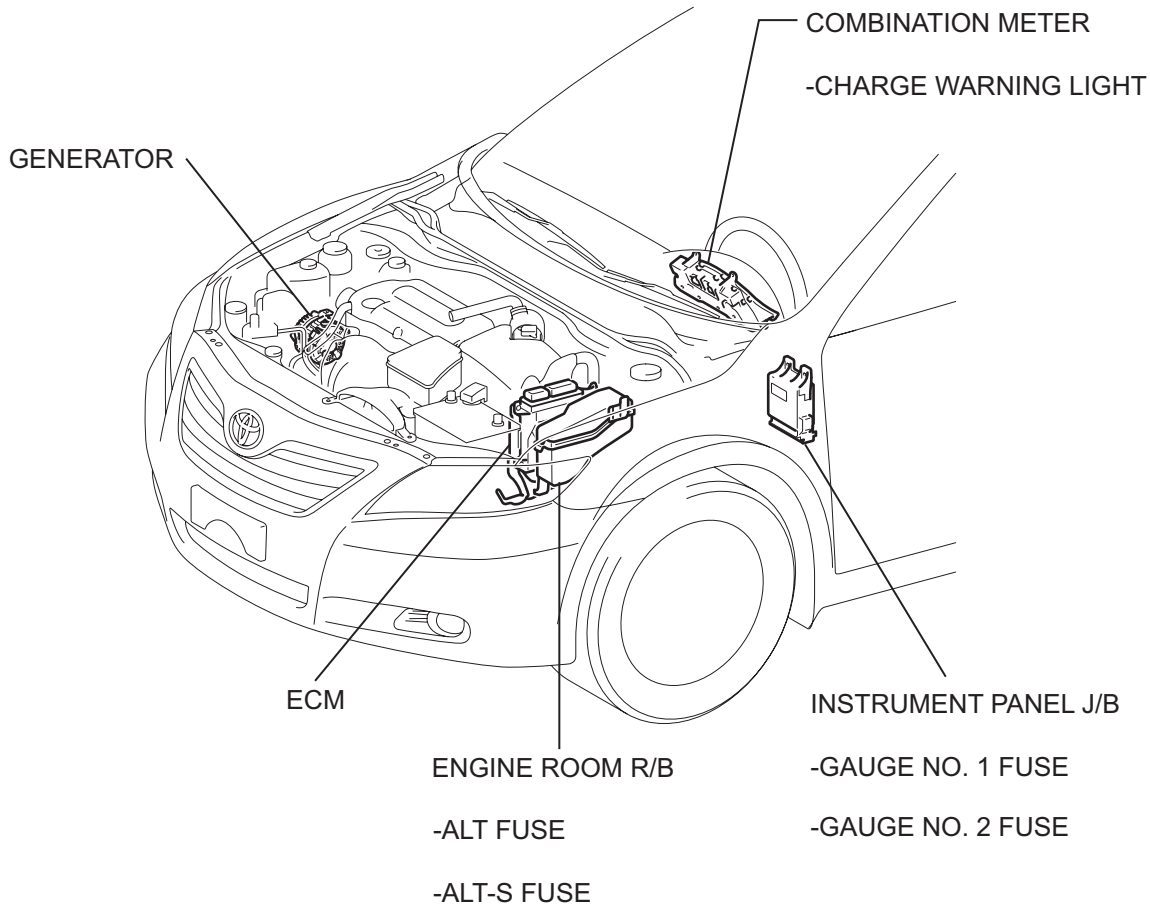
CHARGING SYSTEM

PRECAUTION

1. **Check that the battery cables are connected to the correct terminals.**
2. **Disconnect the battery cables when the battery is given a quick charge.**
3. **Do not perform tests with a high voltage insulation resistance tester.**
4. **Never disconnect the battery while the engine is running.**
5. **Check that the charging cable nut is tightened on terminal B of the generator and the engine room R/B.**

PARTS LOCATION



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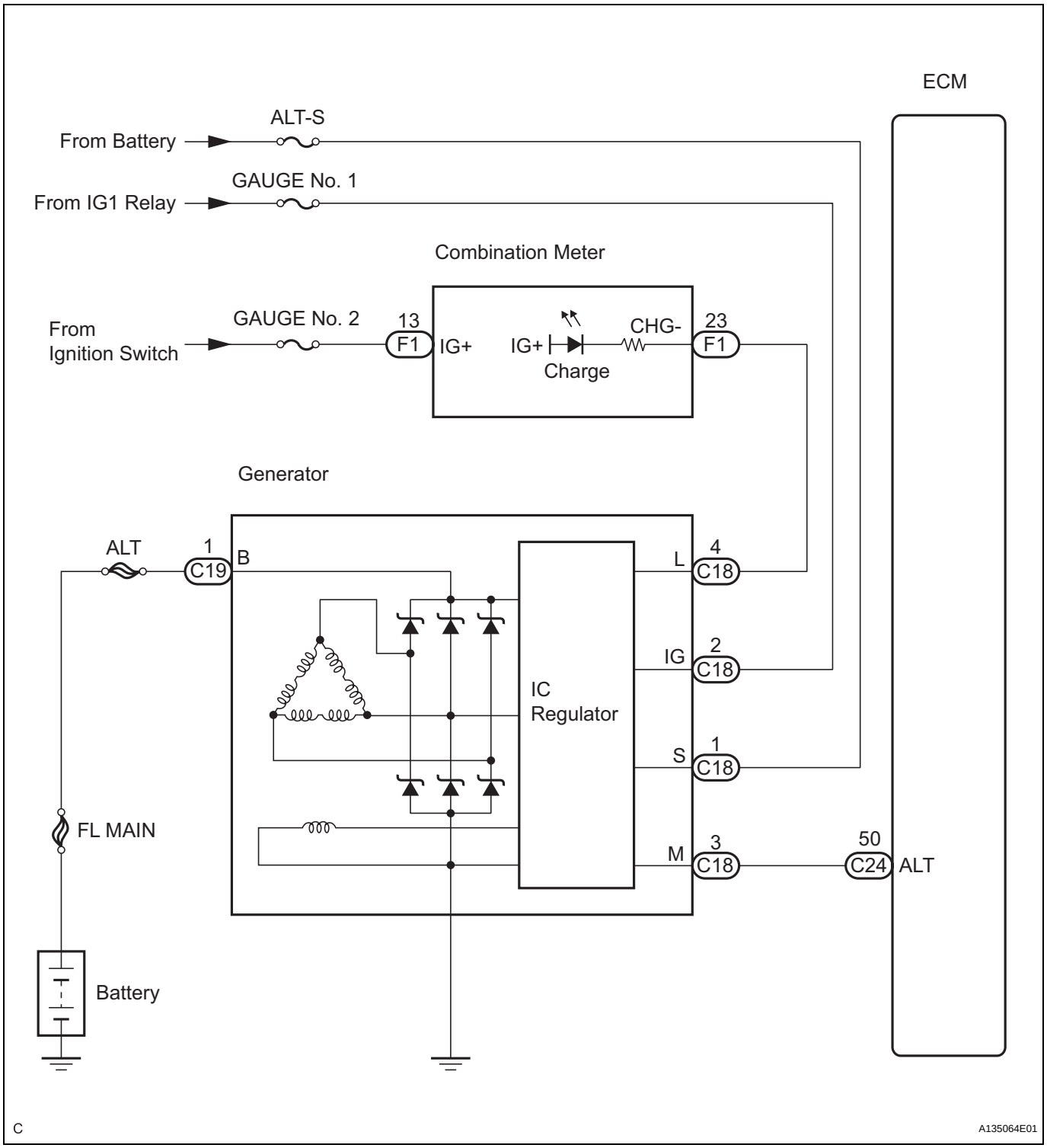
A135520E01

SYSTEM DIAGRAM



CH

PROBLEM SYMPTOMS TABLE

Result

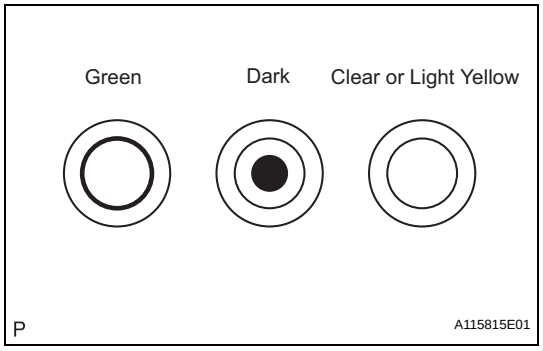
Symptom	Suspected area	See page
Charge Warning Light Comes ON while Driving	1. Clutch pulley	CH-7
	2. Generator assembly	
Noise Occurs from Generator while Engine is Running	1. V-ribbed belt	CH-8
	2. Clutch pulley	
	3. Generator assembly	

ON-VEHICLE INSPECTION

1. CHECK BATTERY ELECTROLYTE LEVEL

(a) Check the electrolyte level.

(1) If the electrolyte level is low, replace the battery (or add distilled water) and check the charging system.



2. CHECK BATTERY SPECIFIC GRAVITY

(a) Check the color of the indicator.

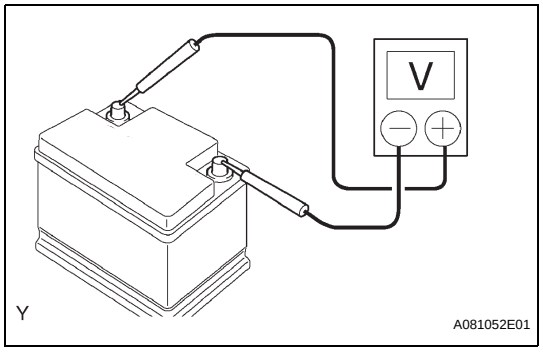
Result

Indicator color	Condition
Green	Good
Dark	Charging necessary
Clear or light yellow	Replacement necessary

3. CHECK BATTERY VOLTAGE

(a) If it has not been 20 minutes since you drove the vehicle or since the engine was stopped, turn the ignition switch to the ON position and turn on the electrical systems (headlight, blower motor, rear defogger, etc.) for 60 seconds. This will remove the surface charge from the battery.

(b) Turn off the ignition switch and the electrical systems.



(c) Measure the battery voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage:

12.5 to 12.9 V at 20°C (68°F)

HINT:

If the voltage is below the specification, charge the battery.

4. CHECK BATTERY TERMINAL

(a) Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean them.

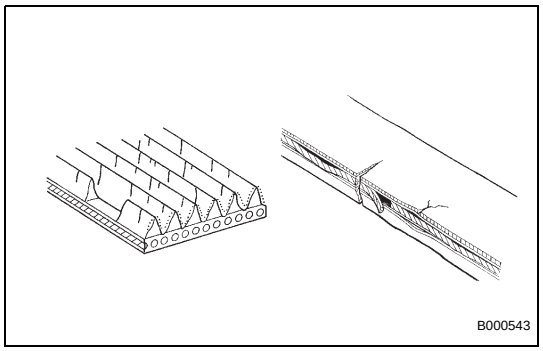
5. CHECK FUSES

(a) Measure the resistance of the ALT fuse, ALT-S fuse, GAUGE No. 1 fuse and GAUGE No. 2 fuse.

Standard resistance:

Below 1 Ω

If the result is not as specified, replace the fuses as necessary.

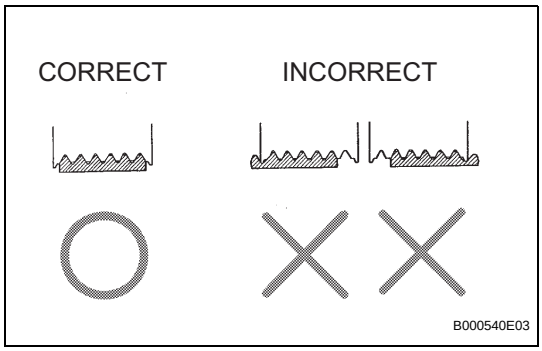


6. CHECK V-RIBBED BELT

(a) Check the belt for wear, cracks or other signs of damage.

If any of the following defects is found, replace the V-ribbed belt.

- The belt is worn out, cracked, or the cords are exposed.
- The cracks reach the cords in more than one place.
- The belt has chunks missing from the ribs.



(b) Check that the belt fits properly in the ribbed grooves.
HINT:
Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt correctly.

7. VISUALLY CHECK GENERATOR WIRING

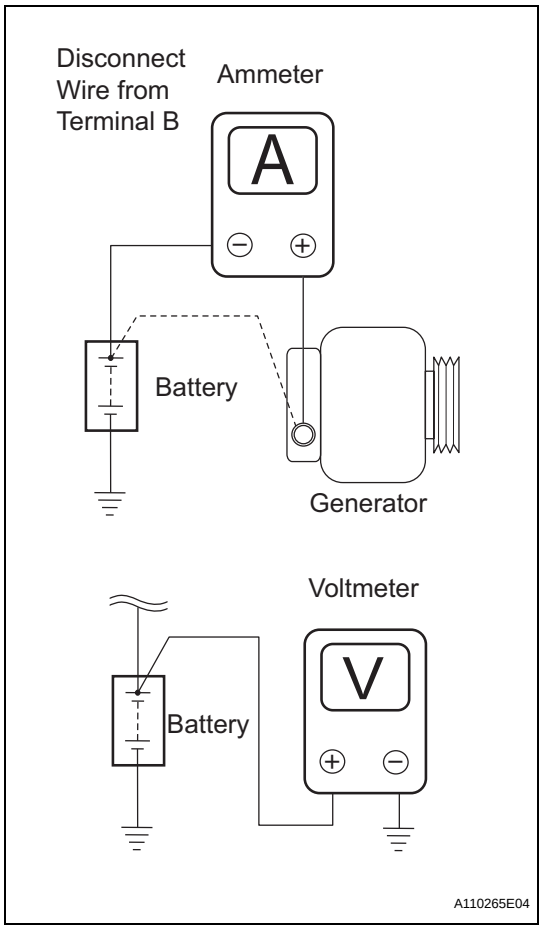
(a) Check that the generator wiring is in good condition.
If the condition is not good, repair or replace the generator wire.

8. LISTEN FOR ABNORMAL NOISES FROM GENERATOR

(a) Check that there is no abnormal noise from the generator while the engine is running.
If there is abnormal noise, replace the pulley or generator.

9. CHECK CHARGE WARNING LIGHT CIRCUIT

(a) Turn the ignition switch to the ON position. Check that the charge warning light comes on.
(b) Start the engine and check that the light goes off.
If the light does not operate as specified, troubleshoot the charge warning light circuit.



10. CHECK CHARGING CIRCUIT WITHOUT LOAD

(a) According to the following procedure, connect an ammeter and voltmeter as shown in the illustration.
(1) Disconnect the wire from terminal B of the generator and connect it to the negative (-) lead of the ammeter.
(2) Connect the positive (+) lead of the ammeter to terminal B of the generator.
(3) Connect the positive (+) lead of the voltmeter to positive (+) terminal of the battery.
(4) Ground the negative (-) lead of the voltmeter.
(b) Check the charging circuit.
(1) While keeping the engine speed at 2,000 rpm, check the readings on the ammeter and voltmeter.
Standard amperage:
10 A or less
Standard voltage:
13.2 to 14.8 V
If the results are not as specified, replace the generator assembly.
HINT:
- If the battery is not fully charged, the ammeter reading may be more than the standard amperage. In this case, increase electrical load by operating devices such as the wiper motor and rear window defogger. Then, recheck the reading on the ammeter.

11. CHECK CHARGING CIRCUIT WITH LOAD

(a) Keep the engine speed at 2,000 rpm, turn on the high beam headlights, and turn the heater blower switch to the "HI" position.

(b) Check the reading on the ammeter.

Standard amperage:

30 A or more

If the ammeter reading is less than the standard amperage, replace the generator assembly.

HINT:

- If the battery is fully charged, the ammeter reading may be less than the standard amperage. In this case, increase electrical load by operating devices such as the wiper motor and rear window defogger. Then, recheck the reading on the ammeter.

Charge Warning Light Comes ON while Driving

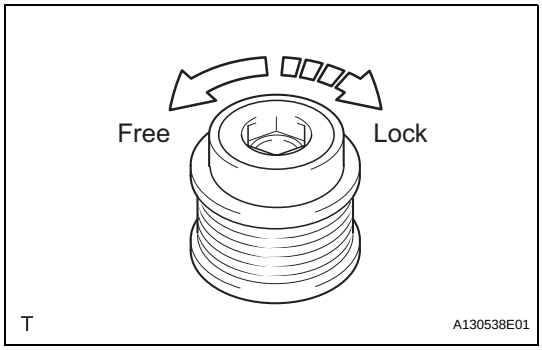
INSPECTION PROCEDURE

1	CHECK LOCK FUNCTION OF CLUTCH PULLEY

(a) Check the lock function with the pulley installed in the vehicle.
  (1) Visually check that the rotor in the generator operates with the engine started.

(b) Check the lock function with the pulley removed from the vehicle.
  (1) Remove the generator pulley cap. Using SST, hold the generator rotor.
  (2) Turn the clutch pulley clockwise and check that the outer ring locks.
  OK:
  The outer ring locks.

SST 09820-63020



NG → **REPLACE CLUTCH PULLEY**

OK

2	CHECK LOCK OF CLUTCH PULLEY

(a) Start the engine and visually check looseness of the clutch pulley.
  OK:
  The clutch pulley is not loose.

NG → **TIGHTEN CLUTCH PULLEY TO THE SPECIFIED TORQUE**

OK

REPLACE GENERATOR ASSEMBLY

Noise Occurs from Generator while Engine is Running

INSPECTION PROCEDURE

1 CHECK LOOSENESS OF V-RIBBED BELT

(a) Check the tension of the belt by pushing it down with a finger.
OK:
The tension of the belt is enough.

NG → **REPLACE V-RIBBED BELT TENSIONER ASSEMBLY**

OK ↓

2 CHECK V-RIBBED BELT FOR WEAR

(a) Check the V-ribbed belt for wear.
OK:
The V-ribbed belt is not worn.

NG → **REPLACE V-RIBBED BELT**

OK ↓

3 CHECK CLUTCH PULLEY FOR WEAR

(a) Check the clutch pulley groove for wear or other defects.
OK:
The clutch pulley groove is not damaged.

NG → **REPLACE CLUTCH PULLEY**

OK ↓

4 CHECK FOR NOISE WHILE CLUTCH PULLEY IS OPERATING

(a) Perform a driving test and check if noise occurs when decelerating.
OK:
Noise does not occur.

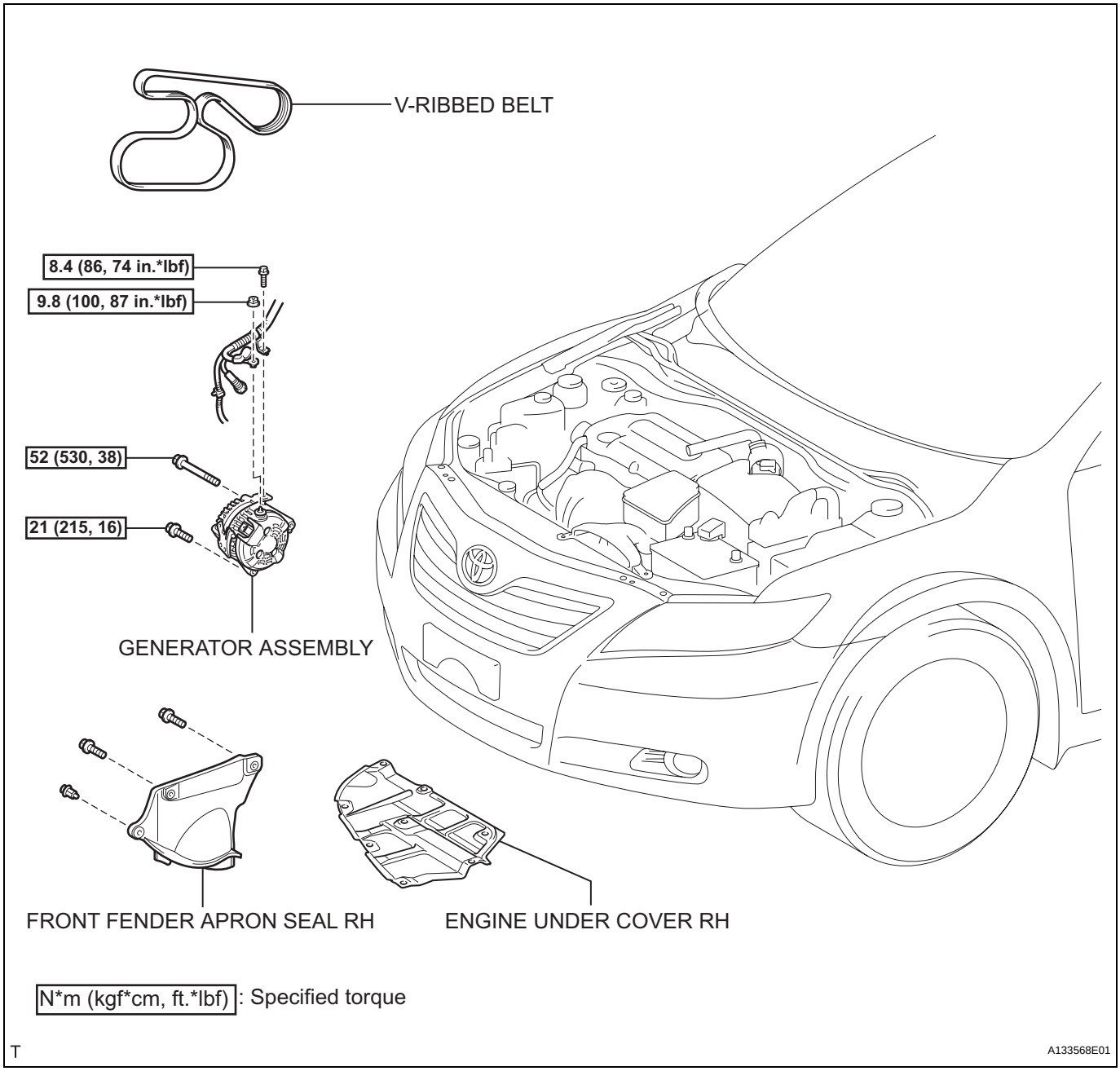
NG → **REPLACE CLUTCH PULLEY**

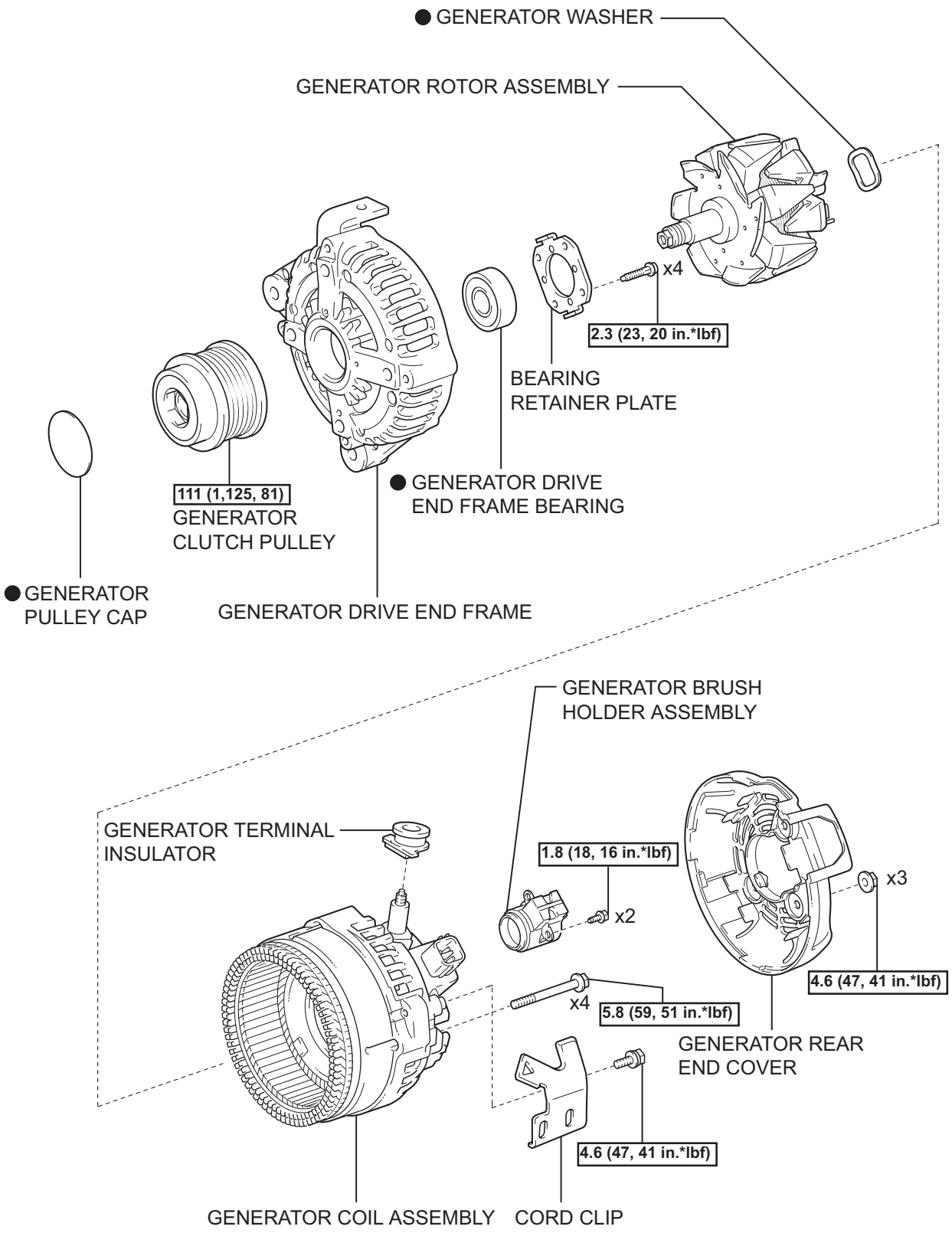
OK ↓

REPLACE GENERATOR ASSEMBLY

GENERATOR

COMPONENTS





CH

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

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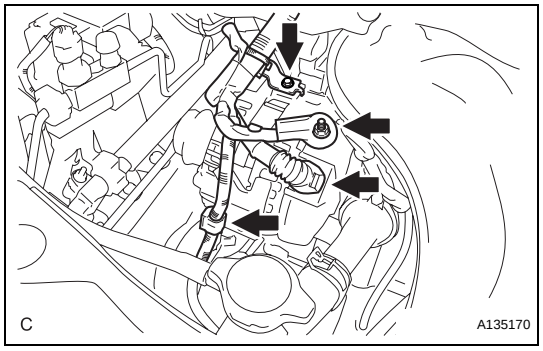
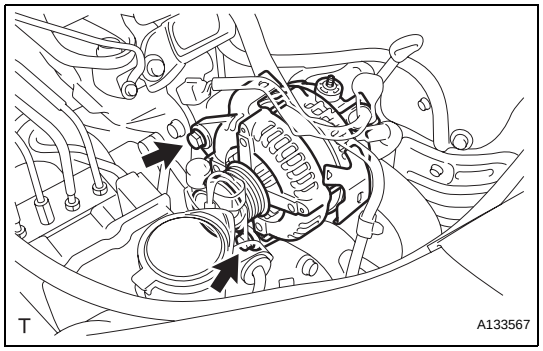
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE FRONT FENDER APRON SEAL RH**
5. **REMOVE V-RIBBED BELT (See page EM-6)**
6. **REMOVE GENERATOR ASSEMBLY**
   (a) Disconnect the generator connector.
   (b) Remove the nut and disconnect the wire harness from terminal B.
   (c) Remove the bolt and wire harness clamp bracket.
   (d) Remove the wire harness clamps.

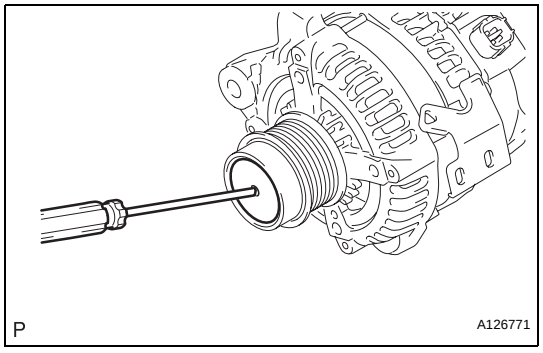




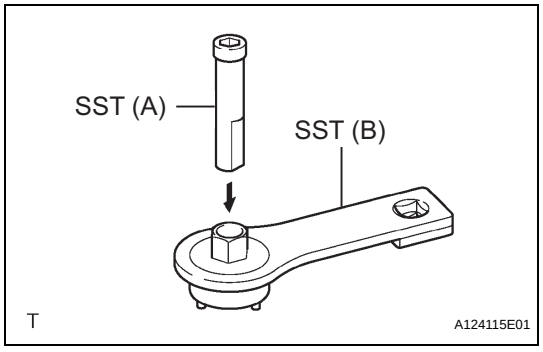
   (e) Remove the 2 bolts and generator assembly.

DISASSEMBLY

1. **REMOVE GENERATOR CLUTCH PULLEY**
   (a) Using a screwdriver, puncture the center of the generator pulley cap and pry it off.
   NOTICE:
   Do not reuse the generator pulley cap.



   (b) Set SST (A) and (B).
   SST 09820-63020
   (c) Clamp SST (A) in a vise.



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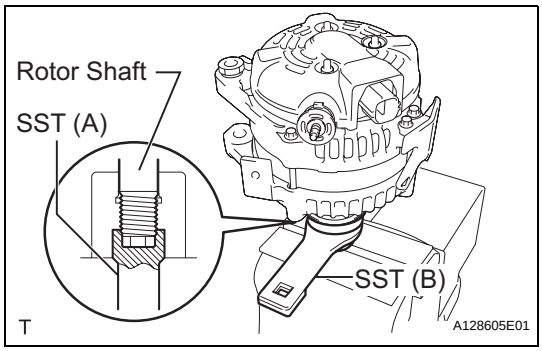
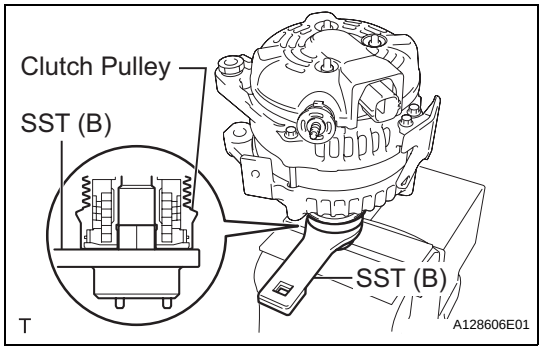
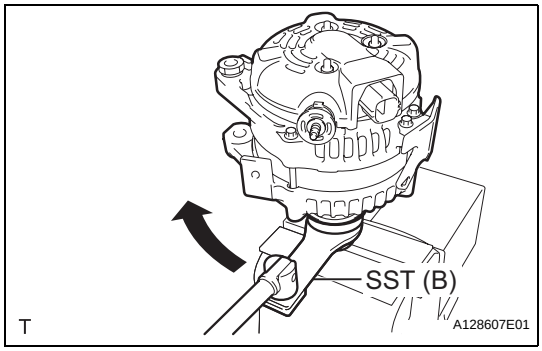


(d) Place the rotor shaft end into SST (A).

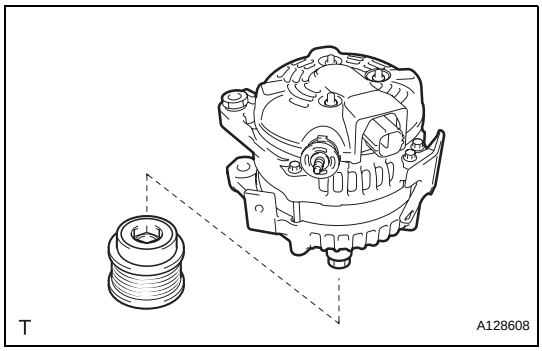


(e) Fit SST (B) to the clutch pulley.

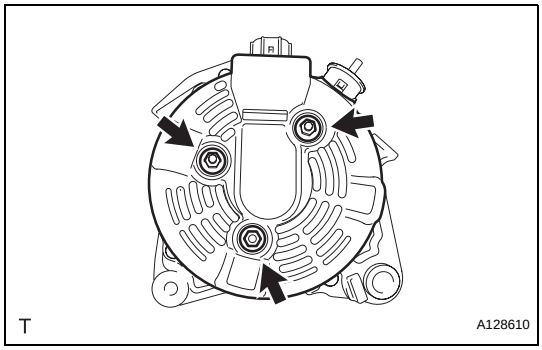


(f) Loosen the pulley by turning SST (B) in the direction shown in the illustration.
(g) Remove the generator assembly from the SST.
(h) Remove the clutch pulley from the rotor shaft.

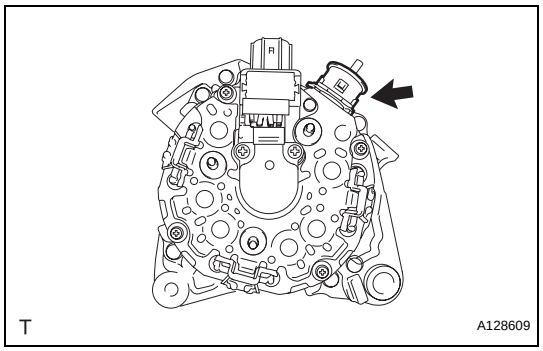
2. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY



(a) Place the generator assembly on the clutch pulley.

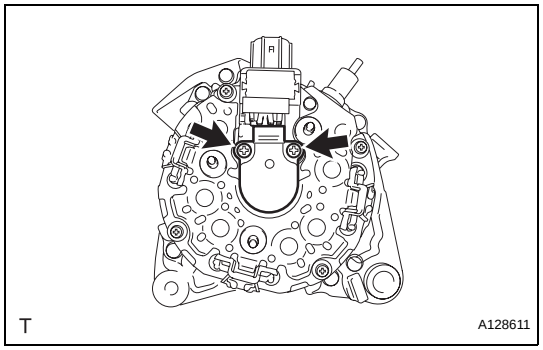


(b) Remove the 3 nuts and generator rear end cover.



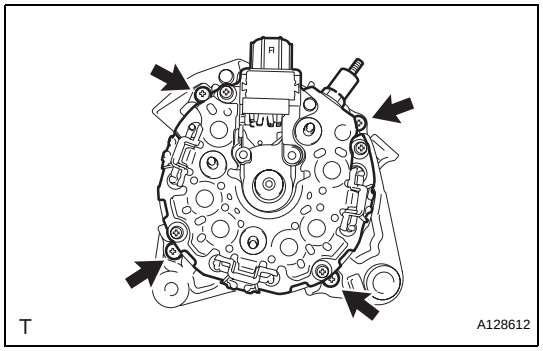
3. REMOVE GENERATOR TERMINAL INSULATOR

(a) Remove the terminal insulator.



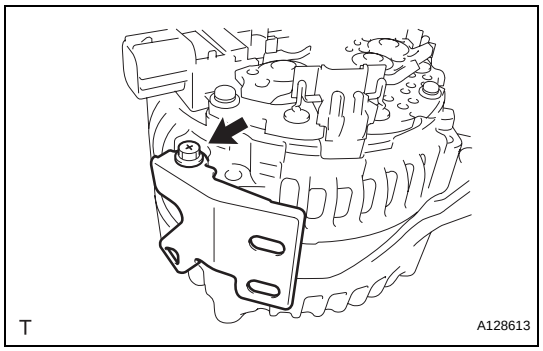
4. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY

(a) Remove the 2 screws and generator brush holder.

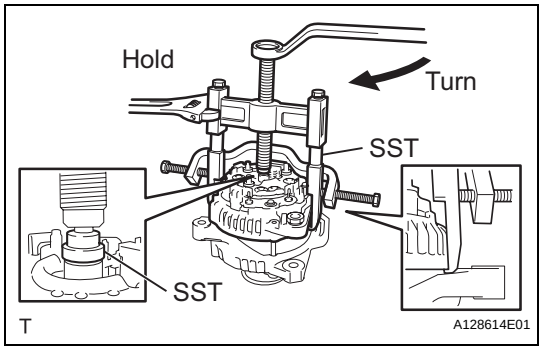


5. REMOVE GENERATOR ROTOR ASSEMBLY

(a) Remove the 4 bolts.



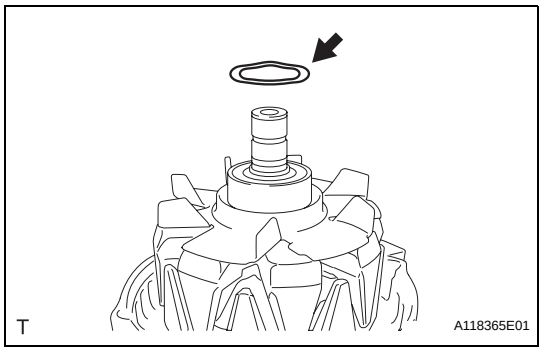
(b) Remove the bolt and cord clip.



(c) Using SST, remove the coil.

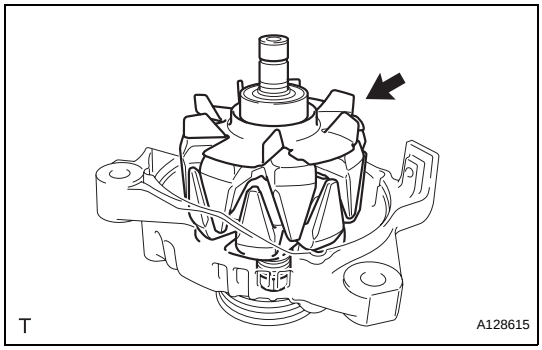
SST 09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04071, 09957-04010, 09958-04011)

CH

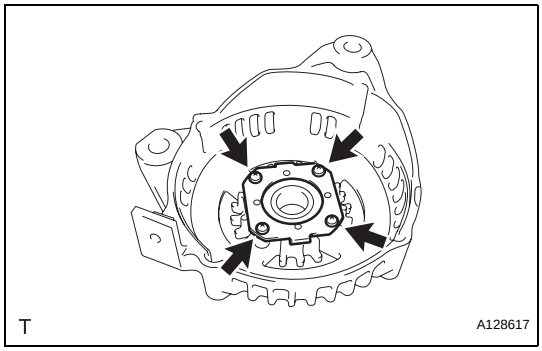


6. REMOVE GENERATOR ROTOR ASSEMBLY

(a) Remove the washer.

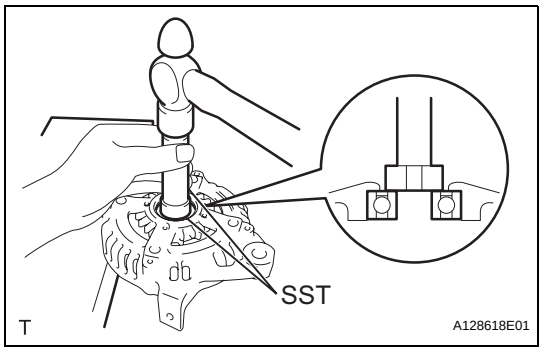


(b) Remove the generator rotor.



7. REMOVE GENERATOR DRIVE END FRAME BEARING

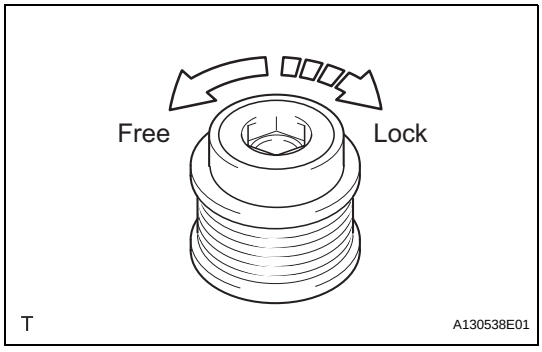
(a) Remove the 4 screws and bearing retainer.



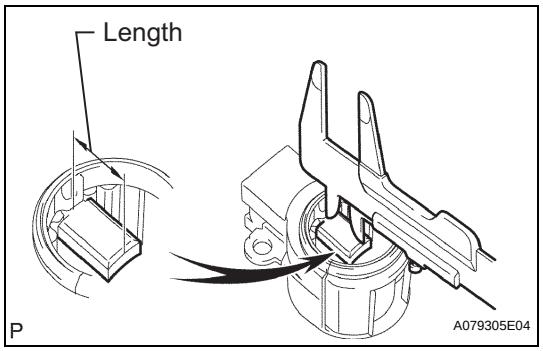
(b) Using SST and a hammer, tap out the bearing.
SST 09950-60010 (09951-00250), 09950-70010 (09951-07100)

INSPECTION

1. INSPECT GENERATOR CLUTCH PULLEY



(a) Hold the center of the pulley, and confirm that the outer ring turns counterclockwise and does not turn clockwise.
If the result is not as specified, replace the generator pulley with clutch.



2. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY

(a) Using vernier calipers, measure the brush length.

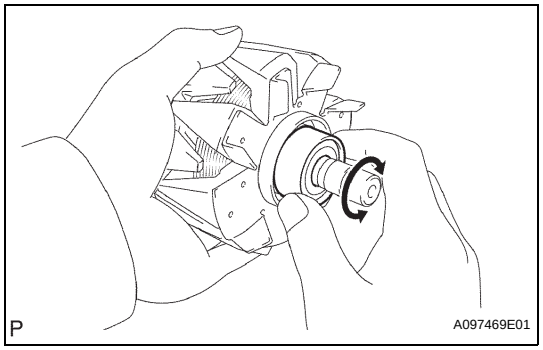
Standard length:

9.5 to 11.5 mm (0.374 to 0.453 in.)

Minimum length:

4.5 mm (0.177 in.)

If the brush length is less than the minimum, replace the generator brush holder assembly.



3. INSPECT GENERATOR ROTOR ASSEMBLY

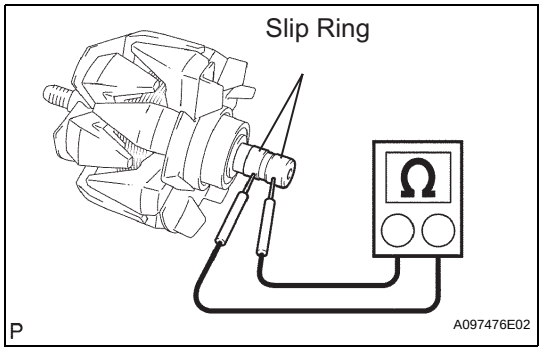
(a) Check the appearance.

(1) Check that the bearing is not rough or worn.

OK:

The bearing rotates smoothly.

If the result is not as specified, replace the generator rotor assembly.



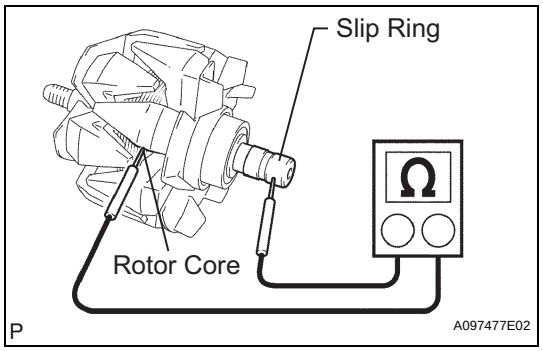
(b) Check the resistance.

(1) Measure the resistance between the slip rings.

Standard resistance

Condition	Specified condition
Approx. 20°C (68°F)	2.3 to 2.7 Ω

If the result is not as specified, replace the generator rotor assembly.

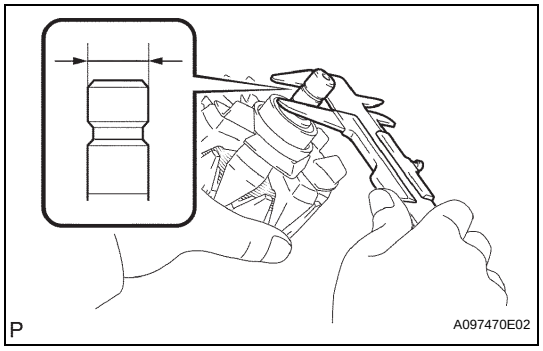


(2) Measure the resistance between the slip ring and rotor core.

Standard resistance

Tester condition	Specified condition
Slip ring - Rotor core	1 MΩ or higher

If the result is not as specified, replace the generator rotor assembly.



(c) Check the slip ring diameter.

(1) Using vernier calipers, measure the slip ring diameter.

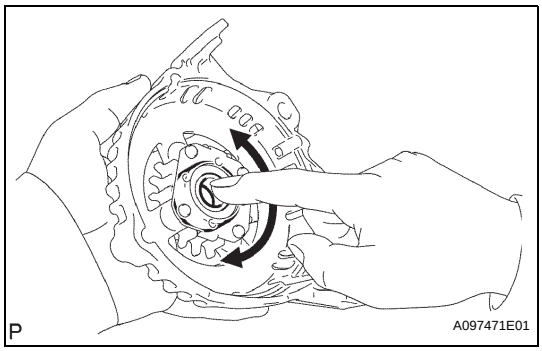
Standard diameter:

14.2 to 14.4 mm (0.559 to 0.567 in.)

Minimum diameter:

14 mm (0.551 in.)

If the diameter is less than the minimum, replace the generator rotor assembly.



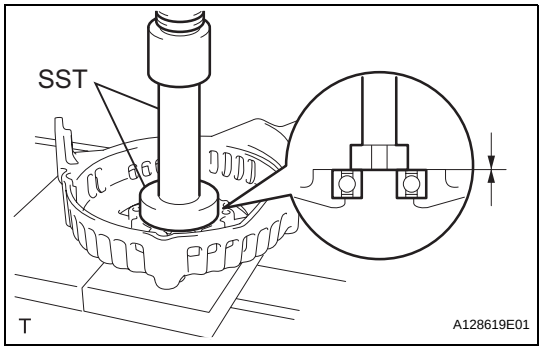
4. INSPECT GENERATOR DRIVE END FRAME BEARING

(a) Check that the bearing is not rough or worn.
OK:
The bearing rotates smoothly.
If the bearing does not rotate smoothly, replace the bearing.

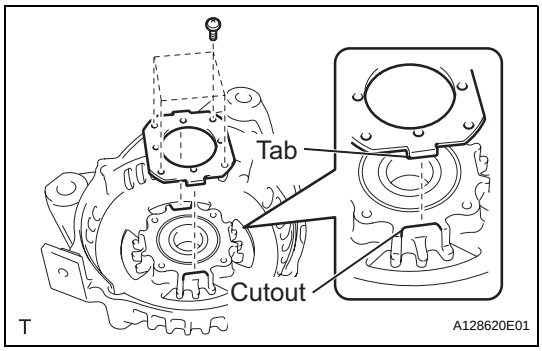
REASSEMBLY

1. INSTALL GENERATOR DRIVE END FRAME BEARING

(a) Using SST and a press, press in a new generator drive end frame bearing.
SST 09950-60010 (09951-00250), 09950-70010 (09951-07100)



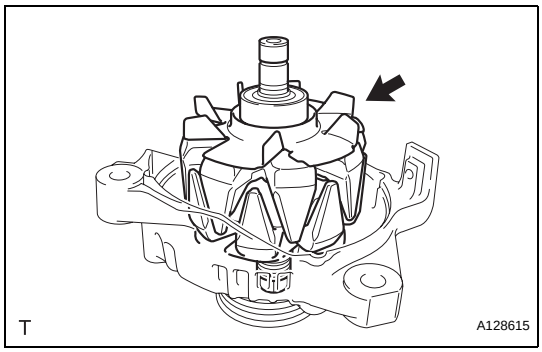
(b) Fit the tabs on the retainer plate into the cutouts on the drive end frame to install the retainer plate.
(c) Install the 4 screws.
Torque: 2.3 N*m (23 kgf*cm, 20 in.*lbf)



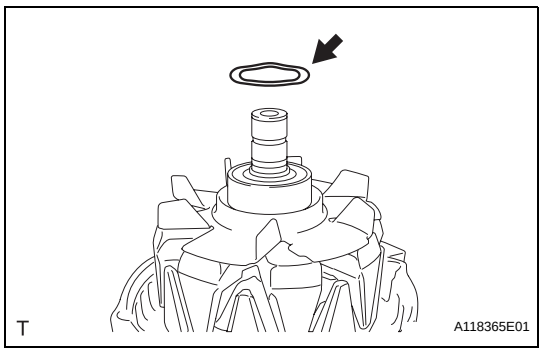
2. INSTALL GENERATOR ROTOR ASSEMBLY

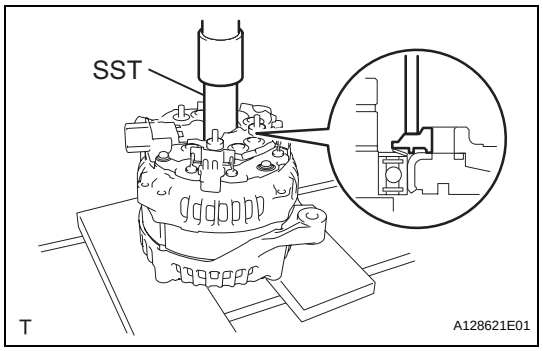
(a) Place the drive end frame on the clutch pulley.

(b) Install the generator rotor onto the generator rectifier end frame.



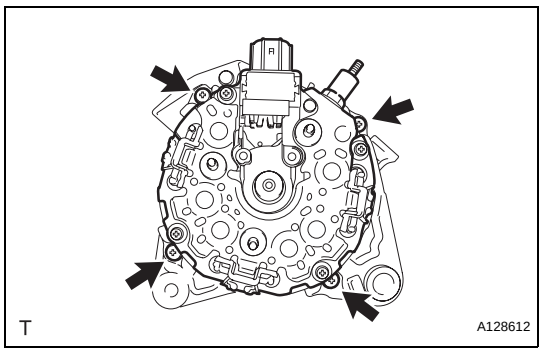
(c) Place a new generator washer on the generator rotor.



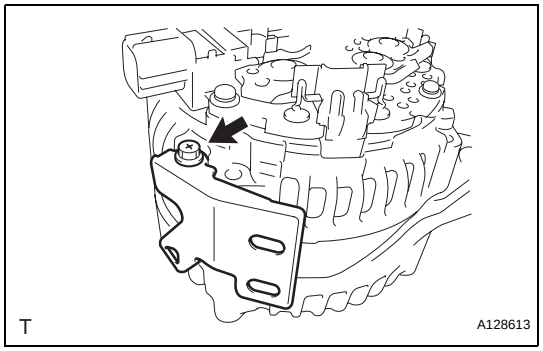


3. INSTALL GENERATOR COIL ASSEMBLY

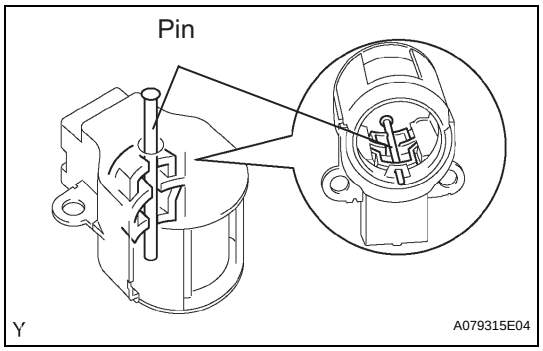
(a) Using SST and a press, press in the generator coil assembly to the drive end frame.
SST 09612-70100 (09612-07240)



(b) Tighten the 4 bolts.
Torque: 5.8 N*m (59 kgf*cm, 51 in.*lbf)

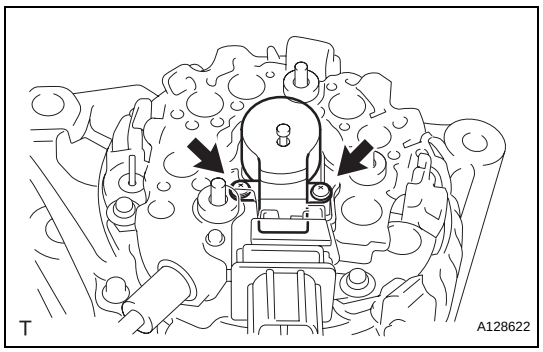


(c) Install the cord clip with the bolt.
Torque: 4.6 N*m (47 kgf*cm, 41 in.*lbf)

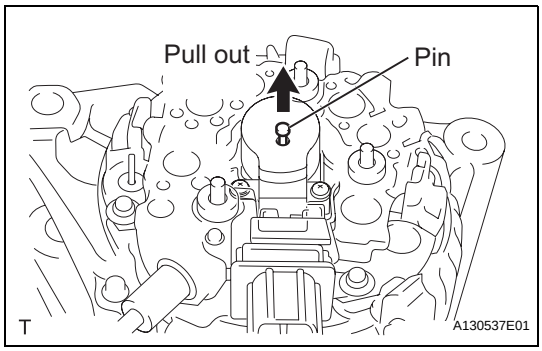


4. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

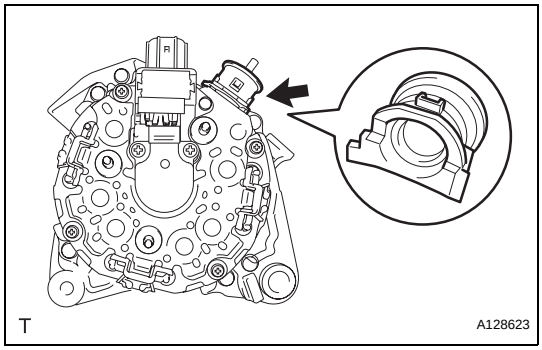
(a) While pushing the 2 brushes into the generator brush holder, insert a 1.0 mm (0.039 in.) pin into the generator brush holder.



(b) Install the generator brush holder with the 2 screws.
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)

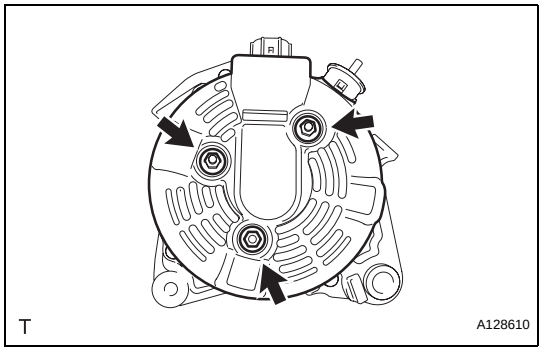


(c) Pull the pin out of the generator brush holder.



5. INSTALL GENERATOR TERMINAL INSULATOR

(a) Install the terminal insulator onto the generator rectifier end frame.

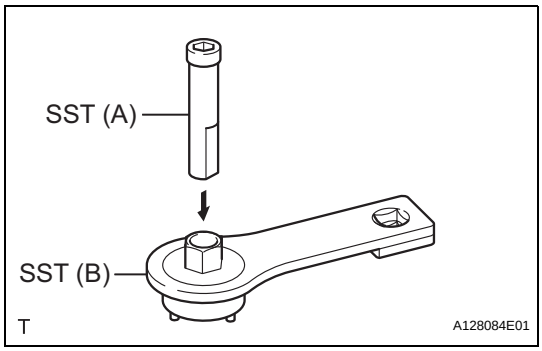


6. INSTALL GENERATOR REAR END COVER

(a) Install the generator rear end cover with the 3 nuts.
Torque: 4.6 N*m (47 kgf*cm, 41 in.*lbf)

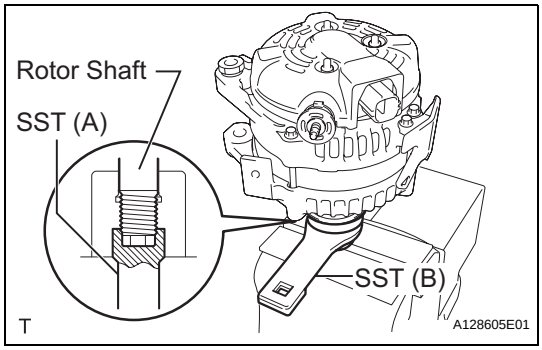
7. INSTALL GENERATOR CLUTCH PULLEY

(a) Temporarily install the clutch pulley onto the rotor shaft.



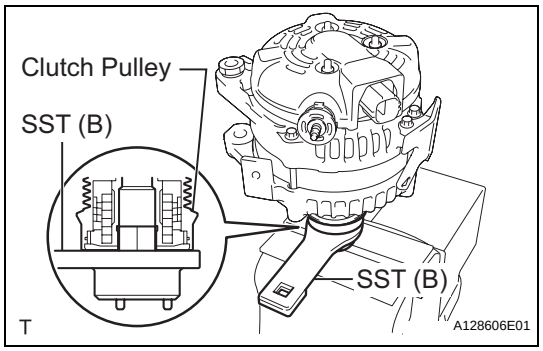
(b) Set SST (A) and (B).
SST 09820-63020

(c) Clamp SST (A) in a vise.

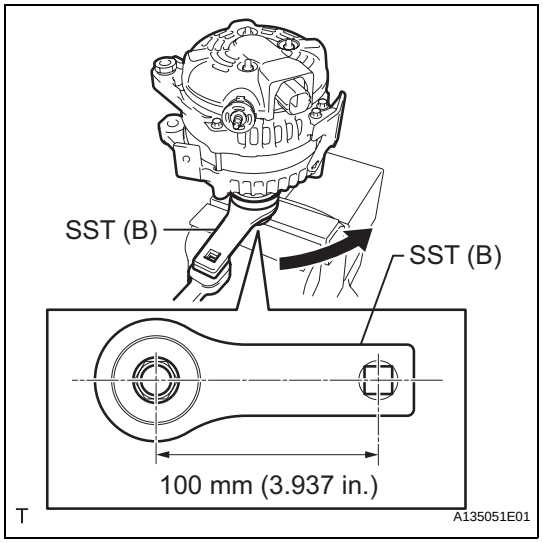


(d) Place the rotor shaft end into SST (A).

CH



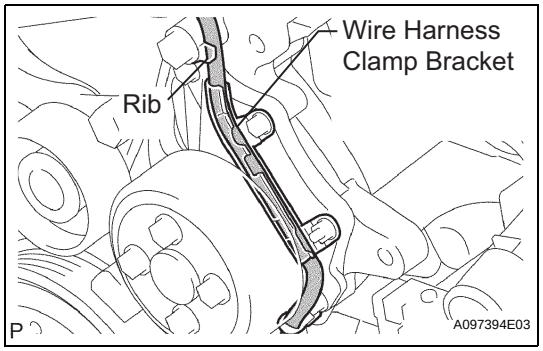
(e) Fit SST (B) to the clutch pulley.



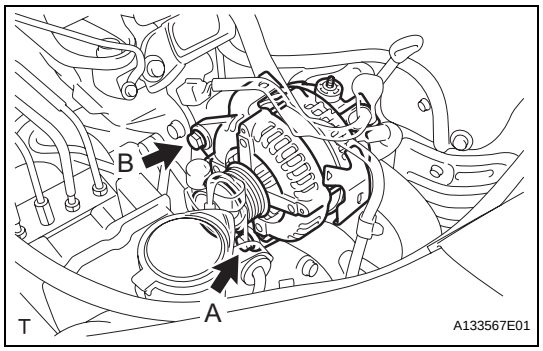
(f) Tighten the pulley by turning SST (B) in the direction shown in the illustration.
Torque: 111 N*m (1,125 kgf*cm, 81 ft.*lbf)
NOTICE:
The torque shown above should be used for tightening without using the SST. When the SST is used for tightening, the torque should be calculated based on the length of the SST (See page IN-6).
(g) Remove the generator assembly from the SST.
(h) Check that the clutch pulley rotates smoothly.
(i) Install a new clutch pulley cap to the clutch pulley.

INSTALLATION

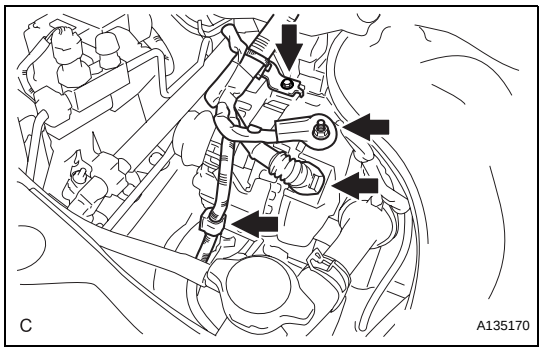
1. INSTALL GENERATOR ASSEMBLY



(a) Confirm that the wire harness of the crankshaft position sensor is secured to the wire harness clamp bracket through the back of the rib of the timing chain cover.

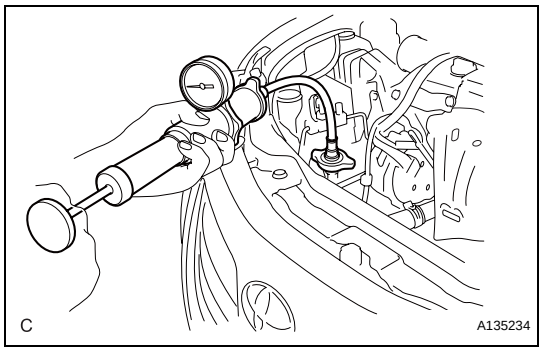


(b) Install the generator assembly with the 2 bolts.
Torque: Bolt A
21 N*m (215 kgf*cm, 16 ft.*lbf)
Bolt B
52 N*m (530 kgf*cm, 38 ft.*lbf)



(c) Install the generator wire to terminal B with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
(d) Install the clamp bracket with the bolt.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)
(e) Attach the clamp and connect the generator connector to the generator.

2. **INSTALL V-RIBBED BELT (See page EM-6)**
3. **INSTALL FRONT FENDER APRON SEAL RH**
4. **INSTALL ENGINE UNDER COVER RH**
5. **INSTALL FRONT WHEEL RH (See page EM-7)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**



COOLING SYSTEM

ON-VEHICLE INSPECTION

1. CHECK FOR ENGINE COOLANT LEAKS

NOTICE:

Before performing each inspection, turn the A/C switch OFF.

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Using a radiator cap tester, increase the pressure inside the radiator to 118 kPa (1.2 kgf*cm, 17 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator and water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

2. INSPECT ENGINE COOLANT LEVEL IN RESERVOIR

(a) Check that the engine coolant level is between the LOW and FULL lines when the engine is cold.

If the engine coolant level is low, check for leaks and add "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite and non-borate coolant with long-life hybrid organic acid technology to the FULL line.

NOTICE:

Do not substitute plain water for engine coolant.

3. INSPECT ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

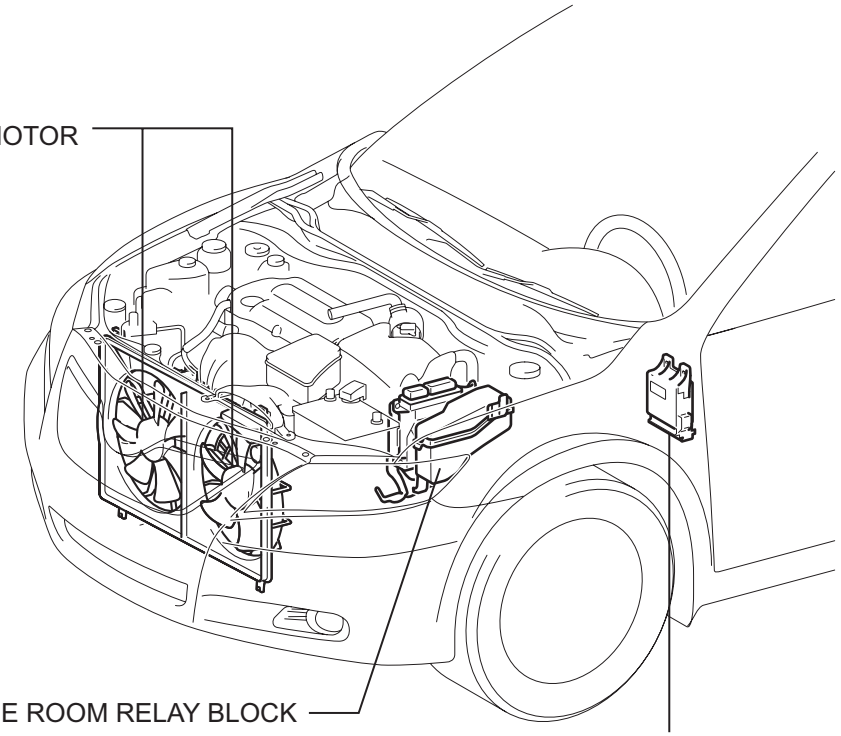
(b) Check if there are any excessive deposits of rust or scales around the radiator cap and radiator filler hole. Also, the coolant should be free of oil.

If excessively dirty, clean the coolant passage and replace the coolant.

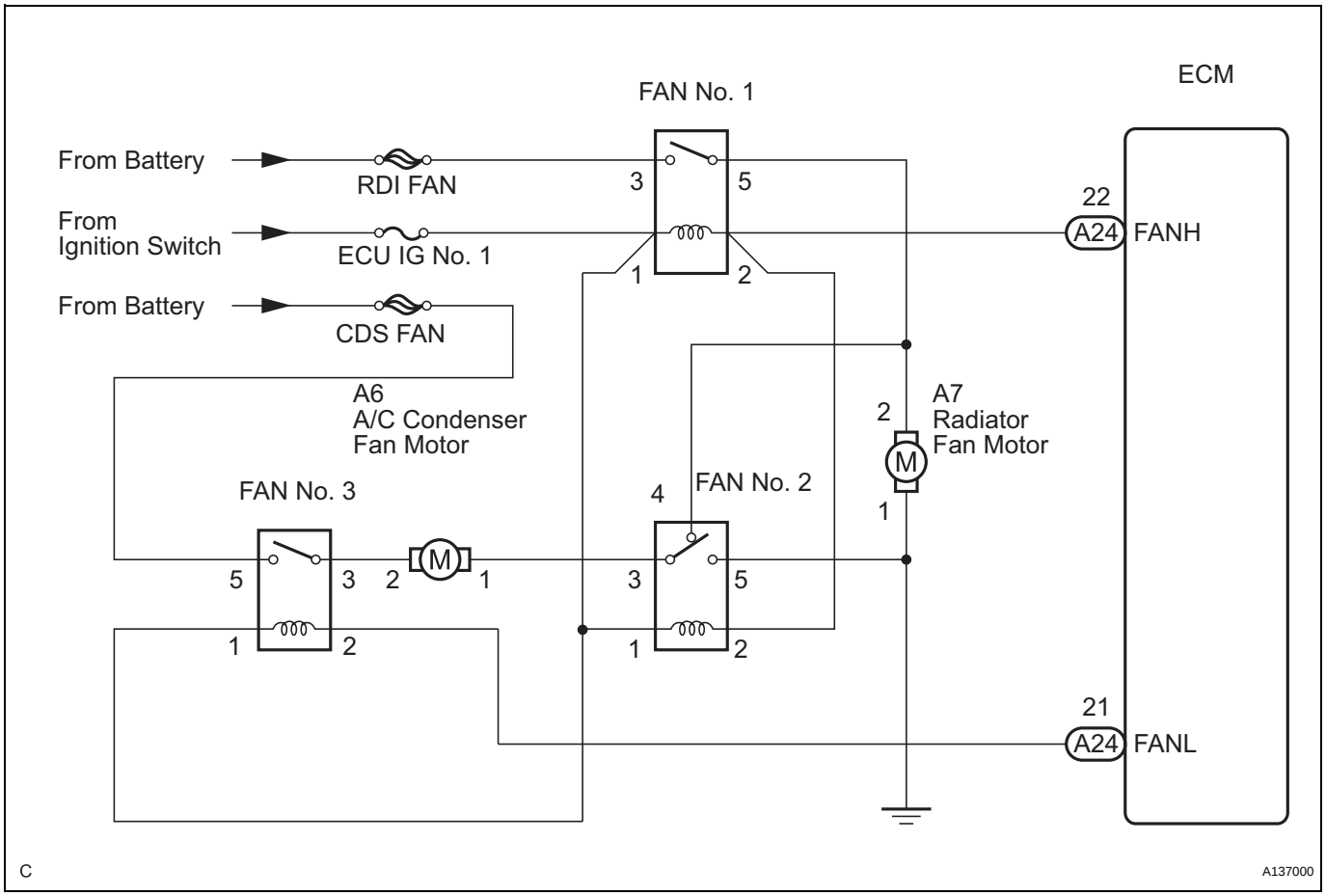
(c) Install the radiator cap.

COOLING FAN SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM



CO

ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN OPERATION AT LOW TEMPERATURES (Below 83°C (181°F))

(a) Turn the ignition switch to the ON position.

(b) Check that the cooling fan stops.
If not, check the cooling fan relay and engine coolant temperature sensor, and check whether there is disconnection or an open circuit between them.

(c) Disconnect the engine coolant temperature sensor connector.

(d) Check that the cooling fan rotates.
If not, check the fuses, cooling fan relay, ECM and cooling fan, and check for a short circuit between the cooing fan relay and engine coolant temperature sensor.

(e) Reconnect the engine coolant temperature sensor connector.

2. INSPECT COOLING FAN OPERATION AT HIGH TEMPERATURES (Above 93°C (199°F))

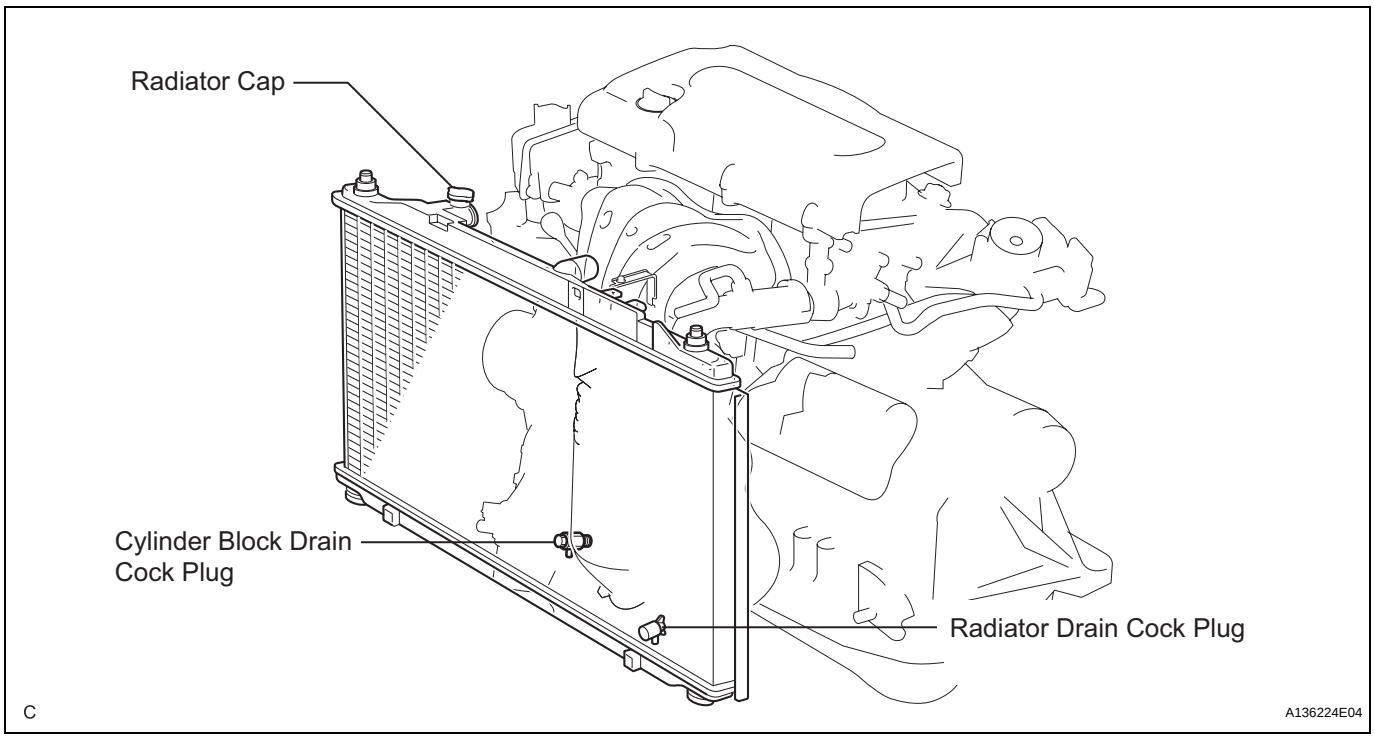
(a) Start the engine, and raise the engine coolant temperature to above 93°C (199°F).
HINT:
Engine coolant temperature is detected by the engine coolant temperature sensor on the water outlet.

(b) Check that the cooling fan rotates.
If not, replace the engine coolant temperature sensor.

COOLANT

ON-VEHICLE INSPECTION

1. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **DRAIN ENGINE COOLANT**
   NOTICE:
   Do not remove the radiator cap sub-assembly while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.
   (a) Remove the radiator cap sub-assembly from the radiator assembly.
   (b) Loosen the radiator drain cock plug and cylinder block drain cock plug, then drain the coolant.



HINT:
Collect the coolant in a container and dispose of it according to the regulations in your area.

6. **ADD ENGINE COOLANT**
   (a) Close the radiator drain cock plug and 2 cylinder block drain cock plugs.
   Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf) for cylinder block drain cock plug

CO

(b) Slowly fill the radiator with TOYOTA Super Long Life Coolant (SLLC).
Specified capacity:
6.2 liters (6.6 US qts, 5.5 lmp. qts)
HINT:
- TOYOTA vehicles are filled with TOYOTA SLLC at the factory. In order to avoid damage to the engine cooling system and other technical problems, only use TOYOTA SLLC or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).
- Contact your TOYOTA dealer for further details.

(c) Slowly pour coolant into the radiator reservoir tank until it reaches the FULL line.

(d) Press the inlet and outlet radiator hoses several times by hand, and then check the level of the coolant.
If the coolant level is low, add coolant.

(e) Install the radiator cap sub-assembly and reservoir tank cap.

(f) Start the engine, and warm it up.
HINT:
Adjust the air conditioner set temperature to MAX (HOT).

(g) Stop the engine, and wait until the engine coolant cools down.

(h) Add engine coolant to the FULL line on the radiator reservoir.

7. CHECK FOR ENGINE COOLANT LEAKS

8. INSTALL ENGINE UNDER COVER RH

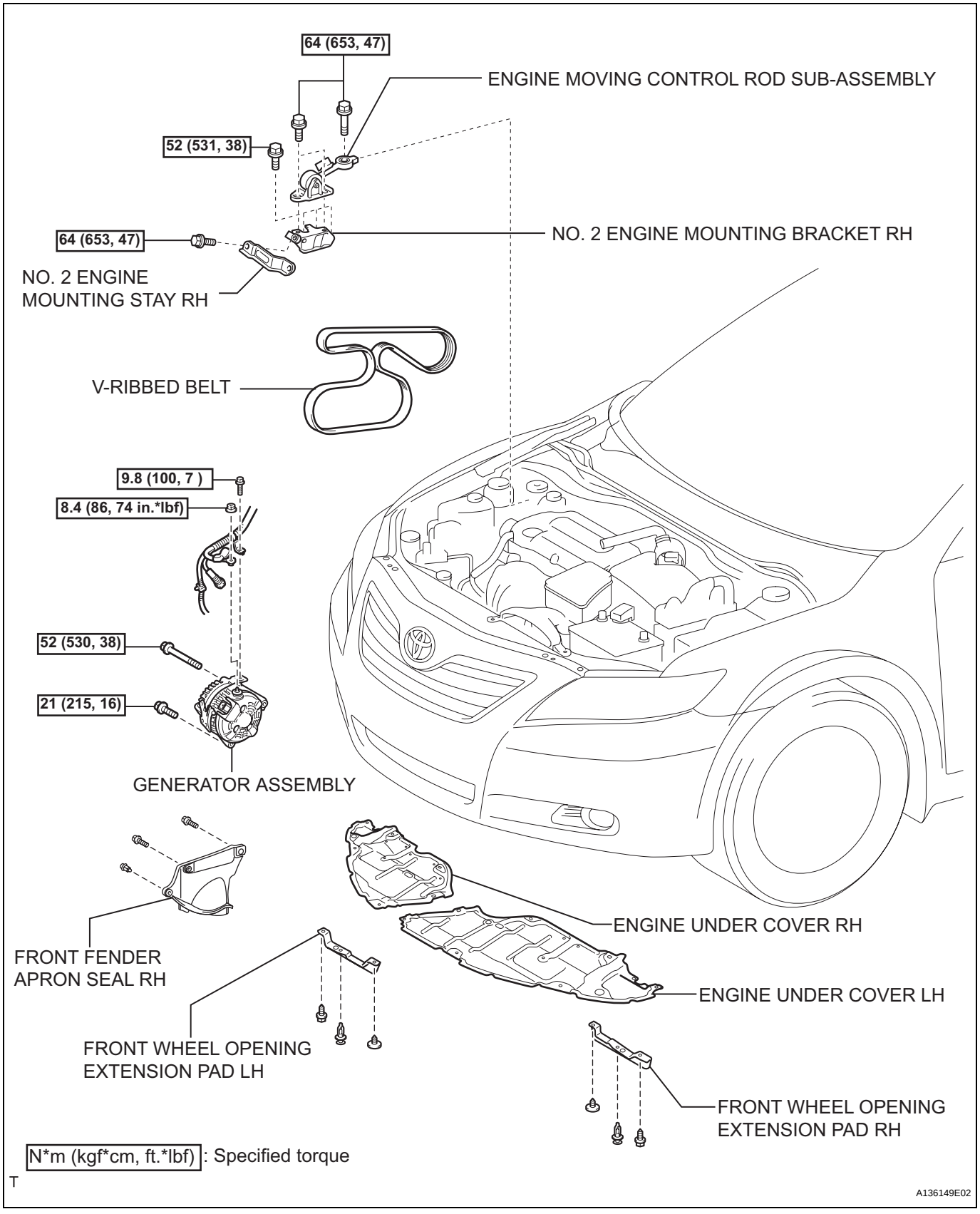
9. INSTALL ENGINE UNDER COVER LH

10. INSTALL FRONT WHEEL OPENING EXTENSION PAD LH

11. INSTALL FRONT WHEEL OPENING EXTENSION PAD RH

WATER PUMP

COMPONENTS



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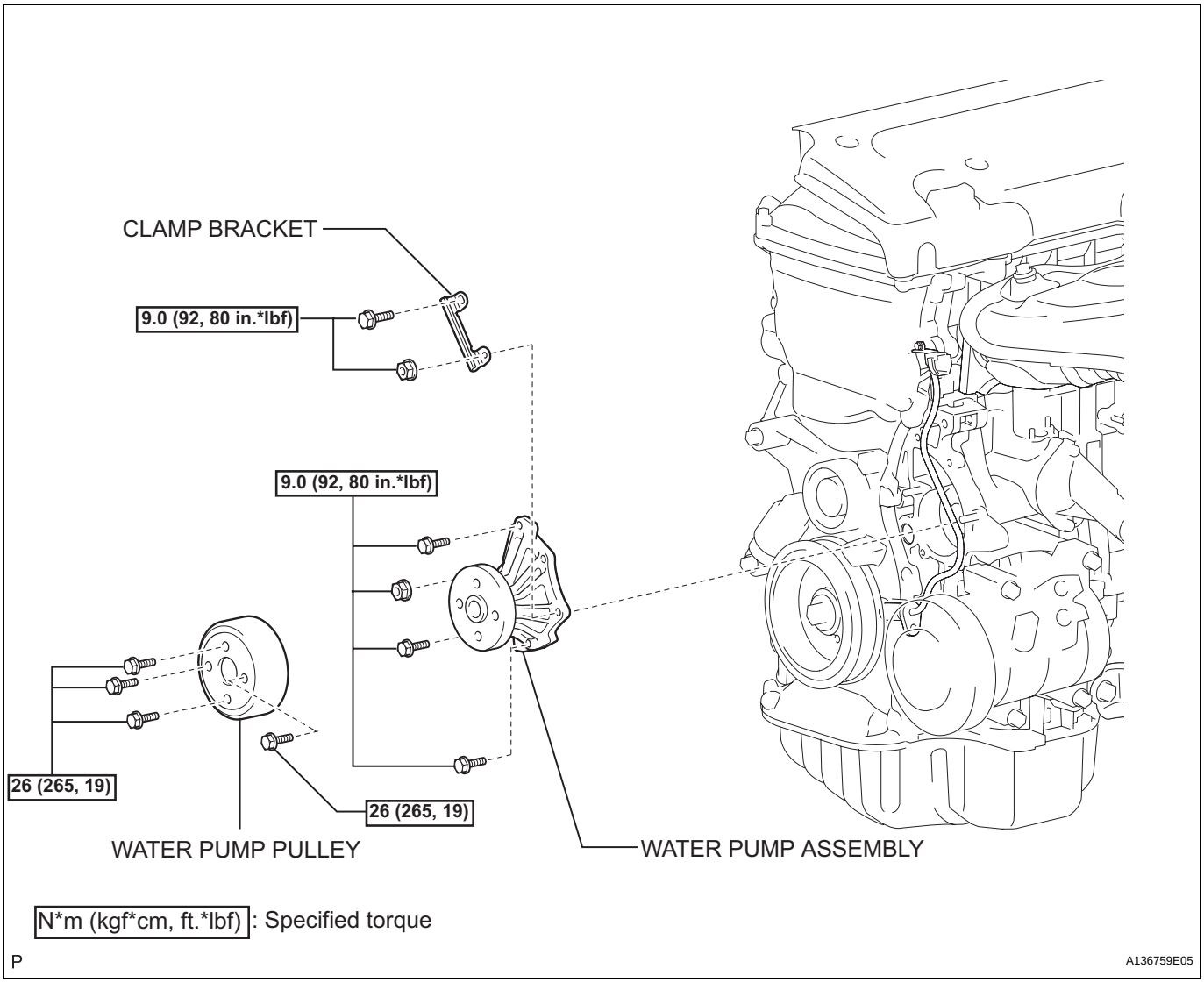
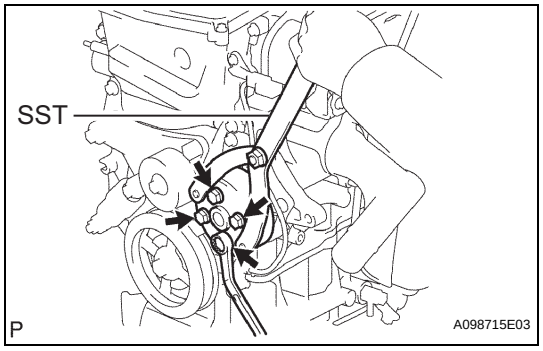
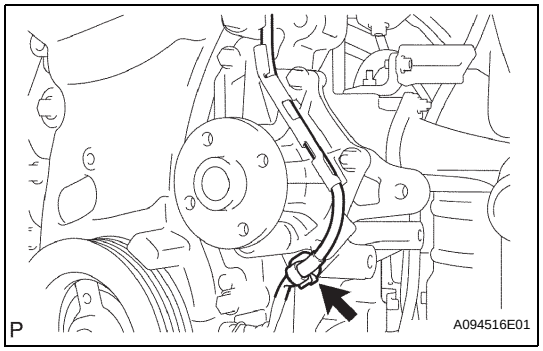

CLAMP BRACKET
9.0 (92, 80 in.*lbf)
9.0 (92, 80 in.*lbf)
26 (265, 19)
26 (265, 19)
WATER PUMP PULLEY
WATER PUMP ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
P
A136759E05

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
3. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE ENGINE UNDER COVER LH**
6. **DRAIN ENGINE COOLANT (See page CO-5)**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-95)**
9. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-95)**
10. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-96)**
11. **REMOVE V-RIBBED BELT (See page EM-6)**
12. **REMOVE GENERATOR ASSEMBLY (See page CH-11)**
13. **REMOVE WATER PUMP PULLEY**
    (a) Using SST, remove the 4 bolts and water pump pulley.
    SST 09960-10010 (09962-01000, 09963-00700)



14. **REMOVE WATER PUMP ASSEMBLY**
    (a) Remove the clamp of the crankshaft position sensor from the water pump.
    (b) Disconnect the wire of the crankshaft position sensor from the clamp bracket.



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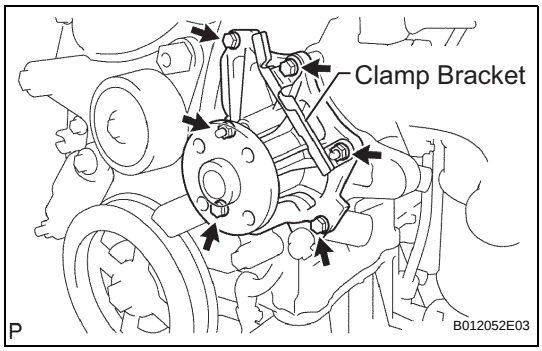
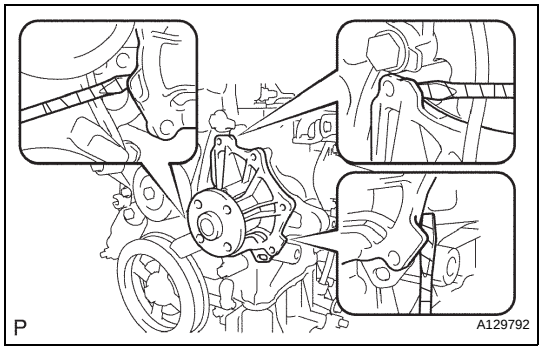


(c) Remove the 4 bolts, 2 nuts and clamp bracket.

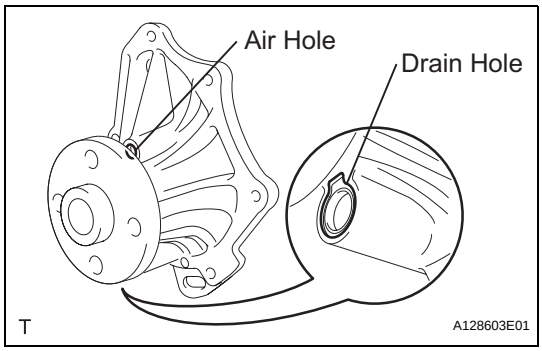


(d) Using a screwdriver, pry between the water pump and cylinder block, and then remove the water pump.
HINT:
Tape the screwdriver tip before use.
NOTICE:
Be careful not to damage the contact surfaces of the water pump and cylinder block.

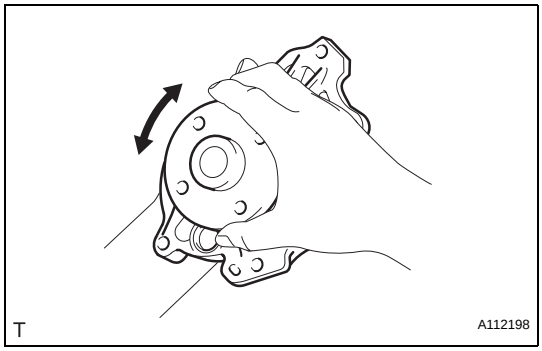
INSPECTION

1. INSPECT WATER PUMP ASSEMBLY

(a) Visually check the drain hole and air hole for coolant leakage.
If leakage is found, replace the water pump assembly.



(b) Turn the pulley, and then check that the water pump bearing moves smoothly without making a "click" sound.
If it does not move smoothly, replace the water pump assembly.



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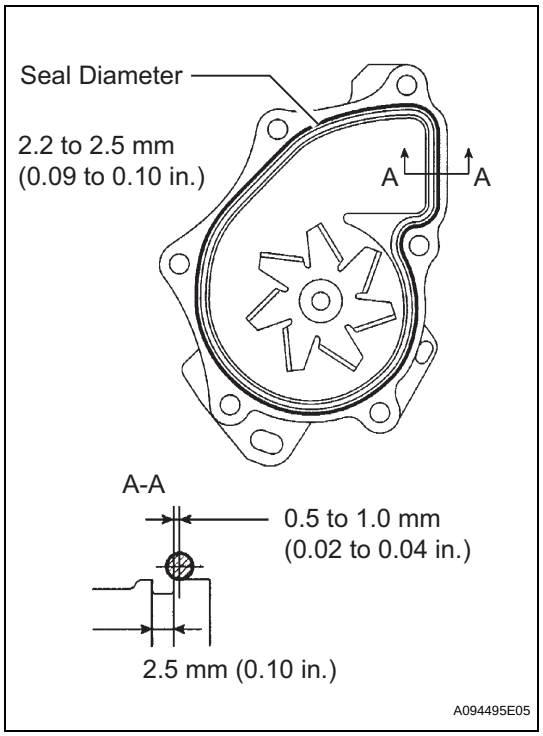
INSTALLATION

1. INSTALL WATER PUMP ASSEMBLY

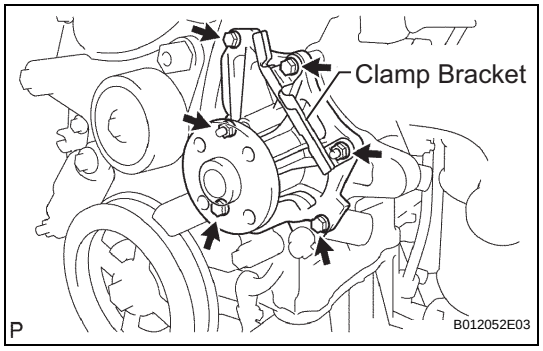
(a) Remove any old seal packing material from the contact surface.

(b) Apply a continuous line of seal packing as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent
Standard seal diameter:
2.2 to 2.5 mm (0.09 to 0.10 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **The parts must be set within 3 minutes after applying seal packing. Otherwise, the material must be removed and reapplied.**

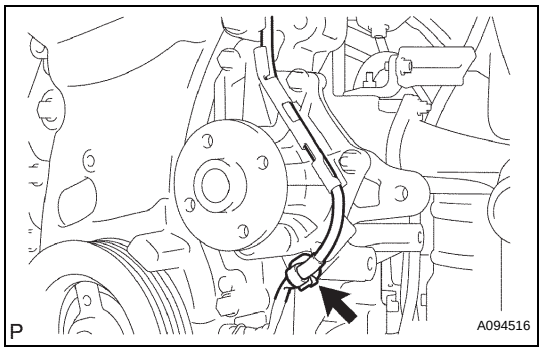


(c) Install the water pump and clamp bracket with the 4 bolts and 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



(d) Install the wire of the crankshaft position sensor onto the clamp bracket.

(e) Install the clamp of the crankshaft position sensor onto the water pump.



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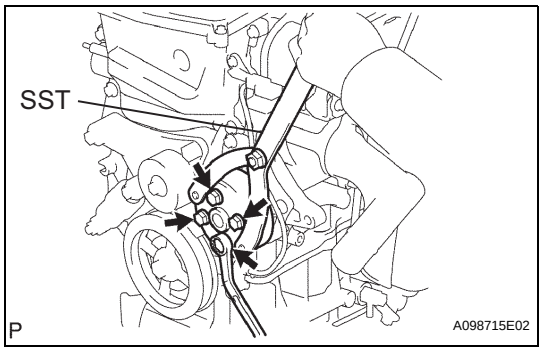
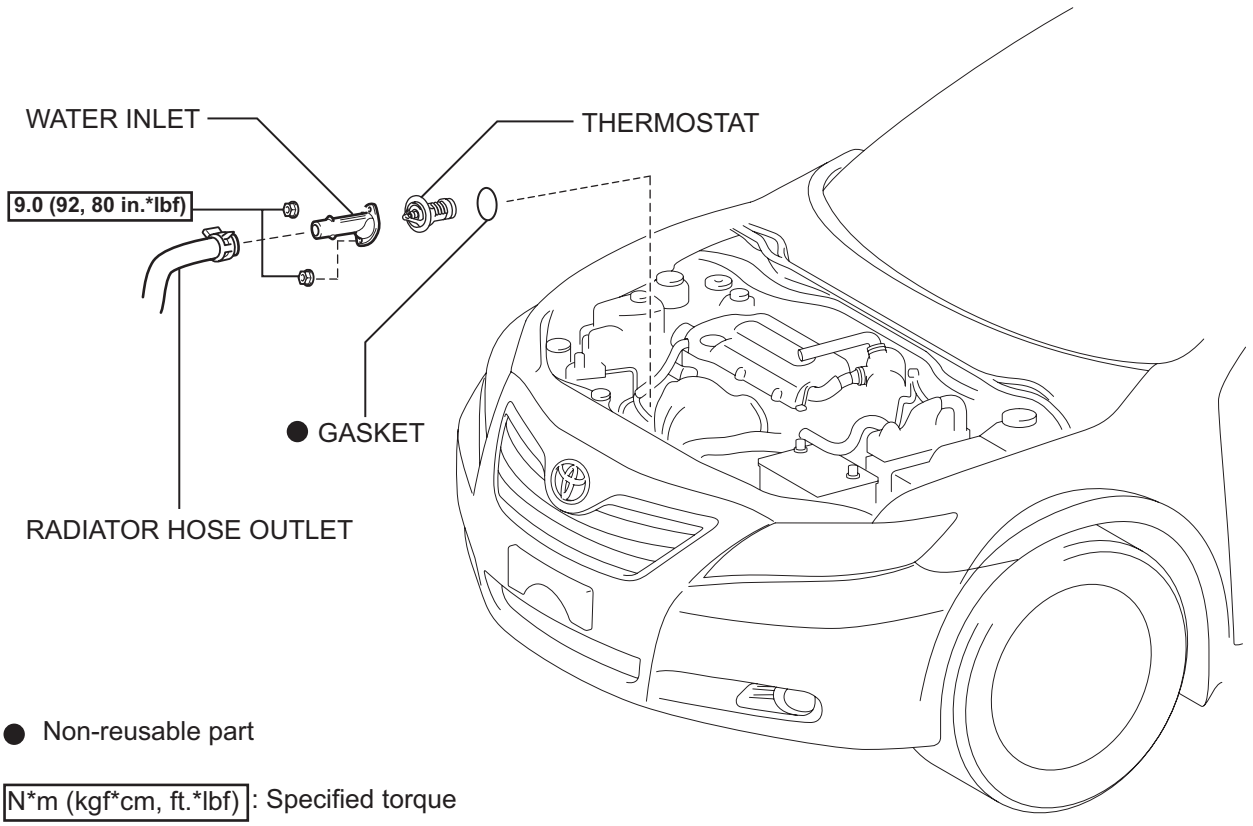


2. **INSTALL WATER PUMP PULLEY**
   (a) Using SST, install the water pump pulley with the 4 bolts.
   SST 09960-10010 (09962-01000, 09963-00700)
   Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
3. **INSTALL GENERATOR ASSEMBLY (See page CH-19)**
4. **INSTALL V-RIBBED BELT (See page EM-6)**
5. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-118)**
6. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-119)**
7. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-119)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**
9. **ADD ENGINE COOLANT (See page CO-5)**
10. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
11. **INSTALL ENGINE UNDER COVER LH**
12. **INSTALL ENGINE UNDER COVER RH**
13. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**
14. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**

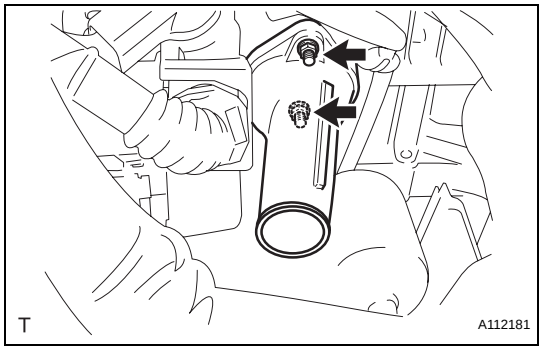
THERMOSTAT

COMPONENTS



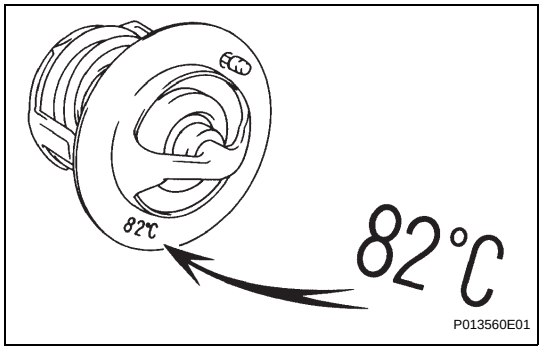
REMOVAL

1. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **DRAIN ENGINE COOLANT (See page CO-5)**
6. **DISCONNECT RADIATOR HOSE OUTLET (See page EM-96)**
7. **REMOVE WATER INLET**
   (a) Remove the 2 nuts and disconnect the water inlet from the cylinder block.
8. **REMOVE THERMOSTAT**
   (a) Remove the gasket from the thermostat.

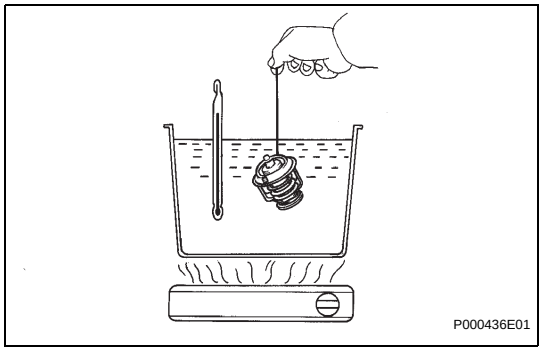


INSPECTION

1. **INSPECT THERMOSTAT**
   (a) The valve opening temperature is inscribed on the thermostat.



   (b) Immerse the thermostat in water, and then gradually heat the water.
   (c) Check the valve opening temperature of the thermostat.
   Standard valve opening temperature:
   80 to 84°C (176 to 183°F)
   If the valve opening temperature is not as specified, replace the thermostat.



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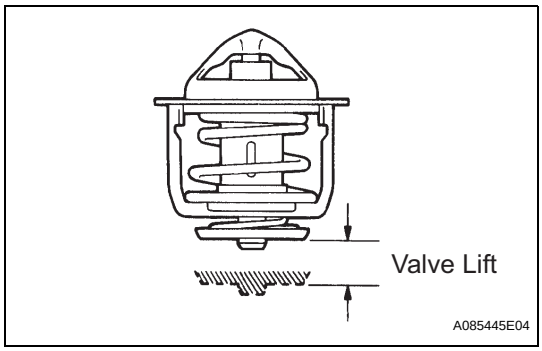
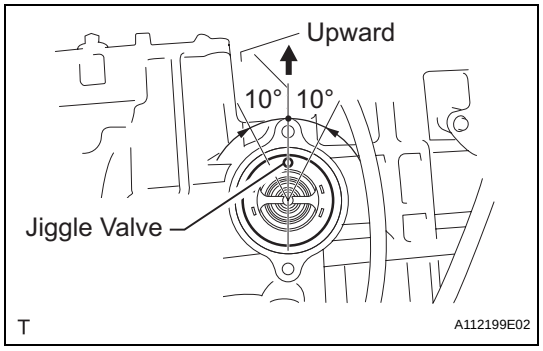


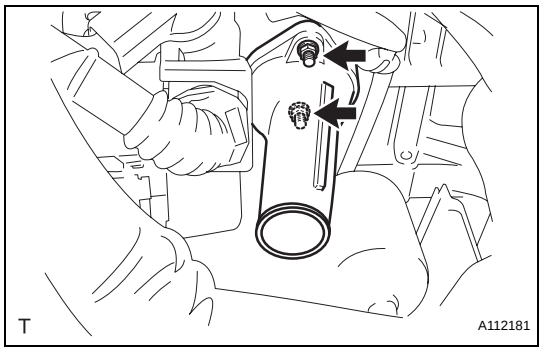
(d) Check the valve lift.
Standard valve lift:
10 mm (0.39 in.) or more at 95°C (203°F)
If the valve lift is not as specified, replace the thermostat.

(e) Check that the valve is fully closed when the thermostat is at low temperatures (below 77°C (171°F)).
If it is not fully closed, replace the thermostat.

INSTALLATION

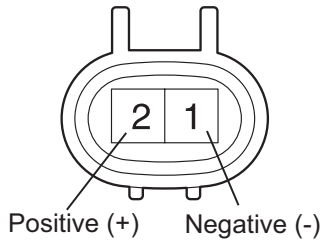


1. **INSTALL THERMOSTAT**
   (a) Install a new gasket onto the thermostat.
   (b) Install the thermostat with the jiggle valve upward.
   HINT:
   The jiggle valve may be set to within 10° on either side of the prescribed position.



2. **INSTALL WATER INLET**
   (a) Install the water inlet with the 2 nuts.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
3. **CONNECT RADIATOR HOSE OUTLET (See page EM-118)**
4. **ADD ENGINE COOLANT (See page CO-5)**
5. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
6. **INSTALL ENGINE UNDER COVER LH**
7. **INSTALL ENGINE UNDER COVER RH**
8. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**
9. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**

Cooling Fan Motor Side Connector:



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COOLING FAN MOTOR

ON-VEHICLE INSPECTION

1. COOLING FAN MOTOR

(a) Check that the motor turns smoothly when the battery is connected to the fan motor connector.

(b) Measure the current while the motor is turning.

Standard current:

With trailer hitch:

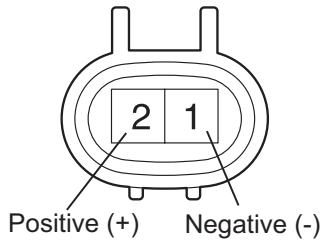
11.8 to 14.8 A at 20°C (68°F)

Without trailer hitch:

7.9 to 10.9 A at 20°C (68°F)

If the result is not as specified, replace the cooling fan motor.

Cooling Fan Motor Side Connector:



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2. NO. 2 COOLING FAN MOTOR

(a) Check that the motor turns smoothly when the battery is connected to the fan motor connector.

(b) Measure the current while the motor is turning.

Standard current:

With trailer hitch:

7.9 to 10.9 A at 20°C (68°F)

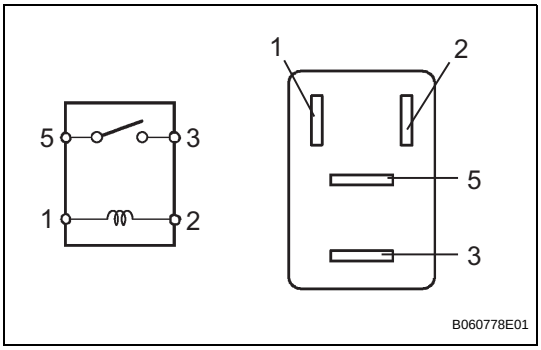
Without trailer hitch:

7.9 to 10.9 A at 20°C (68°F)

If the result is not as specified, replace the cooling fan motor No. 2.

COOLING FAN RELAY

ON-VEHICLE INSPECTION



1. COOLING FAN RELAY

(a) Remove the relay from the engine room No. 2 relay block.

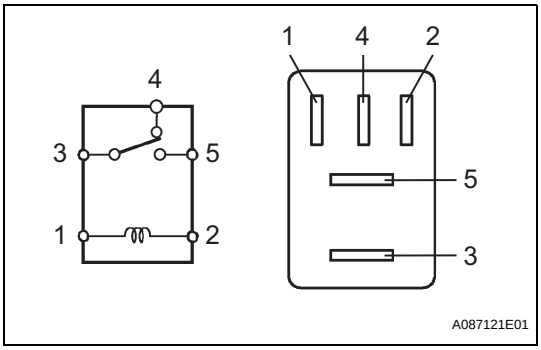
(b) Measure the resistance of the relay.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 Ω or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

(c) Install the relay to the engine room relay block No. 2.



2. COOLING FAN RELAY NO. 2

(a) Remove the relay from the engine room No. 2 relay block.

(b) Measure the resistance of the relay.

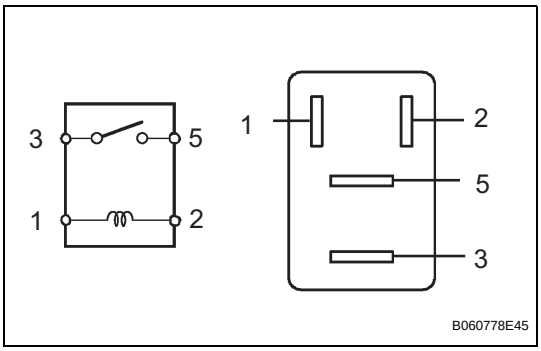
Standard resistance

Tester Connection	Specified Condition
3 - 4	Below 1 Ω
3 - 5	10 Ω or higher
3 - 4	10 Ω or higher (when battery voltage is applied to terminals 1 and 2)
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

(c) Install the relay.

CO



3. COOLING FAN RELAY NO. 3

(a) Remove the relay from the engine room No. 2 relay block.

(b) Measure the resistance of the relay.

Standard resistance

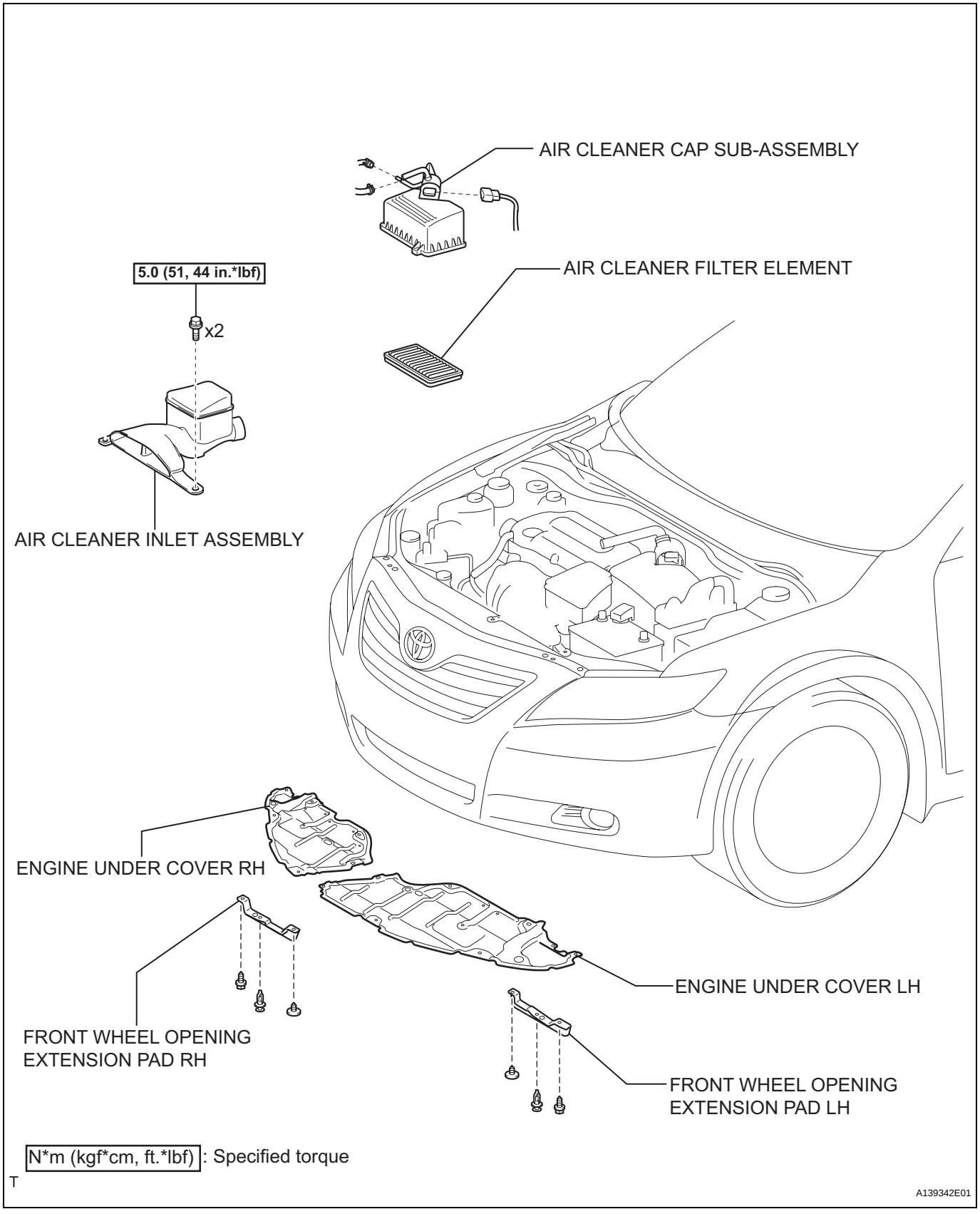
Tester Connection	Specified Condition
3 - 5	10 Ω or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

(c) Install the relay.

RADIATOR

COMPONENTS



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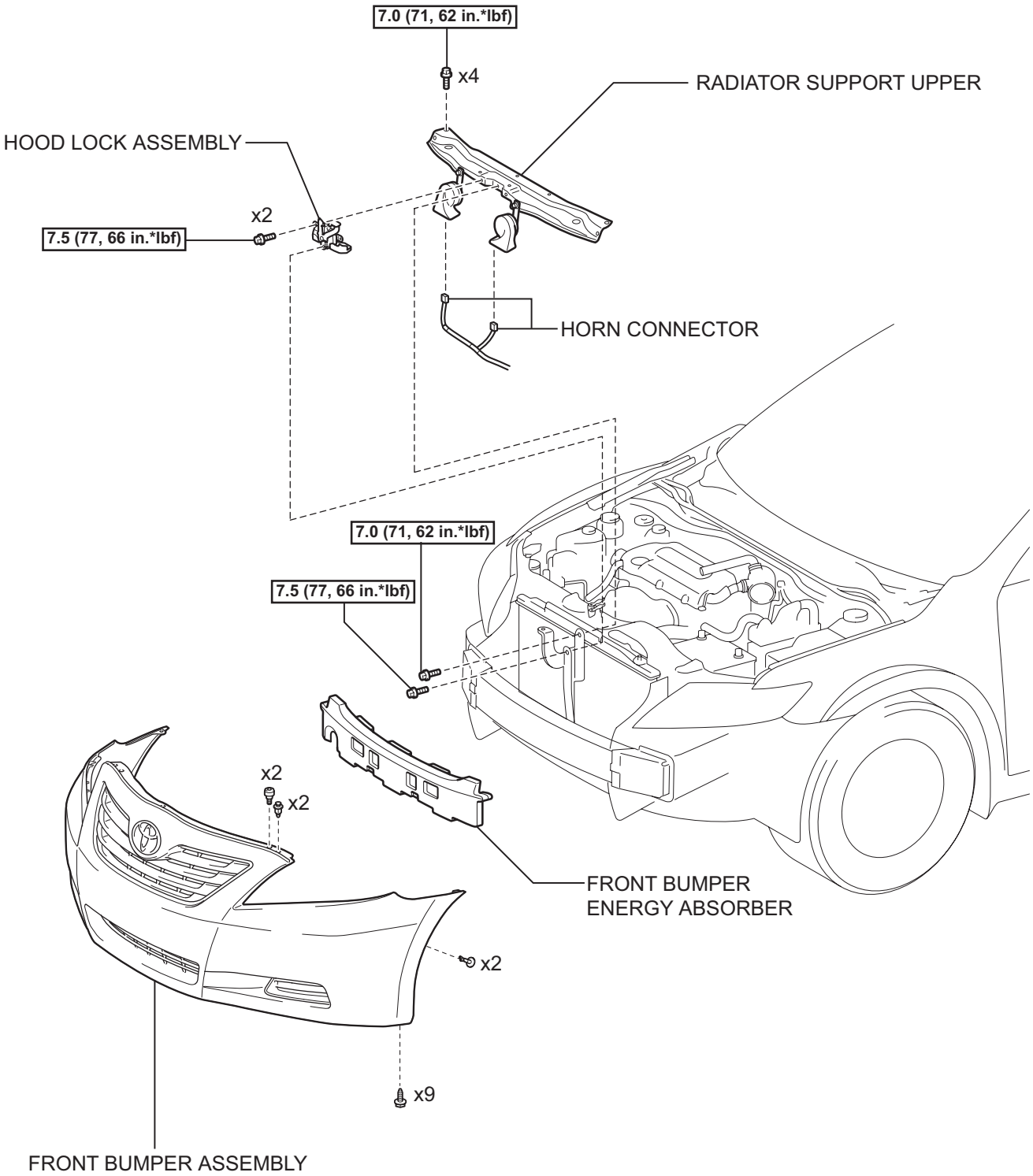

CO

N*m (kgf*cm, ft.*lbf) : Specified torque

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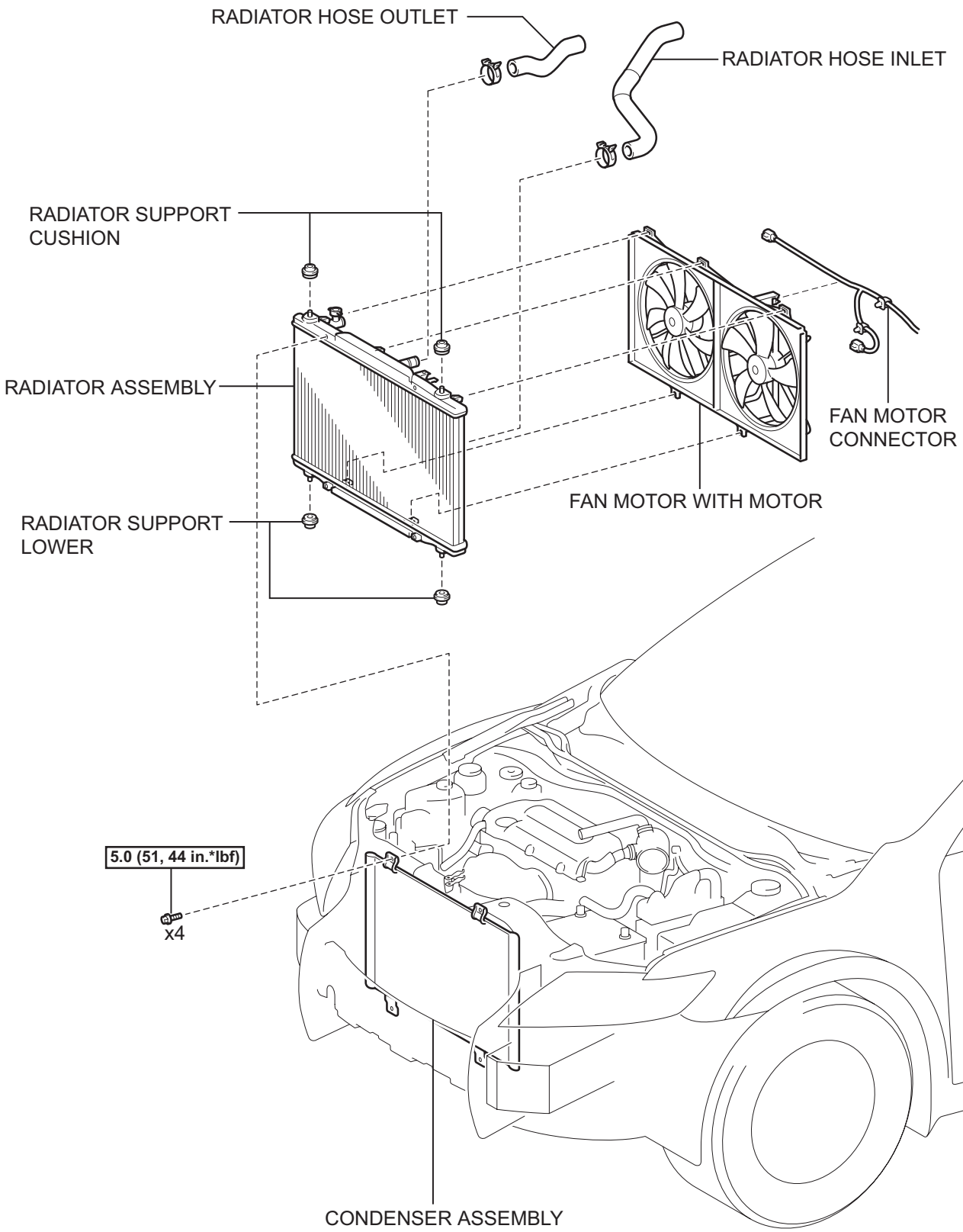
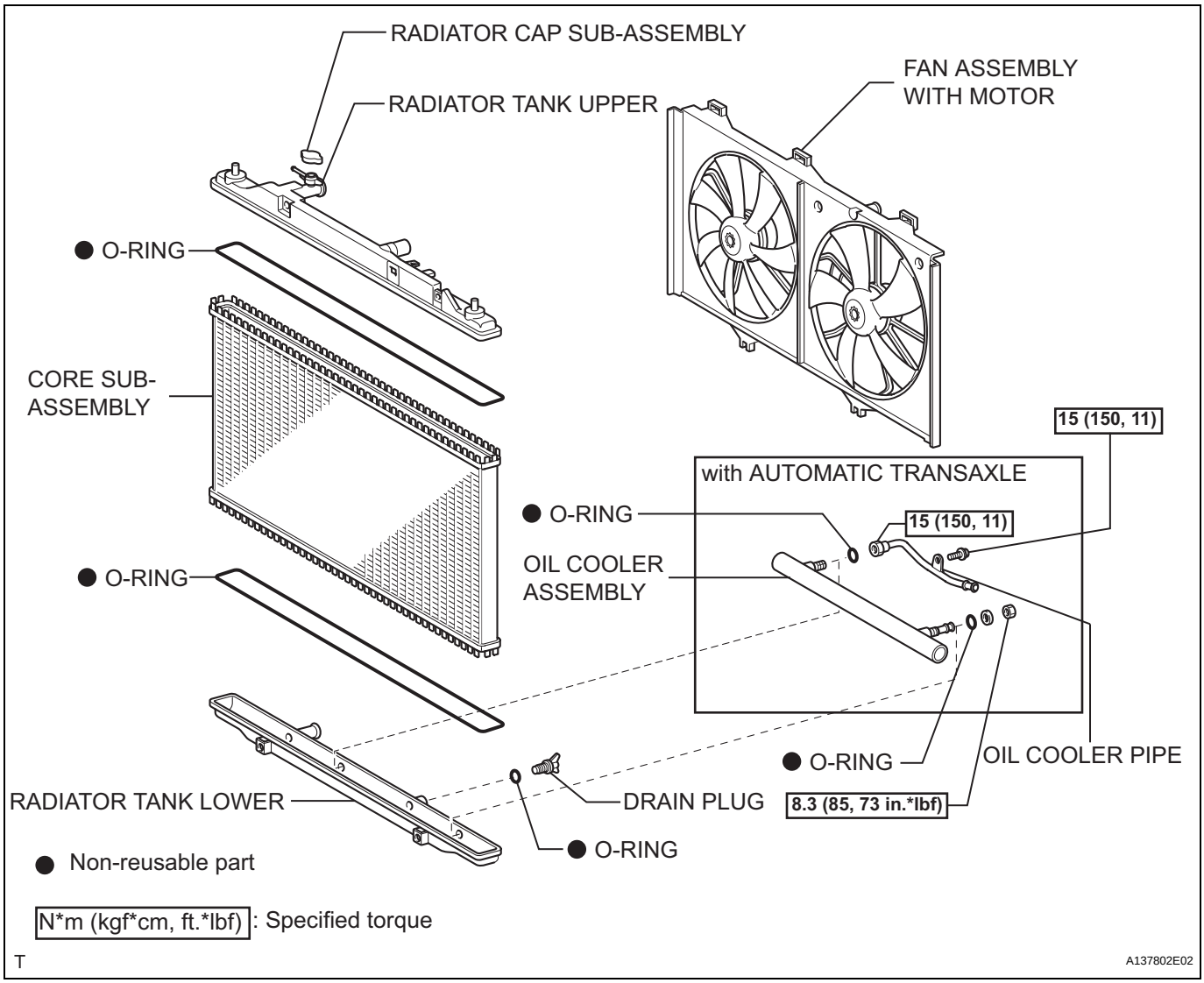


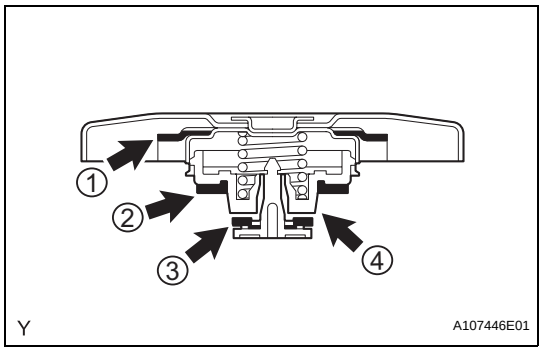
N*m (kgf*cm, ft.*lbf) : Specified torque

T

A134972E02

CO





CO

ON-VEHICLE INSPECTION

1. CHECK RADIATOR CAP SUB-ASSEMBLY

(a) Measure the valve opening pressure.

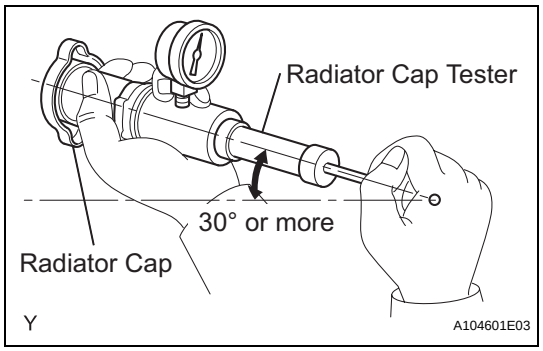
(1) If there are water stains or foreign matter on rubber packings 1, 2 or 3, clean the part(s) with water and finger scouring.

(2) Check that rubber packings 1, 2 and 3 are not deformed, cracked or swollen.

(3) Check that rubber packings 3 and 4 are not stuck together.

(4) Apply engine coolant to rubber packings 2 and 3 before using the radiator cap tester.

(5) When using the cap tester, tilt it to 30° or more above the horizontal.



(6) Pump the cap tester several times, and check the maximum pressure *1.

Pumping speed:

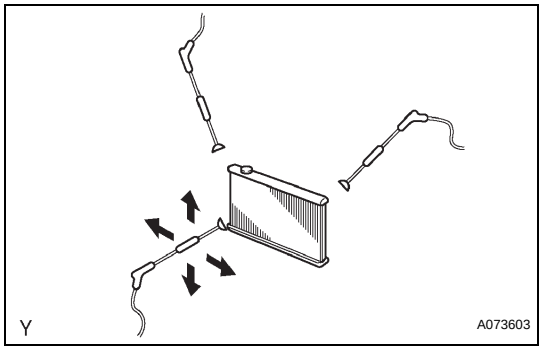
1 pumps every second

*1: Even if the cap cannot maintain the maximum pressure, it is not a defect.

Judgment Criteria

Item	Specified Condition
Standard valve (for brand-new cap)	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
Minimum standard valve (after using cap)	78.5 kPa (0.8 kgf/cm^2, 11.4 psi)

If the maximum pressure is less than the specified pressure for the minimum standard valve, replace the radiator cap sub-assembly.



ON-VEHICLE CLEANING

1. INSPECT FINS BLOCKAGE

(a) If the fins are clogged, wash them with water or a steam cleaner. Dry with compressed air.

NOTICE:

- **If the distance between the steam cleaner and the core is too close, the fins may become damaged. Keep the following injection distance.**

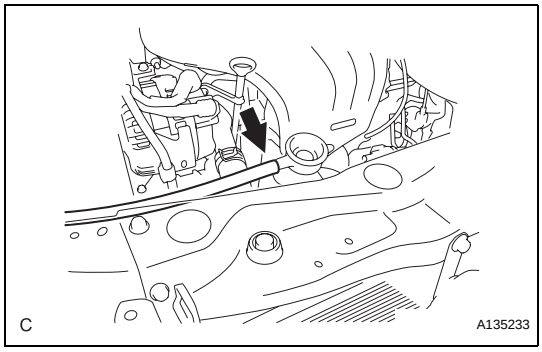
Standard

Injection Distance	Injection Pressure
300 mm (11.81 in.)	2,942 to 4,903 kPa (30 to 50 kg/cm^2, 427 to 711 psi)
500 mm (19.69 in.)	4,903 to 7,845 kPa (50 to 80 kg/cm^2, 711 to 1,138 psi)

- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Never apply water directly onto the electronic components.**

REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
3. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
7. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
8. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**
9. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
10. **REMOVE FRONT BUMPER ENERGY ABSORBER**
11. **SEPARATE RADIATOR RESERVE TANK HOSE**
    (a) Separate the radiator reserve tank hose from the radiator assembly.



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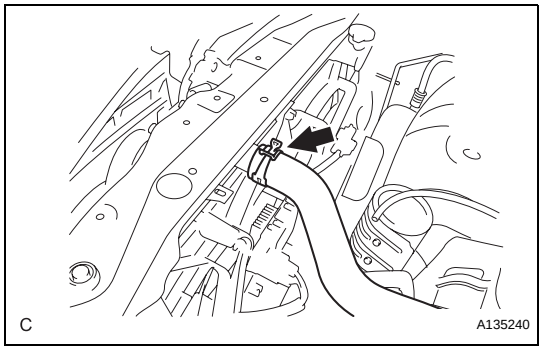
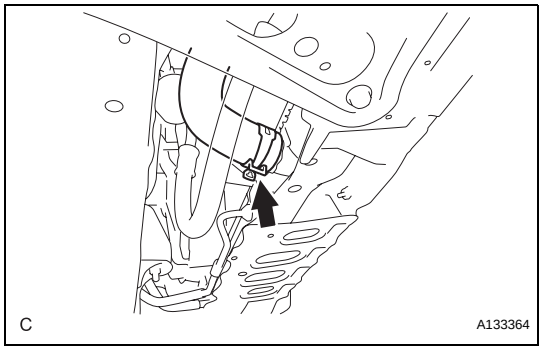
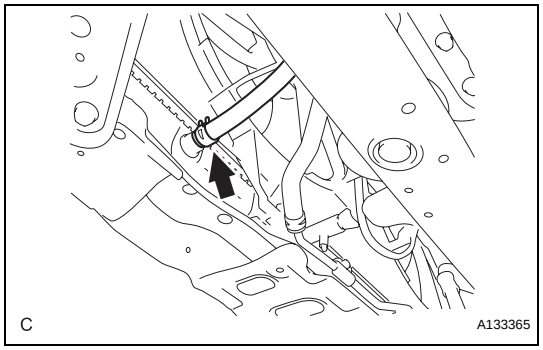
12. **DISCONNECT RADIATOR HOSE INLET**
    (a) Disconnect the radiator hose inlet from the radiator assembly.



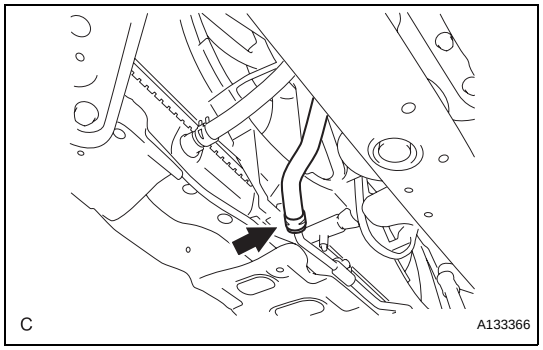
13. **DISCONNECT RADIATOR HOSE OUTLET**
    (a) Disconnect the radiator hose outlet from the radiator assembly.





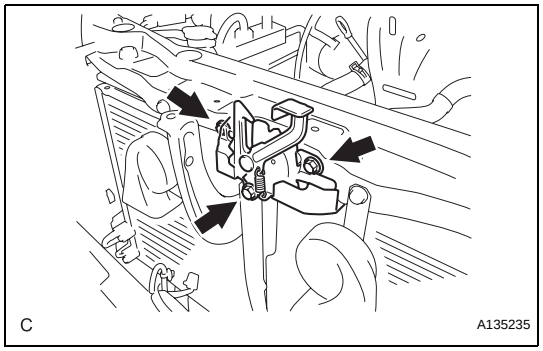
14. DISCONNECT OIL COOLER INLET HOSE (for Automatic Transaxle)

(a) Disconnect the oil cooler inlet hose from the radiator assembly.



15. DISCONNECT OIL COOLER OUTLET HOSE (for Automatic Transaxle)

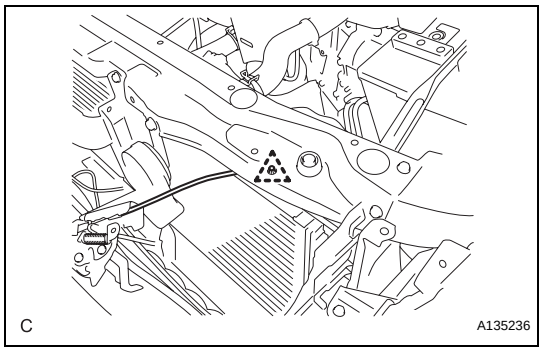
(a) Disconnect the oil cooler outlet hose from the radiator assembly.



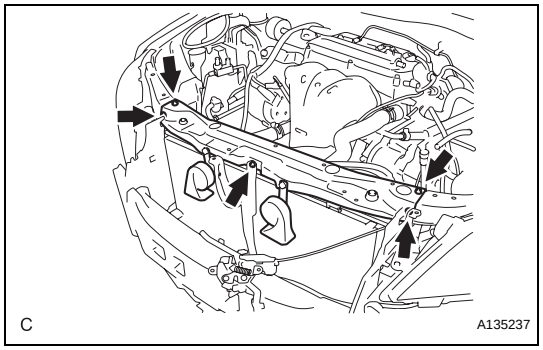
16. REMOVE RADIATOR SUPPORT UPPER

(a) Disconnect the horn connector.

(b) Remove the 3 bolts and separate the hood lock assembly from the radiator support upper.

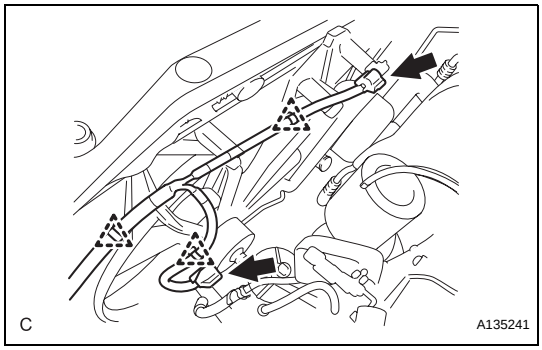


(c) Remove the clamp and separate the hood lock control cable from the radiator support upper.



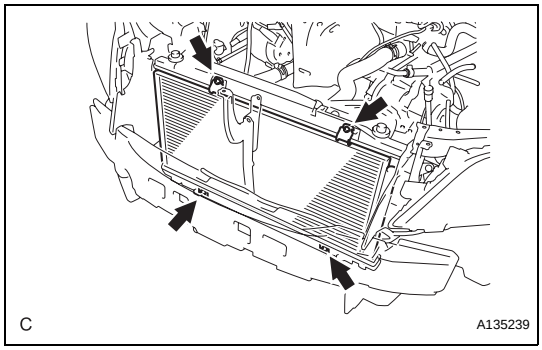
(d) Remove the 5 bolts and radiator support upper.

CO

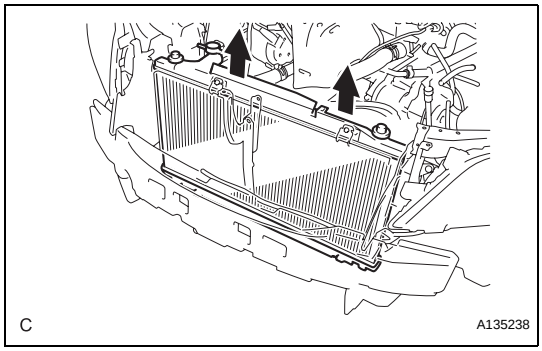


17. REMOVE RADIATOR ASSEMBLY

(a) Remove the 3 clamps and 2 connectors.

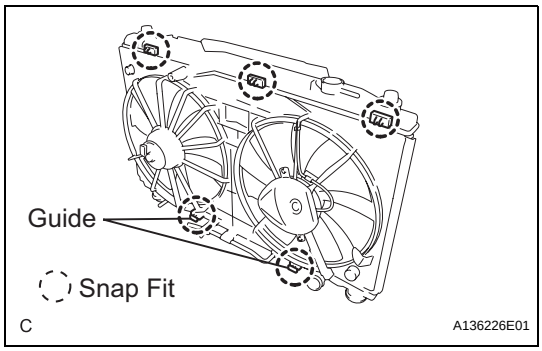


(b) Remove the 4 bolts and separate the condenser assembly from the radiator assembly.



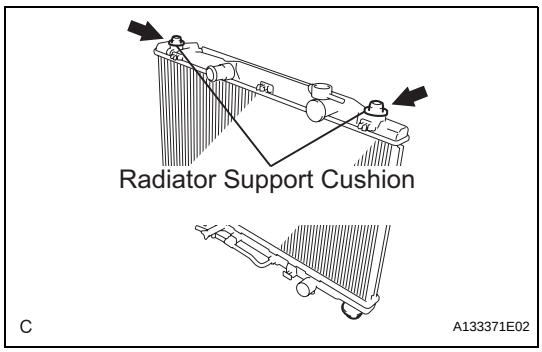
(c) Remove the radiator assembly from the body.

CO



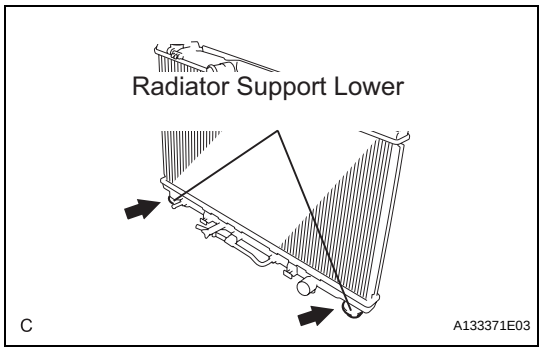
18. REMOVE FAN ASSEMBLY WITH MOTOR

(a) Release the 3 snap fits and lift the fan assembly with motor from the radiator.



19. REMOVE RADIATOR SUPPORT CUSHION

(a) Remove the 2 radiator support cushions from the radiator assembly.



20. REMOVE RADIATOR SUPPORT LOWER

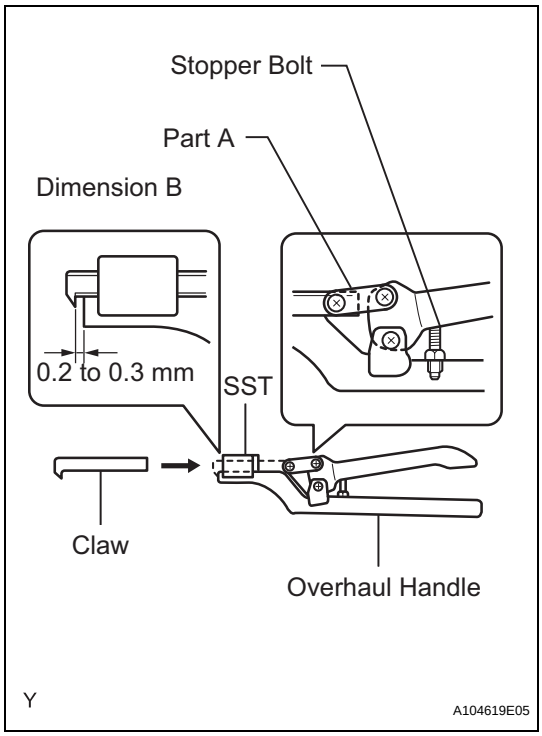
(a) Remove the 2 radiator support lowers from the radiator assembly.

DISASSEMBLY

1. REMOVE DRAIN PLUG

(a) Remove the drain plug.

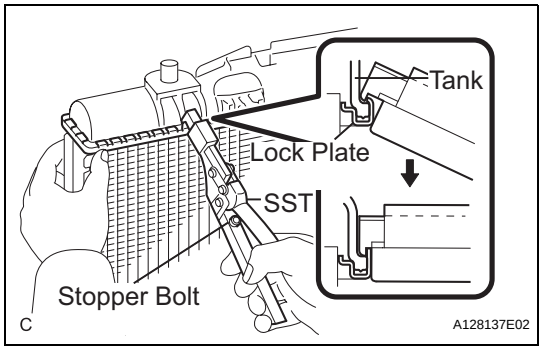
(b) Remove the O-ring.



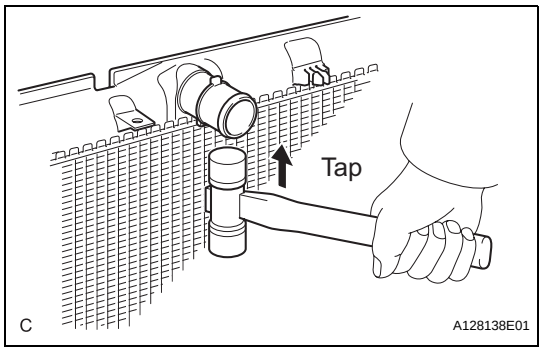
2. REMOVE RADIATOR TANK UPPER

(a) Install the claw to the overhaul handle, inserting it in the hole in part A as shown in the illustration.
SST 09230-01010 (09231-01010, 09231-01030)

(b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.
Dimension B:
0.2 to 0.3 mm (0.008 to 0.012 in.)
NOTICE:
If the stopper bolt is not adjusted, the claw may be damaged.



(c) Using SST to release the caulking, grip the handle until stopped by the stopper bolt.
SST 09230-01010 (09231-01010, 09231-01030)



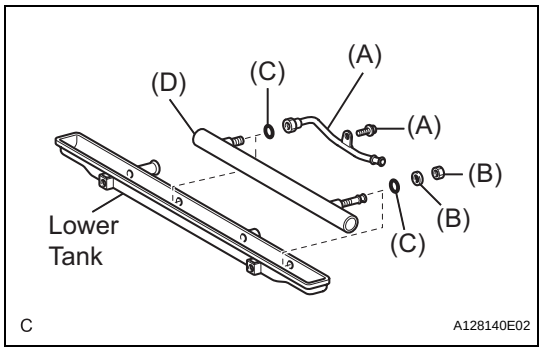
(d) Lightly tap the bracket of the radiator (or radiator hose inlet or outlet) with a soft-faced hammer and remove the tank.

(e) Remove the O-ring.

3. REMOVE RADIATOR TANK LOWER

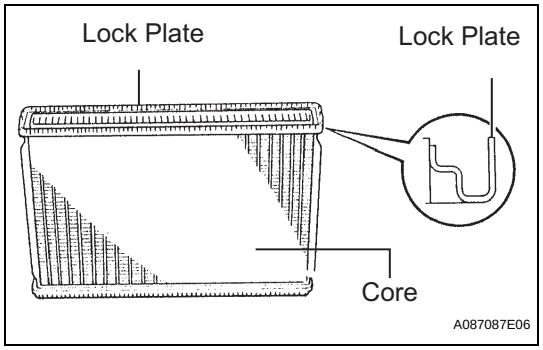
HINT:
Removal procedure of the radiator tank lower is the same as that of the radiator tank upper.

CO



4. REMOVE OIL COOLER ASSEMBLY

(a) Remove the screw and cooler pipe (A).
(b) Remove the nut and plate washer (B).
(c) Remove the oil cooler (C).
(d) Remove the 2 O-rings from the oil cooler (D).

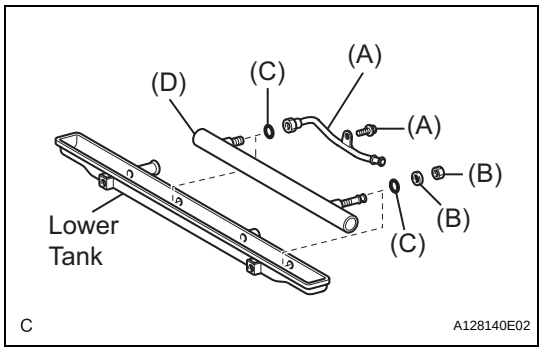


INSPECTION

1. INSPECT LOCK PLATE

(a) Inspect the lock plate for damage.
HINT:
- If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible. Therefore, first correct the shape of the lock plate groove with pliers or a similar object, if necessary.
- Water leakage will result if the bottom of the lock plate groove is damaged or dented. Repair or replace the lock plate if necessary.

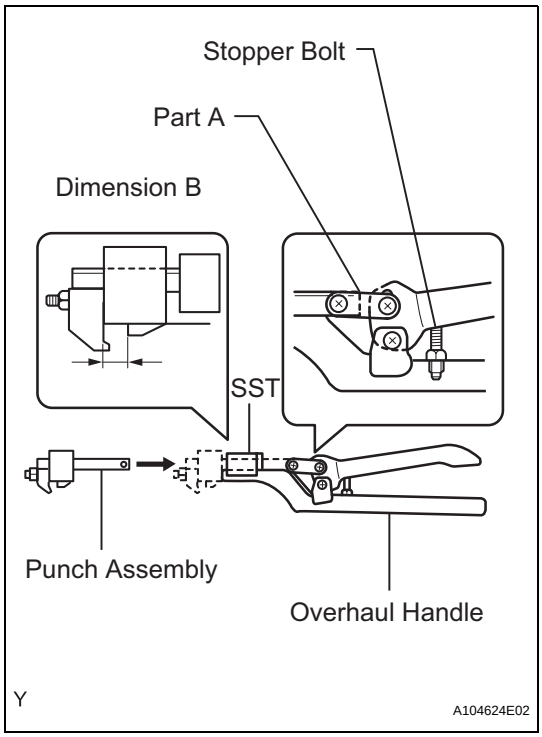
NOTICE:
The radiator can only be recaulked 2 times, After recaulking 2 times, the radiator core must be replaced.



REASSEMBLY

1. INSTALL OIL COOLER ASSEMBLY

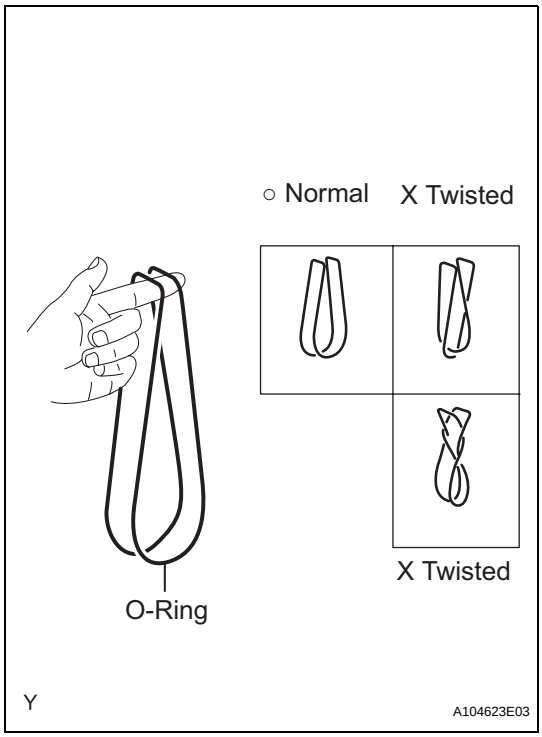
(a) Clean the O-ring contact surfaces of the lower tank and oil cooler (D).
(b) Install 2 new O-rings to the oil cooler (C).
(c) Install the oil cooler to the lower tank.
(d) Install the plate washer and nut (B).
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
(e) Install the cooler pipe (A).
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)
(f) Install the screw (A).



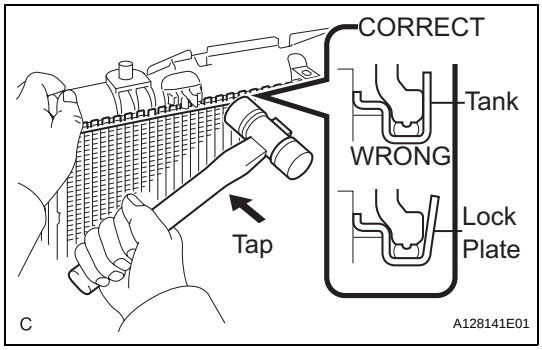
2. INSTALL RADIATOR TANK UPPER

(a) Install the punch assembly to the overhaul handle, inserting it in the hole in part A as shown in the illustration.
SST 09230-01010, 09231-14010

(b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.
Dimension B:
8.4 mm (0.331 in.)



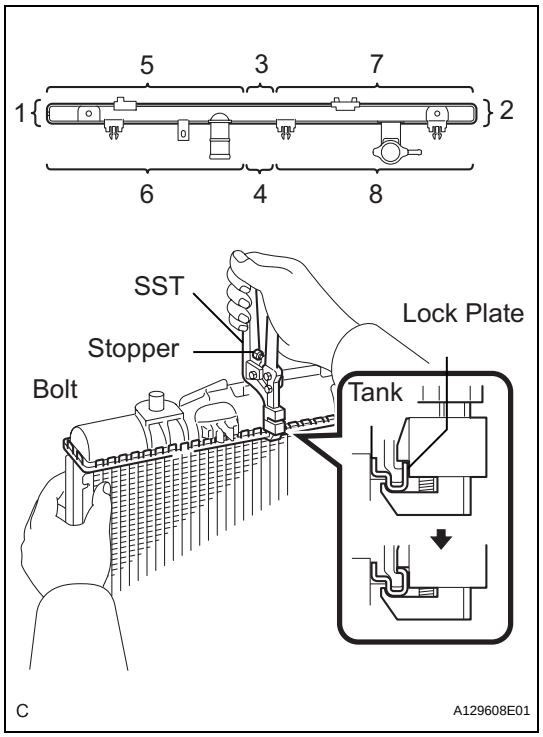
(c) After checking that there are no foreign objects in the lock plate groove, install a new O-ring without twisting it.
HINT:
When cleaning the lock plate groove, lightly rub it with sand paper without scratching it.



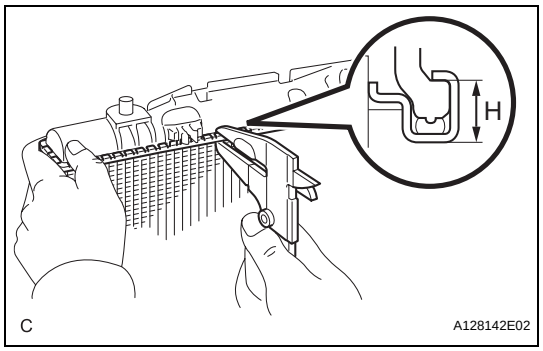
(d) Install the tank without damaging the O-ring.

(e) Tap the lock plate with a soft-faced hammer so that there is no gap between the lock plate and the tank.

CO



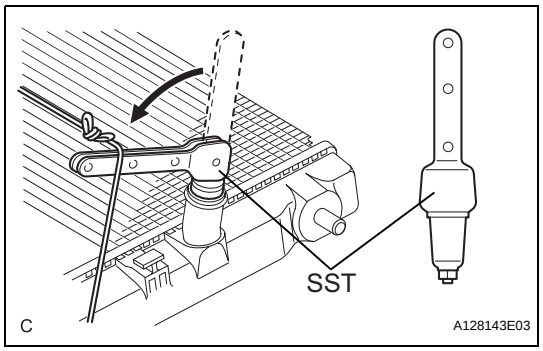
(f) Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by gripping the handle until stopped by the stopper plate.
HINT:
- Do not tap the areas protruding around the pipes, brackets or tank ribs.
- The dotted circles shown in the illustration and parts of the oil cooler near the dotted circles cannot be tapped with the SST. Use pliers or similar objects and be careful not to damage the core plates.



(g) Check the lock plate height (H) after completing caulking.
Plate height (H):
7.40 to 7.80 mm (0.2913 to 0.3071 in.)
If not within the specified height range, adjust the stopper bolt of the handle and caulk again.

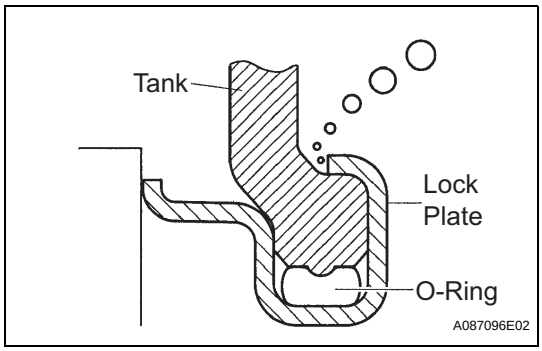
3. INSTALL RADIATOR TANK LOWER
SST 09230-01010, 09231-14010
HINT:
Removal procedure of the lower radiator tank is the same as that of the upper radiator tank.

4. INSTALL DRAIN PLUG
(a) Install a new O-ring to the drain plug.
(b) Install the drain plug.



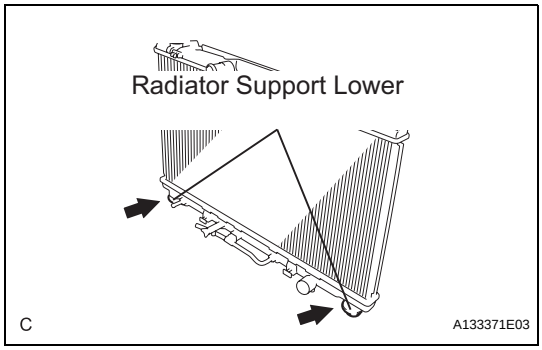
5. INSPECT FOR WATER LEAKS
(a) Plug the inlet and outlet pipes of the radiator with SST.
SST 09230-01010
(b) Using the radiator cap tester, apply pressure to the radiator.
Test pressure:
177 kPa (1.8 kgf/cm^2, 26 psi)
(c) Submerge the radiator in water.

CO



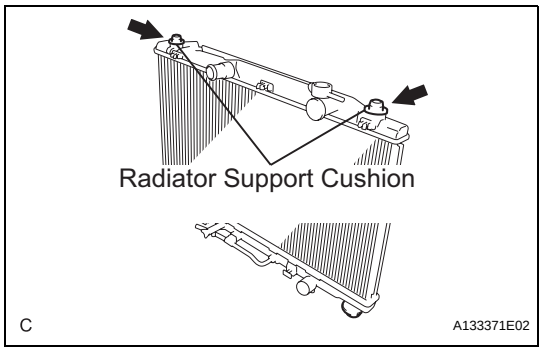
(d) Inspect for leaks.
HINT:
On radiators with resin tanks, there is clearance between the tank and lock plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before doing the water leak test, first swish the radiator around in the water until all air bubbles disappear.

INSTALLATION



1. INSTALL RADIATOR SUPPORT LOWER

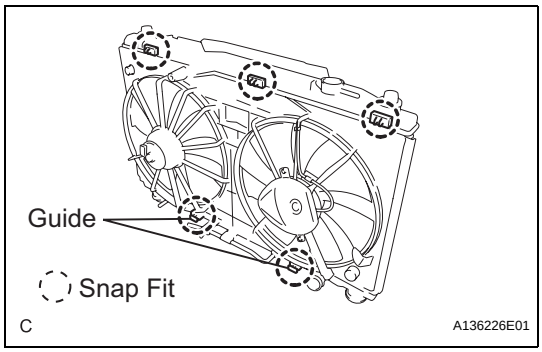
(a) Install the 2 radiator support lowers to the radiator assembly.



2. INSTALL RADIATOR SUPPORT CUSHION

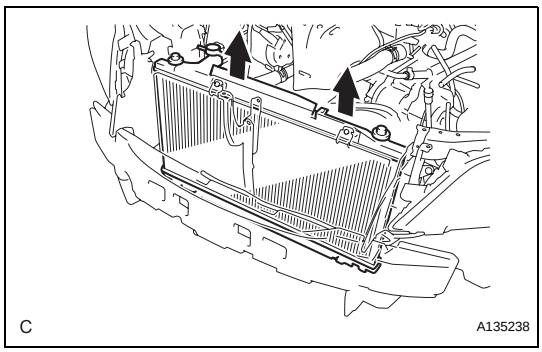
(a) Install the 2 radiator support cushions to the radiator assembly.

CO



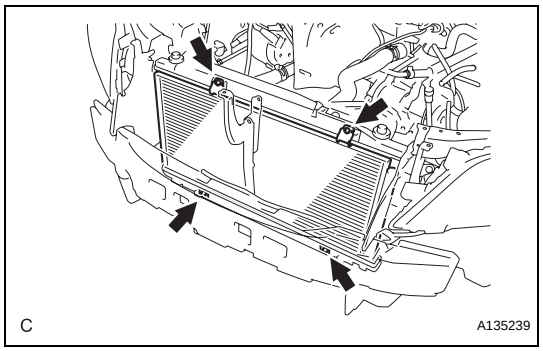
3. INSTALL FAN ASSEMBLY WITH MOTOR

(a) Install the fan assembly with motor to the radiator with the 2 guides at the bottom and 3 snap fits on the top.

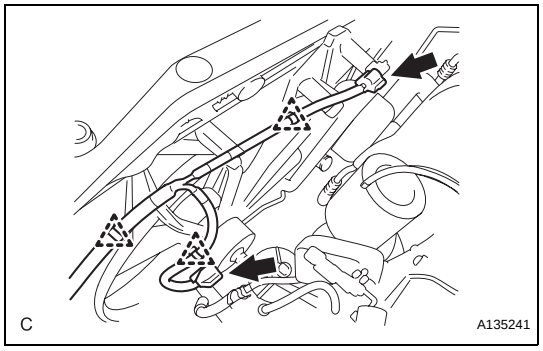


4. INSTALL RADIATOR ASSEMBLY

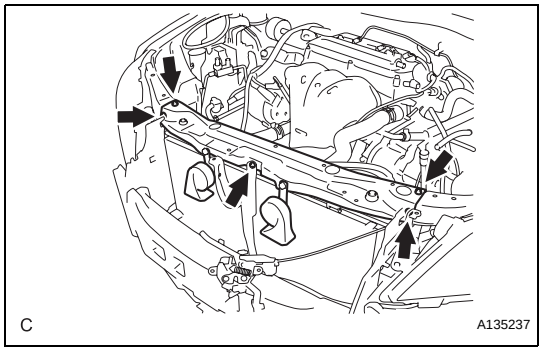
(a) Install the radiator to the body.



(b) Install the condenser assembly with the 4 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

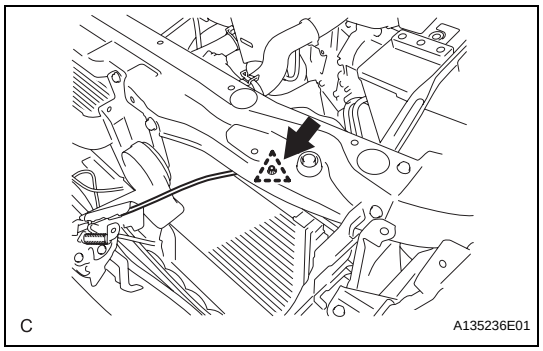


(c) Connect the 2 fan motor connectors and the 3 clamps.

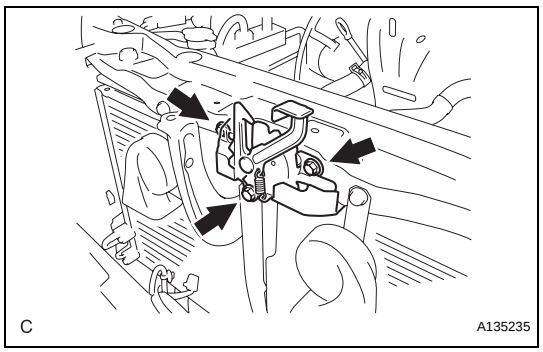


5. INSTALL RADIATOR SUPPORT UPPER

(a) Install the radiator support upper with the 5 bolts.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)



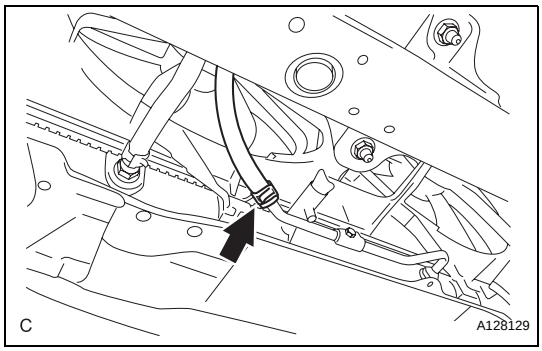
(b) Install the hood lock control cable assembly to the radiator support upper with the clamp.



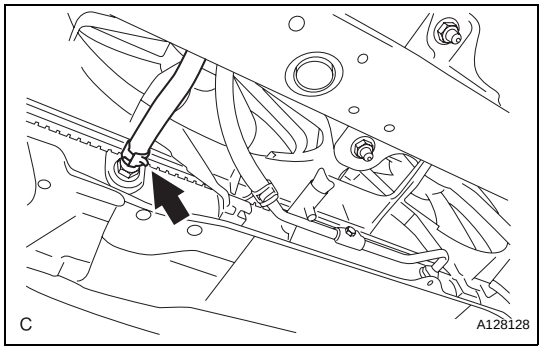
(c) Install the hood lock assembly to the radiator support upper with the 3 bolts.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)

(d) Connect the horn connector.

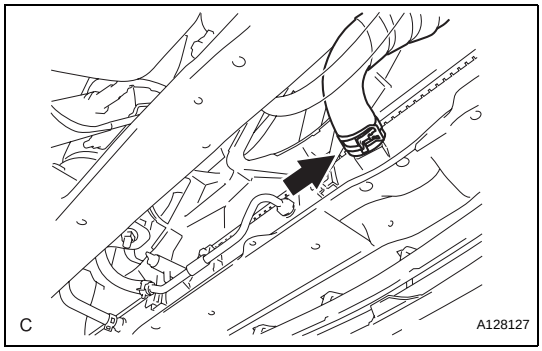
CO



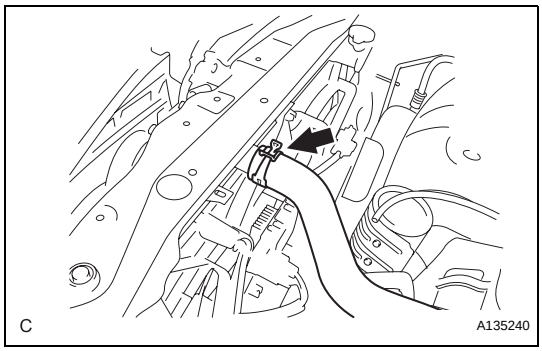
6. **CONNECT OIL COOLER OUTLET HOSE (for Automatic Transaxle)**
   (a) Connect the oil cooler outlet hose to the radiator assembly.



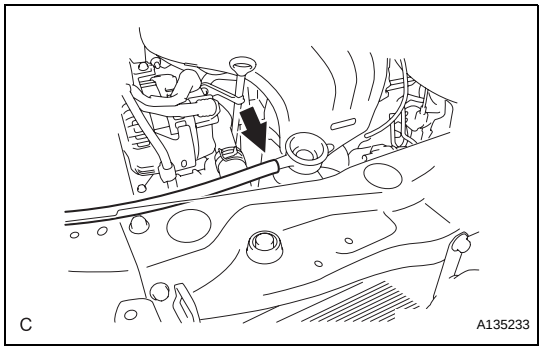
7. **CONNECT OIL COOLER INLET HOSE (for Automatic Transaxle)**
   (a) Connect the oil cooler inlet hose to the radiator assembly.



8. **CONNECT RADIATOR HOSE OUTLET**
   (a) Connect the radiator hose outlet to the radiator assembly.



9. **CONNECT RADIATOR HOSE INLET**
   (a) Connect the radiator hose inlet to the radiator assembly.



10. **CONNECT RADIATOR RESERVOIR TANK HOSE**
    (a) Connect the radiator reservoir tank hose to the radiator assembly.

11. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**

12. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**

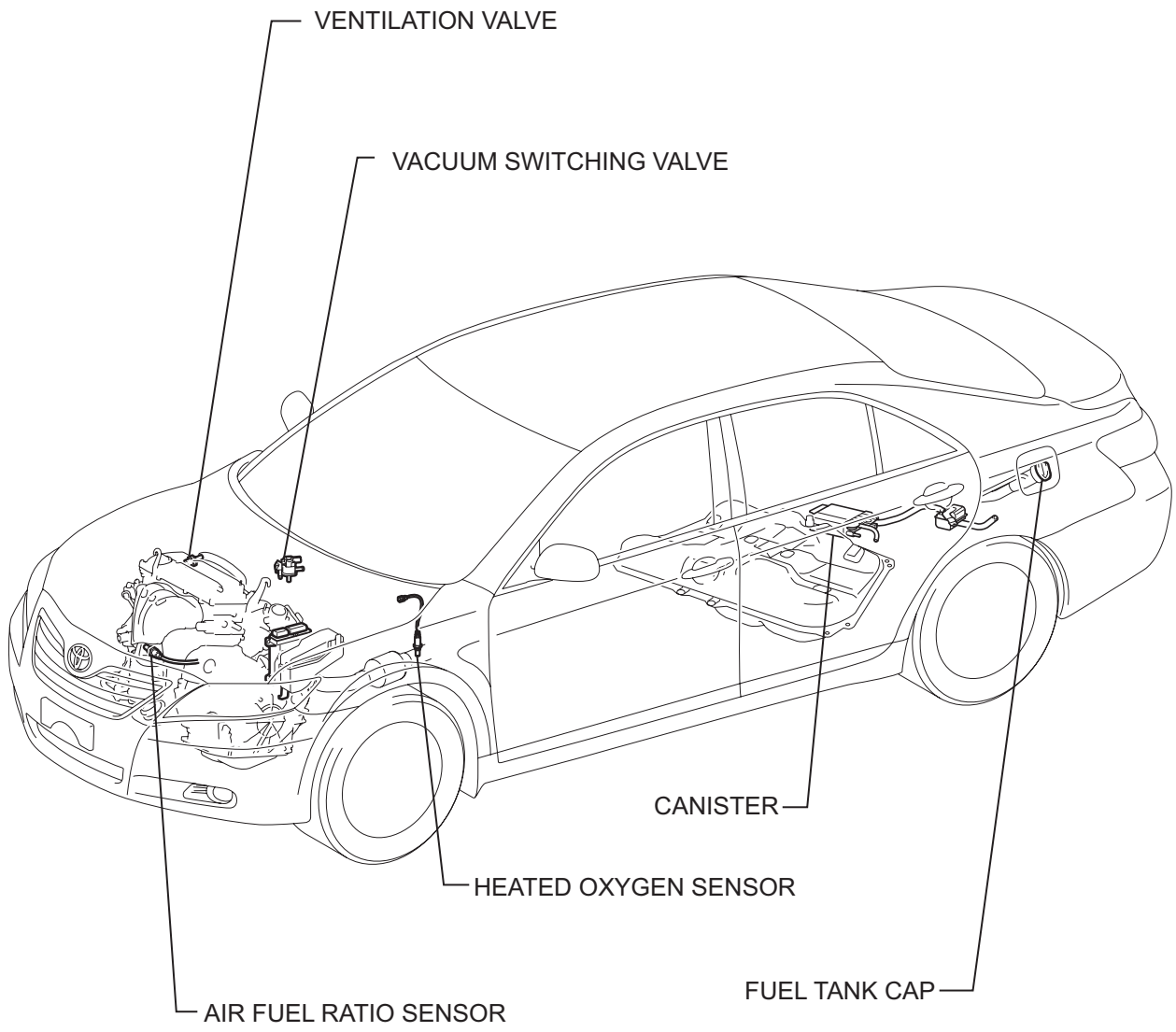
13. **ADD ENGINE COOLANT (See page CO-5)**

CO

14. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
15. **INSTALL ENGINE UNDER COVER LH**
16. **INSTALL ENGINE UNDER COVER RH**
17. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**
18. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**

EMISSION CONTROL SYSTEM

PARTS LOCATION



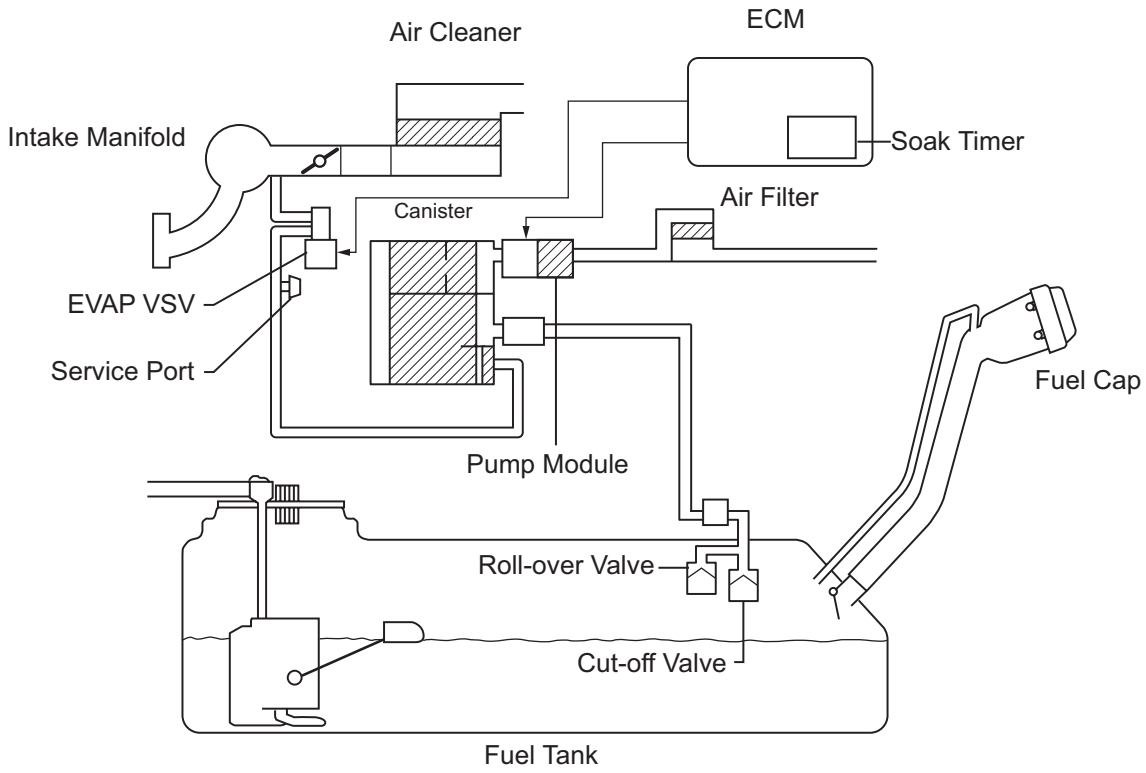
T

A135646E03

EC

SYSTEM DIAGRAM

For PZEV :

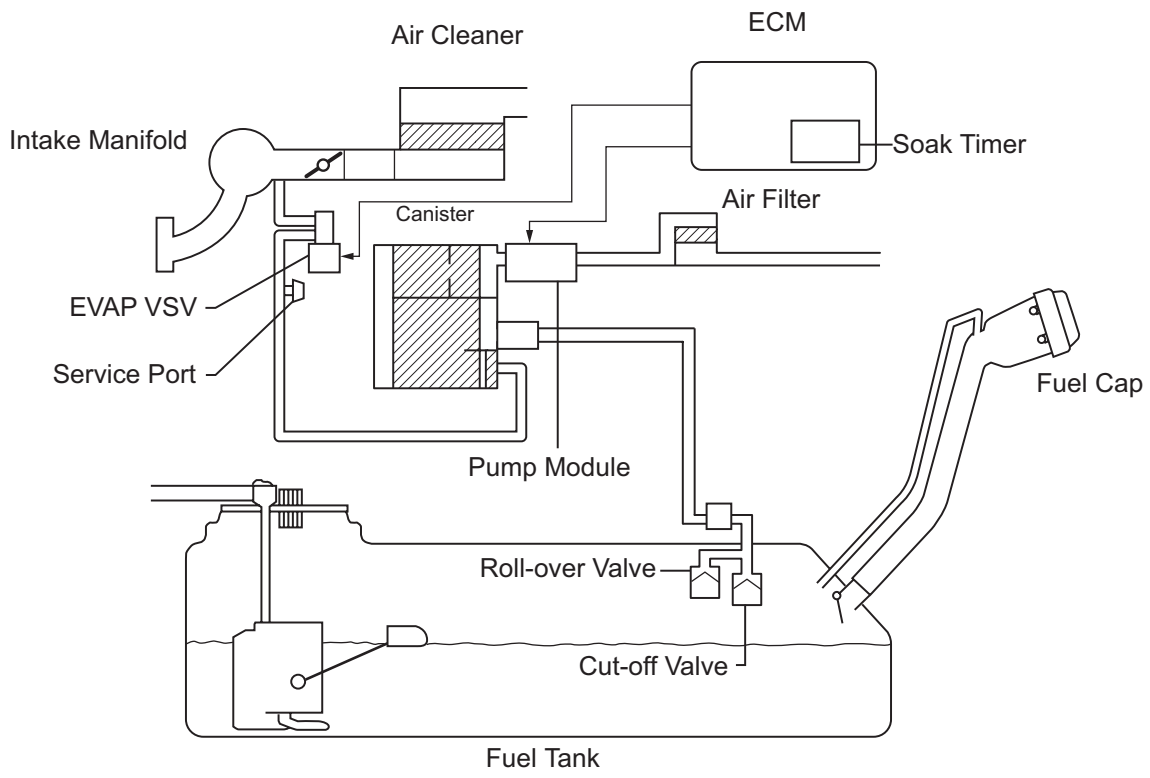


C

A128935E01

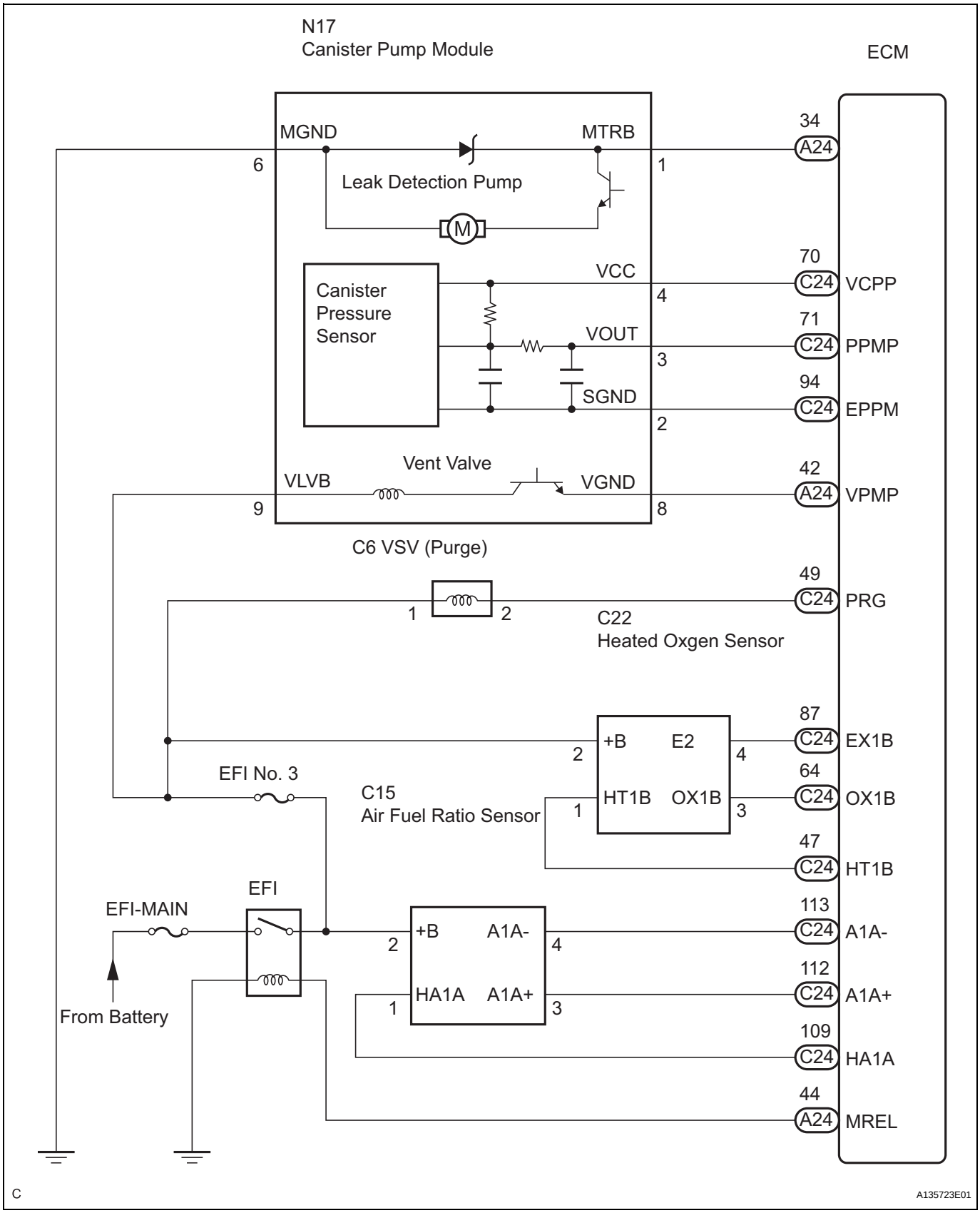
EC

Except PZEV :

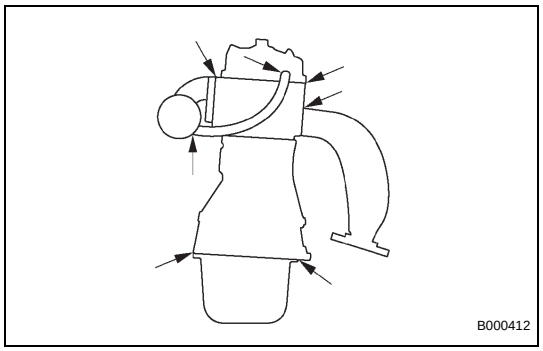


C A128936E01

EC


N17
Canister Pump Module
ECM
MGND
MTRB
6
1
Leak Detection Pump
M
34
A24
70
C24
VCPP
VCC
4
Canister
Pressure
Sensor
71
C24
PPMP
VOUT
3
94
C24
EPPM
SGND
2
Vent Valve
VLVB
VGND
42
A24
VPMP
9
8
C6 VSV (Purge)
49
C24
PRG
1
2
C22
Heated Oxgen Sensor
87
C24
EX1B
+B
E2
2
4
EFI No. 3
64
C24
OX1B
C15
Air Fuel Ratio Sensor
HT1B
OX1B
1
3
47
C24
HT1B
EFI
EFI-MAIN
113
C24
A1A-
+B
A1A-
2
4
112
C24
A1A+
HA1A
A1A+
1
3
From Battery
109
C24
HA1A
44
A24
MREL
C
A135723E01

EC



ON-VEHICLE INSPECTION

1. VISUALLY INSPECT HOSE, CONNECTIONS AND GASKETS

(a) Check that there are no cracks, leaks or damage.
HINT:
- Detachment or other problems with the engine oil dipstick, filler cap, PCV hose and other components may cause the engine to run improperly.
- Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause an engine failure or engine malfunctions.

If the result is not as specified, replace the parts as necessary.

2. INSPECT FUEL CUT RPM

(a) Start and warm up the engine.
(b) Open the throttle valve and keep the engine speed at 3,000 rpm.
(c) Use a sound scope to check for injector operating sounds.
(d) Check that when the accelerator pedal is released, injector operating sounds stop momentarily (at 2,500 rpm) and then resume (at 1400 rpm).

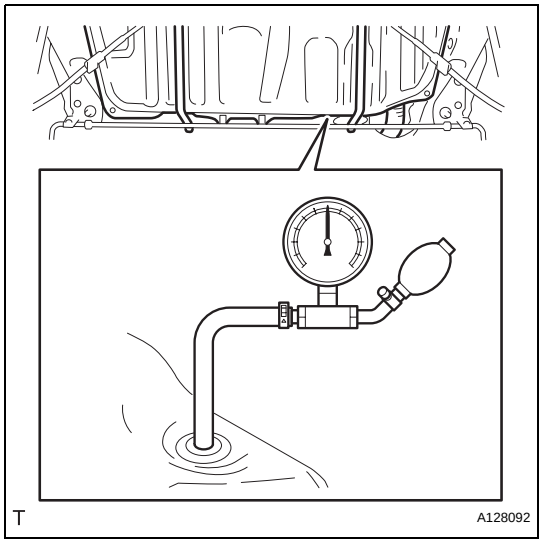
Standard

Item	Specified condition
Fuel cut off rpm	2,500 rpm
Fuel return rpm	1,400 rpm

If the result is not specified, check the injectors, wiring and ECM.

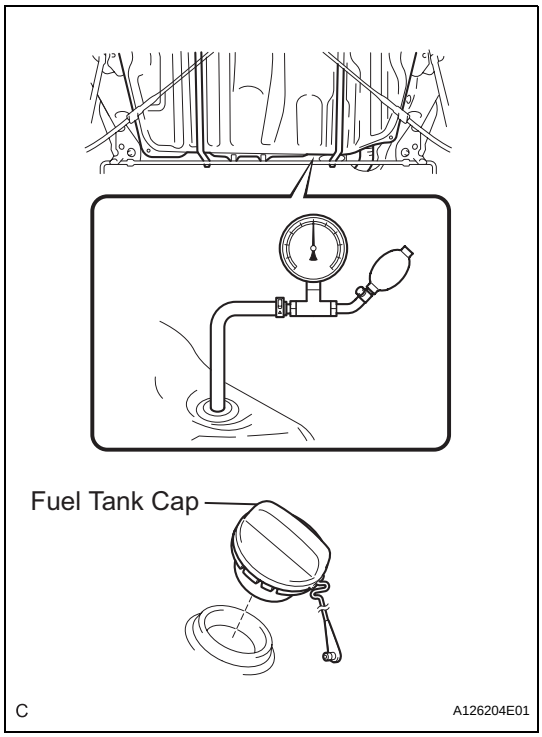
3. INSPECT LINE AND CONNECTORS

(a) Visually check for loose connections, sharp bends or damage.



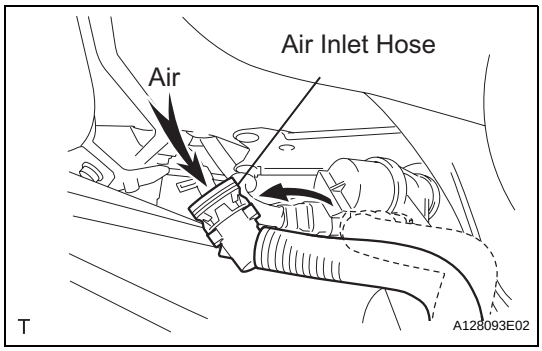
4. CHECK AIR TIGHTNESS IN FUEL TANK AND FILLER PIPE

(a) Disconnect the vent line hose from the fuel tank.
(b) Connect the pressure gauge to the fuel tank.
(c) Apply pressure to the fuel tank to create an internal pressure of 4 kPa (41 gf/cm^2, 0.58 psi).
(d) Check that the internal pressure of the fuel tank is maintained for 1 minute.
(e) Check the connected portions of each hose and pipe.
(f) Check the installed parts on the fuel tank.
If any malfunctions, damage or other problems are found, replace the fuel tank and filler pipe.
(g) Reconnect the vent line hose to the fuel tank.



5. REMOVE FUEL TANK ASSEMBLY

(a) Disconnect the vent line hose from the fuel tank.
(b) Connect the pressure gauge to the fuel tank.
(c) Fill the fuel tank with fuel.
(d) Apply pressure of 4 kPa (41 gf/cm^2, 0.58 psi) to the vent port of the fuel tank.
HINT:
Check the amount of fuel in the fuel tank. When the fuel tank is full, the float valve of the fill check valve is closed and no air can pass through.
(e) Remove the fuel tank cap, and check that the pressure drops.
If the pressure does not drop, replace the fuel tank assembly.
(f) Reconnect the vent line hose to the fuel tank.



EC

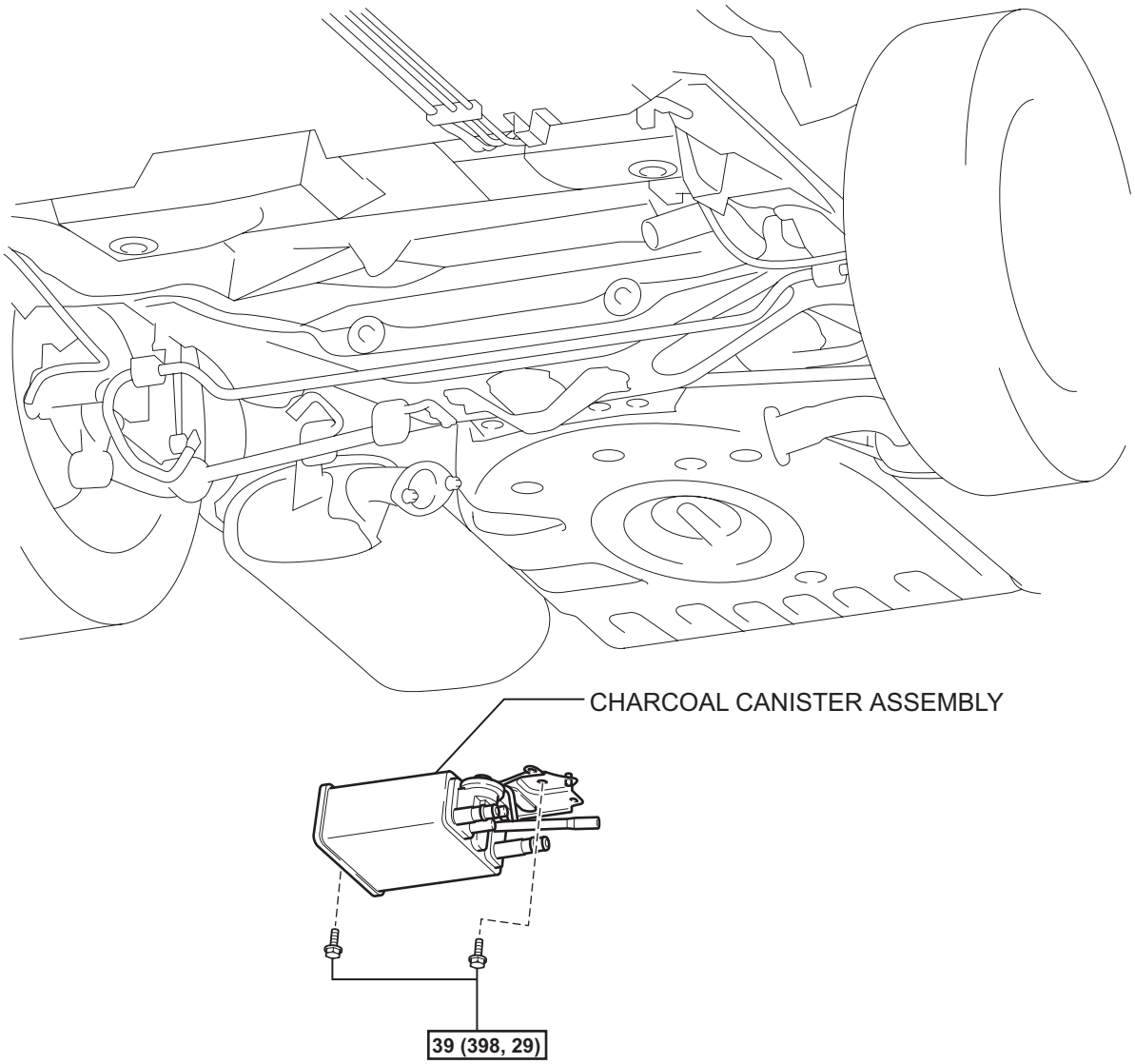
6. REMOVE AIR INLET LINE

(a) Disconnect the air inlet line hose from the charcoal canister.
(b) Check that air can flow freely into the air inlet line.
If air cannot flow freely into the air inlet line, repair or replace it.
(c) Reconnect the air inlet line hose to the charcoal canister.

CANISTER

COMPONENTS

for PZEV:



N*m (kgf*cm, ft.*lbf) : Specified torque

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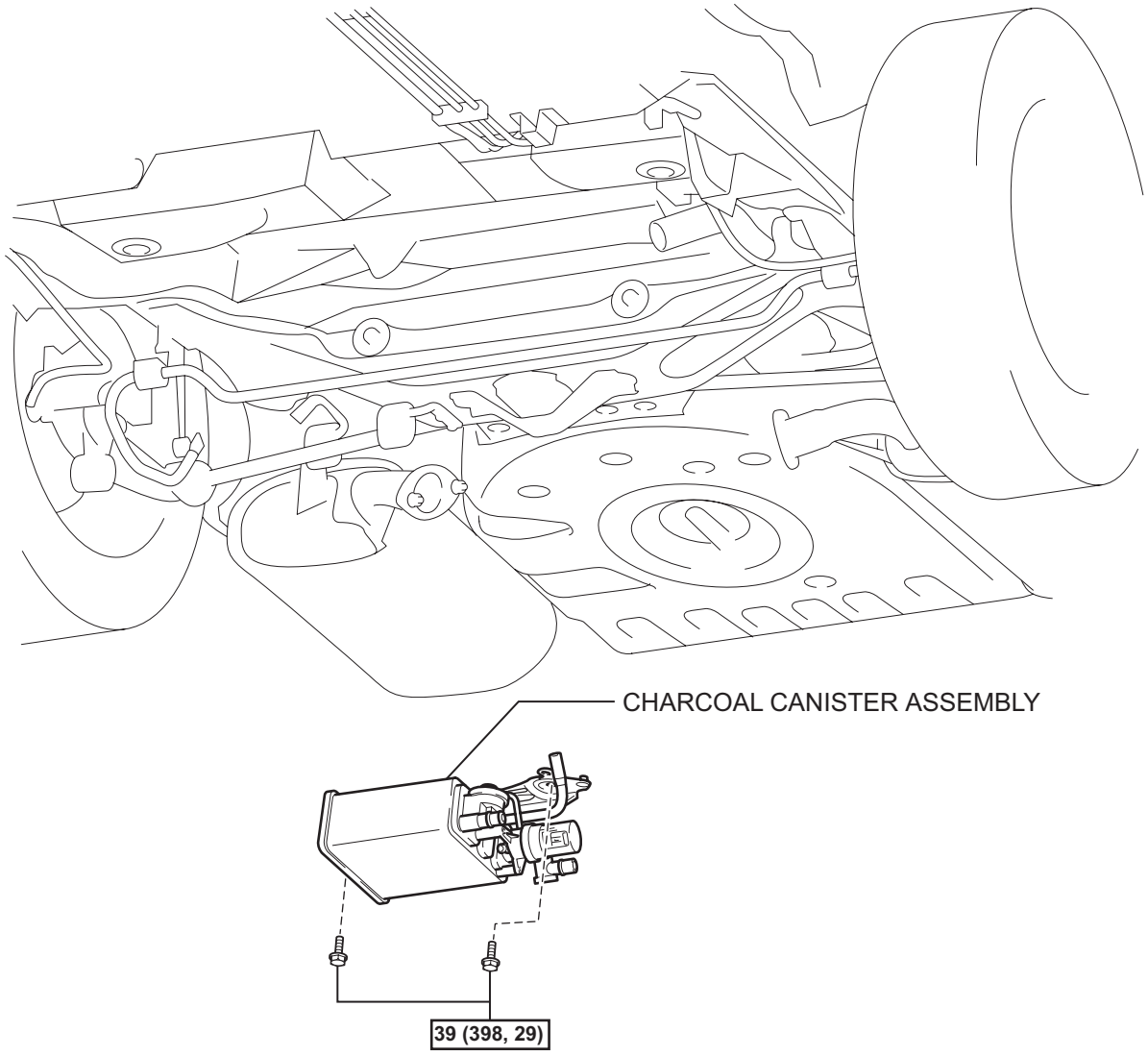
EC

except PZEV:



N*m (kgf*cm, ft.*lbf) : Specified torque

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REMOVAL

1. REMOVE FUEL TANK ASSEMBLY

HINT:

(See page FU-34)

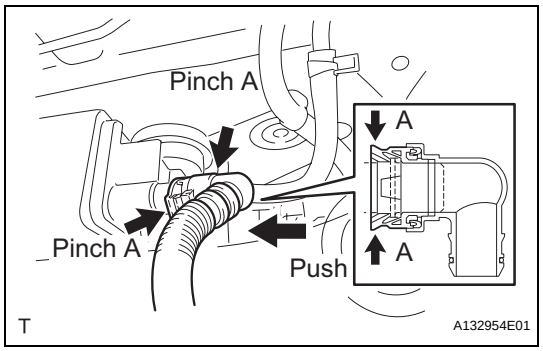
2. REMOVE CHARCOAL CANISTER ASSEMBLY

(a) Disconnect the fuel tank vent hose from the charcoal canister.

(1) Push the connector deep inside.

(2) Pinch portion A.

(3) Pull out the connector.



(b) Disconnect the charcoal canister filter sub-assembly from the charcoal canister.

(1) Push the connector deep inside.

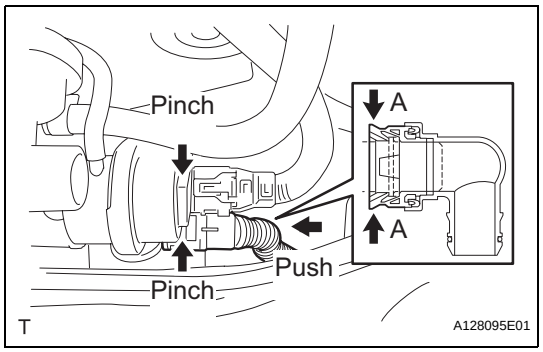
(2) Pinch portion A.

(3) Pull out the connector.

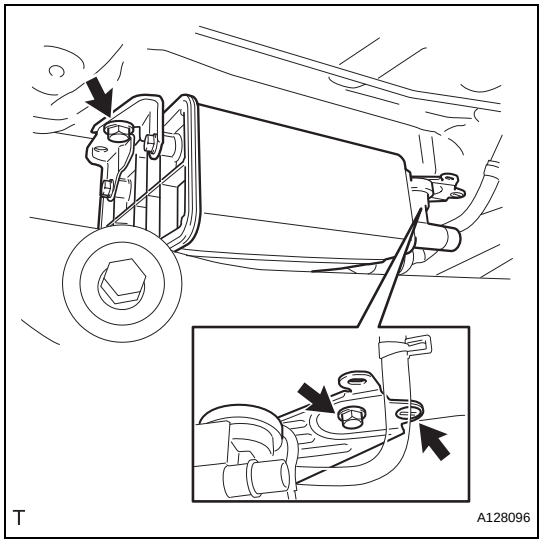
(c) Disconnect the vapor pressure sensor connector.

(d) Disconnect the wire harness clamp.

(e) Disconnect the purge line hose from the charcoal canister.



(f) Remove the 2 bolts, clip and charcoal canister.

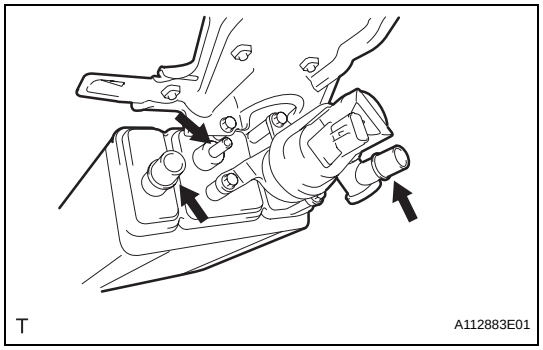


INSPECTION

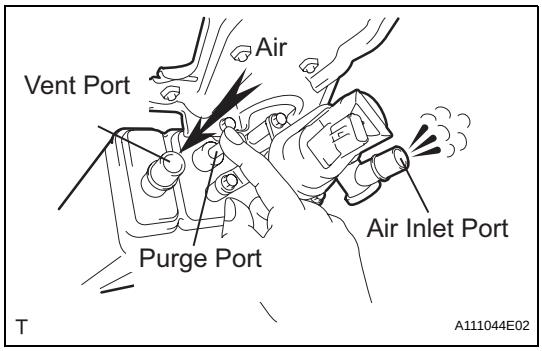
1. INSPECT CHARCOAL CANISTER ASSEMBLY

(a) Visually check the charcoal canister for cracks or damage.

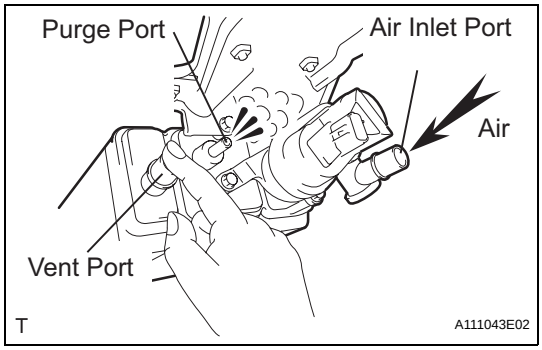
If cracks or damage are found, replace the charcoal canister assembly.



EC

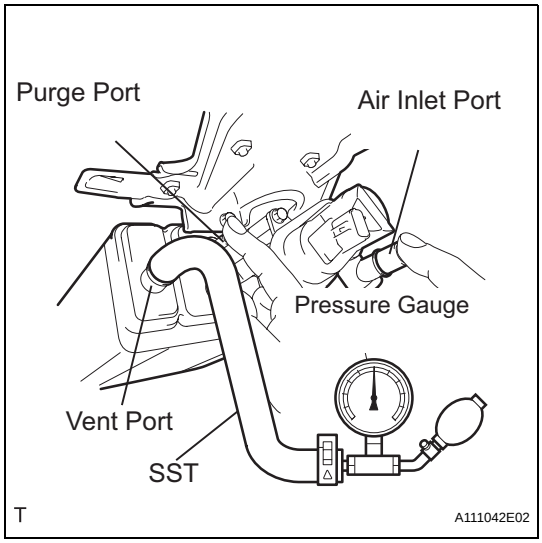


(b) Check charcoal canister operation.
(1) With the purge port closed, blow 1.10 kPa (11.2 gf/cm^2, 0.16 psi) of air into the vent port, and check that air flows from the air inlet port.
If the result is not as specified, replace the charcoal canister assembly.

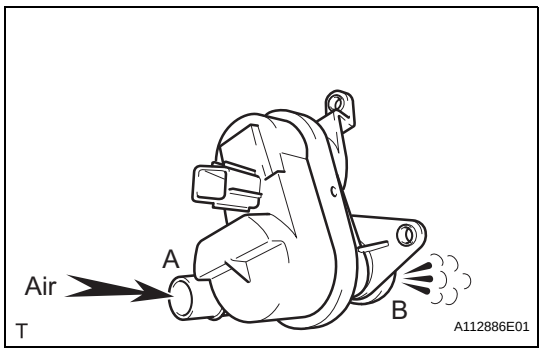


(2) With the vent port closed, blow 1.10 kPa (11.2 gf/cm^2, 0.16 psi) of air into the air inlet port, and check that air flows from the purge port.
If the result is not as specified, replace the charcoal canister assembly.

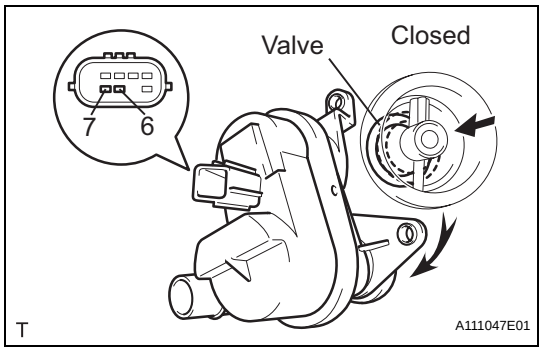
EC

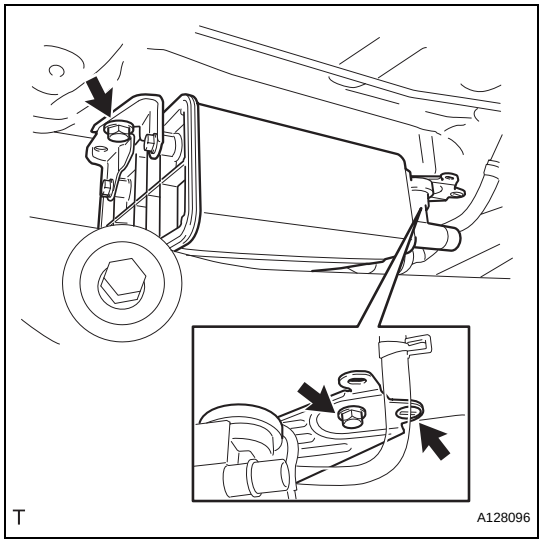


(c) Check for air leakage.
(1) With the purge port and air inlet port closed, apply 19.6 kPa (0.2 kgf/cm^2, 2.81 psi) of pressurized air into the vent port, then confirm that pressure is retained for 1 minute.
If the result is not as specified, replace the charcoal canister assembly.



(d) Check the leak detection pump.
(1) Remove the detection pump from the charcoal canister.
(2) Check that air flows from port A to B.
If the result is not as specified, replace the charcoal canister assembly.





(3) Connect the positive (+) lead of the battery to terminal 7 and the negative (-) lead to terminal 6.
(4) Check that the valve is closed.
If the result is not as specified, replace the charcoal canister assembly.
(5) Install the detection pump.

INSTALLATION

1. INSTALL CHARCOAL CANISTER ASSEMBLY

(a) Install the 2 bolts, clip and charcoal canister.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
(b) Connect the purge line hose to the charcoal canister.
(c) Connect the wire harness clamp.
(d) Connect the vapor pressure sensor connector.
(e) Connect the charcoal canister filter sub-assembly to the charcoal canister.
(f) Connect the fuel tank vent hose to the charcoal canister.

2. INSTALL FUEL TANK ASSEMBLY

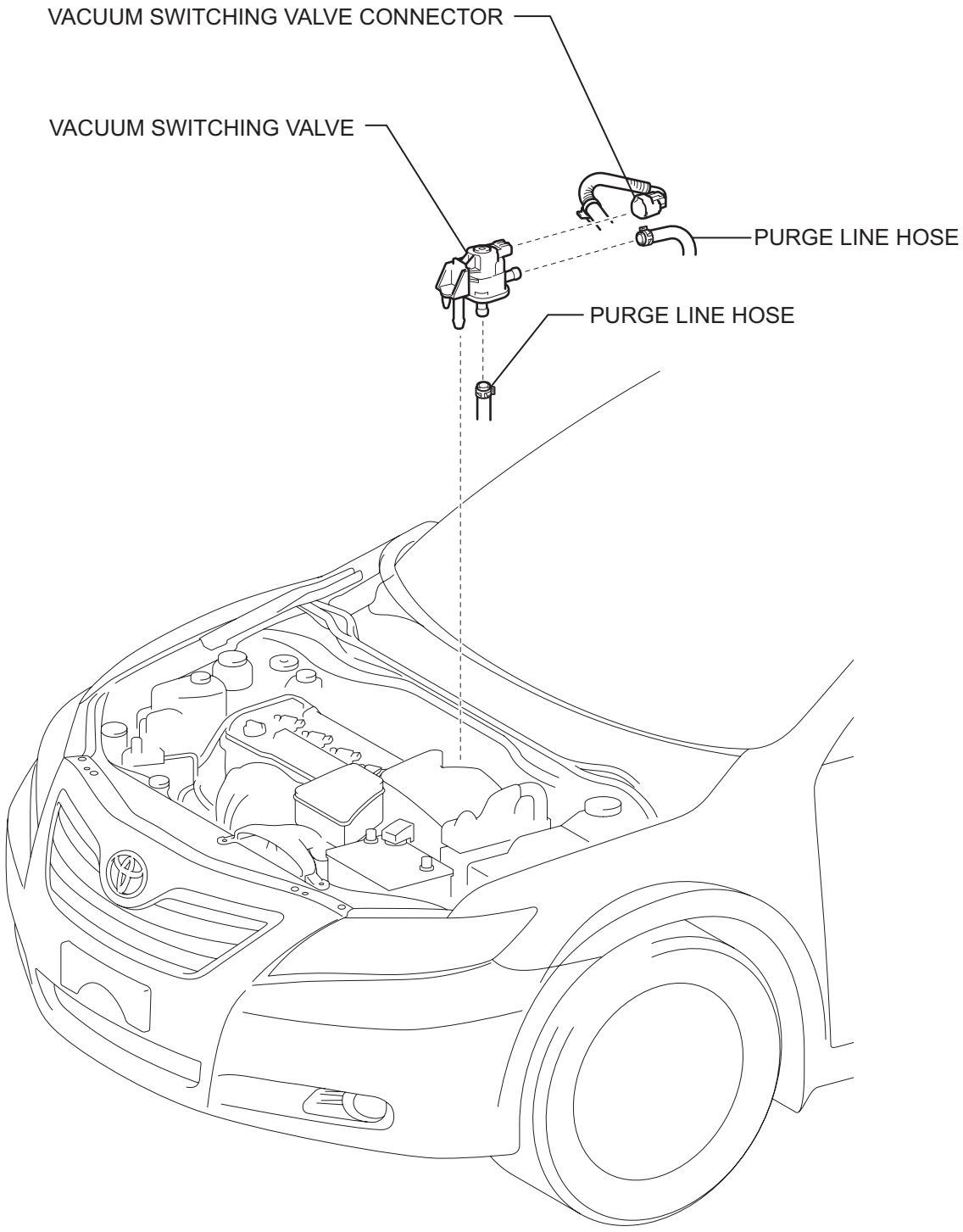
HINT:
(See page FU-39)

3. CHECK FOR EXHAUST GAS LEAKS

EC

VACUUM SWITCHING VALVE

COMPONENTS



EC

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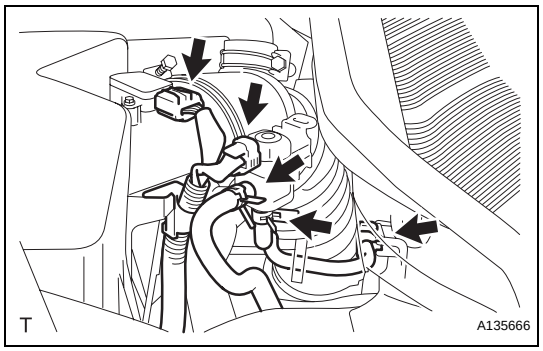


REMOVAL

1. REMOVE VACUUM SWITCHING VALVE

(a) Disconnect the vacuum switching valve connector.
(b) Disconnect the wire harness clamp.
(c) Disconnect the 2 purge line hoses from the purge VSV.
(d) Remove the vacuum switching valve.

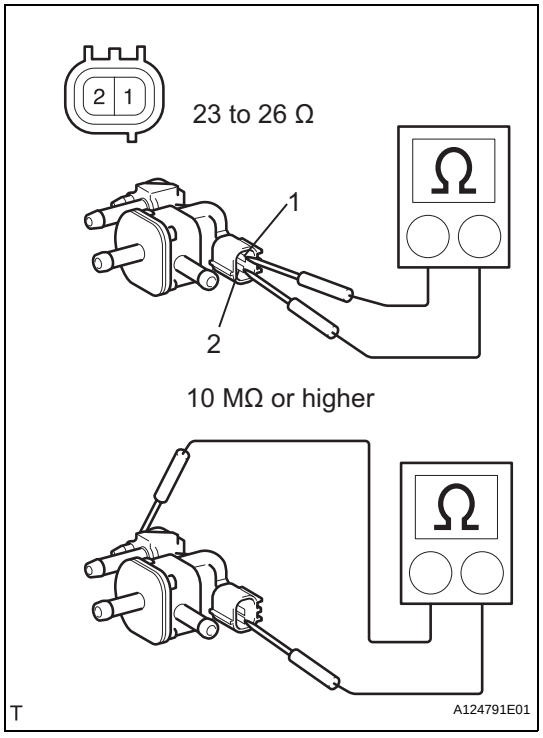
INSPECTION

1. INSPECT VACUUM SWITCHING VALVE

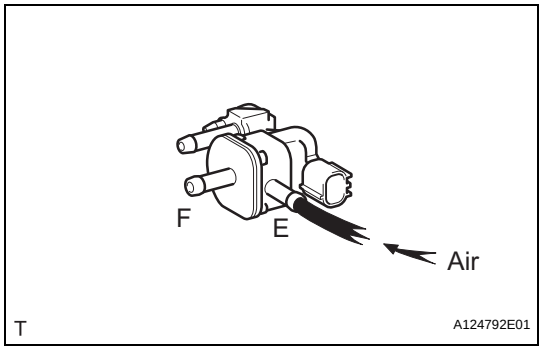
(a) Measure the resistance of the purge VSV.
Standard resistance

Tester Connection	Specified Condition
1 - 2	23 to 26 Ω at 20°C (68°F)
1 - Body ground 2 - Body ground	10 MΩ or higher

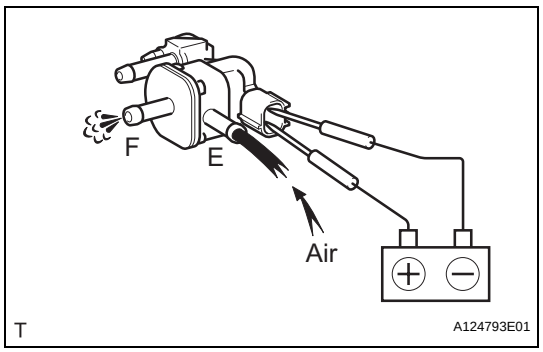
If the result is not as specified, replace the purge VSV.



(b) Check the operation of the purge VSV.
(1) Check that air does not flow from port E to port F.



(2) Apply battery voltage across the terminals.
(3) Check that air flows from port E to port F.
If the result is not as specified, replace the purge VSV.



EC

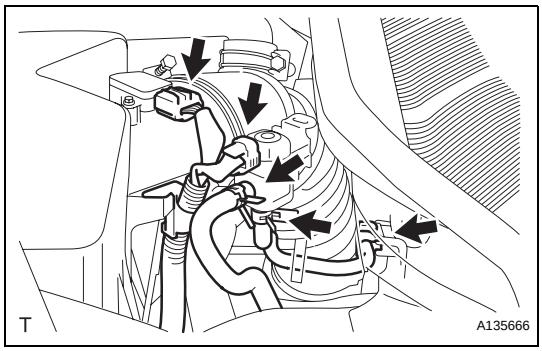
INSTALLATION

1. REMOVE VACUUM SWITCHING VALVE

(a) Install the vacuum switching valve onto the air cleaner hose.

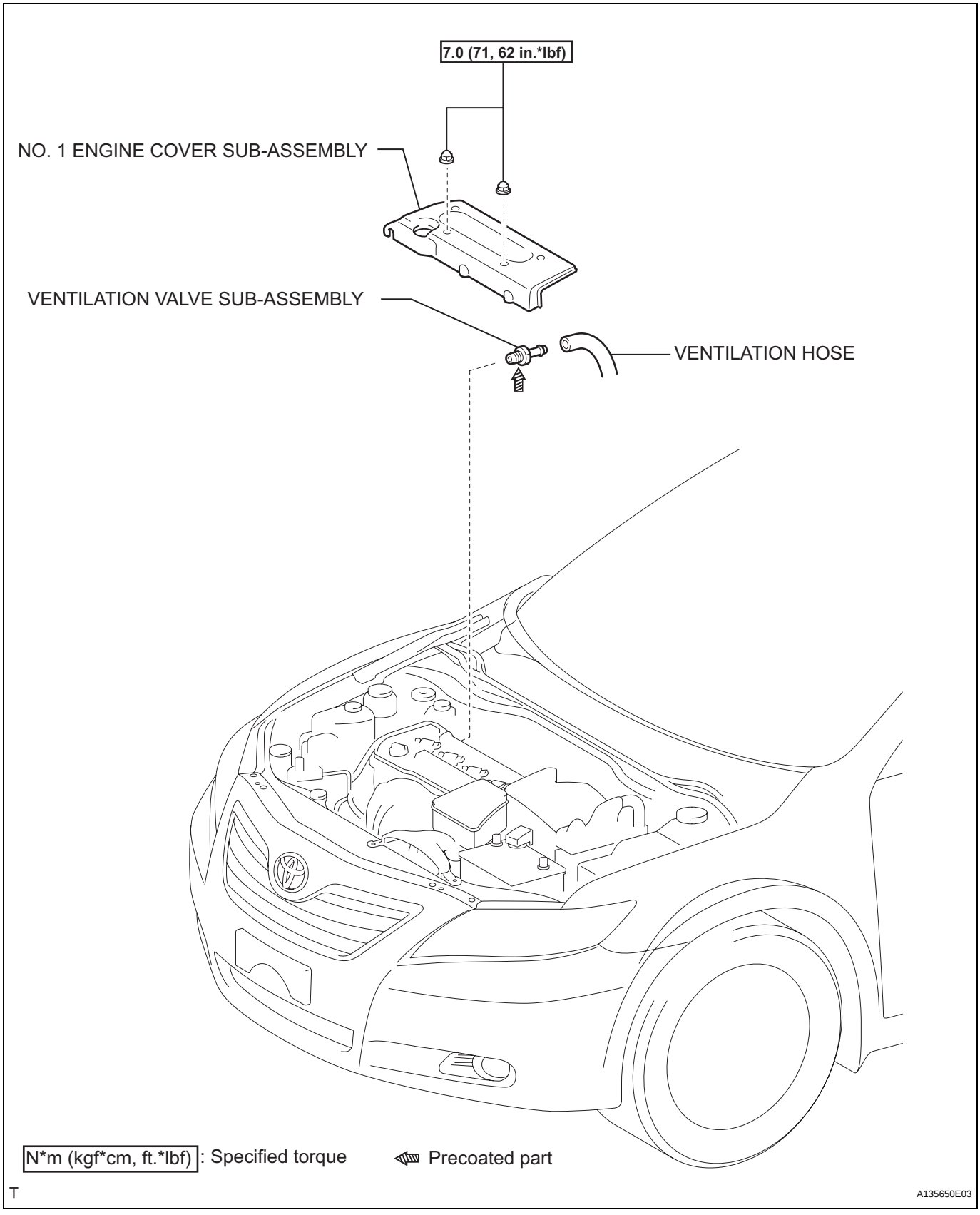
(b) Connect the 2 purge line hoses to the vacuum switching valve.

(c) Connect the vacuum switching valve connector.



VENTILATION VALVE

COMPONENTS



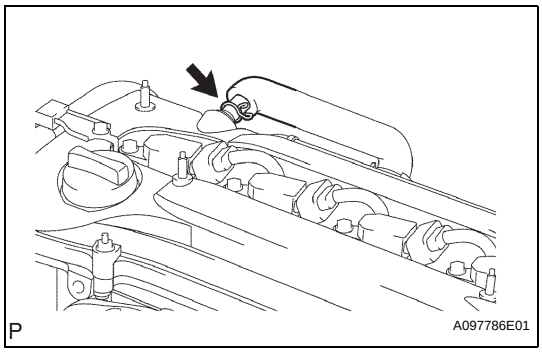
EC

REMOVAL

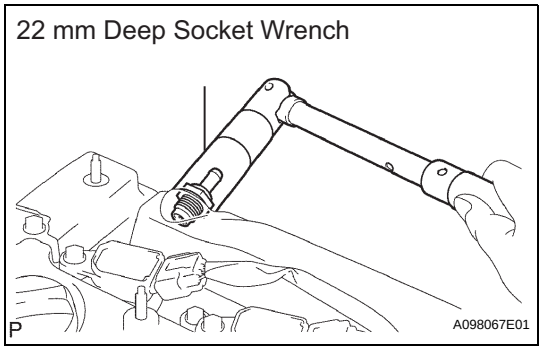
1. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY

2. REMOVE VENTILATION VALVE SUB-ASSEMBLY

(a) Disconnect the ventilation hose from the ventilation valve sub-assmbly.



(b) Using a 22 mm deep socket wrench, remove the ventilation valve sub-assembly.



EC

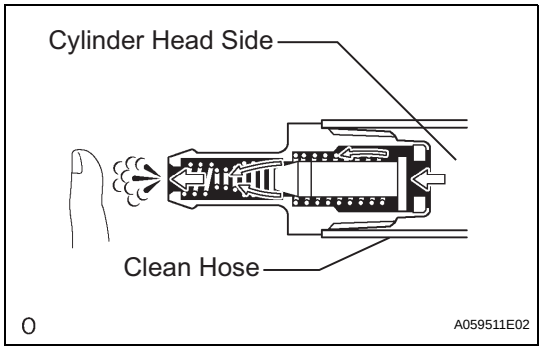
INSPECTION

1. INSPECT VENTILATION VALVE SUB-ASSEMBLY

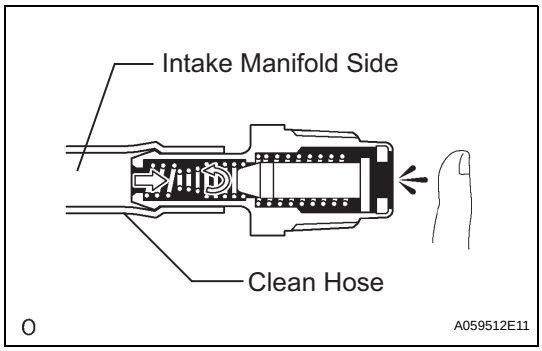
(a) Install a clean hose to the ventilation valve.

(b) Inspect the ventilation valve operation.

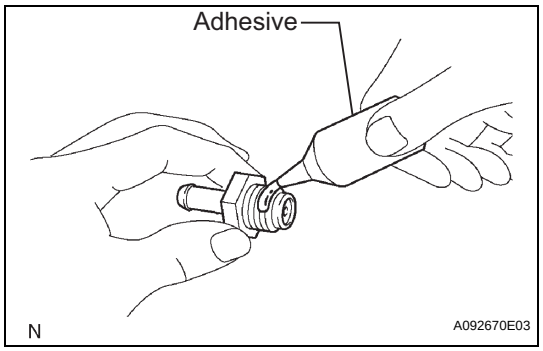
(1) Blow air into the cylinder head side, and check that air passes through easily.
NOTICE:
Do not suck air through the valve.
Petroleum substances inside the valve are hazardous to your health.



(2) Blow air into the intake manifold side, and check that air passes through with difficulty.
If the result is not as specified, replace the ventilation valve.



(c) Remove the clean hose from the ventilation valve.



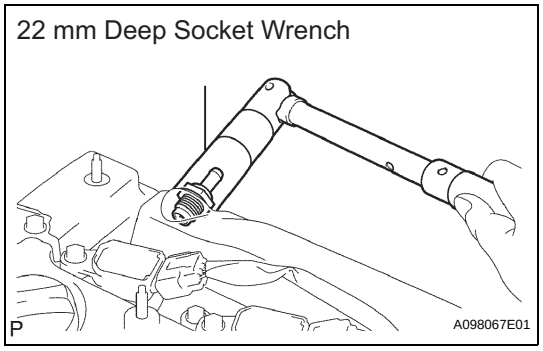
INSTALLATION

1. INSTALL VENTILATION VALVE SUB-ASSEMBLY

(a) Apply adhesive to 2 or 3 threads of the ventilation valve.

Adhesive:

Toyota genuine adhesive 1324, three bond 1324 or equivalent



(b) Using a 22 mm deep socket wrench, install the ventilation valve.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

(c) Connect the ventilation hose.

2. INSTALL ENGINE COVER SUB-ASSEMBLY

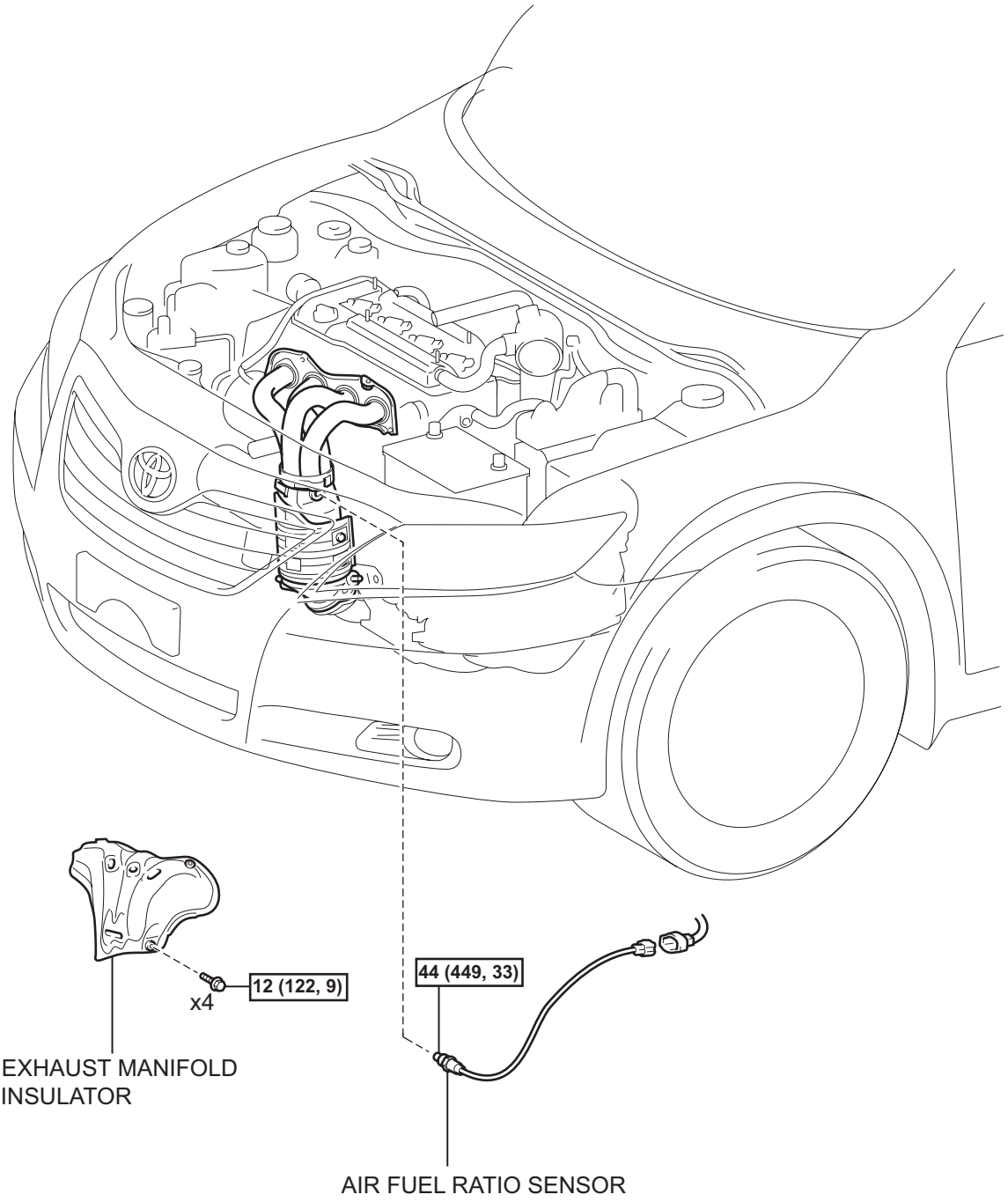
3. CHECK FOR ENGINE OIL LEAKS

EC

AIR FUEL RATIO SENSOR

COMPONENTS

except PZEV :



N*m (kgf*cm, ft.*lbf) : Specified torque

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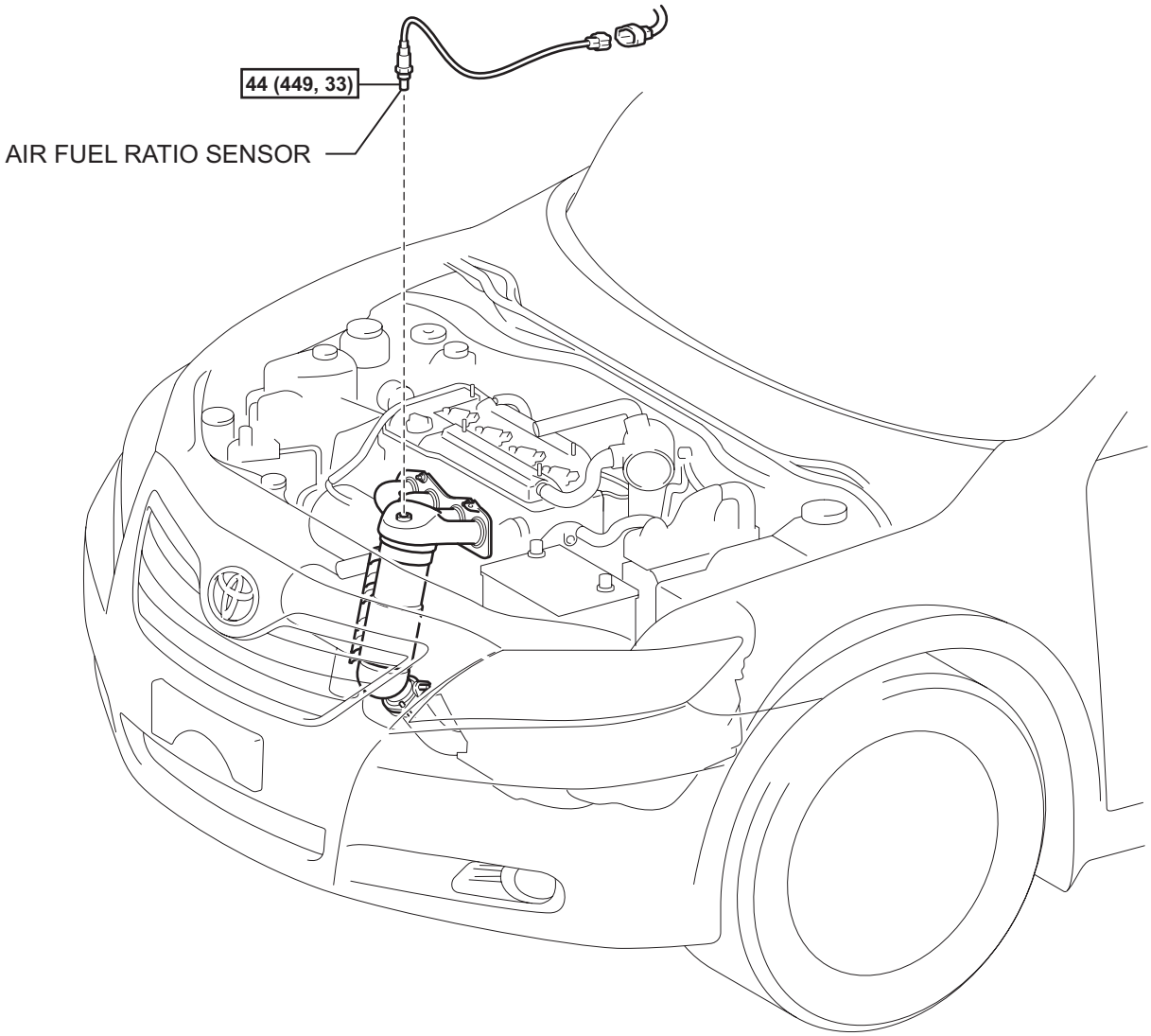
for PZEV :



N*m (kgf*cm, ft.*lbf) : Specified torque

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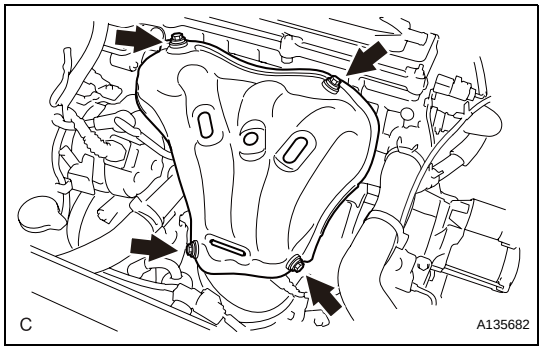
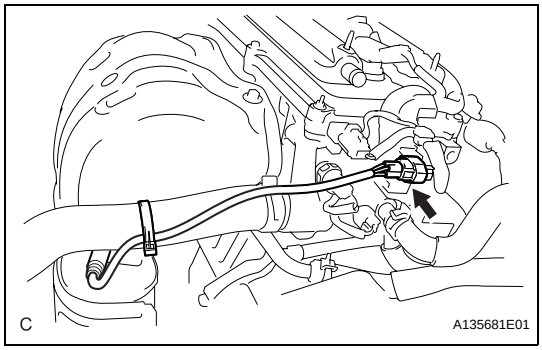


REMOVAL

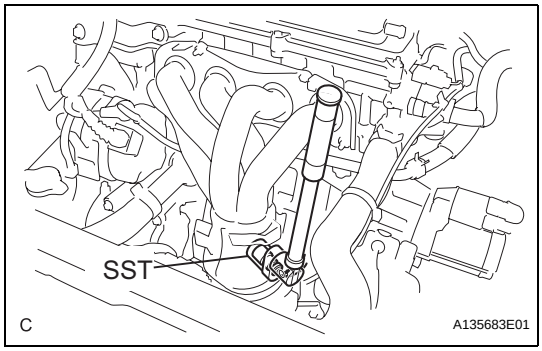
1. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR (except PZEV)

(a) Remove the 4 bolts and No. 1 exhaust manifold heat insulator.



2. REMOVE AIR FUEL RATIO SENSOR (except PZEV)

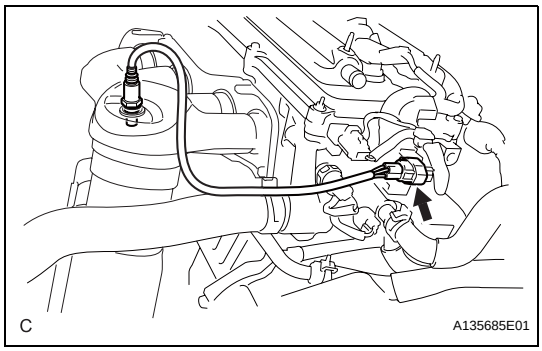
(a) Disconnect the air fuel ratio sensor connector and clamp.



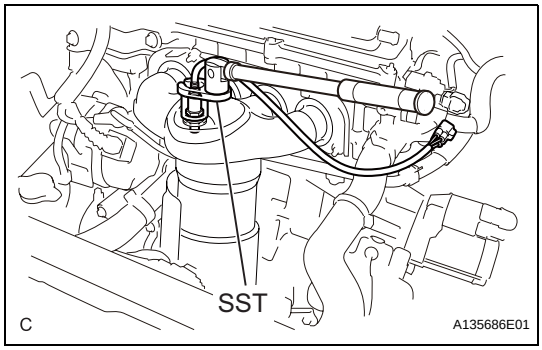
(b) Using SST, remove the air fuel ratio sensor from the exhaust manifold converter sub-assembly No. 2.
SST 09224-00010
NOTICE:
Do not damage the air fuel ratio sensor.

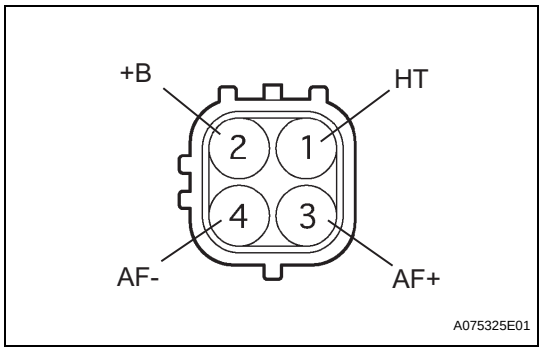
3. REMOVE AIR FUEL RATIO SENSOR (for PZEV)

(a) Disconnect the air fuel ratio sensor connector.



(b) Using SST, remove the air fuel ratio sensor.
SST 09224-00010
NOTICE:
Do not damage the air fuel ratio sensor.





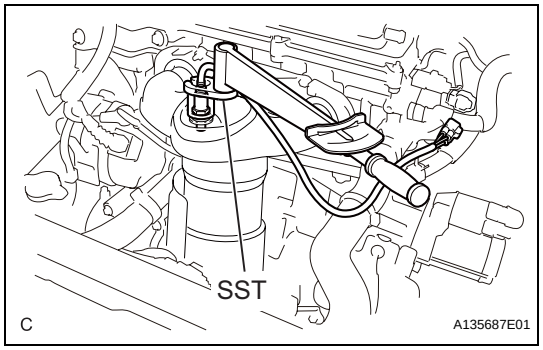
INSPECTION

1. INSPECT AIR FUEL RATIO SENSOR

(a) Using an ohmmeter, measure the resistance between terminals 1 (HT) and 2 (+B).
Standard resistance

Condition	Specified Condition
20°C (68°F)	1.8 to 3.4 Ω

If the result is not as specified, replace the sensor.

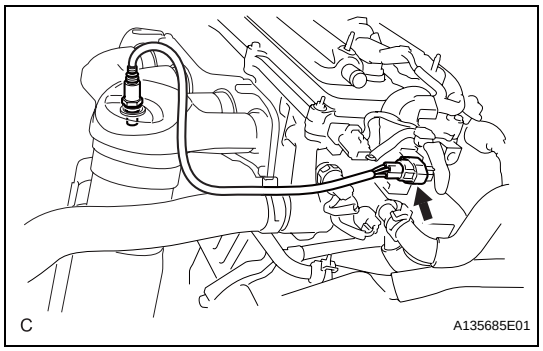


INSTALLATION

1. INSTALL AIR FUEL RATIO SENSOR (for PZEV)

(a) Temporarily tighten the air fuel ratio sensor.
NOTICE:
Do not damage the air fuel ratio sensor.

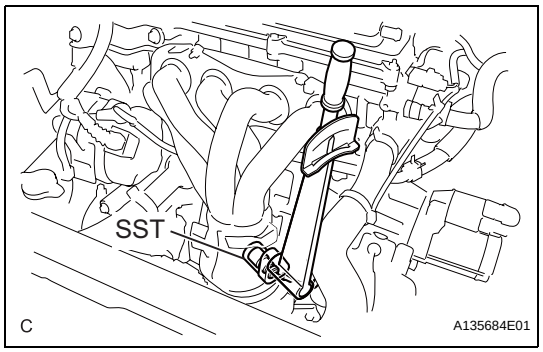
(b) Using SST, fully tighten the air fuel ratio sensor.
SST 09224-00010
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



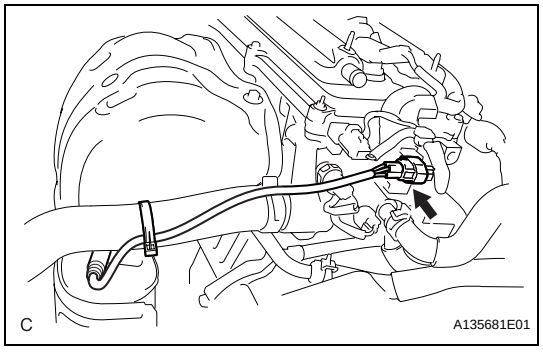
(c) Connect the air fuel ratio sensor connector and clamp.

2. INSTALL AIR FUEL RATIO SENSOR (except PZEV)

(a) Temporarily tighten the air fuel ratio sensor.
NOTICE:
Do not damage the air fuel ratio sensor.

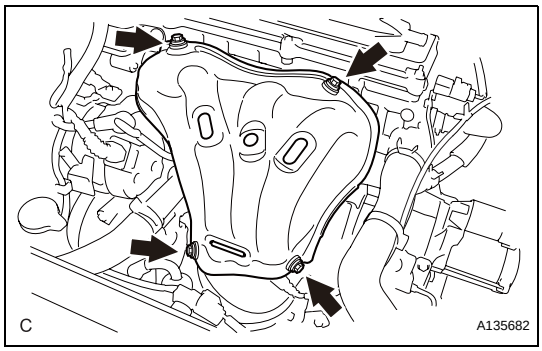


(b) Using SST, fully tighten the air fuel ratio sensor.
SST 09224-00010
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



(c) Connect the air fuel ratio sensor connector and clamp.

EC

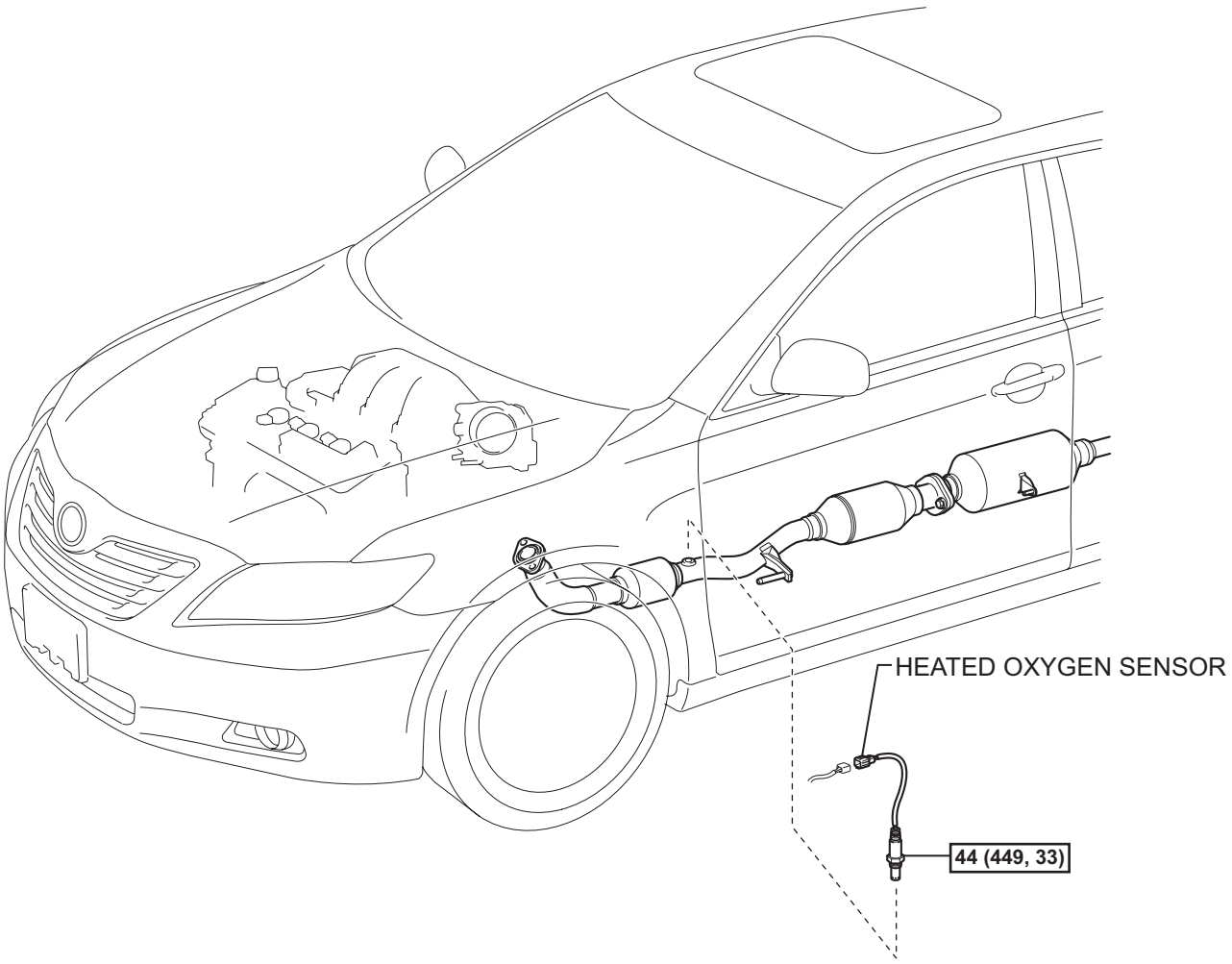


3. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR (except PZEV)

(a) Install the exhaust manifold heat insulator with the 4 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

HEATED OXYGEN SENSOR

COMPONENTS

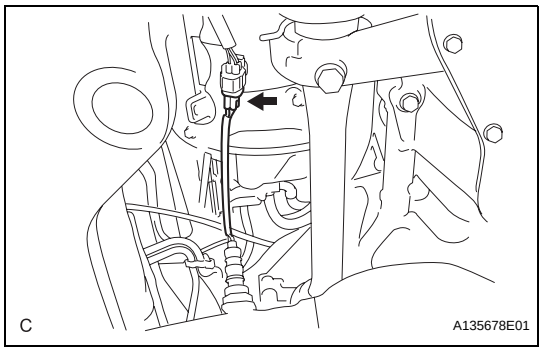


N*m (kgf*cm, ft.*lbf): Specified torque

C

A135656E02

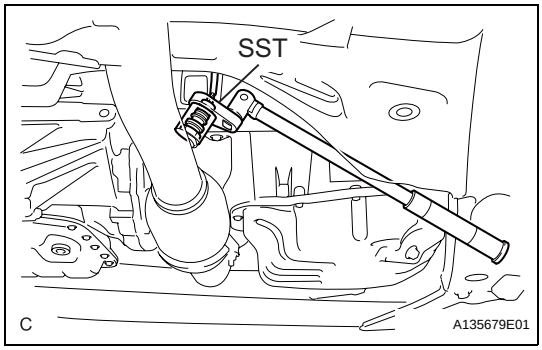
EC



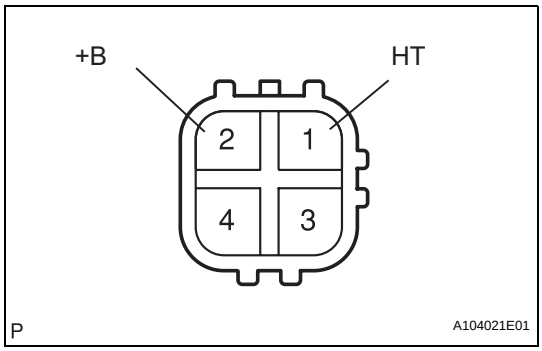
REMOVAL

1. REMOVE HEATED OXYGEN SENSOR

(a) Disconnect the heated oxygen sensor connector.



(b) Using SST, remove the heated oxygen sensor from the exhaust pipe assembly front No. 3.
SST 09224-00010
NOTICE:
Do not damage the heated oxygen sensor.



INSPECTION

1. INSPECT HEATED OXYGEN SENSOR

(a) Measure the resistance between terminals 1 (HT) and 2 (+B).
Standard resistance

Condition	Specified Condition
20°C (68°F)	11 to 16 Ω

If the resistance is not as specified, replace the sensor.

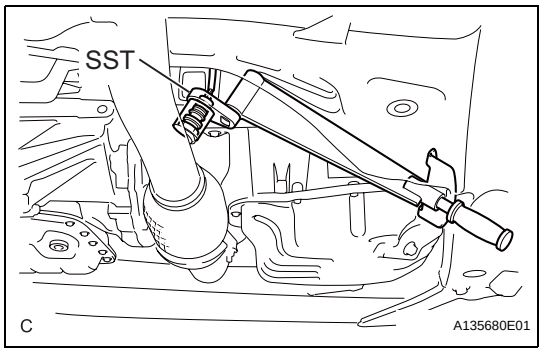
EC

INSTALLATION

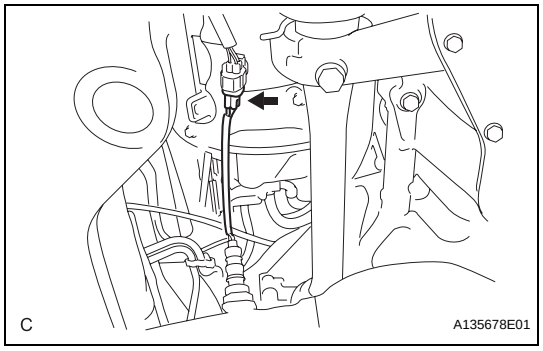
1. INSTALL HEATED OXYGEN SENSOR

(a) Temporarily tighten the heated oxygen sensor.
NOTICE:
Do not damage the heated oxygen sensor.

(b) Using SST, fully tighten the heated oxygen sensor.
SST 09224-00010
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



(c) Connect the heated oxygen sensor connector.



EC

SFI SYSTEM

PRECAUTION

NOTICE:

- **Perform RESET MEMORY (AT initialization) when replacing the automatic transmission assembly, engine assembly or ECM (See page AX-16).**
- **Perform REGISTRATION (VIN registration) when replacing the ECM (See page ES-16).**

HINT:

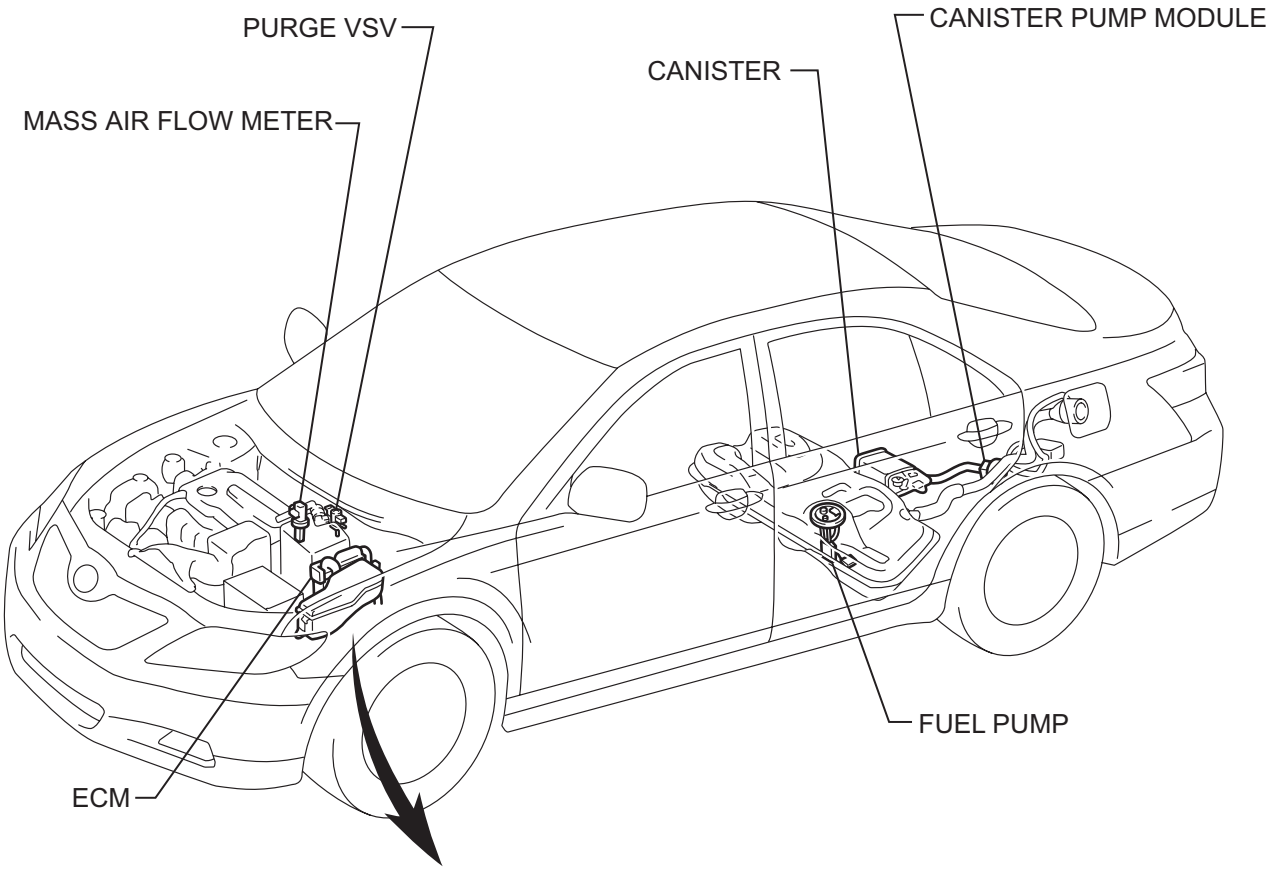
Initialization cannot be completed by removing the battery.

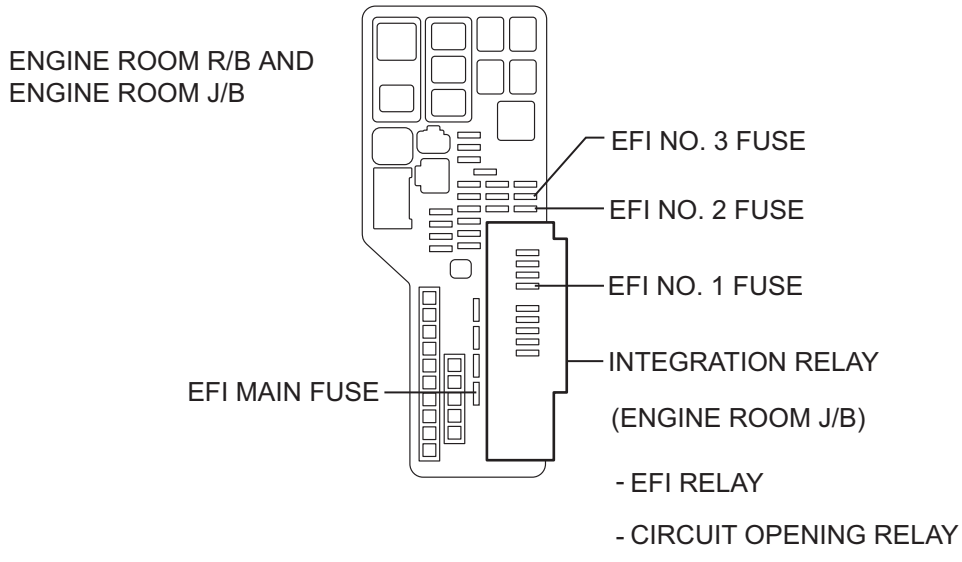
DEFINITION OF TERMS

Terms	Definition
Monitor Description	Description of what ECM monitors and how detects malfunctions (monitoring purpose and details).
Related DTCs	Group of diagnostic trouble codes that are output by ECM based on the same malfunction detection logic.
Typical Enabling Condition	Preconditions that allow ECM to detect malfunctions. With all preconditions satisfied, ECM sets DTC when monitored value(s) exceeds malfunction threshold(s).
Sequence of Operation	Order of monitor priority, applied if multiple sensors and components involved in single malfunction detection process. Each sensor and component monitored in turn, when previous detection operation is completed.
Required Sensor/Components	Sensors and components used by ECM to detect each malfunction.
Frequency of Operation	Number of times ECM checks for each malfunction during each driving cycle. "Once per driving cycle" means ECM only performs checks for that malfunction once in single driving cycle. "Continuous" means ECM performs checks for that malfunction whenever enabling conditions are met.
Duration	Minimum time for which ECM must detect continuous deviation in monitored value(s) in order to set DTC. Timing begins when Typical Enabling Conditions are met.
Malfunction Thresholds	Value, beyond which, ECM determines malfunctions exist and sets DTCs.
MIL Operation	Timing of MIL illumination after malfunction is detected. "Immediate" means ECM illuminates MIL as soon as malfunction is detected. "2 driving cycle" means ECM illuminates MIL if the same malfunction is detected second time in the next sequential driving cycle.

PARTS LOCATION

PZEV:



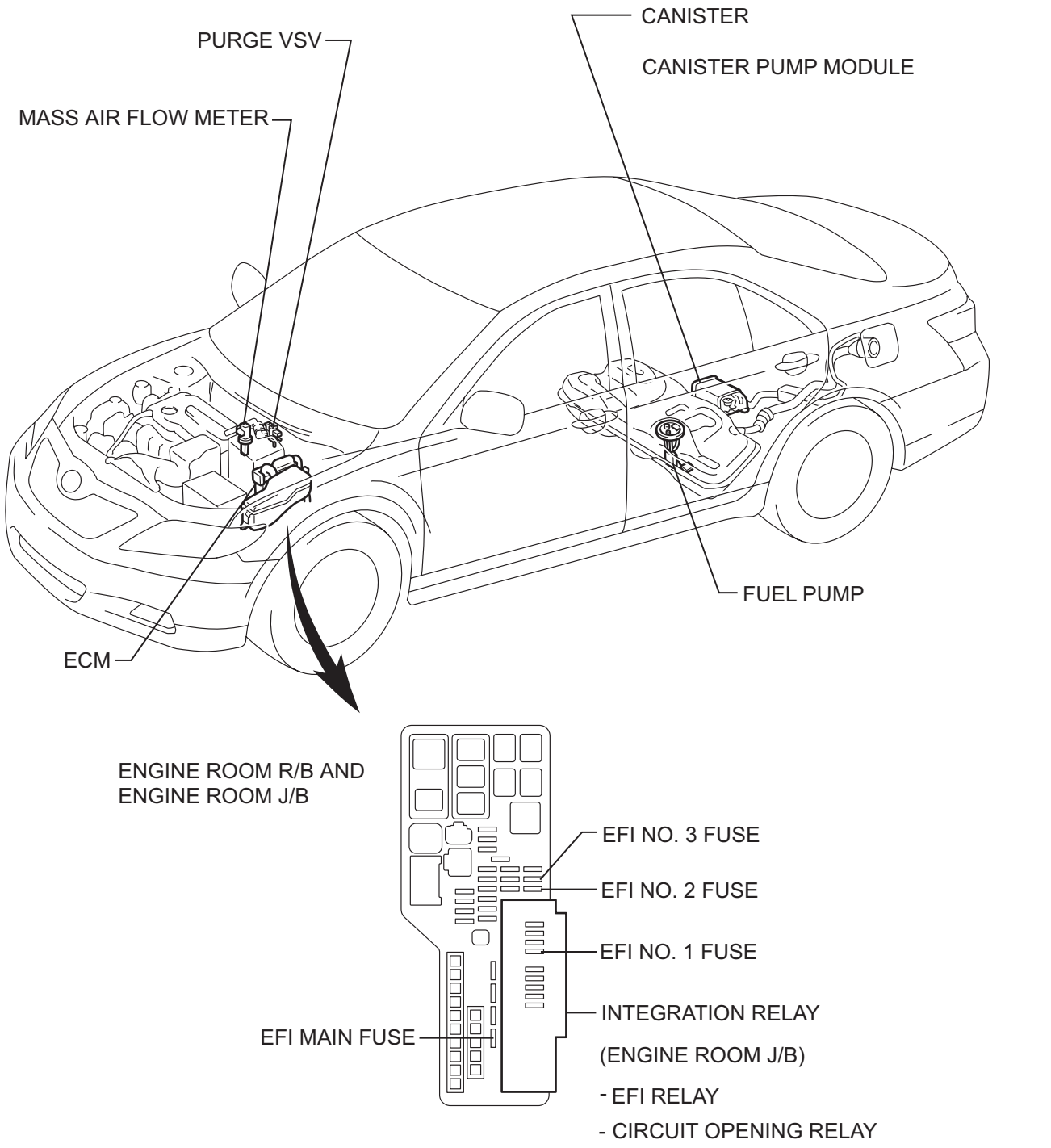


N

A137360E01

ES

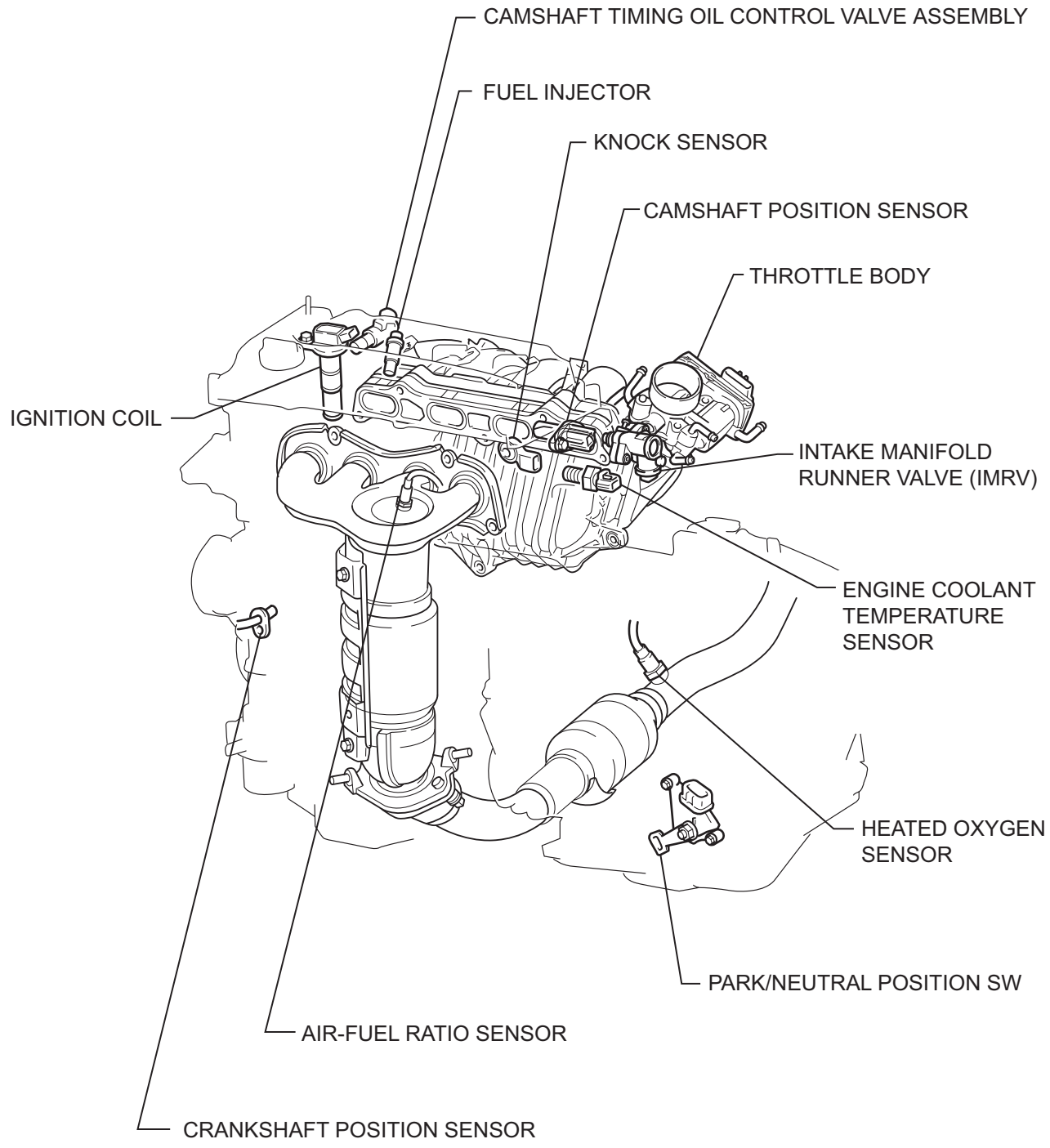
EXCEPT PZEV:



N

A137361E01

PZEV:



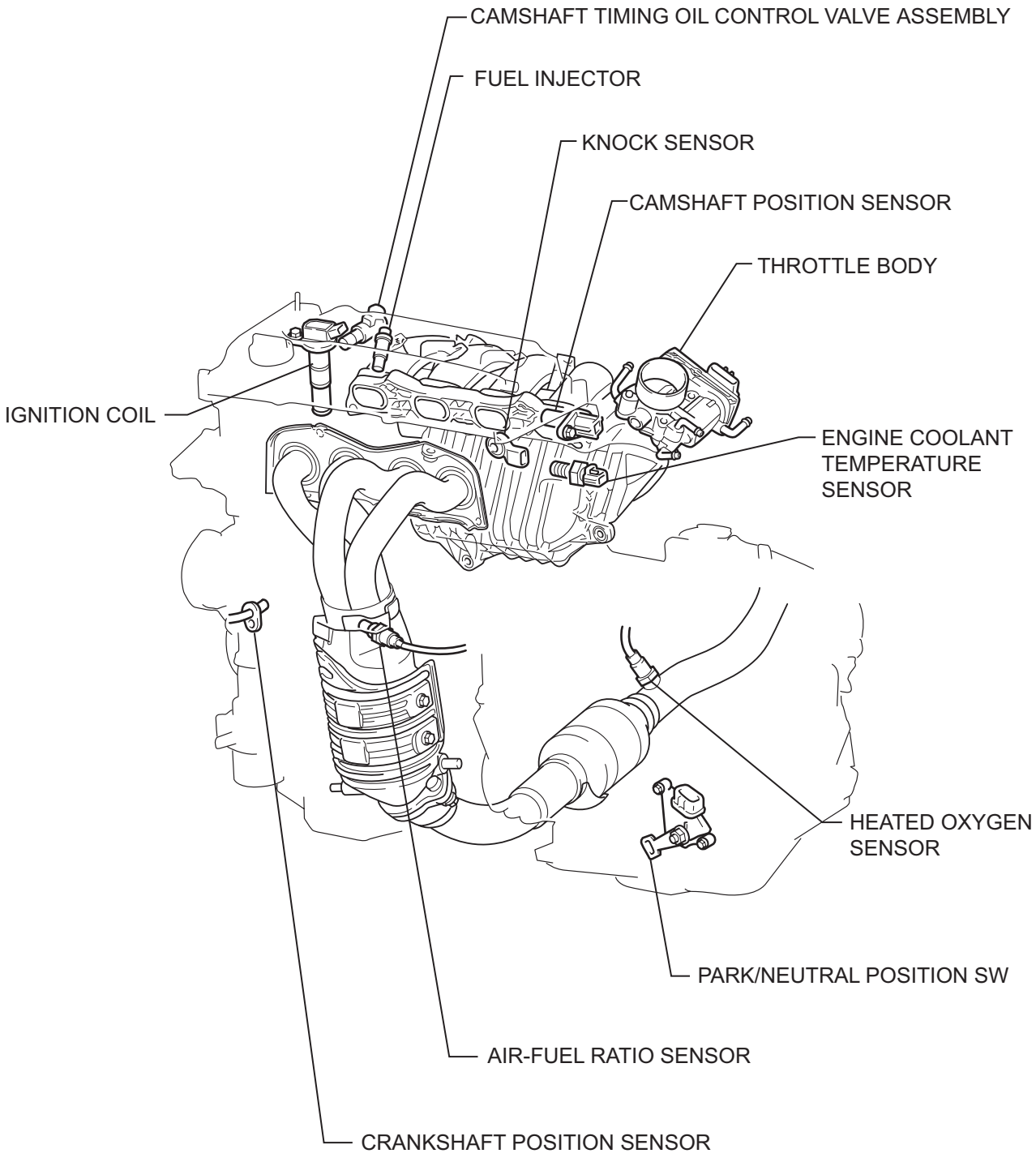
N

A135059E01

ES

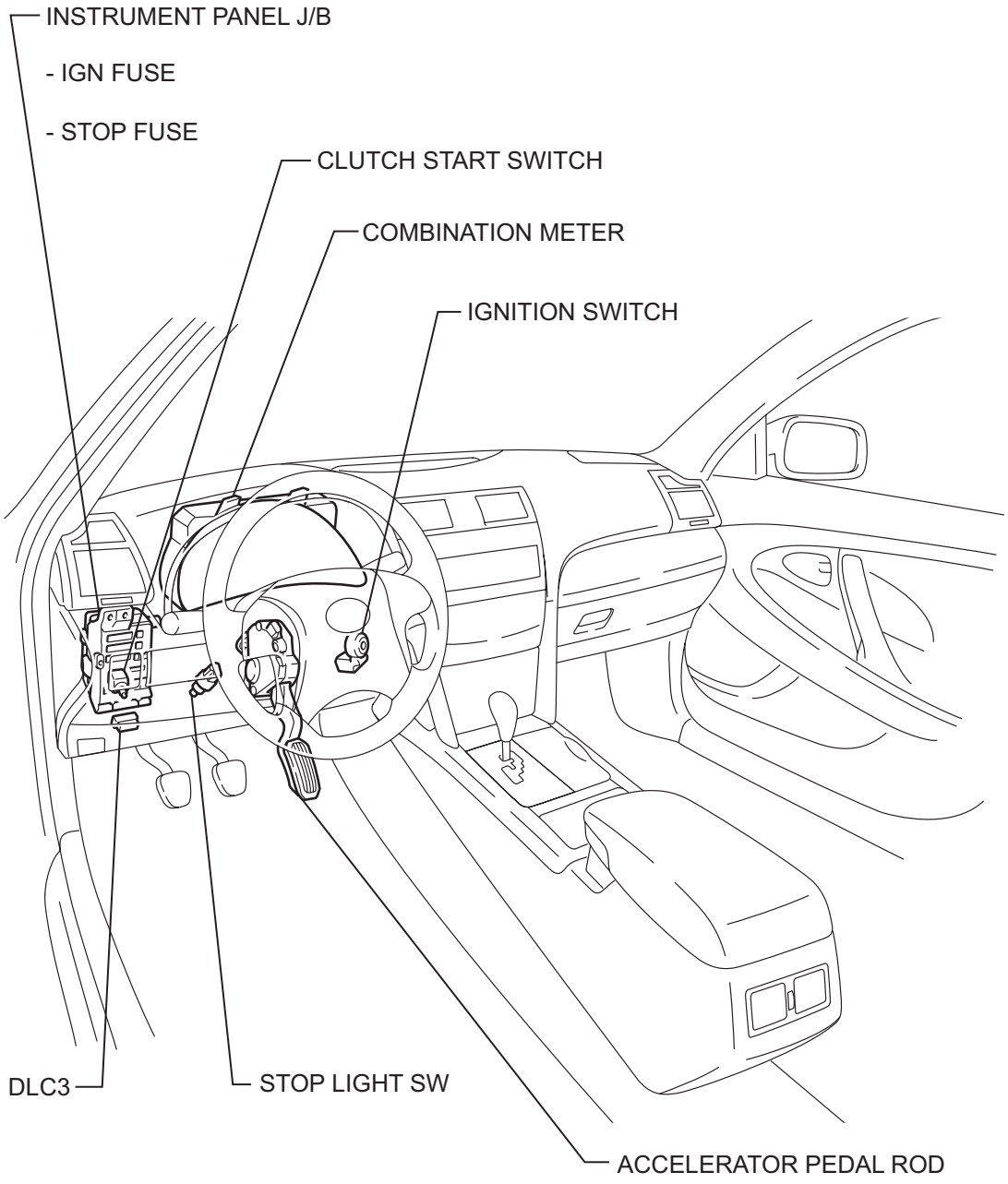
ES

EXCEPT PZEV:



N

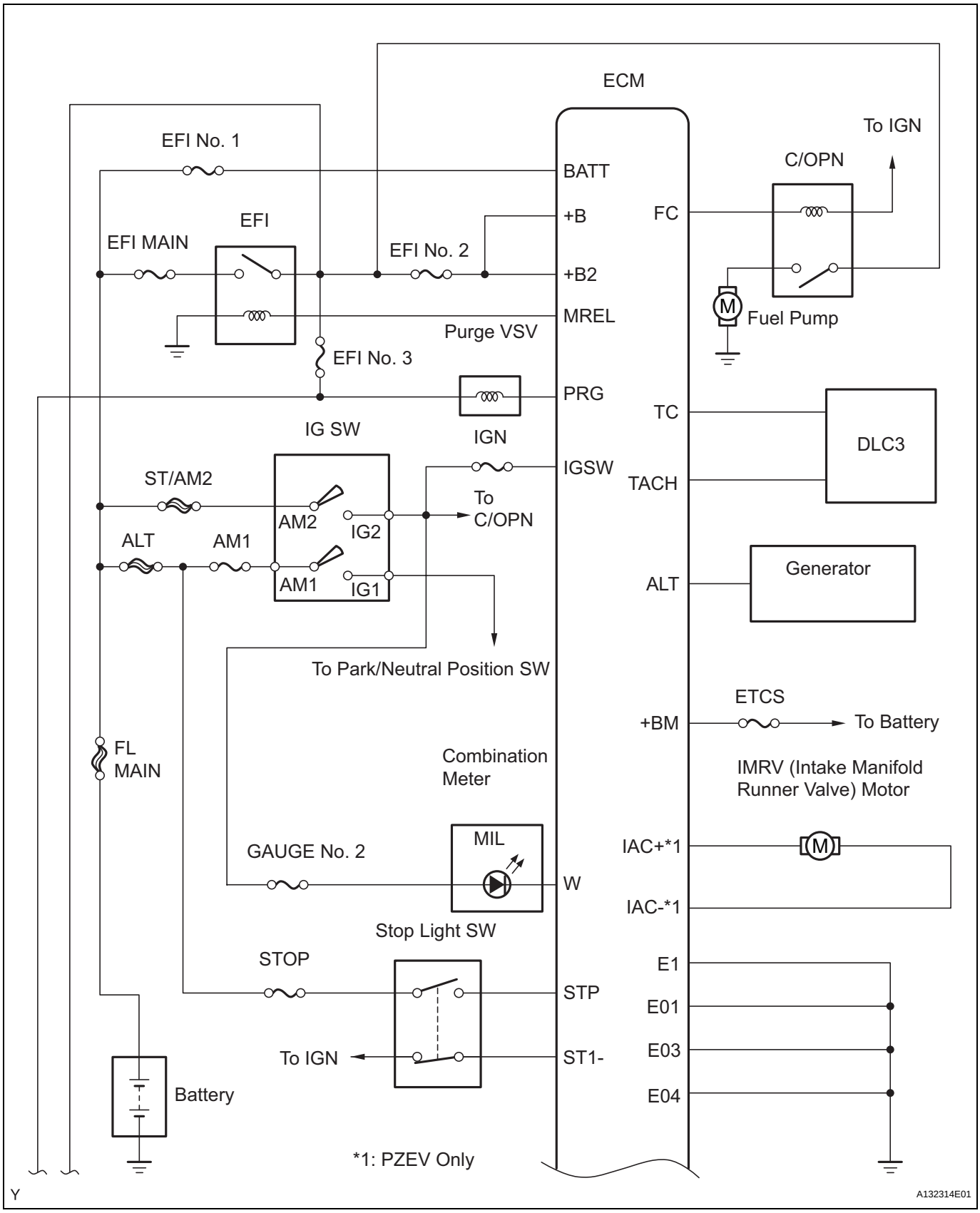
A132270E01

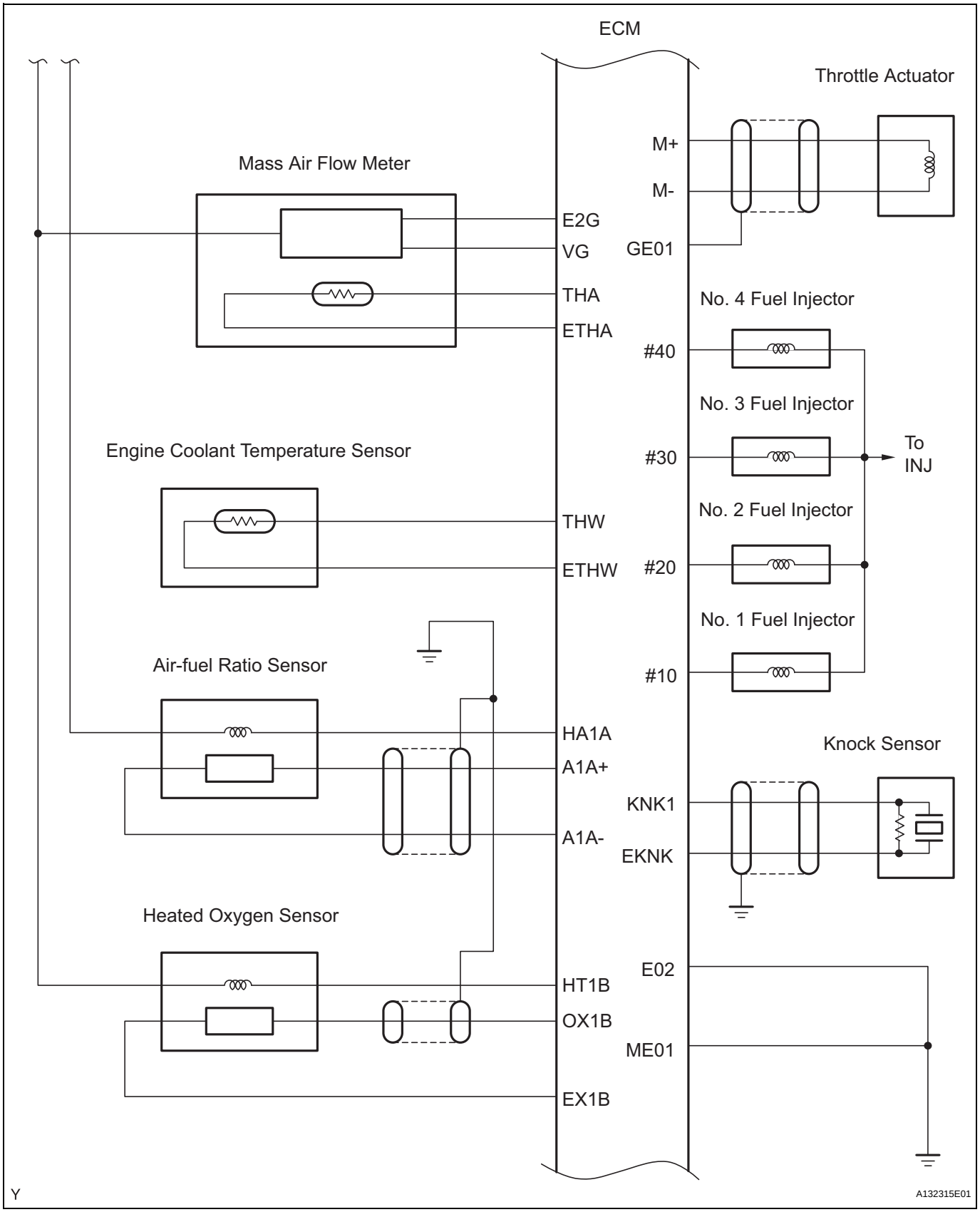


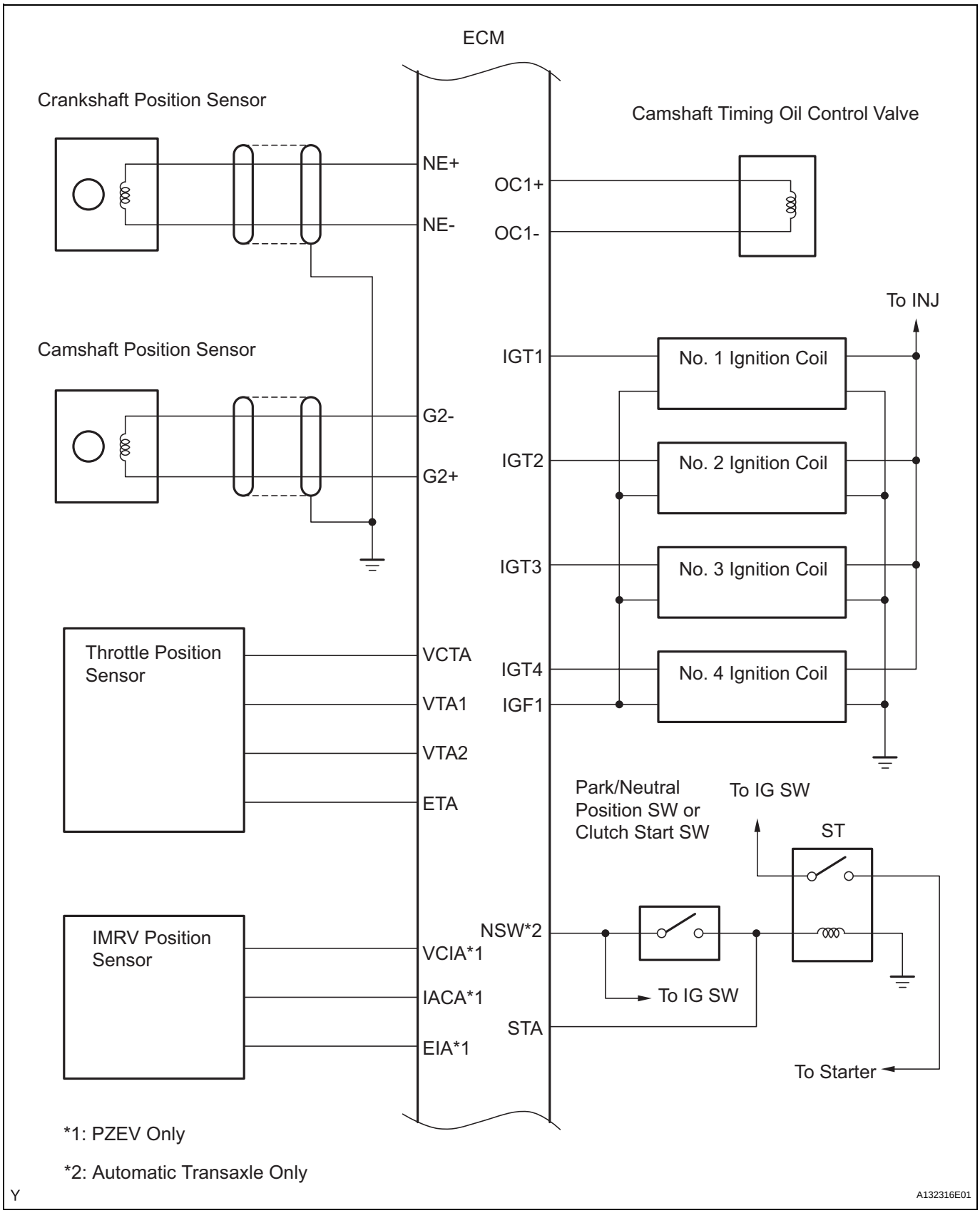
N

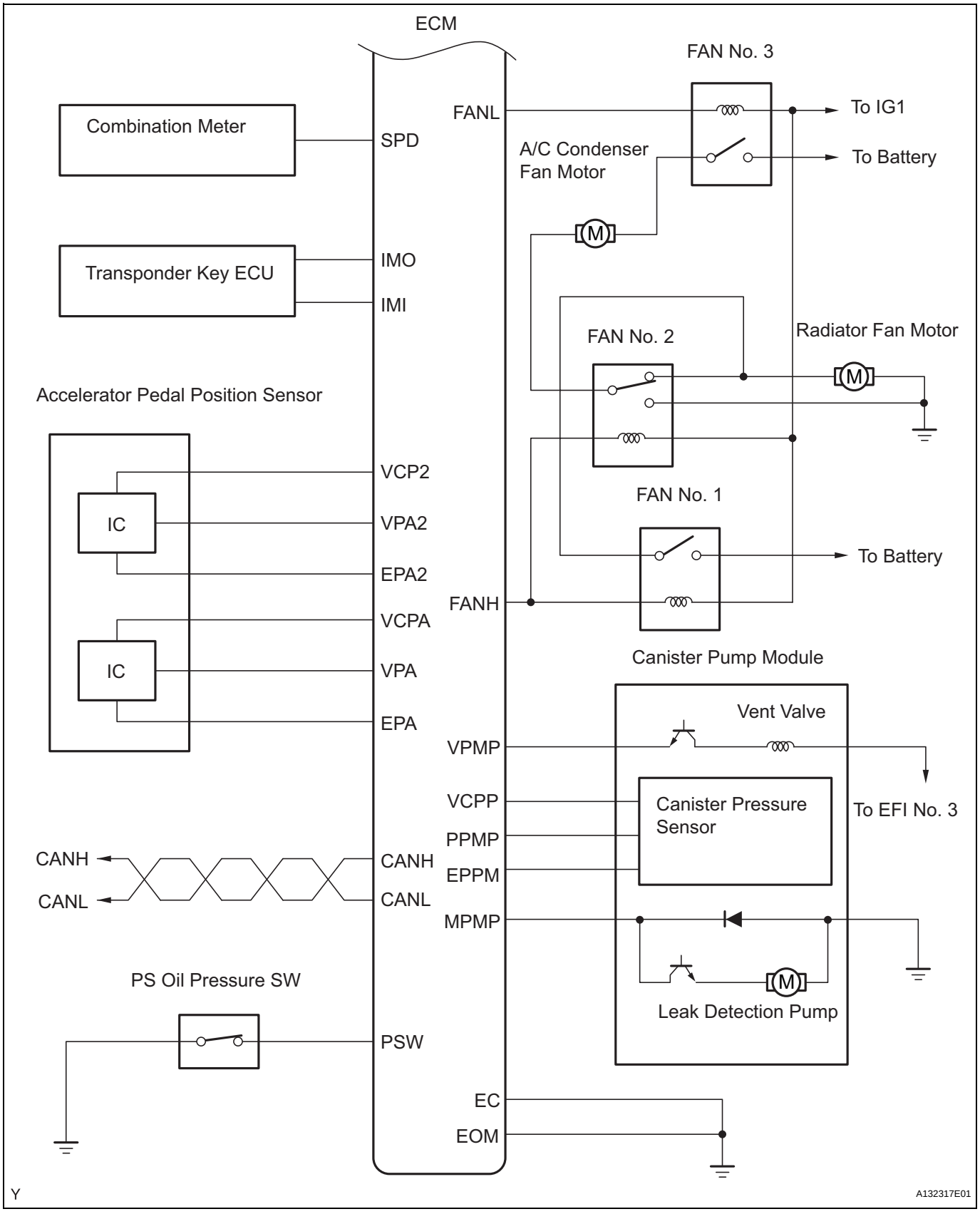
A132271E01

SYSTEM DIAGRAM




ECM
Throttle Actuator
M+
M-
GE01
Mass Air Flow Meter
E2G
VG
THA
ETHA
No. 4 Fuel Injector
#40
No. 3 Fuel Injector
#30
To INJ
Engine Coolant Temperature Sensor
THW
ETHW
No. 2 Fuel Injector
#20
No. 1 Fuel Injector
#10
Air-fuel Ratio Sensor
HA1A
A1A+
A1A-
Knock Sensor
KNK1
EKNK
Heated Oxygen Sensor
HT1B
OX1B
EX1B
E02
ME01
Y
A132315E01


ECM
Crankshaft Position Sensor
NE+
NE-
Camshaft Timing Oil Control Valve
OC1+
OC1-
To INJ
Camshaft Position Sensor
G2-
G2+
IGT1
No. 1 Ignition Coil
IGT2
No. 2 Ignition Coil
IGT3
No. 3 Ignition Coil
IGT4
IGF1
No. 4 Ignition Coil
Throttle Position Sensor
VCTA
VTA1
VTA2
ETA
Park/Neutral Position SW or Clutch Start SW
To IG SW
ST
IMRV Position Sensor
NSW*2
VCIA*1
IACA*1
EIA*1
To IG SW
STA
To Starter
*1: PZEV Only
*2: Automatic Transaxle Only
Y
A132316E01


ECM
FAN No. 3
Combination Meter
SPD
FANL
To IG1
To Battery
A/C Condenser Fan Motor
M
Transponder Key ECU
IMO
IMI
FAN No. 2
Radiator Fan Motor
M
Accelerator Pedal Position Sensor
IC
IC
VCP2
VPA2
EPA2
VCPA
VPA
EPA
FAN No. 1
To Battery
FANH
Canister Pump Module
Vent Valve
VPMP
VCPP
PPMP
EPPM
MPMP
Canister Pressure Sensor
To EFI No. 3
CANH
CANL
CANH
CANL
PS Oil Pressure SW
PSW
M
Leak Detection Pump
EC
EOM
Y
A132317E01

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

ES

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CONNECT INTELLIGENT TESTER TO DLC3*

HINT:
If the display indicates a communication fault in the tester, inspect the DLC3.

NEXT

4	CHECK FOR DTC AND FREEZE FRAME DATA*

HINT:
Record or print DTCs and freeze frame data, if necessary.

NEXT

5	CLEAR DTC AND FREEZE FRAME DATA*

NEXT

6	CONDUCT VISUAL INSPECTION

NEXT

7	SET CHECK MODE DIAGNOSIS*

NEXT

8 **CONFIRM PROBLEM SYMPTOMS**

HINT:
If the engine does not start, first perform the "CHECK DTC" procedures and "CONDUCT BASIC INSPECTION" procedures below.

Result

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → **GO TO STEP 10**

A

9 **SIMULATE SYMPTOMS**

NEXT

10 **CHECK FOR DTC***

Result

Result	Proceed to
Trouble code	A
No code	B

B → **GO TO STEP 12**

A

11 **REFER TO DTC CHART**

NEXT

GO TO STEP 14

12 **CONDUCT BASIC INSPECTION**

Result

Result	Proceed to
Malfunctioning parts not confirmed	A
Malfunctioning parts confirmed	B

B → **GO TO STEP 17**

A

13	REFER TO PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Malfunctioning circuit confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 17

ES

A

14	CHECK ECM POWER SOURCE CIRCUIT

NEXT

15	CONDUCT CIRCUIT INSPECTION

Result

Result	Proceed to
Malfunction not confirmed	A
Malfunction confirmed	B

B → GO TO STEP 18

A

16	CHECK FOR INTERMITTENT PROBLEMS

NEXT

GO TO STEP 18

17	CONDUCT PARTS INSPECTION

NEXT

18	IDENTIFY PROBLEM

NEXT

19	ADJUST AND/OR REPAIR

NEXT

20	CONDUCT CONFIRMATION TEST

NEXT

END

CHECK FOR INTERMITTENT PROBLEMS

HINT:
Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect with the intelligent tester when the ECM is in check mode. In check mode, the ECM uses 1 trip detection logic, which is more sensitive to malfunctions than normal mode (default), which uses 2 trip detection logic.

1. Clear the DTCs (See page ES-38).
2. Switch the ECM from normal mode to check mode using the intelligent tester (See page ES-41).
3. Perform a simulation test.
4. Check and wiggle the harness(es), connector(s) and terminal(s).

BASIC INSPECTION

When a malfunction is not confirmed by the DTC check, troubleshooting should be carried out in all circuits considered to be possible causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location of the problem can be found quickly and efficiently. Therefore, using this check is essential when engine troubleshooting.

1 CHECK BATTERY VOLTAGE

NOTICE:
Conduct this check with the engine stopped and ignition switch off.
Result

Result	Proceed to
11 V or more	OK
Below 11 V	NG

NG → **CHARGE OR REPLACE BATTERY**

OK

2 CHECK WHETHER ENGINE WILL CRANK

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE**

OK

3 CHECK WHETHER ENGINE STARTS

NG → **GO TO STEP 6**

OK

4 CHECK AIR FILTER

(a) Visually check that the air filter is not excessively contaminated with dirt or oil.

NG → **REPLACE AIR FILTER**

OK

5 CHECK IDLING SPEED

NG → **TROUBLESHOOT IDLING SPEED AND PROCEED TO NEXT STEP**

OK

6	CHECK FUEL PRESSURE

NG → TROUBLESHOOT FUEL PRESSURE AND PROCEED TO NEXT STEP

OK

7	CHECK FOR SPARKS

NG → TROUBLESHOOT SPARK AND PROCEED TO NEXT STEP

OK

PROCEED TO PROBLEM SYMPTOMS TABLE

REGISTRATION

NOTICE:
The Vehicle Identification Number (VIN) must be input into the replacement ECM.
HINT:
The VIN is a 17-digit alphanumeric number. The intelligent tester is required to register the VIN.

1. DESCRIPTION

This registration section consists of 3 parts: Input Instructions, Read VIN and Write VIN.

(a) Input Instructions: Explains the general VIN input instructions when using the intelligent tester.

(b) Read VIN: Explains the VIN reading process in a flowchart. This process allows the VIN stored in the ECM to be read in order to confirm that the two VINs, provided with the vehicle and stored in the vehicle's ECM, are the same.

(c) Write VIN: Explains the VIN writing process in a flowchart. This process allows the VIN to be input into the ECM. If the ECM is changed, or the vehicle VIN and ECM VIN do not match, the VIN can be registered or overwritten in the ECM by following this procedure.

2. INPUT INSTRUCTIONS

(a) Intelligent tester
The arrow buttons (UP, DOWN, RIGHT and LEFT) and numerical buttons (0 to 9) are used to input the VIN.

(b) Cursor Operation
To move the cursor around the tester screen, press the RIGHT and LEFT buttons.

(c) Alphabetical Character Input
(1) Press the UP and DOWN buttons to select the desired alphabetical character.
(2) After selection, the cursor should move.

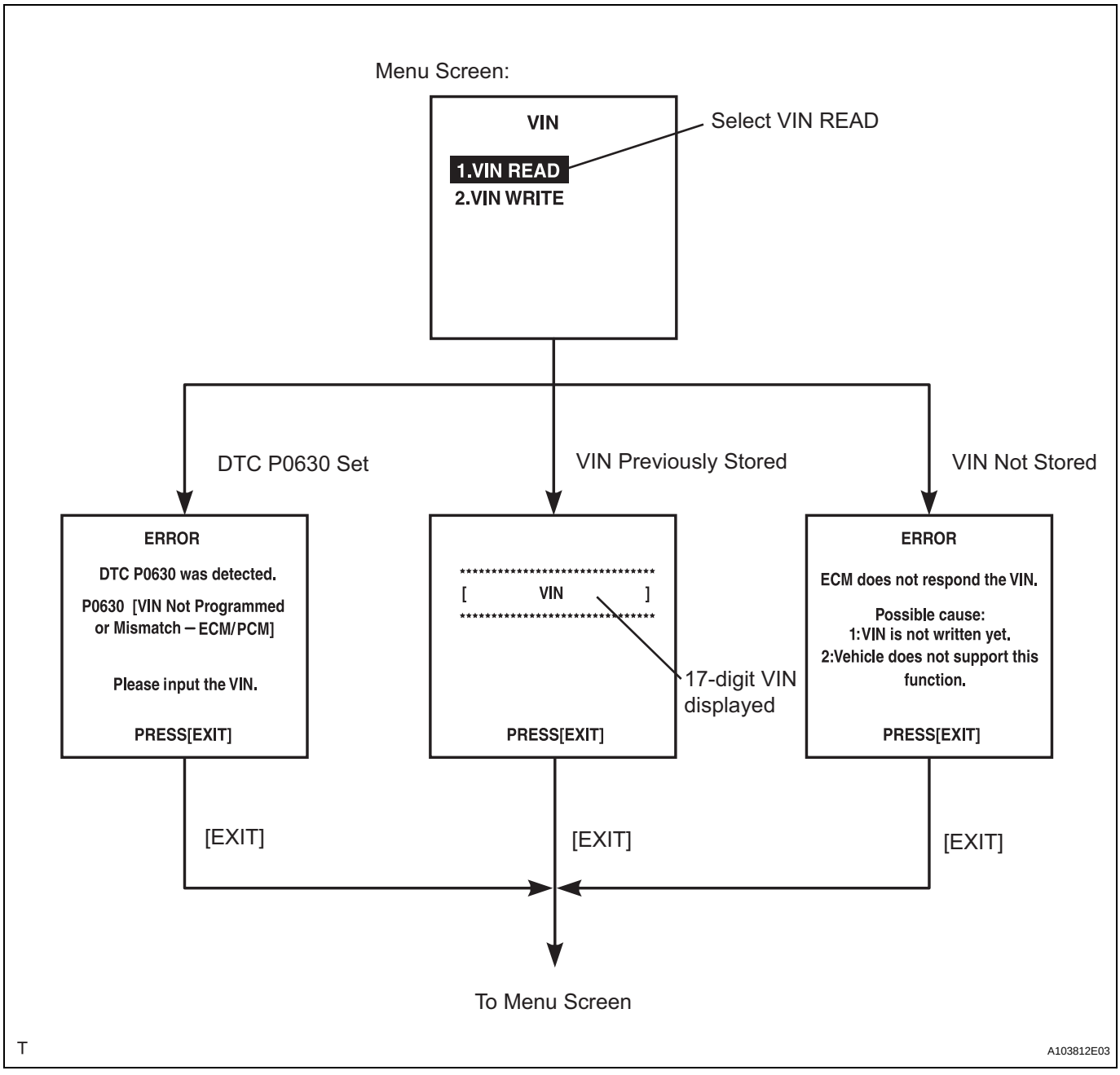
(d) Numeric Character Input
(1) Press the numerical button corresponding to the number that you want to input.
(2) After input, the cursor should move.
HINT:
Numerical characters can also be selected by using the UP and DOWN buttons.

(e) Correction
(1) When correcting the input character(s), put the cursor onto the character using the RIGHT and LEFT buttons.
(2) Select or input the correct character using the UP/DOWN buttons, or the numerical buttons.

(f) Finishing Input Operation
(1) Make sure that the input VIN matches the vehicle VIN after input.
(2) Press the ENTER button on the tester.

3. READ VIN

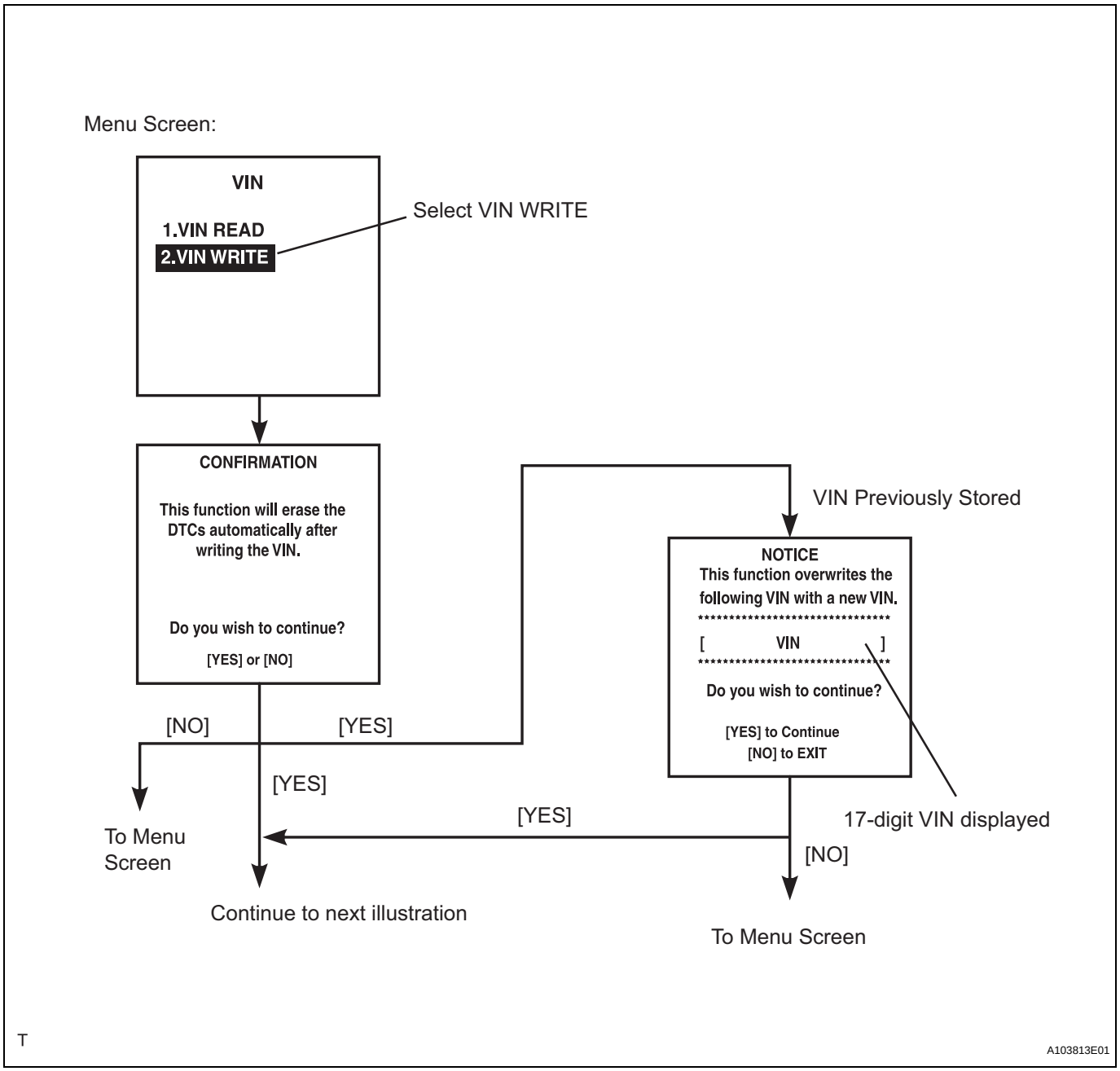
(a) Confirm the vehicle VIN.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn the tester on.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II/ VIN.



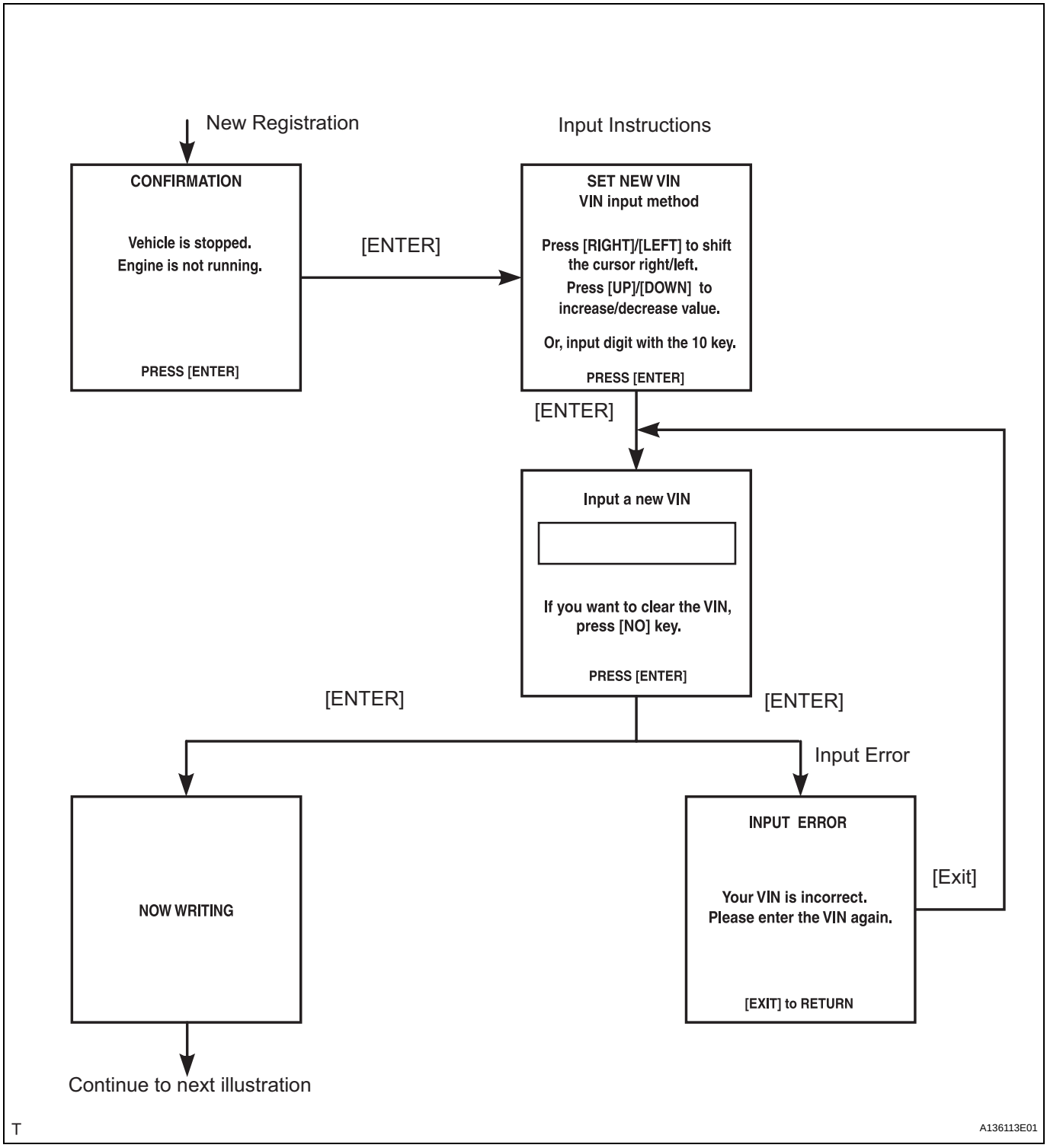
4. WRITE VIN

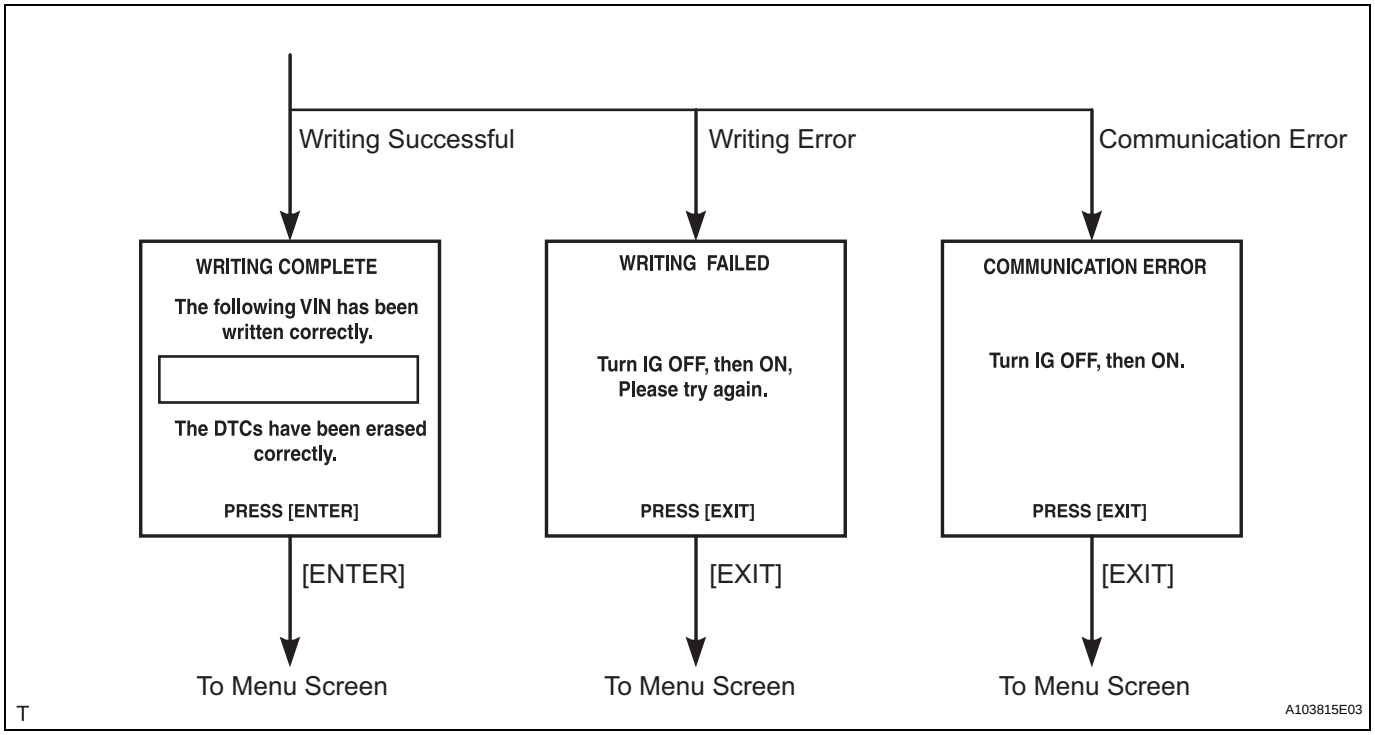
(a) Confirm the vehicle VIN.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn the tester on.

(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II/ VIN.



ES


New Registration
Input Instructions
CONFIRMATION
Vehicle is stopped.
Engine is not running.
PRESS [ENTER]
[ENTER]
SET NEW VIN
VIN input method
Press [RIGHT]/[LEFT] to shift the cursor right/left.
Press [UP]/[DOWN] to increase/decrease value.
Or, input digit with the 10 key.
PRESS [ENTER]
[ENTER]
Input a new VIN
If you want to clear the VIN, press [NO] key.
PRESS [ENTER]
[ENTER]
[ENTER]
Input Error
NOW WRITING
INPUT ERROR
Your VIN is incorrect.
Please enter the VIN again.
[EXIT] to RETURN
[Exit]
Continue to next illustration
T
A136113E01


Writing Successful
Writing Error
Communication Error
WRITING COMPLETE
The following VIN has been written correctly.
The DTCs have been erased correctly.
PRESS [ENTER]
WRITING FAILED
Turn IG OFF, then ON, Please try again.
PRESS [EXIT]
COMMUNICATION ERROR
Turn IG OFF, then ON.
PRESS [EXIT]
[ENTER]
[EXIT]
[EXIT]
To Menu Screen
To Menu Screen
To Menu Screen
T
A103815E03

ES

CHECKING MONITOR STATUS

The purpose of the monitor result (mode 06) is to allow access to the results of on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are catalysts and evaporative emissions (EVAP).

The monitor result allows the OBD II scan tool to display the monitor status, test value, minimum test limit and maximum test limit. These data are displayed after the vehicle has been driven to run the monitor.

When the test value is not between the minimum test limit and maximum test limit, the ECM (PCM) interprets this as a malfunction. If the test value is on the borderline of the test limits, the component is likely to malfunction in the near future.

Perform the following instructions to view the monitor status. Although this instruction refers to the Lexus/Toyota diagnostic tester, it can be checked using a generic OBD II scan tool. Refer to your scan tool operator's manual for specific procedural information.

1. PERFORM MONITOR DRIVE PATTERN

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch to the ON position and turn the tester on.

(c) Clear the DTCs (See page ES-38).

(d) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (See page ES-23). Do not turn the ignition switch off.

NOTE:

The test results will be lost if the ignition switch is turned off.

2. ACCESS MONITOR RESULT

(a) Select the following items from the intelligent tester menus: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO and MONITOR RESULT. The monitor status appears after the component name.

- INCMP: The component has not been monitored yet.
- PASS: The component is functioning normally.
- FAIL: The component is malfunctioning.

(b) Confirm that the component is either PASS or FAIL.

(c) Select the component and press ENTER. The accuracy test value appears if the monitor status is either PASS or FAIL.

3. CHECK COMPONENT STATUS

(a) Compare the test value with the minimum test limit (MIN LIMIT) and maximum test limit (MAX LIMIT).

(b) If the test value is between the minimum test limits and maximum test limits, the component is functioning normally. If not, the component is malfunctioning. The test value is usually not near the test limit. If the test value is on the borderline of the test limits, the component is likely to malfunction in the near future.
HINT:
The monitor result might be PASS on rare occasions even if the malfunction indicator lamp (MIL) is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

4. MONITOR RESULT INFORMATION

If you use a generic scan tool, multiply the test value by the scaling value listed below.

A/F Sensor (Sensor 1):

Monitor ID	Test ID	Scaling	Unit	Description
$01	$8E	Multiply by 0.001	V	A/F sensor deterioration level
$01	$91	Multiply by 0.004	mA	A/F sensor current

HO2 Sensor (Sensor 2):

Monitor ID	Test ID	Scaling	Unit	Description
$02	$07	Multiply by 0.001	V	Minimum sensor voltage
$02	$08	Multiply by 0.001	V	Maximum sensor voltage
$02	$8F	Multiply by 0.0003	g	Maximum oxygen storage capacity

Catalyst:

Monitor ID	Test ID	Scaling	Unit	Description
$21	$A9	Multiply by 0.0003	No dimension	Oxygen storage capacity of catalyst

EVAP:

Monitor ID	Test ID	Scaling	Unit	Description
$3D	$C9	Multiply by 0.001	kPa	Test value for small leak (P0456)
$3D	$CA	Multiply by 0.001	kPa	Test value for gross leak (P0455)
$3D	$CB	Multiply by 0.001	kPa	Test value for leak detection pump stuck OFF (P2401)
$3D	$CD	Multiply by 0.001	kPa	Test value for leak detection pump stuck ON (P2402)
$3D	$CE	Multiply by 0.001	kPa	Test value for vent valve stuck OFF (P2420)
$3D	$CF	Multiply by 0.001	kPa	Test value for vent valve stuck ON (P2419)
$3D	$D0	Multiply by 0.001	kPa	Test value for reference orifice low flow (P043E)
$3D	$D1	Multiply by 0.001	kPa	Test value for reference orifice high flow (P043F)
$3D	$D4	Multiply by 0.001	kPa	Test value for purge VSV stuck closed (P0441)
$3D	$D5	Multiply by 0.001	kPa	Test value for purge VSV stuck open (P0441)
$3D	$D7	Multiply by 0.001	kPa	Test value for purge flow insufficient (P0441)

Rear Oxygen Sensor Heater:

Monitor ID	Test ID	Scaling	Unit	Description
$42	$91	Multiply by 0.001	Ohm	Oxygen sensor resistance bank 1 sensor 2

Misfire:

Monitor ID	Test ID	Scaling	Unit	Description
$A1	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire for all cylinders: EWMA = Total misfire counts for last driving cycle * 0.1 + Last EWMA * 0.9 Misfire counts for last 10 driving cycles - Total
$A1	$0C	Multiply by 1	Time	Ignition switch to the ON position: Total misfire counts for last driving cycle Engine running: Total misfire counts for current driving cycle Misfire counts for last or current driving cycle - all cylinders
$A2	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire for cylinder 1: EWMA = Total misfire counts for last driving cycle * 0.1 + Last EWMA * 0.9 Misfire counts for last 10 driving cycles - Total
$A2	$0C	Multiply by 1	Time	Ignition switch to the ON position: Total misfire counts for last driving cycle Engine running: Total misfire counts for current driving cycle Misfire counts for last or current driving cycle - cylinder 1
$A3	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire for cylinder 2: EWMA = Total misfire counts for last driving cycle * 0.1 + Last EWMA * 0.9 Misfire counts for last 10 driving cycles - Total
$A3	$0C	Multiply by 1	Time	Ignition switch to the ON position: Total misfire counts for last driving cycle Engine running: Total misfire counts for current driving cycle Misfire counts for last or current driving cycle - cylinder 2
$A4	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire for cylinder 3: EWMA = Total misfire counts for last driving cycle * 0.1 + Last EWMA * 0.9 Misfire counts for last 10 driving cycles - Total
$A4	$0C	Multiply by 1	Time	Ignition switch to the ON position: Total misfire counts for last driving cycle Engine running: Total misfire counts for current driving cycle Misfire counts for last or current driving cycle - cylinder 3
$A5	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire for cylinder 4: EWMA = Total misfire counts for last driving cycle * 0.1 + Last EWMA * 0.9 Misfire counts for last 10 driving cycles - Total
$A5	$0C	Multiply by 1	Time	Ignition switch to the ON position: Total misfire counts for last driving cycle Engine running: Total misfire counts for current driving cycle Misfire counts for last or current driving cycle - cylinder 4

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission related components, and indicate any detected abnormalities with DTCs (Diagnostic Trouble Codes). Since various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors.
- The intelligent tester's software must be version 9.0 or newer to view the Readiness Monitor Status. To view the status, select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR STATUS.
- When the Readiness Monitor status reads COMPL (complete), the necessary conditions have been met for running the performance tests for that Readiness Monitor.
- A generic OBD II scan tool can also be used to view the Readiness Monitor status.

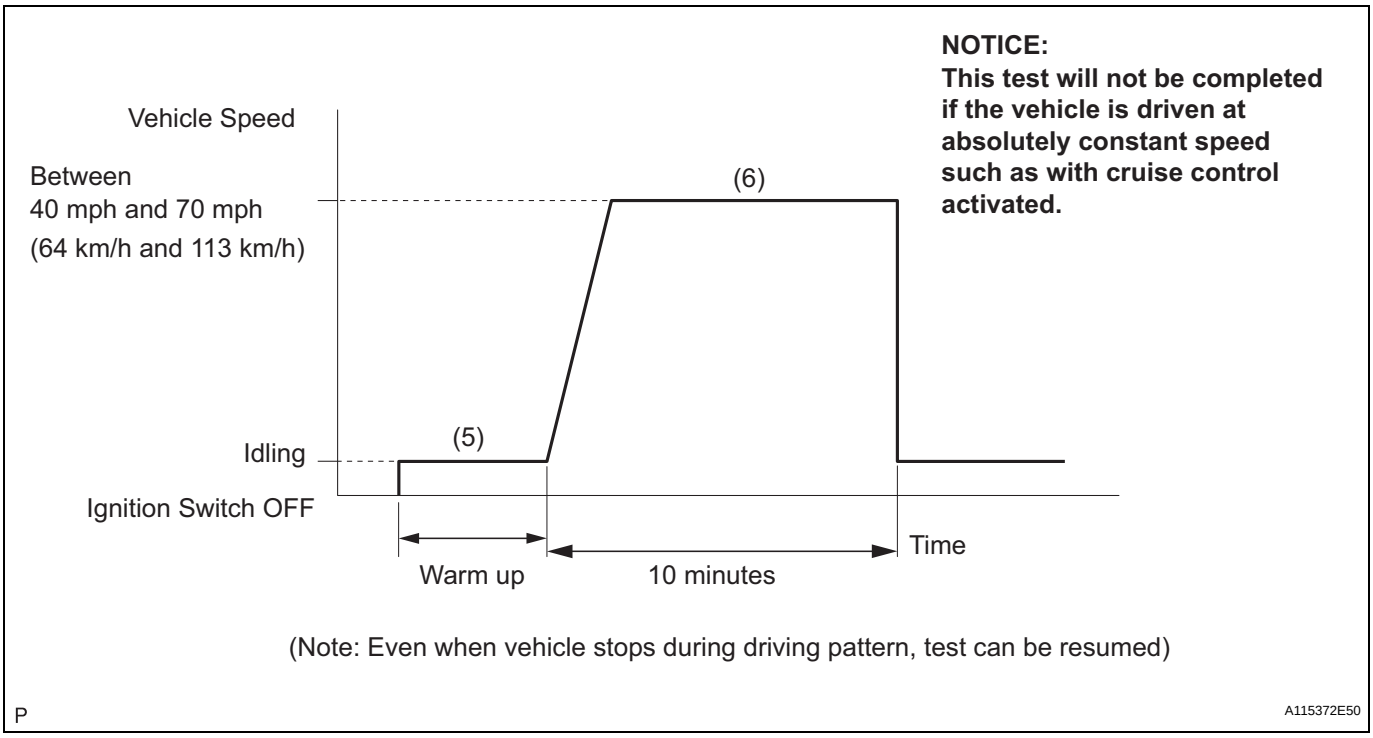
HINT:
Many state Inspection and Maintenance (I/M) programs require a vehicle's Readiness Monitor status to show COMPL before beginning emission tests.
The Readiness Monitor will be reset to INCMPL (incomplete) if:

- The ECM has lost battery power or blown a fuse.
- DTCs have been cleared.
- The conditions for running the Readiness Monitor have not been met.

If the Readiness Monitor status shows INCMPL, follow the appropriate Readiness Monitor Drive Pattern to change the status to COMPL.

CAUTION:
Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.
NOTICE:
These drive patterns represent the fastest method of satisfying all conditions necessary to achieve complete status for each specific Readiness Monitor.
In the event of a drive pattern being interrupted (possibly due to factors such as traffic conditions), the drive pattern can be resumed. In most cases, the Readiness Monitor will still achieve complete status upon completion of the drive pattern.
To ensure completion of the Readiness Monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (ACTIVE AIR-FUEL RATIO CONTROL TYPE)



(a) Preconditions
The monitor will not run unless:
- The MIL is OFF.

(b) Drive Pattern
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Turn the tester on.
(4) Clear the DTCs (if set) (See page ES-38).
(5) Start the engine and warm it up.
(6) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.

(c) Monitor Status
Check the Readiness Monitor status displayed on the tester.
If the status does not switch to COMPL (complete), extend the driving time.

3. EVAP SYSTEM MONITOR (KEY OFF TYPE)

(a) Preconditions
The monitor will not run unless:
– The fuel tank is less than 90% full.
– The altitude is less than 8,000 ft. (2,450 m).
– The vehicle is stationary.
– The engine coolant temperature is between 4.4°C and 35°C (40°F and 95°F).
– The intake air temperature is between 4.4°C and 35°C (40°F and 95°F).
– Vehicle was driven in a city area (or on free-way) for 10 minutes or more.

(b) Monitor Conditions
(1) Turn the ignition switch off and wait for 6 hours.
HINT:
Do not start the engine until checking Readiness Monitor status. If the engine is started, the step described above must be repeated.

(c) Monitor Status
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Turn the tester on.
(4) Check the Readiness Monitor status displayed on the tester.

If the status does not switch to COMPL (complete), restart the engine, make sure that the preconditions have been met, and then perform the Monitor Conditions again.

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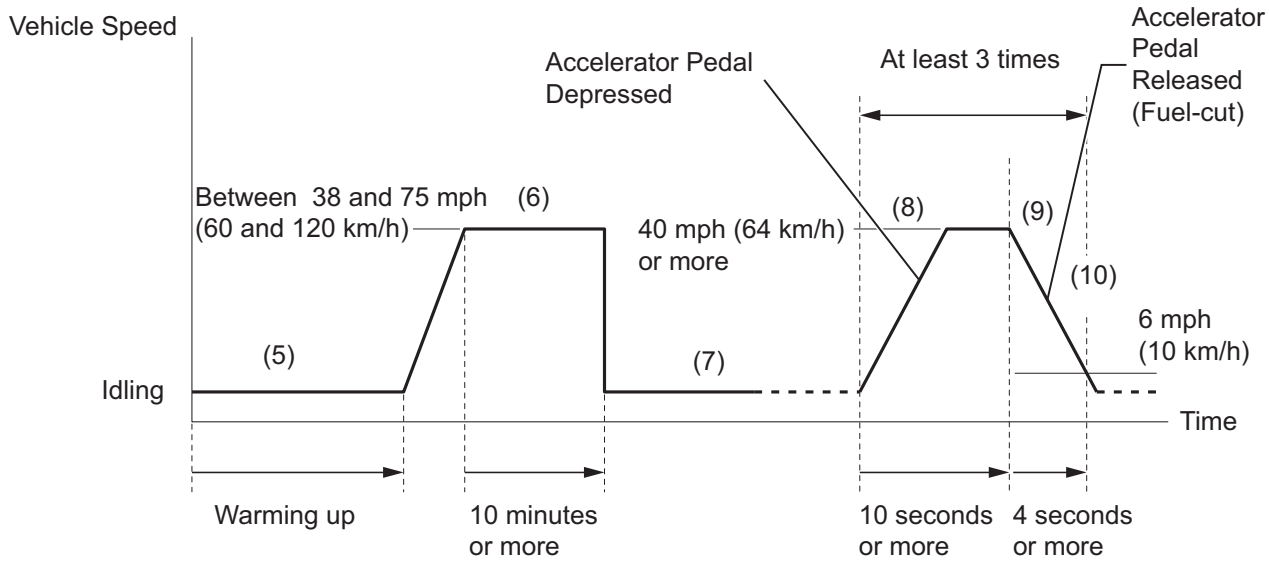
4. AIR-FUEL RATIO (A/F) AND HEATED OXYGEN (HO2) SENSOR MONITORS (ACTIVE AIR-FUEL RATIO CONTROL TYPE)

Monitor Drive Pattern

ECT: 75°C (167°F) or more



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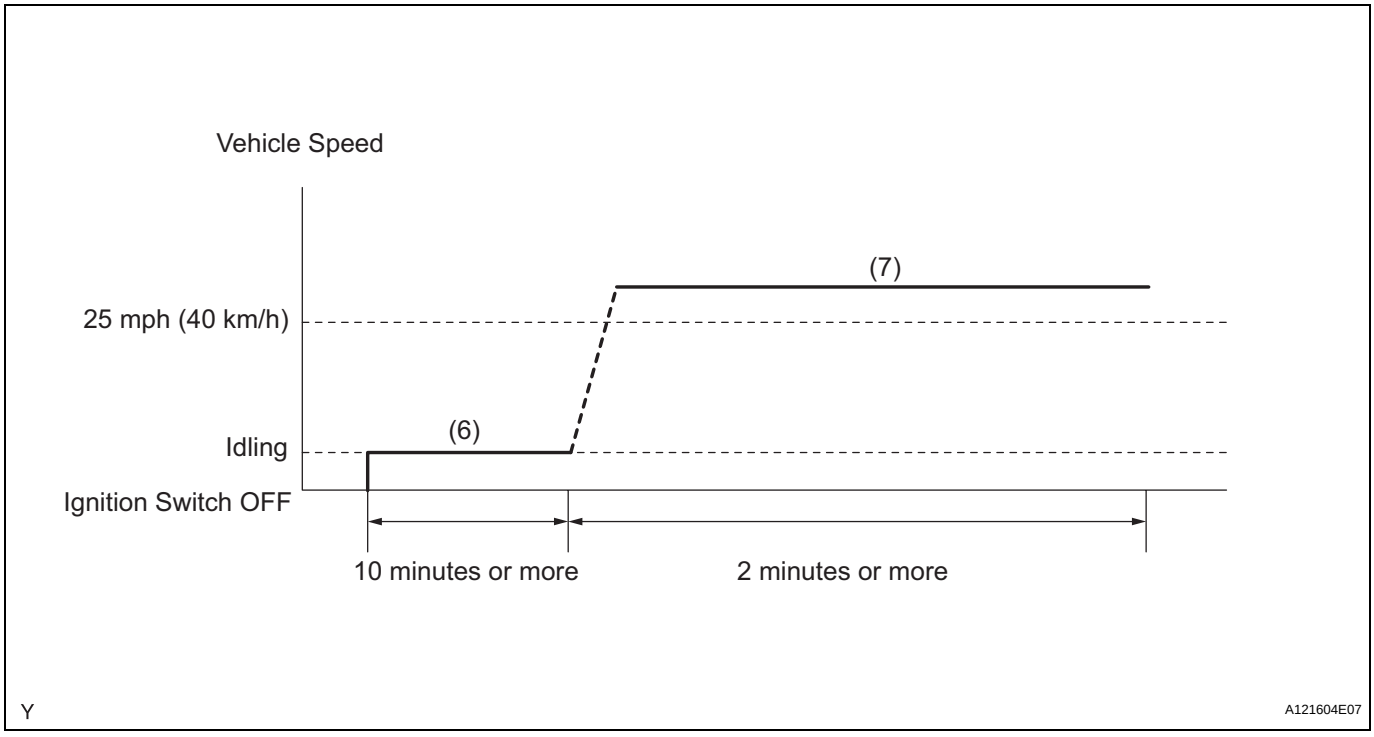
(a) Preconditions
The monitor will not run unless:
– 2 minutes or more have elapsed since the engine was started.
– The Engine Coolant Temperature (ECT) is 75°C (167°F) or more.
– Cumulative driving time at a vehicle speed of 30 mph (48 km/h) or more exceeds 6 minutes.
– Air-fuel ratio feedback control is performed.

(b) Drive Pattern for front A/F sensor and HO2 sensor
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Turn the tester on.
(4) Clear the DTCs (See page ES-38).
(5) Start the engine, and warm it up until the ECT reaches 75°C (167°F) or higher
(6) Drive the vehicle at between 38 mph (60 km/h) and 75 mph (120 km/h) for at least 10 minutes.
(7) Change the transmission to the 2nd gear.
(8) Accelerate the vehicle to 40 mph (64 km/h) or more by depressing the accelerator pedal for at least 10 seconds.
(9) Soon after performing step (8) above, release the accelerator pedal for at least 4 seconds without depressing the brake pedal, in order to execute fuel-cut control.
(10) Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h).
(11) Repeat steps from (8) through (10) above at least 3 times in one driving cycle.

(c) Monitor Status
(1) Check the Readiness Monitor status displayed on the tester.
(2) If the status does not switch to COMPL (complete), make sure that the preconditions have been met, and then perform steps from (5) through (11) in the Drive Pattern above.

5. AIR-FUEL RATIO (A/F) AND HEATED OXYGEN (HO2) SENSOR HEATER MONITORS (FRONT A/F AND REAR HO2 SENSOR TYPE)



(a) Preconditions
The monitor will not run unless:
– The MIL is OFF.

(b) Drive Pattern
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Turn the tester on.
(4) Clear the DTCs (if set) (See page ES-38).
(5) Start the engine.
(6) Allow the engine to idle for 10 minutes or more.
(7) Drive the vehicle at 25 mph (40 km/h) or more for at least 2 minutes.

(c) Monitor Status
(1) Check the Readiness Monitor status displayed on the tester.
If the status does not switch to COMPL (complete), make sure that the preconditions have been met, and repeat steps from (5) to (7) described in the Drive Pattern above.

PROBLEM SYMPTOMS TABLE

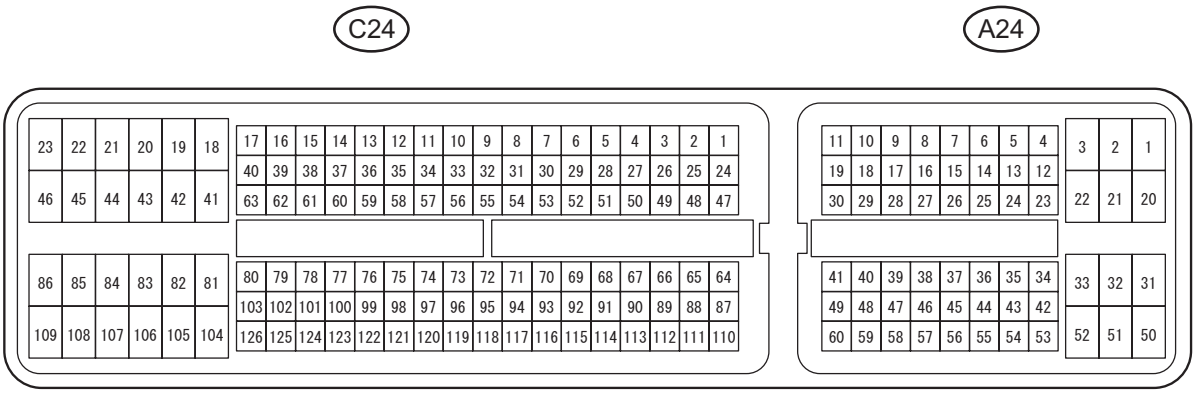
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

SFI system:

Symptom	Suspected area	See page
Engine does not crank (Does not start)	1. Battery	CH-4
	2. Starter	ST-7
	3. Starter relay	ST-14
	4. Park / neutral position switch (Automatic transaxle)	AX-130
	5. Clutch start switch (Manual transaxle)	CL-37
	6. Immobiliser system	EI-55
No initial combustion (Does not start)	1. ECM power source circuit	ES-380
	2. Crankshaft position sensor	ES-411
	3. Camshaft position sensor	ES-409
	4. Ignition system	IG-3
	5. Fuel pump control circuit	ES-392
	6. ECM	ES-29
	7. VC output circuit	ES-387
Engine cranks normally but difficult to start	1. Fuel pump control circuit	ES-392
	2. Compression	EM-3
Difficult to start with cold engine	1. Ignition system	IG-3
	2. Spark plug	IG-5
	3. Fuel pump control circuit	ES-392
	4. Injector	FU-14
Difficult to start with warm engine	1. Injector	FU-14
	2. Ignition system	IG-3
	3. Spark plug	IG-5
	4. Fuel pump control circuit	ES-392
High engine idle speed	1. Electronic throttle control system	ES-280
	2. A/C signal circuit	-
	3. ECM power source circuit	ES-380
Low engine idle speed (Poor idling)	1. Electronic throttle control system	ES-280
	2. A/C signal circuit	-
	3. Fuel pump control circuit	ES-392
	4. Air induction system	EC-5
	5. PCV hose	EC-5
Rough idling	1. Compression	EM-3
	2. Spark plug	IG-5
	3. Injector	FU-14
	4. Ignition system	IG-3
	5. Fuel pump control circuit	ES-392
	6. Electronic throttle control system	ES-280
	7. Air induction system	EC-5
	8. PCV hose	EC-5
	9. Mass air flow meter	ES-402

Symptom	Suspected area	See page
Idle hunting	1. Electronic throttle control system	ES-280
	2. Air induction system	EC-5
	3. ECM power source circuit	ES-380
Hesitation/Poor acceleration	1. Fuel pump control circuit	ES-392
	2. Spark plug	IG-5
	3. Ignition system	IG-3
	4. Injector	FU-14
	5. Mass air flow meter	ES-402
	6. Electronic throttle control system	ES-280
	7. Air induction system	EC-5
	8. Compression	EM-3
Surging (Poor driveability)	1. Spark plug	IG-5
	2. Fuel pump control circuit	ES-392
	3. Ignition system	IG-3
	4. Injector	FU-14
	5. Mass air flow meter	ES-402
	6. Variable valve timing system	ES-69
	7. Compression	EM-3
Engine stalls soon after starting	1. Fuel pump control circuit	ES-392
	2. Spark plug	IG-5
	3. Ignition system	IG-3
	4. Injector	FU-14
	5. Variable valve timing system	ES-69
	6. Electronic throttle control system	ES-280
	7. Air induction system	EC-5
	8. PCV hose	EC-5
	9. Compression	EM-3
Engine stalls only during A/C operation	1. A/C signal circuit	-
	2. ECM	ES-29
Unable/difficult to refuel	1. Refueling valve (canister)	-

TERMINALS OF ECM



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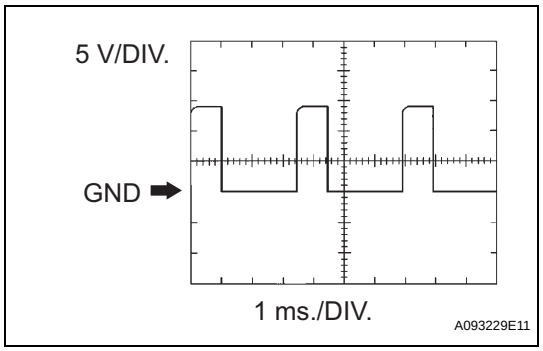
HINT:
The standard normal voltage between each pair of the ECM terminals is shown in the table below. The appropriate conditions for checking each pair of the terminals are also indicated. The result of checks should be compared with the standard normal voltage for that pair of the terminals, displayed in the Specified Condition column. The illustration above can be used as a reference to identify the ECM terminal locations.

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	Specified Conditions
BATT (A24-20) - E1 (C24-104)	Y - W-B	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
+BM (A24-3) - E1 (C24-104)	LG - W-B	Power source of throttle actuator	Always	9 to 14 V
IGSW (A24-28) - E1 (C24-104)	Y - W-B	Ignition switch	Ignition switch to the ON position	9 to 14 V
+B (A24-2) - E1 (C24-104)	R - W-B	Power source of ECM	Ignition switch to the ON position	9 to 14 V
+B2 (A24-1) - E1 (C24-104)	R - W-B	Power source of ECM	Ignition switch to the ON position	9 to 14 V
OC1+ (C24-100) - OC1- (C24-123)	W - B	Camshaft timing oil control valve (OCV)	Idling	Pulse generation (see waveform 1)
MREL (A24-44) - E1 (C24-104)	O - W-B	EFI relay	Ignition switch to the ON position	9 to 14 V
VG (C24-118) - E2G (C24-116)	SB - W	Mass air flow meter	Idling, Shift lever position P or N, A/C switch OFF	0.5 to 3.0 V
THA (C24-65) - ETHA (C24-88)	P - Y	Intake air temperature sensor	Idling, Intake air temperature 20°C (68°F)	0.5 to 3.4 V
THW (C24-97) - ETHW (C24-96)	B - P	Engine coolant temperature sensor	Idling, Engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
VCTA (C24-67) - ETA (C24-91)	B - P	Power source of throttle position sensor (specific voltage)	Ignition switch to the ON position	4.5 to 5.5 V
VTA1 (C24-115) - ETA (C24-91)	Y - P	Throttle position sensor (for engine control)	Ignition switch to the ON position, Throttle valve fully closed	0.5 to 1.1 V
			Ignition switch to the ON position, Throttle valve fully open	3.3 to 4.9 V

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	Specified Conditions
VTA2 (C24-114) - ETA (C24-91)	W-L - P	Throttle position sensor (for sensor malfunction detection)	Ignition switch to the ON position, Throttle valve fully closed	2.1 to 3.1 V
			Ignition switch to the ON position, Throttle valve fully open	4.6 to 5.0 V
VPA (A24-55) - EPA (A24-59)	G - Y	Accelerator pedal position sensor (for engine control)	Ignition switch to the ON position, Accelerator pedal released	0.5 to 1.1 V
			Ignition switch to the ON position, Accelerator pedal fully depressed	2.6 to 4.5 V
VPA2 (A24-56) - EPA2 (A24-60)	R - O	Accelerator pedal position sensor (for sensor malfunctioning detection)	Ignition switch to the ON position, Accelerator pedal released	1.2 to 2.0 V
			Ignition switch to the ON position, Accelerator pedal fully depressed	3.4 to 5.0 V
VCPA (A24-57) - EPA (A24-59)	B - Y	Power source of accelerator pedal position sensor (for VPA)	Ignition switch to the ON position	4.5 to 5.5 V
VCP2 (A24-58) - EPA2 (A24-60)	L - O	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch to the ON position	4.5 to 5.5 V
HA1A (C24-109) - E04 (C24-46)	G - W	A/F sensor heater	Idling	Below 3.0 V
			Ignition switch to the ON position	9 to 14 V
A1A+ (C24-112) - E1 (C24-104)	L -W-B	A/F sensor	Ignition switch to the ON position	3.3 V*1
A1A- (C24-113) - E1 (C24-104)	P - W-B	A/F sensor	Ignition switch to the ON position	3.0 V*1
HT1B (C24-47) - E03 (C24-86)	LG - B	Heated oxygen sensor heater	Idling	Below 3.0 V
			Ignition switch to the ON position	9 to 14 V
OX1B (C24-64) - EX1B (C24-87)	W - BR	Heated oxygen sensor	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor	Pulse generation (see waveform 2)
#10 (C24-108) - E01 (C24-45) #20 (C24-107) - E01 (C24-45) #30 (C24-106) - E01 (C24-45) #40 (C24-105) - E01 (C24-45)	B - W-B R - W-B Y - W-B L - W-B	Injector	Ignition switch to the ON position	9 to 14 V
			Idling	Pulse generation (see waveform 3)
KNK1 (C24-110) - EKNK (C24-111)	G - R	Knock sensor	Engine speed maintained at 4,000 after warming up engine	Pulse generation (see waveform 4)
G2+ (C24-99) - G2- (C24-98)	Y - BR	Camshaft position sensor	Idling	Pulse generation (see waveform 5)
NE+ (C24-122) - NE- (C24-121)	G - R	Crankshaft position sensor	Idling	Pulse generation (see waveform 5)
IGT1 (C24-85) - E1 (C24-104) IGT2 (C24-84) - E1 (C24-104) IGT3 (C24-83) - E1 (C24-104) IGT4 (C24-82) - E1 (C24-104)	W - W-B G-R - W-B G - W-B LG - W-B	Ignition coil (ignition signal)	Idling	Pulse generation (see waveform 6)
IGF1 (C24-81) - E1 (C24-104)	BR - W-B	Ignition coil (ignition confirmation signal)	Ignition switch to the ON position	4.5 to 5.5 V
			Idling	Pulse generation (see waveform 6)
PRG (C24-49) - E1 (C24-104)	O - W-B	Purge VSV	Ignition switch to the ON position	9 to 14 V
			Idling	Pulse generation (see waveform 7)
SPD (A24-8) - E1 (C24-104)	L - W-B	Speed signal from combination meter	Driving at 12 mph (20 km/h)	Pulse generation (see waveform 8)
STA (A24-48) - E1 (C24-104)	V - W-B	Starter signal	Cranking	5.5 V or more
NSW (C24-52)*2 - E1 (C24-104)	SB - W-B	Starter relay control	Ignition switch to the ON position	Below 1.5 V
			Cranking	5.5 V or more
STP (A24-36) - E1 (C24-104)	W - W-B	Stop light switch	Brake pedal depressed	7.5 to 14 V
			Brake pedal released	Below 1.5 V

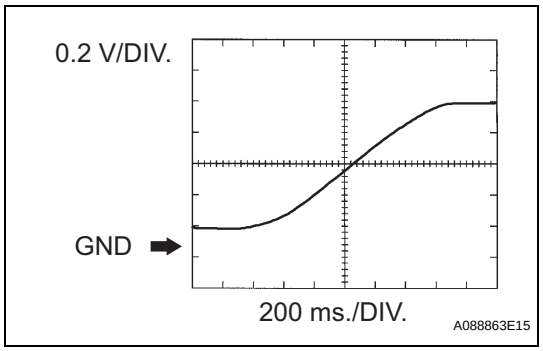
Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	Specified Conditions
ST1- (A24-35) - E1 (C24-104)	GR - W-B	Stop light switch (opposite to STP terminal)	Ignition switch to the ON position, Brake pedal depressed	Below 1.5 V
			Ignition switch to the ON position, Brake pedal released	7.5 to 14 V
M+ (C24-42) - ME01 (C24-43)	G - B	Throttle actuator	Idling with warm engine	Pulse generation (see waveform 9)
M- (C24-41) - ME01 (C24-43)	R - B	Throttle actuator	Idling with warm engine	Pulse generation (see waveform 10)
FC (A24-7) - E1 (C24-104)	Y - W-B	Fuel pump control	Ignition switch to the ON position	9 to 14 V
			Idling	Below 1.5 V
W (A24-24) - E1 (C24-104)	BR - W-B	MIL	Ignition switch to the ON position	Below 1.5 V
			Idling	9 to 14 V
TC (A24-27) - E1 (C24-104)	P - W-B	Terminal TC of DLC3	Ignition switch to the ON position	9 to 14 V
TACH (A24-15) - E1 (C24-104)	B - W-B	Engine speed	Idling	Pulse generation (see waveform 11)
VPMP (A24-42) - E1 (C24-104)	W - W-B	Vent valve (built into canister pump module)	Ignition switch to the ON position	9 to 14 V
MPMP (A24-34) - E1 (C24-104)	G - W-B	Leak detection pump (built into canister pump module)	Leak detection pump OFF	Below 3 V
			Leak detection pump ON	9 to 14 V
VCPP (C24-70) - EPPM (C24-94)	R - G	Power source for canister pressure sensor (specific voltage)	Ignition switch to the ON position	4.5 to 5.5 V
PPMP (C24-71) - EPPM (C24-94)	L - G	Canister pressure sensor (built into canister pump module)	Ignition switch to the ON position	3 to 3.6 V
FANL (A24-21) - E1 (C24-104)	R - W-B	Fan No. 1 relay	Ignition switch to the ON position	9 to 14 V
			Idling with A/C ON, or high engine coolant temperature	Below 1.5 V
FANH (A24-22) - E1 (C24-104)	W - W-B	Fan No. 2, 3 relay	Idling with high engine coolant temperature	Below 1.5 V
ALT (C24-50) - E1 (C24-104)	L - W-B	Generator	Ignition switch to the ON position	9 to 14 V
CANH (A24-41) - E1 (C24-104)	B - W-B	CAN communication line	Ignition switch to the ON position	Pulse generation (see waveform 12)
CANL (A24-49) - E1 (C24-104)	W - W-B	CAN communication line	Ignition switch to the ON position	Pulse generation (see waveform 13)
IAC+ (A24-33)*3 - E1 (C24-104)	L - W-B	Intake manifold runner valve motor	Ignition switch to the ON position	Pulse generation
IAC- (A24-52)*3 - E1 (C24-104)	W - W-B	Intake manifold runner valve motor	Ignition switch to the ON position	Pulse generation
VCIA (C24-103)*3 - EIA (C24-126)*3	B - L	Power source of intake manifold runner valve position sensor (Specific voltage)	Ignition switch to the ON position	4.5 to 5.5 V
IACA (C24-93)*3 - EIA (C24-126)*3	B-W - L	Intake manifold runner valve position sensor	Ignition switch to the ON position, intake manifold runner valve fully closed.	0.2 to 1.0 V
			Ignition switch to the ON position, intake manifold runner valve fully opened.	3.2 to 4.8 V

HINT:
*1: The ECM terminal voltage is constant regardless of the output voltage from the sensor.
*2: Automatic transaxle only
*3: PZEV only



1. WAVEFORM 1
Camshaft timing oil control valve (OCV):

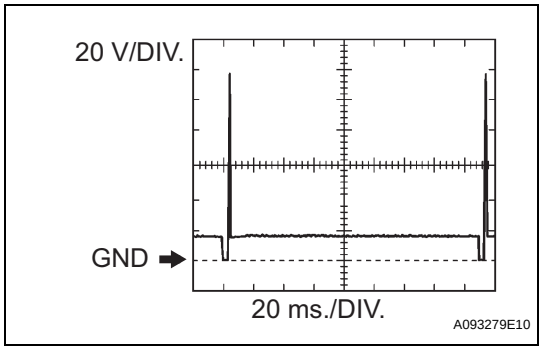
ECM Terminal Names	Between OC1+ and OC1-
Tester Ranges	5 V/DIV., 1 ms./DIV.
Conditions	Idling



2. WAVEFORM 2
Heated oxygen sensor:

ECM Terminal Names	Between OX1B and EX1B
Tester Ranges	0.2 V/DIV., 200 ms./DIV.
Conditions	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor

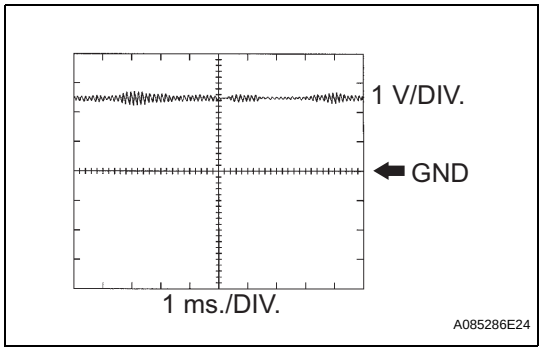
HINT:
In DATA LIST, item O2S B1 S2 shows the ECM input values from the heated oxygen sensor.



3. WAVEFORM 3
Injector No. 1 (to No. 4) injection signal:

ECM Terminal Names	Between #10 (to #40) and E01
Tester Ranges	20 V/DIV., 20 ms./DIV.
Conditions	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

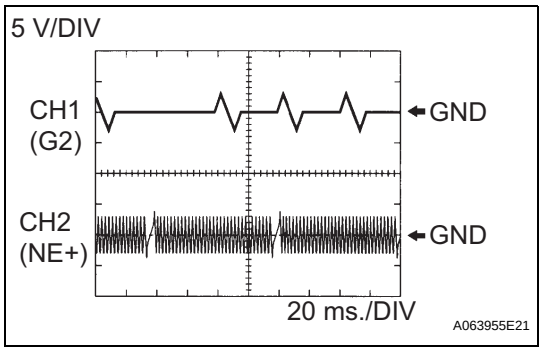


4. WAVEFORM 4
Knock sensor:

ECM Terminal Names	Between KNK1 and EKNK
Tester Ranges	1 V/DIV., 1 ms./DIV.
Conditions	Engine speed maintained at 4,000 rpm after warming up engine

HINT:
- The wavelength becomes shorter as the engine rpm increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle.

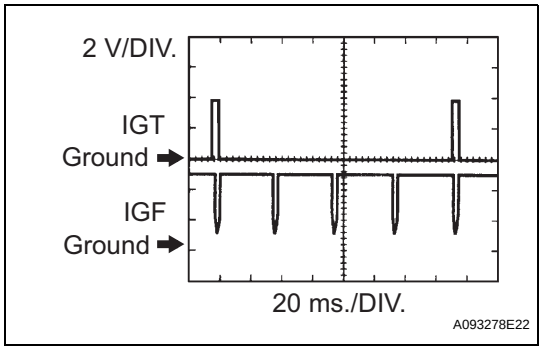
ES



5. WAVEFORM 5
Crankshaft position sensor and Camshaft position sensor:

ECM Terminal Names	CH1: Between G2+ and G2- CH2: Between NE+ and NE-
Tester Ranges	5 V/DIV., 20 ms./DIV.
Conditions	Idling

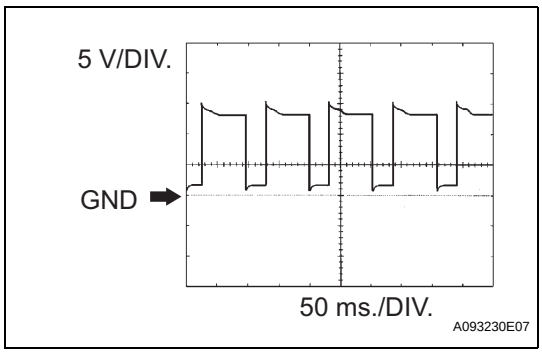
HINT:
The wavelength becomes shorter as the engine rpm increases.



6. WAVEFORM 6
Igniter IGT signal (from ECM to igniter) and Igniter IGF signal (from igniter to ECM):

ECM Terminal Names	Between IGT (1 to 4) and E1 Between IGF1 and E1
Tester Ranges	2 V/DIV., 20 ms./DIV.
Conditions	Idling

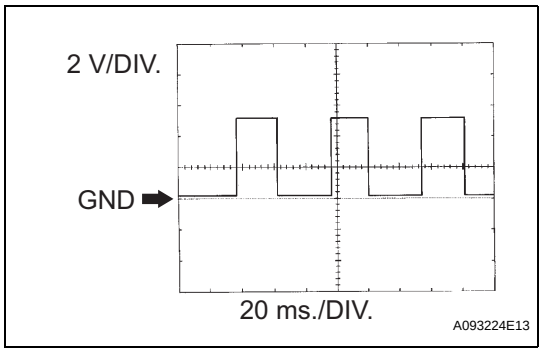
HINT:
The wavelength becomes shorter as the engine rpm increases.



7. WAVEFORM 7
Purge VSV:

ECM Terminal Names	Between PRG and E1
Tester Ranges	5 V/DIV., 50 ms./DIV.
Conditions	Idling

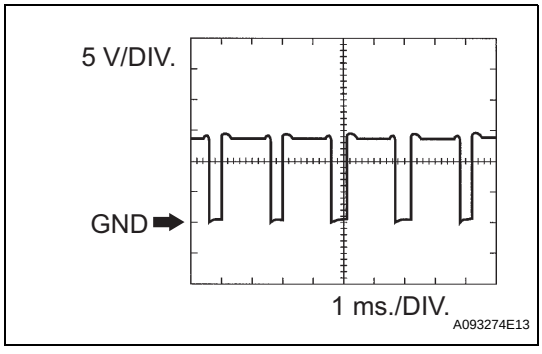
HINT:
If the waveform is not similar to the illustration, check the waveform again after idling for 10 minutes or more.



8. WAVEFORM 8
Vehicle speed signal:

ECM Terminal Names	Between SPD and E1
Tester Ranges	2 V/DIV., 20 ms./DIV.
Conditions	Driving at 12 mph (20 km/h)

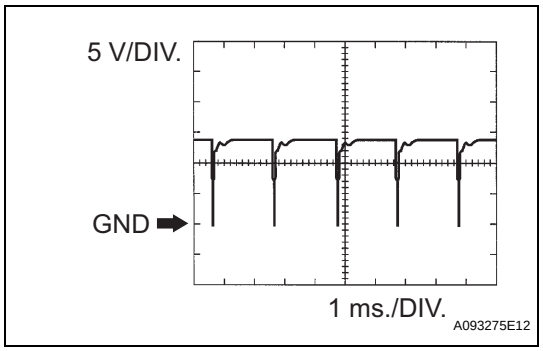
HINT:
The wavelength becomes shorter as the vehicle speed increases.



9. WAVEFORM 9
Throttle actuator positive terminal:

ECM Terminal Names	Between M+ and ME01
Tester Ranges	5 V/DIV., 1 ms./DIV.
Conditions	Idling with warm engine

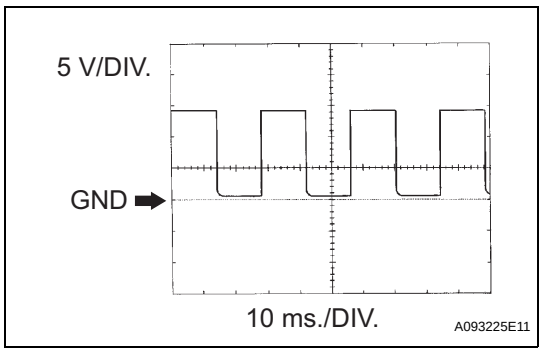
HINT:
The duty ratio varies depending on the throttle actuator operation.



10. WAVEFORM 10
Throttle actuator negative terminal:

ECM Terminal Names	Between M- and ME01
Tester Ranges	5 V/DIV., 1 ms./DIV.
Conditions	Idling with warm engine

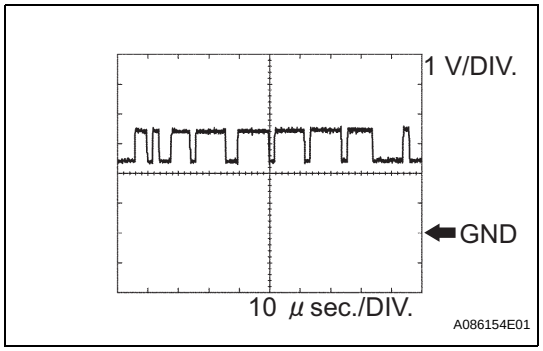
HINT:
The duty ratio varies depending on the throttle actuator operation.



11. WAVEFORM 11
Engine speed signal:

ECM Terminal Names	Between TACH and E1
Tester Ranges	5 V/DIV., 10 ms./DIV.
Conditions	Idling

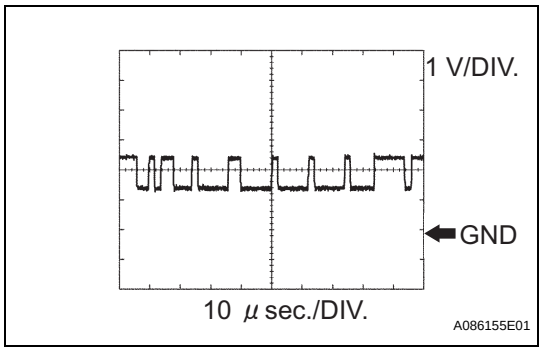
HINT:
The wavelength becomes shorter as the engine rpm increases.



12. WAVEFORM 12
CAN communication signal:

ECM Terminal Names	Between CANH and E1
Tester Ranges	1 V/DIV., 10 μsec./DIV.
Conditions	Engine stops and ignition switch to the ON position

HINT:
The waveform varies depending on the CAN communication signal.



13. WAVEFORM 13
CAN communication signal:

ECM Terminal Names	Between CANL and E1
Tester Ranges	1 V/DIV., 10 μsec./DIV.
Conditions	Engine stops and ignition switch to the ON position

HINT:
The waveform varies depending on the CAN communication signal.

ES

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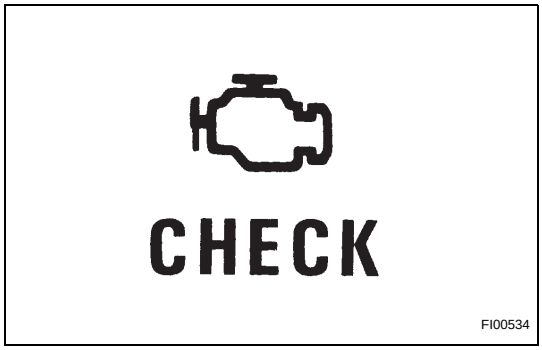
DIAGNOSIS SYSTEM

1. DESCRIPTION



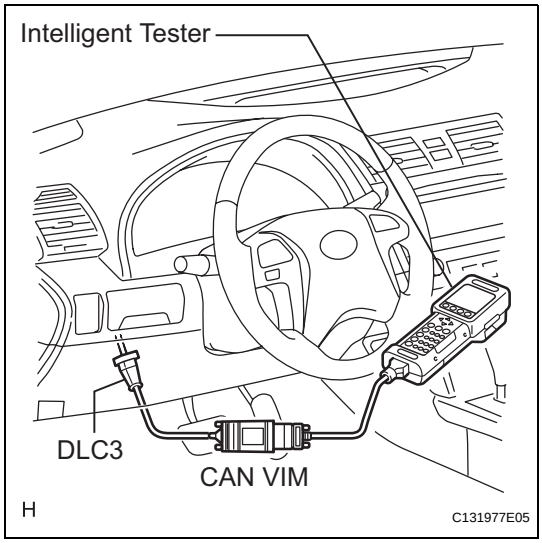
When troubleshooting OBD II (On-Board Diagnostics) vehicles, the intelligent tester (complying with SAE J1987) must be connected to the DLC3 (Data Link Connector 3) of the vehicle. Various data in the vehicle's ECM (Engine Control Module) can be then read.

OBD II regulations require that the vehicle's on-board computer illuminates the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction in:

(a) The emission control system components.
(b) The powertrain control components (which affect vehicle emissions).
(c) The computer itself.

In addition, if the applicable DTCs (Diagnostic Trouble Codes) prescribed by SAE J2012 are not recorded on 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.

To check DTCs, connect the intelligent tester to the DLC3. The tester displays DTCs, freeze frame data, and a variety of the engine data. The DTCs and freeze frame data can be erased with the tester (See page ES-38).



In order to enhance OBD function on vehicles and develop the Off-Board diagnosis system, CAN (Controller Area Network) communication is introduced in this system. It minimizes the gap between technician skills and vehicle technology. CAN is a network, which uses a pair of data transmission lines, spanning multiple computers and sensors. It allows high speed communication between the systems and simplifies the wire harness connection.

Since this system is equipped with the CAN communication, connecting the CAN VIM (Vehicle Interface Module) to the intelligent tester is necessary to display any information from the ECM. (Also the communication between the intelligent tester and the ECM uses CAN communication signals.) When confirming the DTCs and any data of the ECM, connect the CAN VIM between the DLC3 and the intelligent tester.

2. NORMAL MODE AND CHECK MODE

The diagnosis system operates in normal mode during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available as an option for technicians. In check mode, "1 trip detection logic" is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent problems (intelligent tester only) (See page ES-41).

3. 2 TRIP DETECTION LOGIC

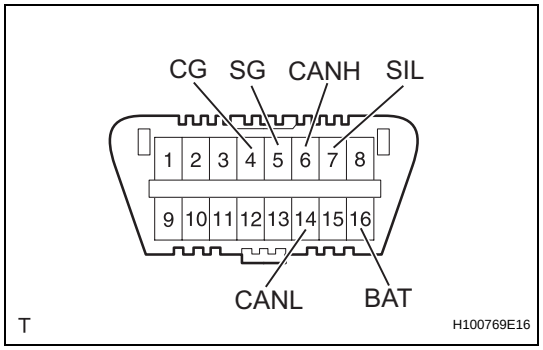
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next subsequent drive cycle, the MIL is illuminated (2nd trip).

4. FREEZE FRAME DATA

The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

5. DLC3 (Data Link Connector 3)

The vehicle's ECM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols	Terminal No.	Names	Reference terminal	Results	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always
CANH	6	CAN "High" line	14 - CANL	54 to 69 Ω	Ignition switch OFF*
			Battery positive	6 kΩ or higher	Ignition switch OFF*
			4 - CG	200 Ω or higher	Ignition switch OFF*
CANL	14	CAN "Low" line	Battery positive	6 kΩ or higher	Ignition switch OFF*
			4 - CG	200 Ω or higher	Ignition switch OFF*

CAUTION:

***: Before measuring the resistance, leave the vehicle as it is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

The DLC3 is the interface prepared for reading various data from the vehicle's ECM. After connecting the cable of the intelligent tester to the CAN VIM, turn the ignition switch to the ON position and turn the tester on. If a communication failure message is displayed on the tester screen (on the tester: UNABLE TO CONNECT TO VEHICLE), a problem exists in either the vehicle or tester. In order to identify the location of the problem, connect the tester to another vehicle.

If communication is normal: Inspect the DLC3 on the original vehicle.

If communication is still not possible: The problem is probably in the tester itself. Consult the Service Department listed in the instruction manual.

6. **BATTERY VOLTAGE**
   Standard voltage:
   11 to 14 V
   If the voltage is below 11 V, replace or recharge the battery before proceeding to the next step.

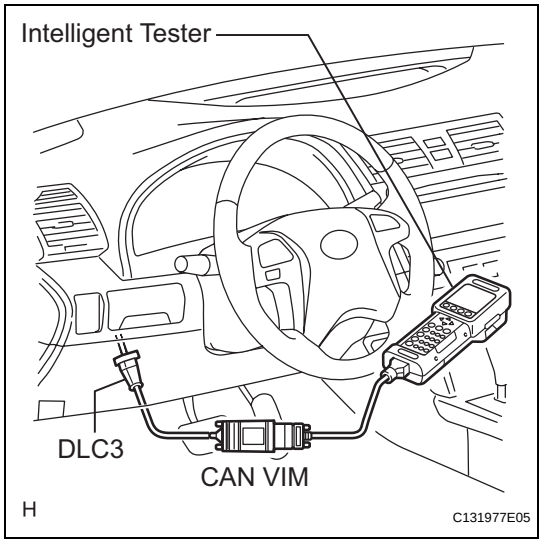
7. **MIL (Malfunction Indicator Lamp)**
   (a) The MIL is illuminated when the ignition switch is first turned ON position (the engine is not running).
   (b) The MIL should turn OFF when the engine is started. If the MIL remains illuminated, the diagnosis system has detected a malfunction or abnormality in the system.
   HINT:
   If the MIL is not illuminated when the ignition switch is first turned ON position, check the MIL circuit (See page ES-397).

8. **ALL READINESS**
   For the vehicle, using the intelligent tester allows readiness codes corresponding to all DTCs to be read. When diagnosis (normal or malfunctioning) has been complete, readiness codes are set. Select the following menu items on the intelligent tester: ENHANCED OBD II / MONITOR STATUS.

DTC CHECK / CLEAR

NOTICE:
When the diagnosis system is changed from normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode are erased. Before changing modes, always check and make a note of any DTCs and freeze frame data.
HINT:

- DTCs which are stored in the ECM can be displayed on the intelligent tester. The intelligent tester can display current and pending DTCs.
- Some DTCs are not set if the ECM does not detect the same malfunction again during a second consecutive driving cycle. However, such malfunctions, detected on only one occasion, are stored as pending DTCs.



1. CHECK FOR DTC (Using intelligent tester)
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES or PENDING CODES.
(e) Check the DTC(s) and freeze frame data, and then write them down.
(f) Check the details of the DTC(s) (See page ES-53).

2. CLEAR DTC (Using intelligent tester)
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
(e) Press the YES button.

3. CLEAR DTC (Without using intelligent tester)
(a) Perform either of the following operations:
(1) Disconnect the cable from the negative (-) battery terminal for more than 1 minute.
(2) Remove the EFI No. 1 and ETCS fuses from the engine room R/B (located inside the engine compartment) for more than 1 minute.

FREEZE FRAME DATA

1. DESCRIPTION

The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

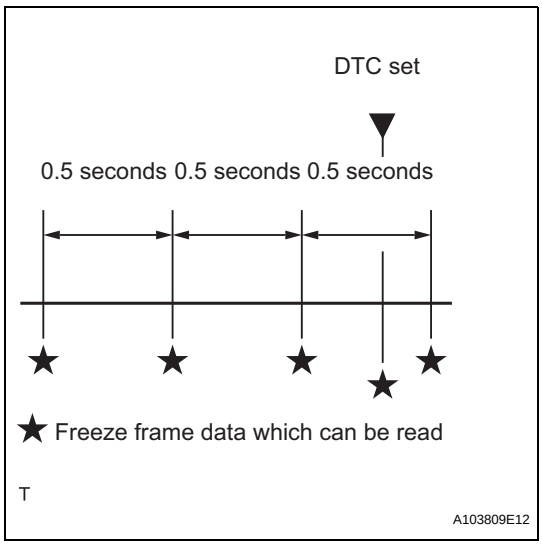
HINT:

If it is impossible to duplicate the problem even though a DTC is detected, confirm the freeze frame data.

The ECM records engine conditions in the form of freeze frame data every 0.5 seconds. Using the intelligent tester, 5 separate sets of freeze frame data can be checked.

– 3 data set before the DTC was set.
– 1 data set when the DTC was set.
– 1 data set after the DTC was set.

These data sets can be used to simulate the condition of the vehicle around the time of the occurrence of the malfunction. The data may assist in identifying the cause of the malfunction, and in judging whether it was temporary or not.



2. LIST OF FREEZE FRAME DATA

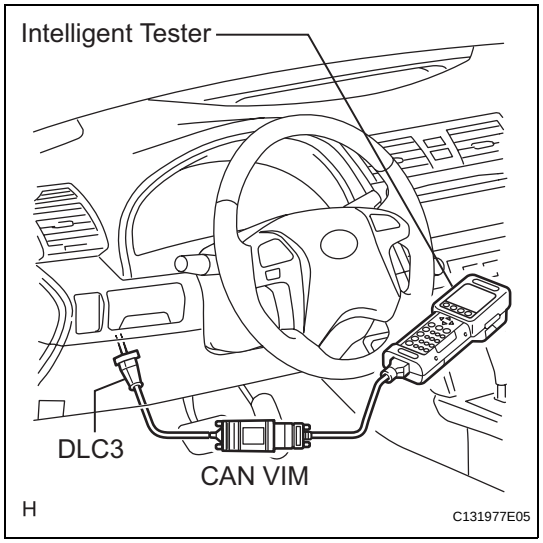
LABEL (Intelligent Tester Display)	Measurement Item	Diagnostic Note
INJECTOR	Injection period of No. 1 cylinder	-
IGN ADVANCE	Ignition advance	-
CALC LOAD	Calculated load	Calculated load by ECM
VEHICLE LOAD	Vehicle load	-
MAF	Mass air flow volume	If approximately 0.0 g/sec.: • Mass air flow meter power source circuit open or short • VG circuit open or short If 160.0 g/sec. or more: • E2G circuit open
ENGINE SPD	Engine speed	-
VEHICLE SPD	Vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature	If -40°C (-40°F), sensor circuit open If 140°C (284°F) or more, sensor circuit shorted
INTAKE AIR	Intake air temperature	If -40°C (-40°F), sensor circuit open If 140°C (284°F) or more, sensor circuit shorted
AIR-FUEL RATIO	Ratio compared to stoichiometric level	-
PURGE DENSITY	Learning value of purge density	-
EVAP PURGE FLOW	Ratio of evaporative purge flow to intake air volume	-
EVAP PURGE VSV	EVAP purge VSV duty ratio	-
KNOCK CRRT VAL	Correction learning value of knocking	-
KNOCK FB VAL	Feedback value of knocking	-

LABEL (Intelligent Tester Display)	Measurement Item	Diagnostic Note
ACCEL POS #1	Absolute Accelerator Pedal Position (APP) No. 1	-
ACCEL POS #2	Absolute APP No. 2	-
THROTTLE POS	Throttle position	-
THROTTLE POS	Throttle sensor positioning	-
THROTTLE POS #2	Throttle sensor positioning #2	-
THROTTLE MOT	Throttle motor	-
O2S B1 S2	Heated oxygen sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
AFS B1 S1	A/F sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
TOTAL FT #1	Total fuel trim	-
SHORT FT #1	Short-term fuel trim	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim	Overall fuel compensation carried out in long-term to compensate for a continual deviation of short-term fuel trim from central valve
FUEL SYS #1	Fuel system status	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using A/F sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but A/F sensor, which used for fuel control malfunctioning
O2FT B1 S2	Fuel trim at heated oxygen sensor	-
AF FT B1 S1	Fuel trim at A/F sensor	-
AFS B1 S1	A/F sensor current	-
CAT TEMP B1S1	Estimated catalyst temperature (sensor 1)	-
CAT TEMP B1S2	Estimated catalyst temperature (sensor 2)	-
S O2S B1S2	Sub heated oxygen sensor impedance (sensor 2)	-
INI COOL TEMP	Engine coolant temperature at engine start	-
INI INTAKE TEMP	Intake air temperature at engine start	-
INJ VOL	Injection volume	-
STARTER SIG	Starter switch (STSW) signal	-
PS SW	Power steering signal	-
PS SIGNAL	Power steering signal (history)	Signal status usually ON until ignition switch turned OFF
CTP SW	Closed throttle position switch	-
A/C SIGNAL	A/C signal	-
PNP SW (NSW)	Park/Neutral Position (PNP) switch signal	-
ELECT LOAD SIG	Electrical load signal	-
STOP LIGHT SW	Stop light switch	-
BATTERY VOLTAGE	Battery voltage	-
ATM PRESSURE	Atmosphere pressure	-
EVAP (Purge) VSV	EVAP Purge VSV	-
FUEL PUMP/SPD	Fuel pump/speed status	-
VVT CTRL B1	VVT control status	-

LABEL (Intelligent Tester Display)	Measurement Item	Diagnostic Note
VACUUM PUMP	Key-off EVAP system leak detection pump status	(see page ES-344)
EVAP VENT VAL	Key-off EVAP system vent valve status	-
FAN MOTOR	Electric fan motor	-
TC/TE1	TC and CG (TE1) terminals of DLC3	-
ENG SPEED #1	Engine rpm during No. 1 cylinder fuel cut	Output only when FUEL CUT #1 is performed using ACTIVE TEST
ENG SPEED #2	Engine rpm during No. 2 cylinder fuel cut	Output only when FUEL CUT #2 is performed using ACTIVE TEST
ENG SPEED #3	Engine rpm during No. 3 cylinder fuel cut	Output only when FUEL CUT #3 is performed using ACTIVE TEST
ENG SPEED #4	Engine rpm during No. 4 cylinder fuel cut	Output only when FUEL CUT #4 is performed using ACTIVE TEST
ENG SPEED ALL	Average of engine rpm values during fuel cut of No. 1 to No. 4 cylinders	Output only when ACTIVE TEST is performed
VVTL AIM ANGL#1	VVT aim angle	-
VVT CHNG ANGL#1	VVT angle	-
VVT OCV DUTY B1	VVT OCV operation duty	-
FC IDL	Fuel cut idle	ON: when throttle valve fully closed and engine speed over 3,500 rpm
FC TAU	Fuel cut with a very light load	Fuel cut being performed with a very light load to prevent incomplete engine combustion
IGNITION	Ignition counter	-
CYL #1	Cylinder #1 misfire	Displayed only during idling
CYL #2	Cylinder #2 misfire	Displayed only during idling
CYL #3	Cylinder #3 misfire	Displayed only during idling
CYL #4	Cylinder #4 misfire	Displayed only during idling
CYL ALL	All cylinders misfire	Displayed only during idling
MISFIRE RPM	Engine speed when misfire occurred	-
MISFIRE LOAD	Engine load when misfire occurred	-
MISFIRE MARGIN	Margin to detect engine misfire	-
MIL ON RUN DIST	Distance after DTC is detected	-
ENG RUN TIME	Accumulated engine running time	-
TIME DTC CLEAR	Cumulative time after DTC cleared	-
DIST DTC CLEAR	Accumulated distance from DTC cleared	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared	-

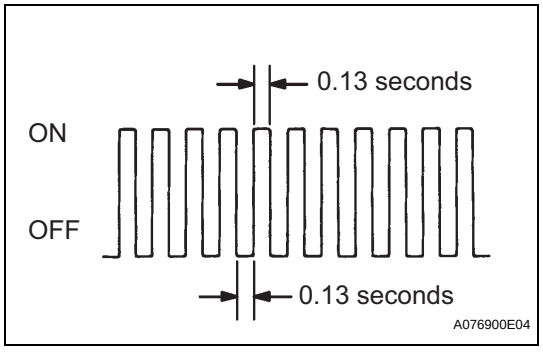
CHECK MODE PROCEDURE

HINT:
Intelligent tester only:
Compared to normal mode, check mode is more sensitive to malfunctions. Therefore, check mode can detect the malfunctions that cannot be detected by normal mode.
NOTICE:
All the stored DTCs and freeze frame data are erased if: 1) the ECM is changed from normal mode to check mode or vice versa; or 2) the ignition switch is turned from ON position to ACC position or off while in check mode. Before changing modes, always check and make a note of any DTCs and freeze frame data.



1. CHECK MODE PROCEDURE (Using intelligent tester)

(a) Check and ensure the following conditions:
  (1) Battery positive voltage 11 V or more.
  (2) Throttle valve fully closed.
  (3) Transmission in the P or N position.
  (4) A/C switch OFF.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn the tester on.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II/ CHECK MODE.
(g) Switch the ECM from normal mode to check mode.



(h) Make sure that the MIL flashes as shown in the illustration.
(i) Start the engine.
(j) Make sure that the MIL turns off.
(k) Simulate the conditions of the malfunction described by the customer.
(l) Check for DTCs and freeze frame data using the tester.

FAIL-SAFE CHART

If any of the following DTCs are set, the ECM enters fail-safe mode to allow the vehicle to be driven temporarily.

DTCs	Components	Fail-Safe Operations	Fail-Safe Deactivation Conditions
P0031 and P0032	Air-Fuel Ratio (A/F) Sensor Heater	ECM turns off A/F sensor heater.	Ignition switch OFF
P0037 and P0038	Heated Oxygen (HO2) Sensor Heater	ECM turns off HO2 sensor heater.	Ignition switch OFF
P0100, P0102 and P0103	Mass Air Flow (MAF) Meter	ECM calculates ignition timing according to engine speed and throttle valve position.	Pass condition detected
P0110, P0112 and P0113	Intake Air Temperature (IAT) Sensor	ECM estimates IAT to be 20°C (68°F).	Pass condition detected
P0115, P0117 and P0118	Engine Coolant Temperature (ECT) Sensor	ECM estimates ECT to be 80°C (176°F).	Pass condition detected
P0120, P0121, P0122, P0123, P0220, P0222, P0223, P0604, P0606, P0607, P0657, P2102, P2103, P2111, P2112, P2118, P2119 and P2135	Electronic Throttle Control System (ETCS)	ECM cuts off throttle actuator current and throttle valve is returned to 6° throttle position by return spring. ECM then adjusts engine output by controlling fuel injection (intermittent fuel-cut) and ignition timing in accordance with accelerator pedal opening angle to allow vehicle to continue at minimal speed*.	Pass condition detected and then ignition switch turned off
P0327 and P0328	Knock Sensor	ECM sets ignition timing to maximum retard.	Ignition switch off
P0351 to P0354	Igniter	ECM cuts fuel.	Pass condition detected
P2120, P2121, P2122, P2123, P2125, P2127, P2128 and P2138	Accelerator Pedal Position (APP) Sensor	APP sensor has 2 sensor circuits: Main and Sub. If either circuit malfunctions, ECM controls engine using the other circuit. If both circuits malfunction, ECM regards accelerator pedal as being released. As a result, throttle valve is closed and engine idles.	Pass condition detected and then ignition switch turned off

HINT:

*: The vehicle can be driven slowly when the accelerator pedal is depressed firmly and slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By reading the DATA LIST displayed on an intelligent tester, values can be checked, including those of the switches, sensors, and actuators, without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to shorten diagnostic time.

NOTICE:

In the table below, the values listed under Normal Condition are for reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn the tester on.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) Check the values by referring to the table below.

ECM:

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
INJECTOR	Injection period of No. 1 cylinder: Min.: 0 ms, Max.: 32.64 ms	1.0 to 3.0 ms: Idling	-
IGN ADVANCE	Ignition timing advance for No. 1 cylinder: Min.: -64 deg, Max.: 63.5 deg	BTDC 8 to 12 deg: Idling	-
CALC LOAD	Calculated load by ECM: Min.: 0 %, Max.: 100 %	• 10 to 30 %: Idling • 10 to 30 %: Running without load at 2,500 rpm	Load value
VEHICLE LOAD	Vehicle load: Min.: 0 %, Max.: 25,700 %	Actual vehicle load	Load percentage in terms of maximum intake air flow amount
MAF	Air flow rate from Mass Air Flow (MAF) meter: Min.: 0 g/sec., Max.: 655.35 g/sec.	1 to 3 g/sec.: Idling 2 to 6 g/sec.: Running without load at 2,500 rpm	If value is approximately 0.0 g/sec.: • MAF meter power source circuit open • VG circuit open or shorted If value is 160.0 g/sec. or more: • E2G circuit open
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	650 to 750 rpm: Idling (Manual transaxle) 610 to 710 rpm: Idling (Automatic transaxle)	-
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature: Min.: -40°C, Max.: 140°C	80 to 100°C (176 to 212°F): After warming up	• If -40°C (-40°F): sensor circuit open • If 140°C (284°F) or more: sensor circuit shorted
INTAKE AIR	Intake air temperature: Min.: -40°C, Max.: 140°C	Equivalent to ambient air temperature	• If -40°C (-40°F): sensor circuit open • If 140°C (284°F) or more: sensor circuit shorted

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
AIR-FUEL RATIO	Ratio compared to stoichiometric level: Min.: 0, Max.: 1.999	0.8 to 1.2: Idling	• Less than 1 (0 to 0.999) = Lean • Stoichiometric air-fuel ratio = 1 • Greater than 1 (1.001 to 1.999) = Rich
PURGE DENSITY	Learning value of purge density: Min.: -50, Max.: 350	-40 to 10: Idling	-
EVAP PURGE FLOW	Ratio of evaporative purge flow to intake air volume: Min.: 0 %, Max.: 102.4 %	0 to 10 %: Idling	-
EVAP PURGE VSV	EVAP (PURGE) VSV control duty: Min.: 0 %, Max.: 100 %	10 to 50 %: Idling	Order signal from ECM
VAPOR PRES PUMP	Vapor pressure: Min.: 33.853 kPa, Max.: 125.596 kPa	Approximately 100 kPa: Ignition switch to the ON position	EVAP system pressure monitored by canister pressure sensor
VAPOR PRES CALC	Vapor pressure (calculated): Min.: -5.632 kPa, Max.: 715.264 kPa	Approximately 100 kPa: Ignition switch to the ON position	EVAP system pressure monitored by canister pressure sensor
KNOCK CRRT VAL	Knock correction learning value: Min: -64°CA, Max.: 1,984°CA	0 to 20°CA: Driving at 44 mph (70 km/h)	Service data
KNOCK FB VAL	Knock feedback value: Min: -64°CA, Max.: 1,984°CA	-20 to 0°CA: Driving at 44 mph (70 km/h)	Service data
ACCEL POS #1	Absolute Accelerator Pedal Position (APP) No. 1: Min.: 0 %, Max.: 100 %	10 to 22 %: Accelerator pedal released 52 to 90 %: Accelerator pedal fully depressed	Read value with ignition switch to the ON position (Do not start engine)
ACCEL POS #2	Absolute APP No. 2: Min.: 0 %, Max.: 100 %	24 to 40 %: Accelerator pedal released 68 to 100 %: Accelerator pedal fully depressed	Read value with ignition switch to the ON position (Do not start engine)
ACCEL POS #1	APP sensor No. 1 voltage: Min.: 0 V, Max.: 5 V	0.5 to 1.1 V: Accelerator pedal released 2.6 to 4.5 V: Accelerator pedal fully depressed	Read value with ignition switch to the ON position (Do not start engine)
ACCEL POS #2	APP sensor No. 2 voltage: Min.: 0 V, Max.: 5 V	1.2 to 2.0 V: Accelerator pedal released 3.4 to 5.0 V: Accelerator pedal fully depressed	Read value with ignition switch to the ON position (Do not start engine)
ACCEL IDL POS	Whether or not accelerator pedal position sensor detecting idle: ON or OFF	ON: Idling	-
THRTL LEARN VAL	Throttle valve fully closed (learned value): Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	-
ACCEL SSR #1 AD	APP sensor No. 1 voltage (AD): Min.: 0 V, Max.: 4.9804 V	-	ETCS service data
ACCEL LRN VAL#1	Accelerator fully closed learning value No. 1: Min.: 0 deg, Max.: 124.512 deg	-	ETCS service data
ACCEL LRN VAL#2	Accelerator fully closed learning value No. 2: Min.: 0 deg, Max.: 124.512 deg	-	ETCS service data
FAIL #1	Whether or not fail safe function executed: ON or OFF	ON: ETCS has failed	-
FAIL #2	Whether or not fail safe function executed: ON or OFF	ON: ETCS has failed	-
ST1	Brake pedal signal: ON or OFF	ON: Brake pedal depressed	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
SYS GUARD JUDGE	System guard: ON or OFF	-	ETCS service data
OPN MALFUNCTION	Open side malfunction: ON or OFF	-	ETCS service data
THROTTLE POS	Throttle position sensor: Min.: 0%, Max.: 100 %	• 10 to 22 %: Throttle fully closed • 66 to 98 %: Throttle fully open	• Calculated value based on VTA1 • Read value with ignition switch to the ON position (Do not start engine)
THROTTL IDL POS	Whether or not throttle position sensor detecting idle: ON or OFF	ON: Idling	-
THRTL REQ POS	Throttle requirement position: Min.: 0 V, Max.: 5 V	0.5 to 1.0 V: Idling	-
THROTTLE POS	Throttle position: Min.: 0 %, Max.: 100 %	• 0 %: Throttle fully closed • 50 to 80 %: Throttle fully open	• Recognition value for throttle opening angle on ECM • Read value with ignition switch to the ON position (Do not start engine)
THROTTLE POS #2	Throttle position No. 2 sensor: Min.: 0 %, Max.: 100 %	• 42 to 62 %: Throttle fully closed • 92 to 100 %: Throttle fully open	• Calculated value based on VTA2 • Read value with ignition switch to the ON position (Do not start engine)
THROTTLE POS #1	Throttle position sensor No. 1 output voltage: Min.: 0 V, Max.: 5 V	• 0.5 to 1.1 V: Throttle fully closed • 3.3 to 4.9 V: Throttle fully open	Read value with ignition switch to the ON position (Do not start engine)
THROTTLE POS #2	Throttle position sensor No. 2 output voltage: Min.: 0 V, Max.: 5 V	• 2.1 to 3.1 V: Throttle fully closed • 4.6 to 5.0 V: Throttle fully open	Read value with ignition switch to the ON position (Do not start engine)
THRTL COMND VAL	Throttle position command value: Min.: 0 V, Max.: 4.9804 V	0.5 to 4.9 V	Read value with ignition switch to the ON position (Do not start engine)
THROTTLE SSR #1	Throttle sensor opener position No. 1: Min.: 0 V, Max.: 4.9804 V	-	ETCS service data
THROTTLE SSR #2	Throttle sensor opener position No. 2: Min.: 0 V, Max.: 4.9804 V	-	ETCS service data
THRTL SSR #1 AD	Throttle position sensor No. 1 output voltage (AD): Min.: 0 V, Max.: 4.9804 V	0.5 to 4.9 V	Read value with ignition switch to the ON position (Do not start engine)
THROTTLE MOT	Whether or not throttle actuator control permitted: ON or OFF	ON: Idling	Read value with ignition switch to the ON position (Do not start engine)
THROTTLE MOT	Throttle actuator current: Min.: 0 A, Max.: 80 A	0 to 3.0 A: Idling	-
THROTTLE MOT	Throttle actuator: Min.: 0 %, Max.: 100 %	0.5 to 40 %: Idling	-
THRTL MOT (OPN)	Throttle actuator duty ratio (open): Min.: 0 %, Max.: 100 %	0 to 40 %: Idling	ETCS service data
THRTL MOT (CLS)	Throttle actuator duty ratio (closed): Min.: 0 %, Max.: 100 %	0 to 40 %: Idling	ETCS service data
O2S B1 S2	Heated oxygen sensor output voltage for sensor 2: Min.: 0 V Max.: 1.275 V	0.1 to 0.9 V: Driving at 44 mph (70 km/h)	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor

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Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
AFS B1 S1	A/F sensor output voltage for sensor 1: Min.: 0 V Max.: 7.999 V	2.8 to 3.8 V: Idling	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
TOTAL FT #1	Total fuel trim value for fuel system: Min.: -0.5, Max.: 0.496	-0.2 to 0.2	-
SHORT FT #1	Short-term fuel trim: Min.: -100 %, Max.: 99.2 %	-20 to 20 %	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim: Min.: -100 %, Max.: 99.2 %	-20 to 20 %	Overall fuel compensation carried out in long-term to compensate for a continual deviation of short-term fuel trim from central value
FUEL SYS #1	Fuel system status: OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling after warming up	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using A/F sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but A/F sensor, which used for fuel control malfunctioning
O2FT B1 S2	Short-term fuel trim associated with sensor 2: Min.: -100 %, Max.: 99.2 %	-	-
AF FT B1 S1	Short-term fuel trim associated with sensor 1: Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) =Lean • Stoichiometric air-fuel ratio=1 • Value greater than 1 (1.001 to 1.999) = Rich	-
AFS B1 S1	A/F sensor current: Min.: -128 mA, Max.: 127.99 mA	-	-
CAT TEMP B1S1	Estimated catalyst temperature (sensor 1): Min.: -40°C, Max.: 6,513.5°C	-	-
CAT TEMP B1S2	Estimated catalyst temperature (sensor 2): Min.: -40°C, Max.: 6,513.5°C	-	-
S O2S B1S2	Sub heated oxygen sensor impedance (sensor 2): Min.: 0 Ω, Max.: 21247.68 Ω	-	-
INI COOL TEMP	Engine coolant temperature at engine start: Min.: -40°C, Max.: 120°C	Close to ambient air temperature	-
INI INTAKE TEMP	Intake air temperature at engine start: Min.: -40°C, Max.: 120°C	Close to ambient air temperature	-
INJ VOL	Injection volume (Cylinder 1): Min.: 0 ml, Max.: 2.048 ml	0 to 0.15 ml: Idling	Quantity of fuel injection volume for 10 times
STARTER SIG	Starter switch (STSW) signal: ON or OFF	ON: Cranking	-
PS SW	Power steering signal: ON or OFF	ON: Power steering operation	-

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Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
PS SIGNAL	Power steering signal (history): ON or OFF	ON: When steering wheel first turned after battery terminals connected	Signal status usually ON until battery terminals disconnected
CTP SW	Closed throttle position switch: ON or OFF	• ON: Throttle fully closed • OFF: Throttle open	-
A/C SIGNAL	A/C signal: ON or OFF	ON: A/C ON	-
PNP SW [NSW]	PNP switch status: ON or OFF	ON: P or N position	-
ELECT LOAD SIG	Electrical load signal: ON or OFF	ON: Headlights or defogger turned ON	-
STOP LIGHT SW	Stop light switch: ON or OFF	ON: Brake pedal depressed	-
+BM	Whether or not electric throttle control system power inputted: ON or OFF	ON: Ignition switch to the ON position and system normal	-
+BM VOLTAGE	+BM voltage: Min.: 0, Max.: 19.2182	9 to 14 (V): Ignition switch to the ON position and system normal	ETCS service data
BATTERY VOLTAGE	Battery voltage: Min.: 0 V, Max.: 65.535 V	9 to 14 V: Ignition switch to the ON position	-
ACTUATOR POWER	Actuator power supply: ON or OFF	ON: Idling	ETCS service data
ATM PRESSURE	Atmospheric pressure: Min.: 0 kPa, Max.: 255 kPa	Approximately 100 kPa: Ignition switch to the ON position	-
EVAP (Purge) VSV	Purge VSV status: ON or OFF	-	-
FUEL PUMP / SPD	Fuel pump status: ON or OFF	ON: Engine running	Active Test support data
VVT CTRL B1	VVT control (bank 1) status: ON or OFF	-	-
VACUUM PUMP	Key-off EVAP system leak detection pump status: ON or OFF	-	Active Test support data
EVAP VENT VAL	Key-off EVAP system vent valve status: ON or OFF	-	Active Test support data
FAN MOTOR	Electric fan motor: ON or OFF	ON: Electric fan motor operating	-
TC/TE1	TC and CG (TE1) terminals of DLC3: ON or OFF	-	Active Test support data
ENG SPEED #1	Engine rpm during No. 1 cylinder fuel cut: Min.: 0 rpm, Max.: 25,600 rpm	-	Output only when FUEL CUT #1 is performed using ACTIVE TEST
ENG SPEED #2	Engine rpm during No. 2 cylinder fuel cut: Min.: 0 rpm, Max.: 25,600 rpm	-	Output only when FUEL CUT #2 is performed using ACTIVE TEST
ENG SPEED #3	Engine rpm during No. 3 cylinder fuel cut: Min.: 0 rpm, Max.: 25,600 rpm	-	Output only when FUEL CUT #3 is performed using ACTIVE TEST
ENG SPEED #4	Engine rpm during No. 4 cylinder fuel cut: Min.: 0 rpm, Max.: 25,600 rpm	-	Output only when FUEL CUT #4 is performed using ACTIVE TEST
ENG SPEED ALL	Average of engine rpm values during fuel cut of No. 1 to No. 4 cylinders: Min.: 0 rpm, Max.: 25,600 rpm	-	Output only when ACTIVE TEST is performed
VVTL AIM ANGL#1*2	VVT aim angle: Min.: 0 %, Max.: 100 %	0 to 100 %	VVT duty signal value during intrusive operation

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
VVT CHNG ANGL#1*2	VVT angle: Min.: 0°FR, Max.: 60°FR	0 to 56°FR	Displacement angle during intrusive operation
VVT OCV DUTY B1*2	VVT OCV operation duty: Min.: 0 %, Max.: 100 %	0 to 100 %	Requested duty value for intrusive operation
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operation	FC IDL = "ON" when throttle valve fully closed and engine speed over 3,500 rpm
FC TAU	Fuel cut TAU (Fuel cut with a very light load): ON or OFF	ON: Fuel cut operating	Fuel cut being performed with a very light load to prevent incomplete engine combustion
IGNITION	Ignition counter: Min.: 0, Max.: 800	0 to 800	-
CYL #1, #2, #3, #4	Misfire of cylinder 1 to 4: Min.: 0, Max.: 255	0	-
CYL ALL	All cylinders misfire: Min.: 0, Max.: 255	0	-
MISFIRE RPM	Engine speed when misfire occurs: Min.: 0 rpm, Max.: 6,375 rpm	-	-
MISFIRE LOAD	Engine load when misfire occurs: Min.: 0 g/rev, Max.: 3.98 g/rev	-	-
MISFIRE MARGIN	Margin to detect engine misfire: Min.: -100 %, Max.: 99.22 %	-100 to 99.22 %	Misfire detecting margin
#CODES	Number of codes: Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode: ON or OFF	ON: Check mode ON	(See page ES-41)
SPD TEST	Check mode result for vehicle speed sensor: COMPL or INCMPL	-	-
MISFIRE TEST	Check mode result for misfire monitor: COMPL or INCMPL	-	-
OXS1 TEST	Check mode result for HO2 sensor: COMPL or INCMPL	-	-
A/F SSR TEST B1	Check mode result for air-fuel ratio sensor: COMPL or INCMPL	-	-
MIL	MIL status: ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance: Min.: 0 km, Max.: 65,535 km	Distance after DTC detected	-
MIL ON RUN TIME	Running time from MIL ON: Min.: 0 minutes, Max.: 65,535 minutes	Equivalent to running time after MIL ON	-
ENG RUN TIME	Engine run time: Min.: 0 seconds, Max.: 65,535 seconds	Time after engine start	-
TIME DTC CLEAR	Time after DTC cleared: Min.: 0 minutes, Max.: 65,535 minutes	Equivalent to time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared: Min.: 0 km, Max.: 65,535 km	Equivalent to drive distance after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared: Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
OBD CERT	OBD requirement	OBD2	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
COMP MON	Comprehensive component monitor: NOT AVL or AVAIL	-	-
FUEL MON	Fuel system monitor: NOT AVL or AVAIL	-	-
MISFIRE MON	Misfire monitor: NOT AVL or AVAIL	-	-
O2S (A/FS) HTR	O2S (A/FS) heater monitor: NOT AVL or AVAIL	-	-
O2S (A/FS) MON	O2S (A/FS) monitor: NOT AVL or AVAIL	-	-
EVAP MON	EVAP monitor: NOT AVL or AVAIL	-	-
CAT MON	Catalyst monitor: NOT AVL or AVAIL	-	-
EGR ENA	EGR monitor: UNABLE or ENABLE	UNABLE	-
EGR CMPL	EGR monitor: COMPL or INCMPL	INCMPL	-
HTR ENA	O2S (A/FS) heater monitor: UNABLE or ENABLE	ENABLE	-
HTR CMPL	O2S (A/FS) heater monitor: COMPL or INCMPL	INCMPL	-
O2S (A/FS) ENA	O2S (A/FS) monitor: UNABLE or ENABLE	ENABLE	-
O2S (A/FS) CMPL	O2S (A/FS) monitor: COMPL or INCMPL	INCMPL	-
ACRF ENA	A/C monitor: UNABLE or ENABLE	UNABLE	-
ACRF CMPL	A/C monitor: COMPL or INCMPL	INCMPL	-
AIR ENA	Secondary air injection system monitor: UNABLE or ENABLE	UNABLE	-
AIR CMPL	Secondary air injection system monitor: COMPL or INCMPL	INCMPL	-
EVAP ENA	EVAP monitor: UNABLE or ENABLE	ENABLE	-
EVAP CMPL	EVAP monitor: COMPL or INCMPL	INCMPL	-
HCAT ENA	Heated catalyst monitor: UNABLE or ENABLE	UNABLE	-
HCAT CMPL	Heated catalyst monitor: COMPL or INCMPL	INCMPL	-
CAT ENA	Catalyst monitor: UNABLE or ENABLE	ENABLE	-
CAT CMPL	Catalyst monitor: COMPL or INCMPL	COMPL	-
MODEL CODE	Identifying model code	ACA3#	-
ENGINE TYPE	Identifying engine type	2AZFE	-
CYLINDER NUMBER	Identifying cylinder number: Min.: 0, Max.: 255	4	-
TRANSMISSION	Identifying transmission type	5AT or M/T	-
DESTINATION	Identifying destination	A (America)	-
MODEL YEAR	Identifying model year: Min.: 1,900, Max.: 2,155	2007	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
SYSTEM	Identifying engine system	GASLIN (gasoline engine)	-

HINT:

- *1: If no idling conditions are specified, the transmission gear selector lever should be in the N or P position, and the A/C switch and all accessory switches should be OFF.
- *2: DATA LIST values are only displayed when performing the following ACTIVE TEST: VVT B1. For other ACTIVE TESTs, the DATA LIST value will be 0.

2. ACTIVE TEST

HINT:

Performing an ACTIVE TEST enables components including the relays, VSV (Vacuum Switching Valve) and actuators, to be operated without removing any parts. The ACTIVE TEST can be performed with the intelligent tester. Performing the ACTIVE TEST as the first step in troubleshooting is one method to shorten diagnostic time.

DATA LIST can be displayed during ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(e) Perform the ACTIVE TEST by referring to the table below.

ECM:

Intelligent Tester Displays	Test Details	Control Ranges	Diagnostic Notes
INJ VOL	Change injection volume	Between -12.5 and 24.8 %	• All injectors tested at same time • Perform test at less than 3,000 rpm • Injection volume can be changed in 0.1 % graduations within control range
A/F CONTROL	Change injection volume	Decrease by 12.5 % or increase by 24.8 %	• Perform test at less than 3,000 rpm • A/F CONTROL enables checking and graphing of A/F (Air-Fuel Ratio) sensor and Heated Oxygen (HO2) sensor voltage outputs • To conduct test, select following menu items: ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2; then press YES and ENTER followed by F4.
EVAP VSV (ALONE)	Activate purge VSV control	ON/OFF	-
FUEL PUMP / SPD	Activate fuel pump (C/OPN Relay)	ON/OFF	Test is possible when engine stopped
TC/TE1	Turn on and off TC and TE1 connection	ON/OFF	• ON: TC and TE1 connected • OFF: TC and TE1 disconnected
FC IDL PROHBT	Prohibit idling fuel cut control	ON/OFF	-
COOLING FAN	Control electric cooling fan	ON/OFF	-

Intelligent Tester Displays	Test Details	Control Ranges	Diagnostic Notes
ETCS OPEN SLOW	Throttle actuator	ON: Throttle valve opens slowly	Test is possible when following conditions met: • Engine stopped • Shift position in P • Fully depressing accelerator pedal (APP: 59° or more)
ETCS CLOSE SLOW	Throttle actuator	ON: Throttle valve closes slowly	
ETCS OPEN FAST	Throttle actuator	ON: Throttle valve opens fast	
ETCS CLOSE FAST	Throttle actuator	ON: Throttle valve closes fast	
VVT LINEAR B1	Control VVT (bank 1)	-128 to 127 % This value added to present OCV control duty 100 %: Maximum advance -100 %: Maximum retard	• Engine stall or rough idle when VVT actuator operated by 100 %. • Test is possible while vehicle stopped and engine idling
VVT CTRL B1	Control VVT (bank 1)	-128 to 127 %	Test is possible while vehicle stopped and engine idling
VACUUM PUMP	Leak detection pump	ON/OFF	-
VENT VALVE	Vent valve	ON/OFF	-
IAC DUTY RATIO	Active IMRV (Intake Manifold Runner Valve) motor	-100% to 100%	• When the duty ratio is -100% IMRV closes • When the duty ratio is 100% IMRV opens
FUEL CUT #1	Cylinder #1 injector fuel cut	ON/OFF	• Test is possible while vehicle stopped and engine idling • ON: All cylinder injector fuel cut and ignition stop
FUEL CUT #2	Cylinder #2 injector fuel cut	ON/OFF	
FUEL CUT #3	Cylinder #3 injector fuel cut	ON/OFF	
FUEL CUT #4	Cylinder #4 injector fuel cut	ON/OFF	
COMPRESS CHECK	All cylinder injector fuel cut and ignition stop	ON/OFF	*

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HINT:

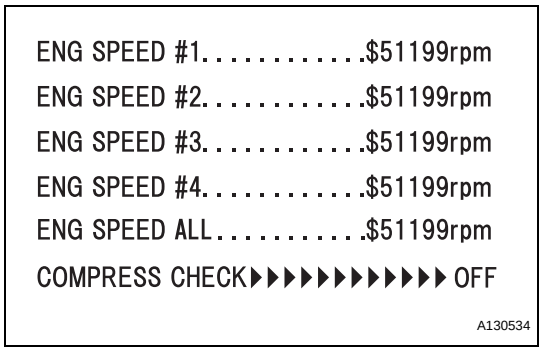
*: When cranking the engine, each cylinder measures the engine rpm.

In this ACTIVE TEST, the fuel and ignition of all cylinders is cut, and cranking occurs for approximately 10 seconds. Then, each cylinder measures the engine rpm. If a cylinder's engine rpm is higher than the others, that cylinder's compression pressure is compared to the others, and whether or not the compression pressure is low can be determined.

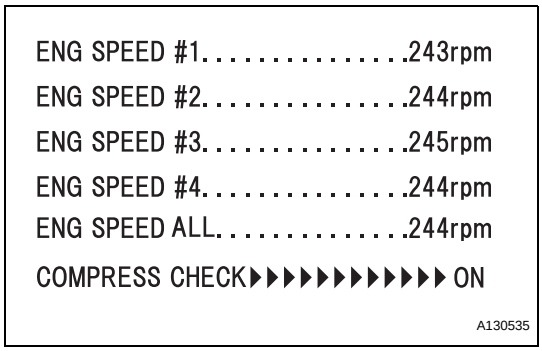
1. Warm up the engine.
2. Turn the ignition switch off.
3. Connect the intelligent tester to the DLC3.
4. Turn the ignition switch to the ON position and turn the intelligent tester on.
5. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / COMPRESS CHECK.

   HINT:

   If the results are not displayed normally, select the display items from the DATA LIST before performing the ACTIVE TEST. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / ENG SPEED #1 and ENG SPEED #2, ENG SPEED #3, ENG SPEED #4 (Press the YES button to change the ENG SPEED #1 to #4) and then press the ENTER button.



6. While the engine is not running, press the RIGHT or LEFT button to change the COMPRESS CHECK to ON.
   HINT:
   After performing the above procedure, the ACTIVE TEST's COMPRESS CHECK will start. Fuel injection for all cylinders is prohibited, and each cylinder's engine rpm measurement will enter standby mode.
7. Fully open the throttle.
8. Crank the engine for about 10 seconds.
9. Monitor the engine speed (ENG SPEED #1 to #4) displayed on the tester.
   HINT:
   At first, the tester's display will show each cylinder's engine rpm measurement to be extremely high. After approximately 10 seconds of engine cranking, each cylinder's engine rpm measurement will change to the actual engine rpm.



NOTICE:

- **After the ACTIVE TEST's COMPRESS CHECK is turned ON, it will automatically turn off after 255 seconds.**
- **When the COMPRESS CHECK test is OFF and the engine is cranked, the engine will start.**
- **If the COMPRESS CHECK test needs to be performed after it is turned ON and performed once, press EXIT to return to the ACTIVE TEST menu screen. Then perform the COMPRESS CHECK test again.**
- **Use a fully-charged battery.**

3. SYSTEM CHECK

HINT:
Performing a SYSTEM CHECK enables the system, which consists of multiple actuators, to be operated without removing any parts. In addition, it can show whether or not any DTCs are set, and can detect potential malfunctions in the system. The SYSTEM CHECK can be performed with the intelligent tester.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK.
(e) Perform the SYSTEM CHECK by referring to the table below.

ECM:

Intelligent Tester Display	Test Detail	Recommended Fuel Temperature	Diagnostic Note
EVAP SYS CHECK (AUTO OPERATION)	Perform 5 steps in order to operate EVAP key-off monitor automatically	35°C (95°F) or less	• If no DTCs in PENDING CODE after performing this test, system functioning normally • Refer to EVAP system
EVAP SYS CHECK (MANUAL OPERATION)	Perform 5 steps in order to operate EVAP key-off monitor manually	35°C (95°F) or less	• Used to detect malfunctioning parts • Refer to EVAP system

DIAGNOSTIC TROUBLE CODE CHART

HINT:
Parameters listed in the chart may be different than your readings depending on the type of instrument and other factors.
If any DTCs are displayed during a check mode DTC check, check the circuit for the DTCs listed in the table below. For details of each DTC, refer to the page indicated.

SFI SYSTEM:

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0010	Camshaft Position "A" Actuator Circuit (Bank 1)	1. Open or short in Oil Control Valve (OCV) circuit 2. OCV 3. ECM	Comes on	DTC stored	ES-65
P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)	1. Valve timing 2. OCV 3. OCV filter 4. Camshaft timing gear assembly 5. ECM	Comes on	DTC stored	ES-69
P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)	Same as DTC P0011	Comes on	DTC stored	ES-69
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)	1. Mechanical system (Timing chain has jumped tooth or chain stretched) 2. ECM	Comes on	DTC stored	ES-75
P0031	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	1. Open in Air-Fuel Ratio (A/F) sensor heater circuit 2. A/F sensor heater (sensor 1) 3. Engine room J/B (EFI relay) 4. ECM	Comes on	DTC stored	ES-77
P0032	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)	1. Short in A/F sensor heater circuit 2. A/F sensor heater (sensor 1) 3. Engine room J/B (EFI relay) 4. ECM	Comes on	DTC stored	ES-77
P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	1. Open in Heated Oxygen (HO2) sensor heater circuit 2. HO2 sensor heater (sensor 2) 3. Engine room J/B (EFI relay) 4. ECM	Comes on	DTC stored	ES-83
P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	1. Short in HO2 sensor heater circuit 2. HO2 sensor heater (sensor 2) 3. Engine room J/B (EFI relay) 4. ECM	Comes on	DTC stored	ES-83

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0100	Mass or Volume Air Flow Circuit	1. Open or short in Mass Air Flow (MAF) meter circuit 2. MAF meter 3. ECM	Comes on	DTC stored	ES-89
P0101	Mass Air Flow Circuit Range / Performance Problem	1. MAF meter 2. Air induction system 3. PCV hose connections	Comes on	DTC stored	ES-96
P0102	Mass or Volume Air Flow Circuit Low Input	1. Open or short in MAF meter circuit 2. MAF meter 3. ECM	Comes on	DTC stored	ES-89
P0103	Mass or Volume Air Flow Circuit High Input	1. Open or short in MAF meter circuit 2. MAF meter 3. ECM	Comes on	DTC stored	ES-89
P0110	Intake Air Temperature Circuit Malfunction	1. Open or short in Intake Air Temperature (IAT) sensor circuit 2. IAT sensor (built into MAF meter) 3. ECM	Comes on	DTC stored	ES-99
P0111	Intake Air Temperature Sensor Gradient Too High	Mass air flow meter assembly	Comes on	DTC stored	ES-105
P0112	Intake Air Temperature Circuit Low Input	1. Short in IAT sensor circuit 2. IAT sensor (built into MAF meter) 3. ECM	Comes on	DTC stored	ES-99
P0113	Intake Air Temperature Circuit High Input	1. Open in IAT sensor circuit 2. IAT sensor (built into MAF meter) 3. ECM	Comes on	DTC stored	ES-99
P0115	Engine Coolant Temperature Circuit Malfunction	1. Open or short in Engine Coolant Temperature (ECT) sensor circuit 2. ECT sensor 3. ECM	Comes on	DTC stored	ES-108
P0116	Engine Coolant Temperature Circuit Range / Performance Problem	1. Thermostat 2. ECT sensor	Comes on	DTC stored	ES-114
P0117	Engine Coolant Temperature Circuit Low Input	1. Short in ECT sensor circuit 2. ECT sensor 3. ECM	Comes on	DTC stored	ES-108
P0118	Engine Coolant Temperature Circuit High Input	1. Open in ECT sensor circuit 2. ECT sensor 3. ECM	Comes on	DTC stored	ES-108
P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction	1. Throttle Position (TP) sensor (built into throttle body) 2. ECM	Comes on	DTC stored	ES-117

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem	TP sensor (built into throttle body)	Comes on	DTC stored	ES-124
P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input	1. TP sensor (built into throttle body) 2. Short in VTA1 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	ES-117
P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA1 circuit 3. Open in E2 circuit 4. Short between VC and VTA1 circuits 5. ECM	Comes on	DTC stored	ES-117
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	1. Cooling system 2. ECT sensor 3. Thermostat	Comes on	DTC stored	ES-126
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	1. Thermostat 2. Cooling system 3. ECT sensor 4. ECM	Comes on	DTC stored	ES-129
P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	1. Open or short in HO2 sensor (sensor 2) circuit 2. HO2 sensor (sensor 2) 3. HO2 sensor heater (sensor 2) 4. Air Fuel Ratio (A/F) sensor (sensor 1) 5. Engine room J/B (EFI relay) 6. Gas leakage from exhaust system	Comes on	DTC stored	ES-132
P0137	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)	1. Open in HO2 sensor (sensor 2) circuit 2. HO2 sensor (sensor 2) 3. HO2 sensor heater (sensor 2) 4. Engine room J/B (EFI relay) 5. Gas leakage from exhaust system	Comes on	DTC stored	ES-132
P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	1. Short in HO2 sensor (sensor 2) circuit 2. HO2 sensor (sensor 2) 3. ECM internal circuit malfunction	Comes on	DTC stored	ES-132

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	1. Open or short in HO2 sensor heater circuit 2. HO2 sensor heater (sensor 2) 3. Engine room J/B (EFI relay) 4. ECM	Comes on	DTC stored	ES-83
P0171	System Too Lean (Bank 1)	1. Air induction system 2. Injector blockage 3. MAF meter 4. ECT sensor 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (sensor 1) circuit 8. A/F sensor (sensor 1) 9. A/F sensor heater (sensor 1) 10. Engine room J/B (EFI relay) 11. A/F sensor heater and EFI relay circuits 12. PCV valve and hose 13. PCV hose connections 14. ECM	Comes on	DTC stored	ES-150
P0172	System Too Rich (Bank 1)	1. Injector leakage or blockage 2. MAF meter 3. ECT sensor 4. Ignition system 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (sensor 1) circuit 8. A/F sensor (sensor 1) 9. A/F sensor heater (sensor 1) 10. Engine room J/B (EFI relay) 11. A/F sensor heater and EFI relay circuits 12. ECM	Comes on	DTC stored	ES-150
P0220	Throttle / Pedal Position Sensor / Switch "B" Circuit	1. TP sensor (built into throttle body) 2. ECM	Comes on	DTC stored	ES-117
P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input	1. TP sensor (built into throttle body) 2. Short in VTA2 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	ES-117

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0223	Throttle / Pedal Position Sensor / Switch "B" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA2 circuit 3. Open in E2 circuit 4. Short between VC and VTA2 circuits 5. ECM	Comes on	DTC stored	ES-117
P0300	Random / Multiple Cylinder Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Vacuum hose connection 4. Ignition system 5. Injector 6. Fuel pressure 7. MAF meter 8. ECT sensor 9. Compression pressure 10. Valve clearance 11. Valve timing 12. PCV valve and hose 13. PCV hose connections 14. Air induction system 15. ECM	Comes on/Blinks *1	DTC stored	ES-159
P0301	Cylinder 1 Misfire Detected	Same as DTC P0300	Comes on/Blinks *1	DTC stored	ES-159
P0302	Cylinder 2 Misfire Detected	Same as DTC P0300	Comes on/Blinks *1	DTC stored	ES-159
P0303	Cylinder 3 Misfire Detected	Same as DTC P0300	Comes on/Blinks *1	DTC stored	ES-159
P0304	Cylinder 4 Misfire Detected	Same as DTC P0300	Comes on/Blinks *1	DTC stored	ES-159
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	1. Short in knock sensor circuit 2. Knock sensor 3. ECM	Comes on	DTC stored	ES-172
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	1. Open in knock sensor circuit 2. Knock sensor 3. ECM	Comes on	DTC stored	ES-172
P0335	Crankshaft Position Sensor "A" Circuit	1. Open or short in Crankshaft Position (CKP) sensor circuit 2. CKP sensor 3. CKP sensor plate 4. ECM	Comes on	DTC stored	ES-177
P0339	Crankshaft Position Sensor "A" Circuit Intermittent	Same as DTC P0335	-	DTC stored	ES-177
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	1. Open or short in Camshaft Position (CMP) sensor circuit 2. CMP sensor 3. Camshaft 4. Jumped tooth of timing chain 5. ECM	Comes on	DTC stored	ES-183

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0351	Ignition Coil "A" Primary / Secondary Circuit	1. Ignition system 2. Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil with igniter and ECM 3. No. 1 to No. 4 ignition coils with igniters 4. ECM	Comes on	DTC stored	ES-188
P0352	Ignition Coil "B" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-188
P0353	Ignition Coil "C" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-188
P0354	Ignition Coil "D" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-188
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	1. Front exhaust pipe (with Three-Way Catalytic Converter) 2. Gas leakage from exhaust system 3. A/F sensor (sensor 1) 4. HO2 sensor (sensor 2)	Comes on	DTC stored	ES-196
P043E	Evaporative Emission System Reference Orifice Clog Up	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector/wire harness (Canister pump module ECM) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. ECM	Comes on	DTC stored	ES-203
P043F	Evaporative Emission System Reference Orifice High Flow	Same as DTC P043E	Comes on	DTC stored	ES-203
P0441	Evaporative Emission Control System Incorrect Purge Flow	1. Purge VSV 2. Connector/wire harness (Purge VSV ECM) 3. Canister pump module 4. Leakage from EVAP system 5. Leakage from EVAP line (Purge VSV Intake manifold) 6. ECM	Comes on	DTC stored	ES-208
P0450	Evaporative Emission Control System Pressure Sensor / Switch	1. Canister pump module 2. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 3. ECM	Comes on	DTC stored	ES-215

ES

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0451	Evaporative Emission Control System Pressure Sensor Range / Performance	1. Canister pump module 2. Connector/wire harness (Canister pump module ECM) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. ECM	Comes on	DTC stored	ES-215
P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input	Same as DTC P0451	Comes on	DTC stored	ES-215
P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input	Same as DTC P0451	Comes on	DTC stored	ES-215
P0455	Evaporative Emission Control System Leak Detected (Gross Leak)	1. Fuel cap (loose) 2. Leakage from EVAP line (Canister Fuel tank) 3. Leakage from EVAP line (Purge VSV Canister) 4. Canister pump module 5. Leakage from fuel tank 6. Leakage from canister	Comes on	DTC stored	ES-224
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	Same as DTC P0455	Comes on	DTC stored	ES-224
P0500	Vehicle Speed Sensor "A"	1. Open or short in speed signal circuit 2. Vehicle speed sensor 3. Combination meter 4. ECM 5. Skid control ECU	Comes on	DTC stored	ES-229
P0504	Brake Switch "A" / "B" Correlation	1. Short in stop light switch signal circuit 2. STOP fuse 3. IGN fuse 4. Stop light switch 5. ECM	-	DTC stored	ES-234
P0505	Idle Control System Malfunction	1. ETCS (Electronic Throttle Control System) 2. Air induction system 3. PCV hose connections 4. ECM	Comes on	DTC stored	ES-237

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P050A	Cold Start Idle Air Control System Performance	1. Throttle body assembly 2. MAF meter 3. Air induction system 4. PCV hose connections 5. VVT system 6. Air cleaner filter element 7. ECM	Comes on	DTC stored	ES-241
P050B	Cold Start Ignition Timing Performance	Same as DTC P050A	Comes on	DTC stored	ES-241
P0560	System Voltage	1. Open in back up power source circuit 2. Battery 3. Battery terminals 4. EFI No. 1 fuse 5. ECM	Comes on	DTC stored	ES-247
P0604	Internal Control Module Random Access Memory (RAM) Error	ECM	Comes on	DTC stored	ES-251
P0606	ECM / PCM Processor	ECM	Comes on	DTC stored	ES-251
P0607	Control Module Performance	ECM	Comes on	DTC stored	ES-251
P0617	Starter Relay Circuit High	1. Park/Neutral Position (PNP) switch 2. ST relay circuit 3. Ignition switch 4. ECM	Comes on	DTC stored	ES-253
P0630	VIN not Programmed or Mismatch - ECM / PCM	ECM	Comes on	DTC stored	ES-259
P0657	Actuator Supply Voltage Circuit / Open	ECM	Comes on	DTC stored	ES-251
P0724	Brake Switch "B" Circuit High	1. Short in stop light switch circuit 2. Stop light switch 3. ECM	Comes on	DTC stored	ES-261
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	1. Intake manifold runner valve (IMRV) motor circuit 2. IMRV motor 3. IMRV position sensor 4. IMRV 5. ECM	Comes on	DTC stored	ES-264
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	Same as DTC P2004	Comes on	DTC stored	ES-264
P2009	Intake Manifold Runner Control Circuit Low (Bank 1)	1. Open in IMRV motor circuit 2. IMRV motor 3. ECM	Comes on	DTC stored	ES-270
P2010	Intake Manifold Runner Control Circuit High (Bank 1)	1. Short in IMRV motor circuit 2. IMRV motor 3. ECM	Comes on	DTC stored	ES-270

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P2014	Intake Manifold Runner Position Sensor / Switch Circuit (Bank 1)	1. Open or short in IMRV position sensor circuit 2. IMRV position sensor 3. ECM	Comes on	DTC stored	ES-275
P2016	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 1)	Same as DTC P2014	Comes on	DTC stored	ES-275
P2017	Intake Manifold Runner Position Sensor / Switch Circuit High (Bank 1)	Same as DTC P2014	Comes on	DTC stored	ES-275
P2102	Throttle Actuator Control Motor Circuit Low	1. Open in throttle actuator circuit 2. Throttle actuator 3. ECM	Comes on	DTC stored	ES-280
P2103	Throttle Actuator Control Motor Circuit High	1. Short in throttle actuator circuit 2. Throttle actuator 3. Throttle valve 4. Throttle body assembly 5. ECM	Comes on	DTC stored	ES-280
P2111	Throttle Actuator Control System - Stuck Open	1. Throttle actuator 2. Throttle body assembly 3. Throttle valve	Comes on	DTC stored	ES-285
P2112	Throttle Actuator Control System - Stuck Closed	Same as DTC P2111	Comes on	DTC stored	ES-285
P2118	Throttle Actuator Control Motor Current Range / Performance	1. Open in ETCS power source circuit 2. Battery 3. Battery terminals 4. ETCS fuse 5. ECM	Comes on	DTC stored	ES-288
P2119	Throttle Actuator Control Throttle Body Range / Performance	1. ETCS 2. ECM	Comes on	DTC stored	ES-295
P2120	Throttle / Pedal Position Sensor / Switch "D" Circuit	1. Accelerator Pedal Position (APP) sensor 2. ECM	Comes on	DTC stored	ES-298
P2121	Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance	1. APP sensor 2. ECM	Comes on	DTC stored	ES-305
P2122	Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input	1. APP sensor 2. Open in VCP1 circuit 3. Open or ground short in VPA circuit 4. ECM	Comes on	DTC stored	ES-298
P2123	Throttle / Pedal Position Sensor / Switch "D" Circuit High Input	1. APP sensor 2. Open in EPA circuit 3. ECM	Comes on	DTC stored	ES-298
P2125	Throttle / Pedal Position Sensor / Switch "E" Circuit	1. APP sensor 2. ECM	Comes on	DTC stored	ES-298

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P2127	Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input	1. APP sensor 2. Open in VCP2 circuit 3. Open or ground short in VPA2 circuit 4. ECM	Comes on	DTC stored	ES-298
P2128	Throttle / Pedal Position Sensor / Switch "E" Circuit High Input	1. APP sensor 2. Open in EPA2 circuit 3. ECM	Comes on	DTC stored	ES-298
P2135	Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation	1. Short between VTA1 and VTA2 circuits 2. TP sensor (built into throttle body) 3. ECM	Comes on	DTC stored	ES-117
P2138	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation	1. Short between VPA and VPA2 circuits 2. APP sensor 3. ECM	Comes on	DTC stored	ES-298
P2195	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. A/F sensor heater (sensor 1) 4. Engine room J/B (EFI relay) 5. A/F sensor heater and EFI relay circuits 6. ECM	Comes on	DTC stored	ES-308
P2196	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Same as DTC P2195	Comes on	DTC stored	ES-308
P2237	Oxygen (A/F) Sensor Pumping Current Circuit / Open (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. ECM	Comes on	DTC stored	ES-322
P2238	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. ECM	Comes on	DTC stored	ES-322
P2239	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. ECM	Comes on	DTC stored	ES-322
P2252	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. ECM	Comes on	DTC stored	ES-322

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P2253	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1)	1. Open or short in A/F sensor (sensor 1) circuit 2. A/F sensor (sensor 1) 3. ECM	Comes on	DTC stored	ES-322
P2401	Evaporative Emission Leak Detection Pump Stuck OFF	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector/wire harness (Canister pump module ECM) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. ECM	Comes on	DTC stored	ES-203
P2402	Evaporative Emission Leak Detection Pump Stuck ON	Same as DTC P2401	Comes on	DTC stored	ES-203
P2419	Evaporative Emission System Switching Valve Control Circuit Low	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector/wire harness (Canister pump module ECM) 3. EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) 4. ECM	Comes on	DTC stored	ES-203
P2420	Evaporative Emission System Switching Valve Control Circuit High	1. Canister pump module (Reference orifice, leak detection pump, vent valve) 2. Connector/wire harness (Canister pump module ECM) 3. ECM	Comes on	DTC stored	ES-330
P2610	ECM / PCM Internal Engine Off Timer Performance	ECM	Comes on	DTC stored	ES-334
P2A00	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)	1. Open or short in A/F sensor circuit 2. A/F sensor 3. ECM	Comes on	DTC stored	ES-337

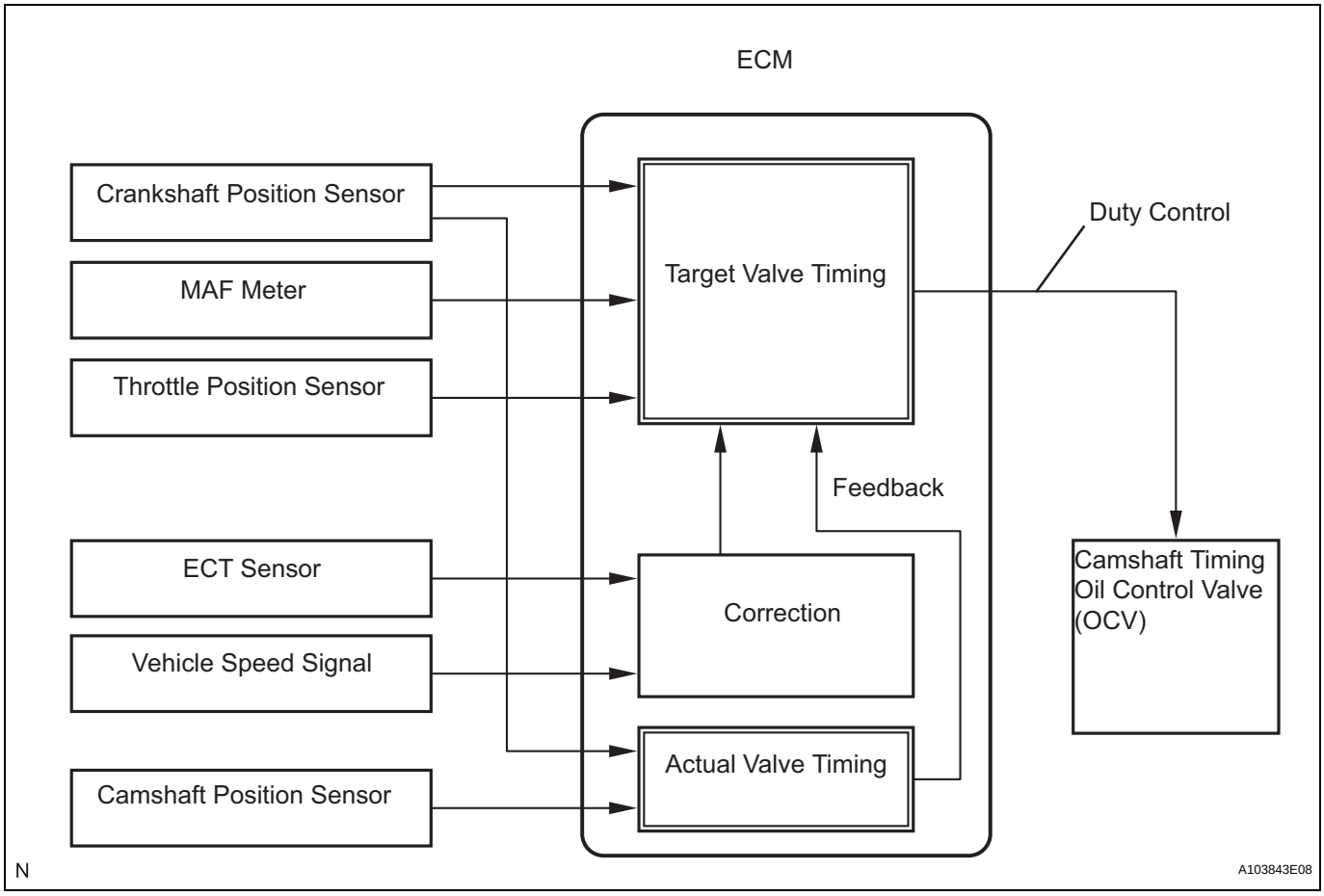
*1: Blinks when terrible misfire is detected.

DTC	P0010	Camshaft Position "A" Actuator Circuit (Bank 1)

DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, OCV and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure applied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as the intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual intake valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.

ES



DTC No.	DTC Detection Condition	Trouble Area
P0010	Open or short in OCV circuit (1 trip detection logic)	• Open or short in OCV circuit • OCV • ECM

HINT:
This DTC relates to the Oil Control Valve (OCV).

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT system to control the intake camshaft. The VVT system includes the ECM, the OCV and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.
After the ECM sends the target duty-cycle control signal to the OCV, the ECM monitors the OCV current to establish an actual duty-cycle. The ECM determines the existence of a malfunction and sets the DTC when the actual duty-cycle ratio varies from the target duty-cycle ratio.

MONITOR STRATEGY

Related DTCs	P0010: VVT OCV range check
Required Sensors/Components (Main)	VVT OCV
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
All of the following conditions are met	-
Starter	OFF
Ignition switch	ON
Time after ignition switch OFF to ON position	0.5 seconds or more

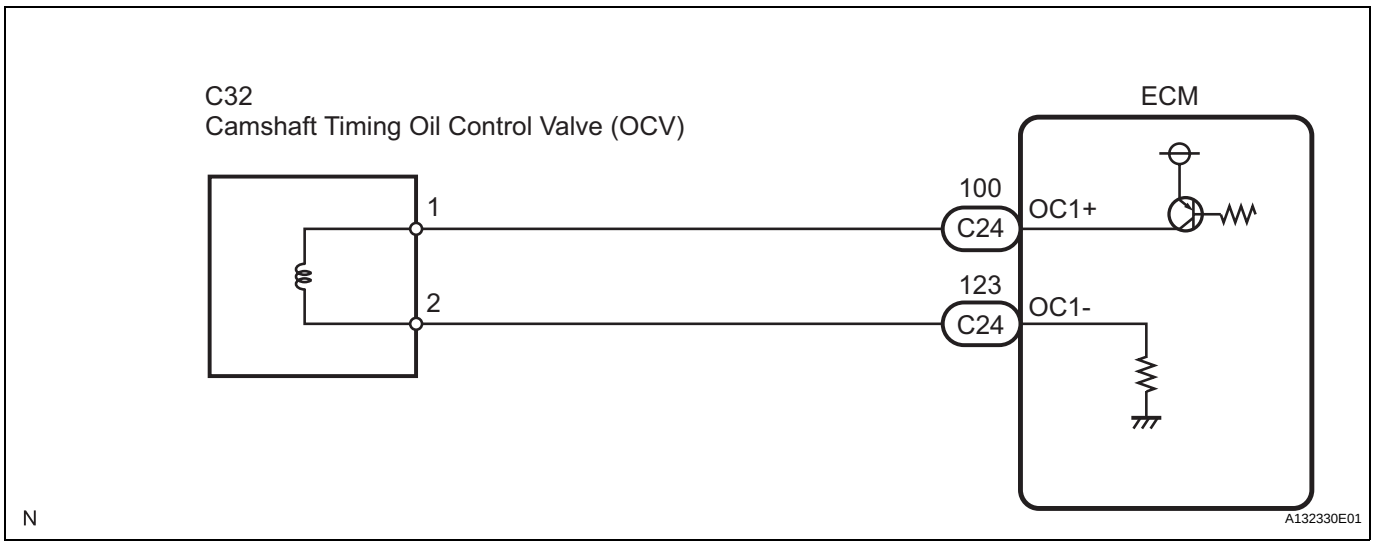
TYPICAL MALFUNCTION THRESHOLDS

One of the following conditions is met	-
A. All of the following conditions are met	-
Battery voltage	11 to 13 V
Target duty ratio	Less than 70 %
Output signal duty ratio	100 %
B. All of the following conditions are met	-
Battery voltage	13 V or more
Target duty ratio	Less than 80 %
Output signal duty ratio	100 %
C. Both of the following conditions is met	-
Current cut status	Not cut
Output signal duty ratio	3 % or less

COMPONENT OPERATING RANGE

VVT OCV duty ratio	3 to 100 %

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

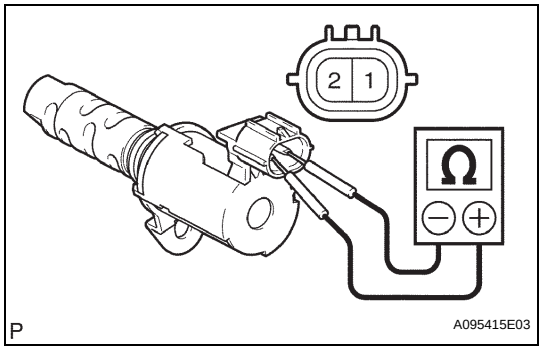
Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → **Go to step 2**

OK

CHECK FOR INTERMITTENT PROBLEMS

2 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

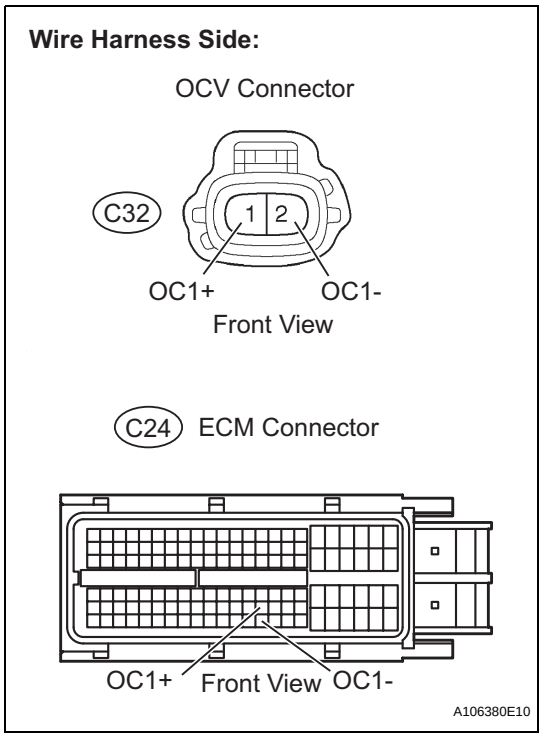


(a) Disconnect the C32 OCV connector.
(b) Measure the resistance between the terminals of the OCV.
Standard resistance:
6.9 to 7.9 Ω at 20°C (68°F)
(c) Reconnect the OCV connector.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

OK

3 CHECK HARNESS AND CONNECTOR (OCV - ECM)



(a) Disconnect the C32 OCV connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
C32-1 (OC1+) - C24-100 (OC1+)	Below 1 Ω
C32-2 (OC1-) - C24-123 (OC1-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C32-1 (OC1+) or C24-100 (OC1+) - Body ground	10 kΩ or higher
C32-2 (OC1-) or C24-123 (OC1-) - Body ground	10 kΩ or higher

(d) Reconnect the OCV connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

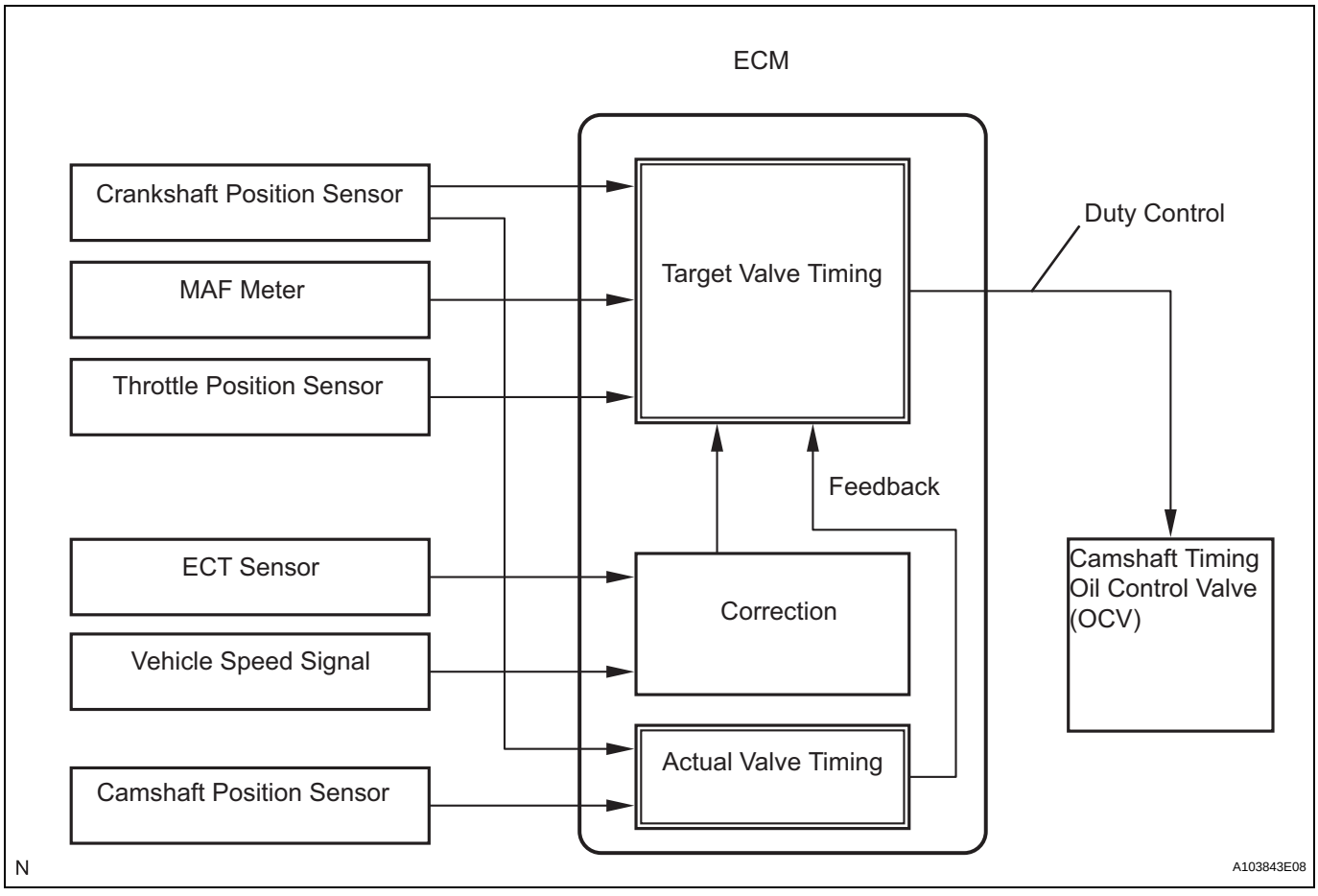
ES

DTC	P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)

DTC	P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)

DESCRIPTION

The VVT system includes the ECM, Oil Control Valve (OCV) and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure applied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as the intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual intake valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.



DTC No.	DTC Detection Conditions	Trouble Areas
P0011	Advanced camshaft timing: With warm engine and engine speed of between 550 rpm and 4,000 rpm, all conditions (1), (2) and (3) are met (1 trip detection logic): 1. Difference between target and actual intake valve timings more than 5°CA (Crankshaft Angle) for 4.5 seconds 2. Current intake valve timing fixed (timing changes less than 5°CA in 5 seconds) 3. Variations in VVT controller timing more than 19°CA of maximum delayed timing (malfunction in advance timing)	• Valve timing • OCV • OCV filter • Camshaft timing gear assembly • ECM
P0012	Retarded camshaft timing: With warm engine and engine speed of between 550 rpm and 4,000 rpm, all conditions (1), (2) and (3) are met (2 trip detection logic): 1. Difference between target and actual intake valve timings more than 5°CA (Crankshaft Angle) for 4.5 seconds 2. Current intake valve timing fixed (timing changes less than 5°CA in 5 seconds) 3. Variations in VVT controller timing 19°CA or less of maximum delayed timing (malfunction in retarded timing)	• Valve timing • OCV • OCV filter • Camshaft timing gear assembly • ECM

ES

MONITOR DESCRIPTION

The ECM optimizes the intake valve timing using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft. If the difference between the target and actual intake valve timings is large, and changes in the actual intake valve timing are small, the ECM interprets this as the VVT controller stuck malfunction and sets a DTC.

Example:

A DTC is set when the following conditions 1, 2 and 3 are met:

(a) The difference between the target and actual intake valve timings is more than 5°CA (Crankshaft Angle) and the condition continues for more than 4.5 seconds.

(b) It takes 5 seconds or more to change the valve timing by 5°CA.

(c) After above conditions 1 and 2 are met, the OCV is forcibly activated during 10 seconds.

DTC P0011 (Advanced Cam Timing) is subject to 1 trip detection logic.

DTC P0012 (Retarded Cam Timing) is subject to 2 trip detection logic.

These DTCs indicate that the VVT controller cannot operate properly due to OCV malfunctions or the presence of foreign objects in the OCV.

The monitor will run if all of the following conditions are met:

– The engine is warm (the engine coolant temperature is 75°C (167°F) or more).
– The vehicle has been driven at more than 40 mph (64 km/h) for 3 minutes.
– The engine has idled for 3 minutes.

MONITOR STRATEGY

Related DTCs	P0011: Advanced camshaft timing P0012: Retarded camshaft timing
Required Sensors/Components (Main)	VVT OCV and VVT Actuator
Required Sensors/Components (Related)	Crankshaft position sensor, camshaft position sensor and engine coolant temperature sensor
Frequency of Operation	Once per driving cycle
Duration	Within 10 seconds

MIL Operation	Advanced camshaft timing: Immediate Retarded camshaft timing: 2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter)
Battery voltage	11 V or more
Engine RPM	550 to 4,000 rpm
ECT	75°C (167°F) to 100°C (212°F)

ES

TYPICAL MALFUNCTION THRESHOLDS

Advanced camshaft timing:

All of the following conditions are met	-
Crank angle between reference position and actual intake camshaft angle	67°CA or more
Valve timing	No change at advanced valve timing

Retard camshaft timing:

All of the following conditions are met	-
Crank angle between reference point and actual intake camshaft angle	Less than 67°CA
Valve timing	No change at retarded valve timing

If the difference between the target and actual camshaft timings is greater than the specified value, the ECM operates the VVT actuator.
Then, the ECM monitors the camshaft timing change for 5 seconds.

WIRING DIAGRAM

Refer to DTC P0010 (See page ES-67).

INSPECTION PROCEDURE

NOTICE:
DTC P0011 or P0012 may be set when foreign objects in the engine oil are caught in some parts of the system. The DTC will remain set even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.
HINT:

- If DTC P0011 or P0012 is present, check the VVT (Variable Valve Timing) system.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0011 OR P0012)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.

(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0011 or P0012	A
P0011 or P0012 and other DTCs	B

HINT:
If any DTCs other than P0011 or P0012 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → Go to step 4

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P0011 OR P0012)

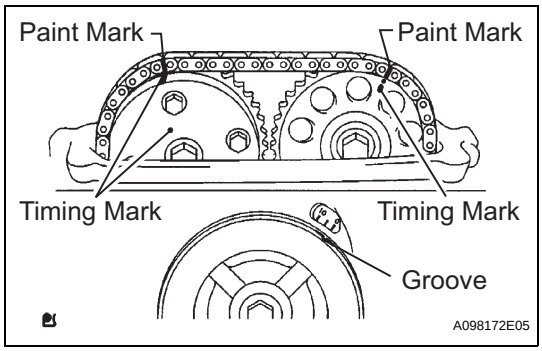
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Start the engine and warm it up.
(e) Switch the ECM from normal mode to check mode using the tester.
(f) Drive the vehicle for more than 10 minutes.
(g) Read the DTCs using the tester.
OK:
No DTC output.

NG → Go to step 4

OK

END

4 CHECK VALVE TIMING (CHECK FOR LOOSE AND JUMPED TEETH ON TIMING CHAIN)

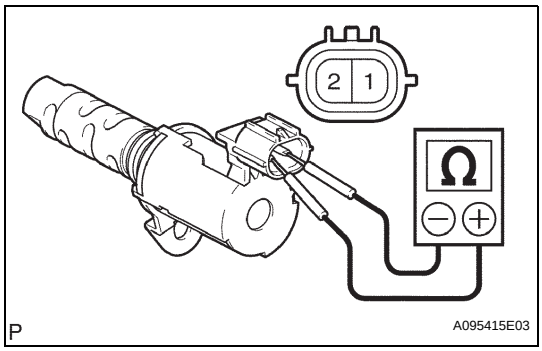


(a) Remove the cylinder head cover.
(b) Turn the crankshaft pulley, and align its groove with the timing mark "0" on the timing chain cover.
(c) Check that the timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
OK:
Timing marks on camshaft timing gears are aligned as shown in the illustration.
(d) Reinstall the cylinder head cover.

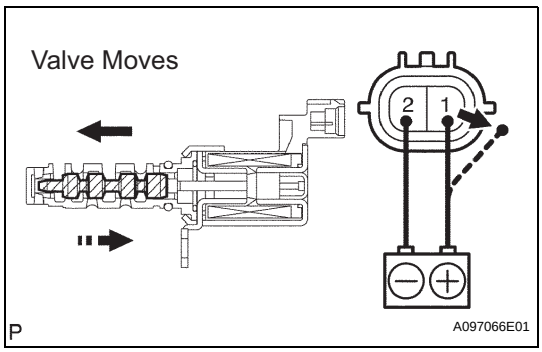
NG → **ADJUST VALVE TIMING**

OK

5 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (OCV)



(a) Remove the OCV.
(b) Measure the resistance between the terminals of the OCV.
Standard resistance:
6.9 to 7.9 Ω at 20°C (68°F)

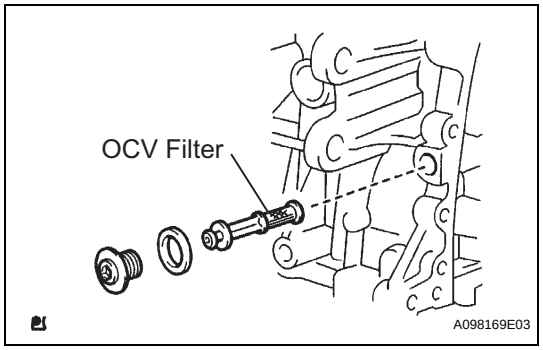


(c) Apply positive battery voltage to terminal 1 and negative battery voltage to terminal 2. Check the valve operation.
OK:
Valve moves quickly.
(d) Reinstall the OCV.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

OK

6	INSPECT OIL CONTROL VALVE FILTER



(a) Remove the generator.
(b) Remove the OCV filter.
(c) Check that the filter is not clogged.
OK:
Filter is not clogged.
(d) Reinstall the OCV filter.
(e) Reinstall the generator.

NG → **CLEAN OIL CONTROL VALVE FILTER**

ES

OK

7	REPLACE CAMSHAFT TIMING GEAR ASSEMBLY

NEXT

8	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Start the engine and warm it up.
(e) Switch the ECM from normal mode to check mode using the tester.
(f) Drive the vehicle for more than 10 minutes.
(g) Read the output DTCs using the tester.
Standard:
No DTC output.
HINT:
DTC P0011 or P0012 is output when foreign objects in engine oil are caught in some parts of the system. These codes will stay output for a short time even after the system returns to normal. These foreign objects are then captured by the oil filter, thus eliminating the source of the problem.

NG → **REPLACE ECM**

OK

SYSTEM OK

DTC	P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

DESCRIPTION

In the VVT (Variable Valve Timing) system, the appropriate intake valve open and close timing is controlled by the ECM. The ECM performs intake valve control by performing the following: 1) controlling the camshaft and camshaft timing oil control valve, and operating the camshaft timing gear; and 2) changing the relative positions of the gaps between the camshaft and crankshaft.

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation between crankshaft and camshaft position sensor signals (2 trip detection logic)	• Mechanical system (Timing chain has jumped tooth or chain stretched) • ECM

ES

MONITOR DESCRIPTION

The ECM optimizes the valve timing by using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller.
The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.
The ECM calibrates the intake valve timing by setting the intake camshaft to the most retarded angle while the engine is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as the VVT learning value. When the difference between the target and actual intake valve timings is 5°CA (Crankshaft Angle) or less, the ECM stores it.
If the VVT learning value matches the following conditions, the ECM determines the existence of a malfunction in the VVT system, and sets the DTC.

- VVT learning value: Less than 27.8°CA, or more than 48°CA.
- Above condition continues for 18 seconds or more.

This DTC indicates that the angle between the intake camshaft and the crankshaft is incorrect due to factors such as the timing chain having a jumped tooth.
This monitor begins to run after the engine has idled for 5 minutes.

MONITOR STRATEGY

Related DTCs	P0016: Camshaft timing misalignment at idling
Required Sensors/Components	VVT actuator
Required Sensors/Components	Camshaft position sensor, Crankshaft position sensor
Frequency of Operation	Once per driving cycle
Duration	Within 1 minute
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0011 (VVT system 1 - advance) P0012 (VVT system 1 - retarded) P0115 - P0118 (ECT sensor)
Engine RPM	550 to 1,000 rpm

TYPICAL MALFUNCTION THRESHOLDS

One of the following conditions is met	-
VVT learning value at maximum retarded valve timing	Less than 27.8°CA
VVT learning value at maximum retarded valve timing	More than 48°CA

WIRING DIAGRAM

Refer to DTC P0335 (See page ES-177).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK VALVE TIMING (CHECK FOR LOOSE AND JUMPED TOOTH OF TIMING CHAIN) (See page ES-78)**

NG → **Go to step 3**

OK

2	**REPLACE ECM**

NEXT → **Go to step 4**

3	**ADJUST VALVE TIMING**

NEXT

4	**CHECK WHETHER DTC OUTPUT RECURS**

NOTICE:

After replacing the ECM or adjusting intake valve timing, confirm that the DTC output does not recur.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Switch the ECM from normal mode to check mode using the tester (See page ES-41).
(f) Start the engine and warm it up.
(g) Allow the engine to idle for 1 minute or more, and then drive the vehicle for 1 minute or more.
(h) Confirm that no DTC is set using the tester.

OK:

No DTC output

NEXT

END

DTC	P0031	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)

DTC	P0032	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)

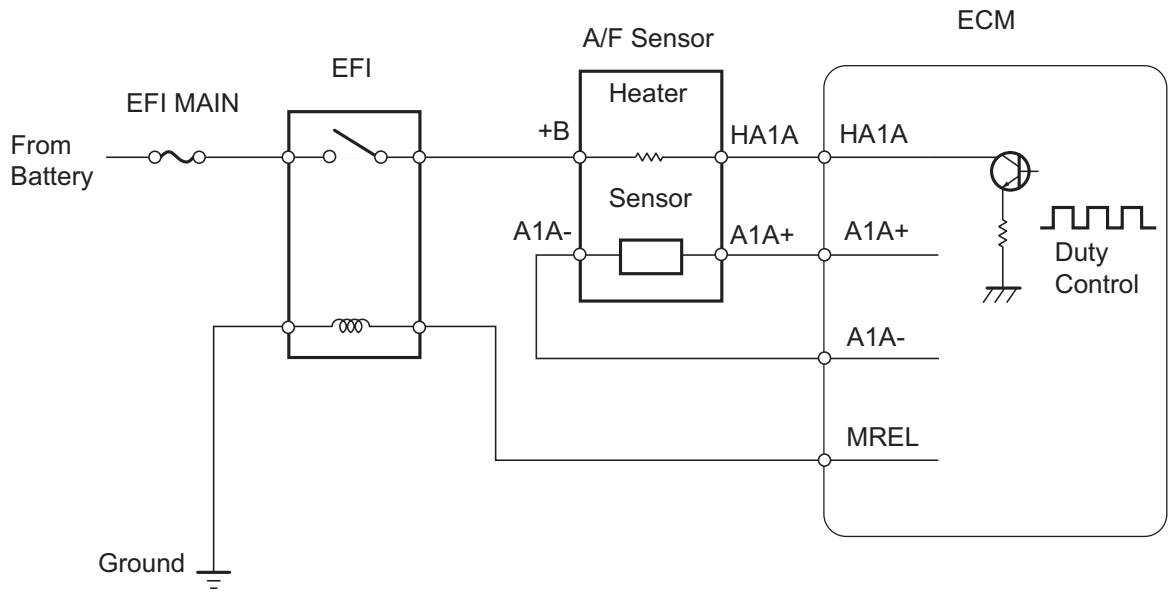
HINT:
- Although the DTC titles say oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

ES

DESCRIPTION

Refer to DTC P2195 (See page ES-308).
HINT:
- When either of these DTCs is set, the ECM enters fail-safe mode. The ECM turns off the A/F sensor heater in fail-safe mode. Fail-safe mode continues until the ignition switch is turned off.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The A/F sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (System Diagram of Sensor 1):



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DTC No.	DTC Detection Condition	Trouble Area
P0031	Air-Fuel Ratio (A/F) sensor heater current less than 0.8 A (1 trip detection logic)	• Open in A/F sensor heater circuit • A/F sensor heater (sensor 1) • Engine room J/B (EFI relay) • ECM
P0032	Air-Fuel Ratio (A/F) sensor heater current more than 10 A (1 trip detection logic)	• Short in A/F sensor heater circuit • A/F sensor heater (sensor 1) • Engine room J/B (EFI relay) • ECM

MONITOR DESCRIPTION

The ECM uses information from the Air-Fuel Ratio (A/F) sensor to regulate the air-fuel ratio and keep it close to the stoichiometric level. This maximizes the ability of the Three-Way Catalytic Converter (TWC) to purify the exhaust gases.

The A/F sensor detects oxygen levels in the exhaust gas and transmits the information to the ECM. The inner surface of the sensor element is exposed to the outside air. The outer surface of the sensor element is exposed to the exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element.

The zirconia element generates a small voltage when there is a large difference in the oxygen concentrations between the exhaust gas and outside air. The platinum coating amplifies this voltage generation.

The A/F sensor is more efficient when heated. When the exhaust gas temperature is low, the sensor cannot generate useful voltage signals without supplementary heating. The ECM regulates the supplementary heating using a duty-cycle approach to adjust the average current in the sensor heater element. If the heater current is outside the normal range, the signal transmitted by the A/F sensor becomes inaccurate, as a result, the ECM is unable to regulate air-fuel ratio properly.

When the current in the A/F sensor heater is outside the normal operating range, the ECM interprets this as a malfunction in the sensor heater and sets a DTC.

Example:

The ECM sets DTC P0032 when the current in the A/F sensor heater is more than 10 A. Conversely, when the heater current is less than 0.8 A, DTC P0031 is set.

MONITOR STRATEGY

Related DTCs	P0031: A/F sensor heater open/short (Low electrical current) P0032: A/F sensor heater open/short (High electrical current)
Required Sensors/Components (Main)	A/F sensor heater
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P0031:

Battery voltage	10.5 V or more
A/F sensor heater duty-cycle ratio	50 % or more
Time after engine start	10 seconds or more

P0032:

Time after engine start	10 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0031:

A/F sensor heater current	Less than 0.8 A

P0032:

A/F sensor heater current	More than 10 A

COMPONENT OPERATING RANGE

A/F sensor heater current	0.9 to 9.9 A

WIRING DIAGRAM

Refer to DTC P2195 (See page ES-312).

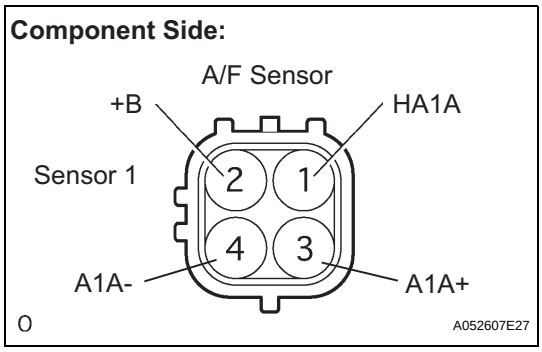
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1 INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE)



(a) Disconnect the C15 A/F sensor connector.

(b) Measure the resistance between the terminals of the A/F sensor connector.

Standard resistance

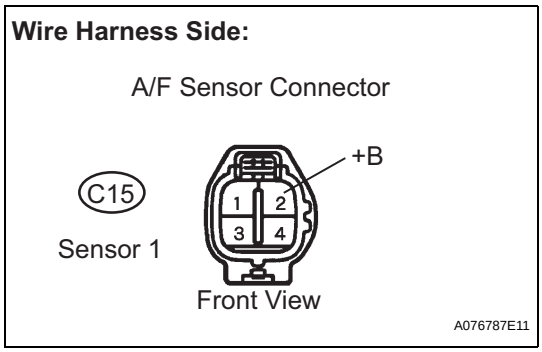
Tester Connection	Specified Condition
1 (HA1A) - 2 (+B)	1.8 Ω to 3.4 Ω at 20°C (68°F)
1 (HA1A) - 4 (A1A-)	10 kΩ or higher

(c) Reconnect the A/F sensor connector.

NG → REPLACE AIR-FUEL RATIO SENSOR

OK

2 CHECK TERMINAL VOLTAGE (+B OF A/F SENSOR)



(a) Disconnect the C15 A/F sensor connector.

(b) Turn the ignition switch to the ON position.

(c) Measure the voltage between the terminal of the A/F sensor connector and body ground.

Standard voltage

Tester Connection	Specified Condition
C15-2 (+B) - Body ground	9 to 14 V

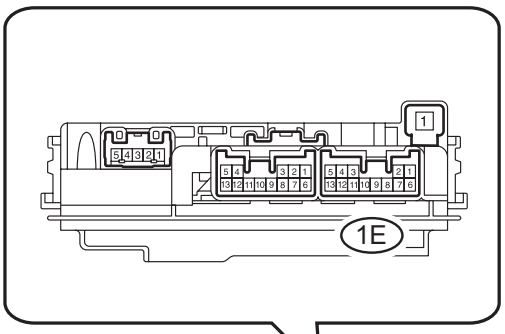
(d) Reconnect the A/F sensor connector.

OK → Go to step 5

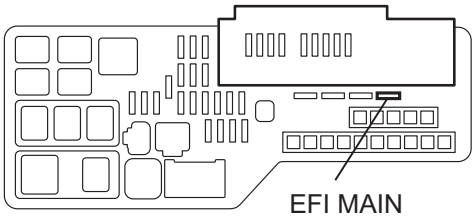
NG

3	INSPECT ENGINE ROOM J/B (EFI RELAY)

Engine Room J/B:



Engine Room R/B:



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(a) Inspect the EFI MAIN fuse.
  (1) Remove the EFI MAIN fuse from the engine room R/B.
  (2) Measure the EFI MAIN fuse resistance.
    Standard resistance:
    Below 1 Ω
  (3) Reinstall the EFI MAIN fuse.

(b) Inspect the EFI relay.
  (1) Remove the engine room J/B from the engine room R/B.
  (2) Measure the EFI relay resistance.
    Standard resistance

Tester Connection	Specified Condition
1E-7 - 1E-12	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-11)

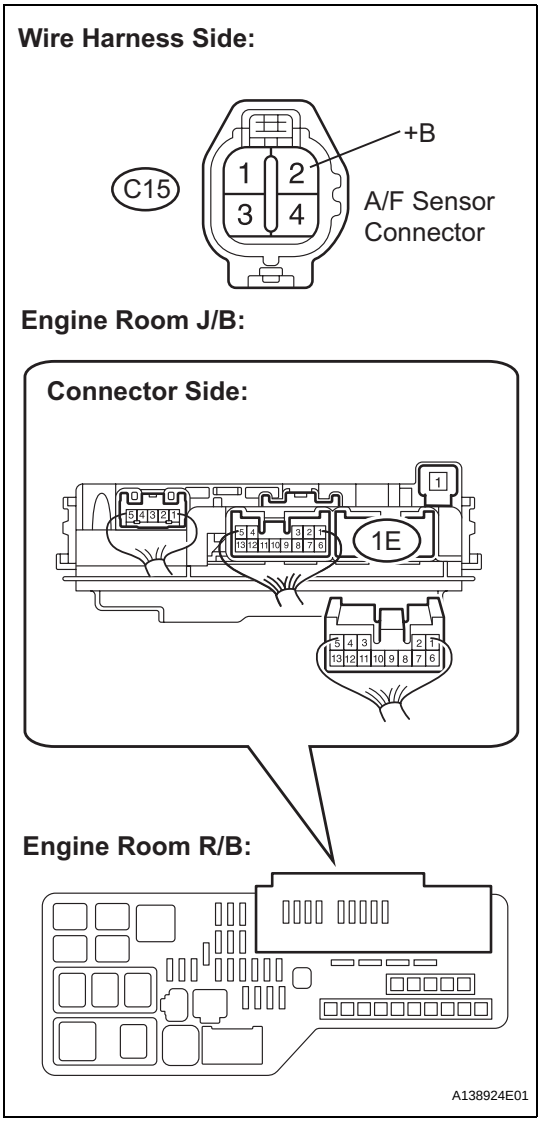
  (3) Reinstall the engine room J/B.

NG → **REPLACE ENGINE ROOM J/B**

OK

ES

4	CHECK HARNESS AND CONNECTOR (A/F SENSOR - EFI RELAY)



(a) Disconnect the C15 A/F sensor connector.
(b) Remove the engine room J/B from the engine room R/B.
(c) Disconnect the 1E engine room J/B connector.
(d) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C15-2 (+B) - 1E-7 (Engine room J/B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C15-2 (+B) or 1E-7 (Engine room J/B) - Body ground	10 kΩ or higher

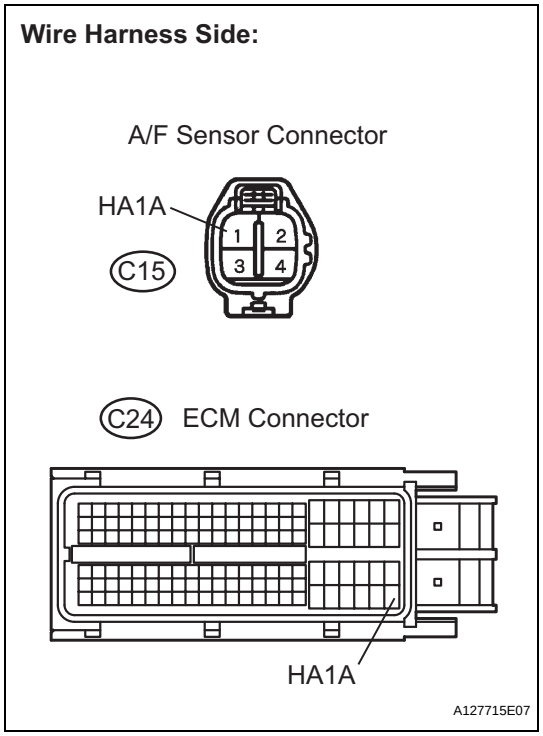
(e) Reconnect the A/F sensor connector.
(f) Reconnect the engine room J/B connector.
(g) Reinstall the engine room J/B.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK ECM POWER SOURCE CIRCUIT

5 CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM)



(a) Disconnect the C15 A/F sensor connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C15-1 (HA1A) - C24-109 (HA1A)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C15-1 (HA1A) or C24-109 (HA1A) - Body ground	10 kΩ or higher

(d) Reconnect the A/F sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Start the engine.
(f) Allow the engine to idle for 1 minute or more.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0031 or P0032	B

B → **REPLACE ECM**

A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)

DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)

DTC	P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

ES

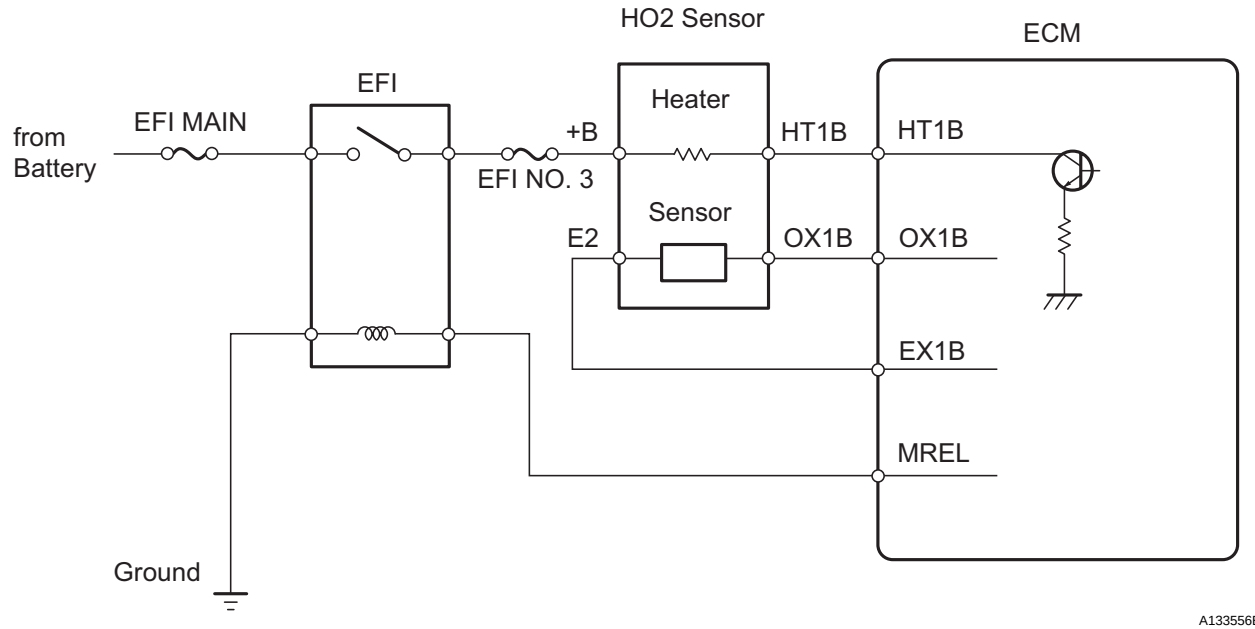
DESCRIPTION

Refer to DTC P0136 (See page ES-132).

HINT:

- When any of these DTCs are set, the ECM enters fail-safe mode. The ECM turns off the Heated Oxygen (HO2) Sensor heater in fail-safe mode. Fail-safe mode continues until the ignition switch is turned off.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The HO2 sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (System Diagram of Sensor 2):



DTC No.	DTC Detection Condition	Trouble Area
P0037	Heated Oxygen (HO2) sensor heater current less than 0.3 A (1 trip detection logic)	• Open in HO2 sensor heater circuit • HO2 sensor heater (sensor 2) • Engine room J/B (EFI relay) • ECM
P0038	Heated Oxygen (HO2) sensor heater current more than 2 A (1 trip detection logic)	• Short in HO2 sensor heater circuit • HO2 sensor heater (sensor 2) • Engine room J/B (EFI relay) • ECM
P0141	Cumulative heater resistance correction value exceeds threshold (2 trip detection logic)	• Open or short in HO2 sensor heater circuit • HO2 sensor heater (sensor 2) • Engine room J/B (EFI relay) • ECM

MONITOR DESCRIPTION

The sensing position of the Heated Oxygen (HO2) sensor has a zirconia element which is used to detect the oxygen concentration in the exhaust gas. If the zirconia element is at the appropriate temperature, and the difference between the oxygen concentrations surrounding the inside and outside surfaces of the sensor is large, the zirconia element generates voltage signals. In order to increase the oxygen concentration detecting capacity of the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor.

Heated oxygen sensor heater range check (P0037 and P0038):

The ECM monitors the current applied to the O2 sensor heater to check the heater for malfunctions. If the current is below the threshold value, the ECM determines that there is an open circuit in the heater. If the current is above the threshold value, the ECM determines that there is a short circuit in the heater.

The ECM constantly monitors the current applied to the heater. If the ECM detects an open or short circuit, the ECM turns the MIL on and sets a DTC.

If a malfunction is detected, the ECM cuts off the current applied to the heater.

Example:

The ECM sets DTC P0038 when the current in the HO2 sensor heater is more than 2 A. Conversely, when the heater current is less than 0.3 A, DTC P0037 is set.

Heated oxygen sensor heater performance (P0141):

After the accumulated heater ON time exceeds 100 seconds, the ECM calculates the heater resistance using the battery voltage and the current applied to the heater.

If the resistance is above the threshold value, the ECM determines that there is a malfunction in the HO2 sensor heater and sets DTC P0141.

MONITOR STRATEGY

Related DTCs	P0037: Heated oxygen sensor heater range check (Low electrical current) P0038: Heated oxygen sensor heater range check (High electrical current) P0141: Heated oxygen sensor heater performance
Required Sensors/Components (Main)	Heated oxygen sensor heater
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous: P0037 and P0038 Once per driving cycle: P0141
Duration	1 second: P0037 and P0038 10 seconds: P0141
MIL Operation	Immediate: P0037 and P0038 2 driving cycles: P0141
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P0037:

Battery voltage	10.5 to 20 V

P0038 (Condition A):

Battery voltage	10.5 V or more
Engine	Running
Starter	OFF

P0038 (Condition B):

Battery voltage	10.5 to 20 V

P0141:

All of the following conditions are met:	-
Battery voltage	10.5 V or more
Fuel cut	OFF
Time after fuel cut ON to OFF	30 seconds or more
Accumulated heater ON time	100 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0037:

Heater current	Less than 0.3 A

P0038:

One of the following conditions A or B is met	-
A. Learned heater OFF current	More than 2 A
B. Heater current	More than 2 A

P0141:

Accumulated heater resistance	Varies with sensor element temperature (Example: More than 23 Ω)

COMPONENT OPERATING RANGE

Heated Oxygen (HO2) sensor heater current	0.4 to 1 A (when engine idles, HO2 sensor warmed up and battery voltage 11 to 14 V)

WIRING DIAGRAM

Refer to DTC P0136 (See page ES-139).

CONFIRMATION DRIVING PATTERN

These DTCs are detected when the engine idles for 110 seconds or more.

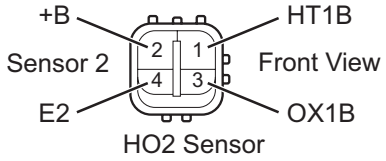
INSPECTION PROCEDURE

HINT:

- Sensor 2 refers to the sensor mounted behind the Three-Way Catalytic Converter (TWC) and located far from the engine assembly.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)

Component Side :



A115661E02

(a) Disconnect the C22 Heated Oxygen (HO2) sensor connector.

(b) Measure the resistance between the terminals of the HO2 sensor connector.

Standard resistance

Tester Connection	Specified Condition
1 (HT1B) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
1 (HT1B) - 4 (E2)	10 kΩ or higher

(c) Reconnect the HO2 sensor connector.

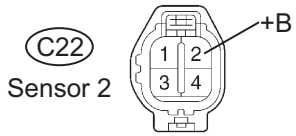
NG → REPLACE HEATED OXYGEN SENSOR

OK

2 CHECK TERMINAL VOLTAGE (+B OF HO2 SENSOR)

Wire Harness Side:

Heated Oxygen Sensor Connector



Front View

A072895E10

(a) Disconnect the C22 HO2 sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminal of the C22 HO2 sensor connector and body ground.

Standard voltage

Tester Connection	Specified Condition
C22-2 (+B) - Body ground	9 to 14 V

(d) Reconnect the HO2 sensor connector.

OK → Go to step 5

NG

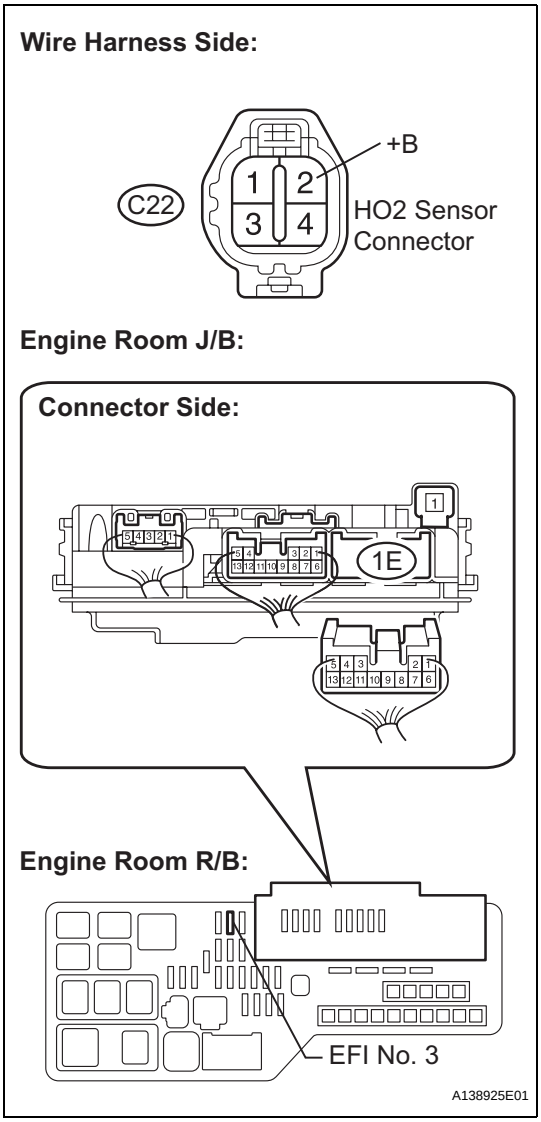
3 INSPECT ENGINE ROOM J/B (EFI RELAY) (See page ES-85)

NG → REPLACE ENGINE ROOM J/B

OK

ES

4	CHECK HARNESS AND CONNECTOR (HO2 SENSOR - EFI RELAY)



(a) Inspect the EFI No. 3 fuse.
  (1) Remove the EFI No. 3 fuse from the engine room R/B.
  (2) Measure the EFI No. 3 fuse resistance.
    Standard resistance:
    Below 1 Ω
  (3) Reinstall the EFI No. 3 fuse.
(b) Disconnect the C22 HO2 sensor connector.
(c) Remove the engine room J/B from the engine room R/B.
(d) Disconnect the 1E engine room J/B connector.
(e) Measure the resistance between the terminals.
  Standard resistance (Check for open)

Tester Connection	Specified Condition
C22-2 (+B) - 1E-6 (Engine room J/B)	Below 1 Ω

  Standard resistance (Check for short)

Tester Connection	Specified Condition
C22-2 (+B) or 1E-6 (Engine room J/B) - Body ground	10 kΩ or higher

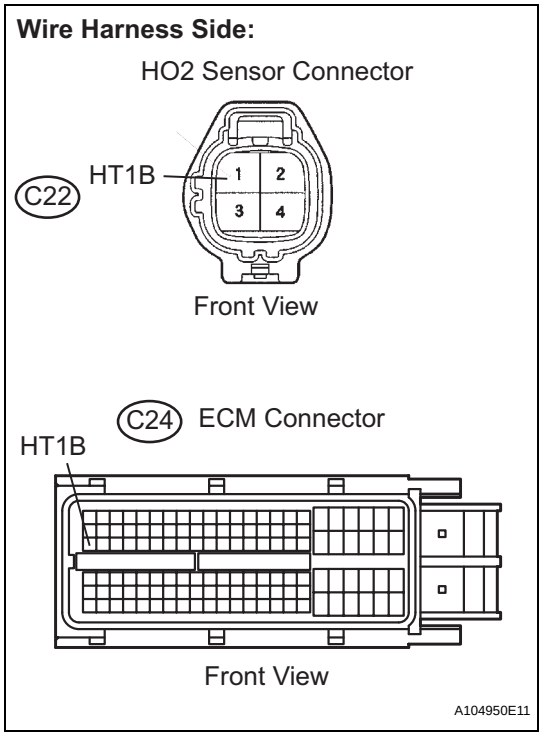
(f) Reconnect the HO2 sensor connector.
(g) Reconnect the engine room J/B connector.
(h) Reinstall the engine room J/B.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK ECM POWER SOURCE CIRCUIT

5 CHECK HARNESS AND CONNECTOR (HO2 SENSOR - ECM)



(a) Disconnect the C22 HO2 sensor connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C22-1 (HT1B) - C24-47 (HT1B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C22-1 (HT1B) or C24-47 (HT1B) - Body ground	10 kΩ or higher

(d) Reconnect the HO2 sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Start the engine.
(f) Allow the engine to idle for 2 minutes or more.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0037, P0038 and/or P0141	B

B → **REPLACE ECM**

A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

DTC	P0103	Mass or Volume Air Flow Circuit High Input

DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the throttle valve.

The ECM uses this information to determine the fuel injection time and to provide the appropriate air-fuel ratio.

ES

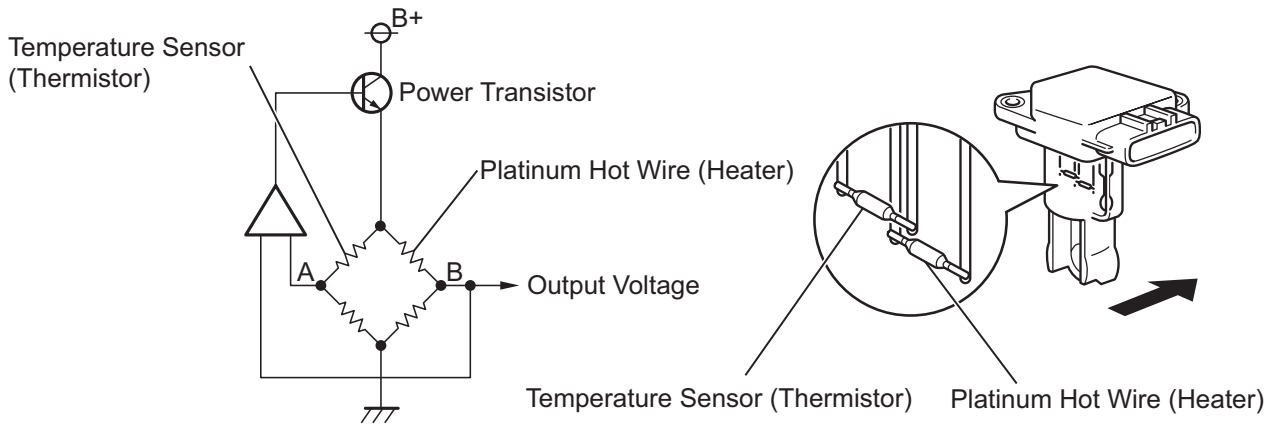
Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air.

By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.

The circuit is constructed so that the platinum hot wire and the temperature sensor create a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.

HINT:

When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine RPM and throttle valve position. Fail-safe mode continues until a pass condition is detected.



DTC No.	DTC Detection Condition	Trouble Area
P0100	MAF meter voltage less than 0.2 V, or more than 4.9 V for 3 seconds (1 trip detection logic)	• Open or short in MAF meter circuit • MAF meter • ECM
P0102	MAF meter voltage less than 0.2 V for 3 seconds (1 trip detection logic)	• Open or short in MAF meter circuit • MAF meter • ECM
P0103	MAF meter voltage more than 4.9 V for 3 seconds (1 trip detection logic)	• Open or short in MAF meter circuit • MAF meter • ECM

HINT:
When any of these DTCs are set, check the air-flow rate by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.

Mass Air Flow Rate (g/sec.)	Malfunctions
Approximately 0.0	• Open in Mass Air Flow (MAF) meter power source circuit • Open or short in VG circuit
271.0 or more	• Open in E2G circuit

MONITOR DESCRIPTION

If there is a defect in the MAF meter or an open or short circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets a DTC.
Example:
When the sensor output voltage remains less than 0.2 V, or more than 4.9 V, for more than 3 seconds, the ECM sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 3 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0100: MAF meter range check (Fluctuating) P0102: MAF meter range check (Low voltage) P0103: MAF meter range check (High voltage)
Required Sensors/Components (Main)	MAF meter
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate: Engine RPM less than 4,000 rpm 2 driving cycles: Engine RPM 4,000 rpm or more
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0100:

MAF meter voltage	Less than 0.2 V, or more than 4.9 V

P0102:

MAF meter voltage	Less than 0.2 V

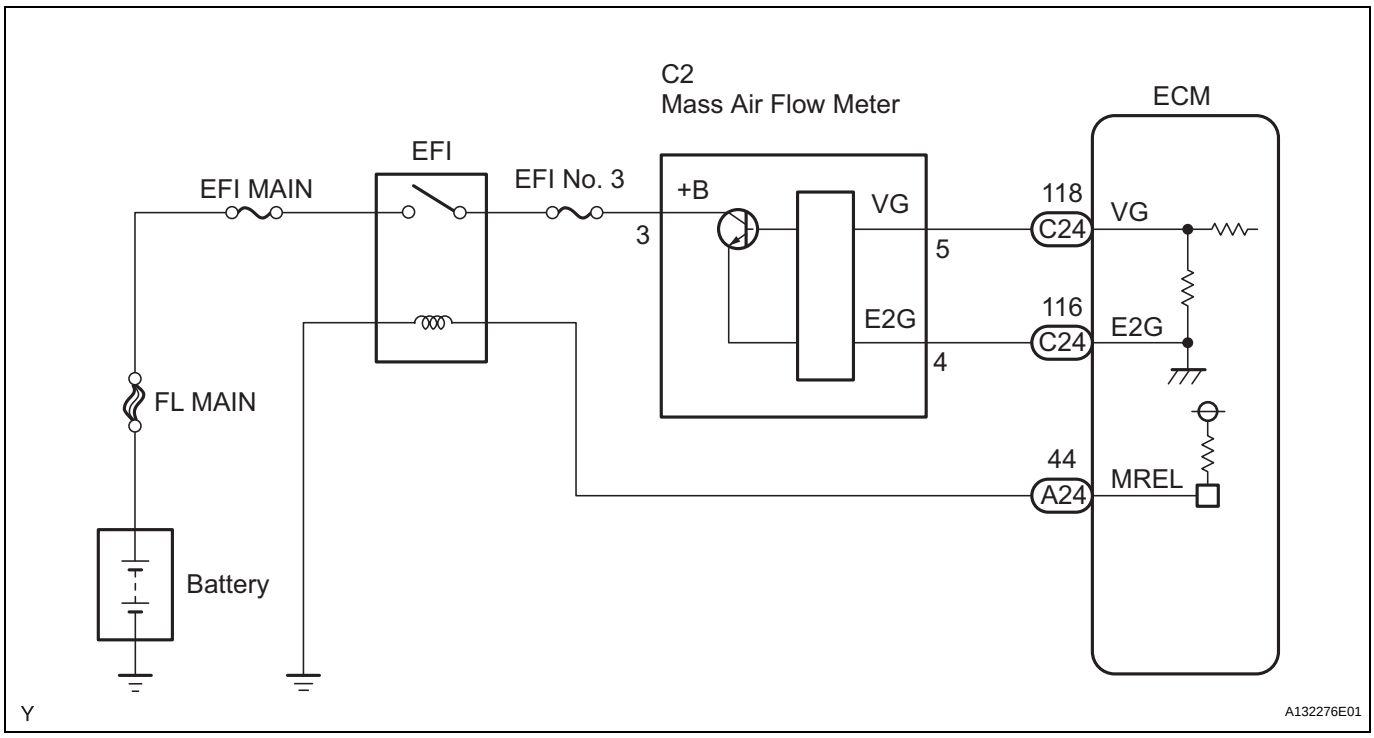
P0103:

MAF meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

MAF meter voltage	Between 0.4 V and 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (MASS AIR FLOW RATE)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.
(e) Read the values displayed on the tester.

Result

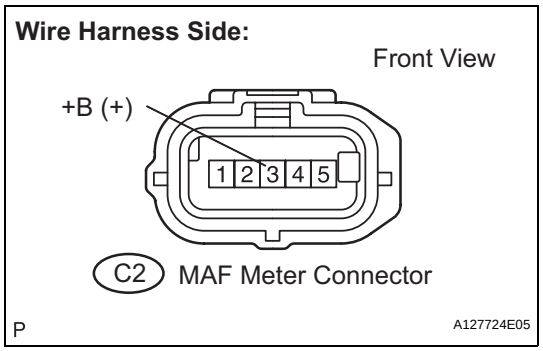
Mass Air Flow Rate (g/sec.)	Proceed to
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

HINT:
*1: The value must change when the throttle valve is open or closed with the engine running.

B	Go to step 6
C	CHECK FOR INTERMITTENT PROBLEMS

A

2 INSPECT MASS AIR FLOW METER (POWER SOURCE VOLTAGE)



(a) Disconnect the C2 Mass Air Flow (MAF) meter connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminal of the wire harness side connector and body ground.
Standard voltage

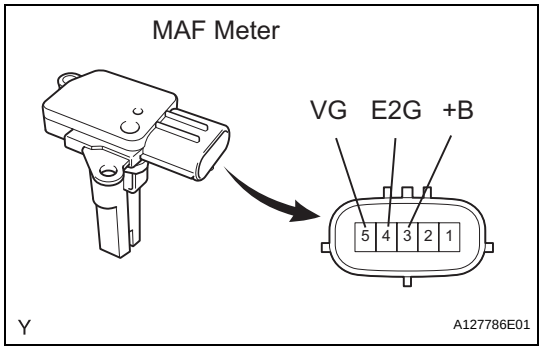
Tester Connection	Specified Condition
C2-3 (+B) - Body ground	9 to 14 V

(d) Reconnect the MAF meter connector.

NG → **Go to step 5**

OK

3 INSPECT MASS AIR FLOW METER (VG VOLTAGE)



(a) Inspect output voltage.
(1) Disconnect the C2 MAF meter connector.
(2) Apply battery voltage across terminals +B and E2G.
(3) Connect the positive (+) tester probe to terminal VG, and the negative (-) tester probe to terminal E2G.
(4) Measure the voltage.
Standard voltage

Tester Connection	Specified Condition
5 (VG) - 4 (E2G)	0.2 to 4.9 V

(5) Reconnect the MAF meter connector.

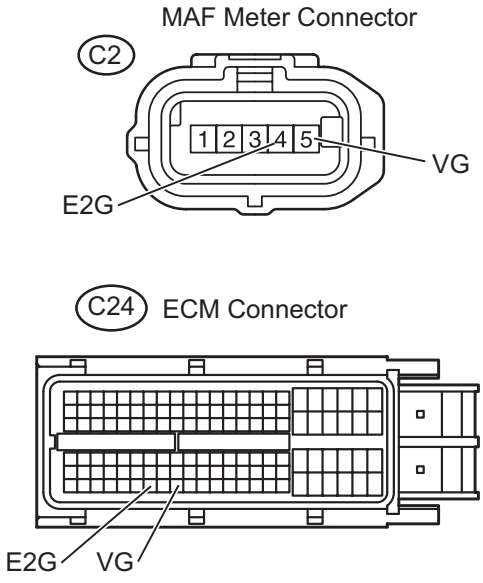
NG → **REPLACE MASS AIR FLOW METER**

OK

ES

4	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)

Wire Harness Side:



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C2-5 (VG) - C24-118 (VG)	Below 1 Ω
C2-4 (E2G) - C24-116 (E2G)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C2-5 (VG) or C24-118 (VG) - Body ground	10 kΩ or higher

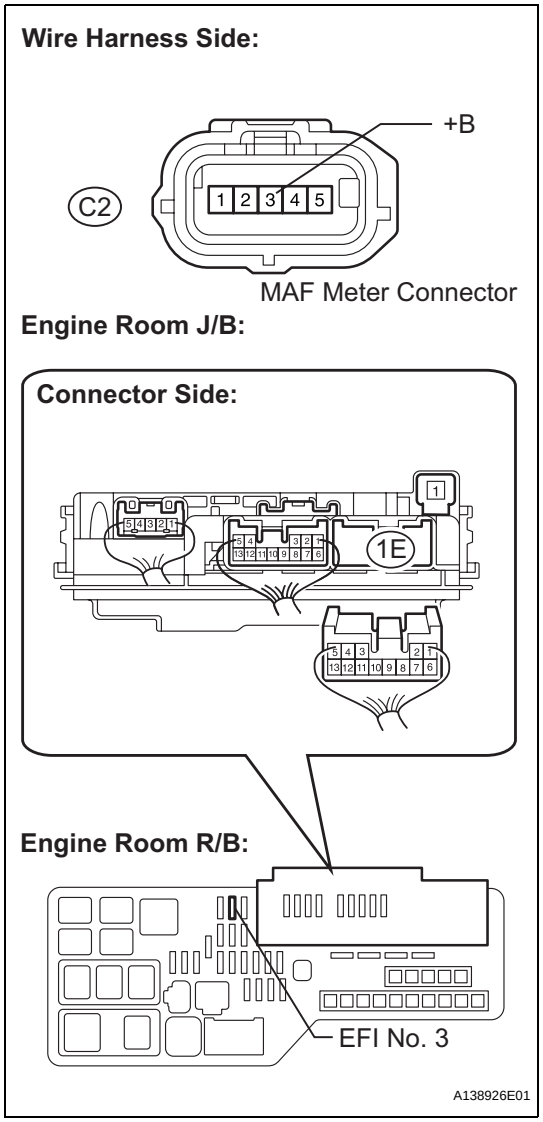
(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

5	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ENGINE ROOM J/B)



(a) Inspect the EFI No. 3 fuse.
  (1) Remove the EFI No. 3 fuse from the engine room R/B.
  (2) Measure the EFI No. 3 fuse resistance.
    Standard resistance:
    Below 1 Ω
  (3) Reinstall the EFI No. 3 fuse.
(b) Disconnect the C2 MAF meter connector.
(c) Remove the engine room J/B from the engine room R/B.
(d) Disconnect the 1E engine room J/B connector.
(e) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C2-3 (+B) - 1E-6	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C2-3 (+B) or 1E-6 - Body ground	10 kΩ or higher

(f) Reconnect the MAF meter connector.
(g) Reconnect the engine room J/B connector.
(h) Reinstall the engine room J/B.

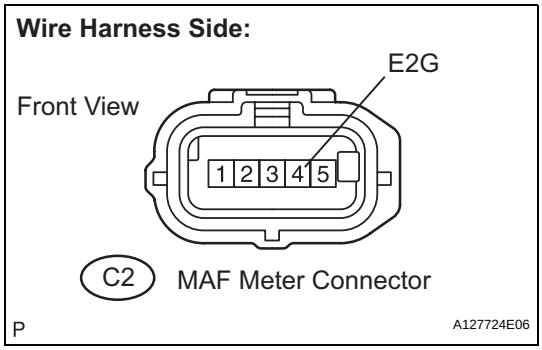
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK ECM POWER SOURCE CIRCUIT

ES

6	CHECK HARNESS AND CONNECTOR (SENSOR GROUND)



(a) Disconnect the C2 MAF meter connector.
(b) Measure the resistance.

Standard resistance

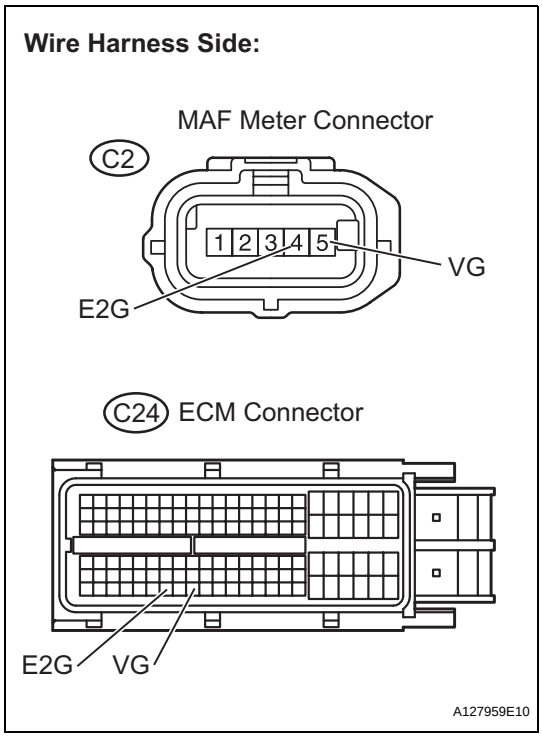
Tester Connection	Specified Condition
C2-4 (E2G) - Body ground	Below 1 Ω

(c) Reconnect the MAF meter connector.

OK → **REPLACE MASS AIR FLOW METER**

NG

7	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C2-5 (VG) - C24-118 (VG)	Below 1 Ω
C2-4 (E2G) - C24-116 (E2G)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C2-5 (VG) or C24-118 (VG) - Body ground	10 kΩ or higher

(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

DTC	P0101	Mass Air Flow Circuit Range / Performance Problem

DESCRIPTION

Refer to DTC P0100 (See page ES-89).

DTC No.	DTC Detection Condition	Trouble Area
P0101	Conditions (a), (b), (c), (d) and (e) continue for more than 10 seconds (2 trip detection logic): (a) Engine running (b) Engine coolant temperature 70°C (158°F) or higher (c) Throttle Position (TP) sensor voltage 0.24 V or more (d) Average engine load value ratio less than 0.85, or more than 1.15 (varies with estimated engine load) Average engine load value ratio = Average engine load based on MAF meter output / Average engine load estimated from driving conditions (e) Average air-fuel ratio less than -20 %, or more than 20 %	• Mass Air Flow (MAF) meter • Air induction system • PCV hose connections

ES

MONITOR DESCRIPTION

The MAF meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components of the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.
The ECM monitors the average engine load value ratio to check the MAF meter for malfunctions. The average engine load value ratio is obtained by comparing the average engine load calculated from the MAF meter output to the average engine load estimated from the driving conditions, such as the engine speed and the throttle opening angle. If the average engine load value ratio is below the threshold value, the ECM determines that the intake air volume is low, and if the average engine load value ratio is above the threshold value, the ECM determines that the intake air volume is high.
If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0101: Mass air flow meter rationality
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Related)	Crankshaft Position (CKP) sensor, Engine Coolant Temperature (ECT) sensor and Throttle Position (TP) sensor
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for closed loop) P0335 (CKP sensor) P0340 (CMP sensor)
Throttle position (TP sensor voltage)	0.24 V or more
Engine	Running

Battery voltage	10.5 V or more
Engine coolant temperature	70°C (158°F) or more
IAT sensor circuit	OK
ECT sensor circuit	OK
CKP sensor circuit	OK
TP sensor circuit	OK
Canister pressure sensor circuit	OK
EVAP leak detection pump	OK
EVAP vent valve	OK

TYPICAL MALFUNCTION THRESHOLDS

ES

Averaged engine load	Less than 0.85, or more than 1.23

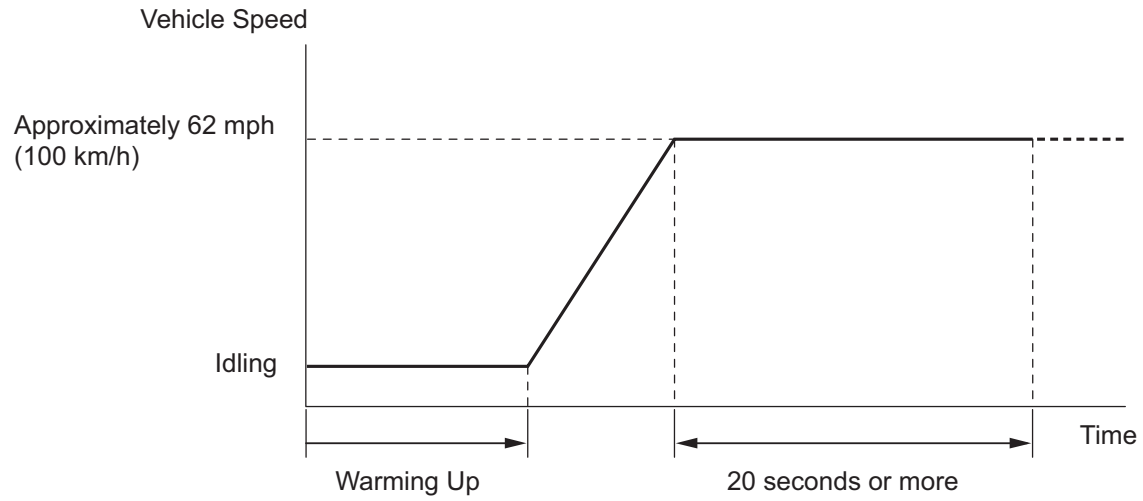
WIRING DIAGRAM

Refer to DTC P0100 (See page ES-91).

CONFIRMATION DRIVING PATTERN

HINT:

Performing this confirmation pattern will activate the mass air flow performance monitor.



1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch to the ON position.
3. Turn the tester on.
4. Clear the DTCs (See page ES-38).
5. Start the engine, and warm it up until the engine coolant temperature reaches 70°C (158°F) or higher.
6. Drive the vehicle at approximately 62 mph (100 km/h) for 20 seconds or more.
7. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0101)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0101	A
P0101 and other DTCs	B

HINT:
If any DTCs other than P0101 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

3 CHECK PCV HOSE CONNECTIONS

OK:
PCV hose is connected correctly and is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

REPLACE MASS AIR FLOW METER

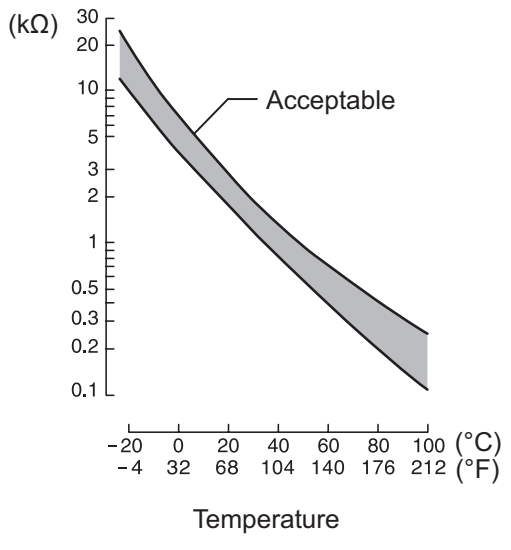
DTC	P0110	Intake Air Temperature Circuit Malfunction

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

DESCRIPTION

Fig. 1



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT becomes low, the resistance of the thermistor increases. When the temperature becomes high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (see Fig. 1).

The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R.

Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes, according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

HINT:

When any of DTCs P0110, P0112 and P0113 are set, the ECM enters fail-safe mode. During fail-safe mode, the IAT is estimated to be 20°C (68°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	DTC Detection Condition	Trouble Area
P0110	Open or short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM
P0112	Short in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM
P0113	Open in IAT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM

HINT:
When any of these DTCs are set, check the IAT by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.

Temperature Displayed	Malfunctions
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the IAT. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a malfunction in the IAT sensor and sets a DTC.
Example:
If the sensor output voltage is more than 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the IAT sensor circuit, and sets DTC P0113. Conversely, if the output voltage is less than 0.18 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0112.
If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0110: IAT sensor range check (Fluctuating) P0112: IAT sensor range check (Low voltage) P0113: IAT sensor range check (High voltage)
Required Sensors/Components (Main)	IAT sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0110:

IAT sensor voltage	Less than 0.18 V, or more than 4.91 V

P0112:

IAT sensor voltage [IAT]	Less than 0.18 V [More than 140°C (284°F)]

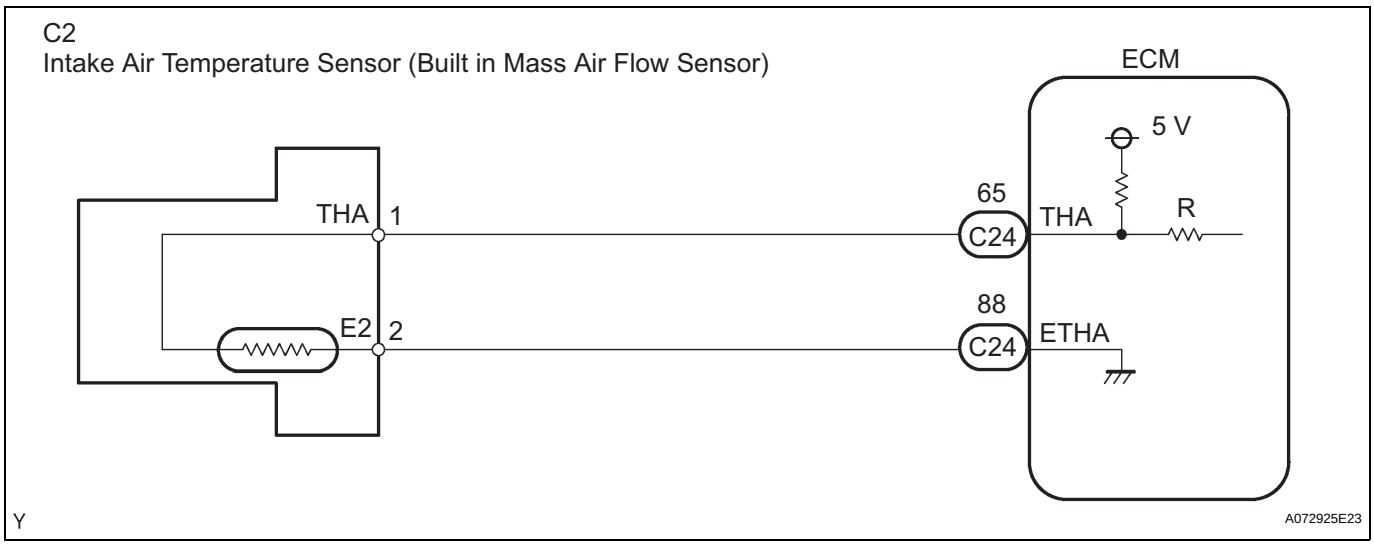
P0113:

IAT sensor voltage [IAT]	More than 4.91 V [Less than -40°C (-40°F)]

COMPONENT OPERATING RANGE

IAT sensor voltage [IAT]	0.18 to 4.91 V [-40°C to 140°C (-40°F to 284°F)]

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ OUTPUT DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0110	A
P0112	B
P0113	C

B	Go to step 5
C	Go to step 3

A

2	READ VALUE USING INTELLIGENT TESTER (INTAKE AIR TEMPERATURE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.

(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(e) Read the value displayed on the tester.
Standard:
Same as actual Intake Air Temperature (IAT).

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Same as actual IAT	C

HINT:
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

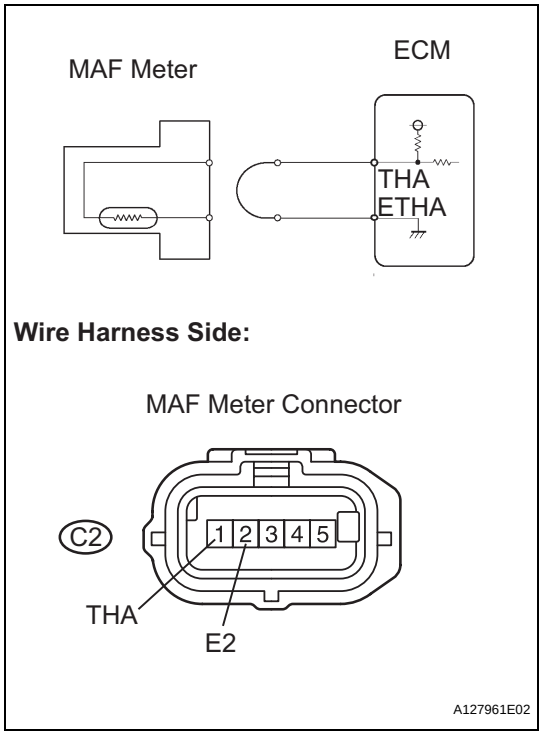
ES

B → **Go to step 5**

C → **CHECK FOR INTERMITTENT PROBLEMS**

A

3 READ VALUE USING INTELLIGENT TESTER (CHECK FOR OPEN IN WIRE HARNESS)



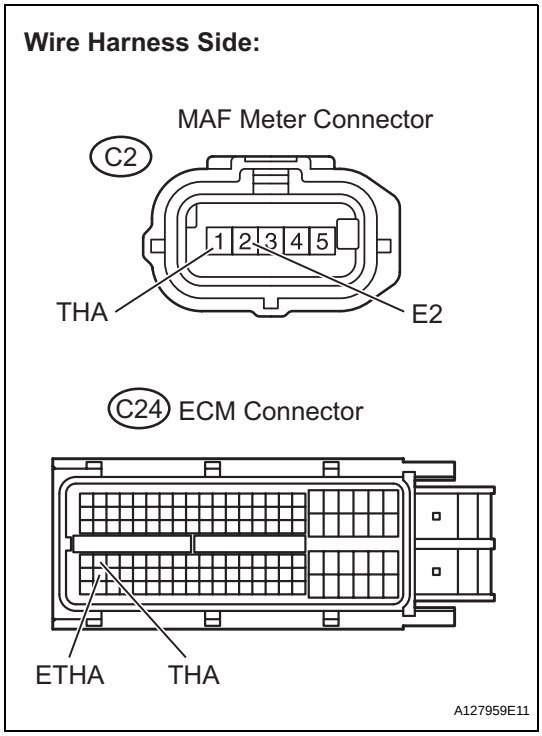
(a) Disconnect the C2 Mass Air Flow (MAF) meter connector.
(b) Connect terminals THA and E2 of the MAF meter wire harness side connector.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn the tester on.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(g) Read the value displayed on the tester.
Standard value:
140°C (284°F) or higher
(h) Reconnect the MAF meter connector.

NG → **Go to step 4**

OK

CONFIRM GOOD CONNECTION TO SENSOR. IF OK, REPLACE MASS AIR FLOW METER

4	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
C2-1 (THA) - C24-65 (THA)	Below 1 Ω
C2-2 (E2) - C24-88 (ETHA)	Below 1 Ω

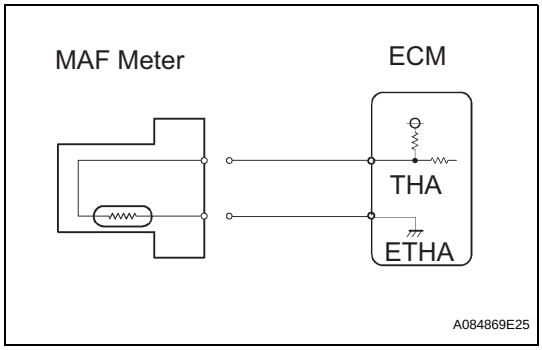
(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CONFIRM GOOD CONNECTION TO ECM. IF OK, REPLACE ECM

5	READ VALUE USING INTELLIGENT TESTER (CHECK FOR SHORT IN WIRE HARNESS)



(a) Disconnect the C2 MAF meter connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn the tester on.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(f) Read the value displayed on the tester.
Standard value:
-40°C (-40°F)
(g) Reconnect the MAF meter connector.

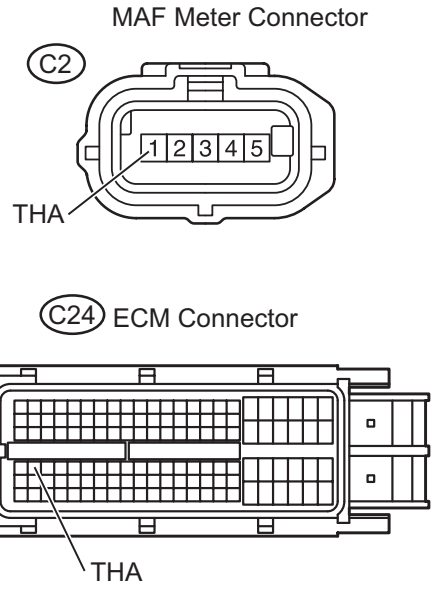
NG → **Go to step 6**

OK

REPLACE MASS AIR FLOW METER

6	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)

Wire Harness Side:



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C2-1 (THA) or C24-65 (THA) - Body ground	10 kΩ or higher

(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

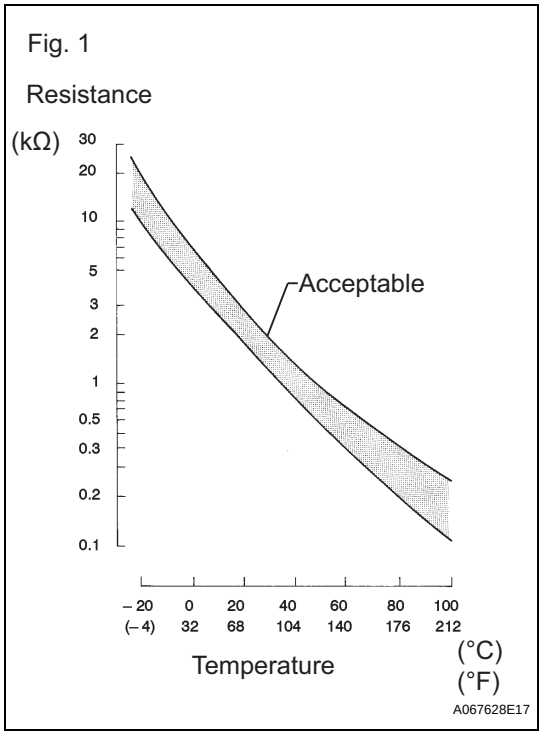
OK

REPLACE ECM

ES

DTC	P0111	Intake Air Temperature Sensor Gradient Too High

DESCRIPTION



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT becomes low, the resistance of the thermistor increases. When the temperature becomes high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (See Fig. 1).
The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R.
Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes, according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

DTC No.	DTC Detection Condition	Trouble Area
P0111	When either condition below is met: 1. The intake air temperature rise is large, from the previous trip warm-up to the following trip. (2 trip detection logic). 2. When the change in the intake air temperature after engine start is less than the threshold value.	Mass air flow meter assembly

MONITOR DESCRIPTION

The ECM performs OBD II monitoring based on the values from the intake air temperature sensor. If there is no change of the sensor value within the normal range, the ECM will not be able to perform OBD II monitoring or will misdiagnose that there is a malfunction in the sensor. The ECM detects the stuck intake air temperature sensor value by performing monitoring after the ignition switch is turned off or the engine is started (short soak or long soak).

MONITOR STRATEGY

Related DTCs	P0111: Intake air temperature sensor rationality (After engine stop) P0111: Intake air temperature sensor rationality (After cold engine start)
Required Sensors/Components (Main)	Intake Air Temperature (IAT) sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Once per driving cycle
Duration	5 hours or more
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

After engine stop:

Time after engine start	10 seconds or more
Battery voltage	10.5 V or more
ECT sensor circuit	OK
ECT change since engine stopped	Less than 180°C (356°F)
ECT before engine stop	70°C (158°F) or more
Time that MAF is low before engine stop	70 minutes
Accumulated MAF amount before engine stop	Except PZEV: 3,549 g or more PZEV: 2,314 g or more
Key-off duration	30 minutes

After cold engine start:

Key-off duration	5 hours
Time after engine start	10 seconds or more
ECT sensor circuit	OK
ECT	70°C (158°F) or more
Accumulated MAF amount	Except PZEV: 3,549 g or more PZEV: 2,314 g or more
One of the following conditions 1 or 2 is met:	-
1. Duration while engine load is low	120 seconds or more
2. Duration while engine load is high	10 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

After engine stop:

IAT change	Less than 1°C (2°F)

After cold engine start:

IAT change	Less than 1°C (2°F)

WIRING DIAGRAM

Refer to DTC P0110 (See page ES-99).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0111)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0111 and other DTCs	A
P0111	B

HINT:
If any DTCs other than P0111 are output, troubleshoot those DTCs first.

B → **REPLACE MASS AIR FLOW METER**

A

GO TO DTC CHART

DTC	P0115	Engine Coolant Temperature Circuit Malfunction

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

DESCRIPTION

A thermistor, whose resistance value varies according to the ECT, is built into the Engine Coolant Temperature (ECT) sensor.

The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

HINT:

When any of DTCs P0115, P0117 and P0118 are set, the ECM enters fail-safe mode. During fail-safe mode, the ECT is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	DTC Detection Condition	Trouble Area
P0115	Open or short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in ECT sensor circuit • ECT sensor • ECM
P0117	Short in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	• Short in ECT sensor circuit • ECT sensor • ECM
P0118	Open in ECT sensor circuit for 0.5 seconds (1 trip detection logic)	• Open in ECT sensor circuit • ECT sensor • ECM

HINT:

When any of these DTCs are set, check the ECT by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

Temperature Displayed	Malfunctions
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the ECT. The ECT sensor has a thermistor with a resistance that varies according to the temperature of the engine coolant. When the coolant temperature becomes low, the resistance in the thermistor increases. When the temperature becomes high, the resistance drops. These variations in resistance are reflected in the output voltage from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the ECT. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

If the sensor output voltage is more than 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the ECT sensor circuit, and sets DTC P0118. Conversely, if the voltage output is less than 0.14 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0117.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0115: ECT sensor range check (Fluctuating) P0117: ECT sensor range check (Low voltage) P0118: ECT sensor range check (High voltage)
Required Sensors/Components (Main)	ECT sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0115:

ECT sensor voltage	Less than 0.14 V, or more than 4.91 V

P0117:

ECT sensor voltage [ECT]	Less than 0.14 V [More than 140°C (284°F)]

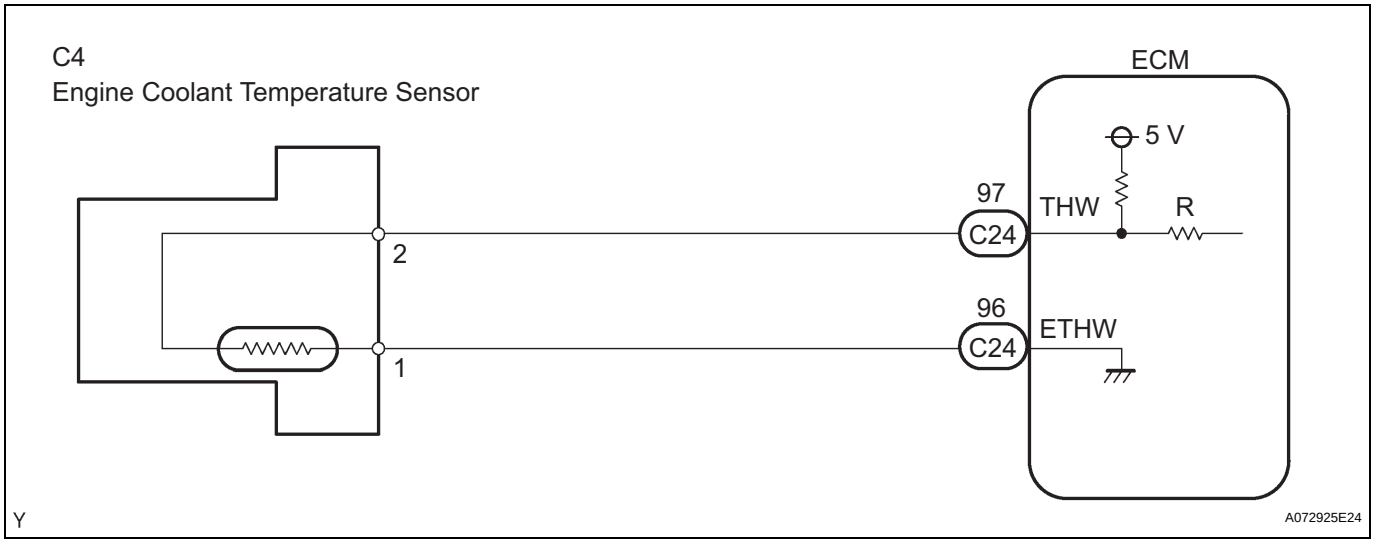
P0118:

ECT sensor voltage [ECT]	More than 4.91 V [Less than -40°C (-40°F)]

COMPONENT OPERATING RANGE

ECT sensor voltage [ECT]	0.14 to 4.91 V [-40°C to 140°C (-40°F to 284°F)]

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 READ OUTPUT DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0115	A
P0117	B
P0118	C

B → **Go to step 5**

C → **Go to step 3**

A

2 READ VALUE USING INTELLIGENT TESTER (ENGINE COOLANT TEMPERATURE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(e) Read the value displayed on the tester.

Standard value:
Between 80°C and 100°C (176°F and 212°F) with warm engine.

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Between 80°C and 100°C (176°F and 212°F)	C

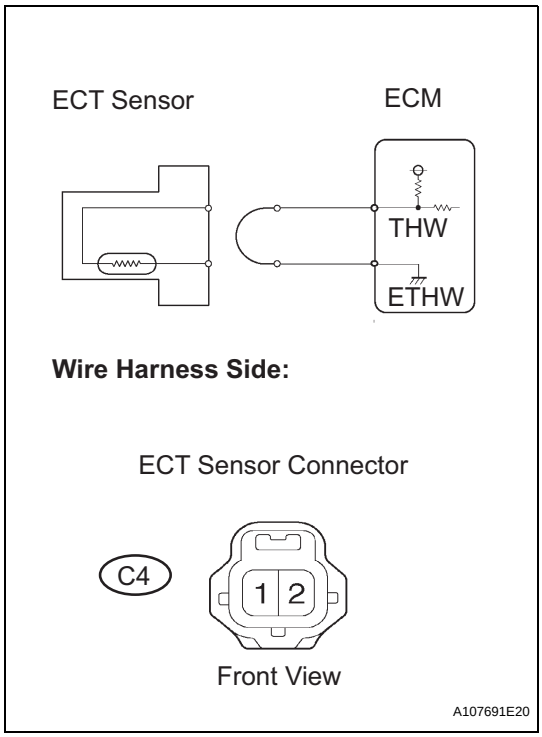
HINT:
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

B → **Go to step 5**

C → CHECK FOR INTERMITTENT PROBLEMS

A

3 READ VALUE USING INTELLIGENT TESTER (CHECK FOR OPEN IN WIRE HARNESS)



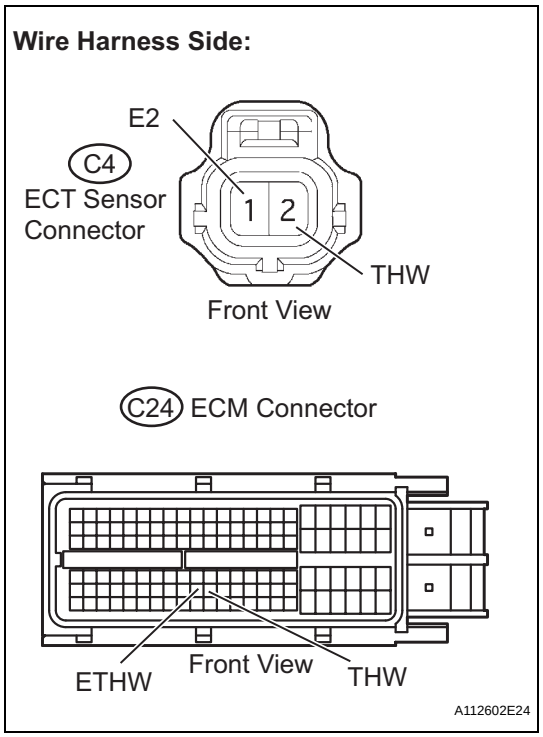
(a) Disconnect the C4 Engine Coolant Temperature (ECT) sensor connector.
(b) Connect terminals 1 and 2 of the ECT sensor connector on the wire harness side.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Turn the tester on.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(g) Read the value displayed on the tester.
Standard value:
140°C (284°F) or higher.
(h) Reconnect the ECT sensor connector.

NG → **Go to step 4**

OK

CONFIRM GOOD CONNECTION TO SENSOR. IF OK, REPLACE ENGINE COOLANT TEMPERATURE SENSOR

4	CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)



(a) Disconnect the C4 ECT sensor connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
C4-2 (THW) - C24-97 (THW)	Below 1 Ω
C4-1 (E2) - C24-96 (ETHW)	Below 1 Ω

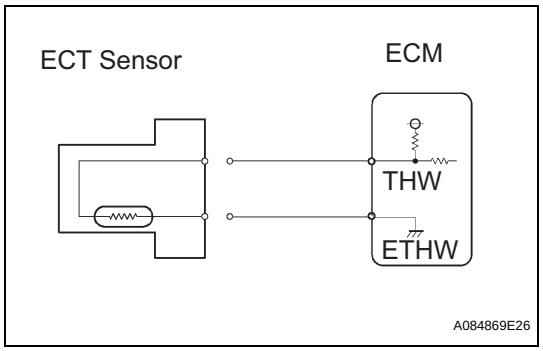
(d) Reconnect the ECT sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CONFIRM GOOD CONNECTION TO ECM. IF OK, REPLACE ECM

5	READ VALUE USING INTELLIGENT TESTER (CHECK FOR SHORT IN WIRE HARNESS)



(a) Disconnect the C4 ECT sensor connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch to the ON position.
(d) Turn the tester on.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(f) Read the value displayed on the tester.
Standard value:
-40°C (-40°F)
(g) Reconnect the ECT sensor connector.

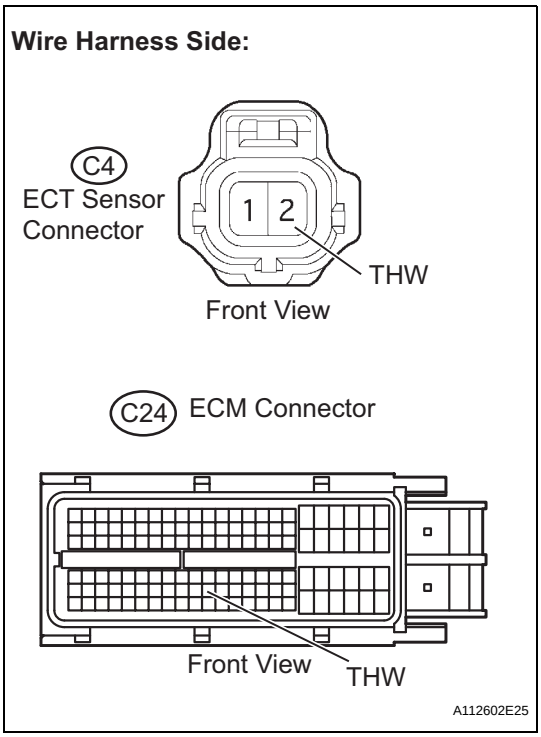
NG → **Go to step 6**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

ES

6	CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)



(a) Disconnect the C4 ECT sensor connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C4-2 (THW) or C24-97 (THW) - Body ground	10 kΩ or higher

(d) Reconnect the ECT sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

ES

DTC	P0116	Engine Coolant Temperature Circuit Range / Performance Problem

DESCRIPTION

Refer to DTC P0115 (See page ES-108).

DTC No.	DTC Detection Condition	Trouble Area
P0116	When either of following conditions is met (2 trip detection logic): • When cold engine started and engine warmed up, Engine Coolant Temperature (ECT) sensor value does not change. • After engine is warmed up, ECT sensor value does not change when engine stopped and then next cold engine start is performed.	• Thermostat • ECT sensor

ES

MONITOR DESCRIPTION

Engine coolant temperature (ECT) sensor cold start monitor

When a cold engine start is performed and then the engine is warmed up, if the ECT sensor value does not change, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

ECT sensor soak monitor

After a warmed up engine is started, if the ECT sensor value does not change when the engine is stopped and then the next cold engine start is performed, it is determined that a malfunction has occurred. If this is detected in 2 consecutive driving cycles, the MIL is illuminated and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0116: Engine coolant temperature (ECT) sensor cold start monitor P0116: ECT sensor soak monitor
Required Sensors/Components (Main)	ECT sensor
Required Sensors/Components (Related)	None
Frequency of Operation	Once per driving cycle
Duration	5 hours or more
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

ECT Sensor cold start monitor:

Monitor runs whenever following DTCs are not present	P0100 to P0103: Mass Air Flow (MAF) meter
Battery voltage	10.5 V or more
Time after engine start	1 second or more
ECT at engine start	Less than 60°C (140°F)
IAT sensor circuit	OK
Soak time	5 hours or more
Accumulated MAF	Except PZEV: 621.76 g or more PZEV: 608 g or more
Engine	Running
Fuel cut	OFF
Difference between ECT at engine start and IAT	Less than 40°C (72°F)

ECT Sensor soak monitor:

Monitor runs whenever following DTCs not present	P0100 to P0103: MAF meter P0110 to P0113: IAT sensor

Battery voltage	10.5 V or more
Engine	Running
Soak time	5 hours or more
Either of the following conditions (a) or (b) is met	-
(a) ECT	60°C (140°F) or more
(b) Accumulated MAF	Except PZEV: 1,021.88 g or more PZEV: 947 g or more

TYPICAL MALFUNCTION THRESHOLDS

ECT Sensor cold start monitor:

ECT sensor value change	Less than 5°C (9°F)

ECT Sensor soak monitor:

Difference between current ECT sensor value and previous ECT sensor value when engine stopped	Less than 5°C (9°F)

COMPONENT OPERATING RANGE

ECT	ECT sensor value changes in accordance with actual ECT

INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0117, P0118 or P0125 are set simultaneously with DTC P0116, the ECT sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0116)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0116	A
P0116 and other DTCs	B

B → **GO TO DTC CHART**

A

2	**INSPECT THERMOSTAT**

(a) Remove the thermostat (See page CO-12).
(b) Measure the valve opening temperature of the thermostat.

Standard value:
80°C to 84°C (176°F to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

(c) Reinstall the thermostat (See page CO-13).

NG → **REPLACE THERMOSTAT**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

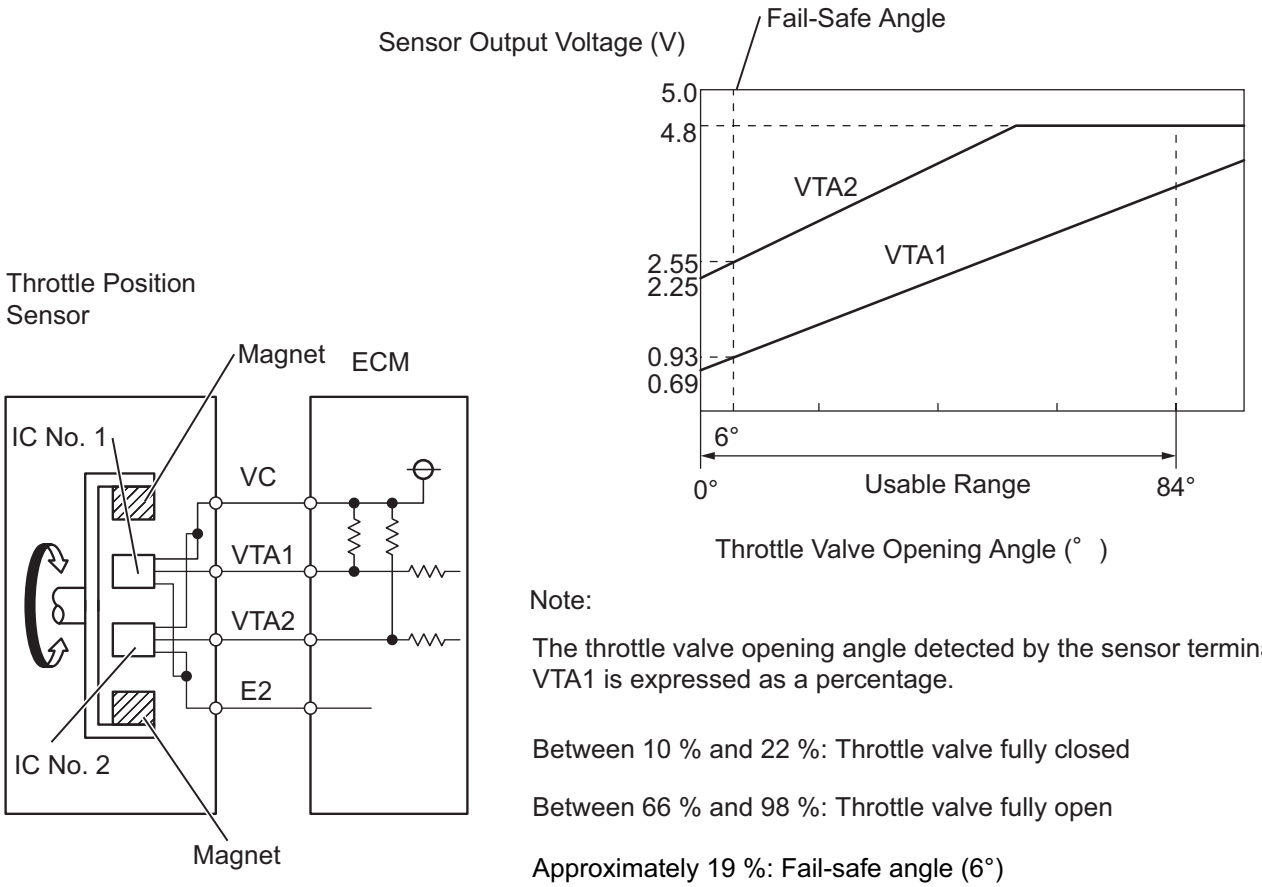
DTC	P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction
DTC	P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input
DTC	P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input
DTC	P0220	Throttle / Pedal Position Sensor / Switch "B" Circuit
DTC	P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input
DTC	P0223	Throttle / Pedal Position Sensor / Switch "B" Circuit High Input
DTC	P2135	Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation

ES

HINT:
These DTCs relate to the Throttle Position (TP) sensor.

DESCRIPTION

The TP sensor is mounted on the throttle body, and detects the opening angle of the throttle valve. This sensor is a non-contact type. It uses Hall-effect elements in order to yield accurate signals even in extreme driving conditions, such as at high speeds as well as very low speeds.
The TP sensor has two sensor circuits which each transmits a signal, VTA1 and VTA2. VTA1 is used to detect the throttle valve angle and VTA2 is used to detect malfunctions in VTA1. The sensor signal voltages vary between 0 V and 5 V in proportion to the throttle valve opening angle, and are transmitted to the VTA terminals of the ECM.
As the valve closes, the sensor output voltage decreases and as the valve opens, the sensor output voltage increases. The ECM calculates the throttle valve opening angle according to these signals and controls the throttle actuator in response to driver inputs. These signals are also used in calculations such as air-fuel ratio correction, power increase correction and fuel-cut control.



Note:

The throttle valve opening angle detected by the sensor terminal VTA1 is expressed as a percentage.

Between 10 % and 22 %: Throttle valve fully closed

Between 66 % and 98 %: Throttle valve fully open

Approximately 19 %: Fail-safe angle (6°)

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DTC No.	DTC Detection Condition	Trouble Area
P0120	Output voltage of VTA1 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds when accelerator pedal depressed (1 trip detection logic)	• Throttle Position (TP) sensor (built into throttle body) • ECM
P0122	Output voltage of VTA1 0.2 V or less for 2 seconds when accelerator pedal depressed (1 trip detection logic)	• TP sensor (built into throttle body) • Short in VTA1 circuit • Open in VC circuit • ECM
P0123	Output voltage of VTA1 4.535 V or more for 2 seconds when accelerator pedal depressed (1 trip detection logic)	• TP sensor (built into throttle body) • Open in VTA1 circuit • Open in E2 circuit • Short between VC and VTA1 circuits • ECM
P0220	Output voltage of VTA2 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds when accelerator pedal depressed (1 trip detection logic)	• TP sensor (built into throttle body) • ECM

DTC No.	DTC Detection Condition	Trouble Area
P0222	Output voltage of VTA2 1.75 V or less for 2 seconds when accelerator pedal depressed (1 trip detection logic)	• TP sensor (built into throttle body) • Short in VTA2 circuit • Open in VC circuit • ECM
P0223	Output voltage of VTA2 4.8 V or more, and VTA1 between 0.2 V and 2.02 V for 2 seconds when accelerator pedal depressed (1 trip detection logic)	• TP sensor (built into throttle body) • Open in VTA2 circuit • Open in E2 circuit • Short between VC and VTA2 circuits • ECM
P2135	Either condition (a) or (b) is met (1 trip detection logic): (a) Difference between output voltages of VTA1 and VTA2 0.02 V or less for 0.5 seconds or more (b) Output voltage of VTA1 0.2 V or less, and VTA2 1.75 V or less, for 0.4 seconds or more	• Short between VTA1 and VTA2 circuits • TP sensor (built into throttle body) • ECM

ES

HINT:

- When any of these DTCs are set, check the throttle valve opening angle by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS #1 AND THROTTLE POS #2.
- THROTTLE POS #1 denotes the VTA1 signal, and THROTTLE POS #2 denotes the VTA2 signal.

Reference (Normal Condition):

Tester Display	Accelerator Pedal Fully Released	Accelerator Pedal Fully Depressed
THROTTLE POS #1	0.5 to 1.1 V	3.3 to 4.9 V
THROTTLE POS #2	2.1 to 3.1 V	4.6 to 5.0 V

MONITOR DESCRIPTION

The ECM uses the Throttle Position (TP) sensor to monitor the throttle valve opening angle. There are several checks that the ECM performs to confirm the proper operation of the TP sensor.

- A specific voltage difference is expected between the sensor terminals, VTA1 and VTA2, for each throttle valve opening angle. If the difference between VTA1 and VTA2 is incorrect, the ECM interprets this as a malfunction in the sensor, and sets a DTC.
- VTA1 and VTA2 each have a specific voltage range. If VTA1 or VTA2 is outside the normal operating range, the ECM interprets this as a malfunction in the sensor, and sets a DTC.
- VTA1 and VTA2 should never be close to the same voltage level. If VTA1 is within 0.02 V of VTA2, the ECM determines that there is a short circuit in the sensor, and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0120: Throttle position sensor 1 range check (Fluctuating) P0122: Throttle position sensor 1 range check (Low voltage) P0123: Throttle position sensor 1 range check (High voltage) P0220: Throttle position sensor 2 range check (Fluctuating) P0222: Throttle position sensor 2 range check (Low voltage) P0223: Throttle position sensor 2 range check (High voltage) P2135: Throttle position sensor range check (Correlation)
Required Sensors/Components (Main)	Throttle position sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	2 seconds: P0120, P0122, P0123, P0220, P0222 and P0223 (Accelerator pedal ON) 10 seconds: P0120, P0122, P0123, P0220, P0222 and P0223 (Accelerator pedal OFF) 0.5 seconds: P2135 Case 1 0.4 seconds: P2135 Case 2
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Electronic throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

P0120:

VTA1 voltage	0.2 V or less, or 4.535 V or more

P0122:

VTA1 voltage	0.2 V or less

P0123:

VTA1 voltage	4.535 V or more

P0220:

VTA2 voltage	1.75 V or less, or 4.8 V or more

P0222:

VTA2 voltage	1.75 V or less

P0223:

VTA2 voltage when VTA1 voltage is 0.2 V or more, and 2.02 V or less	4.8 V or more

P2135 Case 1:

Difference between VTA1 and VTA2 voltages	0.02 V or less

P2135 Case 2:

VTA1 voltage	0.2 V or less
VTA2 voltage	1.75 V or less

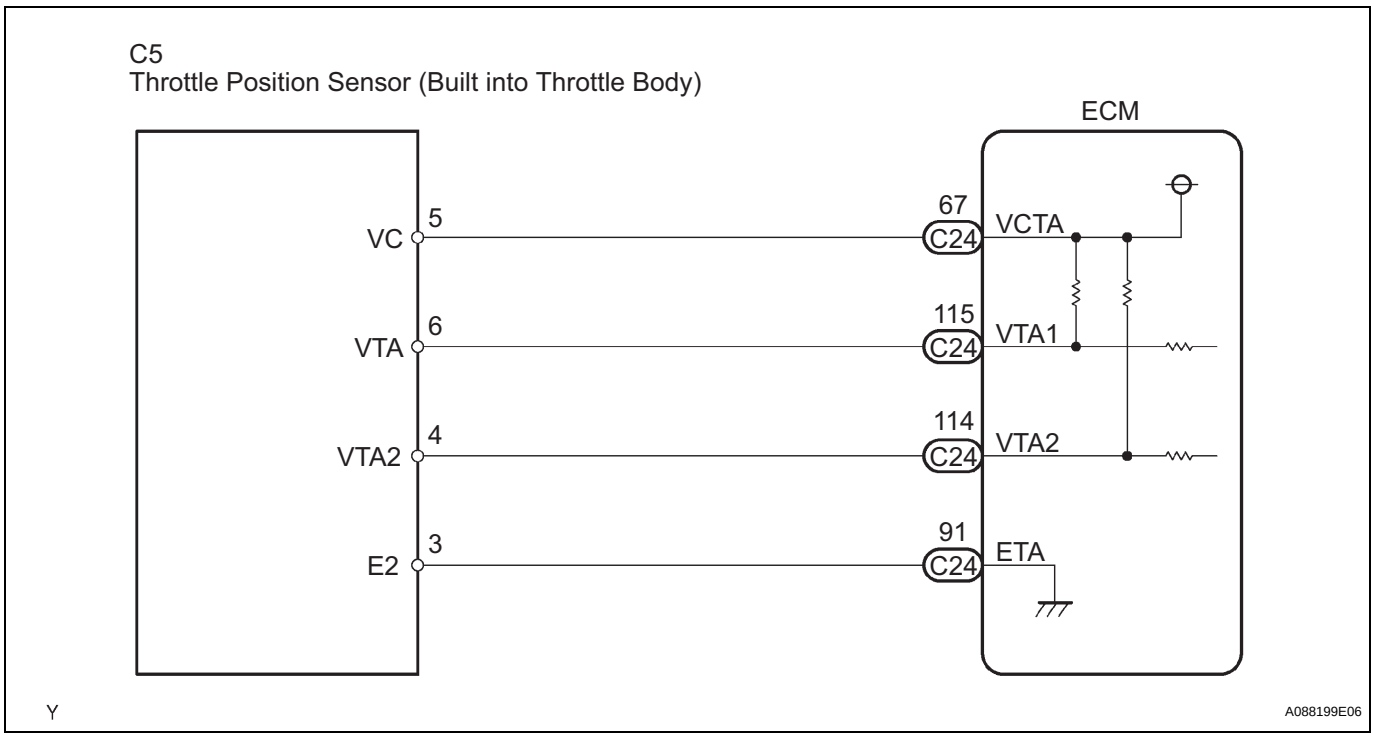
COMPONENT OPERATING RANGE

VTA1 voltage	0.69 to 4.05 V
VTA2 voltage	2.25 to 4.8 V

FAIL-SAFE

When any of these DTCs, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (THROTTLE POS #1 AND THROTTLE POS #2)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS #1 and THROTTLE POS #2.
(d) Check the values displayed on the tester.

Result

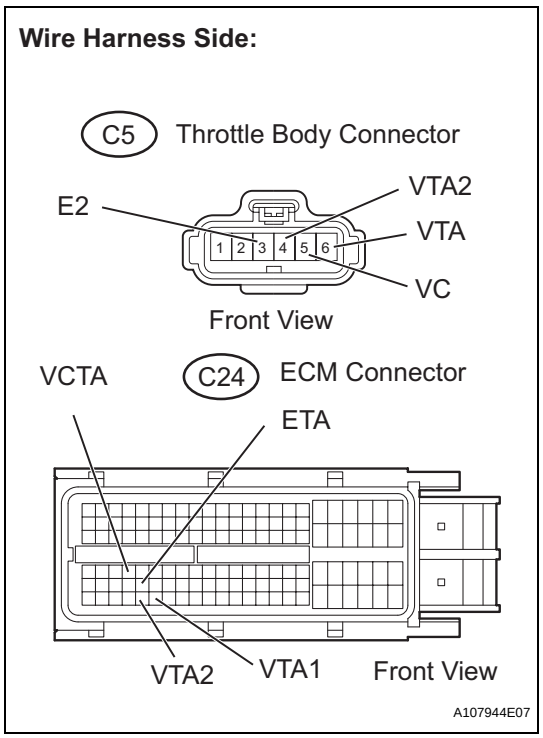
TP#1 (VTA1) When Accelerator Pedal Released	TP#2 (VTA2) When Accelerator Pedal Released	TP#1 (VTA1) When Accelerator Pedal Depressed	TP#2 (VTA2) When Accelerator Pedal Depressed	Trouble Area	Proceed to
0 V to 0.2 V	0 V to 0.2 V	0 V to 0.2 V	0 V to 0.2 V	VC circuit open	A
4.5 V to 5.0 V	4.5 V to 5.0 V	4.5 V to 5.0 V	4.5 V to 5.0 V	E2 circuit open	
0 V to 0.2 V, or 4.5 V to 5.0 V	2.4 V to 3.4 V (Fail-safe)	0 V to 0.2 V, or 4.5 V to 5.0 V	2.4 V to 3.4 V (Fail-safe)	VTA1 circuit open or ground short	
0.7 V to 1.3 V (Fail-safe)	0 V to 0.2 V, or 4.5 V to 5.0 V	0.7 V to 1.3 V (Fail-safe)	0 V to 0.2 V, or 4.5 V to 5.0 V	VTA2 circuit open or ground short	
0.5 V to 1.1 V	2.1 V to 3.1 V	3.3 V to 4.9 V (Not fail-safe)	4.6 V to 5.0 V (Not fail-safe)	TP sensor circuit normal	B

HINT:
TP#1 denotes THROTTLE POS #1, and TP#2 denotes THROTTLE POS #2.

B → Go to step 5

A

2 CHECK HARNESS AND CONNECTOR (THROTTLE POSITION SENSOR - ECM)



(a) Disconnect the C5 throttle body connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C5-5 (VC) - C24-67 (VCTA)	Below 1 Ω
C5-6 (VTA) - C24-115 (VTA1)	Below 1 Ω
C5-4 (VTA2) - C24-114 (VTA2)	Below 1 Ω
C5-3 (E2) - C24-91 (ETA)	Below 1 Ω

Standard resistance (Check for short)

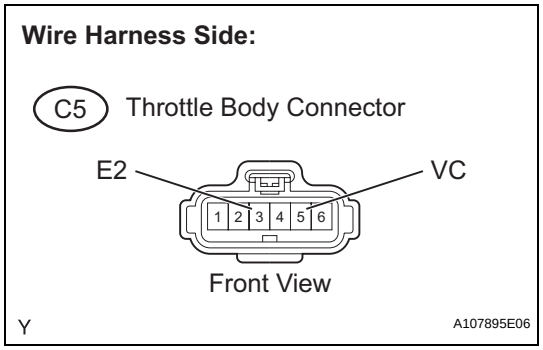
Tester Connection	Specified Condition
C5-5 (VC) or C24-67 (VCTA) - Body ground	10 kΩ or higher
C5-6 (VTA) or C24-115 (VTA1) - Body ground	10 kΩ or higher
C5-4 (VTA2) or C24-114 (VTA2) - Body ground	10 kΩ or higher

(d) Reconnect the throttle body connector.
(e) Reconnect the ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 INSPECT ECM (VC VOLTAGE)



(a) Disconnect the C5 throttle body connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminals of the throttle body connector.

Standard voltage

Tester Connection	Specified Condition
C5-5 (VC) - C5-3 (E2)	4.5 to 5.5 V

(d) Reconnect the throttle body connector.

NG → REPLACE ECM

OK

4	REPLACE THROTTLE BODY ASSEMBLY

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (THROTTLE POSITION SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Start the engine.
(e) Allow the engine to idle for 15 seconds or more.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P0120, P0122, P0123, P0220, P0222, P0223, and/or P2135	A
No output	B

B → SYSTEM OK

A

REPLACE ECM

DTC	P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem

HINT:
This DTC relates to the Throttle Position (TP) sensor.

DESCRIPTION

Refer to DTC P0120 (See page ES-117).

DTC No.	DTC Detection Condition	Trouble Area
P0121	Difference between VTA1 and VTA2 voltages less than 0.8 V, or more than 1.6 V for 2 seconds (1 trip detection logic)	TP sensor (built into throttle body)

ES

MONITOR DESCRIPTION

The ECM uses the TP sensor to monitor the throttle valve opening angle.
This sensor transmits two signals: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. The ECM performs several checks to confirm the proper operation of the TP sensor and VTA1.
For each throttle opening angle, a specific voltage difference is expected between the outputs of VTA1 and VTA2. If the output voltage difference between the two signals deviates from the normal operating range, the ECM interprets this as a malfunction of the TP sensor. The ECM illuminates the MIL and sets the DTC.
If the malfunction is not repaired successfully, the DTC is set 2 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0121: TP sensor rationality
Required Sensors/Components (Main)	TP sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	Within 2 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0120 - P0223, P2135 (TP sensor)
Either of the following conditions A or B is met	-
A. Ignition switch	ON
B. Electric throttle motor power	ON
TP sensor malfunction (P0120, P0122, P0123, P0220, P0222, P0223, P2135)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions A or B is met	-
Difference of the TP sensor voltage between VTA1 and VTA2 x 0.8	More than 1.6 V
Difference of the TP sensor voltage between VTA1 and VTA2 x 0.8	Less than 0.8 V

FAIL-SAFE

When this DTC, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0121)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0121	A
P0121 and other DTCs	B

B → GO TO DTC CHART

A → REPLACE THROTTLE BODY ASSEMBLY

DTC	P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control

DESCRIPTION

Refer to DTC P0115 (See page ES-108).

DTC No.	DTC Detection Condition	Trouble Area
P0125	Engine Coolant Temperature (ECT) does not reach closed-loop enabling temperature for 20 minutes (this period varies with engine start ECT) (2 trip detection logic)	• ECT sensor • Cooling system • Thermostat

MONITOR DESCRIPTION

The resistance of the ECT sensor varies in proportion to the actual ECT. The ECT supplies a constant voltage to the sensor and monitors the signal output voltage of the sensor. The signal voltage output varies according to changes in the resistance of the sensor. After the engine is started, the ECT is monitored through this signal. If the ECT sensor indicates that the engine is not yet warm enough for closed-loop fuel control, despite a specified period of time having elapsed since the engine was started, the ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.
Example:
The ECT is 0°C (32°F) at engine start. After about 1 minute running time, the ECT sensor still indicates that the engine is not warm enough to begin closed-loop fuel (air-fuel ratio feedback) control. The ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0125: Insufficient engine coolant temperature for closed-loop fuel control
Required Sensors/Components (Main)	Thermostat, cooling system
Required Sensors/Components (Related)	Engine coolant temperature sensor and mass air flow meter
Frequency of Operation	Once per driving cycle
Duration	Except PZEV: 62.94 seconds or more: Engine coolant temperature at engine start -8.34°C (17°F) or more 135.32 seconds or more: Engine coolant temperature at engine start -8.34 to -19.45°C (17 to -3°F) 20 minutes or more: Engine coolant temperature at engine start less than -19.45°C (-3°F) PZEV: 52.5 seconds or more: Engine coolant temperature at engine start -8.34°C (17°F) or more 97.56 seconds or more: Engine coolant temperature at engine start -8.34 to -19.45°C (17 to -3°F) 20 minutes or more: Engine coolant temperature at engine start less than -19.45°C (-3°F)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor)
Thermostat	OK

TYPICAL MALFUNCTION THRESHOLDS

Time until actual engine coolant temperature reaches closed-loop fuel control enabling temperature	Except PZEV: 62.94 seconds or more: Engine coolant temperature at engine start -8.34°C (17°F) or more 135.32 seconds or more: Engine coolant temperature at engine start -8.34 to -19.45°C (17 to -3°F) 20 minutes or more: Engine coolant temperature at engine start less than -19.45°C (-3°F) PZEV: 52.5 seconds or more: Engine coolant temperature at engine start -8.34°C (17°F) or more 97.56 seconds or more: Engine coolant temperature at engine start -8.34 to -19.45°C (17 to -3°F) 20 minutes or more: Engine coolant temperature at engine start less than -19.45°C (-3°F)

ES

WIRING DIAGRAM

Refer to DTC P0115 (See page ES-109).

INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0116, P0117 or P0118 are set simultaneously with DTC P0125, the Engine Coolant Temperature (ECT) sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0125)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0125	A
P0125 and other DTCs	B

HINT:
If any DTCs other than P0125 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-12).
(b) Check the valve opening temperature of the thermostat.
Standard value:
80 to 84°C (176 to 183°F)

HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

(c) Reinstall the thermostat (See page CO-13).

NG → **REPLACE THERMOSTAT**

OK

3	CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG → **REPAIR OR REPLACE COOLING SYSTEM**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

HINT:
This DTC relates to the thermostat.

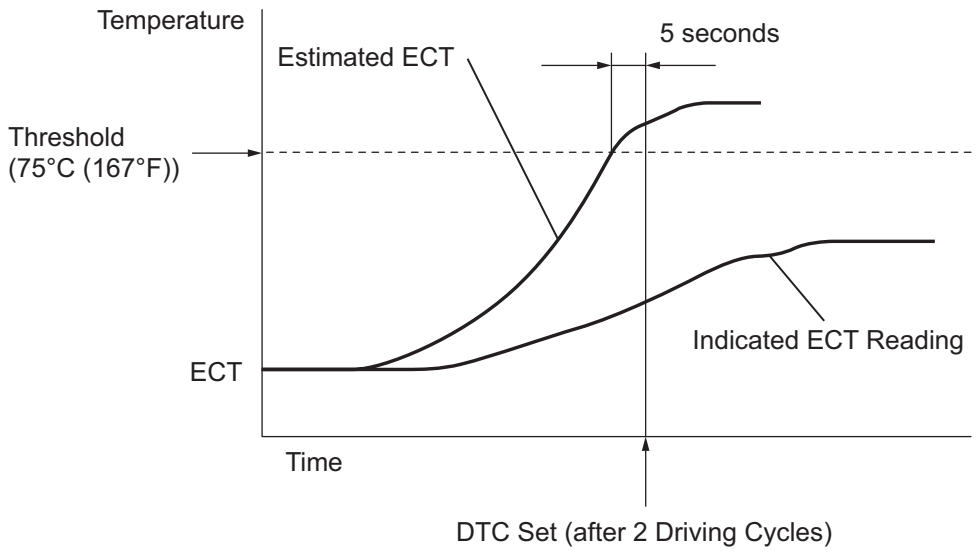
DESCRIPTION

This DTC is set when the Engine Coolant Temperature (ECT) does not reach 75°C (167°F) despite sufficient engine warm-up time having elapsed.

DTC No.	DTC Detection Condition	Trouble Area
P0128	Conditions (a), (b) and (c) are met for 5 seconds (2 trip detection logic): (a) Cold start (b) Engine warmed up (c) ECT less than 75°C (167°F)	• Thermostat • Cooling system • ECT sensor • ECM

ES

MONITOR DESCRIPTION



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The ECM estimates the ECT based on the starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT. When the estimated ECT reaches 75°C (167°F), the ECM checks the actual ECT. If the actual ECT is less than 75°C (167°F), the ECM interprets this as a malfunction in the thermostat or the engine cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0128: Coolant Thermostat
Required Sensors/Components (Main)	Thermostat

Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, Intake Air Temperature (IAT) sensor, Vehicle speed sensor
Frequency of Operation	Once per driving cycle
Duration	450 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0010 (VVT OCV) P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0031, P0032 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0500 (VSS) P2196 (A/F sensor - rationality) P2A00 (A/F sensor - slow response)
Battery voltage	11 V or more
Either of the following conditions 1 or 2 is met:	-
1. All of the following conditions are met:	-
• ECT at engine start - IAT at engine start	-15 to 7°C (-27 to 12.6°F)
• ECT at engine start	-10 to 56°C (14 to 133°F)
• IAT at engine start	-10 to 56°C (14 to 133°F)
2. All of the following conditions are met:	-
• ECT at engine start - IAT at engine start	More than 7°C (12.6°F)
• ECT at engine start	56°C (133°F) or less
• IAT at engine start	-10°C (14°F) or more
Accumulated time at 80 mph (128 km/h) or more	Less than 20 seconds

TYPICAL MALFUNCTION THRESHOLDS

Duration that both following conditions (a) and (b) are met	5 seconds or more
(a) Estimated ECT	75°C (167°F) or more
(b) ECT sensor output	Below 75°C (167°F)

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0128)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.

(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0128	A
P0128 and other DTCs	B

HINT:
If any DTCs other than P0128 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2 CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG → REPAIR OR REPLACE COOLING SYSTEM

OK

3 INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-12).
(b) Measure the valve opening temperature of the thermostat.
Standard value:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.
(c) Reinstall the thermostat (See page CO-13).

NG → REPLACE THERMOSTAT

OK

REPLACE ECM

DTC	**P0136**	**Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)**

DTC	**P0137**	**Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)**

DTC	**P0138**	**Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)**

DESCRIPTION

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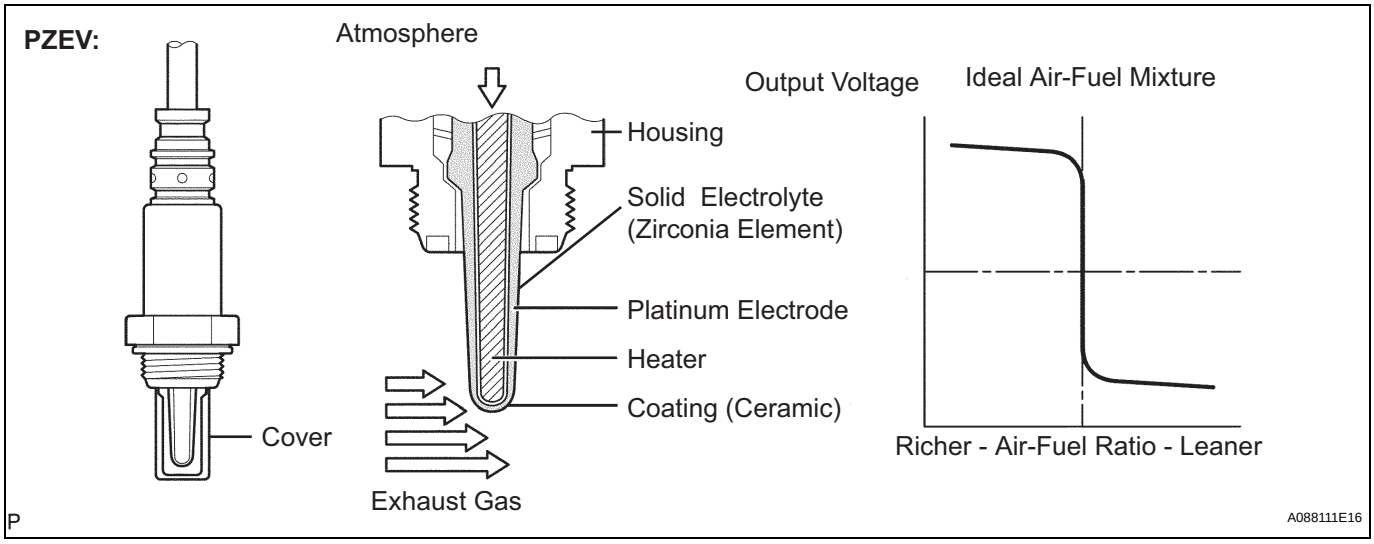
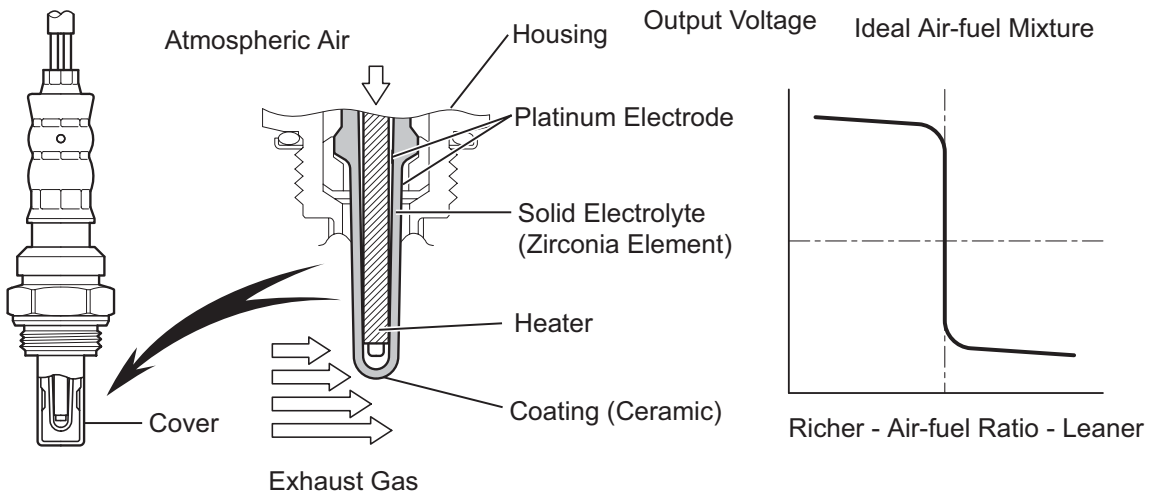
A three-way catalist converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxide (Nox) into less harmful substrances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio. For the purpose of helping the ECM to deliver accurate air-fuel ratio control, a Heated Oxygen (HO2) sensor is used.
The HO2 sensor is located behind the TWC, and detects the oxygen concentration in the exhaust gas. Since the sensor is integrated with the heater that heats the sensing portion, it is possible to detect the oxygen concentration even when the intake air volume is low (the exhaust gas temperature is low).
When the air-fuel ratio becomes lean, the oxygen concentration in the exhaust gas is rich. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is lean (low voltage, i.e. less than 0.45 V).
Conversely, when the air-fuel ratio is richer than the stoichiometric air-fuel level, the oxygen concentration in the exhaust gas becomes lean. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is rich (high voltage, i.e. more than 0.45 V). The HO2 sensor has the property of changing its output voltage drastically when the air-fuel ratio is close to the stoichiometric level.
The ECM uses the supplementary information from the HO2 sensor to determine whether the air-fuel ratio after the TWC is rich or lean, and adjusts the fuel injection time accordingly. Thus, if the HO2 sensor is working improperly due to internal malfunctions, the ECM is unable to compensate for deviations in the primary air-fuel ratio control.



Except PZEV:



P

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DTC No.	DTC Detection Condition	Trouble Area
P0136	• Abnormal voltage output: During active air-fuel ratio control, following conditions (a) and (b) are met for a certain period of time (2 trip detection logic): (a) Heated Oxygen (HO2) sensor voltage does not decrease to less than 0.59 V (b) HO2 sensor voltage does not increase to more than 0.21 V • Low impedance: Sensor impedance less than 5 Ω for more than 30 seconds when ECM presumes sensor to be warmed up and operating normally (2 trip detection logic)	• Open or short in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • HO2 sensor heater (sensor 2) • Air-fuel Ratio (A/F) sensor (sensor 1) • Engine room J/B (EFI relay) • Gas leakage from exhaust system
P0137	• Low voltage (open): During active air-fuel ratio control, following conditions (a) and (b) are met for a certain period of time (2 trip detection logic): (a) HO2 sensor voltage output less than 0.21 V (b) Target air-fuel ratio rich • High impedance: Sensor impedance 15 kΩ or more for more than 90 seconds when ECM presumes sensor to be warmed up and operating normally (2 trip detection logic)	• Open in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • HO2 sensor heater (sensor 2) • Engine room J/B (EFI relay) • Gas leakage from exhaust system
P0138	• High voltage (short): During active air-fuel ratio control, following conditions (a) and (b) are met for a certain period of time (2 trip detection logic): (a) HO2 sensor voltage output more than 0.59 V (b) Target air-fuel ratio lean • Extremely high voltage (short): HO2 sensor voltage output exceeds 1.2 V for more than 10 seconds (2 trip detection logic)	• Short in HO2 sensor (sensor 2) circuit • HO2 sensor (sensor 2) • ECM internal circuit malfunction

MONITOR DESCRIPTION

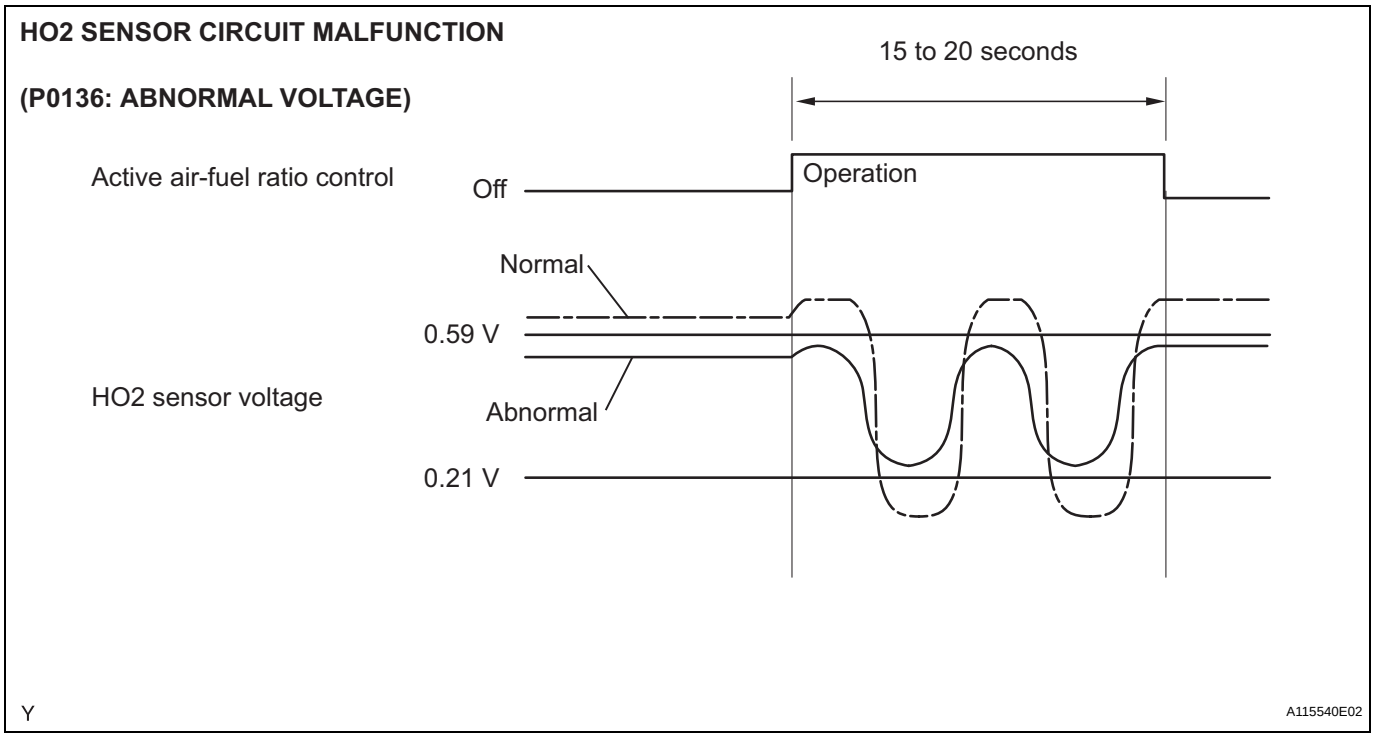
Active Air-Fuel Ratio Control:

The ECM usually performs air-fuel ratio feedback control so that the Air-Fuel Ratio (A/F) sensor output indicates a near stoichiometric air-fuel level. This vehicle includes active air-fuel ratio control in addition to regular air-fuel ratio control. The ECM performs active air-fuel ratio control to detect any deterioration in the Three-Way Catalytic Converter (TWC) and Heated Oxygen (HO2) sensor malfunctions (refer to the diagram below).

Active air-fuel ratio control is performed for approximately 15 to 20 seconds while driving with a warm engine. During active air-fuel ratio control, the air-fuel ratio is forcibly regulated to become lean or rich by the ECM. If the ECM detects a malfunction, one of the following DTCs is set: DTC P0136 (abnormal voltage output), P0137 (open circuit) and P0138 (short circuit).

Abnormal Voltage Output of HO2 Sensor (DTC P0136):

While the ECM is performing active air-fuel ratio control, the air-fuel ratio is forcibly regulated to become rich or lean. If the sensor is not functioning properly, the voltage output variation is small. For example, when the HO2 sensor voltage does not decrease to less than 0.21 V and does not increase to more than 0.59 V during active air-fuel ratio control, the ECM determines that the sensor voltage output is abnormal and sets DTC P0136.



Open or Short in Heated Oxygen (HO2) Sensor Circuit (DTC P0137 or P0138):

During active air-fuel ratio control, the ECM calculates the Oxygen Storage Capacity (OSC)* of the Three-Way Catalytic Converter (TWC) by forcibly regulating the air-fuel ratio to become rich or lean. If the HO2 sensor has an open or short, or the voltage output of the sensor decreases significantly, the OSC indicates an extraordinarily high value. Even if the ECM attempts to continue regulating the air-fuel ratio to become rich or lean, the HO2 sensor output does not change.

While performing active air-fuel ratio control, when the target air-fuel ratio is rich and the HO2 sensor voltage output is 0.21 V or less (lean), the ECM interprets this as an abnormally low sensor output voltage and sets DTC P0137. When the target air-fuel ratio is lean and the voltage output is 0.59 V or more (rich) during active air-fuel ratio control, the ECM determines that the sensor voltage output is abnormally high, and sets DTC P0138.

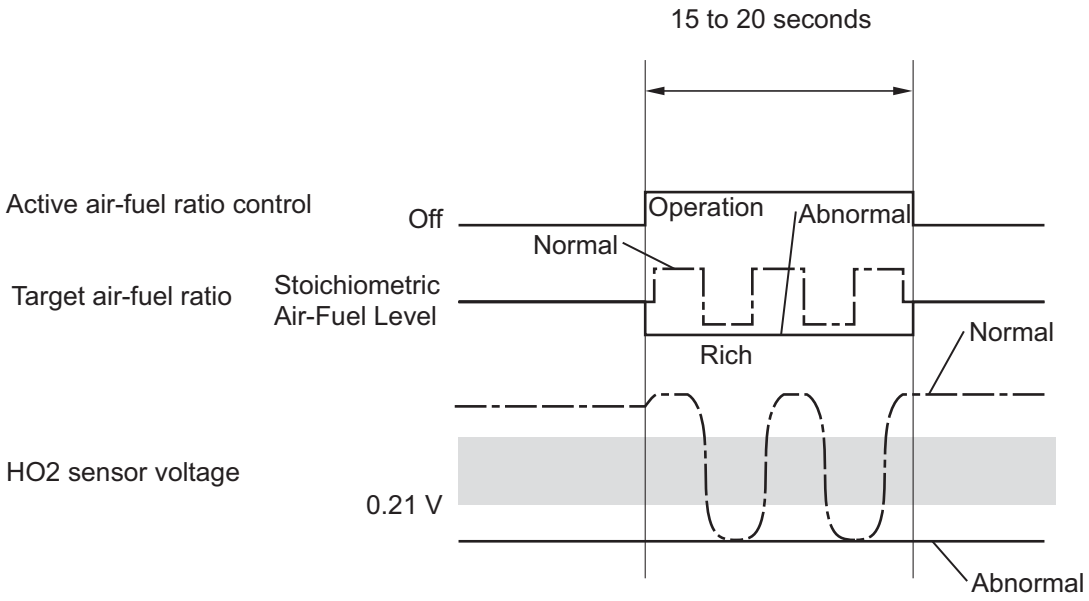
HINT:

DTC P0138 is also set if the HO2 sensor voltage output is more than 1.2 V for 10 seconds or more.

*: The TWC has the capability to store oxygen. The OSC and the emission purification capacity of the TWC are mutually related. The ECM determines whether the catalyst has deteriorated based on the calculated OSC value (See page ES-196).

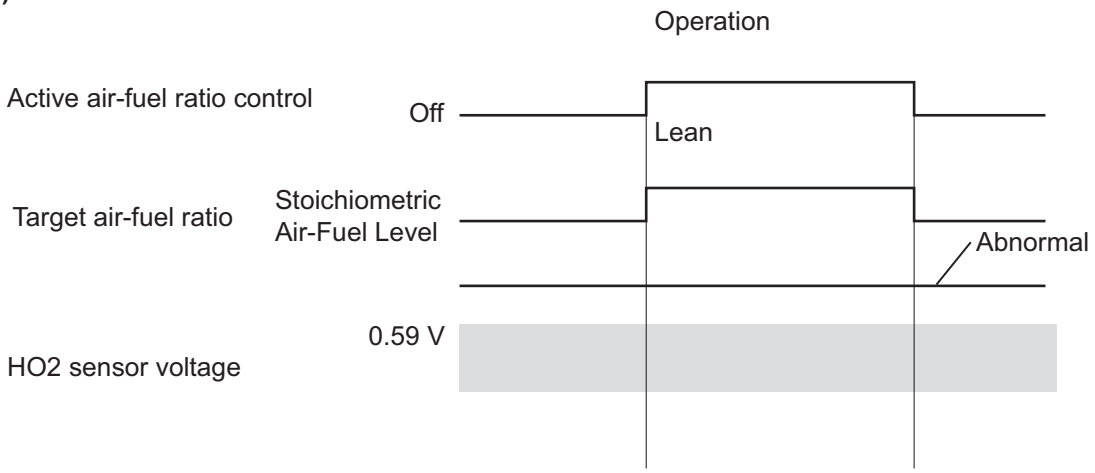
HO2 SENSOR CIRCUIT LOW VOLTAGE

(P0137: OPEN)



HO2 SENSOR CIRCUIT HIGH VOLTAGE

(P0138: SHORT)



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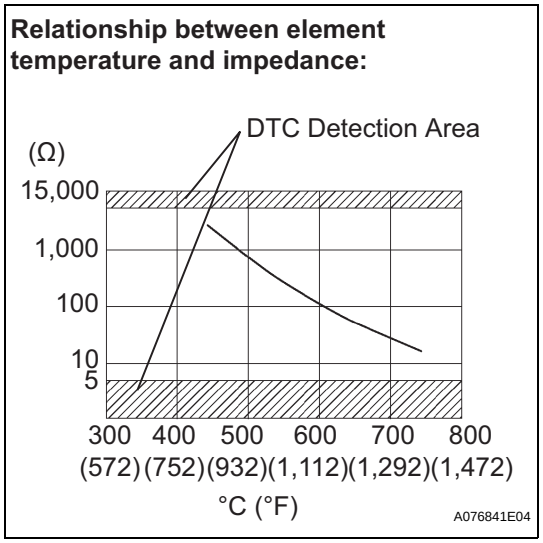
High or Low Impedance of Heated Oxygen (HO2) Sensor (DTC P0136 or P0137):



During normal air-fuel ratio feedback control, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variations in the HO2 sensor signal while the engine is running, the impedance* of the sensor is measured by the ECM. The ECM determines that there is a malfunction in the sensor when the measured impedance deviates from the standard range.
*: The effective resistance in an alternating current electrical circuit.
HINT:

- The impedance cannot be measured using an ohmmeter.
- DTC P0136 indicates the deterioration of the HO2 sensor. The ECM sets this DTC by calculating the impedance of the sensor when the typical enabling conditions are satisfied (2 driving cycles).
- DTC P0137 indicates an open or short circuit in the HO2 sensor (2 driving cycles). The ECM sets this DTC when the impedance of the sensor exceeds the threshold 15 kΩ.

MONITOR STRATEGY

Related DTCs	P0136: Heated oxygen sensor output voltage (Abnormal voltage output) P0136: Heated oxygen sensor impedance (Low) P0137: Heated oxygen sensor output voltage (Low voltage) P0137: Heated oxygen sensor impedance (High) P0138: Heated oxygen sensor output voltage (High voltage) P0138: Heated oxygen sensor output voltage (Extremely high)
Required Sensors/Components (Main)	Heated oxygen sensor
Required Sensors/Components (Related)	Crankshaft position sensor, engine coolant temperature sensor, mass air flow meter and throttle position sensor
Frequency of Operation	Once per driving cycle: Active air-fuel ratio control detection Continuous: Other
Duration	20 seconds: Heated oxygen sensor output voltage (Abnormal voltage output, High voltage and Low voltage) 90 seconds: Heated oxygen sensor impedance (High) 30 seconds: Heated oxygen sensor impedance (Low) 10 seconds: Output voltage (Stuck high)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	P0031, P0032 (A/F Sensor heater - Sensor 1) P0037, P0038 (O2 Sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0451 - P0456, P2401 - P2420 (EVAP system) P0500 (VSS) P2196 (A/F Sensor - rationality) P2A00 (A/F Sensor - slow response)

ES

Heated Oxygen Sensor Output Voltage (Abnormal Voltage Output, High Voltage and Low Voltage):

Active air-fuel ratio control	Performing
Active air-fuel ratio control is performed when the following conditions are met:	-
Battery voltage	11 V or more
Engine coolant temperature	75°C (167°F) or more
Idling	OFF
Engine RPM	Less than 4,000 rpm
A/F sensor status	Activated
Fuel system status	Closed loop
Fuel cut	OFF
Engine load	10 to 80 %
Shift position	4th (Automatic Transaxle) 3rd or more (Manual Transaxle)

Heated Oxygen Sensor Impedance (Low):

Battery voltage	11 V or more
Estimated rear HO2 sensor temperature	Less than 700°C (1,292°F)
ECM monitor	Completed
DTC P0606	Not set

Heated Oxygen Sensor Impedance (High):

Battery voltage	11 V or more
Estimated rear HO2 sensor temperature	450°C (842°F) or more
DTC P0606	Not present

Heated Oxygen Sensor Output Voltage (Extremely High):

Battery voltage	11 V or more
Time after engine start	2 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

Heated Oxygen Sensor Output Voltage (Abnormal Voltage Output):

Either of the following conditions is met:	1 or 2
1. All of the following conditions (a), (b) and (c) are met	-
(a) Commanded air-fuel ratio	14.3 or less
(b) Rear HO2 sensor voltage	0.21 to 0.59 V
(c) OSC (Oxygen Storage Capacity of Catalyst)	2 g or more
2. All of the following conditions (d), (e) and (f) are met	-

(d) Commanded air-fuel ratio	14.9 or more
(e) Rear HO2 sensor voltage	0.21 to 0.59 V
(f) OSC	2 g or more

Heated Oxygen Sensor Output Voltage (Low):

All of the following conditions (a), (b) and (c) are met	-
(a) Commanded air-fuel ratio	14.3 or less
(b) Rear HO2 sensor voltage	Less than 0.21 V
(c) OSC	2 g or more

Heated Oxygen Sensor Output Voltage (High):

All of the following conditions (a), (b) and (c) are met	-
(a) Commanded air-fuel ratio	14.9 or more
(b) Rear HO2 sensor voltage	More than 0.59 V
(c) OSC	2 g or more

Heated Oxygen Sensor Impedance (Low):

Duration of the following condition is met	30 seconds or more
Rear HO2 sensor impedance	Less than 5 Ω

Heated Oxygen Sensor Impedance (High):

Duration of the following condition is met	90 seconds or more
Rear HO2 sensor impedance	15 kΩ or more

Heated Oxygen Sensor Output Voltage (Extremely High):

Duration of the following condition is met	10 seconds or more
Rear HO2 sensor voltage	1.2 V or more

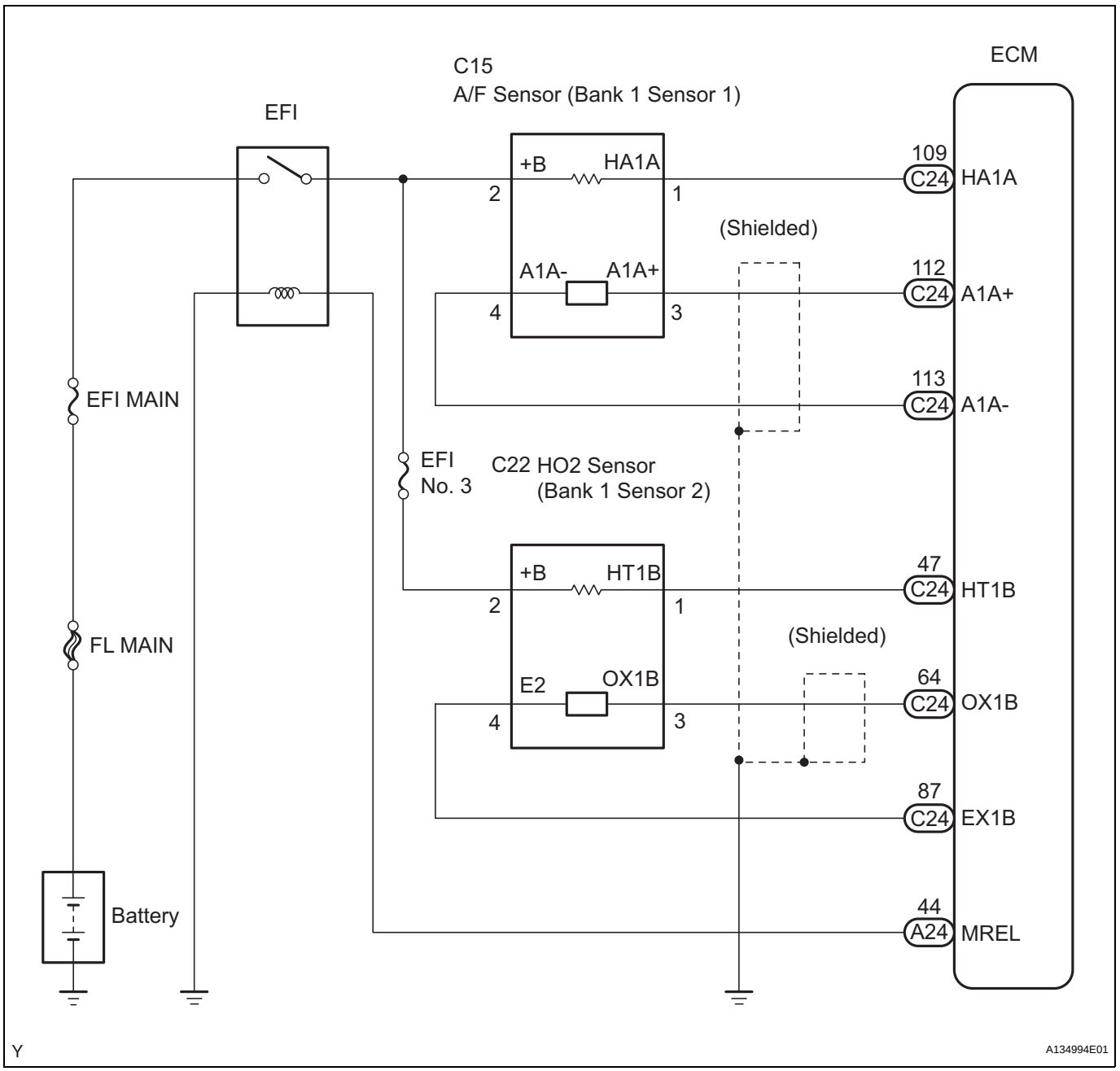
COMPONENT OPERATING RANGE

Duration of the following condition is met	30 seconds or more
Heated oxygen sensor voltage	Varies between 0.1 and 0.9 V

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

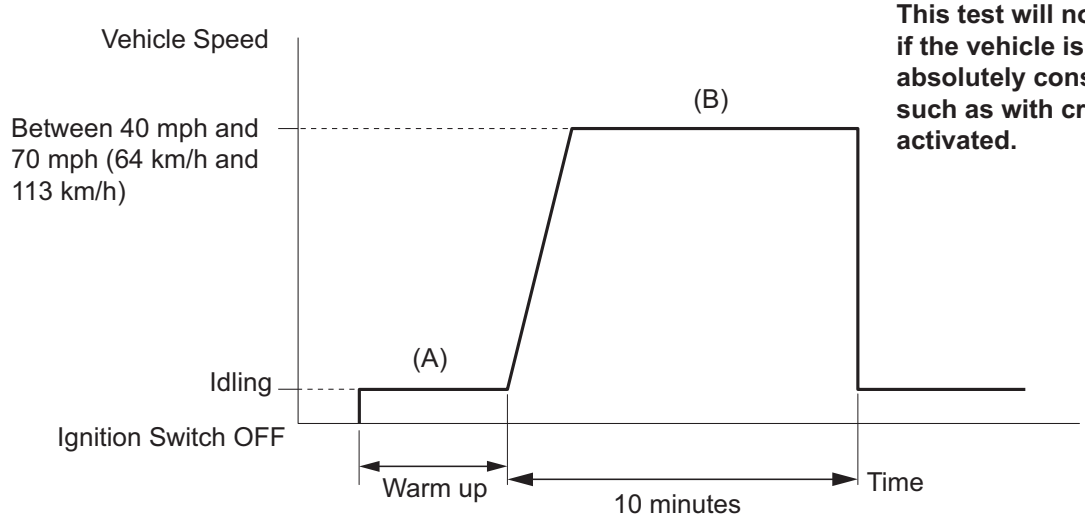
WIRING DIAGRAM



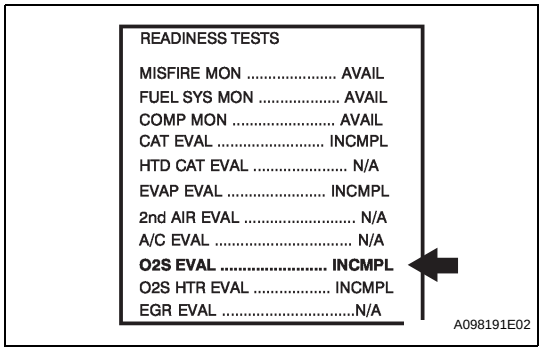
CONFIRMATION DRIVING PATTERN

HINT:

- This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.
- Performing this confirmation pattern will activate the Heated Oxygen (HO2) sensor monitor. (The catalyst monitor is performed simultaneously.) This is very useful for verifying the completion of the repair.



1. Connect the intelligent tester to the DLC3.



2. Turn the ignition switch to the ON position.
3. Turn the tester on.
4. Clear the DTCs (if set) (See page ES-38).
5. Select the following menu items: DIAGNOSIS / CARB OBD II / READINESS TESTS.
6. Check that O2S EVAL is INCMPL (incomplete).
7. Start the engine and warm it up. (Proceed "A")
8. Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes. (Proceed "B")
9. Note the state of the Readiness Tests items. Those items will change to COMPL (complete) as the O2S EVAL monitor operates.
10. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.

HINT:
If O2S EVAL does not change to COMPL, and any pending DTCs fail to set, extend the driving time.

INSPECTION PROCEDURE

HINT:
Sensor 2 refers to the sensor mounted behind the Three-Way Catalytic Converter (TWC) and located far from the engine assembly.
HINT:
Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.
(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.

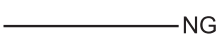
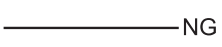
ES

HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1 S1 (A/F)	+25 %	Rich	Less than 3.0
	-12.5 %	Lean	More than 3.35
O2S B1 S2 (HO2)	+25 %	Rich	More than 0.5
	-12.5 %	Lean	Less than 0.4

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction	NG	Output Voltage Almost no reaction	NG	

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; then press the YES button and then the ENTER button followed by the F4 button.
HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the OX1B wire from the ECM connector is short-circuited to the +B wire, DTC P0138 will be set.

ES

1	READ OUTPUT DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0138	A
P0137	B
P0136	C

B → Go to step 14

C → Go to step 7

A

2	READ VALUE USING INTELLIGENT TESTER (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1 S2.
(d) Allow the engine to idle.
(e) Read the Heated Oxygen (HO2) sensor output voltage while idling.

Result

HO2 Sensor Output Voltages	Proceed to
More than 1.2 V	A
Less than 1.0 V	B

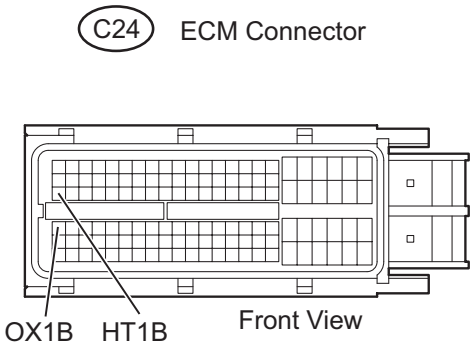
B → Go to step 5

A

3 CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT)

ES

Wire Harness Side:



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(a) Turn the ignition switch off and wait for 5 minutes.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
C24-47 (HT1B) - C24-64 (OX1B)	10 kΩ or higher

(d) Reconnect the ECM connector.

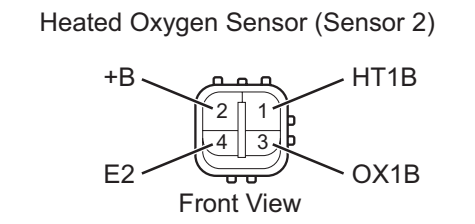
NG → Go to step 4

OK

REPLACE ECM

4 INSPECT HEATED OXYGEN SENSOR (CHECK FOR SHORT)

Component Side :



A115661E01

(a) Disconnect the C22 HO2 sensor connector.
(b) Measure the resistance.
Standard resistance

Tester Connection	Specified Condition
1 (HT1B) - 2 (+B)	11 to 16 Ω at 20°C (68°F)
2 (+B) - 3 (OX1B)	10 kΩ or higher

(c) Reconnect the HO2 sensor connector.

NG → REPLACE HEATED OXYGEN SENSOR

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

5	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

6	CHECK WHETHER DTC OUTPUT RECURS (DTC P0138)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P0138	A
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

REPLACE HEATED OXYGEN SENSOR

7	READ VALUE USING INTELLIGENT TESTER (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Start the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1 S2.
(e) After warming up the engine, run the engine at an engine speed of 2,500 rpm for 3 minutes.
(f) Read the output voltage of the HO2 sensor when the engine rpm is suddenly increased.
HINT:
Quickly accelerate the engine to 4,000 rpm 3 times using the accelerator pedal.
Standard voltage:
Fluctuates between 0.4 V or less and 0.5 V or more.

NG → Go to step 14

OK

8	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

9	CHECK WHETHER DTC OUTPUT RECURS (DTC P0136)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P0136	A
No output	B

B → CHECK FOR INTERMITTENT PROBLEMS

A

10	REPLACE HEATED OXYGEN SENSOR

NEXT

11	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

12	CHECK WHETHER DTC OUTPUT RECURS (DTC P0136)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

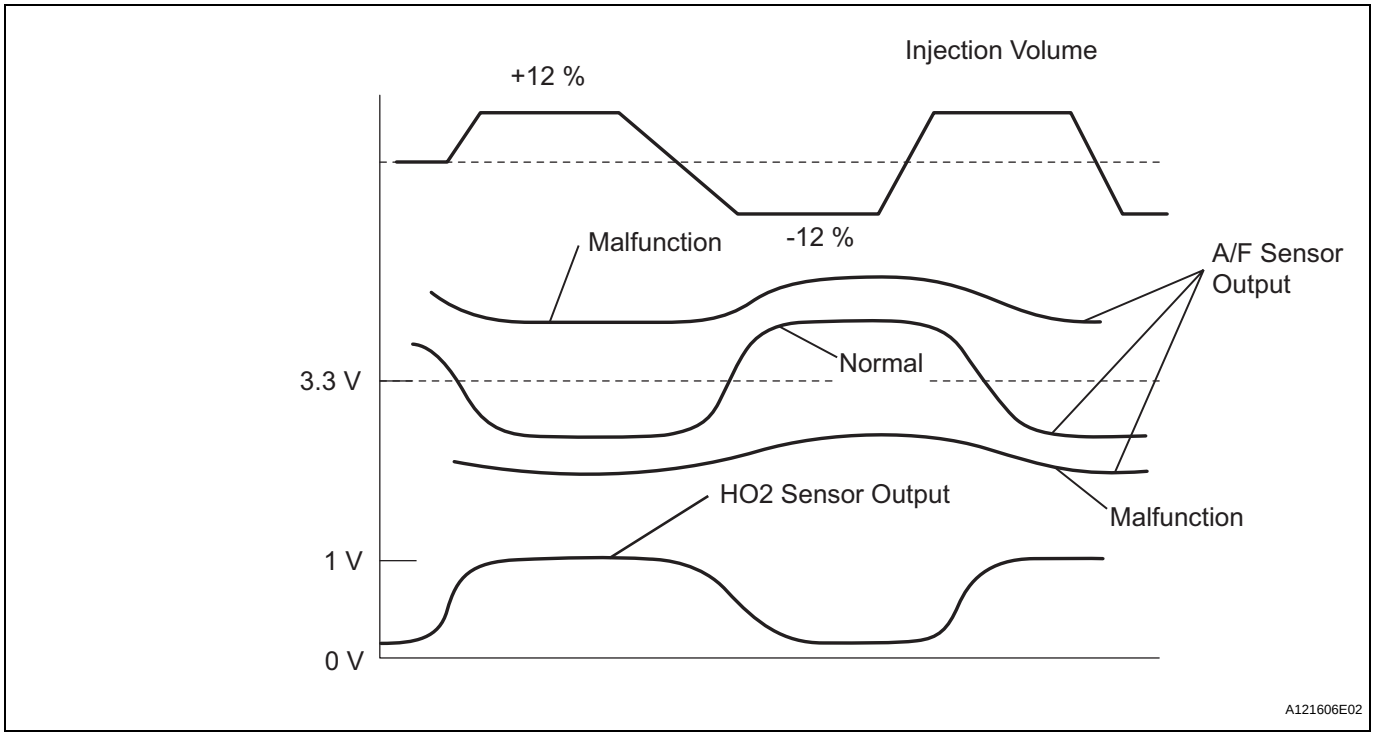
Result

Display (DTC Output)	Proceed to
P0136	A
No output	B

B → END

A

13	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (INJECTION VOLUME)



(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INJ VOL.
(e) Change the fuel injection volume using the tester, and monitor the voltage output of Air-Fuel Ratio (A/F) and HO2 sensors displayed on the tester.

HINT:

- Change the fuel injection volume within the range of -12 % and +12 %. The injection volume can be changed in 1 % graduations within the range.
- The A/F sensor is displayed as AFS B1 S1, and the HO2 sensor is displayed as O2S B1 S2, on the intelligent tester.

Result

Tester Display (Sensor)	Voltage Variations	Proceed to
AFS B1 S1 (A/F)	Alternates between more and less than 3.3 V	OK
	Remains at more than 3.3 V	NG
	Remains at less than 3.3 V	NG

HINT:
A normal HO2 sensor voltage (O2S B1 S2) reacts in accordance with increases and decreases in fuel injection volumes. When the A/F sensor voltage remains at either less or more than 3.3 V despite the HO2 sensor indicating a normal reaction, the A/F sensor is malfunctioning.

NG → REPLACE AIR-FUEL RATIO SENSOR

OK

CHECK AND REPAIR EXTREMELY RICH OR LEAN ACTUAL AIR-FUEL RATIO (INJECTOR, FUEL PRESSURE, GAS LEAKAGE FROM EXHAUST SYSTEM, ETC.)

14	CHECK FOR EXHAUST GAS LEAKAGE

OK:
No gas leakage.

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

15	INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE) (See page ES-90)

NG → REPLACE HEATED OXYGEN SENSOR

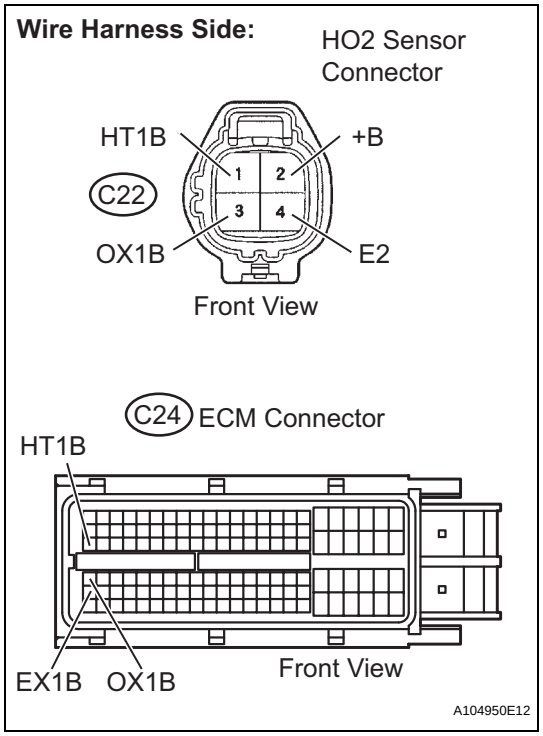
OK

16	INSPECT ENGINE ROOM J/B (EFI RELAY) (See page ES-85)

NG → REPLACE ENGINE ROOM J/B

OK

17 CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM)



(a) Disconnect the C22 HO2 sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the +B terminal of the HO2 sensor connector and body ground.

Standard voltage

Tester Connection	Specified Condition
C22-2 (+B) - Body ground	9 to 14 V

(d) Turn the ignition switch off.
(e) Disconnect the C24 ECM connector.
(f) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

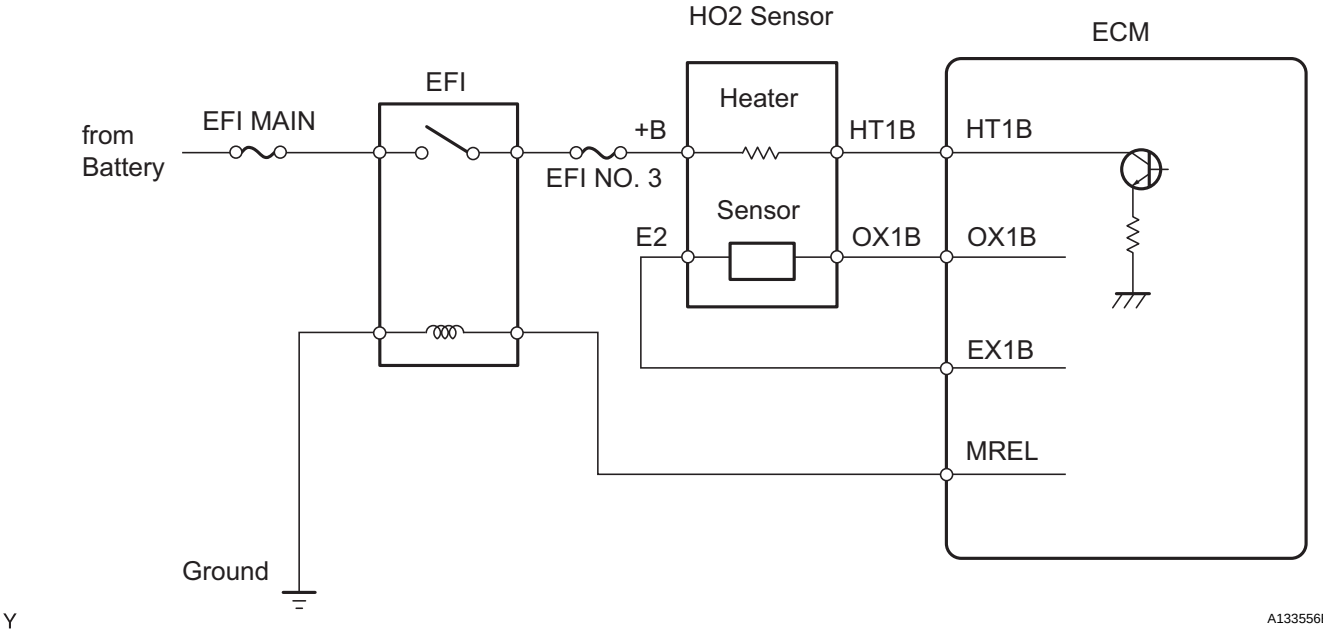
Tester Connection	Specified Condition
C22-1 (HT1B) - C24-47 (HT1B)	Below 1 Ω
C22-3 (OX1B) - C24-64 (OX1B)	Below 1 Ω
C22-4 (E2) - C24-87 (EX1B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C22-1 (HT1B) or C24-47 (HT1B) - Body ground	10 kΩ or higher
C22-3 (OX1B) or C24-64 (OX1B) - Body ground	10 kΩ or higher
C22-4 (E2) or C24-87 (EX1B) - Body ground	10 kΩ or higher

(g) Reconnect the HO2 sensor connector.
(h) Reconnect the ECM connector.

Reference (System Diagram of Sensor 2):



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HEATED OXYGEN SENSOR

DTC	P0171	System Too Lean (Bank 1)

DTC	P0172	System Too Rich (Bank 1)

DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim consists of both the short-term and the long-term fuel trims.

The short-term fuel trim is fuel compensation that is used to constantly maintain the air-fuel ratio at stoichiometric levels. The signal from the Air-Fuel Ratio (A/F) sensor indicates whether the air-fuel ratio is rich or lean compared to the stoichiometric ratio. This triggers a reduction in the fuel injection volume if the air-fuel ratio is rich and an increase in the fuel injection volume if it is lean.

Factors such as individual engine differences, wear over time and changes in operating environment cause short-term fuel trim to vary from the central value. The long-term fuel trim, which controls overall fuel compensation, compensates for long-term deviations in the fuel trim from the central value caused by the short-term fuel trim compensation.

If both the short-term and long-term fuel trims are lean or rich beyond predetermined values, it is interpreted as a malfunction, and the ECM illuminates the MIL and sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0171	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to lean side (2 trip detection logic)	• Air induction system • Injector blockage • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Fuel pressure • Gas leakage from exhaust system • Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Engine room J/B (EFI relay) • A/F sensor heater and EFI relay circuits • PCV valve and hose • PCV hose connections • ECM
P0172	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to rich side (2 trip detection logic)	• Injector leakage or blockage • MAF meter • ECT sensor • Ignition system • Fuel pressure • Gas leakage from exhaust system • Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Engine room J/B (EFI relay) • A/F sensor heater and EFI relay circuits • ECM

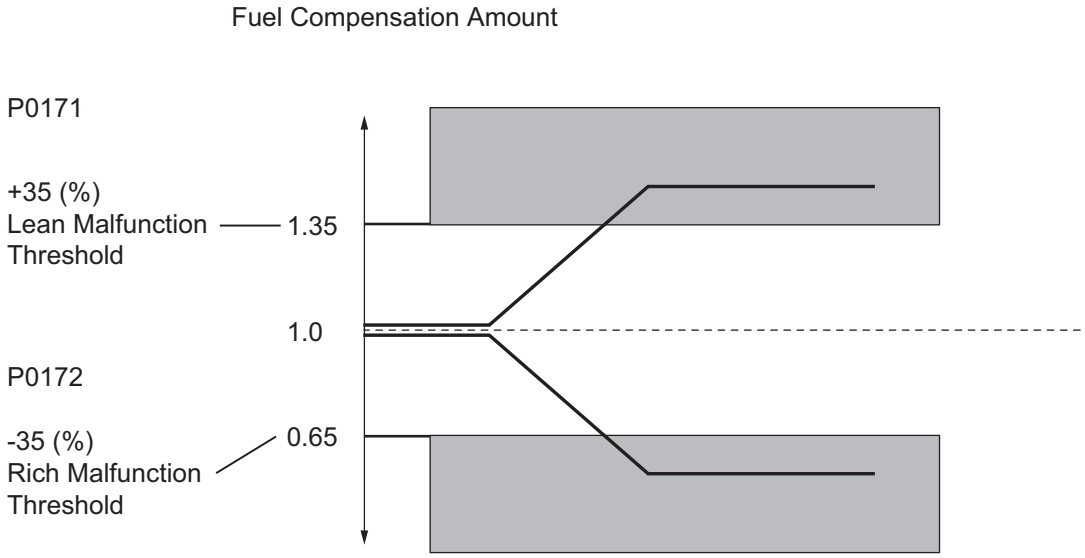
HINT:

- When DTC P0171 is set, the actual air-fuel ratio is on the lean side. When DTC P0172 is set, the actual air-fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air-fuel ratio is lean and DTC P0171 may be set. The MIL is then illuminated.
- When the total of the short-term and long-term fuel trim values is within 20 % (and the engine coolant temperature is more than 75°C [167°F]), the system is functioning normally.

MONITOR DESCRIPTION

Under closed-loop fuel control, fuel injection volumes that deviate from those estimated by the ECM cause changes in the long-term fuel trim compensation value. The long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. Deviations from the ECM's estimated fuel injection volumes also affect the average fuel trim learning value, which is a combination of the average short-term fuel trim (fuel feedback compensation value) and the average long-term fuel trim (learning value of the air-fuel ratio). If the average fuel trim learning value exceeds the malfunction threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.
Example:
The average fuel trim learning value is +35 % or more or -35 % or less, the ECM interprets this as a fuel system malfunction.

ES



MONITOR STRATEGY

Related DTCs	P0171: Fuel trim lean P0172: Fuel trim rich
Required Sensors/Components (Main)	Fuel system
Required Sensors/Components (Related)	A/F sensor, Mass air flow meter, Crankshaft position sensor
Frequency of Operation	Continuous
Duration	Within 10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0010 (VVT OCV) P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0031, P0032 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0500 (VSS)
Fuel system status	Closed loop
Battery voltage	11 V or more
Either of the following conditions 1 or 2 is met	-
1. Engine RPM	Below 1,100 rpm
2. Intake air amount per revolution	0.22 g/rev or more
Catalyst monitor	Not executed

ES

TYPICAL MALFUNCTION THRESHOLDS

EVAP purge-cut	Executing
Either of the following conditions 1 or 2 is met	-
1. Average of short-term fuel trim and long-term fuel trim	35 % or more (varies with ECT)
2. Average of short-term fuel trim and long-term fuel trim	-35 % or less (varies with ECT)

WIRING DIAGRAM

Refer to DTC P2195 (See page ES-312).

INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0171 OR P0172)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0171 or P0172	A
P0171 or P0172 and other DTCs	B

HINT:
If any DTCs other than P0171 or P0172 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (A/F CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the output voltages of the A/F and HO2 sensors (AFS B1S1 and O2S B1S2) displayed on the tester.

Result:

The A/F sensor reacts in accordance with increases and decreases in the fuel injection volume:
+25 % = Rich output:
Less than 3.0 V
-12.5 % = Lean output:
More than 3.35 V

NOTICE:

The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
3	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		Extremely rich or lean actual air-fuel ratio • Injector leakage or blockage • Gas leakage from exhaust system • Fuel pressure • MAF meter • ECT sensor • Air induction system • PCV hose connections
Output Voltage Almost no reaction ——— NG		Output Voltage Almost no reaction		——— NG	

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.

To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2; then press the YES button and then the ENTER button followed by the F4 button.

ES

Result

Result	Proceed to
Case 1	C
Case 2	B
Case 3	A

B → **Go to step 11**

C → **Go to step 15**

A

3	READ VALUE USING INTELLIGENT TESTER (MAF)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF and COOLANT TEMP.
(d) Allow the engine to idle until the COOLANT TEMP reaches 75°C (167°F) or more.
(e) Read the MAF with the engine in an idling condition and at an engine speed of 2,500 rpm.

Standard:

MAF while engine idling:
Between 1 g/sec. and 3 g/sec. (shift position: N, A/C: OFF).

MAF at an engine speed of 2,500 rpm:
Between 2 g/sec. and 6 g/sec. (shift position: N, A/C: OFF).

NG → **REPLACE MASS AIR FLOW METER**

OK

4	READ VALUE USING INTELLIGENT TESTER (COOLANT TEMP)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(d) Read the COOLANT TEMP twice, when the engine is both cold and warmed up.
Standard:
With cold engine:
Same as ambient air temperature.
With warm engine:
Between 75°C and 100°C (167°F and 212°F).

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

OK

5	CHECK PCV HOSE CONNECTIONS

(a) Check for PCV hose connections.
OK:
PCV hose is connected correctly and is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

6	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

7	CHECK FOR SPARKS AND IGNITION (See page ES-172)

NG → **REPAIR OR REPLACE IGNITION SYSTEM**

OK

8	CHECK FOR EXHAUST GAS LEAKAGE

(a) Check for exhaust gas leakage.
OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST SYSTEM**

OK ↓

9	CHECK FUEL PRESSURE

(a) Check the fuel pressure (See page FU-9).
Standard pressure:
304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK ↓

10	INSPECT FUEL INJECTOR (INJECTION AND VOLUME)

(a) Check the injection volume (See page FU-14).
Standard injection volume:
76 to 92 cm^3 (4.6 to 5.6 cu in.) per 15 seconds

NG → **REPLACE FUEL INJECTOR**

OK ↓

11	INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE) (See page ES-84)

NG → **REPLACE AIR-FUEL RATIO SENSOR**

OK ↓

12	INSPECT ENGINE ROOM J/B (EFI RELAY) (See page ES-85)

NG → **REPLACE ENGINE ROOM J/B**

OK ↓

13	CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM) (See page ES-325)

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

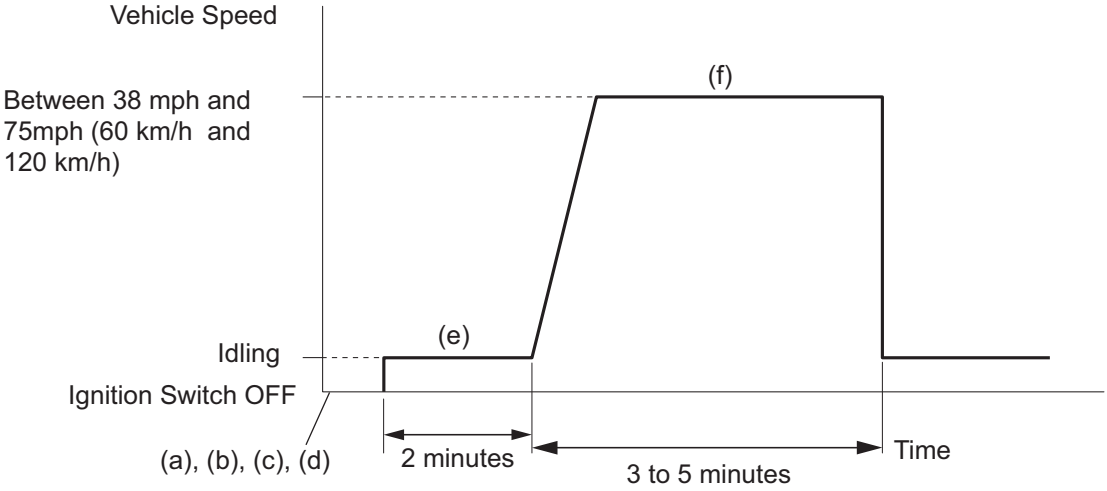
OK ↓

ES

14	REPLACE AIR-FUEL RATIO SENSOR

NEXT

15	PERFORM CONFIRMATION DRIVING PATTERN



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Switch the ECM from normal mode to check mode using the tester (See page ES-41).
(e) Start the engine and warm it up with all the accessories switched OFF.
(f) Drive the vehicle at between 38 mph and 75 mph (60 km/h and 120 km/h) and at an engine speed of between 1,400 rpm and 3,200 rpm for 3 to 5 minutes.

HINT:
If the system is still malfunctioning, the MIL will be illuminated during step (f).

NOTICE:
If the conditions in this test are not strictly followed, no malfunction will be detected.

NEXT

16	CHECK WHETHER DTC OUTPUT RECURS (DTC P0171 OR P0172)

(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0171 or P0172	B

B → Go to step 3

A → END

DTC	P0300	Random / Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

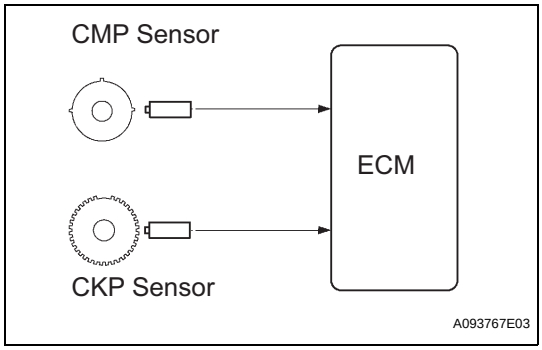
DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

ES

DESCRIPTION



When the engine misfires, high concentrations of hydrocarbons (HC) enter the exhaust gas. Extremely high HC concentration levels can cause increases in exhaust emission levels. High concentrations of HC can also cause increases in the Three-Way Catalytic Converter (TWC) temperature, which may cause damage to the TWC. To prevent these increases in emissions and to limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the TWC reaches the point of thermal degradation, the ECM blinks the MIL. To monitor misfires, the ECM uses both the Camshaft Position (CMP) sensor and the Crankshaft Position (CKP) sensor. The CMP sensor is used to identify any misfiring cylinders and the CKP sensor is used to measure variations in the crankshaft rotation speed. Misfires are counted as when the crankshaft rotation speed variations exceed predetermined thresholds. If the misfire rate exceeds the threshold level, and could cause emission deterioration, the ECM illuminates the MIL and sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0300	Simultaneous misfiring of several cylinders detected (2 trip detection logic)	• Open or short in engine wire harness • Connector connection • Vacuum hose connections • Ignition system • Injector • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Compression pressure • Valve clearance • Valve timing • PCV valve and hose • PCV hose connections • Air induction system • ECM
P0301 P0302 P0303 P0304	Misfiring of specific cylinder detected (2 trip detection logic)	

When DTCs for misfiring cylinders are randomly set, but DTC P0300 is not set, it indicates that misfires have been detected in different cylinders at different times. DTC P0300 is only set when several misfiring cylinders are detected at the same time.

MONITOR DESCRIPTION

The ECM illuminates the MIL and sets a DTC when either of the following conditions, which could cause emission deterioration, is detected (2 trip detection logic).

- Within the first 1,000 crankshaft revolutions of the engine starting, an excessive misfiring rate (approximately 20 to 50 misfires per 1,000 crankshaft revolutions) occurs once.
- After the first 1,000 crankshaft revolutions, an excessive misfiring rate (approximately 20 to 50 misfires per 1,000 crankshaft revolutions) occurs 4 times in sequential crankshaft revolutions.

The ECM flashes the MIL and sets a DTC when either of the following conditions, which could cause Three-Way Catalytic Converter (TWC) damage, is detected (2 trip detection logic).

- In every 200 crankshaft revolutions at a high engine rpm, the threshold misfiring percentage is recorded once.
- In every 200 crankshaft revolutions at a normal engine rpm, the threshold misfiring percentage is recorded 3 times.

MONITOR STRATEGY

Related DTCs	P0300: Multiple cylinder misfire P0301: Cylinder 1 misfire P0302: Cylinder 2 misfire P0303: Cylinder 3 misfire P0304: Cylinder 4 misfire
Required Sensors/Components (Main)	Crankshaft position sensor and camshaft position sensor
Required Sensors/Components (Related)	Engine coolant temperature and intake air temperature sensors and mass air flow meter
Frequency of Operation	Continuous
Duration	1,000 crankshaft revolutions: Emission related misfire 200 crankshaft revolutions: Catalyst damaged misfire
MIL Operation	2 driving cycles: Emission related misfire MIL flashes immediately: Catalyst damaged misfire
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Misfire:

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0327, P0328 (Knock sensor) P0335 (CKP sensor) P0340 (CMP sensor) P0500 (VSS)
Battery voltage	8 V or more
VVT system	Not operated by scan tool
Engine RPM	400 to 6,400 rpm
Either of the following conditions (a) or (b) is met	-
(a) ECT at engine start	More than -7°C (19°F)
(b) ECT	More than 20°C (68°F)
Fuel cut	OFF

Monitor period of emission-related-misfire:

First 1,000 revolutions after engine start, or Check Mode	Crankshaft 1,000 revolutions
Except above	Crankshaft 1,000 revolutions x 4

Monitor period of catalyst-damaged-misfire (MIL blinks):

All of the following conditions 1, 2 and 3 are met	Crankshaft 200 revolutions
1. Driving cycles	1st

2. Check mode	OFF
3. Engine RPM	Less than 2,600 rpm
Except above (MIL blinks immediately)	Crankshaft 200 revolutions x 3

TYPICAL MALFUNCTION THRESHOLDS

Monitor period of emission-related-misfire:

Misfire rate	PZEV: 1.33 % or more Except PZEV: 1.266 % or more

Monitor period of catalyst-damaged-misfire (MIL blinks):

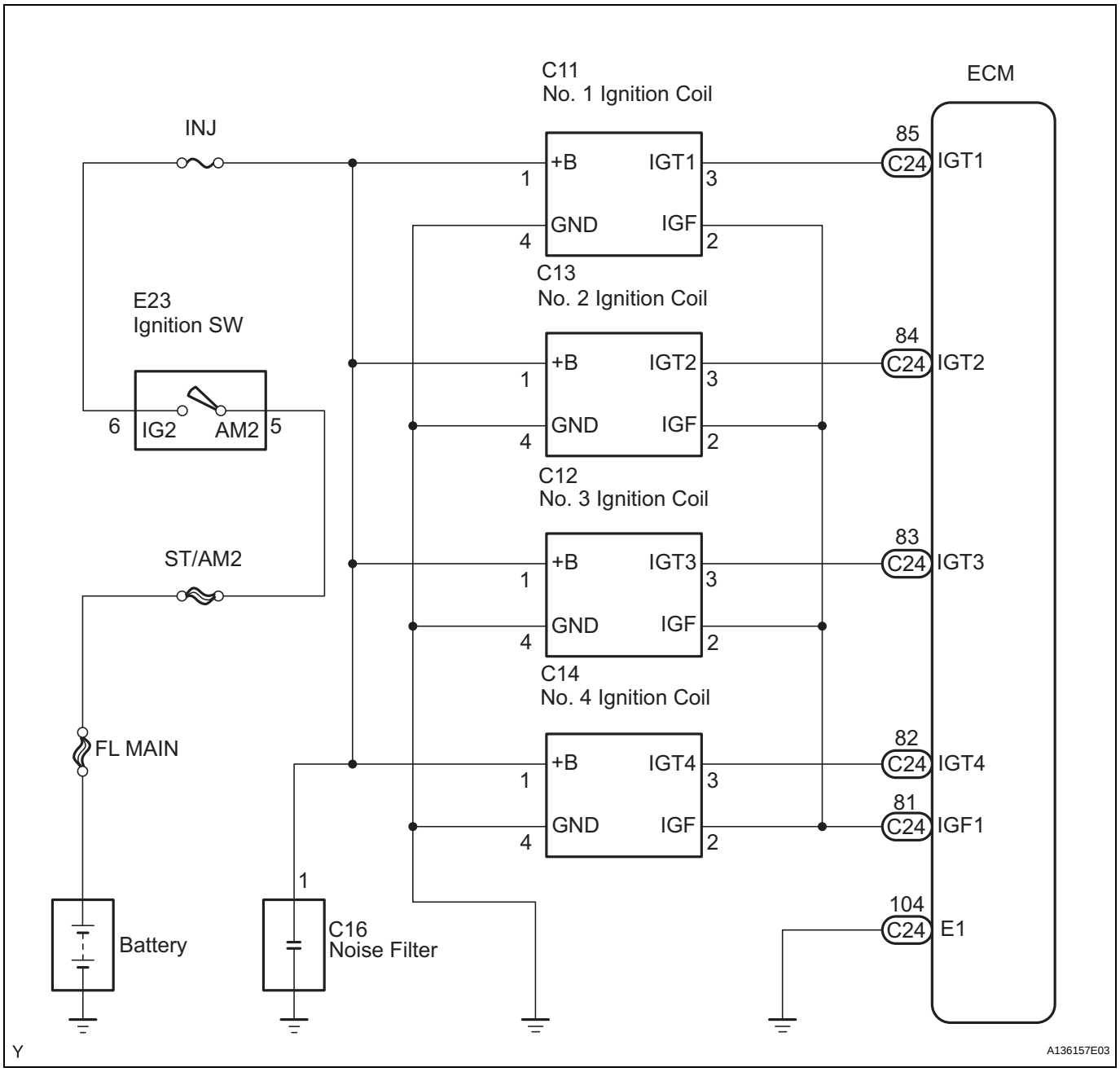
Number of misfire per 200 revolutions	PZEV: 82 or more (varies with intake air amount and RPM) Except PZEV: 118 or more (varies with intake air amount and RPM)

MONITOR RESULT

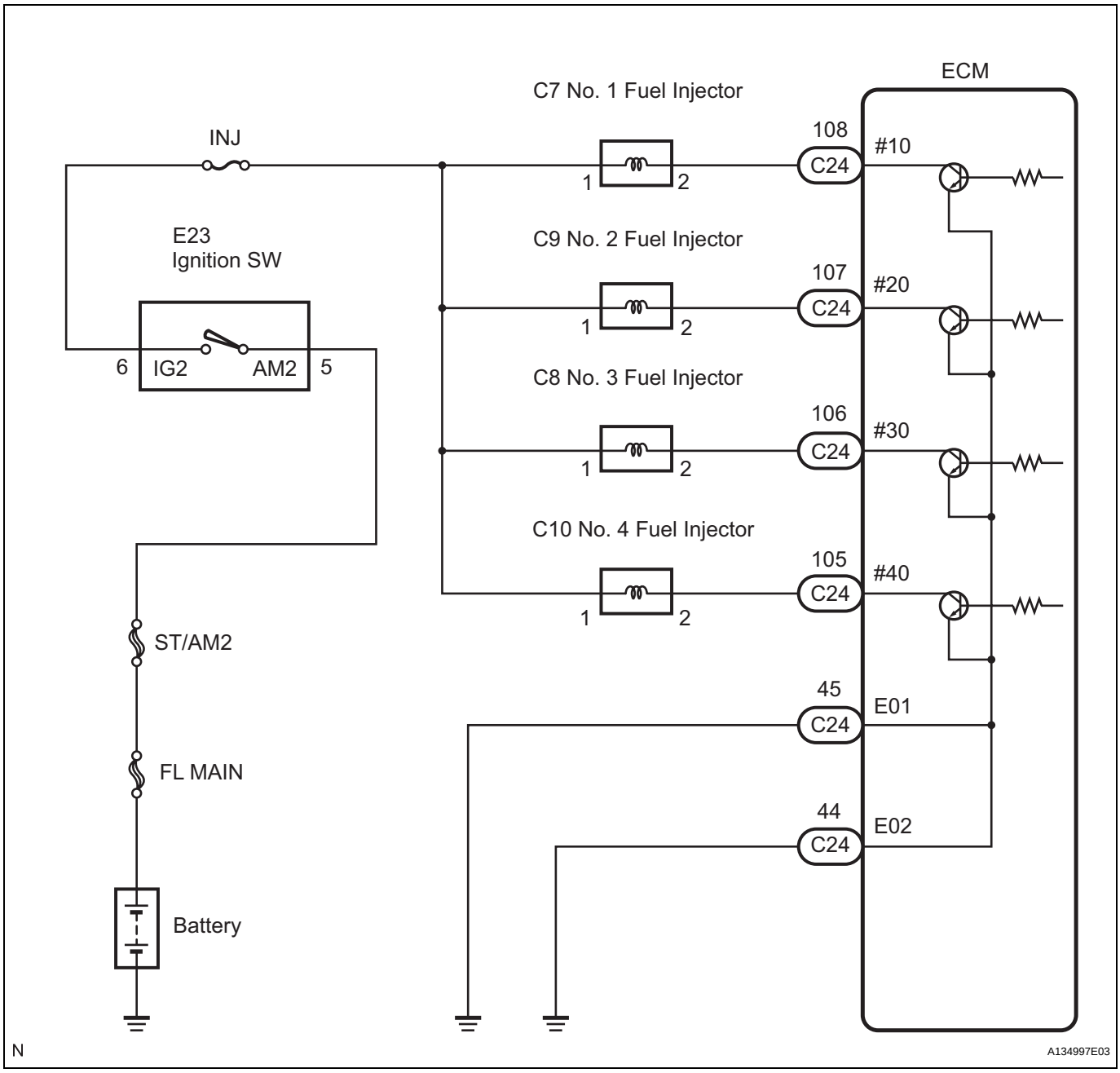
Refer to CHECKING MONITOR STATUS (See page ES-20).

WIRING DIAGRAM

Wiring diagram of the ignition system.



Wiring diagram of the injector circuit.



CONFIRMATION DRIVING PATTERN

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch to the ON position.
3. Turn the tester on.
4. Record the DTC(s) and freeze frame data.
5. Using the tester, switch the ECM from normal mode to check mode (See page ES-41).
6. Read the misfire counts of each cylinder (CYL #1 to #4) with the engine in an idling condition. If any misfire count is displayed, skip the following confirmation driving pattern.

7. Drive the vehicle several times with the conditions, such as engine rpm and engine load, shown in MISFIRE RPM and MISFIRE LOAD in the DATA LIST.
   HINT:
   In order to store misfire DTCs, it is necessary to drive the vehicle for the period of time shown in the table below, with the MISFIRE RPM and MISFIRE LOAD in the DATA LIST.

Engine RPM	Duration
Idling	3.5 minutes or more
1,000	3 minutes or more
2,000	1.5 minutes or more
3,000	1 minute or more

8. Check whether misfires have occurred by checking for DTCs and freeze frame data.
   HINT:
   Do not turn the ignition switch off until the stored DTC(s) and freeze frame data have been recorded. When the ECM returns to normal mode (default), the stored DTC(s), freeze frame data and other data will be erased.
9. Record the DTC(s), freeze frame data and misfire counts.
10. Turn the ignition switch off and wait for at least 5 seconds.

ES

INSPECTION PROCEDURE

HINT:

- If any DTCs other than misfire DTCs are output, troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- If the misfire does not recur when the vehicle is brought to the workshop, reproduce the conditions stored in the freeze frame data.
- If the misfire still cannot be reproduced even though the conditions stored in the freeze frame data have been duplicated, one of the following factors is considered to be a possible cause of the problem:
  (a) The fuel level is low.
  (b) Improper fuel is used.
  (c) The spark plugs are dirty.
  (d) The problem is complex due to multiple factors.
- After finishing repairs, check that no misfires occur in each cylinder (CYL #1, #2, #3 and #4).
- Be sure to confirm that no misfiring cylinder DTCs are set again by conducting the confirmation driving pattern, after the repairs.
- For 6 and 8 cylinder engines, the ECM intentionally does not set the specific misfiring cylinder DTCs at a high engine RPM. If misfires only occur during high engine RPM driving, only DTC P0300 is set.
  In the event of DTC P0300 being present, perform the following operations:
  (a) Clear the DTC (See page ES-38).
  (b) Start the engine and conduct the confirmation driving pattern.
  (c) Read the misfiring rates of each cylinder or DTC(s) using the tester.
  (d) Repair the cylinder(s) that has a high misfiring rate or is indicated by the DTC.
  (e) After finishing repairs, conduct the confirmation driving pattern again, in order to verify that DTC P0300 is not set.
- When either SHORT FT #1 or LONG FT #1 in the freeze frame data is outside the range of +-20 %, the air-fuel ratio may be rich (-20 % or less) or lean (+20 % or more).
- When the COOLANT TEMP in the freeze frame data is less than 75°C (167°F), the misfires occurred only while warming up the engine.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO MISFIRE DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0300, P0301, P0302, P0303 and/or P0304	A
P0300, P0301, P0302, P0303 and/or P0304 and other DTCs	B

HINT:
If any DTCs other than P0300, P0301, P0302, P0303 and P0304 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	READ VALUE USING INTELLIGENT TESTER (MISFIRE RPM AND MISFIRE LOAD)

(a) Connect the intelligent tester the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / MISFIRE RPM and MISFIRE LOAD.
(d) Read and note the MISFIRE RPM and MISFIRE LOAD (engine load) values.
HINT:
The MISFIRE RPM and MISFIRE LOAD indicate the vehicle conditions under which the misfire occurred.

NEXT

3	CHECK PCV HOSE CONNECTIONS

OK:
PCV hose is connected correctly and is not damaged.

NG → REPAIR OR REPLACE PCV HOSE

OK

4	CHECK MISFIRE COUNT (CYL #1, #2, #3 AND #4)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).

(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL #1, #2, #3 and #4.
(f) Allow the engine to idle.
(g) Read each value for CYL #1 to #4 displayed on the tester. If no misfire counts occur in any cylinders, perform the following procedures:
  (1) Shift the gear selector lever to the D position.
  (2) Check the CYL #1 to #4.
  (3) If misfire counts are still not displayed, perform steps (h) and (i) and then check the misfire counts again.
(h) Drive the vehicle with the MISFIRE RPM and MISFIRE LOAD noted in the "READ VALUE USING INTELLIGENT TESTER (MISFIRE RPM AND MISFIRE LOAD)" procedures above.
(i) Read the CYL #1 to #4 or DTCs displayed on the tester.

Result

Misfire Count	Proceed to
Most misfires occur in only 1 or 2 cylinders	A
3 cylinders or more have equal misfire counts	B

HINT:
- If it is difficult to reproduce misfires for each cylinder, check the DATA LIST item called MISFIRE MARGIN. Try to find vehicle driving conditions that lower the MISFIRE MARGIN value. Values above 30 % are considered normal.
- If the freeze frame data's record of the ECT is below 75°C (167°F), the misfire may be detected only when the engine is cold.
- If the freeze frame data's record of the ENGINE RUN TIME is below 120 seconds, the misfire may be detected immediately after the engine is started.

B → **Go to step 14**

A

5	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (FUEL CUT #1 TO #4)

(a) Allow the engine to idle.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL CUT#1 (to #4).
(c) If a cylinder has a high misfire count, cut fuel to that cylinder. Compare the misfire count of the cylinder before fuel cut and after fuel cut.

Result

Misfire Count in Each Cylinder	Proceed to
Misfire count of cylinder before fuel cut and after fuel cut roughly same	A
Misfire count of cylinder before fuel cut lower than after fuel cut	B

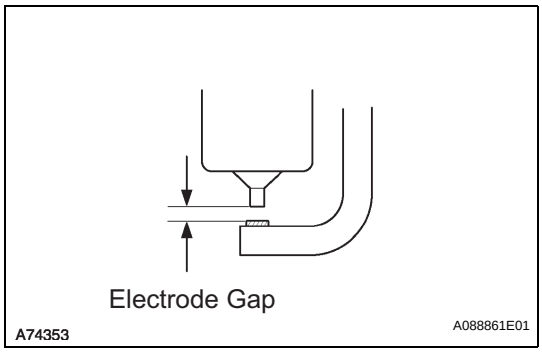
NOTICE:
This ACTIVE TEST cannot be performed while the vehicle is being driven.
HINT:
If the misfire count of the cylinder before and after the fuel cut are roughly the same, the cylinder is misfiring.
If the misfire count of the cylinder before the fuel cut is lower than after the fuel cut, the cylinder misfires sometimes.

B → **Go to step 11**

A

ES

6 CHECK SPARK PLUG



(a) Remove the ignition coil and the spark plug of the misfiring cylinder.
(b) Measure the spark plug electrode gap.
Standard gap:
1.0 to 1.1 mm (0.039 to 0.043 in.)
(c) Check the electrode for carbon deposits.
Recommended spark plug:

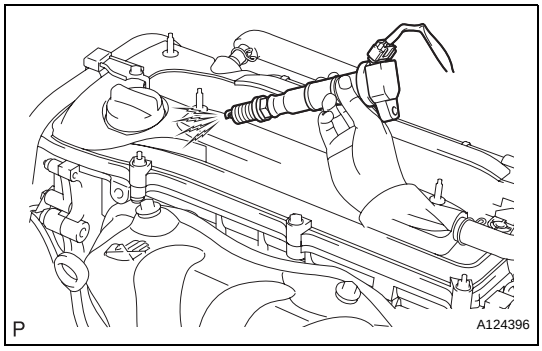
Manufacturers	Products
DENSO	SK20R11
NGK	IFR6A11

NOTICE:
If the electrode gap is larger than standard, replace the spark plug. Do not adjust the electrode gap.

NG → **REPLACE SPARK PLUG**

OK

7 CHECK FOR SPARKS AND IGNITION



(a) Perform a spark test.
CAUTION:
All ways disconnect all fuel injector connectors.
NOTICE:
Do not crank the engine for more than 2 seconds.
(1) Remove the ignition coil from the cylinder head.
(2) Install the spark plug onto the ignition coil.
(3) Disconnect the 4 fuel injector connectors.
(4) Attach the spark plug assembly to the cylinder head.
(5) Crank the engine for less than 2 seconds and check for sparks.
OK:
Sparks jump across electrode gap.
(6) Reconnect the 4 fuel injector connectors.
(7) Install the ignition coil.

NG → **Go to step 9**

OK

8	CHECK CYLINDER COMPRESSION PRESSURE OF MISFIRING CYLINDER

(a) Measure the cylinder compression pressure of the misfiring cylinder (See page EM-3).

OK → **Go to step 10**

NG

CHECK ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION

ES

9	CHANGE NORMAL SPARK PLUG AND CHECK FOR SPARKS OF MISFIRING CYLINDER

(a) Change the installed spark plug with a spark plug that functions normally.

(b) Perform a spark test.

CAUTION:

Always disconnect all fuel injector connectors.

NOTICE:

Do not crank the engine for more than 2 seconds.

(1) Install the spark plug onto the ignition coil.
(2) Disconnect the 4 fuel injector connectors.
(3) Attach the spark plug assembly to the cylinder head.
(4) Crank the engine for less than 2 seconds and check for sparks.

OK:

Sparks jump across electrode gap.

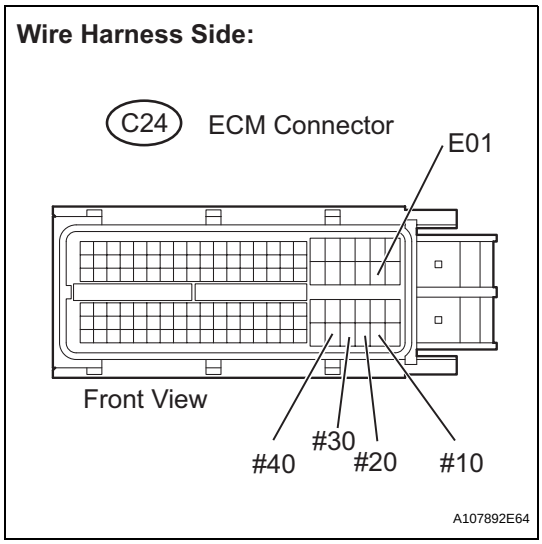
(5) Reconnect the 4 fuel injector connectors.
(6) Install the ignition coil.

NG → **REPLACE IGNITION COIL ASSEMBLY THEN CONFIRM THAT THERE IS NO MISFIRE**

OK

REPLACE SPARK PLUG

10	INSPECT ECM TERMINAL OF MISFIRING CYLINDER (#10, #20, #30, AND /OR #40 VOLTAGE)



(a) Disconnect the C24 ECM connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminals of the ECM connector.

Standard voltage

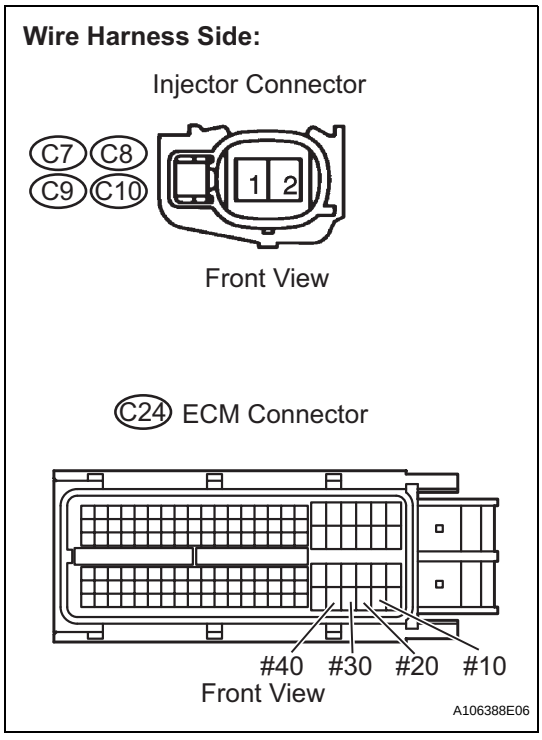
Tester Connection	Specified Condition
C24-108 (#10) - C24-45 (E01)	9 to 14 V
C24-107 (#20) - C24-45 (E01)	9 to 14 V
C24-106 (#30) - C24-45 (E01)	9 to 14 V
C24-105 (#40) - C24-45 (E01)	9 to 14 V

(d) Reconnect the ECM connector.

OK → **Go to step 12**

NG

11	CHECK HARNESS AND CONNECTOR (INJECTOR - ECM)



(a) Disconnect the C7 to C10 injector connectors (of the misfiring cylinder).
(b) Disconnect the C24 ECM connector.
(c) Turn the ignition switch to the ON position.
(d) Measure the resistance and voltage between the injector and the ECM connector terminals.

Standard voltage

Cylinder	Tester Connection	Specified Condition
No. 1	C7-1 - Ground	9 to 14 V
No. 2	C9-1 - Ground	9 to 14 V
No. 3	C8-1 - Ground	9 to 14 V
No. 4	C10-1 - Ground	9 to 14 V

Standard resistance

Cylinder	Tester Connection	Specified Condition
No. 1	C7-2 - Ground	10 kΩ or higher
	C7-2 - C24-108 (#10)	Below 1 Ω
No. 2	C9-2 - Ground	10 kΩ or higher
	C9-2 - C24-107 (#20)	Below 1 Ω
No. 3	C8-2 - Ground	10 kΩ or higher
	C8-2 - C24-106 (#30)	Below 1 Ω
No. 4	C10-2 - Ground	10 kΩ or higher
	C10-2 - C24-105 (#40)	Below 1 Ω

(e) Reconnect the injector connector.
(f) Reconnect the ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

12 CHECK FUEL INJECTOR OF MISFIRING CYLINDER

(a) Check the injector injection (whether fuel volume is high or low, and whether injection pattern is poor).

NG → REPLACE FUEL INJECTOR ASSEMBLY

OK

13 CHECK VALVE CLEARANCE OF MISFIRING CYLINDER

NG → ADJUST VALVE CLEARANCE

OK

14 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

15 CHECK VALVE TIMING (See page ES-78)

NG → ADJUST VALVE TIMING

OK

16 CHECK FUEL PRESSURE

(a) Check the fuel pressure (See page FU-9).

NG → CHECK AND REPLACE FUEL PUMP, PRESSURE REGULATOR, FUEL PIPE LINE AND FILTER

OK

17	READ VALUE USING INTELLIGENT TESTER (COOLANT TEMP) (See page ES-160)

NG → REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK ↓

18	READ VALUE USING INTELLIGENT TESTER (MAF) (See page ES-159)

NG → REPLACE MASS AIR FLOW METER

OK ↓

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)

DTC	P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)

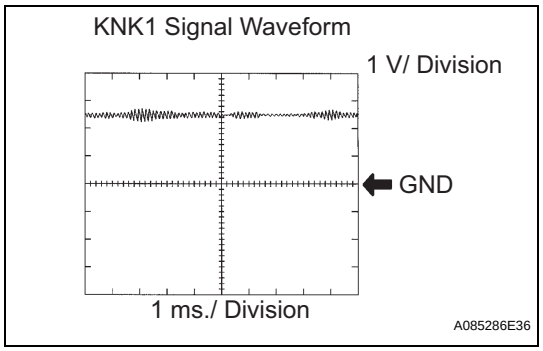
DESCRIPTION

Flat type knock sensors (non-resonant type) have structures that can detect vibrations over a wide band of frequencies: between approximately 6 kHz and 15 kHz.
Knock sensor is fitted onto the engine block to detect engine knocking.
The knock sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The voltage is generated when the engine block vibrates due to knocking. Any occurrence of engine knocking can be suppressed by delaying the ignition timing.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0327	Output voltage of knock sensor less than 0.5 V (1 trip detection logic)	• Short in knock sensor circuit • Knock sensor • ECM
P0328	Output voltage of knock sensor more than 4.5 V (1 trip detection logic)	• Open in knock sensor circuit • Knock sensor • ECM

HINT:
When any of DTCs P0327 and P0328 are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the ignition switch is turned off.
Reference: Inspection using an oscilloscope



The correct waveform is as shown.

Items	Contents
Terminals	KNK1 - EKNK
Equipment Settings	1 V/Division 1 ms./Division
Conditions	Keep engine speed at 4,000 rpm with warm engine

MONITOR DESCRIPTION

If the output voltage transmitted by the knock sensor remains low or high for more than 1 second, the ECM interprets this as a malfunction in the sensor circuit, and sets a DTC.
The monitor for DTCs P0327 and P0328 begins to run when 5 seconds have elapsed since the engine was started.
If the malfunction is not repaired successfully, either DTC P0327 or P0328 is set 5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0327: Knock sensor range check (Low voltage) P0328: Knock sensor range check (High voltage)
Required Sensors/Components (Main)	Knock sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

ES

Monitor runs whenever following DTCs are not present	None
Battery voltage	10.5 V or more
Time after engine start	5 seconds or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

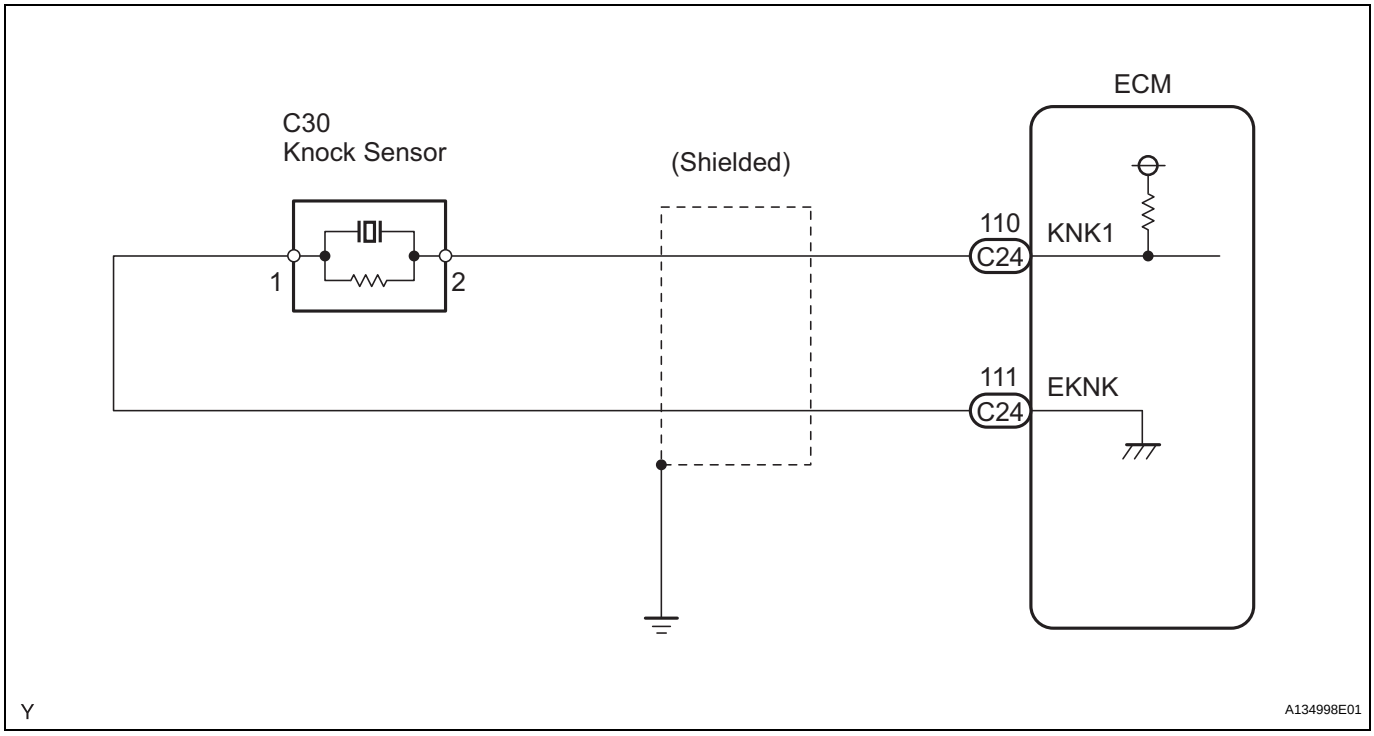
Knock Sensor Range Check (Low voltage) P0327:

Knock sensor voltage	Less than 0.5 V

Knock Sensor Range Check (High voltage) P0328:

Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (KNOCK FB VAL)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / KNOCK FB VAL.
(e) Read the values displayed on the tester while driving the vehicle.
Standard:
The values change.
HINT

Malfunction does not occur	Knock Feedback Values change
Malfunctions occur	Knock Feedback Values do not change

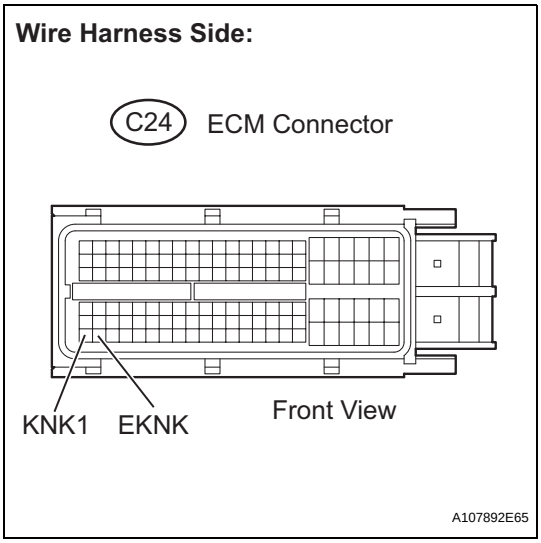
HINT:
The knock feedback value change can be confirmed by running the engine with a high load, for example, by activating the air conditioning system and revving up the engine.

NG → **Go to step 2**

OK

CHECK FOR INTERMITTENT PROBLEMS

2	CHECK HARNESS AND CONNECTOR (ECM - KNOCK SENSOR)



(a) Disconnect the C24 ECM connector.
(b) Measure the resistance between the terminals.
Standard

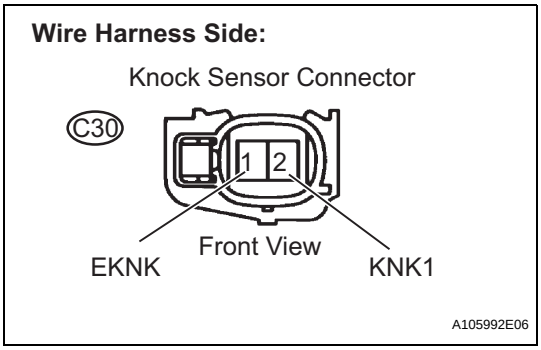
Tester Connection	Specified Condition
C24-110 (KNK1) - C24-111 (EKNK)	120 to 280 kΩ at 20°C (68°F)

(c) Reconnect the ECM connector.

NG → **Go to step 4**

OK

3	INSPECT ECM (KNK1 VOLTAGE)



(a) Disconnect the C30 knock sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the knock sensor terminals.
Standard voltage

Tester Connection	Specified Condition
C30-2 (KNK1) - C30-1 (EKNK)	4.5 to 5.5 V

(d) Reconnect the knock sensor connector.

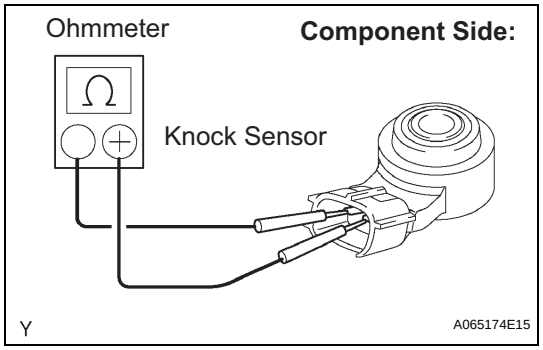
NOTICE:
Fault may be intermittent. Check the wire harness and connectors carefully and retest.

NG → **REPLACE ECM**

OK

CHECK FOR INTERMITTENT PROBLEMS

4	INSPECT KNOCK SENSOR



(a) Remove the knock sensor.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
2 (KNK1) - 1 (EKNK)	120 to 280 kΩ at 20°C (68°F)

(c) Reinstall the knock sensor.

NG → **REPLACE KNOCK SENSOR**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

ES

DTC	P0335	Crankshaft Position Sensor "A" Circuit

DTC	P0339	Crankshaft Position Sensor "A" Circuit Intermittent

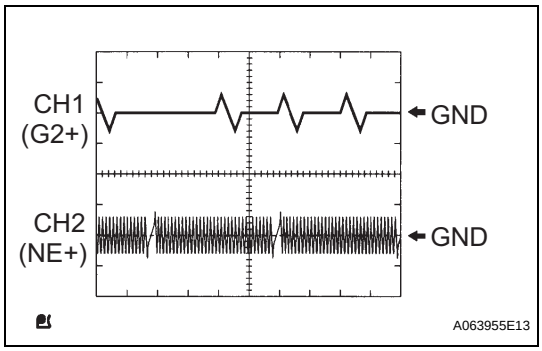
DESCRIPTION

The Crankshaft Position (CKP) sensor system consists of a CKP sensor plate and a pickup coil.
The sensor plate has 34 teeth and is installed on the crankshaft. The pickup coil is made of wound copper wire, an iron core and magnet. The sensor plate rotates and, as each tooth passes through the pickup coil, a pulse signal is created. The pickup coil generates 34 signals per engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0335	When either condition below is met: • No CKP sensor signal to ECM while cranking (1 trip detection logic) • No CKP sensor signal to ECM at engine speed of 600 rpm or more (1 trip detection logic)	• Open or short in CKP sensor circuit • CKP sensor • CKP sensor plate • ECM
P0339	Under conditions (a), (b) and (c), no CKP sensor signal to ECM for 0.05 seconds or more (1 trip detection logic): (a) Engine speed 1,000 rpm or more (b) Starter signal OFF (c) 3 seconds or more have elapsed since starter signal switched from ON to OFF	• Open or short in CKP sensor circuit • CKP sensor • CKP sensor plate • ECM

Reference: Inspection using an oscilloscope.



HINT:
- The correct waveform is as shown.
- G2+ stands for the Camshaft Position (CMP) sensor signal, and NE+ stands for the CKP sensor signal.
- Grounding failure of the shielded wire may cause noise in waveforms.

Items	Contents
Terminals	CH1: G2+ - G2- CH2: NE+ - NE-
Equipment Settings	5 V/Division, 20 ms./Division
Conditions	Cranking or idling

MONITOR DESCRIPTION

If there is no signal from the CKP sensor despite the engine revolving, the ECM interprets this as a malfunction of the sensor.
If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0335: CKP sensor range check or rationality
Required Sensors/Components (Main)	CKP sensor
Required Sensors/Components (Related)	CMP sensor
Frequency of Operation	Continuous
Duration	3 times
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

Case 1:

Time after starter OFF to ON	0.3 seconds or more
Number of CMP sensor signal pulse	6 times
Battery voltage	7 V or more
CMP sensor circuit	OK
Ignition switch	ON

Case 2:

Starter	OFF
Engine speed	600 rpm or more
Time after starter from ON to OFF	3 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

Case 1:

Number of CKP sensor signal pulse	132 or less, and 174 or more

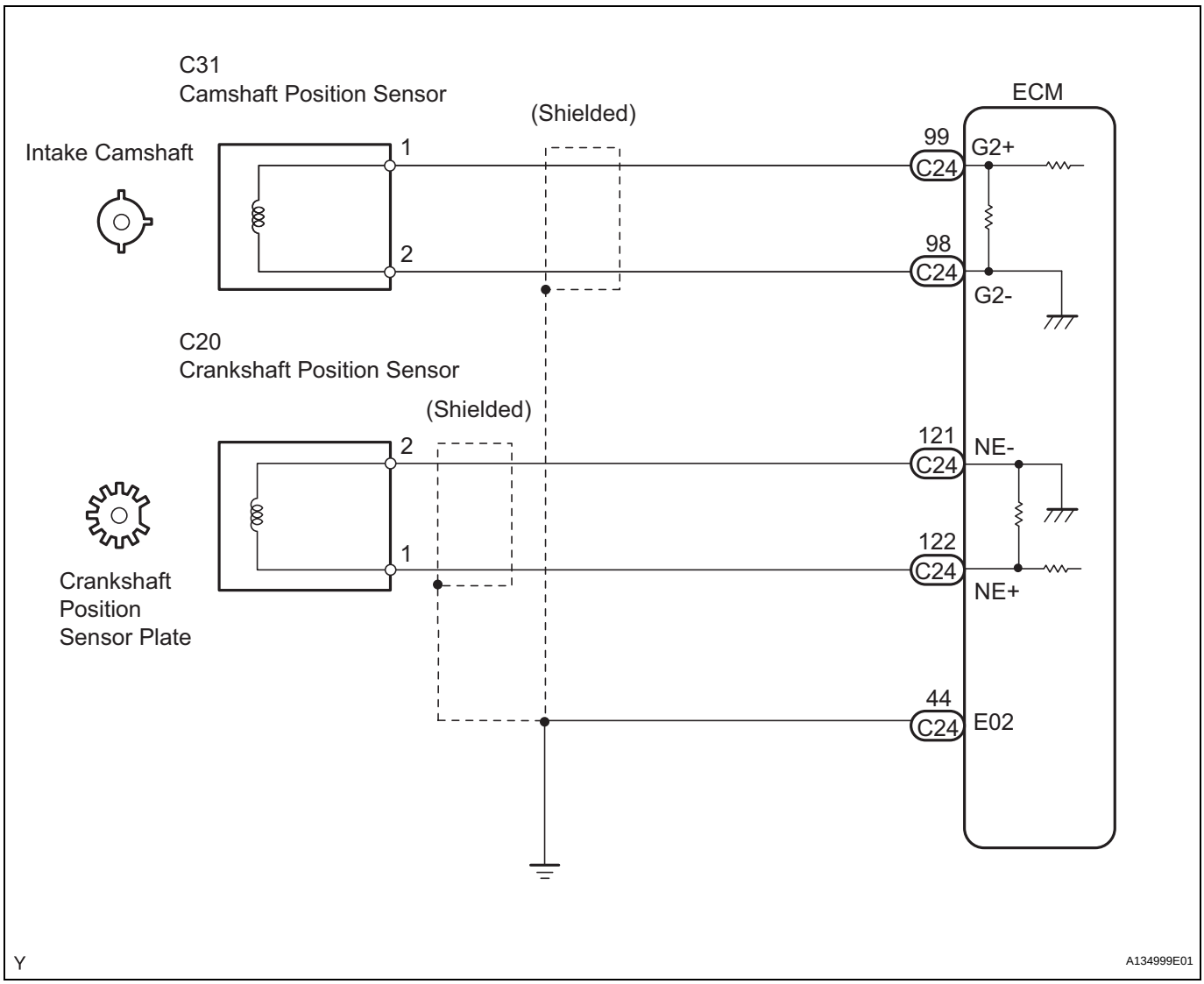
Case 2:

Engine speed signal	No signal

COMPONENT OPERATING RANGE

CKP sensor	• CKP sensor output voltage fluctuates while crankshaft revolving • 34 CKP sensor signals per crankshaft revolution

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If no problem is found through this diagnostic troubleshoot procedure, troubleshoot the engine mechanical systems.
- Check the engine speed. The engine speed can be checked by using the intelligent tester. Follow the procedure below:
  (a) Connect the intelligent tester to the DLC3.
  (b) Start the engine.
  (c) Turn the tester on.
  (d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.
  The engine speed may be indicated as zero despite the engine revolving normally. This is caused by a lack of NE signals from the Crankshaft Position (CKP) sensor. Alternatively, the engine speed may be indicated as lower than the actual engine speed if the CKP sensor output voltage is insufficient.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (ENGINE SPD)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.
(e) Start the engine.
(f) Read the values displayed on the tester while the engine is running.
Standard:
Correct values are displayed.
HINT:
- To check the engine speed change, display the graph on the tester.
- If the engine does not start, check the engine speed while cranking.
- If the engine speed indicated on the tester remains zero (0), there may be an open or short in the Crankshaft Position (CKP) sensor circuit.

ES

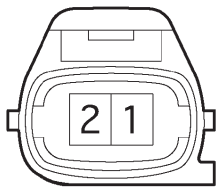
NG → **Go to step 2**

OK

CHECK FOR INTERMITTENT PROBLEMS

2	INSPECT CRANKSHAFT POSITION SENSOR (RESISTANCE)

Component Side:



CKP Sensor

G037727E07

(a) Disconnect the C20 CKP sensor connector.
(b) Measure the resistance between terminals 1 and 2.
Standard resistance

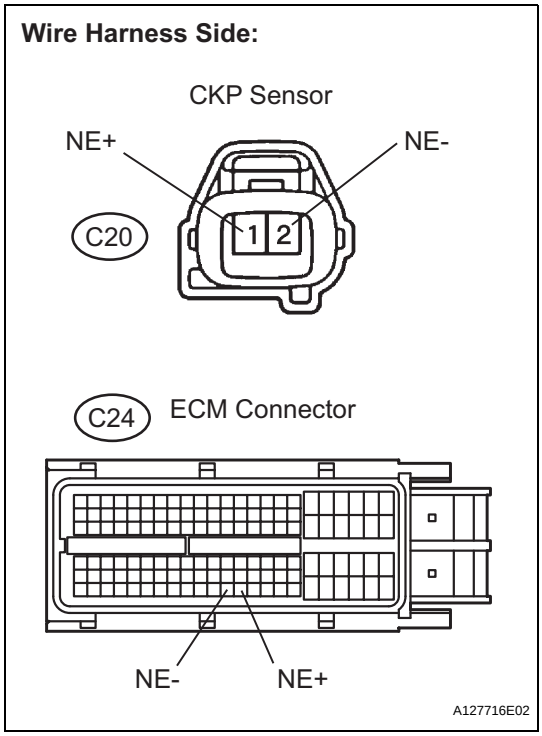
Tester Connection	Specified Condition
1 - 2	1,150 to 1,450 Ω at 20°C (68°F)

(c) Reconnect the CKP sensor connector.

NG → **REPLACE CRANKSHAFT POSITION SENSOR**

OK

3 CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C20 CKP sensor connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C20-1 (NE+) - C24-122 (NE+)	Below 1 Ω
C20-2 (NE-) - C24-121 (NE-)	Below 1 Ω

Standard resistance (Check for short)

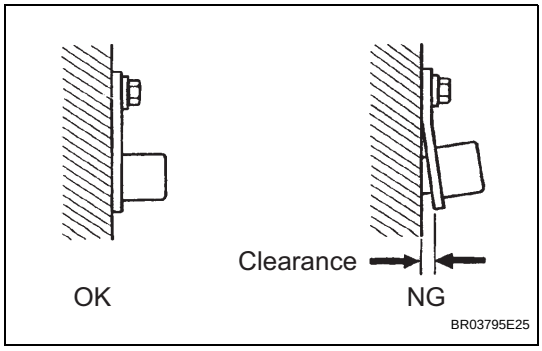
Tester Connection	Specified Condition
C20-1 (NE+) or C24-122 (NE+) - Body ground	10 kΩ or higher
C20-2 (NE-) or C24-121 (NE-) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the CKP sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK SENSOR INSTALLATION (CRANKSHAFT POSITION SENSOR)



(a) Check the CKP sensor installation condition.

OK:

Sensor is installed correctly.

NG → **SECURELY REINSTALL SENSOR**

OK

5 CHECK CRANKSHAFT POSITION SENSOR PLATE (TEETH OF SENSOR PLATE)

(a) Check the teeth of the sensor plate.

OK:

Sensor plate does not have any cracks or deformation.

NG → **REPLACE CRANKSHAFT POSITION SENSOR PLATE**

OK

6	REPLACE CRANKSHAFT POSITION SENSOR

NEXT

7	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Start the engine.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
No output	A
P0335 or P0339	B

HINT:
If the engine does not start, replace the ECM.

B → REPLACE ECM

A

END

DTC	P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)

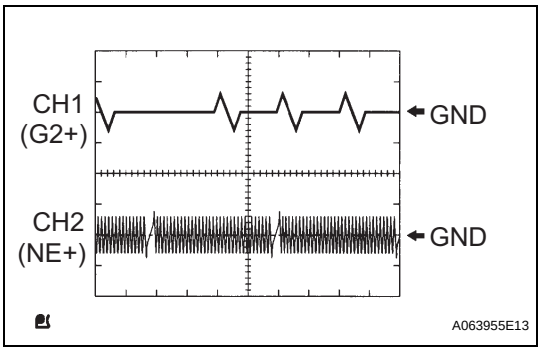
DESCRIPTION

The Camshaft Position (CMP) sensor consists of a magnet and an iron core which is wrapped with copper wire, and is installed onto the cylinder head. When the camshaft rotates, each of 3 teeth on the camshaft passes through the CMP sensor. This activates the internal magnet in the sensor, generating a voltage in the copper wire. The camshaft rotation is synchronized with the crankshaft rotation. When the crankshaft turns twice, the voltage is generated 3 times in the CMP sensor. The generated voltage in the sensor acts as a signal, allowing the ECM to locate the camshaft position. This signal is then used to control ignition timing, fuel injection timing, and the VVT system.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0340	Case 1 • No Camshaft Position (CMP) sensor signal to ECM while cranking (2 trip detection logic) Case 2 • Camshaft/Crankshaft misalignment detected at engine speed of 600 rpm or more (1 trip detection logic)	• Open or short in CMP sensor circuit • CMP sensor • Camshaft • Jumped tooth of timing chain • ECM

HINT:
DTC P0340 indicates a malfunction relating to the CMP sensor (+) circuit (the wire harness between the ECM and CMP sensor, and the CMP sensor itself).
Reference: Inspection using an oscilloscope



HINT:
- The correct waveform is as shown in the illustration.
- G2+ stands for the CMP sensor signal, and NE+ stands for the Crankshaft Position (CKP) sensor signal.
- Grounding failure of the shielded wire may cause noise in waveforms.

Items	Contents
Terminals	CH1: G2+ - G2- CH2: NE+ - NE-
Equipment Settings	5 V/Division, 20 ms./Division
Conditions	Cranking or idling

MONITOR DESCRIPTION

If no signal is transmitted by the CMP sensor despite the engine revolving, or the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.
If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0340: Camshaft position sensor range check P0340: Camshaft position/crankshaft position misalignment
Required Sensors/Components (Main)	Camshaft Position (CMP) sensor
Required Sensors/Components (Related)	Crankshaft Position (CKP) sensor
Frequency of Operation	Continuous
Duration	4 seconds: CMP sensor range check 5 seconds: Camshaft position/crankshaft position misalignment
MIL Operation	2 driving cycles: CMP sensor range check Immediate: Camshaft position/crankshaft position misalignment
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

Camshaft Position Sensor Range Check:

Starter	ON
Minimal battery voltage while starter ON	Less than 11 V

Camshaft Position/Crankshaft Position Misalignment:

Engine speed	600 rpm or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Camshaft Position Sensor Range Check:

CMP sensor signal	No signal

Camshaft Position/Crankshaft Position Misalignment:

Camshaft position and crankshaft position phase	Misaligned

COMPONENT OPERATING RANGE

CMP sensor	• CMP sensor output voltage fluctuates while camshaft revolving • 3 CMP sensor signals per 2 crankshaft revolutions

WIRING DIAGRAM

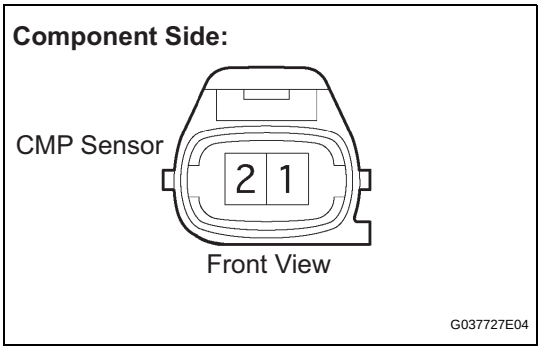
Refer to DTC P0335 (See page ES-179).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	INSPECT CAMSHAFT POSITION SENSOR (RESISTANCE)



(a) Disconnect the C31 Camshaft Position (CMP) sensor connector.
(b) Measure the resistance between terminals 1 and 2.
Standard resistance

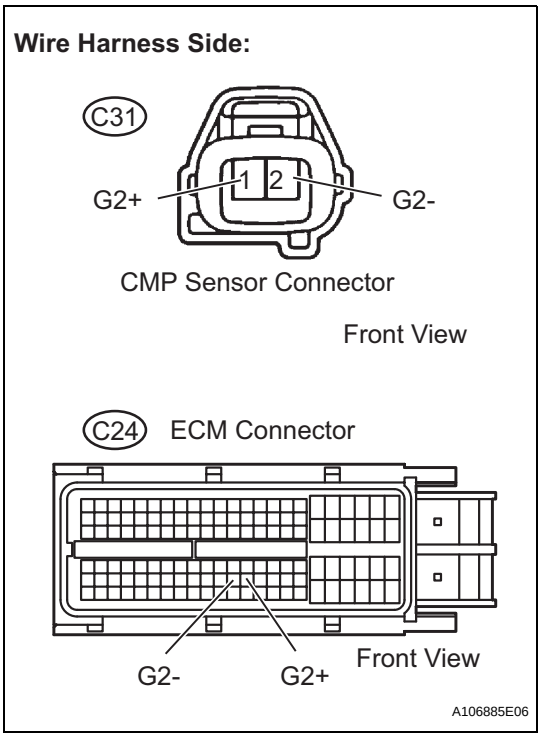
Tester Connection	Specified Condition
1 - 2	950 to 1,250 Ω

(c) Reconnect the CMP sensor connector.

NG → **REPLACE CAMSHAFT POSITION SENSOR**

OK

2	CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C31 CMP sensor connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.
Standard resistance (Check for open)

Tester Connection	Specified Condition
C31-1 (G2+) - C24-99 (G2+)	Below 1 Ω
C31-2 (G2-) - C24-98 (G2-)	Below 1 Ω

Standard resistance (Check for short)

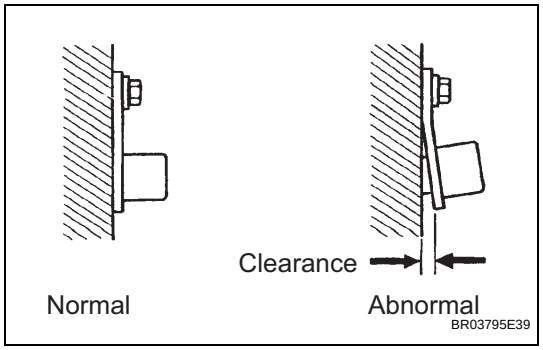
Tester Connection	Specified Condition
C31-1 (G2+) or C24-99 (G2+) - Body ground	10 kΩ or higher
C31-2 (G2-) or C24-98 (G2-) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the CMP sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK SENSOR INSTALLATION (CAMSHAFT POSITION SENSOR)



(a) Check the CMP sensor installation condition.
OK:
Sensor is installed correctly.

NG → **SECURELY REINSTALL SENSOR**

OK

4	CHECK VALVE TIMING (See page ES-78)

NG → **ADJUST VALVE TIMING**

OK

5	CHECK CAMSHAFT

(a) Check the teeth of the camshaft.
OK:
Camshaft teeth do not have any cracks or deformation.

NG → **REPLACE CAMSHAFT**

OK

6	REPLACE CAMSHAFT POSITION SENSOR

NEXT

7	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Start the engine.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A

ES

Display (DTC Output)	Proceed to
P0340	B

HINT:
If the engine does not start, replace the ECM.

B → **REPLACE ECM**

A

END

DTC	P0351	Ignition Coil "A" Primary / Secondary Circuit

DTC	P0352	Ignition Coil "B" Primary / Secondary Circuit

DTC	P0353	Ignition Coil "C" Primary / Secondary Circuit

DTC	P0354	Ignition Coil "D" Primary / Secondary Circuit

DESCRIPTION

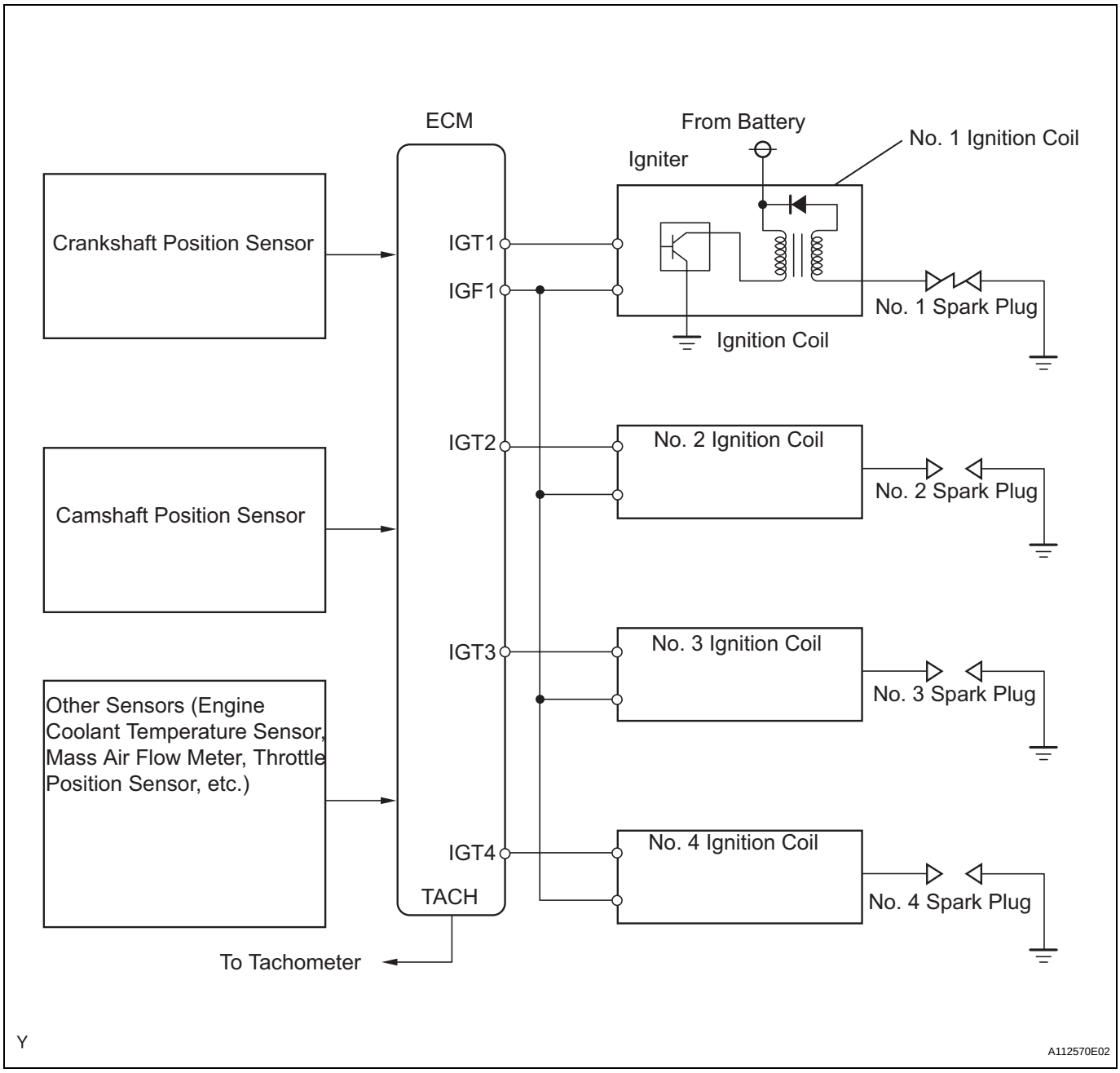
HINT:

- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check the No. 1 ignition coil circuit.
- If DTC P0352 is set, check the No. 2 ignition coil circuit.
- If DTC P0353 is set, check the No. 3 ignition coil circuit.
- If DTC P0354 is set, check the No. 4 ignition coil circuit.

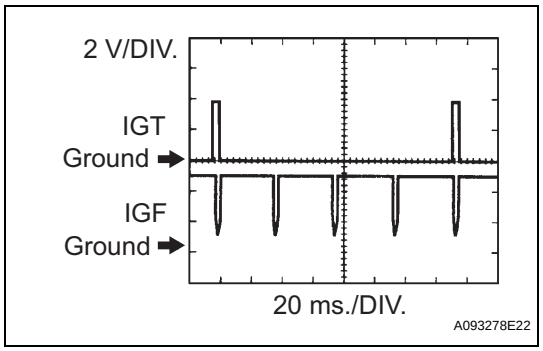
A Direct Ignition System (DIS) is used on this vehicle.

The DIS is a 1-cylinder ignition system in which each cylinder is ignited by one ignition coil and one spark plug is connected to the end of each secondary wiring. A powerful voltage, generated in the secondary wiring, is applied directly to each spark plug. The sparks of the spark plugs pass from the center electrode to the ground electrodes.

The ECM determines the ignition timing and transmits the ignition (IGT) signals to each cylinder. Using the IGT signal, the ECM turns the power transistor inside the igniter on and off. The power transistor, in turn, switches on and off the current to the primary coil. When the current to the primary coil is cut off, a powerful voltage is generated in the secondary coil. This voltage is applied to the spark plugs, causing them to spark inside the cylinders. As the ECM cuts the current to the primary coil off, the igniter sends back an ignition confirmation (IGF) signal to the ECM, for each cylinder ignition.



DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354	No IGF signal to ECM while engine running (1 trip detection logic)	• Ignition system • Open or short in IGF1 or IGT circuit (1 to 4) between ignition coil and ECM • No. 1 to No. 4 ignition coils • ECM

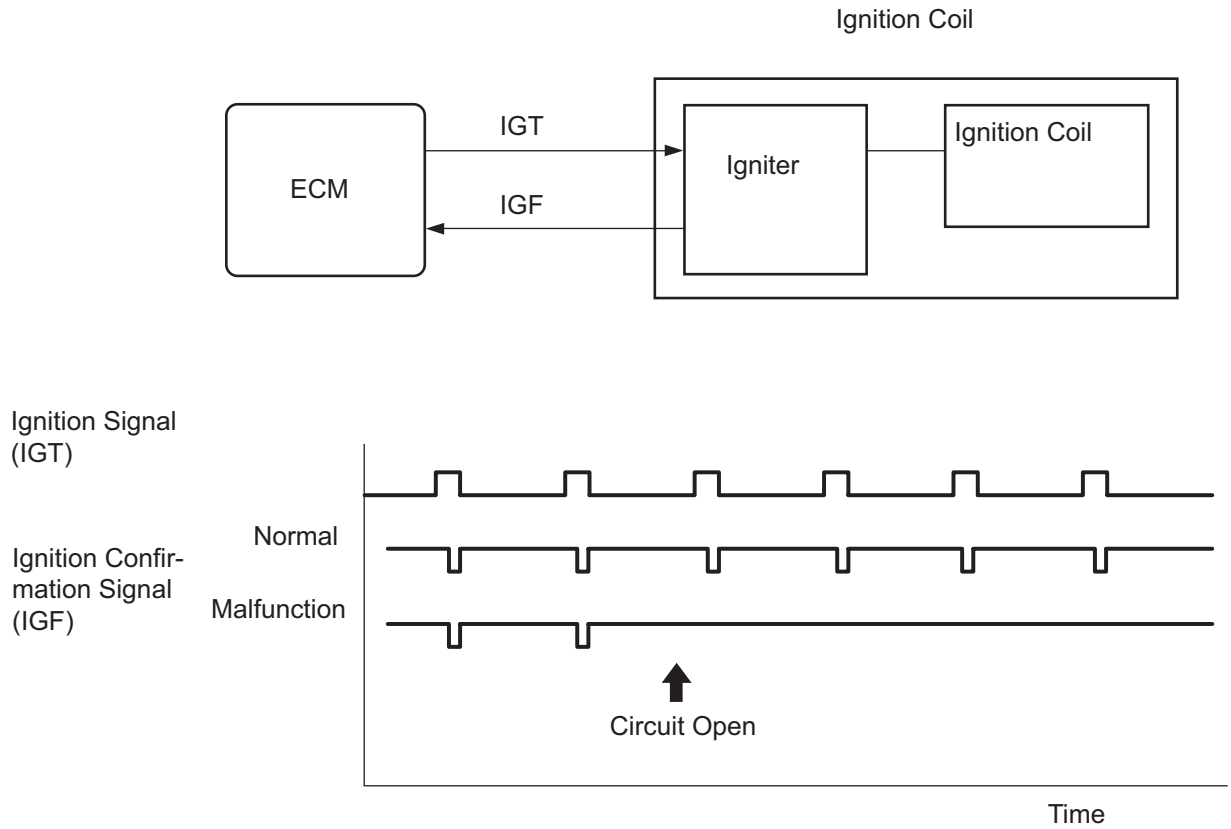


Reference: Inspection using an oscilloscope.
While cranking or idling the engine, check the waveform between terminals IGT (1 to 4) and E1, and IGF1 and E1 of the ECM connector.

ES

Items	Contents
Terminals	CH1: IGT1, IGT2, IGT3, IGT4 - E1 CH2: IGF1 - E1
Equipment Settings	2 V/Division 20 ms./Division
Conditions	Cranking or idling

MONITOR DESCRIPTION



If the ECM does not receive any IGF signals despite transmitting the IGT signal, it interprets this as a fault in the igniter and sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 1 second after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0351: Igniter (cylinder 1) malfunction P0352: Igniter (cylinder 2) malfunction P0353: Igniter (cylinder 3) malfunction P0354: Igniter (cylinder 4) malfunction
Required Sensors/Components (Main)	Igniter
Required Sensors/Components (Related)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	0.512 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Either of the following conditions A or B is met	-

A. Engine RPM	1,500 rpm or less
B. Starter	OFF
Either of the following conditions C or D is met	-
C. Both of the following conditions (a) and (b) are met	-
(a) Engine speed	500 rpm or less
(b) Battery voltage	6 V or more
D. All of the following conditions (a), (b) and (c) are met	-
(a) Engine speed	More than 500 rpm
(b) Battery voltage	10 V or more
(c) Number of sparks after CPU reset	5 sparks or more

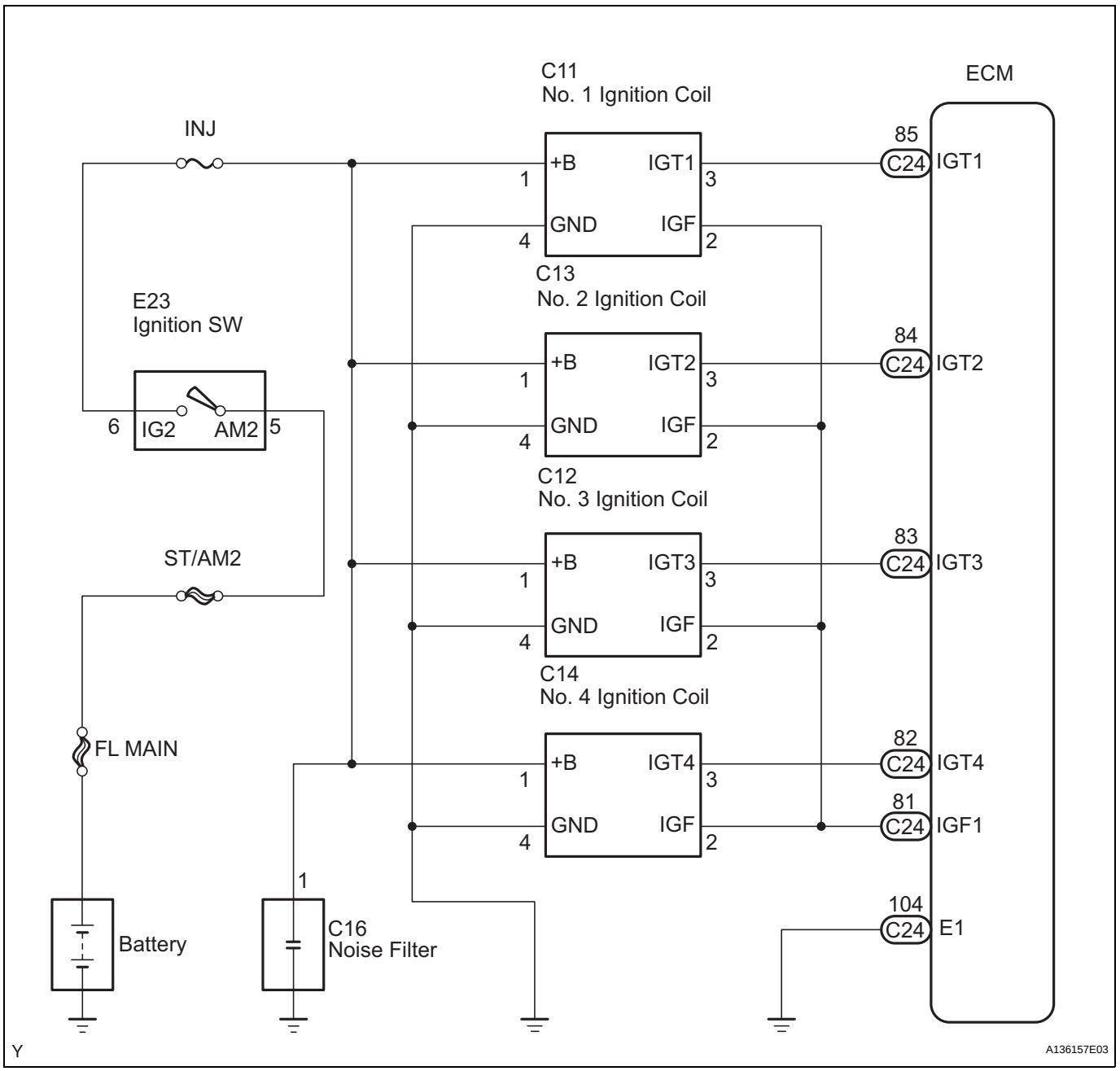
TYPICAL MALFUNCTION THRESHOLDS

IGF signal	ECM does not receive any IGF signal despite ECM sending IGT signal to igniter

COMPONENT OPERATING RANGE

IGF signal	Igniter transmits IGF signal when it receives IGT signal from ECM

WIRING DIAGRAM

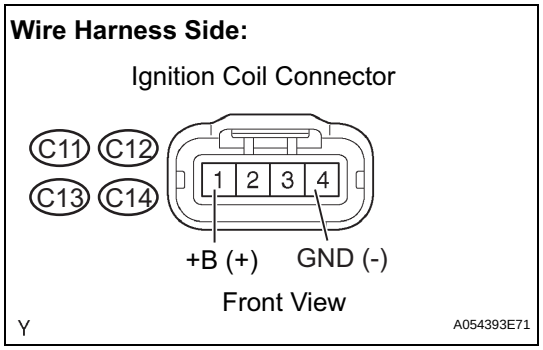


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE)



(a) Disconnect the C11 to C14 ignition coil connectors.
(b) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C11-4 (GND) - Body ground	Below 1 Ω
C13-4 (GND) - Body ground	Below 1 Ω
C12-4 (GND) - Body ground	Below 1 Ω
C14-4 (GND) - Body ground	Below 1 Ω

(c) Turn the ignition switch to the ON position.
(d) Measure the voltage between the terminals of the wire harness side connectors.

Standard voltage

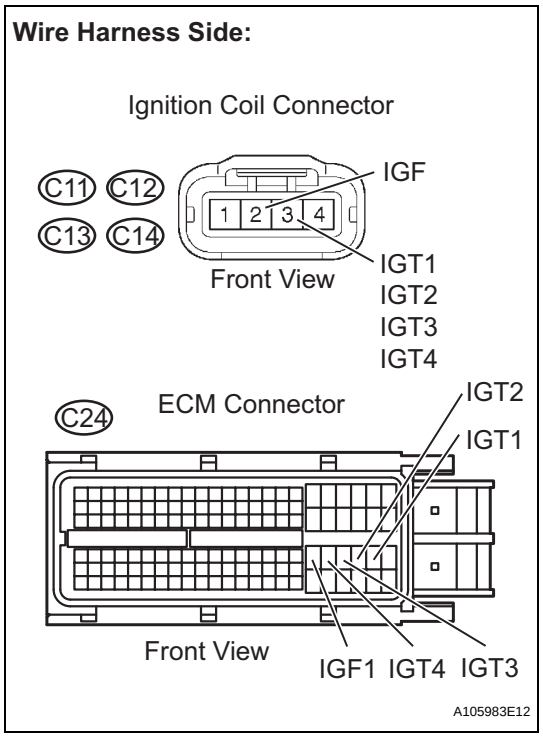
Tester Connection	Specified Condition
C11-1 (+B) - C11-4 (GND)	9 to 14 V
C13-1 (+B) - C13-4 (GND)	9 to 14 V
C12-1 (+B) - C12-4 (GND)	9 to 14 V
C14-1 (+B) - C14-4 (GND)	9 to 14 V

(e) Reconnect the ignition coil connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - ECM)



(a) Disconnect the ignition coil connectors.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C11-2 (IGF) - C24-81 (IGF1)	Below 1 Ω
C13-2 (IGF) - C24-81 (IGF1)	Below 1 Ω
C12-2 (IGF) - C24-81 (IGF1)	Below 1 Ω
C14-2 (IGF) - C24-81 (IGF1)	Below 1 Ω

Standard resistance (Check for open)

Tester Connection	Specified Condition
C11-3 (IGT1) - C24-85 (IGT1)	Below 1 Ω
C13-3 (IGT2) - C24-84 (IGT2)	Below 1 Ω
C12-3 (IGT3) - C24-83 (IGT3)	Below 1 Ω
C14-3 (IGT4) - C24-82 (IGT4)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C11-2 (IGF) or C24-81 (IGF1) - Body ground	10 kΩ or higher
C13-2 (IGF) or C24-81 (IGF1) - Body ground	10 kΩ or higher
C12-2 (IGF) or C24-81 (IGF1) - Body ground	10 kΩ or higher
C14-2 (IGF) or C24-81 (IGF1) - Body ground	10 kΩ or higher

Standard resistance (Check for short)

Tester Connection	Specified Condition
C11-3 (IGT1) or C24-85 (IGT1) - Body ground	10 kΩ or higher
C13-3 (IGT2) or C24-84 (IGT2) - Body ground	10 kΩ or higher
C12-3 (IGT3) or C24-83 (IGT3) - Body ground	10 kΩ or higher
C14-3 (IGT4) or C24-82 (IGT4) - Body ground	10 kΩ or higher

ES

(d) Reconnect the ECM connector.
(e) Reconnect the ignition coil connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P0351, P0352, P0353 OR P0354)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Shuffle arrangement of the ignition coils (among No. 1 to No. 4 cylinders).
NOTICE:
Do not shuffle the connectors.
(e) Perform a simulation test.
(f) Check the DTCs displayed on the tester.

Result

Display (DTC Output)	Proceed to
Same DTC output	A
Different ignition coil DTC output	B

B → **REPLACE IGNITION COIL ASSEMBLY**

A

REPLACE ECM

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

MONITOR DESCRIPTION

The ECM uses the sensors mounted in front of and behind the Three-Way Catalytic Converter (TWC) to monitor its efficiency.
The first sensor, the Air-Fuel Ratio (A/F) sensor, sends pre-catalyst information to the ECM. The second sensor, the Heated Oxygen (HO2) sensor, sends post-catalyst information to the ECM.
In order to detect any deterioration in the TWC, the ECM calculates the Oxygen Storage Capacity (OSC) of the TWC. This calculation is based on the voltage output of the HO2 sensor while performing active air-fuel ratio control, rather than the conventional detecting method, which uses the locus ratio.
The OSC value is an indication of the oxygen storage capacity of the TWC. When the vehicle is being driven with a warm engine, active air-fuel ratio control is performed for approximately 15 to 20 seconds. When it is performed, the ECM deliberately sets the air-fuel ratio to lean or rich levels. If the rich-lean cycle of the HO2 sensor is long, the OSC becomes greater. There is a direct correlation between the OSCs of the HO2 sensor and the TWC.
The ECM uses the OSC value to determine the state of the TWC. If any deterioration has occurred, it illuminates the MIL and sets the DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0420	OSC value smaller than standard value under active air-fuel ratio control (2 trip detection logic)	• Front exhaust pipe (with TWC) • Gas leakage from exhaust system • Air-Fuel Ratio (A/F) sensor (sensor 1) • Heated Oxygen (HO2) sensor (sensor 2)

MONITOR STRATEGY

Related DTCs	P0420: Catalyst Deterioration
Required Sensors/Components (Main)	A/F sensor and HO2 sensor
Required Sensors/Components (Related)	Intake air temperature sensor, mass air flow meter, crankshaft position sensor and engine coolant temperature sensor
Frequency of Operation	Once per driving cycle
Duration	About 30 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0031, P0032 (A/F Sensor heater - Sensor 1) P0037, P0038 (O2 Sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136 (O2 Sensor - Sensor 2) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0500 (VSS) P2196 (A/F Sensor - rationality) P2A00 (A/F Sensor - slow response)
Battery voltage	11 V or more
Intake air temperature	-10°C (14°F) or more

Engine coolant temperature	75°C (167°F) or more
Atmospheric pressure	76 kPa (570 mmHg) or more
Idling	OFF
Engine RPM	Less than 4,000 rpm
A/F sensor status	Activated
Fuel system status	Closed loop
Engine load	10 to 80 %
All of the following conditions (a), (b) and (c) are met	-
(a) Mass air flow rate	2.5 to 50 g/sec.
(b) Estimated front catalyst temperature	650 to 840°C (1,202 to 1,544°F)
(c) Estimated rear catalyst temperature	400 to 770°C (752 to 1,418°F)
Rear HO2 sensor heater monitor	Completed
Shift position	4th (Automatic transaxle) 3rd or higher (Manual transaxle)

ES

TYPICAL MALFUNCTION THRESHOLDS

Oxygen Storage Capacity (OSC) of catalytic	Less than 0.07 g

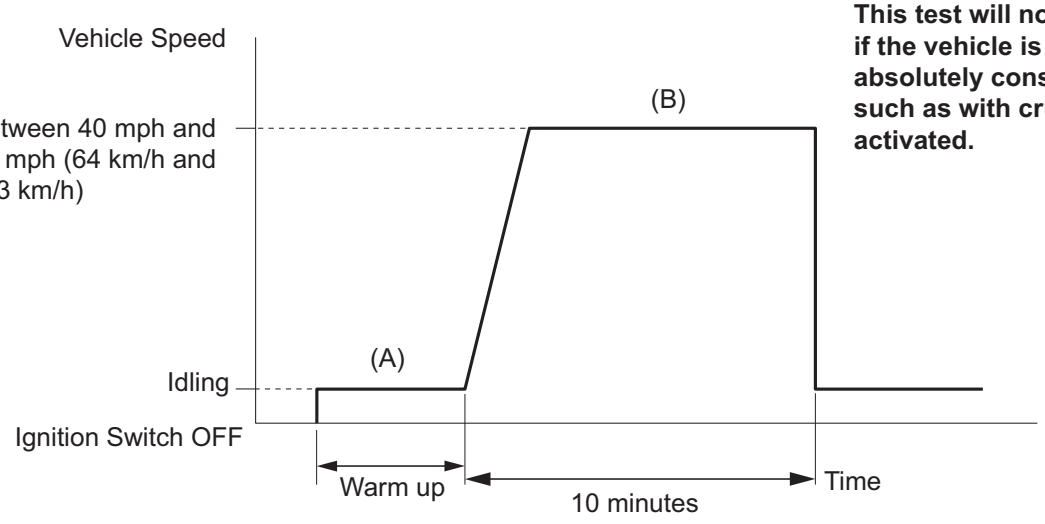
MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

CONFIRMATION DRIVING PATTERN

HINT:

Performing this confirmation pattern will activate the catalyst monitor. This is very useful for verifying completion of a repair.



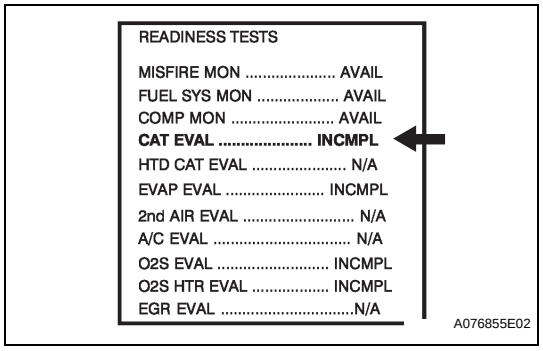
NOTICE:
This test will not be completed if the vehicle is driven at absolutely constant speed such as with cruise control activated.

(Note: Even if vehicle stops during driving pattern, test can be resumed)

P

A115372E53

1. Connect the intelligent tester to the DLC3.

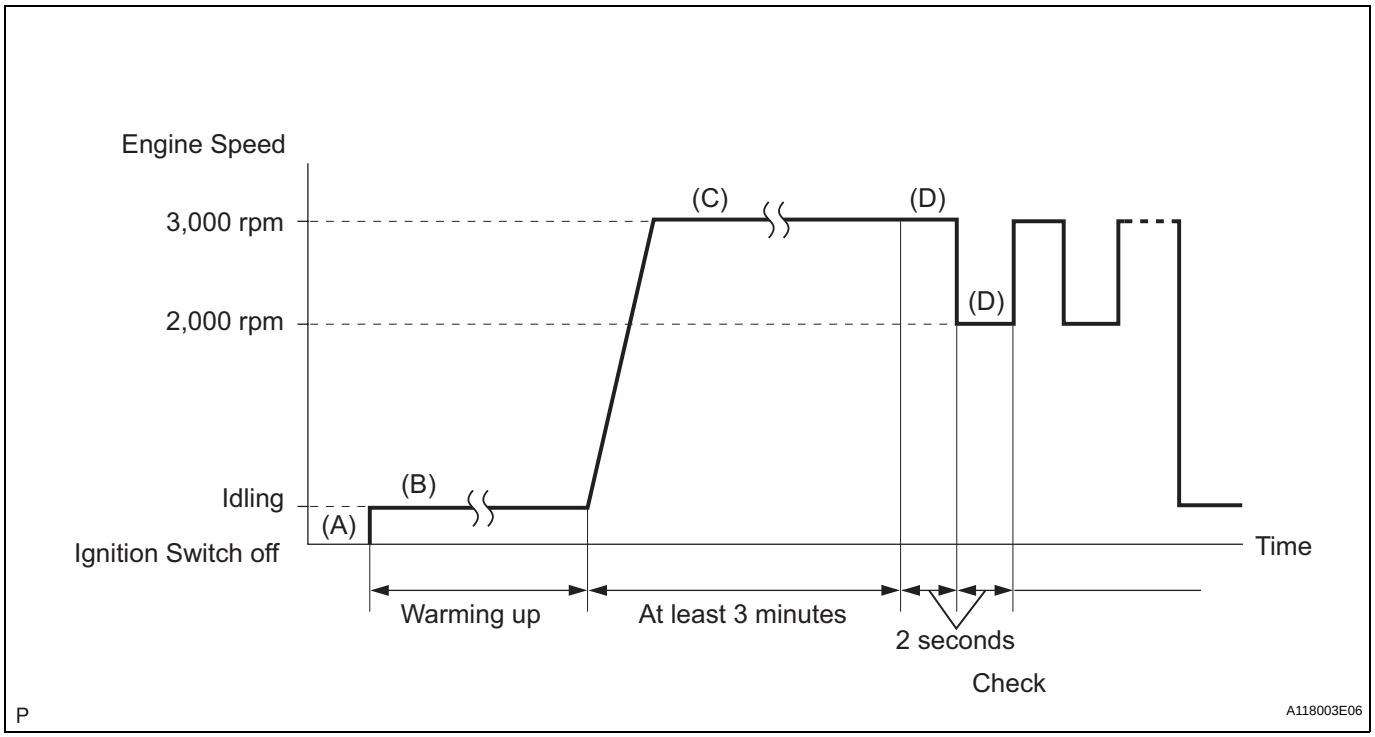


2. Turn the ignition switch to the ON position.
3. Turn the tester on.
4. Clear the DTCs (if set) (See page ES-38).
5. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / CAT CMPL.
6. Check that CAT CMPL is INCMPL (incomplete).
7. Start the engine and warm it up. (Proceed to "A")
8. Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes. (Proceed to "B")
9. Note the state of the Readiness Tests items. Those items will change to COMPL (complete) as CAT CMPL monitor operates.
10. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.

HINT:
If CAT CMPL does not change to COMPL, and any pending DTCs fail to set, extend the driving time.

CONDITIONING FOR SENSOR TESTING

HINT:
Perform the operation with the engine speeds and time durations described below prior to checking the waveforms of the A/F and HO2 sensors. This is in order to activate the sensors sufficiently to obtain the appropriate inspection results.



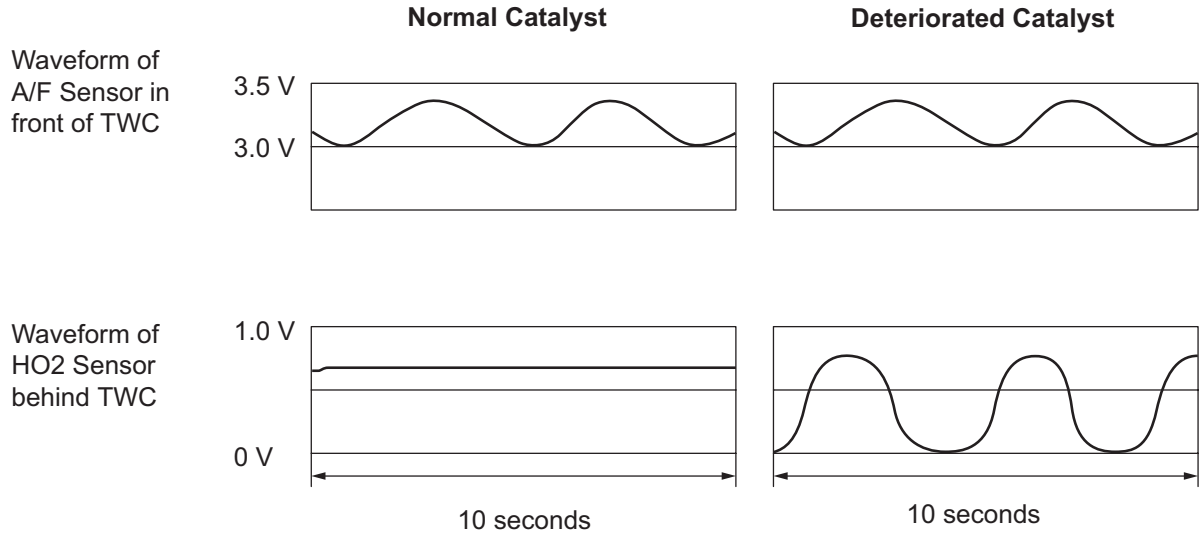
1. Connect the intelligent tester to the DLC3. (Proceed to "A")
2. Start the engine and warm it up with all the accessories switched OFF, until the engine coolant temperature stabilizes. (Proceed to "B")
3. Run the engine at an engine speed of between 2,500 rpm and 3,000 rpm for at least 3 minutes. (Proceed to "C")
4. While running the engine at 3,000 rpm and 2,000 rpm alternating at 2 second intervals, check the waveforms of the A/F and HO2 sensors using the tester. (Proceed to "D")

HINT:

- If either voltage output of the Air-Fuel Ratio (A/F) or Heated Oxygen (HO2) sensor does not fluctuate, or there is a noise in the waveform of either sensor, the sensor may be malfunctioning.
- If the voltage outputs of both the sensors remain lean or rich, the air-fuel ratio may be extremely lean or rich. In such cases, perform the following A/F CONTROL using the intelligent tester.
- If the Three-Way Catalytic Converter (TWC) has deteriorated, the HO2 sensor (located behind the TWC) voltage output fluctuates up and down frequently, even under normal driving conditions (active air-fuel ratio control is not performed).

ES

Voltage output when active air-fuel ratio control not performed:



Y

A121610E02

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0420)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0420	A
P0420 and other DTCs	B

HINT:
If any DTCs other than P0420 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

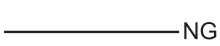
A

2 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (A/F CONTROL)

ES

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
(f) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.
Result:
A/F sensor reacts in accordance with increases and decreases in fuel injection volume:
+25 % = Rich output:
Less than 3.0 V
-12.5 % = Lean output:
More than 3.35 V

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Catalyst • Exhaust gas leakage
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		Extremely rich or lean actual air-fuel ratio • Injector • Fuel pressure • Gas leakage from exhaust system
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

ES

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; then press the YES button and then the ENTER button followed by the F4 button.

Result

Result	Proceed to
Case 1	A
Case 2	B
Case 3	C
Case 4	D

B → **REPLACE AIR-FUEL RATIO SENSOR**

C → **Go to step 4**

D → **CHECK CAUSE OF EXTREMELY RICH OR LEAN ACTUAL AIR-FUEL RATIO, REPLACE FAULTY AREA AND GO TO NEXT STEP**

A

3 CHECK FOR EXHAUST GAS LEAKAGE

OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

REPLACE THREE-WAY CATALYTIC CONVERTER (BOTH FRONT AND REAR CATALYSTS (FRONT EXHAUST PIPE))

4	CHECK FOR EXHAUST GAS LEAKAGE

OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK

REPLACE HEATED OXYGEN SENSOR

DTC	P043E	Evaporative Emission System Reference Orifice Clog Up

DTC	P043F	Evaporative Emission System Reference Orifice High Flow

DTC	P2401	Evaporative Emission Leak Detection Pump Stuck OFF

ES

DTC	P2402	Evaporative Emission Leak Detection Pump Stuck ON

DTC	P2419	Evaporative Emission System Switching Valve Control Circuit Low

DTC SUMMARY

DTCs	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P043E	Reference orifice clogged	P043E, P043F, P2401, P2402 and P2419 present when one of the following conditions is met during key-off EVAP monitor: • Reference orifice clogged • Reference orifice high-flow • Leak detection pump OFF malfunction • Leak detection pump ON malfunction • Vent valve ON (close) malfunction	• Canister pump module (Reference orifice, leak detection pump, vent valve) • Connector/wire harness (Canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	While ignition switch off	2 trip detection logic
P043F	Reference orifice high-flow				
P2401	Leak detection pump stuck OFF				
P2402	Leak detection pump stuck ON				
P2419	Vent valve stuck closed				

HINT:
The reference orifice is located inside the canister pump module.

DESCRIPTION

The description can be found in the EVAP (Evaporative Emission) System (See page ES-346).

INSPECTION PROCEDURE

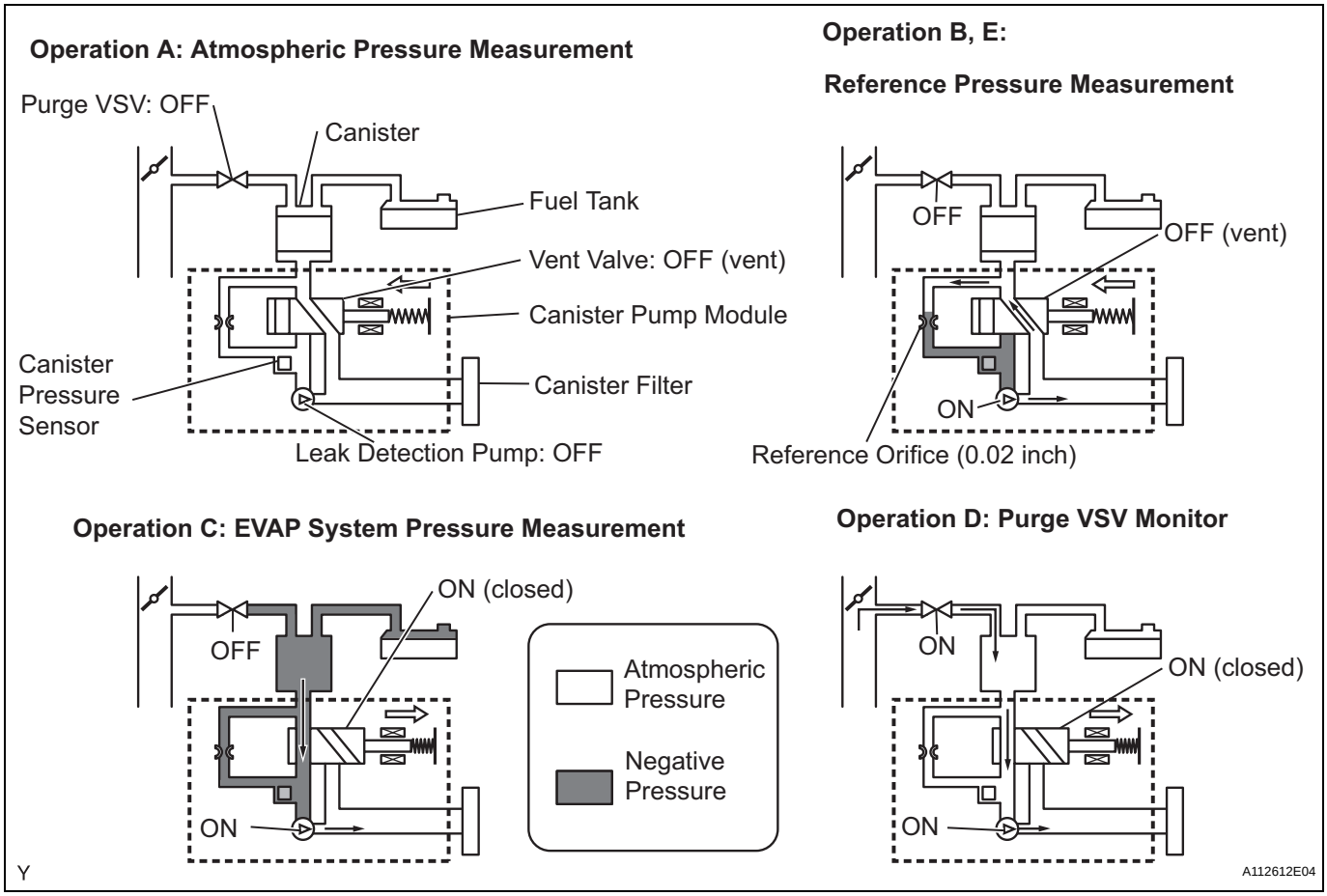
Refer to the EVAP System (See page ES-352).

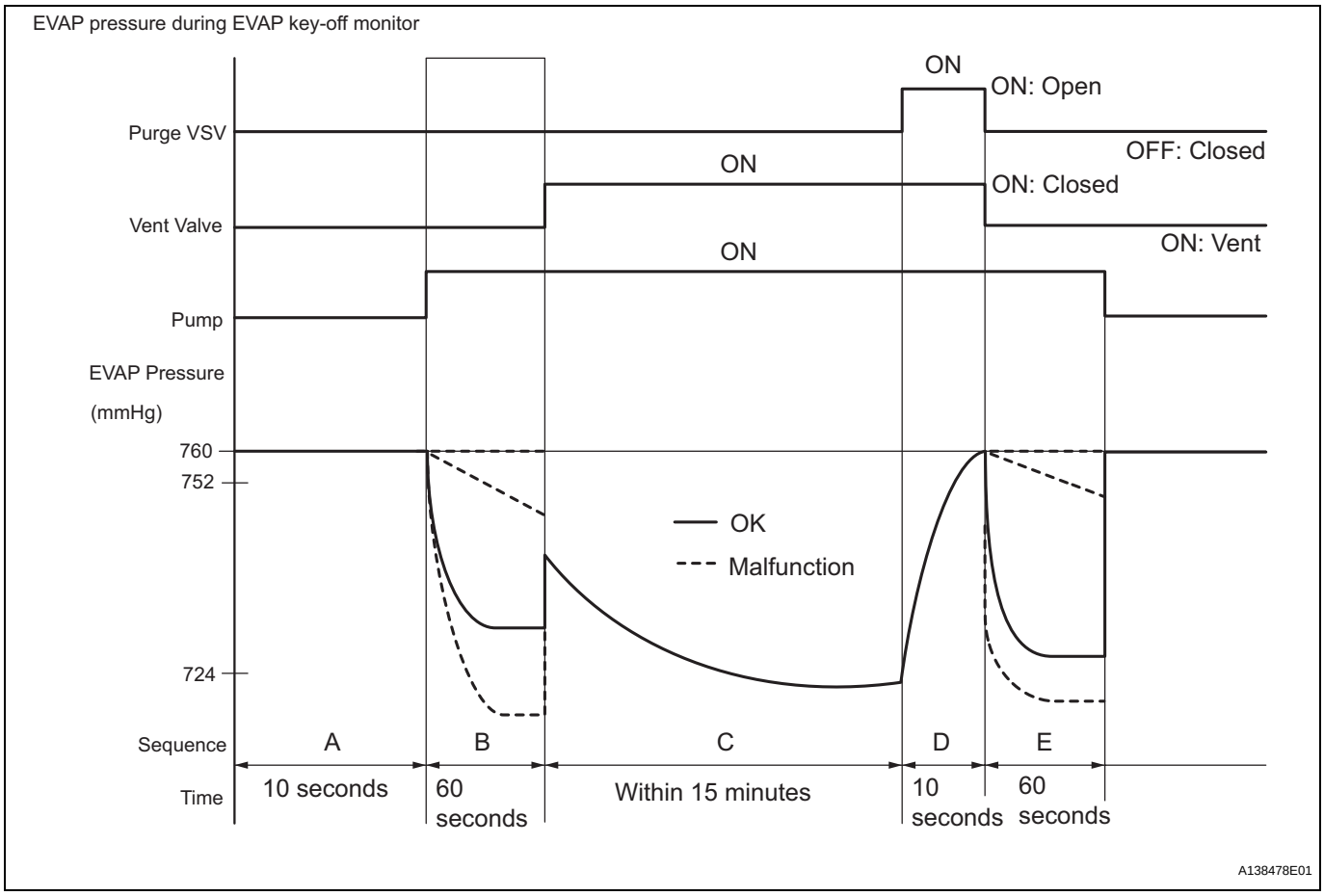
MONITOR DESCRIPTION

5 hours* after the ignition switch is turned off, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.
HINT:
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch turned off.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 76 kPa-a and 110 kPa-a (570 mmHg-a and 825 mmHg-a), ECM cancels EVAP system monitor.	10 seconds
B	First reference pressure measurement	In order to determine reference pressure, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normality.	10 seconds
E	Second reference pressure measurement	After second reference pressure measurement, leak check performed by comparing first and second reference pressure. If stabilized system pressure higher than second reference pressure, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.





The leak detection pump creates negative pressure through the reference orifice. When the system is normal, the EVAP pressure is in 724 to 752 mmHg* and saturated within a minute.
If not, the ECM interprets this as a malfunction. The ECM will illuminate the MIL and set DTC if this malfunction is detected in consecutive drive cycle.
*: Typical valve

MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 2 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
EVAP key-off monitor runs when all of the following conditions are met	-
Atmospheric pressure	70 to 110 kPa-a (525 to 825 mmHg-a)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Ignition switch	off
Time after key off	5, 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
EVAP canister purge valve	Not operated by scan tool
EVAP canister vent valve	Not operated by scan tool

EVAP leak detection pump	Not operated by scan tool
Both of the following conditions are met before key off	Conditions 1 and 2
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence runs if following condition is met	-
Atmospheric pressure change	Less than 0.3 kPa-g (2.25 mmHg-g) in 1 second

2. First reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2 and 3
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence runs if following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa-g (2.25 mmHg-g) or more

4. Vacuum introduction

Next sequence runs if following condition is met	-
EVAP pressure	Saturated within 15 minutes

5. EVAP canister purge valve close stuck check

Next sequence runs if following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa-g (2.25 mmHg-g) or more

6. Second reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds
4. Difference between first reference pressure and second reference pressure	Less than 0.5 kPa-g (3.75 mmHg-g)

7. Leak check

Next sequence runs if following condition is met	-
EVAP pressure when vacuum introduction is complete	Second reference pressure or less

8. Atmospheric pressure measurement

EVAP monitor complete if following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa-g (2.25 mmHg-g)

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.286 kPa-g (2.14 mmHg-g) in 60 seconds.

One of the following conditions is met	-
EVAP pressure just after reference pressure measurement start	More than -1 kPa-g (-7.5 mmHg-g)
Reference pressure	Less than -4.85 kPa-g (-36.4 mmHg-g)
Reference pressure	-1.057 kPa-g (-7.93 mmHg-g) or more
Reference pressure	Not saturated within 60 seconds

Difference between first reference pressure and second reference pressure	0.7 kPa-g (5.25 mmHg-g) or more

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC SUMMARY

DTC	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P0441	Purge VSV (Vacuum Switching Valve) stuck open	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. Reference pressure measured at start and at end of leak check. If stabilized pressure higher than [second reference pressure x 0.2], ECM determines that purge VSV stuck open.	• Purge VSV • Connector/wire harness (Purge VSV - ECM) • ECM • Canister pump module • Leakage from EVAP system	While ignition switch off	2 trip detection logic
	Purge VSV stuck closed	After EVAP leak check performed, purge VSV turned ON (open), and atmospheric air introduced into EVAP system. Reference pressure measured at start and at end of check. If pressure does not return to near atmospheric pressure, ECM determines that purge VSV stuck closed.	• Purge VSV • Connector/wire harness (Purge VSV - ECM) • ECM • Canister pump module • Leakage from EVAP system	While ignition switch off	2 trip detection logic
	Purge flow	While engine running, following conditions successively met: • Negative pressure not created in EVAP system when purge VSV turned ON (open) • EVAP system pressure change less than 0.5 kPa-g (3.75 mmHg-g) when vent valve turned ON (closed) • Atmospheric pressure change before and after purge flow monitor less than 0.1 kPa-g (0.75 mmHg-g)	• Purge VSV • Connector/wire harness (Purge VSV - ECM) • Leakage from EVAP line (Purge VSV - Intake manifold) • ECM	While engine running	2 trip detection logic

DESCRIPTION

The description can be found in the EVAP (Evaporative Emission) System (See page ES-346).

INSPECTION PROCEDURE

Refer to the EVAP System (See page ES-352).

MONITOR DESCRIPTION

The two monitors, Key-Off and Purge Flow, are used to detect malfunctions relating to DTC P0441. The Key-Off monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours* after the ignition switch is turned off. The purge flow monitor runs while the engine is running.

1. KEY-OFF MONITOR

   5 hours* after the ignition switch is turned off, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

   HINT:

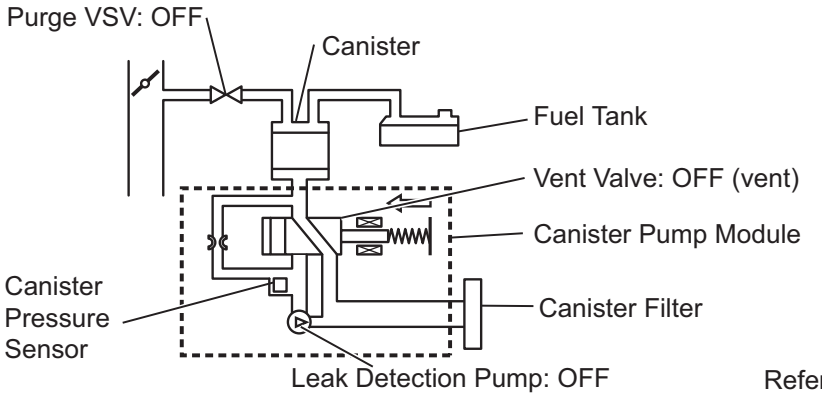
   *: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch turned off.	-

Sequence	Operations	Descriptions	Duration
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 76 kPa-a and 110 kPa-a (570 mmHg-a and 825 mmHg-a), ECM cancels EVAP system monitor.	10 seconds
B	First reference pressure measurement	In order to determine reference pressure, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normality.	10 seconds
E	Second reference pressure measurement	After second reference pressure measurement, leak check performed by comparing first and second reference pressure. If stabilized system pressure higher than second reference pressure, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

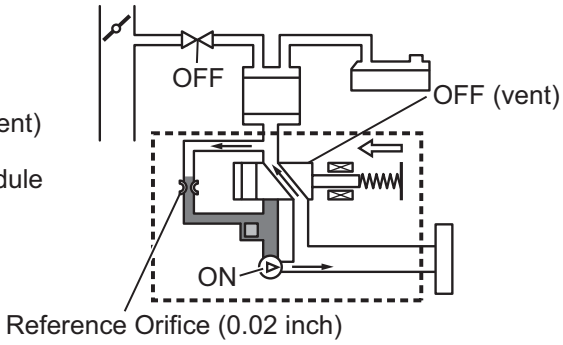
*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

Operation A: Atmospheric Pressure Measurement

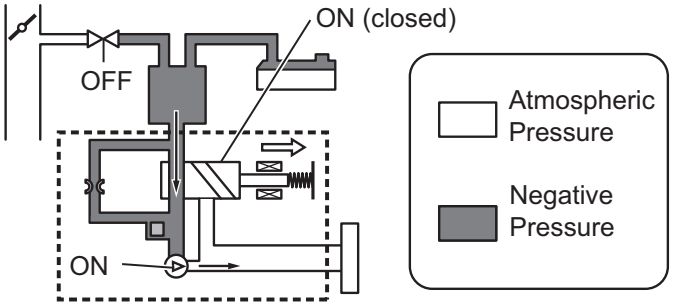


Operation B, E:

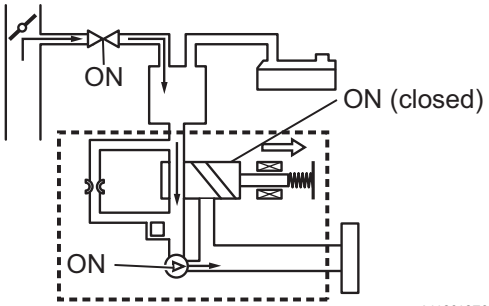
Reference Pressure Measurement



Operation C: EVAP System Pressure Measurement



Operation D: Purge VSV Monitor



Y

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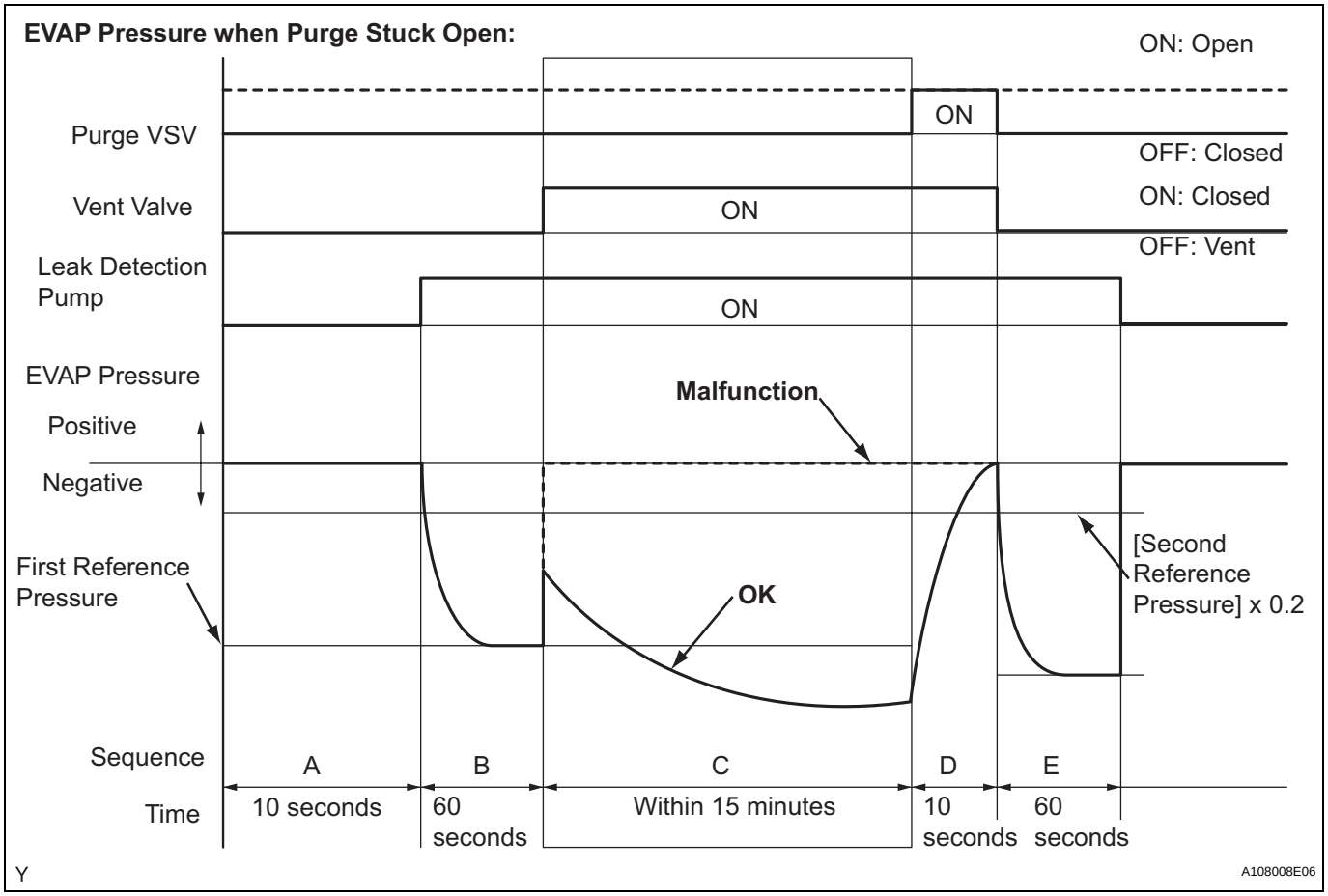
(a) Purge VSV stuck open

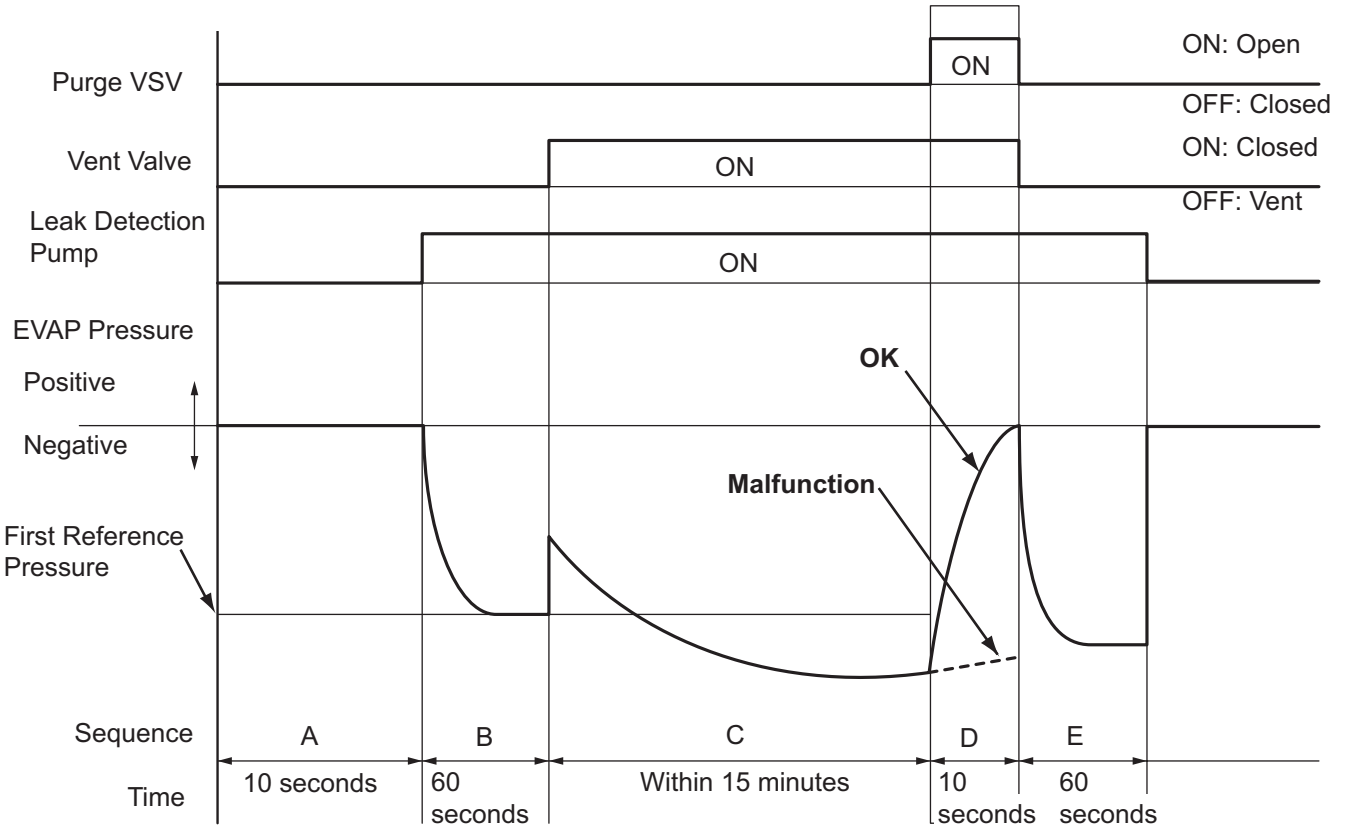
In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The EVAP system pressure is then measured by the ECM using the canister pressure sensor. If the stabilized system pressure is higher than [second reference pressure x 0.2], the ECM interprets this as the purge VSV (Vacuum Switching Valve) being stuck open. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).



(b) Purge VSV stuck closed

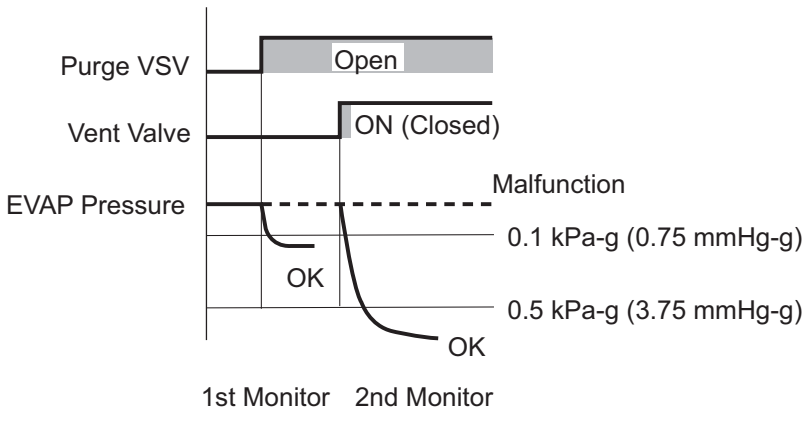
In operation D, the canister pressure sensor measures the EVAP system pressure. The pressure measurement for purge VSV monitor is begun when the purge VSV is turned ON (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa-g (2.25 mmHg-g) or more, the purge VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the purge VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when Purge VSV Stuck Closed:



2. PURGE FLOW MONITOR

EVAP Pressure During Purge Flow Monitor:



The purge flow monitor consists of the two step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the purge VSV is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa-g (3.75 mmHg-g), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:
In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

OBD II MONITOR SPECIFICATIONS

1. Key-off Monitor

Monitor Strategy

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

EVAP key-off monitor runs when all of the following conditions are met	-
Atmospheric pressure	70 to 110 kPa-a (525 to 825 mmHg-a)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Ignition switch	off
Time after key off	5, 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
EVAP canister purge valve	Not operated by scan tool
EVAP canister vent valve	Not operated by scan tool
EVAP leak detection pump	Not operated by scan tool
Both of the following conditions are met before key off	Conditions 1 and 2
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

2. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence runs if following condition is met	-
Atmospheric pressure change	Less than 0.3 kPa-g (2.25 mmHg-g) in 1 second

2. First reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2 and 3
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence runs if following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa-g (2.25 mmHg-g) or more

4. Vacuum introduction

Next sequence runs if following condition is met	-
EVAP pressure	Saturated within 15 minutes

5. EVAP canister purge valve close stuck check

Next sequence runs if following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa-g (2.25 mmHg-g) or more

6. Second reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds
4. Difference between first reference pressure and second reference pressure	Less than 0.5 kPa-g (3.75 mmHg-g)

ES

7. Leak check

Next sequence runs if following condition is met	-
EVAP pressure when vacuum introduction is complete	Second reference pressure or less

8. Atmospheric pressure measurement

EVAP monitor complete if following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa-g (2.25 mmHg-g)

Typical Malfunction Thresholds

EVAP canister purge valve stuck open:	-
EVAP pressure when vacuum introduction is complete	Higher than reference pressure x 0.2

EVAP canister purge valve stuck closed:	-
EVAP pressure change after EVAP canister purge valve is open	Less than 0.3 kPa-g (2.25 mmHg-g)

OBD II MONITOR SPECIFICATIONS

1. Purge Flow Monitor

Monitor Strategy

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions

Monitor runs whenever following DTCs are not present	P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0450 - P0453 (EVAP press sensor) P0500 (VSS)
Engine	Running
ECT	4.4°C (40°F) or more

IAT	4.4°C (40°F) or more
EVAP pressure sensor malfunction	Not detected
EVAP canister purge valve	Not operated by scan tool
EVAP system check	Not operated by scan tool
Battery voltage	10 V or more
Purge duty cycle	8 % or more

Typical Malfunction Thresholds

Both of the following conditions are met	Conditions 1 and 2
1. EVAP pressure change when purge flow is started	Less than 0.1 kPa-g (0.75 mmHg-g)
2. EVAP pressure change during purge flow when EVAP pressure switching valve is ON (closed)	Less than 0.5 kPa-g (3.75 mmHg-g)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

DTC	P0450	Evaporative Emission Control System Pressure Sensor / Switch

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range / Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input

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DTC	P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input

DTC SUMMARY

DTC	Monitoring Item	Malfunction Detection Condition	Trouble Ares	Detection Timing	Detection Logic
P0450	Canister pressure sensor voltage fluctuation abnormal	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	• Canister pump module • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition off) • Ignition ON position	1 trip detection logic
P0451	Canister pressure sensor noise	Sensor output voltage fluctuates frequently within certain time period.	• Canister pump module • Connector/wire harness (Canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition off) • Engine running	2 trip detection logic
	Canister pressure sensor signal becomes fixed/flat	Sensor output voltage does not vary within certain time period.	• Canister pump module • Connector/wire harness (Canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• EVAP monitoring (ignition off)	2 trip detection logic
P0452	Canister pressure sensor low input	EVAP pressure less than 42.1 kPa for 0.5 seconds.	• Canister pump module • Connector/wire harness (Canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• Ignition ON position • EVAP monitoring (ignition off)	1 trip detection logic

DTC	Monitoring Item	Malfunction Detection Condition	Trouble Ares	Detection Timing	Detection Logic
P0453	Canister pressure sensor high input	EVAP pressure more than 123.8 kPa for 0.5 seconds.	• Canister pump module • Connector/wire harness (Canister pump module - ECM) • EVAP system hose (pipe from air inlet port to canister pump module, canister filter, fuel tank vent hose) • ECM	• Ignition ON position • EVAP monitoring (ignition off)	1 trip detection logic

HINT:
The canister pressure sensor is built into the canister pump module.

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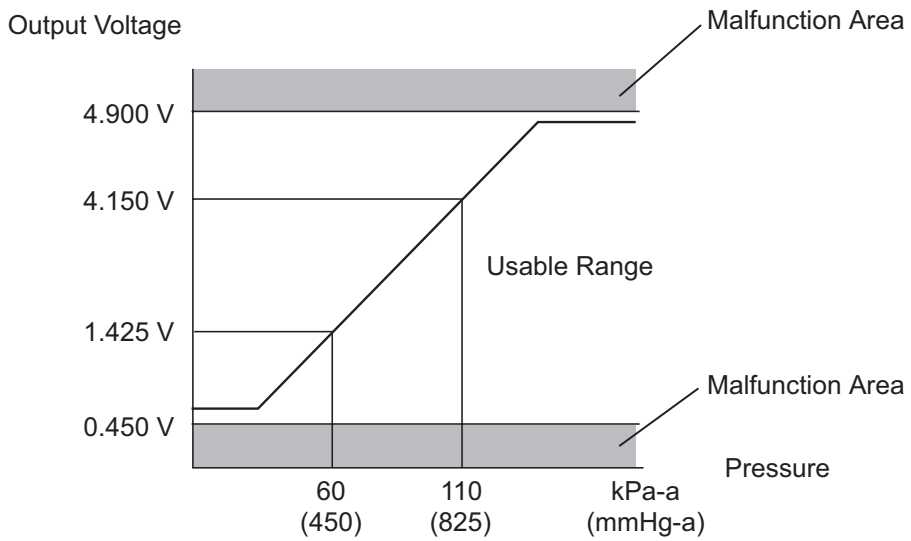
DESCRIPTION

The description can be found in the EVAP (Evaporative Emission) System (See page ES-346).

MONITOR DESCRIPTION

Canister Pressure Sensor Specification:



HINT:

Standard atmospheric pressure is 101.3 kPa-a (760 mmHg-a)

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1. DTC P0450: Canister pressure sensor abnormal fluctuation
   If the canister pressure sensor output [pressure] rapidly fluctuates between less than 42.1 kPa-a (315.9 mmHg-a) and more than 123.8 kPa-a (928.4 mmHg-a), the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP (Evaporative Emission) system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

2. DTC P0451: Canister pressure sensor noise or fixed/flat
   If the canister pressure sensor voltage output fluctuates rapidly for 10 seconds, the ECM stops the EVAP system monitor. The ECM interprets this as noise from the canister pressure sensor, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
   Alternatively, if the sensor voltage output does not change for 10 seconds, the ECM interprets this as the sensor being fixed/flat, and stops the monitor. The ECM then illuminates the MIL and sets the DTC. (Both the malfunctions are detected by 2 trip detection logic).
3. DTC P0452: Canister pressure sensor voltage low
   If the canister pressure sensor output [pressure] is below 42.1 kPa-a (315.9 mmHg-a), the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).
4. DTC P0453: Canister pressure sensor voltage high
   If the canister pressure sensor output [pressure] is 123.8 kPa-a (928.4 mmHg-a) or more, the ECM interprets this as an open or short circuit malfunction in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	Canister pump module
Frequency of Operation	Once per driving cycle: P0451 sensor fixed/flat Continuous: P0451 sensor noise, P0450, P0452 and P0453
Duration	0.5 seconds: P0450, P0452 and P0453 2 minutes: P0451
MIL Operation	Immediate: P0450, P0452 and P0453 2 driving cycles: P0451
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P0451 (Noise monitor):

Monitor runs whenever following DTCs are not present	None
Atmospheric pressure (absolute pressure)	70 to 110 kPa-a (525 to 825 mmHg-a)
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction (P0450, P0452, 0453)	Not detected
Either of the following conditions A or B is met	-
A. Engine condition	Running
B. Time after key off	5, 7 or 9.5 hours

P0451 (Fixed/flat monitor):

Monitor runs whenever following DTCs are not present	None
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction (P0450, P0452, 0453)	Not detected
Atmospheric pressure (absolute pressure)	70 to 110 kPa-a (525 to 825 mmHg-a)
Time after key off	5, 7 or 9.5 hours

P0450, P0452 and P0453:

Monitor runs whenever following DTCs are not present	None
Either of following conditions is met	(a) or (b)
(a) Ignition switch	ON
(b) Soak timer	ON
Battery voltage	8 V or more

Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0450: Canister pressure sensor chattering

EVAP pressure	Less than 42.1 kPa-a (315.9 mmHg-a), or more than 123.8 kPa-a (928.4 mmHg-a)

P0451: Canister pressure sensor noise

Frequency that EVAP pressure change 0.3 kPa-g (2.25 mmHg-g) or more	10 times or more in 10 seconds

P0451: Canister pressure sensor fixed/flat

EVAP pressure change during reference pressure measurement	Less than 0.65 kPa-g (4.88 mmHg-g)

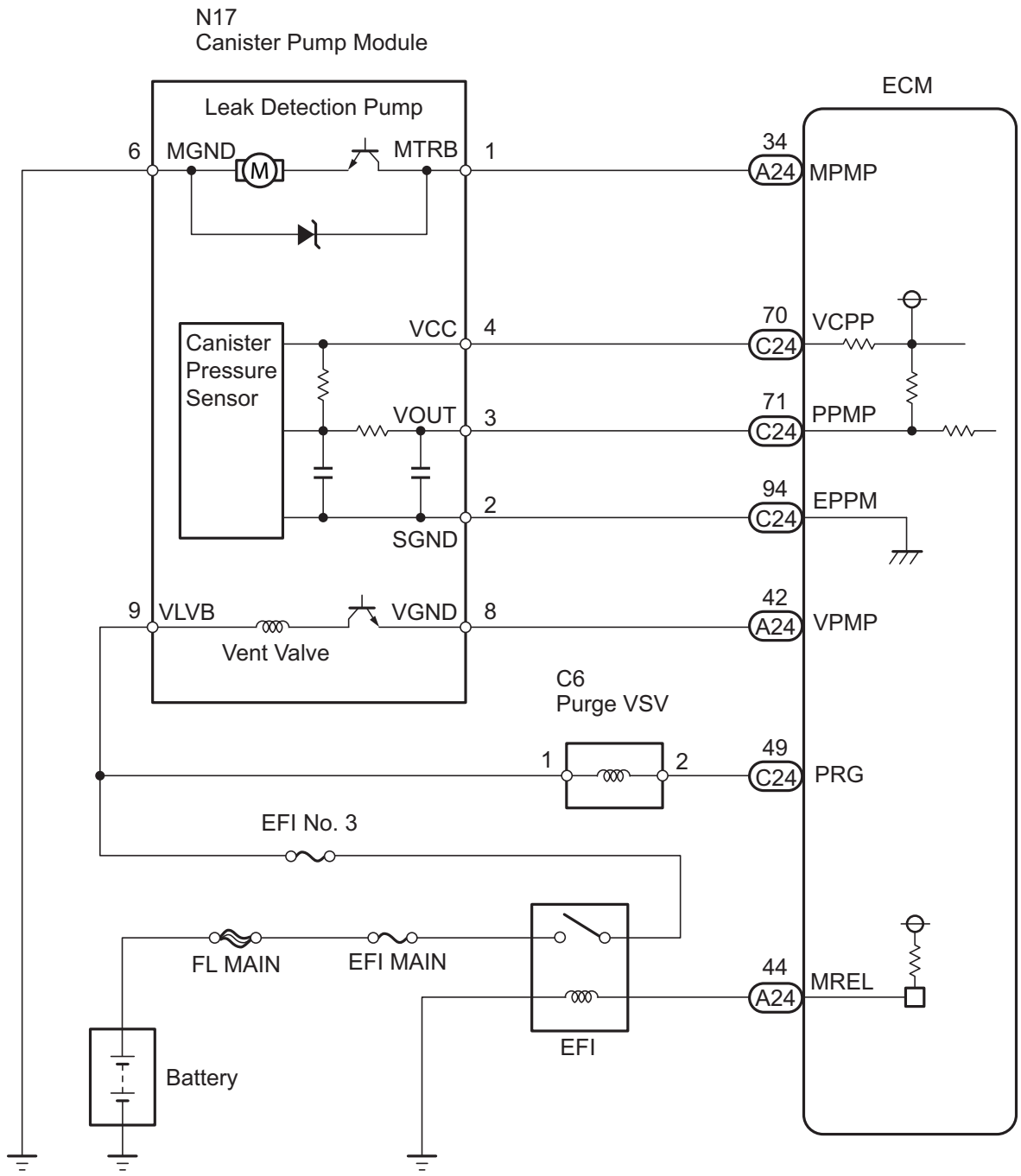
P0452: Canister pressure sensor low voltage

EVAP pressure	Less than 42.1 kPa-a (315.9 mmHg-a)

P0453: Canister pressure sensor high voltage

EVAP pressure	More than 123.8 kPa-a (928.4 mmHg-a)

WIRING DIAGRAM



INSPECTION PROCEDURE

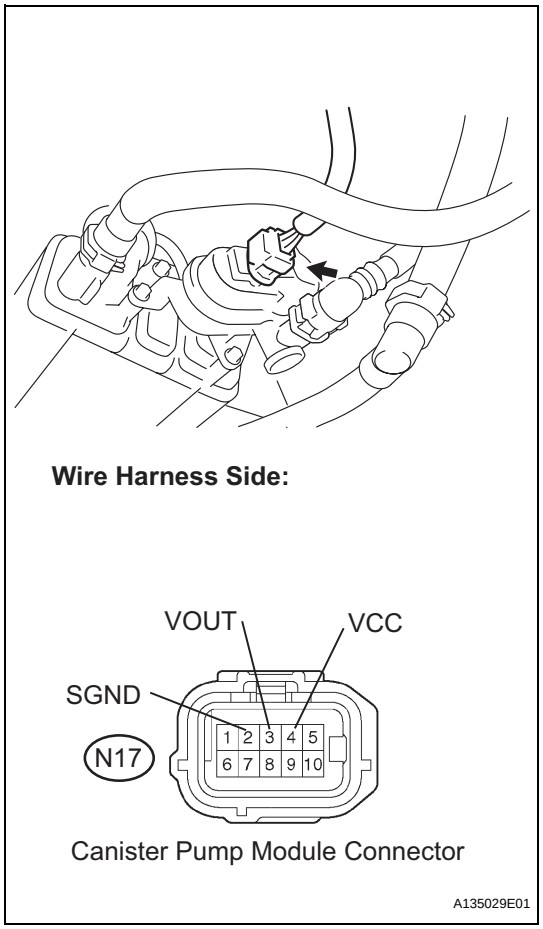
NOTICE:

- **When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel cap.**
- **Do not disassemble the canister pump module.**
- **An intelligent tester is required to conduct the following diagnostic troubleshooting procedure.**

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)



(a) Disconnect the N17 canister pump module connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage and resistance of the canister connector.

Standard

Tester Connection	Specified Condition
N17-4 (VCC) - Body ground	4.5 to 5.5 V
N17-3 (VOUT) - Body ground	4.5 to 5.5 V
N17-2 (SGND) - Body ground	100 Ω or less

Result

Test Result	Proceed to
Voltage and resistance within standard ranges	A
Voltage and resistance outside standard ranges	B

(d) Reconnect the canister pump module connector.

B → Go to step 3

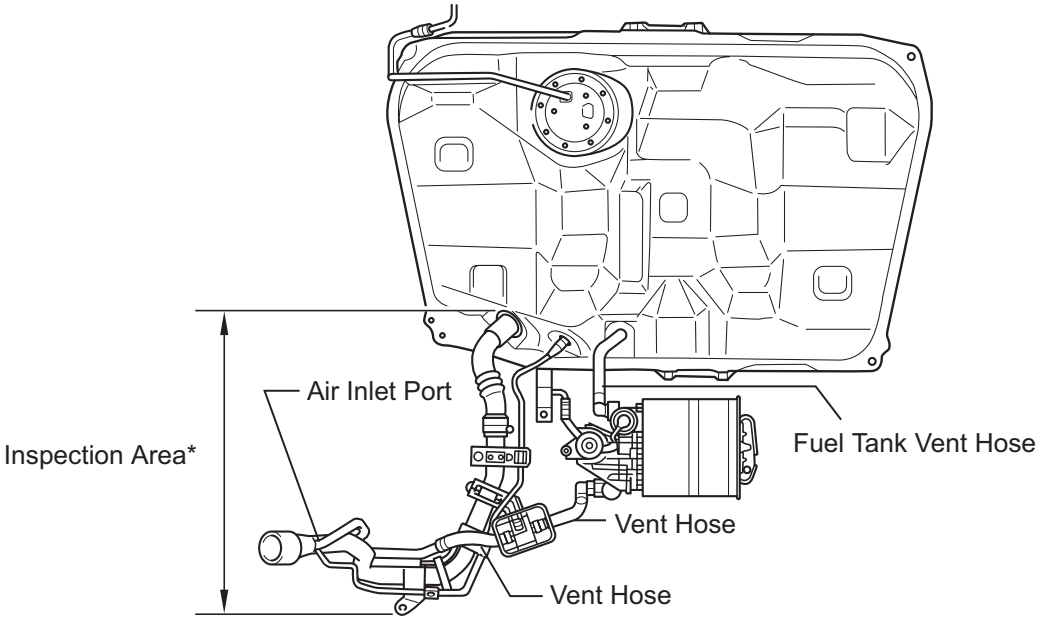
A

2	REPLACE CHARCOAL CANISTER ASSEMBLY

(a) Replace the canister assembly (See page EC-9).

NOTICE:
When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.

Except PZEV:



*: Check for disconnection and/or crack

N

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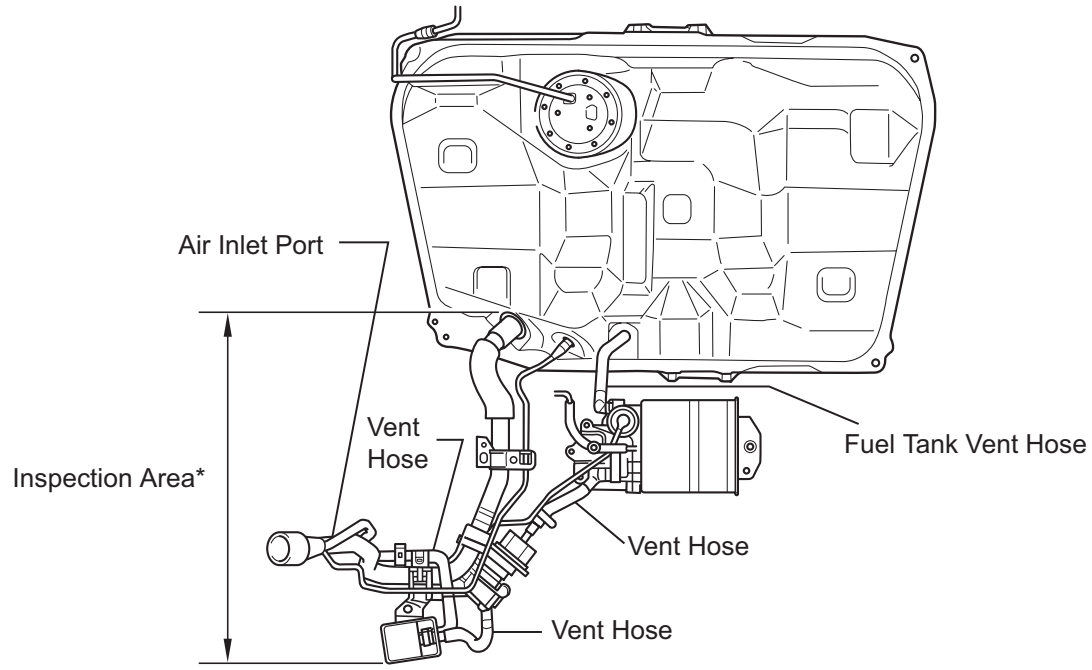
PZEV:

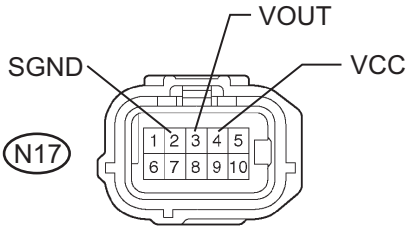


ES

NEXT → **Go to step 5**

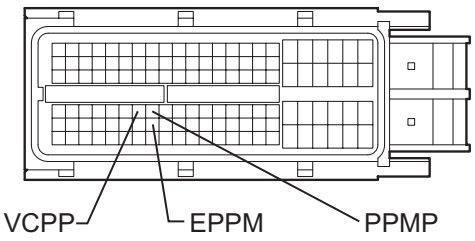
3 CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)

Wire Harness Side:



Canister Pump Module Connector

C24 ECM Connector



(a) Disconnect the N17 canister pump module connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N17-4 (VCC) - C24-70 (VCPP)	Below 1 Ω
N17-3 (VOUT) - C24-71 (PPMP)	Below 1 Ω
N17-2 (SGND) - C24-94 (EPPM)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
N17-4 (VCC) or C24-70 (VCPP) - Body ground	10 kΩ or higher
N17-3 (VOUT) or C24-71 (PPMP) - Body ground	10 kΩ or higher
N17-2 (SGND) or C24-94 (EPPM) - Body ground	10 kΩ or higher

(d) Reconnect the canister pump module connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR AND GO TO STEP 5**

OK

4	REPLACE ECM

(a) Replace the ECM (See page ES-432).

NEXT → Go to step 5

5	CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Wait for at least 60 seconds.
(d) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTCs are displayed on the tester, the repair has been successfully completed.

NEXT

COMPLETED

DTC	P0455	Evaporative Emission Control System Leak Detected (Gross Leak)

DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

DTC SUMMARY

DTCs	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P0455	EVAP gross leak	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. Reference pressure measured at start and at end of leak check. If stabilized pressure higher than [second reference pressure x 0.2], ECM determines that EVAP system has large leak.	• Fuel cap (loose) • Leakage from EVAP line (Canister - Fuel tank) • Leakage from EVAP line (Purge VSV - Canister) • Canister pump module • Leakage from fuel tank • Leakage from canister	While ignition switch off	2 trip detection logic
P0456	EVAP small leak	Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. Reference pressure measured at start and at end of leak check. If stabilized pressure higher than second reference pressure, ECM determines that EVAP system has a small leak.	• Fuel cap (loose) • Leakage from EVAP line (Canister - Fuel tank) • Leakage from EVAP line (Purge VSV - Canister) • Canister pump module • Leakage from fuel tank • Leakage from canister	While ignition switch off	2 trip detection logic

ES

DESCRIPTION

The description can be found in the EVAP (Evaporative Emission) System (See page ES-346).

INSPECTION PROCEDURE

Refer to the EVAP System (See page ES-352).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned off, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

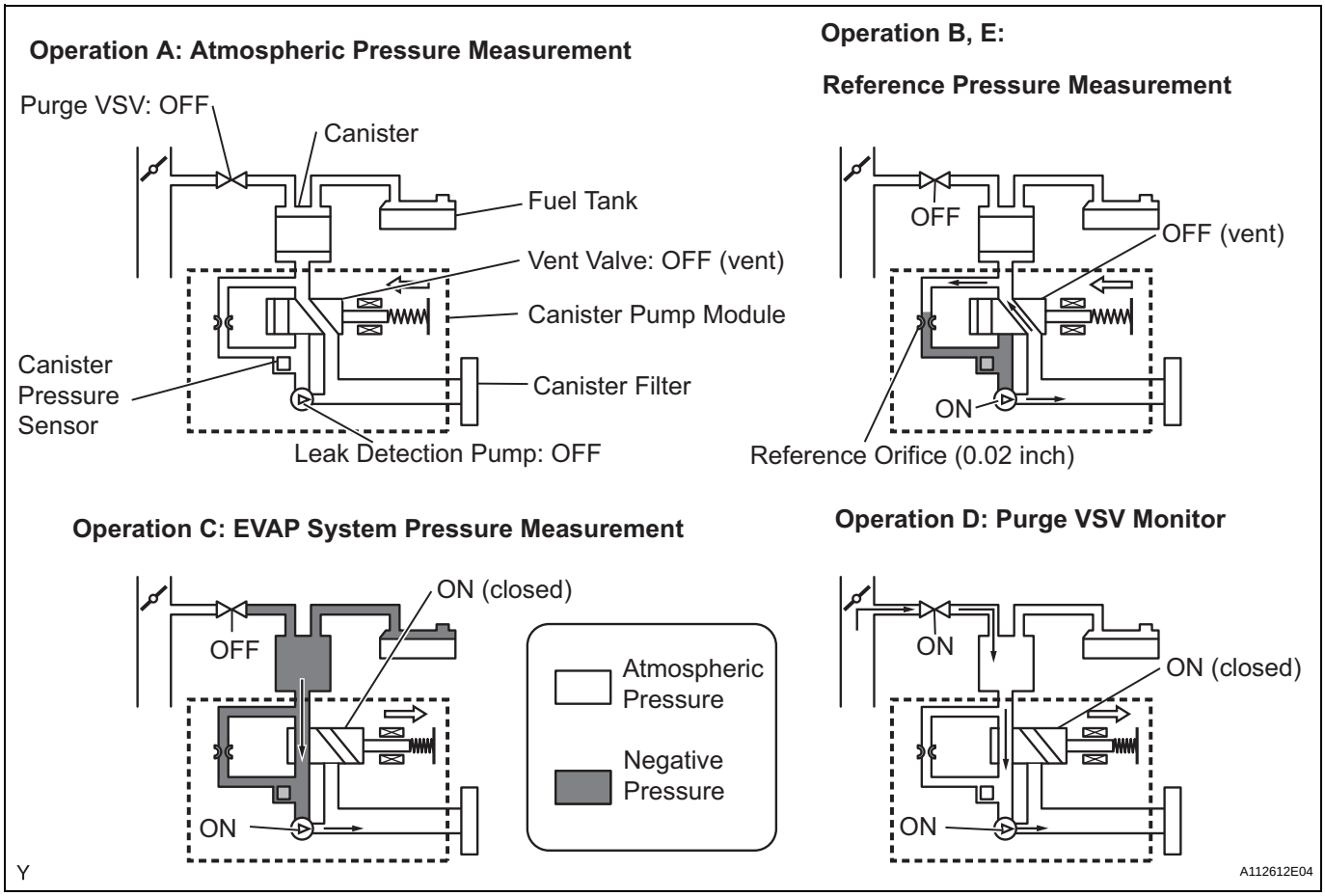
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch turned off.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 76 kPa-a and 110 kPa-a (570 mmHg-a and 825 mmHg-a), ECM cancels EVAP system monitor.	10 seconds
B	First reference pressure measurement	In order to determine reference pressure, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*

Sequence	Operations	Descriptions	Duration
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normality.	10 seconds
E	Second reference pressure measurement	After second reference pressure measurement, leak check performed by comparing first and second reference pressure. If stabilized system pressure higher than second reference pressure, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

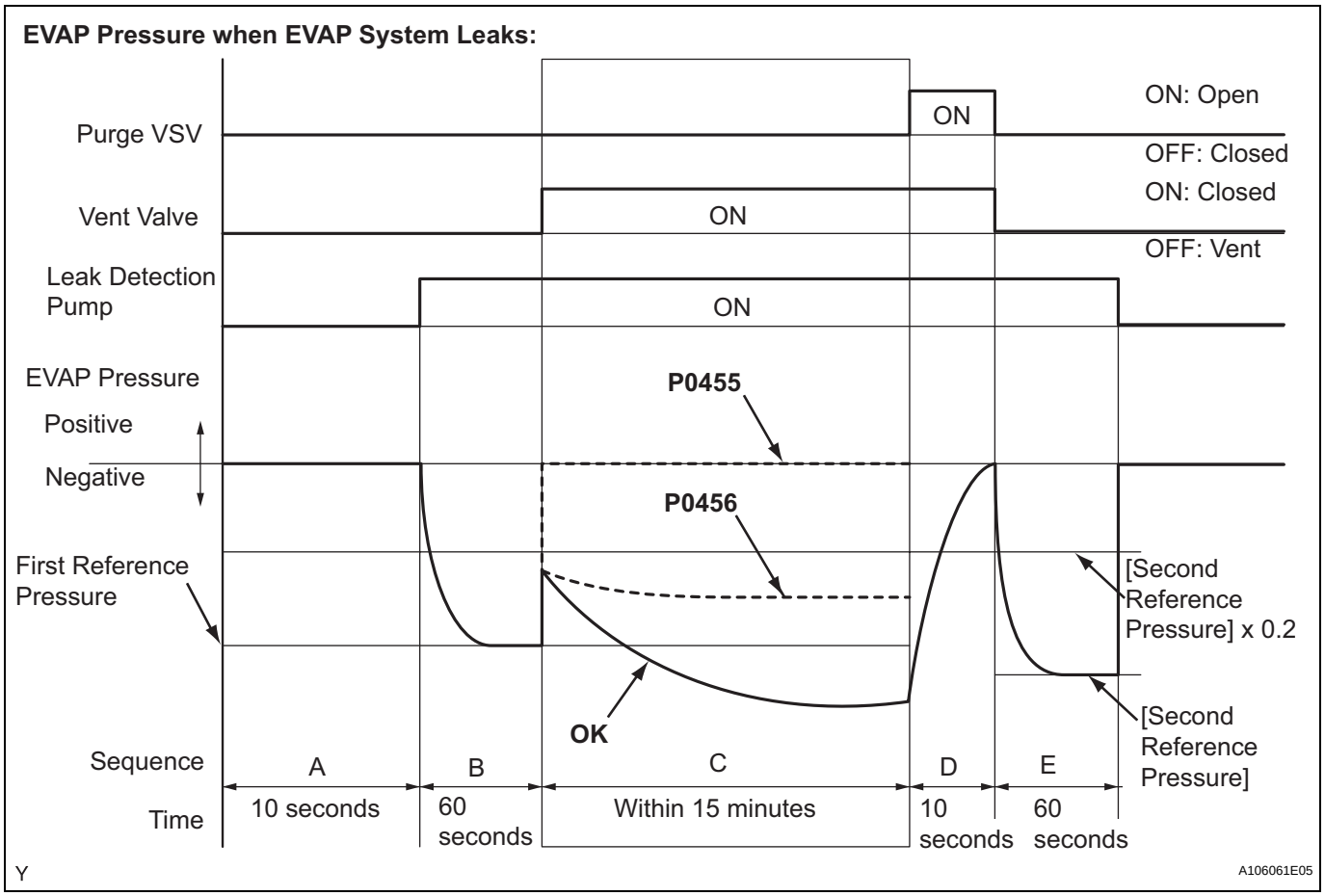


(a) P0455: EVAP gross leak

In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than [second reference pressure x 0.2] (near atmospheric pressure), the ECM determines that the EVAP system has a large leakage, illuminates the MIL and sets the DTC (2 trip detection logic).

(b) P0456: EVAP very small leak

In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than the second reference pressure, the ECM determines that the EVAP system has a small leakage, illuminates the MIL and sets the DTC (2 trip detection logic).



MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
EVAP key-off monitor runs when all of the following conditions are met	-
Atmospheric pressure	70 to 110 kPa-a (525 to 825 mmHg-a)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Ignition switch	off
Time after key off	5, 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
EVAP canister purge valve	Not operated by scan tool
EVAP canister vent valve	Not operated by scan tool

EVAP leak detection pump	Not operated by scan tool
Both of the following conditions are met before key off	Conditions 1 and 2
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence runs if following condition is met	-
Atmospheric pressure change	Less than 0.3 kPa-g (2.25 mmHg-g) in 1 second

2. First reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2 and 3
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds

3. Vent valve stuck closed check

Next sequence runs if following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa-g (2.25 mmHg-g) or more

4. Vacuum introduction

Next sequence runs if following condition is met	-
EVAP pressure	Saturated within 15 minutes

5. EVAP canister purge valve close stuck check

Next sequence runs if following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa-g (2.25 mmHg-g) or more

6. Second reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds
4. Difference between first reference pressure and second reference pressure	Less than 0.5 kPa-g (3.75 mmHg-g)

7. Leak check

Next sequence runs if following condition is met	-
EVAP pressure when vacuum introduction is complete	Second reference pressure or less

8. Atmospheric pressure measurement

EVAP monitor complete if following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa-g (2.25 mmHg-g)

TYPICAL MALFUNCTION THRESHOLDS

P0455: EVAP gross leak

EVAP pressure when vacuum introduction is complete	Higher than reference pressure x 0.2

P0456: EVAP small leak

EVAP pressure when vacuum introduction is complete	Between reference pressure and reference pressure x 0.2

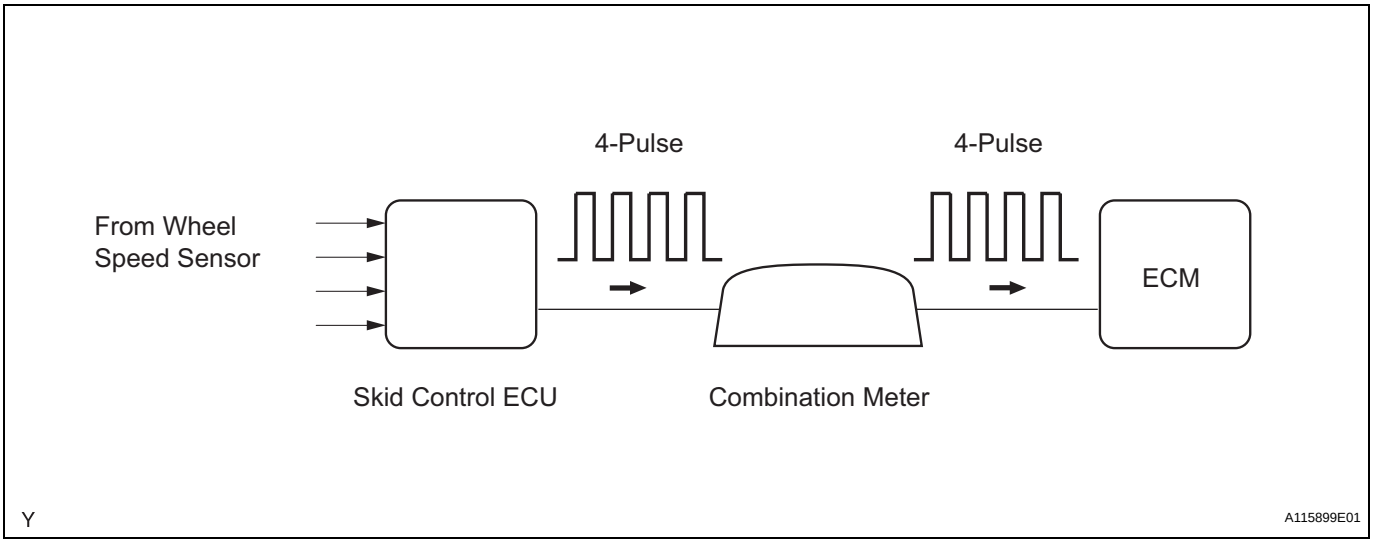
MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

DTC	P0500	Vehicle Speed Sensor "A"

DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	While vehicle being driven, no vehicle speed sensor signal transmitted to ECM (1 trip detection logic: Automatic transaxle) (2 trip detection logic: Manual transaxle)	• Open or short in speed signal circuit • Vehicle speed sensor • Combination meter • ECM • Skid control ECU

MONITOR DESCRIPTION

The ECM assumes that the vehicle is being driven, when the indicated engine speed is more than 2,300 rpm and 30 seconds have elapsed since the Park/Neutral Position (PNP) switch was turned OFF. If there is no speed signal from the combination meter, despite these conditions being met, the ECM interprets this as a malfunction in the speed signal circuit. The ECM then illuminates the MIL and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0500: Vehicle speed sensor "A" pulse input error
Required Sensors/Components (Main)	Vehicle Speed Sensor (VSS), Combination meter and Skid control ECU
Required Sensors/Components (Related)	Park/Neutral Position (PNP) switch, Engine Coolant Temperature (ECT) sensor, Crankshaft Position (CKP) sensor, Throttle Position (TP) sensor and Mass Air Flow (MAF) meter
Frequency of Operation	Continuous
Duration	2 seconds: Automatic Transaxle 8 seconds: Manual Transaxle
MIL Operation	Immediate: Automatic Transaxle 2 driving cycles: Manual Transaxle
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Automatic transmission:

Monitor runs whenever following DTCs are not present	P0120 - P0223, P2135 (TP sensor)
Either of the following conditions (a) or (b) is met:	-
(a) Following conditions 1 and 2 are met:	-
1. ECT and ECT sensor	20°C (68°F) or more, and sensor does not malfunction (P0115 or P0116)
2. Time after PNP switch turned OFF	10 seconds or more
(b) Following conditions 1 and 2 are met:	-
1. ECT and ECT sensor	Less than 20°C (68°F), and sensor malfunction (P0115 or P0116)
2. Time after PNP switch turned OFF	30 seconds or more
Time after ignition switch turned ON position	More than 0.5 seconds
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

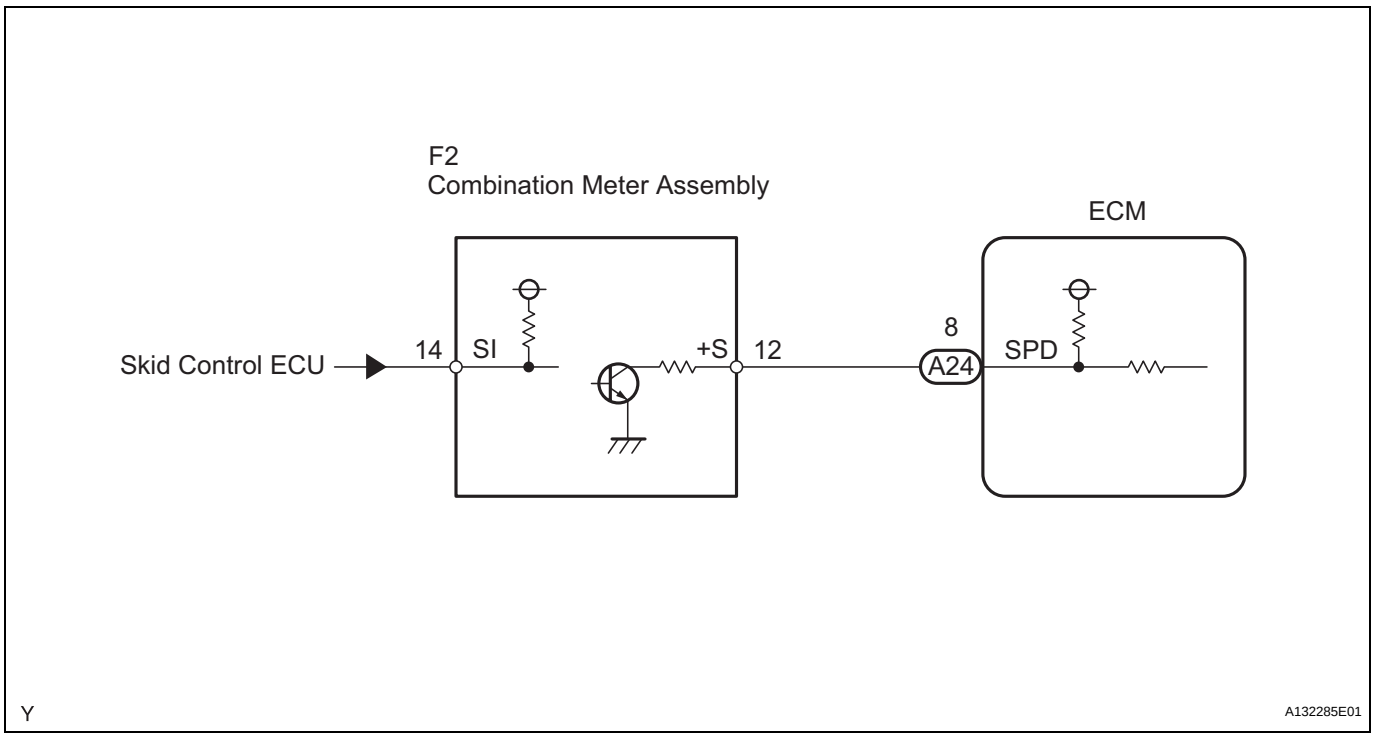
Manual transmission:

Monitor runs whenever following DTCs are not present	P0100 - P0103, (MAF sensor) P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop)
ECT	70°C (158°F) or more
Engine PRM	2,000 rpm or more, and less than 4,500 rpm
Engine Load	33.7%
Battery voltage	8 V or more
Starter	OFF
Ignition switch	ON
ECT sensor circuit	OK
MAF sensor circuit	OK

TYPICAL MALFUNCTION THRESHOLDS

Vehicle speed sensor signal	No pulse input

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check whether the operation of the speedometer in the combination meter is normal.
HINT:
- The vehicle speed sensor is operating normally if the speedometer reading is normal.
- If the speedometer does not operate, check it by following the procedure described in speedometer malfunction (See page ME-44).

NG → GO TO MALFUNCTION IN SPEEDOMETER

OK

2	READ VALUE USING INTELLIGENT TESTER (VEHICLE SPD)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.

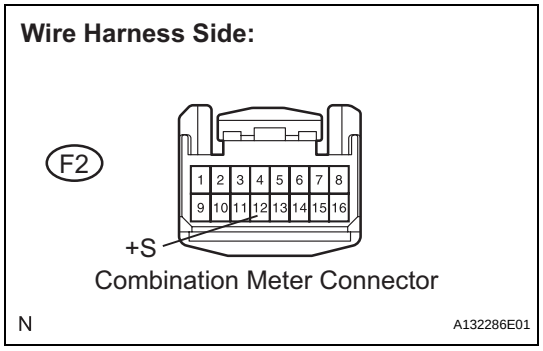
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / VEHICLE SPD.
(e) Drive the vehicle.
(f) Read the value displayed on the tester.
OK:
Vehicle speeds displayed on tester and speedometer display are equal.

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

ES

3 CHECK COMBINATION METER ASSEMBLY (+S VOLTAGE)



(a) Disconnect the F2 combination meter connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminal of the combination meter and body ground.
Standard voltage

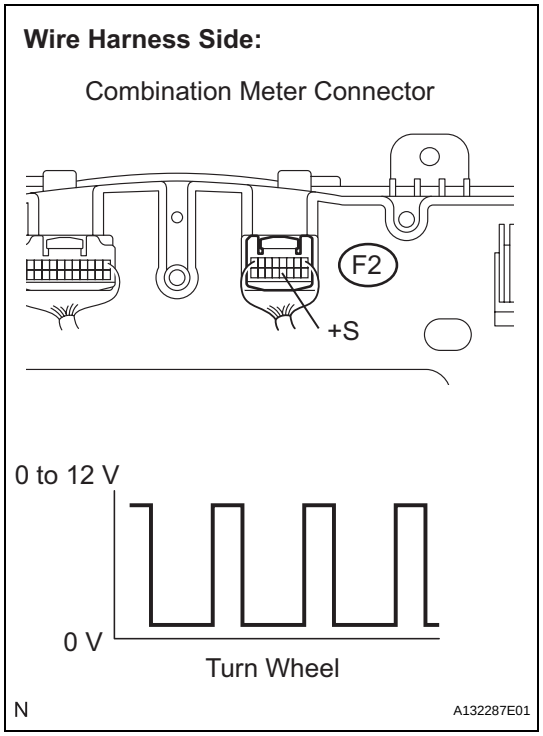
Tester Connection	Specified Condition
F2-12 (+S) - Body ground	4.5 to 5.5 V

(d) Reconnect the combination meter connector.

NG → **Go to step 5**

OK

4 CHECK COMBINATION METER ASSEMBLY (SPD SIGNAL WAVEFORM)



(a) Shift the transmission gear selector lever to the neutral position.
(b) Jack up the vehicle.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage between the terminal of the combination meter and body ground while the wheel is turned slowly.
Standard voltage

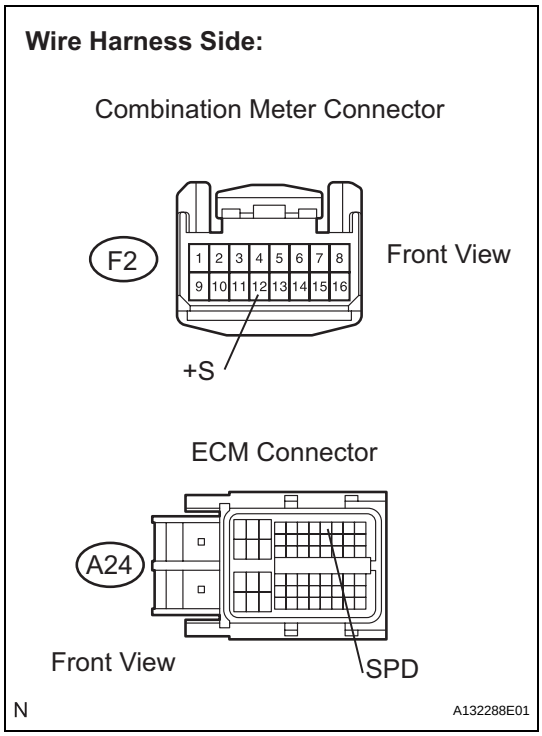
Tester Connection	Specified Condition
F2-12 (+S) - Body ground	Voltage generated intermittently

HINT:
The output voltage should fluctuate up and down, similarly to the diagram, when the wheel is turned slowly.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

5	CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - ECM)



(a) Disconnect the F2 combination meter connector.
(b) Disconnect the A24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
F2-12 (+S) - A24-8 (SPD)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
F2-12 (+S) or A24-8 (SPD) - Body ground	10 kΩ or higher

(d) Reconnect the combination meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

DTC	P0504	Brake Switch "A" / "B" Correlation

DESCRIPTION

The stop light switch is a duplex system that transmits two signals: STP and ST1-. These two signals are used by the ECM to monitor whether or not the brake system is working properly. If the signals, which indicate the brake pedal is being depressed and released, are detected simultaneously, the ECM interprets this as a malfunction in the stop light switch and sets the DTC.

HINT:

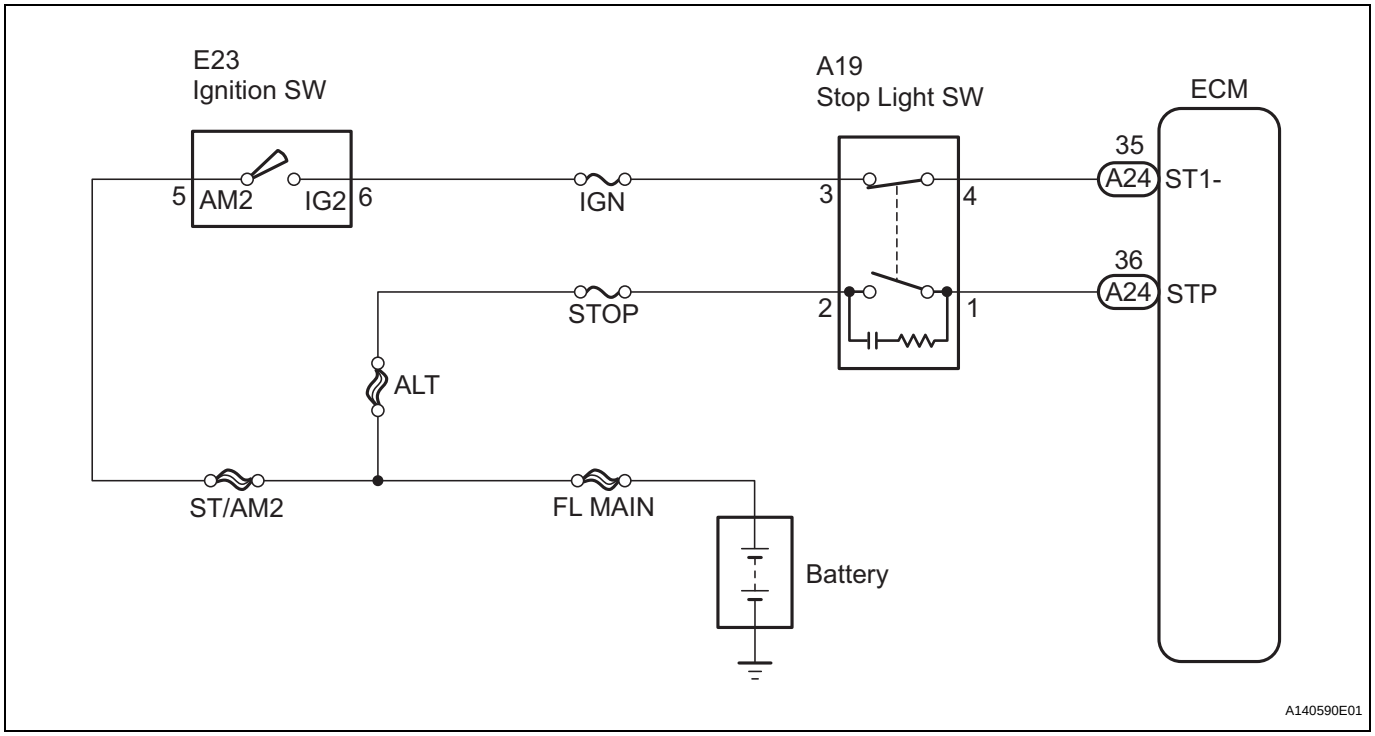
The normal conditions are as shown in the table below. The signals can be read using the intelligent tester.

Signals	Brake Pedal Released	In Transition	Brake Pedal Depressed
STP	OFF	ON	ON
ST1-	ON	ON	OFF

ES

DTC No.	DTC Detection Condition	Trouble Area
P0504	Conditions (a), (b) and (c) continue for 0.5 seconds or more (1 trip detection logic): (a) Ignition switch to the ON position (b) Brake pedal released (c) STP signal OFF when ST1- signal OFF	• Short in stop light switch signal circuit • STOP fuse • IGN fuse • Stop light switch • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

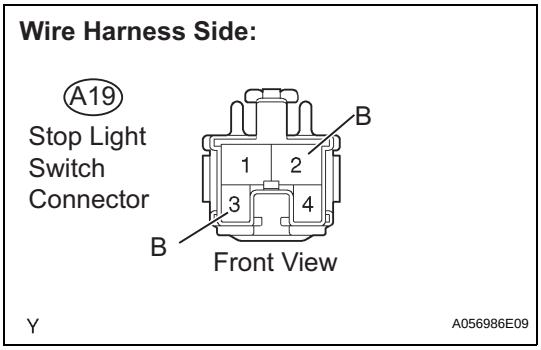
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- STP signal conditions can be checked using the intelligent tester.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STOP LIGHT SW.
(e) Check the STP signal when the brake pedal is depressed and released.

Brake Pedal Operation	Specified Condition
Depressed	STP signal ON
Released	STP signal OFF

ES

1 CHECK STOP LIGHT SWITCH ASSEMBLY (TERMINAL B VOLTAGE)



(a) Disconnect the A19 stop light switch connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminals of the stop light switch connector and body ground.
Standard voltage

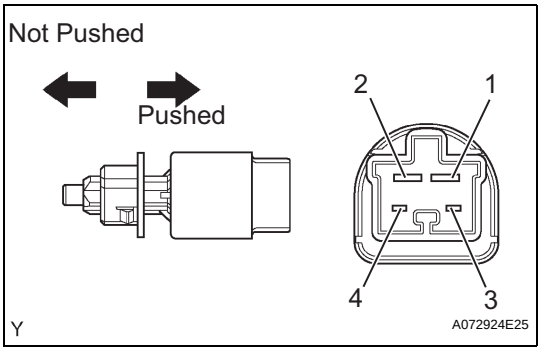
Tester Connection	Specified Condition
A19-2 (B) - Body ground	9 to 14 V
A19-3 (B) - Body ground	9 to 14 V

(d) Reconnect the stop light switch connector.

NG → Go to step 4

OK

2 INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Remove the stop light switch assembly.
(b) Measure the resistance between the terminals.
Standard resistance

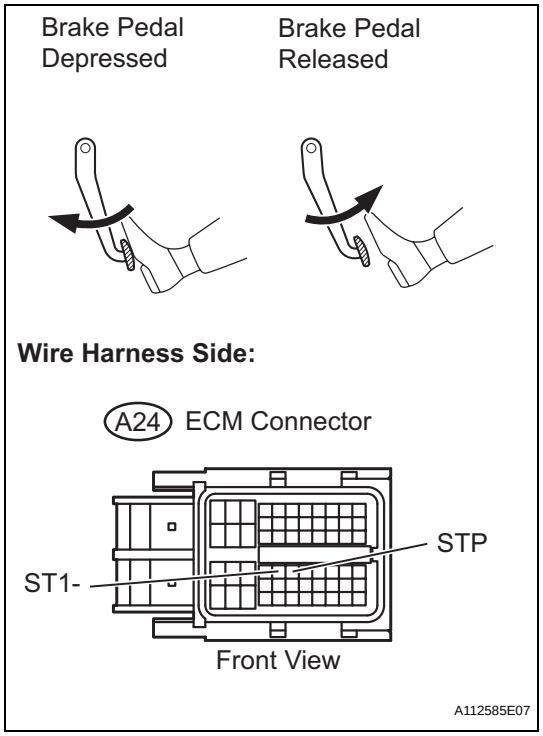
Tester Connection	Switch Position	Specified Condition
1 - 2	Switch pin not pushed	Below 1 Ω
	Switch pin pushed	10 kΩ or higher
3 - 4	Switch pin not pushed	10 kΩ or higher
	Switch pin pushed	Below 1 Ω

(c) Reinstall the stop light switch assembly.

NG → REPLACE STOP LIGHT SWITCH ASSEMBLY

OK

3 CHECK ECM (STP AND ST1 - VOLTAGE)



(a) Disconnect the A24 ECM connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between terminals ST1- and STP of the A24 ECM connector and body ground.
Standard voltage

Tester Connection	Brake Pedal Operation	Specified Condition
A24-35 (ST1-) - Body ground	Released	9 to 14 V
	Depressed	0 to 3 V
A24-36 (STP) - Body ground	Released	0 to 3 V
	Depressed	9 to 14 V

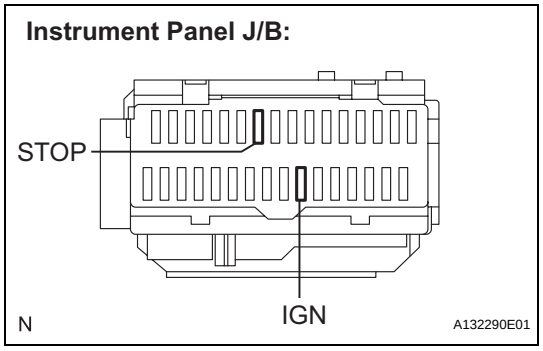
(d) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

4 INSPECT FUSE (STOP AND IGN FUSE)



(a) Remove the STOP and IGN fuses from the instrument panel J/B.
(b) Measure the resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the STOP and IGN fuses.

NG → **REPLACE FUSES (STOP AND/OR IGN FUSES)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

ES

DTC	P0505	Idle Control System Malfunction

DESCRIPTION

The idling speed is controlled by the ETCS (Electronic Throttle Control System). The ETCS is comprised of: 1) the one valve type throttle body; 2) the throttle actuator, which operates the throttle valve; 3) the Throttle Position (TP) sensor, which detects the opening angle of the throttle valve; 4) the Accelerator Pedal Position (APP) sensor, which detects the accelerator pedal position; and 5) the ECM, which controls the ETCS. Based on the target idling speed, the ECM controls the throttle actuator to provide the proper throttle valve opening angle.

DTC No.	DTC Detection Condition	Trouble Area
P0505	Idling speed continues to vary greatly from target idling speed (2 trip detection logic)	• ETCS • Air induction system • PCV hose connections • ECM

ES

MONITOR DESCRIPTION

The ECM monitors the idling speed and idling air flow volume to conduct Idle Speed Control (ISC). The ECM determines that the ISC system is malfunctioning if the following conditions are met:

- The learned idling air flow volume remains at the maximum or minimum volume 5 times or more during a driving cycle.
- After driving at 6.25 mph (10 km/h) or more, the actual engine idling speed varies from the target idling speed by between 100 rpm and 200 rpm, 5 times or more during a driving cycle.

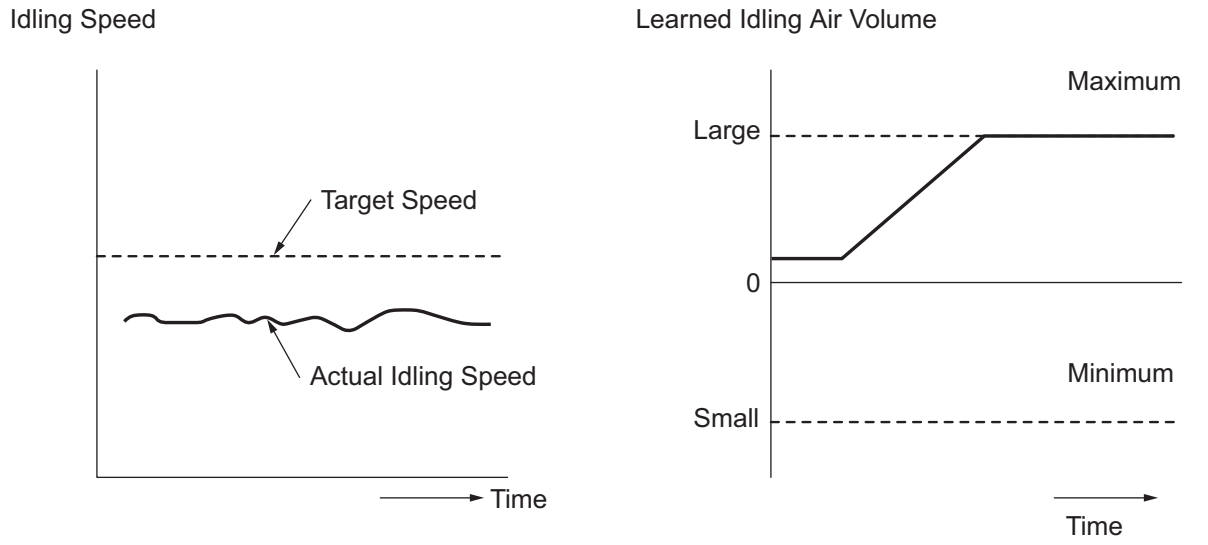
Example:

If the actual idling speed varies from the target idling speed by more than 200 rpm* 5 times during a driving cycle, the ECM illuminates the MIL and sets the DTC.

HINT:

*: Threshold idling speed varies with engine load.

Example:



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A121611E02

ES

MONITOR STRATEGY

Related DTCs	P0505: ISC function
Required Sensors/Components (Main)	ETCS
Required Sensors/Components (Related)	Crankshaft position sensor, Engine coolant temperature sensor, and Vehicle speed sensor
Frequency of Operation	Once per driving cycle
Duration	10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor will run whenever these DTCs are not present	None
Engine	Running

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions 1 or 2 is met	-
1. Frequency that both of the following conditions (a) and (b) are met	5 times or more
(a) Engine rpm - Target engine rpm	Less than -100 rpm, or more than 150 rpm
(b) Vehicle condition	Stop after vehicle was driven by 6.25 mph (10 km/h) or more
2. Frequency that both of the following conditions (c) and (d) are met	Once
(c) Engine rpm - Target engine rpm	Less than -100 rpm, or more than 150 rpm
(d) IAC flow rate learning value	1.3 L/sec. or less, or 6 L/sec. or more

INSPECTION PROCEDURE

HINT:

- The following conditions may also cause DTC P0505 to be set:
  (a) The floor carpet overlapping slightly onto the accelerator pedal, causing the accelerator pedal to be slightly depressed and therefore the throttle valve position to be slightly open.
  (b) The accelerator pedal being not fully released.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

ES

1 CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0505)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following the menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0505	A
P0505 and other DTCs	B

HINT:
If any DTCs other than P0505 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 CHECK PCV HOSE CONNECTIONS

OK:
PCV hose is connected correctly and is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

4	CHECK THROTTLE VALVE

(a) Check the throttle valve condition.
OK:
Throttle valve is not contamainated with foreign objects and moves smoothly.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK ↓

REPLACE ECM

DTC	P050A	Cold Start Idle Air Control System Performance

DTC	P050B	Cold Start Ignition Timing Performance

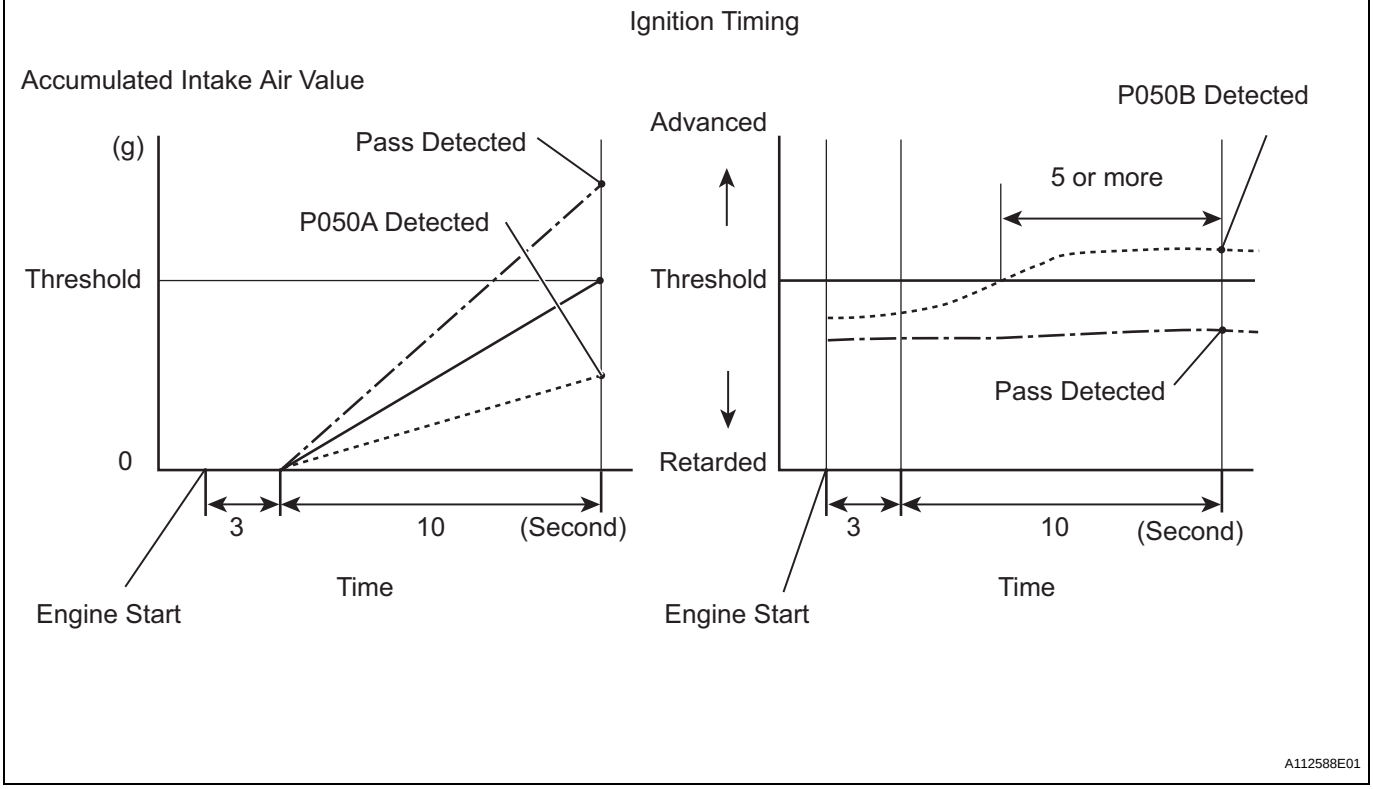
DESCRIPTION

The Electronic Throttle Control System (ETCS) controls the engine idling speed. The ETCS operates the throttle actuator to open and close the throttle valve, and adjusts the intake air amount to achieve the target idling speed.
In addition, the ECM retards the ignition timing and the ETCS increases the intake air amount to quickly increase the catalyst temperature at cold start to reduce emissions.

ES

DTC No.	DTC Detection Condition	Trouble Area
P050A	Accumulated intake air amount during 10 seconds of idling after cold start is less than threshold (2 trip detection logic)	• Throttle body assembly • Mass air flow meter • Air induction system • PCV hose connections • VVT system • Air cleaner filter element • ECM
P050B	Ignition timing retard value insufficient for 5 seconds or more during 10 seconds of P050A monitoring duration at cold start (2 trip detection logic)	• Throttle body assembly • Mass air flow meter • Air induction system • PCV hose connections • VVT system • Air cleaner filter element • ECM

MONITOR DESCRIPTION



The ECM monitors the intake air amount during idling and the ignition timing.
When the Engine Coolant Temperature (ECT) is between -10°C and 50°C (14°F and 122°F), the ECM calculates the idling intake air amount for 10 seconds, beginning 3 seconds after the engine starts.
When the accumulated value is below the threshold, the ECM interprets this as a malfunction in the Idle Speed Control (ISC) system at cold start.
The ECM also monitors the ignition timing at cold start, and judges it to be incorrect when it is advanced to the same value for a warm engine for 5 seconds or more of the 10 second monitoring period.
Example:
P050A is detected when all conditions below are met (2 trip detection logic).
1. The ECT is between -10°C and 50°C (14°F and 122°F) when the engine starts.
2. The engine idles for 13 seconds after engine start.
3. The accumulated intake air amount is below the threshold.

The ECM sets the DTC and illuminates the MIL 13 seconds after the engine is next started.

NOTICE:

When the negative battery terminal is disconnected during inspection or repairs, the ISC learning values are cleared. The ISC learning must be performed by warming up the engine and idling for 5 minutes with the ECT at 75°C (167°F) or more because DTCs cannot be detected with the ISC learning values cleared.

MONITOR STRATEGY

Related DTCs	P050A: Idle speed control problem at cold P050B: Idle ignition timing problem at cold
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, Throttle position sensor, Vehicle speed sensor
Frequency of Operation	Once per driving cycle
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P050A:

Battery voltage	8 V or more
Time after engine start	3 seconds or more
Starter	OFF
ECT at engine start	-10°C (14°F) or more
ECT	-10°C to 50°C (14°F to 122°F)
Engine idling time	3 seconds or more
Fuel-cut	OFF
Vehicle speed	Less than 1.875 mph (3 km/h)
Time after shift position changed (PZEV)	1 second or more
Atmospheric pressure	76 kPa (570 mmHg) or more

P050B:

Battery voltage	8 V or more
Time after engine start	3 seconds or more
Starter	OFF
ECT at engine start	-10°C (14°F) or more
ECT	-10°C to 50°C (14°F to 122°F)
Engine idling time	3 seconds or more
Fuel-cut	OFF
Vehicle speed	Less than 1.875 mph (3 km/h)

TYPICAL MALFUNCTION THRESHOLDS

P050A:

Accumulated mass air flow	Manual transaxle: Less than 14.375 g Automatic transaxle (Except PZEV): Less than 13.75 g Automatic transaxle (PZEV): Less than 21.25 g

P050B:

Accumulated time when ignition timing retard is cut off	5 seconds or more

INSPECTION PROCEDURE

HINT:

ES

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P050A AND/OR P050B)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following the menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P050A and/or P050B	A
P050A and/or P050B and other DTCs	B

HINT:
If any DTCs other than P050A and P050B are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	READ VALUE USING INTELLIGENT TESTER (FUEL TRIM)

HINT:
Calculate the total fuel trim values to check the characteristic deviation of the mass air flow meter.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / SHORT FT #1 and LONG FT #1.
(e) Read the values displayed on the tester.
(f) Add together the SHORT FT #1 and LONG FT #1 values to obtain the total FUEL TRIM.

OK:

Total of SHORT FT #1 and LONG FT #1 values is between -20 % and 20 %.

OK → **Go to step 12**

NG

3	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

ES

OK

Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → **Go to step 8**

OK

4	CHECK PCV HOSE CONNECTIONS

OK:

PCV hose is connected correctly and is not damaged.

NG → **Go to step 9**

OK

5	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **Go to step 10**

OK

6	CHECK AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Visually check that the air cleaner filter element is not excessively contaminated with dirt or oil.
OK:
Air cleaner filter element is not excessively contaminated with dirt or oil.

NG → Go to step 11

OK

7	REPLACE MASS AIR FLOW METER

NEXT → Go to step 15

8	CHECK AND REPAIR VVT SYSTEM

NEXT → Go to step 15

9	REPAIR OR REPLACE PCV HOSE

NEXT → Go to step 15

10	REPAIR OR REPLACE AIR INDUCTION SYSTEM

NEXT → Go to step 15

11	REPLACE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

NEXT → Go to step 15

12	CHECK THROTTLE VALVE

(a) Check for deposits around the throttle valve and throttle valve condition.

OK:

No deposits around throttle valve and throttle valve moves smoothly.

NG → Go to step 14

OK

13	REPLACE ECM

NEXT → Go to step 15

14	REPAIR OR REPLACE THROTTLE BODY ASSEMBLY

NEXT → Go to step 15

15	CHECK WHETHER DTC OUTPUT RECURS (DTC P050A AND/OR P050B)

NOTICE:
In this operation, the engine must be cold (the same level as the engine coolant temperature recorded in the freeze frame data).

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Switch the ECM from normal mode to check mode using the tester (See page ES-41).
(f) Start the engine to idle for a minute.
OK:
Stable fast idling.
(g) Read the DTCs.
OK:
No DTC output.

ES

NEXT

END

DTC	P0560	System Voltage

DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is off. This power allows the ECM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, the memory is cleared and the ECM determines that there is a malfunction in the power supply circuit. When the engine is next started, the ECM illuminates the MIL and set the DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in ECM back up power source circuit (1 trip detection logic)	• Open in back up power source circuit • Battery • Battery terminals • EFI No. 1 fuse • ECM

ES

HINT:
If DTC P0560 is set, the ECM does not store other DTCs or the data stored in the ECM are partly erased.

MONITOR STRATEGY

Related DTCs	P0560: ECM system voltage
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate (MIL illuminated after next engine start)
Sequence of Operation	None

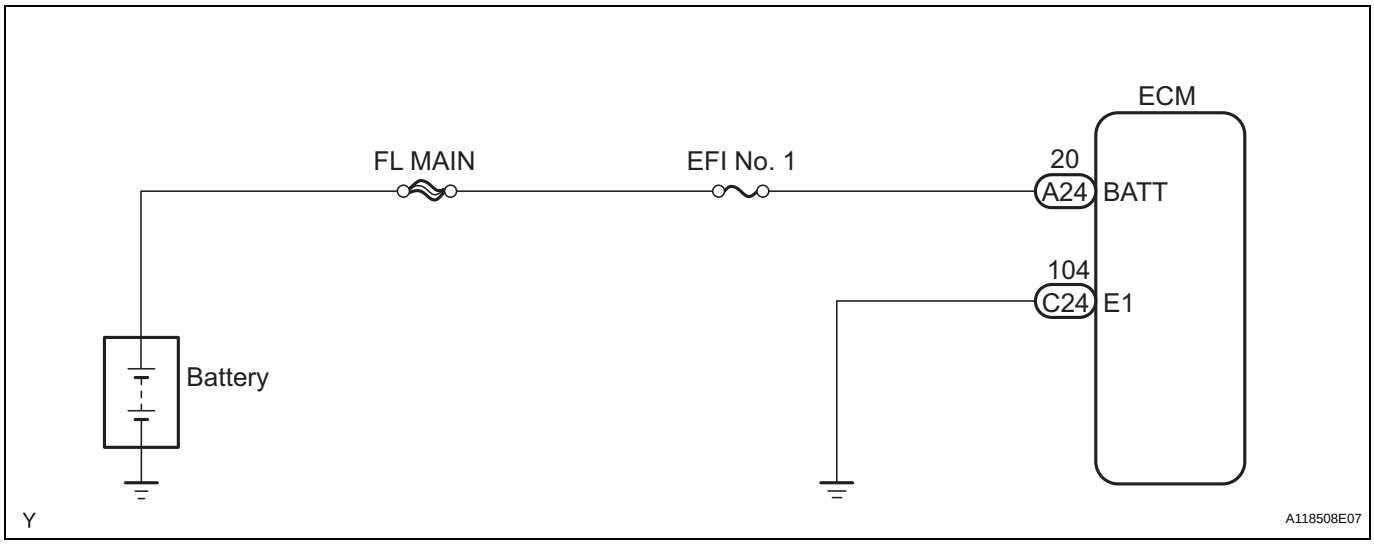
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Stand-by RAM	Initialized

TYPICAL MALFUNCTION THRESHOLDS

ECM power source	Less than 3.5 V

WIRING DIAGRAM

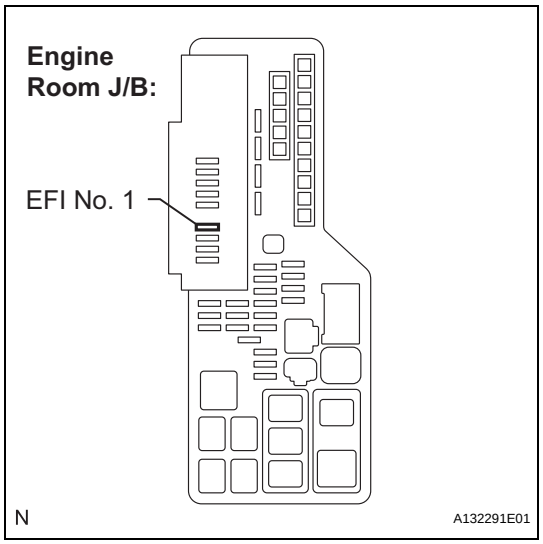


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK FUSE (EFI NO. 1 FUSE)



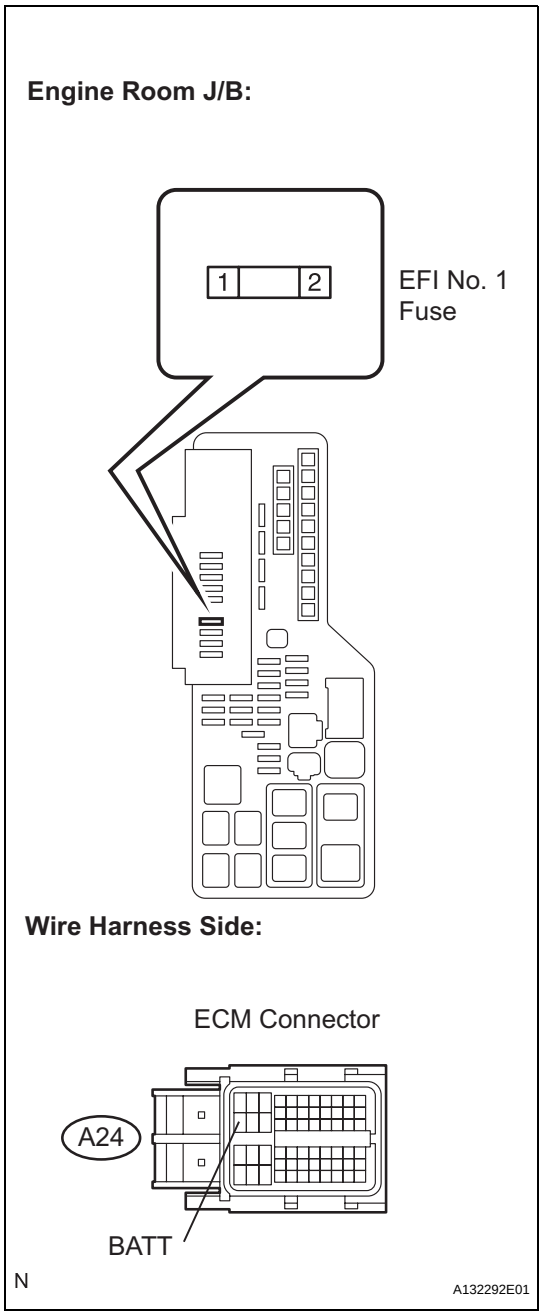
(a) Remove the EFI No. 1 fuse from the engine room J/B.
(b) Measure the resistance of the EFI No. 1 fuse.
Standard resistance:
Below 1 Ω
(c) Reinstall the EFI No. 1 fuse.

NG → **REPLACE FUSE (EFI NO. 1 FUSE)**

OK

ES

2	CHECK HARNESS AND CONNECTOR (ECM - EFI NO. 1 FUSE, EFI NO. 1 FUSE - BATTERY)



(a) Check the harness and the connector between the EFI No. 1 fuse and ECM.
  (1) Remove the EFI No. 1 fuse from the engine room J/B.
  (2) Disconnect the A24 ECM connector.
  (3) Measure the resistance.
  Standard resistance (Check for open)

Tester Connection	Specified Condition
2 (EFI No. 1 fuse) - A24-20 (BATT)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
2 (EFI No. 1 fuse) or A24-20 (BATT) - Body ground	10 kΩ or higher

  (4) Reconnect the ECM connector.
  (5) Reinstall the EFI No. 1 fuse.

(b) Check the harness and the connector between the EFI No. 1 fuse and battery.
  (1) Remove the EFI No. 1 fuse from the engine room J/B.
  (2) Disconnect the negative battery terminal.
  (3) Disconnect the positive battery terminal.
  (4) Measure the resistance.
  Standard resistance (Check for open)

Tester Connection	Specified Condition
Battery positive terminal - 1 (EFI No. 1 fuse)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Battery positive terminal or 1 (EFI No. 1 fuse) - Body ground	10 kΩ or higher

  (5) Reconnect the positive battery terminal.
  (6) Reconnect the negative battery terminal.
  (7) Reinstall the EFI No. 1 fuse.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT BATTERY

(a) Check the battery voltage.
  Standard voltage:
  12.5 to 12.9 V at 20°C (68°F)

NG → **REPLACE BATTERY**

OK

4	CHECK BATTERY TERMINAL

(a) Check that the battery terminals are not loose or corroded.
OK:
Battery terminals are not loose or corroded.

NG → **REPAIR OR REPLACE BATTERY TERMINAL**

OK

ES

5	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Turn the ignition switch off and turn the tester off.
(e) Start the engine and turn the tester on.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0560	A
No output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A

REPLACE ECM

DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DTC	P0606	ECM / PCM Processor

DTC	P0607	Control Module Performance

DTC	P0657	Actuator Supply Voltage Circuit / Open

DESCRIPTION

The ECM continuously monitors its own internal memory status, internal circuits, and output signals transmitted to the throttle actuator. This self-check ensures that the ECM is functioning properly. If any malfunction is detected, the ECM sets the appropriate DTC and illuminates the MIL.
The ECM memory status is diagnosed by internal mirroring of the main CPU and the sub CPU to detect Random Access Memory (RAM) errors. The two CPUs also perform continuous mutual monitoring. The ECM illuminates the MIL and sets a DTC if: 1) outputs from the two CPUs are different or deviate from the standards, 2) the signals sent to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detection Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM internal error (1 trip detection logic)	ECM

MONITOR STRATEGY

Related DTCs	P0604: ECM RAM error P0606: ECM range check P0607: ECM CPU malfunction P0657: ETCS power supply
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	-
Frequency of Operation	Once per driving cycle: P0657 Continuous: P0604, P0606 and P0607
Duration	Within 1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

ECM RAM errors (P0604):

RAM mirror check	Fail

ECM CPU range check (P0606):

Either of the following conditions is met:	-
Difference between throttle valve position of main CPU and throttle valve position of sub CPU	0.3 V or more
Difference between accelerator pedal position of main CPU and accelerator pedal position of sub CPU	0.3 V or more

ECM CPU malfunction (P0607):

Either of the following conditions A or B is met	-
A. All of the following conditions (a), (b) and (c) are met	-
(a) CPU reset	1 time or more
(b) Learned TP - learned APP	0.4 V or more
(c) Electronic throttle actuator	OFF
B. CPU reset	2 times or more

ETCS power supply (P0657):

ETCS power supply when ignition switch turned ON position	7 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0604, P0606, P0607 OR P0657)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0604, P0606, P0607 or P0657	A
P0604, P0606, P0607 or P0657 and other DTCs	B

B → **GO TO DTC CHART**

A →

REPLACE ECM

DTC	P0617	Starter Relay Circuit High

DESCRIPTION

While the engine is being cranked, the positive battery voltage is applied to terminal STA of the ECM. If the ECM detects the Starter Control (STA) signal while the vehicle is being driven, it determines that there is a malfunction in the STA circuit. The ECM then illuminates the MIL and sets the DTC.
This monitor runs when the vehicle is driven at 12.43 mph (20 km/h) for over 20 seconds.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When conditions (a), (b) and (c) are met, positive (+B) battery voltage 10.5 V or more is applied to ECM for 20 seconds (1 trip detection logic) (a) Vehicle speed 12.43 mph (20 km/h) or more (b) Engine speed 1,000 rpm or more (c) STA signal ON	• Park/Neutral Position (PNP) switch • Starter relay circuit • Ignition switch • ECM

ES

MONITOR STRATEGY

Related DTCs	P0617: Starter signal
Required Sensors/Components (Main)	STARTER relay, PNP switch, Clutch start switch and Ignition switch
Required Sensors/Components (Related)	Vehicle Speed Sensor (VSS), Crankshaft Position (CKP) sensor
Frequency of Operation	Continuous
Duration	20 seconds
MIL Operation	Immediate
Sequence of Operation	None

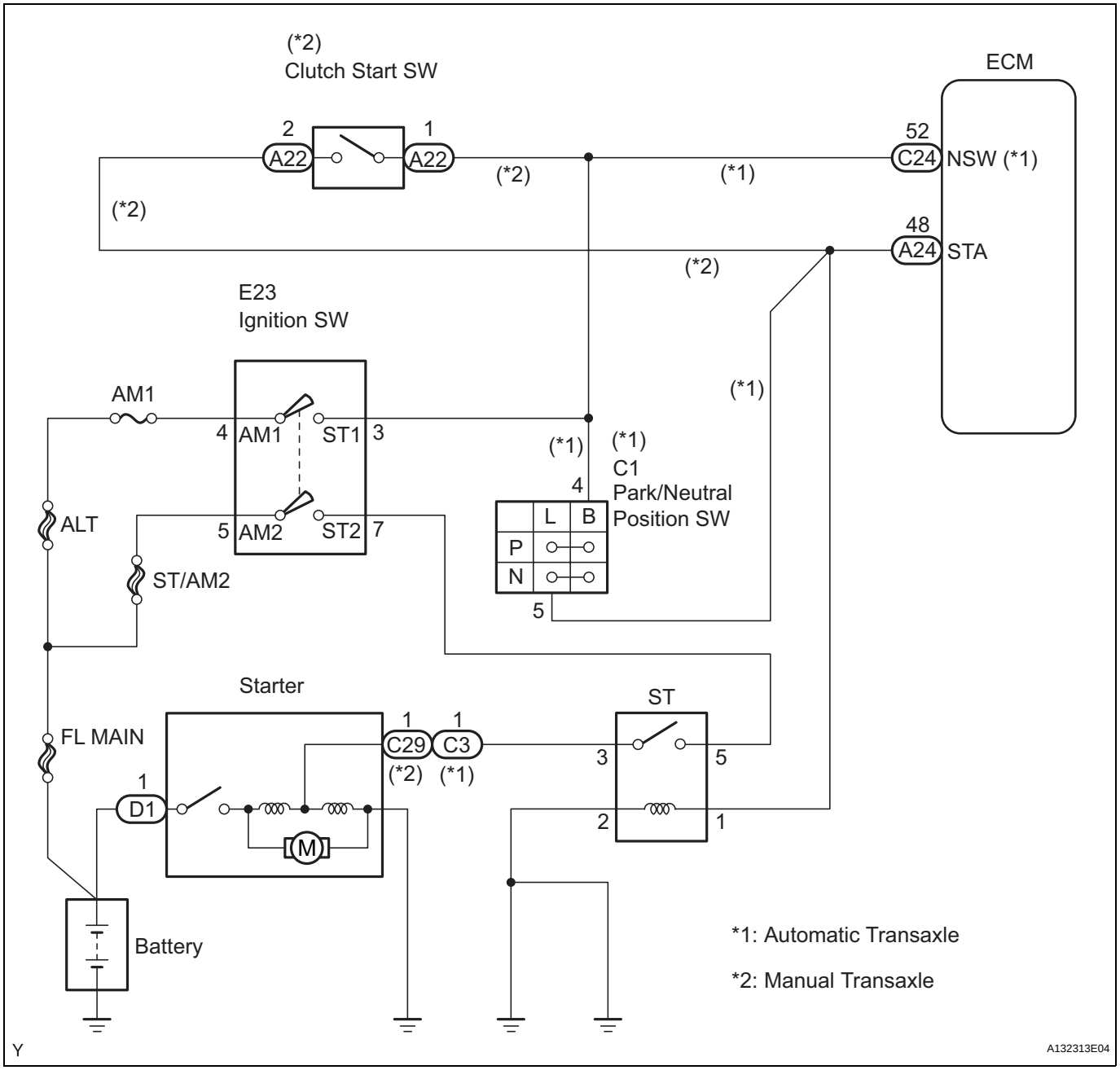
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery voltage	10.5 V or more
Vehicle speed	12.43 mph (20 km/h) or more
Engine speed	1,000 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

Starter signal	ON

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- The following troubleshooting flowchart is based on the premise that the engine is cranked normally. If the engine does not crank, proceed to the problem symptoms table (See page ES-27).
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STARTER SIG.
(d) Read the value displayed on the tester when turn the ignition switch to the ON and START positions.

OK

Ignition Switch Position	STARTER SIG
ON	OFF
START	ON

ES

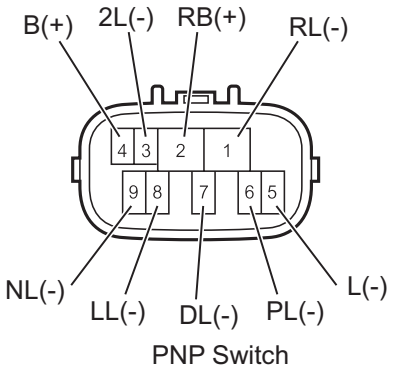
NG → **Go to step 2**

OK

CHECK FOR INTERMITTENT PROBLEMS

2 INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

Component Side:



HINT:
For vehicles with the manual transaxle, proceed to step 5.
(a) Disconnect the C1 PNP switch connector.
(b) Measure the resistance when the transmission gear selector lever is moved to each position.
Standard resistance

Gear Selector Lever Position	Tester Connection	Specified Condition
P	2 - 6, 4 - 5	Below 1 Ω
R	1 - 2	Below 1 Ω
N	2 - 9, 4 - 5	Below 1 Ω
D	2 - 7	Below 1 Ω
2	2 - 3	Below 1 Ω
L	2 - 8	Below 1 Ω

(c) Reconnect the PNP switch connector.

OK → **Go to step 8**

NG

3 REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

NEXT

4 READ VALUE USING INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.

(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STARTER SIG.
(d) Read the value displayed on the tester when turn the ignition switch to the ON and START positions.

OK

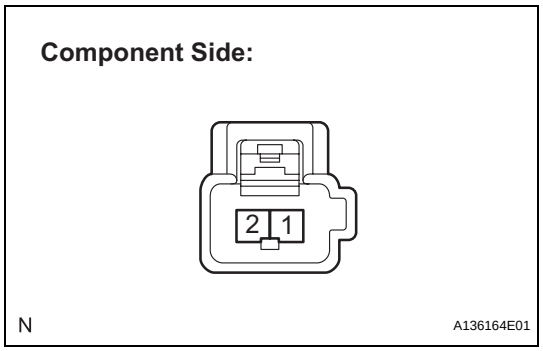
Ignition Switch Positions	STARTER SIG
ON	OFF
START	ON

NG → **Go to step 8**

OK

SYSTEM OK

5 INSPECT CLUTCH START SWITCH ASSEMBLY



(a) Disconnect the A22 clutch start switch connector.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Clutch pedal released	10 kΩ or higher
1 - 2	Clutch pedal depressed	Below 1 Ω

(c) Reconnect the clutch start switch connector.

OK → **Go to step 8**

NG

6 REPLACE CLUTCH START SWITCH ASSEMBLY

NEXT

7 READ VALUE USING INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STARTER SIG.
(d) Check the value displayed on the tester when turn the ignition switch to the ON and START positions.

OK

Ignition Switch Position	STARTER SIG
ON	OFF
START	ON

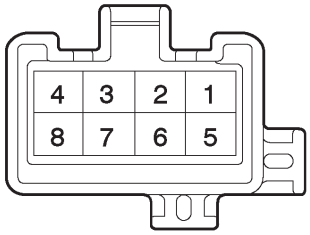
NG → Go to step 8

OK

SYSTEM OK

8 INSPECT IGNITION SWITCH ASSEMBLY

Component Side:



A056879E35

(a) Disconnect the E23 ignition switch connector.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Ignition Switch Position	Specified Condition
All Terminals	LOCK	10 kΩ or higher
2 - 4	ACC	Below 1 Ω
1 - 2 - 4, 5 - 6	ON	
1 - 3 - 4, 5 - 6 - 7	START	

(c) Reconnect the ignition switch connector.

OK → Go to step 10

NG

9 REPLACE IGNITION SWITCH ASSEMBLY

NEXT

10 READ VALUE USING INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STARTER SIG.
(d) Check the value displayed on the tester when turn the ignition switch to the ON and START positions.

OK

Ignition Switch Position	STARTER SIG
ON	OFF
START	ON

NG → Go to step 11

OK

SYSTEM OK

11	REPAIR OR REPLACE HARNESS OR CONNECTOR (PNP SWITCH OR CLUTCH START SWITCH - STA TERMINAL OF ECM)

NEXT

12	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Drive the vehicle at more than 12.43 mph (20 km/h) for over 20 seconds.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P0617	A
No DTC	B

B → SYSTEM OK

A

REPLACE ECM

DTC	P0630	VIN not Programmed or Mismatch - ECM / PCM

DESCRIPTION

DTC P0630 is set when the Vehicle Identification Number (VIN) is not stored in the Engine Control Module (ECM) or the input VIN is incorrect. Input the VIN with the intelligent tester.

DTC No.	DTC Detection Condition	Trouble Area
P0630	• VIN not stored in ECM • Input VIN incorrect (1 trip detection logic)	ECM

MONITOR STRATEGY

ES

Related DTCs	P0630: VIN not programmed
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.325 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

VIN code	Not programmed

COMPONENT OPERATING RANGE

VIN code	Programmed

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ CURRENT DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed To
P0630	A
P0630 and other DTCs	B

If any DTCs other than P0630 are output, troubleshoot those DTCs first.

NOTICE:

If P0630 is set, the VIN must be input to the ECM using the intelligent tester. However, all DTCs are cleared automatically by the tester when the VIN is input. If DTCs other than P0630 are set, check them first.

B → **GO TO DTC CHART**

A

2 **INPUT VIN WITH INTELLIGENT TESTER**

(a) Refer to REGISTRATION (See page ES-17).

NEXT

END

DTC	P0724	Brake Switch "B" Circuit High

DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in the lock-up condition when the brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	Stop light switch remains ON even when vehicle is driven in GO (18.65 mph (30 km/h) or more) and STOP (less than 1.86 mph (3 km/h)) pattern 5 times (2 trip detection logic)	• Short in stop light switch signal circuit • Stop light switch • ECM

ES

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains ON. When the stop light switch remains ON during GO and STOP driving, the ECM interprets this as a fault in the stop light switch. Then the MIL illuminates and the ECM stores the DTC. The vehicle must be driven in GO (18.65 mph (30 km/h) or more) and STOP (less than 1.86 mph (3 km/h)) pattern 5 times in 2 driving cycles in order for the DTC to be output.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

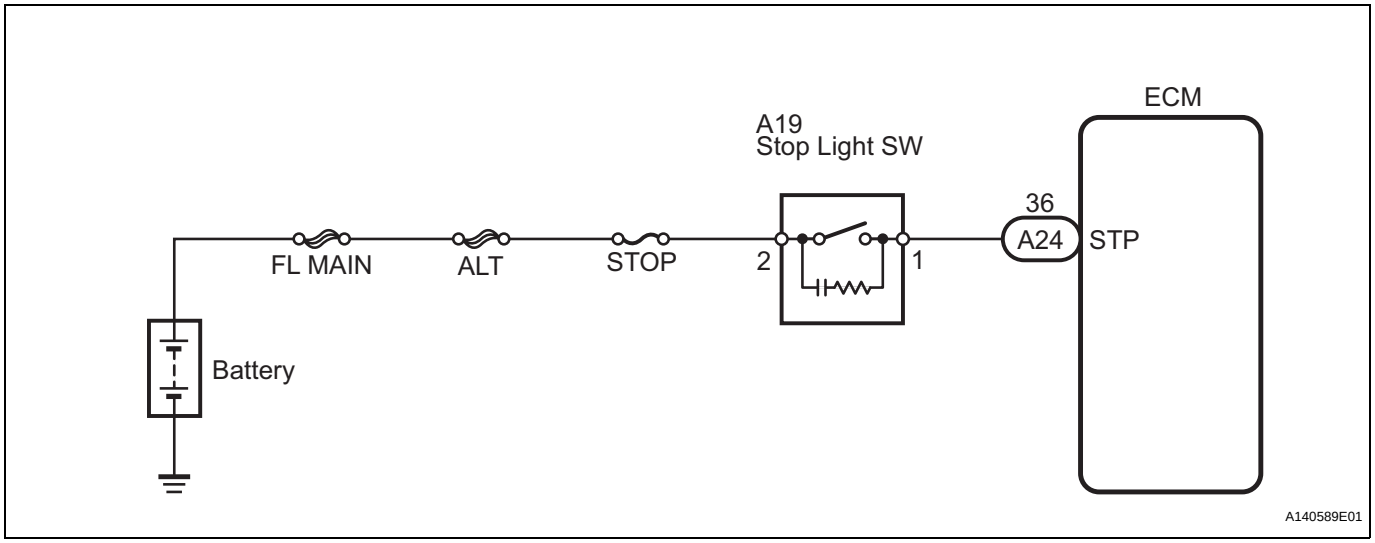
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery voltage	8 V or more
Starter	OFF
Ignition switch	ON
GO (Vehicle speed is 18.65 mph (30 km/h) or more)	Once
STOP (Vehicle speed is less than1.86 mph (3 km/h))	Once

TYPICAL MALFUNCTION THRESHOLDS

Brake switch	Stuck ON

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

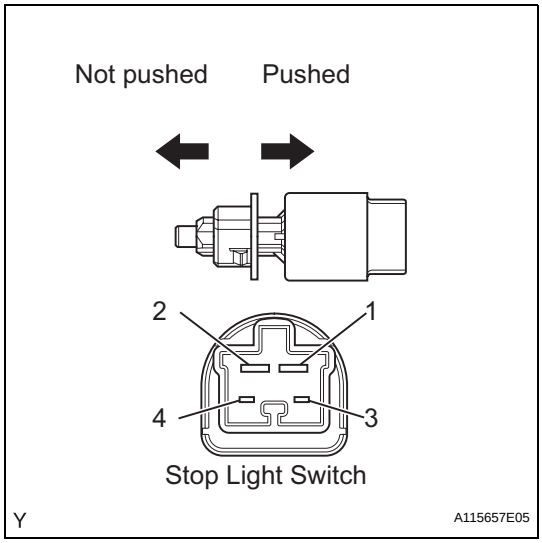
NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

1. Warm up the engine.
2. Turn the ignition switch off.
3. Connect the intelligent tester to the DLC3.
4. Turn the ignition switch to the ON position.
5. Turn the intelligent tester on.
6. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
7. Follow the instructions on the tester and read the DATA LIST.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF	-

1	INSPECT STOP LIGHT SWITCH



(a) Remove the stop light switch.
(b) Measure the resistance between the terminals.
Standard resistance

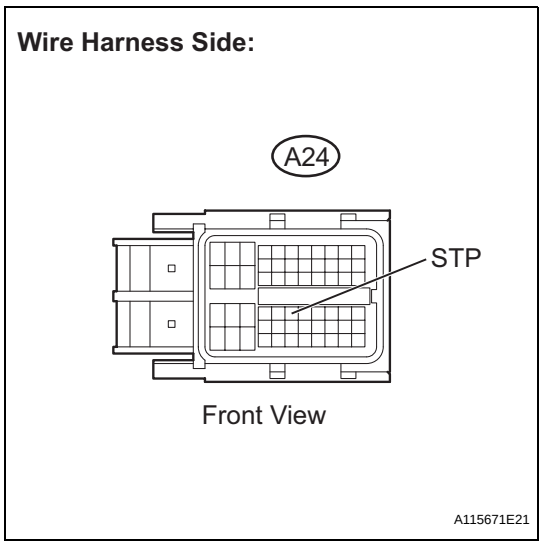
Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin released	Below 1 Ω
	Switch pin pushed in	10 kΩ or higher
3 - 4	Switch pin released	10 kΩ or higher
	Switch pin pushed in	Below 1 Ω

(c) Reinstall the stop light switch.

NG → **REPLACE STOP LIGHT SWITCH**

OK

2	CHECK WIRE HARNESS (ECM - BATTERY)



(a) Measure the voltage of the wire harness side connector.
(1) Disconnect the A24 ECM connector.
(2) Measure the voltage.
Standard voltage

Tester Connection	Condition	Specified Condition
A24-36 (STP) - Body ground	Brake pedal is depressed	10 to 14 V
A24-36 (STP) - Body ground	Brake pedal is released	Below 1 V

(3) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

DTC	P2004	Intake Manifold Runner Control Stuck Open (Bank 1)

DTC	P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)

DESCRIPTION

The intake manifold runner valve system is mounted on the intake manifold and consists of the intake manifold runner valve (IMRV), the IMRV motor and the IMRV position sensor. The IMRV motor opens and closes the IMRV using multiple gears (See page ES-270 for details). The valve position sensor detects the opening angle of the IMRV (See page ES-275 for details).

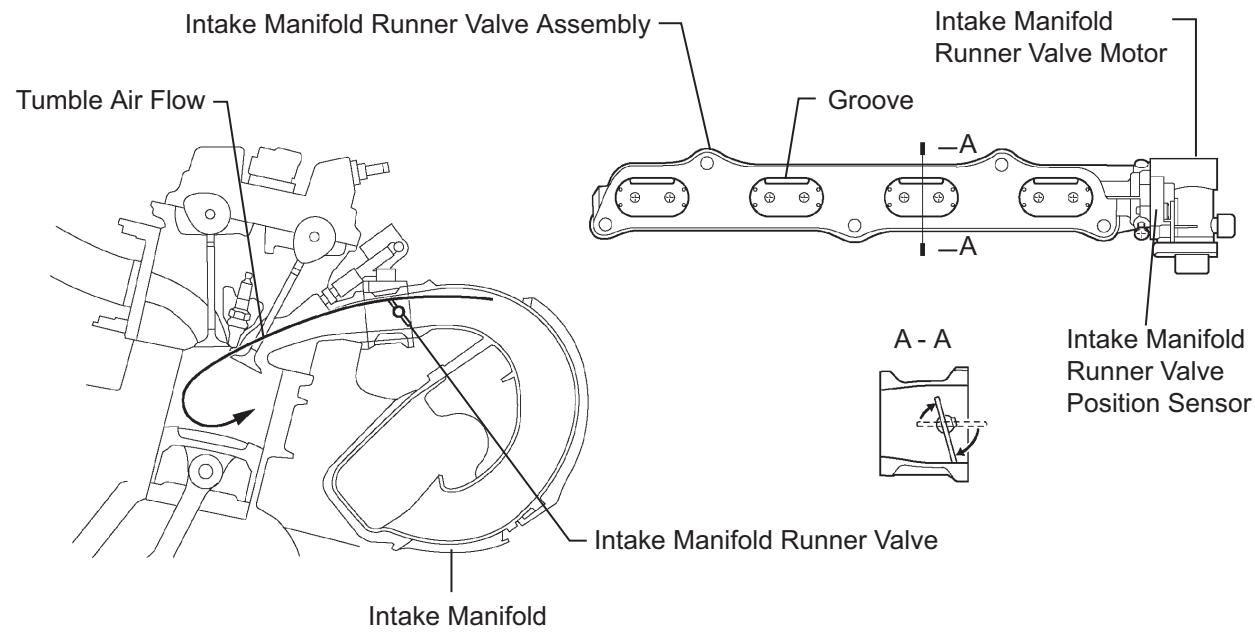
The IMRV has a groove on its upper portion.

When the IMRV is closed, air flows through a groove into the cylinder from the intake manifold, so that a dynamic air flow or "tumble" air flow is generated in the cylinder. The tumble air flow drastically reduces fuel deposits inside the intake air port and the combustion wall surface inside the cylinder. This improves the combustion efficiency by boosting the air-fuel mixture and air flow turbulence.

The related DTCs are P2009 and P2010 (See page ES-270), and P2014, P2016 and P2017 (See page ES-275).

NOTICE:

Do not disassemble the IMRV and the IMRV motor.



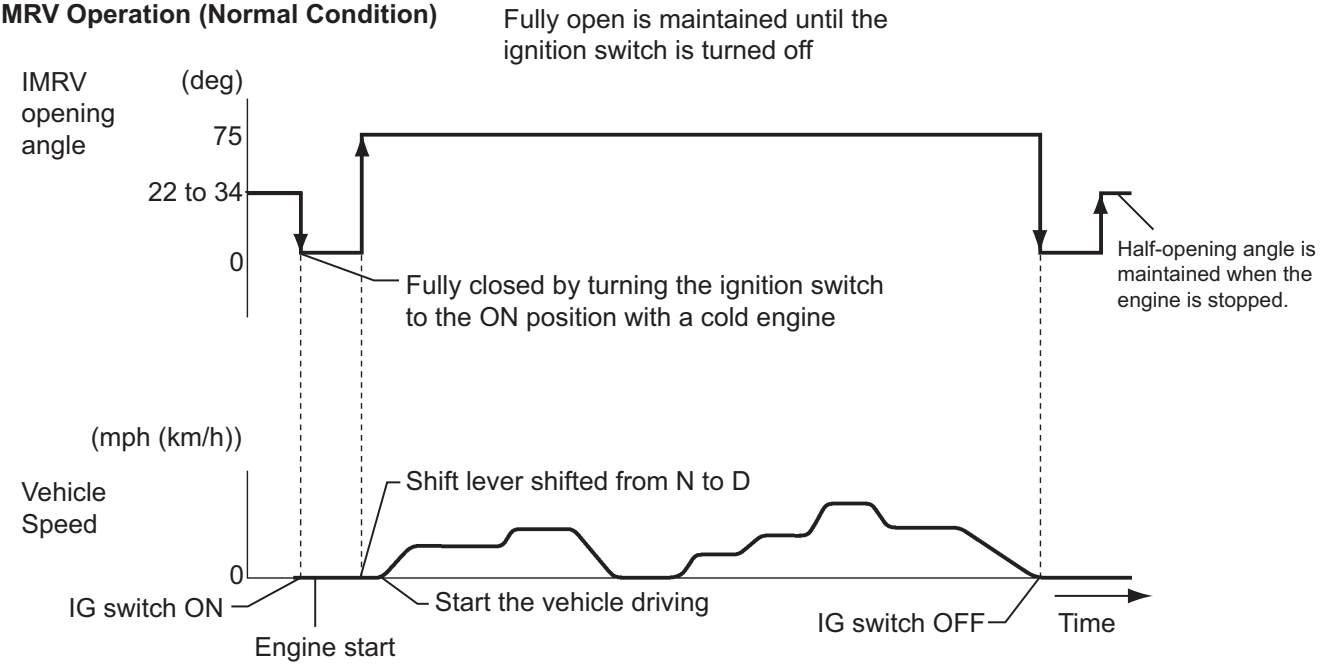
The ECM fully closes the IMRV during the first idle with the engine coolant temperature more than -10°C (14°F) and less than 60°C (140°F) and the intake air temperature is more than -10°C (14°F) before the engine is warmed up. In other condition, the ECM fully opens the IMRV.

Open and closed condition for IMRV:

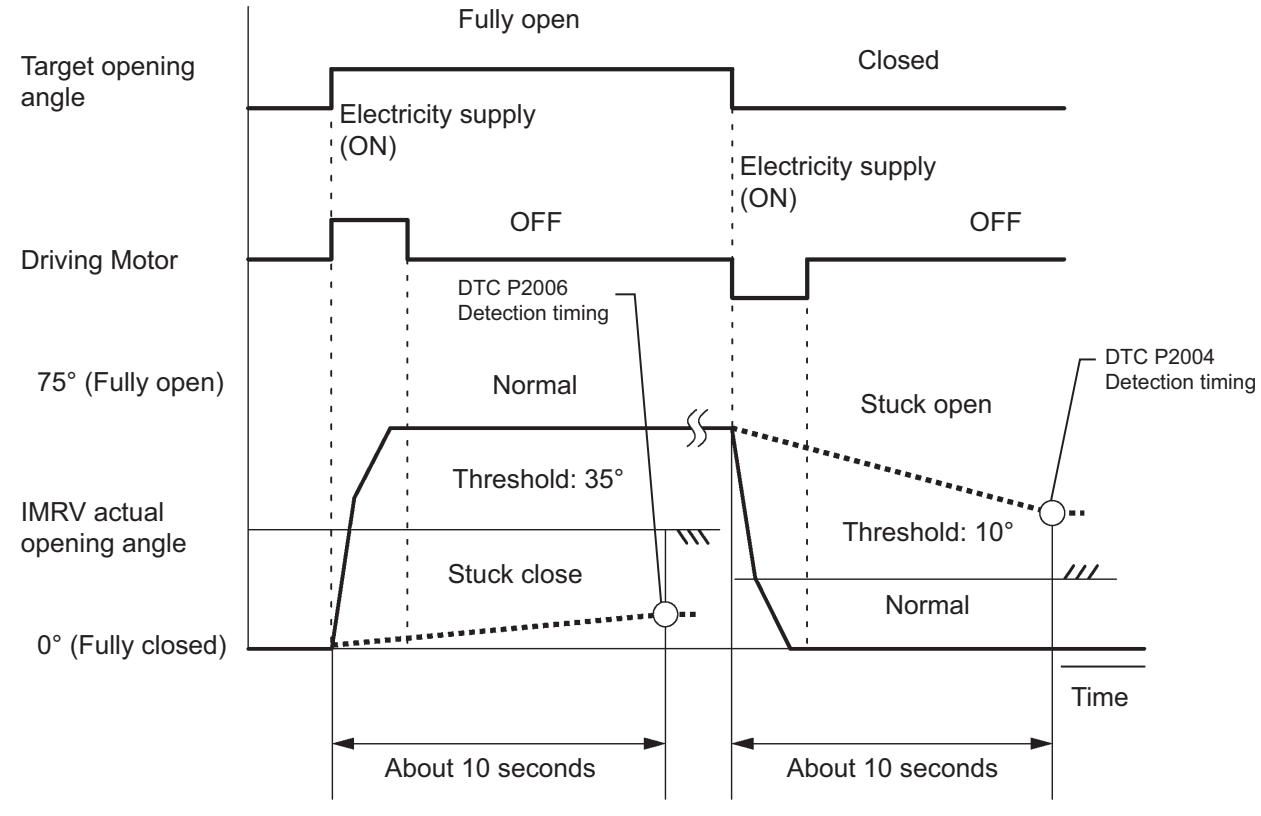
Temperatures of the engine coolant and the intake air when the engine starting up	**Before warming up the engine**	**When one of the following conditions is met:** **(a) Throttle valve opening angle is 1.5° or more.** **(b) Vehicle speed is 3 mph (5 km/h) or more.** **(c) Engine speed is 3,000 rpm or more.** **(d) When the shift lever is in any position other than N.**	**After warming up the engine**
Engine coolant temp. is less than -10°C (14°F) or more than 60°C 140°F) or intake air temp. is less than -10°C (14°F).	OPEN	OPEN	OPEN
Engine coolant temp. is between -10°C (14°F) and 60°C (140°F). Intake air temp. is -10°C (14°F) or more.	CLOSED	OPEN	OPEN

ES

IMRV Operation (Normal Condition)



IMRV Malfunction Detection



DTC No.	DTC Detection Condition	Trouble Area
P2004 (Stuck open)	When the IMRV opening angle is more than 10° after requesting the IMRV full close (2 trip detection logic)	• IMRV motor circuit • IMRV motor • IMRV position sensor • IMRV • ECM
P2006 (Stuck closed)	When the IMRV opening angle is less than 35° after requesting the IMRV full open (2 trip detection logic)	Same as DTC No. P2004

MONITOR STRATEGY

Related DTCs	P2004: IMRC Valve Stuck Open P2006: IMRC Valve Stuck Closed
Required sensors/components (Main)	IMRC Valve
Required sensors/components (Related)	IAT sensor, ECT sensor
Frequency of operation	Once per driving cycles
Duration	10 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor)

P2004:

Battery voltage	8 V or more
ECT	-10°C (14°F) or more
IAT	-10°C (14°F) or more
Ignition switch	ON
Command IMRC valve	Closed

P2006:

Battery voltage	8 V or more
Command IMRC valve	Closed

TYPICAL MALFUNCTION THRESHOLDS

P2004:

IMRC valve angle	10° or more

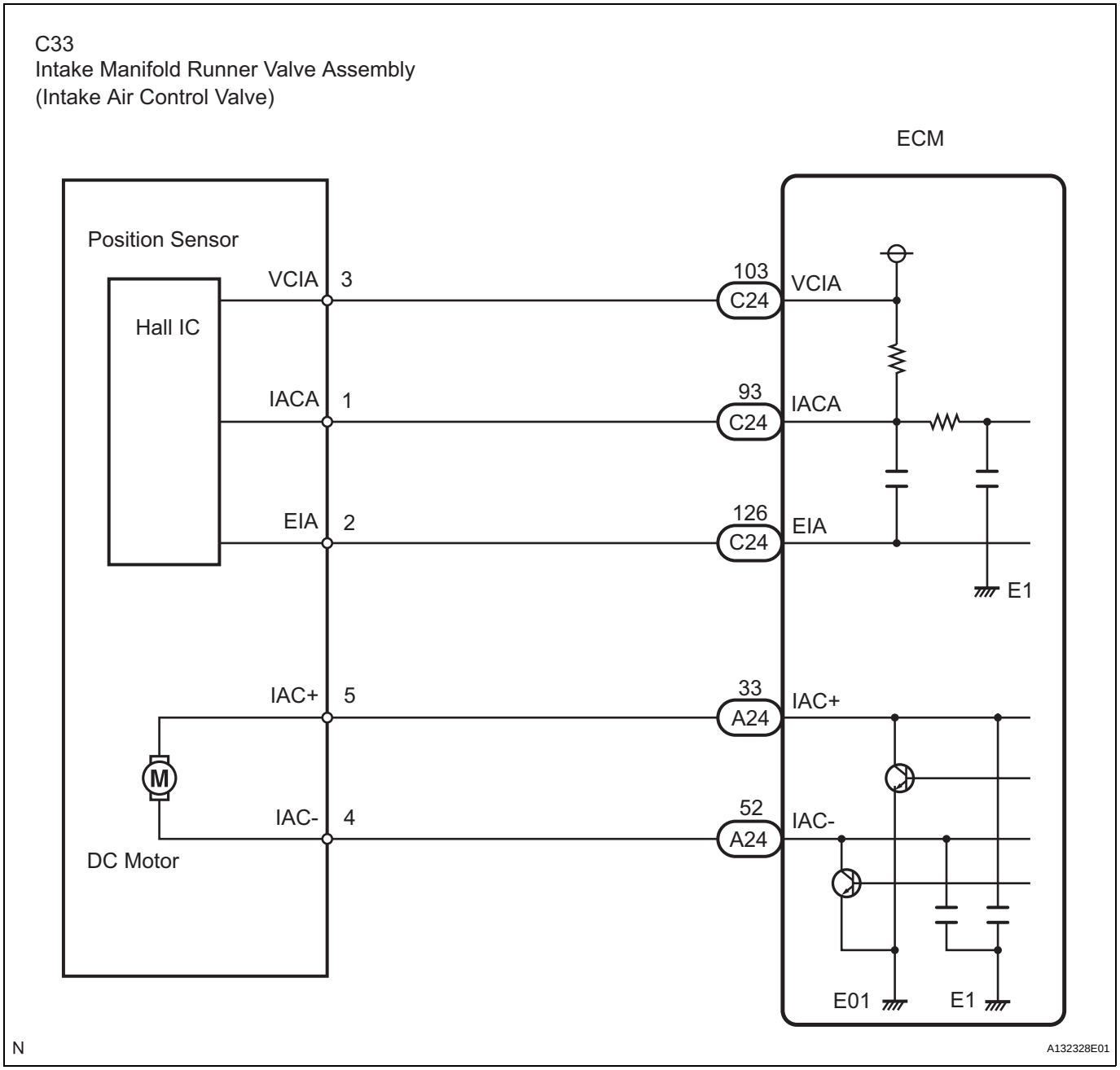
P2006:

IMRC valve angle	Less than 35°

COMPONENT OPERATING RANGE

IMRC valve position sensor voltage	0.2 and 4.8 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK WHETHER DTC OUTPUT RECURS

(a) Clear the DTC (See page ES-38).
(b) Start the engine.

(c) Allow the engine to idle for 20 seconds or more after running the engine at more than 3,000 rpm for 20 seconds.
(d) Turn the ignition switch off. Let the engine remain stopped for 20 seconds.
HINT:
As running the engine to 3,000 rpm, the IMRV usually becomes fully opened. If the ignition switch is turned off under this condition, the IMRV is fully closed and then becomes half-opening angle.
(e) Connect the intelligent tester to the DLC3.
(f) Turn the ignition switch to the ON position.
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

ES

Result

Display (DTC output)	Proceed to
P2004 and/or P2006 are output again	A
No DTC output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A → **REPLACE INTAKE MANIFOLD RUNNER VALVE ASSEMBLY**

DTC	P2009	Intake Manifold Runner Control Circuit Low (Bank 1)

DTC	P2010	Intake Manifold Runner Control Circuit High (Bank 1)

DESCRIPTION

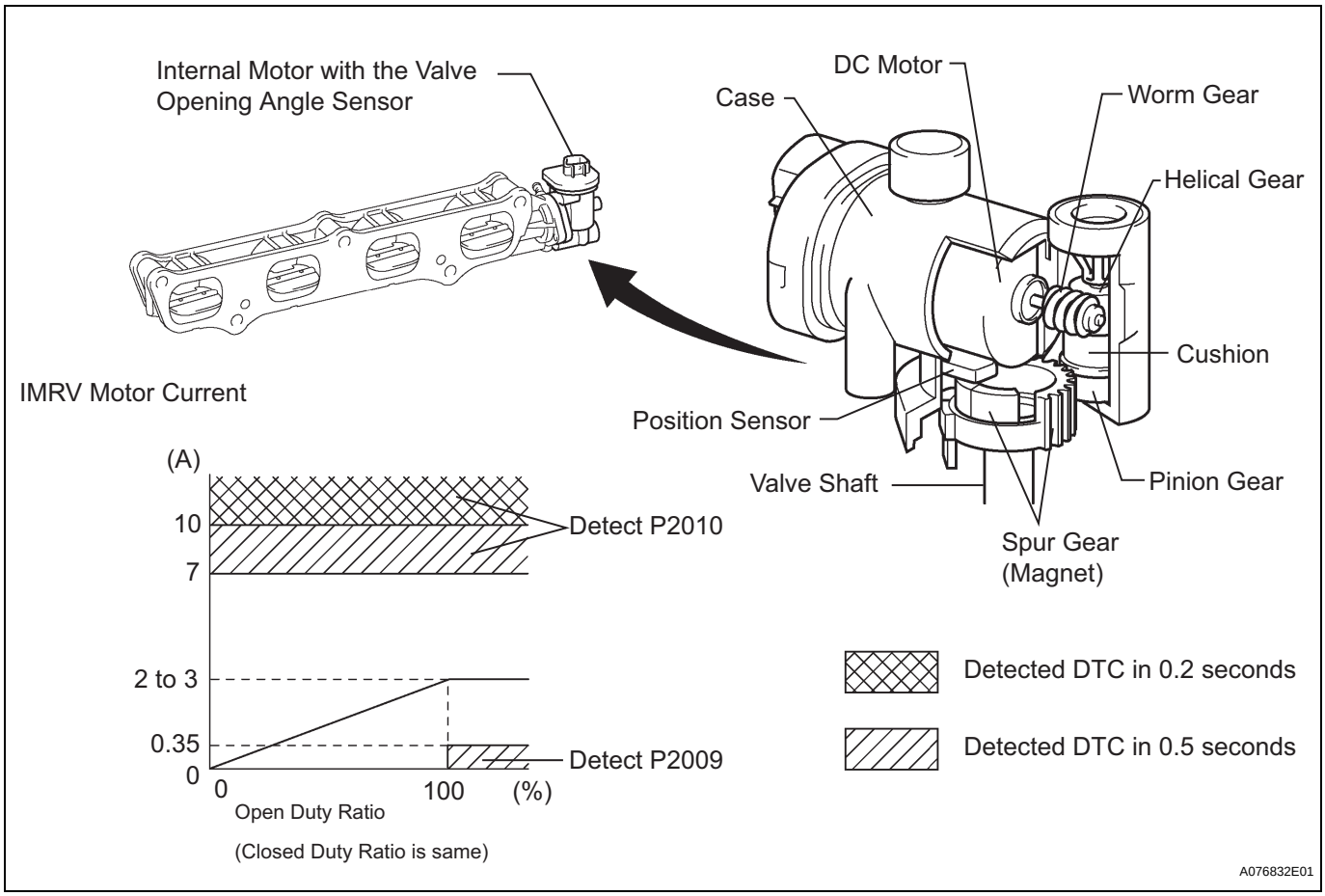
The Intake Manifold Runner Valve (IMRV) motor is driven by the ECM. The IMRV motor opens and closes the IMRV.

When the current of the IMRV motor deviates from the standard range, the ECM determines that there is a malfunction.

The related DTCs are P2004 and P2006 (See page ES-264), and P2014, P2016 and P2017 (See page ES-275).

NOTICE:

Do not disassemble the IMRV and the IMRV motor.



DTC No.	DTC Detection Condition	Trouble Area
P2009	Detecting open (in the motor or in the motor circuit) Condition (a) and (b) continue for 1 second: (1 trip detection logic) (a) IMRV motor output duty is 100 % (b) IMRV motor current is less than 0.35 A	• Open in IMRV motor circuit • IMRV motor • ECM

DTC No.	DTC Detection Condition	Trouble Area
P2010	• Detecting excess current (in the motor or in the motor circuit) Condition (a) continues for 0.2 seconds: (1 trip detection logic) (a) IMRV motor current is 10 A or more • Condition (a) continues for 0.5 seconds: (1 trip detection logic) (a) IMRV motor current is 7 A or more	• Short in IMRV motor circuit • IMRV motor • ECM

MONITOR STRATEGY

Related DTCs	P2009: IMRC Actuator Range Check (Low Current) P2010: IMRC Actuator Range Check (High Current)
Required sensors/components (Main)	IMRC Valve (Actuator)
Required sensors/components (Related)	None
Frequency of operation	Continuous
Duration	1 second: IMRC Actuator Range Check (Low Current) 6 times: IMRC Actuator Range Check (High Current)
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2009:

IMRC actuator current	Less than 0.35 A

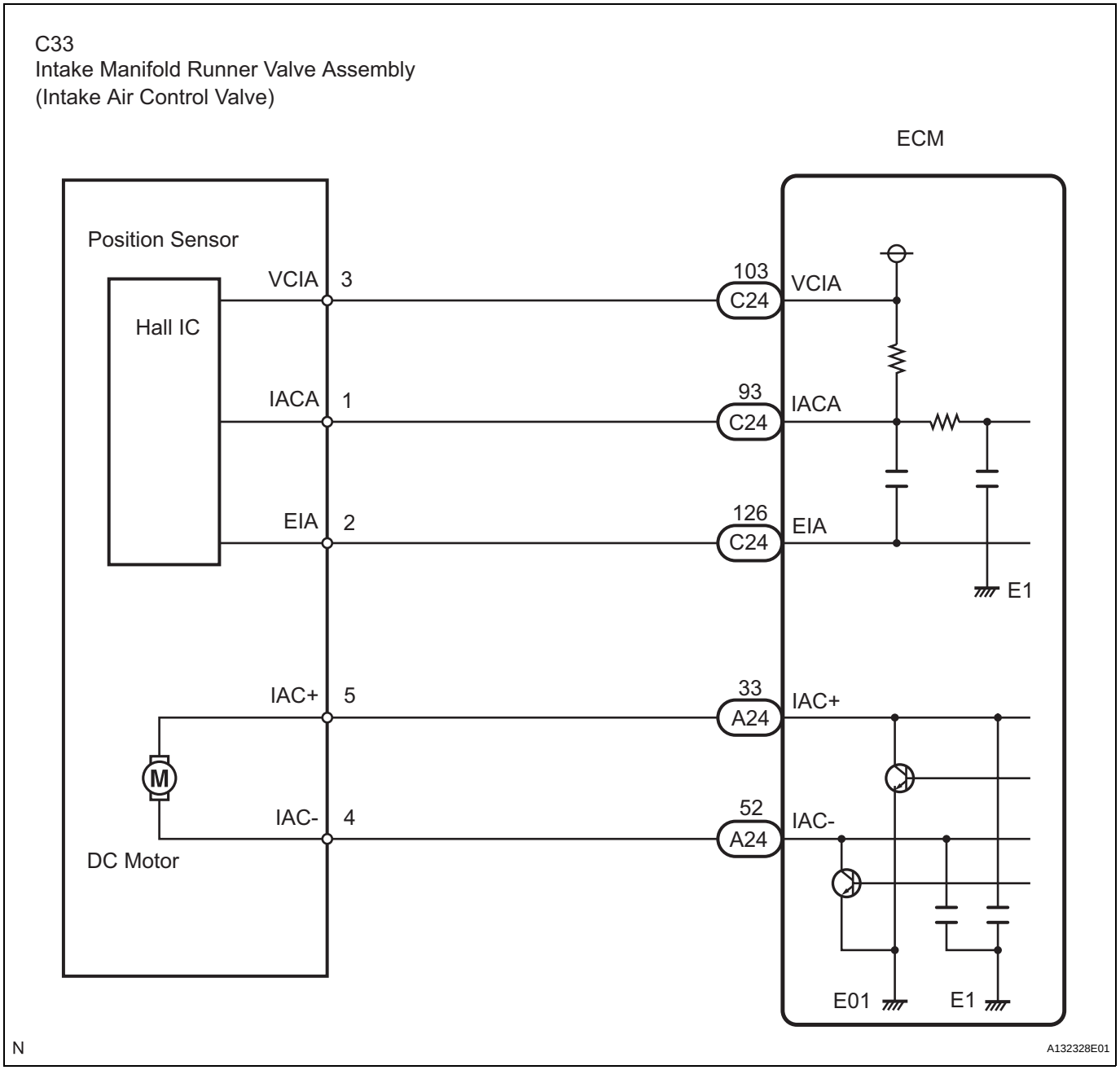
P2010:

IMRC actuator control IC current limiter port	Fail

COMPONENT OPERATING RANGE

IMRC actuator current	0.4 to 3 A

WIRING DIAGRAM



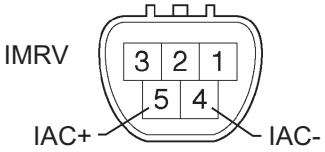
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 INSPECT INTAKE MANIFOLD RUNNER VALVE ASSEMBLY (IMRV MOTOR RESISTANCE)

Component Side:



Y A066037E01

(a) Disconnect the C33 IMRV connector.
(b) Measure the motor resistance between the terminals.

Standard resistance

Tester Connection	Condition	Specified Condition
C33-5 (IAC+) - C33-4 (IAC-)	20°C (68°F)	1 to 19 Ω

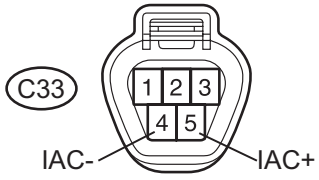
NG → **REPLACE INTAKE MANIFOLD RUNNER VALVE ASSEMBLY**

OK

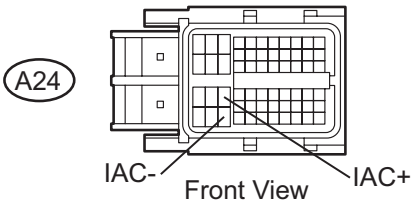
2 CHECK HARNESS AND CONNECTOR (IMRV MOTOR - ECM)

Wire Harness Side:

IMRV Motor Connector



ECM Connector



N A132309E01

(a) Disconnect the A24 ECM connector.
(b) Disconnect the C33 IMRV motor connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
A24-33 (IAC+) - C33-5 (IAC+)	Below 1 Ω
A24-52 (IAC-) - C33-4 (IAC-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
A24-33 (IAC+) or C33-5 (IAC+) - Body ground	10 kΩ or more
A24-52 (IAC-) or C33-4 (IAC-) - Body ground	10 kΩ or more

(d) Reconnect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK WHETHER DTC OUTPUT RECURS

(a) Clear the DTC (See page ES-38).
(b) Start the engine.
(c) Run the engine at more than 3,000 rpm.
(d) Turn the ignition switch off.

HINT:
As running the engine to 3,000 rpm, the IMRV usually becomes fully opened. If the ignition switch is turned off under this condition, the IMRV is fully closed and then becomes half-opening angle.

(e) Read the DTC.

Result

Display (DTC output)	Proceed to
P2009 and/or P2010 are output again	A
No DTC output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A → **REPLACE ECM**

DTC	P2014	Intake Manifold Runner Position Sensor / Switch Circuit (Bank 1)

DTC	P2016	Intake Manifold Runner Position Sensor / Switch Circuit Low (Bank 1)

DTC	P2017	Intake Manifold Runner Position Sensor / Switch Circuit High (Bank 1)

ES

DESCRIPTION

HINT:

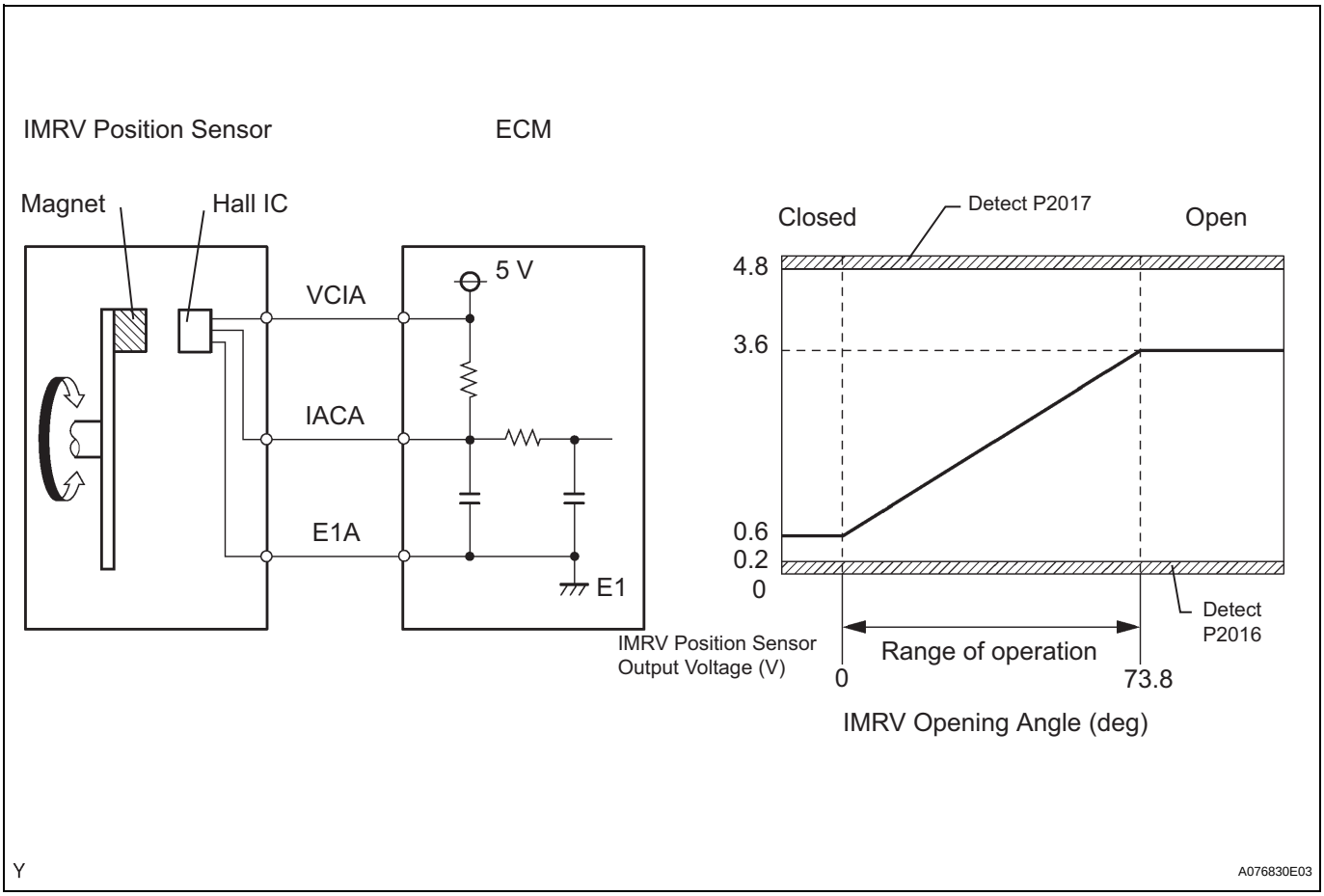
This IMRV position sensor is non-contact type.

The IMRV position sensor is mounted on the valve shaft axis (See page ES-264) and is used to measure the opening angle of the IMRV. Since this sensor is electronically controlled with hall elements, accurate control and reliability can be obtained.

Voltage of approximately 0.6 V is applied to terminal IACA of the ECM when the IMRV is fully closed. The voltage applied to terminal IACA increases in proportion to the IMRV opening angle, approximately 3.6 V is applied to the terminal when it is fully opened.

The ECM detects a malfunction in the IMRV position sensor when its voltage output deviates from the standard range. When a malfunction is detected, the ECM fully opens the IMRV using the IMRV motor until the IMRV position sensor returns to normal.

The related DTCs are P2004 and P2006 (See page ES-264), and P2009 and P2010 (See page ES-270).



DTC No.	DTC Detection Condition	Trouble Area
P2014	Condition (a) continues for 0.5 seconds: (1 trip detection logic) (a) IMRV position sensor output voltage is "0.2 V or less" or "4.8 V or more".	• Open or short in IMRV position sensor circuit • IMRV position sensor • ECM
P2016	Condition (a) continues for 0.5 seconds: (1 trip detection logic) (a) IMRV position sensor output voltage is 0.2 V or less.	Same as DTC No. P2014
P2017	Condition (a) continues for 0.5 seconds: (1 trip detection logic) (a) IMRV position sensor output voltage is 4.8 V or more.	Same as DTC No. P2014

MONITOR STRATEGY

Related DTCs	P2014: IMRC Valve Position Sensor Range Check (Chattering) P2016: IMRC Valve Position Sensor Range Check (Low Voltage) P2017: IMRC Valve Position Sensor Range Check (High Voltage)
Required sensors/components (Main)	IMRC Valve Position Sensor
Required sensors/components (Related)	None
Frequency of operation	Continuous
Duration	0.5 seconds
MIL operation	Immediate
Sequence operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P2014:

IMRC valve position sensor voltage	Less than 0.2 V, or more than 4.8 V

P2016:

IMRC valve position sensor voltage	Less than 0.2 V

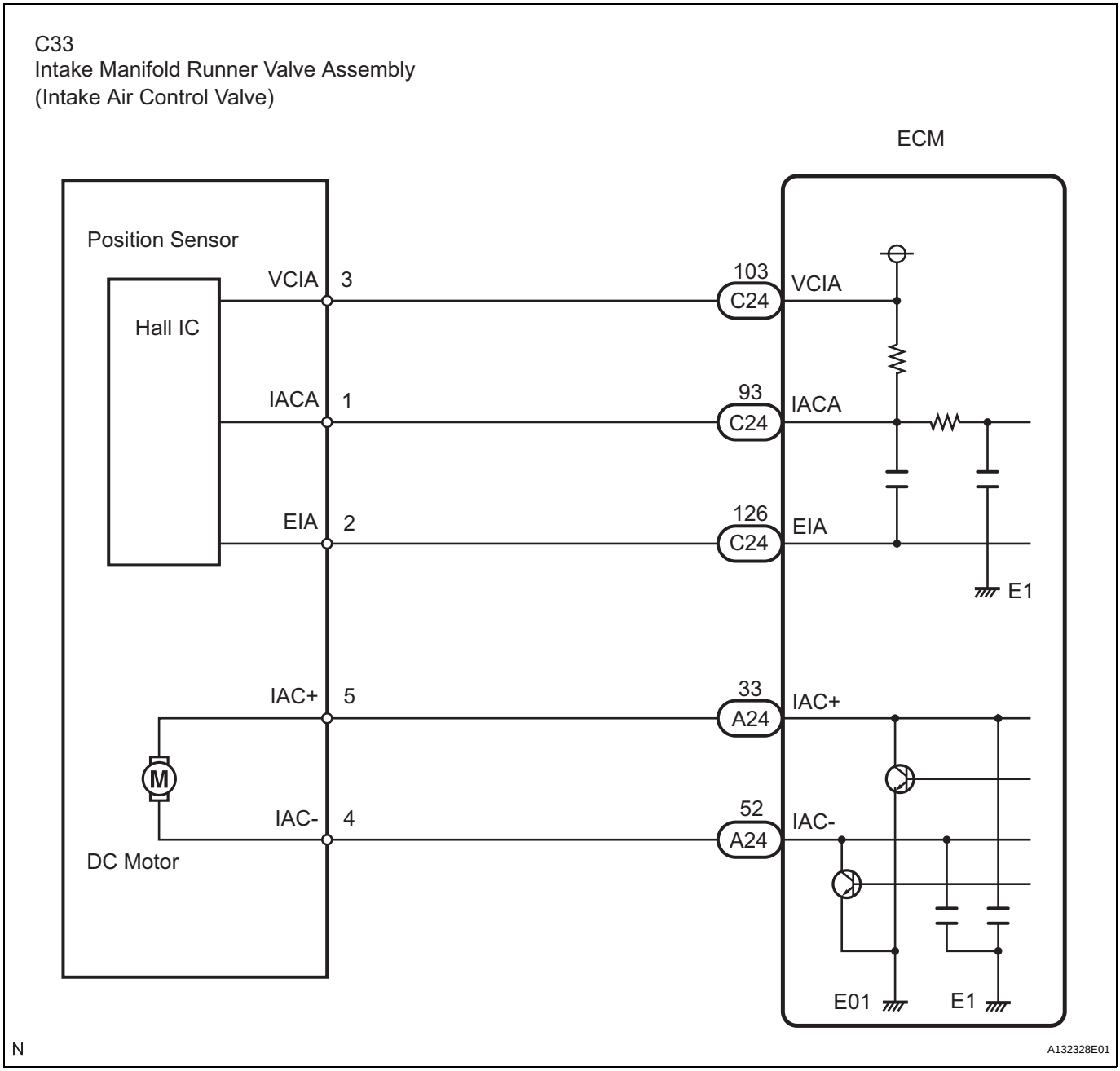
P2017:

IMRC valve position sensor voltage	Less than 4.8 V

COMPONENT OPERATING RANGE

IMRC valve position sensor voltage	0.2 to 4.8 V

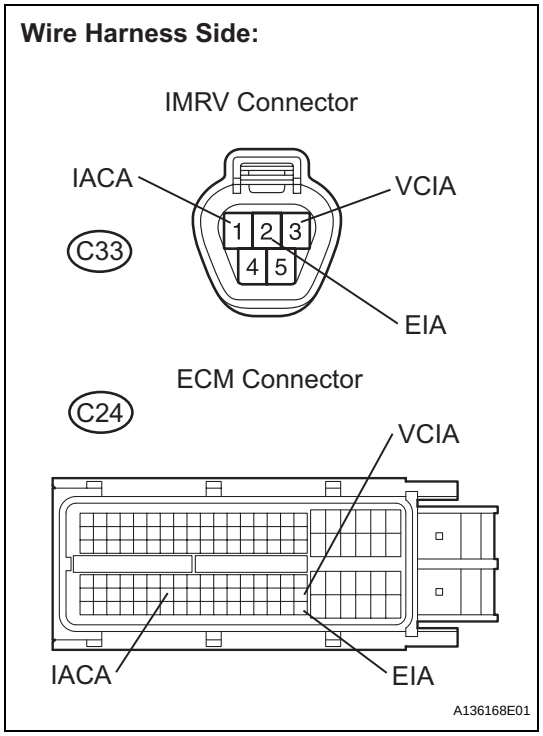
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
If different DTCs that are related to a different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.

1 CHECK HARNESS AND CONNECTOR (ECM - IMRV)



(a) Disconnect the C33 IMRV connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C33-1 (IACA) - C24-93 (IACA)	Below 1 Ω
C33-2 (EIA) - C24-126 (EIA)	Below 1 Ω
C33-3 (VCIA) - C24-103 (VCIA)	Below 1 Ω

Standard resistance (Check for short)

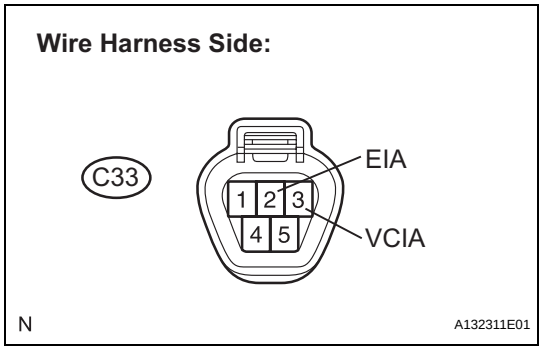
Tester Connection	Specified Condition
C33-1 (IACA) or C24-93 (IACA) - Body ground	10 kΩ or more
C33-3 (VCIA) or C24-103 (VCIA) - Body ground	10 kΩ or more

(d) Reconnect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT ECM (VC VOLTAGE)



(a) Disconnect the C33 IMRV connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage.

Standard voltage

Tester Connection	Specified Condition
C33-1 (VCIA) - C33-2 (EIA)	4.5 to 5.5 V

NG → **REPLACE ECM**

OK

3 REPLACE INTAKE MANIFOLD RUNNER VALVE ASSEMBLY

NEXT

4 CHECK WHETHER DTC OUTPUT RECURS

(a) Clear the DTC (See page ES-38).
(b) Start the engine.
(c) Run the engine at more than 3,000 rpm.

ES

(d) Turn the ignition switch off.
HINT:
As running the engine to 3,000 rpm, the IMRV usually becomes fully opened. If the ignition switch is turned off under this condition, the IMRV is fully closed and then becomes half-opening angle.
(e) Turn the ignition switch to the ON position 20 seconds later.
(f) Read the DTCs.

Result

Display (DTC output)	Proceed to
P2014, P2016 and/or P2017 are output again	A
No DTC output	B

ES

B → **SYSTEM OK**

A

REPLACE ECM

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

DESCRIPTION

The throttle actuator is operated by the ECM and opens and closes the throttle valve using gears.
The opening angle of the throttle valve is detected by the Throttle Position (TP) sensor, which is mounted on the throttle body assembly. The TP sensor provides feedback to the ECM. This feedback allows the ECM to appropriately control the throttle actuator and monitor the throttle opening angle as the ECM responds to driver inputs.
HINT:
This ETCS (Electronic Throttle Control System) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds (1 trip detection logic): (a) Throttle actuator duty ratio 80 % or more (b) Throttle actuator current 0.5 A or less	• Open in throttle actuator circuit • Throttle actuator • ECM
P2103	Either of following conditions is met (1 trip detection logic): • Hybrid IC diagnosis signal failure • Hybrid IC current limiter port failure	• Short in throttle actuator circuit • Throttle actuator • Throttle valve • Throttle body assembly • ECM

MONITOR DESCRIPTION

The ECM monitors the electrical current through the electronic actuator, and detects malfunctions and open circuits in the throttle actuator based on this value. If the current is outside the standard range, the ECM determines that there is a malfunction in the throttle actuator. In addition, if the throttle valve does not function properly (for example, stuck on), the ECM determines that there is a malfunction. The ECM then illuminates the MIL and sets a DTC.
Example:
When the electrical current is less than 0.5 A and the throttle actuator duty ratio exceeds 80 %, the ECM interprets this as the current being outside the standard range, and illuminates the MIL and sets a DTC. If the malfunction is not repaired successfully, a DTC is set when the engine is quickly revved to a high rpm several times after the engine has idled for 5 seconds after engine start.

MONITOR STRATEGY

Related DTCs	P2102: Throttle actuator current (low current) P2103: Throttle actuator current (high current)
Required Sensors/Components (Main)	Throttle actuator (throttle body)
Required Sensors/Components (Related)	None
Frequency of Operation	Continuous
Duration	2 seconds: P2102 25 times or 0.6 seconds: P2103
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

P2102:

Throttle motor	ON
Duty-cycle ratio to open throttle actuator	80 % or more

Throttle actuator power supply	8 V or more

P2103:

Throttle motor	ON
Throttle actuator power supply	8 V or more
Battery voltage	8 V or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2102:

Throttle actuator current	Less than 0.5 A

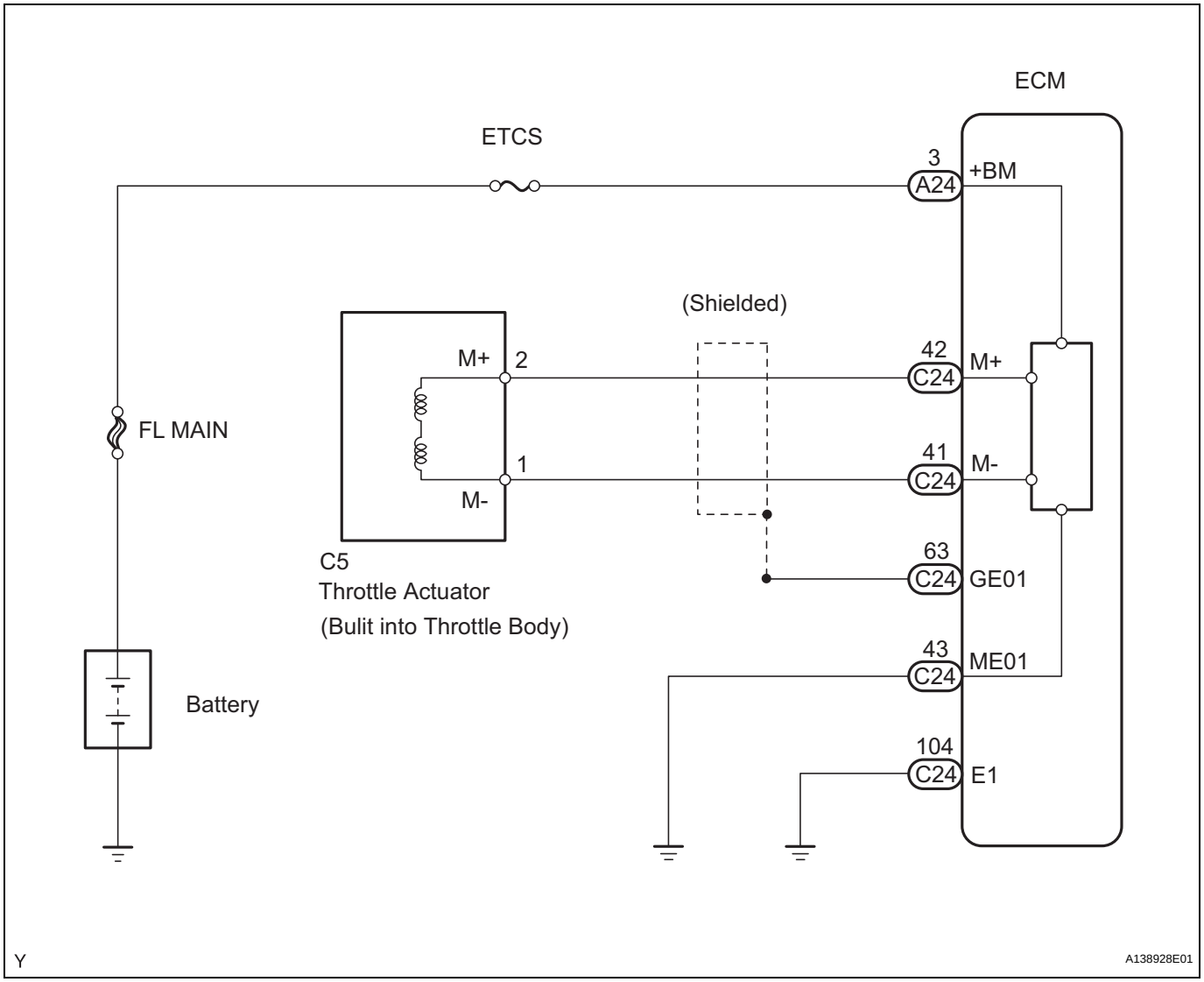
P2103:

Hybrid IC current limiter port	Fail

FAIL-SAFE

When either of these DTCs, or other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM



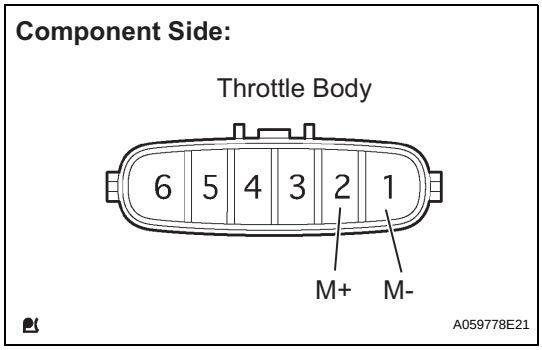
ES

INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- The throttle actuator current (THROTTLE MOT) and the throttle actuator duty ratio (THROTL OPN DUTY / THROTL CLS DUTY) can be read using the intelligent tester. However, the ECM shuts off the throttle actuator current when the ETCS malfunctions.

1 INSPECT THROTTLE BODY (RESISTANCE OF THROTTLE ACTUATOR)



(a) Disconnect the C5 throttle body connector.
(b) Measure the resistance between terminals of the wire harness side connectors.
Standard resistance

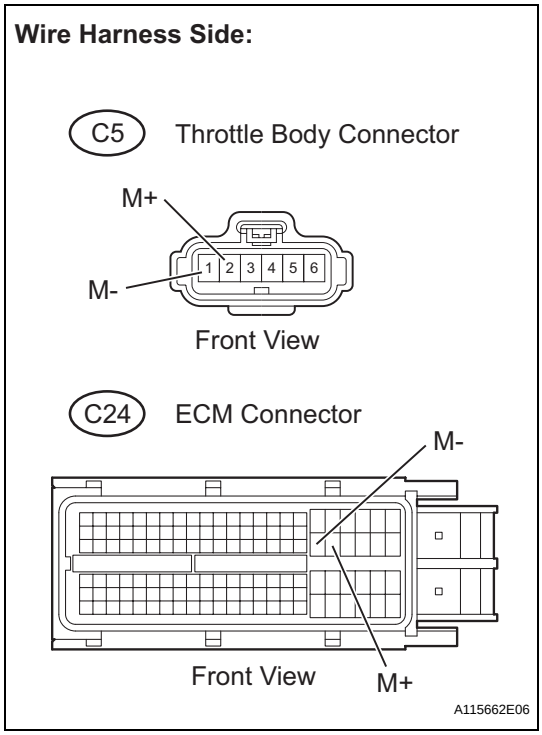
Tester Connection	Specified Condition
2 (M+) - 1 (M-)	0.3 to 100 Ω at 20°C (68°F)

(c) Reconnect the throttle body connector.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

2 CHECK HARNESS AND CONNECTOR (THROTTLE ACTUATOR - ECM)



(a) Disconnect the C5 throttle body connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connector.
Standard resistance (Check for open)

Tester Connection	Specified Condition
C5-2 (M+) - C24-42 (M+)	Below 1 Ω
C5-1 (M-) - C24-41 (M-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C5-2 (M+) or C24-42 (M+) - Body ground	10 kΩ or higher
C5-1 (M-) or C24-41 (M-) - Body ground	10 kΩ or higher

(d) Reconnect the throttle body connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT THROTTLE BODY ASSEMBLY

(a) Check for foreign objects between the throttle valve and the housing.
OK:
No foreign objects between throttle valve and housing.

NG → **REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY**

OK

4	INSPECT THROTTLE VALVE

(a) Check if the throttle valve opens and closes smoothly.
OK:
Throttle valve opens and closes smoothly.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

REPLACE ECM

DTC	P2111	Throttle Actuator Control System - Stuck Open

DTC	P2112	Throttle Actuator Control System - Stuck Closed

DESCRIPTION

The throttle actuator is operated by the ECM, and opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the Throttle Position (TP) sensor, which is mounted on the throttle body assembly. The TP sensor provides feedback to the ECM in order that it can control the throttle actuator, and therefore the throttle valve, appropriately in response to driver inputs.

HINT:

ES

This ETCS (Electronic Throttle Control System) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	Throttle actuator does not close when signaled by ECM (1 trip detection logic)	• Throttle actuator • Throttle body assembly • Throttle valve
P2112	Throttle actuator does not open when signaled by ECM (1 trip detection logic)	• Throttle actuator • Throttle body assembly • Throttle valve

MONITOR DESCRIPTION

The ECM determines that there is a malfunction in the ETCS when the throttle valve remains at a fixed angle despite a high drive current from the ECM. The ECM illuminates the MIL and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set when the accelerator pedal is fully depressed and released quickly (to fully open and close the throttle valve) after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2111: Throttle actuator stuck open P2112: Throttle actuator stuck closed
Required Sensors/Components (Main)	Throttle actuator
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P2111 (Throttle actuator stuck open):

All of the following conditions are met	-
System guard*	ON
Throttle actuator current	2 A or more
Duty cycle to close throttle	80 % or more
* System guard is ON when the following conditions are met	-
Throttle actuator	ON
Throttle actuator duty calculation	Executing
Throttle position sensor	Fail determined
Throttle actuator current-cut operation	Not executing

Throttle actuator power supply	4 V or more
Throttle actuator	Fail determined

P2112 (Throttle actuator stuck closed):

All of the following conditions are met	-
System guard*	ON
Throttle actuator current	2 A or more
Duty cycle to open throttle	80 % or more
* System guard is ON when the following conditions are met	-
Throttle actuator	ON
Throttle actuator duty calculation	Executing
Throttle position sensor	Fail determined
Throttle actuator current-cut operation	Not executing
Throttle actuator power supply	4 V or more
Throttle actuator	Fail determined

ES

TYPICAL MALFUNCTION THRESHOLDS

P2111 (Throttle actuator stuck open):

TP sensor voltage change	No change

P2112 (Throttle actuator stuck closed):

TP sensor voltage change	No change

FAIL-SAFE

When either of these DTCs, or other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM

Refer to DTC P2102 (See page ES-282).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2111 OR P2112)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2111 or P2112	A
P2111 or P2112 and other DTCs	B

HINT:
If any DTCs other than P2111 or P2112 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

ES

2 INSPECT THROTTLE BODY ASSEMBLY (VISUALLY CHECK THROTTLE VALVE)

(a) Check for contamination between the throttle valve and the housing. If necessary, clean the throttle body. And check that the throttle valve moves smoothly.
OK:
Throttle valve is not contaminated with foreign objects and moves smoothly.

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P2111 OR P2112)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Start the engine, and fully depress and release the accelerator pedal quickly (to fully open and close the throttle valve).
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No DTC	A
P2111 or P2112	B

B → **REPLACE ECM**

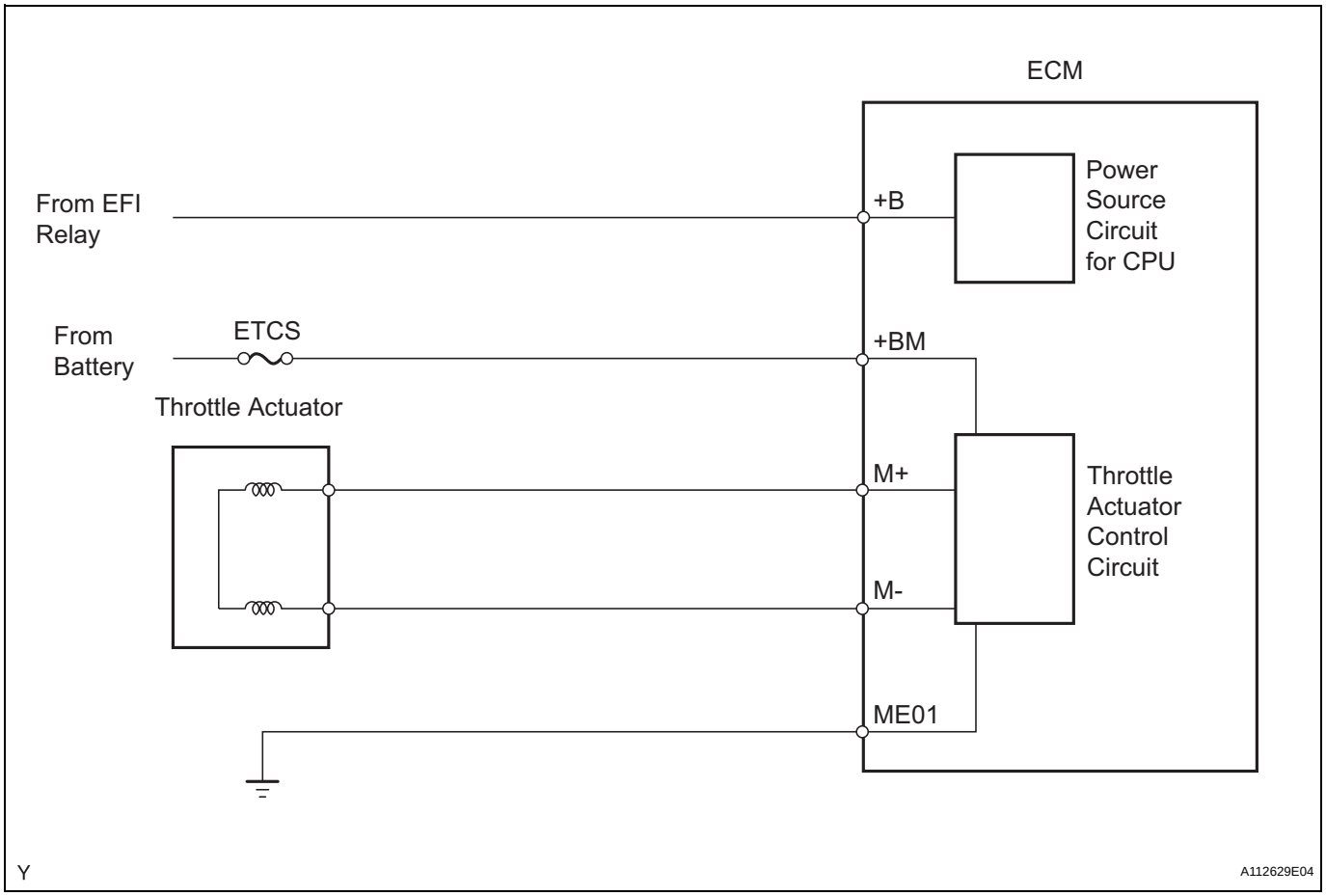
A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P2118	Throttle Actuator Control Motor Current Range / Performance

DESCRIPTION

The ETCS (Electronic Throttle Control System) has a dedicated power supply circuit. The voltage (+BM) is monitored and when it is low (less than 4 V), the ECM determines that there is a malfunction in the ETCS and cuts off the current to the throttle actuator.
When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the throttle actuator is cut. If repairs are made and the system returns to normal, turn the ignition switch off. The ECM then allows the current to flow to the throttle actuator so that it can be restarted.
HINT:
The ETCS does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source (+BM) circuit (1 trip detection logic)	• Open in ETCS power source circuit • Battery • Battery terminals • ETCS fuse • ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the throttle actuator.
When the power supply voltage (+BM) drops below 4 V for 0.8 seconds or more, the ECM interprets this as an open in the power supply circuit (+BM). The ECM illuminates the MIL and sets the DTC.
If the malfunction is not repaired successfully, the DTC is set 5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2118: Throttle actuator power supply
Required Sensors/Components (Main)	Throttle actuator, throttle valve, ETCS fuse
Required Sensors/Components (Related)	None
Frequency of Operation	Continuous
Duration	0.8 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery voltage	8 V or more
Electronic throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

Throttle actuator power supply voltage (+BM)	Less than 4 V

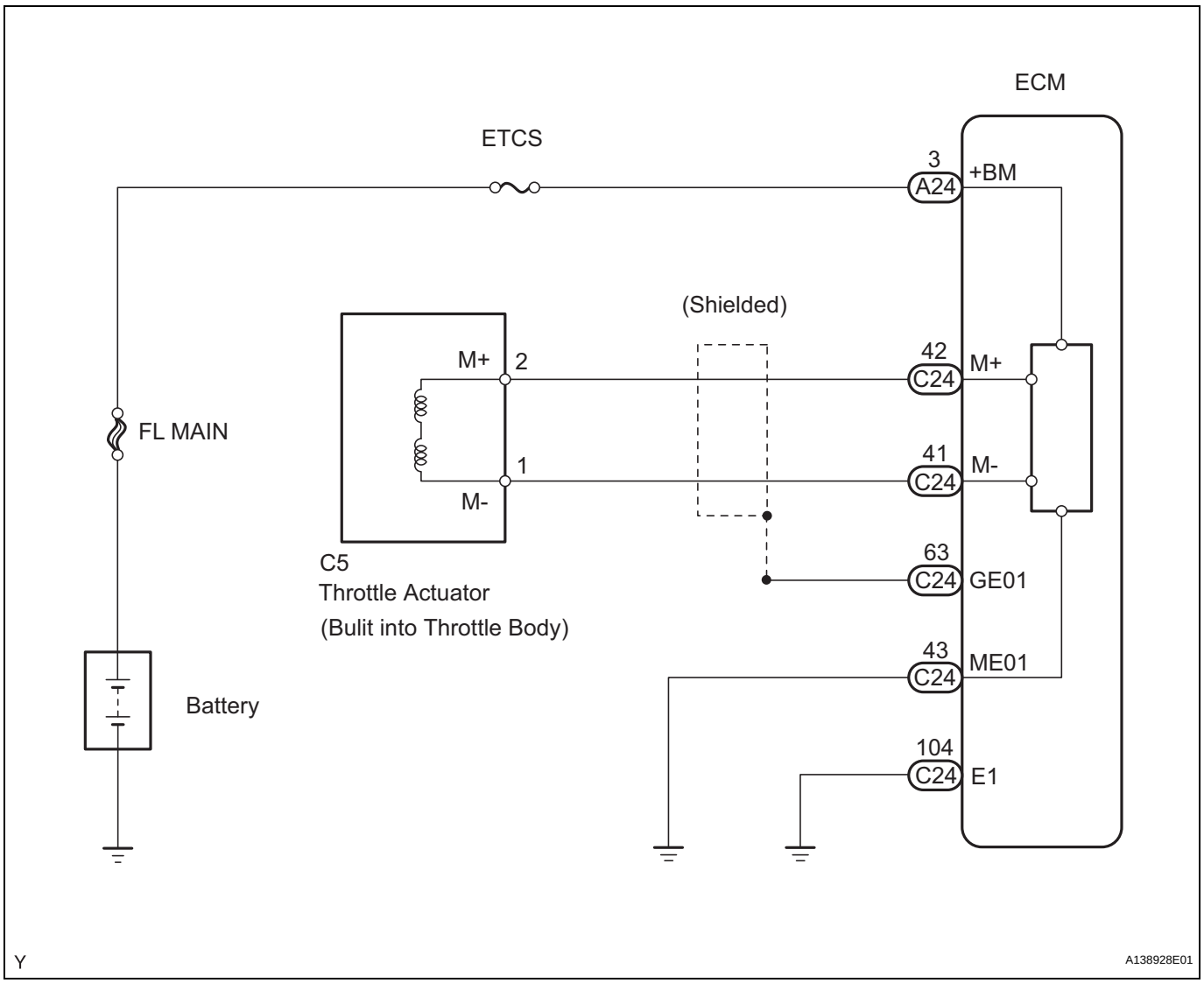
COMPONENT OPERATING RANGE

Throttle actuator power supply voltage (+BM)	9 to 14 V

FAIL-SAFE

When this DTC, or other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

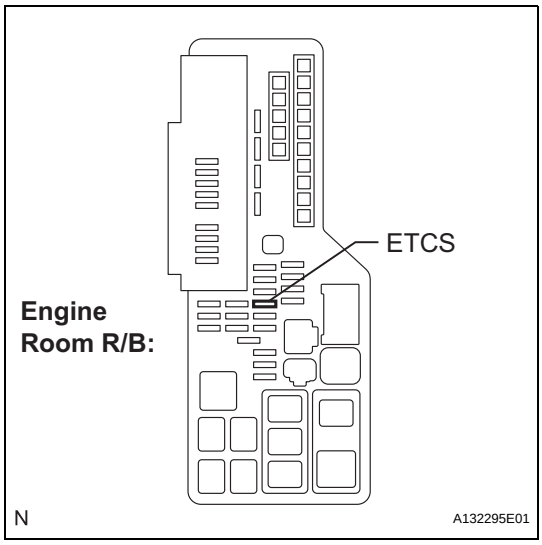
1	READ VALUE USING INTELLIGENT TESTER (+BM VOLTAGE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / +BM VOLTAGE.
(e) Read the value displayed on the tester.
Standard voltage:
9 to 14 V

OK → Go to step 5

NG

2	CHECK FUSE (ETCS FUSE)



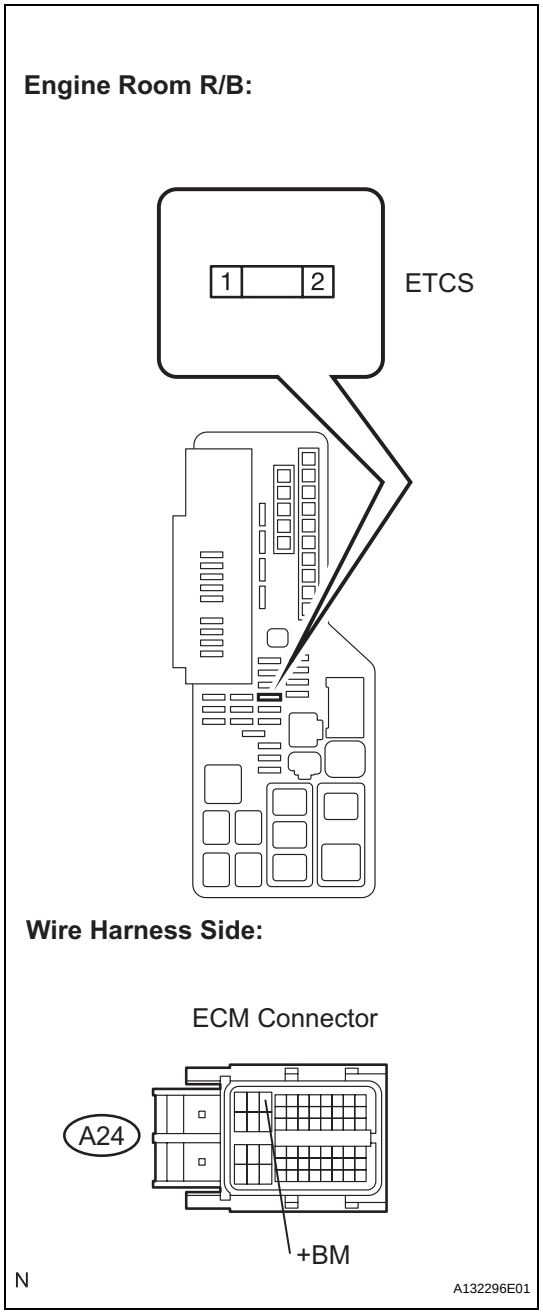
(a) Remove the ETCS fuse from the engine room R/B.
(b) Measure the ETCS fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the ETCS fuse.

NG → **REPLACE FUSE (ETCS FUSE)**

OK

ES

3	CHECK HARNESS AND CONNECTOR (ECM - ETCS FUSE, ETCS FUSE - BATTERY)



(a) Remove the ETCS fuse from the engine room R/B.
(b) Disconnect the cable from the negative (-) battery terminal.
(c) Disconnect the cable from the negative (+) battery terminal.
(d) Disconnect the A24 ECM connector.
(e) Measure the resistance.

Standard resistance (Check for open)

Tester Connection	Specified Condition
2 (ETCS fuse) - A24-3 (+BM)	Below 1 Ω
Positive battery terminal - 1 (ETCS fuse)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
2 (ETCS fuse) or A24-3 (+BM) - Body ground	10 kΩ or higher
Positive battery terminal or 1 (ETCS fuse) - Body ground	10 kΩ or higher

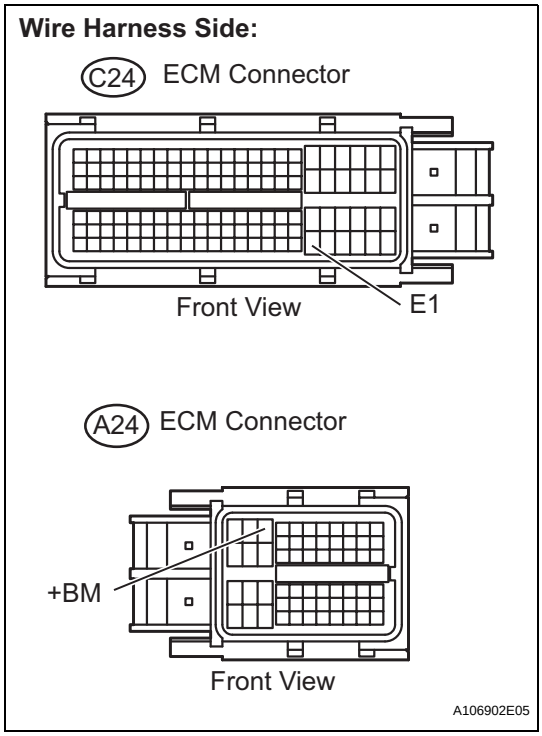
(f) Reinstall the ETCS fuse.
(g) Reconnect the cable to the positive (+) battery terminal.
(h) Reconnect the cable to the negative (-) battery terminal.
(i) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ES

4	INSPECT ECM (+BM VOLTAGE)



(a) Disconnect the A24 and C24 ECM connectors.
(b) Measure the voltage between the terminals of the A24 and C24 ECM connectors.
Standard voltage

Tester Connection	Specified Condition
A24-3 (+BM) - C24-104 (E1)	9 to 14 V

(c) Reconnect the ECM connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TERMINAL E1 - BODY GROUND)**

OK

REPLACE ECM

5	INSPECT BATTERY

(a) Check the battery voltage.
Standard voltage:
12.5 to 12.9 V at 20°C (68°F)

NG → **REPLACE BATTERY**

OK

6	CHECK BATTERY TERMINAL

(a) Check that the battery terminals and ECM ground are not loose or corroded.
OK:
Battery terminals and ECM ground are not loose or corroded.

NG → **REPAIR OR REPLACE BATTERY TERMINAL**

OK

CHECK FOR INTERMITTENT PROBLEMS

DTC	P2119	Throttle Actuator Control Throttle Body Range / Performance

DESCRIPTION

The Electronic Throttle Control System (ETCS) is composed of the throttle actuator, Throttle Position (TP) sensor, Accelerator Pedal Position (APP) sensor, and ECM. The ECM operates the throttle actuator to regulate the throttle valve in response to driver inputs. The TP sensor detects the opening angle of the throttle valve, and provides the ECM with feedback so that the throttle valve can be appropriately controlled by the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle valve opening angle continues to vary greatly from target opening angle (1 trip detection logic)	• ETCS • ECM

ES

MONITOR DESCRIPTION

The ECM determines the actual opening angle of the throttle valve from the TP sensor signal. The actual opening angle is compared to the target opening angle commanded by the ECM. If the difference between these two values is outside the standard range, the ECM interprets this as a malfunction in the ETCS. The ECM then illuminates the MIL and sets the DTC.
If the malfunction is not repaired successfully, the DTC is set when the accelerator pedal is quickly released (to close the throttle valve) after the engine speed reaches 5,000 rpm by the accelerator pedal being fully depressed (fully open the throttle valve).

MONITOR STRATEGY

Related DTCs	P2119: ETCS malfunction
Required Sensors/Components (Main)	Throttle actuator
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	Within 1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
System guard*	ON
*System guard is ON when the following conditions are met	-
Throttle actuator	ON
Throttle actuator duty calculation	Executing
Throttle position sensor	Fail determined
Throttle actuator current-cut operation	Not executing
Throttle actuator power supply	4 V or more
Throttle actuator	Fail determined

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions A or B is met	-
A. Difference between commanded closed throttle position and current closed throttle position	0.3 V or more
B. Difference between commanded open throttle position and current open throttle position	0.3 V or more

FAIL-SAFE

When this DTC, or other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM

Refer to DTC P2102 (See page ES-282).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2119)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2119	A
P2119 and other DTCs	B

HINT:
If any DTCs other than P2119 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

2	CHECK WHETHER DTC OUTPUT RECURS (DTC P2119)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Allow the engine to idle for 15 seconds.
CAUTION:
Exercise extreme care and take precautions in steps (f) and (g) below. Failure to do so may result in the vehicle unexpectedly rolling away.

(f) Securely apply the parking brake and move the gear selector lever to the D position.
(g) While depressing the brake pedal securely, fully depress the accelerator pedal for 5 seconds.
(h) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(i) Read the DTCs.
HINT:
The output voltage of the throttle position sensor can be checked during step (g) using the intelligent tester. Variations in the output voltage indicate that the throttle actuator is in operation. To check the output voltage using the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS #1.
OK:
No DTC output.

ES

NG → **REPLACE THROTTLE BODY ASSEMBLY**

OK

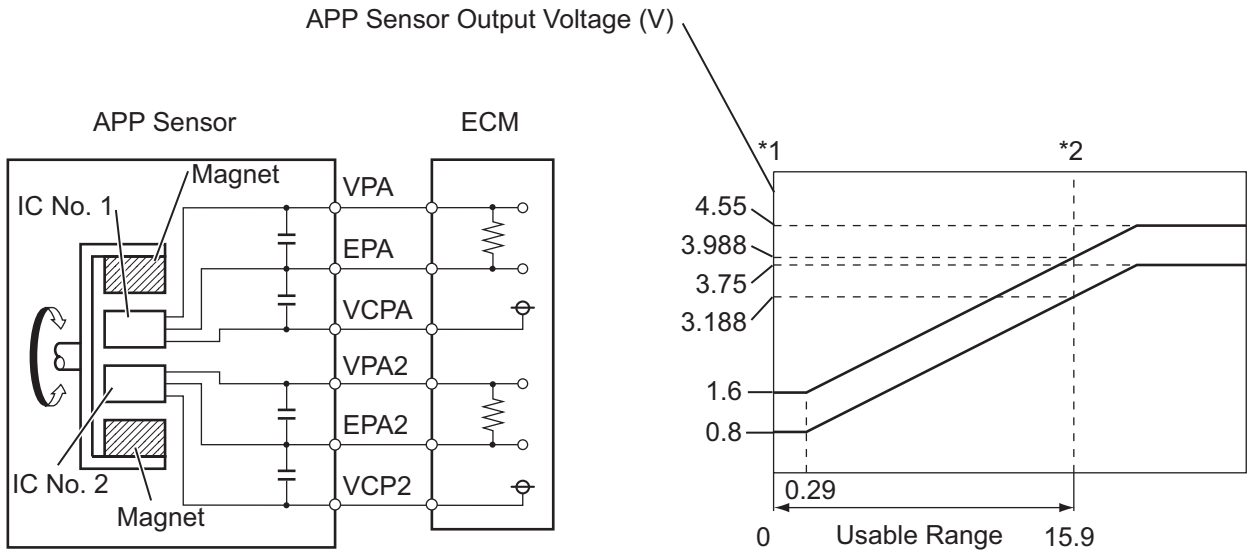
CHECK FOR INTERMITTENT PROBLEMS

DTC	P2120	Throttle / Pedal Position Sensor / Switch "D" Circuit
DTC	P2122	Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input
DTC	P2123	Throttle / Pedal Position Sensor / Switch "D" Circuit High Input
DTC	P2125	Throttle / Pedal Position Sensor / Switch "E" Circuit
DTC	P2127	Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input
DTC	P2128	Throttle / Pedal Position Sensor / Switch "E" Circuit High Input
DTC	P2138	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation

HINT:
These DTCs relate to the Accelerator Pedal Position (APP) sensor.

DESCRIPTION

HINT:
This ETCS (Electronic Throttle Control System) does not use a throttle cable.
The APP sensor is mounted on the accelerator pedal bracket and has 2 sensor circuits: VPA (main) and VPA2 (sub). This sensor is a non-contact type It uses Hall-effect elements in order to yield accurate signals even in extreme driving conditions, such as at high speeds as well as very low speeds. The voltage, which is applied to terminals VPA and VPA2 of the ECM, varies between 0 V and 5 V in proportion to the operating angle of the accelerator pedal (throttle valve). A signal from VPA indicates the actual accelerator pedal opening angle (throttle valve opening angle) and is used for engine control. A signal from VPA2 conveys the status of the VPA circuit and is used to check the APP sensor itself.
The ECM monitors the actual accelerator pedal opening angle (throttle valve opening angle) through the signals from VPA and VPA2, and controls the throttle actuator according to these signals.



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DTC No.	DTC Detection Condition	Trouble Area
P2120	VPA fluctuates rapidly beyond upper and lower malfunction thresholds for 0.5 seconds or more (1 trip detection logic)	• APP sensor • ECM
P2122	VPA 0.4 V or less for 0.5 seconds or more when accelerator pedal fully released (1 trip detection logic)	• APP sensor • Open in VCP1 circuit • Open or ground short in VPA circuit • ECM
P2123	VPA 4.8 V or more for 2.0 seconds or more (1 trip detection logic)	• APP sensor • Open in EPA circuit • ECM
P2125	VPA2 fluctuates rapidly beyond upper and lower malfunction thresholds for 0.5 seconds or more (1 trip detection logic)	• APP sensor • ECM
P2127	VPA2 1.2 V or less for 0.5 seconds or more when accelerator pedal fully released (1 trip detection logic)	• APP sensor • Open in VCP2 circuit • Open or ground short in VPA2 circuit • ECM
P2128	Conditions (a) and (b) continue for 2.0 seconds or more (1 trip detection logic): (a) VPA2 4.8 V or more (b) VPA between 0.4 V and 3.45 V	• APP sensor • Open in EPA2 circuit • ECM

DTC No.	DTC Detection Condition	Trouble Area
P2138	Condition (a) or (b) continues for 2.0 seconds or more (1 trip detection logic): (a) Difference between VPA and VPA2 0.02 V or less (b) VPA 0.4 V or less and VPA2 1.2 V or less	• Short between VPA and VPA2 circuits • APP sensor • ECM

HINT:
When any of these DTCs are set, check the APP sensor voltage by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ACCEL POS #1 and ACCEL POS #2.

Trouble Areas	ACCEL POS #1 When AP Released	ACCEL POS #2 When AP Released	ACCEL POS #1 When AP Depressed	ACCEL POS #2 When AP Depressed
VCP circuit open	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V
Open or ground short in VPA circuit	0 to 0.2 V	1.2 to 2.0 V	0 to 0.2 V	3.4 to 5.0 V
Open or ground short in VPA2 circuit	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
EPA circuit open	4.5 to 5.0 V	4.5 to 5.0 V	4.5 to 5.0 V	4.5 to 5.0 V
Normal condition	0.5 to 1.1 V	1.2 to 2.0 V	2.6 to 4.5 V	3.4 to 5.0 V

ES

HINT:
- Accelerator pedal positions are expressed as voltages.
- AP denotes Accelerator Pedal.

MONITOR DESCRIPTION

When either output voltage of VPA or VPA2 deviates from the standard range, or the difference between the output voltages of the 2 sensor circuits is less than the threshold, the ECM determines that there is a malfunction in the APP sensor. The ECM then illuminates the MIL and sets a DTC.
Example:
When the output voltage of VPA drops below 0.4 V for more than 0.5 seconds when the accelerator pedal is fully depressed, DTC P2122 is set.
If the malfunction is not repaired successfully, a DTC is set 2 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2120: APP sensor 1 range check (fluctuating) P2122: APP sensor 1 range check (low voltage) P2123: APP sensor 1 range check (high voltage) P2125: APP sensor 2 range check (fluctuating) P2127: APP sensor 2 range check (low voltage) P2128: APP sensor 2 range check (high voltage) P2138: APP sensor range check (correlation)
Required Sensors/Components (Main)	APP sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds: P2120, P2122, P2125 and P2127 2.0 seconds: P2123, P2128 and P2138
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Either of the following conditions 1 or 2 is met:	-
1. Ignition switch	ON
2. Throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

P2120:

Either of the following conditions 1 or 2 is met:	-
1. VPA voltage when VPA2 voltage is 0.04 V or more	0.4 V or less
2. VPA voltage	4.8 V or more

P2122:

VPA voltage when VPA2 voltage is 0.04 V or more	0.4 V or less

P2123:

VPA voltage	4.8 V or more

P2125:

Either of the following conditions 1 or 2 is met:	-
1. VPA2 voltage when VPA voltage is 0.04 V or more	1.2 V or less
2. VPA2 voltage when VPA voltage is 0.4 to 3.45 V	4.8 V or more

P2127:

VPA2 voltage when VPA voltage is 0.04 V or more	1.2 V or less

P2128:

VPA2 voltage when VPA voltage is 0.4 to 3.45 V	4.8 V or more

P2138:

Either of the following conditions A or B is met:	-
Condition A	-
Difference between VPA and VPA 2 voltages	0.02 V or less
Condition B	-
VPA voltage	0.4 V or less
VPA2 voltage	1.2 V or less

COMPONENT OPERATING RANGE

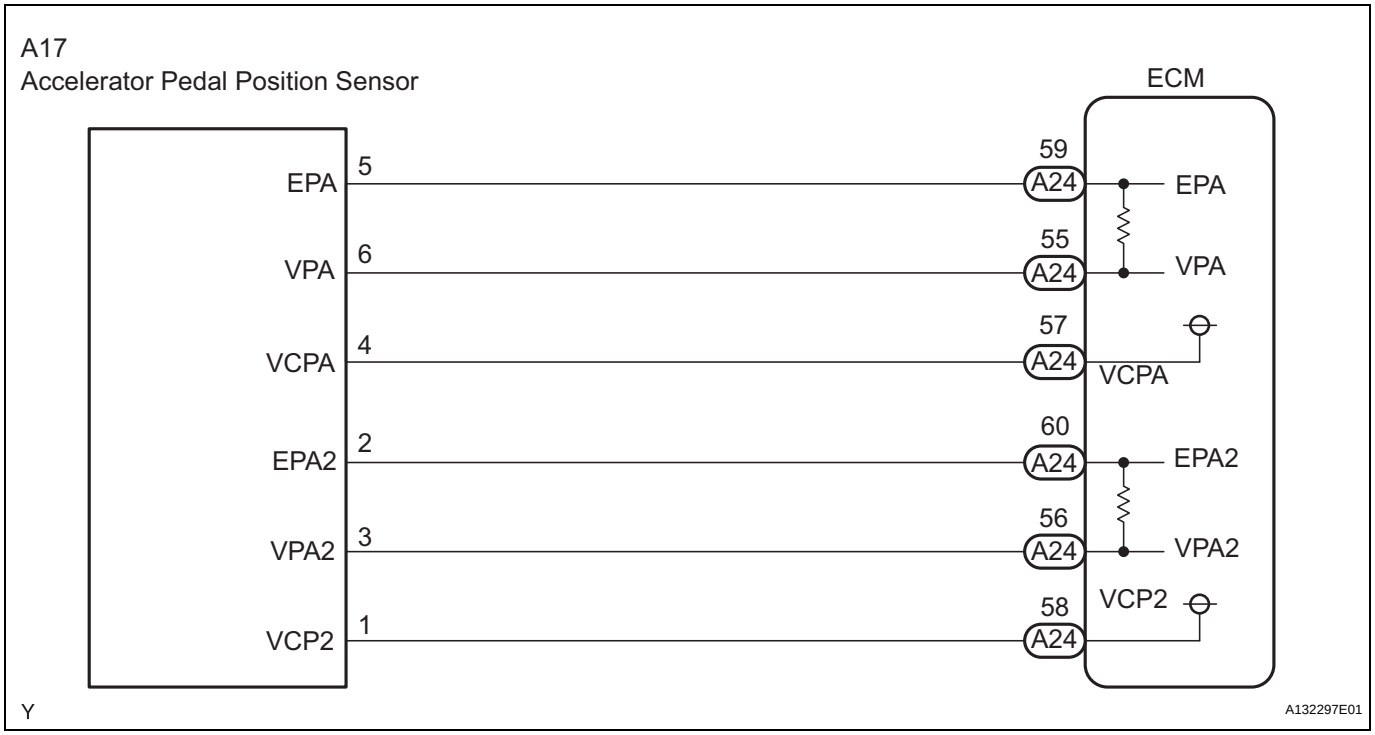
VPA voltage	0.5 V to 4.5 V
VPA2 voltage	1.2 V to 5.0 V
Difference between VPA and VPA2 voltages	More than 0.02 V

FAIL-SAFE

When any of DTCs P2120, P2121, P2122, P2123, P2125, P2127, P2128 and P2138 are set, the ECM enters fail-safe mode. If either of the 2 sensor circuit malfunctions, the ECM uses the remaining circuit to calculate the accelerator pedal position to allow the vehicle to continue driving. If both of the circuits malfunction, the ECM regards the accelerator pedal as being released. As a result, the throttle valve is closed and the engine idles.

Fail-safe mode continues until a pass condition is detected, and the ignition switch is turned off.

WIRING DIAGRAM



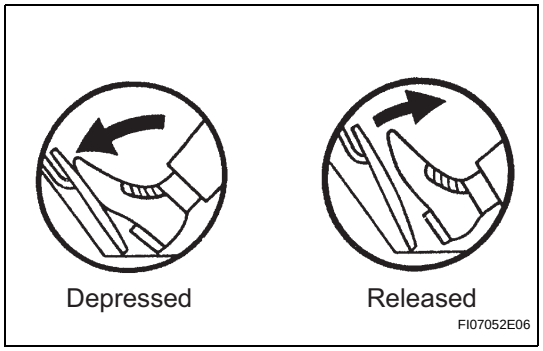
ES

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	READ VALUE USING INTELLIGENT TESTER (ACCEL POS #1 AND ACCEL POS #2)



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.
(d) Read the value displayed on the tester.

Standard voltage

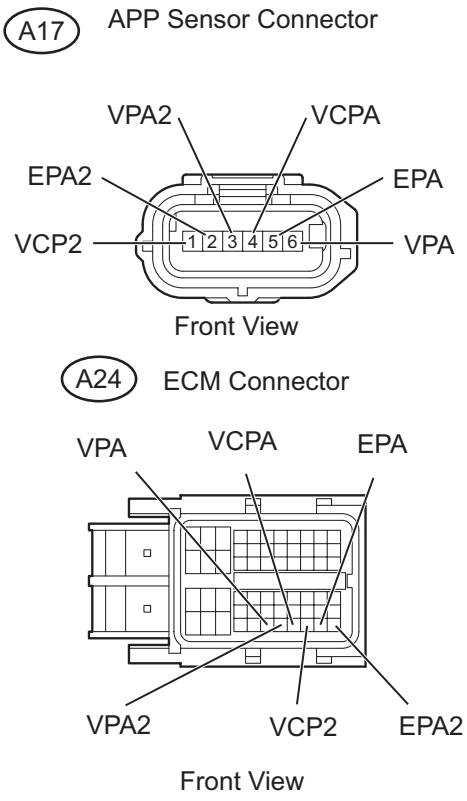
Accelerator Pedal Operations	ACCEL POS #1	ACCEL POS #2
Released → Depressed → Released	0.5 to 4.5 V	1.2 to 5.0 V
	Difference between ACCEL POS #1 and ACCEL POS #2 is greater than 0.02 V	Difference between ACCEL POS #1 and ACCEL POS #2 is greater than 0.02 V

OK → **Go to step 5**

NG

2	CHECK HARNESS AND CONNECTOR (ACCELERATOR PEDAL POSITION SENSOR - ECM)

Wire Harness Side:



(a) Disconnect the A17 Accelerator Pedal Position (APP) sensor connector.
(b) Disconnect the A24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
A17-6 (VPA) - A24-55 (VPA)	Below 1 Ω
A17-5 (EPA) - A24-59 (EPA)	Below 1 Ω
A17-4 (VCPA) - A24-57 (VCPA)	Below 1 Ω
A17-3 (VPA2) - A24-56 (VPA2)	Below 1 Ω
A17-2 (EPA2) - A24-60 (EPA2)	Below 1 Ω
A17-1 (VCP2) - A24-58 (VCP2)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
A17-6 (VPA) or A24-55 (VPA) - body ground	10 kΩ or higher
A17-5 (EPA) or A24-59 (EPA) - body ground	10 kΩ or higher
A17-4 (VCPA) or A24-57 (VCPA) - body ground	10 kΩ or higher
A17-3 (VPA2) or A24-56 (VPA2) - body ground	10 kΩ or higher
A17-2 (EPA2) or A24-60 (EPA2) - body ground	10 kΩ or higher
A17-1 (VCP2) or A24-58 (VCP2) - body ground	10 kΩ or higher

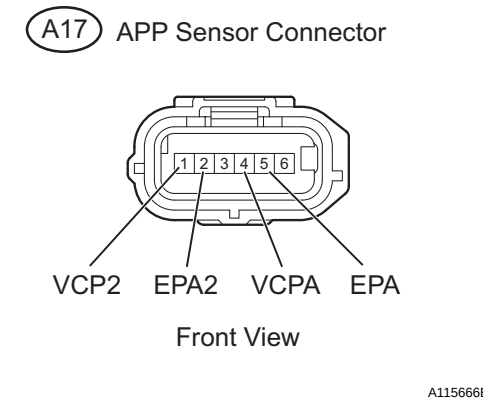
(d) Reconnect the APP sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK ECM (VCPA AND VCP2 VOLTAGE)

Wire Harness Side:



(a) Disconnect the A17 APP sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminals of the A17 APP sensor connector.

Standard voltage

Tester Connection	Specified Condition
A17-4 (VCPA) - A17-5 (EPA)	4.5 to 5.5 V
A17-1 (VCP2) - A17-2 (EPA2)	4.5 to 5.5 V

(d) Reconnect the APP sensor connector.

NG → **REPLACE ECM**

OK

4	REPLACE ACCELERATOR PEDAL ASSEMBLY

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (ACCELERATOR PEDAL POSITION SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Start the engine.
(e) Allow the engine to idle for 15 seconds.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P2120, P2122, P2123, P2125, P2127, P2128, and/or P2138	A
No output	B

B → SYSTEM OK

A

REPLACE ECM

DTC	P2121	Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance

DESCRIPTION

HINT:

Refer to DTC P2120 (See page ES-298).

DTC No.	DTC Detection Condition	Trouble Area
P2121	Difference between VPA and VPA2 less than 0.4 V, or more than 1.2 V for 0.5 seconds (1 trip detection logic)	• Accelerator Pedal Position (APP) sensor • ECM

ES

MONITOR DESCRIPTION

When the difference between the output voltages of VPA and VPA2 deviates from the standard, the ECM determines that the Accelerator Pedal Position (APP) sensor is malfunctioning. The ECM turns on the MIL and the DTC is set.

MONITOR STRATEGY

Related DTCs	P2121: APP sensor rationality
Required Sensors/Components (Main)	APP sensor
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Either of the following conditions 1 or 2 is met:	-
1. Ignition switch	ON
2. Throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

Difference between VPA voltage (learned value) and VPA2 voltage (learned value)	Less than 0.4 V, or more than 1.2 V

FAIL-SAFE

The APP sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the functioning circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal as being fully closed. In this case, the throttle valve remains closed as if the engine is idling.

If a pass condition is detected and then the ignition switch is turned off, the fail-safe operation stops and the system returns to a normal condition.

WIRING DIAGRAM

Refer to DTC P2120 (See page ES-302).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2121)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

ES

Result

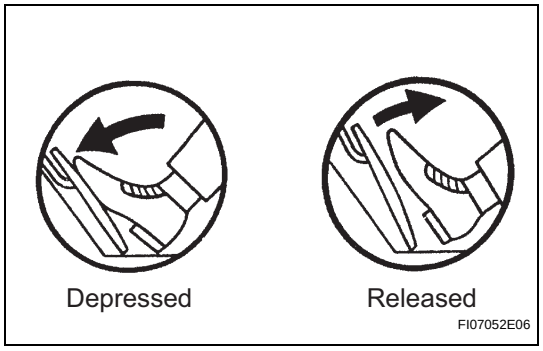
Display (DTC Output)	Proceed to
P2121	A
P2121 and other DTCs	B

HINT:
If any DTCs other than P2121 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 READ VALUE USING INTELLIGENT TESTER (ACCEL POS #1 AND ACCEL POS #2)



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.
(d) Read the values displayed on the tester.
Standard voltage

Accelerator Pedal Operations	ACCEL POS #1	ACCEL POS #2
Released → Depressed → Released	0.5 to 4.5 V	1.2 to 5.0 V
	Difference between ACCEL POS #1 and ACCEL POS #2 is greater than 0.02 V	Difference between ACCEL POS #1 and ACCEL POS #2 is greater than 0.02 V

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

3	REPLACE ACCELERATOR PEDAL ASSEMBLY

NEXT

4	CHECK WHETHER DTC OUTPUT RECURS (DTC P2121)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Start the engine.
(e) Allow the engine to idle for 15 seconds.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2121	A
No output	B

B → SYSTEM OK

A

REPLACE ECM

DTC	P2195	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)

HINT:
- Although the DTC titles say oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

ES

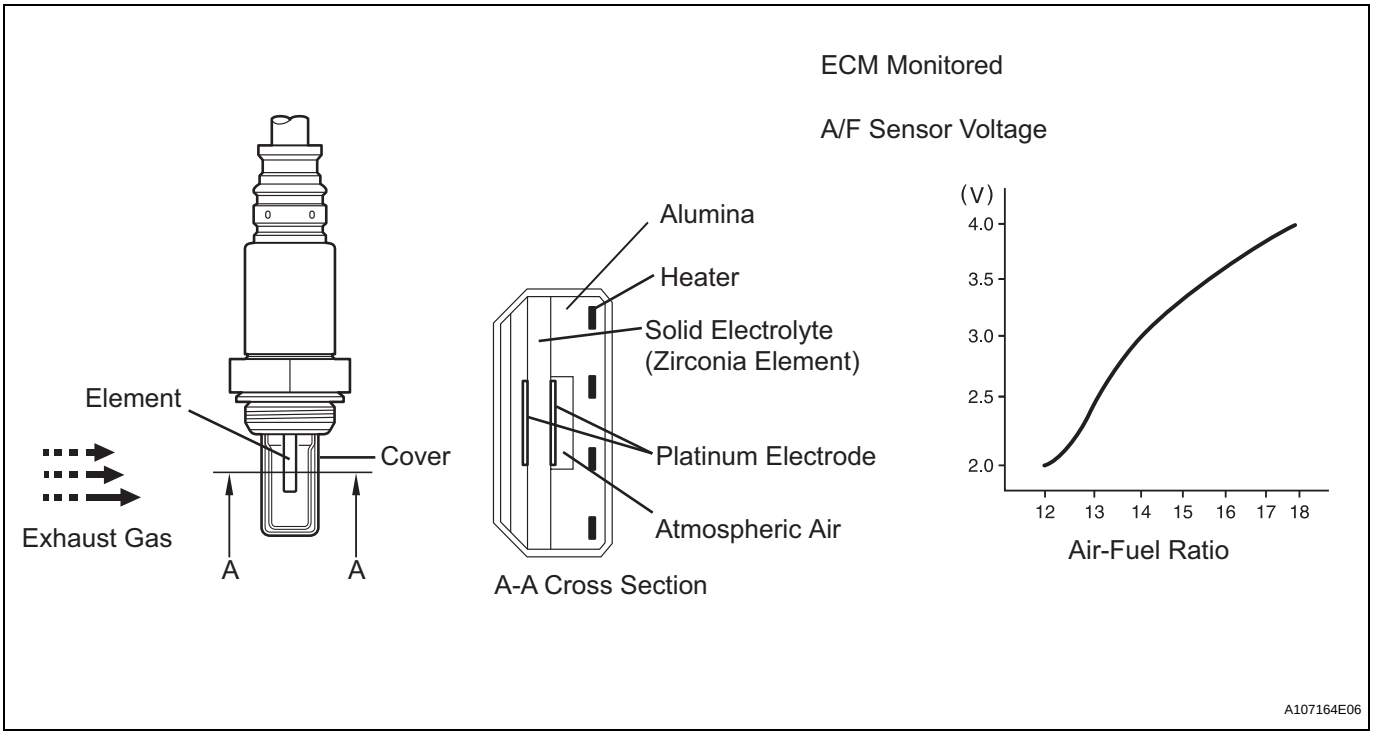
DESCRIPTION

The A/F sensor generates a voltage* that corresponds to the actual air-fuel ratio. This sensor voltage is used to provide the ECM with feedback so that it can control the air-fuel ratio. The ECM determines the deviation from the stoichiometric air-fuel ratio level, and regulates the fuel injection time. If the A/F sensor malfunctions, the ECM is unable to control the air-fuel ratio accurately.

The A/F sensor is of the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate air-fuel ratio detection. In addition, the sensor and heater portions are narrower than the conventional type. The heat generated by the heater is conducted to the solid electrolyte through the alumina, therefore the sensor activation is accelerated.

A three-way catalytic converter (TWC) is used in order to convert the carbon monxide (CO), hydrocarbons (HC), and nitrogen oxide (NOX) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio.

*: Value changes inside the ECM. Since the A/F sensor is the current output element, a current is converted into a voltage inside the ECM. Any measurements taken at the A/F sensor or ECM connectors will show a constant voltage.



DTC No.	DTC Detection Condition	Trouble Area
P2195	Conditions (a) and (b) continue for 10 seconds or more (2 trip detection logic): (a) A/F sensor voltage more than 3.8 V (b) Heated Oxygen (HO2) sensor voltage 0.15 V or more	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Engine room J/B (EFI relay) • A/F sensor heater and EFI relay circuits • ECM
	While fuel-cut operation is performed (during vehicle deceleration), A/F sensor current 3.6 mA or more for 3 seconds (2 trip detection logic)	• A/F sensor • ECM
P2196	Conditions (a) and (b) continue for 10 seconds or more (2 trip detection logic): (a) A/F sensor voltage less than 2.8 V for 10 seconds (b) HO2 sensor voltage less than 0.6 V	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • A/F sensor heater (sensor 1) • Engine room J/B (EFI relay) • A/F sensor heater and EFI relay circuits • ECM
	While fuel-cut operation is performed (during vehicle deceleration), A/F sensor current less than 1.0 mA for 3 seconds (2 trip detection logic)	• A/F sensor • ECM

ES

HINT:

- When either of these DTCs is set, check the A/F sensor output voltage by selecting the following menu items on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / AFS B1 S1.
- Short-term fuel trim values can also be read using the intelligent tester.
- The ECM regulates the voltages at the A1A+ and A1A- terminals of the ECM to a constant level. Therefore, the A/F sensor output voltage cannot be confirmed without using the intelligent tester.
- If the A/F sensor is malfunctioning, the ECM sets the DTC P2195 or P2196.

MONITOR DESCRIPTION

Sensor voltage detection monitor

Under the air-fuel ratio feedback control, if the A/F sensor output voltage indicates rich or lean for a certain period of time, the ECM determines that there is a malfunction in the A/F sensor. The ECM illuminates the MIL and sets a DTC.

Example:

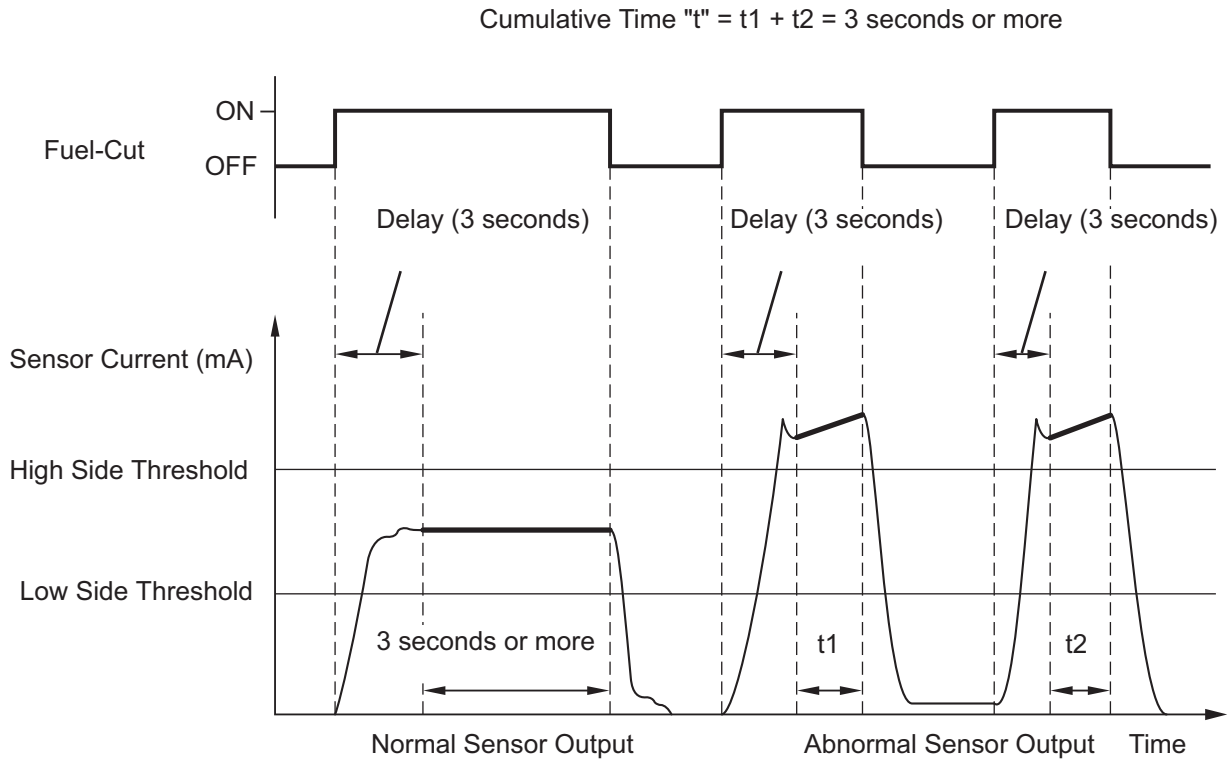
If the A/F sensor output voltage is less than 2.8 V (very rich condition) for 10 seconds, despite the rear HO2 sensor output voltage being less than 0.6 V, the ECM sets DTC P2196. Alternatively, if the A/F sensor output voltage is more than 3.8 V (very lean condition) for 10 seconds, despite the rear HO2 sensor output voltage being 0.15 V or more, DTC P2195 is set.

Sensor current detection monitor

A rich air-fuel mixture causes a low A/F sensor current, and a lean air-fuel mixture causes a high A/F sensor current. Therefore, the sensor output becomes low during acceleration, and it becomes high during deceleration with the throttle valve fully closed. The ECM monitors the A/F sensor current during fuel-cut and detects any abnormal current values.

If the A/F sensor output is 3.6 mA or more for more than 3 seconds of cumulative time, the ECM interprets this as a malfunction in the A/F sensor and sets DTC P2195 (high-side stuck). If the A/F sensor output is less than 1.0 mA for more than 3 seconds of cumulative time, the ECM sets DTC P2196 (low-side stuck).

A/F Sensor Current Monitor:



ES

MONITOR STRATEGY

Related DTCs	P2195: A/F sensor signal stuck lean P2196: A/F sensor signal stuck rich
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	HO2 sensor
Frequency of Operation	Continuous
Duration	10 seconds: Sensor voltage detection monitor 3 seconds: Sensor current detection monitor
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All

Monitor runs whenever following DTCs are not present	P0031, P0032 (A/F sensor heater - Sensor 1) P0037, P0038 (O2 sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136 (O2 Sensor - Sensor 2) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0441 - P0456, P2401 - P2420 (EVAP system) P0500 (VSS)

Sensor voltage detection monitor (Lean side malfunction P2195):

Duration while all of the following conditions are met	2 seconds or more
Rear HO2 sensor voltage	0.15 V or more
Time after engine start	30 seconds or more
A/F sensor status	Activated
Fuel system status	Closed-loop
Engine	Running

Sensor voltage detection monitor (Rich side malfunction P2196):

Duration while all of the following conditions are met	2 seconds or more
Rear HO2 sensor voltage	Below 0.6 V
Time after engine start	30 seconds or more
A/F sensor status	Activated
Fuel system status	Closed-loop
Engine	Running

Sensor current detection monitor P2195 and P2196

Battery voltage	11 V or more
Atmospheric pressure	76 kPa (570 mmHg) or more
A/F sensor status	Activated
Continuous time of fuel cut	3 to 10 seconds
ECT	75°C (167°F) or more

TYPICAL MALFUNCTION THRESHOLDS

Sensor voltage detection monitor (Lean side malfunction P2195):

A/F sensor voltage	More than 3.8 V

Sensor voltage detection monitor (Rich side malfunction P2196):

A/F sensor voltage	Less than 2.8 V

Sensor current detection monitor (High side malfunction P2195):

A/F sensor current	3.6 mA or more

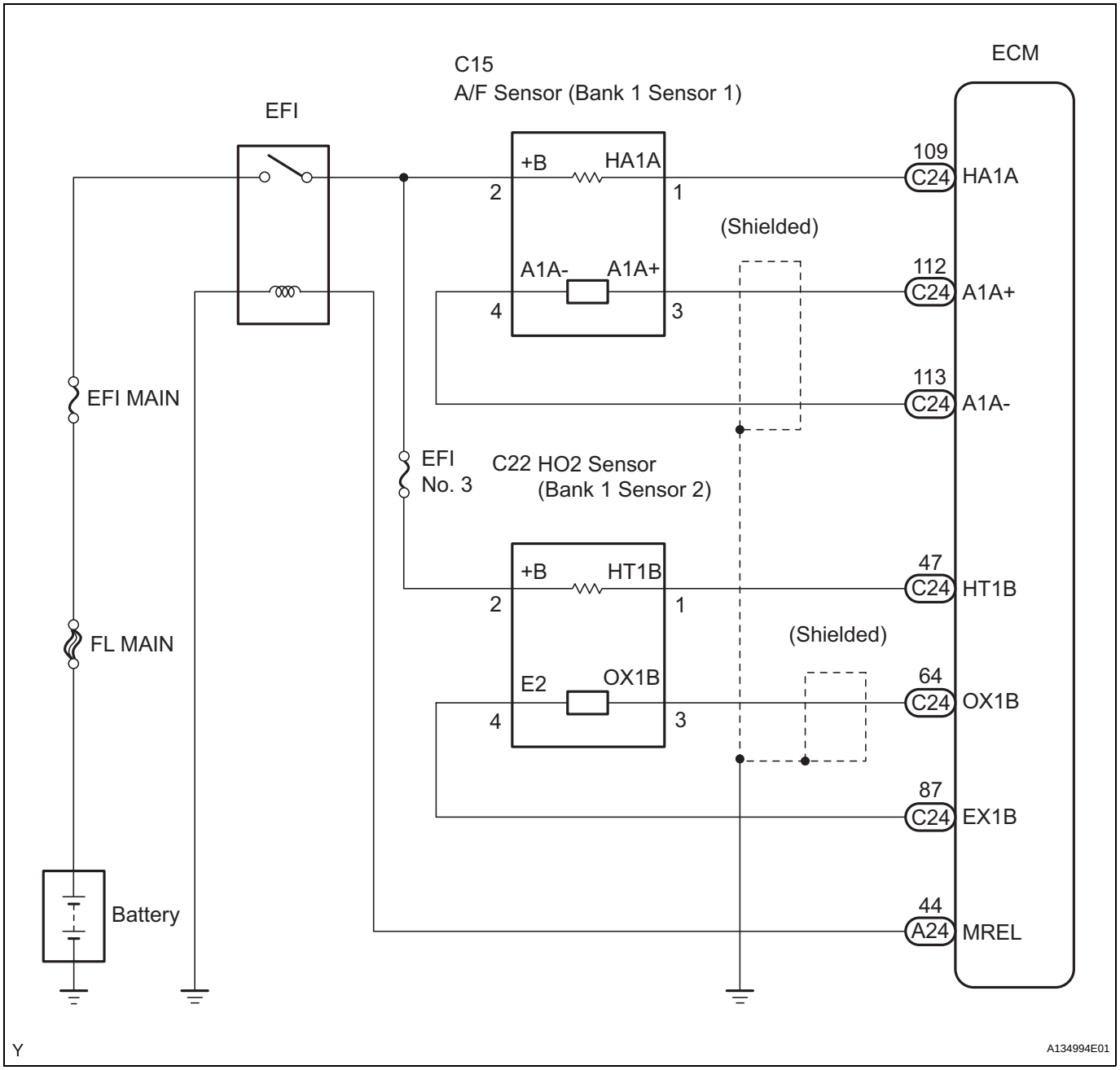
Sensor current detection monitor (Low side malfunction P2196):

A/F sensor current	Less than 1 mA

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

WIRING DIAGRAM

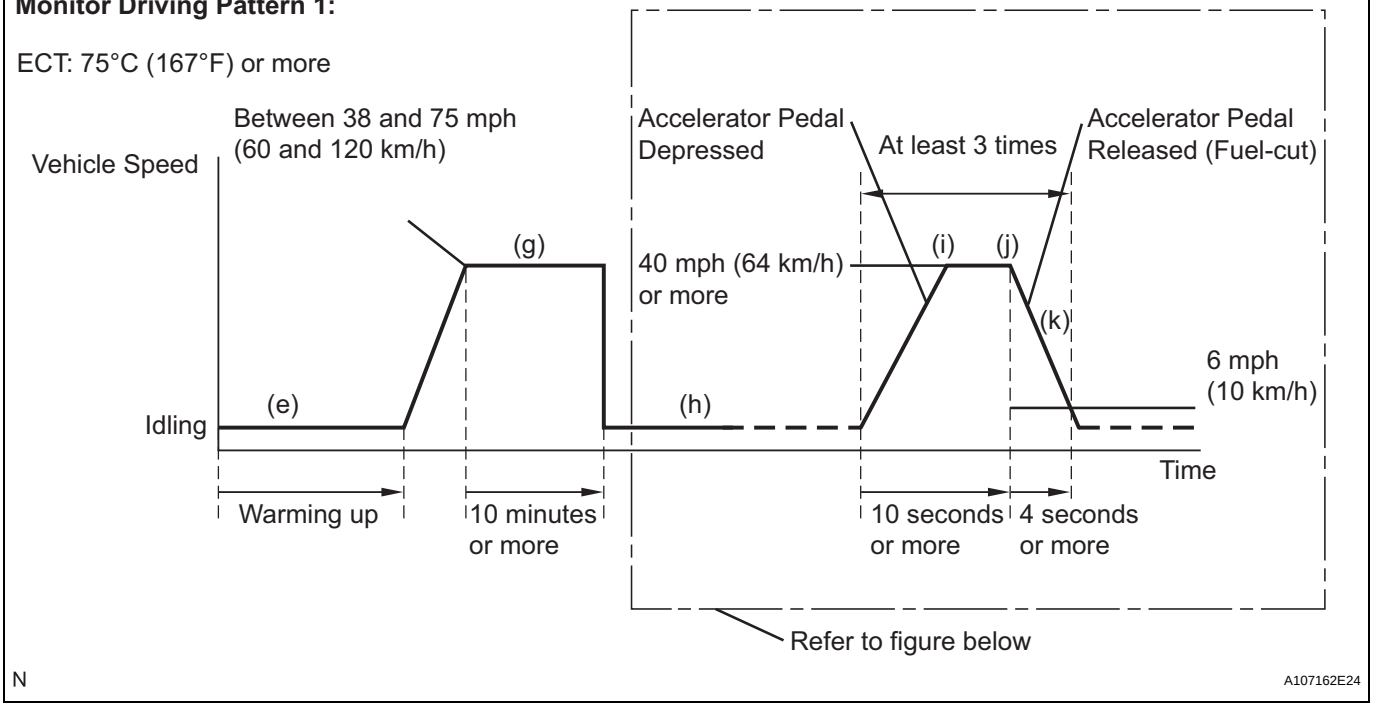


ES

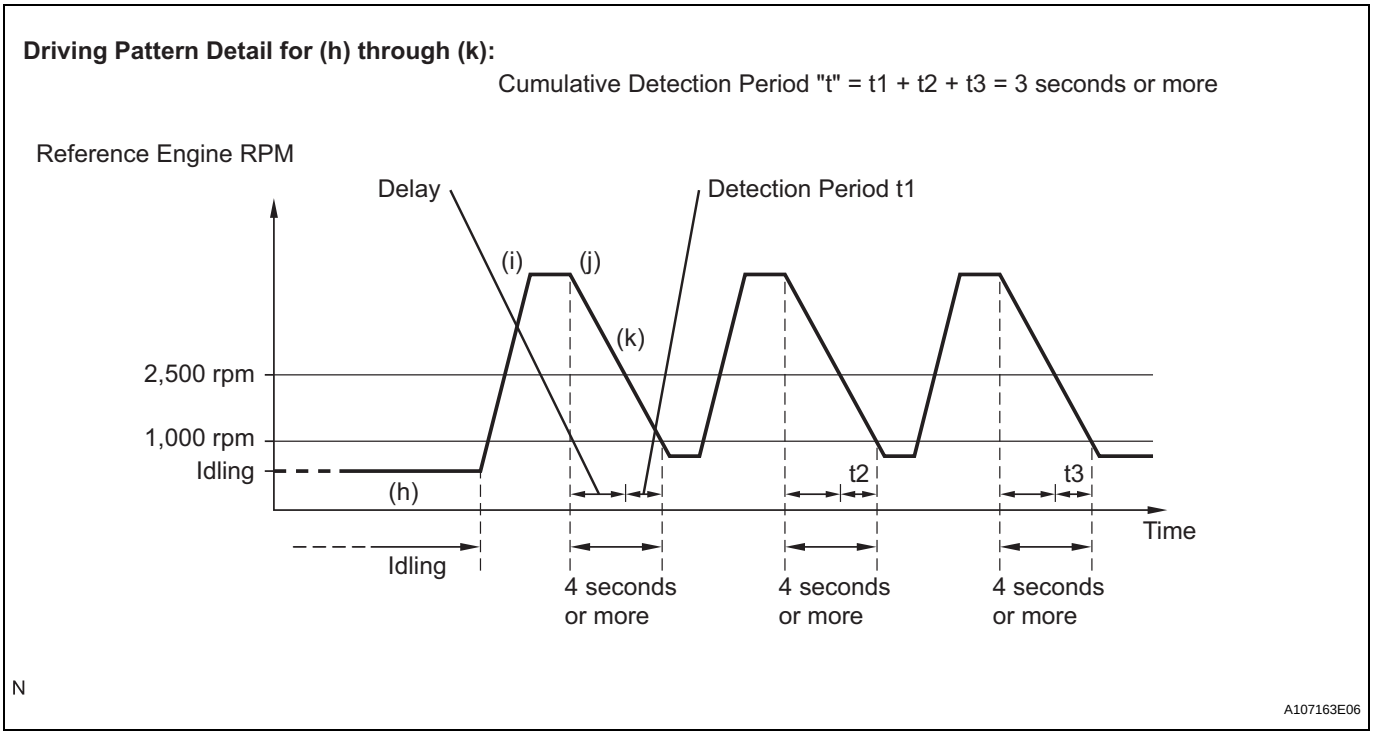
CONFIRMATION DRIVING PATTERN

This confirmation driving pattern is used in the "PERFORM CONFIRMATION DRIVING PATTERN" procedure of the following diagnostic troubleshooting procedure.

Monitor Driving Pattern 1:



Driving Pattern Detail for (h) through (k):



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Start the engine, and warm it up until the ECT reaches 75°C (167°F) or higher.
(f) On the intelligent tester, select the following menu items to check the fuel-cut status: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / FC IDL.
(g) Drive the vehicle at between 38 mph (60 km/h) and 75 mph (120 km/h) for at least 10 minutes.

(h) Change the transmission to the 2nd gear.
(i) Drive the vehicle at a proper vehicle speed to perform fuel-cut operation.
(j) Accelerate the vehicle to 40 mph (64 km/h) or more by depressing the accelerator pedal for at least 10 seconds.
HINT:
Fuel-cut is performed when the following conditions are met:
- Accelerator pedal fully is released.
- Engine speed is 2,500 rpm or more (fuel injection resumes at 1,000 rpm).

(k) Soon after performing step (j) above, release the accelerator pedal for at least 4 seconds without depressing the brake pedal, in order to execute fuel-cut control.
(l) Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h).
(m) Repeat steps from (h) through (k) above at least 3 times in one driving cycle.
HINT:
Completion of all A/F sensor monitors is required to change the value in TEST RESULT.
CAUTION:
Strictly observe posted speed limits, traffic laws, and road conditions when performing these driving patterns.

INSPECTION PROCEDURE

HINT:
Intelligent tester only:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

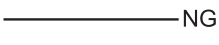
1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.

HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25%.
- The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volume	Status	Voltages
AFS B1 S1 (A/F)	+25%	Rich	Less than 3.0
	-12.5%	Lean	More than 3.35
O2S B1 S2 (HO2)	+25%	Rich	More than 0.5
	-12.5%	Lean	Less than 0.4

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor (sensor 2) output has a maximum output delay of approximately of 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

ES

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2, and press the YES button and then the ENTER button followed by the F4 button.
HINT:

- DTC P2A00 may be set when the air-fuel ratio is stuck rich or lean.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO P2195 OR P2196)

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2195 or P2196	A
P2195 or P2196 and other DTCs	B

HINT:
If any DTCs relating to the A/F sensor (DTCs for the A/F sensor heater or A/F sensor admittance) are output, troubleshoot those DTCs first.

B → GO TO DTC CHART

A

ES

2 READ VALUE USING INTELLIGENT TESTER (TEST VALUE OF A/F SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Drive the vehicle in accordance with the drive pattern described in the CONFIRMATION DRIVING PATTERN.
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR STATUS.
(f) Check that the status of O2S MON is COMPL.
If the status is still INCMPL, drive the vehicle according to the driving pattern again.
HINT:
- AVAIL indicates that the component has not been monitored yet.
- COMPL indicates that the component is functioning normally.
- INCMPL indicates that the component is malfunctioning.

(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / TEST RESULT / RANGE B1 S1; then press the ENTER button.
(h) Check the test value of the A/F sensor output current during fuel-cut.

Result

Test Value	Proceed to
Within normal range (1.0 mA or more, and less than 3.6 mA)	A
Outside normal range (Less than 1.0 mA, or 3.6 mA or more)	B

B → Go to step 12

A

3 READ VALUE USING INTELLIGENT TESTER (OUTPUT VOLTAGE OF A/F SENSOR)

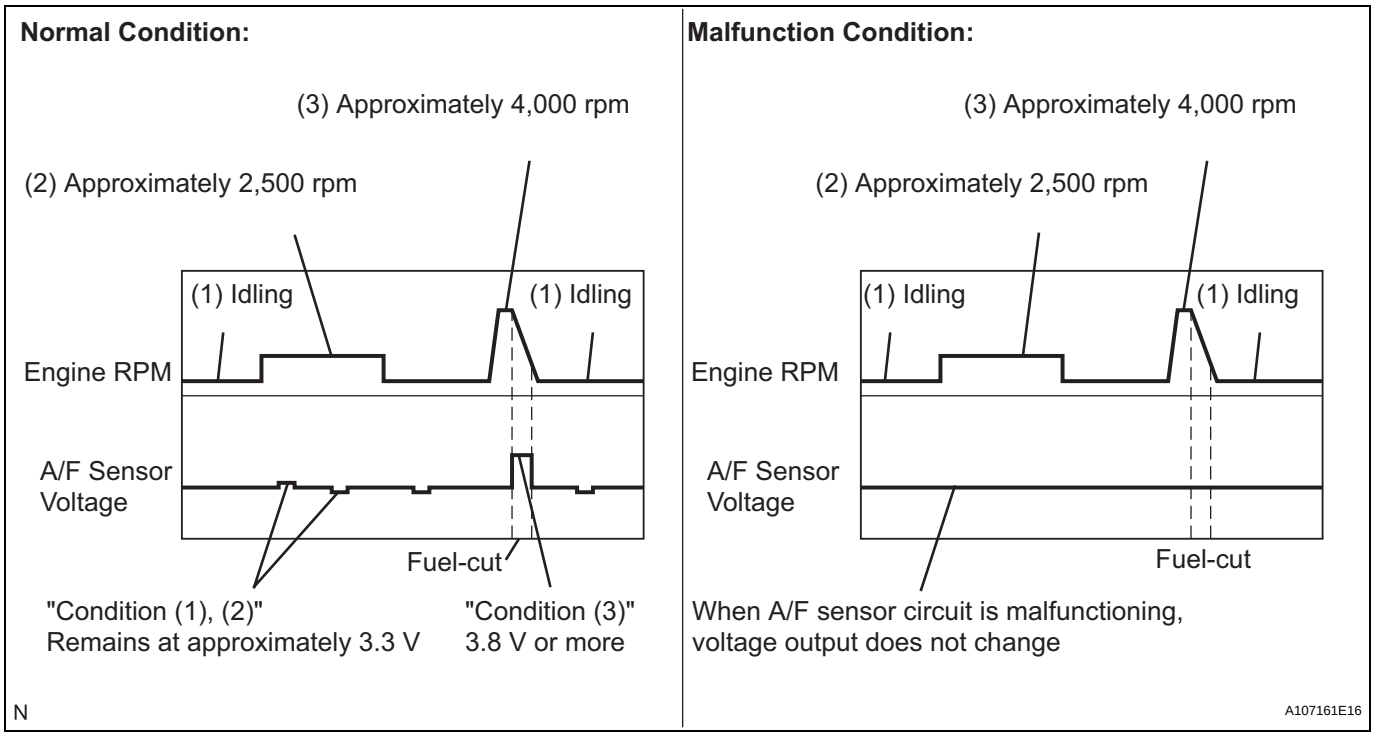
(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Turn the tester on.
(d) Warm up the A/F sensor at an engine speed of 2,500 rpm for 90 seconds.
(e) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA / AFS B1 S1 and ENGINE SPD.
(f) Check the A/F sensor voltage 3 times, when the engine is in each of the following conditions:
  (1) While idling (for at least 30 seconds)
  (2) At an engine speed of approximately 2,500 rpm (without any sudden changes in engine speed)
  (3) Raise the engine speed to 4,000 rpm and then quickly release the accelerator pedal so that the throttle valve is fully closed.

ES

Standard voltage

Conditions	A/F Sensor Voltage Variations	Reference
(1) and (2)	Remains at approximately 3.3 V	Between 3.1 V and 3.5 V
(3)	Increases to 3.8 V or more	This occurs during engine deceleration (when fuel-cut performed)



HINT:
- For more information, see the diagrams below.
- If the output voltage of the A/F sensor remains at approximately 3.3 V (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have an open circuit. (This will also happen if the A/F sensor heater has an open circuit.)

- If the output voltage of the A/F sensor remains at either approximately 3.8 V or more, or 2.8 V or less (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have a short circuit.
- The ECM stops fuel injection (fuel cut) during engine deceleration. This causes a lean condition and results in a momentary increase in the A/F sensor output voltage.
- The ECM must establish a closed throttle valve position learning value to perform fuel cut. If the battery terminal has been reconnected, the vehicle must be driven over 10 mph (16 km/h) to allow the ECM to learn the closed throttle valve position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element; therefore, the current is converted into a voltage inside the ECM. Measuring the voltage at the connectors of the A/F sensor or ECM will show a constant voltage result.

ES

NG → **Go to step 9**

OK

4	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196)

(a) Read the DTCs using the intelligent tester.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
P2195 or P2196	A
No output	B

B → **END**

A

6	REPLACE AIR-FUEL RATIO SENSOR

NEXT

7	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

ES

8	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196)

(a) Read the DTCs using the intelligent tester.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2195 or P2196	B

B → REPLACE ECM

A

END

9	INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE) (See page ES-84)

NG → REPLACE AIR-FUEL RATIO SENSOR

OK

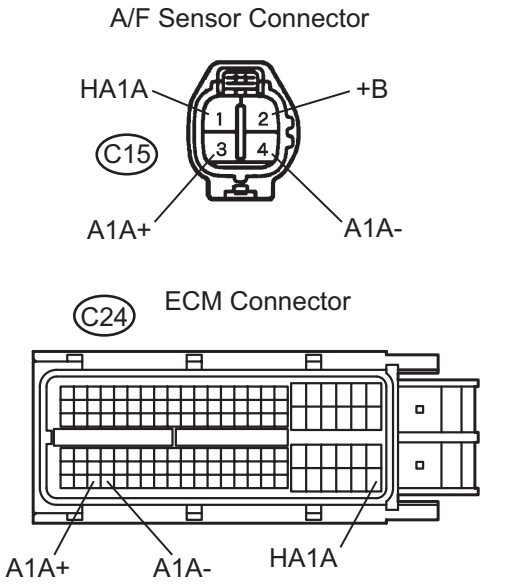
10	INSPECT ENGINE ROOM J/B (EFI RELAY) (See page ES-85)

NG → REPLACE ENGINE ROOM J/B

OK

11	CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM)

Wire Harness Side:



(a) Disconnect the C15 A/F sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the +B terminal of the A/F sensor connector and body ground.

Standard voltage

Tester Connection	Specified Condition
C15-2 (+B) - Body ground	9 to 14 V

(d) Turn the ignition switch off.
(e) Disconnect the C24 ECM connector.
(f) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

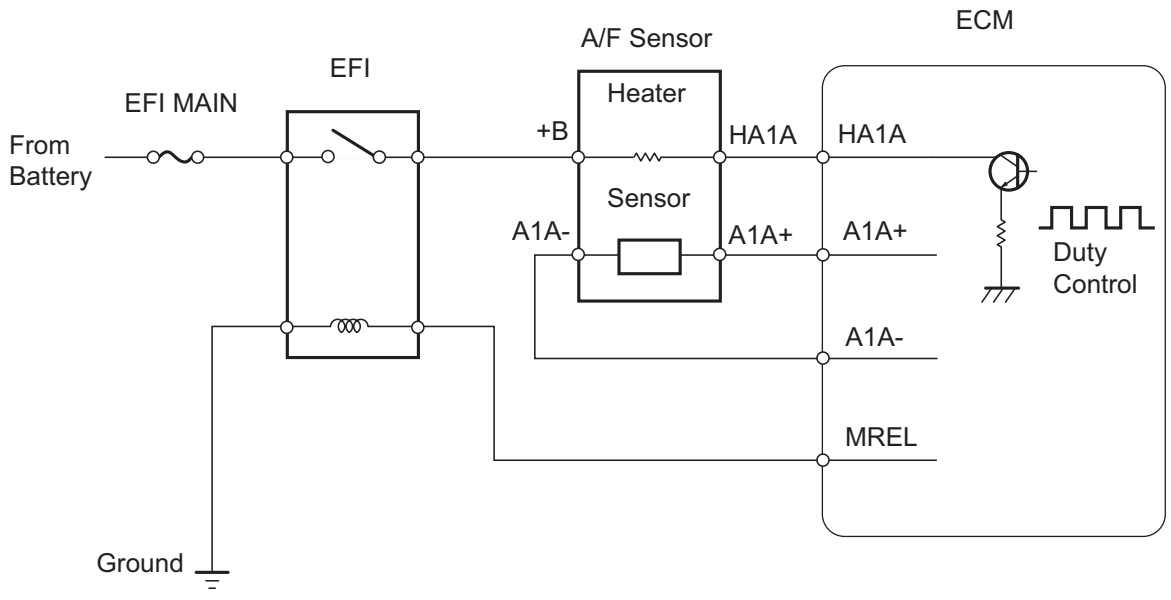
Tester Connection	Specified Condition
C15-1 (HA1A) - C24-109 (HA1A)	Below 1 Ω
C15-3 (A1A+) - C24-112 (A1A+)	Below 1 Ω
C15-4 (A1A-) - C24-113 (A1A-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C15-1 (HA1A) or C24-109 (HA1A) - Body ground	10 kΩ or higher
C15-3 (A1A+) or C24-112 (A1A+) - Body ground	10 kΩ or higher
C15-4 (A1A-) or C24-113 (A1A-) - Body ground	10 kΩ or higher

(g) Reconnect the ECM connector.
(h) Reconnect the A/F sensor connector.

Reference (System Diagram of Sensor 1):



NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

12	REPLACE AIR-FUEL RATIO SENSOR

NEXT

13	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

ES

14	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196)

(a) Read the DTCs using the intelligent tester.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2195 or P2196	B

B → REPLACE ECM

A

END

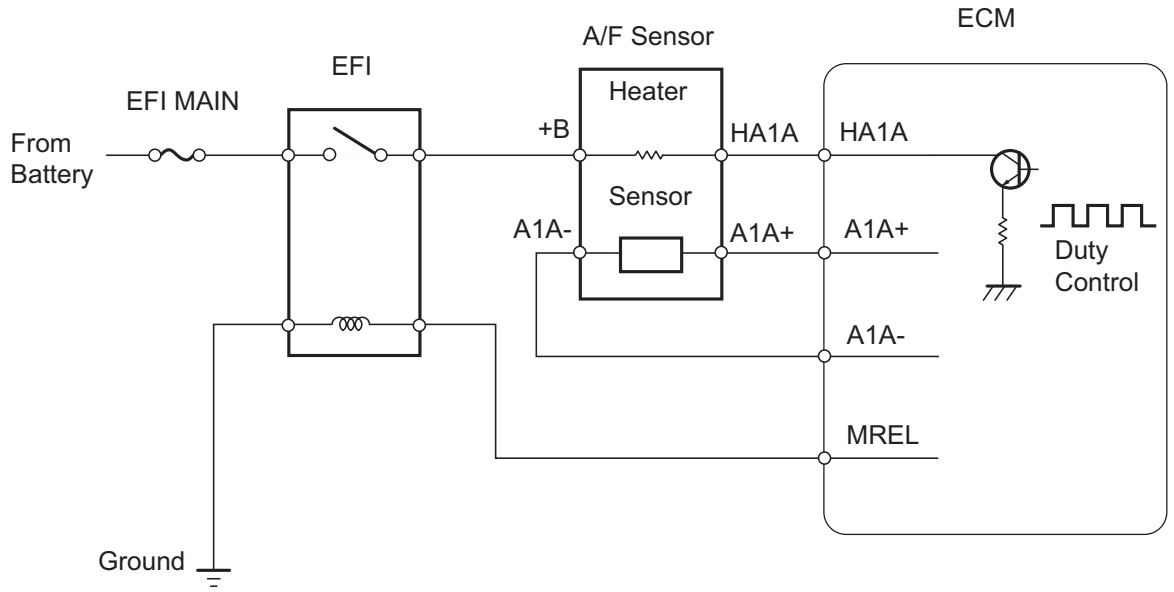
DTC	P2237	Oxygen (A/F) Sensor Pumping Current Circuit / Open (Bank 1 Sensor 1)
DTC	P2238	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1)
DTC	P2239	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1)
DTC	P2252	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1)
DTC	P2253	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1)

HINT:
- Although the DTC titles say oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

DESCRIPTION

These DTCs are set when there is an open or short in the A/F sensor circuit, or if A/F sensor output drops. To detect these problems, the voltage of the A/F sensor is monitored when turn the ignition switch to the ON position, and the admittance (admittance is an electrical term that indicates the ease of flow of current) is checked while driving. If the voltage of the A/F sensor is between 0.6V and 4.5V, it is considered normal. If the voltage is out of the specified range, or the admittance is less than the standard value, the ECM will determine that there is a malfunction in the A/F sensor. If the same malfunction is detected in next driving cycle, the MIL will be illuminated and a DTC will be stored.
The A/F sensor, which is located between the exhaust manifold and catalyst, consists of alloyed metal elements and a heater.
Depending on the engine operating conditions, the heater heats the sensor elements to activate them. Battery voltage is applied to the heater, the sensor ground is controlled by the ECM using a duty ratio. The sensor elements convert the oxygen concentration in the exhaust gas into voltage values to output. Based on the voltage, the ECM determines the air-fuel ratio and regulates the fuel injection volume depending on the air-fuel ratio and engine operating conditions. The voltage changes between 0.6V and 4.5V while the engine is running. If the air-fuel ratio is LEAN, which means the oxygen concentration in the exhaust gas is high, the voltage is high. If the air-fuel ratio is RICH, which means the oxygen concentration in the exhaust gas is low, the voltage is low.

Reference (System Diagram of Sensor 1):



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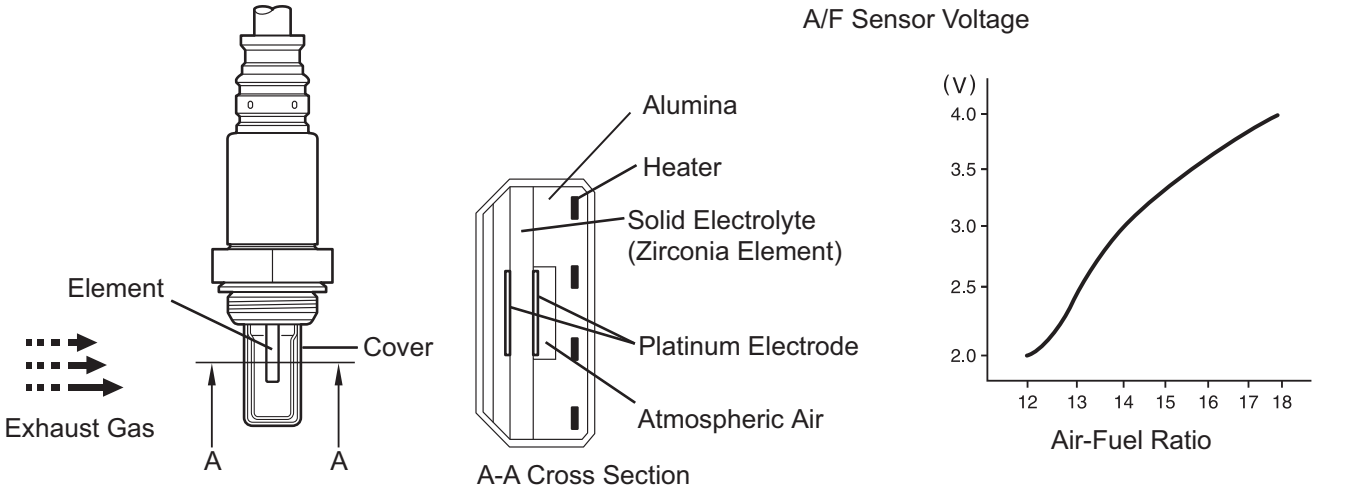

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DTC No.	DTC Detection Condition	Trouble Area
P2237	Open in the circuit between terminals AF+ and AF- of the AF sensor while engine is running (2 trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • ECM
P2238	Any of the following conditions are met (2 trip detection logic) • AF sensor output drops while engine is running. • Voltage at terminal AF+ is 0.5V or less. • Voltage difference between terminals AF+ and AF- is 0.1V or less.	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • ECM

DTC No.	DTC Detection Condition	Trouble Area
P2239	AF+ voltage more than 4.5 V (2 trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • ECM
P2252	AF- voltage 0.5 V or less (2 trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • ECM
P2253	AF- voltage more than 4.5 V (2 trip detection logic)	• Open or short in A/F sensor (sensor 1) circuit • A/F sensor (sensor 1) • ECM

MONITOR DESCRIPTION

These DTCs are output when there is an open or short in the A/F sensor circuit, or if A/F sensor output drops. To detect these problems, the voltage of the A/F sensor is monitored when turn the ignition switch to the ON position, and the admittance (admittance is an electrical term that indicates the ease of flow of current) is checked while driving. If the voltage of the A/F sensor is between 0.6V and 4.5V, it is considered normal. If the voltage is out of the specified range, or the admittance is less than the standard value, the ECM will determine that there is a malfunction in the A/F sensor. If the same malfunction is detected in next driving cycle, the MIL will be illuminated and a DTC will be stored.

MONITOR STRATEGY

Related DTCs	P2237: A/F sensor open circuit between AF+ and AF- P2238: A/F sensor short circuit between AF+ and AF- P2238: A/F sensor short circuit between AF+ and GND P2238: A/F sensor admittance low P2239: A/F sensor short circuit between AF+ and +B P2252: A/F sensor short circuit between AF- and GND P2253: A/F sensor short circuit between AF- and +B
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, Crankshaft position sensor
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0031, P0032 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel trim) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0441 - P0456, P2401 - P2420 (EVAP system) P0500 (VSS)
Battery voltage	11 V or more
Engine	Running
ECT	10°C (50°F) or more (Closed loop enabling ECT)
Estimated sensor temperature	450 to 550°C (842 to 1,022°F) (for P2237) 700 to 800°C (1,292 to 1,472°F) (for P2238)
Fuel-cut	Not executed

TYPICAL MALFUNCTION THRESHOLDS

P2237:

A/F sensor admittance	Below 0.002 1/Ω

P2238:

One of the following conditions is met	-
1. A/F sensor admittance	Below 0.022 1/Ω
2. AF+ terminal voltage	0.5 V or less
3. Difference between AF+ and AF- terminal voltages	Below 0.1 V

P2239:

AF+ terminal voltage	More than 4.5 V

P2252:

AF- terminal voltage	0.5 V or less

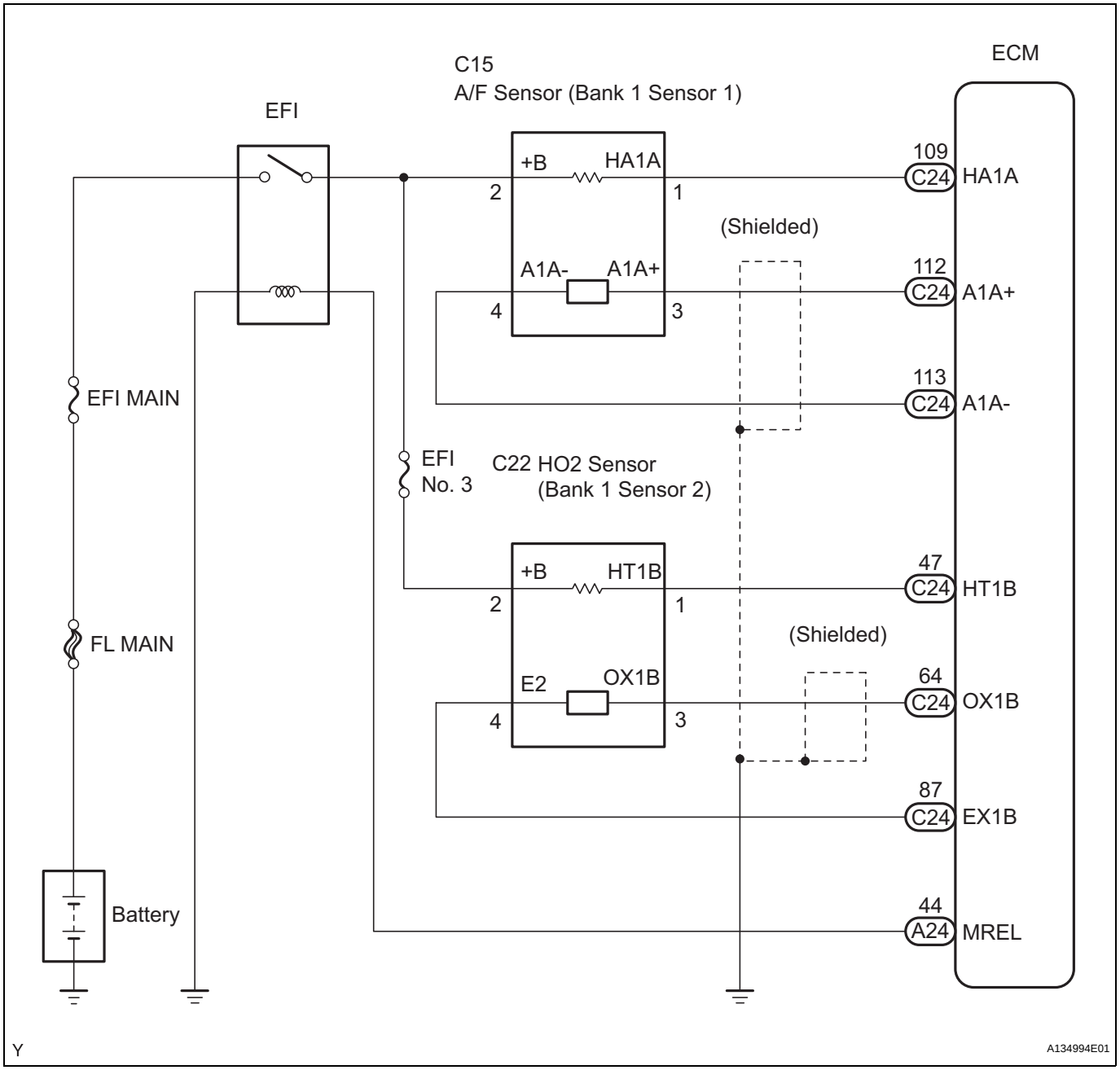
P2253:

AF- terminal voltage	More than 4.5 V

COMPONENT OPERATING RANGE

A/F sensor admittance	0.022 1/Ω or more
AF+ terminal voltage	0.6 to 4.5 V
AF- terminal voltage	0.6 to 4.5 V
Difference between AF+ and AF- terminal voltages	0.1 to 0.8 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.

5. Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.

HINT:

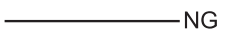
- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volume	Status	Voltages
AFS B1 S1 (A/F)	+25 %	Rich	Less than 3.0
	-12.5 %	Lean	More than 3.35
O2S B1 S2 (HO2)	+25 %	Rich	More than 0.5
	-12.5 %	Lean	Less than 0.4

NOTICE:

The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

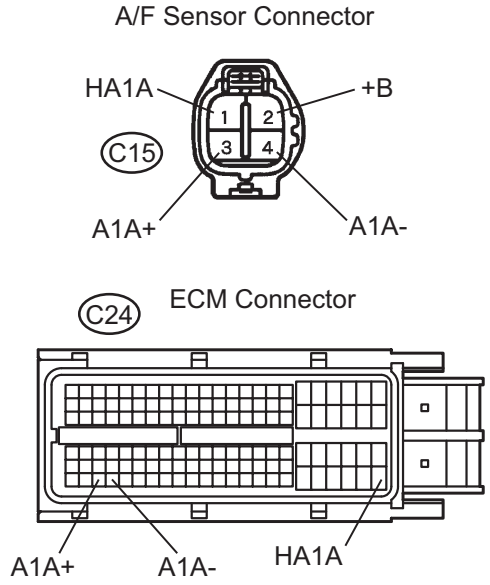
Following the A/F CONTROL procedure enables technicians to check and graph the output voltages of both the A/F and HO2 sensors.

To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; then press the YES button and then the ENTER button followed by the F4 button.

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM)

Wire Harness Side:



(a) Disconnect the C15 A/F sensor connector.
(b) Disconnect the C24 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

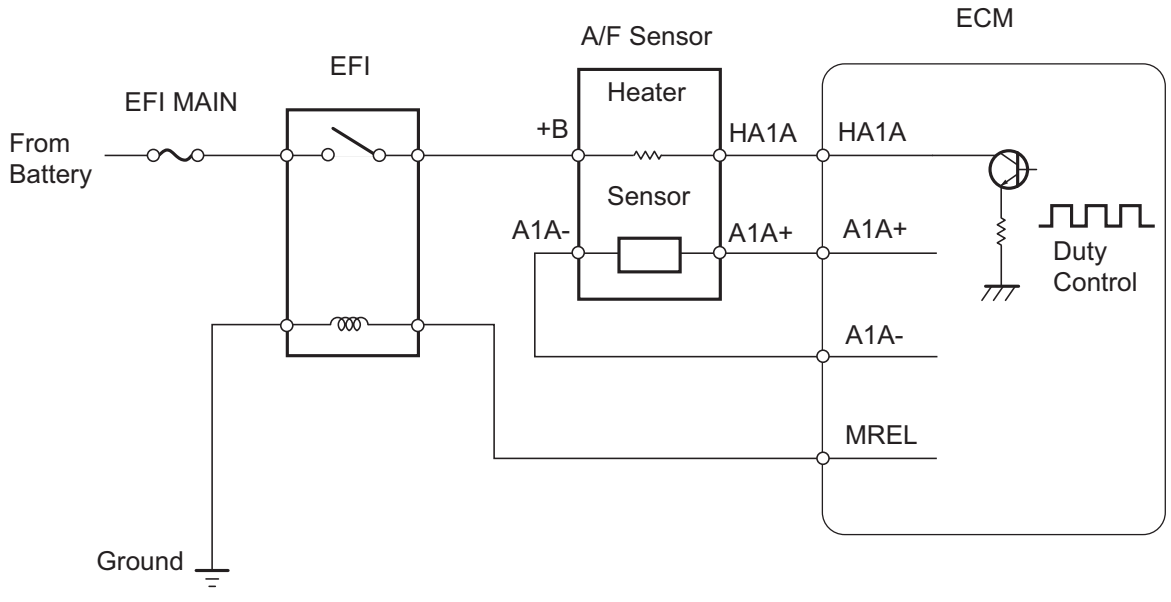
Tester Connection	Specified Condition
C15-3 (A1A+) - C24-112 (A1A+)	Below 1 Ω
C15-4 (A1A-) - C24-113 (A1A-)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
C15-3 (A1A+) or C24-112 (A1A+) - Body ground	10 kΩ or higher
C15-4 (A1A-) or C24-113 (A1A-) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the A/F sensor connector.

Reference (System Diagram of Sensor 1):



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	REPLACE AIR-FUEL RATIO SENSOR

NEXT

3	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Clear the DTCs (See page ES-38).
(d) Start the engine.
(e) Allow the engine to idle for 5 minutes or more.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(g) Read pending DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P2237, P2238, P2239, P2252 or P2253	B

B → REPLACE ECM

A

END

DTC	P2420	Evaporative Emission System Switching Valve Control Circuit High

DTC SUMMARY

DTCs	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2420	Vent valve stuck open (vent)	Following condition is met during key-off EVAP monitor: • EVAP pressure change when vent valve closed (ON) less than 0.3 kPa-g (2.25 mmHg-g)	• Canister pump module (Reference orifice, leak detection pump, vent valve) • Connector/wire harness (Canister pump module - ECM) • ECM	While ignition switch off	2 trip detection logic

ES

HINT:
The vent valve is built into the canister pump module.

DESCRIPTION

The description can be found in the EVAP (Evaporative Emission) System (See page ES-346).

INSPECTION PROCEDURE

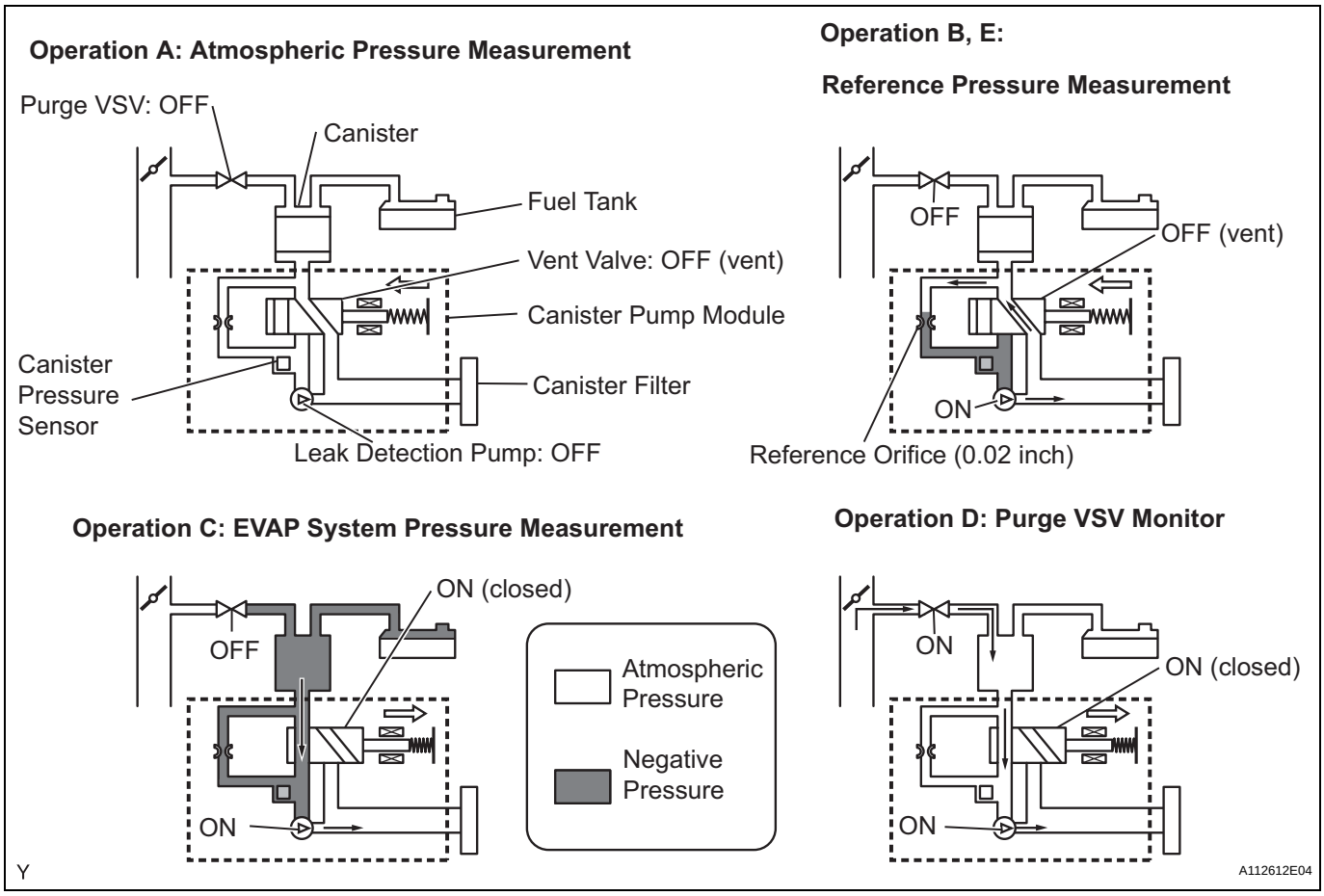
Refer to the EVAP System (See page ES-352).

MONITOR DESCRIPTION

5 hours* after the ignition switch is turned off, the leak detection pump creates negative pressure (vacuum) in the EVAP system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.
HINT:
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

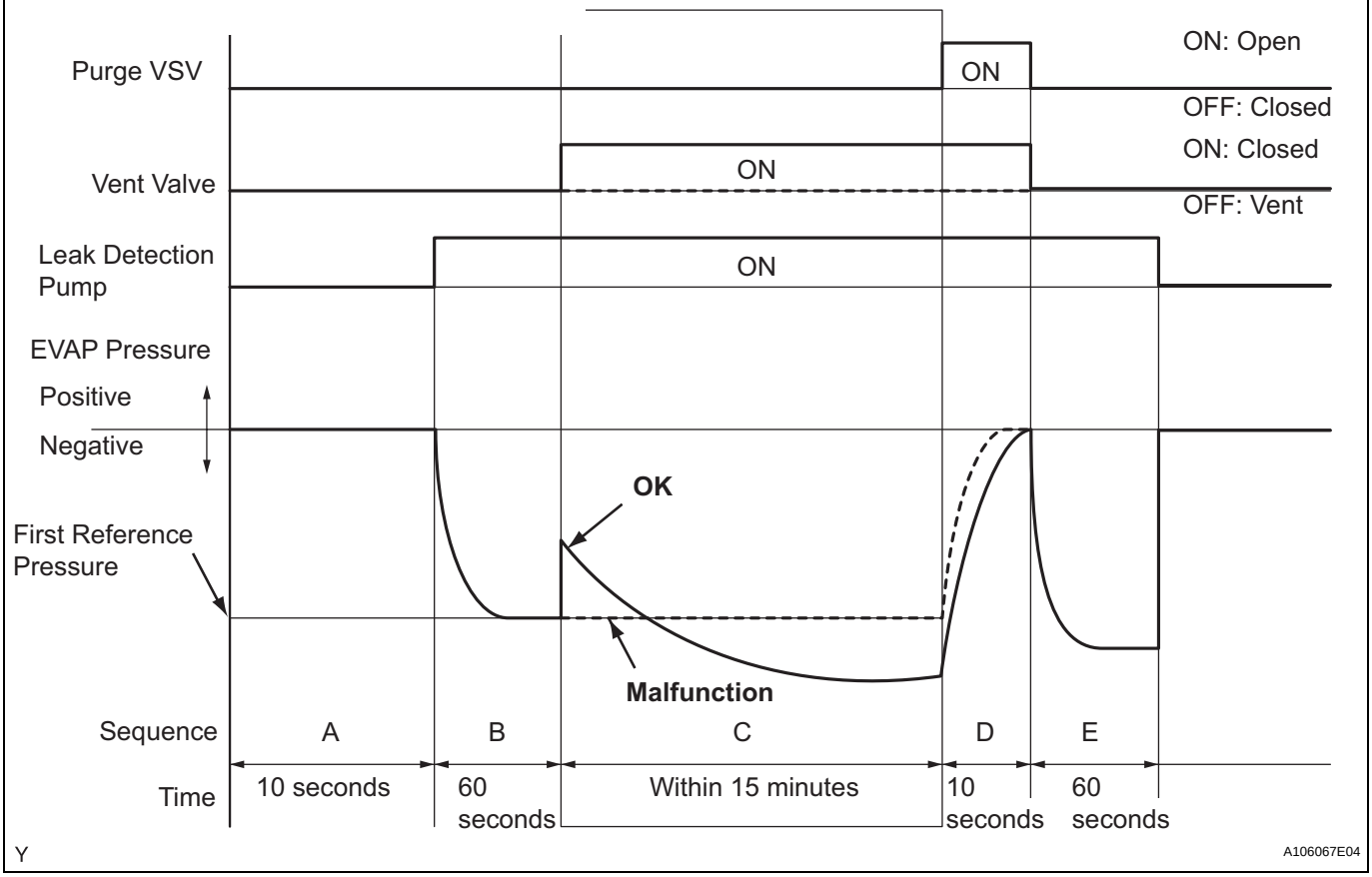
Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer 5, 7 or 9.5 hours after ignition switch turned off.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 76 kPa-a and 110 kPa-a (570 mmHg-a and 825 mmHg-a), ECM cancels EVAP system monitor.	10 seconds
B	First reference pressure measurement	In order to determine reference pressure, leak detection pump creates negative pressure (vacuum) through reference orifice and then ECM checks if leak detection pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normality.	10 seconds
E	Second reference pressure measurement	After second reference pressure measurement, leak check performed by comparing first and second reference pressure. If stabilized system pressure higher than second reference pressure, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.



The vent valve turns ON (closes) and the EVAP system pressure is then measured by the ECM, using the canister pressure sensor, to conduct an EVAP leak check. If the pressure does not increase when the vent valve is open, the ECM interprets this as the vent valve being stuck open. The ECM illuminates the MIL and sets the DTC.

EVAP Pressure when Vent Valve Stuck OFF:



ES

MONITOR STRATEGY

Required Sensors/Components	Purge VSV and canister pump module
Frequency of Operation	Once per driving cycle
Duration	Within 2 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
EVAP key-off monitor runs when all of the following conditions are met	-
Atmospheric pressure	70 to 110 kPa-a (525 to 825 mmHg-a)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Ignition switch	off
Time after key off	5, 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
EVAP canister purge valve	Not operated by scan tool
EVAP canister vent valve	Not operated by scan tool
EVAP leak detection pump	Not operated by scan tool
Both of the following conditions are met before key off	Conditions 1 and 2
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed

ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence runs if following condition is met	-
Atmospheric pressure change	Less than 0.3 kPa-g (2.25 mmHg-g) in 1 second

2. First reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2 and 3
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds

ES

3. Vent valve stuck closed check

Next sequence runs if following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa-g (2.25 mmHg-g) or more

4. Vacuum introduction

Next sequence runs if following condition is met	-
EVAP pressure	Saturated within 15 minutes

5. EVAP canister purge valve close stuck check

Next sequence runs if following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa-g (2.25 mmHg-g) or more

6. Second reference pressure measurement

Next sequence runs if all of the following conditions are met	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure measurement start	-1 kPa-g (-7.5 mmHg-g) or less
2. Reference pressure	-4.85 to -1.057 kPa-g (-36.4 to -7.93 mmHg-g)
3. Reference pressure	Saturated within 60 seconds
4. Difference between first reference pressure and second reference pressure	Less than 0.5 kPa-g (3.75 mmHg-g)

7. Leak check

Next sequence runs if following condition is met	-
EVAP pressure when vacuum introduction completes	Second reference pressure or less

8. Atmospheric pressure measurement

EVAP monitor complete if following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa-g (2.25 mmHg-g)

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.286 kPa-g (2.14 mmHg-g) in 60 seconds.

EVAP pressure change after EVAP canister vent valve ON	Less than 0.3 kPa-g (2.25 mmHg-g)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

DTC	P2610	ECM / PCM Internal Engine Off Timer Performance

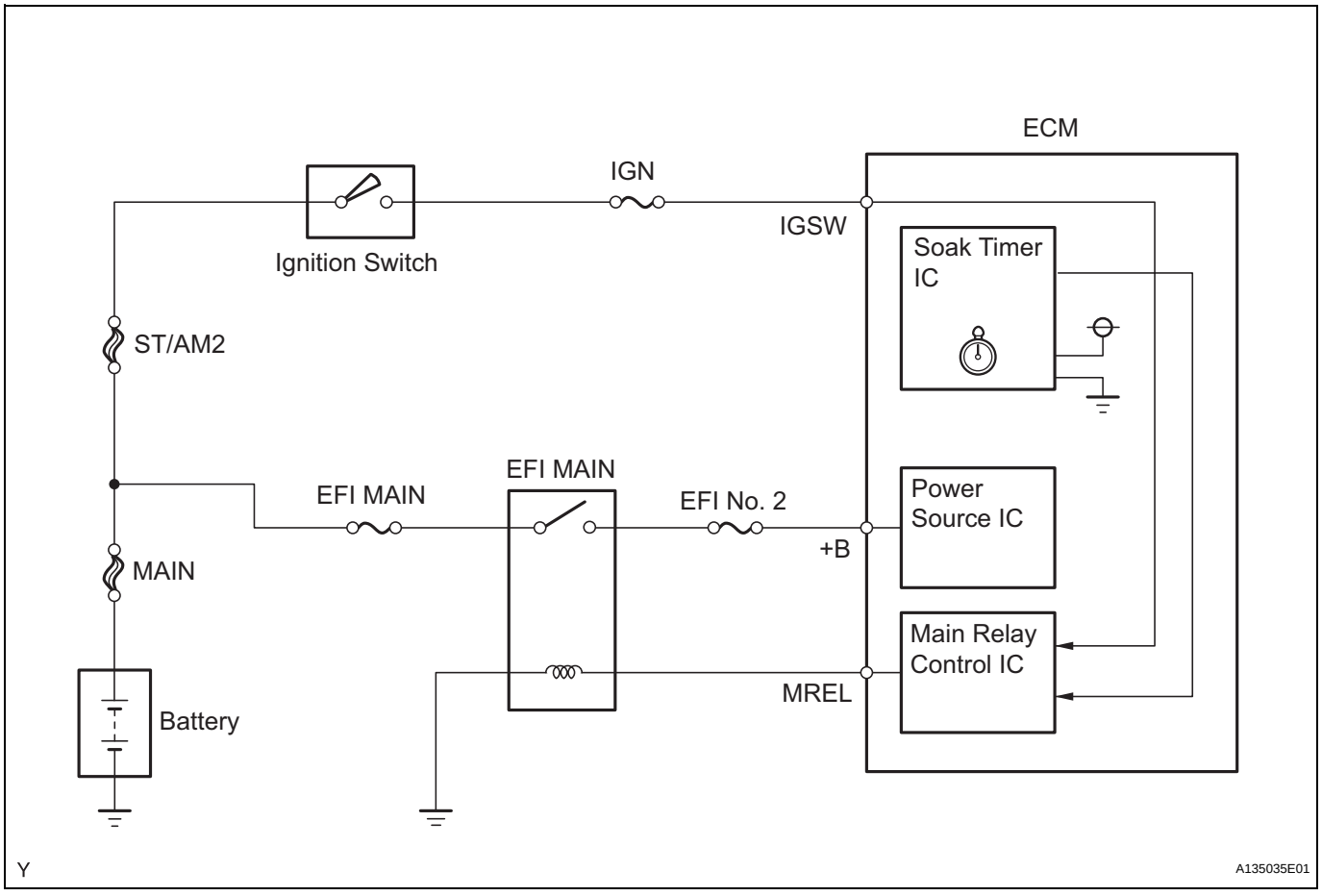
DTC SUMMARY

DTC	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2610	Soak timer (built into ECM)	ECM internal malfunction	ECM	Engine running	2 trip detection logic

DESCRIPTION

ES

To ensure the accuracy of the EVAP (Evaporative Emission) monitor values, the soak timer, which is built into the ECM, measures 5 hours (+-15 minutes) from when the ignition switch is turned off, before the monitor is run. This allows the fuel to cool down, which stabilizes the EVAP pressure. When 5 hours have elapsed, the ECM turns on.



MONITOR DESCRIPTION

5 hours after the ignition switch is turned off, the soak timer activates the ECM to begin the EVAP system monitor. While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If these two are not synchronized, the ECM interprets this as a malfunction, illuminates the MIL and sets the DTC (2 trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	ECM

Frequency of Operation	Once per driving cycle
Duration	10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTC are not present	None

Case 1:

Engine	Running
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

Case 2:

Internal engine OFF timer (elapsed time from engine stop)	10 to 300 minutes
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

Case 3:

Internal engine OFF timer (elapsed time from engine stop)	310 minutes or more
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Case 1:

Soak timer measurement when ECM CPU clock counts 10 minutes	Less than 7 minutes, or more than 13 minutes

Case 2:

ECM had the started record by internal engine OFF timer	YES

Case 3:

ECM had the starter record by internal engine OFF timer	NO

INSPECTION PROCEDURE

HINT:

- DTC P2610 is set if an internal ECM problem is detected. Diagnostic procedures are not required. ECM replacement is necessary.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**REPLACE ECM**

(a) Replace the ECM (See page ES-432).

NEXT

2	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-38).
(e) Start the engine and wait for 10 minutes or more.
(f) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(g) If no pending DTC is displayed, the repair has been successfully completed.

NEXT

END

DTC	P2A00	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)

HINT:
Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

DESCRIPTION

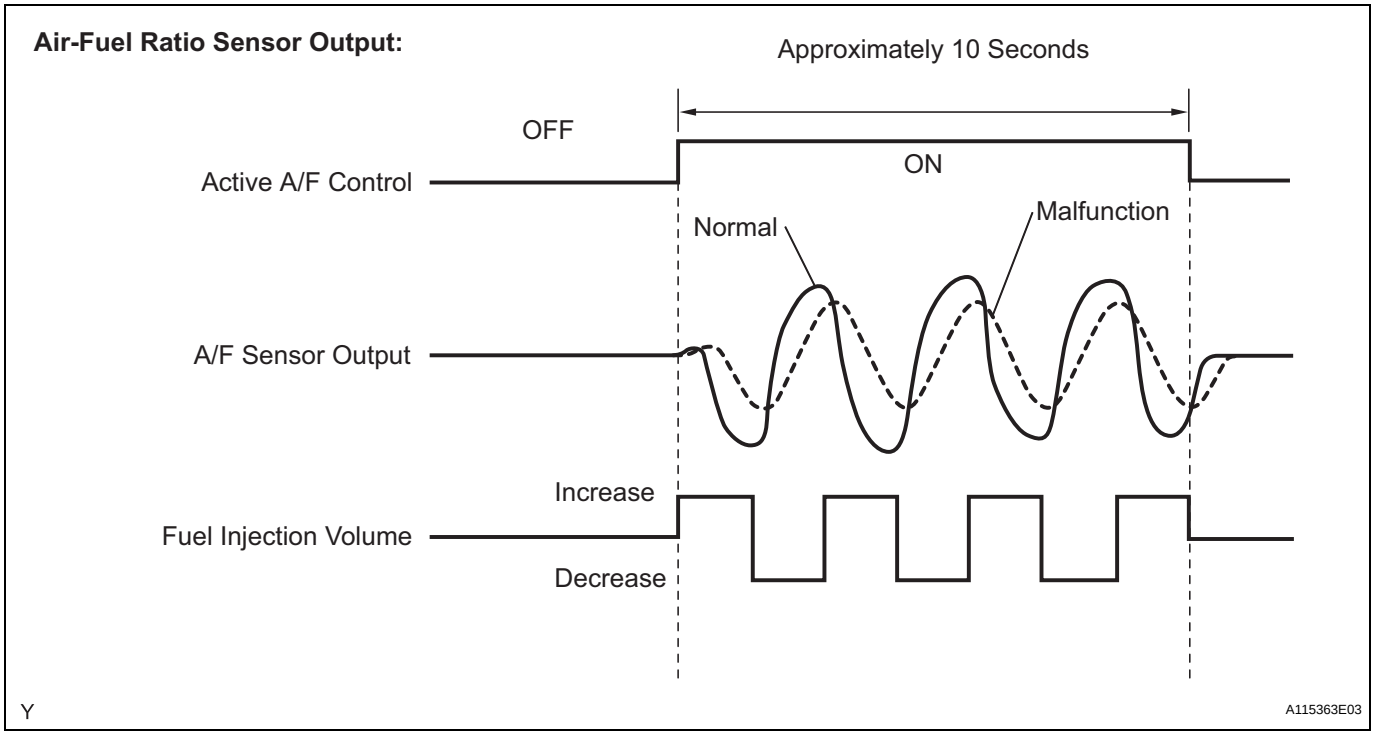
Refer to DTC P2195 (See page ES-308).

DTC No.	DTC Detection Condition	Trouble Area
P2A00	Calculated value of air-fuel ratio (A/F) sensor response rate deterioration level less than threshold (2 trip detection logic)	• Open or short in A/F sensor circuit • A/F sensor • ECM

ES

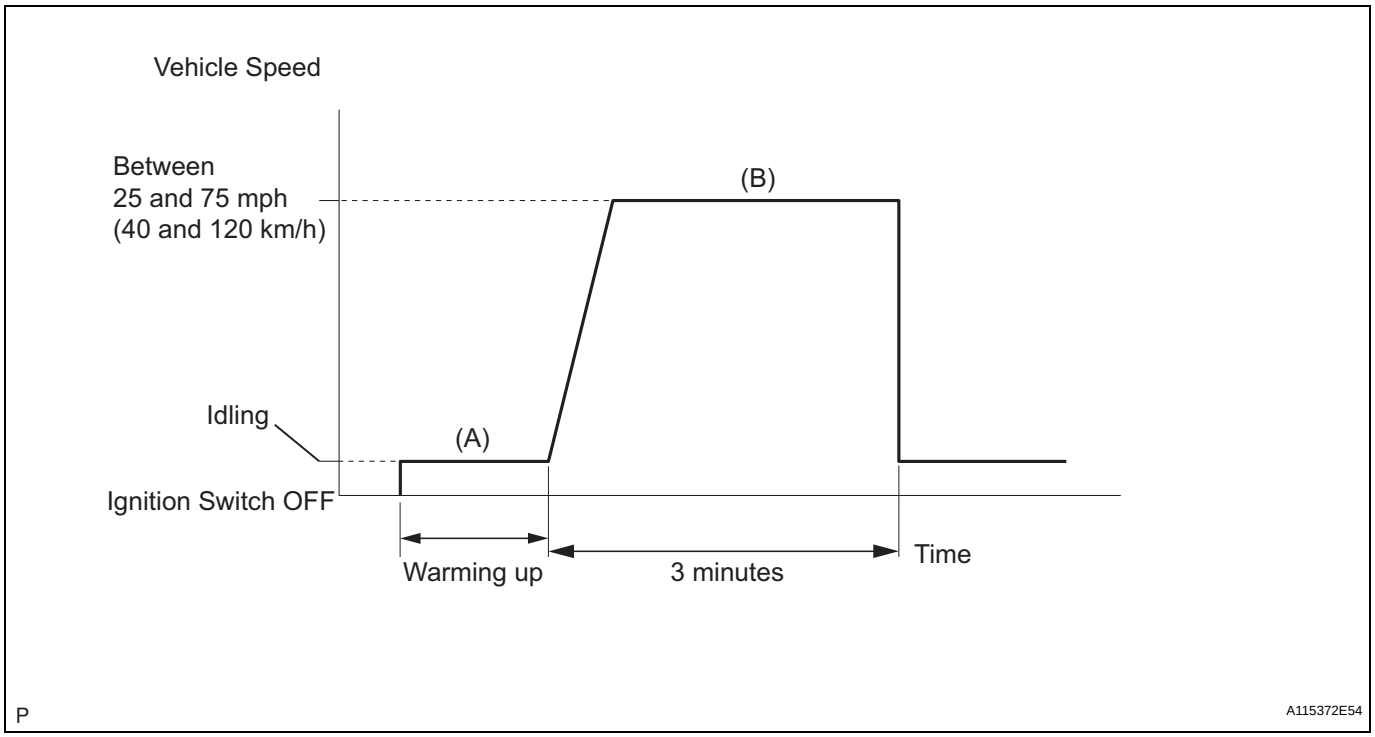
MONITOR DESCRIPTION

After the engine is warmed up, the ECM performs air-fuel ratio feedback control to maintain the air-fuel ratio at the stoichiometric level. In addition, active A/F control is performed for approximately 10 seconds after the preconditions are met in order to measure the A/F sensor response rate. During active A/F control, the ECM forcibly increases and decreases the injection volume by a certain amount, based on the stoichiometric air-fuel ratio learned during normal air-fuel ratio control, and measures the A/F sensor response rate. The ECM receives a signal from the A/F sensor while performing active A/F control and uses it to calculate the A/F sensor response rate deterioration level.
If the A/F sensor response rate deterioration level is less than the threshold, the ECM interprets this as a malfunction and sets the DTC.

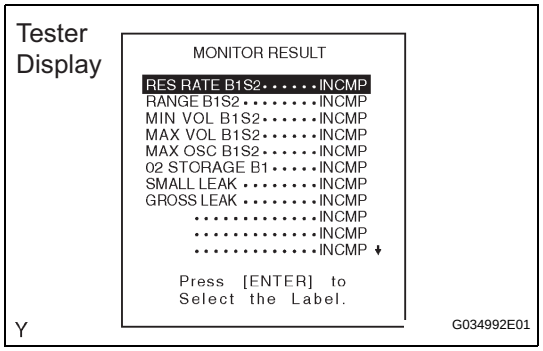


CONFIRMATION DRIVING PATTERN

HINT:
Performing this confirmation pattern will activate the A/F sensor response monitor.



1. Connect the intelligent tester to the DLC3.



2. Turn the ignition switch to the ON position.
3. Turn the tester on.
4. Clear the DTCs (if set) (See page ES-38).
5. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR RESULT.
6. Check that RES RATE B1S1 is INCOMP.
7. Start the engine and warm it up. (Proceed "A")
8. Drive the vehicle at a constant speed of between 25 mph and 75 mph (40 km/h and 120 km/h) for 3 minutes. (Proceed "B")
9. Check the monitor result values on the intelligent tester by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / TEST RESULT.
10. If the values indicated on the tester do not change, perform READINESS MONITOR DRIVE PATTERN for the A/F sensor and the heated oxygen sensor (See page ES-23).
    HINT:
    Completion of all A/F sensor monitors is required to change the value in TEST RESULT.
11. Note the value of the Monitor Result.
12. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
13. Check if any DTCs (any pending DTCs) are set.

MONITOR STRATEGY

Related DTCs	P2A00: Air-Fuel Ratio (A/F) sensor slow response
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	Vehicle speed sensor, Crankshaft position sensor
Frequency of Operation	Once per driving cycle
Duration	10 to 15 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0031, P0032 (A/F Sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P00441 - P0456, P2401 - P2420 (EVAP system) P0500 (VSS) P2196 (A/F Sensor - rationality)
Active A/F control	Performing
Active A/F control performed when the following conditions are met	-
Engine coolant temperature	75°C (167°F) or more
Battery voltage	11 V or more
Idle	OFF
Engine RPM	Less than 4,000 rpm
A/F sensor status	Activated
Fuel-cut	OFF
Engine load	10 to 70 %
Shift position	2 or more
Catalyst monitor	Not yet
Intake air amount	4 to 16 g/sec.

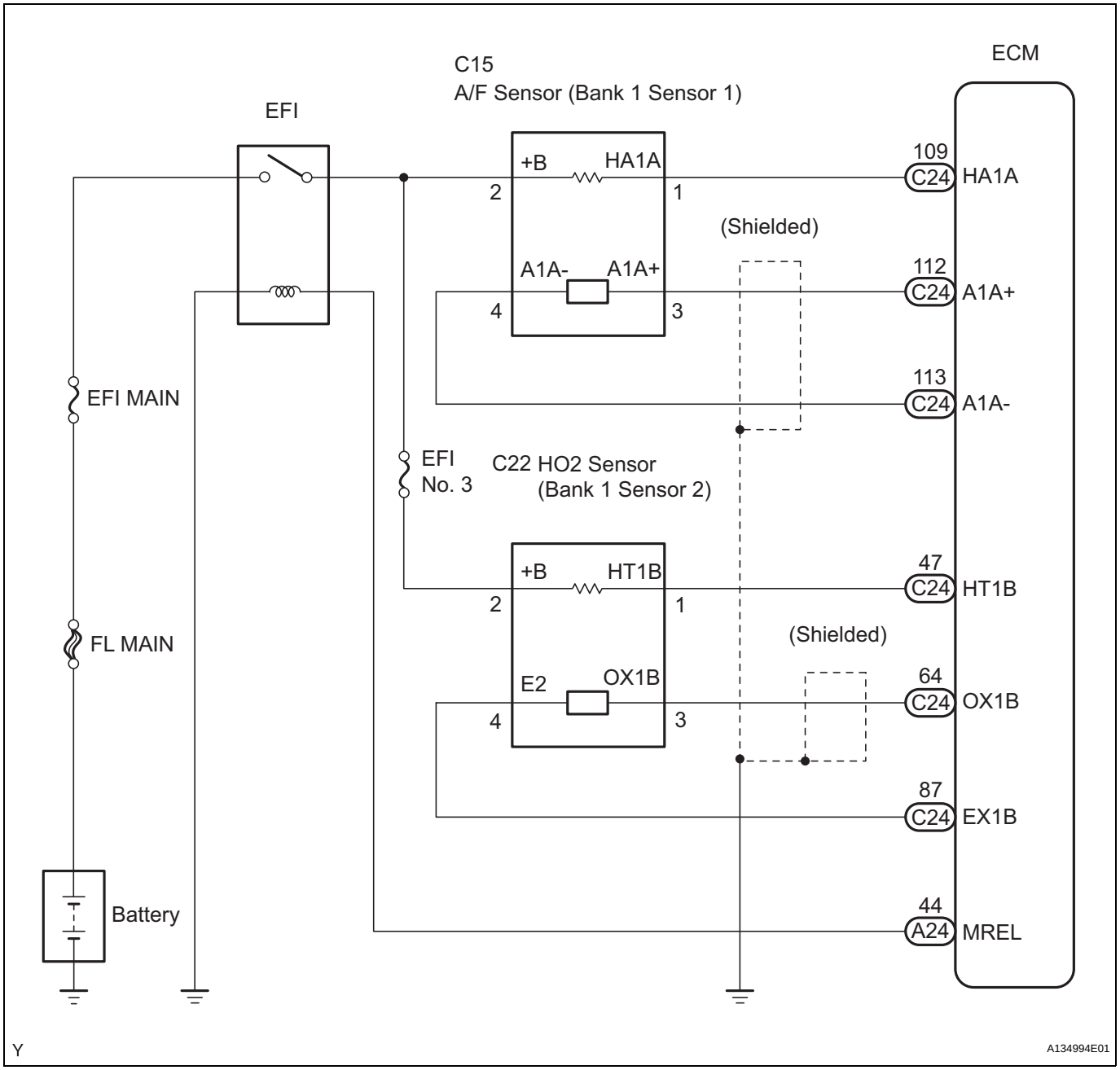
TYPICAL MALFUNCTION THRESHOLDS

Response rate deterioration level	Less than 0.12 V

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-20).

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.

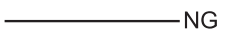
5. Perform the A/F CONTROL operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2) displayed on the tester.
   HINT:
   - The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25 %.
   - The sensors react in accordance with increases and decreases in the fuel injection volume.

Standard

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1 S1 (A/F)	+25%	Rich	Less than 3.0
	-12.5%	Lean	More than 3.35
O2S B1 S2 (HO2)	+25%	Rich	More than 0.5
	-12.5%	Lean	Less than 0.4

ES

NOTICE:
The A/F sensor has an output delay of a few seconds and the HO2 sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.5 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.5 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output voltage Almost no reaction		

Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2; and press the YES button and then the ENTER button followed by the F4 button.
HINT:
- DTC P2A00 may be set when the air-fuel ratio is stuck rich or lean.

- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1 CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2A00)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Turn the tester ON.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2A00	A
P2A00 and other DTCs	B

If any DTCs relating to the A/F sensor (DTCs for the A/F sensor heater or A/F sensor admittance) are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART**

A

2 INSPECT AIR-FUEL RATIO SENSOR (HEATER RESISTANCE) (See page ES-84)

NG → **REPLACE AIR-FUEL RATIO SENSOR**

OK

3 CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM) (See page ES-325)

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 PERFORM CONFIRMATION DRIVING PATTERN

NEXT

5 CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(d) Read pending DTCs.

Result

Display (DTC Output)	Proceed to
P2A00	A
No output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A

6	**REPLACE AIR-FUEL RATIO SENSOR**

NEXT

7	**PERFORM CONFIRMATION DRIVING PATTERN**

NEXT

8	**CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(d) Read pending DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P2A00	B

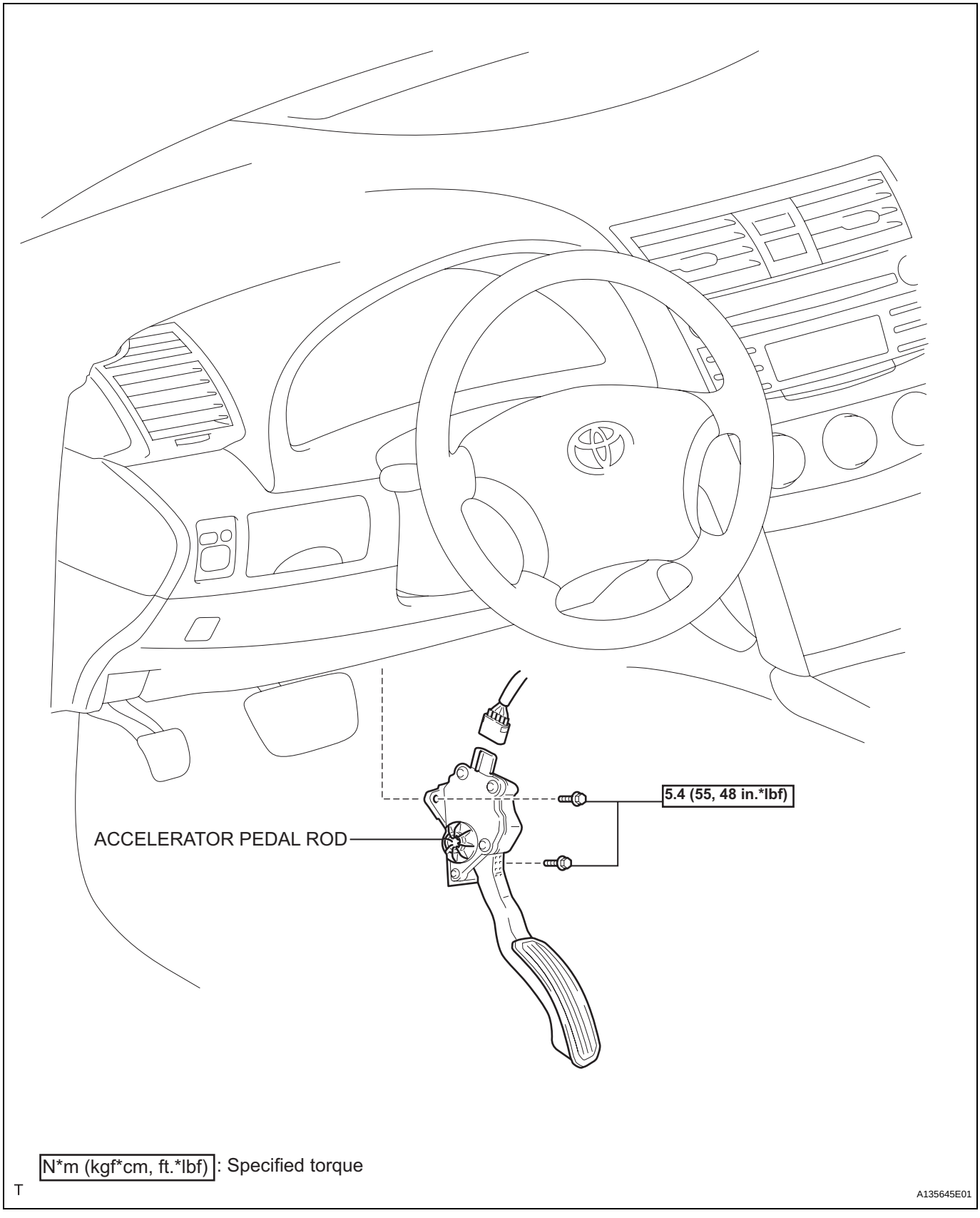
B → **REPLACE ECM**

A

END

ACCELERATOR PEDAL ROD

COMPONENTS



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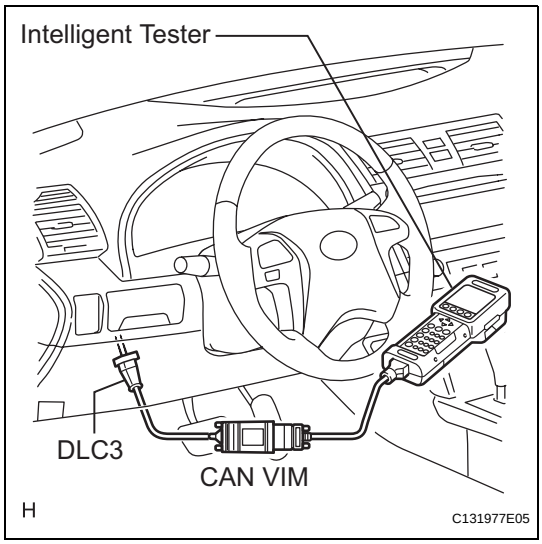


ON-VEHICLE INSPECTION

1. CHECK ACCELERATOR PEDAL ROD

(a) Measure the voltage.

(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch to the ON position.

(3) Turn the intelligent tester ON.

(4) Select the menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ACCEL POS #1, ACCEL POS #2.

(5) Operate the accelerator pedal, and then check that the ACCEL POS #1 and ACCEL POS #2 values are within the specifications.

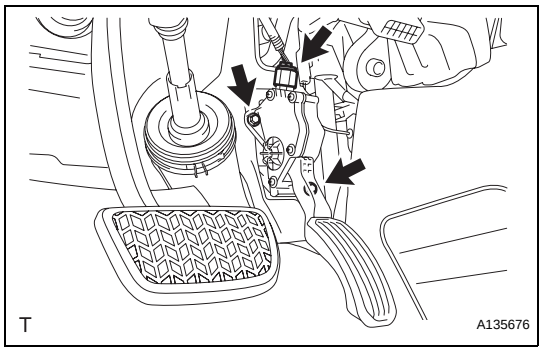
Standard voltage (ACCEL POS #1)

Accelerator Pedal Condition	Specified Condition
Released	0.5 to 1.1 V
Depressed	2.5 to 4.5 V

Standard voltage (ACCEL POS #2)

Accelerator Pedal Condition	Specified Condition
Released	1.2 to 2.0 V
Depressed	3.4 to 5.0 V

If the result is not as specified, check the accelerator pedal rod, wire harness or ECM.



REMOVAL

1. REMOVE ACCELERATOR PEDAL ROD

(a) Disconnect the accelerator pedal position sensor connector.

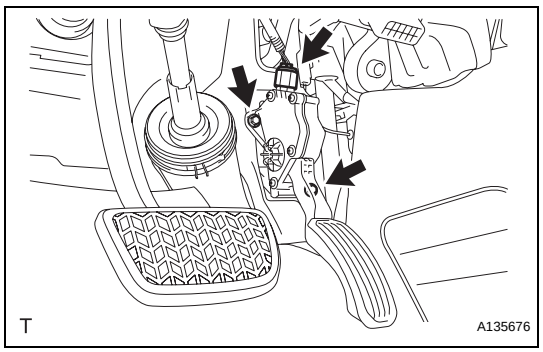
(b) Remove the 2 bolts and accelerator pedal rod.

INSTALLATION

1. INSTALL ACCELERATOR PEDAL ROD

NOTICE:

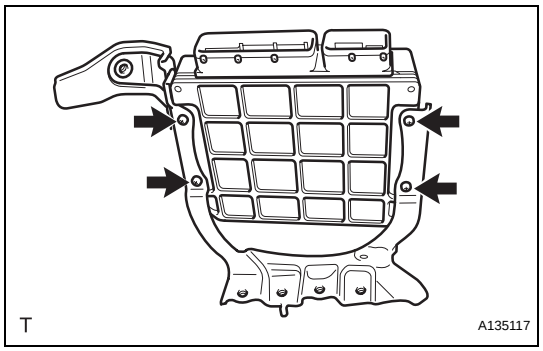
- **Avoid physical shock to the accelerator pedal assembly.**
- **Do not disassemble the accelerator pedal assembly.**



(a) Install the accelerator pedal rod with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

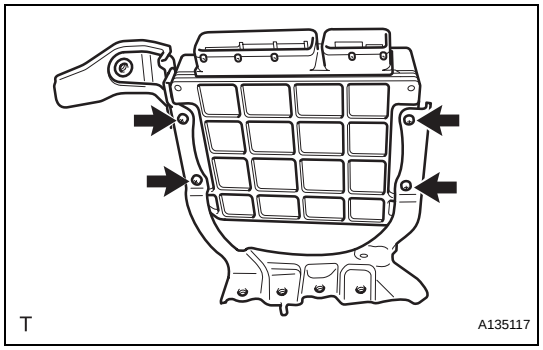
(b) Connect the accelerator pedal position sensor connector.

ES



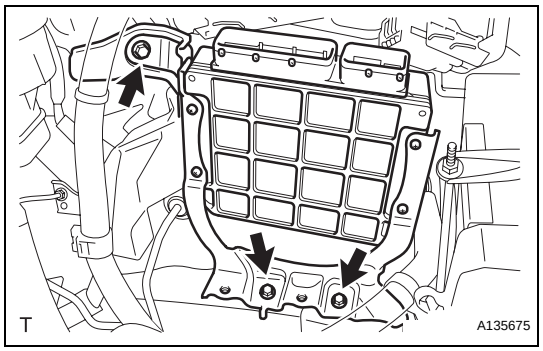
(c) Remove the 4 screws and ECM bracket.

INSTALLATION

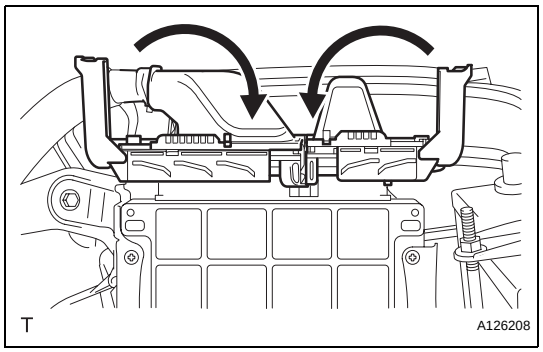


1. INSTALL ECM

(a) Install the bracket to the ECM with the 4 screws.
Torque: 3.0 N*m (30 kgf*cm, 27 in.*lbf)



(b) Install the ECM with the 3 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



2. CONNECT CONNECTOR

(a) Connect the 2 ECM connectors.
NOTICE:
When connecting the connector, make sure that dirt, water and other foreign matter does not become stuck between the connector and other part.

(1) Connect the 2 ECM connectors and lower the 2 levers.
NOTICE:
Make sure that the 2 levers are securely lowered.

3. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)

4. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)

5. INSTALL ENGINE COVER SUB-ASSEMBLY (See page EM-121)

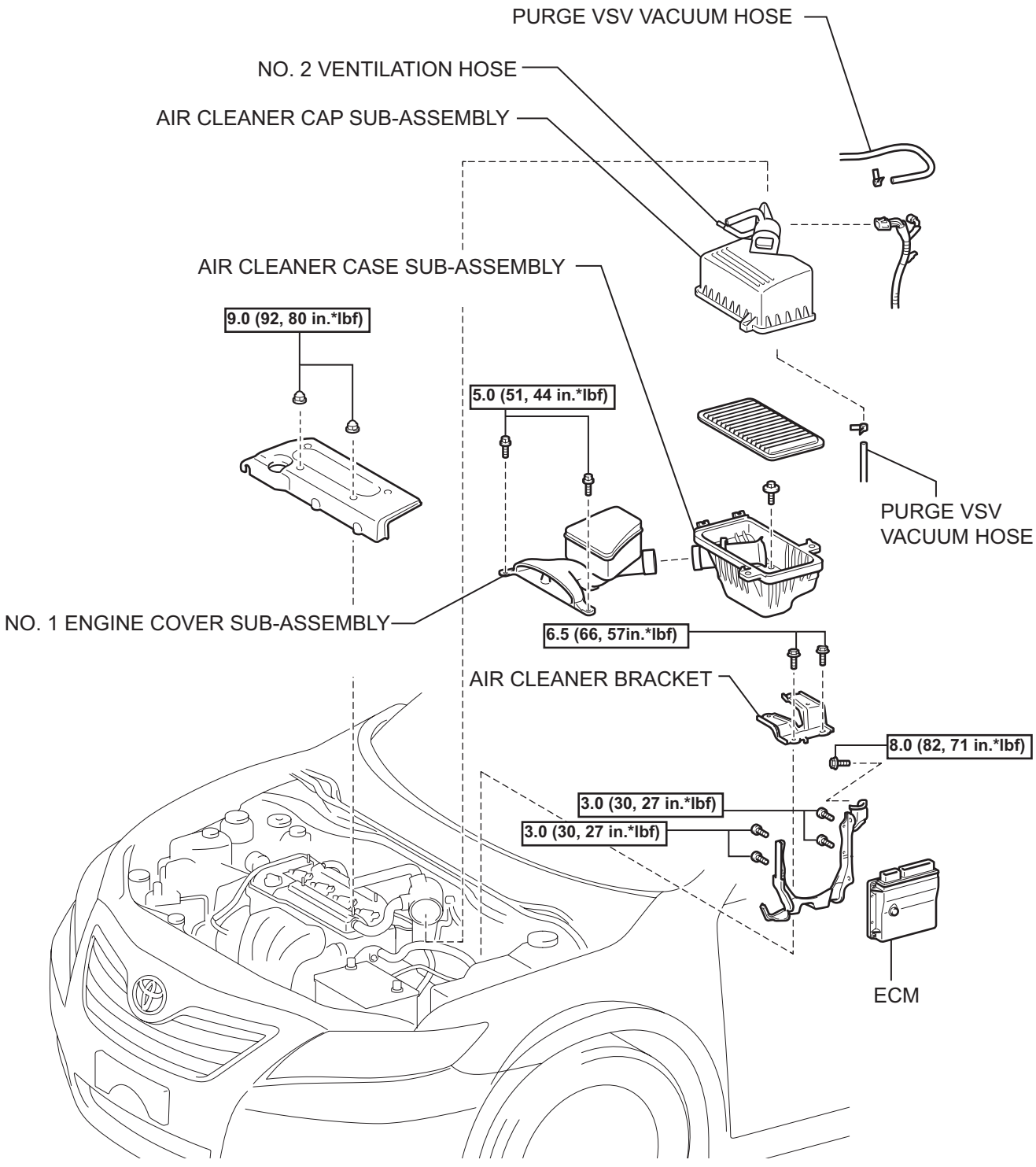
ES

6. RESET MEMORY

(a) When replacing the ECM, perform the RESET MEMORY procedure (A/T initialization) (See page AX-16).

ECM

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

T

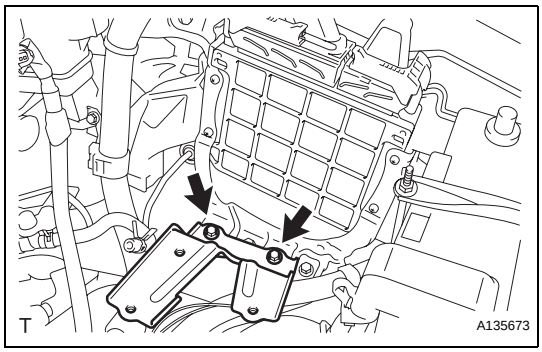
A135643E01

ES

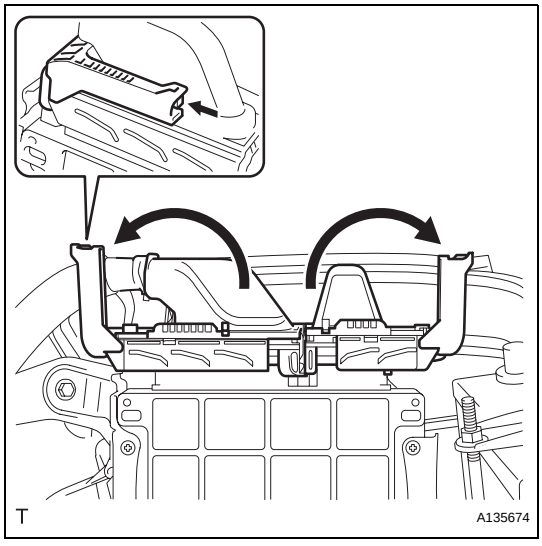
ES

REMOVAL

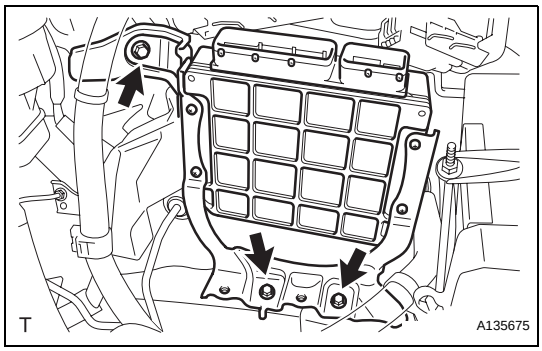
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
6. **REMOVE AIR CLEANER BRACKET**
   (a) Remove the 2 bolts and air cleaner bracket.



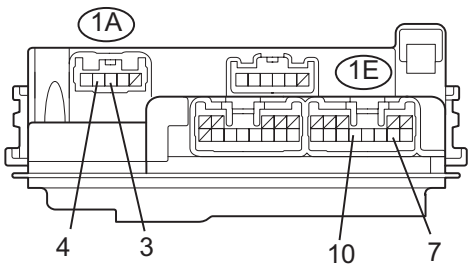
7. **DISCONNECT ECM CONNECTOR**
   (a) Disconnect the 2 ECM connectors.
      (1) Raise the levers while pushing the locks on the levers, and disconnect the 2 ECM connectors.
      NOTICE:
      After disconnecting the connector, make sure that dirt, water and other foreign matter does not contact the connecting part of the connector.



8. **REMOVE ECM**
   (a) Remove the 3 bolts of the ECM with bracket.
   (b) Remove the ECM with bracket.



Engine Room R/B Unit D:



A137364E03

AIR FUEL RATIO SENSOR RELAY

INSPECTION

1. INSPECT AIR FUEL RATIO SENSOR RELAY

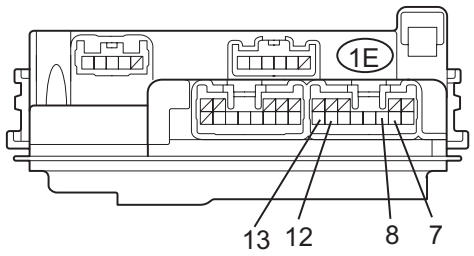
(a) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Specified Condition
1E-7 - 1E-10	Below 1 Ω
1A-3 - 1A-4	10 kΩ or higher
1A-3 - 1A-4	Below 1 Ω (Battery voltage applied between terminals 1E-7 and 1E-10)

ES

Engine Room R/B Unit D:



A137364E02

CIRCUIT OPENING RELAY

INSPECTION

1. INSPECT CIRCUIT OPENING RELAY

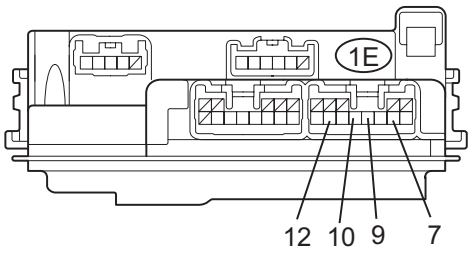
(a) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Specified Condition
1E-8 - 1E-12	Below 1 Ω
1E-7 - 1E-13	10 kΩ or higher
1E-7 - 1E-13	Below 1 Ω (Battery voltage applied between terminals 1E-8 and 1E-12)

ES

Engine Room R/B Unit D:



A137364E01

EFI RELAY

INSPECTION

1. INSPECT EFI RELAY

(a) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

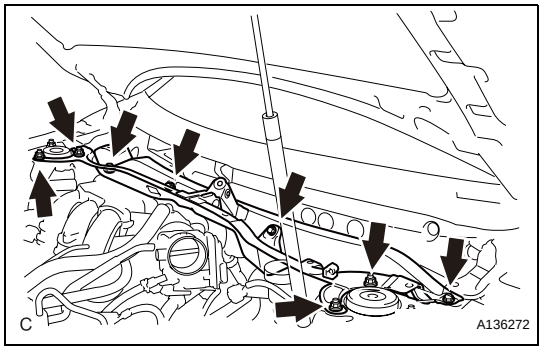
Standard resistance

Tester connection	Specified Condition
1E-9 - 1E-10	Below 1 Ω
1E-7 - 1E-12	10 kΩ or higher
1E-7 - 1E-12	Below 1 Ω (Battery voltage applied between terminals 1E-9 and 1E-10)

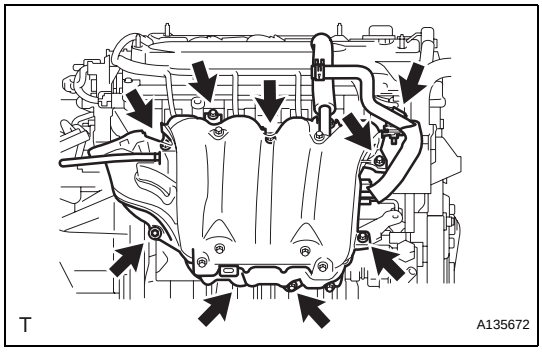
ES

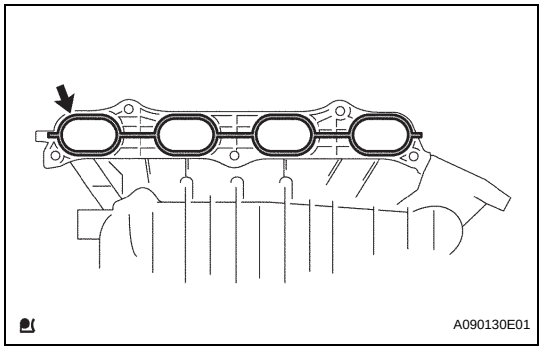
REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE (See page FU-12)**
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE NO. 1 ENGINE COVER (See page EM-94)**
4. **DRAIN COOLANT (See page CO-5)**
5. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
6. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
8. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
9. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
10. **REMOVE WINDSHIELD WIPER MOTOR AND LINK (See page WW-10)**
11. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY**
    (a) Remove the 4 bolts, 4 nuts and cowl top panel outer sub-assembly.

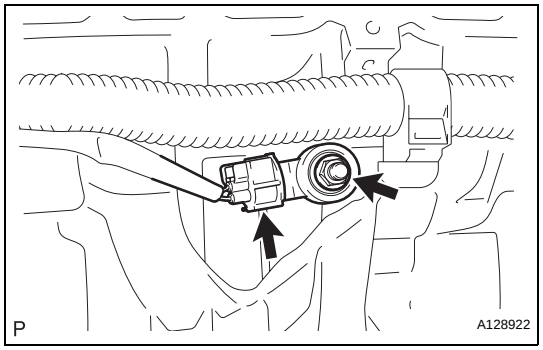


12. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-502)**
13. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
14. **REMOVE THROTTLE BODY (See page ES-417)**
15. **DISCONNECT FUEL TUBE (See page FU-12)**
16. **REMOVE FUEL DELIVERY PIPE WITH INJECTOR (See page FU-13)**
17. **REMOVE INTAKE MANIFOLD**
    (a) Disconnect the union to check valve hose from the brake booster.
    (b) Disconnect the camshaft timing oil control valve connector.
    (c) Remove the wire harness clamp.
    (d) Remove the union to check valve hose from the vacuum hose clamp.
    (e) Remove the 5 bolts, 2 nuts and intake manifold.





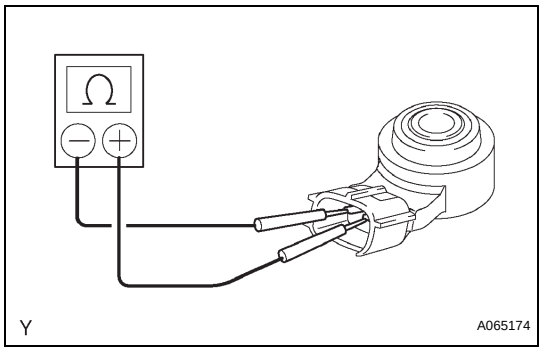
(f) Remove the gasket from the intake manifold.



18. REMOVE KNOCK SENSOR

(a) Disconnect the knock sensor connector.

(b) Remove the nut and knock sensor.



INSPECTION

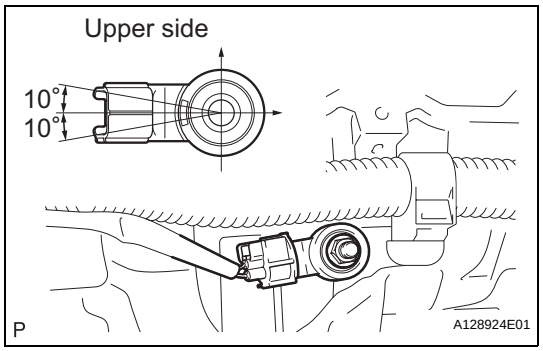
1. KNOCK CONTROL SENSOR

(a) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance:

120 to 280 kΩ at 20°C (68°F)

If the resistance is not specified, replace the sensor.



INSTALLATION

1. INSTALL KNOCK SENSOR

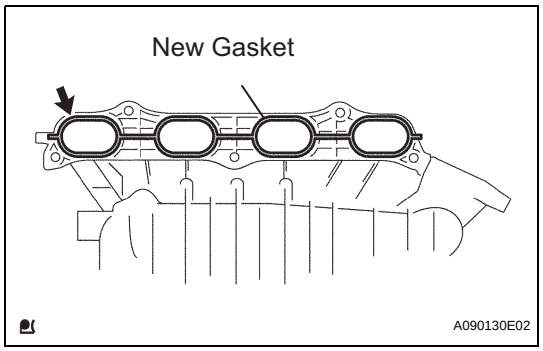
(a) Install the knock sensor with the nut.

Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

NOTICE:

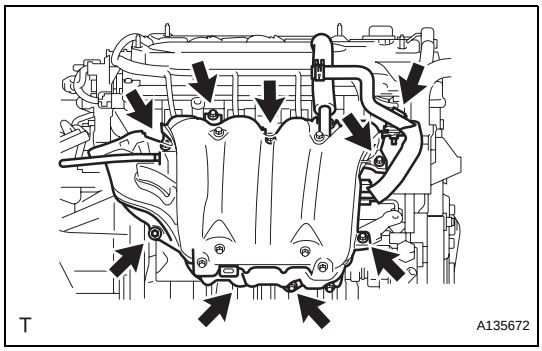
Make sure that the knock sensor is in the correct position.

(b) Connect the knock sensor connector.



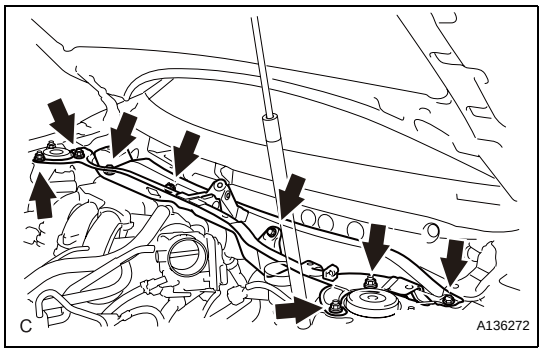
2. INSTALL INTAKE MANIFOLD

(a) Install a new gasket into the intake manifold.



(b) Install the intake manifold with the 5 bolts and 2 nuts.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
(c) Fit the union to check valve hose into the vacuum hose clamp.
(d) Install the wire harness clamp.
(e) Connect the camshaft timing oil control valve connector.
(f) Connect the union to check valve hose to the brake booster.

3. **INSTALL FUEL DELIVERY PIPE WITH INJECTOR (See page FU-15)**
4. **INSTALL FUEL TUBE (See page FU-16)**
5. **INSTALL THROTTLE BODY (See page ES-418)**
6. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
7. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
8. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**
10. **ADD ENGINE COOLANT (See page CO-5)**
11. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
12. **CHECK FOR FUEL LEAKS (See page FU-9)**
13. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**

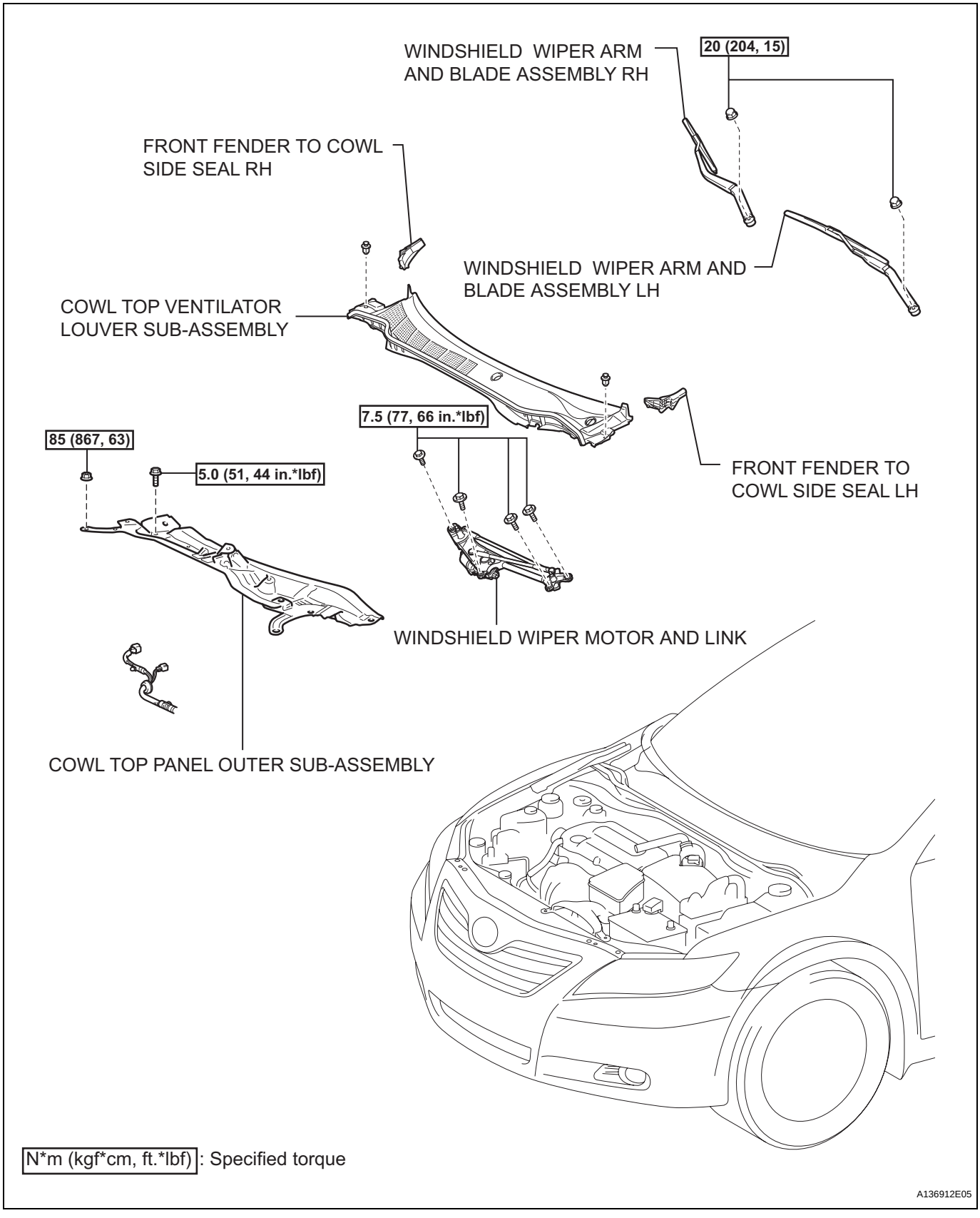


14. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY**
(a) Install the outer cowl top panel sub-assembly with the 4 bolts and 4 nuts.
Torque: Bolt
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Nut
85 N*m (867 kgf*cm, 44 ft.*lbf)
15. **INSTALL WINDSHIELD WIPER MOTOR AND LINK (See page WW-14)**
16. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)**
17. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
18. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
19. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**

20. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**

KNOCK SENSOR

COMPONENTS



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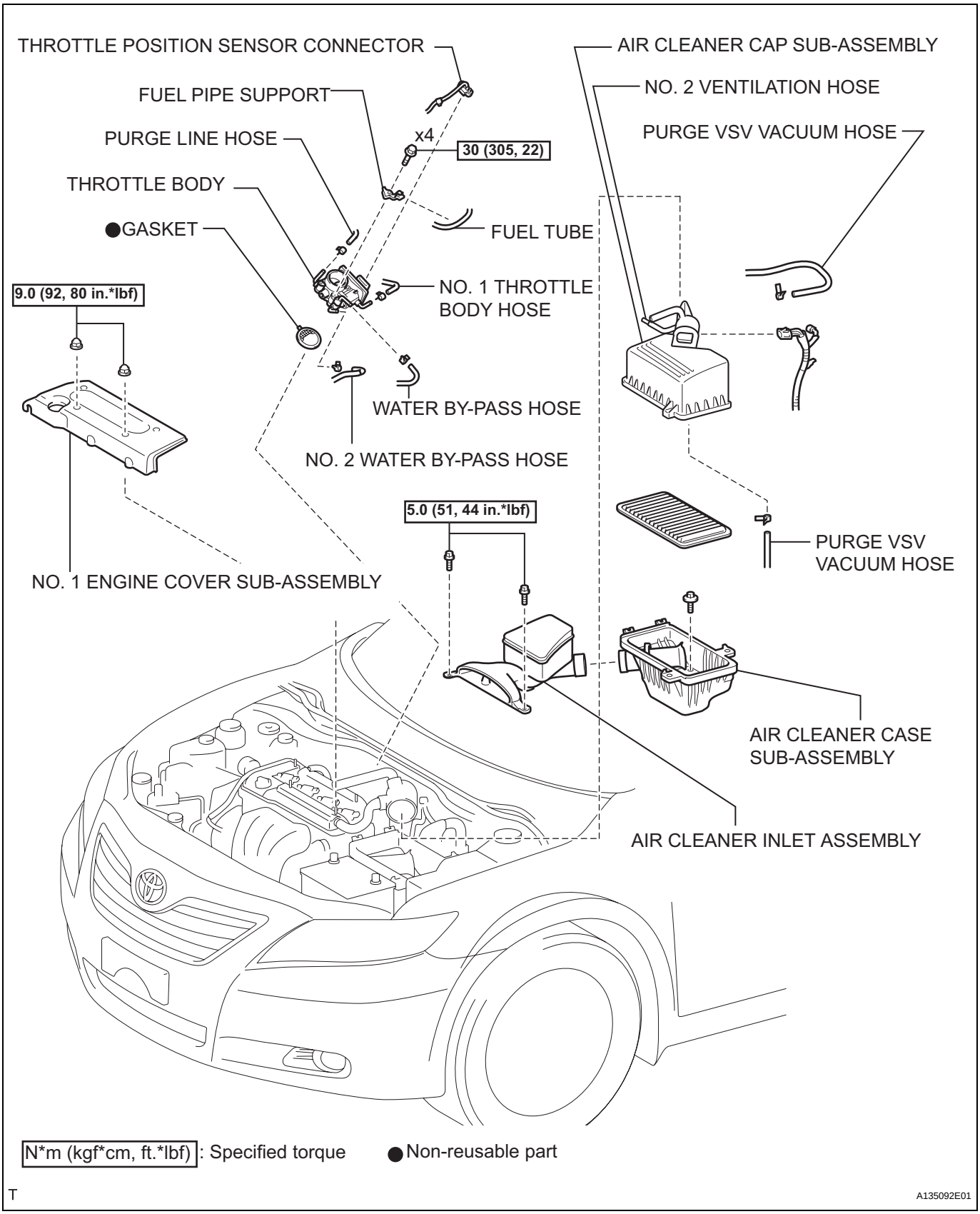

N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

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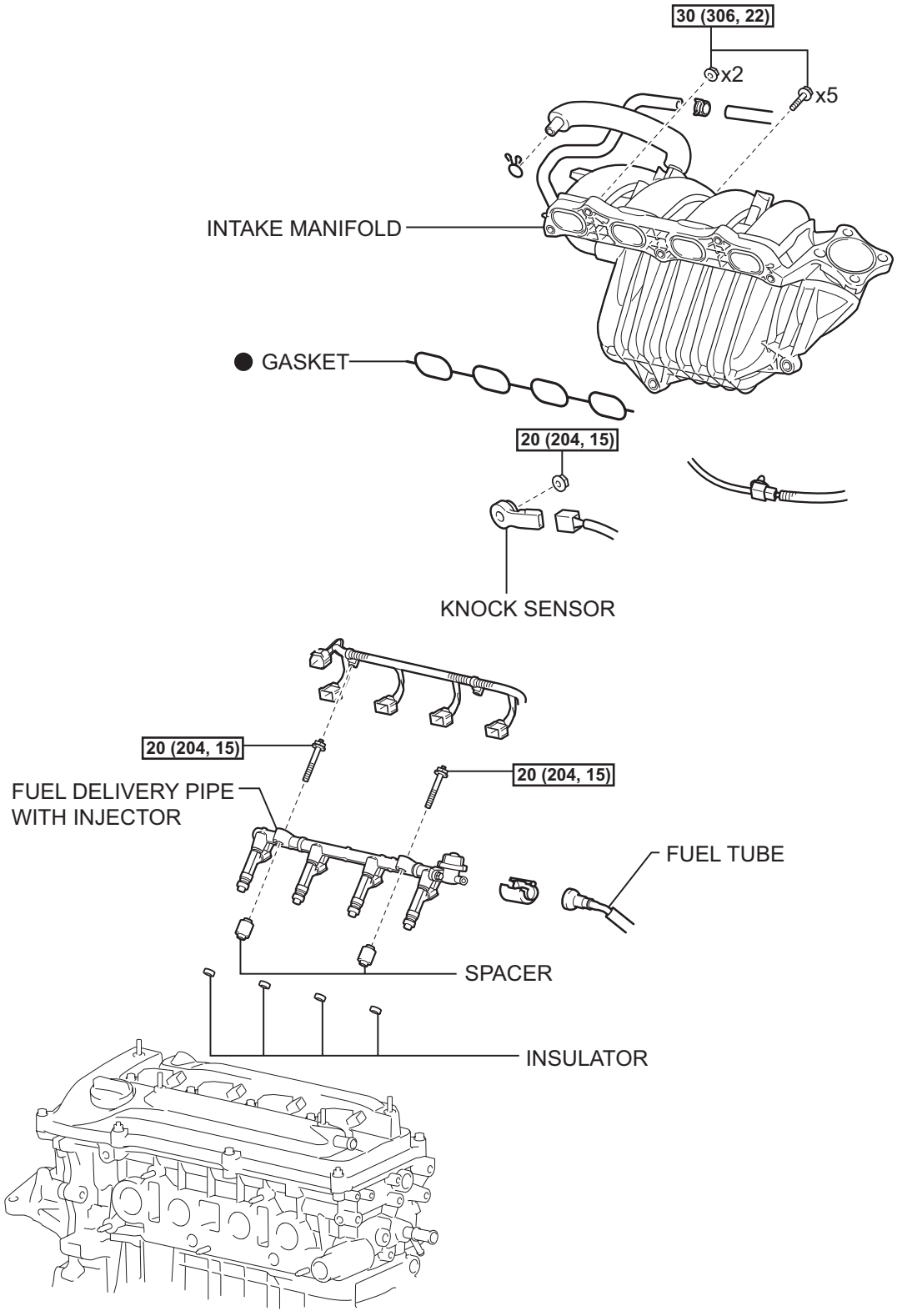

N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

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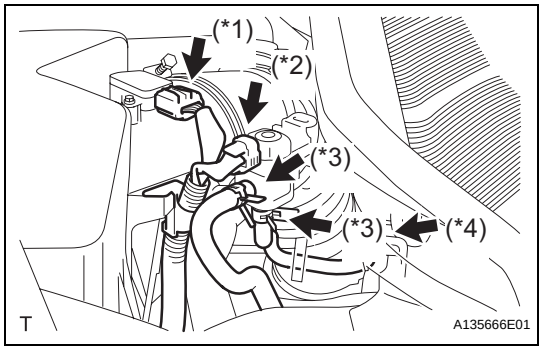
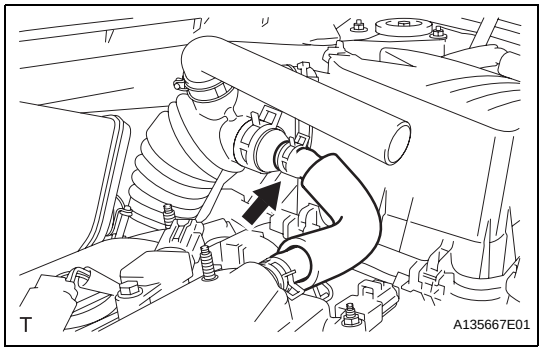
REMOVAL

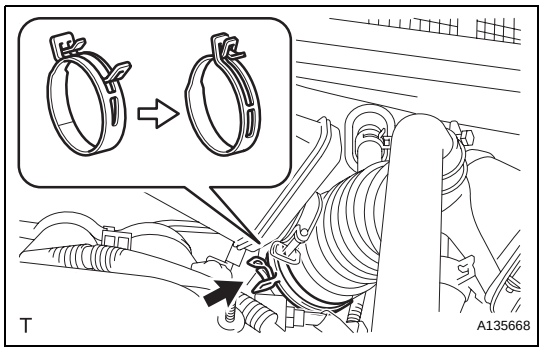
1. **DRAIN ENGINE COOLANT (See page CO-5)**
2. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
3. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY**



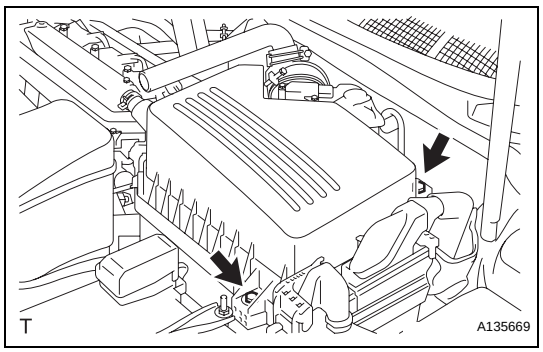
(a) Disconnect the mass air flow meter connector (*1).
(b) Disconnect the purge VSV connector (*2).
(c) Disconnect the 2 purge VSV vacuum hoses (*3).
(d) Disconnect the purge line hose from the clamp (*4).



(e) Disconnect the No. 2 ventilation hose from the air cleaner hose.



(f) Lock the No. 1 air cleaner hose clamp, and then disconnect the No. 1 air cleaner hose from the throttle body.



(g) Remove the 2 bolts and air cleaner cap.
(h) Remove the air cleaner filter element from the air cleaner case.

4. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**

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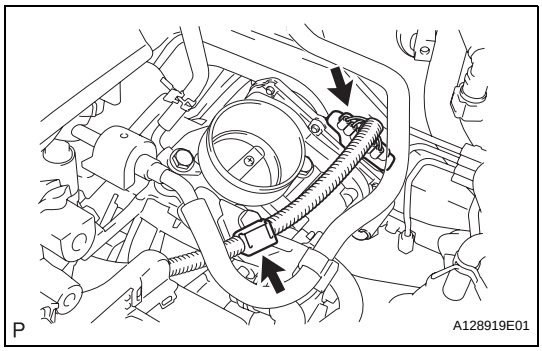
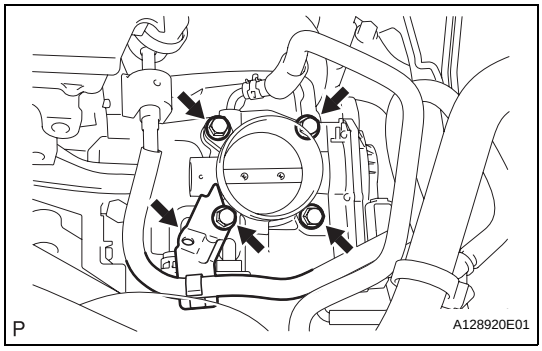
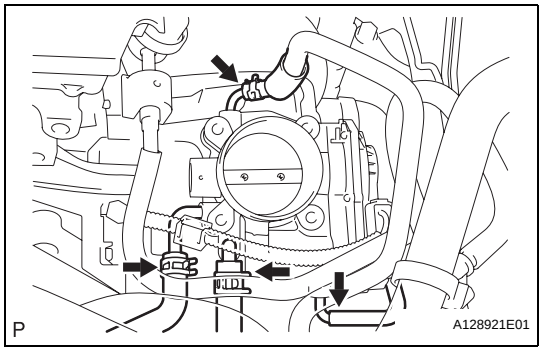


5. REMOVE THROTTLE BODY

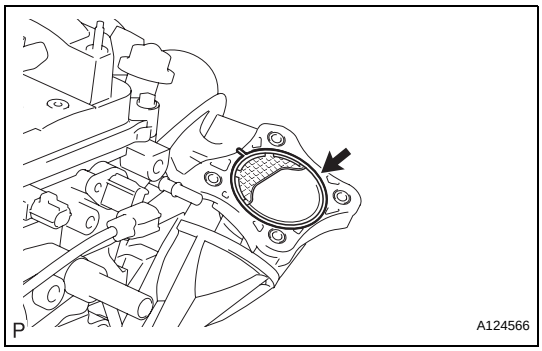
(a) Disconnect the throttle position sensor connector and wire harness clamp.



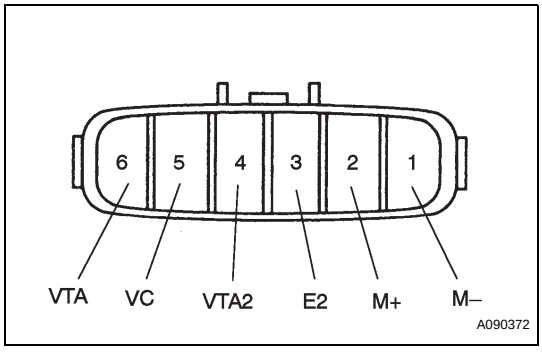
(b) Remove the 4 bolts, and then remove the fuel pipe support and throttle body.



(c) Disconnect the purge line hose from the throttle body.
(d) Disconnect the water by-pass hose from the throttle body.
(e) Disconnect the No. 2 water by-pass hose from the throttle body.
(f) Disconnect the No. 1 throttle body hose from the throttle body.



(g) Remove the gasket from the intake manifold.



INSPECTION

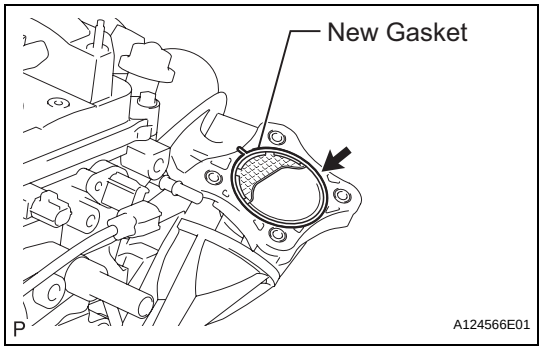
1. INSPECT THROTTLE BODY ASSEMBLY

(a) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance

Symbols (terminal No.)	Resistance	Temperature
M+ (2) - M- (1)	0.3 to 100 Ω	20°C (68°F)

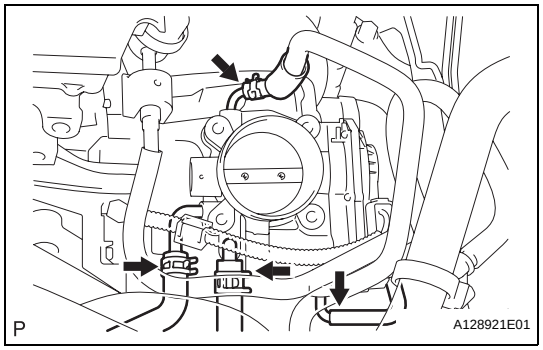
If the result is not as specified, replace the throttle body assembly.



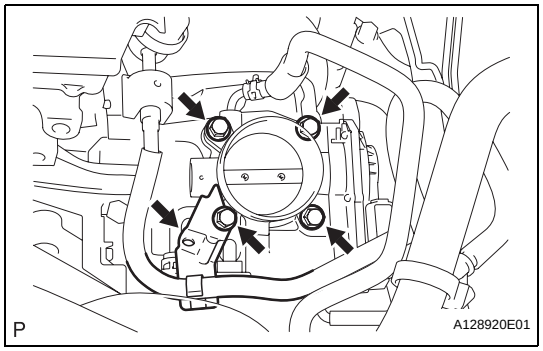
INSTALLATION

1. INSTALL THROTTLE BODY

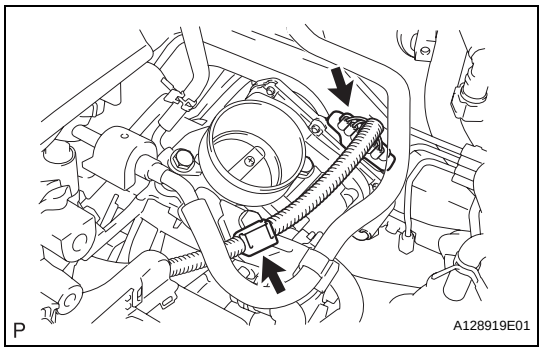
(a) Install a new gasket onto the intake manifold.



(b) Connect the purge line hose to the throttle body.
(c) Connect the water by-pass hose to the throttle body.
(d) Connect the No. 2 water by-pass hose to the throttle body.
(e) Connect the No. 1 throttle body hose to the throttle body.



(f) Install the throttle body and fuel pipe clamp with the 4 bolts.
Torque: 30 N*m (305 kgf*cm, 22 ft.*lbf)
(g) Connect the fuel tube into the clamp.



(h) Connect the throttle position sensor connector.
(i) Connect the wire harness clamp.

2. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)

3. INSTALL AIR CLEANER CAP SUB-ASSEMBLY

(a) Install the air cleaner filter element onto the air cleaner case.

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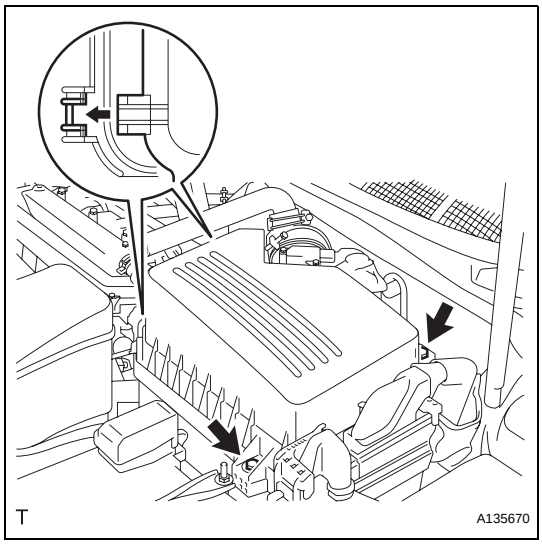
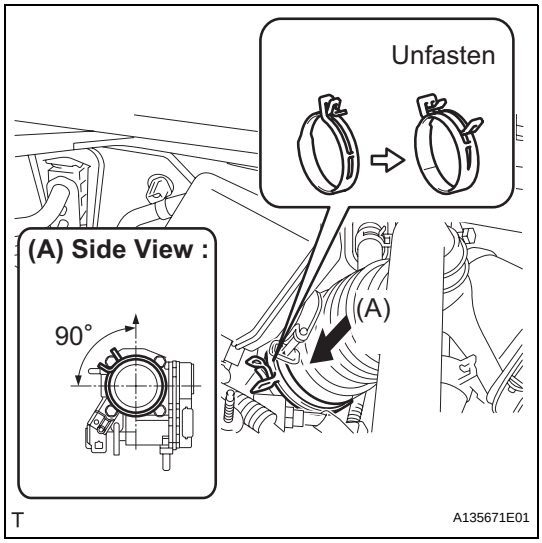
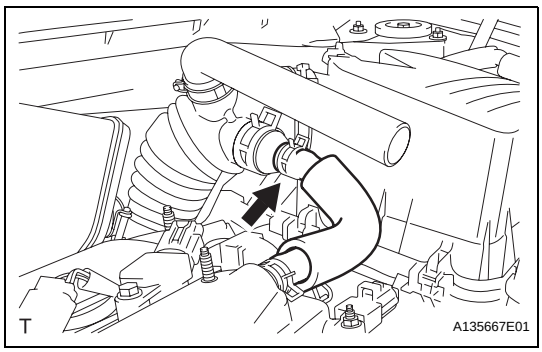


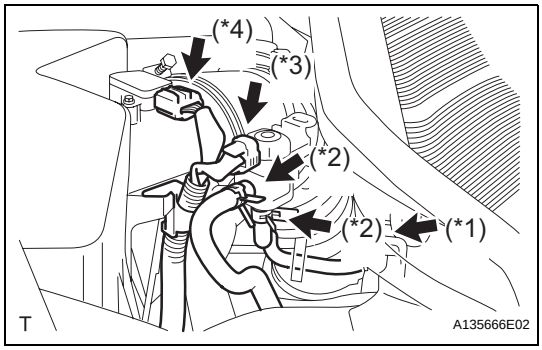
(b) Insert the hinges. Install the air cleaner cap sub-assembly with the 2 bolts.



(c) Align the matchmarks of the No. 1 air cleaner hose and throttle body, and then connect the air cleaner hose No. 1 to the throttle body and unfasten the No. 1 air cleaner hose clamp.
NOTICE:
Make sure that the hose clamp is at the correct angle.



(d) Connect the No. 2 ventilation hose to the air cleaner hose.



(e) Connect the purge line hose to the clamp (*1).
(f) Connect the 2 purge VSV vacuum hoses (*2).
(g) Connect the purge VSV connector (*3).
(h) Connect the mass air flow meter connector (*4).

4. INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)

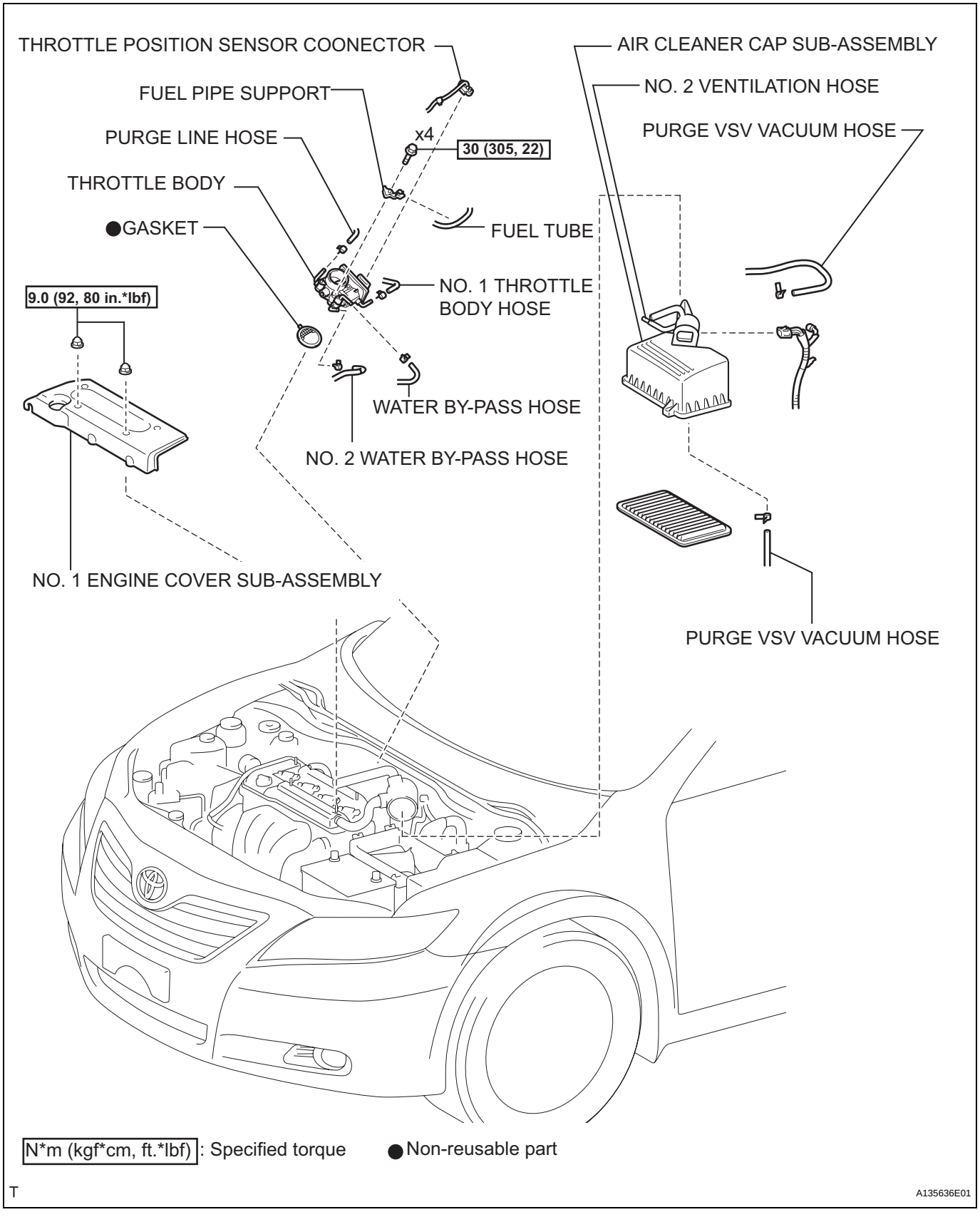
5. ADD ENGINE COOLANT (See page CO-5)

6. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**

7. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**

THROTTLE BODY

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

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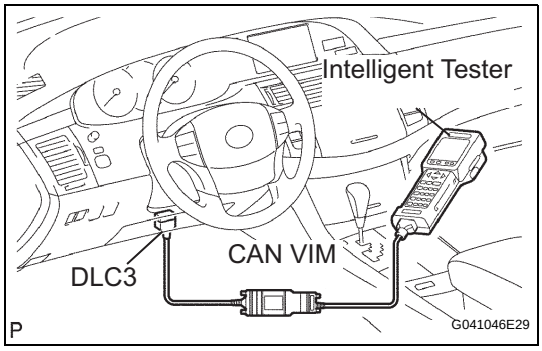
ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY ASSEMBLY

(a) Listen to the throttle control motor operating sounds.
  (1) Turn the ignition switch to the ON position.
  (2) When pressing the accelerator pedal position sensor lever, listen to the running motor. Make sure that no friction noise comes from the motor.
  If friction noise exists, replace the throttle body assembly.

(b) Inspect the throttle position sensor.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch to the ON position.
  (3) Check that the MIL turns off.
  (4) Under CURRENT DATA, the throttle valve opening percentage (THROTTLE POS) should be within the standard range below.
  Standard throttle valve opening percentage: 60% or more
  If the percentage is less than 60%, replace the throttle body assembly.
  NOTICE:
  When checking the throttle valve opening percentage, the transmission should be in neutral.



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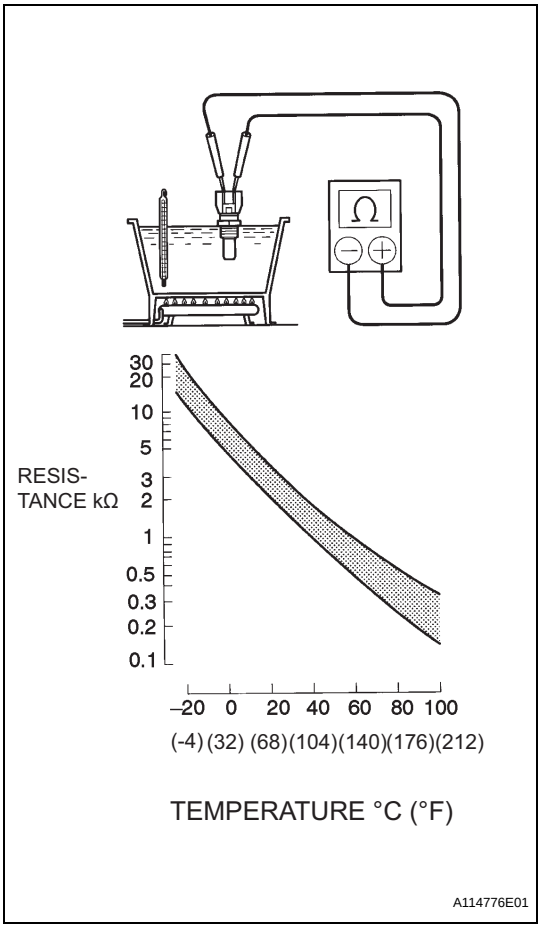
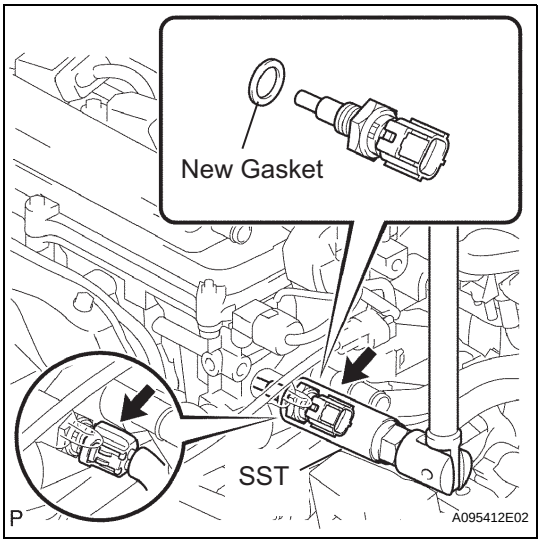


INSPECTION

1. **INSPECT ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Using an ohmmeter, measure the resistance between the terminals.
   Standard resistance

Condition	Specified Condition
20°C (68°F)	2.32 to 2.59 kΩ
80°C (176°F)	0.310 to 0.326 kΩ

If the result is not as specified, replace the sensor.
NOTICE:
In case of checking the water temperature sensor in the water, do not allow water to go into the terminals. After checking, dry the sensor.

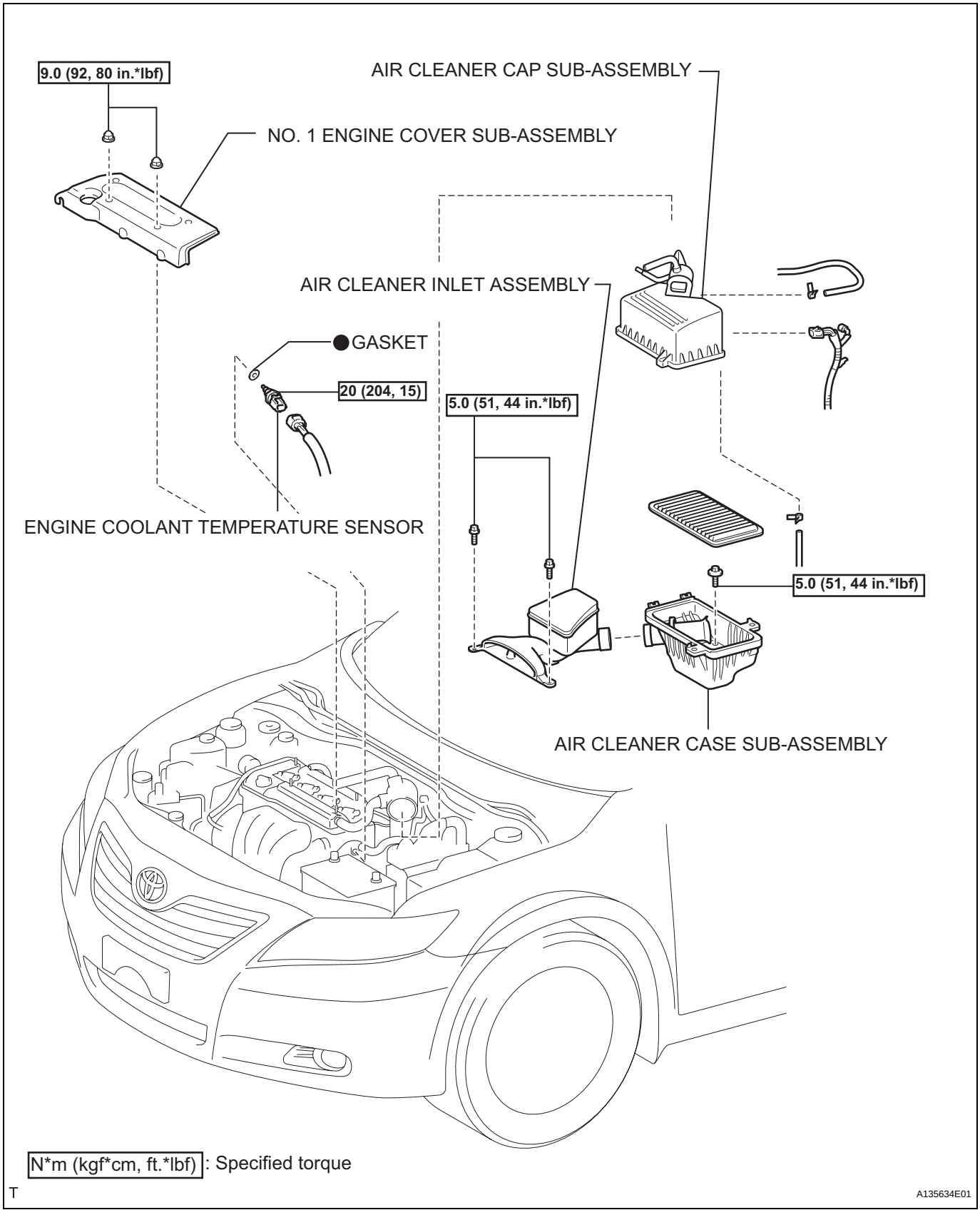


INSTALLATION

1. **INSTALL ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Install a new gasket onto the engine coolant temperature sensor.
   (b) Using SST, install the engine coolant temperature sensor.
   SST 09817-33190
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
   (c) Connect the engine coolant temperature sensor connector.
2. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
3. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
4. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
5. **ADD ENGINE COOLANT (See page CO-5)**
6. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
7. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**

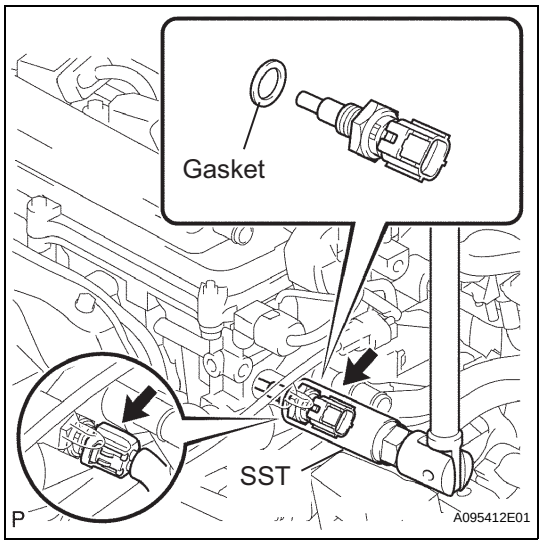
ENGINE COOLANT TEMPERATURE SENSOR

COMPONENTS



REMOVAL

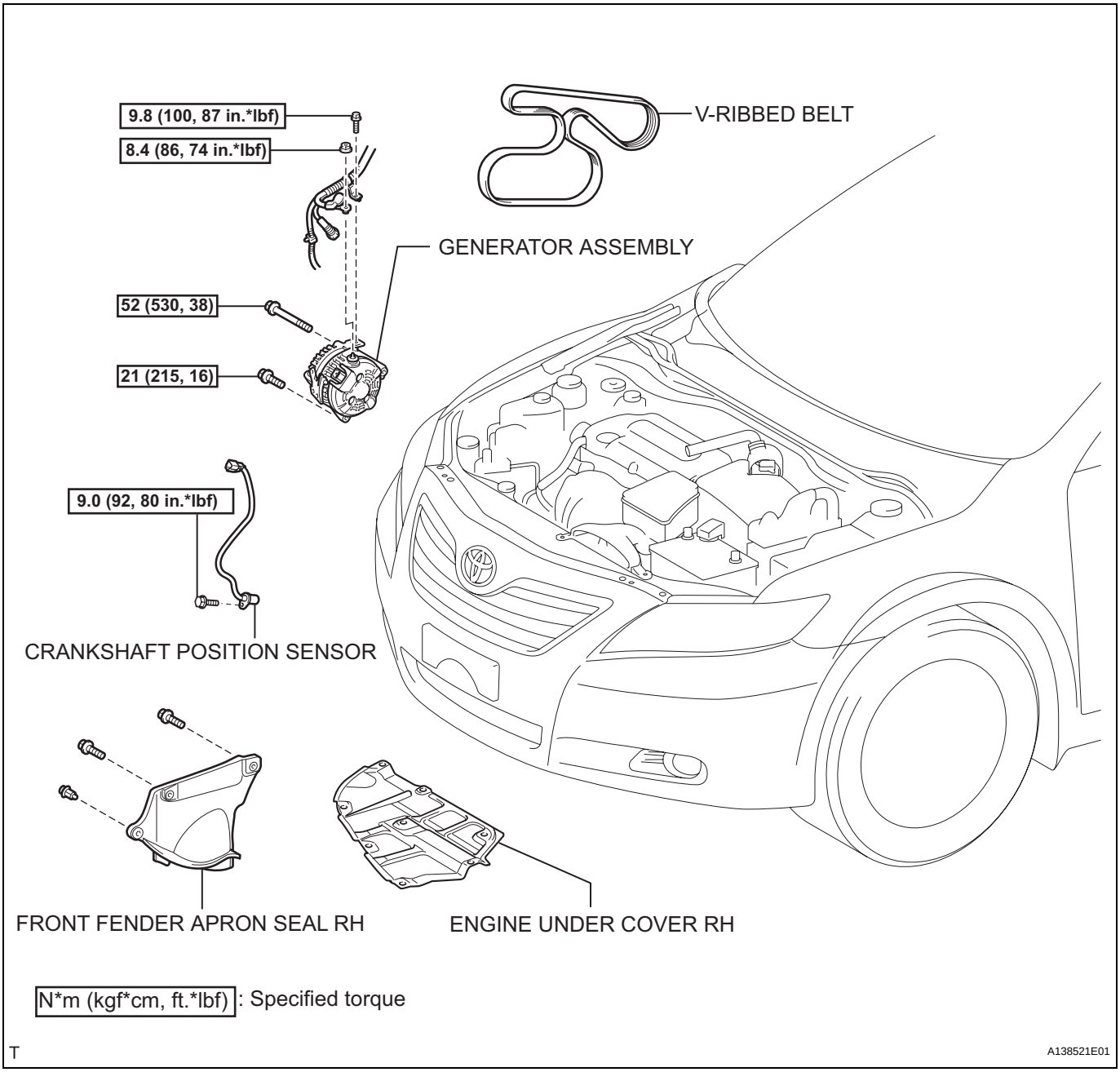
1. **DRAIN ENGINE COOLANT (See page CO-5)**
2. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
6. **REMOVE ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Disconnect the engine coolant temperature sensor connector.
   (b) Using SST, remove the engine coolant temperature sensor and gasket.
   SST 09817-33190



ES

CRANKSHAFT POSITION SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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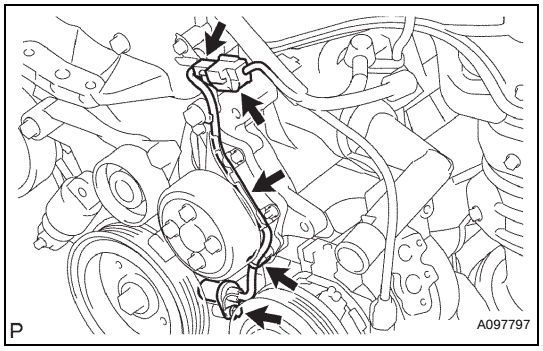
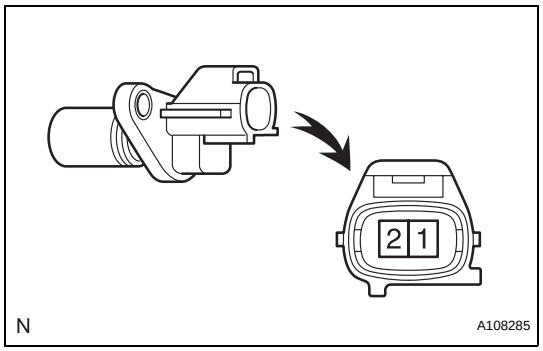
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE FRONT FENDER APRON RH**
4. **REMOVE V-RIBBED BELT (See page EM-6)**
5. **REMOVE GENERATOR ASSEMBLY (See page CH-11)**
6. **REMOVE CRANKSHAFT POSITION SENSOR**
   (a) Disconnect the crankshaft position sensor connector.
   (b) Remove the connector clamp and wire harness clamp.
   (c) Remove the wire harness clamp bracket from the wire harness.
   (d) Remove the bolt, and then remove the crankshaft position sensor.





INSPECTION

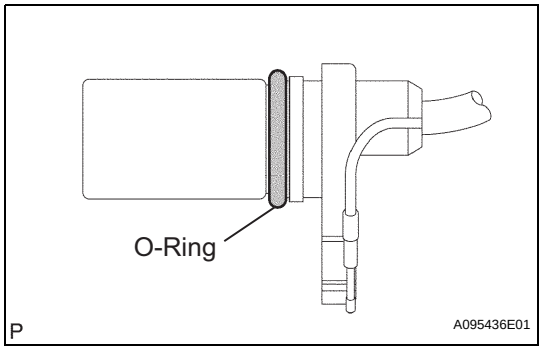
1. **INSPECT CRANKSHAFT POSITION SENSOR**
   (a) Using an ohmmeter, measure the resistance between the terminals.
   Standard resistance

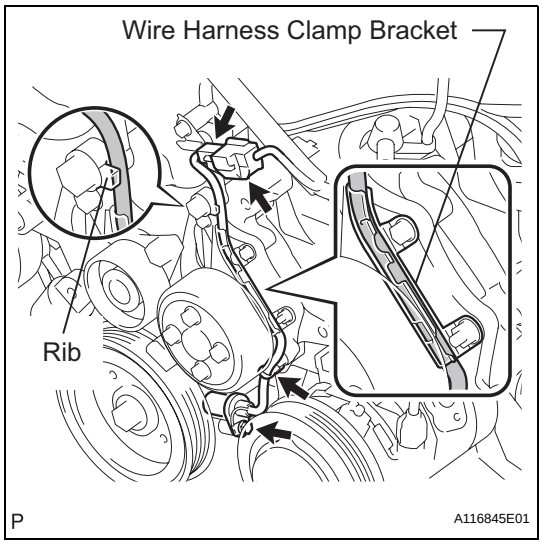
Temperature	Specified Condition
Cold	985 to 1,600 Ω
Hot	1,265 to 1,890 Ω

NOTICE:
"Cold" and "Hot" mean the temperature of the coils themselves. "Cold" is from -10 to 50°C (14 to 122°F) and "Hot" is from 50 to 100°C (122 to 212°F).
If the resistance is not as specified, replace the sensor.

INSTALLATION

1. **INSTALL CRANKSHAFT POSITION SENSOR**
   (a) Apply a light coat of engine oil to the O-ring on the crankshaft position sensor.



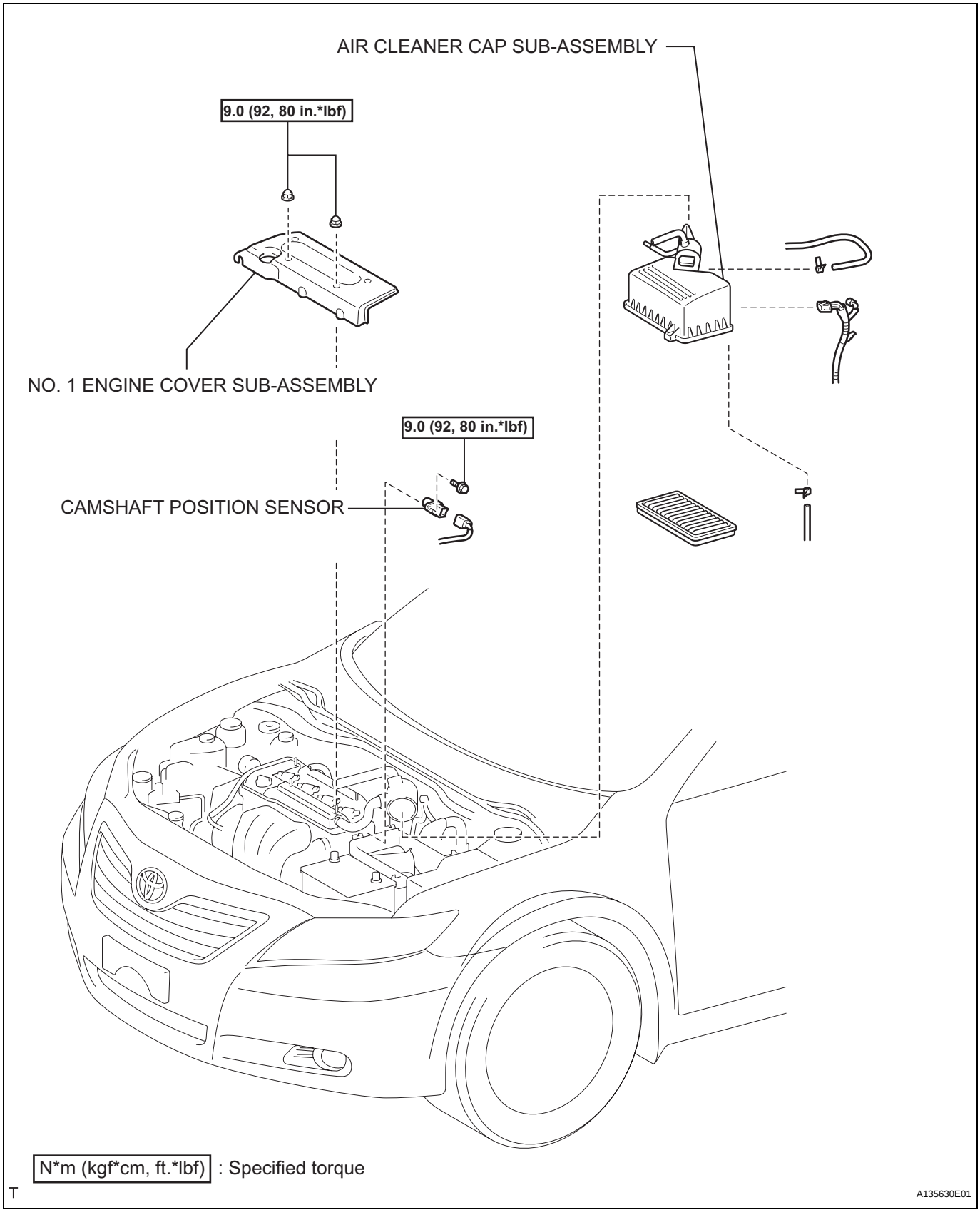


(b) Install the crankshaft position sensor with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
(c) Connect the crankshaft position sensor connector.

2. **INSTALL GENERATOR ASSEMBLY (See page CH-19)**
3. **INSTALL V-RIBBED BELT (See page EM-7)**
4. **INSTALL FRONT FENDER APRON SEAL RH**
5. **INSTALL FRONT WHEEL RH**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

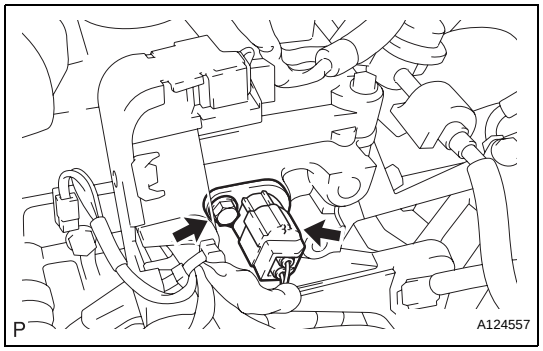
CAMSHAFT POSITION SENSOR

COMPONENTS



REMOVAL

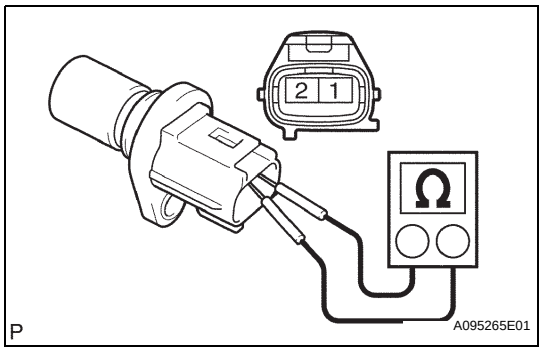
1. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
2. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
3. **REMOVE CAMSHAFT POSITION SENSOR**
   (a) Disconnect the camshaft position sensor connector.
   (b) Remove the bolt and camshaft position sensor.



INSPECTION

1. **INSPECT CAMSHAFT POSITION SENSOR**
   (a) Measure the resistance of the sensor.
   Standard resistance

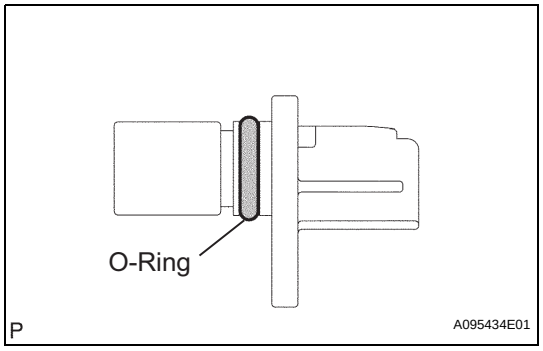
Tester Connection	Specified Condition
1 (G+) - 2 (G-)	835 to 1,400 Ω at Cold
1 (G+) - 2 (G-)	1,060 to 1,645 Ω at Hot



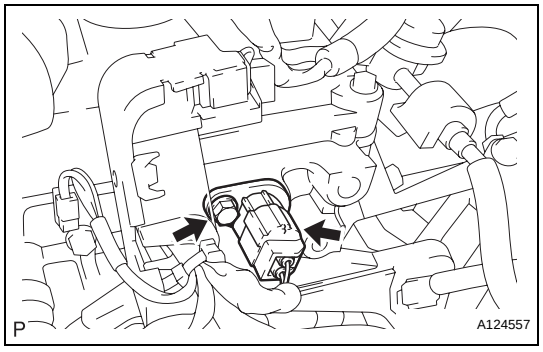
NOTICE:
"Cold" and "Hot" mean the temperature of the coils themselves. "Cold" is from -10 to 50°C (14 to 122 °F) and "Hot" is from 50 to 100°C (122 to 212°F).
If the result is not as specified, replace the camshaft position sensor.

INSTALLATION

1. **INSTALL CAMSHAFT POSITION SENSOR**
   (a) Apply a light coat of engine oil to the O-ring of the sensor.
   NOTICE:
   Make sure that the O-ring is not cracked or jammed when installing it.



   (b) Install the camshaft position sensor with the bolt.
   Torque: 9.0 N*m (90 kgf*cm, 80 in.*lbf)
   (c) Connect the camshaft position sensor connector.
2. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
3. **CHECK FOR ENGINE OIL LEAKS**
4. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**

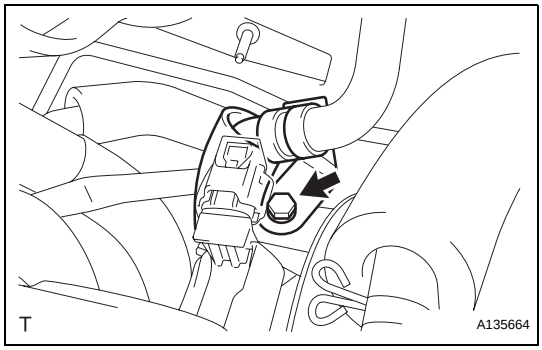


REMOVAL

1. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)

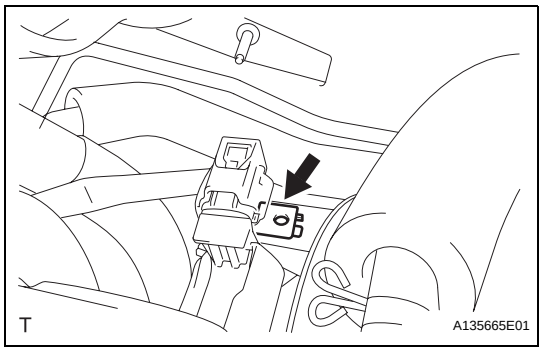
2. REMOVE VACUUM HOSE CLAMP

(a) Remove the bolt and disconnect the vacuum hose clamp.



3. REMOVE CLIP NUT

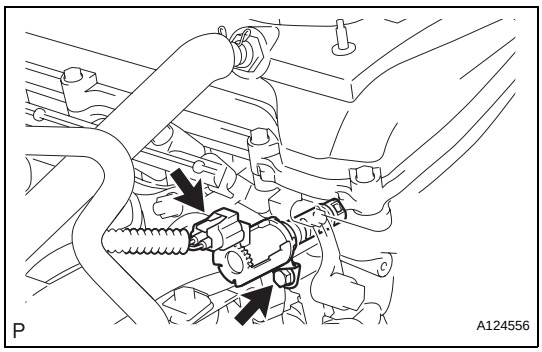
(a) Remove the clip nut.



4. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Disconnect the camshaft timing oil control valve assembly connector.

(b) Remove the bolt and camshaft timing oil control valve assembly.



INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

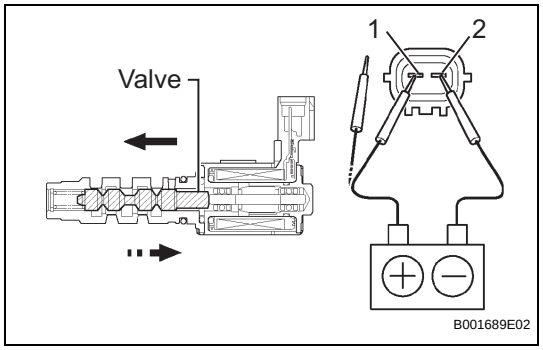
(a) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance:

6.9 to 7.9 Ω at 20°C (68°F)

If necessary, replace the camshaft timing oil control valve assembly.



(b) Movement inspection.

(1) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check the movement of the valve.

NOTICE:

Confirm that the valve moves freely and does not stick in any position.

If necessary, replace the camshaft timing oil control valve assembly.

HINT:

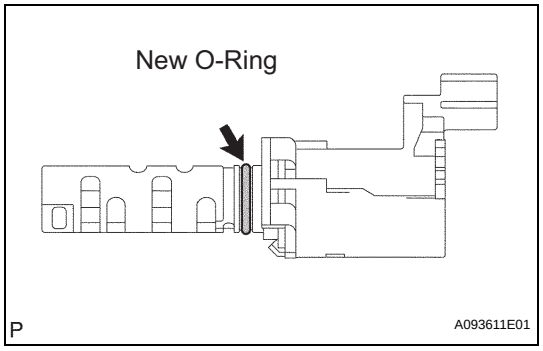
Accumulation of foreign objects causes subtle pressure leaks. The subtle pressure leaks will cause the camshaft to advance, and this will cause a DTC to be set.

ES

INSTALLATION

1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

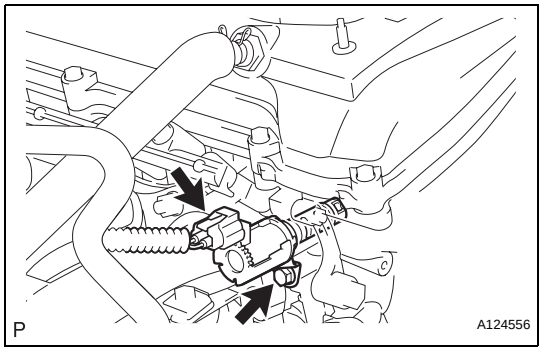
(a) Apply a light coat of engine oil to an O-ring of the camshaft timing oil control valve assembly sensor.

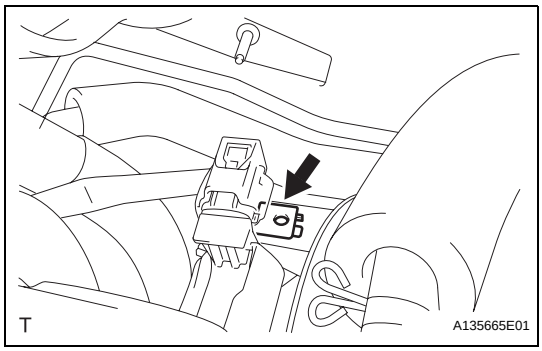


(b) Install the camshaft timing oil control valve assembly with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

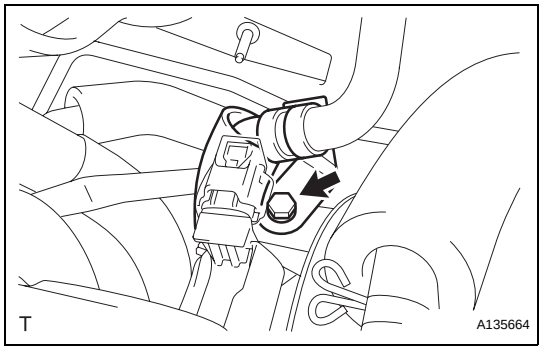
(c) Connect the camshaft timing oil control valve assembly connector.





2. INSTALL CLIP NUT

(a) Install the clip nut.



3. INSTALL VACUUM HOSE CLAMP

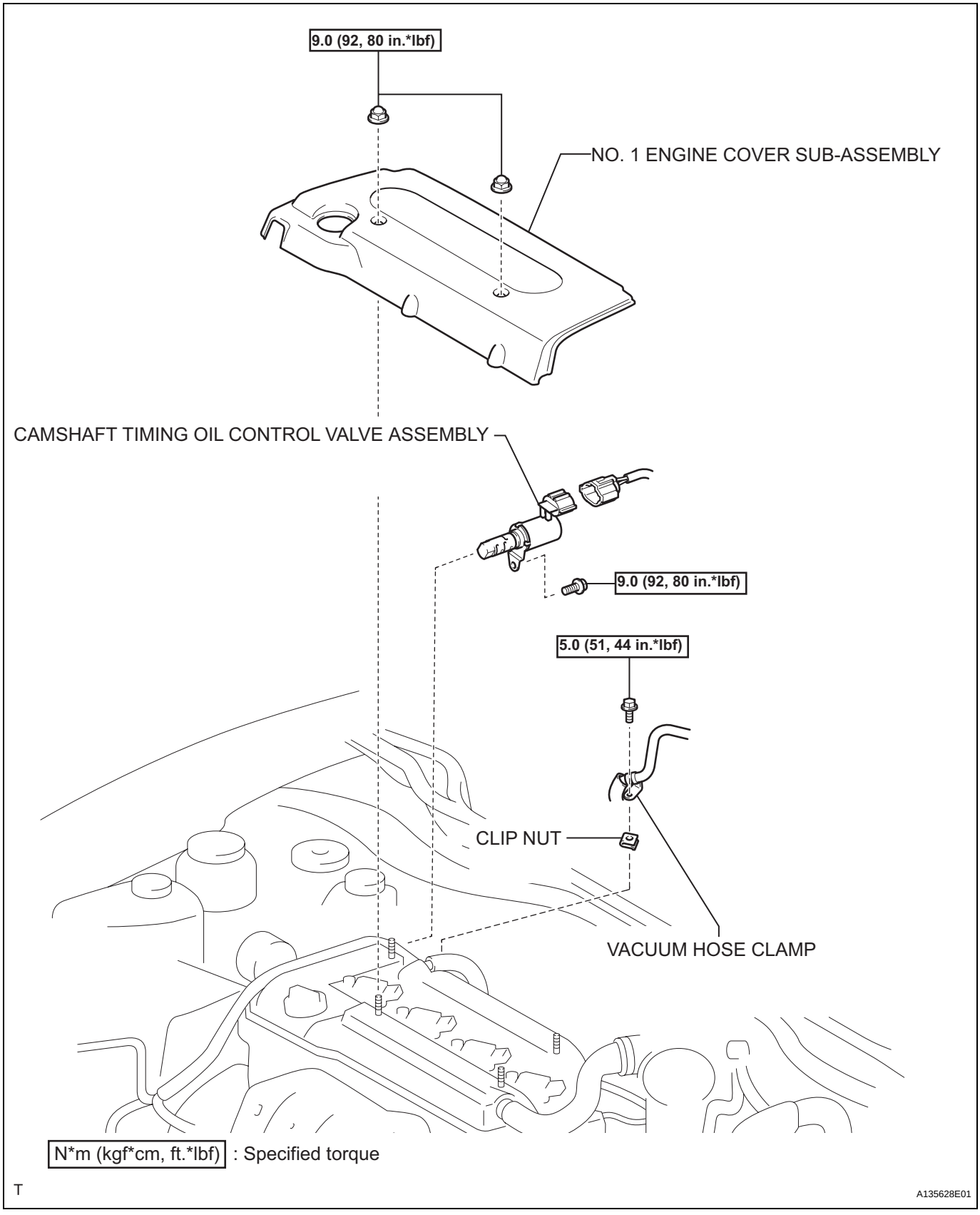
(a) Install the vacuum hose clamp with the bolt.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

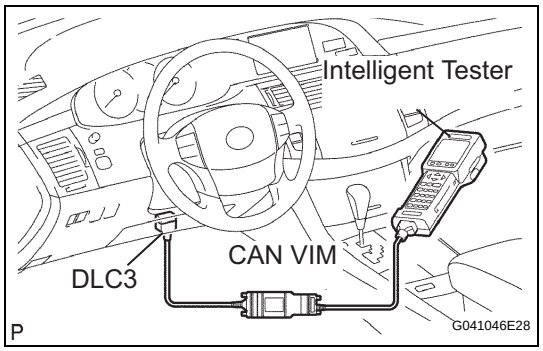
4. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY
(See page EM-94)

ES

CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

COMPONENTS





ON-VEHICLE INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

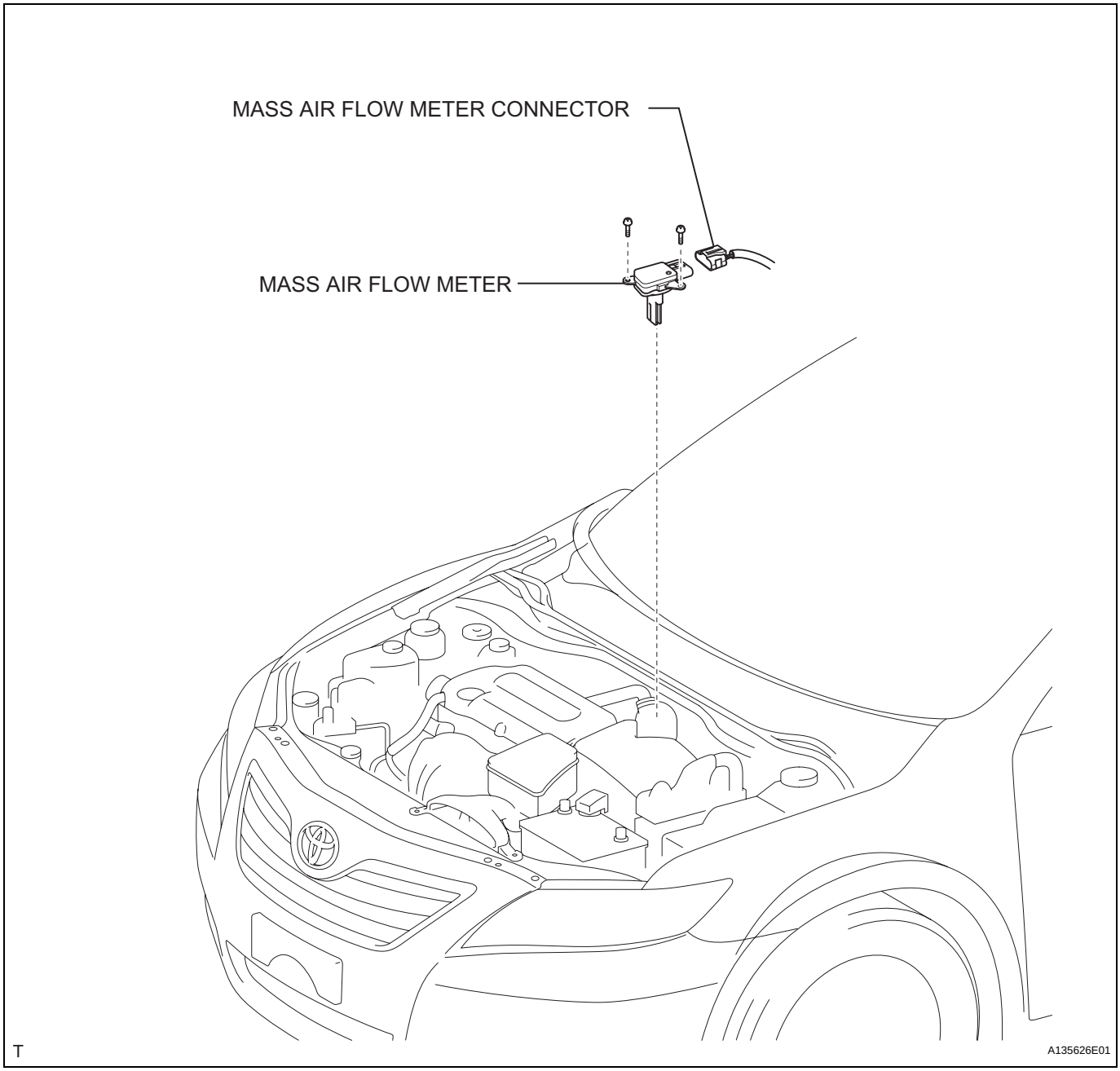
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Start the engine and warm it up.
(d) Select the intelligent tester from the ACTIVE TEST menu.
(e) Check the engine speed when the OCV is operated by the intelligent tester.

Standard

Condition	Specified Condition
VVT system is OFF (OCV is OFF)	Normal engine speed
VVT system is ON (OCV is ON)	Rough idle or engine stalled

MASS AIR FLOW METER

COMPONENTS



ON-VEHICLE INSPECTION

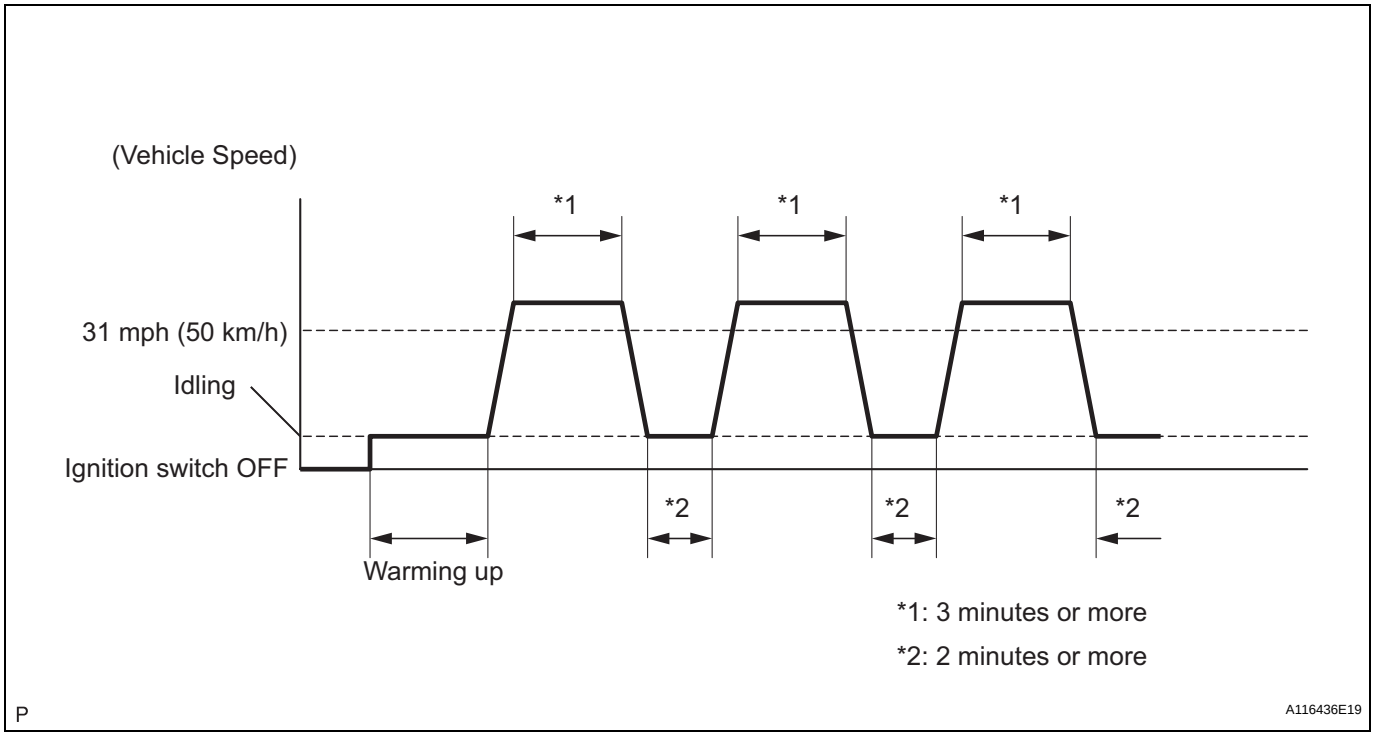
NOTICE:

- **Perform the MAF meter inspection according to the procedures below.**
- **Only replace the MAF meter when both the LONG FT#1 value and MAF value in the DATA LIST (with the engine stopped) are not within the normal operating range.**

1. INSPECT MASS AIR FLOW METER

(a) Perform confirmation driving pattern.

(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch to the ON position.
(3) Turn the tester ON.
(4) Clear the DTCs (See page ES-38).
(5) Start the engine and warm it up with all accessory switches OFF (until the engine coolant temperature is 75°C (167°F) or more).
(6) Drive the vehicle at 50 km/h (31 mph) or more for 3 to 5 minutes (*1).
(7) Allow the engine to idle for 2 minutes (*2).
(8) Perform steps (*1) and (*2) at least 3 times.

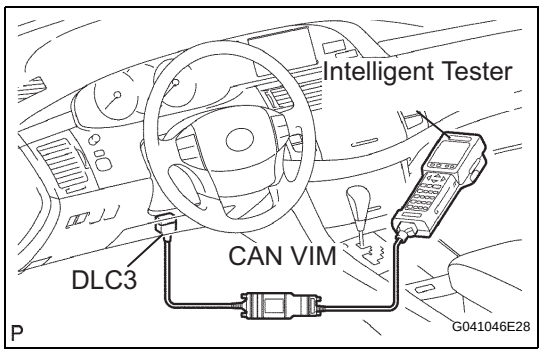


(b) Read values using the intelligent tester (LONG FT#1).

(1) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / LONG FT#1.
(2) Read the values displayed on the tester.
Standard value:
Within -15 to +15 %
If the result is not within the specified range, perform the inspection below.

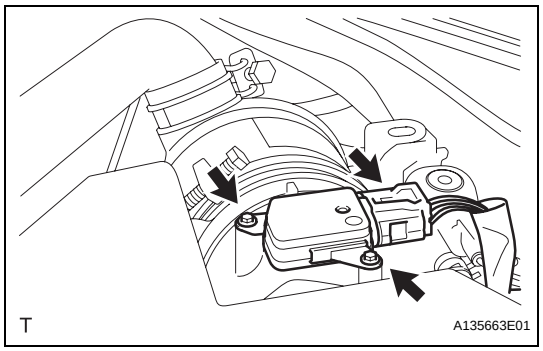
(c) Read values using the intelligent tester (MAF).
NOTICE:
- **Turn off the engine.**
- **Perform the inspection with the vehicle indoors and on a level surface.**
- **Perform the inspection of the MAF meter while it is installed to the air cleaner case (installed to the vehicle).**
- **During the test, do not use the exhaust air duct to perform suction on the exhaust pipe.**

(1) Turn the ignition switch to the ACC position.
(2) Turn the ignition switch to the ON position (do not run the engine).



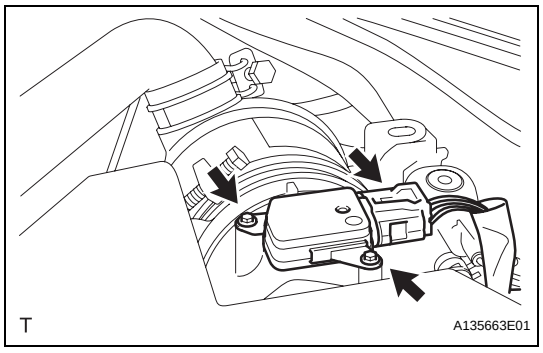
(3) Turn the intelligent tester ON.
(4) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.
(5) Wait 30 seconds, and read the values on the intelligent tester.
Standard condition:
Less than 0.50 g/sec.
- If the result is not as specified, replace the MAF meter.
- If the result is within the specified range, inspect the cause of the extremely rich or lean air fuel ratio (See page EC-20).

REMOVAL



1. REMOVE MASS AIR FLOW METER
(a) Disconnect the mass air flow meter connector.
(b) Remove the 2 screws and mass air flow meter.

INSTALLATION



1. INSTALL MASS AIR FLOW METER
(a) Install the mass air flow meter with the 2 screws.
(b) Connect the mass air flow meter connector.

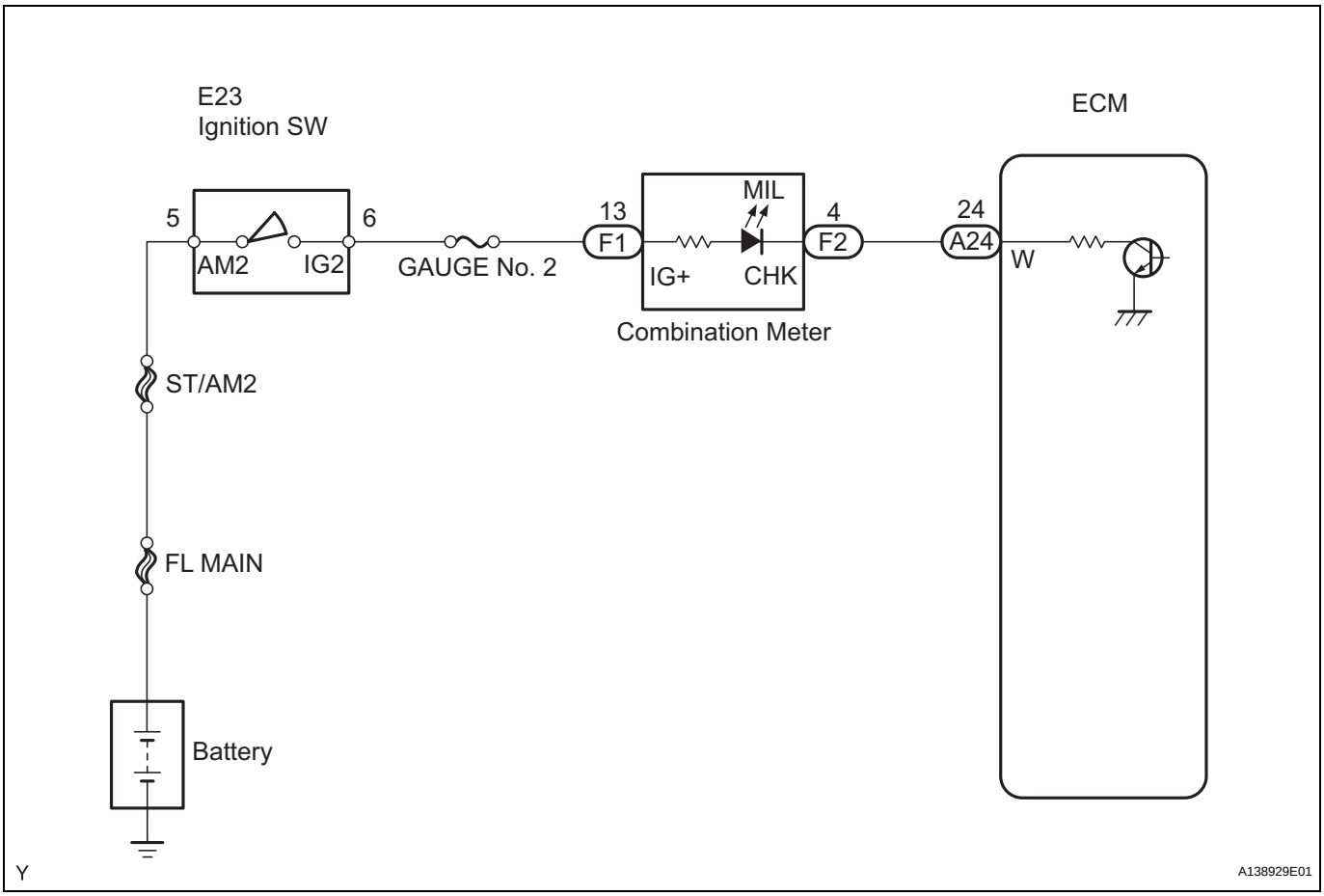
MIL Circuit

DESCRIPTION

The MIL (Malfunction Indicator Lamp) is used to indicate vehicle malfunction detected by the ECM. When the ignition switch is turned ON position, power is supplied to the MIL circuit, and the ECM provides the circuit ground which illuminates the MIL.
The MIL operation can be checked visually: When the ignition switch is first turned ON position, the MIL should be illuminated and should then turn off. If the MIL remains illuminated or is not illuminated, conduct the following troubleshooting procedure using the intelligent tester.

WIRING DIAGRAM

ES



INSPECTION PROCEDURE

1	CHECK THAT MIL IS ILLUMINATED

(a) Perform troubleshooting in accordance with the table below.
Result

Condition	Proceed to
MIL remains ON	A
MIL does not illuminate	B

B	Go to step 5

A

2	CHECK WHETHER MIL TURNS OFF

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Check if any DTCs have been stored. Note down any DTCs.
(e) Clear the DTCs (See page ES-38).
(f) Check if the MIL goes off.
Standard:
MIL goes off.

ES

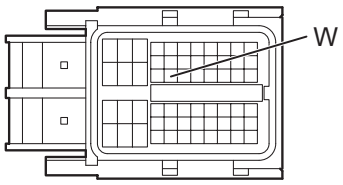
OK → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

NG

3	CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT IN WIRE HARNESS)

Wire Harness Side:

A24 ECM Connector



Front View

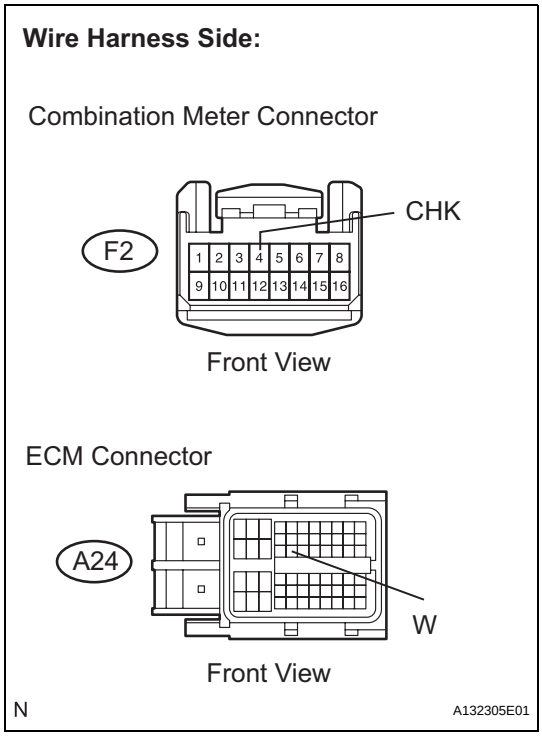
A115671E23

(a) Disconnect the A24 ECM connector.
(b) Turn the ignition switch to the ON position.
(c) Check that the MIL is not illuminated.
OK:
MIL is not illuminated.
(d) Reconnect the ECM connector.

OK → **REPLACE ECM**

NG

4	CHECK HARNESS AND CONNECTOR (COMBINATION METER - ECM)



(a) Disconnect the A24 ECM connector.
(b) Disconnect the F2 combination meter connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.
Standard resistance (Check for short)

Tester Connection	Specified Condition
A24-24 (W) or F2-4 (CHK) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the combination meter connector.

OK → **REPAIR OR REPLACE COMBINATION METER ASSEMBLY**

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

5	CHECK THAT MIL IS ILLUMINATED

(a) Check if the MIL is illuminated when the ignition switch is turned ON position.
OK:
MIL is illuminated.

OK → **SYSTEM OK**

NG

6	CHECK THAT ENGINE STARTS

(a) Turn the ignition switch to the ON position.
(b) Start the engine.
Result

Result	Proceed to
Engine starts	A
Engine does not start*	B

HINT:
*: The intelligent tester cannot communicate with the ECM.

B → GO TO VC OUTPUT CIRCUIT

A

7 INSPECT COMBINATION METER ASSEMBLY (MIL CIRCUIT)

(a) Check the MIL circuit (See page ME-19).

NG → REPAIR OR REPLACE COMBINATION METER ASSEMBLY

OK

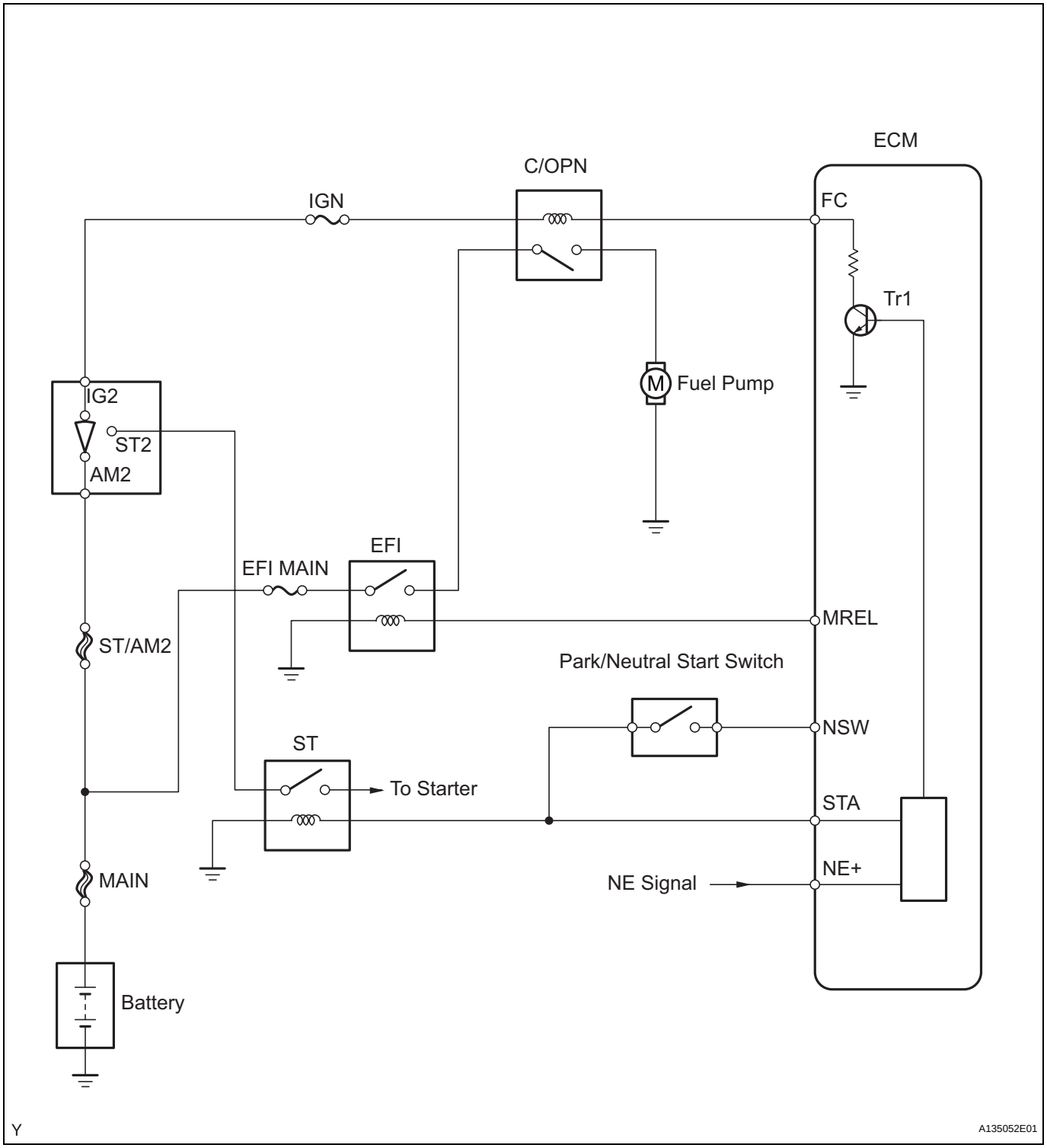
CHECK AND REPLACE HARNESS AND CONNECTOR (COMBINATION METER - ECM)

Fuel Pump Control Circuit

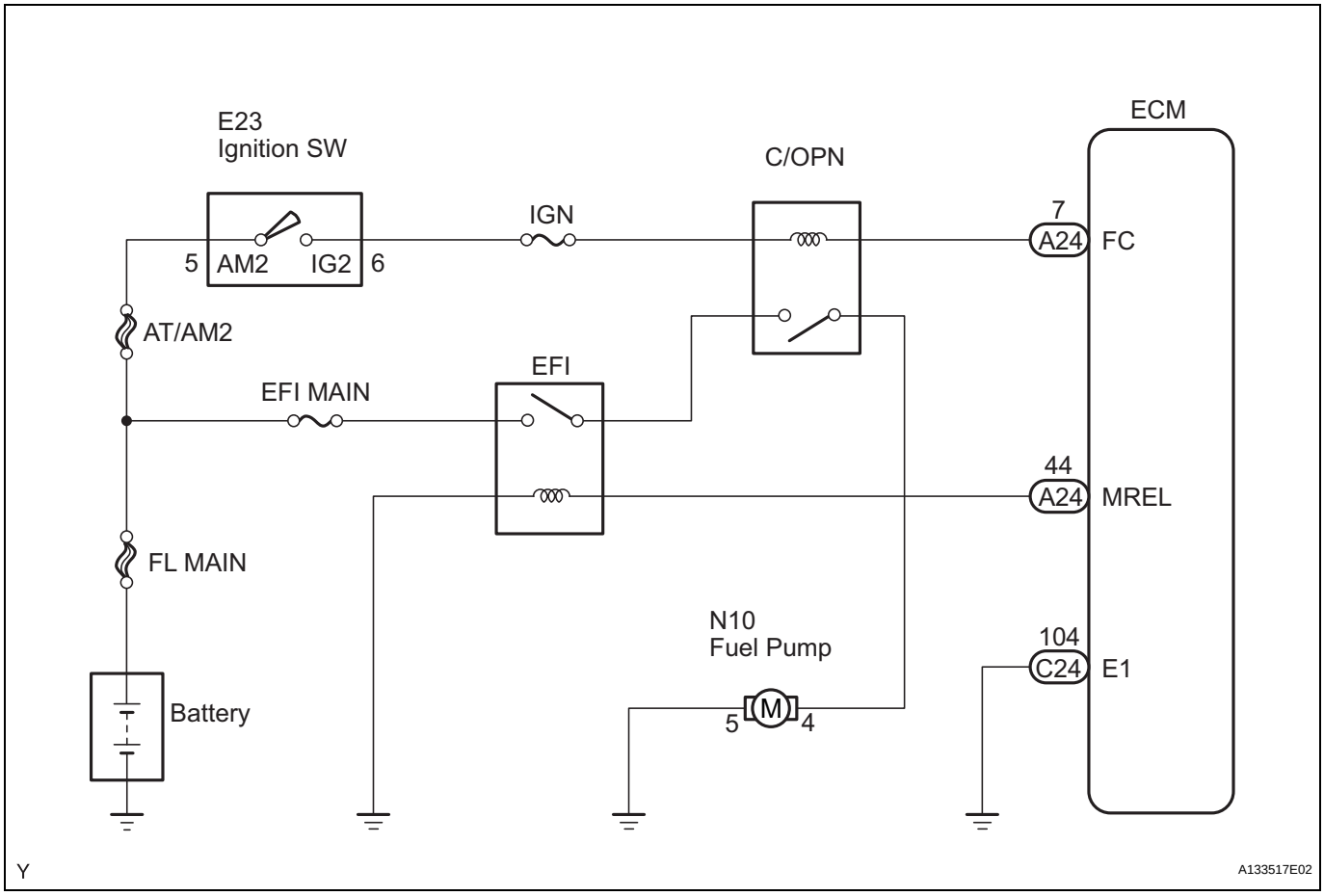
DESCRIPTION

When the engine is cranked, the starter relay drive signal output from the STAR terminal of the ECM is input into the STA terminal of the ECM, and NE signal generated by the crankshaft position sensor is also input into the NE+ terminal. Thus, the ECM interprets that the engine is cranked, and turns the transistor Tr1 in the ECM internal circuit ON. The current flows to the C/OPN (Circuit Opening) relay by turning the Tr1 ON. Then, the fuel pump operates.

While the NE signal is input into the ECM, when the engine is running, the ECM turns the Tr1 on continuously.



WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE C/OPN RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
(d) Check whether the fuel pump operation sound occurs when performing the Active Test on the tester.
OK:
Fuel pump operating sound occurs.

NG	Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

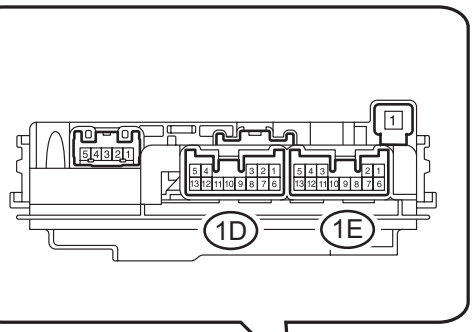
2	CHECK ECM POWER SOURCE CIRCUIT

NG → REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT

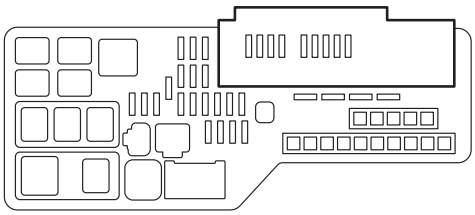
OK

3	INSPECT ENGINE ROOM J/B (C/OPN RELAY)

Engine Room J/B:



Engine Room R/B:



A138918E02

(a) Remove the engine room J/B from the engine room R/B.
(b) Inspect the C/OPN relay.
(1) Measure the C/OPN relay resistance.

Standard resistance

Tester Connection	Specified Condition
1E-7 - 1E-13	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1D-12 and 1E-8)

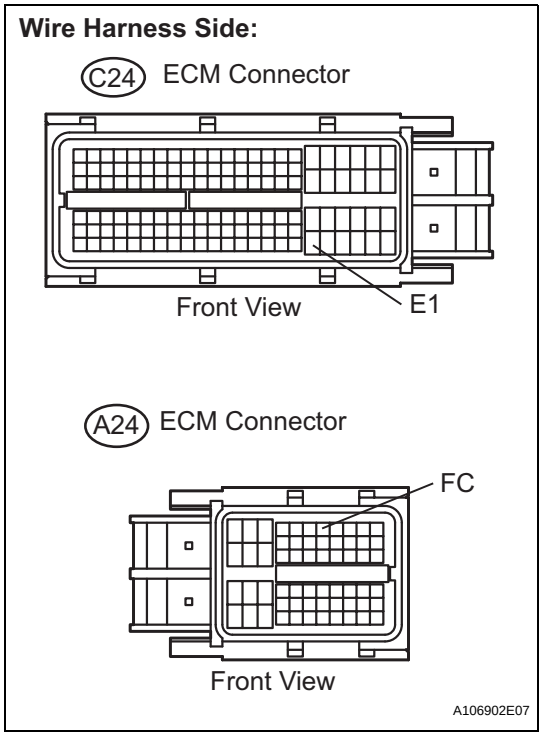
(c) Reinstall the engine room J/B.

NG → REPLACE ENGINE ROOM J/B

OK

ES

4	INSPECT ECM (FC VOLTAGE)



(a) Disconnect the A24 and C24 ECM connectors.
(b) Measure the voltage between the terminals of the A24 and C24 ECM connectors.
Standard voltage

Tester Connection	Specified Condition
A24-7 (FC) - C24-104 (E1)	9 to 14 V

(c) Reconnect the ECM connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BATTERY)**

OK

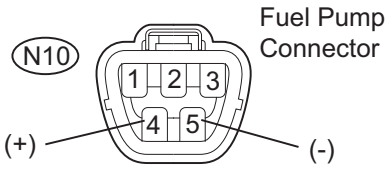
5	INSPECT FUEL PUMP

NG → **REPLACE FUEL PUMP**

OK

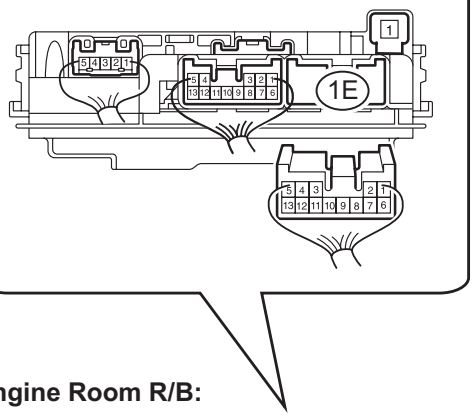
6	CHECK HARNESS AND CONNECTOR (C/OPN RELAY - FUEL PUMP - BODY GROUND)

Wire Harness Side:

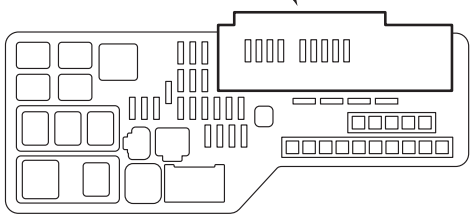


Engine Room J/B:

Component Side:



Engine Room R/B:



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(a) Check the harness and the connectors between the engine room J/B and the fuel pump.
  (1) Remove the engine room J/B from the engine room R/B.
  (2) Disconnect the 1E engine room J/B connector.
  (3) Disconnect the N10 fuel pump connector.
  (4) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
1E-13 - N10-4 (Fuel pump)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
1E-13 or N10-4 (Fuel pump) - Body ground	10 kΩ or higher

(b) Check the harness and the connectors between the fuel pump and body ground.
  (1) Disconnect the N10 fuel pump connector.
  (2) Measure the resistance.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N10-5 (Fuel pump) - Body ground	Below 1 Ω

(c) Reconnect the engine room J/B connector.
(d) Reconnect the fuel pump connector.
(e) Reinstall the engine room J/B.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

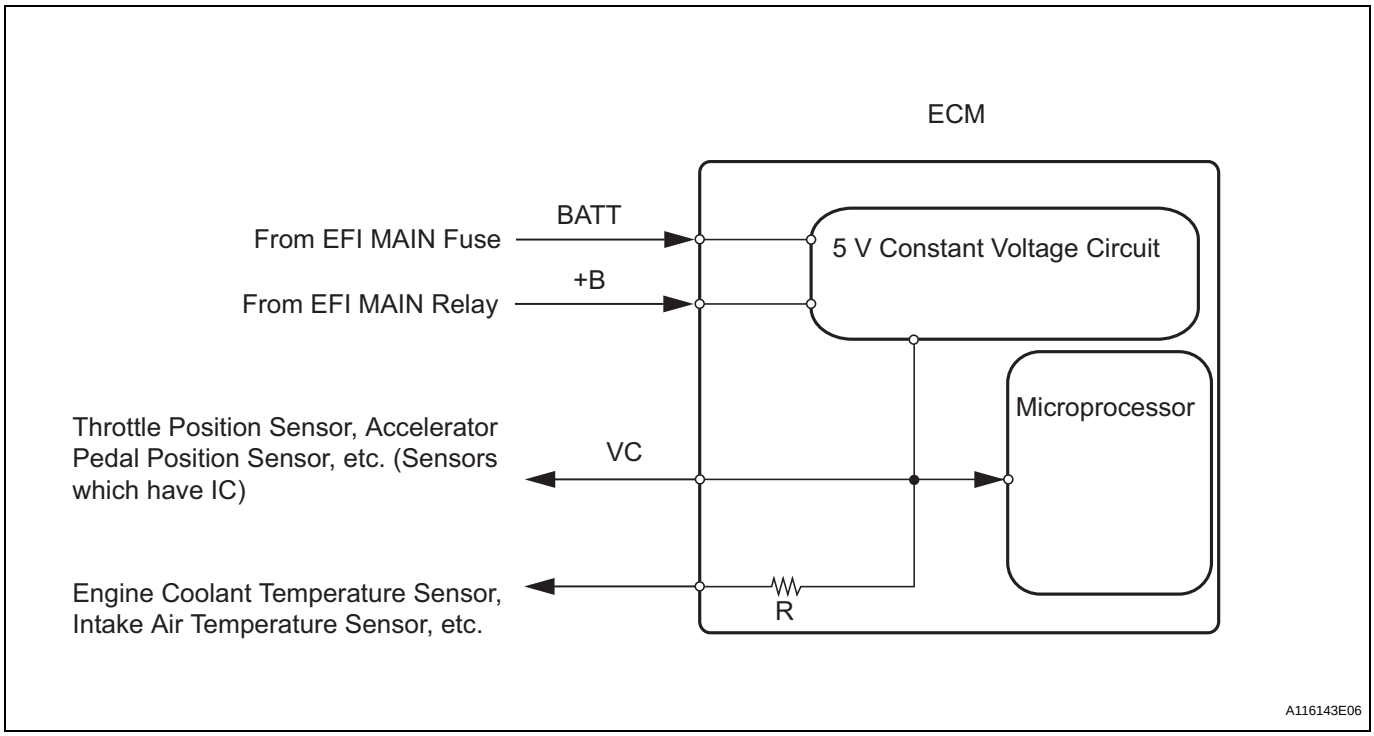
REPLACE ECM

ES

VC Output Circuit

DESCRIPTION

The ECM constantly generates 5 V power from the battery voltages supplied to the +B (BATT) terminal to operate the microprocessor. The ECM also provides this power to the sensors through the VC output circuit.

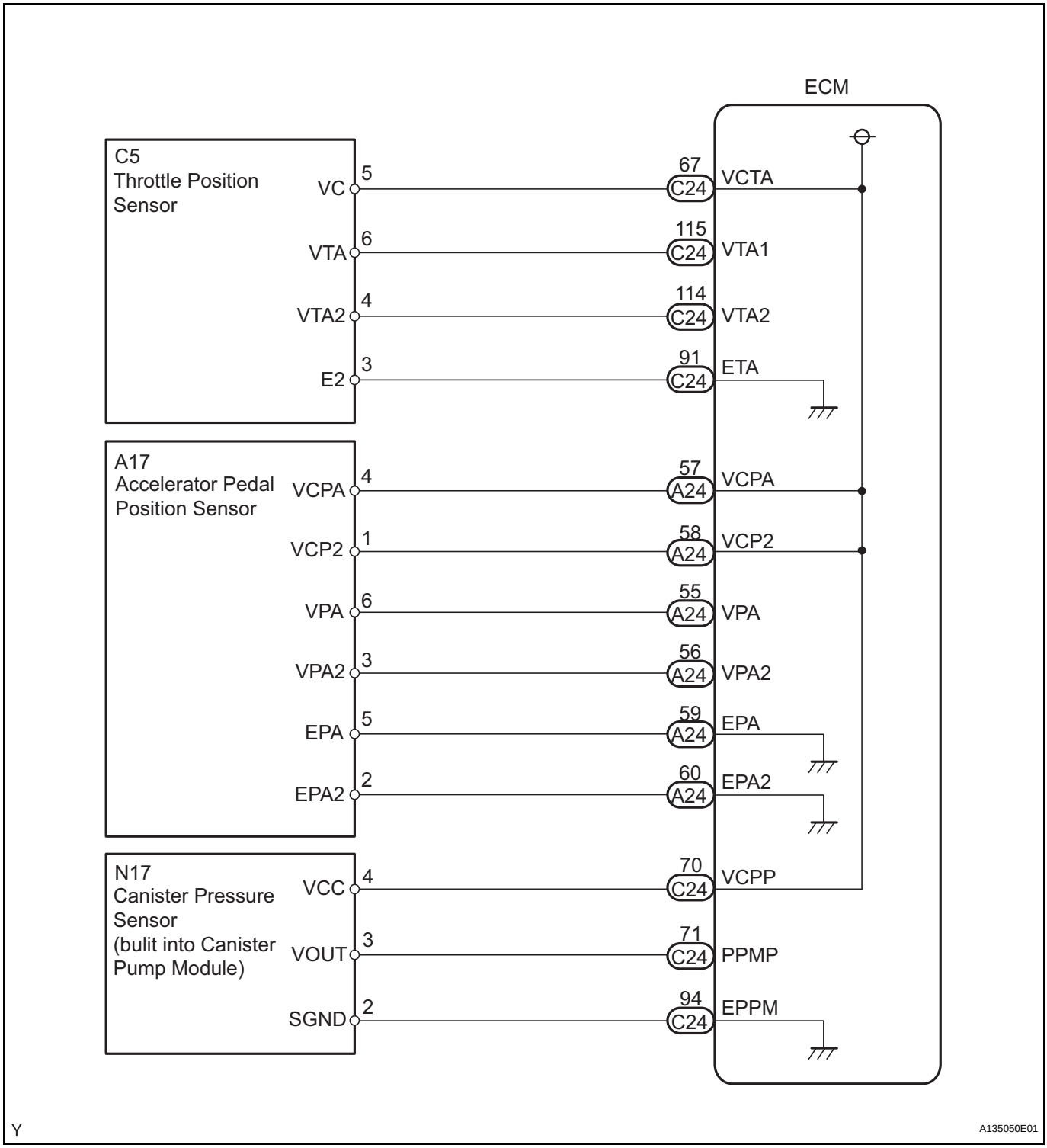


When the VC circuit is short-circuited, the microprocessor in the ECM and sensors that are supplied with power through the VC circuit are inactivated because the power is not supplied from the VC circuit. Under this condition, the system does not start up and the MIL does not illuminate even if the system malfunctions.

HINT:

Under normal conditions, the MIL is illuminated for several seconds when the ignition switch is first turned ON position. The MIL goes off when the engine is started.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK MIL CONDITION

(a) Check that the Malfunction Indicator Lamp (MIL) lights up when turning the ignition switch to the ON position.
OK:
MIL lights up.

OK → SYSTEM OK

NG

2	CHECK COMMUNICATION BETWEEN INTELLIGENT TESTER AND ECM

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to the ON position and turn the tester on.
(c) Check for communication between the tester and ECM.

Result

Result	Proceed to
Communication is possible	A
Communication is not possible	B

A → GO TO MIL CIRCUIT

B

3	CHECK MIL (THROTTLE POSITION SENSOR)

(a) Disconnect the C5 throttle body connector.
(b) Turn the ignition switch to the ON position.
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the throttle body connector.

A → REPLACE THROTTLE BODY ASSEMBLY

B

4	CHECK MIL (ACCELERATOR PEDAL POSITION SENSOR)

(a) Disconnect the A17 accelerator pedal position sensor connector.
(b) Turn the ignition switch to the ON position.
(c) Check the MIL.

Result

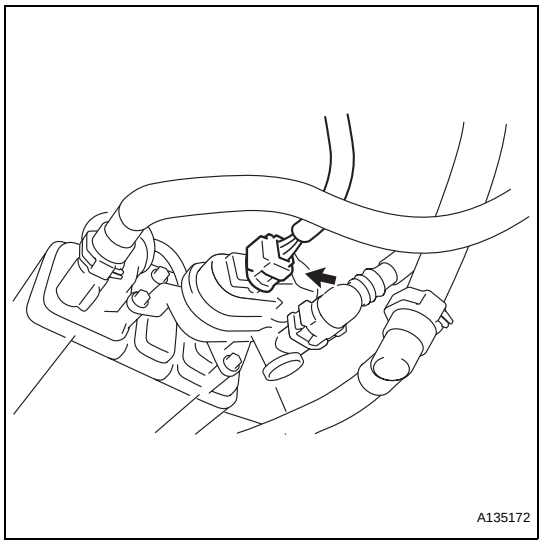
Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the accelerator pedal position sensor connector.

A → REPLACE ACCELERATOR PEDAL ASSEMBLY

B

5 CHECK MIL (CANISTER PUMP MODULE)



(a) Disconnect the N17 canister pump module connector.
(b) Turn the ignition switch to the ON position.
(c) Check the MIL.

Result

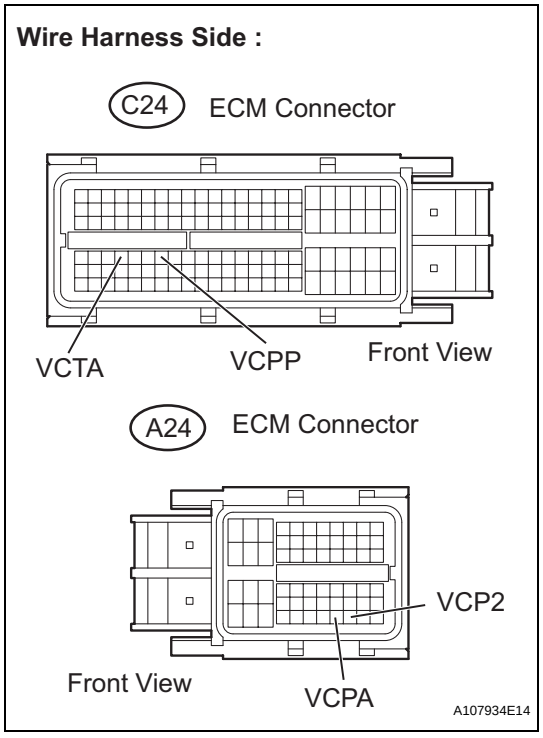
Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the canister pump module connector.

A → **REPLACE CHARCOAL CANISTER ASSEMBLY**

B

6 CHECK HARNESS AND CONNECTOR



(a) Disconnect the C5 throttle body connector.
(b) Disconnect the A17 accelerator pedal position sensor connector.
(c) Disconnect the N17 canister pump module connector.
(d) Disconnect the A24 and C24 ECM connectors.
(e) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for short)

Tester Connection	Specified Condition
C24-67 (VCTA) - Body ground	10 kΩ or higher
A24-57 (VCPA) - Body ground	10 kΩ or higher
A24-58 (VCP2) - Body ground	10 kΩ or higher
C24-70 (VCPP) - Body ground	10 kΩ or higher

(f) Reconnect the throttle body connector.
(g) Reconnect the accelerator pedal position sensor connector.
(h) Reconnect the canister pump module connector.
(i) Reconnect the ECM connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ES

OK

REPLACE ECM

EVAP System

RELATED DTCS

DTC	Monitoring Item	See page
P043E	Reference orifice clogged (built into canister pump module)	ES-203
P043F	Reference orifice high-flow (built into canister pump module)	
P0441	• Purge VSV (Vacuum Switching Valve) stuck closed • Purge VSV stuck open • Purge flow	ES-208
P0450	Canister pressure sensor (built into canister pump module) voltage abnormal fluctuation	ES-215
P0451	• Canister pressure sensor (built into canister pump module) noise • Canister pressure sensor (built into canister pump module) signal becomes fixed/flat	
P0452	Canister pressure sensor (built into canister pump module) voltage low	
P0453	Canister pressure sensor (built into canister pump module) voltage high	
P0455	EVAP gross leak	ES-224
P0456	EVAP small leak	
P2401	Leak detection pump stuck OFF (built into canister pump module)	ES-203
P2402	Leak detection pump stuck ON (built into canister pump module)	
P2419	Vent valve stuck closed (built into canister pump module)	
P2420	Vent valve stuck open (vent) (built into canister pump module)	ES-330
P2610	Soak timer (built into ECM)	ES-334

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor fixed output				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

Y

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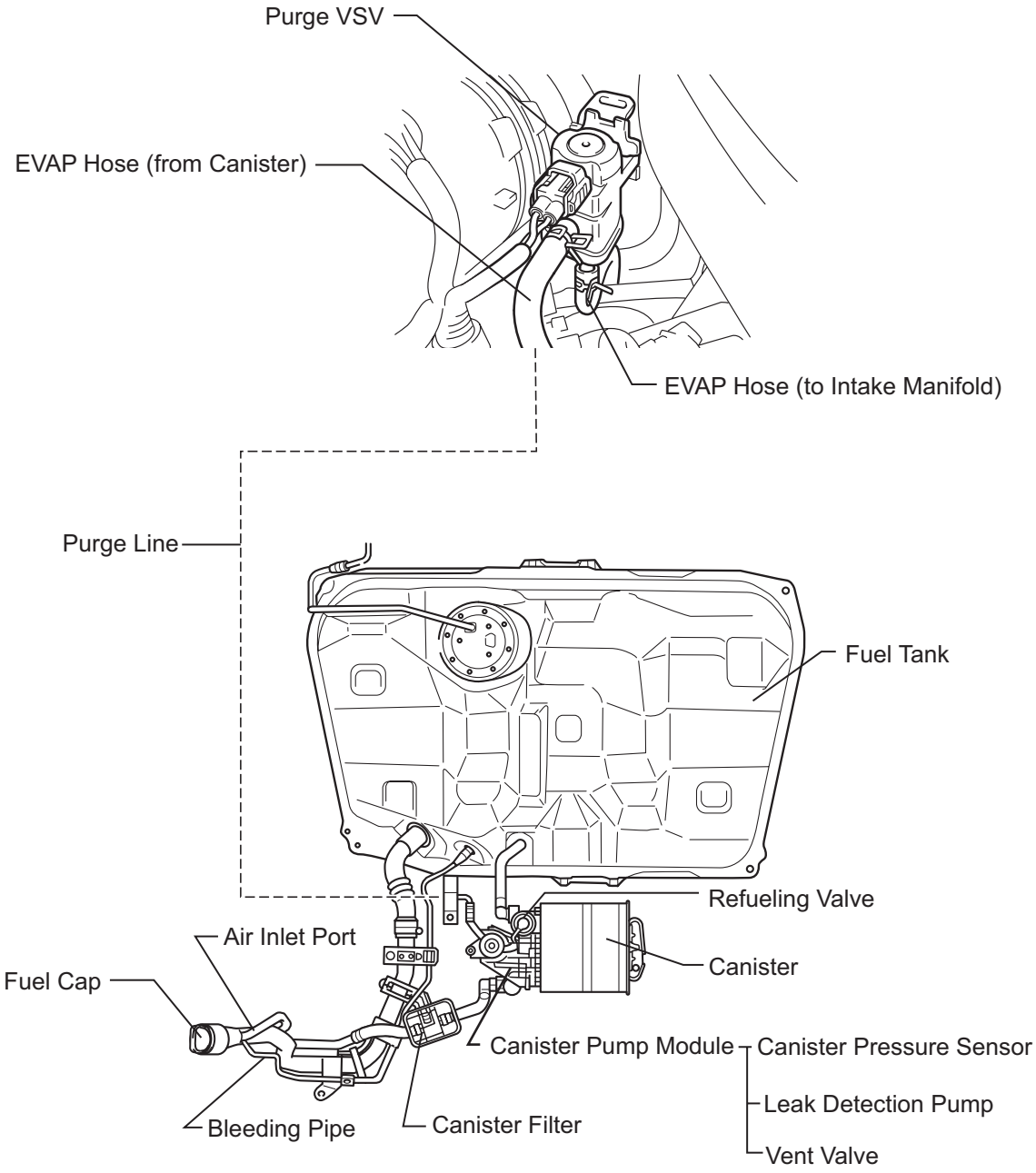
NOTICE:
If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

DESCRIPTION

Location of EVAP (Evaporative Emission) System:

Except PZEV



Note:

The canister is located near the fuel tank, underneath the body.

N

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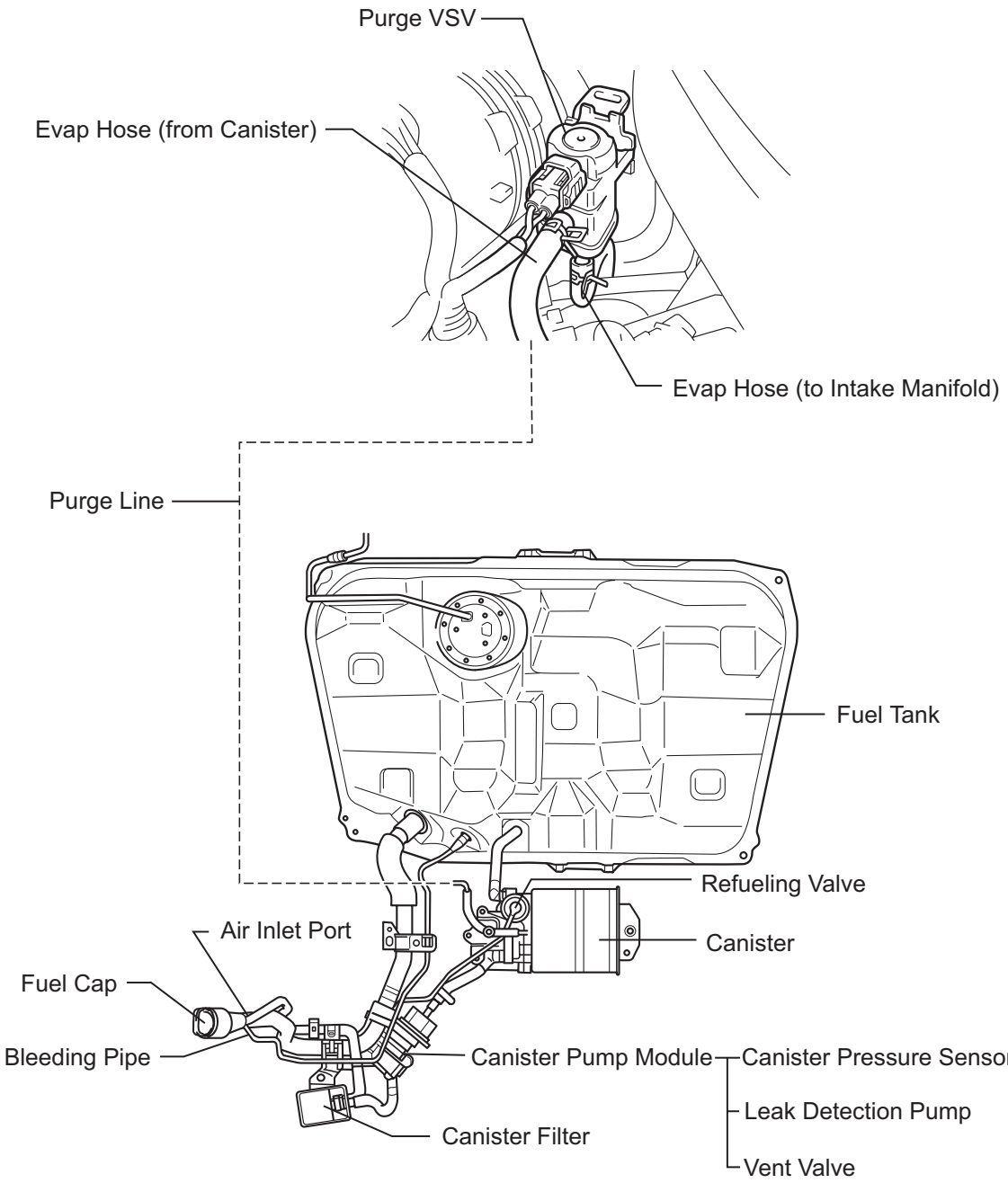
ES

Location of EVAP (Evaporative Emission) System:

PZEV



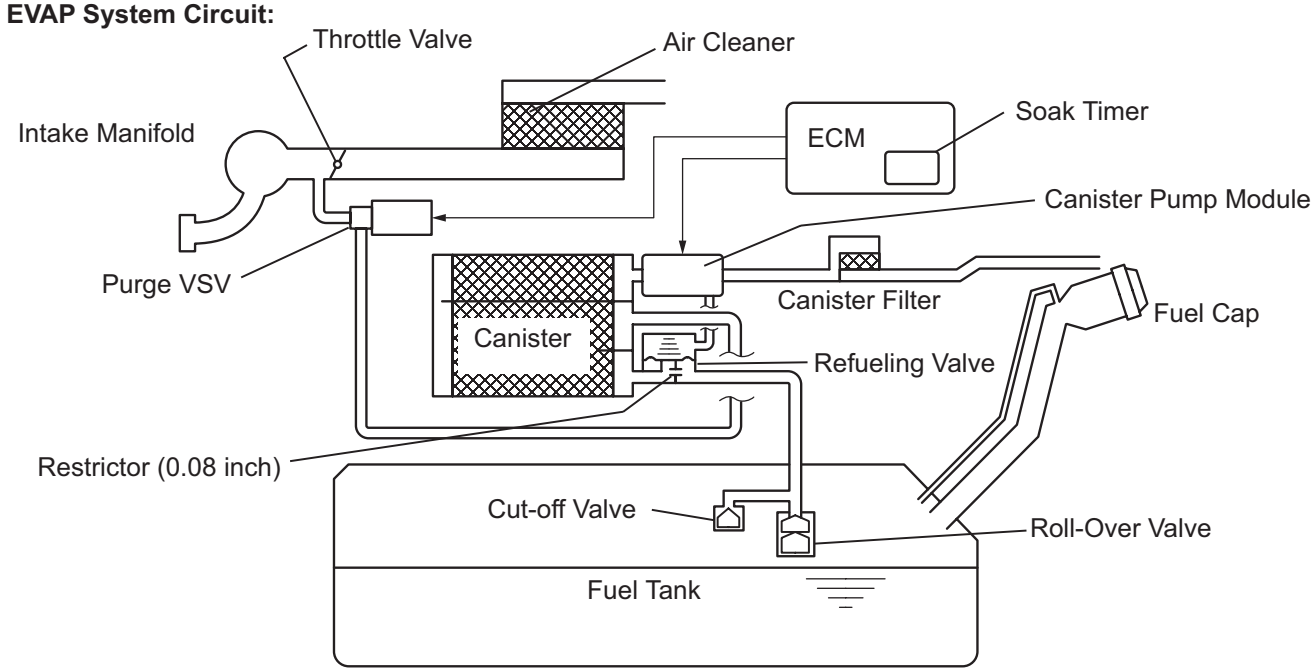
Note:

The canister is lecated near the fuel tank, underneath the body.

N

A135201E01

EVAP System Circuit:



NOTICE:

In this vehicle's EVAP system, turning ON the vent valve does not seal off the EVAP system. To check for leaks in the EVAP system, disconnect the air inlet vent hose and apply pressure from the atmospheric side of the canister.

While the engine is running, if a predetermined condition (closed-loop, etc.) is met, the purge VSV is opened by the ECM and stored fuel vapors in the canister are purged into the intake manifold. The ECM changes the duty cycle ratio of the purge VSV to control purge flow volume.

The purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that the purge flow is maintained when the negative pressure (vacuum) is applied to the canister.

The following two monitors run to confirm the appropriate EVAP system operation.

1. Key-off monitor

This monitor checks for EVAP (Evaporative Emission) system leaks and canister pump module malfunctions. The monitor starts 5 hours* after the ignition switch is turned off. At least 5 hours are required for the fuel to cool down to stabilize the EVAP pressure, thus making the EVAP system monitor more accurate.

The leak detection pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system, and malfunctions in both the canister pump module and purge VSV, based on the EVAP pressure.

HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

2. Purge flow monitor

The purge flow monitor consists of the two monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

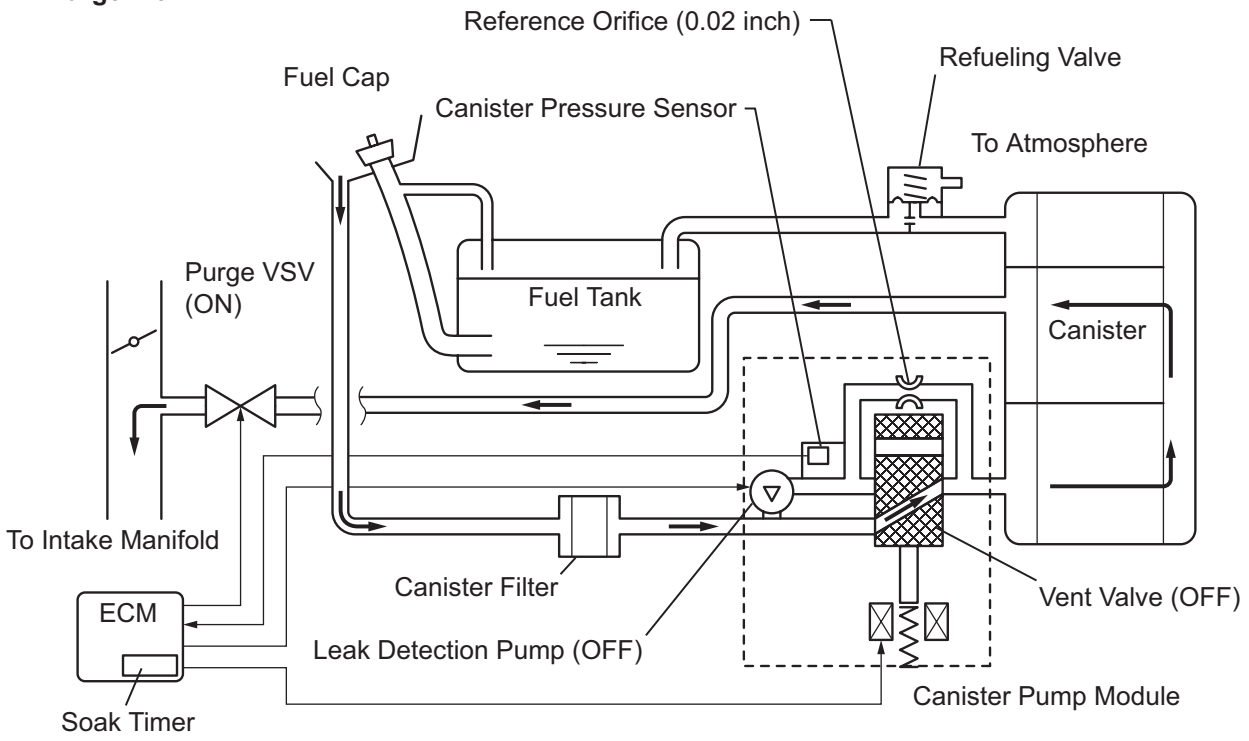
- The 1st monitor

  While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.

- The 2nd monitor
  The vent valve is turned OFF (open) and the EVAP pressure is measured. If the variation in the pressure is less than 0.5 kPa-g (3.75 mmHg-g), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:
In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

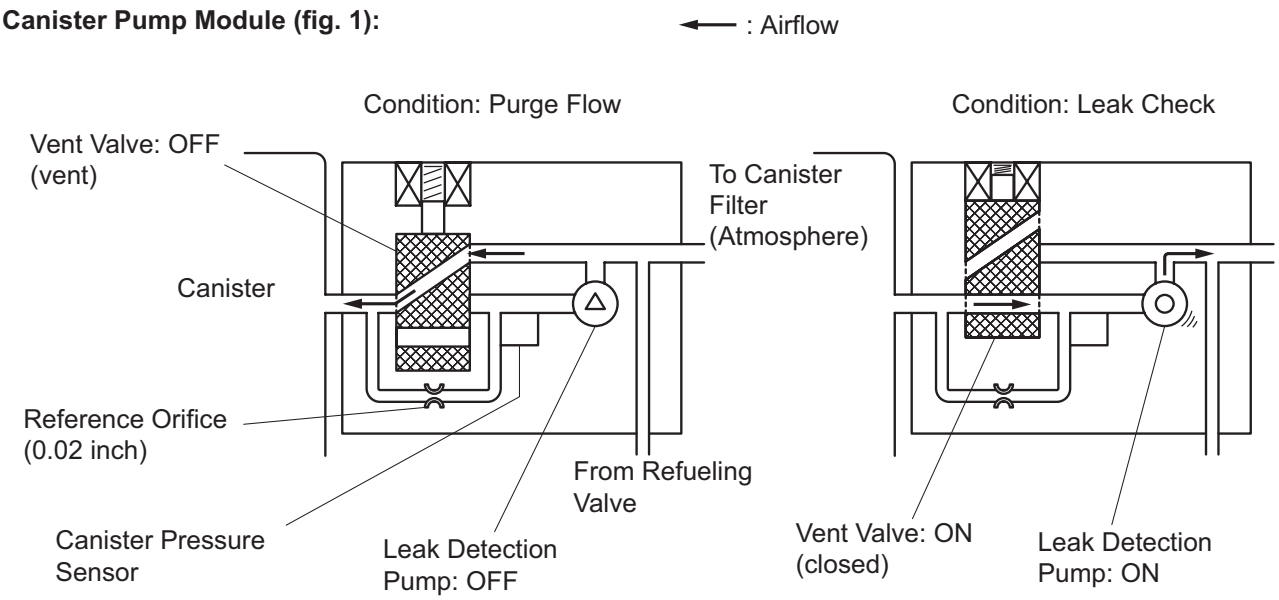
EVAP Purge Flow:



Components	Operations
Canister	Contains activated charcoal to absorb EVAP (Evaporative Emissions) generated in fuel tank.
Cut-off valve	Located in fuel tank. Valve floats and closes when fuel tank 100 % full.
Purge VSV (Vacuum Switching Valve)	Opens or closes line between canister and intake manifold. ECM uses purge VSV to control EVAP purge flow. In order to discharge EVAP absorbed by canister to intake manifold, ECM opens purge VSV. EVAP discharge volume to intake manifold controlled by purge VSV duty cycle ratio (current-carrying time) (Open: ON; Closed: OFF).
Refueling valve	Controls EVAP pressure from fuel tank to canister. Valve consists of diaphragm, spring and restrictor (diameter: 0.08 inch). When fuel vapor and pressure inside fuel tank increase, valve opens. While EVAP purged, valve closes and restrictor prevents large amount of vacuum from affecting pressure in fuel tank. Valve opened while refueling.
Roll-over valve	Located in fuel tank. Valve closed by its own weight when vehicle overturns to prevent fuel from spilling out.
Soak timer	Built into ECM. To ensure accurate EVAP monitor, measures 5 hours (+-15 min) after ignition switch turned off. This allows fuel to cool down, stabilizing EVAP pressure. When approximately 5 hours elapsed, ECM activates (refer to fig. 3).
Canister pump module	Consists of (a) to (d) below. Canister pump module cannot be disassembled.
(a) Vent valve	Vents and closes EVAP system. When ECM turns valve ON, EVAP system closed. When ECM turns valve OFF, EVAP system vented. Negative pressure (vacuum) created in EVAP system to check for EVAP leaks by closing purge VSV, turning on vent valve (closed) and operating leak detection pump (refer to fig. 1).
(b) Canister pressure sensor	Indicates pressure as voltages. ECM supplies regulated 5 V to canister pressure sensor, and uses feedback from sensor to monitor EVAP system pressure (refer to fig. 2).

Components	Operations
(c) Leak detection pump	Creates negative pressure (vacuum) in EVAP system for leak check.
(d) Reference orifice	Has opening with 0.02 inch diameter. Vacuum produced through orifice by closing purge VSV, turning off vent valve and operating leak detection pump, to monitor reference pressure. Reference pressure indicates small leak of EVAP.

Canister Pump Module (fig. 1):



Y

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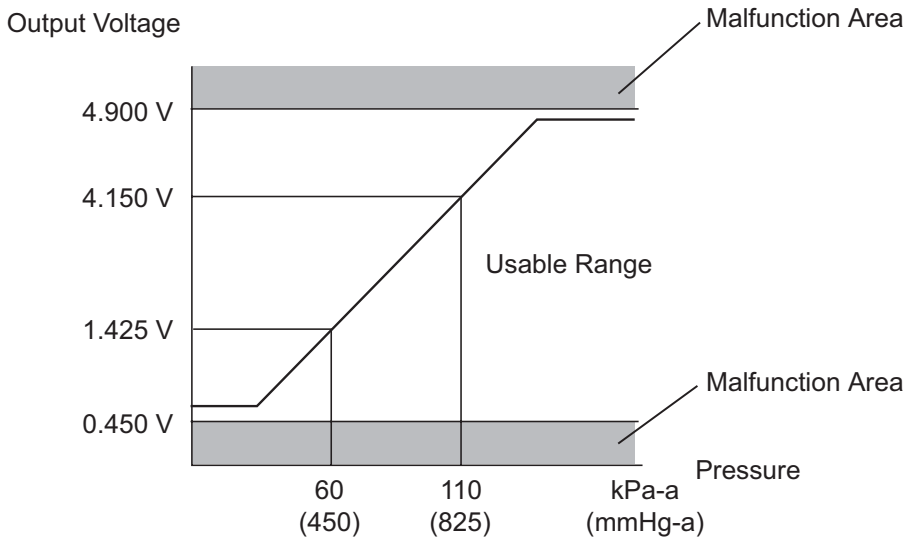
Canister Pressure Sensor Specification (fig. 2):

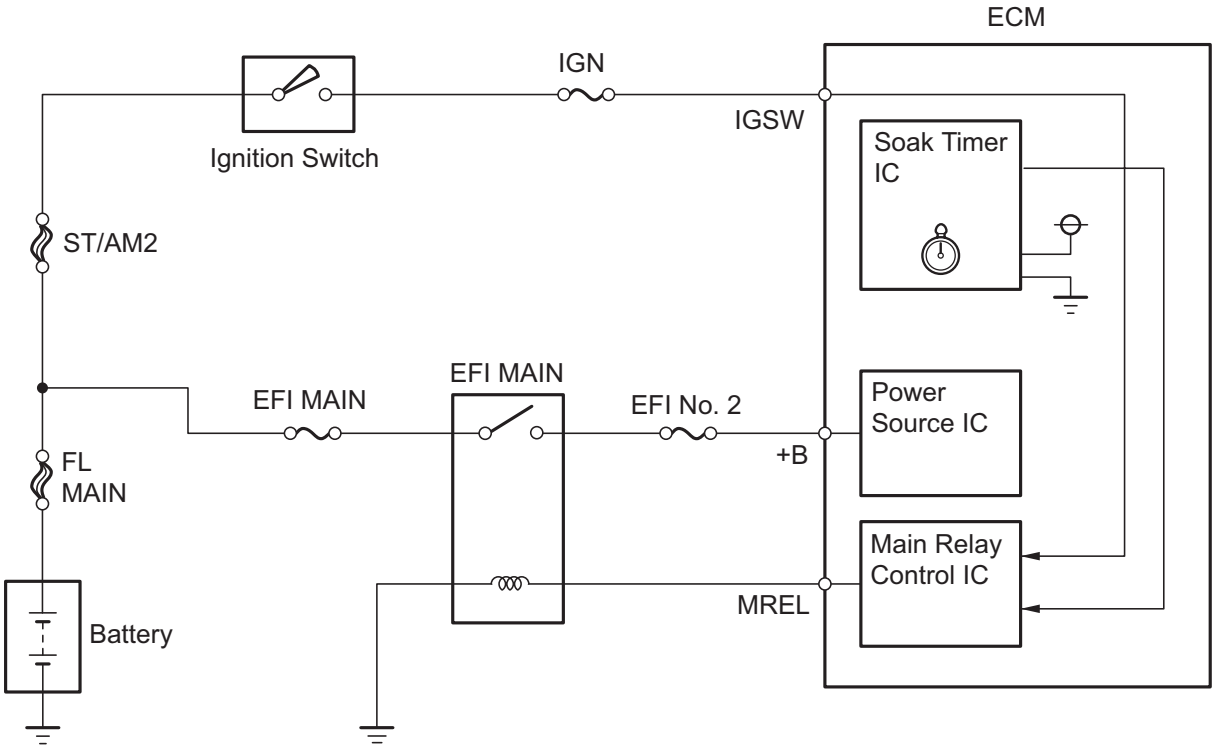


HINT:

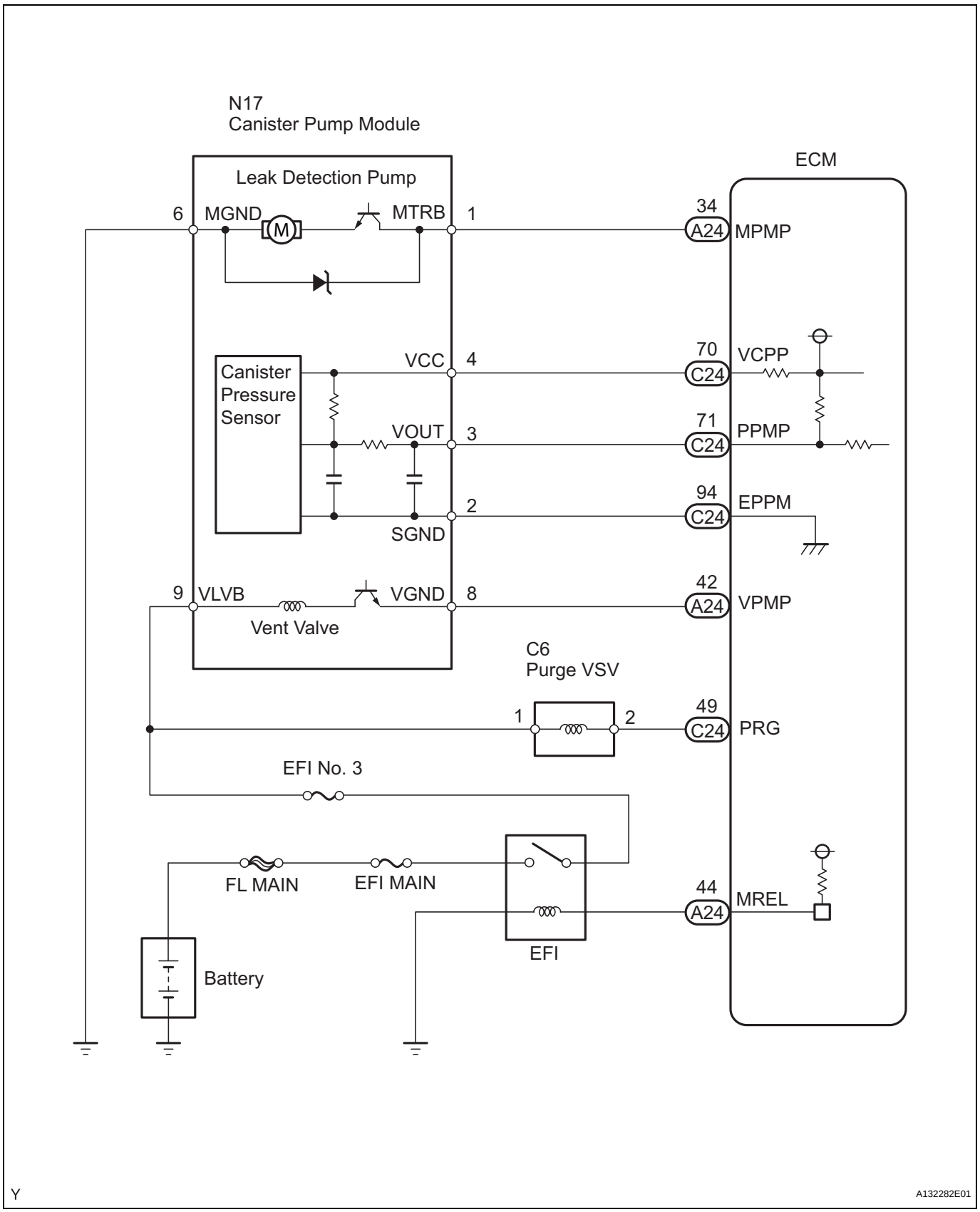
Standard atmospheric pressure is 101.3 kPa-a (760 mmHg-a)

A115543E06

Soak Timer Circuit (fig. 3):



WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.

HINT:

- Using intelligent tester monitor results enables the EVAP (Evaporative Emission) system to be confirmed.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**CONFIRM DTC**

(a) Turn the ignition switch off and wait for 10 seconds.
(b) Turn the ignition switch to the ON position.
(c) Turn the ignition switch off and wait for 10 seconds.
(d) Connect an intelligent tester to the DLC3.
(e) Turn the ignition switch to the ON position and turn the tester on.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Confirm DTCs and freeze frame data.
If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.
NOTICE:
If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor fixed output				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

Y

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NEXT

2	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of 5 steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.**
- **Do not run the engine during this operation.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

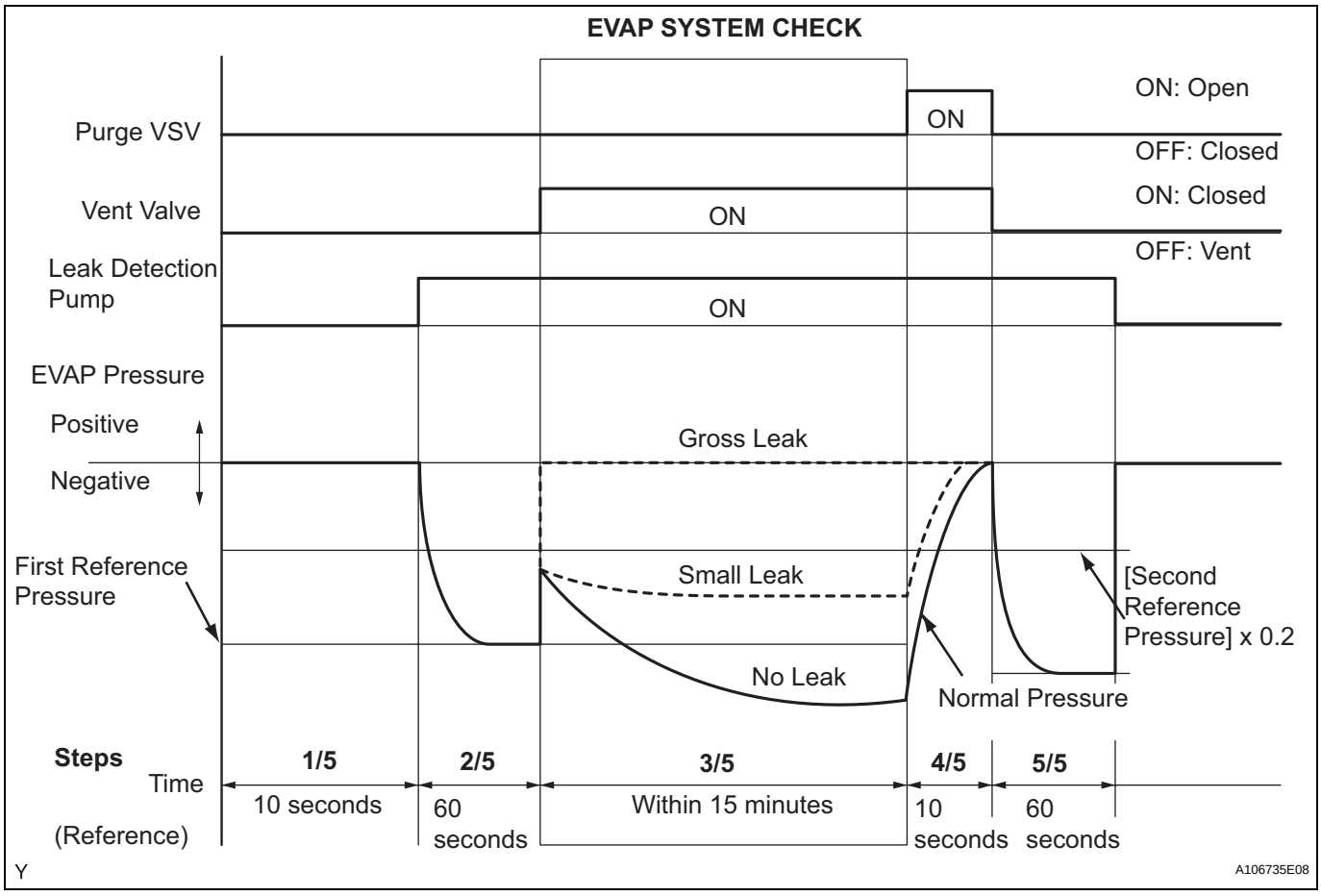
(a) Clear the DTCs (See page ES-38).

(b) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.
(c) After the EVAP SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTCs are displayed, perform MONITOR CONFIRMATION (see "Diagnostic Help" menu). After this confirmation, check for pending DTCs. If no DTCs are displayed, the EVAP system is normal.

ES

NEXT

3	PERFORM EVAP SYSTEM CHECK (MANUAL OPERATION)



NOTICE:

- **In the EVAP SYSTEM CHECK (MANUAL OPERATION), perform the series of 5 EVAP SYSTEM CHECK steps manually using the intelligent tester.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.**
- **Do not run the engine during this operation.**

- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

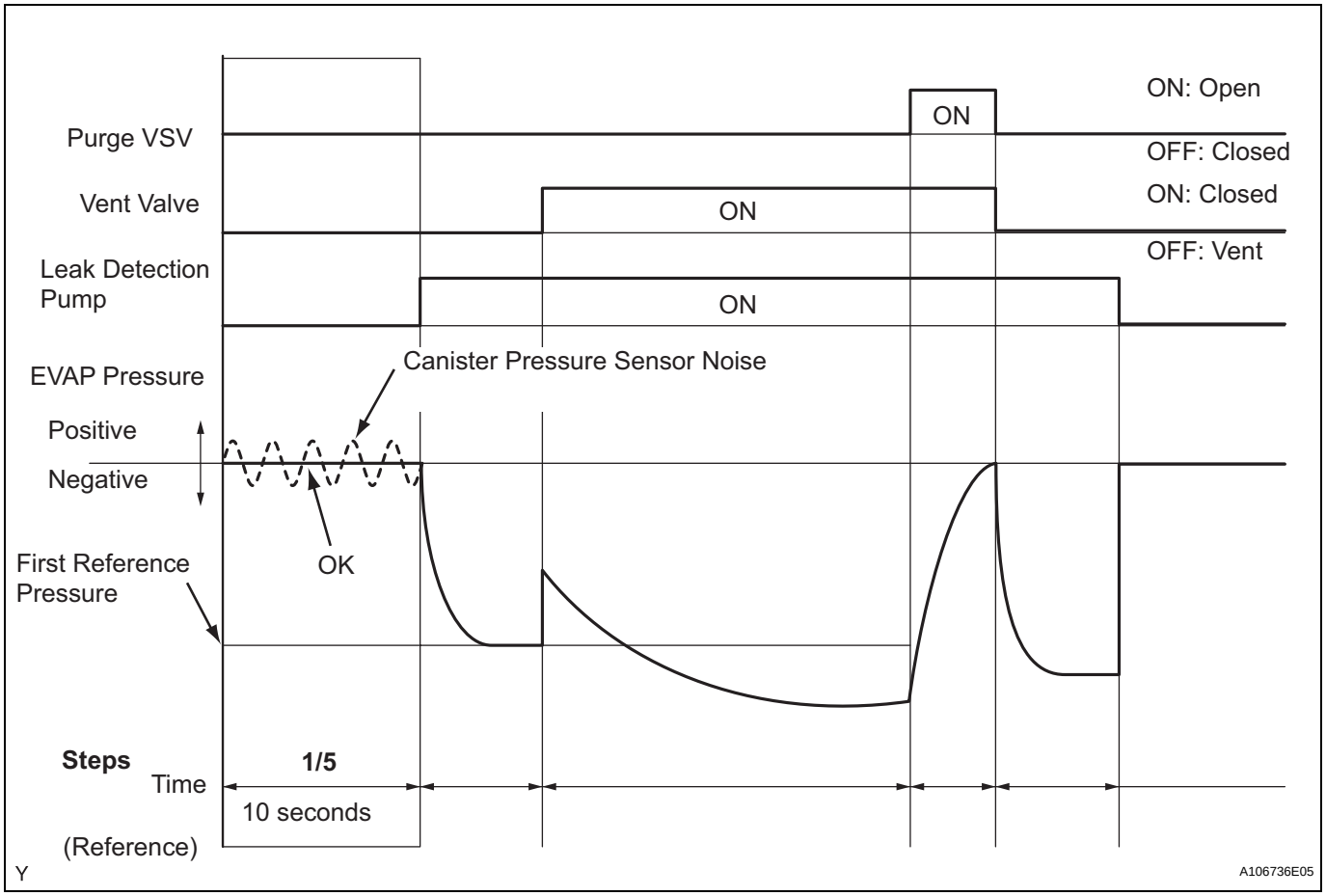
(a) Clear the DTCs (See page ES-38).

(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / MANUAL OPERATION.

NEXT

4	PERFORM EVAP SYSTEM CHECK (STEP 1/5)

ES



(a) Check the EVAP pressure in step 1/5.

Result

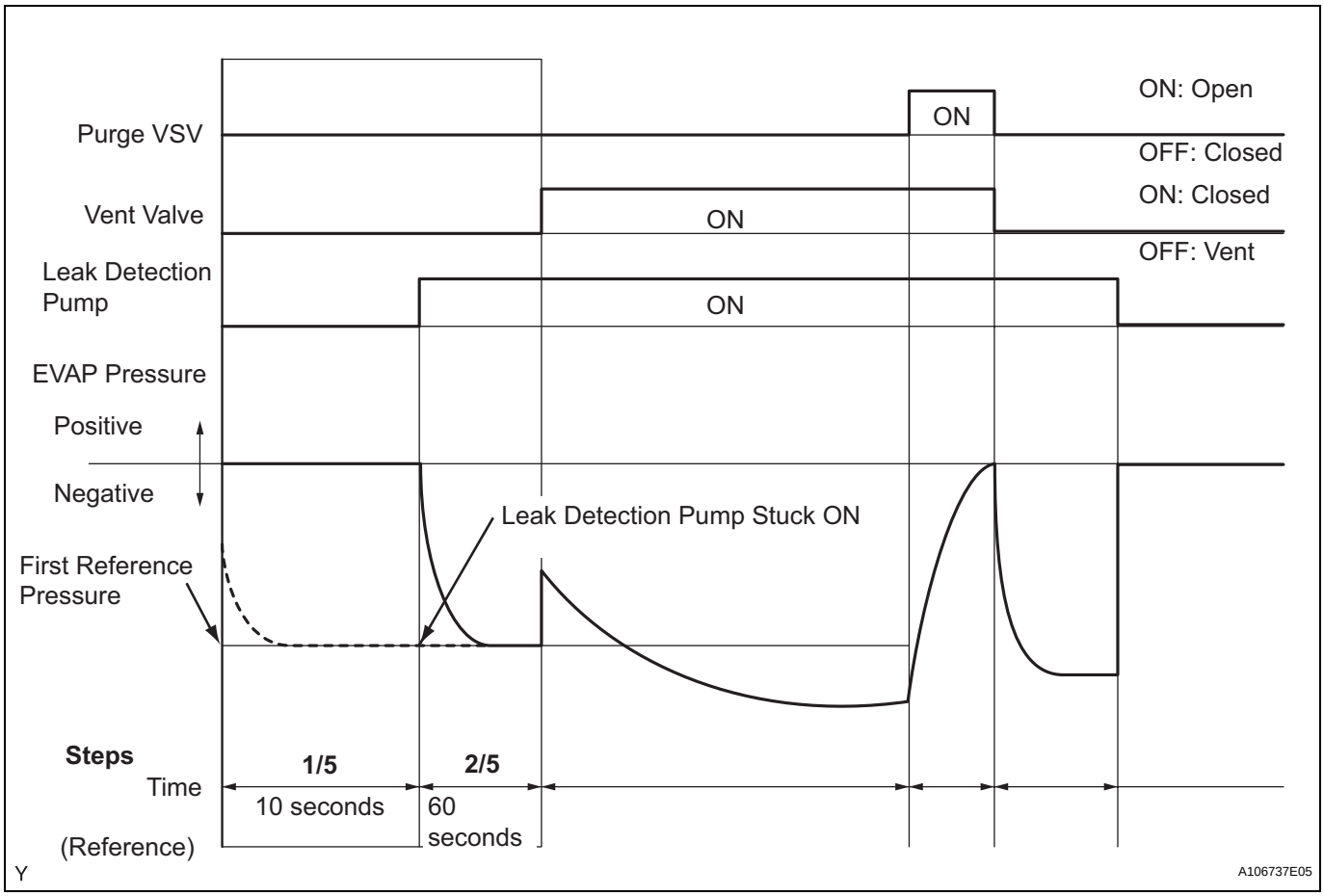
DTCs*	Test Result	Suspected Trouble Area	Proceed to
-	Virtually no variation in EVAP pressure	Not yet determined	A
P0451	EVAP pressure fluctuates by +-0.3 kPa-g (2.25 mmHg-g) or more	Canister pressure sensor noise	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B → **Go to step 29**

A

5	PERFORM EVAP SYSTEM CHECK (STEP 1/5 TO 2/5)



(a) Check the EVAP pressure in steps 1/5 and 2/5.

Result

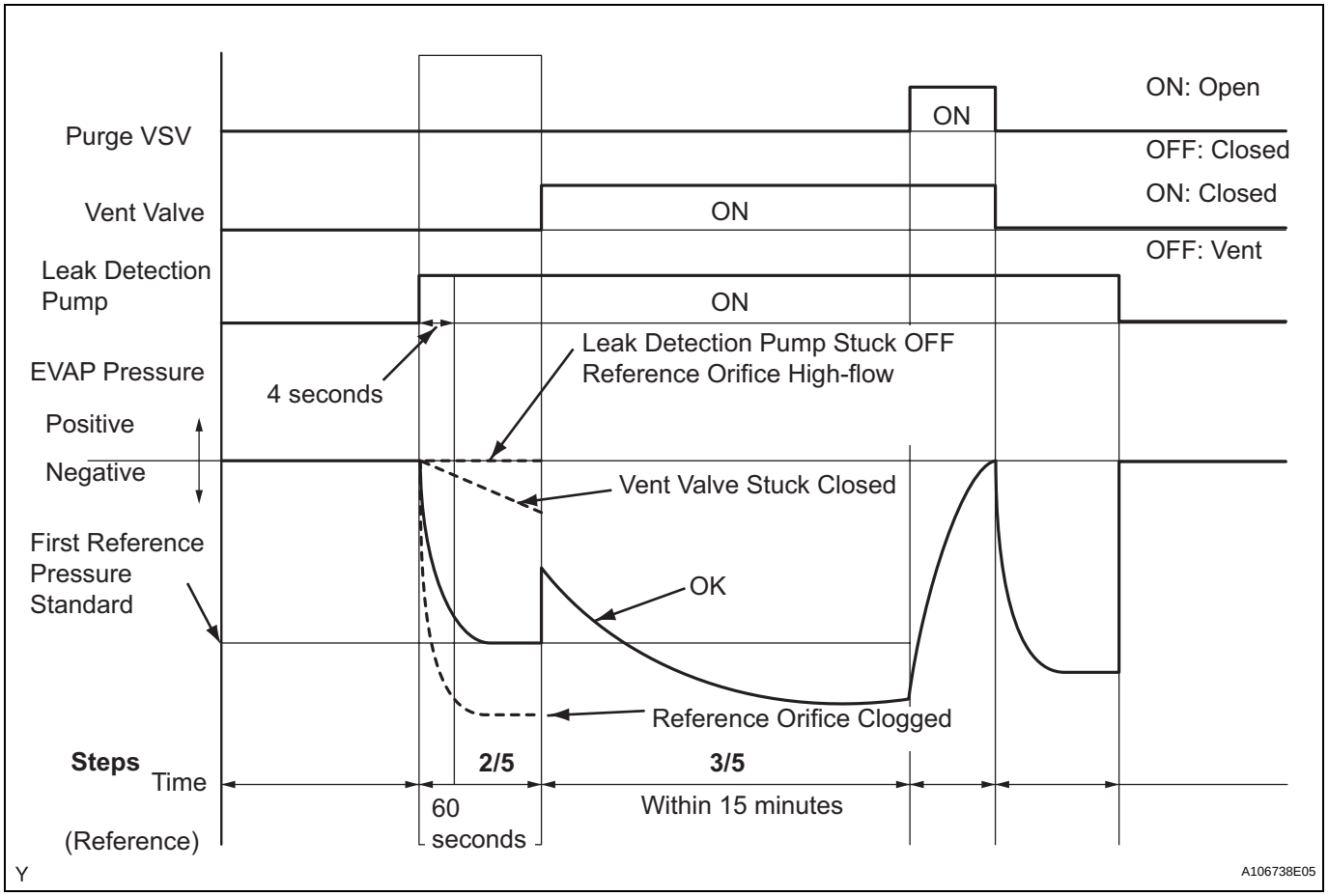
DTCs*	Test Results	Suspected Trouble Area	Proceed to
-	Virtually no variation in EVAP pressure during step 1/5. Then decreases to reference pressure	Not yet determined	A
P2402	Small difference between EVAP pressures during steps 1/5 and 2/5	Leak detection pump stuck ON	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.
HINT:
The first reference pressure is the value determined in step 2/5.

B → Go to step 22

A

6	PERFORM EVAP SYSTEM CHECK (STEP 2/5)



HINT:
Make a note of the pressures checked in steps (a) and (b) below.

(a) Check the EVAP pressure 4 seconds after the leak detection pump is activated*.
HINT:
*: The leak detection pump begins to operate as step 1/5 finishes and step 2/5 starts.

(b) Check the EVAP pressure again when it has stabilized. This pressure is the reference pressure.

Result

DTCs*	Test Result	Suspected Trouble Area	Proceed to
-	EVAP pressure in step (b) between -4.85 kPa-g and -1.057 kPa-g (-36.4 mmHg-g and -7.93 mmHg-g)	Not yet determined	A
P043F and P2401	EVAP pressure in step (b) -1.057 kPa-g (-7.93 mmHg-g) or more	• Reference orifice high-flow • Leak detection pump stuck OFF	B
P043E	EVAP pressure in step (b) below -4.85 kPa-g (-36.4 mmHg-g)	Reference orifice clogged	C
P2419	EVAP pressure in step (a) more than -1.057 kPa-g (-7.93 mmHg-g)	Vent valve stuck closed	D

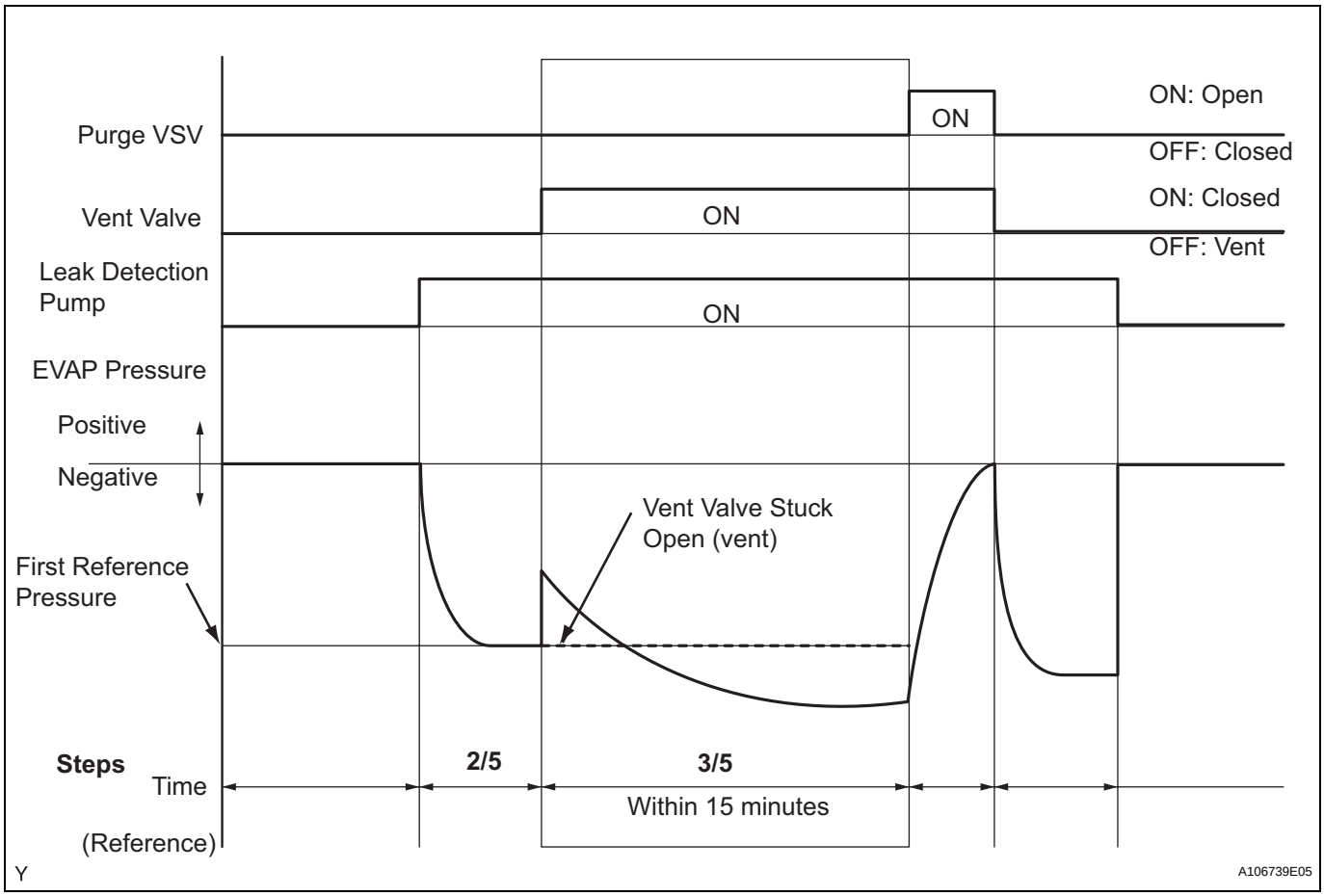
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B	Go to step 11
C	Go to step 29
D	Go to step 20

A

ES

7	PERFORM EVAP SYSTEM CHECK (STEP 2/5 TO 3/5)



(a) Check the EVAP pressure increases in step 3/5.

Result

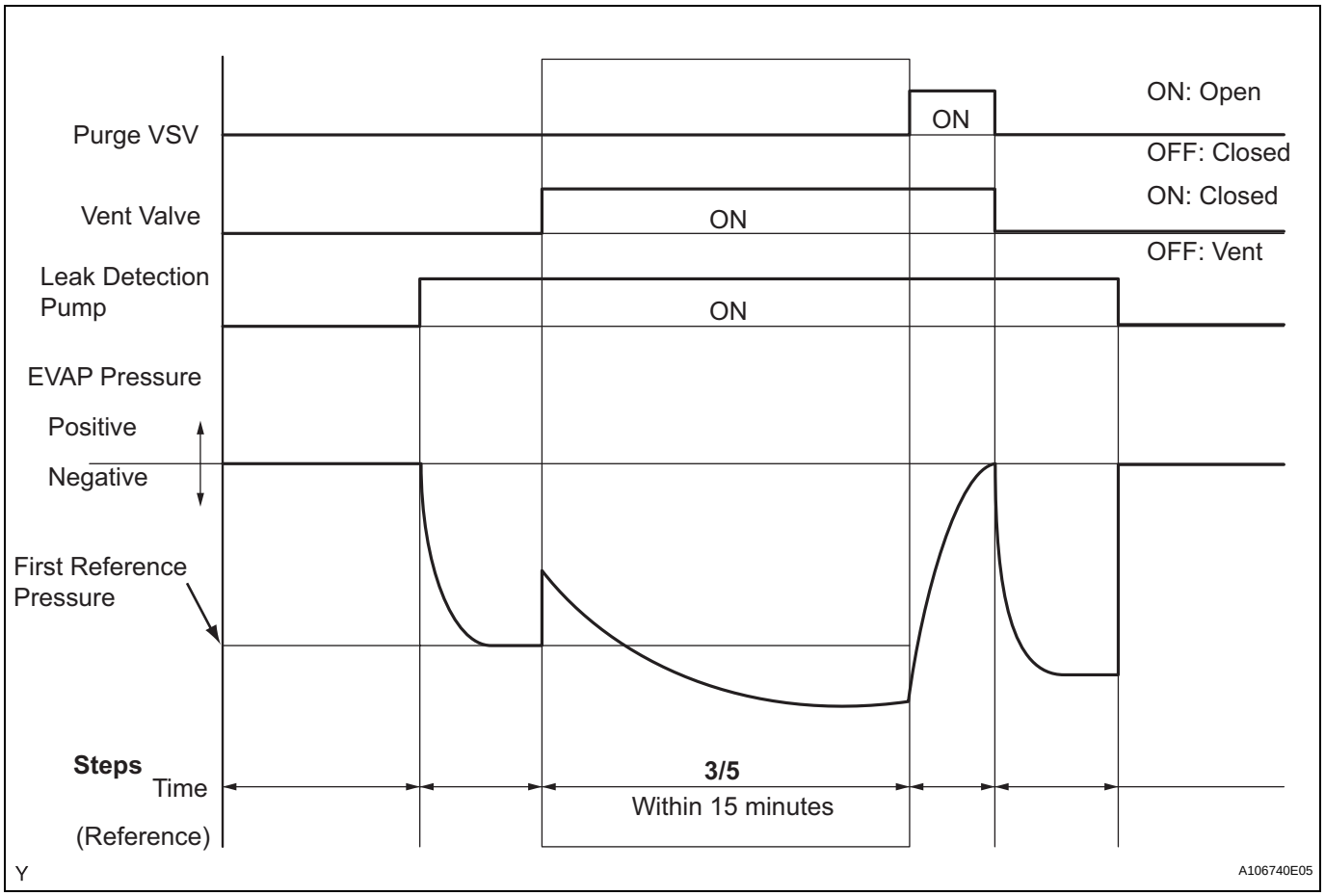
DTCs*	Test Result	Suspected Trouble Area	Proceed to
-	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 2/5 to step 3/5	Not yet determined	A
P2420	No variation in EVAP pressure despite proceeding from step 2/5 to step 3/5	Vent valve stuck open (vent)	B
P0451	No variation in EVAP pressure during steps 1/5 through 3/5	Canister pressure sensor malfunction fixed	C

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B	Go to step 19
C	Go to step 29

A

8	PERFORM EVAP SYSTEM CHECK (STEP 3/5)

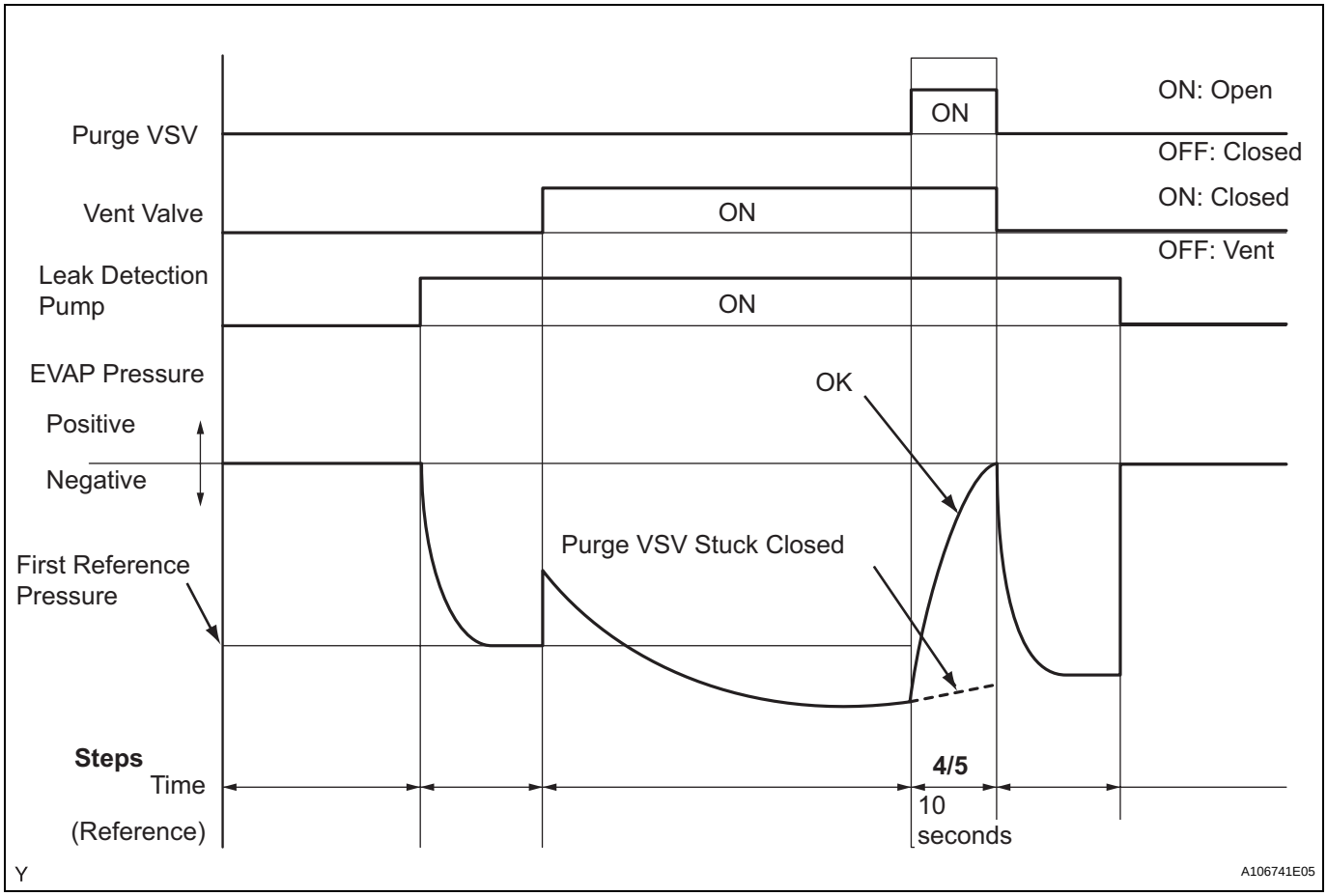


(a) Wait until the EVAP pressure change is less than 0.1 kPa-g (0.75 mmHg-g) for 30 seconds.
(b) Measure the EVAP pressure and record it.
HINT:
A few minutes are required for the EVAP pressure to become saturated. When there is little fuel in the fuel tank, it takes up to 15 minutes.

NEXT

ES

9	PERFORM EVAP SYSTEM CHECK (STEP 4/5)



(a) Check the EVAP pressure in step 4/5.

Result

DTCs*	Test Result	Suspected Trouble Area	Proceed to
-	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Not yet determined	A
P0441	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Problems in EVAP hose between purge VSV and intake manifold	B
P0441	Variation in EVAP pressure less than 0.3 kPa-g (2.25 mmHg-g) for 10 seconds, after proceeding from step 3/5 to step 4/5	Purge VSV stuck closed	C

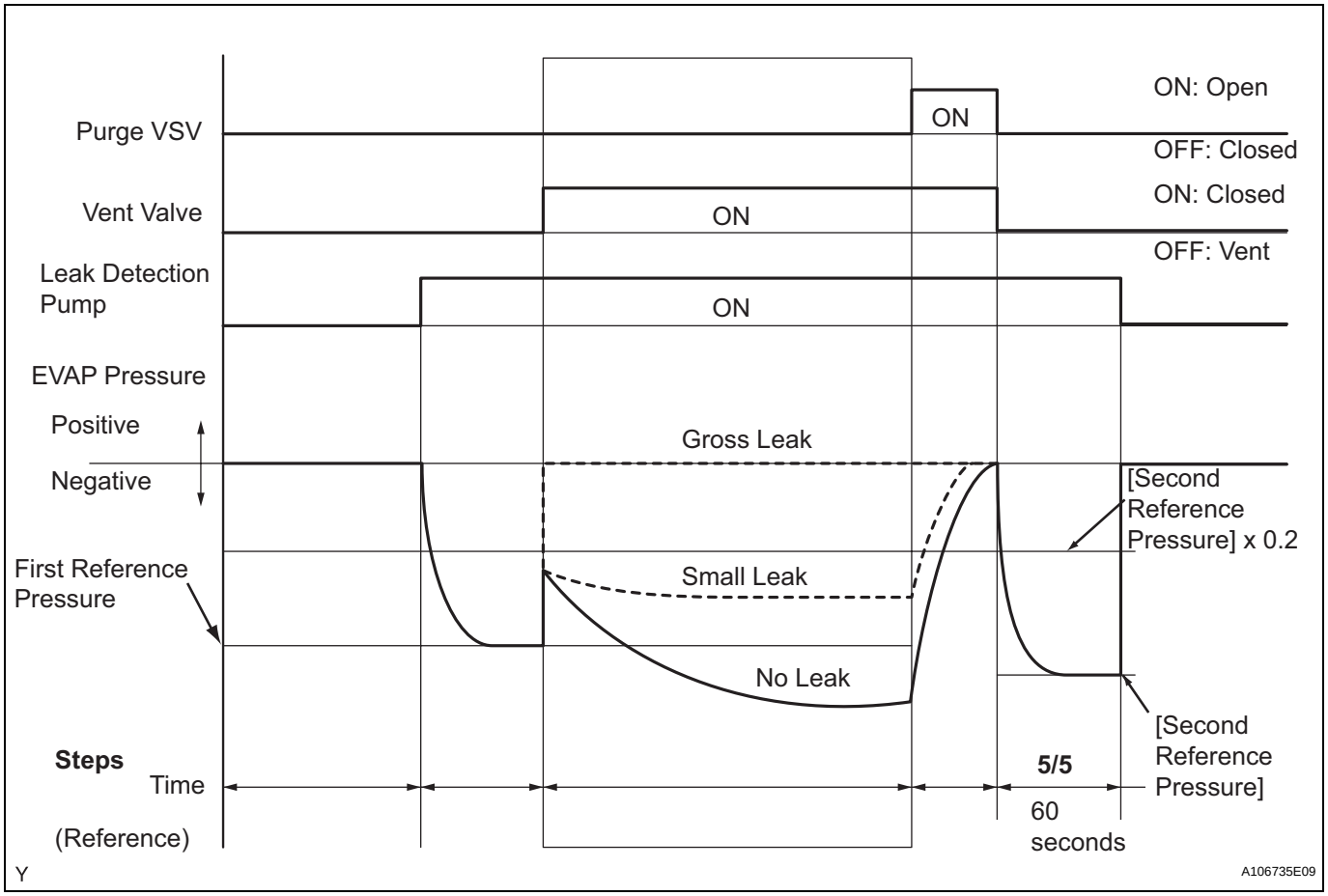
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B → Go to step 15

C → Go to step 12

A

10	PERFORM EVAP SYSTEM CHECK (STEP 5/5)



(a) Check the EVAP pressure in step 5/5.
(b) Compare the EVAP pressure in step 3/5 and the second reference pressure (step 5/5).

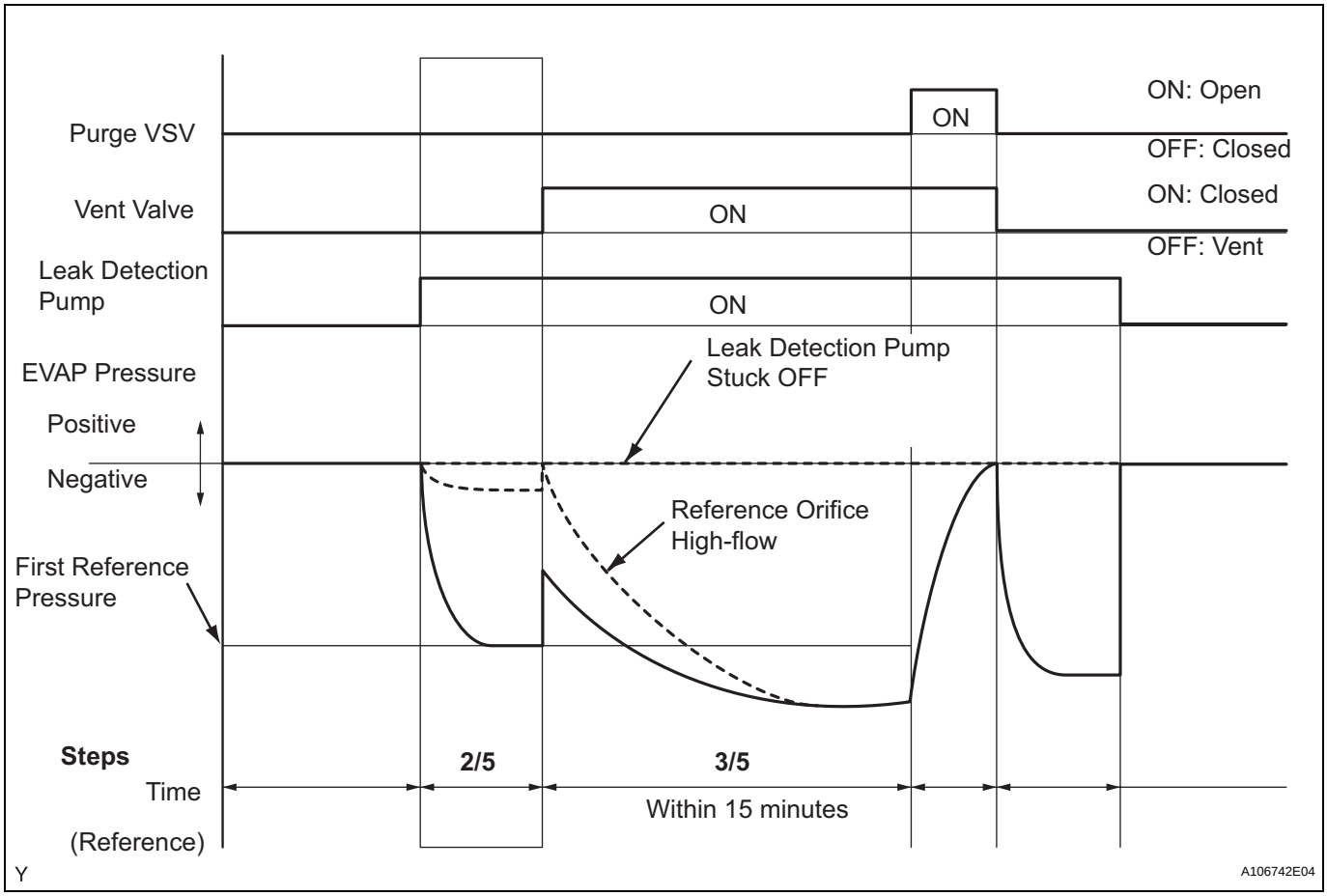
Result

DTCs*	Test Result	Suspected Trouble Area	Proceed to
-	EVAP pressure (step 3/5) lower than second reference pressure (step 5/5)	Not yet determined (no leakage from EVAP system)	A
P0441 and P0455	EVAP pressure (step 3/5) higher than [second reference pressure (step 5/5) x 0.2]	• Purge VSV stuck open • EVAP gross leak	B
P0456	EVAP pressure (step 3/5) higher than second reference pressure (step 5/5)	EVAP small leak	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

A	Go to step 35
B	Go to step 12

11	PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(a) Check the EVAP pressure in step 3/5.

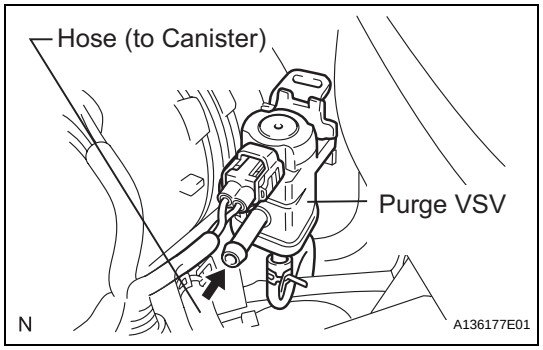
Result

DTCs*	Test Result	Suspected Trouble Area	Proceed to
P043F	EVAP pressure less than [reference pressure] measured at 2/5	Reference orifice high-flow	A
P2401	EVAP pressure almost same as [reference pressure] measured at 2/5	Leak detection pump stuck OFF	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.
HINT:
The first reference pressure is the value determined in step 2/5.

A	Go to step 29
B	Go to step 22

12 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (PURGE VSV)



(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / EVAP VSV (ALONE).
(b) Disconnect the hose (connected to the canister) from the purge VSV.
(c) Start the engine.
(d) Using the tester, turn off the purge VSV (EVAP VSV: OFF).
(e) Use your finger to confirm that the purge VSV has no suction.
(f) Using the tester, turn on the purge VSV (EVAP VSV: ON).
(g) Use your finger to confirm that the purge VSV has suction.

ES

Result

Test Result	Suspected Trouble Area	Proceed to
No suction when purge VSV turned OFF, and suction applied when turned ON	Purge VSV normal	A
Suction applied when purge VSV turned OFF	Purge VSV stuck open	B
No suction when purge VSV turned ON	• Purge VSV stuck closed • Problems with EVAP hose between purge VSV and intake manifold	C

(h) Reconnect the hose.

B → **Go to step 14**

C → **Go to step 15**

A

13 CHECK FUEL CAP

(a) Check that the fuel cap is correctly installed and confirm the fuel cap meets OEM specifications.
(b) Tighten the fuel cap until a few click sounds are heard.
HINT:
If an EVAP tester is available, check the fuel cap using the tester.
1. Remove the fuel cap and install it onto a fuel cap adapter.
2. Connect an EVAP tester pump hose to the adapter, and pressurize the cap to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.
3. Seal the adapter and wait for 2 minutes.
4. Check the pressure. If the pressure is 2 kPa (15 mmHg) or more, the fuel cap is normal.

Result

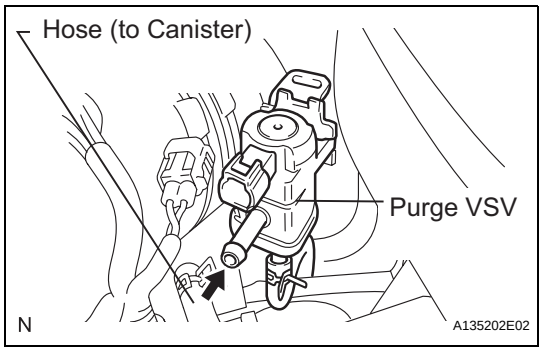
Test Result	Suspected Trouble Area	Proceed to
Fuel cap correctly installed	-	A

Test Result	Suspected Trouble Area	Proceed to
Fuel cap loose	• Fuel cap improperly installed • Defective fuel cap • Fuel cap does not meet OEM specifications	B
Defective fuel cap	-	B
No fuel cap	-	C

(c) Reinstall the fuel cap.

A	Go to step 28
B	Go to step 26
C	Go to step 27

14 INSPECT DUTY VACUUM SWITCHING VALVE (PURGE VSV)



(a) Turn the ignition switch off.
(b) Disconnect the C6 purge VSV connector.
(c) Disconnect the hose (connected to the canister) from the purge VSV.
(d) Start the engine.
(e) Use your finger to confirm that the purge VSV has no suction.

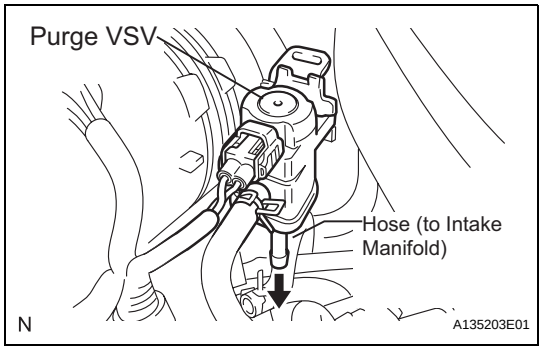
Result

Test Result	Suspected Trouble Area	Proceed to
No suction	ECM	A
Suction applied	Purge VSV	B

(f) Reconnect the purge VSV connector.
(g) Reconnect the hose.

A	Go to step 34
B	Go to step 30

15 CHECK EVAP HOSE (PURGE VSV - INTAKE MANIFOLD)



(a) Disconnect the hose (connected to the intake manifold) from the purge VSV.
(b) Start the engine.
(c) Use your finger to confirm that the hose has suction.

Result

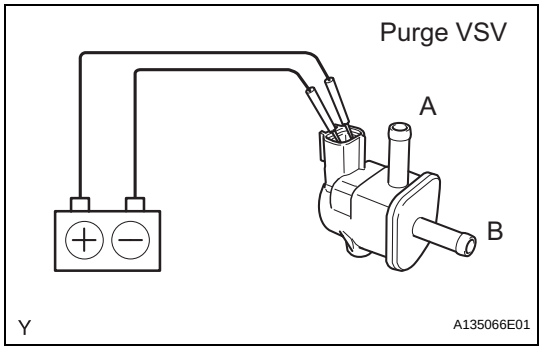
Test Result	Suspected Trouble Area	Proceed to
Suction applied	EVAP hose between purge VSV and intake manifold normal	A
No suction	• Intake manifold port • EVAP hose between purge VSV and intake manifold	B

(d) Reconnect the hose.

B → Go to step 25

A

16 INSPECT DUTY VACUUM SWITCHING VALVE (PURGE VSV)



(a) Remove the purge VSV.
(b) Apply the battery voltage to the terminals of the purge VSV.
(c) Using an air gun, confirm that air flows from port A to port B.

Result

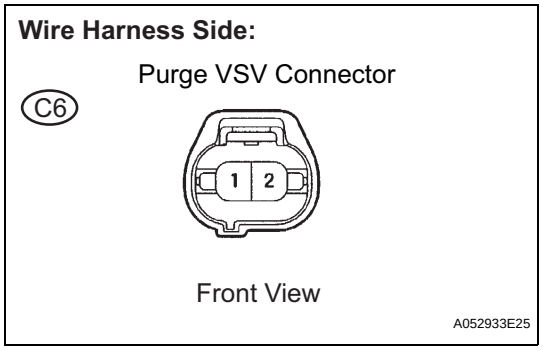
Test Result	Suspected Trouble Area	Proceed to
Air flows	Purge VSV normal	A
No air flow	Purge VSV	B

(d) Install the purge VSV.

B → Go to step 30

A

17 CHECK HARNESS AND CONNECTOR (POWER SOURCE OF PURGE VSV)



(a) Disconnect the C6 purge VSV connector.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between terminal 1 of the purge VSV connector and body ground.

Result

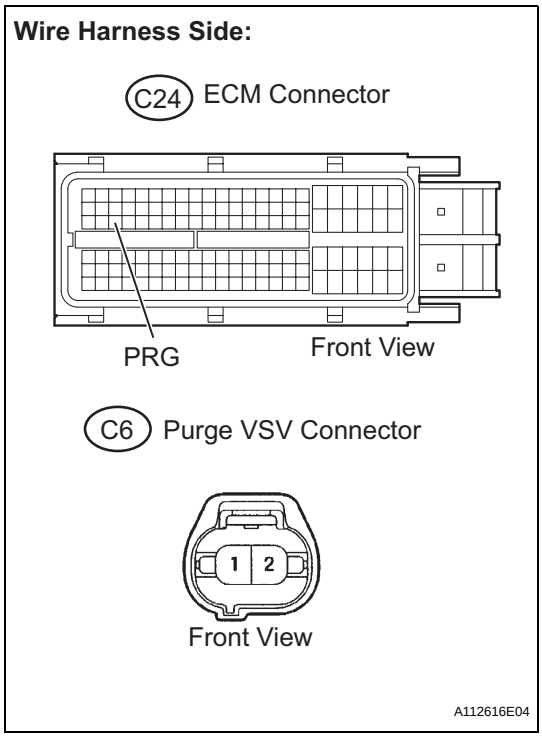
Test Result	Suspected Trouble Area	Proceed to
9 to 14 V	Normal	A
Other than result above	Wire harness or connectors between purge VSV and ECM	B

(d) Reconnect the purge VSV connector.

B	Go to step 31

A

18	CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM)



(a) Disconnect the C24 ECM connector and the C6 purge VSV connector.
(b) Measure the resistance between the terminals of the wire harness side connectors.

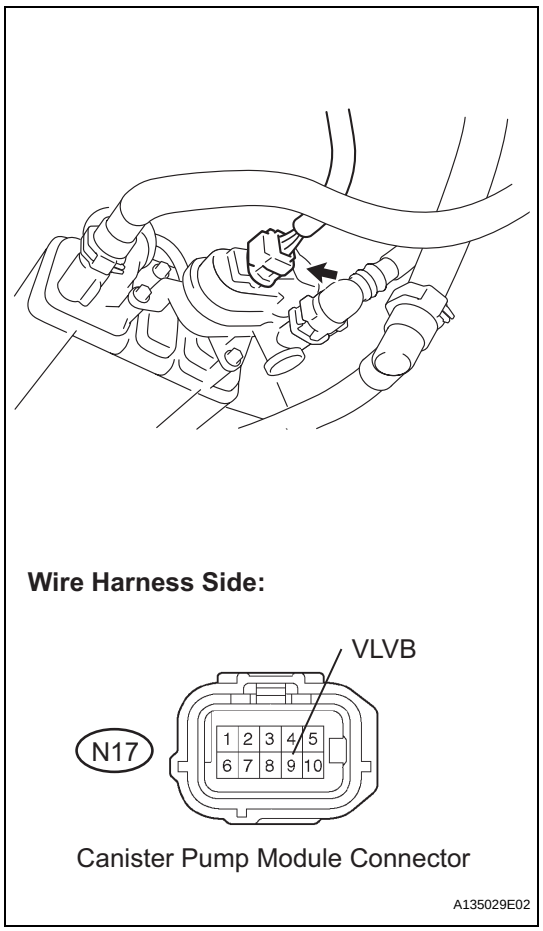
Standard resistance

Tester Connection	Specified Condition
C24-49 (PRG) - C6-2 (Purge VSV)	Below 1 Ω
C24-49 (PRG) - Body ground	10 kΩ or higher
C6-2 (Purge VSV) - Body ground	10 kΩ or higher

(c) Reconnect the purge VSV connector.
(d) Reconnect the ECM connector.

OK	Go to step 34
NG	Go to step 31

19	INSPECT CANISTER PUMP MODULE (POWER SOURCE FOR VENT VALVE)



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage between the VLVB terminal of the canister pump module connector and body ground.

ES

Result

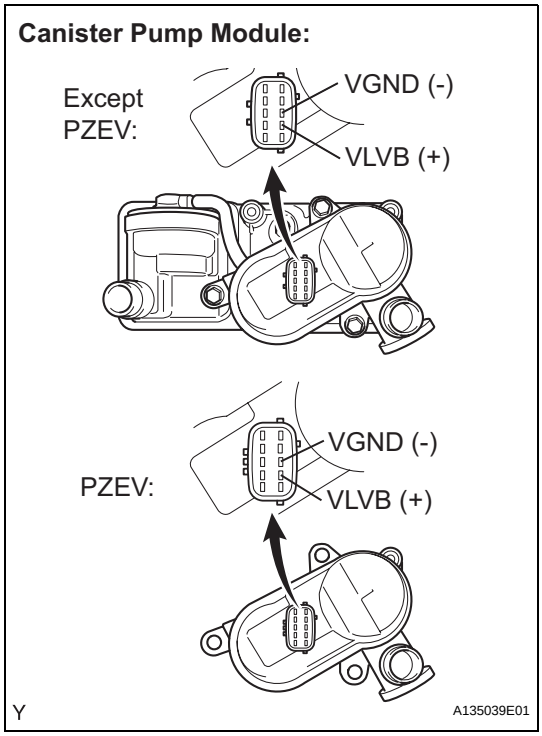
Test Result	Suspected Trouble Area	Proceed to
9 to 14 V	1. Wire harness between vent valve and ECM 2. Vent valve 3. ECM	A
Below 3 V	Power source wire harness of vent valve	B

(e) Reconnect the canister pump module connector.

B → Go to step 31

A

20	INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION)



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Apply the battery voltage to the VLVB and VGND terminals of the canister pump module.
(d) Touch the canister pump module to confirm the vent valve operation.

Result

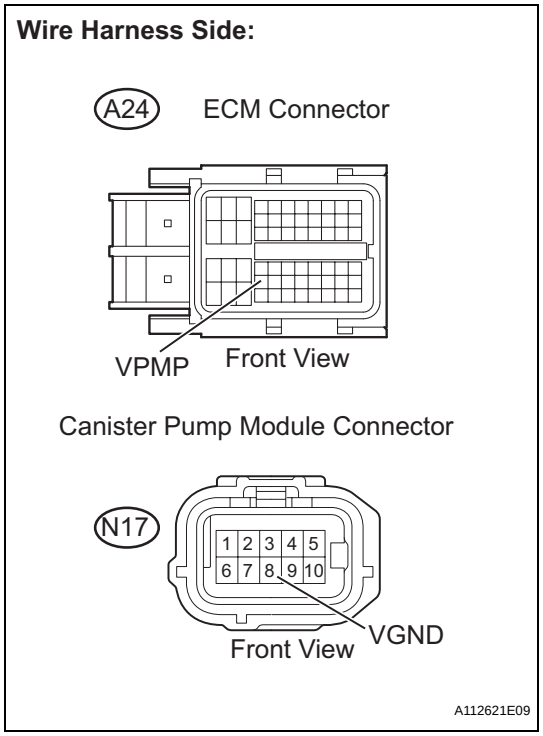
Test Result	Suspected Trouble Areat	Proceed to
Operating	1. Wire harness between vent valve and ECM 2. ECM	A
Not operating	Vent valve	B

(e) Reconnect the canister connector.

B → Go to step 29

A

21	CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)



(a) Disconnect the A24 ECM connector.
(b) Disconnect the N17 canister pump module connector.
(c) Measure the resistance between the VPMP terminal of the ECM connector and the VGND terminal of the canister pump module connector.

ES

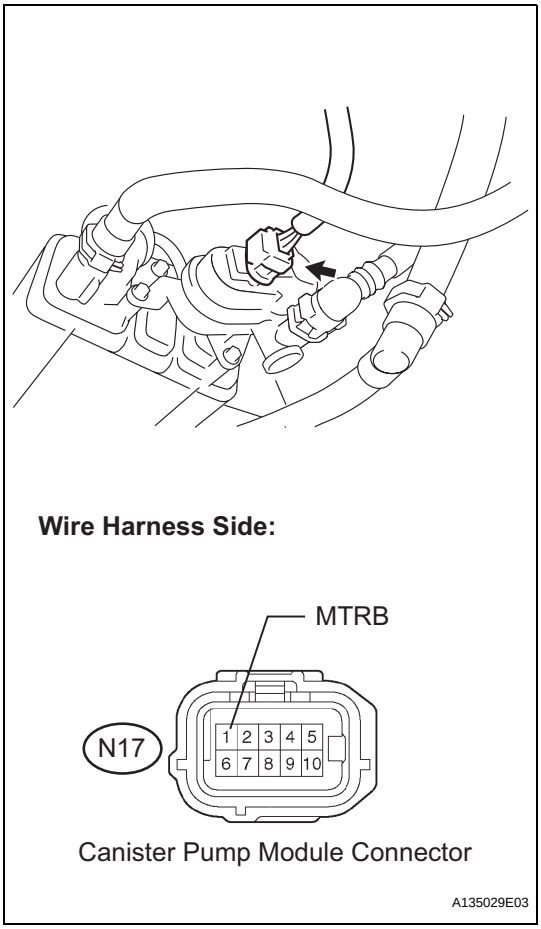
Result

Test Result	Suspected Trouble Area	Proceed to
Below 1 Ω	**ECM**	**A**
10 kΩ or higher	**Wire harness between ECM and canister pump module**	**B**

(d) Reconnect the ECM connector.
(e) Reconnect the canister pump module connector.

A	**Go to step 34**
B	**Go to step 31**

22	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (VACUUM PUMP (ALONE))



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Turn the ignition switch to the ON position.
(d) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP.
(e) Measure the voltage between MTRB terminal 1 of the canister pump module connector and body ground when the leak detection pump is turned ON and OFF using the tester.

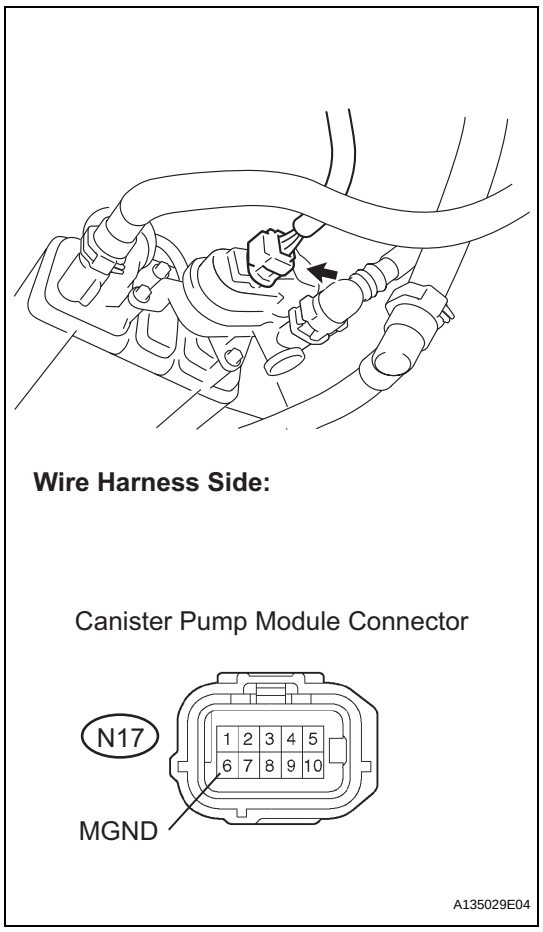
Result

Test Result	Suspected Trouble Area	Proceed to
Below 3 V when OFF 9 to 14 V when ON	1. Wire harness between leak detection pump and body ground 2. Leak detection pump	A
Below 3 V when OFF and ON	1. Wire harness between leak detection pump and ECM 2. ECM	B

B → Go to step 24

A

23	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - BODY GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Measure the resistance between the MGND terminal of the canister pump module connector and body ground.

ES

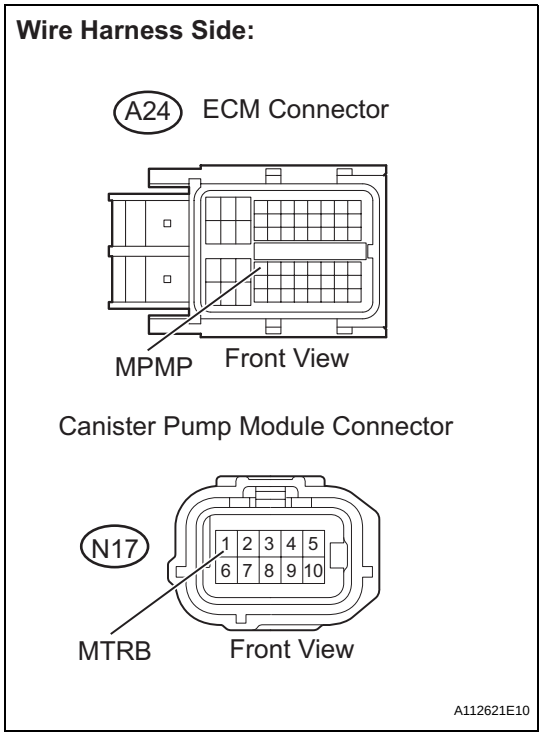
Result

Test Result	Suspected Trouble Area	Proceed to
Below 1 Ω	Leak detection pump	A
10 kΩ or higher	Wire harness between canister pump module and body ground	B

(d) Reconnect the canister pump module connector.

A	Go to step 29
B	Go to step 31

24 CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Disconnect the A24 ECM connector.
(d) Measure the resistance between the MPMP terminal of the ECM connector and the MTRB terminal of the canister pump module connector.

Result

Test Result	Suspected Trouble Area	Proceed to
Below 1 Ω	ECM	A
10 kΩ or higher	Wire harness between ECM and canister pump module	B

(e) Reconnect the canister pump module connector.
(f) Reconnect the ECM connector.

A	Go to step 34
B	Go to step 31

25 INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

(a) Stop the engine.
(b) Disconnect the EVAP hose from the intake manifold.
(c) Start the engine.
(d) Use your finger to confirm that the port of the intake manifold has suction.

Result

Test Result	Suspected Trouble Area	Proceed to
Suction applied	EVAP hose between intake manifold and purge VSV	A
No suction	Intake manifold	B

(e) Reconnect the EVAP hose.

A	Go to step 32
B	Go to step 33

26	CORRECTLY REINSTALL OR REPLACE FUEL CAP

HINT:
- When reinstalling the fuel cap, tighten it until a few click sounds are heard.
- When replacing the fuel cap, use a fuel cap that meets OEM specifications.

NEXT	Go to step 36

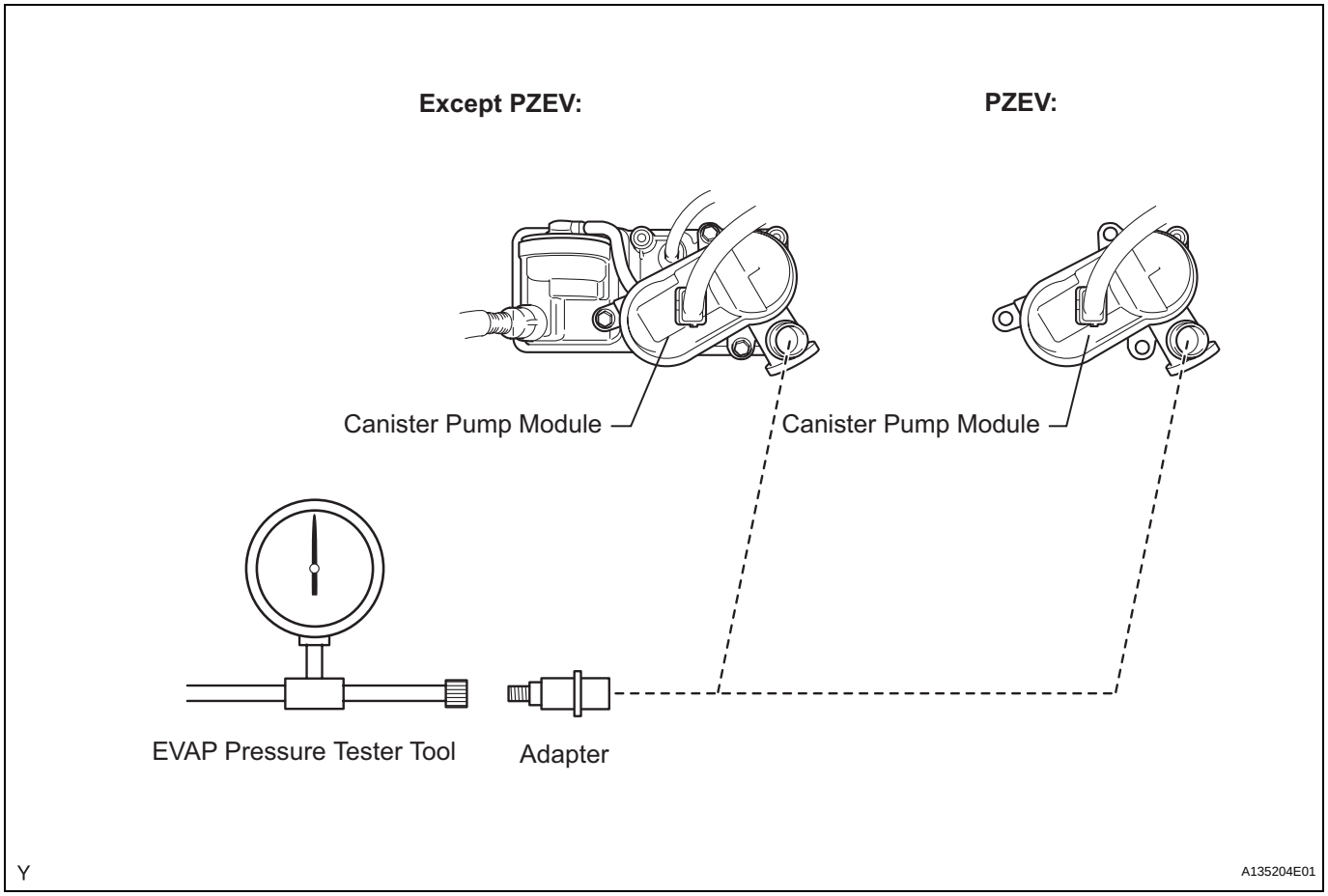
27	REPLACE FUEL CAP

ES

HINT:
When installing the fuel cap, tighten it until a few click sounds are heard.

NEXT	Go to step 36

28	LOCATE EVAP LEAK PART



(a) Disconnect the vent hose.
(b) Connect the EVAP pressure tester tool to the canister pump module with the adapter.

(c) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).
(d) Apply soapy water to the piping and connecting parts of the EVAP system.
(e) Look for areas where bubbles appear. This indicates the leak point.
(f) Repair or replace the leak point.
HINT:
Disconnect the hose between the canister and the fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

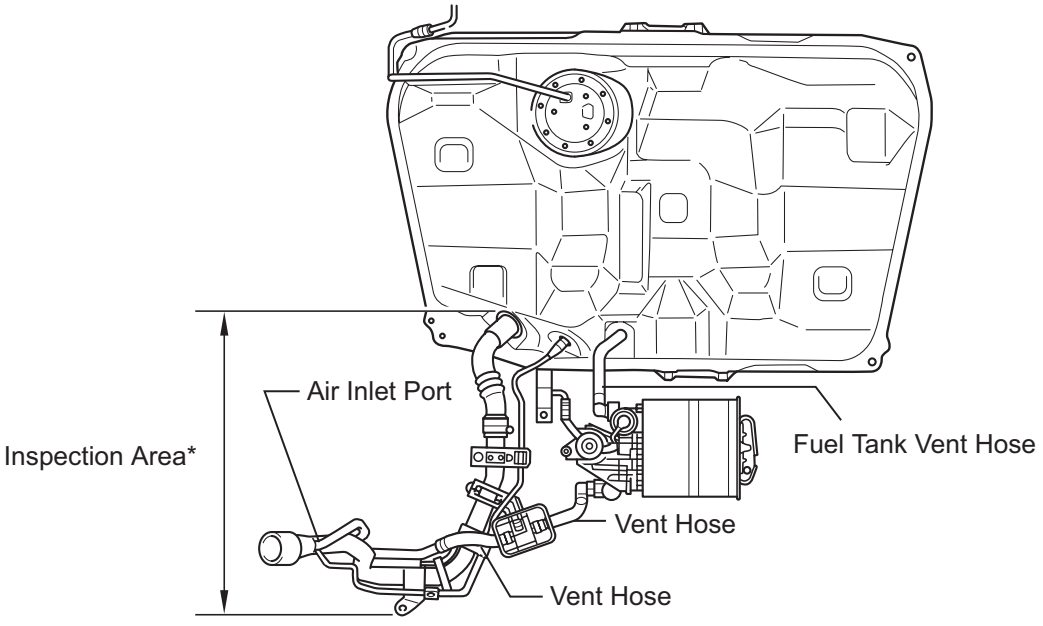
ES

NEXT → Go to step 36

29	REPLACE CHARCOAL CANISTER ASSEMBLY

(a) Replace the canister assembly (See page EC-9).
NOTICE:
When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.

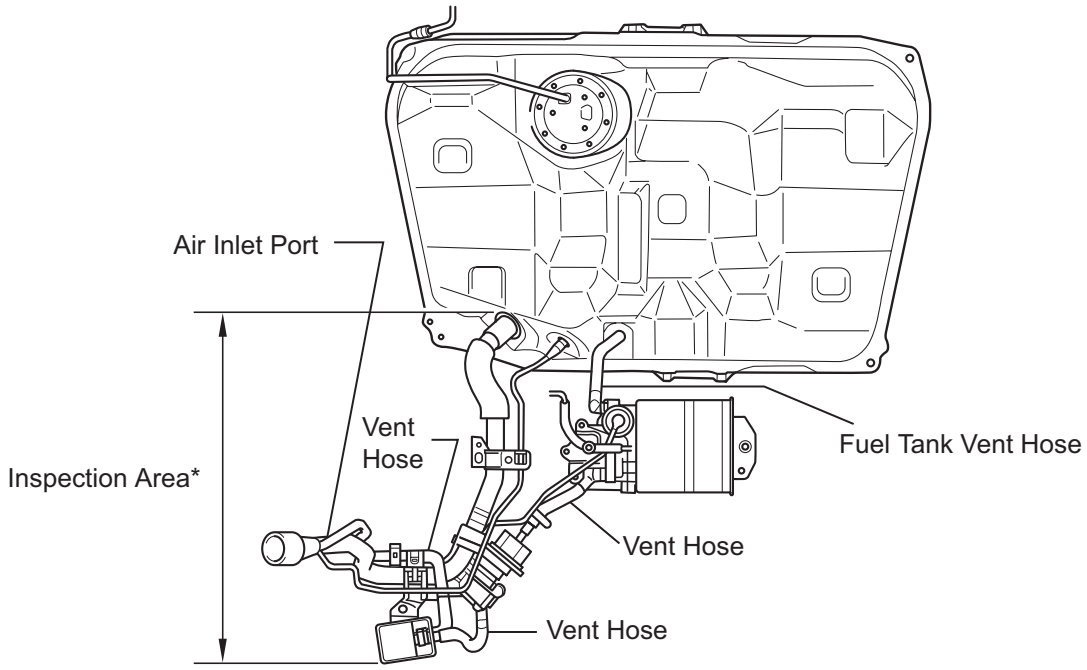
Except PZEV:



*: Check for disconnection and/or crack

N A132283E01

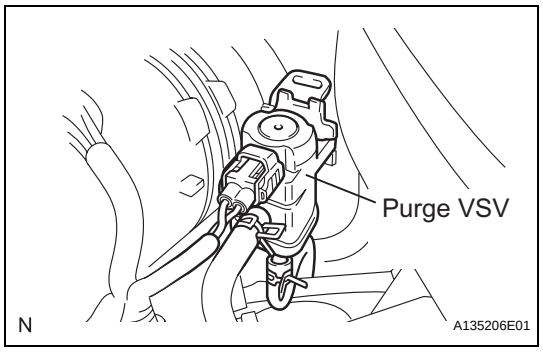
PZEV:



ES

NEXT → Go to step 36

30 REPLACE DUTY VACUUM SWITCHING VALVE (PURGE VSV)



(a) Disconnect the connector and the hoses from the purge VSV.
(b) Remove the purge VSV.
(c) Install a new purge VSV.
(d) Reconnect the connector and hoses.

NEXT → Go to step 36

31 REPAIR OR REPLACE HARNESS OR CONNECTOR

NEXT → Go to step 36

32 REPLACE EVAP HOSE (INTAKE MANIFOLD - PURGE VSV)

NEXT → Go to step 36

33	INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

(a) Check that the EVAP purge port of the intake manifold is not clogged. If necessary, replace the intake manifold.

NEXT → Go to step 36

34	REPLACE ECM

(a) Replace the ECM (See page ES-432).

NEXT → Go to step 36

35	REPAIR OR REPLACE PARTS AND COMPONENTS INDICATED BY OUTPUT DTCS

(a) Repair the malfunctioning areas indicated by the DTCs that had been confirmed when the vehicle was brought in.

NEXT → Go to step 36

36	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of 5 steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear the DTCs (See page ES-38).

(b) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

(c) After the SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTCs are found, the repair has been successfully completed.

NEXT

COMPLETED

CONFIRMATION DRIVING PATTERN

HINT:
After a repair, check Monitor Status by performing the Key-Off Monitor Confirmation and Purge Flow Monitor Confirmation described below.

1. KEY-OFF MONITOR CONFIRMATION

(a) Preconditions
The monitor will not run unless:
- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway)
- The fuel tank is less than 90 % full
- The altitude is less than 8,000 ft (2,400 m)
- The Engine Coolant Temperature (ECT) is between 4.4°C and 35°C (40°F and 95°F)
- The Intake Air Temperature (IAT) is between 4.4°C and 35°C (40°F and 95°F)
- The vehicle remains stationary (the vehicle speed is 0 mph (0 km/h))

(b) Monitor Conditions
1. Allow the engine to idle for at least 5 minutes.
2. Turn the ignition switch off and wait for 6 hours (8 or 10.5 hours).
   HINT:
   Do not start the engine until checking MONITOR STATUS. If the engine is started, the steps described above must be repeated.

(c) Monitor Status
1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch to the ON position and turn the tester on.
3. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
4. Check the Monitor Status displayed on the tester.
   HINT:
   If INCMP is displayed, the monitor is not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

2. PURGE FLOW MONITOR CONFIRMATION (P0441)

HINT:
Perform this monitor confirmation after the Key-Off Monitor Confirmation shows COMPL (complete).

(a) Preconditions
The monitor will not run unless:
- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway)
- The ECT is between 4.4°C and 35°C (40°F and 95°F)
- The IAT is between 4.4°C and 35°C (40°F and 95°F)

(b) Monitor Conditions
1. Release the pressure from the fuel tank by removing and reinstalling the fuel cap.
2. Warm the engine up until the ECT reaches more than 75°C (167°F).
3. Increase the engine speed to 3,000 rpm once.
4. Allow the engine to idle and turn A/C ON for 1 minute.

(c) Monitor Status
1. Turn the ignition switch off (if ON or the engine is running).
2. Connect the intelligent tester to the DLC3.
3. Turn the ignition switch to the ON position and turn the tester on.
4. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
5. Check the Monitor Status displayed on the tester.
   HINT:
   If INCMP is displayed, the monitor is not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

MONITOR RESULT

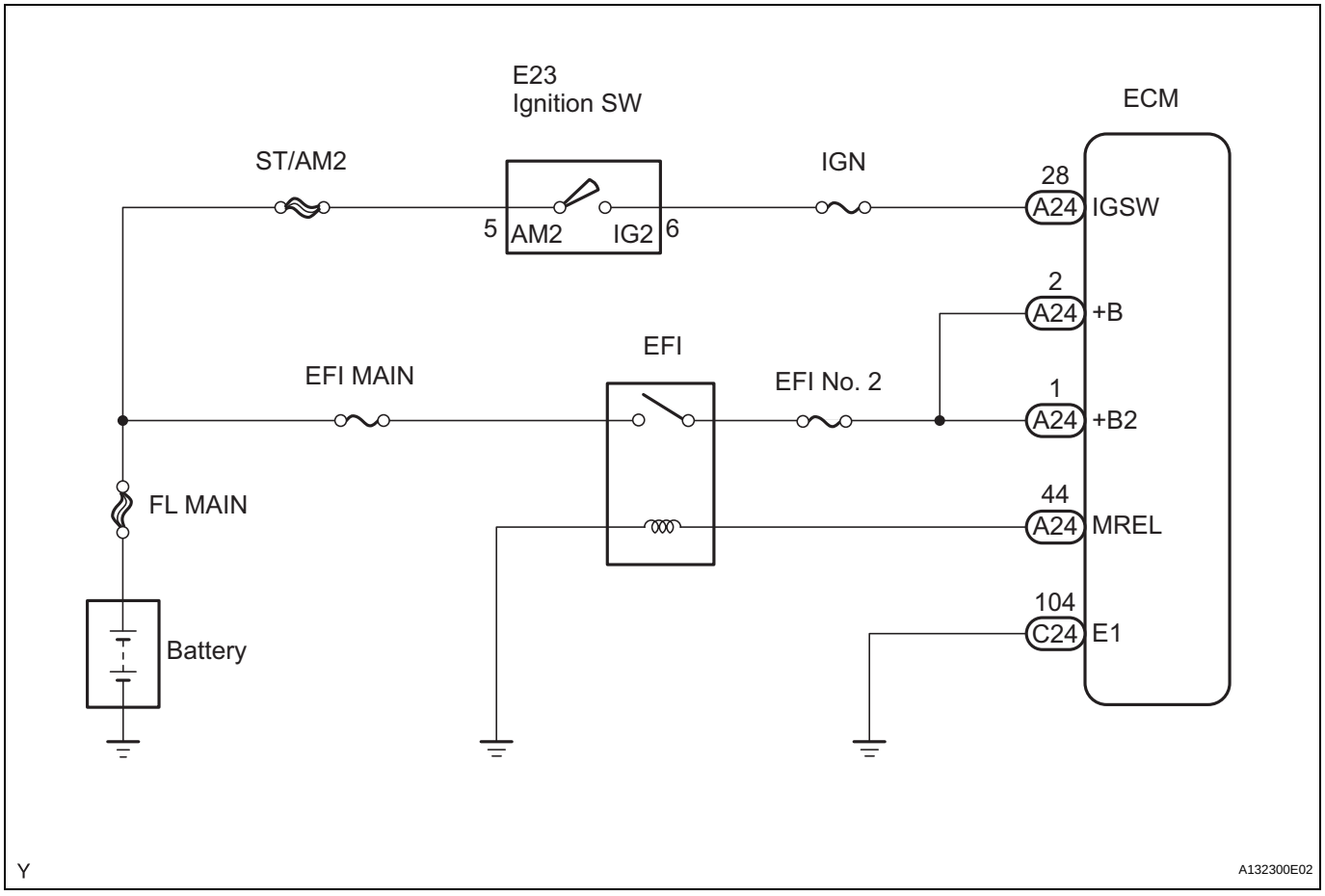
Refer to CHECKING MONITOR STATUS (See page ES-20).

ECM Power Source Circuit

DESCRIPTION

When the ignition switch is turned ON position, the battery voltage is applied to IGSW of the ECM. The output signal from the MREL terminal of the ECM causes a current to flow to the coil, closing the contacts of the engine room J/B (EFI relay) and supplying power to either terminal +B or +B2 of the ECM.

WIRING DIAGRAM

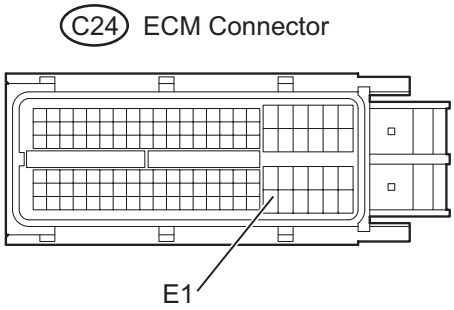


ES

INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (ECM - BODY GROUND)

Wire Harness Side:



A107892E79

(a) Disconnect the C24 ECM connector.
(b) Measure the resistance.

Standard resistance

Tester Connection	Specified Condition
C24-104 (E1) - Body ground	Below 1 Ω

(c) Reconnect the ECM connector.

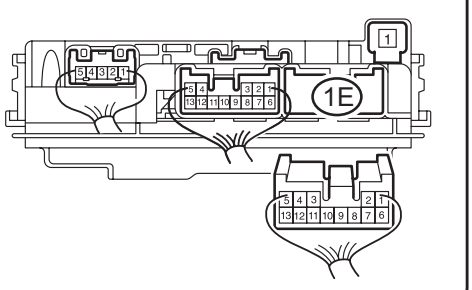
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

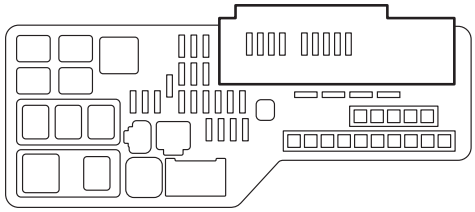
2	INSPECT ENGINE ROOM J/B (EFI RELAY VOLTAGE)

Engine Room J/B:

Connector Side:



Engine Room R/B:



A138922E01

(a) Remove the engine room J/B from the engine room R/B.
(b) Disconnect the 1E engine room J/B connector.
(c) Turn the ignition switch to the ON position.
(d) Measure the voltage between the terminals.

Standard voltage

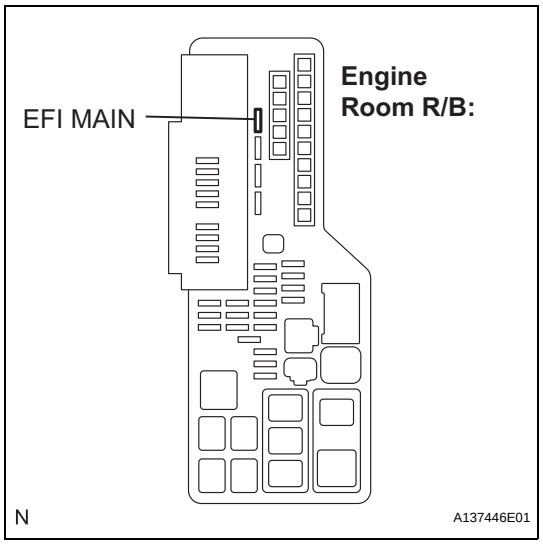
Tester Connection	Specified Condition
1E-12 - Body ground	9 to 14 V

(e) Reconnect the engine room J/B connector.
(f) Reinstall the engine room J/B.

OK → **Go to step 4**

NG

3	INSPECT FUSE (EFI MAIN FUSE)



(a) Inspect the EFI MAIN fuse.
  (1) Remove the EFI MAIN fuse from the engine room R/B.
  (2) Measure the EFI MAIN fuse resistance.
    Standard resistance:
    Below 1 Ω
  (3) Reinstall the EFI MAIN fuse.

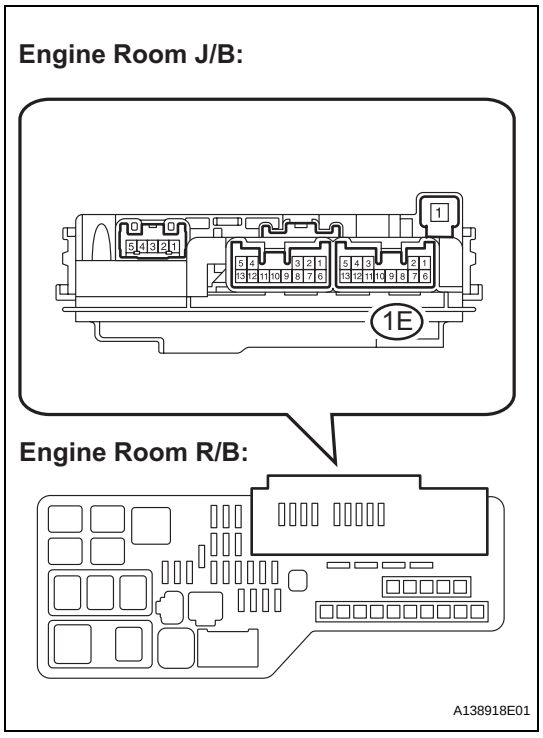
NG	REPLACE FUSE (EFI MAIN FUSE)

ES

OK

CHECK AND REPAIR HARNESS AND CONNECTOR (BATTERY - EFI RELAY)

4	INSPECT ENGINE ROOM J/B (EFI RELAY)



(a) Remove the engine room J/B from the engine room R/B.
(b) Inspect the EFI relay.
  (1) Measure the EFI relay resistance.
    Standard resistance

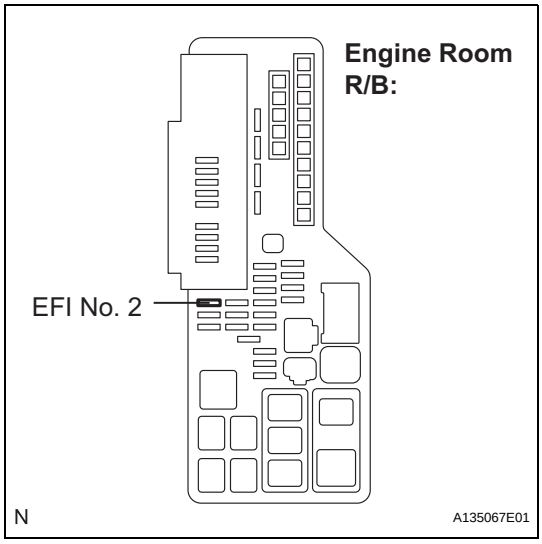
Tester Connection	Specified Condition
1E-6 - 1E-12	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-11)

(c) Reinstall the engine room J/B.

NG	REPLACE ENGINE ROOM J/B

OK

5	INSPECT FUSE (EFI NO. 2 FUSE)



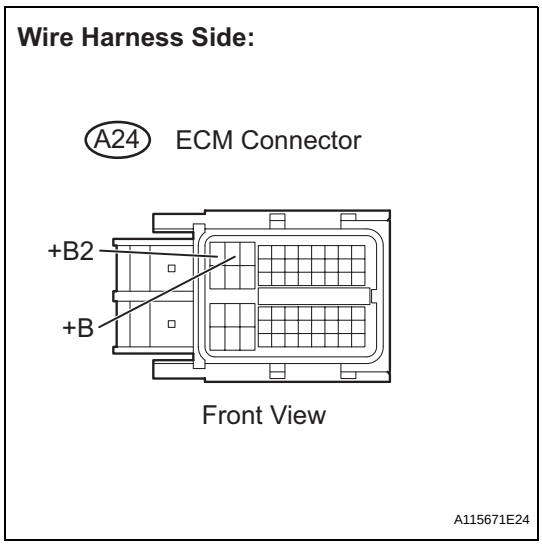
(a) Inspect the EFI No. 2 fuse.
  (1) Remove the EFI No. 2 fuse from the engine room R/B.
  (2) Measure the EFI No. 2 fuse resistance.
    Standard resistance:
      Below 1 Ω
  (3) Reinstall the EFI No. 2 fuse.

NG → **REPLACE FUSE (EFI NO. 2 FUSE)**

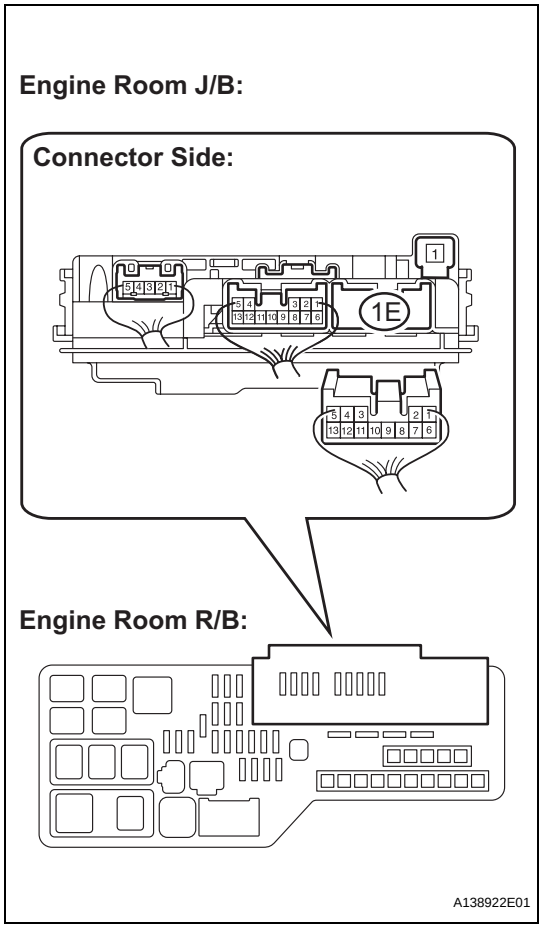
ES

OK

6	CHECK HARNESS AND CONNECTOR (EFI RELAY - ECM)



(a) Disconnect the A24 ECM connector.



(b) Remove the engine room J/B from the engine room R/B.
(c) Disconnect the 1E engine room J/B connector.
(d) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
A24-2 (+B) - 1E-6	Below 1 Ω
A24-1 (+B2) - 1E-6	Below 1 Ω

Standard resistance (Check for short)

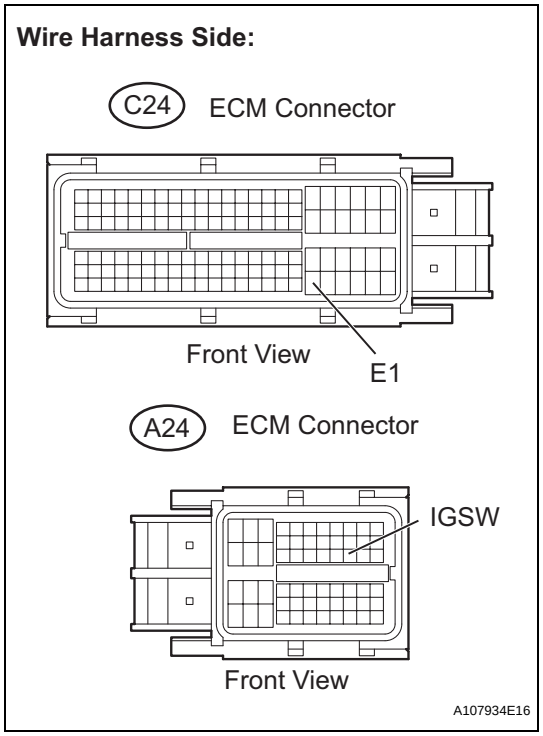
Tester Connection	Specified Condition
A24-2 (+B) or 1E-6 - Body ground	10 kΩ or higher
A24-1 (+B2) or 1E-6 - Body ground	10 kΩ or higher

(e) Reconnect the ECM connector.
(f) Reconnect the engine room J/B connector.
(g) Reinstall the engine room J/B.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7 INSPECT ECM (IGSW VOLTAGE)



(a) Disconnect the A24 and C24 ECM connectors.
(b) Turn the ignition switch to the ON position.
(c) Measure the voltage between the terminals of the A24 and C24 ECM connectors.

Standard voltage

Tester Connection	Specified Condition
A24-28 (IGSW) - C24-104 (E1)	9 to 14 V

(d) Reconnect the ECM connectors.

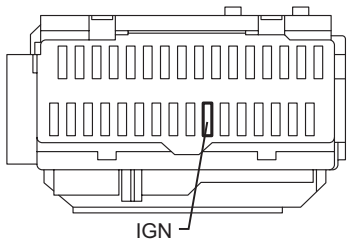
OK → **Go to step 10**

ES

NG

8	INSPECT FUSE (IGN FUSE)

Instrument Panel J/B:



(a) Remove the IGN fuse from the instrument panel J/B.
(b) Measure the fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the fuse.

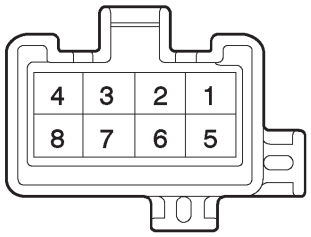
NG → **REPLACE FUSE (IGN FUSE)**

ES

OK

9	INSPECT IGNITION SWITCH ASSEMBLY

Component Side:



(a) Disconnect the E23 ignition switch connector.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Ignition Switch Position	Specified Condition
All Terminals	LOCK	10 kΩ or higher
2 - 4	ACC	Below 1 Ω
1 - 2 - 4, 5 - 6	ON	
1 - 3 - 4, 5 - 6 - 7	START	

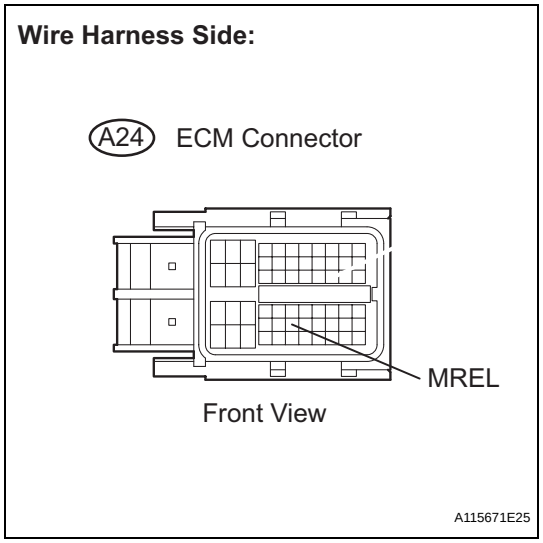
(c) Reconnect the ignition switch connector.

NG → **REPLACE IGNITION SWITCH ASSEMBLY**

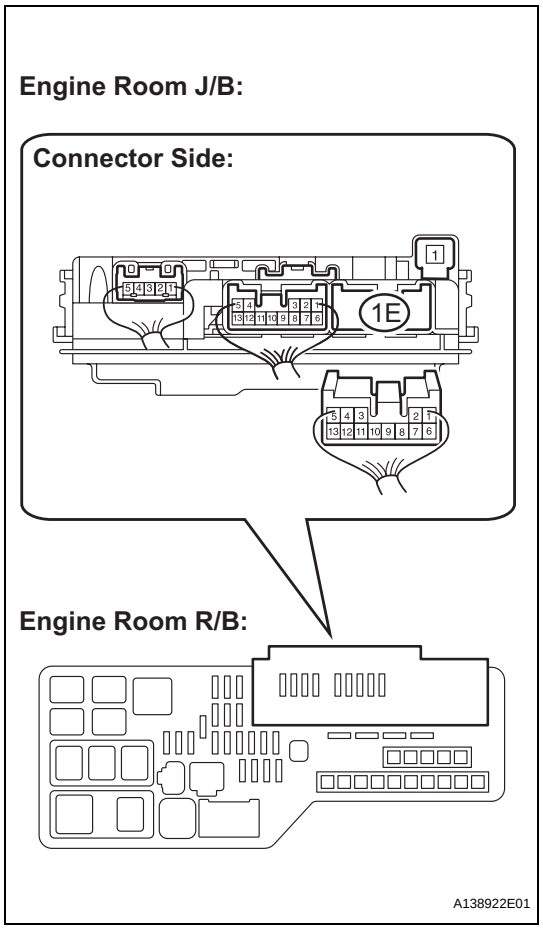
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

10	CHECK HARNESS AND CONNECTOR (EFI RELAY - ECM, EFI RELAY - BODY GROUND)



(a) Disconnect the A24 ECM connector.



(b) Remove the engine room J/B from the engine room R/B.
(c) Disconnect the 1E engine room J/B connector.
(d) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
A24-44 (MREL) - 1E-9	Below 1 Ω
1E-11 - Body ground	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
A24-44 (MREL) or 1E-9 - Body ground	10 kΩ or higher

(e) Reconnect the ECM connector.
(f) Reconnect the engine room J/B connector.
(g) Reinstall the engine room J/B.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

ENGINE

INSPECTION

1. INSPECT ENGINE COOLANT

(a) Inspect the engine coolant (See page CO-1).

2. INSPECT ENGINE OIL

(a) Inspect the engine oil (See page LU-1).

3. INSPECT BATTERY

(a) Inspect the battery (See page CH-4).

4. INSPECT SPARK PLUGS

(a) Inspect the spark plugs (See page IG-5).

5. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Remove the air cleaner filter element sub-assembly.

(b) Visually check that there is no dirt, blockage, and/or damage to the air cleaner filter element.
HINT:
- If there is any dirt or a blockage in the air cleaner filter element, clean it with compressed air.
- If any dirt or a blockage remains even after cleaning the air cleaner filter element with compressed air, replace it.

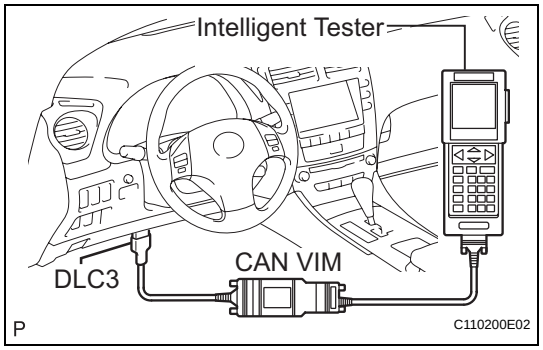
6. INSPECT IGNITION TIMING

(a) Warm up the engine.

(b) When using the intelligent tester:
Check the ignition timing.

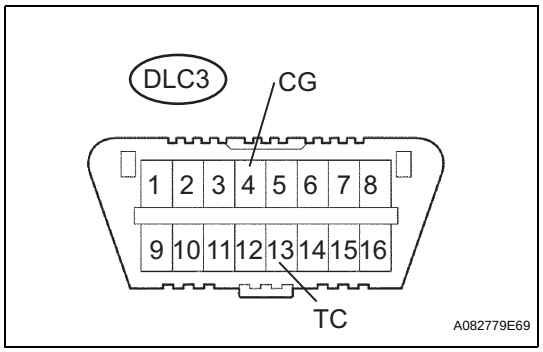
(1) Connect the intelligent tester to the DLC3.

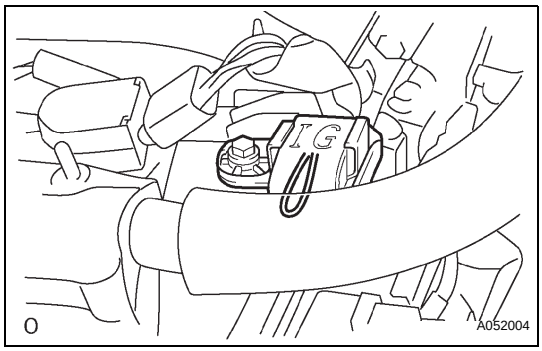
(2) Enter DATA LIST MODE on the intelligent tester.
Ignition timing:
8 to 12° BTDC at idle
HINT:
Refer to the intelligent tester operator's manual for help when selecting the DATA LIST.



(c) When not using the intelligent tester:
Check the ignition timing.

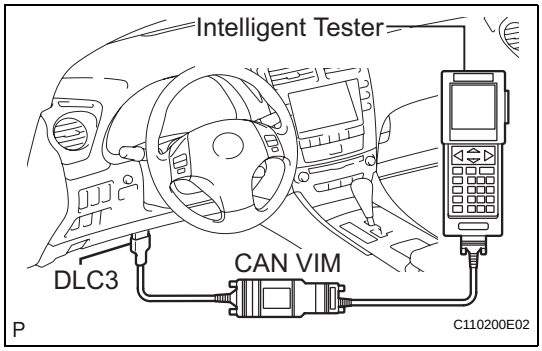
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
NOTICE:
- **Confirm the terminal numbers before connecting them. Connection with a wrong terminal can damage the engine.**
- **Turn off all electrical systems before connecting the terminals.**
- **Perform this inspection after the cooling fan motor is turned off.**





(2) Remove the No. 1 engine cover.
(3) Pull out the wire harness as shown in the illustration. Connect the clip of the timing light to the wire harness.
NOTICE:
- **Use a timing light which can detect the first signal.**
- **After checking, be sure to tape the wire harness.**

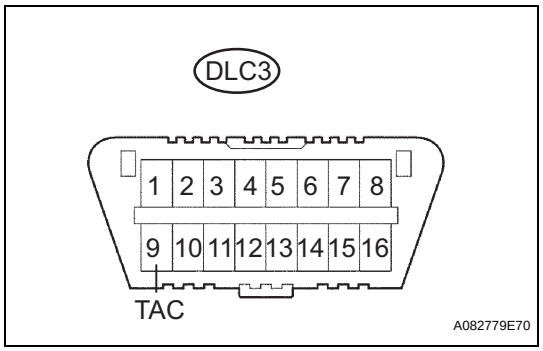
(4) Check the ignition timing at idle.
Ignition timing:
8 to 12° BTDC at idle
NOTICE:
When checking the ignition timing, the transmission should be in neutral.
HINT:
After engine rpm is kept at 1,000 to 1,300 rpm for 5 seconds, check that it returns to idle speed.
(5) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
(6) Check the ignition timing at idle.
Ignition timing:
5 to 15° BTDC at idle
(7) Confirm that the ignition timing moves to the advanced angle side when the engine rpm is increased.
(8) Remove the timing light.



7. INSPECT ENGINE IDLE SPEED
(a) Warm up the engine.
(b) When using the intelligent tester:
Check the idle speed.
(1) Connect the intelligent tester to the DLC3.
HINT:
Refer to the intelligent tester operator's manual for further details.
(2) Enter DATA LIST MODE on the intelligent tester.
Idle speed

Item	Specified Condition
M/T	650 to 750 rpm
A/T	610 to 710 rpm

NOTICE:
- **When checking the idle speed, the transmission should be in neutral.**
- **Check the idle speed with the cooling fan off.**
- **Switch off all accessories and air conditioning before connecting the intelligent tester.**

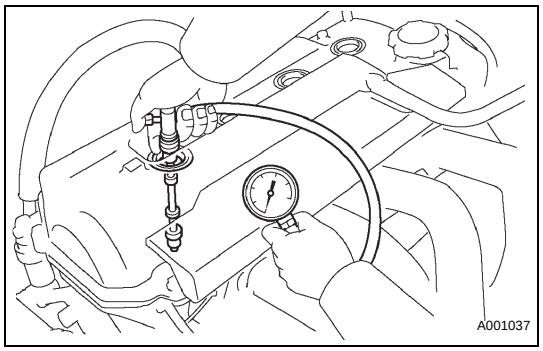


(c) When not using the intelligent tester:
Check the idle speed.
(1) Using SST, connect the tachometer tester probe to terminal 9 (TAC) of the DLC3.
SST 09843-18030
(2) Check the idle speed.
Idle speed

Item	Specified Condition
M/T	650 to 750 rpm
A/T	610 to 710 rpm

8. INSPECT COMPRESSION

(a) Warm up and stop the engine.
(b) Disconnect the injector connectors.
(c) Remove the ignition coils.
(d) Remove the spark plugs.



(e) Check the cylinder compression pressure.
(1) Insert a compression gauge into the spark plug hole.
(2) Fully open the throttle.
(3) While cranking the engine, measure the compression pressure.
Compression pressure:
1.360 MPa (13.9 kgf/ cm^2, 198 psi)
Minimum pressure:
0.98 MPa (10 kgf/ cm^2, 142 psi)
Difference between each cylinder:
100 kPa (1.0 kgf/ cm^2, 14 psi)
NOTICE:
- **Always use a fully charged battery to obtain an engine speed of 250 rpm or more.**
- **Check the other cylinders' compression pressure in the same way.**
- **This measurement must be done as quickly as possible.**

(4) If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole and inspect again.
HINT:
- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If pressure stays low, a valve may be stuck or seated improperly, or there may be leakage in the gasket.

9. INSPECT CO/HC

(a) Start the engine.
(b) Run the engine at 2,500 rpm for approximately 180 seconds.
(c) Insert the CO/HC meter testing probe at least 40 cm (1.3 ft) into the tailpipe during idling.

EM

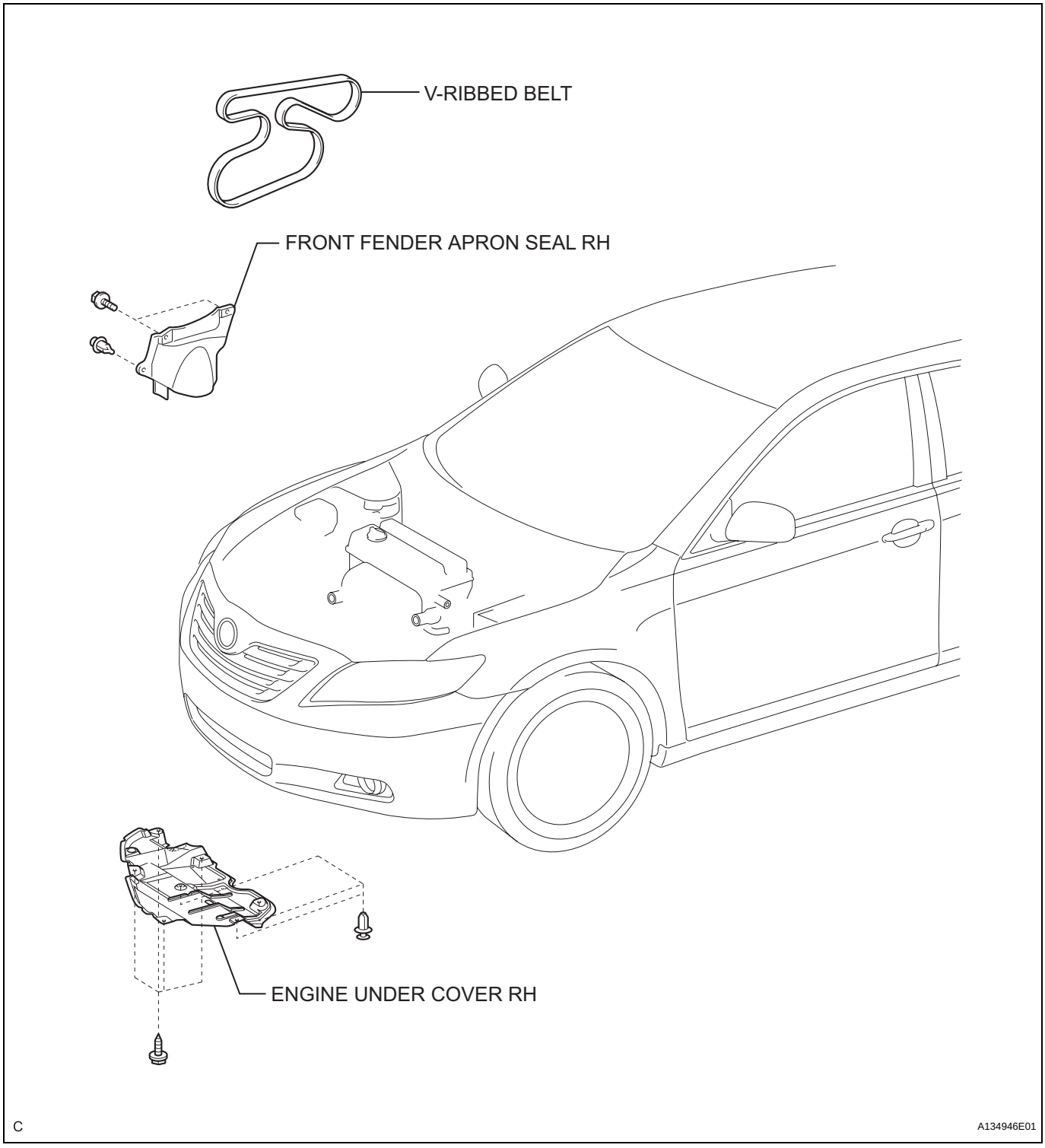
(d) Immediately check CO/HC concentration at idle and/or 2,500 rpm.
HINT:
- Complete the measuring within 3 minutes.
- Check regulations and restrictions in your area when performing 2 mode CO/HC concentration testing (engine check at both idle speed and at 2,500 rpm).

(e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.
(1) Check A/F sensor and heated oxygen sensor operation (See page EC-21).
(2) See the table below for possible causes, and then inspect and repair.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: – Incorrect timing – Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (fluctuating HC reading)	1. Vacuum leaks: – PCV hoses – Intake manifold – Throttle body – Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI system: – Faulty pressure regulator – Defective ECT – Defective MAF meter – Faulty ECM – Faulty injectors – Faulty throttle position sensor

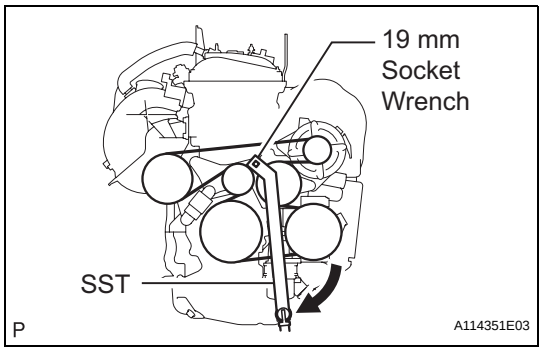
DRIVE BELT

COMPONENTS



REMOVAL

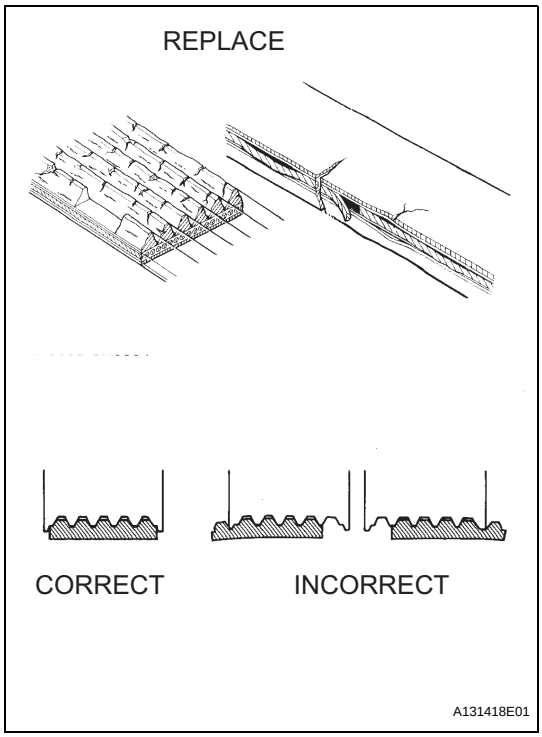
1. **REMOVE FRONT WHEEL RH**
2. **REMOVE ENGINE UNDER COVER RH**
3. **REMOVE FRONT FENDER APRON SEAL RH**
4. **REMOVE V-RIBBED BELT**
   (a) Using SST and 19 mm socket wrench, loosen the V-ribbed belt tensioner arm clockwise, then remove the V-ribbed belt.
   SST 09216-42010
   NOTICE:
   - **Be sure to connect SST and the tools so that they are in line during use.**
   - **When retracting the tensioner, turn it clockwise slowly for 3 seconds or more. Do not apply force rapidly.**
   - **After the tensioner is fully retracted, do not apply force any more than necessary.**



EM

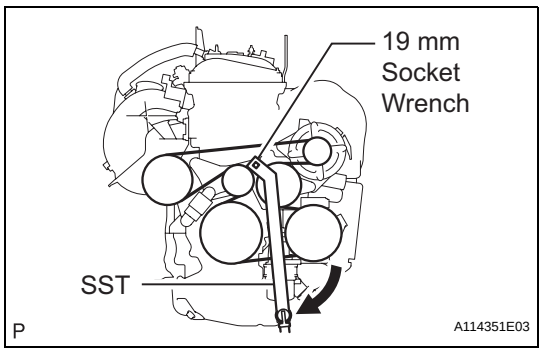
INSPECTION

1. **INSPECT V-RIBBED BELT**
   (a) Visually check the V-ribbed belt for excessive wear, frayed cords, etc. If any defect has been found, replace the V-ribbed belt.
   HINT:
   - Cracks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.
   - A "new belt" is a belt which has been used for less than 5 minutes with the engine running.
   - A "used belt" is a belt which has been used for 5 minutes or more with the engine running.



INSTALLATION

1. **INSTALL V-RIBBED BELT**
   (a) Using SST and 19 mm socket wrench, loosen the V-ribbed belt tensioner arm clockwise, then install the V-ribbed belt.
   SST 09216-42010
   NOTICE:
   - **Be sure to connect SST and the tools so that they are in line during use.**
   - **When retracting the tensioner, turn it clockwise slowly for 3 seconds or more. Do not apply force rapidly.**



- **After the tensioner is fully retracted, do not apply force any more than necessary.**

(b) After installing the V-ribbed belt, check that it fits properly in the ribbed grooves. Check to confirm that the belt has not slipped out of the grooves on the bottom of the crank pulley by hand.

2. INSTALL FRONT FENDER APRON SEAL RH

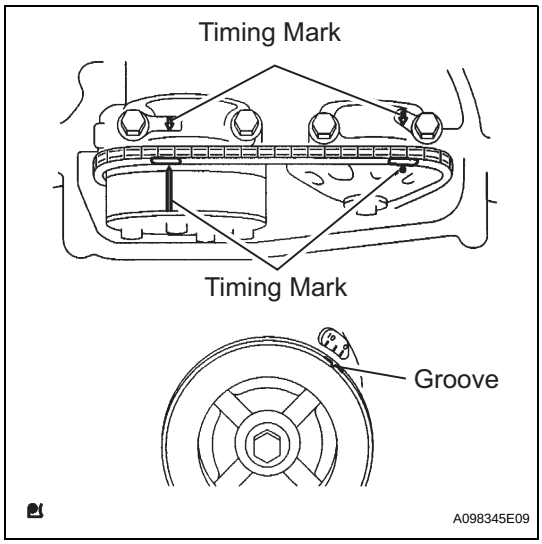
3. INSTALL ENGINE UNDER COVER RH

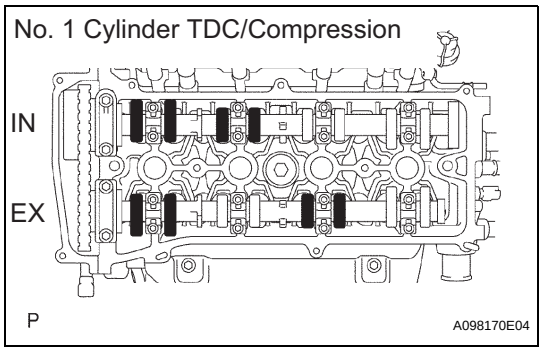
4. INSTALL FRONT WHEEL RH
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

VALVE CLEARANCE

ADJUSTMENT

1. **REMOVE FRONT WHEEL RH**
2. **REMOVE ENGINE UNDER COVER LH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE FRONT FENDER APRON SUB-ASSEMBLY RH**
5. **REMOVE NO. 1 ENGINE COVER (See page EM-94)**
6. **REMOVE IGNITION COIL ASSEMBLY (See page EM-106)**
7. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-21)**
8. **SET NO. 1 CYLINDER TO TDC/COMPRESSION**
   (a) Turn the crankshaft pulley until its groove and the timing mark "0" of the timing chain cover are aligned.
   (b) Check that each timing mark of the camshaft timing gear and sprocket is aligned with each timing mark located on the No. 1 and No. 2 bearing caps as shown in the illustration. If not, turn the crankshaft by 1 revolution (360°) to align the timing marks as above.

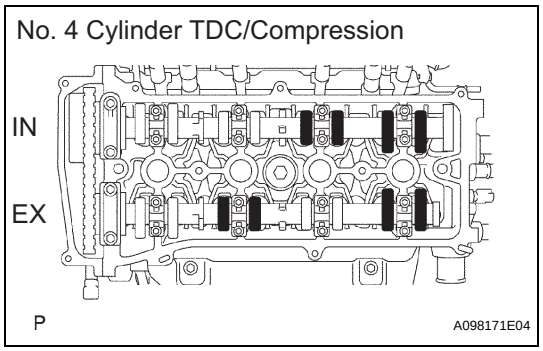




9. **CHECK VALVE CLEARANCE**
   (a) Check only the valves indicated.
      (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
      Standard valve clearance (cold)

Item	Standard Condition
Intake	0.19 to 0.29 mm (0.0075 to 0.0114 in.)
Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)

      (2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve clearance lifters.
   (b) Turn the crankshaft 1 revolution (360°) and set the No. 4 cylinder to the TDC/compression.



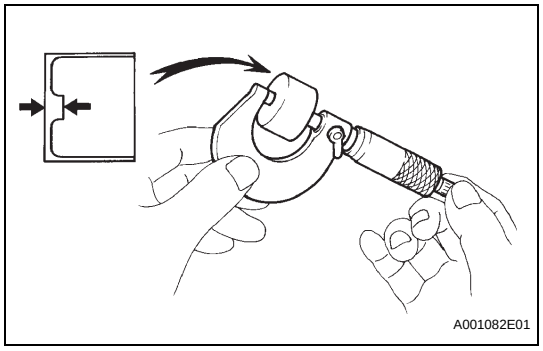
(c) Check only the valves indicated.
(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
Standard valve clearance (cold)

Item	Standard Condition
Intake	0.19 to 0.29 mm (0.0075 to 0.0114 in.)
Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)

(2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifters.

10. ADJUST VALVE CLEARANCE

(a) Remove the No. 2 camshaft (see page EM-38).
(b) Remove the camshaft (see page EM-38).
(c) Remove the valve lifters.



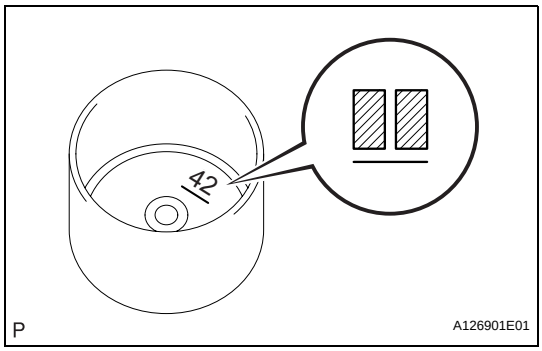
(d) Using a micrometer, measure the thickness of the removed valve lifters.
(e) Calculate the thickness of a new lifter so that the valve clearance comes within the specified values.
New lifter thickness

Item	Specification
Intake	A = B + (C - 0.24 mm (0.0095 in.))
Exhaust	A = B + (C - 0.43 mm (0.0169 in.))

A	New lifter thickness
B	Used lifter thickness
C	Measured valve clearance

CALCULATION EXAMPLE (Intake):
1. Measured intake valve clearance = 0.40 mm (0.0158 in.)
(Measured - Specification = Excess clearance)
(a) 0.40 mm (0.0158 in.) - 0.24 mm (0.0095 in.) = 0.16 mm (0.0063 in.)
2. Measured used lifter measurement = 5.250 mm (0.2067 in.)
3. New lifter thickness = 5.410 mm (0.2130 in.)
(Excess clearance + Used lifter thickness = Ideal new lifter)
(a) 0.16 mm (0.0063 in.) + 5.250 mm (0.2067 in.) = 5.410 mm (0.2130 in.)
4. Closest new lifter = 5.420 mm (0.2134 in.)
– Select No. 42 lifter

EM



(f) Select a new lifter with a thickness as close as possible to the calculated values.
HINT:
- Lifters are available in 35 sizes in increments of 0.020 mm (0.0008 in.), from 5.060 to 5.740 mm (0.1992 to 0.2260 in.).
- The identification number inside the valve lifters shows the value to 2 decimal places. (The illustration shows 5.420 mm (0.2134 in.)

(g) Valve lifter selection chart (intake).

Installed lifter thickness mm (in.) \ Measured clearance mm (in.)	0.000 - 0.030 (0.0000 - 0.0012)	0.031 - 0.050 (0.0012 - 0.0020)	0.051 - 0.070 (0.0020 - 0.0028)	0.071 - 0.090 (0.0028 - 0.0035)	0.091 - 0.110 (0.0036 - 0.0043)	0.111 - 0.130 (0.0044 - 0.0051)	0.131 - 0.150 (0.0052 - 0.0059)	0.151 - 0.170 (0.0059 - 0.0067)	0.171 - 0.189 (0.0067 - 0.0074)	0.190 - 0.290 (0.0075 - 0.0114)
5.060 (0.1992)										
5.080 (0.2000)									06	
5.100 (0.2008)								06	08	
5.120 (0.2016)							06	08	10	
5.140 (0.2024)						06	08	10	12	
5.160 (0.2031)					06	08	10	12	14	
5.180 (0.2039)				06	08	10	12	14	16	
5.200 (0.2047)			06	08	10	12	14	16	18	
5.210 (0.2051)		06	08	10	12	14	16	18	20	
5.220 (0.2055)		06	08	10	12	14	16	18	20	
5.230 (0.2059)		06	08	10	12	14	16	18	20	
5.240 (0.2063)		08	10	12	14	16	18	20	22	
5.250 (0.2067)	06	08	10	12	14	16	18	20	22	
5.260 (0.2071)	06	10	12	14	16	18	20	22	24	
5.270 (0.2075)	08	10	12	14	16	18	20	22	24	
5.280 (0.2079)	08	12	14	16	18	20	22	24	26	
5.290 (0.2083)	10	12	14	16	18	20	22	24	26	
5.300 (0.2087)	10	14	16	18	20	22	24	26	28	
5.310 (0.2091)	12	14	16	18	20	22	24	26	28	
5.320 (0.2094)	12	16	18	20	22	24	26	28	30	
5.330 (0.2098)	14	16	18	20	22	24	26	28	30	
5.340 (0.2102)	14	18	20	22	24	26	28	30	32	
5.350 (0.2106)	16	18	20	22	24	26	28	30	32	
5.360 (0.2110)	16	20	22	24	26	28	30	32	34	
5.370 (0.2114)	18	20	22	24	26	28	30	32	34	
5.380 (0.2118)	18	22	24	26	28	30	32	34	36	
5.390 (0.2122)	20	22	24	26	28	30	32	34	36	
5.400 (0.2126)	20	24	26	28	30	32	34	36	38	
5.410 (0.2130)	22	24	26	28	30	32	34	36	38	
5.420 (0.2134)	22	26	28	30	32	34	36	38	40	
5.430 (0.2138)	24	26	28	30	32	34	36	38	40	
5.440 (0.2142)	24	28	30	32	34	36	38	40	42	
5.450 (0.2146)	26	28	30	32	34	36	38	40	42	
5.460 (0.2150)	26	30	32	34	36	38	40	42	44	
5.470 (0.2154)	28	30	32	34	36	38	40	42	44	
5.480 (0.2157)	28	32	34	36	38	40	42	44	46	
5.490 (0.2161)	30	32	34	36	38	40	42	44	46	
5.500 (0.2165)	30	34	36	38	40	42	44	46	48	
5.510 (0.2169)	32	34	36	38	40	42	44	46	48	
5.520 (0.2173)	32	36	38	40	42	44	46	48	50	
5.530 (0.2177)	34	36	38	40	42	44	46	48	50	
5.540 (0.2181)	34	38	40	42	44	46	48	50	52	
5.550 (0.2185)	36	38	40	42	44	46	48	50	52	
5.560 (0.2189)	36	40	42	44	46	48	50	52	54	
5.570 (0.2193)	38	40	42	44	46	48	50	52	54	
5.580 (0.2197)	38	42	44	46	48	50	52	54	56	
5.590 (0.2201)	40	42	44	46	48	50	52	54	56	
5.600 (0.2205)	40	44	46	48	50	52	54	56	58	
5.620 (0.2213)	42	46	48	50	52	54	56	58	60	
5.640 (0.2220)	44	48	50	52	54	56	58	60	62	
5.660 (0.2228)	46	50	52	54	56	58	60	62	64	
5.680 (0.2236)	48	52	54	56	58	60	62	64	66	
5.700 (0.2244)	50	54	56	58	60	62	64	66	68	
5.720 (0.2252)	52	56	58	60	62	64	66	68	70	
5.740 (0.2260)	54	58	60	62	64	66	68	70	72	

Installed lifter thickness mm (in.) \ Measured clearance mm (in.)	0.291 - 0.310 (0.0115 - 0.0122)	0.311 - 0.330 (0.0122 - 0.0130)	0.331 - 0.350 (0.0130 - 0.0138)	0.351 - 0.370 (0.0138 - 0.0146)	0.371 - 0.390 (0.0146 - 0.0154)	0.391 - 0.410 (0.0154 - 0.0161)	0.411 - 0.430 (0.0162 - 0.0169)	0.431 - 0.450 (0.0170 - 0.0177)	0.451 - 0.470 (0.0178 - 0.0185)	0.471 - 0.490 (0.0185 - 0.0193)	0.491 - 0.510 (0.0193 - 0.0201)	0.511 - 0.530 (0.0201 - 0.0209)	0.531 - 0.550 (0.0209 - 0.0217)	0.551 - 0.570 (0.0217 - 0.0224)	0.571 - 0.590 (0.0225 - 0.0232)	0.591 - 0.610 (0.0233 - 0.0240)
5.060 (0.1992)	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
5.080 (0.2000)	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44
5.100 (0.2008)	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46
5.120 (0.2016)	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48
5.140 (0.2024)	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50
5.160 (0.2031)	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52
5.180 (0.2039)	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
5.200 (0.2047)	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56
5.210 (0.2051)	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
5.220 (0.2055)	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58
5.230 (0.2059)	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
5.240 (0.2063)	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60
5.250 (0.2067)	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62
5.260 (0.2071)	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62
5.270 (0.2075)	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64
5.280 (0.2079)	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64
5.290 (0.2083)	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
5.300 (0.2087)	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66
5.310 (0.2091)	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68
5.320 (0.2094)	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68
5.330 (0.2098)	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
5.340 (0.2102)	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
5.350 (0.2106)	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72
5.360 (0.2110)	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72
5.370 (0.2114)	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
5.380 (0.2118)	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
5.390 (0.2122)	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74
5.400 (0.2126)	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74
5.410 (0.2130)	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	
5.420 (0.2134)	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	
5.430 (0.2138)	50	52	54	56	58	60	62	64	66	68	70	72	74	74		
5.440 (0.2142)	50	52	54	56	58	60	62	64	66	68	70	72	74	74		
5.450 (0.2146)	52	54	56	58	60	62	64	66	68	70	72	74	74			
5.460 (0.2150)	52	54	56	58	60	62	64	66	68	70	72	74	74			
5.470 (0.2154)	54	56	58	60	62	64	66	68	70	72	74	74				
5.480 (0.2157)	54	56	58	60	62	64	66	68	70	72	74	74				
5.490 (0.2161)	56	58	60	62	64	66	68	70	72	74	74					
5.500 (0.2165)	56	58	60	62	64	66	68	70	72	74	74					
5.510 (0.2169)	58	60	62	64	66	68	70	72	74	74						
5.520 (0.2173)	58	60	62	64	66	68	70	72	74	74						
5.530 (0.2177)	60	62	64	66	68	70	72	74	74							
5.540 (0.2181)	60	62	64	66	68	70	72	74	74							
5.550 (0.2185)	62	64	66	68	70	72	74	74								
5.560 (0.2189)	62	64	66	68	70	72	74	74								
5.570 (0.2193)	64	66	68	70	72	74	74									
5.580 (0.2197)	64	66	68	70	72	74	74									
5.590 (0.2201)	66	68	70	72	74	74										
5.600 (0.2205)	66	68	70	72	74	74										
5.620 (0.2213)	68	70	72	74	74											
5.640 (0.2220)	70	72	74	74	74											
5.660 (0.2228)	72	74	74	74												
5.680 (0.2236)	74	74	74													
5.700 (0.2244)	74	74														
5.720 (0.2252)	74															
5.740 (0.2260)																

Installed lifter thickness mm (in.) \ Measured clearance mm (in.)	0.611 - 0.630 (0.0241 - 0.0248)	0.631 - 0.650 (0.0248 - 0.0256)	0.651 - 0.670 (0.0256 - 0.0264)	0.671 - 0.690 (0.0264 - 0.0272)	0.691 - 0.710 (0.0272 - 0.0280)	0.711 - 0.730 (0.0280 - 0.0287)	0.731 - 0.750 (0.0288 - 0.0295)	0.751 - 0.770 (0.0296 - 0.0303)	0.771 - 0.790 (0.0304 - 0.0311)	0.791 - 0.810 (0.0311 - 0.0319)	0.811 - 0.830 (0.0319 - 0.0327)	0.831 - 0.850 (0.0327 - 0.0335)	0.851 - 0.870 (0.0335 - 0.0343)	0.871 - 0.890 (0.0343 - 0.0350)	0.891 - 0.910 (0.0351 - 0.0358)	0.911 - 0.930 (0.0359 - 0.0366)
5.060 (0.1992)	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74
5.080 (0.2000)	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	
5.100 (0.2008)	48	50	52	54	56	58	60	62	64	66	68	70	72	74		
5.120 (0.2016)	50	52	54	56	58	60	62	64	66	68	70	72	74			
5.140 (0.2024)	52	54	56	58	60	62	64	66	68	70	72	74				
5.160 (0.2031)	54	56	58	60	62	64	66	68	70	72	74					
5.180 (0.2039)	56	58	60	62	64	66	68	70	72	74						
5.200 (0.2047)	58	60	62	64	66	68	70	72	74							
5.210 (0.2051)	60	62	64	66	68	70	72	74	74							
5.220 (0.2055)	60	62	64	66	68	70	72	74	74							
5.230 (0.2059)	62	64	66	68	70	72	74	74								
5.240 (0.2063)	62	64	66	68	70	72	74	74								
5.250 (0.2067)	64	66	68	70	72	74	74									
5.260 (0.2071)	64	66	68	70	72	74	74									
5.270 (0.2075)	66	68	70	72	74	74										
5.280 (0.2079)	66	68	70	72	74	74										
5.290 (0.2083)	68	70	72	74	74											
5.300 (0.2087)	68	70	72	74	74											
5.310 (0.2091)	70	72	74	74												
5.320 (0.2094)	70	72	74	74												
5.330 (0.2098)	72	74	74													
5.340 (0.2102)	72	74	74													
5.350 (0.2106)	74	74														
5.360 (0.2110)	74	74														
5.370 (0.2114)	74															
5.380 (0.2118)	74															
5.390 (0.2122)																
5.400 (0.2126)																
5.410 (0.2130)																
5.420 (0.2134)																
5.430 (0.2138)																
5.440 (0.2142)																
5.450 (0.2146)																
5.460 (0.2150)																
5.470 (0.2154)																
5.480 (0.2157)																
5.490 (0.2161)																
5.500 (0.2165)																
5.510 (0.2169)																
5.520 (0.2173)																
5.530 (0.2177)																
5.540 (0.2181)																
5.550 (0.2185)																
5.560 (0.2189)																
5.570 (0.2193)																
5.580 (0.2197)																
5.590 (0.2201)																
5.600 (0.2205)																
5.620 (0.2213)																
5.640 (0.2220)																
5.660 (0.2228)																
5.680 (0.2236)																
5.700 (0.2244)																
5.720 (0.2252)																
5.740 (0.2260)																

G

A126931E02

EM

New lifter thickness

Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)

Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)	-	-

Standard intake valve clearance (cold):
0.19 to 0.29 mm (0.0075 to 0.0114 in.)

EM

EXAMPLE:

The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0157 in.). Replace the 5.250 mm (0.2067 in.) lifter with a new No. 42 lifter.

(h) Valve lifter selection chart (exhaust).

Installed lifter thickness mm (in.) \ Measured clearance mm (in.)	0.000 - 0.030 (0.0000 - 0.0012)	0.031 - 0.050 (0.0012 - 0.0020)	0.051 - 0.070 (0.0020 - 0.0028)	0.071 - 0.090 (0.0028 - 0.0035)	0.091 - 0.110 (0.0036 - 0.0043)	0.111 - 0.130 (0.0044 - 0.0051)	0.131 - 0.150 (0.0052 - 0.0059)	0.151 - 0.170 (0.0059 - 0.0067)	0.171 - 0.190 (0.0067 - 0.0075)	0.191 - 0.210 (0.0075 - 0.0083)	0.211 - 0.230 (0.0083 - 0.0091)	0.231 - 0.250 (0.0091 - 0.0098)	0.251 - 0.270 (0.0099 - 0.0106)	0.271 - 0.290 (0.0107 - 0.0114)	0.291 - 0.299 (0.0115 - 0.0118)	0.300 - 0.400 (0.0118 - 0.0157)	0.401 - 0.420 (0.0158 - 0.0165)	0.421 - 0.440 (0.0166 - 0.0173)	0.441 - 0.460 (0.0174 - 0.0181)	0.461 - 0.480 (0.0181 - 0.0189)	0.481 - 0.500 (0.0189 - 0.0197)	0.501 - 0.520 (0.0197 - 0.0205)	0.521 - 0.540 (0.0205 - 0.0213)	0.541 - 0.560 (0.0213 - 0.0220)	0.561 - 0.580 (0.0221 - 0.0228)	0.581 - 0.600 (0.0229 - 0.0236)	0.601 - 0.620 (0.0237 - 0.0244)	0.621 - 0.640 (0.0244 - 0.0252)	0.641 - 0.660 (0.0252 - 0.0260)	0.661 - 0.680 (0.0260 - 0.0268)	0.681 - 0.700 (0.0268 - 0.0276)	0.701 - 0.720 (0.0276 - 0.0283)	0.721 - 0.740 (0.0284 - 0.0291)	0.741 - 0.760 (0.0292 - 0.0299)	0.761 - 0.780 (0.0300 - 0.0307)	0.781 - 0.800 (0.0307 - 0.0315)	0.801 - 0.820 (0.0315 - 0.0323)	0.821 - 0.840 (0.0323 - 0.0331)	0.841 - 0.860 (0.0331 - 0.0339)	0.861 - 0.880 (0.0339 - 0.0346)	0.881 - 0.900 (0.0347 - 0.0354)	0.901 - 0.920 (0.0355 - 0.0362)	0.921 - 0.940 (0.0363 - 0.0370)	0.941 - 0.960 (0.0370 - 0.0378)	0.961 - 0.980 (0.0378 - 0.0386)	0.981 - 1.000 (0.0386 - 0.0394)	1.001 - 1.020 (0.0394 - 0.0402)	1.021 - 1.040 (0.0402 - 0.0409)	1.041 - 1.060 (0.0410 - 0.0417)	1.061 - 1.080 (0.0418 - 0.0425)
5.060 (0.1992)																											28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74
5.080 (0.2000)															06		14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74	
5.100 (0.2008)														06	08		16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74	
5.120 (0.2016)													06	08	10		18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74		
5.140 (0.2024)												06	08	10	12		20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74			
5.160 (0.2031)											06	08	10	12	14		22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74				
5.180 (0.2039)										06	08	10	12	14	16		24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74					
5.200 (0.2047)									06	08	10	12	14	16	18		26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74						
5.210 (0.2051)								06	08	10	12	14	16	18	20		26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74						
5.220 (0.2055)								06	08	10	12	14	16	18	20		28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74							
5.230 (0.2059)							06	08	10	12	14	16	18	20	22		28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74							
5.240 (0.2063)							06	08	10	12	14	16	18	20	22		30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74								
5.250 (0.2067)					06	08	10	12	14	16	18	20	22	24		30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74									
5.260 (0.2071)					06	08	10	12	14	16	18	20	22	24		32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74										
5.270 (0.2075)				06	08	10	12	14	16	18	20	22	24	26		32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74										
5.280 (0.2079)				06	08	10	12	14	16	18	20	22	24	26		34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74											
5.290 (0.2083)			06	08	10	12	14	16	18	20	22	24	26	28		34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74											
5.300 (0.2087)			06	08	10	12	14	16	18	20	22	24	26	28		36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74												
5.310 (0.2091)		06	08	10	12	14	16	18	20	22	24	26	28	30		36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74												
5.320 (0.2094)		06	08	10	12	14	16	18	20	22	24	26	28	30		38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74													
5.330 (0.2098)	06	08	10	12	14	16	18	20	22	24	26	28	30	32		38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74													
5.340 (0.2102)	06	08	10	12	14	16	18	20	22	24	26	28	30	32		40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74														
5.350 (0.2106)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34		40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74														
5.360 (0.2110)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34		42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74															
5.370 (0.2114)	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36		42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74															
5.380 (0.2118)	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36		44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																
5.390 (0.2122)	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38		44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																
5.400 (0.2126)	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38		46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																	
5.410 (0.2130)	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40		46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																	
5.420 (0.2134)	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40		48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																		
5.430 (0.2138)	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42		48	50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																		
5.440 (0.2142)	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42		50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																			
5.450 (0.2146)	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44		50	52	54	56	58	60	62	64	66	68	70	72	74	74	74																			
5.460 (0.2150)	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44		52	54	56	58	60	62	64	66	68	70	72	74	74	74																				
5.470 (0.2154)	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46		52	54	56	58	60	62	64	66	68	70	72	74	74	74																				
5.480 (0.2157)	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46		54	56	58	60	62	64	66	68	70	72	74	74	74																					
5.490 (0.2161)	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		54	56	58	60	62	64	66	68	70	72	74	74	74																					
5.500 (0.2165)	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48		56	58	60	62	64	66	68	70	72	74	74	74																						
5.510 (0.2169)	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50		56	58	60	62	64	66	68	70	72	74	74	74																						
5.520 (0.2173)	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50		58	60	62	64	66	68	70	72	74	74	74																							
5.530 (0.2177)	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52		58	60	62	64	66	68	70	72	74	74	74																							
5.540 (0.2181)	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52		60	62	64	66	68	70	72	74	74	74																							
5.550 (0.2185)	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54		60	62	64	66	68	70	72	74	74	74																							
5.560 (0.2189)	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54		62	64	66	68	70	72	74	74	74																							
5.570 (0.2193)	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56		62	64	66	68	70	72	74	74	74																							
5.580 (0.2197)	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56		64	66	68	70	72	74	74	74																							
5.590 (0.2201)	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58		64	66	68	70	72	74	74	74																							
5.600 (0.2205)	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58		66	68	70	72	74	74	74																							
5.620 (0.2213)	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60		68	70	72	74	74	74																							
5.640 (0.2220)	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62		70	72	74	74	74																							
5.660 (0.2228)	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64		72	74	74	74																							
5.680 (0.2236)	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66		74	74	74																							
5.700 (0.2244)	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68		74	74																							
5.720 (0.2252)	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70		74																							
5.740 (0.2260)	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72																									

G

A114356E01

New lifter thickness

Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)

Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)	-	-

EM

Standard exhaust valve clearance (cold):
0.38 to 0.48 mm (0.0150 to 0.0189 in.)

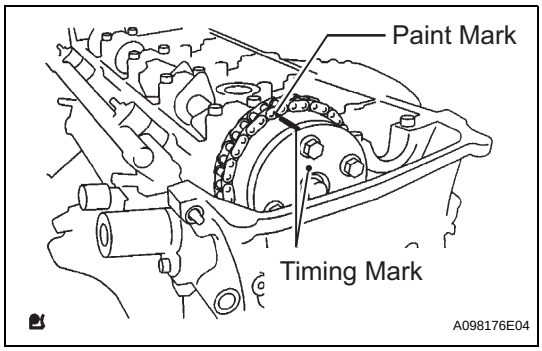
EXAMPLE:
The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.430 mm (0.0169 in.).
Replace the 5.340 mm (0.2102 in.) lifter with a new No. 42 lifter.

(i) Install the selected valve lifter.

11. INSTALL CAMSHAFT

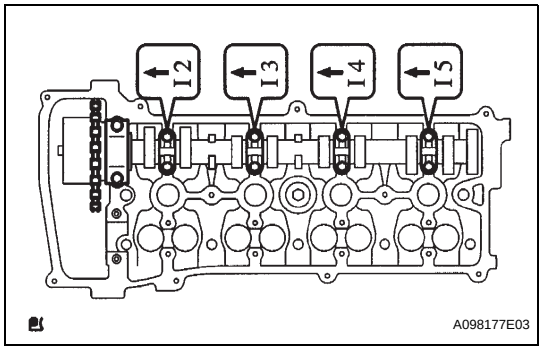
(a) Apply a light coat of engine oil to the journal portion of the camshaft.

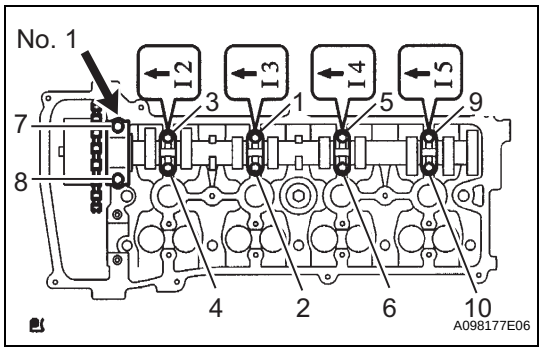
(b) Install the timing chain onto the camshaft timing gear with the paint mark aligned with the timing mark on the camshaft timing gear as shown in the illustration.



(c) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.

(d) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



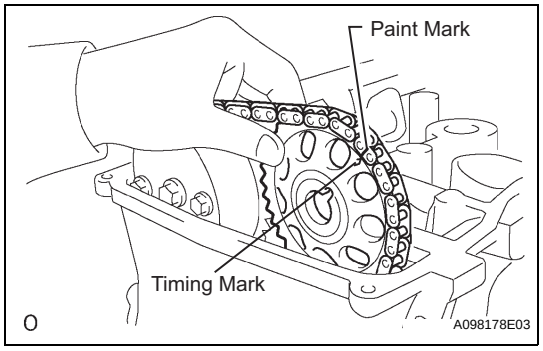


(e) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

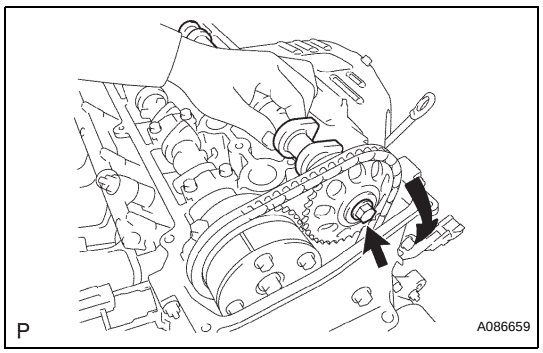
Torque: No. 1 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

12. INSTALL NO. 2 CAMSHAFT

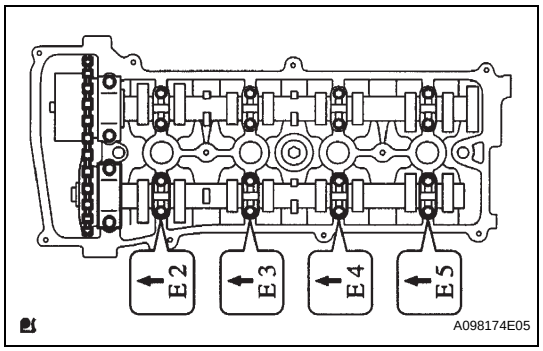
(a) Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.



(b) Put the No. 2 camshaft on the cylinder head with the paint mark of the chain aligned with the timing mark on the camshaft timing sprocket.

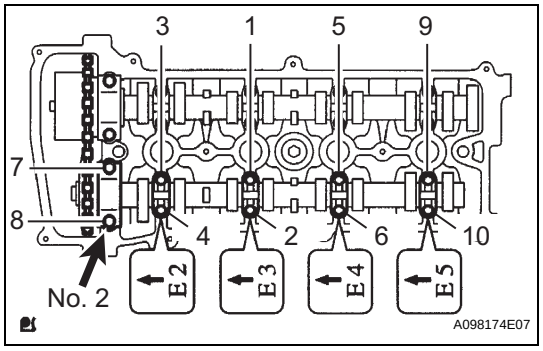


(c) While holding the No. 2 camshaft by hand, temporarily tighten the camshaft timing sprocket set bolt.



(d) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

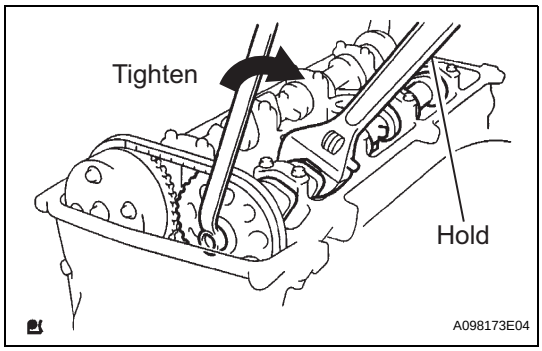
(e) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



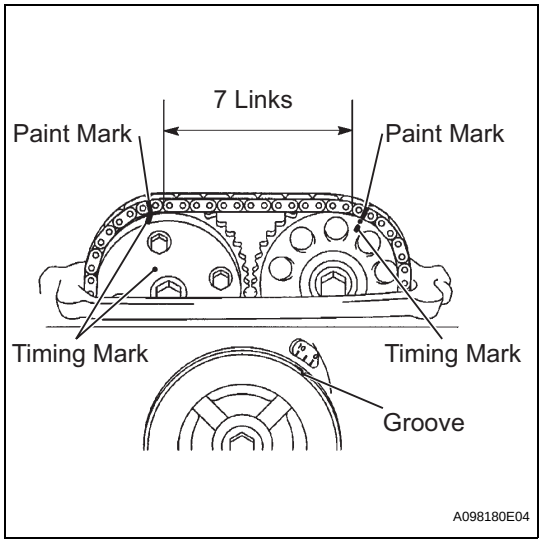
(f) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

Torque: No. 2 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

EM



(g) While holding the camshaft with a wrench, tighten the camshaft timing sprocket set bolt.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)
NOTICE:
Be careful not to damage the valve lifter.

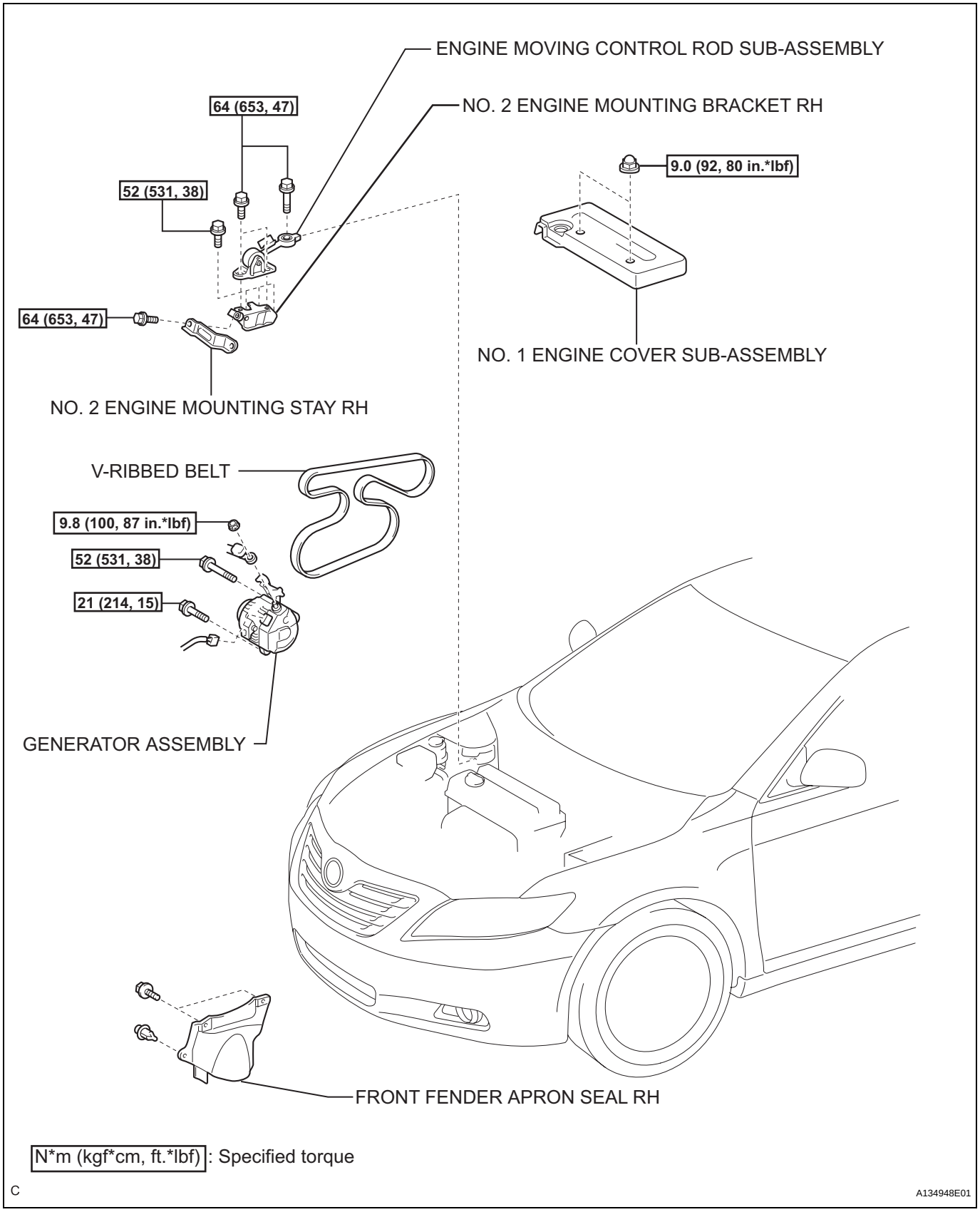


(h) Check that the paint marks on the chain are aligned with the timing marks on the camshaft timing gear and camshaft timing sprocket. Also, check that the crankshaft pulley groove is aligned with the timing mark "0" of the timing chain cover.

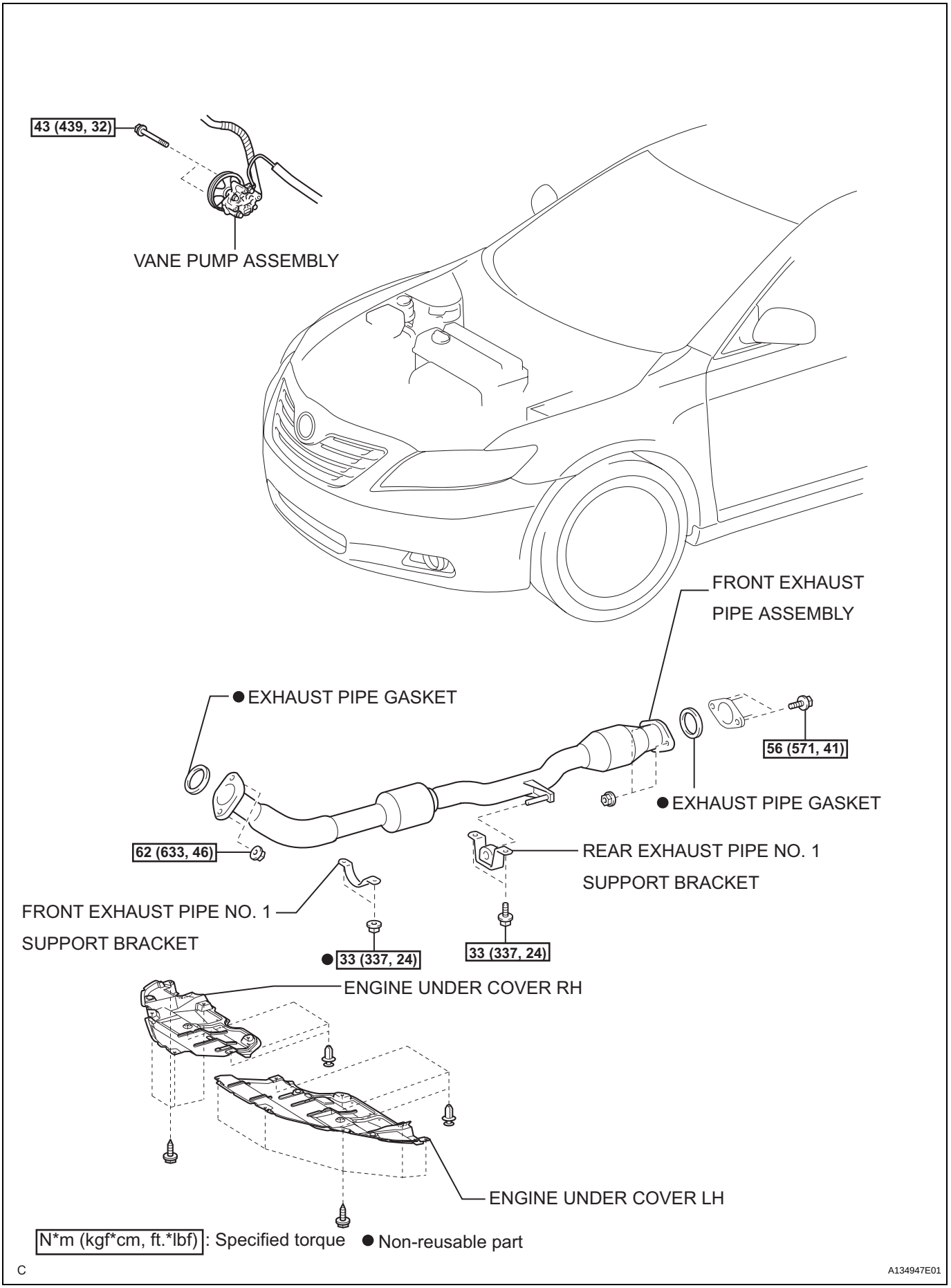
13. **INSTALL NO. 1 CHAIN TENSIONER (See page EM-32)**
14. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-33)**
15. **INSTALL IGNITION COIL ASSEMBLY (See page EM-33)**
16. **CHECK FOR ENGINE OIL LEAKS**
17. **INSTALL NO. 1 ENGINE COVER (See page EM-121)**
18. **INSTALL FRONT FENDER APRON RH**
19. **INSTALL ENGINE UNDER COVER LH**
20. **INSTALL ENGINE UNDER COVER RH**
21. **INSTALL FRONT WHEEL RH**

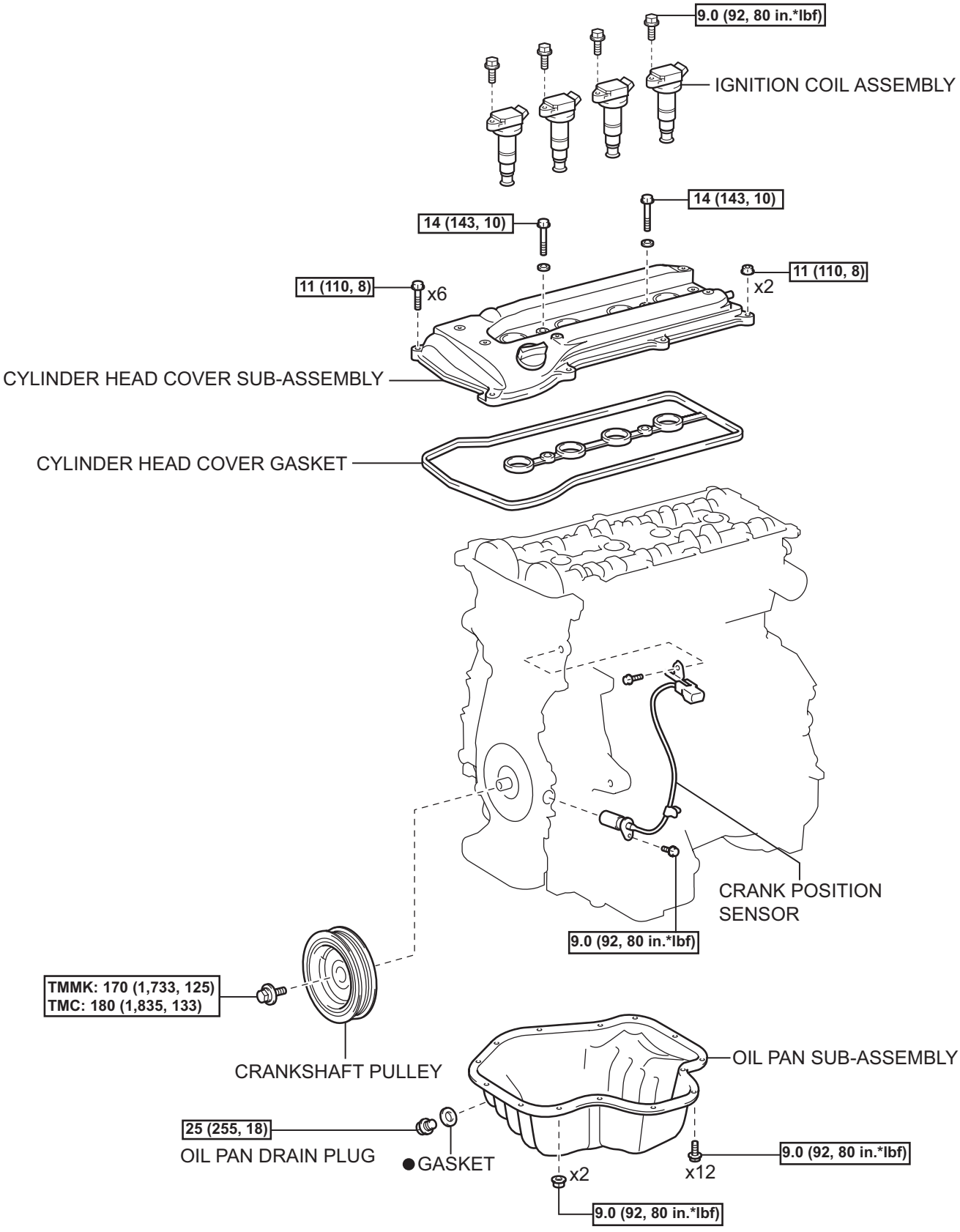
TIMING CHAIN

COMPONENTS



EM

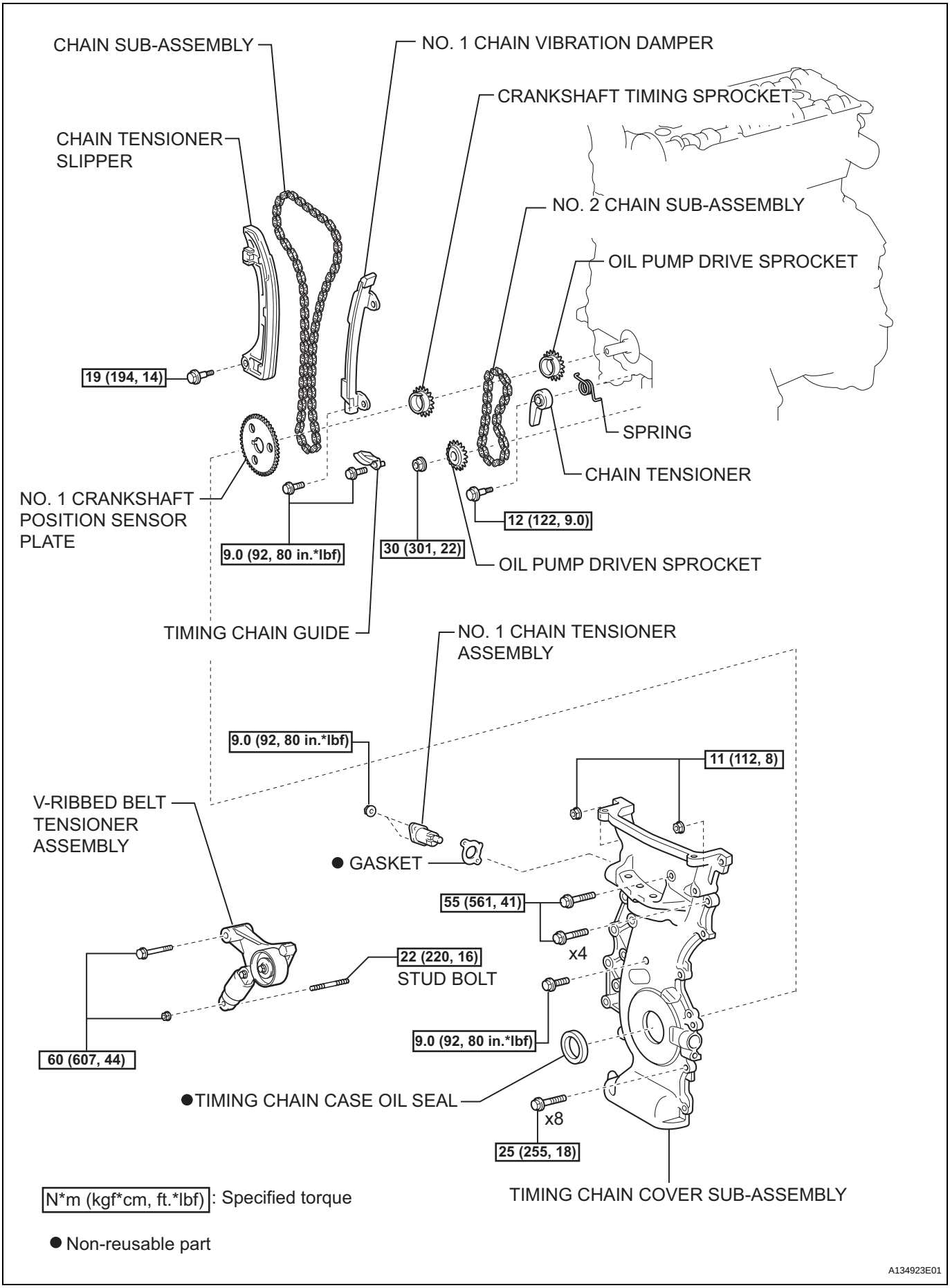

43 (439, 32)
VANE PUMP ASSEMBLY
FRONT EXHAUST
PIPE ASSEMBLY
● EXHAUST PIPE GASKET
56 (571, 41)
● EXHAUST PIPE GASKET
62 (633, 46)
REAR EXHAUST PIPE NO. 1
SUPPORT BRACKET
FRONT EXHAUST PIPE NO. 1
SUPPORT BRACKET
● 33 (337, 24)
33 (337, 24)
ENGINE UNDER COVER RH
ENGINE UNDER COVER LH
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
C
A134947E01



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

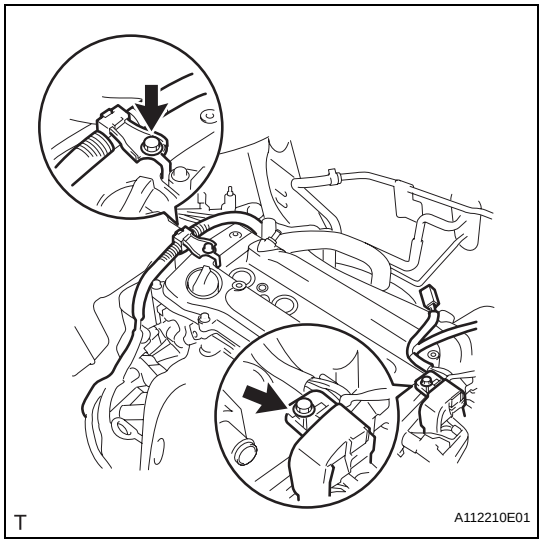
A134922E01

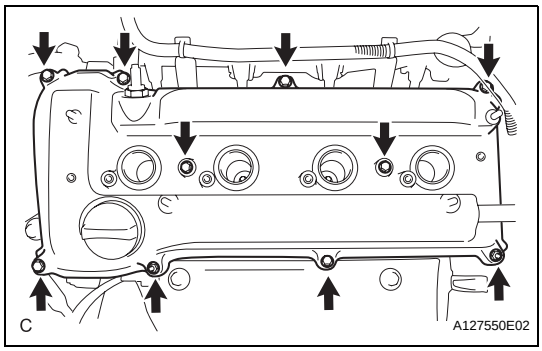
EM


CHAIN SUB-ASSEMBLY
NO. 1 CHAIN VIBRATION DAMPER
CRANKSHAFT TIMING SPROCKET
CHAIN TENSIONER SLIPPER
NO. 2 CHAIN SUB-ASSEMBLY
OIL PUMP DRIVE SPROCKET
19 (194, 14)
SPRING
CHAIN TENSIONER
NO. 1 CRANKSHAFT POSITION SENSOR PLATE
12 (122, 9.0)
9.0 (92, 80 in.*lbf)
30 (301, 22)
OIL PUMP DRIVEN SPROCKET
TIMING CHAIN GUIDE
NO. 1 CHAIN TENSIONER ASSEMBLY
9.0 (92, 80 in.*lbf)
11 (112, 8)
V-RIBBED BELT TENSIONER ASSEMBLY
● GASKET
55 (561, 41)
x4
22 (220, 16)
STUD BOLT
60 (607, 44)
9.0 (92, 80 in.*lbf)
●TIMING CHAIN CASE OIL SEAL
x8
25 (255, 18)
TIMING CHAIN COVER SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
A134923E01

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
3. **REMOVE FRONT WHEEL RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **REMOVE ENGINE UNDER COVER RH**
6. **REMOVE FRONT FENDER APRON SEAL RH**
7. **DRAIN ENGINE OIL (See page LU-4)**
8. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
   HINT:
   See page EX-2.
9. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-95)**
10. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-95)**
11. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-96)**
12. **REMOVE V-RIBBED BELT (See page EM-6)**
13. **REMOVE GENERATOR ASSEMBLY (See page CH-11)**
14. **REMOVE VANE PUMP ASSEMBLY (See page EM-101)**
15. **REMOVE IGNITION COIL ASSEMBLY (See page EM-106)**
16. **DISCONNECT VENTILATION HOSE**
17. **DISCONNECT NO. 2 VENTILATION HOSE**
18. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**
    (a) Remove the 2 bolts and disconnect the 2 engine wires.



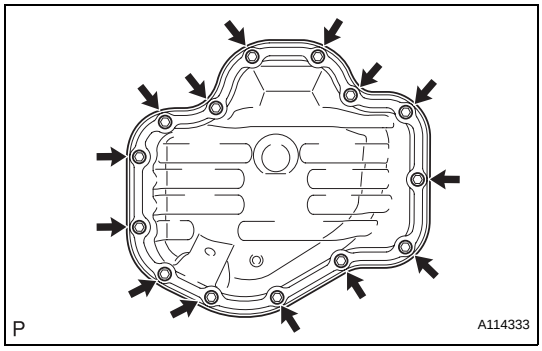


(b) Remove the 8 bolts, 2 nuts, and the cylinder head cover.

19. SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page EM-8)

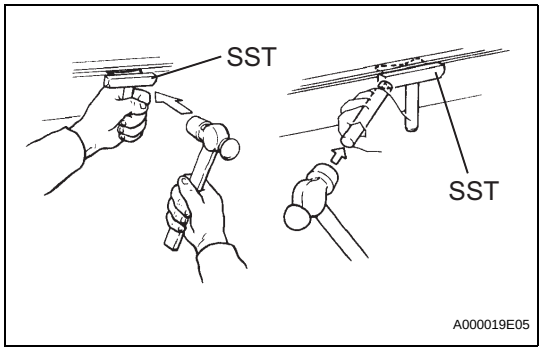
20. REMOVE CRANKSHAFT PULLEY (See page EM-75)

21. REMOVE CRANK POSITION SENSOR (See page ES-411)



22. REMOVE OIL PAN SUB-ASSEMBLY

(a) Remove the 12 bolts and 2 nuts.

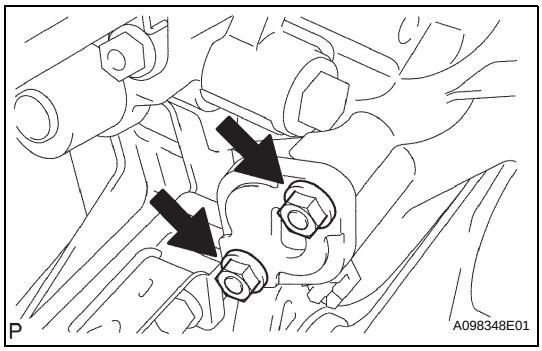


(b) Insert the blade of SST between the crankcase and oil pan. Cut through the sealer and remove the oil pan.

SST 09032-00100

NOTICE:

Be careful not to damage the contact surfaces of the crankcase, chain cover and oil pan.

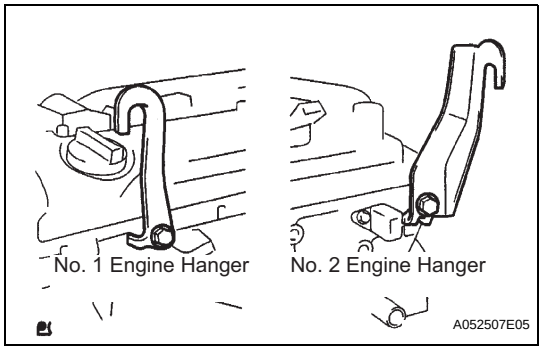


23. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY

(a) Remove the 2 nuts, tensioner and gasket.

NOTICE:

Do not turn the crankshaft without the chain tensioner.



24. INSTALL ENGINE HANGERS

(a) Install the No. 1 engine hanger and No. 2 engine hanger with the bolts as shown in the illustration.

Parts No.:

No. 1 Engine hanger	12281-28010
No. 2 Engine hanger	12282-28010
Bolt	91512-61020

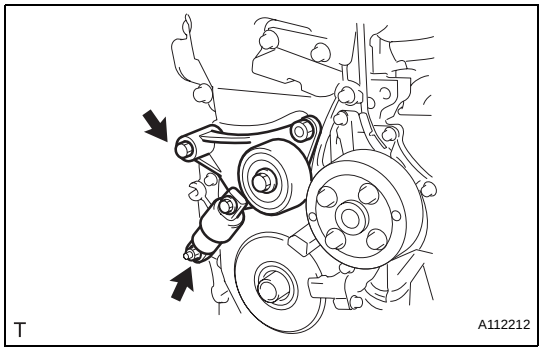
Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)

(b) Attach the sling device to the engine hangers and chain block.

25. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

(a) Lift the engine upward using the chain block.
NOTICE:
Do not lift the engine more than necessary.

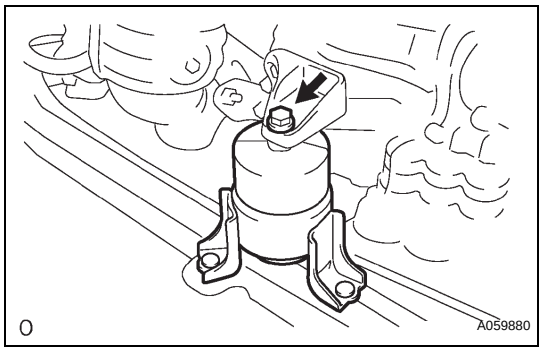
(b) Remove the bolt, nut and V-ribbed belt tensioner.



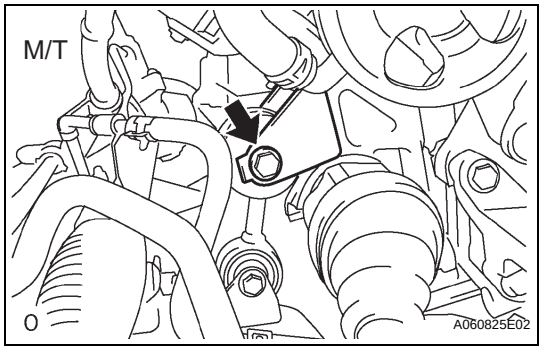
26. REMOVE ENGINE MOUNTING INSULATOR

(a) Attach the engine chain hoist to the engine hangers.
CAUTION:
Do do not attempt to hang the engine by hooking the chain to any other part.

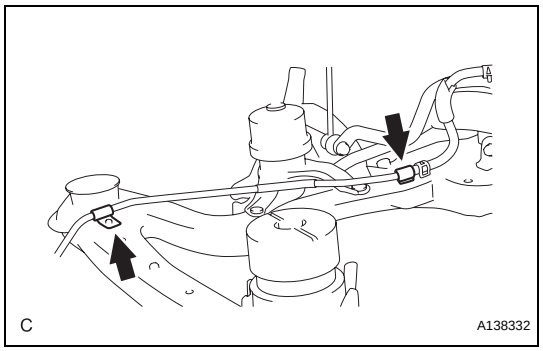
(b) Remove the bolt and disconnect the engine mounting insulator FR.



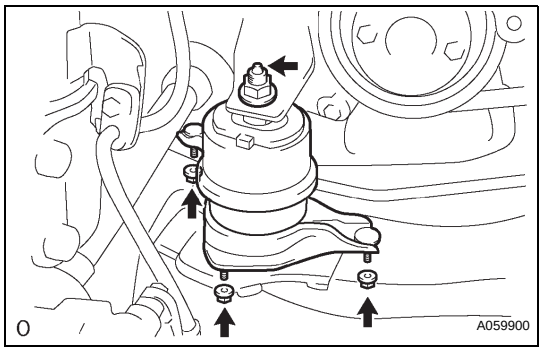
(c) M/T:
Remove the bolt and disconnect the engine lateral control rod.



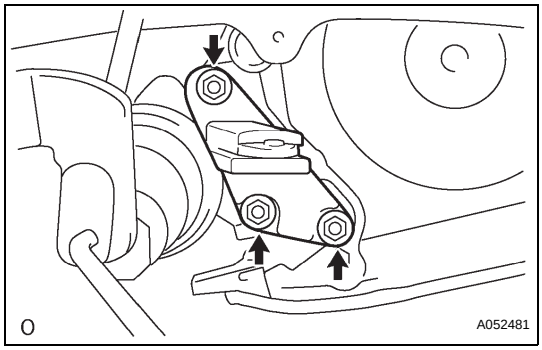
(d) Remove the 2 bolts and disconnect the steering gear return tube clamps from the frame.



EM



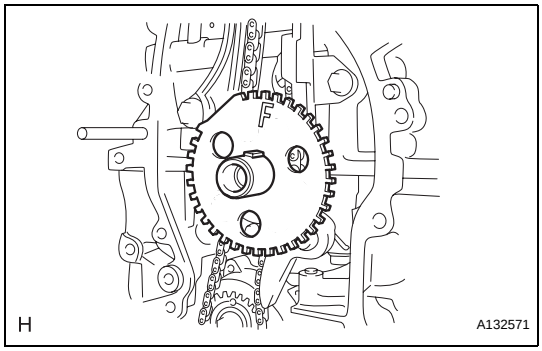
(e) Remove the 4 nuts from the engine mounting insulator RH.
(f) Raise the engine and remove the engine mounting insulator RH.



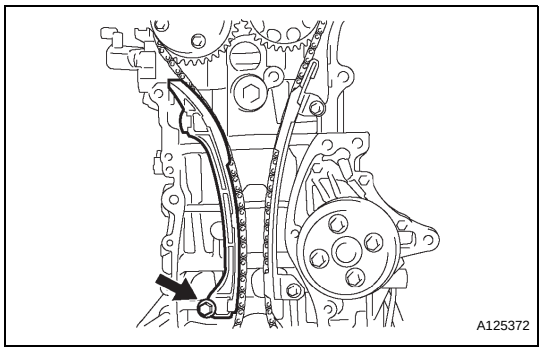
27. REMOVE ENGINE MOUNTING BRACKET RH
(a) Remove the 3 bolts and engine mounting bracket.

28. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-11)

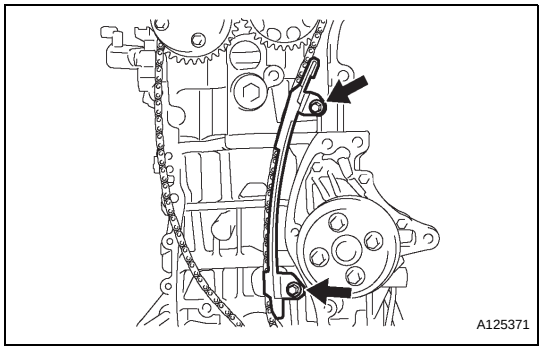
29. REMOVE TIMING CHAIN CASE OIL SEAL (See page LU-12)



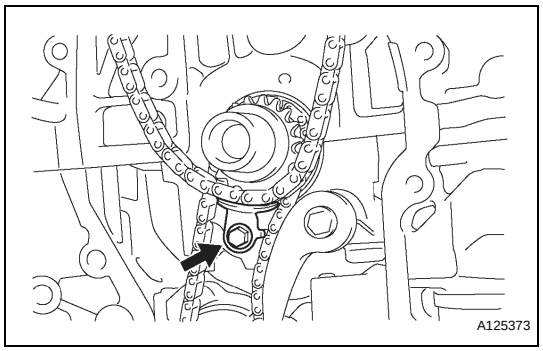
30. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE
(a) Remove the crankshaft position sensor plate.



31. REMOVE CHAIN TENSIONER SLIPPER
(a) Remove the bolt and chain tensioner slipper.

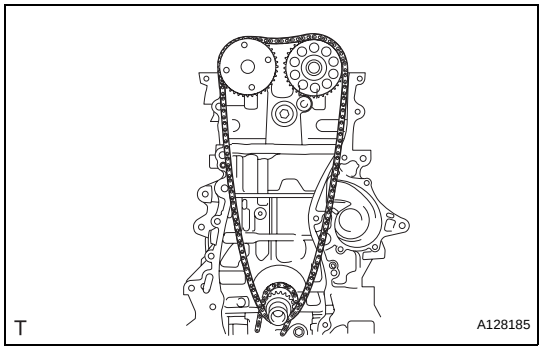


32. REMOVE NO. 1 CHAIN VIBRATION DAMPER
(a) Remove the 2 bolts and chain vibration damper.



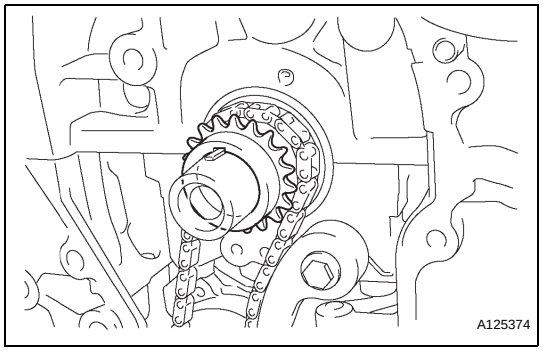
33. REMOVE TIMING CHAIN GUIDE

(a) Remove the bolt and timing chain guide.



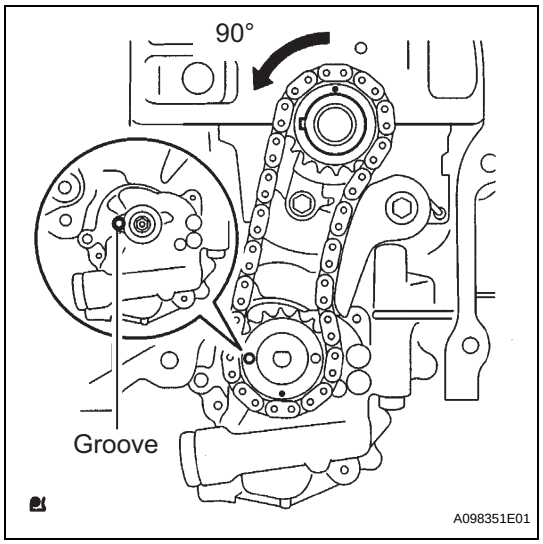
34. REMOVE CHAIN SUB-ASSEMBLY

(a) Remove the chain sub-assembly.



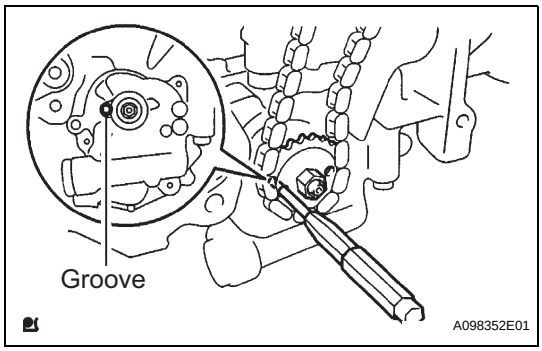
35. REMOVE CRANKSHAFT TIMING SPROCKET

(a) Remove the crankshaft timing sprocket.

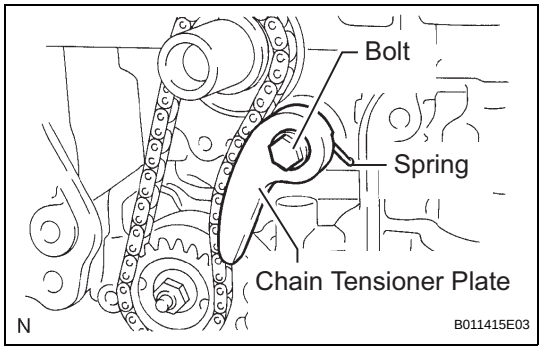


36. REMOVE NO. 2 CHAIN SUB-ASSEMBLY

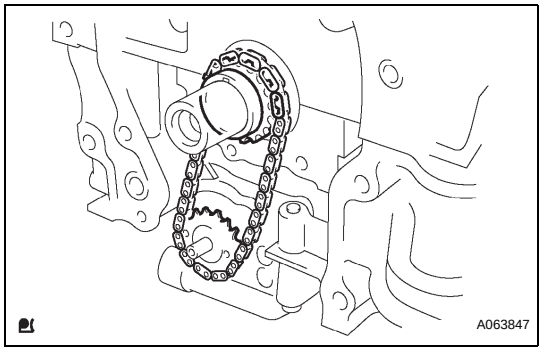
(a) Turn the crankshaft by 90° counterclockwise to align the adjusting hole of the oil pump drive shaft sprocket with the groove of the oil pump.



(b) Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft sprocket to lock the gear in position, and then remove the nut.



(c) Remove the bolt, chain tensioner plate and spring.



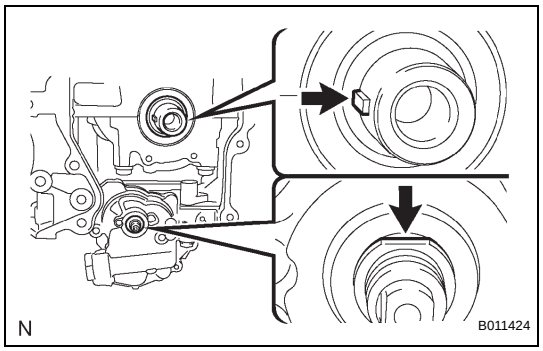
(d) Remove the chain tensioner, oil pump driven sprocket and chain.

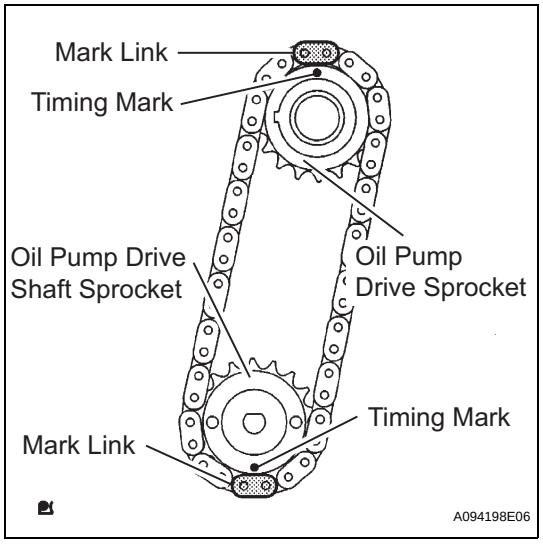
INSPECTION

1. **INSPECT CHAIN SUB-ASSEMBLY (See page EM-138)**
2. **INSPECT NO. 2 CHAIN SUB-ASSEMBLY (See page EM-138)**
3. **INSPECT OIL PUMP DRIVE SPROCKET (See page EM-138)**
4. **INSPECT OIL PUMP DRIVE SHAFT SPROCKET (See page EM-139)**
5. **INSPECT CHAIN TENSIONER SLIPPER (See page EM-140)**
6. **INSPECT NO. 1 CHAIN VIBRATION DAMPER (See page EM-140)**
7. **INSPECT CHAIN TENSIONER PLATE (See page EM-140)**
8. **INSPECT NO. 1 CHAIN TENSIONER (See page EM-140)**

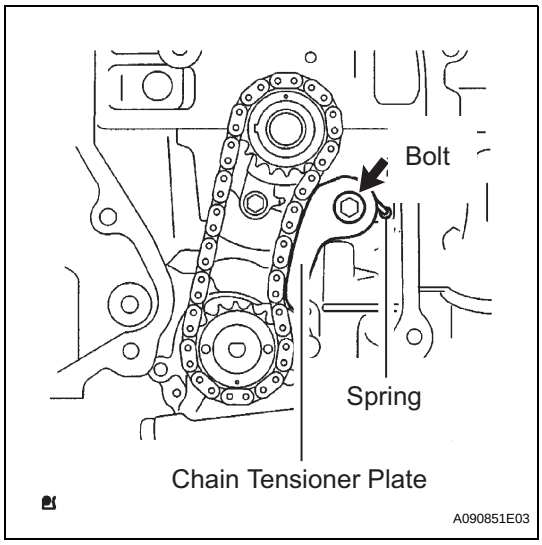
INSTALLATION

1. **INSTALL NO. 2 CHAIN SUB-ASSEMBLY**
   (a) Set the crankshaft key into the left horizontal position.
   (b) Turn the drive shaft so that the cutout faces upward.

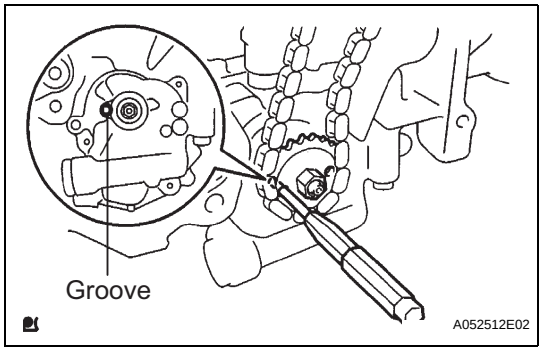




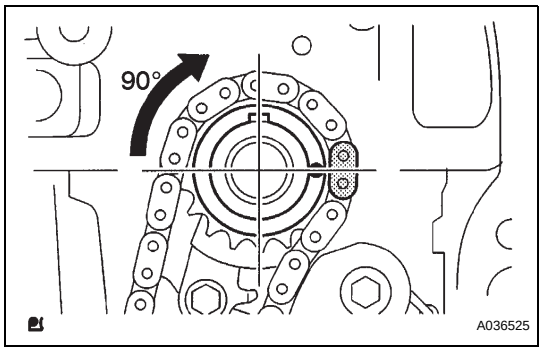
   (c) Align the yellow mark links with the timing marks of each gear as shown in the illustration.
   (d) Install the sprockets onto the crankshaft and oil pump shaft with the chain wrapped on the gears.
   (e) Temporarily tighten the oil pump drive shaft sprocket with the nut.



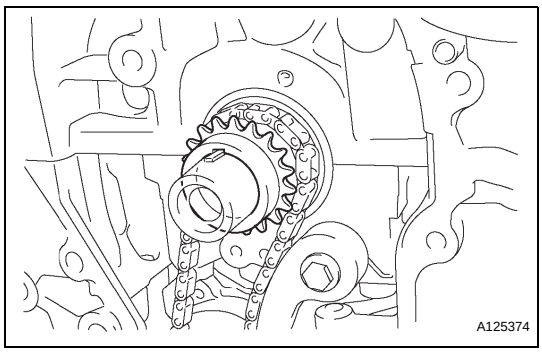
(f) Insert the damper spring into the adjusting hole, and then install the chain tensioner plate with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



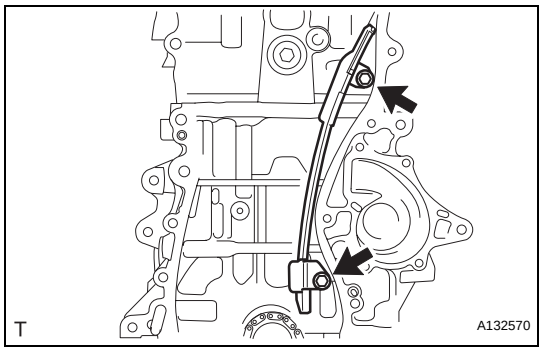
(g) Align the adjusting hole of the oil pump drive shaft sprocket with the groove of the oil pump.
(h) Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft gear to lock the gear in position, and then tighten the nut.
Torque: 30 N*m (301 kgf*cm, 22 ft.*lbf)



(i) Rotate the crankshaft clockwise by 90°, and align the crankshaft key to the top.

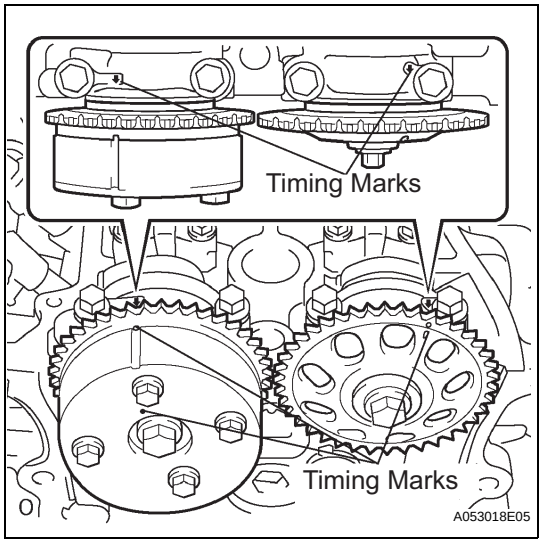


2. INSTALL CRANKSHAFT TIMING SPROCKET
(a) Install the crankshaft timing sprocket.



3. INSTALL NO. 1 CHAIN VIBRATION DAMPER

(a) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

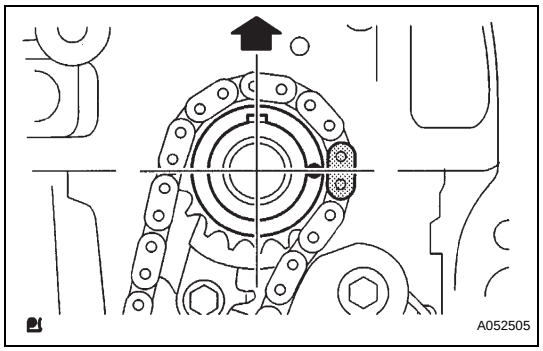


4. INSTALL CHAIN SUB-ASSEMBLY

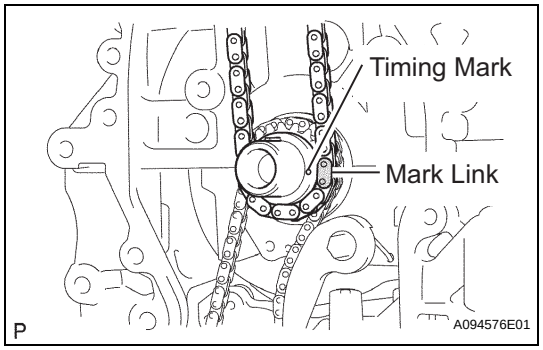
(a) Set the No. 1 cylinder to TDC/compression.

(1) Turn the camshafts with a wrench (using the hexagonal lobe) to align the timing marks of the camshaft timing gear with each timing mark located on the No. 1 and No. 2 bearing caps as shown in the illustration.

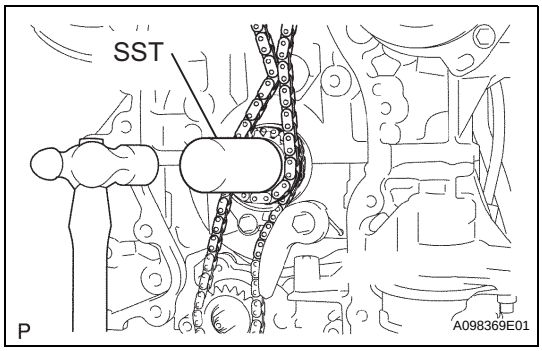
EM



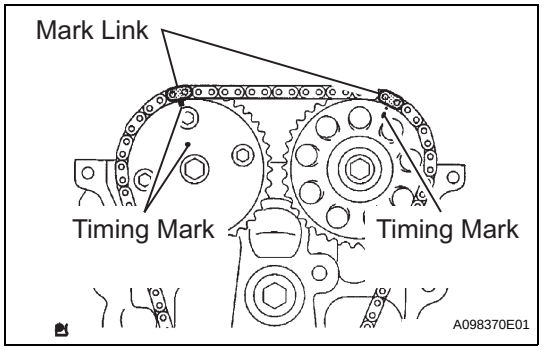
(2) Using the crankshaft pulley bolt, turn the crankshaft to position with the key on the crankshaft upward.



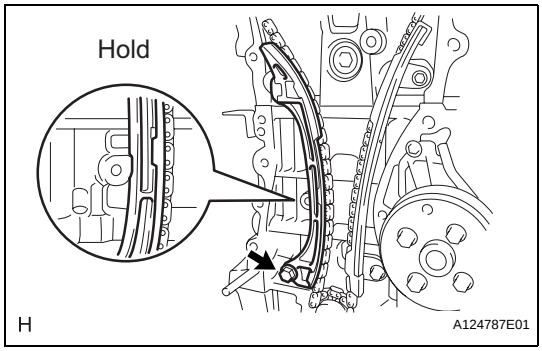
(b) Install the chain onto the crankshaft timing sprocket with the gold or pink mark link aligned with the timing mark on the crankshaft.



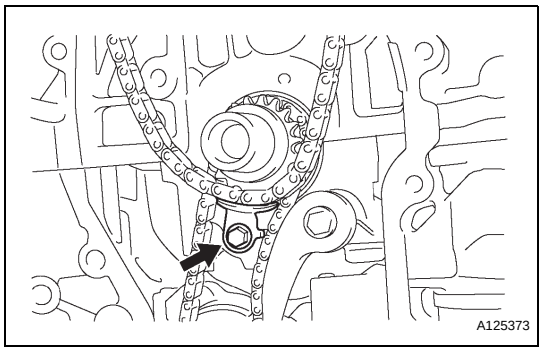
(c) Using SST and a hammer, tap in the crankshaft timing sprocket.
SST 09309-37010



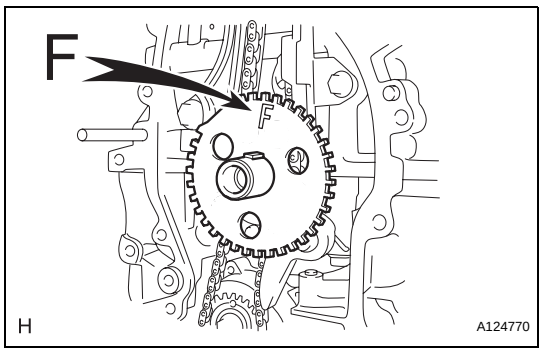
(d) Align the gold or yellow link with each timing mark located on the camshaft timing gear and sprocket, then install the chain.



5. INSTALL CHAIN TENSIONER SLIPPER
(a) Install the chain tensioner slipper with the bolt.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



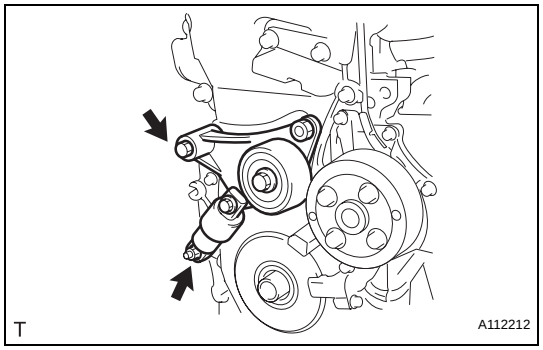
6. INSTALL TIMING CHAIN GUIDE
(a) Install the timing chain guide with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



7. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE
(a) Install the sensor plate with the "F" mark facing forward.

8. INSTALL TIMING CHAIN CASE OIL SEAL (See page LU-15)

9. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-15)



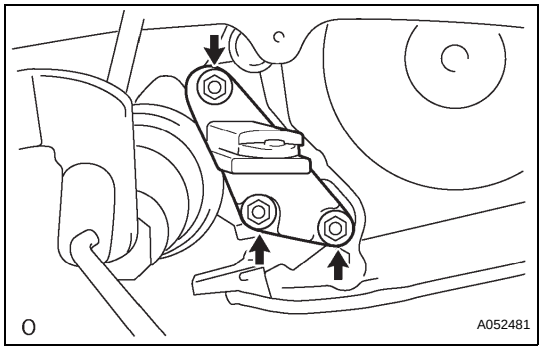
10. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

(a) Install the V-ribbed belt tensioner with the bolt and nut.

Torque: 60 N*m (607 kgf*cm, 44 ft.*lbf)

NOTICE:

Do not lift the engine more than necessary.

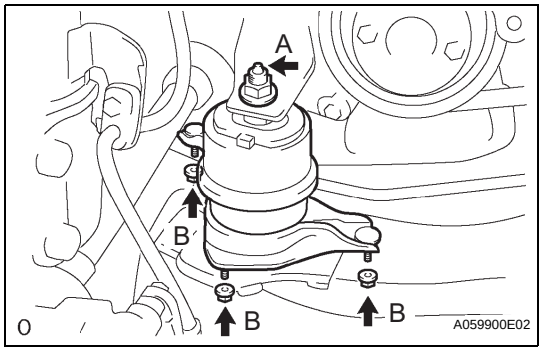


11. INSTALL ENGINE MOUNTING BRACKET RH

(a) Install the engine mounting bracket with the 3 bolts.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

EM



12. INSTALL ENGINE MOUNTING INSULATOR

(a) Raise the engine and install the engine mounting insulator RH.

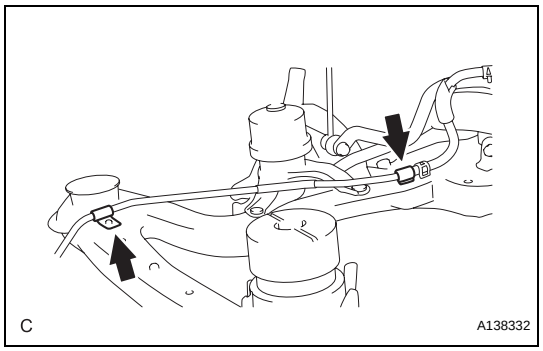
(b) Install the engine mounting insulator RH with the 4 nuts.

Torque: Nut A

95 N*m (969 kgf*cm, 70 ft.*lbf)

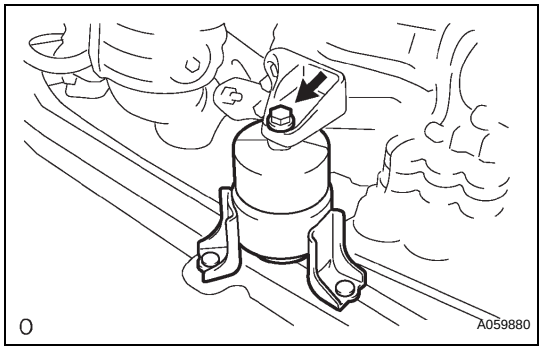
Nut B

87 N*m (888 kgf*cm, 64 ft.*lbf)



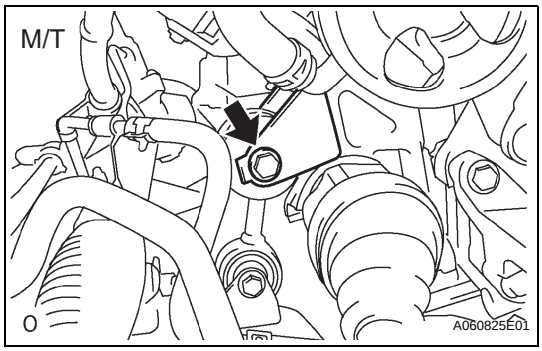
(c) Install the steering gear return tube clamps to the frame with the 2 bolts.

Torque: 8.0 N*m (80 kgf*cm, 69 in.*lbf)

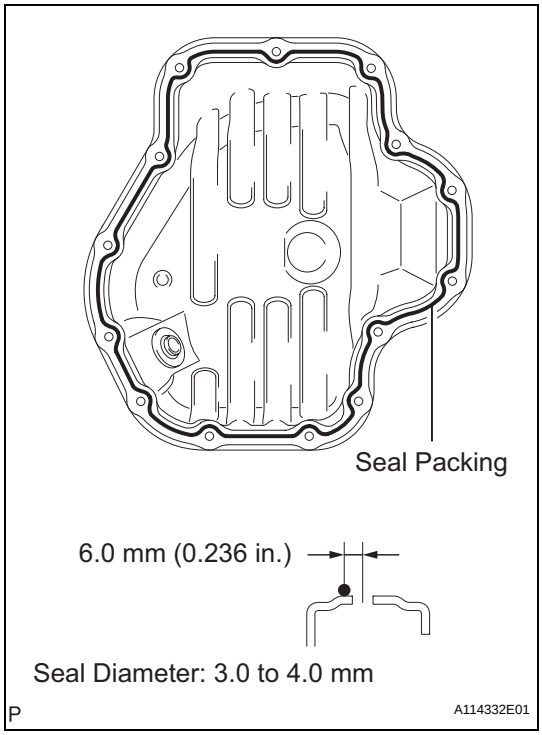


(d) Install the engine mounting insulator FR with the bolt.

Torque: 87 N*m (888 kgf*cm, 64 ft.*lbf)



(e) M/T:
Install the engine lateral control rod with the bolt.
Torque: 89 N*m (910 kgf*cm, 66 ft.*lbf)

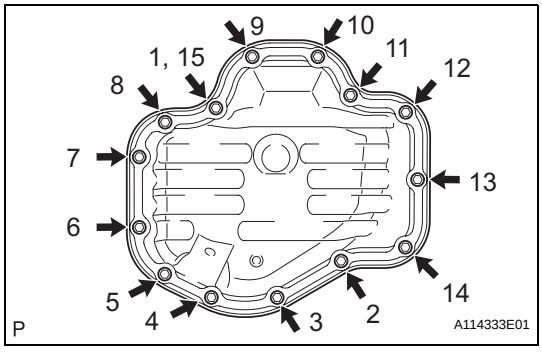


13. INSTALL OIL PAN SUB-ASSEMBLY

(a) Remove any old packing material and be careful not to drop any oil on the contact surfaces of the cylinder block and oil pan.

(b) Apply a continuous bead of seal packing (Diameter 3.0 to 4.0 mm (0.118 to 0.157 in.)) as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent
NOTICE:
- **Remove any oil from the contact surfaces.**
- **Install the oil pan within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

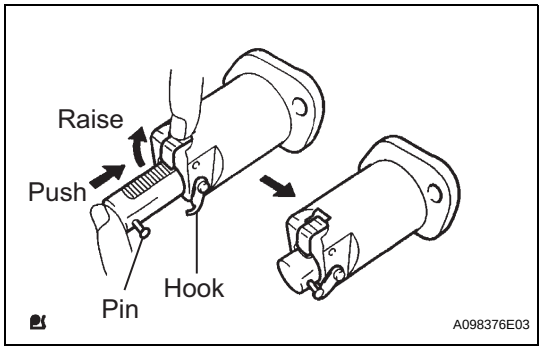
(c) Install the oil pan to the cylinder block.



(d) Uniformly tighten the 12 bolts and 2 nuts in the sequence shown in the illustration.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

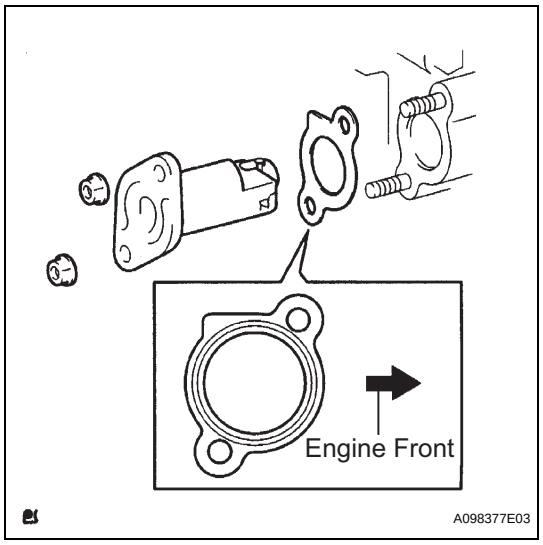
14. INSTALL CRANK POSITION SENSOR (See page ES-411)

15. INSTALL CRANKSHAFT PULLEY (See page EM-76)

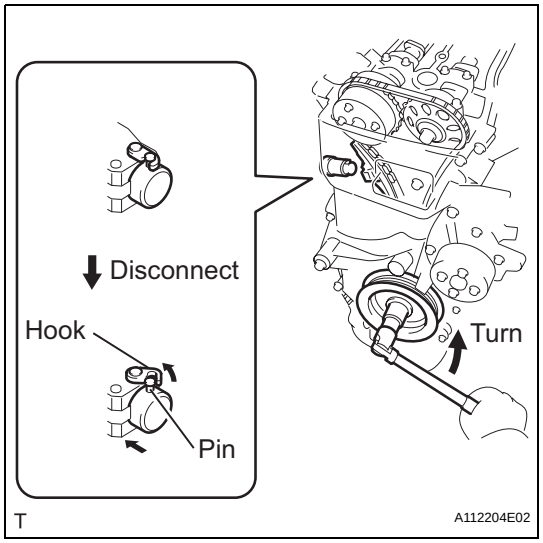


16. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY

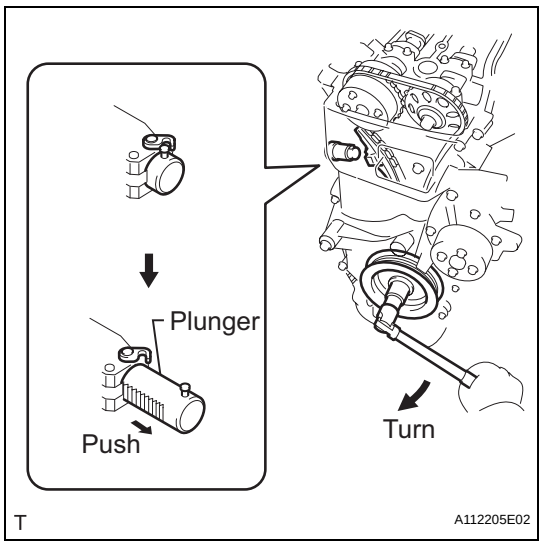
(a) Release the ratchet pawl, then fully push in the plunger and hook the hook to the pin so that the plunger is in the position shown in the illustration.



(b) Install a new gasket and the chain tensioner with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
NOTICE:
If the hook releases the plunger while the chain tensioner is being installed, set the hook again.



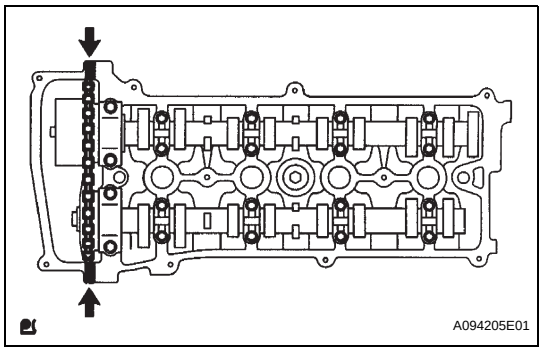
(c) Turn the crankshaft counterclockwise, then disconnect the plunger knock pin from the hook.



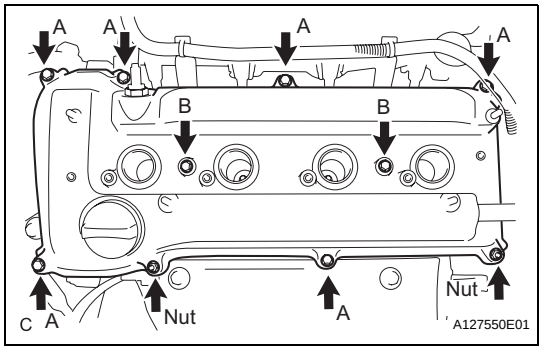
(d) Turn the crankshaft clockwise, then check that the plunger is extended.

17. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

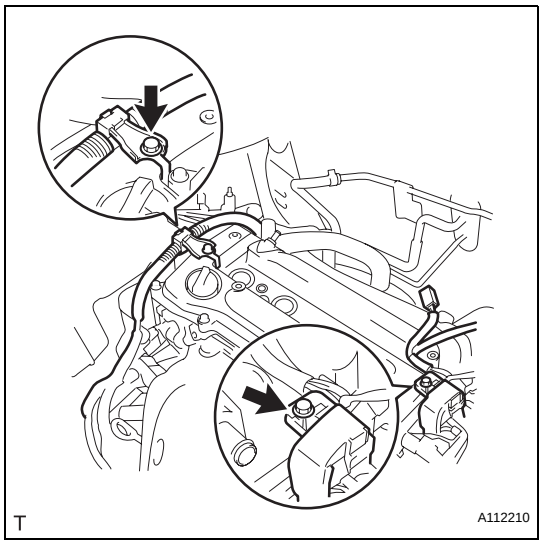
(a) Remove any old packing material from the contact surface.



(b) Apply seal packing to the 2 locations shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes of applying seal packing.**
- **Do not add engine oil for at least 2 hours after installing the cylinder head cover.**



(c) Install the cylinder head cover with the 8 bolts and 2 nuts.
Torque: Bolt A
11 N*m (112 kgf*cm, 8 ft.*lbf)
Bolt B
14 N*m (143 kgf*cm, 10 ft.*lbf)
Nut
11 N*m (112 kgf*cm, 8 ft.*lbf)



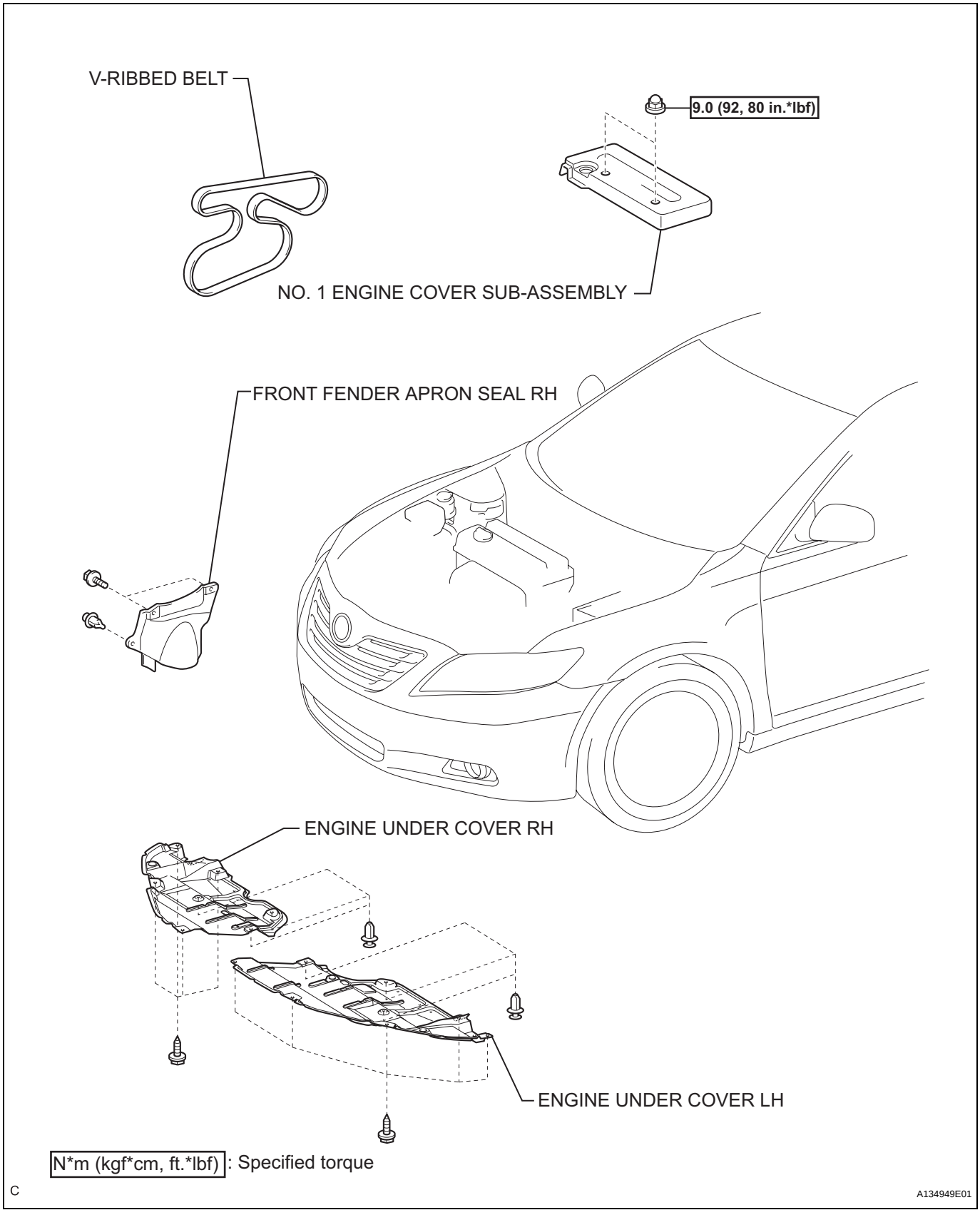
(d) Install the 2 engine wires with the 2 bolts.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

18. **INSTALL NO. 2 VENTILATION HOSE**
19. **INSTALL VENTILATION HOSE**
20. **INSTALL IGNITION COIL ASSEMBLY**
    (a) Install the 4 ignition coils with the 4 bolts.
    Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
21. **INSTALL VANE PUMP ASSEMBLY (See page EM-113)**
22. **INSTALL GENERATOR ASSEMBLY (See page CH-19)**
23. **INSTALL V-RIBBED BELT (See page EM-6)**
24. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-118)**
25. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-119)**
26. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-119)**
27. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
    HINT:
    See page EX-3.
28. **ADD ENGINE OIL**
29. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**
30. **CHECK FOR ENGINE OIL LEAKS**
31. **CHECK FOR EXHAUST GAS LEAKS**
32. **CHECK IGNITION TIMING (See page EM-1)**

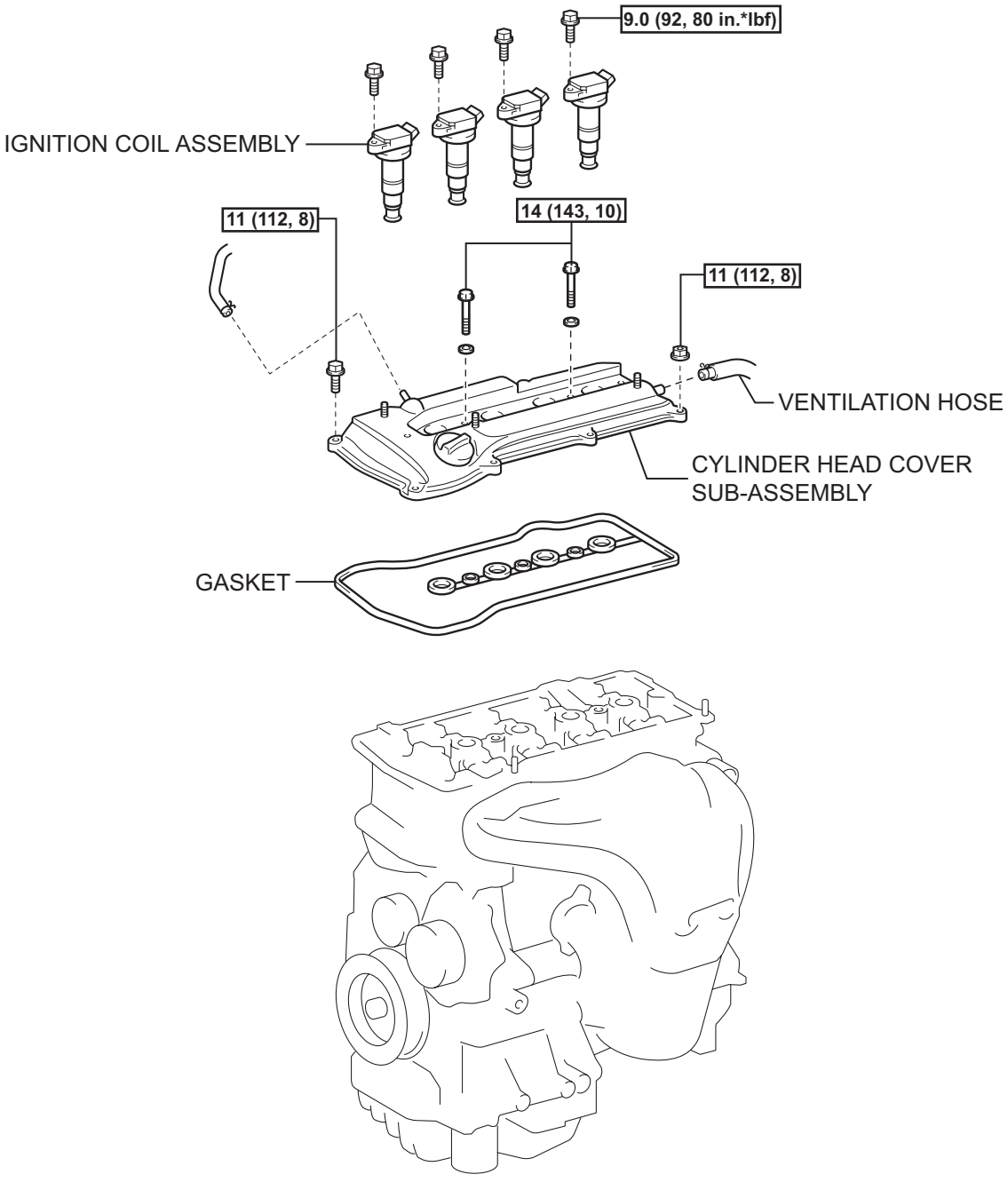
33. **INSTALL FRONT FENDER APRON SEAL RH**
34. **INSTALL ENGINE UNDER COVER LH**
35. **INSTALL ENGINE UNDER COVER RH**
36. **INSTALL FRONT WHEEL RH**
37. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**

CAMSHAFT

COMPONENTS

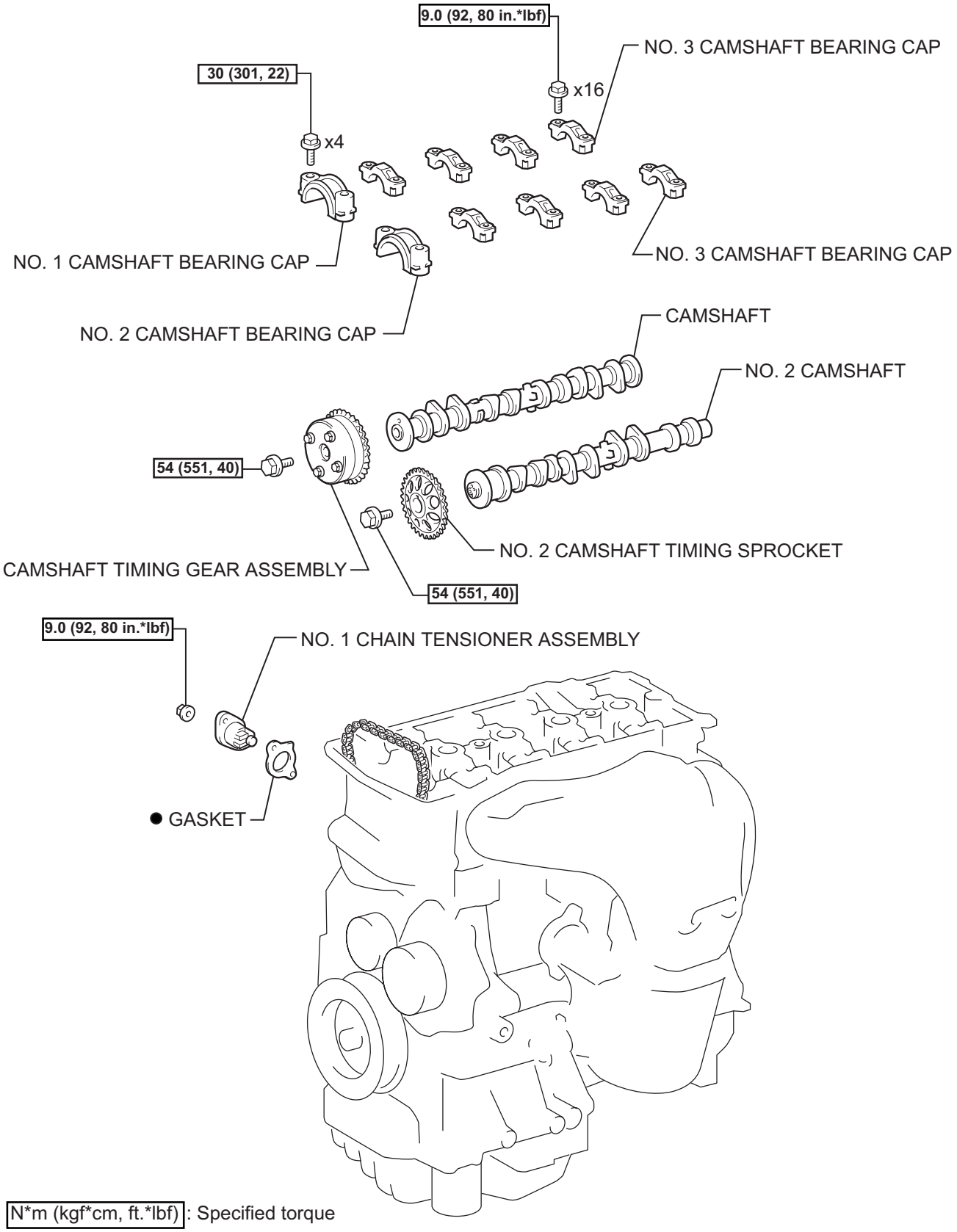


EM



N*m (kgf*cm, ft.*lbf): Specified torque

A134919E01



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

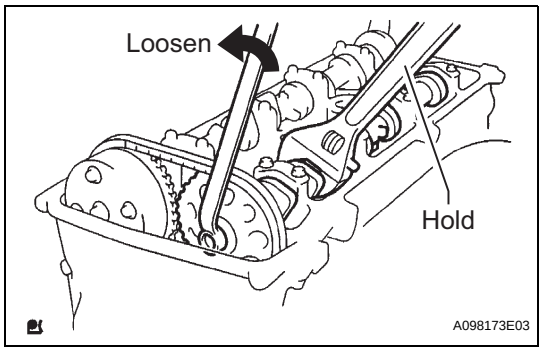
A134921E01

EM

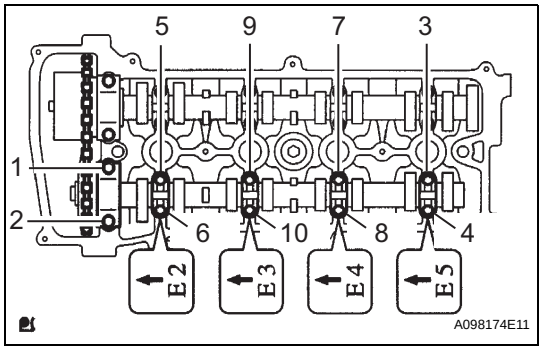
EM

REMOVAL

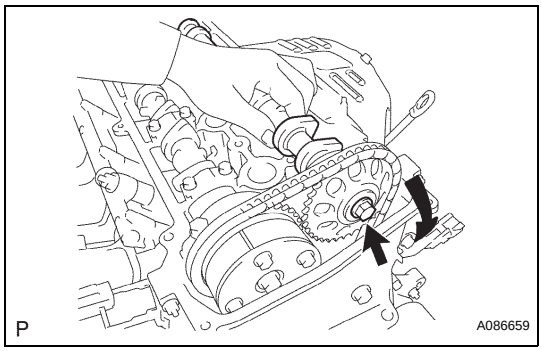
1. **REMOVE FRONT WHEEL RH**
2. **REMOVE ENGINE UNDER COVER LH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE FRONT FENDER APRON SEAL RH**
5. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
6. **REMOVE IGNITION COIL ASSEMBLY (See page EM-106)**
7. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-21)**
8. **SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page EM-8)**
9. **REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-22)**
10. **REMOVE NO. 2 CAMSHAFT**



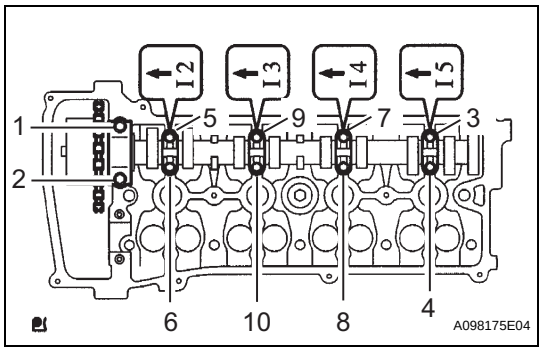
(a) While holding the camshaft with a wrench, loosen the camshaft timing set bolt.



(b) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
(c) Remove the 5 bearing caps.



(d) While holding the No. 2 camshaft by hand, remove the camshaft timing sprocket set bolt.
(e) Remove the camshaft timing sprocket from the No. 2 camshaft with the timing chain wrapped on the sprocket.
(f) Remove the camshaft timing sprocket from the timing chain.

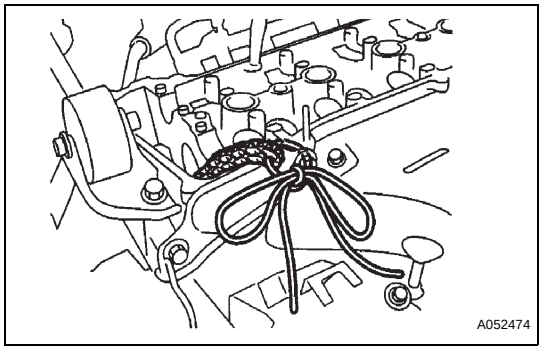


11. REMOVE CAMSHAFT

(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

(b) Remove the 5 bearing caps.

(c) Remove the camshaft and camshaft timing gear while holding the timing chain by hand.

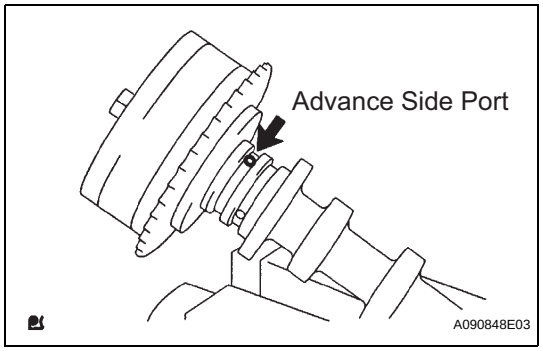


(d) Tie the timing chain with a string as shown in the illustration.

NOTICE:

Be careful not to drop anything inside the timing chain cover.

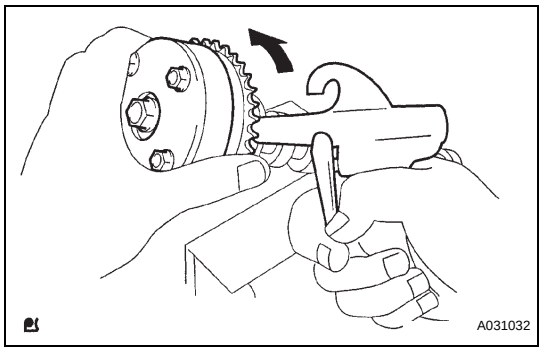
EM



12. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

(a) Clamp the camshaft in a vise, and make sure that the camshaft timing gear does not rotate.

(b) Cover all the oil ports except the advance side port shown in the illustration with vinyl tape.



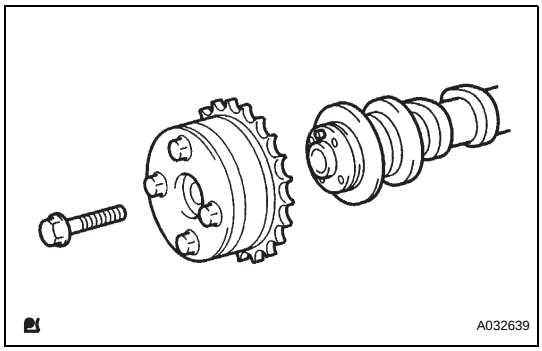
(c) Apply air pressure of 100 kPa (1.0 kgf/cm^2, 14 psi) to the oil path, then turn the camshaft timing gear in the advance direction (counterclockwise) by hand.

CAUTION:

Cover the paths with a shop rag or piece of cloth to avoid oil splashes.

HINT:

Depending on the air pressure, the camshaft timing gear will turn to the advance angle side without applying force by hand. Also, if the pressure is difficult to apply because of air leakage from the port, the lock may be difficult to release.



(d) Remove the flange bolt of the camshaft timing gear.
NOTICE:
- **Be sure not to remove the other 4 bolts.**
- **If planning to reuse the gear, be sure to release the straight pin lock before installing the gear.**

INSPECTION

1. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

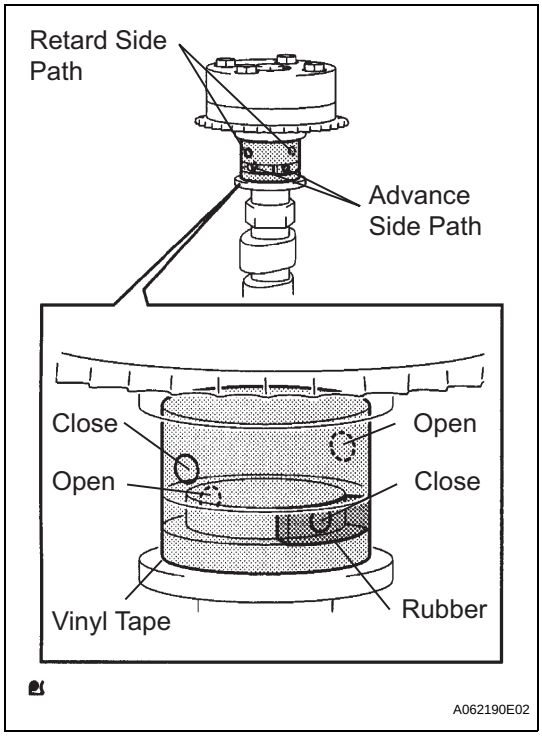
(a) Check the lock of the camshaft timing gear.

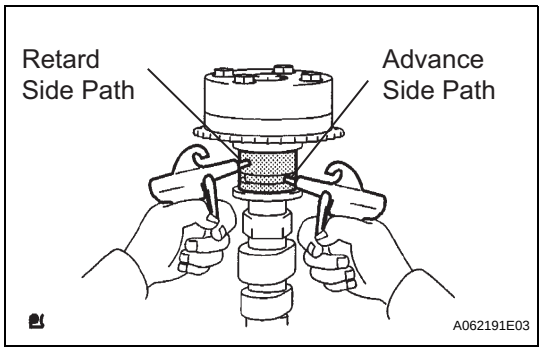
(1) Clamp the camshaft in a vise, and confirm that the camshaft timing gear is locked.
NOTICE:
Be careful not to damage the camshaft.

(b) Release the lock pin.

(1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.
HINT:
The 2 advance side paths are provided in the groove of the camshaft. Plug one of the paths with a rubber piece.

(2) Break through the tape of the advance side path and the retard side path on the opposite side to the hole of the advance side path, as shown in the illustration.





(3) Apply approximately 200 kPa (2.0 kgf/cm^2, 28 psi) of air pressure to the two broken paths.
CAUTION:
Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.

(4) Check that the camshaft timing gear revolves in the advance direction when reducing the air pressure of the retard side path.
OK:
Gear rotates in the advance direction.
HINT:
This operation releases the lock pin for the most retarded position.

(5) When the camshaft timing gear reaches the most advanced position, remove the air gun from the retard side path and advance side path, in that order.

NOTICE:

Do not remove the air gun from the advance side path first. The gear may abruptly shift in the retard direction and break the lock pin.

(c) Check for smooth rotation.

(1) Rotate the camshaft timing gear within its movable range several times, but do not turn it to the most retarded position. Check that the gear rotates smoothly.

OK:

Gear rotates smoothly.

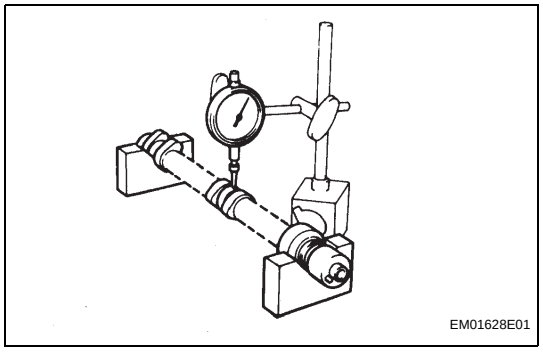
NOTICE:

Do not use an air gun to check for smooth operation.

(d) Check the lock in the most retarded position.

(1) Confirm that the camshaft timing gear is locked at the most retarded position.

2. INSPECT CAMSHAFT


EM01628E01

(a) Inspect the camshaft for runout.

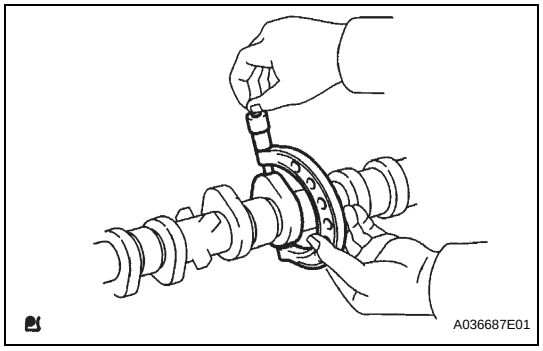
(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.03 mm (0.0012 in.)

If the circle runout is greater than the maximum, replace the camshaft.


A036687E01

(b) Inspect the cam lobes.

(1) Using a micrometer, measure the cam lobe height.

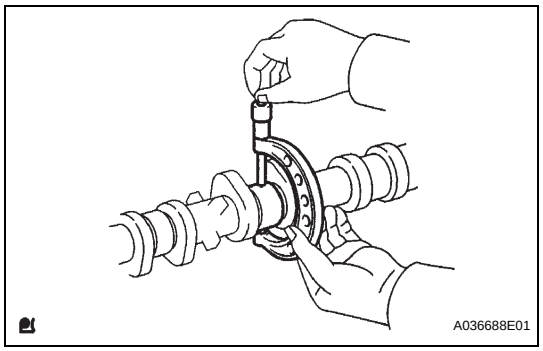
Standard cam lobe height:

47.306 to 47.406 mm (1.8624 to 1.8664 in.)

Minimum cam lobe height:

47.196 mm (1.8581 in.)

If the cam lobe height is less than the minimum, replace the camshaft.


A036688E01

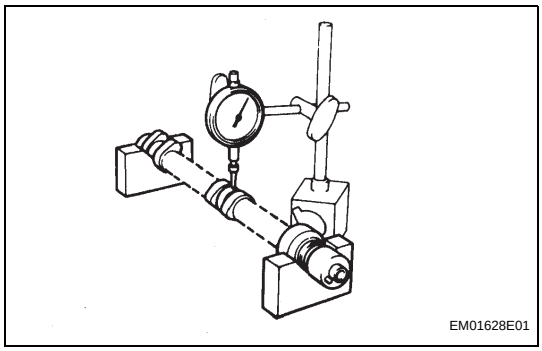
(c) Inspect the camshaft journals.

(1) Using a micrometer, measure the journal diameter.

Standard journal diameter

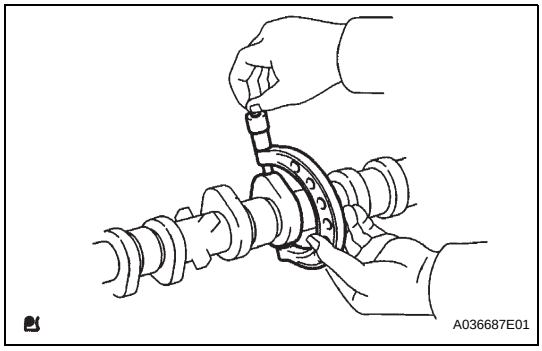
Journal Position	Specified Condition
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

If the journal diameter is not as specified, check the oil clearance.

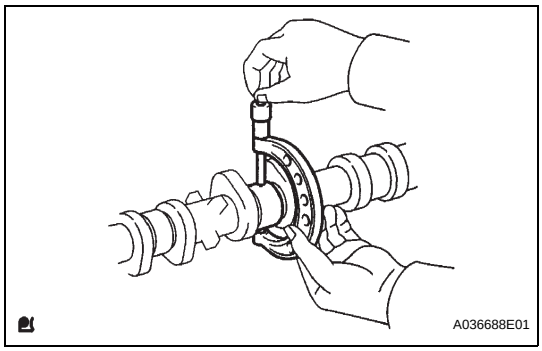


3. INSPECT NO. 2 CAMSHAFT

(a) Inspect the camshaft for runout.
(1) Place the camshaft on V-blocks.
(2) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.03 mm (0.0012 in.)
If the circle runout is greater than the maximum, replace the No. 2 camshaft.



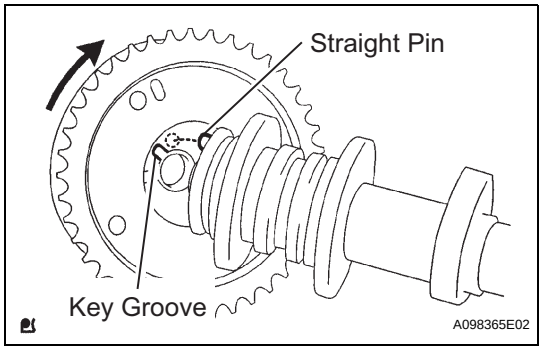
(b) Inspect the cam lobes.
(1) Using a micrometer, measure the cam lobe height.
Standard cam lobe height:
45.983 to 46.083 mm (1.8104 to 1.8143 in.)
Minimum cam lobe height:
45.873 mm (1.8060 in.)
If the cam lobe height is less than the minimum, replace the No. 2 camshaft.



(c) Inspect the camshaft journals.
(1) Using a micrometer, measure the journal diameter.
Standard journal diameter

Journal Position	Specified Condition
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

If the journal diameter is not as specified, check the oil clearance.



INSTALLATION

1. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

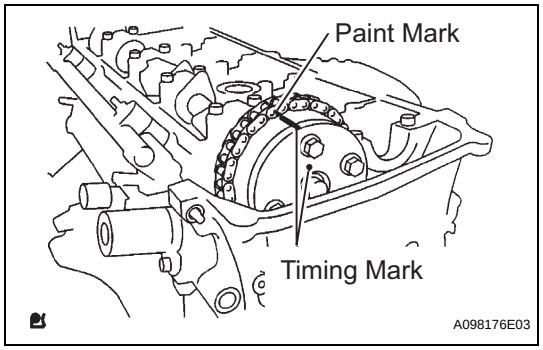
(a) Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned, as shown in the illustration.
(b) Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.
NOTICE:
Be sure not to turn the camshaft timing gear to the retard angle side (the right angle).
(c) Check that there is no clearance between the gear and camshaft.
(d) Tighten the flange bolt with the camshaft timing gear fixed in place.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

(e) Check that the camshaft timing gear can move to the retard angle side (the right direction) and is locked in the most retarded position.

2. INSTALL CAMSHAFT

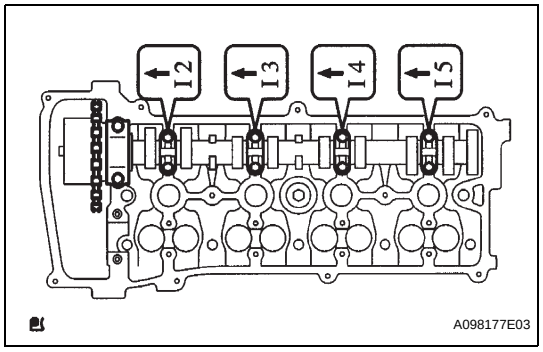
(a) Apply a light coat of engine oil to the journal portion of the camshaft.

(b) Install the timing chain onto the camshaft timing gear with the paint mark aligned with the timing mark in the camshaft timing gear as shown in the illustration.



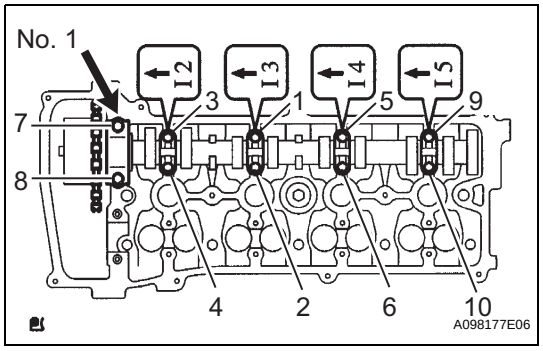
(c) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.

(d) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



(e) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

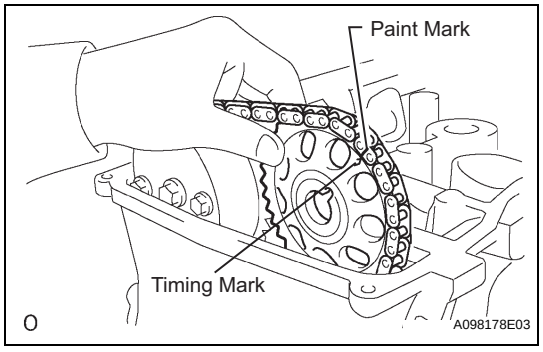
Torque: No. 1 Bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 Bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

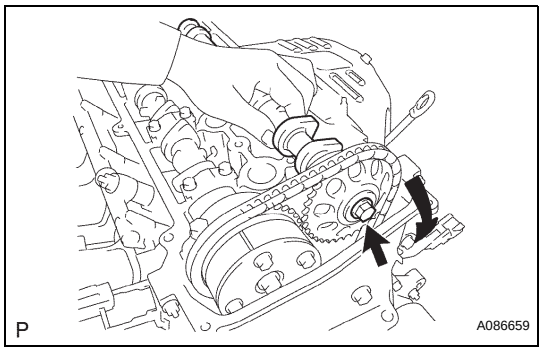


3. INSTALL NO. 2 CAMSHAFT

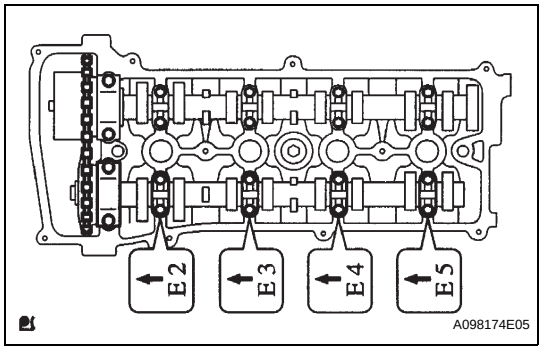
(a) Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.

(b) Put the No. 2 camshaft on the cylinder head with the paint mark of the chain aligned with the timing mark on the camshaft timing sprocket.



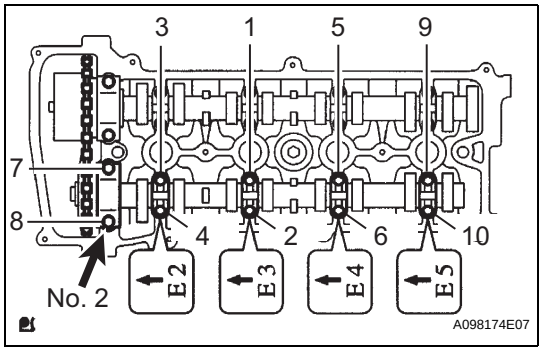


(c) While holding the No. 2 camshaft by hand, temporarily tighten the camshaft timing sprocket set bolt.



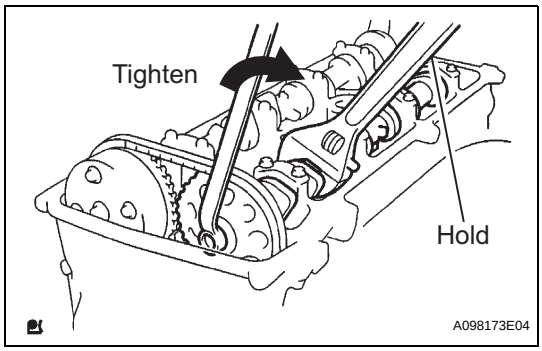
(d) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

(e) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



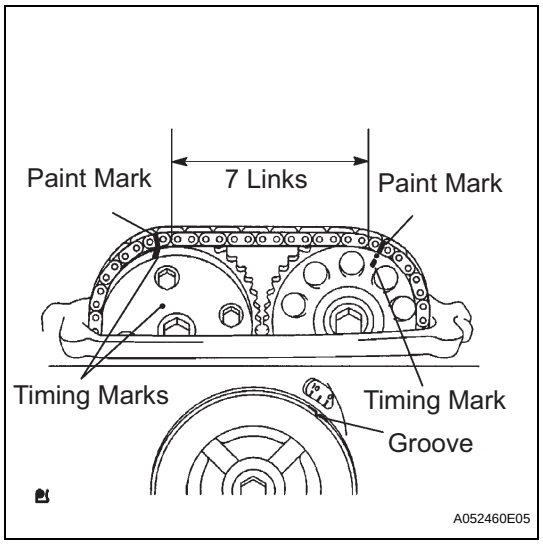
(f) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

Torque: No. 2 Bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 Bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)



(g) While holding the camshaft with a wrench, tighten the camshaft timing sprocket set bolt.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

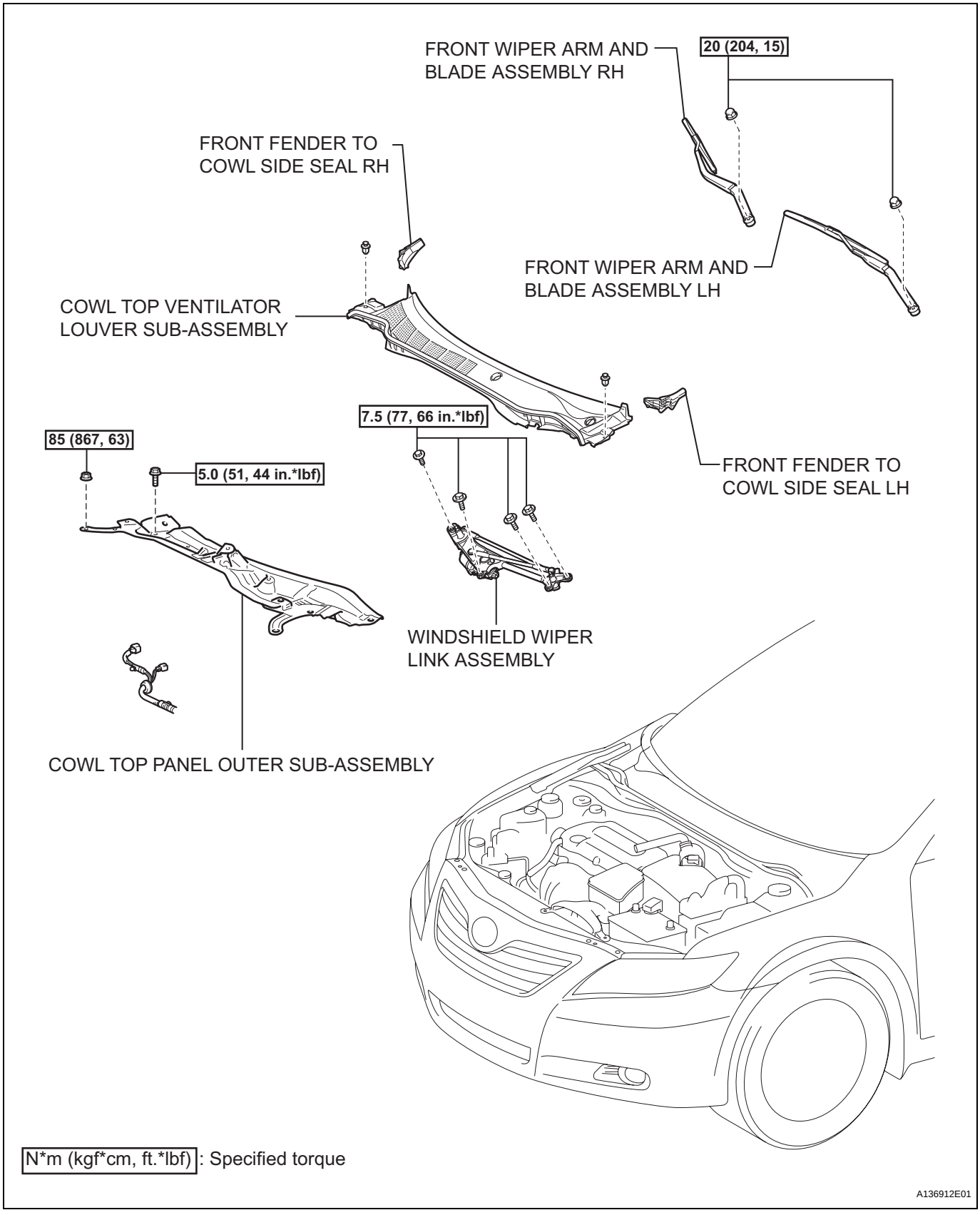


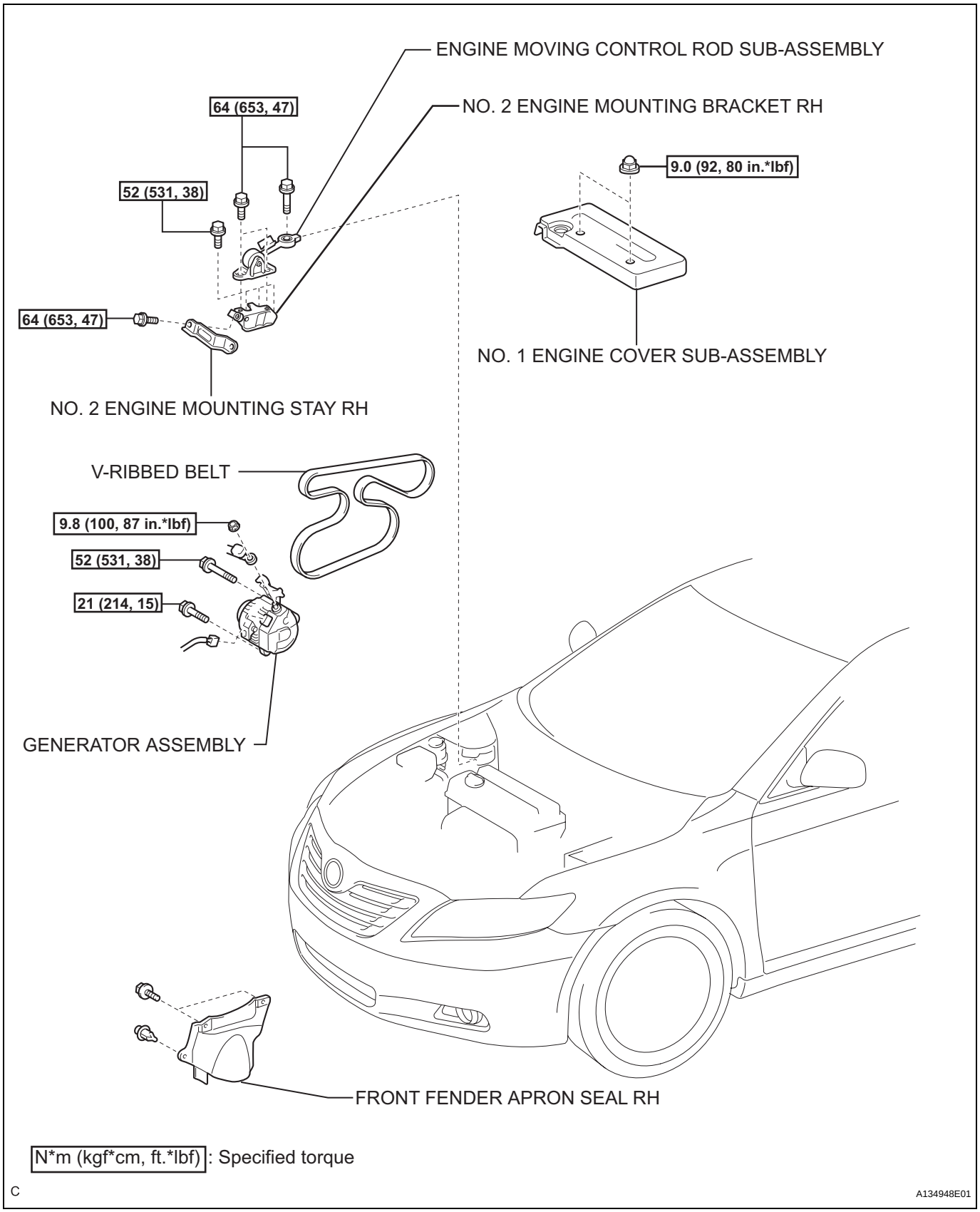
(h) Check that the paint marks on the chain are aligned with the timing marks on the camshaft timing gear and camshaft timing sprocket. Also, check that the crankshaft pulley groove is aligned with the timing mark "0" of the timing chain cover.

4. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-32)**
5. **CHECK VALVE CLEARANCE (See page EM-8)**
6. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-33)**
7. **INSTALL IGNITION COIL ASSEMBLY (See page EM-33)**
8. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**
9. **INSTALL FRONT FENDER APRON SEAL RH**
10. **INSTALL ENGINE UNDER COVER LH**
11. **INSTALL ENGINE UNDER COVER RH**
12. **INSTALL FRONT WHEEL RH**
13. **CHECK FOR ENGINE OIL LEAKS**

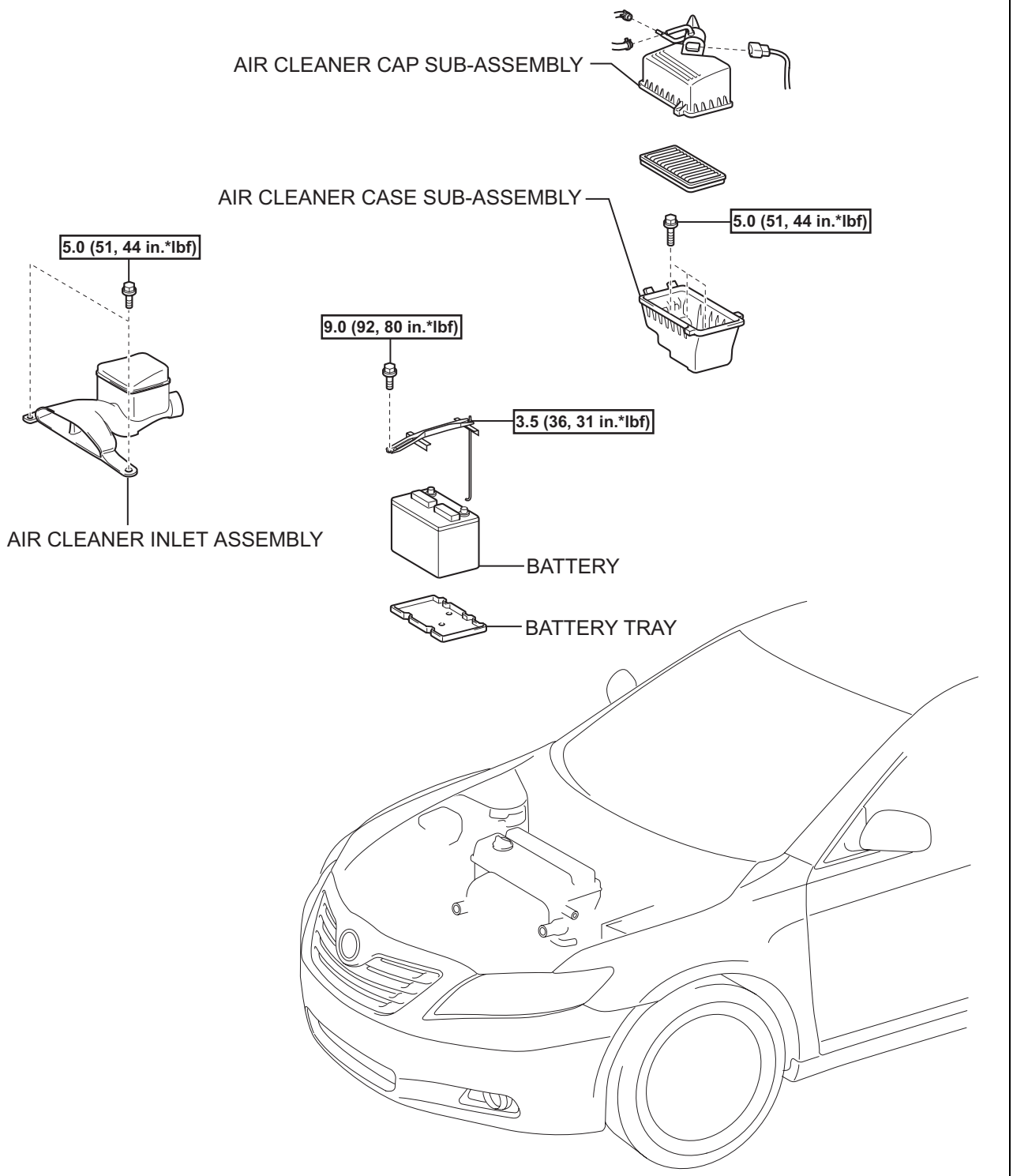
CYLINDER HEAD

COMPONENTS




ENGINE MOVING CONTROL ROD SUB-ASSEMBLY
NO. 2 ENGINE MOUNTING BRACKET RH
64 (653, 47)
52 (531, 38)
64 (653, 47)
9.0 (92, 80 in.*lbf)
NO. 1 ENGINE COVER SUB-ASSEMBLY
NO. 2 ENGINE MOUNTING STAY RH
V-RIBBED BELT
9.8 (100, 87 in.*lbf)
52 (531, 38)
21 (214, 15)
GENERATOR ASSEMBLY
FRONT FENDER APRON SEAL RH
N*m (kgf*cm, ft.*lbf): Specified torque
C
A134948E01

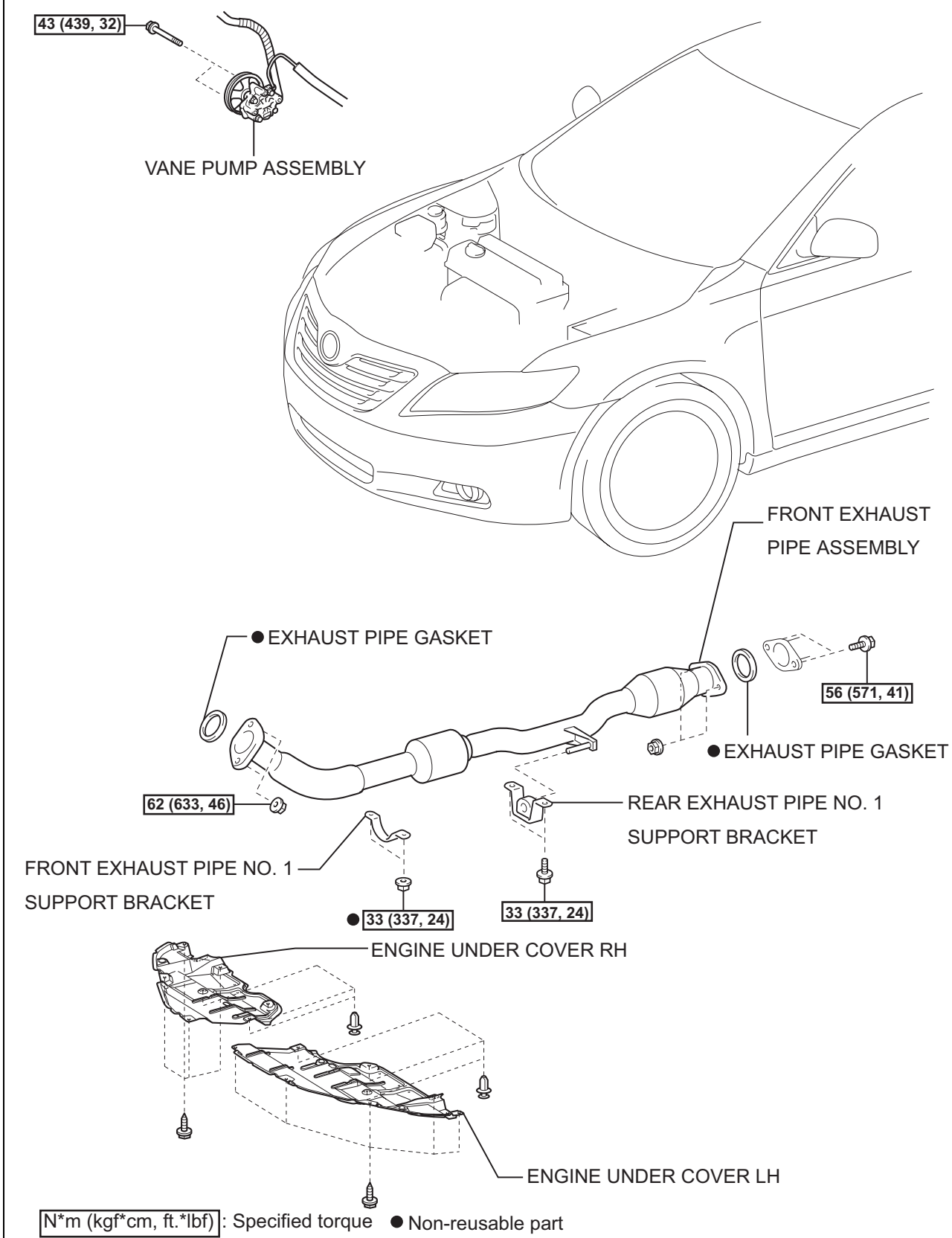
EM



N*m (kgf*cm, ft.*lbf): Specified torque

C

A134950E01

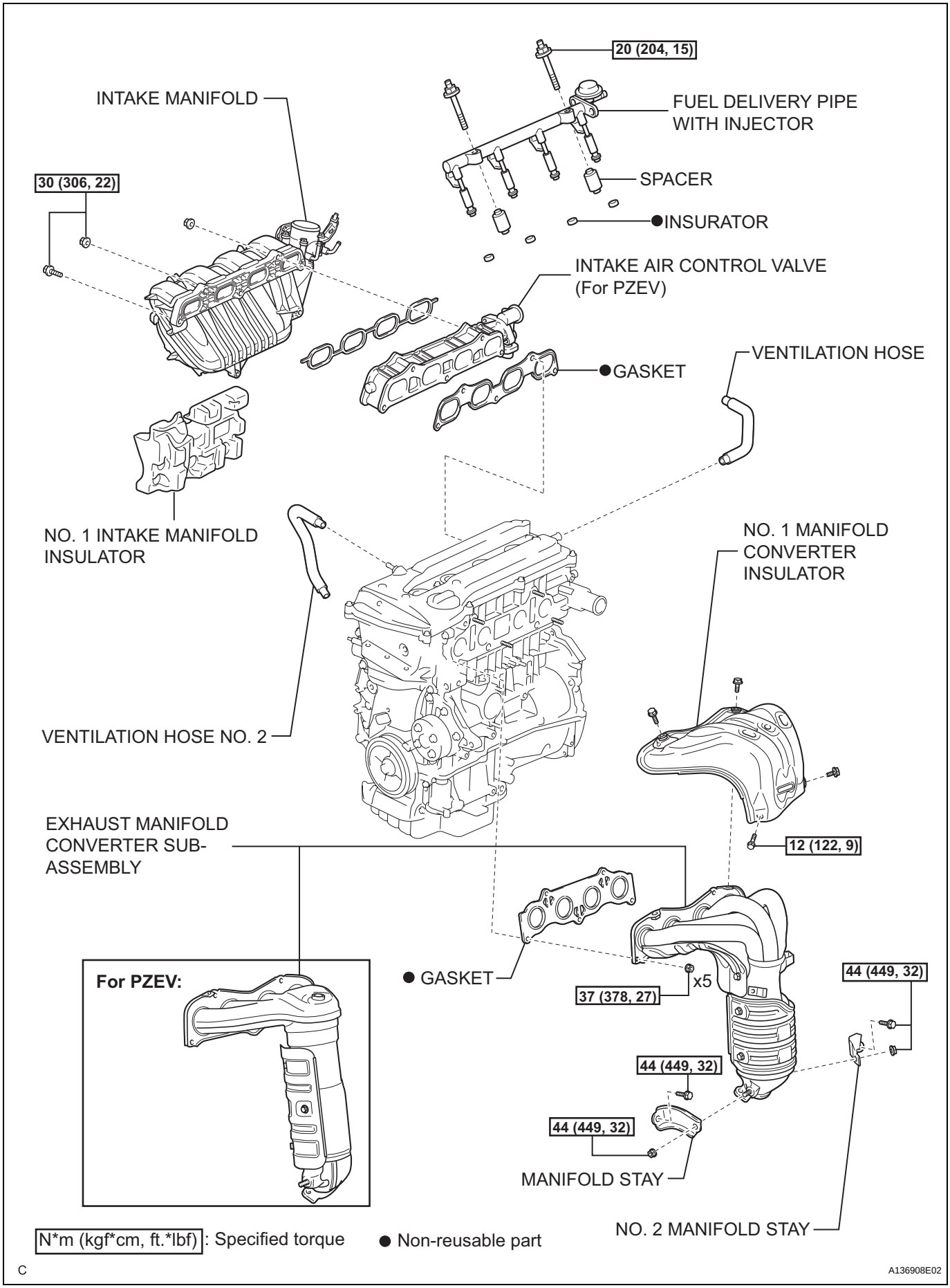


EM

N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

A134947E01

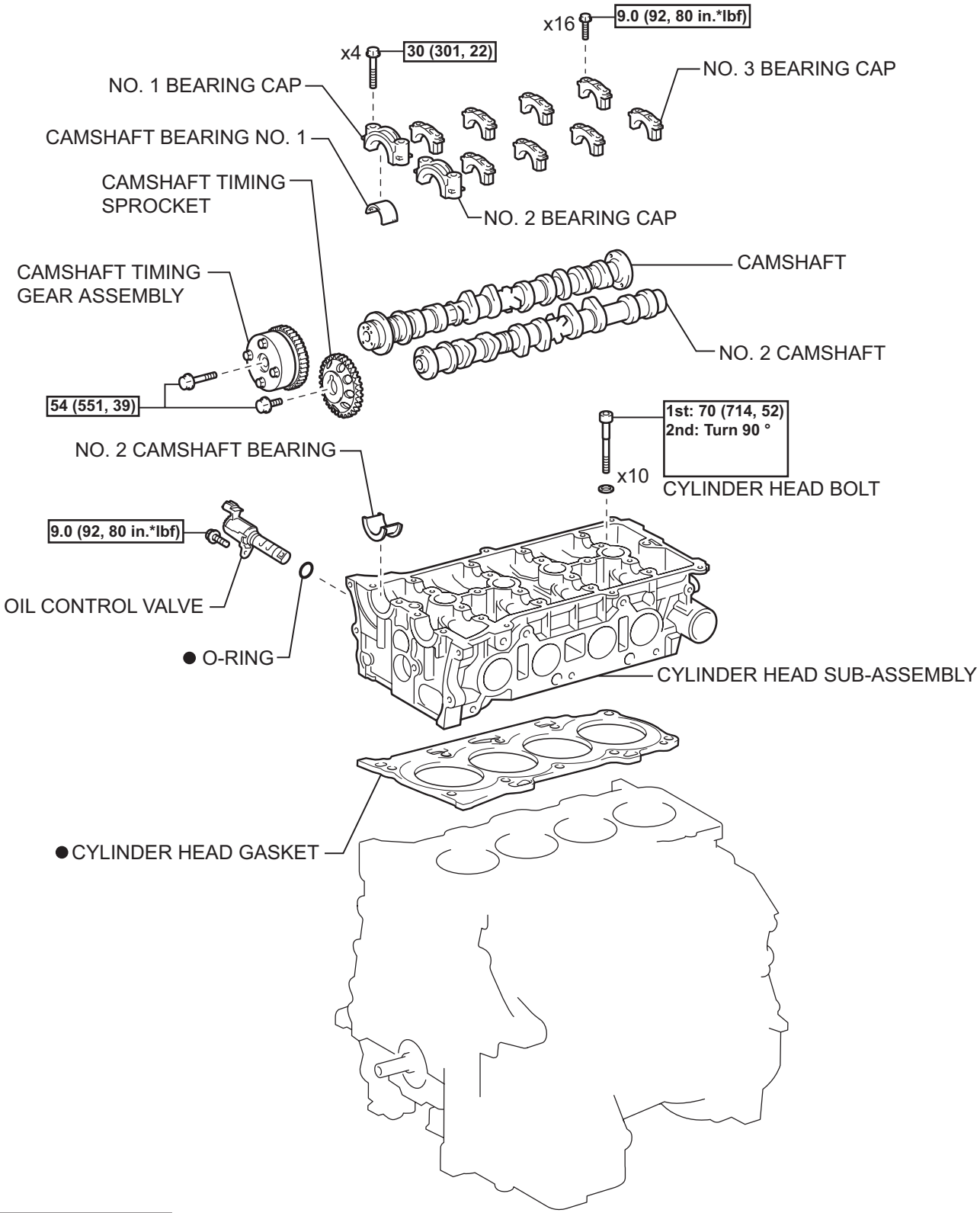


EM

N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

A136908E02

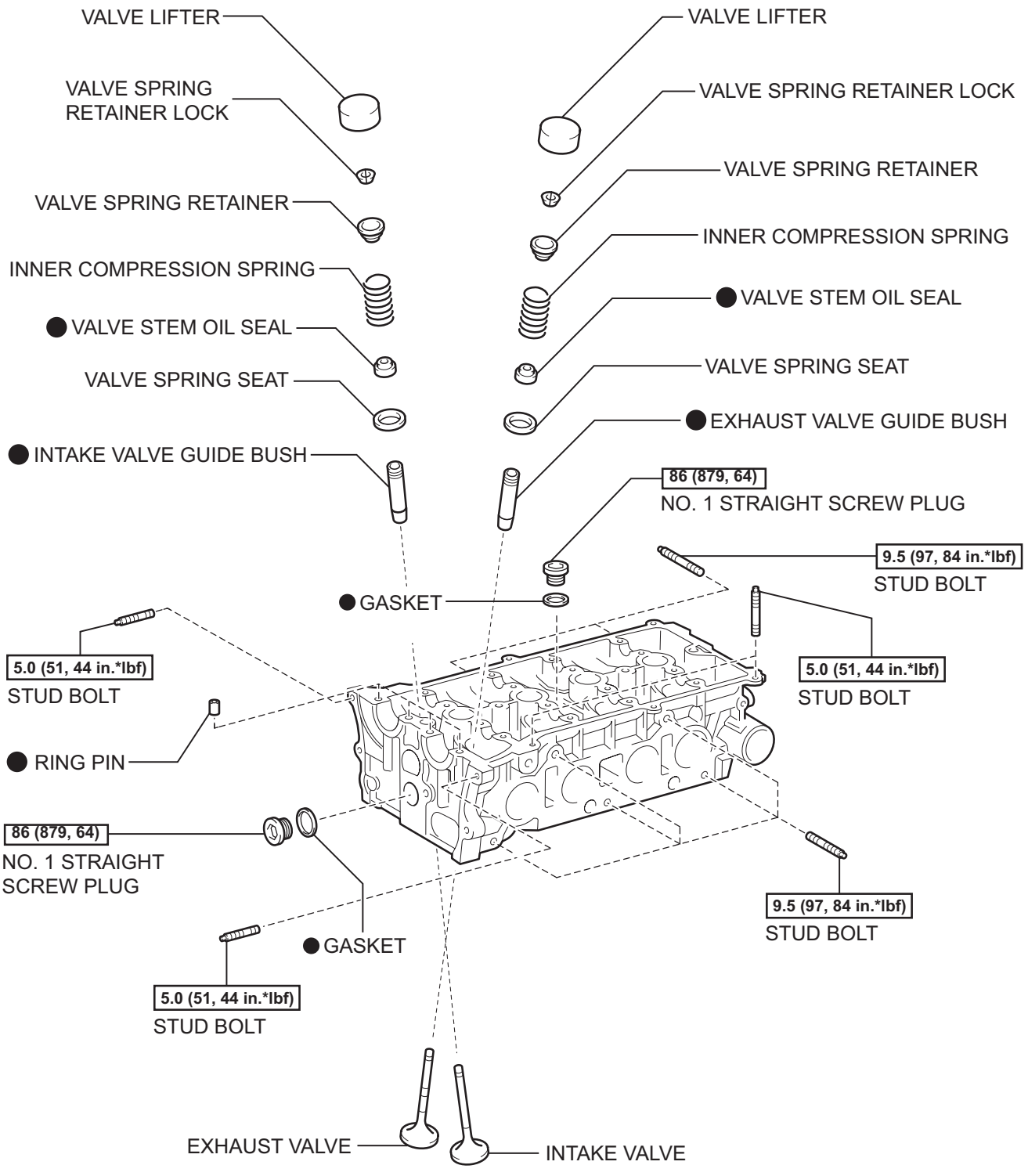


N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

A134951E01

EM



N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

A136083E01

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FRONT FENDER APRON SEAL RH**
6. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
7. **DRAIN ENGINE COOLANT (See page CO-5)**
8. **DRAIN ENGINE OIL (See page LU-4)**
9. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
   HINT:
   See page WW-9.
10. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-424)**
11. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
12. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
13. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
14. **REMOVE BATTERY (See page EM-95)**
15. **REMOVE THROTTLE BODY ASSEMBLY (See page ES-417)**
16. **DISCONNECT FUEL TUBE SUB-ASSEMBLY (See page FU-12)**
17. **REMOVE FUEL DELIVERY PIPE WITH INJECTOR (See page FU-13)**
18. **REMOVE INTAKE MANIFOLD (See page ES-424)**
19. **REMOVE INTAKE AIR CONTROL VALVE (For PZEV) (See page IT-7)**
20. **REMOVE NO. 1 INTAKE MANIFOLD INSULATOR (See page EM-103)**
21. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
    HINT:
    See page EX-2.
22. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-95)**
23. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-95)**

24. REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-96)

25. REMOVE V-RIBBED BELT (See page EM-6)

26. REMOVE GENERATOR ASSEMBLY (See page CH-11)

27. REMOVE OIL LEVEL GAUGE SUB-ASSEMBLY

28. REMOVE OIL LEVEL GAUGE GUIDE (See page EM-104)

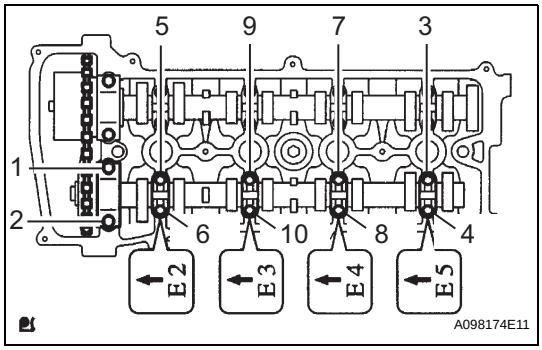
29. REMOVE MANIFOLD STAY (See page EM-104)

30. REMOVE NO. 2 MANIFOLD STAY (See page EM-104)

31. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY (See page EM-104)

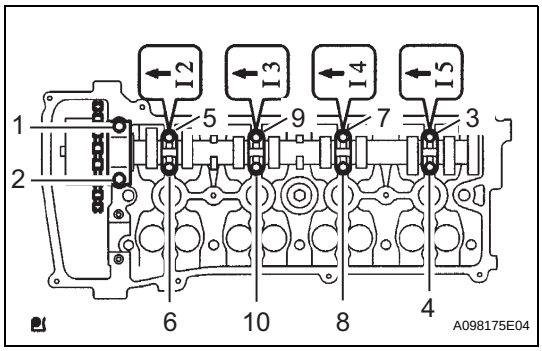
32. REMOVE CHAIN SUB-ASSEMBLY

HINT:
See page EM-21.



33. REMOVE NO. 2 CAMSHAFT

(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
(b) Remove the 5 bearing caps and No. 2 camshaft.

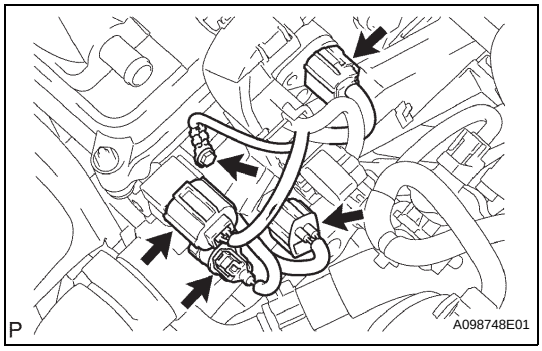


34. REMOVE CAMSHAFT

(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
(b) Remove the 5 bearing caps and camshaft.

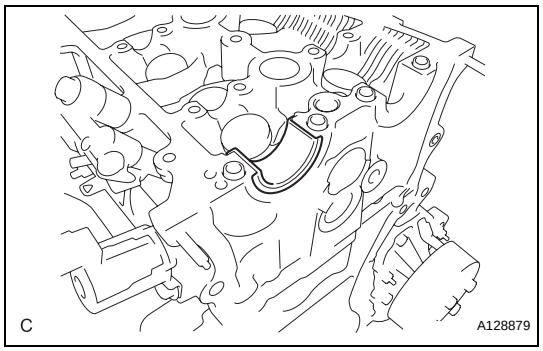
35. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-405)

36. DISCONNECT RADIATOR HOSE INLET (See page EM-96)



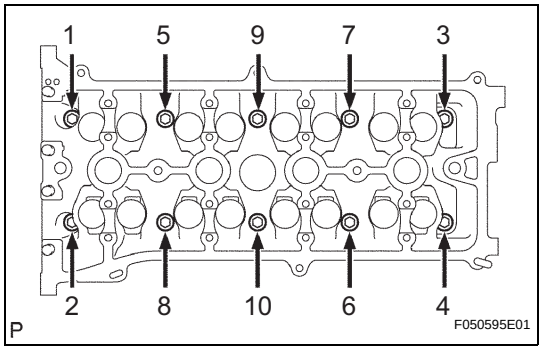
37. DISCONNECT ENGINE WIRE

(a) Disconnect the radio setting condenser connector.
(b) Disconnect the engine oil pressure switch connector.
(c) Disconnect the engine coolant temperature sensor connector.
(d) Disconnect the camshaft position sensor connector.
(e) Remove the bolt and ground cable.



38. REMOVE NO. 2 CAMSHAFT BEARING

(a) Remove the No. 2 camshaft bearing.



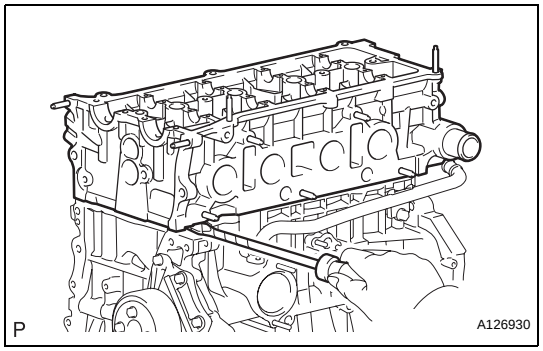
39. REMOVE CYLINDER HEAD SUB-ASSEMBLY

(a) Using several steps, uniformly loosen and remove the 10 cylinder head bolts and 10 plate washers with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

NOTICE:

Head warpage or cracking could result from removing the bolts in the wrong order.

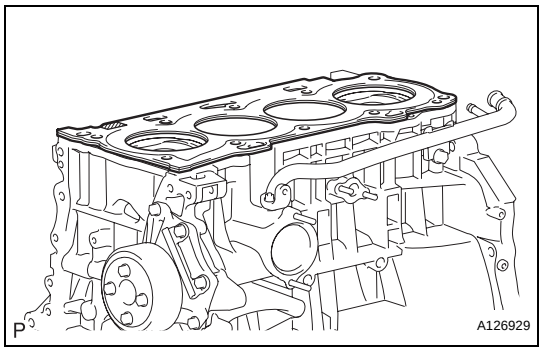
EM



(b) Using a screwdriver with its tip wrapped with tape, pry between the cylinder head and cylinder block, and remove the cylinder head.

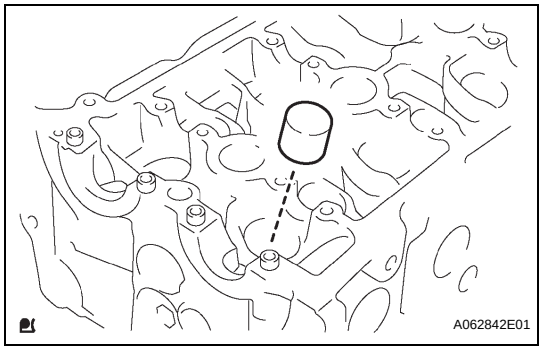
NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.



40. REMOVE CYLINDER HEAD GASKET

(a) Remove the cylinder head gasket.



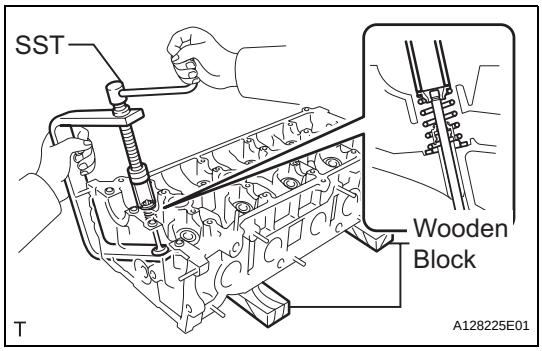
DISASSEMBLY

1. REMOVE VALVE LIFTER

(a) Remove the valve lifters.

HINT:

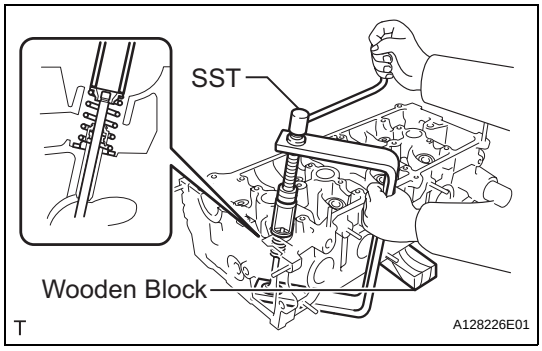
Arrange the valve lifters in the correct order.



2. REMOVE INTAKE VALVE

(a) Using SST and wooden blocks, compress and remove the valve retainer locks.
SST 09202-70020 (09202-00010)

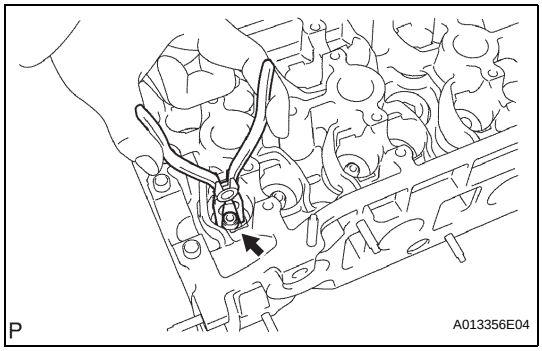
(b) Remove the retainer, valve spring and valve.
HINT:
Arrange the removed parts in the correct order.



3. REMOVE EXHAUST VALVE

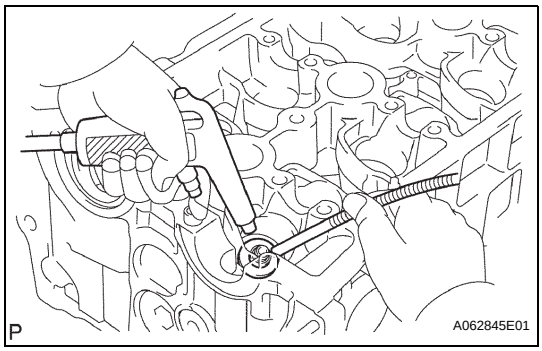
(a) Using SST and wooden blocks, compress and remove the valve retainer locks.
SST 09202-70020 (09202-00010)

(b) Remove the retainer, valve spring and valve.
HINT:
Arrange the removed parts in the correct order.



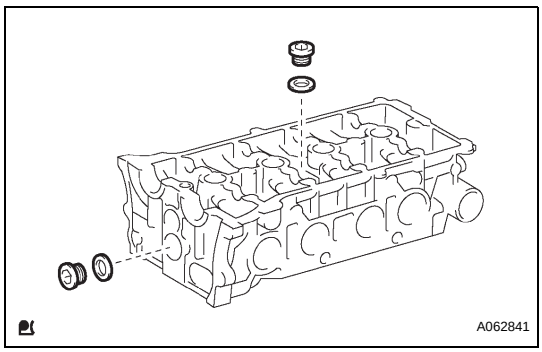
4. REMOVE VALVE STEM OIL SEAL

(a) Using needle-nose pliers, remove the oil seals.



5. REMOVE VALVE SPRING SEAT

(a) Using compressed air and a magnetic finger, remove the valve spring seats by blowing air onto them.



6. REMOVE NO. 1 STRAIGHT SCREW PLUG

(a) Using a 14 mm straight hexagon wrench, remove the 2 screw plugs and 2 gaskets.
NOTICE:
If water leaks from the straight screw plug or the plug corrodes, replace it.

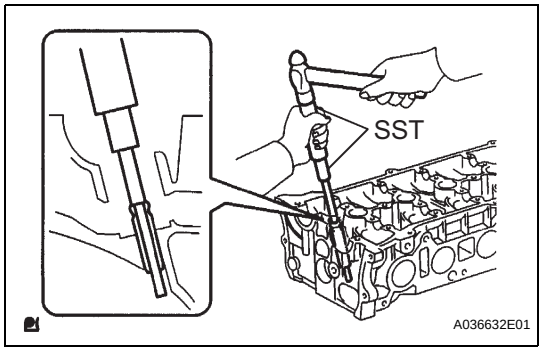
7. REMOVE STUD BOLT

8. REMOVE RING PIN

9. REMOVE INTAKE VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.

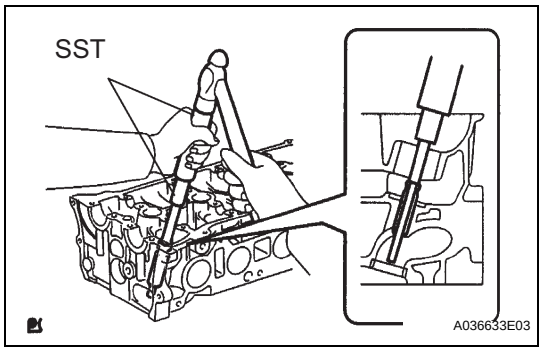


(c) Using SST and a hammer, tap out the guide bush.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

10. REMOVE EXHAUST VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



(c) Using SST and a hammer, tap out the guide bush.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

EM

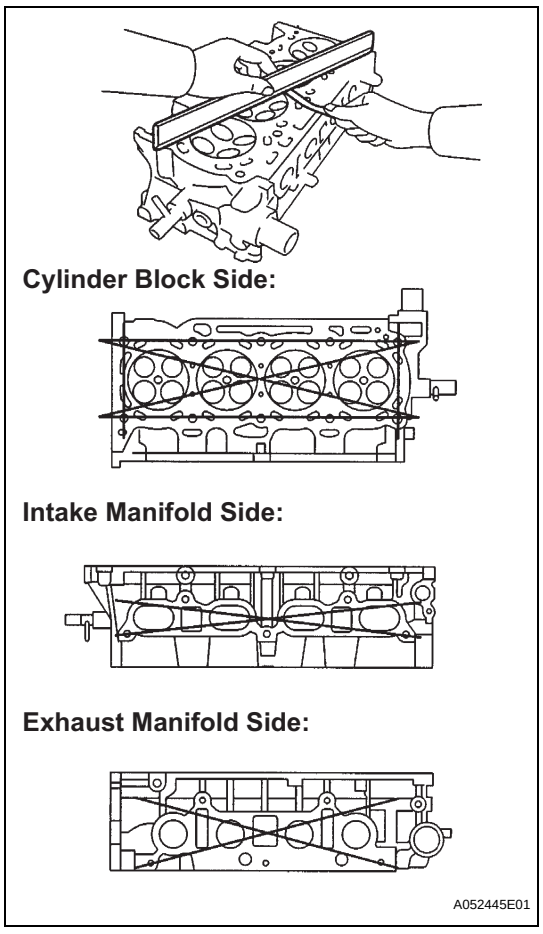
INSPECTION

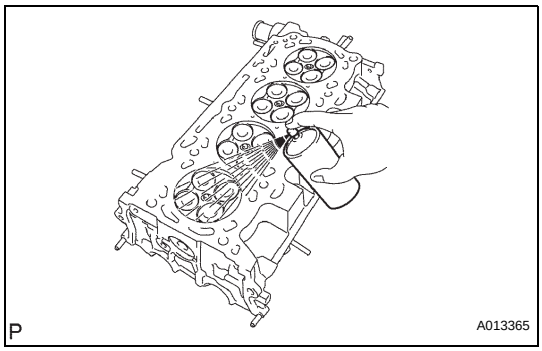
1. INSPECT CYLINDER HEAD FOR FLATNESS

(a) Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.
Maximum warpage

Item	Specified Condition
Cylinder block side	0.05 mm (0.0020 in.)
Intake manifold side	0.08 mm (0.0031 in.)
Exhaust manifold side	0.08 mm (0.0031 in.)

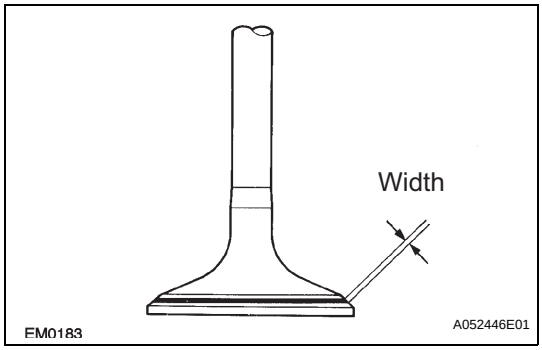
If the warpage is greater than the maximum, replace the cylinder head.





2. INSPECT CYLINDER HEAD FOR CRACKS

(a) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks. If cracked, replace the cylinder head.



3. INSPECT VALVE SEATS

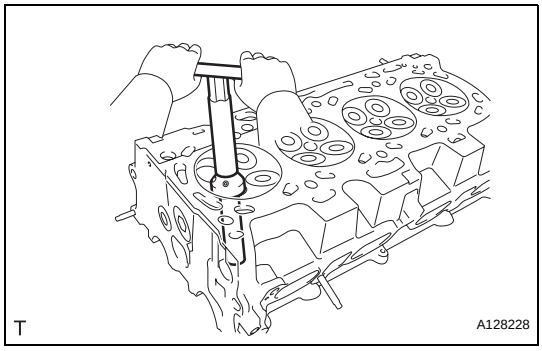
(a) Apply a light coat of prussian blue to the valve face.
(b) Lightly press the valve face against the valve seat.
(c) Check the valve face and valve seat according to the following procedure:
  (1) If prussian blue appears 360° around the valve face, the valve face is concentric. If not, replace the valve.
  (2) If prussian blue appears 360° around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
  (3) Check that the valve seat contact is in the middle of the valve face with the width between 1.0 to 1.4 mm (Intake side (0.039 to 0.055 in.)).
  (4) Check that the valve seat contact is in the middle of the valve face with the width between 1.2 to 1.6 mm (Exhaust side (0.047 to 0.063 in.)).

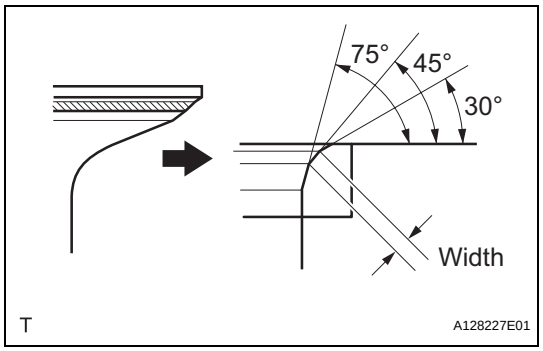
4. REPAIR VALVE SEATS

NOTICE:

- **Repair the seat while checking the seating position.**
- **Keep the lip free from foreign matter.**

(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.





(b) Using 30° and 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Valve Seat Width

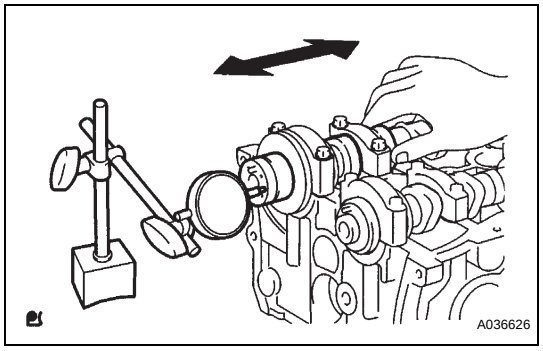
Item	Specified Condition
Intake Side	1.0 to 1.4 mm (0.039 to 0.055 in.)
Exhaust Side	1.2 to 1.6 mm (0.047 to 0.063 in.)

(c) Handrub the valve and valve seat with an abrasive compound.

(d) Check the valve seating position.

5. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshafts (See page EM-70).



(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance

Item	Specified Condition
Intake	0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Exhaust	0.080 to 0.135 mm (0.0032 to 0.0053 in.)

Maximum thrust clearance

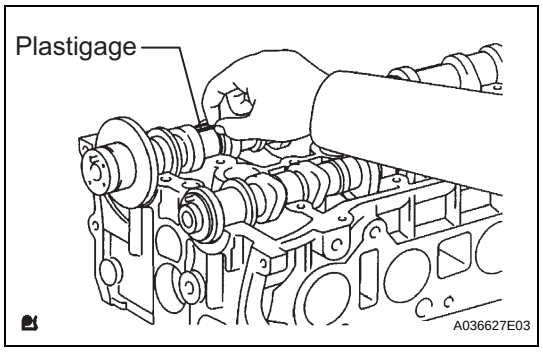
Item	Specified Condition
Intake	0.110 mm (0.0043 in.)
Exhaust	0.150 mm (0.0059 in.)

If the thrust clearance is greater than the maximum, replace the cylinder head. If the thrust surface is damaged, replace the camshaft.

6. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the cylinder head.



(c) Lay a strip of Plastigage across each of the camshaft journals.

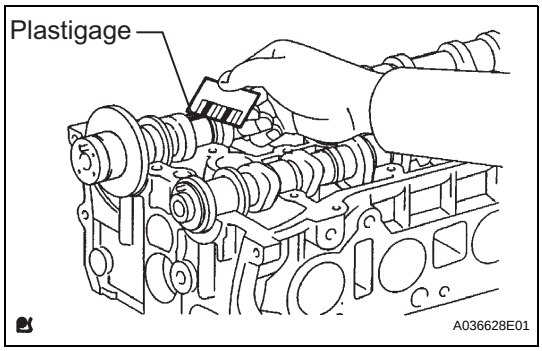
(d) Install the bearing caps (See page EM-70).

NOTICE:

Do not turn the camshaft.

(e) Remove the bearing caps (See page EM-53).

EM



(f) Measure the Plastigage at its widest point.

Standard oil clearance

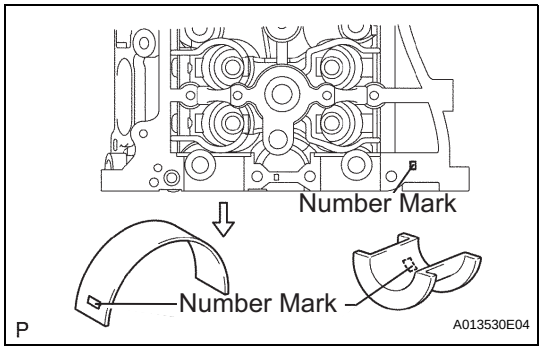
Item	Specified Condition
Camshaft No. 1 journal bearing mark 1	0.007 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft No. 1 journal bearing mark 2	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft No. 1 journal bearing mark 3	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
No. 2 camshaft No. 1 journal	0.015 to 0.054 mm (0.0006 to 0.0021 in.)
No. 2 camshaft other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)

Maximum oil clearance

Item	Specified Condition
Intake	0.070 mm (0.0028 in.)
Exhaust	0.100 mm (0.0039 in.)

NOTICE:
Completely remove the Plastigage after the inspection.

- If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the cylinder head.
- If the oil clearance on the camshaft No. 1 journal is greater than the maximum, choose a new bearing and install it.



(1) Check the number mark shown in the illustration.

Cylinder head journal bore diameter

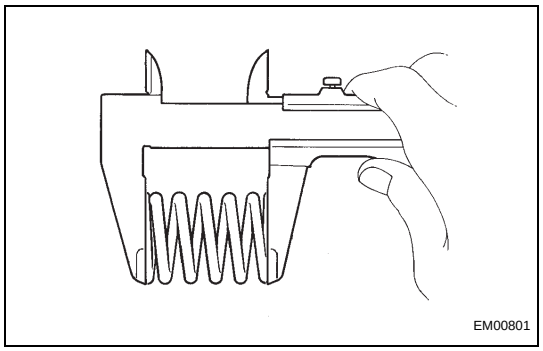
Mark 1	Mark 2	Mark 3
40.000 to 40.008 mm (1.5748 to 1.5752 in.)	40.009 to 40.017 mm (1.5752 to 1.5755 in.)	40.018 to 40.025 mm (1.5755 to 1.5758 in.)

Standard bearing center wall thickness

Mark 1	Mark 2	Mark 3
2.000 to 2.004 mm (0.0787 to 0.0789 in.)	2.005 to 2.008 mm (0.0789 to 0.0791 in.)	2.009 to 2.012 mm (0.0791 to 0.0792 in.)

Camshaft journal diameter

Mark 1	Mark 2	Mark 3
35.971 to 35.985 mm (1.4162 to 1.4167 in.)	35.971 to 35.985 mm (1.4162 to 1.4167 in.)	35.971 to 35.985 mm (1.4162 to 1.4167 in.)



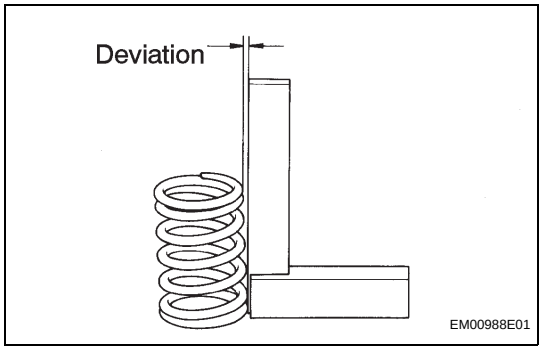
7. INSPECT INNER COMPRESSION SPRING

(a) Using vernier calipers, measure the free length of the valve spring.

Free length:

47.43 mm (1.867 in.)

If the free length is not as specified, replace the valve spring.



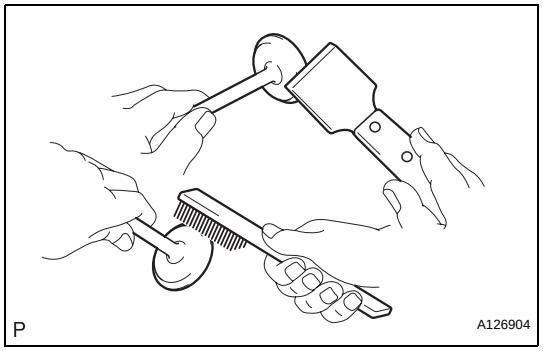
(b) Using steel squares, measure the deviation of the valve spring.

Maximum deviation:

1.6 mm (0.063 in.)

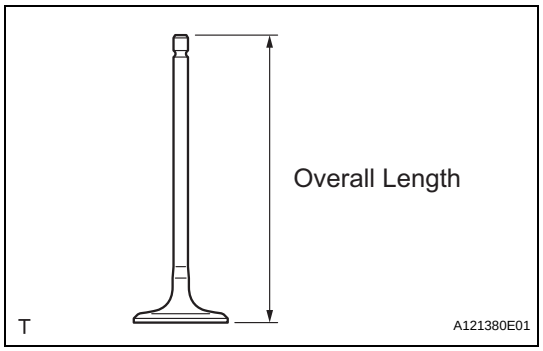
If the deviation is greater than the maximum, replace the valve spring.

EM



8. INSPECT INTAKE VALVE

(a) Using a gasket scraper, scrape off any carbon on the valve head.



(b) Using vernier calipers, measure the overall length of the valve.

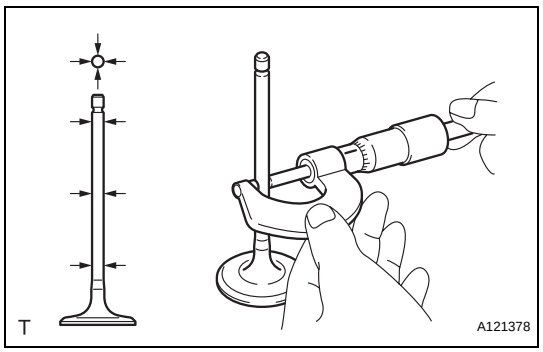
Standard overall length:

101.71 mm (4.0043 in.)

Minimum overall length:

101.21 mm (3.9846 in.)

If the overall length is less than the minimum, replace the valve.

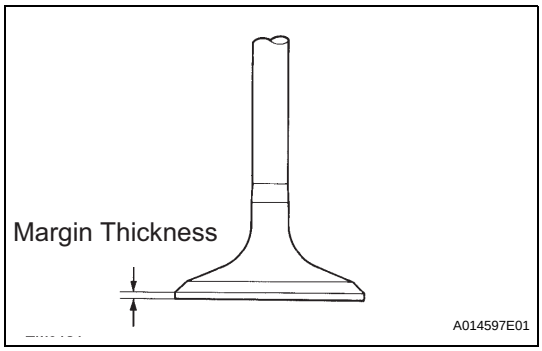


(c) Using a micrometer, measure the diameter of the valve stem.

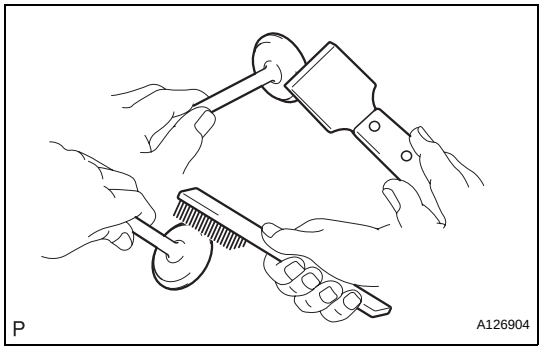
Valve stem diameter:

5.470 to 5.485 mm (0.2154 to 0.2159 in.)

If the valve stem is not as specified, check the oil clearance.

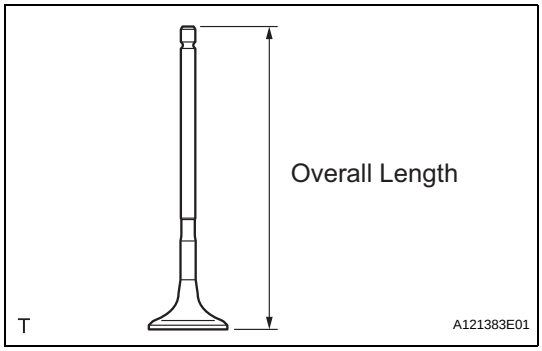


(d) Using vernier calipers, measure the valve head margin thickness.
Standard margin thickness:
1.05 to 1.45 mm (0.0413 to 0.0571 in.)
Minimum margin thickness:
0.50 mm (0.0197 in.)
If the margin thickness is less than the minimum, replace the valve.

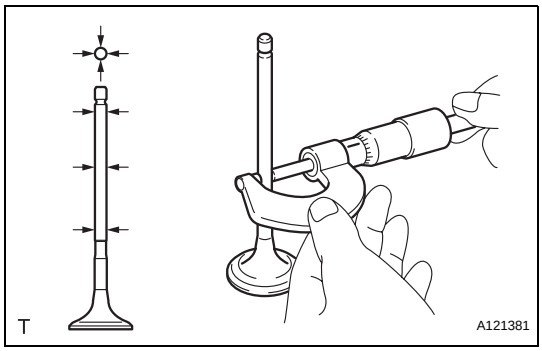


9. INSPECT EXHAUST VALVE

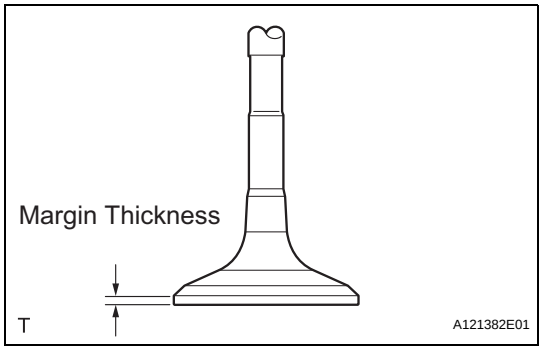
(a) Using a gasket scraper, scrape off any carbon on the valve head.



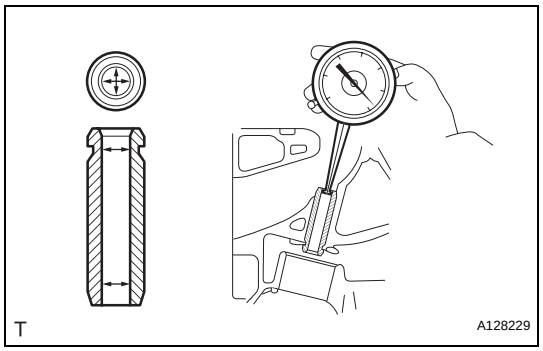
(b) Using vernier calipers, measure the overall length of the valve.
Standard overall length:
101.15 mm (3.9823 in.)
Minimum overall length:
100.70 mm (3.9646 in.)
If the overall length is less than the minimum, replace the valve.



(c) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
5.465 to 5.480 mm (0.2152 to 0.2157 in.)
If the valve stem is not as specified, check the oil clearance.



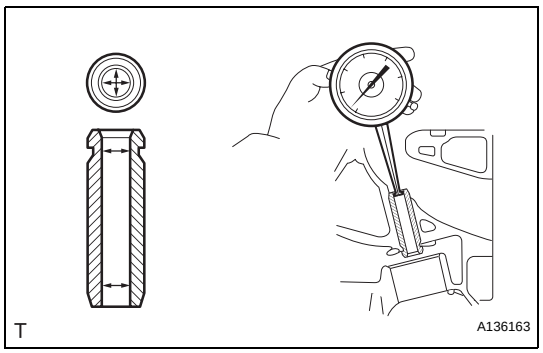
(d) Using vernier calipers, measure the valve head margin thickness.
Standard margin thickness:
1.20 to 1.60 mm (0.0472 to 0.0630 in.)
Minimum margin thickness:
0.50 mm (0.0197 in.)
If the margin thickness is less than the minimum, replace the valve.



10. INSPECT INTAKE VALVE GUIDE BUSH

(a) Using a caliper gauge, measure the inside diameter of the guide bush.
Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

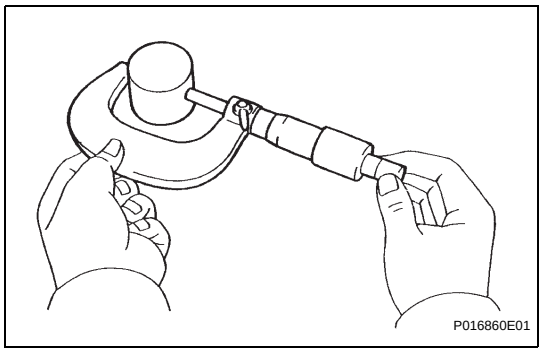
(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Maximum oil clearance:
0.080 mm (0.0031 in.)
If the clearance is greater than the maximum, replace the valve and guide bush.



11. INSPECT EXHAUST VALVE GUIDE BUSH

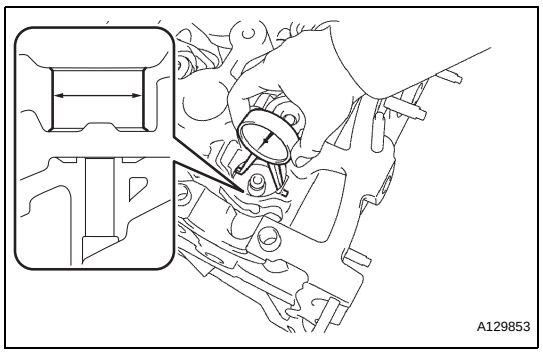
(a) Using a caliper gauge, measure the inside diameter of the guide bush.
Bushing inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

(b) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.
Standard oil clearance:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)
Maximum oil clearance:
0.100 mm (0.0039 in.)
If the clearance is greater than the maximum, replace the valve and guide bush.



12. INSPECT VALVE LIFTER

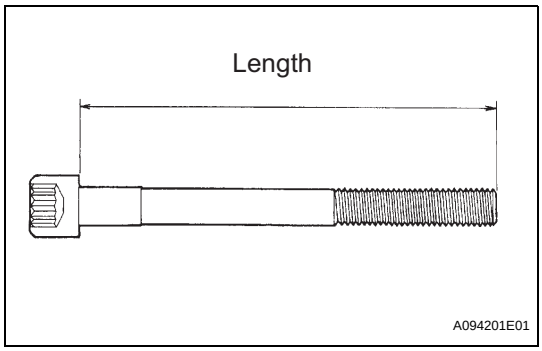
(a) Using a micrometer, measure the lifter diameter.
Lifter diameter:
30.966 to 30.976 mm (1.2191 to 1.2195 in.)



(b) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Standard lifter bore diameter:
31.009 to 31.025 mm (1.2208 to 1.2215 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.033 to 0.059 mm (0.0013 to 0.0023 in.)
Maximum oil clearance:
0.070 mm (0.0028 in.)
If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder head.

EM



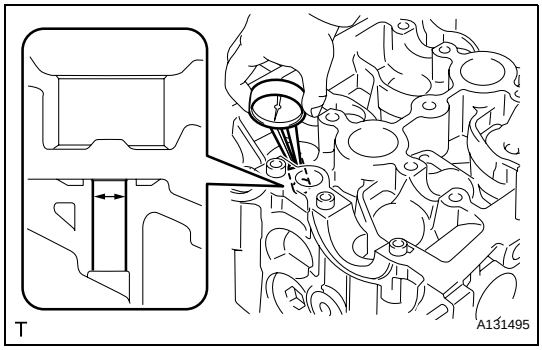
13. INSPECT CYLINDER HEAD SET BOLT

(a) Using vernier calipers, measure the length of the head bolts from the seat to the end.

Standard bolt length:
141.3 to 142.7 mm (5.563 to 5.618 in.)
Maximum bolt length:
144.2 mm (5.677 in.)

If the bolt length is greater than the maximum, replace the cylinder head set bolt.

REASSEMBLY



1. INSTALL INTAKE VALVE GUIDE BUSH

(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

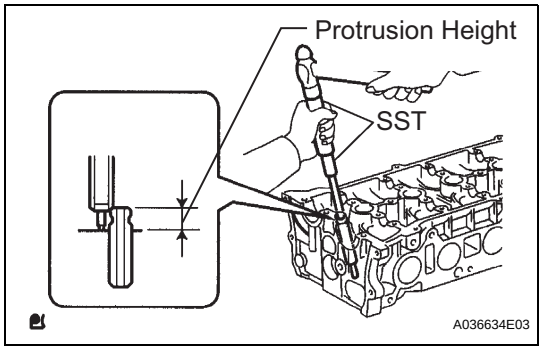
Cylinder bore diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a new guide bush (STD or O/S 0.05)

Bush size	Bush bore diameter
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install a O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

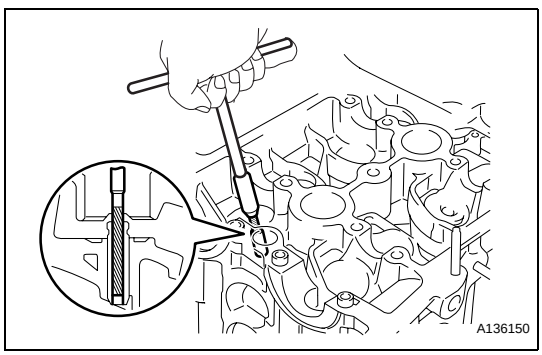
(b) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(c) Place the cylinder head on wooden blocks.



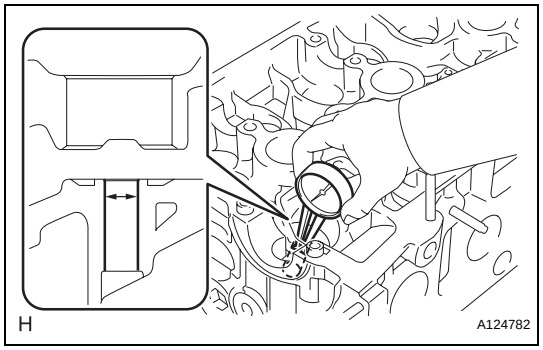
(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Protrusion height:
9.6 to 10.0 mm (0.3779 to 0.3937 in.)



(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)



2. INSTALL EXHAUST VALVE GUIDE BUSH

(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Diameter:

10.285 to 10.306 mm (0.4049 to 0.4057 in.)

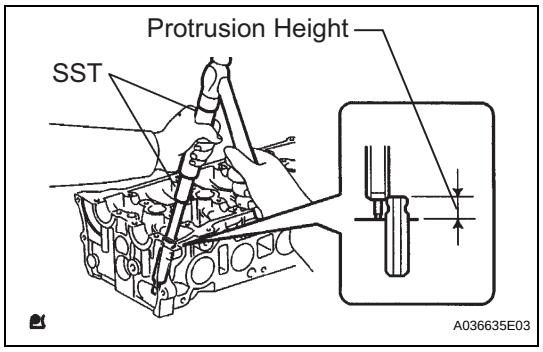
Select a new guide bush (STD or O/S 0.05)

Bush size	Bush bore diameter
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install a O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(b) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(c) Place the cylinder head on wooden blocks.

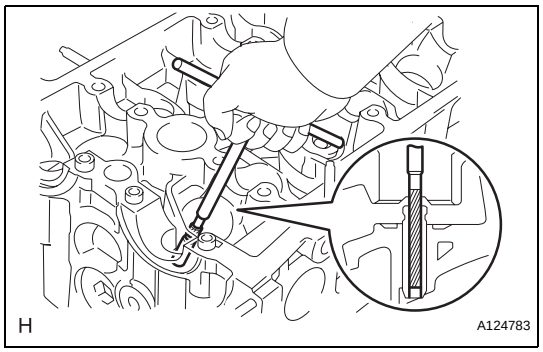


(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

Protrusion height:

9.6 to 10.0 mm (0.3779 to 0.3937 in.)

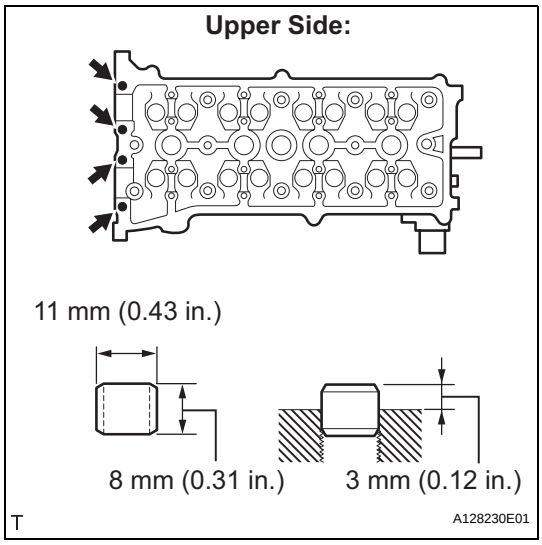


(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

Standard oil clearance:

0.030 to 0.065 mm (0.0012 to 0.0026 in.)

EM



3. INSTALL RING W/HEAD PIN

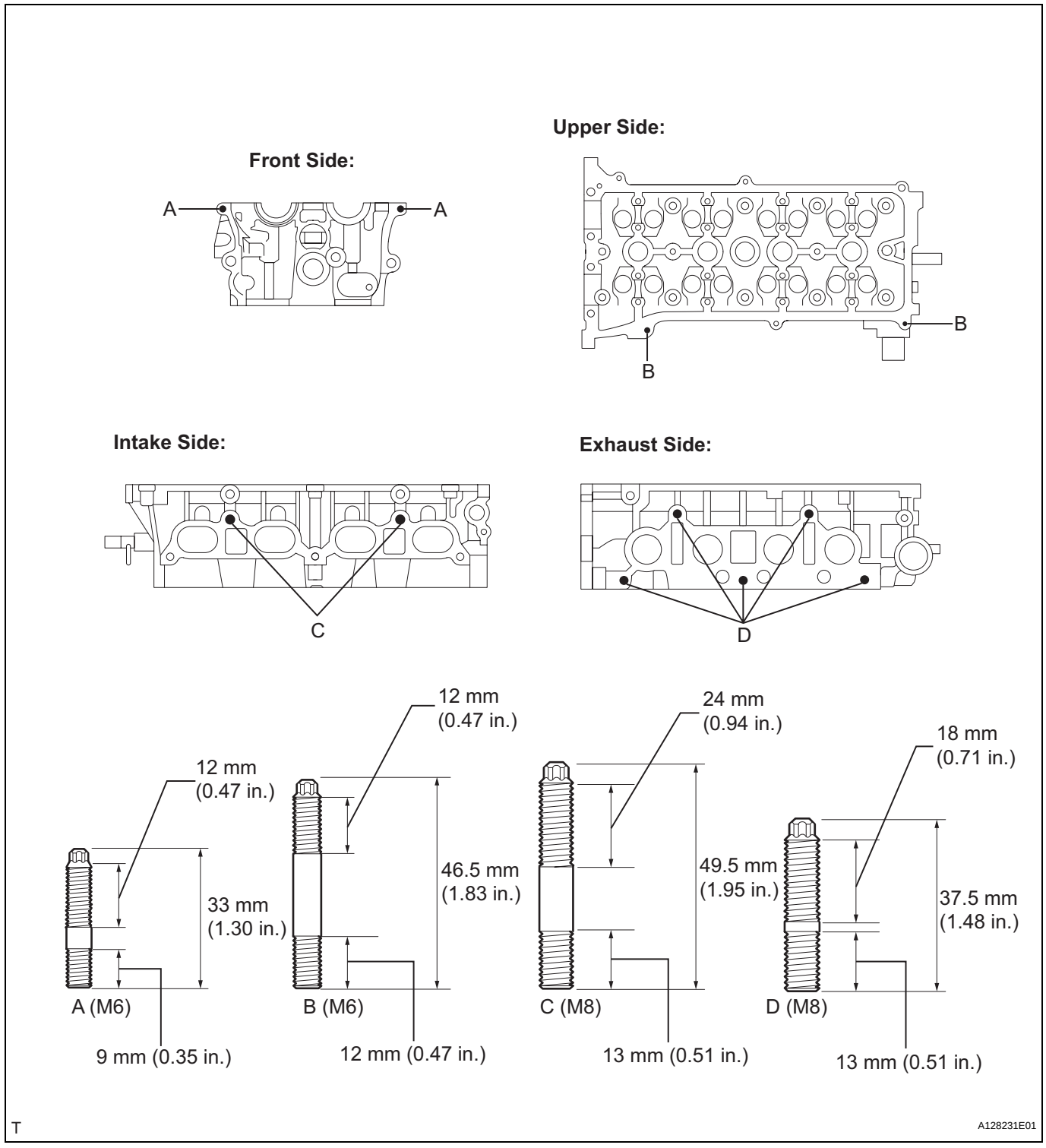
(a) Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.

Protrusion height:
3 mm (0.12 in.)

4. INSTALL STUD BOLT

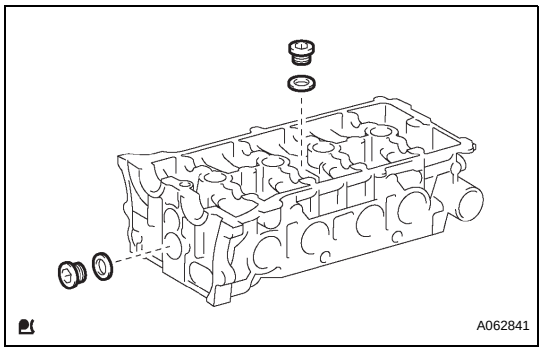
NOTICE:
If the stud bolt is deformed or the threads are damaged, replace it.

(a) Using E5 and E7 "torx" sockets, install the stud bolts.



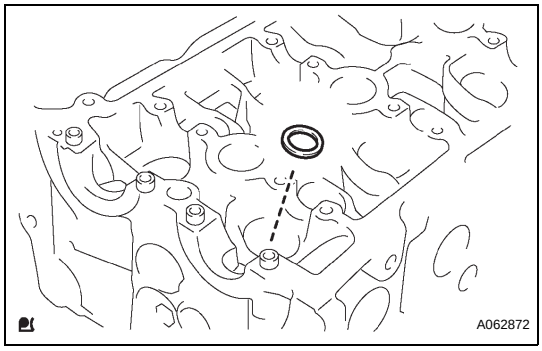
Torque: Bolt A
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Bolt B
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Bolt C
9.5 N*m (97 kgf*cm, 84 in.*lbf)
Bolt D
9.5 N*m (97 kgf*cm, 84 in.*lbf)

EM



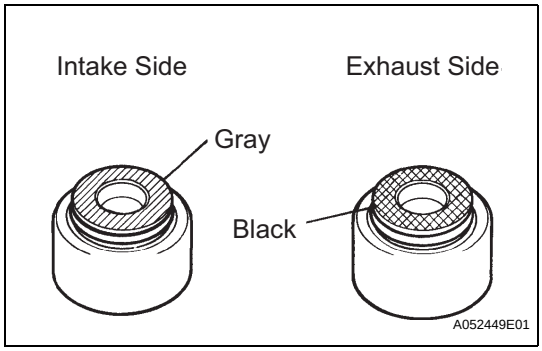
5. INSTALL NO. 1 STRAIGHT SCREW PLUG

(a) Using a 14 mm straight hexagon wrench, install 2 new gaskets and the 2 straight screw plugs.



6. INSTALL VALVE SPRING SEAT

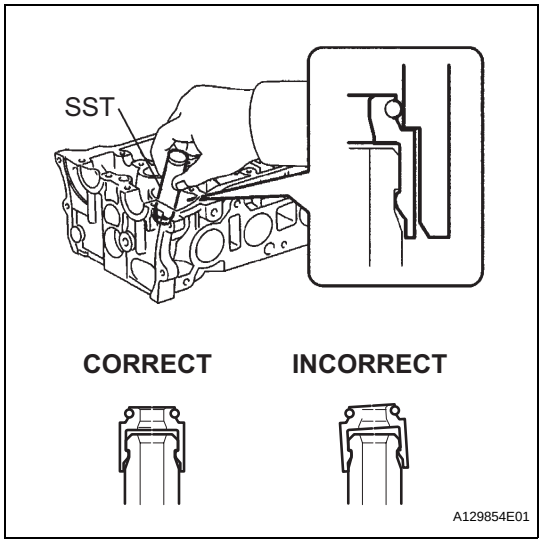
(a) Install the valve spring seats to the cylinder head.

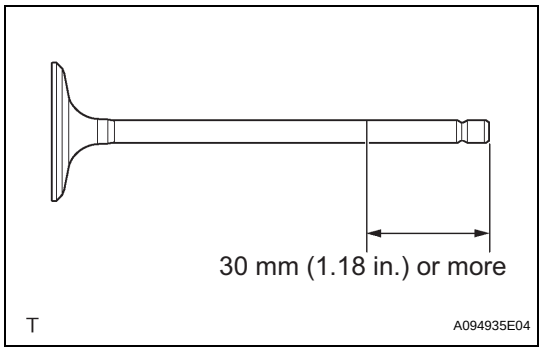


7. INSTALL VALVE STEM OIL SEAL

(a) Apply a light coat of engine oil to a new oil seal.
NOTICE:
Pay close attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal into the exhaust side or installing the exhaust oil seal to the intake side can cause installation problems later.
HINT:
The intake valve oil seal is gray and the exhaust valve oil seal is black.

(b) Using SST, push in the oil seal.
SST 09201-41020
NOTICE:
Failure to use SST will cause the seal to be damaged or improperly seated.

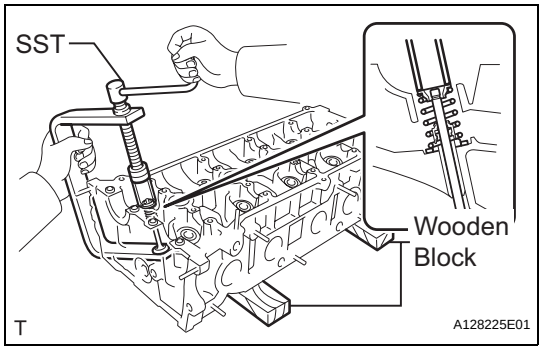




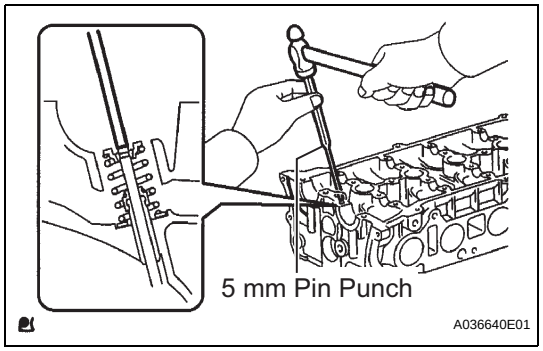
8. INSTALL INTAKE VALVE

(a) Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.

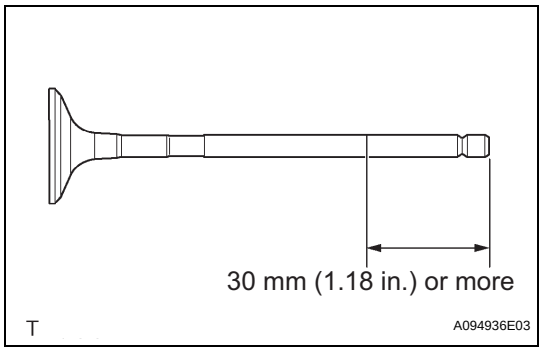
(b) Install the valve, compression spring and spring retainer to the cylinder head.
NOTICE:
Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.
SST 09202-70020 (09202-00010)



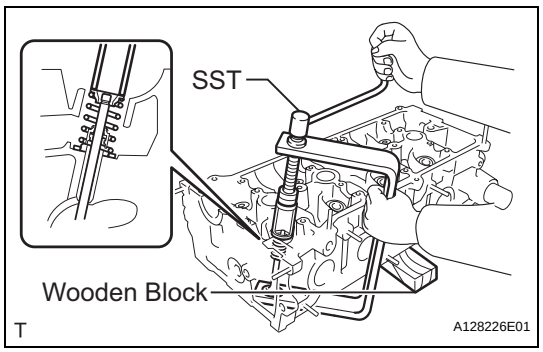
(d) Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the valve stem tip.



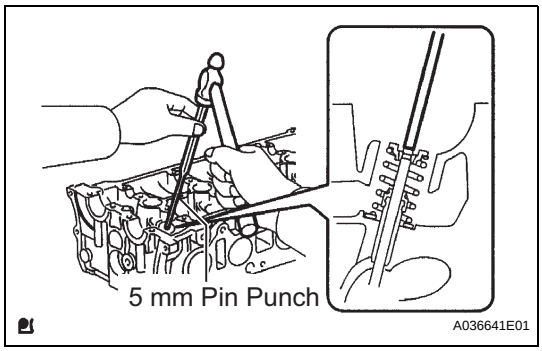
9. INSTALL EXHAUST VALVE

(a) Apply a sufficient coat of engine oil to the tip area of the exhaust valve shown in the illustration.

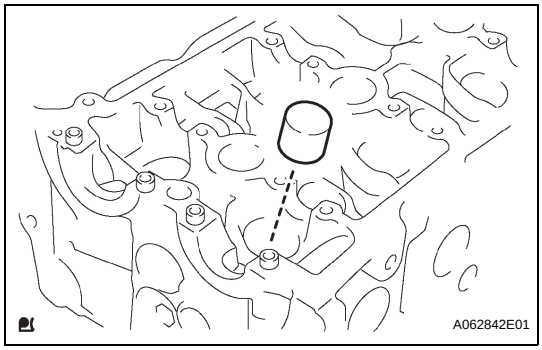
(b) Install the valve, compression spring and spring retainer to the cylinder head.
NOTICE:
Install the same parts in the same combination to the original locations.



(c) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.
SST 09202-70020 (09202-00010)



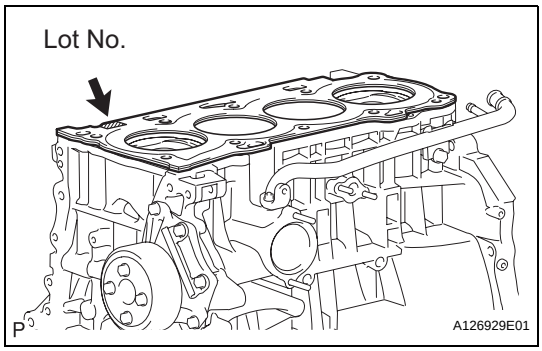
(d) Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the valve stem tip.



10. INSTALL VALVE LIFTER

(a) Assemble the valve lifter and the tip of the valve stem with a light coat of engine oil applied.
NOTICE:
Install the valve lifters in their original places.

INSTALLATION



1. INSTALL CYLINDER HEAD GASKET

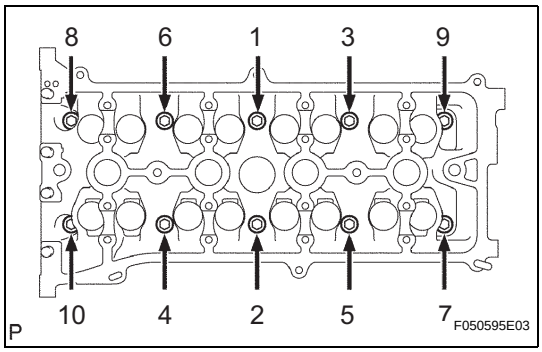
(a) Place a new gasket on the cylinder block surface with the Lot No. stamp facing upward.
NOTICE:
- **Remove any oil from the contact surface.**
- **Make sure that the gasket is installed in the correct direction.**

2. INSTALL CYLINDER HEAD SUB-ASSEMBLY

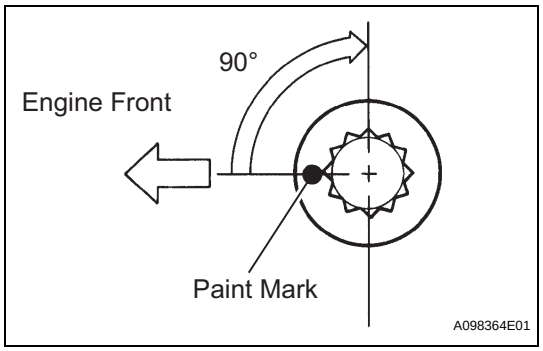
HINT:
The cylinder head bolts are tightened in 2 progressive steps.

(a) Apply a light coat of engine oil to the bolt threads and the area beneath the bolt heads that come in contact with the washers.

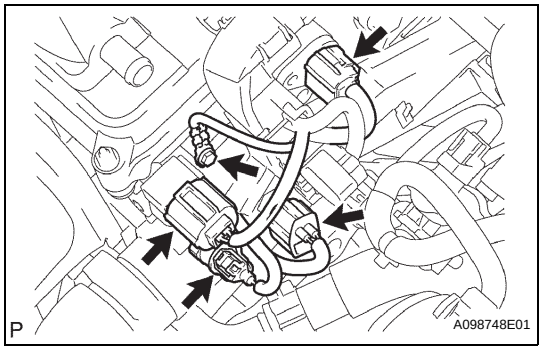
(b) Install the bolts and plate washers to the cylinder head.
NOTICE:
Do not drop the washers into the cylinder head.



(c) Using several steps, uniformly install and tighten the 10 cylinder head set bolts and plate washers with a 10 mm bi-hexagon wrench in the order shown in the illustration.
Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)



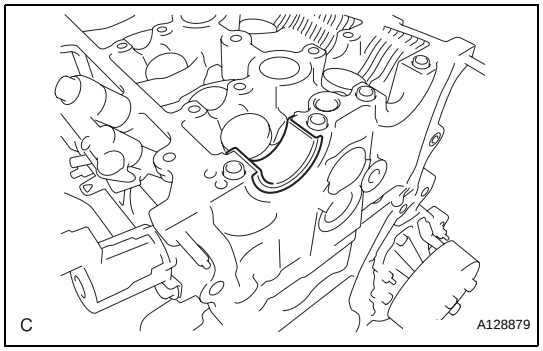
(d) Mark the front side of the cylinder head bolt with paint.
(e) Retighten the cylinder head bolts 90° in the sequence shown in the illustration.
(f) Check that the paint mark is now at a 90° angle to the front.



3. CONNECT ENGINE WIRE

(a) Connect the ground cable with the bolt.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)
(b) Connect the camshaft position sensor connector.
(c) Connect the engine coolant temperature sensor connector.
(d) Connect the engine oil pressure switch connector.
(e) Connect the radio setting condenser connector.

4. CONNECT RADIATOR HOSE INLET (See page EM-118)



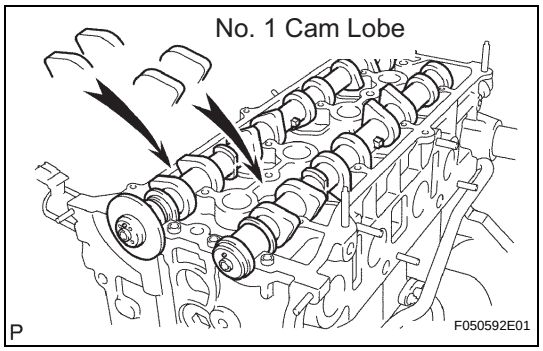
5. INSTALL NO. 2 CAMSHAFT BEARING

(a) Install the No. 2 camshaft bearing.

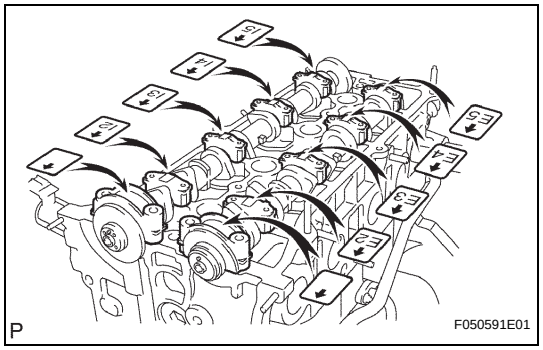
6. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-406)

7. INSTALL CAMSHAFTS

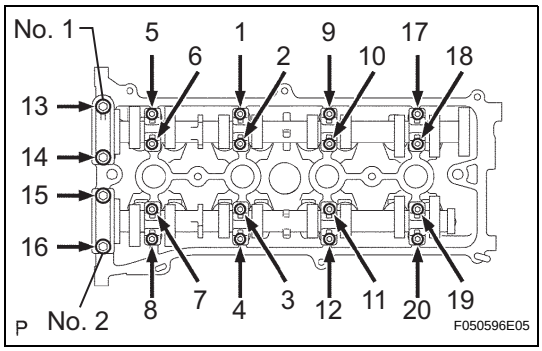
(a) Apply a light coat of engine oil to the journal portion of the camshaft.



(b) Place the 2 camshafts on the cylinder head with the No. 1 cam lobes facing the directions shown in the illustration.



(c) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.
(d) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



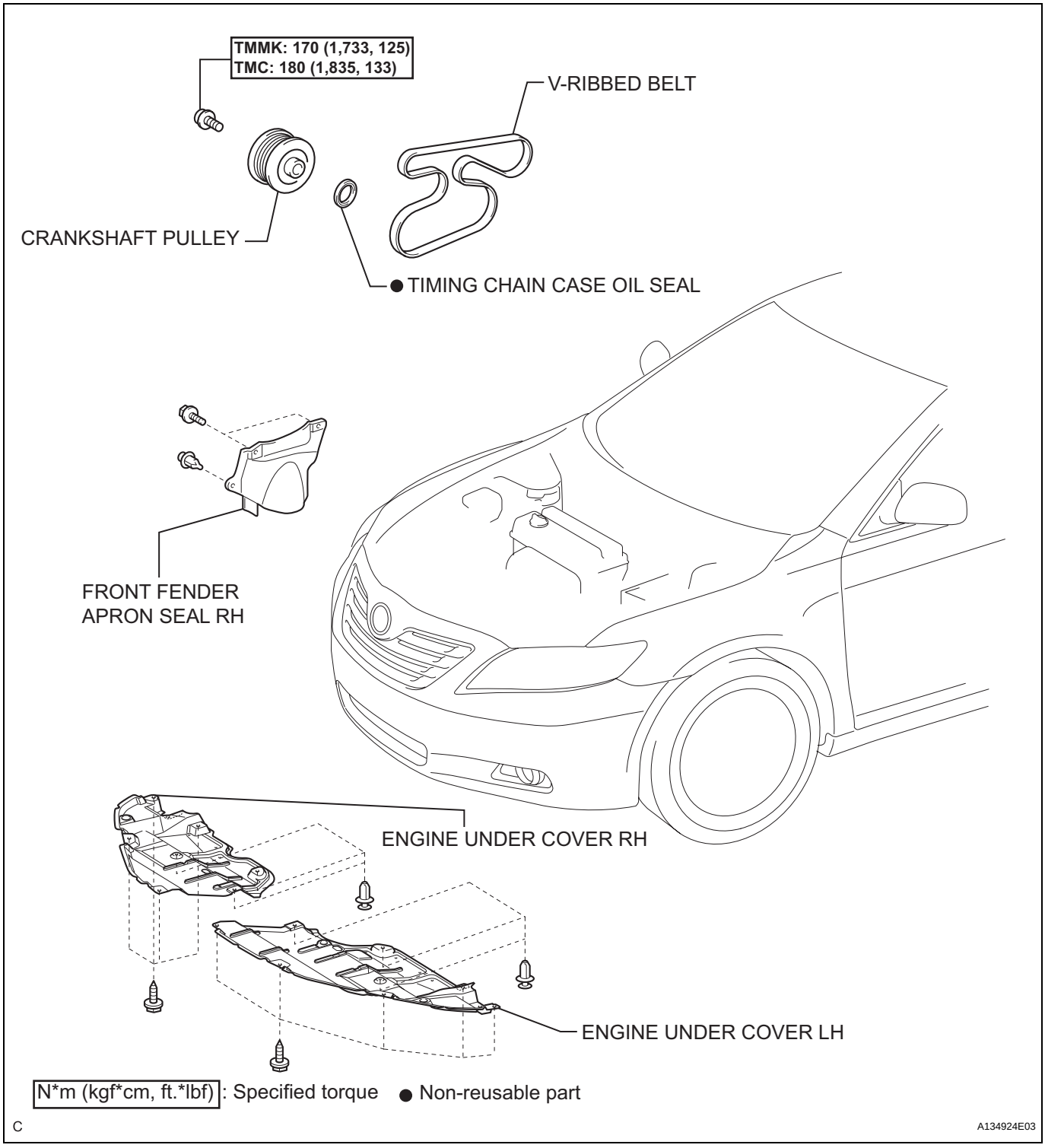
(e) Using several steps, uniformly tighten the 20 bearing cap bolts in the sequence shown in the illustration.
Torque: No. 1 and No. 2 bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

8. **INSTALL CHAIN SUB-ASSEMBLY**
HINT:
See page EM-27.
9. **INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY (See page EM-109)**
10. **INSTALL NO. 2 MANIFOLD STAY (See page EM-110)**
11. **INSTALL MANIFOLD STAY (See page EM-111)**
12. **INSTALL OIL LEVEL GAUGE GUIDE (See page EM-111)**
13. **INSTALL OIL LEVEL GAUGE SUB-ASSEMBLY**
14. **INSTALL GENERATOR ASSEMBLY (See page CH-19)**
15. **INSTALL V-RIBBED BELT (See page EM-6)**
16. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-118)**
17. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-119)**
18. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-119)**
19. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
HINT:
See page EX-3.
20. **INSTALL NO. 1 INTAKE MANIFOLD INSULATOR (See page EM-111)**
21. **INSTALL INTAKE AIR CONTROL VALVE (For PZEV) (See page IT-7)**
22. **INSTALL INTAKE MANIFOLD (See page ES-425)**
23. **INSTALL FUEL DELIVERY PIPE WITH INJECTOR (See page FU-15)**
24. **CONNECT FUEL TUBE SUB-ASSEMBLY (See page FU-16)**
25. **INSTALL THROTTLE BODY ASSEMBLY (See page ES-418)**
26. **INSTALL BATTERY (See page EM-119)**
27. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
28. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**

29. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
30. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-426)**
31. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY**
    HINT:
    See page WW-13.
32. **CONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (See page EM-120)**
33. **ADD ENGINE OIL**
34. **CHECK FOR FUEL LEAKS (See page FU-9)**
35. **ADD COOLANT (See page CO-5)**
36. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
37. **CHECK FOR ENGINE OIL LEAKS**
38. **CHECK FOR EXHAUST GAS LEAKS**
39. **INSPECT IGNITION TIMING (See page EM-1)**
40. **INSPECT IDLE SPEED (See page EM-2)**
41. **INSPECT COMPRESSION (See page EM-3)**
42. **INSPECT CO/HC (See page EM-3)**
43. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**
44. **INSTALL FRONT FENDER APRON SEAL RH**
45. **INSTALL ENGINE UNDER COVER LH**
46. **INSTALL ENGINE UNDER COVER RH**
47. **INSTALL FRONT WHEEL RH (See page EM-120)**

ENGINE FRONT OIL SEAL

COMPONENTS



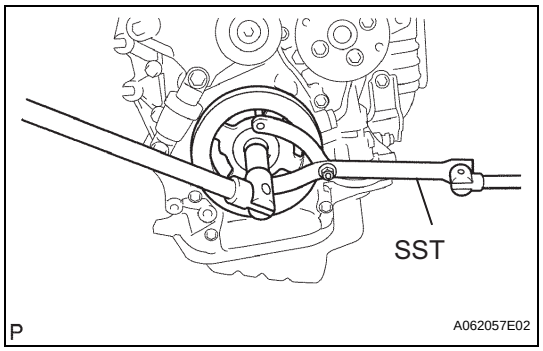
REMOVAL

1. **REMOVE FRONT WHEEL RH**
2. **REMOVE FRONT FENDER APRON SEAL RH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE V-RIBBED BELT (See page EM-6)**
6. **REMOVE CRANKSHAFT PULLEY**

(a) TMMK made:

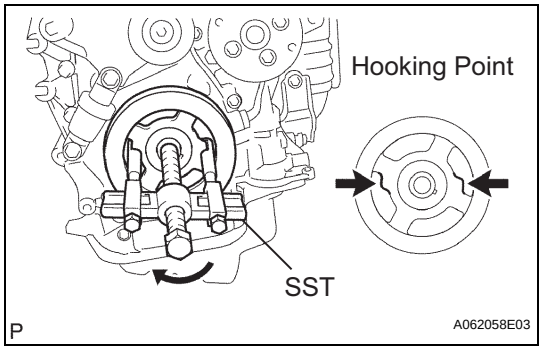
(1) Using SST, fix the pulley in place and loosen the pulley bolt.

SST 09960-10010 (09962-01000, 09963-01000)



(2) Using SST, remove the pulley bolt and pulley.

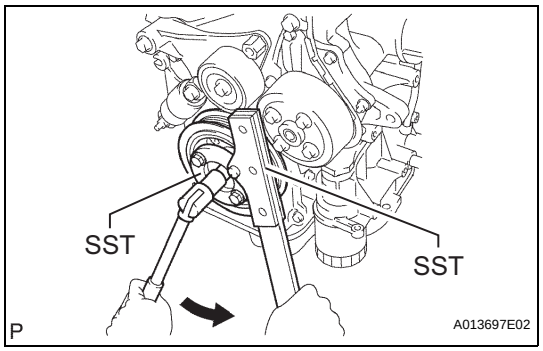
SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09955-04041, 09957-04010, 09954-04010, 91111-51014)



(b) TMC made:

(1) Using SST, fix the pulley in place and loosen the pulley bolt.

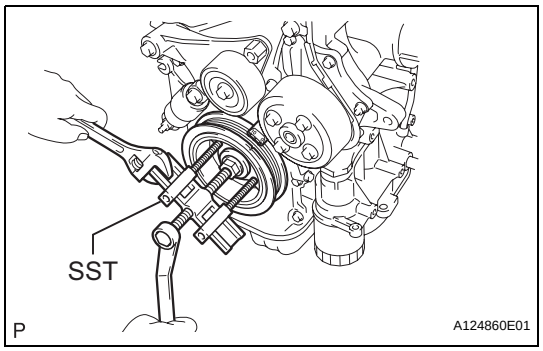
SST 09213-54015 (91651-60855), 09330-00021

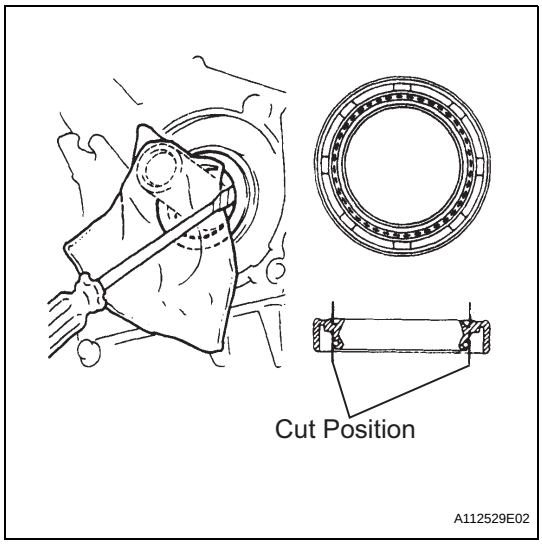


(2) Using SST, remove the pulley bolt and pulley.

SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021), 09950-40011 (09957-04010)

HINT:
If necessary, remove the pulley and pulley bolt using SST.





7. REMOVE TIMING CHAIN CASE OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with the tip taped, pry out the oil seal.

NOTICE:

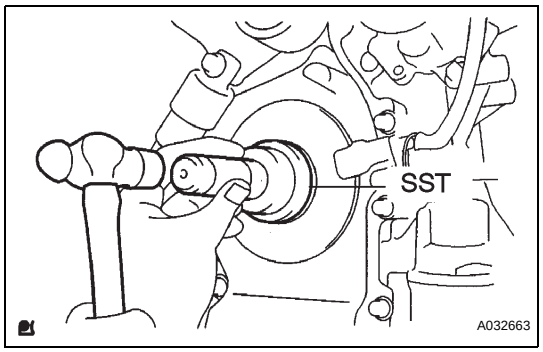
After the removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.

INSTALLATION

1. INSTALL TIMING CHAIN CASE OIL SEAL

(a) Apply MP grease to a new oil seal lip.
NOTICE:
Keep the lip free from foreign matter.

(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-22010
NOTICE:
Wipe off extra grease from the crankshaft.

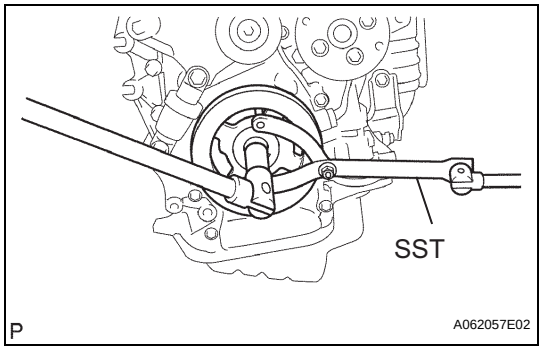


2. INSTALL CRANKSHAFT PULLEY

(a) TMMK made:

(1) Align the pulley set key with the key groove of the pulley.

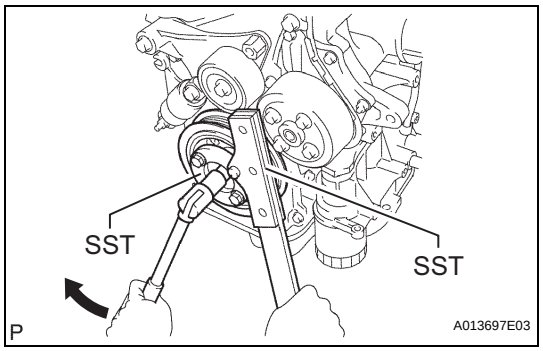
(2) Using SST, fix the pulley in place and tighten the bolt.
SST 09960-10010 (09962-01000, 09963-01000)
Torque: 170 N*m (1,733 kgf*cm, 125 ft.*lbf)



(b) TMC made:

(1) Align the pulley set key with the key groove of the pulley.

(2) Using SST, fix the pulley in place and tighten the bolt.
SST 09213-54015 (91651-60855), 09330-00021
Torque: 180 N*m (1,835 kgf*cm, 133 ft.*lbf)



3. INSTALL V-RIBBED BELT (See page EM-6)

4. INSTALL ENGINE UNDER COVER LH

5. INSTALL ENGINE UNDER COVER RH

6. INSTALL FRONT FENDER APRON SEAL RH

7. INSTALL FRONT WHEEL RH

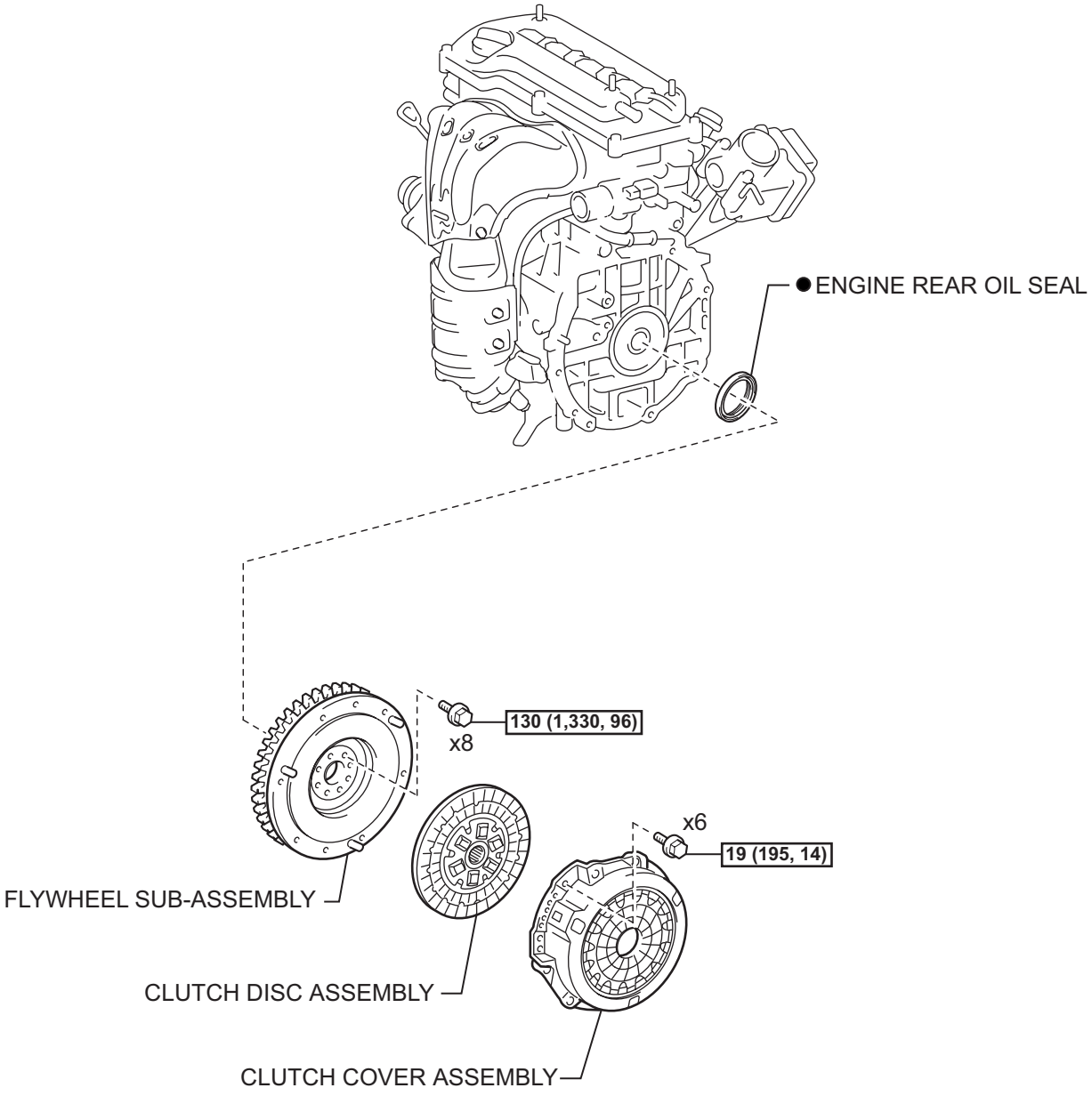
8. CHECK FOR ENGINE OIL LEAKS

EM

ENGINE REAR OIL SEAL

COMPONENTS

M/T:



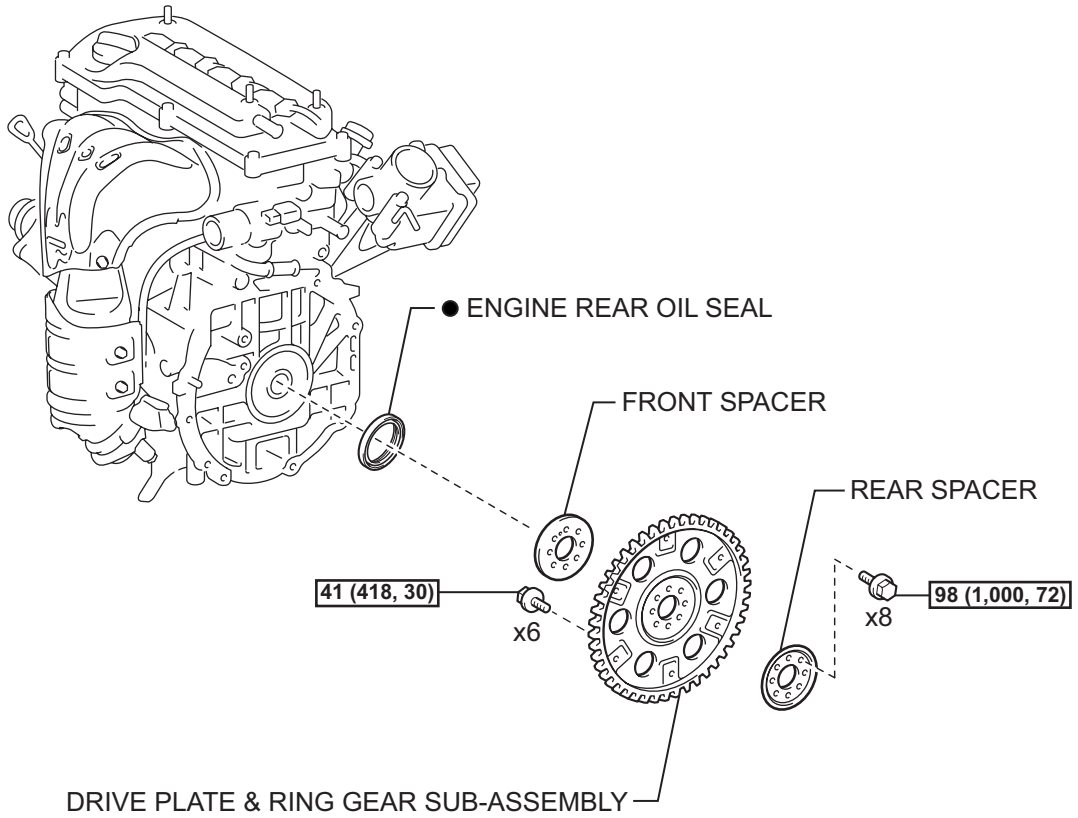
N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

A136909E01

EM

A/T:



N*m (kgf*cm, ft.*lbf): Specified torque

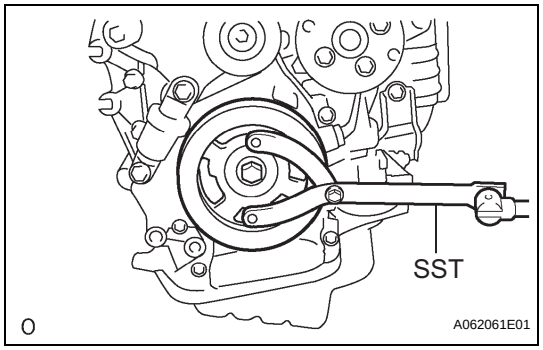
● Non-reusable part

A136910E01

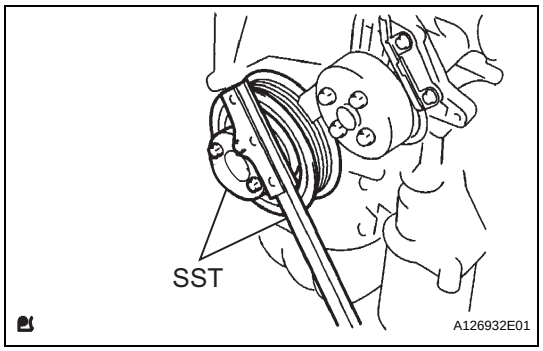
REMOVAL

1. **SEPARATE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)**
   HINT:
   See page AX-162.

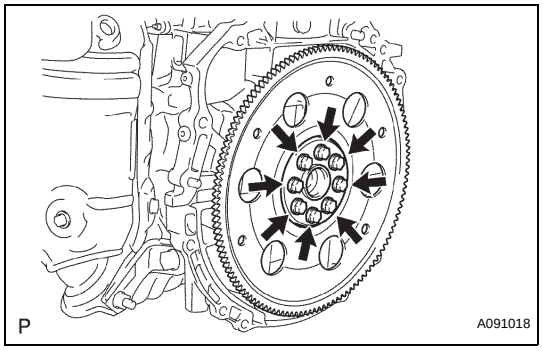
2. **SEPARATE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)**
   HINT:
   See page MX-24.



3. **REMOVE DRIVE PLATE & RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)**
   (a) TMMK made:
   (1) Using SST, hold the crankshaft.
   SST 09960-10010 (09962-01000, 09963-01000)



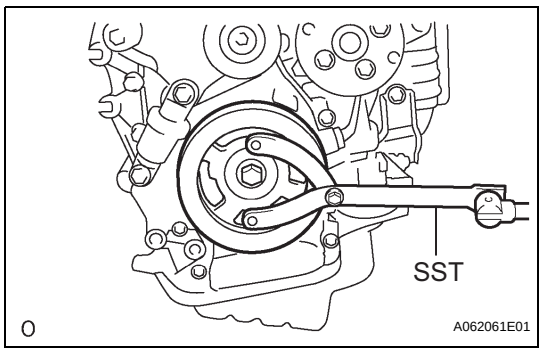
   (b) TMC made:
   (1) Using SST, hold the crankshaft.
   SST 09213-54015 (91651-60855), 09330-00021



   (c) Remove the 8 bolts, rear spacer, drive plate and front spacer.

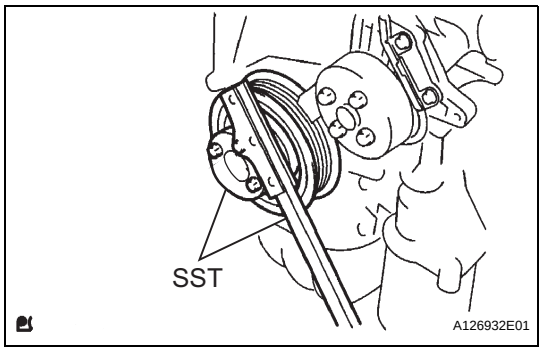
4. **REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See page CL-32)**

5. **REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle) (See page CL-32)**

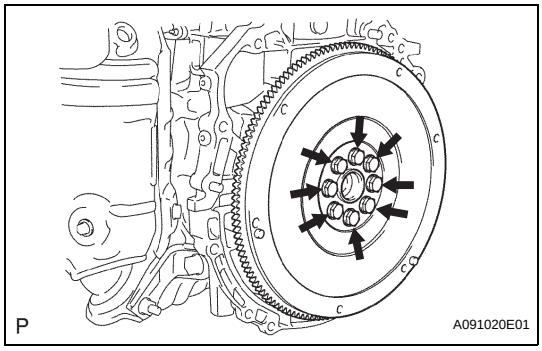


6. **REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)**
   (a) TMMK made:
   (1) Using SST, hold the crankshaft.
   SST 09960-10010 (09962-01000, 09963-01000)

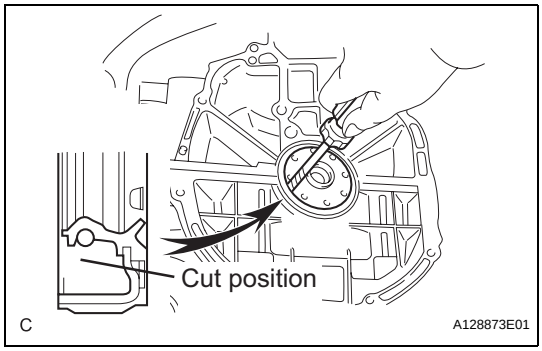
EM



(b) TMC made:
(1) Using SST, hold the crankshaft.
SST 09213-54015 (91651-60855), 09330-00021



(c) Remove the 8 bolts and flywheel.



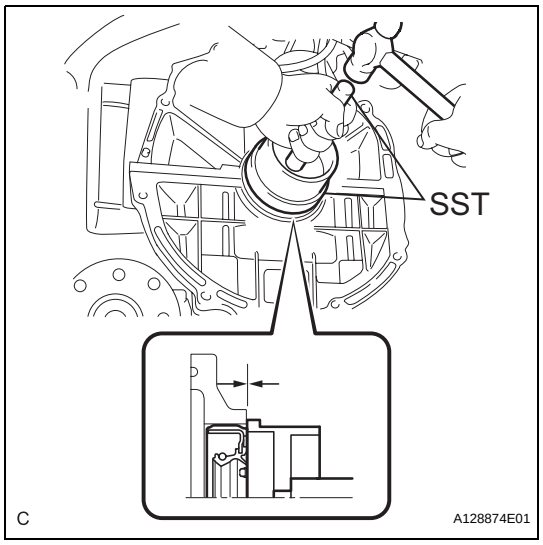
7. REMOVE ENGINE REAR OIL SEAL
(a) Using a knife, cut through the oil seal lip.
(b) Using a screwdriver with its tip taped, pry out the oil seal.
NOTICE:
After the removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.

INSTALLATION

1. INSTALL ENGINE REAR OIL SEAL

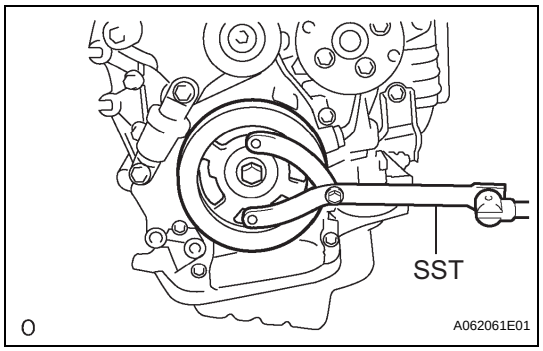
(a) Apply MP grease to a new oil seal lip.
NOTICE:
Keep the lip free from foreign matter.

(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-15030, 09950-70010 (09951-07100)
NOTICE:
Wipe off extra grease from the crankshaft.

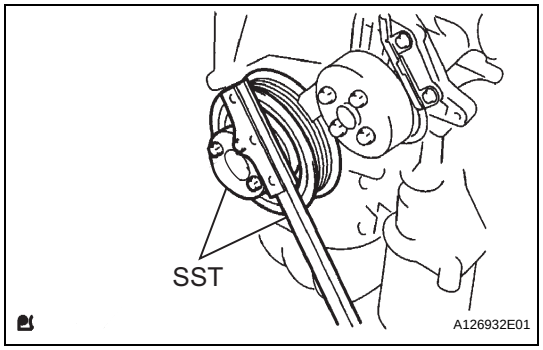


2. INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)

(a) TMMK made:
(1) Using SST, hold the crankshaft.
SST 09960-10010 (09962-01000, 09963-01000)

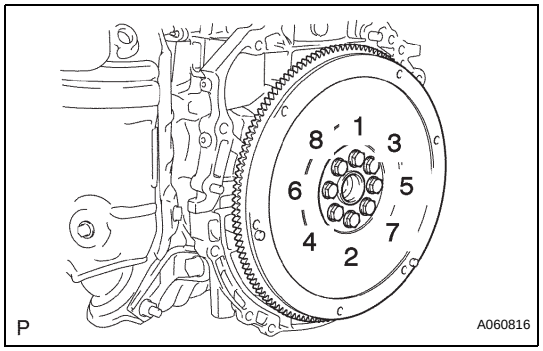


(b) TMC made:
(1) Using SST, hold the crankshaft.
SST 09213-54015 (91651-60855), 09330-00021



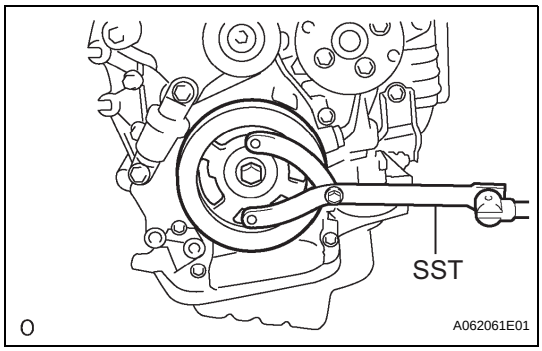
(c) Clean the bolt and the bolt hole.
(d) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND or equivalent

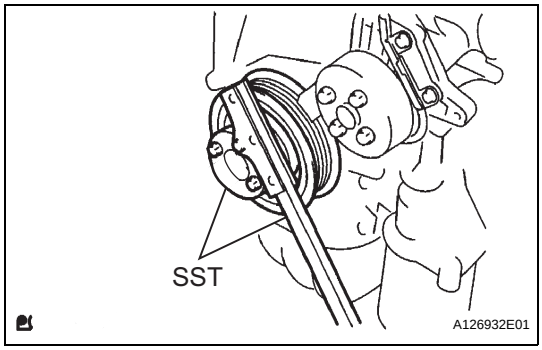
(e) Install the flywheel with the 8 bolts. Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 130 N*m (1,330 kgf*cm, 96 ft.*lbf)

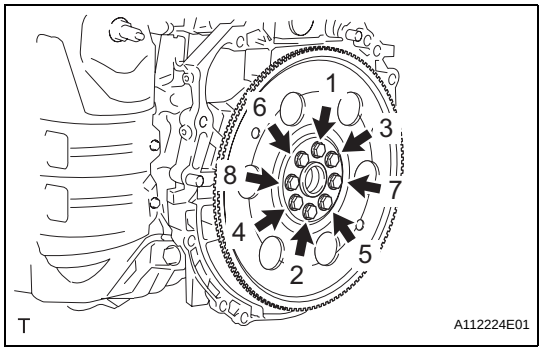


3. INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle) (See page CL-34)

4. INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See page CL-34)







5. INSTALL DRIVE PLATE & RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)

(a) TMMK made:

(1) Using SST, hold the crankshaft.

SST 09960-10010 (09962-01000, 09963-01000)

(b) TMC made:

(1) Using SST, hold the crankshaft.

SST 09213-54015 (91651-60855), 09330-00021

(c) Clean the bolt and the bolt hole.

(d) Apply adhesive to 2 or 3 threads of the bolt end.

Adhesive:

Part No. 08833-00070, THREE BOND or equivalent

(e) Install the front spacer, drive plate and rear spacer with the 8 bolts. Uniformly tighten the 8 bolts in the sequence shown in the illustration.

Torque: 98 N*m (1,000 kgf*cm, 72 ft.*lbf)

6. INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

HINT:

See page MX-27.

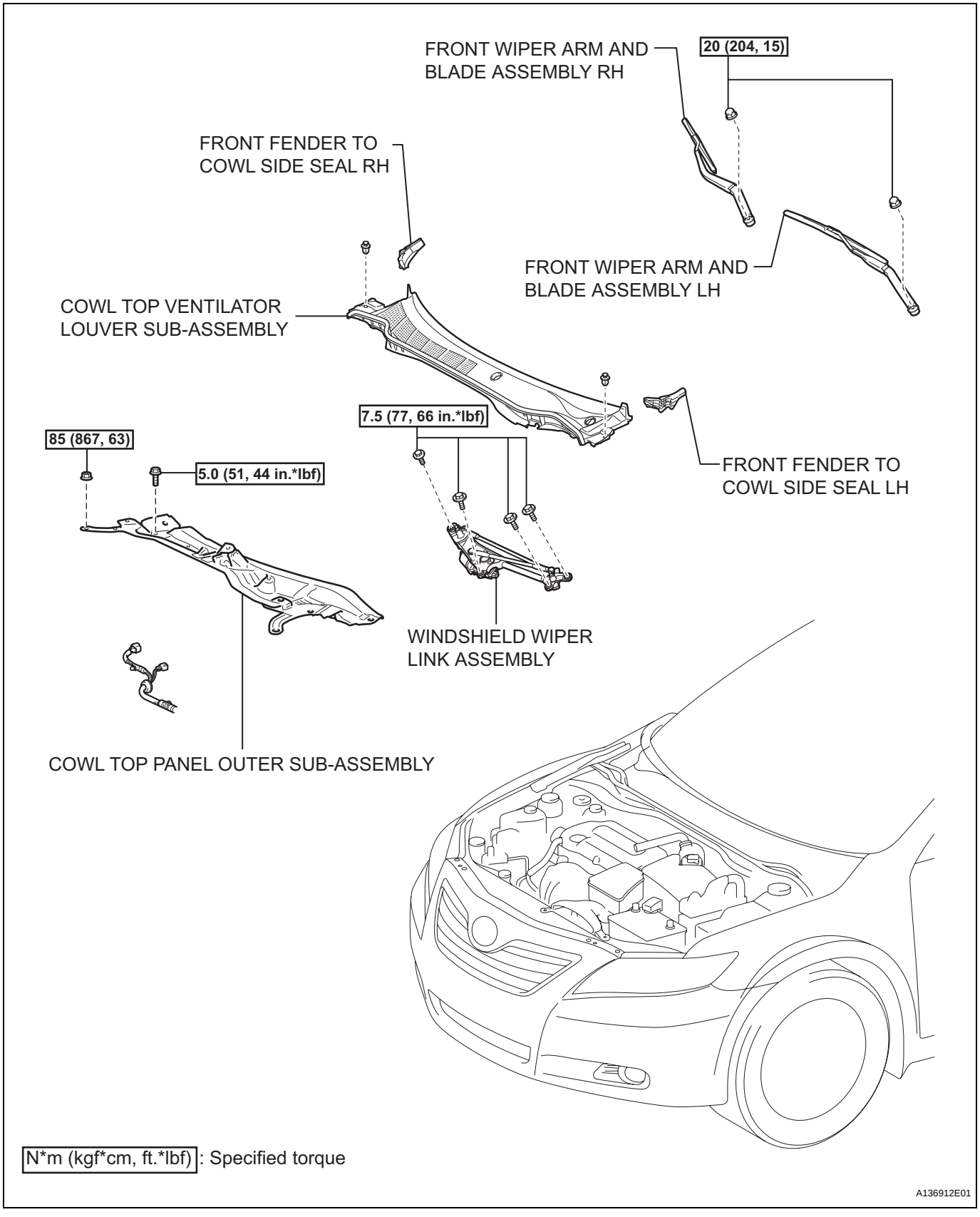
7. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

HINT:

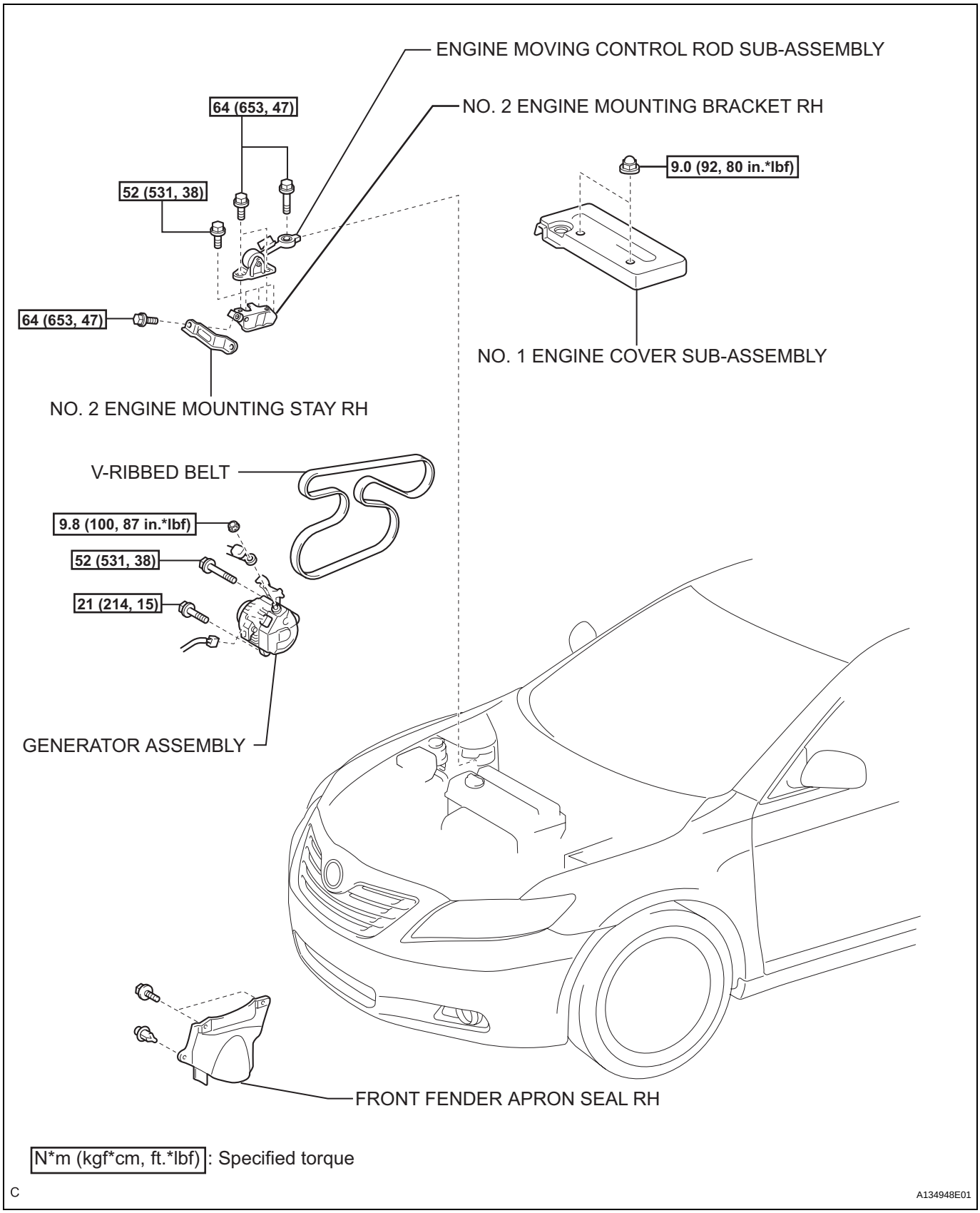
See page AX-168.

ENGINE ASSEMBLY

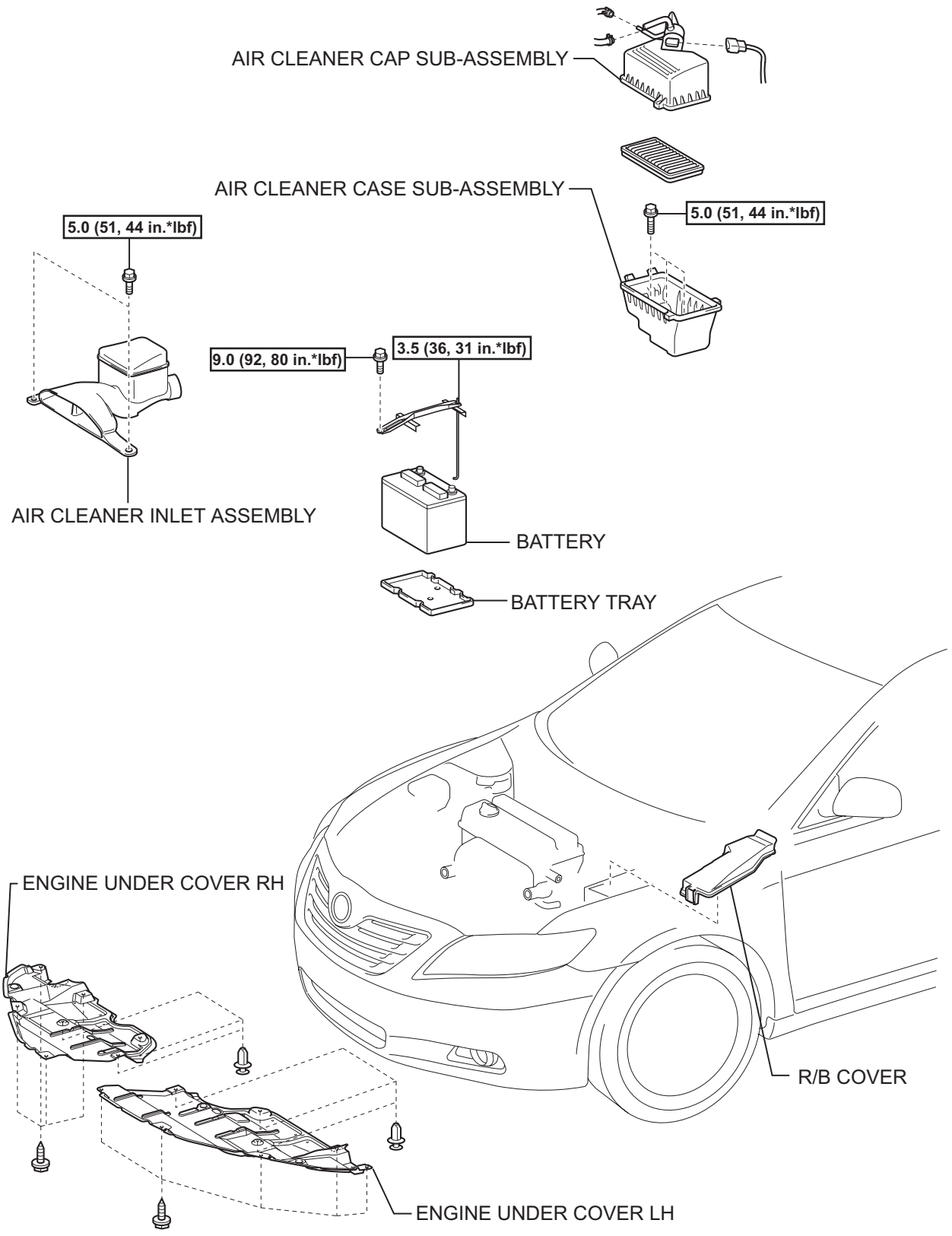
COMPONENTS



EM


ENGINE MOVING CONTROL ROD SUB-ASSEMBLY
NO. 2 ENGINE MOUNTING BRACKET RH
64 (653, 47)
52 (531, 38)
64 (653, 47)
9.0 (92, 80 in.*lbf)
NO. 1 ENGINE COVER SUB-ASSEMBLY
NO. 2 ENGINE MOUNTING STAY RH
V-RIBBED BELT
9.8 (100, 87 in.*lbf)
52 (531, 38)
21 (214, 15)
GENERATOR ASSEMBLY
FRONT FENDER APRON SEAL RH
N*m (kgf*cm, ft.*lbf): Specified torque
C
A134948E01

EM



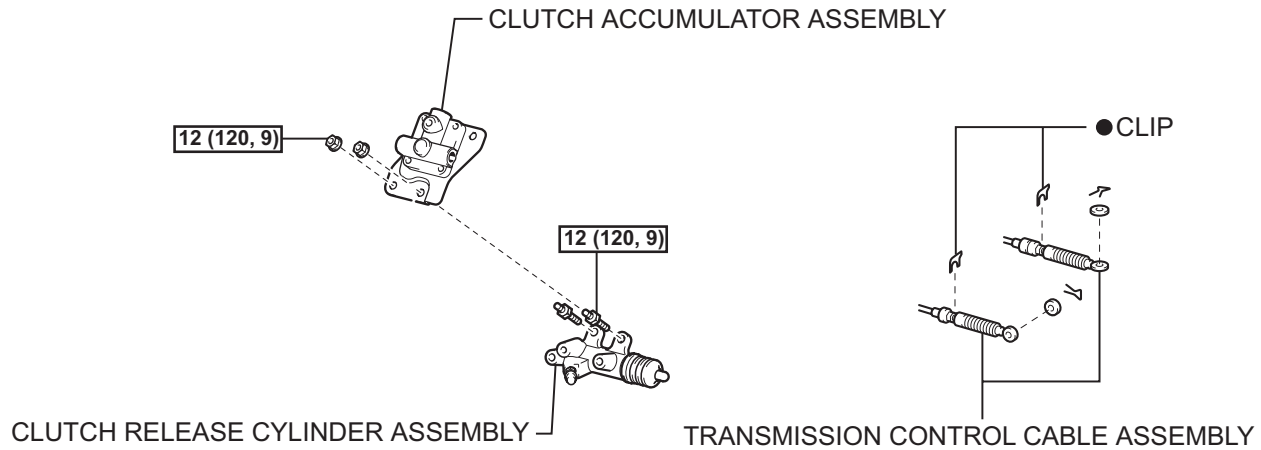
N*m (kgf*cm, ft.*lbf): Specified torque

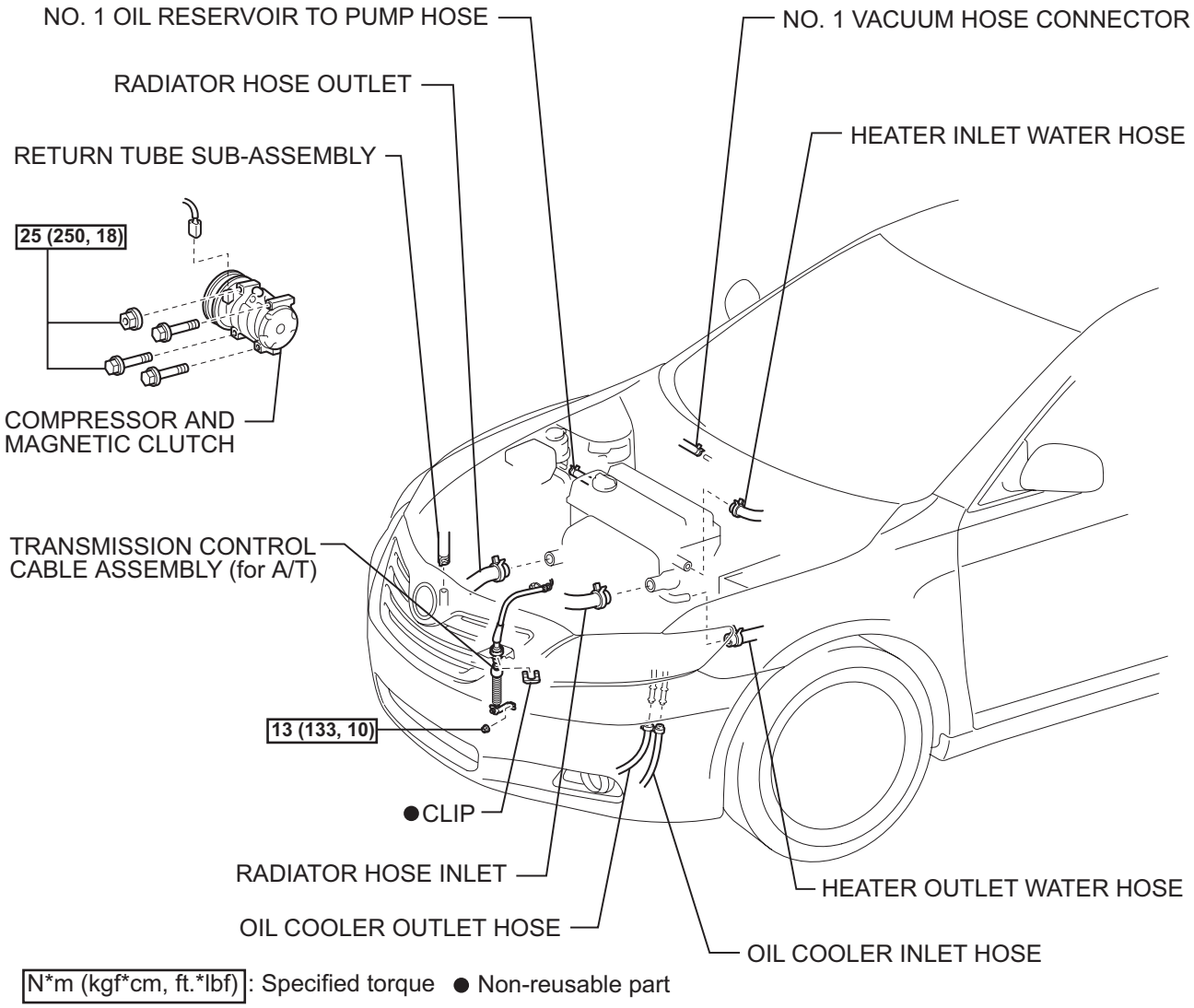
C

A134915E01

EM

M/T:

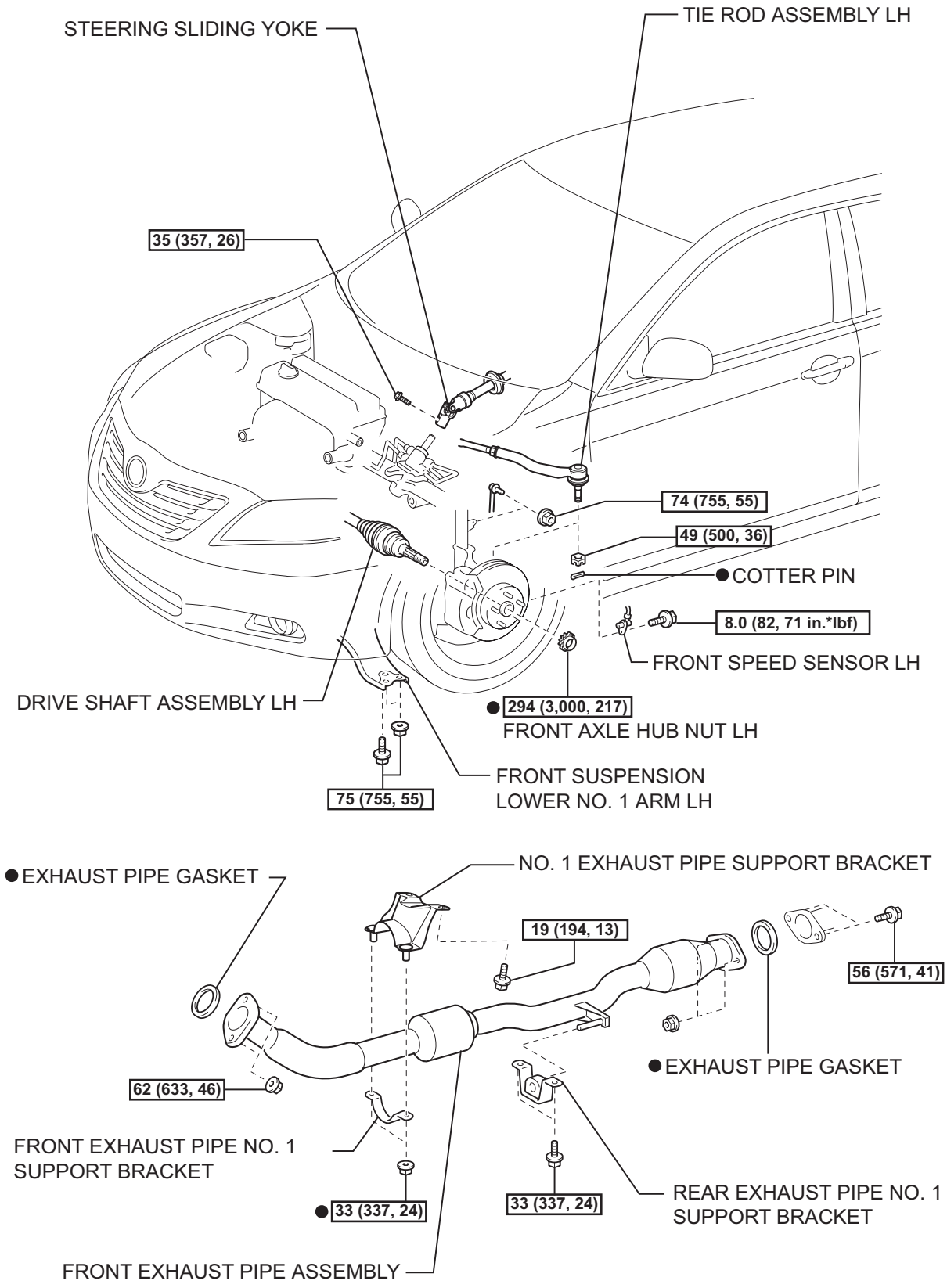




N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

A134916E01

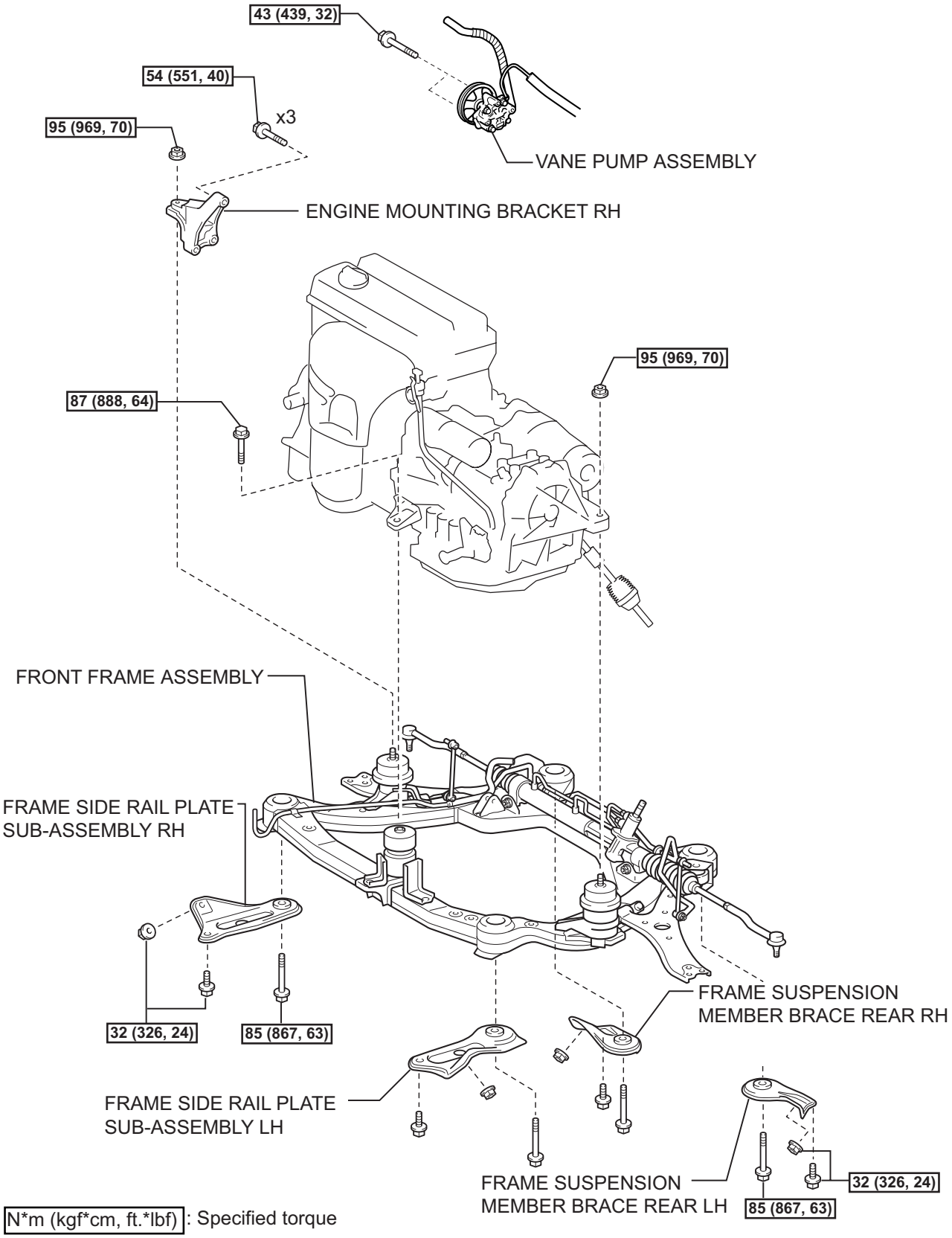


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

A134917E01

A/T:

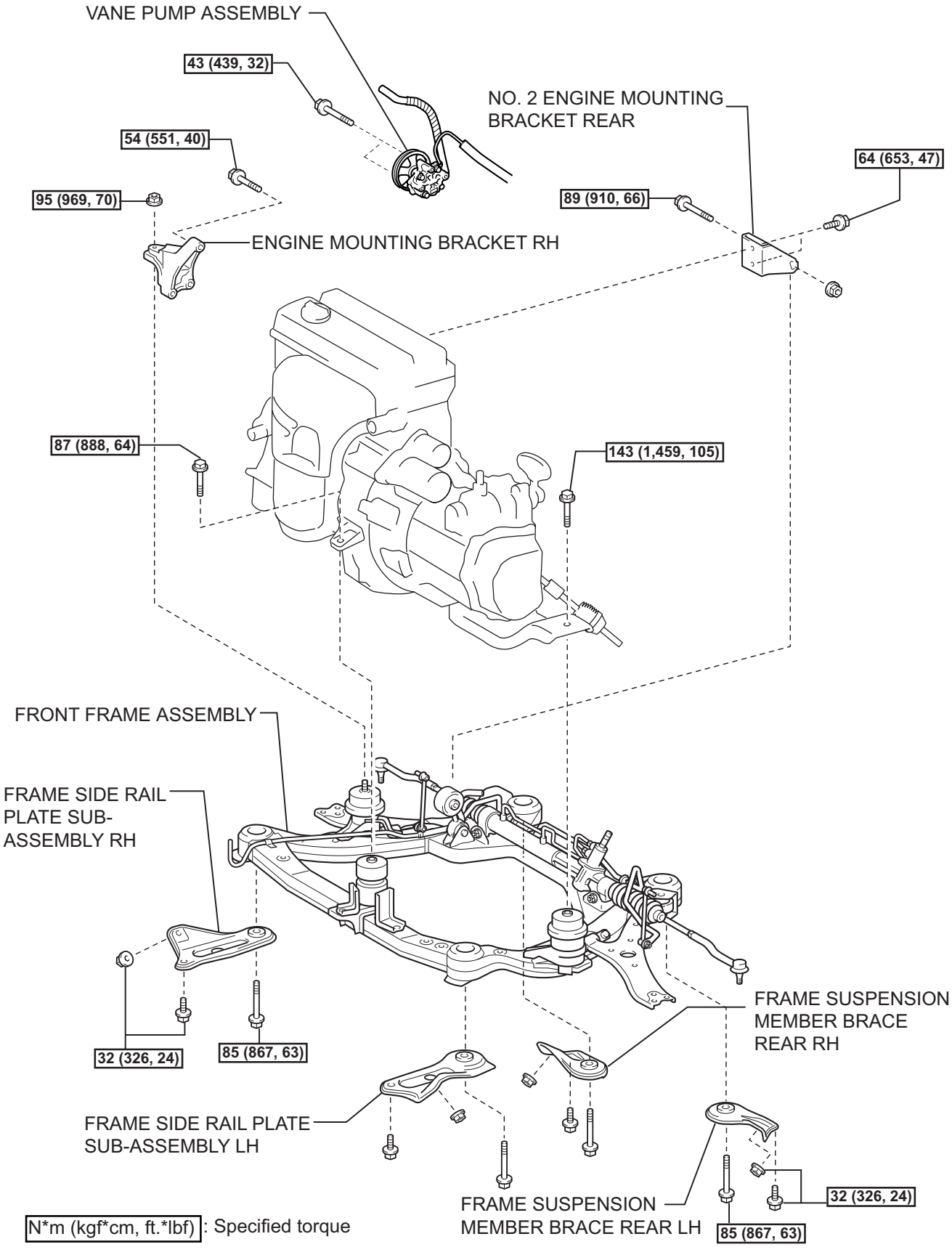


N*m (kgf*cm, ft.*lbf) : Specified torque

C

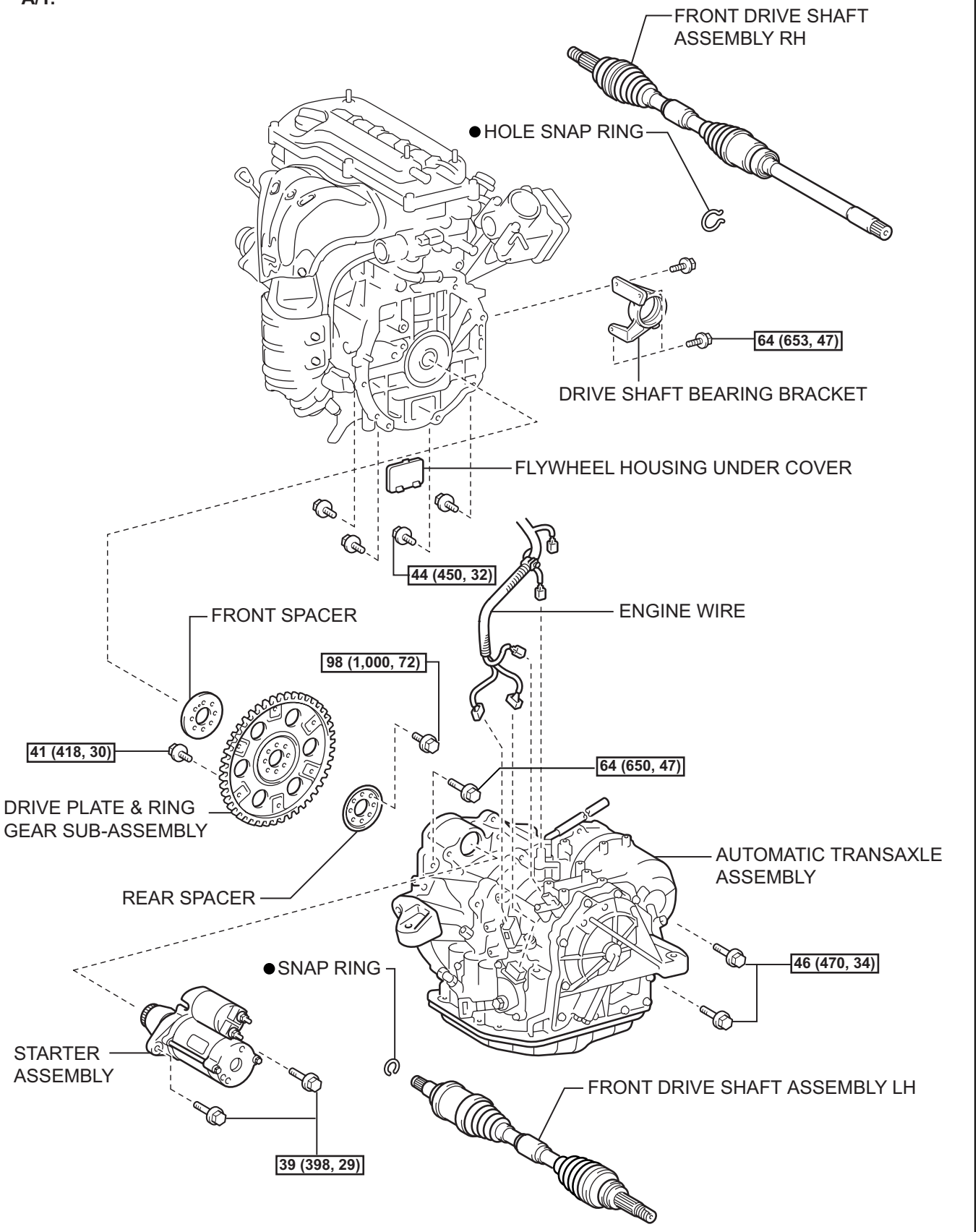
A138330E01

M/T:


VANE PUMP ASSEMBLY
43 (439, 32)
NO. 2 ENGINE MOUNTING BRACKET REAR
54 (551, 40)
64 (653, 47)
95 (969, 70)
89 (910, 66)
ENGINE MOUNTING BRACKET RH
87 (888, 64)
143 (1,459, 105)
FRONT FRAME ASSEMBLY
FRAME SIDE RAIL PLATE SUB-ASSEMBLY RH
FRAME SUSPENSION MEMBER BRACE REAR RH
32 (326, 24)
85 (867, 63)
FRAME SIDE RAIL PLATE SUB-ASSEMBLY LH
FRAME SUSPENSION MEMBER BRACE REAR LH
32 (326, 24)
85 (867, 63)
N*m (kgf*cm, ft.*lbf): Specified torque
C
A138333E01

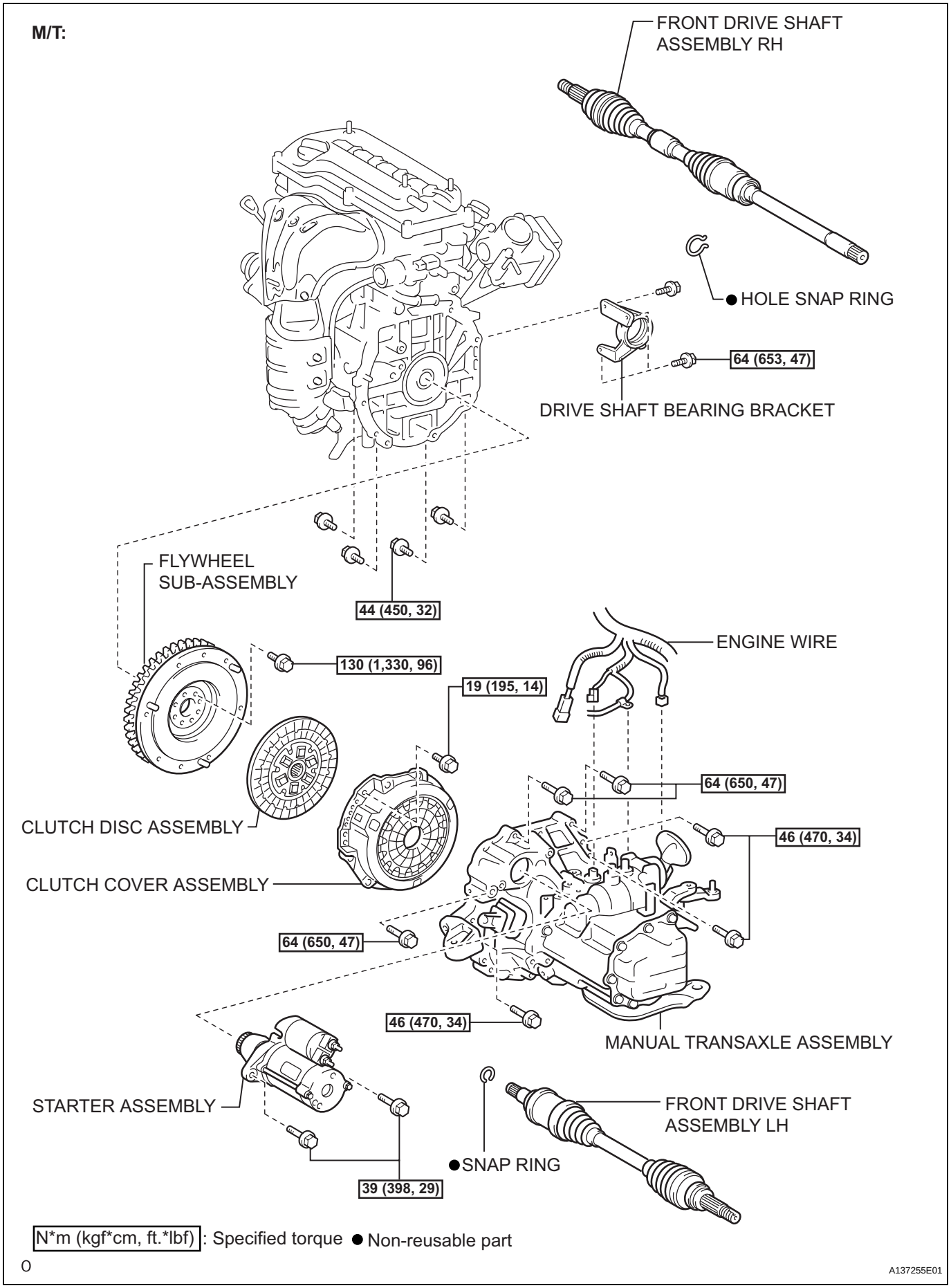
EM

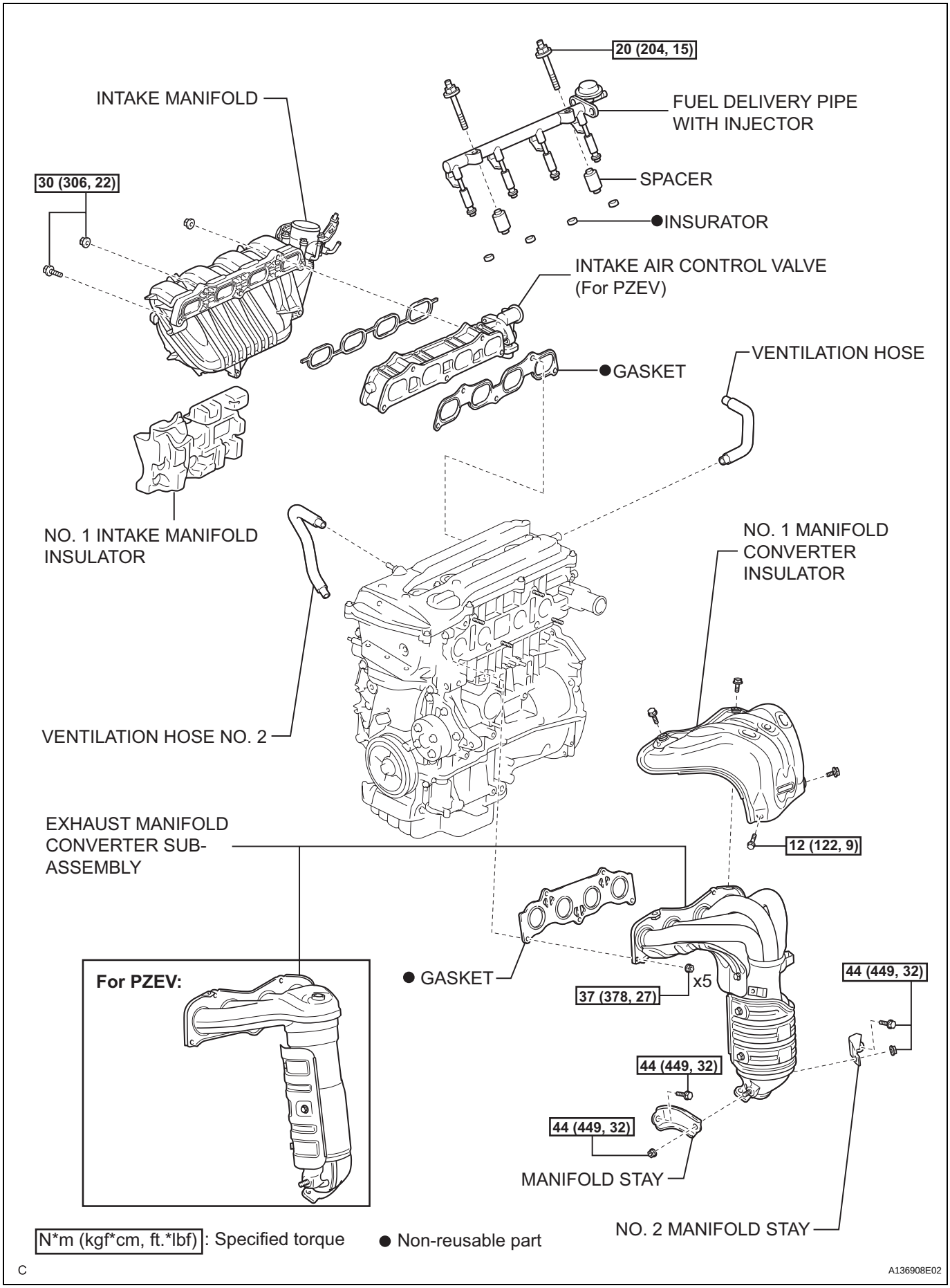
A/T:

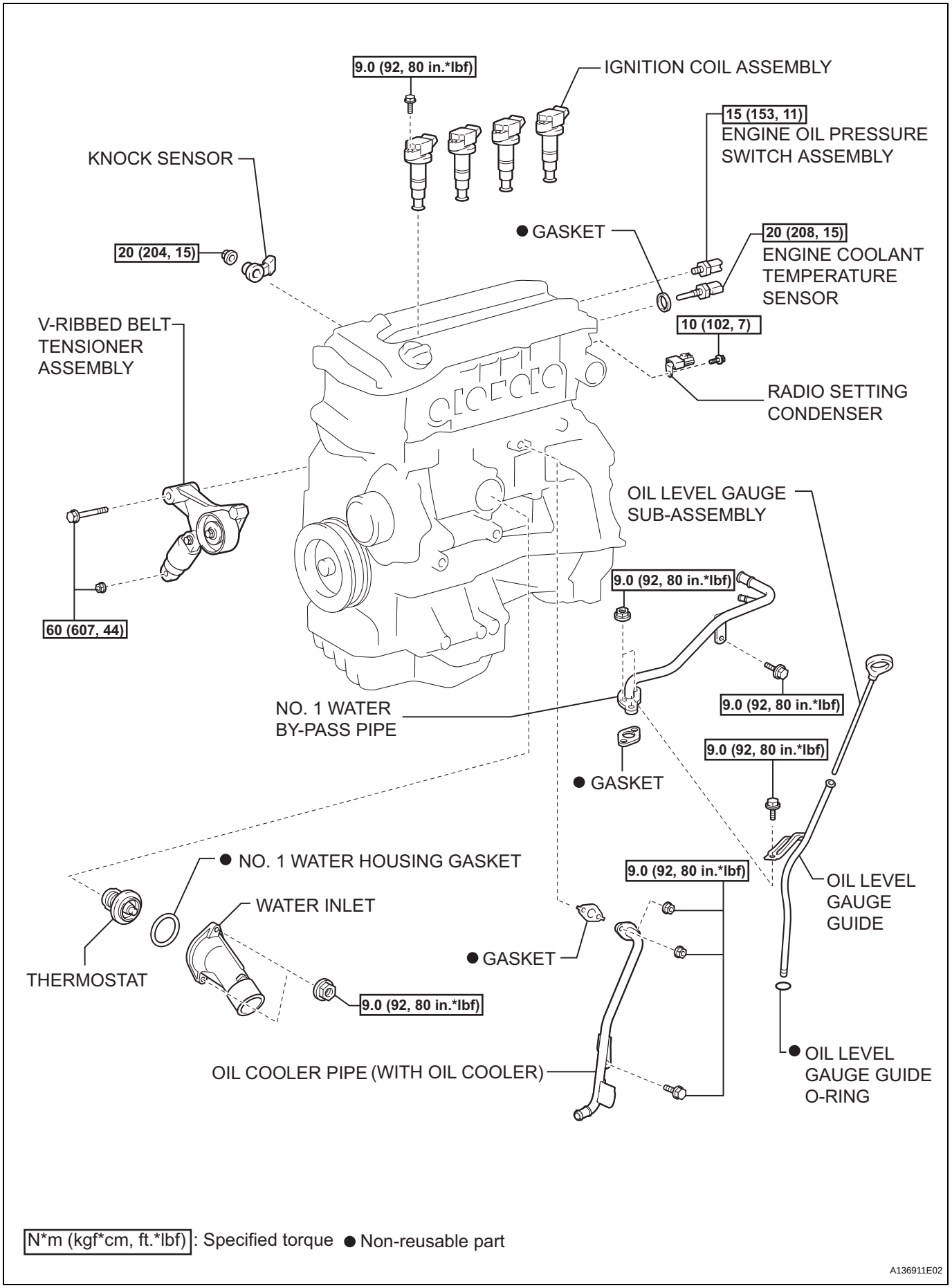


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

A139203E01


M/T:
FRONT DRIVE SHAFT ASSEMBLY RH
HOLE SNAP RING
64 (653, 47)
DRIVE SHAFT BEARING BRACKET
FLYWHEEL SUB-ASSEMBLY
44 (450, 32)
130 (1,330, 96)
19 (195, 14)
ENGINE WIRE
64 (650, 47)
46 (470, 34)
CLUTCH DISC ASSEMBLY
CLUTCH COVER ASSEMBLY
64 (650, 47)
46 (470, 34)
MANUAL TRANSAXLE ASSEMBLY
STARTER ASSEMBLY
FRONT DRIVE SHAFT ASSEMBLY LH
SNAP RING
39 (398, 29)
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part
A137255E01


20 (204, 15)
INTAKE MANIFOLD
FUEL DELIVERY PIPE WITH INJECTOR
30 (306, 22)
SPACER
●INSURATOR
INTAKE AIR CONTROL VALVE (For PZEV)
●GASKET
VENTILATION HOSE
NO. 1 INTAKE MANIFOLD INSULATOR
NO. 1 MANIFOLD CONVERTER INSULATOR
VENTILATION HOSE NO. 2
EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY
12 (122, 9)
For PZEV:
● GASKET
37 (378, 27)
x5
44 (449, 32)
44 (449, 32)
44 (449, 32)
MANIFOLD STAY
NO. 2 MANIFOLD STAY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
C
A136908E02



EM

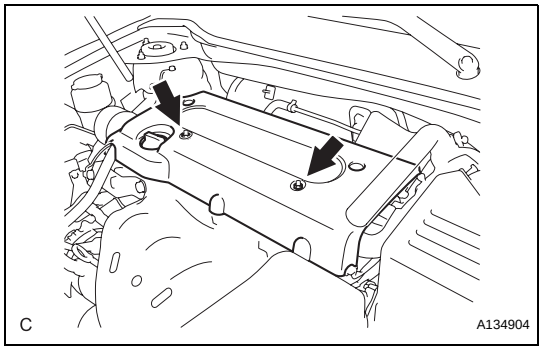
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

A136911E02

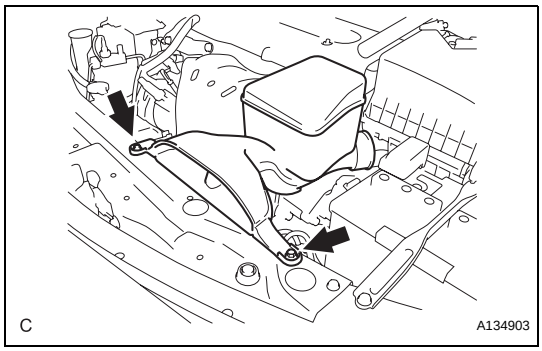
EM

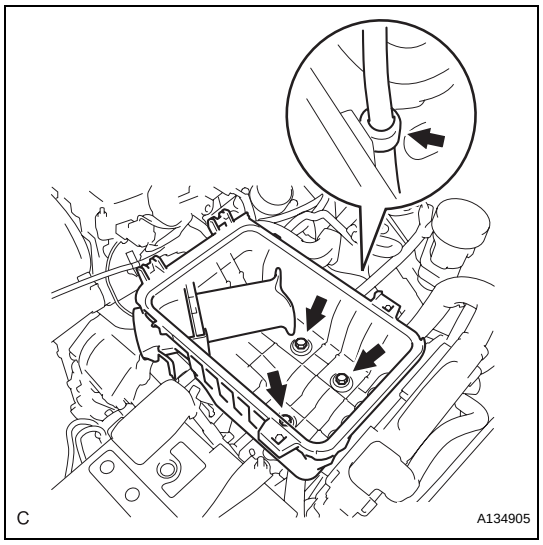
REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **DRAIN ENGINE OIL (See page LU-4)**
9. **DRAIN ENGINE COOLANT (See page CO-5)**
10. **DRAIN AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle) (See page AX-162)**
11. **DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-5)**
12. **DRAIN BRAKE FLUID (for Manual Transaxle) (See page BR-28)**
13. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
    HINT:
    See page WW-9.
14. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-424)**
15. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY**
    (a) Remove the 2 nuts and cover.



16. **REMOVE V-RIBBED BELT (See page EM-6)**
17. **REMOVE AIR CLEANER INLET ASSEMBLY**
    (a) Remove the 2 bolts, clamp and air cleaner inlet.
18. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**

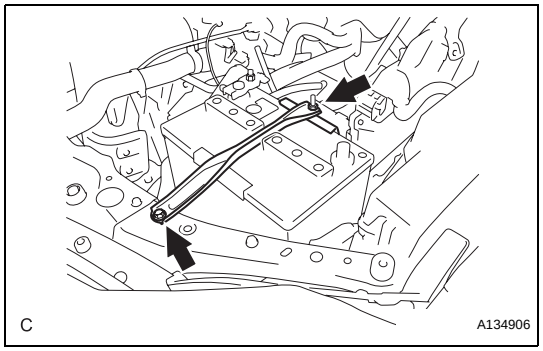




19. REMOVE AIR CLEANER CASE SUB-ASSEMBLY

(a) Disconnect the hose clamp.

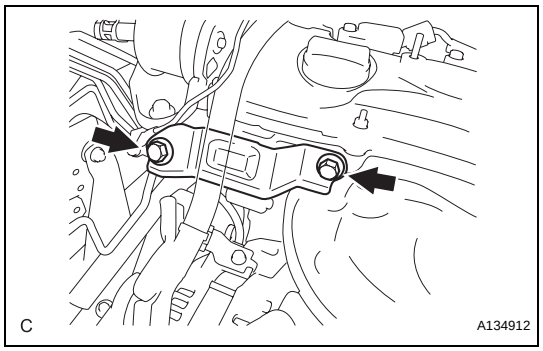
(b) Remove the 3 bolts and air cleaner case.



20. REMOVE BATTERY

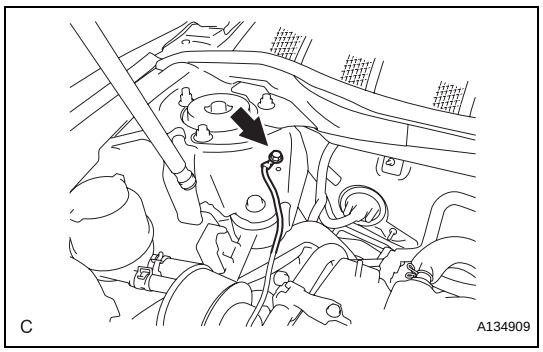
(a) Loosen the bolt and nut, and remove the battery clamp.

(b) Remove the battery and battery tray.



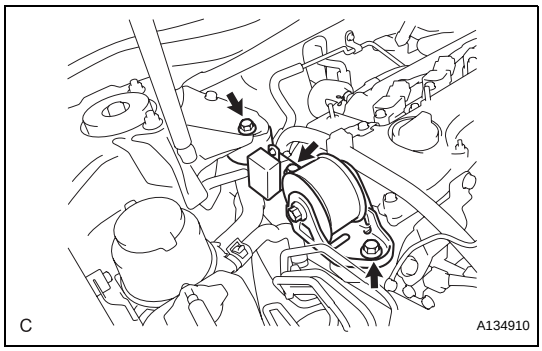
21. REMOVE NO. 2 ENGINE MOUNTING STAY RH

(a) Remove the 2 bolts and No. 2 mounting stay RH.

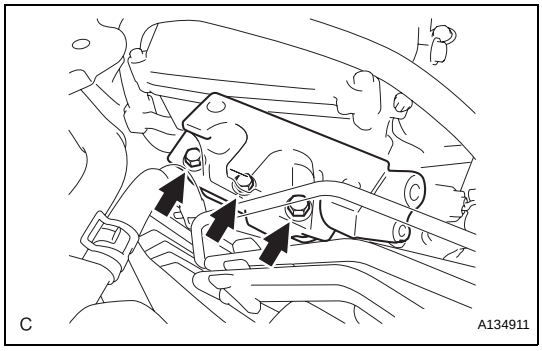


22. REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY

(a) Remove the bolt and disconnect the ground cable.

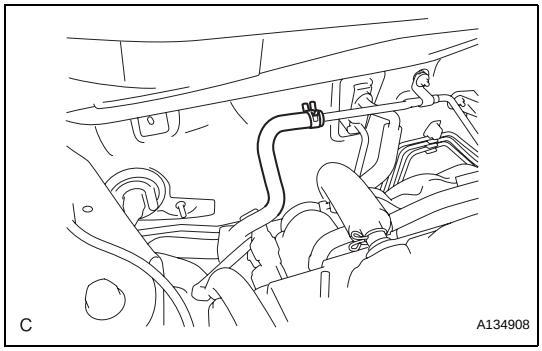


(b) Remove the 3 bolts and the engine moving control rod with bracket.



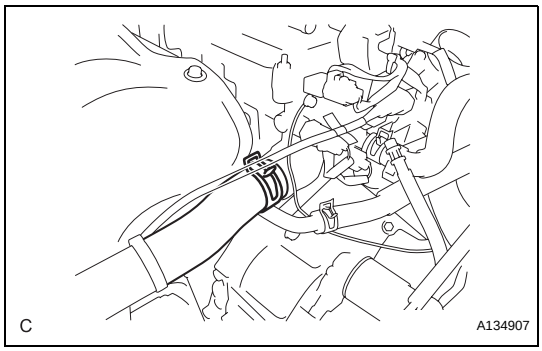
23. REMOVE NO. 2 ENGINE MOUNTING BRACKET RH

(a) Remove the 3 bolts and No. 2 mounting bracket RH.



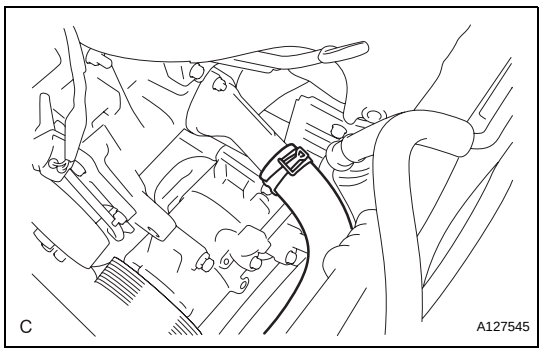
24. DISCONNECT NO. 1 VACUUM HOSE CONNECTOR

(a) Remove the clamp and disconnect the vacuum hose connector.



25. DISCONNECT RADIATOR HOSE INLET

(a) Remove the clamp and disconnect the radiator hose inlet.

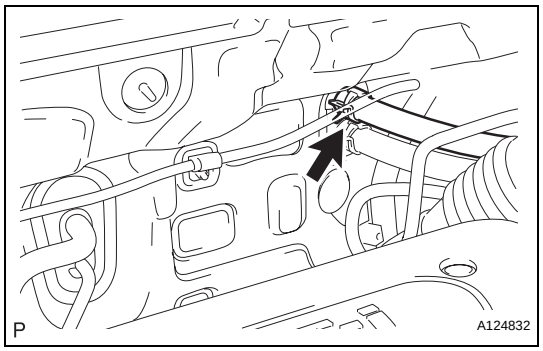


26. DISCONNECT RADIATOR HOSE OUTLET

(a) Remove the clamp and disconnect the radiator hose outlet.

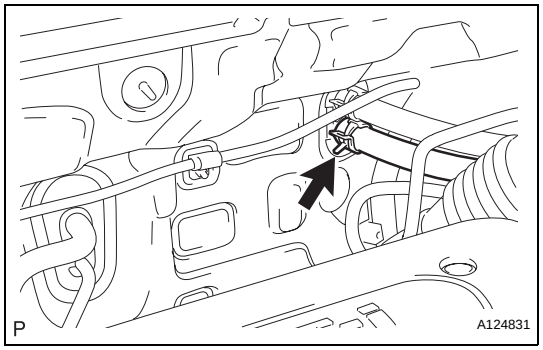
27. DISCONNECT OIL COOLER INLET HOSE (for Automatic Transaxle) (See page CO-22)

28. DISCONNECT OIL COOLER OUTLET HOSE (for Automatic Transaxle) (See page CO-23)



29. DISCONNECT HEATER INLET WATER HOSE

(a) Disconnect the heater inlet water hose.



30. DISCONNECT HEATER OUTLET WATER HOSE

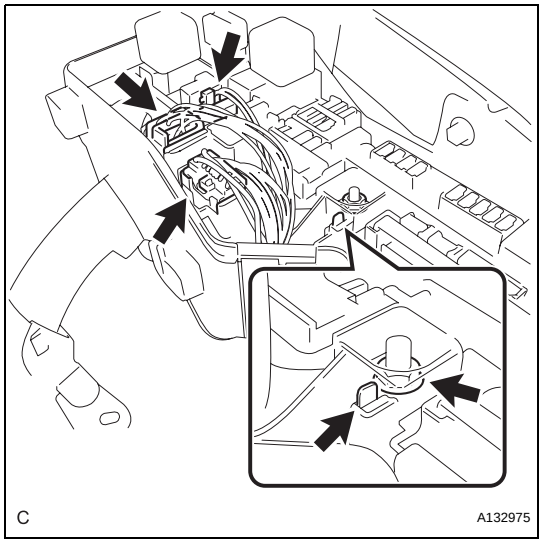
(a) Disconnect the heater outlet water hose.

31. REMOVE ECM

HINT:

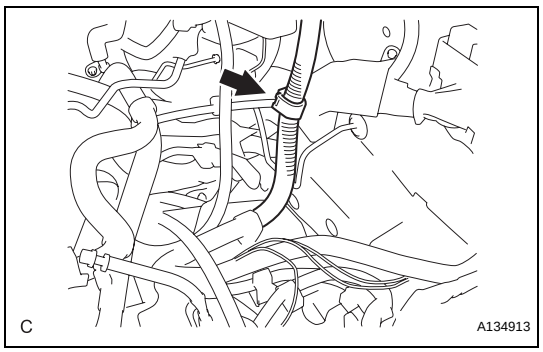
See page ES-432.

EM

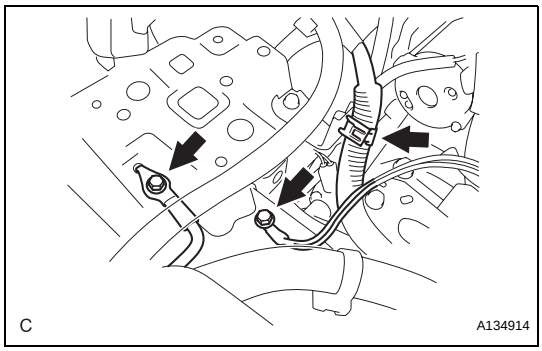


32. DISCONNECT ENGINE WIRE

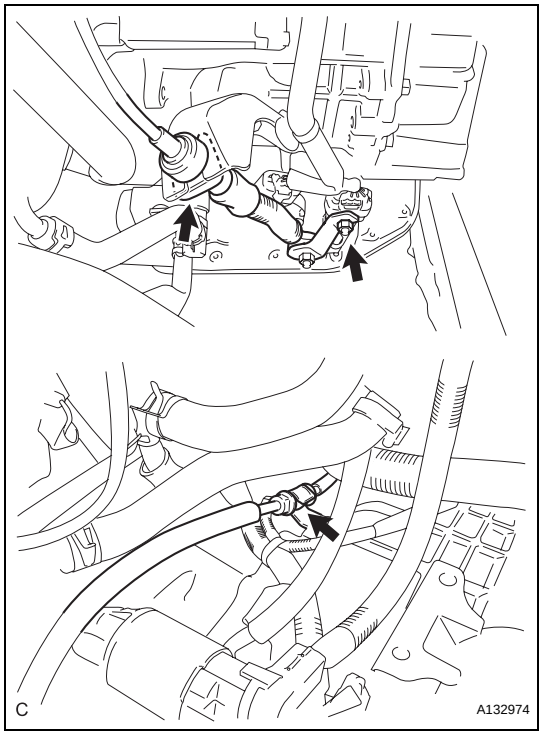
(a) Disconnect the engine wire from the engine room relay block.
  (1) Remove the nut and separate the wire harness.
  (2) Using a screwdriver, unlock the engine room R/B. Pull the engine room R/B upward.
  (3) Disconnect the engine wire connectors.



(b) Remove the clamp from the bracket.



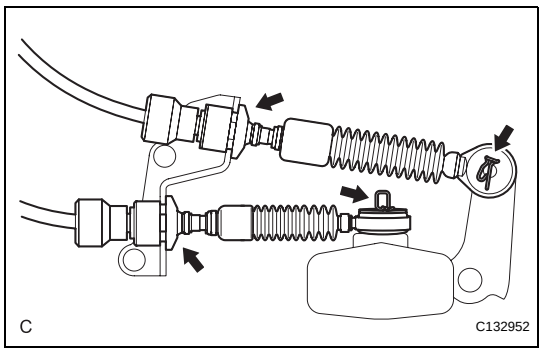
(c) Remove the 2 bolts and clamp from the body.



33. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)

(a) Remove the clip and nut, and separate the control lever.

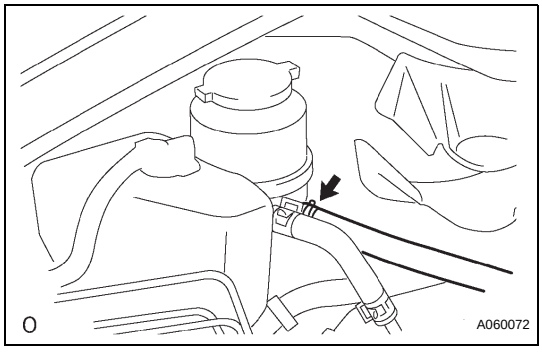
(b) Separate the clamp and separate the cable from the transaxle.



34. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)

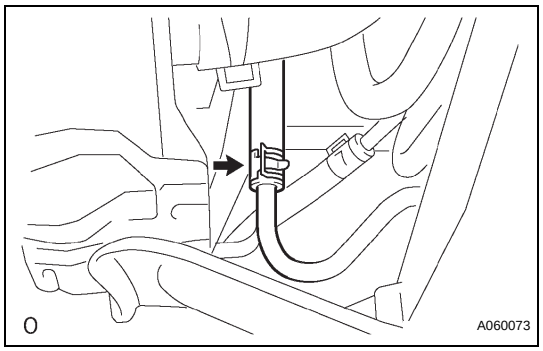
(a) Remove the 2 clips and 2 washers and disconnect the 2 cables from the transaxle.

(b) Remove the 2 clips and disconnect the 2 cables from the control cable bracket.



35. DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

(a) Disconnect the No. 1 oil reservoir to pump hose.



36. DISCONNECT RETURN TUBE SUB-ASSEMBLY

(a) Disconnect the return tube sub-assembly.

37. REMOVE CLUTCH ACCUMULATOR ASSEMBLY (for Manual Transaxle)

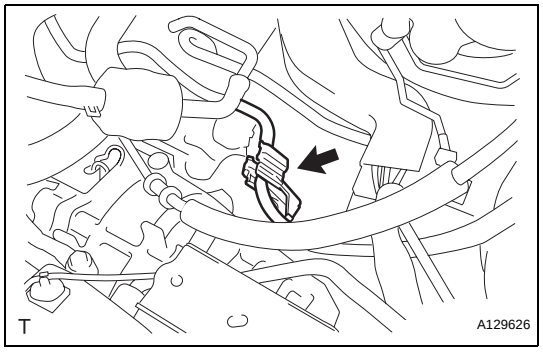
HINT:

See page CL-27.

38. REMOVE CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)

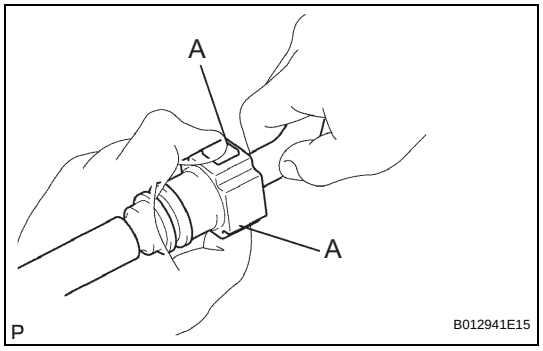
HINT:

See page CL-24.



39. DISCONNECT FUEL TUBE SUB-ASSEMBLY

(a) Remove the No. 1 fuel pipe clamp.

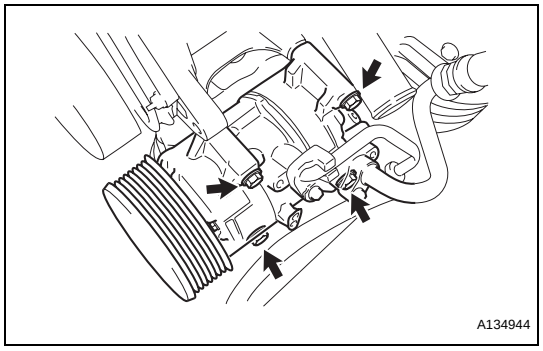


(b) Disconnect the connector from the tube while pinching part A with your fingers as shown in the illustration.

NOTICE:

- **Check for contamination in the pipe and around the connector. Clean if necessary and then disconnect the connector.**
- **Disconnect the connector by hand.**
- **Do not bend, fold or rotate the nylon tube.**
- **If the pipe and connector are stuck together, push and pull the connector until it becomes free.**
- **Put the pipe and connector ends in vinyl bags to prevent damage and contamination.**

40. REMOVE GENERATOR ASSEMBLY (See page CH-11)



41. SEPARATE COMPRESSOR AND MAGNETIC CLUTCH

(a) Disconnect the connector.

(b) Remove the 4 bolts and separate the compressor.

HINT:

Hang up the hoses instead of detaching them.

42. REMOVE FRONT EXHAUST PIPE ASSEMBLY

HINT:

See page EX-2.

43. REMOVE FRONT AXLE HUB NUT LH (See page DS-7)

44. REMOVE FRONT AXLE HUB NUT RH

HINT:

Use the same procedures described for the LH side.

45. REMOVE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)

46. REMOVE FRONT STABILIZER LINK ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

47. REMOVE FRONT SPEED SENSOR LH (See page DS-7)

48. REMOVE FRONT SPEED SENSOR RH
HINT:
Use the same procedures described for the LH side.

49. DISCONNECT TIE ROD ASSEMBLY LH (See page DS-8)

50. DISCONNECT TIE ROD ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

EM

51. DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)

52. DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM RH
HINT:
Use the same procedures described for the LH side.

53. SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)

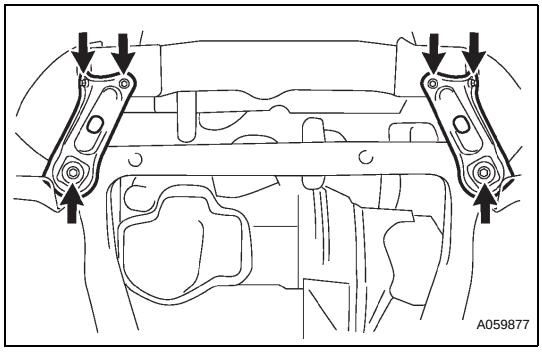
54. SEPARATE FRONT AXLE ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

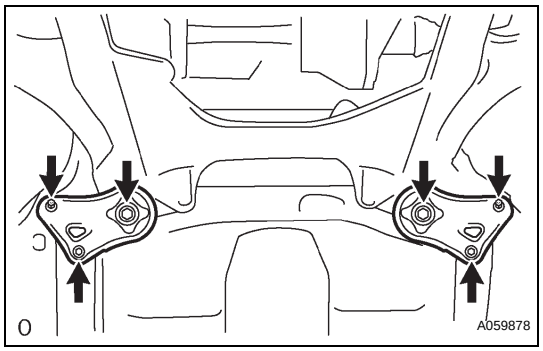
55. REMOVE DRIVE PLATE & TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle) (See page AX-164)

56. REMOVE NO. 1 EXHAUST PIPE SUPPORT BRACKET
(a) Remove the 2 bolts and exhaust pipe support bracket.

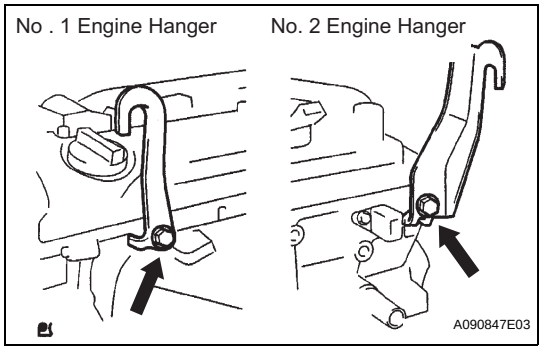
57. SEPARATE STEERING SLIDING YOKE (See page PS-40)

58. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE
(a) Set the engine lifter.
(b) Remove the 4 bolts, 2 nuts and frame side rail plate RH and LH.





(c) Remove the 4 bolts, 2 nuts and front suspension member brace rear RH and LH.
(d) Carefully remove the engine assembly from the vehicle.

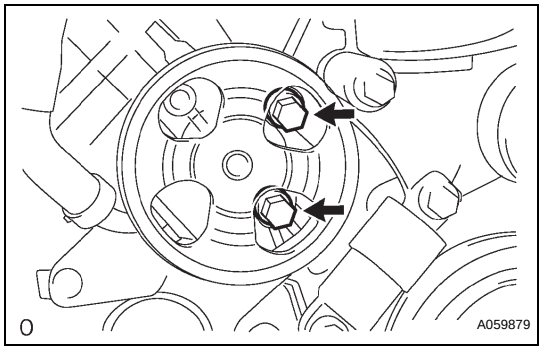


(e) Install the 2 engine hangers as shown in the illustration.
Parts No.:

Parts	Parts No.
No. 1 Engine hanger	12281-28010
No. 2 Engine hanger	12282-28010
Bolt	91512-61020

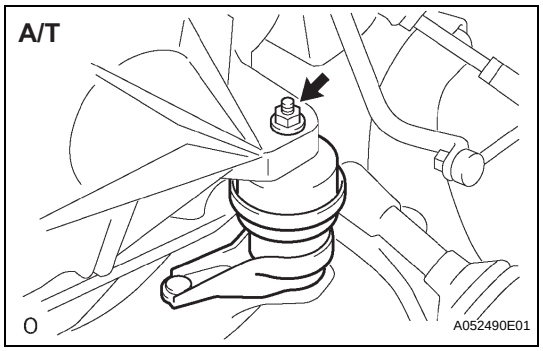
Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)

(f) Using a chain block and an engine sling device, hang the engine assembly.



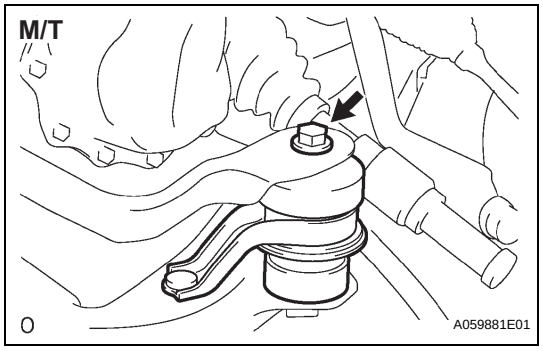
59. REMOVE VANE PUMP ASSEMBLY

(a) Disconnect the oil pressure switch connector.
(b) Loosen the 2 bolts and remove the vane pump from the engine.

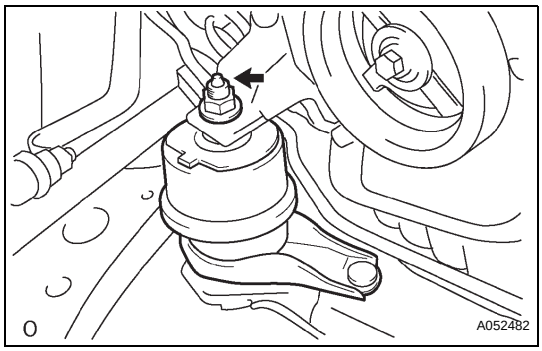


60. REMOVE FRONT FRAME ASSEMBLY

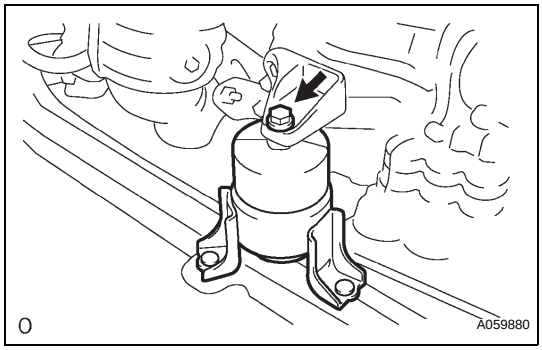
(a) A/T:
Remove the nut from the engine mounting insulator LH.



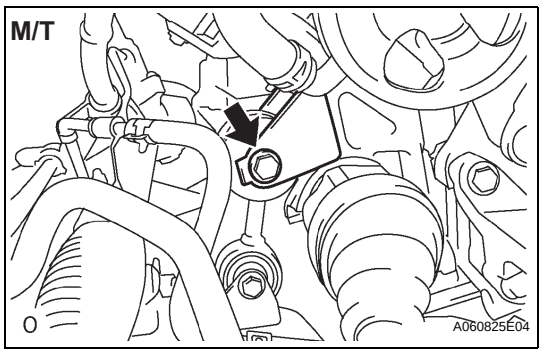
(b) M/T:
Remove the bolt from the engine mounting insulator LH.



(c) Remove the nut from the engine mounting insulator RH.



(d) Remove the bolt from the engine mounting insulator FR.



(e) M/T:
Remove the bolt from the engine lateral control rod.

(f) Raise the engine assembly and separate the front frame.

61. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)

62. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)

63. REMOVE ENGINE WIRE

64. REMOVE STARTER ASSEMBLY (for Manual Transaxle) (See page ST-5)

65. REMOVE STARTER ASSEMBLY (for Automatic Transaxle) (See page ST-5)

66. SEPARATE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)
HINT:
See page AX-162.

67. SEPARATE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)
HINT:
See page MX-24.

68. REMOVE DRIVE PLATE & RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) (See page EM-79)

69. REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See page CL-32)

70. REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle) (See page CL-32)

71. REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) (See page EM-79)

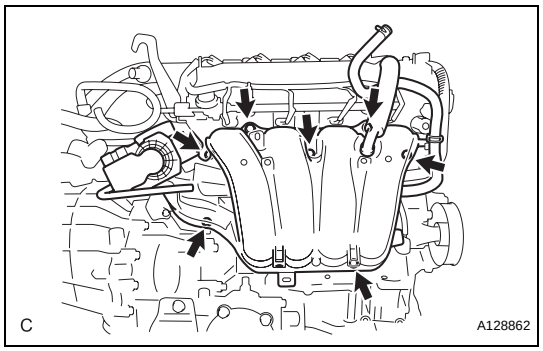
72. INSTALL ENGINE STAND

(a) Fix the engine onto a engine stand with the bolts.

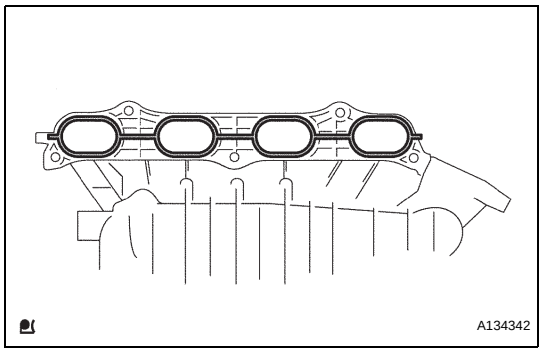
73. REMOVE FUEL DELIVERY PIPE WITH INJECTOR (See page FU-13)

74. REMOVE INTAKE MANIFOLD

(a) Remove the 5 bolts, 2 nuts, and intake manifold.

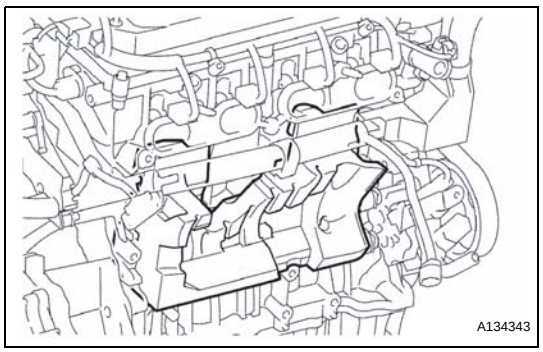


(b) Remove the gasket from the intake manifold.



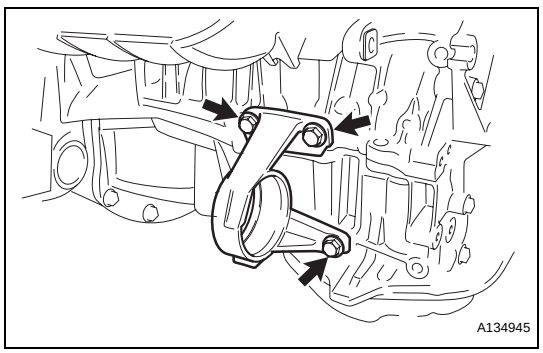
75. REMOVE INTAKE AIR CONTROL VALVE (for PZEV) (See page IT-7)

76. REMOVE NO. 2 VENTILATION HOSE



77. REMOVE NO. 1 INTAKE MANIFOLD INSULATOR

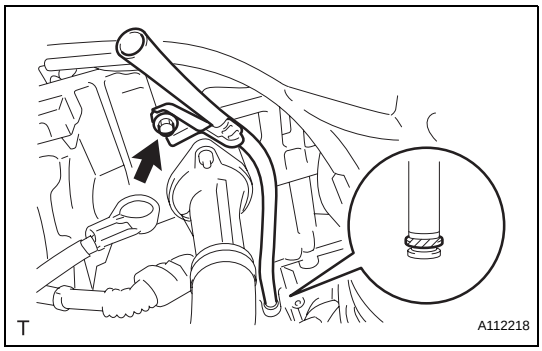
(a) Remove the intake manifold insulator from the cylinder block.



78. REMOVE DRIVE SHAFT BEARING BRACKET

(a) Remove the 3 bolts and drive shaft bearing bracket.

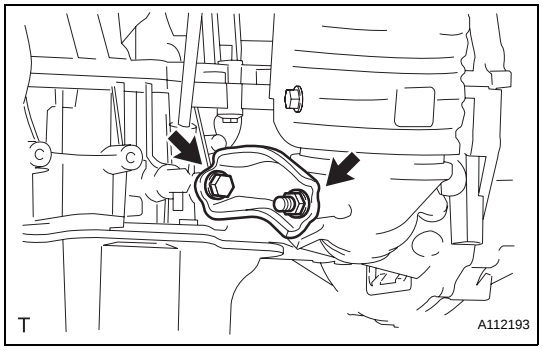
79. REMOVE OIL LEVEL GAUGE SUB-ASSEMBLY



80. REMOVE OIL LEVEL GAUGE GUIDE

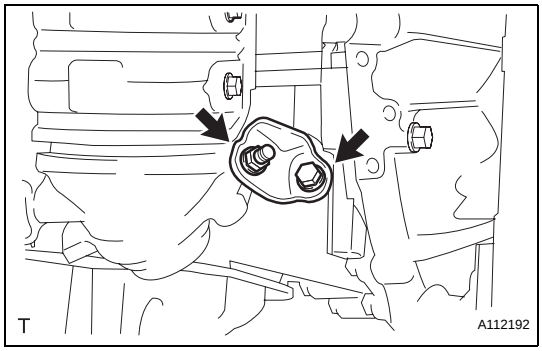
(a) Remove the bolt and oil level gauge guide.

(b) Remove the O-ring from the oil level gauge guide.



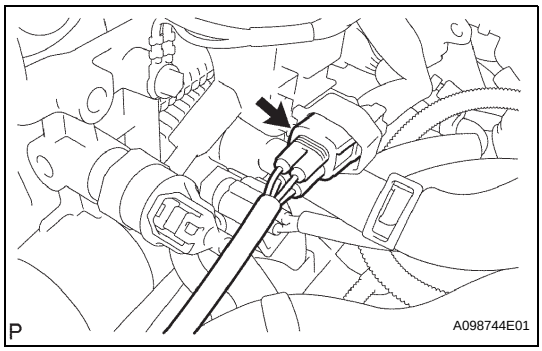
81. REMOVE MANIFOLD STAY

(a) Remove the bolt, nut and stay.



82. REMOVE NO. 2 MANIFOLD STAY

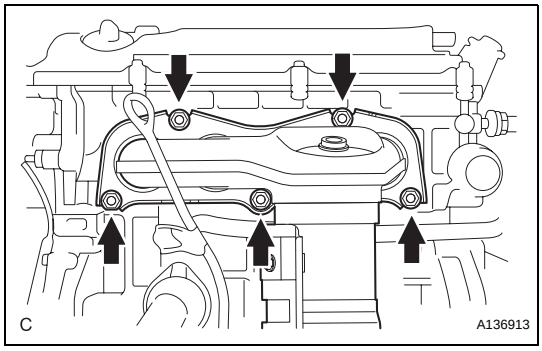
(a) Remove the bolt, nut and stay.



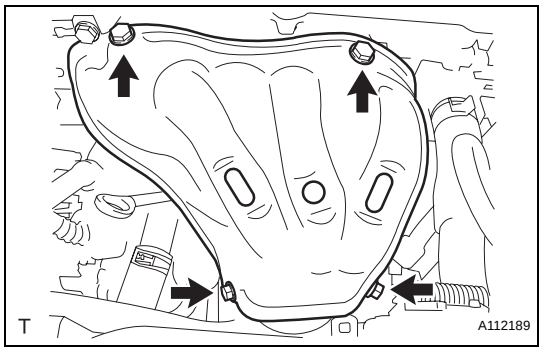
83. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

(a) For PZEV:

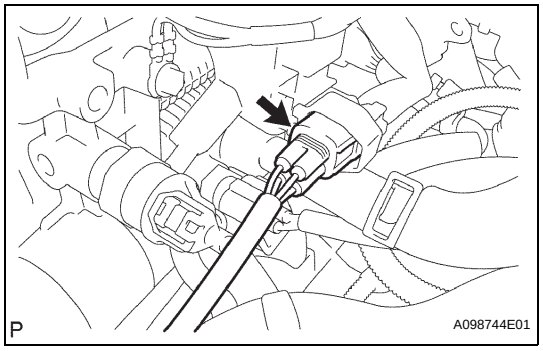
(1) Disconnect the air-fuel ratio sensor connector.



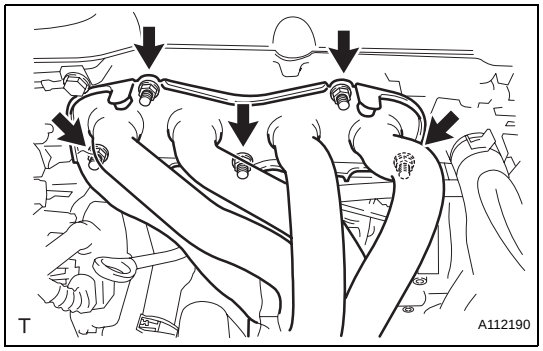
(2) Remove the 5 nuts, manifold converter and gasket.



(b) Except for PZEV:
(1) Remove the 4 bolts and No. 1 insulator.



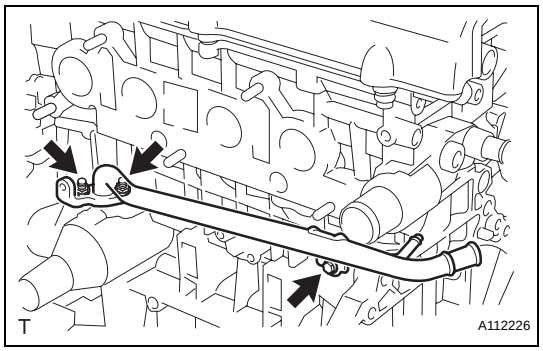
(2) Disconnect the air-fuel ratio sensor connector.



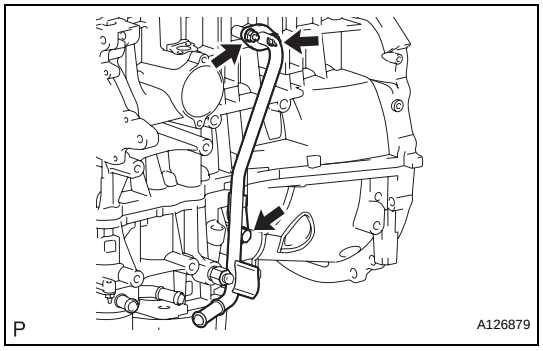
(3) Remove the 5 nuts, manifold converter and gasket.

84. REMOVE WATER INLET (See page CO-13)

85. REMOVE THERMOSTAT (See page CO-13)

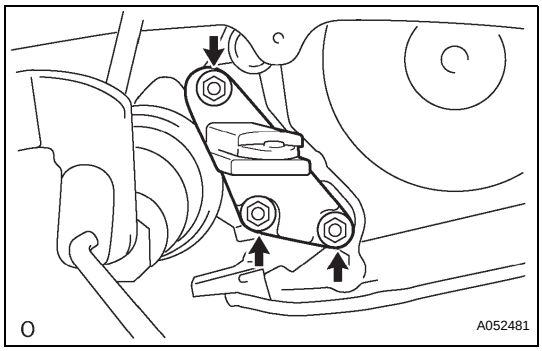


86. REMOVE NO. 1 WATER BY-PASS PIPE
(a) Remove the bolt, 2 nuts and No. 1 water by-pass pipe with the gasket.



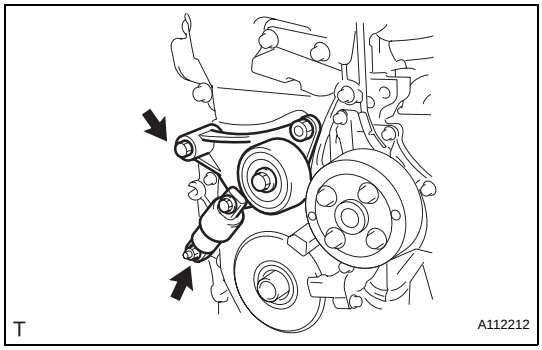
87. REMOVE OIL COOLER PIPE (w/ Oil Cooler)
(a) Remove the bolt, 2 nuts and oil cooler pipe with the gasket.

EM



88. REMOVE ENGINE MOUNTING BRACKET RH

(a) Remove the 3 bolts and engine mounting bracket RH.



89. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

(a) Remove the bolt, nut and belt tensioner.

90. REMOVE IGNITION COIL ASSEMBLY

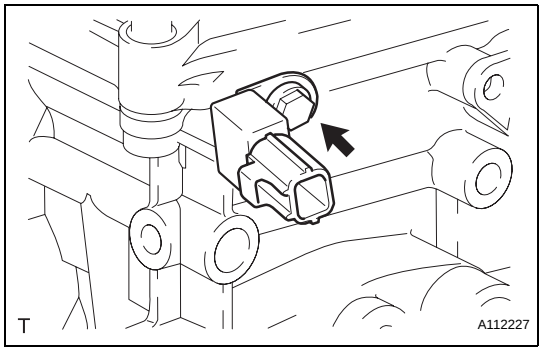
(a) Remove the 4 bolts and 4 ignition coils.

91. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-405)

92. REMOVE KNOCK SENSOR

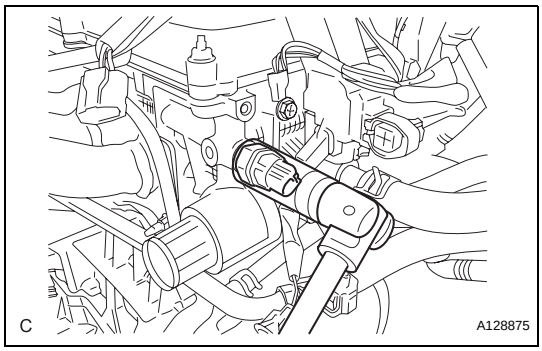
(a) Disconnect the sensor connector.

(b) Remove the nut and sensor.



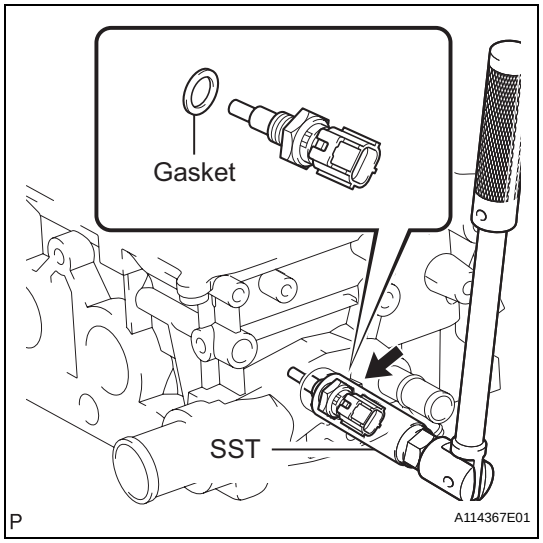
93. REMOVE RADIO SETTING CONDENSER

(a) Remove the bolt and radio setting condenser.



94. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY

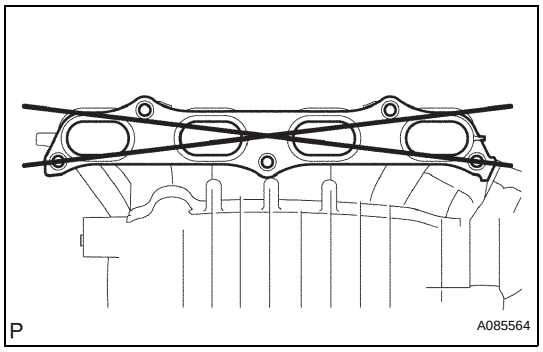
(a) Using a 24 mm deep socket wrench, remove the engine oil pressure switch assembly.



95. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

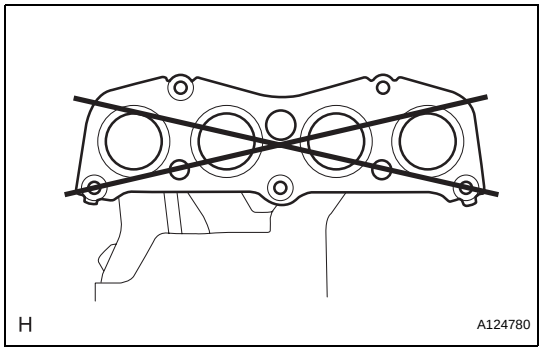
(a) Using SST, remove the sensor and gasket.
SST 09817-33190

INSPECTION



1. INSPECT INTAKE MANIFOLD

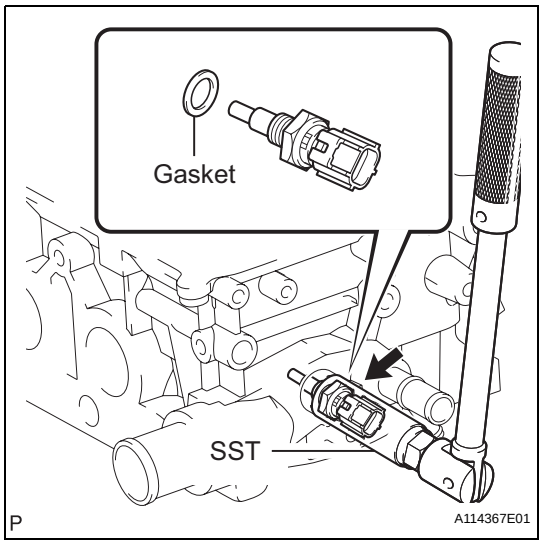
(a) Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.20 mm (0.0079 in.)
If the warpage is greater than maximum, replace the manifold.



2. INSPECT EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

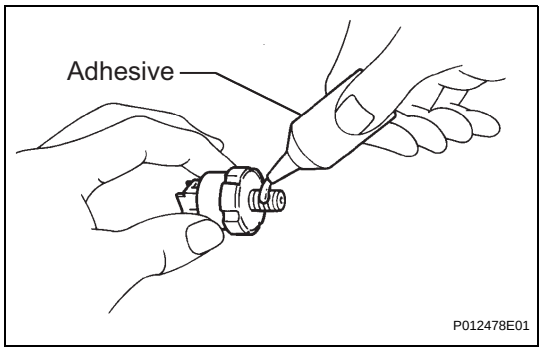
(a) Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.70 mm (0.0276 in.)
If the warpage is greater than the maximum, replace the manifold.

INSTALLATION



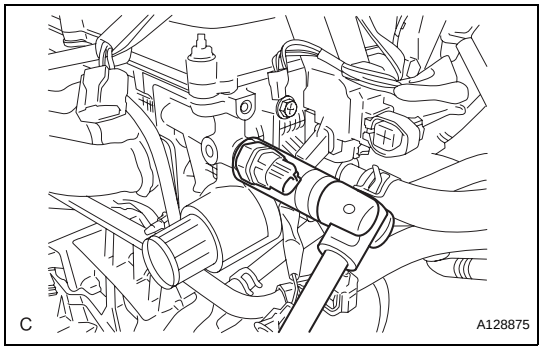
1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR

(a) Using SST, install a new gasket and the ECT sensor.
SST 09817-33190
Torque: 20 N*m (208 kgf*cm, 15 ft.*lbf)

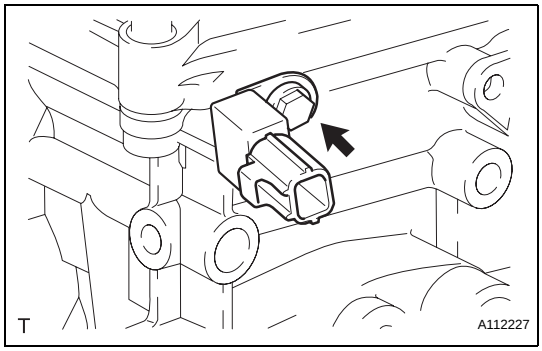


2. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Clean the threads of the oil pressure switch. Apply adhesive to 2 or 3 threads of the oil.
Adhesive:
Part No. 08833-00080 THREE BOND 1344 or equivalent

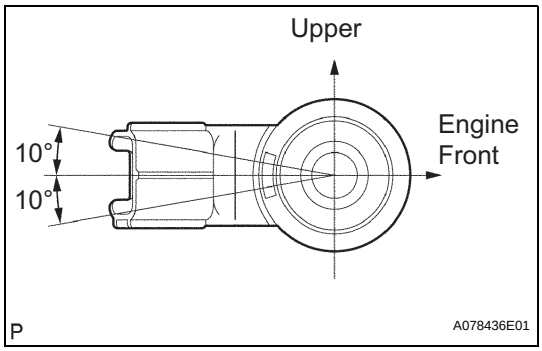


(b) Using a 24 mm deep socket wrench, install the oil pressure switch.
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)



3. INSTALL RADIO SETTING CONDENSER

(a) Install the condenser with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



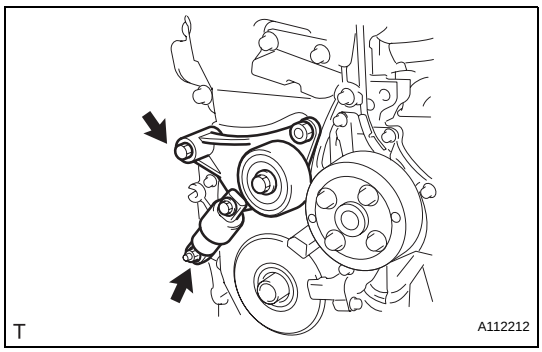
4. INSTALL KNOCK SENSOR

(a) Install the sensor with the nut as shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

5. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-406)

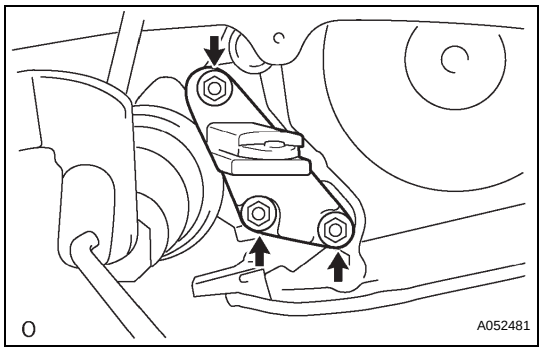
6. INSTALL IGNITION COIL ASSEMBLY

(a) Install the 4 ignition coils with the 4 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



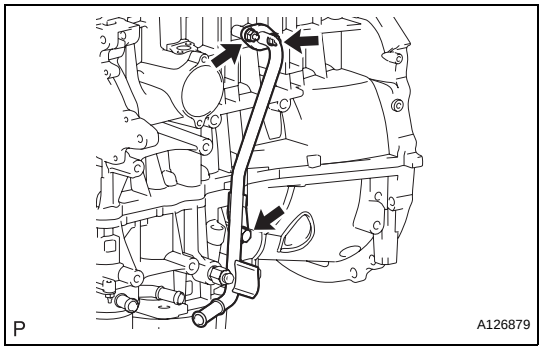
7. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

(a) Install the V-ribbed belt tensioner with the bolt and nut.
Torque: 60 N*m (607 kgf*cm, 44 ft.*lbf)



8. INSTALL ENGINE MOUNTING BRACKET RH

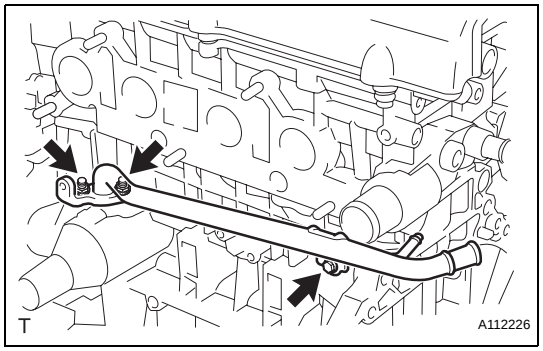
(a) Remove the engine mounting bracket RH with the 3 bolts.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)



9. INSTALL OIL COOLER PIPE (w/ Oil Cooler)

(a) Install a new gasket and the pipe with the bolt and 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

EM



10. INSTALL NO. 1 WATER BY-PASS PIPE

(a) Install a new gasket and the pipe with the bolt and 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

11. INSTALL THERMOSTAT (See page CO-13)

12. INSTALL WATER INLET (See page CO-14)

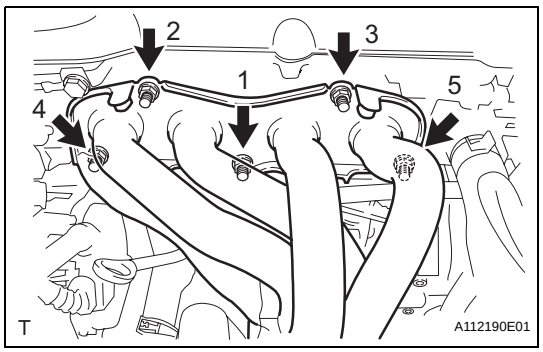
13. INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

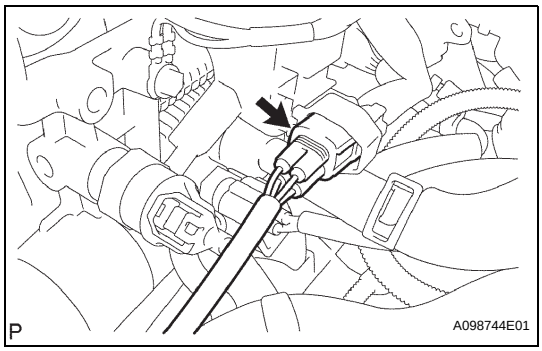
(a) Except for PZEV:

(1) Install a new gasket onto the cylinder head.

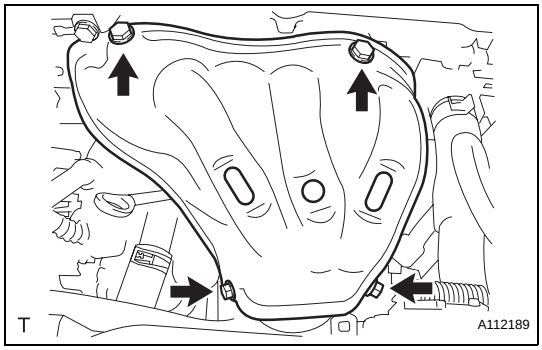
(2) Temporarily tighten the exhaust manifold converter with the 5 nuts.

(3) Tighten the 5 nuts in the sequence shown in the illustration.
Torque: 37 N*m (378 kgf*cm, 27 ft.*lbf)



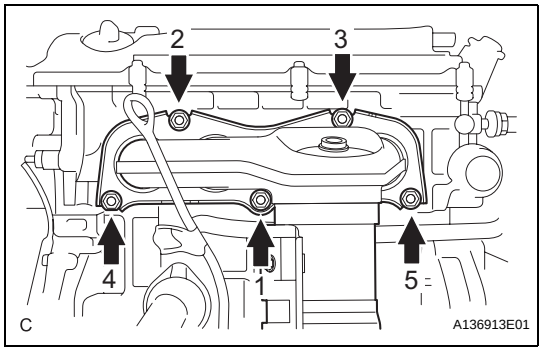


(4) Connect the air-fuel ratio sensor connector.

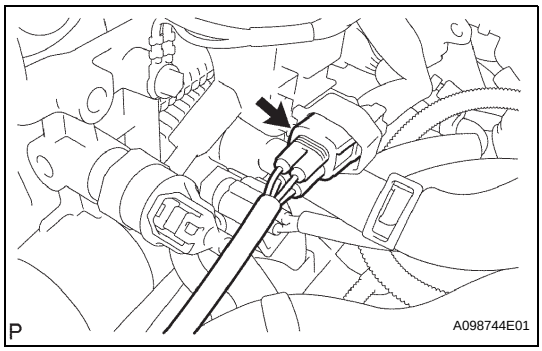


(5) Install the exhaust manifold heat insulator with the 4 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

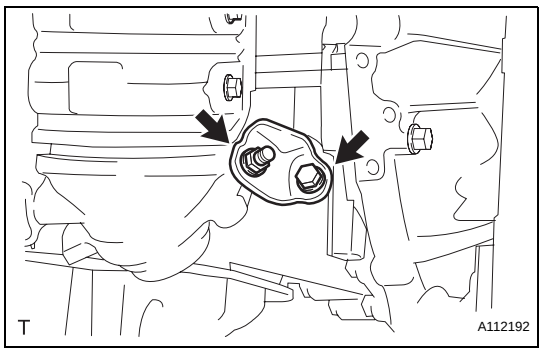
(b) For PZEV:
(1) Install a new gasket onto the cylinder head.
(2) Temporarily tighten the exhaust manifold converter with the 5 nuts.



(3) Tighten the 5 nuts in the sequence shown in the illustration.
Torque: 37 N*m (378 kgf*cm, 27 ft.*lbf)

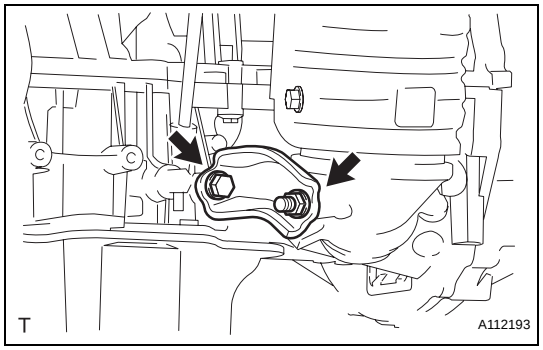


(4) Connect the air-fuel ratio sensor connector.



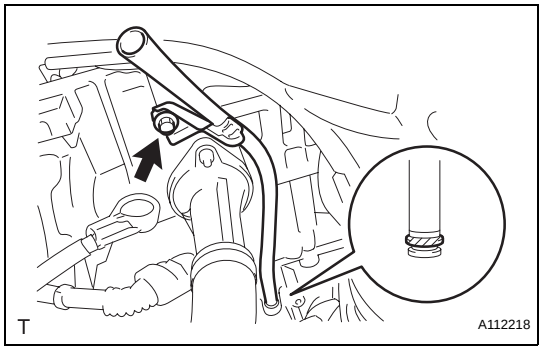
14. INSTALL NO. 2 MANIFOLD STAY

(a) Install the stay with the bolt and nut.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



15. INSTALL MANIFOLD STAY

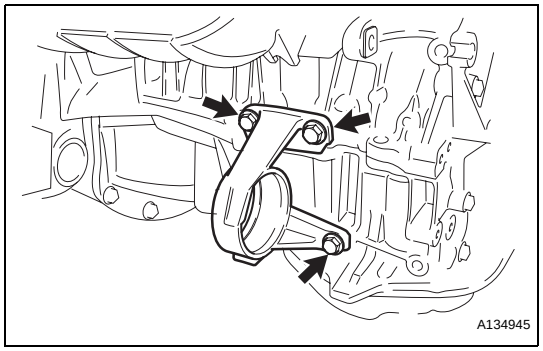
(a) Install the stay with the bolt and nut.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



16. INSTALL OIL LEVEL GAUGE GUIDE

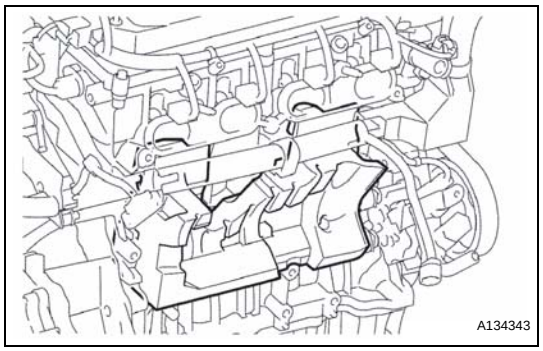
(a) Apply a light coat of engine oil to a new O-ring and install it to the guide.
(b) Install the oil level gauge guide with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

17. INSTALL OIL LEVEL GAUGE SUB-ASSEMBLY



18. INSTALL DRIVE SHAFT BEARING BRACKET

(a) Install the bracket with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

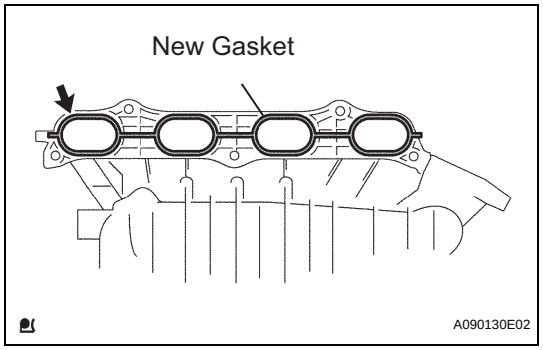


19. INSTALL NO. 1 INTAKE MANIFOLD INSULATOR

(a) Install the intake manifold insulator onto the cylinder block.

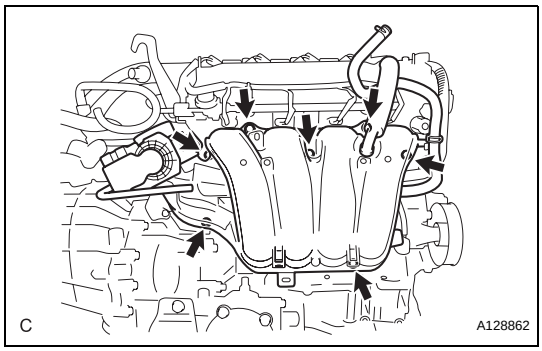
20. INSTALL NO. 2 VENTILATION HOSE

21. INSTALL INTAKE AIR CONTROL VALVE (for PZEV)
(See page IT-7)



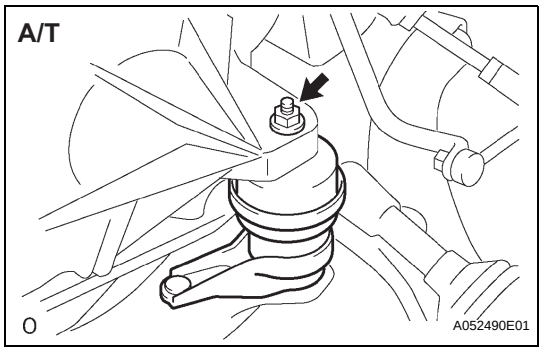
22. INSTALL INTAKE MANIFOLD

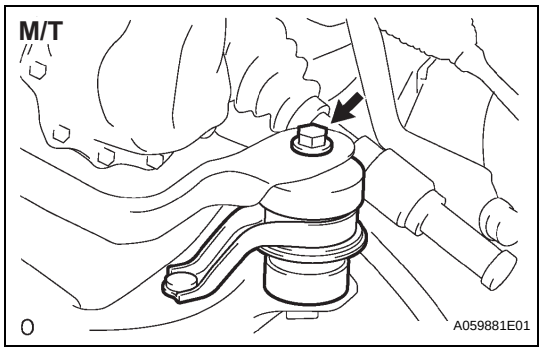
(a) Install a new gasket into the intake manifold.



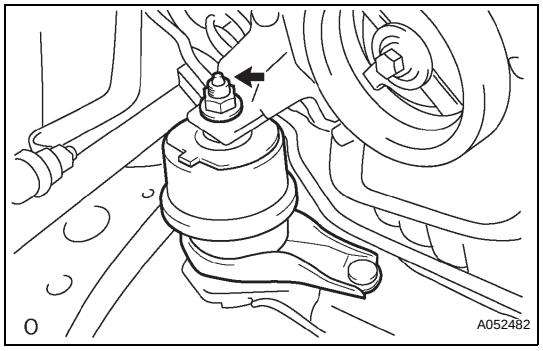
(b) Install the intake manifold with the 5 bolts and 2 nuts.
Torque: 30 N*m (305 kgf*cm, 22 ft.*lbf)

23. **INSTALL FUEL DELIVERY PIPE WITH INJECTOR (See page FU-15)**
24. **REMOVE ENGINE STAND**
25. **INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) (See page EM-80)**
26. **INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle) (See page CL-34)**
27. **INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See page CL-34)**
28. **INSTALL DRIVE PLATE & RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) (See page EM-81)**
29. **INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)**
HINT:
See page MX-27.
30. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)**
HINT:
See page AX-168.
31. **INSTALL STARTER ASSEMBLY (for Manual Transaxle) (See page ST-13)**
32. **INSTALL STARTER ASSEMBLY (for Automatic Transaxle) (See page ST-13)**
33. **INSTALL ENGINE WIRE**
34. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)**
35. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)**
36. **INSTALL FRONT FRAME ASSEMBLY**
(a) A/T:
Install the engine mounting insulator LH with the nut.
Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)

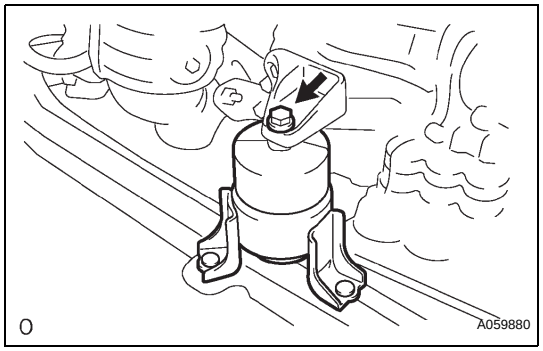




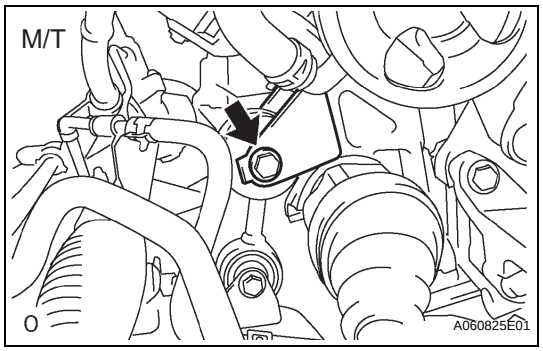
(b) M/T:
Install the engine mounting insulator LH with the bolt.
Torque: 143 N*m (1,459 kgf*cm, 105 ft.*lbf)



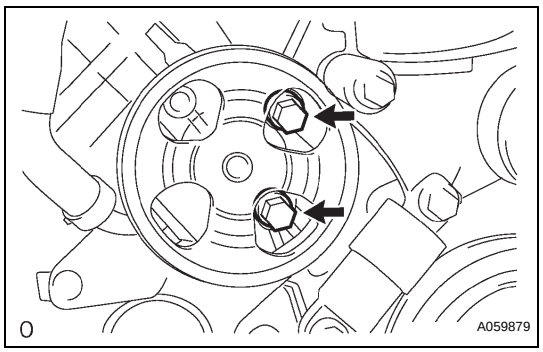
(c) Install the engine mounting insulator RH with the nut.
Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)



(d) Install the engine mounting insulator FR with the bolt.
Torque: 87 N*m (888 kgf*cm, 64 ft.*lbf)



(e) M/T:
Install the engine lateral control rod with the bolt.
Torque: 89 N*m (910 kgf*cm, 66 ft.*lbf)

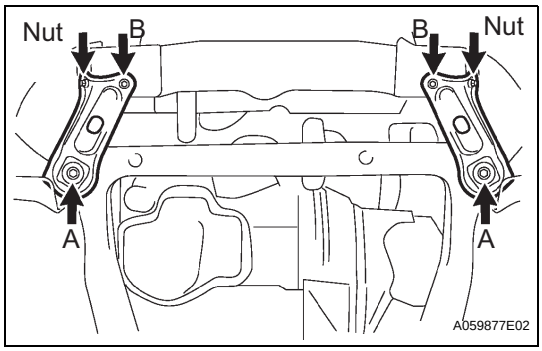


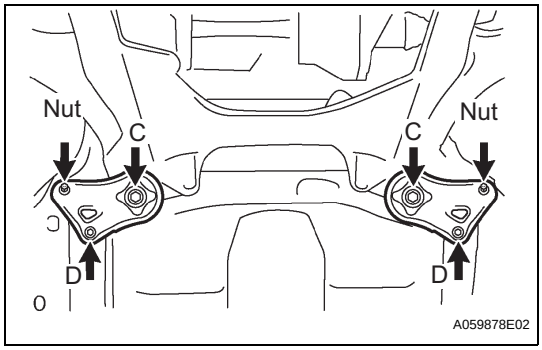
37. INSTALL VANE PUMP ASSEMBLY

(a) Install the vane pump to the engine with the 2 bolts.
Torque: 43 N*m (439 kgf*cm, 32 ft.*lbf)

(b) Connect the oil pressure switch connector.

EM





38. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine assembly with transaxle on the engine lifter.

(b) Install the engine assembly to the vehicle.

(c) Install the frame side plate LH and RH with the 4 bolts and 2 nuts.

Torque: Bolt A
85 N*m (867 kgf*cm, 63 ft.*lbf)
Bolt B and nut
32 N*m (326 kgf*cm, 24 ft.*lbf)

(d) Install the front suspension member brace rear RH and LH with the 4 bolts and 2 nuts.

Torque: Bolt C
85 N*m (867 kgf*cm, 63 ft.*lbf)
Bolt D and nut
32 N*m (326 kgf*cm, 24 ft.*lbf)

39. INSTALL STEERING SLIDING YOKE (See page PS-65)

40. INSTALL NO. 1 EXHAUST PIPE SUPPORT BRACKET

(a) Install the exhaust pipe support bracket with the 2 bolts.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

41. INSTALL DRIVE PLATE & TORQUE CONVERTER CLUTCH SETTING BOLT (for Automatic Transaxle) (See page AX-172)

42. INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)

43. INSTALL FRONT AXLE ASSEMBLY RH

HINT:
Use the same procedures described for the LH side.

44. INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)

45. INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH

HINT:
Use the same procedures described for the LH side.

46. INSTALL TIE ROD ASSEMBLY LH (See page DS-21)

47. INSTALL TIE ROD ASSEMBLY RH

HINT:
Use the same procedures described for the LH side.

48. INSTALL FRONT SPEED SENSOR LH (See page DS-21)

49. INSTALL FRONT SPEED SENSOR RH
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

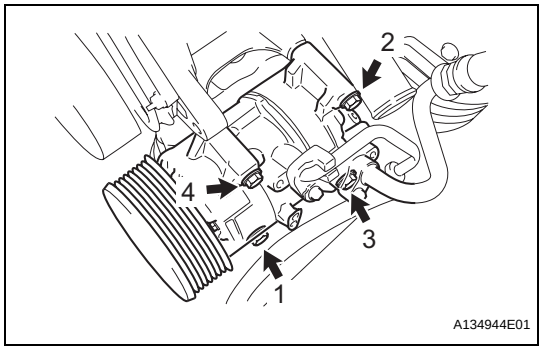
50. INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)

51. INSTALL FRONT STABILIZER LINK ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

52. INSTALL FRONT AXLE HUB NUT LH (See page DS-22)

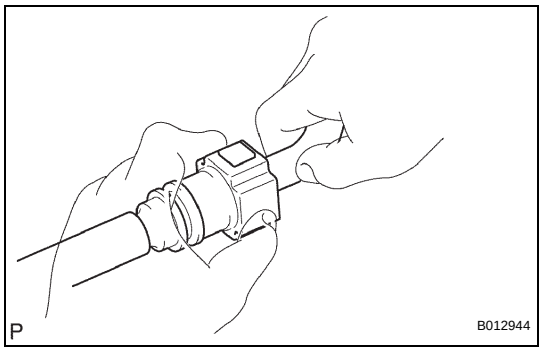
53. INSTALL FRONT AXLE HUB NUT RH
HINT:
Use the same procedures described for the LH side.

54. INSTALL FRONT EXHAUST PIPE ASSEMBLY
HINT:
See page EX-3.



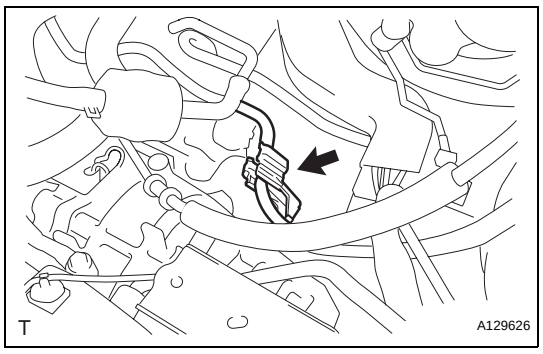
55. INSTALL COMPRESSOR AND MAGNETIC CLUTCH
(a) Install the cooler compressor with the 4 bolts.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)
NOTICE:
Tighten the bolts in the order shown in the illustration to install the cooler compressor.

56. INSTALL GENERATOR ASSEMBLY (See page CH-19)



57. CONNECT FUEL TUBE SUB-ASSEMBLY
(a) Push in the fuel tube connector to the fuel pipe until the connector makes a "click" sound.
NOTICE:
- **Check for damage or contamination on the connected part of the pipe.**
- **Check if the pipe and the connector are securely connected by trying to pull them apart.**

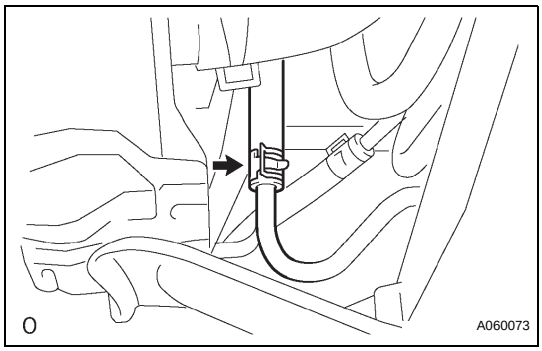
(b) Install the No. 1 fuel pipe clamp.



58. INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)
HINT:
See page CL-25.

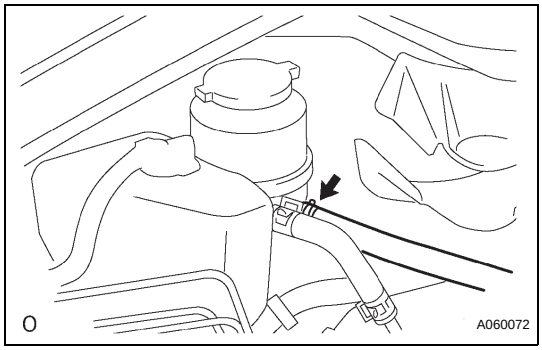
59. REMOVE CLUTCH ACCUMULATOR ASSEMBLY (for Manual Transaxle)
HINT:
See page CL-29.

EM



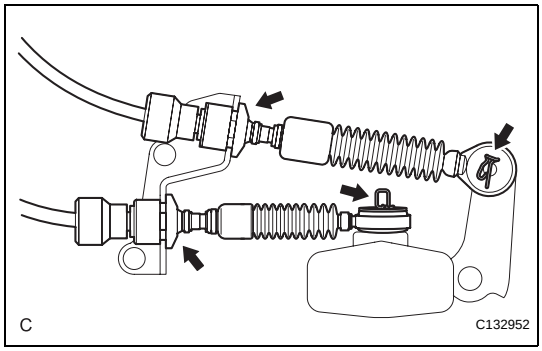
60. CONNECT RETURN TUBE SUB-ASSEMBLY

(a) Connect the return tube sub-assembly.



61. CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

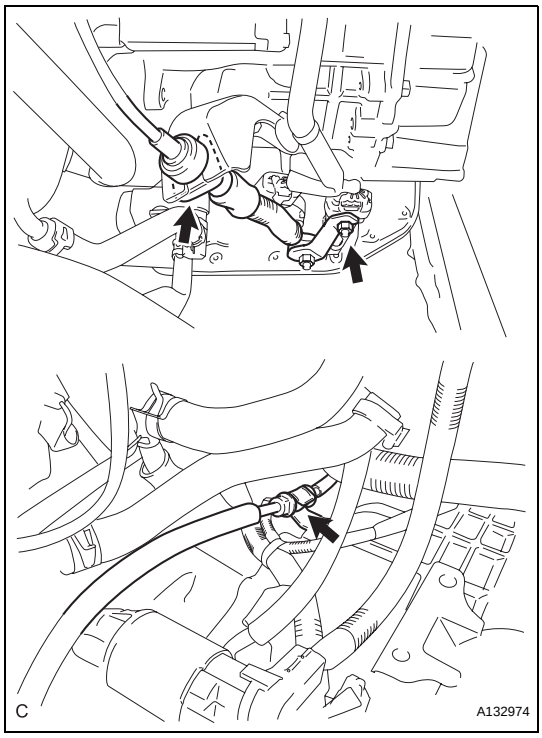
(a) Connect the No. 1 oil reservoir to pump hose.



62. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)

(a) Connect the ends of the 2 cables and install the 2 washers and 2 clips.

(b) Install 2 new clips to the control cable bracket.

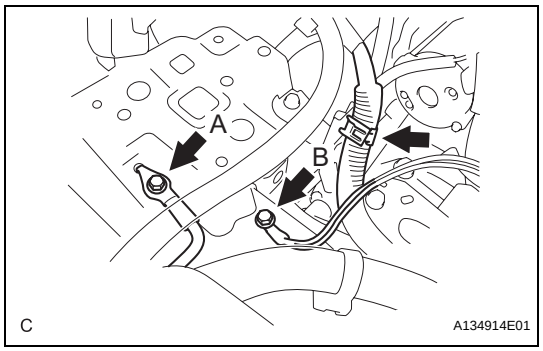


63. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)

(a) Install a new clip and nut, and connect the control lever.

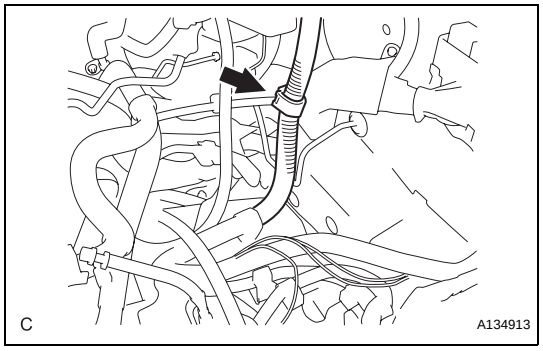
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

(b) Connect the clamp with the cable to the transaxle.

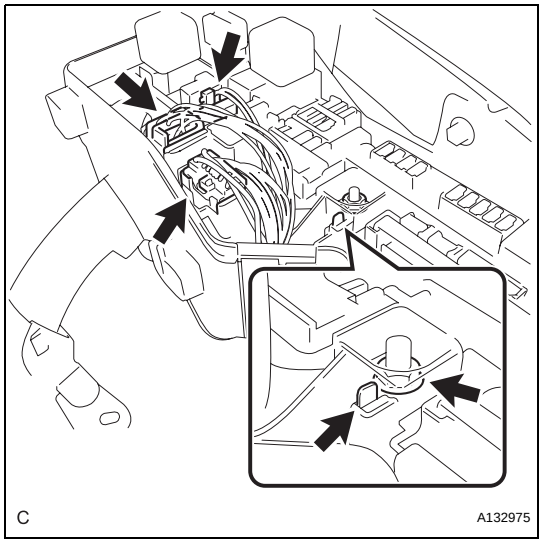


64. CONNECT ENGINE WIRE

(a) Install the 2 bolts and clamp to the body.
Torque: Bolt A
8.4 N*m (85 kgf*cm, 74 in.*lbf)
Bolt B
12 N*m (123 kgf*cm, 9 ft.*lbf)



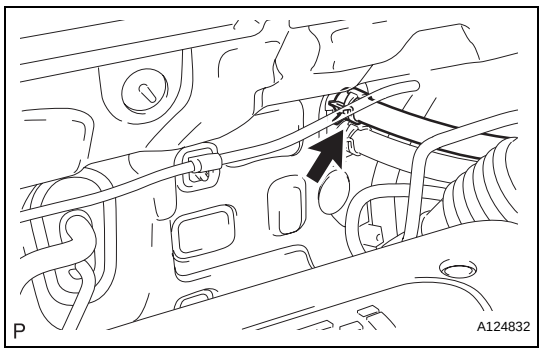
(b) Connect the clamp to the bracket.



(c) Connect the wire to the engine room junction block. Then, install it with the nut and 3 connectors.
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

65. INSTALL ECM

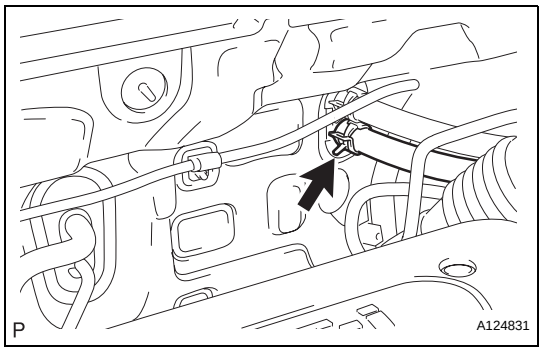
HINT:
See page ES-433.



66. CONNECT HEATER INLET WATER HOSE

(a) Connect the heater inlet water hose.

EM

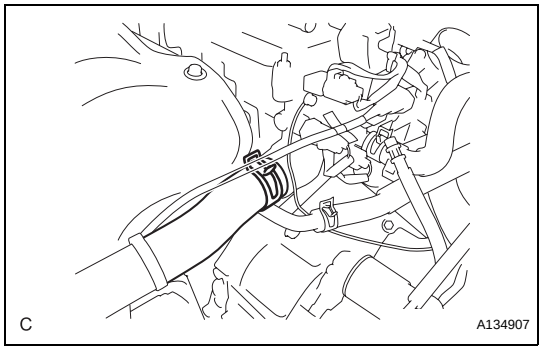


67. CONNECT HEATER OUTLET WATER HOSE

(a) Connect the heater outlet water hose.

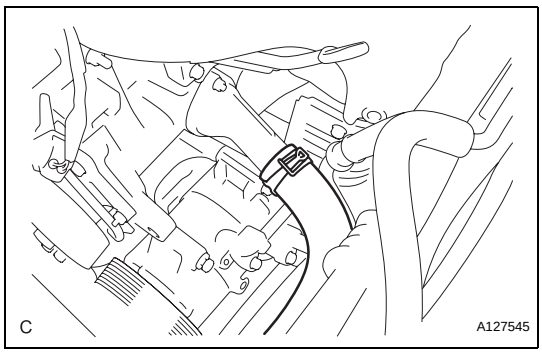
68. CONNECT OIL COOLER INLET HOSE (See page CO-30)

69. CONNECT OIL COOLER OUTLET HOSE (See page CO-30)



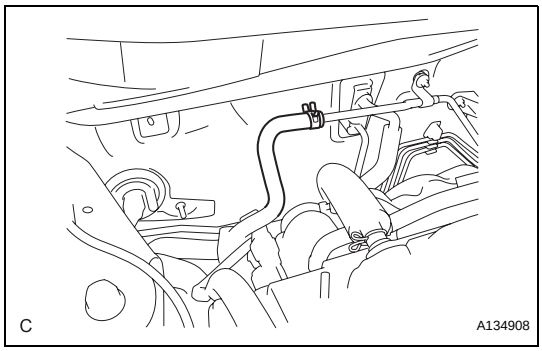
70. CONNECT RADIATOR HOSE INLET

(a) Install the clamp and connect the radiator hose inlet.



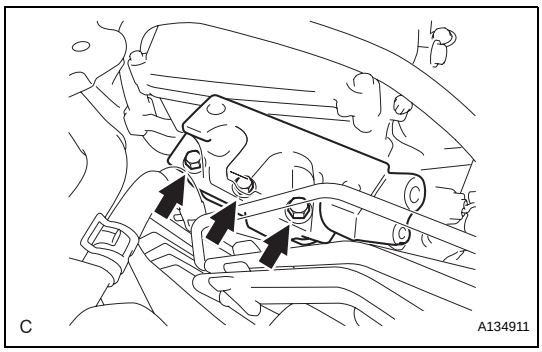
71. CONNECT RADIATOR HOSE OUTLET

(a) Install the clamp and connect the radiator hose outlet.



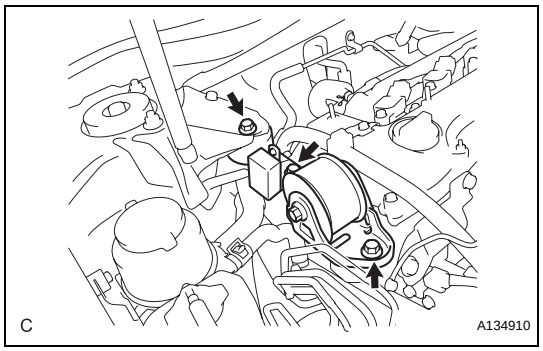
72. CONNECT NO. 1 VACUUM HOSE CONNECTOR

(a) Install the clamp and connect the vacuum hose connector.



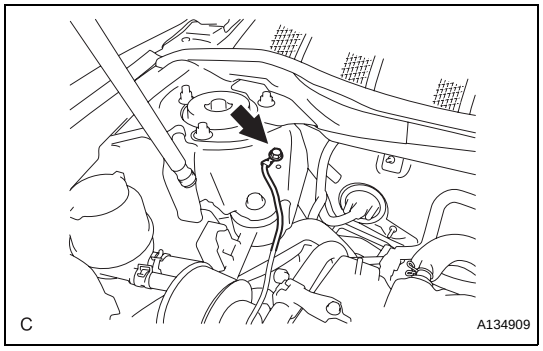
73. INSTALL NO. 2 ENGINE MOUNTING BRACKET RH

(a) Install the 3 bolts and No. 2 mounting bracket RH.
Torque: 52 N*m (531 kgf*cm, 38 ft.*lbf)



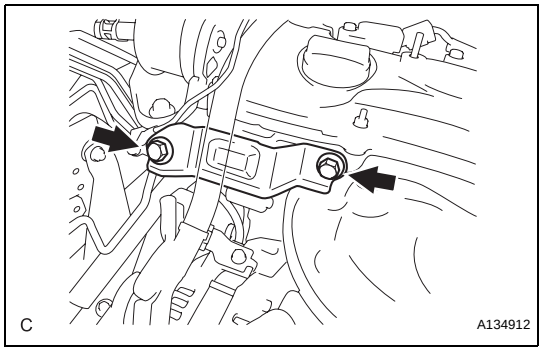
74. INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY

(a) Install the engine moving control rod with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



(b) Install the ground cable with the bolt.
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

EM

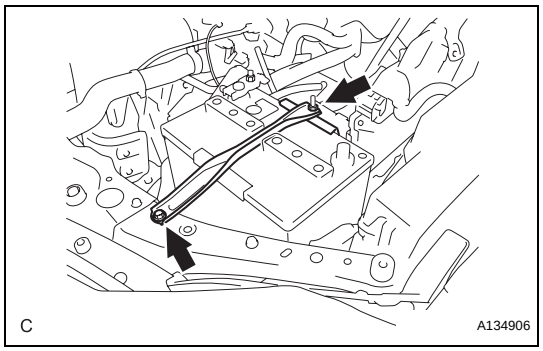


75. INSTALL NO. 2 ENGINE MOUNTING STAY RH

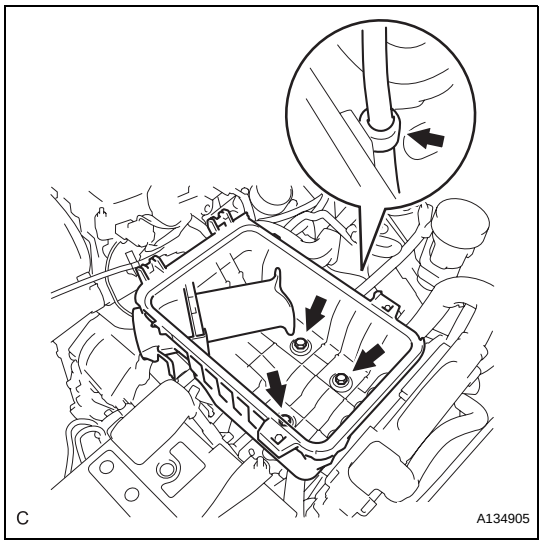
(a) Install the No. 2 mounting stay RH with the 2 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

76. INSTALL BATTERY

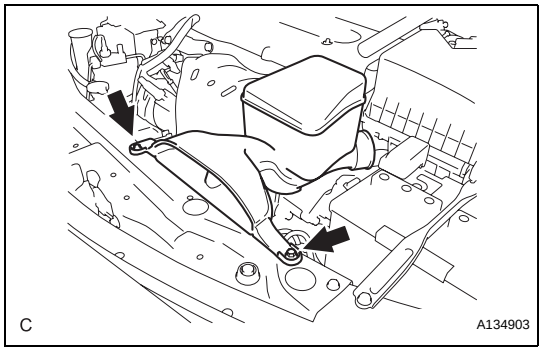
(a) Install the battery and battery tray.



(b) Install the battery clamp with the bolt and nut.
Torque: Bolt
9.0 N*m (92 kgf*cm, 80 in.*lbf)
Nut
3.5 N*m (36 kgf*cm, 31 in.*lbf)



77. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY**
    (a) Install the air cleaner case with the 3 bolts.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
    (b) Connect the hose clamp.
78. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**



79. **INSTALL AIR CLEANER INLET ASSEMBLY**
    (a) Install the air cleaner inlet with the 2 bolts.
    Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
80. **INSTALL V-RIBBED BELT (See page EM-6)**
81. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-426)**
82. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY**
    HINT:
    See page WW-13.
83. **INSTALL FRONT WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
84. **ADD ENGINE OIL**
85. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
    Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)
86. **BLEED CLUTCH LINE (for Manual Transaxle) (See page CL-25)**
87. **ADD ENGINE COOLANT (See page CO-5)**
88. **ADD MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-6)**
89. **ADD AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle) (See page AX-175)**
90. **ADD POWER STEERING FLUID**
91. **BLEED POWER STEERING FLUID (See page PS-7)**
92. **CHECK FOR FUEL LEAKS (See page FU-9)**
93. **CHECK FOR ENGINE OIL LEAKS**
94. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
95. **CHECK FOR EXHAUST GAS LEAKS**
96. **CHECK SHIFT LEVER POSITION (See page AX-179)**

97. ADJUST FRONT WHEEL ALIGNMENT
HINT:
See page SP-4.

98. CHECK IGNITION TIMING (See page EM-1)

99. CHECK ENGINE IDLE SPEED (See page EM-2)

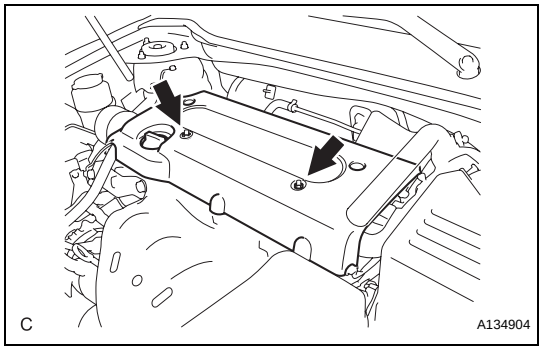
100. INSPECT CO/HC (See page EM-3)

101. INSTALL FRONT FENDER APRON SEAL RH

102. INSTALL ENGINE UNDER COVER LH

103. INSTALL ENGINE UNDER COVER RH

104. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY
(a) Install the engine cover with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

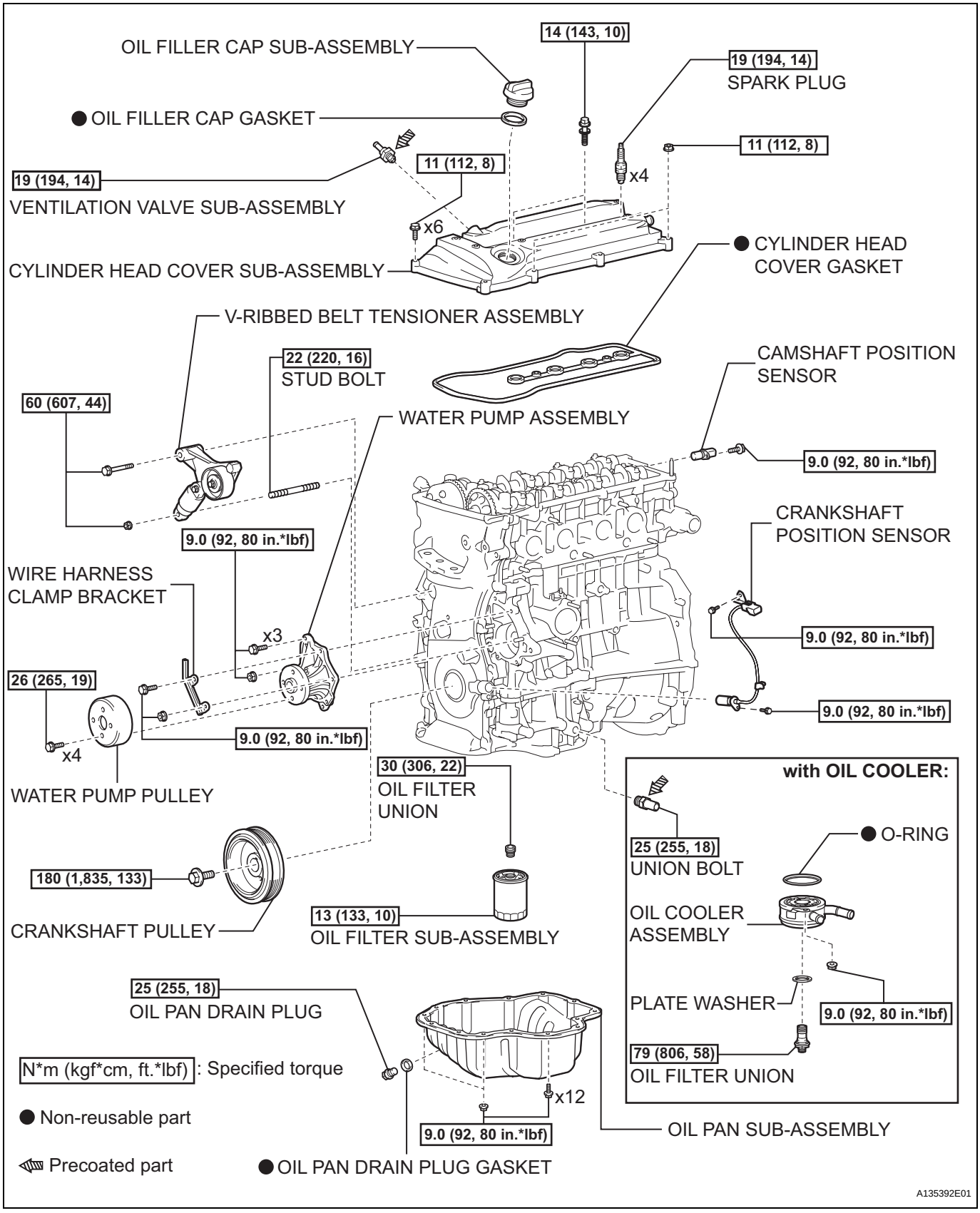


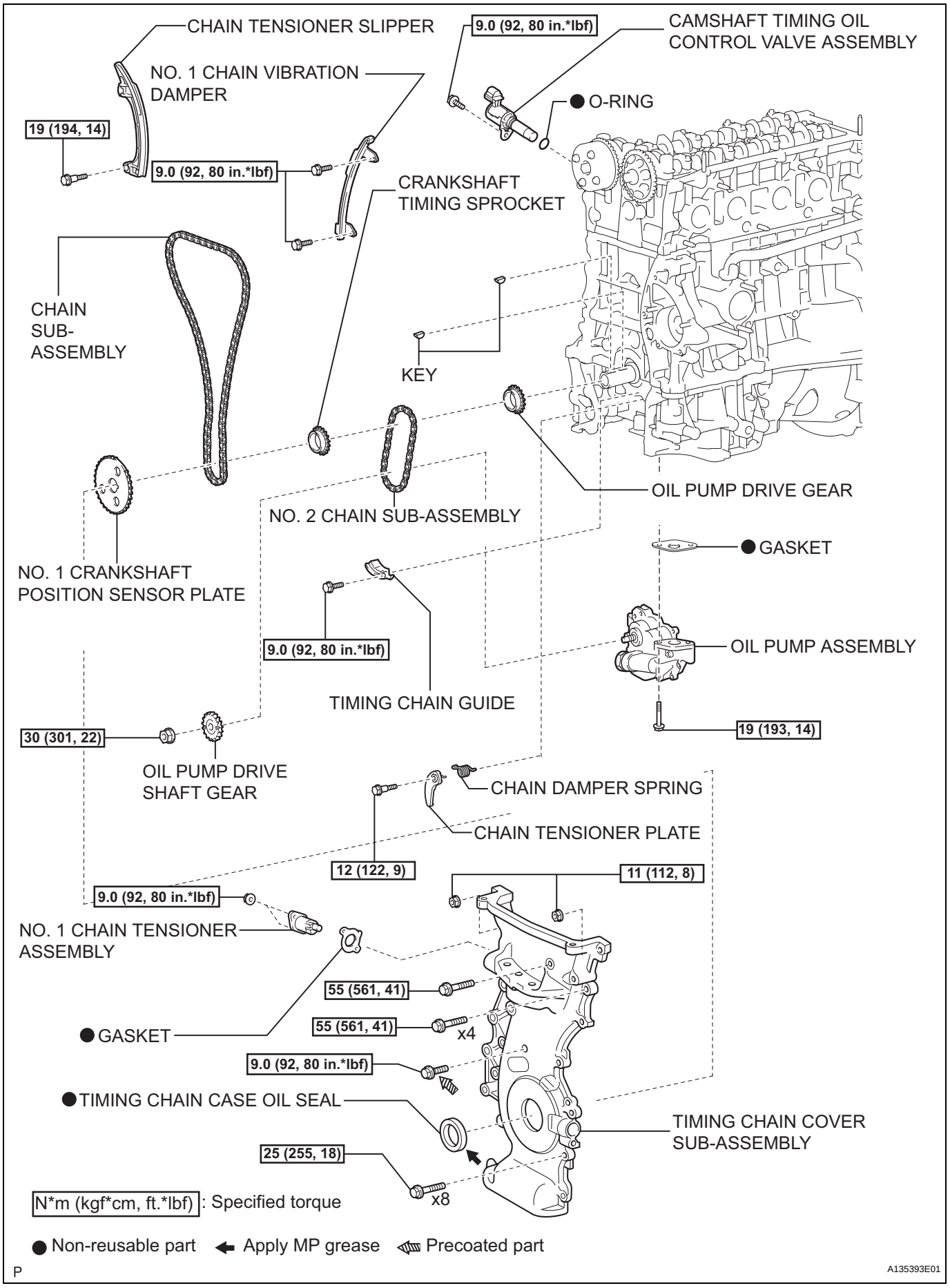
105. CHECK ABS SPEED SENSOR SIGNAL
(a) ABS: See page BC-11.
(b) VSC (for BOSCH): See page BC-123.
(c) VSC (for ADVICS): See page BC-290.

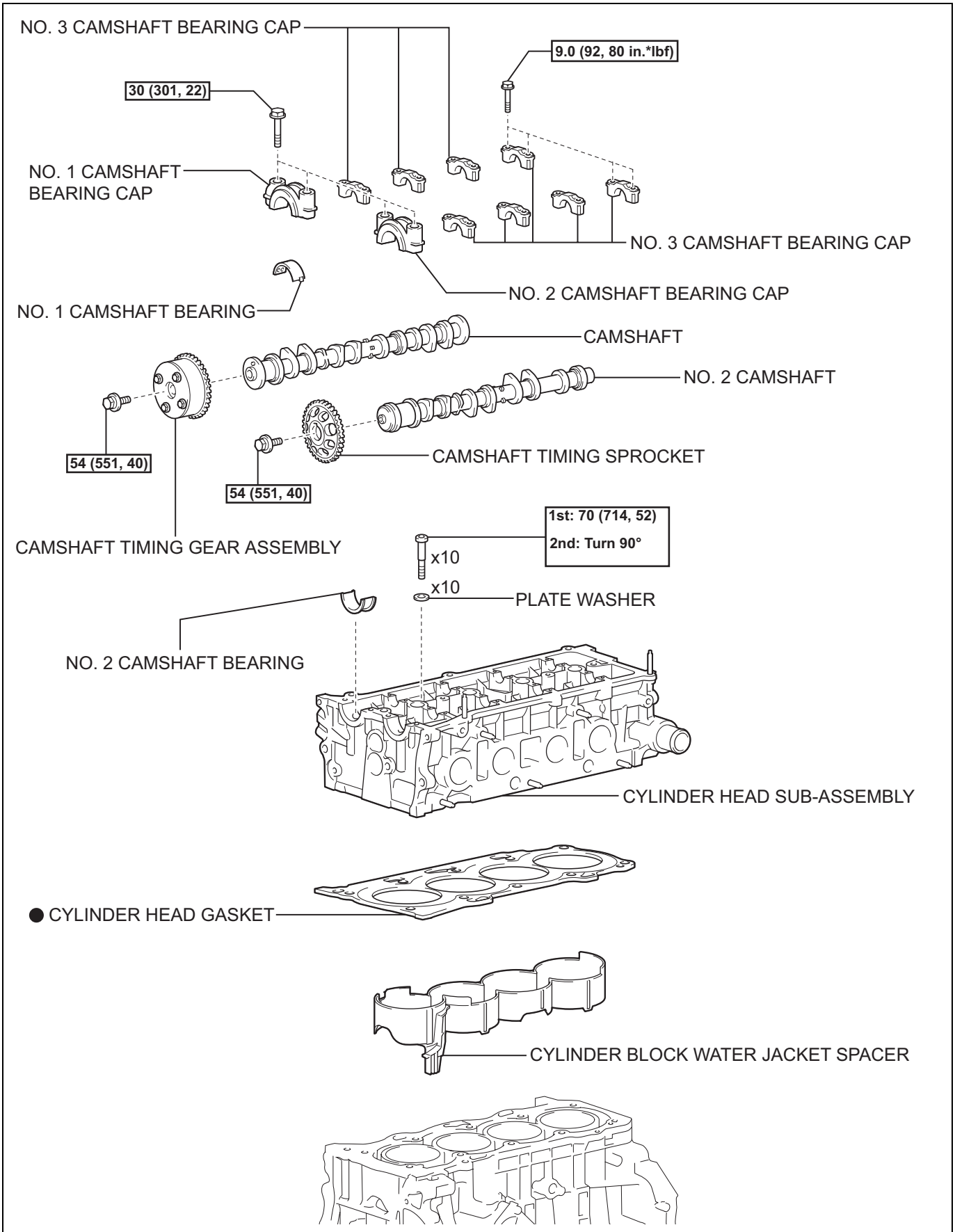
EM

ENGINE UNIT

COMPONENTS

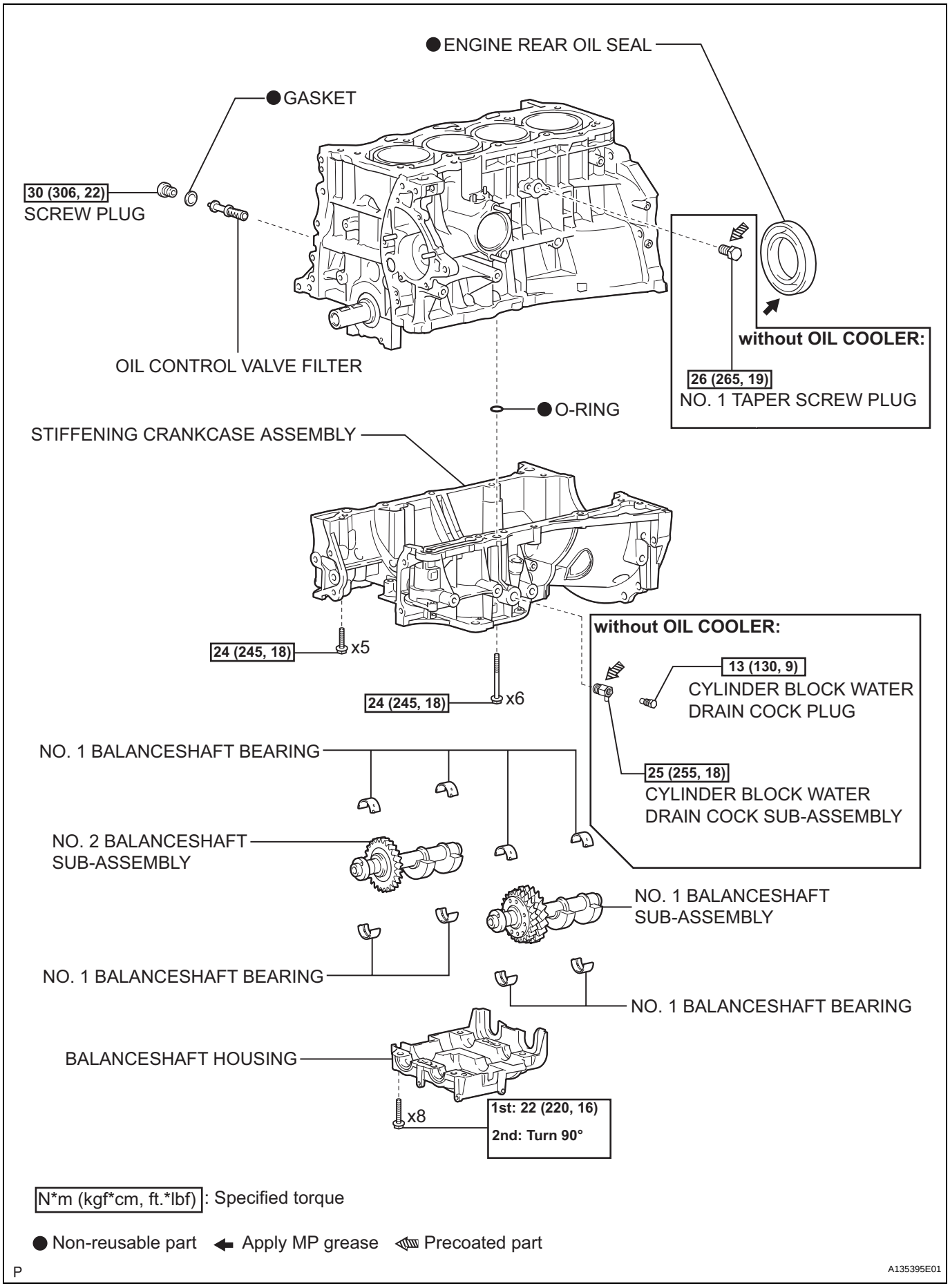



CHAIN TENSIONER SLIPPER
9.0 (92, 80 in.*lbf)
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
NO. 1 CHAIN VIBRATION DAMPER
● O-RING
19 (194, 14)
9.0 (92, 80 in.*lbf)
CRANKSHAFT TIMING SPROCKET
CHAIN SUB-ASSEMBLY
KEY
OIL PUMP DRIVE GEAR
NO. 2 CHAIN SUB-ASSEMBLY
● GASKET
NO. 1 CRANKSHAFT POSITION SENSOR PLATE
9.0 (92, 80 in.*lbf)
OIL PUMP ASSEMBLY
TIMING CHAIN GUIDE
19 (193, 14)
30 (301, 22)
OIL PUMP DRIVE SHAFT GEAR
CHAIN DAMPER SPRING
CHAIN TENSIONER PLATE
12 (122, 9)
11 (112, 8)
9.0 (92, 80 in.*lbf)
NO. 1 CHAIN TENSIONER ASSEMBLY
55 (561, 41)
● GASKET
55 (561, 41)
x4
9.0 (92, 80 in.*lbf)
● TIMING CHAIN CASE OIL SEAL
TIMING CHAIN COVER SUB-ASSEMBLY
25 (255, 18)
x8
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Apply MP grease
Precoated part
P
A135393E01

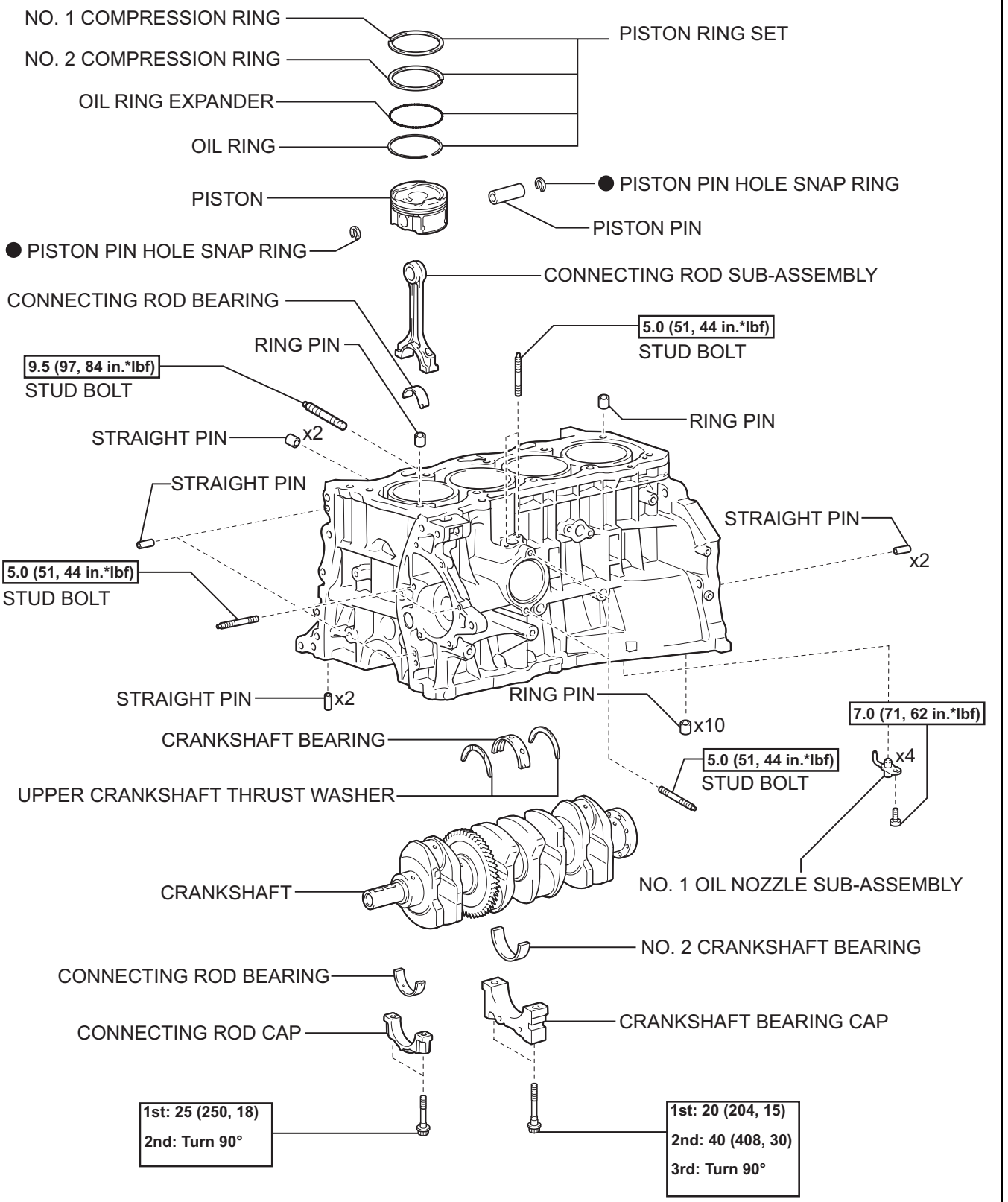

NO. 3 CAMSHAFT BEARING CAP
9.0 (92, 80 in.*lbf)
30 (301, 22)
NO. 1 CAMSHAFT BEARING CAP
NO. 3 CAMSHAFT BEARING CAP
NO. 2 CAMSHAFT BEARING CAP
NO. 1 CAMSHAFT BEARING
CAMSHAFT
NO. 2 CAMSHAFT
54 (551, 40)
CAMSHAFT TIMING SPROCKET
54 (551, 40)
CAMSHAFT TIMING GEAR ASSEMBLY
1st: 70 (714, 52)
2nd: Turn 90°
x10
x10
PLATE WASHER
NO. 2 CAMSHAFT BEARING
CYLINDER HEAD SUB-ASSEMBLY
● CYLINDER HEAD GASKET
CYLINDER BLOCK WATER JACKET SPACER
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
A135394E01

EM

P

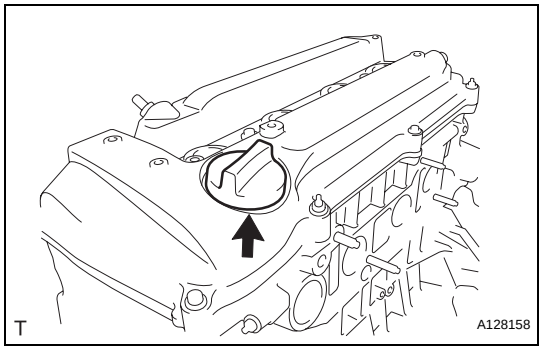

● ENGINE REAR OIL SEAL
● GASKET
30 (306, 22)
SCREW PLUG
OIL CONTROL VALVE FILTER
without OIL COOLER:
26 (265, 19)
NO. 1 TAPER SCREW PLUG
● O-RING
STIFFENING CRANKCASE ASSEMBLY
24 (245, 18) x5
24 (245, 18) x6
without OIL COOLER:
13 (130, 9)
CYLINDER BLOCK WATER DRAIN COCK PLUG
25 (255, 18)
CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY
NO. 1 BALANCESHAFT BEARING
NO. 2 BALANCESHAFT SUB-ASSEMBLY
NO. 1 BALANCESHAFT SUB-ASSEMBLY
NO. 1 BALANCESHAFT BEARING
NO. 1 BALANCESHAFT BEARING
BALANCESHAFT HOUSING
x8
1st: 22 (220, 16)
2nd: Turn 90°
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Apply MP grease
Precoated part
P
A135395E01

EM



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

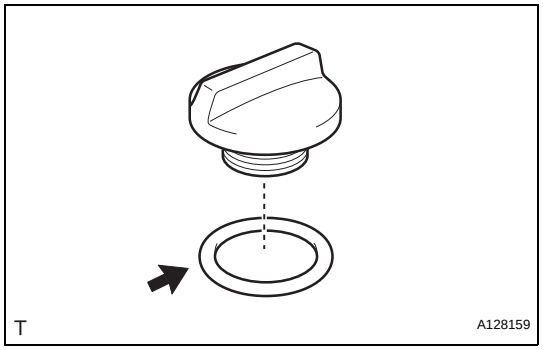
A135396E01



DISASSEMBLY

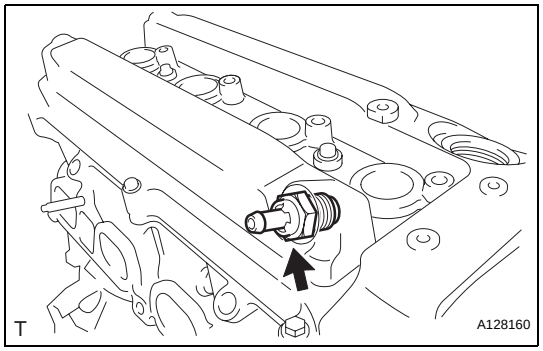
1. REMOVE OIL FILLER CAP SUB-ASSEMBLY

(a) Remove the oil filler cap.



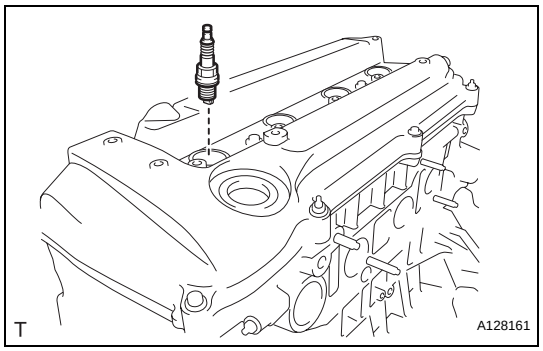
2. REMOVE OIL FILLER CAP GASKET

(a) Remove the oil filler cap gasket.



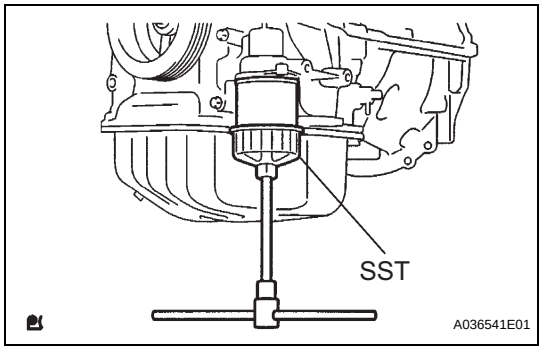
3. REMOVE VENTILATION VALVE SUB-ASSEMBLY

(a) Remove the ventilation valve.



4. REMOVE SPARK PLUG

(a) Remove the spark plugs.



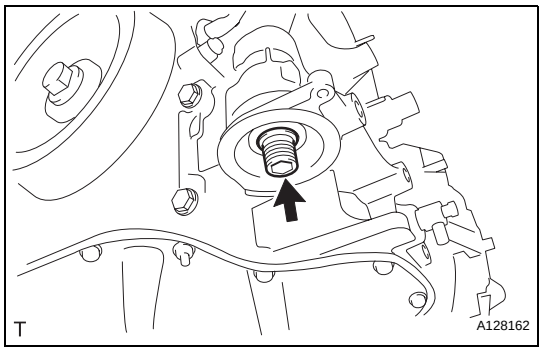
5. REMOVE OIL FILTER SUB-ASSEMBLY

(a) Using SST, remove the oil filter.

SST 09228-06501

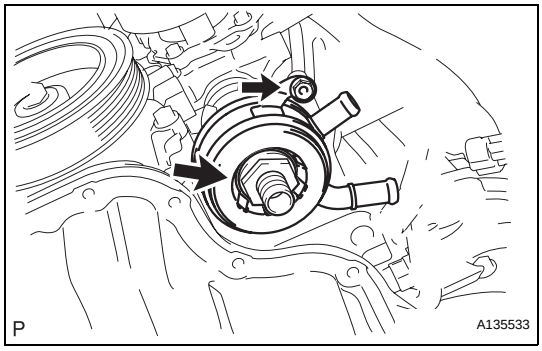
HINT:

Place a container for oil to be drained before removing the oil filter.



6. REMOVE OIL FILTER UNION (w/o Oil Cooler)

(a) Using a 12 mm hexagon wrench, remove the union.

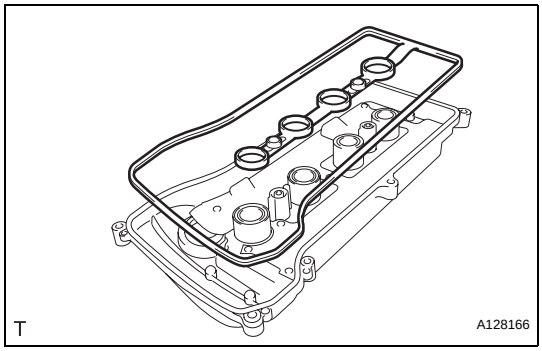


7. REMOVE OIL COOLER ASSEMBLY (w/ Oil Cooler)

(a) Remove the oil filter union, plate washer, nut, oil cooler and O-ring.

(b) Remove the union bolt.

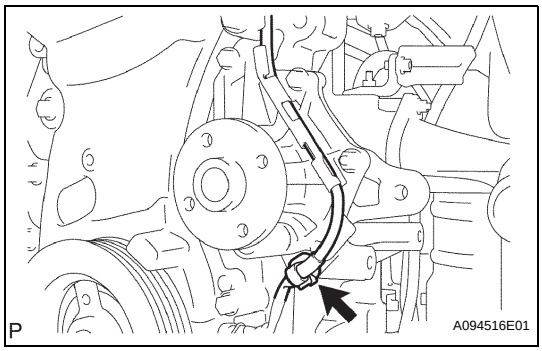
8. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-21)



9. REMOVE CYLINDER HEAD COVER GASKET

(a) Remove the cylinder head cover gasket.

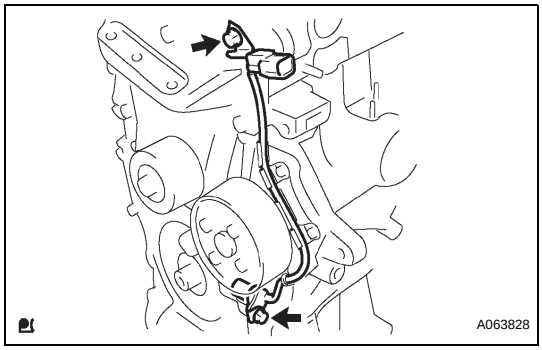
10. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-23)



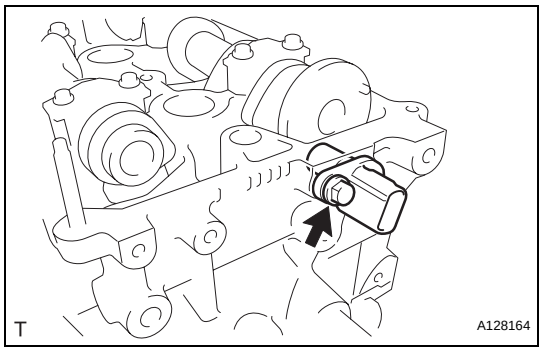
11. REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the wire harness clamp.

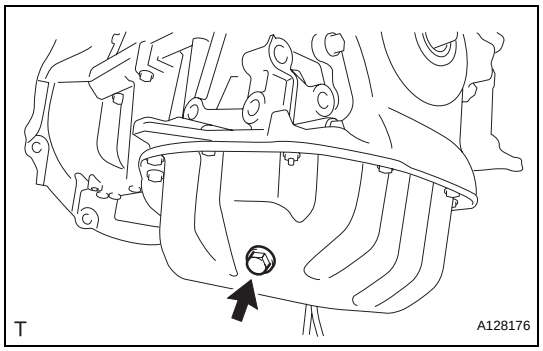
(b) Separate the wire harness from the wire harness clamp bracket.



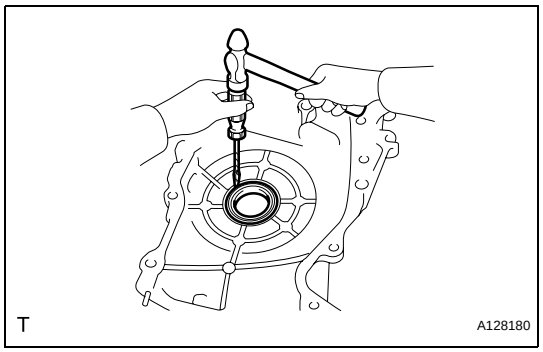
(c) Remove the 2 bolts and sensor.



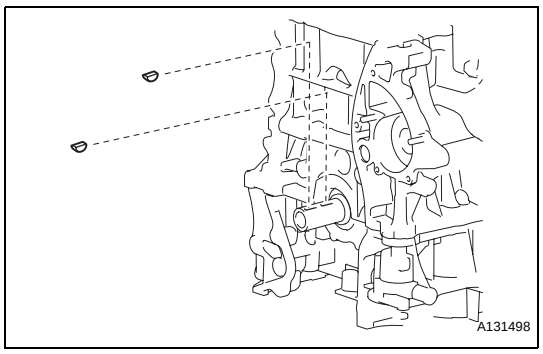
12. **REMOVE CAMSHAFT POSITION SENSOR**
    (a) Remove the bolt and sensor.
13. **REMOVE CRANKSHAFT PULLEY (See page EM-75)**
14. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-405)**
15. **REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-22)**
16. **REMOVE WATER PUMP PULLEY (See page CO-9)**
17. **REMOVE WATER PUMP ASSEMBLY (See page CO-9)**



18. **REMOVE OIL PAN DRAIN PLUG**
    (a) Remove the oil pan drain plug and gasket.
19. **REMOVE OIL PAN SUB-ASSEMBLY (See page EM-22)**
20. **REMOVE TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-11)**

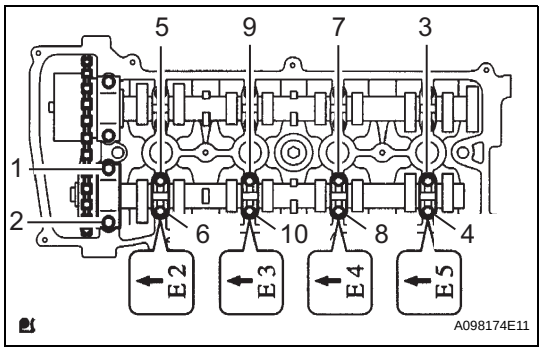


21. **REMOVE TIMING CHAIN CASE OIL SEAL**
    (a) Using a screwdriver and a hammer, remove the oil seal.
22. **REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-24)**
23. **REMOVE TIMING CHAIN GUIDE (See page EM-25)**
24. **REMOVE CHAIN TENSIONER SLIPPER (See page EM-24)**
25. **REMOVE NO. 1 CHAIN VIBRATION DAMPER (See page EM-24)**
26. **REMOVE CHAIN SUB-ASSEMBLY (See page EM-25)**
27. **REMOVE CRANKSHAFT TIMING SPROCKET (See page EM-25)**
28. **REMOVE NO. 2 CHAIN SUB-ASSEMBLY (See page EM-25)**



29. **REMOVE KEYS**
    (a) Remove the 2 pulley set keys from the crankshaft.

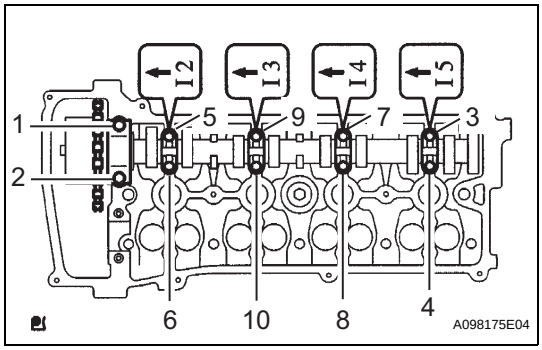
EM



30. REMOVE NO. 2 CAMSHAFT

(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

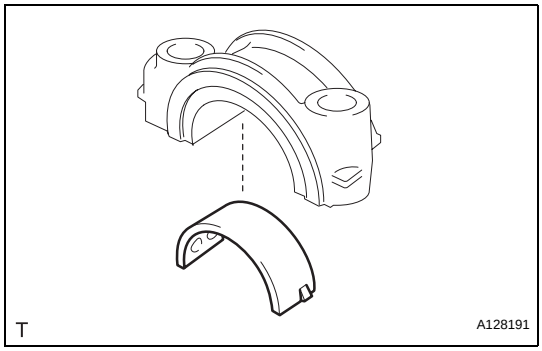
(b) Remove the 5 bearing caps.



31. REMOVE CAMSHAFT

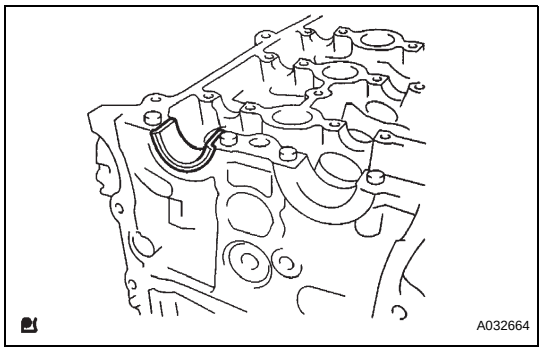
(a) Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.

(b) Remove the 5 bearing caps.



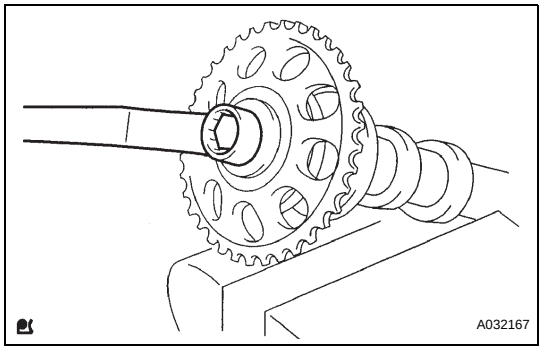
32. REMOVE NO. 1 CAMSHAFT BEARING

Remove the No. 1 camshaft bearing.



33. REMOVE NO. 2 CAMSHAFT BEARING

(a) Remove the No. 2 camshaft bearing.



34. REMOVE CAMSHAFT TIMING SPROCKET

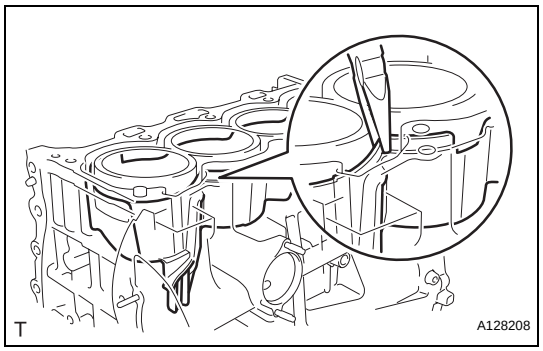
(a) Clamp the camshaft in a vise.

(b) Remove the flange bolt of the camshaft timing sprocket.

35. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY (See page EM-39)

36. REMOVE CYLINDER HEAD SUB-ASSEMBLY (See page EM-55)

37. REMOVE CYLINDER HEAD GASKET (See page EM-55)

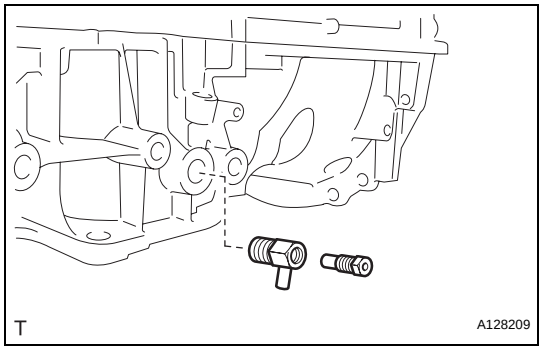


38. REMOVE CYLINDER BLOCK WATER JACKET SPACER

(a) Using needle-nose pliers, remove the cylinder block water jacket spacer.

NOTICE:

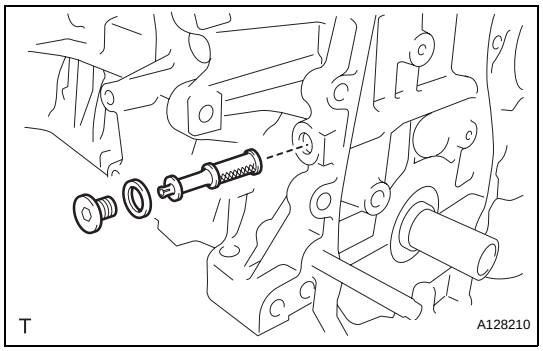
Be sure to remove the water jacket spacer if turning the cylinder block upside down.



39. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY (w/o Oil Cooler)

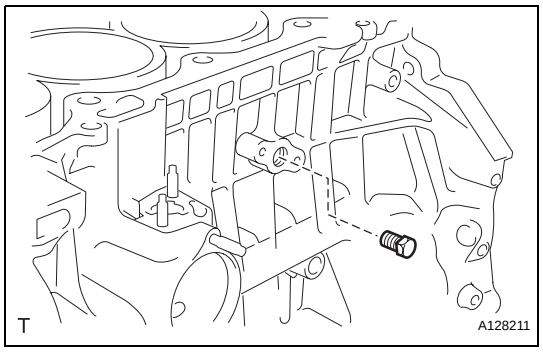
(a) Remove the water drain cock from the stiffening crankcase.

(b) Remove the water drain cock plug from the water drain cocks.



40. REMOVE OIL CONTROL VALVE FILTER

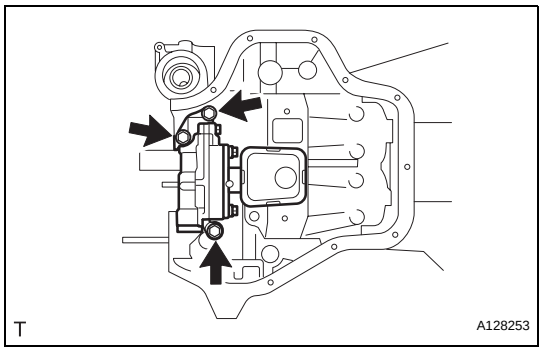
(a) Using an 8 mm socket hexagon wrench, remove the plug and filter.



41. REMOVE NO. 1 TAPER SCREW PLUG (w/o Oil Cooler)

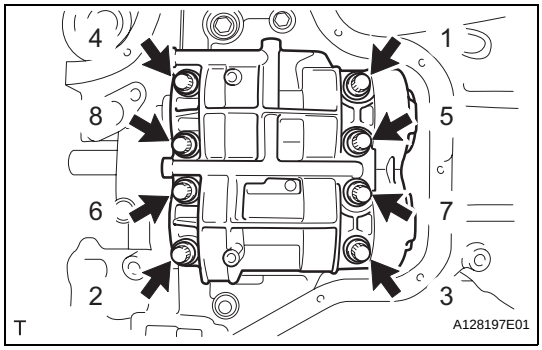
(a) Remove the taper screw plug.

EM



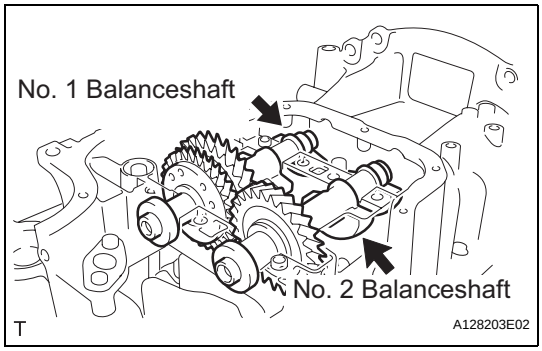
42. REMOVE OIL PUMP ASSEMBLY

(a) Remove the 3 bolts, oil pump and gasket.

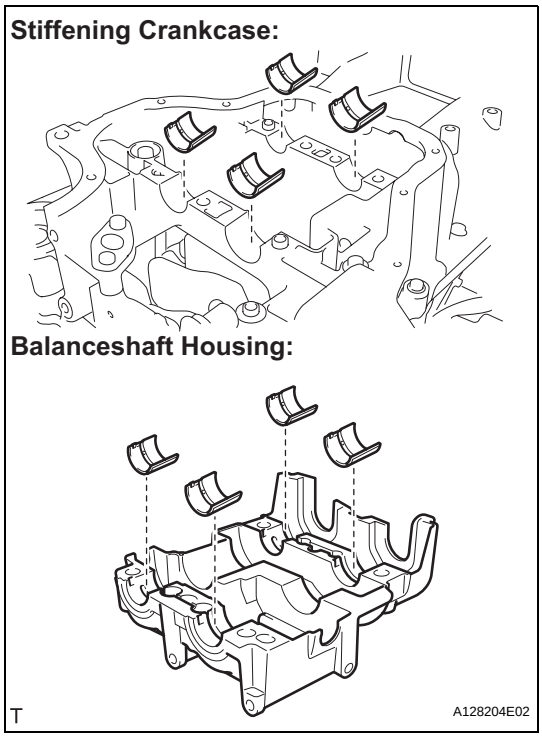


43. REMOVE NO. 1 AND NO. 2 BALANCESHAFT SUB-ASSEMBLY

(a) Uniformly loosen and remove the 8 bolts in the sequence shown in the illustration.

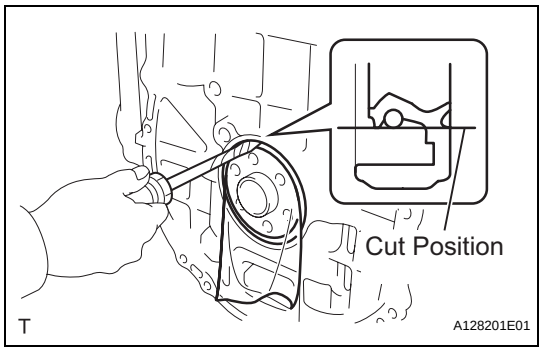


(b) Remove the No. 1 and No. 2 balanceshafts.



44. REMOVE NO. 1 BALANCESHAFT BEARING

(a) Remove the balanceshaft bearings.



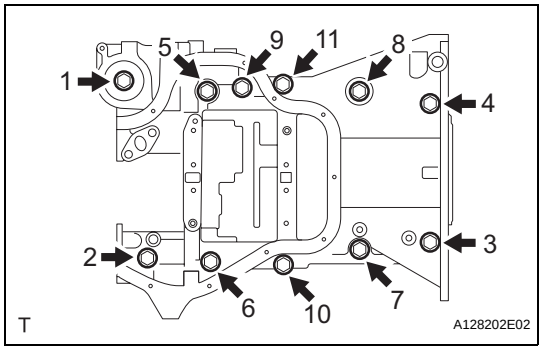
45. REMOVE ENGINE REAR OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with its tip taped, pry out the oil seal.

NOTICE:

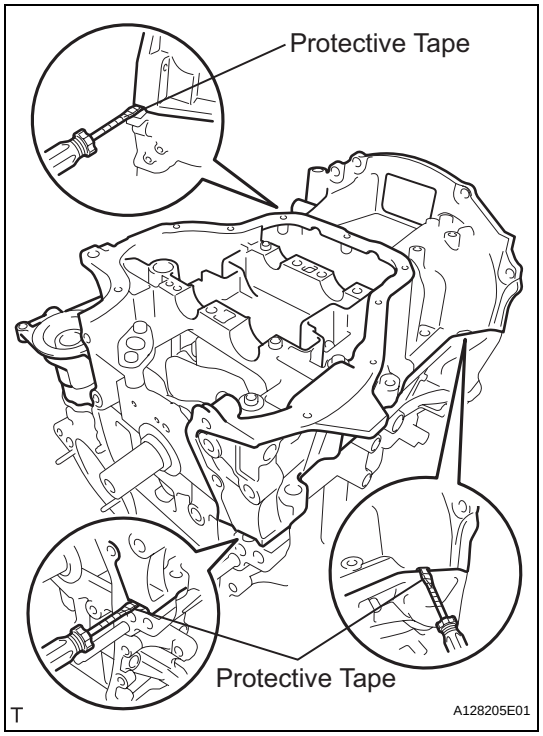
After removing the oil seal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.



46. REMOVE STIFFENING CRANKCASE ASSEMBLY

(a) Uniformly loosen and remove the 11 bolts in the sequence shown in the illustration.

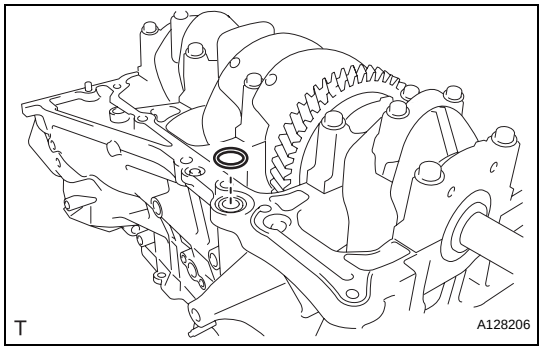
EM



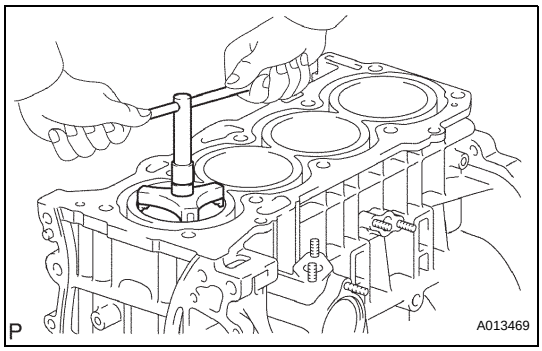
(b) Using a screwdriver, remove the crankcase by prying between the crankcase and cylinder block.

NOTICE:

Be careful not to damage the contact surfaces of the crankcase and cylinder block.

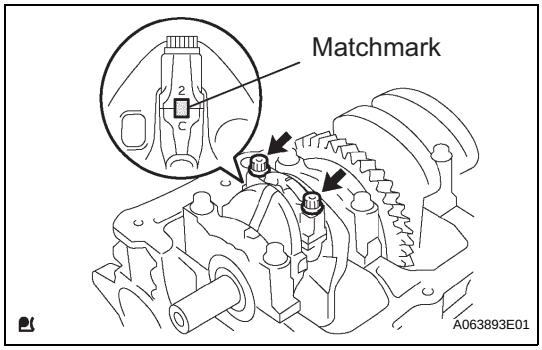


(c) Remove the O-ring from the cylinder block.

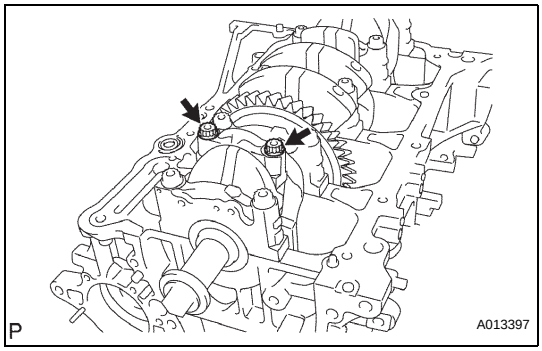


47. REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.



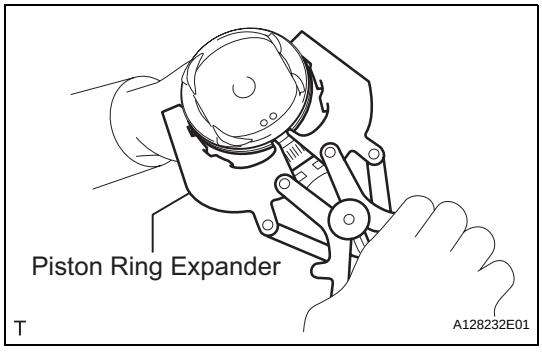
(b) Check that the matchmarks on the connecting rod and cap are aligned to ensure the correct reassembly.
HINT:
The matchmarks on the connecting rods and caps are provided for ensuring the correct reassembly.



(c) Using a 12 mm socket wrench, uniformly loosen the 2 bolts.
(d) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.
HINT:
Keep the lower bearing inserted in the connecting rod cap.
(e) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.
HINT:
- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

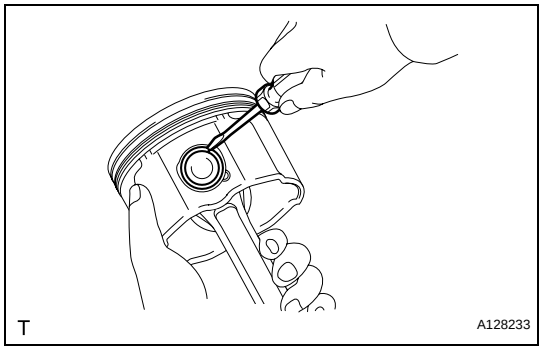
48. REMOVE CONNECTING ROD BEARING

(a) Remove the connecting rod bearings.
HINT:
Arrange the removed parts in the correct order.



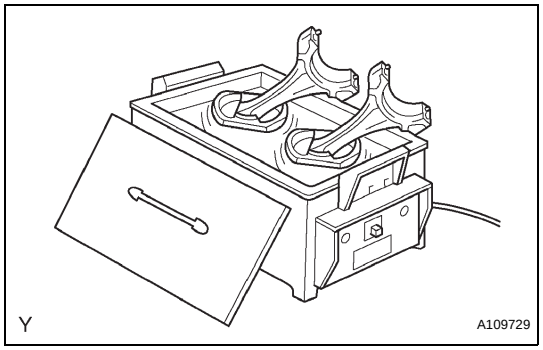
49. REMOVE PISTON RING SET

(a) Using a piston ring expander, remove the 2 compression rings.
(b) Remove the oil ring rail and oil ring expander by hand.
HINT:
Arrange the removed parts in the correct order.



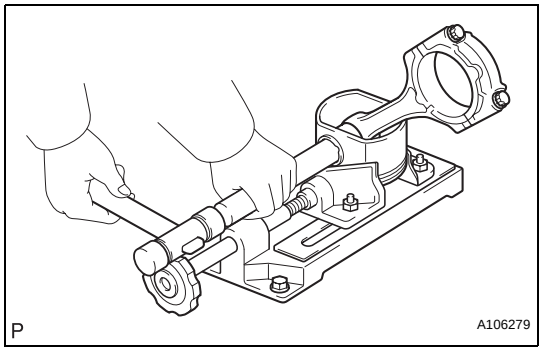
50. REMOVE PISTON PIN HOLE SNAP RING

(a) Using a screwdriver, pry out the 2 snap rings.

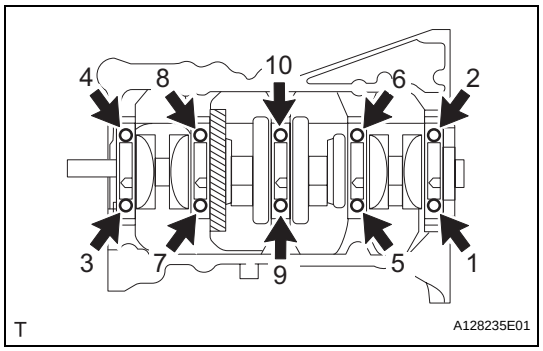


51. REMOVE PISTON

(a) Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).

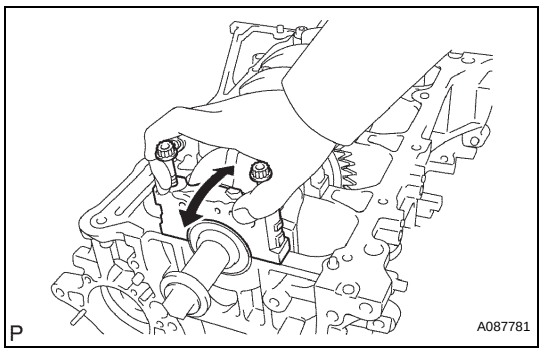


(b) Using a plastic hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.
HINT:
- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.



52. REMOVE CRANKSHAFT

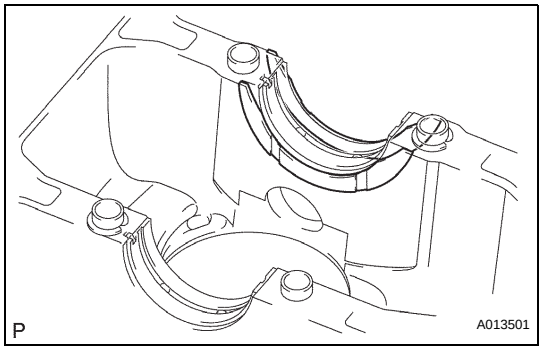
(a) Uniformly loosen and remove the 10 main bearing cap bolts in the sequence shown in the illustration.



(b) Use 2 removed main bearing cap bolts to remove the 5 main bearing caps and 5 lower bearings.
NOTICE:
Insert the bolts into one of the caps. Ease the cap out by gently pulling up and applying force toward the front and back side of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.

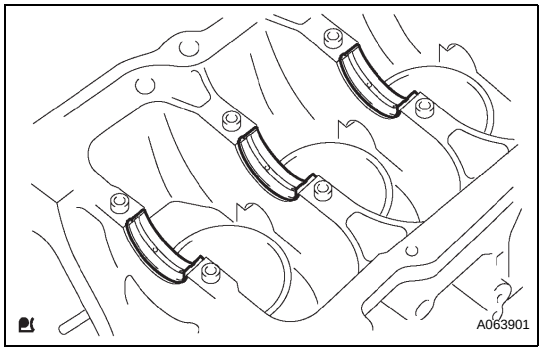
HINT:
- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps in the correct order.

(c) Lift out the crankshaft.



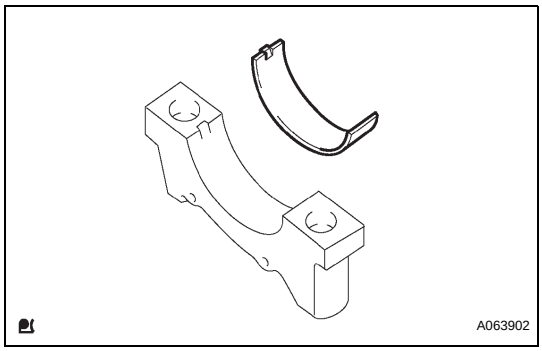
53. REMOVE UPPER CRANKSHAFT THRUST WASHER

(a) Remove the upper thrust washers from the cylinder block.



54. REMOVE CRANKSHAFT BEARING

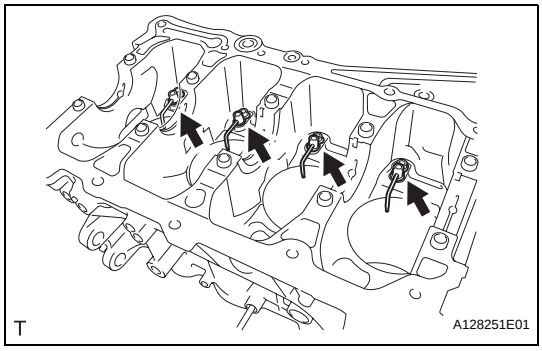
(a) Remove the 5 upper main bearings from the cylinder block.
HINT:
Arrange the bearings in the correct order.



55. REMOVE NO. 2 CRANKSHAFT BEARING

(a) Remove the 5 lower main bearings from the 5 main bearing caps.
HINT:
Arrange the bearings in the correct order.

56. REMOVE STUD BOLT



57. REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY

(a) Using a 5 mm hexagon wrench, remove the bolts and oil nozzles.

58. CLEAN CYLINDER BLOCK

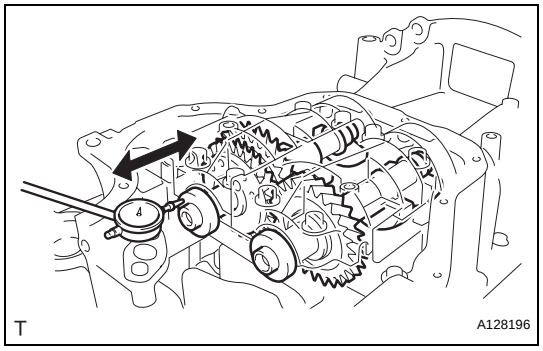
NOTICE:

If the cylinder is washed at high temperatures, the cylinder liner will stick out beyond the cylinder block. Always wash the cylinder block at a temperature of 45°C (113°F) or less.

INSPECTION

1. INSPECT BALANCESHAFT THRUST CLEARANCE

(a) Install the balanceshafts (See page EM-149).



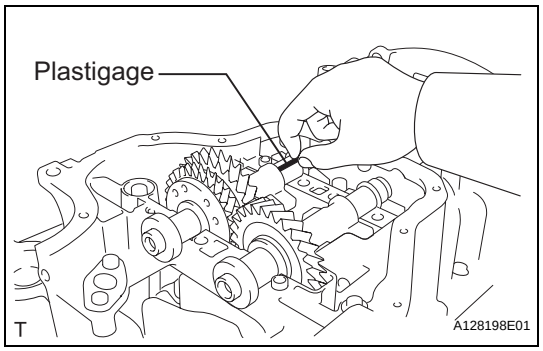
(b) Using a dial indicator, measure the thrust clearance while moving the balanceshaft back and forth.
Standard thrust clearance:
0.05 to 0.09 mm (0.0020 to 0.0035 in.)
Maximum thrust clearance:
0.09 mm (0.0035 in.)
If the thrust clearance is greater than the maximum, replace the balanceshaft housing and bearings. If necessary, replace the balanceshaft.

2. INSPECT BALANCESHAFT OIL CLEARANCE

(a) Clean each bearing and journal.

(b) Check each bearing and journal for pitting and scratches.
If a bearing or journal is damaged, replace the bearings. If necessary, replace the balanceshaft.

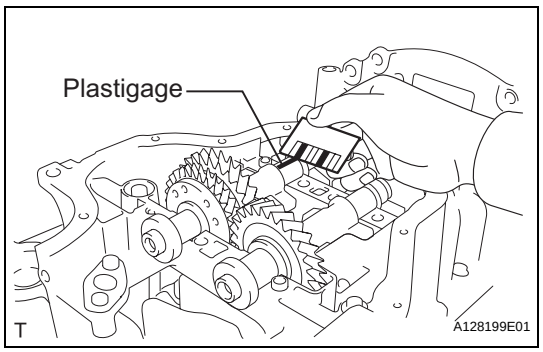
(c) Place the No. 1 and No. 2 balanceshafts onto the crankcase.



(d) Lay a strip of Plastigage across each journal.

(e) Install the balanceshaft housing (See page EM-149).
NOTICE:
Do not turn the balanceshafts.

(f) Remove the balanceshafts (See page EM-127).



(g) Measure the Plastigage at its widest point.
Standard oil clearance:
0.004 to 0.049 mm (0.0002 to 0.0019 in.)
Maximum oil clearance:
0.049 mm (0.0019 in.)
NOTICE:
Remove the Plastigage completely after the measurement.
If the oil clearance is greater than the maximum, replace the bearing. If necessary, replace the balanceshaft.

(h) If replacing a bearing, select a new one with the same number.
Standard balanceshaft housing journal bore diameter

Item	Specified Condition
Mark 1	26.000 to 26.006 mm (1.0236 to 1.0239 in.)
Mark 2	26.007 to 26.012 mm (1.0239 to 1.0241 in.)
Mark 3	26.013 to 26.018 mm (1.0241 to 1.0243 in.)

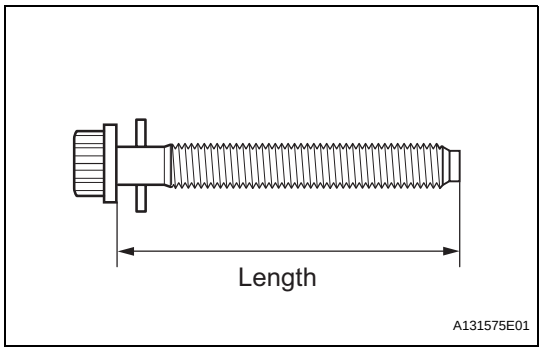
EM

Standard bearing center wall thickness

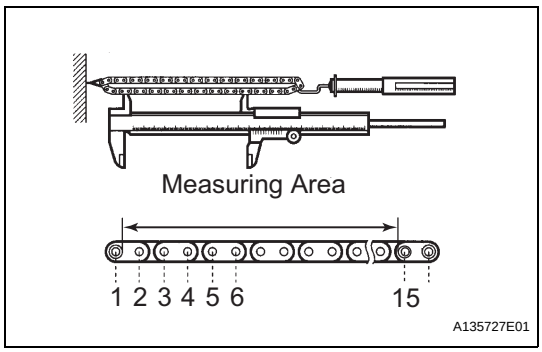
Item	Specified Condition
Mark 1	1.486 to 1.489 mm (0.05850 to 0.05862 in.)
Mark 2	1.490 to 1.492 mm (0.05866 to 0.05874 in.)
Mark 3	1.493 to 1.495 mm (0.0588 to 0.0589 in.)

Standard balanceshaft journal diameter

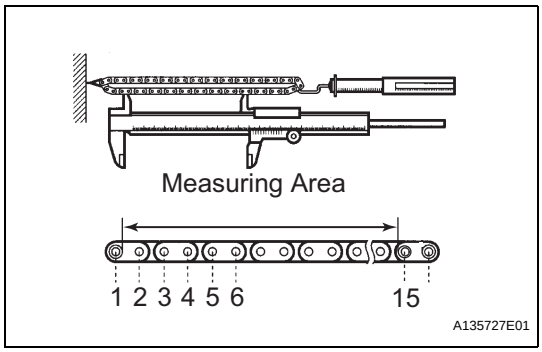
Item	Journal diameter
Mark 1	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Mark 2	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Mark 3	22.985 to 23.000 mm (0.9049 to 0.9055 in.)



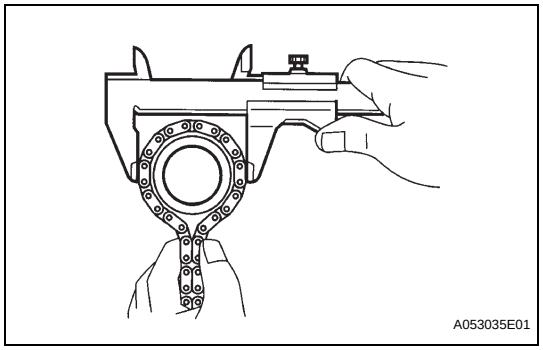
(i) Inspect the balanceshaft housing bolts.
(1) Using vernier calipers, measure the length of the bolts from the seat to the end.
Standard bolt length:
58.3 to 59.7 mm (2.295 to 2.350 in.)
Maximum bolt length:
60.3 mm (2.374 in.)
If the bolt length is greater than the maximum, replace the balanceshaft housing bolt.



3. INSPECT CHAIN SUB-ASSEMBLY
(a) Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as shown in the illustration.
(b) Using vernier calipers, measure the length of 15 links.
Maximum chain elongation:
114.5 mm (4.508 in.)
NOTICE:
Perform the measurement at 3 random places.
Use the average of the measurements.
If the elongation is greater than the maximum, replace the chain.



4. INSPECT NO. 2 CHAIN SUB-ASSEMBLY
(a) Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as shown in the illustration.
(b) Using vernier calipers, measure the length of 15 links.
Maximum chain elongation:
102.2 mm (4.024 in.)
NOTICE:
Perform the measurement at 3 random places.
Use the average of the measurements.
If the elongation is greater than the maximum, replace the No. 2 chain.



5. INSPECT OIL PUMP DRIVE GEAR

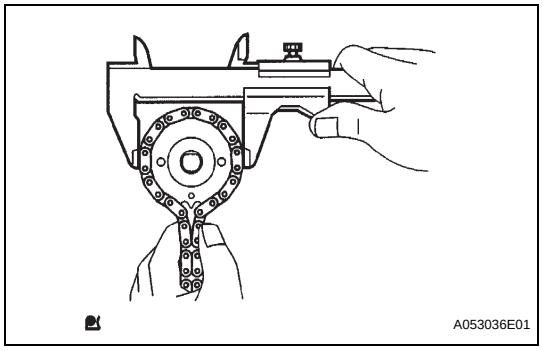
(a) Wrap the chain around the sprocket.

(b) Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain):
48.2 mm (1.898 in.)

NOTICE:
The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.



6. INSPECT OIL PUMP DRIVE SHAFT GEAR

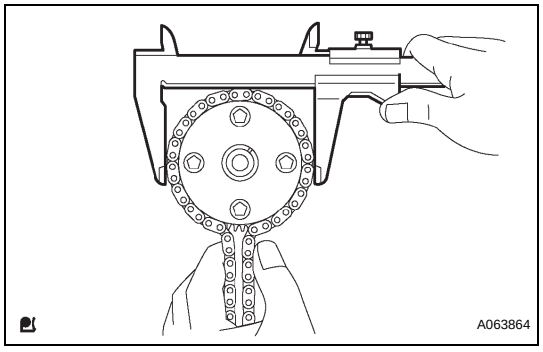
(a) Wrap the chain around the sprocket.

(b) Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain):
48.2 mm (1.898 in.)

NOTICE:
The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.



7. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

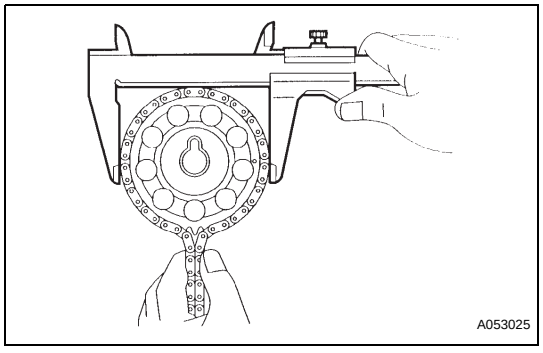
(a) Wrap the chain around the sprocket.

(b) Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain):
97.3 mm (3.831 in.)

NOTICE:
The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.



8. INSPECT CAMSHAFT TIMING SPROCKET

(a) Wrap the chain around the sprocket.

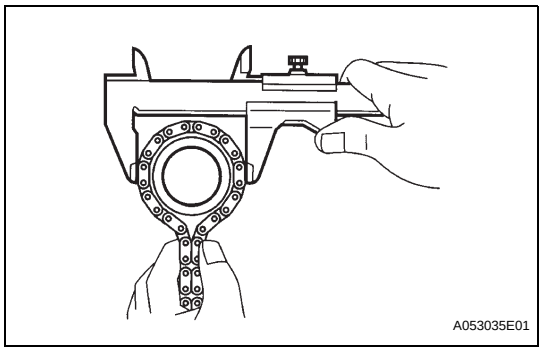
(b) Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain):
97.3 mm (3.831 in.)

NOTICE:
The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

EM



9. INSPECT CRANKSHAFT TIMING GEAR

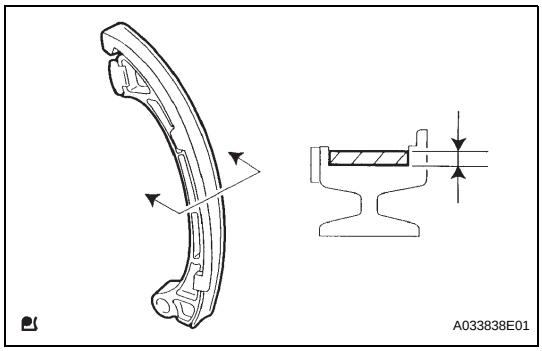
(a) Wrap the chain around the timing sprocket.

(b) Using vernier calipers, measure the timing gear diameter with the chain wrapped around.

Minimum gear diameter (with chain):
51.6 mm (2.031 in.)

NOTICE:
The vernier calipers must be in contact with the chain rollers when measuring.

If the gear diameter is less than the minimum, replace the chain sub-assembly and crankshaft timing sprocket.

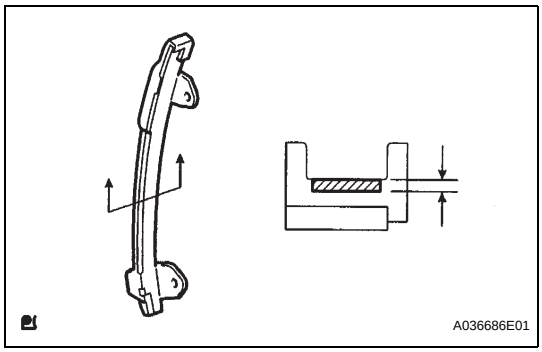


10. INSPECT CHAIN TENSIONER SLIPPER

(a) Using vernier calipers, measure the tensioner slipper wear.

Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the chain tensioner slipper.

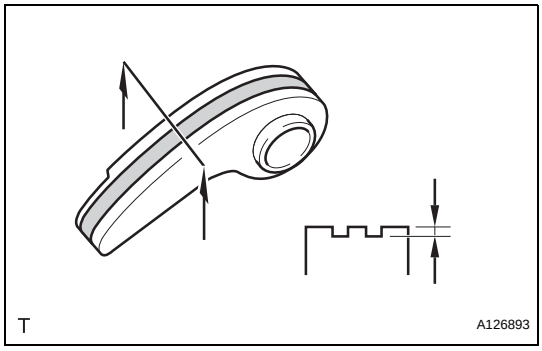


11. INSPECT NO. 1 CHAIN VIBRATION DAMPER

(a) Using vernier calipers, measure the vibration damper wear.

Maximum wear:
1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the No. 1 chain vibration damper.

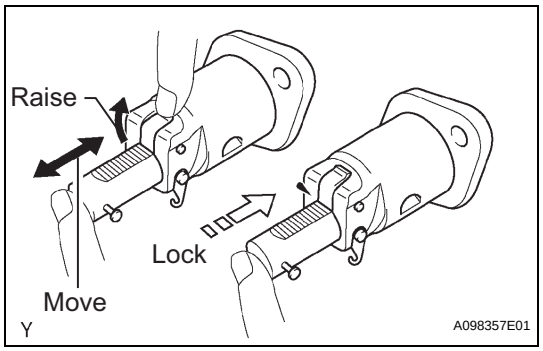


12. INSPECT CHAIN TENSIONER PLATE

(a) Using vernier calipers, measure the vibration damper wear.

Maximum wear:
0.5 mm (0.020 in.)

If the wear is greater than the maximum, replace the chain tensioner plate.



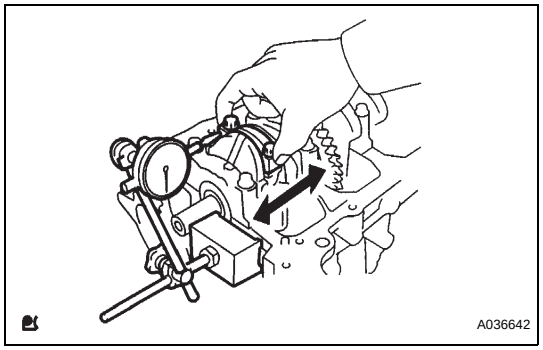
13. INSPECT NO. 1 CHAIN TENSIONER

(a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.

(b) Release the ratchet pawl, then check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.

14. INSPECT CONNECTING ROD THRUST CLEARANCE

(a) Install the connecting rod cap (See page EM-149).



(b) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

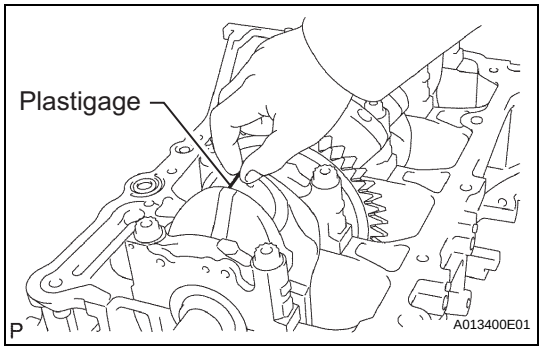
Standard thrust clearance:
0.160 to 0.362 mm (0.0063 to 0.0143 in.)
Maximum thrust clearance:
0.362 mm (0.0143 in.)

If the thrust clearance is greater than the maximum, replace the connecting rod assemblies as necessary. If necessary, replace the crankshaft.

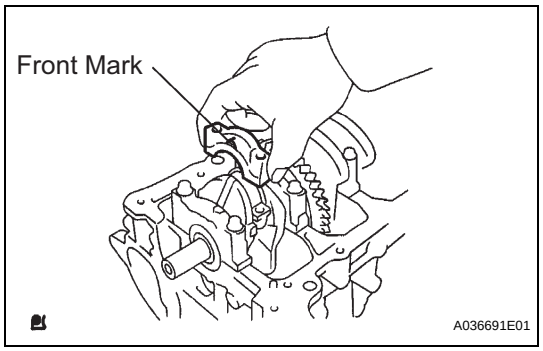
15. INSPECT CONNECTING ROD OIL CLEARANCE

(a) Clean the crank pin and bearing.

(b) Check the crank pin and bearing for pitting and scratches.



(c) Lay a strip of Plastigage on the crank pin.



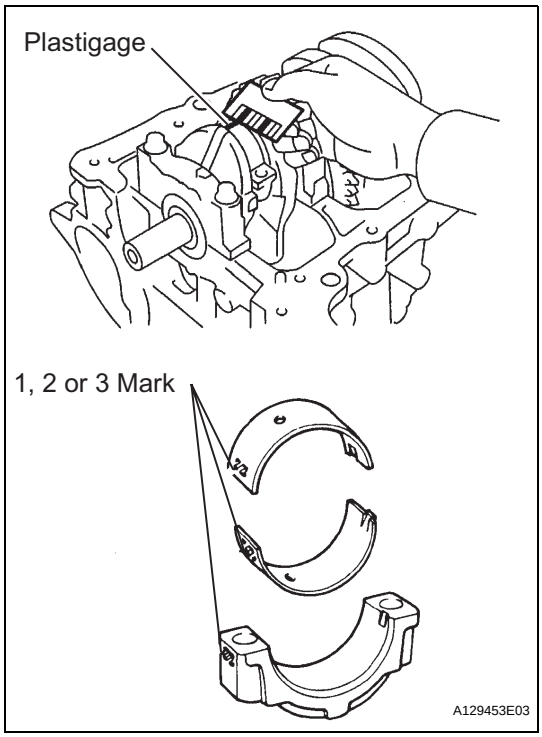
(d) Check that the front mark of the connecting rod cap is facing forward.

(e) Install the connecting rod cap (See page EM-149).

NOTICE:
Do not turn the crankshaft.

(f) Remove the 2 bolts and connecting rod cap (See page EM-127).

EM



(g) Measure the Plastigage at its widest point.

Standard oil clearance:
0.032 to 0.063 mm (0.0013 to 0.0025 in.)
Maximum oil clearance:
0.063 mm (0.0025 in.)
NOTICE:
Completely remove the Plastigage after the measurement.

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.

HINT:

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing's standard thickness is indicated by a 1, 2, or 3 mark on its surface.

Standard connecting rod large end bore diameter

Mark	Specified Condition
Mark 1	51.000 to 51.007 mm (2.0079 to 2.0082 in.)
Mark 2	51.008 to 51.013 mm (2.0082 to 2.0084 in.)
Mark 3	51.014 to 51.020 mm (2.0084 to 2.0087 in.)

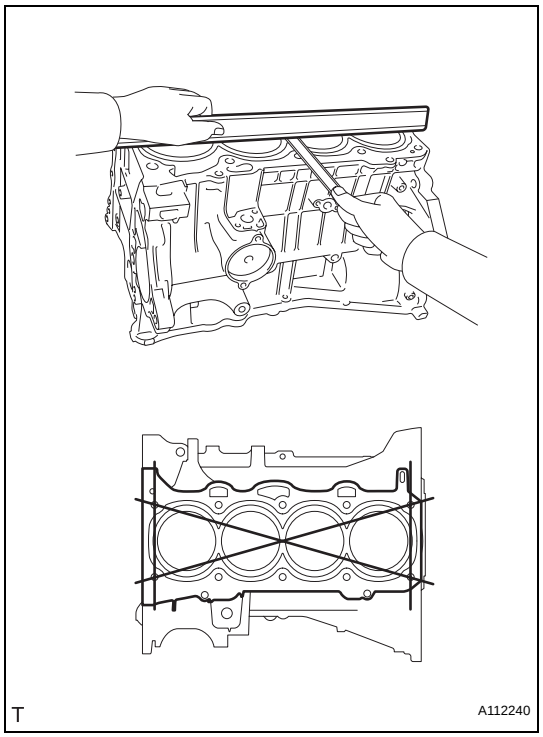
Standard connecting rod bearing thickness

Mark	Specified Condition
Mark 1	1.485 to 1.488 mm (0.0585 to 0.0586 in.)
Mark 2	1.489 to 1.491 mm (0.0586 to 0.0587 in.)
Mark 3	1.492 to 1.494 mm (0.0587 to 0.0588 in.)

Standard crankshaft pin diameter

Mark	Specified Condition
Mark 1	47.990 to 48.000 (1.8894 to 1.8898 in.)
Mark 2	47.990 to 48.000 (1.8894 to 1.8898 in.)
Mark 3	47.990 to 48.000 (1.8894 to 1.8898 in.)

EM



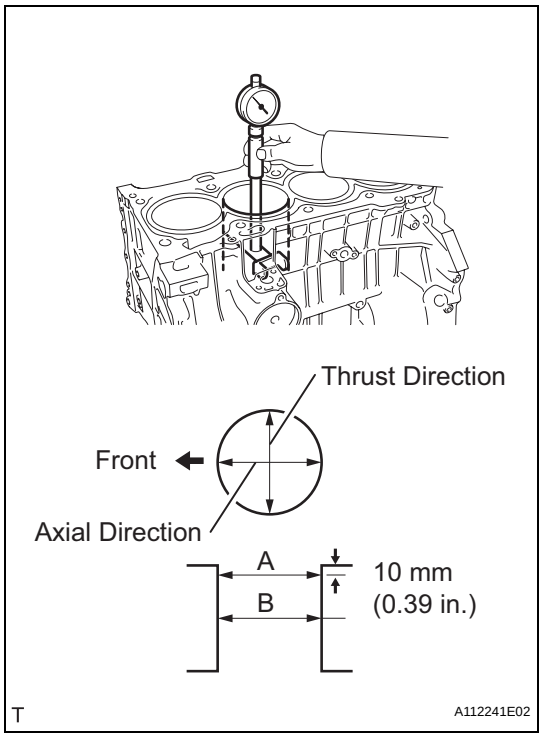
16. INSPECT CYLINDER BLOCK FOR WARPAGE

(a) Using a precision straightedge and feeler gauge, measure the warpage of the surface that is in contact with the cylinder head gasket.

Maximum warpage:

0.05 mm (0.0020 in.)

If the warpage is greater than the maximum, replace the cylinder block.



17. INSPECT CYLINDER BORE

(a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in the thrust and axial directions.

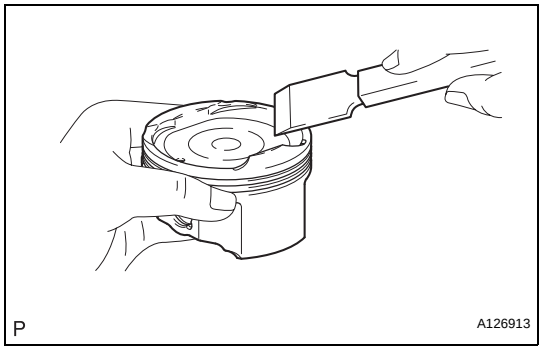
Standard diameter:

88.500 to 88.513 mm (3.4843 to 3.4847 in.)

Maximum diameter:

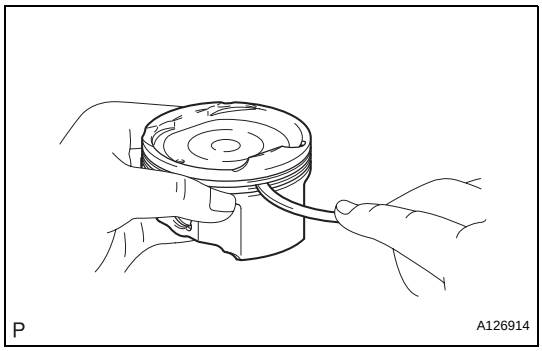
88.633 mm (3.4894 in.)

If the average diameter of the 4 positions is greater than the maximum, replace the cylinder block.

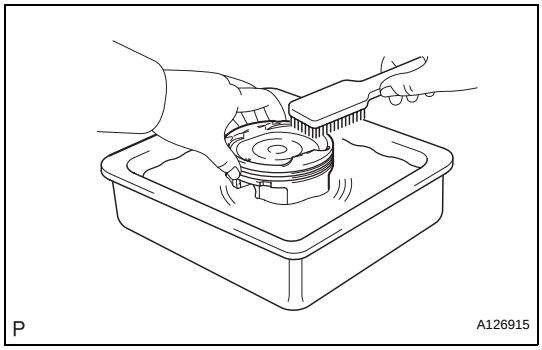


18. INSPECT PISTON

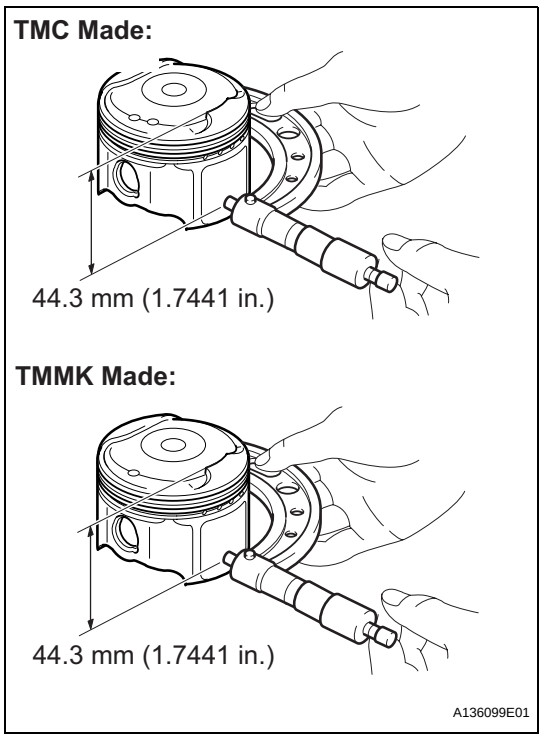
(a) Using a gasket scraper, remove the carbon from the piston top.



(b) Using a groove cleaning tool or a broken ring, clean the piston ring grooves.



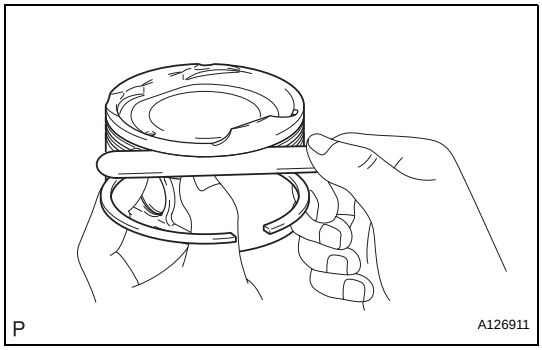
(c) Using a brush and solvent, thoroughly clean the piston.
NOTICE:
Do not use a wire brush.



(d) Using a micrometer, measure the piston diameter at right angles to the piston pin hole, and at the piston 44.3 mm (1.7441 in.) from the piston head.
Standard piston diameter:
88.469 to 88.479 mm (3.4830 to 3.4834 in.)
If the diameter is not as specified, replace the piston.

19. INSPECT PISTON OIL CLEARANCE

(a) Subtract the piston diameter measurement from the cylinder bore diameter measurement.
Standard oil clearance:
0.021 to 0.044 mm (0.0008 to 0.0017 in.)
Maximum oil clearance:
0.10 mm (0.0039 in.)
If the oil clearance is greater than the maximum, replace all the pistons. If necessary, replace the cylinder block.

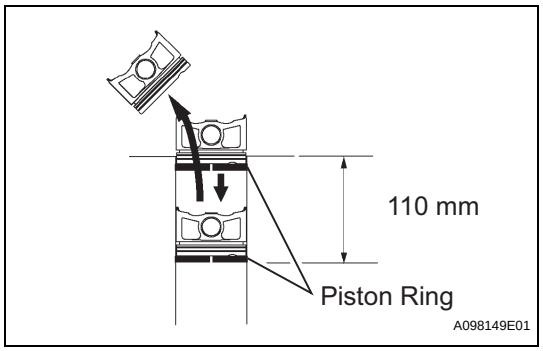


20. INSPECT RING GROOVE CLEARANCE

(a) Using a feeler gauge, measure the clearance between a new piston ring and wall of the ring groove.
Standard ring groove clearance

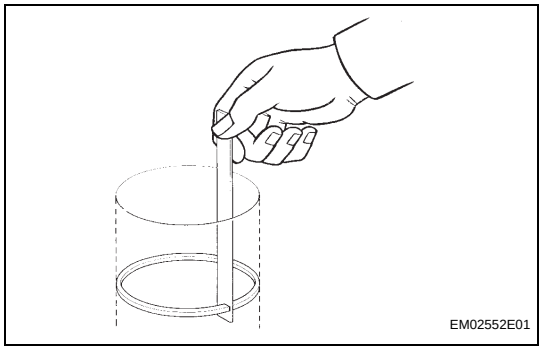
Item	Specified Condition
No. 1 Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
No. 2 Ring	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
Oil Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)

If the groove clearance is not as specified, replace the piston.



21. INSPECT PISTON RING END GAP

(a) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.



(b) Using a feeler gauge, measure the end gap.

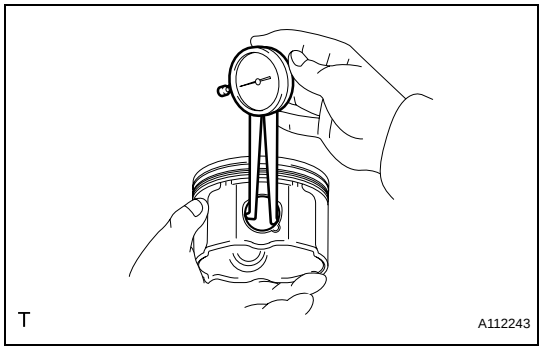
Standard end gap

Item	Specified Condition
No. 1 Ring	0.24 to 0.31 mm (0.0094 to 0.0122 in.)
No. 2 Ring	0.33 to 0.43 mm (0.0130 to 0.0169 in.)
Oil Ring	0.10 to 0.30 mm (0.0040 to 0.0119 in.)

Maximum end gap

Item	Specified Condition
No. 1 Ring	0.89 mm (0.0350 in.)
No. 2 Ring	1.37 mm (0.0539 in.)
Oil Ring	0.73 mm (0.0287 in.)

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum, even with a new piston ring, replace the cylinder block.



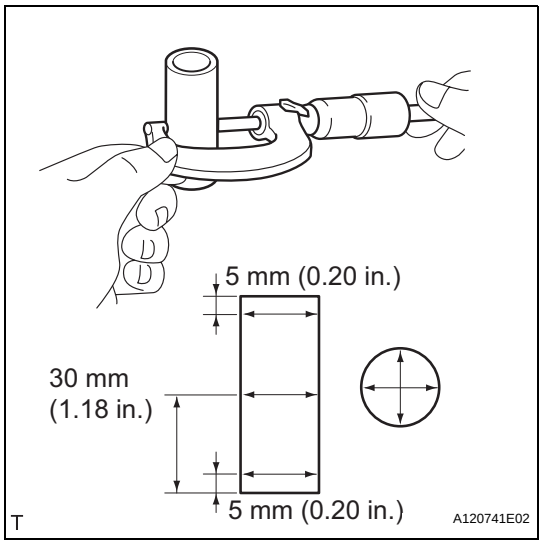
22. INSPECT PISTON PIN OIL CLEARANCE

(a) Using a caliper gauge, measure the piston pin bore diameter.

Standard piston pin bore diameter:
22.001 to 22.010 mm (0.8662 to 0.8665 in.)

Item	Specified Condition
A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
B	22.005 to 22.007 mm (0.8663 to 0.8664 in.)
C	22.008 to 22.010 mm (0.8665 to 0.8665 in.)

If the diameter is not as specified, replace the piston.

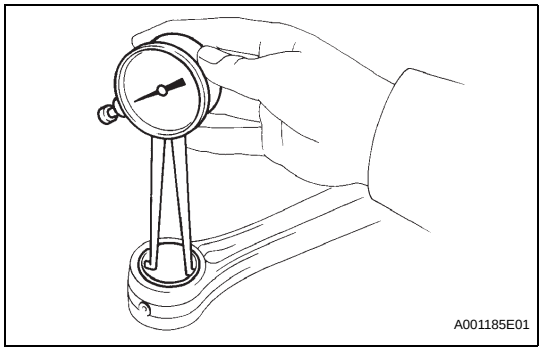


(b) Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter:
21.997 to 22.006 mm (0.8660 to 0.8664 in.)

Item	Specified Condition
A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)

If the diameter is not as specified, replace the piston pin.

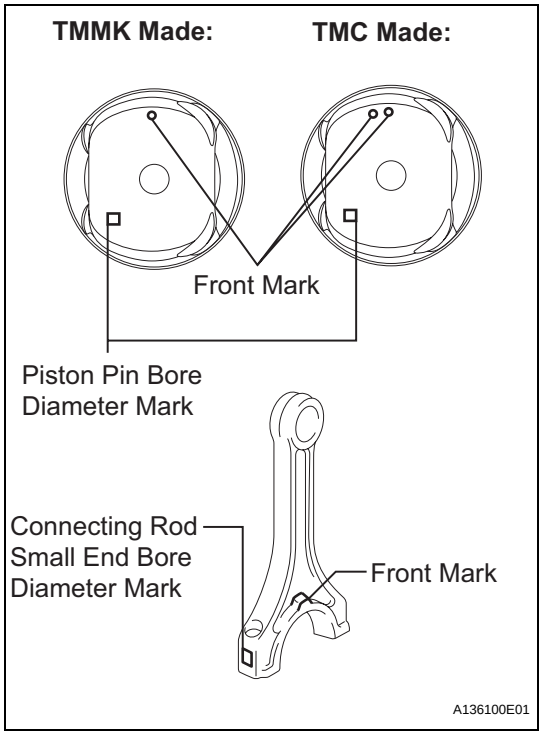


(c) Using a caliper gauge, measure the connecting rod small end bore diameter.

Standard connecting rod small end bore diameter:
22.005 to 22.014 mm (0.8663 to 0.8667 in.)

Item	Specified Condition
A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)

If the diameter is not as specified, replace the connecting rod.



(d) Subtract the piston pin diameter measurement from the piston pin bore diameter measurement.

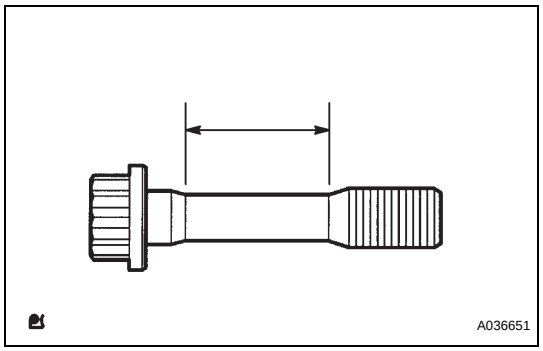
Standard oil clearance:
0.001 to 0.007 mm (0.00004 to 0.0003 in.)
Maximum oil clearance:
0.010 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the piston and piston pin as a set.

(e) Subtract the piston pin diameter measurement from the connecting rod small end bore diameter measurement.

Standard oil clearance:
0.005 to 0.011 mm (0.0002 to 0.0004 in.)
Maximum oil clearance:
0.011 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the connecting rod and piston pin as a set.

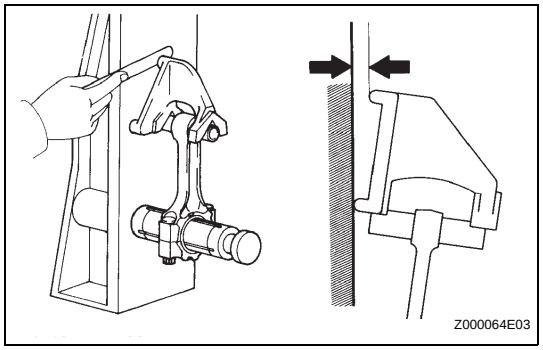


23. INSPECT CONNECTING ROD BOLT

(a) Using vernier calipers, measure the tension portion diameter of the bolt.

Standard diameter:
7.2 to 7.3 mm (0.283 to 0.287 in.)
Minimum diameter:
7.0 mm (0.276 in.)

If the diameter is less than the minimum, replace the connecting rod bolt.



24. INSPECT CONNECTING ROD SUB-ASSEMBLY

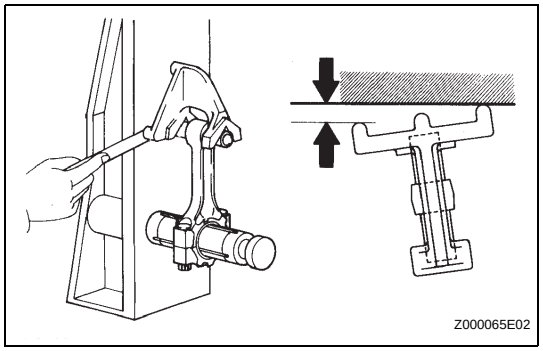
(a) Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.

(1) Check for misalignment.

Maximum misalignment:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the misalignment is greater than the maximum, replace the connecting rod.

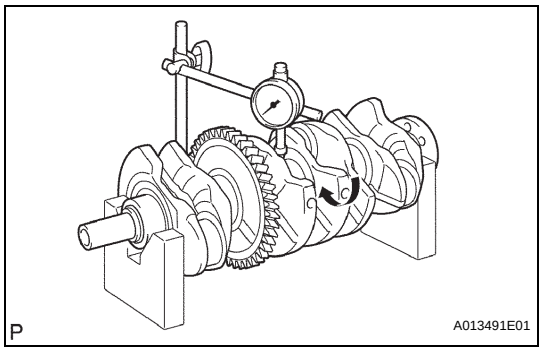
EM



(2) Check for twist.

Maximum twist:
0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If the twist is greater than the maximum, replace the connecting rod.

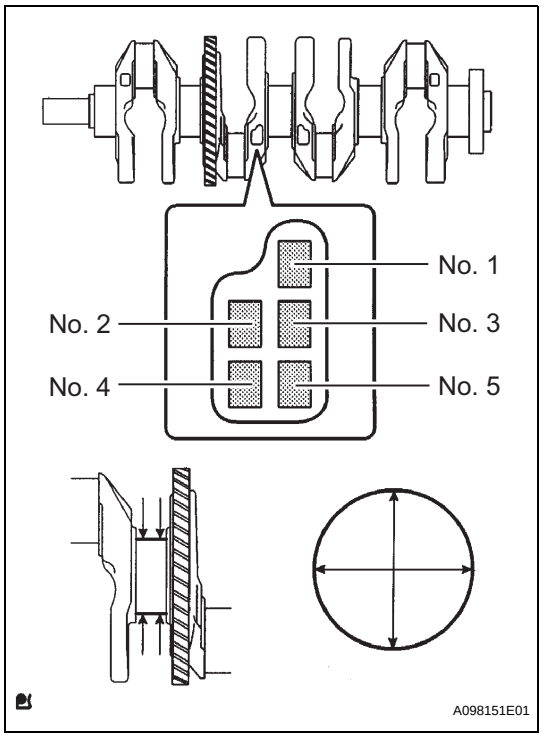


25. INSPECT CRANKSHAFT

(a) Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

Maximum circle runout:
0.03 mm (0.0012 in.)

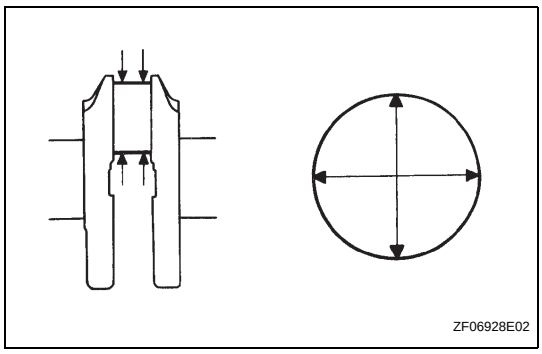
If the taper and distortion are greater than the maximum, replace the crankshaft.



(b) Using a micrometer, measure the diameter of each main journal.
Standard diameter:
54.988 to 55.000 mm (2.1649 to 2.1654 in.)
If the diameter is not as specified, check the crankshaft oil clearance.

(c) Check each main journal for taper and distortion as shown in the illustration.
Maximum taper and distortion:
0.003 mm (0.0001 in.)
If the taper and distortion are greater than the maximum, replace the crankshaft.
Standard diameter (Reference)

Mark	Specified Condition
0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)
4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)
5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)

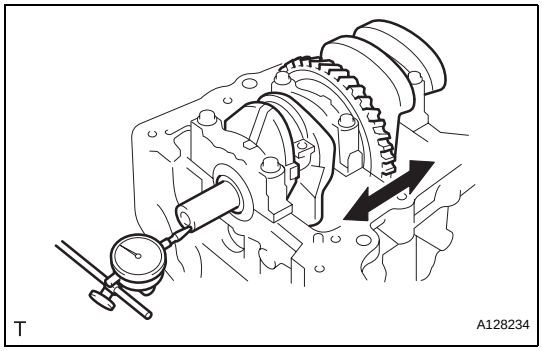


(d) Using a micrometer, measure the diameter of each crank pin.
Standard diameter:
47.990 to 48.000 mm (1.8894 to 1.8898 in.)
If the diameter is not as specified, check the connecting rod oil clearance.

(e) Inspect each crank pin for taper and distortion as shown in the illustration.
Maximum taper and distortion:
0.003 mm (0.0001 in.)
If the taper and distortion are greater than the maximum, replace the crankshaft.

26. INSPECT CRANKSHAFT THRUST CLEARANCE

(a) Install the main bearing cap (See page EM-149).



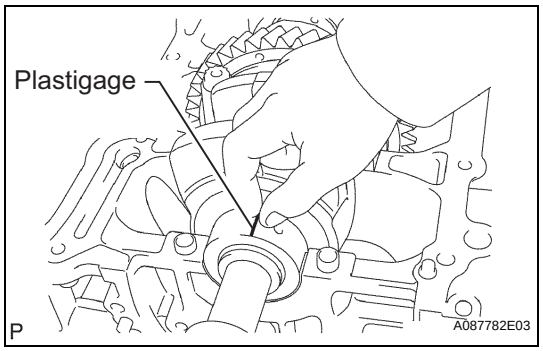
(b) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.
Standard thrust clearance:
0.04 to 0.24 mm (0.0016 to 0.0095 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)
If the thrust clearance is greater than the maximum, replace the thrust washers as a set.
HINT:
The thrust washer thickness is 1.93 to 1.98 mm (0.0760 to 0.0780 in.).

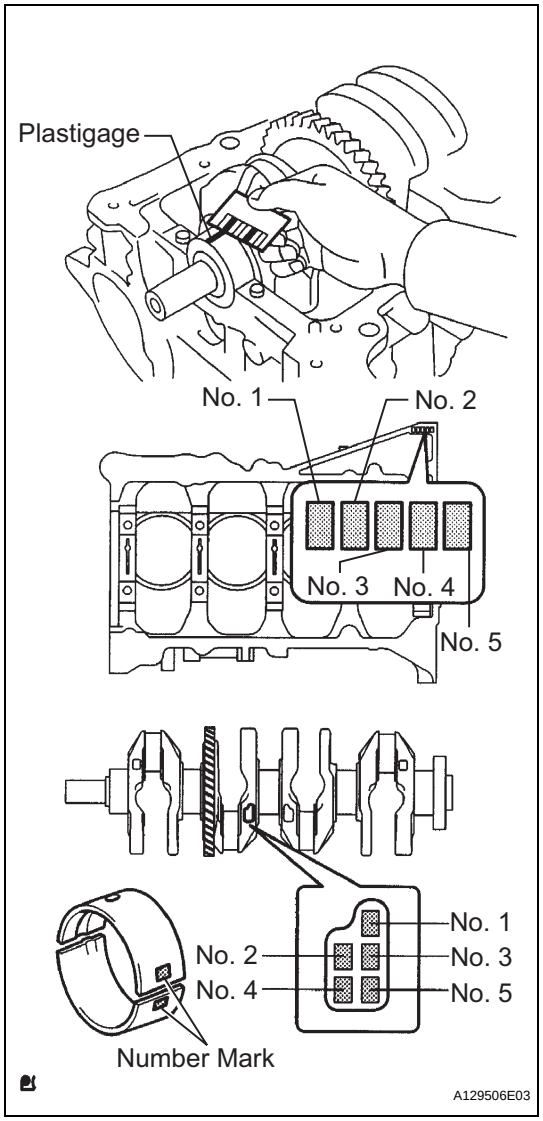
27. INSPECT CRANKSHAFT OIL CLEARANCE

(a) Check the crank journal and bearing for pitting and scratches.

(b) Install the crankshaft bearing (See page EM-149).

(c) Place the crankshaft on the cylinder block.





(d) Lay a strip of Plastigage across each journal.
(e) Examine the front marks and numbers and install the bearing caps on the cylinder block.
HINT:
A number is marked on each main bearing cap to indicate the installation position.
(f) Install the main bearing cap (See page EM-149).
NOTICE:
Do not turn the crankshaft.
(g) Remove the main bearing caps (See page EM-127).

(h) Measure the Plastigage at its widest point.
Standard oil clearance:
0.017 to 0.040 mm (0.0007 to 0.0016 in.)
Maximum oil clearance:
0.060 mm (0.0024 in.)
NOTICE:
Remove the Plastigage completely after the measurement.
If the oil clearance is greater than the maximum, replace the crankshaft bearing. If necessary, replace the crankshaft.
HINT:
- If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft. Then select a new bearing with the calculated number. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4" accordingly.
- EXAMPLE: Cylinder block "3" + Crankshaft "5" = Total number 8 (Use bearing "3")

Cylinder block + Crankshaft	0 to 2	3 to 5	6 to 8	9 to 11
Bearing to be used	"1"	"2"	"3"	"4"

Standard cylinder block journal bore diameter

Mark	Specified Condition
0	59.000 to 59.002 mm (2.3228 to 2.3229 in.)
1	59.003 to 59.004 mm (2.3230 to 2.3230 in.)
2	59.005 to 59.006 mm (2.3230 to 2.3231 in.)
3	59.007 to 59.009 mm (2.3231 to 2.3232 in.)
4	59.010 to 59.011 mm (2.3232 to 2.3233 in.)
5	59.012 to 59.013 mm (2.3233 to 2.3234 in.)
6	59.014 to 59.016 mm (2.3234 to 2.3235 in.)

Standard crankshaft journal diameter

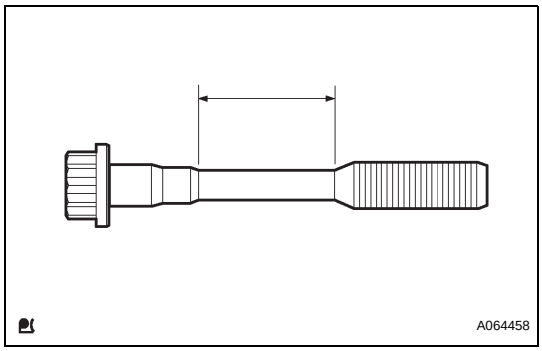
Mark	Specified Condition
0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)
4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)

EM

Mark	Specified Condition
5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)

Standard bearing center wall thickness

Mark	Specified Condition
1	1.993 to 1.996 mm (0.0785 to 0.0786 in.)
2	1.997 to 1.999 mm (0.0786 to 0.0787 in.)
3	2.000 to 2.002 mm (0.0787 to 0.0788 in.)
4	2.003 to 2.005 mm (0.0789 to 0.0789 in.)



28. INSPECT CRANKSHAFT BEARING CAP SET BOLT

(a) Using vernier calipers, measure the tension portion diameter of the bolts.

Standard diameter:

7.3 to 7.5 mm (0.287 to 0.295 in.)

Minimum diameter:

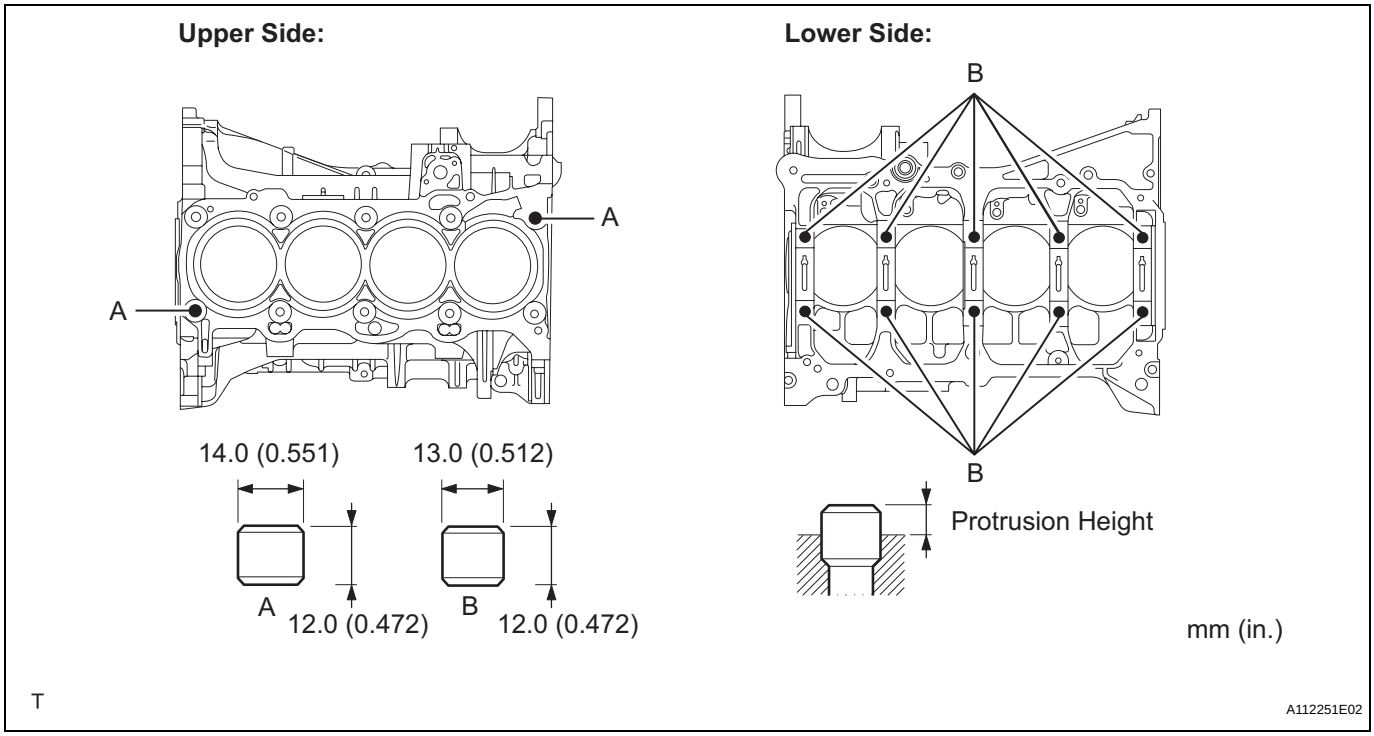
7.2 mm (0.284 in.)

If the diameter is less than the minimum, replace the bolt.

REASSEMBLY

1. INSTALL RING PIN

(a) Using a plastic hammer, tap into the ring pin.



Standard protrusion

Item	Protrusion
Pin A	6 mm (0.236 in.)
Pin B	5 mm (0.197 in.)

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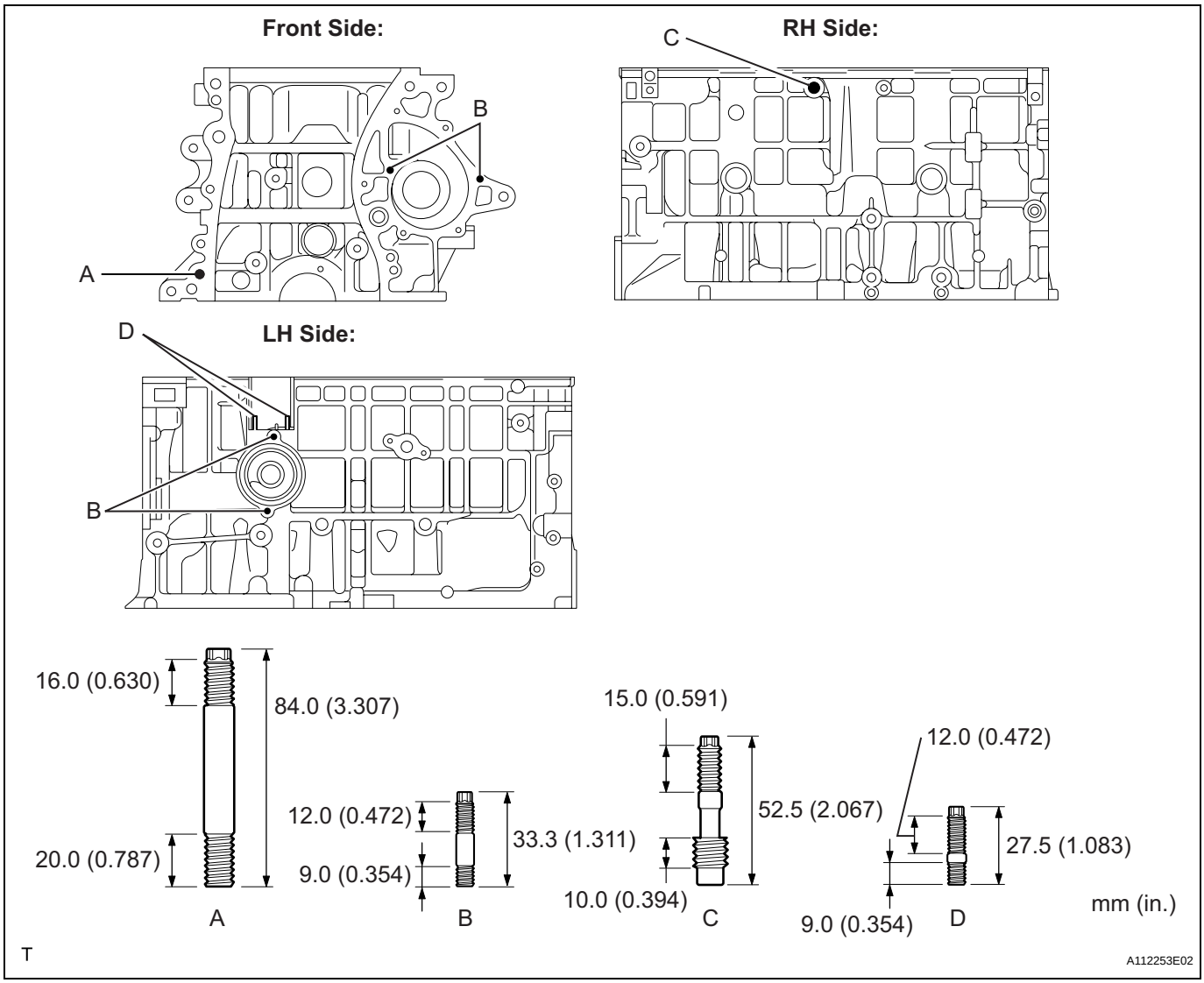
2. INSTALL STUD BOLT

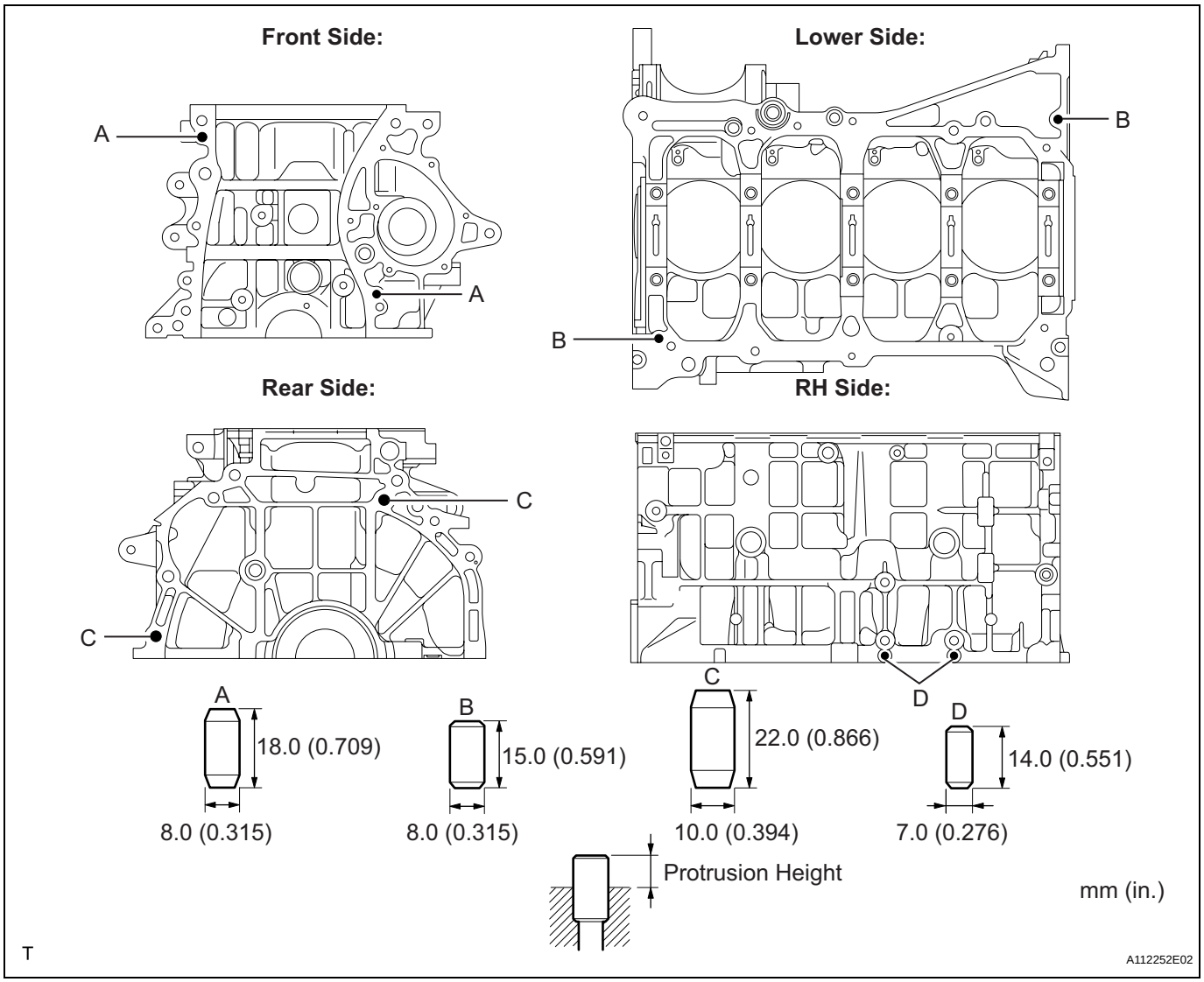
(a) Install the stud bolts as shown in the illustration.



Torque: Stud Bolt A
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Stud Bolt B
22 N*m (220 kgf*cm, 16 ft.*lbf)
Stud Bolt C
9.5 N*m (97 kgf*cm, 84 in.*lbf)
Stud Bolt D
5.0 N*m (51 kgf*cm, 44 in.*lbf)

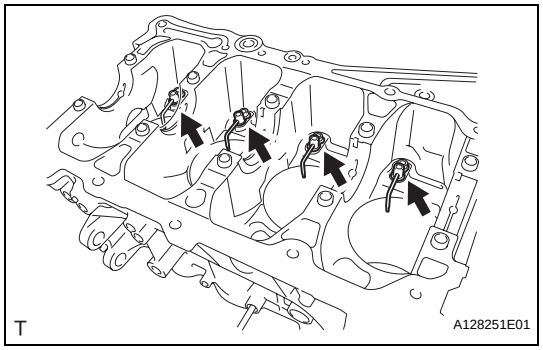
3. INSTALL STRAIGHT PIN

(a) Using a plastic hammer, tap into the straight pin.



Standard protrusion

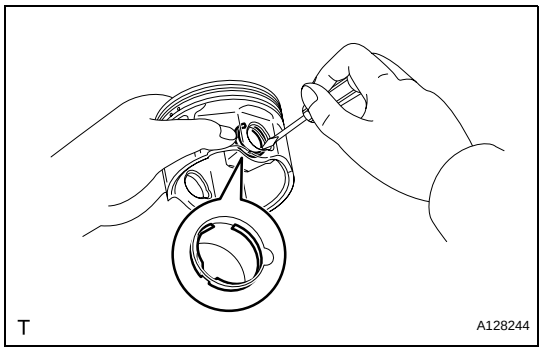
Item	Protrusion
Pin A	8 mm (0.315 in.)
Pin B	7.5 mm (0.295 in.)
Pin C	12 mm (0.472 in.)
Pin D	5 mm (0.197 in.)



4. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY

(a) Using a 5 mm hexagon wrench, install the oil nozzles with the bolts.

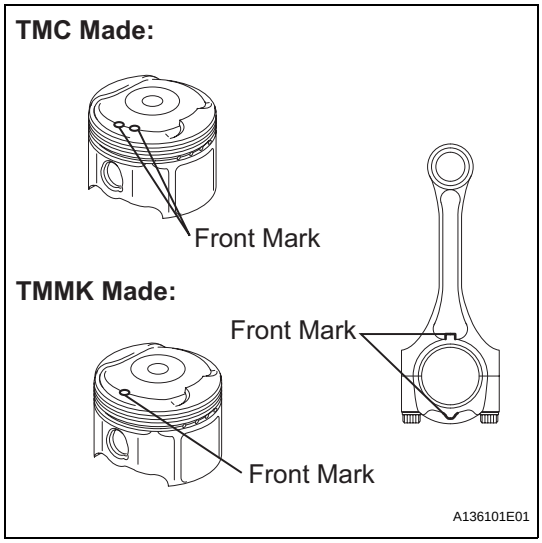
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)



5. INSTALL PISTON

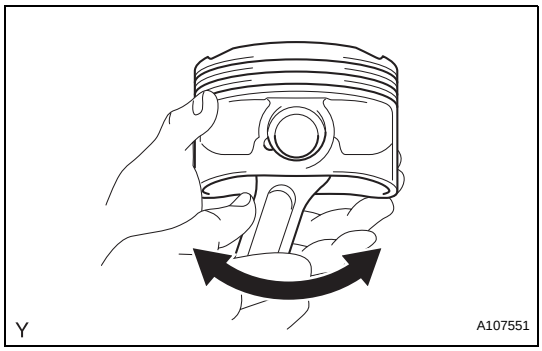
(a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.
HINT:
Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

(b) Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).

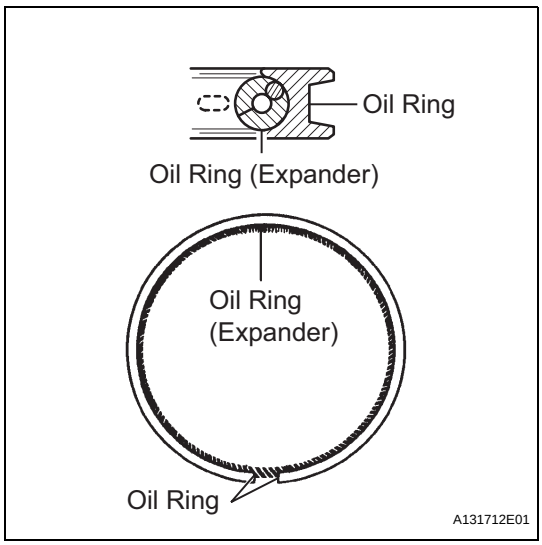


(c) Align the front marks of the piston and connecting rod, and push in the piston with your thumb.

(d) Using a screwdriver, install a new snap ring on the other end of the piston pin hole.
HINT:
Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

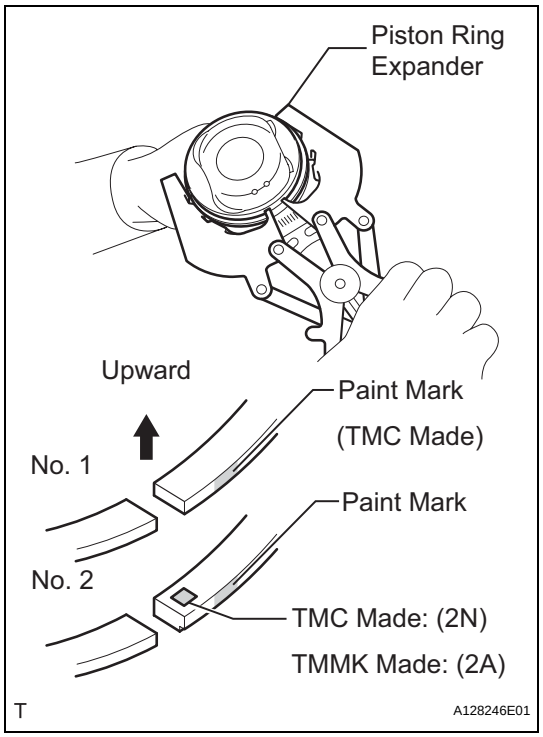


(e) Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.

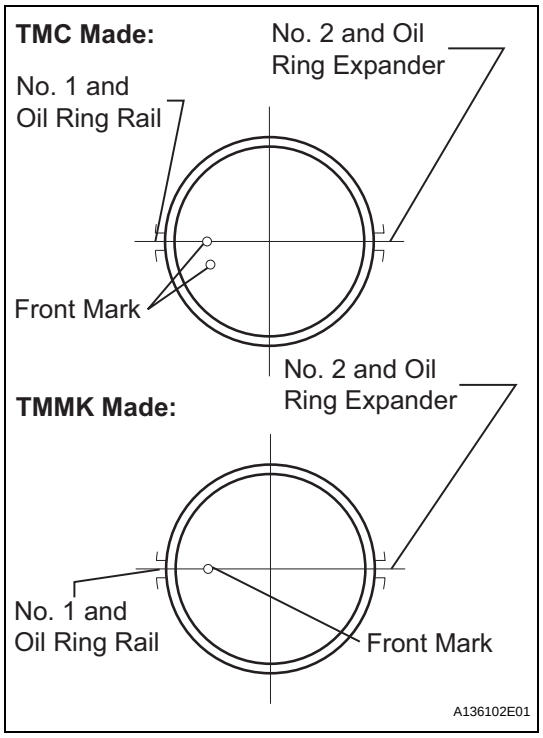


6. INSTALL PISTON RING SET

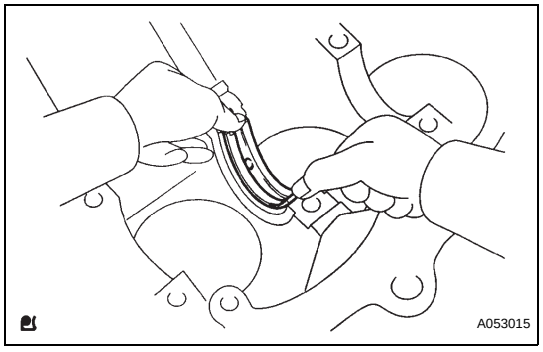
(a) Install the oil ring expander and oil ring rail by hand.
NOTICE:
- **Install the expander and oil ring so that their ring ends are at opposite sides.**
- **Securely install the expander to the inner groove of the oil ring.**



(b) Using a piston ring expander, install the 2 compression rings so that the paint marks are positioned as shown in the illustration.
NOTICE:
Install the compression ring No. 2 with the code mark (2N and 2A) facing upward.



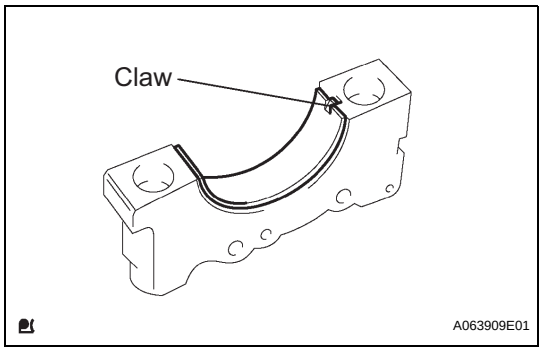
(c) Position the piston rings so that the ring ends are as shown in the illustration.



7. INSTALL CRANKSHAFT BEARING

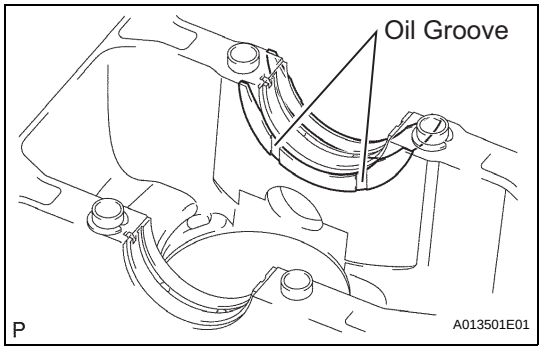
(a) Install the upper bearing with an oil groove on the cylinder block.
NOTICE:
Do not apply engine oil to the bearings and the contact surfaces.

EM



8. INSTALL NO. 2 CRANKSHAFT BEARING

(a) Install the lower bearing on the bearing cap.
NOTICE:
Clean the backside of the bearing and the bearing surface of the connecting rod. The surface should be free of dust and oils.

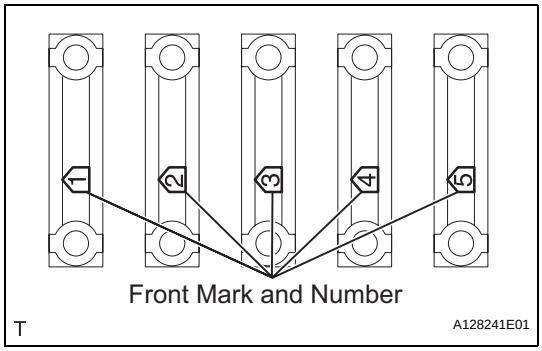


9. INSTALL UPPER CRANKSHAFT THRUST WASHER

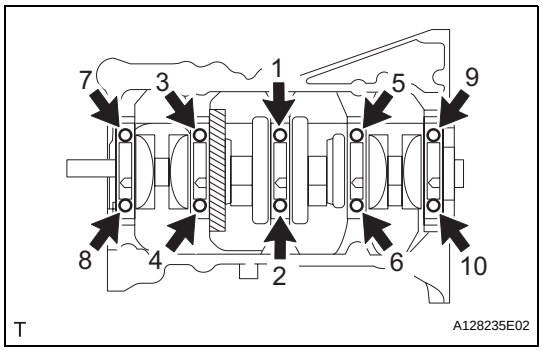
(a) Install the 2 thrust washers under the No. 3 journal of the cylinder block with the oil grooves facing outward.
(b) Apply engine oil to the crankshaft thrust washer.

10. INSTALL CRANKSHAFT

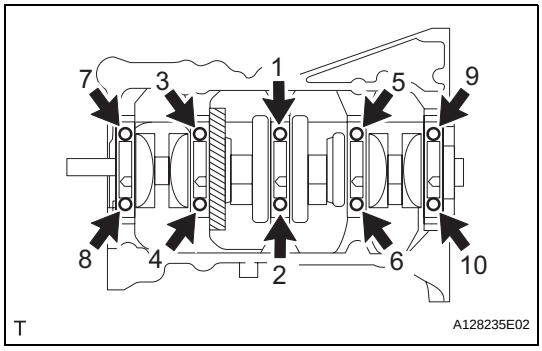
(a) Apply engine oil to the upper bearing and install the crankshaft on the cylinder block.
(b) Apply engine oil to the lower bearing.



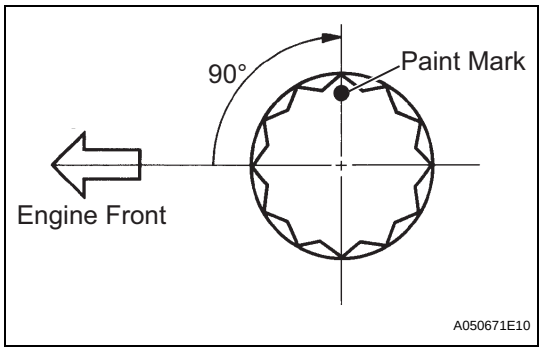
(c) Examine the front marks and install the bearing caps on the cylinder block.
(d) Apply a light coat of engine oil to the threads and under the bearing cap bolts.
(e) Install the crankshaft bearing cap bolts.
NOTICE:
The main bearing cap bolts are tightened in 2 progressive steps.

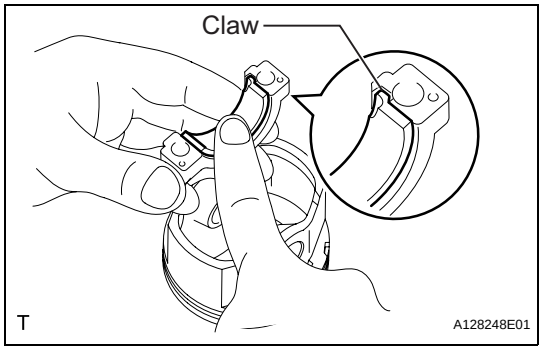


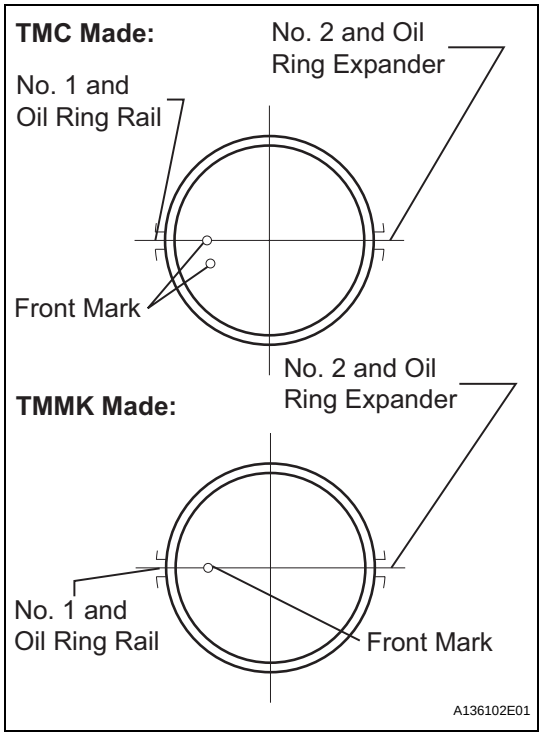
(f) Step 1
(1) Install and uniformly tighten the 10 main bearing cap bolts in the sequence shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



(2) Retighten the 10 main bearing cap bolts in the sequence shown in the illustration.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)







(g) Step 2
  (1) Mark the front of the bearing cap bolts with paint.
  (2) Retighten the bearing cap bolts by 90°in the numerical order shown in the illustration.
(h) Check that the paint mark is now at a 90°angle to the front.
(i) Check that the crankshaft turns smoothly.
(j) Check the crankshaft thrust clearance (See page EM-147).

11. INSTALL CONNECTING ROD BEARING

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.
NOTICE:
Do not apply engine oil to the bearings and the contact surfaces.

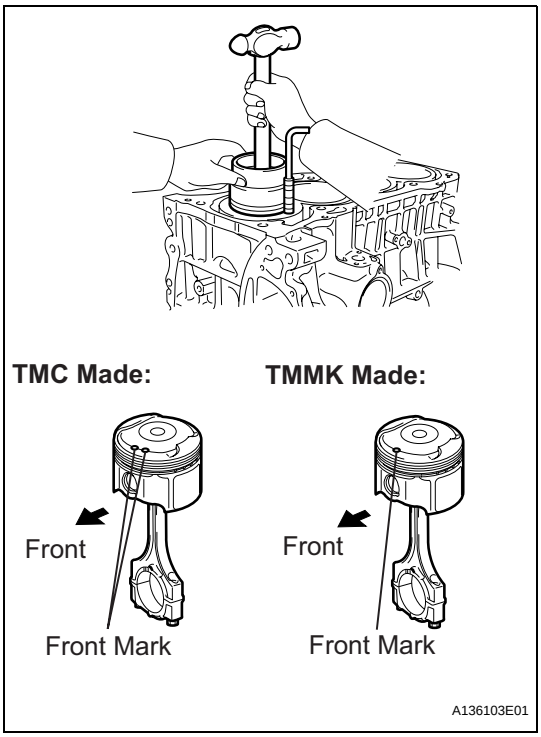
12. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD

NOTICE:
The connecting rod cap bolts are tightened in 2 progressive steps.

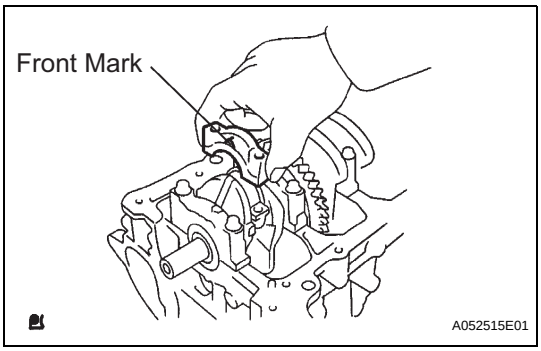
(a) Apply engine oil to the cylinder walls, the pistons, and the surfaces of connecting rod bearings.

(b) Check the position of the piston ring ends.

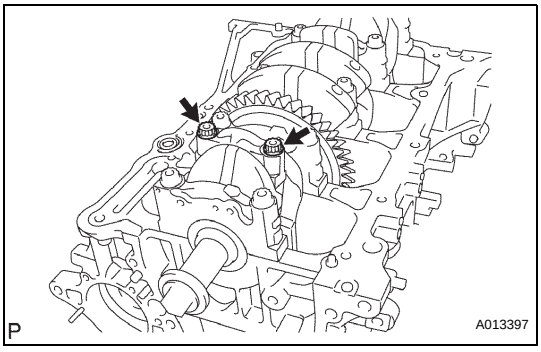
EM



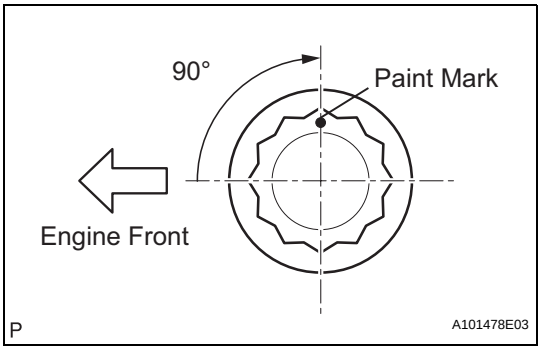
(c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.
NOTICE:
Match the numbered connecting rod cap with the connecting rod.



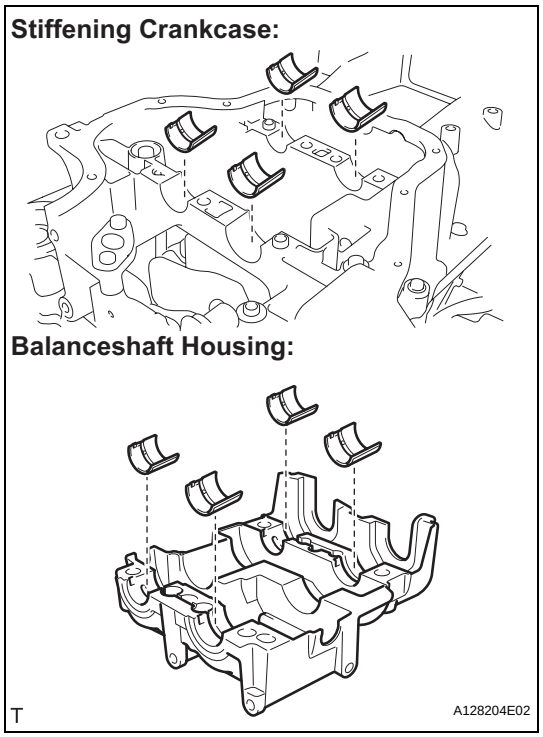
(d) Check that the protrusion of the connecting rod cap is facing in the correct direction.
(e) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.
(f) Install the connecting cap bolts.
NOTICE:
The connecting cap bolts should be tightened in 2 progressive steps.



(g) Step 1
(1) Install and alternately tighten the bolts of the connecting rod cap in several steps.
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)



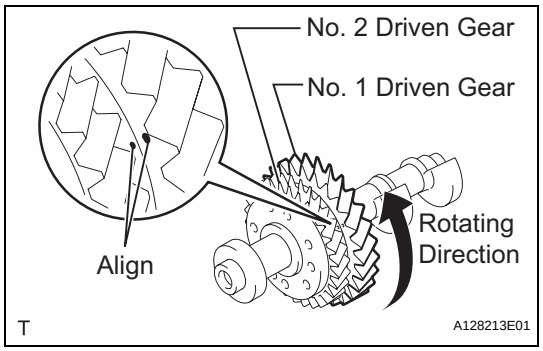
(h) Step 2
(1) Mark the front of the connecting rod cap bolts with paint.
(2) Retighten the cap bolts by 90°as shown in the illustration.
(i) Check that the crankshaft turns smoothly.
(j) Check the connecting rod thrust clearance (See page EM-140).



13. INSTALL NO. 1 BALANCESHAFT BEARING

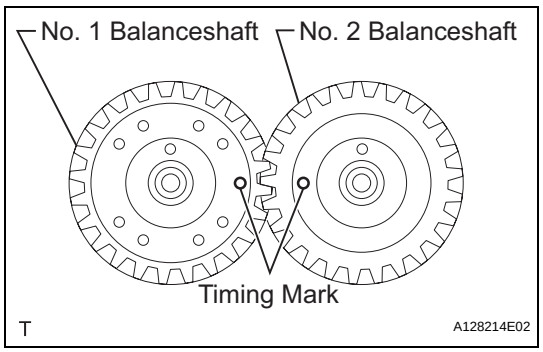
(a) Install the bearings in the crankcase and balanceshaft housing.
NOTICE:
Do not apply engine oil to the bearings and the contact surfaces.

(b) Apply a light coat of engine oil to the bearings.

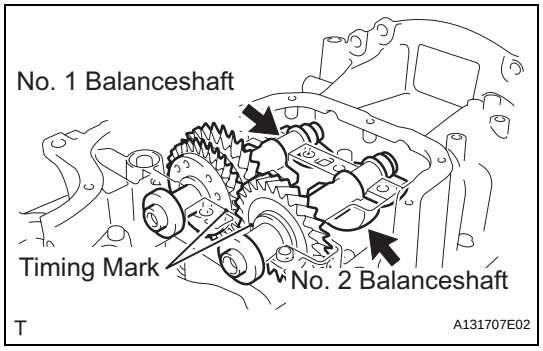


14. INSTALL NO. 1 AND NO. 2 BALANCESHAFT SUB-ASSEMBLY

(a) Rotate the driven gear No. 1 of balanceshaft No. 1 in the rotating direction until it hits the stopper.
NOTICE:
Confirm that the matchmarks on driven gears No. 1 and No. 2 are matched.



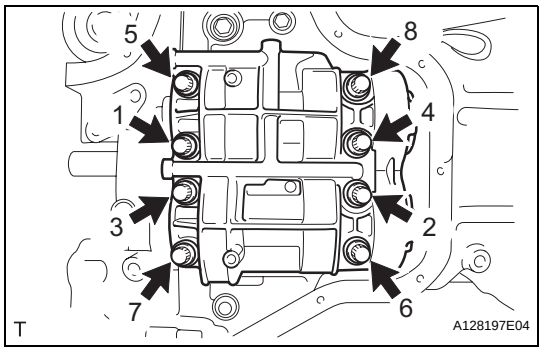
(b) Align the timing marks of the No. 1 and No. 2 balanceshafts as shown in the illustration.



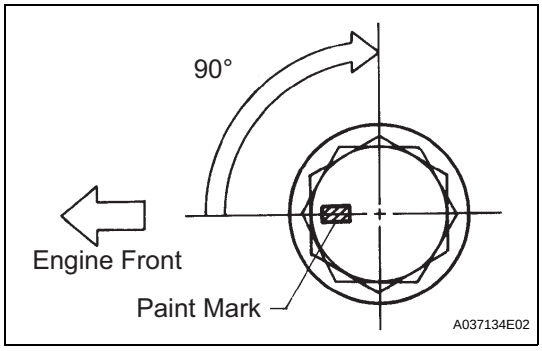
(c) Place the No. 1 and No. 2 balanceshafts on the crankcase.

(d) Apply a light coat of engine oil under the heads of the balanceshaft housing bolts.

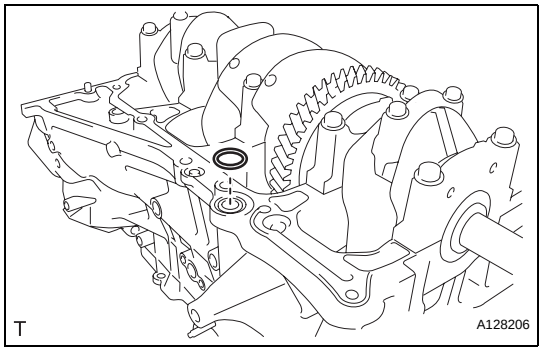
(e) Install the balanceshaft housing bolts.
NOTICE:
The balance shaft housing bolts are tightened in 2 progressive steps.



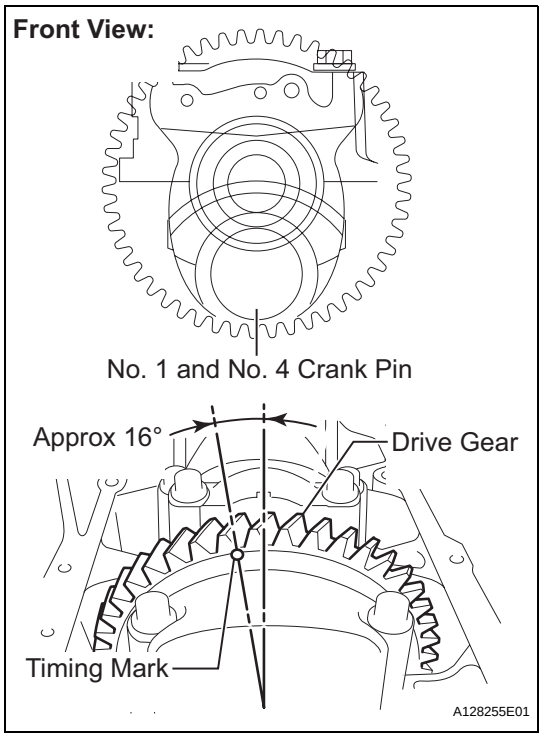
(f) Step 1
(1) Install and uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)



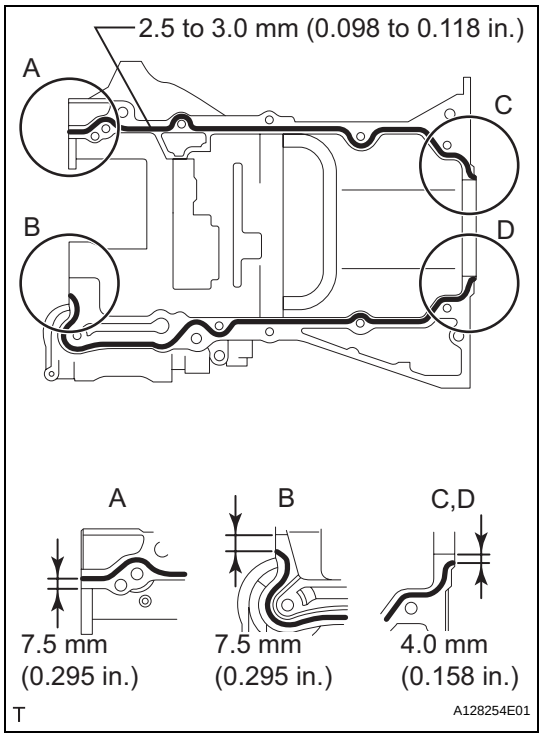
(g) Step 2
(1) Mark the front side of each balanceshaft housing bolt head with paint.
(2) Retighten the bolts by 90°as shown in the illustration.
(3) Check that the paint marks are now at a 90°angle to the front.



15. INSTALL STIFFENING CRANKCASE ASSEMBLY
(a) Place a new O-ring on the cylinder block, as shown in the illustration.
(b) Temporarily tighten the pulley set bolt.



(c) Turn the crankshaft to set the crank pins of the No. 1 and No. 4 cylinders to the bottom.
HINT:
Make sure that the timing mark on the balanceshaft drive gear is positioned as shown in the illustration.



(d) Apply seal packing in a continuous bead (diameter: 2.5 to 3.0 mm (0.098 to 0.118 in.)) to the places shown in the illustration.

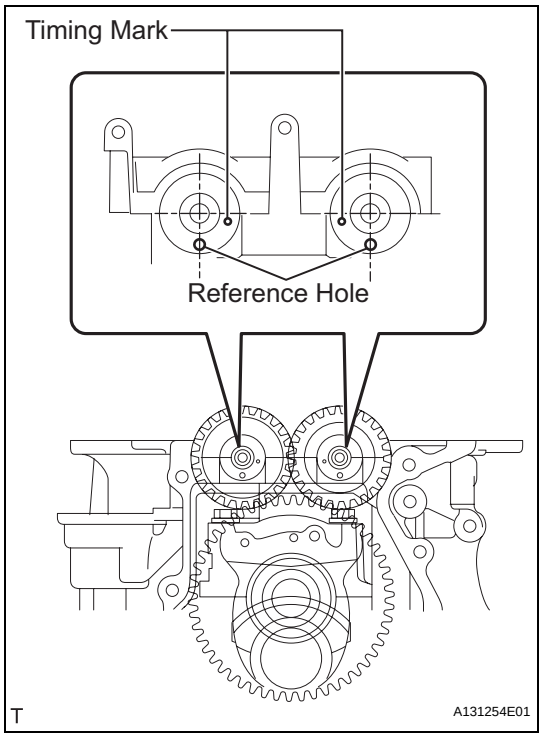
Seal packing:

Toyota Genuine Seal Packing Black, Three bond 1207B or Equivalent

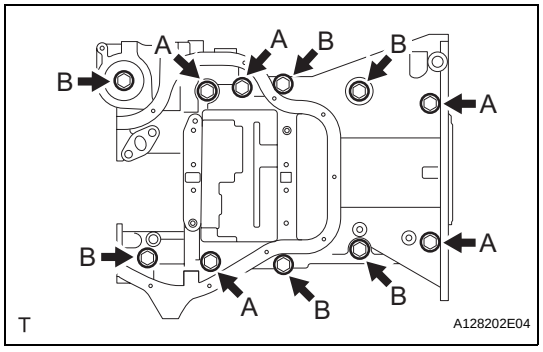
NOTICE:

- **Remove any oil from the contact surface.**
- **Install the crankcase within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing the crankcase stiffener.**

EM



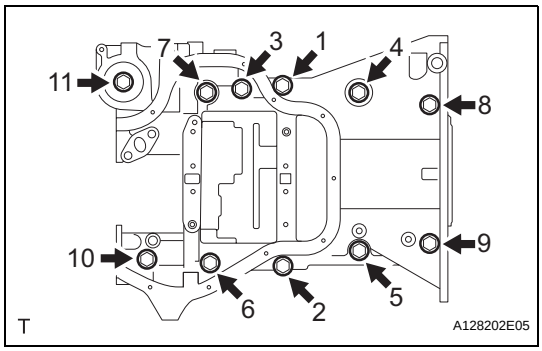
(e) Install the stiffening crankcase so that the reference holes on the balanceshafts are positioned as shown in the illustration.



(f) Temporarily install the crankcase with the 11 bolts.

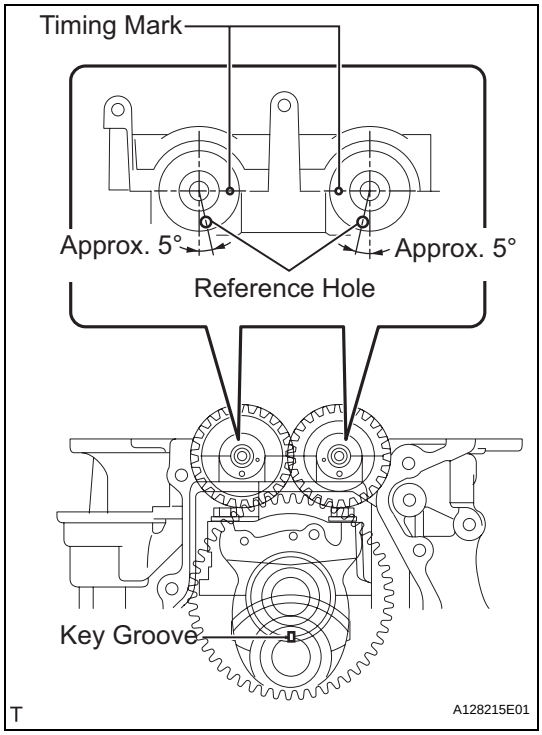
Bolt length

Item	Length
Bolt A	122 mm (4.803 in.)
Bolt B	45 mm (1.772 in.)



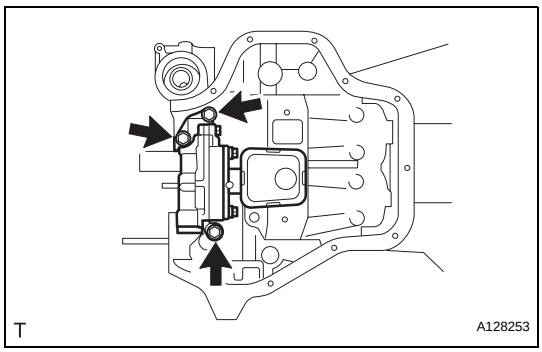
(g) Uniformly tighten the 11 bolts in the sequence shown in the illustration.
Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)

(h) Wipe off the excess seal packing with a clean piece of cloth.



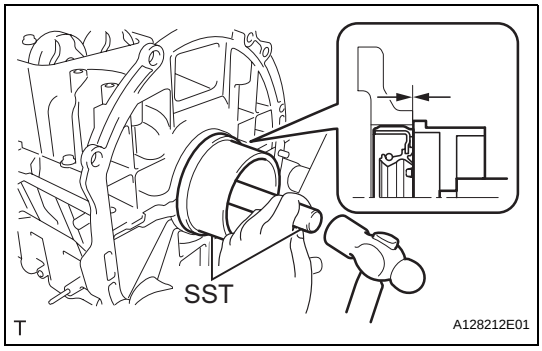
(i) Turn the crankshaft again to set the key groove to the bottom. Make sure that the timing marks are aligned as shown in the illustration.
HINT:
An 'O' is stamped as a timing mark.

(j) Remove the pulley set bolt.



16. INSTALL OIL PUMP ASSEMBLY

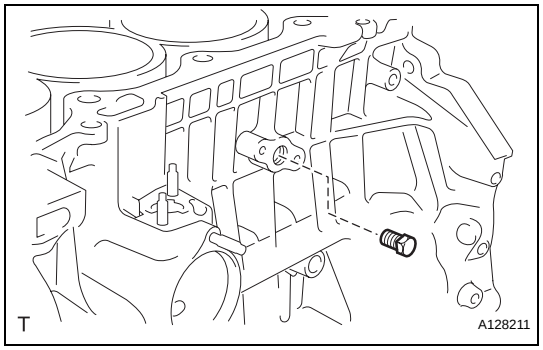
(a) Install a new gasket and oil pump with the 3 bolts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



17. INSTALL ENGINE REAR OIL SEAL

(a) Using SST and a hammer, evenly tap the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-15030, 09950-70010 (09951-07100)
NOTICE:
Keep the lip free from foreign materials.

(b) Apply MP grease to a new oil seal lip.
NOTICE:
Wipe off extra grease on the crankshaft.

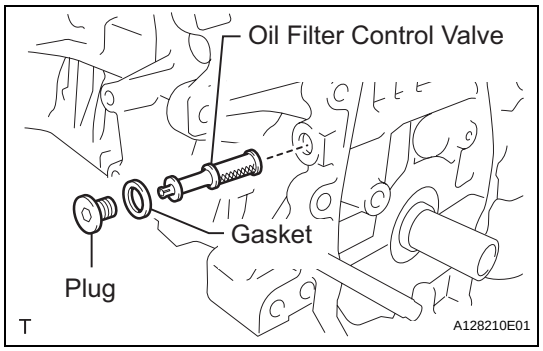


18. INSTALL NO. 1 TAPER SCREW PLUG (w/o Oil Cooler)

(a) Apply adhesive to 2 or 3 threads of the plug, and install the plug.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent

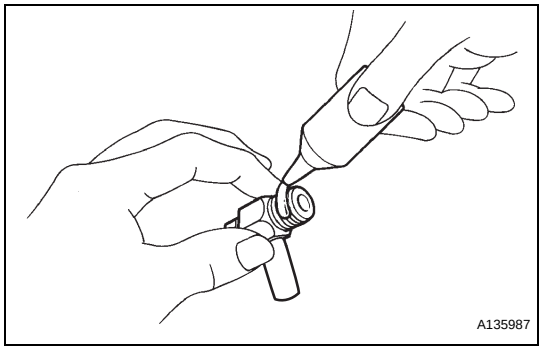
19. INSTALL OIL CONTROL VALVE FILTER

(a) Check that no foreign matter is on the mesh part of the filter.



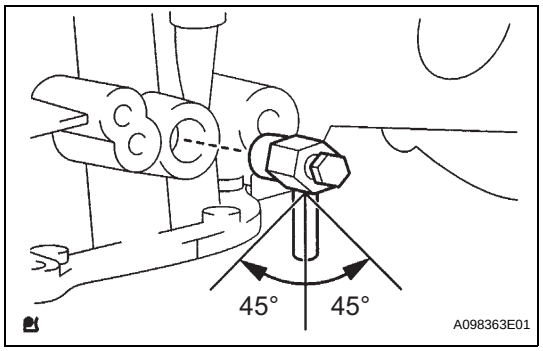
(b) Using an 8 mm socket hexagon wrench, install a new gasket and the oil control valve filter with the screw plug.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
NOTICE:
Do not touch the mesh when installing the oil control valve filter.

EM



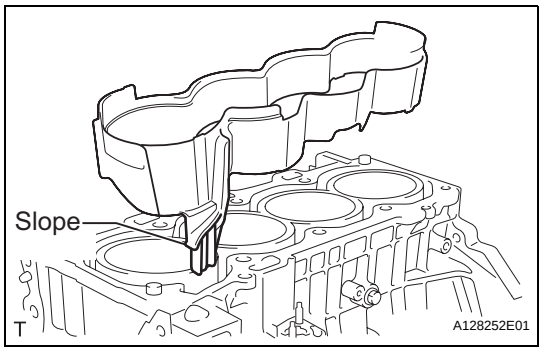
20. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY (w/o Oil Cooler)

(a) Apply adhesive around the drain cock.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent



(b) Install the water drain cock within the range shown in the illustration.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
NOTICE:
Do not rotate the drain cocks more than 1 revolution (360°) after tightening the drain cocks to the specified torque.

(c) Install the water drain cock plugs to the water drain cocks.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

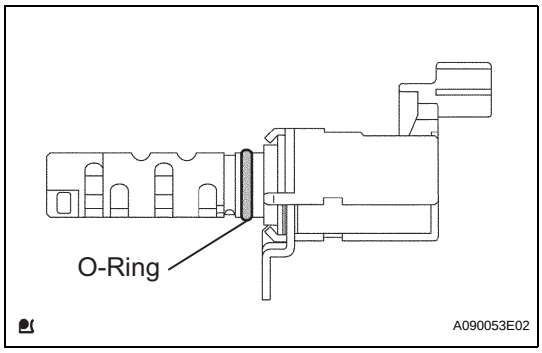


21. **INSTALL CYLINDER BLOCK WATER JACKET SPACER**
    (a) Install the water jacket spacer as shown in the illustration.
    HINT:
    Be sure to face the slope to the front of the engine.

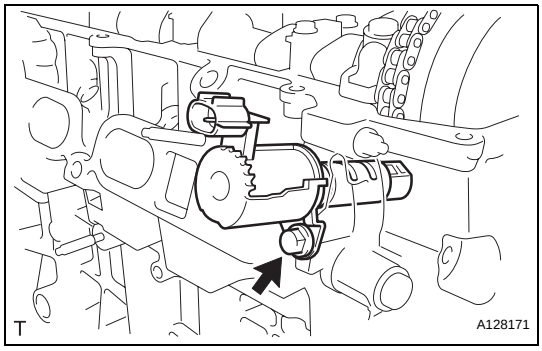
22. **INSTALL CYLINDER HEAD GASKET (See page EM-70)**

23. **INSTALL CYLINDER HEAD SUB-ASSEMBLY (See page EM-70)**

24. **INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**
    (a) Apply a light coat of engine oil to a new O-ring, then install it onto the camshaft timing oil control valve.

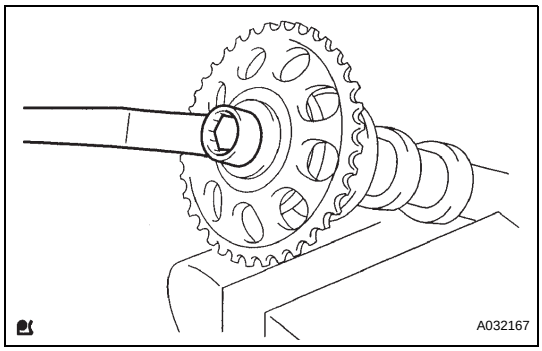


EM

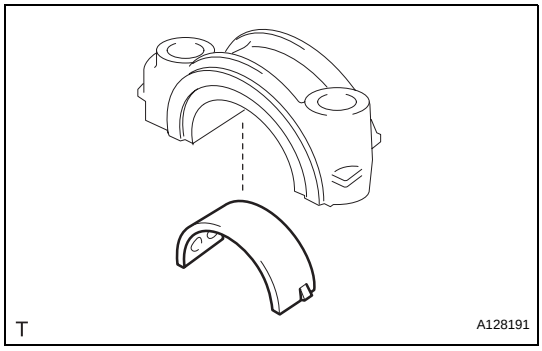


    (b) Install the camshaft timing oil control valve with the bolt.
    Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

25. **INSTALL CAMSHAFT TIMING GEAR ASSEMBLY (See page EM-42)**



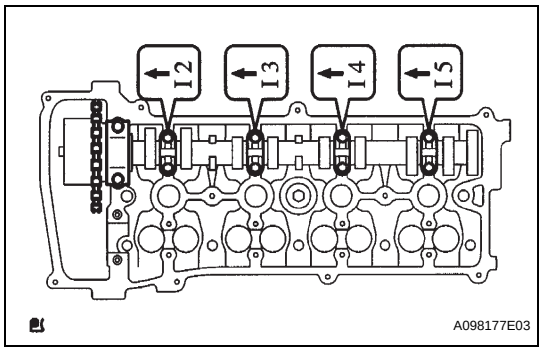
26. **INSTALL CAMSHAFT TIMING SPROCKET**
    (a) Clamp the camshaft in a vise.
    (b) Tighten the flange bolt with the camshaft timing sprocket fixed.
    Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)



27. **INSTALL NO. 1 CAMSHAFT BEARING**
    (a) Install the No. 1 camshaft bearing.

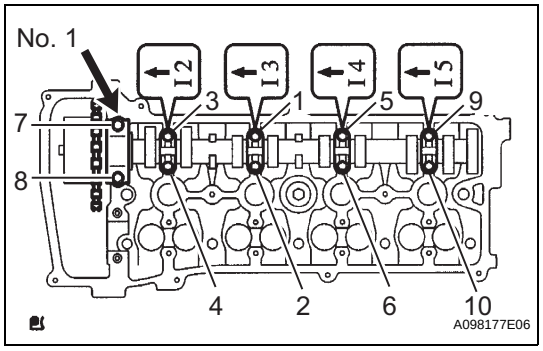
28. **INSTALL NO. 2 CAMSHAFT BEARING (See page EM-71)**

29. **INSTALL CAMSHAFT**
    (a) Apply a light coat of engine oil to the journal portion of the camshaft.



(b) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.

(c) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



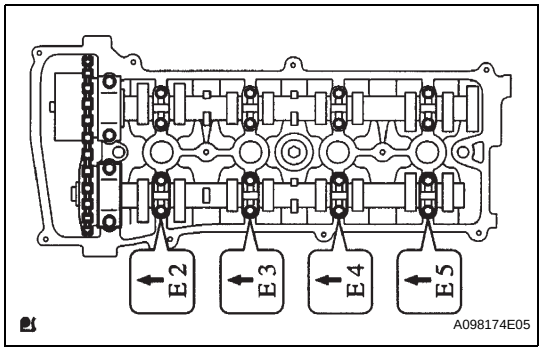
(d) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

Torque: No. 1 Bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 Bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)

EM

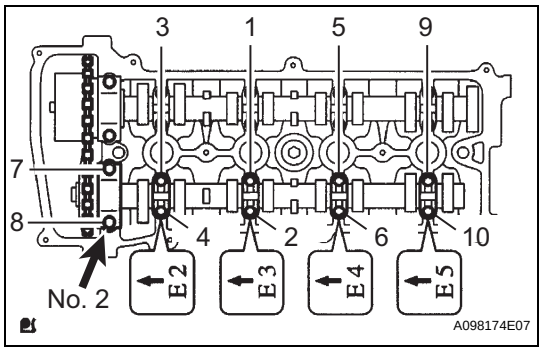
30. INSTALL NO. 2 CAMSHAFT

(a) Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.



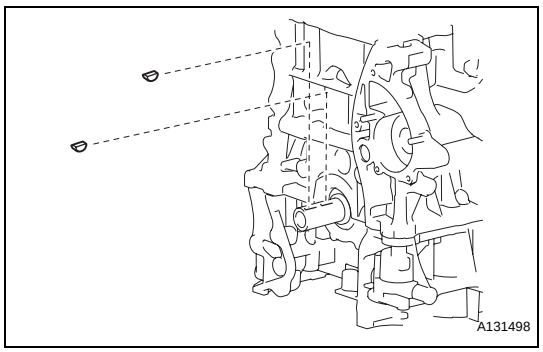
(b) Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

(c) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



(d) Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

Torque: No. 1 Bearing cap
30 N*m (301 kgf*cm, 22 ft.*lbf)
No. 3 Bearing cap
9.0 N*m (92 kgf*cm, 80 in.*lbf)



31. INSTALL KEYS

(a) Install the 2 keys.

32. INSTALL NO. 2 CHAIN SUB-ASSEMBLY (See page EM-27)

33. INSTALL CRANKSHAFT TIMING SPROCKET (See page EM-28)

34. INSTALL NO. 1 CHAIN VIBRATION DAMPER (See page EM-28)

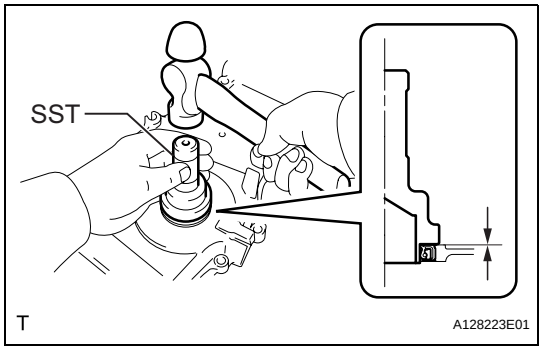
35. INSTALL CHAIN SUB-ASSEMBLY (See page EM-28)

36. **INSTALL CHAIN TENSIONER SLIPPER (See page EM-29)**

37. **INSTALL TIMING CHAIN GUIDE (See page EM-30)**

38. **INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-30)**

39. **INSTALL TIMING CHAIN CASE OIL SEAL**
    (a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.
    SST 09223-22010
    (b) Apply a light coat of MP grease to the lip of the oil seal.
    NOTICE:
    Keep the gap between the timing chain cover edge and the oil seal free of foreign matter.



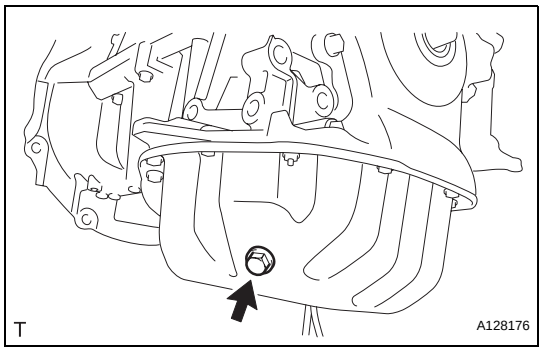
EM

40. **INSTALL TIMING CHAIN COVER SUB-ASSEMBLY (See page LU-15)**

41. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-30)**

42. **INSTALL OIL PAN SUB-ASSEMBLY (See page EM-31)**

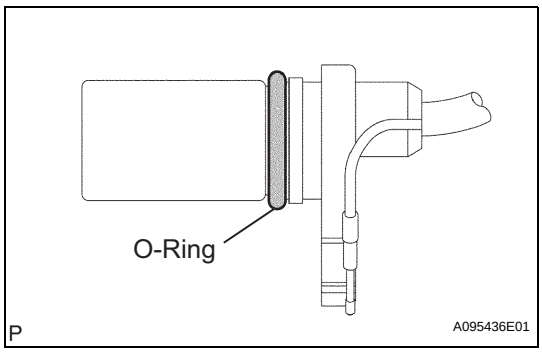
43. **INSTALL OIL PAN DRAIN PLUG**
    (a) Install a new gasket and oil pan drain plug with a new gasket.
    Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)



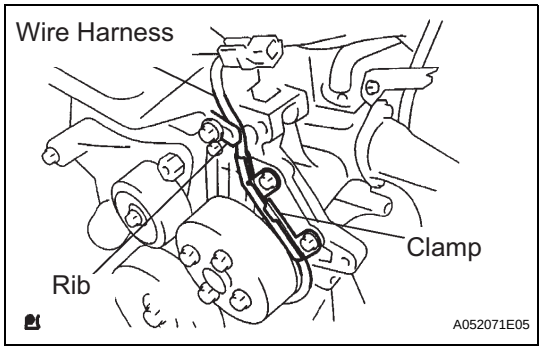
44. **INSTALL WATER PUMP ASSEMBLY (See page CO-10)**

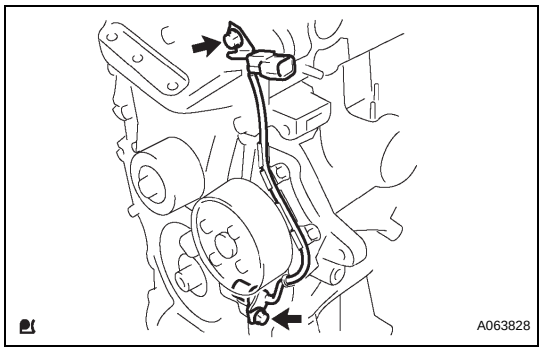
45. **INSTALL WATER PUMP PULLEY (See page CO-11)**

46. **INSTALL CRANKSHAFT POSITION SENSOR**
    (a) Apply a light coat of engine oil to the O-ring of the sensor.

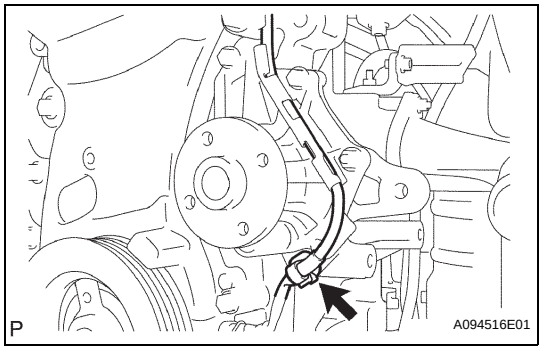


    (b) Confirm that the wire harness of the sensor is placed as shown in the illustration.





(c) Install the sensor with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



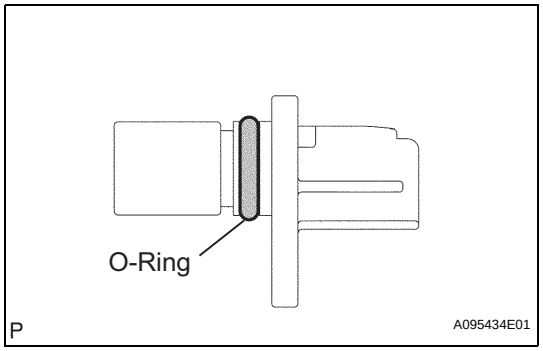
(d) Install the clamp of the crankshaft position sensor onto the water pump.

47. INSTALL CRANKSHAFT PULLEY (See page EM-76)

48. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-32)

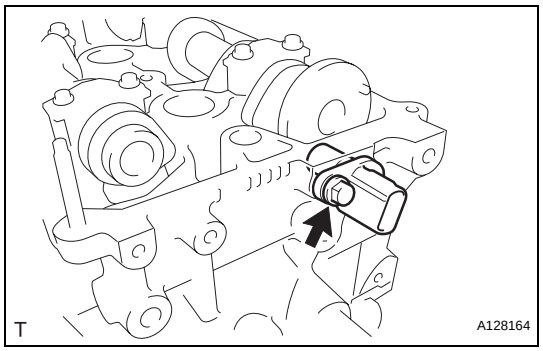
49. INSPECT VALVE CLEARANCE (See page EM-8)

50. ADJUST VALVE CLEARANCE (See page EM-9)

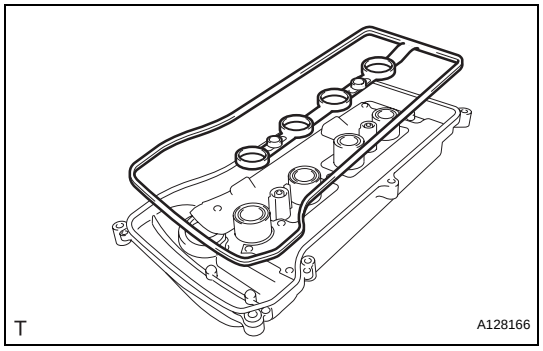


51. INSTALL CAMSHAFT POSITION SENSOR

(a) Apply a light coat of engine oil to the O-ring of the sensor.



(b) Install the sensor with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

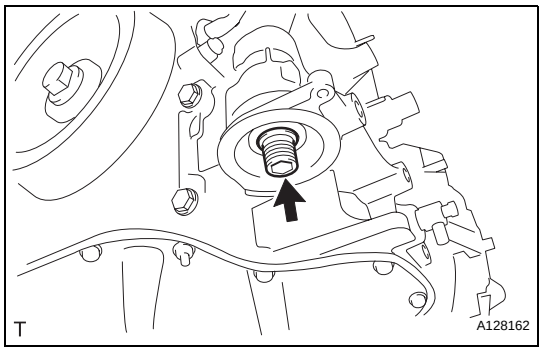


52. INSTALL CYLINDER HEAD COVER GASKET

(a) Install the gasket to the cylinder head cover.
NOTICE:
Remove any oil from the contact surface.

53. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-33)

EM

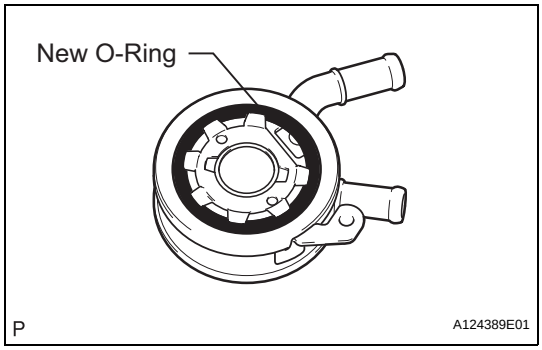


54. INSTALL OIL FILTER UNION (w/o Oil Cooler)

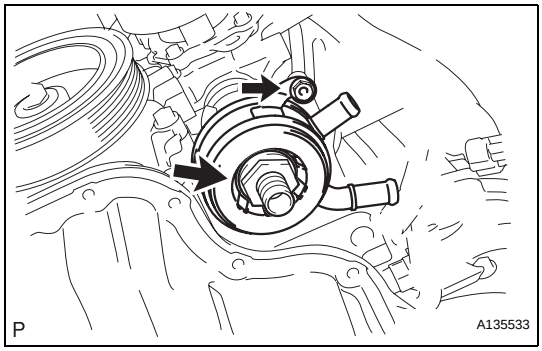
(a) Using a 12 mm hexagon wrench, install the oil filter union.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

55. INSTALL OIL COOLER ASSEMBLY (w/ Oil Cooler)

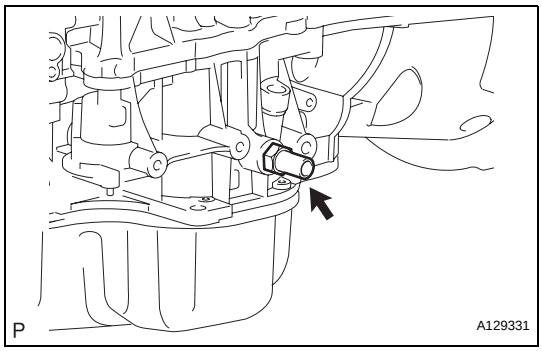
(a) Clean the oil cooler contact surface on the cooler mounting.



(b) Install a new O-ring to the oil cooler.
(c) Apply a light coat of engine oil to the threads and under the head of the union bolt.



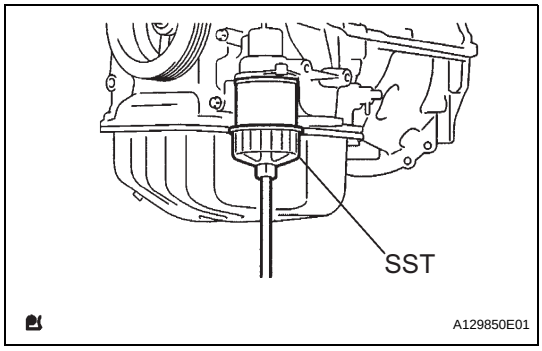
(d) Install the oil cooler with the plate washer, oil filter union and nut.
Torque: Oil Filter Union
79 N*m (806 kgf*cm, 58 ft.*lbf)
Nut
9.0 N*m (92 kgf*cm, 80 in.*lbf)
(e) Apply adhesive to the threads of the oil filter union.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent



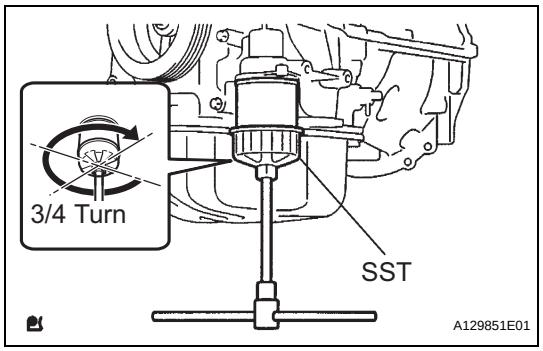
(f) Install the union bolt.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

56. INSTALL OIL FILTER SUB-ASSEMBLY

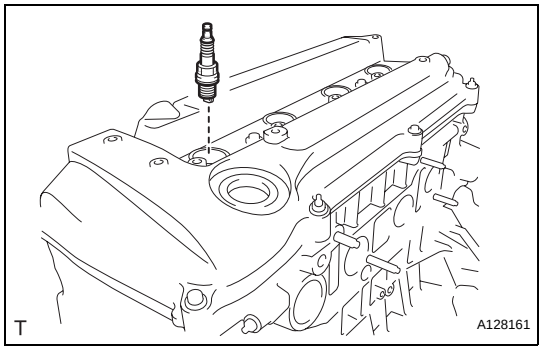
(a) Check and clean the oil filter installation surface.
(b) Apply clean engine oil to the gasket of a new oil filter.
(c) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.



(d) When using a torque wrench:
(1) Using SST, tighten the oil filter.
SST 09228-06501
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

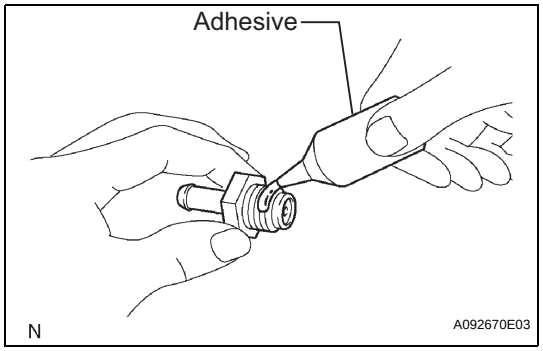


(e) When not using a torque wrench:
(1) Using SST, tighten it an additional 3/4 turn.
SST 09228-06501



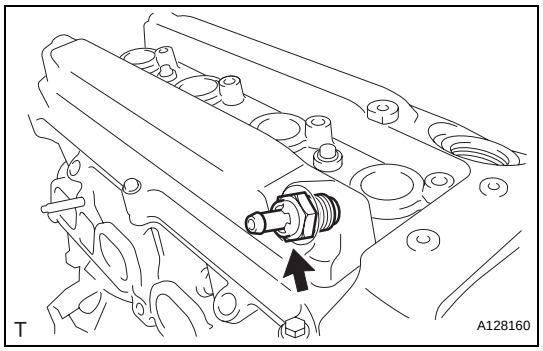
57. INSTALL SPARK PLUG

(a) Install the spark plugs.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

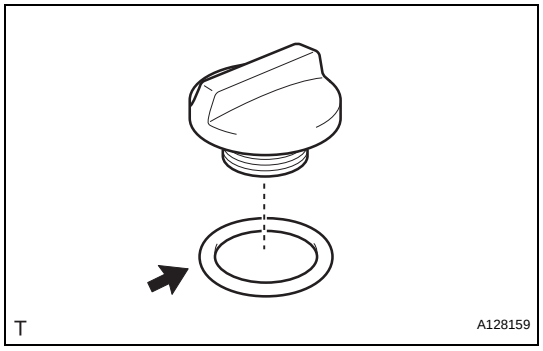


58. INSTALL VENTILATION VALVE SUB-ASSEMBLY

(a) Apply adhesive to the threads of the ventilation valve.

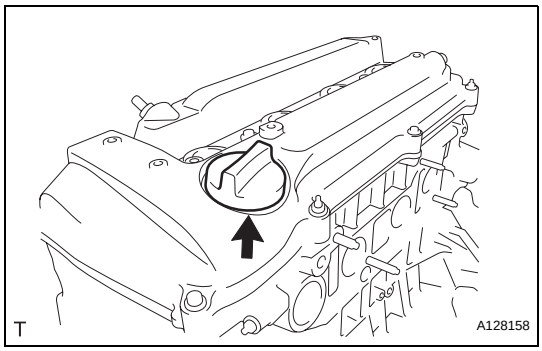


(b) Install the ventilation valve.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent



59. INSTALL OIL FILLER CAP GASKET

(a) Install a new gasket to the cap.

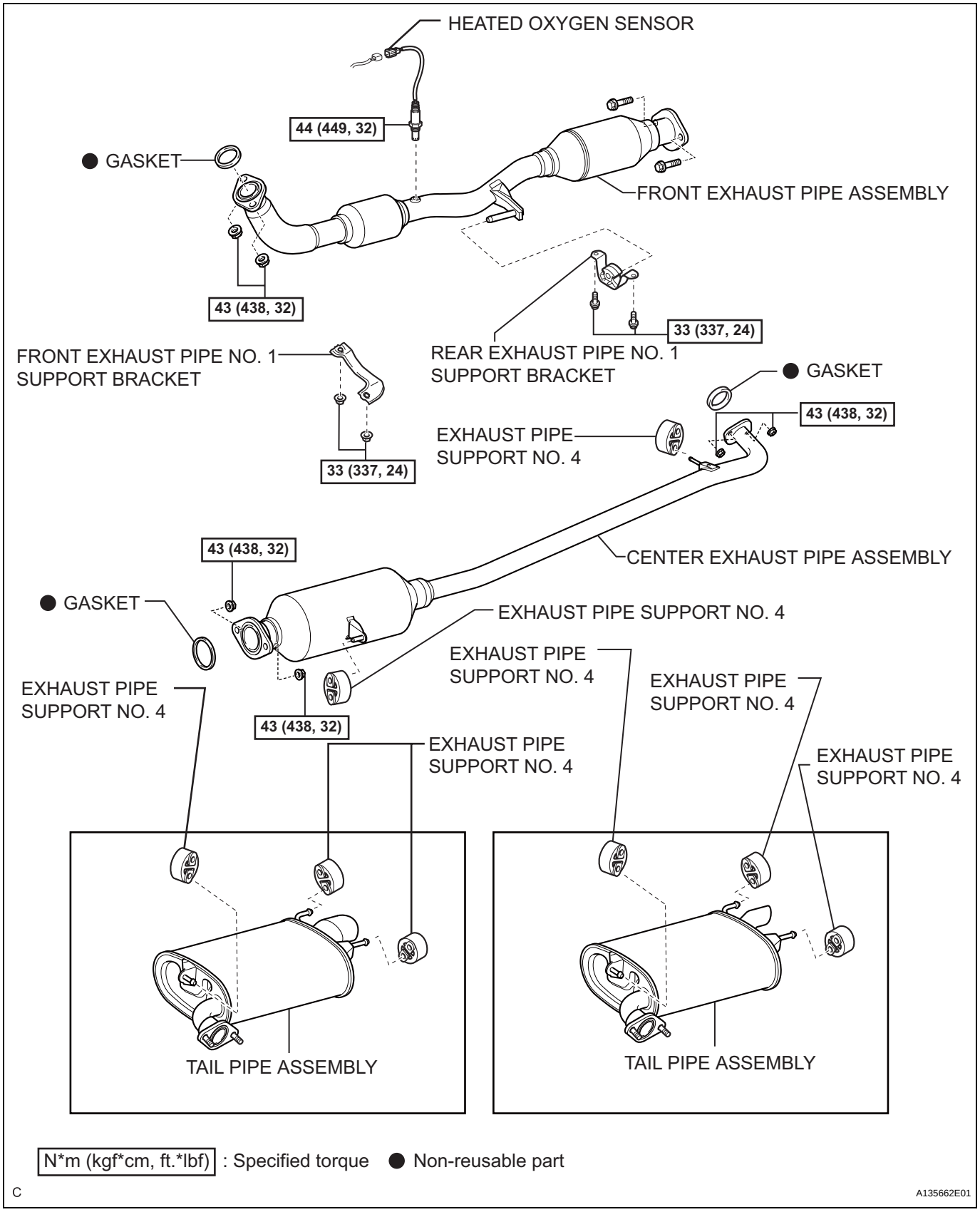


60. INSTALL OIL FILLER CAP SUB-ASSEMBLY

(a) Install the oil filler cap.

EXHAUST PIPE

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

C

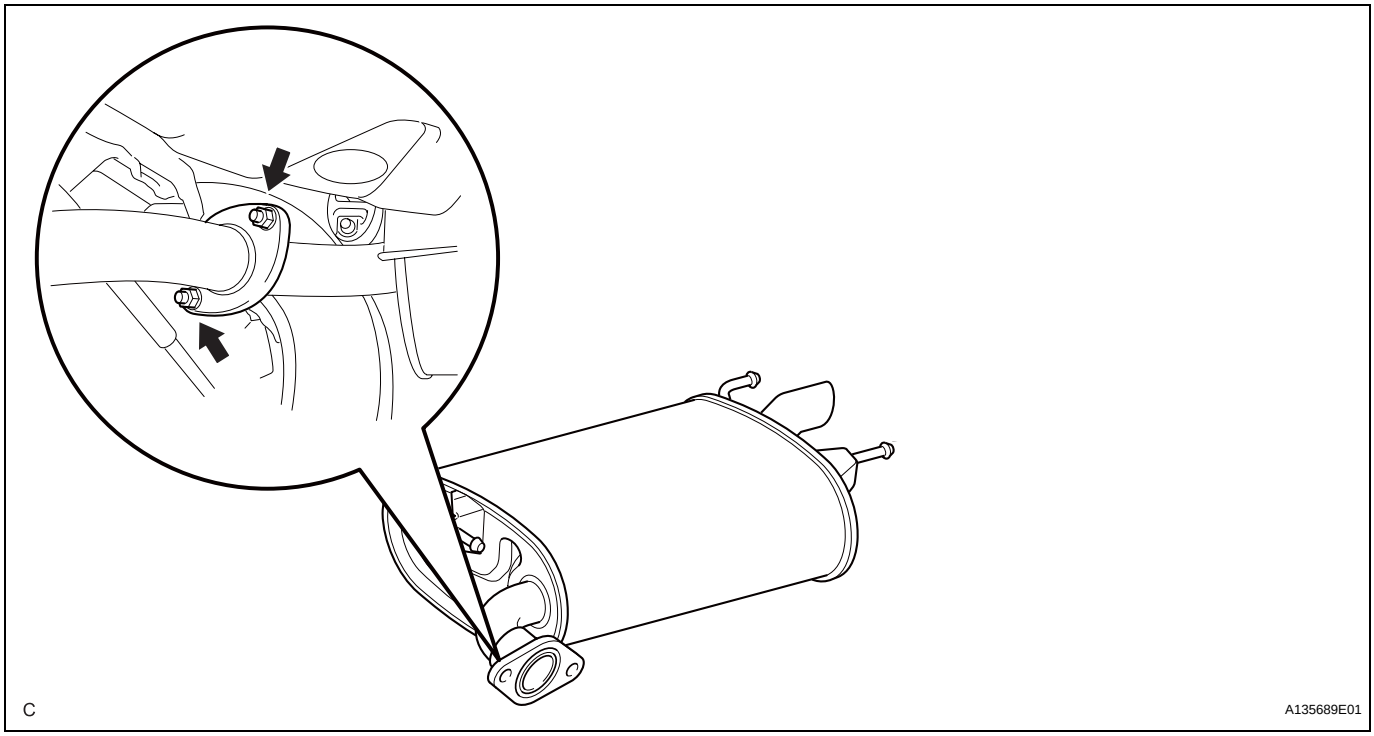
A135662E01

EX

REMOVAL

1. REMOVE TAIL PIPE ASSEMBLY

(a) Remove the 2 nuts and tail pipe assembly.

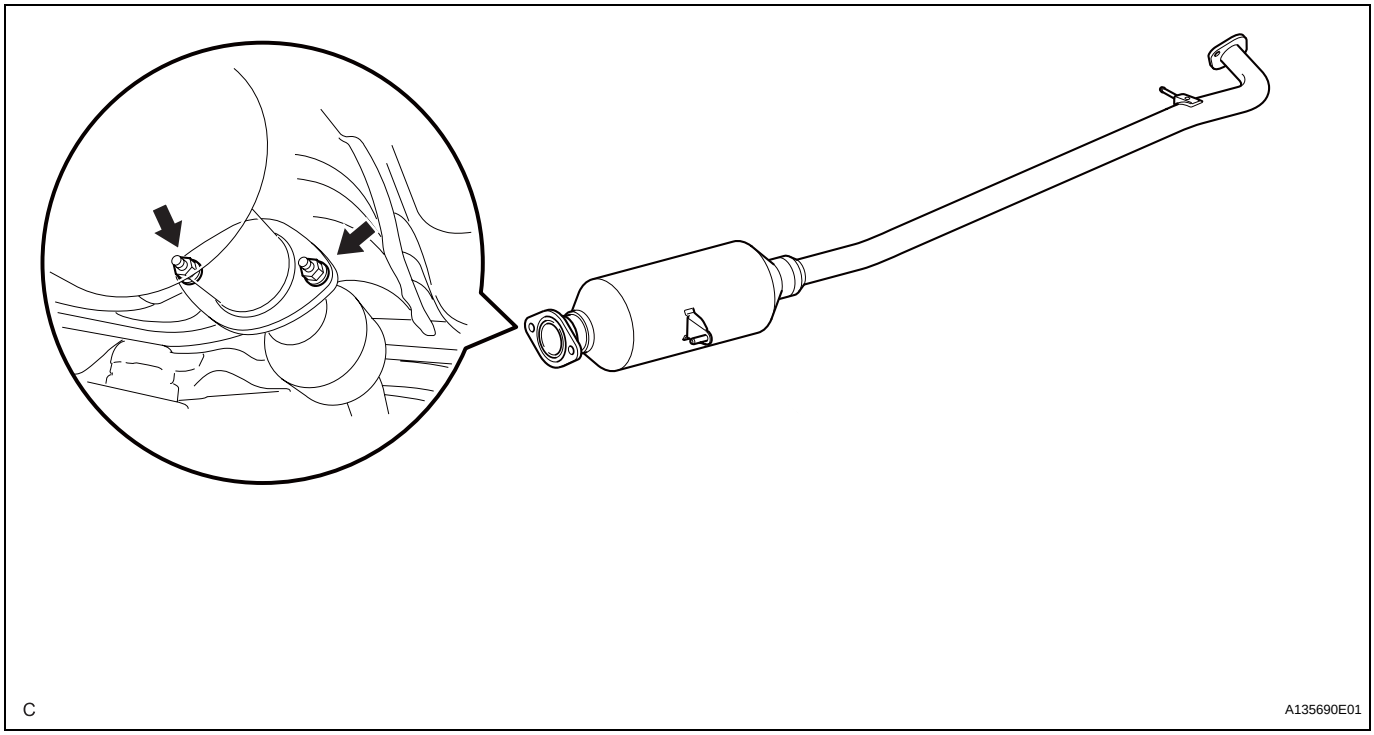


(b) Remove the gasket from the center exhaust pipe.

2. REMOVE CENTER EXHAUST PIPE ASSEMBLY

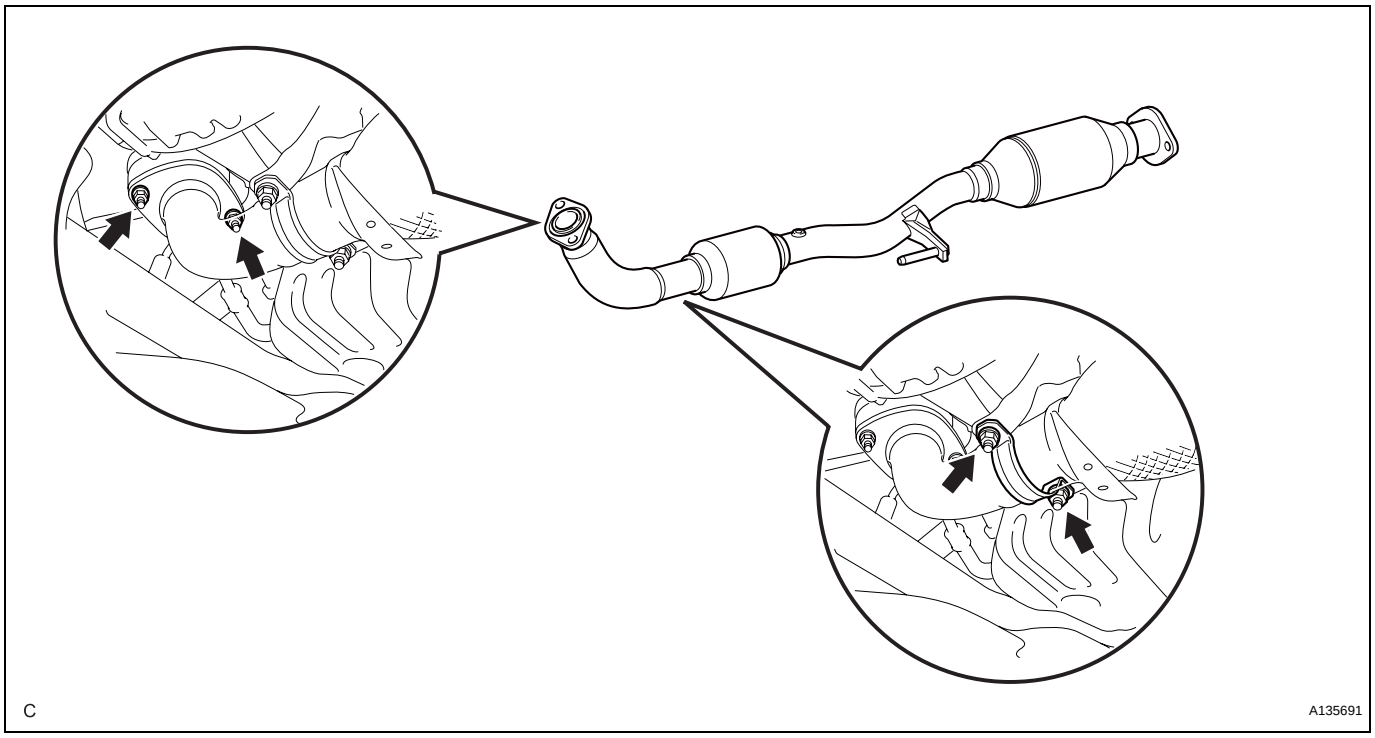
(a) Remove the 2 bolts, 2 nuts and center exhaust pipe assembly.

EX



(b) Remove the gasket from the front exhaust pipe.

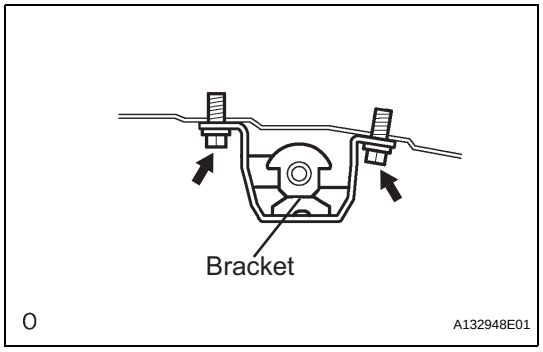
3. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
   (a) Remove the 2 nuts.



   (b) Remove the 2 nuts, front exhaust pipe No. 1 support bracket and front exhaust pipe assembly.
   (c) Remove the gasket from the exhaust manifold.

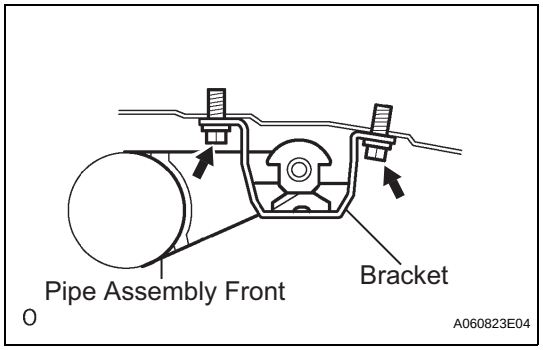
4. **REMOVE HEATED OXYGEN SENSOR (See page EC-24)**

5. **REMOVE REAR EXHAUST PIPE NO. 1 SUPPORT BRACKET**
   (a) Remove the 2 bolts and rear support bracket.



INSTALLATION

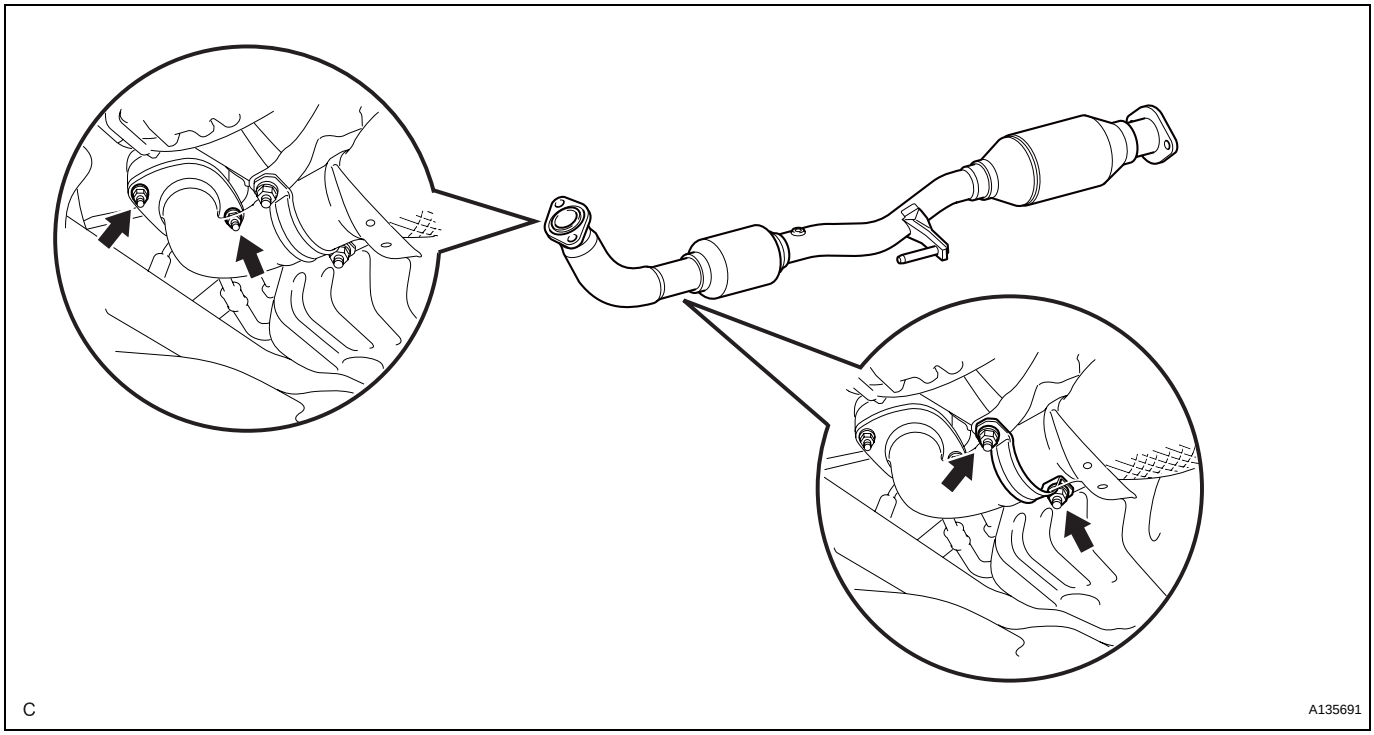
1. **INSTALL REAR EXHAUST PIPE NO. 1 SUPPORT BRACKET**
   (a) Install the rear support bracket with the 2 bolts.
   Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)
   NOTICE:
   Be sure to install the bracket in the correct direction.



2. **INSTALL HEATED OXYGEN SENSOR (See page EC-24)**

3. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
   (a) Install a new gasket onto the front exhaust pipe assembly.

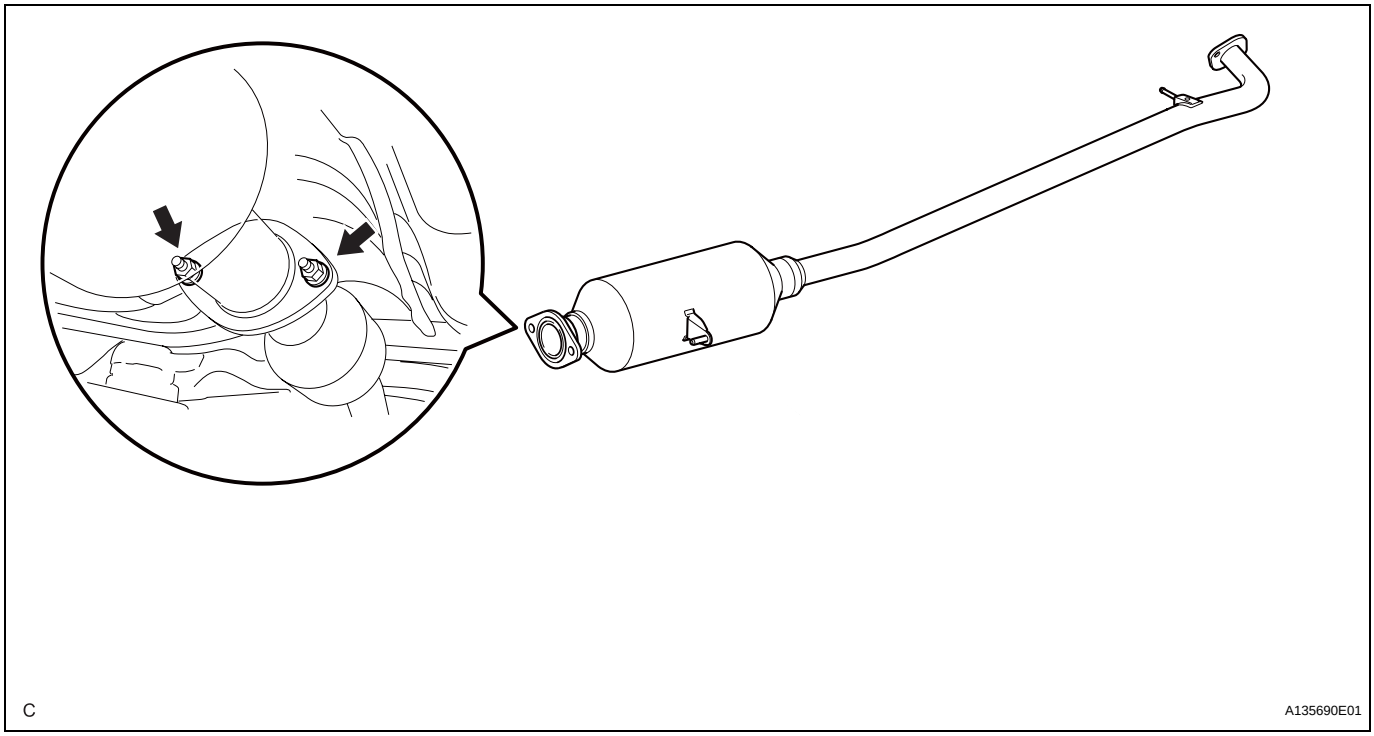
(b) Install the front exhaust pipe assembly with the 2 nuts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



(c) Install the front exhaust pipe No. 1 support bracket with the 2 nuts .
Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)

4. INSTALL CENTER EXHAUST PIPE ASSEMBLY

(a) Install a new gasket onto the front exhaust pipe.
(b) Install the center exhaust pipe assembly with the 2 bolts and 2 nuts.

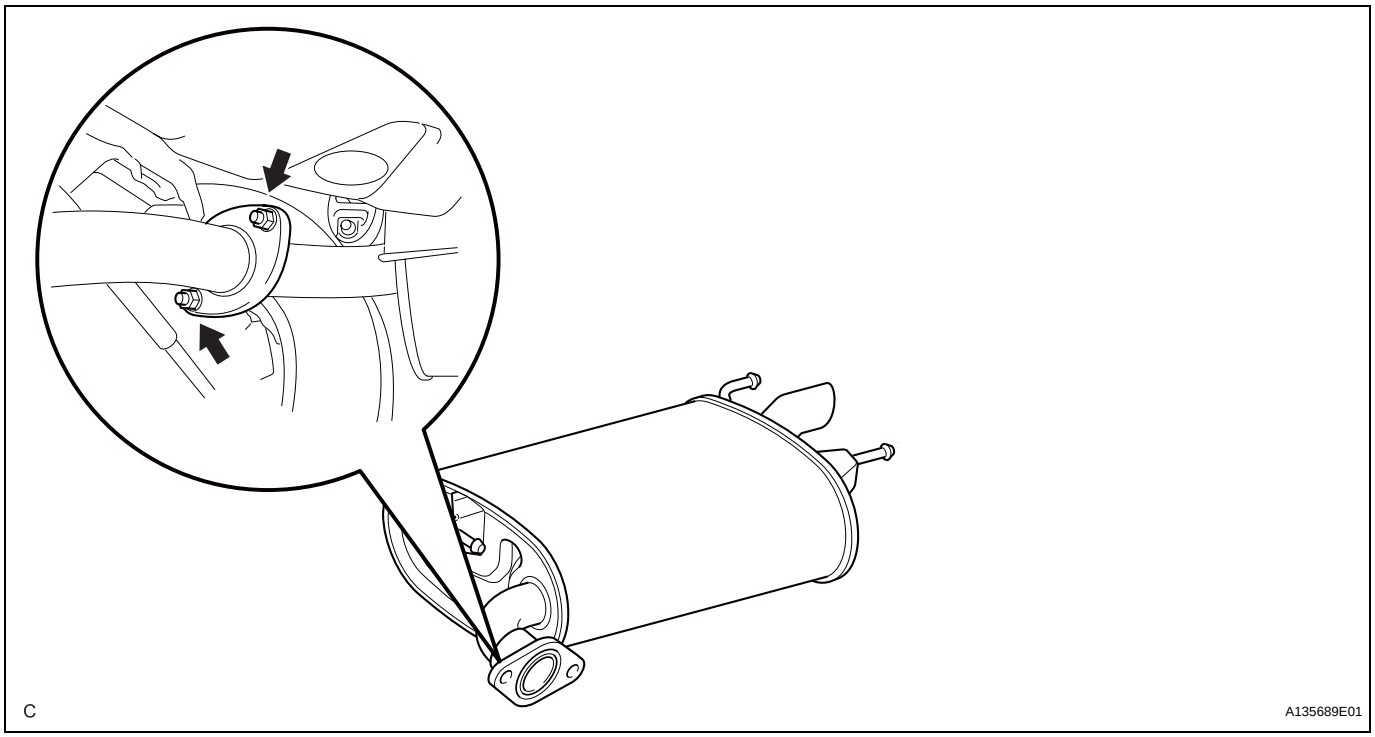


Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

5. INSTALL TAIL PIPE ASSEMBLY

(a) Install a new gasket onto the tail pipe assembly.

(b) Install the tail pipe assembly with the 2 nuts.



Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

6. CHECK FOR EXHAUST GAS LEAKS

If gas is leaking, tighten the areas necessary to stop the leak. Replace the damaged parts as necessary.

FUEL SYSTEM

PRECAUTION

1. PRECAUTION

(a) Before inspecting and repairing the fuel system, disconnect the negative (-) battery terminal.

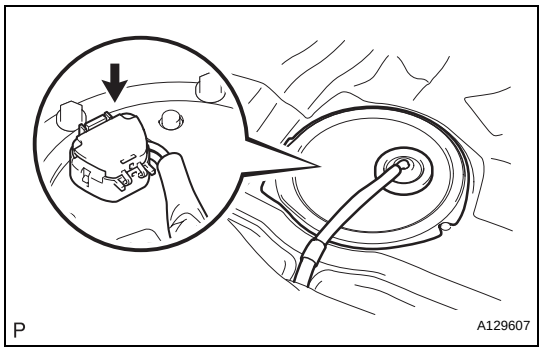
(b) Do not smoke or work near fire when handling the fuel system.

(c) Keep gasoline away from rubber or leather parts.

2. DISCHARGE FUEL SYSTEM PRESSURE

CAUTION:

- **Perform the following procedures to prevent fuel from spilling out before removing any fuel system parts.**
- **Pressure will still remain in the fuel line even after performing the following procedures. When disconnecting the fuel line, cover it with a shop rag or a piece of cloth to prevent fuel from spraying or coming out.**



(a) Disconnect the fuel pump connector.

(1) Remove the rear seat cushion assembly.

(2) Remove the rear floor service hole cover.

(3) Disconnect the fuel pump connector.

(4) Start the engine.

(5) After the engine stops, turn the ignition switch off.

HINT:

DTC P0171/25 (fuel problem) and/or P0191/49 (fuel pressure sensor signal error) may be detected.

(6) Crank the engine again. Check that the engine does not start.

(7) Remove the fuel tank cap to discharge pressure from the fuel tank.

(8) Disconnect the negative (-) battery terminal.

(9) Reconnect the fuel pump connector.

(10) Install the rear floor service hole cover.

(11) Install the rear seat.

3. FUEL SYSTEM

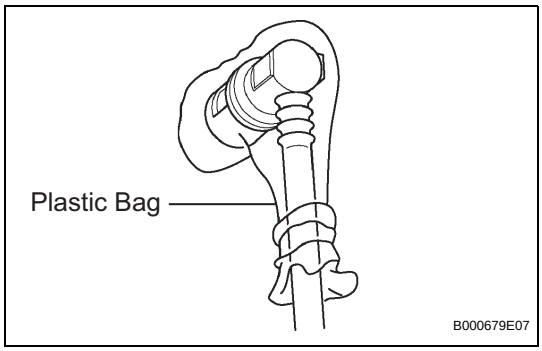
(a) When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe the following procedures:

(1) Discharge the fuel system pressure. (step 2)

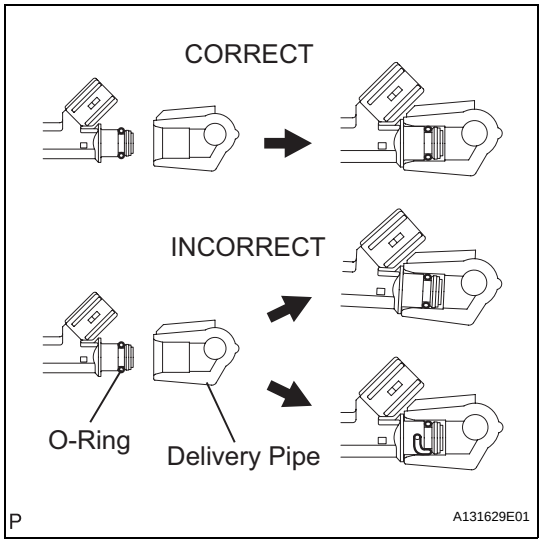
(2) Disconnect the fuel pump tube (See page FU-23).

(3) Drain the fuel that remains inside the fuel pump tube.

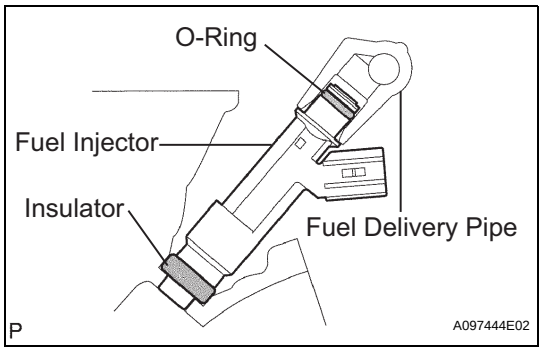
FU



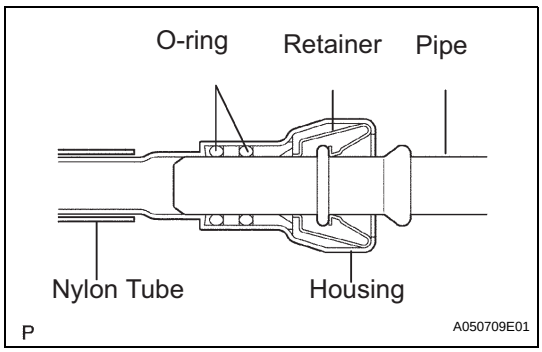
(4) To protect the disconnected fuel pump tube from damage and contamination, cover it with a plastic bag.
(5) Put a container under the connection part.



(b) Observe the following precautions when removing and installing the fuel injectors:
(1) Never reuse an O-ring.
(2) When placing a new O-ring on the injector, do not damage the O-ring.
(3) Coat a new O-ring with gasoline before installing it.
NOTICE:
Do not use engine oil, gear oil or brake fluid.

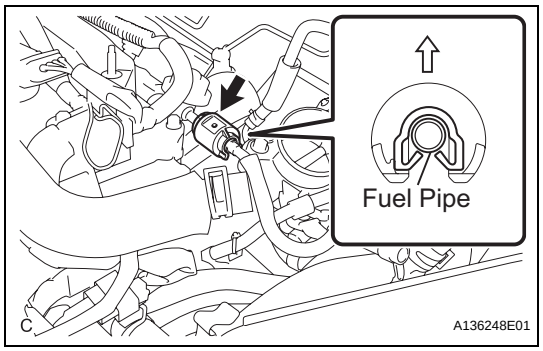


(c) Install the injector to the delivery pipe and cylinder head, as shown in the illustration.
NOTICE:
Before installing the injector, be sure to apply grease or gasoline to the place where the delivery pipe or cylinder head contacts the O-ring of the injector.



(d) Observe the following precautions when disconnecting the fuel delivery pipe (metallic type):
HINT:
The structure of the metallic connector is shown on the left.

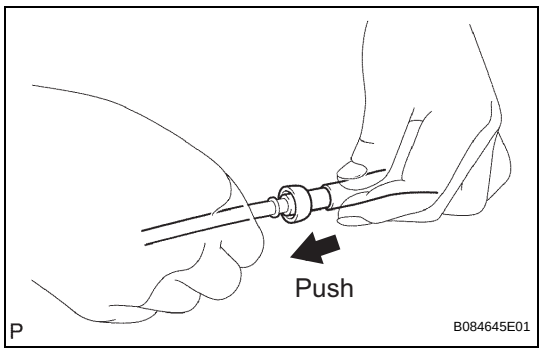
FU



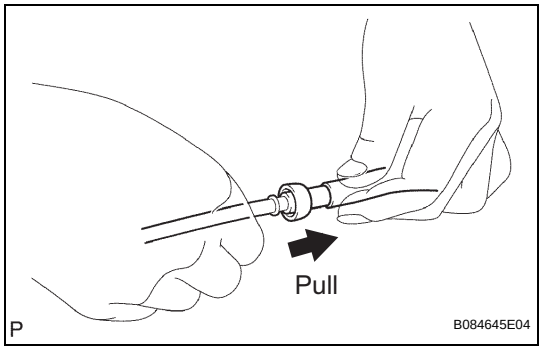
(1) Remove the No. 2 fuel pipe clamp.
HINT:
The No. 2 fuel pipe clamp cannot be reused.

(2) Find the metallic connector of the fuel tube assembly.
(3) Assemble SST to the connection as shown in the illustration.
SST 09268-21010
(4) Turn the SST, align the retainers inside the connector with the SST chamfered parts and insert SST into the connector.
(5) Slide the SST and the connector together towards the fuel tube assembly.

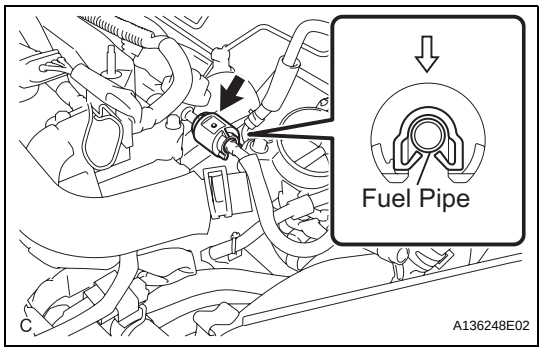
FU



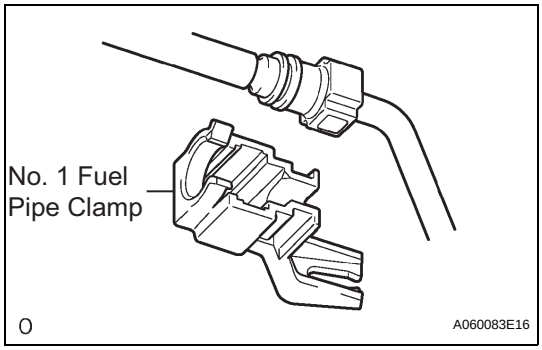
(e) Observe the following precautions when connecting the fuel tube connector (metallic type):
(1) Check if there is any damage or foreign objects on the connecting part of the pipe.
(2) Match the axis of the connector with the axis of the pipe, and push into the connector until the connector makes a "click" sound. If the connection is tight, apply a small amount of fresh engine oil to the tip of the pipe.



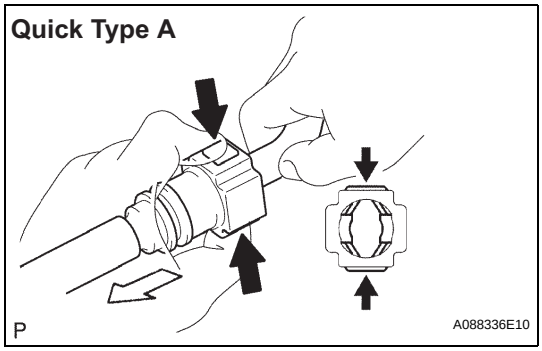
(3) After finishing the connection, check if the pipe and the connector are securely connected by pulling on them.
(4) Check for fuel leaks.



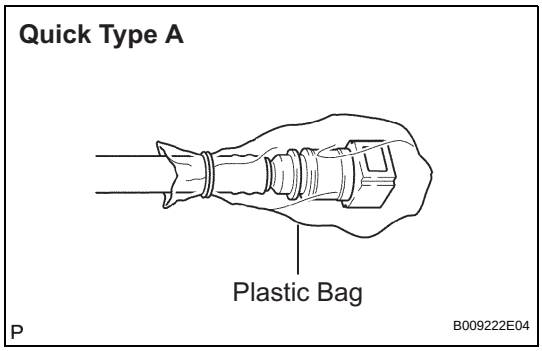
(5) Install a new No. 2 fuel pipe clamp.



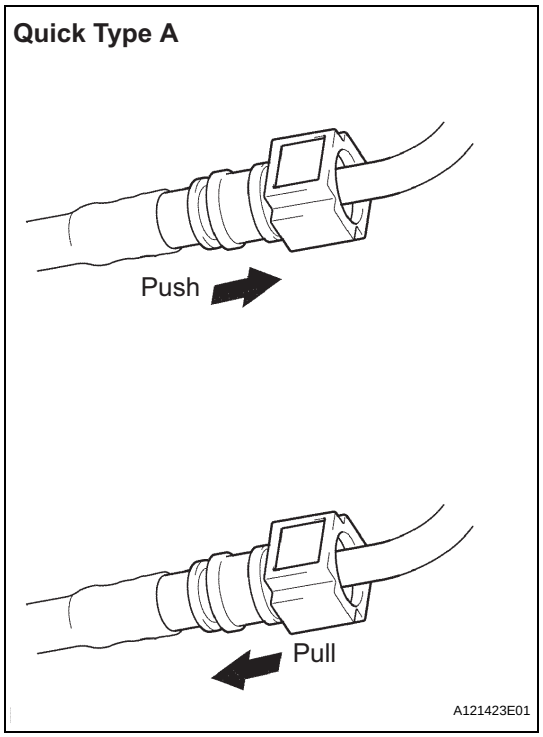
(f) Observe the following precautions when disconnecting the fuel tube connectors (Quick type A):
(1) Remove the No. 1 fuel pipe clamp from the tube connector.
(2) Check that there is no dirt or other foreign objects on the pipe and around the connector before disconnecting them. Clean them if necessary.



(3) Disconnect the connector from the pipe by hand.
(4) When the connector and the pipe are stuck, push in and pull on the connector to release it. Pull the connector out of the pipe carefully.
(5) Check that there is no dirt or other foreign objects on the sealing surface of the disconnected pipe. Clean it away if necessary.

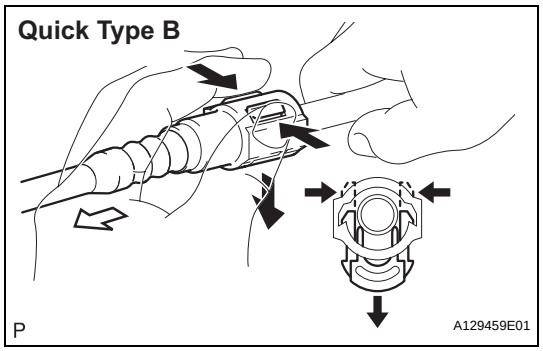


(6) Do not damage the disconnected pipe and connector, and prevent entry of foreign objects by covering them with a plastic bag.

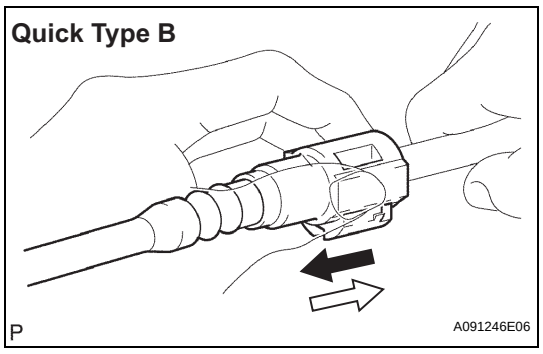


(g) Observe the following precautions when connecting the fuel tube connectors (Quick Type A):
(1) Check if there is any damage or foreign objects on the connecting parts of the pipes.
(2) Line up the two parts of the pipes to be connected, and push them together until the connector makes a "click" sound. If the pipe is difficult to push into the connector, apply a small amount of clean engine oil to the tip of the pipe and reinsert it.
(3) After connecting the pipes, check that the pipe and connector are securely connected by pulling on them.
(4) Check for fuel leaks.

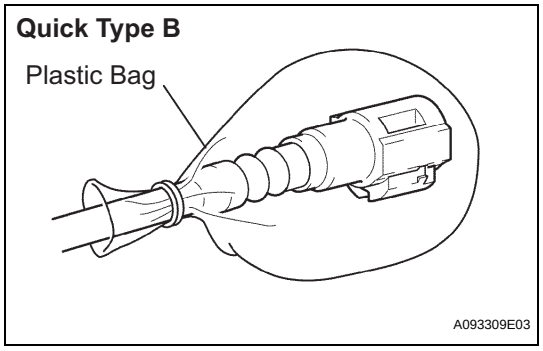
FU



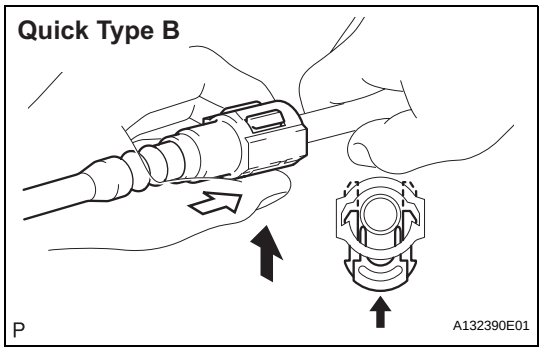
(h) Observe the following precautions when disconnecting the fuel tube connector (Quick type B):
(1) Before disconnecting the connector, clean off any dirt that may be present.
(2) Pinch the tabs of the fuel tube retainer to disengage the 2 claws. Push the retainer down as shown in the illustration.
HINT:
Be sure to disconnect the connector by hand.



(3) If the connector and pipe are stuck, hold the fuel pipe by hand and push and pull on the connector. Pull the two pipes apart to separate the connector.
(4) If there is any dirt or any other foreign objects on the sealing surfaces of the disconnected pipes, clean them if necessary.



(5) Do not damage the disconnected pipe and connector, and prevent entry of foreign objects by covering them with a plastic bag.



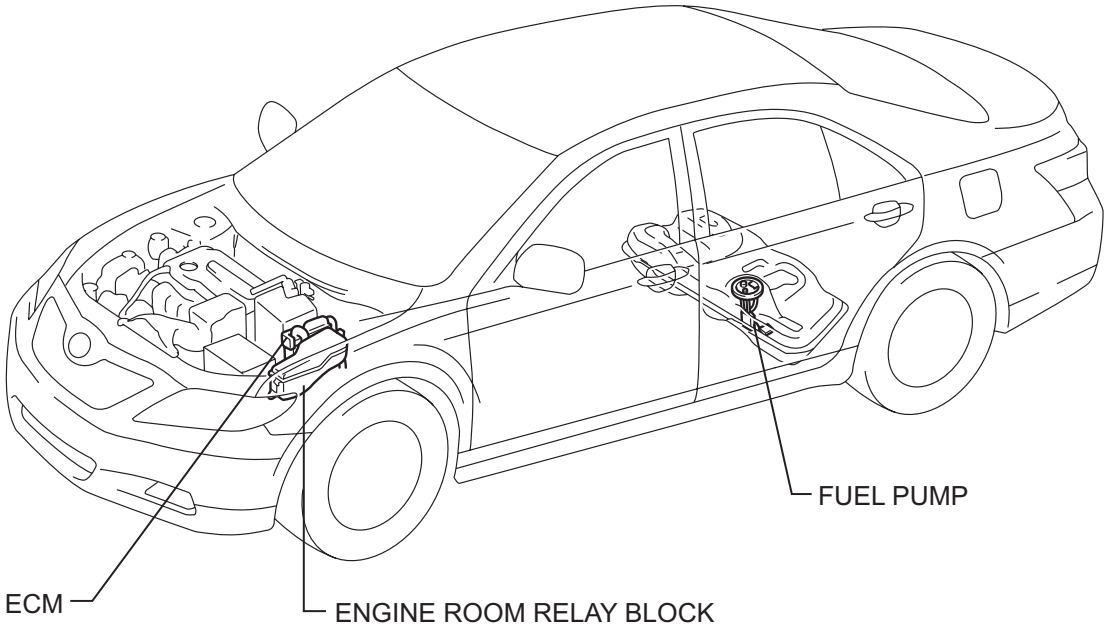
(i) Observe the following precautions when connecting the fuel tube connector (Quick Type B):
(1) Line up the two parts of the pipes to be connected, and fully push the fuel tube connector and pipe together until they are fully seated. Next, push the retainer into the connector until its claws lock. If the pipe is difficult to push in to the connector, apply a small amount of clean engine oil to the tip of the pipe and reinsert it.
(2) After connecting the pipes, check that the pipe and connector are securely connected by pulling on them.
(3) Check for fuel leaks.

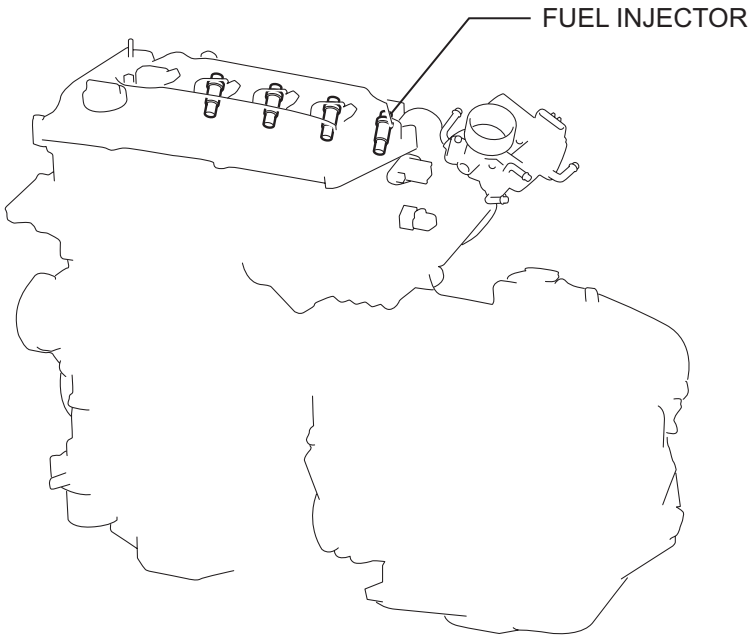
(j) Observe the following precautions when handling a nylon tube:
CAUTION:
- **Do not twist the connection part of the nylon tube and the quick connector when connecting them.**
- **Do not bend or twist the nylon tube.**
- **Do not remove the EPDM protector on the outside of the nylon tube.**
- **Do not close the piping by bending the nylon tube.**

4. CHECK FOR FUEL LEAKS

(a) Check that there are no fuel leaks from the fuel system after doing any maintenance or repairs (See page FU-9).

PARTS LOCATION





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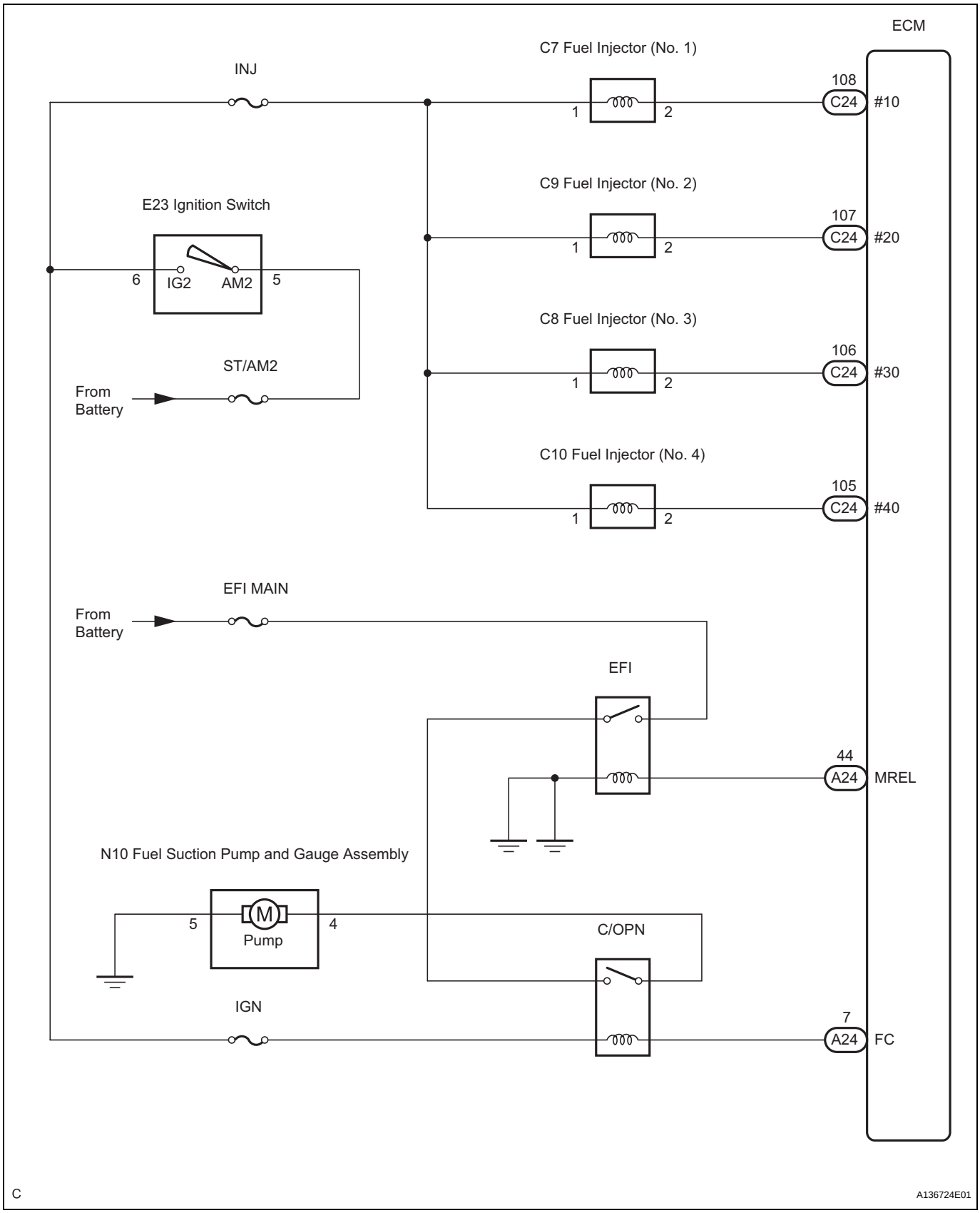
FU

SYSTEM DIAGRAM



ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION AND FOR FUEL LEAKS

(a) Check fuel pump operation.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch to the ON position and push the intelligent tester main switch on.
  NOTICE:
  Do not start the engine.
  (3) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
  (4) Check for pressure in the fuel inlet tube from the fuel line. Check that sound of fuel flowing in the fuel tank can be heard. If no sound can be heard, check the integration relay, fuel pump, ECM and wiring connector.

(b) Check for fuel leaks.
  (1) Check that there are no fuel leaks anywhere on the system after performing maintenance. If there is a fuel leak, repair or replace parts as necessary.

(c) Turn the ignition switch off.

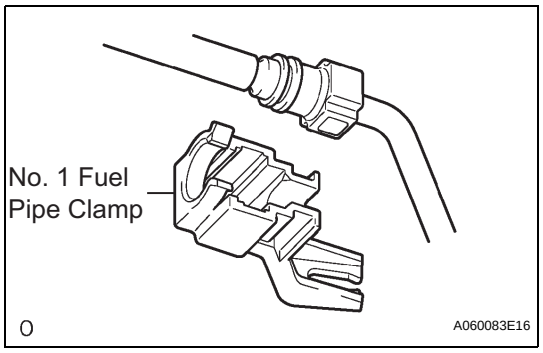
(d) Disconnect the intelligent tester from the DLC3.

2. CHECK FUEL PRESSURE

(a) Using a voltmeter, measure the battery voltage.
  Standard voltage:
  11 to 14 V

(b) Discharge the fuel system pressure (See page FU-1).

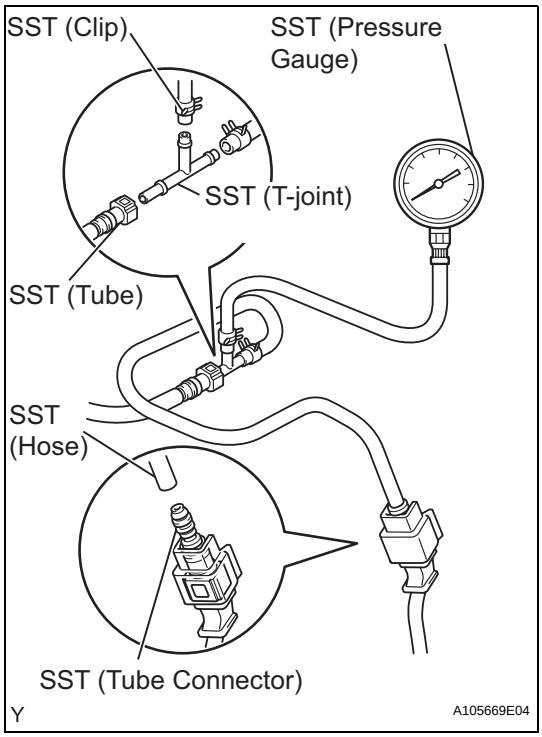
(c) Disconnect the cable from the negative (-) battery terminal.



(d) Remove the No. 1 fuel pipe clamp from the fuel tube connector.

(e) Disconnect the fuel hose from the fuel main tube.
  CAUTION:
  - **Always read the precautions (See page FU-1) before disconnecting the fuel tube connector (quick type).**
  - **The fuel pipe line may spray fuel as a result of retained pressure that remains in it. Do not allow fuel to be sprayed in the engine compartment.**

FU



(f) Install SST (pressure gauge) and the fuel tube connector using SST as shown in the illustration.
SST 09268-31011 (09268-41500, 90467-13001, 95336-08070), 09268-45014 (09268-41200, 09268-41220, 09268-41250)

(g) Wipe up any gasoline.

(h) Reconnect the cable to the negative (-) battery terminal.

(i) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.

(j) Measure the fuel pressure.
Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)

If the pressure is high, replace the fuel pressure regulator.

If the pressure is low, check the fuel hoses and connections, fuel pump, fuel filter and fuel pressure regulator.

(k) Disconnect the intelligent tester from the DLC3.

(l) Start the engine.

(m) Measure the fuel pressure at idle.
Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)

(n) Stop the engine.

(o) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.
Fuel pressure:

147 kPa (1.5 kgf/cm^2, 21 psi) or more

If the pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

(p) After checking the fuel pressure, disconnect the cable from the negative battery terminal and carefully remove the SST to prevent gasoline from splashing.

(q) Reconnect the fuel main tube (fuel tube connector).
CAUTION:
Always read the precautions (See page FU-1) before connecting the fuel tube connector (quick type).

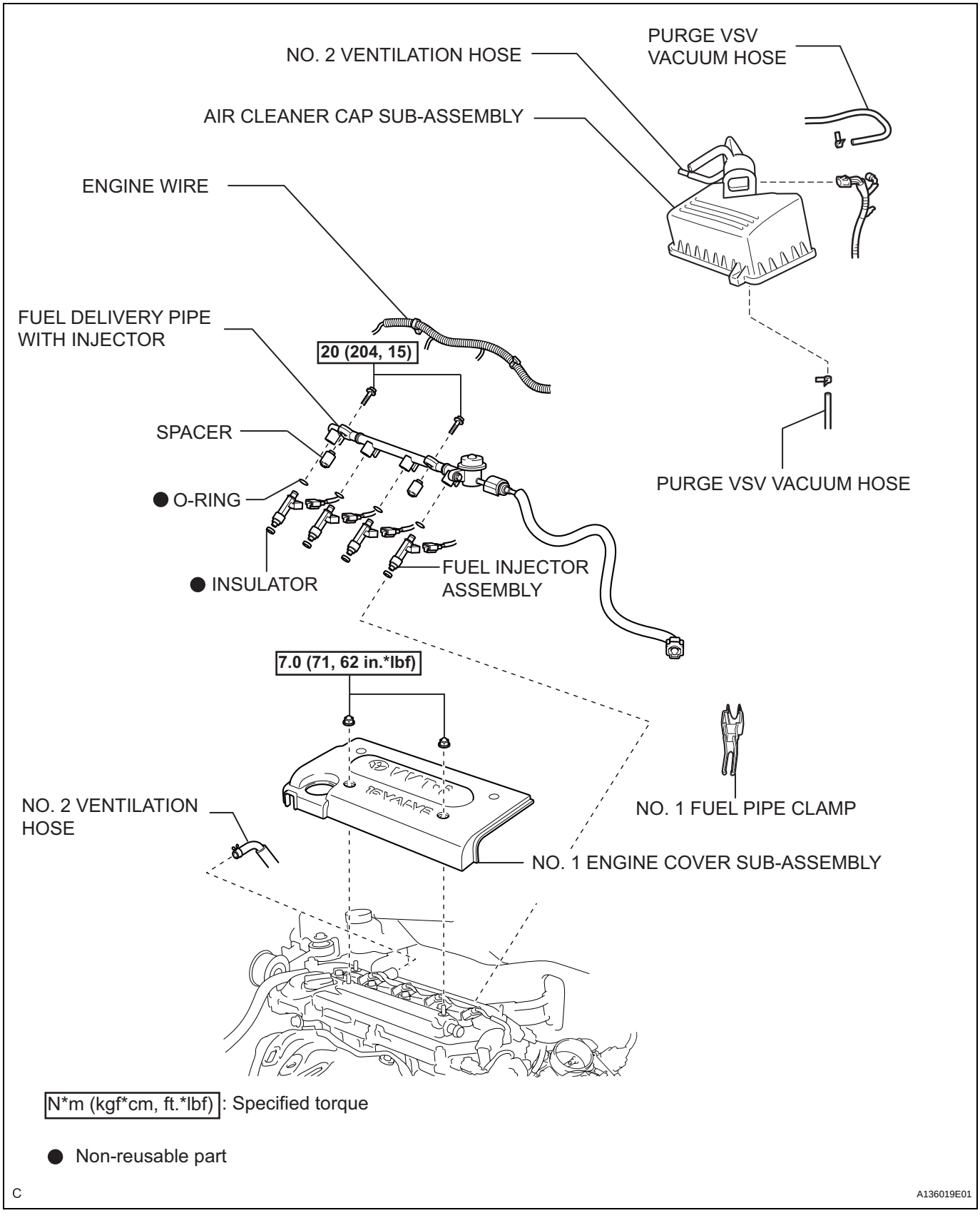
(r) Install the No. 1 fuel pipe clamp to the fuel tube connector.

(s) Check for fuel leaks (Step 1).

FU

FUEL INJECTOR

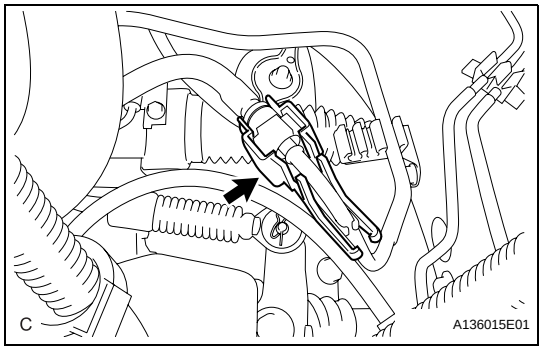
COMPONENTS



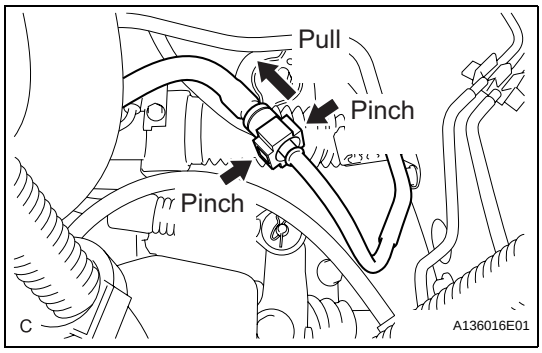
FU

REMOVAL

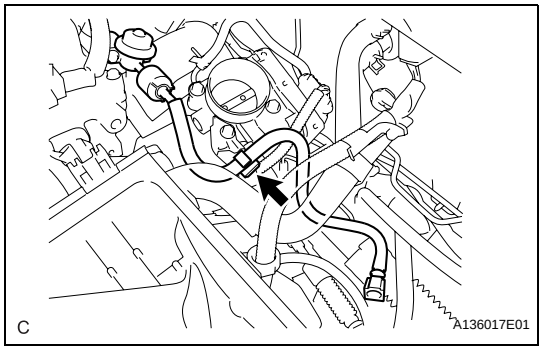
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
4. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
5. **DISCONNECT FUEL TUBE SUB-ASSEMBLY**
   (a) Remove the No. 1 fuel pipe clamp.
   NOTICE:
   Check for foreign matter on the pipe and around the connector before disconnecting the quick connector. Clean the connector if necessary.

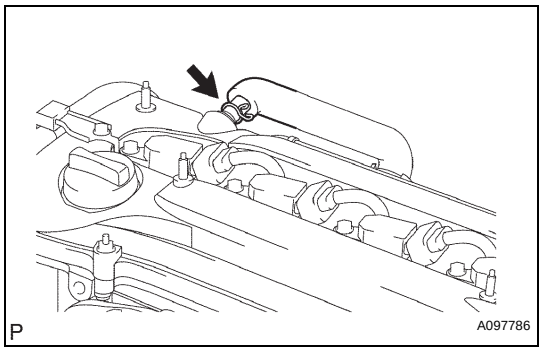


   (b) If the connector and pipe are stuck, pinch the connector, and push and pull the pipe to disconnect them.
   NOTICE:
   - **Do not use any tools in this procedure.**
   - **Check for foreign matter on the sealing surface of the disconnected pipe. Clean it if necessary.**



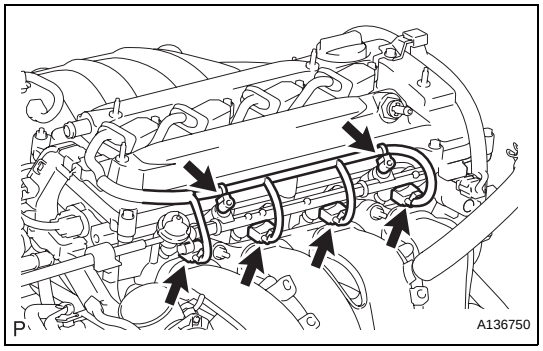
   (c) Separate the fuel tube from the fuel hose clamp.





6. DISCONNECT NO. 2 VENTILATION HOSE

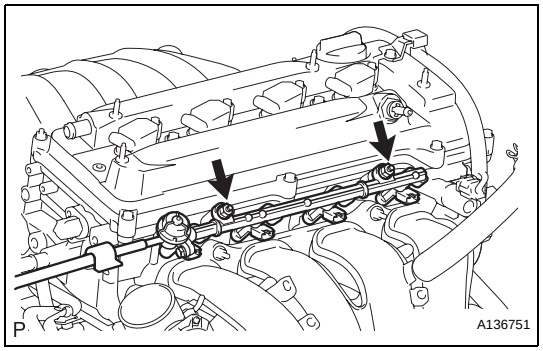
(a) Disconnect the No. 2 ventilation hose from the ventilation valve.



7. REMOVE FUEL DELIVERY PIPE WITH INJECTOR

(a) Remove the 2 wire harness clamps.

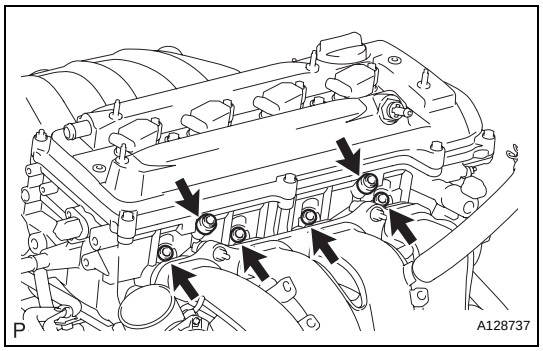
(b) Disconnect the 4 fuel injector connectors.



(c) Remove the 2 bolts, then remove the fuel delivery pipe together with the 4 fuel injectors.

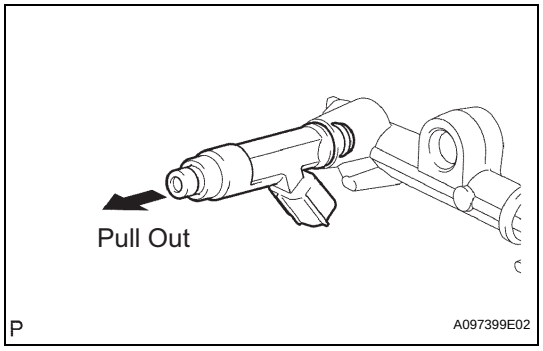
NOTICE:

Be careful not to drop the fuel injectors when removing the fuel delivery pipe.



(d) Remove the 2 delivery pipe spacers from the cylinder head.

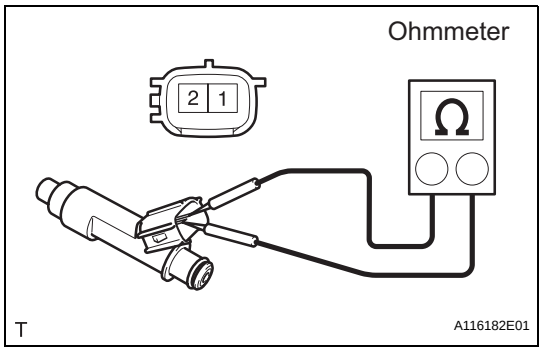
(e) Remove the 4 insulators from the cylinder head.



8. REMOVE FUEL INJECTOR ASSEMBLY

(a) Pull out the 4 injectors from the delivery pipe.

(b) Remove the 4 O-rings from the injectors.



INSPECTION

1. INSPECT FUEL INJECTOR ASSEMBLY

(a) Measure the resistance between the injector terminals.

Standard resistance:

11.6 to 12.4 Ω at 20°C (68°F)

If the result is not as specified, replace the injector.

(b) Inspect the injector injection volume.

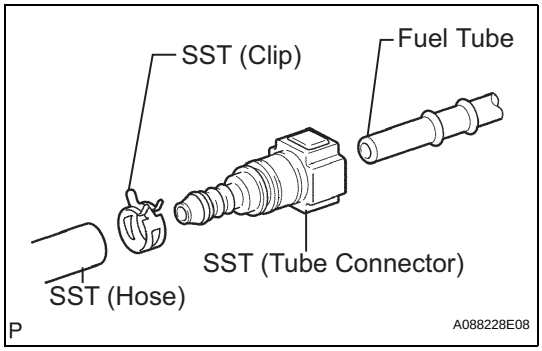
CAUTION:

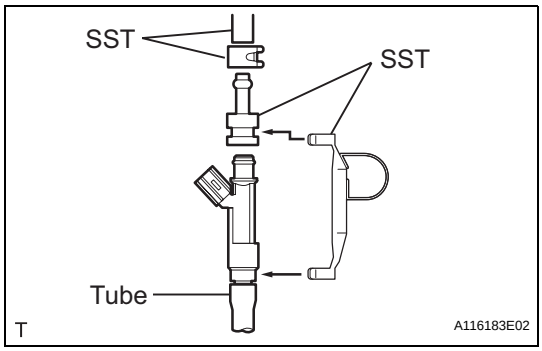
Keep the injector away from sparks during this test.

(1) Connect SST (fuel tube connector) to SST (hose), then connect them to the fuel pipe (vehicle side).

SST 09268-31011 (09268-41500, 90467-13001, 95336-08070)

(2) Install the O-ring to the fuel injector.





(3) Connect SST (adapter and hose) to the injector, and hold the injector and union with SST (clamp).

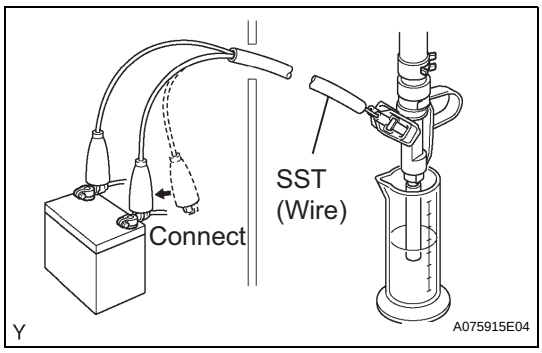
SST 09268-31011 (09268-41110, 09268-41300, 90467-13001)

(4) Put the injector into the graduated cylinder.

CAUTION:

Install a suitable vinyl tube onto the injector to contain gasoline spray.

(5) Operate the fuel pump.



(6) Connect SST (wire) to the injector and the battery for 15 seconds, and measure the injection volume with the graduated cylinder. Test each injector 2 or 3 times.

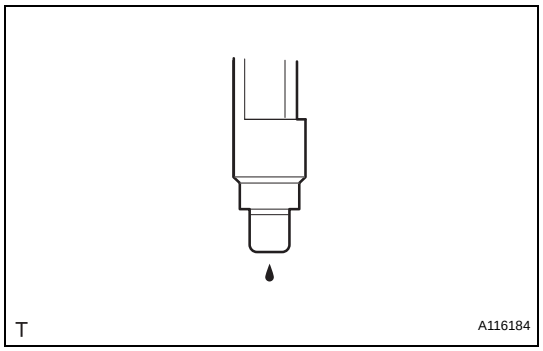
SST 09842-30080

Standard injection volume:

76 to 92 cm^3 (4.6 to 5.6 cu in.) per 15 seconds

Standard difference between each injector:

16 cm^3 (0.98 cu in.) or less

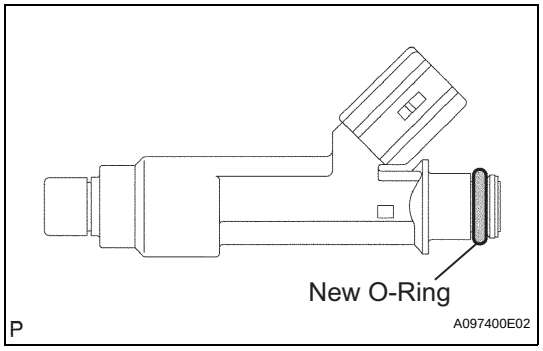


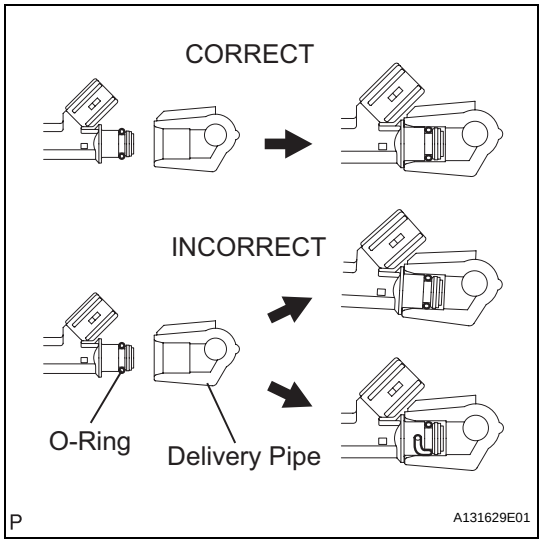
(c) Inspect the fuel leakage.
(1) Disconnect the SST (wire) tester probes from the battery and check the fuel leakage from the injector.
Standard fuel drop:
1 drop or less per 12 minutes
(2) Turn the ignition switch off.
(3) Disconnect the cable from the negative (-) battery terminal.
(4) Remove the SST.
(5) Disconnect the intelligent tester from the DLC3.
(6) Reconnect the fuel inlet hose (rear fuel pipe) to the fuel main tube.

INSTALLATION

1. INSTALL FUEL INJECTOR ASSEMBLY

(a) Apply a light coat of gasoline or spindle oil to new O-rings, then install one onto each fuel injector.

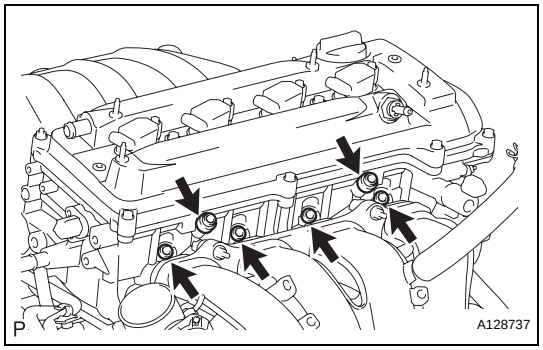


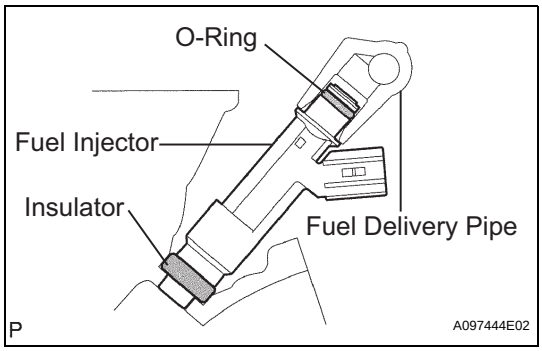


(b) Apply a light coat of gasoline or spindle oil to the part of the fuel delivery pipe which comes into contact with the O-ring of the fuel injector.
(c) Apply a light coat of gasoline or spindle oil to the O-ring again, then install the right and left fuel injectors onto the fuel delivery pipe.
NOTICE:
Make sure that the O-ring is not cracked or jammed before installing the injector.
(d) Check that the fuel injector rotates smoothly. If the fuel injector does not rotate, replace the O-ring.

2. INSTALL FUEL DELIVERY PIPE WITH INJECTOR

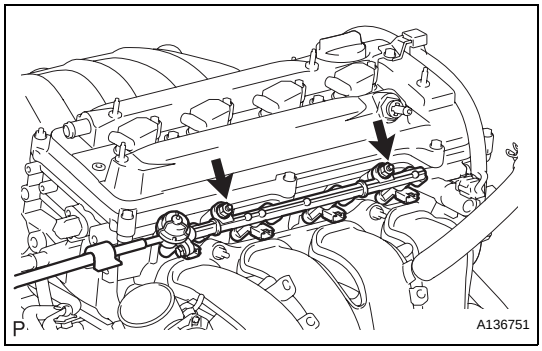
(a) Install 4 new insulators into the cylinder head.
(b) Install the 2 delivery pipe spacers onto the cylinder head.



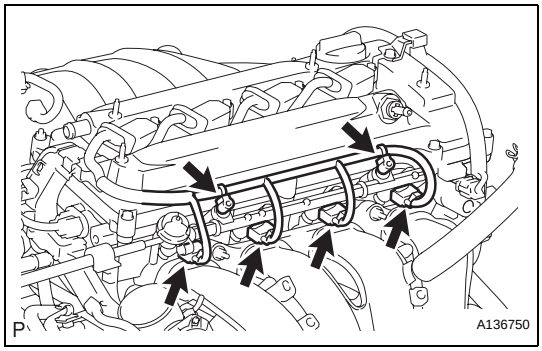


(c) Install the fuel delivery pipe together with the 4 fuel injectors, then temporarily tighten the 2 bolts.
NOTICE:
Be careful not to drop the fuel injectors when installing the fuel delivery pipe.

(d) Check that the fuel injector rotates smoothly.
If the fuel injector does not rotate smoothly, replace the O-ring.

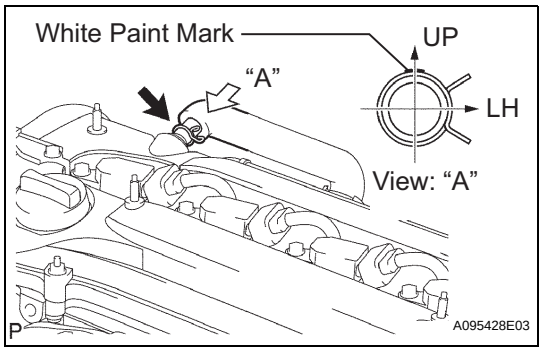


(e) Tighten the 2 bolts to the specified torque.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



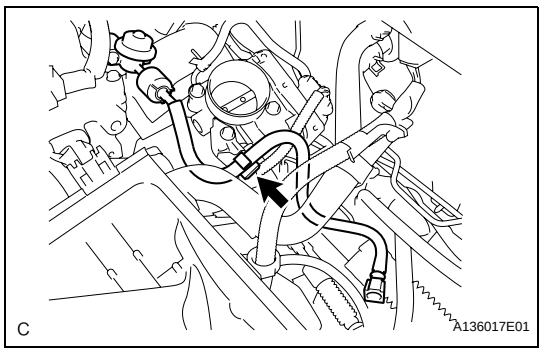
(f) Connect the 4 fuel injector connectors.

(g) Install the 2 wire harness clamps.



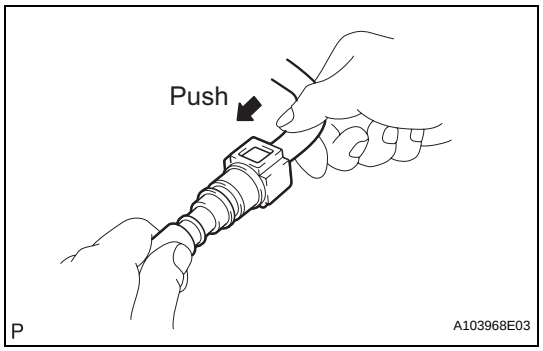
3. INSTALL NO. 2 VENTILATION HOSE

(a) Connect the ventilation hose to the ventilation valve.
NOTICE:
Make sure that the paint mark and hose clamp are positioned as shown in the illustration after connecting the hose.

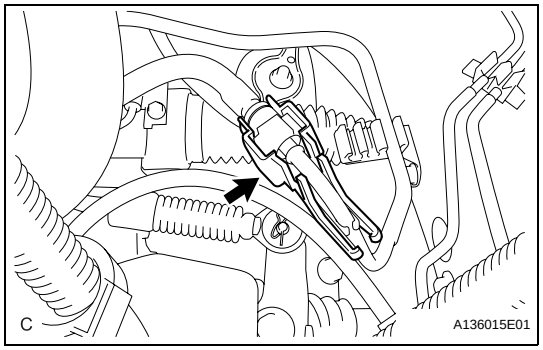


4. CONNECT FUEL TUBE SUB-ASSEMBLY

(a) Install the fuel tube to the fuel hose clamp.



(b) Push the fuel tube connector until it makes a "click" sound.



(c) Install the No. 1 fuel pipe clamp.

5. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

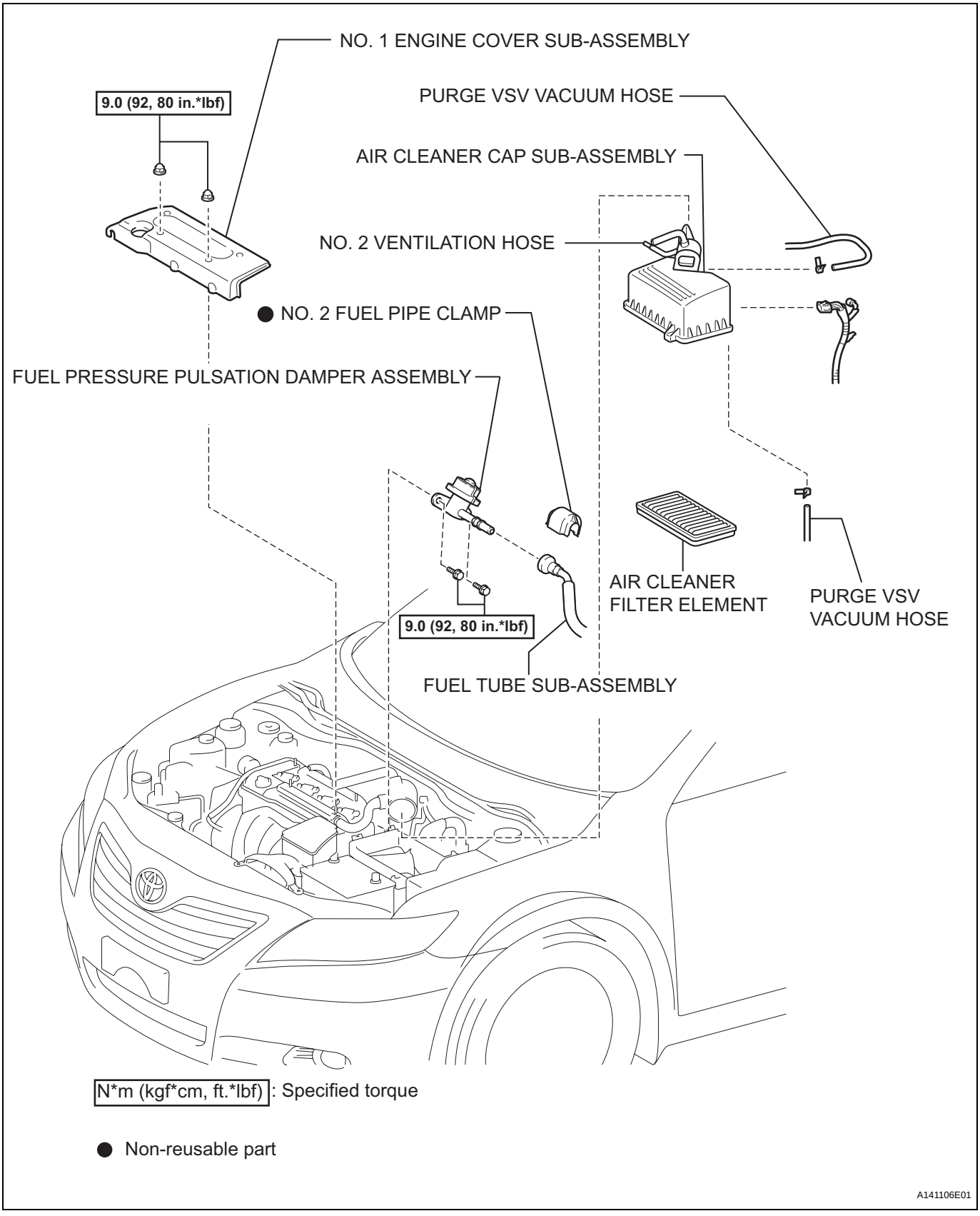
7. **CHECK FOR FUEL LEAKS**
HINT:
See page FU-9.

8. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**

FU

FUEL PRESSURE PULSATION DAMPER

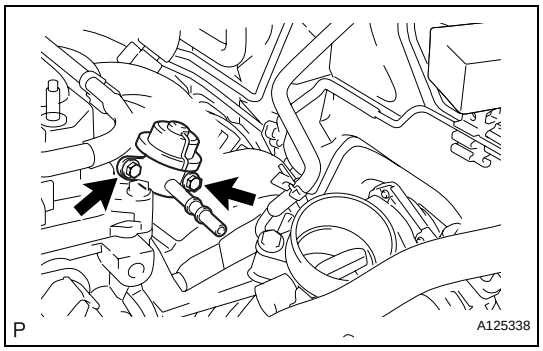
COMPONENTS

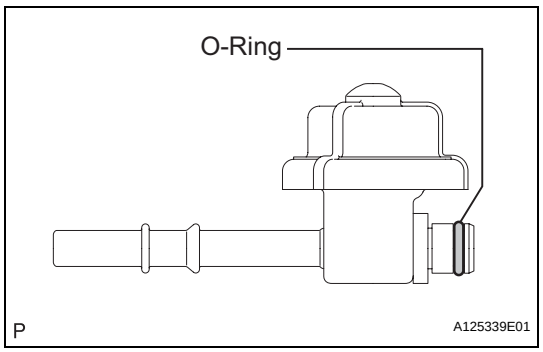


FU

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
5. **DISCONNECT FUEL TUBE SUB-ASSEMBLY**
   HINT:
   Disconnect the metallic type connector (See page FU-1).
6. **REMOVE FUEL PRESSURE PULSATION DAMPER ASSEMBLY**
   (a) Remove the 2 bolts and fuel pressure pulsation damper.

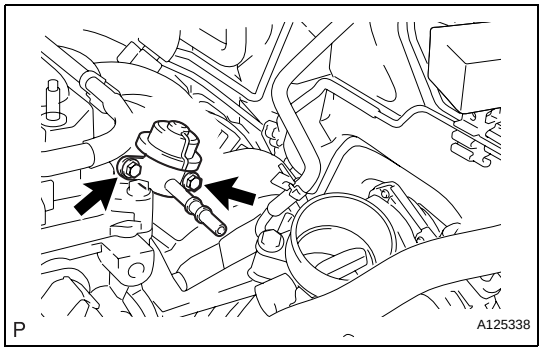




INSTALLATION

1. **INSTALL FUEL PRESSURE PULSATION DAMPER ASSEMBLY**
   (a) Apply a light coat of gasoline or spindle oil to the O-ring of the fuel pressure pulsation damper.

   (b) Install the fuel pressure pulsation damper with the 2 bolts.
   Torque: 9.0 N*m (90 kgf*cm, 80 in.*lbf)
   NOTICE:
   Make sure that the O-ring is not cracked or jammed before installing the damper.
2. **INSTALL FUEL TUBE SUB-ASSEMBLY**
   HINT:
   Connect the metallic type connector (See page FU-1).
3. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**



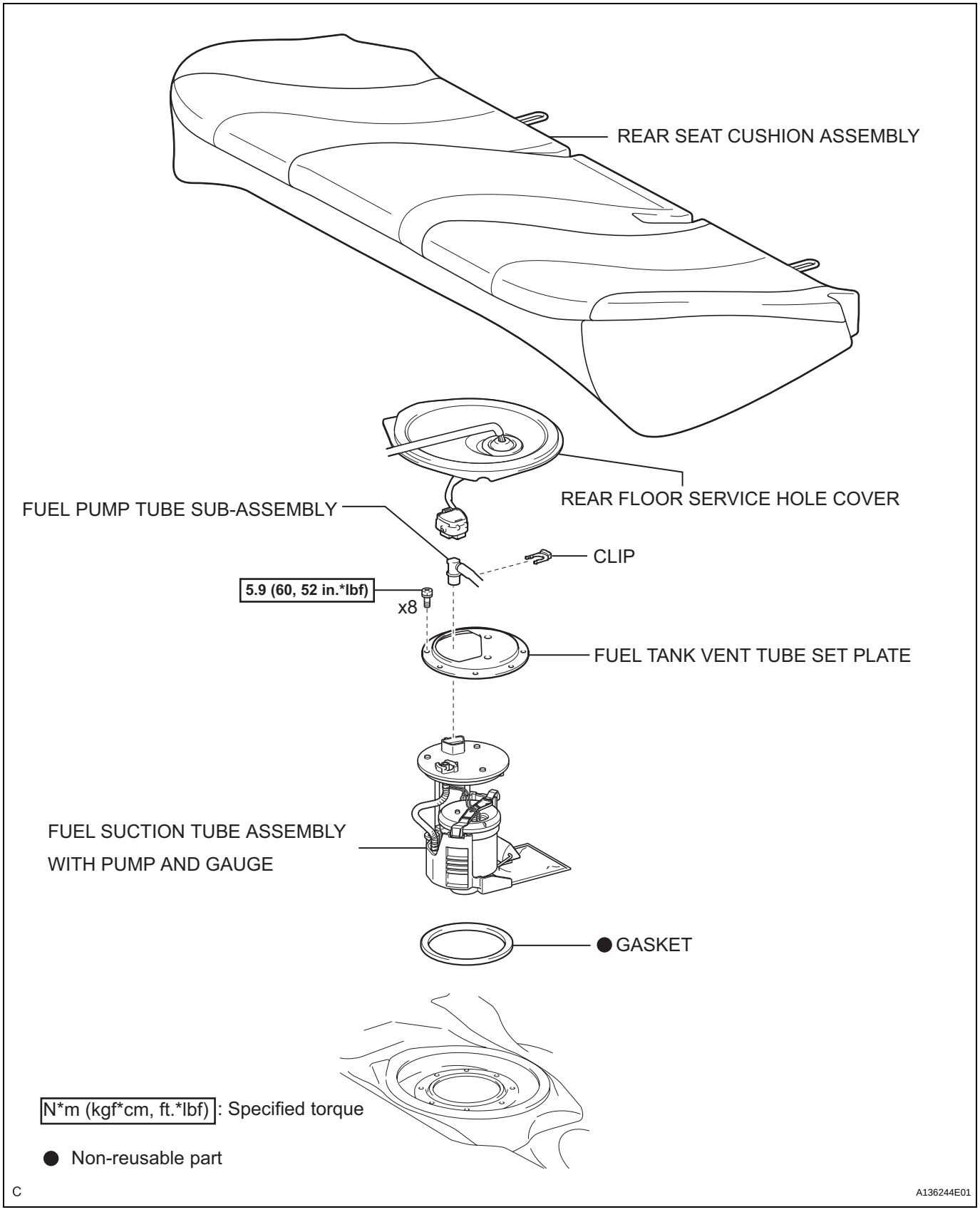
FU

5. **CHECK FOR FUEL LEAKS**
   HINT:
   See page FU-9.

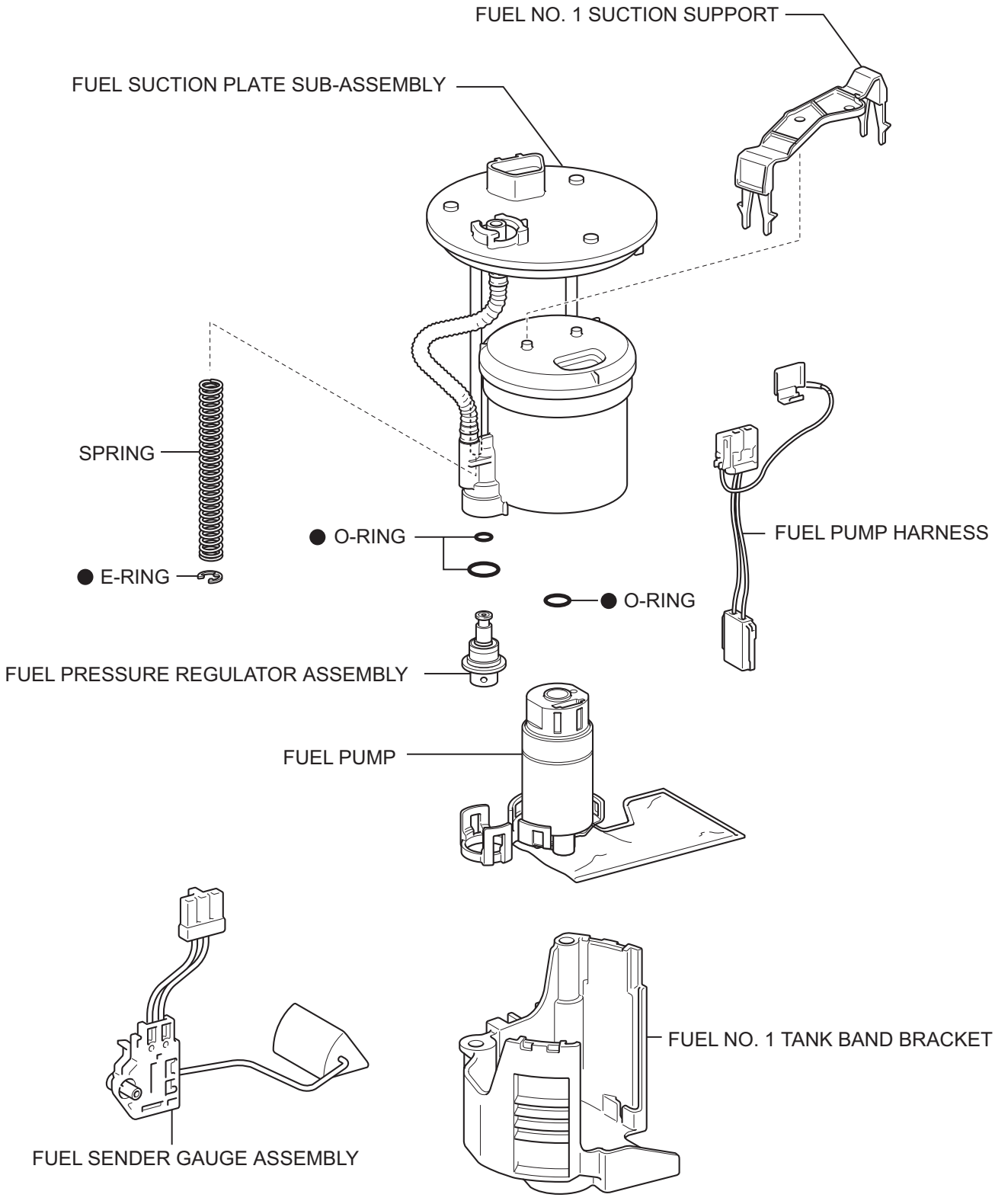
6. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY**
   (See page EM-121)

FUEL PUMP

COMPONENTS



FU



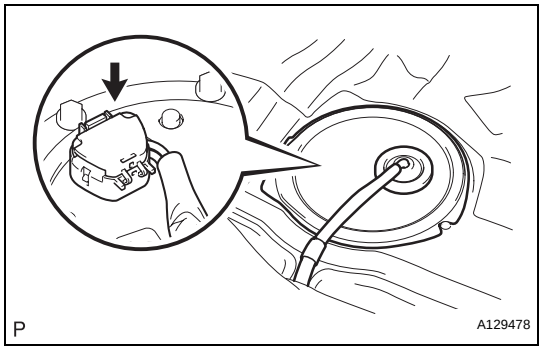
● Non-reusable part

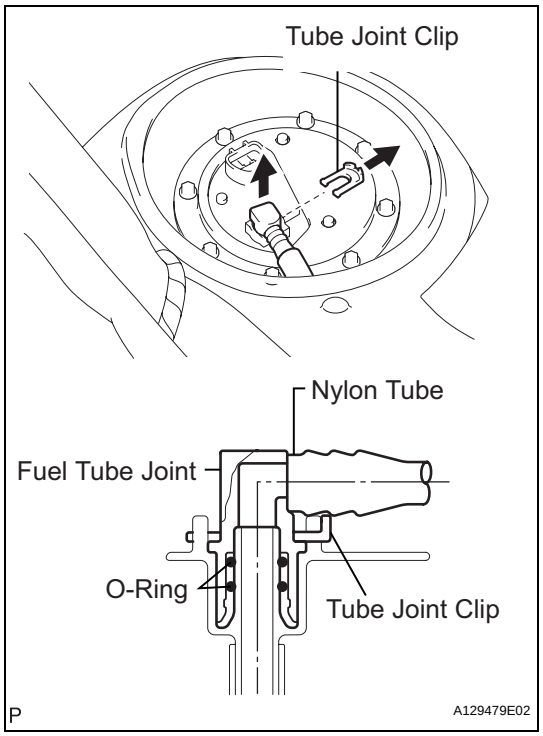
C

A136245E01

REMOVAL

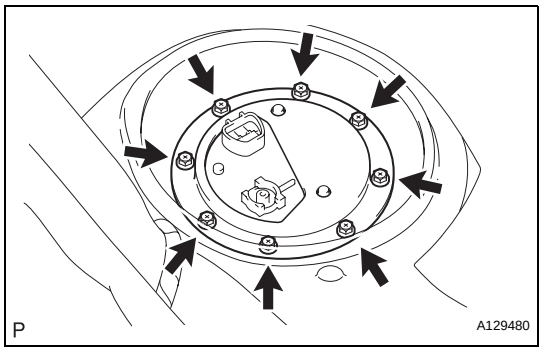
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
4. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
5. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
6. **REMOVE REAR FLOOR SERVICE HOLE COVER**
   (a) Remove the rear floor service hole cover.
   (b) Disconnect the fuel pump connector.





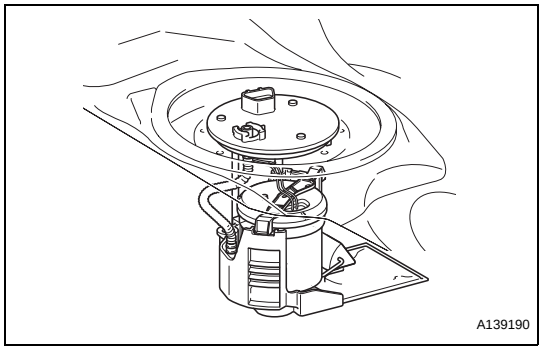
7. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY**
   (a) Remove the tube joint clip, and pull out the fuel pump tube.
   NOTICE:
   - **Check that there is no dirt around the fuel tube joint before this work and clean any dirt away.**
   - **It is necessary to prevent mud or dirt from entering the fuel tube joint. If mud enters the joint, the O-rings may not seal the fuel tube connector and fuel suction plate properly.**
   - **Do not use any tools in this work.**
   - **Do not bend or twist the nylon tube.**
   - **After disconnecting, cover the fuel tube joint with a plastic bag.**
   - **If the fuel tube joint and fuel suction plate are stuck, pinch the fuel tank tube between fingers, and turn it carefully to release. Disconnect the fuel tank tube.**

FU



8. REMOVE FUEL TANK VENT TUBE SET PLATE

(a) Remove the 8 bolts and set plate.

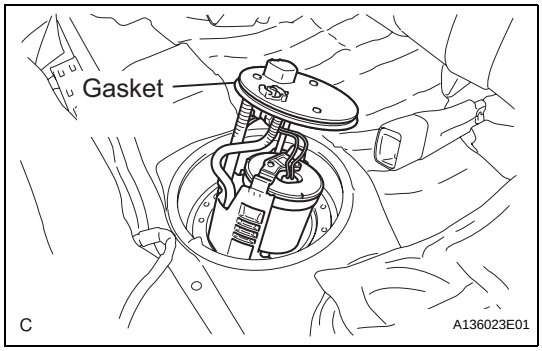


9. REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

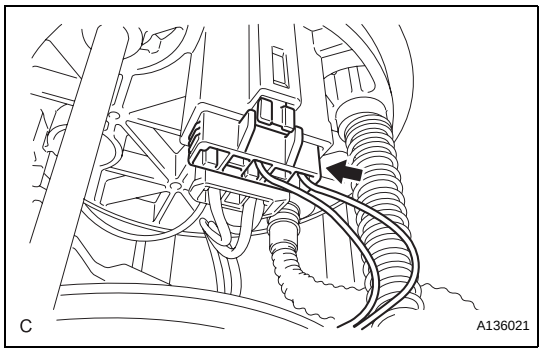
(a) Pull out the fuel suction tube from the fuel tank.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge does not bend.**



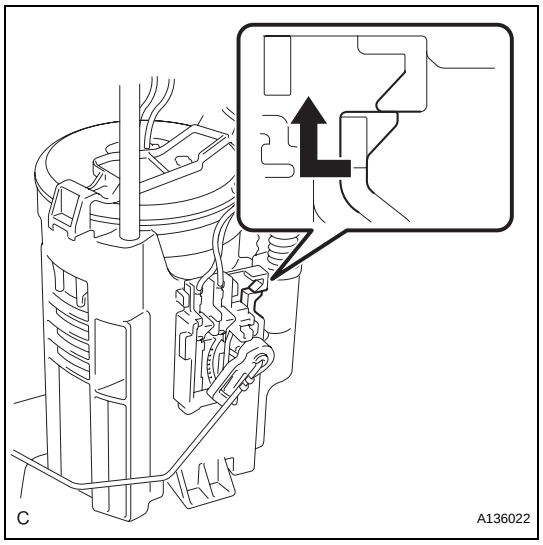
(b) Remove the gasket from the fuel suction tube.



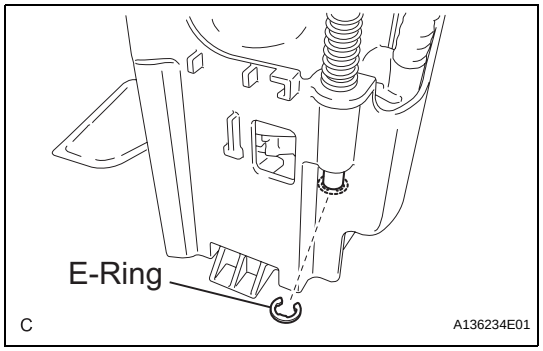
DISASSEMBLY

1. REMOVE FUEL SENDER GAUGE ASSEMBLY

(a) Disconnect the fuel sender gauge connector.

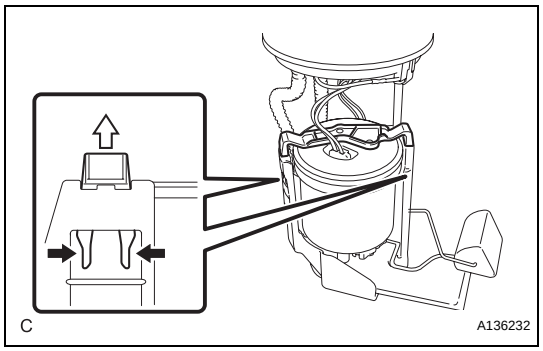


(b) Unlock the fuel sender gauge, and slide it to remove.



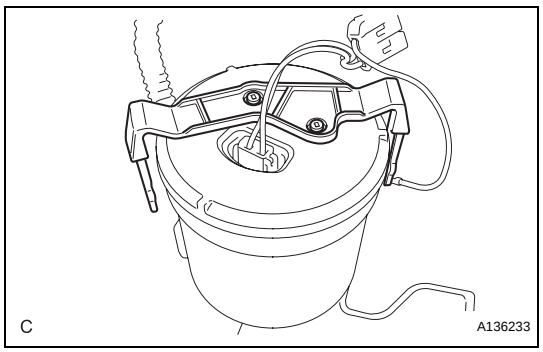
2. REMOVE FUEL NO. 1 TANK BAND BRACKET

(a) Using needle nozzle pliers, remove the E-ring.



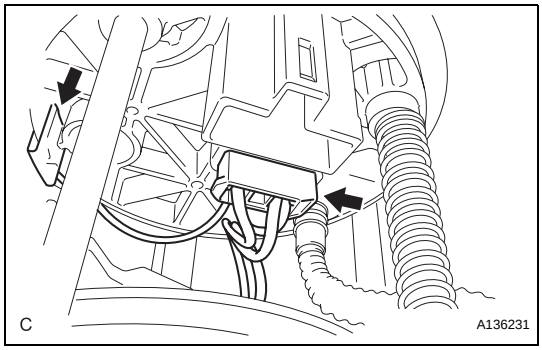
(b) Disengage the 4 claws of the fuel No. 1 suction support and remove the fuel No. 1 tank band bracket from the fuel suction plate with the fuel filter.

(c) Remove the spring from the fuel suction plate.



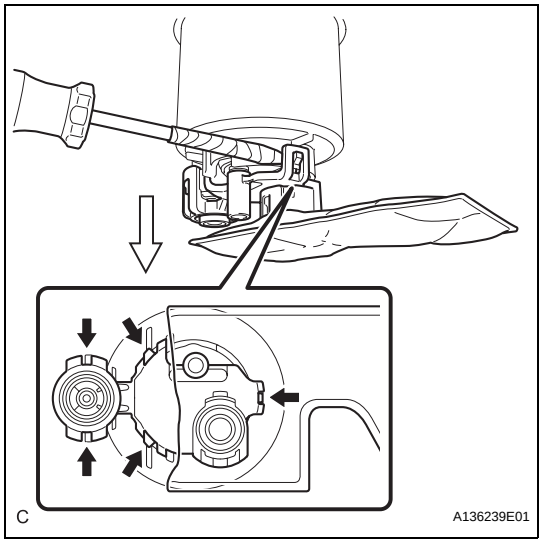
3. REMOVE FUEL NO. 1 SUCTION SUPPORT

(a) Using a screwdriver with the tip taped, disengage the claw and remove the fuel No. 1 suction support.



4. DISCONNECT FUEL PUMP HARNESS

(a) Disconnect the fuel pump harness connector from the fuel suction plate.

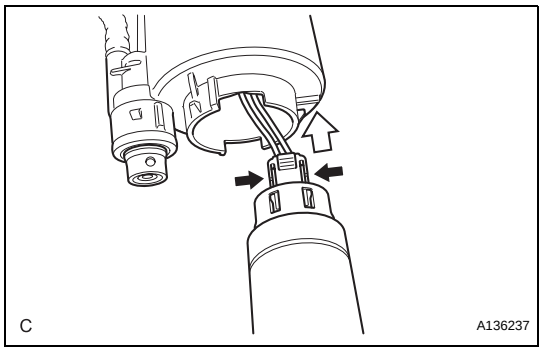


5. REMOVE FUEL PUMP

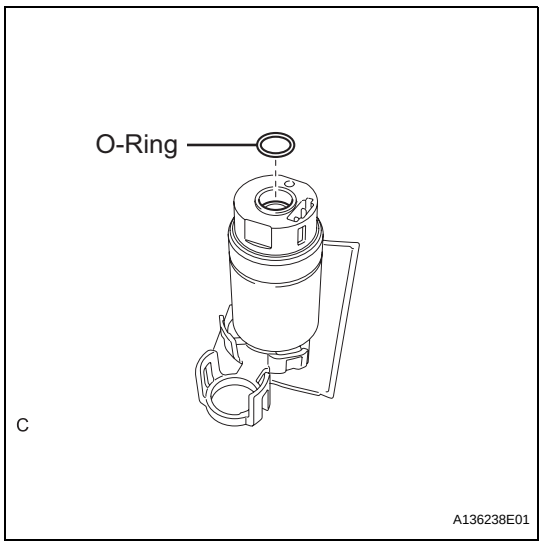
(a) Using a screwdriver with its tip taped, disengage the 5 claws and pull out the fuel pump from the fuel filter assembly.

NOTICE:

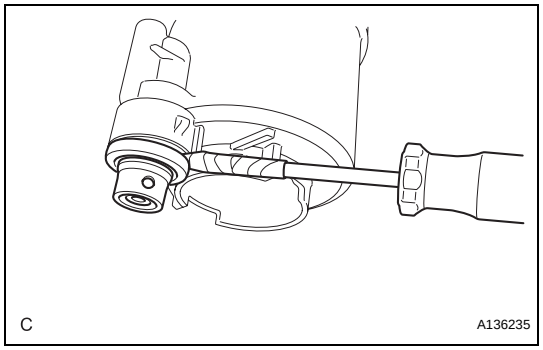
- **Do not damage the fuel pump filter.**
- **Do not remove the suction filter.**



(b) Remove the fuel pump harness connector.

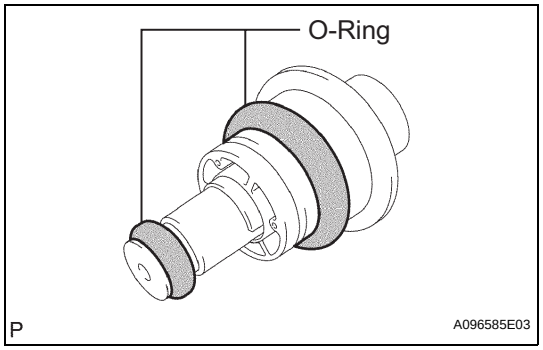


(c) Remove the O-ring from the fuel pump.

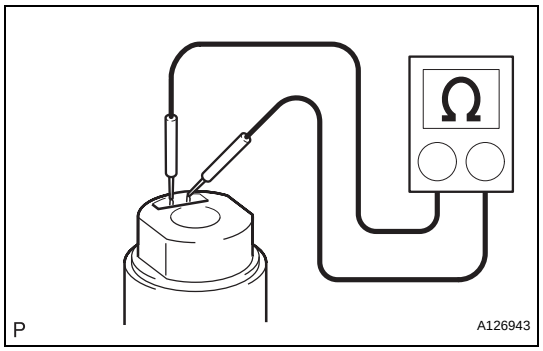


6. REMOVE FUEL PRESSURE REGULATOR ASSEMBLY

(a) Using a screwdriver with its tip taped, remove the fuel pressure regulator from the fuel filter.



(b) Remove the 2 O-rings from the fuel pressure regulator.



INSPECTION

1. INSPECT FUEL PUMP

(a) Check the fuel pump resistance.

(1) Measure the resistance between terminals 1 and 2.

Standard resistance:

0.2 to 3.0 Ω at 20°C (68°F)

If the result is not as specified, replace the fuel pump.

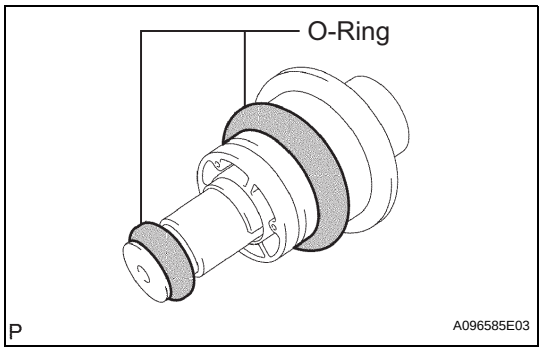
(b) Check fuel pump operation.

(1) Apply battery voltage to terminals 1 and 2. Check that the pump operates.

NOTICE:

- **These tests must be completed within 10 seconds to prevent the coil from burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always switch the voltage on and off on the battery side, not on the fuel pump side.**

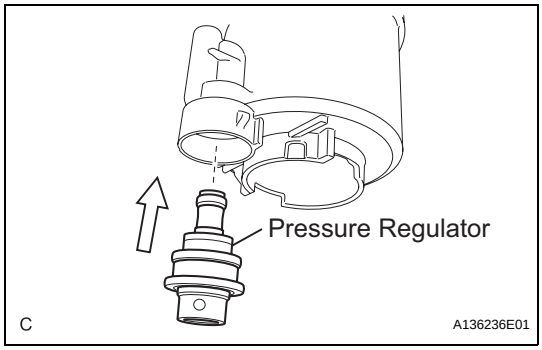
If the pump does not operate, replace the fuel pump.



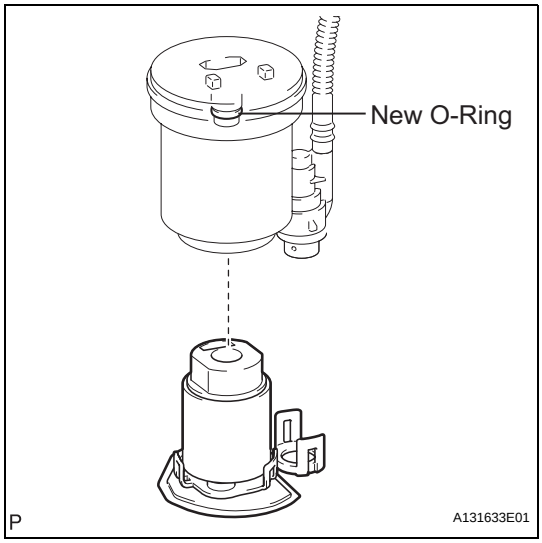
REASSEMBLY

1. INSTALL FUEL PRESSURE REGULATOR ASSEMBLY

(a) Apply a light coat of gasoline to 2 new O-rings, and install them to the fuel pressure regulator.

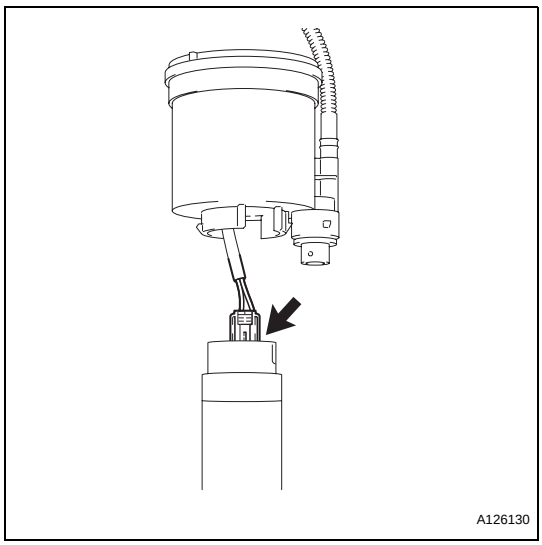


(b) Install the fuel pressure regulator to the fuel filter.

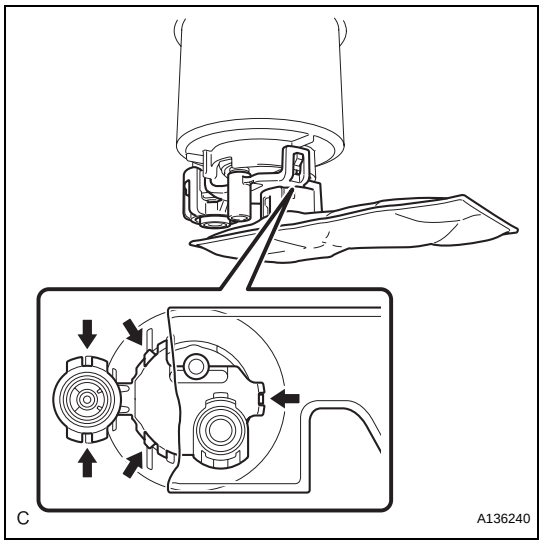


2. INSTALL FUEL PUMP

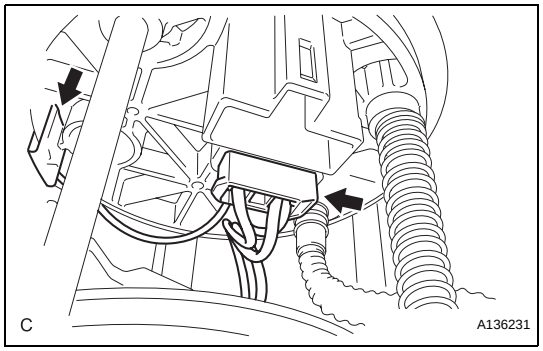
(a) Apply gasoline to a new O-ring and install it to the fuel filter.



(b) Connect the fuel pump harness connector.

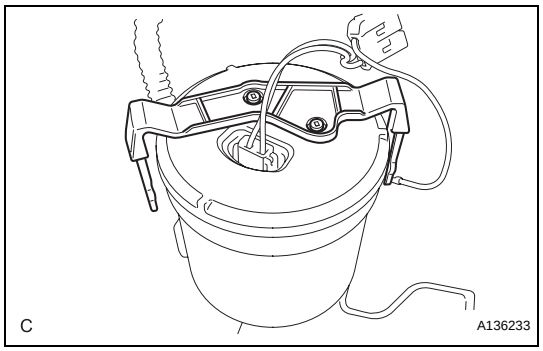


(c) Engage the 5 claws on the fuel filter and install the fuel pump with the pump filter.



3. CONNECT FUEL PUMP HARNESS

(a) Connect the fuel pump harness connector from the fuel suction plate.



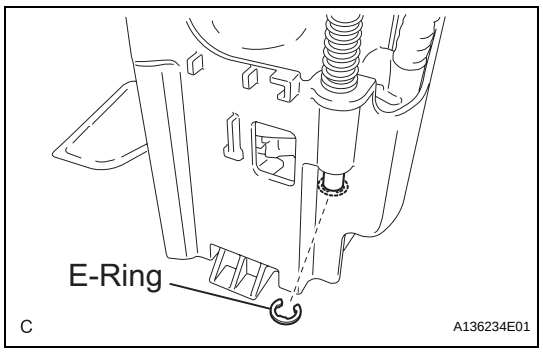
4. INSTALL FUEL NO. 1 SUCTION SUPPORT

(a) Install the fuel No. 1 suction support to the fuel filter.

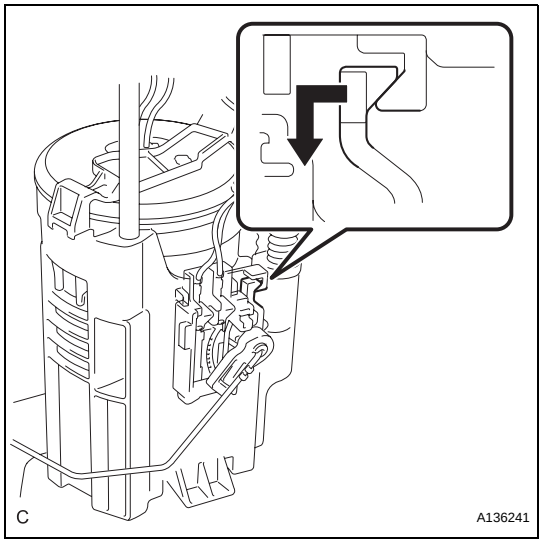
5. INSTALL FUEL NO. 1 TANK BAND BRACKET

(a) Install the spring to the fuel suction plate shaft and install them to the fuel No. 1 tank band bracket.

(b) Engage the 4 claws of the fuel No. 1 suction support and install the fuel No. 1 tank band bracket to the fuel suction plate with the fuel filter.

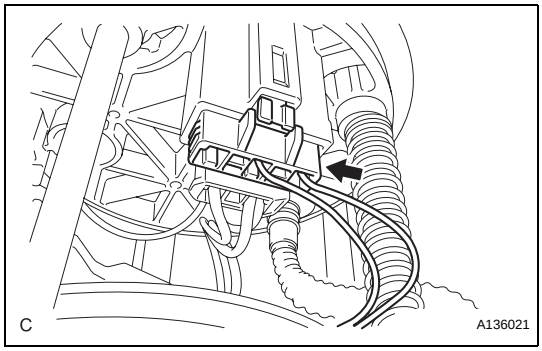


(c) Install a new E-ring.



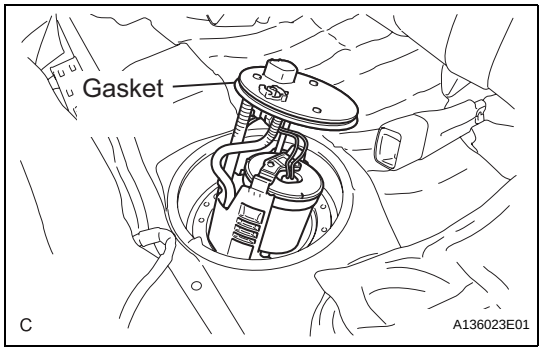
6. INSTALL FUEL SENDER GAUGE ASSEMBLY

(a) Slide the fuel sender gauge to engage the claw.



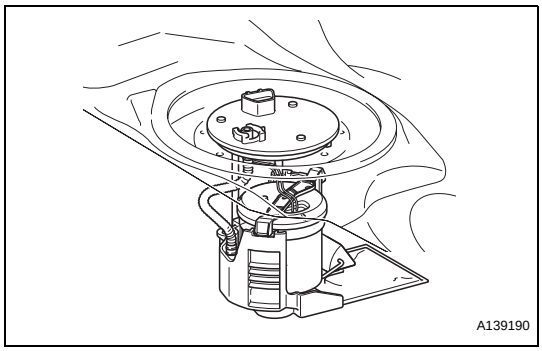
(b) Connect the fuel sender gauge connector.

INSTALLATION



1. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

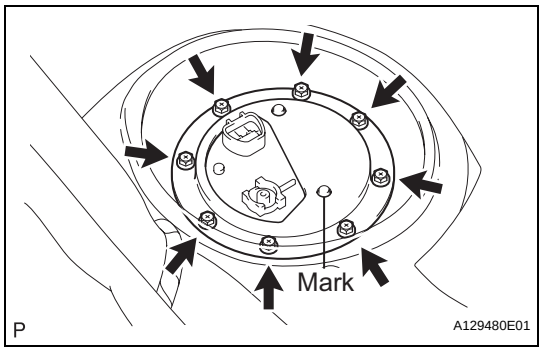
(a) Install a new gasket to the fuel suction tube.



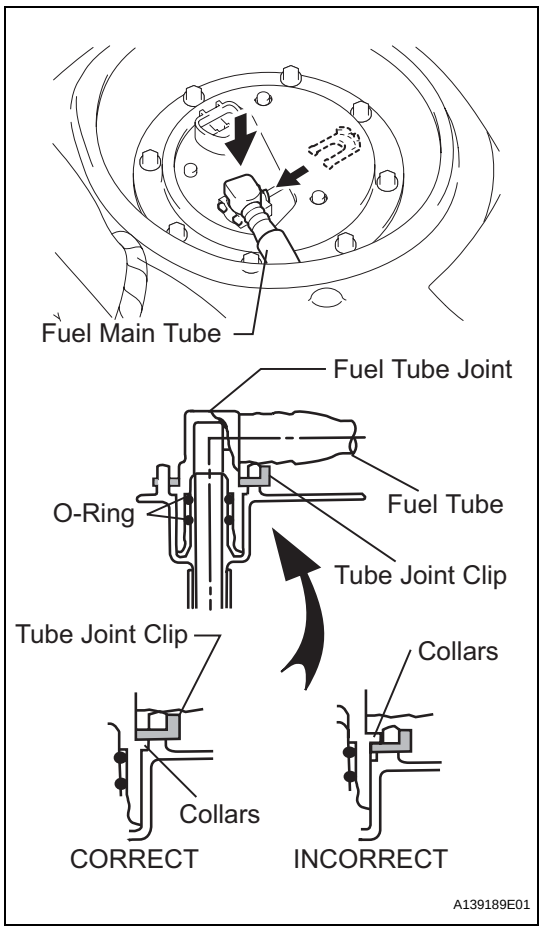
(b) Install the fuel suction tube.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge does not bend.**



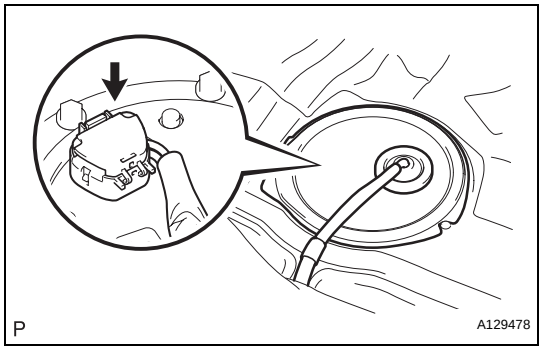
2. **INSTALL FUEL TANK VENT TUBE SET PLATE**
   (a) Align the mark of the set plate with the fuel suction tube.
   (b) Install the set plate with the 8 bolts.
   Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)



3. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY**
   (a) Install the fuel pump tube with the tube joint clip.
   NOTICE:
   - **Check that there are no scratches or foreign objects on the connecting part.**
   - **Check that the fuel tube joint is inserted securely.**
   - **Check that the tube joint clip is on the collar of the fuel tube joint.**
   - **After installing the tube joint clip, check that the fuel tube joint is pulled off.**

4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

5. **CHECK FOR FUEL LEAKS (See page FU-8)**



6. **INSTALL REAR FLOOR SERVICE HOLE COVER**
   (a) Connect the fuel pump connector.
   (b) Install the rear floor service hole cover with new butyl tape.

7. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)**

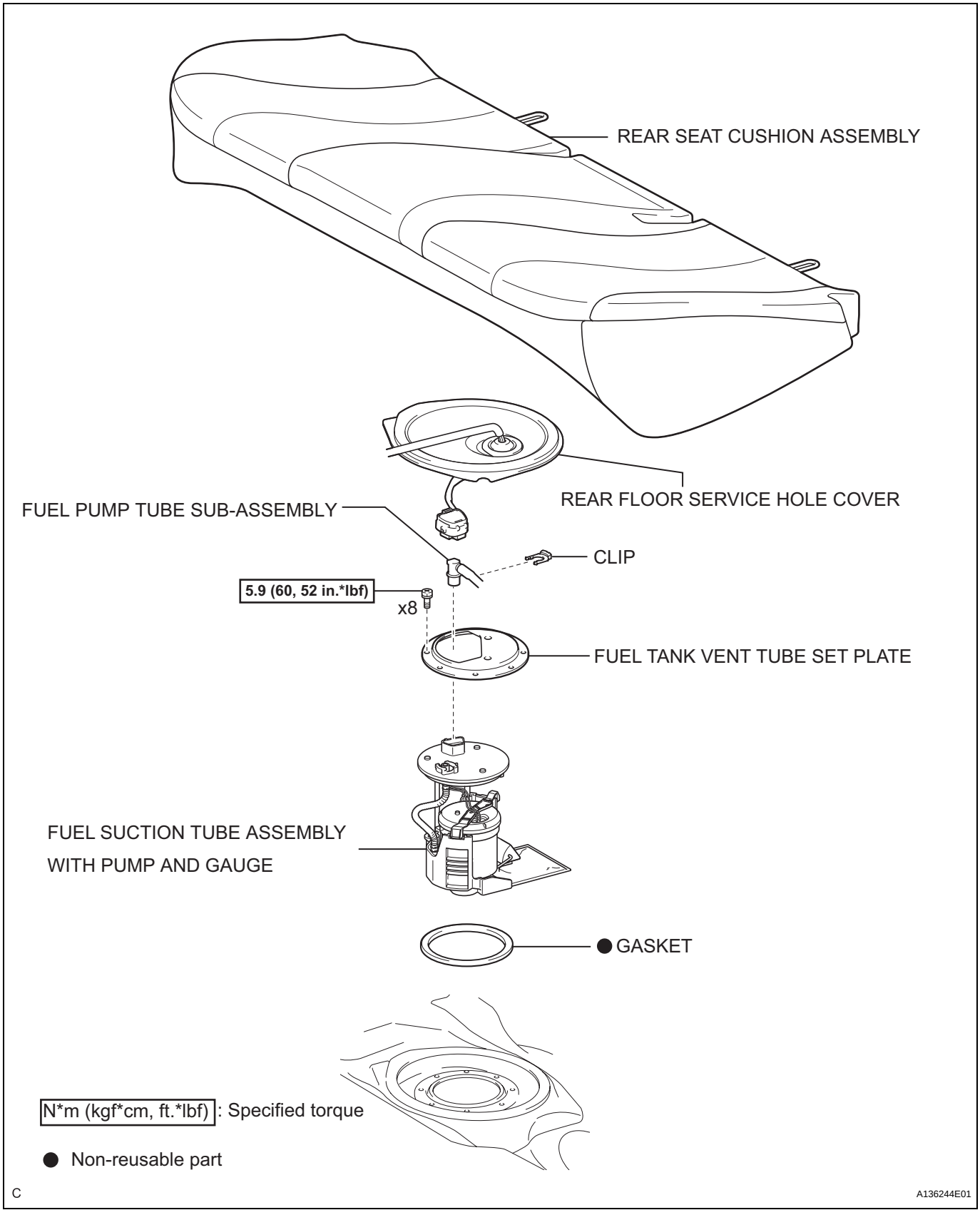
8. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**

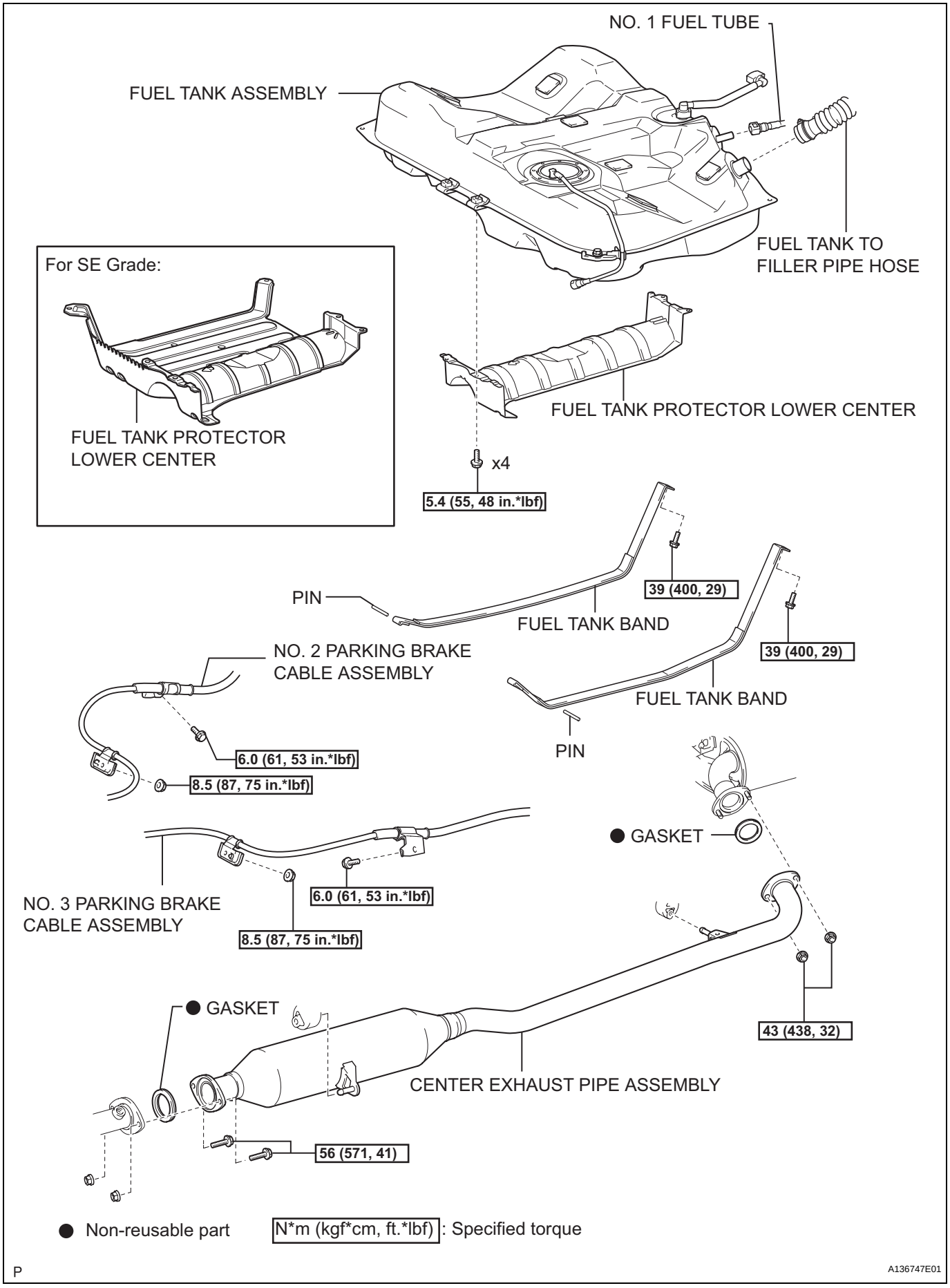
9. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**

FU

FUEL TANK

COMPONENTS





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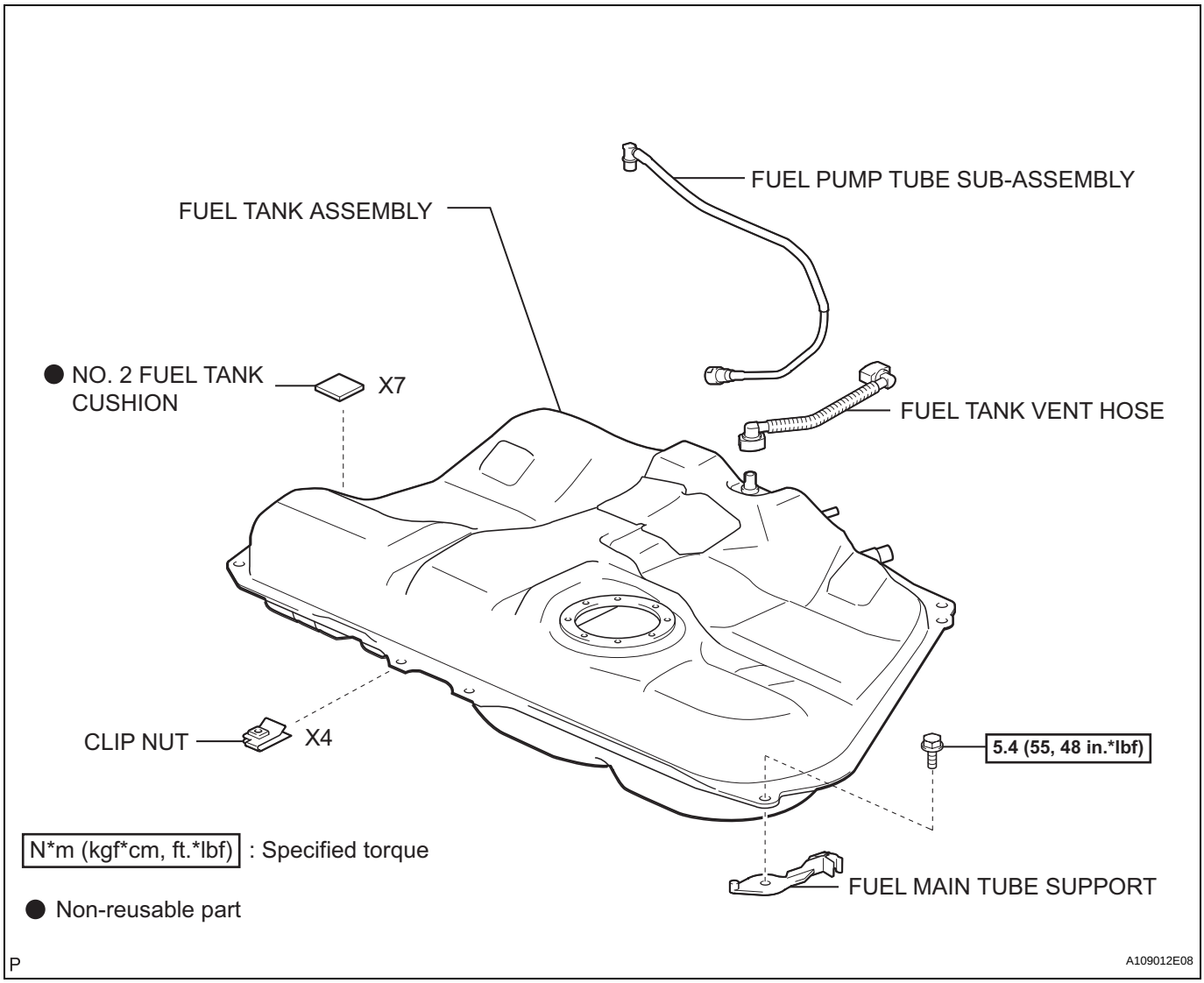
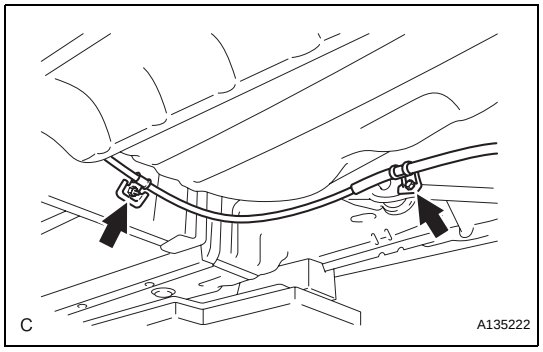
A136747E01

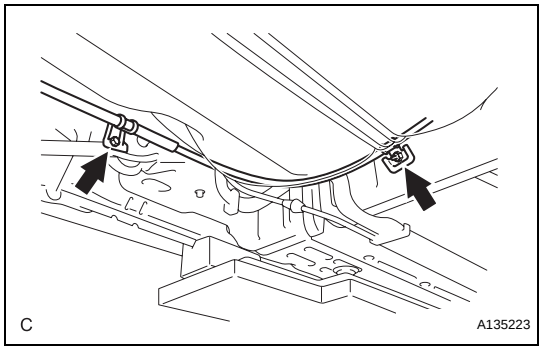

FUEL PUMP TUBE SUB-ASSEMBLY
FUEL TANK ASSEMBLY
● NO. 2 FUEL TANK CUSHION
X7
FUEL TANK VENT HOSE
CLIP NUT
X4
5.4 (55, 48 in.*lbf)
FUEL MAIN TUBE SUPPORT
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
P
A109012E08

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
4. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
5. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
6. **REMOVE REAR FLOOR SERVICE HOLE COVER (See page FU-27)**
7. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-27)**
8. **REMOVE FUEL TANK VENT TUBE SET PLATE (See page FU-28)**
9. **REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-28)**
10. **DRAIN FUEL**
11. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (See page EX-2)**
12. **DISCONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the set bolt and set nut of the No. 2 parking brake cable assembly.



13. **DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the set bolt and set nut of the No. 3 parking brake cable assembly.



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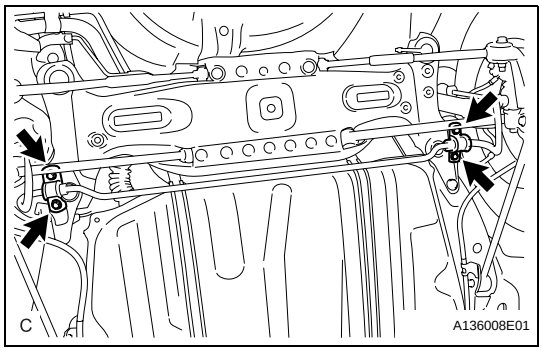
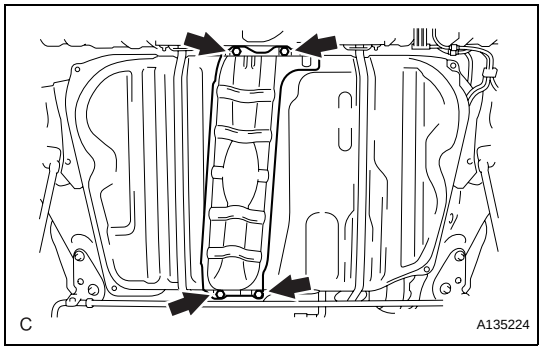


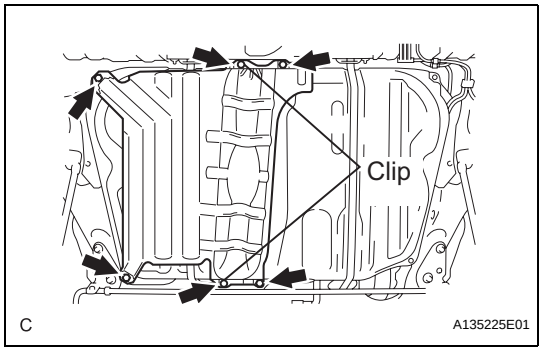
14. REMOVE REAR STABILIZER BAR NO. 1 BRACKET

(a) Remove the 4 bolts and 2 rear stabilizer bar No. 1 brackets.

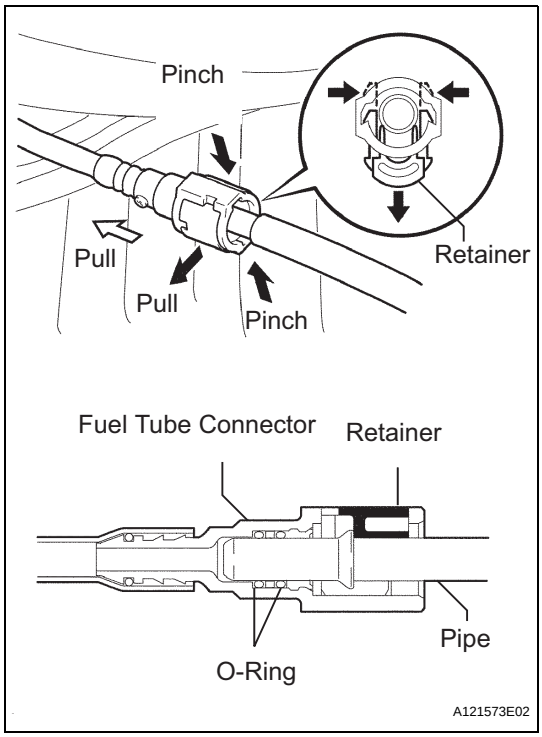


15. REMOVE FUEL TANK PROTECTOR LOWER CENTER

(a) Remove the 4 bolts and fuel tank protector (Except SE Grade).



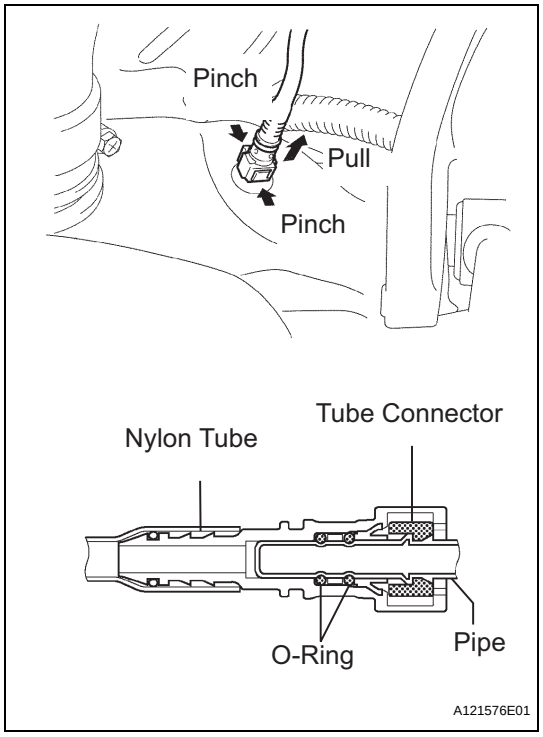
(b) Remove the 4 bolts and 2 clips (for SE Grade).
(c) Remove the fuel tank protector (for SE Grade).



16. REMOVE FUEL TANK ASSEMBLY

(a) Disconnect the fuel pump tube.
  (1) Pinch the tab of the retainer to disengage the lock claws and pull it down as shown in the illustration.
  (2) Pull out the fuel tank main tube.
  NOTICE:
  - **Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector as necessary.**
  - **It is necessary to prevent mud or dirt from entering the quick connector. If mud enters the connector, the O-rings may not seal properly.**
  - **Remove the quick connector by hand.**
  - **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**

- **If the pipe and connector are stuck, try wiggling or pushing and pulling the connector to release it and pull the connector off of the pipe carefully.**

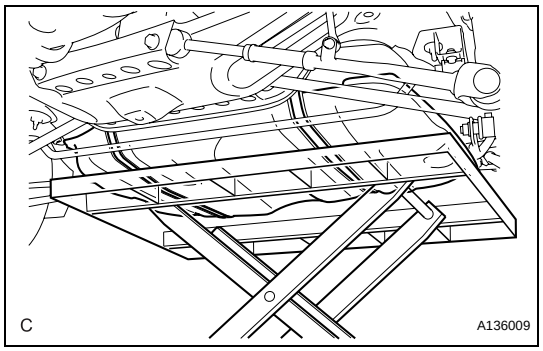


(b) Disconnect the No. 1 fuel tube.

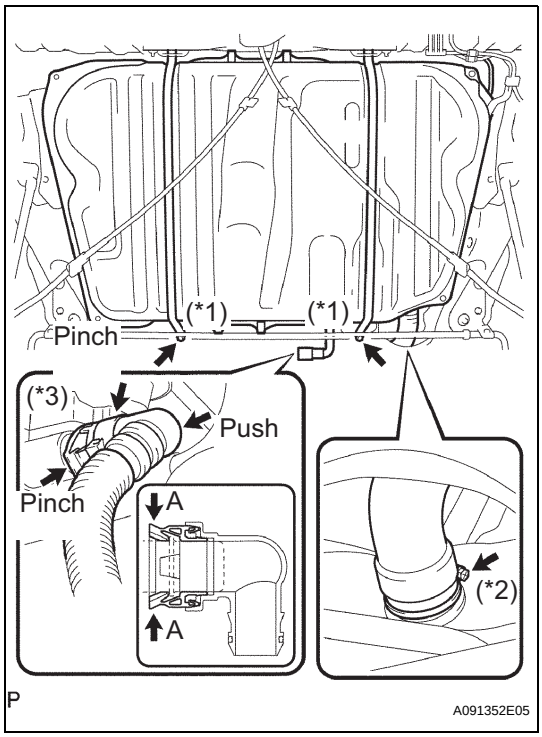
(1) Pinch the tube connector and then pull out the No. 1 fuel tube.

NOTICE:

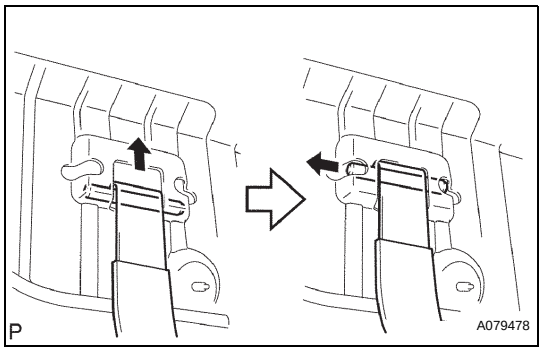
- **Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector if necessary.**
- **It is necessary to prevent mud or dirt from entering the quick connector. If mud enters the connector, the O-rings may not seal properly.**
- **Remove the quick connector by hand.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**
- **If the pipe and connector are stuck, try wiggling or pushing and pulling the connector to release it and pull the connector off of the pipe carefully.**



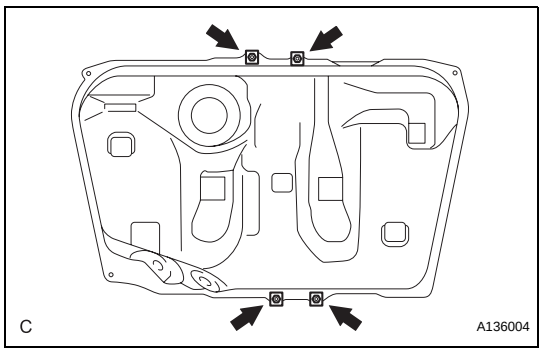
(c) Place a engine lifter under the fuel tank assembly.



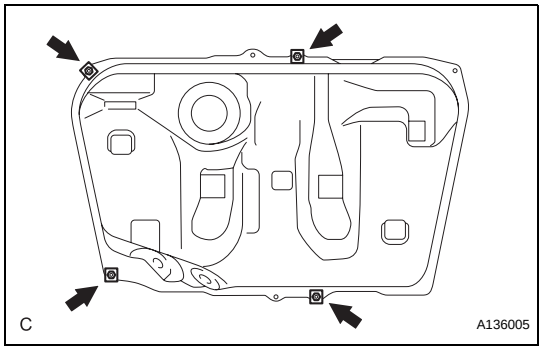
(d) Remove the 2 set bolts of the fuel tank bands. (*1)
(e) Remove the hose clamp and disconnect the fuel tank to filter pipe hose. (*2)
(f) Slightly lower the transmission jack.
(g) Disconnect the fuel tank vent hose from the charcoal canister. (*3)
  (1) Push the connector deep into the charcoal canister to release the locking pin.
  (2) Pinch portion A.
  (3) Pull out the connector.
(h) Remove the fuel tank.



(i) Remove the 2 pins and 2 fuel tank bands as shown in the illustration.

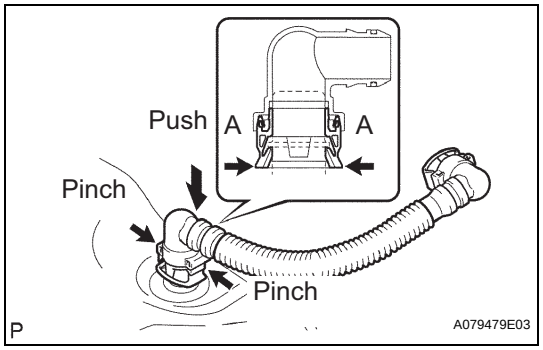


(j) Remove the 4 clip nuts (Except SE Grade).



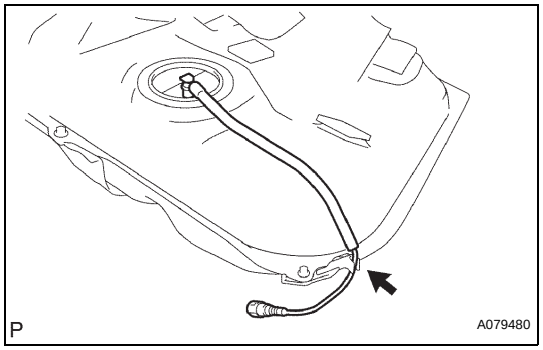
(k) Remove the 4 clip nuts (for SE Grade).

FU



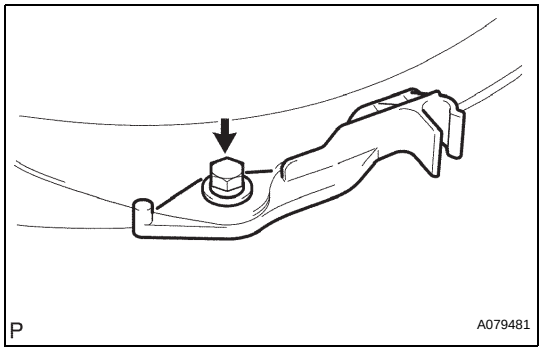
17. REMOVE FUEL TANK VENT HOSE

(a) Push the connector deep into the charcoal canister to release the locking pin.
(b) Pinch portion A.
(c) Pull out the connector.



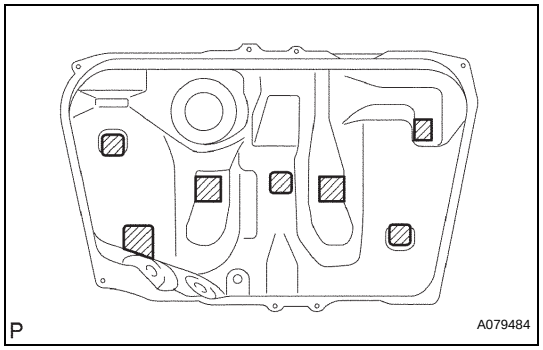
18. REMOVE FUEL PUMP TUBE SUB-ASSEMBLY

(a) Remove the fuel pump tube from the fuel main tube support.



19. REMOVE FUEL MAIN TUBE SUPPORT

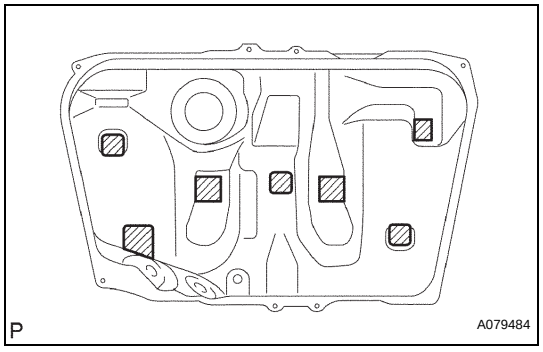
(a) Remove the bolt and tube support.



20. REMOVE NO. 2 FUEL TANK CUSHION

(a) Remove the 7 No. 2 fuel tank cushions.

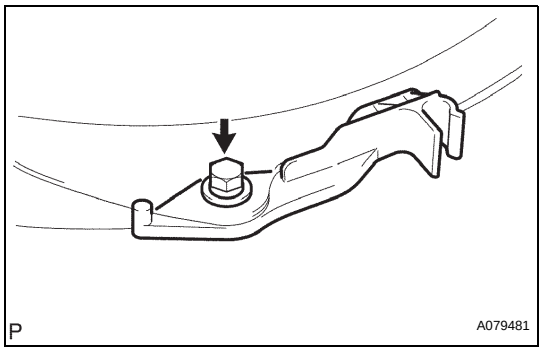
INSTALLATION



1. INSTALL NO. 2 FUEL TANK CUSHION

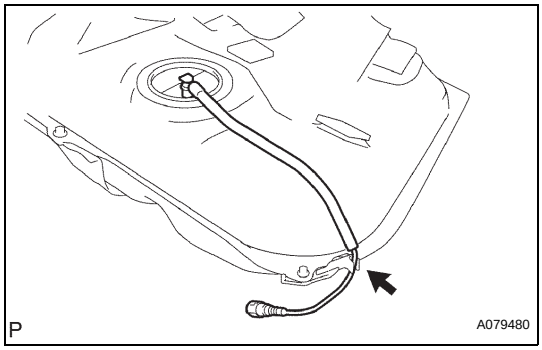
(a) Install 7 new No. 2 fuel tank cushions to the fuel tank.

FU



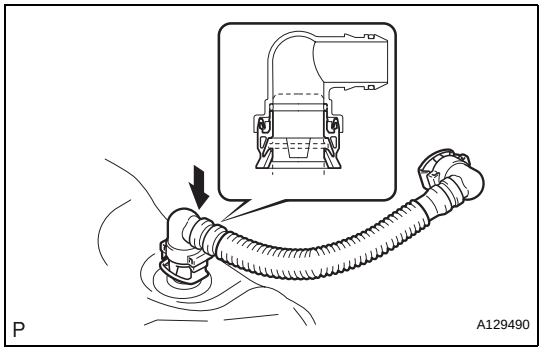
2. INSTALL FUEL MAIN TUBE SUPPORT

(a) Install the fuel main tube support with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



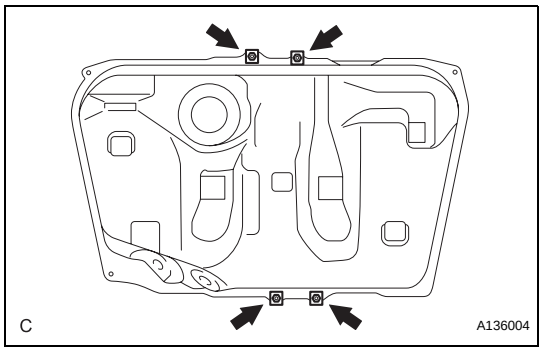
3. INSTALL FUEL PUMP TUBE SUB-ASSEMBLY

(a) Install the fuel pump tube to the fuel main tube support.



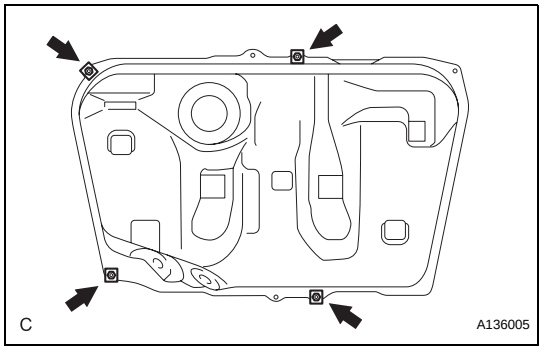
4. INSTALL FUEL TANK VENT HOSE

(a) Install the fuel tank vent hose.

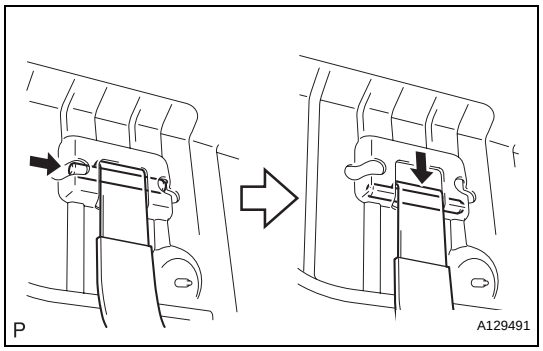


5. INSTALL FUEL TANK ASSEMBLY

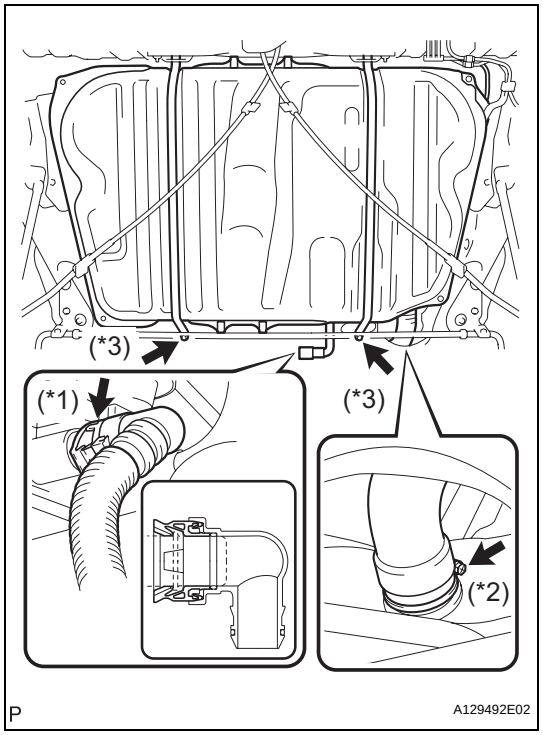
(a) Install the 4 clip nuts (Except SE Grade).



(b) Install the 4 clip nuts (for SE Grade).

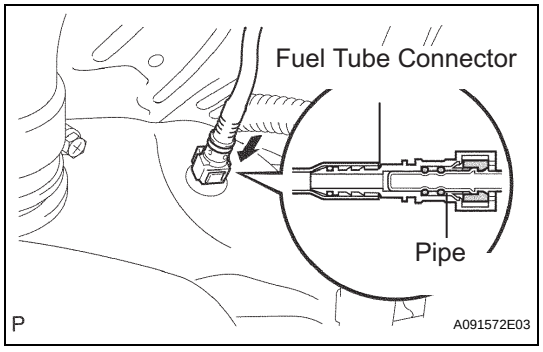


(c) Install the 2 fuel tank bands with the 2 pins.
(d) Set the fuel tank assembly onto the transmission jack.

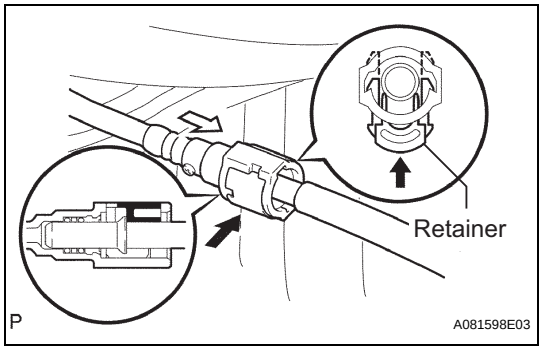


(e) Raise the transmission jack so that the fuel tank vent hose can be connected. (*1)
NOTICE:
Slowly raise the jack to prevent the fuel tank assembly from dropping.
(f) Connect the fuel tank inlet pipe with the fuel filter pipe clamp. (*2)
(g) Tighten the 2 set bolts of the fuel tank bands. (*3)
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)

FU

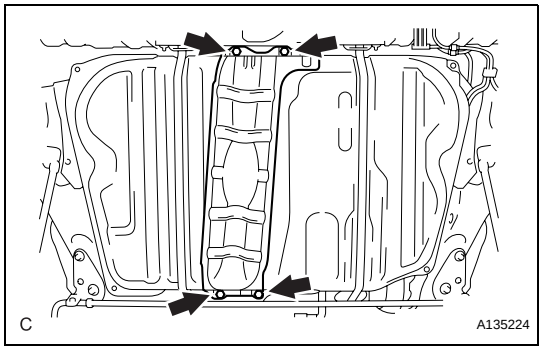


(h) Connect the No. 1 fuel tube.
(1) Push the fuel tube connector into the pipe until the fuel tube connector makes a "click" sound.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**
- **After connecting, check if the fuel tube connector and the pipe are securely connected by pulling on them.**



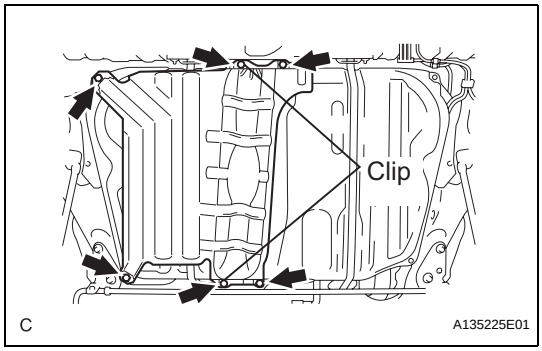
(i) Connect the fuel pump tube.
(1) Push the fuel connector into the pipe and push up the retainer so that the claws engage.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**

- **After connecting, check if the fuel tube connector and the pipe are securely connected by pulling on them.**



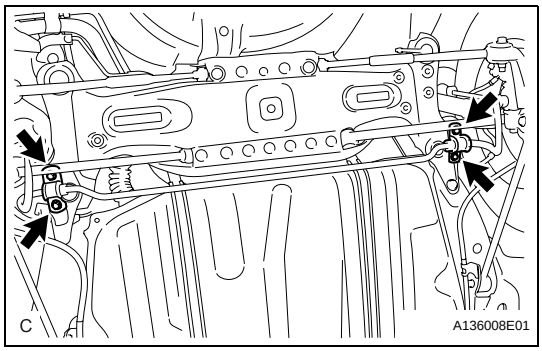
6. INSTALL FUEL TANK PROTECTOR LOWER CENTER

(a) Install the 4 bolts and fuel tank protector (Except SE Grade).
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



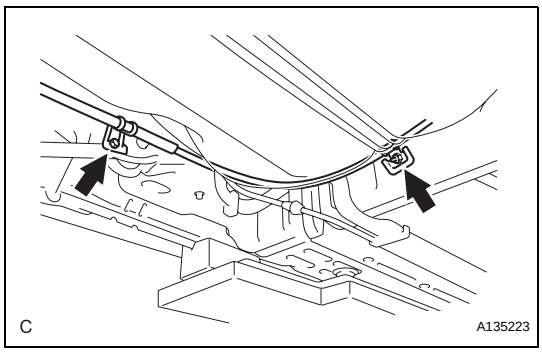
(b) Install the fuel tank protector with the 4 bolts and 2 clips (for SE Grade).
Torque: Bolt
5.4 N*m (55 kgf*cm, 48 in.*lbf)

FU



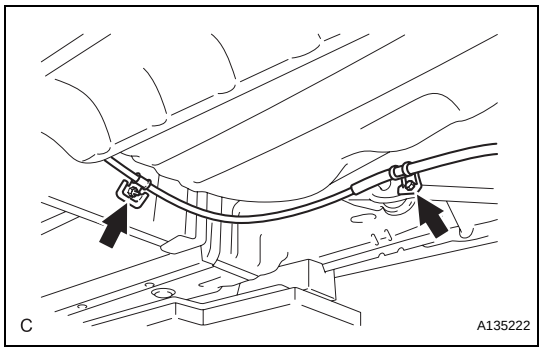
7. INSTALL REAR STABILIZER BAR NO. 1 BRACKET

(a) Install the 2 rear stabilizer bar No. 1 brackets with the 4 bolts.
Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)



8. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

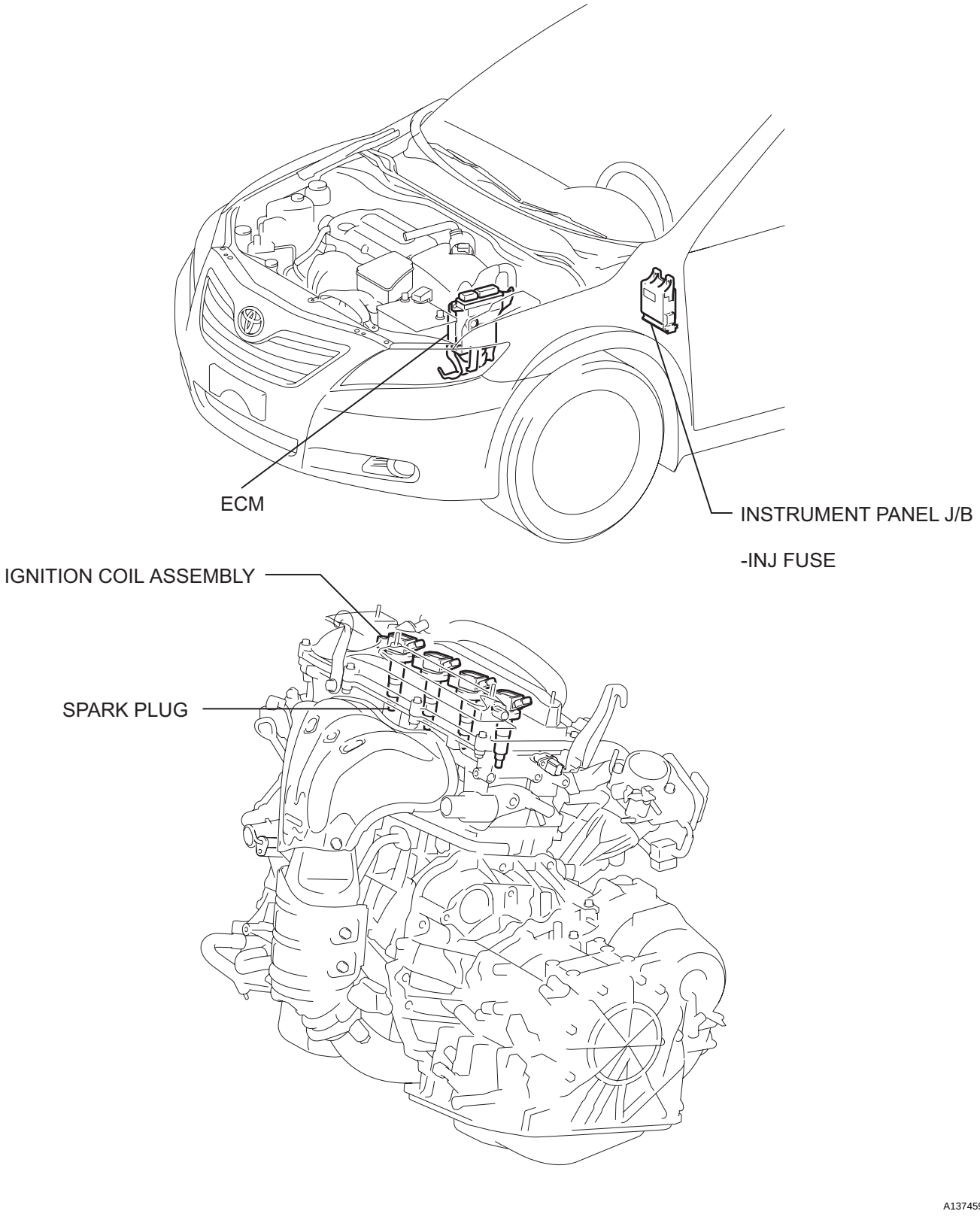
(a) Install the No. 3 parking brake cable assembly with the bolt and nut.
Torque: Bolt
6.0 N*m (61 kgf*cm, 53 in.*lbf)
Nut
8.5 N*m (87 kgf*cm, 75 in.*lbf)



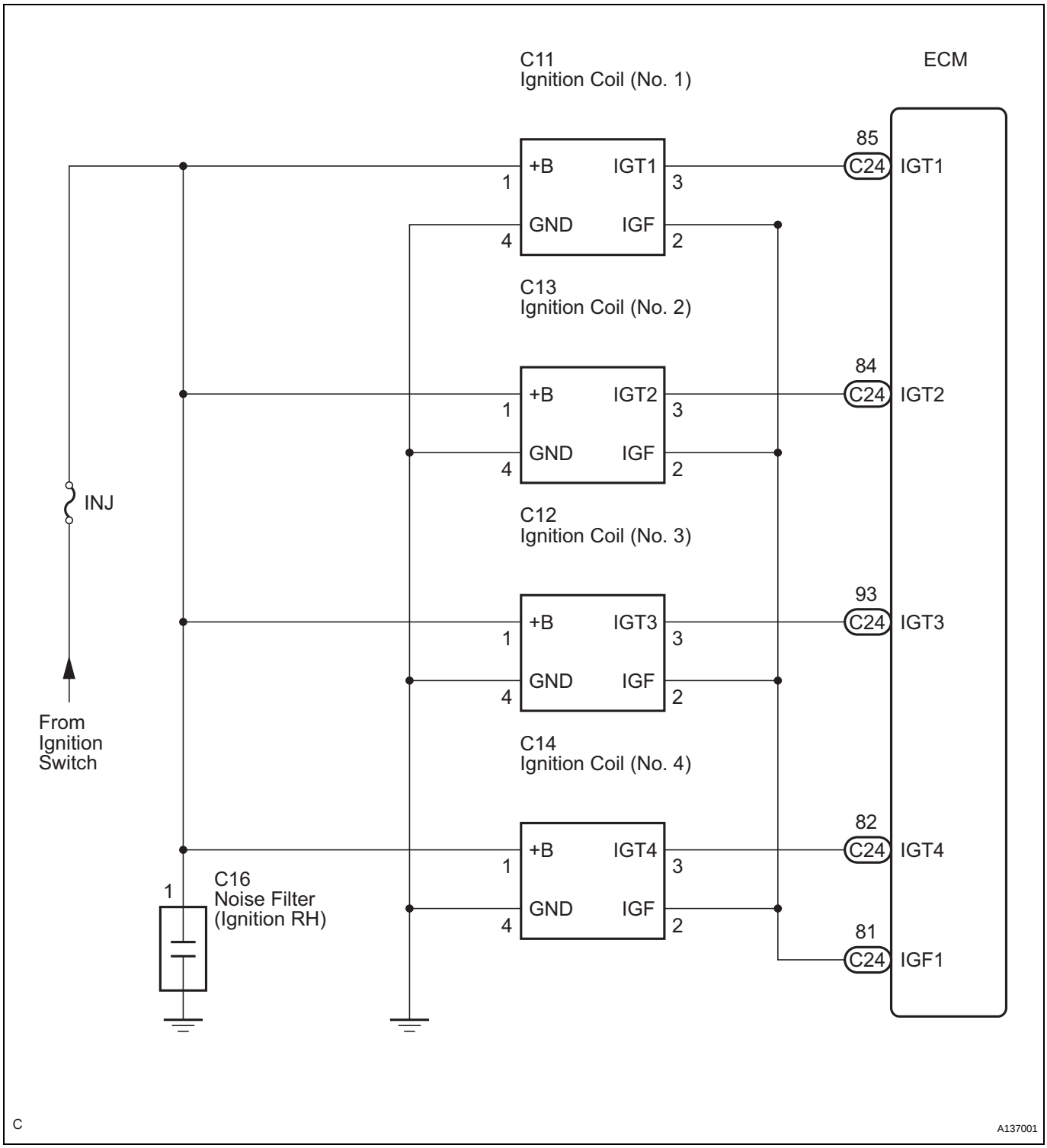
9. **INSTALL NO. 2 PARKING BRAKE CABLE ASSEMBLY**
   (a) Install the No. 2 parking brake cable assembly with the bolt and nut.
   Torque: Bolt
   6.0 N*m (61 kgf*cm, 53 in.*lbf)
   Nut
   8.5 N*m (87 kgf*cm, 75 in.*lbf)
10. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (See page EX-4)**
11. **INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-32)**
12. **INSTALL FUEL TANK VENT TUBE SET PLATE (See page FU-32)**
13. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-33)**
14. **ADD FUEL**
15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
16. **CHECK FOR FUEL LEAKS (See page FU-8)**
17. **CHECK FOR EXHAUST GAS LEAKS**
18. **INSTALL REAR FLOOR SERVICE HOLE COVER**
19. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
20. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**
21. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**

IGNITION SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM



ON-VEHICLE INSPECTION

1. CHECK IGNITION COIL ASSEMBLY AND PERFORM SPARK TEST

NOTICE:

In this section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

(a) Check for DTCs.

NOTICE:

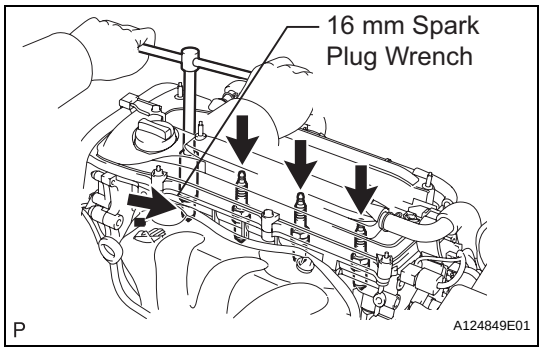
If any DTC is present, perform troubleshooting in accordance with the procedure for that DTC.

(b) Check that sparks occur.

(1) Remove the No. 1 engine cover.

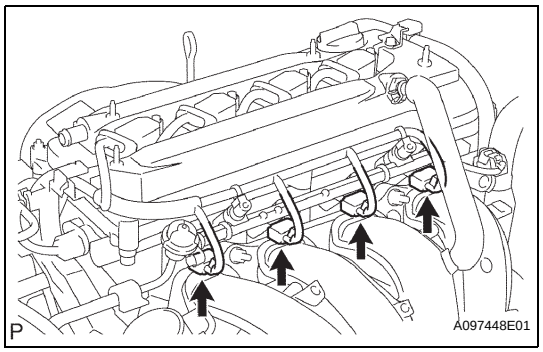
(2) Disconnect the 4 ignition coil connectors and remove the 4 bolts and ignition coils.

(3) Using a 16 mm (0.63 in.) spark plug wrench, remove the 4 spark plugs.



(4) Disconnect the 4 fuel injector connectors.

(5) Install the spark plug to each ignition coil, and connect the ignition coil connectors.

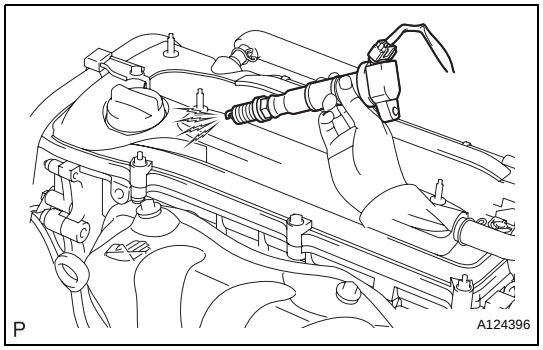


(6) Ground the spark plug.

(7) Check if a spark occurs at each spark plug while the engine is being cranked.

NOTICE:

- **Be sure to ground the spark plugs when checking.**
- **Replace the ignition coil if it receives an impact.**
- **Do not crank the engine for more than 2 seconds.**



IG

(c) Perform the spark test according to the flowchart below.

(1) Check that the ignition coil connector is securely connected.

Result

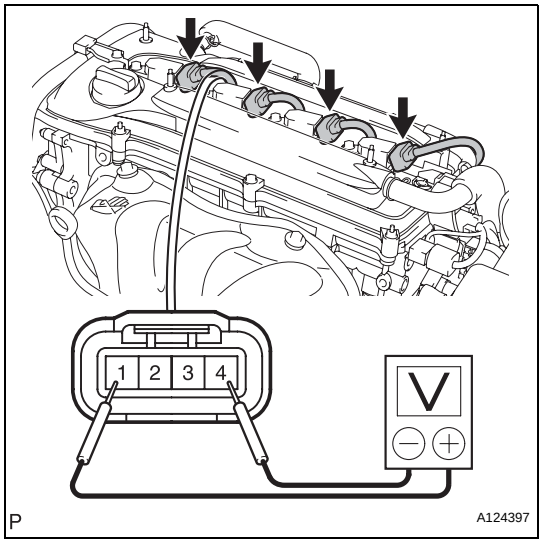
Result	Proceed to
NG	Connect securely
OK	Go to next step

(2) Perform the spark test on each ignition coil.

1. Replace the ignition coil with a normal one.
2. Perform the spark test again.

Result

Result	Proceed to
OK	Replace ignition coil
NG	Go to next step



(3) Check the power supply to the ignition coil.

1. Turn the ignition switch to the ON position.
2. Measure the voltage between the terminals of the wire harness side connector.

Standard voltage

Tester Connection	Specified Condition
1 (+B) - 4 (GND)	9 to 14 V

Result

Result	Proceed to
NG	Check wire harness and connector
OK	Go to next step

(4) Measure the resistance of the camshaft position sensor.

Standard resistance

Temperature	Specified Condition
Cold	835 to 1,400 Ω
Hot	1,060 to 1,645 Ω

Result

Result	Proceed to
NG	Replace camshaft position sensor
OK	Go to next step

(5) Measure the resistance of the crankshaft position sensor.

Standard resistance

Temperature	Specified Condition
Cold	985 to 1,600 Ω
Hot	1,265 to 1,890 Ω

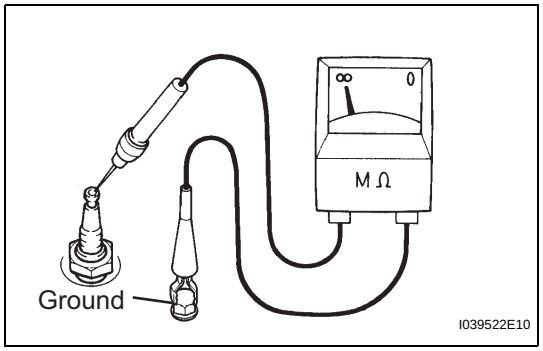
Result

Result	Proceed to
NG	Replace crankshaft position sensor
OK	Go to next step

(6) Check the IGT signal from the ECM.
Result

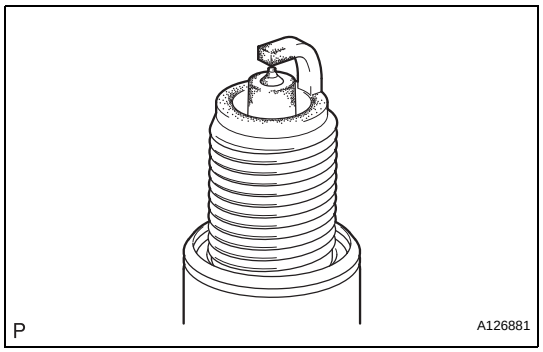
Result	Proceed to
NG	Check ECM (see page ES-188)
OK	Repair wiring between ignition coil and ECM

(7) Using a 16 mm (0.63 in.) plug wrench, install the spark plug.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
(8) Install the 4 ignition coils with the 4 bolts and connect the 4 ignition coil connectors.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
(9) Connect the 4 fuel injector connectors.
(10) Install the No. 1 engine cover.



2. CHECK SPARK PLUG

(a) Check the electrode.
(1) Using a megohmmeter, measure the insulation resistance.
Standard insulation resistance:
10 MΩ or more
HINT:
- If a megohmmeter is not available, perform the following simple inspection instead.
- If the result is 10 MΩ or less, clean the plug and measure the resistance again.

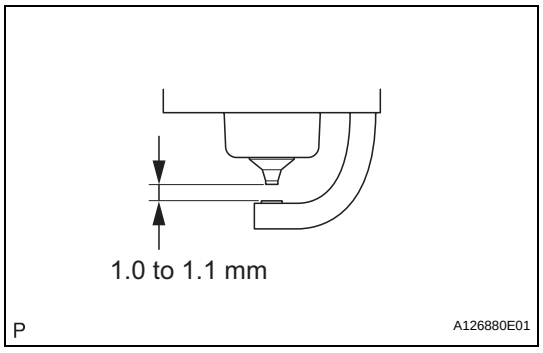


(b) Alternative inspection method:
(1) Quickly accelerate the engine to 4,000 rpm 5 times.
(2) Remove the spark plug.
(3) Visually check the spark plug.
If the electrode is dry, the spark plug is functioning properly. If the electrode is damp, proceed to the next step.

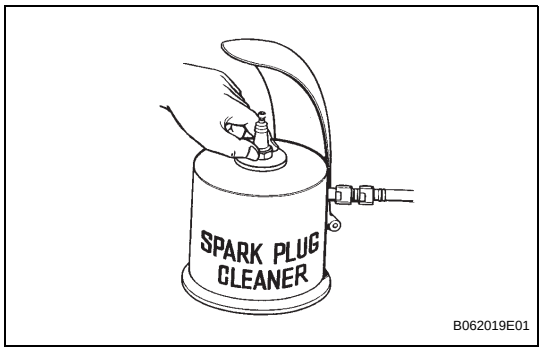
(c) Check the spark plug for any damage to its threads and insulator.
If there is damage, replace the spark plug.
Recommended spark plug

Manufacturer	Spark plug type
DENSO	SK20R11
NGK	IFR6A11

(d) Check the spark plug electrode gap.
Maximum electrode gap for used spark plug:
1.3 mm (0.051 in.)
If the gap is greater than the maximum, replace the spark plug.
Electrode gap for new spark plug:
1.0 to 1.1 mm (0.039 to 0.043 in.)



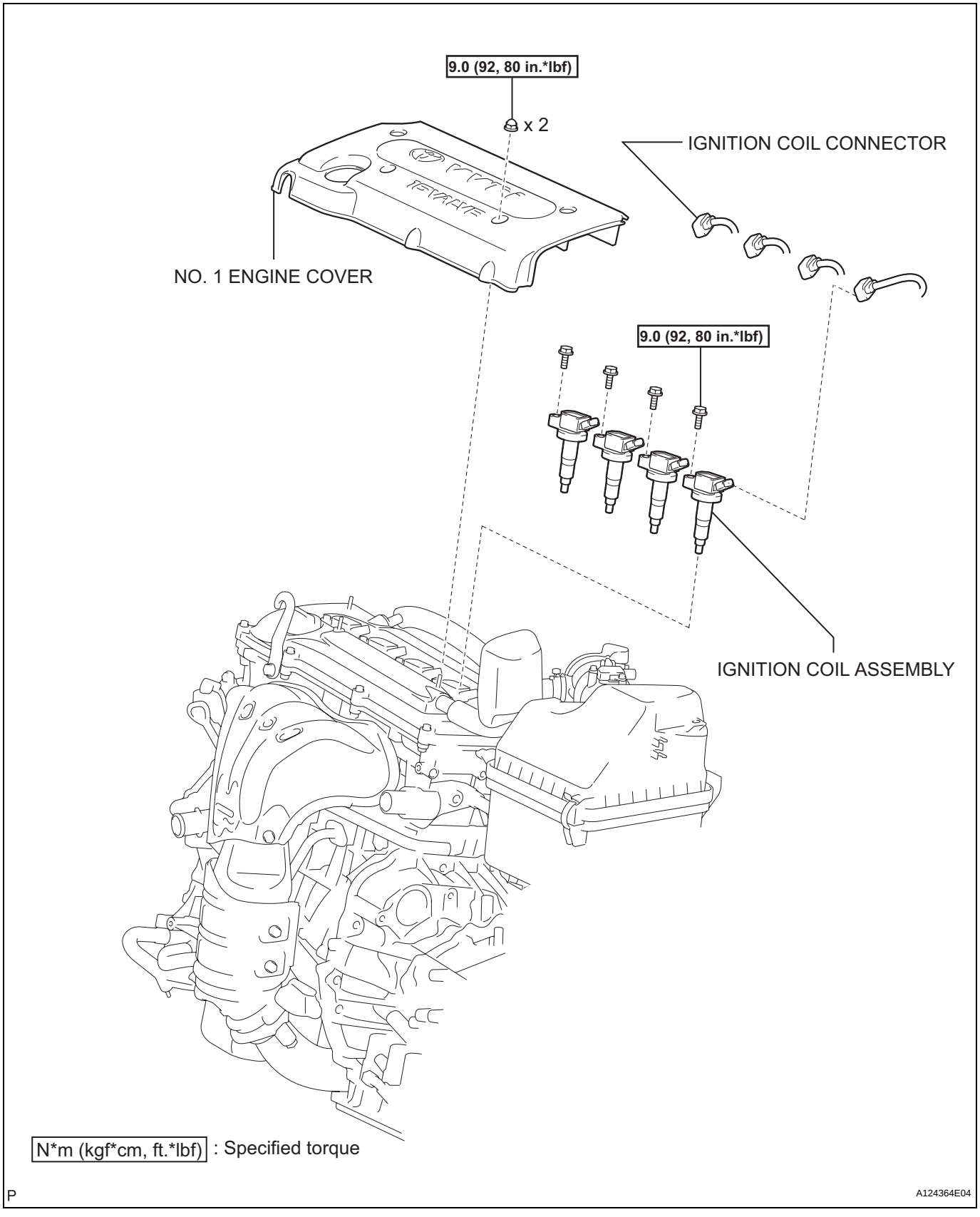
IG



(e) Clean the spark plugs.
If the electrode has traces of wet carbon, clean the electrode with a spark plug cleaner and then dry it.
Standard air pressure:
588 kPa (6 kgf*cm^2, 85 psi)
Standard duration:
20 seconds or less
HINT:
Only use the spark plug cleaner when the electrode is free of oil. If the electrode has traces of oil, use gasoline to clean off the oil before using the spark plug cleaner.

IGNITION COIL

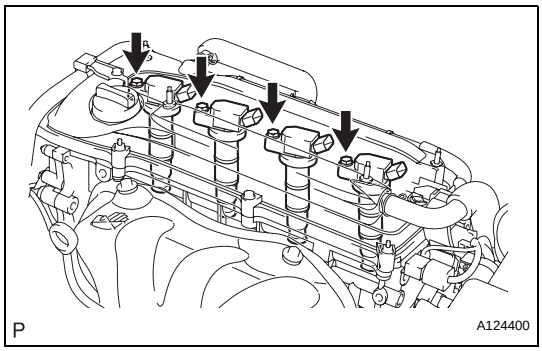
COMPONENTS

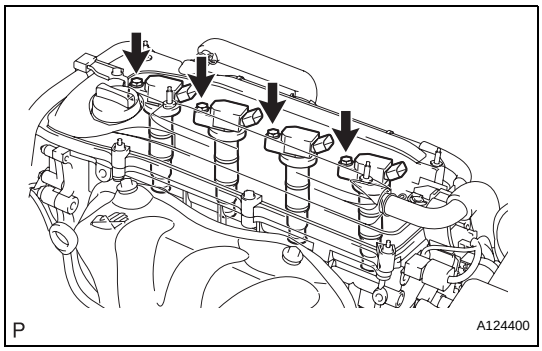


IG

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE NO. 1 ENGINE COVER (See page EM-94)**
3. **REMOVE IGNITION COIL ASSEMBLY**
   (a) Disconnect the 4 ignition coil connectors.
   (b) Remove the 4 bolts and 4 ignition coils.





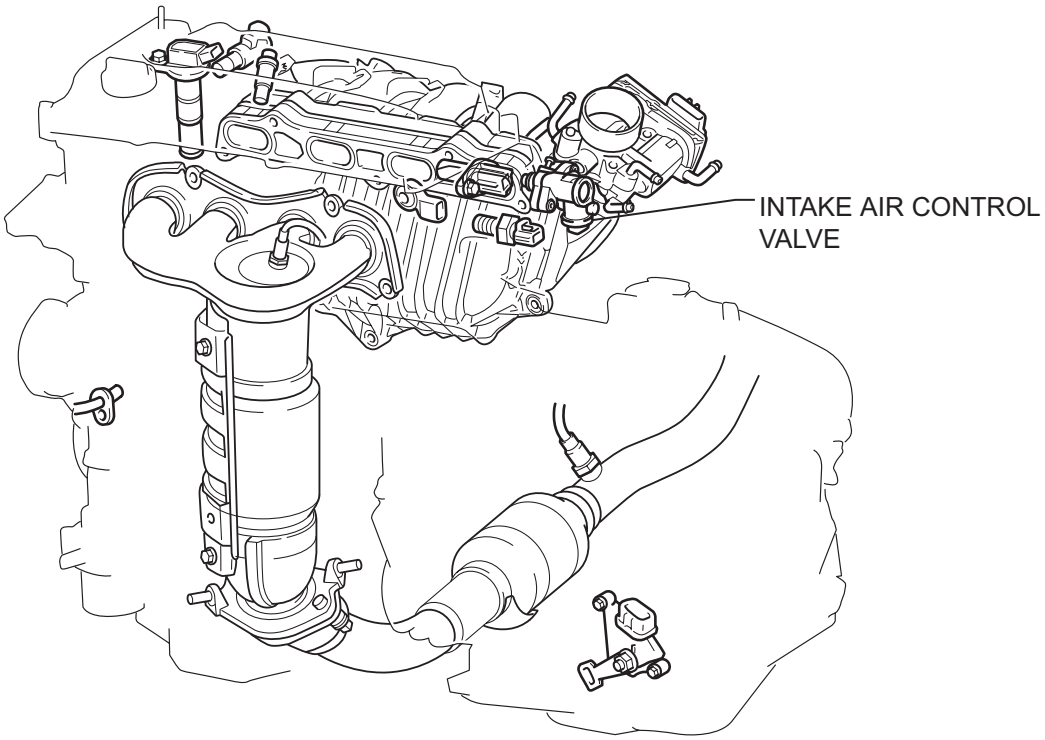
INSTALLATION

1. **INSTALL IGNITION COIL ASSEMBLY**
   (a) Install the 4 ignition coils with the 4 bolts.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
   (b) Connect the 4 ignition coil connectors.
2. **INSTALL NO. 1 ENGINE COVER (See page EM-121)**
3. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**

INTAKE AIR CONTROL SYSTEM

PARTS LOCATION

for PZEV:



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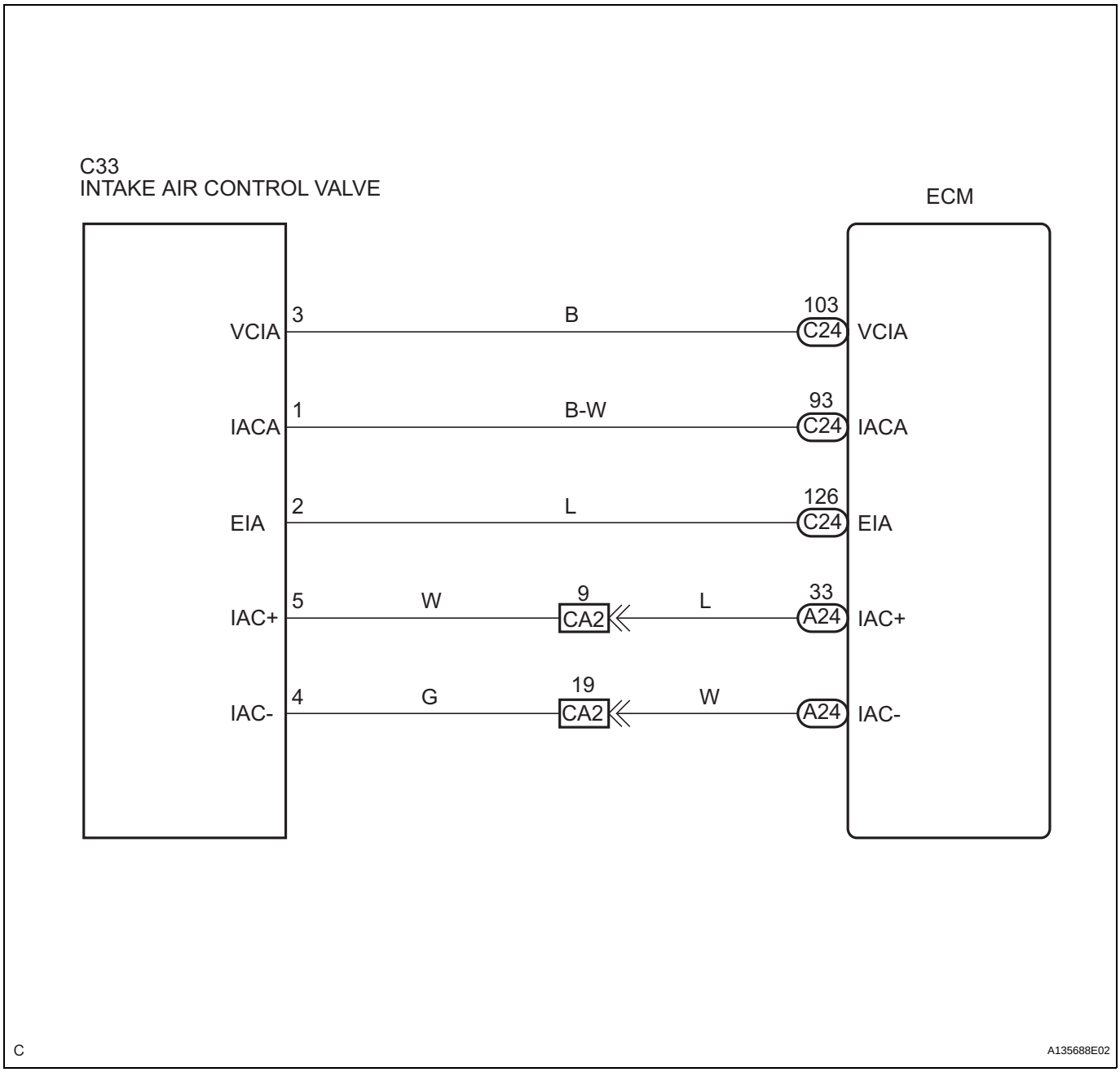
A135059E06

SYSTEM DIAGRAM



IT

ON-VEHICLE INSPECTION

1. INSPECT INTAKE AIR CONTROL VALVE ASSEMBLY

(a) Inspection procedure when using the intelligent tester:

(1) Warm up the engine.

(2) Stop the engine.

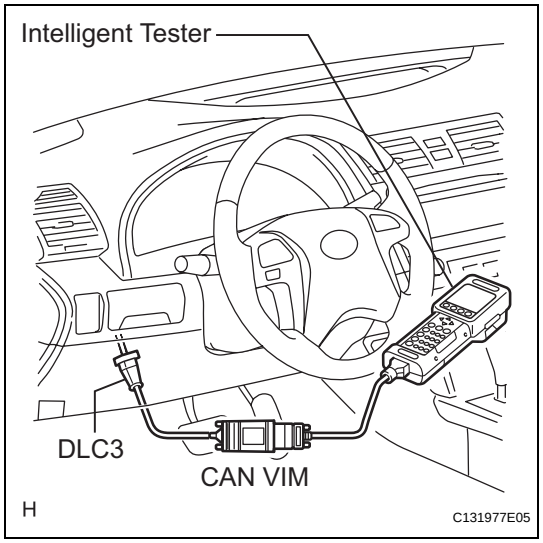
(3) Connect the intelligent tester to the DLC3.

(4) Turn the ignition switch on (IG).

(5) Turn the tester on.

(6) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INTAKE CTL VSV1. Press the right or left button.

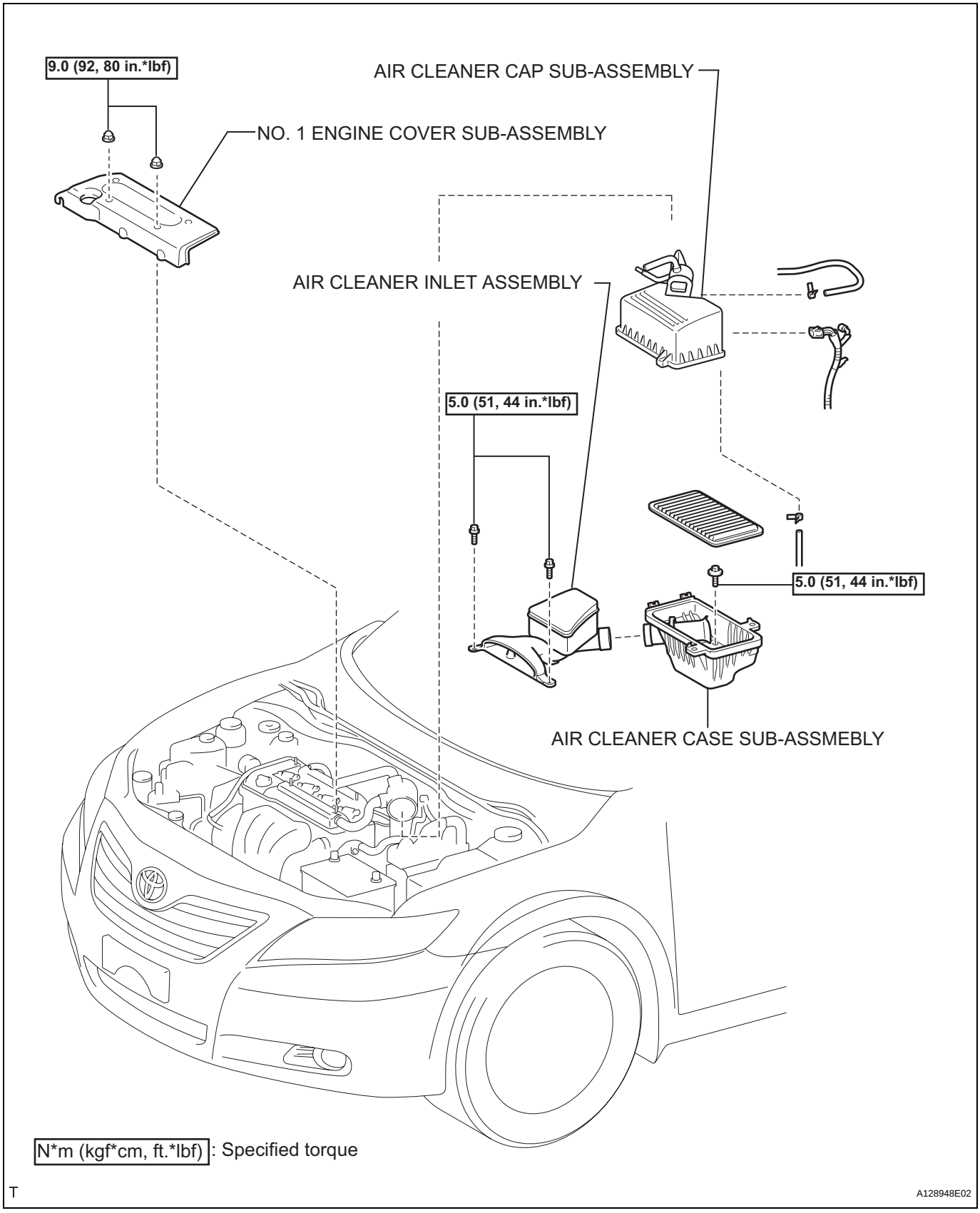
(7) Make sure that a clicking sound is heard from the intake air control valve when current flows. If the result is not as specified, replace the intake air surge tank.



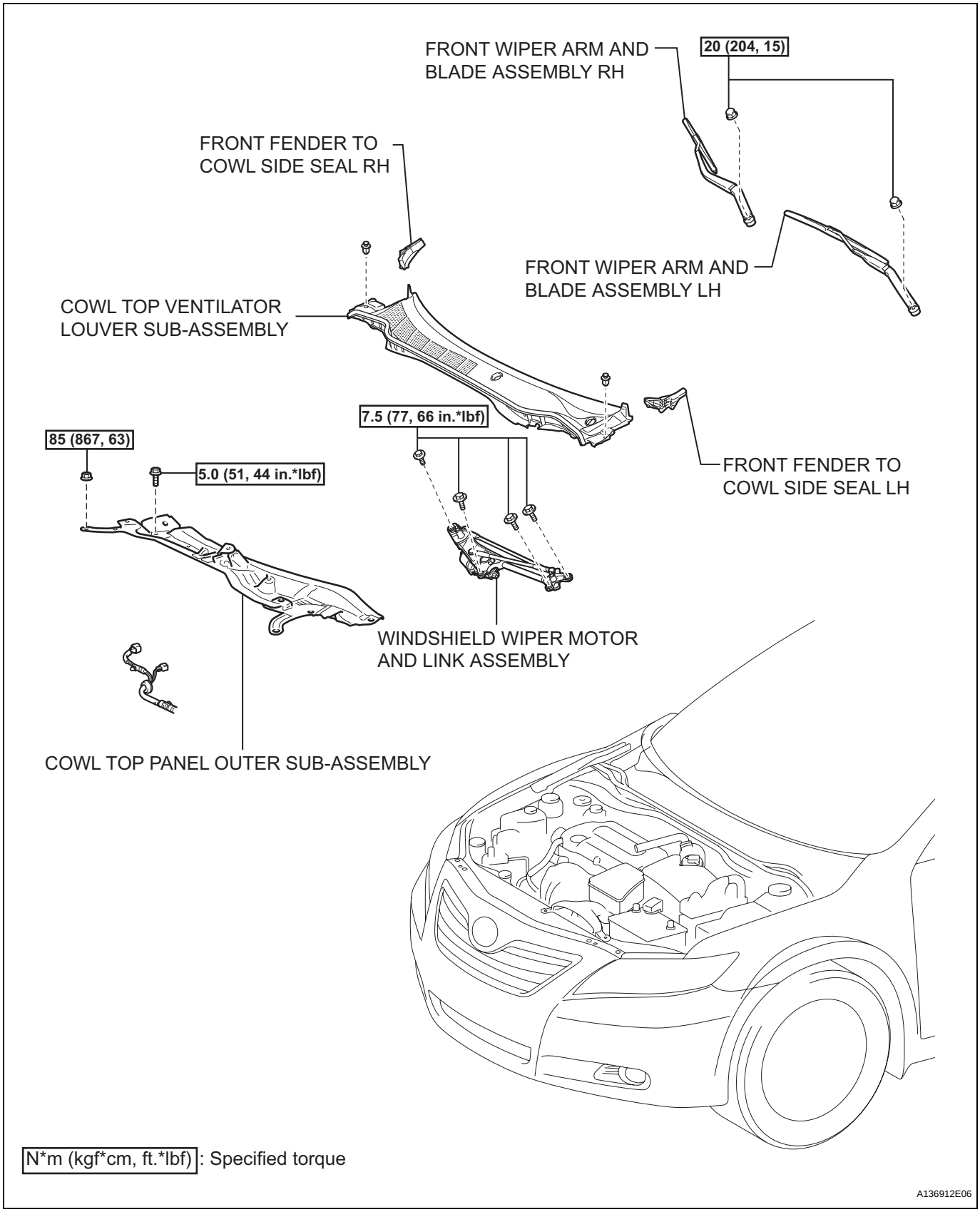
IT

INTAKE AIR CONTROL VALVE

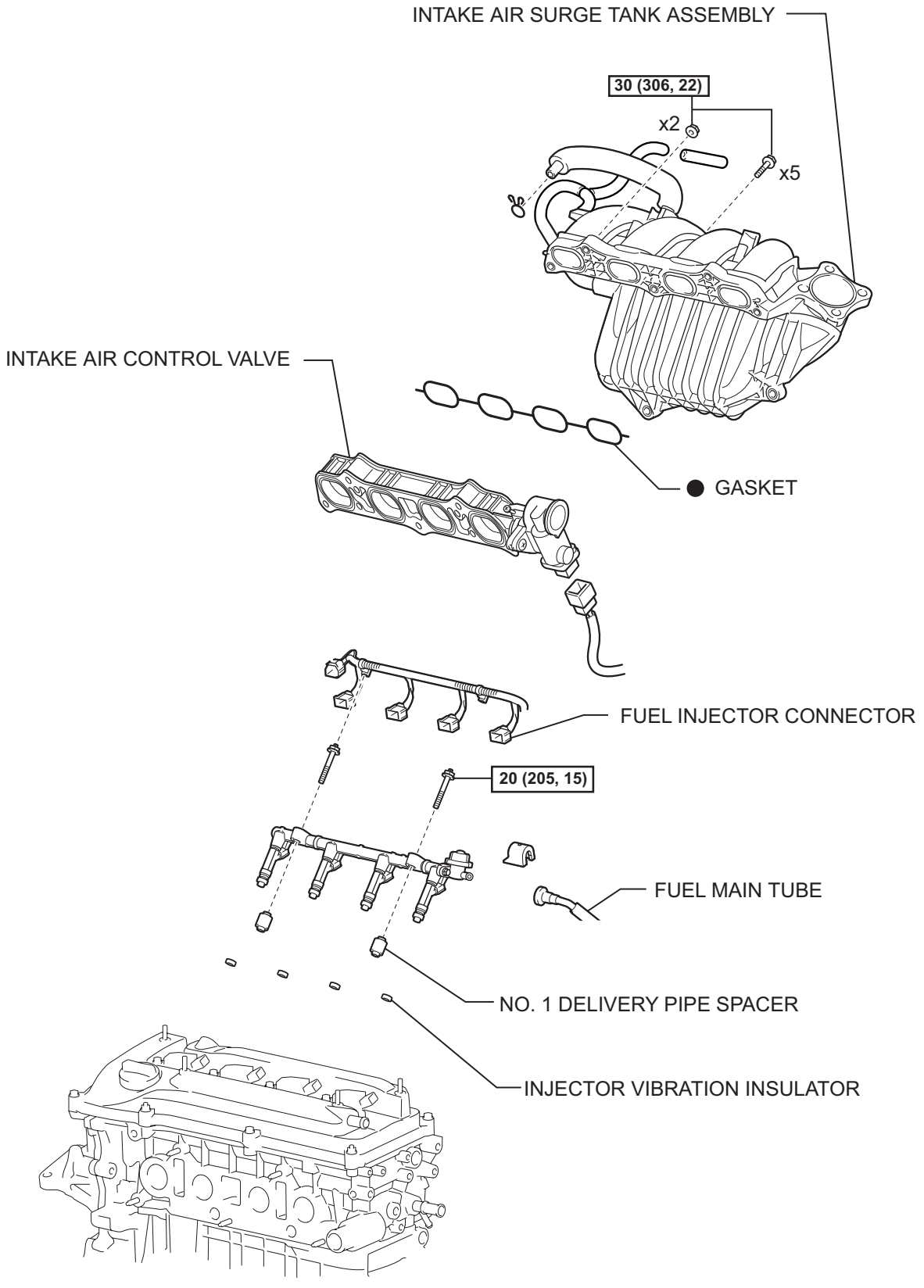
COMPONENTS



IT


FRONT WIPER ARM AND BLADE ASSEMBLY RH
20 (204, 15)
FRONT FENDER TO COWL SIDE SEAL RH
FRONT WIPER ARM AND BLADE ASSEMBLY LH
COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY
7.5 (77, 66 in.*lbf)
85 (867, 63)
5.0 (51, 44 in.*lbf)
FRONT FENDER TO COWL SIDE SEAL LH
WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY
COWL TOP PANEL OUTER SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
A136912E06

IT



IT

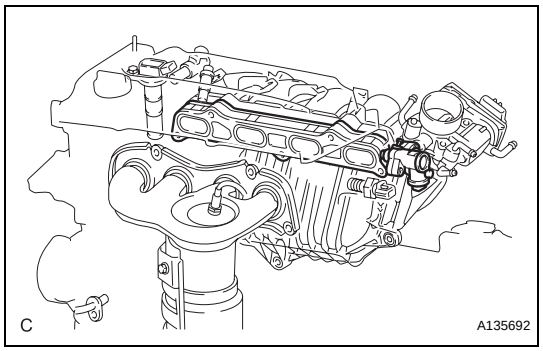
N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

C

A135660E04

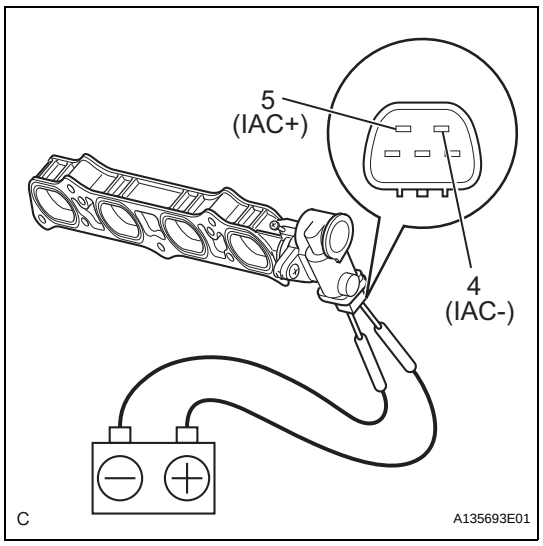
REMOVAL

1. **REMOVE INTAKE AIR SURGE TANK ASSEMBLY**
   HINT:
   (See page ES-510)
2. **REMOVE INTAKE AIR CONTROL VALVE**
   (a) Remove the intake air control valve.



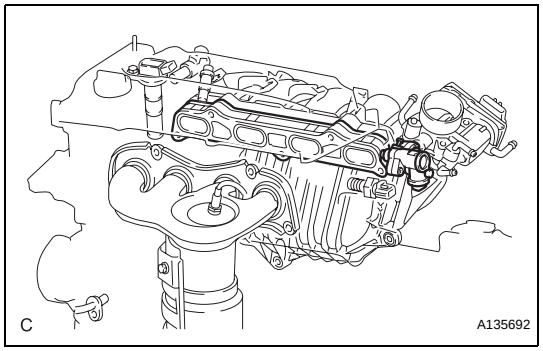
INSPECTION

1. **INSPECT INTAKE AIR CONTROL VALVE**
   (a) Inspection procedure when applying voltage between the terminals:
      (1) Apply battery voltage between terminals 4 (IAC+) and 5 (IAC-) of the intake air control valve. The actuator should continue to keep the valve open.



INSTALLATION

1. **INSTALL INTAKE AIR CONTROL VALVE**
   (a) Install the intake air control valve.
2. **INSTALL INTAKE AIR SURGE TANK ASSEMBLY**
   HINT:
   (See page ES-511)



IT

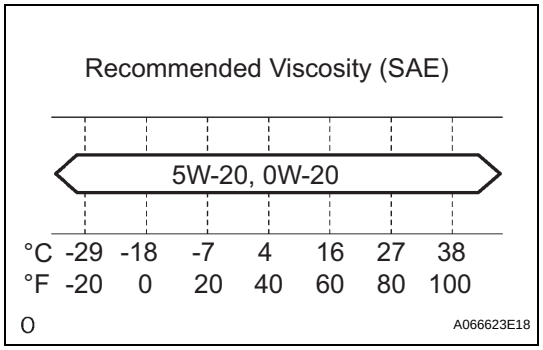
LUBRICATION SYSTEM

ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

(a) Warm up the engine, stop the engine and wait for 5 minutes.

(b) Check that the engine oil level is between the L and F marks of the oil dipstick.
If low, check for leakage and add oil up to the F mark.
NOTICE:
Do not add engine oil above the F mark.



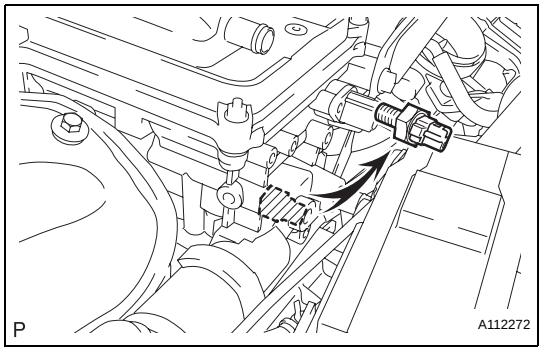
2. CHECK ENGINE OIL QUALITY

(a) Check the oil for deterioration, water intrusion, discoloration or thinning.
If the quality is visibly poor, replace the oil.
Oil grade:
Use ILSAC multigrade engine oil. SAE 5W-20 and SAE 0W-20 engine oil may be used. However, SAE 0W-20 is the best choice for good fuel economy and good starting in cold weather.

3. CHECK OIL PRESSURE

(a) Disconnect the oil pressure switch connector.

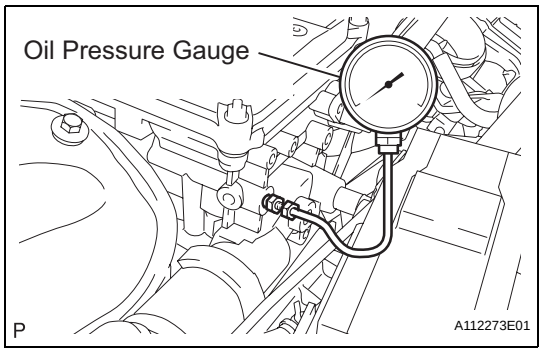
(b) Using a 24 mm deep socket wrench, remove the oil pressure switch.



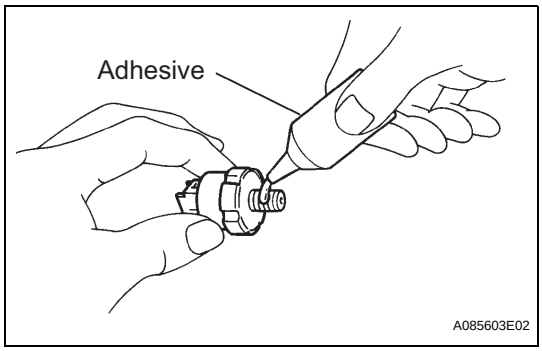
(c) Install the oil pressure gauge.

(d) Warm up the engine.

(e) Measure the oil pressure.
Standard oil pressure



Condition	Specified Condition
Idle	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
3,000 rpm	170 to 300 kPa (1.7 to 3.1 kgf/cm^2, 24 to 44 psi)



(f) Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent

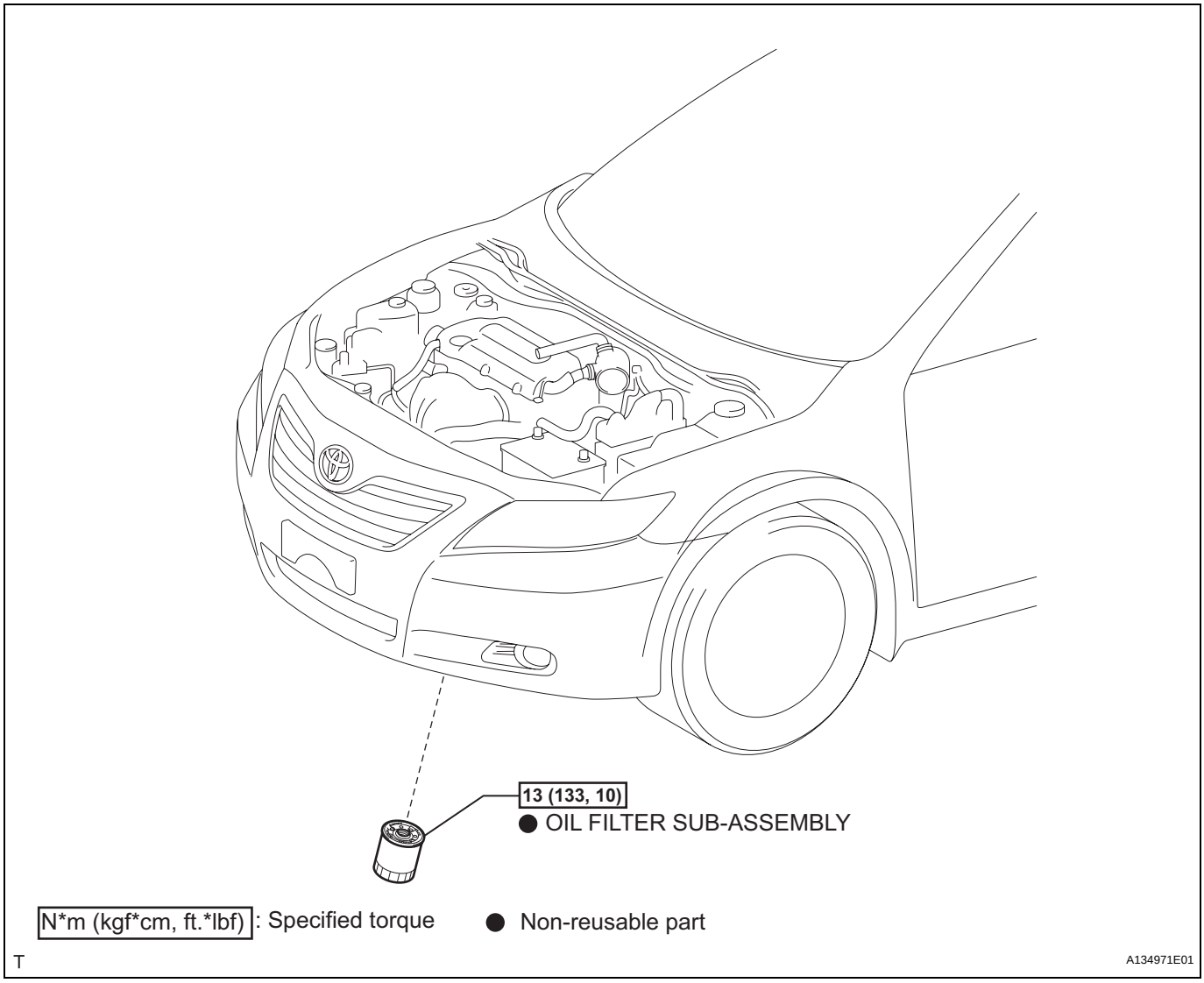
(g) Using a 24 mm deep socket wrench, install the oil pressure switch.
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)
NOTICE:
Do not start the engine within 1 hour of installation.

(h) Connect the oil pressure switch connector.

(i) Check for engine oil leaks.

OIL FILTER

COMPONENTS



REPLACEMENT

CAUTION:

- **Prolonged and repeated contact with engine oil will cause the loss of natural oils from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Precautions should be taken when replacing engine oil to minimize the risk of your skin making contact with used engine oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use a waterless hand cleaner to remove any used engine oil. Do not use gasoline, thinners or solvents.**
- **For environmental protection, used oil and used oil filters must be disposed of at designated disposal sites.**

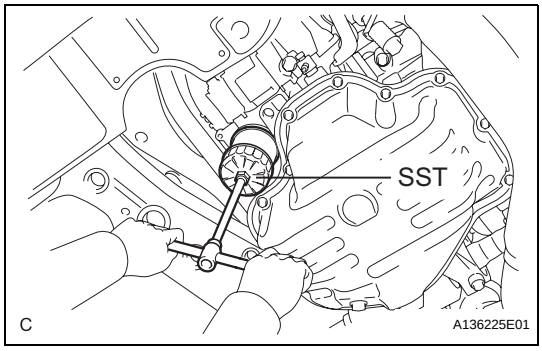
1. DRAIN ENGINE OIL

(a) Remove the oil filler cap.

(b) Remove the oil drain plug and drain the oil into a container.

2. REMOVE OIL FILTER SUB-ASSEMBLY

(a) Using SST, remove the oil filter.
SST 09228-06501



3. INSTALL OIL FILTER SUB-ASSEMBLY

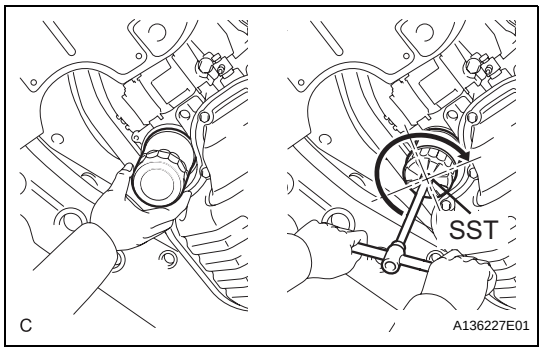
(a) Check and clean the oil filter installation surface.

(b) Apply clean engine oil to the gasket of a new oil filter.

(c) Lightly screw the oil filter into place by hand. Tighten it until the gasket contacts the seat.

(d) Using SST, tighten the oil filter.
SST 09228-06501

(1) Depending on the work space available, choose from the following.
1. If enough space is available, use a torque wrench to tighten the oil filter.
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
2. If enough space is not available to use a torque wrench, tighten the oil filter a 3/4 turn by hand or use a common wrench.



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4. ADD ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

(b) Add new oil.
Standard capacity

Item	Standard Condition
Drain and refill with oil filter change	4.3 liters (4.5 US qts, 3.8 Imp. qts)

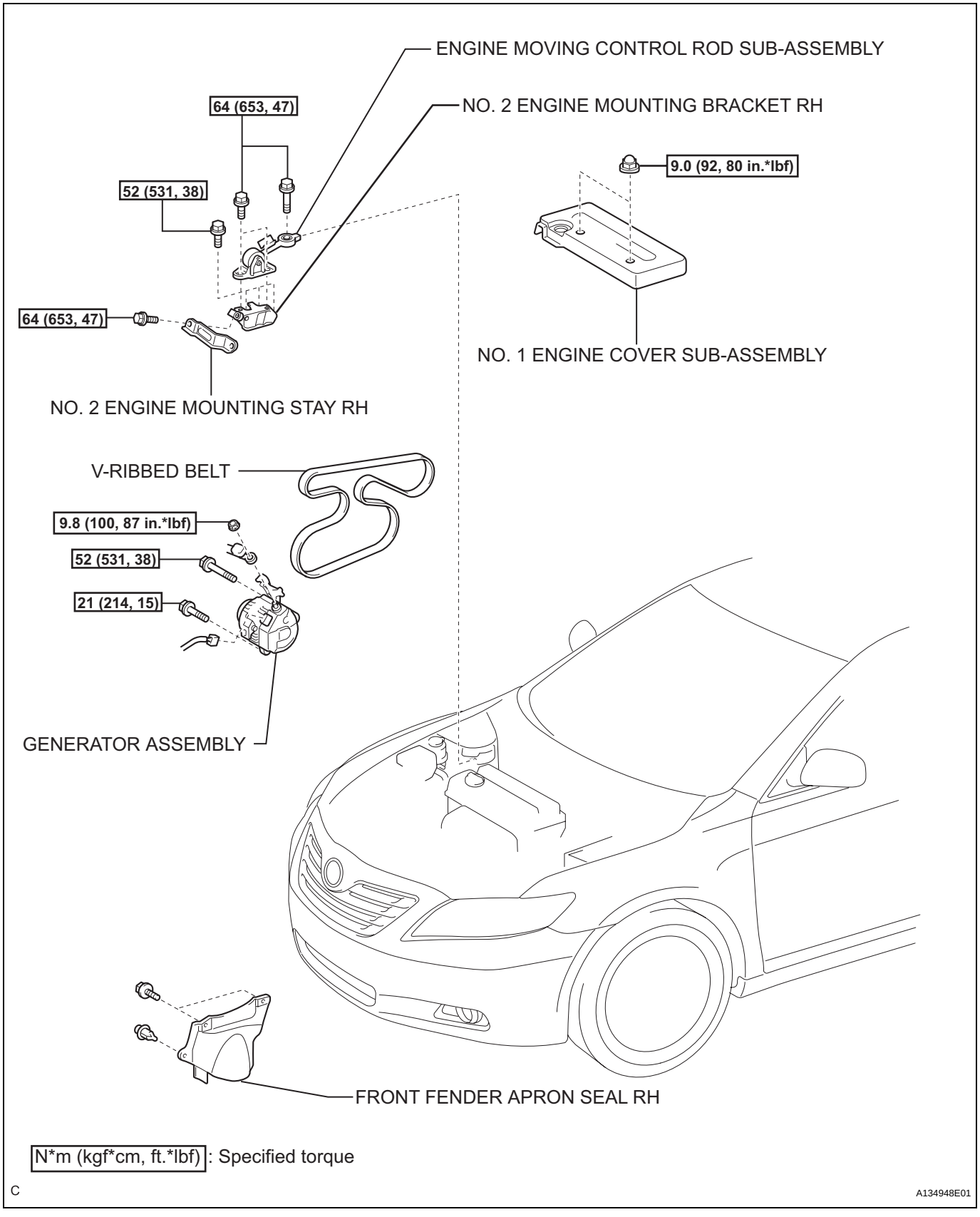
Item	Standard Condition
Drain and refill without oil filter change	4.1 liters (4.3 US qts, 3.6 Imp. qts)
Dry fill	5.0 liters (5.3 US qts, 4.4 Imp. qts)

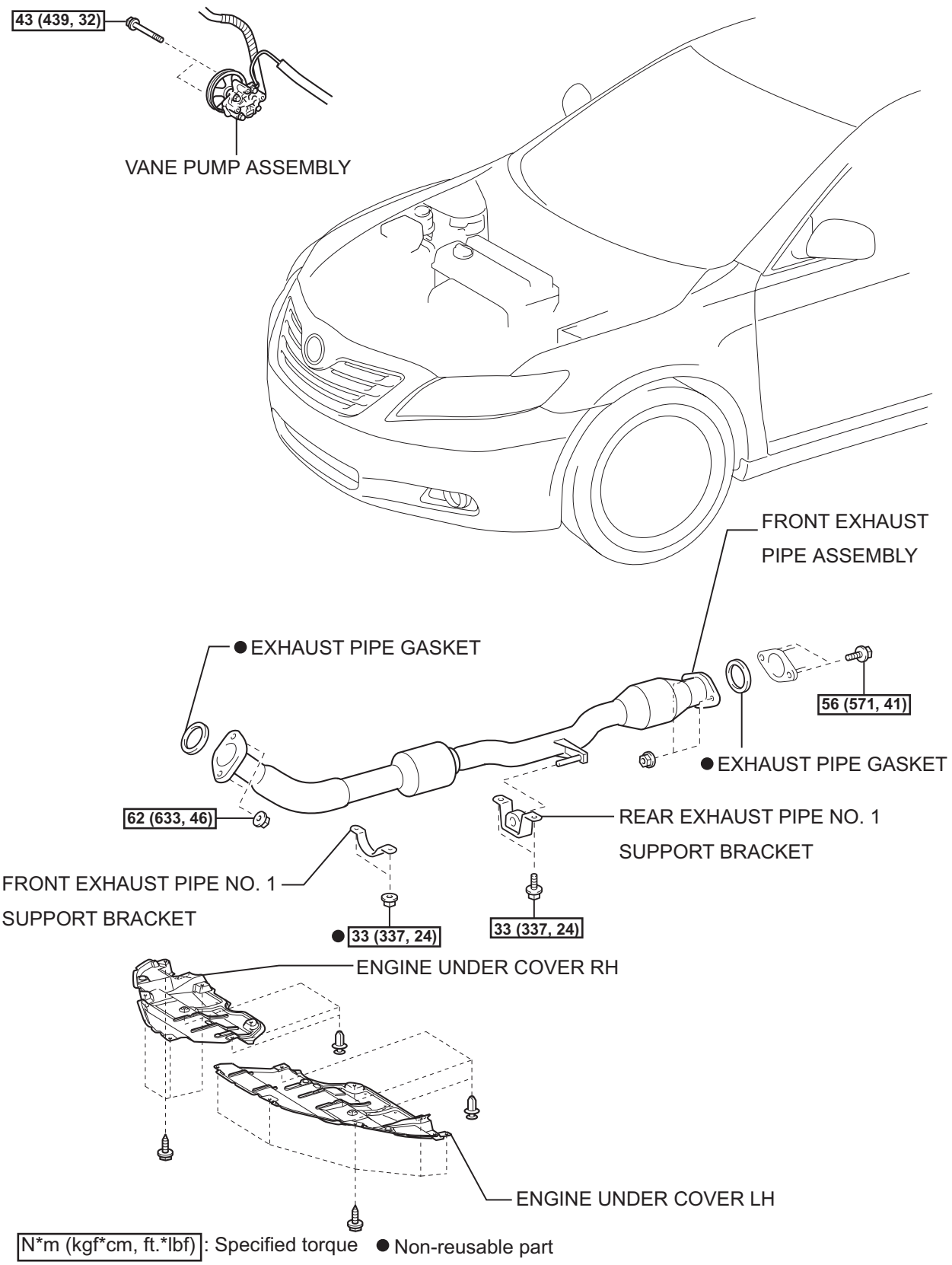
(c) Install the oil filler cap.

5. CHECK FOR ENGINE OIL LEAKS

OIL PUMP

COMPONENTS



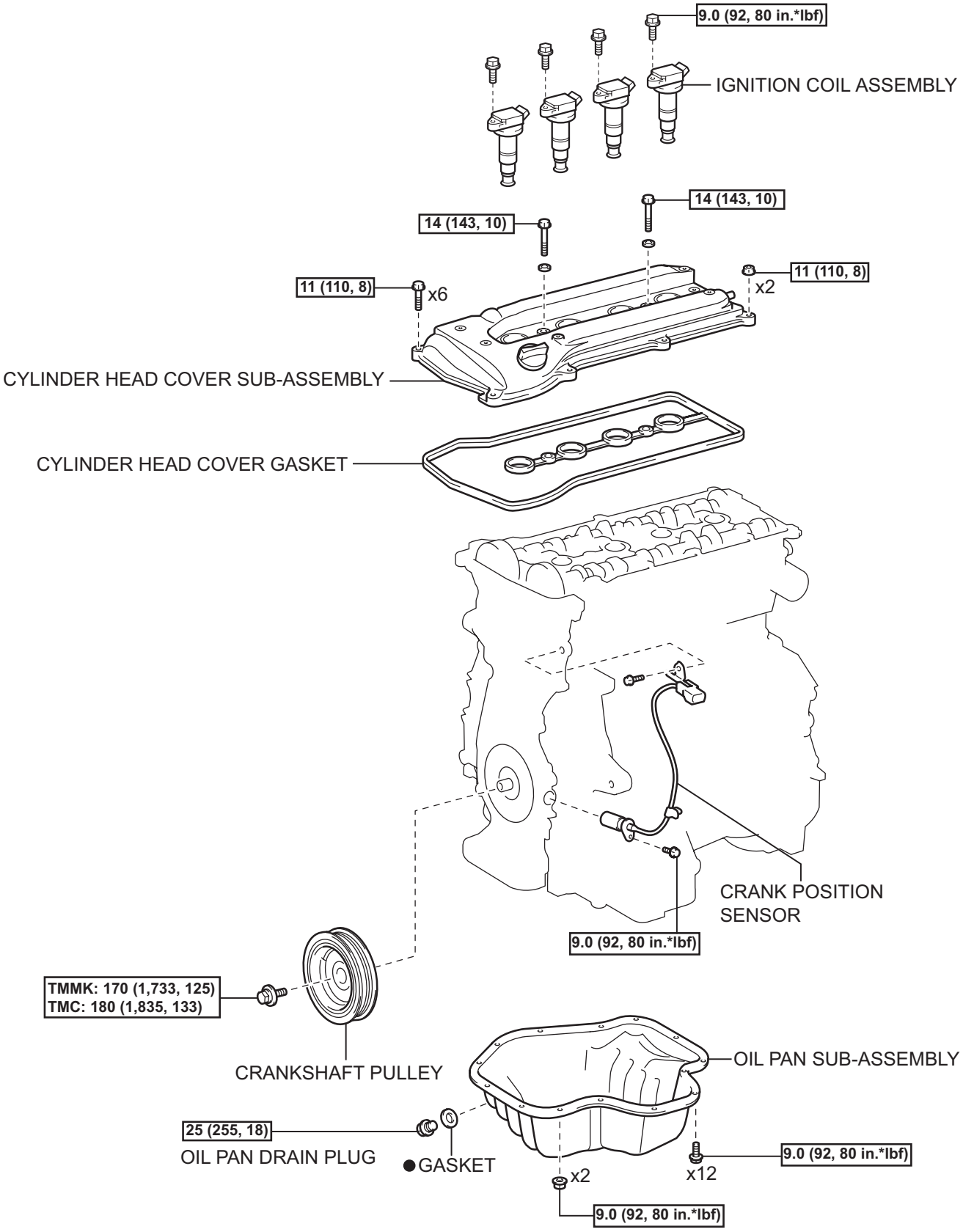


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

A134947E01

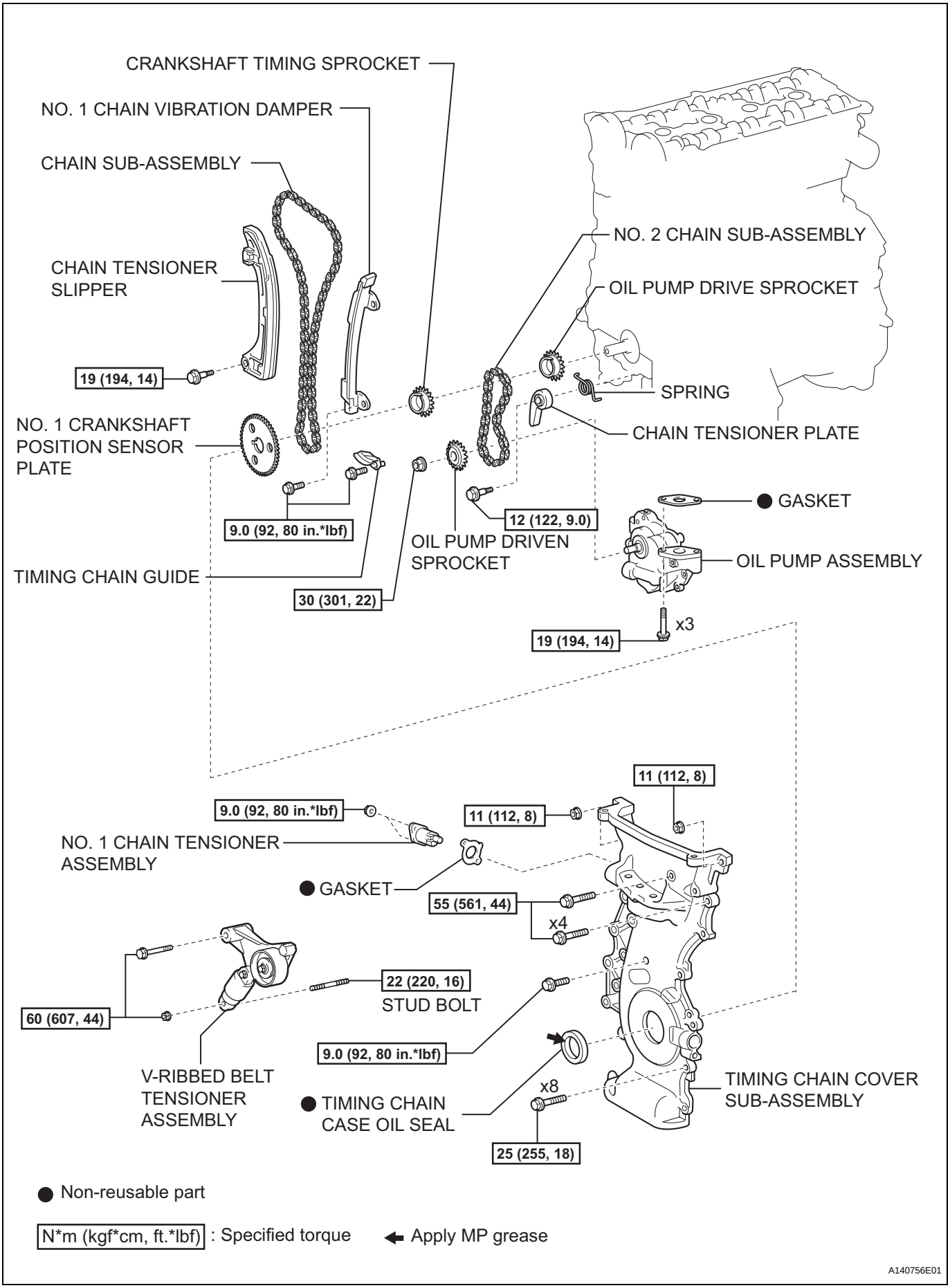
LU



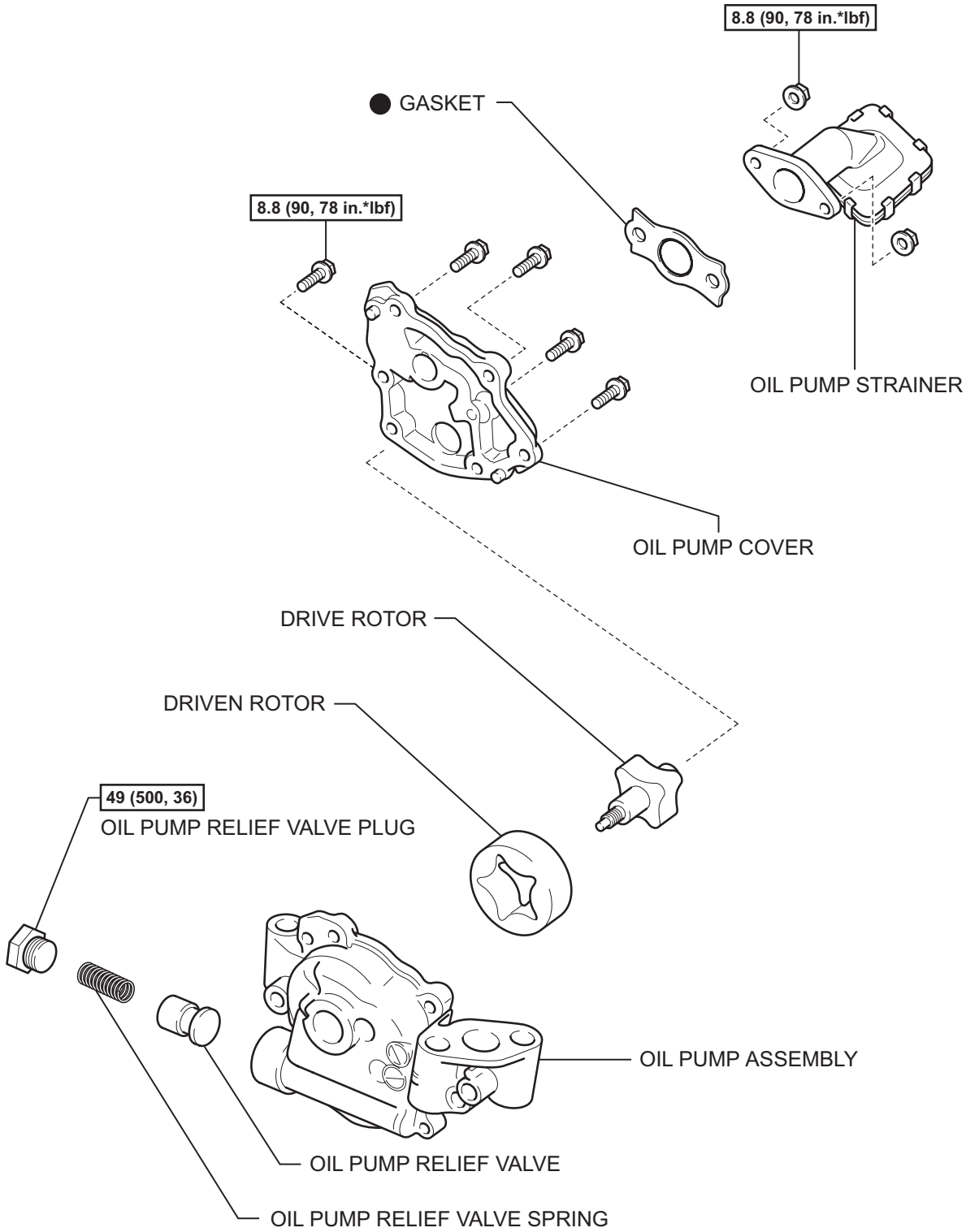
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

A134922E01

LU


CRANKSHAFT TIMING SPROCKET
NO. 1 CHAIN VIBRATION DAMPER
CHAIN SUB-ASSEMBLY
CHAIN TENSIONER SLIPPER
19 (194, 14)
NO. 1 CRANKSHAFT POSITION SENSOR PLATE
9.0 (92, 80 in.*lbf)
TIMING CHAIN GUIDE
30 (301, 22)
OIL PUMP DRIVEN SPROCKET
12 (122, 9.0)
NO. 2 CHAIN SUB-ASSEMBLY
OIL PUMP DRIVE SPROCKET
SPRING
CHAIN TENSIONER PLATE
GASKET
OIL PUMP ASSEMBLY
x3
19 (194, 14)
11 (112, 8)
9.0 (92, 80 in.*lbf)
11 (112, 8)
NO. 1 CHAIN TENSIONER ASSEMBLY
GASKET
55 (561, 44)
x4
22 (220, 16)
STUD BOLT
60 (607, 44)
V-RIBBED BELT TENSIONER ASSEMBLY
9.0 (92, 80 in.*lbf)
TIMING CHAIN CASE OIL SEAL
x8
25 (255, 18)
TIMING CHAIN COVER SUB-ASSEMBLY
Non-reusable part
N*m (kgf*cm, ft.*lbf) : Specified torque
Apply MP grease
A140756E01

LU



● Non-reusable part

N*m (kgf*cm, ft.*lbf) : Specified torque

T

A114157E07

LU

REMOVAL

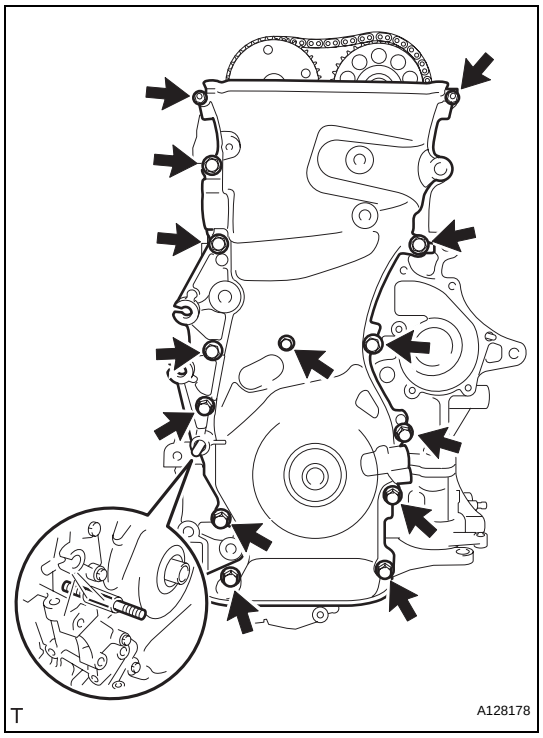
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
3. **REMOVE FRONT WHEEL RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **REMOVE ENGINE UNDER COVER RH**
6. **REMOVE FRONT FENDER APRON SEAL RH**
7. **DRAIN ENGINE OIL (See page LU-4)**
8. **REMOVE FRONT EXHAUST PIPE ASSEMBLY** (See page EX-2)
9. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-95)**
10. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-95)**
11. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-96)**
12. **REMOVE V-RIBBED BELT (See page EM-6)**
13. **REMOVE GENERATOR ASSEMBLY (See page CH-11)**
14. **REMOVE VANE PUMP ASSEMBLY (See page EM-101)**
15. **REMOVE IGNITION COIL ASSEMBLY (See page EM-106)**
16. **DISCONNECT VENTILATION HOSE**
17. **DISCONNECT NO. 2 VENTILATION HOSE**
18. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-21)**
19. **SET SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page EM-8)**
20. **REMOVE CRANKSHAFT PULLEY (See page EM-75)**
21. **REMOVE CRANK POSITION SENSOR (See page ES-411)**
22. **REMOVE OIL PAN SUB-ASSEMBLY (See page EM-22)**
23. **REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-22)**
24. **INSTALL ENGINE HANGERS (See page EM-22)**
25. **REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-23)**
26. **REMOVE ENGINE MOUNTING INSULATOR (See page EM-23)**

27. **REMOVE ENGINE MOUNTING BRACKET RH (See page EM-24)**

28. **REMOVE TIMING CHAIN COVER SUB-ASSEMBLY**

(a) Using a E10 "torx" socket, remove the stud bolt for the drive belt tensioner from the cylinder block.

(b) Remove the 12 bolts and 2 nuts.



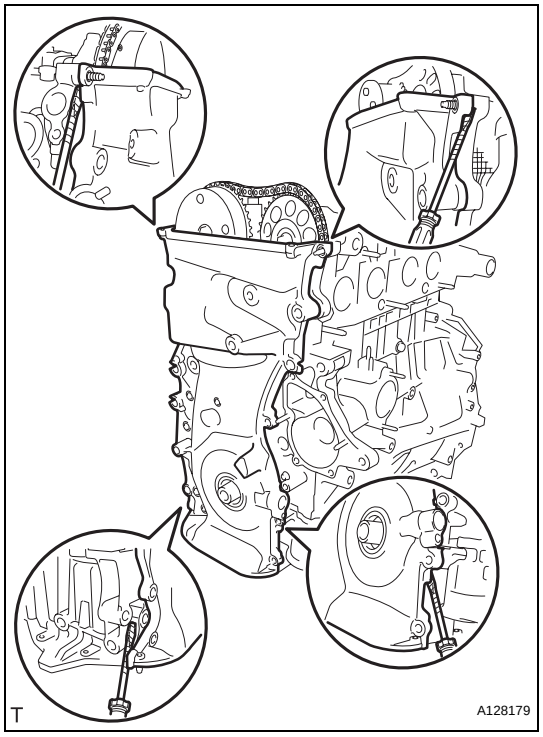
(c) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

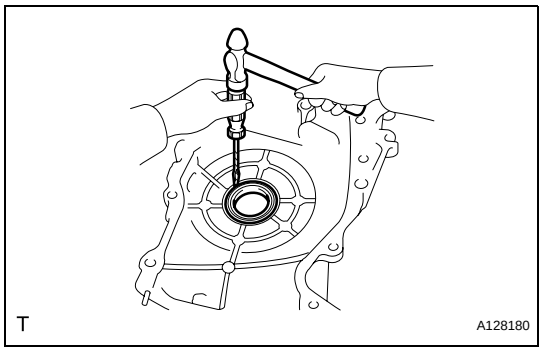
NOTICE:

Be careful not to damage the contact surfaces of the timing chain cover, cylinder block and cylinder head.

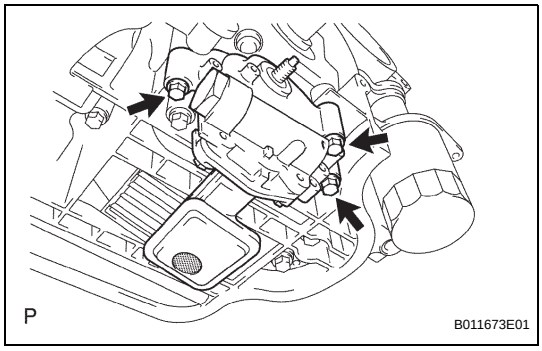
HINT:

Tape the screwdriver tip before use.



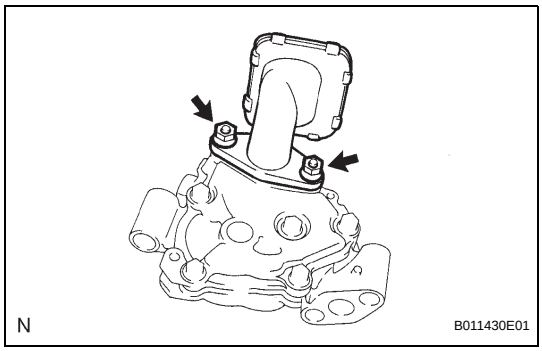


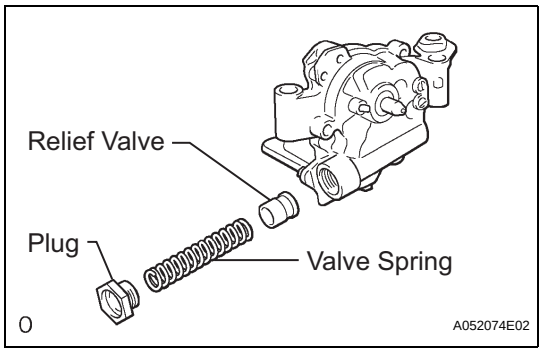
29. **REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL**
    (a) Using a screwdriver and a hammer, tap out the oil seal.
    HINT:
    Tape the screwdriver tip before use.
30. **REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-24)**
31. **REMOVE CHAIN TENSIONER SLIPPER (See page EM-24)**
32. **REMOVE NO. 1 CHAIN VIBRATION DAMPER (See page EM-24)**
33. **REMOVE TIMING CHAIN GUIDE (See page EM-25)**
34. **REMOVE CHAIN SUB-ASSEMBLY (See page EM-25)**
35. **REMOVE CRANKSHAFT TIMING SPROCKET (See page EM-25)**
36. **REMOVE NO. 2 CHAIN SUB-ASSEMBLY (See page EM-25)**
37. **REMOVE OIL PUMP ASSEMBLY**
    (a) Remove the 3 bolts, oil pump and gasket.



DISASSEMBLY

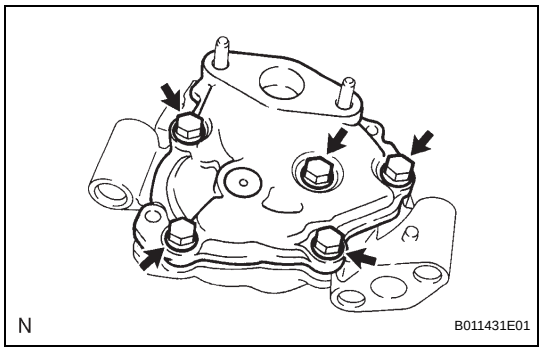
1. **REMOVE OIL PUMP STRAINER**
    (a) Remove the 2 nuts, oil pump strainer and gasket.





2. **REMOVE OIL PUMP RELIEF VALVE**
    (a) Using a 27 mm socket wrench, remove the plug.
    (b) Remove the valve spring and relief valve.

LU

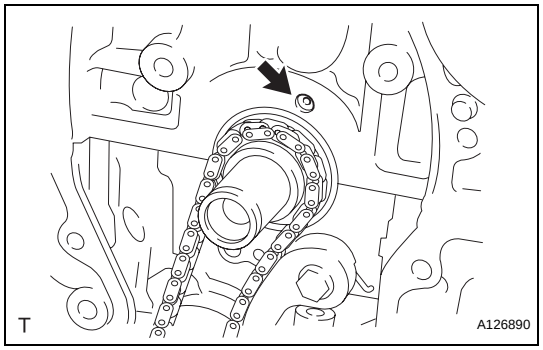


3. REMOVE OIL PUMP COVER

(a) Remove the 5 bolts and oil pump cover.

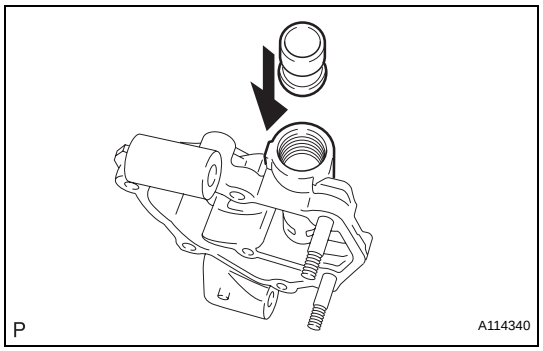
(b) Remove the oil pump rotor.

INSPECTION



1. INSPECT OIL JET

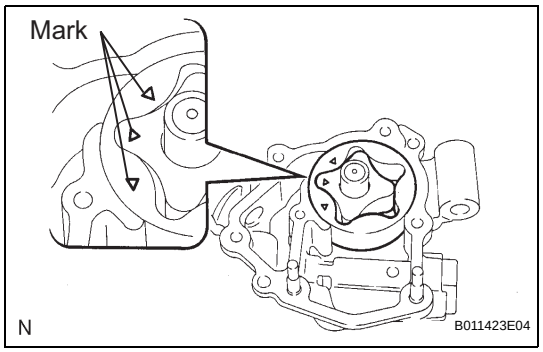
(a) Check the oil jet for damage or clogging.
If necessary, repair the cylinder block.



2. INSPECT OIL PUMP RELIEF VALVE

(a) Check the relief valve.

(1) Coat the valve with engine oil, and then check that the valve falls smoothly into the valve hole under its own weight.
If the valve does not fall smoothly, replace the relief valve. If necessary, replace the oil pump assembly.

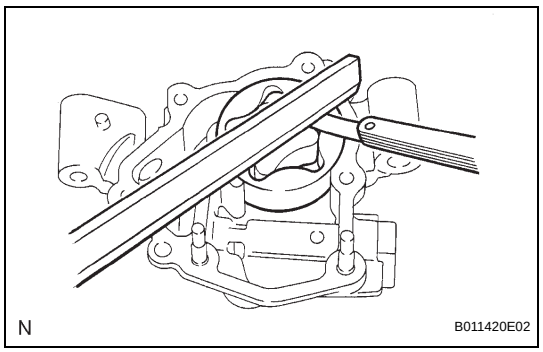


3. INSPECT OIL PUMP ROTOR

(a) Install the oil pump rotor.

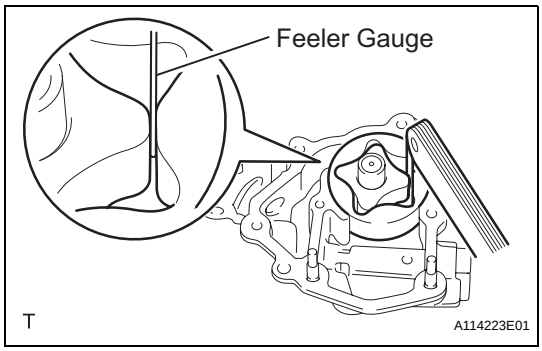
(1) Coat the drive rotor and driven rotor with engine oil.

(2) Place the drive and driven rotors into the oil pump with the marks facing the pump cover side.

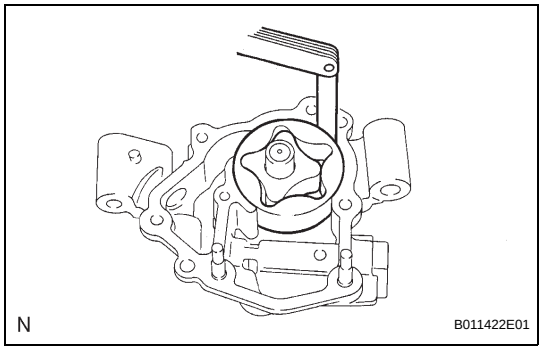


(b) Check the side clearance.

(1) Using a feeler gauge and precision straightedge, measure the clearance between the rotors and precision straightedge.
Standard clearance:
0.030 to 0.085 mm (0.0012 to 0.0033 in.)
Maximum clearance:
0.16 mm (0.0063 in.)
If the side clearance is greater than the maximum, replace the oil pump assembly.



(c) Check the tip clearance.
(1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.
Standard clearance:
0.080 to 0.160 mm (0.0031 to 0.0063 in.)
Maximum clearance:
0.35 mm (0.0138 in.)
If the tip clearance is greater than the maximum, replace the oil pump assembly.



(d) Check the body clearance.
(1) Using a feeler gauge, measure the clearance between the driven rotor and pump body.
Standard clearance:
0.100 to 0.170 mm (0.0039 to 0.0067 in.)
Maximum clearance:
0.325 mm (0.0128 in.)
If the body clearance is greater than the maximum, replace the oil pump assembly.

4. **INSPECT NO. 2 CHAIN SUB-ASSEMBLY (See page EM-138)**

5. **INSPECT OIL PUMP DRIVE SPROCKET (See page EM-138)**

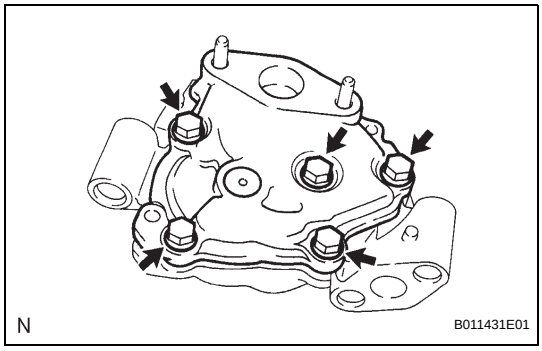
6. **INSPECT OIL PUMP DRIVEN SPROCKET (See page EM-139)**

7. **INSPECT CHAIN TENSIONER PLATE (See page EM-140)**

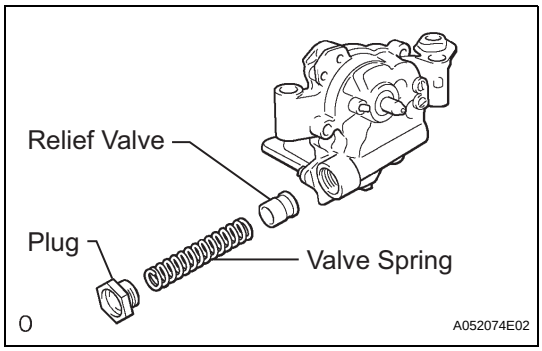
REASSEMBLY

1. **INSTALL OIL PUMP COVER**
(a) Install the oil pump cover with the 5 bolts.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

2. **INSTALL OIL PUMP RELIEF VALVE**
(a) Coat the relief valve with engine oil.



(b) Insert the relief valve and spring into the pump body hole.
(c) Using a 27 mm socket wrench, install the plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



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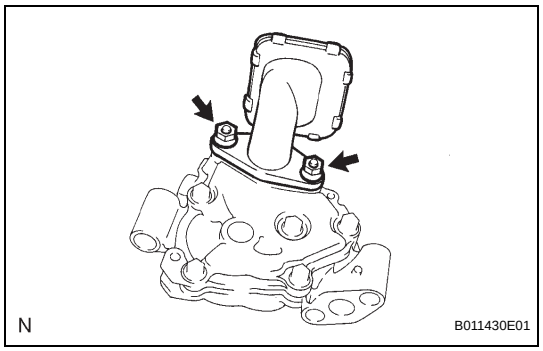
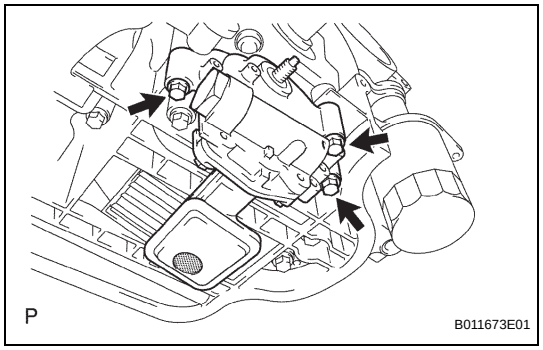
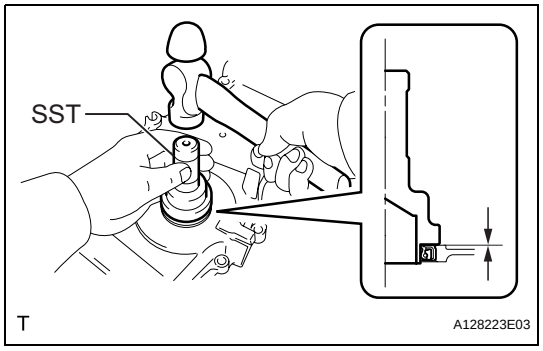


3. **INSTALL OIL PUMP STRAINER**
   (a) Install a new gasket and the oil strainer with the 2 nuts.
   Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

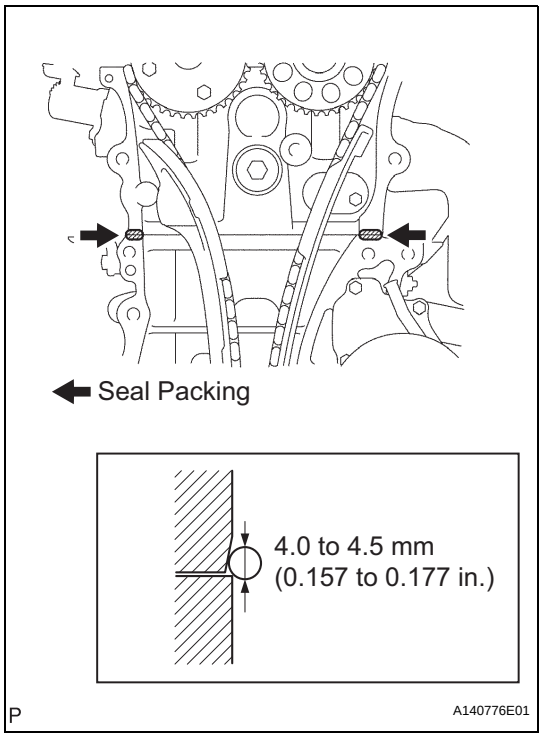


INSTALLATION

1. **INSTALL OIL PUMP ASSEMBLY**
   (a) Install a new gasket and the oil pump with the 3 bolts.
   Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
2. **INSTALL NO. 2 CHAIN SUB-ASSEMBLY (See page EM-27)**
3. **INSTALL CRANKSHAFT TIMING SPROCKET (See page EM-28)**
4. **INSTALL NO. 1 CHAIN VIBRATION DAMPER (See page EM-28)**
5. **INSTALL CHAIN SUB-ASSEMBLY (See page EM-28)**
6. **INSTALL CHAIN TENSIONER SLIPPER (See page EM-29)**
7. **INSTALL TIMING CHAIN GUIDE (See page EM-30)**
8. **INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See page EM-30)**

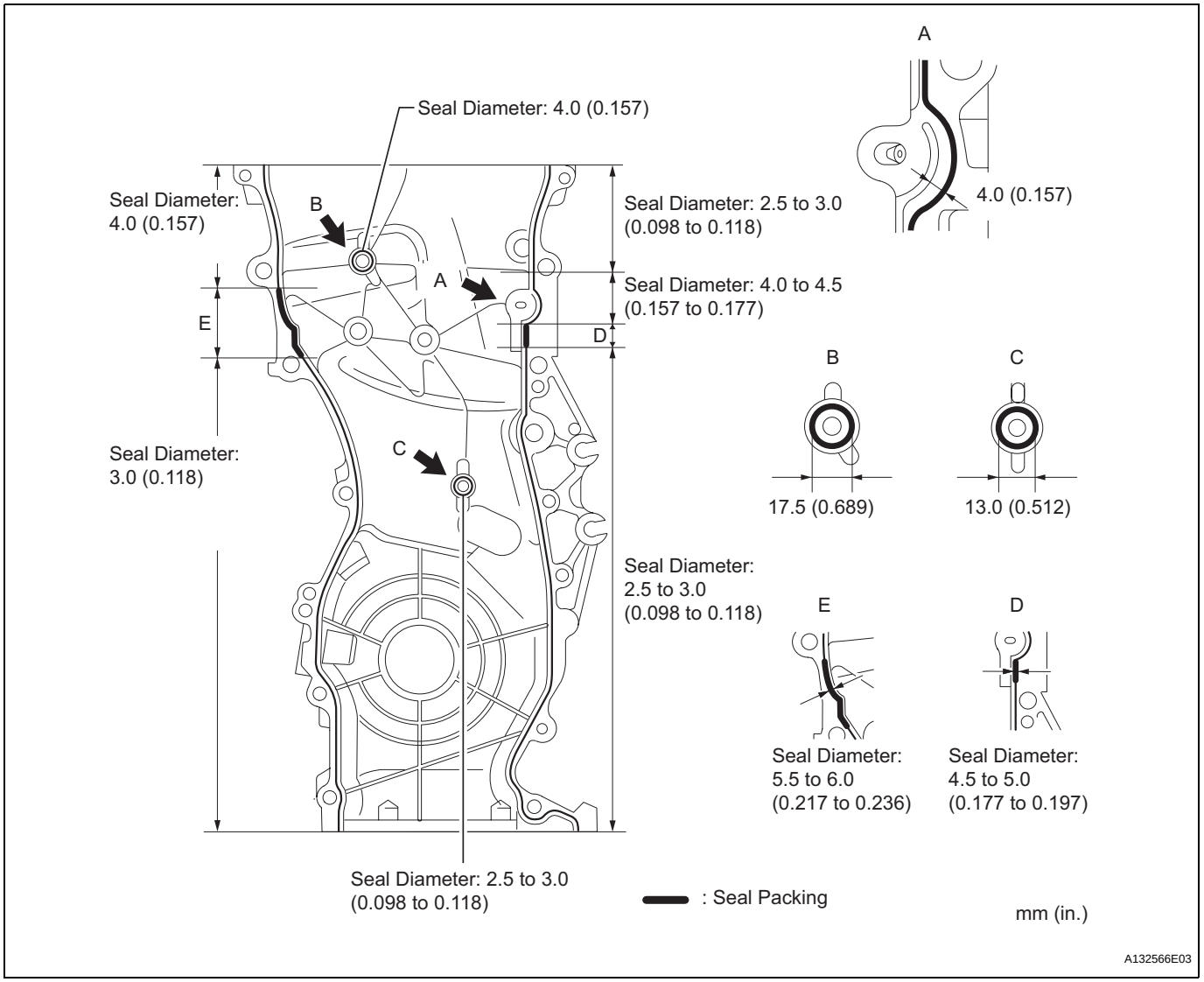


9. **INSTALL TIMING CHAIN CASE OIL SEAL**
   (a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.
   SST 09223-22010
   (b) Apply a light coat of MP grease to the lip of the oil seal.
   NOTICE:
   Keep the gap between the timing chain cover edge and the oil seal free of foreign matter.
10. **INSTALL TIMING CHAIN COVER SUB-ASSEMBLY**
   (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.



(b) Apply seal packing (diameter: 4.0 to 4.5 mm (0.157 to 0.177 in.)) as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent

(c) Apply seal packing in a continuous bead as shown in the illustration.



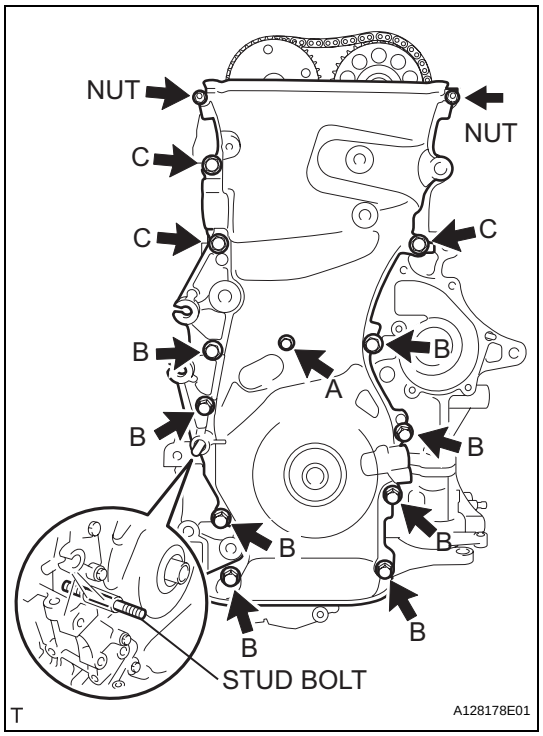
LU

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the chain cover within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

(d) Install the timing chain cover with the 12 bolts and 2 nuts.
Torque: Bolt A
9.0 N*m (92 kgf*cm, 80 in.*lbf)
Bolt B
25 N*m (255 kgf*cm, 18 ft.*lbf)
Bolt C
55 N*m (561 kgf*cm, 41 ft.*lbf)
Nut
11 N*m (112 kgf*cm, 8 ft.*lbf)

Bolt length

Item	Length
Bolt A	30 mm (1.18 in.) length for 10 mm head
Bolt B	30 mm (1.18 in.) length for 12 mm head
Bolt C	40 mm (1.57 in.) length for 14 mm head



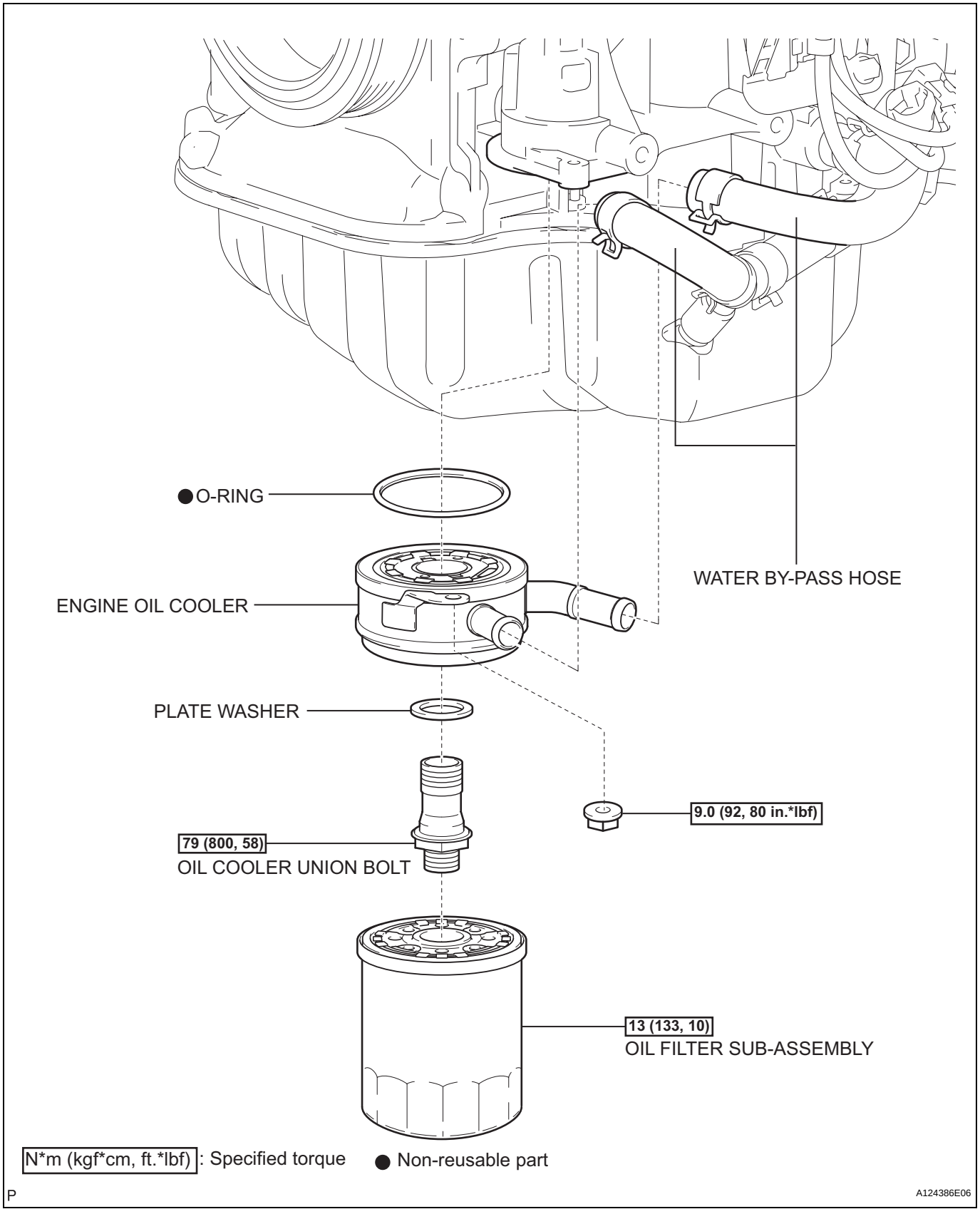
(e) Using a E10 "torx" socket, install the stud bolt to the drive belt tensioner.
Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)

11. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-30)**
12. **INSTALL ENGINE MOUNTING BRACKET RH (See page EM-30)**
13. **INSTALL ENGINE MOUNTING INSULATOR (See page EM-30)**
14. **INSTALL OIL PAN SUB-ASSEMBLY (See page EM-31)**
15. **INSTALL CRANK POSITION SENSOR (See page ES-411)**
16. **INSTALL CRANKSHAFT PULLEY (See page EM-76)**
17. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY (See page EM-32)**
18. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-33)**
19. **INSTALL NO. 2 VENTILATION HOSE**
20. **INSTALL VENTILATION HOSE**
21. **INSTALL IGNITION COIL ASSEMBLY (See page EM-33)**
22. **INSTALL VANE PUMP ASSEMBLY (See page EM-113)**
23. **INSTALL GENERATOR ASSEMBLY (See page CH-19)**

24. **INSTALL V-RIBBED BELT (See page EM-6)**
25. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-118)**
26. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-119)**
27. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-119)**
28. **INSTALL FRONT EXHAUST PIPE ASSEMBLY** (See page EX-3)
29. **ADD ENGINE OIL**
30. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**
31. **CHECK ENGINE OIL LEAKS**
32. **CHECK CHECK EXHAUST GAS LEAKS**
33. **CHECK IGNITION TIMING (See page EM-1)**
34. **INSTALL FRONT FENDER APRON SEAL RH**
35. **INSTALL ENGINE UNDER COVER LH**
36. **INSTALL ENGINE UNDER COVER RH**
37. **INSTALL FRONT WHEEL RH**
38. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**

ENGINE OIL COOLER (w/ Oil Cooler)

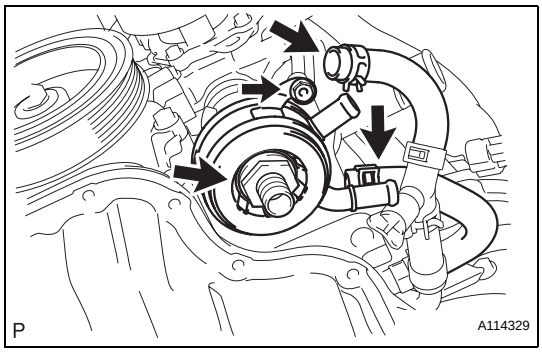
COMPONENTS



LU

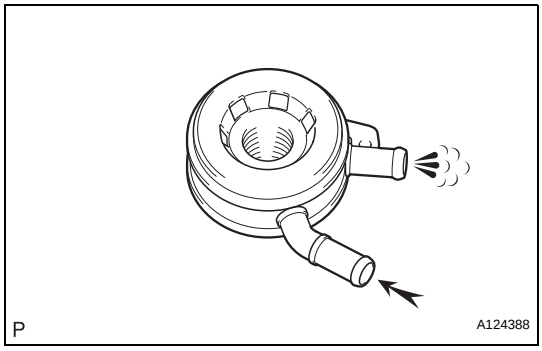
REMOVAL

1. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **DRAIN ENGINE COOLANT (See page CO-5)**
6. **DRAIN ENGINE OIL (See page LU-4)**
7. **REMOVE OIL FILTER SUB-ASSEMBLY (See page LU-4)**
8. **REMOVE ENGINE OIL COOLER**
   (a) Disconnect the 2 oil cooler hoses from the oil cooler.
   (b) Remove the oil cooler union bolt, plate washer, nut, oil cooler and O-ring.



INSPECTION

1. **INSPECT ENGINE OIL COOLER**
   (a) Check the engine oil cooler for damage or clogging. If necessary, replace the oil cooler.

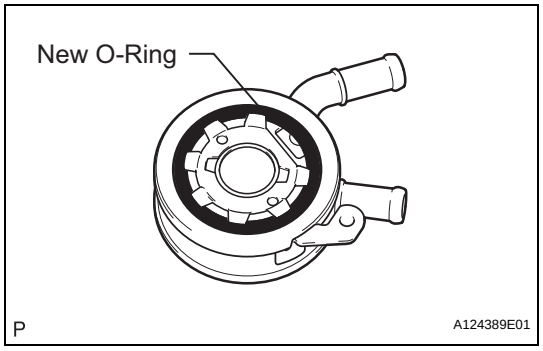


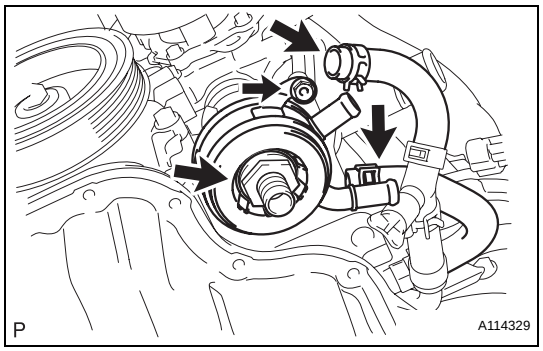
INSTALLATION

1. INSTALL ENGINE OIL COOLER

(a) Clean the oil cooler contact surface.

(b) Install a new O-ring to the oil cooler.





(c) Apply a light coat of engine oil to the threads and under the head of the oil cooler union bolt.

(d) Install the oil cooler with the plate washer, oil cooler union bolt and nut.

Torque: for union bolt
79 N*m (800 kgf*cm, 58 ft.*lbf)
for nut
9.0 N*m (92 kgf*cm, 80 in.*lbf)

(e) Connect the 2 oil cooler hoses.

2. INSTALL OIL FILTER SUB-ASSEMBLY (See page LU-4)

3. ADD ENGINE OIL (See page LU-4)

4. ADD ENGINE COOLANT (See page CO-5)

5. CHECK FOR ENGINE OIL LEAKS

6. CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)

7. CHECK ENGINE OIL LEVEL (See page LU-1)

8. INSTALL ENGINE UNDER COVER RH

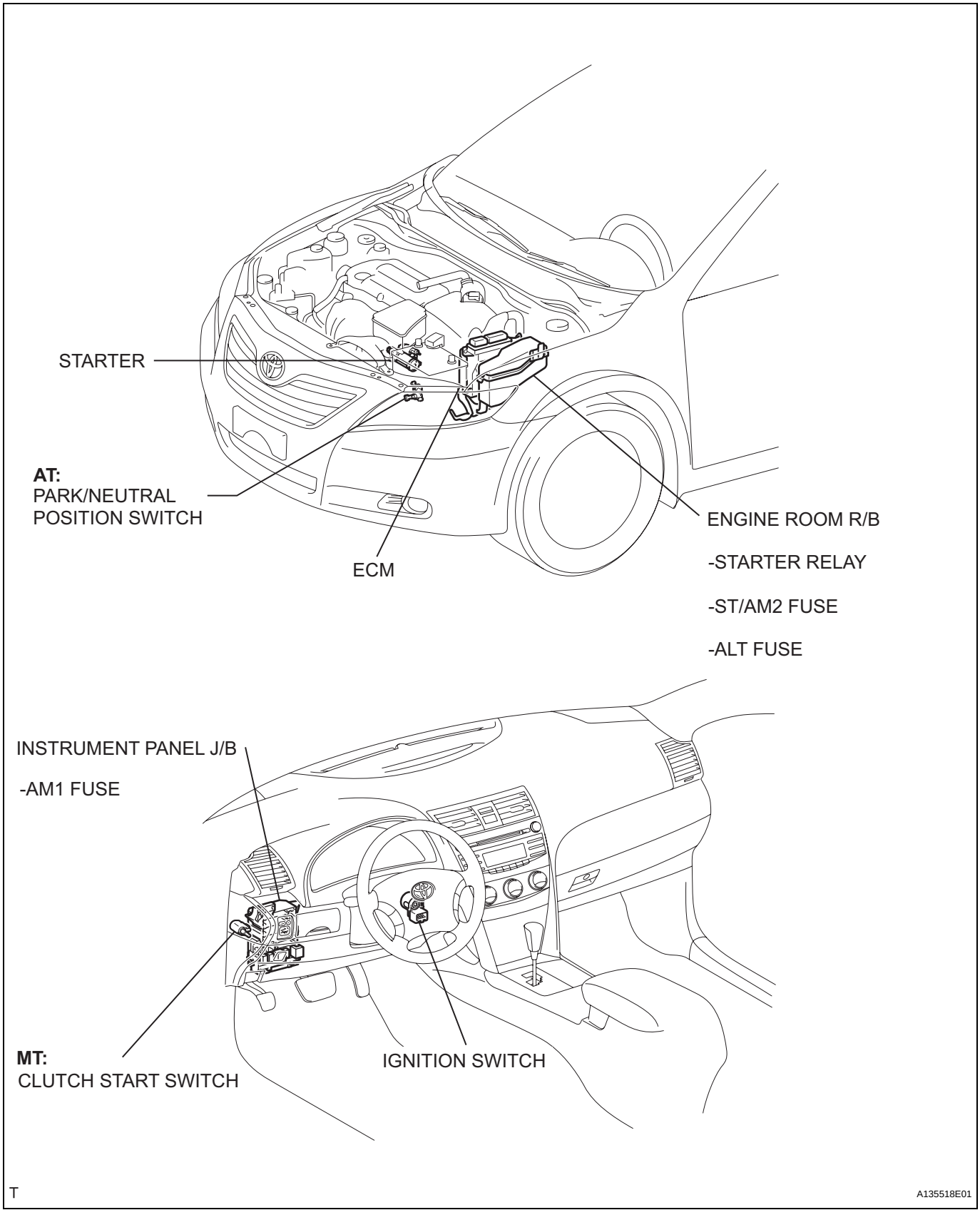
9. INSTALL ENGINE UNDER COVER LH

10. INSTALL FRONT WHEEL OPENING EXTENSION PAD LH

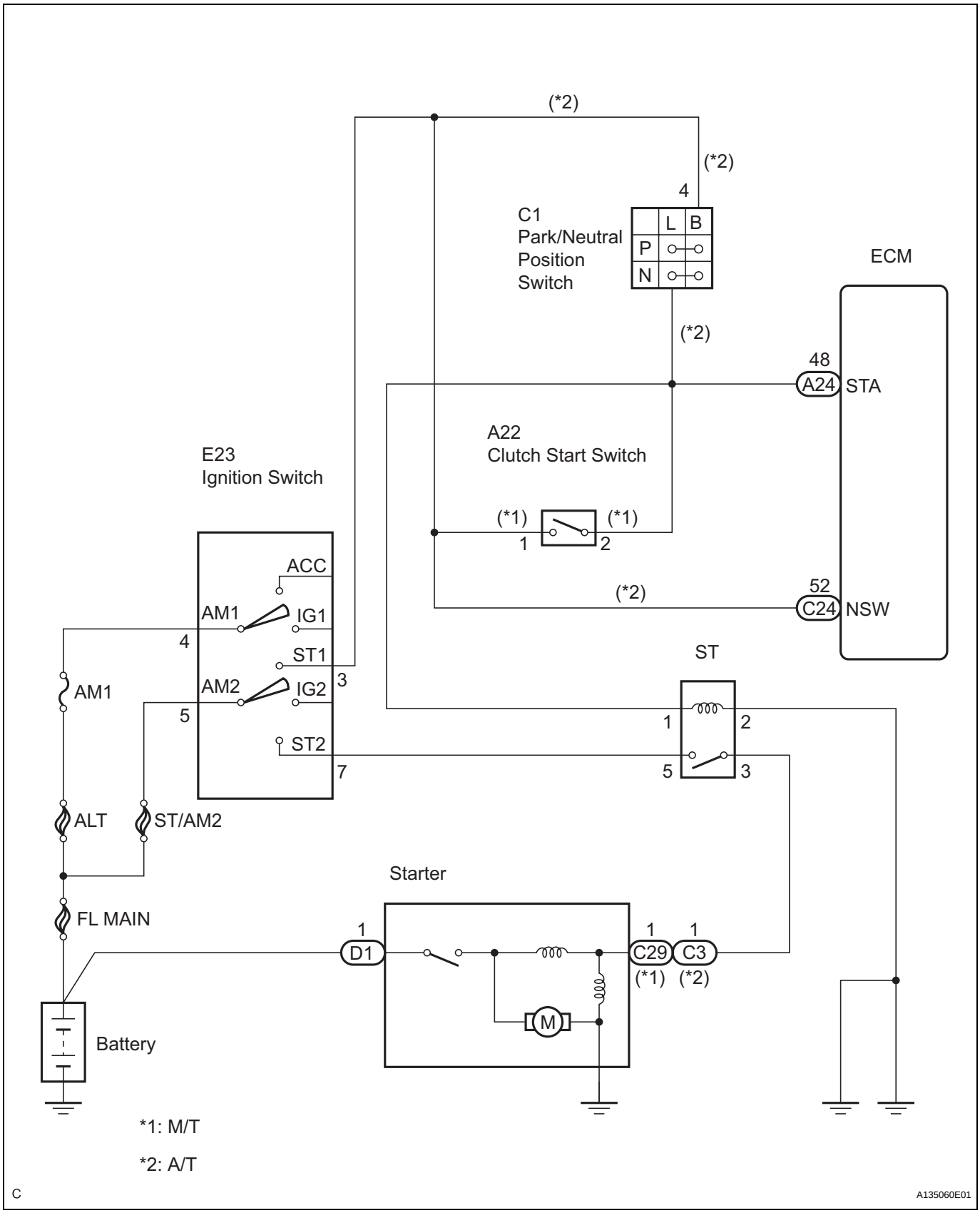
11. INSTALL FRONT WHEEL OPENING EXTENSION PAD RH

STARTING SYSTEM

PARTS LOCATION



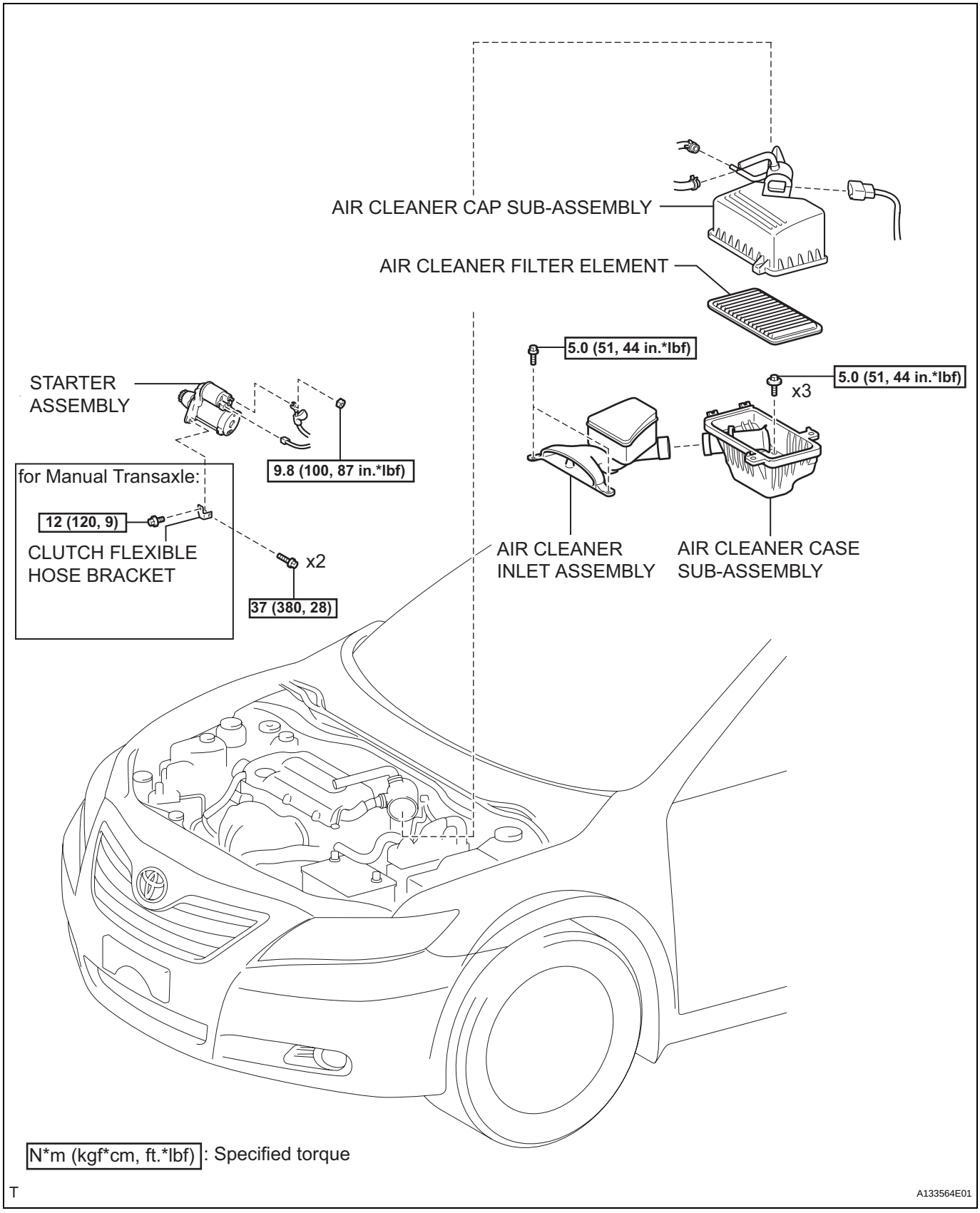
SYSTEM DIAGRAM



ST

STARTER

COMPONENTS



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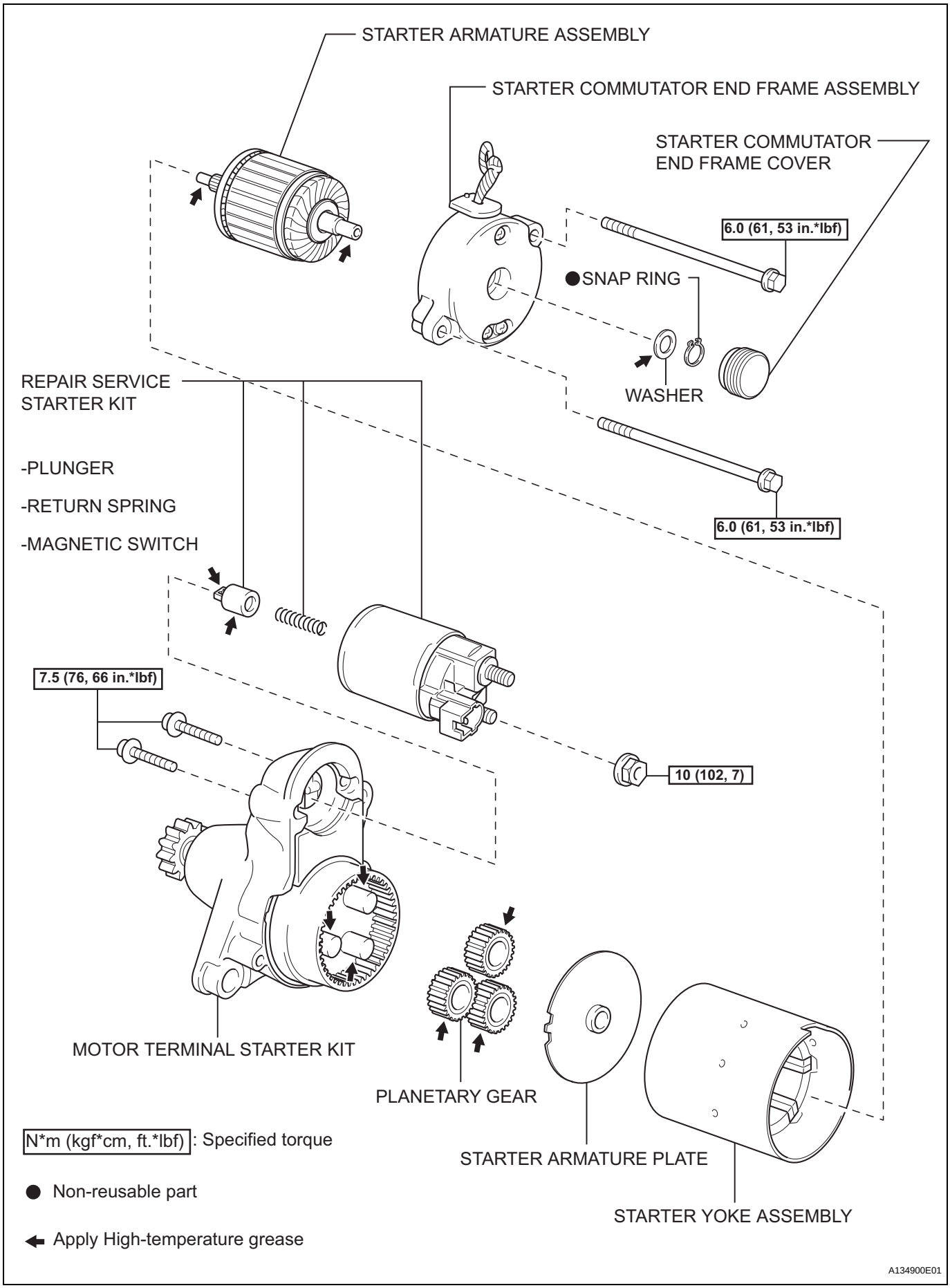
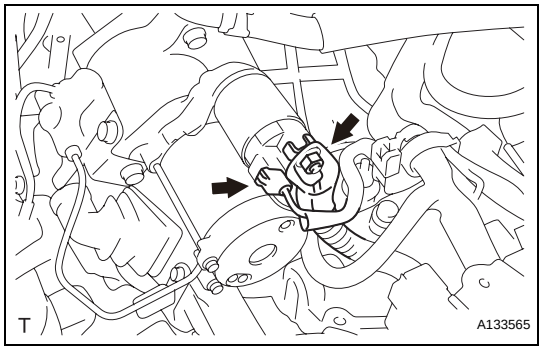

STARTER ARMATURE ASSEMBLY
STARTER COMMUTATOR END FRAME ASSEMBLY
STARTER COMMUTATOR END FRAME COVER
6.0 (61, 53 in.*lbf)
●SNAP RING
WASHER
REPAIR SERVICE STARTER KIT
-PLUNGER
-RETURN SPRING
-MAGNETIC SWITCH
6.0 (61, 53 in.*lbf)
7.5 (76, 66 in.*lbf)
10 (102, 7)
MOTOR TERMINAL STARTER KIT
PLANETARY GEAR
STARTER ARMATURE PLATE
STARTER YOKE ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Apply High-temperature grease
A134900E01

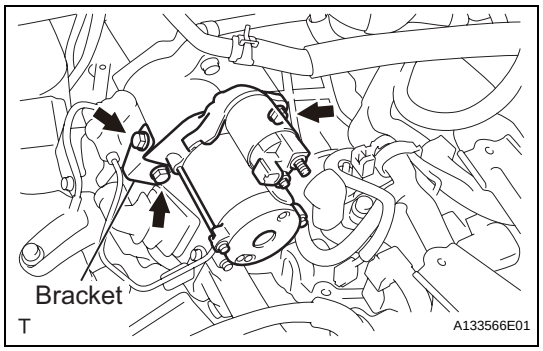
ST

REMOVAL

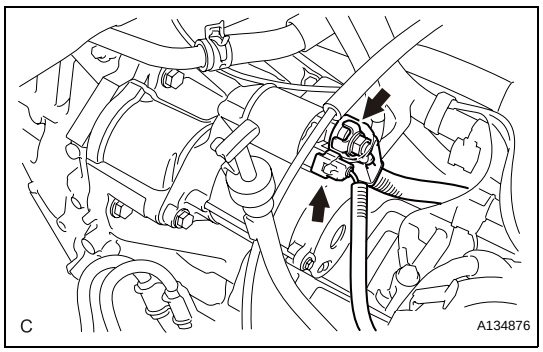
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
3. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
4. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
5. **REMOVE STARTER ASSEMBLY (for Manual Transaxle)**
   (a) Disconnect the terminal 50 connector from the starter assembly.
   (b) Remove the nut and disconnect the wire harness from terminal 30.



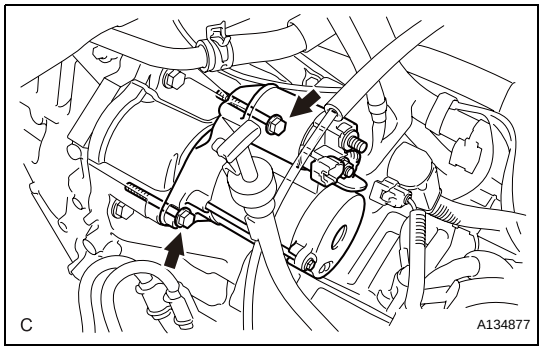
   (c) Remove the 3 bolts, clutch flexible hose bracket and starter assembly.



6. **REMOVE STARTER ASSEMBLY (for Automatic Transaxle)**
   (a) Disconnect the terminal 50 connector from the starter assembly.
   (b) Remove the nut and disconnect the wire harness from terminal 30.



   (c) Remove the 2 bolts and starter assembly.



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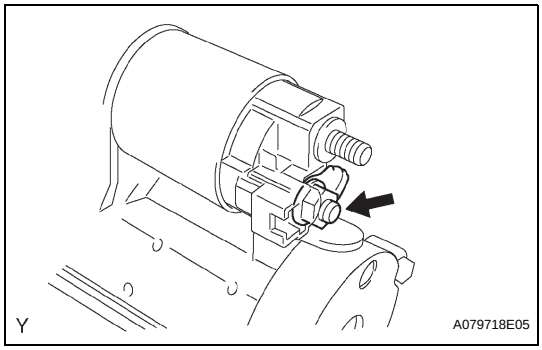
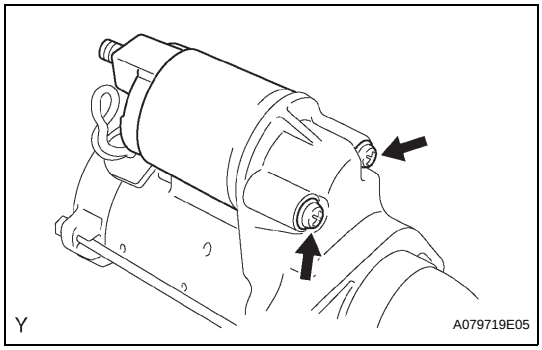
DISASSEMBLY

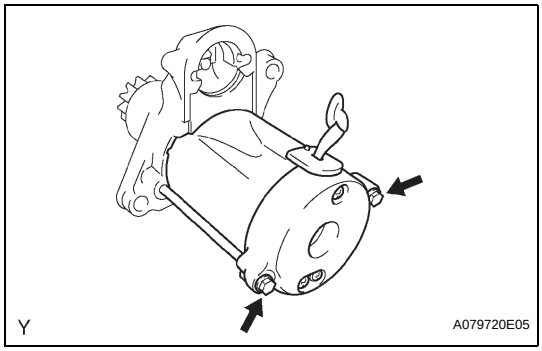


1. REMOVE REPAIR SERVICE STARTER KIT

(a) Remove the nut and disconnect the lead wire from terminal C.

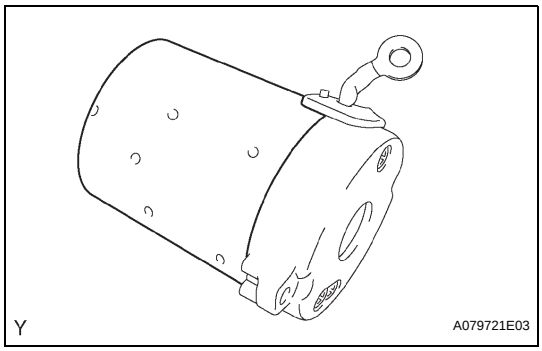


(b) Remove the 2 screws that hold the magnetic switch to the motor terminal starter kit.
(c) Remove the repair service starter kit.
(d) Remove the return spring and the plunger from the repair service starter kit.

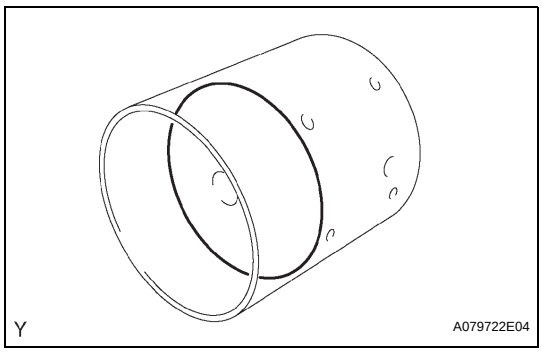


2. REMOVE STARTER YOKE ASSEMBLY

(a) Remove the 2 through bolts and pull out the starter yoke assembly together with the starter commutator end frame assembly.



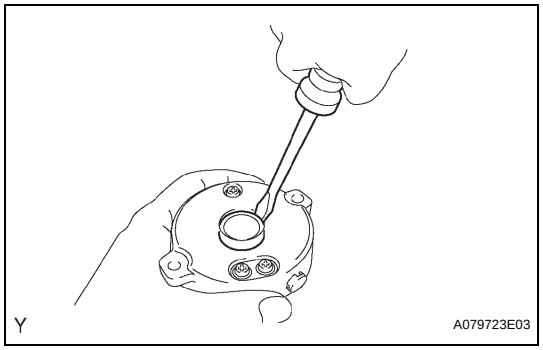
(b) Remove the starter yoke assembly from the starter commutator end frame assembly.



3. REMOVE STARTER ARMATURE PLATE

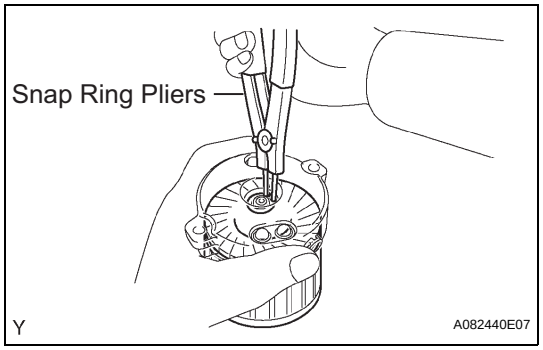
(a) Remove the starter armature plate from the starter yoke assembly.

ST



4. REMOVE STARTER COMMUTATOR END FRAME COVER

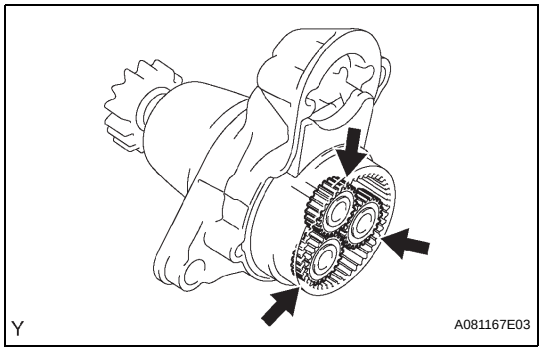
(a) Using a screwdriver, remove the starter commutator end frame cover.



5. REMOVE STARTER ARMATURE ASSEMBLY

(a) Using snap ring pliers, remove the snap ring and plate washer.

(b) Remove the starter armature assembly from the commutator end frame assembly.



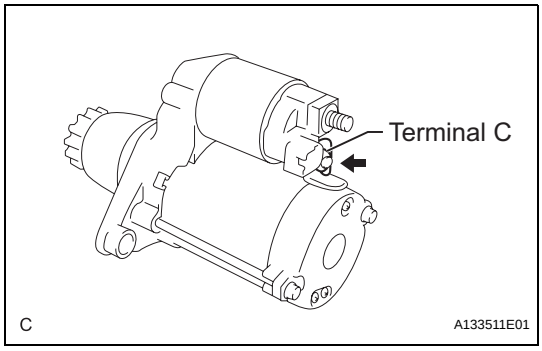
6. REMOVE PLANETARY GEAR

(a) Remove the 3 planetary gears from the motor terminal starter kit.

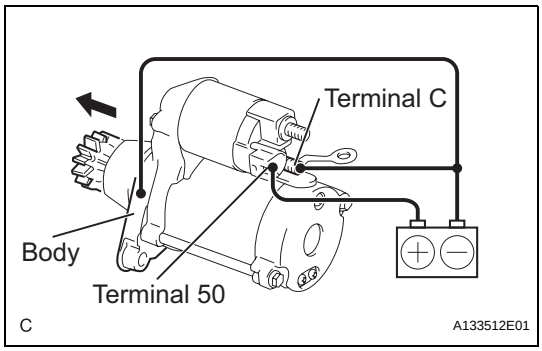
INSPECTION

1. INSPECT STARTER ASSEMBLY

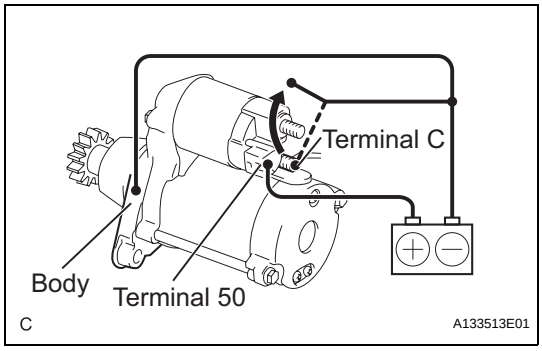
CAUTION:
Make sure to complete each of the following tests within 5 seconds to prevent the coil from burning out.



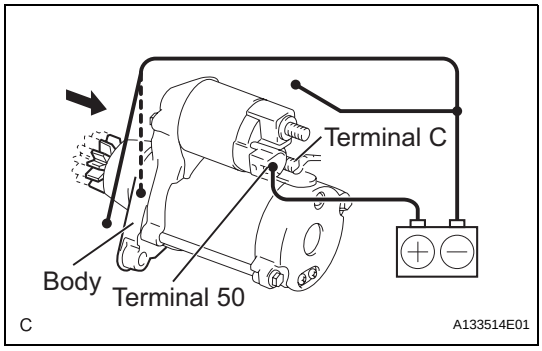
(a) Perform pull-in test:
(1) Disconnect the lead wire from terminal C.



(2) Connect the battery to the magnetic switch as shown in the illustration. Check that the clutch pinion gear moves outward.
If the clutch pinion gear does not move outward, replace the repair service starter kit.

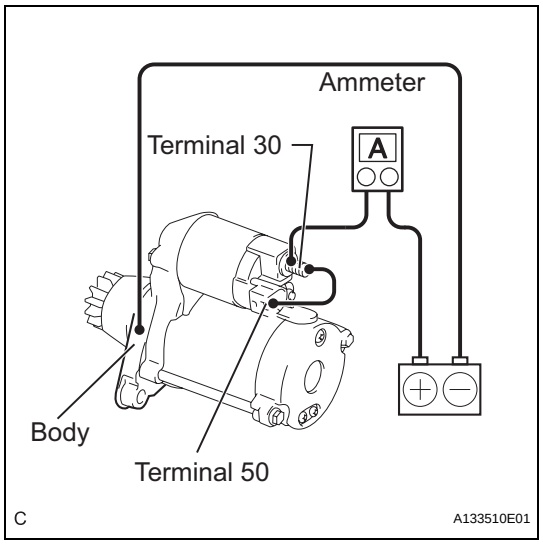


(b) Perform hold-in test:
(1) Disconnect the negative (-) terminal lead from terminal C under the conditions for pull-in test. Check that the pinion gear remains out.
If the clutch pinion gear moves inward, replace the repair service starter kit.



(c) Inspect clutch pinion gear return:
(1) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear moves inward.
If the clutch pinion gear does not move inward, replace the repair service starter kit.

(d) Perform no-load performance test:
(1) Connect the field coil wire to terminal C with the nut. Make sure that the lead is not grounded.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
(2) Clamp the starter in a vise.

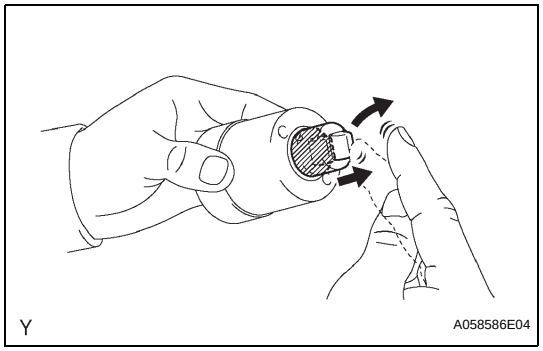


(3) Connect the battery and an ammeter to the starter as shown in the illustration.
(4) Check that the starter rotates smoothly and steadily with the clutch pinion gear extended. Check that the ammeter reads the specified current.

Specified current

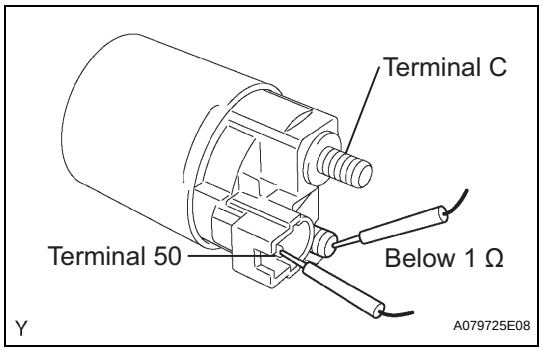
Condition	Specified condition
at 11.5 V	90 A or less

If the result is not as specified, overhaul the starter assembly.



2. INSPECT REPAIR SERVICE STARTER KIT

(a) Check the plunger.
(1) Push in the plunger and check that it returns quickly to its original position.
If necessary, replace the repair service starter kit.

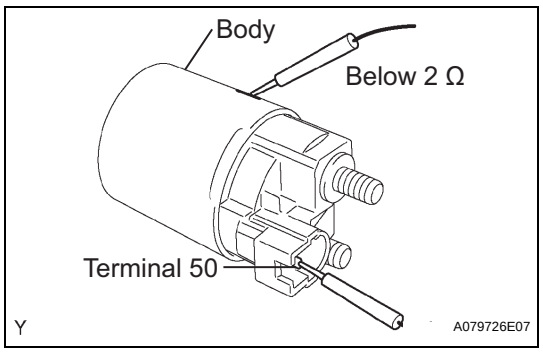


(b) Inspect the resistance of the pull-in coil.
(1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard resistance

Tester connection	Specified condition
Terminal 50 - Terminal C	Below 1 Ω

If the resistance is not as specified, replace the repair service starter kit.



(c) Inspect the resistance of the hold-in coil.
(1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

Standard resistance

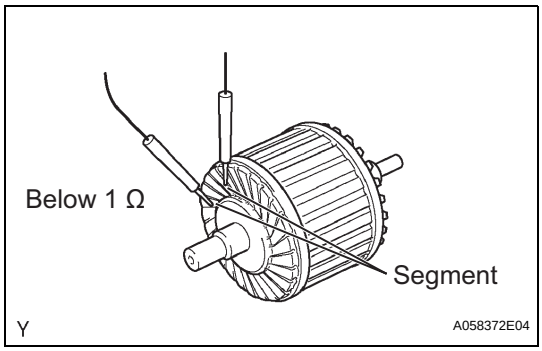
Tester connection	Specified condition
Terminal 50 - Switch body	Below 2 Ω

If the resistance is not as specified, replace the repair service starter kit.

3. INSPECT STARTER ARMATURE ASSEMBLY

(a) Check the commutator surface for dirt or burning.
If the surface is dirty or burnt, smooth the surface with 400-grit sandpaper or leather.

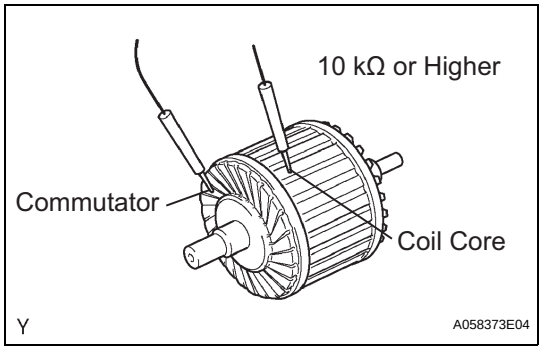
ST



(b) Inspect the resistance of the commutator.
(1) Using an ohmmeter, measure the resistance between the segments of the commutator.
Standard resistance

Tester connection	Specified condition
Segment - Segment	Below 1 Ω

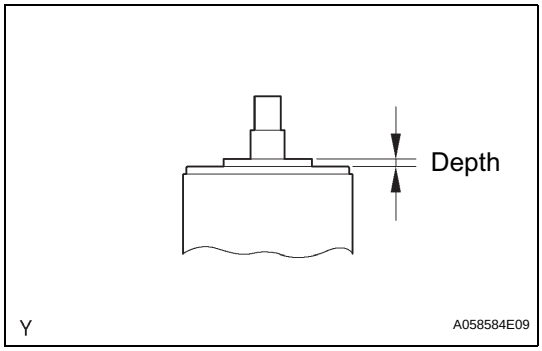
If the resistance is not as specified, replace the starter armature assembly.



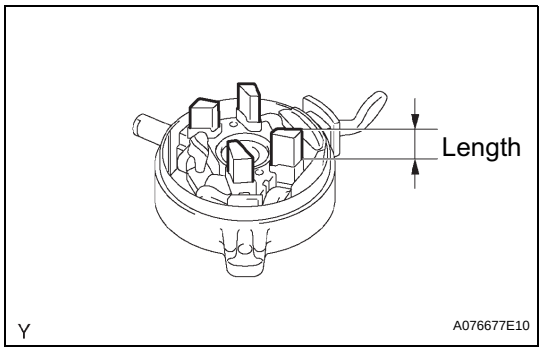
(2) Using an ohmmeter, measure the resistance between the commutator and armature coil core.
Standard resistance

Tester connection	Specified condition
Commutator - Armature coil core	10 kΩ or higher

If the resistance is not as specified, replace the starter armature assembly.

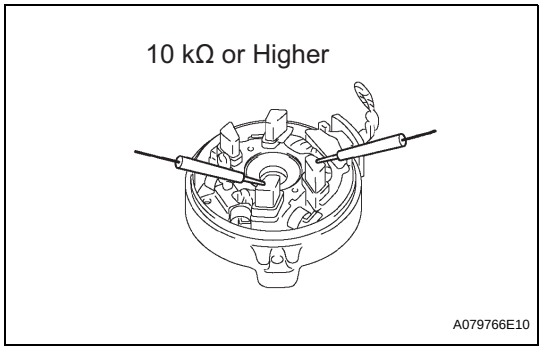


(c) Using vernier calipers, measure the commutator depth.
Specified depth:
3.1 mm (0.122 in.)
Maximum depth:
3.8 mm (0.150 in.)
If the depth is greater than the maximum, replace the starter armature assembly.



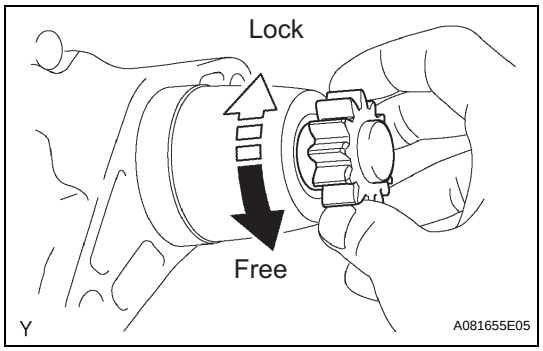
4. INSPECT STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Check the brush length.
(1) Using vernier calipers, measure the brush length.
Specified length:
9.0 mm (0.354 in.)
Maximum length:
4.0 mm (0.157 in.)
If the length is less than the minimum, replace the starter commutator end frame assembly.



(b) Check the resistance.
(1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brushes.
Resistance:
10 kΩ or higher
If the resistance is not as specified, repair or replace the starter commutator end frame assembly.

ST



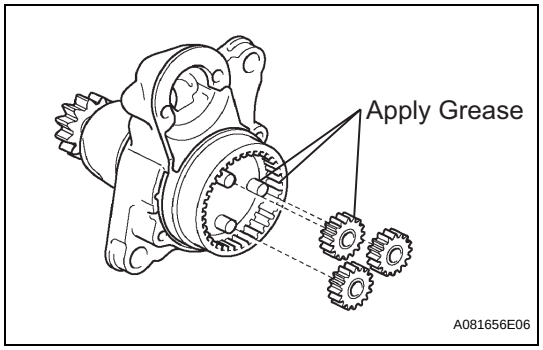
5. INSPECT MOTOR TERMINAL STARTER KIT

(a) Check the starter clutch.

(1) Rotate the clutch pinion gear counterclockwise and check that it turns freely. Try to rotate the clutch pinion gear clockwise and check that it locks.

If necessary, replace the motor terminal starter kit.

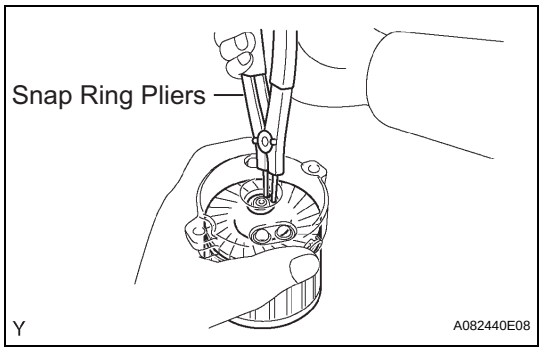
REASSEMBLY



1. INSTALL PLANETARY GEAR

(a) Apply high-temperature grease to the planetary gears and pin parts of the planetary shaft.

(b) Install the 3 planetary gears to the motor terminal starter kit.

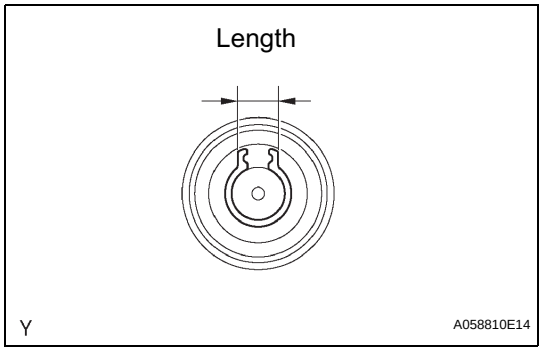


2. INSTALL STARTER ARMATURE ASSEMBLY

(a) Apply high-temperature grease to the plate washer and the armature shaft.

(b) Install the starter armature assembly to the starter commutator end frame assembly.

(c) Using snap ring pliers, install the plate washer and a new snap ring.

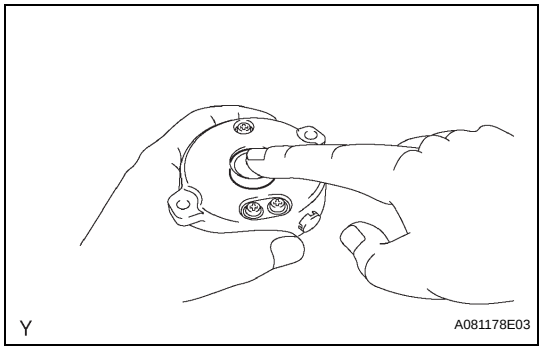


(d) Using vernier calipers, measure the snap ring.

Maximum length:

5.0 mm (0.197 in.)

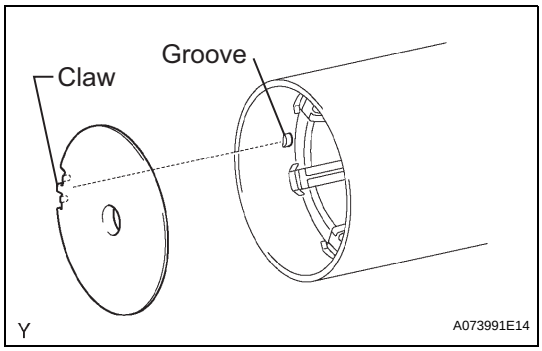
If the length is greater than the maximum, replace the snap ring with a new one.



3. INSTALL STARTER COMMUTATOR END FRAME COVER

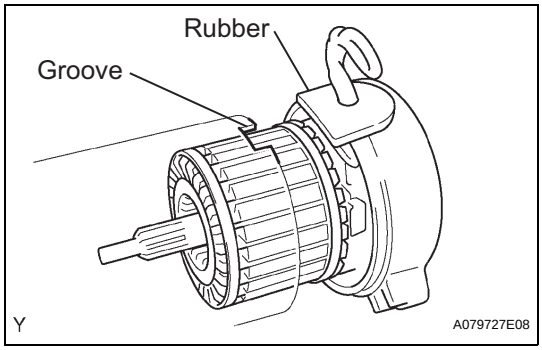
(a) Install the starter commutator end frame cover to the starter commutator end frame assembly.

ST



4. INSTALL STARTER ARMATURE PLATE

(a) Align the claw of the armature plate with the groove inside the starter yoke assembly, and install the starter armature plate.



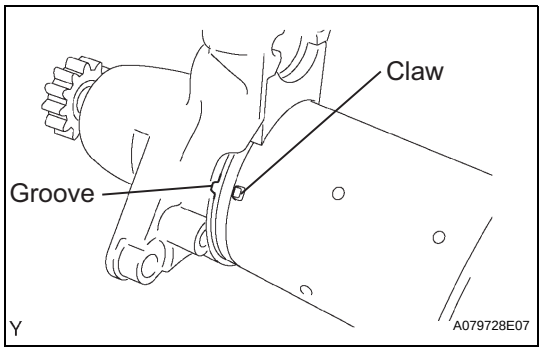
5. INSTALL STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Align the starter commutator end frame rubber with the groove of the starter yoke assembly.

(b) Install the starter commutator end frame assembly to the starter yoke assembly.

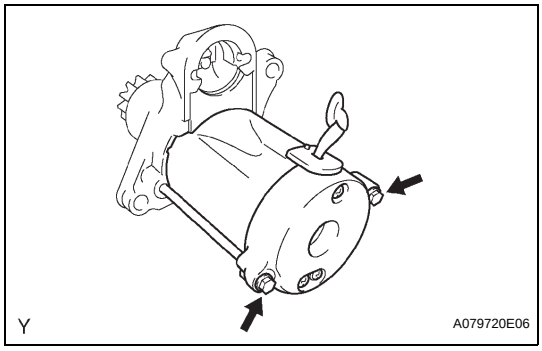
NOTICE:

The magnet of the starter yoke assembly may attract the starter armature assembly when the starter commutator end frame assembly is installed, causing the magnet to break.



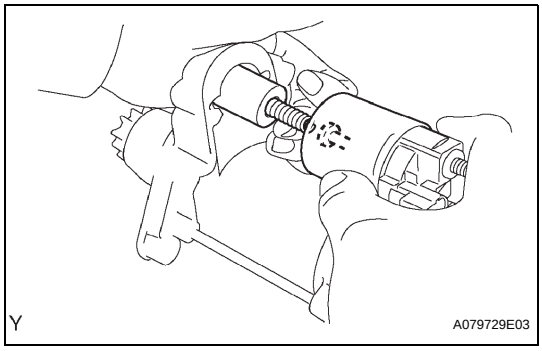
6. INSTALL STARTER YOKE ASSEMBLY

(a) Align the claw of the starter yoke with the groove inside the motor terminal starter kit.



(b) Install the starter yoke with the 2 through bolts.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)



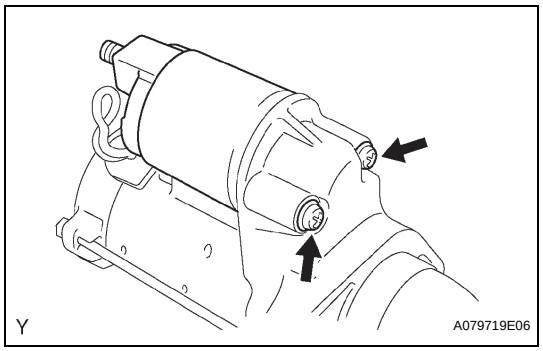
7. INSTALL REPAIR SERVICE STARTER KIT

(a) Apply high-temperature grease to the plunger and the hook.

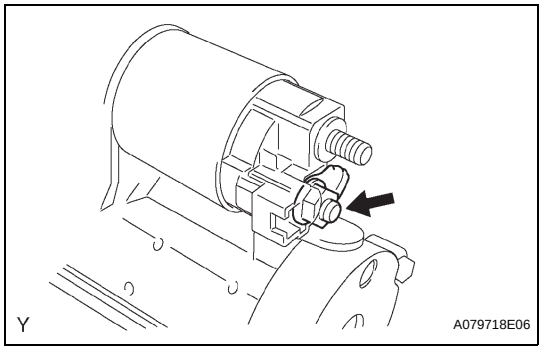
(b) Hang the plunger hook of the repair service starter kit to the drive lever hook.

(c) Install the plunger and the return spring.

ST



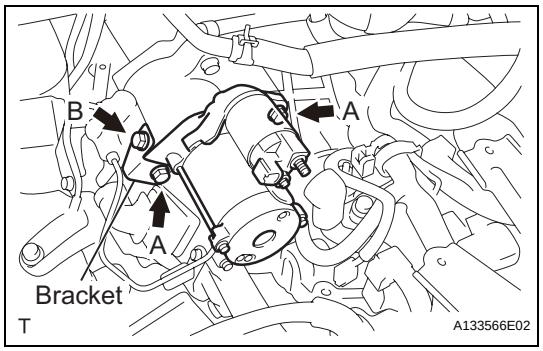
(d) Install the repair service starter kit with the 2 screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)



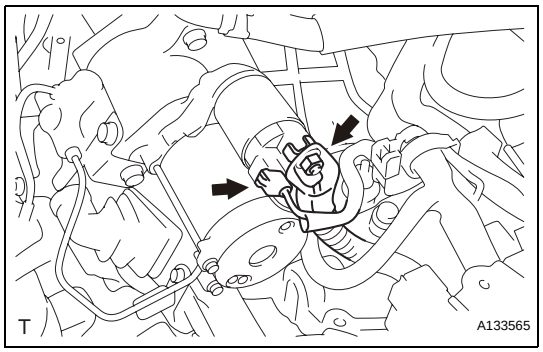
(e) Connect the lead wire to terminal C with the nut.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

INSTALLATION

1. INSTALL STARTER ASSEMBLY (for Manual Transaxle)



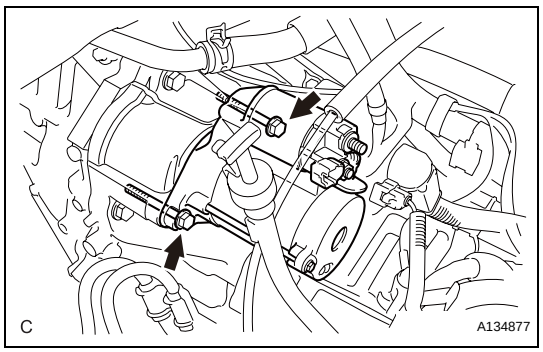
(a) Install the starter assembly and clutch flexible hose bracket with the 3 bolts.
Torque: Bolt A
37 N*m (380 kgf*cm, 28 ft.*lbf)
Bolt B
12 N*m (120 kgf*cm, 9 ft.*lbf)



(b) Connect the wire harness to terminal 30 and install the nut. Then, attach the terminal cap.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

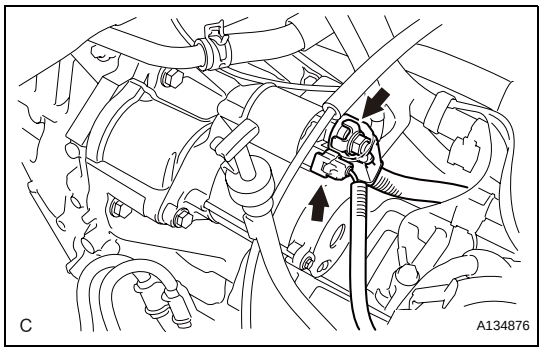
(c) Connect the terminal 50 connector to the starter assembly.

2. INSTALL STARTER ASSEMBLY (for Automatic Transaxle)



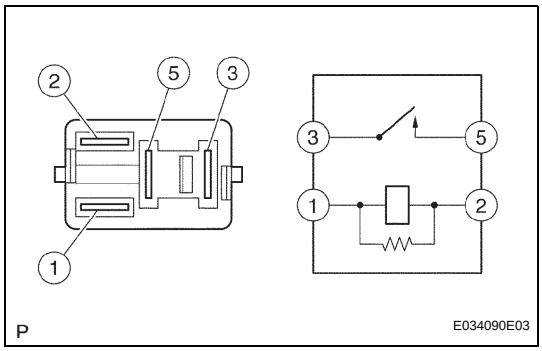
(a) Install the starter assembly with the 2 bolts.
Torque: 37 N*m (380 kgf*cm, 28 ft.*lbf)

ST



(b) Connect the wire harness to terminal 30 and install the nut. Then, attach the terminal cap.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
(c) Connect the terminal 50 connector to the starter assembly.

3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
5. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**



STARTER RELAY

ON-VEHICLE INSPECTION

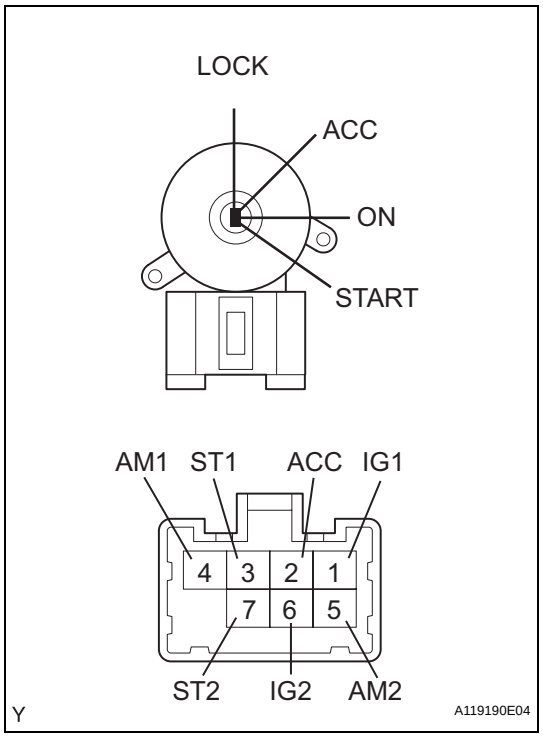
1. INSPECT STARTER RELAY ASSEMBLY

(a) Using an ohmmeter, measure the resistance between each terminal.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the starter relay assembly.



IGNITION SWITCH

ON-VEHICLE INSPECTION

1. INSPECT IGNITION OR STARTER SWITCH ASSEMBLY

(a) Check the resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance

Condition	Tester Connection	Specified Condition
LOCK	Between all terminals	10 kΩ or higher
ACC	2 - 4	Below 1 Ω
ON	1 - 2 - 4	Below 1 Ω
	5 - 6	
START	1 - 3 - 4	Below 1 Ω
	5 - 6 - 7	

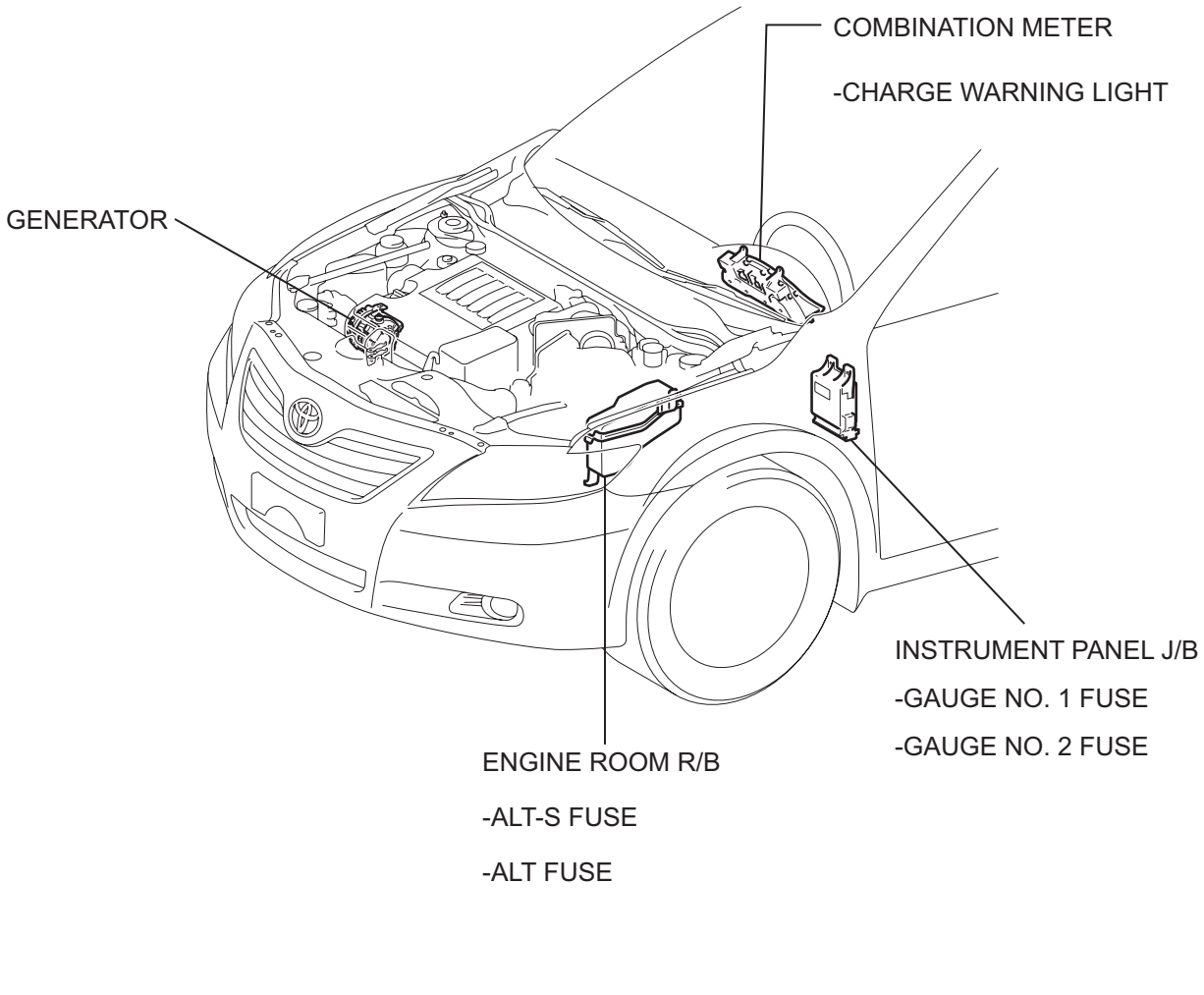
If the result is not as specified, replace the ignition or starter switch.

CHARGING SYSTEM

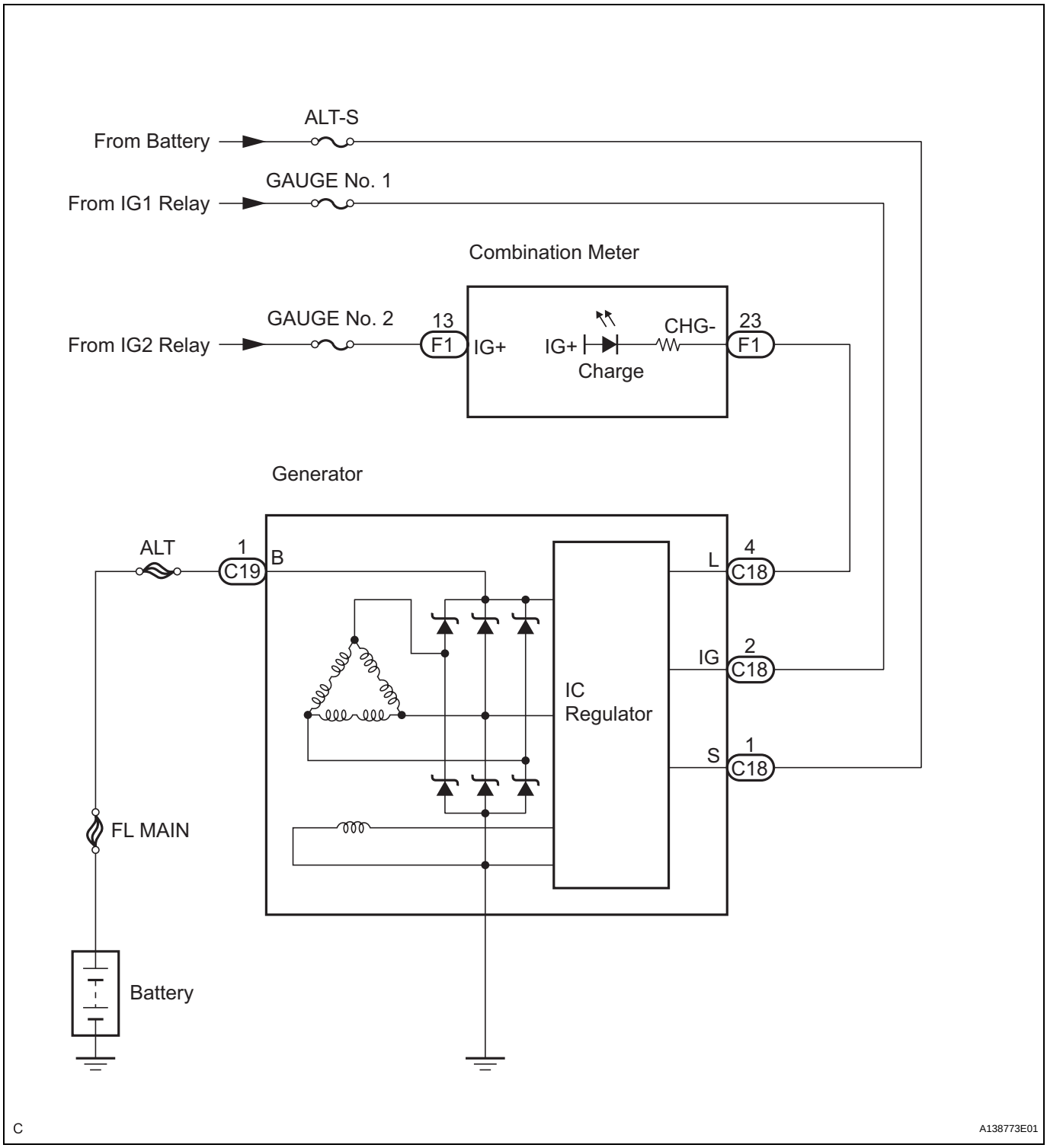
PRECAUTION

1. **Check that the battery cables are connected to the correct terminals.**
2. **Disconnect the battery cables when the battery is given a quick charge.**
3. **Do not perform tests with a high voltage insulation resistance tester.**
4. **Never disconnect the battery while the engine is running.**
5. **Check that the charging cable nut is tightened on terminal B of the generator and the engine room R/B.**

PARTS LOCATION



SYSTEM DIAGRAM



PROBLEM SYMPTOMS TABLE

Result

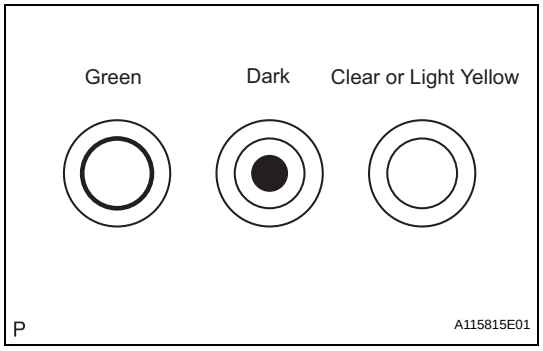
Symptom	Suspected area	See page
Charge Warning Light Comes ON while Driving	1. Clutch pulley	CH-7
	2. Generator assembly	
Noise Occurs from Generator while Engine is Running	1. V-ribbed belt	CH-8
	2. Clutch pulley	
	3. Generator assembly	

ON-VEHICLE INSPECTION

1. CHECK BATTERY ELECTROLYTE LEVEL

(a) Check the electrolyte level.

(1) If the electrolyte level is low, replace the battery (or add distilled water) and check the charging system.



2. CHECK BATTERY SPECIFIC GRAVITY

(a) Check the color of the indicator.

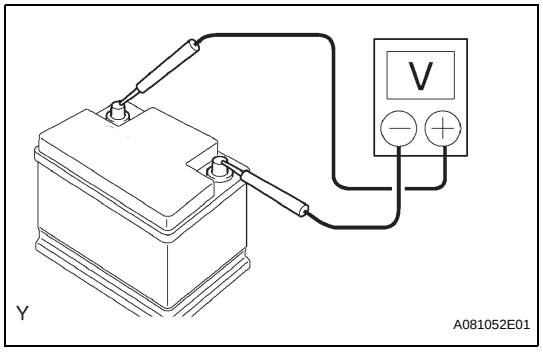
Result

Indicator color	Condition
Green	Good
Dark	Charging necessary
Clear or light yellow	Replacement necessary

3. CHECK BATTERY VOLTAGE

(a) If it has not been 20 minutes since you drove the vehicle or since the engine was stopped, turn the ignition switch on (IG) and turn on the electrical systems (headlight, blower motor, rear defogger, etc.) for 60 seconds. This will remove the surface charge from the battery.

(b) Turn off the ignition switch and the electrical systems.



(c) Measure the battery voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage:

12.5 to 12.9 V at 20°C (68°F)

HINT:

If the voltage is below the specification, charge the battery.

4. CHECK BATTERY TERMINAL

(a) Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean them.

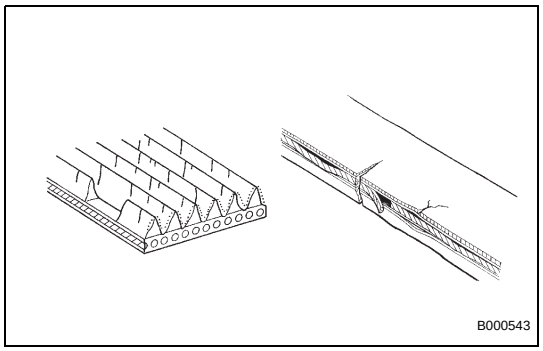
5. CHECK FUSES

(a) Measure the resistance of the ALT fuse, ALT-S fuse, GAUGE No. 1 fuse and GAUGE No. 2 fuse.

Standard resistance:

Below 1 Ω

If the result is not as specified, replace the fuses as necessary.

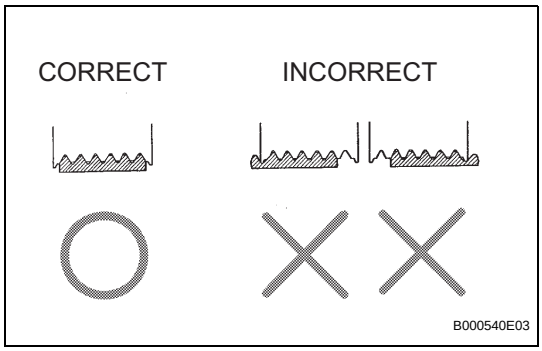


6. CHECK V-RIBBED BELT

(a) Check the belt for wear, cracks or other signs of damage.

If any of the following defects is found, replace the V-ribbed belt.

- The belt is worn out, cracked, or the cords are exposed.
- The cracks reach the cords in more than one place.
- The belt has chunks missing from the ribs.



(b) Check that the belt fits properly in the ribbed grooves.
HINT:
Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
If it has slipped out, replace the V-ribbed belt. Install a new V-ribbed belt correctly.

7. VISUALLY CHECK GENERATOR WIRING

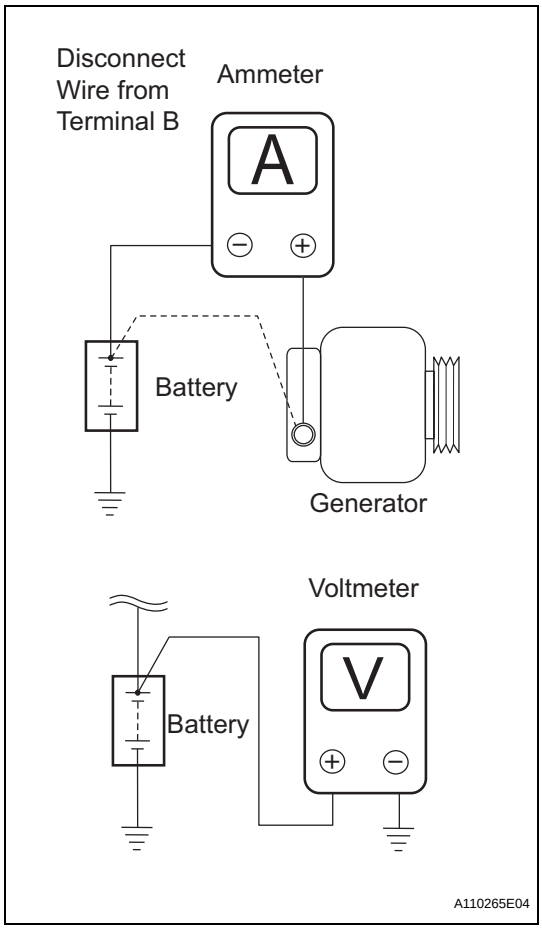
(a) Check that the generator wiring is in good condition.
If the condition is not good, repair or replace the generator wire.

8. LISTEN FOR ABNORMAL NOISES FROM GENERATOR

(a) Check that there is no abnormal noise from the generator while the engine is running.
If there is abnormal noise, replace the pulley or generator.

9. CHECK CHARGE WARNING LIGHT CIRCUIT

(a) Turn the ignition switch on (IG). Check that the charge warning light comes on.
(b) Start the engine and check that the light goes off.
If the light does not operate as specified, troubleshoot the charge warning light circuit.



10. CHECK CHARGING CIRCUIT WITHOUT LOAD

(a) According to the following procedure, connect an ammeter and voltmeter as shown in the illustration.
(1) Disconnect the wire from terminal B of the generator and connect it to the negative (-) lead of the ammeter.
(2) Connect the positive (+) lead of the ammeter to terminal B of the generator.
(3) Connect the positive (+) lead of the voltmeter to positive (+) terminal of the battery.
(4) Ground the negative (-) lead of the voltmeter.
(b) Check the charging circuit.
(1) While keeping the engine speed at 2,000 rpm, check the readings on the ammeter and voltmeter.
Standard amperage:
10 A or less
Standard voltage:
13.2 to 14.8 V
If the results are not as specified, replace the generator assembly.
HINT:
- If the battery is not fully charged, the ammeter reading may be more than the standard amperage. In this case, increase electrical load by operating devices such as the wiper motor and rear window defogger. Then, recheck the reading on the ammeter.

11. CHECK CHARGING CIRCUIT WITH LOAD

(a) Keep the engine speed at 2,000 rpm, turn on the high beam headlights, and turn the heater blower switch to the "HI" position.

(b) Check the reading on the ammeter.

Standard amperage:

30 A or more

If the ammeter reading is less than the standard amperage, replace the generator assembly.

HINT:

- If the battery is fully charged, the ammeter reading may be less than the standard amperage. In this case, increase electrical load by operating devices such as the wiper motor and rear window defogger. Then, recheck the reading on the ammeter.

Charge Warning Light Comes ON while Driving

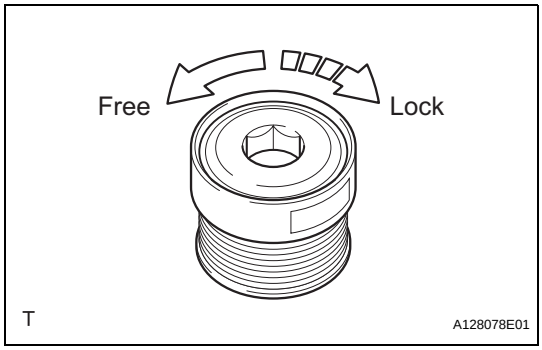
INSPECTION PROCEDURE

1	CHECK LOCK FUNCTION OF CLUTCH PULLEY

(a) Check the lock function with the pulley installed in the vehicle.
  (1) Visually check that the rotor in the generator operates with the engine started.

(b) Check the lock function with the pulley removed from the vehicle.
  (1) Remove the generator pulley cap. Using SST, hold the generator rotor.
  (2) Turn the clutch pulley clockwise and check that the outer ring locks.
  OK:
  The outer ring locks.

SST 09820-63020



NG → **REPLACE CLUTCH PULLEY**

OK

2	CHECK LOCK OF CLUTCH PULLEY

(a) Start the engine and visually check looseness of the clutch pulley.
  OK:
  The clutch pulley is not loose.

NG → **TIGHTEN CLUTCH PULLEY TO THE SPECIFIED TORQUE**

OK

REPLACE GENERATOR ASSEMBLY

Noise Occurs from Generator while Engine is Running

INSPECTION PROCEDURE

1 CHECK LOOSENESS OF V-RIBBED BELT

(a) Check the tension of the belt by pushing it down with a finger.
OK:
The tension of the belt is enough.

NG → **REPLACE V-RIBBED BELT TENSIONER ASSEMBLY**

OK ↓

2 CHECK V-RIBBED BELT FOR WEAR

(a) Check the V-ribbed belt for wear.
OK:
The V-ribbed belt is not worn.

NG → **REPLACE V-RIBBED BELT**

OK ↓

3 CHECK CLUTCH PULLEY FOR WEAR

(a) Check the clutch pulley groove for wear or other defects.
OK:
The clutch pulley groove is not damaged.

NG → **REPLACE CLUTCH PULLEY**

OK ↓

4 CHECK FOR NOISE WHILE CLUTCH PULLEY IS OPERATING

(a) Perform a driving test and check if noise occurs when decelerating.
OK:
Noise does not occur.

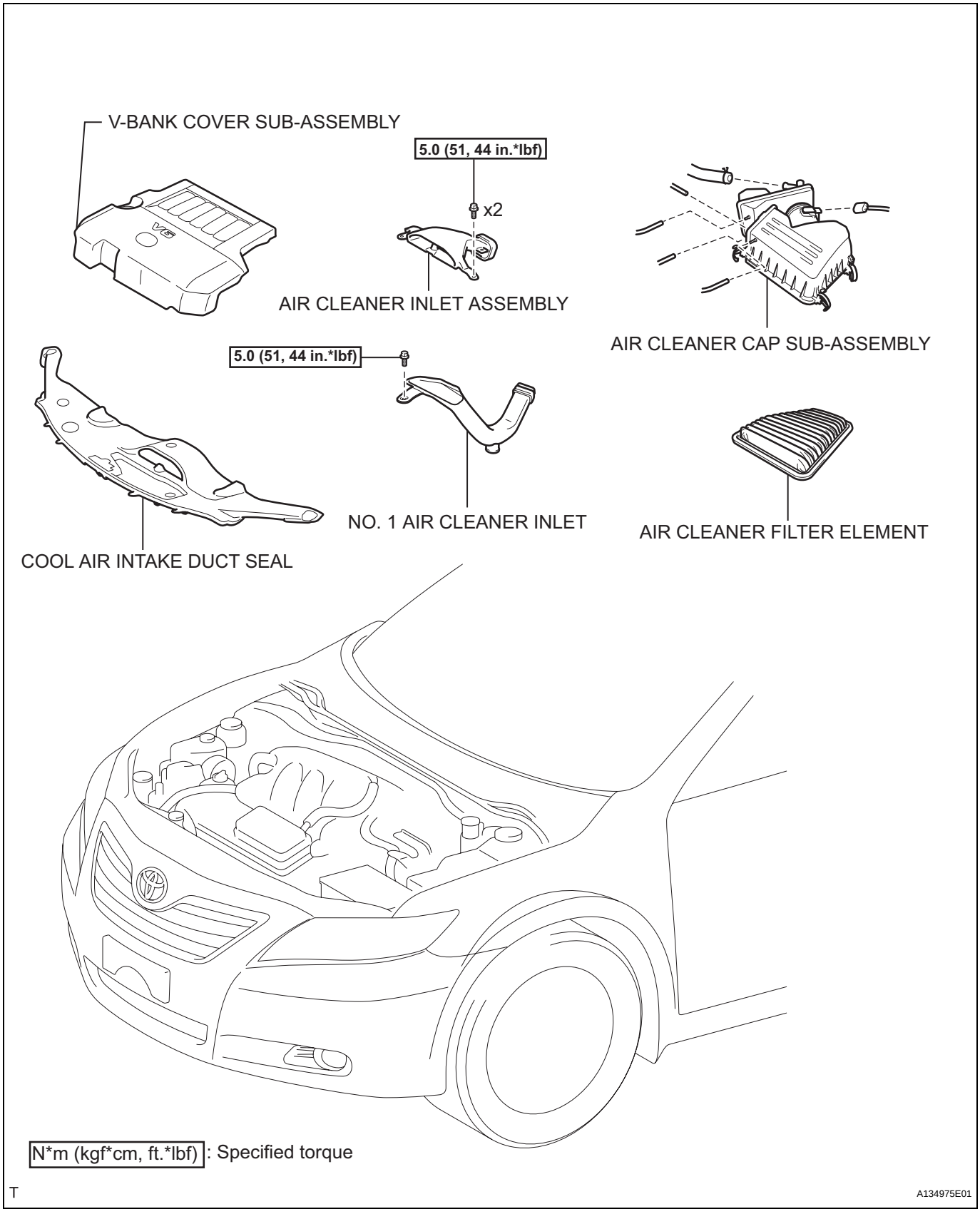
NG → **REPLACE CLUTCH PULLEY**

OK ↓

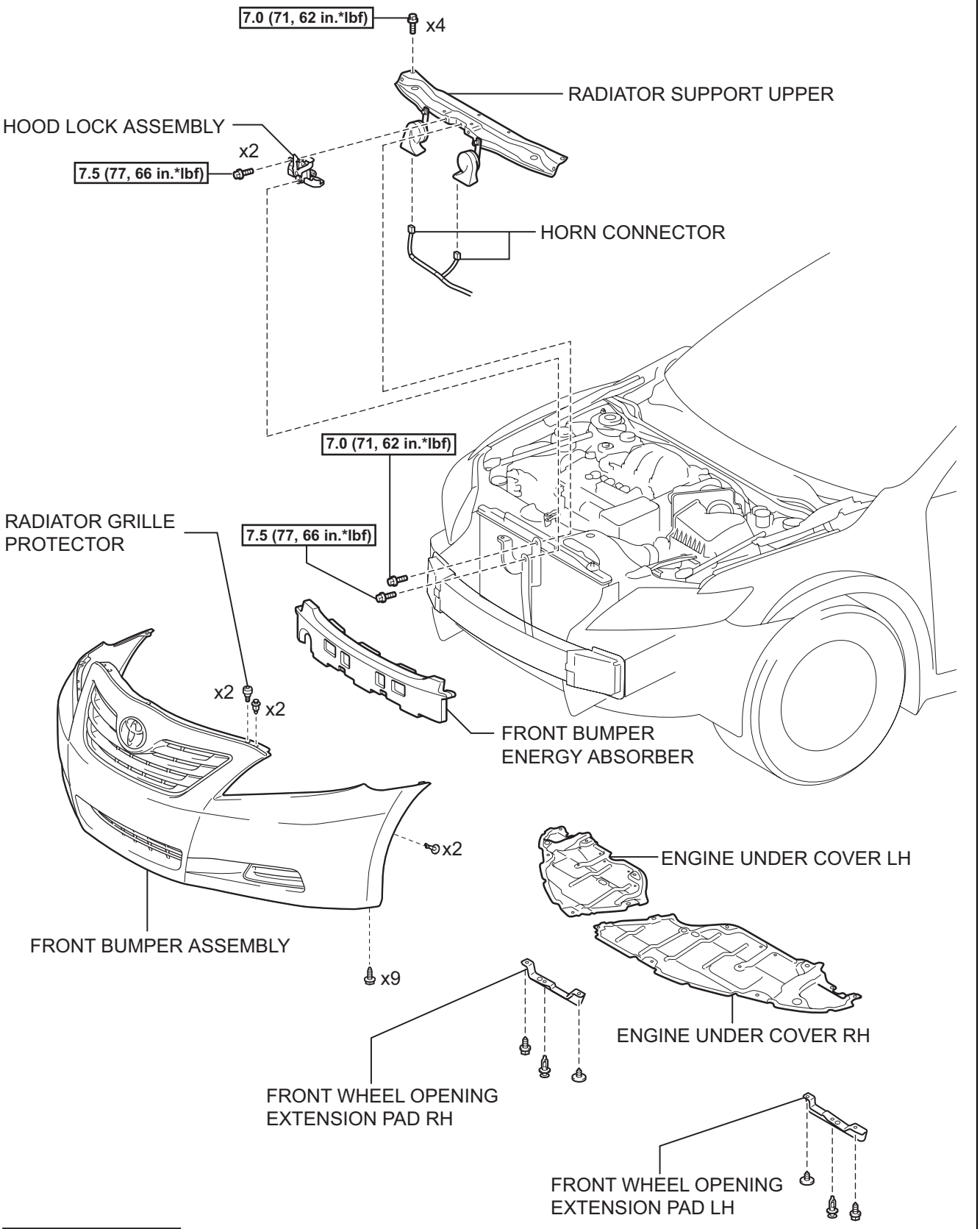
REPLACE GENERATOR ASSEMBLY

GENERATOR

COMPONENTS



CH

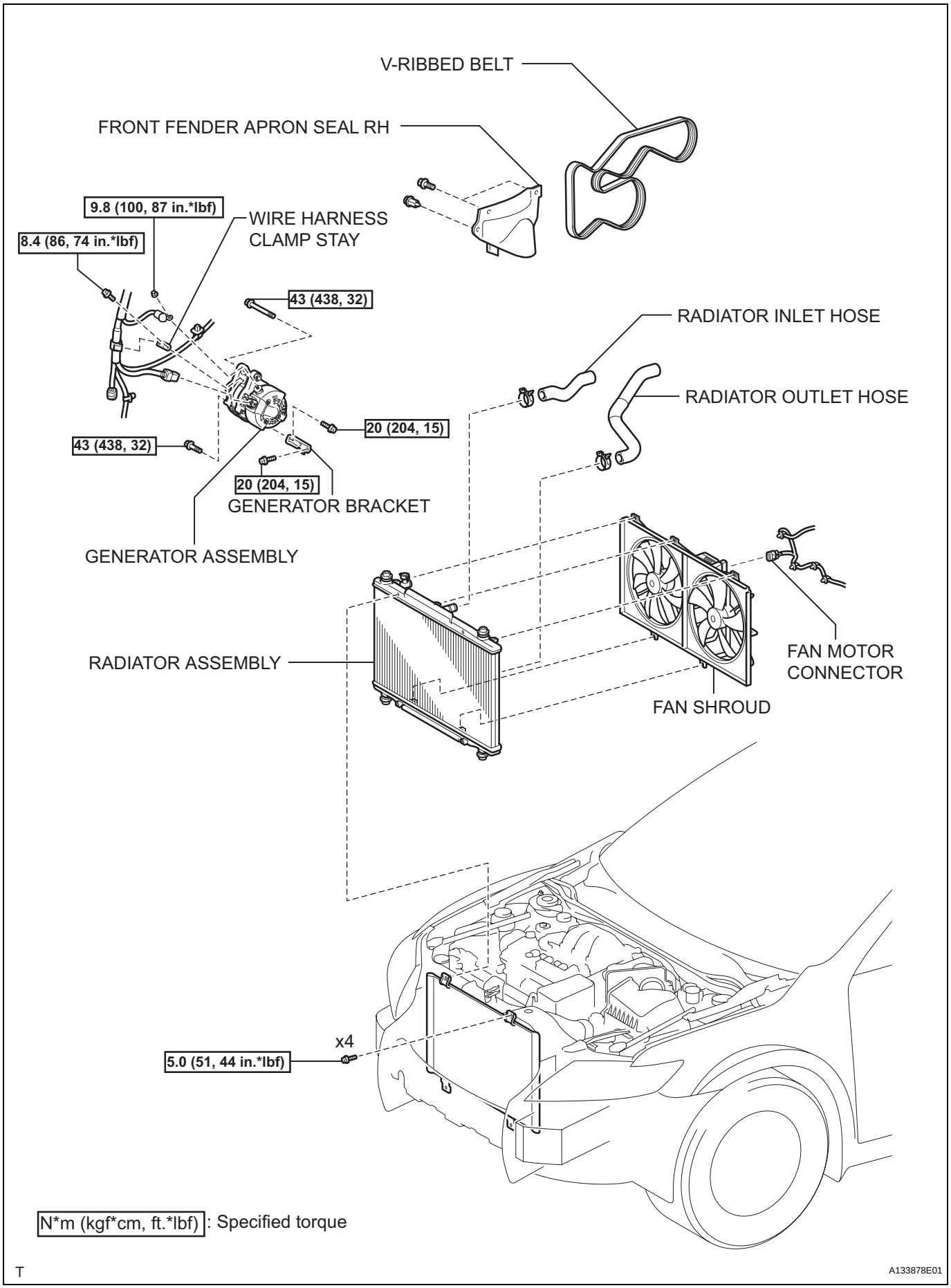


CH

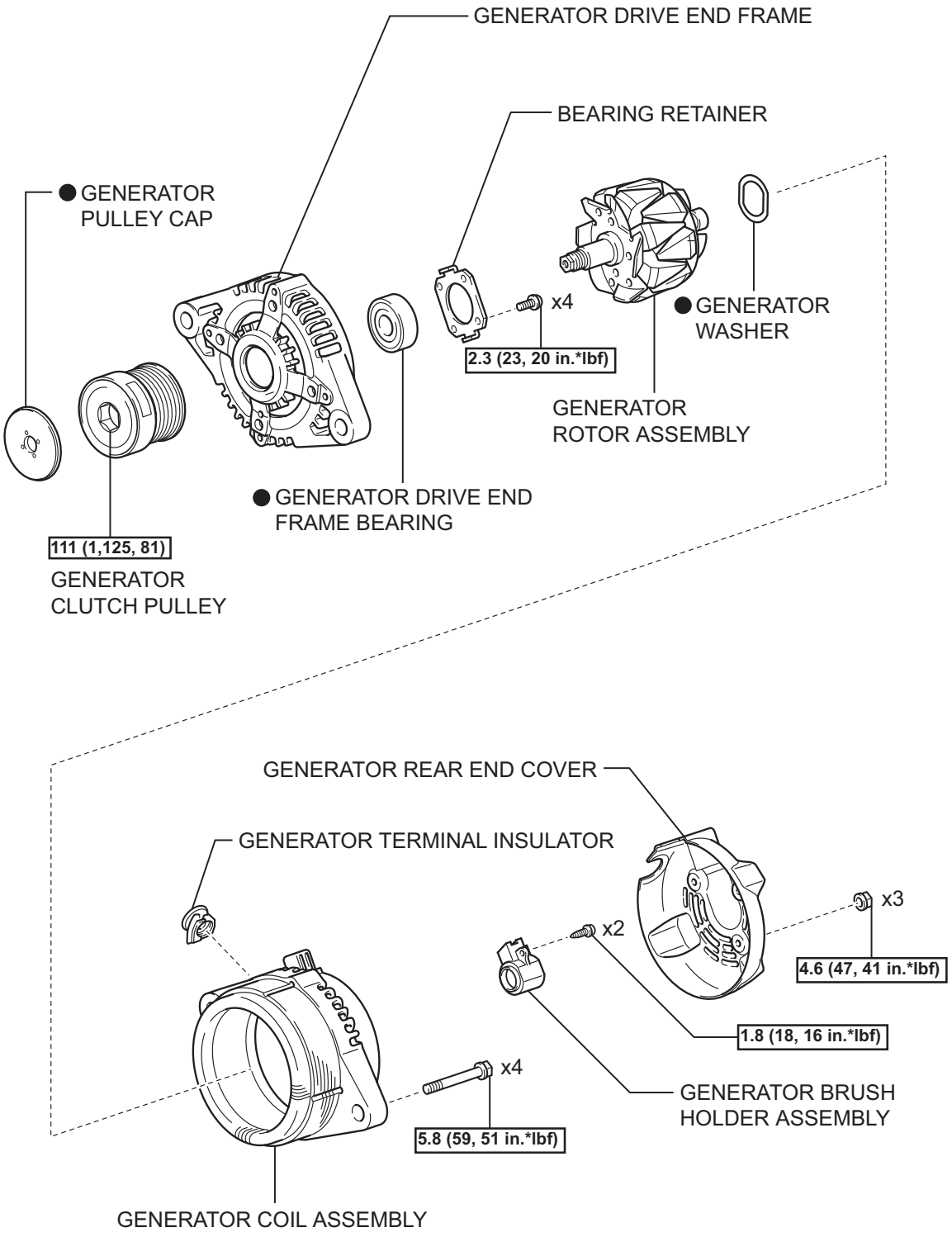
N*m (kgf*cm, ft.*lbf) : Specified torque

T

A133359E05


V-RIBBED BELT
FRONT FENDER APRON SEAL RH
9.8 (100, 87 in.*lbf)
WIRE HARNESS CLAMP STAY
8.4 (86, 74 in.*lbf)
43 (438, 32)
RADIATOR INLET HOSE
RADIATOR OUTLET HOSE
20 (204, 15)
43 (438, 32)
20 (204, 15)
GENERATOR BRACKET
GENERATOR ASSEMBLY
RADIATOR ASSEMBLY
FAN MOTOR CONNECTOR
FAN SHROUD
x4
5.0 (51, 44 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque
T
A133878E01

CH



CH

N*m (kgf*cm, ft.*lbf): Specified torque

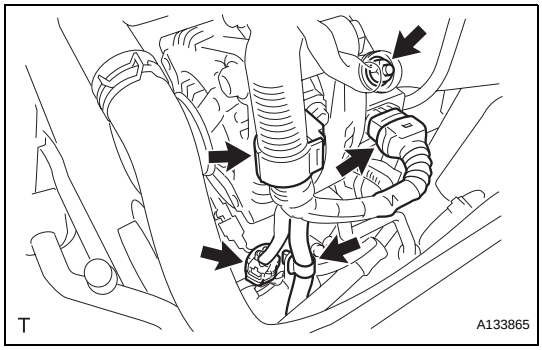
● Non-reusable part

T

A135482E01

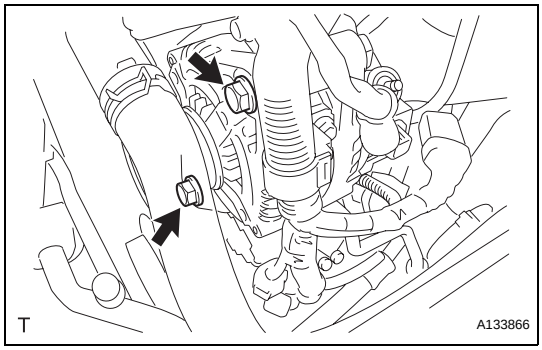
REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE FRONT WHEEL RH
3. REMOVE FRONT FENDER APRON SEAL RH
4. REMOVE FRONT WHEEL OPENING EXTENSION PAD RH
5. REMOVE FRONT WHEEL OPENING EXTENSION PAD LH
6. REMOVE ENGINE UNDER COVER RH
7. REMOVE ENGINE UNDER COVER LH
8. DRAIN ENGINE COOLANT (See page CO-5)
9. REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)
10. REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)
11. REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)
12. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)
13. REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)
14. REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)
15. REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)
16. REMOVE FRONT BUMPER ENERGY ABSORBER (See page ET-9)
17. SEPARATE RADIATOR RESERVE TANK HOSE (See page CO-24)
18. SEPARATE RADIATOR INLET HOSE (See page CO-24)
19. SEPARATE RADIATOR OUTLET HOSE (See page CO-24)
20. SEPARATE NO. 1 OIL COOLER INLET HOSE (See page CO-25)
21. SEPARATE NO. 1 OIL COOLER OUTLET HOSE (See page CO-25)
22. REMOVE RADIATOR SUPPORT UPPER (See page CO-25)
23. REMOVE FAN SHROUD (See page CO-26)
24. REMOVE RADIATOR ASSEMBLY (See page CO-26)
25. REMOVE V-RIBBED BELT (See page EM-6)

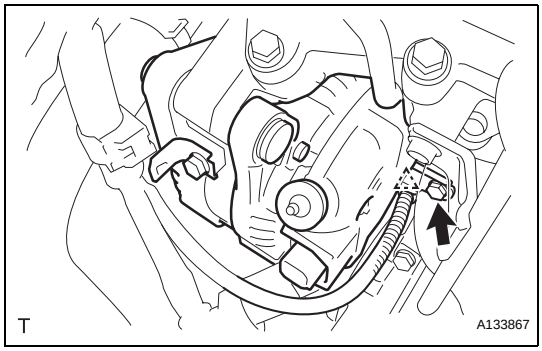


26. REMOVE GENERATOR ASSEMBLY

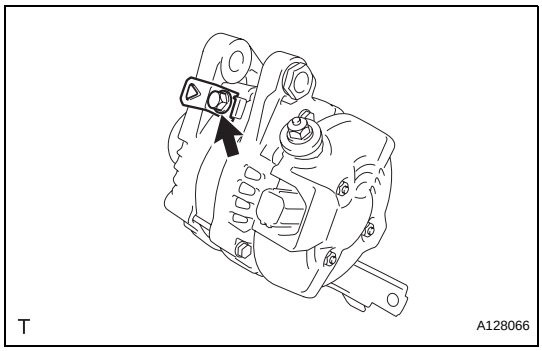
(a) Remove the terminal cap.
(b) Remove the nut and disconnect the wire harness from terminal B.
(c) Disconnect the generator connector from the generator assembly.
(d) Disconnect the connector from the compressor and magnetic clutch.
(e) Disconnect the 2 wire harness clamps.



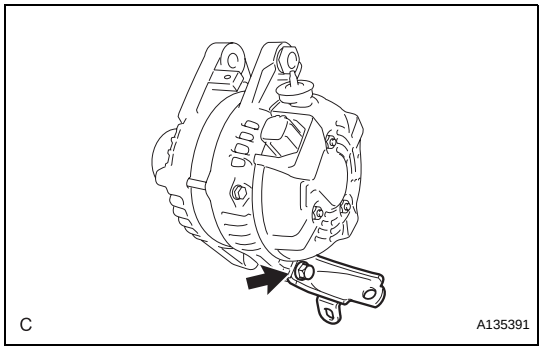
(f) Remove the 2 bolts.



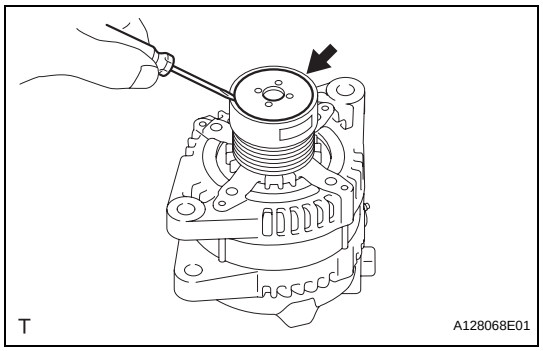
(g) Remove the bolt from the cylinder block.
(h) Disconnect the wire harness clamp and remove the generator assembly.



(i) Remove the bolt and wire harness clamp stay.



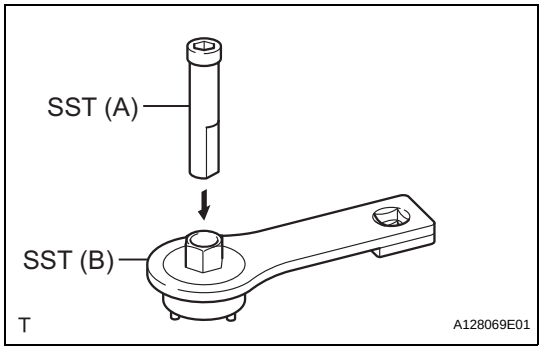
(j) Remove the bolt and bracket.



DISASSEMBLY

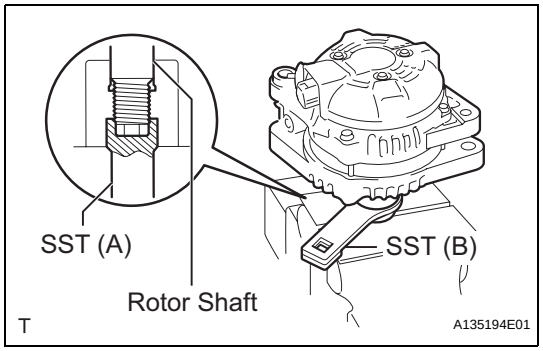
1. REMOVE GENERATOR CLUTCH PULLEY

(a) Using a screwdriver, remove the generator pulley cap.

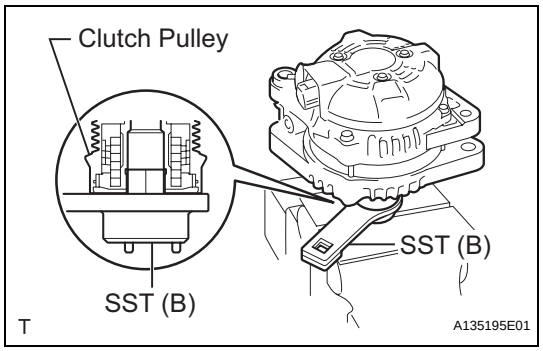


(b) Set SST (A) and (B).
SST 09820-63020

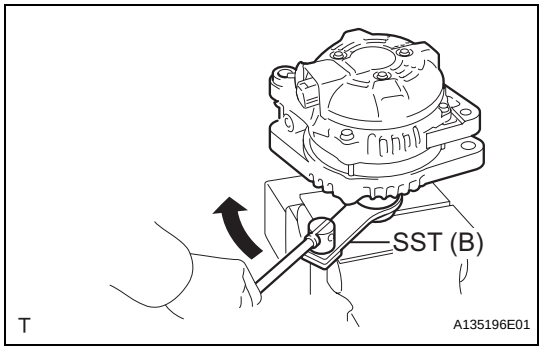
(c) Clamp SST (A) in a vise.



(d) Place the rotor shaft end into SST (A).



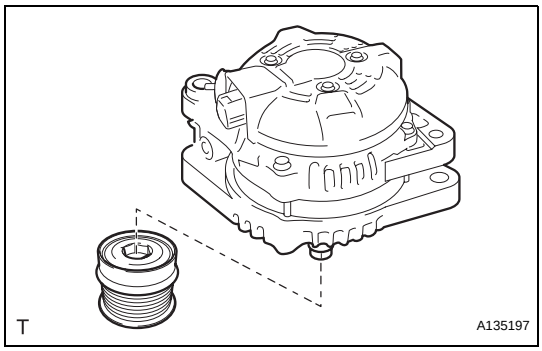
(e) Fit SST (B) to the clutch pulley.



(f) Loosen the pulley by turning SST (B) in the direction shown in the illustration.

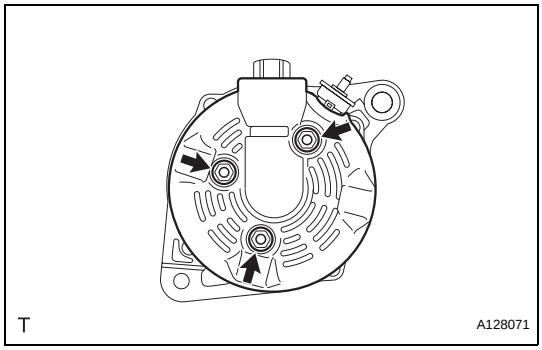
(g) Remove the generator assembly from the SST.

(h) Remove the clutch pulley from the rotor shaft.

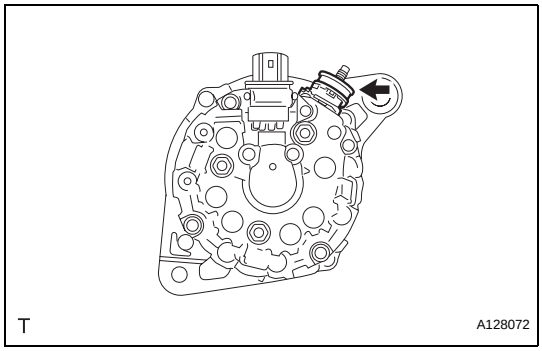


2. REMOVE GENERATOR REAR END COVER

(a) Place the generator assembly on the clutch pulley.

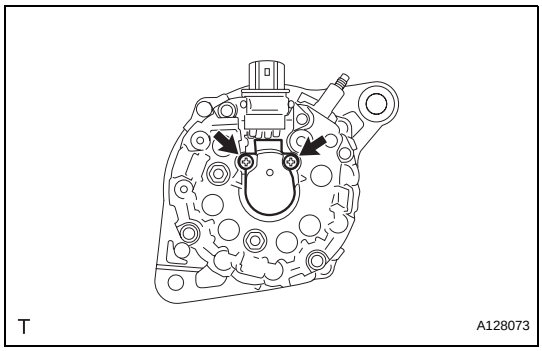


(b) Remove the 3 nuts and generator rear end cover.



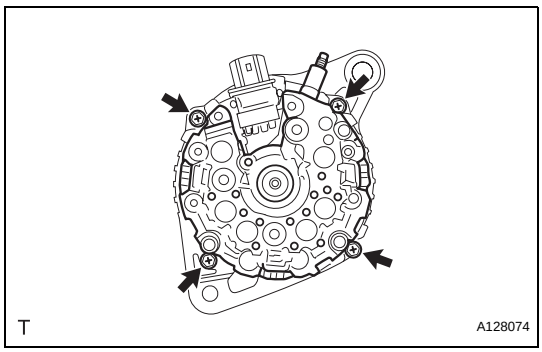
3. REMOVE GENERATOR TERMINAL INSULATOR

(a) Remove the terminal insulator from the generator coil.



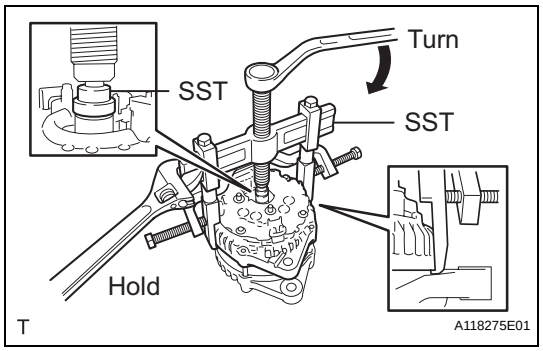
4. REMOVE GENERATOR BRUSH HOLDER ASSEMBLY

(a) Remove the 2 screws and brush holder from the generator coil.

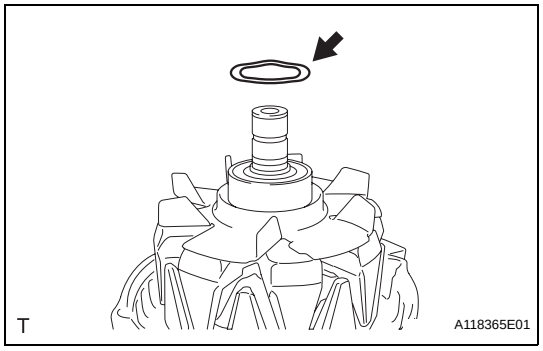


5. REMOVE GENERATOR COIL ASSEMBLY

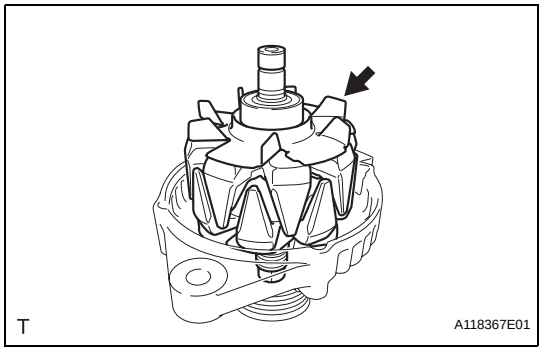
(a) Remove the 4 bolts.



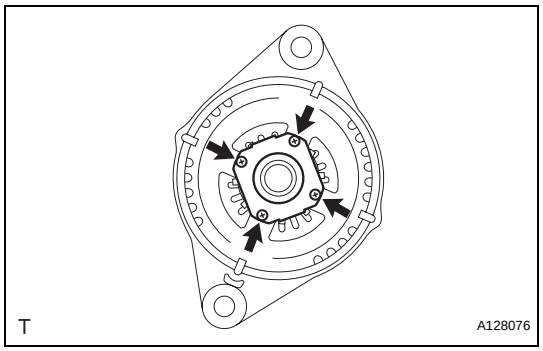
(b) Using SST, remove the generator coil assembly.
SST 09950-40011 (09951-04020, 09952-04010, 09953-04020, 09954-04010, 09955-04071, 09957-04010, 09958-04011)



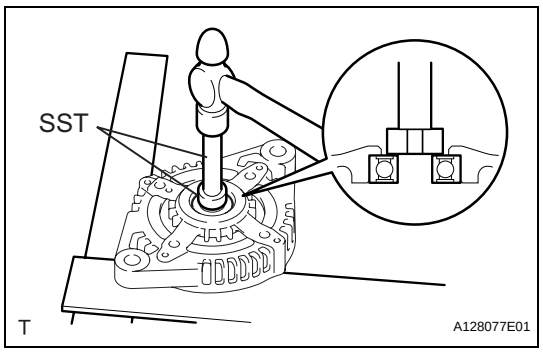
6. REMOVE GENERATOR ROTOR ASSEMBLY
(a) Remove the generator washer.



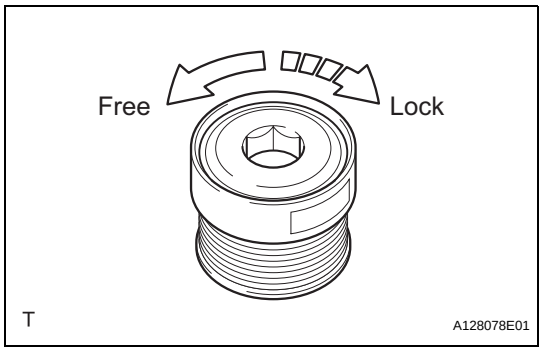
(b) Remove the generator rotor assembly.



7. REMOVE GENERATOR DRIVE END FRAME BEARING
(a) Remove the 4 screws and retainer plate from the drive end frame.



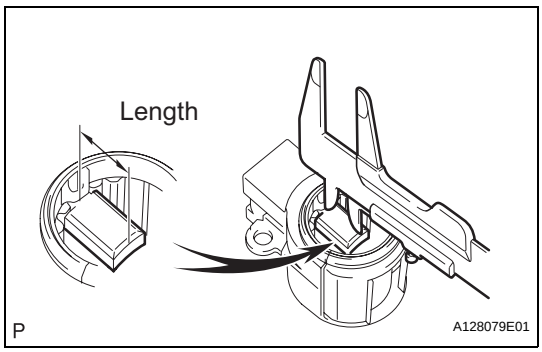
(b) Using SST and a hammer, tap out the drive end frame bearing from the drive end frame.
SST 09950-60010 (09951-00250), 09950-70010 (09951-07100)



INSPECTION

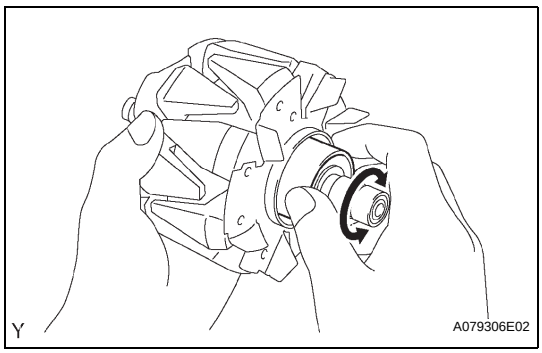
1. INSPECT GENERATOR CLUTCH PULLEY

(a) Hold the center of the pulley, and confirm that the outer ring turns counterclockwise and does not turn clockwise.
If the result is not as specified, replace the clutch pulley.



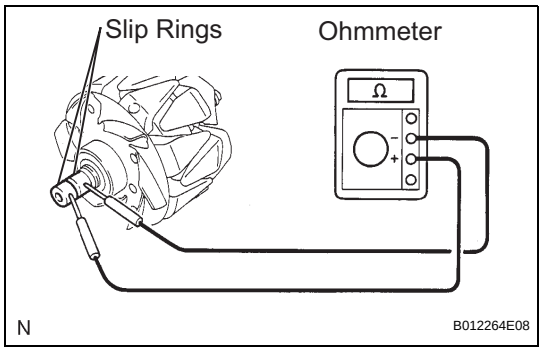
2. INSPECT GENERATOR BRUSH HOLDER ASSEMBLY

(a) Using vernier calipers, measure the length of the exposed brushes.
Standard exposed length:
9.5 to 11.5 mm (0.374 to 0.453 in.)
Minimum exposed length:
4.5 mm (0.177 in.)
If the exposed length is less than the minimum, replace the brush holder assembly.



3. INSPECT GENERATOR ROTOR ASSEMBLY

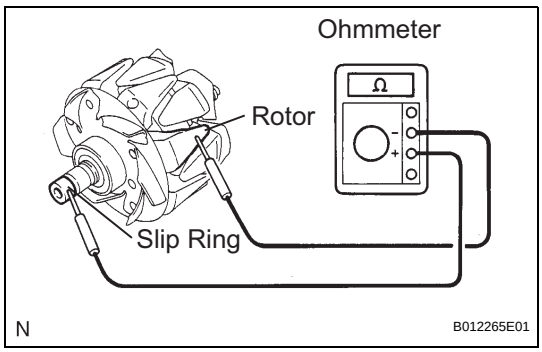
(a) Check that the generator rotor bearing is not rough or worn.
If necessary, replace the generator rotor assembly.



(b) Check the generator rotor for an open circuit.
(1) Using an ohmmeter, measure the resistance between the slip rings.
Standard resistance

Condition	Specified condition
Approx. 20°C (68°F)	2.3 to 2.7 Ω

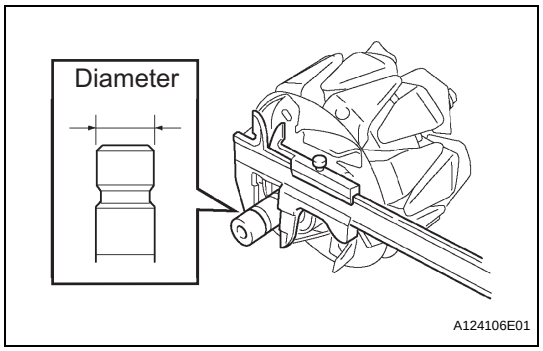
If the result is not as specified, replace the generator rotor assembly.



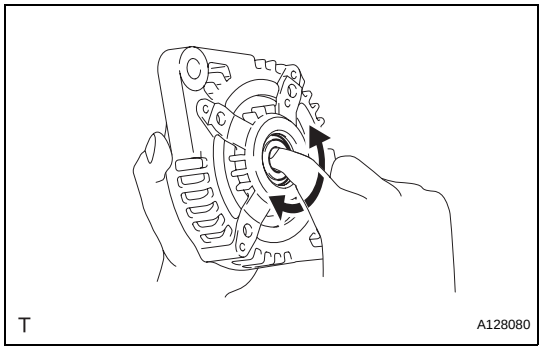
(c) Check the rotor for a short to ground.
(1) Using an ohmmeter, measure the resistance between the slip ring and rotor.
Standard resistance

Tester condition	Specified condition
Slip ring - Rotor	1 MΩ or higher

If the result is not as specified, replace the generator rotor assembly.



(d) Using vernier calipers, measure the slip ring diameter.
Standard diameter:
14.2 to 14.4 mm (0.559 to 0.567 in.)
Minimum diameter:
14.0 mm (0.551 in.)
If the diameter is less than the minimum, replace the generator rotor assembly.



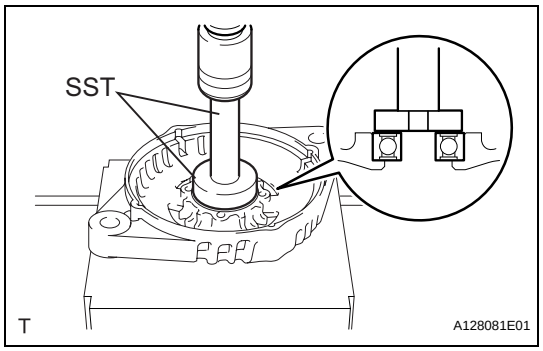
4. INSPECT GENERATOR DRIVE END FRAME BEARING

(a) Check that the drive end frame bearing is not rough or worn.
If necessary, replace the drive end frame bearing.

REASSEMBLY

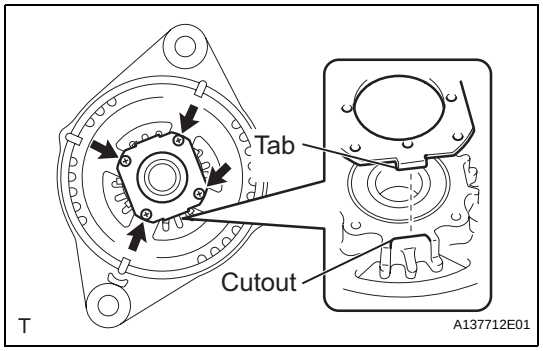
1. INSTALL GENERATOR DRIVE END FRAME BEARING

(a) Using SST and a press, press in a new generator drive end frame bearing.
SST 09950-60010 (09951-00470), 09950-70010 (09951-07100)



(b) Fit the tabs on the retainer plate into the cutouts on the drive end frame to install the retainer plate.

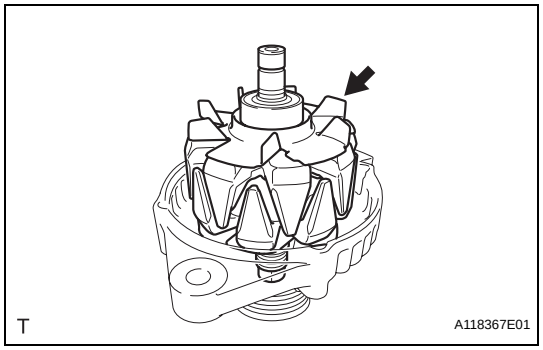
(c) Install the 4 screws.
Torque: 2.3 N*m (23 kgf*cm, 20 in.*lbf)

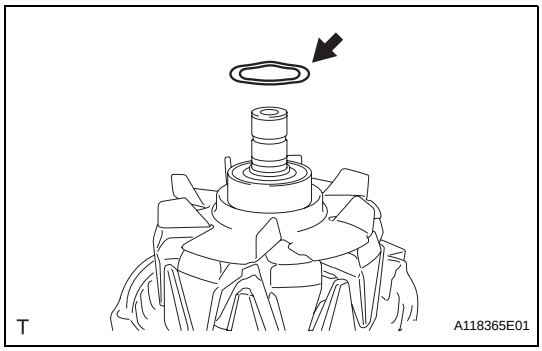


2. INSTALL GENERATOR ROTOR ASSEMBLY

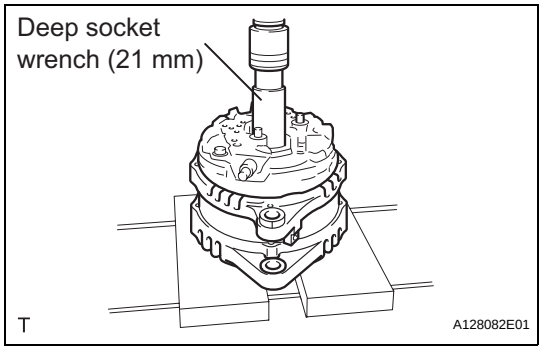
(a) Place the drive end frame on the clutch pulley.

(b) Install the generator rotor assembly to the drive end frame.



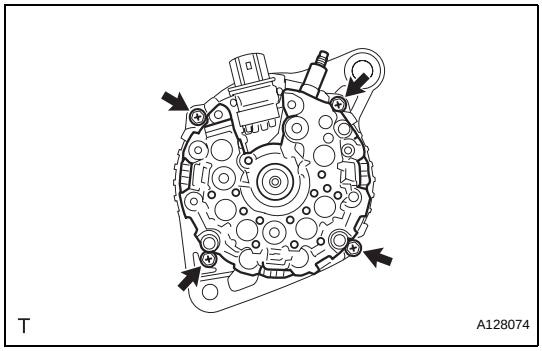


(c) Place a new generator washer on the generator rotor.

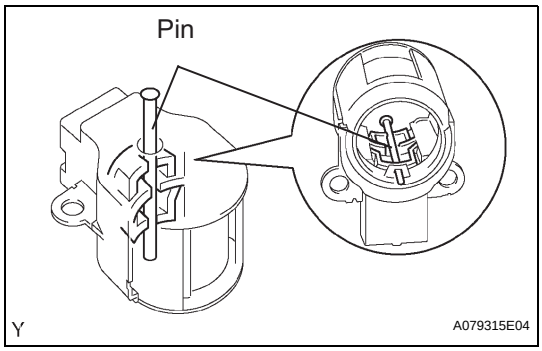


3. INSTALL GENERATOR COIL ASSEMBLY

(a) Using a deep socket wrench (21 mm) and a press, slowly press in the generator coil assembly.

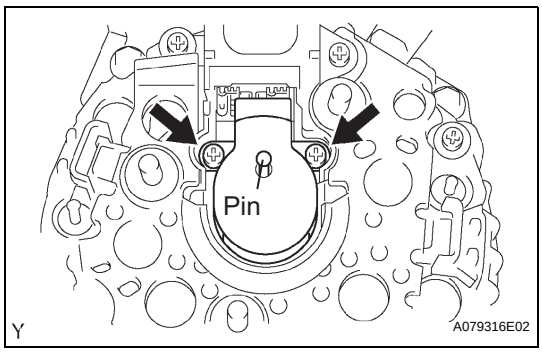


(b) Install the 4 bolts.
Torque: 5.8 N*m (59 kgf*cm, 51 in.*lbf)



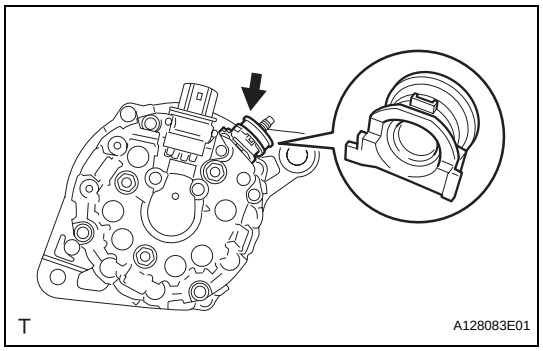
4. INSTALL GENERATOR BRUSH HOLDER ASSEMBLY

(a) While pushing the 2 brushes into the generator brush holder assembly, insert a ϕ1.0 mm (0.039 in.) pin into the brush holder hole.



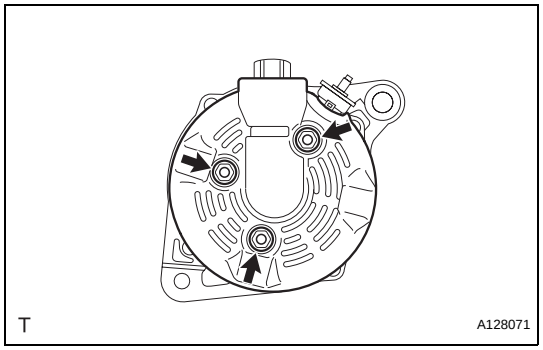
(b) Install the brush holder assembly to the generator coil with the 2 screws.
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)

(c) Pull out the pin from the generator brush holder.



5. INSTALL GENERATOR TERMINAL INSULATOR

(a) Install the terminal insulator to the generator coil.
NOTICE:
Pay attention to installation direction of the terminal insulator.

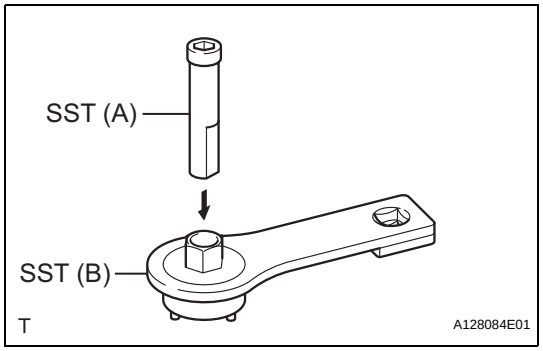


6. INSTALL GENERATOR REAR END COVER

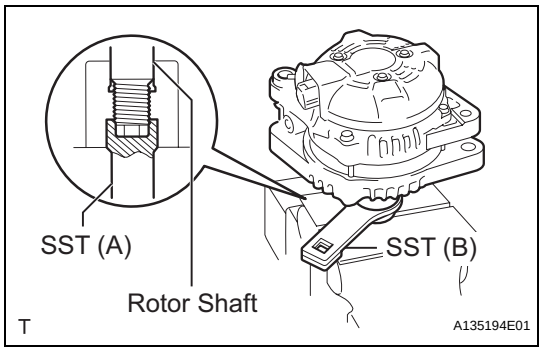
(a) Install the generator rear end cover to the generator coil with the 3 nuts.
Torque: 4.6 N*m (47 kgf*cm, 41 in.*lbf)

7. REMOVE GENERATOR CLUTCH PULLEY

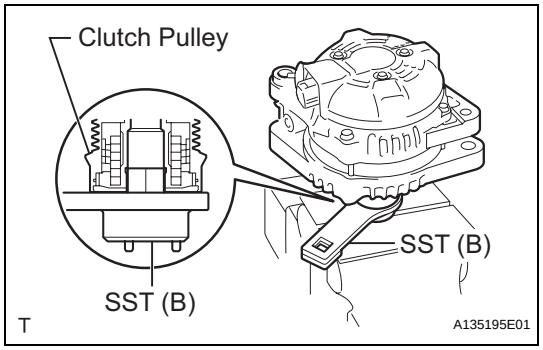
(a) Temporarily install the clutch pulley onto the rotor shaft.



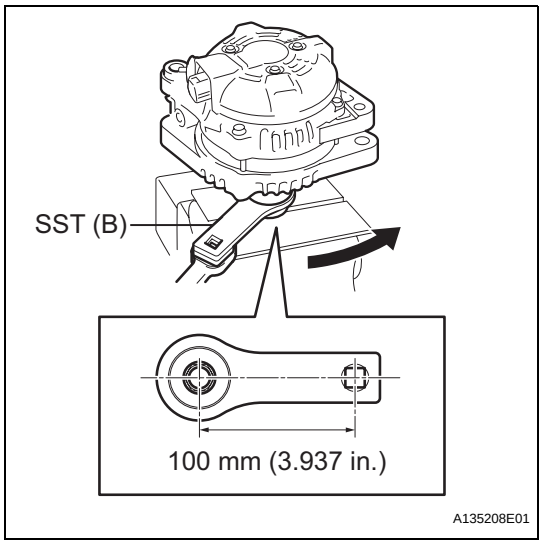
(b) Set SST (A) and (B).
SST 09820-63020



(c) Clamp SST (A) in a vise.
(d) Place the rotor shaft end into SST (A).



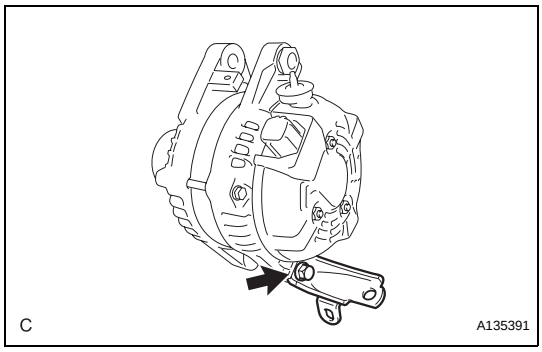
(e) Fit SST (B) to the clutch pulley.



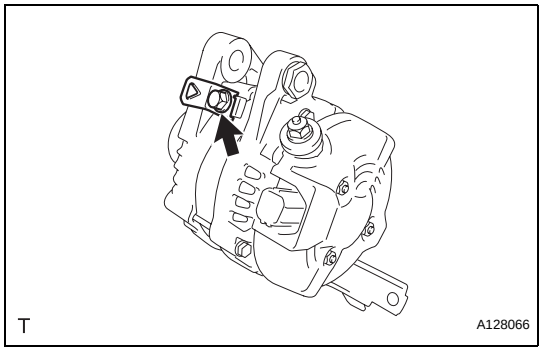
(f) Tighten the pulley by turning SST (B) in the direction shown in the illustration.
Torque: 111 N*m (1,125 kgf*cm, 81 ft.*lbf)
NOTICE:
The torque shown above should be used for tightening without using the SST. When the SST is used for tightening, the torque should be calculated based on the length of the SST (See page IN-6).
(g) Remove the generator assembly from the SST.
(h) Check that the clutch pulley rotates smoothly.
(i) Install a new clutch pulley cap to the clutch pulley.

INSTALLATION

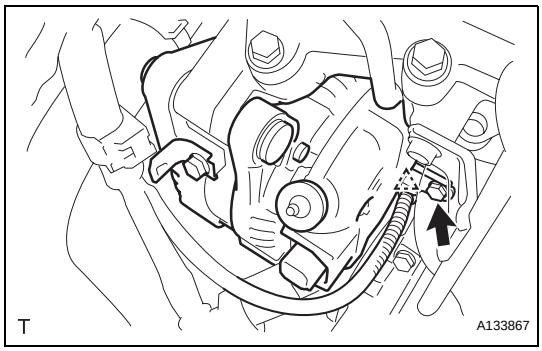
1. INSTALL GENERATOR ASSEMBLY



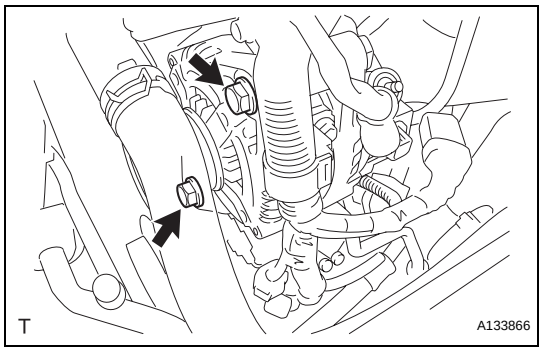
(a) Install the bracket with the bolt.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



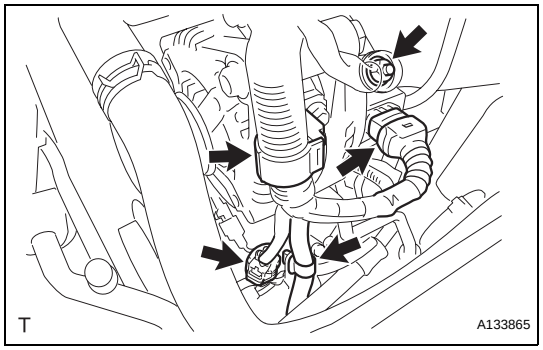
(b) Install the wire harness clamp stay.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)



(c) Connect the wire harness clamp.
(d) Install the generator assembly to the cylinder block with the bolt.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



(e) Install the 2 bolts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



(f) Connect the generator connector to the generator assembly.
(g) Install the generator wire with the nut.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
(h) Install the terminal cap.
(i) Connect the 2 wire harness clamps.
(j) Connect the magnetic clutch connector to the compressor and magnetic clutch.

2. **INSTALL V-RIBBED BELT (See page EM-7)**
3. **INSTALL RADIATOR ASSEMBLY (See page CO-31)**
4. **INSTALL FAN SHROUD (See page CO-32)**
5. **INSTALL RADIATOR SUPPORT UPPER (See page CO-32)**
6. **CONNECT NO. 1 OIL COOLER OUTLET TUBE (See page CO-33)**
7. **CONNECT NO. 1 OIL COOLER INLET TUBE (See page CO-33)**
8. **CONNECT RADIATOR OUTLET HOSE (See page CO-33)**
9. **CONNECT RADIATOR INLET HOSE (See page CO-33)**
10. **CONNECT RADIATOR RESERVE TANK HOSE (See page CO-34)**
11. **INSTALL FRONT BUMPER ENERGY ABSORBER (See page ET-10)**
12. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
13. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
14. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
15. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
16. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**

17. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)
18. ADD ENGINE COOLANT (See page CO-6)
19. CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)
20. INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)
21. INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)
22. INSTALL FRONT FENDER APRON SEAL RH
23. INSTALL ENGINE UNDER COVER RH
24. INSTALL ENGINE UNDER COVER LH
25. INSTALL FRONT WHEEL OPENING EXTENSION PAD RH
26. REMOVE FRONT WHEEL OPENING EXTENSION PAD LH
27. INSTALL FRONT WHEEL RH (See page EM-7)

COOLING SYSTEM

ON-VEHICLE INSPECTION

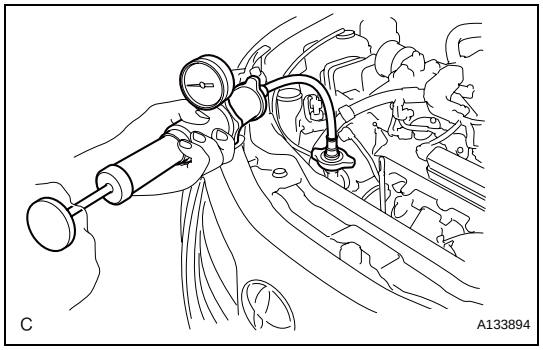
1. CHECK FOR ENGINE COOLANT LEAKS

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

NOTICE:

Before performing each inspection, turn the A/C switch OFF.



(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Using a radiator cap tester, increase the pressure inside the radiator to 118 kPa (1.2 kgf*cm, 17 psi), and check that the pressure does not drop.
If the pressure drops, check the hoses, radiator and water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

2. INSPECT ENGINE COOLANT LEVEL IN RESERVOIR

(a) Check that the engine coolant level is between the LOW and FULL lines when the engine is cold.
If the engine coolant level is low, check for leaks and add "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite and non-borate coolant with long-life hybrid organic acid technology to the FULL line.
NOTICE:
Do not substitute plain water for engine coolant.

3. INSPECT ENGINE COOLANT QUALITY

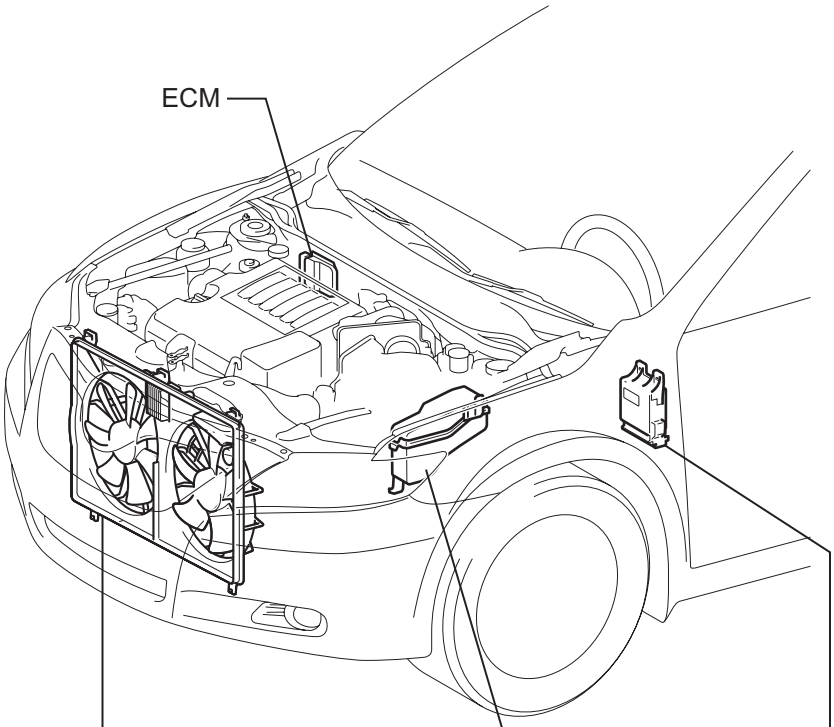
(a) Remove the radiator cap.
CAUTION:
Do not remove the radiator cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

(b) Check if there are any excessive deposits of rust or scales around the radiator cap and radiator filler hole. Also, the coolant should be free of oil.
If excessively dirty, clean the coolant passage and replace the coolant.

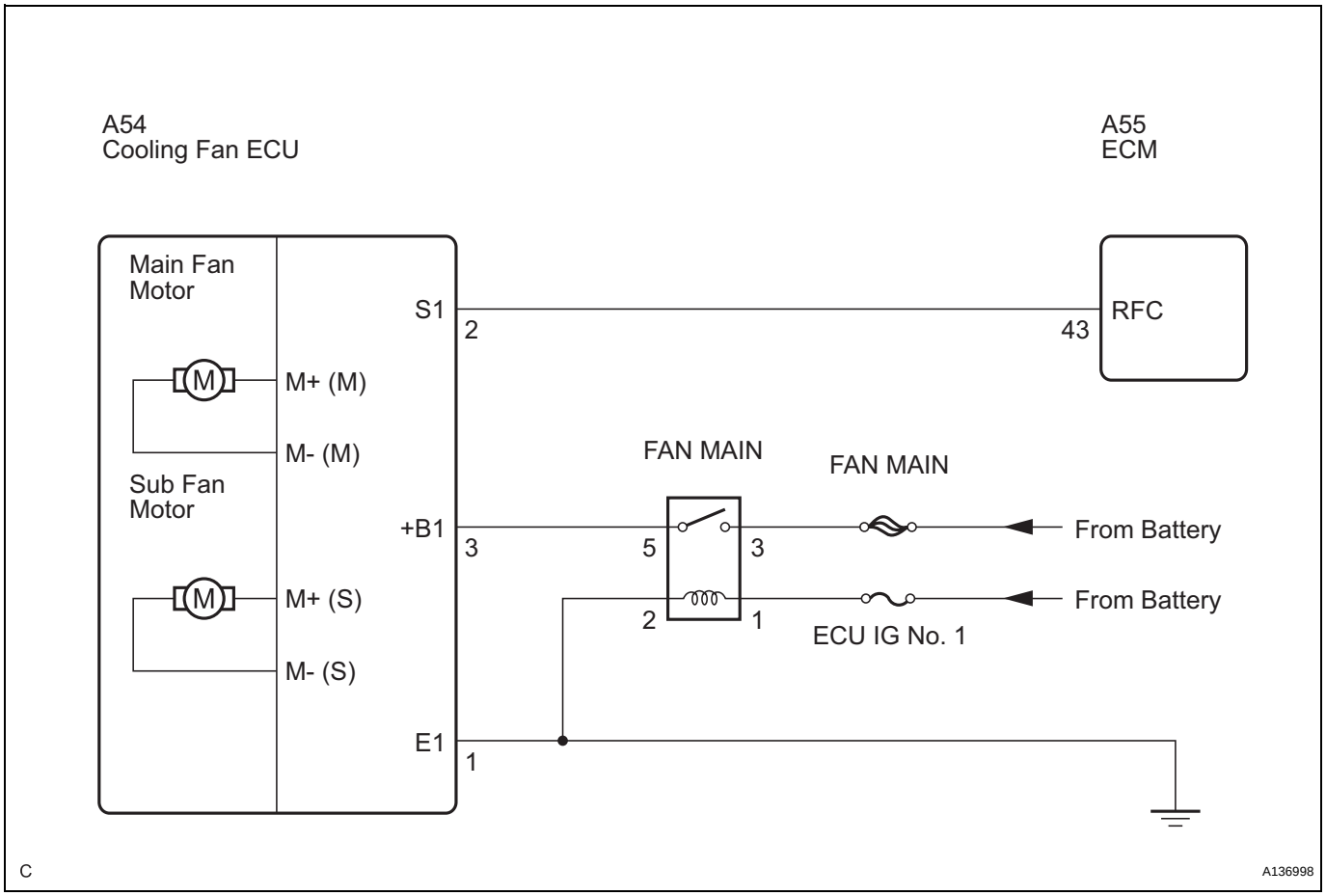
(c) Install the radiator cap.

COOLING FAN SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM



CO

ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN SYSTEM

(a) Put the vehicle in the following conditions:
  (1) The ignition switch is off.
  (2) The coolant temperature is less than 95°C (203°F).
  (3) The battery voltage is between 9 and 14 V.
  (4) The A/C switch is OFF.

(b) Connect the 400 A probe of the ammeter to terminals M+ (M) and M+ (S) of the cooling fan motor.

(c) Turn the ignition switch on (IG) and wait for approximately 10 seconds. Check that the fan stops.

(d) Start the engine. Check that the fan stops with the engine idling.
HINT:
- Make sure that the radiator engine coolant temperature is less than 95°C (203°F).
- Turn the A/C switch OFF.

(e) Check that the fan operates when the A/C switch is turned ON (MAX COOL and the magnet clutch is operating).

Standard current : Without trailer hitch

Item	Specified Condition
Cooling fan motor	2 to 8 A
Cooling fan motor No. 2	2 to 8 A

Standard current : With trailer hitch

Item	Specified Condition
Cooling fan motor	2 to 11 A
Cooling fan motor No. 2	2 to 11 A

HINT:
The coolant temperature is less than 95°C (203°F).

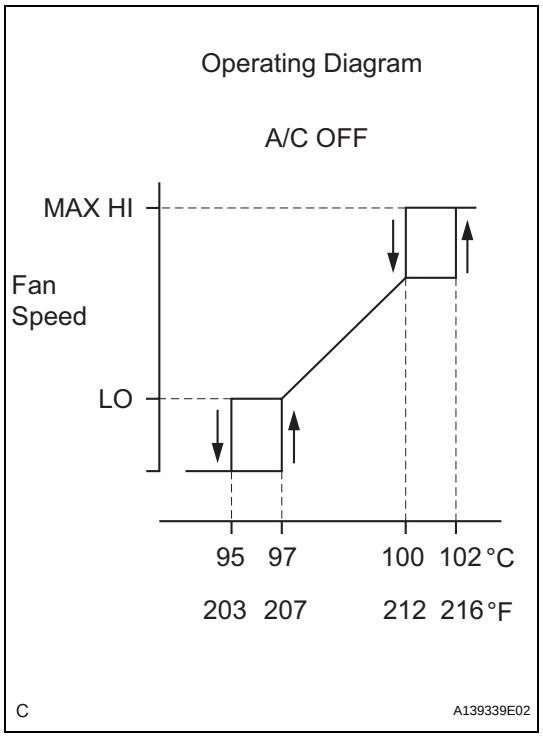
(f) Check that the fan operates when the engine coolant temperature sensor connector is disconnected.

Standard current : Without trailer hitch

Item	Specified Condition
Cooling fan motor	2 to 11 A
Cooling fan motor No. 2	2 to 11 A

Standard current : With trailer hitch

Item	Specified Condition
Cooling fan motor	2 to 15 A
Cooling fan motor No. 2	2 to 15 A

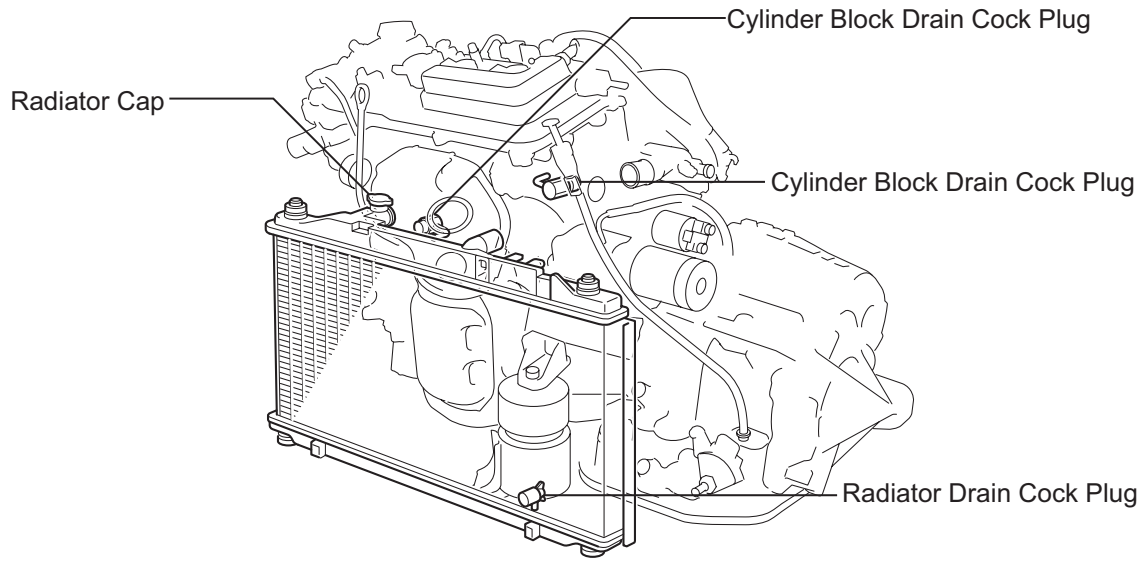


(g) After the engine is warmed up, check that the fan operates as shown in the illustration on the left.
HINT:
- The coolant temperature at which the fan starts operating is approximately 95°C (203°F).
- This system can also be checked using the intelligent tester.
- Select the following menu items: Power train / Engine / Data List / Initial Engine Coolant Temp.

COOLANT

ON-VEHICLE INSPECTION

1. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
6. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
7. **DRAIN ENGINE COOLANT**
   NOTICE:
   Do not remove the radiator cap sub-assembly while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.
   (a) Remove the radiator cap sub-assembly from the radiator assembly.
   (b) Loosen the radiator drain cock plug and 2 cylinder block drain cock plugs, then drain the coolant.



HINT:
Collect the coolant in a container and dispose of it according to the regulations in your area.

CO

8. **ADD ENGINE COOLANT**
   (a) Close the radiator drain cock plug and 2 cylinder block drain cock plugs.
   Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf) for cylinder block drain cock plug
   (b) Slowly fill the radiator with TOYOTA Super Long Life Coolant (SLLC).
   Specified capacity:
   9.0 liters (9.5 US qts, 7.9 lmp. qts)
   HINT:
   - TOYOTA vehicles are filled with TOYOTA SLLC at the factory. In order to avoid damage to the engine cooling system and other technical problems, only use TOYOTA SLLC or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).
   - Contact your TOYOTA dealer for further details.

   (c) Slowly pour coolant into the radiator reservoir tank until it reaches the FULL line.
   (d) Press the inlet and outlet radiator hoses several times by hand, and then check the level of the coolant.
   If the coolant level is low, add coolant.
   (e) Install the radiator cap sub-assembly and reservoir tank cap.
   (f) Start the engine, and warm it up.
   HINT:
   Adjust the air conditioner set temperature to MAX (HOT).
   (g) Stop the engine, and wait until the engine coolant cools down.
   (h) Add engine coolant to the FULL line on the radiator reservoir.

9. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**

10. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**

11. **INSTALL ENGINE UNDER COVER RH**

12. **INSTALL ENGINE UNDER COVER LH**

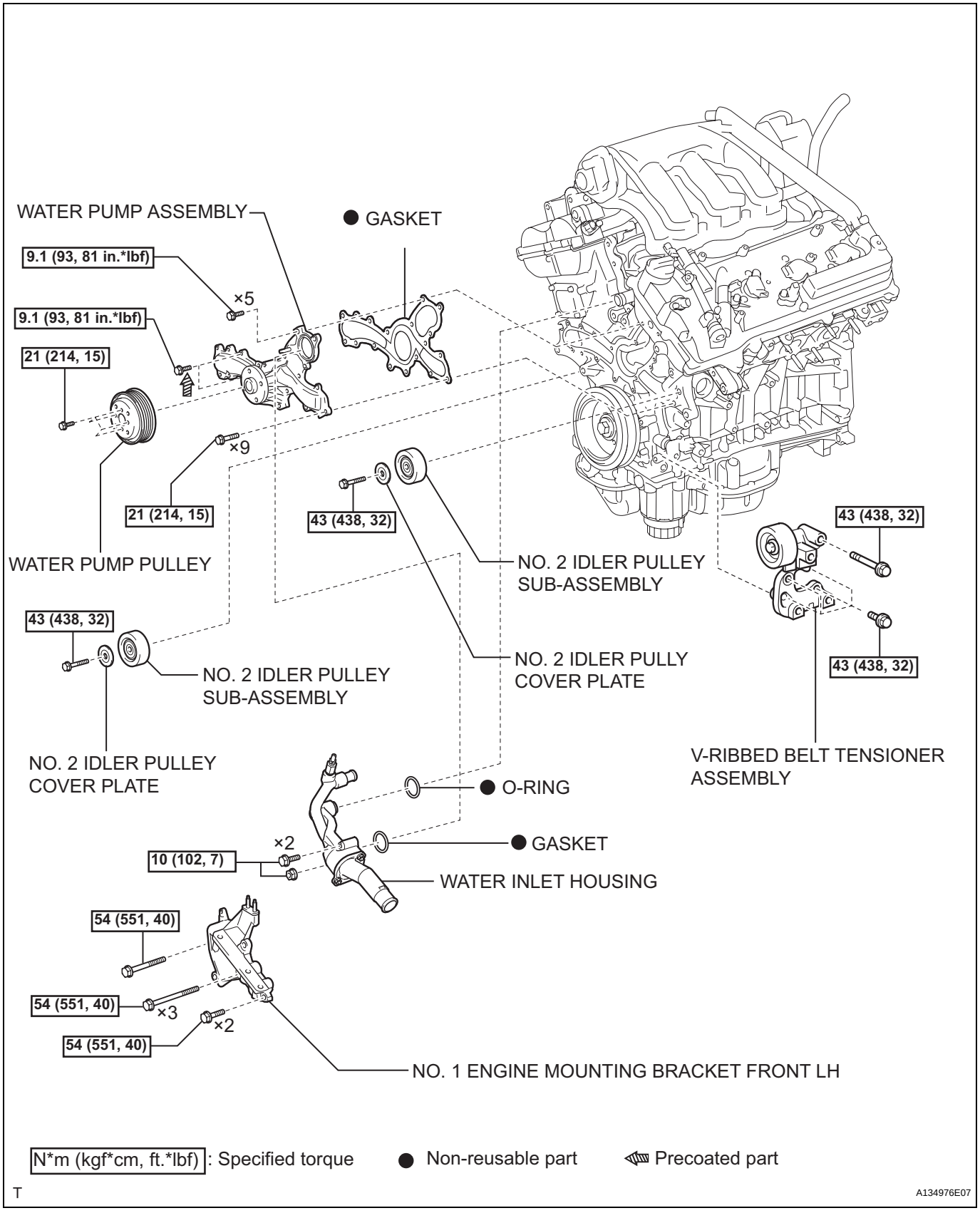
13. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**

14. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**

15. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**

WATER PUMP

COMPONENTS



CO

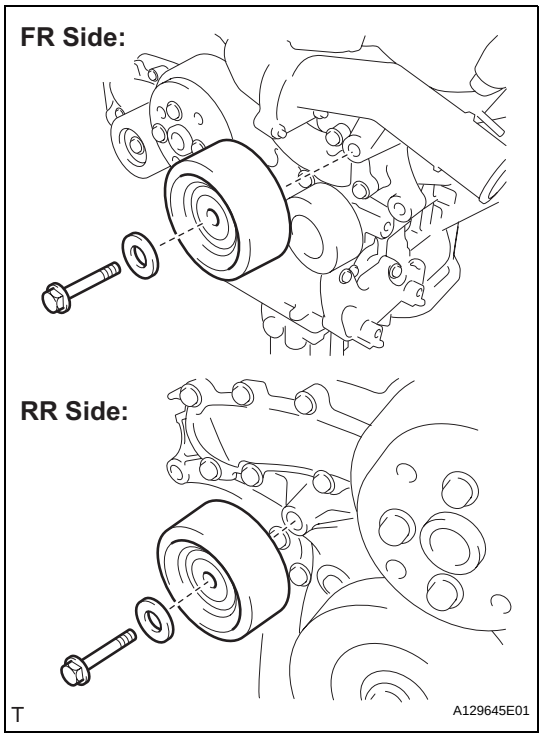
REMOVAL

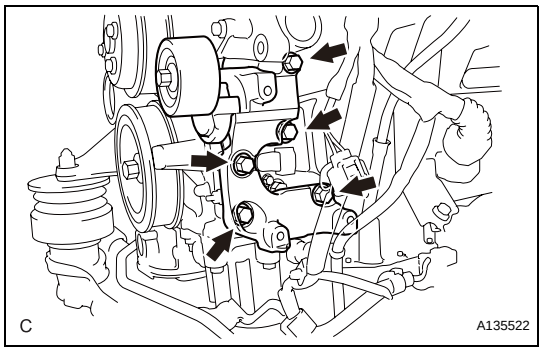
1. **REMOVE ENGINE ASSEMBLY AND TRANSAXLE**
   HINT:
   See page EM-23

2. **SECURE ENGINE STAND**
   HINT:
   See page EM-30

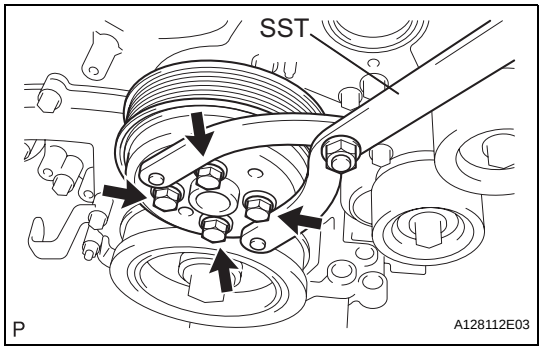
3. **REMOVE NO. 1 ENGINE MOUNTING BRACKET FRONT LH (See page EM-35)**

4. **REMOVE NO. 2 IDLER PULLEY SUB-ASSEMBLY**
   (a) Remove the 2 bolts, 2 idler pulley cover plates and 2 idler pulley sub-assemblies.



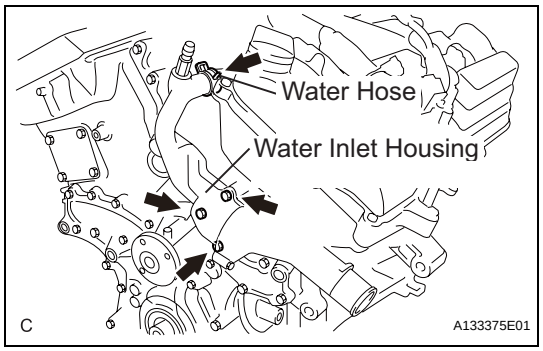


5. **REMOVE V-RIBBED BELT TENSIONER ASSEMBLY**
   (a) Remove the 5 bolts and V-ribbed belt tensioner assembly.



6. **REMOVE WATER PUMP PULLEY**
   (a) Using SST, hold the water pump pulley.
   SST 09960-10010 (09962-01000, 09963-00700)
   (b) Remove the 4 bolts and water pump pulley.

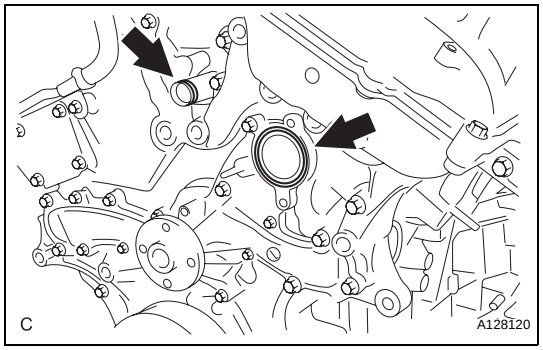
CO



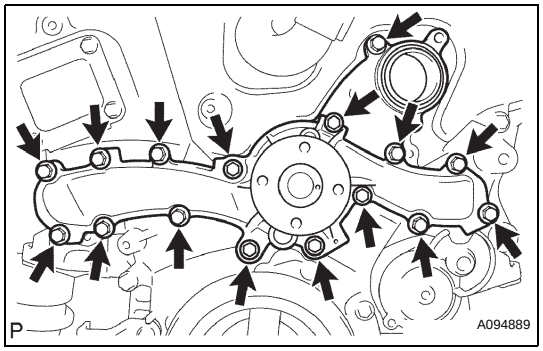
7. REMOVE WATER INLET HOUSING

(a) Disconnect the water hose.

(b) Remove the 2 bolts, nut and water inlet housing.



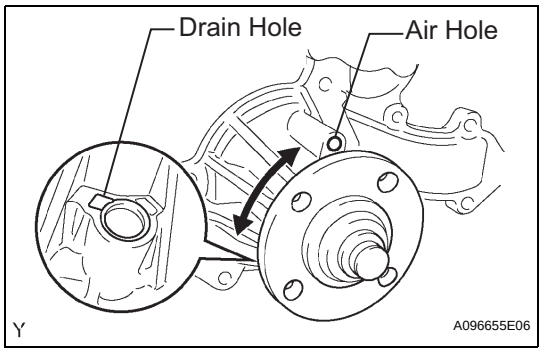
(c) Remove the water inlet housing gasket and water outlet pipe O-ring.



8. REMOVE WATER PUMP ASSEMBLY

(a) Remove the 16 bolts, water pump assembly and water pump gasket.

INSPECTION



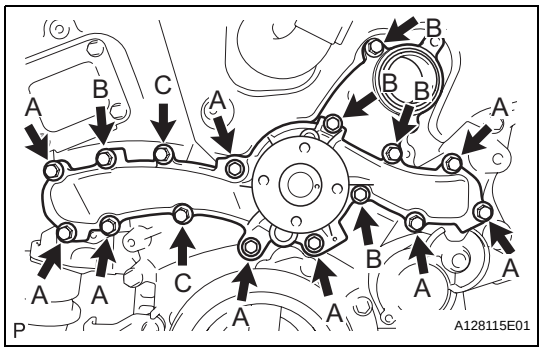
1. INSPECT WATER PUMP ASSEMBLY

(a) Visually check the drain hole and air hole for coolant leakage.

(b) Turn the pulley, and check that the water pump bearing moves smoothly and noiselessly.
If the bearing does not move smoothly and noiselessly, replace the water pump.

CO

INSTALLATION



1. INSTALL WATER PUMP ASSEMBLY

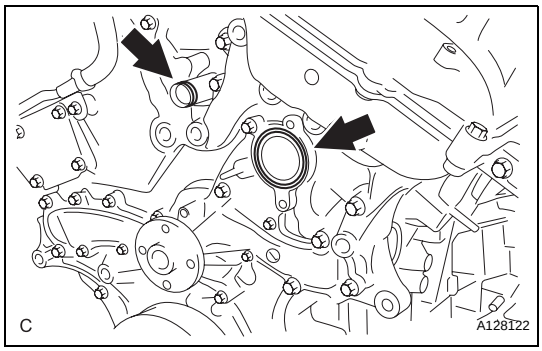
(a) Install a new water pump gasket and the water pump assembly with the 16 bolts.

Torque: Bolt A
21 N*m (214 kgf*cm, 15 ft.*lbf)
Bolts B and C
9.1 N*m (93 kgf*cm, 81 in.*lbf)

NOTICE:

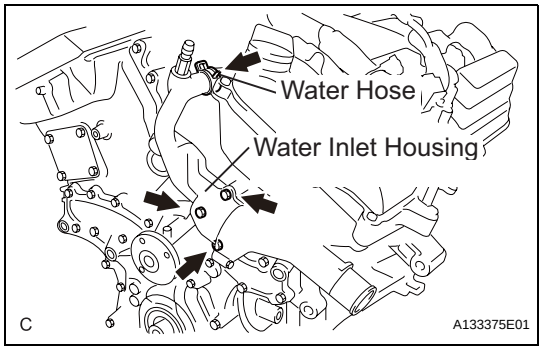
- **Make sure that there is no oil on the threads of bolts A.**

- **Be sure to replace 2 bolts C with new ones or reuse them after applying adhesive 1344.**
  Adhesive:
  Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent



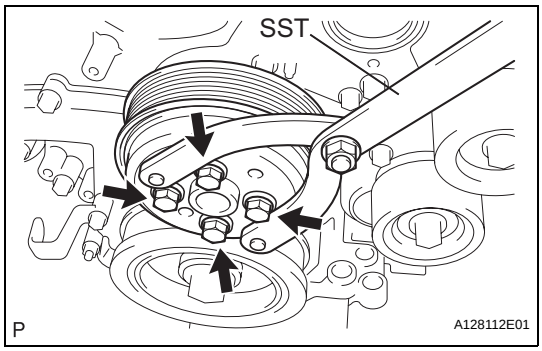
2. INSTALL WATER INLET HOUSING

(a) Install a new water inlet housing No. 1 gasket and water outlet pipe O-ring.



(b) Install the water inlet housing with the 2 bolts and nut.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
NOTICE:
Be careful not to allow the O-ring to get caught between the parts.

(c) Connect the water hose.

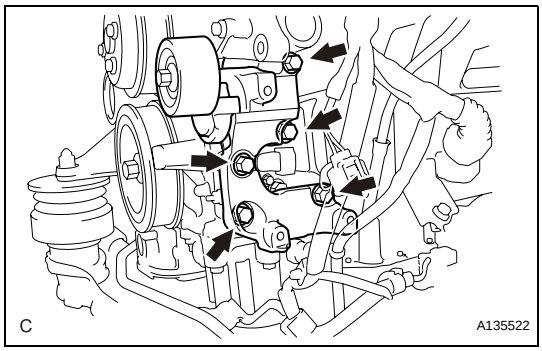


3. INSTALL WATER PUMP PULLEY

(a) Temporarily install the water pump pulley with the 4 bolts.

(b) Using SST, hold the water pump pulley.
SST 09960-10010 (09962-01000, 09963-00700)

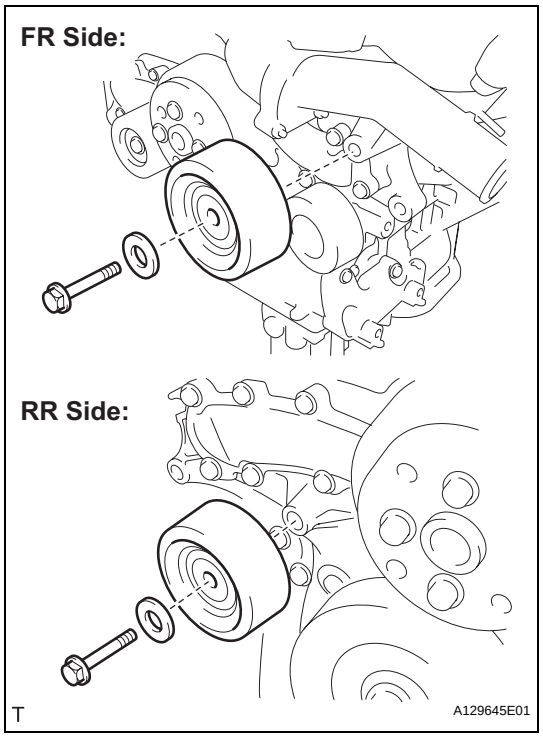
(c) Tighten the 4 bolts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)



4. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

(a) Install the V-ribbed belt tensioner assembly with the 5 bolts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

CO



5. **INSTALL NO. 2 IDLER PULLEY SUB-ASSEMBLY**
   (a) Install the 2 idler pulley cover plates and idler pulley sub-assemblies with the 2 bolts.
   Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

6. **INSTALL NO. 1 ENGINE MOUNTING BRACKET FRONT LH (See page EM-38)**

7. **REMOVE ENGINE STAND**

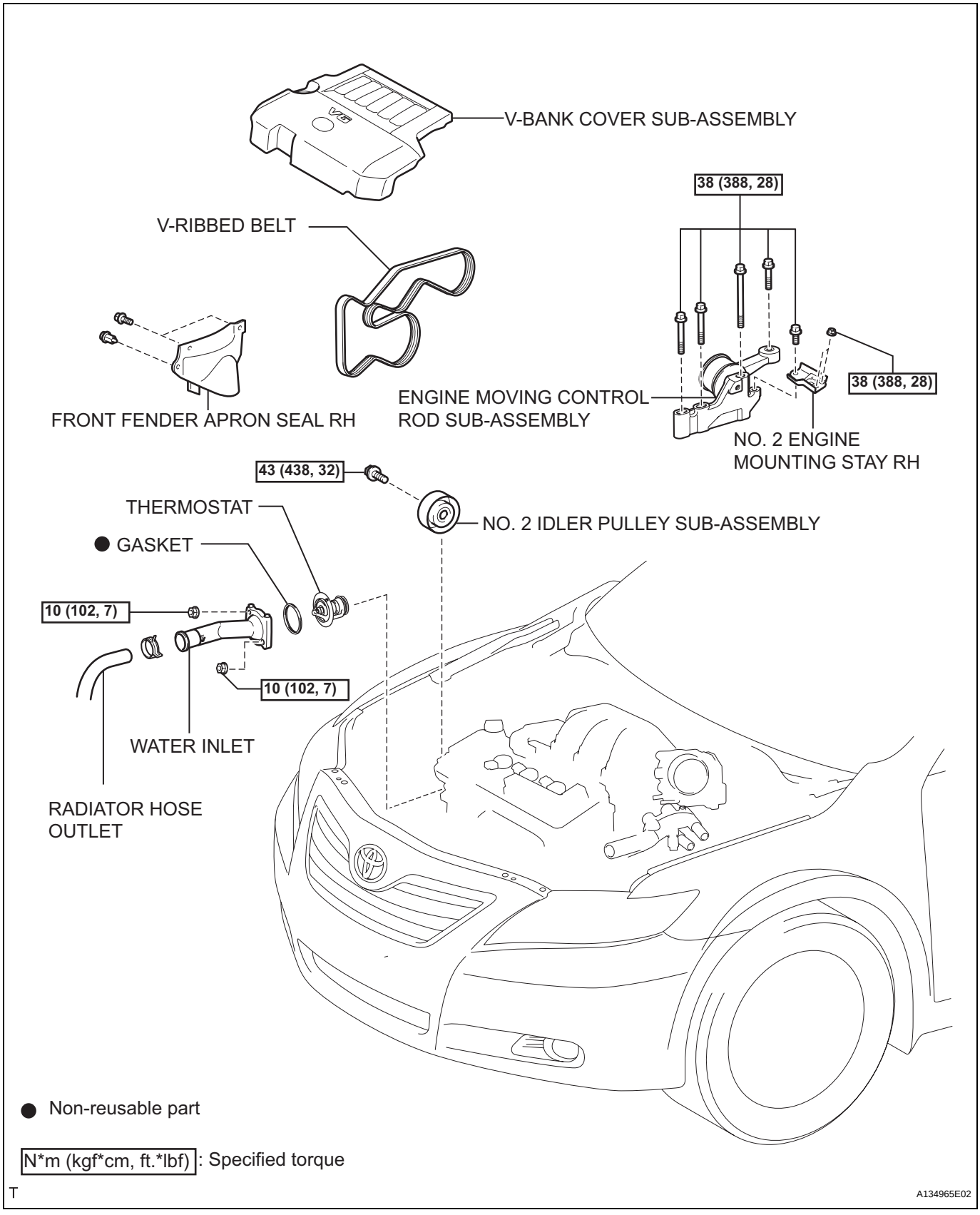
8. **INSTALL ENGINE ASSEMBLY AND TRANSAXLE**
   HINT:
   See page EM-37

9. **ADD ENGINE COOLANT (See page CO-6)**

10. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**

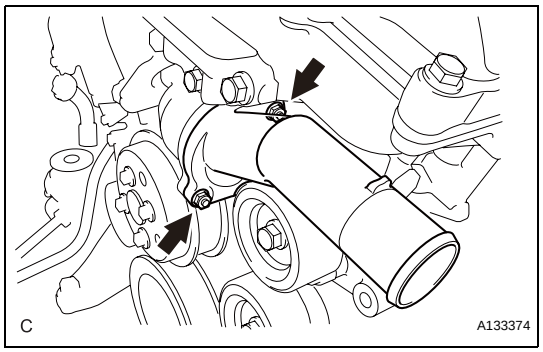
THERMOSTAT

COMPONENTS



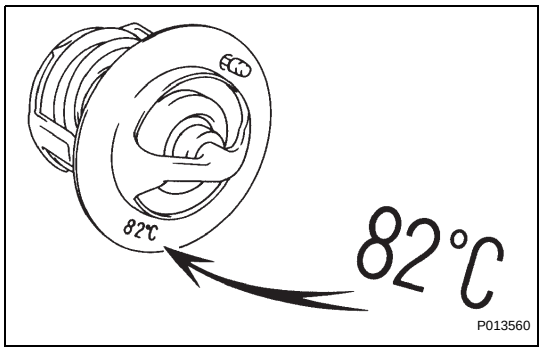
REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
3. **REMOVE FRONT FENDER APRON SEAL RH**
4. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-25)**
5. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-25)**
6. **REMOVE V-RIBBED BELT (See page EM-6)**
7. **REMOVE NO. 2 IDLER PULLEY SUB-ASSEMBLY (See page EM-34)**
8. **DISCONNECT RADIATOR HOSE OUTLET (See page EM-26)**
9. **REMOVE WATER INLET**
   (a) Remove the 2 nuts and water inlet.
10. **REMOVE THERMOSTAT**
    (a) Remove the gasket from the thermostat.

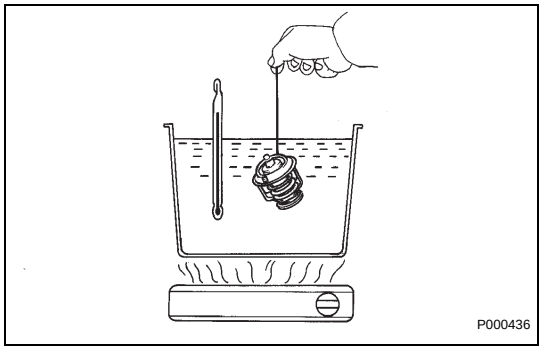


INSPECTION

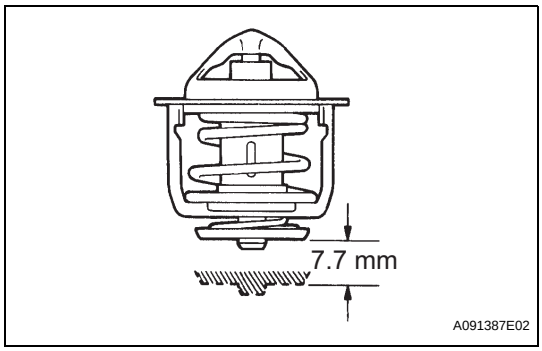
1. **INSPECT THERMOSTAT**
   (a) Inspect the thermostat.
   HINT:
   The valve opening temperature is inscribed on the thermostat.



   (b) Immerse the thermostat in water and gradually heat the water.
   (c) Check the valve opening temperature.
   Valve opening temperature:
   80 to 84°C (176 to 183°F)
   If the valve opening temperature is not as specified, replace the thermostat.

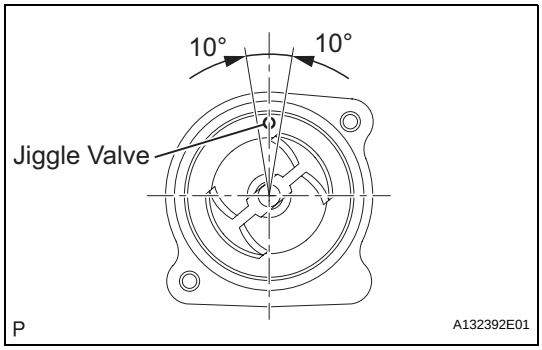


CO



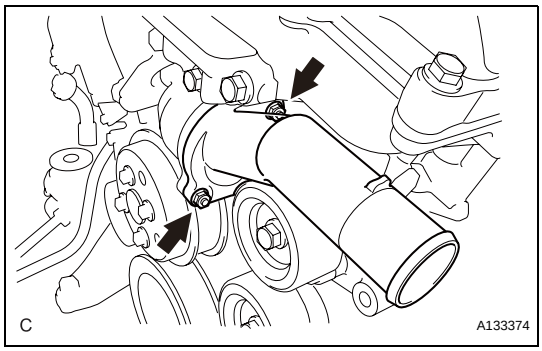
(d) Check the valve lift.
Valve lift:
7.7 mm (0.3031 in.) or more at 95°C (203°F)
If the valve lift is not as specified, replace the thermostat.

(e) Check that the valve is fully closed when the thermostat is at low temperatures (below 40°C (104°F)).
If it is not fully closed, replace the thermostat.

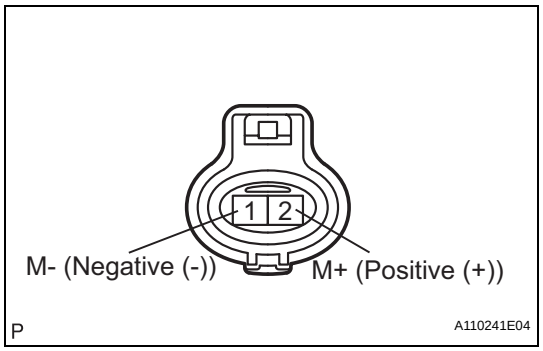


INSTALLATION

1. **INSTALL THERMOSTAT**
   (a) Install a new gasket to the thermostat.
   (b) Install the thermostat with the jiggle valve facing up.
   HINT:
   The jiggle valve may be set within 10°on either side of the prescribed position.



2. **INSTALL WATER INLET**
   (a) Install the water inlet with the 2 nuts .
   Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
3. **CONNECT RADIATOR HOSE OUTLET (See page EM-48)**
4. **INSTALL NO. 2 IDLER PULLEY SUB-ASSEMBLY (See page EM-39)**
5. **INSTALL V-RIBBED BELT (See page EM-7)**
6. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-49)**
7. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-49)**
8. **INSTALL FRONT FENDER APRON SEAL RH**
9. **ADD ENGINE COOLANT (See page CO-6)**
10. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
11. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**



COOLING FAN MOTOR

ON-VEHICLE INSPECTION

1. COOLING FAN MOTOR

(a) Check that the motor turns smoothly when the battery is connected to the fan motor connector.

(b) Measure the current while the motor is turning.

Standard current:

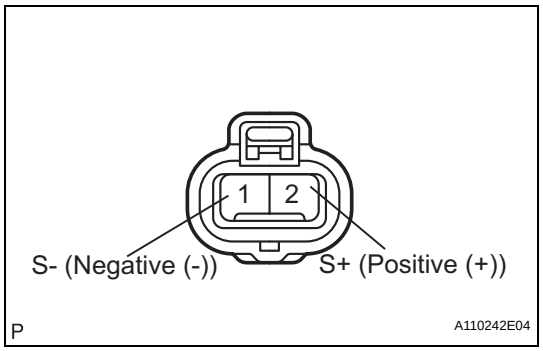
With trailer hitch:

11.8 to 14.8 A at 20°C (68°F)

Without trailer hitch:

6.8 to 9.8 A at 20°C (68°F)

If the result is not as specified, replace the cooling fan motor.



2. NO. 2 COOLING FAN MOTOR

(a) Check that the motor turns smoothly when the battery is connected to the fan motor connector.

(b) Measure the current while the motor is turning.

Standard current:

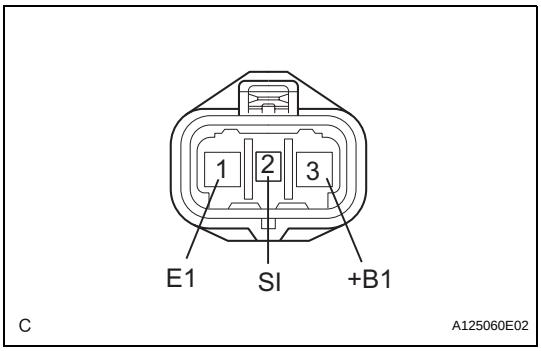
With trailer hitch:

6.8 to 9.8 A at 20°C (68°F)

Without trailer hitch:

6.8 to 9.8 A at 20°C (68°F)

If the result is not as specified, replace the cooling fan motor No. 2.



COOLING FAN ECU

ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN ECU

(a) Inspect the input voltage.

(1) Disconnect the cooling fan ECU connector.

(2) Turn the ignition switch on (IG). Check the voltage of the +B terminal of the disconnected wire harness side connector.

Standard voltage:

9 to 14 V

If the result is not as specified, inspect the power source system (fusible link, fuse, wire harness and relay).

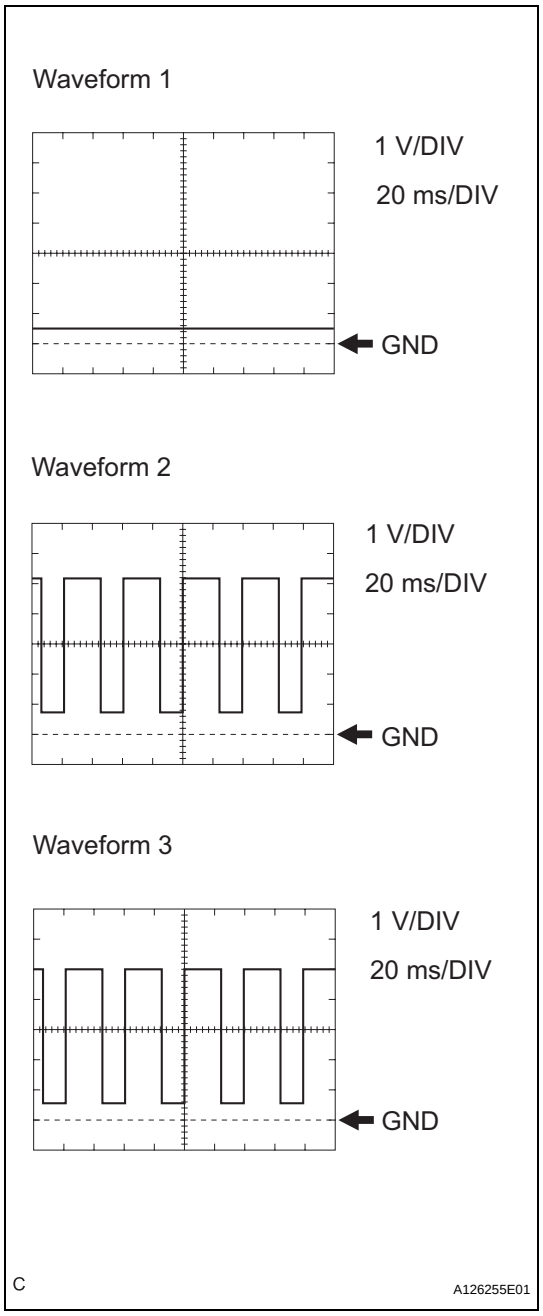
(b) Inspect the cooling fan motor (see page CO-15).

(c) Measure the resistance between terminals RFC (ECM) and SI (cooling fan ECU) of the wire harness side connectors.

HINT:

- If the fan does not operate, there may be a short circuit.
- If the fan remains operating, there may be an open circuit.

(d) Inspect the ECM power source circuit and ground circuit.

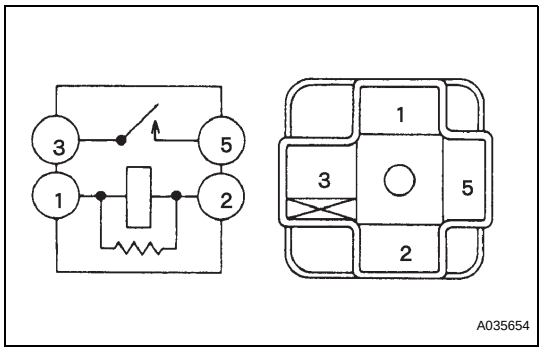


(e) Inspect the input signal and output current.
NOTICE:
Be sure to perform the inspection with the radiator coolant temperature less than 95°C (203 °F).
(1) Connect the 400 A probe of the ammeter to terminal M+ of the cooling fan motor.
(2) Set the intelligent tester to the oscilloscope function.
(3) Using the intelligent tester, check the waveform between terminals RFC and E1 of the ECM.
Standard waveform

Condition	Input Signal	Output Current
Engine stopped (Ignition switch on (IG))	**Waveform 1 (Duty ratio 0 %)**	**(Fan stops)**
Engine idling (A/C OFF)	**Waveform 1 (0 %)**	**(Fan stops)**
Engine idling (A/C ON)	**Waveform 2 (30 to 70 %)**	**2 to 11 A (Fan operates)**
Engine idling (Coolant temperature sensor connector disconnected)	**Waveform 3 (30 to 70 %)**	**2 to 11 A (Fan operates)**

HINT:
- If the input signal is abnormal, there is a malfunction in the ECM or cooling fan ECU.
- If the output current is abnormal even when the input signal is normal, there is a malfunction in the cooling fan ECU (RFC) or motor.

CO



COOLING FAN RELAY

ON-VEHICLE INSPECTION

1. COOLING FAN RELAY

(a) Remove the relay from engine room relay block No. 1.

(b) Measure the resistance of the relay.

Standard resistance

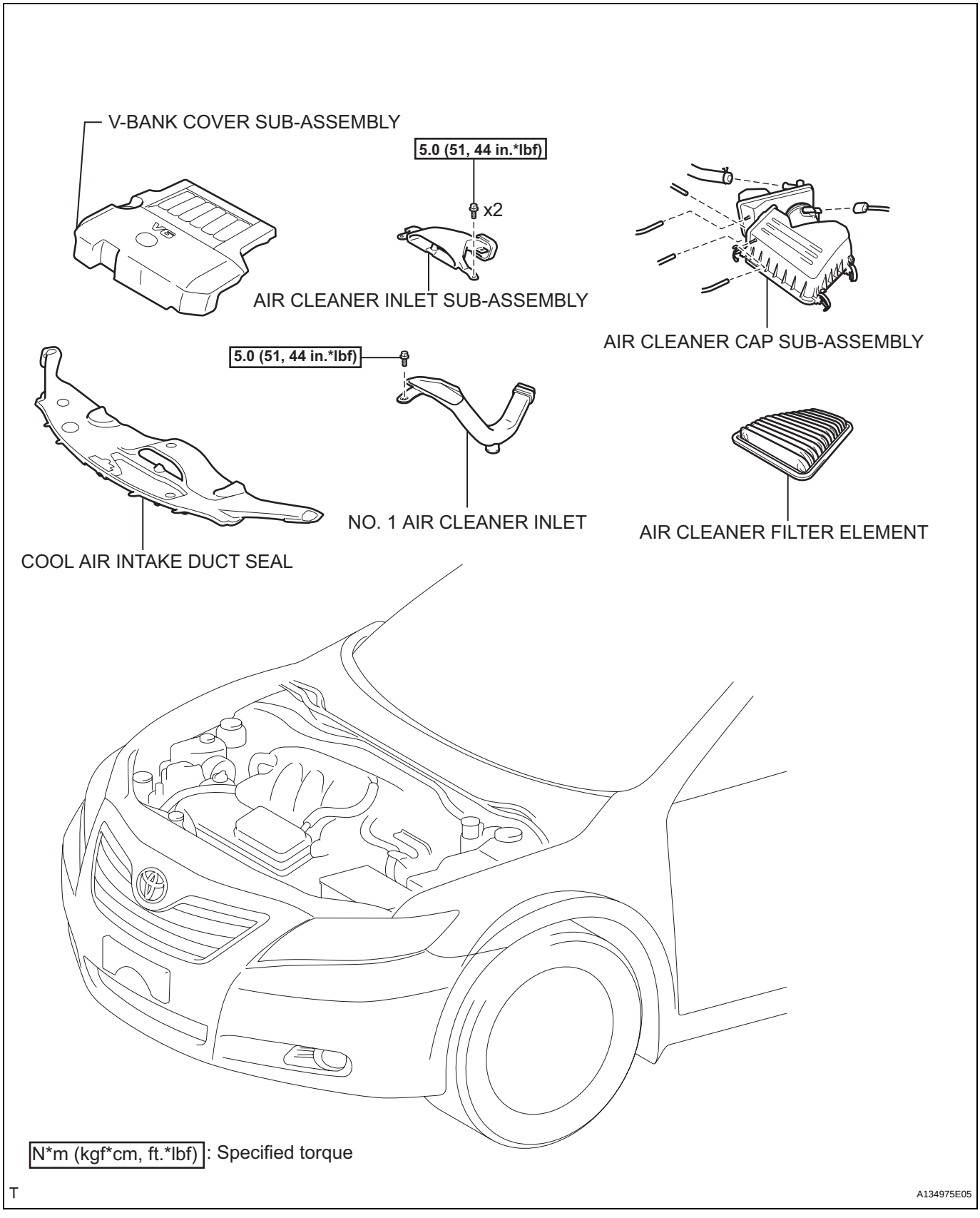
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the cooling fan relay.

(c) Install the relay to engine room relay block No. 1.

RADIATOR

COMPONENTS



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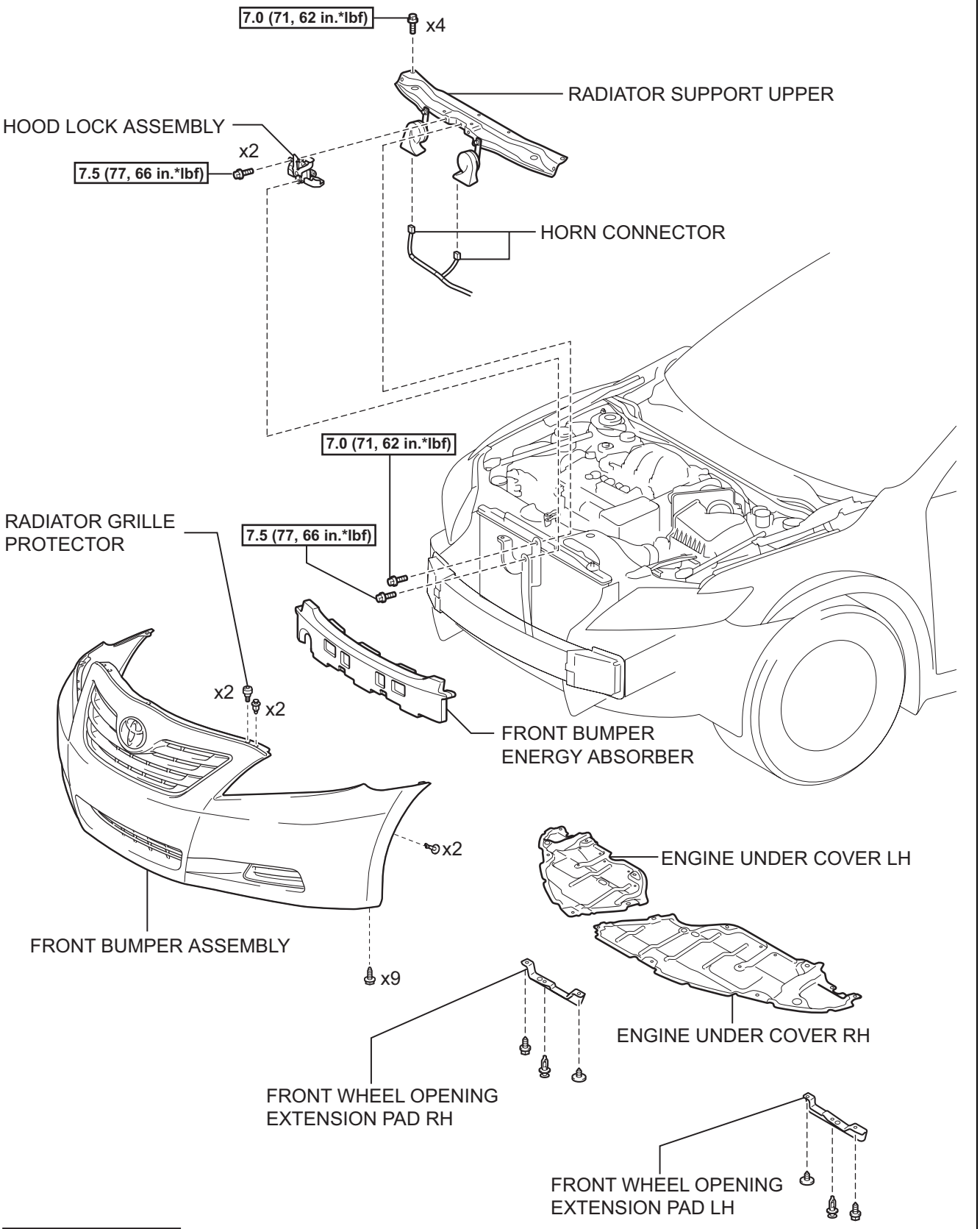
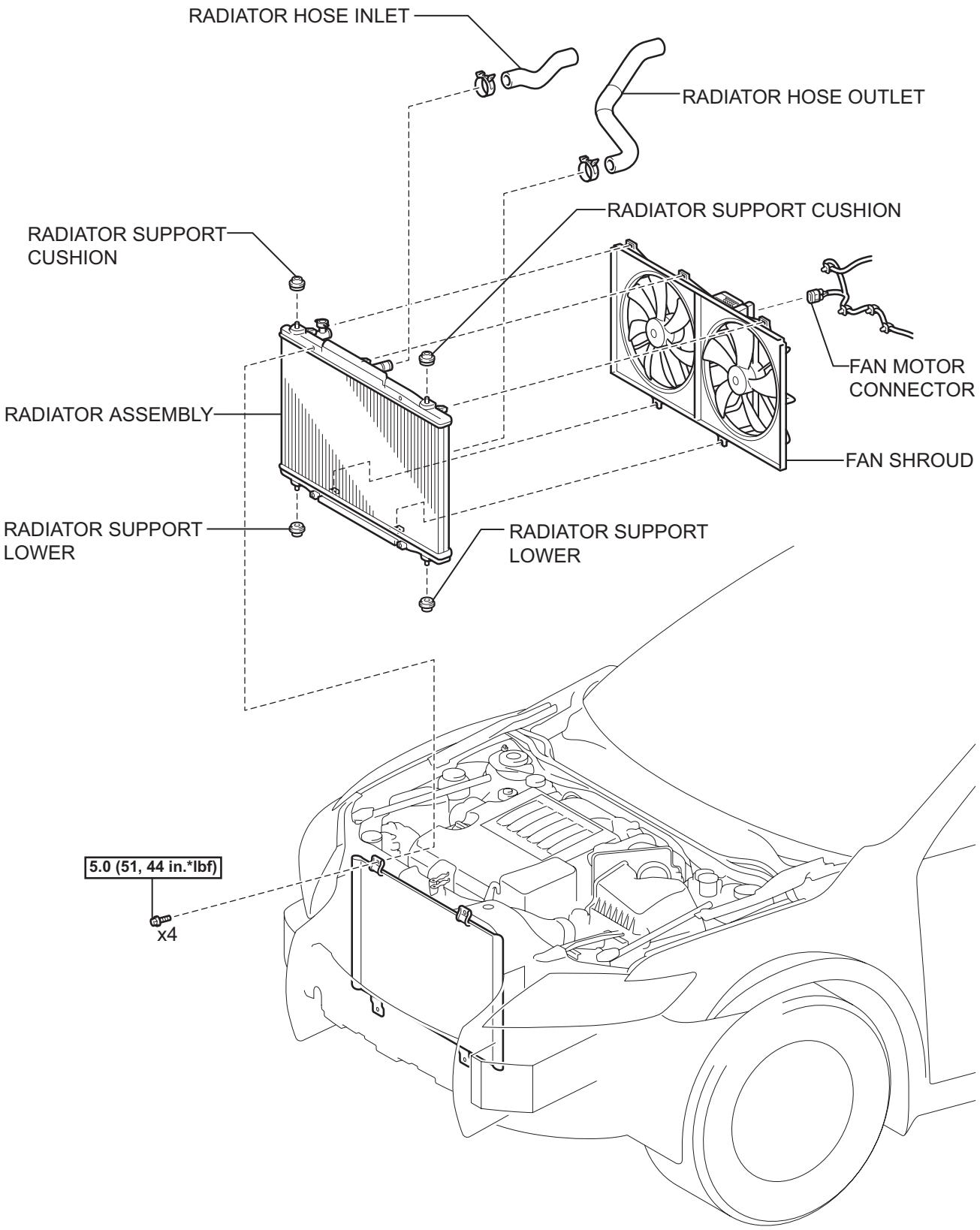


CO

N*m (kgf*cm, ft.*lbf) : Specified torque

T

A133359E05

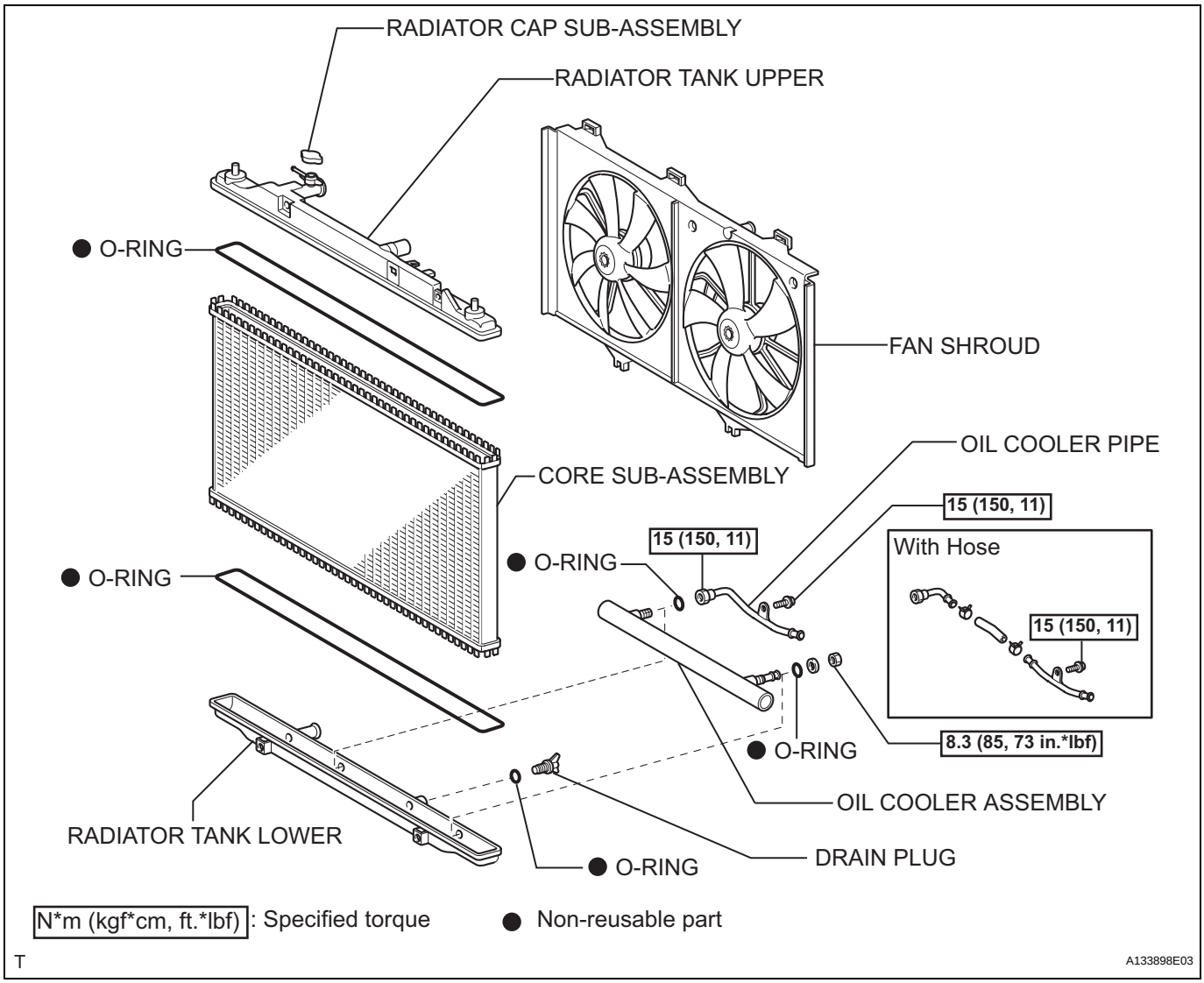


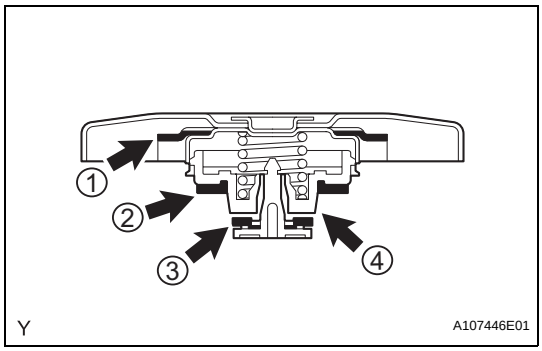
N*m (kgf*cm, ft.*lbf): Specified torque

T

A133360E02

CO





ON-VEHICLE INSPECTION

1. CHECK RADIATOR CAP SUB-ASSEMBLY

(a) Measure the valve opening pressure.

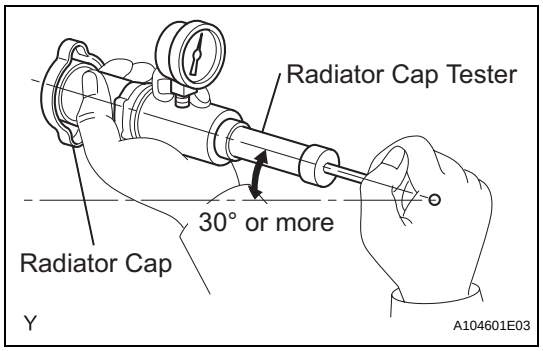
(1) If there are water stains or foreign matter on rubber packings 1, 2 or 3, clean the part(s) with water and finger scouring.

(2) Check that rubber packings 1, 2 and 3 are not deformed, cracked or swollen.

(3) Check that rubber packings 3 and 4 are not stuck together.

(4) Apply engine coolant to rubber packings 2 and 3 before using the radiator cap tester.

(5) When using the cap tester, tilt it to 30° or more above the horizontal.



(6) Pump the cap tester several times, and check the maximum pressure *1.

Pumping speed:

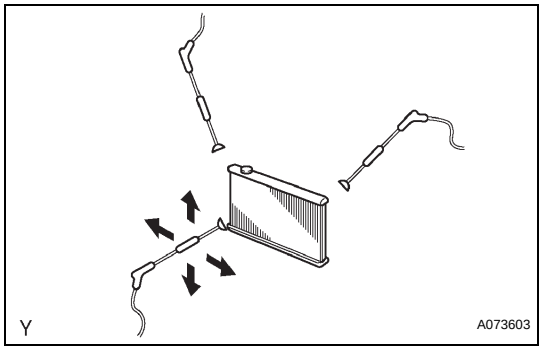
1 pumps every second

*1: Even if the cap cannot maintain the maximum pressure, it is not a defect.

Judgment Criteria

Item	Specified Condition
Standard valve (for brand-new cap)	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
Minimum standard valve (after using cap)	78.5 kPa (0.8 kgf/cm^2, 11.4 psi)

If the maximum pressure is less than the specified pressure for the minimum standard valve, replace the radiator cap sub-assembly.



ON-VEHICLE CLEANING

1. INSPECT FINS BLOCKAGE

(a) If the fins are clogged, wash them with water or a steam cleaner. Dry with compressed air.

NOTICE:

- **If the distance between the steam cleaner and the core is too close, the fins may become damaged. Keep the following injection distance.**

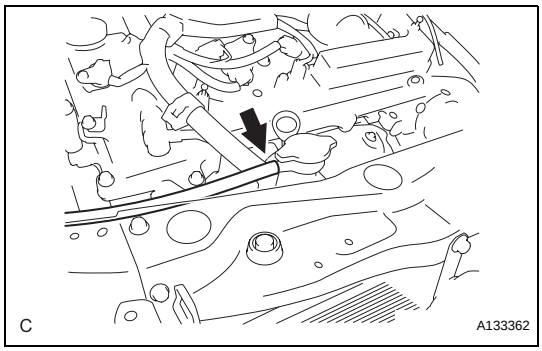
Standard

Injection Distance	Injection Pressure
300 mm (11.81 in.)	2,942 to 4,903 kPa (30 to 50 kg/cm^2, 427 to 711 psi)
500 mm (19.69 in.)	4,903 to 7,845 kPa (50 to 80 kg/cm^2, 711 to 1,138 psi)

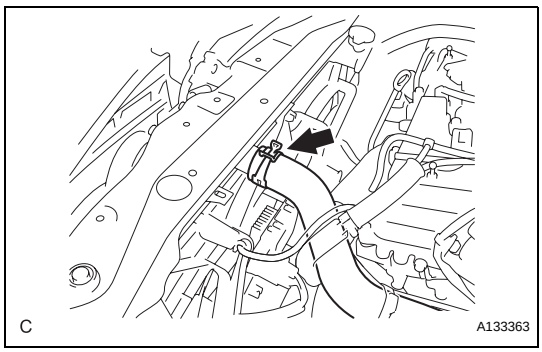
- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Never apply water directly onto the electronic components.**

REMOVAL

1. **REMOVE FRONT WHEEL OPENING EXTENSION PAD RH**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE ENGINE UNDER COVER LH**
5. **DRAIN ENGINE COOLANT (See page CO-5)**
6. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
7. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
8. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
9. **REMOVE AIR CLEANER INLET SUB-ASSEMBLY (See page EM-24)**
10. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
11. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
12. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-6)**
13. **REMOVE FRONT BUMPER ENERGY ABSORBER (See page ET-9)**
14. **SEPARATE RADIATOR RESERVE TANK HOSE**
    (a) Separate the radiator reserve tank hose from the radiator assembly.



15. **DISCONNECT RADIATOR HOSE INLET**
    (a) Separate the radiator inlet hose from the radiator assembly.



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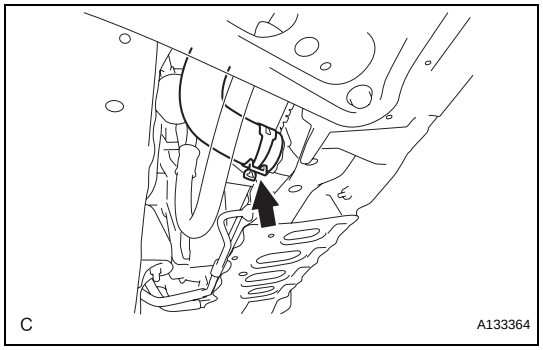
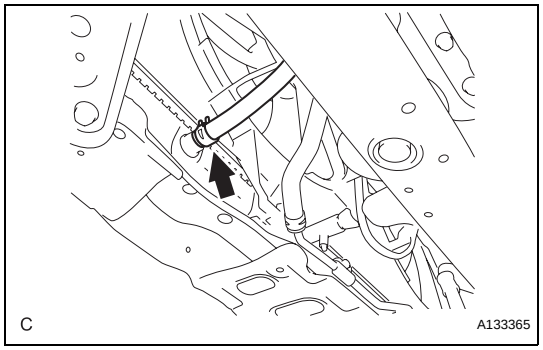


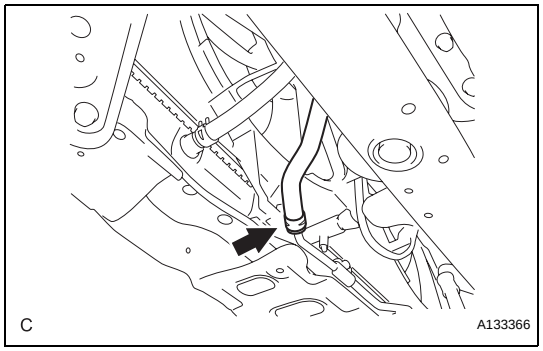
16. DISCONNECT RADIATOR HOSE OUTLET

(a) Separate the radiator outlet hose from the radiator assembly.



17. DISCONNECT NO. 1 OIL COOLER INLET HOSE

(a) Separate the No. 1 oil cooler inlet hose from the radiator assembly.

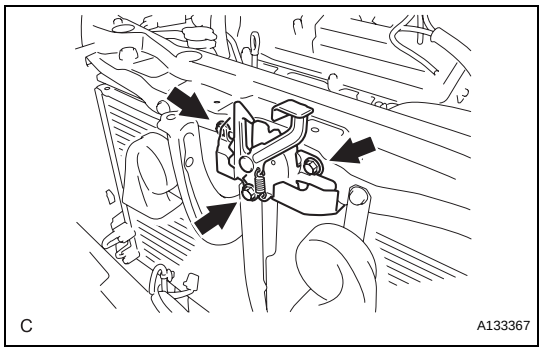


18. DISCONNECT NO. 1 OIL COOLER OUTLET HOSE

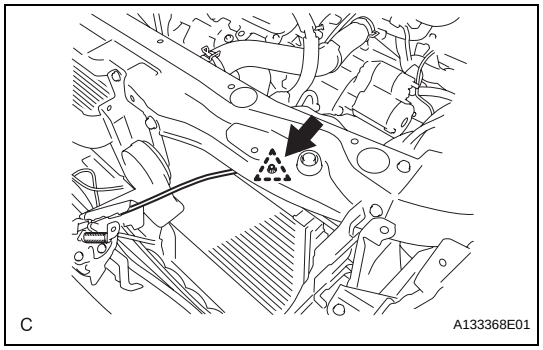
(a) Separate the No. 1 oil cooler outlet hose from the radiator assembly.

19. REMOVE RADIATOR SUPPORT UPPER

(a) Disconnect the horn connector.

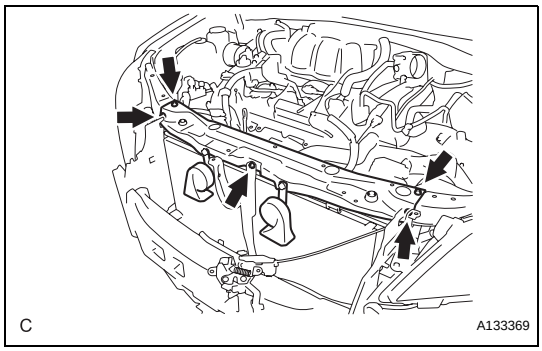


(b) Remove the 3 bolts and separate the hood lock assembly from the radiator support upper.



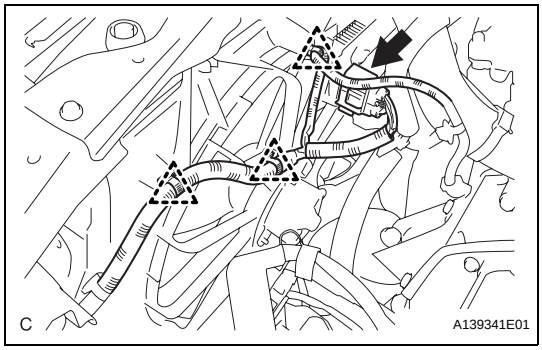
(c) Remove the clamp and separate the hood lock control cable from the radiator support upper.

CO

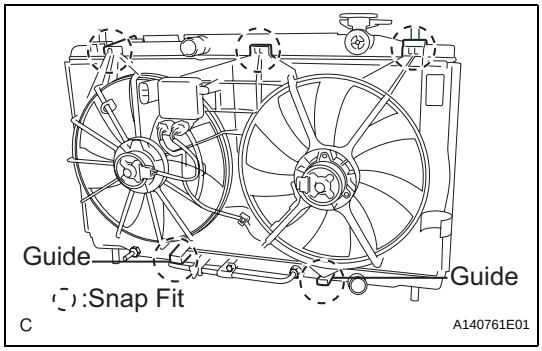


(d) Remove the 5 bolts and radiator support upper.

20. REMOVE FAN SHROUD

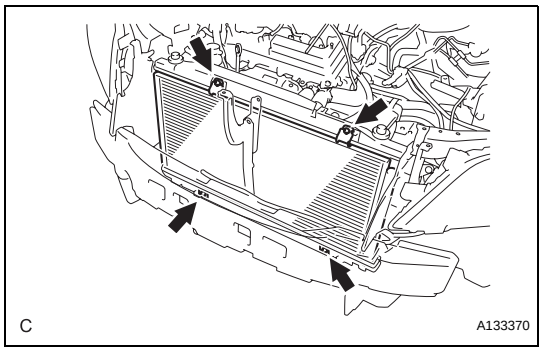


(a) Remove the 3 clamps and connector.

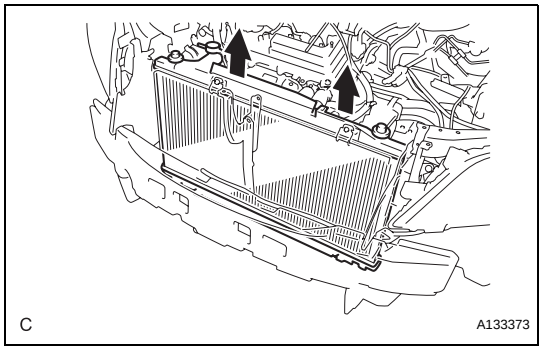


(b) Release the 3 snap fits and lift the fan assembly with motor from the radiator.

21. REMOVE RADIATOR ASSEMBLY

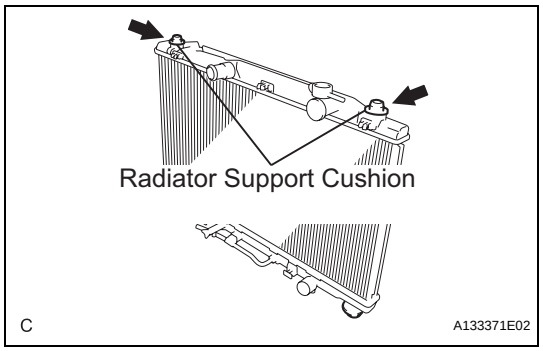


(a) Remove the 4 bolts and separate the condenser assembly from the radiator assembly.



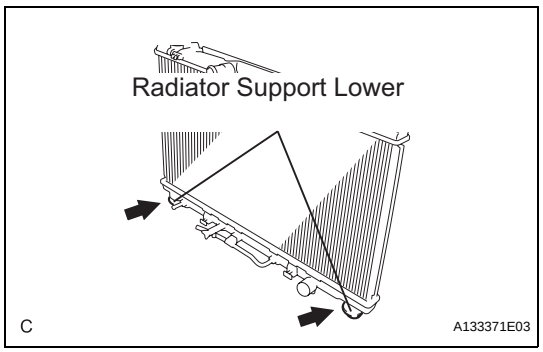
(b) Remove the radiator assembly from the body.

CO



22. REMOVE RADIATOR SUPPORT CUSHION

(a) Remove the 2 radiator support cushions from the radiator assembly.



23. REMOVE RADIATOR SUPPORT LOWER

(a) Remove the 2 radiator support lowers from the radiator assembly.

DISASSEMBLY

1. REMOVE DRAIN PLUG

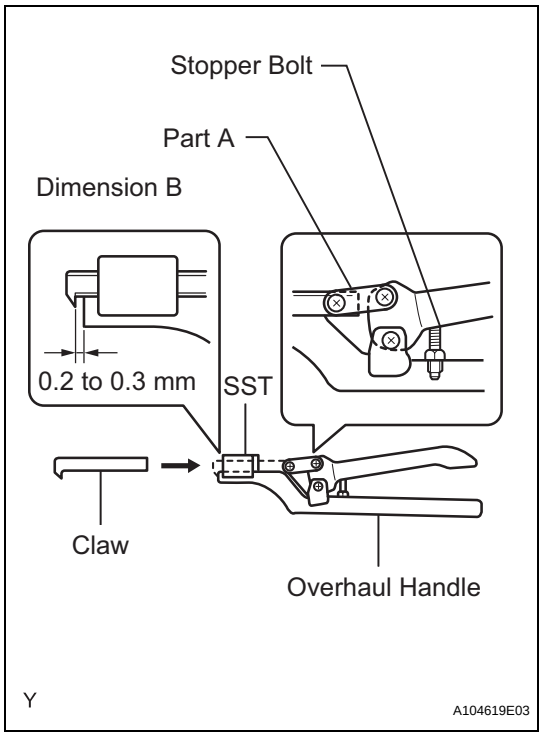
(a) Remove the drain plug.

(b) Remove the O-ring.

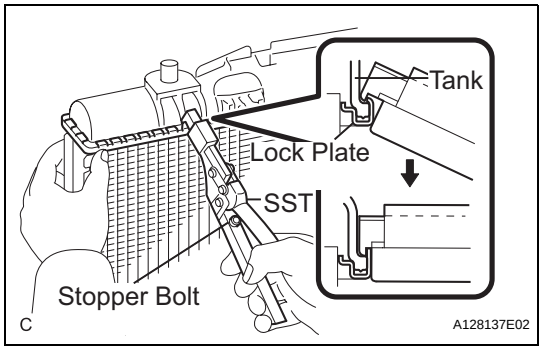
2. REMOVE RADIATOR TANK UPPER

(a) Install the claw to the overhaul handle, inserting it in the hole in part A as shown in the illustration.
SST 09230-01010 (09231-01010, 09231-01030)

(b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.
Dimension B:
0.2 to 0.3 mm (0.008 to 0.012 in.)
NOTICE:
If the stopper bolt is not adjusted, the claw may be damaged.

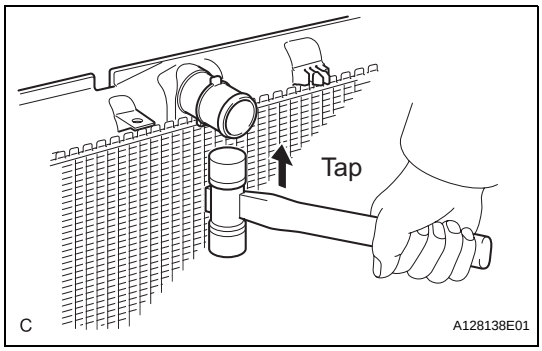


(c) Using SST to release the caulking, grip the handle until stopped by the stopper bolt.
SST 09230-01010 (09231-01010, 09231-01030)



(d) Lightly tap the bracket of the radiator (or radiator hose inlet or outlet) with a soft-faced hammer and remove the tank.

(e) Remove the O-ring.



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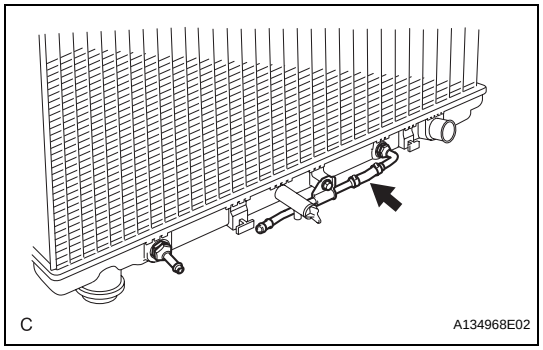
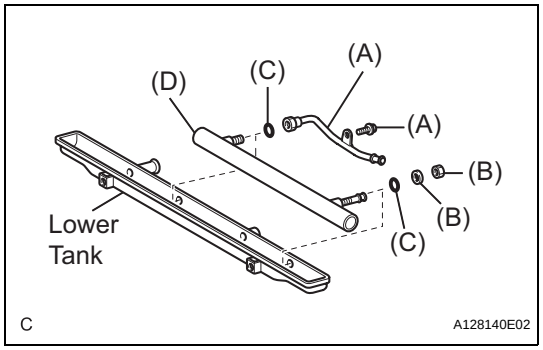


3. REMOVE RADIATOR TANK LOWER

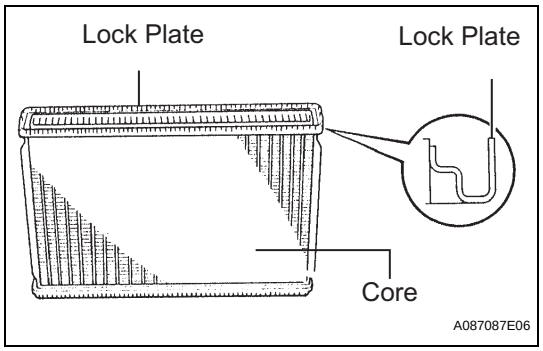
(a) With hose:
  (1) Remove the 2 clips and hose from the radiator assembly.

(b) Removal procedure of the radiator tank lower is the same as that of the radiator tank upper.



4. REMOVE OIL COOLER ASSEMBLY

(a) Without hose:
  (1) Remove the bolt and cooler pipe (A).
  (2) Remove the nut and plate washer (B).
  (3) Remove the oil cooler (C).
  (4) Remove the 2 O-rings from the oil cooler (D).



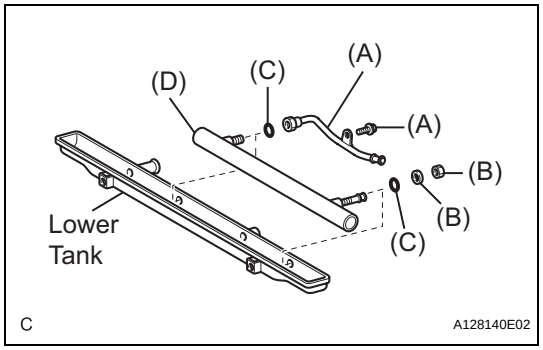
INSPECTION

1. INSPECT LOCK PLATE

(a) Inspect the lock plate for damage.
  HINT:
  - If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible. Therefore, first correct the shape of the lock plate groove with pliers or a similar object, if necessary.
  - Water leakage will result if the bottom of the lock plate groove is damaged or dented. Repair or replace the locking plate if necessary.

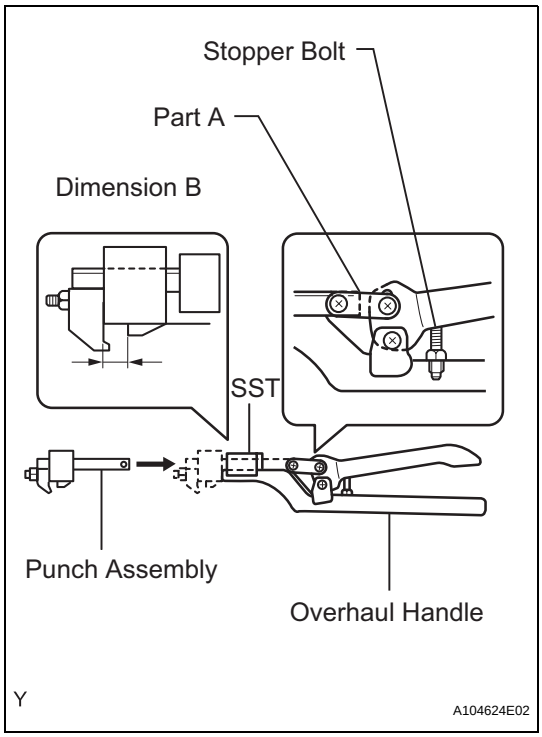
  NOTICE:
  The radiator can only be recaulked 2 times. After recaulking 2 times, the radiator core must be replaced.

REASSEMBLY



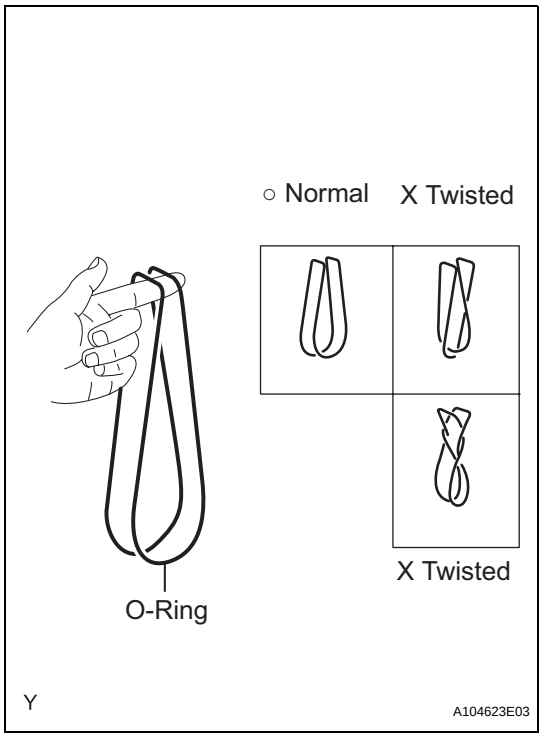
1. INSTALL OIL COOLER ASSEMBLY

(a) Without hose
  (1) Clean the O-ring contact surfaces of the lower tank and oil cooler.
  (2) Install 2 new O-rings to the oil cooler (D).
  (3) Install the oil cooler to the lower tank (C).
  (4) Install the plate washer and nut (B).
    Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)
  (5) Install the cooler pipe with the bolt (A).
    Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)

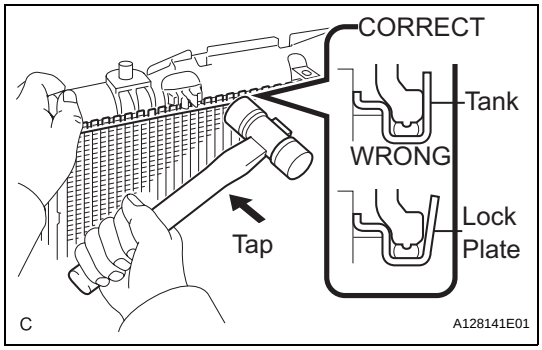


2. INSTALL RADIATOR TANK UPPER

(a) Install the punch assembly to the overhaul handle, inserting it in the hole in part A as shown in the illustration.
SST 09230-01010, 09231-14010

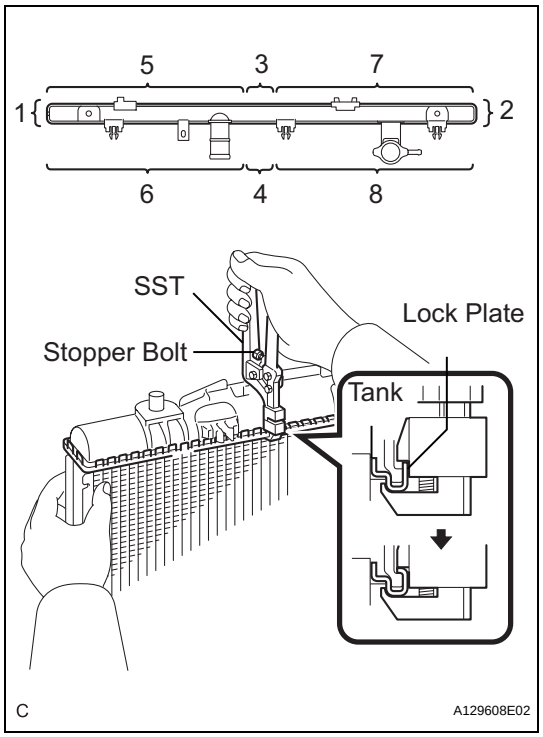


(b) After checking that there are no foreign objects in the lock plate groove, install a new O-ring without twisting it.
HINT:
When cleaning the lock plate groove, lightly rub it with sand paper without scratching it.

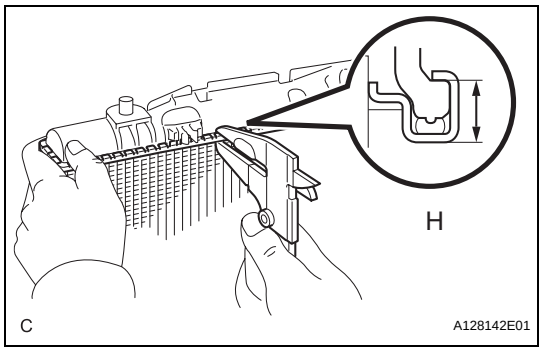


(c) Install the tank without damaging the O-ring.

CO



(d) Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by gripping the handle until stopped by the stopper plate.
HINT:
- Do not tap the areas protruding around the pipes, brackets or tank ribs.
- The dotted circles shown in the illustration and parts of the oil cooler near the dotted circles cannot be tapped with the SST. Use pliers or similar objects and be careful not to damage the core plates.



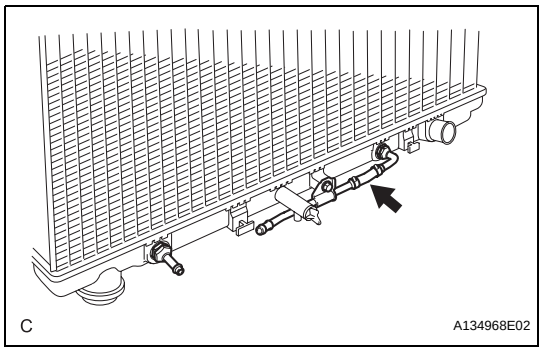
(e) Check the lock plate height (H) after completing caulking.
Plate height (H):
7.40 to 7.80 mm (0.2913 to 0.3071 in.)
If not within the specified height range, adjust the stopper bolt of the handle and caulk again.

(f) Tap the lock plate with a soft-faced hammer so that there is no gap between the lock plate and the tank.

3. INSTALL RADIATOR TANK LOWER

(a) Installation procedure of the radiator tank lower is the same as that of the radiator tank upper.

(b) With hose
(1) Install the hose and 2 clips.

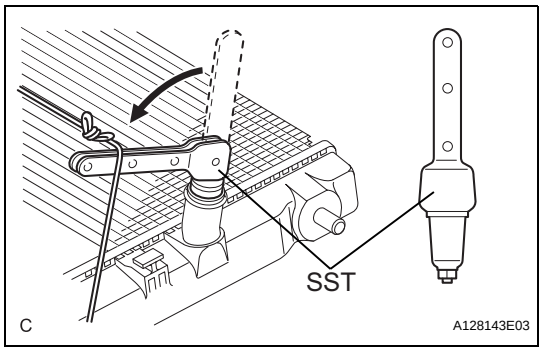


4. INSTALL DRAIN PLUG

(a) Install a new O-ring to the drain plug.

(b) Install the drain plug.

CO

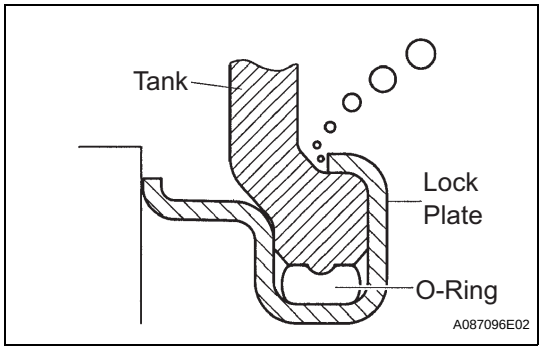


5. INSPECT FOR WATER LEAKS

(a) Plug the inlet and outlet pipes of the radiator with SST.
SST 09230-01010

(b) Using the radiator cap tester, apply pressure to the radiator.
Test pressure:
177 kPa (1.8 kgf/cm^2, 26 psi)

(c) Submerge the radiator in water.

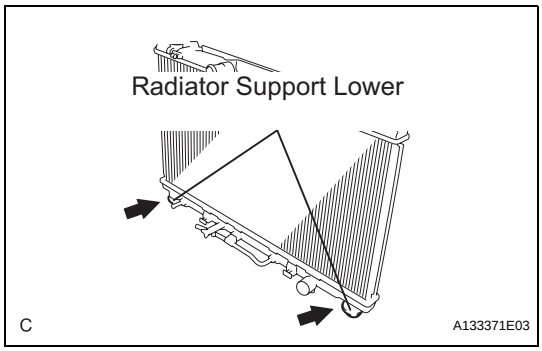


(d) Inspect for leaks.
HINT:
On radiators with resin tanks, there is clearance between the tank and lock plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before doing the water leak test, first swish the radiator around in the water until all air bubbles disappear.

INSTALLATION

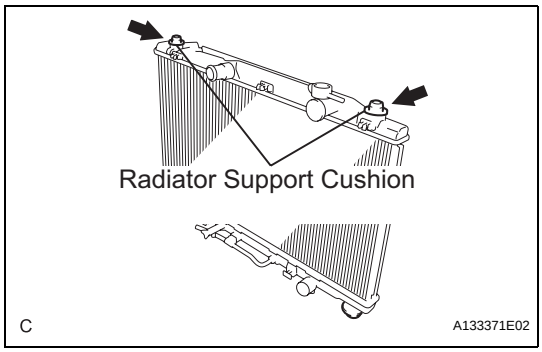
1. INSTALL RADIATOR SUPPORT LOWER

(a) Install the 2 radiator support lowers to the radiator assembly.



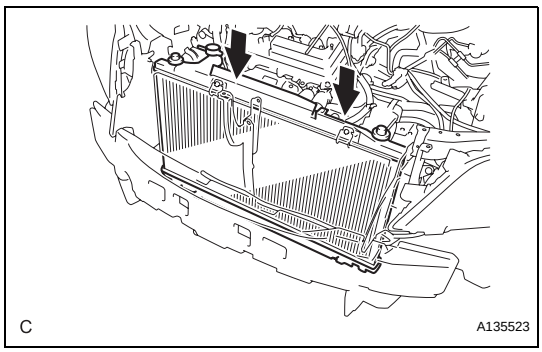
2. INSTALL RADIATOR SUPPORT CUSHION

(a) Install the 2 radiator support cushions to the radiator assembly.

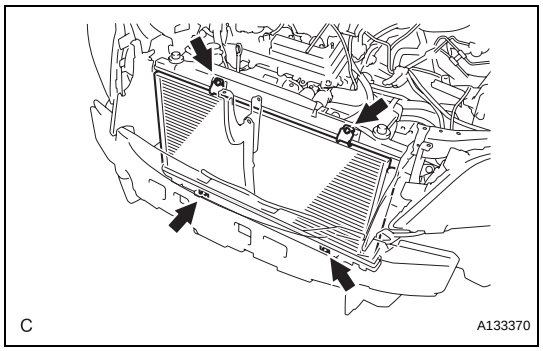


3. INSTALL RADIATOR ASSEMBLY

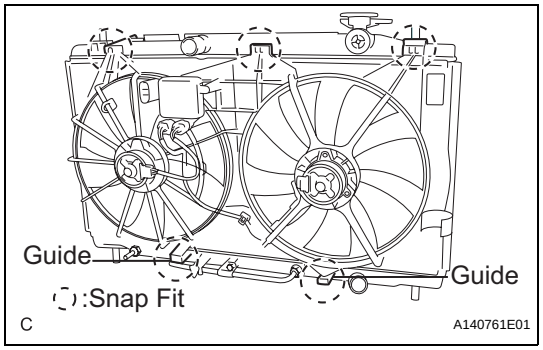
(a) Install the radiator to the body.



CO

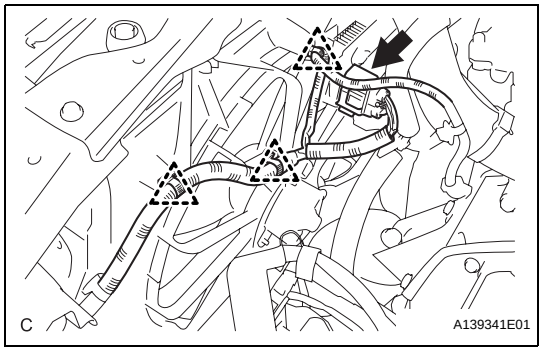


(b) Install the condenser assembly with the 4 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

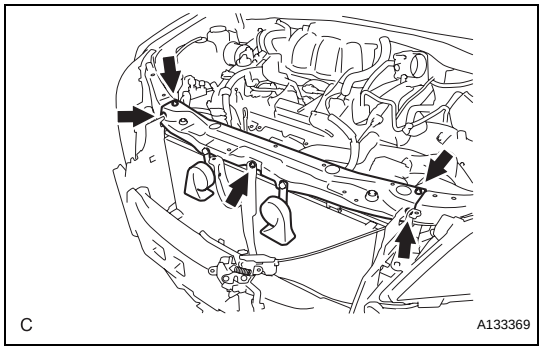


4. INSTALL FAN SHROUD

(a) Install the fan assembly with motor to the radiator with the 2 guides at the bottom and 3 snap fits on the top.

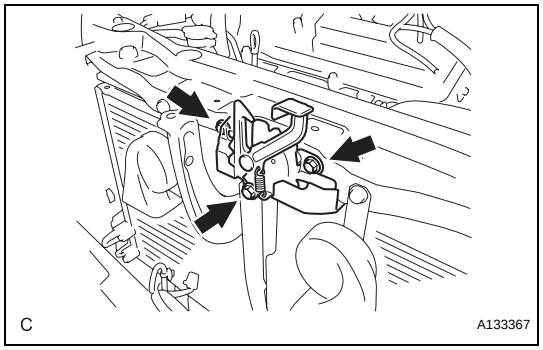


(b) Connect the fan motor connector.



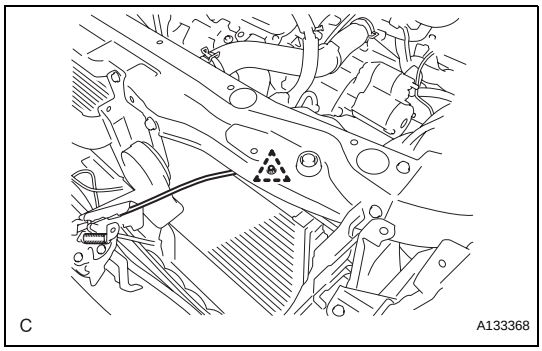
5. INSTALL RADIATOR SUPPORT UPPER

(a) Install the radiator support upper with the 5 bolts.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)

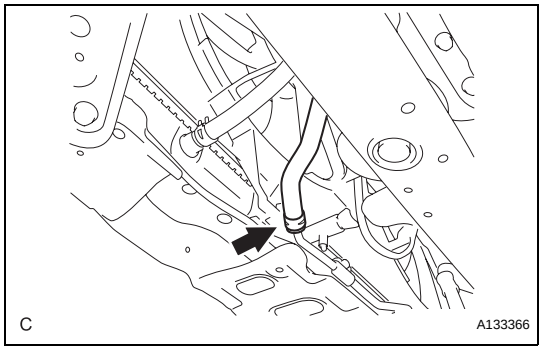


(b) Install the hood lock assembly to the radiator support upper with the 3 bolts.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)

CO

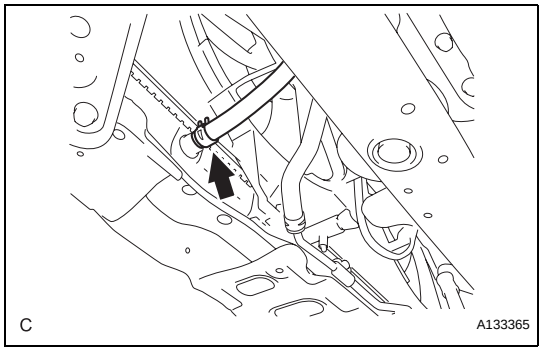


(c) Install the hood lock control cable assembly to the radiator support upper with the clamp.
(d) Connect the 2 horn connectors.



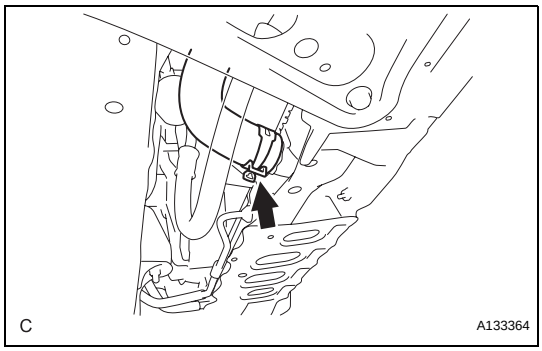
6. CONNECT NO. 1 OIL COOLER OUTLET TUBE

(a) Connect the No. 1 oil cooler outlet tube to the radiator assembly.



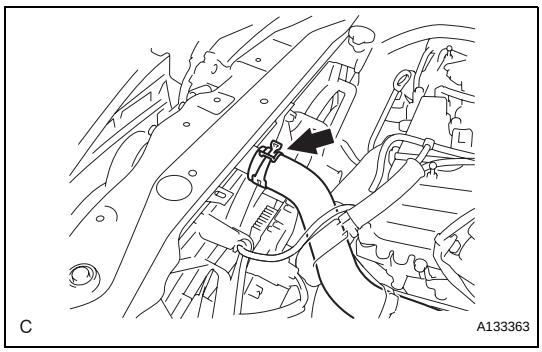
7. CONNECT NO. 1 OIL COOLER INLET TUBE

(a) Connect the No. 1 oil cooler inlet tube to the radiator assembly.



8. CONNECT RADIATOR HOSE OUTLET

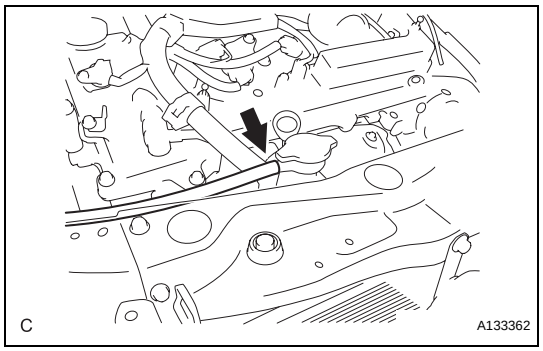
(a) Connect the radiator hose outlet to the radiator assembly.



9. CONNECT RADIATOR HOSE INLET

(a) Connect the radiator hose inlet to the radiator assembly.

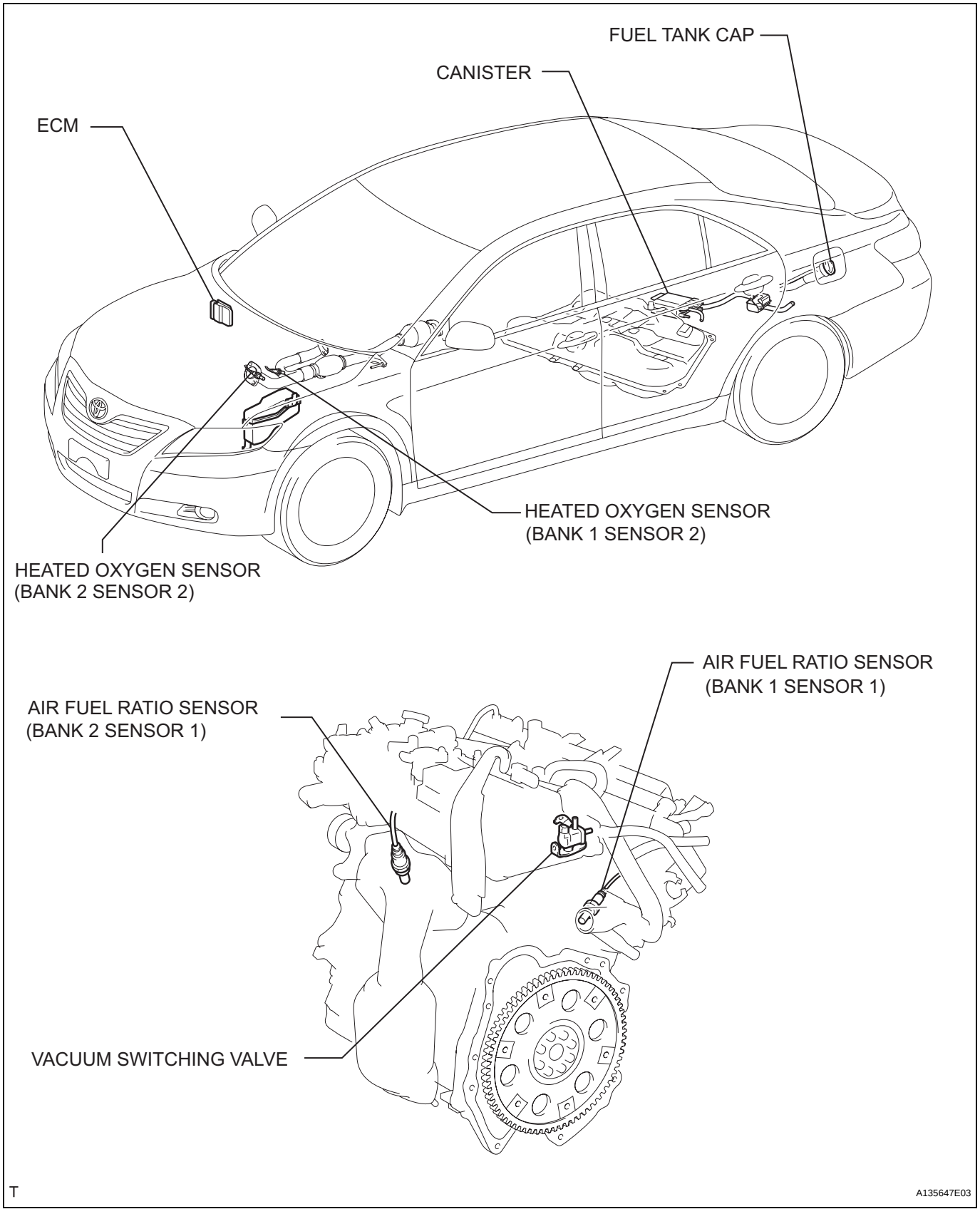
CO



10. **CONNECT RADIATOR RESERVOIR TANK HOSE**
    (a) Connect the radiator reservoir tank hose to the radiator assembly.
11. **INSTALL FRONT BUMPER ENERGY ABSORBER (See page ET-10)**
12. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
13. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
14. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
15. **INSTALL AIR CLEANER INLET SUB-ASSEMBLY (See page EM-50)**
16. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
17. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
18. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
19. **ADD ENGINE COOLANT (See page CO-6)**
20. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
21. **INSTALL ENGINE UNDER COVER RH**
22. **INSTALL ENGINE UNDER COVER LH**
23. **INSTALL FRONT WHEEL OPENING EXTENSION PAD RH**
24. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH**

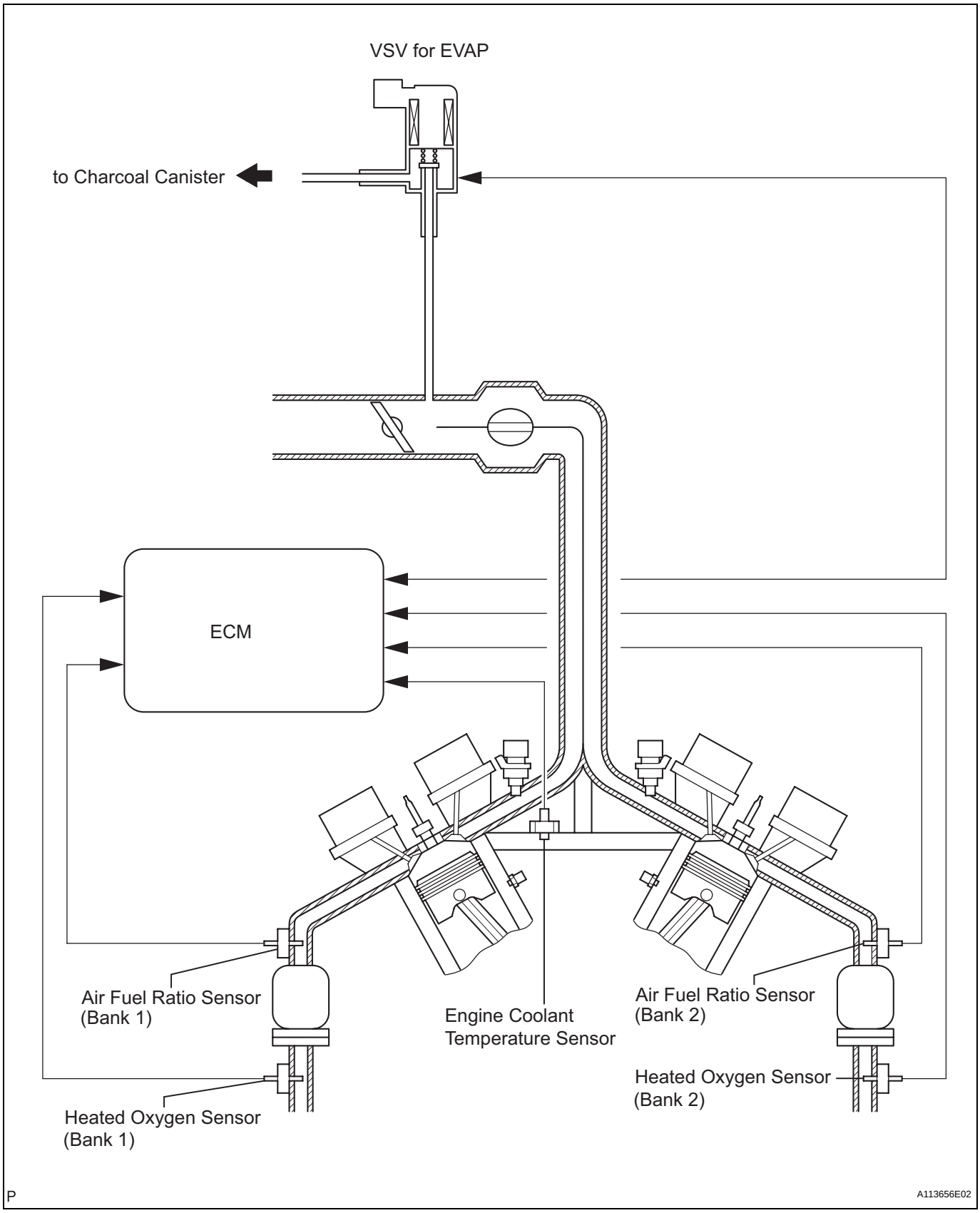
EMISSION CONTROL SYSTEM

PARTS LOCATION



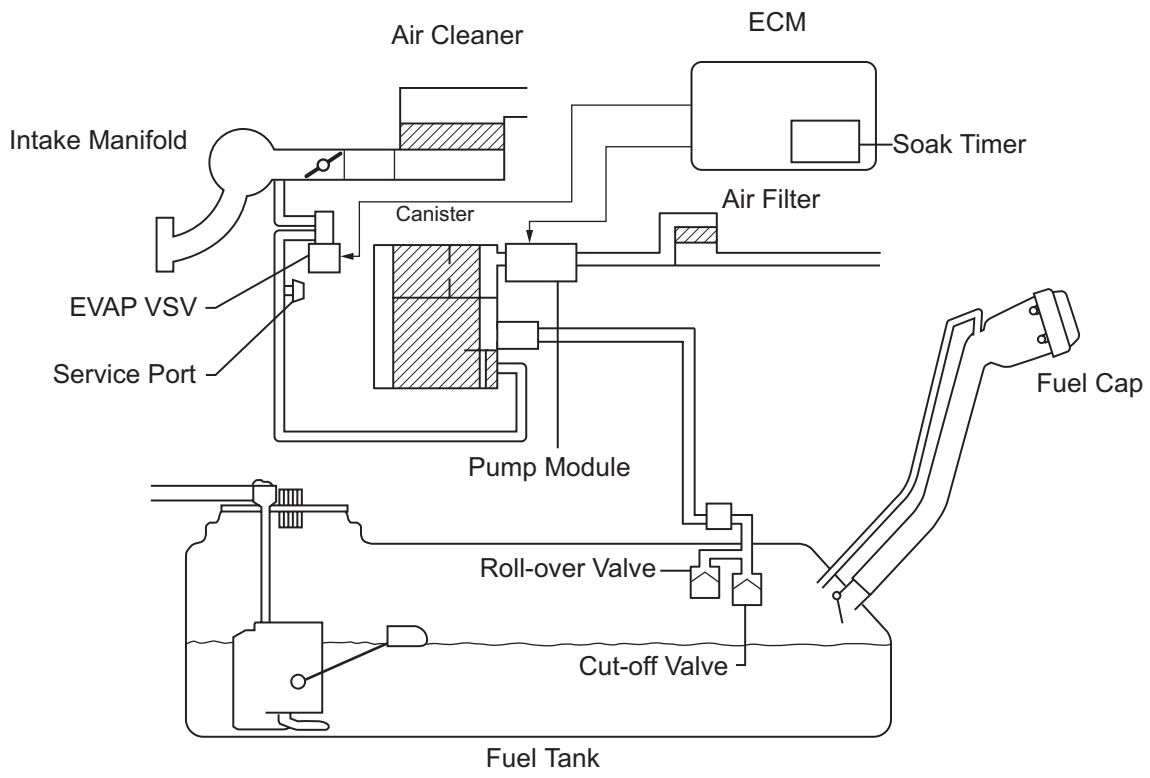
EC

SYSTEM DIAGRAM



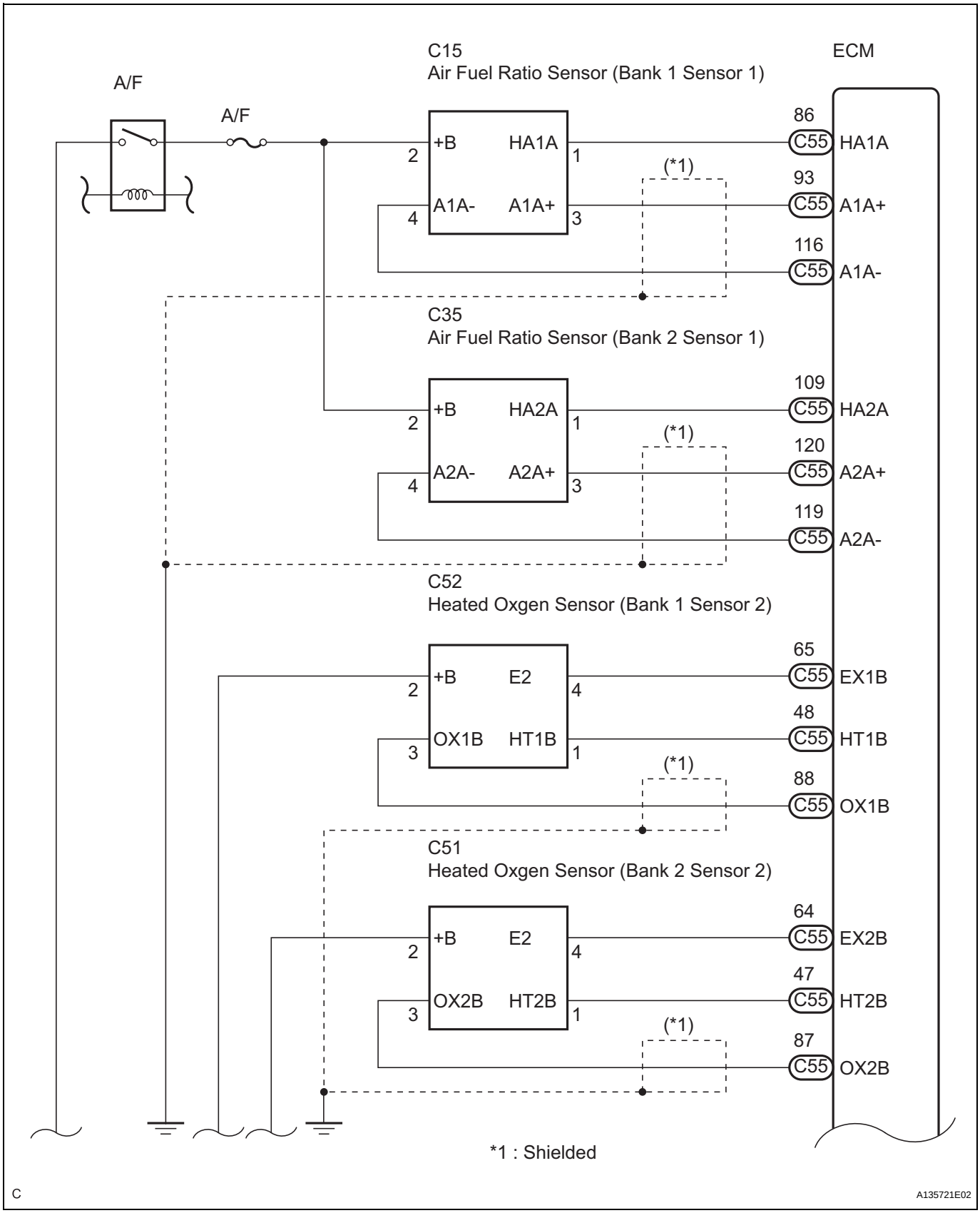
EC

EVAP System Circuit :

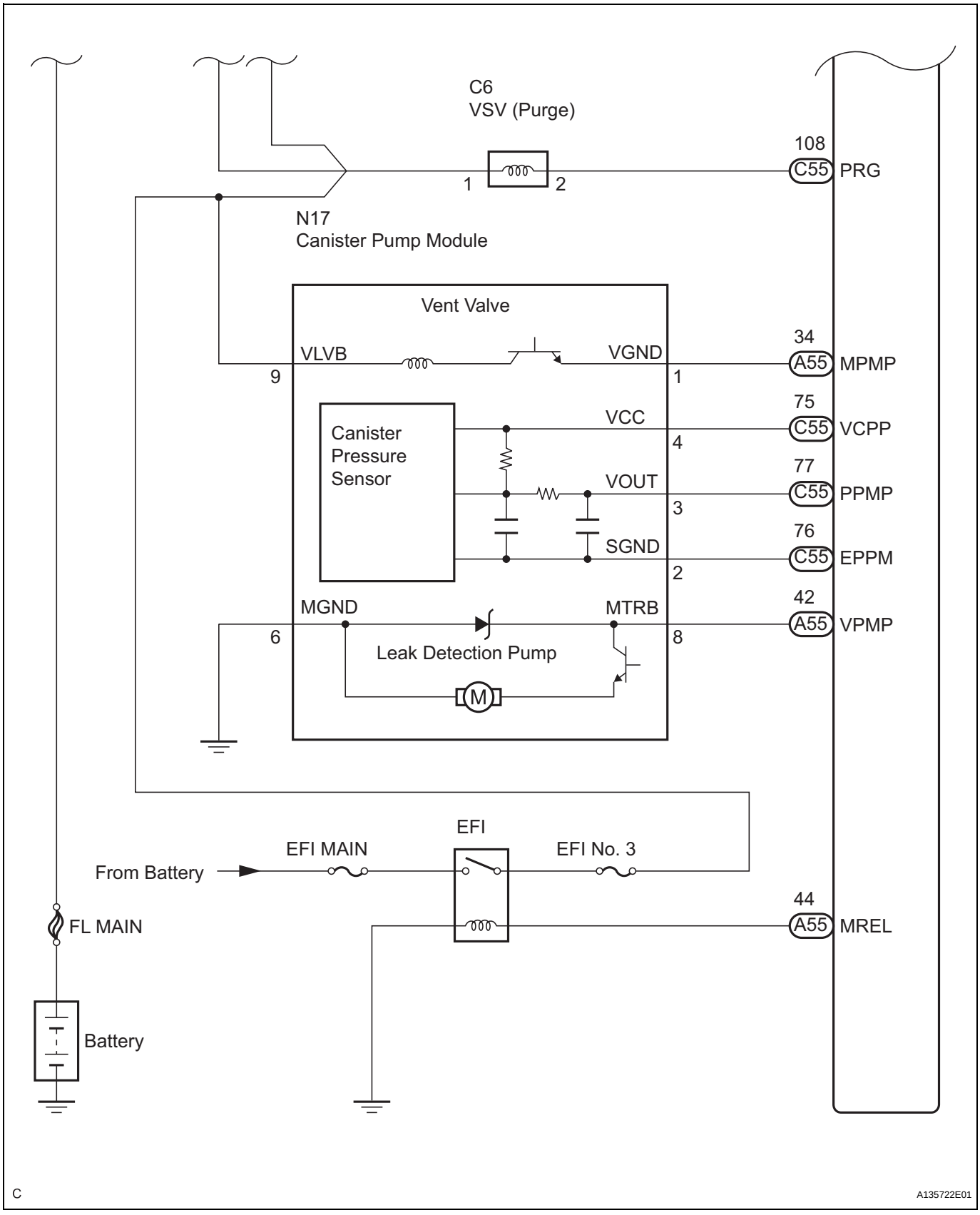


C A128936E03

EC


C15
Air Fuel Ratio Sensor (Bank 1 Sensor 1)
ECM
A/F
A/F
+B
HA1A
A1A-
A1A+
2
1
4
3
(*1)
86
C55
HA1A
93
C55
A1A+
116
C55
A1A-
C35
Air Fuel Ratio Sensor (Bank 2 Sensor 1)
+B
HA2A
A2A-
A2A+
2
1
4
3
(*1)
109
C55
HA2A
120
C55
A2A+
119
C55
A2A-
C52
Heated Oxgen Sensor (Bank 1 Sensor 2)
+B
E2
OX1B
HT1B
2
4
3
1
(*1)
65
C55
EX1B
48
C55
HT1B
88
C55
OX1B
C51
Heated Oxgen Sensor (Bank 2 Sensor 2)
+B
E2
OX2B
HT2B
2
4
3
1
(*1)
64
C55
EX2B
47
C55
HT2B
87
C55
OX2B
*1 : Shielded
C
A135721E02

EC


C6
VSV (Purge)
1
2
108
C55
PRG
N17
Canister Pump Module
Vent Valve
VLVB
9
VGND
1
34
A55
MPMP
Canister
Pressure
Sensor
VCC
4
75
C55
VCPP
VOUT
3
77
C55
PPMP
SGND
2
76
C55
EPPM
MGND
6
MTRB
8
42
A55
VPMP
Leak Detection Pump
M
EFI
EFI MAIN
EFI No. 3
From Battery
FL MAIN
44
A55
MREL
Battery
C
A135722E01

EC

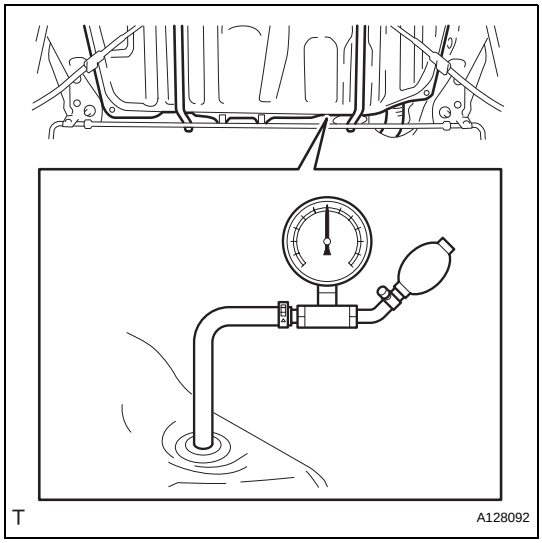
ON-VEHICLE INSPECTION

1. INSPECT FUEL CUT-OFF RPM

(a) Increase the engine speed to at least 3,500 rpm.
(b) Use a sound scope to check for injector operating sounds.
(c) Check that when the throttle lever is released, injector operating sounds stop momentarily (at 2,500 rpm) and then resume (at 1,400 rpm).

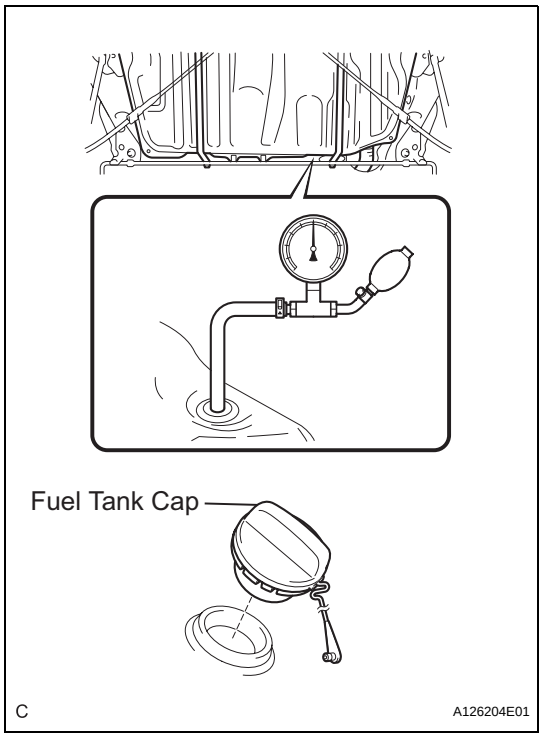
Standard

Item	Specified Condition
Fuel cut off rpm	2,500 rpm
Fuel return rpm	1,400 rpm



2. CHECK AIR TIGHTNESS IN FUEL TANK AND FILLER PIPE

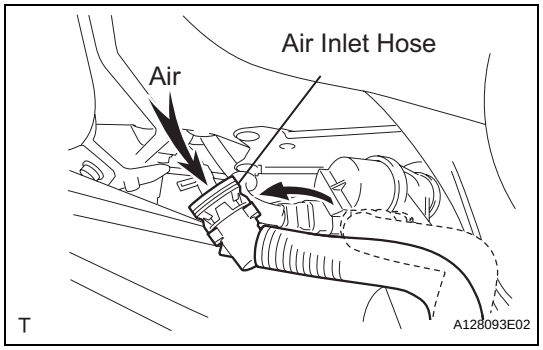
(a) Disconnect the vent line hose from the fuel tank.
(b) Connect the pressure gauge to the fuel tank.
(c) Apply pressure to the fuel tank to create an internal pressure of 4 kPa (41 gf/cm^2, 0.58 psi).
(d) Check that the internal pressure of the fuel tank is maintained for 1 minute.
(e) Check the connected portions of each hose and pipe.
(f) Check the installed parts on the fuel tank.
If any malfunctions, damage or other problems are found, replace the fuel tank and filler pipe.
(g) Reconnect the vent line hose to the fuel tank.



3. INSPECT FUEL CUT OFF VALVE AND FUEL CHECK VALVE

(a) Disconnect the vent line hose from the fuel tank.
(b) Connect the pressure gauge to the fuel tank.
(c) Fill the fuel tank with fuel.
(d) Apply pressure of 4 kPa (41 gf/cm^2, 0.58 psi) to the vent port of the fuel tank.
HINT:
Check the amount of fuel in the fuel tank. When the fuel tank is full, the float valve of the fill check valve is closed and no air can pass through.
(e) Remove the fuel tank cap, and check that the pressure drops.
If the pressure does not drop, replace the fuel tank assembly.
(f) Reconnect the vent line hose to the fuel tank.

EC

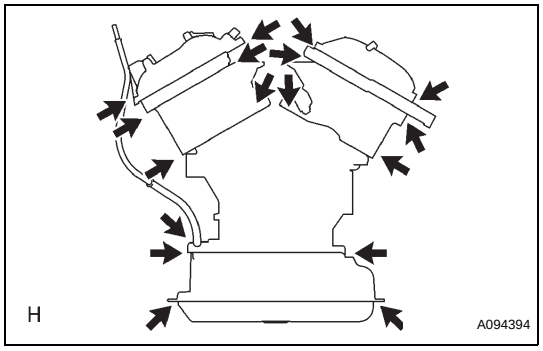


4. CHECK AIR INLET LINE

(a) Disconnect the air inlet line hose from the charcoal canister.

(b) Check that air can flow freely into the air inlet line.
If air cannot flow freely into the air inlet line, repair or replace it.

(c) Reconnect the air inlet line hose to the charcoal canister.



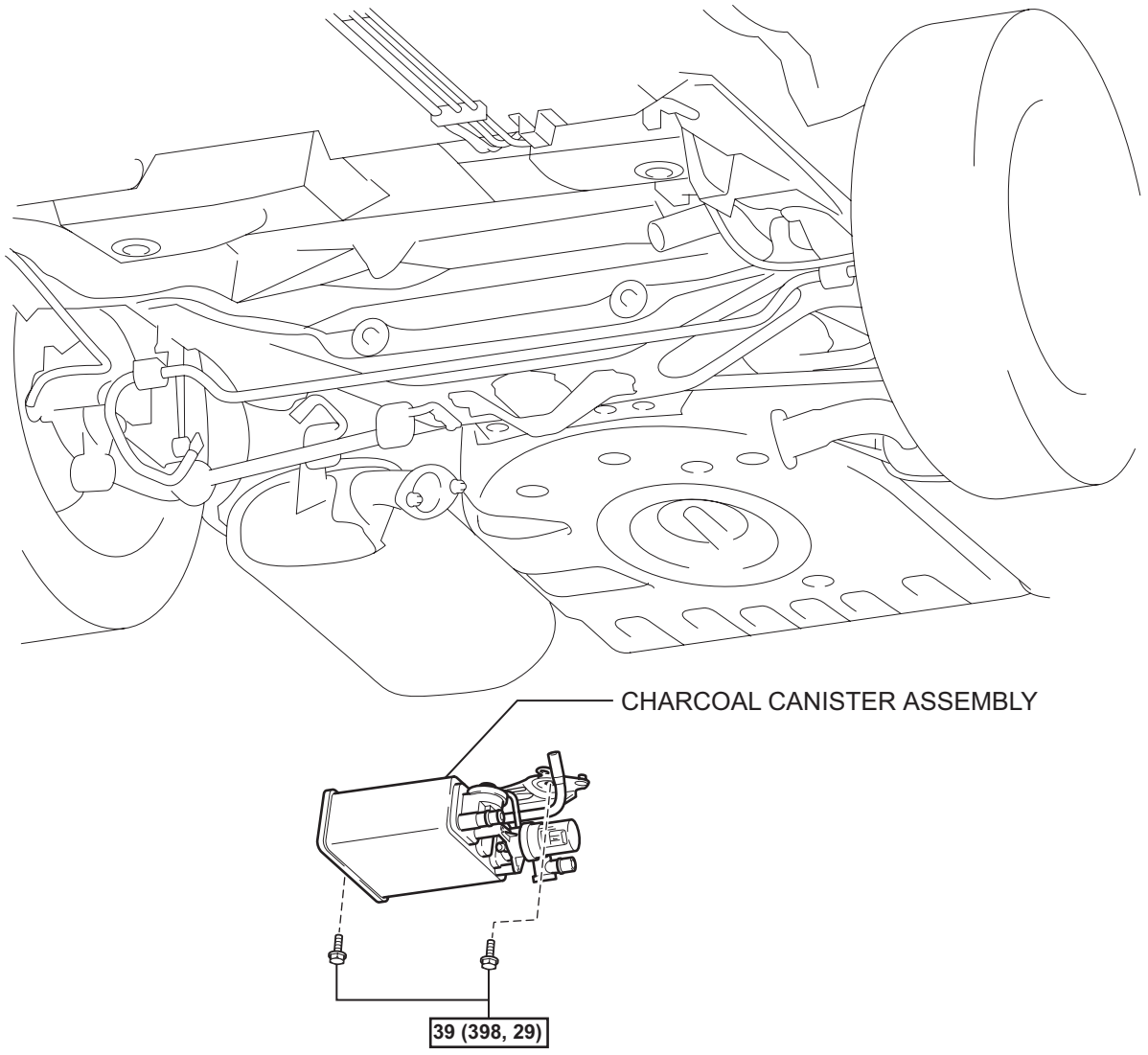
5. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

(a) Check for cracks, leaks or damage.
HINT:
Removal or problems with the engine oil dipstick, oil filler cap, PCV hose and other components may cause the engine to run improperly. Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run improperly.
If necessary, replace any damaged parts.

EC

CANISTER

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

A135648E04

REMOVAL

1. REMOVE FUEL TANK ASSEMBLY

HINT:

(See page FU-36)

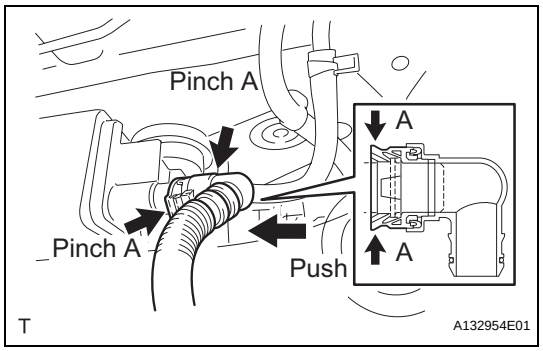
2. REMOVE CHARCOAL CANISTER ASSEMBLY

(a) Disconnect the fuel tank vent hose from the charcoal canister.

(1) Push the connector deep inside.

(2) Pinch portion A.

(3) Pull out the connector.



(b) Disconnect the charcoal canister filter sub-assembly from the charcoal canister.

(1) Push the connector deep inside.

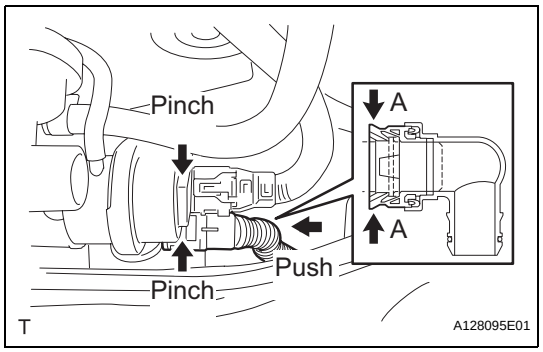
(2) Pinch portion A.

(3) Pull out the connector.

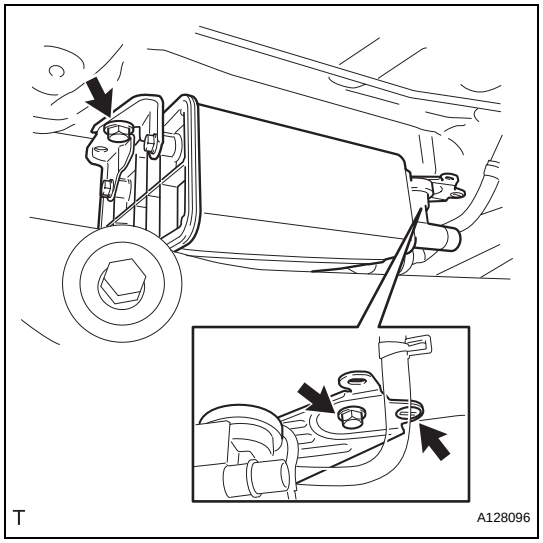
(c) Disconnect the vapor pressure sensor connector.

(d) Disconnect the wire harness clamp.

(e) Disconnect the purge line hose from the charcoal canister.



(f) Remove the 2 bolts, clip and charcoal canister.

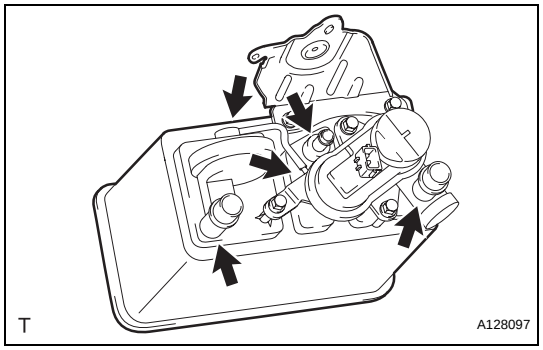


INSPECTION

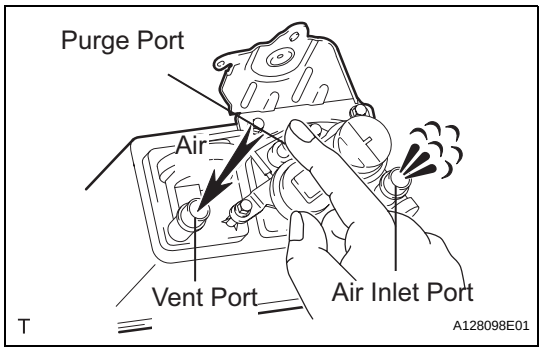
1. INSPECT CHARCOAL CANISTER ASSEMBLY

(a) Visually check the charcoal canister for cracks or damage.

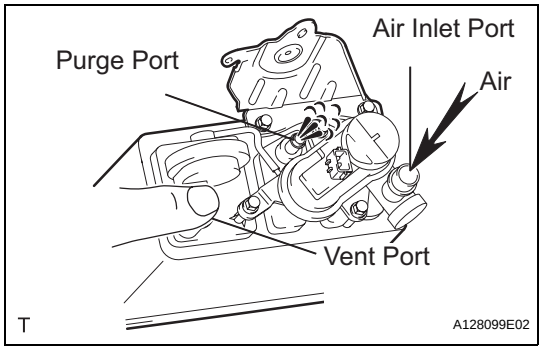
If cracks or damage are found, replace the charcoal canister assembly.



EC

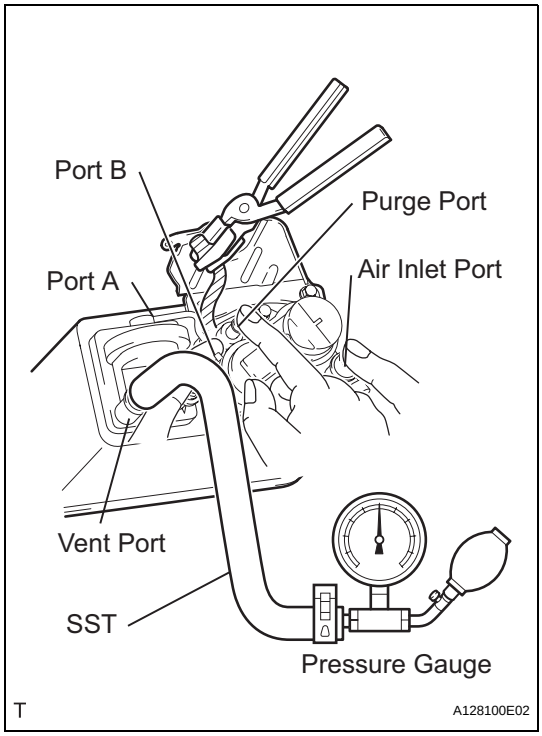


(b) Check charcoal canister operation.
(1) With the purge port closed, blow 1.67 kPa (17.0 gf/cm^2, 0.24 psi) of air into the vent port, and check that air flows from the air inlet port.
If the result is not as specified, replace the charcoal canister assembly.

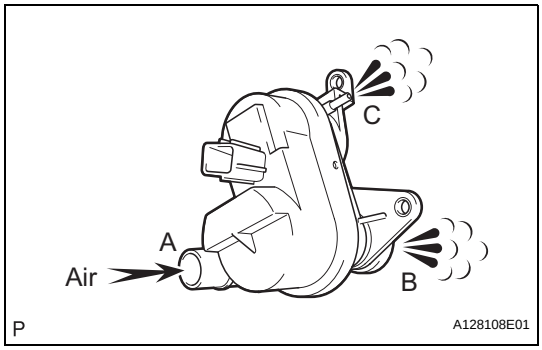


(2) With the vent port closed, blow 1.10 kPa (11.2 gf/cm^2, 0.16 psi) of air to the air inlet port, and check that air flows from the purge port.
If the result is not as specified, replace the charcoal canister assembly.

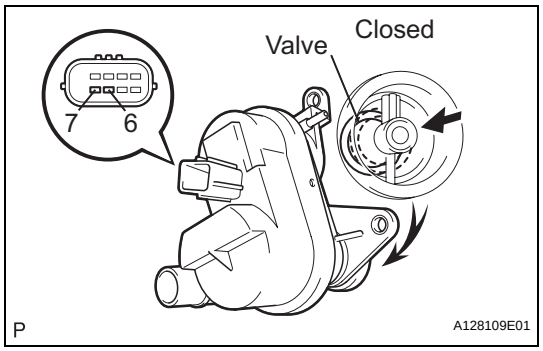
EC



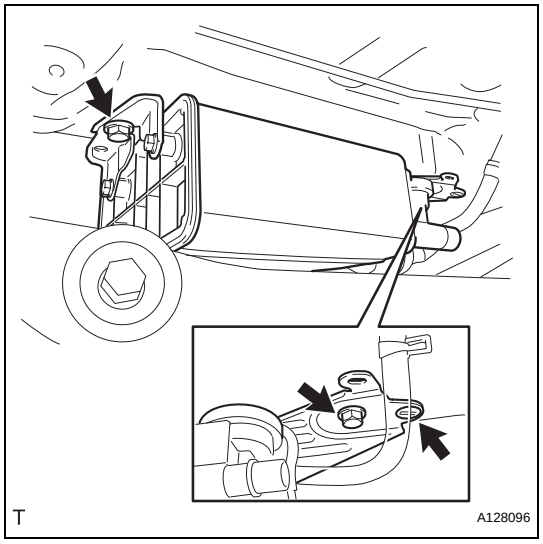
(c) Check for air leakage.
(1) Remove the air hose between ports A and B.
(2) Connect the SST (pressure gauge) to the vent port of the charcoal canister.
SST 09992-00242
(3) While holding port B, with the purge port and the air inlet port closed and port A open, apply 19.6 kPa (0.2 kgf/cm^2, 2.81 psi) of pressurized air into the vent port, then confirm that pressure is retained for 1 minute.
If the result is not as specified, replace the charcoal canister assembly.



(d) Check the leak detection pump.
(1) Remove the detection pump from the charcoal canister.
(2) Check that air flows from port A to B and then C.
If the result is not as specified, replace the charcoal canister assembly.



(3) Connect the positive (+) lead to terminal 7 and the negative (-) lead to terminal 6.
(4) Check that the valve is closed.
If the result is not as specified, replace the charcoal canister assembly.
(5) Install the detection pump.



INSTALLATION

1. INSTALL CHARCOAL CANISTER ASSEMBLY

(a) Install the 2 bolts, clip and charcoal canister.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
(b) Connect the purge line hose to the charcoal canister.
(c) Connect the wire harness clamp.
(d) Connect the vapor pressure sensor connector.
(e) Connect the charcoal canister filter sub-assembly to the charcoal canister.
(f) Connect the fuel tank vent hose to the charcoal canister.

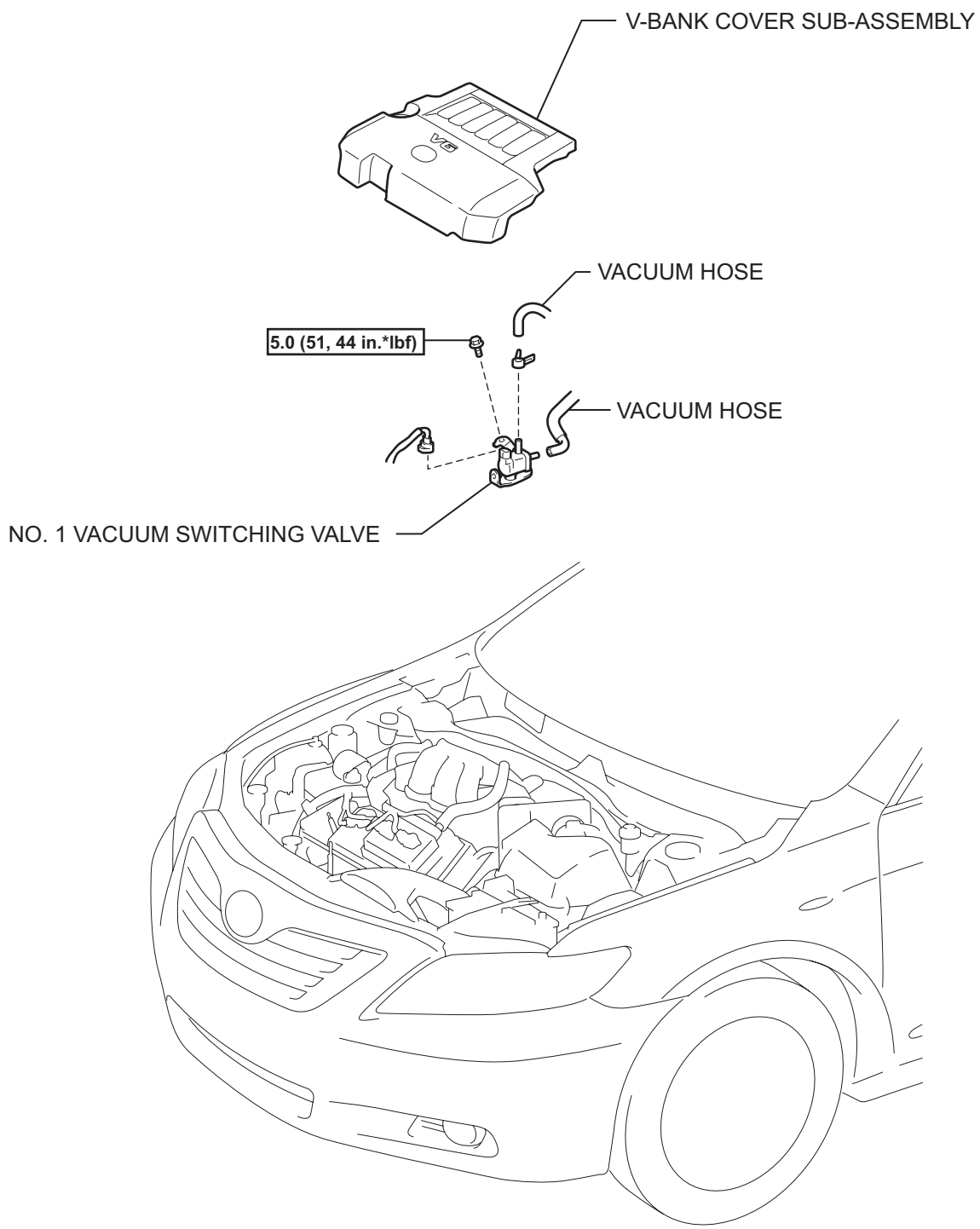
2. INSTALL FUEL TANK ASSEMBLY

HINT:
(See page FU-41)

EC

VACUUM SWITCHING VALVE (for EVAP)

COMPONENTS



EC

N*m (kgf*cm, ft.*lbf): Specified torque

T

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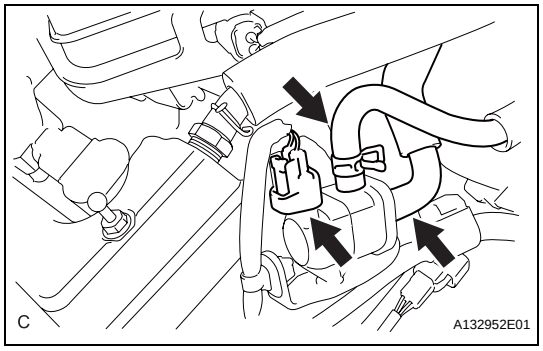
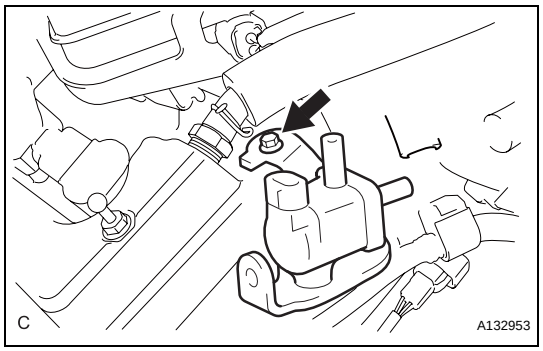
REMOVAL

1. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**

2. **REMOVE NO. 1 VACUUM SWITCHING VALVE**
   (a) Disconnect the 2 vacuum hoses and No. 1 vacuum switching valve connector.





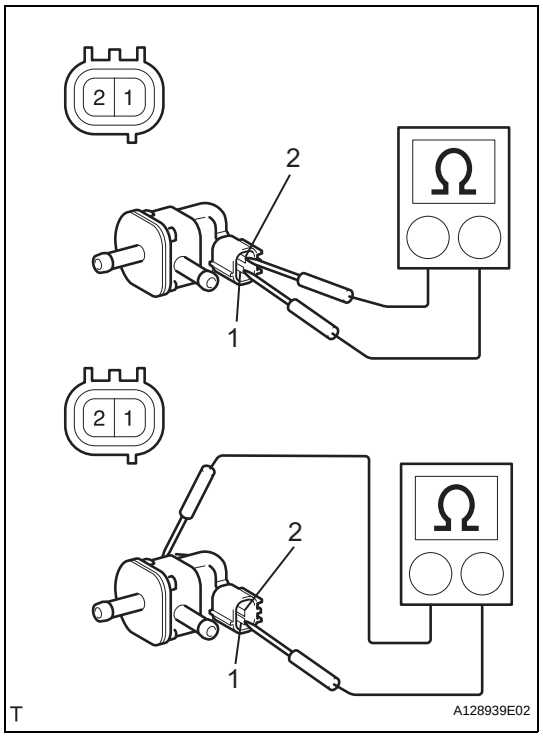
   (b) Remove the bolt and No. 1 vacuum switching valve.

INSPECTION

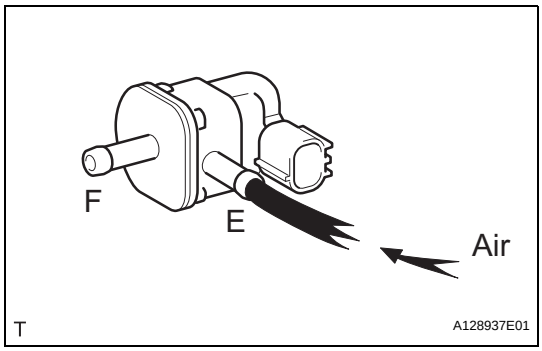
1. **INSPECT EVAP VSV**
   (a) Check the VSV for an open circuit.
      (1) Measure the resistance.
      Standard resistance

Tester Connection	Specified Condition
1 - 2	23 to 26Ω at 20°C (68°F)
1 - Body ground 2 - Body ground	10 kΩ or higher

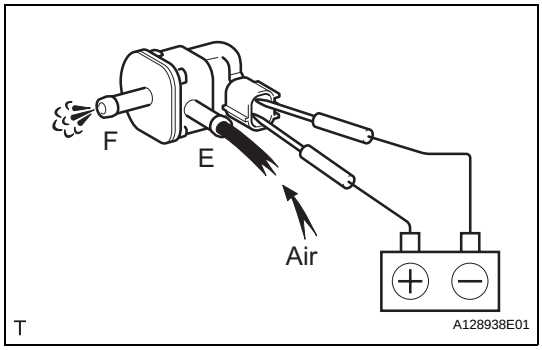
If the resistance is not as specified, replace the VSV assembly.



EC

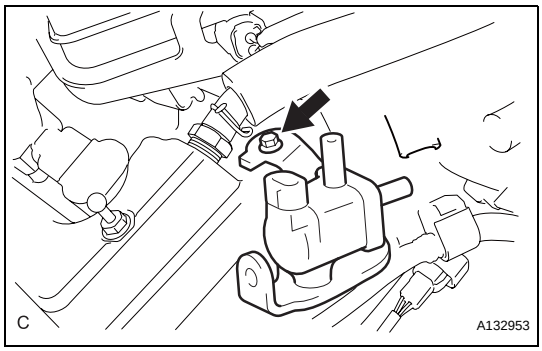


(b) Check VSV operation.
(1) Check that air does not flow from the port as shown in the illustration.

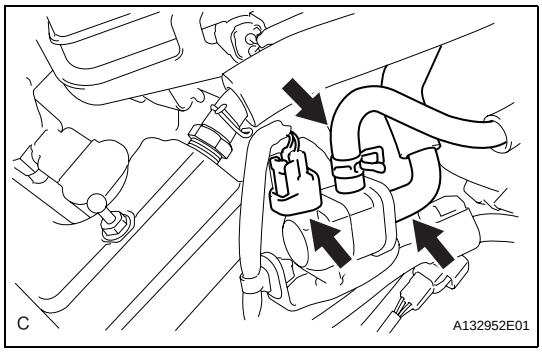


(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from the ports.
If the result is not as specified, replace the VSV assembly.

INSTALLATION



1. INSTALL NO. 1 VACUUM SWITCHING VALVE
(a) Install the No. 1 vacuum switching valve with the bolt.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



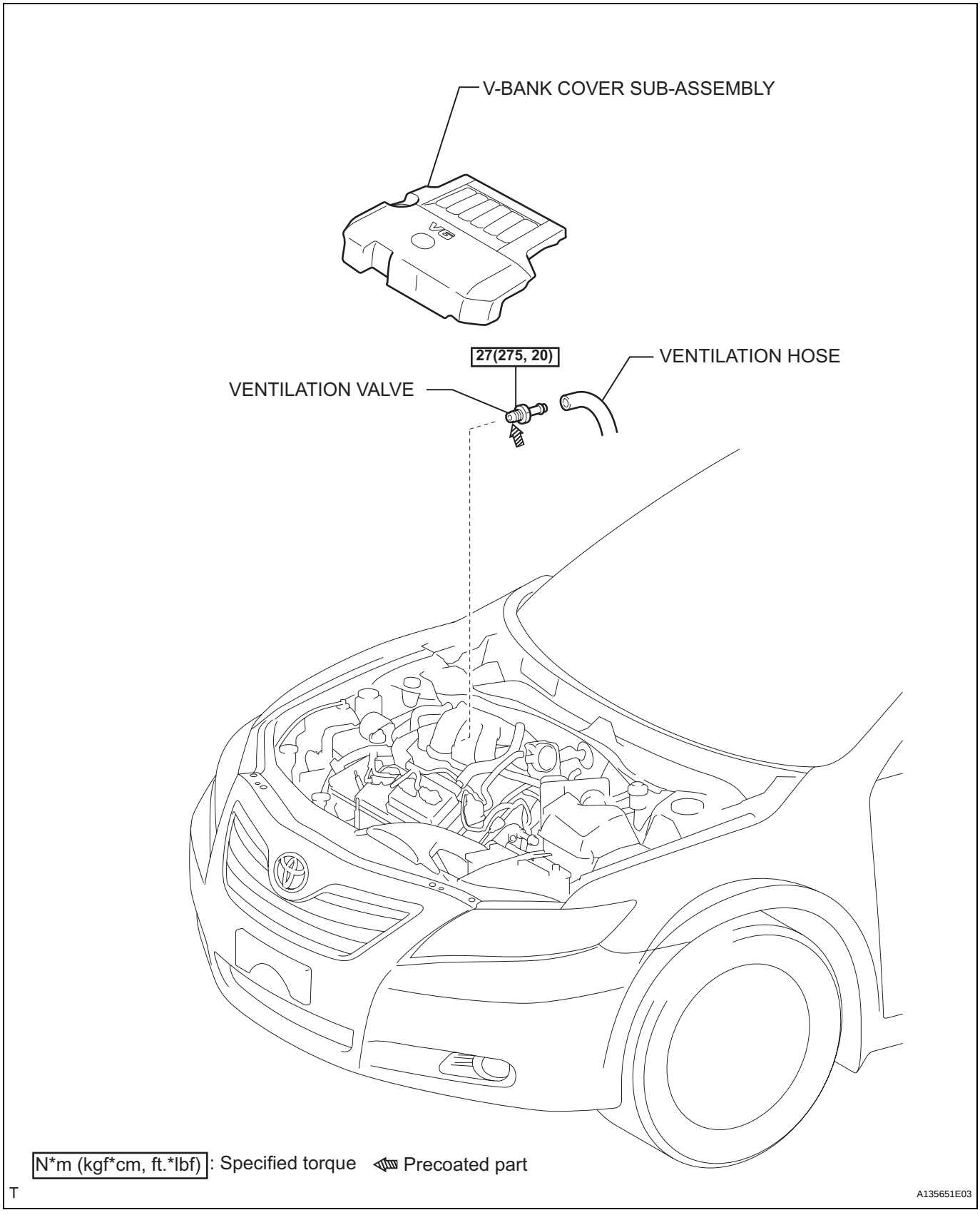
(b) Disconnect the 2 vacuum hoses and No. 1 vacuum switching valve connector.

2. INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)

EC

VENTILATION VALVE

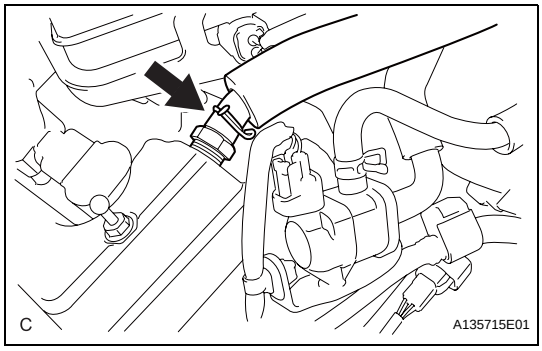
COMPONENTS



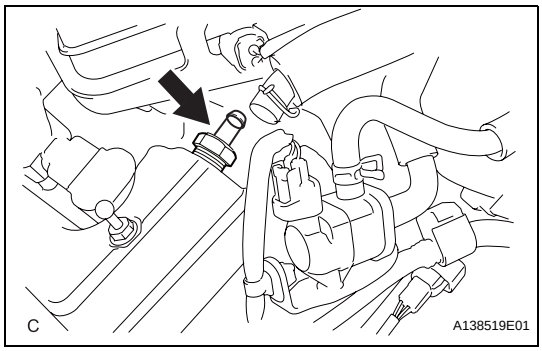
REMOVAL

1. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**

2. **DISCONNECT VENTILATION HOSE**
   (a) Disconnect the ventilation hose from the ventilation valve.



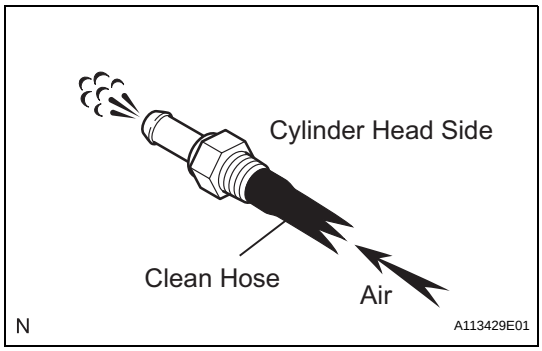
3. **REMOVE VENTILATION VALVE**
   (a) Remove the ventilation valve.

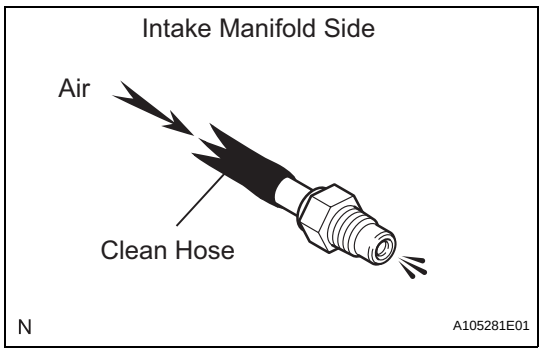


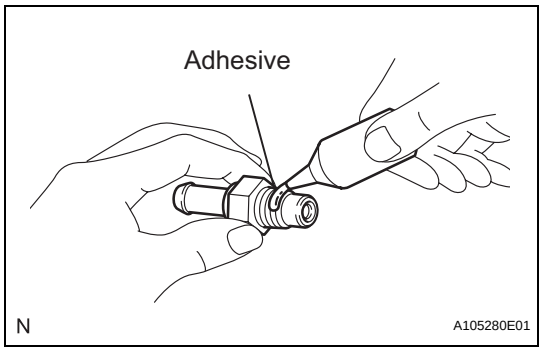
INSPECTION

1. **INSPECT VENTILATION VALVE**
   (a) Install a clean hose to the ventilation valve.
   (b) Check the ventilation valve operation.
      (1) Blow air into the cylinder head side, and check that air passes through easily.
      NOTICE:
      Do not suck air through the valve.
      Petroleum substances inside the valve are hazardous to your health.

      (2) Blow air into the intake manifold side, and check that air passes through with difficulty.
      If the result is not as specified, replace the ventilation valve.
   (c) Remove the clean hose from the ventilation valve.







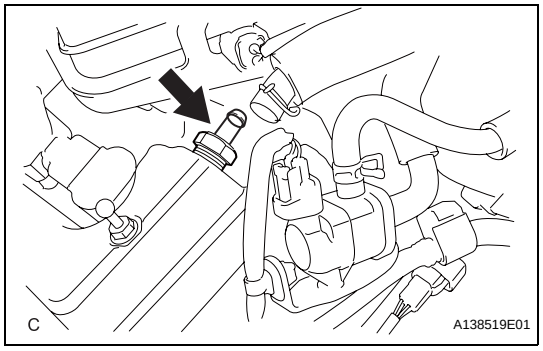
INSTALLATION

1. INSTALL VENTILATION VALVE

(a) Install the ventilation valve.

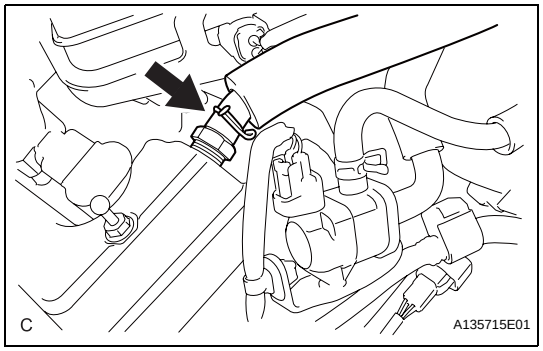
(1) Apply adhesive to 2 or 3 threads.

Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent.



(2) Install the ventilation valve.

Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



2. CONNECT VENTILATION HOSE

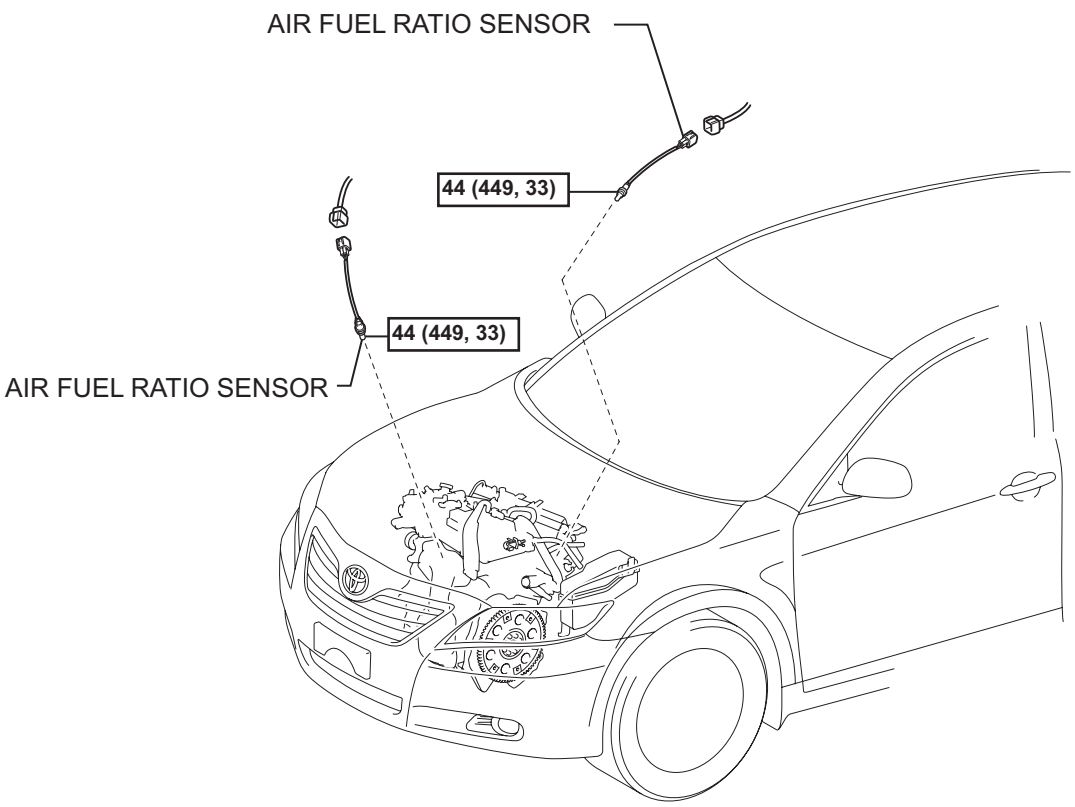
(a) Connect the ventilation hose to the ventilation valve.

3. INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)

EC

AIR FUEL RATIO SENSOR

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

T

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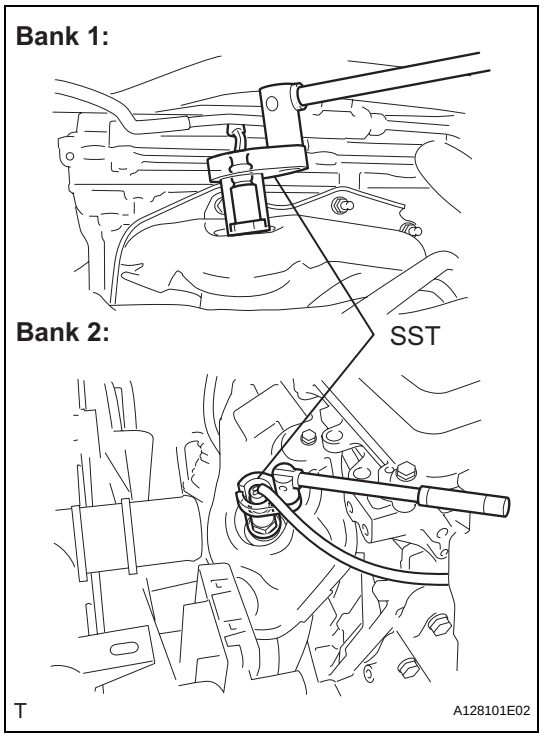
EC



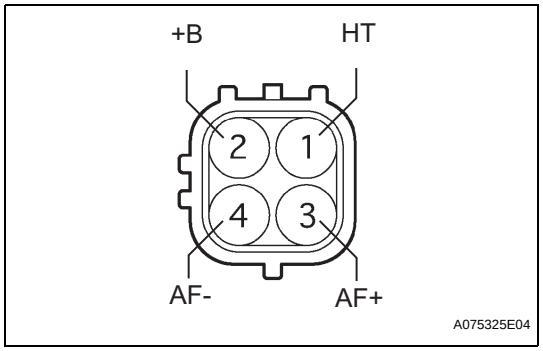
REMOVAL

1. REMOVE AIR FUEL RATIO SENSOR

(a) Disconnect the 2 air fuel ratio sensor connectors.

(b) Using SST, remove the 2 air fuel ratio sensors from the front pipe assembly.

SST 09224-00010



INSPECTION

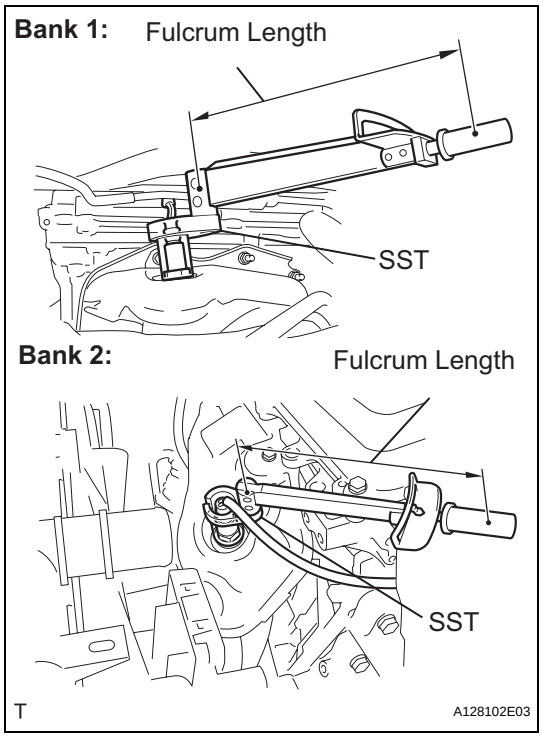
1. INSPECT AIR FUEL RATIO SENSOR

(a) Measure the resistance between terminals 1 (HT) and 2 (+B).

Standard resistance

Condition	Specified Condition
20 °C (68°F)	1.8 to 3.4 Ω

If the result is not as specified, replace the sensor.



INSTALLATION

1. INSTALL AIR FUEL RATIO SENSOR

(a) Using SST, install the 2 air fuel ratio sensors to the front pipe assembly.

SST 09224-00010

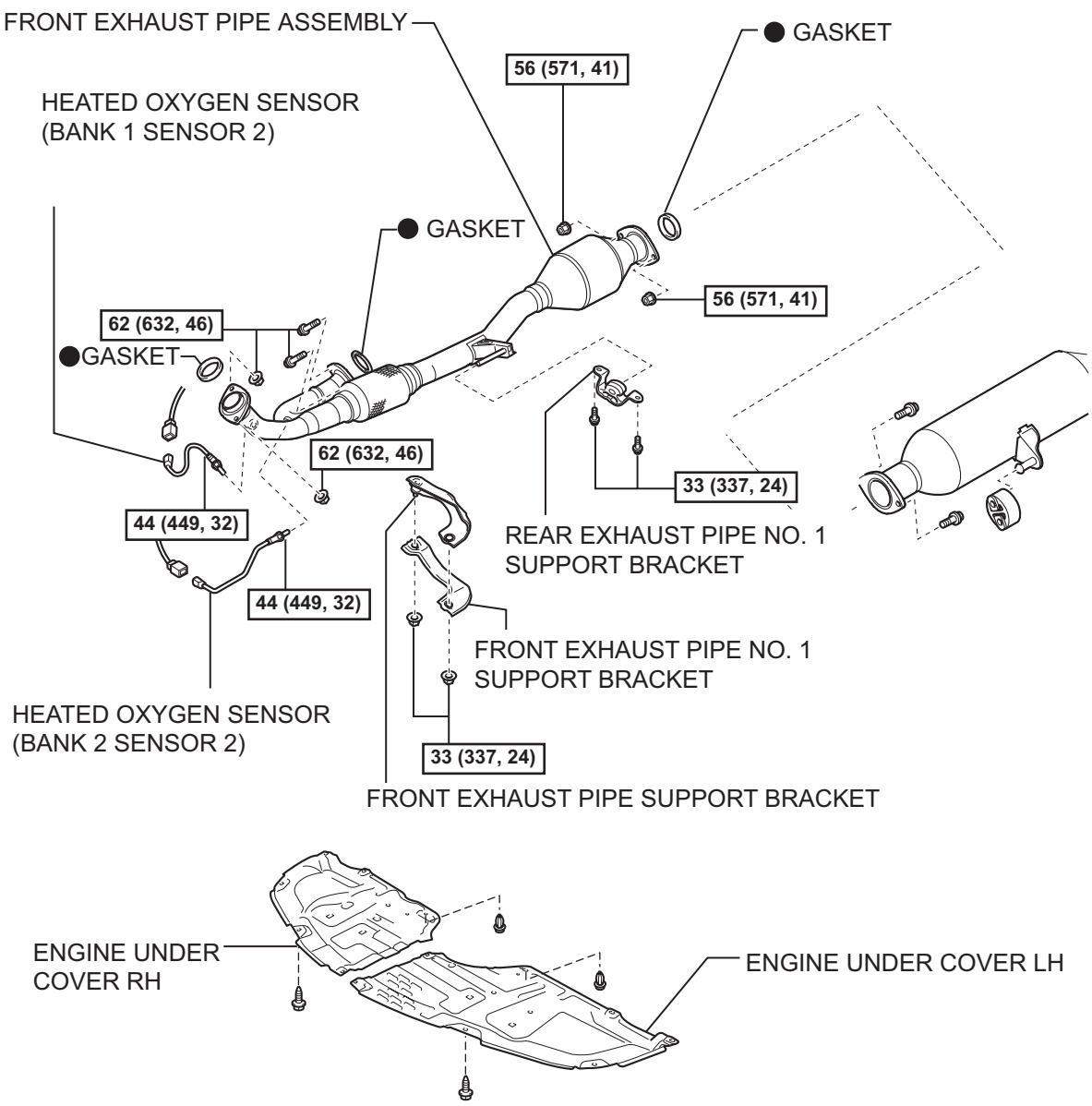
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)

(b) Connect the 2 air fuel ratio sensor connectors.

EC

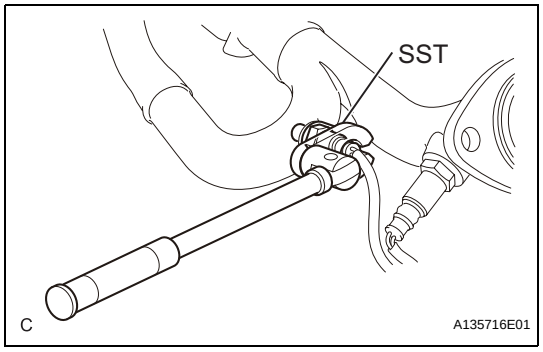
HEATED OXYGEN SENSOR

COMPONENTS

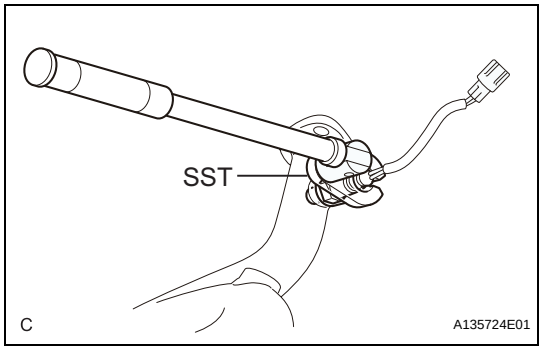


REMOVAL

1. **REMOVE ENGINE UNDER COVER LH**
2. **REMOVE ENGINE UNDER COVER RH**
3. **REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-2)**
4. **REMOVE HEATED OXYGEN SENSOR (for Bank 1)**
   (a) Using SST, remove the oxygen sensor.
   SST 09224-00010

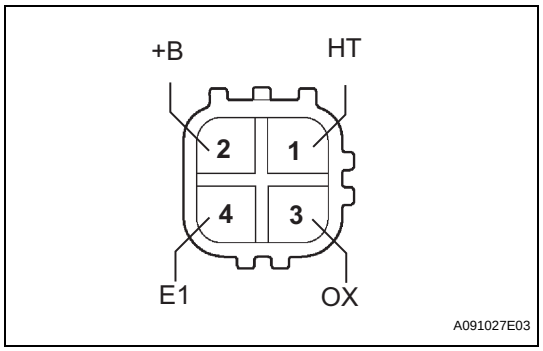


5. **REMOVE HEATED OXYGEN SENSOR (for Bank 2)**
   (a) Using SST, remove the oxygen sensor.
   SST 09224-00010



INSPECTION

1. **INSPECT HEATED OXYGEN SENSOR**
   (a) Measure the resistance between terminals 1 (HT) and 2 (+B).
   Standard resistance

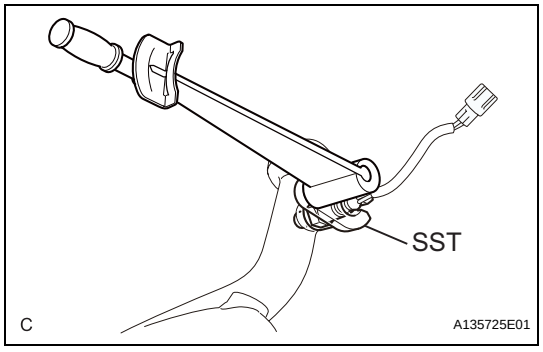


Condition	Specified Condition
20°C (68°F)	11 to 16 Ω

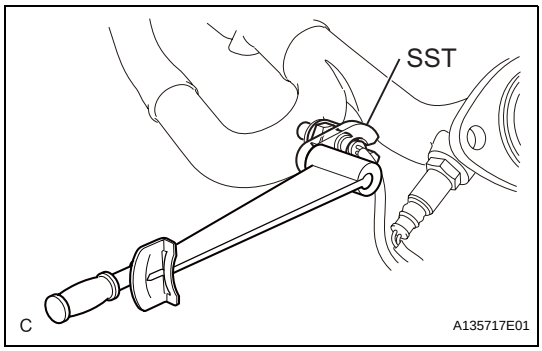
If the result is not as specified, replace the sensor.

INSTALLATION

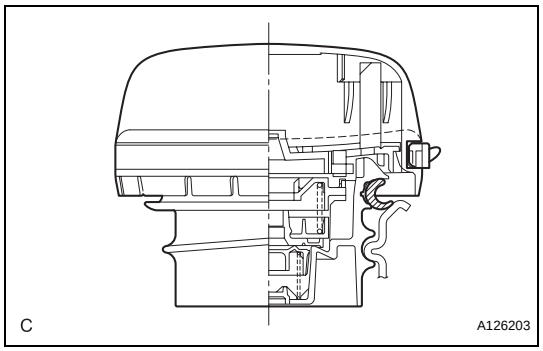
1. **INSTALL HEATED OXYGEN SENSOR (for Bank 2)**
   (a) Using SST, install the heated oxygen sensor.
   SST 09224-00010
   Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



EC



2. **INSTALL HEATED OXYGEN SENSOR (for Bank 1)**
   (a) Using SST, install the heated oxygen sensor.
   SST 09224-00010
3. **INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-4)**
4. **INSTALL ENGINE UNDER COVER LH**
5. **INSTALL ENGINE UNDER COVER RH**



FUEL TANK CAP

INSPECTION

1. REMOVE FUEL TANK CAP ASSEMBLY

(a) Visually check if the cap and gasket are deformed or damaged.
If necessary, replace the cap.

SFI SYSTEM

PRECAUTION

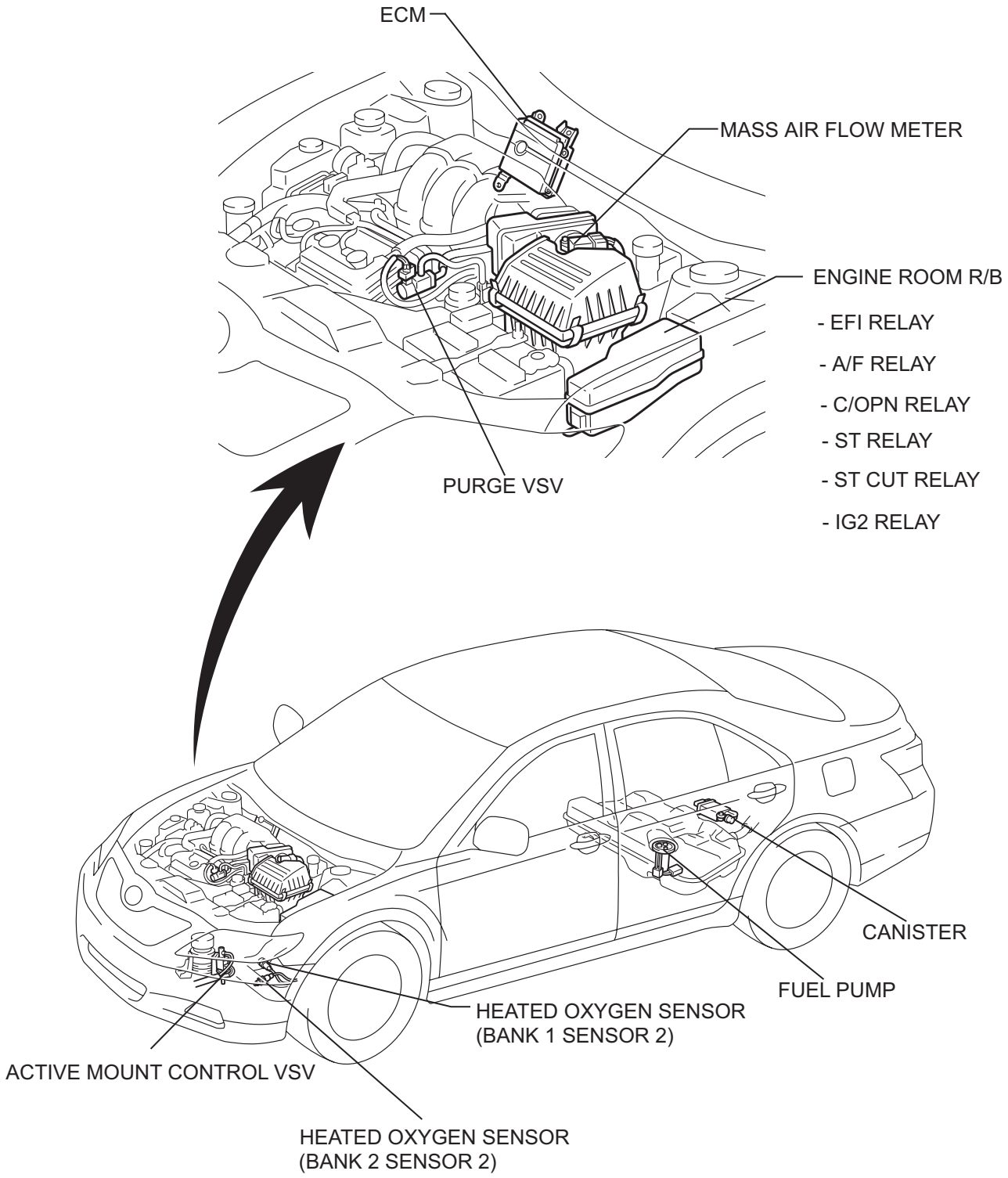
NOTICE:

- **Perform the RESET MEMORY (AT) initialization operation after replacing the automatic transmission assembly, engine assembly or ECM (See page AX-25).**
- **Perform REGISTRATION (VIN registration) when replacing the ECM (See page ES-20).**

DEFINITION OF TERMS

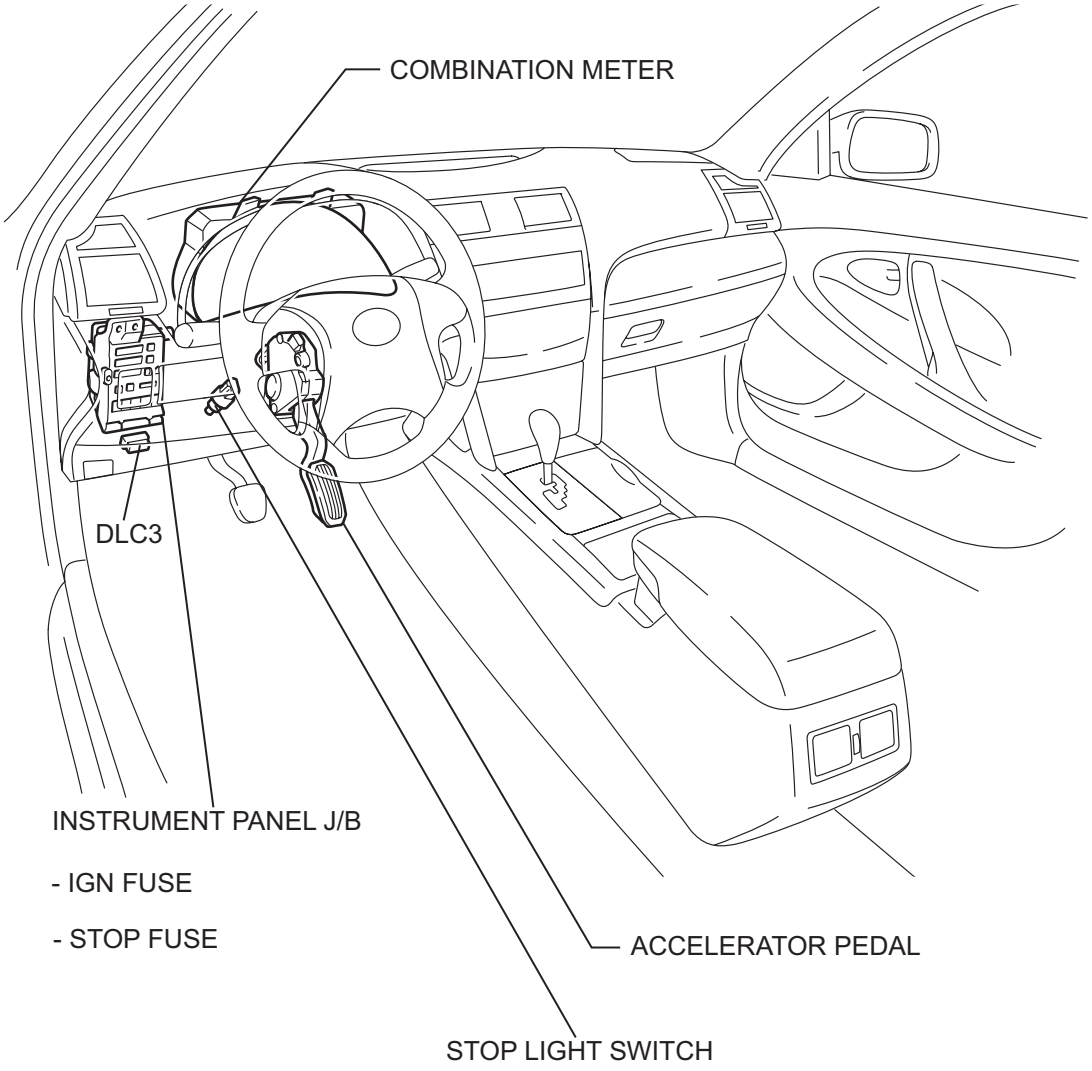
Terms	Definition
Monitor Description	Description of what ECM monitors and how to detect malfunctions (monitoring purpose and its details).
Related DTCs	A group of diagnostic trouble codes that are output by ECM based on the same malfunction detection logic.
Typical Enabling Condition	Preconditions that allow ECM to detect malfunctions. With all preconditions satisfied, ECM sets DTC when monitored value(s) exceeds malfunction threshold(s).
Sequence of Operation	Order of monitor priority, applied if multiple sensors and components are involved in single malfunction detection process. Each sensor and component monitored in turn and not monitored until previous detection operation is completed.
Required Sensor/Components	Sensors and components used by ECM to detect each malfunction.
Frequency of Operation	Number of times ECM checks for each malfunction during each driving cycle. "Once per driving cycle" means that ECM checks for malfunctions only once in single driving cycle. "Continuous" means that ECM checks for malfunctions whenever enabling conditions are met.
Duration	Minimum time for which ECM must detect continuous deviation in monitored value(s) in order to set DTC. Timing begins when Typical Enabling Conditions are met.
Malfunction Thresholds	Value, beyond which, ECM determines malfunctions exist and sets DTCs.
MIL Operation	Timing of MIL illumination after a malfunction is detected. "Immediate" means that ECM illuminates MIL as soon as a malfunction is detected. "2 driving cycle" means that ECM illuminates MIL if the same malfunction is detected twice during next sequential driving cycle.

PARTS LOCATION

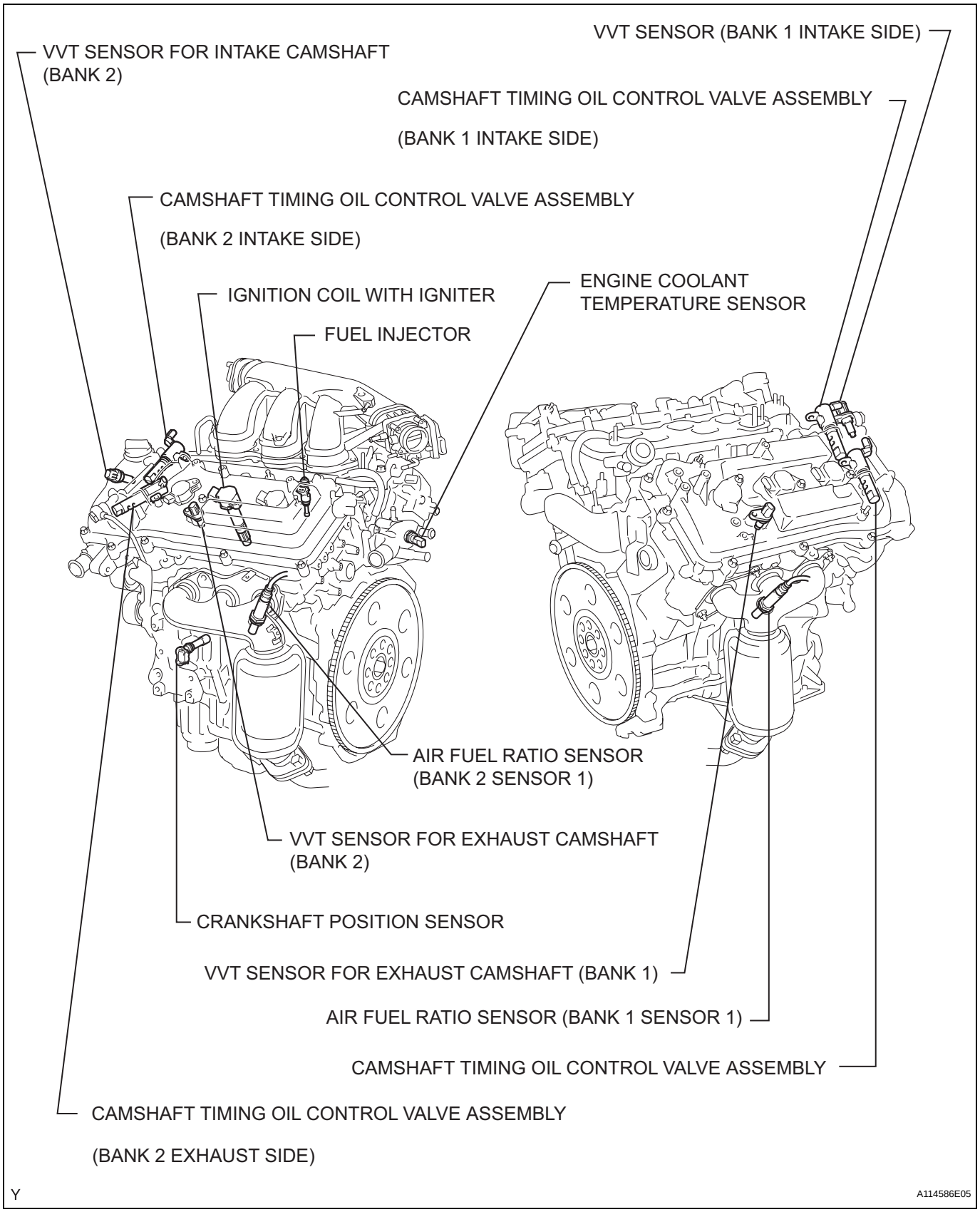


ES

ES

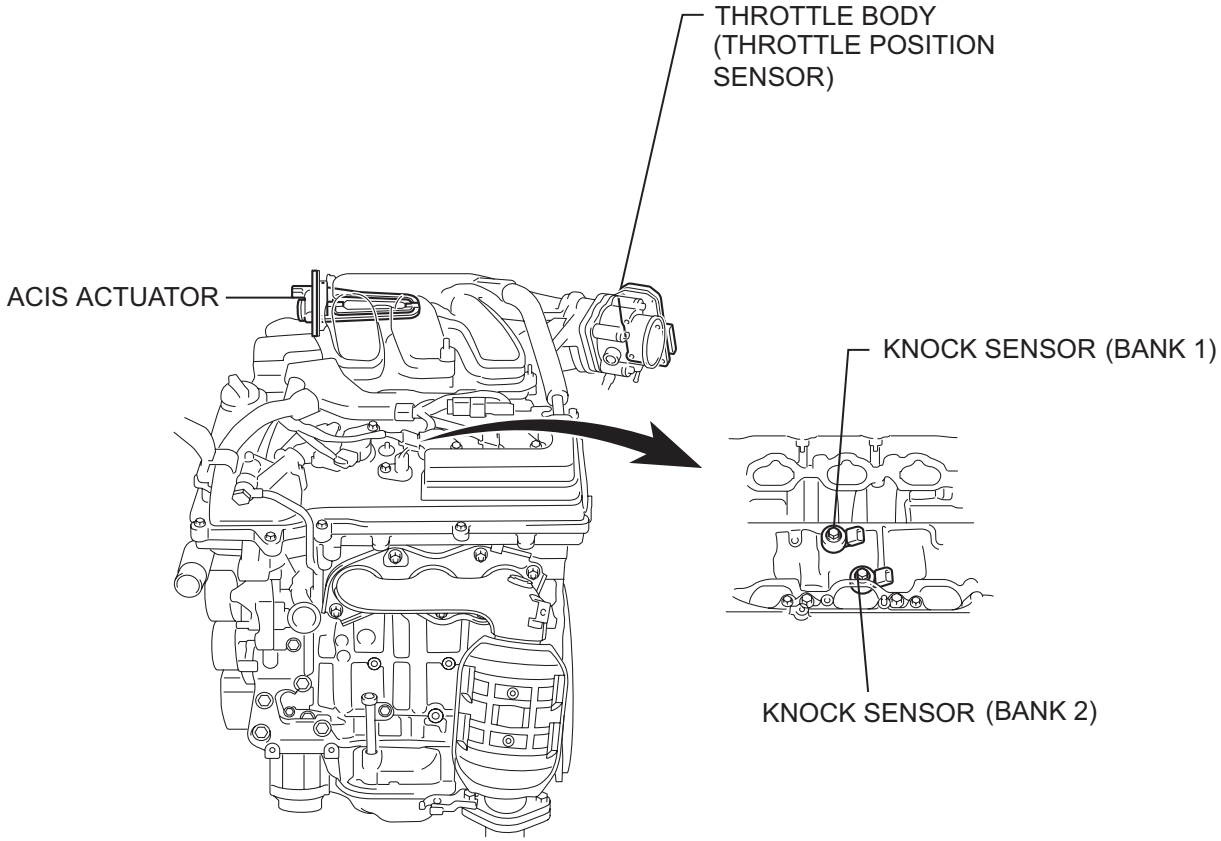


A139510E01


VVT SENSOR (BANK 1 INTAKE SIDE)
VVT SENSOR FOR INTAKE CAMSHAFT (BANK 2)
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (BANK 1 INTAKE SIDE)
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (BANK 2 INTAKE SIDE)
IGNITION COIL WITH IGNITER
ENGINE COOLANT TEMPERATURE SENSOR
FUEL INJECTOR
AIR FUEL RATIO SENSOR (BANK 2 SENSOR 1)
VVT SENSOR FOR EXHAUST CAMSHAFT (BANK 2)
CRANKSHAFT POSITION SENSOR
VVT SENSOR FOR EXHAUST CAMSHAFT (BANK 1)
AIR FUEL RATIO SENSOR (BANK 1 SENSOR 1)
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (BANK 2 EXHAUST SIDE)
Y
A114586E05

ES

ES

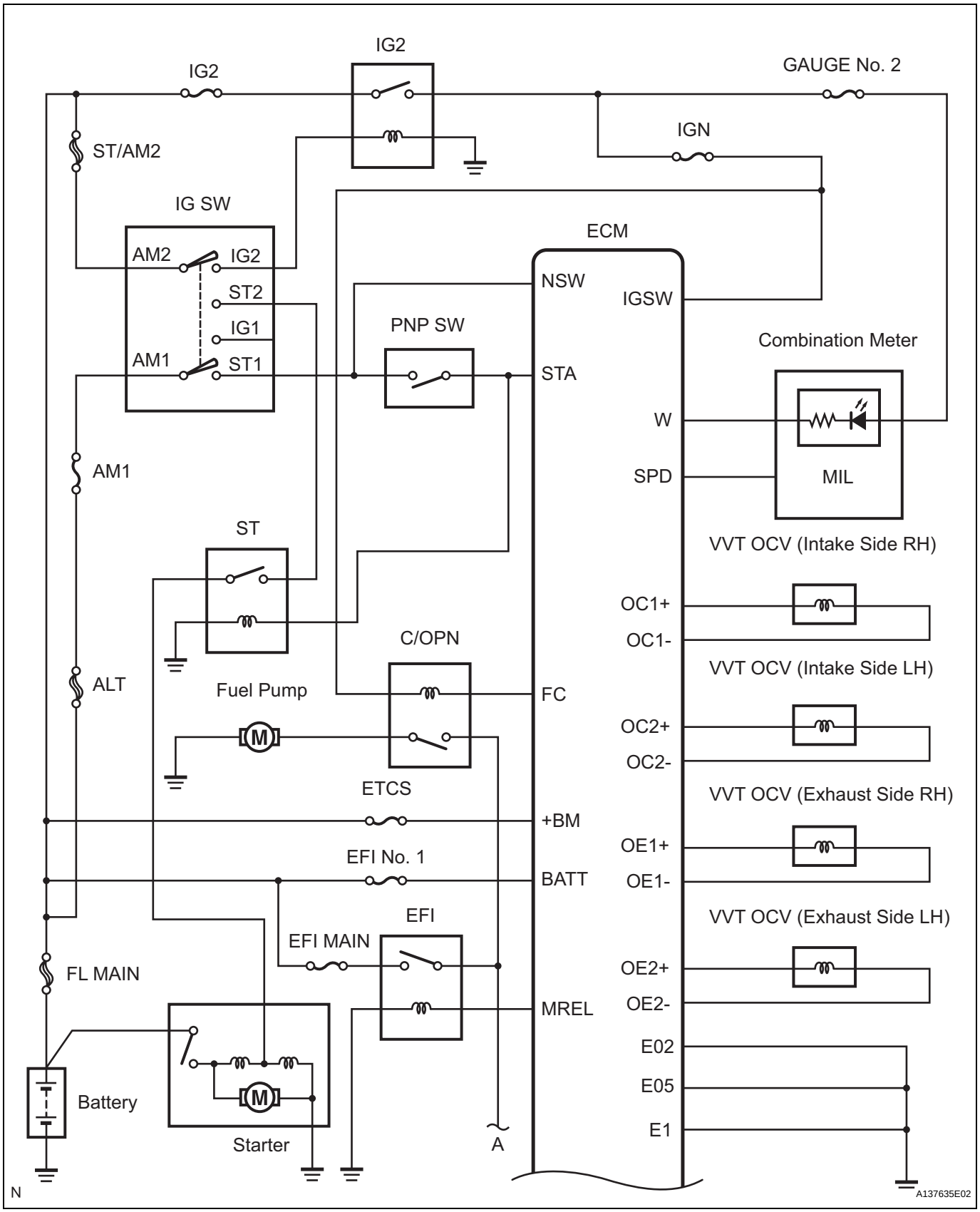


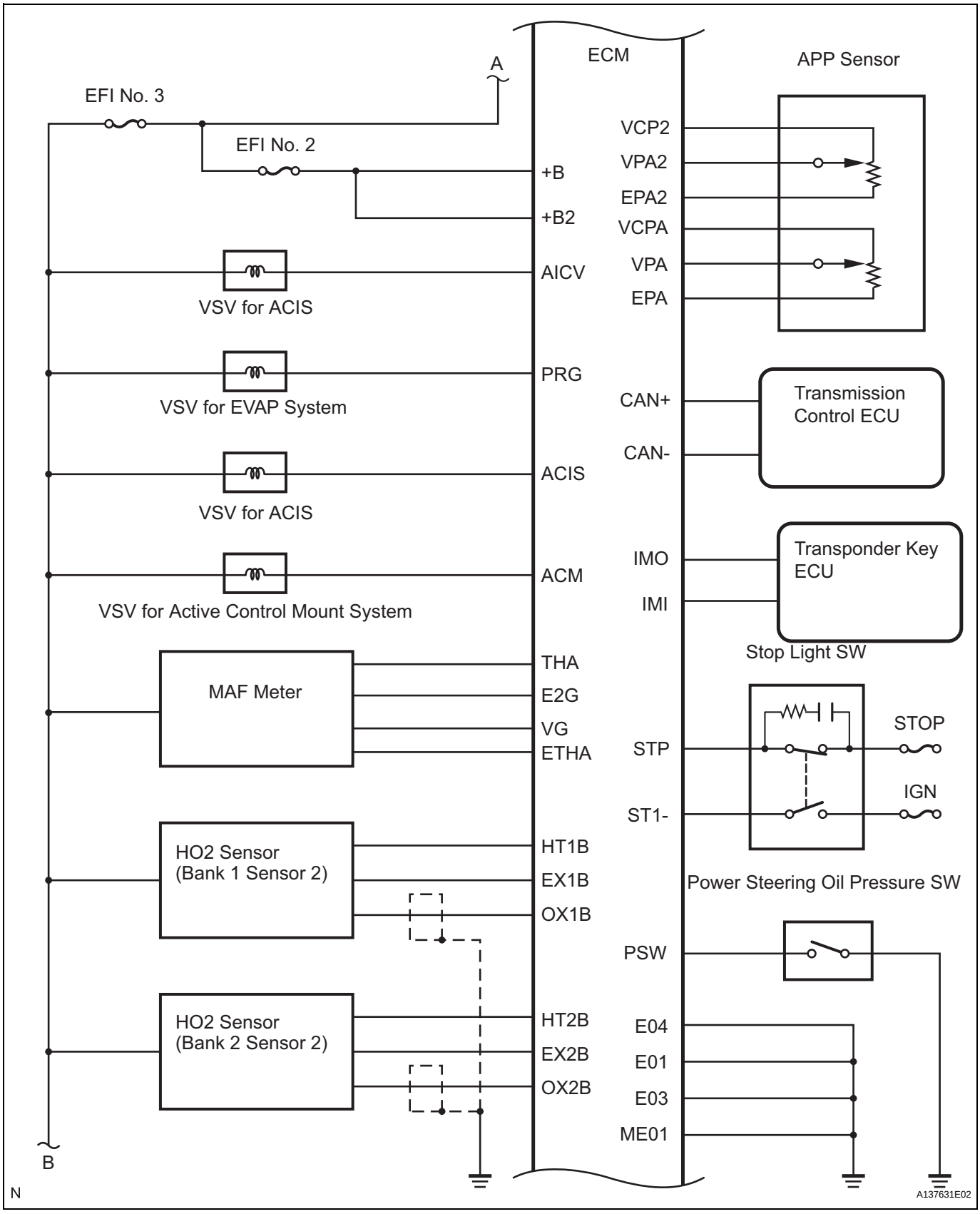
Y

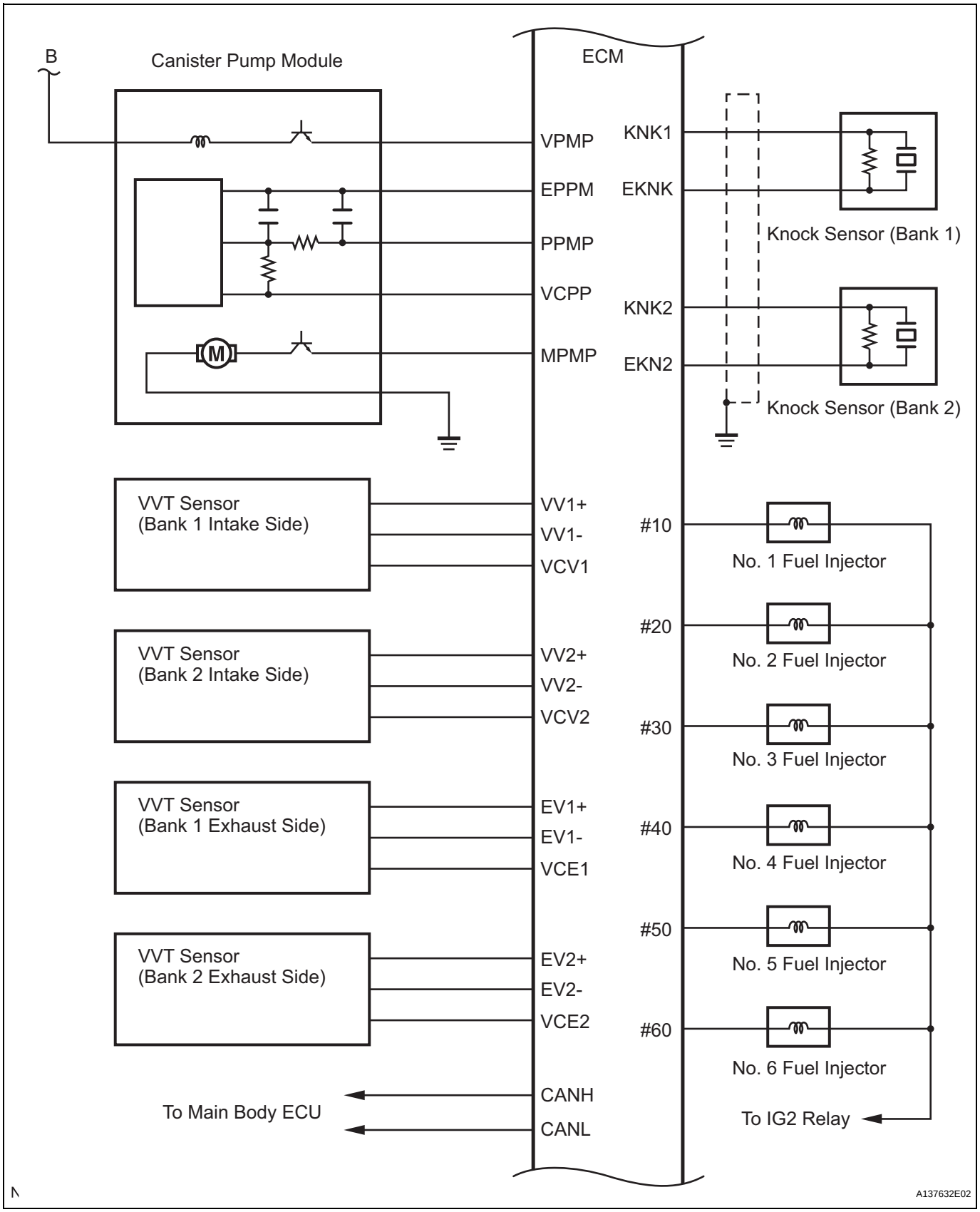
A114543E04

SYSTEM DIAGRAM

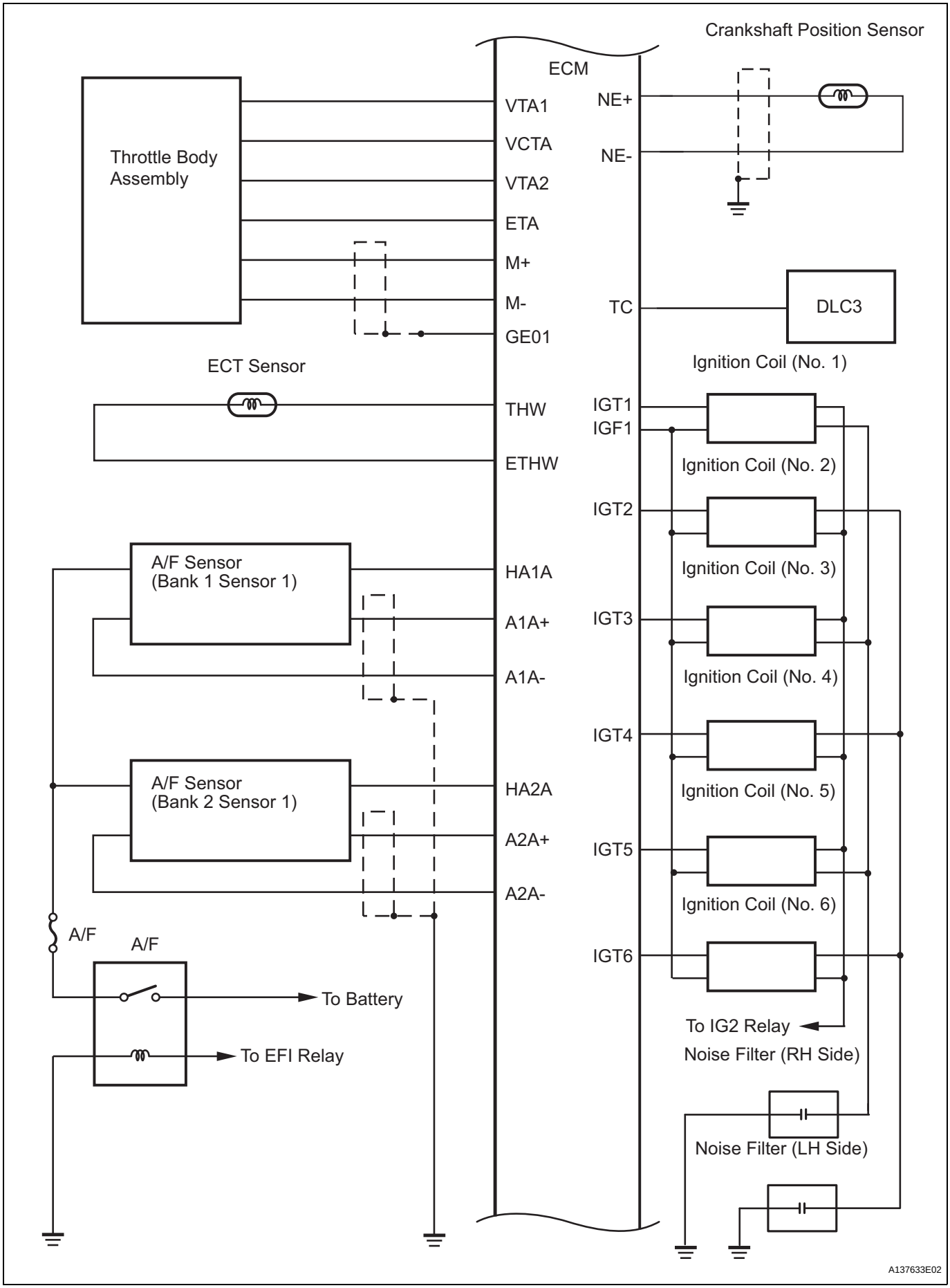
1. Without Smart Key System:

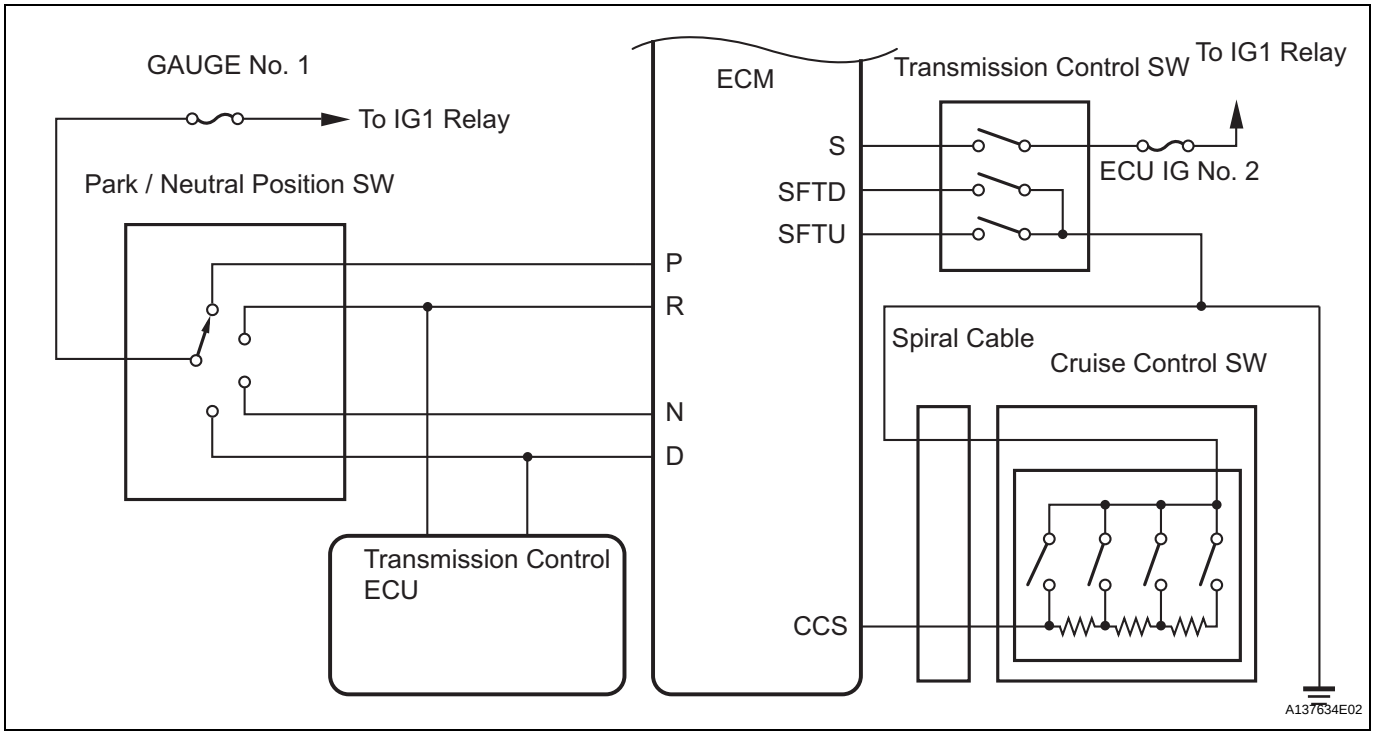



ECM
APP Sensor
A
EFI No. 3
EFI No. 2
+B
+B2
AICV
VSV for ACIS
PRG
VSV for EVAP System
ACIS
VSV for ACIS
ACM
VSV for Active Control Mount System
MAF Meter
THA
E2G
VG
ETHA
HO2 Sensor
(Bank 1 Sensor 2)
HT1B
EX1B
OX1B
HO2 Sensor
(Bank 2 Sensor 2)
HT2B
EX2B
OX2B
B
VCP2
VPA2
EPA2
VCPA
VPA
EPA
CAN+
CAN-
Transmission
Control ECU
IMO
IMI
Transponder Key
ECU
Stop Light SW
STP
ST1-
STOP
IGN
Power Steering Oil Pressure SW
PSW
E04
E01
E03
ME01
N
A137631E02


B
Canister Pump Module
ECM
VPMP
EPPM
PPMP
VCPP
MPMP
M
KNK1
EKNK
Knock Sensor (Bank 1)
KNK2
EKN2
Knock Sensor (Bank 2)
VVT Sensor
(Bank 1 Intake Side)
VV1+
VV1-
VCV1
VVT Sensor
(Bank 2 Intake Side)
VV2+
VV2-
VCV2
VVT Sensor
(Bank 1 Exhaust Side)
EV1+
EV1-
VCE1
VVT Sensor
(Bank 2 Exhaust Side)
EV2+
EV2-
VCE2
To Main Body ECU
CANH
CANL
#10
No. 1 Fuel Injector
#20
No. 2 Fuel Injector
#30
No. 3 Fuel Injector
#40
No. 4 Fuel Injector
#50
No. 5 Fuel Injector
#60
No. 6 Fuel Injector
To IG2 Relay
A137632E02

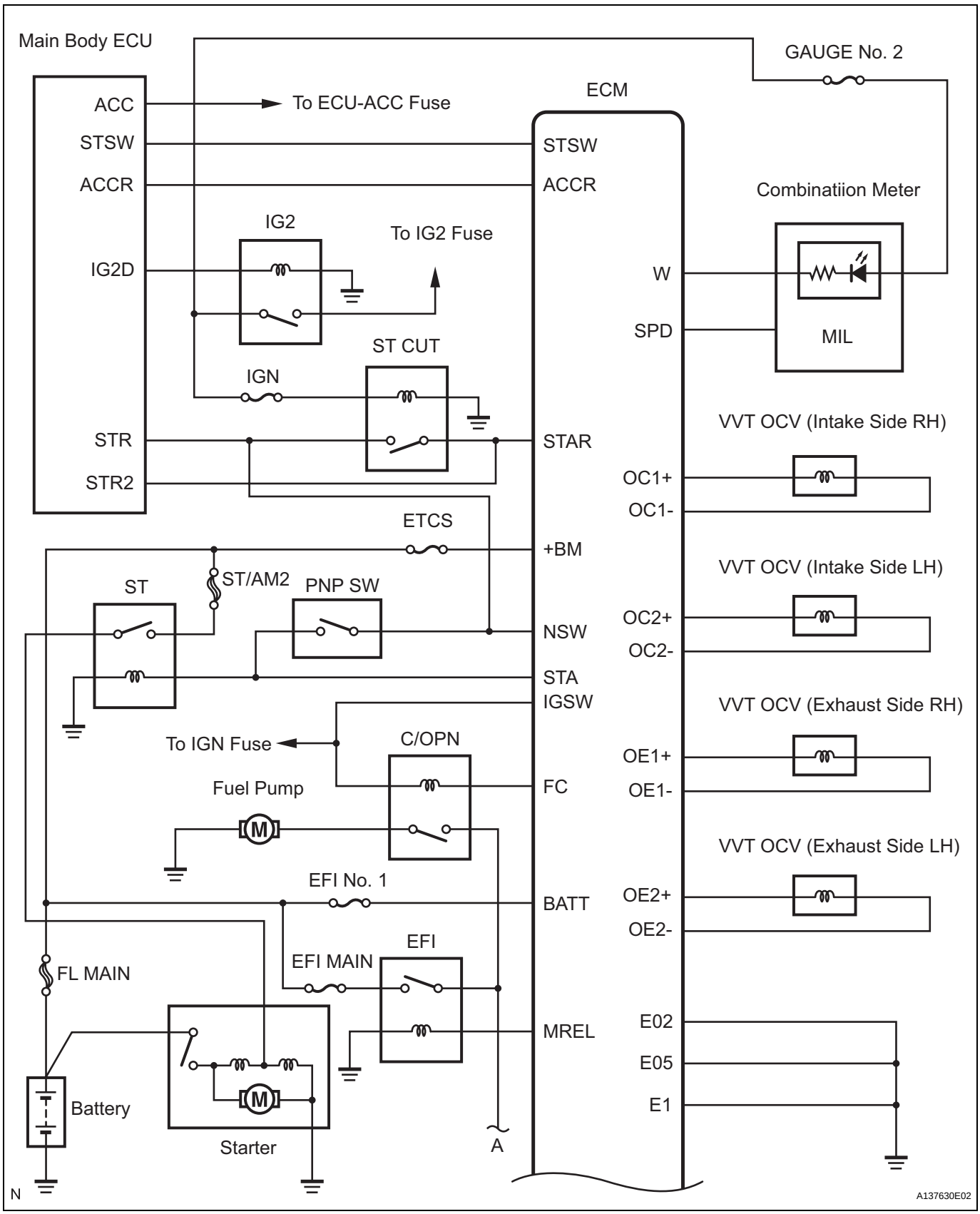
ES

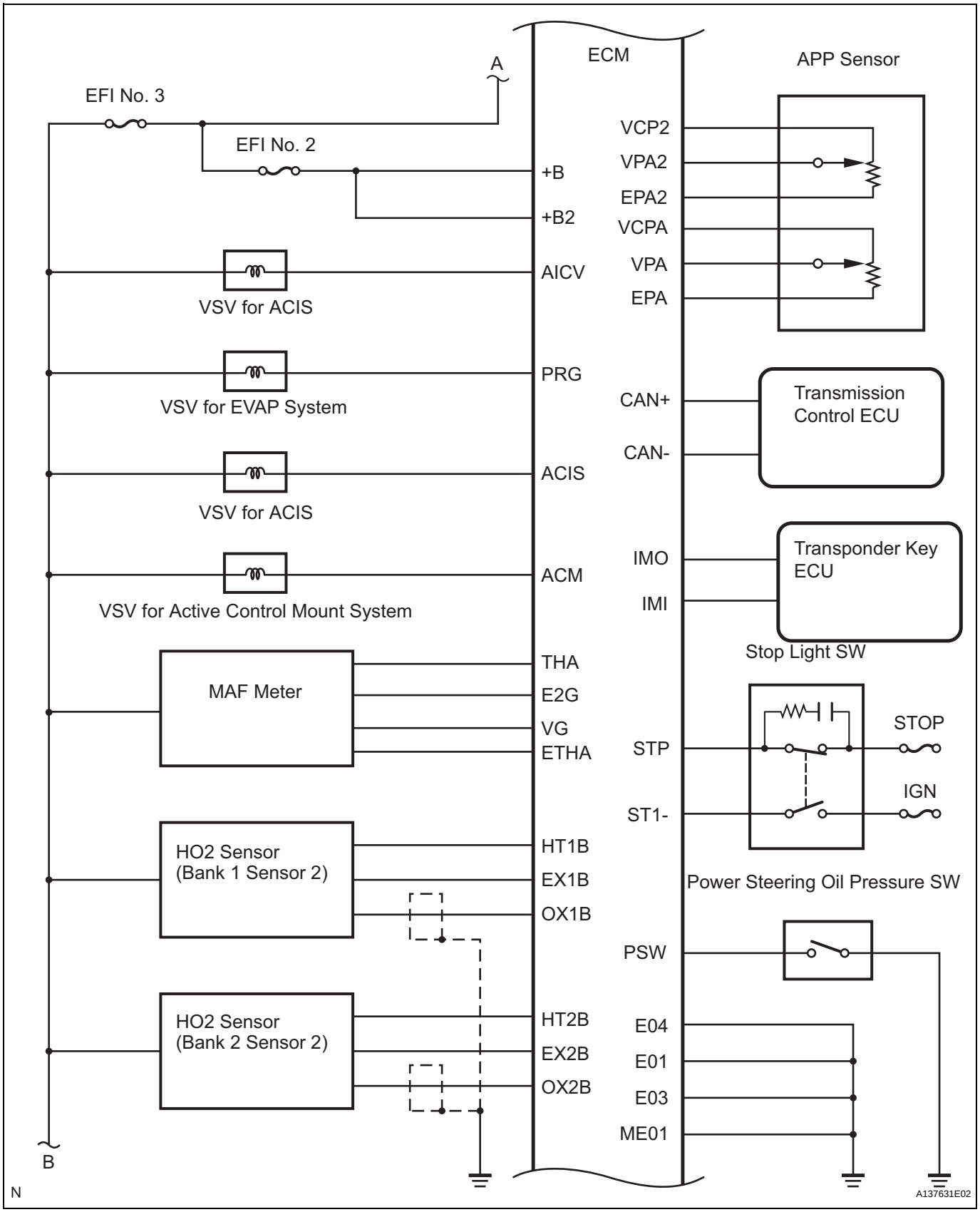

Crankshaft Position Sensor
ECM
Throttle Body Assembly
VTA1
VCTA
VTA2
ETA
M+
M-
GE01
NE+
NE-
TC
DLC3
Ignition Coil (No. 1)
ECT Sensor
THW
ETHW
IGT1
IGF1
Ignition Coil (No. 2)
IGT2
Ignition Coil (No. 3)
A/F Sensor (Bank 1 Sensor 1)
HA1A
A1A+
A1A-
IGT3
Ignition Coil (No. 4)
IGT4
Ignition Coil (No. 5)
A/F Sensor (Bank 2 Sensor 1)
HA2A
A2A+
A2A-
IGT5
Ignition Coil (No. 6)
IGT6
A/F
A/F
To Battery
To EFI Relay
To IG2 Relay
Noise Filter (RH Side)
Noise Filter (LH Side)
A137633E02

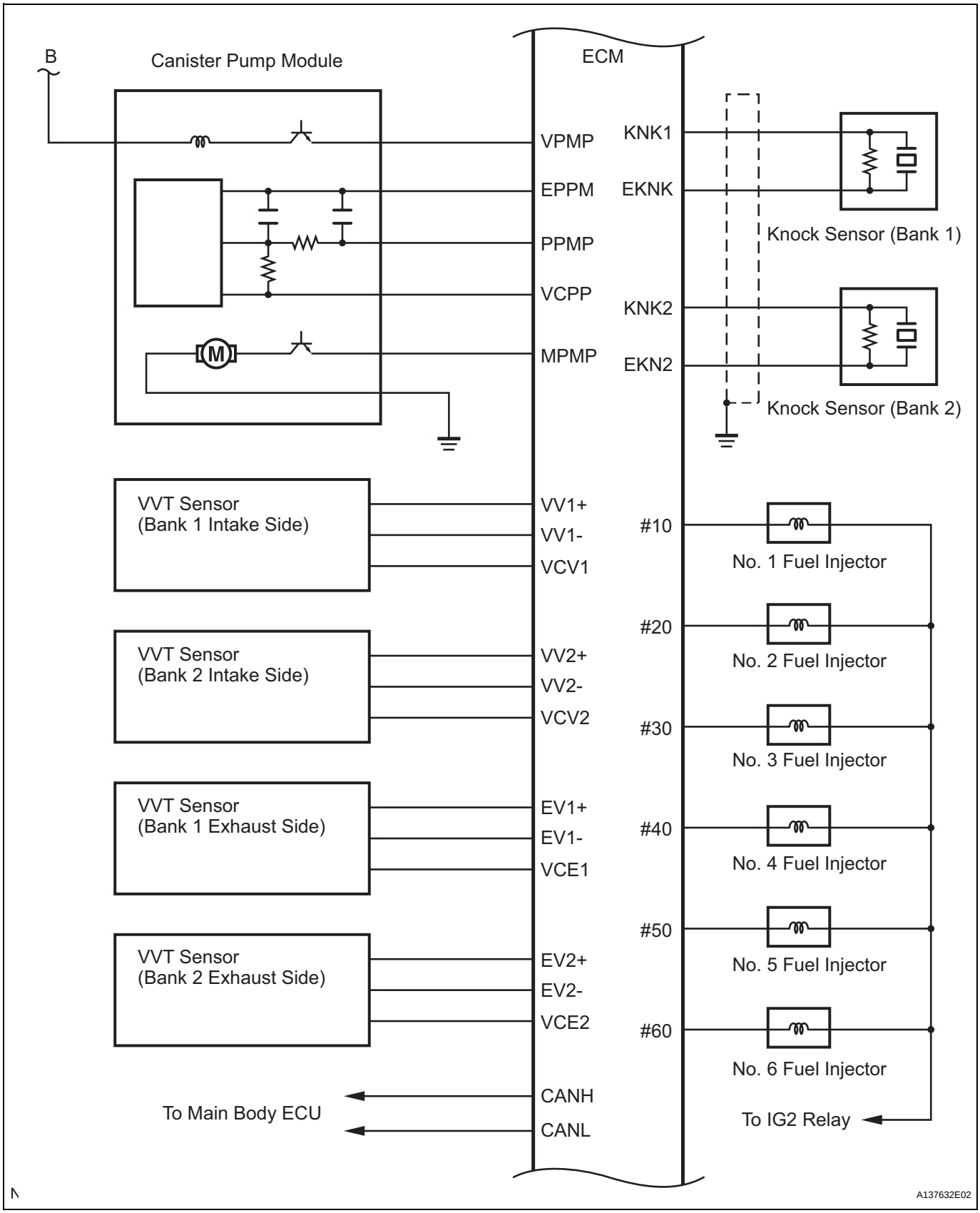

GAUGE No. 1
To IG1 Relay
Park / Neutral Position SW
Transmission Control ECU
ECM
P
R
N
D
S
SFTD
SFTU
CCS
Transmission Control SW
To IG1 Relay
ECU IG No. 2
Spiral Cable
Cruise Control SW
A137634E02

ES

2. With Smart Key System:




ECM
A
EFI No. 3
EFI No. 2
+B
+B2
AICV
VSV for ACIS
PRG
VSV for EVAP System
ACIS
VSV for ACIS
ACM
VSV for Active Control Mount System
THA
E2G
VG
ETHA
MAF Meter
HT1B
EX1B
OX1B
HO2 Sensor
(Bank 1 Sensor 2)
HT2B
EX2B
OX2B
HO2 Sensor
(Bank 2 Sensor 2)
B
N
APP Sensor
VCP2
VPA2
EPA2
VCPA
VPA
EPA
CAN+
CAN-
Transmission
Control ECU
IMO
IMI
Transponder Key
ECU
Stop Light SW
STP
ST1-
STOP
IGN
Power Steering Oil Pressure SW
PSW
E04
E01
E03
ME01
A137631E02


B
Canister Pump Module
ECM
VPMP
EPPM
PPMP
VCPP
MPMP
M
KNK1
EKNK
KNK2
EKN2
Knock Sensor (Bank 1)
Knock Sensor (Bank 2)
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(Bank 1 Intake Side)
VV1+
VV1-
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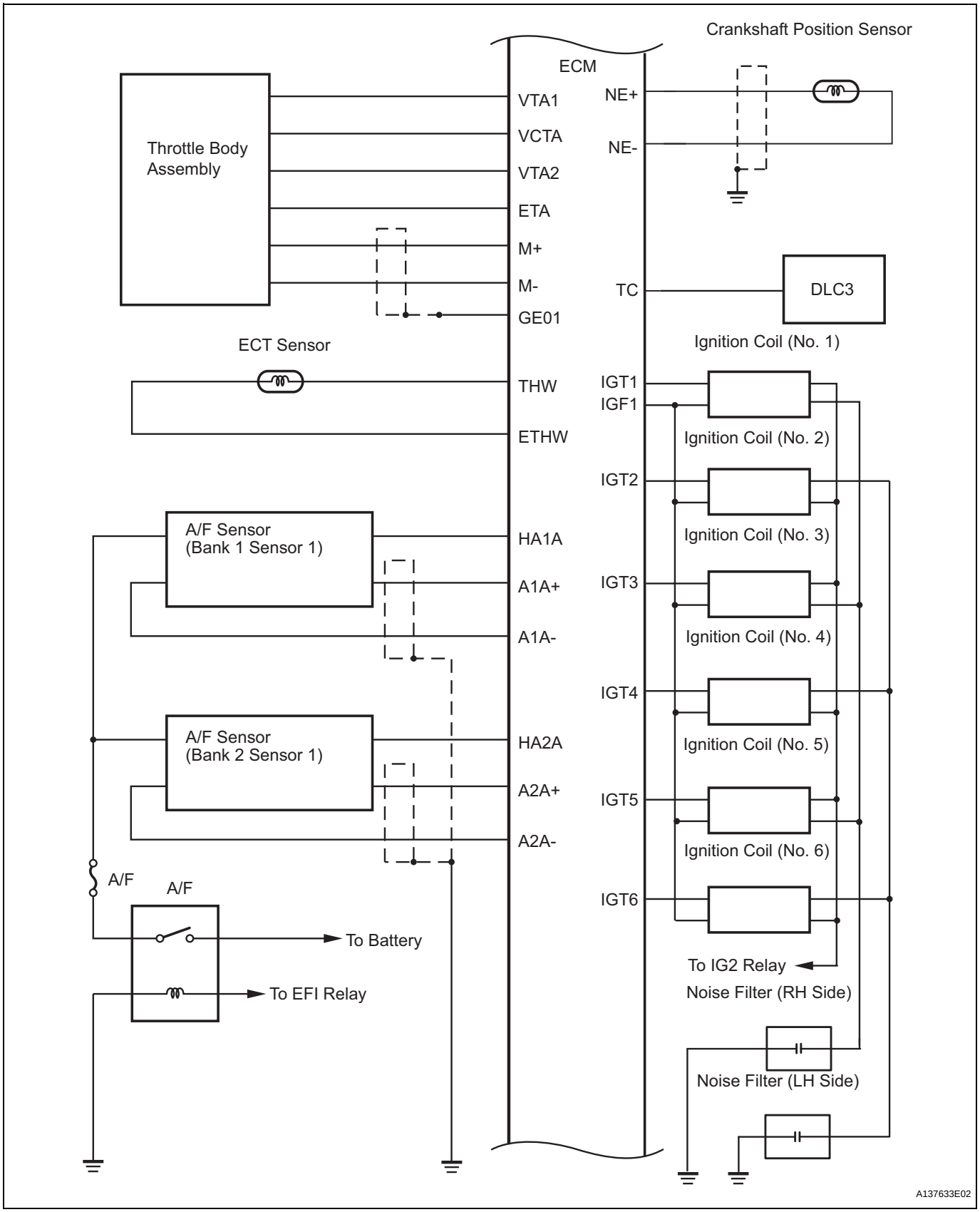
VVT Sensor
(Bank 2 Intake Side)
VV2+
VV2-
VCV2
VVT Sensor
(Bank 1 Exhaust Side)
EV1+
EV1-
VCE1
VVT Sensor
(Bank 2 Exhaust Side)
EV2+
EV2-
VCE2
To Main Body ECU
CANH
CANL
#10
#20
#30
#40
#50
#60
No. 1 Fuel Injector
No. 2 Fuel Injector
No. 3 Fuel Injector
No. 4 Fuel Injector
No. 5 Fuel Injector
No. 6 Fuel Injector
To IG2 Relay
A137632E02


Crankshaft Position Sensor
ECM
Throttle Body Assembly
VTA1
VCTA
VTA2
ETA
M+
M-
GE01
NE+
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TC
DLC3
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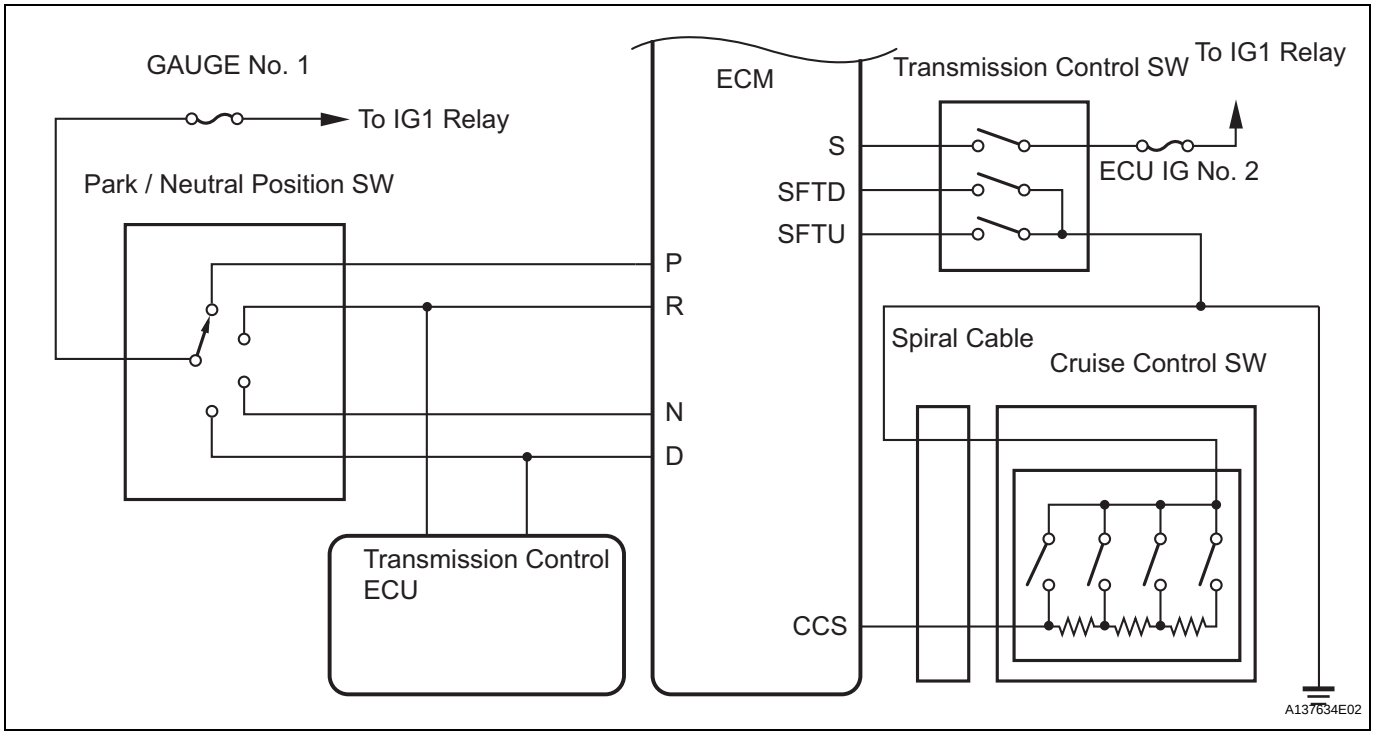
Ignition Coil (No. 1)
IGT1
IGF1
Ignition Coil (No. 2)
IGT2
Ignition Coil (No. 3)
IGT3
Ignition Coil (No. 4)
IGT4
Ignition Coil (No. 5)
IGT5
Ignition Coil (No. 6)
IGT6
A/F Sensor (Bank 1 Sensor 1)
HA1A
A1A+
A1A-
A/F Sensor (Bank 2 Sensor 1)
HA2A
A2A+
A2A-
A/F
A/F
To Battery
To EFI Relay
To IG2 Relay
Noise Filter (RH Side)
Noise Filter (LH Side)
A137633E02


GAUGE No. 1
To IG1 Relay
Park / Neutral Position SW
ECM
Transmission Control SW
To IG1 Relay
S
SFTD
SFTU
ECU IG No. 2
P
R
N
D
Spiral Cable
Cruise Control SW
Transmission Control ECU
CCS
A137634E02

ES

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
*: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CONNECT INTELLIGENT TESTER TO DLC3*

HINT:
If the display indicates a communication fault in the tester, inspect the DLC3.

NEXT

4	CHECK DTC AND FREEZE FRAME DATA*

HINT:
Record or print DTCs and freeze frame data, if necessary.

NEXT

5	CLEAR DTC AND FREEZE FRAME DATA*

NEXT

6	CONDUCT VISUAL INSPECTION

NEXT

7	SET CHECK MODE DIAGNOSIS*

NEXT

8	CONFIRM PROBLEM SYMPTOMS

HINT:
If the engine does not start, perform steps 10 and 12 first.

Result

Result	Proceed to
Malfunction does not occur	A
Malfunction occurs	B

B → GO TO STEP 10

A

9	SIMULATE SYMPTOMS

NEXT

ES

10	CHECK FOR DTCS*

Result

Result	Proceed to
Trouble code	A
No code	B

B → GO TO STEP 12

A

11	REFER TO DTC CHART

NEXT

GO TO STEP 14

12	CONDUCT BASIC INSPECTION

Result

Result	Proceed to
Malfunctioning parts not confirmed	A
Malfunctioning parts confirmed	B

B → GO TO STEP 17

A

13	REFER TO PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Malfunctioning circuit confirmed	A

Result	Proceed to
Malfunctioning parts confirmed	B

B → GO TO STEP 17

A

14	CHECK ECM POWER SOURCE CIRCUIT

NEXT

15	CONDUCT CIRCUIT INSPECTION

ES

Result

Result	Proceed to
Malfunction not confirmed	A
Malfunction confirmed	B

B → GO TO STEP 18

A

16	CHECK FOR INTERMITTENT PROBLEMS

NEXT

GO TO STEP 18

17	CONDUCT PARTS INSPECTION

NEXT

18	IDENTIFY PROBLEM

NEXT

19	ADJUST AND/OR REPAIR

NEXT

20	CONDUCT CONFIRMATION TEST

NEXT

END

CHECK FOR INTERMITTENT PROBLEMS

HINT:
Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect with an intelligent tester when the ECM is in check mode. In check mode, the ECM uses 1 trip detection logic, which is more sensitive to malfunctions than normal mode (default), which uses 2 trip detection logic.

1. Clear the DTCs.
2. Switch the ECM from normal mode to check mode using an intelligent tester (See page ES-49).
3. Perform a simulation test (See page IN-40).
4. Check and wiggle the harness(es), connector(s) and terminal(s) (See page IN-45).

BASIC INSPECTION

When the malfunction is not confirmed by the DTC check, troubleshooting should be carried out in all circuits considered to be possible causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location of the problem can be found quickly and efficiently. Therefore, using this check is essential when troubleshooting the engine.

1 CHECK BATTERY VOLTAGE

NOTICE:
Carry out this check with the engine stopped and the engine switch off.
Result

Result	Proceed to
11 V or more	OK
Below 11 V	NG

NG → **CHARGE OR REPLACE BATTERY**

OK ↓

2 CHECK WHETHER ENGINE CRANKS

NG → **PROCEED TO PROBLEM SYMPTOMS TABLE**

OK ↓

3 CHECK WHETHER ENGINE STARTS

NG → **GO TO STEP 6**

OK ↓

4 CHECK AIR FILTER

(a) Visually check that the air filter is not excessively contaminated with dirt or oil.

NG → **REPLACE AIR FILTER**

OK ↓

5 CHECK IDLING SPEED

NG → **TROUBLESHOOT IDLING SPEED AND PROCEED TO NEXT STEP**

OK

6	CHECK FUEL PRESSURE

NG → TROUBLESHOOT FUEL PRESSURE AND PROCEED TO NEXT STEP

OK

7	CHECK FOR SPARKS

NG → TROUBLESHOOT SPARK AND PROCEED TO NEXT STEP

OK

PROCEED TO PROBLEM SYMPTOMS TABLE

REGISTRATION

NOTICE:
The Vehicle Identification Number (VIN) must be input into the replacement ECM.
HINT:
The VIN is in the form of a 17-digit alphanumeric vehicle identification number. An intelligent tester is required to register the VIN.

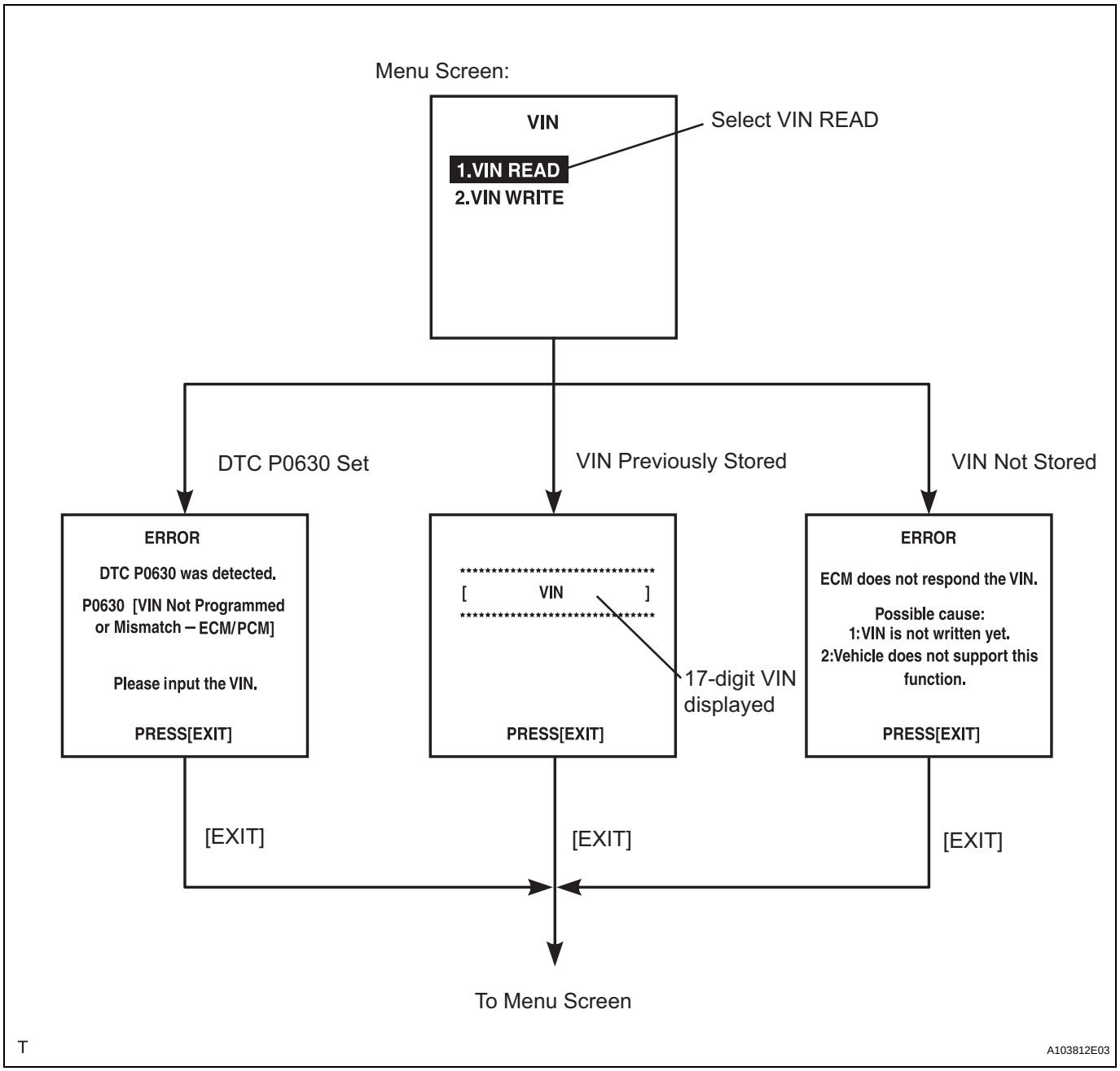
1. INPUT INSTRUCTIONS

(a) The general VIN input instructions using an intelligent tester are explained below:
(b) The arrow buttons (UP, DOWN, RIGHT and LEFT) and numerical buttons (0 to 9) are used, in order to input the VIN.
(c) Cursor Operation
To move the cursor around the tester screen, press the RIGHT and LEFT buttons.
(d) Alphabetical Character Input
(1) Press the UP and DOWN buttons to select the desired alphabetical character.
(e) Numeric Character Input
(1) Press the numerical button corresponding to the number that you want to input.
HINT:
Numerical characters can be selected by using the UP and DOWN buttons.
(f) Correction
(1) When correcting the input character(s), put the cursor onto the character using the RIGHT or LEFT button.
(2) Select or input the correct character using the UP and DOWN buttons, or the numerical buttons.
(g) Finishing Input Operation
(1) Make sure that the input VIN matches the vehicle VIN after input.
(2) Press the ENTER button on the tester.

2. READ VIN (Vehicle Identification Number)

(a) The flowchart of the VIN reading process is shown. This process allows the VIN stored in the ECM to be read, in order to confirm that the two VINs, provided with the vehicle and stored in the vehicle's ECM, are the same.
(b) Read VIN using an intelligent tester.
(c) Check the vehicle's VIN.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the ignition switch on (IG).
(f) Turn the tester on.

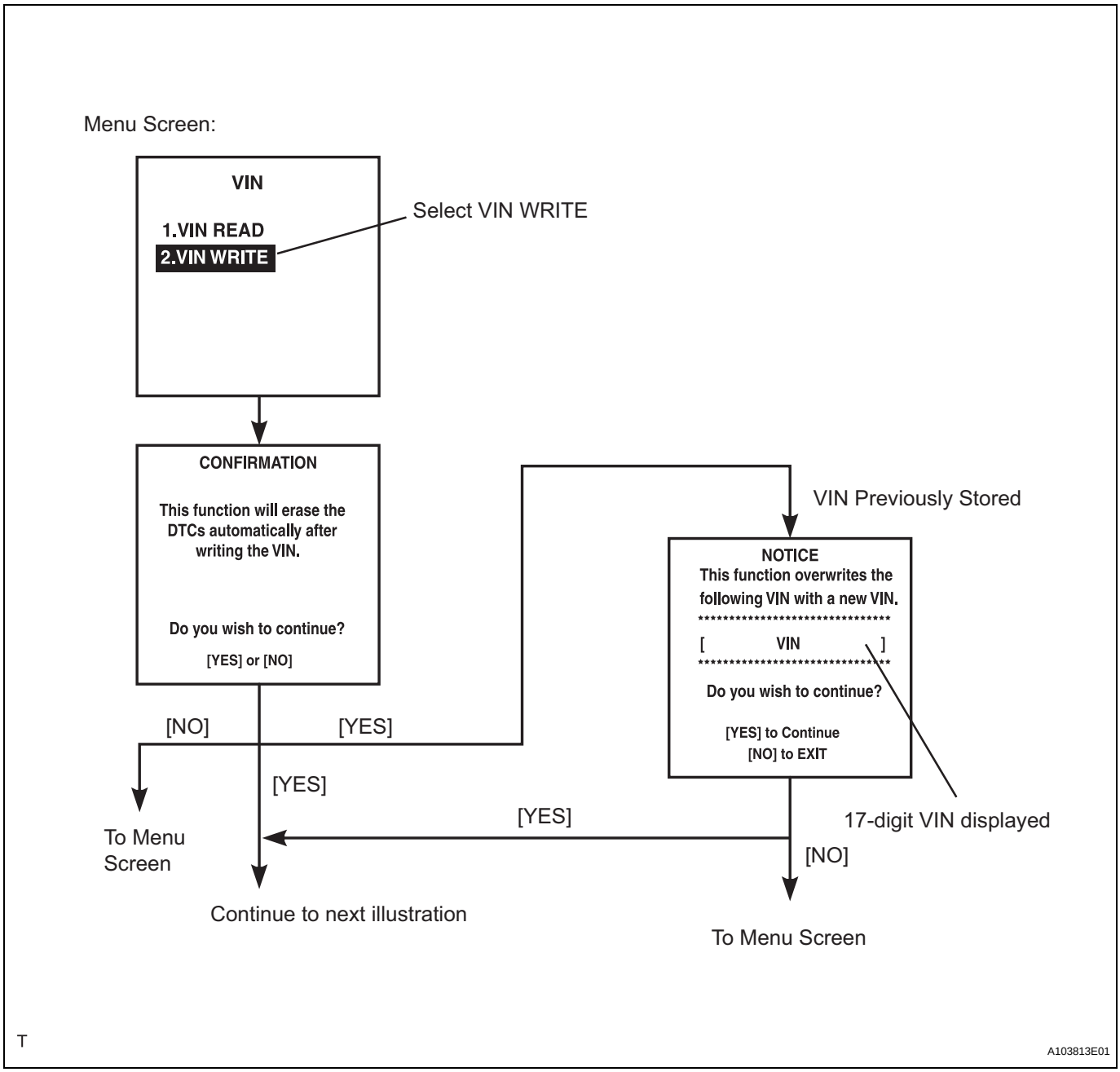
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / VIN.

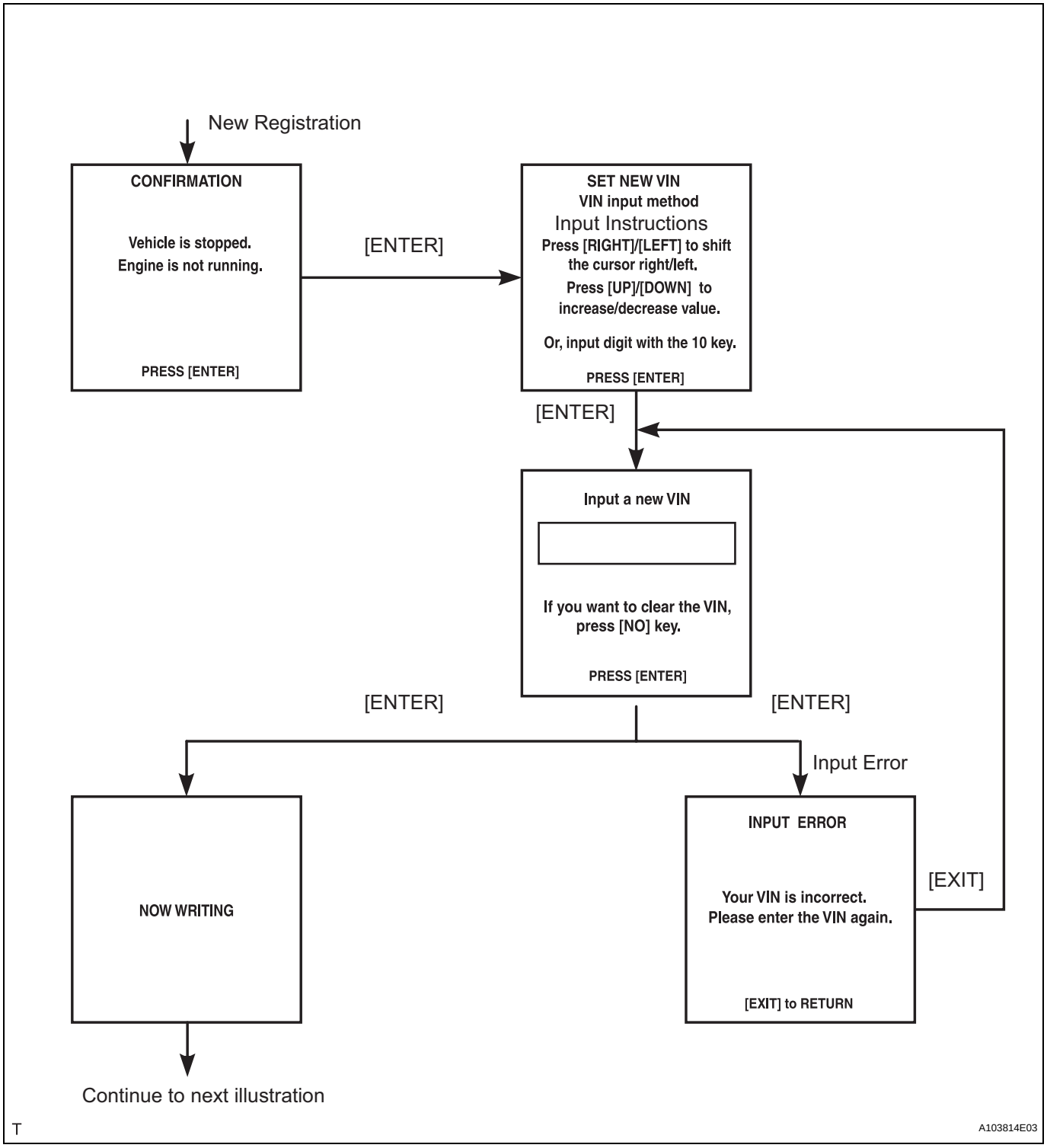


3. WRITE VIN

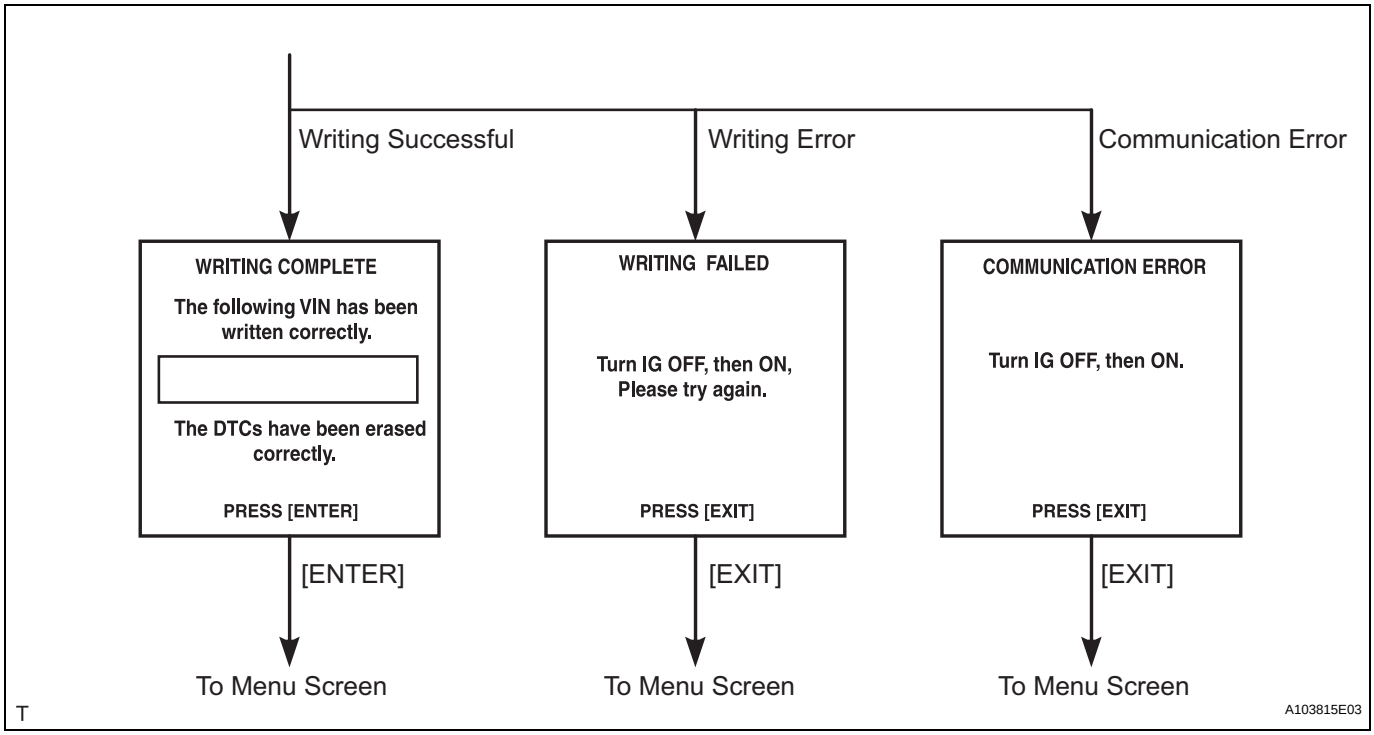
(a) The flowchart of the VIN writing process is shown. This process allows the VIN to be input into the ECM. If the ECM is changed, or the VINs do not match, the VIN can be registered, or overwritten in the ECM by following this procedure.
(b) Write VIN using the intelligent tester.
(c) Check the vehicle's VIN.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the ignition switch on (IG).
(f) Turn the tester on.

(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / VIN.




New Registration
CONFIRMATION
Vehicle is stopped.
Engine is not running.
PRESS [ENTER]
[ENTER]
SET NEW VIN
VIN input method
Input Instructions
Press [RIGHT]/[LEFT] to shift the cursor right/left.
Press [UP]/[DOWN] to increase/decrease value.
Or, input digit with the 10 key.
PRESS [ENTER]
[ENTER]
Input a new VIN
If you want to clear the VIN, press [NO] key.
PRESS [ENTER]
[ENTER]
[ENTER]
Input Error
NOW WRITING
INPUT ERROR
Your VIN is incorrect.
Please enter the VIN again.
[EXIT] to RETURN
[EXIT]
Continue to next illustration
T
A103814E03

ES


Writing Successful
Writing Error
Communication Error
WRITING COMPLETE
The following VIN has been written correctly.
The DTCs have been erased correctly.
PRESS [ENTER]
WRITING FAILED
Turn IG OFF, then ON, Please try again.
PRESS [EXIT]
COMMUNICATION ERROR
Turn IG OFF, then ON.
PRESS [EXIT]
[ENTER]
[EXIT]
[EXIT]
To Menu Screen
To Menu Screen
To Menu Screen
T
A103815E03

ES

CHECKING MONITOR STATUS

The purpose of the monitor result (mode 06) is to allow access to the results for on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are catalyst, evaporative emission (EVAP) and thermostat.

The monitor result allows the OBD II scan tool to display the monitor status, test value, minimum test limit and maximum test limit. These data are displayed after the vehicle has been driven to run the monitor.

When the test value is not between the minimum test limit and maximum test limit, the ECM (PCM) interprets this as a malfunction. When the component is not malfunctioning, if the difference of the test value and test limit is very small, the component will malfunction in the near future.

Perform the following instructions to view the monitor status. Although the Toyota diagnostic tester is used in the following instructions, it can be checked using a generic OBD II scan tool. Refer to your scan tool operator's manual for specific procedures.

1. PERFORM MONITOR DRIVE PATTERN

The monitor results and test values can be checked with the OBD II scan tool or the intelligent tester. The engine control module (ECM) monitors the emissions-related components such as the thermostat, catalyst converter and evaporative emissions (EVAP), and determines whether they are functioning normally or not. When monitoring is finished, the ECM stores the monitor results and the test values. The monitor result indicates whether the component is functioning normally or not. The test value is the value that was used to determine the monitor result. If the test value is outside of the test limit (malfunction criterion), the ECM determines the component is malfunctioning. Some emissions-related components have multiple test values to determine monitor result. If one of these test values is outside of the test limit, the ECM determines the component is malfunctioning.

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Clear the DTCs.
(d) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (See page ES-28). DO NOT turn the engine switch off.

NOTICE:
The test results will be lost if the engine switch is turned off.

2. ACCESS MONITOR RESULT

(a) Select the following menus on the intelligent tester: DIAGNOSIS, ENHANCED OBDII, MONITOR INFO and MONITOR RESULT. The monitor status appears after the component name.
- INCMP: The component has not been monitored yet.
- PASS: The component is functioning normally.
- FAIL: The component is malfunctioning.

(b) Confirm that the component is either PASS or FAIL.

(c) Select the component and press ENTER. The accuracy test value appears if the monitor status is either PASS or FAIL.

HINT:

The monitor result might be PASS on rare occasions even if the Malfunction Indicator Lamp (MIL) is illuminated. This indicates that the system was malfunctioning in the previous driving cycle. This might be caused by an intermittent problem.

3. CHECK COMPONENT STATUS

(a) Compare the test value with the minimum test limit (MIN LIMIT) and maximum test limit (MAX LIMIT).

(b) If the test value is between the minimum test limit and maximum test limit, the component is functioning normally. If not, the component is malfunctioning. The test value is usually significantly higher or lower than the test limit. If the test value is on the borderline of the test limit, the component will malfunction in the near future.

HINT:

The monitor result might be PASS on rare occasions even if the Malfunction Indicator Lamp (MIL) is illuminated. This indicates that the system was malfunctioning in the previous driving cycle. This might be caused by an intermittent problem.

4. MONITOR RESULT INFORMATION

If you use a generic scan tool, multiply the test value by the scaling value listed below.

A/F Sensor Bank 1:

Monitor ID	Test ID	Scaling	Unit	Description
$01	$8E	Multiply by 0.0003	No dimension	A/F sensor deterioration level
$01	$91	Multiply by 0.004	mA	A/F sensor current

HO2S Bank 1 Sensor 2:

Monitor ID	Test ID	Scaling	Unit	Description
$02	$07	Multiply by 0.001	V	Minimum sensor voltage
$02	$08	Multiply by 0.001	V	Maximum sensor voltage
$02	$8F	Multiply by 0.003	g	Maximum oxygen storage capacity

A/F Sensor Bank 2:

Monitor ID	Test ID	Scaling	Unit	Description
$05	$8E	Multiply by 0.0003	No dimension	A/F sensor deterioration level
$05	$91	Multiply by 0.004	mA	A/F sensor current

HO2S Bank 2 Sensor 2:

Monitor ID	Test ID	Scaling	Unit	Description
$06	$07	Multiply by 0.001	V	Minimum sensor voltage
$06	$08	Multiply by 0.001	V	Maximum sensor voltage
$06	$8F	Multiply by 0.003	g	Maximum oxygen storage capacity

Catalyst-Bank 1:

Monitor ID	Test ID	Scaling	Unit	Description
$21	$A9	Multiply by 0.003	No dimension	Oxygen storage capacity of catalyst-bank 1

Catalyst-Bank 2:

Monitor ID	Test ID	Scaling	Unit	Description
$22	$A9	Multiply by 0.003	No dimension	Oxygen storage capacity of catalyst-bank 2

EVAP:

Monitor ID	Test ID	Scaling	Unit	Description
$3D	$C9	Multiply by 0.001	kPa	Test value for small leak (P0456)
$3D	$CA	Multiply by 0.001	kPa	Test value for gross leak (P0455)
$3D	$CB	Multiply by 0.001	kPa	Test value for leak detection pump OFF stuck (P2401)
$3D	$CD	Multiply by 0.001	kPa	Test value for leak detection pump ON stuck (P2402)
$3D	$CE	Multiply by 0.001	kPa	Test value for vent valve OFF stuck (P2420)
$3D	$CF	Multiply by 0.001	kPa	Test value for vent valve ON stuck (P2419)
$3D	$D0	Multiply by 0.001	kPa	Test value for reference orifice low flow (P043E)
$3D	$D1	Multiply by 0.001	kPa	Test value for reference orifice high flow (P043F)
$3D	$D4	Multiply by 0.001	kPa	Test value for purge VSV close stuck (P0441)
$3D	$D5	Multiply by 0.001	kPa	Test value for purge VSV open stuck (P0441)
$3D	$D7	Multiply by 0.001	kPa	Test value for purge flow insufficient (P0441)

Misfire:

Monitor ID	Test ID	Scaling	Unit	Description
$A1	$0B	Multiply by 1	Time	Exponential Weighted Moving Average (EWMA) misfire for all cylinders: Misfire counts for last ten driving cycles-Total
$A1	$0C	Multiply by 1	Time	Misfire rate for all cylinders: Misfire counts for last/current driving cycles-Total
$A2	$0B	Multiply by 1	Time	EWMA misfire for cylinder 1: Misfire counts for last ten driving cycles-Total
$A2	$0C	Multiply by 1	Time	Misfire rate for cylinder 1: Misfire counts for last/current driving cycle-Total
$A3	$0B	Multiply by 1	Time	EWMA misfire for cylinder 2: Misfire counts for last ten driving cycles-Total
$A3	$0C	Multiply by 1	Time	Misfire rate for cylinder 2: Misfire counts for last/current driving cycle-Total
$A4	$0B	Multiply by 1	Time	EWMA misfire for cylinder 3: Misfire counts for last ten driving cycles-Total
$A4	$0C	Multiply by 1	Time	Misfire rate for cylinder 3: Misfire counts for last/current driving cycle-Total
$A5	$0B	Multiply by 1	Time	EWMA misfire for cylinder 4: Misfire counts for last ten driving cycles-Total
$A5	$0C	Multiply by 1	Time	Misfire rate for cylinder 4: Misfire counts for last/current driving cycle-Total
$A6	$0B	Multiply by 1	Time	EWMA misfire for cylinder 5: Misfire counts for last ten driving cycles-Total
$A6	$0C	Multiply by 1	Time	Misfire rate for cylinder 5: Misfire counts for last/current driving cycle-Total
$A7	$0B	Multiply by 1	Time	EWMA misfire for cylinder 6: Misfire counts for last ten driving cycles-Total

Monitor ID	Test ID	Scaling	Unit	Description
$A7	$0C	Multiply by 1	Time	Misfire rate for cylinder 6: Misfire counts for last/current driving cycle-Total

Rear Oxygen Sensor Heater:

Monitor ID	Test ID	Scaling	Unit	Description
$42	$91	Multiply by 0.001	Ohm	Oxygen sensor heater resistance bank 1 sensor 2
$46	$91	Multiply by 0.004	Ohm	Oxygen sensor heater resistance bank 2 sensor 2

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission-related components, and indicate any detected abnormalities with DTCs (Diagnostic Trouble Codes). Since various components need to be monitored in different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors.
- The intelligent tester's software must be version 9.0 or newer to view the Readiness Monitor status. To view the status, select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR STATUS.
- When the Readiness Monitor status reads COMPL (complete), the necessary conditions have been met for running the performance tests for that Readiness Monitor.
- A generic OBD II scan tool can also be used to view the Readiness Monitor status.

HINT:

Many Inspection and Maintenance (I/M) programs require a vehicle's Readiness Monitor status to show COMPL before beginning emission tests.

The Readiness Monitor will be reset to INCMPL (incomplete) if:

- The ECM has lost battery power or broken a fuse.
- DTCs have been cleared.
- The conditions for running the Readiness Monitor have not been met.

If the Readiness Monitor status shows INCMPL, follow the appropriate Readiness Monitor Drive Pattern to change the status to COMPL.

CAUTION:

Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

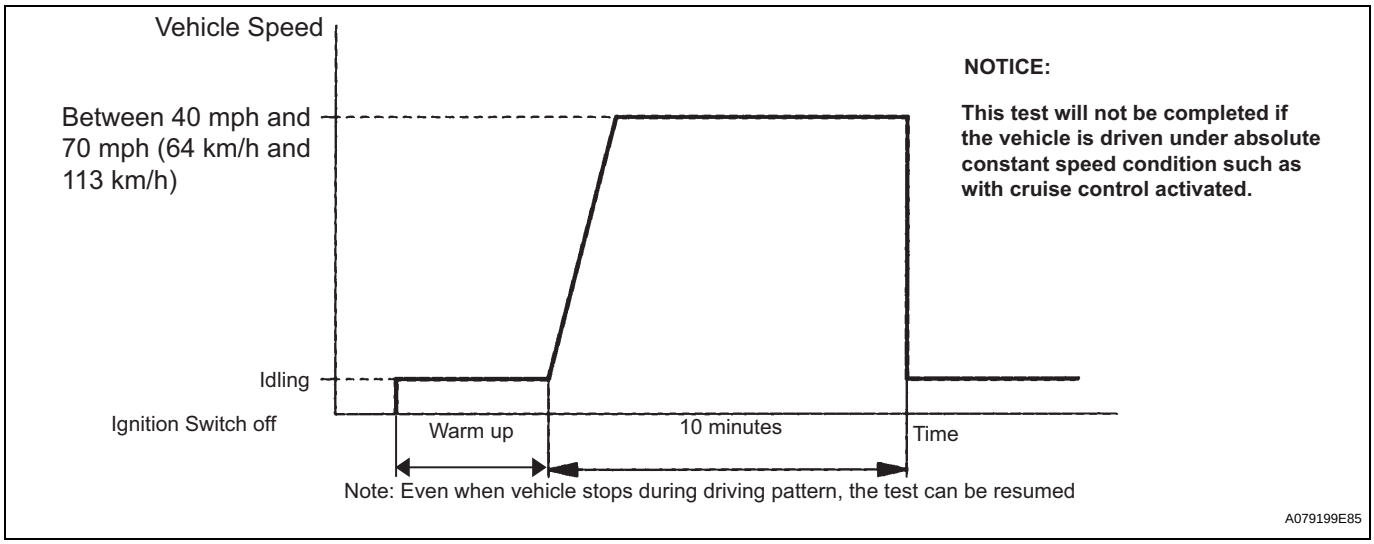
NOTICE:

These drive patterns represent the fastest method of satisfying all conditions necessary to achieve complete status for each specific Readiness Monitor.

In the event of a drive pattern being interrupted (possibly due to factors such as traffic conditions), the drive pattern can be resumed. In most cases, the Readiness Monitor will still achieve complete status upon completion of the drive pattern.

To ensure completion of the Readiness Monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (ACTIVE AIR-FUEL RATIO CONTROL TYPE)



(a) Preconditions

The monitor will not run unless:

- The MIL is OFF.

(b) Drive Pattern

(1) Connect an intelligent tester.
(2) Turn the ignition switch on (IG).
(3) Turn the tester or scan tool ON.
(4) Clear the DTCs.
(5) Start the engine and warm it up.
(6) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes.

(c) Monitor Status

(1) Check the Readiness Monitor status displayed on the tester.
(2) If the status does not switch to COMPL (complete), extend the driving time.

3. EVAP MONITOR (KEY-OFF TYPE)

(a) Preconditions

The monitor will not run unless:

- The fuel tank is less than 90% full.
- The altitude is less than 8,000 ft (2,450 m).
- The vehicle is stationary.
- The engine coolant temperature is between 4.4°C and 35°C (40°F to 95°F).
- The intake air temperature is between 4.4°C and 35°C (40°F to 95°F).
- Vehicle was driven in the city area (or on free-way) for 10 minutes or more.

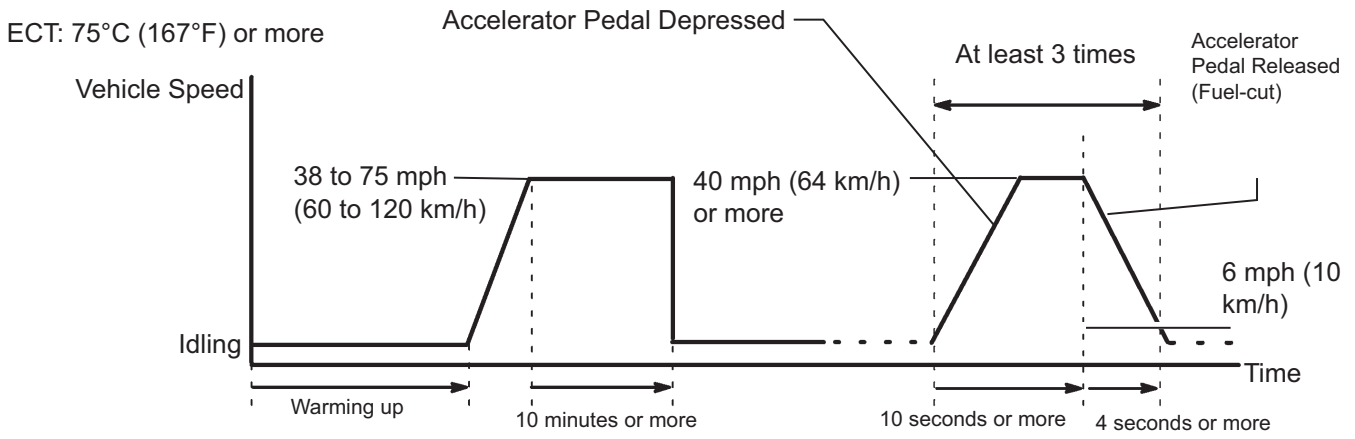
(b) Monitor Conditions

(1) Turn the ignition switch off and wait for 6 hours.
HINT:
Do not start the engine until checking Readiness Monitor status. If the engine is started, the step described above must be repeated.

(c) Monitor Status
(1) Connect an intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Turn the tester or scan tool on.
(4) Check the Readiness Monitor status displayed on the tester or scan tool.
If the status does not switch to COMPL (complete), restart the engine, make sure that the preconditions have been met, and then perform the Monitor Conditions again.

4. A/F SENSOR AND HO2S MONITORS

Monitor Drive Pattern:



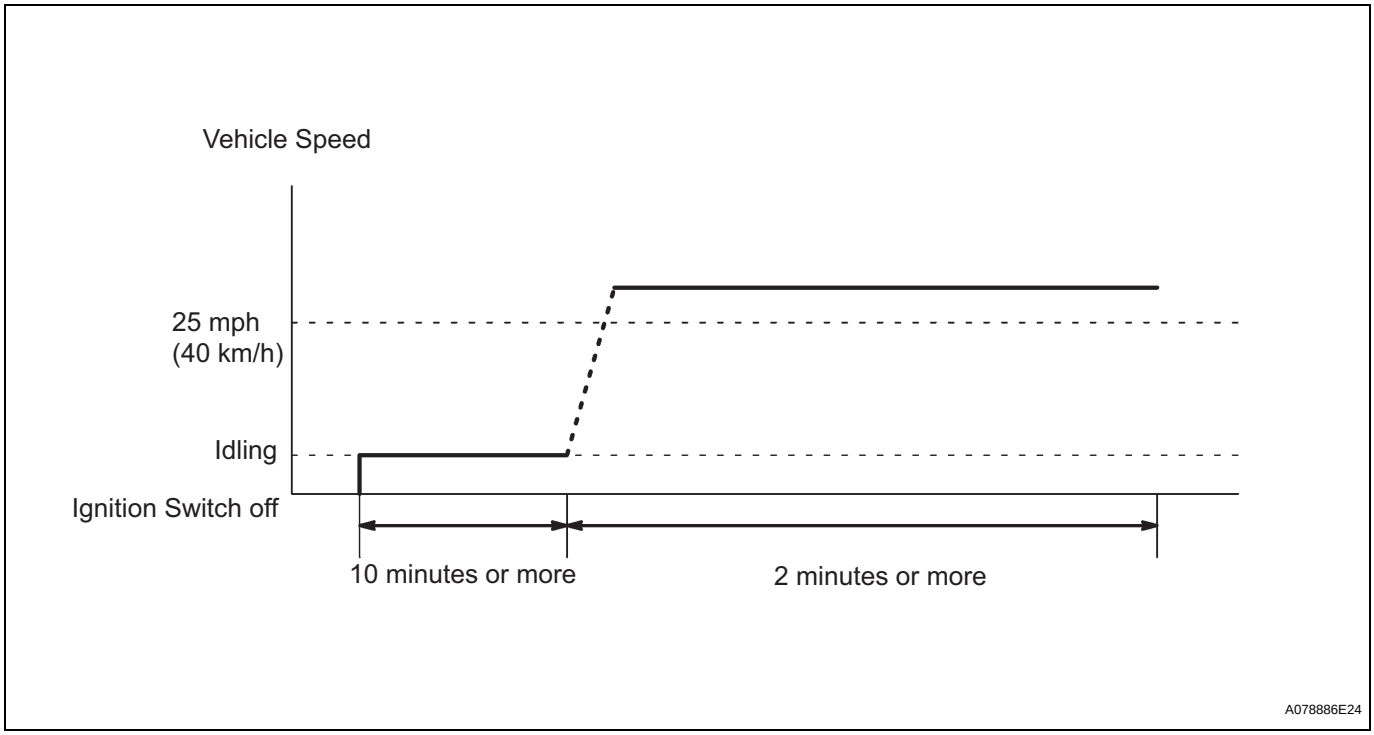
(a) Preconditions
The monitor will not run unless:
- 2 minutes or more have elapsed since the engine was started.
- The Engine Coolant Temperature (ECT) is 75°C (167°F) or more.
- Cumulative driving time at a vehicle speed of 30 mph (48 km/h) or more exceeds 6 minutes.
- Air-fuel ratio feedback control is performed.
- Fuel-cut control is performed for 8 seconds or more (for the Rear HO2 Sensor Monitor).

(b) Drive Pattern for front A/F sensor and HO2 sensor
(1) Connect an intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Turn the tester on.
(4) Clear the DTCs.
(5) Start the engine, and warm it up until the ECT reaches 75°C (167°F) or higher.
(6) Drive the vehicle at 38 mph (60 km/h) or more for at least 10 minutes.
(7) Change the transmission to the 2nd gear.
(8) Accelerate the vehicle to 40 mph (64 km/h) or more by depressing the accelerator pedal for at least 10 seconds (Procedure "A").

(9) Soon after performing procedure "A" above, release the accelerator pedal for at least 4 seconds without depressing the brake pedal, in order to execute fuel-cut control (Procedure "B").
(10) Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h) (Procedure "C").
(11) Repeat procedures from "A" through "C" above at least 3 times in one driving cycle.

(c) Monitor Status
(1) Check the Readiness Monitor status displayed on the tester.
(2) If the status does not switch to COMPL (complete), make sure that the preconditions have been met and then perform the Drive Pattern again.

5. AIR-FUEL RATIO (A/F) AND HEATED OXYGEN (HO2) SENSOR HEATER MONITORS (FRONT A/F AND REAR HO2 SENSOR TYPE)



(a) Preconditions
The monitor will not run unless:
- The MIL is OFF.

(b) Drive Pattern
(1) Connect an intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Clear the DTCs.
(4) Start the engine.
(5) Allow the engine to idle for 10 minutes or more.
(6) Drive the vehicle at 25 mph (40 km/h) or more for at least 2 minutes.

(c) Monitor Status

(1) Check the Readiness Monitor status displayed on the tester or scan tool.
If the status does not switch to COMPL (complete), make sure that the preconditions have been met, and repeat the Drive Pattern.

PROBLEM SYMPTOMS TABLE

HINT:
When a malfunction is not confirmed by a DTC (Diagnostic Trouble Code) check and the cause of problem cannot be identified through a basic inspection, troubleshoot according to the priority order indicated in the table below.

SFI SYSTEM

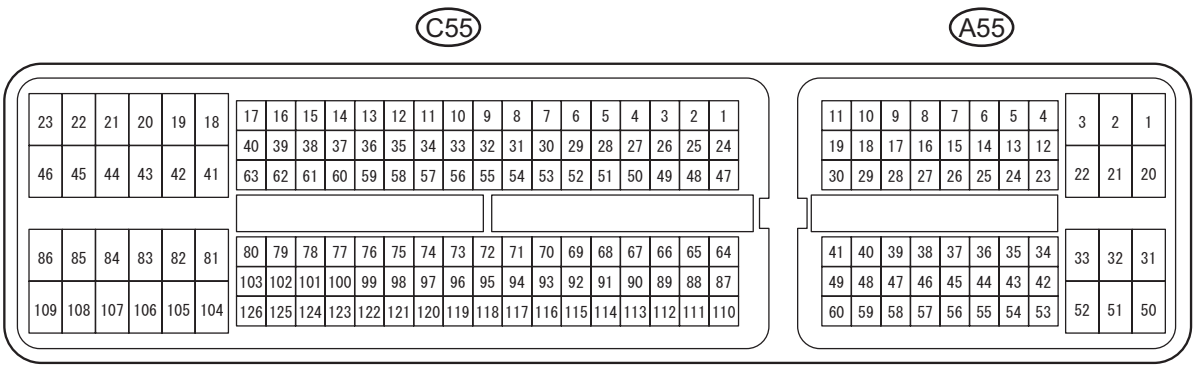
Symptom	Suspected area	See page
Without Smart Key System: Engine does not crank (Does not start)	1. Immobilizer system (with smart key system)	EI-7
	2. Immobilizer system (without smart key system)	EI-55
	3. Starter signal circuit	ES-304
	4. Starter	ST-143
	5. STARTER relay	ST-149
With Smart Key System: Engine does not crank (Does not start)	1. Immobilizer system (with smart key system)	EI-7
	2. Immobilizer system (without smart key system)	EI-55
	3. Cranking holding function circuit	ES-455
	4. Starter signal circuit	ES-304
	5. Starter	ST-143
	6. STARTER relay	ST-149
	7. ECM power source circuit	ES-432
	8. ECM	ES-518
No initial combustion (Does not start)	1. ECM power source circuit	ES-432
	2. Ignition system	IG-3
	3. Fuel pump control circuit	ES-449
	4. Injector	FU-15
	5. Crank angle sensor	ES-497
	6. ECM	ES-518
Engine cranks normally but difficult to start	1. Electronic Throttle Control System (ETCS)	ES-320
	2. Fuel pump control circuit	ES-449
	3. Ignition system	IG-3
	4. Spark plug	IG-5
	5. Compression	EM-3
	6. Injector	FU-15
	7. Crank angle sensor	ES-497
Difficult to start with cold engine	1. Starter signal circuit	ES-304
	2. Electronic Throttle Control System (ETCS)	ES-320
	3. Fuel pump control circuit	ES-449
	4. Spark plug	IG-5
	5. Ignition system	IG-3
	6. Injector	FU-15
	7. Engine coolant temperature sensor	ES-500
Difficult to start with warm engine	1. Starter signal circuit	ES-304
	2. Electronic Throttle Control System (ETCS)	ES-320
	3. Fuel pump control circuit	ES-449
	4. Spark plug	IG-5
	5. Ignition system	IG-3
	6. Injector	FU-15
	7. Engine coolant temperature sensor	ES-500

Symptom	Suspected area	See page
High engine idling speed (Poor idling)	1. Electronic Throttle Control System (ETCS)	ES-320
	2. ECM power source circuit	ES-432
	3. A/C signal circuit (Compressor circuit)	-
	4. Acoustic Control Induction System (ACIS)	ES-462
	5. PCV hose	EC-5
	6. ECM	ES-518
Low engine idling speed (Poor idling)	1. Electronic Throttle Control System (ETCS)	ES-320
	2. ECM power source circuit	ES-432
	3. A/C signal circuit (Compressor circuit)	-
	4. Acoustic Control Induction System (ACIS)	ES-462
	5. PCV hose	EC-5
	6. Injector	FU-15
	7. ECM	ES-518
Rough idling (Poor idling)	1. Electronic Throttle Control System (ETCS)	ES-320
	2. Injector	FU-15
	3. Ignition system	IG-3
	4. Compression	EM-3
	5. Fuel pump control circuit	ES-449
	6. Spark plug	IG-5
	7. Acoustic Control Induction System (ACIS)	ES-462
	8. PCV hose	EC-5
Hunting (Poor idling)	1. Electronic Throttle Control System (ETCS)	ES-320
	2. ECM power source circuit	ES-432
	3. Fuel pump control circuit	ES-449
	4. Spark plug	IG-5
	5. Ignition system	IG-3
	6. Injector	FU-15
	7. Acoustic Control Induction System (ACIS)	ES-462
	8. PCV hose	EC-5
Hesitation/Poor acceleration (Poor driveability)	1. Injector	FU-15
	2. Fuel pump control circuit	ES-449
	3. Ignition system	IG-3
	4. Spark plug	IG-5
	5. Air Intake Control System (AICS)	ES-462
	6. A/T faulty	AX-9
Surging (Poor driveability)	1. Fuel pump control circuit	ES-449
	2. Spark plug	IG-5
	3. Ignition system	IG-3
	4. Injector	FU-15
Engine stalls soon after starting	1. Fuel pump control circuit	ES-449
	2. Electronic Throttle Control System (ETCS)	ES-320
	3. Crank angle sensor	ES-497
	4. Spark plug	IG-5
	5. Ignition system	IG-3
	6. Injector	FU-15
Engine stalls during A/C operation	1. A/C signal circuit	-
	2. ECM	ES-518
Unable/difficult to refuel	Refueling valve (canister)	-
Engine vibrates frequently when idling (Active Control engine Mount (ACM) system does not operate)	Active control engine mount circuit	ES-393

ES

TERMINALS OF ECM

1. SFI SYSTEM



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HINT:
The standard normal voltage between each pair of the ECM terminals is shown in the table below. The appropriate conditions for checking each pair of the terminals are also indicated.
The check results should be compared with the standard normal voltage for that pair of terminals, listed in the "STD Voltages" column.
The illustration above can be used as a reference to identify the ECM terminal locations.

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	STD Voltages
+B (A55-2) - E1 (C55-81)	R - W-B	Power source of ECM	Ignition switch on (IG)	9 to 14 V
+B2 (A55-1) - E1 (C55-81)	R - W-B	Power source of ECM	Ignition switch on (IG)	9 to 14 V
BATT (A55-20) - E1 (C55-81)	Y - W-B	Battery (for measuring the battery voltage and for the ECM memory)	Always	9 to 14 V
VPMP (A55-42) - E1 (C55-81)	W - W-B	Vent valve operation signal (built into pump module)	Ignition switch on (IG)	9 to 14 V
MPMP (A55-34) - E1 (C55-81)	G - W-B	Vacuum pump operation signal (built into pump module)	Vacuum pump OFF	0 to 3 V
MPMP (A55-34) - E1 (C55-81)	G - W-B	Vacuum pump operation signal (built into pump module)	Vacuum pump ON	9 to 14 V
+BM (A55-3) - E1 (C55-81)	LG - W-B	Power source of ETCS throttle motor	Always	9 to 14 V
MREL (A55-44) - E1 (C55-81)	O - W-B	EFI relay operation signal	Ignition switch on (IG)	9 to 14 V
IGSW (A55-28) - E1 (C55-81)	Y - W-B	Ignition switch signal	Ignition switch on (IG)	9 to 14 V
FC (A55-7) - E1 (C55-81)	FC (A55-7) - E1 (C55-81)	C/OPEN relay operation signal (fuel pump control)	Ignition switch on (IG), Engine stopped	9 to 14 V
FC (A55-7) - E1 (C55-81)	FC (A55-7) - E1 (C55-81)	C/OPEN relay operation signal (fuel pump control)	Ignition switch on (IG), Engine idling	0 to 1.5 V
STP (A55-36) - E1 (C55-81)	- W-B	Stop light switch signal	W-Brake pedal depressed	7.5 to 14 V
STP (A55-36) - E1 (C55-81)	- W-B	Stop light switch signal	W-Brake pedal released	Below 1.5 V
ST1- (A55-35) - E1 (C55-81)	GR - W-B	Stop light switch signal (opposite to STP terminal)	Ignition switch on (IG), W-Brake pedal depressed	Below 1.5 V

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	STD Voltages
ST1- (A55-35) - E1 (C55-81)	GR - W-B	Stop light switch signal (opposite to STP terminal)	Ignition switch on (IG), W-Brake pedal released	7.5 to 14 V
ACCR*2 (A24-17) - E1 (C55-81)	B - W-B	ACC relay control signal	Cranking	Below 1.5 V
VPA (A55-55) - E1 (C55-81)	G - W-B	Accelerator pedal position sensor signal (for engine control)	Ignition switch on (IG), Accelerator pedal fully released	0.5 to 1.1 V
VPA (A55-55) - E1 (C55-81)	G - W-B	Accelerator pedal position sensor signal (for engine control)	Ignition switch on (IG), Accelerator pedal fully depressed	2.6 to 4.5 V
VPA2 (A55-58) - EPA2 (A55-60)	R - O	Accelerator pedal position sensor signal (for sensor malfunction detection)	Ignition switch on (IG), Accelerator pedal fully released	1.2 to 2.0 V
VPA2 (A55-58) - EPA2 (A55-60)	R - O	Accelerator pedal position sensor signal (for sensor malfunction detection)	Ignition switch on (IG), Accelerator pedal fully depressed	3.4 to 5.0 V
EPA (A5-59) - VPA (A55-55)	Y - G	Accelerator pedal position sensor signal (for engine control)	Ignition switch on (IG), Accelerator pedal fully released	0.5 to 1.1 V
EPA (A5-59) - VPA (A55-55)	Y - G	Accelerator pedal position sensor signal (for engine control)	Ignition switch on (IG), Accelerator pedal fully depressed	2.6 to 4.5 V
EPA2 (A55-60) - VPA2 (A55-58)	O - R	Accelerator pedal position sensor signal (for sensor malfunction detection)	Ignition switch on (IG), Accelerator pedal fully released	1.2 to 2.0 V
EPA2 (A55-60) - VPA2 (A55-58)	O - R	Accelerator pedal position sensor signal (for sensor malfunction detection)	Ignition switch on (IG), Accelerator pedal fully depressed	3.4 to 5.0 V
PPMP (C55-77) - E1 (C55-81)	L - W-B	Pressure sensor signal (built into pump module)	Ignition switch on (IG)	3 to 3.6 V
TC (A55-27) - E1 (C55-81)	P - W-B	Terminal TC of DLC3	Ignition switch on (IG)	9 to 14 V
VCPA (A55-57) - EPA (A55-59)	R - Y	Power source of accelerator pedal position sensor (for VPA)	Ignition switch on (IG)	4.5 to 5.0 V
VCP2 (A55-56) - EPA2 (A55-60)	L - O	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch on (IG)	4.5 to 5.0 V
TACH (A55-15) - E1 (C55-81)	B - W-B	Engine speed signal (for combination meter)	Idling	Pulse generation (see waveform 11)
CCS (A55-40) - E1 (C55-81)	W - W-B	Cruise control main switch signal	Ignition switch on (IG) CANCEL switch ON SET/COAST switch ON RES/ACC switch ON Main switch ON	10 to 16 V 6.6 to 10.1 V 4.5 to 7.1 V 2.3 to 4.0 V Below 1 V
SPD (A55-24) - E1 (C55-81)	BR - W-B	Vehicle speed signal from combination meter	Ignition switch on (IG), driving wheel rotated slowly	Pulse generation (see waveform 8)
W (A55-24) - E1 (C55-81)	BR - W-B	Malfunction Indicator Lamp (MIL) operation signal	Ignition switch on (IG)	Below 3.0 V
W (A55-24) - E1 (C55-81)	BR - W-B	Malfunction Indicator Lamp (MIL) operation signal	Idling	9 to 14 V
CANH (A55-41) - CANL (A55-49)	B - W	CAN communication circuit	Ignition switch off	54 to 69 Ω
E1 (C55-81) - Body ground	W-B - -	Earth (ground) circuit of ECM	Always	Below 1 V

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	STD Voltages
#10 (C55-45) - E01 (C55-22) #20 (C55-85) - E01 (C55-22) #30 (C55-44) - E01 (C55-22) #40 (C55-84) - E01 (C55-22) #50 (C55-43) - E01 (C55-22) #60 (C55-83) - E01 (C55-20)	B - W-B R - W-B Y - W-B L - W-B W-L - W-B BR - W-B	Fuel injector operation signal	Ignition switch on (IG)	9 to 14 V
#10 (C55-45) - E01 (C55-22) #20 (C55-85) - E01 (C55-22) #30 (C55-44) - E01 (C55-22) #40 (C55-84) - E01 (C55-22) #50 (C55-43) - E01 (C55-22) #60 (C55-83) - E01 (C55-20)	B - W-B R - W-B Y - W-B L - W-B W-L - W-B BR - W-B	Fuel injector operation signal	Idling	Pulse generation (see waveform 3)
PSW (C55-810) - E1 (C55-81)	B - W-B	P/S pressure switch signal	Ignition switch on (IG)	9 to 14 V
STA (A55-48) - E1 (C55-81)	V - W-B	Starter relay operation signal	Cranking	9 to 14 V
STSW*2 (A55-14) - E1 (C55-81)	R - W-B	Starter relay operation signal	Cranking	9 to 14 V
OC2- (C55-51) - OC2+ (C55-52)	R - BR	Camshaft timing Oil Control Valve (OCV) operation signal (Intake side)	Ignition switch on (IG)	Pulse generation (see waveform 1)
OC2+ (C55-52) - OC2- (C55-51)	BR - R	Camshaft timing Oil Control Valve (OCV) operation signal (Intake side)	Ignition switch on (IG)	Pulse generation (see waveform 1)
OC1- (C55-57) - OC1+ (C55-58)	B - W	Camshaft timing Oil Control Valve (OCV) operation signal (Intake side)	Ignition switch on (IG)	Pulse generation (see waveform 1)
OC1+ (C55-58) - OC1- (C55-57)	W - B	Camshaft timing Oil Control Valve (OCV) operation signal (Intake side)	Ignition switch on (IG)	Pulse generation (see waveform 1)
VV2+ (C55-67) - VV2- (C55-90)	W - B	Variable Valve Timing (VVT) sensor signal (Intake side)	Idling	Pulse generation (see waveform 5)
VV1+ (C55-69) - VV1- (C55-92)	L - LG	Variable Valve Timing (VVT) sensor signal (Intake side)	Idling	Pulse generation (see waveform 5)
NE- (C55-111) - NE+ (C55-110)	R - G	Crankshaft position sensor signal	Idling	Pulse generation (see waveform 5)
NE+ (C55-110) - NE- (C55-111)	G - R	Crankshaft position sensor signal	Idling	Pulse generation (see waveform 5)
EV2- (C55-89) - EV2+ (C55-66)	L - G-R	Variable Valve Timing (VVT) sensor signal (Exhaust side)	Idling	Pulse generation (see waveform 5)
EV2+ (C55-66) - EV2- (C55-89)	G-R - L	Variable Valve Timing (VVT) sensor signal (Exhaust side)	Idling	Pulse generation (see waveform 5)
EV1- (C55-91) - EV1+ (C55-68)	B - Y	Variable Valve Timing (VVT) sensor signal (Exhaust side)	Idling	Pulse generation (see waveform 5)
EV1+ (C55-68) - EV1- (C55-91)	Y - B	Variable Valve Timing (VVT) sensor signal (Exhaust side)	Idling	Pulse generation (see waveform 5)
OE1+ (C55-16) - OE1- (C55-17)	L - LG	Camshaft timing Oil Control Valve (OCV) operation signal (Exhaust side)	Ignition switch on (IG)	Pulse generation (see waveform 1)

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	STD Voltages
OE2+ (C55-14) - OE2- (C55-15)	W-L - Y	Camshaft timing Oil Control Valve (OCV) operation signal (Exhaust side)	Ignition switch on (IG)	Pulse generation (see waveform 1)
VV2- (C55-90) - VV2+ (C55-67)	B - W	Variable Valve Timing (VVT) sensor signal (Intake side)	Idling	Pulse generation (see waveform 5)
VV1- (C55-92) - VV1+ (C55-69)	LG - L	Variable Valve Timing (VVT) sensor signal (Intake side)	Idling	Pulse generation (see waveform 5)
OE1- (B47-31) - OE1+ (B47-26)	LG - L	Camshaft timing Oil Control Valve (OCV) operation signal (Exhaust side)	Ignition switch on (IG)	Pulse generation (see waveform 1)
OE2- (C55-15) - OE2+ (C55-14)	Y - W-L	Camshaft timing Oil Control Valve (OCV) operation signal (Exhaust side)	Ignition switch on (IG)	Pulse generation (see waveform 1)
HT1B (C55-48) - E1 (C55-81) HT2B (C55-47) - E1 (C55-81)	LG - W-B Y - W-B	Heated oxygen sensor heater operation signal	Idling	Below 3.0 V
HT1B (C55-48) - E1 (C55-81) HT2B (C55-47) - E1 (C55-81)	LG - W-B Y - W-B	Heated oxygen sensor heater operation signal	Ignition switch on (IG)	9 to 14 V
ACM (C55-42) - E1 (C55-81)	L-B - W-B	VSV for active control mount system operation signal	Ignition switch on (IG)	9 to 14 V
M- (C55-18) - ME01 (C55-20)	R - B	Throttle drive motor operation signal (negative terminal)	Idling with warm engine	Pulse generation (see waveform 10)
M+ (C55-19) - ME01 (C55-20)	G - B	Throttle drive motor operation signal (positive terminal)	Idling with warm engine	Pluse generation (see waveform 9)
E02 (C55-21) - Body ground	B-W - -	Earth (ground) circuit of ECM	Always	Below 1 V
E01 (C55-22) - Body ground	W-B - -	Earth (ground) circuit of ECM	Always	Below 1 V
IGT1 (C55-40) - E1 (C55-81) IGT2 (C55-39) - E1 (C55-81) IGT3 (C55-38) - E1 (C55-81) IGT4 (C55-37) - E1 (C55-81) IGT5 (C55-36) - E1 (C55-81) IGT6 (C55-35) - E1 (C55-81)	W - W-B GR - W-B G - W-B LG - W-B P - W-B G-R - W-B	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (see waveform 6)
GE01(C55-41) - E1 (C55-81)	G-R - W-B	Shielded earth (ground) circuit of throttle drive motor	Always	Below 1 V
OX1B (C55-88) - EX1B (C55-65) OX2B (C55-87) - EX2B (C55-64)	W - BR B - W-B	Heated oxygen sensor signal	With engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (see waveform 2)
VTA2 (C55-99) - ETA (C55-97)	W-L - P	Throttle position sensor signal (for sensor malfunction detection)	Ignition switch on (IG), Accelerator pedal fully released	2.1 to 3.1 V
VTA2 (C55-99) - ETA (C55-97)	W-L - P	Throttle position sensor signal (for sensor malfunction detection)	Ignition switch on (IG), Accelerator pedal fully depressed	4.5 to 5.0 V
VTA1 (C55-98) - ETA (C55-97)	Y - P	Throttle position sensor signal (for engine control)	Ignition switch on (IG), Throttle valve fully closed	0.5 to 1.2 V
VTA1 (C55-98) - ETA (C55-97)	Y - P	Throttle position sensor signal (for engine control)	Ignition switch on (IG), Throttle valve fully open	3.2 to 4.8 V
THW (C55-79) - ETHW (C55-78)	B - P	Engine coolant temperature sensor signal	Idling, Engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
THA (C55-71) - ETHA (C55-74)	P - G-R	Intake air temperature sensor signal	Idling, Intake air temperature 20°C (68°F)	0.5 to 3.4 V

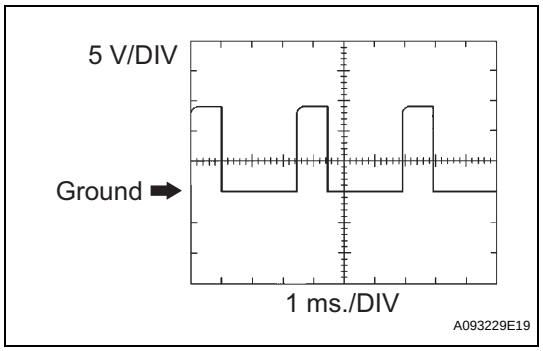
ES

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	STD Voltages
IGF1 (C55-106) - E1 (C55-81)	BR - W-B	Ignition coil with igniter (ignition confirmation signal)	Ignition switch on (IG)	4.5 to 5.0 V
IGF1 (C55-106) - E1 (C55-81)	BR - W-B	Ignition coil with igniter (ignition confirmation signal)	Idling	Pulse generation (see waveform 6)
AICV (A55-4) - E1 (C55-81)	V - W-B	VSV for Air intake control system operation signal	Ignition switch on (IG)	9 to 14 V
E2G (C55-73) - E1 (C55-81)	LG - W-B	Earth (ground) circuit of sensor for mass air flow meter	Always	Below 1 V
VG (C55-72) - E2G (C55-73)	L-B - LG	Mass Air Flow (MAF) meter signal	Idling, Shift lever position P or N, A/C switch OFF	0.5 to 3.0 V
ACIS (C55-107) - E1 (C55-81)	R - W-B	VSV for ACIS (Acoustic Control Induction System) operation signal	Ignition switch on (IG)	9 to 14 V
PRG (C55-108) - E1 (C55-81)	G-R - W-B	Purge VSV for EVAP system operation signal	Ignition switch on (IG)	9 to 14 V
PRG (C55-108) - E1 (C55-81)	G-R - W-B	Purge VSV for EVAP system operation signal	Idling	Pulse generation (see waveform 7)
HA2A (C55-109) - E05 (C55-46)	B-W - W	A/F sensor heater operation signal	Idling	Below 3.0 V
HA2A (C55-109) - E05 (C55-46)	B-W - W	A/F sensor heater operation signal	Ignition switch on (IG)	9 to 14 V
HA1A (C55-86) - E04 (C55-23)	G - W	A/F sensor heater operation signal	Idling	Below 3.0 V
HA1A (C55-86) - E04 (C55-23)	G - W	A/F sensor heater operation signal	Ignition switch on (IG)	9 to 14 V
ME01 (C55-20) - E1 (C55-81)	B - W-R	Earth (ground) circuit of ECM	Always	Below 1 V
E03 (C55-104) - E1 (C55-81)	B - W-B	Earth (ground) circuit of ECM	Always	Below 1 V
HT2B (C55-47) - E1 (C55-81) HT1B (C55-48) - E1 (C55-81)	Y - W-B LG - W-B	Heated oxygen sensor heater operation signal	Idling	Below 3.0 V
HT2B (C55-47) - E1 (C55-81) HT1B (C55-48) - E1 (C55-81)	Y - W-B LG - W-B	Heated oxygen sensor heater operation signal	Ignition switch on (IG)	9 to 14 V
E05 (C55-46) - E1 (C55-81)	W - W-B	Earth (ground) circuit of ECM	Always	Below 1 V
E04 (C55-23) - E1 (C55-81)	W - W-B	Earth (ground) circuit of ECM	Always	Below 1 V
NSW (C55-62) - E1 (C55-81)	R - W-B	Park/Neutral position switch signal	Ignition switch on (IG), Shift lever position P or N	Below 3.0 V
NSW (C55-62) - E1 (C55-81)	R - W-B	Park/Neutral position switch signal	Ignition switch on (IG), Shift lever position other than P or N	9 to 14 V
EKN2 (C55-117) - KNK2 (C55-118)	W - B	Earth (ground) circuit of knock sensor	With engine speed at 4,000 rpm after warming up	Pulse generation (see waveform 4)
KNK2 (C55-118) - EKN2 (C55-117)	B - W	Knock sensor signal	With engine speed at 4,000 rpm after warming up	Pulse generation (see waveform 4)
A1A+ (C55-93) - E1 (C55-81)	P - W-B	A/F sensor signal	Ignition switch on (IG)	3.3 V*1
A1A+ (C55-93) - E1 (C55-81)	P - W-B	A/F sensor signal	Ignition switch on (IG)	3.0 V*1
A2A+ (C55-120) - E1 (C55-81)	L - W-B	A/F sensor signal	Ignition switch on (IG)	3.3 V*1
A2A+ (C55-120) - E1 (C55-81)	L - W-B	A/F sensor signal	Ignition switch on (IG)	3.0 V*1
EKNK (C55-94) - KNK1 (C55-95)	G - R	Earth (ground) circuit of knock sensor	With engine speed at 4,000 rpm after warming up	Pulse generation (see waveform 4)
KNK1 (C55-95) - EKNK (C55-94)	R - G	Knock sensor signal	With engine speed at 4,000 rpm after warming up	Pulse generation (see waveform 4)
A1A- (C55-116) - E1 (C55-81)	P - W-B	A/F sensor	Ignition switch on (IG)	3.3 V*1

Symbols (Terminal No.)	Wiring Colors	Terminal Descriptions	Conditions	STD Voltages
A1A- (B46-30) - E1 (C55-81)	P - W-B	A/F sensor	Ignition switch on (IG)	3.0 V*1
A2A- (C55-119) - E1 (C55-81)	Y - W-B	A/F sensor	Ignition switch on (IG)	3.3 V*1
A2A- (C55-119) - E1 (C55-81)	Y - W-B	A/F sensor	Ignition switch on (IG)	3.0 V*1
OX2B (C55-87) - EX2B (C55-64) OX1B (C55-88) - EX1B (C55-65)	B - W-R W - BR	Heated oxygen sensor signal	With engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (see waveform 2)

*1: The ECM terminal voltage is constant regardless of the output voltage from the sensor.

*2: With Smart Key system

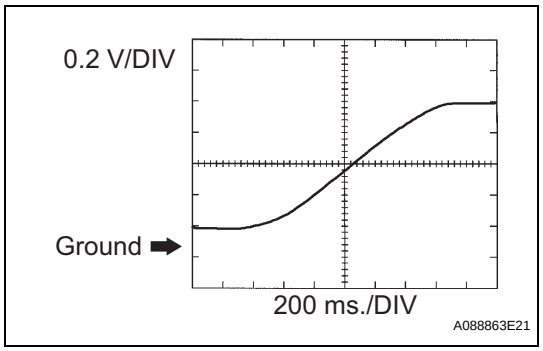


(a) WAVEFORM 1

(1) Camshaft timing Oil Control Valve (OCV) operation signal

ECM Terminal Names	Between OC1+ and OC1- , OC2+ and OC2- , OE1+ and OE1- , or OE2+ and OE2-
Tester Ranges	5 V/DIV, 1 ms./DIV
Conditions	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

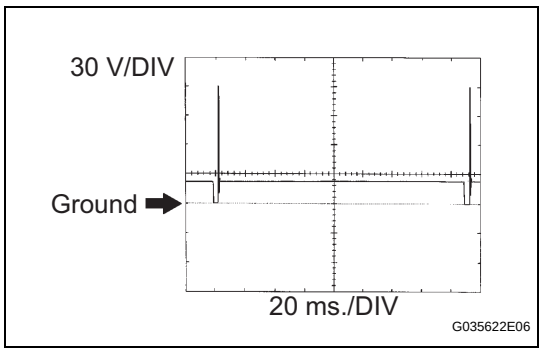


(b) WAVEFORM 2

(1) Heated oxygen sensor signal

ECM Terminal Names	Between OX1B and EX1B, or OX2B and EX2B
Tester Ranges	0.2 V/DIV, 200 ms./DIV
Conditions	Engine speed is maintained at 2,500 rpm for 2 minutes after sensor is warmed up

HINT:
In the DATA LIST, item O2S B1S2 shows the ECM input values from the heated oxygen sensor.



(c) WAVEFORM 3

(1) Fuel injector operation signal

ECM Terminal Names	Between #10 (to 60) and E01
Tester Ranges	30 V/DIV, 20 ms./DIV
Conditions	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

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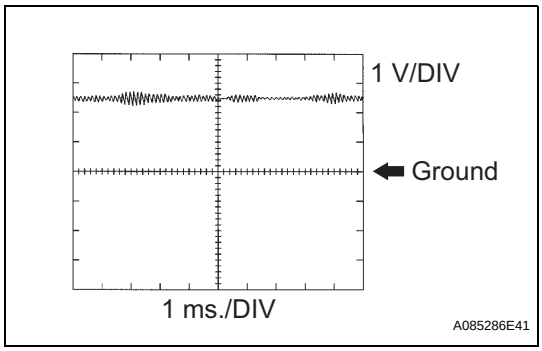
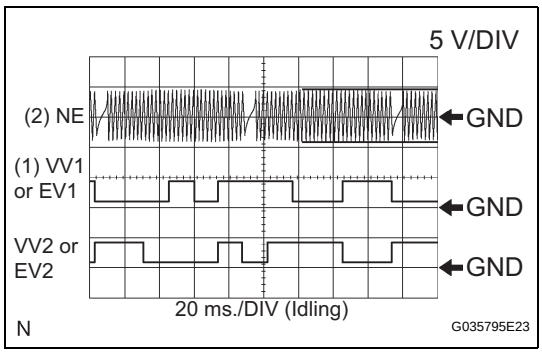


(d) WAVEFORM 4
(1) Knock sensor signal

ECM Terminal Names	Between KNK1 and EKNK, or KNK2 and EKN2
Tester Ranges	0.01 to 10 V/DIV, 0.01 to 10 ms./DIV
Conditions	Engine speed is maintained at 4,000 rpm after engine is warmed up

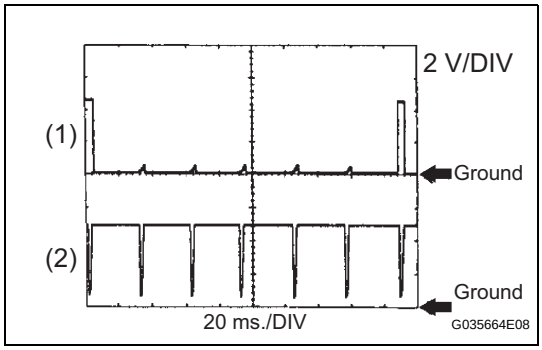
HINT:
- The wavelength becomes shorter as the engine rpm increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle.



(e) WAVEFORM 5
(1) Variable Valve Timing (VVT) sensor signal (1)
(2) Crankshaft position sensor signal (2)

ECM Terminal Names	(1) Between VV1+ and VV1- , VV2+ and VV2-, EV1+ and EV1-, or EV2+ and EV2- (2) Between NE+ and NE-
Tester Ranges	5 V/DIV, 20 ms./DIV
Conditions	Idling

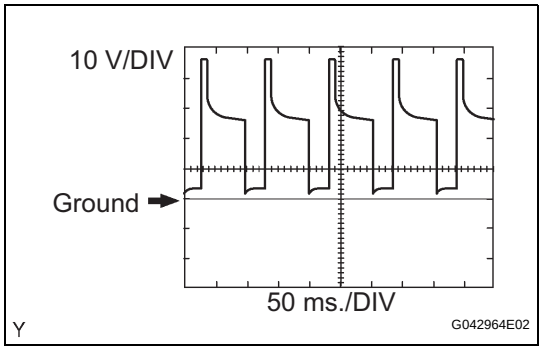
HINT:
The wavelength becomes shorter as the engine rpm increases.



(f) WAVEFORM 6
(1) Igniter IGT signal (from ECM to igniter) (1)
(2) Igniter IGF signal (from igniter to ECM) (2)

ECM Terminal Names	(1) Between IGT (1 to 6) and E1 (2) Between IGF1 and E1
Tester Ranges	2 V/DIV, 20 ms./DIV
Conditions	Idling

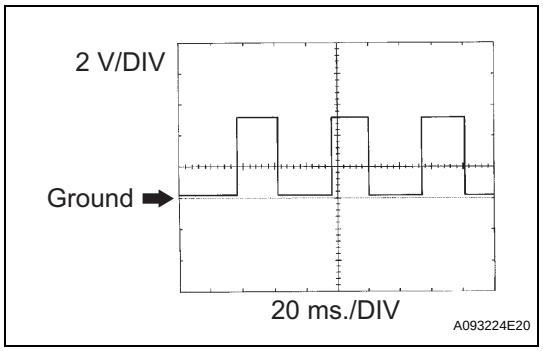
HINT:
The wavelength becomes shorter as the engine rpm increases.



(g) WAVEFORM 7
(1) Purge VSV for EVAP system operation signal

ECM Terminal Names	Between PRG and E1
Tester Ranges	10 V/DIV, 50 ms./DIV
Conditions	Idling

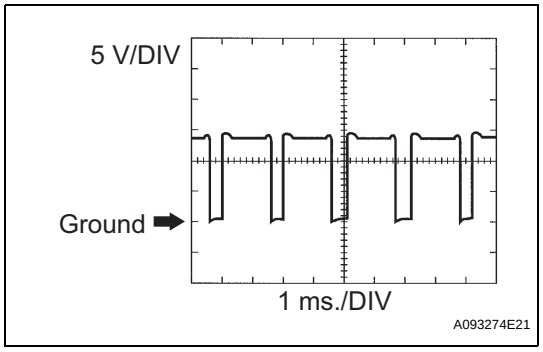
HINT:
If the waveform is not similar to that shown in the illustration, check the waveform again after idling for 10 minutes or more.



(h) WAVEFORM 8
(1) Vehicle speed signal

ECM Terminal Names	Between SPD and E1
Tester Ranges	2 V/DIV, 20 ms./DIV
Conditions	Driving at 12 mph (20 km/h)

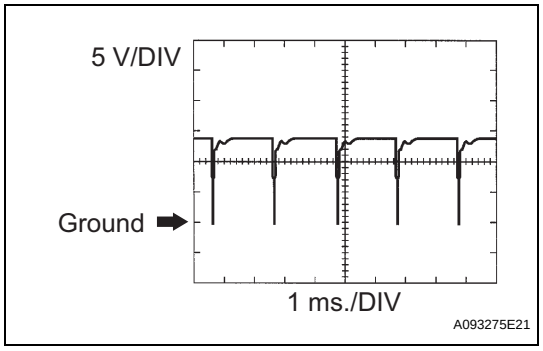
HINT:
- The wavelength becomes shorter as the vehicle speed increases.
- Depending on the vehicle, the output waveform voltage may rise to 12 V if influenced by optionally installed systems.



(i) WAVEFORM 9
(1) Throttle drive motor operation signal (positive terminal)

ECM Terminal Names	Between M+ and ME01
Tester Ranges	5 V/DIV, 1 ms./DIV
Conditions	Idling with warm engine

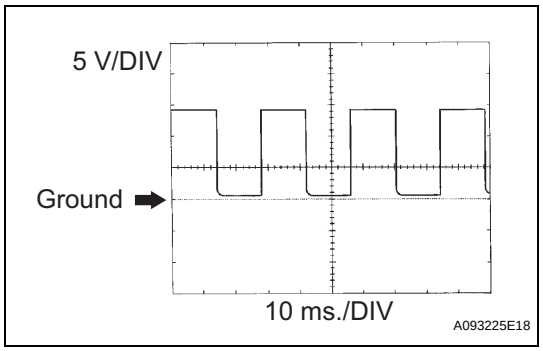
HINT:
The duty ratio varies depending on the throttle actuator operation.



(j) WAVEFORM 10
(1) Throttle drive motor operation signal (negative terminal)

ECM Terminal Names	Between M- and ME01
Tester Ranges	5 V/DIV, 1 ms./DIV
Conditions	Idling with warm engine

HINT:
The duty ratio varies depending on the throttle actuator operation.



(k) WAVEFORM 11
(1) Engine speed signal

ECM Terminal Names	Between TACH and E1
Tester Ranges	5 V/DIV, 10 ms./DIV
Conditions	Idling

HINT:
The wavelength becomes shorter as the engine rpm increases.

ES

DIAGNOSIS SYSTEM

1. DESCRIPTION

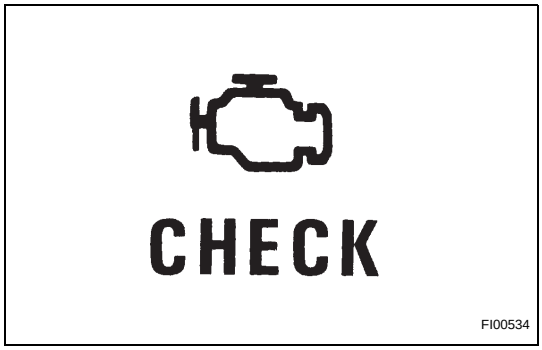
When troubleshooting OBD II (On-Board Diagnostics) vehicles, the intelligent tester (complying with SAE J1987) must be connected to the DLC3 (Data Link Connector 3) of the vehicle. Various data in the vehicle's ECM (Engine Control Module) can be then read.

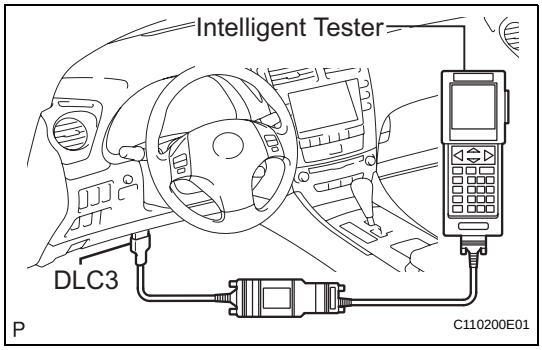
OBD ll regulations require that the vehicle's on-board computer illuminates the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction in:

(a) The emission control systems and components.
(b) The power train control components (which affect vehicle emissions).
(c) The computer itself.

In addition, the applicable DTCs (Diagnostic Trouble Codes) prescribed by SAE J2012 are recorded on 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.

To check for DTCs, connect the intelligent tester to the DLC3. The tester displays DTCs, freeze frame data, and a variety of the engine data. The DTCs and freeze frame data can be erased with the tester. In order to enhance OBD function on vehicles and develop the Off-Board diagnosis system, CAN communication is introduced in this system (CAN: Controller Area Network). It minimizes a gap between technician skills and vehicle technology. CAN is a network, which uses a pair of data transmission lines, spanning multiple computers and sensors. It allows a high speed communication between the systems and simplification of the wire harness connection. Since this system is equipped with the CAN communication, connecting the CAN VIM (VIM: Vehicle Interface Module) with the intelligent tester is necessary to display any information from the ECM. (Also the communication between the intelligent tester and the ECM uses CAN communication signal). When confirming the DTCs and any data of the ECM, connect the CAN VIM between the DLC3 and the intelligent tester.





2. NORMAL MODE AND CHECK MODE

The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2 trip detection logic is used to ensure accurate detection of malfunctions. Check mode is also available as an option for technicians. In check mode, 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent problems (intelligent tester only).

3. 2 TRIP DETECTION LOGIC

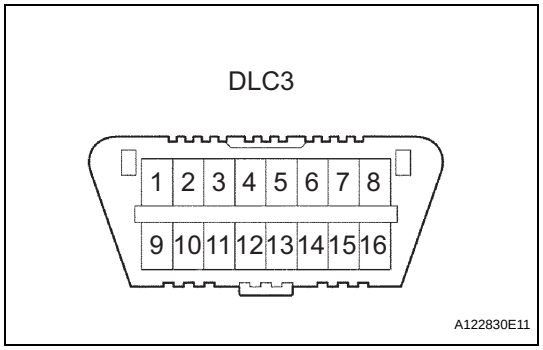
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the next subsequent drive cycle, the MIL is illuminated (2nd trip).

4. FREEZE FRAME DATA

The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

5. DLC3 (Data link Connector 3)

The vehicle's ECM uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols	Terminal No.	Names	Reference terminal	Results	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery ground	Body ground	9 to 14 V	Always
CANH	6	CAN "High" line	CANL	54 to 69 Ω	Engine switch off
CANH	6	CAN "High" line	Battery positive	1 MΩ or higher	Engine switch off
CANH	6	CAN "High" line	CG	1 kΩ or higher	Engine switch off
CANL	14	CAN "Low" line	Battery positive	1 MΩ or higher	Engine switch off
CANL	14	CAN "Low" line	CG	1 kΩ or higher	Engine switch off

HINT:

The DLC3 is the interface prepared for reading various data from the vehicle's ECM. After connecting the cable of an intelligent tester, turn the ignition switch on (IG) and turn the tester on. If a communication failure message is displayed on the tester screen (on the tester: UNABLE TO CONNECT TO VEHICLE), a problem exists in either the vehicle or tester. In order to identify the location of the problem, connect the tester to another vehicle.

If communication is normal: Inspect the DLC3 on the original vehicle.

If communication is still not possible: The problem is probably in the tester itself. Consult the Service Department listed in the instruction manual.

6. BATTERY VOLTAGE

Standard Voltage:

11 to 14 V

If voltage is below 11 V, replace or recharge the battery before proceeding to the next step.

7. MIL (Malfunction Indicator Lamp)

(a) The MIL is illuminated when the engine switch is first turned on (the engine is not running).

(b) The MIL should turn OFF when the engine is started. If the MIL remains illuminated, the diagnosis system has detected a malfunction or abnormality in the system.

HINT:
If the MIL is not illuminated when the engine switch is first turned on, check the MIL circuit (See page ES-471).

DTC CHECK / CLEAR

NOTICE:
When the diagnosis system is changed from the normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode are erased. Before changing modes, always check and make a note of DTCs and freeze frame data.

HINT:

- DTCs which are stored in the ECM can be displayed on an intelligent tester. An intelligent tester can display the current and pending DTCs.
- Some DTCs are not set if the ECM does not detect the same malfunction again during a second consecutive driving cycle. However, such malfunctions, detected on only one occasion, are stored as pending DTCs.

1. CHECK DTC (Using an intelligent tester)

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Check the DTC(s) and freeze frame data, and then write them down.
(f) Check the details of the DTC(s) (See page ES-63).

2. CLEAR DTC (Using an intelligent tester)

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
(e) Press the YES button.

3. CLEAR DTC (Without using an intelligent tester)

(a) Perform either one of the following operations:
(1) Disconnect the negative battery cable for more than 1 minute.
(2) Remove the EFI MAIN and ETCS fuses from the Engine Room relay block located inside the engine compartment for more than 1 minute.

FREEZE FRAME DATA

1. DESCRIPTION

The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

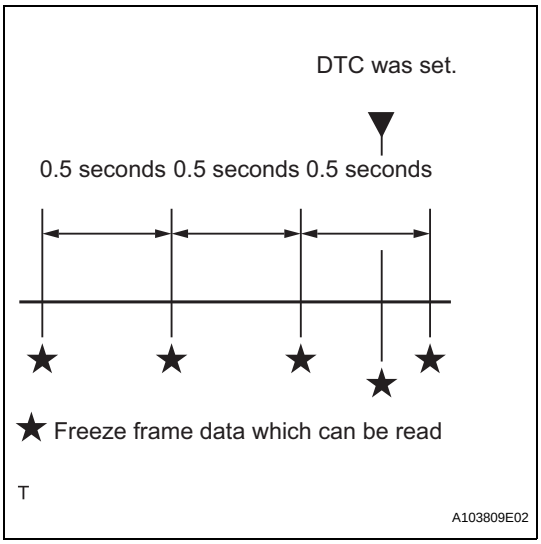
HINT:

If it is impossible to duplicate the problem even though a DTC is detected, confirm the freeze frame data.

The ECM records engine conditions as freeze frame data every 0.5 seconds. Using the intelligent tester, five separate sets of freeze frame data, including the data values at the time when the DTC was set, can be checked.

– 3 data set before the DTC was set.
– 1 data set when the DTC was set.
– 1 data set after the DTC was set.

These data sets can be used to simulate the condition of the vehicle around the time of the occurrence of the malfunction. The data may assist in identifying of the cause of the malfunction, and in judging whether it was temporary or not.



2. LIST OF FREEZE FRAME DATA

LABEL (Intelligent Tester Display)	Measurement Item/Range	Diagnostic Note
IGN ADVANCE	Ignition advance	-
CALC LOAD	Calculate load	Calculated load by ECM
VEHICLE LOAD	Vehicle load	-
MAF	Mass air flow volume	If value is approximately 0.0 g/s: • Mass air flow meter power source circuit open or shorted • VG circuit open or shorted If value is 160.0 g/s or more: • E2G circuit open
ENGINE SPD	Engine speed	-
VEHICLE SPD	Vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature	If value is -40°C (-40°F), sensor circuit open If value is 140°C (284°F), sensor circuit shorted
INTAKE AIR	Intake air temperature	If value is -40°C (-40°F), sensor circuit open If value is 140°C (284°F), sensor circuit shorted
FUEL PRESS	Fuel pressure	-
AIR-FUEL PATIO	Air-fuel ratio	-
AMBIENT TEMP	Ambient temperature	-
PURGE DENSITY	Learning value of purge density	-
PURGE FLOW	Purge flow	-
EVAP PURGE VSV	EVAP purge VSV duty ratio	-
KNOCK CRRT VAL	Correction learning value of knocking	-

LABEL (Intelligent Tester Display)	Measurement Item/Range	Diagnostic Note
KNOCK FB VAL	Feedback value of knocking	-
ACCEL POS #1	Absolute Accelerator Pedal Position (APP) No. 1	-
ACCEL POS #2	Absolute APP No. 2	-
THROTTLE POS	Throttle position	Read value with ignition switch on (IG) (Do not start engine)
THROTTLE POS	Throttle sensor positioning	Read value with ignition switch on (IG) (Do not start engine)
THROTTLE POS #2	Throttle sensor positioning #2	-
THROTTLE MOT	Throttle motor	-
O2S B1 S2	Heated oxygen sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
O2S B2 S2	Heated oxygen sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
AFS B1 S1	A/F sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
AFS B2 S1	A/F sensor output	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
TOTAL FT #1	Total fuel trim	-
TOTAL FT #2	Total fuel trim	-
SHORT FT #1	Short-term fuel trim	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim	Overall fuel compensation carried out in long-term to compensate for a continual deviation of short-term fuel trim from central valve
SHORT FT #2	Short-term fuel trim	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #2	Long-term fuel trim	Overall fuel compensation carried out in long-term to compensate for a continual deviation of short-term fuel trim from central valve
FUEL SYS #1	Fuel system status (Bank 1)	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control malfunctioning
FUEL SYS #2	Fuel system status (Bank 2)	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control malfunctioning
O2FT B1 S2	Fuel trim at heated oxygen sensor	Same as SHORT FT #1
O2FT B2 S2	Fuel trim at heated oxygen sensor	Same as SHORT FT #1

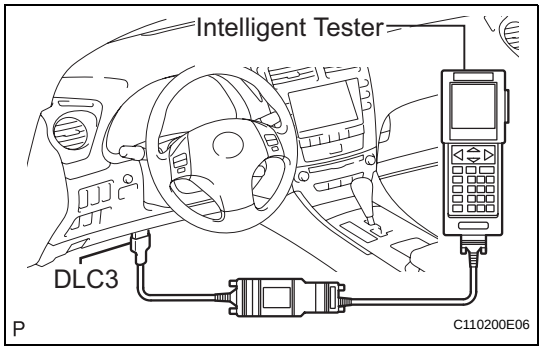
LABEL (Intelligent Tester Display)	Measurement Item/Range	Diagnostic Note
AF FT B1 S1	Fuel trim at A/F sensor	-
AF FT B2 S1	Fuel trim at A/F sensor	-
CAT TEMP B1 S1	Catalyst temperature	-
CAT TEMP B2 S1	Catalyst temperature	-
CAT TEMP B1 S2	Catalyst temperature	-
CAT TEMP B2 S2	Catalyst temperature	-
INI COOL TEMP	Initial engine coolant temperature	-
INI INTAKE TEMP	Initial intake air temperature	-
INJ VOL	Injection volume	-
ING TIMMING D4	Injection timing (D4)	-
FUEL PUMP D4	Fuel pump duty (D4)	-
COMBUSTION D4	Combustion status (D4)	-
ACC RELAY	ACC relay	-
STARTER RELAY	Starter relay	-
STARTER SIG	Starter signal	-
STARTER CONTROL	Starter control	-
CTP SW	Closed throttle position switch	-
A/C SIGNAL	A/C signal	-
PNP SW (NSW)	Neutral position switch signal	-
ELECT LOAD SIG	Electrical load signal	-
STOP LIGHT SW	Stop light switch	-
ENG OIL PRES SW	Engine oil pressure switch signal	Always ON while engine is running
BATTERY VOLTAGE	Battery voltage	-
ATM PRESSURE	Atmospheric pressure	-
FUEL PMP SP CTL	Fuel pump speed control status	-
VVT CTRL B2	VVT control status (bank 2)	-
EVAP (Purge) VSV	EVAP Purge VSV	-
A/C MAG CLUTCH	A/C magnetic clutch relay	-
FUEL PUMP/SPD	Fuel pump/speed status	-
VVT CTRL B1	VVT control status (bank 1)	-
TC/TE1	TC and TE1 terminals of DLC3	-
SCV DUTY RATIO	SCV duty ratio	-
VVTL AIM ANGL#1	VVT aim angle (bank 1)	-
VVT CHNG ANGL#1	VVT change angle (bank 1)	-
VVT OCV D B1	VVT OCV operation duty (bank 1)	-
VVT EX HOLD B1	VVT exhaust hold duty ratio learning value (bank 1)	-
VVT EX CHG ANG1	VVT exhaust change angle (bank 1)	-
VVT EX OCV D B1	VVT exhaust OCV duty (bank 1)	-
VVTL AIM ANGL#2	VVT aim angle (bank 2)	-
VVT CHNG ANGL#2	VVT change angle (bank 2)	-
VVT OCV DUTY B2	VVT OCV operation duty (bank 2)	-
VVT EX HOLD B2	VVT exhaust hold duty ratio learning value (bank 2)	-
VVT EX CHG ANG2	VVT exhaust change angle (bank 2)	-
VVT EX OCV D B2	VVT exhaust OCV duty (bank 2)	-
FC IDL	Idle fuel cut	ON: when throttle valve fully closed and engine speed over 1,500 rpm
FC TAU	FC TAU	Fuel cut being performed under very light load to prevent incomplete engine combustion

LABEL (Intelligent Tester Display)	Measurement Item/Range	Diagnostic Note
IGNITION	Ignition	-
CYL ALL	All cylinder misfire rate	Displayed only during idling
MISFIRE RPM	Misfire RPM	-
CYL ALL	All cylinder misfire rate	Displayed only during idling
MISFIRE RPM	Misfire RPM	-
MISFIRE LOAD	Misfired load	-
MISFIRE MARGIN	Misfire monitoring	-
ENG RUN TIME	Accumulated engine running time	-
TIME DTC CLEAR	Cumulative time after DTC cleared	-
DIST DTC CLEAR	Accumulated distance after DTC cleared	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared	-

CHECK MODE PROCEDURE

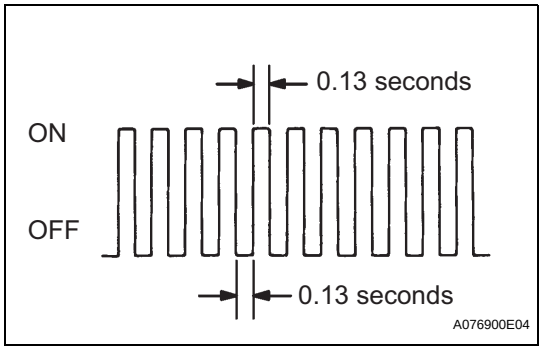
HINT:
Intelligent tester only:
Compared to the normal mode, check mode is more sensitive to malfunctions. Therefore, check mode can detect the malfunctions that cannot be detected in normal mode.
NOTICE:
All the stored DTCs and freeze frame data are erased if: 1) the ECM is changed from normal mode to check mode or vice versa; or 2) the engine switch is turned from on (IG) to ACC or off while in check mode. Before changing modes, always check and note any DTCs and freeze frame data.

ES



1. CHECK MODE PROCEDURE (Using an intelligent tester)

(a) Check and ensure the following conditions:
  (1) Battery positive voltage 11 V or more.
  (2) Throttle valve fully closed.
  (3) Transmission in the P or N position.
  (4) A/C switch OFF.
(b) Turn the engine switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn the tester on.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE.
(g) Switch the ECM from normal mode to check mode.



(h) Make sure that the MIL flashes as shown in the illustration.
(i) Start the engine.
(j) Make sure that the MIL turns OFF.
(k) Simulate the conditions of the malfunction described by the customer.
(l) Check for DTCs and freeze frame data using the tester.

FAIL-SAFE CHART

If any of the following DTCs are set, the ECM enters fail-safe mode to allow the vehicle to be driven temporarily.

DTCs	Components	Fail-Safe Operations	Fail-Safe Deactivation Conditions
P0031, P0032, P0051 and P0052	Air-Fuel Ratio (A/F) Sensor Heater	ECM turns off A/F sensor heater	Ignition switch off
P0037, P0038, P0057 and P0058	Heated Oxygen (HO2) Sensor Heater	ECM turns off HO2 sensor heater	Ignition switch off
P0100, P0102 and P0103	Mass Air Flow (MAF) Meter	ECM calculates ignition timing according to engine speed and throttle valve position	Pass condition detected
P0110, P0112 and P0113	Intake Air Temperature (IAT) Sensor	ECM estimates IAT to be 20°C (68°F)	Pass condition detected
P0115, P0117 and P0118	Engine Coolant Temperature (ECT) Sensor	ECM estimates ECT to be 80°C (176°F)	Pass condition detected
P0120, P0121, P0122, P0123, P0220, P0222, P0223, P0604, P0606, P0607, P0657, P2102, P2103, P2111, P2112, P2118, P2119 and P2135	Electronic Throttle Control System (ETCS)	ECM cuts off throttle actuator current and throttle valve returned to 6.5° throttle position by return spring ECM then adjusts engine output by controlling fuel injection (intermittent fuel-cut) and ignition timing in accordance with accelerator pedal opening angle, to allow vehicle to continue at minimal speed*	Pass condition detected and then ignition switch turned off
P0327, P0328, P0332 and P0333	Knock Sensor	ECM sets ignition timing to maximum retard	Ignition switch off
P0351 to P0356	Igniter	ECM cuts fuel	Pass condition detected
P2120, P2121, P2122, P2123, P2125, P2127, P2128 and P2138	Accelerator Pedal Position (APP) Sensor	APP sensor has 2 sensor circuits: Main and Sub If either of circuits malfunctions, ECM controls engine using the other circuit If both of circuits malfunction, ECM regards accelerator pedal as being released. As a result, throttle valve is closed and engine idles	Pass condition detected and then ignition switch turned off

NOTE:

*: The vehicle can be driven slowly when the accelerator pedal is depressed slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By reading the DATA LIST displayed on an intelligent tester, you can check values, including those of the switches, sensors, and actuators, without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method of shortening diagnostic time.

NOTICE:

In the table below, the values listed under Normal Condition are reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn the tester on.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) Check the values by referring to the table below.

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
INJECTOR	Injection period of No. 1 cylinder: Min.: 0 ms, Max.: 32.64 ms	1.2 to 2.4 ms: Idling	-
IGN ADVANCE	Ignition timing advance for No. 1 cylinder: Min.: -64 deg, Max.: 63.5 deg	BTDC 7 to 24 deg: Idling	-
CALC LOAD	Load calculated by ECM: Min.: 0%, Max.: 100%	• 10 to 20%: Idling • 10 to 20%: Running without load at 2,500 rpm	Load value
VEHICLE LOAD	Vehicle load: Min.: 0%, Max.: 25,700%	Actual vehicle load	Load percentage in terms of maximum intake air flow amount
MAF	Air flow rate from MAF meter: Min.: 0 g/sec., Max.: 655.35 g/sec.	2 to 5 g/sec.: Idling 8 to 19 g/sec.: Running without load at 2,500 rpm	If value is approximately 0.0 g/sec.: • Mass air flow meter power source circuit open • VG circuit open or shorted If value is 160.0 g/sec. or more: • E2G circuit open
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	600 to 700 rpm: Idling	-
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
COOLANT TEMP	Engine coolant temperature: Min.: -40°C, Max.: 140°C	80 to 100°C (176 to 212°F): After warming up	• If value is -40°C (-40°F): sensor circuit open • If value is 140°C (284°F) or more: sensor circuit shorted
INTAKE AIR	Intake air temperature: Min.: -40°C, Max.: 140°C	Equivalent to ambient air temperature	• If value is -40°C (-40°F): sensor circuit open • If value is 140°C (284°F) or more: sensor circuit shorted
AIR-FUEL RATIO	Ratio compared to stoichiometric level: Min.: 0, Max.: 1.999	0.8 to 1.2: Idling	-
PURGE DENSITY	Learning value of purge density: Min.: -50, Max.: 350	-40 to 0: Idling	Service data

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
EVAP PURGE FLOW	Ratio of evaporative purge flow to intake air volume: Min.: 0%, Max.: 102.4%	0 to 8%: Idling	-
EVAP PURGE VSV	EVAP (PURGE) VSV control duty: Min.: 0%, Max.: 100%	0 to 100%: Idling	Command signal from ECM
VAPOR PRES PUMP	Vapor pressure: Min.: 33.853 kPa, Max.: 125.596 kPa	0 kPa: Fuel tank cap removed	EVAP system pressure monitored by canister pressure sensor
VAPOR PRES CALC	Vapor pressure (calculated): Min.: -5.632 kPa, Max.: 715.264 kPa	0 kPa: Fuel tank cap removed	EVAP system pressure monitored by canister pressure sensor
KNOCK CRRT VAL	Correction learning value of knocking: Min: -64°CA, Max.: 1,984°CA	0 to 22°CA: Driving at 70 km/h (44 mph)	Service data
KNOCK FB VAL	Feedback value of knocking: Min: -64°CA, Max.: 1,984°CA	-22 to 0°CA: Driving at 70 km/h (44 mph)	Service data
CLUTCH	Clutch current: Min.: 0 A, Max.: 2.49 A	-	-
EVAP VAPOR PRES	EVAP vapor pressure: Min.: 0 kPa, Max.: 327.675 kPa	0 kPa: Fuel tank cap removed	EVAP system pressure monitored by canister pressure sensor
ACCEL POS #1	Absolute Accelerator Pedal Position (APP) No. 1: Min.: 0%, Max.: 100%	10 to 22%: Accelerator pedal released 54 to 86%: Accelerator pedal fully depressed	Read value with ignition switch ON (Do not start engine)
ACCEL POS #2	Absolute APP No. 2: Min.: 0%, Max.: 100%	12 to 42%: Accelerator pedal released 66 to 98%: Accelerator pedal fully depressed	Read value with ignition switch ON (Do not start engine)
ACCEL POS #1	APP sensor No. 1 voltage: Min.: 0 V, Max.: 4.98 V	-	ETCS freeze frame data
ACCEL POS #2	APP sensor No. 2 voltage: Min.: 0 V, Max.: 4.98 V	-	ETCS freeze frame data
ACCEL POS #1	APP sensor No. 1 voltage: Min.: 0 V, Max.: 5 V	0.5 to 1.1 V: Accelerator pedal released 2.6 to 4.5 V: Accelerator pedal fully depressed	Read value with ignition switch ON (Do not start engine)
ACCEL POS #2	APP sensor No. 2 voltage: Min.: 0 V, Max.: 5 V	1.2 to 2.0 V: Accelerator pedal released 3.4 to 5.0 V: Accelerator pedal fully depressed	Read value with ignition switch ON (Do not start engine)
ACCEL IDL POS	Whether or not accelerator pedal position sensor detecting idle: ON or OFF	ON: Idling	-
THRTL LEARN VAL	Throttle valve fully closed (learned value): Min.: 0 V, Max.: 5 V	0.4 to 0.8 V	-
ACCEL SSR #1 AD	Accelerator fully closed value No. 1 (AD): Min.: 0 V, Max.: 4.98 V	-	ETCS service data
ACCEL LRN VAL#1	Accelerator fully closed learning value No. 1: Min.: 0 deg, Max.: 124.512 deg	-	ETCS service data
ACCEL LRN VAL#2	Accelerator fully closed learning value No. 2: Min.: 0 deg, Max.: 124.512 deg	-	ETCS service data
FAIL #1	Whether or not fail safe function executed: ON or OFF	ON: ETCS has failed	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
FAIL #2	Whether or not fail safe function executed: ON or OFF	ON: ETCS has failed	-
ST1	Starter signal: ON or OFF	ON: Cranking	-
SYS GUARD JUDGE	System guard: ON or OFF	-	ETCS service data
OPN MALFUNCTION	Open side malfunction: ON or OFF	-	ETCS service data
THROTTLE POS	Absolute throttle position sensor: Min.: 0%, Max.: 100%	• 10 to 24%: Throttle fully closed • 64 to 96%: Throttle fully open	• Calculated value based on VTA1 • Read value with ignition switch ON (Do not start engine)
THROTTL IDL POS	Whether or not throttle position sensor detecting idle: ON or OFF	ON: Idling	-
THRTL REQ POS	Throttle requirement position: Min.: 0 V, Max.: 5 V	0.5 to 1.0 V: Idling	-
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	0 to 18%: Idling	Calculated value based on VTA1
THROTTLE POS #2	Absolute throttle position sensor No. 2: Min.: 0%, Max.: 100%	-	Calculated value based on VTA2
THROTTLE POS #1	Throttle position sensor No. 1 output voltage: Min.: 0 V, Max.: 4.98 V	-	ETCS freeze frame data
THROTTLE POS #2	Throttle position sensor No. 2 output voltage: Min.: 0 V, Max.: 4.98 V	-	ETCS freeze frame data
THROTTLE POS #1	Throttle position sensor No. 1 output voltage: Min.: 0 V, Max.: 5 V	• 0.5 to 1.2 V: Throttle fully closed • 3.2 to 4.8 V: Throttle fully open	-
THROTTLE POS #2	Throttle position sensor No. 2 output voltage: Min.: 0 V, Max.: 5 V	• 2.0 to 2.9 V: Throttle fully closed • 4.6 to 5.0 V: Throttle fully open	Read value with ignition switch ON (Do not start engine)
THRTL COMND VAL	Throttle position command value: Min.: 0 V, Max.: 4.9804 V	0.5 to 4.8 V	Read value with ignition switch ON (Do not start engine)
THROTTLE SSR #1	Throttle sensor opener position No. 1: Min.: 0 V, Max.: 4.9804 V	0.6 to 0.9 V	ETCS service data
THROTTLE SSR #2	Throttle sensor opener position No. 2: Min.: 0 V, Max.: 4.9804 V	2.2 to 2.6 V	ETCS service data
THRTL SSR #1 AD	Throttle position sensor No. 1 output voltage (AD): Min.: 0 V, Max.: 4.9804 V	0.6 to 0.9 V	ETCS service data
THROTTLE MOT	Whether or not throttle actuator control permitted: ON or OFF	ON: Idling	Read value with ignition switch ON (Do not start engine)
THROTTLE MOT	Throttle actuator current: Min.: 0 A, Max.: 80 A	0 to 3.0 A: Idling	-
THROTTLE MOT	Throttle actuator: Min.: 0%, Max.: 100%	0.5 to 40%: Idling	-
THROTTLE MOT	Throttle actuator current: Min.: 0 A, Max.: 19.92 A	0 to 3.0 A: Idling	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
THROTL OPN DUTY	Throttle actuator opening duty ratio: Min.: 0%, Max.: 100%	0 to 40%: Idling	• When accelerator pedal is depressed, duty ratio increaseds • Read value with ignition switch ON (Do not start engine)
THROTL CLS DUTY	Throttle actuator closed duty ratio: Min.: 0%, Max.: 100%	0 to 40%: Idling	• When accelerator pedal is increaseds quickly, duty ratio increaseds • Read value with ignition switch ON (Do not start engine)
THRTL MOT (OPN)	Throttle actuator duty ratio (open): Min.: 0%, Max.: 100%	-	ETCS service data
THRTL MOT (CLS)	Throttle actuator duty ratio (closed): Min.: 0%, Max.: 100%	-	ETCS service data
O2S B1 S2	Heated oxygen sensor output voltage for bank 1 sensor 2: Min.: 0 V Max.: 1.275 V	0.1 to 0.9 V: Driving at 70 km/h (44 mph)	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
O2S B2 S2	Heated oxygen sensor output voltage for bank 2 sensor 2: Min.: 0 V Max.: 1.275 V	0.1 to 0.9 V: Driving at 70 km/h (44 mph)	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
AF FT B1 S1	Short-term fuel trim associated with sensor 1: Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) =Lean • Stoichiometric air-fuel ratio=1 • Value greater than 1 (1.001 to 1.999) = Rich	-
AF FT B2 S1	Short-term fuel trim associated with sensor 1: Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) =Lean • Stoichiometric air-fuel ratio=1 • Value greater than 1 (1.001 to 1.999) = Rich	-
AFS B1 S1	A/F sensor output voltage for bank 1 sensor 1: Min.: 0 V Max.: 7.999 V	2.8 to 3.8 V: Idling	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
AFS B2 S1	A/F sensor output voltage for bank 2 sensor 1: Min.: 0 V Max.: 7.999 V	2.8 to 3.8 V: Idling	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables technician to check output voltage of sensor
TOTAL FT #1	Total fuel trim of bank 1 Average value for fuel system of bank 1: Min.: -0.5, Max.: 0.496	-0.2 to 0.2: Idling	-
TOTAL FT #2	Total fuel trim of bank 2 Average value for fuel system of bank 2: Min.: -0.5, Max.: 0.496	-0.2 to 0.2: Idling	-
SHORT FT #1	Short-term fuel trim of bank 1: Min.: -100%, Max.: 99.2%	-20 to 20%	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
SHORT FT #2	Short-term fuel trim of bank 2: Min.: -100%, Max.: 99.2%	-20 to 20%	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long-term fuel trim of bank 1: Min.: -100%, Max.: 99.2%	-20 to 20%	Overall fuel compensation carried out in long-term to compensate for continual deviation of short-term fuel trim from central value

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
LONG FT #2	Long-term fuel trim of bank 2: Min.: -100%, Max.: 99.2%	-20 to 20%	Overall fuel compensation carried out in long-term to compensate for continual deviation of short-term fuel trim from central value
FUEL SYS #1	Fuel system status (Bank 1): OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling after warming up	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using A/F sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but A/F sensor, which used for fuel control malfunctioning
FUEL SYS #2	Fuel system status (Bank 2): OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling after warming up	• OL (Open Loop): Has not yet satisfied conditions to go closed loop • CL (Closed Loop): Using A/F sensor as feedback for fuel control • OL DRIVE: Open loop due to driving conditions (fuel enrichment) • OL FAULT: Open loop due to detected system fault • CL FAULT: Closed loop but A/F sensor, which used for fuel control, malfunctioning
O2FT B1 S2	Short-term fuel trim associated with bank 1 sensor 2: Min.: -100%, Max.: 99.2%	-20 to 20%	Same as SHORT FT #1
O2FT B2 S2	Short-term fuel trim associated with bank 2 sensor 2: Min.: -100%, Max.: 99.2%	-20 to 20%	Same as SHORT FT #2
AF FT B1 S1	Short-term fuel trim associated with bank 1 sensor 1: Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) = Lean • Stoichiometric air-fuel ratio = 1 • Value greater than 1 (1.001 to 1.999) = Rich	-
AF FT B2 S1	Short-term fuel trim associated with bank 2 sensor 1: Min.: 0, Max.: 1.999	• Value less than 1 (0.000 to 0.999) = Lean • Stoichiometric air-fuel ratio = 1 • Value greater than 1 (1.001 to 1.999) = Rich	-
AFS B1 S1	A/F sensor current: Min.: -128 mA, Max.: 127.99 mA	-	-
AFS B2 S1	A/F sensor current: Min.: -128 mA, Max.: 127.99 mA	-	-
CAT TEMP B1S1	Estimated catalyst temperature (bank 1 sensor 1): Min.: -40°C, Max.: 6,513.5°C	-	-
CAT TEMP B1S2	Estimated catalyst temperature (bank 1 sensor 2): Min.: -40°C, Max.: 6,513.5°C	-	-
CAT TEMP B2S1	Estimated catalyst temperature (bank 2 sensor 1): Min.: -40°C, Max.: 6,513.5°C	-	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
CAT TEMP B2S2	Estimated catalyst temperature (bank 2 sensor 2): Min.: -40°C, Max.: 6,513.5°C	-	-
S O2S B1S2	Sub heated oxygen sensor impedance (bank 1 sensor 2): Min.: 0 Ω, Max.: 21,247.68 Ω	-	-
S O2S B2S2	Sub heated oxygen sensor impedance (bank 2 sensor 2): Min.: 0 Ω, Max.: 21,247.68 Ω	-	-
INI COOL TEMP	Engine coolant temperature at engine start: Min.: -40°C, Max.: 120°C	Close to ambient air temperature	-
INI INTAKE TEMP	Intake air temperature at engine start: Min.: -40°C, Max.: 120°C	Close to ambient air temperature	-
INJ VOL	Injection volume (cylinder 1): Min.: 0 ml, Max.: 2.048 ml	Max.: 0.5 ml	Fuel volume injected over 10 injections
STARTER SIG	Starter signal: ON or OFF	ON: Cranking	-
PS SW	Power steering signal: ON or OFF	ON: Power steering operation	-
PS SIGNAL	Power steering signal (history): ON or OFF	ON: When steering wheel is first turned after battery terminals connected	Signal status usually ON until battery terminals disconnected
CTP SW	Closed throttle position switch: ON or OFF	• ON: Throttle fully closed • OFF: Throttle open	-
A/C SIGNAL	A/C signal: ON or OFF	ON: A/C ON	-
PNP SW [NSW]	PNP switch status: ON or OFF	ON: P or N position	-
ELECT LOAD SIG	Electrical load signal: ON or OFF	ON: Headlights or defogger turned ON	-
STOP LIGHT SW	Stop light switch: ON or OFF	ON: Brake pedal depressed	-
+BM	Whether or not electric throttle control system power input: ON or OFF	ON: Idling	-
+BM VOLTAGE	+BM voltage: Min.: 0, Max.: 19.922	10 to 15 V: Idling	ETCS service data
BATTERY VOLTAGE	Battery voltage: Min.: 0 V, Max.: 65.535 V	9 to 14 V: Idling	-
ACTUATOR POWER	Actuator power supply: ON or OFF	ON: Idling	ETCS service data
ATM PRESSURE	Atmospheric pressure: Min.: 0 kPa, Max.: 255 kPa	Equivalent to atmospheric pressure (absolute pressure)	-
BATTERY CURRENT	Battery current: Min.: -100 A, Max.: 100 A	-	-
BATTERY TEMP	Battery temperature: Min.: -45 °C, Max.: 156.4 °C	-	-
ALT OUTPUT DUTY	Generator output duty ratio: Min.: 0%, Max.: 100%	-	During charge control
ALT V NORMAL	Request output voltage: Min.: 0 V, Max.: 20 V	9 to 14 V	Not during alternator forced activation
ALT V ACT TST	Request output voltage: Min.: 0 V, Max.: 20 V	-	During alternator forced activation
FUEL PMP SP CTL	Fuel pump speed control status: ON or OFF	Idling: ON	Active Test support data

ES

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
ACIS VSV	VSV for Acoustic Control Induction System Status: ON or OFF	-	ON: Open OFF: Closed
EVAP (Purge) VSV	Purge VSV status: ON or OFF	-	Active Test support data
FUEL PUMP / SPD	Fuel pump status: ON or OFF	-	Active Test support data
VVT CTRL B1	VVT control (bank 1) status: ON or OFF	-	Active Test support data
VVT CTRL B2	VVT control (bank 2) status: ON or OFF	-	Active Test support data
VACUUM PUMP	Key-off EVAP system leak detection pump status: ON or OFF	-	Active Test support data
EVAP VENT VAL	Key-off EVAP system vent valve status: ON or OFF	-	Active Test support data
FAN MOTOR	Electric fan motor: ON or OFF	ON: Electric fan motor operating	Active Test support data
AICV VSV	VSV for Air Intake Control System Status: ON or OFF	-	-
TC/TE1	TC and CG (TE1) terminal of DLC3: ON or OFF	-	Active Test support data
VVTL AIM ANGL#1*2	VVT aim angle (bank 1 Intake side): Min.: 0%, Max.: 100%	-	-
VVT CHNG ANGL#1*2	VVT change angle (bank 1 Intake side): Min.: 0°FR, Max.: 60°FR	0 to 5°FR: Idling	Displacement angle during intrusive operation
VVT OCV DUTY B1*2	VVT OCV operation duty (bank 1 Intake side): Min.: 0%, Max.: 100%	0 to 100%	Requested duty value for intrusive operation
VVT EX HOLD B1*2	VVT exhaust hold duty ratio learning value (bank 1 Exhaust side): Min.: 0%, Max.: 100%	10 to 50%: Idling	Requested duty value for intrusive operation
VVT EX CHG ANG1*2	VVT change angle (bank 1 Exhaust side): Min.: 0° FR, Max.: 60° FR	0 to 5° FR: Idling	Displacement angle during intrusive operation
VVT EX OCV D B1*2	VVT OCV operation duty (bank 1 Exhaust side): Min.: 0%, Max.: 100%	0 to 100%	Requested duty value for intrusive operation
VVTL AIM ANGL #2*2	VVT aim angle (bank 2 Intake side): Min.: 0%, Max.: 100%	-	-
VVT CHNG ANGL #2*2	VVT change angle (bank 2 Intake side): Min.: 0° FR, Max.: 60° FR	0 to 5° FR: Idling	Displacement angle during intrusive operation
VVT OCV DUTY B2*2	VVT OCV operation duty (bank 2 Intake side): Min.: 0%, Max.: 100%	0 to 100%	Requested duty value for intrusive operation
VVT EX HOLD B2*2	VVT exhaust hold duty ratio learning value (bank 2 Exhaust side): Min.: 0%, Max.: 100%	10 to 50%: Idling	Requested duty value for intrusive operation
VVT EX CHG ANG2*2	VVT change angle (bank 2 Exhaust side): Min.: 0° FR, Max.: 60° FR	0 to 5° FR: Idling	Displacement angle during intrusive operation

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
VVT EX OCV D B2*2	VVT exhaust operation duty (bank 2 Exhaust side): Min.: 0%, Max.: 100%	0 to 100%	Requested duty value for intrusive operation
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operation	FC IDL = "ON" when throttle valve fully closed and engine speed over 2,800 rpm
FC TAU	Fuel cut TAU (Fuel cut with very light load): ON or OFF	ON: Fuel cut operating	Fuel cut being performed with very light load to prevent incomplete engine combustion
IGNITION	Ignition counter: Min.: 0, Max.: 800	0 to 800	-
CYL #1	Misfire ratio of cylinder 1: Min.: 0, Max.: 255	0	This item displayed only during idling
CYL #2	Misfire ratio of cylinder 2: Min.: 0, Max.: 255	0	This item displayed only during idling
CYL #3	Misfire ratio of cylinder 3: Min.: 0, Max.: 255	0	This item displayed only during idling
CYL #4	Misfire ratio of cylinder 4: Min.: 0, Max.: 255	0	This item displayed only during idling
CYL #5	Misfire ratio of cylinder 5: Min.: 0, Max.: 255	0	This item displayed only during idling
CYL #6	Misfire ratio of cylinder 6: Min.: 0, Max.: 255	0	This item displayed only during idling
CYL ALL	All cylinders misfire rate: Min.: 0, Max.: 255	0 to 35	-
MISFIRE RPM	Engine RPM for first misfire range: Min.: 0 rpm, Max.: 6,375 rpm	0 rpm: Misfire 0	-
MISFIRE LOAD	Engine load for first misfire range: Min.: 0 g/rev, Max.: 3.98 g/rev	0 g/rev: Misfire 0	-
MISFIRE MARGIN	Misfire monitoring: Min.: -100%, Max.: 99.22%	-100 to 99.22%	Misfire detecting margin
#CODES	#Codes: Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode: ON or OFF	ON: Check mode ON	(see page ES-49)
SPD TEST	Check mode result for vehicle speed sensor: COMPL or INCMPL	-	-
MISFIRE TEST	Check mode result for misfire monitor: COMPL or INCMPL	-	-
OXS1 TEST	Check mode result for HO2 sensor (bank 1): COMPL or INCMPL	-	-
OXS2 TEST	Check mode result for HO2 sensor (bank 2): COMPL or INCMPL	-	-
A/F SSR TEST B1	Check mode result for air-fuel ratio sensor (bank 1): COMPL or INCMPL	-	-
A/F SSR TEST B2	Check mode result for air-fuel ratio sensor (bank 2): COMPL or INCMPL	-	-
MIL	MIL status: ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance: Min.: 0 km, Max.: 65,535 km	Distance driven after DTC detected	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
MIL ON RUN TIME	Running time from MIL ON: Min.: 0 minutes, Max.: 65,535 minutes	Running time after MIL ON	-
ENG RUN TIME	Engine run time: Min.: 0 seconds, Max.: 65,535 seconds	Time after engine start	-
TIME DTC CLEAR	Time after DTC cleared: Min.: 0 minutes, Max.: 65,535 minutes	Time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared: Min.: 0 km, Max.: 65,535 km	Distance driven after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared: Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
OBD CERT	OBD requirement	OBD2	-
#CARB CODES	Number of emission related DTCs	-	-
COMP MON	Comprehensive component monitor: NOT AVL or AVAIL	-	-
FUEL MON	Fuel system monitor: NOT AVL or AVAIL	-	-
MISFIRE MON	Misfire monitor: NOT AVL or AVAIL	-	-
O2S (A/FS) HTR	O2S (A/FS) heater monitor: NOT AVL or AVAIL	-	-
O2S (A/FS) HTR	O2S (A/FS) heater monitor: COMPL or INCMPL	-	-
O2S (A/FS) MON	O2S (A/FS) monitor: NOT AVL or AVAIL	-	-
O2S (A/FS) MON	O2S (A/FS) monitor: COMPL or INCMPL	-	-
EVAP MON	EVAP monitor: NOT AVL or AVAIL	-	-
EVAP MON	EVAP monitor: COMPL or INCMPL	-	-
CAT MON	Catalyst monitor: NOT AVL or AVAIL	-	-
CAT MON	Catalyst monitor: COMPL or INCMPL	-	-
CCM ENA	Comprehensive component monitor: UNABLE or ENABLE	-	-
CCM CMPL	Comprehensive component monitor: COMPL or INCMPL	-	-
FUEL ENA	Fuel system monitor: UNABLE or ENABLE	-	-
FUEL CMPL	Fuel system monitor: COMPL or INCMPL	-	-
MISFIRE ENA	Misfire monitor: UNABLE or ENABLE	-	-
MISFIRE CMPL	Misfire monitor: COMPL or INCMPL	-	-
EGR ENA	EGR monitor: UNABLE or ENABLE	-	-
EGR CMPL	EGR monitor: COMPL or INCMPL	-	-
HTR ENA	O2S (A/FS) heater monitor: UNABLE or ENABLE	-	-

Intelligent Tester Display	Measurement Item: Range (Display)	Normal Condition*1	Diagnostic Note
HTR CMPL	O2S (A/FS) heater monitor: COMPL or INCMPL	-	-
O2S (A/FS) ENA	O2S (A/FS) monitor: UNABLE or ENABLE	-	-
O2S (A/FS) CMPL	O2S (A/FS) monitor: COMPL or INCMPL	-	-
ACRF ENA	A/C monitor: UNABLE or ENABLE	-	-
ACRF CMPL	A/C monitor: COMPL or INCMPL	-	-
AIR ENA	2nd Air monitor: UNABLE or ENABLE	-	-
AIR CMPL	2nd Air monitor: COMPL or INCMPL	-	-
EVAP ENA	EVAP monitor: UNABLE or ENABLE	-	-
EVAP CMPL	EVAP monitor: COMPL or INCMPL	-	-
HCAT ENA	Heated catalyst monitor: UNABLE or ENABLE	-	-
HCAT CMPL	Heated catalyst monitor: COMPL or INCMPL	-	-
CAT ENA	Catalyst monitor: UNABLE or ENABLE	-	-
CAT CMPL	Catalyst monitor: COMPL or INCMPL	-	-
MODEL CODE	Model code information	-	Identifying model code: GSA3#
ENGINE TYPE	Engine type information	-	Identifying engine type: 2GRFE
CYLINDER NUMBER	Cylinder number: Min.: 0, Max.: 255	-	Identifying cylinder number: 6
TRANSMISSION	Transmission type information	-	Identifying transmission type: 5AT
DESTINATION	Destination information	-	Identifying destination: A (America)
MODEL YEAR	Model year: Min.: 1900, Max.: 2155	-	Identifying model year: 200#
SYSTEM	Engine system information	-	Identifying engine system: GASLIN (gasoline engine)

HINT:

- *1: If no idling conditions are specified, the transmission gear selector lever should be in the N or P position, and the A/C switch and all accessory switches should be OFF.
- *2: DATA LIST values are displayed only when performing the following ACTIVE TESTs: VVT B1, VVT B2, VVT EX B1 and VVT EX B2. For other ACTIVE TESTs, the DATA LIST value will be 0.

ES

2. ACTIVE TEST

HINT:

Performing an ACTIVE TEST enables components including the relays, VSV (Vacuum Switching Valve) and actuators, to be operated without removing any parts. The ACTIVE TEST can be performed with an intelligent tester. Performing an ACTIVE TEST as the first step in troubleshooting is one method of shortening diagnostic time.

DATA LIST can be displayed during ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(e) Perform the ACTIVE TEST by referring to the table below.

Intelligent Tester Displays	Test Details	Control Ranges	Diagnostic Note
INJ VOL	Change injection volume	Between -12.5 and 24.8 %	• All injectors tested at the same time • Perform test at less than 3,000 rpm • Injection volume can be changed in 1 % graduations within control range
A/F CONTROL	Change injection volume	Lower by 12.5 % or increase by 24.8 %	• Perform test at less than 3,000 rpm • A/F CONTROL enables to check and to graph A/F (Air Fuel Ratio) sensor and Heated Oxygen (HO2) sensor voltage outputs • To conduct test, select following menu items: ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2, and press YES and ENTER followed by F4
FUEL PMP SP CTL	Fuel pump speed control	ON (low speed)/OFF (high speed)	Test is possible when following conditions are met: • Ignition switch is on (IG) • Engine is stopped
EVAP (PURGE) VSV	Activate VSV for EVAP (Purge)	ON/OFF	-
EVAP VSV (ALONE)	Activate EVAP VSV control	ON/OFF	-
VVT CTRL B1	Turn on and off OCV (Oil Control Valve)	ON/OFF	• Engine stalls or idles roughly when OCV turned ON • Normal engine running or idling when OCV OFF
VVT CTRL B2	Turn on and off OCV (Oil Control Valve)	ON/OFF	• Engine stalls or idles roughly when OCV turned ON • Normal engine running or idling when OCV OFF
A/C MAG CLUTCH	Control the A/C magnet clutch	ON/OFF	-
FUEL PUMP / SPD	Activate fuel pump (C/OPN Relay)	ON/OFF	-
TC/TE1	Turn on and off TC and TE1 connection	ON/OFF	• ON: TC and TE1 connected • OFF: TC and TE1 disconnected
FC IDL PROHBT	Prohibit idling fuel cut control	ON/OFF	-

Intelligent Tester Displays	Test Details	Control Ranges	Diagnostic Note
COOLING FAN	Control Electric Cooling Fan	ON/OFF	Test is possible when following conditions are met: • Ignition switch is on (IG) • Ignition is stopped
ACC CUT	Active ACC cut relay	ON/OFF	Test is possible when following conditions are met: • Ignition switch is on (IG) • Ignition is stopped
STARTER	Starter	ON/OFF	-
ETCS OPEN SLOW	Throttle actuator	ON: Throttle valve opens slowly	Test is possible when following conditions are met: • Ignition switch is on (IG) • Ignition is stopped • Accelerator pedal is fully depressed (APP: 58 degrees or more)
ETCS CLOSE SLOW	Throttle actuator	ON: Throttle valve closes slowly	Same as above
ETCS OPEN FAST	Throttle actuator	ON: Throttle valve opens fast	Same as above
ETCS CLOSE FAST	Throttle actuator	ON: Throttle valve closes fast	Same as above
FUEL CUT #1	Cylinder #1 injector fuel cut	ON/OFF	Test is possible during vehicle stopping and engine idling.
FUEL CUT #2	Cylinder #2 injector fuel cut	ON/OFF	Same as above
FUEL CUT #3	Cylinder #3 injector fuel cut	ON/OFF	Same as above
FUEL CUT #4	Cylinder #4 injector fuel cut	ON/OFF	Same as above
FUEL CUT #5	Cylinder #5 injector fuel cut	ON/OFF	Same as above
FUEL CUT #6	Cylinder #6 injector fuel cut	ON/OFF	Same as above
COMPRESS CHECK	Check the cylinder compression pressure	ON/OFF	Fuel injection and ignition stop in all cylinders.
VVT B1	Control VVT (bank 1)	-128 to 127 % This valve added to present OCV control duty 100 %: Maximum advance -100 %: Maximum retard	Engine stalls or roughly idles when VVT actuator is operated by 100 %. Test is possible during idling.
VVT B2	Control VVT (bank 2)	Between -128 and 127%	Same as above
VVT EX B1	Control VVT (bank 1)	-128 to 127 % This valve added to present OCV control duty 100 %: Maximum advance -100 %: Maximum retard	-
VVT EX B2	Control VVT (bank 2)	Between -128 and 127 %	Same as above
TARGET FUEL PRS	Control the target fuel pressure	Between -12.5 and 24.8 %	Test is possible during vehicle stopping and engine idling.
INJ TIMING #1	Control injection timing #1	Between -16 CA and 16 CA	Test is possible during vehicle stopping and engine idling.
INJ TIMING #2	Control injection timing #2	Between -16 CA and 16 CA	Same as above
INJ TIMING #3	Control injection timing #3	Between -16 CA and 16 CA	Same as above
INJ TIMING #4	Control injection timing #4	Between -16 CA and 16 CA	Same as above
INJ TIMING #5	Control injection timing #5	Between -16 CA and 16 CA	Same as above
INJ TIMING #6	Control injection timing #6	Between -16 CA and 16 CA	Same as above
VACUUM PUMP	Vacuum pump	ON/OFF	-
VENT VALVE	Vent valve	ON/OFF	-

3. SYSTEM CHECK

HINT:

Performing a SYSTEM CHECK enables the system, which consists of multiple actuators, to be operated without removing any parts. In addition, it can show whether or not any DTCs are set, and can detect potential malfunctions in the system. The SYSTEM CHECK can be performed with an intelligent tester.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK.
(e) Perform the SYSTEM CHECK by referring to the table below.

ES

Intelligent Tester Display	Test Detail	Recommended Fuel Temperature	Diagnostic Note
EVAP SYS CHECK (AUTO OPERATION)	Perform 4 steps in order to operate EVAP key-off monitor automatically	35°C (95°F) or less	• If no DTCs are in PENDING CODE after performing this test, system is functioning normally • Refer to EVAP system
EVAP SYS CHECK (MANUAL OPERATION)	Perform 4 steps in order to operate EVAP key-off monitor automatically	35°C (95°F) or less	• Used to detect malfunctioning parts • Refer to EVAP system

DIAGNOSTIC TROUBLE CODE CHART

HINT:
The parameters listed in the chart may not conform exactly to those read during the DTC check due to the type of instrument or other factors.
If a trouble code is displayed during the DTC check in the check mode, check the circuit for the code listed in the table below. For details of each code, refer to the "See page" column in the DTC chart.

SFI SYSTEM:

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0010	Camshaft Position "A" Actuator Circuit (Bank 1)	1. Open or short in Oil Control Valve (OCV) for intake camshaft circuit 2. OCV for intake camshaft (bank 1) 3. ECM	Comes on	DTC stored	ES-79
P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)	1. Valve timing 2. OCV for intake camshaft 3. OCV filter 4. Intake camshaft timing gear assembly 5. ECM	Comes on	DTC stored	ES-84
P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)	Same as DTC P0011	Comes on	DTC stored	ES-84
P0013	Camshaft Position "B" Actuator Circuit / Open (Bank 1)	1. Open or short in Oil Control Valve (OCV) for exhaust camshaft circuit 2. OCV for exhaust camshaft (bank 1) 3. ECM	Comes on	DTC stored	ES-91
P0014	Camshaft Position "B" - Timing Over-Advanced or System Performance (Bank 1)	1. Valve timing 2. OCV for exhaust camshaft 3. OCV filter 4. Exhaust camshaft 5. ECM	Comes on	DTC stored	ES-96
P0015	Camshaft Position "B" - Timing Over-Retarded (Bank 1)	Same as DTC P0014	Comes on	DTC stored	ES-96
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)	1. Mechanical system (Timing chain has jumped teeth or chain is stretched) 2. ECM	Comes on	DTC stored	ES-104
P0017	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor B)	Same as DTC P0016	Comes on	DTC stored	ES-104
P0018	Crankshaft Position - Camshaft Position Correlation (Bank 2 Sensor A)	Same as DTC P0016	Comes on	DTC stored	ES-104
P0019	Crankshaft Position - Camshaft Position Correlation (Bank 2 Sensor B)	Same as DTC P0016	Comes on	DTC stored	ES-104

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0020	Camshaft Position "A" Actuator Circuit (Bank 2)	1. Open or short in Oil Control Valve (OCV) for intake camshaft circuit 2. OCV for intake camshaft (bank 2) 3. ECM	Comes on	DTC stored	ES-79
P0021	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 2)	Same as DTC P0011	Comes on	DTC stored	ES-84
P0022	Camshaft Position "A" - Timing Over-Retarded (Bank 2)	Same as DTC P0011	Comes on	DTC stored	ES-84
P0023	Camshaft Position "B" Actuator Circuit / Open (Bank 2)	1. Open or short in Oil Control Valve (OCV) for exhaust camshaft circuit 2. OCV for exhaust camshaft (bank 2) 3. ECM	Comes on	DTC stored	ES-91
P0024	Camshaft Position "B" - Timing Over-Advanced or System Performance (Bank 2)	Same as DTC P0014	Comes on	DTC stored	ES-96
P0025	Camshaft Position "B" - Timing Over-Retarded (Bank 2)	Same as DTC P0014	Comes on	DTC stored	ES-96
P0031	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	1. Open in Air-Fuel Ratio (A/F) sensor heater circuit 2. A/F sensor heater (bank 1 sensor 1) 3. A/F sensor heater relay 4. ECM	Comes on	DTC stored	ES-107
P0032	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)	1. Short in A/F sensor heater circuit 2. A/F sensor heater (bank 1 sensor 1) 3. A/F sensor heater relay 4. ECM	Comes on	DTC stored	ES-107
P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	1. Open in Heated Oxygen (HO2) sensor heater circuit 2. HO2 sensor heater (bank 1 sensor 2) 3. Engine room junction block (EFI relay) 4. ECM	Comes on	DTC stored	ES-115
P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	1. Short in HO2 sensor heater circuit 2. HO2 sensor heater (bank 1 sensor 2) 3. Engine room junction block (EFI relay) 4. ECM	Comes on	DTC stored	ES-115

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0051	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 2 Sensor 1)	1. Open in A/F sensor heater circuit 2. A/F sensor heater (bank 2 sensor 1) 3. A/F sensor heater relay 4. ECM	Comes on	DTC stored	ES-107
P0052	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 2 Sensor 1)	1. Short in A/F sensor heater circuit 2. A/F sensor heater (bank 2 sensor 1) 3. A/F sensor heater relay 4. ECM	Comes on	DTC stored	ES-107
P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)	1. Open in HO2 sensor heater circuit 2. HO2 sensor heater (bank 2 sensor 2) 3. Engine room junction block (EFI relay) 4. ECM	Comes on	DTC stored	ES-115
P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)	1. Short in HO2 sensor heater circuit 2. HO2 sensor heater (bank 2 sensor 2) 3. Engine room junction block (EFI relay) 4. ECM	Comes on	DTC stored	ES-115
P0100	Mass or Volume Air Flow Circuit	1. Open or short in Mass Air Flow (MAF) meter circuit 2. MAF meter 3. ECM	Comes on	DTC stored	ES-125
P0101	Mass Air Flow Circuit Range / Performance Problem	MAF meter	Comes on	DTC stored	ES-133
P0102	Mass or Volume Air Flow Circuit Low Input	1. Open in MAF meter circuit 2. Short in MAF meter circuit 3. MAF meter 4. ECM	Comes on	DTC stored	ES-125
P0103	Mass or Volume Air Flow Circuit High Input	1. Short in MAF meter circuit (+B circuit) 2. MAF meter 3. ECM	Comes on	DTC stored	ES-125
P0110	Intake Air Temperature Circuit Malfunction	1. Open or short in Intake Air Temperature (IAT) sensor circuit 2. IAT sensor (built into Mass Air Flow [MAF] meter) 3. ECM	Comes on	DTC stored	ES-136
P0111	Intake Air Temperature Sensor Gradient Too High	MAF meter	Comes on	DTC stored	ES-142

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0112	Intake Air Temperature Circuit Low Input	1. Short in IAT sensor circuit 2. IAT sensor (built into MAF meter) 3. ECM	Comes on	DTC stored	ES-136
P0113	Intake Air Temperature Circuit High Input	1. Open in IAT sensor circuit 2. IAT sensor (built into MAF meter) 3. ECM	Comes on	DTC stored	ES-136
P0115	Engine Coolant Temperature Circuit Malfunction	1. Open or short in Engine Coolant Temperature (ECT) sensor circuit 2. ECT sensor 3. ECM	Comes on	DTC stored	ES-145
P0116	Engine Coolant Temperature Circuit Range / Performance Problem	1. Thermostat 2. ECT sensor	Comes on	DTC stored	ES-151
P0117	Engine Coolant Temperature Circuit Low Input	1. Short in ECT sensor circuit 2. ECT sensor 3. ECM	Comes on	DTC stored	ES-145
P0118	Engine Coolant Temperature Circuit High Input	1. Open in ECT sensor circuit 2. ECT sensor 3. ECM	Comes on	DTC stored	ES-145
P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction	1. Throttle Position (TP) sensor (built into throttle body) 2. ECM	Comes on	DTC stored	ES-154
P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem	TP sensor (built into throttle body)	Comes on	DTC stored	ES-161
P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input	1. TP sensor (built into throttle body) 2. Short in VTA1 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	ES-154
P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA1 circuit 3. Open in E2 circuit 4. Short between VC and VTA1 circuits 5. ECM	Comes on	DTC stored	ES-154
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	1. Cooling system 2. ECT sensor 3. Thermostat	Comes on	DTC stored	ES-165
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	1. Thermostat 2. Cooling system 3. ECT sensor 4. ECM	Comes on	DTC stored	ES-168

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	1. Open or short in HO2 sensor (bank 1 sensor 2) circuit 2. HO2 sensor (bank 1 sensor 2) 3. HO2 sensor heater (bank 1 sensor 2) 4. A/F sensor (bank 1 sensor 1) 5. Engine room junction block (EFI relay) 6. Gas leakage from exhaust system	Comes on	DTC stored	ES-171
P0137	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)	1. Open in HO2 sensor (bank 1 sensor 2) circuit 2. HO2 sensor (bank 1 sensor 2) 3. HO2 sensor heater (bank 1 sensor 2) 4. Engine room junction block (EFI relay) 5. Gas leakage from exhaust system	Comes on	DTC stored	ES-171
P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	1. Short in HO2 sensor (bank 1 sensor 2) circuit 2. HO2 sensor (bank 1 sensor 2) 3. ECM internal circuit malfunction	Comes on	DTC stored	ES-171
P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	1. HO2 sensor 2. ECM	Comes on	DTC stored	ES-115
P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	1. Open or short in HO2 sensor (bank 2 sensor 2) circuit 2. HO2 sensor (bank 2 sensor 2) 3. HO2 sensor heater (bank 2 sensor 2) 4. A/F sensor (bank 2 sensor 1) 5. Engine room junction block (EFI relay) 6. Gas leakage from exhaust system	Comes on	DTC stored	ES-171
P0157	Oxygen Sensor Circuit Low Voltage (Bank 2 Sensor 2)	1. Open in HO2 sensor (bank 2 sensor 2) circuit 2. HO2 sensor (bank 2 sensor 2) 3. HO2 sensor heater (bank 2 sensor 2) 4. Engine room junction block (EFI relay) 5. Gas leakage from exhaust system	Comes on	DTC stored	ES-171

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0158	Oxygen Sensor Circuit High Voltage (Bank 2 Sensor 2)	1. Short in HO2 sensor (bank 2 sensor 2) circuit 2. HO2 sensor (bank 2 sensor 2) 3. ECM internal circuit malfunction	Comes on	DTC stored	ES-171
P0161	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)	1. HO2 sensor 2. ECM	Comes on	DTC stored	ES-115
P0171	System Too Lean (Bank 1)	1. Air induction system 2. Injector blockage 3. MAF meter 4. ECT sensor 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (bank 1 sensor 1) circuit 8. A/F sensor (bank 1 sensor 1) 9. A/F sensor heater (bank 1 sensor 1) 10. A/F sensor heater relay 11. A/F sensor heater and A/F sensor heater relay circuits 12. PCV hose connections 13. PCV valve and hose 14. ECM	Comes on	DTC stored	ES-191
P0172	System Too Rich (Bank 1)	1. Injector leakage or blockage 2. MAF meter 3. ECT sensor 4. Ignition system 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (bank 1 sensor 1) circuit 8. A/F sensor (bank 1 sensor 1) 9. A/F sensor heater (bank 1 sensor 1) 10. A/F sensor heater relay 11. A/F sensor heater and A/F sensor heater relay circuits 12. ECM	Comes on	DTC stored	ES-191

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0174	System Too Lean (Bank 2)	1. Air induction system 2. Injector blockage 3. MAF meter 4. ECT sensor 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (bank 2 sensor 1) circuit 8. A/F sensor (bank 2 sensor 1) 9. A/F sensor heater (bank 2 sensor 1) 10. A/F sensor heater relay 11. A/F sensor heater and A/F sensor heater relay circuits 12. PCV hose connections 13. PCV valve and hose 14. ECM	Comes on	DTC stored	ES-191
P0175	System Too Rich (Bank 2)	1. Injector leakage or blockage 2. MAF meter 3. ECT sensor 4. Ignition system 5. Fuel pressure 6. Gas leakage from exhaust system 7. Open or short in A/F sensor (bank 2 sensor 1) circuit 8. A/F sensor (bank 2 sensor 1) 9. A/F sensor heater (bank 2 sensor 1) 10. A/F sensor heater relay 11. A/F sensor heater and A/F sensor heater relay circuits 12. ECM	Comes on	DTC stored	ES-191
P0220	Throttle / Pedal Position Sensor / Switch "B" Circuit	1. TP sensor (built into throttle body) 2. ECM	Comes on	DTC stored	ES-154
P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input	1. TP sensor (built into throttle body) 2. Short in VTA2 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	ES-154
P0223	Throttle / Pedal Position Sensor / Switch "B" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA2 circuit 3. Open in E2 circuit 4. Short between VC and VTA2 circuits 5. ECM	Comes on	DTC stored	ES-154

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0300	Random / Multiple Cylinder Misfire Detected	1. Open or short in engine wire harness 2. Connector connections 3. Vacuum hose connection 4. Ignition system 5. Injector 6. Fuel pressure 7. Mass Air Flow (MAF) meter 8. Engine Coolant Temperature (ECT) sensor 9. Compression pressure 10. Valve clearance 11. Valve timing 12. PCV valve and hose 13. PCV hose connections 14. Air induction system 15. ECM	Comes on or flashes	DTC stored	ES-204
P0301	Cylinder 1 Misfire Detected	Same as DTC P0300	Comes on or flashes	DTC stored	ES-204
P0302	Cylinder 2 Misfire Detected	Same as DTC P0300	Comes on or flashes	DTC stored	ES-204
P0303	Cylinder 3 Misfire Detected	Same as DTC P0300	Comes on or flashes	DTC stored	ES-204
P0304	Cylinder 4 Misfire Detected	Same as DTC P0300	Comes on or flashes	DTC stored	ES-204
P0305	Cylinder 5 Misfire Detected	Same as DTC P0300	Comes on or flashes	DTC stored	ES-204
P0306	Cylinder 6 Misfire Detected	Same as DTC P0300	Comes on or flashes	DTC stored	ES-204
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	1. Short in knock sensor 1 circuit 2. Knock sensor 1 3. ECM	Comes on	DTC stored	ES-216
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	1. Open in knock sensor 1 circuit 2. Knock sensor 1 3. ECM	Comes on	DTC stored	ES-216
P0332	Knock Sensor 2 Circuit Low Input (Bank 2)	1. Short in knock sensor 2 circuit 2. Knock sensor 2 3. ECM	Comes on	DTC stored	ES-216
P0333	Knock Sensor 2 Circuit High Input (Bank 2)	1. Open in knock sensor 2 circuit 2. Knock sensor 2 3. ECM	Comes on	DTC stored	ES-216
P0335	Crankshaft Position Sensor "A" Circuit	1. Open or short in Crankshaft Position Sensor (CKP) circuit 2. CKP sensor 3. Sensor plate (CKP sensor plate) 4. ECM	Comes on	DTC stored	ES-222
P0339	Crankshaft Position Sensor "A" Circuit Intermittent	Same as DTC P0335	Does not come on	DTC stored	ES-222

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0340	Camshaft Position Sensor Circuit Malfunction	1. Open or short in VVT sensor for intake camshaft circuit 2. VVT sensor for intake camshaft 3. Camshaft timing gear for intake camshaft 4. Jumped tooth of timing chain for intake camshaft 5. ECM	Comes on	DTC stored	ES-228
P0342	Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor)	Same as DTC P0340	Comes on	DTC stored	ES-228
P0343	Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor)	Same as DTC P0340	Comes on	DTC stored	ES-228
P0345	Camshaft Position Sensor "A" Circuit (Bank 2)	Same as DTC P0340	Comes on	DTC stored	ES-228
P0347	Camshaft Position Sensor "A" Circuit Low Input (Bank 2)	Same as DTC P0340	Comes on	DTC stored	ES-228
P0348	Camshaft Position Sensor "A" Circuit High Input (Bank 2)	Same as DTC P0340	Comes on	DTC stored	ES-228
P0351	Ignition Coil "A" Primary / Secondary Circuit	1. Ignition system 2. Open or short in IGF1 or IGT circuit (1 to 6) between ignition coil and ECM 3. No. 1 to No. 6 ignition coils 4. ECM	Comes on	DTC stored	ES-234
P0352	Ignition Coil "B" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-234
P0353	Ignition Coil "C" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-234
P0354	Ignition Coil "D" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-234
P0355	Ignition Coil "E" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-234
P0356	Ignition Coil "F" Primary / Secondary Circuit	Same as DTC P0351	Comes on	DTC stored	ES-234
P0365	Camshaft Position Sensor "B" Circuit (Bank 1)	1. Open or short in VVT sensor for exhaust camshaft circuit 2. VVT sensor for exhaust camshaft 3. Exhaust camshaft 4. Jumped tooth of timing chain 5. ECM	Comes on	DTC stored	ES-243

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0367	Camshaft Position Sensor "B" Circuit Low Input (Bank 1)	1. Open or short in VVT sensor for exhaust camshaft circuit 2. VVT sensor for exhaust camshaft 3. Exhaust camshaft 4. Jumped tooth of timing chain 5. ECM	Comes on	DTC stored	ES-243
P0368	Camshaft Position Sensor "B" Circuit High Input (Bank 1)	1. Open or short in VVT sensor for exhaust camshaft circuit 2. VVT sensor for exhaust camshaft 3. Exhaust camshaft 4. Jumped tooth of timing chain 5. ECM	Comes on	DTC stored	ES-243
P0390	Camshaft Position Sensor "B" Circuit (Bank 2)	1. Open or short in VVT sensor for exhaust camshaft circuit 2. VVT sensor for exhaust camshaft 3. Exhaust camshaft 4. Jumped tooth of timing chain 5. ECM	Comes on	DTC stored	ES-243
P0392	Camshaft Position Sensor "B" Circuit Low Input (Bank 2)	1. Open or short in VVT sensor for exhaust camshaft circuit 2. VVT sensor for exhaust camshaft 3. Exhaust camshaft 4. Jumped tooth of timing chain 5. ECM	Comes on	DTC stored	ES-243
P0393	Camshaft Position Sensor "B" Circuit High Input (Bank 2)	1. Open or short in VVT sensor for exhaust camshaft circuit 2. VVT sensor for exhaust camshaft 3. Exhaust camshaft 4. Jumped tooth of timing chain 5. ECM	Comes on	DTC stored	ES-243
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	1. Gas leakage from exhaust system 2. A/F sensor (bank 1 sensor 1) 3. HO2 sensor (bank 1 sensor 2) 4. Exhaust manifold (Three-Way Catalytic Converter [TWC])	Comes on	DTC stored	ES-249

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0430	Catalyst System Efficiency Below Threshold (Bank 2)	1. Gas leakage from exhaust system 2. A/F sensor (bank 2 sensor 1) 3. HO2 sensor (bank 2 sensor 2) 4. Exhaust manifold (Three-Way Catalytic Converter [TWC])	Comes on	DTC stored	ES-249
P043E	Evaporative Emission System Reference Orifice Clog Up	1. Pump module 2. Connector / wire harness (Pump module - ECM) 3. ECM	Comes on	DTC stored	ES-255
P043F	Evaporative Emission System Reference Orifice High Flow	1. Pump module 2. Connector / wire harness (Pump module - ECM) 3. ECM	Comes on	DTC stored	ES-255
P0441	Evaporative Emission Control System Incorrect Purge Flow	1. EVAP VSV 2. Connector / wire harness (EVAP VSV - ECM) 3. ECM 4. Pump module 5. Leakage from EVAP system 6. Leakage from EVAP line (EVAP VSV - Intake manifold)	Comes on	DTC stored	ES-260
P0450	Evaporative Emission Control System Pressure Sensor / Switch	1. Pump module (including pressure sensor) 2. ECM	Comes on	DTC stored	ES-267
P0451	Evaporative Emission Control System Pressure Sensor Range / Performance	1. Pump module (including pressure sensor) 2. Connector / wire harness (between pump module and ECM) 3. ECM	Comes on	DTC stored	ES-267
P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input	1. Pump module (including pressure sensor) 2. Connector / wire harness (between pump module and ECM) 3. ECM	Comes on	DTC stored	ES-267
P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input	1. Pump module (include pressure sensor) 2. Connector / wire harness (between pump module and ECM) 3. ECM	Comes on	DTC stored	ES-267

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0455	Evaporative Emission Control System Leak Detected (Gross Leak)	1. Fuel tank cap (loose) 2. Leakage from EVAP line (Canister - Fuel tank) 3. Leakage from EVAP line (EVAP VSV - Canister) 4. Pump module 5. Leakage from fuel tank 6. Leakage from canister	Comes on	DTC stored	ES-274
P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	Same as DTC P0455	Comes on	DTC stored	ES-274
P0500	Vehicle Speed Sensor "A"	1. Vehicle speed sensor 2. Vehicle speed sensor signal circuit 3. Combination meter 4. ECM 5. Skid control ECU	Comes on	DTC stored	ES-279
P0504	Brake Switch "A" / "B" Correlation	1. Short in stop light switch signal circuit 2. Stop light switch 3. ECM	Does not come on	DTC stored	ES-284
P0505	Idle Control System Malfunction	1. ETCS (Electronic Throttle Control System) 2. Air induction system 3. PCV hose connection 4. ECM	Comes on	DTC stored	ES-288
P050A	Cold Start Idle Air Control System Performance	1. Throttle body assembly 2. MAF meter 3. Air induction system 4. PCV hose connections 5. VVT system 6. Air cleaner filter element 7. ECM	Comes on	DTC stored	ES-291
P050B	Cold Start Ignition Timing Performance	Same as DTC P050A	Comes on	DTC stored	ES-291
P0560	System Voltage	1. Open in back-up power source circuit 2. ECM	Comes on	DTC stored	ES-297
P0604	Internal Control Module Random Access Memory (RAM) Error	ECM	Comes on	DTC stored	ES-302
P0606	ECM / PCM Processor	ECM	Comes on (except when there is a malfunction in the ECM internal circuit)	DTC stored	ES-302

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P0607	Control Module Performance	ECM	Comes on (except when there is a malfunction in the cruise control switch circuit)	DTC stored	ES-302
P0617	Starter Relay Circuit High	1. Park / Neutral Position (PNP) switch 2. Starter relay circuit 3. Cranking holding function circuit 4. Ignition switch 5. ECM	Comes on	DTC stored	ES-304
P0630	VIN not Programmed or Mismatch - ECM / PCM	ECM	Comes on	DTC stored	ES-309
P0657	Actuator Supply Voltage Circuit / Open	ECM	Comes on	DTC stored	ES-302
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	1. Short in park / neutral position switch circuit 2. Park / neutral position switch 3. ECM	Comes on	DTC stored	ES-311
P0724	Brake Switch "B" Circuit High	1. Short in stop light switch signal circuit 2. Stop light switch 3. ECM	Comes on	DTC stored	ES-284
P2102	Throttle Actuator Control Motor Circuit Low	1. Open in throttle actuator circuit 2. Throttle actuator 3. ECM	Comes on	DTC stored	ES-320
P2103	Throttle Actuator Control Motor Circuit High	1. Short in throttle actuator circuit 2. Throttle actuator 3. Throttle valve 4. Throttle body assembly 5. ECM	Comes on	DTC stored	ES-320
P2111	Throttle Actuator Control System - Stuck Open	1. Throttle actuator 2. Throttle body 3. Throttle valve	Comes on	DTC stored	ES-324
P2112	Throttle Actuator Control System - Stuck Closed	Same as DTC P2111	Comes on	DTC stored	ES-324
P2118	Throttle Actuator Control Motor Current Range / Performance	1. Open in ETCS power source circuit 2. ETCS fuse 3. ECM	Comes on	DTC stored	ES-327
P2119	Throttle Actuator Control Throttle Body Range / Performance	1. ETCS 2. ECM	Comes on	DTC stored	ES-331
P2120	Throttle / Pedal Position Sensor / Switch "D" Circuit	1. Accelerator Pedal Position (APP) sensor 2. ECM	Comes on	DTC stored	ES-334
P2121	Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance	1. Accelerator Pedal Position (APP) sensor 2. ECM	Comes on	DTC stored	ES-341

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P2122	Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input	1. Accelerator Pedal Position (APP) sensor 2. Open in VCP1 circuit 3. Open or ground short in VPA circuit 4. ECM	Comes on	DTC stored	ES-334
P2123	Throttle / Pedal Position Sensor / Switch "D" Circuit High Input	1. Accelerator Pedal Position (APP) sensor 2. Open in EPA circuit 3. ECM	Comes on	DTC stored	ES-334
P2125	Throttle / Pedal Position Sensor / Switch "E" Circuit	1. Accelerator Pedal Position (APP) sensor 2. ECM	Comes on	DTC stored	ES-334
P2127	Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input	1. Accelerator Pedal Position (APP) sensor 2. Open in VCP2 circuit 3. Open or ground short in VPA2 circuit 4. ECM	Comes on	DTC stored	ES-334
P2128	Throttle / Pedal Position Sensor / Switch "E" Circuit High Input	1. Accelerator Pedal Position (APP) sensor 2. Open in EPA2 circuit 3. ECM	Comes on	DTC stored	ES-334
P2135	Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation	1. Short between VTA1 and VTA2 circuits 2. TP sensor (built into throttle body) 3. ECM	Comes on	DTC stored	ES-154
P2138	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation	1. Short between VPA and VPA2 circuits 2. APP sensor 3. ECM	Comes on	DTC stored	ES-334
P2195	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)	1. Open or short in A/F sensor (bank 1 sensor 1) circuit 2. A/F sensor (bank 1 sensor 1) 3. A/F sensor heater (bank 1 sensor 1) 4. A/F sensor heater relay 5. A/F sensor heater and relay circuits 6. Air induction system 7. Fuel pressure 8. Injector 9. ECM	Comes on	DTC stored	ES-345
P2196	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Same as DTC P2195	Comes on	DTC stored	ES-345

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P2197	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 2 Sensor 1)	1. Open or short in A/F sensor (bank 2 sensor 1) circuit 2. A/F sensor (bank 2 sensor 1) 3. A/F sensor heater (bank 2 sensor 1) 4. A/F sensor heater relay 5. A/F sensor heater and relay circuits 6. Air induction system 7. Fuel pressure 8. Injector 9. ECM	Comes on	DTC stored	ES-345
P2198	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 2 Sensor 1)	Same as DTC P2197	Comes on	DTC stored	ES-345
P2238	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1)	1. Open or short in A/F sensor (bank 1 sensor 1) circuit 2. A/F sensor (bank 1 sensor 1) 3. A/F sensor heater (bank 1 sensor 1) 4. A/F sensor heater relay 5. A/F sensor heater and relay circuits 6. ECM	Comes on	DTC stored	ES-364
P2239	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1)	Same as DTC P2238	Comes on	DTC stored	ES-364
P2241	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 2 Sensor 1)	1. Open or short in A/F sensor (bank 2 sensor 1) circuit 2. A/F sensor (bank 2 sensor 1) 3. A/F sensor heater (bank 2 sensor 1) 4. A/F sensor heater relay 5. A/F sensor heater and relay circuits 6. ECM	Comes on	DTC stored	ES-364
P2242	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 2 Sensor 1)	Same as DTC P2241	Comes on	DTC stored	ES-364
P2252	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1)	Same as DTC P2238	Comes on	DTC stored	ES-364
P2253	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1)	Same as DTC P2238	Comes on	DTC stored	ES-364
P2255	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 2 Sensor 1)	Same as DTC P2241	Comes on	DTC stored	ES-364

DTC No.	Detection Item	Suspected Trouble Area	MIL	Memory	See page
P2256	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 2 Sensor 1)	Same as DTC P2241	Comes on	DTC stored	ES-364
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	1. Pump module 2. Connector / wire harness (Pump module - ECM) 3. ECM	Comes on	DTC stored	ES-255
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	1. Pump module 2. Connector / wire harness (Pump module - ECM) 3. ECM	Comes on	DTC stored	ES-255
P2419	Evaporative Emission System Switching Valve Control Circuit Low	1. Pump module 2. Connector / wire harness (Pump module - ECM) 3. ECM	Comes on	DTC stored	ES-255
P2420	Evaporative Emission System Switching Valve Control Circuit High	1. Pump module (0.02 inch orifice, vacuum pump, vent valve) EVAP system monitor 2. Connector / wire harness (Pump module - ECM) 3. ECM	Comes on	DTC stored	ES-373
P2610	ECM / PCM Internal Engine Off Timer Performance	ECM	Comes on	DTC stored	ES-377
P2A00	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)	1. Open or short in A/F sensor (bank 1 sensor 1) circuit 2. A/F sensor (bank1 sensor 1) 3. ECM	Comes on	DTC stored	ES-380
P2A03	A/F Sensor Circuit Slow Response (Bank 2 Sensor 1)	1. Open or short in A/F sensor (bank 2 sensor 1) circuit 2. A/F sensor (bank 2 sensor 1) 3. ECM	Comes on	DTC stored	ES-380
U0101	Lost Communication with TCM	1. Open or short in TCM and ECM circuit 2. TCM 3. ECM	Comes on	DTC stored	ES-389

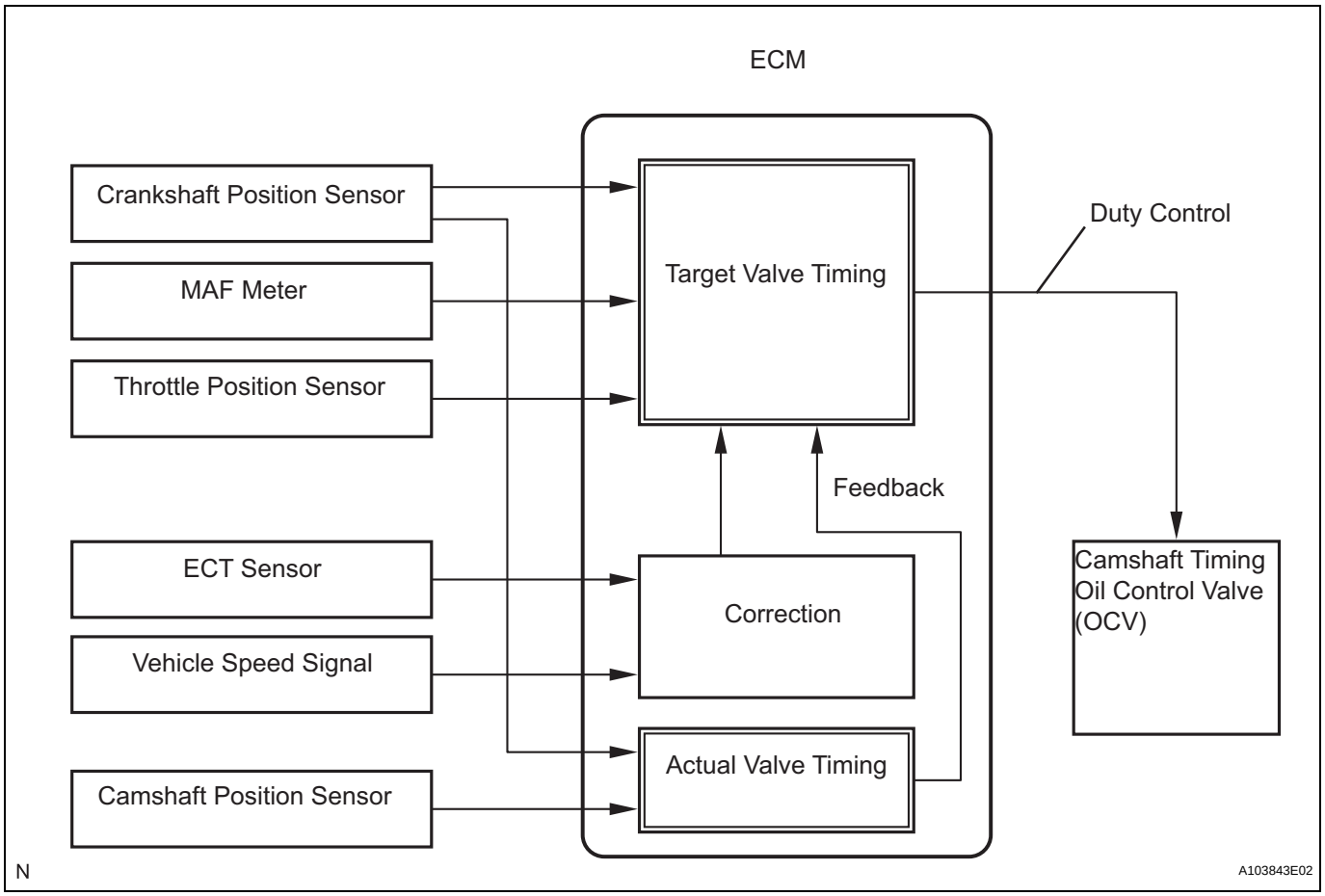
*1: This DTC is related to the A/F sensor, although the caption in the "Detection Item" column refers to the heated oxygen sensor.
*2: This DTC indicates a malfunction related to the primary circuit.

DTC	P0010	Camshaft Position "A" Actuator Circuit (Bank 1)

DTC	P0020	Camshaft Position "A" Actuator Circuit (Bank 2)

DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, Oil Control Valve (OCV) and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improves, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual intake valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0010	Open or short in OCV for intake camshaft (bank 1) circuit (1 trip detection logic)	• Open or short in OCV for intake camshaft (bank 1) circuit • OCV for intake camshaft (bank 1) • ECM
P0020	Open or short in OCV for intake camshaft (bank 2) circuit (1 trip detection logic)	• Open or short in OCV for intake camshaft (bank 2) circuit • OCV for intake camshaft (bank 2) • ECM

MONITOR DESCRIPTION

After the ECM sends the "target" duty-cycle signal to the OCV, the ECM monitors the OCV current to establish an "actual" duty-cycle. The ECM detects a malfunction and sets a DTC when the actual duty-cycle ratio varies from the target duty-cycle ratio.

MONITOR STRATEGY

Related DTCs	P0010: VVT OCV (bank 1) open/short P0020: VVT OCV (bank 2) open/short
Required sensors / components (Main)	VVT OCV (Variable Valve Timing oil control valve)
Required sensors / components (Sub)	-
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor will run whenever these DTCs are not present	None
All of the following conditions are met:	-
Starter	OFF
Engine switch	ON
Time after turning ignition switch off to on (IG)	0.5 seconds or more

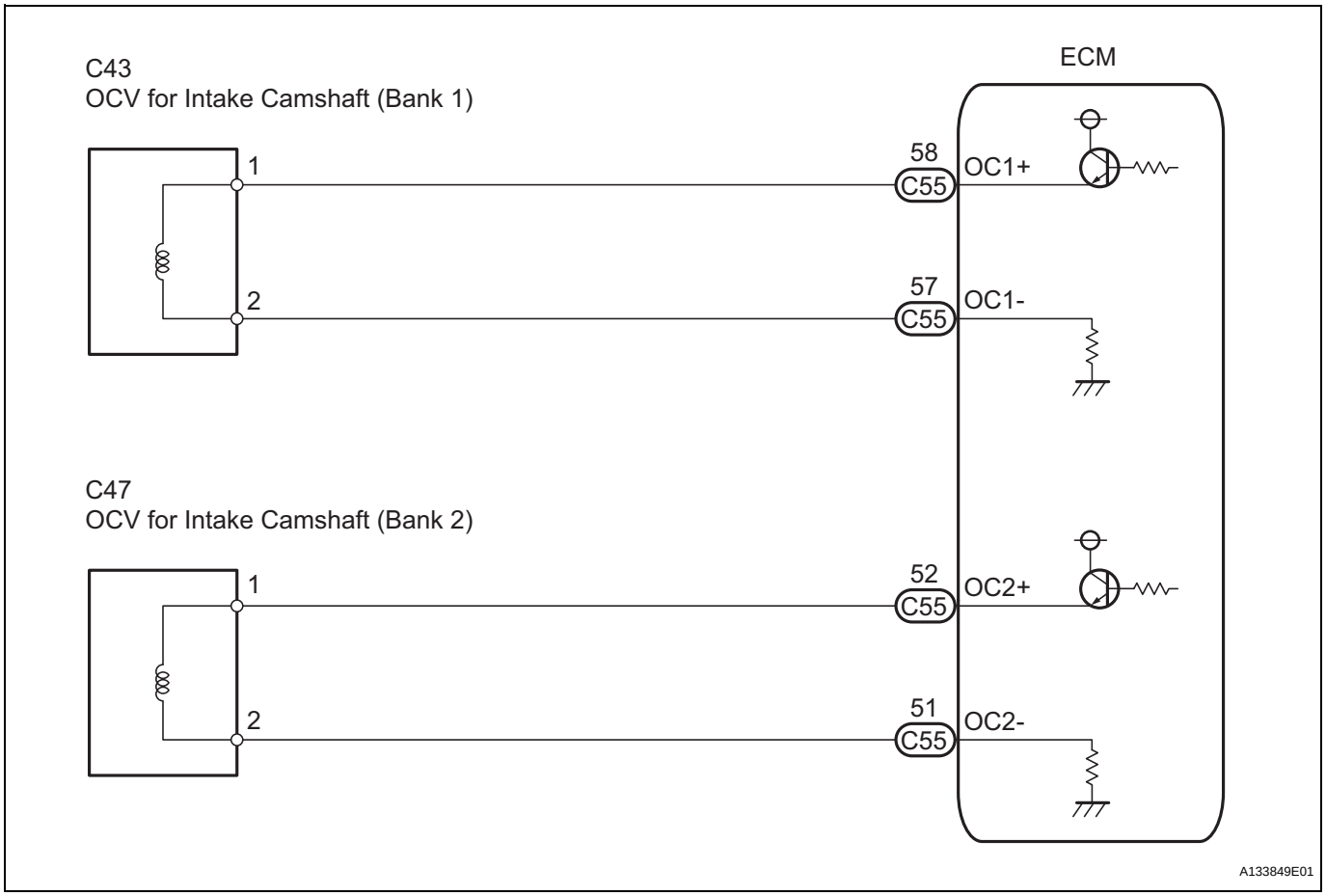
TYPICAL MALFUNCTION THRESHOLDS

One of the following conditions is met:	Condition A, B or C
A. All of the following conditions are met:	-
Battery voltage	11 to 13 V
Target duty ratio	Less than 70 %
Output signal duty ratio	100 %
B. All of the following conditions are met:	-
Battery voltage	13 V or more
Target duty ratio	Less than 80 %
Output signal duty ratio	100 %
C. All of the following conditions are met:	-
Current cut status	Not cut
Output signal duty ratio	3 % or less

COMPONENT OPERATING RANGE

VVT OCV duty ratio	More than 3 %, and Less than 100 %

WIRING DIAGRAM



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INSPECTION PROCEDURE

HINT:

- If DTC P0010 is displayed, check the intake camshaft circuit for the right bank VVT system.
- Bank 1 refers to the bank that includes cylinder No. 1.
- If DTC P0020 is displayed, check the intake camshaft circuit for the left bank VVT system.
- Bank 2 refers to the bank that does not include cylinder No. 1.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**PERFORM ACTIVE TEST BY CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (OCV)**

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

OK → **CHECK FOR INTERMITTENT PROBLEMS (See page ES-33)**

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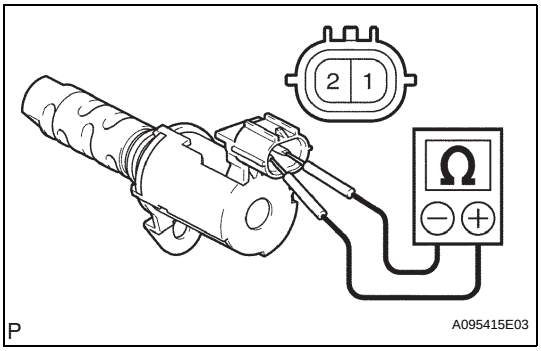
2 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



(a) Disconnect the C43 or C47 OCV connector.
(b) Measure the resistance between the terminals of the OCV.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	6.9 to 7.9 Ω

(c) Reconnect the OCV connector.

OK → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-481)**

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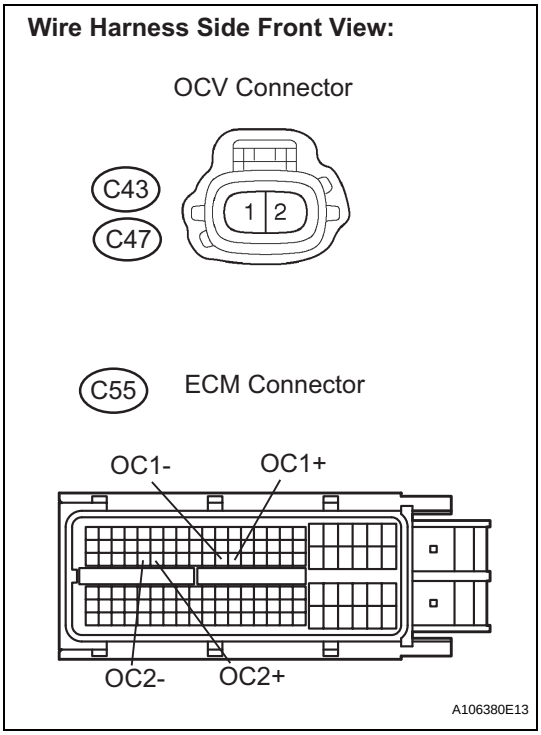
3 CHECK HARNESS AND CONNECTOR (OCV - ECM)

Wire Harness Side Front View:



(a) Disconnect the C43 or C47 OCV connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
OC1+ (C55-58) - C43-1	Below 1 Ω
OC1- (C55-57) - C43-2	Below 1 Ω
OC2+ (C55-52) - C47-1	Below 1 Ω
OC2- (C55-51) - C47-2	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
OC1+ (C55-58) or C43-1 - Body ground	10 kΩ or higher
OC1- (C55-57) or C43-2 - Body ground	10 kΩ or higher
OC2+ (C55-52) or C47-1 - Body ground	10 kΩ or higher
OC2- (C55-51) or C47-2 - Body ground	10 kΩ or higher

(d) Reconnect the OCV connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-518)

DTC	P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)

DTC	P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)

DTC	P0021	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 2)

DTC	P0022	Camshaft Position "A" - Timing Over-Retarded (Bank 2)

ES

DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, Oil Control Valve (OCV) and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual intake valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0011 P0021	Advanced cam timing: With warm engine and engine speed of between 500 rpm and 4,000 rpm, all conditions (1), (2) and (3) are met (1 trip detection logic): 1. Difference between target and actual intake valve timing is more than 5°CA (Crankshaft Angle) for 4.5 seconds 2. Current intake valve timing is fixed (timing changes less than 5°CA in 5 seconds) 3. Variations in VVT controller timing is more than 19°CA of maximum delayed timing (advance)	• Valve timing • Oil Control valve (OCV) for intake camshaft (bank 1) • OCV filter (bank 1) • Intake camshaft (bank 1) timing gear assembly • ECM
P0012 P0022	Retarded cam timing: With warm engine and engine speed of between 500 rpm and 4,000 rpm, all conditions (1), (2) and (3) are met (2 trip detection logic): 1. Difference between target and actual intake valve timing is more than 5°CA (Crankshaft Angle) for 4.5 seconds 2. Current intake valve timing is fixed (timing changes less than 5°CA in 5 seconds) 3. Variations in VVT controller timing is 19°CA or less of maximum delayed timing (retarded)	• Valve timing • OCV for intake camshaft (bank 2) • OCV filter (bank 2) • Intake camshaft (bank 2) timing gear assembly • ECM

MONITOR DESCRIPTION

1. The ECM optimizes the intake valve timing using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller.

2. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft. If the difference between the target and actual intake valve timing is large, and changes in the actual intake valve timing are small, the ECM interprets this as the VVT controller stuck malfunction and sets a DTC.
   Example:
   A DTC will be set when the following conditions 1), 2) and 3) are met:
   1) The difference between the target and actual intake valve timings is more than 5° CA (Crankshaft Angle) and the condition continues for more than 4.5 seconds.
   2) It takes 5 seconds or more to change the valve timing by 5° CA.
   3) After above conditions 1) and 2) are met, the OCV is forcibly activated 63 times or more.
3. DTCs P0011 and P0021 (Advanced Cam Timing) are detected with 1 trip detection logic.
4. DTCs P0012 and P0022 (Retarded Cam Timing) are detected with 2 trip detection logic.
   These DTCs indicate that the VVT controller cannot operate properly due to OCV malfunctions or the presence of foreign objects in the OCV.
5. The monitor will not run unless the following conditions are met:
   (a) The engine is warm (the engine coolant temperature is 75°C (167°F) or more).
   (b) The vehicle has been driven at more than 40 mph (64 km/h) for 3 minutes.
   (c) The engine has idled for 3 minutes.

ES

MONITOR STRATEGY

Related DTCs	P0011: Advanced camshaft timing (bank 1) P0012: Retard camshaft timing (bank 1) P0021: Advanced camshaft timing (bank 2) P0022: Retard camshaft timing (bank 2)
Required sensors / components (Main)	VVT OCV and VVT Actuator
Required sensors / components (Sub)	Crankshaft position sensor, camshaft position sensor and Engine coolant temperature sensor
Frequency of operation	Once per drive cycle
Duration	Within 10 seconds
MIL operation	Advanced camshaft timing (bank 1): Immediately Advanced camshaft timing (bank 2): Immediately Retard camshaft timing (bank 1): 2 driving cycles Retard camshaft timing (bank 2): 2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF sensor) P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0351 - P0358 (ignitor)
Battery voltage	11 V or more
Engine	500 to 4,000 rpm
ECT	75 to 100°C (167 to 212°F)

TYPICAL MALFUNCTION THRESHOLDS

Advanced camshaft timing:

Difference between actual valve timing and target valve timing	More than 5°CA
Valve timing	No change in advanced valve timing

Retard camshaft timing:

Difference between actual valve timing and target valve timing	More than 5°CA

Valve timing	No change in retarded valve timing

WIRING DIAGRAM

Refer to DTC P0010 (See page ES-81).

INSPECTION PROCEDURE

HINT:

Abnormal bank	Advanced timing over (Valve timing is out of specified range)	Retarded timing over (Valve timing is out of specified range)
Bank 1	P0011	P0012
Bank 2	P0021	P0022

- If DTC P0011 or P0012 is displayed, check the right bank VVT system for intake camshaft circuit (bank 1).
- Bank 1 refers to the bank that includes cylinder No. 1.
- If DTC P0021 or P0022 is displayed, check the intake camshaft circuit for the left bank VVT system (bank 2).
- Bank 2 refers to the bank that does not include cylinder No. 1.
- Read freeze frame data using an intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0011, P0012, P0021 OR P0022)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0011, P0012, P0021 or P0022	A
P0011, P0012, P0021 or P0022 and other DTCs	B

HINT:
If any DTCs other than P0011, P0012, P0021 or P0022 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART (See page ES-63)**

A

2	**PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE OCV)**

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.

(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → **Go to step 4**

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P0011, P0012, P0021 OR P0022)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Clear the DTCs.
(d) Start the engine and warm it up.
(e) Switch the ECM from normal mode to check mode using the tester.
(f) Drive the vehicle for more than 10 minutes.
(g) Read the DTCs using the tester.
OK:
No DTC output.

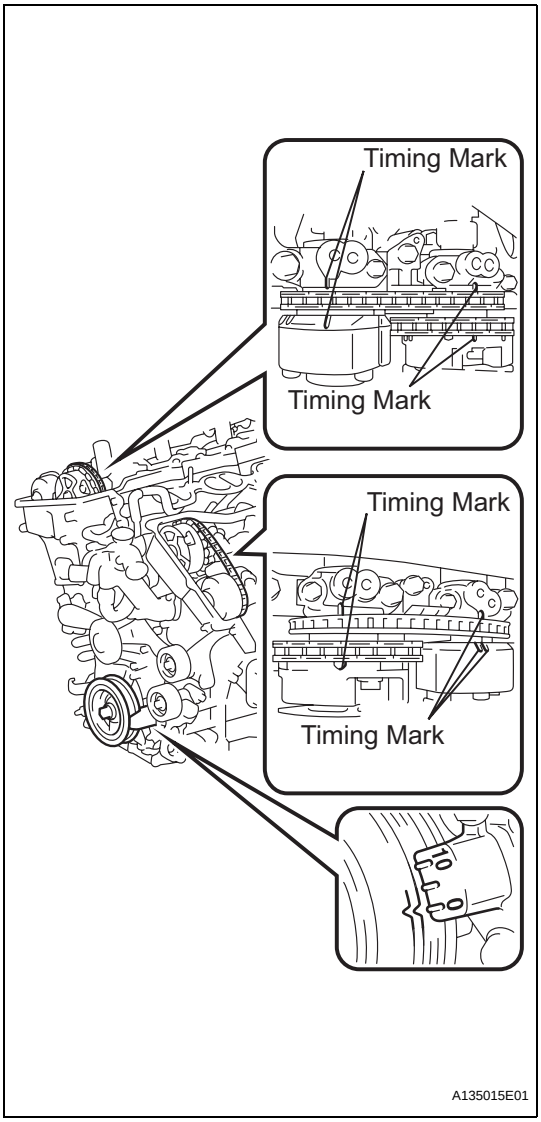
NG → **Go to step 4**

OK

END

ES

4	CHECK VALVE TIMING (CHECK FOR LOOSE AND JUMPED TEETH ON TIMING CHAIN)

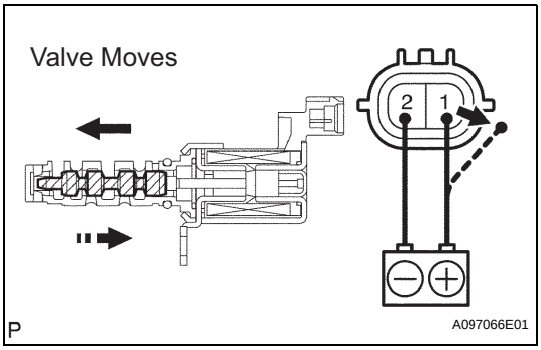


(a) Remove the cylinder head covers RH and LH.
(b) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.
(c) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
OK:
Timing marks on camshaft timing gears are aligned as shown in the illustration.
(d) Reinstall the cylinder head cover.

NG → **ADJUST VALVE TIMING**

OK

5	INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (OCV)



(a) Remove the OCV.
(b) Measure the resistance between the terminals of the OCV.
Standard resistance

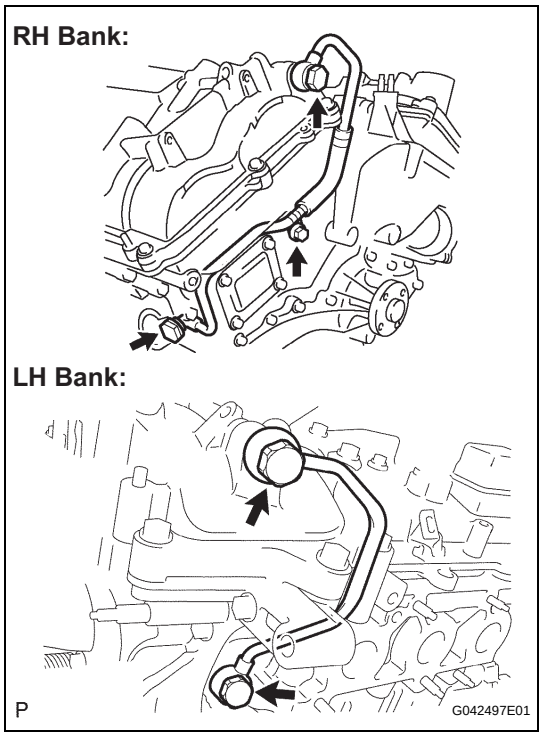
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	6.9 to 7.9 Ω

(c) Apply positive battery voltage to terminal 1 and negative battery voltage to terminal 2. Check the valve operation.
OK:
Valve moves quickly.
(d) Reinstall the OCV.

NG → REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-481)

OK

6 INSPECT OIL CONTROL VALVE FILTER AND PIPE



(a) Remove the oil pipe No. 1 or No. 2.
(b) Remove the oil control valve filter.
(c) Check that the filter and pipe are not clogged.
OK:
The filter and pipe are not clogged.

NG → CLEAN OIL CONTROL VALVE FILTER AND PIPE

OK

7 REPLACE CAMSHAFT TIMING GEAR ASSEMBLY

NEXT

8 CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Clear the DTCs.
(d) Start the engine and warm it up.
(e) Switch the ECM from normal mode to check mode using the tester.
(f) Driver the vehicle for more than 10 minutes.
(g) Read the output DTCs using the intelligent tester.
OK:
No DTC output.

HINT:
DTC P0011, P0012, P0021 or P0022 is output when foreign objects in engine oil are caught in some parts of the system. These codes will stay output even if the system returns to normal after a short time. These foreign objects are then captured by the oil filter, thus eliminating the source of the problem.

OK → **SYSTEM IS OK**

NG

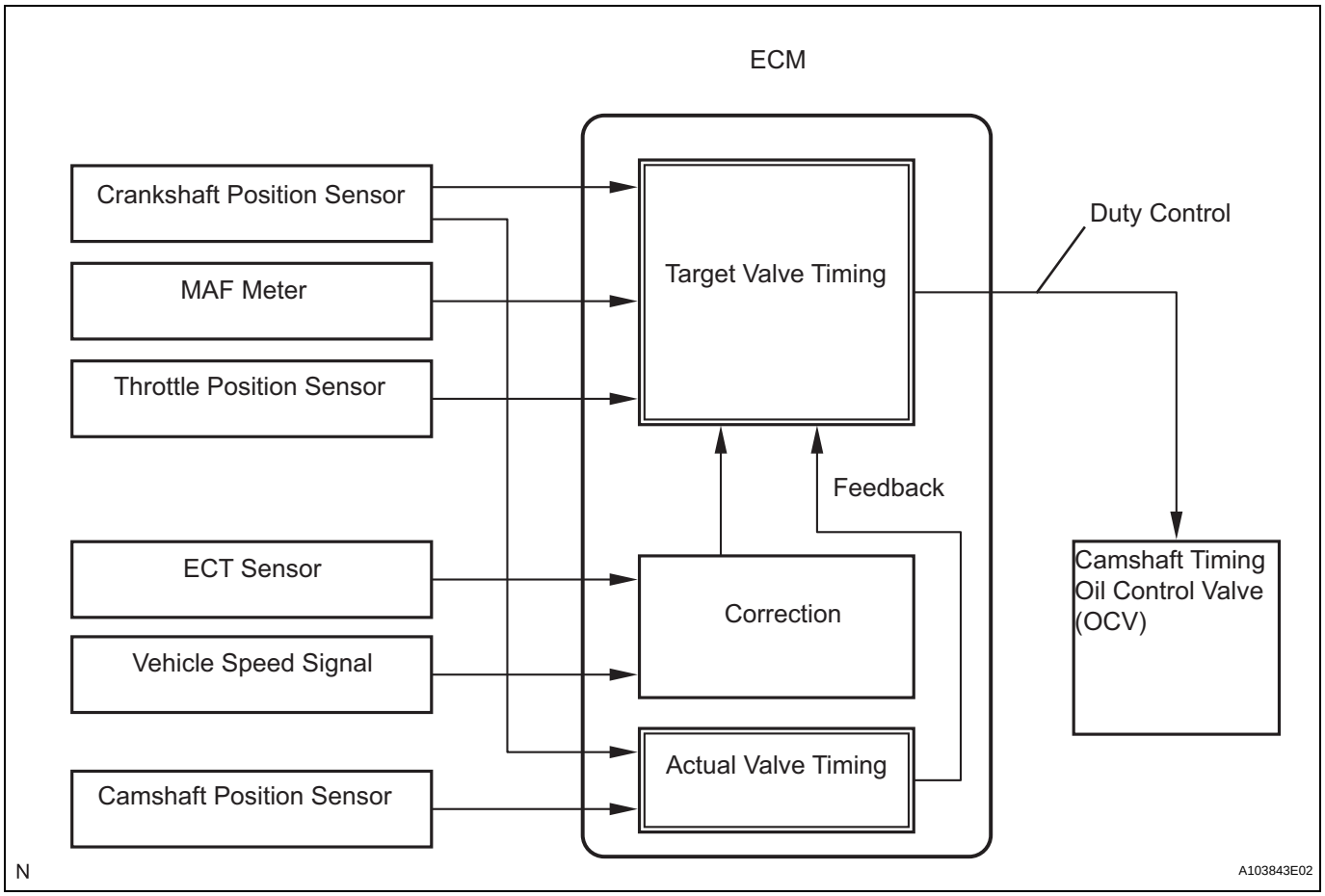
REPLACE ECM (See page ES-518)

DTC	P0013	Camshaft Position "B" Actuator Circuit / Open (Bank 1)

DTC	P0023	Camshaft Position "B" Actuator Circuit / Open (Bank 2)

DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, OCV and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as the intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the exhaust camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual exhaust valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0013	Open or short in OCV for exhaust camshaft (bank 1) circuit (1 trip detection logic)	• Open or short in OCV for exhaust camshaft (bank 1) circuit • OCV for exhaust camshaft (bank 1) • ECM
P0023	Open or short in OCV for exhaust camshaft (bank 2) circuit (1 trip detection logic)	• Open or short in OCV for exhaust camshaft (bank 2) circuit • OCV for exhaust camshaft (bank 2) • ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT system to control the exhaust camshaft. The VVT system includes the ECM, the OCV and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the exhaust camshaft.
After the ECM sends the target duty-cycle signal to the OCV, the ECM monitors the OCV current to establish an actual duty-cycle. The ECM determines the existence of a malfunction and sets the DTC when the actual duty-cycle ratio varies from the target duty-cycle ratio.

MONITOR STRATEGY

Related DTCs	P0013: VVT OCV (bank 1) open/short P0023: VVT OCV (bank 2) open/short
Required sensors / components (Main)	VVT OCV (Variable Valve Timing oil control valve)
Required sensors / components (Sub)	-
Frequency of operation	Continuous
Duration	1 second
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
All of the following conditions are met:	-
Starter	OFF
Engine switch	ON
Time after engine switch off to on	0.5 seconds or more

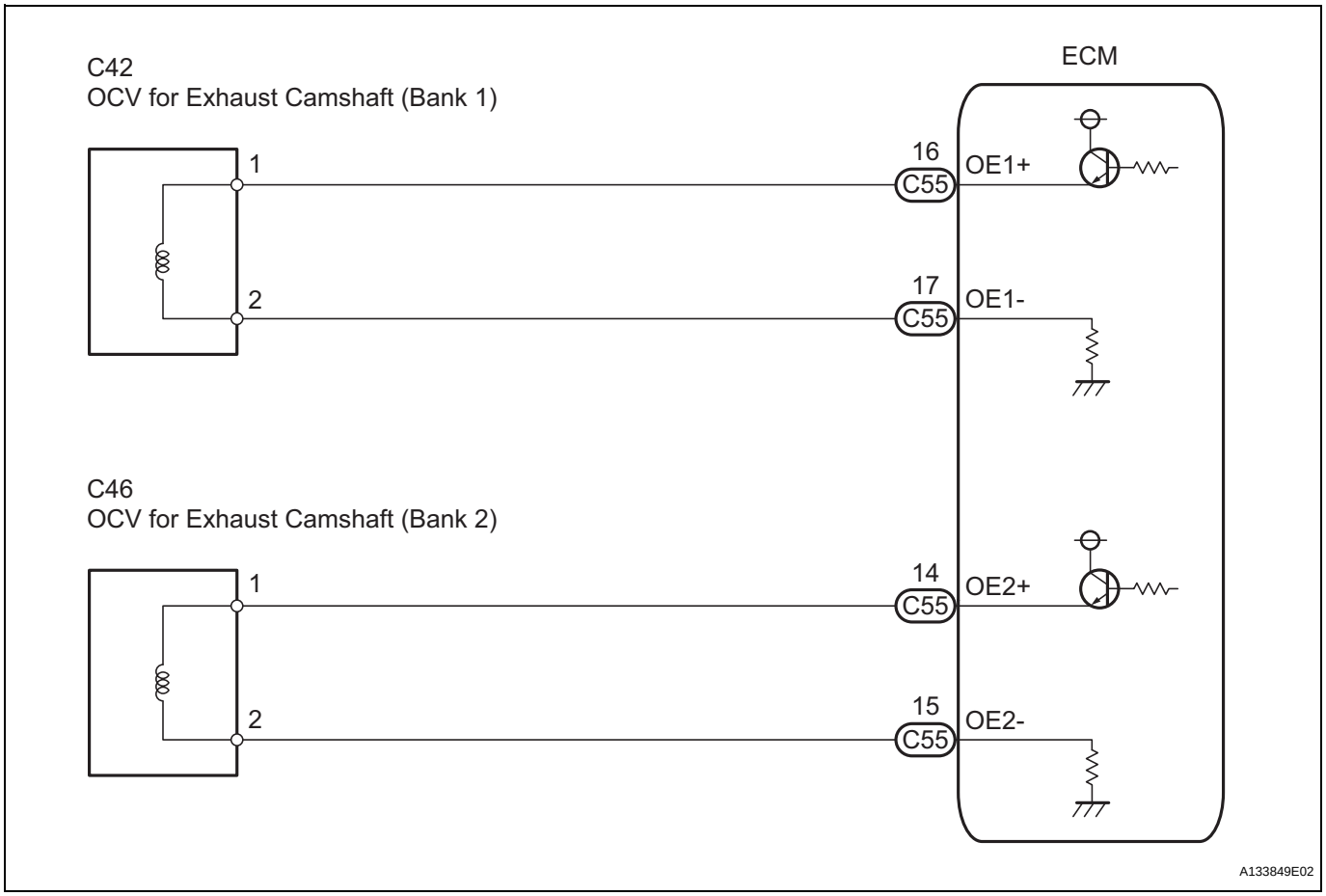
TYPICAL MALFUNCTION THRESHOLDS

One of the following conditions is met:	Condition A, B or C
A. All of the following conditions are met:	-
Battery voltage	11 to 13 V
Target duty ratio	Less than 70%
Output signal duty ratio	100 %
B. All of the following conditions are met:	-
Battery voltage	13 V or more
Target duty ratio	Less than 80%
Output duty ratio	100 %
C. All of the following conditions are met:	-
Current cut status	Not cut
Output signal duty ratio	3% or less

COMPONENT OPERATING RANGE

VVT duty ratio	More than 3, and less than 100 %

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:

- If DTC P0013 is displayed, check the exhaust camshaft circuit for the bank 1 VVT system.
- Bank 1 refers to the bank that includes cylinder No. 1.
- If DTC P0023 is displayed, check the exhaust camshaft circuit for the bank 2 VVT system.
- Bank 2 refers to the bank that does not include cylinder No. 1.
- Read freeze frame data using an intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1 or VVT CTRL B2.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

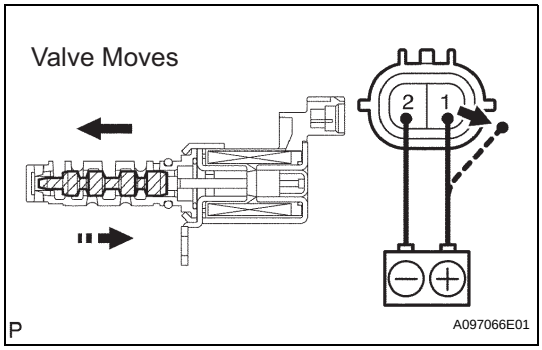
NG → **Go to step 2**

OK →

CHECK FOR INTERMITTENT PROBLEMS

ES

2 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



(a) Disconnect the C42 or C46 OCV connector.
(b) Measure the resistance between the terminals of the OCV.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	6.9 to 7.9 Ω

(c) Reconnect the OCV connector.

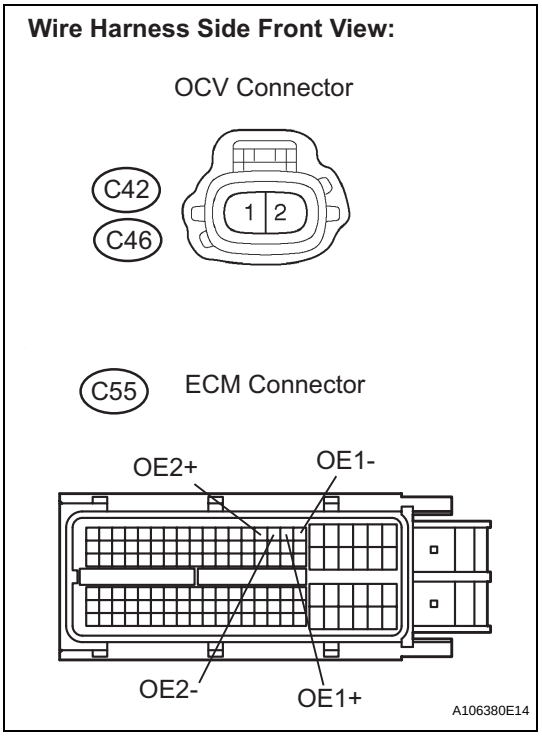
NG → **Go to step 3**

OK →

REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-481)

3	CHECK HARNESS AND CONNECTOR (OCV - ECM)

Wire Harness Side Front View:



(a) Disconnect the C42 or C46 OCV connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
OE1+ (C55-16) - C42-1	Below 1 Ω
OE1- (C55-17) - C42-2	Below 1 Ω
OE2+ (C55-14) - C46-1	Below 1 Ω
OE2- (C55-15) - C46-2	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
OE1+ (C55-16) or C42-1 - Body ground	10 kΩ or higher
OE1- (C55-17) or C42-2 - Body ground	10 kΩ or higher
OE2+ (C55-14) or C46-1 - Body ground	10 kΩ or higher
OE2- (C55-15) or C46-2 - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the OCV connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-481)

ES

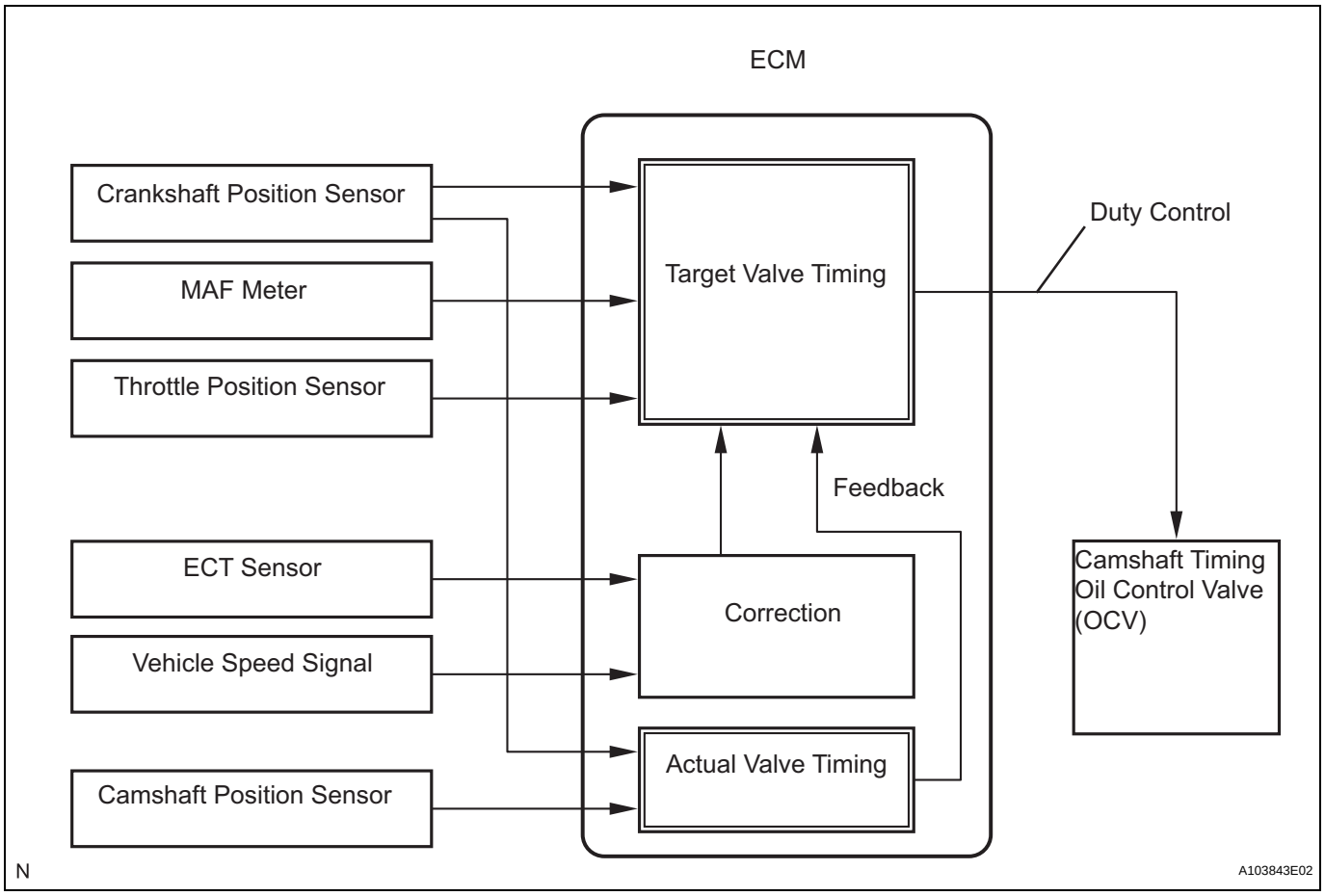
DTC	P0014	Camshaft Position "B" - Timing Over-Advanced or System Performance (Bank 1)
DTC	P0015	Camshaft Position "B" - Timing Over-Retarded (Bank 1)
DTC	P0024	Camshaft Position "B" - Timing Over-Advanced or System Performance (Bank 2)
DTC	P0025	Camshaft Position "B" - Timing Over-Retarded (Bank 2)

DESCRIPTION

HINT:

If DTC P0014, P0015, P0024 or P0025 is present, check the VVT (Variable Valve Timing) system.

The Variable Valve Timing (VVT) system includes the ECM, OCV and VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed according to engine operating conditions such as the intake air volume, throttle valve position and engine coolant temperature. The ECM controls the OCV, based on the signals transmitted by several sensors. The VVT controller regulates the exhaust camshaft angle using oil pressure through the OCV. As a result, the relative positions of the camshaft and crankshaft are optimized, the engine torque and fuel economy improve, and the exhaust emissions decrease under overall driving conditions. The ECM detects the actual exhaust valve timing using signals from the camshaft and crankshaft position sensors, and performs feedback control. This is how the target intake valve timing is verified by the ECM.



DTC No.	DTC Detection Condition	Trouble Area
P0014 P0024	Advanced cam timing: With warm engine and engine speed of between 500 rpm and 4,000 rpm, all conditions (a), (b) and (c) are met (2 trip detection logic): (a) Difference between target and actual exhaust valve timing is more than 5°CA (Crankshaft Angle) for 4.5 seconds (b) Current exhaust valve timing is fixed (timing changes less than 5°CA in 5 seconds) (c) Variations in VVT controller timing are more than 19°CA of maximum delayed timing (advanced)	• Valve timing • Oil control valve (OCV) for exhaust camshaft (bank 1) • OCV filter (bank 1) • Exhaust camshaft • ECM
P0015 P0025	Retarded cam timing: With warm engine and engine speed of between 500 rpm and 4,000 rpm, all conditions (a), (b) and (c) are met (1 trip detection logic): (a) Difference between target and actual exhaust valve timing is more than 5°CA (Crankshaft Angle) for 4.5 seconds (b) Current exhaust valve timing is fixed (timing changes less than 5°CA in 5 seconds) (c) Variations in VVT controller timing are more than 19°CA or less of maximum delayed timing (retarded)	• Valve timing • OCV for exhaust camshaft (bank 2) • OCV filter (bank 2) • Exhaust camshaft • ECM

MONITOR DESCRIPTION

1. The ECM optimizes the exhaust valve timing using the VVT (Variable Valve Timing) system to control the exhaust camshaft. The VVT system includes the ECM, the Oil Control Valve (OCV) and the VVT controller.

2. The ECM sends a target duty-cycle control signal to the OCV. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the exhaust camshaft.
   If the difference between the target and actual exhaust valve timings is large, and changes in actual exhaust valve timing are small, the ECM interprets this as the VVT controller stuck malfunction and sets a DTC.
   Example:
   A DTC is set when the following conditions A, B and C are met:
   (1) The difference between the target and actual exhaust valve timings is more than 5°CA (Crankshaft Angle) and the condition continues for more than 4.5 seconds (Procedure "A").
   (2) It takes 5 seconds or more to change the valve timing by 5°CA (Procedure "B").
   (3) After above procedures "A" and "B" are met, the OCV is forcibly activated 63 times or more (Procedure "C").
3. DTCs P0014 and P0024 (Advanced Cam Timing) are detected with 1 trip detection logic.
4. DTCs P0015 and P0025 (Retarded Cam Timing) are detected with 2 trip detection logic.
   These DTCs indicate that the VVT controller cannot operate properly due to OCV malfunctions or the presence of foreign objects in the OCV.
5. The monitor will not run unless the following conditions are met:
   (a) The engine is warm (the engine coolant temperature is 75°C [167°F] or more).
   (b) The vehicle has been driven at more than 40 mph (64 km/h) for 3 minutes.
   (c) The engine has idled for 3 minutes.

ES

MONITOR STRATEGY

Related DTCs	P0014: Advanced camshaft timing (bank 1) P0015: Retarded camshaft timing (bank 1) P0024: Advanced camshaft timing (bank 2) P0025: Retarded camshaft timing (bank 2)
Required sensors / components (Main)	VVT OCV and VVT Actuator
Required sensors / components (Related)	Crankshaft position sensor, Camshaft position sensor and Engine coolant temperature sensor
Frequency of operation	Once per driving cycle
Duration	Within 10 seconds
MIL operation	Advanced camshaft timing (bank 1): Immediate Advanced camshaft timing (bank 2): Immediate Retarded camshaft timing (bank 1): 2 driving cycles Retarded camshaft timing (bank 2): 2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF sensor) P0115 - P0118 (ECT sensor) P0125 (insufficient ECT for closed loop) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0351 - P0358 (ignitor)
Battery voltage	11 V or more
Engine RPM	500 to 4,000 rpm
Engine coolant temperature	75 to 100°C (167 to 212°F)

TYPICAL MALFUNCTION THRESHOLDS

Advanced camshaft timing:

Valve timing	No change
Valve timing	Advanced position

Retarded camshaft timing:

Valve timing	No change
Valve timing	Retard position

WIRING DIAGRAM

Refer to DTC P0013 (See page ES-93).

INSPECTION PROCEDURE

HINT:

Abnormal bank	Advanced timing over (Valve timing is out of specified range)	Retarded timing over (Valve timing is out of specified range)
Bank 1	P0014	P0015
Bank 2	P0024	P0025

- If DTC P0014 or P0015 is displayed, check the exhaust camshaft circuit for the bank 1 VVT system.
- Bank 1 refers to the bank that includes cylinder No. 1.
- If DTC P0024 or P0025 is displayed, check for exhaust camshaft circuit for the bank 2 VVT system.
- Bank 2 refers to the bank that does not include cylinder No. 1.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0014, P0015, P0024 OR P0025)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0014, P0015, P0024 or P0025	A
P0014, P0015, P0024 or P0025 and other DTCs	B

HINT:
If any DTCs other than P0014, P0015, P0024 or P0025 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART (See page ES-63)

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.

(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operation	Specified Condition
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → **Go to step 4**

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P0014, P0015, P0024 OR P0025)

ES

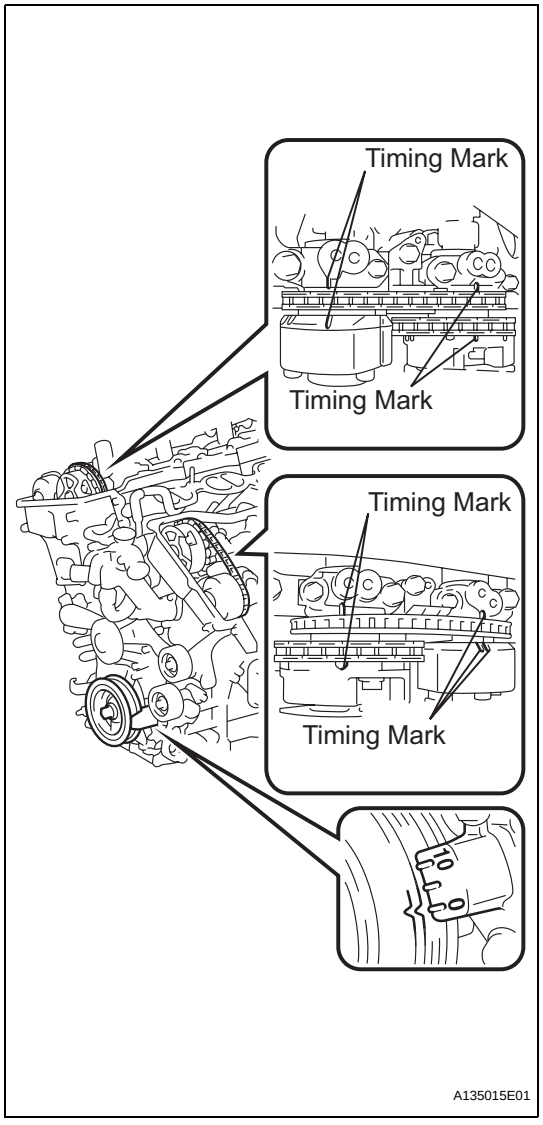
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-45).
(d) Start the engine and warm it up.
(e) Switch the ECM from normal mode to check mode using the tester (See page ES-49).
(f) Drive the vehicle for more than 10 minutes.
(g) Read the DTCs using the tester.
OK:
No DTC output.

NG → **Go to step 4**

OK

END

4 CHECK VALVE TIMING (CHECK FOR LOOSE AND JUMPED TEETH ON TIMING CHAIN)

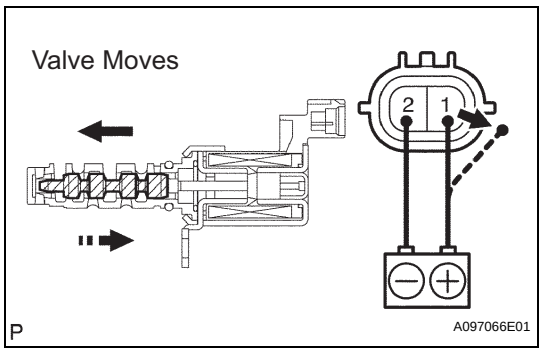


(a) Remove the cylinder head covers RH and LH.
(b) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.
(c) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
OK:
Timing marks on crankshaft timing gears are aligned as shown in the illustration.
(d) Reinstall the cylinder head covers.

NG → **ADJUST VALVE TIMING**

OK

5 INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (OCV FOR EXHAUST CAMSHAFT)



(a) Remove the OCV.
(b) Measure the resistance between the terminals of the OCV.
Standard resistance

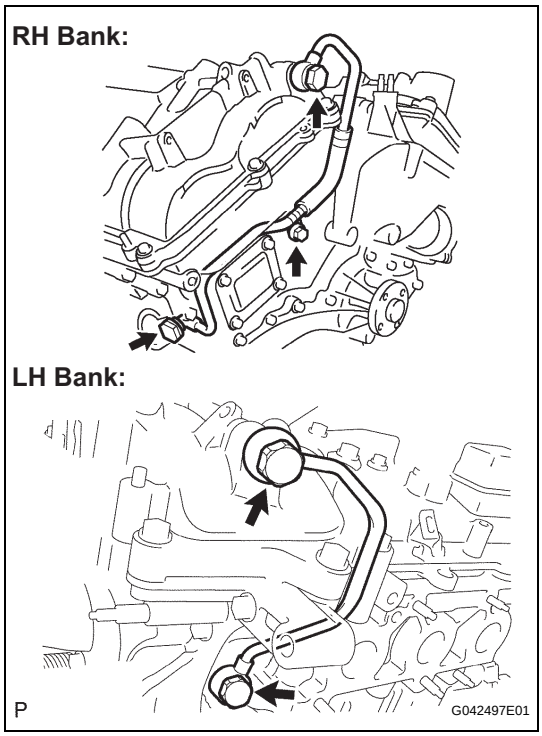
Tester Connection	Condition	Specified Condition
1 - 2	20°C (68°F)	6.9 to 7.9 Ω

(c) Apply positive battery voltage to terminal 1 and negative battery voltage to terminal 2. Check the valve operation.
OK:
Valve moves quickly.
(d) Reinstall the OCV.

NG → **REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See page ES-481)**

OK

6	INSPECT OIL CONTROL VALVE FILTER AND PIPE



(a) Remove the oil pipe No. 1 or No. 2.
(b) Remove the oil control valve filter.
(c) Check that the filter and pipe are not clogged.
OK:
Filter is not clogged.

NG → **CLEAN OIL CONTROL VALVE FILTER AND PIPE**

OK

7	REPLACE EXHAUST CAMSHAFT

NEXT

8	CHECK WHETHER DTC OUTPUT RECURS

(a) Clear the DTCs.
(1) Operate the intelligent tester, or disconnect the EFI and ETCS fuses more than 60 seconds to erase the codes.
(b) Start the engine and warm up the engine.
(c) Switch the ECM from normal mode to check mode using the intelligent tester (See page ES-49).
(d) Drive the vehicle for more than 10 minutes or more.
(e) Read the output DTCs using the intelligent tester.
OK:
No DTC output.

HINT:
DTC P0014, P0015, P0024 or P0025 is output when foreign objects in engine oil are caught in some parts of the system. These codes will stay output even if the system returns to normal after a short time. These foreign objects are then captured by the oil, thus eliminating the source of the problem.

OK → **SYSTEM IS OK**

NG

REPLACE ECM (See page ES-518)

DTC	P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

DTC	P0017	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor B)

DTC	P0018	Crankshaft Position - Camshaft Position Correlation (Bank 2 Sensor A)

DTC	P0019	Crankshaft Position - Camshaft Position Correlation (Bank 2 Sensor B)

ES

DESCRIPTION

In the VVT system, the appropriate intake and exhaust valve open and close timings are controlled by the ECM. The ECM performs intake and exhaust valve control by performing the following: 1) controlling the camshaft and camshaft oil control valve, and operating the camshaft timing gear; and 2) changing the relative positions of the gaps between the camshaft and crankshaft.

DTC No.	DTC Detection Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and VVT sensor 1 (for intake camshaft (bank 1)) signal (2 trip detection logic)	• Mechanical system (Timing chain has jumped teeth or chain stretched) • ECM
P0017	Deviation in crankshaft position sensor signal and VVT sensor 1 (for exhaust camshaft (bank 1)) signal (2 trip detection logic)	• Mechanical system (Timing chain has jumped teeth or chain stretched) • ECM
P0018	Deviation in crankshaft position sensor signal and VVT sensor 2 (for intake camshaft (bank 2)) signal (2 trip detection logic)	• Mechanical system (Timing chain has jumped teeth or chain stretched) • ECM
P0019	Deviation in crankshaft position sensor signal and VVT sensor 2 (for exhaust camshaft (bank 2)) signal (2 trip detection logic)	• Mechanical system (Timing chain has jumped teeth or chain stretched) • ECM

MONITOR DESCRIPTION

To monitor the correlation of the intake camshaft position and crankshaft position, the ECM checks the VVT learning value while the engine is idling. The VVT learning value is calibrated based on the camshaft position and crankshaft position. The intake valve timing is set to the most retarded angle while the engine is idling. If the VVT learning value is out of the specified range in consecutive driving cycles, the ECM illuminates the MIL and sets the DTC P0016 (Bank 1) or P0018 (Bank 2).

To monitor the correlation of the exhaust camshaft position and crankshaft position, the ECM checks the VVT learning value while the engine is idling. The VVT learning value is calibrated based on the camshaft position and crankshaft position. The exhaust valve timing is set to the most advanced angle while the engine is idling. If the VVT learning value is out of the specified range in consecutive driving cycles, the ECM illuminates the MIL and sets the DTC P0017 (Bank 1) or P0019 (Bank 2).

MONITOR STRATEGY

Related DTCs	P0016: Camshaft timing misalignment at idle (intake camshaft bank 1) P0017: Camshaft timing misalignment at idle (exhaust camshaft bank 1) P0018: Camshaft timing misalignment at idle (intake camshaft bank 2) P0019: Camshaft timing misalignment at idle (exhaust camshaft bank 2)
Required sensors/components (Main)	VVT actuator

Required sensors/components (Sub)	Camshaft position sensor, Crankshaft position sensor
Frequency of operation	Once per drive cycle
Duration	Within 1 minute
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	P0011 (VVT system 1 - advance) P0012 (VVT system 1 - retard) P0021 (VVT system 2 - advance) P0115 - P0118 (ECT sensor)

Intake side:

Engine speed	500 to 1,000 rpm

Exhaust side:

VVT feedback mode	Executing
VVT	Maximum advanced position
Engine speed	500 to 1,000 rpm

TYPICAL MALFUNCTION THRESHOLDS

Intake side:

One of the following conditions is met:	Condition 1 or 2
1. VVT leaning value at maximum retarded valve timing	Less than 18.5°CA
2. VVT leaning valve at maximum retarded valve timing	More than 43.5°CA

Exhaust side:

One of the following conditions is met:	Condition 1 or 2
1. VVT leaning value	Less than 77°CA
2. VVT leaning value	More than 102°CA

WIRING DIAGRAM

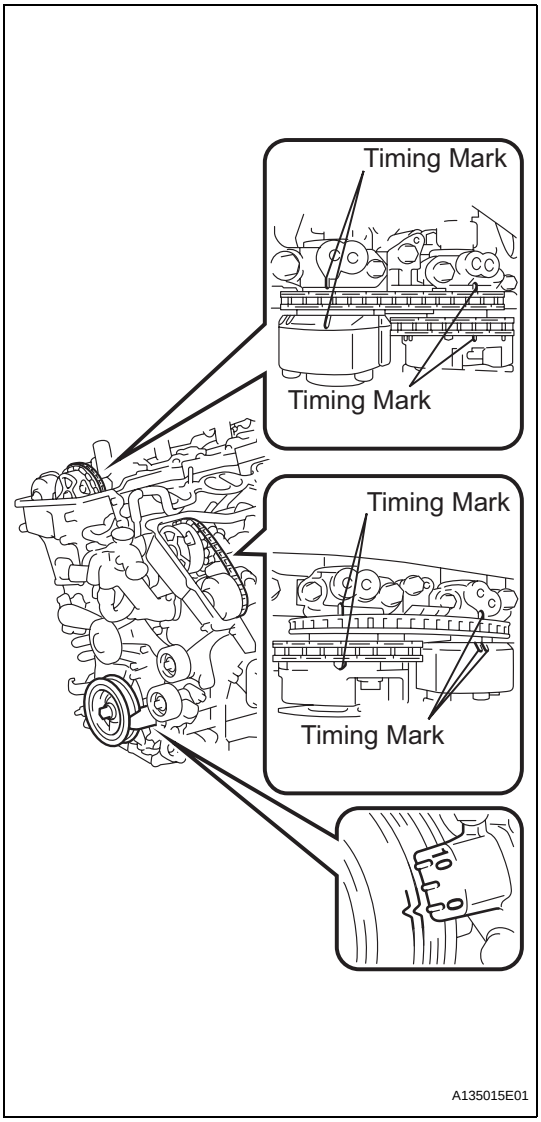
Refer to DTC P0335 (See page ES-224).

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK VALVE TIMING (CHECK FOR LOOSE AND A JUMPED TOOTH OF TIMING CHAIN)



(a) Remove the cylinder head covers RH and LH.
(b) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.
(c) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°), then align the marks as above.
OK:
Timing marks on camshaft timing gears are aligned as shown in the illustration.
(d) Reinstall the cylinder head covers.

NG → **ADJUST VALVE TIMING (REPAIR OR REPLACE TIMING CHAIN)**

OK

REPLACE ECM (See page ES-518)

DTC	P0031	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1)

DTC	P0032	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1)

DTC	P0051	Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 2 Sensor 1)

DTC	P0052	Oxygen (A/F) Sensor Heater Control Circuit High (Bank 2 Sensor 1)

DESCRIPTION

HINT:

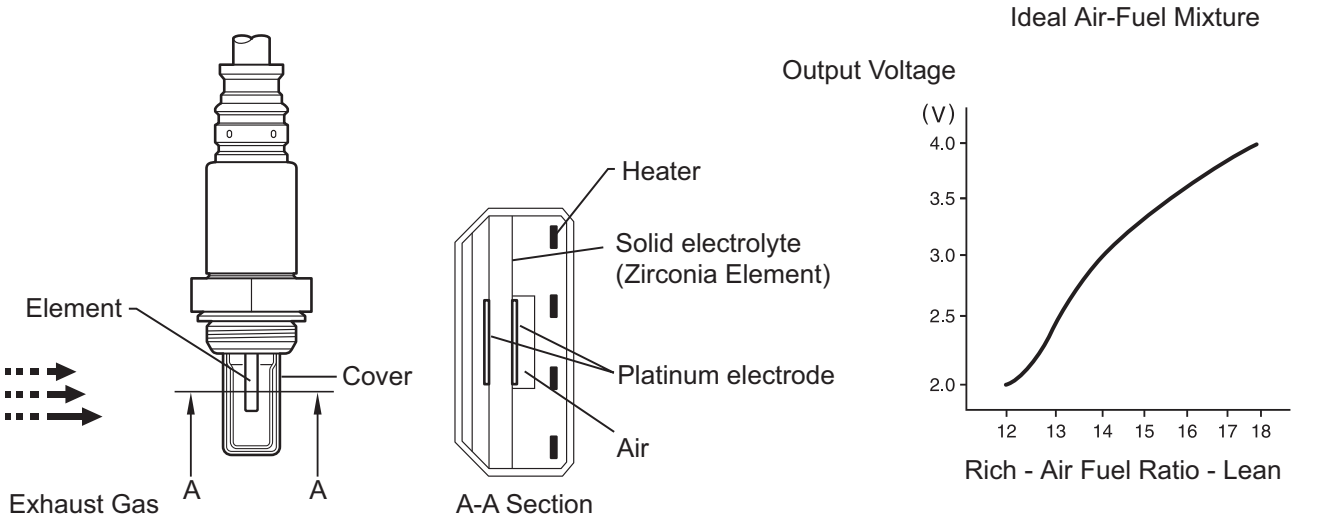
- Although the DTC titles include oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

The A/F sensor generates voltage* that corresponds to the actual air-fuel ratio. This sensor voltage is used to provide the ECM with feedback so that it can control the air-fuel ratio. The ECM determines the deviation from the stoichiometric air-fuel ratio level, and regulates the fuel injection time. If the A/F sensor malfunctions, the ECM is unable to control the air-fuel ratio accurately.

The A/F sensor is the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate oxygen concentration detection. In addition, the sensor and heater portions are narrower than the conventional type. The heat generated by the heater is conducted to the solid electrolyte through the alumina, therefore the sensor activation is accelerated.

A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio.

*: Value changes inside the ECM. Since the A/F sensor is the current output element, a current is converted to a voltage inside the ECM. Any measurements taken at the A/F sensor or ECM connectors will show a constant voltage.



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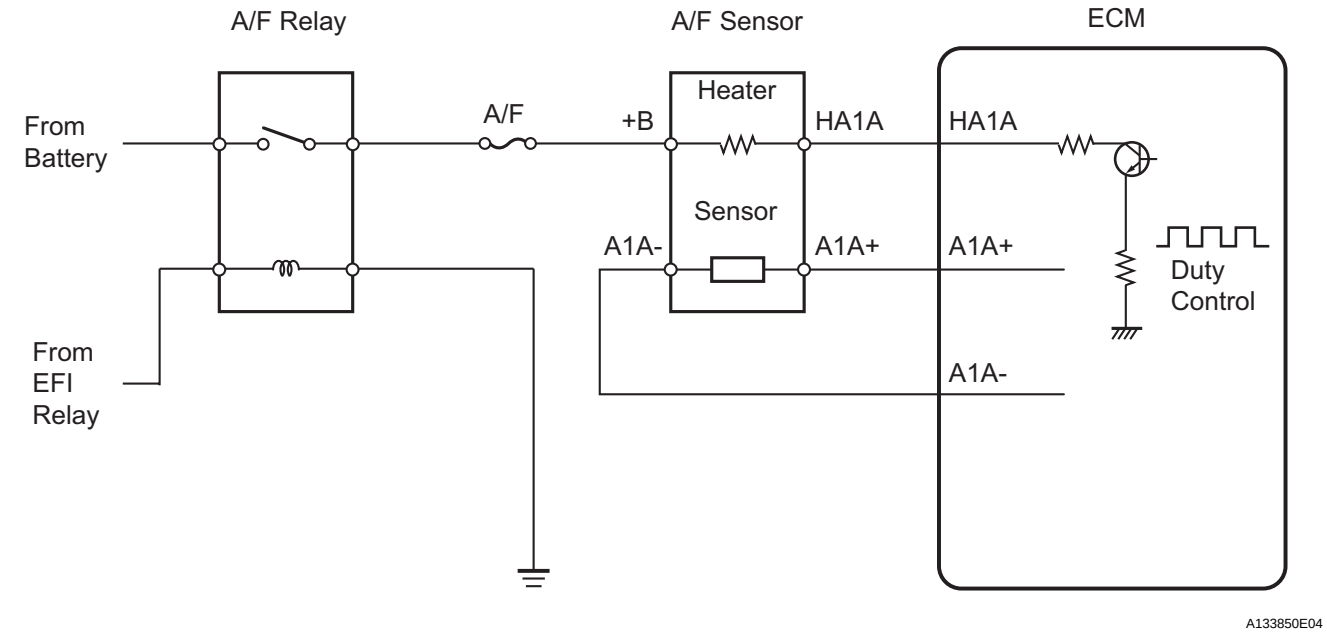
HINT:

- When any of these DTCs are set, the ECM enters fail-safe mode. The ECM turns off the A/F sensor heater in fail-safe mode. Fail-safe mode continues until the engine switch is turned off.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The A/F sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (System Diagram of Bank 1 Sensor 1):



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DTC No.	DTC Detection Condition	Trouble Area
P0031 P0051	Air-Fuel Ratio (A/F) sensor heater (bank 1, 2, sensor 1) current is less than 0.8 A (1 trip detection logic)	• Open in A/F sensor heater (bank 1, 2, sensor 1) circuit • A/F sensor heater (bank 1, 2, sensor 1) • A/F HTR relay • ECM

DTC No.	DTC Detection Condition	Trouble Area
P0032 P0052	Air-Fuel Ratio (A/F) sensor heater (bank 1, 2, sensor 1) current is more than 10 A (1 trip detection logic)	• Short in A/F sensor heater (bank 1, 2, sensor 1) circuit • A/F sensor heater (sensor 1) • A/F HTR relay • ECM

HINT:
- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that does not include cylinder No. 1.
- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

MONITOR DESCRIPTION

1. The ECM uses information from the Air-Fuel Ratio (A/F) sensor to regulate the air-fuel ratio and keep it close to the stoichiometric level. This maximizes the ability of the Three-Way Catalytic Converter (TWC) to purify the exhaust gases.
2. The A/F sensor detects oxygen levels in the exhaust gas and transmits the information to the ECM. The inner surface of the sensor element is exposed to the outside air. The outer surface of the sensor element is exposed to the exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element.
3. The zirconia element generates a small voltage when there is a large difference in the oxygen concentrations between the exhaust gas and outside air. The platinum coating amplifies this voltage generation.
4. The A/F sensor is more efficient when heated. When the exhaust gas temperature is low, the sensor cannot generate useful voltage signals without supplementary heating. The ECM regulates the supplementary heating using a duty-cycle approach to adjust the average current in the sensor heater element. If the heater current is outside the normal range, the signal transmitted by the A/F sensor will be inaccurate, as a result, the ECM will be unable to regulate air-fuel ratio properly.
5. When the current in the A/F sensor heater is outside the normal operating range, the ECM interprets this as a malfunction in the sensor heater and sets a DTC.

   Example:

   The ECM sets DTC P0032 or P0052 when the current in the A/F sensor heater is more than 10 A. Conversely, when the heater current is less than 0.8 A, DTC P0031 or P0051 is set.

MONITOR STRATEGY

Related DTCs	P0031: A/F sensor heater (bank 1) open/short (Low electrical current) P0032: A/F sensor heater (bank 1) open/short (High electrical current) P0051: A/F sensor heater (bank 2) open/short (Low electrical current) P0052: A/F sensor heater (bank 2) open/short (High electrical current)
Required sensors / components (Main)	A/F sensor heater (bank 1 and 2)
Required sensors / components (Sub)	-
Frequency of operation	Continuous
Duration	10 seconds
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	P0300 - P0306 (misfire)

P0031 and P0051:

Battery voltage	10.5 V or more
Heater output duty	50 % or more

Time after engine start	10 seconds or more

P0032 and P0052:

Battery voltage	Less than 20 V
Engine	Running
Heater output duty	More than 0 %

TYPICAL MALFUNCTION THRESHOLDS

P0031 and P0051:

A/F sensor heater current	Less than 0.8 A

P0032 and P0052:

Hybrid IC high current limiter port	Fail

ES

COMPONENT OPERATING RANGE

P0031 and P0051:

A/F sensor heater current	1.8 to 3.4 A at 20°C (68°F)

WIRING DIAGRAM

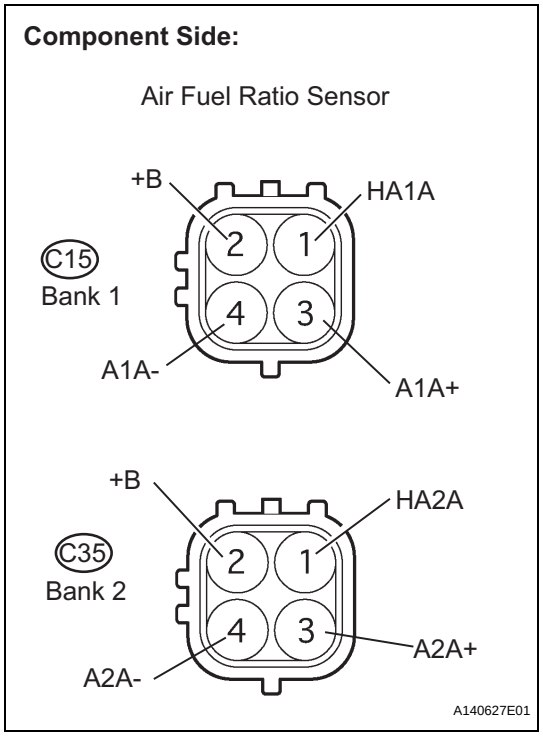
Refer to DTC P2195 (See page ES-350)

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



(a) Disconnect the C15 or C35 A/F sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Bank 1 sensor 1)

Tester Connection	Condition	Specified Condition
HA1A (1) - +B (2)	20°C (68°F)	1.8 to 3.4 Ω
HA1A (1) - A1A- (4)	-	10 kΩ or higher

Standard resistance (Bank 2 sensor 1)

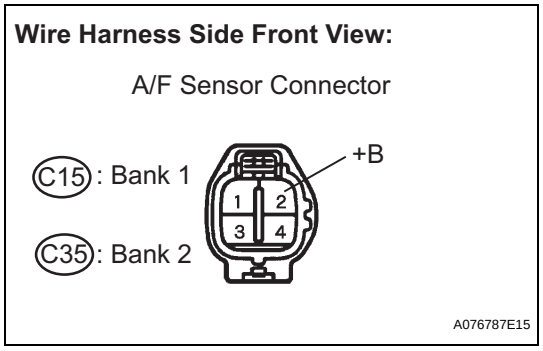
Tester Connection	Condition	Specified Condition
HA2A (1) - +B (2)	20°C (68°F)	1.8 to 3.4 Ω
HA2A (1) - A2A- (4)	-	10 kΩ or higher

(c) Reconnect the A/F sensor connector.

NG → **REPLACE AIR FUEL RATIO SENSOR (See page EC-19)**

OK

2 CHECK TERMINAL VOLTAGE (+B OF A/F SENSOR)



(a) Disconnect the C15 or C35 A/F sensor Connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between the terminals of the A/F sensor connector and body ground.

Standard voltage

Tester Connection	Specified Condition
+B (C15-2) - Body ground	9 to 14 V
+B (C35-2) - Body ground	9 to 14 V

OK → **Go to step 7**

NG

3 INSPECT FUSE (A/F)

(a) Remove the A/F sensor fuse from the No. 1 integration relay.
(b) Measure the A/F sensor fuse resistance.

Standard resistance:
Below 1 Ω

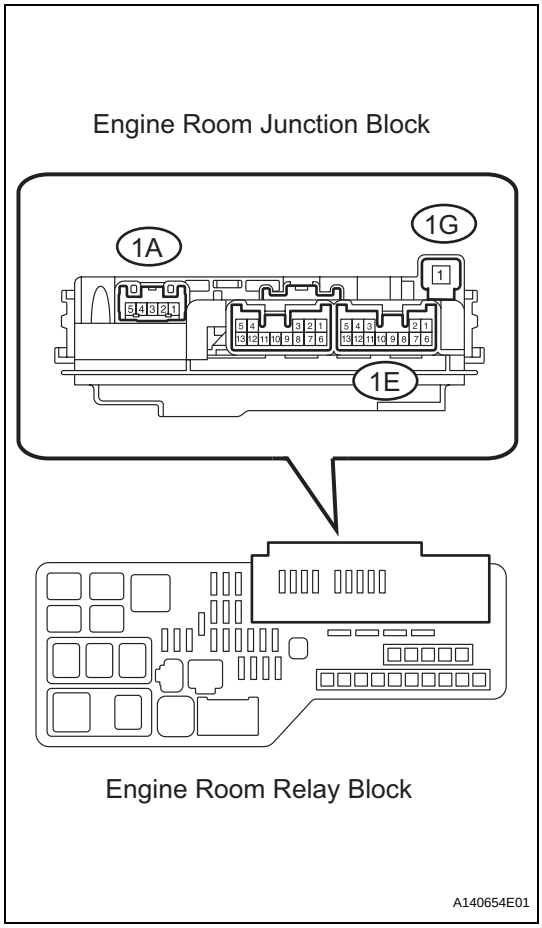
(c) Reinstall the A/F fuse.

NG → **REPLACE A/F FUSE**

ES

OK

4	INSPECT ENGINE ROOM JUNCTION BLOCK (EFI RELAY, A/F RELAY)



(a) Remove the engine room junction block from the engine room R/B.
(b) Inspect the EFI relay.
  (1) Measure the EFI relay resistance.
  Standard resistance

Tester Connection	Specified Condition
1E-12 - 1E-6	10 kΩ or higher
1E-12 - 1E-6	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-10)

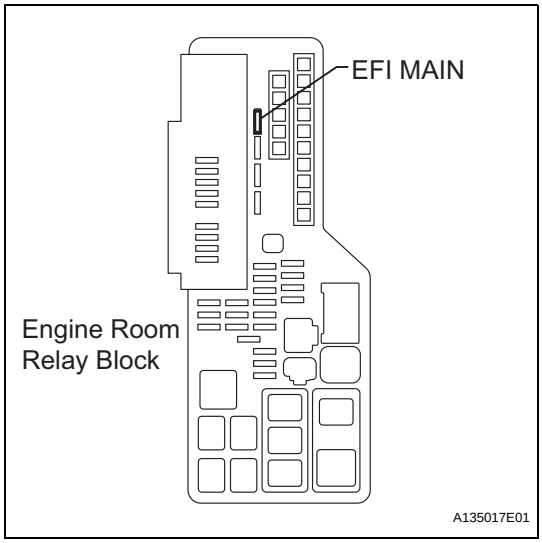
(c) Inspect the A/F relay.
  (1) Measure the A/F relay resistance.
  Standard resistance

Tester Connection	Specified Condition
1G-1 - 1A-4	10 kΩ or higher
1G-1 - 1A-4	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-10)

NG → REPLACE ENGINE ROOM JUNCTION BLOCK

OK

5	INSPECT FUSE (EFI MAIN)

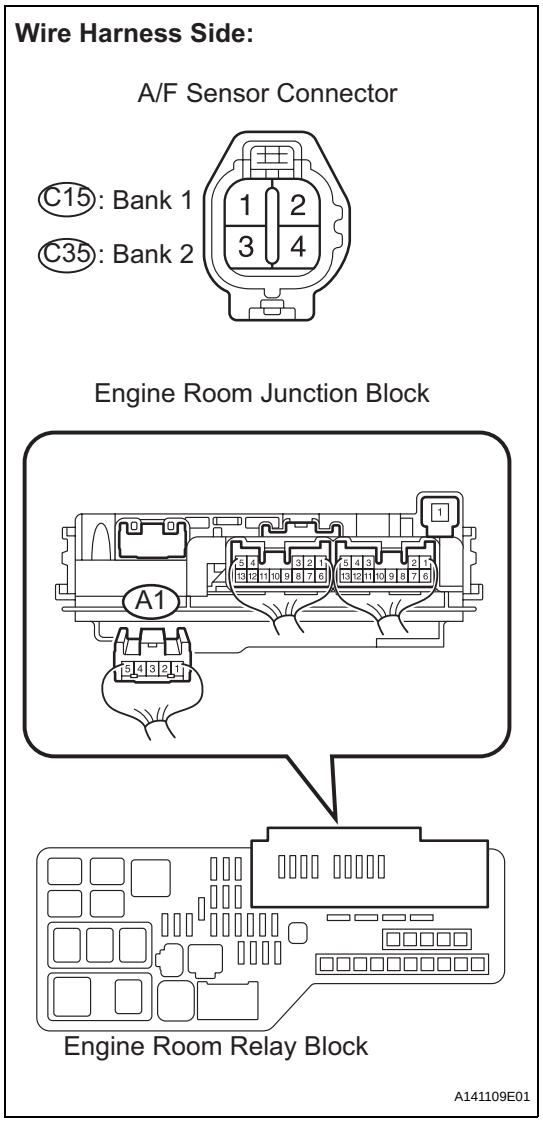


(a) Remove the EFI MAIN fuse from the engine room R/B.
(b) Measure the EFI MAIN fuse resistance.
  Standard resistance:
  Below 1 Ω
(c) Reinstall the EFI MAIN fuse.

NG → REPLACE EFI MAIN FUSE

OK

6	CHECK HARNESS AND CONNECTOR (A/F SENSOR - A/F RELAY)



(a) Disconnect the C15 or C35 A/F sensor connector.
(b) Remove the engine room junction block from the engine room R/B.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (C15-2) - 1A-4 (Engine room R/B)	Below 1 Ω
+B (C35-2) - 1A-4 (Engine room R/B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
+B (C15-2) or 1A-4 (Engine room R/B) - Body ground	10 kΩ or higher
+B (C35-2) or 1A-4 (Engine room R/B) - Body ground	10 kΩ or higher

(d) Reinstall the engine room junction block.
(e) Reconnect the A/F sensor connector.

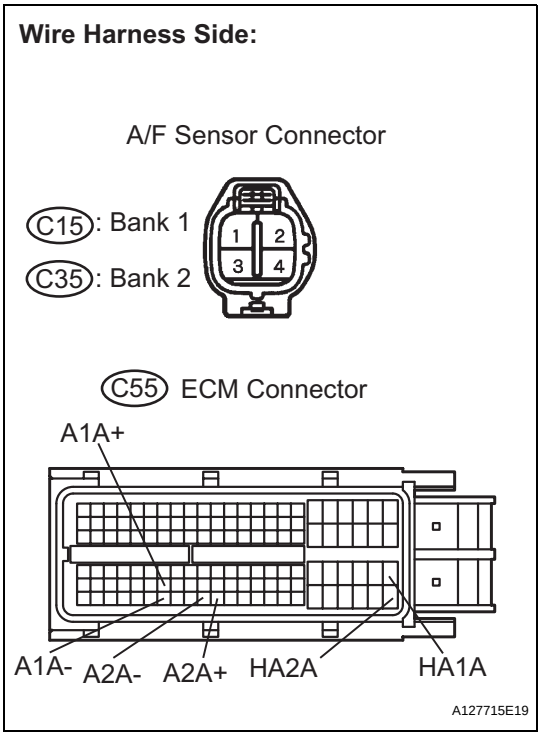
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

CHECK ECM POWER SOURCE CIRCUIT (See page ES-432)

ES

7 CHECK HARNESS AND CONNECTOR



(a) Disconnect the C15 or C35 A/F sensor connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
HA1A (C55-86) - HA1A (C15-1)	Below 1 Ω
HA2A (C55-109) - HA2A (C35-1)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HA1A (C55-86) or HA1A (C15-1) - Body ground	10 kΩ or higher
HA2A (C55-109) or HA2A (C35-1) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the A/F sensor connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

8 CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the intelligent tester on.
(d) Clear the DTCs (See page ES-45).
(e) Start the engine.
(f) Allow the engine to idle for 1 minute or more.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0031, P0032, P0051 and/or P0052	B

B → **REPLACE ECM (See page ES-518)**

A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)
DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)
DTC	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)
DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)
DTC	P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)
DTC	P0161	Oxygen Sensor Heater Circuit Malfunction (Bank 2 Sensor 2)

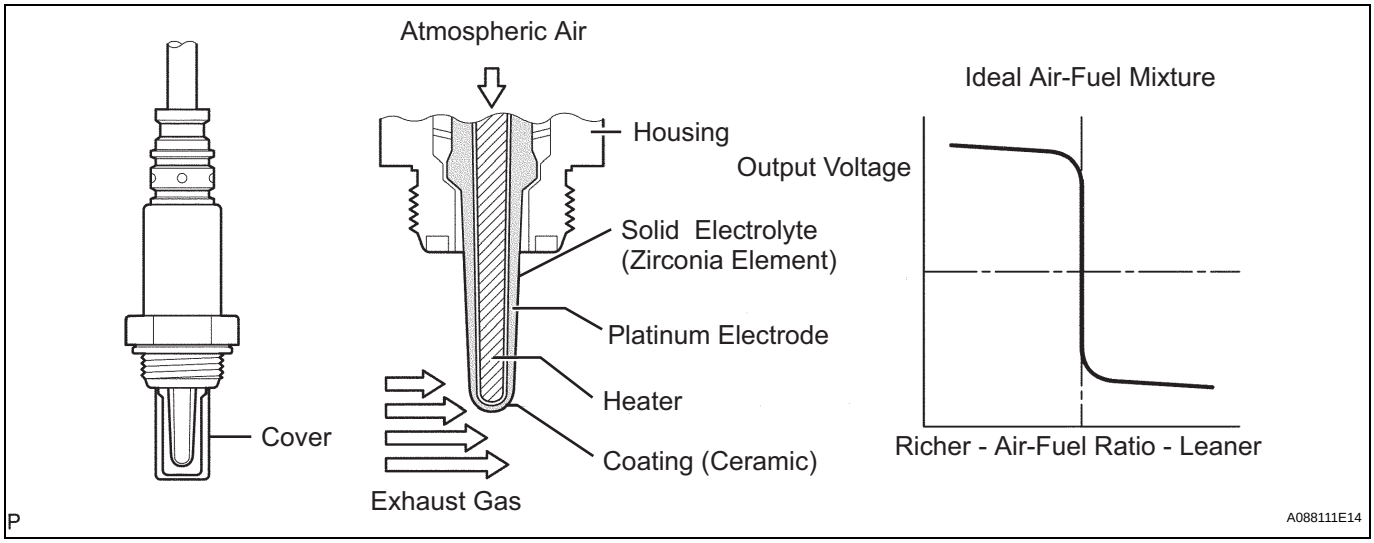
DESCRIPTION

A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio. For the purpose of helping the ECM to deliver accurate air-fuel ratio control, a Heated Oxygen (HO2) sensor is used.

The HO2 sensor is located behind the TWC, and detects the oxygen concentration in the exhaust gas. Since the sensor is integrated with the heater that heats the sensing portion, it is possible to detect the oxygen concentration even when the intake air volume is low (the exhaust gas temperature is low).

When the air-fuel ratio becomes lean, the oxygen concentration in the exhaust gas becomes rich. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is lean (low voltage, i.e. less than 0.45 V). Conversely, when the air-fuel ratio is richer than the stoichiometric air-fuel level, the oxygen concentration in the exhaust gas becomes lean. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is rich (high voltage, i.e. more than 0.45 V). The HO2 sensor has the property of changing its output voltage drastically when the air-fuel ratio is close to the stoichiometric level.

The ECM uses the supplementary information from the HO2 sensor to determine whether the air-fuel ratio after the TWC is rich or lean, and adjusts the fuel injection time accordingly. Thus, if the HO2 sensor is working improperly due to internal malfunctions, the ECM is unable to compensate for deviations in the primary air-fuel ratio control.

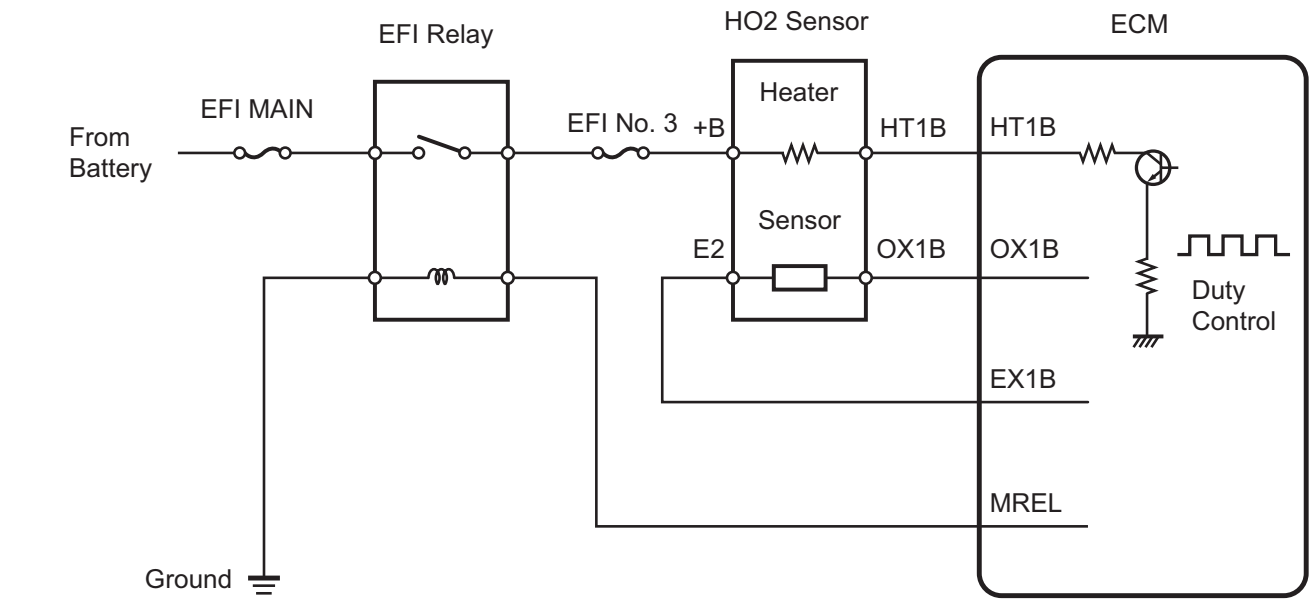


ES

HINT:

- Sensor 2 refers to the sensor mounted behind the Three-Way Catalytic Converter (TWC) and located far from the engine assembly.
- When any of these DTCs are set, the ECM enters fail-safe mode. The ECM turns off the Heated Oxygen (HO2) Sensor heater in fail-safe mode. Fail-safe mode continues until the engine switch is turned off.
- The ECM provides a pulse width modulated control circuit to adjust the current through the heater. The HO2 sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (System Diagram of Bank 1 Sensor 2):



DTC No.	DTC Detection Condition	Trouble Area
P0037 P0057	Heated Oxygen (HO2) sensor heater current is less than 0.3 A (1 trip detection logic)	• Open in HO2 sensor heater circuit • HO2 sensor heater • Engine room junction block (EFI relay) • ECM
P0038 P0058	Heated Oxygen (HO2) sensor heater current is more than 2 A (1 trip detection logic)	• Short in HO2 sensor heater circuit • HO2 sensor heater • Engine room junction block (EFI relay) • ECM

DTC No.	DTC Detection Condition	Trouble Area
P0141 P0161	Cumulative heater resistance correction value exceeds the acceptable threshold. (2 trip detection logic)	• HO2 sensor heater • ECM

HINT:
- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that does not include cylinder No. 1.
- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

MONITOR DESCRIPTION

The sensing position of the Heated Oxygen (HO2) sensor has a zirconia element which is used to detect the oxygen concentration in the exhaust gas. If the zirconia element is at the appropriate temperature, and the difference between the oxygen concentrations surrounding the inside and outside surfaces of the sensor is large, the zirconia element generates voltage signals. In order to increase the oxygen concentration detecting capacity of the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor.

Heated oxygen sensor heater range check (P0037,P0038, P0057 and P0058):

The ECM monitors the current applied to the O2 sensor heater to check the heater for malfunctions. If the current is below the threshold value, the ECM will determine that there is an open circuit in the heater. If the current is above the threshold value, the ECM will determine that there is a short circuit in the heater.

Example:

The ECM sets DTC P0038 or P0058 when the current in the HO2 sensor heater is more than 2 A. Conversely, when the heater current is less than 0.3 A, DTC P0037 or P0057 is set.

Heated oxygen sensor heater performance (P0141 and P0161):

After the accumulated heater ON time exceeds 100 seconds, the ECM calculates the heater resistance using the battery voltage and the current applied to the heater. If the resistance is above the threshold value, the ECM will determine that there is a malfunction in the HO2S heater and set DTC P0141 and P0161.

MONITOR STRATEGY

Related DTCs	P0037: Heated oxygen sensor heater (bank 1 sensor 2) open/short (Low electrical current) P0038: Heated oxygen sensor heater (bank 1 sensor 2) open/short (High electrical current) P0057: Heated oxygen sensor heater (bank 2 sensor 2) open/short (Low electrical current) P0058: Heated oxygen sensor heater (bank 2 sensor 2) open/short (High electrical current) P0141: Heated oxygen sensor heater performance (bank 1 sensor 2) P0161: Heated oxygen sensor heater performance (bank 2 sensor 2)
Required sensors / components (Main)	Heated oxygen sensor heater (bank 1 sensor 2) Heated oxygen sensor heater (bank 2 sensor 2)
Required sensors / components (Sub)	Vehicle speed sensor
Frequency of operation	Continuous
Duration	1 second: P0037, P0038, P0057 and P0058 10 seconds: P0141 and P0161
MIL operation	Immediate: P0037, P0038, P0057 and P0058 2 driving cycles: P0141 and P0161
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P0037 and P0057:

Battery voltage	10.5 to 20 V

P0038 and P0058 (Case 1):

Battery voltage	10.5 V or more
Engine	Running
Starter	OFF

P0038 and P0058 (Case 2):

Battery voltage	10.5 to 20 V

P0141 and P0161:

One of the following conditions is met:	Condition A or B
A. All of the following conditions are met:	Conditions 1, 2, 3, 4 and 5
1. Battery voltage	10.5 V or more
2. Fuel cut	OFF
3. Time after fuel cut ON to OFF	30 seconds or more
4. Accumulated heater ON time	100 seconds or more
5. Learned heater OFF current operation	Completed
B. Duration that rear heated oxygen sensor impedance is less than 15 kΩ	2 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

P0037 and P0057:

Heater current	Less than 0.3 A

P0038 and P0058:

One of the following conditions is met:	Condition A or B
A. Learned heater OFF current	More than 2 A
B. Heater current	2 A or more

P0141 and P0161 (Heater performance monitor check):

Accumulated heater resistance	Varies with sensor element temperature (Example: More than 23 ohm)

COMPONENT OPERATING RANGE

Heated Oxygen (HO2) sensor heater current	0.4 to 1 A (when engine idles, HO2 sensor warmed up and battery voltage 11 to 14 V)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

WIRING DIAGRAM

Refer to DTC P0136 (See page ES-178).

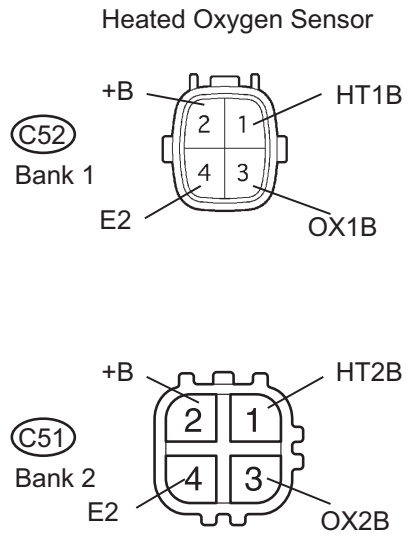
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1 INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)

Component Side:



A137614E06

(a) Disconnect the C52 heated oxygen sensor connector (Bank 1 Sensor 2) or C51 heated oxygen sensor connector (Bank 2 Sensor 2).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Bank 1 sensor 2)

Tester Connection	Condition	Specified Condition
HT1B (1) - +B (2)	20°C (68°F)	11 to 16 Ω
HT1B (1) - E2 (4)	Always	10 kΩ or higher

Standard resistance (Bank 2 sensor 2)

Tester Connection	Condition	Specified Condition
HT2B (1) - +B (2)	20°C (68°F)	11 to 16 Ω
HT2B (1) - E2 (4)	Always	10 kΩ or higher

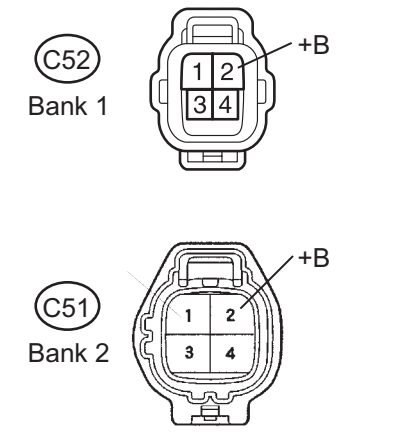
(c) Reconnect the HO2 sensor connector.

NG → **REPLACE HEATED OXYGEN SENSOR (See page EC-20)**

OK

2 CHECK TERMINAL VOLTAGE (+B OF HO2 SENSOR)

Wire Harness Side:



A137619E01

(a) Disconnect the C52 heated oxygen sensor connector (Bank 1 Sensor 2) or C51 heated oxygen sensor connector (Bank 2 Sensor 2).

(b) Turn the ignition switch on (IG).

(c) Measure the voltage between the terminals.

Standard voltage

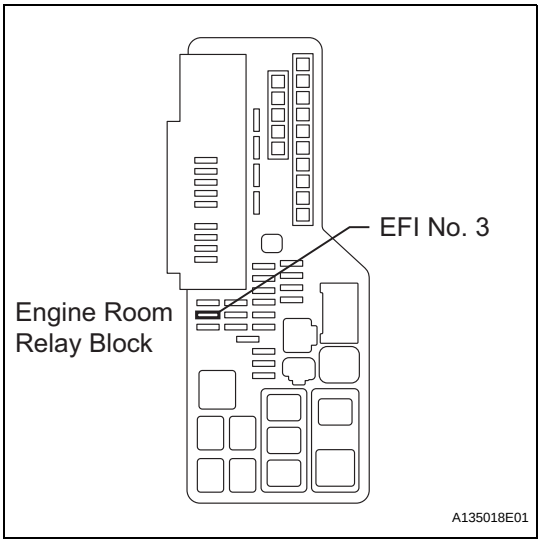
Tester Connection	Specified Condition
+B (C52-2) - Body ground	9 to 11 V
+B (C51-2) - Body ground	9 to 11 V

(d) Reconnect the HO2 sensor connector.

OK → **Go to step 7**

NG

3	INSPECT FUSE (EFI NO. 3)

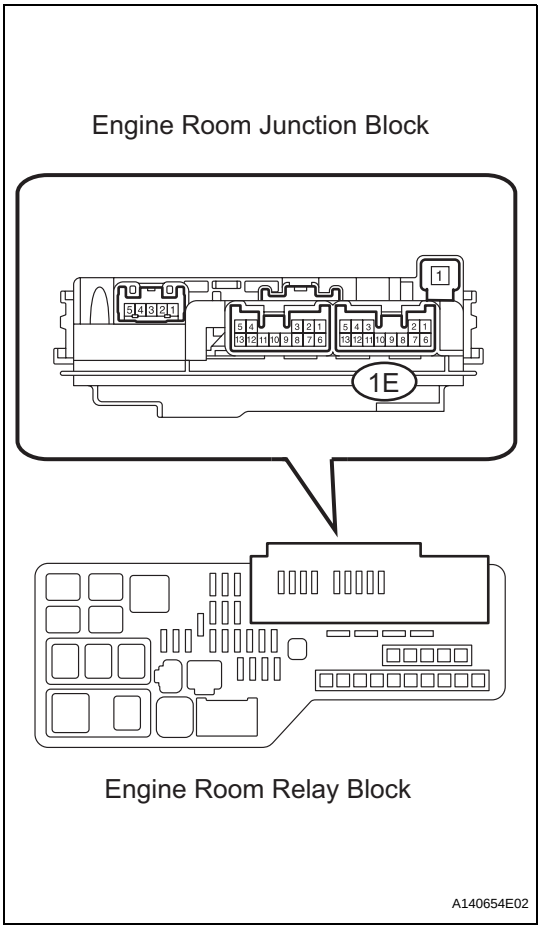


(a) Remove the EFI No. 3 fuse from the engine room R/B.
(b) Measure the EFI No. 3 fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the EFI No. 3 fuse.

NG → **REPLACE EFI NO. 3 FUSE**

OK

4	INSPECT ENGINE ROOM JUNCTION BLOCK



(a) Remove the engine room junction block from the engine room R/B.
(b) Inspect the EFI relay.
(1) Measure the EFI relay resistance.
Standard resistance

Tester Connection	Specified Condition
1E-12 - 1E-6	10 kΩ or higher
1E-12 - 1E-6	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-10)

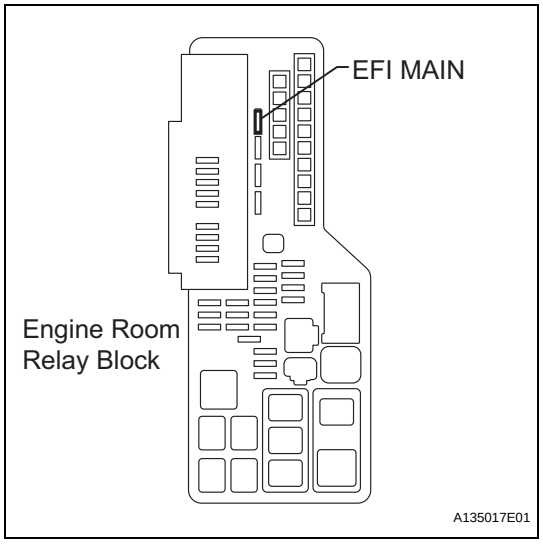
(c) Reinstall the engine room junction block.

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

ES

5	INSPECT FUSE (EFI MAIN)



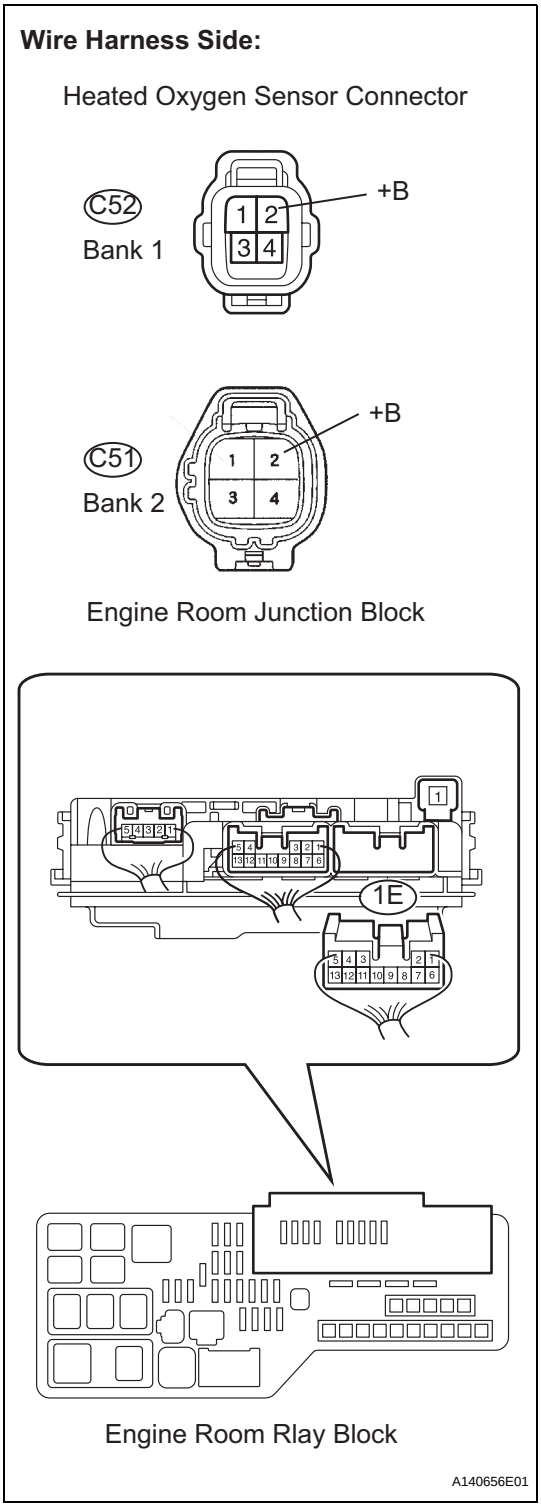
(a) Remove the EFI MAIN fuse from the engine room R/B.
(b) Measure the EFI MAIN fuse.
Standard resistance:
Below 1 Ω
(c) Reinstall the EFI MAIN fuse.

NG → **REPLACE EFI MAIN FUSE**

OK

ES

6	CHECK HARNESS AND CONNECTOR (HO2 SENSOR - EFI RELAY)



(a) Disconnect the C52 or C51 HO2 sensor connector.
(b) Remove the engine room junction block from the engine room R/B.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (C52-2) - 1E-6 (Engine room R/B)	Below 1 Ω
+B (C51-2) - 1E-6 (Engine room R/B)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
+B (C52-2) or 1E-6 (Engine room R/B) - Body ground	10 kΩ or higher
+B (C51-2) or 1E-6 (Engine room R/B) - Body ground	10 kΩ or higher

(d) Reinstall the engine room junction block.
(e) Reconnect the HO2 sensor connector.

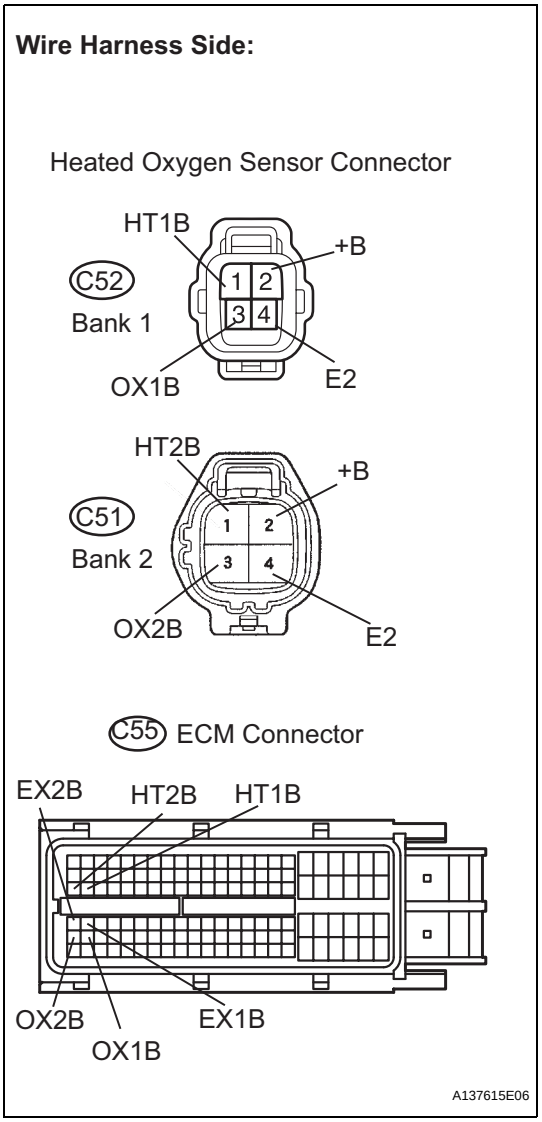
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CHECK ECM POWER SOURCE CIRCUIT

7 CHECK HARNESS AND CONNECTOR (HO2 SENSOR - ECM)

Wire Harness Side:



(a) Disconnect the C52 heated oxygen sensor connector (Bank 1 Sensor 2) or C51 heated oxygen sensor connector (Bank 2 Sensor 2).
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal Connection	Specified Condition
+B (C52-2) - Body ground	9 to 14 V
+B (C51-2) - Body ground	9 to 14 V

(d) Turn the engine switch off.
(e) Disconnect the C55 ECM connector.
(f) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Terminal Connection	Specified Condition
HT1B (C52-1) - HT1B (C55-48)	Below 1 Ω
OX1B (C52-3) - OX1B (C55-88)	Below 1 Ω
E2 (C52-4) - EX1B (C55-65)	Below 1 Ω
HT2B (C51-1) - HT2B (C55-47)	Below 1 Ω
OX2B (C51-3) - OX2B (C55-87)	Below 1 Ω
E2 (C51-4) - EX2B (C55-64)	Below 1 Ω

Standard resistance (Check for short)

Terminal Connection	Specified Condition
HT1B (C52-1) or HT1B (C55-48) - Body ground	10 kΩ or higher
OX1B (C52-3) - OX1B (C55-88) - Body ground	10 kΩ or higher
E2 (C52-4) or EX1B (C55-65) - Body ground	10 kΩ or higher
HT2B (C51-1) or HT2B (C55-47) - Body ground	10 kΩ or higher
OX2B (C51-3) or OX2B (C55-87) - Body ground	10 kΩ or higher
E2 (C51-4) or EX2B (C55-64) - Body ground	10 kΩ or higher

(g) Reconnect the HO2 sensor connector.
(h) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

8 CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the intelligent tester on.
(d) Clear the DTCs (See page ES-45).
(e) Start the engine.
(f) Allow the engine to idle for 2 minutes.

(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0037, P0038, P0057 and/or P0058	B

B → **REPLACE ECM (See page ES-518)**

A

CHECK FOR INTERMITTENT PROBLEMS (See page ES-33)

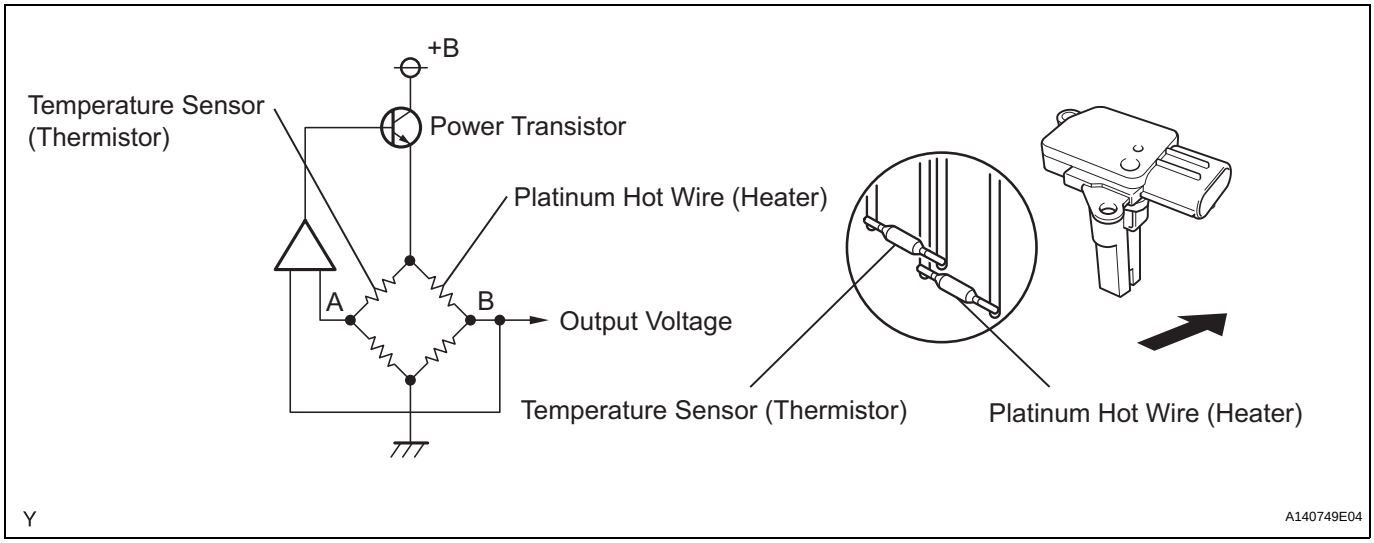
DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

DTC	P0103	Mass or Volume Air Flow Circuit High Input

DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the valve. The ECM uses this information to determine the fuel injection time and to prove appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air.
By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.
The circuit is constructed so that the platinum hot wire and the temperature sensor provide a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.
HINT:
When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine RPM and throttle valve position. Fail-safe mode continues until a pass condition is detected.



DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in Mass Air Flow (MAF) meter circuit for 3 seconds	• Open or short in MAF meter circuit • MAF meter • ECM
P0102	Open in Mass Air Flow (MAF) meter circuit for 3 seconds	• Open in MAF meter circuit • Short in MAF meter circuit • MAF meter • ECM
P0103	Short in Mass Air Flow (MAF) meter circuit for 3 seconds	• Short in MAF meter circuit (+B circuit) • MAF meter • ECM

HINT:
When any of these DTCs are set, check the air-flow rate by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.

Mass Air Flow Rate (gm/s)	Malfunctions
Approximately 0.0	• Open in Mass Air Flow (MAF) meter power source circuit • Open or short in VG circuit
271.0 or more	Open in EVG circuit

MONITOR DESCRIPTION

If there is a defect in the MAF meter or an open or short circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets a DTC.
Example:
When the sensor output voltage remains less than 0.2 V, or more than 4.9 V, for more than 3 seconds, the ECM sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 3 seconds after the engine is next started.

ES

MONITOR STRATEGY

Related DTCs	P0100: Mass air flow meter range check (Fluctuating) P0102: Mass air flow meter range check (Low voltage) P0103: Mass air flow meter range check (High voltage)
Required Sensors/Components (Main)	MAF meter
Required Sensors/Components (Sub)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate: Engine RPM less than 4,000 rpm 2 driving cycles: Engine RPM 4,000 rpm or more
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0100:

Mass air flow meter voltage	Less than 0.2 V, or more than 4.9 V

P0102:

Mass air flow meter voltage	Less than 0.2 V

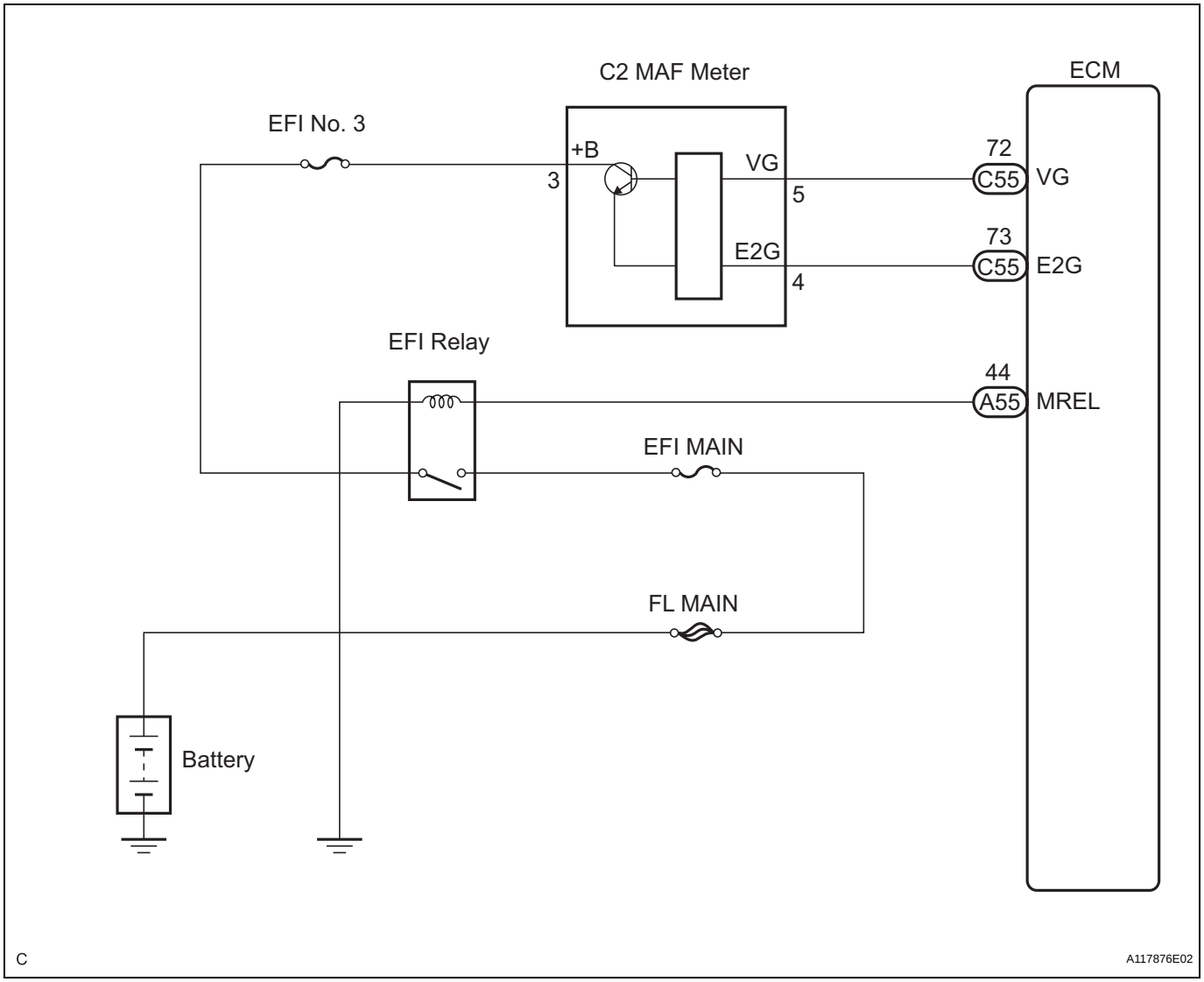
P0103:

Mass air flow meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

Mass air flow meter voltage	Between 0.4 V and 2.2 V

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**READ VALUE OF MASS AIR FLOW METER (MAF)**

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF.
(e) Read the values displayed on the tester.

Result

Mass Air Flow Rate (gm/s)	Proceed to
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

*1: The value must be changed when the throttle valve is open or closed.

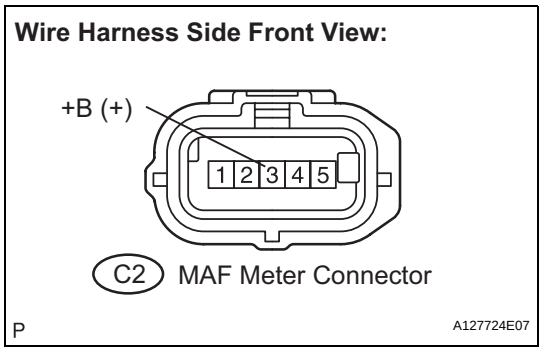
B → Go to step 8

C → CHECK FOR INTERMITTENT PROBLEMS (See page ES-33)

A

ES

2 INSPECT MASS AIR FLOW METER (POWER SOURCE VOLTAGE)



(a) Disconnect the C2 mass air flow (MAF) meter connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

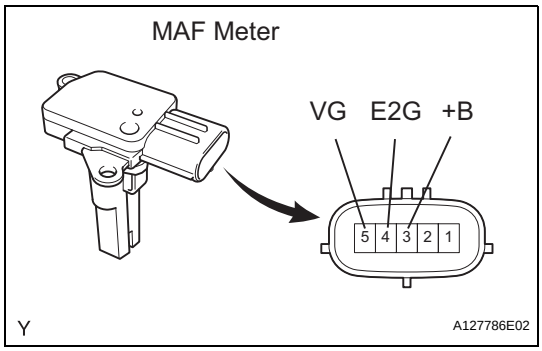
Tester Connection	Specified Condition
+B (C2-3) - Body ground	9 to 14 V

(d) Reconnect the MAF meter connector.

NG → Go to step 5

OK

3 INSPECT MASS AIR FLOW METER (VG VOLTAGE)



(a) Inspect the output voltage.
(1) Apply battery voltage across terminals +B and E2G.
(2) Connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.
(3) Measure the voltage between the terminals.

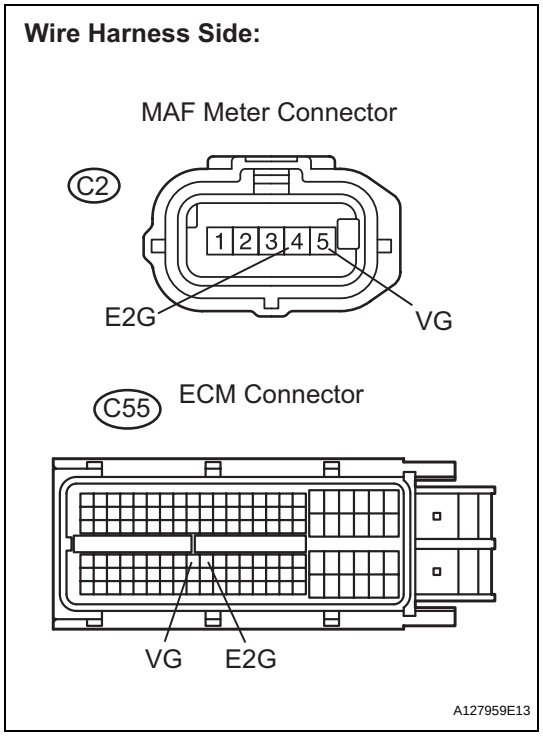
Standard voltage

Tester Connection	Specified Condition
5 (VG) - 4 (E2G)	0.2 to 4.9 V

NG → REPLACE MASS AIR FLOW METER

OK

4 CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VG (C55-72) - VG (C2-5)	Below 1 Ω
E2G (C55-73) - E2G (C2-4)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VG (C55-72) or VG (C2-5) - Body ground	10 kΩ or higher
E2G (C55-73) or E2G (C2-4) - Body ground	10 kΩ or higher

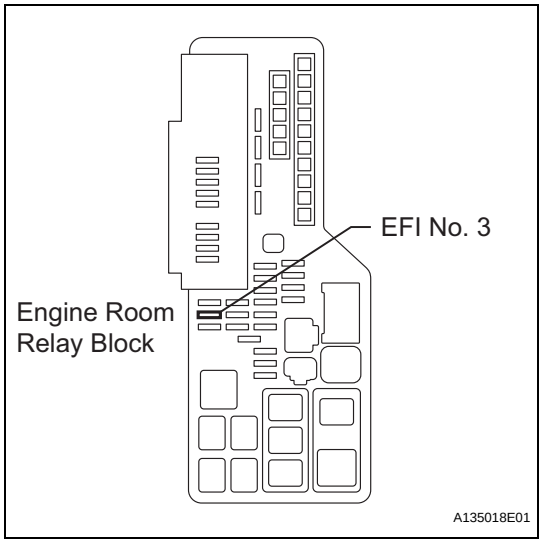
(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

5 INSPECT FUSE (EFI NO. 3)



(a) Remove the EFI No. 3 fuse from the engine room R/B.
(b) Measure the EFI No. 3 fuse resistance.

Standard resistance:
Below 1 Ω

(c) Reinstall the EFI No. 3 fuse.

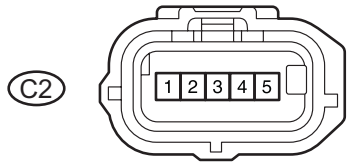
NG → **REPLACE EFI NO. 3 FUSE**

OK

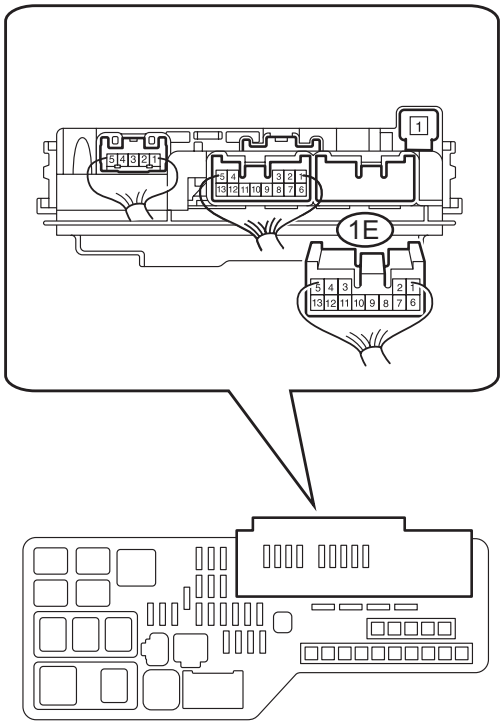
6	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ENGINE ROOM JUNCTION BLOCK)

Wire Harness Side:

MAF Meter Connector



Engine Room Junction Block



Engine Room Relay Block

A140657E01

OK

(a) Disconnect the C2 MAF meter connector.
(b) Remove the engine room junction block from the engine room R/B.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+B (C2-3) - 1E-6 (Engine room R/B)	Below 1 Ω

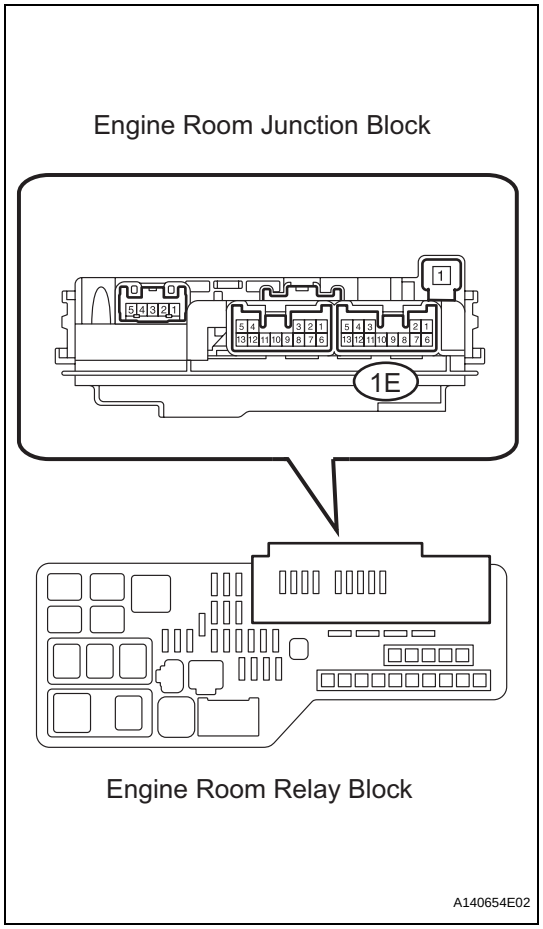
Standard resistance (Check for short)

Tester Connection	Specified Condition
+B (C2-3) or 1E-6 (Engine room R/B) - Body ground	10 kΩ or higher

(d) Reinstall the engine room junction block.
(e) Reconnect the C2 MAF meter connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

7 INSPECT ENGINE ROOM JUNCTION BLOCK (EFI RELAY)



(a) Remove the engine room junction block from the engine room R/B.
(b) Inspect the EFI relay.
(1) Measure the EFI relay resistance.
Standard resistance

Tester Connection	Specified Condition
1E-12 - 1E-6	10 kΩ or higher
1E-12 - 1E-6	Bellow 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-10)

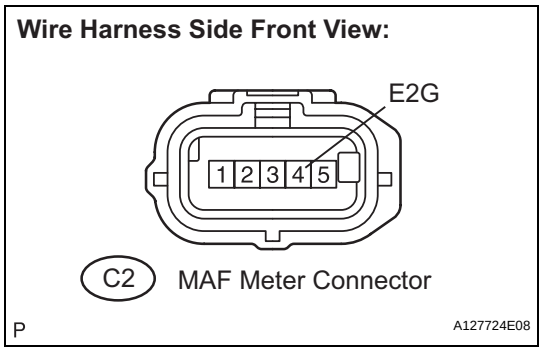
(c) Reinstall the engine room junction block.

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

CHECK ECM POWER SOURCE CIRCUIT (See page ES-432)

8 CHECK HARNESS AND CONNECTOR (SENSOR GROUND)



(a) Disconnect the C2 MAF meter connector.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
E2G (C2-4) - Body ground	Below 1 Ω

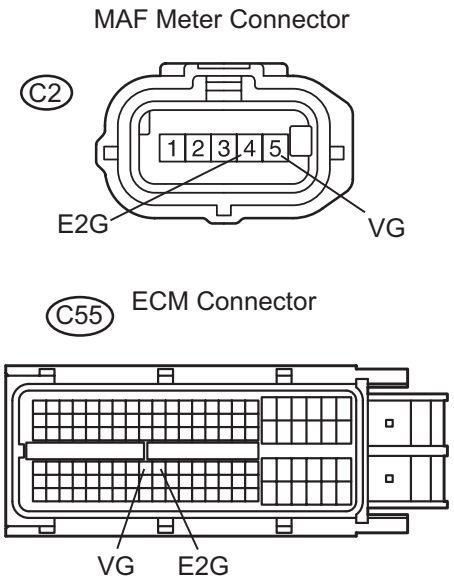
(c) Reconnect the MAF meter connector.

OK → **REPLACE MASS AIR FLOW METER (See page ES-477)**

NG

9	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)

Wire Harness Side:



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VG (C55-72) - VG (C2-5)	Below 1 Ω
E2G (C55-73) - E2G (C2-4)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VG (C55-72) or VG (C2-5) - Body ground	10 kΩ or higher
E2G (C55-73) or E2G (C2-4) - Body ground	10 kΩ or higher

(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

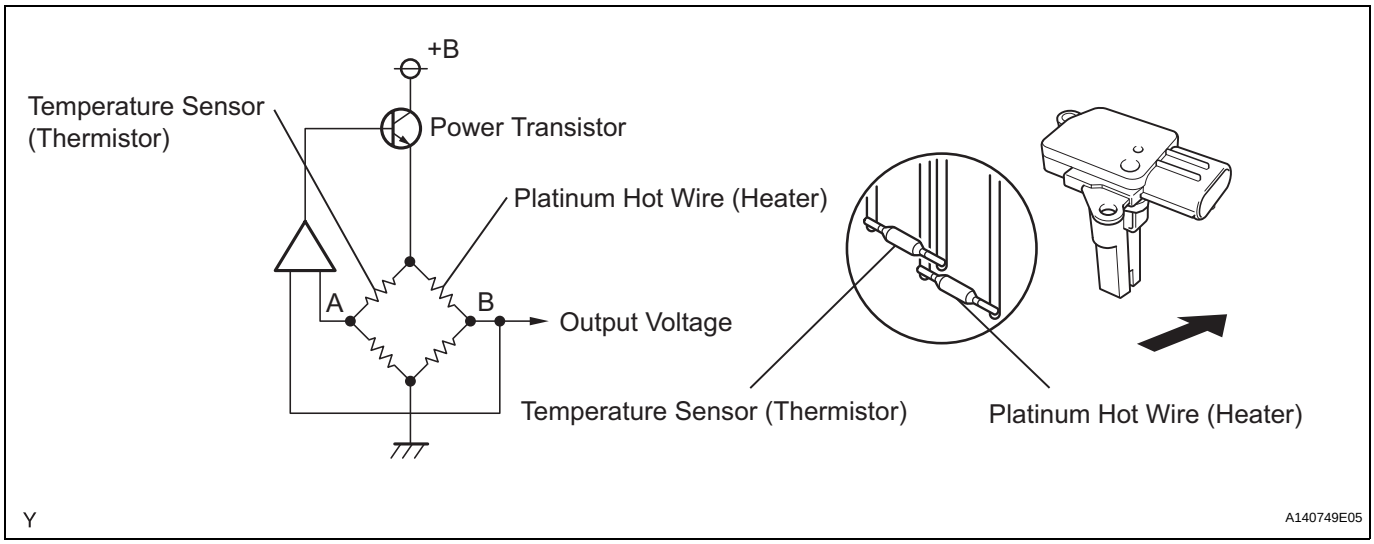
OK

REPLACE ECM (See page ES-518)

DTC	P0101	Mass Air Flow Circuit Range / Performance Problem

DESCRIPTION

The Mass Air Flow (MAF) meter is a sensor that measures the amount of air flowing through the valve. The ECM uses this information to determine the fuel injection time and to prove appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air.
By applying a specific electrical current to the wire, the ECM heats it to a given temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.
The circuit is constructed so that the platinum hot wire and the temperature sensor provide a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.
HINT:
When any of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine RPM and throttle valve position. Fail-safe mode continues until a pass condition is detected.



DTC No.	DTC Detection Condition	Trouble Area
P0101	Test value calculated with engine load and fuel trim are out of specified threshold under the following conditions (2 trip detection logic): – Engine load is 30 % or more and constant – Engine coolant temperature is 70°C (158°F) or higher	MAF meter

MONITOR DESCRIPTION

The MAF meter is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air-fuel ratio. Inside the MAF meter, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components of the MAF meter. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume. If there is a defect in the sensor, or an open or short in the circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the MAF meter and sets the DTC.

Example:

If the voltage is more than 2.2 V, or less than 1.48 V while idling, the ECM determines that there is a malfunction in the MAF meter and sets the DTC.

ES

MONITOR STRATEGY

Related DTCs	P0101: Mass air flow meter rationality
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Sub)	Crankshaft position sensor, engine coolant temperature sensor and throttle position sensor
Frequency of Operation	Continuos
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for closed loop) P0335 (CKP sensor) P0340, P0341 (CMP sensor)
TP (Throttle position) sensor voltage	0.24 V or more
Engine	Running
Battery voltage	10.5 V or more
ECT	70°C (158°F) or more
IAT sensor circuit	OK
ECT sensor circuit	OK
CKP sensor circuit	OK
TP sensor circuit	OK
FTP sensor circuit	OK
EVAP leak detection pump	OK
EVAP vent valve	OK

TYPICAL MALFUNCTION THRESHOLDS

Average engine load	Less than 0.838 %, or more than 1.287 %

WIRING DIAGRAM

Refer to DTC P0100 (See page ES-127).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0101)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

ES

Result

Display (DTC Output)	Proceed to
P0101 and other DTCs	A
P0101	B

(e) Read the DTCs.
HINT:
If any DTCs other than P0101 are output, troubleshoot those DTCs first.

B → **REPLACE MASS AIR FLOW METER (See page ES-477)**

A →

GO TO DTC CHART (See page ES-63)

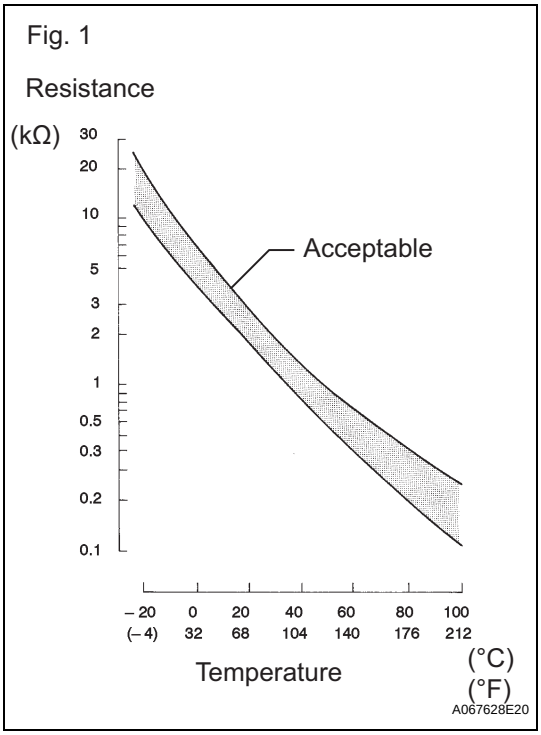
DTC	P0110	Intake Air Temperature Circuit Malfunction

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

DESCRIPTION

Fig. 1



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT drops, the resistance of the thermistor increases. When the temperature rises, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (See Fig. 1).

The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R.

Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes, according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

HINT:

When any of DTCs P0110, P0112 and P0113 are set, the ECM enters fail-safe mode. During fail-safe mode, the IAT is estimated to be 20°C (68°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in Intake Air Temperature (IAT) sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM
P0112	Step 4	Short in Intake Air Temperature (IAT) sensor circuit for 0.5 seconds (1 trip detection logic)	• Short in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM
P0113	Step 2	Open in Intake Air Temperature (IAT) sensor circuit for 0.5 seconds (1 trip detection logic)	• Open in IAT sensor circuit • IAT sensor (built into MAF meter) • ECM

HINT:
When any of these DTCs are set, check the IAT by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the Intake Air Temperature (IAT). When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a malfunction in the IAT sensor and sets a DTC.
Example:

If the sensor output voltage is -40°C (-40°F) for 0.5 seconds or more, the ECM determines that there is an open in the IAT sensor circuit, and sets DTC P0113. Conversely, if the output voltage is more than 140°C (284°F) for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0112.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0110: Intake air temperature sensor open/short (Fluctuating) P0112: Intake air temperature sensor short (Low electrical resistance) P0113: Intake air temperature sensor open (High electrical resistance)
Required Sensors/Components (Main)	Intake Air Temperature (IAT) sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0110:

Intake air temperature sensor voltage	Less than 0.18 V, or more than 4.91 V

P0112:

Intake air temperature sensor voltage	Less than 0.18 V

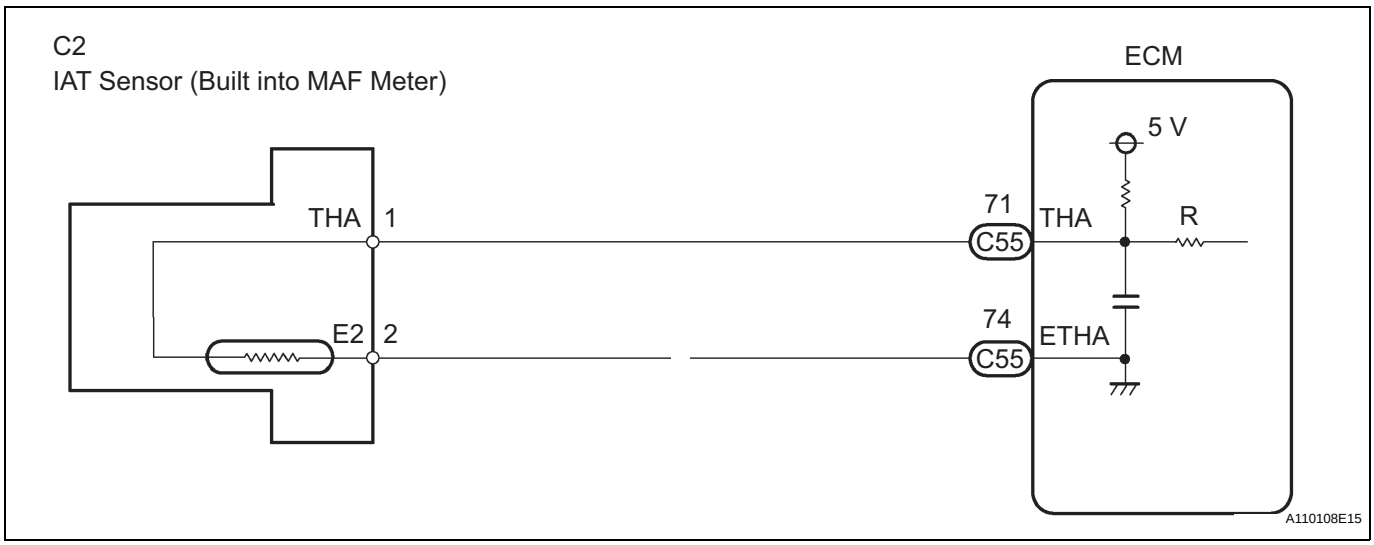
P0113:

Intake air temperature sensor voltage	More than 4.91 V

COMPONENT OPERATING RANGE

Intake air temperature sensor resistance	98.5 Ω to 156 kΩ [-40 to 140°C (-40 to 284°F)]

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the intelligent tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0110	A
P0112	B
P0113	C

B → Go to step 6

C → Go to step 4

A

2	READ VALUE OF INTAKE AIR TEMPERATURE SENSOR (INTAKE AIR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.

(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(e) Read the value displayed on the tester.

Standard:
Same as actual Intake Air Temperature (IAT).

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Same as actual IAT	C

HINT:
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

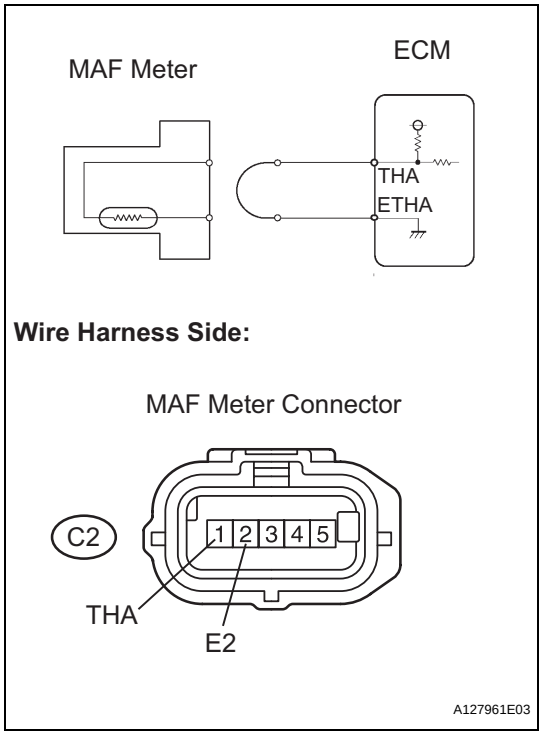
ES

B → **Go to step 5**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page ES-33)**

A

3 CHECK MASS AIR FLOW METER (CHECK FOR OPEN IN SENSOR)



(a) Confirm good connection of the Mass Air Flow (MAF) meter.
(b) Disconnect the C2 MAF meter connector.
(c) Connect terminals THA and E2 of the MAF meter wire harness side connector.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the ignition switch on (IG).
(f) Turn the tester on.
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(h) Read the value displayed on the tester.

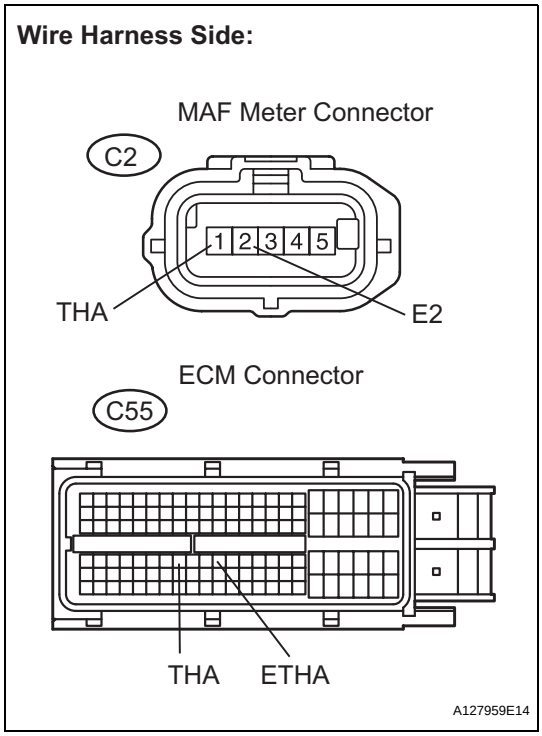
Standard:
140°C (284°F) or higher

(i) Reconnect the MAF meter connector.

OK → **REPLACE MASS AIR FLOW METER (See page ES-477)**

NG

4 CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER - ECM)



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
THA (C55-71) - THA (C2-1)	Below 1 Ω
ETHA (C55-74) - E2 (C2-2)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
THA (C55-71) or THA (C2-1) - Body ground	10 kΩ or higher
ETHA (C55-74) or E2 (C2-2) - Body ground	10 kΩ or higher

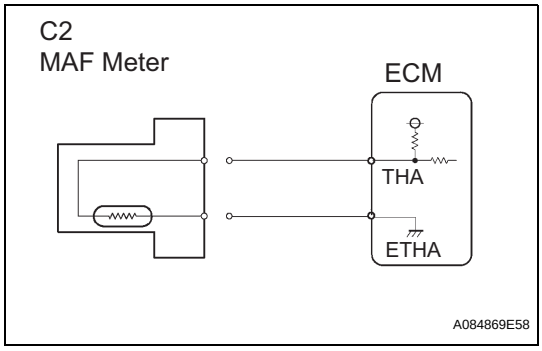
(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-518)

5 CHECK MASS AIR FLOW METER (CHECK FOR SHORT IN SENSOR)



(a) Disconnect the C2 MAF meter connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Turn the tester on.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / INTAKE AIR.
(f) Read the value displayed on the tester.

Standard:

-40°C (-40°F) or higher

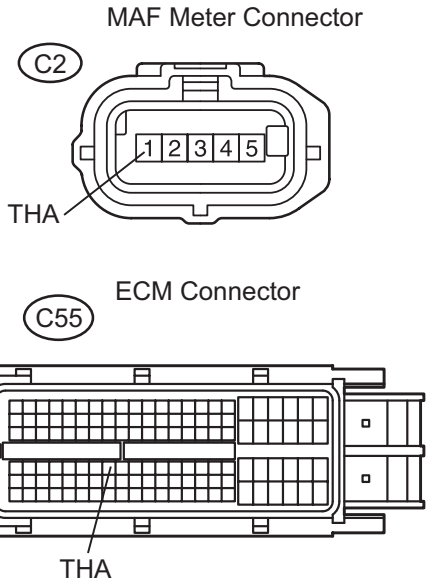
(g) Reconnect the MAF meter connector.

OK → **REPLACE MASS AIR FLOW METER (See page ES-477)**

NG

6	CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER- ECM)

Wire Harness Side:



(a) Disconnect the C2 MAF meter connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
THA (C55-71) or THA (C2-1) - Body ground	10 kΩ or higher

(d) Reconnect the MAF meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

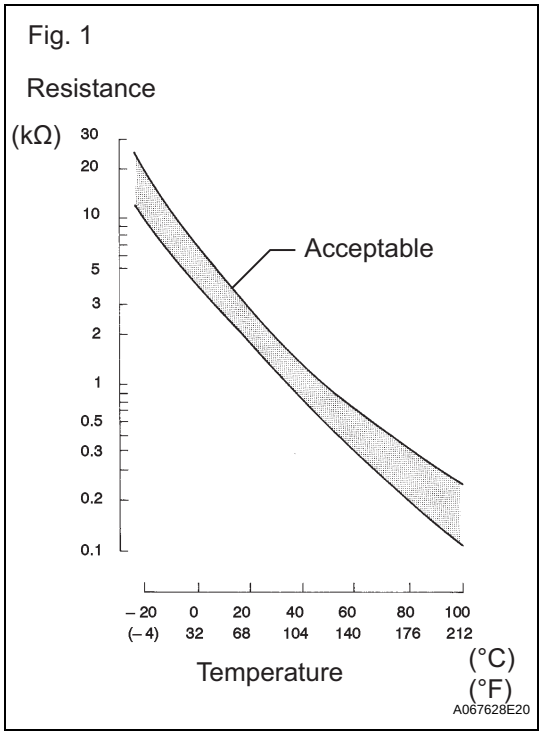
OK

REPLACE ECM (See page ES-518)

ES

DTC	P0111	Intake Air Temperature Sensor Gradient Too High

DESCRIPTION



The Intake Air Temperature (IAT) sensor, mounted on the Mass Air Flow (MAF) meter, monitors the IAT. The IAT sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the IAT drops, the resistance of the thermistor increases. When the temperature rises, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (See Fig. 1).
The IAT sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R.
Resistor R and the IAT sensor are connected in series. When the resistance value of the IAT sensor changes, according to changes in the IAT, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

DTC No.	DTC Detection Condition	Trouble Area
P0111	1. The intake air temperature rise is large, from the previous trip warm-up to the following trip. (2 trip detection logic) 2. When the change in the intake air temperature after engine start is less than the threshold value.	Mass air flow meter assembly

MONITOR DESCRIPTION

The ECM performs OBD II monitoring based on the values from the intake air temperature sensor. If there is no change of the sensor value within the normal range, the ECM will not be able to perform OBD II monitoring or will misdiagnose that there is a malfunction in the sensor. The ECM detects the stuck intake air temperature sensor value by performing monitoring after the engine switch is turned off or the engine is started (short soak or long soak).

MONITOR STRATEGY

Related DTCs	P0111: Intake air temperature sensor rationality (After engine stop) P0111: Intake air temperature sensor rationality (After cold engine start)

Required Sensors/Components (Main)	Intake Air Temperature (IAT) sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Once per driving cycle
Duration	5 hours
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

After engine stop:

Time after engine start	10 seconds or more
Battery voltage	10.5 V or more
ECT sensor circuit	OK
ECT change since engine stopped	Less than 180°C (356°F)
ECT before engine stop	70°C (158°F) or more
Time that MAF is low before engine stop	70 minutes
Accumulated MAF amount before engine stop	3,800 g or more
Key-off duration	30 minutes

After cold engine start:

Key-off duration	5 hours
Time after engine start	10 seconds or more
ECT sensor circuit	OK
ECT	70°C (158°F) or more
Accumulated MAF amount	6,300 g or more
One of the following conditions 1 or 2 is met:	-
1. Duration while engine load is low	129 seconds or more
2. Duration while engine load is high	10 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

After engine stop:

IAT change	Less than 1°C (2°F)

After cold engine start:

IAT change	Less than 1°C (2°F)

WIRING DIAGRAM

Refer to DTC P0110 (See page ES-138).

INSPECTION PROCEDURE

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0111)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0111 and other DTCs	A
P0111	B

HINT:
If any DTCs other than P0111 are output, troubleshoot those DTCs first.

B → **REPLACE MASS AIR FLOW METER (See page ES-477)**

A →

ES

GO TO DTC CHART (See page ES-63)

DTC	P0115	Engine Coolant Temperature Circuit Malfunction

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor, of which the resistance value varies according to the ECT.

The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

HINT:

When any of DTCs P0115, P0117 and P0118 are set, the ECM enters fail-safe mode. During fail-safe mode, the ECT is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

ES

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in Engine Coolant Temperature (ECT) sensor circuit for 0.5 seconds (1 trip detection logic)	• Open or short in ECT sensor circuit • ECT sensor • ECM
P0117	Step 4	Short in Engine Coolant Temperature (ECT) sensor circuit for 0.5 seconds (1 trip detection logic)	• Short in ECT sensor circuit • ECT sensor • ECM
P0118	Step 2	Open in Engine Coolant Temperature (ECT) sensor circuit for 0.5 seconds (1 trip detection logic)	• Open in ECT sensor circuit • ECT sensor • ECM

HINT:

When any of these DTCs are set, check the ECT by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
140°C (284°F) or higher	Short circuit

MONITOR DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is used to monitor the ECT. The ECT sensor has a thermistor with a resistance that varies according to the temperature of the engine coolant. When the coolant temperature drops, the resistance in the thermistor increases. When the temperature rises, the resistance drops. These variations in resistance are reflected in the output voltage from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the ECT. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

If the sensor output voltage is -40°C (-40°F) for 0.5 seconds or more, the ECM determines that there is an open in the ECT sensor circuit, and sets DTC P0118. Conversely, if the voltage output is more than 140°C (284°F) for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0117.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0115: Engine coolant temperature sensor open/short (Fluctuating) P0117: Engine coolant temperature sensor short (Low electrical resistance) P0118: Engine coolant temperature sensor open (High electrical resistance)
Required Sensors/Components (Main)	Engine coolant temperature sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0115:

Engine coolant temperature sensor voltage	Less than 0.14 V, or more than 4.91 V

P0117:

Engine coolant temperature sensor voltage	Less than 0.14 V

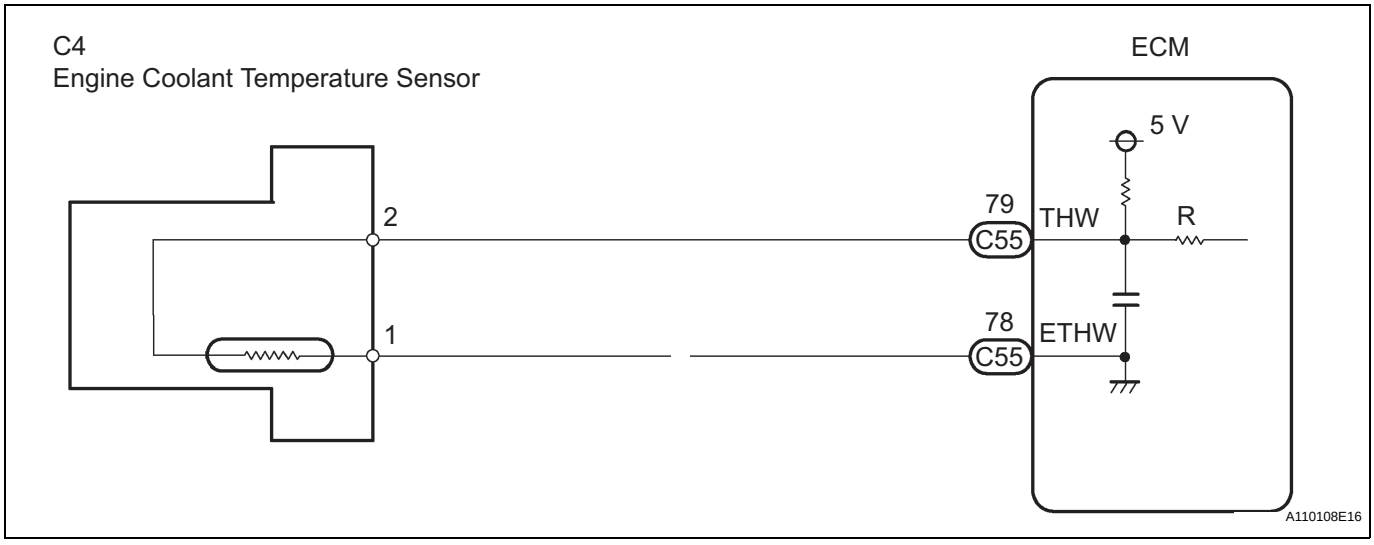
P0118:

Engine coolant temperature sensor voltage	More than 4.91 V

COMPONENT OPERATING RANGE

Engine coolant temperature sensor resistance	79 Ω to 156 kΩ [-40 to 140°C (-40 to 284°F)]

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0115	A
P0117	B
P0118	C

B → **Go to step 6**

C → **Go to step 4**

A

2	READ VALUE OF ENGINE COOLANT TEMPERATURE SENSOR (COOLANT TEMP)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(e) Read the value displayed on the tester.

Standard:

Between 80°C and 97°C (176°F and 207°F) with warm engine.

Result

Temperature Displayed	Proceed to
-40°C (-40°F)	A
140°C (284°F) or higher	B
Between 80°C and 97°C (176°F and 207°F)	C

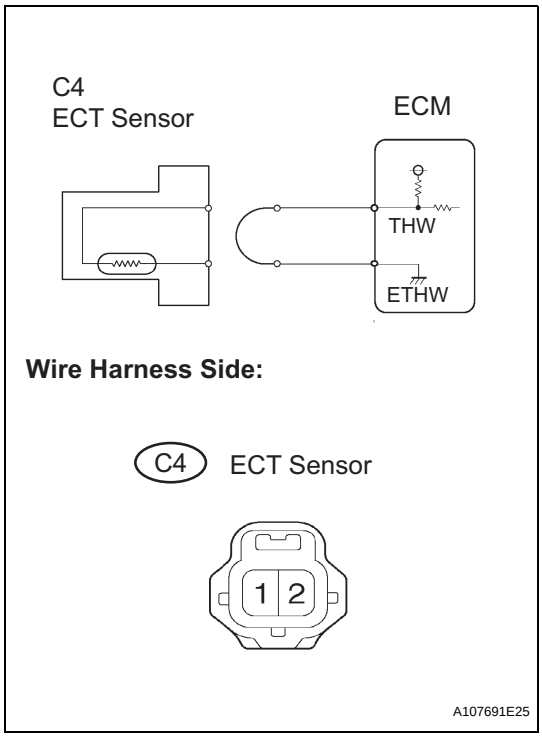
HINT:
- If there is an open circuit, the intelligent tester indicates -40°C (-40°F).
- If there is a short circuit, the intelligent tester indicates 140°C (284°F) or higher.

B → **Go to step 5**

C → CHECK FOR INTERMITTENT PROBLEMS

A

3 CHECK ENGINE COOLANT TEMPERATURE SENSOR (CHECK FOR OPEN IN SENSOR)

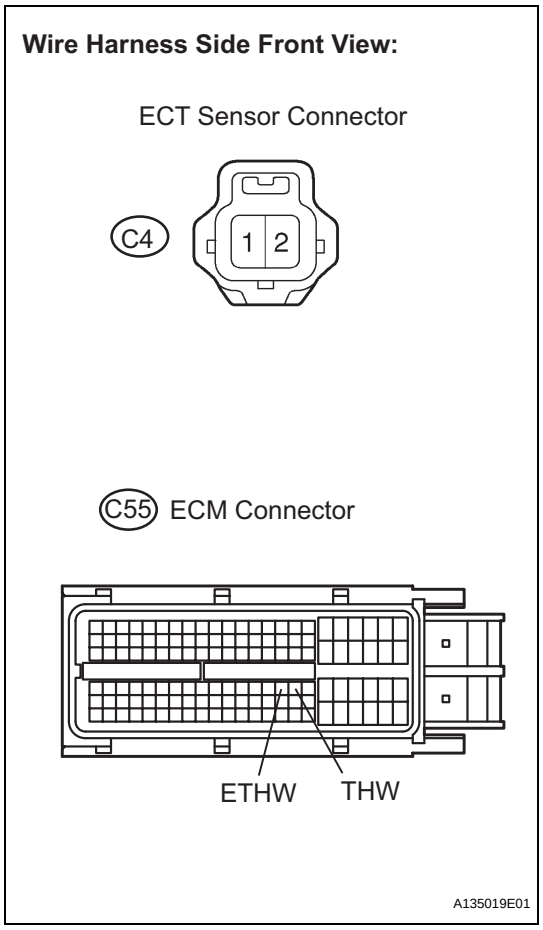


(a) Confirm good connection of the sensor.
(b) Disconnect the C4 engine coolant temperature (ECT) sensor connector.
(c) Connect terminals 1 and 2 of the ECT sensor connector on the wire harness side.
(d) Connect the intelligent tester to the DLC3.
(e) Turn the ignition switch on (IG).
(f) Turn the tester on.
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(h) Read the value displayed on the tester.
Standard:
140°C (284°F) or higher.
(i) Reconnect the ECT sensor connector.

OK → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR (See page ES-499)**

NG

4	CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)



(a) Disconnect the C4 ECT sensor connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
THW (C55-79) - C4-2	Below 1 Ω
ETHW (C55-78) - C4-1	Below 1 Ω

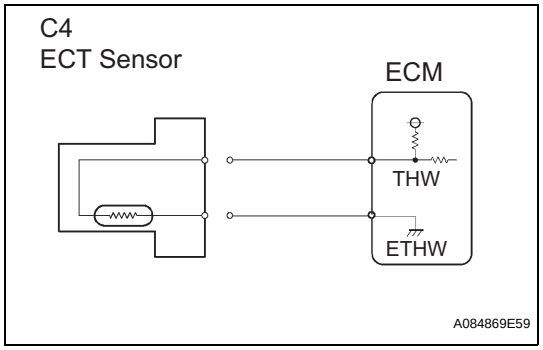
(d) Reconnect the ECM connector.
(e) Reconnect the ECT connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-518)

5	CHECK ENGINE COOLANT TEMPERATURE SENSOR (CHECK FOR SHORT IN SENSOR)



(a) Disconnect the C4 ECT sensor connector.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Turn the tester on.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(f) Read the value displayed on the tester.
Standard:
-40°C (-40°F)
(g) Reconnect the ECT sensor connector.

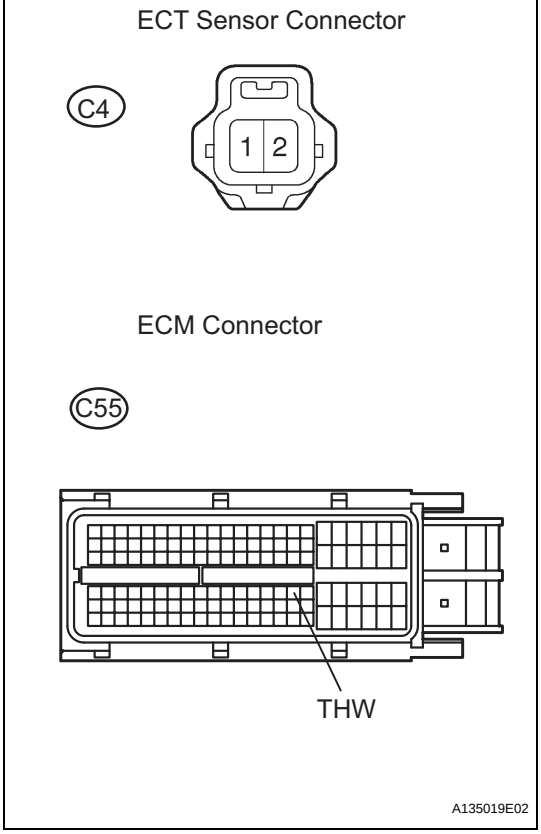
OK → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR (See page ES-499)**

ES

NG

6	CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)

Wire Harness Side Front View:



(a) Disconnect the C4 ECT sensor connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance

Tester Connection	Specified Condition
THW (C55-79) or C4-2 - Body ground	10 kΩ or higher

(d) Reconnect the ECT sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-518)

DTC	P0116	Engine Coolant Temperature Circuit Range / Performance Problem

DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor, of which the resistance value varies according to the ECT.
The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

DTC No.	DTC Detection Condition	Trouble Area
P0116	ECTs as listed below are nearly same (2 trip detection logic): – ECT when engine is started at lower than 60°C (140°F) of ECT – ECT when engine is warmed up	• Thermostat • ECT sensor
	ECTs as listed below are nearly same when engine is started at higher than 60°C (140°F) of ECT (2 trip detection logic) – ECT when engine is stopped after driving – ECT when engine is started at lower than 60°C (140°F) of ECT	

ES

MONITOR DESCRIPTION

The ECT sensor is used to monitor the ECT. The ECT sensor has a built-in thermistor with a resistance that varies according to the temperature of the engine coolant. When the ECT drops, the resistance of the thermistor increases. When the temperature rises, the resistance drops. These variations in the resistance are reflected in the output voltage from the ECT sensor.
The ECM monitors the sensor voltage and uses this value to calculate the ECT. If the sensor output voltage deviates from the normal operating range, the ECM interprets this deviation as a malfunction in the ECT sensor and sets the DTC.

Examples:

(1) Upon starting the engine, the ECT is between 35°C and 60°C (95°F and 140°F). If, after driving for 250 seconds, the ECT remains within 3°C (5.4°F) of the starting temperature, the DTC is set (2 trip detection logic).

(2) Upon starting the engine, the ECT is over 60°C (140°F). If, after driving for 250 seconds, the ECM remains within 1°C (1.8°F) of the starting temperature, the DTC is set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116: Engine coolant temperature sensor rationality (ECT sensor cold start monitor) P0116: Engine coolant temperature sensor rationality (ECT sensor soak monitor)
Required Sensors/Components (Main)	Engine coolant temperature (ECT) sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Once per driving cycle
Duration	10
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF sensor)

ECT sensor cold start monitor:

Battery voltage	10.5 V or more
Time after engine start	1 second or more
ECT at engine start	Less than 60°C (140°F)
IAT sensor circuit	OK
Soak time	5 hours
Accumulated MAF	1,056.06 g or more
Engine	Running
Fuel cut	OFF
Difference between ECT at engine start and IAT	Less than 40°C (104°F)

ECT sensor soak monitor:

Battery voltage	10.5 V or more
Engine	Running
Soak time	5 hours or more
ECT at engine start	60°C (140°F) or more
Accumulated MAF	2,101.98 times or more

ES

TYPICAL MALFUNCTION THRESHOLDS

ECT sensor cold start monitor:

ECT sensor value change	Less than 5°C (9°F)

ECT sensor soak monitor:

Difference between current ECT sensor value and previous ECT sensor value when engine stopped	Less than 5°C (9°F)

COMPONENT OPERATING RANGE

Engine coolant temperature	Varies with actual engine coolant temperature

INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0117, P0118 or P0125 are set simultaneously with DTC P0116, the ECT sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0116)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(e) Read the DTC.

Result

Display (DTC output)	Proceed to
P0116	A

Display (DTC output)	Proceed to
P0116 and other DTCs	B

B → **GO TO DTC CHART (See page ES-63)**

A

2 INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-13).
(b) Check the valve opening temperature of the thermostat.
Standard:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.
(c) Reinstall the thermostat (See page CO-14).

NG → **REPLACE THERMOSTAT (See page CO-13)**

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR (See page ES-499)

DTC	P0120	Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction
DTC	P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input
DTC	P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input
DTC	P0220	Throttle / Pedal Position Sensor / Switch "B" Circuit
DTC	P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input
DTC	P0223	Throttle / Pedal Position Sensor / Switch "B" Circuit High Input
DTC	P2135	Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation

ES

DESCRIPTION

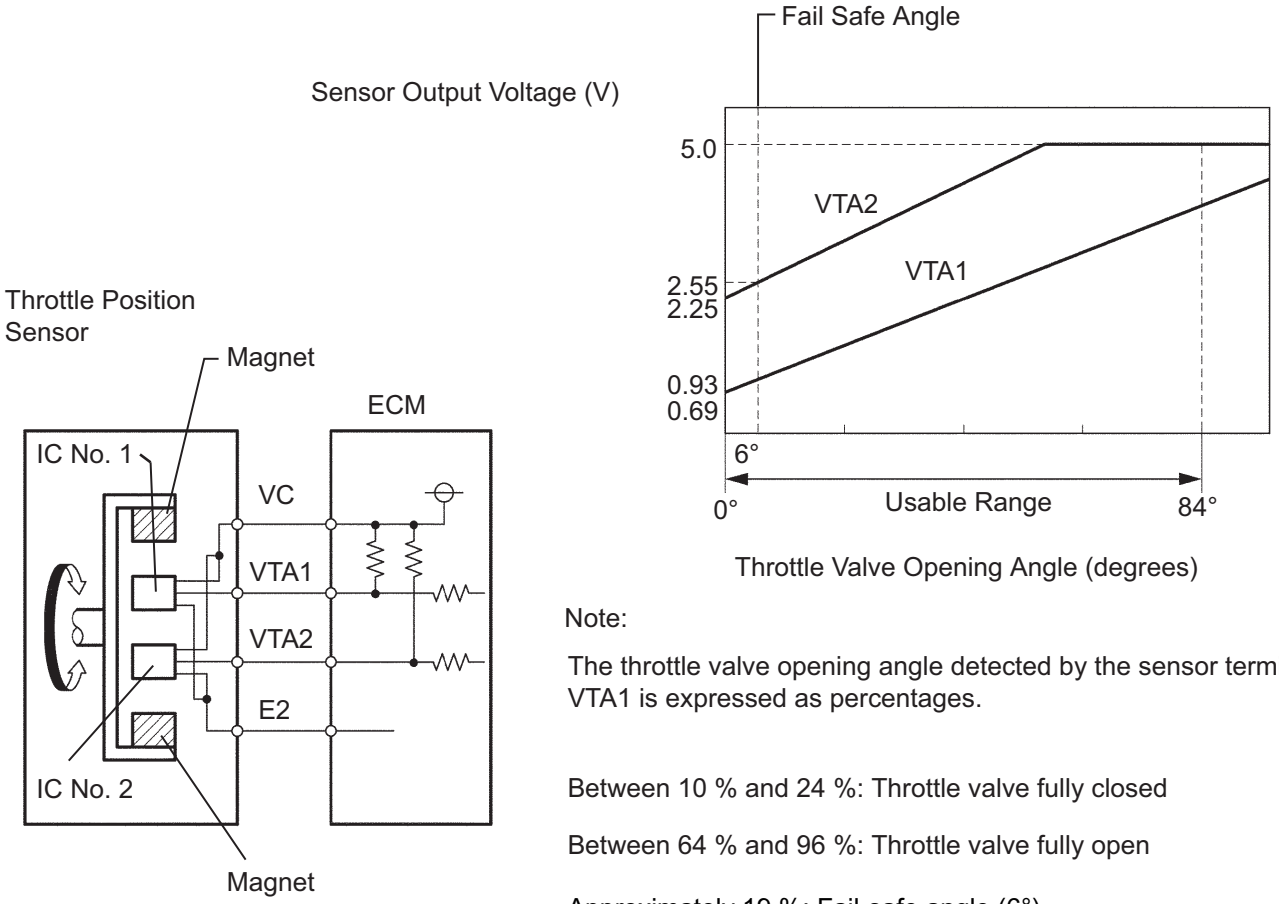
HINT:

This ETC (Electrical Throttle Control System) does not use a throttle cable.

The Throttle Position (TP) sensor is mounted on the throttle body, and detects the opening angle of the throttle valve. This sensor is a non-contact type, and uses Hall-effect elements, in order to yield accurate signals, even in extreme driving conditions, such as at high speeds as well as very low speeds.

The TP sensor has two sensor circuits which each transmits a signal, VTA1 and VTA2. VTA1 is used to detect the throttle valve angle and VTA2 is used to detect malfunctions in VTA1. The sensor signal voltages vary between 0 V and 5 V in proportion to the throttle valve opening angle, and are transmitted to the VTA terminals of the ECM.

As the valve closes, the sensor output voltage decreases and as the valve opens, the sensor output voltage increases. The ECM calculates the throttle valve opening angle according to these signals and controls the throttle actuator in response to driver inputs. These signals are also used in calculations such as air-fuel ratio correction, power increase correction and fuel-cut control.



Note:

The throttle valve opening angle detected by the sensor terminal VTA1 is expressed as percentages.

Between 10 % and 24 %: Throttle valve fully closed

Between 64 % and 96 %: Throttle valve fully open

Approximately 19 %: Fail-safe angle (6°)

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DTC No.	DTC Detection Condition	Trouble Area
P0120	Output voltage of VTA1 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds (1 trip detection logic)	• Throttle Position (TP) sensor (built into throttle body) • ECM
P0122	Output voltage of VTA1 is 0.2 V or less for 2 seconds (1 trip detection logic)	• TP sensor (built into throttle body) • Short in VTA1 circuit • Open in VC circuit • ECM
P0123	Output voltage of VTA1 is 4.535 V or more for 2 seconds (1 trip detection logic)	• TP sensor (built into throttle body) • Open in VTA1 circuit • Open in E2 circuit • Short between VC and VTA1 circuits • ECM
P0220	Output voltage of VTA2 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds (1 trip detection logic)	• TP sensor (built into throttle body) • ECM

DTC No.	DTC Detection Condition	Trouble Area
P0222	Output voltage of VTA2 is 1.75 V or less for 2 seconds (1 trip detection logic)	• TP sensor (built into throttle body) • Short in VTA2 circuit • Open in VC circuit • ECM
P0223	Output voltage of VTA2 is 4.8 V or more, and VTA1 is between 0.2 V and 2.02 V, for 2 seconds (1 trip detection logic)	• TP sensor (built into throttle body) • Open in VTA2 circuit • Open in E2 circuit • Short between VC and VTA2 circuits • ECM
P2135	Either condition (a) or (b) is met (1 trip detection logic): (a) Difference between output voltages of VTA1 and VTA2 is 0.02 V or less for 0.5 seconds or more (b) Output voltage of VTA1 is 0.2 V or less, and VTA2 is 1.75 V or less, for 0.4 seconds or more	• Short between VTA1 and VTA2 circuits • TP sensor (built into throttle body) • ECM

HINT:

- When any of these DTCs are set, check the throttle valve opening angle by entering the following menus on an intelligent tester: DIAGNOSIS / ENHANCED OBD ll / DATA LIST / ETCS / THROTTLE POS AND THROTTLE POS #2.
- THROTTLE POS denotes the VTA1 signal (expressed in percentages), and THROTTLE POS #2 denotes the VTA2 signal (expressed in voltages).

Reference (Normal Condition):

Tester Display	Accelerator Pedal Fully Released	Accelerator Pedal Fully Depressed
THROTTLE POS	10 to 24 %	64 to 96 %
THROTTLE POS #2	2.1 to 3.1 V	4.5 to 5.0 V

MONITOR DESCRIPTION

The ECM uses the Throttle Position (TP) sensor to monitor the throttle valve opening angle. There are several checks that the ECM performs to confirm the proper operation of the TP sensor.

- A specific voltage difference is expected between the sensor terminals, VTA1 and VTA2, for each throttle valve opening angle. If the difference between VTA1 and VTA2 is incorrect, the ECM interprets this as a malfunction in the sensor, and sets a DTC.
- VTA1 and VTA2 each have a specific voltage range. If VTA1 or VTA2 is outside the normal operating range, the ECM interprets this as a malfunction in the sensor, and sets a DTC.
- VTA1 and VTA2 should never be close to the same voltage level. If VTA1 is within 0.02 V of VTA2, the ECM determines that there is a short circuit in the sensor, and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0120: Throttle position sensor 1 range check (Fluctuating) P0122: Throttle position sensor 1 range check (Low voltage) P0123: Throttle position sensor 1 range check (High voltage) P0220: Throttle position sensor 2 range check (Fluctuating) P0222: Throttle position sensor 2 range check (Low voltage) P0223: Throttle position sensor 2 range check (High voltage) P2135: Throttle position sensor range check (Correlation)
Required Sensors/Components (Main)	Throttle position sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous

Duration	Throttle position sensor 1 range check (Fluctuating): 2 seconds (Accelerator pedal ON) Throttle position sensor 1 range check (Low voltage): 2 seconds (Accelerator pedal ON) Throttle position sensor 1 range check (High voltage): 2 seconds (Accelerator pedal ON) Throttle position sensor 2 range check (Fluctuating): 2 seconds (Accelerator pedal ON) Throttle position sensor 2 range check (Low voltage): 2 seconds (Accelerator pedal ON) Throttle position sensor 2 range check (High voltage): 2 seconds (Accelerator pedal ON) Throttle position sensor 1 range check (Fluctuating): 10 seconds (Accelerator pedal OFF) Throttle position sensor 1 range check (Low voltage): 10 seconds (Accelerator pedal OFF) Throttle position sensor 1 range check (High voltage): 10 seconds (Accelerator pedal OFF) Throttle position sensor 2 range check (Fluctuating): 10 seconds (Accelerator pedal OFF) Throttle position sensor 2 range check (Low voltage): 10 seconds (Accelerator pedal OFF) Throttle position sensor 2 range check (High voltage): 10 seconds (Accelerator pedal OFF) Throttle position sensor range check (Correlation): Within 0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P0120:

VTA1 voltage	0.2 V or less, or 4.535 V or more

P0122:

VTA1 voltage	0.2 V or less

P0123:

VTA1 voltage	4.535 V or more

P0220:

VTA2 voltage	1.75 V or less, or 4.8 V or more

P0222:

VTA2 voltage	1.75 V or less

P0223:

VTA2 voltage when VTA1 is 0.2 to 2.02 V	4.8 V or more

P2135:

Either of following conditions A or B is met:	-
Condition A	-
Difference between VTA1 and VTA2 voltages	0.02 V or less
Condition B	-
VTA1 voltage	0.2 V or less
VTA2 voltage	1.75 V or less

COMPONENT OPERATING RANGE

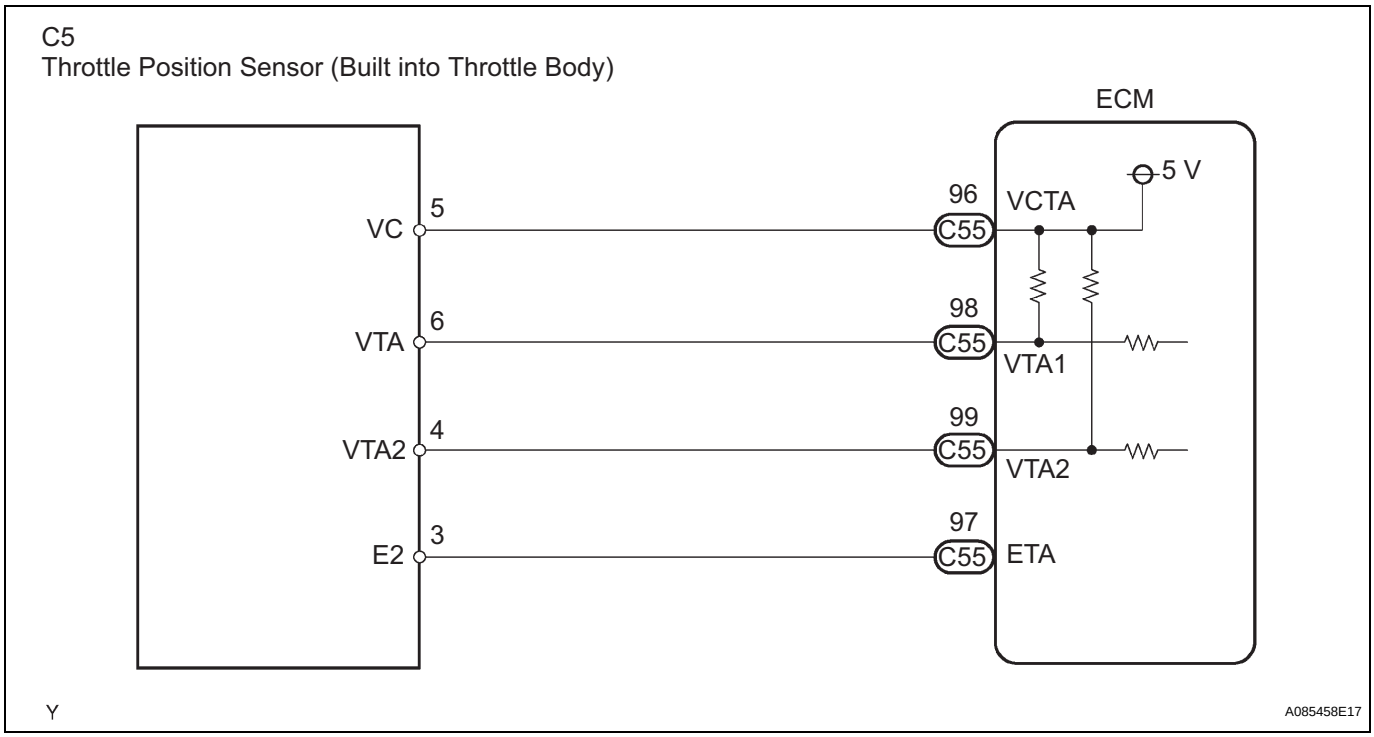
VTA1 voltage	0.69 to 4.05 V
VTA2 voltage	2.25 to 4.8 V

FAIL-SAFE

When any of these DTCs, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.

WIRING DIAGRAM

ES



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**READ VALUE OF THROTTLE POSITION SENSOR (THROTTLE POS AND THROTTLE POS #2)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / THROTTLE POS and THROTTLE POS #2.
(d) Check the values displayed on the tester.

Result

TP#1 (VTA1) When AP Released	TP#2 (VTA2) When AP Released	TP#1 (VTA1) When AP Depressed	TP#2 (VTA2) When AP Depressed	Trouble Area	Proceed to
0 %	Between 0 V and 0.2 V	0 %	Between 0 V and 0.2 V	VC circuit open	A
100 %	Between 4.5 V and 5.0 V	100 %	Between 4.5 V and 5.0 V	E2 circuit open	A
0 % or 100 %	Between 2.1 V and 3.1 V (Fail-safe)	0 % or 100 %	Between 2.1 V and 3.1 V (Fail-safe)	VTA1 circuit open or ground short	A
Approx. 19 % (Fail-safe)	Between 0 V and 0.2 V, or 4.5 V and 5.0 V	Between 10 % and 24 % (Fail-safe)	Between 0 V and 0.2 V, or 4.5 V and 5.0 V	VTA2 circuit open or ground short	A
Between 10 % and 24 %	Between 2.1 V and 3.1 V	Between 64 % and 96 % (Not fail-safe)	Between 4.5 V and 5.0 V (Not fail-safe)	TP sensor circuit normal	B

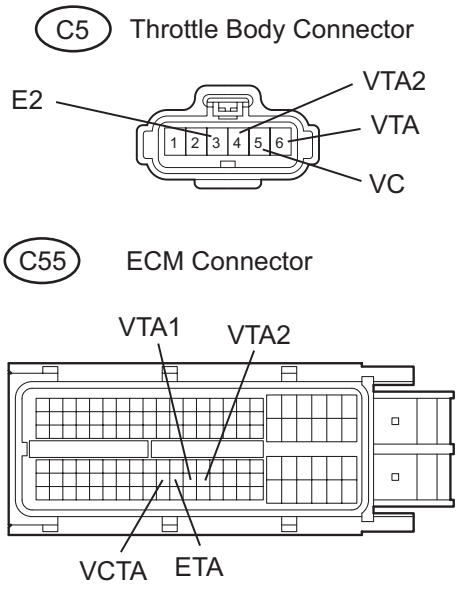
HINT:
- TP#1 denotes THROTTLE POS, and TP#2 denotes THROTTLE POS#2.
- AP denotes Accelerator Pedal.
- VTA1 is expressed as percentages, and VTA2 is expressed as voltages.

B → **Go to step 5**

A

2 CHECK HARNESS AND CONNECTOR (THROTTLE POSITION SENSOR - ECM)

Wire Harness Side Front View:



(a) Disconnect the C5 throttle body connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VC (C5-5) - VCTA (C55-96)	Below 1 Ω
VTA (C5-6) - VTA1 (C55-98)	Below 1 Ω
VTA2 (C5-4) - VTA2 (C55-99)	Below 1 Ω
E2 (C5-3) - ETA (C55-97)	Below 1 Ω

Standard resistance (Check for short)

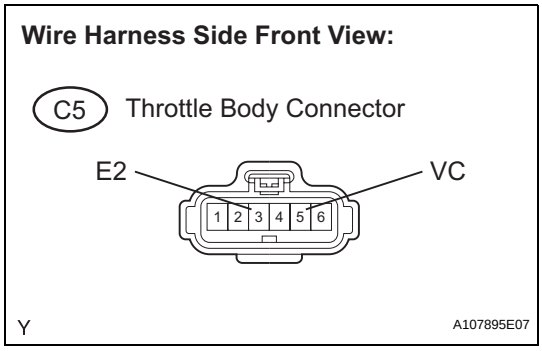
Tester Connection	Specified Condition
VC (C5-5) or VCTA (C55-96) - Body ground	10 kΩ or higher
VTA (C5-6) or VTA1 (C55-98) - Body ground	10 kΩ or higher
VTA2 (C5-4) or VTA2 (C55-99) - Body ground	10 kΩ or higher

(d) Reconnect the throttle body connector.
(e) Reconnect the ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 INSPECT ECM (VC VOLTAGE)



(a) Disconnect the C5 throttle body connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
VC (C5-5) - E2 (C5-3)	4.5 to 5.0 V

(d) Reconnect the throttle body connector.

NG → REPLACE ECM (See page ES-518)

OK

4 REPLACE THROTTLE BODY

(a) Replace the throttle body assembly (See page ES-503).

NEXT

5 CHECK WHETHER DTC OUTPUT RECURS (THROTTLE POSITION SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-45).
(d) Start the engine.
(e) Allow the engine to idle for 15 seconds or more.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0120, P0122, P0123, P0220, P0223, and/or P2135	A
No output	B

B → SYSTEM IS OK

A

REPLACE ECM (See page ES-518)

DTC	P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem

DESCRIPTION

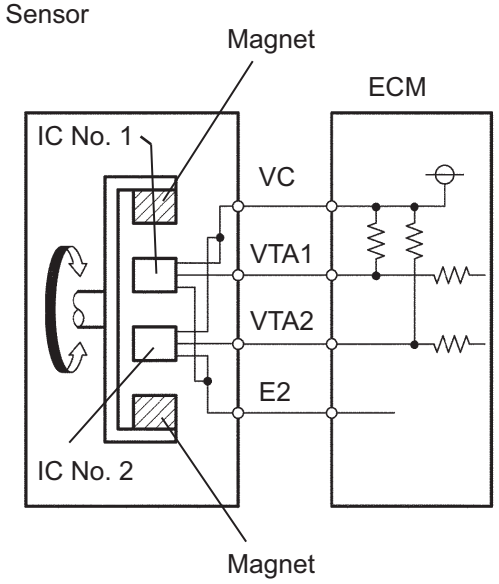
HINT:

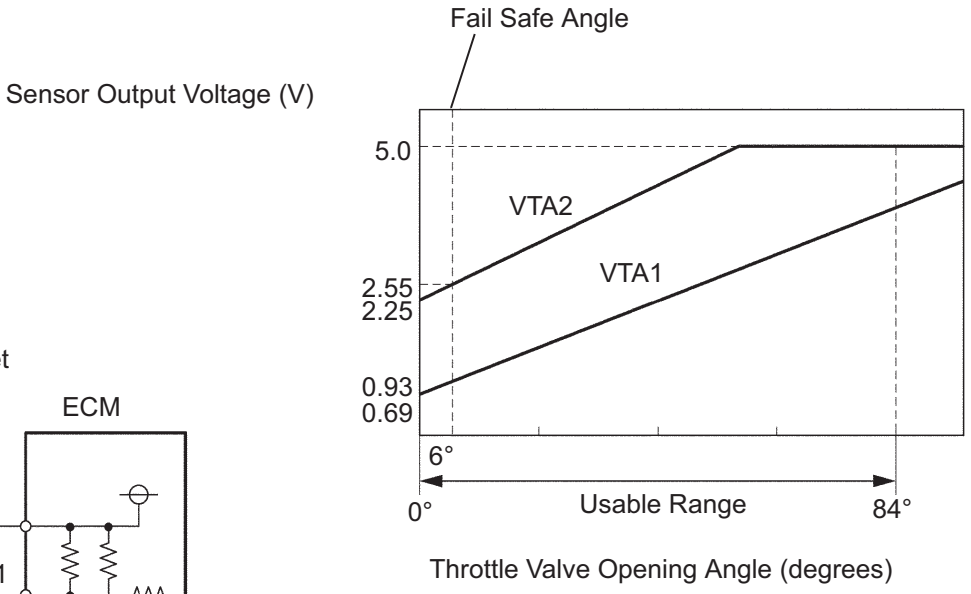
This ETC (Electrical Throttle Control System) does not use a throttle cable.

The Throttle Position (TP) sensor is mounted on the throttle body, and detects the opening angle of the throttle valve. This sensor is a non-contact type, and uses Hall-effect elements, in order to yield accurate signals, even in extreme driving conditions, such as at high speeds as well as very low speeds.

The TP sensor has two sensor circuits which each transmits a signal, VTA1 and VTA2. VTA1 is used to detect the throttle valve angle and VTA2 is used to detect malfunctions in VTA1. The sensor signal voltages vary between 0 V and 5 V in proportion to the throttle valve opening angle, and are transmitted to the VTA terminals of the ECM.

As the valve closes, the sensor output voltage decreases and as the valve opens, the sensor output voltage increases. The ECM calculates the throttle valve opening angle according to these signals and controls the throttle actuator in response to driver inputs. These signals are also used in calculations such as air-fuel ratio correction, power increase correction and fuel-cut control.





Note:

The throttle valve opening angle detected by the sensor terminal VTA1 is expressed as percentages.

Between 10 % and 24 %: Throttle valve fully closed

Between 64 % and 96 %: Throttle valve fully open

Approximately 19 %: Fail-safe angle (6°)

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HINT:
This DTC relates to the Throttle Position (TP) sensor.

DTC No.	DTC Detection Condition	Trouble Area
P0121	Difference between VTA1 and VTA2 voltages less than 0.8 V, or more than 1.6 V for 2 seconds (1 trip detection logic)	TP sensor (built into throttle body)

MONITOR DESCRIPTION

The ECM uses the TP sensor to monitor the throttle valve opening angle.
This sensor transmits two signals: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. The ECM performs several checks to confirm the proper operation of the TP sensor and VTA1.

For each throttle opening angle, a specific voltage difference is expected between the outputs of VTA1 and VTA2. If the output voltage difference between the two signals deviates from the normal operating range, the ECM interprets this as a malfunction of the TP sensor. The ECM illuminates the MIL and sets the DTC.
If the malfunction is not repaired successfully, the DTC is set 2 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0121: TP sensor rationality
Required Sensors/Components (Main)	TP sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	Within 2 seconds
MIL Operation	Immediate
Sequence of Operation	None

ES

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0120, P0122, P0123, P0220, P0222, P0223, P2135 (TP sensor)
Either of following conditions A or B is met:	-
A. Engine switch	ON
B. Electric throttle motor power	ON
TP sensor malfunction (P0120, P0122, P0123, P0220, P0222, P0223, P2135)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Difference in voltage between VAT1 and VTA2 TP sensor 1 - [TP sensor 2 x 0.8 (corrected by learning value)]	Less than 0.8 V or more than 1.6 V

FAIL-SAFE

When this DTC, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly. Fail-safe mode continues until a pass condition is detected, and the engine switch is then turned off.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0121)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Turn the tester on.

(d) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(e) Read the DTC.

Result

Display (DTC output)	Proceed to
P0121	A
P0121 and other DTCs	B

B → **GO TO DTC CHART (See page ES-63)**

A

REPLACE THROTTLE BODY (See page ES-503)

DTC	P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control

DESCRIPTION

A thermistor is built into the Engine Coolant Temperature (ECT) sensor, and its resistance value varies according to the ECT.
The structure of the sensor and its connection to the ECM are the same as those of the Intake Air Temperature (IAT) sensor.

DTC No.	DTC Detection Condition	Trouble Area
P0125	Engine coolant temperature (ECT) does not reach closed-loop enabling temperature for 20 minutes (this period varies with ECT when engine start)	• Engine coolant temperature sensor • Cooling system • Thermostat

MONITOR DESCRIPTION

The resistance of the ECT varies in proportion to the actual ECT. The ECT supplies a constant voltage to the sensor and monitors the signal output voltage of the sensor. The signal voltage output varies according to the changing resistance of the sensor. After the engine is started, the ECT is monitored through this signal. If the ECT sensor indicates that the engine is not yet warm enough for closed-loop fuel control, despite a specified period of time having elapsed since the engine was started, the ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.
Example:

The ECT is 0°C (32°F) at engine start. After 5 minutes running time, the ECT sensor still indicates that the engine is not warm enough to begin closed-loop fuel (air-fuel ratio feedback) control. The ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0125: Insufficient engine coolant temperature for closed-loop fuel control
Required Sensors/Components (Main)	Thermostat, cooling system
Required Sensors/Components (Related)	Engine coolant temperature sensor and mass air flow meter
Frequency of Operation	Once per driving cycle
Duration	64 seconds: Closed-loop enabling temperature - 8.34°C (15°F) or more 111.2 seconds: Closed-loop enabling temperature - 19.45 to 8.34°C (35 to 15°F) 1,200 seconds: Less than closed-loop enabling temperature - 19.45°C (35°F)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF sensor) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor)
MAF sensor circuit fail	Not detected
IAT sensor circuit fail	Not detected
ECT sensor circuit fail	Not detected
Thermostat fail	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Time until actual engine coolant temperature reaches closed-loop fuel control enabling temperature	64 seconds or more: Engine coolant temperature at engine start is - 8.34°C (15°F) or more 111.2 seconds or more: Engine coolant temperature at engine start is - 19.45 to 8.35°C (15 to 35°F) 1,200 seconds or more: Engine coolant temperature at engine start is less than - 19.4°C (35°F)

WIRING DIAGRAM

Refer to DTC P0115 (See page ES-146).

INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0116, P0117 or P0118 are set simultaneously with DTC P0125, the Engine Coolant Temperature (ECT) sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0125)

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0125	A
P0125 and other DTCs	B

HINT:
If any DTCs other than P0125 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART (See page ES-63)

A

2	INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-13).
(b) Check the valve opening temperature of the thermostat.
Standard:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.
(c) Reinstall the thermostat (See page CO-14).

NG → REPLACE THERMOSTAT (See page CO-13)

OK

3	CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG → REPAIR OR REPLACE COOLING SYSTEM

OK

REPLACE ENGINE COOLANT TEMPERATURE SENSOR (See page ES-499)

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

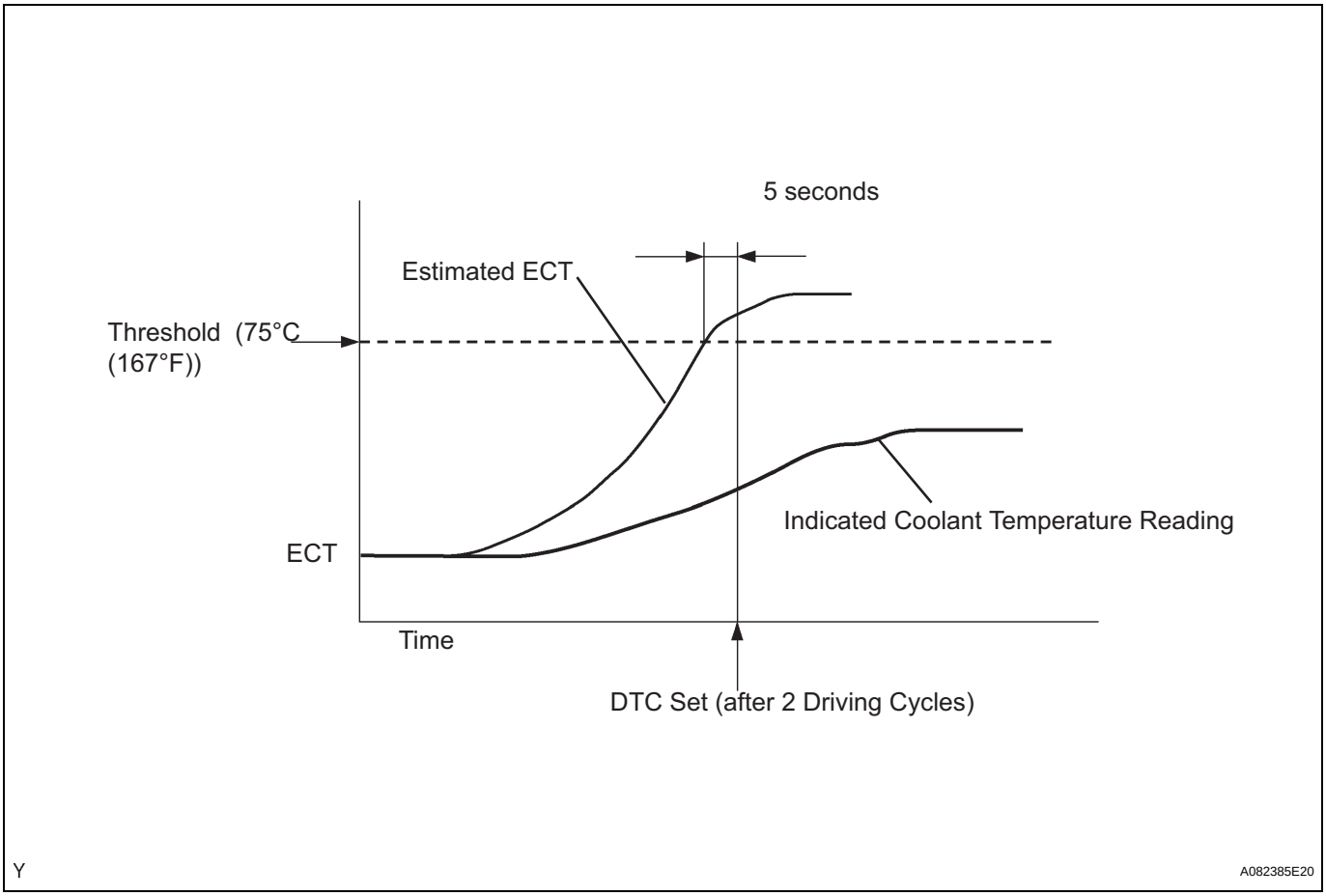
DESCRIPTION

This DTC is set when the Engine Coolant Temperature (ECT) does not reach 75°C (167°F) despite sufficient engine warm-up time.

DTC No.	DTC Detection Condition	Trouble Area
P0128	Conditions (a), (b) and (c) are met for 5 seconds (2 rip detection logic): (a) Cold start (b) Engine warmed up (c) ECT less than 75°C (167°F)	• Thermostat • Cooling system • ECT sensor • ECM

ES

MONITOR DESCRIPTION



The ECM estimates the ECT based on the starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT. When the estimated ECT reaches 75°C (167°F), the ECM checks the actual ECT. If the actual ECT is less than 75°C (167°F), the ECM interprets this as a malfunction in the thermostat or the engine cooling system and sets the DTC.

MONITOR STRATEGY

Related DTCs	P0128: Coolant Thermostat
Required Sensors/Components (Main)	Thermostat
Required Sensors/Components (Sub)	Engine Coolant Temperature (ECT) sensor, Intake Air Temperature (IAT) sensor, Vehicle speed sensor
Frequency of Operation	Once per driving cycle

Duration	900 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor will run whenever this DTC is not present	P0010, P0020 (VVT OCV Bank 1, 2) P0011 (VVT System 1 - Advance) P0012 (VVT System 1 - Retard) P0021 (VVT System 2 - Advance) P0022 (VVT System 2 - Retard) P0031, P0032, P0051, P0052 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0351 - P0356 (Ignitor) P0500 (VSS) P2196, P2198 (A/F sensor - rationality) P2A00, P2A03 (A/F sensor - slow response)
Battery voltage	11 V or more
Either of following conditions 1 or 2 is met:	-
1. All of following conditions are met:	-
• ECT at engine start - IAT at engine start	-15 to 7°C (-27 to 12.6°F)
• ECT at engine start	-10 to 56°C (14 to 133°F)
• IAT at engine start	-10 to 56°C (14 to 133°F)
2. All of following conditions are met:	-
• ECT at engine start - IAT at engine start	More than 7°C (12.6°F)
• ECT at engine start	56°C (132.8°F) or less
• IAT at engine start	-10°C (14°F) or more
Accumulated time with 80 mph (128 km/h) or more of vehicle speed	Less than 20 seconds

TYPICAL MALFUNCTION THRESHOLDS

Duration that both of the following conditions 1 and 2 are met:	5 seconds or more
1. Estimated ECT	75°C (167°F) or more
2. ECT sensor output	Less than 75°C (167°F)

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0128)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.

(d) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(e) Read the DTC.

Result

Display (DTC Output)	Proceed to
P0128	A
P0128 and other DTCs	B

HINT:
If any DTC other than P0128 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART (See page ES-63)**

A

ES

2 CHECK COOLING SYSTEM

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG → **REPAIR OR REPLACE COOLING SYSTEM**

OK

3 INSPECT THERMOSTAT

(a) Remove the thermostat (See page CO-13).
(b) Check the valve opening temperature of the thermostat.
Standard:
80 to 84°C (176 to 183°F)
HINT:
In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.
(c) Reinstall the thermostat (See page CO-14).

NG → **REPLACE THERMOSTAT (See page CO-13)**

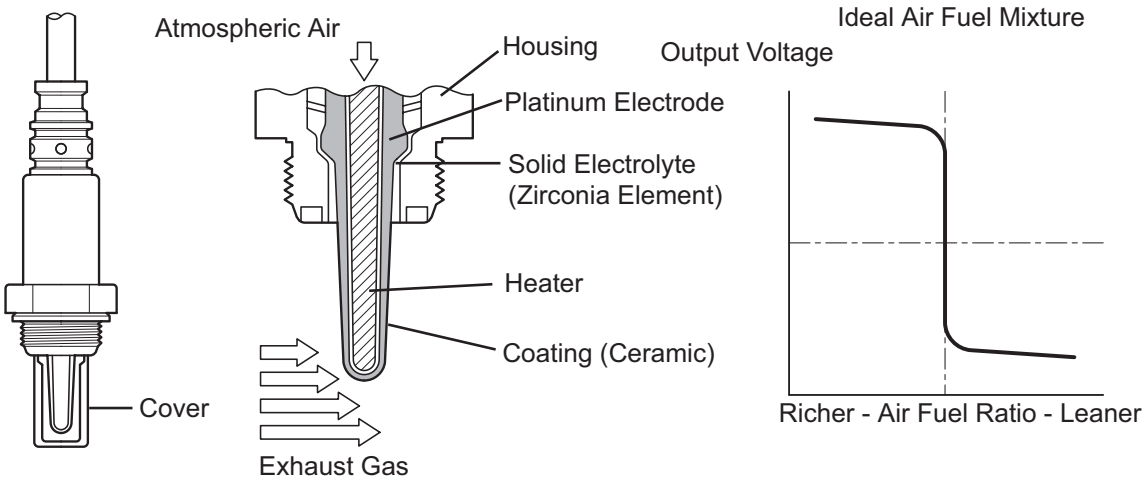
OK

REPLACE ECM (See page ES-518)

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)
DTC	P0137	Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2)
DTC	P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)
DTC	P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)
DTC	P0157	Oxygen Sensor Circuit Low Voltage (Bank 2 Sensor 2)
DTC	P0158	Oxygen Sensor Circuit High Voltage (Bank 2 Sensor 2)

DESCRIPTION

A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio. For the purpose of helping the ECM to deliver accurate air-fuel ratio control, the Heated Oxygen (HO2) sensor is used.
The HO2 sensor is located behind the TWC, and detects the oxygen concentration in the exhaust gas. Since the sensor is integrated with the heater that heats the sensing portion, it is possible to detect the oxygen concentration even when the intake air volume is low (the exhaust gas temperature is low).
When the air-fuel ratio becomes lean, the oxygen concentration in the exhaust gas becomes rich. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is lean (low voltage, i.e. less than 0.45 V). Conversely, when the air-fuel ratio is richer than the stoichiometric air-fuel level, the oxygen concentration in the exhaust gas becomes lean. The HO2 sensor informs the ECM that the post-TWC air-fuel ratio is rich (high voltage, i.e. more than 0.45 V). The HO2 sensor has the property of changing its output voltage drastically when the air-fuel ratio is close to the stoichiometric level.
The ECM uses the supplementary information from the HO2 sensor to determine whether the air-fuel ratio after the TWC is rich or lean, and adjusts the fuel injection time accordingly. Thus, if the HO2 sensor is working improperly due to internal malfunctions, the ECM is unable to compensate for deviations in the primary air-fuel ratio control.



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DTC No.	DTC Detection Condition	Trouble Area
P0136 P0156	• Abnormal voltage output: During active air-fuel ratio control, following conditions (a) and (b) are met for a certain period of time (2 trip detection logic) (a) Heated Oxygen (HO2) sensor voltage does not decrease to less than 0.2 V (b) HO2 sensor voltage does not increase to more than 0.6 V • Low impedance: Sensor impedance is less than 5 Ω for more than 30 seconds when ECM presumes sensor to being warmed up and operating normally (2 trip detection logic)	• Open or short in HO2 sensor (bank 1, 2 sensor 2) circuit • HO2 sensor (bank 1, 2 sensor 2) • HO2 sensor heater (bank 1, 2 sensor 2) • Air-Fuel Ratio (A/F) sensor (bank 1, 2 sensor 1) • Engine room junction block (EFI relay) • Gas leakage from exhaust system
P0137 P0157	• Low voltage (open): During active air-fuel ratio control, following conditions (a) and (b) are met for a certain period of time (2 trip detection logic) (a) HO2 sensor voltage output less than 0.21 V (b) Target air-fuel ratio rich • High impedance: Sensor impedance is 15 kΩ or more for more than 90 seconds when ECM presumes sensor to being warmed up and operating normally (2 trip detection logic)	• Open in HO2 sensor (bank 1, 2 sensor 2) circuit • HO2 sensor (bank 1, 2 sensor 2) • HO2 sensor heater (bank 1, 2 sensor 2) • Engine room junction block (EFI relay) • Gas leakage from exhaust system
P0138 P0158	• High voltage (short): During active air-fuel ratio control, following conditions (a) and (b) are met for a certain period of time (2 trip detection logic) (a) HO2 sensor voltage output 0.59 V or more (b) Target air-fuel ratio lean • Extremely high voltage (short): HO2 sensor voltage output exceeds 1.2 V for more than 30 seconds (2 trip detection logic)	• Short in HO2 sensor (bank 1, 2 sensor 2) circuit • HO2 sensor (bank 1, 2 sensor 2) • ECM internal circuit malfunction

MONITOR DESCRIPTION

1. Active Air-Fuel Ratio Control

The ECM usually performs air-fuel ratio feedback control so that the Air-Fuel Ratio (A/F) sensor output indicates a near stoichiometric air-fuel level. This vehicle includes active air-fuel ratio control in addition to regular air-fuel ratio control. The ECM performs active air-fuel ratio control to detect any deterioration in the Three-Way Catalytic Converter (TWC) and Heated Oxygen (HO2) sensor malfunctions (refer to the diagram below).

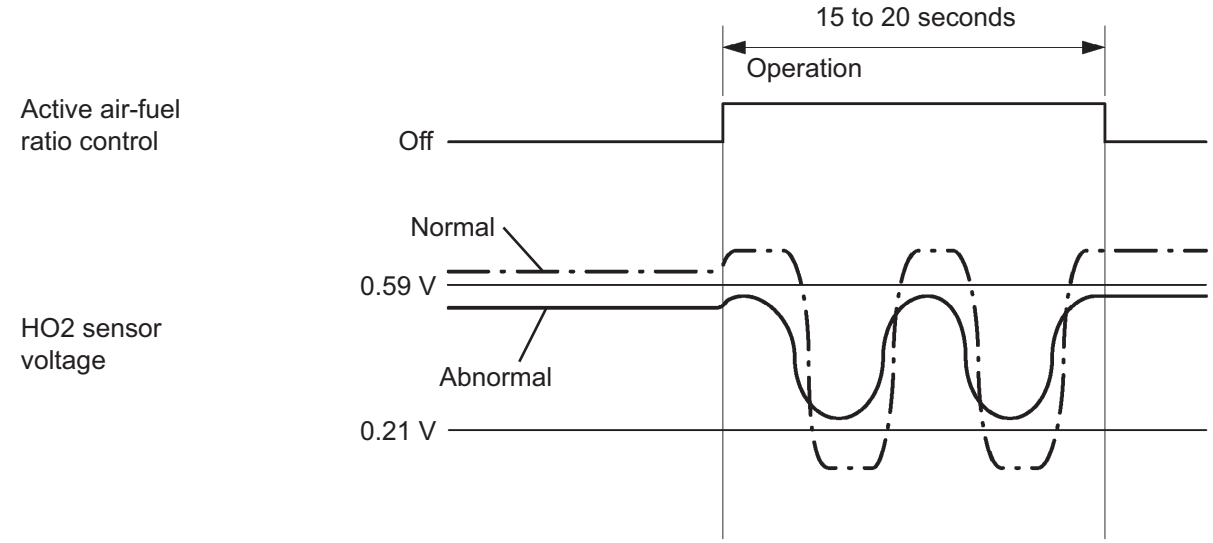
Active air-fuel ratio control is performed for approximately 15 to 20 seconds while driving with a warm engine. During active air-fuel ratio control, the air-fuel ratio is forcibly regulated to become lean or rich by the ECM. If the ECM detects a malfunction, one of the following DTCs is set: DTC P0136 or P0156 (abnormal voltage output), P0137 or P0157 (open circuit) or P0138 or P0158 (short circuit).

2. Abnormal Voltage Output of HO2 Sensor (DTCs P0136 and P0156)

While the ECM is performing active air-fuel ratio control, the air-fuel ratio is forcibly regulated to become rich or lean. If the sensor is not functioning properly, the voltage output variation is small. For example, when the HO2 sensor voltage does not decrease to less than 0.21 V and does not increase to more than 0.59 V during active air-fuel ratio control, the ECM determines that the sensor voltage output is abnormal and sets DTCs P0136 and P0156.

ES

HO2 SENSOR CIRCUIT MALFUNCTION (P0136 and P0156: ABNORMAL VOLTAGE):



3. Open or Short in Heated Oxygen (HO2) Sensor Circuit (DTCs P0137 and P0157 or P0138 and P0158)

During active air-fuel ratio control, the ECM calculates the Oxygen Storage Capacity (OSC)* of the Three- Way Catalytic Converter (TWC) by forcibly regulating the air-fuel ratio to become rich or lean. If the HO2 sensor has an open or short circuit, or the voltage output of the sensor noticeably decreases, the OSC indicates an extraordinarily high value. Even if the ECM attempts to continue regulating the air-fuel ratio to become rich or lean, the HO2 sensor output does not change.

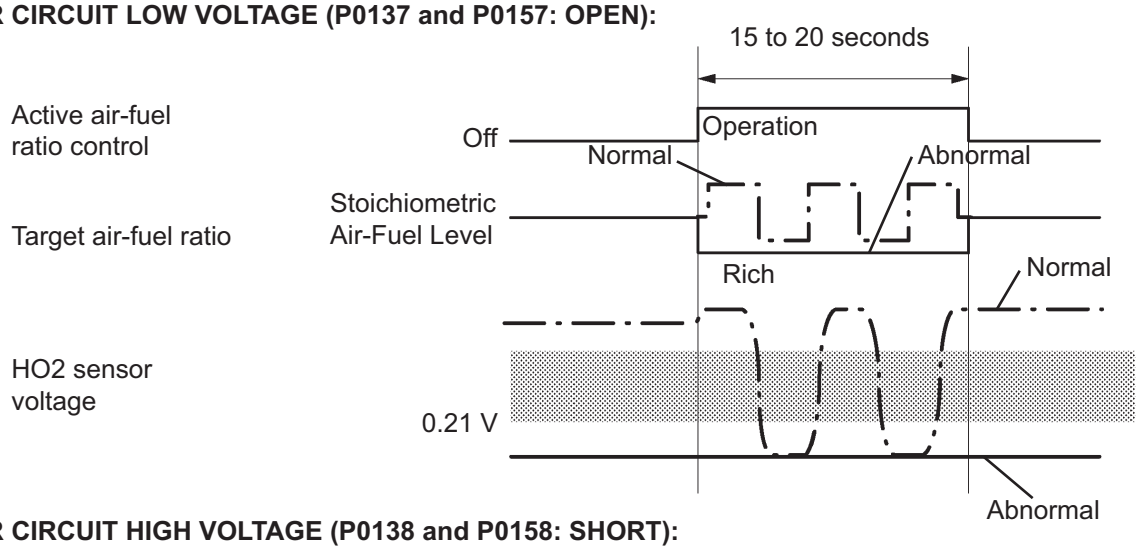
While performing active air-fuel ratio control, when the target air-fuel ratio is rich and the HO2 sensor voltage output is 0.21 V or less (lean), the ECM interprets this as an abnormally low sensor output voltage and sets DTC P0137 or P0157. When the target air-fuel ratio is lean and the voltage output is 0.59 V or more (rich) during active air-fuel ratio control, the ECM determines that the sensor voltage output is abnormally high, and sets DTC P0138 or P0158.

HINT:

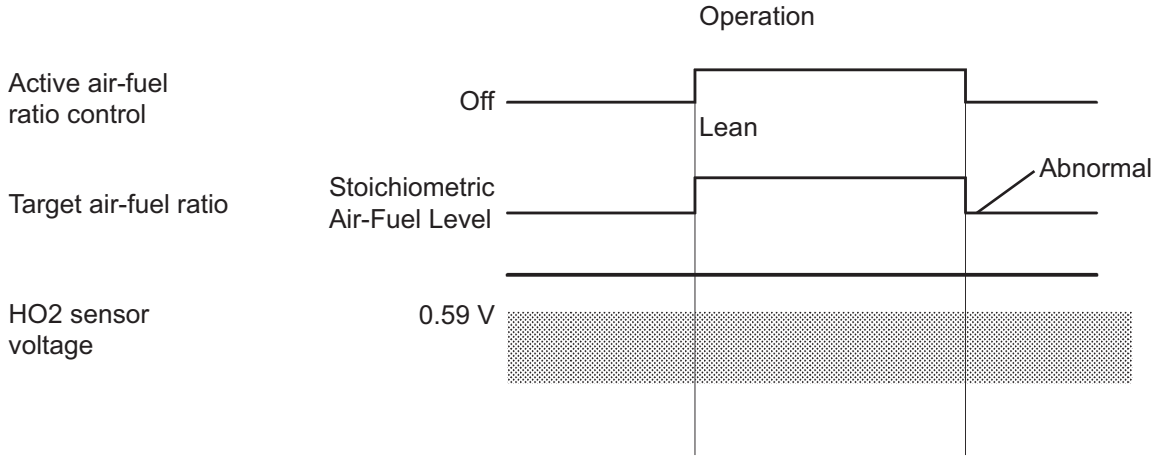
DTC P0138 or P0158 is also set if the HO2 sensor voltage output is more than 1.2 V for 30 seconds or more.

*: The TWC has the capability to store oxygen. The OSC and the emission purification capacity of the TWC are mutually related. The ECM determines whether the catalyst has deteriorated, based on the calculated OSC value (See page ES-249).

HO2 SENSOR CIRCUIT LOW VOLTAGE (P0137 and P0157: OPEN):



HO2 SENSOR CIRCUIT HIGH VOLTAGE (P0138 and P0158: SHORT):



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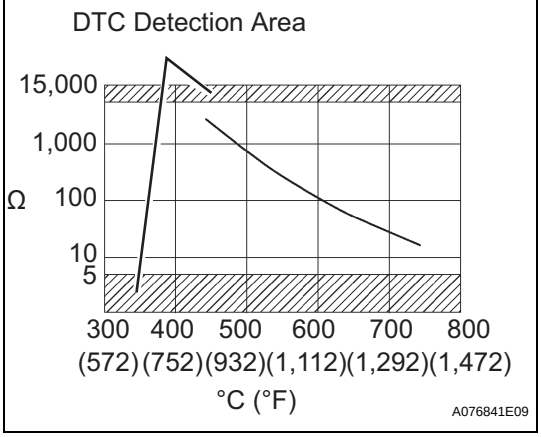
Interrelation between temperature of element and impedance:



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4. High or Low Impedance of Heated Oxygen (HO2) Sensor (DTCs P0136 and P0156 or P0137 and P0157)

During normal air-fuel ratio feedback control, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variation of the HO2 sensor signal while the engine is running, the impedance* of the sensor is measured by the ECM. The ECM determines that there is a malfunction in the sensor when the measured impedance deviates from the standard range.

*: The effective resistance in an alternating current electrical circuit.

HINT:

- The impedance cannot be measured using an ohmmeter.

- DTCs P0136 and P0156 indicate the deterioration of the HO2 sensor. The ECM sets the DTCs by calculating the impedance of the sensor when the typical enabling conditions are satisfied (1 driving cycle).
- DTCs P0137 and P0157 indicate an open or short circuit in the HO2 sensor (1 driving cycle). The ECM sets the DTCs when the impedance of the sensor exceeds the threshold of 15 kΩ.

MONITOR STRATEGY

Related DTCs	P0136: HO2S voltage (Bank 1) P0136: HO2S low impedance (Bank 1) P0137: HO2S high impedance (Bank 1) P0137: HO2S low voltage (Bank 1) P0138: HO2S high voltage (Bank 1) P0138: HO2S high voltage (Extremely high) (Bank 1) P0156: HO2S voltage (Bank 2) P0156: HO2S low impedance (Bank 2) P0157: HO2S high impedance (Bank 2) P0157: HO2S low voltage (Bank 2) P0158: HO2S high voltage (Bank 2) P0158: HO2S high voltage (Extremely high) (Bank 2)
Required Sensors/Components (Main)	HO2S
Required Sensors/Components (Sub)	Crankshaft position sensor, Engine coolant temperature sensor, Mass air flow meter, Throttle position sensor
Frequency of Operation	Once per driving cycle
Duration	20 seconds: HO2S voltage (P0136, P0156), HO2S low voltage (P0137, P0157), HO2S high voltage (P0138, P0158) 30 seconds: HO2S low impedance (P0136, P0156) 90 seconds: HO2S high impedance (P0137, P0157) 10 seconds: HO2S high voltage (P0138, P0158)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	P0031, P0032, P0051, P0052 (A/F sensor heater - Sensor 1) P0037, P0038, P0057, P0058 (O2 Sensor Heater - Sensor 2) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0442 - P0456 (EVAP system) P0500 (VSS) P2196, P2198 (A/F sensor - rationality) P2A00, P2A03 (A/F sensor - slow response)

HO2S voltage (P0136, P0156), HO2S low voltage (P0137, P0157), HO2S high voltage (P0138, P0158):

Active A/F control	Performing
Battery voltage	11 V or more
ECT	75 °C (167°F) or more
Idle	OFF

Engine rpm	Less than 3,200 rpm
A/F sensor status	Activated
Fuel system status	Closed loop
Fuel-cut	OFF
Engine load	10 to 70%
Shift position	4th or more

HO2S low impedance (P0136, P0156):

Battery voltage	11 V or more
Estimated rear HO2S temperature	Less than 700°C (1,292°F)
ECM monitor	Completed
P0606	Not set

HO2S high impedance (P0137, P0157):

Battery voltage	11 V or more
Estimated rear HO2S temperature	450°C (842°F) or more
P0606	Not preset

HO2S high voltage (Extremely high) (P0138, P0158):

Battery voltage	11 V or more
Time after engine start	2 seconds or more

TYPICAL MALFUNCTION THRESHOLDS

HO2S voltage (P0136, P0156):

Either of the following conditions 1 or 2 is met:	-
1. All of the following conditions (a), (b) and (c) are met:	-
(a) Commanded air-fuel ratio	14.3 or less
(b) Rear HO2S voltage	0.21 to 0.59 V
(c) OSC (Oxygen capacity of catalyst)	2 g or more
2. All of the following conditions (d), (e) and (f) are met:	-
(d) Commanded air-fuel ratio	14.9 or more
(e) Rear HO2S voltage	0.21 to 0.59 V
(f) OSC (Oxygen capacity of catalyst)	2 g or more

HO2S low impedance (P0136, P0156):

Duration that following condition is met:	30 seconds or more
Rear HO2S impedance	Less than 5 Ω

HO2S high impedance (P0137, P0157):

Duration that following condition is met:	90 seconds or more
Rear HO2S impedance	15 kΩ or more

HO2S low voltage (P0137, P0157):

All of the following conditions 1, 2 and 3 are met:	-
1. Commanded air-fuel ratio	14.3 or less
2. Rear HO2S voltage	Less than 0.21 V
3. OSC (Oxygen capacity of catalyst)	2 g or more

HO2S high voltage (P0138, P0158):

All of the following conditions 1, 2 and 3 are met:	-
1. Commanded air-fuel ratio	14.9 or more
2. Rear HO2S voltage	More than 0.59 V
3. OSC (Oxygen capacity of catalyst)	2 g or more

HO2S high voltage (Extremely high) (P0138, P0158):

Duration that following condition is met:	10 seconds or more
Rear HO2S voltage	1.2 V or more

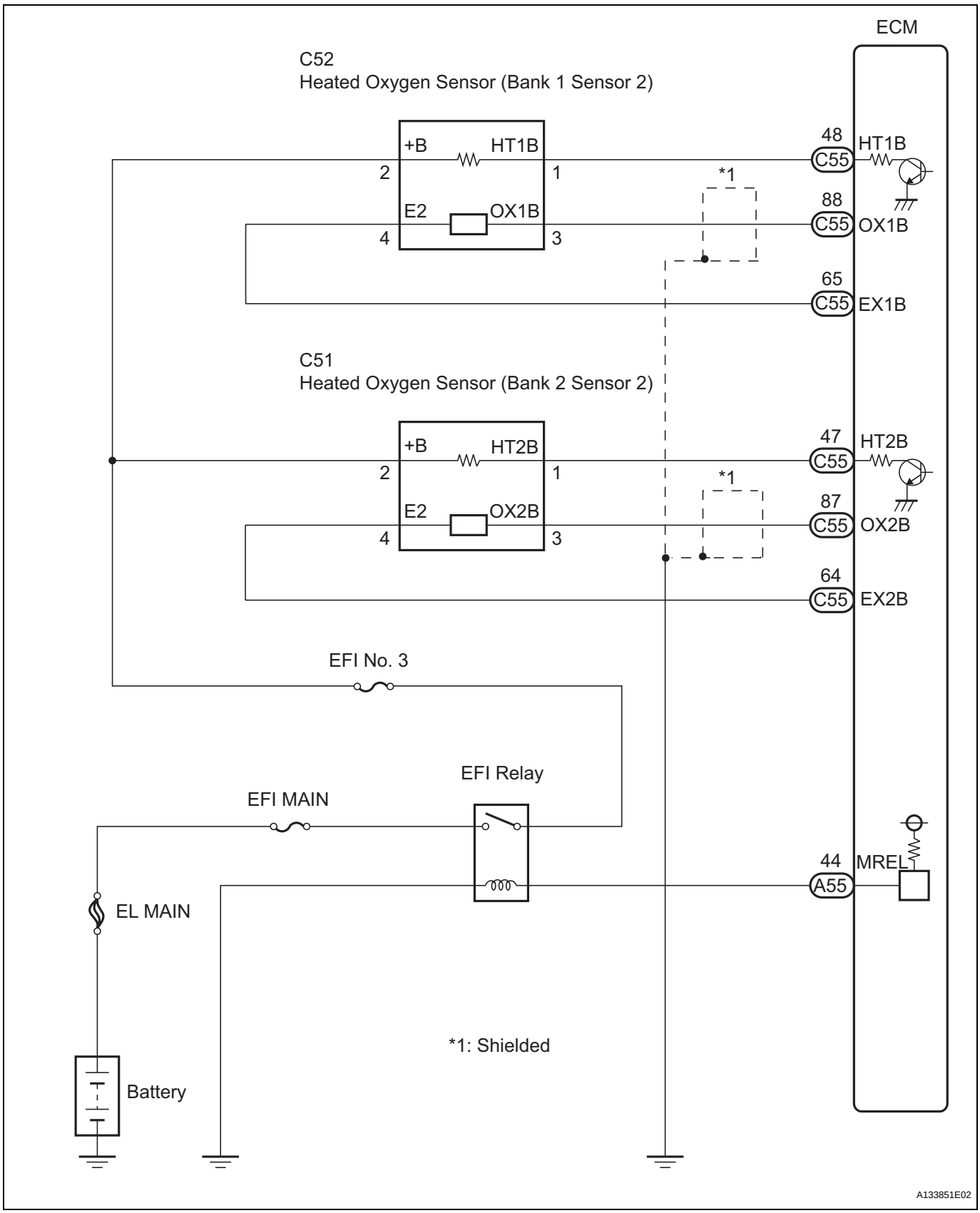
COMPONENT OPERATING RANGE

Duration that following condition is met:	30 seconds or more
Heated oxygen sensor voltage	Varies between 0.1 and 0.9 V

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

WIRING DIAGRAM



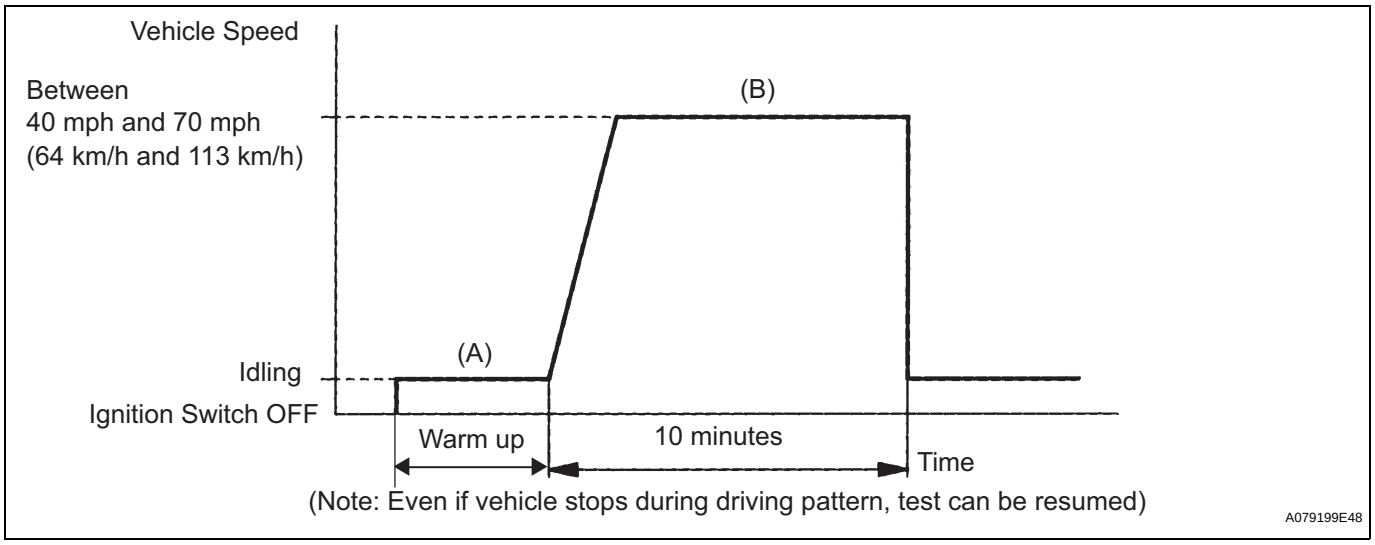
CONFIRMATION DRIVING PATTERN

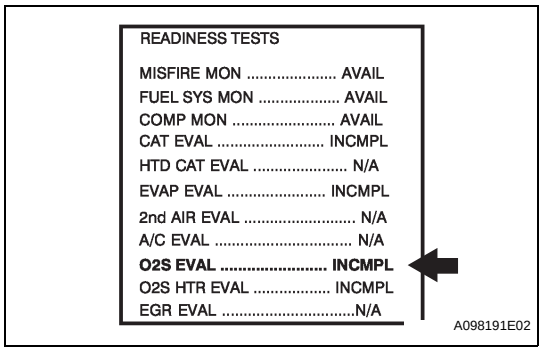
HINT:

- This confirmation driving pattern is used in steps 5, 8 and 11 of the following diagnostic troubleshooting procedure when using an intelligent tester.
- Performing this confirmation driving pattern will activate the Heated Oxygen (HO2) sensor monitor. (The catalyst monitor is performed simultaneously.) This is very useful for verifying the completion of a repair.

NOTICE:

This test will not be completed if the vehicle is driven under absolutely constant speed conditions such as with cruise control activated.





1. Connect an intelligent tester to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn the tester on.
4. Clear the DTCs (where set) (See page ES-45).
5. Select the following menu items: DIAGNOSIS / CARB OBD II / READINESS TESTS.
6. Check that O2S EVAL is INCMPL (incomplete).
7. Start the engine and warm it up (Procedure "A").
8. Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes (Procedure "B").
9. Note the state of the Readiness Tests items. Those items will change to COMPL (complete) as O2S EVAL monitor operates.
10. On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES and check if any DTCs (any pending DTCs) are set.

HINT:

If O2S EVAL does not change to COMPL, and any pending DTCs fail to set, extend the driving time.

INSPECTION PROCEDURE

HINT:

Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using an intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 and O2S B1S2 or AFS B2S1 and O2S B2S2) displayed on the tester.

ES

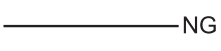
HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases in the fuel injection volume.

Tester Display (Sensor)	Injection Volume	Status	Voltage
AFS B1S1 or AFS B2S1 (A/F)	+25 %	Rich	Less than 3.0 V
AFS B1S1 or AFS B2S1 (A/F)	-12.5 %	Lean	More than 3.35 V
O2S B1S2 or O2S B2S2 (HO2)	+25 %	Rich	More than 0.55 V
O2S B1S2 or O2S B2S2 (HO2)	-12.5 %	Lean	Less than 0.4 V

NOTICE:

The Air-Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

ES

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
- To display the graph, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2 or AFS B2S1 and O2S B2S2, and press the YES button and then the ENTER button followed by the F4 button.

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).
- If the OX1B wire from the ECM connector is short-circuited to the +B wire, DTC P0136 will be set.
- If the OX2B wire from the ECM connector is short-circuited to the +B wire, DTC P0156 will be set.

1	READ DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0138 or P0158	A
P0137 or P0157	B
P0136 or P0156	C

B → Go to step 14

C → Go to step 7

A

2	READ VALUE OF OXYGEN SENSOR (OUTPUT VOLTAGE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / O2S B1S2 or O2S B2S2.
(d) Allow the engine to idle.
(e) Read the Heated Oxygen (HO2) sensor output voltage while idling.

Result

HO2 Sensor Output Voltage	Proceed to
More than 1.2 V	A
Less than 1.0 V	B

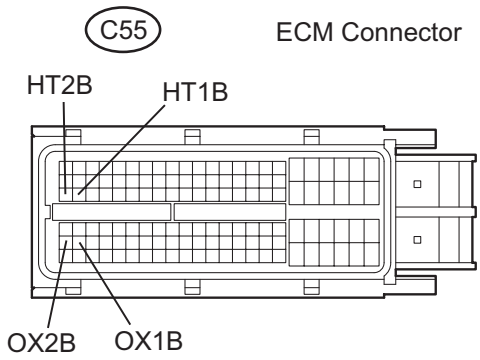
B → **Go to step 5**

A

ES

3 CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT)

Wire Harness Side Front View:



(a) Turn the engine switch off and wait for 5 minutes.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
HT1B (C55-48) - OX1B (C55-88)	10 kΩ or higher
HT2B (C55-47) - OX2B (C55-87)	10 kΩ or higher

(d) Reconnect the ECM connector.

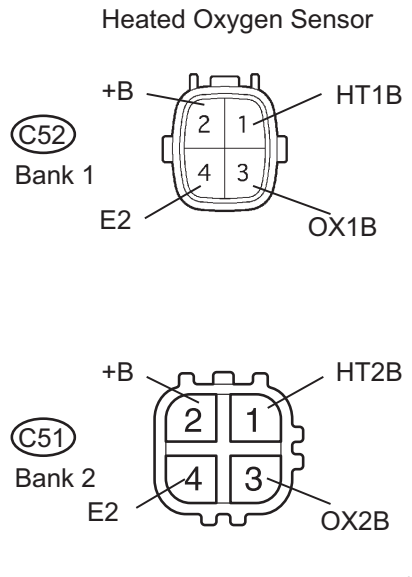
NG → **Go to step 4**

OK

REPLACE ECM (See page ES-518)

4	INSPECT HEATED OXYGEN SENSOR (CHECK FOR SHORT)

Component Side:



(a) Disconnect the C52 oxygen sensor connector (Bank 1 Sensor 2) or C51 oxygen sensor connector (Bank 2 sensor 2).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Bank 1 sensor 2)

Tester Connection	Specified Condition
+B (2) - E2 (4)	10 kΩ or higher
+B (2) - OX1B (3)	10 kΩ or higher

Standard resistance (Bank 2 sensor 2)

Tester Connection	Specified Condition
+B (2) - E2 (4)	10 kΩ or higher
+B (2) - OX2B (3)	10 kΩ or higher

ES

NG → **REPLACE HEATED OXYGEN SENSOR (See page EC-20)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

5	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

6	CHECK WHETHER DTC OUTPUT RECURS (DTC P0138 or P0158)

(a) On the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

(b) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0138 or P0158	A
No output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A

REPLACE HEATED OXYGEN SENSOR (See page EC-20)

7	READ VALUE OF OXYGEN SENSOR (OUTPUT VOLTAGE)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Start the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1S2 or O2S B1S2.
(e) After warming up the engine, run the engine at an engine speed of 2,500 rpm for 3 minutes.
(f) Read the output voltage of the HO2 sensor when the engine rpm is suddenly increased.
HINT:
Quickly accelerate the engine to 4,000 rpm 3 times using the accelerator pedal.
Standard voltage:
Fluctuates between 0.4 V or less and 0.5 V or more.

NG → **Go to step 14**

OK

8	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

9	CHECK WHETHER DTC OUTPUT RECURS (DTC P0136 or P0156)

(a) On the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0136 or P0156	A
No output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A

10	REPLACE HEATED OXYGEN SENSOR

(a) Replace the hated oxygen sensor (See page EC-20).

NEXT

11	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

12	CHECK WHETHER DTC OUTPUT RECURS (DTC P0136 or P0156)

(a) On the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(b) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0136 or P0156	A
No output	B

B → END

A

13	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (INJECTION VOLUME)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II /ACTIVE TEST / INJ VOL.
(e) Change the fuel injection volume using the tester, while monitoring the output voltage of Air-Fuel Ratio (A/F) and HO2 sensor displayed on the tester.

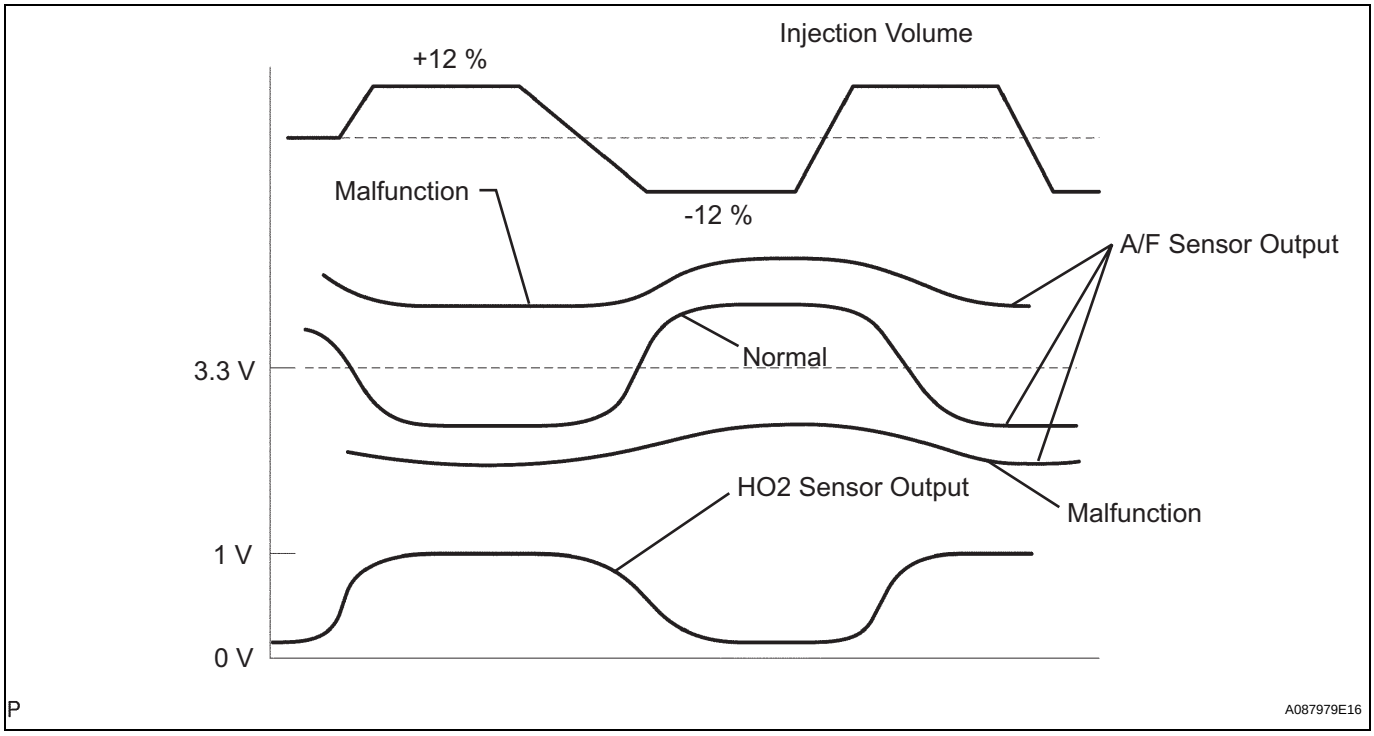
HINT:

- Change the fuel injection volume within the range of -12 % and +12 %. The injection volume can be changed in 1 % graduations within the range.
- The A/F sensor is displayed as AFS B1S1 or AFS B2S1, and the HO2 sensor is displayed as O2S B1S2 or O2S B2S2, on the intelligent tester.

Result

Tester Display (Sensor)	Voltage Variation	Proceed to
AFS B1S1 (A/F) AFS B2S1 (A/F)	Alternates between more and less than 3.3 V	OK
AFS B1S1 (A/F) AFS B2S1 (A/F)	Remains more than 3.3 V	NG
AFS B1S1 (A/F) AFS B2S1 (A/F)	Remains less than 3.3 V	NG

HINT:
A normal HO2 sensor voltage (O2S B1S2 or O2S B2S2) reacts in accordance with increases and decreases in fuel injection volumes. When the A/F sensor voltage remains either less or more than 3.3 V despite the HO2 sensor indicating a normal reaction, the A/F sensor is malfunctioning.



NG → **REPLACE AIR FUEL RATIO SENSOR (See page EC-19)**

OK →

CHECK AND REPAIR EXTREMELY RICH OR LEAN ACTUAL AIR FUEL RATIO (INJECTOR, FUEL PRESSURE, GAS LEAKAGE FROM EXHAUST SYSTEM)

14	CHECK FOR EXHAUST GAS LEAKS

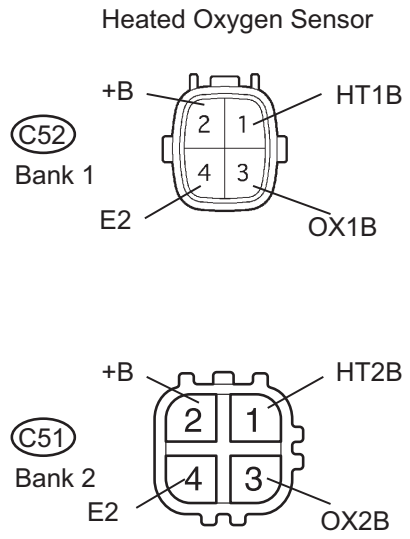
OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT**

OK →

15	INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE)

Component Side:



A137614E04

(a) Disconnect the C52 oxygen sensor connector (Bank 1 Sensor 2) or C51 oxygen sensor connector (Bank 2 sensor 2).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Bank 1 sensor 2)

Tester Connection	Condition	Specified Condition
HT1B (1) - +B (2)	20°C (68°F)	11 to 16 Ω
HT1B (1) - E2 (4)	Always	10 kΩ or higher

Standard resistance (Bank 2 sensor 2)

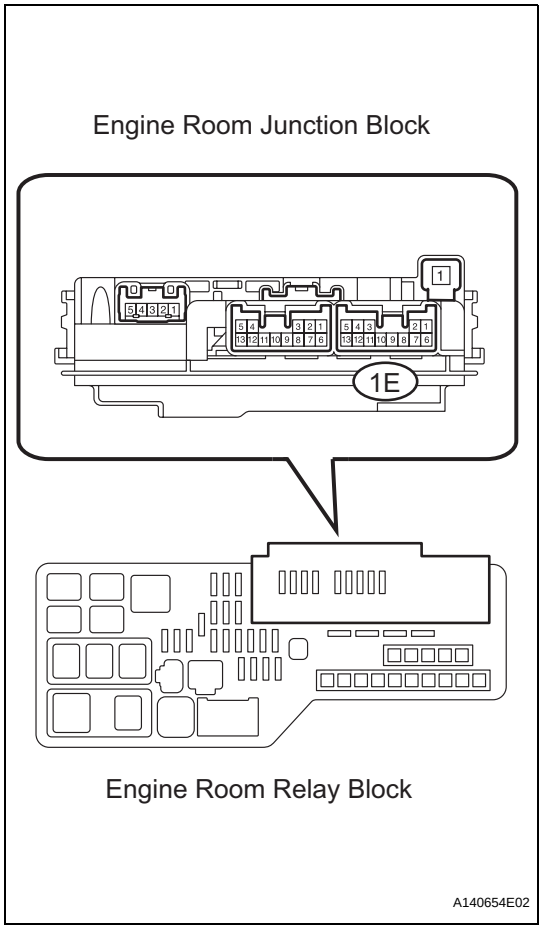
Tester Connection	Condition	Specified Condition
HT2B (1) - +B (2)	20°C (68°F)	11 to 16 Ω
HT2B (1) - E2 (4)	Always	10 kΩ or higher

ES

NG → **REPLACE HEATED OXYGEN SENSOR (See page EC-20)**

OK

16	INSPECT ENGINE ROOM JUNCTION BLOCK (EFI MAIN RELAY)



(a) Remove the engine room junction block from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal Connection	Specified Condition
1E-12 - 1E-6	10 kΩ or higher
1E-12 - 1E-6	Below 1 Ω (when battery voltage applied to terminals 1E-9 and 1E-10)

(c) Reinstall the engine room junction block.

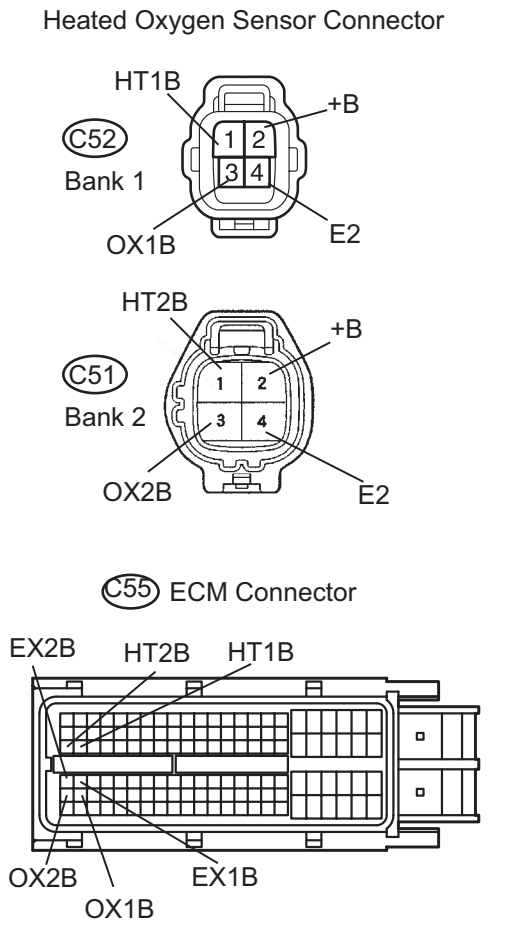
NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

ES

17	CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM)

Wire Harness Side:



(a) Disconnect the C52 oxygen sensor connector (Bank 1 Sensor 2) or C51 oxygen sensor connector (Bank 2 sensor 2).
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal Connection	Specified Condition
+B (C52-2) - Body ground	9 to 14 V
+B (C51-2) - Body ground	9 to 14 V

(d) Turn the engine switch off.
(e) Disconnect the C55 ECM connector.
(f) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Terminal Connection	Specified Condition
HT1B (C52-1) - HT1B (C55-48)	Below 1 Ω
OX1B (C52-3) - OX1B (C55-88)	Below 1 Ω
E2 (C52-4) - EX1B (C55-65)	Below 1 Ω
HT2B (C51-1) - HT2B (C55-47)	Below 1 Ω
OX2B (C51-3) - OX2B (C55-87)	Below 1 Ω
E2 (C51-4) - EX2B (C55-64)	Below 1 Ω

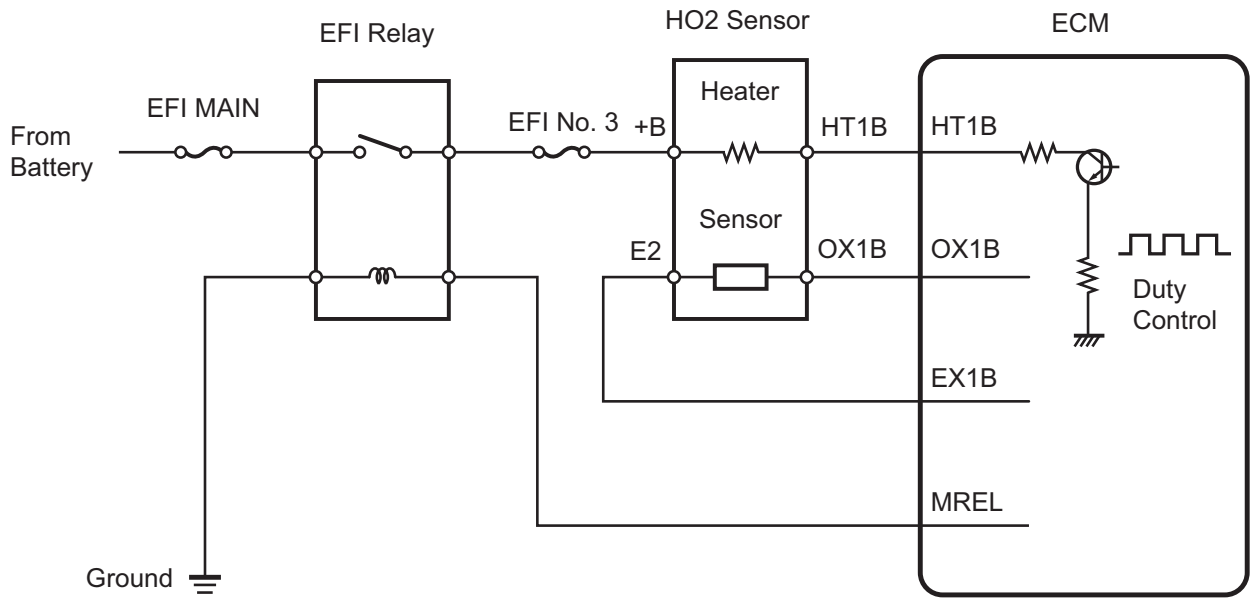
Standard resistance (Check for short)

Terminal Connection	Specified Condition
HT1B (C52-1) or HT1B (C55-48) - Body ground	10 kΩ or higher
OX1B (C52-3) or OX1B (C55-88) - Body ground	10 kΩ or higher
E2 (C52-4) or EX1B (C55-65) - Body ground	10 kΩ or higher
HT2B (C51-1) or HT2B (C55-47) - Body ground	10 kΩ or higher
OX2B (C51-3) or OX2B (C55-87) - Body ground	10 kΩ or higher
E2 (C51-4) or EX2B (C55-64) - Body ground	10 kΩ or higher

(g) Reconnect the HO2 sensor connector.
(h) Reconnect the ECM connector.

ES

Reference (System Diagram of Bank 1 Sensor 2):



ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE HEATED OXYGEN SENSOR (See page EC-20)

DTC	P0171	System Too Lean (Bank 1)

DTC	P0172	System Too Rich (Bank 1)

DTC	P0174	System Too Lean (Bank 2)

DTC	P0175	System Too Rich (Bank 2)

DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim consists of both the short-term and long-term fuel trims.

The short-term fuel trim is fuel compensation that is used to constantly maintain the air-fuel ratio at stoichiometric levels. The signal from the Air-Fuel Ratio (A/F) sensor indicates whether the air-fuel ratio is rich or lean compared to the stoichiometric ratio. This triggers a reduction in the fuel injection volume if the air-fuel ratio is rich and an increase in the fuel injection volume if it is lean.

Factors such as individual engine differences, wear over time and changes in operating environment cause short-term fuel trim to vary from the central value. The long-term fuel trim, which controls overall fuel compensation, compensates for long-term deviations in the fuel trim from the central value caused by the short-term fuel trim compensation.

If both the short-term and long-term fuel trims are lean or rich beyond predetermined values, it is interpreted as a malfunction, and the ECM illuminates the MIL and sets a DTC.

ES

DTC No.	DTC Detection Conditions	Trouble Areas
P0171 P0174	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to lean side (2 trip detection logic)	• Air induction system • Injector blockage • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Fuel pressure • Gas leakage from exhaust system • Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor heater (bank 1, 2 sensor 1) • A/F sensor heater relay • A/F sensor heater and A/F sensor heater relay circuits • PCV valve and hose • PCV hose connections • ECM
P0172 P0175	With warm engine and stable air-fuel ratio feedback, fuel trim considerably in error to rich side (2 trip detection logic)	• Injector leakage or blockage • MAF meter • ECT sensor • Ignition system • Fuel pressure • Gas leakage from exhaust system • Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor heater (bank 1, 2 sensor 1) • A/F sensor heater relay • A/F sensor heater and A/F sensor heater relay circuits • ECM

HINT:

- When DTC P0171 or P0174 is set, the actual air-fuel ratio is on the lean side. When DTC P0172 or P0175 is set, the actual air-fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air-fuel ratio is lean and DTC P0171 or P0174 may be set. The MIL is then illuminated.

- When the total of the short-term and long-term fuel trim values is within the malfunction threshold (and the engine coolant temperature is more than 75°C [167°F]), the system is functioning normally.

MONITOR DESCRIPTION

Under closed-loop fuel control, fuel injection volumes that deviate from those estimated by the ECM cause changes in the long-term fuel trim compensation value. The long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. Deviations from the ECM's estimated fuel injection volumes also affect the average fuel trim learning value, which is a combination of the average short-term fuel trim (fuel feedback compensation value) and the average long-term fuel trim (learning value of the air-fuel ratio). If the average fuel trim learning value exceeds the malfunction thresholds, the ECM interprets this as a fault in the fuel system and sets a DTC.

Example:

The average fuel trim learning value is more than +35% or less than -35%, the ECM interprets this as a fuel system malfunction.

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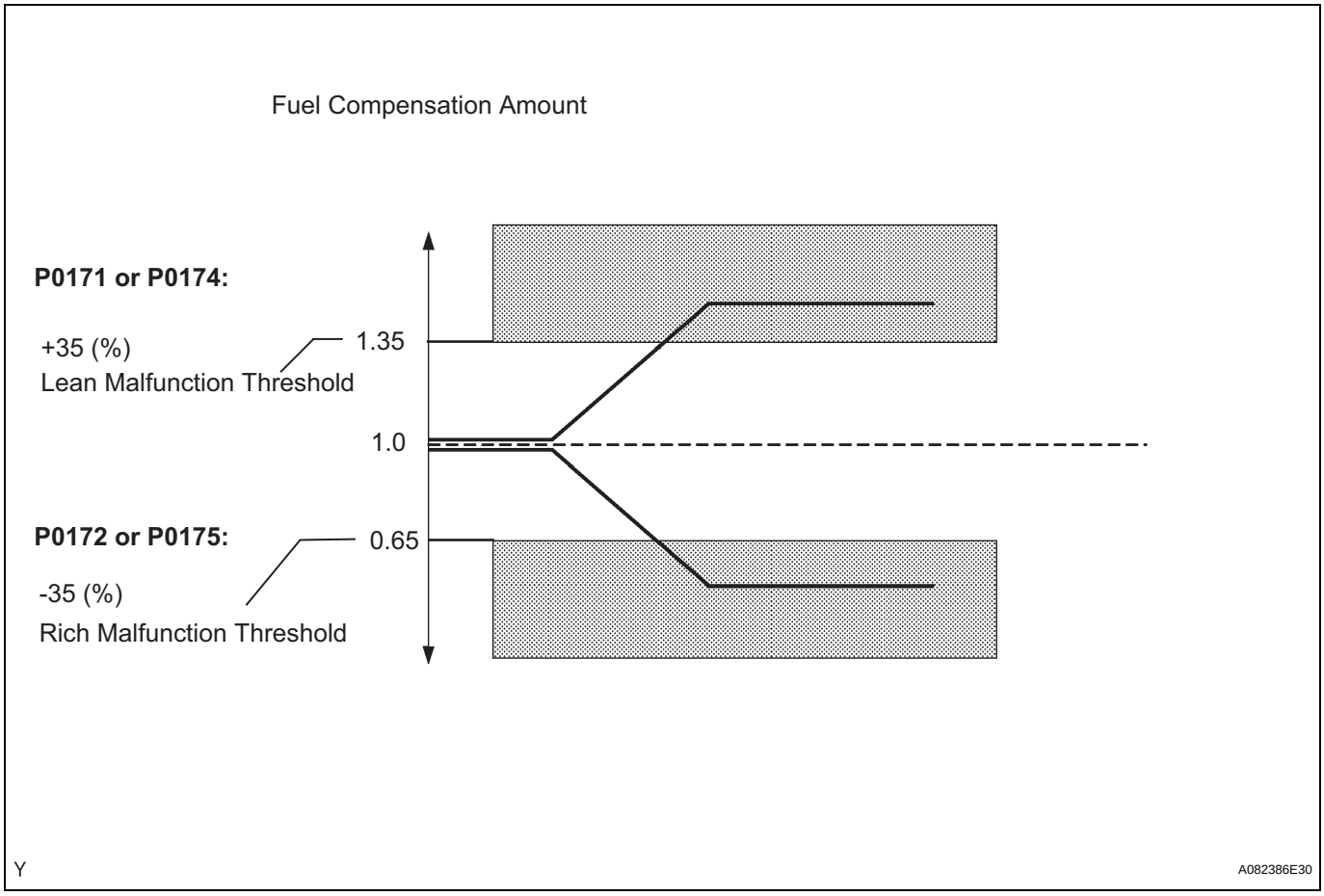


MONITOR STRATEGY

Related DTCs	P0171: Fuel trim Lean (Bank 1) P0172: Fuel trim Rich (Bank 1) P0174: Fuel trim Lean (Bank 2) P0175: Fuel trim Rich (Bank 2)
Required Sensors / Components (Main)	Fuel system
Required Sensors / Components (Related)	A/F sensor, Mass air flow meter, Crankshaft position sensor
Frequency of Operation	Continuous
Duration	Less than 10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Fuel-trim:

The monitor will run whenever these DTCs are not present	P0010, P0020 (VVT VSV1, 2), P0011, P0012 (VVT System-Advance, Retard), P0021, P0022(VVT System2-Adavance, Retard), P0031, P0031, P0032, P0051, P0052 (A/F Sensor heater Sensor 1), P0100, P0101, P0102, P0103 (MAF Sensor), P0115, P0116, P0117, P0118 (ECT Sensor), P0120, P0121, P0122, P0123, P0220, P0222, P0223 , P2135 (TP Sensor), P0125 (Insufficient ECT for Closed Loop), P0335 (CKP Sensor), P0340, P0342, P0343, P0345 (VVT Sensor 1, 2), P0351, P0352, P0353, P0354, P0356 (Ignitor), P0500 (VSS),
Fuel system status	Closed-loop
Battery voltage	11 V or more
Either of following conditions is met	Condition 1 or 2
1. Engine RPM	Less than 1,100 rpm
2. Intake air amount per revolution	0.22 g/rev or more

ES

TYPICAL MALFUNCTION THRESHOLDS

Fuel trim:

EVAP purge-cut	Executing
Either of following conditions met	Condition 1 or 2
1. Average between short-term fuel trim and long-term fuel trim	35% or more at 80°C (176°F) of ECT
2. Average between short-term fuel trim and long-term fuel trim	-35% or less at 80°C (176°F) of ECT

WIRING DIAGRAM

Refer to DTC P2195 (See page ES-350).

INSPECTION PROCEDURE

HINT:

For use of the intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. Select the following menu items on the tester: DIAGNOSIS / ENHANCEDOBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 and O2S B1S2 or AFS B2S1 and O2S B2S2) displayed on the tester.

   HINT:

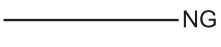
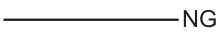
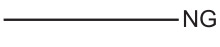
   - The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
   - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard voltage

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 or AFS B2S1 (A/F)	+25%	Rich	Less than 3.0
AFS B1S1 or AFS B2S1 (A/F)	-12.5%	Lean	More than 3.35

Tester Display (Sensor)	Injection Volumes	Status	Voltages
O2S B1S2 or O2S B2S2 (HO2)	+25%	Rich	More than 0.55
O2S B1S2 or O2S B2S2 (HO2)	-12.5%	Lean	Less than 0.4

NOTICE:
The Air-Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25% -12.5%		Injection Volume +25% -12.5%		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25% -12.5%		Injection Volume +25% -12.5%		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

ES

– Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
– To display the graph, select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1S1 and O2S B1S2 or AFS B2S1 and O2S B2S2. Press the YES button and then the ENTER button. Then press the F4 button.
HINT:
  - Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.
  - A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
  - A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0171, P0172, P0174 OR P0175)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0171, P0172, P0174 or P0175	A
P0171, P0172, P0174 or P0175 and other DTCs	B

HINT:
If any DTCs other than P0171, P0172, P0174 or P0175 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART (See page ES-63)**

A

2	CHECK PCV HOSE CONNECTIONS

OK:
PCV hose is connected correctly and is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

3	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from the air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

4	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (A/F CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
(d) Select the following menu items on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).

(f) Monitor the voltage outputs of the A/F and HO2 sensors (AFS B1S1 and O2S B1S2 or AFS B2S1 and O2S B2S2) displayed on the tester.
HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Standard voltage

Tester Display (Sensor)	Injection Volumes	Status	Voltages
AFS B1S1 or AFS B2S1 (A/F)	+25%	Rich	Less than 3.0
AFS B1S1 or AFS B2S1 (A/F)	-12.5%	Lean	More than 3.35
O2S B1S2 or O2S B2S2 (HO2)	+25%	Rich	More than 0.55
O2S B1S2 or O2S B2S2 (HO2)	-12.5%	Lean	Less than 0.4

ES

Result

Status AFS B1S1 or AFS B2S1	Status O2S B1S2 or O2S B2S2	A/F Condition and A/F Sensor Condition	Misfires	Suspected Trouble Areas	Proceed to
Lean/Rich	Lean/Rich	Normal	-	-	C
Lean	Lean	Actual air-fuel ratio lean	May occur	• PCV valve and hose • PCV hose connections • Injector blockage • Gas leakage from exhaust system • Air induction system • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor	A
Rich	Rich	Actual air-fuel ratio rich	-	• Injector leakage or blockage • Gas leakage from exhaust system • Ignition system • Fuel pressure • MAF meter • ECT sensor	A
Lean	Lean/Rich	A/F sensor malfunction	-	A/F sensor	B
Rich	Lean/Rich	A/F sensor malfunction	-	A/F sensor	B

Lean: During A/F CONTROL, the A/F sensor output voltage (AFS) is consistently more than 3.35 V, and the HO2 sensor output voltage (O2S) is consistently less than 0.4 V.
Rich: During A/F CONTROL, the AFS is consistently less than 3.0 V, and the O2S is consistently more than 0.55 V.
Lean/Rich: During A/F CONTROL of the ACTIVE TEST, the output voltage of the heated oxygen sensor alternates correctly.

B	Go to step 11
C	Go to step 15

A

5	READ VALUE OF INTELLIGENT TESTER (COOLANT TEMP)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(d) Read the COOLANT TEMP twice, when the engine is both cold and warmed up.
Standard:
With cold engine:
Same as ambient air temperature.
With warm engine:
Between 75°C and 95°C (167°F and 203°F)

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR (See page ES-499)**

OK

6	READ VALUE OF INTELLIGENT TESTER (MAF)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF and COOLANT TEMP.
(d) Allow the engine to idle until the COOLANT TEMP reaches 75°C (167°F) or more.
(e) Read the MAF with the engine in an idling condition and at an engine speed of 2,500 rpm.
Standard:
MAF while engine is idling:
Between 3.2 g/s and 4.7 g/s (shift position: N, A/C: OFF).
MAF at engine speed of 2,500 rpm:
Between 13.1 g/s and 18.9 g/s (shift position: N, A/C: OFF).

NG → **REPLACE MASS AIR FLOW METER (See page ES-477)**

OK

7	CHECK FUEL PRESSURE

(a) Check the fuel pressure (See page FU-8).

NG → **REPAIR OR REPLACE FUEL SYSTEM**

ES

OK

8	CHECK FOR EXHAUST GAS LEAKS

OK:
No gas leakage.

NG → **REPAIR OR REPLACE EXHAUST SYSTEM**

OK

9	CHECK FOR SPARKS AND IGNITION

ES

(a) Check for sparks and ignition (See page IG-3).
HINT:
If the spark plugs or ignition system malfunctions, engine misfire may occur. The misfire count can be read using the intelligent tester. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / CYL #1 (to CYL #6).

NG → **REPAIR OR REPLACE IGNITION SYSTEM**

OK

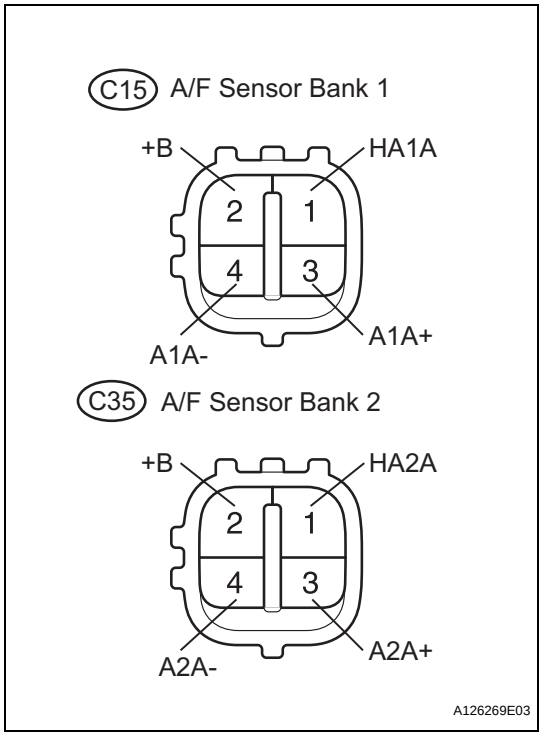
10	INSPECT FUEL INJECTOR ASSEMBLY (INJECTION AND VOLUME)

(a) Inspect the fuel injector assembly (See page FU-15).
HINT:
If the injectors malfunction, engine misfire may occur. The misfire count can be read using the intelligent tester. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / CYL #1 (to CYL #6).

NG → **REPLACE FUEL INJECTOR ASSEMBLY (See page FU-13)**

OK

11	INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)



(a) Disconnect the C15 or C35 A/F sensor connector.

(b) Measure the resistance between the terminals of the A/F sensor connector.

Standard resistance:

Bank 1

Tester Connections	Specified Conditions
HA1A (1) - +B (2)	1.8 to 3.4 Ω at 20°C (68°F)
HA1A (1) - A1A- (4)	10 kΩ or higher

Bank 2

Tester Connections	Specified Conditions
HA2A (1) - +B (2)	1.8 to 3.4 Ω at 20°C (68°F)
HT2A (1) - A2A- (4)	10 kΩ or higher

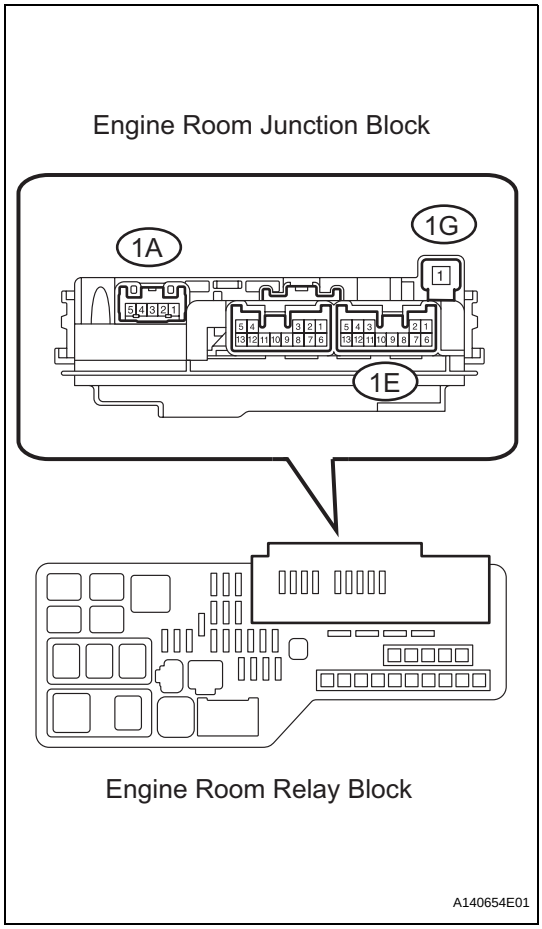
(c) Reconnect the A/F sensor connector.

NG → **REPLACE AIR FUEL RATIO SENSOR (See page EC-19)**

OK

ES

12	INSPECT ENGINE ROOM JUNCTION BLOCK (A/F SENSOR HEATER RELAY)



(a) Remove the engine room junction block from the engine room R/B.
(b) Measure the A/F relay resistance.
Standard resistance

Tester Connections	Specified Conditions
1G-1 - 1A-4	10 kΩ or higher
1G-1 - 1A-4	Below 1 Ω (when battery voltage applied to terminals 1E-6 and 1E-10)

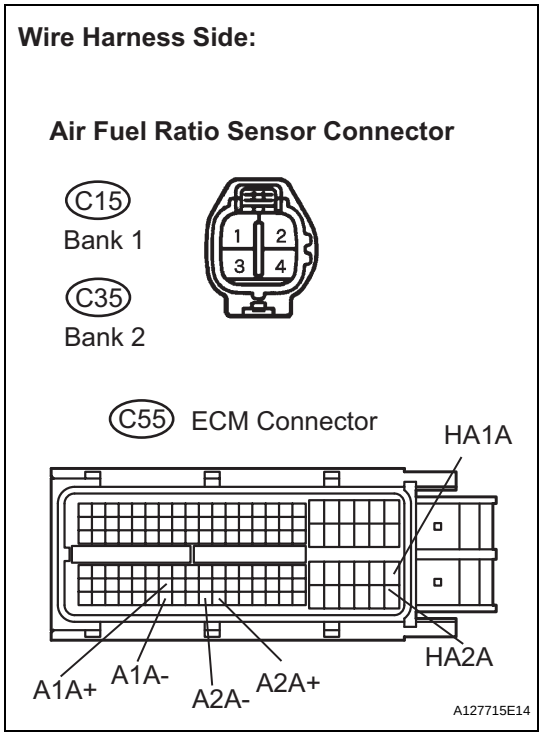
(c) Reinstall the engine room junction block.

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

ES

13 CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM)



(a) Disconnect the C15 or C35 A/F sensor connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between the +B terminal of the A/F sensor connector and body ground.

Standard voltage

Tester Connections	Specified Conditions
+B (C15-2) - Body ground	9 to 14 V
+B (C35-2) - Body ground	9 to 14 V

(d) Turn the ignition switch off.
(e) Disconnect the C55 ECM connector.
(f) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
HA1A (C15-1) - HA1A (C55-86)	Below 1 Ω
A1A+ (C15-3) - A1A+ (C55-93)	Below 1 Ω
A1A- (C15-4) - A1A- (C55-116)	Below 1 Ω
HA2A (C35-1) - HA2A (C55-109)	Below 1 Ω
A2A+ (C35-3) - A2A+ (C55-120)	Below 1 Ω
A2A- (C35-4) - A2A- (C55-119)	Below 1 Ω

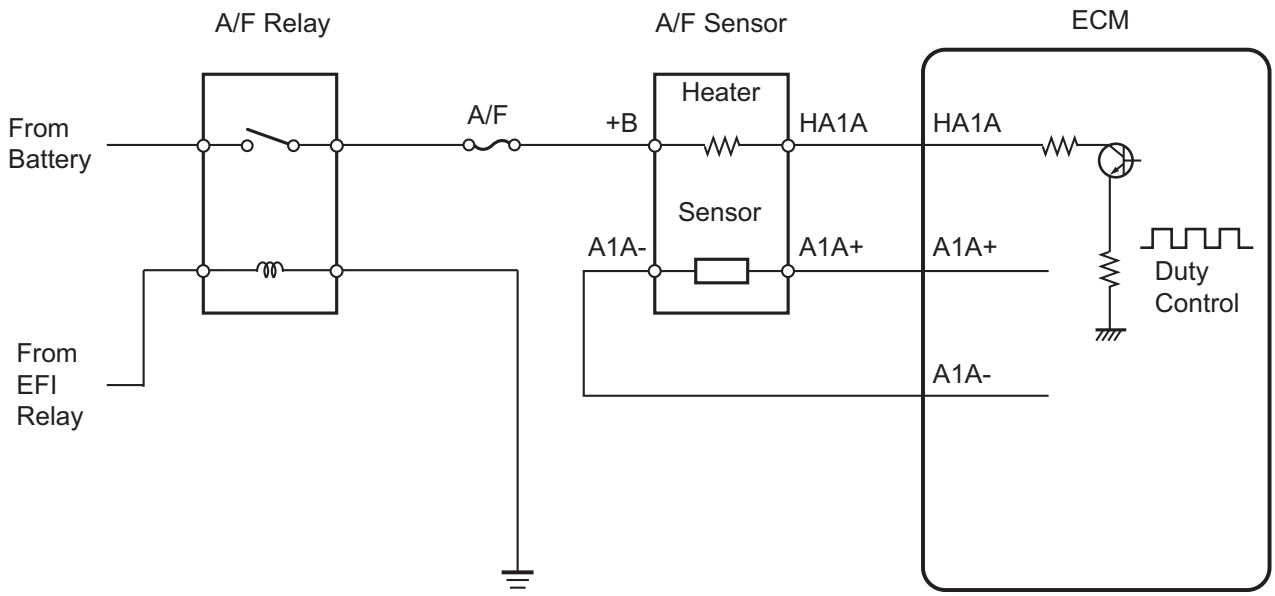
Standard resistance (Check for short)

Tester Connections	Specified Conditions
HA1A (C15-1) or HA1A (C55-86) - Body ground	10 kΩ or higher
A1A+ (C15-3) or A1A+ (C55-93) - Body ground	10 kΩ or higher
A1A- (C15-4) or A1A- (C55-116) - Body ground	10 kΩ or higher
HA2A (C35-1) or HA2A (C55-109) - Body ground	10 kΩ or higher
A2A+ (C35-3) or A2A+ (C55-120) - Body ground	10 kΩ or higher
A2A- (C35-4) or A2A- (C55-119) - Body ground	10 kΩ or higher

(g) Reconnect the ECM connector.
(h) Reconnect the A/F sensor connector.

ES

Reference (System Diagram of Bank 1 Sensor 1):



ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

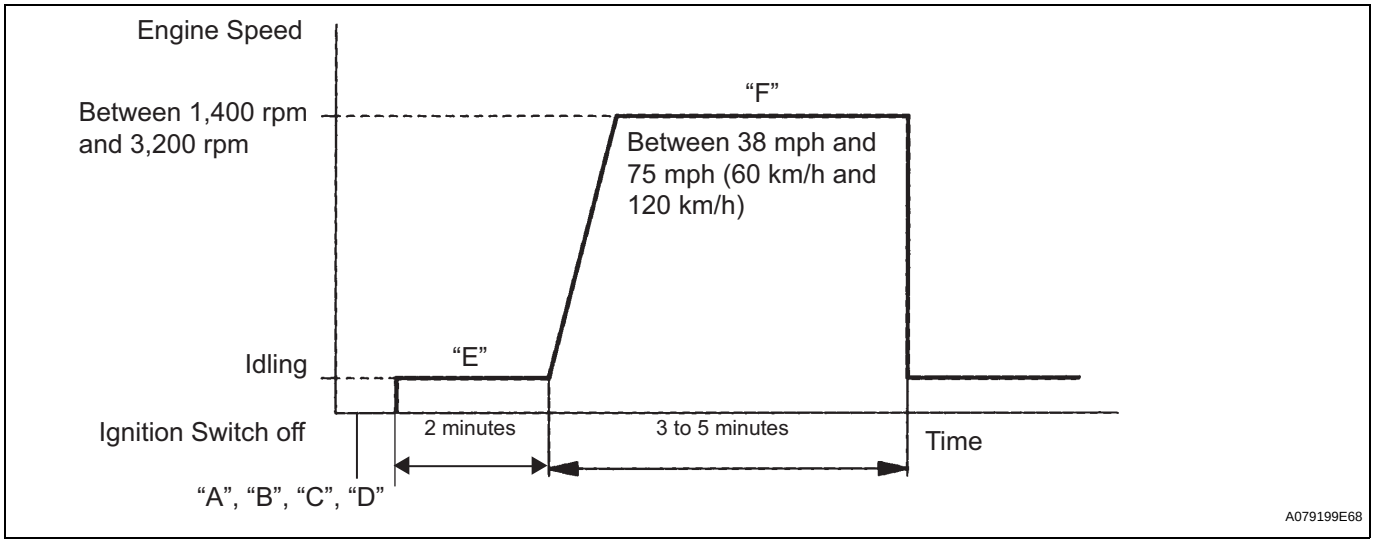
14	REPLACE AIR FUEL RATIO SENSOR

(a) Replace the air fuel ratio sensor (See page EC-19).

NEXT

15	PERFORM CONFIRMATION DRIVING PATTERN

(a) Connect the intelligent tester to the DLC3 (Procedure A).
(b) Turn the ignition switch on (IG) and turn the tester on (Procedure B).
(c) Clear the DTCs (See page ES-45) (Procedure C).
(d) Select the check mode using the tester (See page ES-49) (Procedure D).
(e) Start the engine and warm it up with all the accessories switched off (Procedure E).
(f) Drive the vehicle at between 38 mph and 75 mph (60 km/h and 120 km/h) and at an engine speed of between 1,400 rpm and 3,200 rpm for 3 to 5 minutes (Procedure F).



ES

HINT:
If the system is still malfunctioning, the MIL will be illuminated during procedure "F".
NOTICE:
If the conditions in this test are not strictly followed, no malfunction will be detected.

NEXT

16	CHECK WHETHER DTC OUTPUT RECURS (DTC P0171, P0172, P0174 OR P0175)

(a) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(b) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0171, P0172, P0174 or P0175	B

B → **Go to step 5**

A

END

DTC	P0300	Random / Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

DTC	P0305	Cylinder 5 Misfire Detected

ES

DTC	P0306	Cylinder 6 Misfire Detected

DESCRIPTION

When the engine misfires, high concentrations of hydrocarbons (HC) enter the exhaust gas. Extremely high HC concentration levels can cause an increase in exhaust emission levels. High concentrations of HC can also cause increases in the Three-Way Catalytic Converter (TWC) temperature, which may cause damage to the TWC. To prevent this increase in emissions and to limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the TWC reaches the point of thermal degradation, the ECM blinks the MIL. To monitor misfires, the ECM uses both the Camshaft Position (CMP) sensor and the Crankshaft Position (CKP) sensor. The CMP sensor is used to identify any misfiring cylinders and the CKP sensor is used to measure variations in the crankshaft rotation speed. Misfires are counted when the crankshaft rotation speed variations exceed predetermined thresholds. If the misfire exceeds the threshold levels and may cause emission deterioration, the ECM illuminates the MIL and sets a DTC.

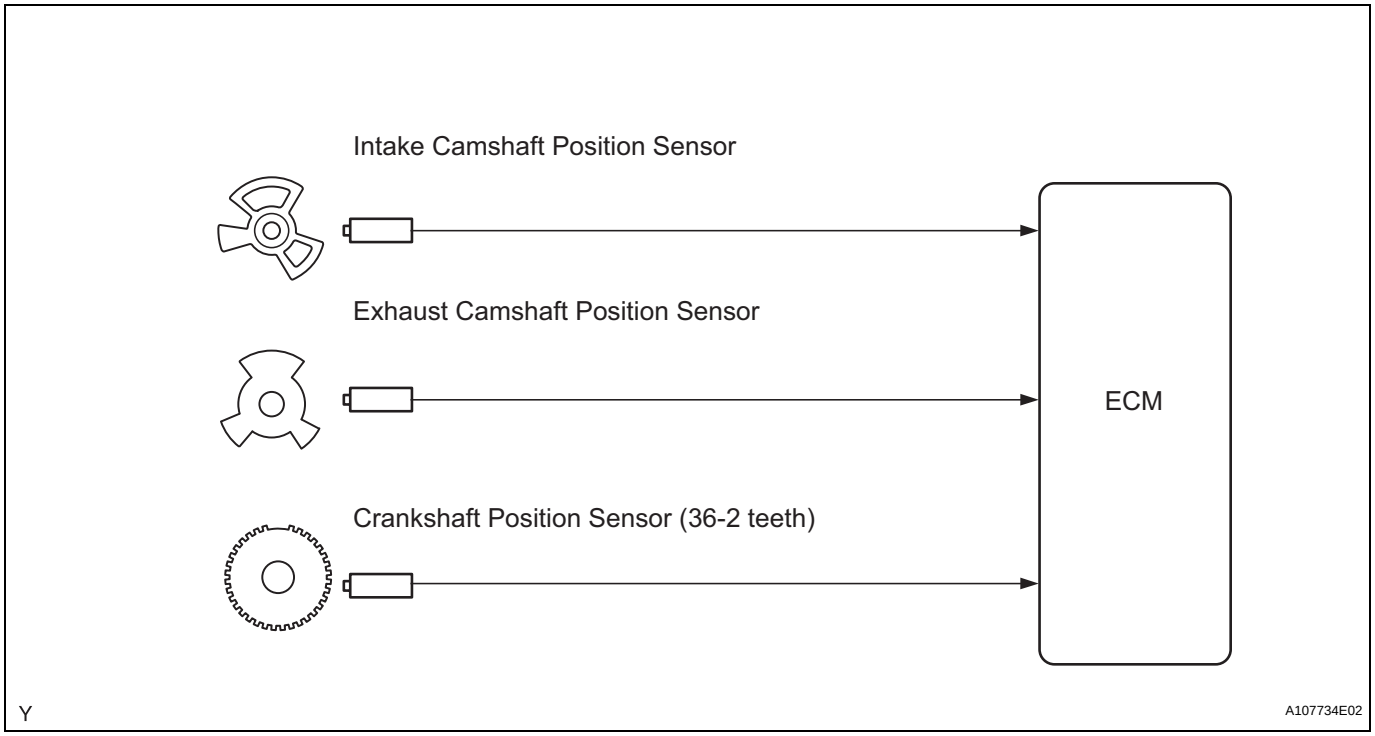
DTC No.	DTC Detection Condition	Trouble Area
P0300	Simultaneous misfiring of several cylinder detected (2 trip detection logic)	• Open or short in engine wire harness • Connector connection • Vacuum hose connections • Ignition system • Injector • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Compression pressure • Valve clearance • Valve timing • PCV valve and hose • PCV hose connections • Air induction system • ECM

DTC No.	DTC Detection Condition	Trouble Area
P0301 P0302 P0303 P0304 P0305 P0306	Misfiring of specific cylinder detected (2 trip detection logic)	• Open or short in engine wire harness • Connector connection • Vacuum hose connections • Ignition system • Injector for direct injector • Injector for port injector • Fuel pressure • Mass Air Flow (MAF) meter • Engine Coolant Temperature (ECT) sensor • Compression pressure • Valve clearance • Valve timing • PCV valve and hose • PCV hose connections • Air induction system • ECM

If DTCs that indicate misfires are set for different cylinders, but DTC P0300 is not set, it indicates that misfires have been detected in different cylinders at different times. DTC P0300 is only set when several misfiring cylinders are detected at the same time.

ES

MONITOR DESCRIPTION



The ECM illuminates the MIL and sets a DTC when either one of the following conditions, which could cause emission deterioration, is detected (2 trip detection logic):

- Within the first 1,000 crankshaft revolutions of the engine starting, an excessive misfiring rate (approximately 20 to 50 misfires per 1, 000 crankshaft revolutions) occurs once.
- After the first 1,000 crankshaft revolutions, an excessive misfiring rate (approximately 20 to 60 misfires per 1, 000 crankshaft revolutions) occurs 4 times in sequential crankshaft revolutions.

The ECM flashes the MIL and sets a DTC when either one of the following conditions, which could cause the Three-Way Catalytic Converter (TWC) damage, is detected (2 trip detection logic):

- In every 200 crankshaft revolutions at a high engine rpm, the threshold misfiring percentage is recorded once.
- In every 200 crankshaft revolutions at a normal engine rpm, the threshold misfiring percentage is recorded 3 times.

MONITOR STRATEGY

Related DTCs	P0300: Multiple cylinder misfire P0301: Cylinder 1 misfire P0302: Cylinder 2 misfire P0303: Cylinder 3 misfire P0304: Cylinder 4 misfire P0305: Cylinder 5 misfire P0306: Cylinder 6 misfire
Required Sensors/Components (Main)	Injector, Ignition coil, Spark plug
Required Sensors/Components (Related)	Crankshaft, Camshaft, Engine coolant temperature and intake air temperature sensors and Mass air flow meter
Frequency of Operation	Continuous
Duration	1,000 to 4,000 crankshaft revolutions: Emission related misfire 200 to 600 crankshaft revolutions: Catalyst damaged misfire
MIL Operation	2 driving cycles: Emission related misfire MIL flashes immediately: Catalyst damaged misfire
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Misfire:

Monitor runs whenever following DTCs are not present	P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0327 - P0333 (Knock sensor) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0500 (VSS)
Battery voltage	8 V or more
VVT system	Not operated by scan tool
Engine RPM	450 to 6,500 rpm
Either of following conditions (a) or (b) is met:	-
(a) ECT at engine start	More than -7°C (19°F)
(b) ECT	More than 20°C (68°F)
Fuel cut	OFF

Monitor period of emission-related-misfire:

First 1,000 revolutions after engine start, or Check Mode	Crankshaft 1,000 revolutions
Except above	Crankshaft 1,000 revolutions x 4

Monitor period of catalyst-damaged-misfire (MIL blinks):

All of following conditions 1, 2 and 3 are met:	Crankshaft 200 revolutions
1. Driving cycles	1st
2. Check mode	OFF
3. Engine RPM	Less than 2,500 rpm
Except above	Crankshaft 200 revolutions x 3

TYPICAL MALFUNCTION THRESHOLDS

Monitor period of emission-related-misfire:

Misfire rate	1 % or more

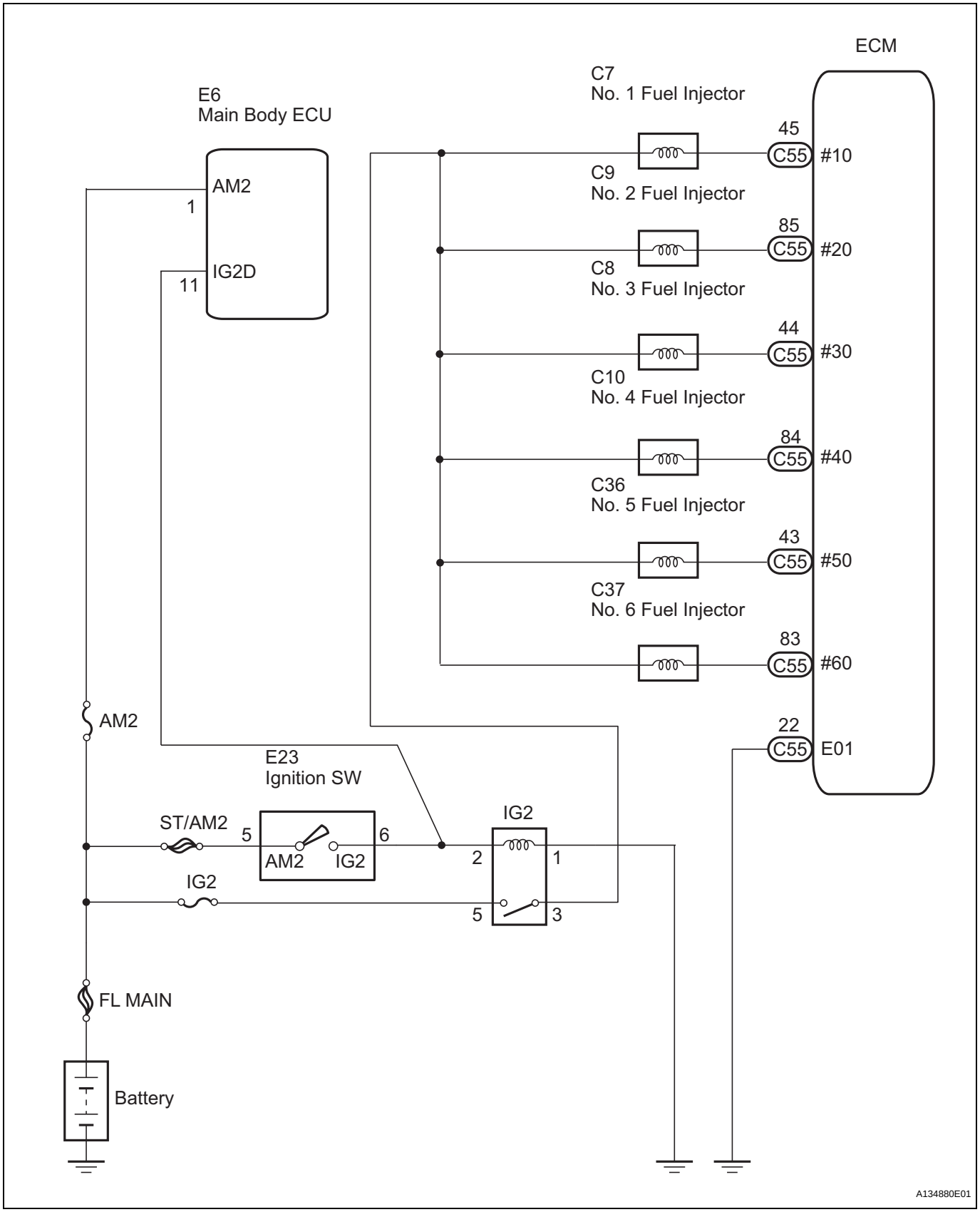
Monitor period of catalyst-damage-misfire (MIL blinks):

Number of misfire per 200 revolutions	94 or more (varies with intake air amount and RPM)
Paired cylinders misfire (MIL blinks immeditately)	Detected

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn the tester on.
4. Record the DTC(s) and freeze frame data.
5. Using the tester, switch the ECM from normal mode to check mode (See page ES-49).
6. Read the misfire counts of each cylinder (CYL #10 to #60) with the engine in an idling condition. If any misfire count is displayed, skip the following confirmation driving pattern.
7. Drive the vehicle several times with the conditions, such as engine rpm and engine load, shown in MISFIRE RPM and MISFIRE LOAD in the DATA LIST.
   HINT:
   In order to store misfire DTCs, it is necessary to operate the vehicle for the period of time shown in the table below, using the MISFIRE RPM and MISFIRE LOAD in the DATA LIST.

ES

Engine RPM	Duration
Idling	3.5 minutes or more
1,000	3 minutes or more
2,000	1.5 minutes or more
3,000	1 minute or more

8. Check whether misfires have occurred by checking DTCs and freeze frame data.
   HINT:
   Do not turn the engine switch off until the stored DTC(s) and freeze frame data have been recorded. When the ECM returns to normal mode (default), the stored DTC(s), freeze frame data and other data will be erased.
9. Record the DTC(s), freeze frame data and misfire counts.
10. Turn the engine switch off and wait for at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If any DTCs other than misfire DTCs are output, troubleshoot those DTCs first.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).
- If the misfire does not recur when the vehicle is brought to the workshop, reproduce the conditions stored in the ECM as freeze frame data.
- If the misfire still cannot be reproduced even though the conditions stored in the ECM as freeze frame data have been reproduced, one of the following factors is considered to be a possible cause of the problem:
  (a) There was insufficient fuel in the tank.
  (b) Improper fuel is used.
  (c) The spark plugs have been contaminated.
  (d) The problem requires further diagnosis.
- After finishing repairs, check the misfire counts of the cylinders (CYL #1, #2, #3, #4, #5 and #6).
- Be sure to confirm that no misfiring cylinder DTCs are set again by conducting the confirmation driving pattern after finishing repairs.
- For 6 and 8 cylinder engines, the ECM intentionally does not set the specific misfiring cylinder DTCs at high engine RPM. If misfires occur only in high engine RPM areas, only DTC P0300 is set.
  In the event of DTC P0300 being present, perform the following operations:
  (a) Clear the DTC (See page ES-45).
  (b) Start the engine and conduct the confirmation driving pattern.
  (c) Read the misfiring rates of each cylinder or DTC(s) using the tester.

(d) Repair the cylinder(s) that has a high misfiring rate or is indicated by the DTC.
(e) After finishing repairs, conduct the confirmation driving pattern again, in order to verify that DTC P0300 is not set.

- When one of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is outside the range of +-20 %, the air-fuel ratio may be RICH (-20 % or less) or LEAN (+20 % or more).
- When the COOLANT TEMP in the freeze frame data is less than 75°C (167°F), the misfire have occurred only while warming up the engine.

1	CHECK ANY OTHER DTC OUTPUT (IN ADDITION TO MISFIRE DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

ES

Result

Display (DTC output)	Proceed to
P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306	A
P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306 and other DTCs	B

HINT:
If any DTCs other than P0300, P0301, P0302, P0303, P0304, P0305 and P0306 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART (See page ES-63)**

A

2	READ VALUE OF INTELLIGENT TESTER (MISFIRE RPM AND MISFIRE LOAD)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / MISFIRE RPM and MISFIRE LOAD.
(d) Read and note the MISFIRE RPM and MISFIRE LOAD (engine load) values.
HINT:
The MISFIRE RPM and MISFIRE LOAD values indicate the vehicle conditions under which the misfire occurred.

NEXT

3	CHECK PCV HOSE (HOSE CONNECTIONS)

OK:
PCV hose is connected correctly and is not damaged.

NG → **REPAIR OR REPLACE PCV HOSE**

OK

4	CHECK MISFIRE COUNT (CYL #1, #2, #3, #4, #5 AND #6)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Clear DTCs.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / MISFIRE / CYL #1, #2, #3, #4, #5 and #6 (Step "A").
(f) Allow the engine to idle (Step "B").
(g) Read the value of CYL #1 to #6 displayed on the tester. If no misfire counts occur in any cylinders, perform the following operations (Step "C"):
  (1) Shift the gear selector lever to the D position.
  (2) Repeat steps "A" to "C" above.
  (3) Check the CYL #1 to #6.
  (4) If misfire counts are still no displayed, perform steps "D" and "E" and then check the misfire counts again.
(h) Drive the vehicle with the MISFIRE RPM and MISFIRE LOAD noted in step 2 (Step "D").
(i) Read the CYL #1 to #6 or DTCs displayed on the tester (Step "E").

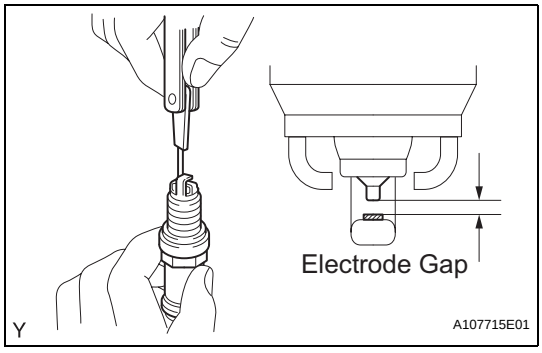
Result

Misfire count	Proceed to
1 or 2 cylinders have misfire counts	A
3 cylinders or more have misfire counts	B

B → **Go to step 13**

A

5	CHECK SPARK PLUG



(a) Remove the ignition coil and the spark plug of the misfiring cylinder.
(b) Measure the spark plug electrode gap.
Standard:
Between 1.0 mm and 1.4 mm (0.039 in. and 0.055 in.)
(c) Check the electrode for carbon deposits.
Recommended spark plug:

Manufacture	Product
DENSO	FK20HBR11

NOTICE:
If the electrode gap is larger than standard, replace the spark plug. Do not adjust the electrode gap.

NG → **REPLACE SPARK PLUG**

OK

6	CHECK FOR SPARKS AND IGNITION

(a) Disconnect the injector connectors, in order to prevent the engine from starting.
(b) Install the spark plug to the ignition coil.
(c) Attach the spark plug assembly to the cylinder head cover.
(d) Crank the engine for less than 2 seconds and check the sparks.
OK:
Sparks jump across the electrode gap.
(e) Reconnect the injector connectors.

NG → **Go to step 8**

OK

7	CHECK CYLINDER COMPRESSION PRESSURE (MALFUNCTION CYLINDER)

(a) Measure the cylinder compression pressure of the misfiring cylinder.

OK → **Go to step 9**

NG

REPAIR OR REPLACE ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION

8	CHANGE SPARK PLUG WITH NORMAL ONE AND CHECK FOR SPARKS OF MISFIRING CYLINDER

(a) Change the installed spark plug with a spark plug that functions normally.
(b) Perform a spark test.
CAUTION:
Always disconnect each injector connector.
NOTICE:
Do not crank the engine for more than 2 seconds.
(1) Install the spark plug to the ignition coil and connect the ignition coil connector.
(2) Disconnect the injector connector.
(3) Ground the spark plug.
(4) Check if sparks occur while the engine is being cranked.
OK:
Sparks jump across the electrode gap.

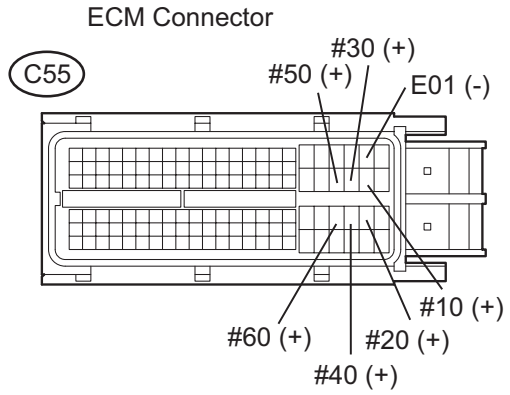
NG → **REPLACE IGNITION COIL ASSEMBLY (See page IG-9)**

OK

REPLACE SPARK PLUG

9	INSPECT ECM (#10, #20, #30, #40, #50 AND/OR #60 VOLTAGE))

Wire Harness Side Front View:



(a) Disconnect the C55 ECM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between the terminals.
Standard voltage

Tester Connection	Specified Condition
#10 (C55-45) - E01 (C55-22)	9 to 14 V
#20 (C55-85) - E01 (C55-22)	9 to 14 V
#30 (C55-44) - E01 (C55-22)	9 to 14 V
#40 (C55-84) - E01 (C55-22)	9 to 14 V
#50 (C55-43) - E01 (C55-22)	9 to 14 V
#60 (C55-83) - E01 (C55-22)	9 to 14 V

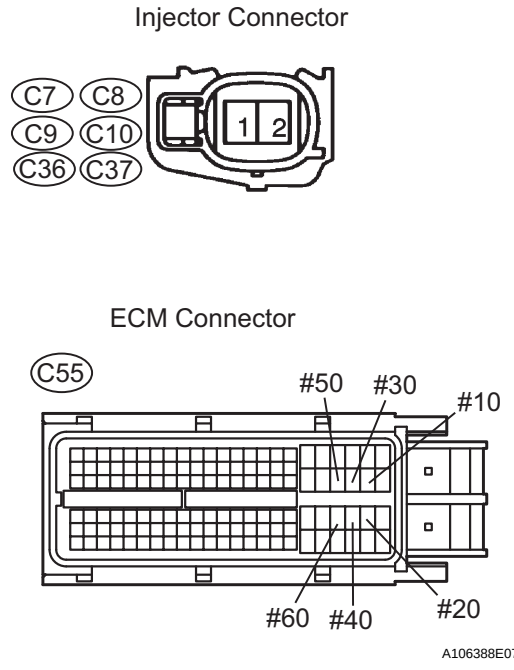
(d) Reconnect the ECM connector.

OK → **Go to step 12**

NG

10	CHECK HARNESS AND CONNECTOR (INJECTOR - ECM)

Wire Harness Side Front View:



(a) Disconnect the injector connector (misfire cylinder).
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
#10 (C55-45) - C7-1	Below 1 Ω
#20 (C55-85) - C9-1	Below 1 Ω
#30 (C55-44) - C8-1	Below 1 Ω
#40 (C55-84) - C10-1	Below 1 Ω
#50 (C55-43) - C36-1	Below 1 Ω
#60 (C55-83) - C37-1	Below 1 Ω
#10 (C55-45) or C7-1 - Body ground	10 kΩ or higher
#20 (C55-85) or C9-1 - Body ground	10 kΩ or higher
#30 (C55-44) or C8-1 - Body ground	10 kΩ or higher
#40 (C55-84) or C10-1 - Body ground	10 kΩ or higher
#50 (C55-43) or C36-1 - Body ground	10 kΩ or higher
#60 (C55-83) or C37-1 - Body ground	10 kΩ or higher

(d) Reconnect the injector connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

11	CHECK FUEL INJECTOR ASSEMBLY (MISFIRING CYLINDER)

(a) Check the injector injection (whether fuel volume high or low, and whether injection pattern is poor).

NG → **REPLACE FUEL INJECTOR ASSEMBLY (See page FU-13)**

OK

12	CHECK VALVE CLEARANCE (MISFIRING CYLINDER)

NG → **ADJUST VALVE CLEARANCE**

OK

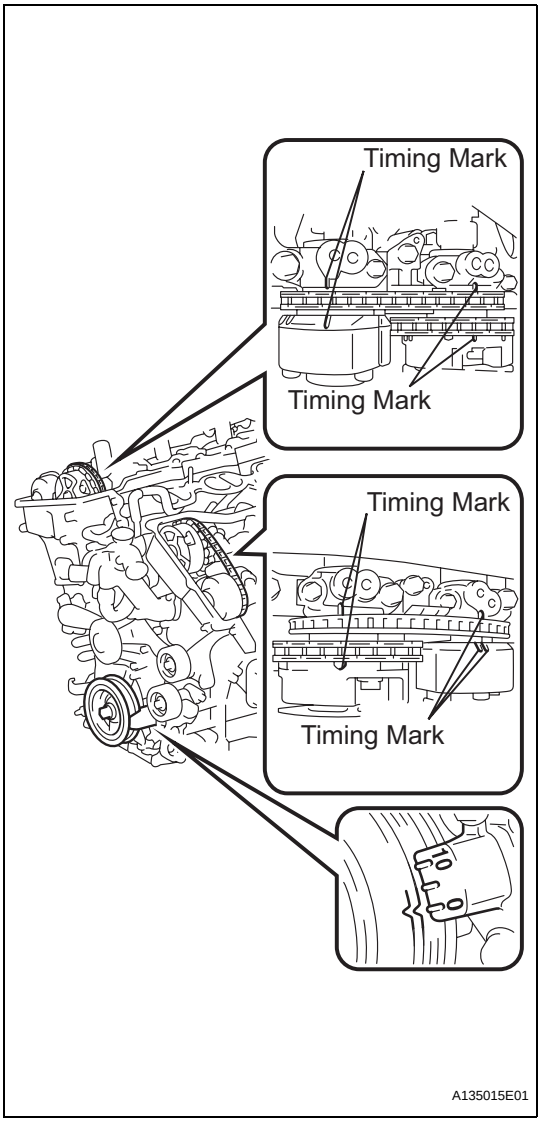
13	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

14	CHECK VALVE TIMING



(a) Remove the cylinder head covers.
(b) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.
(c) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°) and align the marks as above.
OK:
Timing marks on camshaft timing gears are aligned as shown in illustration.
(d) Reinstall the cylinder head covers.

NG → **ADJUST VALVE TIMING**

OK

15	CHECK FUEL PRESSURE

(a) Check the fuel pressure (high or low pressure).
Standard

Item	Standard Condition
Fuel pressure	147 kPa (1.5 kgf/cm^2, 21 psi)

NG → **CHECK AND REPLACE FUEL SYSTEM**

OK

16	READ VALUE OF INTELLIGENT TESTER (COOLANT TEMP)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / COOLANT TEMP.
(e) Read the COOLANT TEMP twice, when the engine is both cold and warmed up.
Standard:
With cold engine:
Same as ambient air temperature.
With warm engine:
Between 75°C and 95°C (167°F and 203°F).

NG → **REPLACE ENGINE COOLANT TEMPERATURE SENSOR (See page ES-499)**

OK

ES

17	READ VALUE OF INTELLIGENT TESTER (MAF)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / MAF and COOLANT TEMP.
(e) Allow the engine to idle until the COOLANT TEMP reaches 75°C (167°F) or more.
(f) Read the MAF with the engine in an idling condition and at an engine speed of 2,500 rpm.
Standard:
MAF while engine is idling:
Between 2.1 g/sec and 3.1 g/sec (shift position: N, A/C: OFF).
MAF at an engine speed of 2,500 rpm:
Between 7.8 g/sec and 11.4 g/sec (shift position: N, A/C: OFF).

NG → **REPLACE MASS AIR FLOW METER (See page ES-477)**

OK

18	CHECK MISFIRE COUNT (CYL #1, #2, #3, #4, #5 AND #6)

HINT:
- If the result of step 4 is "1 or 2 cylinders", proceed to A.
- If the result of step 4 os "more than 3 cylinders", proceed to B.

B → **Go to step 5**

A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)

DTC	P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)

DTC	P0332	Knock Sensor 2 Circuit Low Input (Bank 2)

DTC	P0333	Knock Sensor 2 Circuit High Input (Bank 2)

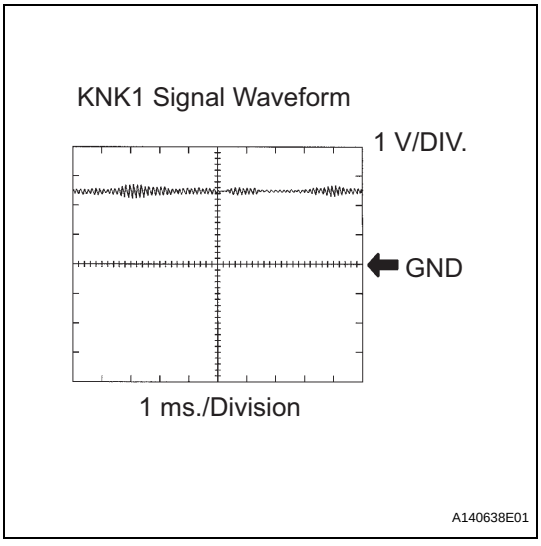
DESCRIPTION

ES

A flat type knock sensor (non-resonant type) has a structure that can detect vibrations over a wide band of frequencies: between approximately 6 kHz and 15 kHz.
Knock sensors are fitted onto the engine block to detect engine knocking.
The knock sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The voltage is generated when the engine block vibrates due to knocking. Any occurrence of engine knocking can be suppressed by delaying the ignition timing.

DTC No.	DTC Detection Condition	Trouble Area
P0327 P0332	Output voltage of knock sensor 1 or 2 is 0.5 V or less (1 trip detection logic)	• Short in knock sensor 1 or 2 circuit • Knock sensor 1 or 2 • ECM
P0328 P0333	Output voltage of knock sensor 1 or 2 is 4.5 V or more (1 trip detection logic)	• Open in knock sensor 1 or 2 circuit • Knock sensor 1 or 2 • ECM

HINT:
When any of DTCs P0327, P0328, P0332 and P0333 are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the engine switch is turned off.
Reference: Inspection using an oscilloscope



The correct waveform is as shown.

Item	Content
Terminals	KNK1 - EKNK or KNK2 -EKN2

Item	Content
Equipment Settings	0.01 to 10 V/DIV. 0.01 to 10 ms./DIV.
Conditions	Keep engine speed at 4,000 rpm with warm engine

MONITOR DESCRIPTION

The knock sensor, located on the cylinder block, detects spark knock. When spark knock occurs, the piezoelectric element of the sensor vibrates. When the ECM detects a voltage in this frequency range, it retards the ignition timing to suppress spark knock.
The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 seconds, or if the knock sensor output voltage is outside the normal range, the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0327: Knock sensor (Bank 1) open/short (Low voltage) P0328: Knock sensor (Bank 1) open/short (High voltage) P0332: Knock sensor (Bank 2) open/short (Low voltage) P0333: Knock sensor (Bank 2) open/short (High voltage)
Required Sensors/Components (Main)	Knock sensor (Bank 1 and 2)
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery voltage	10.5 V or more
Time after engine start	5 seconds or more
Engine switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

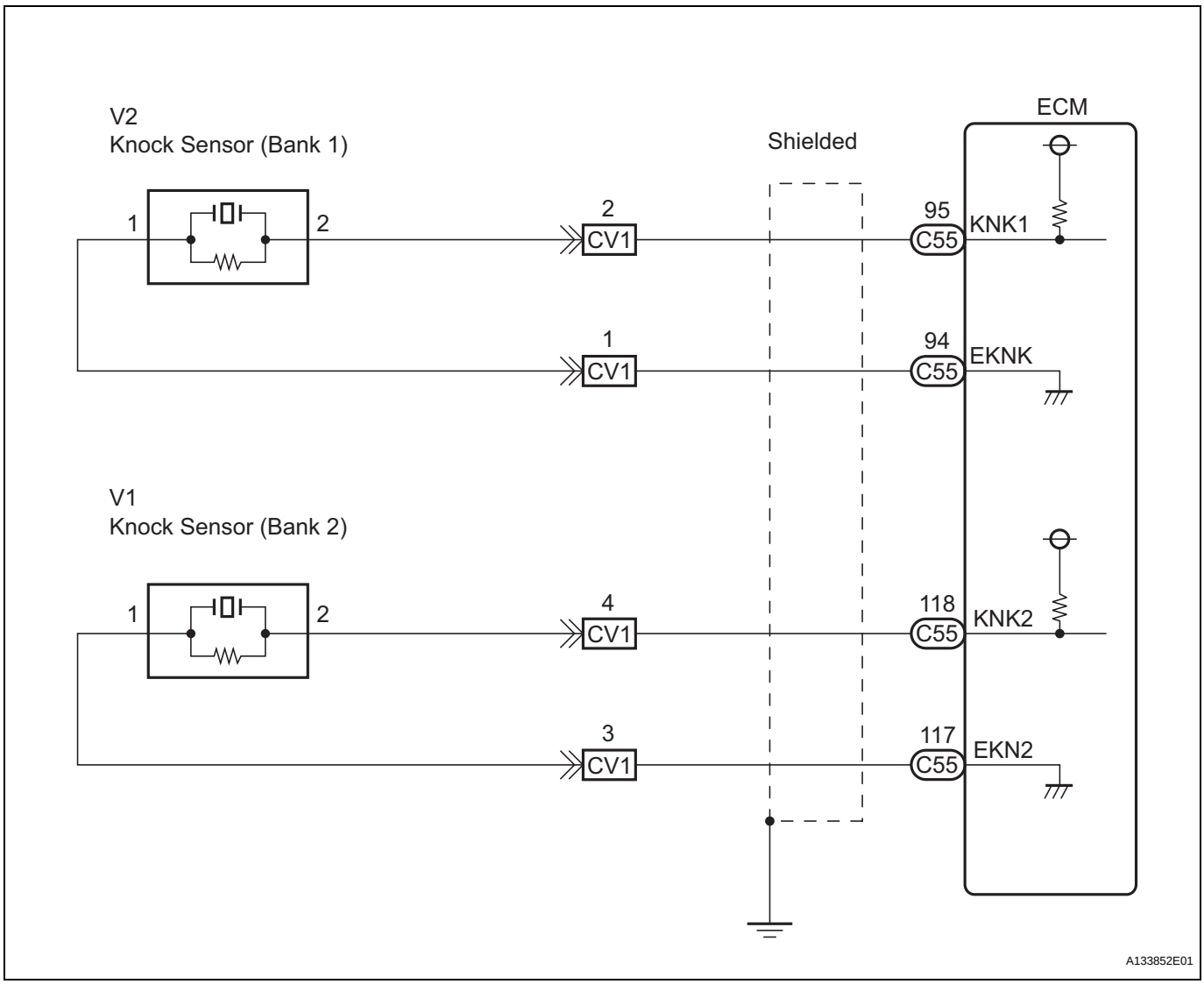
Knock Sensor Range Check (Low voltage) P0327 and P0332:

Knock sensor voltage	Less than 0.5 V

Knock Sensor Range Check (High voltage) P0328 and P0333:

Knock sensor voltage	More than 4.5 V

WIRING DIAGRAM

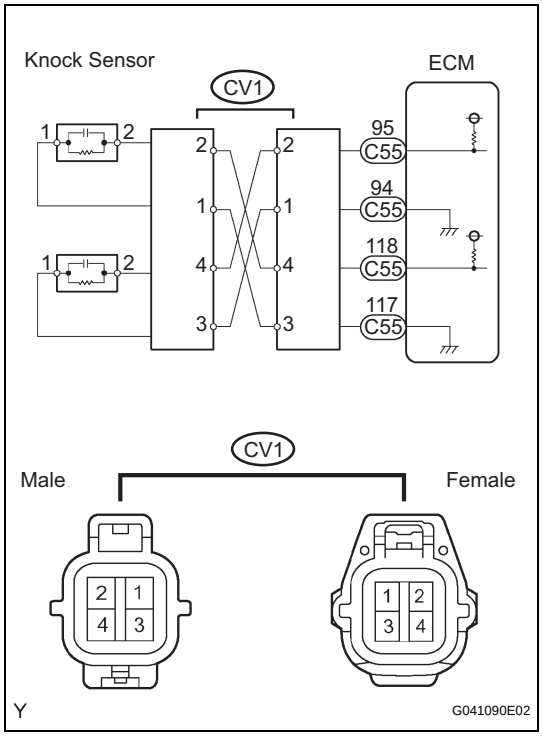


INSPECTION PROCEDURE

HINT:

- DTCs P0327 and P0328 are for the bank 1 knock sensor circuit.
- DTCs P0332 and P0333 are for the bank 2 knock sensor circuit.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	READ OUTPUT DTC (CHECK KNOCK SENSOR CIRCUIT)



(a) Disconnect the CV1 connector.
(b) Using lead wires, connect the connectors as follows:

Male Connector - Female Connector
Terminal 2 - Terminal 4
Terminal 1 - Terminal 3
Terminal 4 - Terminal 2
Terminal 3 - Terminal 1

(c) Warm up the engine.
(d) Run the engine at 3,000 rpm for 10 seconds or more.
(e) Connect the intelligent tester to the DLC3.
(f) Turn the ignition switch on (IG) and turn the intelligent tester on.
(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display	Proceed to
DTCs same as when vehicle brought in P0327, P0328 → P0327, P0328 or P0332, P0333 → P0332, P0333	**A**
DTCs different from when vehicle brought in P0327, P0328 → P0332, P0333 or P0332, P0333 → P0327, P0328	**B**

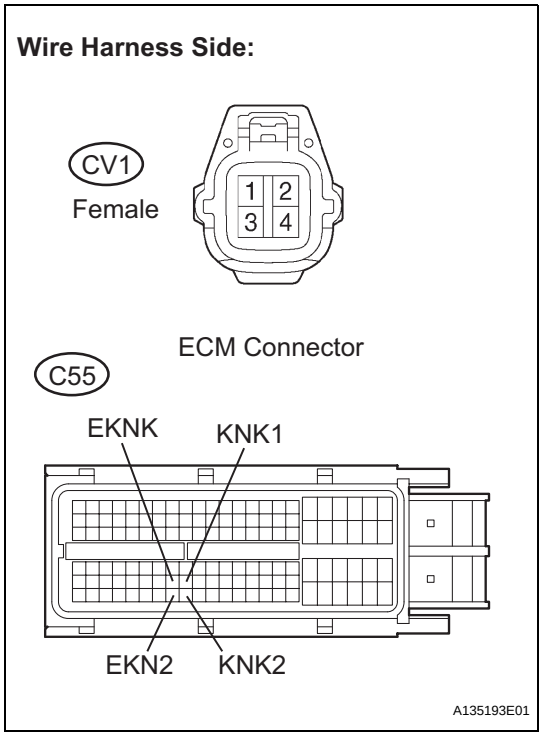
(i) Reconnect the CV1 connector.

B → **Go to step 4**

A

ES

2 CHECK WIRE HARNESS AND CONNECTOR (CONNECTOR - ECM)



(a) Disconnect the CV1 connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
CV1 female connector 2 - KNK1 (C55-95)	Below 1 Ω
CV1 female connector 1 - EKNK (C55-94)	Below 1 Ω
CV1 female connector 4 - KNK2 (C55-118)	Below 1 Ω
CV1 female connector 3 - EKN2 (C55-117)	Below 1 Ω

Standard resistance (Check for short)

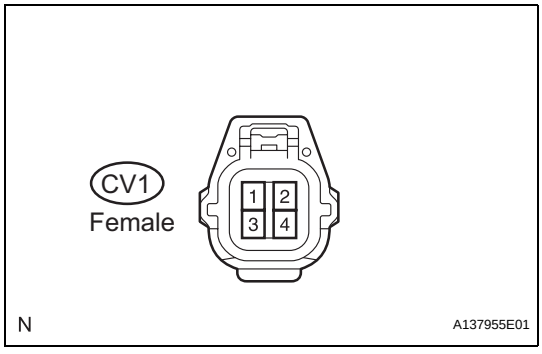
Tester Connection	Specified Condition
CV1 female connector 2 or KNK1 (C55-95) - Body ground	10 kΩ or higher
CV1 female connector 1 or EKNK (C55-94) - Body ground	10 kΩ or higher
CV1 female connector 4 or KNK2 (C55-118) - Body ground	10 kΩ or higher
CV1 female connector 3 or EKN2 (C55-117) - Body ground	10 kΩ or higher

(d) Reconnect the CV1 connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT ECM



(a) Disconnect the CV1 connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
CV1 female connector 2 - 1	4.5 to 5.5 V
CV1 female connector 4 - 3	4.5 to 5.5 V

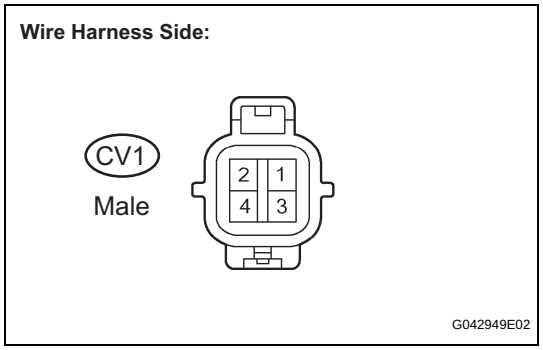
(d) Reconnect the ECM connector.

NG → **REPLACE ECM (See page ES-518)**

OK

CHECK FOR INTERMITTENT PROBLEMS

4 INSPECT KNOCK SENSOR



(a) Disconnect the CV1 connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

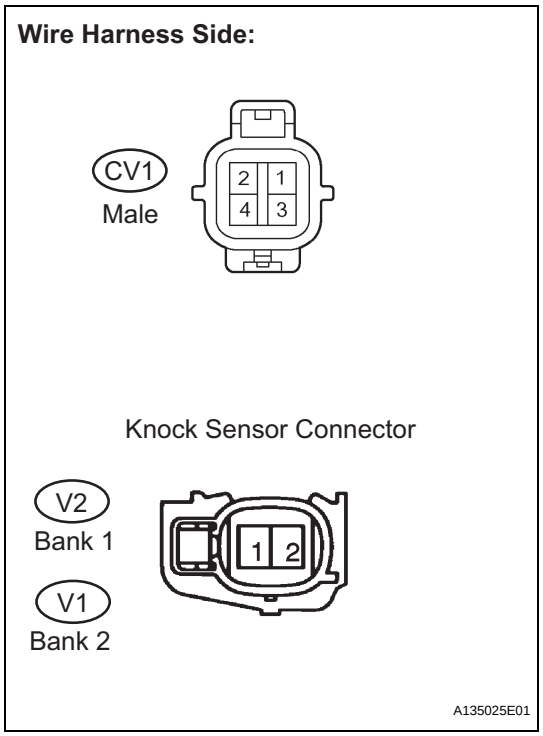
Tester Connection	Specified Condition
CV1 male connector 1 - 2	120 to 280 kΩ
CV1 male connector 3- 4	120 to 280 kΩ

(c) Reconnect the CV1 connector.

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

5 CHECK HARNESS AND CONNECTOR (CONNECTOR - KNOCK SENSOR)



HINT:
- If DTC P0327 or P0328 has changed to P0332 or P0333, check the knock sensor circuit on the right bank side.
- If DTC P0332 or P0333 has changed to P0327 or P0328, check the knock sensor circuit on the left bank side.

(a) Disconnect the CV1 connector.
(b) Disconnect the V2 and V1 knock sensor connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
CV1 male connector 2 - V2-2	Below 1 Ω
CV1 male connector 1 - V2-1	Below 1 Ω
CV1 male connector 4 - V1-2	Below 1 Ω
CV1 male connector 3 - V1-1	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
CV1 male connector 2 or V2-2 - Body ground	10 kΩ or higher
CV1 male connector 1 or V2-1 - Body ground	10 kΩ or higher
CV1 male connector 4 or V1-2 - Body ground	10 kΩ or higher
CV1 male connector 3 or V1-1 - Body ground	10 kΩ or higher

(d) Reconnect the CV1 connector.
(e) Reconnect the knock sensor connectors.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE KNOCK SENSOR (See page ES-510)

ES

DTC	P0335	Crankshaft Position Sensor "A" Circuit

DTC	P0339	Crankshaft Position Sensor "A" Circuit Intermittent

DESCRIPTION

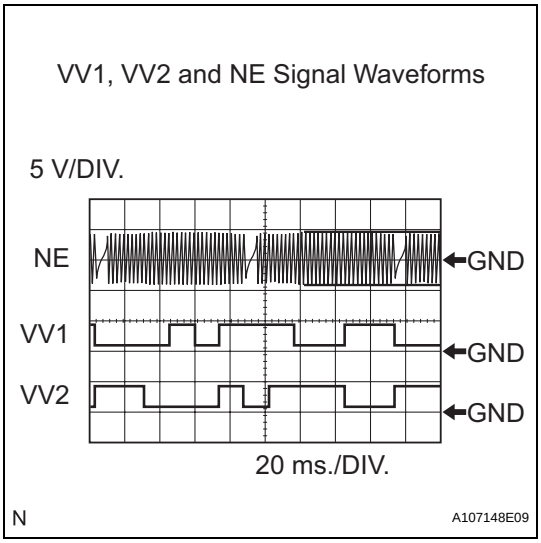
The crankshaft position (CKP) sensor system consists of a crankshaft position sensor plate and a magnetic coil.

The sensor plate has 34 teeth and is installed on the crankshaft. The pickup coil is made of windings, an iron core and magnet. The sensor plate rotates and as each tooth passes through the pickup coil, a pulse signal is created. The pickup coil generates 34 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition time are controlled.

ES

DTC No.	DTC Detection Condition	Trouble Area
P0335	• No CKP sensor signal to ECM while cranking (1 trip detection logic) • No CKP sensor signal to ECM at engine speed of 600 rpm or more (1 trip detection logic)	• Open or short in CKP sensor circuit • CKP sensor • CKP sensor plate • ECM
P0339	Under conditions (a), (b) and (c), no CKP sensor signal to ECM for 0.05 seconds or more (1 trip detection logic): (a) Engine speed 1,000 rpm or more (b) Starter signal OFF (c) 3 seconds or more have elapsed since starter signal switched from ON to OFF	• Open or short in CKP sensor circuit • CKP sensor • CKP sensor plate • ECM

Reference: Inspection using an oscilloscope.



HINT:

- The correct waveform is as shown.
- VV1+ and VV2+ stand for the VVT sensor signal, and NE+ stands for the CKP sensor signal.

Item	Content
Terminals	VV1+ - VV1- VV2+ - VV2- NE+ - NE-
Equipment Settings	5 V/DIV, 20 ms./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION

If there is no signal from the crankshaft position sensor despite the engine revolving, the ECM interprets this as a malfunction of the sensor.
If the malfunction is not repaired successfully, these DTCs are set 10 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0335: CKP sensor signal check when starter ON P0335: CKP sensor signal check when starter OFF P0335: sensor pulse check
Required Sensors/Components (Main)	Crankshaft Position (CKP) sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	Within 5 seconds and 3 times
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor will run whenever these DTCs are not present	-

CKP sensor signal check when starter OFF:

Engine rpm	600 rpm or more
Time after starter ON to OFF	3 seconds or more

CKP sensor pulse check:

Battery voltage	7 V or higher
Starter	ON
Number of VVT sensor signal pulse	6 times
CMP sensor circuit fail	Not detected
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

CKP sensor signal check when starter OFF:

Sensor signal	No signal

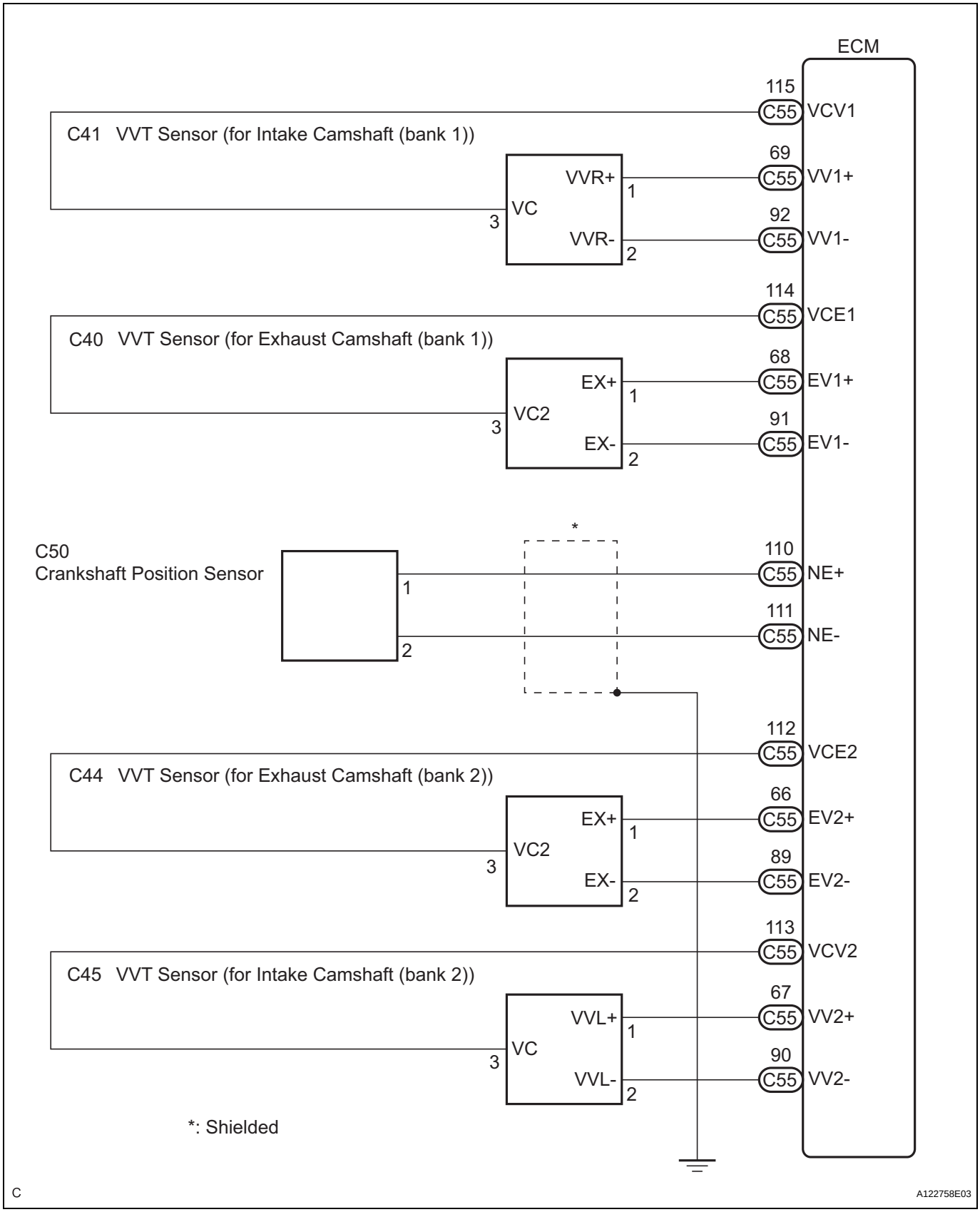
CKP sensor pulse check:

Number of sensor pulse	132 or less, or 174 or more

COMPONENT OPERATING RANGE

CKP sensor	• CKP sensor output voltage fluctuates while crankshaft is revolving • 34 CKP sensor signals per crankshaft revolution

WIRING DIAGRAM



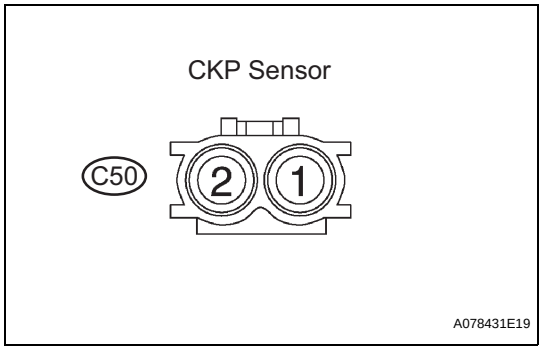
INSPECTION PROCEDURE

HINT:

- If no problem is found by this diagnostic troubleshooting procedure, troubleshoot the engine mechanical system.
- Check the engine speed. The engine speed can be checked by using the intelligent tester. To check, follow the procedure below:
  (a) Connect the intelligent tester to the DLC3.
  (b) Start the engine.
  (c) Turn the tester on.
  (d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD.
  The engine speed may be indicated as zero despite the engine revolving normally. This is caused by a lack of NE signals from the crankshaft position (CKP) sensor. Alternatively, the engine speed may be indicated as lower than the actual engine speed, if the CKP sensor output voltage is insufficient.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

ES

1	INSPECT CRANKSHAFT POSITION SENSOR



(a) Disconnect the C50 crankshaft position (CKP) sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Cold	1,630 to 2,740 Ω
1 - 2	Hot	2,065 to 3,225 Ω

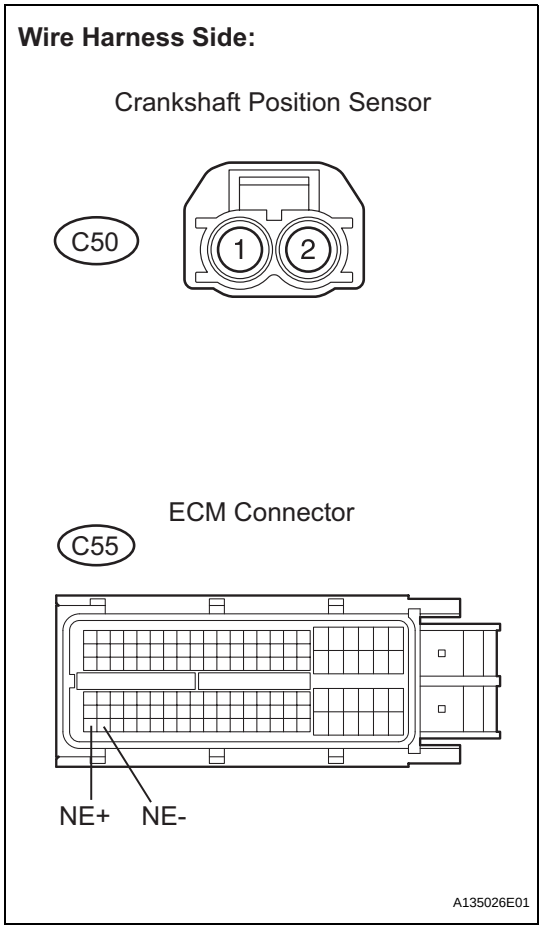
HINT:
Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).

(c) Reconnect the CKP sensor connector.

NG → **REPLACE CRANKSHAFT POSITION SENSOR (See page ES-496)**

OK

2	CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)



(a) Disconnect the C50 CKP sensor connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C50-1 - NE+ (C55-110)	Below 1 Ω
C50-2 - NE- (C55-111)	Below 1 Ω

Standard resistance (Check for short)

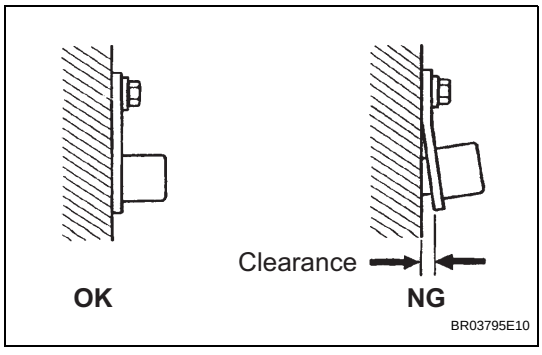
Tester Connection	Specified Condition
C50-1 or NE+ (C55-110) - Body ground	10 kΩ or higher
C50-2 or NE- (C55-111) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the CKP sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK CRANK POSITION SENSOR (SENSOR INSTALLATION)



(a) Check the CKP sensor installation condition.
OK:
Sensor is installed correctly.

NG → **REPAIR OR REPLACE CRANK POSITION SENSOR**

OK

4	CHECK CRANKSHAFT POSITION SENSOR PLATE (TEETH OF SENSOR PLATE)

(a) Check the teeth of the sensor plate.

OK:
Sensor plate does not have any cracks or deformation.

NG → **REPLACE CRANKSHAFT POSITION SENSOR PLATE**

OK

REPLACE ECM (See page ES-518)

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

DTC	P0342	Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor)

DTC	P0343	Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor)

DTC	P0345	Camshaft Position Sensor "A" Circuit (Bank 2)

DTC	P0347	Camshaft Position Sensor "A" Circuit Low Input (Bank 2)

DTC	P0348	Camshaft Position Sensor "A" Circuit High Input (Bank 2)

DESCRIPTION

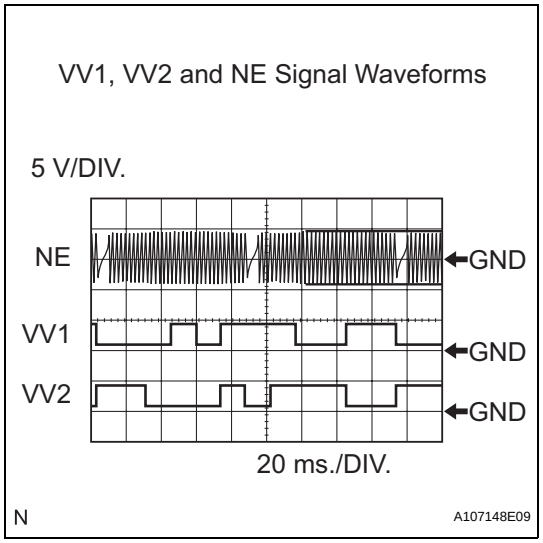
The intake camshaft's Variable Valve Timing (VVT) sensor (G signal) consists of a magnet and MRE (Magneto Resistance Element).

The VVT camshaft drive gear has a sensor plate with 3 teeth on its outer circumference. When the gear rotates, changes occur in the air gaps between the sensor plate and MRE, which affects the magnetic field. As a result, the resistance of the MRE material fluctuates. The VVT sensor converts the gear rotation data to pulse signals, uses the pulse signals to determine the camshaft angle, and sends it to the ECM.

The crankshaft angle sensor plate has 34 teeth. The pickup coil generates 34 signals for each engine revolution. Based on combination of the G signal and NE signal, the ECM detects the crankshaft angle. Then the ECM uses this data to control fuel injection time and injection timing. Also, based on the NE signal, the ECM detects the engine speed.

DTC No.	DTC Detection Condition	Trouble Area
P0340 P0345	• Input voltage to ECM remains 0.3 V or less, or 4.7 V or higher for more than 5 seconds, when 2 or more seconds have elapsed after turning engine switch on (IG) (1 trip detection logic) • No VVT sensor signal to ECM during cranking (1 trip detection logic)	• Open or short in VVT sensor for intake camshaft circuit • VVT sensor for intake camshaft • Camshaft timing gear for intake camshaft • Jumped tooth of timing chain for intake camshaft • ECM
P0342 P0347	Output voltage of VVT sensor 0.3 V or less is for 5 seconds (1 trip detection logic)	• Open or short in VVT sensor for intake camshaft circuit • VVT sensor for intake camshaft • Camshaft timing gear for intake camshaft • Jumped tooth of timing chain for intake camshaft • ECM
P0343 P0348	Output voltage of VVT sensor 4.7 V or more is for 5 seconds (1 trip detection logic)	• Open or short in VVT sensor for intake camshaft circuit • VVT sensor for intake camshaft • Camshaft timing gear for intake camshaft • Jumped tooth of timing chain for intake camshaft • ECM

Reference: Inspection using an oscilloscope



HINT:
- The correct waveform is as shown.
- VV1+ and VV2+ stand for the VVT sensor signal, and NE+ stands for the CKP sensor signal.

Item	Content
Terminals	NE+ - NE- VV1+ - VV1- VV2+ - VV2-
Equipment Settings	5 V/DIV. 20 ms./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION

If no signal is transmitted by the VVT sensor despite the engine revolving, or the rotations of the camshaft and the crankshaft are not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340: VVT sensor (Bank 1) open/short P0340: VVT position/Crankshaft position misalignment (Bank 1) P0342: VVT position sensor (Bank 1) range check (low voltage) P0343: VVT position sensor (Bank 1) range check (high voltage) P0345: VVT sensor (Bank 2) open/short P0345: VVT position/Crankshaft position misalignment (Bank 2) P0347: VVT position sensor (Bank 2) range check (low voltage) P0348: VVT position sensor (Bank 2) range check (high voltage)
Required Sensors/Components (Main)	VVT position sensor (Bank 1 and 2)
Required Sensors/Components (Sub)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	5 seconds
MIL Operation	2 driving cycles: P0340 (cranking), P0345 (cranking) Immediate: Others
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P0340 (Engine running):

Engine speed	600 rpm or more
Starter	OFF

P0345 (Engine running):

Engine speed	600 rpm or more
Battery voltage	8 V or more
Starter	OFF
Engine switch	ON

P0340 (Cranking):

Starter	ON
Minimum battery voltage	Less than 11 V
CPU initial	Not initial

ES

P0345 (Cranking):

Starter	ON
Battery voltage while starter is ON at least once	Less than 11 V

P0340, P0342, P0343 (Chattering, Low voltage, High voltage):

Starter	OFF
Engine switch	ON
Time after engine switch off to on	2 seconds or more

P0345, P0347, P0348 (Chattering, Low voltage, High voltage):

Starter	OFF
Engine switch	ON
Time after engine switch off to on	2 seconds or more
Battery Voltage	8 V or more

TYPICAL MALFUNCTION THRESHOLDS

P0340 (Engine running):

Camshaft position and crankshaft position phase	Misaligned
Camshaft position signal	No signal

P0340 (Cranking):

Camshaft position signal	No signal

P0340 (Chattering):

Camshaft position sensor voltage	Less than 0.3 V, or more than 4.7 V

P0342 (Low voltage):

Camshaft position sensor voltage	Less than 0.3 V

P0343 (High voltage):

Camshaft position sensor voltage	More than 4.7 V

P0345 (Engine running, cranking):

VVT sensor signal	No signal

P0345 (Chattering):

VVT sensor voltage	Less than 0.3 V, or more than 4.7 V

P0347 (Low voltage):

VVT sensor voltage	Less than 0.3 V

P0348 (High voltage):

VVT sensor voltage	More than 4.7 V

COMPONENT OPERATING RANGE

VVT sensor voltage	0.3 to 4.7 V

WIRING DIAGRAM

Refer to DTC P0335 (See page ES-224).

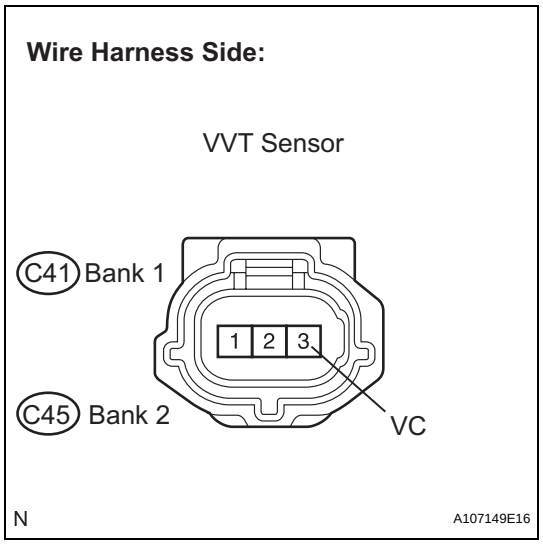
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

ES

1	CHECK HARNESS AND CONNECTOR (SENSOR POWER SOURCE)



(a) Disconnect the C41 or C45 VVT sensor connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

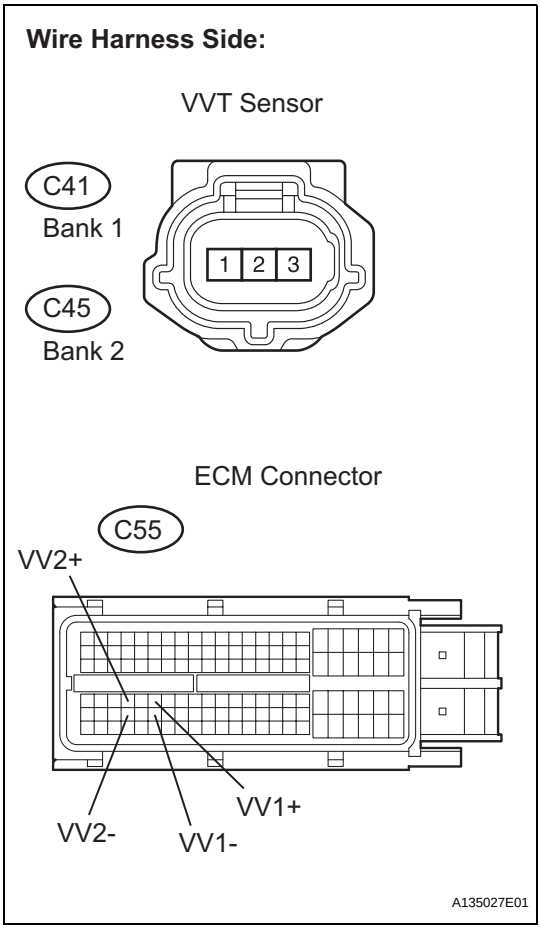
Tester Connection	Specified Condition
VC (C41-3) - Body ground	4.5 to 5.0 V
VC (C45-3) - Body ground	4.5 to 5.0 V

(c) Reconnect the VVT sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (VVT SENSOR FOR INTAKE CAMSHAFT - ECM)



(a) Disconnect the C41 or C45 VVT sensor connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VVR+ (C41-1) - VV1+ (C55-69)	Below 1 Ω
VVR- (C41-2) - VV1- (C55-92)	Below 1 Ω
VVL+ (C45-1) - VV2+ (C55-67)	Below 1 Ω
VVL- (C45-2) - VV2- (C55-90)	Below 1 Ω

Standard resistance (Check for short)

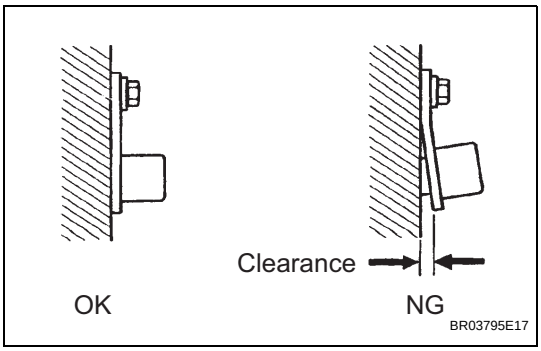
Tester Connection	Specified Condition
VVR+ (C41-1) or VV1+ (C55-69) - Body ground	10 kΩ or higher
VVR- (C41-2) or VV1- (C55-92) - Body ground	10 kΩ or higher
VVL+ (C45-1) or VV2+ (C55-67) - Body ground	10 kΩ or higher
VVL- (C45-2) or VV2- (C55-90) - Body ground	10 kΩ or higher

(d) Reconnect the VVT sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK VVT SENSOR FOR INTAKE CAMSHAFT (SENSOR INSTALLATION)



(a) Check the CKP sensor installation condition.
OK:
Sensor is installed correctly.

NG → **REPAIR OR REPLACE VVT SENSOR**

OK

4	CHECK CAMSHAFT TIMING GEAR ASSEMBLY (TEETH OF PLATE)

(a) Check the teeth of the signal plate.

OK:
Sensor plate teeth do not have any cracks or deformation.

NG → **REPLACE CAMSHAFT TIMING GEAR ASSEMBLY**

OK

5	**REPLACE VVT SENSOR**

NEXT

6	**CHECK WHETHER DTC OUTPUT RECURS**

ES

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch to on (IG).
(c) Turn the intelligent tester on.
(d) Clear the DTCs (See page ES-45).
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(f) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0340, P0342, P0343, P0345, P0347 or P0348	B

HINT:
If the engine does not start, replace the ECM.

B → **REPLACE ECM (See page ES-518)**

A

END

DTC	P0351	Ignition Coil "A" Primary / Secondary Circuit

DTC	P0352	Ignition Coil "B" Primary / Secondary Circuit

DTC	P0353	Ignition Coil "C" Primary / Secondary Circuit

DTC	P0354	Ignition Coil "D" Primary / Secondary Circuit

DTC	P0355	Ignition Coil "E" Primary / Secondary Circuit

DTC	P0356	Ignition Coil "F" Primary / Secondary Circuit

ES

DESCRIPTION

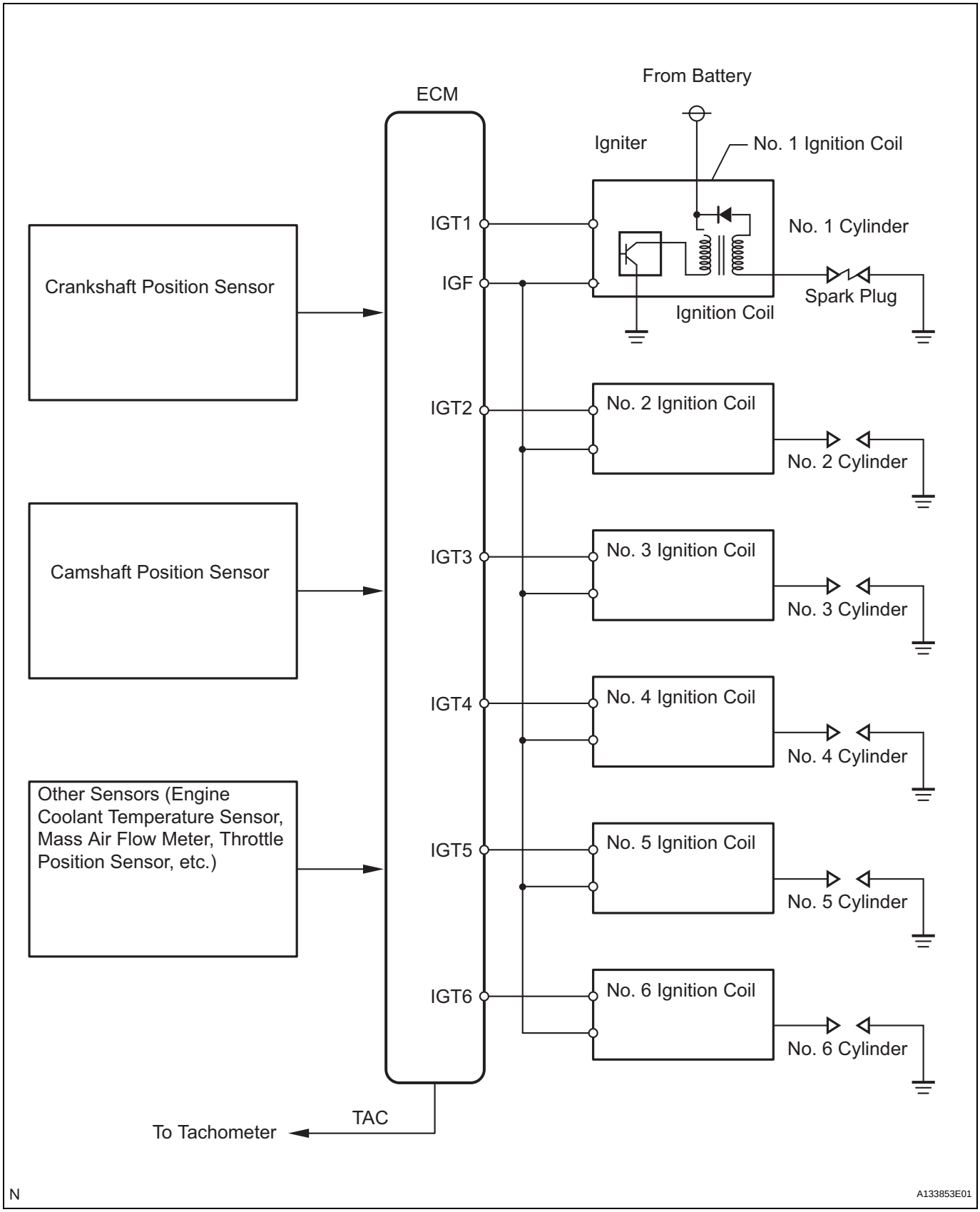
HINT:

- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check the No. 1 ignition coil circuit.
- If DTC P0352 is set, check the No. 2 ignition coil circuit.
- If DTC P0353 is set, check the No. 3 ignition coil circuit.
- If DTC P0354 is set, check the No. 4 ignition coil circuit.
- If DTC P0355 is set, check the No. 5 ignition coil circuit.
- If DTC P0356 is set, check the No. 6 ignition coil circuit.

A Direct Ignition System (DIS) is used on this vehicle.

The DIS is a 1-cylinder ignition system in which each cylinder is ignited by one ignition coil and spark plug is connected to the end of each secondary wiring. A powerful voltage, generated in the secondary wiring, is applied directly to each spark plug. The sparks of the spark plugs pass from the center electrode to the ground electrodes.

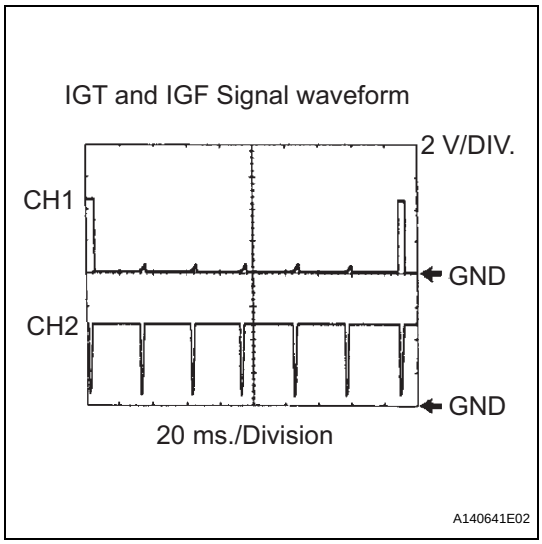
The ECM determines the ignition timing and transmits the ignition signals (IGT) to each cylinder. Using the IGT signal, the ECM turns the power transistor inside the igniter on and off. The power transistor, in turn, switches on and off the current to the primary coil. When the current to the primary coil is cut off, a powerful voltage is generated in the secondary coil. This voltage is applied to the spark plugs, causing them to spark inside the cylinders. As the ECM cuts the current to the primary coil off, the igniter sends back an ignition confirmation signal (IGF) to the ECM, for each cylinder ignition.


From Battery
ECM
Igniter
No. 1 Ignition Coil
IGT1
IGF
No. 1 Cylinder
Spark Plug
Ignition Coil
Crankshaft Position Sensor
IGT2
No. 2 Ignition Coil
No. 2 Cylinder
Camshaft Position Sensor
IGT3
No. 3 Ignition Coil
No. 3 Cylinder
IGT4
No. 4 Ignition Coil
No. 4 Cylinder
Other Sensors (Engine Coolant Temperature Sensor, Mass Air Flow Meter, Throttle Position Sensor, etc.)
IGT5
No. 5 Ignition Coil
No. 5 Cylinder
IGT6
No. 6 Ignition Coil
No. 6 Cylinder
TAC
To Tachometer
N
A133853E01

ES

DTC No.	DTC Detection Condition	Trouble Area
P0351 P0352 P0353 P0354 P0355 P0356	No IGF signal to ECM while engine is running (1 trip detection logic)	• Ignition system • Open or short in IGF1 or IGT circuit (1 to 6) between ignition coil and ECM • No. 1 to No. 6 ignition coils • ECM

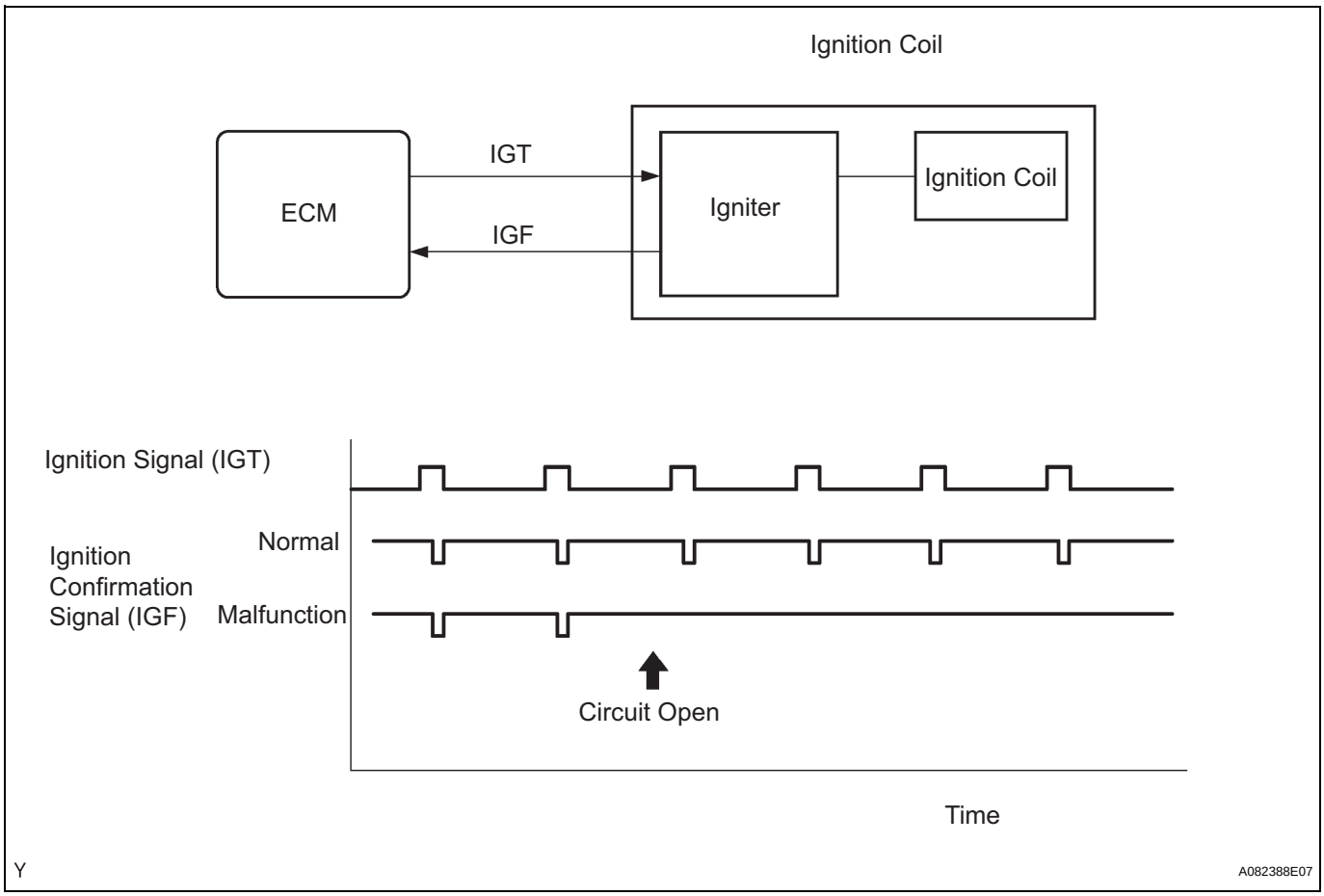
Reference: Inspection using an oscilloscope.



While cranking or idling the engine, check the waveform between terminals IGT (1 to 6) and E1, and IGF1, IGF1 and E1 of the ECM connector.

Item	Content
Terminals	CH1: IGT1, IGT2, IGT3, IGT4, IGT5, IGT6 - E1 CH2: IGF1 - E1
Equipment Settings	2 V/DIV. 20 ms./DIV.
Conditions	Cranking or idling

MONITOR DESCRIPTION



If the ECM does not receive any IGF signals despite transmitting the IGT signal, it interprets this as a fault in the igniter and sets a DTC.
If the malfunction is not repaired successfully, a DTC is set 1 second after the engine is next started.

MONITOR STRATEGY

Related DTCs	P0351: Igniter (cylinder 1) malfunction P0352: Igniter (cylinder 2) malfunction P0353: Igniter (cylinder 3) malfunction P0354: Igniter (cylinder 4) malfunction P0355: Igniter (cylinder 5) malfunction P0356: Igniter (cylinder 6) malfunction
Required Sensors/Components (Main)	Igniter (Cylinder 1 to 6)
Required Sensors/Components (Sub)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	0.256 seconds and 4 sparks
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever the following DTCs are not present	None
Either of the following condition A or B is met:	-
A. Engine RPM	1,500 rpm or less
B. Starter	OFF
Either of the following condition C or D is met:	-

C. Both of the following conditions are met:	-
(a) Engine speed	500 rpm or less
(b) Battery voltage	6 V or more
D. All of the following conditions are met:	-
(a) Engine speed	More than 500 rpm
(b) Battery voltage	10 V or more
(c) Number of sparks after CPU reset	5 sparks or more

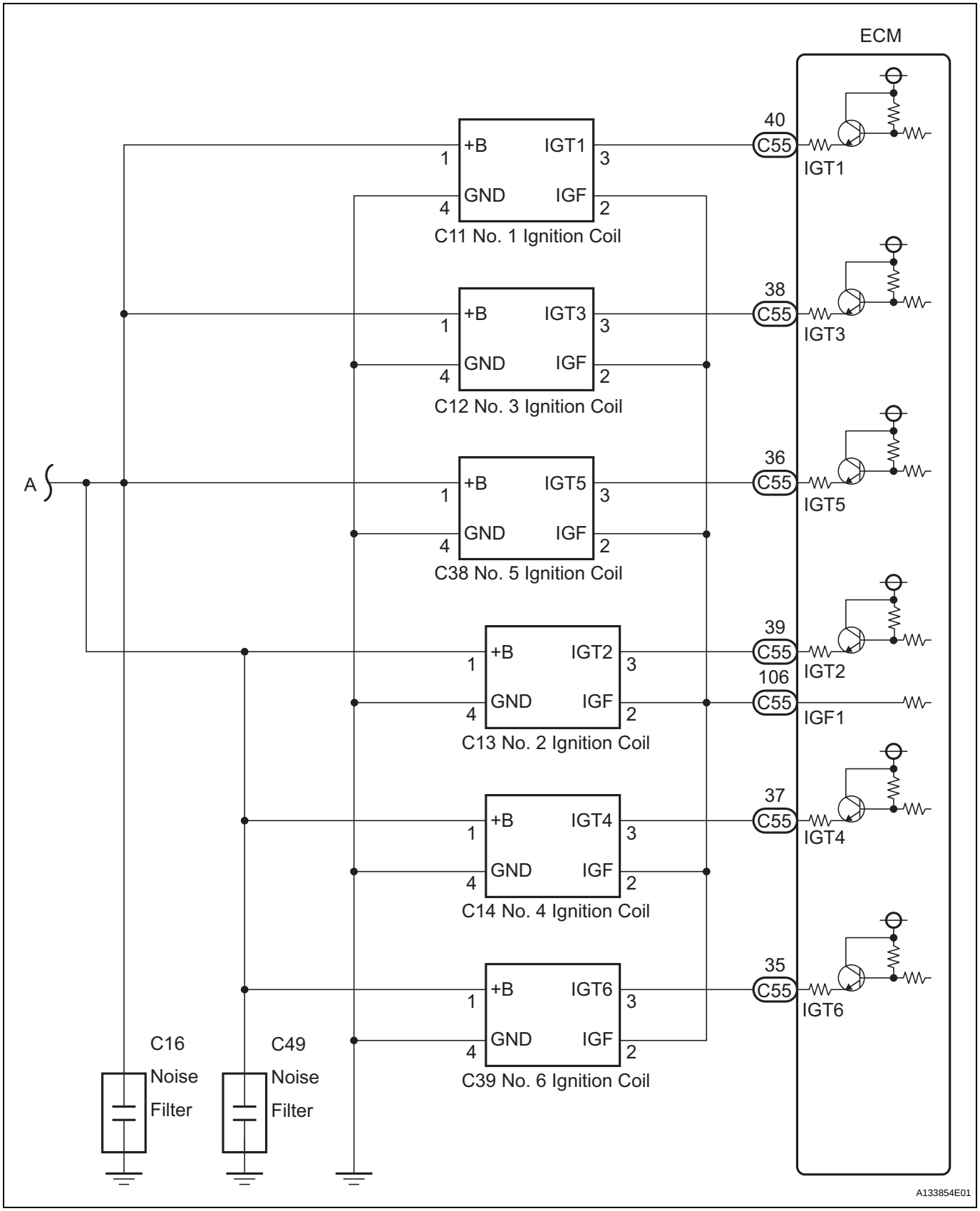
TYPICAL MALFUNCTION THRESHOLDS

Ignition signal fail count	More than 2 times
Ignition signal fail count	No ignition confirmation signal from ignitor

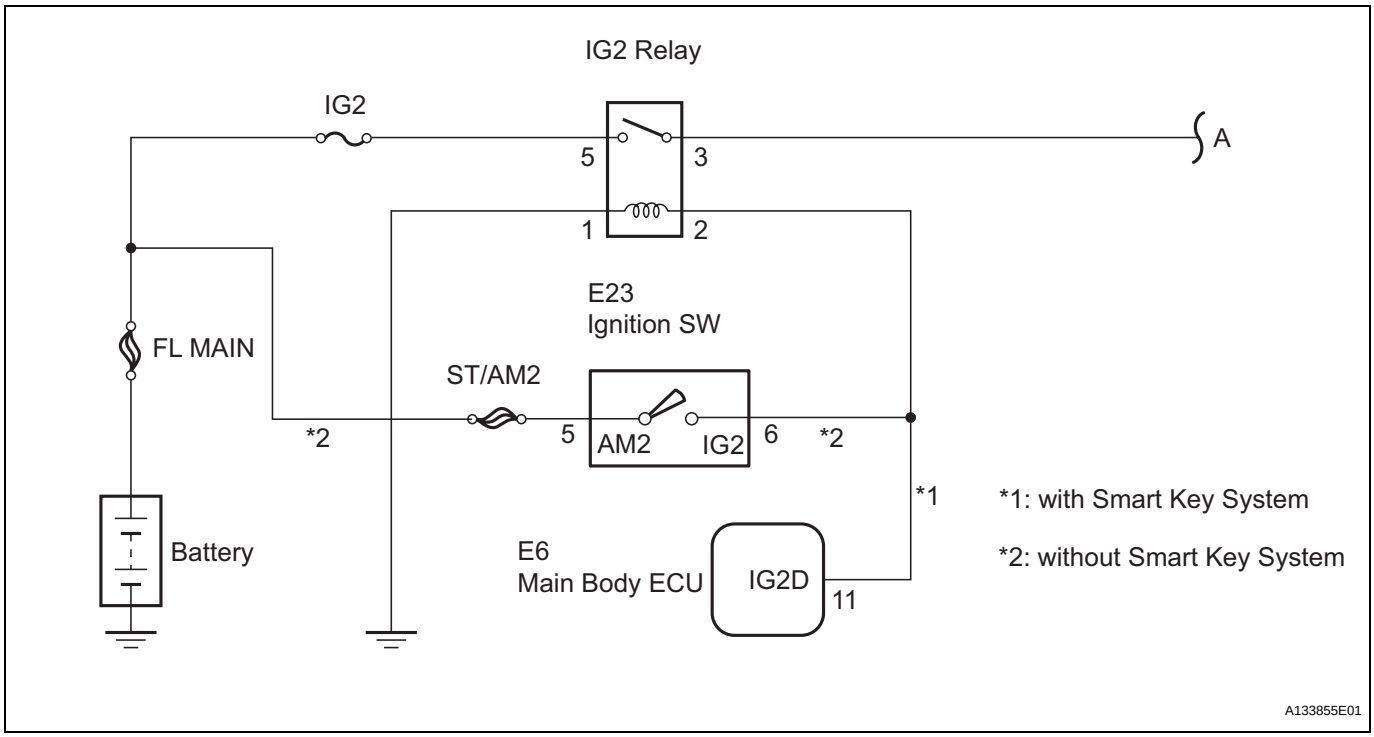
COMPONENT OPERATING RANGE

IGF signal	Igniter transmits IGF signal when it receives IGT signal from ECM

WIRING DIAGRAM



ES



ES

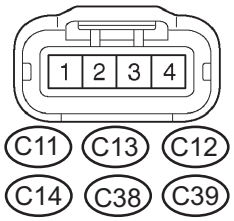
INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE)

Wire Harness Side:

Ignition Coil Connector



(a) Disconnect the C11, C13, C12, C14, C38 or C39 ignition coil connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
C11-1 - Body ground	9 to 14 V
C13-1 - Body ground	9 to 14 V
C12-1 - Body ground	9 to 14 V
C14-1 - Body ground	9 to 14 V
C38-1 - Body ground	9 to 14 V
C39-1 - Body ground	9 to 14 V

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
C11-4 - Body ground	Below 1 Ω
C13-4 - Body ground	Below 1 Ω

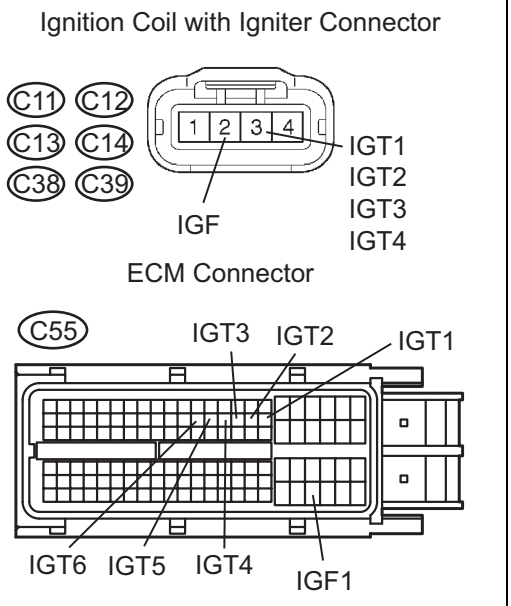
Tester Connection	Specified Condition
C12-4 - Body ground	Below 1 Ω
C14-4 - Body ground	Below 1 Ω
C38-4 - Body ground	Below 1 Ω
C39-4 - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2 CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - ECM (IGT SIGNAL TERMINAL))

Wire Harness Side Front View:



(a) Disconnect the C11, C13, C12, C14, C38 or C39 ignition coil connector.
(b) Disconnect the ECM C55 connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGT1 (C11-3) - IGT1 (C55-40)	Below 1 Ω
IGT2 (C13-3) - IGT2 (C55-39)	Below 1 Ω
IGT3 (C12-3) - IGT3 (C55-38)	Below 1 Ω
IGT4 (C14-3) - IGT4 (C55-37)	Below 1 Ω
IGT5 (C38-3) - IGT5 (C55-36)	Below 1 Ω
IGT6 (C39-3) - IGT6 (C55-35)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
IGT1 (C11-3) or IGT1 (C55-40) - Body ground	10 kΩ or higher
IGT2 (C13-3) or IGT2 (C55-39) - Body ground	10 kΩ or higher
IGT3 (C12-3) or IGT3 (C55-38) - Body ground	10 kΩ or higher
IGT4 (C14-3) or IGT4 (C55-37) - Body ground	10 kΩ or higher
IGT5 (C38-3) or IGT5 (C55-36) - Body ground	10 kΩ or higher
IGT6 (C39-3) or IGT6 (C55-35) - Body ground	10 kΩ or higher

Standard resistance (Check for open)

Tester Connection	Specified Condition
IGF (C11-2) - IGF1 (C55-106)	Below 1 Ω
IGF (C13-2) - IGF1 (C55-106)	Below 1 Ω
IGF (C12-2) - IGF1 (C55-106)	Below 1 Ω
IGF (C14-2) - IGF1 (C55-106)	Below 1 Ω
IGF (C38-2) - IGF1 (C55-106)	Below 1 Ω
IGF (C39-2) - IGF1 (C55-106)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
IGF (C11-2) or IGF1 (C55-106) - Body ground	10 kΩ or higher
IGF (C13-2) or IGF1 (C55-106) - Body ground	10 kΩ or higher
IGF (C12-2) or IGF1 (C55-106)- Body ground	10 kΩ or higher
IGF (C14-2) or IGF1 (C55-106) - Body ground	10 kΩ or higher

Tester Connection	Specified Condition
IGF (C38-2) or IGF1 (C55-106) - Body ground	10 kΩ or higher
IGF (C39-2) or IGF1 (C55-106) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 PERFORM SIMULATION TEST

(a) Clear the DTC(s) (See page ES-45).
(b) Change the arrangement of the ignition coils (with igniters).
NOTICE:
Do not change the location of the connectors.
(c) Reform a simulation test.

Result

Display (DTC Output)	Proceed to
Same DTCs (that have been erased)	A
Other DTCs	B

B → **REPLACE IGNITION COIL ASSEMBLY**

A

REPLACE ECM (See page ES-518)

DTC	P0365	Camshaft Position Sensor "B" Circuit (Bank 1)

DTC	P0367	Camshaft Position Sensor "B" Circuit Low Input (Bank 1)

DTC	P0368	Camshaft Position Sensor "B" Circuit High Input (Bank 1)

DTC	P0390	Camshaft Position Sensor "B" Circuit (Bank 2)

DTC	P0392	Camshaft Position Sensor "B" Circuit Low Input (Bank 2)

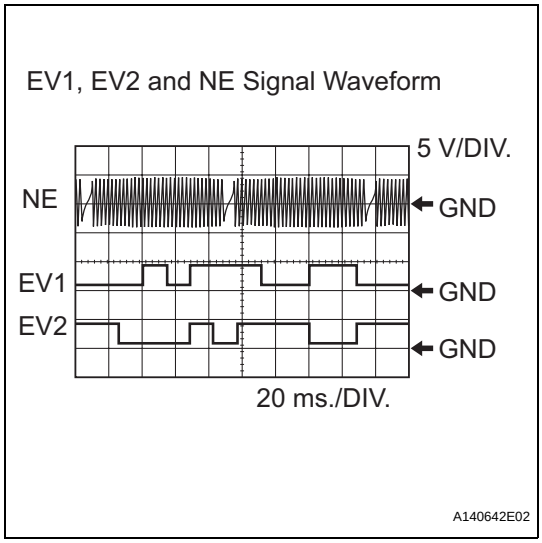
DTC	P0393	Camshaft Position Sensor "B" Circuit High Input (Bank 2)

DESCRIPTION

The exhaust camshaft's Variable Valve Timing (VVT) sensor consists of a magnet and MRE (Magneto Resistance Element).
The exhaust camshaft has a sensor plate with 3 teeth on its outer circumference.
When the exhaust camshaft rotates, changes occur in the air gaps between the 3 teeth and MRE, which affects the magnet. As a result, the resistance of the MRE material fluctuates. The VVT sensor converts the exhaust camshaft rotation data to pulse signals, uses the pulse signals to determine the camshaft angle, and sends it to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0365 P0390	• Input voltage to ECM remains 0.3 V or less, or 4.7 V or higher for more than 5 seconds, when 2 or more seconds have elapsed after turning engine switch on (IG) (1 trip detection logic) • No VVT sensor signal to ECM during cranking (1 trip detection logic)	• Open or short in VVT sensor for exhaust camshaft circuit • VVT sensor for exhaust camshaft • Exhaust camshaft • Jumped tooth of timing chain • ECM
P0367 P0392	Output voltage of VVT sensor is 0.3 V or less for 5 seconds (1 trip detection logic)	• Open or short in VVT sensor for exhaust camshaft circuit • VVT sensor for exhaust camshaft • Exhaust camshaft • Jumped tooth of timing chain • ECM
P0368 P0393	Output voltage of VVT sensor is 4.7 V or more for 5 seconds (1 trip detection logic)	• Open or short in VVT sensor for exhaust camshaft circuit • VVT sensor for exhaust camshaft • Exhaust camshaft • Jumped tooth of timing chain • ECM

Reference: Inspection using an oscilloscope



HINT:
- The correct waveform is as shown.
- EV1+ and EV2+ stand for the VVT sensor signal, and NE+ stands for the CKP sensor signal.

Item	Content
Terminal	NE+ - NE- EV1+ - EV1- EV2+ - EV2-
Equipment Setting	5 V/DIV. 20 ms./DIV.
Condition	Cranking or idling

MONITOR DESCRIPTION

If no signal is transmitted by the VVT sensor despite the engine revolving, or the rotations of the camshaft and the crankshaft are not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0365: VVT sensor (Bank 1) open/short P0365: VVT position/Crankshaft position misalignment (Bank 1) P0367: VVT position sensor (Bank 1) range check (low voltage) P0368: VVT position sensor (Bank 1) range check (high voltage) P0390: VVT sensor (Bank 2) open/short P0390: VVT position/Crankshaft position misalignment (Bank 2) P0392: VVT position sensor (Bank 2) range check (low voltage) P0393: VVT position sensor (Bank 2) range check (high voltage)
Required Sensors/Components (Main)	VVT position sensor (Bank 1 and 2)
Required Sensors/Components (Sub)	Crankshaft position sensor
Frequency of Operation	Continuous
Duration	5 seconds
MIL Operation	2 driving cycles: P0365, P0390 (cranking) Immediate: Others
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

Chattering, Low voltage, High voltage:

Starter	OFF
Engine switch	ON
Time after engine switch off to on	2 seconds or more
Battery voltage	8 V or more

P0365, P0390 (Engine running):

Engine speed	600 rpm or more
Battery voltage	8 V or more
Starter	OFF
Engine switch	ON

P0365, P0390 (Cranking):

Starter	ON
Minimum battery voltage	Less than 11 V

TYPICAL MALFUNCTION THRESHOLDS

P0365, P0390 (Chattering):

Exhaust camshaft position sensor voltage	Less than 0.3 V, or more than 4.7 V

P0367, P0392 (Low voltage):

Exhaust camshaft position sensor voltage	Less than 0.3 V

P0368, P0393 (High voltage):

Exhaust camshaft position sensor voltage	More than 4.7 V

P0365, P0390 (Engine running, Cranking):

Exhaust camshaft position signal	No signal

COMPONENT OPERATING RANGE

VVT sensor voltage	0.3 to 4.7 V

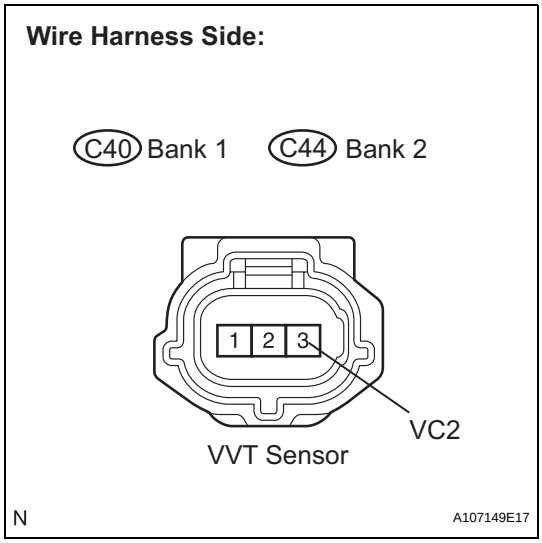
WIRING DIAGRAM

Refer to DTC P0335 (See page ES-224).

INSPECTION PROCEDURE

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK HARNESS AND CONNECTOR (SENSOR POWER SOURCE)



(a) Disconnect the C40 or C44 VVT sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

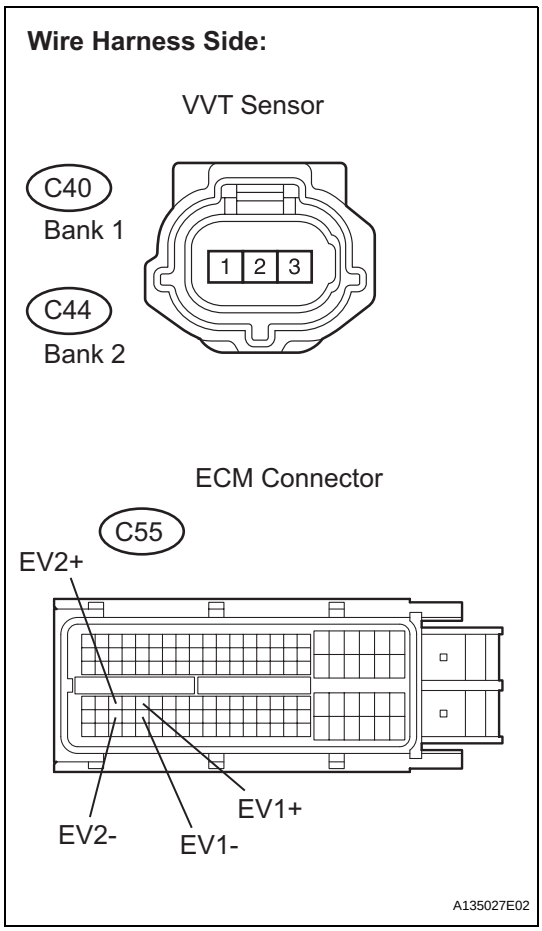
Tester Connection	Specified Condition
VC2 (C40-3) - Body ground	4.5 to 5.0 V
VC2 (C44-3) - Body ground	4.5 to 5.0 V

(c) Reconnect the VVT sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (VVT SENSOR - ECM)



(a) Disconnect the C40 or C44 VVT sensor connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
EX+ (C40-1) - EV1+ (C55-68)	Below 1 Ω
EX- (C40-2) - EV1- (C55-91)	Below 1 Ω
EX+ (C44-1) - EV2+ (C55-66)	Below 1 Ω
EX- (C44-2) - EV2- (C55-89)	Below 1 Ω

Standard resistance (Check for short)

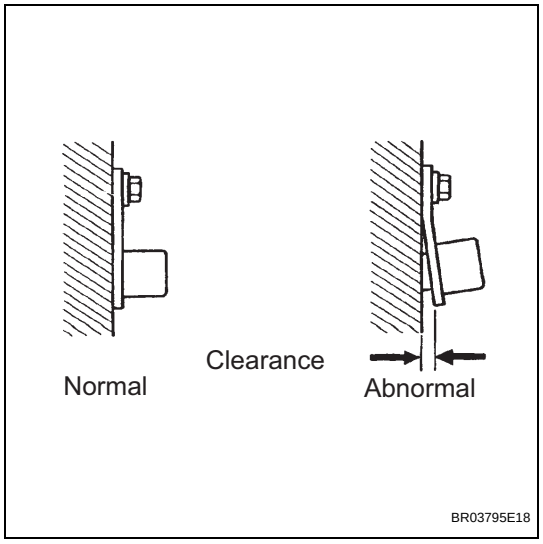
Tester Connection	Specified Condition
EX+ (C40-1) or EV1+ (C55-68) - Body ground	10 kΩ or higher
EX- (C40-2) or EV1- (C55-91) - Body ground	10 kΩ or higher
EX+ (C44-1) or EV2+ (C55-66) - Body ground	10 kΩ or higher
EX- (C44-2) or EV2- (C55-89) - Body ground	10 kΩ or higher

(d) Reconnect the VVT sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK VVT SENSOR FOR EXHAUST CAMSHAFT (SENSOR INSTALLATION)



(a) Check the VVT sensor installation condition.
OK:
Sensor is installed correctly.

NG → **REPAIR OR REPLACE VVT SENSOR**

OK

4	CHECK EXHAUST CAMSHAFT

(a) Check the teeth of the camshaft.

NG → **REPLACE EXHAUST CAMSHAFT**

OK

5	REPLACE VVT SENSOR

NEXT

6	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the intelligent tester on.
(d) Clear the DTCs (See page ES-45).
(e) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
(f) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No output	A
P0365, P0352, P0353, P0354, P0355 or P0356	B

HINT:
If the engine does not start, replace the ECM.

B → **REPLACE ECM (See page ES-518)**

A

END

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

MONITOR DESCRIPTION

The ECM uses the sensors mounted in front of and behind the Three-Way Catalytic Converter (TWC) to monitor its efficiency.

The first sensor, the Air-Fuel Ratio (A/F) sensor, sends pre-catalyst information to the ECM. The second sensor, the Heated Oxygen (HO2) sensor, sends post-catalyst information to the ECM.

In order to detect any deterioration in the TWC, the ECM calculates the Oxygen Storage Capacity (OSC) of the TWC. This calculation is based on the voltage output of the HO2 sensor while performing active air-fuel ratio control, rather than the conventional detecting method, which uses the locus ratio.

The OSC value is an indication of the oxygen storage capacity of the TWC. When the vehicle is being driven with a warm engine, active air-fuel ratio control is performed for approximately 15 to 20 seconds. When it is performed, the ECM deliberately sets the air-fuel ratio to lean or rich levels. If a rich-lean cycle of the HO2 sensor is long, the OSC becomes greater. There is a direct correlation between the OSCs of the HO2 sensor and the TWC.

The ECM uses the OSC value to determine the state of the TWC. If any deterioration has occurred, it illuminates the MIL and sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0420	OSC value is smaller than standard value under active air-fuel ratio control (2 trip detection logic)	• Gas leakage from exhaust system • A/F sensor (bank 1 sensor 1) • HO2 sensor (bank 1 sensor 2) • Exhaust manifold (TWC)
P0430	OSC value is smaller than standard value under active air-fuel ratio control (2 trip detection logic)	• Gas leakage from exhaust system • A/F sensor (bank 2 sensor 1) • HO2 sensor (bank 2 sensor 2) • Exhaust manifold (TWC)

HINT:

- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that does not include cylinder No. 1.
- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

MONITOR STRATEGY

Related DTCs	P0420: Catalyst Deterioration P0420: Catalyst Deterioration
Required Sensors/Components (Main)	TWC
Required Sensors/Components (Sub)	A/F sensor, heated oxygen sensor, intake air temperature sensor, mass air flow meter, crankshaft position sensor and engine coolant temperature sensor
Frequency of Operation	Once per driving cycle
Duration	Approximately 30 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0011, 14 (VVT System 1 - Advance) P0012, 15 (VVT System 1 - Retard) P0031, 32, 51, 52 (A/F Sensor heater - Sensor 1) P0037, 38, 58, 59 (O2 Sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136, P0156(O2 Sensor - Sensor 2) P0171, P0172, P0174, P0175 (Fuel system) P0300 - P0304 (Misfire) P0335 (CKP sensor) P0340 (CMP sensor) P0351 - P0354 (Igniter) P0500 (VSS) P2196, P2198 (A/F Sensor - rationality) P2A00, P2A03 (A/F Sensor - slow response)
Battery voltage	11 V or more
IAT	-10°C (14°F) or more
ECT	70 kPa (525 mmHg) or more
Atmospheric pressure	-
Idle	OFF
Engine RPM	Less than 3,200 rpm
A/F sensor	Activated
Fuel system status	Closed loop
Engine load	10 to 70 %
All of the following conditions 1, 2 and 3 are met:	-
1. MAF	5 to 25 g/sec.
2. Front catalyst temperature (estimated)	600 to 750°C (1,112 to 1,382°F)
3. Rear catalyst temperature (estimated)	100 to 900°C (212 to 1,652°F)
EVAP system monitor	The monitor has not run yet or the vacuum introduction has been completed.
A/F sensor monitor	Completed
Rear HO2S monitor	Completed
Shift position	4th or higher

TYPICAL MALFUNCTION THRESHOLDS

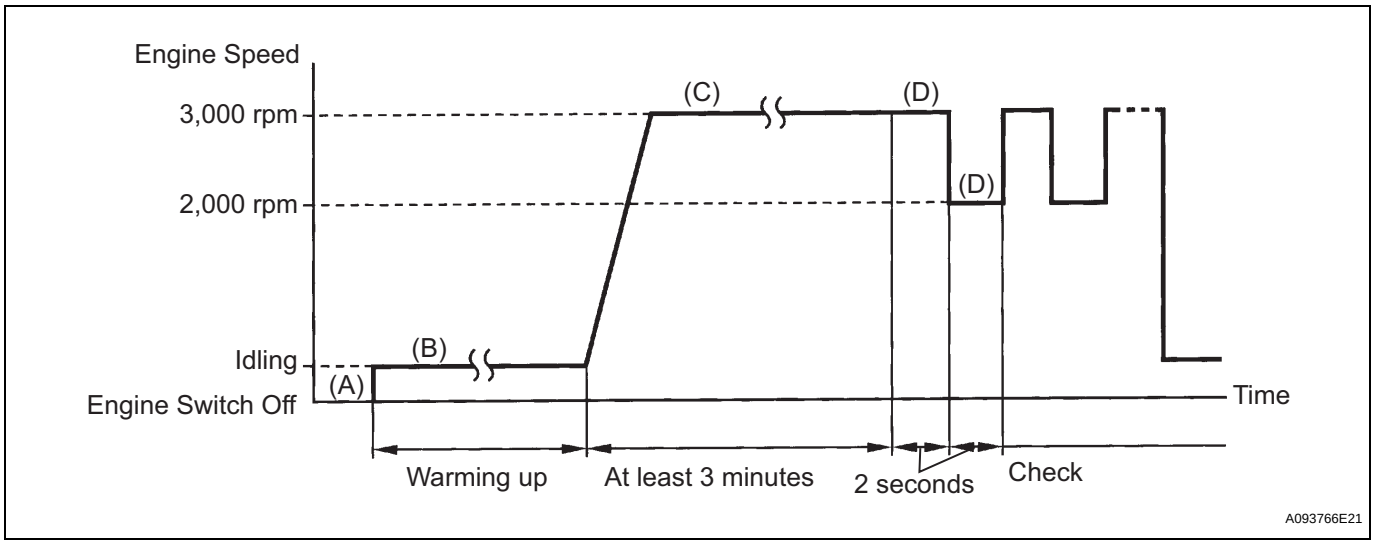
OSC (Oxygen Storage Capacity) of Catalyst	Less than 0.046 g

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

CONDITIONING FOR SENSOR TESTING

Perform the operation with the engine speeds and time durations described below prior to checking the waveforms of the A/F and HO2 sensors. This is performed in order to heat the sensors sufficiently to obtain the appropriate inspection results.

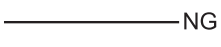
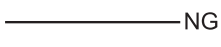


ES

1. Connect the intelligent tester to the DLC3 (Procedure "A").
2. Start the engine and warm it up with all the accessories switched OFF, until the engine coolant temperature stabilizes (Procedure "B").
3. Run the engine at an engine speed of between 2,500 rpm and 3,000 rpm for at least 3 minutes (Procedure "C").
4. While running the engine at 3,000 rpm for 2 seconds and 2,000 rpm for 2 seconds, check the waveforms of the A/F and HO2 sensors using the tester or scan tool (Procedure "D").

NOTICE:

The Air-Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the output voltages of both the A/F and HO2 sensors.
- To display the graph, enter the following menus on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2 or AFS B2 S1 and O2S B2 S2, and press the YES button and then the ENTER button followed by the F4 button.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0420 AND/OR P0430)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0420 and/or P0430	A
P0420 and/or P0430 and other DTCs	B

HINT:
If any DTCs other than P0420 or P0430 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART (See page ES-63)

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (A/F CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester on.
(c) Warm up the engine at a engine speed of 2,500 rpm for approximately 90 seconds.
(d) On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
(e) Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume.)
(f) Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2 or AFS B2 S1 and O2S B2 S2) displayed on the tester.
HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.

- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Tester Display (Sensor)	Injection Volume	Status	Voltage
AFS B1 S1 or AFS B2 S1 (A/F)	+25 %	Rich	Less than 3.0 V
AFS B1 S1 or AFS B2 S1 (A/F)	-12.5 %	Lean	More than 3.35 V
O2S B1 S2 or O2S B2 S2 (HO2)	+25 %	Rich	More than 0.55 V
O2S B1 S2 or O2S B2 S2 (HO2)	-12.5 %	Lean	Less than 0.4 V

Result

Status AFS B1 S1 or AFS B2 S1	Status O2S B1 S2 or O2S B2 S2	A/F Condition and A/F and HO2 Sensor Conditions	Misfire	Main Suspected Trouble Areas	Proceed to
Lean/Rich	Lean/Rich	Normal	-	• Three-Way Catalytic Converter (TWC) • Gas leakage from exhaust system	A
Lean	Lean/Rich	A/F sensor malfunction	-	• A/F sensor	B
Rich	Lean/Rich	A/F sensor malfunction	May occur	• A/F sensor	B
Lean/Rich	Lean	HO2 sensor malfunction	-	• HO2 sensor • Gas leakage from exhaust system	C
Lean/Rich	Rich	HO2 sensor malfunction	-	• HO2 sensor • Gas leakage from exhaust system	C
Lean	Lean	Actual air-fuel ratio lean	May occur	• Extremely rich or lean actual air-fuel ratio • Gas leakage from exhaust system	A
Rich	Rich	Actual air-fuel ratio lean	-	• Extremely rich or lean actual air-fuel ratio • Gas leakage from exhaust system	A

Lean:

During A/F CONTROL, the A/F sensor (AFS) output voltage is consistently more than 3.35 V, and the HO2 sensor output voltage (O2S) is consistently less than 0.4 V.

Rich:

During A/F CONTROL, the AFS is consistently less than 3.0 V, and the O2S is consistently more than 0.55 V.

Lean/Rich:

During A/F CONTROL of the ACTIVE TEST, the output voltage of the HO2 sensor alternates correctly.

B → **CHECK AND REPLACE AIR FUEL RATIO SENSOR**

C → CHECK AND REPLACE HEATED OXYGEN SENSOR, AND CHECK AND REPAIR EXHAUST GAS LEAKAGE

A

3	CHECK FOR EXHAUST GAS LEAKAGE

OK:
No gas leakage.

NG → REPAIR OR REPLACE EXHAUST GAS LEAKAGE POINT

OK

REPLACE THREE-WAY CATALYTIC CONVERTER

DTC	P043E	Evaporative Emission System Reference Orifice Clog Up

DTC	P043F	Evaporative Emission System Reference Orifice High Flow

DTC	P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low

DTC	P2402	Evaporative Emission System Leak Detection Pump Control Circuit High

DTC	P2419	Evaporative Emission System Switching Valve Control Circuit Low

DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P043E	0.02 inch orifice clogged	P043E, P043F, P2401, P2402, P2419 are present when one of the following conditions is met during key-off EVAP monitor • Reference orifice clogged • Reference orifice high-flow • Leak detection pump OFF malfunction • Leak detection pump ON malfunction • Vent valve ON (close) malfunction	• Pump module • Connector/wire harness (Pump module - ECM) • ECM	While ignition switch OFF	2 trip
P043F	0.02 inch orifice high-flow				
P2401	Vacuum pump stuck OFF				
P2402	Vacuum pump stuck ON				
P2419	Vent valve stuck open (vent)				

HINT:
The 0.02 inch orifice is located inside the pump module.

DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System (See page ES-400).

INSPECTION PROCEDURE

Refer to the EVAP System (See page ES-400).

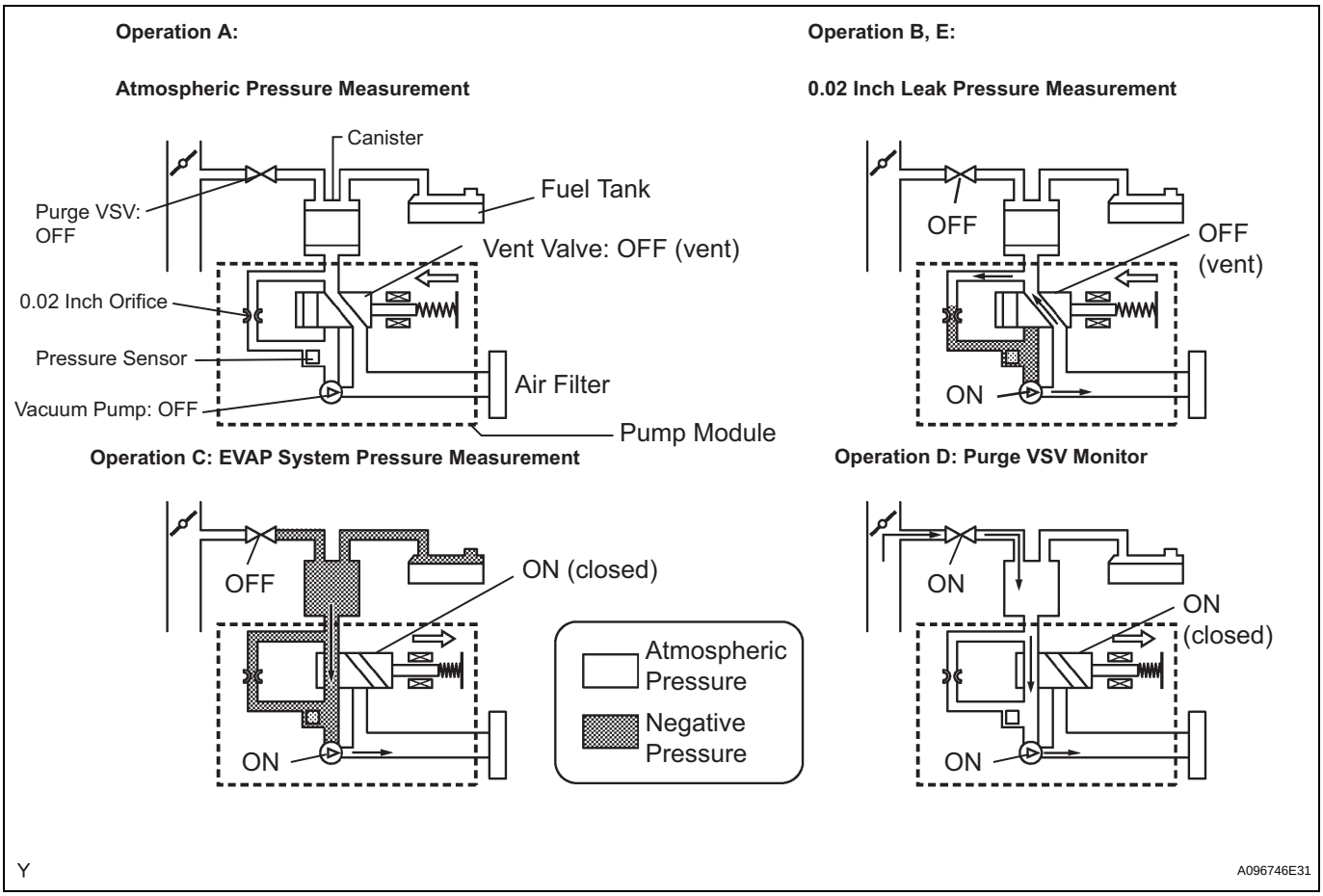
MONITOR DESCRIPTION

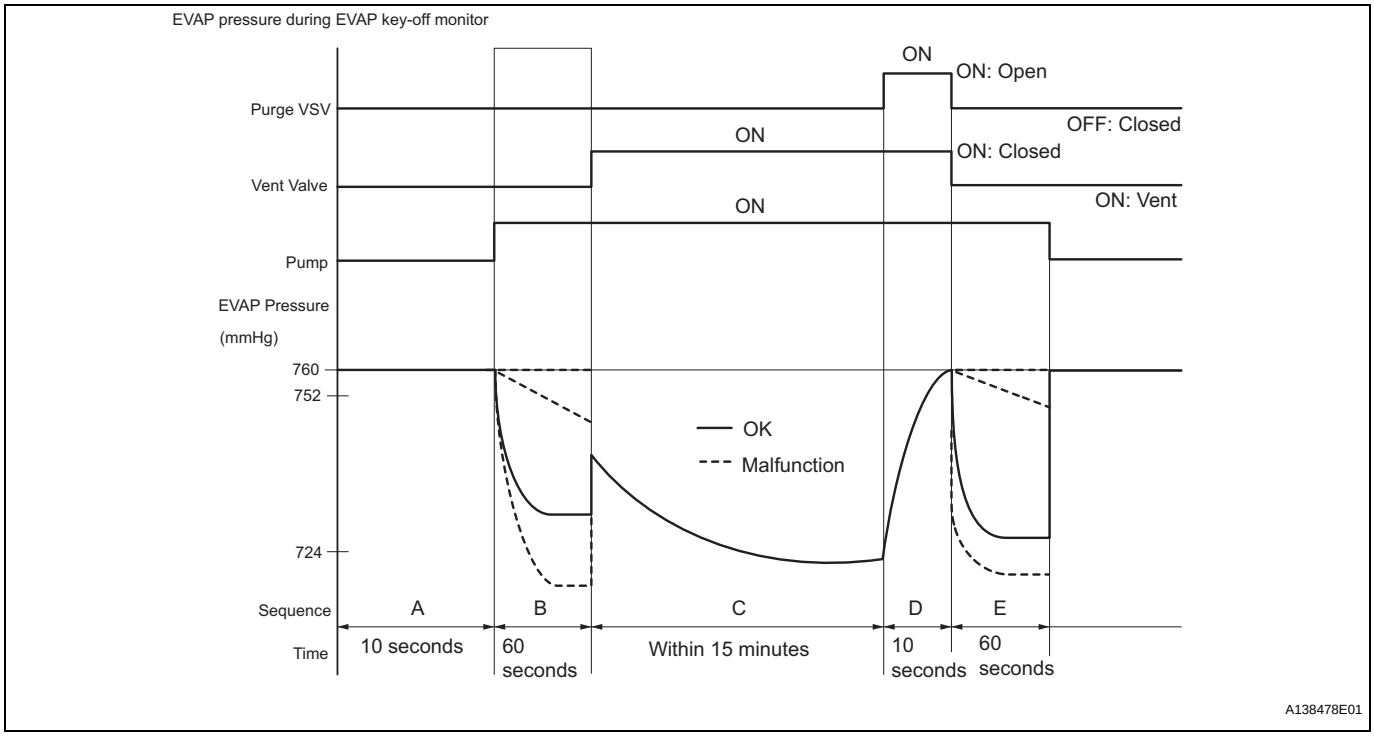
5 hours*1 after the ignition switch is turned off, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.
HINT:
*1: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned off.	-

Sequence	Operations	Descriptions	Duration
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) is created in EVAP system, and EVAP system pressure then measured. Write down measured value as it will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*2
D	Purge VSV monitor	Purge VSV is opened and then EVAP system pressure is measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	After second 0.02 inch leak pressure measurement, leak check is performed by comparing first and second 0.02 inch leak pressure standards. If stabilized system pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure is measured and then monitoring result is recorded by ECM.	-

*2: If there is only a small amount of fuel in the fuel tank, stabilizing the EVAP pressure takes longer than usual.





The leak detection pump creates negative pressure through the reference orifice. When the system is normal, the EVAP pressure is in 724 to 752 mmHg* and saturated within a minute.
If not, the ECM interprets this as a malfunction. The ECM will illuminate the MIL and set DTC if this malfunction is detected in consecutive drive cycle.

*: Typical valve

MONITOR STRATEGY

Related DTCs	P043E: 0.02 inch orifice clog (built-in pump module) P043F: 0.02 inch orifice high-flow (built-in pump module) P2401: Vacuum pump stuck OFF P2402: Vacuum pump stuck ON P2419: Vent valve stuck open (vent)
Required Sensors / Components	Pump module
Frequency of Operation	Once per driving cycle
Duration	Within 2 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	None
EVAP key-off monitor is run when all of the following conditions are met	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Ignition switch	OFF
Time after key-off	5 or 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0451, P0452, P0453)	Not detected
EVAP canister purge valve	Not operated by scan tool

EVAP canister vent valve	Not operated by scan tool
EVAP leak detection pump	Not operated by scan tool
Both of the following conditions 1 and 2 are met before key-off	Conditions 1 and 2
1. Duration that vehicle driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met:	-
Atmospheric pressure measurement	Less than 0.3 kPa (2.25 mmHg) in 1 second

2. First reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure just after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.384 to -7.929 mmHg)
3. Reference pressure	Saturated within 1 minute

3. EVAP canister vent valve close stuck check

Next sequence is run if the following condition is met:	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction

Next sequence is run if the following condition is met:	-
Vacuum introduction time	Saturated within 15 minutes

5. EVAP canister purge valve close stuck check

Next sequence is run if the following condition is met:	-
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of the following conditions are met:	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.384 to -7.929 mmHg)
3. Reference pressure	Saturated
4. Difference between first reference pressure and second reference pressure	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if the following condition is met	-
EVAP pressure when vacuum introduction was complete	Lower than second reference pressure

8. Atmospheric pressure measurement

EVAP monitor is complete if the following condition is met:	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa (2.25 mmHg)

TYPICAL MALFUNCTION THRESHOLDS

One of following conditions met	-

EVAP pressure just after reference pressure measurement start	More than -1 kPa (-7.5 mmHg)
Reference pressure	Less than -4.85 kPa (-36.384 mmHg)
Reference pressure	-1.057 kPa (-7.929 mmHg) or more
Reference pressure	Not saturated
Difference between first reference pressure and second reference pressure	0.7 kPa (5.25 mmHg) or more

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC SUMMARY

DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P0441	EVAP VSV (Vacuum Switching Valve) stuck open	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard measured at start and at end of leak check. If stabilized pressure higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that EVAP VSV stuck open	• EVAP VSV • Connector/wire harness (EVAP VSV - ECM) • ECM • Pump module • Leakage from EVAP system	While engine switch off	2 trip
P0441	EVAP VSV stuck closed	After EVAP leak check performed, EVAP VSV turned ON (open), and atmospheric air introduced into EVAP system. 0.02 inch leak pressure standard measured at start and at end of the check. If pressure does not return to near atmospheric pressure, ECM determines that purge valve stuck closed	• EVAP VSV • Connector/wire harness (EVAP VSV - ECM) • ECM • Pump module • Leakage from EVAP system	While engine switch off	2 trip
P0441	Purge flow	While engine running, following conditions are successively met: • Negative pressure not created in EVAP system when EVAP VSV turned ON (open) • EVAP system pressure change less than 0.5 kPa (3.75 mmHg) when vent valve turned ON (closed) • Atmospheric pressure change before and after purge flow monitor less than 0.1 kPa (0.75 mmHg)	• EVAP VSV • Connector/wire harness (EVAP VSV - ECM) • Leakage from EVAP line (EVAP VSV - Intake manifold) • ECM	While engine running	2 trip

DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System (See page ES-400).

INSPECTION PROCEDURE

Refer to the EVAP System (See page ES-400).

MONITOR DESCRIPTION

The two monitors, Key-off and Purge Flow, are used to detect malfunctions relating to DTC P0441. The key-off monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours* after the engine switch is turned off. The purge flow monitor runs while the engine is running.

1. KEY-OFF MONITOR

5 hours* after the engine switch is turned off, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

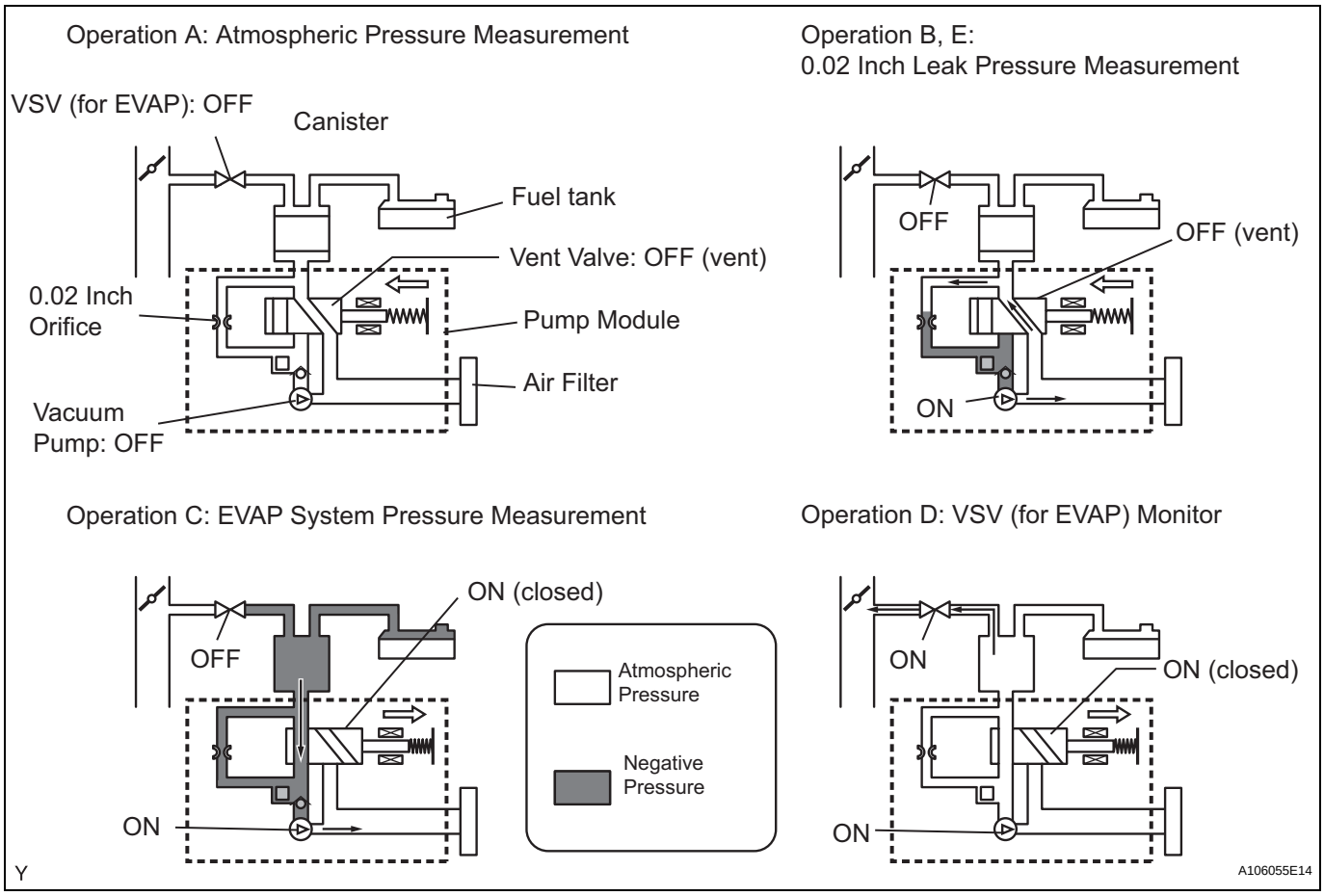
HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the engine switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the engine switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operation	Description	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after engine switch turned off.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as they will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 seconds*
D	EVAP VSV monitor	EVAP VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	After second 0.02 inch leak pressure measurement, leak check performed by comparing first and second 0.02 inch leak pressure standards. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

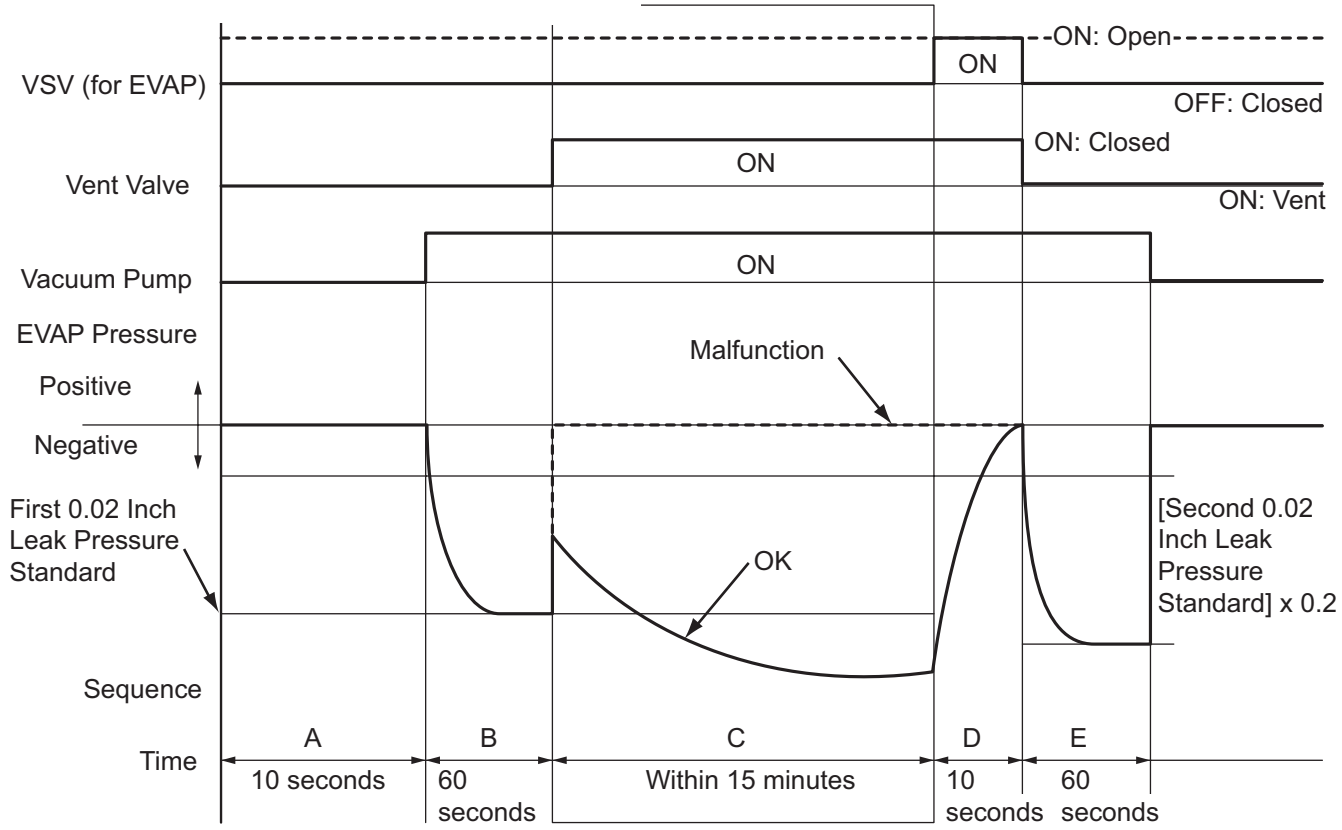
HINT:

*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.


Operation A: Atmospheric Pressure Measurement
VSV (for EVAP): OFF
Canister
Fuel tank
Vent Valve: OFF (vent)
0.02 Inch Orifice
Pump Module
Air Filter
Vacuum Pump: OFF
Operation B, E: 0.02 Inch Leak Pressure Measurement
OFF
OFF (vent)
ON
Operation C: EVAP System Pressure Measurement
ON (closed)
OFF
ON
Atmospheric Pressure
Negative Pressure
Operation D: VSV (for EVAP) Monitor
ON
ON (closed)
ON
A106055E14

(a) EVAP VSV stuck open
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The EVAP system pressure is then measured by the ECM using the pressure sensor. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2], the ECM interprets this as the EVAP VSV (Vacuum Switching Valve) being stuck open. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when VSV (for EVAP) Stuck Open:



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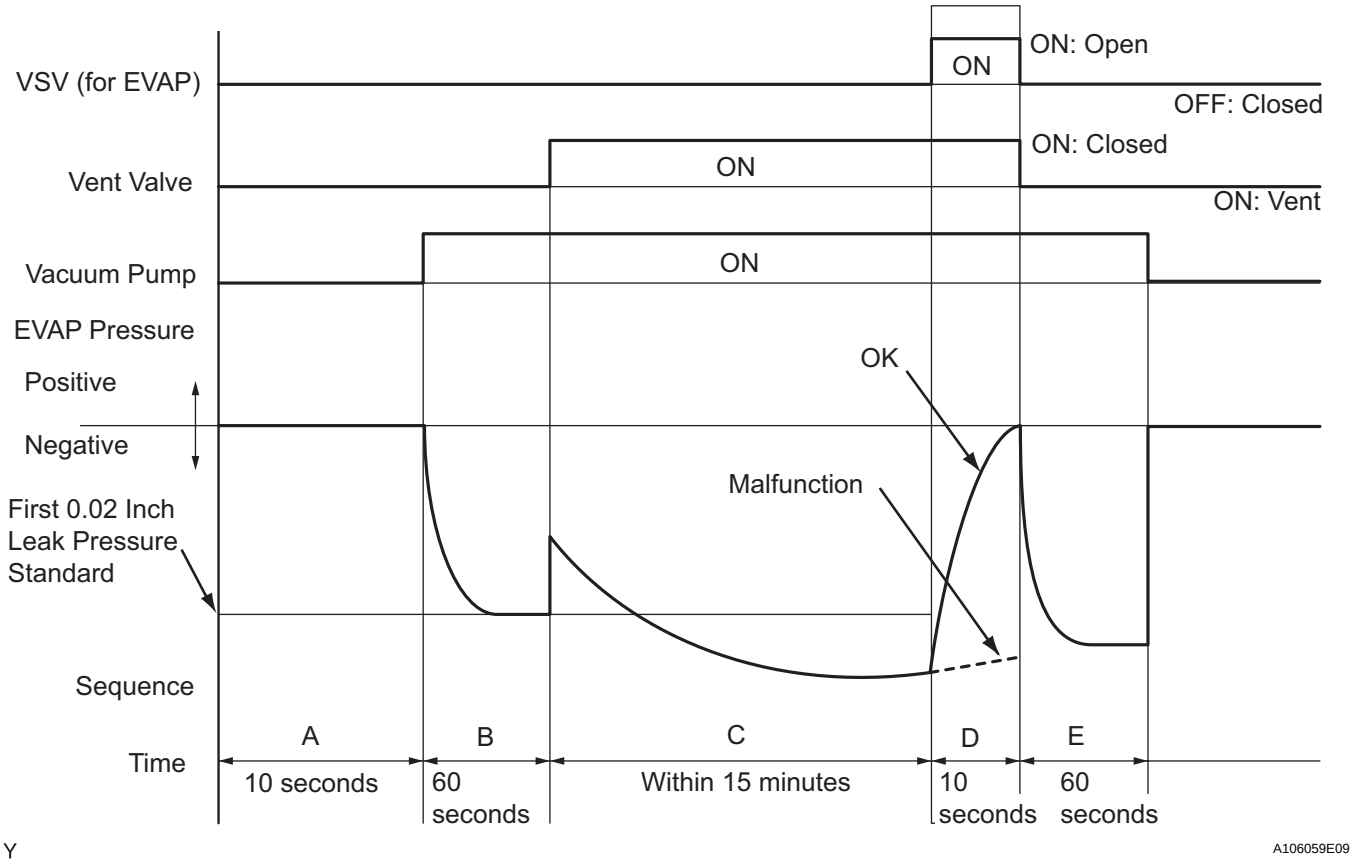
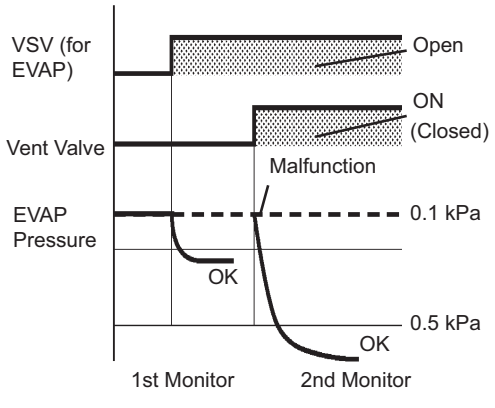
(b) EVAP VSV stuck closed
In operation D, the pressure sensor measures the EVAP (Evaporative Emission) system pressure. The pressure measurement for EVAP VSV monitor is begun when the EVAP VSV is turned ON (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa (2.25 mmHg) or more, the EVAP VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the EVAP VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when VSV (for EVAP) Stuck Closed:



EVAP Pressure During Purge Flow Monitor:



2. PURGE FLOW MONITOR

The purge flow monitor consists of the two step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the EVAP VSV (vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM interprets this as the EVAP VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressure, before and after conduction of the purge flow monitor, is measured by the ECM.

OBD II MONITOR SPECIFICATIONS

1. Key-off Monitor

Monitor Strategy:

Required Sensors/Components	EVAP VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions:

EVAP key-off monitor runs when all of following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Engine switch	OFF
Time after key off	5, 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0451, P0452 and/or P0453)	Not detected
EVAP VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of following conditions are met before key off:	Conditions 1 and 2
1. Duration that vehicle is being driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

(a) Key-off monitor sequence 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition is met:	-
Atmospheric pressure change	Less than 0.3 kPa (2.25 mmHg) for 1 second

2. First reference pressure

Next sequence is run if all of following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure when 4 seconds. after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.05 kPa (-36.38 to -7.87 mmHg)
3. Reference pressure	Saturated within 1 minute

3. Vent valve stuck closed check

Next sequence is run if following condition is met:	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction and leak

Next sequence is run if both of following condition is met:	-
Vacuum introduction time	15 minutes or less

5. EVAP VSV stuck closed check

Next sequence is run if following condition is met:	-

EVAP pressure change after purge VSV ON	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions are met:	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.05 kPa (-36.38 to -7.87 mmHg)
3. Reference pressure	Saturated within 1 minute
4. Reference pressure difference between first and second	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if following condition is met:	-
EVAP pressure when vacuum introduction was complete	Less than second reference pressure

8. Atmospheric pressure

Monitor is complete	-
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

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Typical Malfunction Thresholds:

One of the following conditions is met:	-
(a) EVAP VSV stuck open	-
EVAP pressure when vacuum introduction is complete	Higher than reference pressure x 0.2
(b) EVAP VSV stuck closed	-
EVAP pressure change after EVAP canister purge valve is open	Less than 0.3 kPa (2.25 mmHg)

2. Purge Flow Monitor

Monitor Strategy:

Required Sensors/Components	EVAP VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

Typical Enabling Conditions:

Monitor runs whenever these DTCs are not present	-
Engine	Running
ECT	4.4°C (40°F) or more
IAT	4.4°C (40°F) or more
EVAP pressure sensor malfunction	Not detected
EVAP VSV	Not operated by scan tool
EVAP system check	Not detected by scan tool
Battery voltage	10 V or more
Purge duty cycle	8 % or more

Typical Malfunction Thresholds:

Both of following conditions are met:	Condition 1 or 2
1. EVAP pressure change when purge operation is started	Less than 0.1 kPa (0.75 mmHg)
2. EVAP pressure change during purge operation when vent valve is closed	Less than 0.5 kPa (3.75 mmHg)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

DTC	P0450	Evaporative Emission Control System Pressure Sensor / Switch

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range / Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor / Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor / Switch High Input

DTC SUMMARY

DTC No.	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection logic
P0450	Pressure sensor voltage abnormal fluctuation	Sensor output voltage rapidly fluctuates beyond upper and lower malfunction thresholds for 0.5 seconds.	• Pump module • ECM	• EVAP monitoring (engine switch off) • Engine switch on	1 trip
P0451	Pressure sensor noising	Sensor output voltage fluctuates frequently in a certain time period.	• Pump module • Connector / wire harness (Pump module - ECM) • ECM	• EVAP monitoring (engine switch off) • Engine switch running	2 trip
P0451	Pressure sensor stuck	Sensor output voltage does not vary in a certain time period.	• Pump module • Connector / wire harness (Pump module - ECM) • ECM	• EVAP monitoring (engine switch off)	2 trip
P0452	Pressure sensor voltage low	Sensor output voltage less than 0.45 V for 0.5 seconds.	• Pump module • Connector / wire harness (Pump module - ECM) • ECM	• EVAP monitoring (engine switch off) • Engine switch on	1 trip
P0453	Pressure sensor voltage high	Sensor output voltage more than 4.9V for 0.5 seconds.	• Pump module • Connector / wire harness (Pump module - ECM) • ECM	• EVAP monitoring (engine switch off) • Engine switch on	1 trip

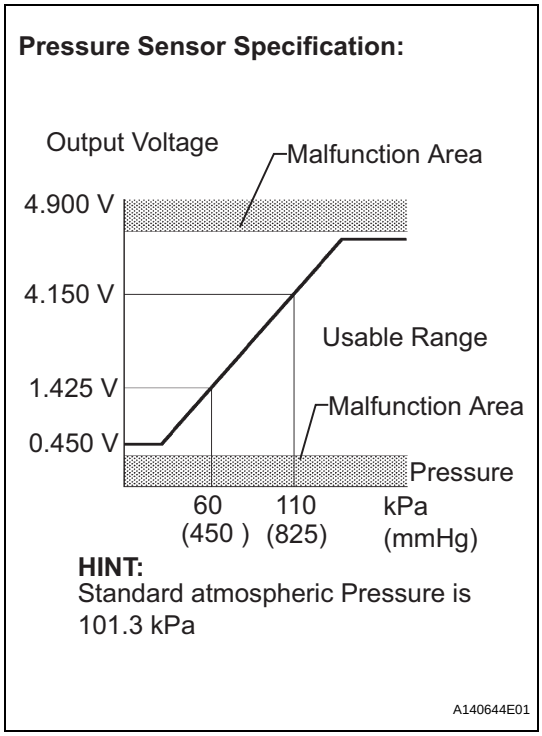
HINT:
The pressure sensor is built into the pump module.

DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System (See page ES-400).

MONITOR DESCRIPTION

1. DTC P0450: Pressure sensor voltage abnormal fluctuation
   If the pressure sensor output voltage rapidly fluctuates between less than 0.45 V and more than 4.9 V, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP (Evaporative Emission) system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).



2. DTC P0451: Pressure sensor noising or stuck
   If the pressure sensor output voltage fluctuates rapidly for 10 seconds, the ECM stops the EVAP system monitor. The ECM interprets this as noise from the pressure sensor, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.
   Alternatively, if the sensor output voltage does not change for 10 seconds, the ECM interprets this as the sensor being stuck, and stops the monitor. The ECM then illuminates the MIL and sets the DTC. (Both the malfunctions are detected by 2 trip detection logic).
3. DTC P0452: Pressure sensor voltage low
   If the pressure sensor output voltage is below 0.45 V, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).
4. DTC P0453: Pressure sensor voltage high
   If the pressure sensor voltage output is 4.9 V or more, the ECM interprets this as an open or short circuit malfunction in the pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0450: Pressure sensor chattering P0451: Pressure sensor noise P0451: Pressure sensor stuck P0452: Pressure sensor low voltage P0453: Pressure sensor high voltage
Required Sensors/Components	Pump module
Frequency of Operation	Once per driving cycle: P0451 sensor stuck Continuous: P0451 sensor noising, P0450, P0452 and P0453
Duration	0.5 seconds: P0450, P0452, P0453 Within 15 seconds: P0451

MIL Operation	Immediate: P0450, P0452, P0453 2 driving cycles: P0451
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P0450, P0452 and P0453 (Pressure sensor chattering, low voltage, high voltage):

Monitor runs whenever following DTCs are not present:	None
Battery voltage	8 V or more
Starter	OFF
Engine switch	ON

P0451 (Pressure sensor noise):

Atmospheric pressure	70 kPa (525 mmHg) to 110 kPa (825 mmHg)
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Either of following conditions is met:	1 or 2
1. Engine	Running
2. Time after key off	5, 7 or 9.5 hours

P0451 (Pressure sensor stuck):

Atmospheric pressure	Less than 70 kPa (525 mmHg), or 110 kPa (825 mmHg) or more
Battery voltage	10.5 V or more
Intake air temperature	4.4 to 35°C (40 to 95°F)
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected
Time after key off	5, 7 or 9.5 hours

TYPICAL MALFUNCTION THRESHOLDS

P0450: Pressure sensor chattering

EVAP Pressure	Less than 42.11 kPa (315.82 mmHg), or more than 123.761 kPa (928.207 mmHg)

P0451: Pressure sensor noise

Frequency that EVAP pressure change is 0.3 kPa or more	10 times or more in 10 seconds

P0451: Pressure sensor stuck

EVAP pressure change during reference pressure	Less than 0.65 kPa (4.87 mmHg)

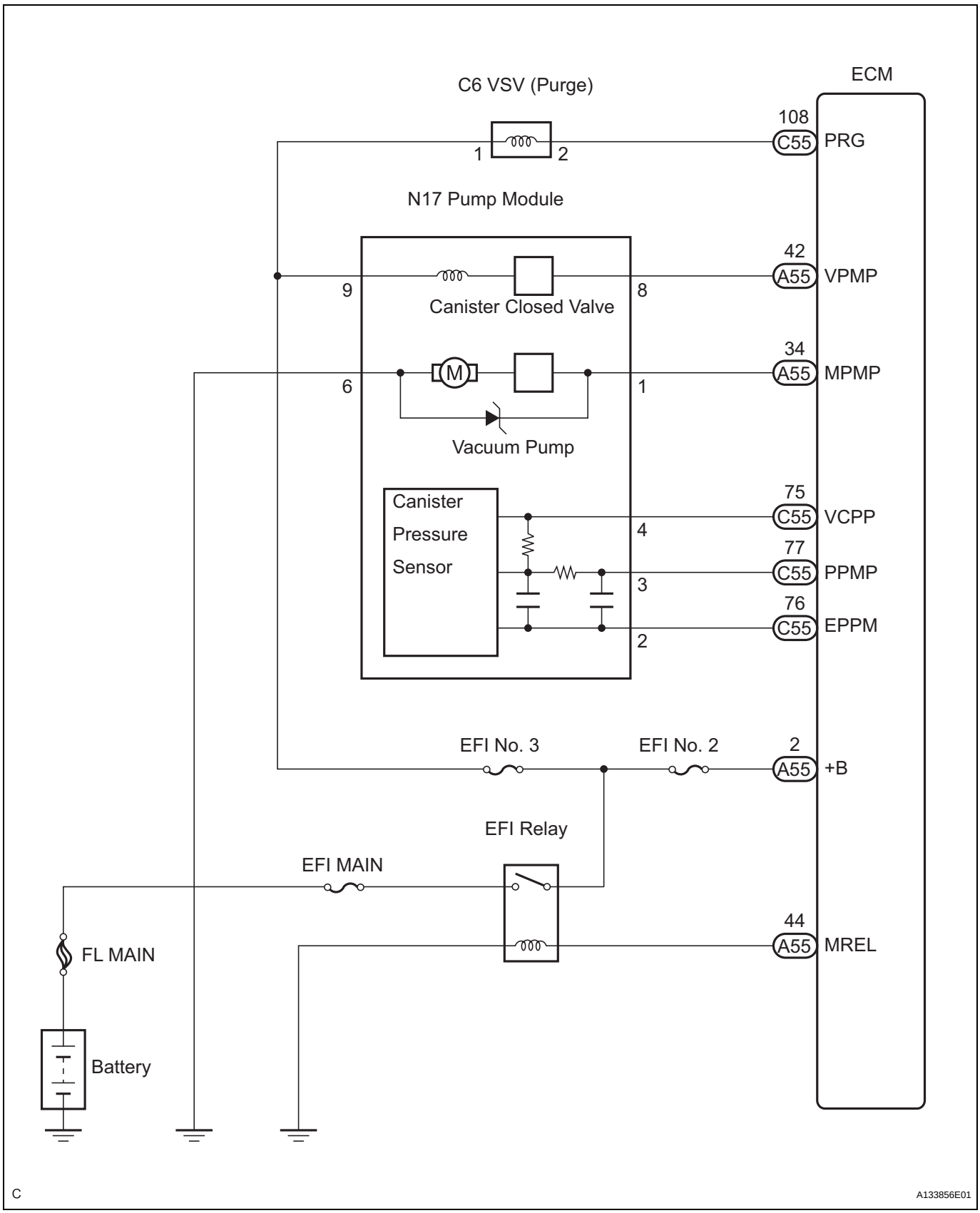
P0452: Pressure sensor low voltage

EVAP Pressure	Less than 42.11 kPa (315.82 mmHg)

P0453: Pressure sensor high voltage

EVAP Pressure	More than 123.761 kPa (928.207 mmHg)

WIRING DIAGRAM

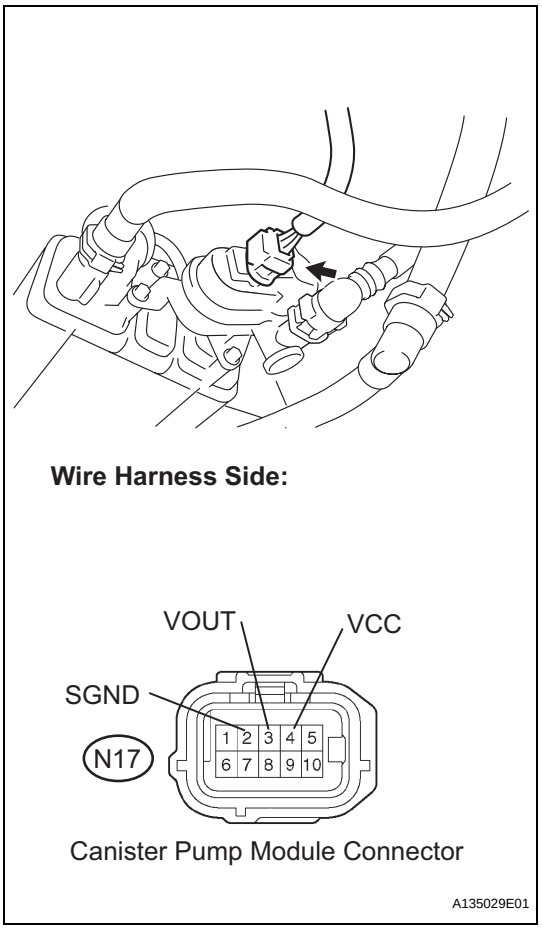


INSPECTION PROCEDURE

NOTICE:

- **When a vehicle is brought into a workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel tank cap.**
- **Do not disassemble the pump module.**
- **The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.**

1 CHECK HARNESS AND CONNECTOR (PUMP MODULE - ECM)



(a) Disconnect the N17 canister connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
N17-4 - Body ground	4.5 to 5.0 V
N17-3 - Body ground	4.5 to 5.0 V
N17-2 - Body ground	100 Ω or less

Result

Test Result	Suspected Trouble Area	Proceed to
Voltage and resistance within standard ranges	Open in pressure sensor circuit	A
Voltage and resistance outside standard ranges	Open in wire harness/ connector (ECM - pressure sensor)	B

(d) Reconnect the canister connector.

B → **Go to step 3**

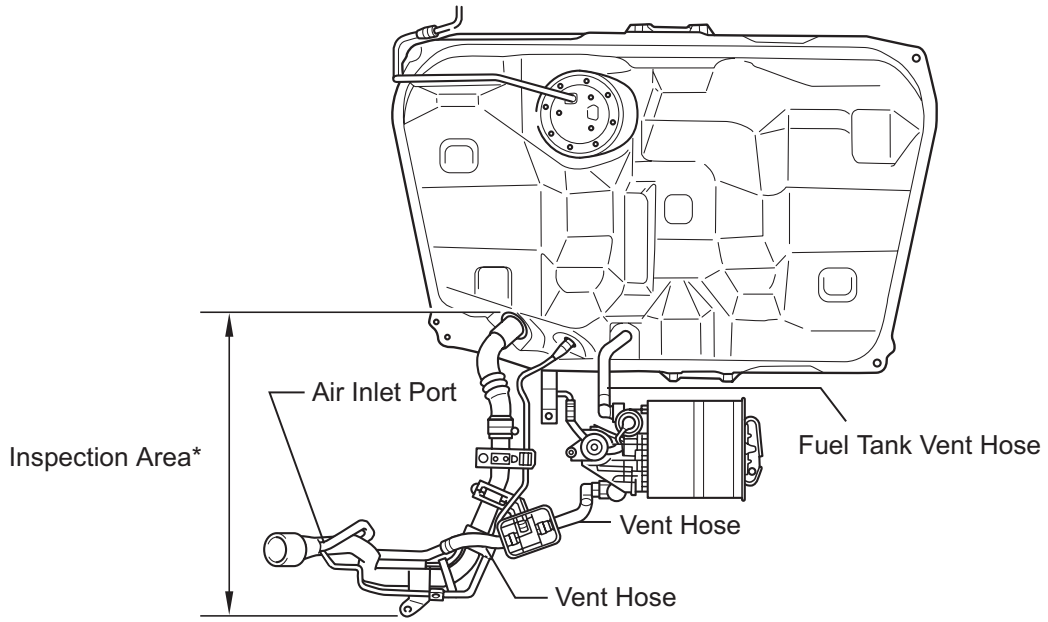
A

2 REPLACE CHARCOAL CANISTER ASSEMBLY

(a) Replace the canister assembly (See page EC-9).

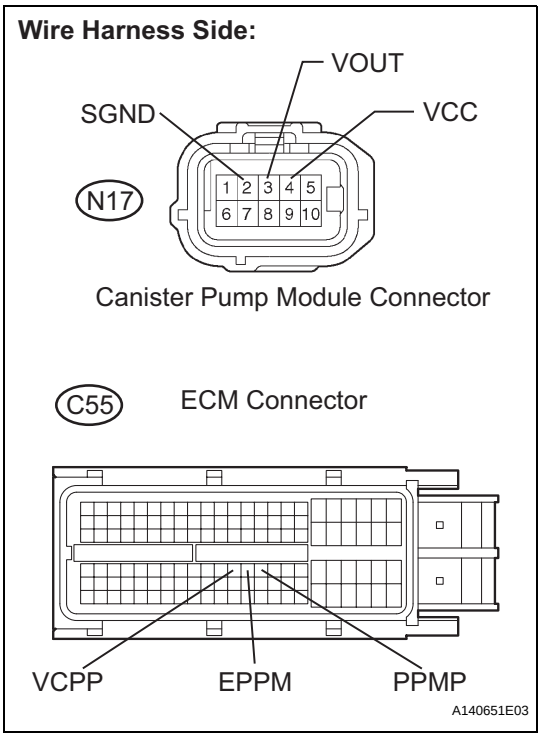
NOTICE:

When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.



NEXT	Go to step 5

3 CHECK HARNESS AND CONNECTOR



(a) Disconnect the N17 canister pump module connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance between the terminals of the wire harness side connectors.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N17-4 (VCC) - C55-75 (VCPP)	Below 1 Ω
N17-3 (VOUT) - C55-77 (PPMP)	Below 1 Ω
N17-2 (SGND) - C55-76 (EPPM)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
N17-4 (VCC) or C55-75 (VCPP) - Body ground	10 kΩ or higher
N17-3 (VOUT) or C55-77 (PPMP) - Body ground	10 kΩ or higher
N17-2 (SGND) or C55-76 (EPPM) - Body ground	10 kΩ or higher

(d) Reconnect the canister pump module connector.
(e) Reconnect the ECM connector.

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	REPLACE ECM

(a) Replace the ECM (See page ES-518).

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) (do not start the engine).
(c) Turn the tester on.
(d) Wait for at least 60 seconds.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTCs are displayed on the tester, the repair has been successfully completed.

NEXT

COMPLETED

DTC	P0455	Evaporative Emission Control System Leak Detected (Gross Leak)

DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

DTC SUMMARY

DTC No.	Monitoring Item	Malfunction Detection Condition	Trouble Area	Detection Timing	Detection logic
P0455	EVAP gross leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard measured at start and at end of leak check. If stabilized pressure higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that EVAP system has a large leak	• Fuel tank cap (loose) • Leakage from EVAP line (Canister - Fuel tank) • Leakage from EVAP line (EVAP VSV - Canister) • Pump module • Leakage from fuel tank • Leakage from canister	While engine switch off	2 trip
P0456	EVAP small leak	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard measured at start and at end of leak check. If stabilized pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system has a small leak	Same above	While engine switch off	2 trip

DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System (See page ES-400).

INSPECTION PROCEDURE

Refer to the EVAP System (See page ES-400).

MONITOR DESCRIPTION

5 hours* after the engine switch is turned off, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:

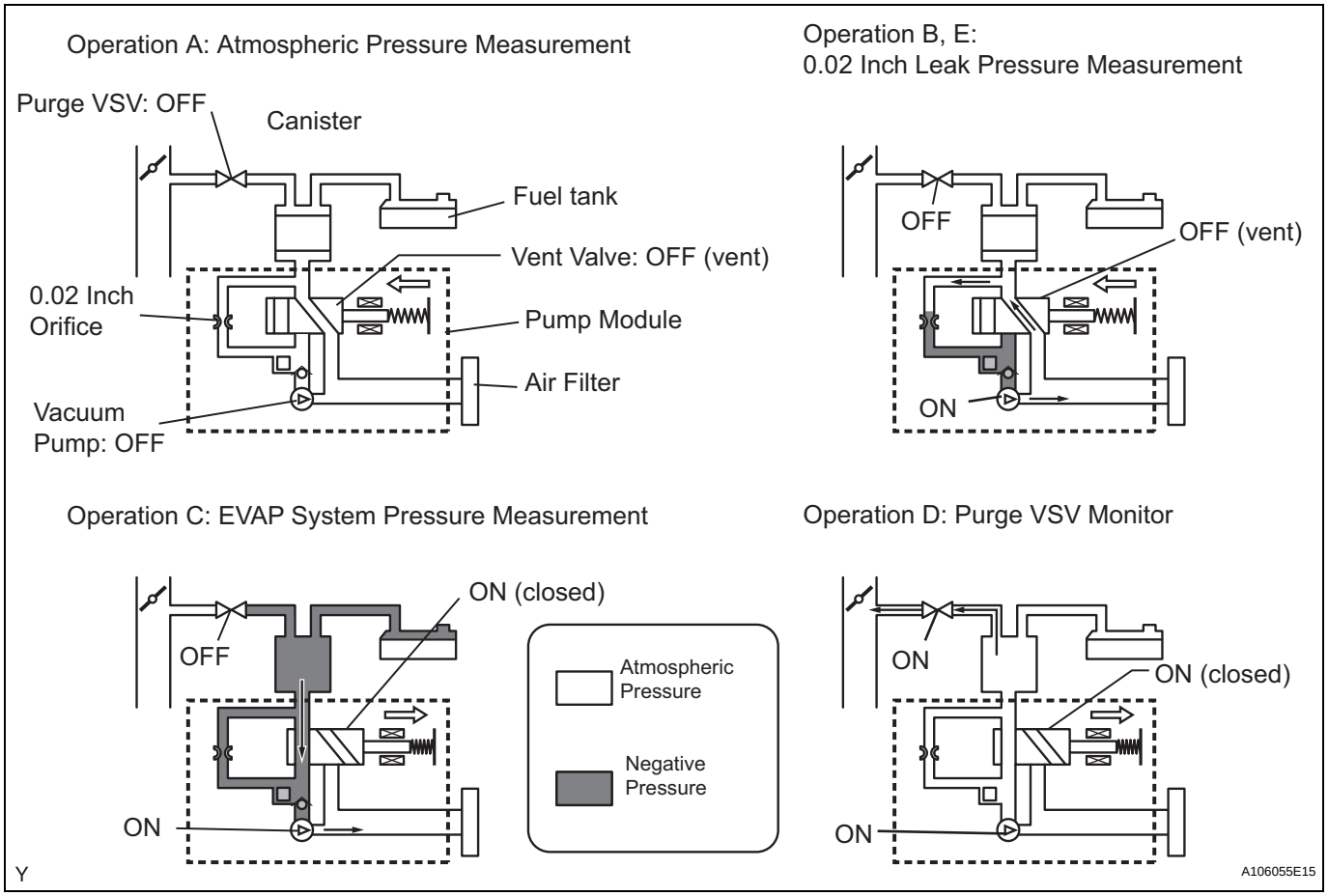
*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the engine switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the engine switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operation	Description	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after engine switch turned off.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds

Sequence	Operation	Description	Duration
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down measured value as they will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	EVAP VSV monitor	EVAP VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	After second 0.02 inch leak pressure measurement, leak check performed by comparing first and second 0.02 inch leak pressure standards. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	-

ES

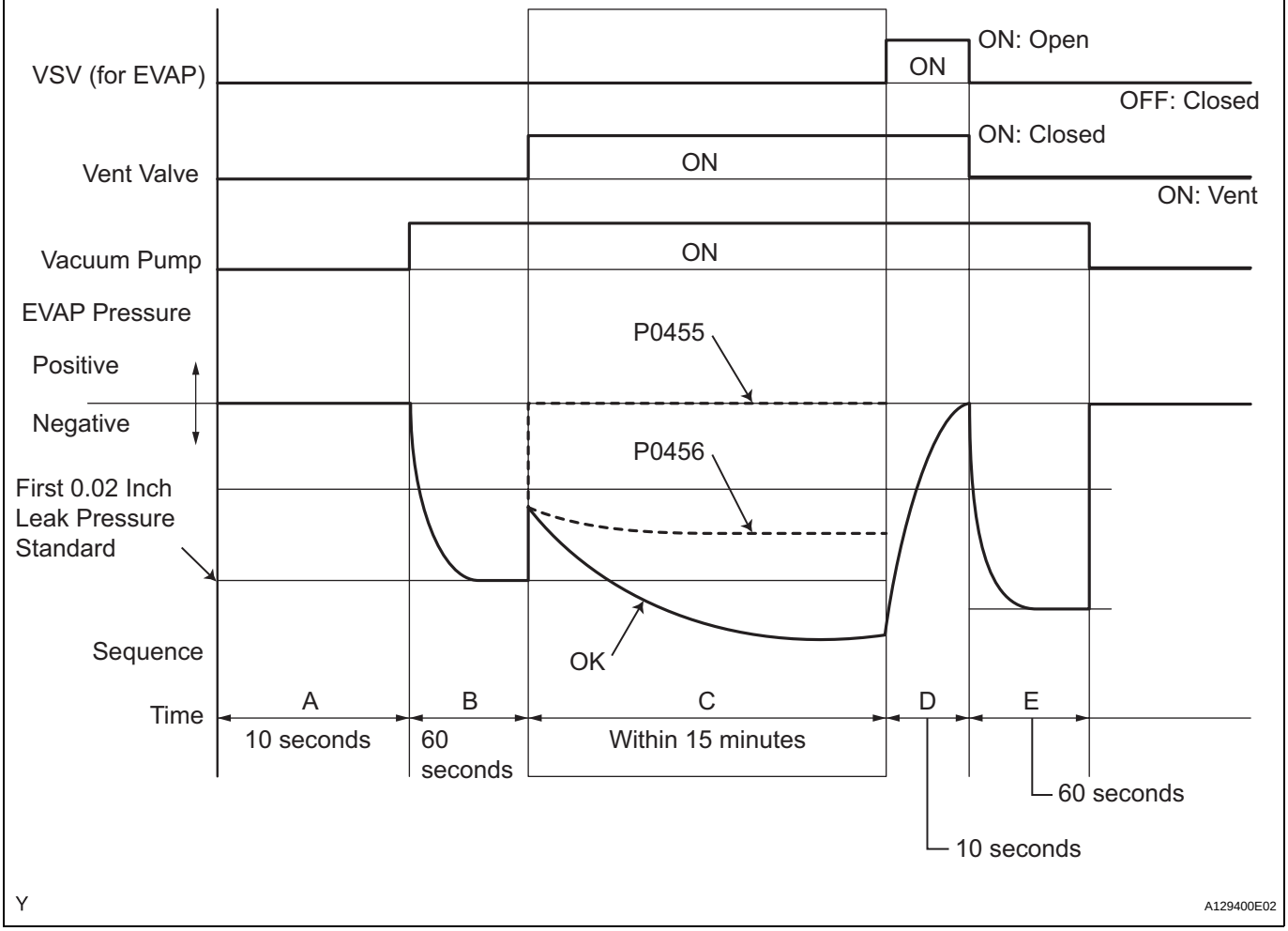
HINT:
*: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.



1. P0455: EVAP (Evaporative Emission) gross leak
   In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2] (near atmospheric pressure), the ECM determines that the EVAP system has a large leak, illuminates the MIL and sets the DTC (2 trip detection logic).

2. P0456: EVAP very small leak
In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than the second 0.02 inch leak pressure standard, the ECM determines that the EVAP system has a small leak, illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when EVAP System Leaks:



MONITOR STRATEGY

Required Sensors/Components	EVAP VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 15 minutes (varies with amount of fuel in tank)
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

EVAP key-off monitor runs when all of following conditions are met:	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	Below 2.5 mph (4 km/h)
Engine switch	OFF

Time after key off	5, 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0451, P0452 and P0453)	Not detected
EVAP VSV	Not operated by scan tool
Vent valve	Not operated by scan tool
Leak detection pump	Not operated by scan tool
Both of following conditions are met before key OFF:	Conditions 1 and 2
1. Duration that vehicle is being driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

1. Key-off monitor sequence 1 to 8

1. Atmospheric pressure

Next sequence is run if following condition is met:	-
Atmospheric pressure change	Less than 0.3 kPa (2.25 mmHg) for 1 second

ES

2. First reference pressure

Next sequence is run if all of following conditions are met:	Conditions 1, 2 and 3
1. EVAP pressure when 4 seconds after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.05 kPa (-36.38 to -7.87 mmHg)
3. Reference pressure	Saturated within 1 minute

3. Vent valve stuck closed check

Next sequence is run if following condition is met:	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction and leak

Next sequence is run if both of following conditions are met:	-
Vacuum introduction time	15 minutes or less

5. EVAP VSV stuck closed check

Next sequence is run if following condition is met:	-
EVAP pressure change after purge VSV ON	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if all of following conditions are met:	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure measurement	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.05 kPa (-36.38 to -7.87 mmHg)
3. Reference pressure	Saturated within 1 minute
4. Reference pressure difference between first and second	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if following condition is met:	-
EVAP pressure when vacuum introduction was complete	Less than second reference pressure

8. Atmospheric pressure

Monitor is complete	-
Atmospheric pressure difference between sequence 1 and 8	0.3 kPa (2.25 mmHg) or less

TYPICAL MALFUNCTION THRESHOLDS

"Saturated" indicates that the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) in 30 seconds.

P0455: EVAP gross leak

EVAP pressure when vacuum introduction is complete	Higher than reference pressure x 0.2

P0456: EVAP small leak

EVAP pressure when vacuum introduction is complete	Between reference pressure and reference pressure x 0.2

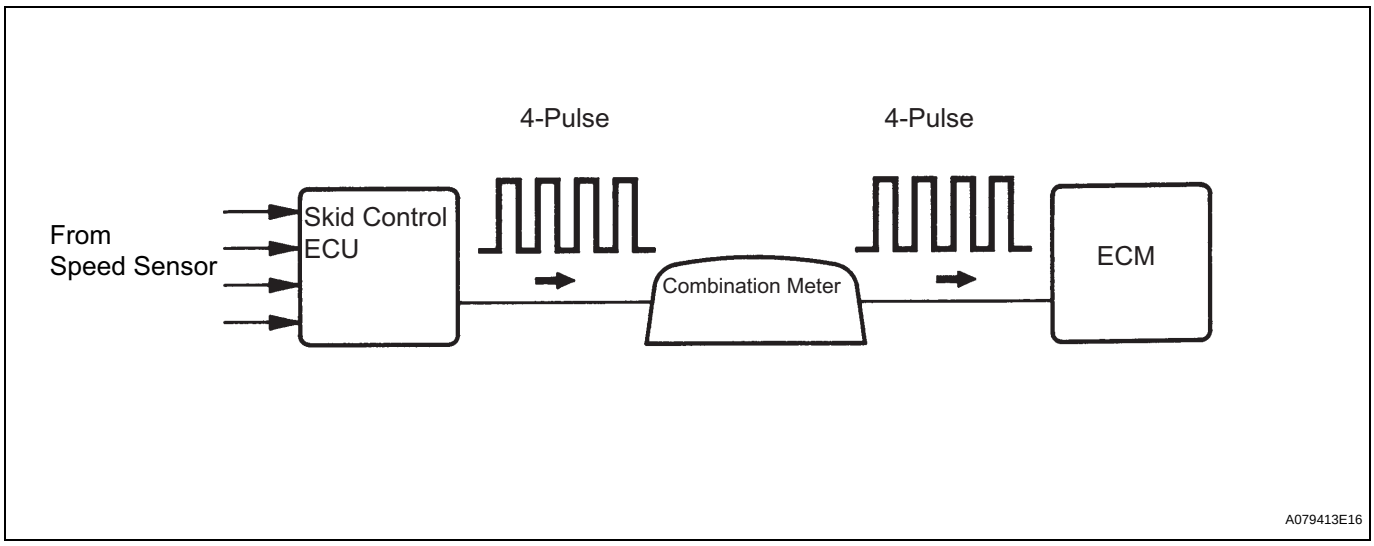
MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

DTC	P0500	Vehicle Speed Sensor "A"

DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	Vehicle speed signal from vehicle speed sensor is cut for 0.14 sec. or more while cruise control is in operation	• Vehicle speed sensor • Vehicle speed sensor signal circuit • Combination meter • ECM • Skid control ECU

MONITOR DESCRIPTION

The ECM assumes that the vehicle is being driven when the transmission counter gear indicates more than 300 rpm and over 30 seconds have passed since the park/neutral position switch was turned OFF. If there is no signal from the vehicle speed sensor with these conditions satisfied, the ECM concludes that the vehicle speed sensor is malfunctioning. The ECM will turn on the MIL and a DTC will be set.

MONITOR STRATEGY

Related DTCs	P0500: Vehicle Speed Sensor Circuit
Required sensors / components (Main)	Vehicle speed sensor, Combination meter, ABS ECU
Required sensors / components (Sub)	Counter gear Speed (CS) sensor, ECT sensor
Frequency of operation	Continuous
Duration	8 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	P0100 - P0103 (MAF sensor) P0105 - P0108 (MAP sensor) P0115 - P0118 (ECT sensor) P0120 - P02238 (TP sensor) P0125 (VSS/ECT1 sensor, non-ECT)
Engine coolant temperature	70°C (158°F) or more

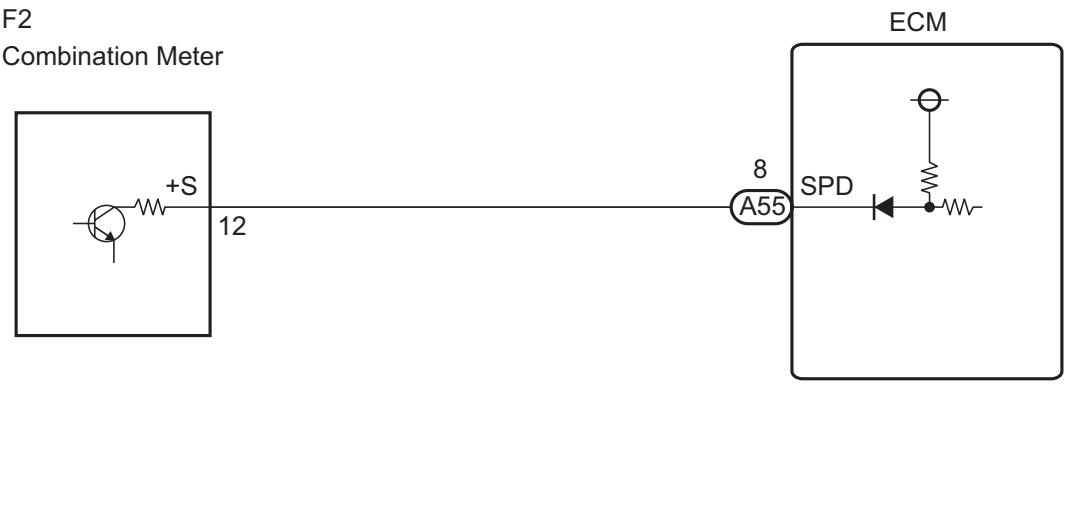
Engine speed	2,000 to 5,000 rpm
Engine load	30.37 % or more
Fuel cut high engine speed	Not executing
Battery voltage	8 V or more
Engine switch	ON
ETC sensor circuit fail	Not detected
MAF sensor circuit fail	Not detected
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Vehicle speed sensor signal	No pulse input

ES

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester or the OBD II scan tool. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**CHECK SPEEDOMETER**

(a) Drive the vehicle and check whether the operation of the speedometer in the combination meter is normal.
HINT:
- The vehicle speed sensor is operating normally if the speedometer reading is normal.

- If the speedometer does not operate, check it by following the procedure described in speedometer malfunction.

NG → GO TO SPEEDOMETER CIRCUIT

OK

2	READ VALUE OF INTELLIGENT TESTER (VEHICLE SPEED)

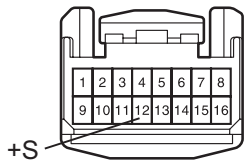
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / VEHICLE SPD.
(e) Drive the vehicle.
(f) Read the value displayed on the tester.
OK:
Vehicle speeds displayed on tester and speedometer display are equal.

NG → CHECK INTERMITTENT PROBLEMS

OK

3	CHECK COMBINATION METER ASSEMBLY (+S VOLTAGE)

Wire Harness Side:



Combination Meter Connector

N A132286E01

(a) Disconnect the F2 combination meter connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between the terminal of the combination meter and body ground.
Standard voltage

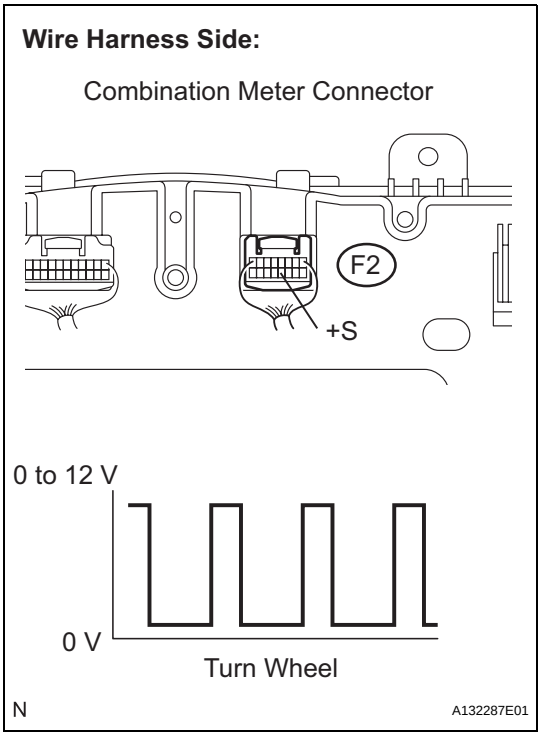
Tester Connection	Specified Condition
F2-12 (+S) - Body ground	4.5 to 5.5 V

(d) Reconnect the combination meter connector.

NG → Go to step 5

OK

4	CHECK COMBINATION METER ASSEMBLY (SPD SIGNAL WAVEFORM)



(a) Shift the transmission gear selector lever to the neutral position.
(b) Jack up the vehicle.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage between the terminal of the combination meter and body ground while the wheel is turned slowly.

Standard voltage

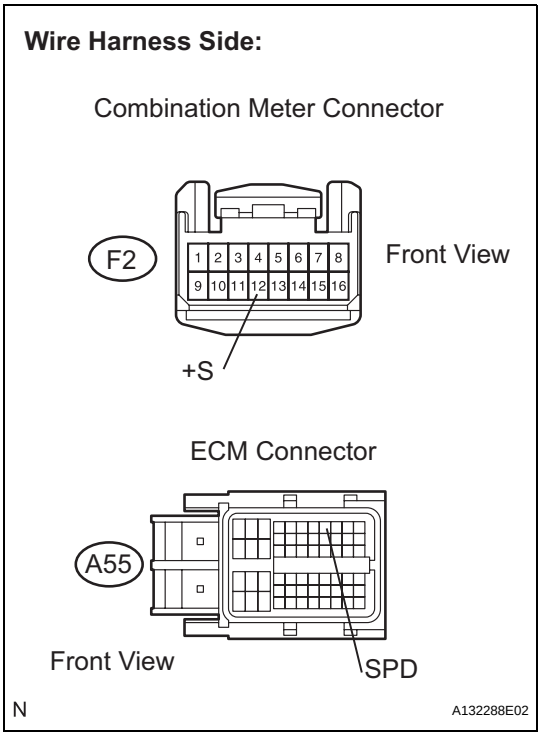
Tester Connection	Specified Condition
F2-12 (+S) - Body ground	Voltage generated intermittently

HINT:
The output voltage should fluctuate up and down, similarly to the diagram, when the wheel is turned slowly.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

5	CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - ECM)



(a) Disconnect the F2 combination meter connector.
(b) Disconnect the A55 ECM connector.
(c) Measure the resistance.

Standard resistance (Check for open)

Tester Connection	Specified Condition
+S (F2-12) - SPD (A55-8)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
+S (F2-12) or SPD (A55-8) - Body ground	10 kΩ or higher

(d) Reconnect the combination meter connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ES

OK

REPLACE ECM (See page ES-518)

DTC	P0504	Brake Switch "A" / "B" Correlation

DTC	P0724	Brake Switch "B" Circuit High

DESCRIPTION

The stop light switch is a duplex system that transmits two signals: STP and ST1-. These two signals are used by the ECM to monitor whether or not the brake system is working properly. If the signals, which indicate the brake pedal is being depressed and released, are detected simultaneously, the ECM interprets this as a malfunction in the stop light switch and sets the DTC.

HINT:

The normal conditions are as shown in the table below. The signals can be read using an intelligent tester.

Signal	Brake Pedal Released	In Transition	Brake Pedal Depressed
STP	OFF	ON	ON
ST1-	ON	ON	OFF

ES

DTC No.	DTC Detection Condition	Trouble Area
P0504	Conditions (a), (b) and (c) continue for 0.5 seconds or more (1 trip detection logic): (a) Ignition switch on (IG) (b) Brake pedal released (c) STP signal OFF when ST1- signal OFF	• Short in stop light switch signal circuit • Stop light switch • ECM
P0724	The stop light switch remains ON even when the vehicle is driven in a STOP (less than 2 mph (3 km/h)) and GO (19 mph (30 km/h) or more) fashion 5 times. (2 trip detection logic)	• Short in stop light switch signal circuit • Stop light switch • ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains on. When the stop light switch remains ON during "stop and go" driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop (less than 2 mph (3 km/h)) and go (19 mph (30 km/h) or more) 5 times in two driving cycles in order to detect a malfunction.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

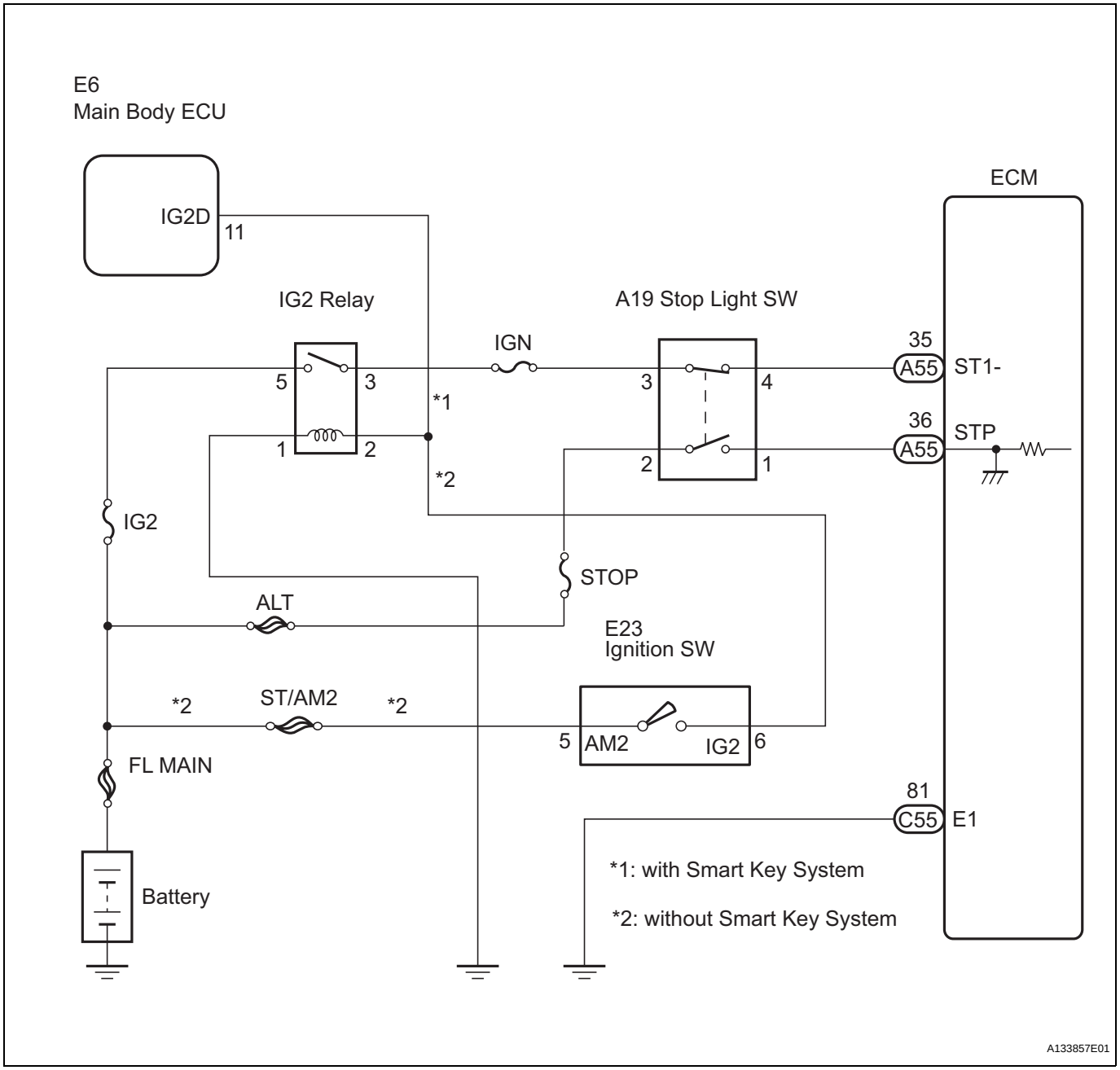
TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present	None
Engine switch	ON
Starter	OFF
Battery voltage	8 V or more
GO (Vehicle speed is 18.65 mph (30 km/h) or more)	Once
STOP (Vehicle speed is less than 1.86 mph (3 km/h))	Once

TYPICAL MALFUNCTION THRESHOLDS

Brake switch	Remain ON during GO and STOP 5 times

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1 **CHECK STOP LIGHT (OPERATION OF STOP LIGHT)**

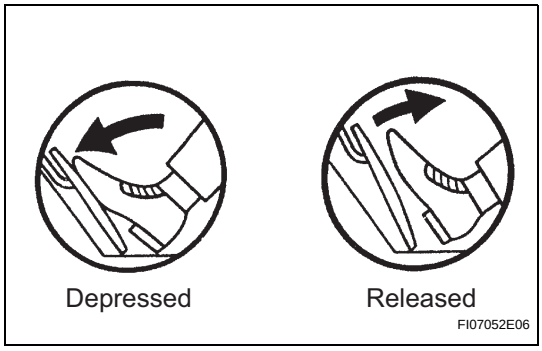
(a) Check whether the stop lights turn on and off normally when the brake pedal is depressed and released.
OK:
Stop lights turn ON when brake pedal is depressed.

NG → **REPAIR OR REPLACE STOP LIGHT SWITCH CIRCUIT**

OK

ES

2 **READ VALUE OF INTELLIGENT TESTER (STP SIGNAL AND ST1 - VOLTAGE)**



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / STOP LIGHT SW.
(d) Check the STP signal when the brake pedal is depressed and released.
OK

Brake Pedal Operation	Specified Condition
Depressed	STP signal ON
Released	STP signal OFF

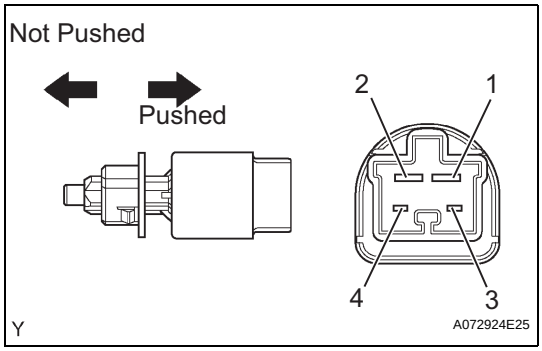
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ST1.
(f) Check the ST1 signal when the brake pedal is depressed and released.
OK

Brake Pedal Operation	Specified Condition
Depressed	ST1 signal OFF
Released	ST1 signal ON

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

3 **INSPECT STOP LIGHT SWITCH ASSEMBLY**



(a) Remove the stop light switch assembly.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

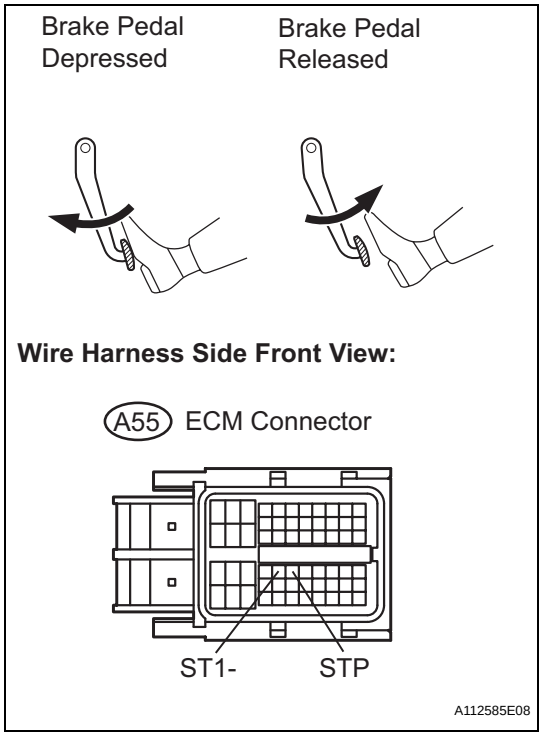
Switch Position	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

(c) Reinstall the stop light switch assembly.

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY (See page LI-125)**

OK

4 CHECK ECM (STP, ST1 - VOLTAGE)



(a) Disconnect the A55 ECM connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Brake Pedal Operation	Specified Condition
STP (A55-36) - Body ground	Depressed	9 to 14 V
STP (A55-36) - Body ground	Released	0 to 3 V
ST1- (A55-35) - Body ground	Depressed	0 to 3 V
ST1- (A55-35) - Body ground	Released	9 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-518)

ES

DTC	P0505	Idle Control System Malfunction

DESCRIPTION

The idle speed is controlled by the Electronic Throttle Control System (ETCS). The ETCS is comprised of: 1) one valve type throttle body; 2) the throttle actuator, which operates the throttle valve; 3) the throttle position sensor, which detects the opening angle of the throttle valve; 4) the accelerator pedal position sensor, which detects the accelerator pedal position; 5) the ECM, which controls the ETCS. Based on the target idle speed, the ECM controls the throttle actuator to provide the proper throttle valve opening angle.

DTC No.	DTC Detection Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	• ETCS • Air induction system • PCV hose connection • ECM

ES

MONITOR DESCRIPTION

The ECM monitors the idling speed and idling air flow volume to conduct Idle Speed Control (ISC). The ECM determines that the ISC system is malfunctioning if the following conditions are met:

- The learned idling air flow volume remains at the maximum or minimum 5 times or more during a driving cycle
- While driving at 6 mph (10 km/h) or more, the actual engine idling speed varies from the target idling speed by between 100 rpm and 200 rpm, 5 times or more during a driving cycle.

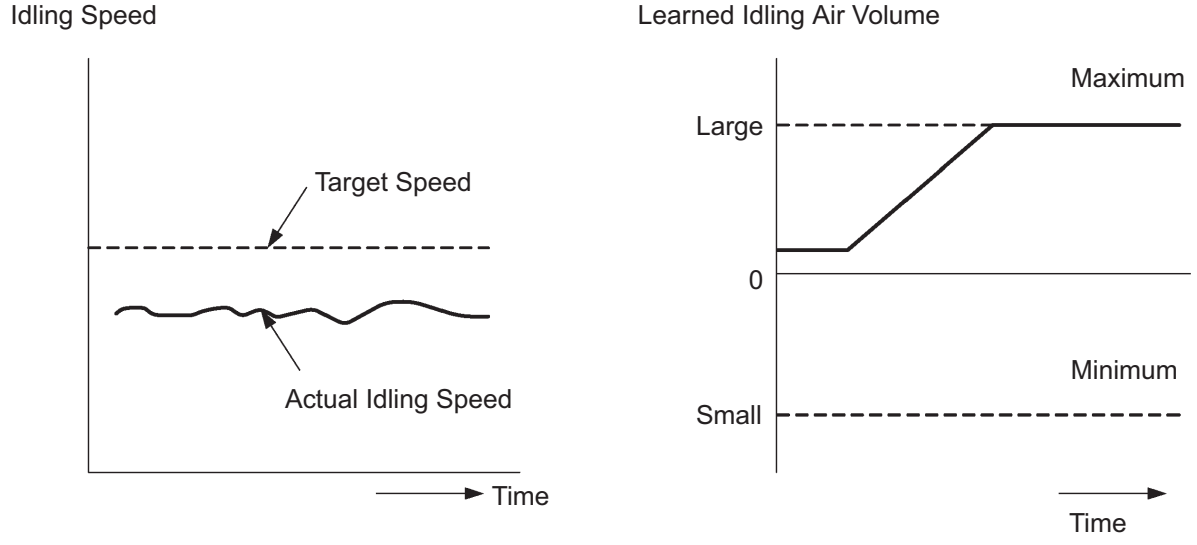
Example:

If the actual idling speed varies from the target idling speed by more than 200 rpm* 5 times during a driving cycle, the ECM illuminates the MIL and sets the DTC.

HINT:

*: Threshold idling speed varies with engine load.

Example



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A082389E26

MONITOR STRATEGY

Related DTCs	P0505: ISC function
Required Sensors/Components (Main)	ETCS
Required Sensors/Components (Sub)	Crankshaft position sensor, Engine coolant temperature sensor, and Vehicle speed sensor
Frequency of Operation	Continuous
Duration	10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Functional check:

Monitor will run whenever these DTCs are not present	None
Engine	Running

ES

TYPICAL MALFUNCTION THRESHOLDS

Functional check:

Either of the following conditions 1 or 2 is met:	-
1. Frequency that following conditions (a) and (b) are met:	5 time or more
(a) Engine RPM - target engine RPM	Below -100 rpm, or 200 rpm or more
(b) Vehicle condition	Stop after vehicle was driven by 6.25 mph (10 km/h) or more
2. Frequency that following conditions (a) and (b) are met:	Once
(a) Engine RPM - target engine RPM	Below -100 rpm, or 200 rpm or more
(b) ISC flow rate learning value	1.3 L/sec. or less. or 8.5 L/sec. or more

INSPECTION PROCEDURE

HINT:

- The following conditions may also cause DTC P0505 to be set:
  (a) The floor carpet overlapping onto the accelerator pedal, causing the accelerator pedal to be slightly depressed and therefore the throttle valve position to be slightly open.
  (b) The accelerator pedal being not fully released.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0505)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following the menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0505	A

Display (DTC output)	Proceed to
P0505 and other DTCs	B

HINT:
If any DTCs other than P0505 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART (See page ES-63)

A

2 CHECK PCV HOSE (HOSE CONNECTIONS)

OK:
PCV hose is connected correctly and is not damaged.

NG → REPAIR OR REPLACE PCV HOSE

OK

3 CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → REPAIR OR REPLACE AIR INDUCTION SYSTEM

OK

4 CHECK THROTTLE BODY (VISUALLY CHECK THROTTLE VALVE)

(a) Check for contamination between the throttle valve and the housing. If necessary, clean the throttle body. And check that the throttle valve moves smoothly.
OK:
Throttle valve is not contamainated with foreign objects and moves smoothly.

NG → REPLACE THROTTLE BODY (See page ES-503)

OK

REPLACE ECM (See page ES-518)

DTC	P050A	Cold Start Idle Air Control System Performance

DTC	P050B	Cold Start Ignition Timing Performance

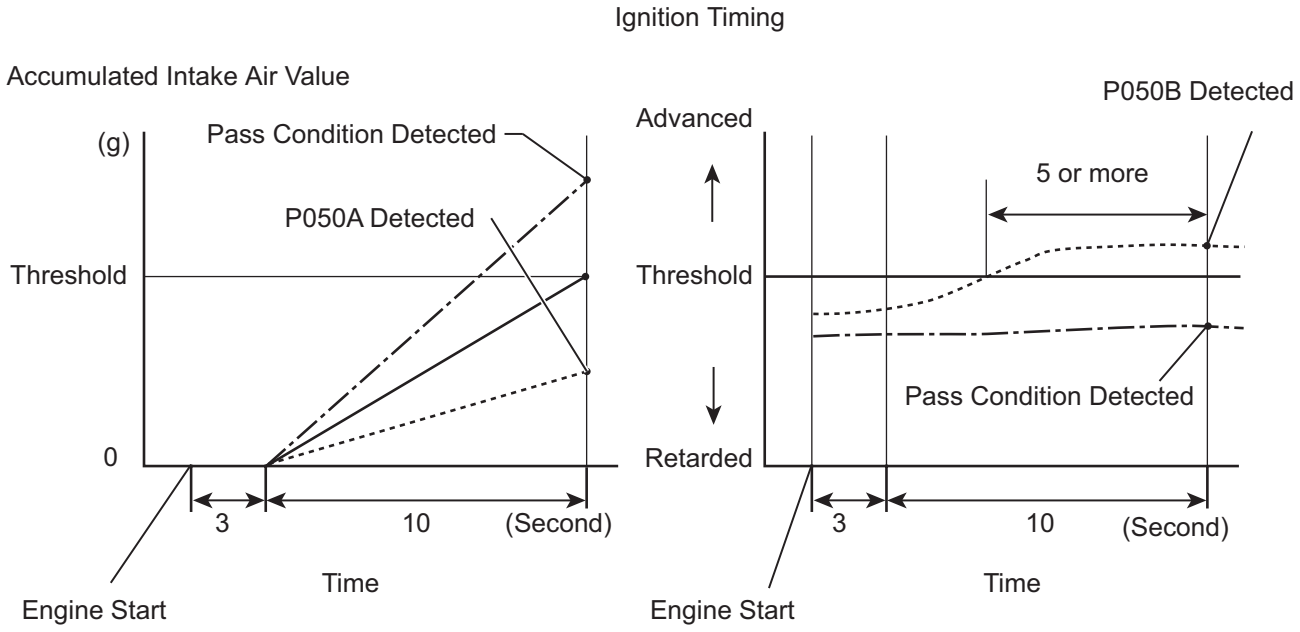
DESCRIPTION

The Electronic Throttle Control System (ETCS) controls the engine idling speed. The ETCS operates the throttle actuator to open and close the throttle valve, and adjusts the intake air amount to achieve the target idling speed.
In addition, the ECM retards the ignition timing and the ETCS increases the intake air amount to quickly increase the catalyst temperature at cold start to reduce emissions.

DTC No.	DTC Detection Conditions	Trouble Areas
P050A	Accumulated intake air amount during 10 seconds of idling after cold start, less than threshold (2 trip detection logic)	• Throttle body assembly • Mass air flow meter • Air induction system • PCV hose connections • VVT system • Air cleaner filter element • ECM
P050B	Ignition timing retard value insufficient for 5 seconds or more during 10 seconds of P050A monitoring at cold start (2 trip detection logic)	• Throttle body assembly • Mass air flow meter • Air induction system • PCV hose connections • VVT system • Air cleaner filter element • ECM

ES

MONITOR DESCRIPTION



The ECM monitors the intake air amount during idling and the ignition timing.
When the Engine Coolant Temperature (ECT) is between -10°C and 50°C (14°F and 122°F), the ECM calculates the idling intake air amount for 10 seconds, beginning 3 seconds after the engine starts.
When the accumulated value is below the threshold, the ECM interprets this as a malfunction in the Idle Speed Control (ISC) system at cold start.
The ECM also monitors the ignition timing at cold start, and judges it to be incorrect when it is advanced to the same value for a warm engine for 5 seconds or more of the 10 second monitoring period.
Example:
P050A is detected when all conditions below are met (2 trip detection logic).
1. The ECT is between -10°C and 50°C (14°F and 122°F) when the engine starts.
2. The engine idles for 13 seconds after engine start.
3. The accumulated intake air amount is below the threshold.

The ECM sets the DTC and illuminates the MIL 13 seconds after the engine is next started.

NOTICE:

When the negative battery terminal is disconnected during inspection or repairs, the ISC learning values are cleared. The ISC learning must be performed by warming up the engine and idling for 5 minutes with the ECT at 75°C (167°F) or more because DTCs cannot be detected with the ISC learning values cleared.

ES

MONITOR STRATEGY

Related DTCs	P050A: Idle speed control problem at cold P050B: Idle ignition timing problem at cold
Required Sensors/Components (Main)	Mass air flow meter
Required Sensors/Components (Related)	Engine Coolant Temperature (ECT) sensor, Throttle position sensor, Vehicle speed sensor
Frequency of Operation	Once per driving cycle
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

P050A:

Battery voltage	8 V or more
Time after engine start	3 seconds or more
Starter	OFF
ECT at engine start	-10°C (14°F) or more
ECT	-10°C to 50°C (14°F to 122°F)
Engine idling time	3 seconds or more
Fuel-cut	OFF
Vehicle speed	Less than 1.875 mph (3 km/h)
Time after shift position changed	1 second or more
Atmospheric pressure	76 kPa (570 mmHg) or more

P050B:

Battery voltage	8 V or more
Time after engine start	3 seconds or more
Starter	OFF
ECT at engine start	-10°C (14°F) or more
ECT	-10°C to 50°C (14°F to 122°F)
Engine idling time	3 seconds or more
Fuel-cut	OFF
Vehicle speed	Less than 1.875 mph (3 km/h)

TYPICAL MALFUNCTION THRESHOLDS

P050A:

Accumulated mass air flow	Varies with ECT (Example: Less than 42.5 g)

P050B:

Accumulated time when ignition timing retard is cut off	5 seconds or more

INSPECTION PROCEDURE

HINT:
Read freeze frame data using an intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

ES

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P050A AND/OR P050B)

(a) Connect an intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Select the following the menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P050A and/or P050B	A
P050A and/or P050B and other DTCs	B

HINT:
If any DTCs other than P050A and P050B are output, troubleshoot those DTCs first.

B → GO TO DTC CHART (See page ES-63)

A

2	READ VALUE USING INTELLIGENT TESTER (FUEL TRIM)

HINT:
Calculate the total fuel trim values to check the characteristic deviation of the mass air flow meter.
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / SHORT FT #1 and LONG FT #1.
(e) Read the values displayed on the tester.
(f) Add together the SHORT FT #1 and LONG FT #1 values to obtain the total FUEL TRIM.

OK:
Total of SHORT FT #1 and LONG FT #1 values is between -20 % and 20 %.

OK → **Go to step 12**

NG

3	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (OPERATE OCV)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the tester ON.
(c) Warm up the engine.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.
(e) Check the engine speed while operating the Oil Control Valve (OCV) using the tester.

OK

Tester Operations	Specified Conditions
OCV OFF	Normal engine speed
OCV ON	Engine idles roughly or stalls (soon after OCV switched from OFF to ON)

NG → **Go to step 8**

OK

4	CHECK PCV HOSE CONNECTIONS

OK:
PCV hose is connected correctly and is not damaged.

NG → **Go to step 9**

OK

5	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **Go to step 10**

OK

6	CHECK AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Visually check that the air cleaner filter element is not excessively contaminated with dirt or oil.
OK:
Air cleaner filter element is not excessively contaminated with dirt or oil.

NG → Go to step 11

OK

7	REPLACE MASS AIR FLOW METER

NEXT → Go to step 15

8	CHECK AND REPAIR VVT SYSTEM

NEXT → Go to step 15

ES

9	REPAIR OR REPLACE PCV HOSE

NEXT → Go to step 15

10	REPAIR OR REPLACE AIR INDUCTION SYSTEM

NEXT → Go to step 15

11	REPLACE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

NEXT → Go to step 15

12	CHECK THROTTLE VALVE

(a) Check for deposits around the throttle valve and throttle valve condition.

OK:

No deposits around throttle valve and throttle valve moves smoothly.

NG → Go to step 14

OK

13	REPLACE ECM

NEXT → Go to step 15

14	REPAIR OR REPLACE THROTTLE BODY ASSEMBLY

NEXT → Go to step 15

15	CHECK WHETHER DTC OUTPUT RECURS (DTC P050A AND/OR P050B)

NOTICE:
In this operation, the engine must be cold (the same level as the engine coolant temperature recorded in the freeze frame data).

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-45).
(e) Switch the ECM from normal mode to check mode using the tester (See page ES-49).
(f) Start the engine to idle for a minute.
OK:
Stable fast idling.
(g) Read the DTCs.
OK:
No DTC output.

NEXT

END

DTC	P0560	System Voltage

DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is off. This power allows the ECM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, these memories are cleared and the ECM determines that there is a malfunction in the power supply circuit. When the engine is next started, the ECM illuminates the MIL and sets the DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in ECM back-up power source circuit (1 trip detection logic)	• Open in back-up power source circuit • ECM

HINT:
If DTC P0560 is set, the ECM does not store other DTCs.

MONITOR STRATEGY

Related DTCs	P0560: ECM system voltage
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate (MIL illuminated after next engine start)
Sequence of Operation	None

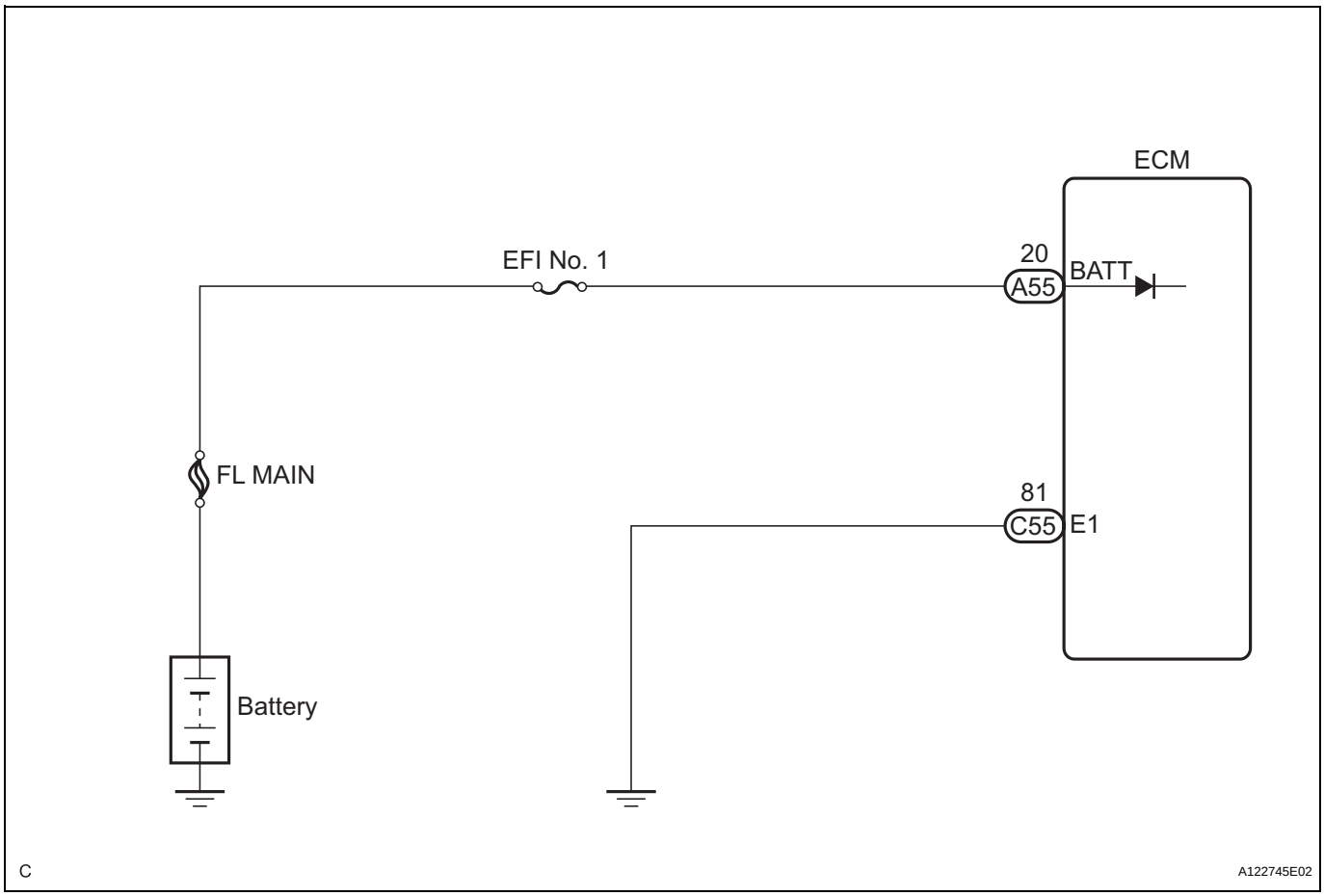
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present:	None
Stand-by RAM	Initialized

TYPICAL MALFUNCTION THRESHOLDS

ECM power source	Less than 3.5 V

WIRING DIAGRAM

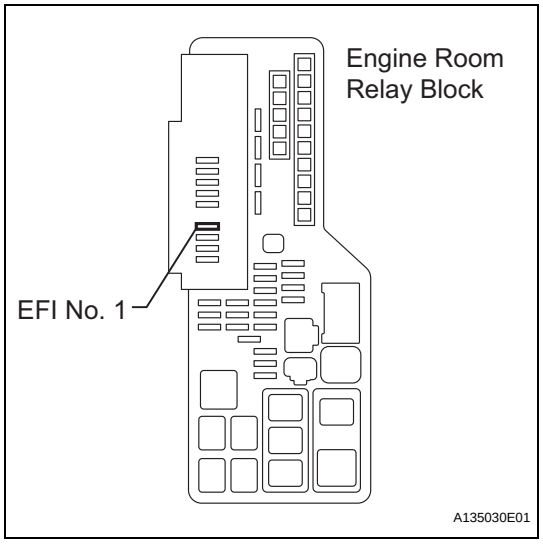


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	INSPECT FUSE (EFI NO. 1)

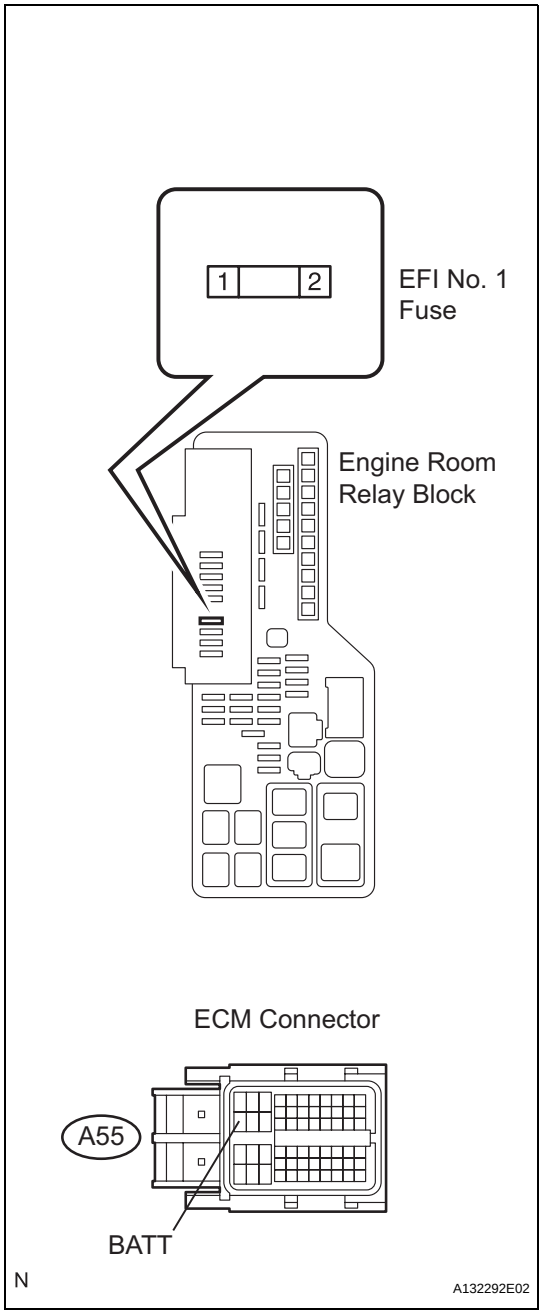


(a) Remove the EFI No. 1 fuse from the engine room R/B.
(b) Measure the EFI No. 1 fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the EFI No. 1 fuse.

NG → **REPLACE EFI NO. 1 FUSE**

OK

2	CHECK HARNESS AND CONNECTOR



(a) Check the harness and connector between the EFI No. 1 fuse and ECM.
  (1) Remove the EFI No. 1 fuse from the engine room R/B.
  (2) Disconnect the A55 ECM connector.
  (3) Measure the resistance between the terminals.
  Standard resistance (Check for open)

Tester Connection	Specified Condition
Engine room R/B EFI No. 1 fuse terminal 2 - BATT (A55-20)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Engine room R/B EFI No. 1 fuse terminal 2 or BATT (A55-20) - Body ground	10 kΩ or higher

  (4) Reinstall the ECM connector.

(b) Check the harness and the connector between the EFI No. 1 fuse and battery.
  (1) Disconnect the negative battery terminal.
  (2) Disconnect the positive battery terminal.
  (3) Measure the resistance between the terminals.
  Standard resistance (Check for open)

Tester Connection	Specified Condition
Battery positive terminal - Engine room R/B EFI No 1 fuse terminal 1	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Battery positive terminal or Engine room R/B EFI No. 1 fuse terminal 1 - Body ground	10 kΩ or higher

  (4) Reconnect the positive battery terminal.
  (5) Disconnect the negative battery terminal.
  (6) Reinstall the EFI No. 1 fuse.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT BATTERY

(a) Check that the battery is not depleted.
OK:
Battery is not depleted.

NG → **REPLACE BATTERY**

OK

4	CHECK BATTERY TERMINAL

(a) Check that the battery terminals are not loose or corroded.
OK:
Battery terminals are not loose or corroded.

NG → **REPAIR OR REPLACE BATTERY TERMINAL**

OK ↓

5	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the intelligent tester on.
(d) Clear the DTCs (See page ES-45).
(e) Turn the intelligent tester off.
(f) Start the engine and turn the intelligent tester on.
(g) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(h) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0560	A
No output	B

B → **CHECK FOR INTERMITTENT PROBLEMS**

A ↓

REPLACE ECM (See page ES-518)

ES

DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DTC	P0606	ECM / PCM Processor

DTC	P0607	Control Module Performance

DTC	P0657	Actuator Supply Voltage Circuit / Open

DESCRIPTION

ES

The ECM continuously monitors its internal memory status, internal circuits, and output signals sent to the throttle actuator. This self-check ensures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.

The ECM memory status is diagnosed by internal "mirroring" of the main CPU and the sub CPU to detect Random Access Memory (RAM) errors. The 2 CPUs also perform continuous mutual monitoring. The ECM illuminates the MIL and sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals sent to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detection Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM internal error (1 trip detection logic)	ECM

MONITOR STRATEGY

Related DTCs	P0604: ECM RAM error P0606: ECM range check P0607: ECM CPU malfunction P0657: ETCS power supply
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	Within 1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

ECM RAM errors (P0604):

RAM mirror check	Fail

ECM CPU range check (P0606):

Either of following conditions is met:	-
Difference between throttle valve position of main CPU and throttle valve position of sub CPU	0.3 V or more
Difference between accelerator pedal position of main CPU and accelerator pedal position of sub CPU	0.3 V or more

ECM CPU malfunction (P0607):

Either A or B is met	-
A. Following conditions are met:	-
CPU reset	1 time or more
Learned TP - learned APP	0.4 V or more
Throttle actuator	OFF
B. CPU reset	2 times or more

ETCS power supply (P0657):

ETCS (Electronic Throttle Control System) power supply when ignition switch turned on (IG)	7 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

ES

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0604/P0606/P0607/P0657)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC output)	Proceed to
P0604, P0606, P0607, P0657	A
No output DTC	B

B → END

A → REPLACE ECM (See page ES-518)

DTC	P0617	Starter Relay Circuit High

DESCRIPTION

While the engine is being cranked, the positive battery voltage is applied to terminal STA of the ECM. If the ECM detects the Starter Control (STA) signal while the vehicle is being driven, it determines that there is a malfunction in the STA circuit. The ECM then illuminates the MIL and sets the DTC.
This monitor runs when the vehicle is driven at 12.4 mph (20 km/h) for over 20 seconds.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When conditions (a), (b) and (c) are met, positive (+B) battery voltage 10.5 V or more applied to ECM for 20 seconds (1 trip detection logic): (a) Vehicle speed more than 12.4 mph (20 km/h) (b) Engine speed more than 1,000 rpm (c) STA signal ON	• Park/Neutral Position (PNP) switch • Starter relay circuit • Cranking holding function circuit (With smart key system) • Ignition switch (Without smart key system) • ECM

ES

MONITOR STRATEGY

Related DTCs	P0617: Starter signal
Required Sensors/Components (Main)	STARTER relay, PMP switch, Engine switch
Required Sensors/Components (Sub)	Vehicle speed sensor (VSS), Crankshaft Position (CKP) sensor
Frequency of Operation	Continuous
Duration	20 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

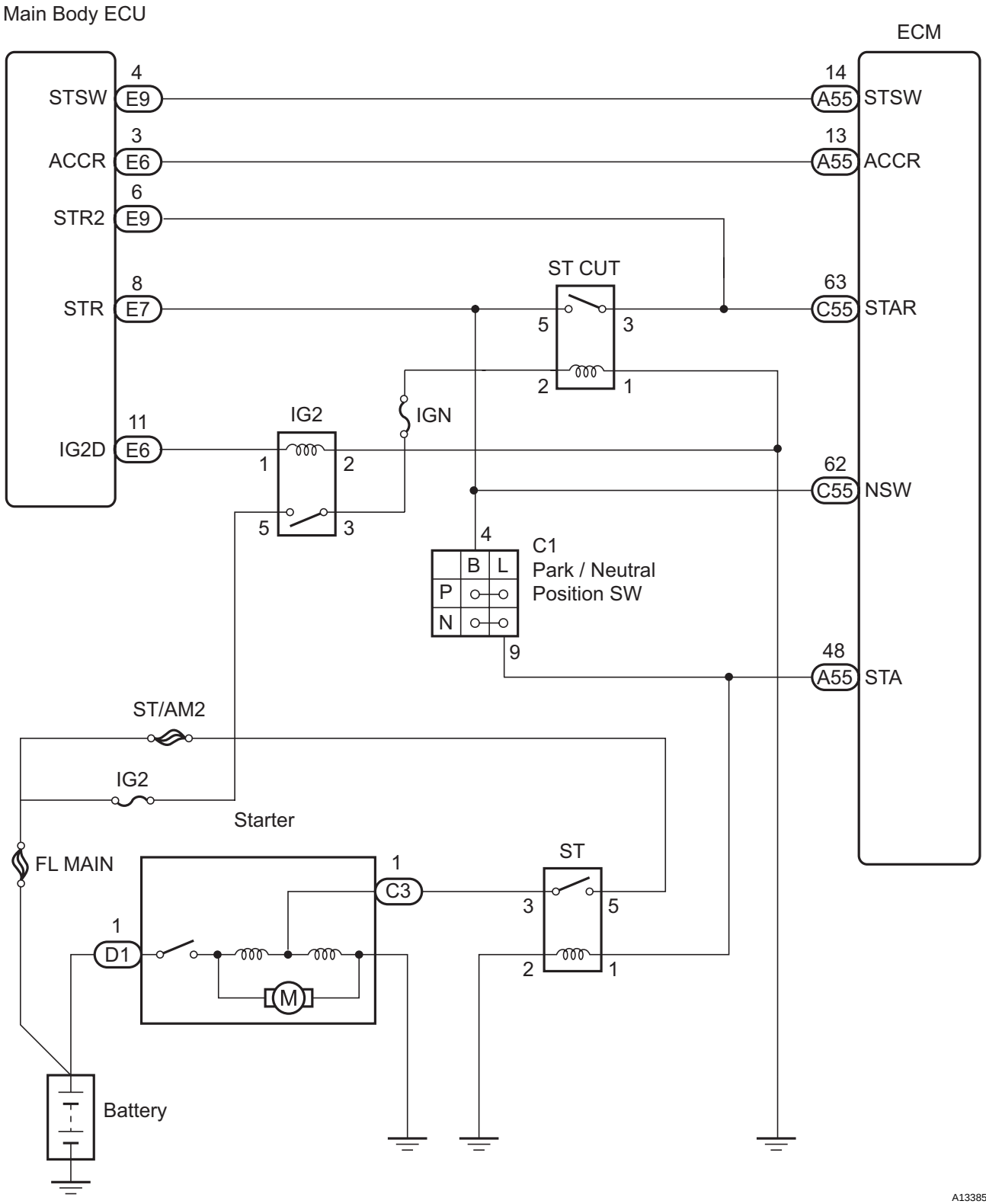
Monitor runs whenever these DTCs are not present:	None
Battery voltage	10.5 V or more
Vehicle speed	12.43 mph (20 km/h) or more
Engine speed	1,000 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

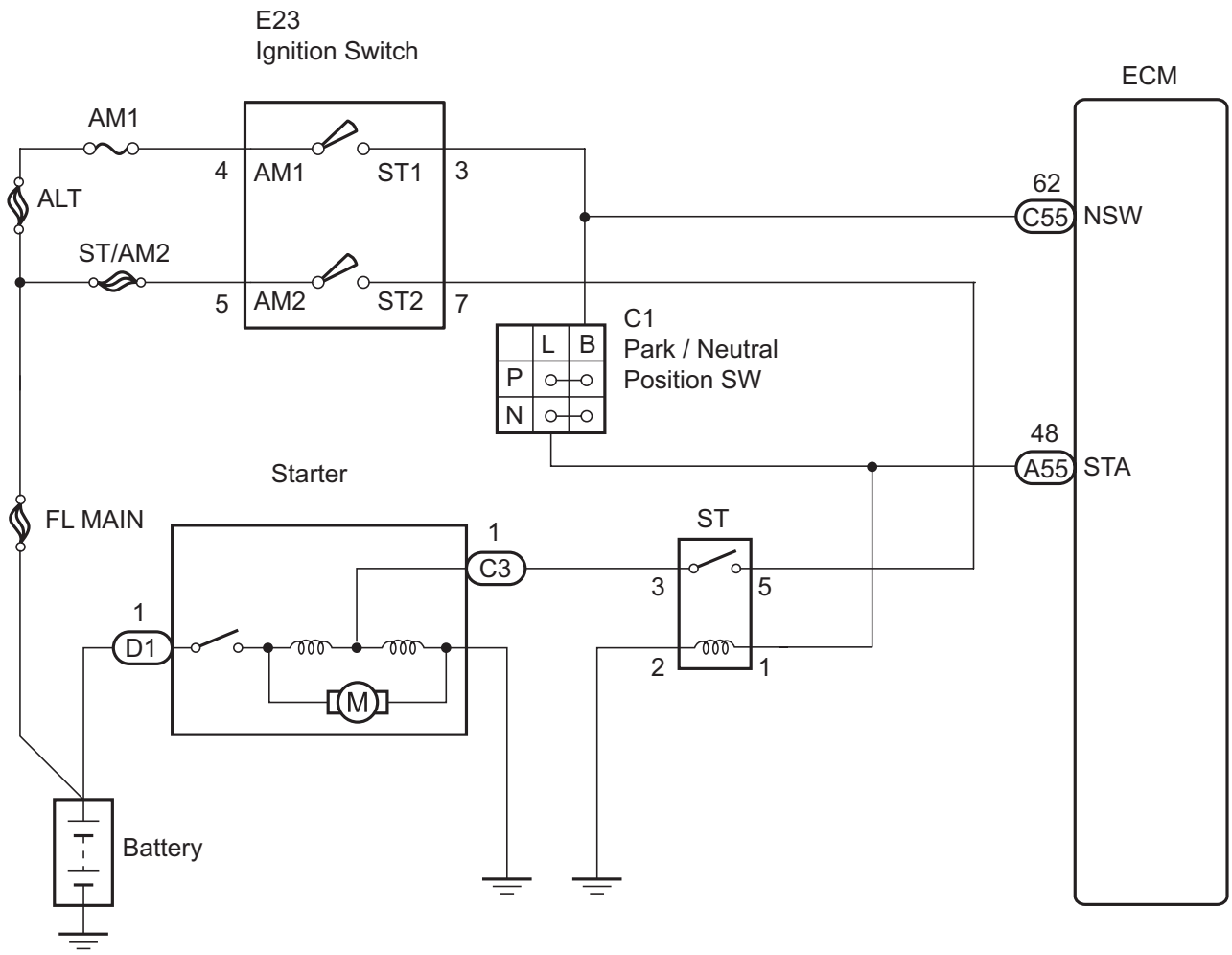
Starter signal	ON

WIRING DIAGRAM

With Smart Key System:



Without Smart Key System:



INSPECTION PROCEDURE

HINT:

- The following troubleshooting flowchart is based on the premise that the engine is cranked normally. If the engine does not crank, proceed to the problem symptoms table (See page ES-33).
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	READ VALUE OF INTELLIGENT TESTER (STARTER SIGNAL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.
(d) Check the value displayed on the tester when the ignition switch is turned on (IG) and the engine is started.

OK

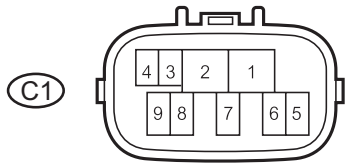
Engine Switch Condition	ON (IG)	ENGINE START
STARTER SIG	OFF	ON

OK → **REPLACE ECM (See page ES-518)**

NG

2 INSPECT PARK / NEUTRAL POSITION SWITCH ASSEMBLY

Component Side:



Park / Neutral Position Switch

A107908E03

(a) Inspect the Park / Neutral Position (PNP) switch.
(1) Disconnect the C1 switch connector.
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Gear Selector Lever Position	Tester Connection	Specified Condition
P	4 - 5	Below 1 Ω
N	4 - 5	Below 1 Ω

(3) Reconnect the PNP switch connector.

Result

Result	Proceed to
OK (without smart key system)	A
OK (with smart key system)	B
NG	C

B → **CHECK CRANKING HOLDING FUNCTION CIRCUIT (See page ES-455)**

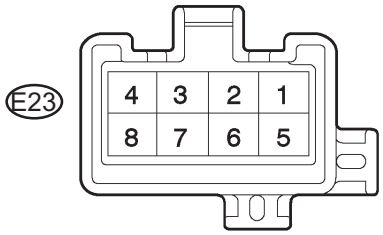
C → **REPLACE PARK / NEUTRAL POSITION SWITCH (THEN CHECK CRANKING HOLDING FUNCTION CIRCUIT) (See page AX-174)**

A

ES

3	INSPECT IGNITION SWITCH ASSEMBLY

Component Side:



Ignition Switch

A135034E01

(a) Disconnect the E23 ignition switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Switch Condition	Tester Connection	Specified Condition
LOCK	3-4, 5-7	10 kΩ or higher
START	3-4, 5-7	Below 1 Ω

(c) Reconnect the ignition switch connector.

NG → **REPAIR OR REPLACE IGNITION SWITCH ASSEMBLY**

OK

4	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.
(d) Check the value displayed on the tester when the ignition switch is turned on (IG) and the ignition is started.

OK

Engine Switch Condition	ON (IG)	ENGINE START
STARTER SIG	OFF	ON

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

SYSTEM IS OK

DTC	P0630	VIN not Programmed or Mismatch - ECM / PCM

DESCRIPTION

DTC P0630 is set when the Vehicle Identification Number (VIN) is not stored in the Engine Control Module (ECM) or the input VIN is not accurate. Input the VIN with the intelligent tester.

DTC No.	DTC Detection Condition	Trouble Area
P0630	• VIN not stored in ECM • Input VIN in ECM not accurate	ECM

MONITOR STRATEGY

Related DTCs	P0630: VIN not programmed
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	0.325 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Battery voltage	8 V or more
Engine switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

VIN code	Not programmed

COMPONENT OPERATING RANGE

VIN code	Programmed

INSPECTION PROCEDURE

1	READ DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P0630	**A**
P0630 and other DTCs	**B**

If any DTCs other than P0630 are output, troubleshoot those DTCs first.

NOTICE:
If P0630 is set, the VIN must be input to the ECM using the intelligent tester. However, all DTCs are cleared automatically by the tester when inputting the VIN. If DTCs other than P0630 are set, check them first.

B	GO TO DTC CHART (See page ES-518)

A

2	INPUT VIN WITH INTELLIGENT TESTER

NEXT

ES

END

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DESCRIPTION

The park / neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(A) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) • P input signal is ON. • N input signal is ON. • R input signal is ON. • D input signal is ON. (B) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) • NSW input signal is ON. • R input signal is ON. • D input signal is ON. (C) Any of following conditions is met for 2.0 sec. or more in the S position (2-trip detection logic). • NSW input signal is ON. • P input signal is ON. • N input signal is ON. • R input signal is ON. (D) All switches are OFF simultaneously for NSW, P, R, N and D.	• Short in park / neutral position switch circuit • Park / neutral position switch • ECM

ES

MONITOR DESCRIPTION

These DTCs indicate a problem with the park / neutral position switch and the wire harness in the park / neutral position switch circuit.
The park / neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park / neutral position switch detects the shift lever position so that engine can be started only when the shift lever is in the P or N position.
The park / neutral position switch sends a signal to the ECM according to the shift position (P, R, N or D).
The ECM determines that there is a problem with the switch or related parts if it receives more than 1 position signal simultaneously. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705: Park / neutral position switch/Verify switch input
Required sensors/Components	Park / neutral position switch
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	None
Ignition switch	ON
Battery voltage	10.5 V or more

Condition (C):

One of the following conditions is met:	Condition (a), (b), (c) or (d)
(a) Park Neutral position switch	ON
(b) Park position switch	ON

(c) Neutral position switch	ON
(d) R range position switch	ON

TYPICAL MALFUNCTION THRESHOLDS

1. One of the following conditions is met: Condition (A), (B) and (C)

Condition (A):

Number of the following signal input at the same time	2 or more
Park position switch	ON
Neutral position switch	ON
R range position switch	ON
D range position switch	ON

Condition (B):

Number of the following signal input at the same time	2 or more
Park neutral position switch	ON
R range switch	ON
D range switch	ON

Condition (C):

"M" switch	ON

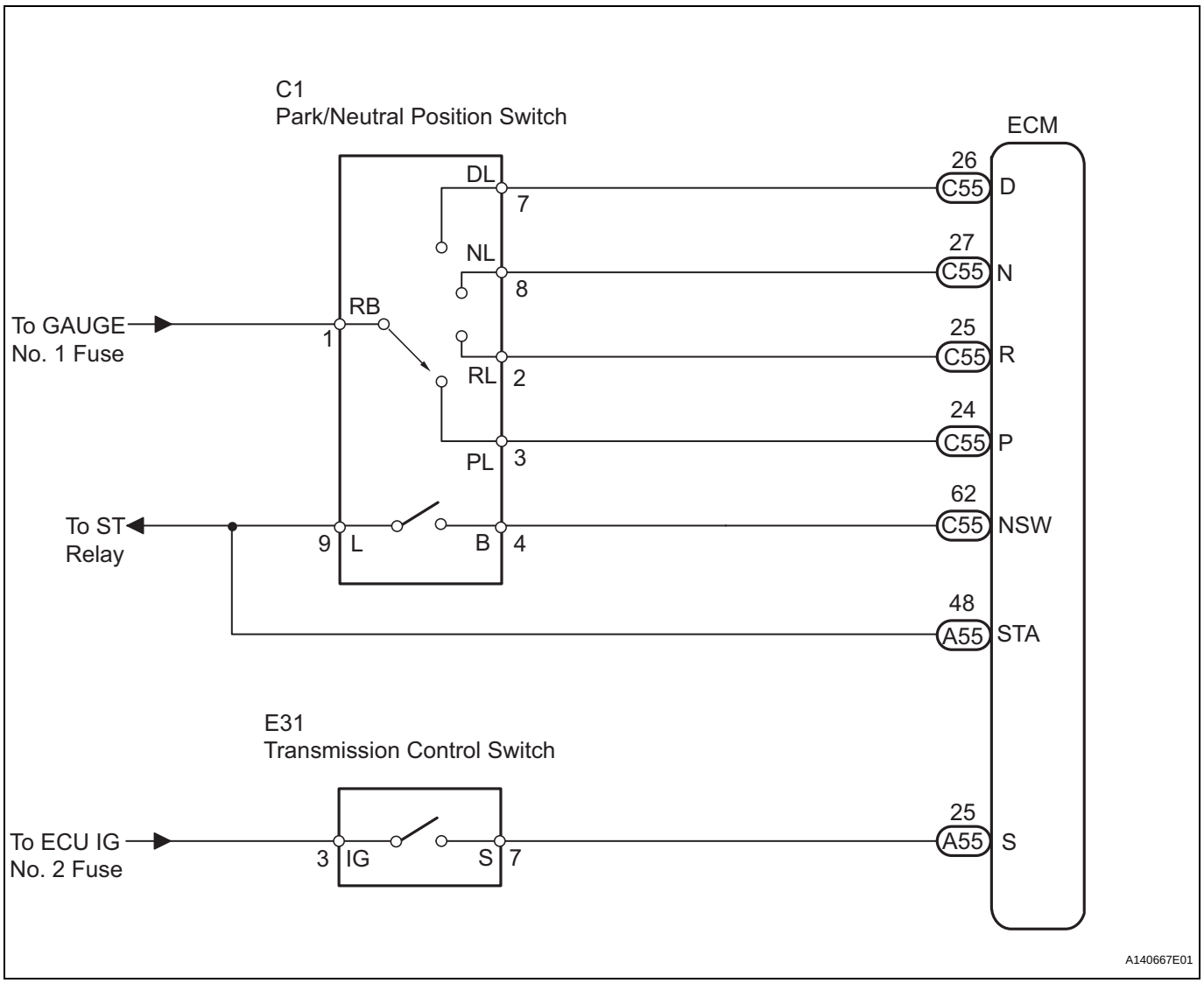
Condition (D):

Park position switch	OFF
Neutral position switch	OFF
Park neutral position switch	OFF
R range switch	OFF
D range switch	OFF

COMPONENT OPERATING RANGE

Park / neutral Position switch	The park / neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

1. READ DATA LIST

(a) Turn the ignition switch off.

(b) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.

(c) Turn the ignition switch on (IG).

(d) Turn on the tester.

(e) Select the item "DIAGNOSIS / ENHANCED OBD II / DATA LIST".

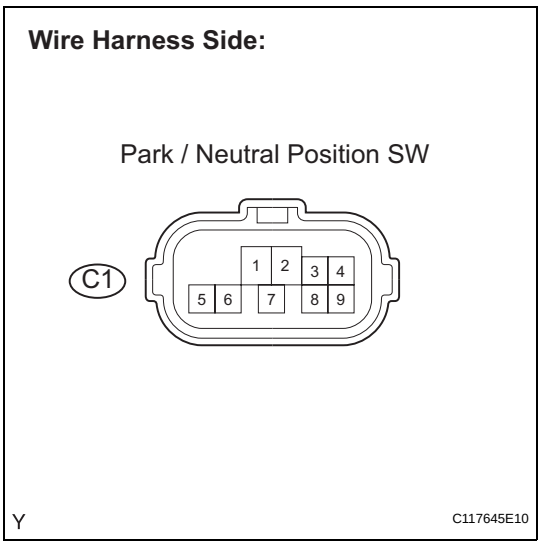
(f) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status / ON or OFF	Shift lever position is; P and N: ON Except P or N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
REVERSE	PNP SW Status / ON or OFF	Shift lever position is; R: ON Except R: OFF	↑
DRIVE	PNP SW Status / ON or OFF	Shift lever position is; D and S: ON Except D or S: OFF	↑

ES

1 CHECK HARNESS AND CONNECTOR (BATTERY - PARK / NEUTRAL POSITION SWITCH)

Wire Harness Side:



(a) Disconnect the park / neutral position switch connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

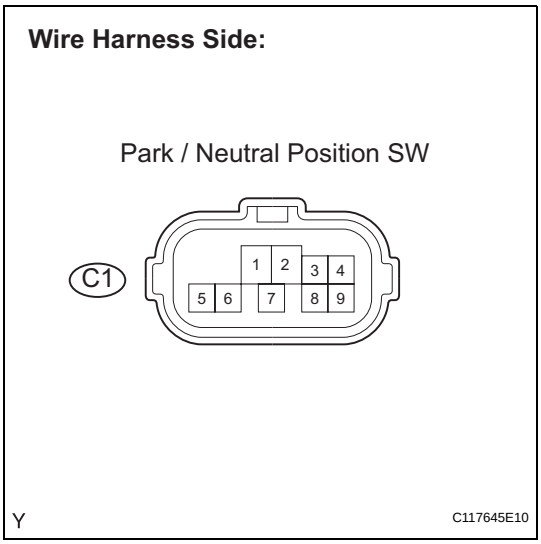
Tester Connection	Specified Condition
2 - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK ECM (OUTPUT SIGNAL)

Wire Harness Side:



(a) Turn the ignition switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

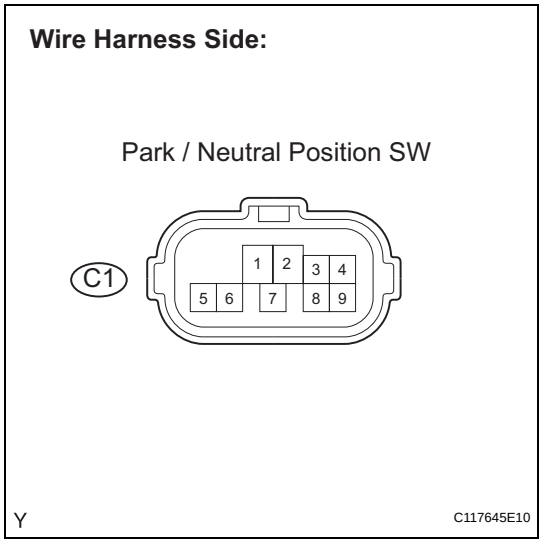
Standard voltage

Tester Connection	Specified Condition
4 - Body ground	10 to 14 V

NG → **Go to step 9**

OK

3	CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - BODY GROUND)



(a) Disconnect the C1 park/neutral position switch connector.
(b) Measure the resistance between the terminals.
Standard resistance

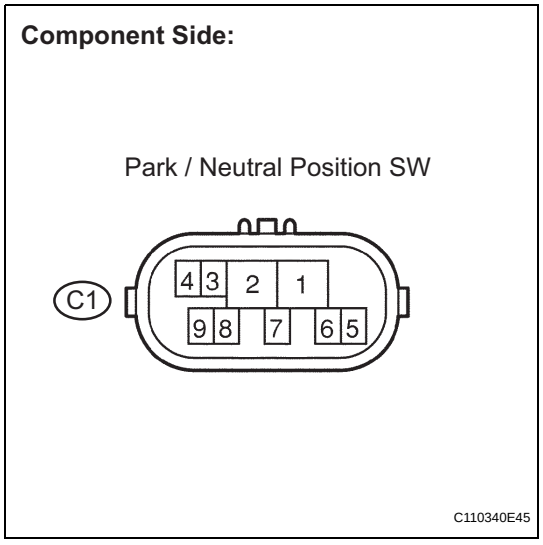
Tester Connection	Specified Condition
L (C1-9) - Body ground	Below 1 Ω

(c) Reconnect the park/neutral position switch connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT PARK / NEUTRAL POSITION SWITCH ASSEMBLY



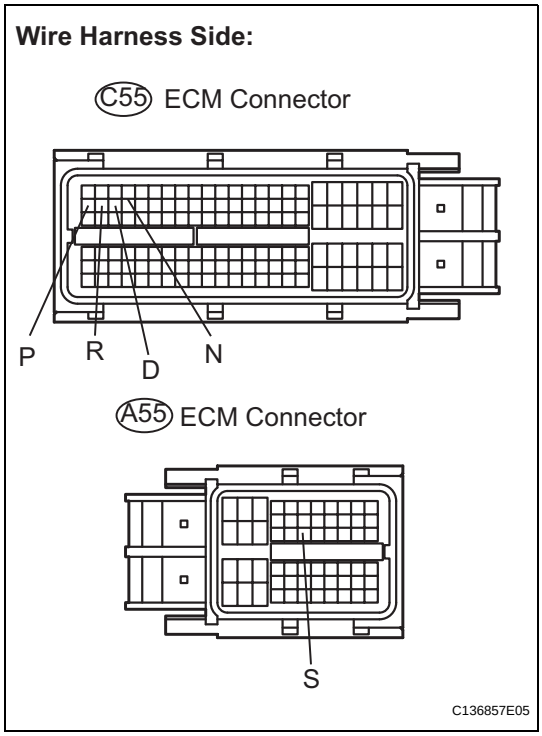
(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.
Standard resistance

Shift Position	Tester Connection	Specified Condition
P	1 - 3 and 4 - 9	Below 1 Ω
Except P		10 kΩ or higher
R	1 - 2	Below 1 Ω
Except R		10 kΩ or higher
N	1 - 8and 4 - 9	Below 1 Ω
Except N		10 kΩ or higher
D, S, "+" and "-"	1 - 7	Below 1 Ω
Except D, S, "+" and "-"		10 kΩ or higher

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY**

OK

5	CHECK HARNESS AND CONNECTOR



(a) Connect the park / neutral position switch connector.
(b) Disconnect the ECM connectors.
(c) Turn the ignition switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
P	C55-24 (P) - Body ground	10 to 14 V
Except P		Below 1 V
N	C55-27 (N) - Body ground	10 to 14 V
Except N		Below 1 V
R	C55-25 (R) - Body ground	10 to 14 V*
Except R		Below 1 V
D and S	C55-26 (D) - Body ground	10 to 14 V
Except D and S		Below 1 V
S, "+" and "-"	A55-25 (S) - Body ground	10 to 14 V
Except S, "+" and "-"		Below 1 V

HINT:
*: The voltage will drop slightly due to lighting up of the back up light.

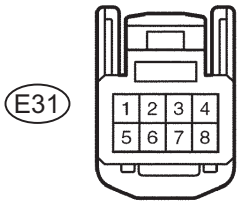
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK HARNESS AND CONNECTOR

Wire Harness Side:

Transmission Control Switch



C110345E20

(a) Disconnect the transmission control switch connector of the shift lock control unit assembly.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between the terminals.
Standard voltage

Tester Connection	Specified Condition
3 - Body ground	10 to 14 V

(d) Reconnect the transmission control switch connector.

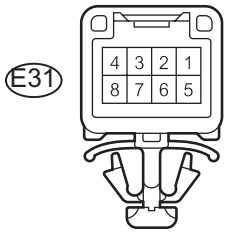
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7 INSPECT TRANSMISSION CONTROL SWITCH

Component Side:

Transmission Control Switch



C136860E03

(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.
Standard resistance

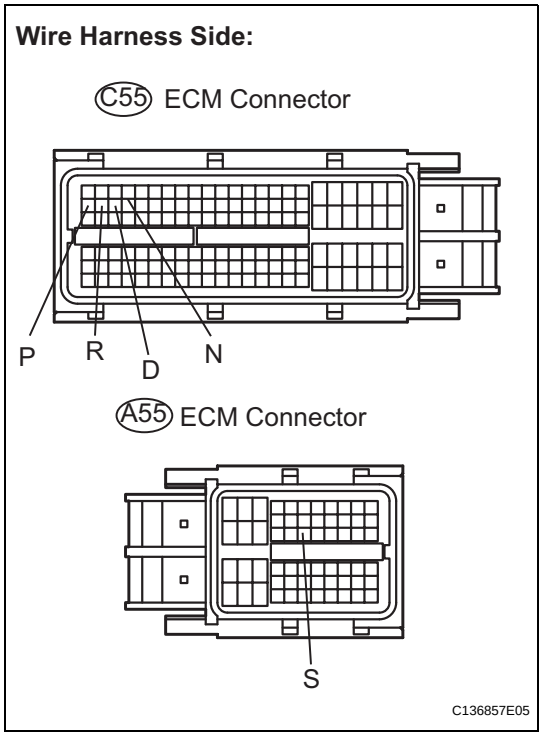
Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	3 - 7	Below 1 Ω
Except S, "+" and "-"		10 kΩ or higher

NG → **REPLACE TRANSMISSION CONTROL SWITCH**

OK

ES

8	CHECK HARNESS AND CONNECTOR



(a) Connect the transmission control switch connector of the shift lock control unit assembly.
(b) Turn the ignition switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
P	C55-24 (P) - Body ground	10 to 14 V
Except P	↑	Below 1 V
N	C55-27 (N) - Body ground	10 to 14 V
Except N	↑	Below 1 V
R	C55-25 (R) - Body ground	10 to 14 V *
Except R	↑	Below 1 V
D and S	C55-26 (D) - Body ground	10 to 14 V
Except D and S	↑	Below 1 V
S, "+" and "-"	A55-25 (S) - Body ground	10 to 14 V
Except S, "+" and "-"	↑	Below 1 V

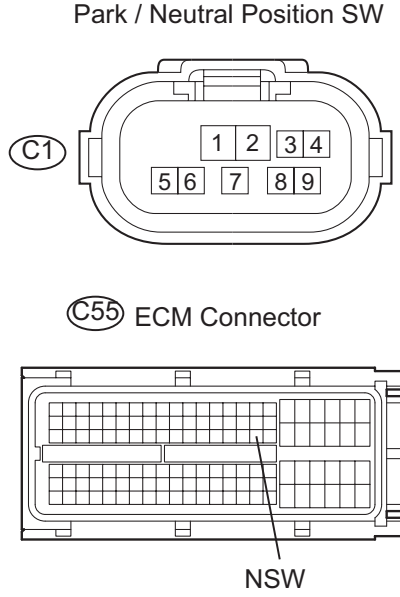
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

9	CHECK HARNESS AND CONNECTOR (PARK / NEUTRAL POSITION SWITCH - ECM)

Wire Harness Side:



(a) Disconnect the ECM connectors.
(b) Turn the ignition switch off.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
B (C1-4) - NSW (C55-62)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
B (C1-4) or NSW (C55-62) - Body ground	10 kΩ or higher

ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK →

REPLACE ECM

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

SYSTEM DESCRIPTION

The throttle actuator is operated by the ECM and opens and closes the throttle valve using the gears. The opening angle of the throttle valve is detected by the Throttle Position (TP) sensor, which is mounted on the throttle body. The TP sensor provides feedback to the ECM. This feedback allows the ECM to appropriately control the throttle actuator and monitor the throttle opening angle as the ECM responds to driver inputs.

HINT:

This ETCS (Electronic Throttle Control System) does not use a throttle cable.

ES

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds (1 trip detection logic): (a) Throttle actuator duty ratio 80 % or more (b) Throttle actuator current 0.5 A or less	• Open in throttle actuator circuit • Throttle actuator • ECM
P2103	Either of the following conditions is met: • Hybrid IC diagnosis signal fails • Hybrid IC current limiter port fails	• Short in throttle actuator circuit • Throttle actuator • Throttle valve • Throttle body assembly • ECM

MONITOR DESCRIPTION

The ECM monitors the electrical current through the electronic actuator, and detects malfunctions and open circuits in the throttle actuator based on this value. If the current is outside the standard range, the ECM determines that there is a malfunction in the throttle actuator. In addition, if the throttle valve does not function properly (for example, stuck on), the ECM determines that there is a malfunction. The ECM then illuminates the MIL and sets a DTC.

Example:

When the electrical current is more than 10 A, or less than 0.5 A and the throttle actuator duty ratio exceeds 80 %, the ECM interprets this as the current being outside the standard range, and illuminates the MIL and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set when the engine is quickly revved up to a high rpm several times after the engine has idled for 5 seconds after engine start.

MONITOR STRATEGY

Related DTCs	P2102: Throttle actuator current (low current) P2103: Throttle actuator current (high current)
Required Sensors/Components (Main)	Throttle actuator (throttle body)
Required Sensors/Components (Related)	None
Frequency of Operation	Continuous
Duration	P2102 (Throttle actuator current (low current)): 2 seconds P2103 (Throttle actuator current (high current)): 25 times or 0.6 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P2102:

Throttle motor	ON
Duty-cycle ratio to open throttle actuator	80 % or more
Throttle actuator power supply	8 V or more
Current motor current - Motor current at 0.016 sec. before	Less than 0.2 A

P2103:

Throttle motor	ON
Either of the following conditions 1 or 2 is met:	-
1. Throttle actuator power supply	8 V or more
2. Throttle actuator power	ON
Battery voltage	8 V or more
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2102:

Throttle actuator current	Less than 0.5 A

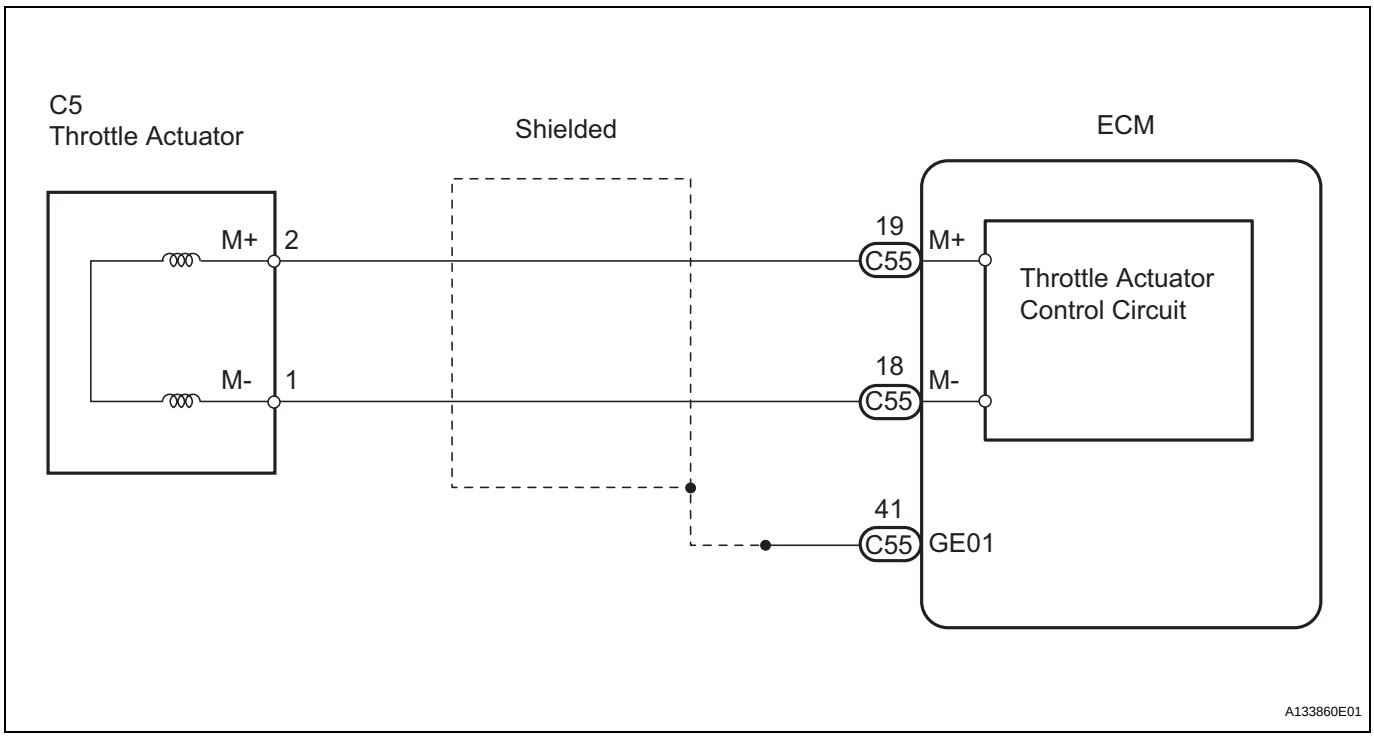
P2103:

Either of following conditions is met:	A or B
A. Hybrid IC diagnosis signal	Fail
B. Hybrid IC current limiter port	Fail

FAIL-SAFE

When either of these DTCs, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue running at a minimal speed. If the accelerator pedal is depressed gently, the vehicle can be driven slowly.
Fail-safe mode continues until a pass condition is detected, and the engine switch is then turned off.

WIRING DIAGRAM



ES

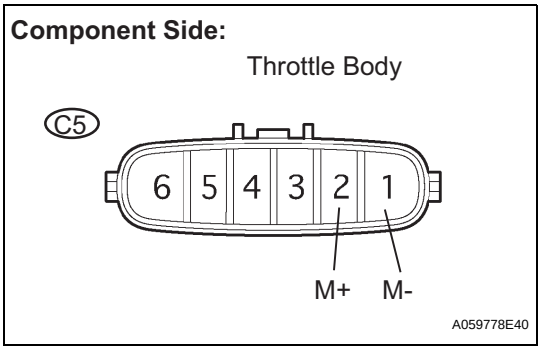
INSPECTION PROCEDURE

HINT:

- Read freeze frame data using an intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).
- The throttle actuator current (THROTTLE MOT) and the throttle actuator duty ratio (THROTTLE OPN / THROTTLE CLS) can be read using the intelligent tester. However, the ECM shuts off the throttle actuator current when the ETCS malfunctions.

1	INSPECT THROTTLE BODY (RESISTANCE OF THROTTLE CONTROL MOTOR)

Component Side:



(a) Disconnect the C5 throttle body connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
M+ (C5-2) - M- (C5-1)	20°C (68°F)	0.3 to 100 Ω

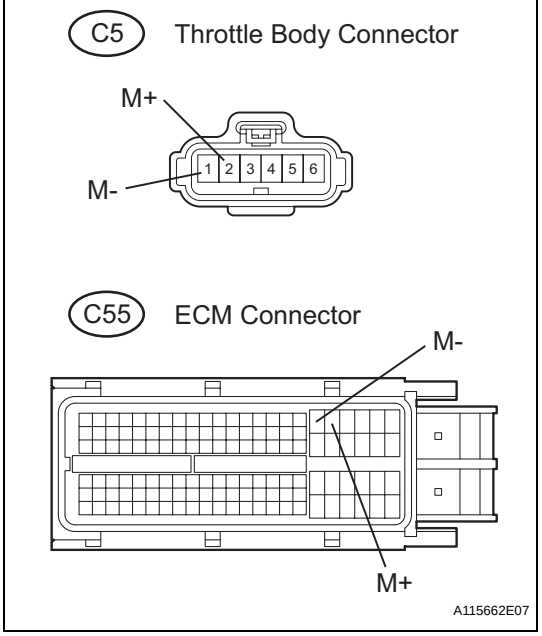
(c) Reconnect the throttle body connector.

NG → **REPLACE THROTTLE BODY (See page ES-503)**

OK

2	CHECK HARNESS AND CONNECTOR (THROTTLE CONTROL MOTOR - ECM)

Wire Harness Side Front View:



(a) Disconnect the C5 throttle body connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
M+ (C5-2) - M+ (C55-19)	Below 1 Ω
M- (C5-1) - M- (C55-18)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
M+ (C5-2) or M+ (C55-19) - Body ground	10 kΩ or higher
M- (C5-1) or M- (C55-18) - Body ground	10 kΩ or higher

(d) Reconnect the throttle body connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT THROTTLE BODY (VISUALLY CHECK THROTTLE VALVE)

(a) Check for foreign objects between the throttle valve and the housing.

NG → **REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY**

OK

4	INSPECT THROTTLE VALVE

(a) Check if the throttle valve opens and closes smoothly.

NG → **REPLACE THROTTLE BODY (See page ES-503)**

OK

REPLACE ECM (See page ES-518)

DTC	P2111	Throttle Actuator Control System - Stuck Open

DTC	P2112	Throttle Actuator Control System - Stuck Closed

SYSTEM DESCRIPTION

The throttle actuator is operated by the ECM, and opens and closes the throttle valve using the gears. The opening angle of the throttle valve is detected by the Throttle Position (TP) sensor, which is mounted on the throttle body. The TP sensor provides feedback to the ECM. This feedback allows the ECM to appropriately control the throttle actuator and monitor the throttle opening angle as the ECM responds to driver inputs.

HINT:

This ETCS (Electronic Throttle Control System) does not use a throttle cable.

ES

DTC No.	DTC Detection Condition	Trouble Area
P2111	ECM signals throttle actuator to close, but stuck (1 trip detection logic)	• Throttle actuator • Throttle body • Throttle valve
P2112	ECM signals throttle actuator to open, but stuck (1 trip detection logic)	• Throttle actuator • Throttle body • Throttle valve

MONITOR DESCRIPTION

The ECM determines that there is a malfunction in the ETCS when the throttle valve remains at a fixed angle despite a high drive current from the ECM. The ECM illuminates the MIL and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set when the accelerator pedal is fully depressed and released quickly (to fully open and close the throttle valve) after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2111: Throttle actuator stuck open P2112: Throttle actuator stuck closed
Required Sensors/Components (Main)	Throttle actuator
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All:

Monitor runs whenever following DTCs are not present	None

P2111 (Throttle actuator stuck open):

System guard*	ON
Throttle actuator current	2 A or more
Duty cycle to close throttle	80 % or more

P2112 (Throttle actuator stuck closed):

System guard*	ON
Throttle actuator current	2 A or more
Duty cycle to open throttle	80 % or more

*System guard set when following conditions are met:	-
Throttle actuator	ON
Throttle actuator duty calculation	Executing
Throttle position sensor	Fail determined
Throttle actuator current-cut operation	Not executing
Throttle actuator power supply	4 V or more
Throttle actuator	Fail determined

TYPICAL MALFUNCTION THRESHOLDS

P2111 (Throttle actuator stuck open):

TP sensor voltage change	No change

P2112 (Throttle actuator stuck closed):

TP sensor voltage change	No change

ES

FAIL-SAFE

When either of these DTCs, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue running at a minimal speed. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly. Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM

Refer to DTC P2102 (See page ES-320).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2111 or P2112)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2111 or P2112	A
P2111 or P2112 and other DTCs	B

HINT:
If any DTCs other than P2111 or P2112 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART (See page ES-63)

A

2 INSPECT THROTTLE BODY (VISUALLY CHECK THROTTLE VALVE)

(a) Check for contamination between the throttle valve and the housing. If necessary, clean the throttle body. And check that the throttle valve moves smoothly.

OK:

Throttle valve is not contaminated with foreign objects and moves smoothly.

NG → REPLACE THROTTLE BODY ASSEMBLY (See page ES-503)

OK

3 CHECK WHETHER DTC OUTPUT RECURS (DTC P2111 OR P2112)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-45).
(e) Start the engine, and fully depress and release the accelerator pedal quickly (to fully open and close the throttle valve).
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
No DTC	A
P2111 or P2112	B

B → REPLACE ECM (See page ES-518)

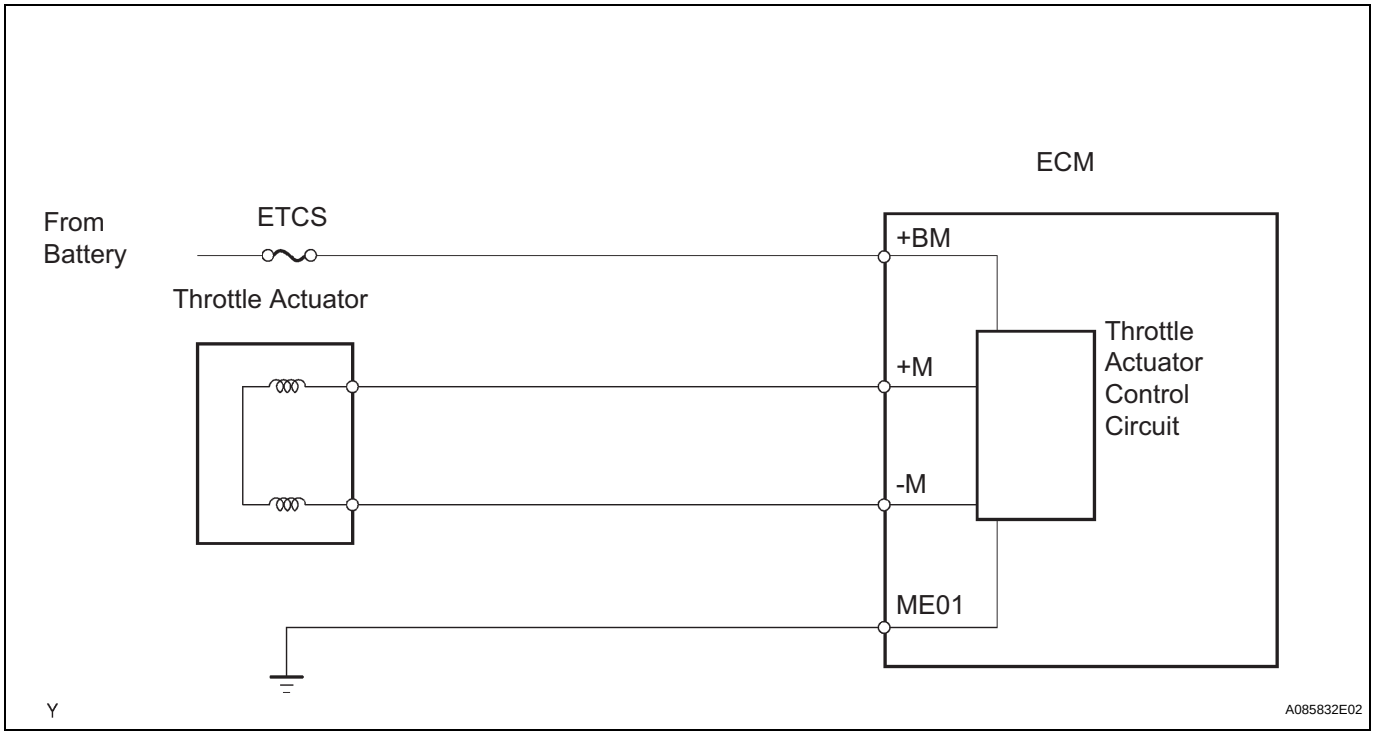
A

CHECK FOR INTERMITTENT PROBLEMS

DTC	P2118	Throttle Actuator Control Motor Current Range / Performance

DESCRIPTION

The ETCS (Electronic Throttle Control System) has a dedicated power supply circuit. When the monitored voltage (+BM) is low (less than 4 V), the ECM determines that there is a malfunction in the ETCS and cuts off the current to the throttle actuator.
When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the throttle actuator is cut. If repairs are made and the system returns to normal, turn the ignition switch off. The ECM then allows the current to flow to the throttle actuator so that it can be restarted.
HINT:
The ETCS does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source (+BM) circuit (1 trip detection logic)	• Open in ETCS power source circuit • ETCS fuse • ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the throttle actuator.
When the power supply voltage (+BM) drops below 4 V for 0.8 seconds or more, the ECM interprets this as an open in the power supply circuit (+BM). The ECM illuminates the MIL and sets the DTC.
If the malfunction is not repaired successfully, the DTC is set 5 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2118: Throttle actuator power supply
Required Sensors/Components (Main)	Throttle actuator, throttle valve, ETCS fuse
Required Sensors/Components (Sub)	None
Frequency of Operation	Continuous
Duration	0.8 seconds

MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery voltage	8 V or more
Throttle actuator power	ON

TYPICAL MALFUNCTION THRESHOLDS

Throttle actuator power supply voltage (+BM)	Less than 4 V

ES

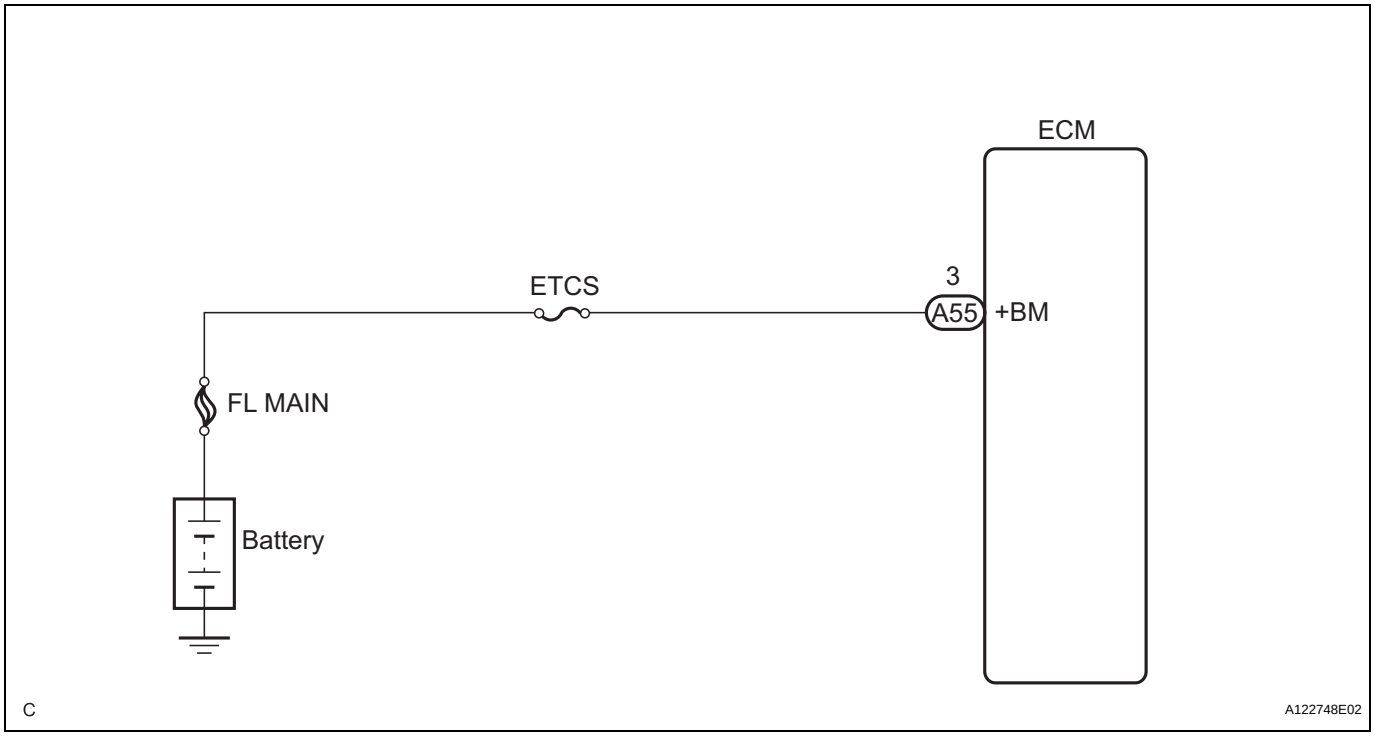
COMPONENT OPERATING RANGE

Throttle actuator power supply voltage	9 to 14 V

FAIL-SAFE

When this DTC, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue running at a minimal speed. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly. Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

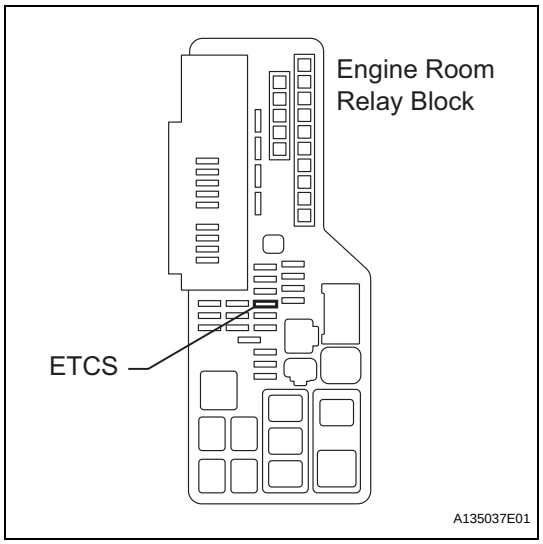
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK FUSE (ETCS FUSE)

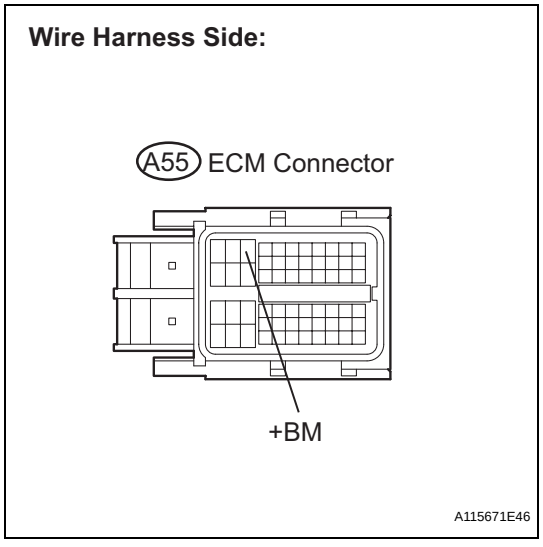


(a) Remove the ETCS fuse from the engine room R/B.
(b) Measure the resistance of the ETCS fuse.
Standard resistance:
Below 1 Ω
(c) Reinstall the ETCS fuse.

NG → **REPLACE ETCS FUSE**

OK

2	INSPECT ECM (+BM VOLTAGE)



(a) Disconnect the A55 ECM connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

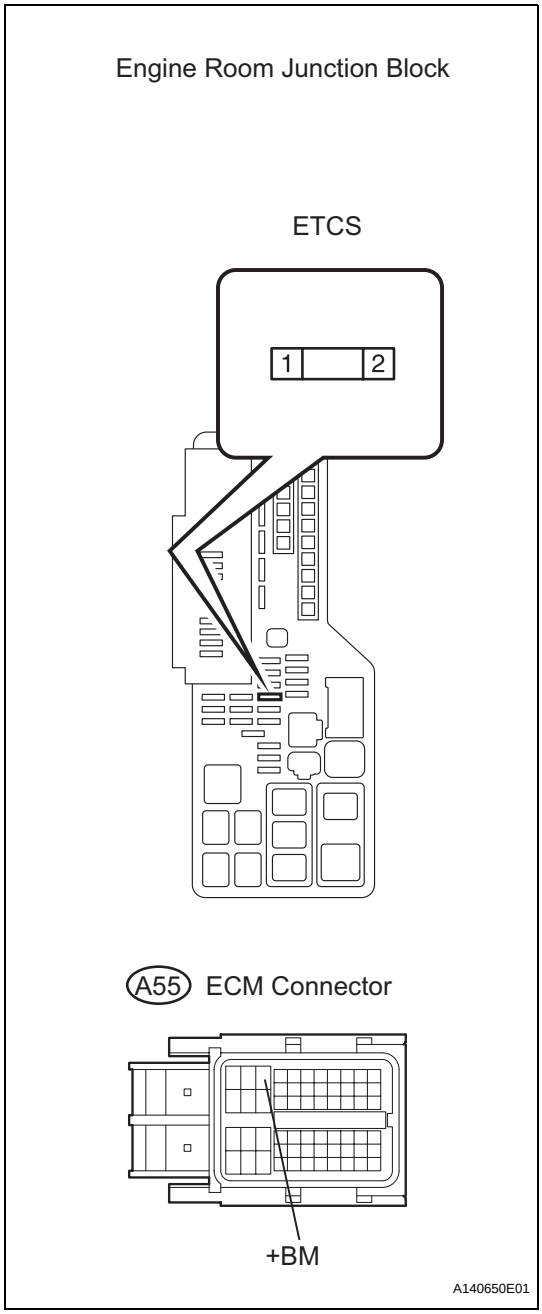
Tester Connection	Specified Condition
+BM (A55-3) - Body ground	9 to 14 V

(c) Reconnect the ECM connector.

OK → **CHECK FOR INTERMITTENT PROBLEMS**

NG

3	CHECK HARNESS AND CONNECTOR (ECM - ETCS FUSE, ETCS FUSE - BATTERY)



(a) Check the harness and connector between the ETCS fuse and ECM.
  (1) Remove the ETCS fuse from the engine room R/B.
  (2) Disconnect the A55 ECM connector.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
Engine room R/B ETCS fuse terminal 2 - +BM (A55-3)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Engine room R/B ETCS fuse terminal 2 or +BM (A55-3) - Body ground	10 kΩ or higher

  (4) Reinstall the ETCS fuse.
  (5) Reconnect the ECM connector.

(b) Check the harness and connector between the ETCS fuse and positive battery cable.
  (1) Remove the ETCS fuse from the engine room R/B.
  (2) Disconnect the negative battery terminal.
  (3) Disconnect the positive battery terminal.
  (4) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
Positive battery terminal - Engine room R/B ETCS fuse terminal 1	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
Positive battery terminal or Engine room R/B ETCS fuse terminal 1 - Body ground	10 kΩ or higher

  (5) Reinstall the ETCS fuse.
  (6) Reconnect the positive battery terminal.
  (7) Reconnect the negative battery terminal.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-518)

DTC	P2119	Throttle Actuator Control Throttle Body Range / Performance

SYSTEM DESCRIPTION

The Electronic Throttle Control System (ETCS) is composed of the throttle actuator, Throttle Position (TP) sensor, Accelerator Pedal Position (APP) sensor, and ECM. The ECM operates the throttle actuator to regulate the throttle valve in response to driver inputs. The TP sensor detects the opening angle of the throttle valve, and provides the ECM with feedback so that the throttle valve can be appropriately controlled by the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle valve opening angle continues to vary greatly from target opening angle (1 trip detection logic)	• ETCS • ECM

MONITOR DESCRIPTION

The ECM determines the actual opening angle of the throttle valve from the TP sensor signal. The actual opening angle is compared to the target opening angle commanded by the ECM. If the difference between these two values is outside the standard range, the ECM interprets this as a malfunction in the ETCS. The ECM then illuminates the MIL and sets the DTC.
If the malfunction is not repaired successfully, the DTC is set when the accelerator pedal is quickly released (to close the throttle valve) after the engine speed reaches 5,000 rpm by fully depressing the accelerator pedal (fully open the throttle valve).

MONITOR STRATEGY

Related DTCs	P2119: ETCS malfunction
Required Sensors/Components (Main)	Throttle actuator
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	1 second
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
System guard*	ON
*System guard set when following conditions are met:	-
Throttle actuator	ON
Throttle actuator duty calculation	Executing
TP sensor	Fail determined
Throttle actuator current-cut operation	Not executing
Throttle actuator power supply	4 V or more
Throttle actuator	Fail determined

TYPICAL MALFUNCTION THRESHOLDS

Either of following conditions A or B is met	-
A. Commanded closed TP - current closed TP	0.3 V or more for 1 second
B. Commanded open TP - current open TP	0.3 V or more for 0.6 seconds

FAIL-SAFE

When this DTC, as well as other DTCs relating to ETCS (Electronic Throttle Control System) malfunctions, is set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator off, and the throttle valve is returned to a 6° throttle angle by the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing, in accordance with the accelerator pedal opening angle, to allow the vehicle to continue running at a minimal speed. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly. Fail-safe mode continues until a pass condition is detected, and the ignition switch is then turned off.

WIRING DIAGRAM

Refer to DTC P2102 (See page ES-322).

INSPECTION PROCEDURE

ES

HINT:

Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2119)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2119	A
P2119 and other DTCs	B

HINT:

If any DTCs other than P2119 are output, troubleshoot those DTCs first.

B → GO TO DTC CHART (See page ES-63)

A

2	CHECK WHETHER DTC OUTPUT RECURS (DTC P2119)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Clear the DTCs (See page ES-45).
(e) Allow the engine to idle for 15 seconds.

CAUTION:

Exercise extreme care and take precautions at procedure "A" and "B" below. Failure to do so may result in the vehicle unexpectedly rolling away.

(f) Securely apply the parking brake and move the gear selector lever to the D position (Procedure "A").
(g) While depressing the brake pedal securely, fully depress the accelerator pedal for 5 seconds (Procedure "B").
(h) On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(i) Read the DTCs.
HINT:
The output voltage of the throttle position sensor can be checked during procedure "B" using the intelligent tester. Variations in the output voltage indicate that the throttle actuator is in operation. To check the output voltage using the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / THROTTLE POS #1.
OK:
No DTC output.

ES

NG → **REPLACE THROTTLE BODY ASSEMBLY (See page ES-503)**

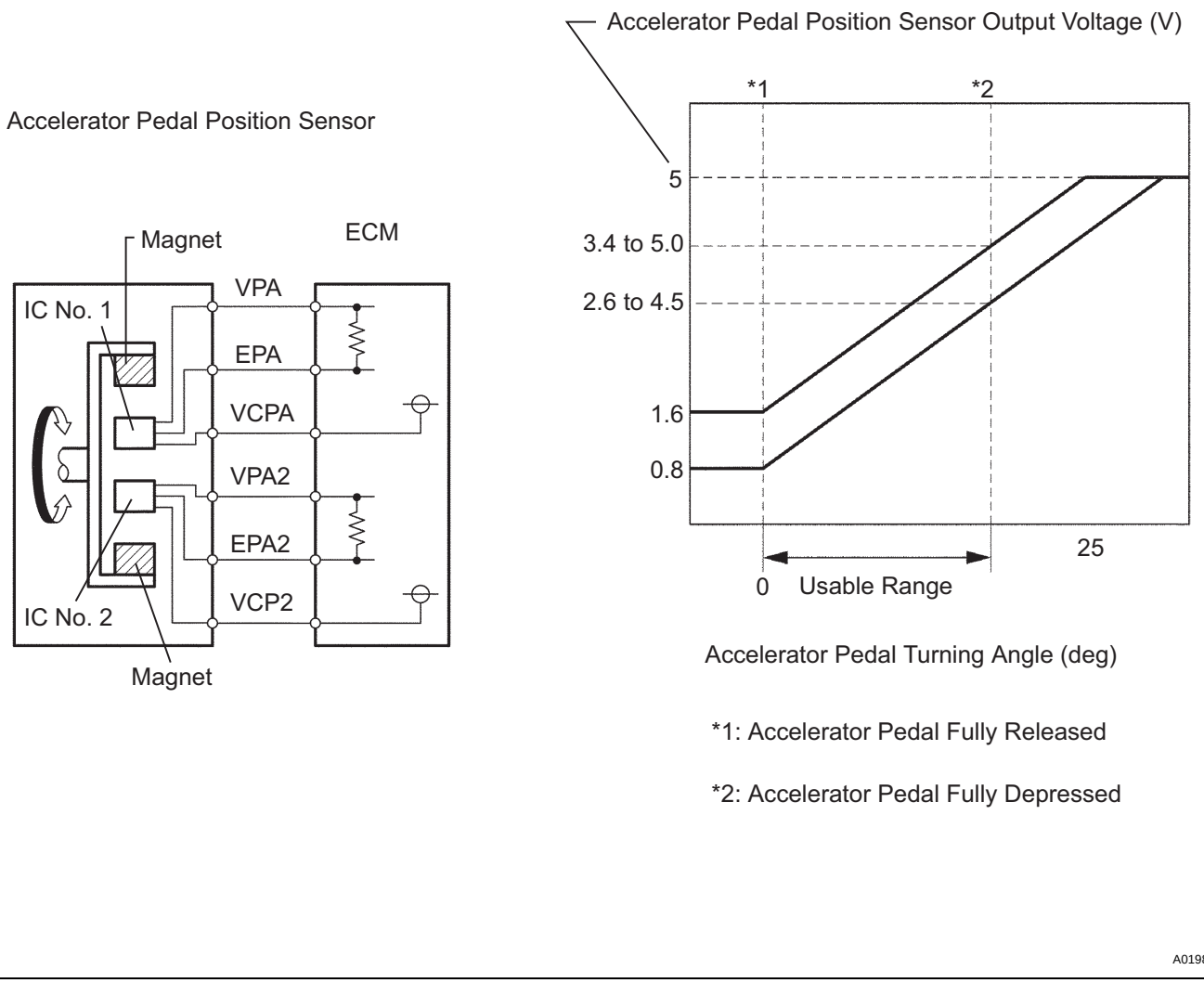
OK

END

DTC	P2120	Throttle / Pedal Position Sensor / Switch "D" Circuit
DTC	P2122	Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input
DTC	P2123	Throttle / Pedal Position Sensor / Switch "D" Circuit High Input
DTC	P2125	Throttle / Pedal Position Sensor / Switch "E" Circuit
DTC	P2127	Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input
DTC	P2128	Throttle / Pedal Position Sensor / Switch "E" Circuit High Input
DTC	P2138	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation

DESCRIPTION

This ETCS (Electronic Throttle Control System) does not use a throttle cable.
The Accelerator Pedal Position (APP) sensor is mounted on the accelerator pedal bracket and has 2 sensor circuits: VPA (main) and VPA2 (sub). This sensor is a non-contact type, and uses Hall-effect elements, in order to yield accurate signals, even in extreme driving conditions, such as at high speeds as well as very low speeds. The voltage, which is applied to terminals VPA and VPA2 of the ECM, varies between 0 V and 5 V in proportion to the operating angle of the accelerator pedal (throttle valve). A signal from VPA indicates the actual accelerator pedal opening angle (throttle valve opening angle) and is used for engine control. A signal from VPA2 conveys the status of the VPA circuit and is used to check the APP sensor itself.
The ECM monitors the actual accelerator pedal opening angle (throttle valve opening angle) through the signals from VPA and VPA2, and controls the throttle actuator according to these signals.



DTC No.	DTC Detection Condition	Trouble Area
P2120	VPA fluctuates rapidly beyond upper and lower malfunction thresholds for 0.5 seconds or more (1 trip detection logic)	• Accelerator Pedal Position (APP) sensor • ECM
P2122	VPA is 0.4 V or less for 0.5 seconds or more when accelerator pedal is fully released (1 trip detection logic)	• APP sensor • Open in VCP1 circuit • Open or ground short in VPA circuit • ECM
P2123	VPA is 4.8 V or more for 2.0 seconds or more (1 trip detection logic)	• APP sensor • Open in EPA circuit • ECM
P2125	VPA2 fluctuates rapidly beyond upper and lower malfunction thresholds for 0.5 seconds or more (1 trip detection logic)	• APP sensor • ECM
P2127	VPA2 is 1.2 V or less for 0.5 seconds or more when accelerator pedal is fully released (1 trip detection logic)	• APP sensor • Open in VCP2 circuit • Open or ground short in VPA2 circuit • ECM
P2128	Conditions (a) and (b) continue for 2.0 seconds or more (1 trip detection logic): (a) VPA2 is 4.8 V or more (b) VPA is between 0.4 V and 3.45 V	• APP sensor • Open in EPA2 circuit • ECM

DTC No.	DTC Detection Condition	Trouble Area
P2138	Condition (a) or (b) continues for 2.0 seconds or more (1 trip detection logic): (a) Difference between VPA and VPA2 is 0.02 V or less (b) VPA is 0.4 V or less and VPA2 1.2 V or less	• Short between VPA and VPA2 circuits • APP sensor • ECM

HINT:
When any of these DTCs are set, check the APP sensor voltage by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ACCEL POS #1 and ACCEL POS #2.

Trouble Areas	ACCEL POS #1 When AP Released	ACCEL POS #2 When AP Released	ACCEL POS #1 When AP Depressed	ACCEL POS #2 When AP Depressed
VCP circuit open	0 to 0.4 V	0 to 1.2 V	0 to 0.4 V	0 to 1.2 V
Open or ground short in VPA circuit	0 to 0.4 V	1.2 to 2.0 V	0 to 0.4 V	3.4 to 5.0 V
Open or ground short in VPA2 circuit	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
EPA circuit open	4.5 to 5.0 V	4.5 to 5.0 V	4.5 to 5.0 V	4.5 to 5.0 V
Normal condition	0.5 to 1.1 V	1.2 to 2.0 V	2.6 to 4.5 V	3.4 to 5.0 V

HINT:
- Accelerator pedal positions are expressed as voltages.
- AP denotes Accelerator Pedal.

MONITOR DESCRIPTION

When either of the output voltages of VPA or VPA2 deviates from the standard range, or the difference between the output voltages of the 2 sensor circuits is less than the threshold, the ECM determines that there is a malfunction in the APP sensor. The ECM then illuminates the MIL and sets a DTC.

Example:

When the output voltage of VPA drops below 0.4 V for more than 0.5 seconds when the accelerator pedal is fully depressed, DTC P2122 is set.

If the malfunction is not repaired successfully, a DTC is set 2 seconds after the engine is next started.

MONITOR STRATEGY

Related DTCs	P2120: Accelerator Pedal Position (APP) sensor 1 range check (fluctuating) P2122: APP sensor 1 range check (low voltage) P2123: APP sensor 1 range check (high voltage) P2125: APP sensor 2 range check (fluctuating) P2127: APP sensor 2 range check (low voltage) P2128: APP sensor 2 range check (high voltage) P2138: APP sensor range check (correlation)
Required Sensors/Components (Main)	APP sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	Accelerator Pedal Position (APP) sensor 1 range check (fluctuating): 0.5 seconds APP sensor 1 range check (low voltage): 0.5 seconds APP sensor 1 range check (high voltage): 2 seconds APP sensor 2 range check (fluctuating): 0.5 seconds APP sensor 2 range check (low voltage): 0.5 seconds APP sensor 2 range check (high voltage): 2 seconds APP sensor range check (correlation): 2 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

P2120:

One of the following conditions is met:	-
VPA voltage when VPA2 is 0.04 V or more	0.4 V or less
VPA voltage	4.8 V or more

P2122:

VPA voltage when VPA2 is 0.04 V or more	0.4 V or less

P2123:

VPA voltage	4.8 V or more

P2125:

One of the following conditions is met:	-
VPA2 voltage when VPA 0.04 V or more	1.2 V or less
VPA2 voltage when VPA 0.4 to 3.45 V	4.8 V or more

P2127:

VPA2 voltage when VPA is 0.04 V or more	1.2 V or less

P2128:

VPA2 voltage when VPA is 0.4 to 3.45 V	4.8 V or more

P2138:

Either of following conditions A or B is met:	-
Condition A	-
Difference between VPA and VPA 2 voltages	0.02 V or less
Condition B	-
VPA voltage	0.4 V or less
VPA2 voltage	1.2 V or less

COMPONENT OPERATING RANGE

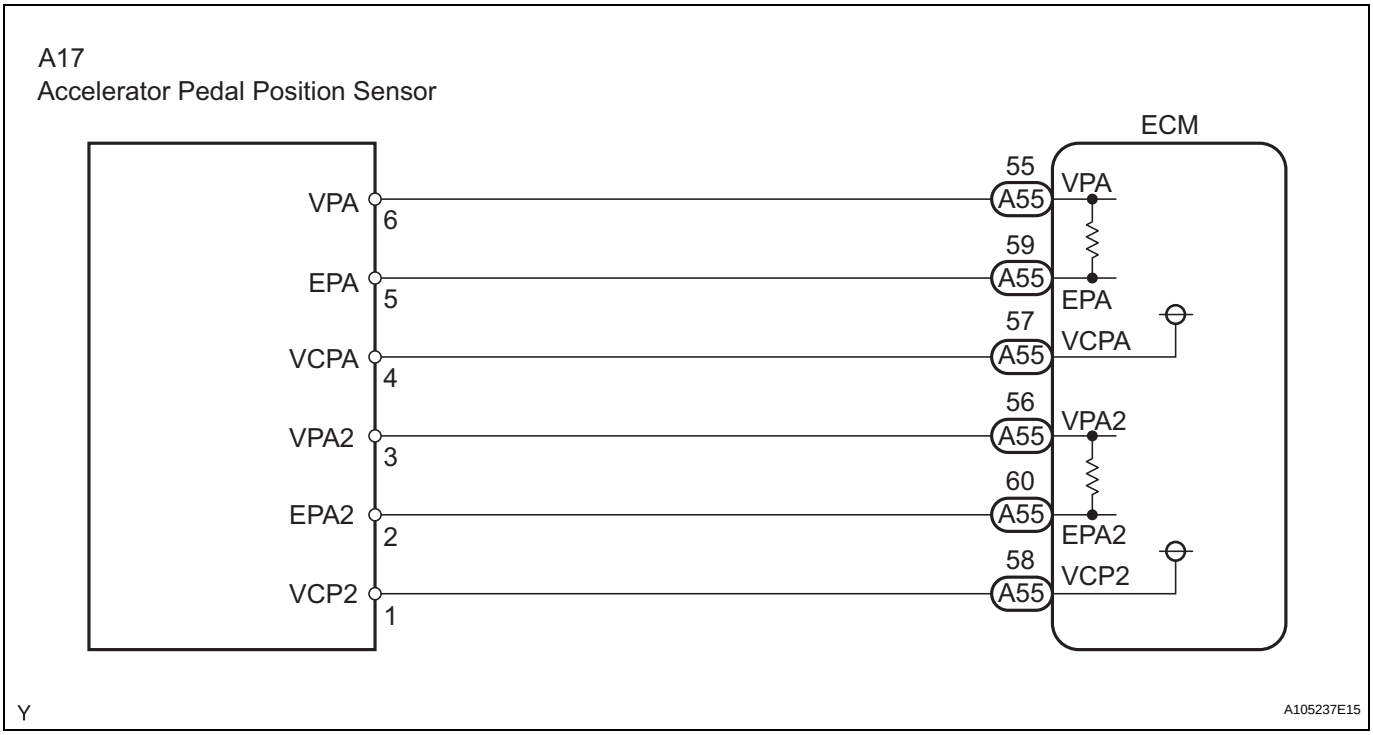
Parameter	Standard Value
VPA voltage	0.4 V to 4.8 V
VPA2 voltage	0.5 V to 4.8 V
Difference between VPA and VPA2 voltages	More than 0.02 V

FAIL-SAFE

When any of DTCs P2120, P2121, P2122, P2123, P2125, P2127, P2128 and P2138 are set, the ECM enters fail-safe mode. If either of the 2 sensor circuits malfunctions, the ECM uses the remaining circuit to calculate the accelerator pedal position to allow the vehicle to continue driving. If both of the circuits malfunction, the ECM regards the accelerator pedal as being released. As a result, the throttle valve is closed and the engine idles.

Fail-safe mode continues until a pass condition is detected, and the engine switch is then turned off.

WIRING DIAGRAM



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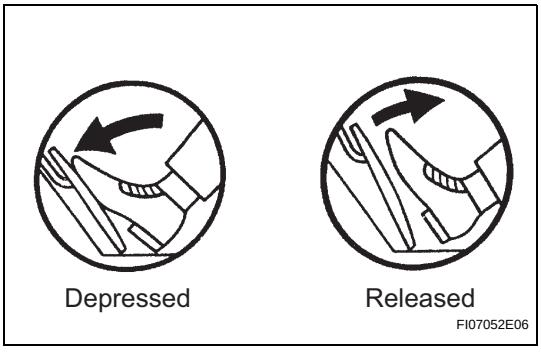
INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).
- These DTCs relate to the Accelerator Pedal Position (APP) sensor.

1	READ VALUE OF INTELLIGENT TESTER (ACCEL POS #1 AND ACCEL POS #2)



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ACCEL POS #1 and ACCEL POS #2.
(d) Read the value displayed on the tester.

Standard voltage

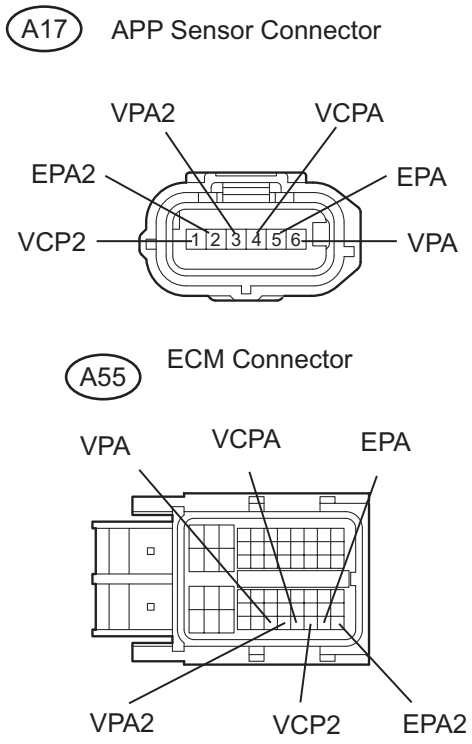
Accelerator Pedal Operations	ACCEL POS #1 (AP#1)	ACCEL POS #2 (AP#2)
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.0 V

OK → **Go to step 5**

NG

2 CHECK HARNESS AND CONNECTOR (ACCELERATOR PEDAL POSITION SENSOR - ECM)

Wire Harness Side Front View:



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(a) Disconnect the A17 Accelerator Pedal Position (APP) sensor connector.
(b) Disconnect the A55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VPA (A17-6) - VPA (A55-55)	Below 1 Ω
EPA (A17-5) - EPA (A55-59)	Below 1 Ω
VCPA (A17-4) - VCPA (A55-57)	Below 1 Ω
VPA2 (A17-3) - VPA2 (A55-56)	Below 1 Ω
EPA2 (A17-2) - EPA2 (A55-60)	Below 1 Ω
VCP2 (A17-1) - VCP2 (A55-58)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VPA (A17-6) or VPA (A55-55) - body ground	10 kΩ or higher
EPA (A17-5) or EPA (A55-59) - body ground	10 kΩ or higher
VCPA (A17-4) or VCPA (A55-57) - body ground	10 kΩ or higher
VPA2 (A17-3) or VPA2 (A55-56) - body ground	10 kΩ or higher
EPA2 (A17-2) or EPA2 (A55-60) - body ground	10 kΩ or higher
VCP2 (A17-1) or VCP2 (A55-58) - body ground	10 kΩ or higher

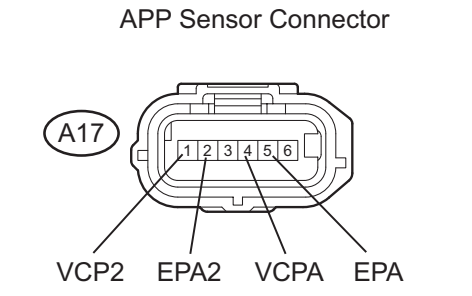
(d) Reconnect the APP sensor connector.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT ACCELERATOR POSITION SENSOR (VCPA AND VCP2 VOLTAGE)

Wire Harness Side Front View:



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(a) Disconnect the A17 APP sensor connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
VCPA (A17-4) - EPA (A17-5)	4.5 to 5.0 V
VCP2 (A17-1) - EPA2 (A17-2)	4.5 to 5.0 V

(d) Reconnect the APP sensor connector.

NG → **REPLACE ECM (See page ES-518)**

OK

4	REPLACE ACCELERATOR PEDAL ROD ASSEMBLY

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (ACCELERATOR PEDAL POSITION SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-45).
(d) Start the engine.
(e) Allow the engine to idle for 15 seconds.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES
(g) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2120, P2122, P2123, P2125, P2127, P2128, and/or P2138	A
No output	B

B → SYSTEM IS OK

A

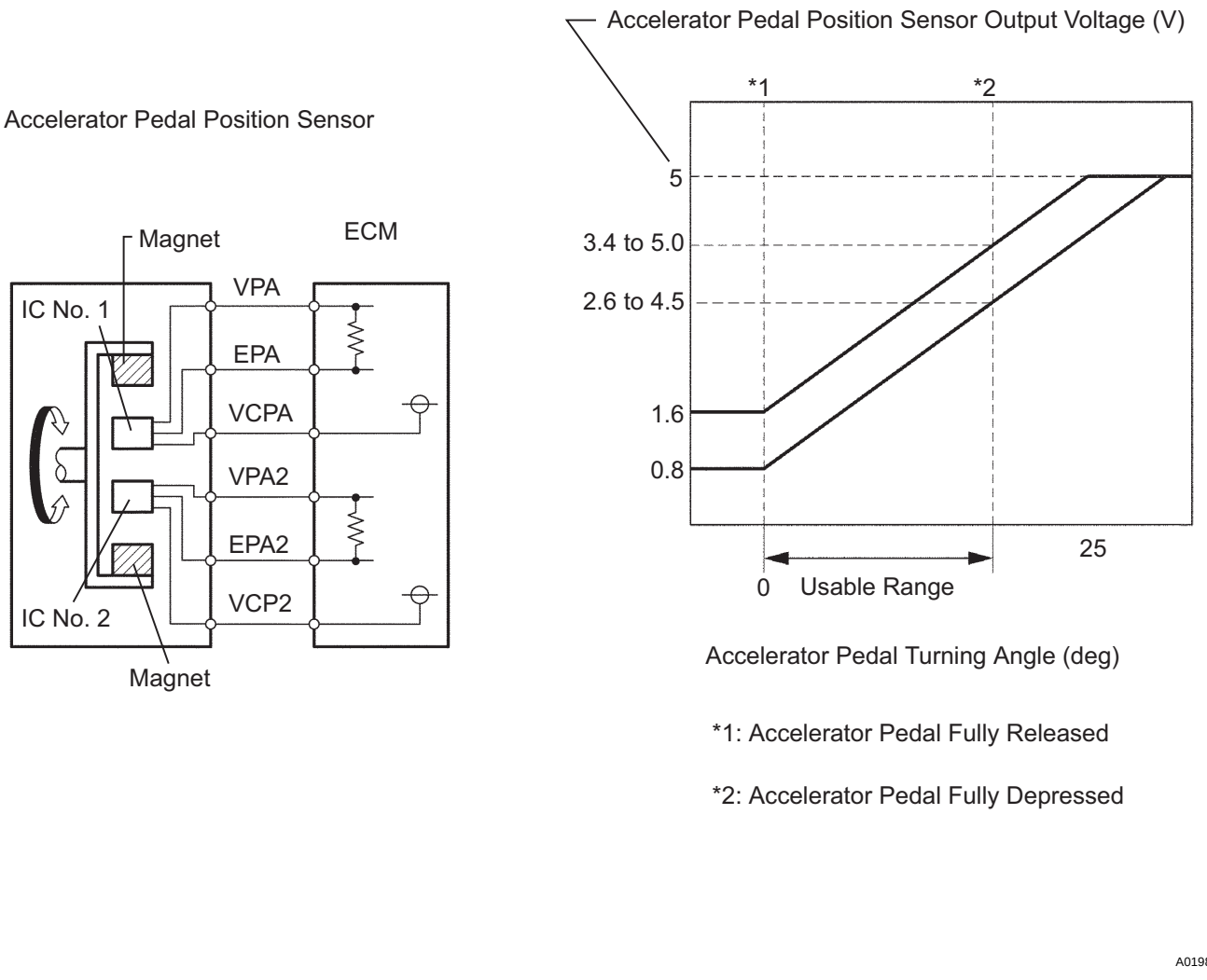
REPLACE ECM (See page ES-518)

DTC	P2121	Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance

DESCRIPTION

This ETCS (Electronic Throttle Control System) does not use a throttle cable.
The Accelerator Pedal Position (APP) sensor is mounted on the accelerator pedal bracket and has 2 sensor circuits: VPA (main) and VPA2 (sub). This sensor is a non-contact type, and uses Hall-effect elements, in order to yield accurate signals, even in extreme driving conditions, such as at high speeds as well as very low speeds. The voltage, which is applied to terminals VPA and VPA2 of the ECM, varies between 0 V and 5 V in proportion to the operating angle of the accelerator pedal (throttle valve). A signal from VPA indicates the actual accelerator pedal opening angle (throttle valve opening angle) and is used for engine control. A signal from VPA2 conveys the status of the VPA circuit and is used to check the APP sensor itself.
The ECM monitors the actual accelerator pedal opening angle (throttle valve opening angle) through the signals from VPA and VPA2, and controls the throttle actuator according to these signals.

ES



DTC No.	DTC Detection Condition	Trouble Area
P2121	Difference between VPA and VPA2 is less than 0.4 V, or more than 1.2 V for 0.5 seconds (1 trip detection logic)	• Accelerator Pedal Position (APP) sensor • ECM

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has 2 sensor elements and 2 signal outputs: VPA and VPA2. VPA is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA. When the difference between the output voltages of VPA and VPA2 deviates from the standard, the ECM determines that the accelerator pedal position sensor is a malfunctioning. The ECM turns on the MIL and the DTC is set.

MONITOR STRATEGY

Related DTCs	P2121: Accelerator pedal position (APP) sensor rationality
Required Sensors/Components (Main)	APP sensor
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	0.5 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None

TYPICAL MALFUNCTION THRESHOLDS

Difference between VPA1 voltage (learned value) and VPA2 voltage (learned value)	Less than 0.4 V, or more than 1.2 V

FAIL-SAFE

The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the functioning circuit is used to calculate the accelerator pedal opening angle to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal as being fully closed. In this case, the throttle valve remains closed as if the engine is idling.
If a pass condition is detected and then the ignition switch is turned off, the fail-safe operation stops and the system returns to a normal condition.

WIRING DIAGRAM

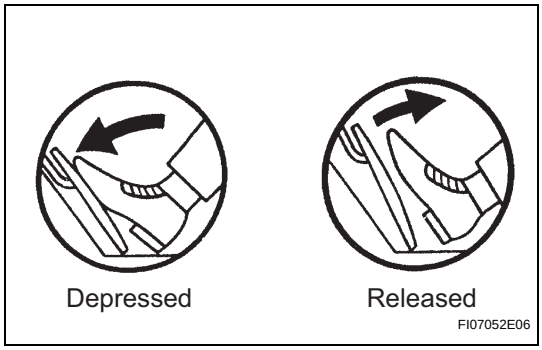
Refer to DTC P2120 (See page ES-338).

INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).
- This DTC relates to the Accelerator Pedal Position (APP) sensor.

1	READ VALUE OF INTELLIGENT TESTER (ACCEL POS #1 AND ACCEL POS #2)



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ACCEL POS #1 and ACCEL POS #2.
(d) Read the values displayed on the tester.

Standard voltage

Accelerator Pedal Operations	ACCEL POS #1 (AP#1)	ACCEL POS #2 (AP#2)
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 4.7 V

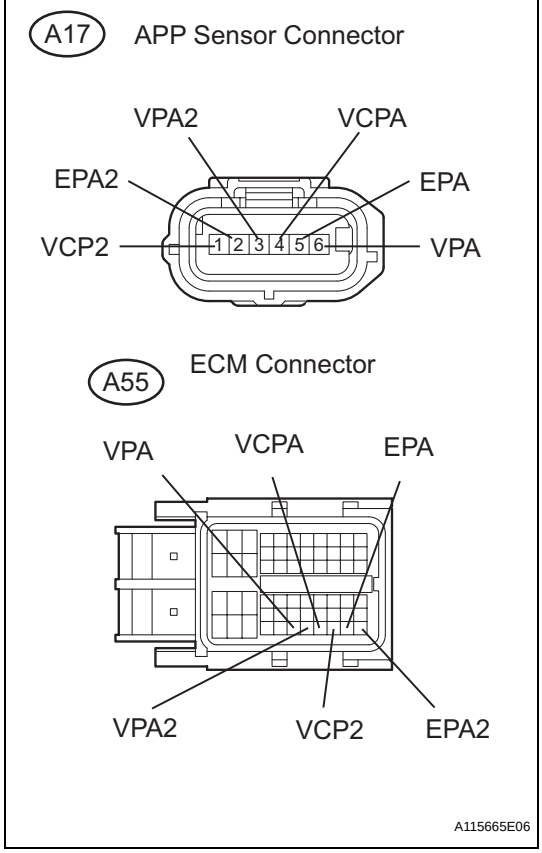
ES

OK → Go to step 3

NG

2	CHECK HARNESS AND CONNECTOR (ACCELERATOR PEDAL POSITION SENSOR - ECM)

Wire Harness Side Front View:



(a) Disconnect the A17 Accelerator Pedal Position (APP) sensor connector.
(b) Disconnect the A55 ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
VPA (A17-6) - VPA (A55-55)	Below 1 Ω
EPA (A17-5) - EPA (A55-59)	Below 1 Ω
VCPA (A17-4) - VCPA (A55-57)	Below 1 Ω
VPA2 (A17-3) - VPA2 (A55-56)	Below 1 Ω
EPA2 (A17-2) - EPA2 (A55-60)	Below 1 Ω
VCP2 (A17-1) - VCP2 (A55-58)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VPA (A17-6) or VPA (A55-55) - body ground	10 kΩ or higher
EPA (A17-5) or EPA (A55-59) - body ground	10 kΩ or higher
VCPA (A17-4) or VCPA (A55-57) - body ground	10 kΩ or higher
VPA2 (A17-3) or VPA2 (A55-56) - body ground	10 kΩ or higher
EPA2 (A17-2) or EPA2 (A55-60) - body ground	10 kΩ or higher
VCP2 (A17-1) or VCP2 (A55-58) - body ground	10 kΩ or higher

(d) Reconnect the APP sensor connector.
(e) Reconnect the ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3	REPLACE ACCELERATOR PEDAL ROD ASSEMBLY

NEXT

4	CHECK WHETHER DTC OUTPUT RECURS (ACCELERATOR PEDAL POSITION SENSOR DTCS)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Clear the DTCs (See page ES-45).
(d) Start the engine.
(e) Allow the engine to idle for 15 seconds.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Read the DTCs.

ES

Result

Display (DTC Output)	Proceed to
P2121	A
No output	B

B → END

A

REPLACE ECM (See page ES-518)

DTC	P2195	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1)

DTC	P2197	Oxygen (A/F) Sensor Signal Stuck Lean (Bank 2 Sensor 1)

DTC	P2198	Oxygen (A/F) Sensor Signal Stuck Rich (Bank 2 Sensor 1)

DESCRIPTION

HINT:

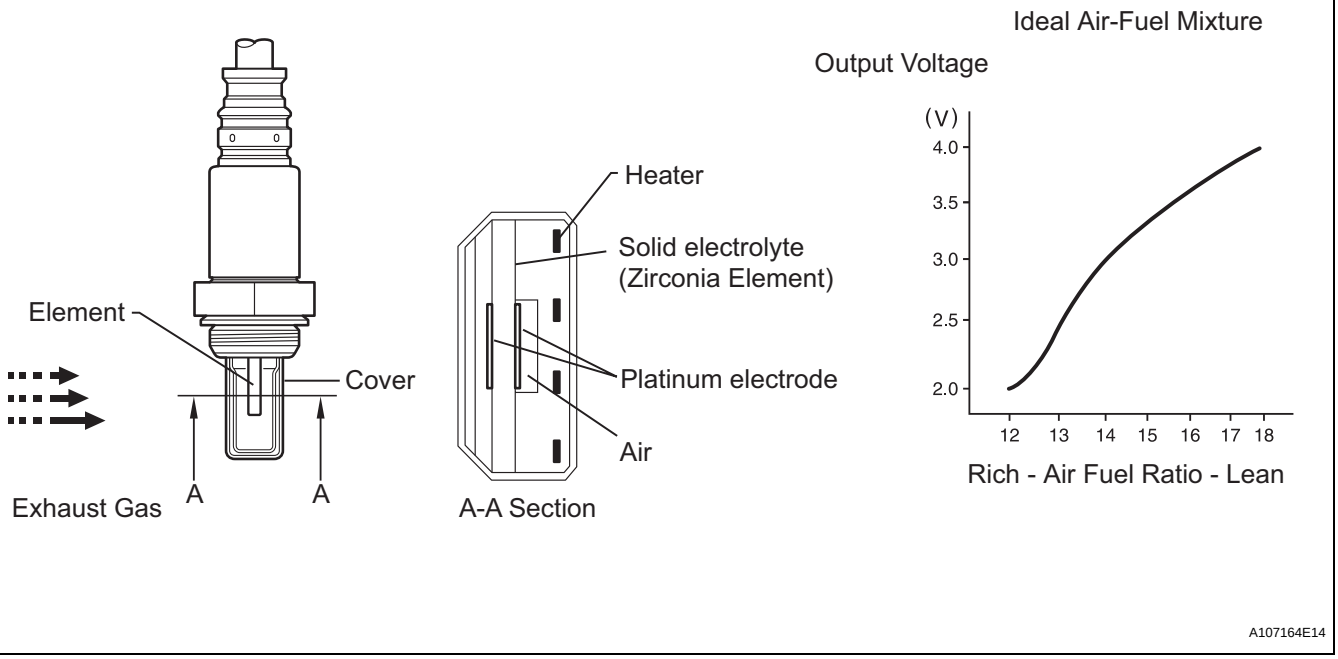
- Although the DTC titles include oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

The A/F sensor generates voltage* that corresponds to the actual air-fuel ratio. This sensor voltage is used to provide the ECM with feedback so that it can control the air-fuel ratio. The ECM determines the deviation from the stoichiometric air-fuel ratio level, and regulates the fuel injection time. If the A/F sensor malfunctions, the ECM is unable to control the air-fuel ratio accurately.

The A/F sensor is the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate oxygen concentration detection. In addition, the sensor and heater portions are narrower than the conventional type. The heat generated by the heater is conducted to the solid electrolyte through the alumina, therefore the sensor activation is accelerated.

A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio.

*: Value changes inside the ECM. Since the A/F sensor is the current output element, a current is converted to a voltage inside the ECM. Any measurements taken at the A/F sensor or ECM connectors will show a constant voltage.



DTC No.	DTC Detection Condition	Trouble Area
P2195 P2197	Conditions (a) and (b) continue for 2 seconds or more (2 trip detection logic): (a) Air-Fuel Ratio (A/F) sensor voltage is more than 3.8 V (b) Heated Oxygen (HO2) sensor voltage is 0.15 V or more	• Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor (bank 1, 2 sensor 1) heater • A/F sensor heater relay • A/F sensor heater and relay circuits • Air induction system • Injector • ECM
P2195 P2197	While fuel-cut operation is performed (during vehicle deceleration), air-fuel ratio (A/F) sensor current is 3.6 mA or more for 3 seconds (2 trip detection logic)	• A/F sensor • ECM
P2196 P2198	Conditions (a) and (b) continue for 2 seconds or more (2 trip detection logic): (a) A/F sensor voltage is less than 2.8 V (b) HO2 sensor voltage is less than 0.85 V	• Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor (bank 1, 2 sensor 1) heater • A/F sensor heater relay • A/F sensor heater and relay circuits • Air induction system • Injector • ECM
P2196 P2198	While fuel-cut operation is performed (during vehicle deceleration), air-fuel ratio (A/F) sensor current is 1.4 mA for 3 seconds (2 trip detection logic)	• A/F sensor • ECM

HINT:

- DTCs P2195 and P2196 indicate malfunctions related to the bank 1 A/F sensor circuit.
- DTCs P2197 and P2198 indicate malfunctions related to the bank 2 A/F sensor circuit.
- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that includes cylinder No. 2.
- When any of these DTCs are set, check the A/F sensor output voltage by entering the following menus on the intelligent tester: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / AFS B1S1.
- Short-term fuel trim values can also be read using an intelligent tester.
- The ECM regulates the voltages at the A1A+, A2A+, A1A- and A2A- terminals of the ECM to a constant level. Therefore, the A/F sensor output voltage cannot be confirmed without using the intelligent tester.

- If a A/F sensor malfunction is detected, the ECM sets a DTC.

MONITOR DESCRIPTION

Sensor voltage detection monitor

Under the air-fuel ratio feedback control, if the A/F sensor output voltage indicates rich or lean for a certain period of time, the ECM determines that there is a malfunction in the A/F sensor. The ECM illuminates the MIL and sets a DTC.

Example:

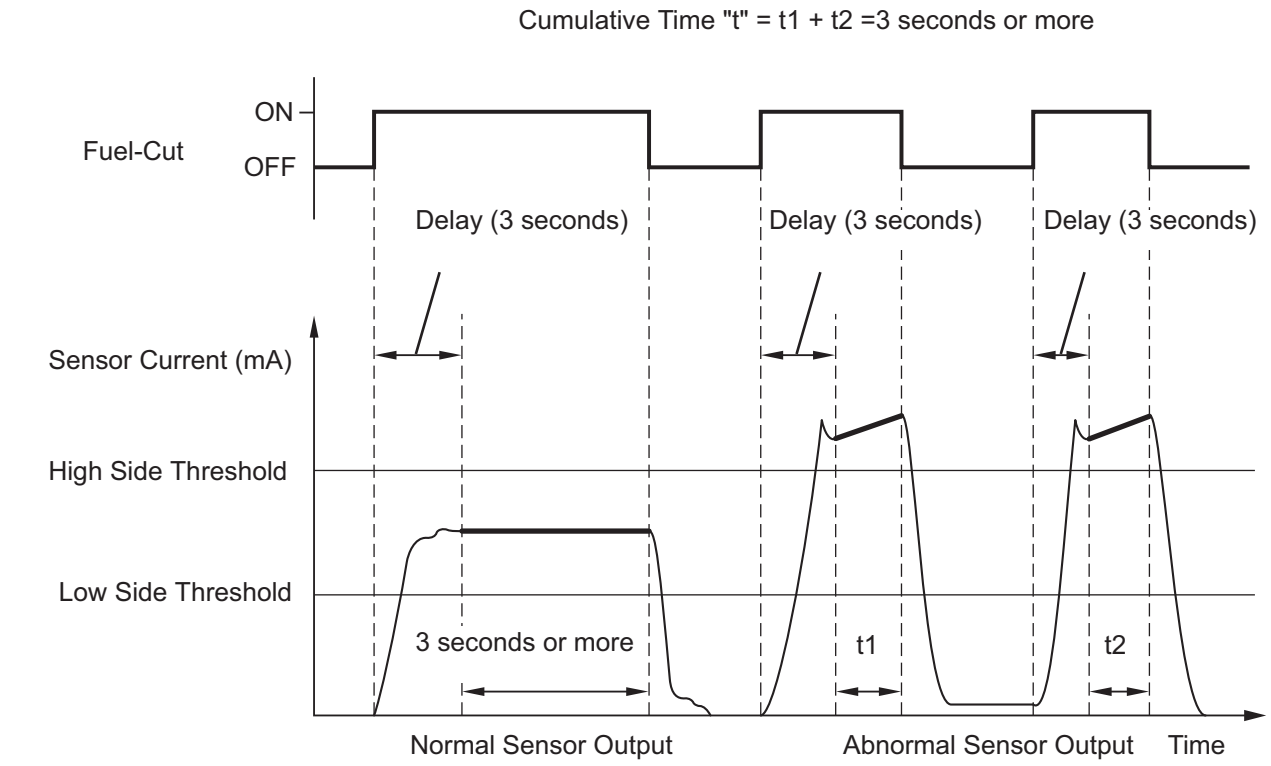
(1) If the A/F sensor voltage output is less than 2.8 V (very rich condition) for 10 seconds, despite the HO2 sensor output voltage being less than 0.6 V, the ECM sets DTC P2196. Alternatively, if the A/F sensor output voltage is more than 3.8 V (very lean condition) for 15 seconds, despite the HO2 sensor output voltage being 0.15 V or more, DTC P2195 is set.

(2) Sensor current detection monitor

(3) A rich air-fuel mixture causes a low A/F sensor current, and a lean air-fuel mixture causes a high A/F sensor current. Therefore, the sensor output becomes low during acceleration, and it becomes high during deceleration with the throttle valve fully closed. The ECM monitors the A/F sensor current during fuel-cut and detects any abnormal current values.

(4) If the A/F sensor output is 3.6 mA or more for more than 3 seconds of cumulative time, the ECM interprets this as a malfunction in the A/F sensor and sets DTC P2195 (high-side stuck). If the A/F sensor output is 1.0 mA or less for more than 3 seconds of cumulative time, the ECM sets DTC P2196 (low-side stuck).

Air Fuel Ratio Sensor Current Monitor



MONITOR STRATEGY

Related DTCs	P2195: A/F sensor (Bank 1) signal stuck lean P2196: A/F sensor (Bank 1) signal stuck rich P2197: A/F sensor (Bank 2) signal stuck lean P2198: A/F sensor (Bank 2) signal stuck rich

Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	HO2 sensor
Frequency of Operation	Continuous
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Sensor voltage detection monitor (Lean side malfunction P2195, P2197):

The monitor will run whether these DTCs are not present	P0031, P0032, P0051, P0052 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136, P0156 (HO2 Sensor - Sensor 2) P0171, P0172 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0500 (VSS)
Time while all of following conditions are met:	2 seconds or more
Rear HO2 sensor voltage	0.15 V or more
Time after engine start	30 seconds or more
A/F sensor status	Activated
Fuel system status	Closed-loop
Engine	Running

Sensor voltage detection monitor (Rich side malfunction P2196, P2198):

The monitor will run whether these DTCs are not present	P0031, P0032, P0051, P0052 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136, P0156 (HO2 Sensor - Sensor 2) P0171, P0172 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0500 (VSS)
Time while all of following conditions are met:	2 seconds or more
Rear HO2 sensor voltage	Less than 0.6 V
Time after engine start	30 seconds or more
A/F sensor status	Activated
Fuel system status	Closed-loop
Engine	Running

Sensor current detection monitor (High and low side malfunction P2195, P2196, P2197 and P2198):

Monitor runs whenever following DTCs are not present	P0031, P0032, P0051, P0052 (A/F sensor heater - Sensor 1) P0037, P0038, P0057, P0058 (HO2 sensor heater - Sensor 2) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0136, P0156 (O2 Sensor - Sensor 2) P0171, P0172 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0500 (VSS)
Battery voltage	11 V or more
Atmospheric pressure	22.5 kPa (570 mmHg) or more
A/F sensor status	Activated
Continuous time of fuel cut	3 to 10 seconds
ECT	75°C (167°F) or more

ES

TYPICAL MALFUNCTION THRESHOLDS

Sensor voltage detection monitor (Lean side malfunction P2195, P2197):

A/F sensor voltage	More than 3.8 V

Sensor voltage detection monitor (Rich side malfunction P2196, P2198):

A/F sensor voltage	Less than 2.8 V

Sensor current detection monitor (High side malfunction P2195, P2197):

A/F sensor current	3.6 mA or more

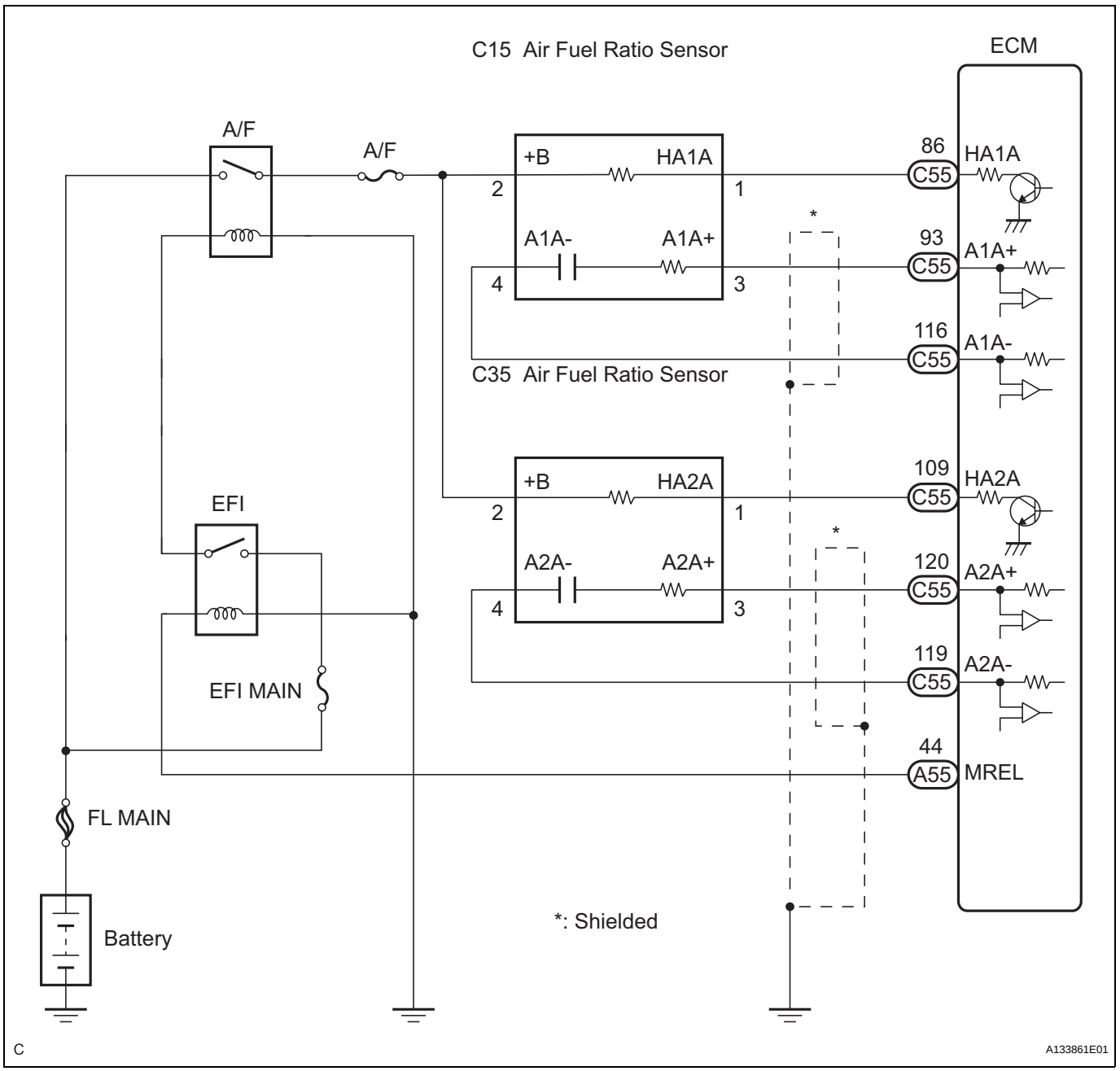
Sensor current detection monitor (Low side malfunction P2196, P2198):

A/F sensor current	Less than 1.4 mA

MONITOR RESULT

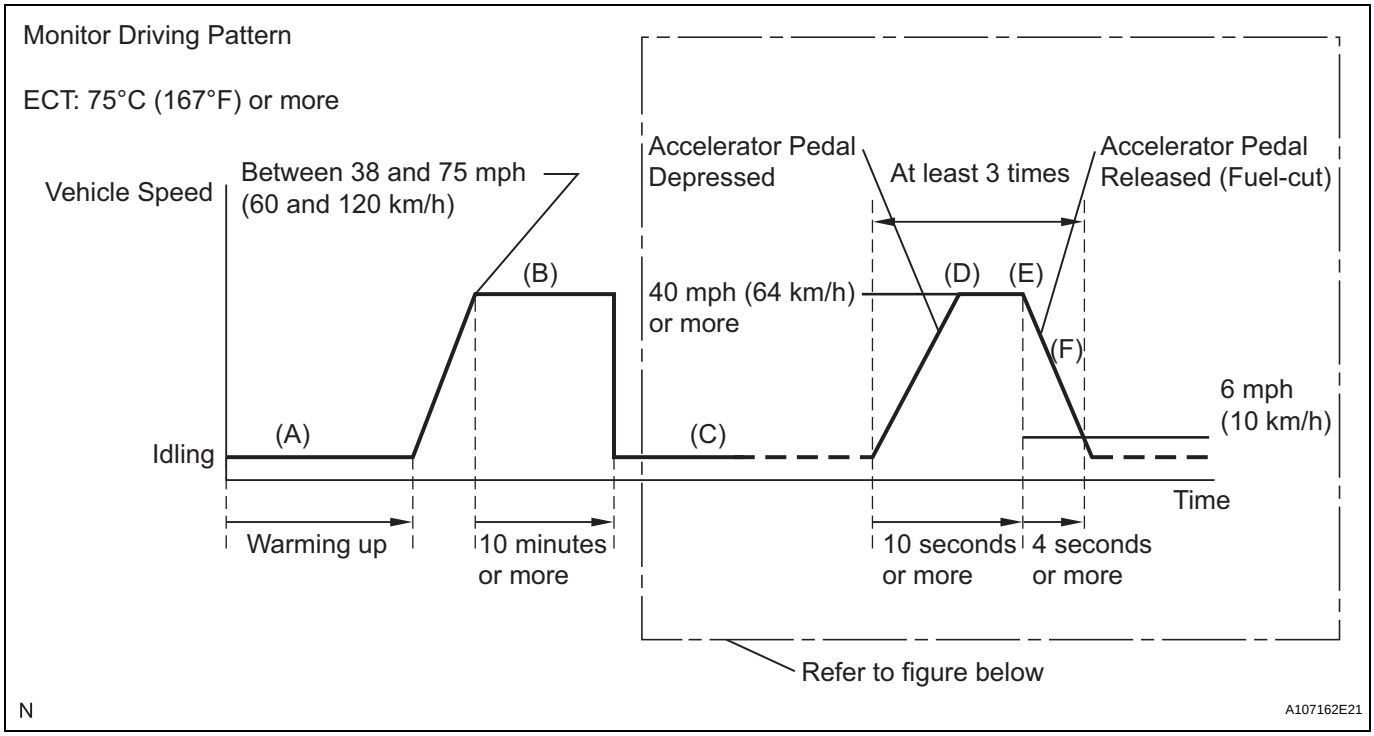
Refer to CHECKING MONITOR STATUS (See page ES-49).

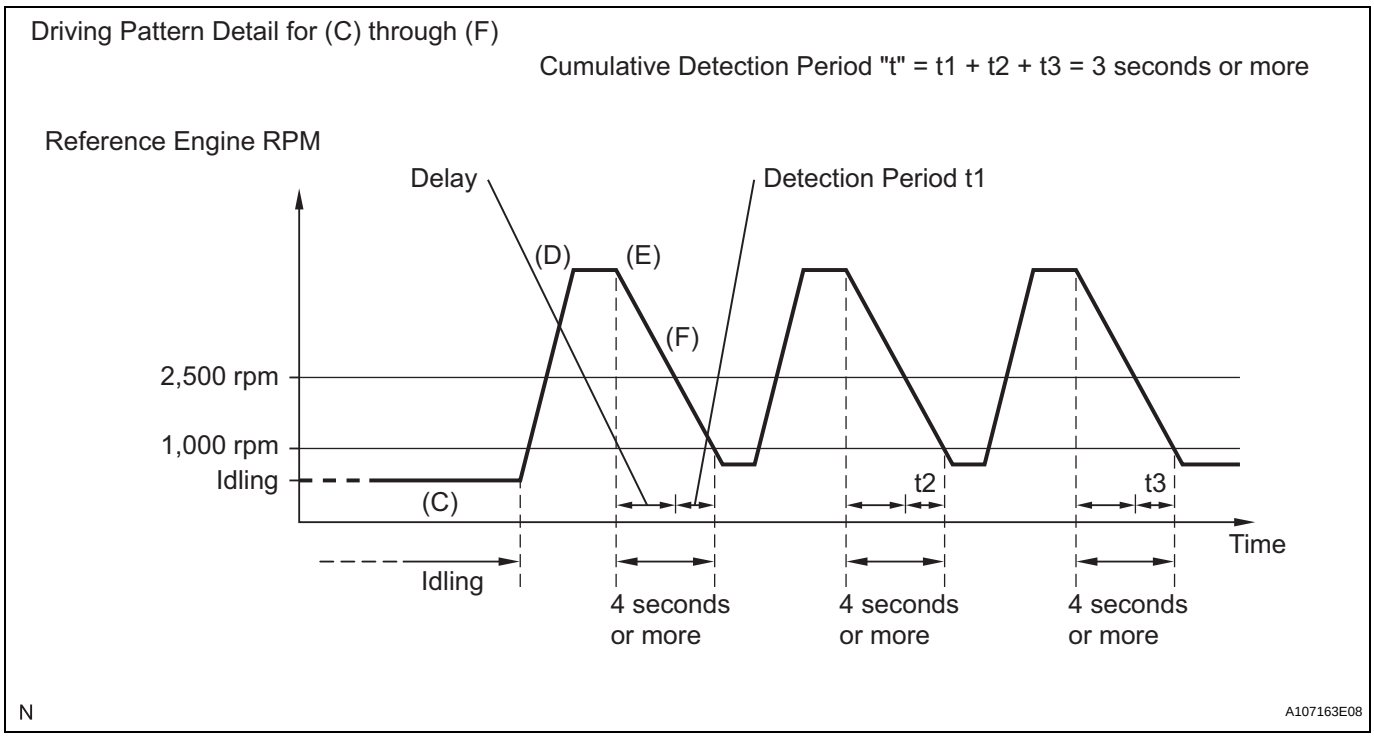
WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

This confirmation driving pattern is used in steps 2, 4, 7, 17 and 21 of the following diagnostic troubleshooting procedure when using an intelligent tester.





1. Connect an intelligent tester to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn the tester on.
4. Clear the DTCs.
5. Start the engine, and warm it up until the ECT reaches 75°C (167°F) or higher (Procedure "A").
6. On the intelligent tester, enter the following menus to check the fuel-cut status: DIAGNOSIS / ENHANCED OBD II / DATA LIST / USER DATA / FC IDLE.
7. Drive the vehicle at between 38 mph (60 km/h) and 75 mph (120 km/h) for at least 10 minutes (Procedure "B").
8. Change the transmission to the 2nd gear (Procedure "C").

9. Drive the vehicle at a proper vehicle speed to perform fuel-cut operation (refer to the following HINT) (Procedure "D").
   HINT:
   Fuel-cut is performed when the following conditions are met:
   - Accelerator pedal is fully released.
   - Engine speed is 2,500 rpm or more (fuel injection resumes at 1,000 rpm).
10. Accelerate the vehicle to 40 rpm (64 km/h) or more by depressing the accelerator pedal for at least 10 seconds (Procedure "E").
11. Soon after performing procedure E above, release the accelerator pedal for at least 4 seconds without depressing the brake pedal, in order to execute fuel-cut control (Procedure "F").
12. Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h).
13. Repeat procedure from C through F above at least 3 times in one driving cycle.
    HINT:
    Completion of all A/F sensor monitors is required to change the value in TEST RESULT.
    CAUTION:
    Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

ES

INSPECTION PROCEDURE

HINT:
Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.
The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2 or AFS B2 S1 and O2S B2 S2) displayed on the tester.

HINT:
- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases in the fuel injection volume.

Tester Display (Sensor)	Injection Volume	Status	Voltage
AFS B1S1 or AFS B2S1 (A/F)	+25 %	Rich	Less than 3.0 V
AFS B1S1 or AFS B2S1 (A/F)	-12.5 %	Lean	More than 3.35 V
O2S B1S2 or O2S B2S2 (HO2)	+25 %	Rich	More than 0.55 V
O2S B1S2 or O2S B2S2 (HO2)	-12.5 %	Lean	Less than 0.4 V

NOTICE:
The Air-Fuel Ratio (A/F) sensor has an output delay of a few seconds and the HO2S (sensor 2) output has a maximum output delay of 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
- To display the graph, enter the following menus on the tester: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B 1S2 or AFS B2 S1 and O2S B2 S2 and press the YES button and then the ENTER button followed by the F4 button.

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).
- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO P2195, P2196, 2197 OR P2198)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2195, P2196, P2197, or P2198	A
P2195, P2196, P2197, or P2198 and other DTCs	B

HINT:
If any DTCs other than P2195, P2196, P2197 or P2198 are output, troubleshoot those DTCs first.

B → **GO TO DTC CHART (See page ES-63)**

A

2	READ VALUE OF INTELLIGENT TESTER (TEST VALUE OF A/F SENSOR)

ES

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Clear the DTCs.
(d) Allow the vehicle to drive in accordance with the driving pattern described in the CONFIRMATION DRIVING PATTERN.
(e) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / MONITOR STATUS.
(f) Check the status of O2S MON is COMPL.
If the status is still INCMPL, drive the vehicle according to the driving pattern again.
HINT:
- AVAIL indicates that the component has not been monitored yet.
- COMPL indicates that the component is functioning normally.
- INCMPL indicates that the component is malfunctioning.

(g) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / TEST RESULT / RANGE B1 S1, then press the ENTER button.
(h) Check the test value of the A/F sensor output current during fuel-cut.

Result

Test Value	Proceed to
Within normal range (1.4 mA or more, and less than 3.6 mA)	A
Outside normal range (Less than 1.4 mA, or 3.6 mA or more)	B

B → **Go to step 20**

A

3	READ VALUE OF INTELLIGENT TESTER (OUTPUT VOLTAGE OF A/F SENSOR)

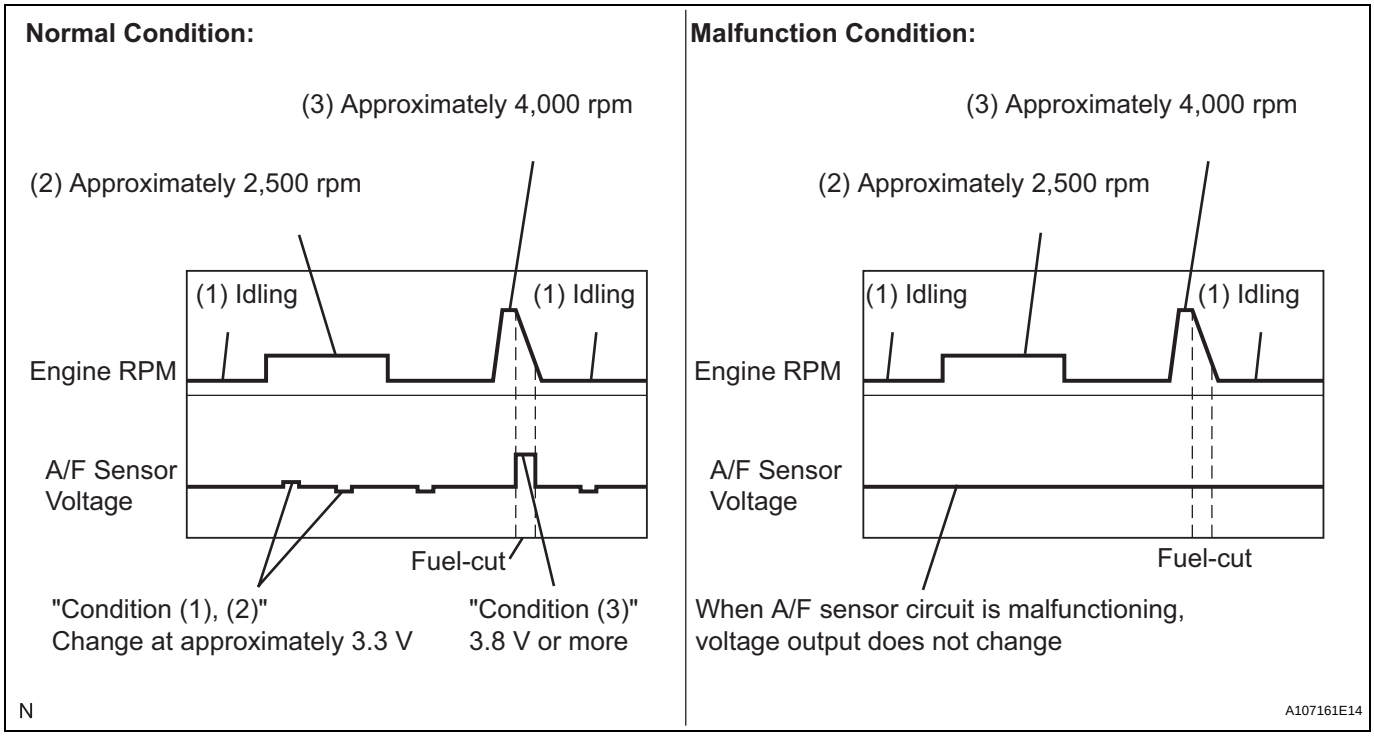
(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Turn the tester on.

(d) Warm up the Air-Fuel Ratio (A/F) sensor at an engine speed of 2,500 rpm for 90 seconds.
(e) On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / SNAPSHOT / MANUAL SNAPSHOT / USER DATA / AFS B1 S1 or AFS B2 S1 and ENGINE SPD.
(f) Check the A/F sensor voltage three times, when the engine is in each of the following conditions:
  (1) While idling (check for at least 30 seconds)
  (2) At an engine speed of approximately 2,500 rpm (without any sudden changes in engine speed)
  (3) Raise the engine speed to 4,000 rpm and then quickly release the accelerator pedal so that the throttle valve is fully closed.

Standard voltage

Condition	A/F Sensor Voltage Variation	Reference
(1) and (2)	Changes at approximately 3.3 V	Between 3.1 V and 3.5 V
(3)	Increases to 3.8 V or more	This occurs during engine deceleration (when fuel-cut performed)

HINT:
- For more information, see the diagrams below.



- If the output voltage of the A/F sensor remains at approximately 3.3 V (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have an open circuit. (this will also happen if the A/F sensor heater has an open circuit.)
- If the output voltage of the A/F sensor remains at either approximately 3.8 V or more, or 2.8 V or less (see Malfunction Condition diagram) under any conditions, including those above, the A/F sensor may have a short circuit.

- The ECM stops fuel injection (fuel cut) during engine deceleration. This causes a lean condition and results in a momentary increase in the A/F sensor output voltage.
- The ECM must establish a closed throttle valve position learning value to perform fuel cut. If the battery terminal has been reconnected, the vehicle must be driven over 10 mph (16 km/h) to allow the ECM terminal to be reconnected, the vehicle must be driven at over 10 mph (16 km/h) to allow the ECM to learn the closed throttle valve position.
- When the vehicle is driven:
  The output voltage of the A/F sensor may be below 2.8 V during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The A/F sensor is functioning normally.
- The A/F sensor is a current output element; therefore, the current is converted into a voltage inside the ECM. Measuring the voltage at the connectors of the A/F sensor or ECM will show a constant voltage result.

NG → **Go to step 10**

OK

4	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195, P2196, P2197 OR P2198)

(a) Read the DTCs using the intelligent tester.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

Result

Display (DTC Output)	Proceed to
P2195, P2196, P2197, or P2198	A
No output	B

B → **Go to step 9**

A

6	REPLACE AIR FUEL RATIO SENSOR

(a) Replace the air fuel ratio sensor (See page EC-19).

NEXT

7	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

8	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195, P2196, P2197 OR P2198)

(a) Read the DTCs using the intelligent tester.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2195, P2196, P2197, or P2198	B

B → REPLACE ECM (See page ES-518)

A

9	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

(a) Has the vehicle run out of fuel in the past?

NO → CHECK FOR INTERMITTENT PROBLEMS

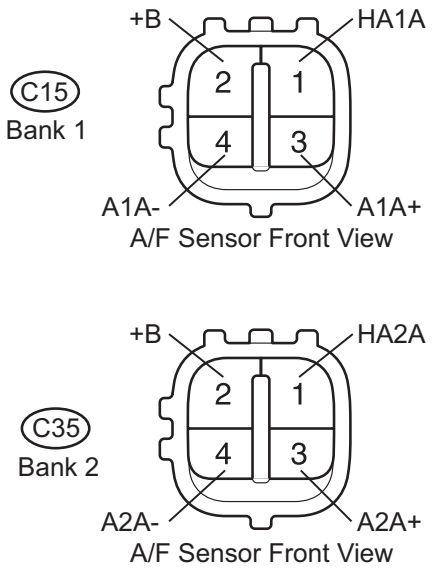
YES

DTC CAUSED BY RUNNING OUT OF FUEL

ES

10	INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)

Component Side:



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(a) Disconnect the C15 or C35 A/F sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Bank 1 sensor 1)

Tester Connection	Condition	Specified Condition
HA1A (1) - +B (2)	20°C (68°F)	1.8 Ω to 3.4 Ω
HA1A (1) - A1A- (4)	Always	10 kΩ or higher

Standard resistance (Bank 2 sensor 1)

Tester Connection	Condition	Specified Condition
HA2A (1) - +B (2)	20°C (68°F)	1.8 Ω to 3.4 Ω
HA2A (1) - A2A- (4)	Always	10 kΩ or higher

(c) Reconnect the A/F sensor connector.

NG → **REPLACE AIR FUEL RATIO SENSOR (See page EC-19)**

OK

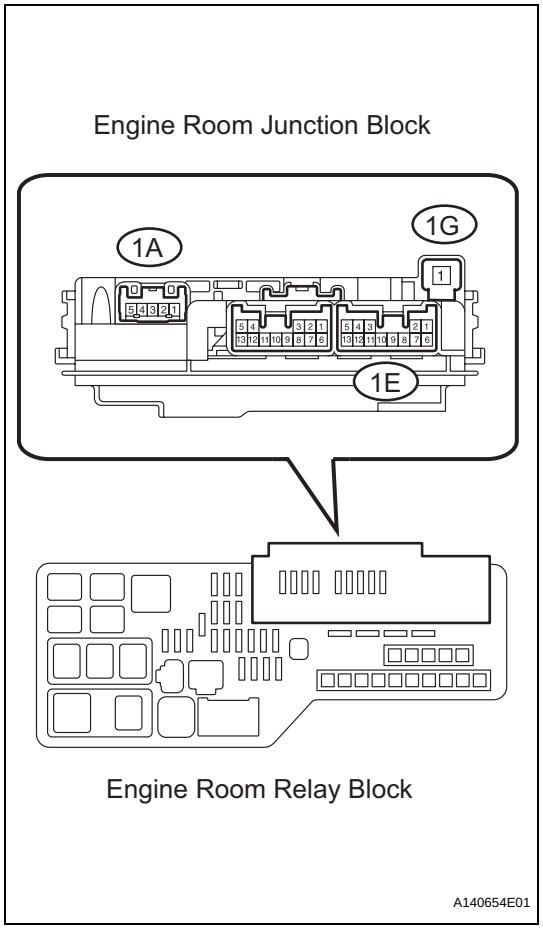
11	INSPECT FUSE (A/F FUSE)

(a) Remove the A/F fuse from the integration relay.
(b) Measure the A/F fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the A/F fuse.

NG → **REPLACE A/F FUSE**

OK

12	INSPECT ENGINE ROOM JUNCTION BLOCK (A/F RELAY)



(a) Remove the engine room junction block from the engine room R/B.

(b) Inspect the A/F relay.

(1) Measure the A/F relay resistance.

Standard resistance

Tester Connection	Specified Condition
1G-1 - 1A-4	10 kΩ or higher
1G-1 - 1A-4	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-10)

(c) Reinstall the engine room junction block.

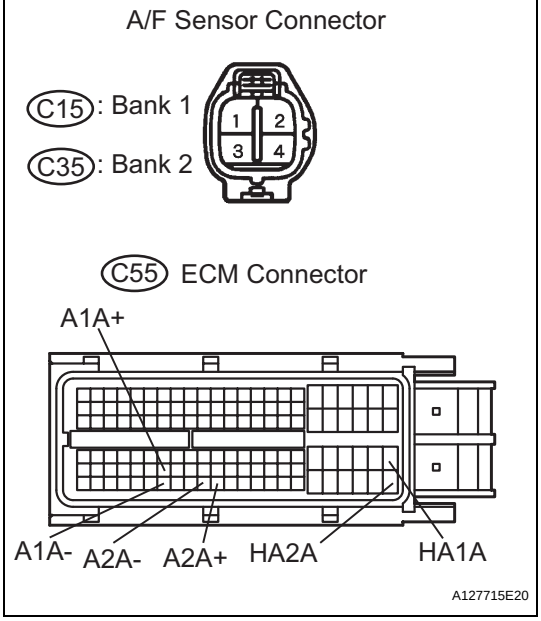
NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

ES

13	CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM)

Wire Harness Side:



(a) Disconnect the C15 and C35 A/F sensor connectors.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
+B (C15-2) - Body ground	9 to 14 V
+B (C35-2) - Body ground	9 to 14 V

(d) Turn the ignition switch off.
(e) Disconnect the C55 ECM connector.
(f) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

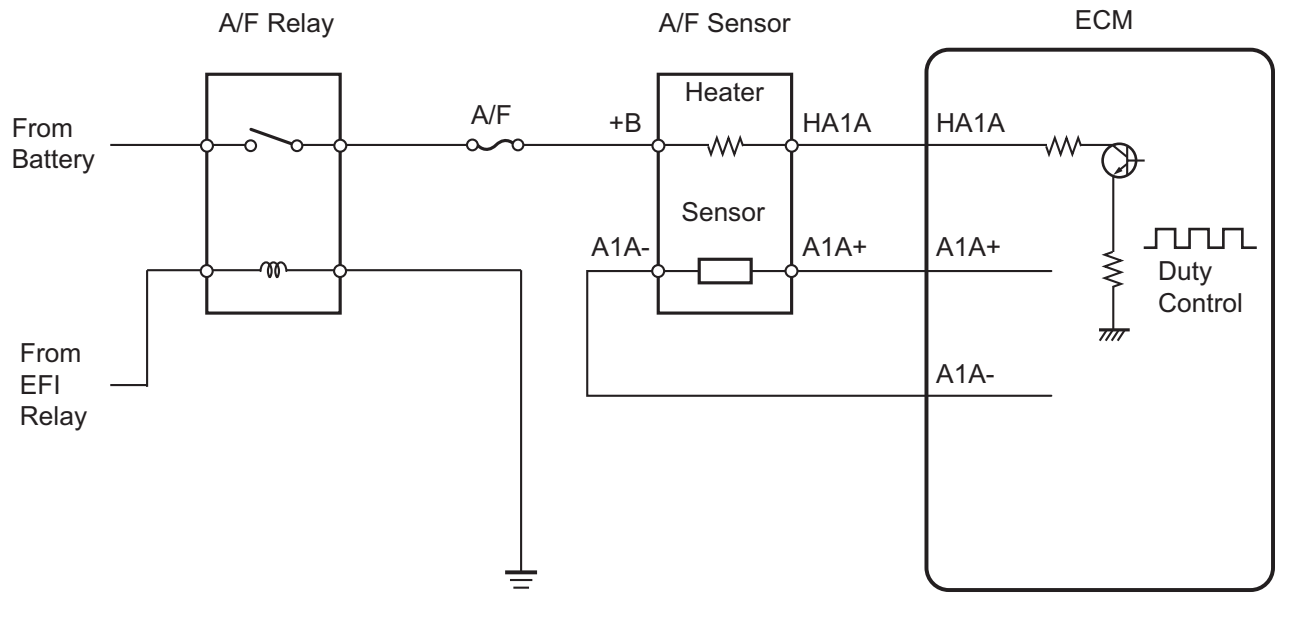
Tester Connection	Specified Condition
HA1A (C15-1) - HA1A (C55-86)	Below 1 Ω
A1A+ (C15-3) - A1A+ (C55-93)	Below 1 Ω
A1A- (C15-4) - A1A- (C55-116)	Below 1 Ω
HA2A (C35-1) - HA2A (C55-109)	Below 1 Ω
A2A+ (C35-3) - A2A+ (C55-120)	Below 1 Ω
A2A- (C35-4) - A2A- (C55-119)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HA1A (C15-1) or HA1A (C55-86) - Body ground	10 kΩ or higher
A1A+ (C15-3) or A1A+ (C55-93) - Body ground	10 kΩ or higher
A1A- (C15-4) or A1A- (C55-116) - Body ground	10 kΩ or higher
HA2A (C35-1) or HA2A (C55-109) - Body ground	10 kΩ or higher
A2A+ (C35-3) or A2A+ (C55-120) - Body ground	10 kΩ or higher
A2A- (C35-4) or A2A- (C55-119) - Body ground	10 kΩ or higher

(g) Reconnect the ECM connector.
(h) Reconnect the A/F sensor connector.

Reference (System Diagram of Bank 1 Sensor 1):



ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

14	CHECK AIR INDUCTION SYSTEM

(a) Check the air induction system for vacuum leakage.
OK:
No leakage from air induction system.

NG → **REPAIR OR REPLACE AIR INDUCTION SYSTEM**

OK

15	CHECK FUEL PRESSURE (HIGH PRESSURE SIDE AND LOW PRESSURE SIDE)

(a) Check the fuel pressure.

NG → **REPAIR OR REPLACE FUEL SYSTEM**

OK

16	REPLACE AIR FUEL RATIO SENSOR

(a) Replace the air fuel ratio sensor (See page EC-19).

NEXT

17	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

18	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195, P2196, P2197 OR P2198)

(a) Read the DTCs using the intelligent tester.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2195, P2196, P2197 or P2198	B

B → REPAIR OR REPLACE ECM

A

19	CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST

(a) Has the vehicle run out of fuel in the past?

NO → CHECK FOR INTERMITTENT PROBLEMS

YES

DTC CAUSED BY RUNNING OUT OF FUEL

20	REPLACE AIR FUEL RATIO SENSOR

(a) Replace the air fuel ratio sensor (See page EC-19).

NEXT

21	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

22	CHECK WHETHER DTC OUTPUT RECURS (DTC P2195, P2196, P2197 OR P2198)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Read the DTCs using the intelligent tester.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2195, P2196, P2197 or P2198 (A/F sensor pending DTCs)	B

B → REPLACE ECM (See page ES-518)

A

END

DTC	P2238	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1)
DTC	P2239	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1)
DTC	P2241	Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 2 Sensor 1)
DTC	P2242	Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 2 Sensor 1)
DTC	P2252	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1)
DTC	P2253	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1)
DTC	P2255	Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 2 Sensor 1)
DTC	P2256	Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 2 Sensor 1)

ES

DESCRIPTION

HINT:

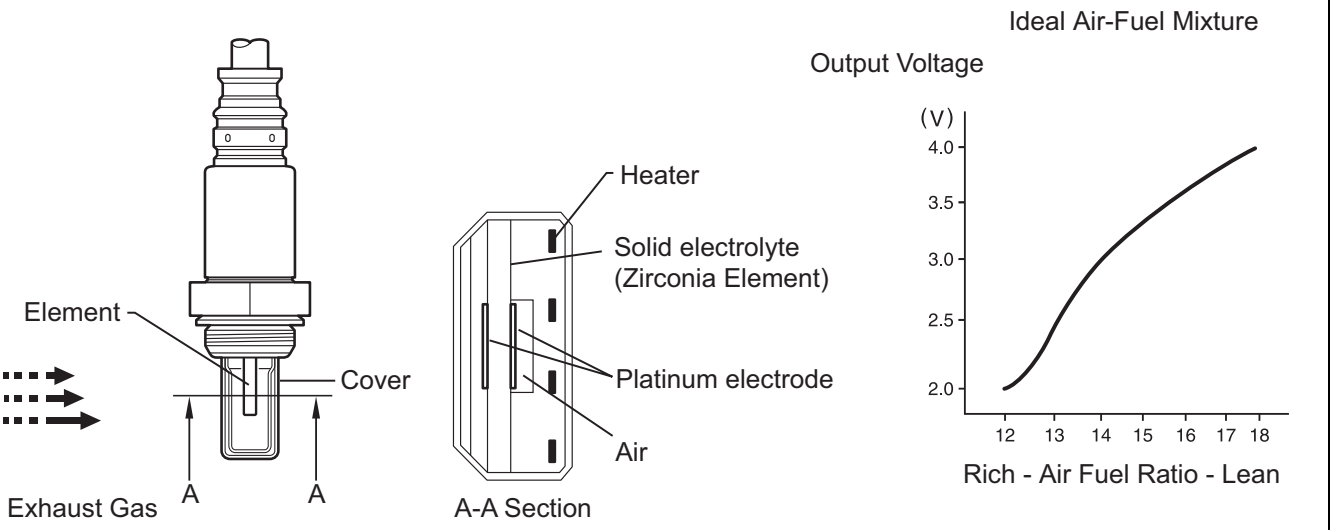
- Although the DTC titles include oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

The A/F sensor generates voltage* that corresponds to the actual air-fuel ratio. This sensor voltage is used to provide the ECM with feedback so that it can control the air-fuel ratio. The ECM determines the deviation from the stoichiometric air-fuel ratio level, and regulates the fuel injection time. If the A/F sensor malfunctions, the ECM is unable to control the air-fuel ratio accurately.

The A/F sensor is the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate oxygen concentration detection. In addition, the sensor and heater portions are narrower than the conventional type. The heat generated by the heater is conducted to the solid electrolyte through the alumina, therefore the sensor activation is accelerated.

A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio.

*: Value changes inside the ECM. Since the A/F sensor is the current output element, a current is converted to a voltage inside the ECM. Any measurements taken at the A/F sensor or ECM connectors will show a constant voltage.



DTC No.	DTC Detection Condition	Trouble Area
P2238 P2241	• Case 1: Condition (a) or (b) continues for 5.0 seconds or more (1 trip detection logic): (a) AF+ voltage is 0.5 V or less (b) (AF+) - (AF-) = 0.1 V or less • Case 2: A/F sensor admittance: Less than 0.022 1/Ω (2 trip detection logic)	• Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor heater • A/F sensor heater relay • A/F sensor heater and relay circuits • ECM
P2239 P2242	AF+ voltage is more than 4.5 V for 5.0 seconds or more (2 trip detection logic)	• Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor heater • A/F sensor heater relay • A/F sensor heater and relay circuits • ECM
P2252 P2255	AF- voltage is 0.5 V or less for 5.0 seconds or more (2 trip detection logic)	• Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor heater • A/F sensor heater relay • A/F sensor heater and relay circuits • ECM
P2253 P2256	AF- voltage is more than 4.5 V for 5.0 seconds or more (2 trip detection logic)	• Open or short in A/F sensor (bank 1, 2 sensor 1) circuit • A/F sensor (bank 1, 2 sensor 1) • A/F sensor heater • A/F sensor heater relay • A/F sensor heater and relay circuits • ECM

HINT:

- DTCs P2238, P2239, P2252 and P2253 indicate malfunctions related to the bank 1 A/F sensor circuit.
- DTCs P2241, P2242, P2255 and P2256 indicate malfunctions related to the bank 2 A/F sensor circuit.
- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that includes cylinder No. 2.

MONITOR DESCRIPTION

The Air-Fuel Ratio (A/F) sensor varies its output voltage in proportion to the air-fuel ratio. If the A/F sensor impedance (alternating current resistance) or output voltage deviates greatly from the standard range, the ECM determines that there is an open or short malfunction in the A/F sensor circuit.

MONITOR STRATEGY

Related DTCs	P2238: A/F sensor (Bank 1) open circuit between AF+ and AF- P2238: A/F sensor (Bank 1) short circuit between AF+ and AF- P2238: A/F sensor (Bank 1) short circuit between AF+ and GND P2239: A/F sensor (Bank 1) short circuit between AF+ and +B P2241: A/F sensor (Bank 2) open circuit between AF+ and AF- P2241: A/F sensor (Bank 2) short circuit between AF+ and AF- P2241: A/F sensor (Bank 2) short circuit between AF+ and GND P2242: A/F sensor (Bank 2) short circuit between AF+ and +B P2252: A/F sensor (Bank 1) short circuit between AF- and GND P2253: A/F sensor (Bank 1) short circuit between AF- and +B P2255: A/F sensor (Bank 2) short circuit between AF- and GND P2256: A/F sensor (Bank 2) short circuit between AF- and +B
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Sub)	Engine Coolant Temperature (ECT) sensor, Crankshaft position sensor
Frequency of Operation	Once per driving cycle
Duration	10 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0031, P0032, P0051, P0052 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0500 (VSS)

P2238 and P2241 (open circuit between AF+ and AF-):

AF+ terminal voltage	0.5 to 4.5 V
AF- terminal voltage	0.5 to 4.5 V
Difference between AF+ and AF- terminal voltages	0.1 to 0.8 V
ECT	5°C (41°F) or more (Varies with ECT at engine start)
Engine condition	Running
Fuel-cut	OFF
Time after engine start	10 seconds or more
A/F sensor heater duty-cycle	ON
Time after A/F sensor heating	5 seconds or more
Battery voltage	11 V or more
Ignition switch	ON

Others:

Battery voltage	10.5 V or more
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

P2238 and P2241 (Open circuit between AF+ and AF-):

A/F sensor admittance	Below 0.022 1/Ω

P2238 and P2241 (Short circuit between AF+ and GND):

AF+ terminal voltage	0.5 V or less

P2238 and P2241 (Short circuit between AF+ and AF-):

Difference between AF+ and AF- terminal voltages	0.1 v or less

P2239 and P2242 (Short circuit between AF+ and +B):

AF+ terminal voltage	More than 4.5 V

P2252 and P2255 (Short circuit between AF- and GND):

AF- terminal voltage	0.5 V or less

P2253 and P2256 (Short circuit between AF- and +B):

AF- terminal voltage	More than 4.5 V

ES

WIRING DIAGRAM

Refer to DTC P2195 (See page ES-350).

INSPECTION PROCEDURE

HINT:

Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-Fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

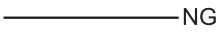
1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2 or AFS B2 S1 and O2S B2 S2) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

Tester Display (Sensor)	Injection Volume	Status	Voltage
AFS B1S1 or AFS B2S1 (A/F)	+25 %	Rich	Less than 3.0 V
AFS B1S1 or AFS B2S1 (A/F)	-12.5 %	Lean	More than 3.35 V
O2S B1S2 or O2S B2S2 (HO2)	+25 %	Rich	More than 0.55 V
O2S B1S2 or O2S B2S2 (HO2)	-12.5 %	Lean	Less than 0.4 V

NOTICE:
The Air-Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Areas
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.55 V Less than 0.4 V		
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater • A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Injector • Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

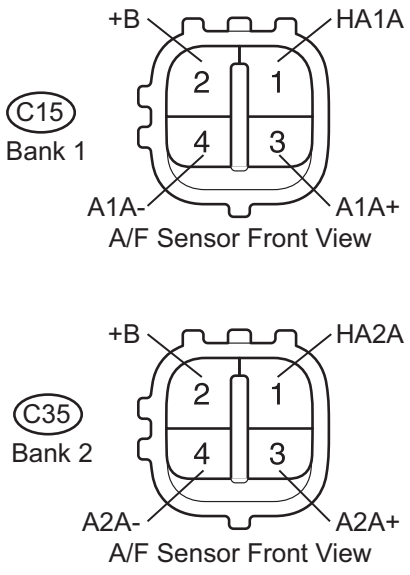
- Following the A/F CONTROL procedure enables technicians to check and graph the output voltages of both the A/F and HO2 sensors.
- To display the graph, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2 or AFS B2 S1 and O2S B2 S2, and press the YES button and then the ENTER button followed by the F4 button.

HINT:

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)

Component Side:



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(a) Disconnect the C15 or C35 A/F sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Bank 1 sensor 1)

Tester Connection	Condition	Specified Condition
HA1A (1) - +B (2)	20°C (68°F)	1.8 to 3.4 Ω
HA1A (1) - A1A- (4)	-	10 kΩ or higher

Standard resistance (Bank 2 sensor 1)

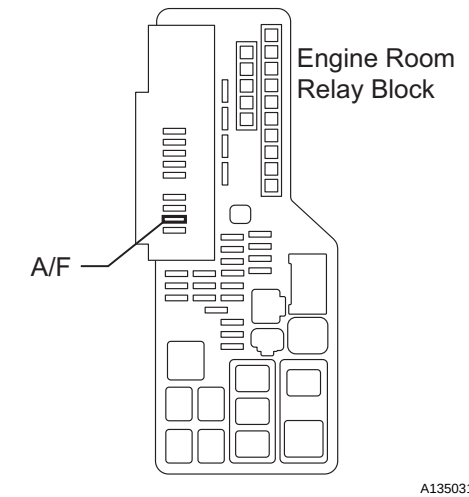
Tester Connection	Condition	Specified Condition
HA2A (1) - +B (2)	20°C (68°F)	1.8 to 3.4 Ω
HA2A (1) - A2A- (4)	-	10 kΩ or higher

(c) Reconnect the A/F sensor connector.

NG → **REPLACE AIR FUEL RATIO SENSOR (See page EC-19)**

OK

2 INSPECT A/F FUSE



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(a) Remove the A/F fuse from the engine room junction block.
(b) Measure the A/F fuse resistance.

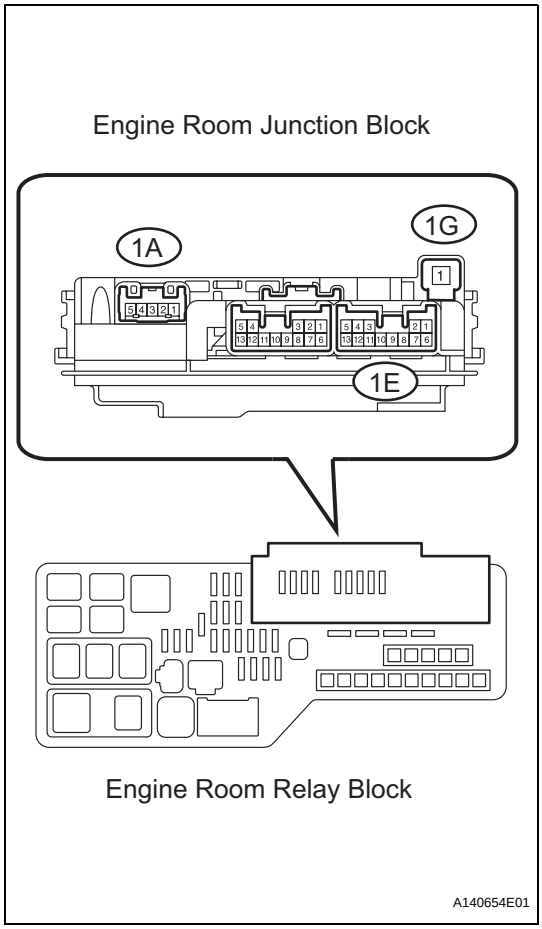
Standard resistance:
Below 1 Ω

(c) Reinstall the A/F fuse.

NG → **REPLACE A/F FUSE**

OK

3	INSPECT ENGINE ROOM JUNCTION BLOCK (A/F RELAY)



(a) Remove the engine room junction block from the engine room R/B.
(b) Inspect the A/F relay.
  (1) Measure the A/F relay resistance.
  Standard resistance

Tester Connection	Specified Condition
1G-1 - 1A-4	10 kΩ or higher
1G-1 - 1A-4	Below 1 Ω (Apply battery voltage between terminals 1E-6 and 1E-10)

(c) Reinstall the engine room junction block.

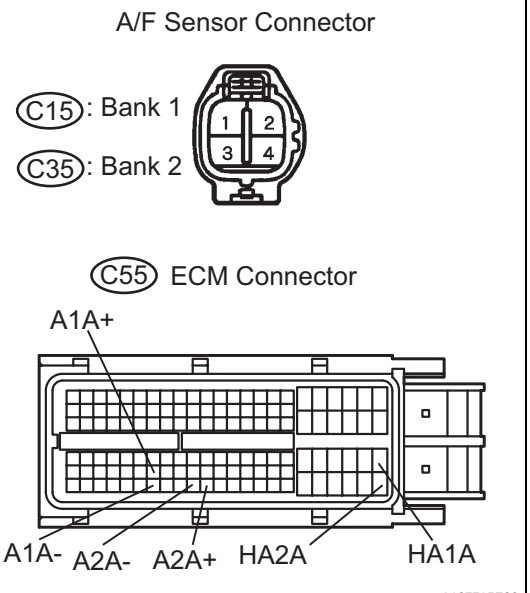
NG → REPLACE ENGINE ROOM JUNCTION BLOCK

OK

ES

4	CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM)

Wire Harness Side:



(a) Disconnect the C15 and C35 A/F sensor connectors.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
+B (C15-2) - Body ground	9 to 14 V
+B (C35-2) - Body ground	9 to 14 V

(d) Turn the ignition switch off.
(e) Disconnect the C55 ECM connector.
(f) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
HA1A (C15-1) - HA1A (C55-86)	Below 1 Ω
A1A+ (C15-3) - A1A+ (C55-93)	Below 1 Ω
A1A- (C15-4) - A1A- (C55-116)	Below 1 Ω
HA2A (C35-1) - HA2A (C55-109)	Below 1 Ω
A2A+ (C35-3) - A2A+ (C55-120)	Below 1 Ω
A2A- (C35-4) - A2A- (C55-119)	Below 1 Ω

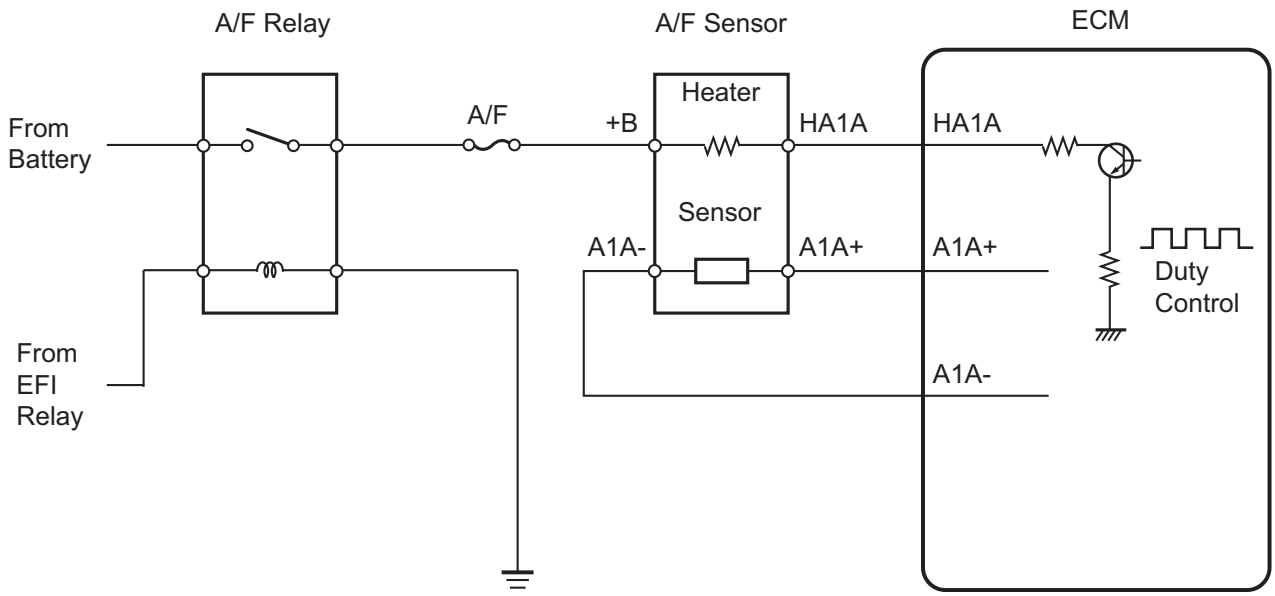
Standard resistance (Check for short)

Tester Connection	Specified Condition
HA1A (C15-1) or HA1A (C55-86) - Body ground	10 kΩ or higher
A1A+ (C15-3) or A1A+ (C55-93) - Body ground	10 kΩ or higher
A1A- (C15-4) or A1A- (C55-116) - Body ground	10 kΩ or higher
HA2A (C35-1) or HA2A (C55-109) - Body ground	10 kΩ or higher
A2A+ (C35-3) or A2A+ (C55-120) - Body ground	10 kΩ or higher
A2A- (C35-4) or A2A- (C55-119) - Body ground	10 kΩ or higher

(g) Reconnect the ECM connector.
(h) Reconnect the A/F sensor connector.

ES

Reference (System Diagram of Bank 1 Sensor 1):



ES

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM (See page ES-518)

DTC	P2420	Evaporative Emission System Switching Valve Control Circuit High

DTC SUMMARY

DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2420	Vent valve stuck open (vent)	The following condition is met during key-off EVAP monitor • EVAP pressure change when vent valve is closed (ON) less than 2.3 mmHg	• Pump module (0.02 inch orifice, vacuum pump, vent valve) • Connector / wire harness (Pump module - ECM) • ECM	Ignition switch off	2 trip

DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System (See page ES-400).

ES

INSPECTION PROCEDURE

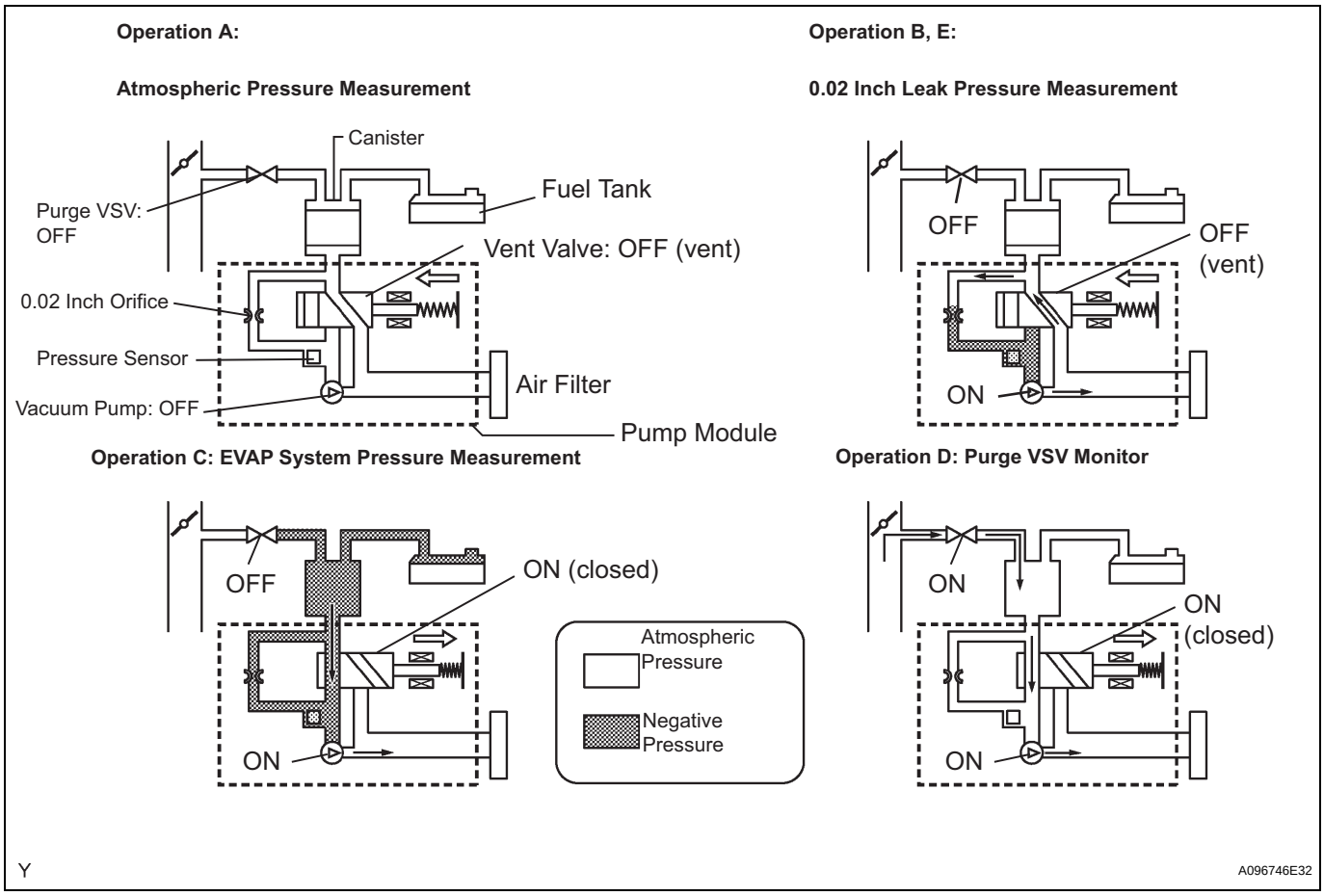
Refer to the EVAP System (See page ES-400).

MONITOR DESCRIPTION

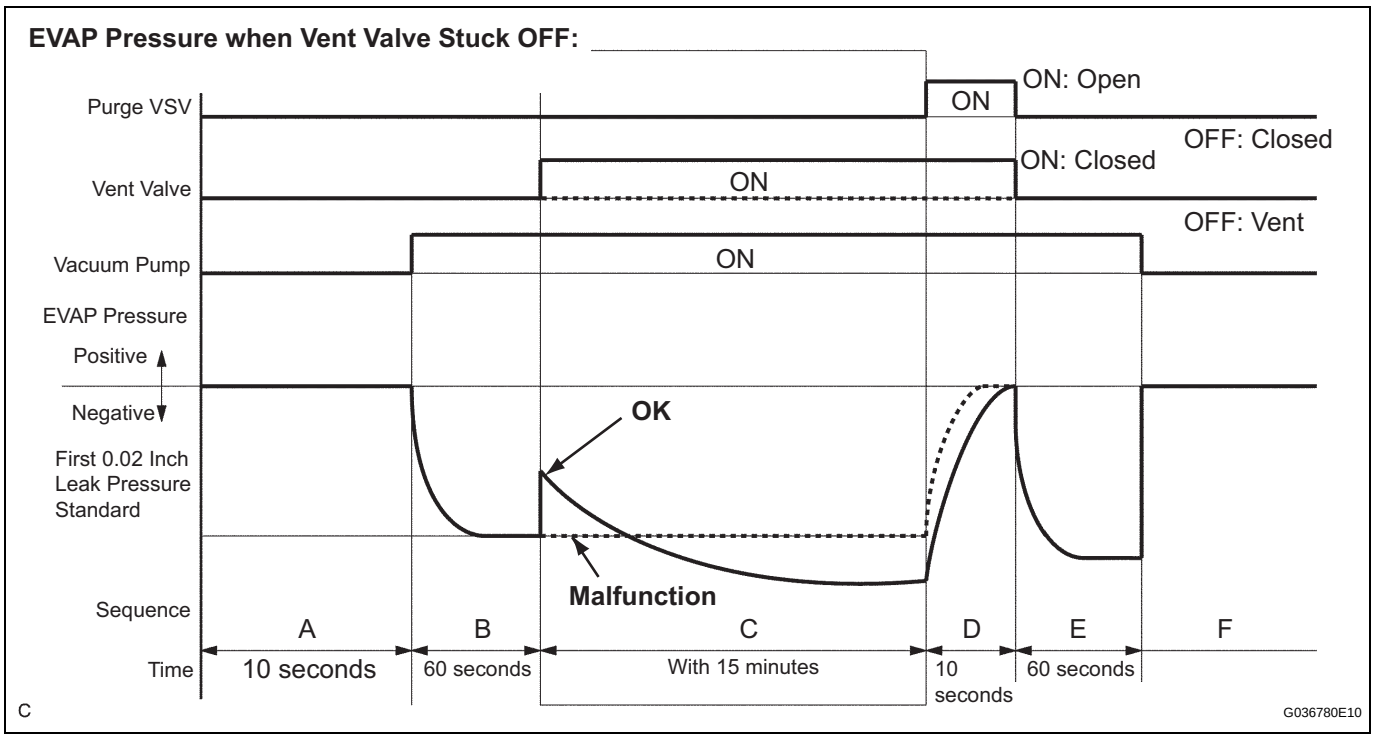
5 hours*1 after the ignition switch is turned off, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.
HINT:
*1: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
-	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned off.	-
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If pressure in EVAP system is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve is turned ON (closed) to shut EVAP system. Negative pressure (vacuum) is created in EVAP system, and then EVAP system pressure is measured. Write down measured value as they will be used in leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*2
D	Purge VSV monitor	Purge VSV is opened and then EVAP system pressure is measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	After second 0.02 inch leak pressure measurement, leak check is performed by comparing first and second 0.02 inch leak pressure standards. If stabilized system pressure is higher than second 0.02 inch leak pressure standard, ECM determines that there is a leak in EVAP system.	60 seconds
F	Final check	Atmospheric pressure is measured and then monitoring result is recorded by ECM.	-

*2: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.



The vent valve turns ON (closes) and the EVAP (Evaporative Emission) system pressure is then measured by the ECM, using the pressure sensor, to conduct an EVAP leak check. If the pressure does not increase when the vent valve is open, the ECM interprets this as the vent valve being stuck open. The ECM illuminates the MIL and sets the DTC.



MONITOR STRATEGY

Related DTC	P2420: Vent valve stuck open (vent)
Required Sensors/Components	Purge VSV and pump module
Frequency of Operation	Once per driving cycle
Duration	Within 2 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever these DTCs are not present	None
Key-off monitor is run when all of the following conditions are met	-
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)
Battery voltage	10.5 V or more
Vehicle speed	2.5 mph (4 km/h) or less
Ignition switch	OFF
Time after key-off	5 or 7 or 9.5 hours
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected
EVAP canister purge valve	Not operated by scan tool
EVAP canister vent valve	Not operated by scan tool
EVAP leak detection pump	Not operated by scan tool
Both of the following conditions 1 and 2 are set before key-off	-
1. Duration that vehicle has been driven	5 minutes or more
2. EVAP purge operation	Performed
ECT	4.4 to 35°C (40 to 95°F)
IAT	4.4 to 35°C (40 to 95°F)

ES

Key-off monitor sequence 1 to 8

1. Atmospheric pressure measurement

Next sequence is run if the following condition is met	-
Atmospheric pressure change	Less than 0.3 kPa (2.25 mmHg) in 1 second

2. First reference pressure measurement

Next sequence is run if the following conditions are met	Conditions 1, 2 and 3
1. EVAP pressure just after reference pressure measurement start	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.384 to -7.929 mmHg)
3. Reference pressure	Saturated

3. EVAP canister vent valve close stuck check

Next sequence is run if the following condition is met	-
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg) or more

4. Vacuum introduction

Next sequence is run if the following condition is met	-
EVAP pressure	Saturated within 15 minutes

5. EVAP canister purge valve close stuck check

Next sequence is run if the following condition is met	-
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg) or more

6. Second reference pressure measurement

Next sequence is run if the following conditions are met	Conditions 1, 2, 3 and 4
1. EVAP pressure just after reference pressure	-1 kPa (-7.5 mmHg) or less
2. Reference pressure	-4.85 to -1.057 kPa (-36.384 to -7.929 mmHg)
3. Reference pressure	Saturated
4. Difference between first reference pressure and second reference pressure	Less than 0.7 kPa (5.25 mmHg)

7. Leak check

Next sequence is run if the following condition is met	-
EVAP pressure when vacuum introduction is complete	Lower than second reference pressure

8. Atmospheric pressure measurement

EVAP monitor is complete if the following condition is met	-
Atmospheric pressure difference between sequence 1 and 8	Within 0.3 kPa (2.25 mmHg)

TYPICAL MALFUNCTION THRESHOLDS

EVAP pressure change after EVAP canister vent valve is ON	Less than 0.3 kPa (2.25 mmHg)

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

DTC	P2610	ECM / PCM Internal Engine Off Timer Performance

DTC SUMMARY

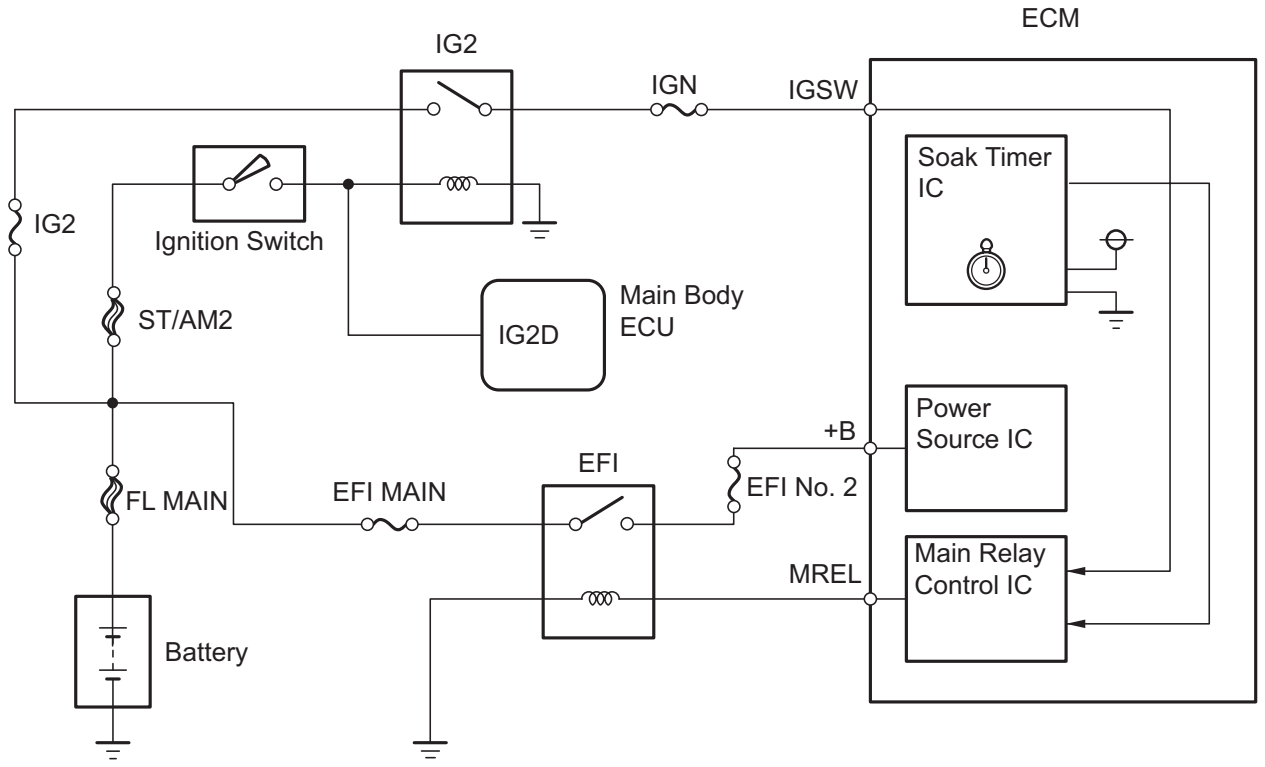
DTC No.	Monitoring Item	DTC Detection Condition	Trouble Area	Detection Timing	Detection Logic
P2610	Soak timer (built into ECM)	ECM internal malfunction	ECM	Engine running	2 trip

DESCRIPTION

To ensure the accuracy of the EVAP (Evaporative Emission) monitor values, the soak timer, which is built into the ECM, measures 5 hours (+/- 15 minutes) from when the ignition switch is turned off, before the monitor is run. This allows the fuel to cool down, which stabilizes the Fuel Tank Pressure (FTP). When 5 hours have elapsed, the ECM turns on.

ES

Soak Timer Circuit (fig. 3):



MONITOR DESCRIPTION

5 hours after the ignition switch is turned off, the soak timer activates the ECM to begin the EVAP system monitor. While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If these two are not synchronized, the ECM interprets this as a malfunction, illuminates the MIL and sets the DTC (2 trip detection logic).

MONITOR STRATEGY

Required Sensors/Components	ECM
Frequency of Operation	Once per driving cycle

Duration	10 minutes
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Case 1:

Engine switch	ON
Engine	Running
Battery voltage	8 V or more
Starter	OFF

Case 2:

Internal engine OFF timer (elapsed time from engine stop)	10 to 300 minutes
Battery voltage	8 V or more
Engine switch	ON
Starter	OFF

Case 3:

Internal engine OFF timer (elapsed time from engine stop)	310 minutes
Battery voltage	8 V or more
Engine switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Case 1:

Soak timer measurement when ECM CPU clock counts 10 minutes	Less than 7 minutes or more than 13 minutes

Case 2:

ECM had the started record by internal engine	Yes

Case 3:

ECM had the started record by internal engine	No

INSPECTION PROCEDURE

HINT:

- DTC P2610 is set if an internal ECM problem is detected. In this case, diagnostic procedures are not required. ECM replacement is required.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	**REPLACE ECM**

(a) Replace the ECM (See page ES-518).

NEXT

2	CHECK WHETHER DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on.
(c) Clear the DTCs (See page ES-45).
(d) Start the engine and wait for 10 minutes or more.
(e) On the tester, enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC / INFO / PENDING CODEs.
(f) If no pending DTC is displayed, the repair has been successfully completed.

NEXT

ES

END

DTC	P2A00	A/F Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P2A03	A/F Sensor Circuit Slow Response (Bank 2 Sensor 1)

DESCRIPTION

HINT:

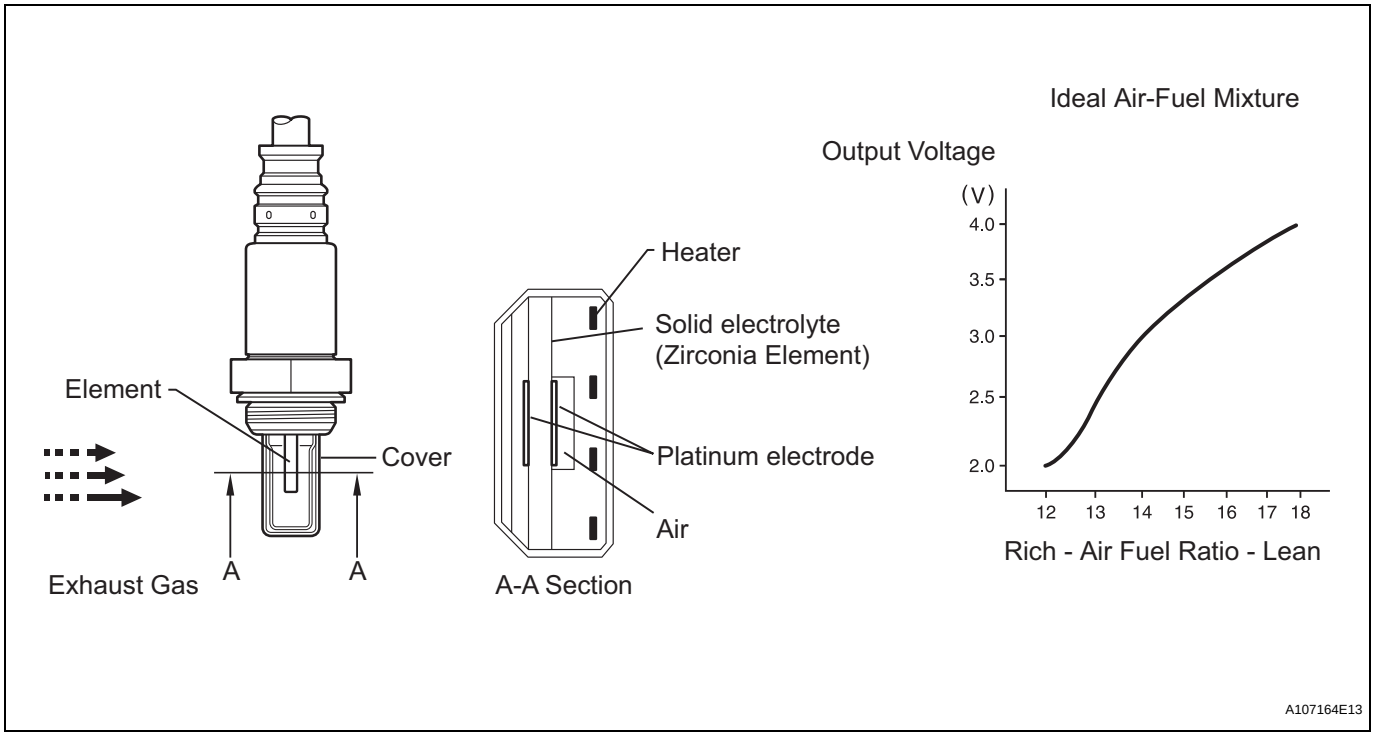
- DTC P2A00 indicates malfunctions related to the bank 1 A/F sensor.
- DTC P2A03 indicates malfunctions related to the bank 2 A/F sensor.
- Bank 1 refers to the bank that includes cylinder No. 1.
- Bank 2 refers to the bank that includes cylinder No. 2.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.
- Although the DTC titles say oxygen sensor, these DTCs relate to the Air-Fuel Ratio (A/F) sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-Way Catalytic Converter (TWC) and located near the engine assembly.

The A/F sensor generates voltage* that corresponds to the actual air-fuel ratio. This sensor voltage is used to provide the ECM with feedback so that it can control the air-fuel ratio. The ECM determines the deviation from the stoichiometric air-fuel ratio level, and regulates the fuel injection time. If the A/F sensor malfunctions, the ECM is unable to control the air-fuel ratio accurately.

The A/F sensor is the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate oxygen concentration detection. In addition, the sensor and heater portions are narrower than the conventional type. The heat generated by the heater is conducted to the solid electrolyte through the alumina, therefore the sensor activation is accelerated.

A three-way catalytic converter (TWC) is used in order to convert the carbon monoxide (CO), hydrocarbon (HC), and nitrogen oxide (NOx) into less harmful substances. To allow the TWC to function effectively, it is necessary to keep the air-fuel ratio of the engine near the stoichiometric air-fuel ratio.

*: Value changes inside the ECM. Since the A/F sensor is the current output element, a current is converted to a voltage inside the ECM. Any measurements taken at the A/F sensor or ECM connectors will show a constant voltage.

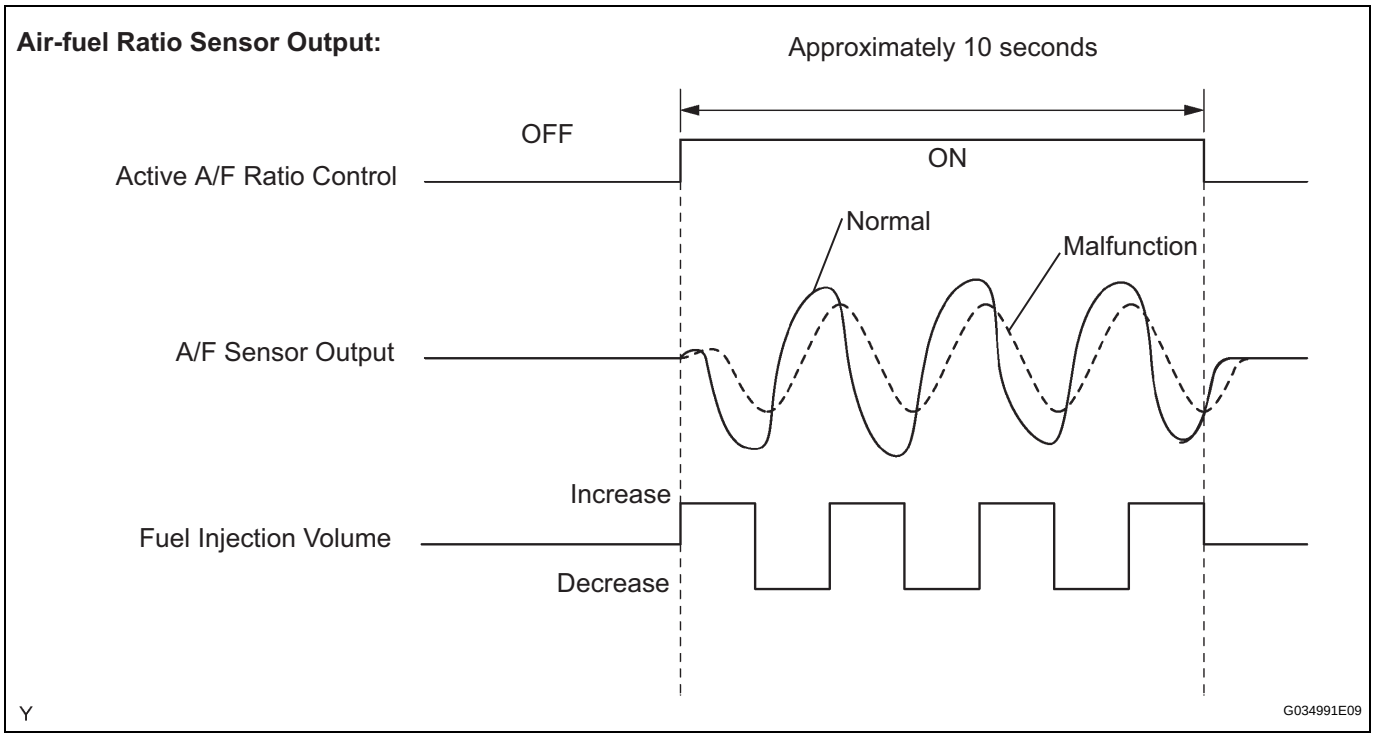


DTC No.	DTC Detection Conditions	Trouble Area
P2A00 P2A03	Calculated value for air-fuel ratio (A/F) sensor response rate deterioration level is less than threshold	• Open or short in A/F sensor circuit • A/F sensor • ECM

MONITOR DESCRIPTION

After the engine is warmed up, the ECM performs air-fuel ratio feedback control to maintain the air-fuel ratio at the stoichiometric level. In addition, active A/F ratio control is performed for approximately 10 seconds after preconditions are met in order to measure the A/F sensor response rate. During active A/F ratio control, the ECM forcibly increases and decreases the injection volume by a certain amount, based on the stoichiometric air-fuel ratio learned during normal air-fuel ratio control, and measures the A/F sensor response rate. The ECM receives a signal from the A/F sensor while performing active A/F ratio control and uses it to calculate the A/F sensor response rate deterioration level.

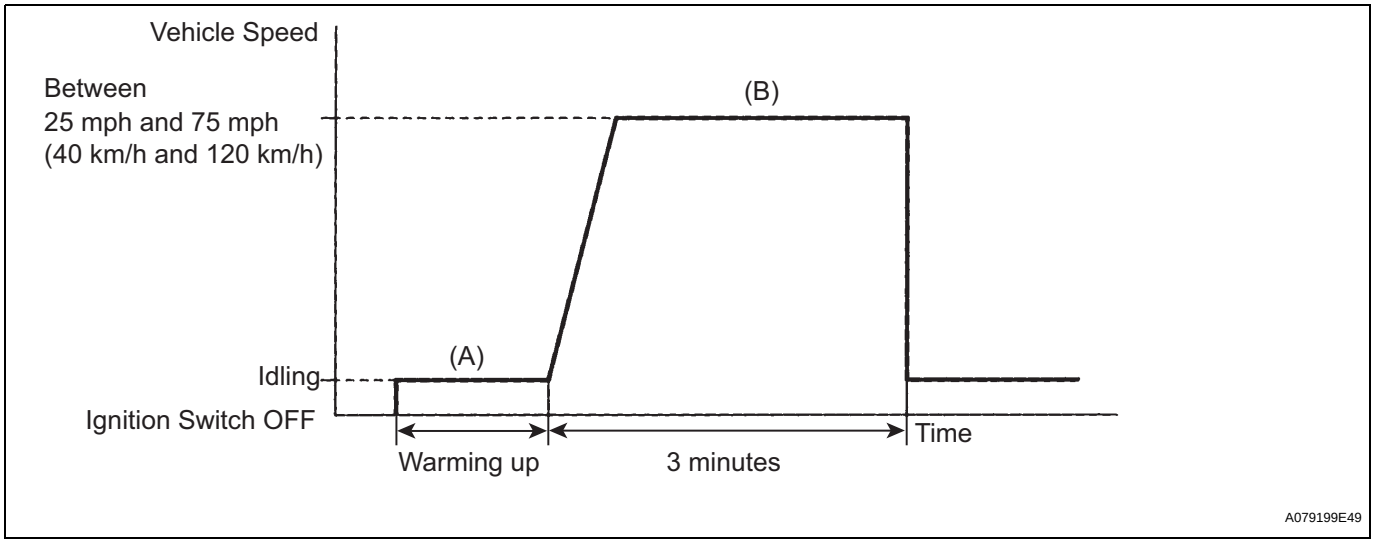
If the value for A/F sensor response rate deterioration level is less than the threshold, the ECM interprets this as a malfunction and sets the DTC.

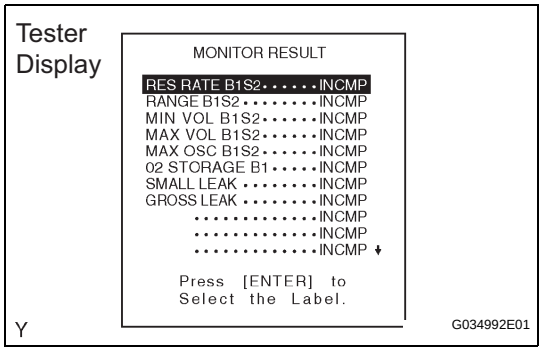


ES

CONFIRMATION DRIVING PATTERN

HINT:
Performing this confirmation pattern will activate the A/F sensor response monitor.





1. Connect an intelligent tester to the DLC3.

2. Turn the ignition switch on (IG).
3. Turn the tester on.
4. Clear the DTCs (where set).
5. Select the following menu items: DIAGNOSIS /ENHANCED OBD II / MONITOR INFO / MONITOR RESULT.
6. Check that RES RATE B1S1 is INCOMP.
7. Start the engine and warm it up (Procedure "A").
8. Drive the vehicle at between 25 mph and 75 mph (40 km/h and 120 km/h) for 3 minutes. However, the vehicle should be driven at a constant speed (Procedure "B").
9. Check the monitor result values on the intelligent tester by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR INFO / TEST RESULT.
10. If the values indicated on the tester do not change, perform READINESS MONITOR DRIVE PATTERN for the A/F sensor and the heated oxygen sensor (See page ES-338).
    HINT:
    Completion of all A/F sensor monitors is required to change the value in TEST RESULT.
11. Note the value of the Monitor Result.
12. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
13. Check if any DTCs (any pending DTCs) are set.

ES

MONITOR STRATEGY

Related DTCs	P2A00: A/F sensor (Bank 1) slow response P2A03: A/F sensor (Bank 2) slow response
Required Sensors/Components (Main)	A/F sensor
Required Sensors/Components (Related)	Vehicle speed sensor, Crankshaft position sensor
Frequency of Operation	Once per driving cycle
Duration	10 to 15 seconds
MIL Operation	2 driving cycles
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	P0031, P0032, P0051, P0052 (A/F sensor heater - Sensor 1) P0100 - P0103 (MAF meter) P0110 - P0113 (IAT sensor) P0115 - P0118 (ECT sensor) P0120 - P0223, P2135 (TP sensor) P0125 (Insufficient ECT for Closed Loop) P0171, P0172, P0173, P0174 (Fuel system) P0300 - P0308 (Misfire) P0335 (CKP sensor) P0340, P0341 (CMP sensor) P0500 (VSS) P2196, P2198 (A/F sensor - rationality)
Battery voltage	11 V or more
ECT	75°C (167°F) or more
Idle	OFF
Engine rpm	Less than 4,000 rpm
A/F sensor status	Activated
Fuel-cut	OFF
Engine load	10 to 70 %
Shift position	2 or more
Catalyst monitor	Not yet
MAF	2.5 to 15 g/sec.

TYPICAL MALFUNCTION THRESHOLDS

Response rate deterioration level	Less than 0.18 V

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

WIRING DIAGRAM

Refer to DTC P2195 (See page ES-350).

INSPECTION PROCEDURE

HINT:

Intelligent tester only:

Malfunctioning areas can be identified by performing the A/F CONTROL function provided in the ACTIVE TEST. The A/F CONTROL function can help to determine whether the Air-fuel Ratio (A/F) sensor, Heated Oxygen (HO2) sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the A/F CONTROL operation using the intelligent tester.

1. Connect the intelligent tester to the DLC3.
2. Start the engine and turn the tester on.
3. Warm up the engine at an engine speed of 2,500 rpm for approximately 90 seconds.
4. On the intelligent tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL.
5. Perform the A/F CONTROL operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
6. Monitor the output voltages of the A/F and HO2 sensors (AFS B1 S1 and O2S B1 S2 or AFS B2 S1 and O2S B2 S2) displayed on the tester.

HINT:

- The A/F CONTROL operation lowers the fuel injection volume by 12.5 % or increases the injection volume by 25 %.
- Each sensor reacts in accordance with increases in the fuel injection volume.

Tester Display (Sensor)	Injection Volume	Status	Voltage
AFS B1 S1 or AFS B2 S1 (A/F)	+25 %	Rich	Less than 3.0 V
AFS B1 S1 or AFS B2 S1 (A/F)	-12.5 %	Lean	More than 3.35 V
O2S B1 S2 or O2S B2 S2 (HO2)	+25 %	Rich	More than 0.55 V
O2S B1 S2 or O2S B2 S2 (HO2)	-12.5 %	Lean	Less than 0.4 V

NOTICE:

The Air-Fuel Ratio (A/F) sensor has an output delay of a few seconds and the Heated Oxygen (HO2) sensor has a maximum output delay of approximately 20 seconds.

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
1	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		-
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage More than 0.55 V Less than 0.4 V		

Case	A/F Sensor (Sensor 1) Output Voltage		HO2 Sensor (Sensor 2) Output Voltage		Main Suspected Trouble Area
2	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• A/F sensor • A/F sensor heater A/F sensor circuit
	Output Voltage Almost no reaction		Output Voltage More than 0.55 V Less than 0.4 V		
3	Injection Volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• HO2 sensor • HO2 sensor heater • HO2 sensor circuit
	Output Voltage More than 3.35 V Less than 3.0 V		Output Voltage Almost no reaction		
4	Injection volume +25 % -12.5 %		Injection Volume +25 % -12.5 %		• Fuel pressure • Gas leakage from exhaust system (Air-fuel ratio extremely lean or rich)
	Output Voltage Almost no reaction		Output Voltage Almost no reaction		

- Following the A/F CONTROL procedure enables technicians to check and graph the voltage outputs of both the A/F and HO2 sensors.
- To display the graph, enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL / USER DATA / AFS B1 S1 and O2S B1 S2 or AFS B2 S1 and O2S B2 S2, and press the YES button and then the ENTER button followed by the F4 button.

HINT:

- DTC P2A00 or P2A03 may also be set, when the air-fuel ratio is stuck rich or lean.
- A low A/F sensor voltage could be caused by a rich air-fuel mixture. Check for conditions that would cause the engine to run rich.
- A high A/F sensor voltage could be caused by a lean air-fuel mixture. Check for conditions that would cause the engine to run lean.
- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2A00 AND/OR P2A03)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

Display (DTC Output)	Proceed to
P2A00 and/or P2A03	A
P2A00 and/or P2A03 and other DTCs	B

ES

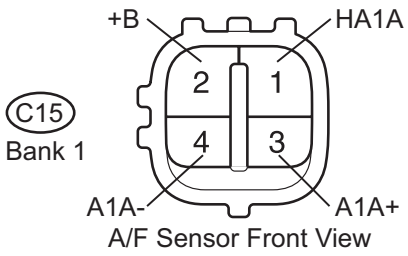
HINT:
If any DTCs other than P2A00 or P2A03 are output, troubleshoot those DTCs first.

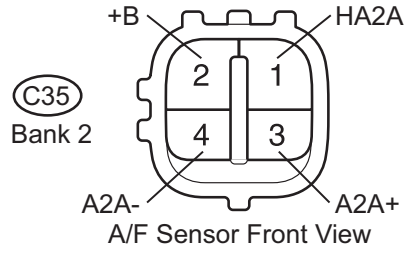
B → **GO TO DTC CHART (See page ES-63)**

A

2 INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)

Component Side:





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(a) Disconnect the C15 or C35 A/F sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance (Bank 1 sensor 1)

Tester Connection	Condition	Specified Condition
HA1A (1) - +B (2)	20°C (68°F)	1.8 to 3.4 Ω
HA1A (1) - A1A- (4)	-	10 kΩ or higher

Standard resistance (Bank 2 sensor 1)

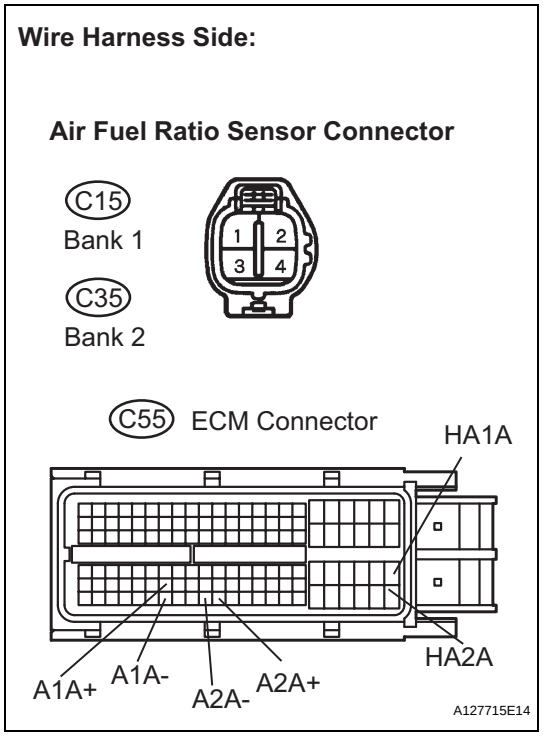
Tester Connection	Condition	Specified Condition
HA2A (1) - +B (2)	20°C (68°F)	1.8 to 3.4 Ω
HA2A (1) - A2A- (4)	-	10 kΩ or higher

(c) Reconnect the A/F sensor connector.

NG → **REPLACE AIR FUEL RATIO SENSOR (See page EC-19)**

OK

3	CHECK HARNESS AND CONNECTOR (A/F SENSOR - ECM)



(a) Disconnect the C15 and C35 A/F sensor connectors.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
+B (C15-2) - Body ground	9 to 14 V
+B (C35-2) - Body ground	9 to 14 V

(d) Turn the ignition switch off.
(e) Disconnect the C55 ECM connector.
(f) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
HA1A (C15-1) - HA1A (C55-86)	Below 1 Ω
A1A+ (C15-3) - A1A+ (C55-93)	Below 1 Ω
A1A- (C15-4) - A1A- (C55-116)	Below 1 Ω
HA2A (C35-1) - HA2A (C55-109)	Below 1 Ω
A2A+ (C35-3) - A2A+ (C55-120)	Below 1 Ω
A2A- (C35-4) - A2A- (C55-119)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
HA1A (C15-1) or HA1A (C55-86) - Body ground	10 kΩ or higher
A1A+ (C15-3) or A1A+ (C55-93) - Body ground	10 kΩ or higher
A1A- (C15-4) or A1A- (C55-116) - Body ground	10 kΩ or higher
HA1A (C35-1) or HA2A (C55-109) - Body ground	10 kΩ or higher
A2A+ (C35-3) or A2A+ (C55-120) - Body ground	10 kΩ or higher
A2A- (C35-4) or A2A- (C55-119) - Body ground	10 kΩ or higher

(g) Reconnect the ECM connector.
(h) Reconnect the A/F sensor connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

5	CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00 AND/OR P2A03)

(a) Read the DTCs using the intelligent tester.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

ES

Result

Display (DTC Output)	Proceed to
P2A00 and/or P2A03	A
No output	B

B → **REPLACE ECM (See page ES-518)**

A

6	REPLACE AIR FUEL RATIO SENSOR

(a) Replace the air fuel ratio sensor (See page EC-19).

NEXT

ES

7	PERFORM CONFIRMATION DRIVING PATTERN

NEXT

8	CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00 AND/OR P2A03)

(a) Read the DTCs using the intelligent tester.
(b) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

Result

Display (DTC Output)	Proceed to
No output	A
P2A00 and/or P2A03	B

B → **REPLACE ECM (See page ES-518)**

A

END

DTC	U0101	Lost Communication with TCM

DESCRIPTION

The Transmission Control Module (TCM) and ECM perform 2-way communications with each other via the Controller Area Network (CAN). The TCM sends signals to the ECM concerning required engine rpm, required engine torques, warning indicators in the combination meter, DTCs and other data. The ECM sends signals to the TCM concerning engine rpm, opening angles of the throttle valve, temperature of intake air, temperature of engine coolant, engine torques and other data. If the TCM cannot communicate with the ECM, the TCM will conclude that there is a malfunction in the CAN system, illuminate the MIL and set a DTC.

DTC No.	DTC Detection Condition	Trouble Area
U0101	No communication from TCM continues	• Open or short in TCM and ECM circuit • TCM • ECM

ES

MONITOR STRATEGY

Related DTCs	U0101: Verify communication
Required Sensors/Components (Main)	ECM
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	1.25 seconds
MIL Operation	immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present	None
Battery Voltage	10.5 V or more (0.5 second or more)
Engine switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Communication signal	Lost communication with TCM

INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC U0101)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(e) Read the DTCs.

Result

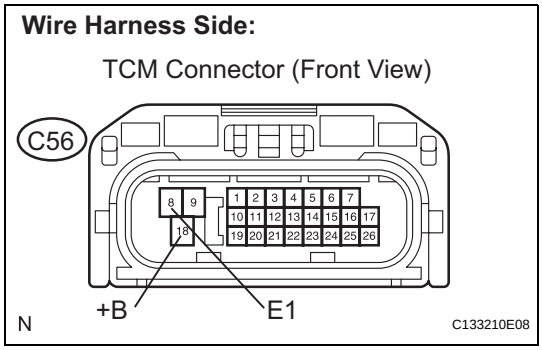
Display (DTC output)	Proceed to
U0101	A
U0101 and other DTCs	B

ES

B → **GO TO DTC CHART (See page ES-63)**

A

2	CHECK TCM TERMINAL VOLTAGE (+B AND E1 TERMINALS)



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage of the TCM connectors.
Standard voltage

Tester Connection	Specified Condition
C56-18 (+B) - C56-8 (E1)	9 to 14 V

(d) Turn the ignition switch off.
(e) Measure the resistance of the TCM connector.
Standard resistance

Tester Connection	Specified Condition
C56-8 (E1) - Body ground	Below 1 Ω

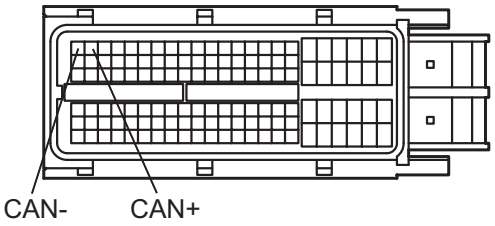
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

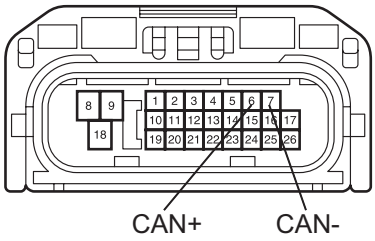
3 CHECK HARNESS AND CONNECTOR

Wire Harness Side:

ECM Connector (Front View)



TCM Connector (Front View)



C133242E02

(a) Disconnect the C56 TCM connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C56-6 (CAN+) - C55-2 (CAN+)	Below 1 Ω
C56-7 (CAN-) - C55-1 (CAN-)	Below 1 Ω
C56-6 (CAN+) or C55-2 (CAN+) - Body ground	1 MΩ or more
C56-7 (CAN-) or C55-1 (CAN-) - Body ground	1 MΩ or more

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 REPLACE ECM

(a) Replace the ECM (See page ES-518).

NOTICE:
Replace the ECM with a ECM from a normally functioning vehicle of the same model.

NEXT

5 CHECK IF DTC RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Clear the DTC.
(c) Start the engine.
(d) Read the DTCs.

Result

Display (DTC Output)	Proceed to
U0101	A
No DTC	B

B → **REPLACE ECM**

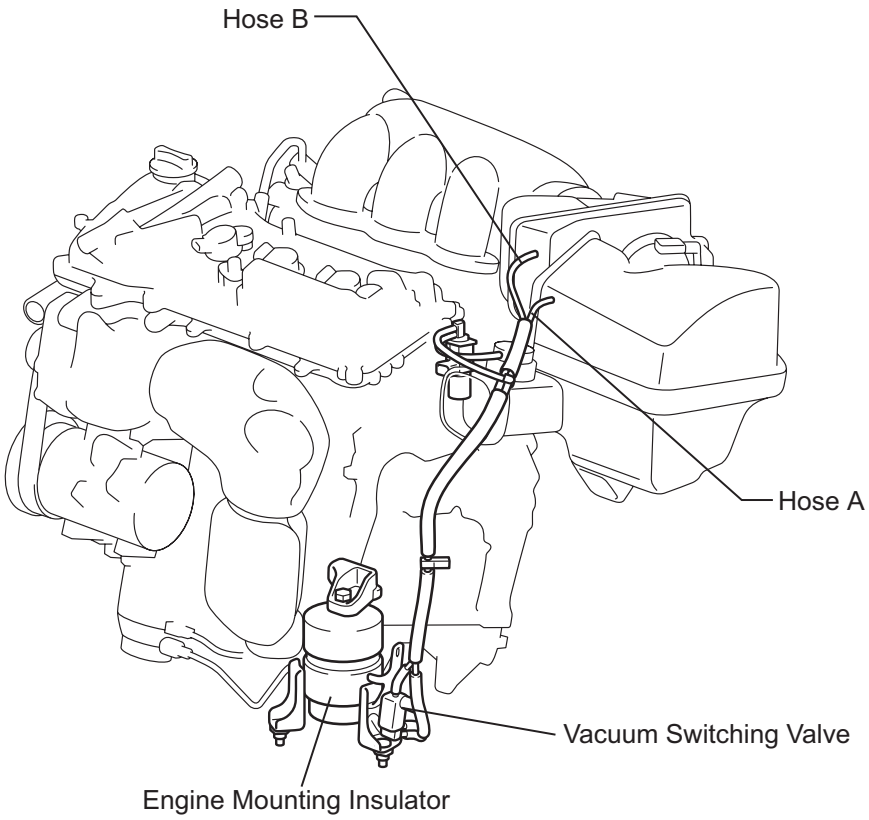
A

REPLACE TCM

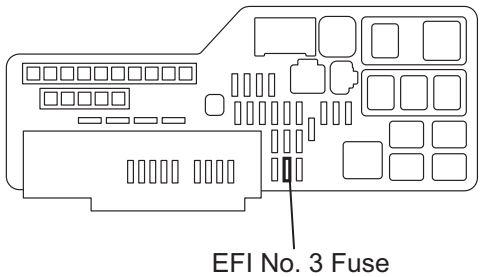
Active Control Engine Mount System

DESCRIPTION

LOCATION



Engine Room R/B:

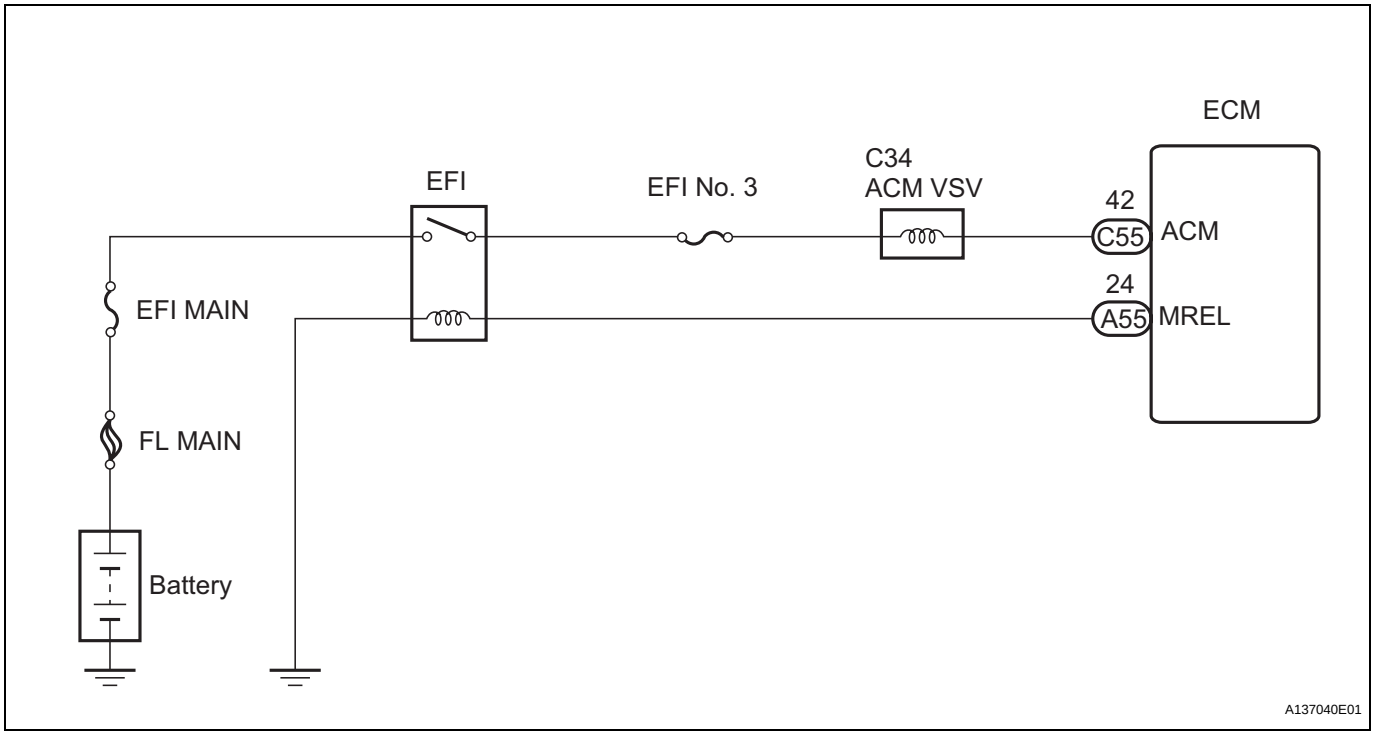


N

A136282E01

The Active Control Engine Mount (ACM) system decreases engine vibration at a low engine speed using the ACM VSV. The VSV is controlled by a pulse signal transmitted to the VSV from the ECM. The frequency of this pulse signal is matched to the engine speed to decrease engine vibration.

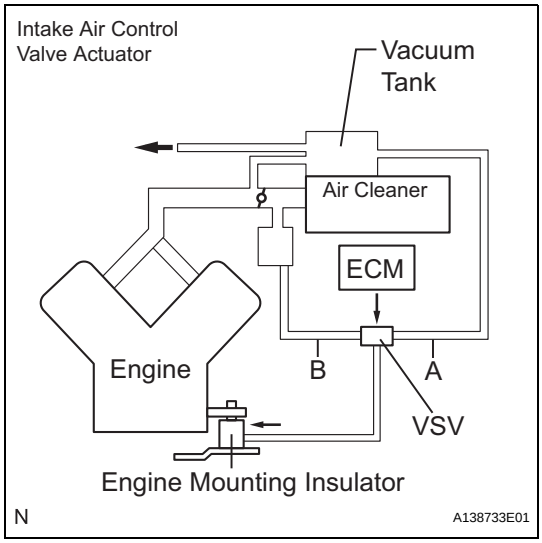
WIRING DIAGRAM



ES

INSPECTION PROCEDURE

1	CHECK VACUUM HOSES

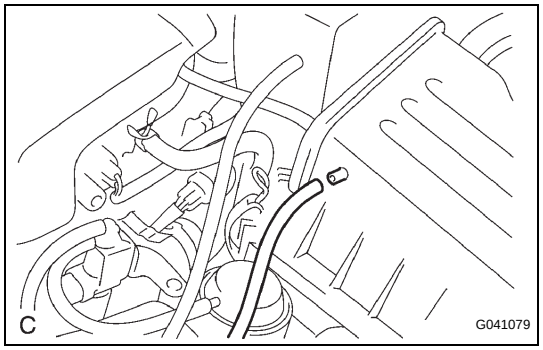


(a) If the hose is damaged, replace the vacuum hose assembly.
(b) Check the air and vacuum hoses for looseness, disconnection and blockage.

NG → **REPAIR OR REPLACE VACUUM HOSES**

OK

2 **CHECK VACUUM**



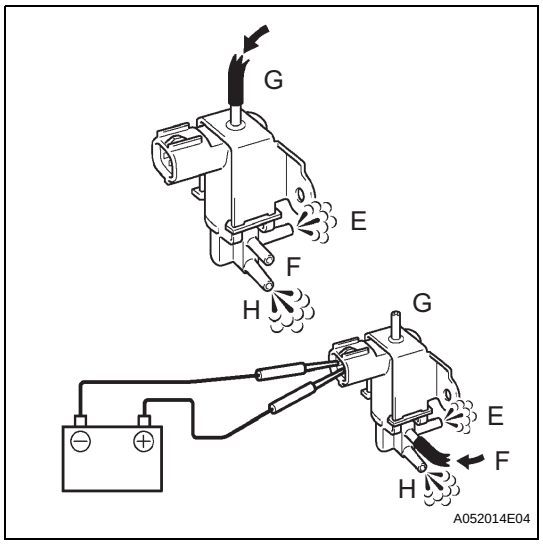
(a) Start the engine.
(b) Disconnect the vacuum hose from the air cleaner cap.
(c) Check that the disconnected port located on the vacuum tank applies suction to your finger.
OK:
Vacuum pressure exists.
(d) Reconnect the vacuum hose.

NG → **CHECK AND REPLACE VACUUM SOURCE AND HOSES**

OK

ES

3 **INSPECT DUTY VACUUM SWITCHING VALVE (OPERATION)**

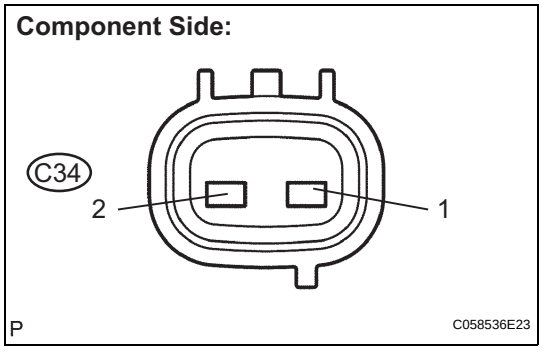


(a) Remove the VSV for ACM.
(b) Check operation of the VSV for ACM when positive battery voltage is applied to the terminals of the VSV for ACM connector.
Positive battery voltage is not applied:
The air from pipe G is flowing out through pipes E and H.
Positive battery voltage is applied:
The air from pipe F is flowing out through pipes E and H.
(c) Reinstall the VSV for ACM.

NG → **REPLACE DUTY VACUUM SWITCHING VALVE**

OK

4 **INSPECT DUTY VACUUM SWITCHING VALVE (RESISTANCE)**

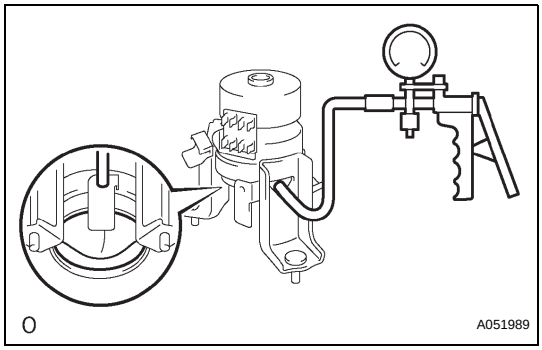


(a) Disconnect the C34 VSV for ACM connector.
(b) Measure the resistance between terminals 1 and 2.
Standard resistance:
19 to 21 Ω at 20°C (68°F)
(c) Reconnect the VSV for ACM connector.

NG → **REPLACE DUTY VACUUM SWITCHING VALVE**

OK

5	INSPECT ENGINE MOUNTING INSULATOR ASSEMBLY FRONT

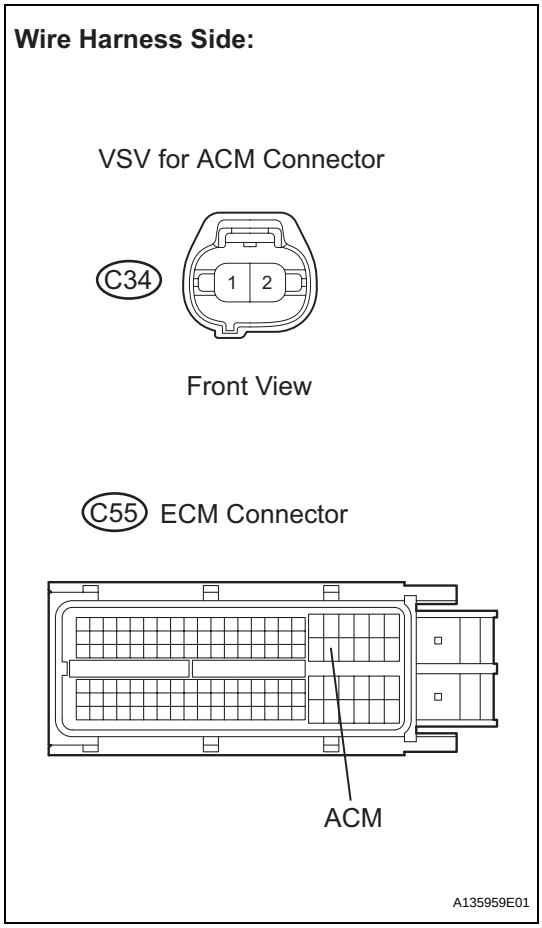


(a) Disconnect the vacuum hose from the front engine mount insulator.
(b) Using a vacuum pump, apply vacuum of 80 kPa (600 mmHg, 25 in.Hg) and wait for 1 minute.
(c) Check that there is no change in the needle movement of the vacuum pump gauge.
(d) Check that there is no fluid leakage caused by a break in the diaphragm.
OK:
Vacuum pressure exists.
(e) Reconnect the vacuum hose.

NG → **REPLACE FRONT ENGINE MOUNTING INSULATOR ASSEMBLY**

OK

6	CHECK HARNESS AND CONNECTOR (VSV FOR ACM - ECM)



(a) Check the wire harness between the VSV for ACM connector and the ECM connector.
(1) Disconnect the C34 VSV for ACM connector.
(2) Disconnect the C55 ECM connector.
(3) Measure the resistance between the wire harness side connectors.
Standard resistance (Check for open)

Tester Connections	Specified Conditions
VSV for ACM (C34-2) - ACM (C55-42)	Below 1 Ω

Standard resistance (Check for open)

Tester Connections	Specified Conditions
VSV for ACM (C34-2) or ACM (C55-42) - Body ground	10 kΩ or higher

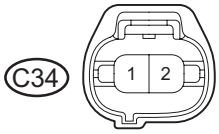
(4) Reconnect the ECM connector.
(5) Reconnect the VSV connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7	INSPECT DUTY VACUUM SWITCHING VALVE (VOLTAGE)

Wire Harness Side:



VSV for ACM Connector

A135958E01

(a) Disconnect the C34 VSV connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between the terminals.

Standard voltage

Tester Connection	Specified Condition
C34-1 - Body ground	9 to 14 V

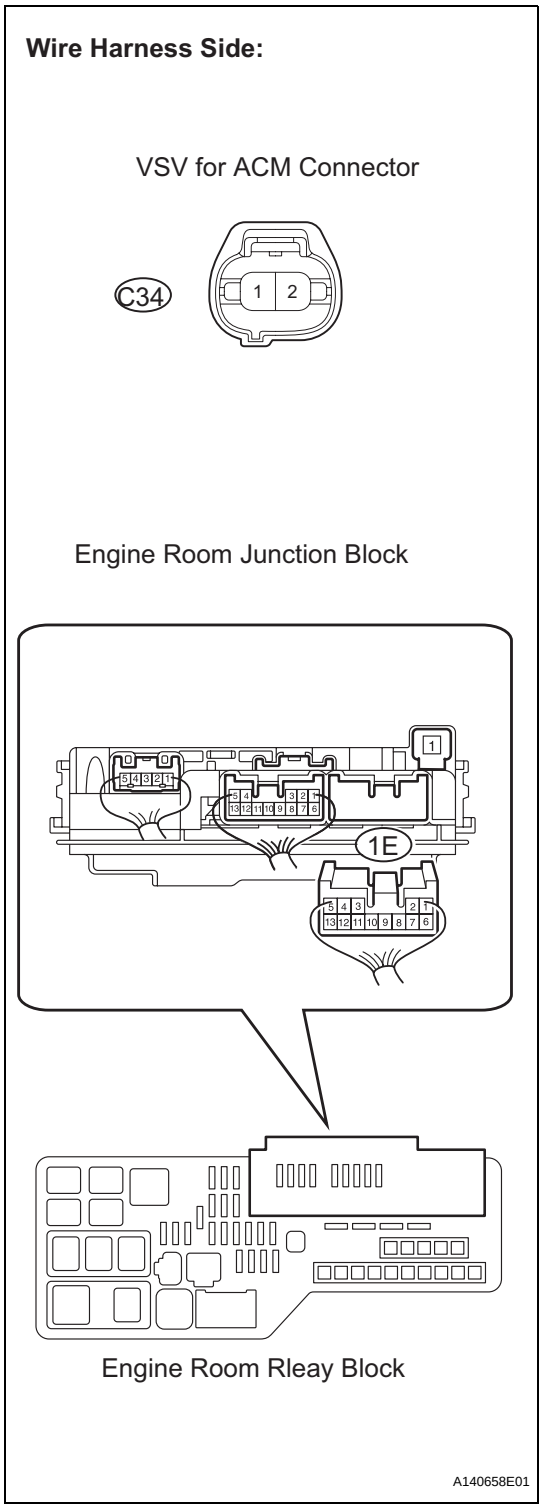
NG → **Go to step 8**

OK

REPLACE ECM (See page ES-518)

ES

8	CHECK HARNESS AND CONNECTOR (VSV FOR ACM - ENGINE JUNCTION BLOCK (EFI RELAY))



(a) Check the wire harness between the VSV for ACM and the EFI relay.
  (1) Disconnect the C34 VSV connector.
  (2) Remove the engine room junction block.
  (3) Measure the resistance between the wire harness side connectors.

Standard resistance (Check for open)

Tester Connections	Specified Condition
VSV for ACM (C34-1) - 1E-6 (Engine room relay block)	Below 1 Ω

Standard resistance (Check for short)

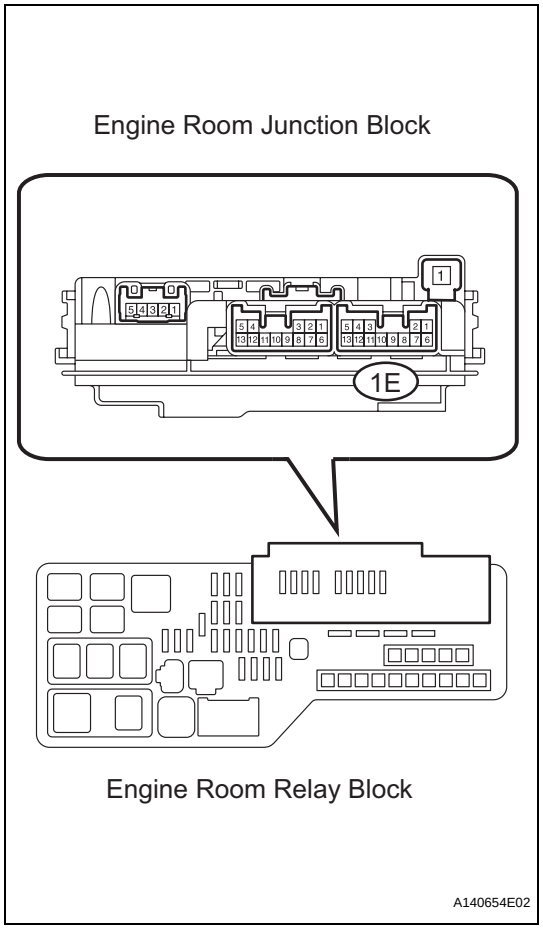
Tester Connections	Specified Condition
VSV for ACM (C34-1) or 1E-6 (Engine room relay block) - Body ground	10 kΩ or higher

  (4) Reconnect the VSV for ACM connector.
  (5) Reinstall the engine room junction block.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

9	INSPECT ENGINE ROOM JUNCTION BLOCK (EFI RELAY)



(a) Remove the engine room junction block.
(b) Measure the EFI relay resistance.
Standard resistance

Tester Connection	Specified Condition
1E-12 - 1E-6	10 kΩ or higher
1E-12 - 1E-6	Bellow 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-10)

(c) Reinstall the engine room junction block.

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

REPLACE ECM (See page ES-518)

ES

EVAP System

RELATED DTCS

DTCs	Monitoring Items	See page
P043E	Reference orifice clogged (built into canister pump module)	ES-255
P043F	Reference orifice high-flow (built into canister pump module)	
P0441	• Purge VSV (Vacuum Switching Valve) stuck closed • Purge VSV stuck open • Purge flow	ES-260
P0450	Canister pressure sensor (built into canister pump module) voltage abnormal fluctuation	ES-267
P0451	• Canister pressure sensor (built into canister pump module) noise • Canister pressure sensor (built into canister pump module) signal becomes fixed/flat	
P0452	Canister pressure sensor (built into canister pump module) voltage low	
P0453	Canister pressure sensor (built into canister pump module) voltage high	
P0455	EVAP gross leak	ES-274
P0456	EVAP small leak	
P2401	Leak detection pump stuck OFF (built into canister pump module)	ES-255
P2402	Leak detection pump stuck ON (built into canister pump module)	
P2419	Vent valve stuck closed (built into canister pump module)	ES-255
P2420	Vent valve stuck open (vent) (built into canister pump module)	ES-373
P2610	Soak timer (built into ECM)	ES-377

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor fixed output				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

Y

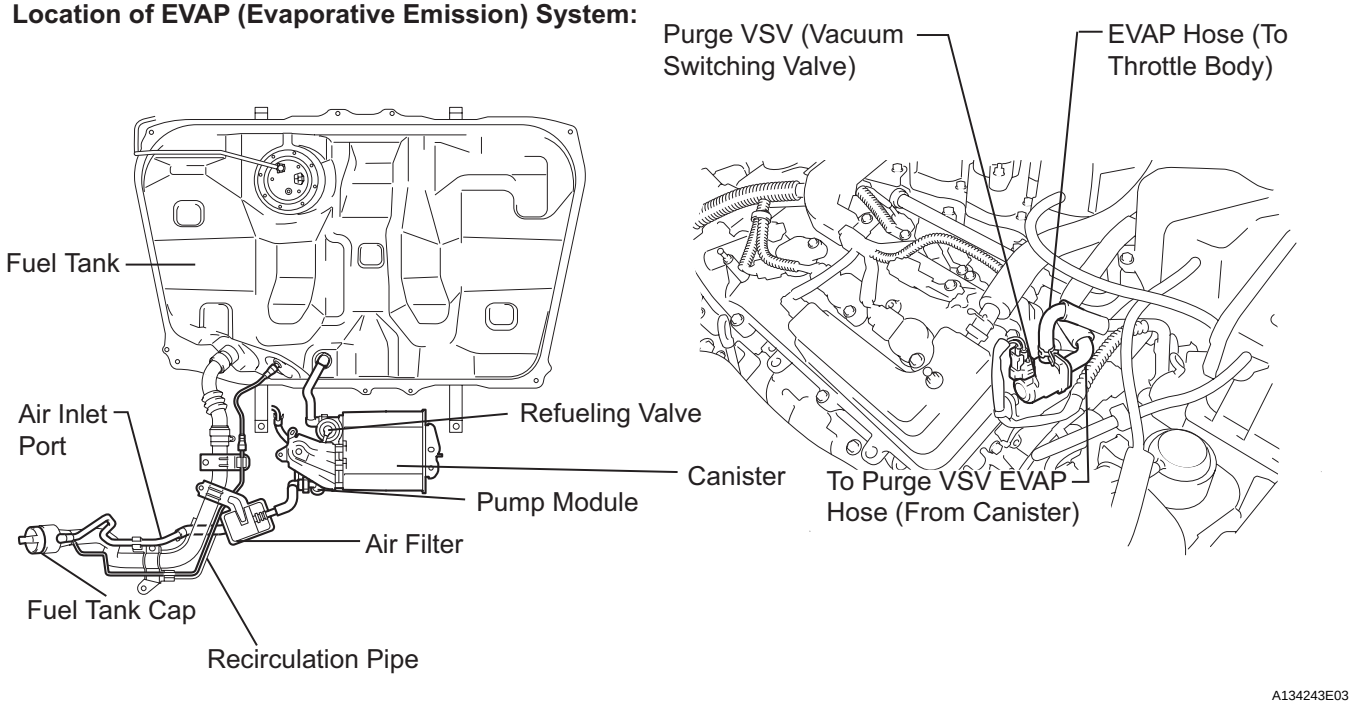
A106731E11

NOTICE:
If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

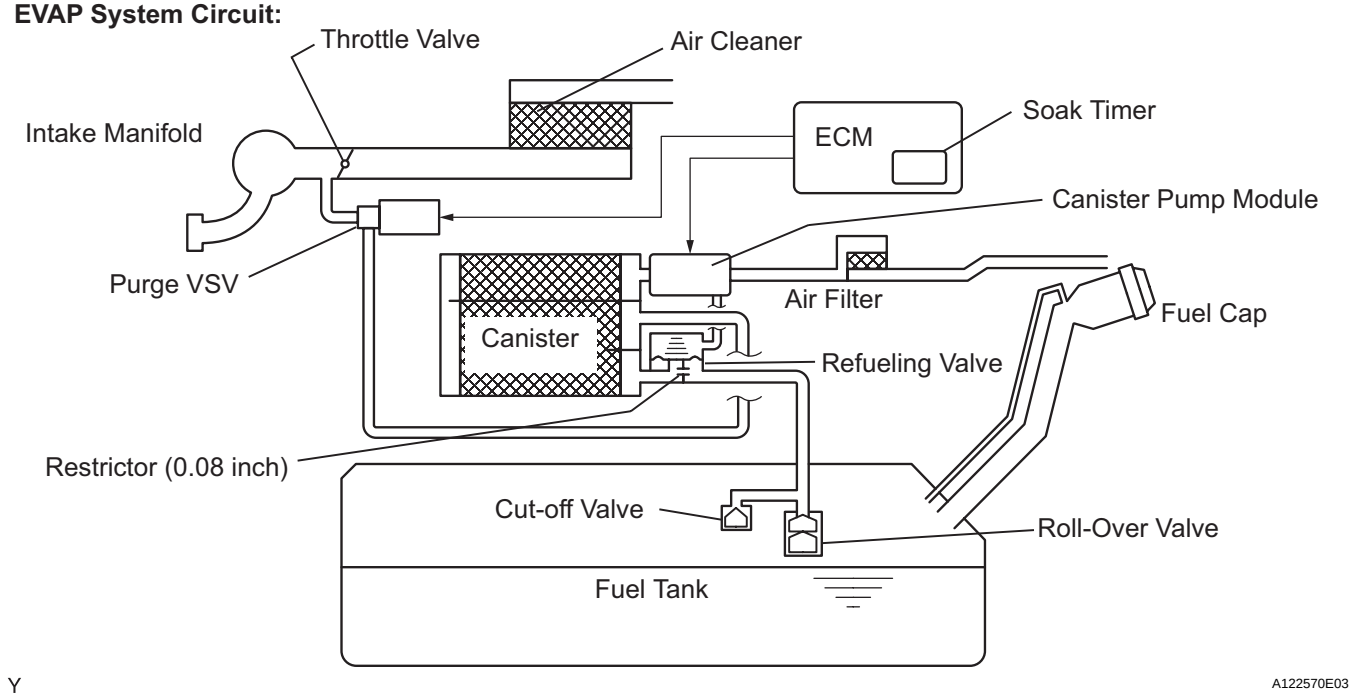
ES

DESCRIPTION

Location of EVAP (Evaporative Emission) System:



EVAP System Circuit:



NOTICE:

In this vehicle's EVAP system, turning ON the vent valve does not seal off the EVAP system. To check for leaks in the EVAP system, disconnect the air inlet vent hose and apply pressure from the atmospheric side of the canister.

While the engine is running, if a predetermined condition (closed-loop, etc.) is met, the purge VSV is opened by the ECM and fuel vapors stored in the canister are purged into the intake manifold. The ECM changes the duty cycle ratio of the purge VSV to control purge flow volume.

The purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that the purge flow is maintained when negative pressure (vacuum) is applied to the canister.

The following two monitors run to confirm the appropriate EVAP system operation.

1. Key-off monitor

This monitor checks for EVAP (Evaporative Emission) system leaks and canister pump module malfunctions. The monitor starts 5 hours* after the ignition switch is turned off. At least 5 hours are required for the fuel to cool down to stabilize the EVAP pressure, thus making the EVAP system monitor more accurate.

The leak detection pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system, and malfunctions in both the canister pump module and purge VSV, based on the EVAP pressure.

HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

2. Purge flow monitor

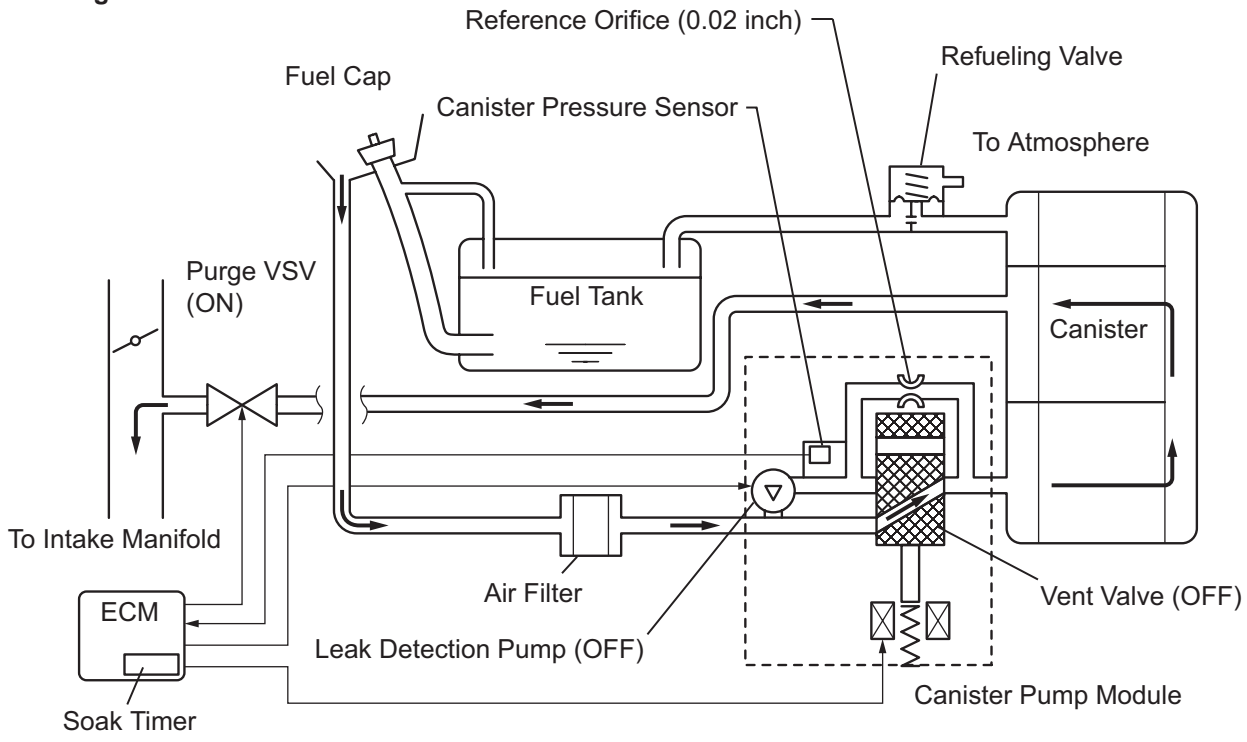
The purge flow monitor consists of the two monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
  While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
  The vent valve is turned OFF (open) and the EVAP pressure is measured. If the variation in the pressure is less than 0.5 kPa-g (3.75 mmHg-g), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

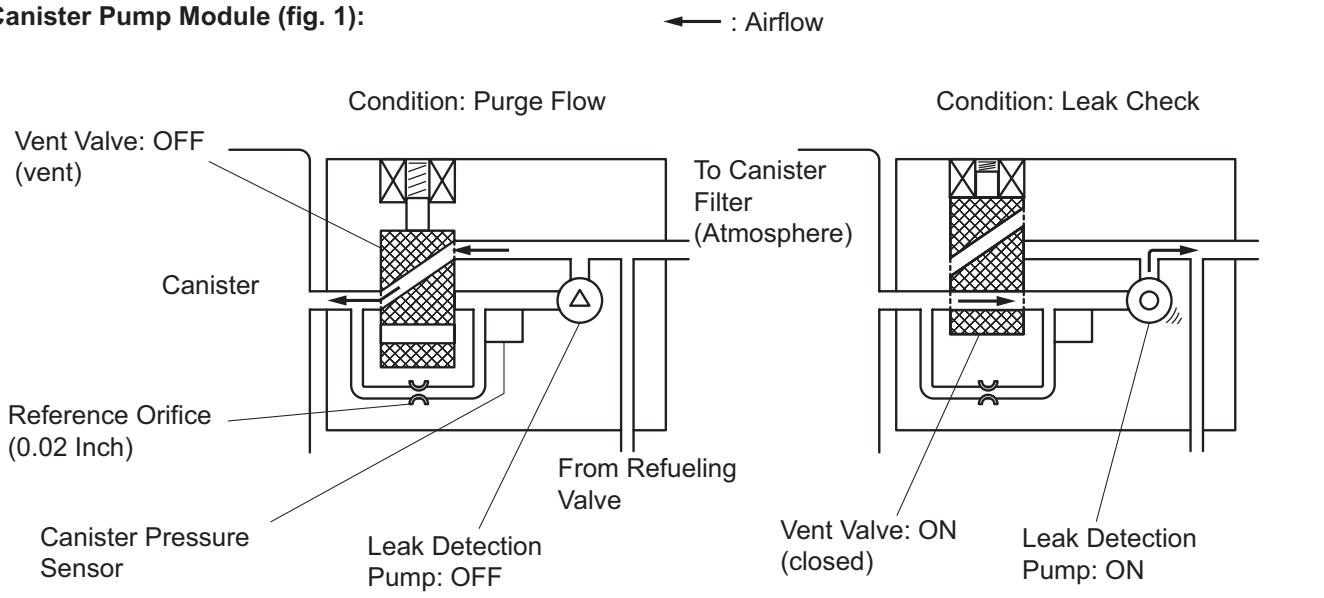
EVAP Purge Flow:



Components	Operations
Canister	Contains activated charcoal to absorb EVAP (Evaporative Emissions) generated in fuel tank.
Cut-off valve	Located in fuel tank. Valve floats and closes when fuel tank 100 % full.
Purge VSV (Vacuum Switching Valve)	Opens or closes line between canister and intake manifold. ECM uses purge VSV to control EVAP purge flow. In order to discharge EVAP absorbed by canister to intake manifold, ECM opens purge VSV. EVAP discharge volume to intake manifold controlled by purge VSV duty cycle ratio (current-carrying time) (Open: ON; Closed: OFF).
Refueling valve	Controls EVAP pressure from fuel tank to canister. Valve consists of diaphragm, spring and restrictor (diameter: 0.08 inch). When fuel vapor and pressure inside fuel tank increase, valve opens. While EVAP purged, valve closes and restrictor prevents large amount of vacuum from affecting pressure in fuel tank. Valve opened while refueling.
Roll-over valve	Located in fuel tank. Valve closed by its own weight when vehicle overturns to prevent fuel from spilling out.
Soak timer	Built into ECM. To ensure accurate EVAP monitor, measures 5 hours (+-15 min) after ignition switch turned off. This allows fuel to cool down, stabilizing EVAP pressure. When approximately 5 hours elapsed, ECM in activated (refer to fig. 3).
Canister pump module	Consists of (a) to (d) below. Canister pump module cannot be disassembled.
(a) Vent valve	Vents and closes EVAP system. When ECM turns valve ON, EVAP system closed. When ECM turns valve off, EVAP system vented. Negative pressure (vacuum) created in EVAP system to check for EVAP leaks by closing purge VSV, turning on vent valve (closed) and operating leak detection pump (refer to fig. 1).
(b) Canister pressure sensor	Indicates pressure as voltages. ECM supplies regulated 5 V to canister pressure sensor, and uses feedback from sensor to monitor EVAP system pressure (refer to fig. 2).
(c) Leak detection pump	Creates negative pressure (vacuum) in EVAP system for leak check.
(d) Reference orifice	Has opening with 0.02 inch diameter. Vacuum produced through orifice by closing purge VSV, turning off vent valve and operating leak detection pump, to monitor reference pressure. Reference pressure indicates small leak of EVAP.

ES

Canister Pump Module (fig. 1):



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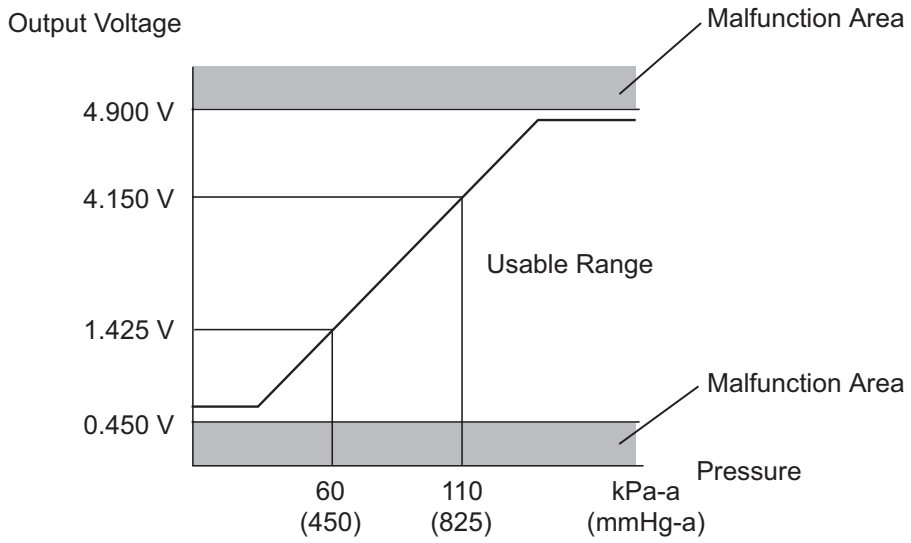
Canister Pressure Sensor Specification (fig. 2):

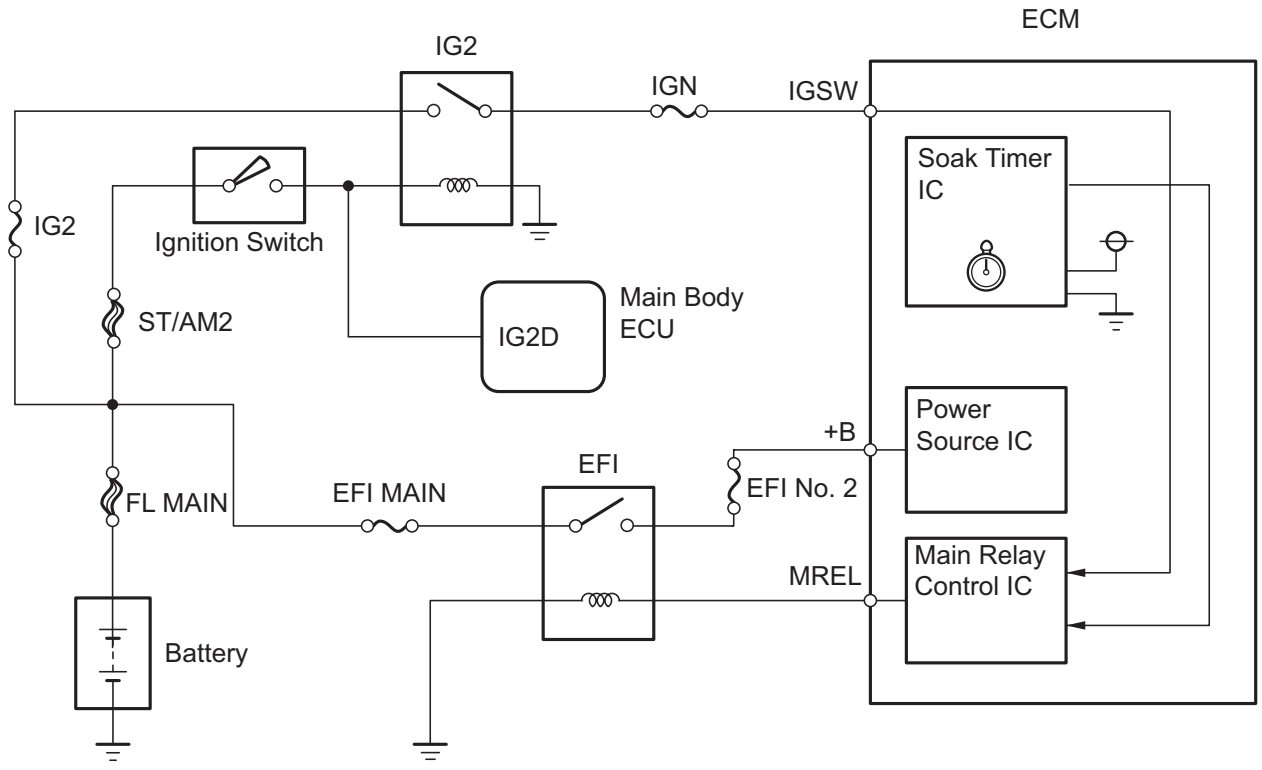


HINT:

Standard atmospheric pressure is 101.3 kPa-a (760 mmHg-a)

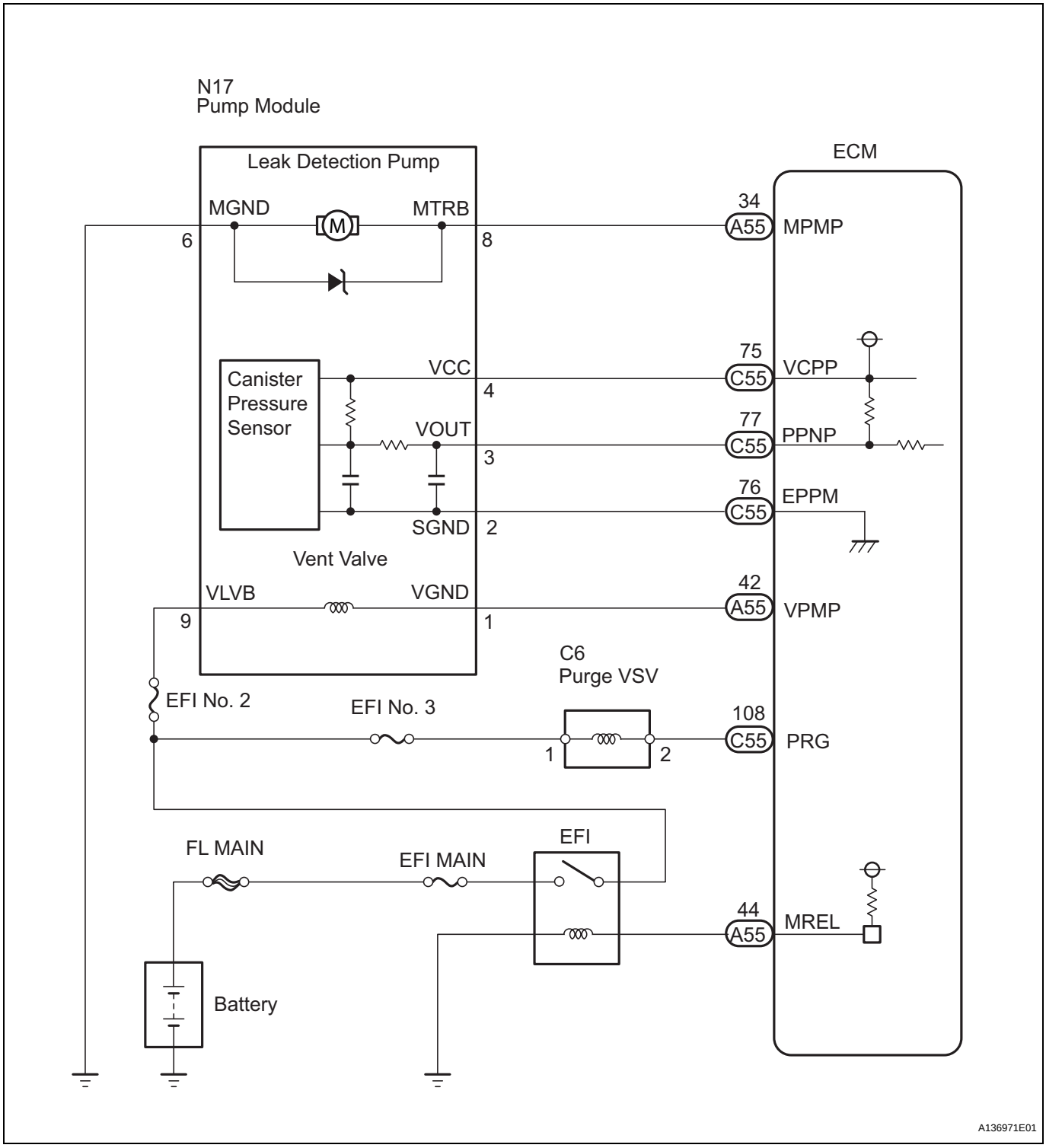
A115543E06

Soak Timer Circuit (fig. 3):



A136968E01

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

The intelligent tester is required to conduct the following diagnostic troubleshooting procedure.

HINT:

- Using intelligent tester monitor results enables the EVAP (Evaporative Emission) system to be confirmed.

- Read freeze frame data using the intelligent tester. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction (See page ES-45).

1	CONFIRM DTC

(a) Turn the ignition switch off and wait for 10 seconds.
(b) Turn the ignition switch on (IG).
(c) Turn the ignition switch off and wait for 10 seconds.
(d) Connect an intelligent tester to the DLC3.
(e) Turn the ignition switch on (IG) and turn the tester ON.
(f) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(g) Confirm DTCs and freeze frame data.
If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.
NOTICE:
If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

ES

DTCs / Malfunctioning Areas	P043E P043F	P0441	P0450	P0451	P0452	P0453	P0455	P0456	P2401 P2402	P2419	P2420
Reference orifice clogged	●								●	●	
Reference orifice high-flow	●								●	●	
Purge VSV stuck open		●					●				
Purge VSV stuck closed		●									
Canister pressure sensor fixed output				●							
Canister pressure sensor noise				●							
Canister pressure sensor low output			●		●						
Canister pressure sensor high output			●			●					
Gross leak		●					●				
Small leak								●			
Leak detection pump stuck OFF	●								●	●	
Leak detection pump stuck ON	●								●	●	
Vent valve stuck closed	●								●	●	
Vent valve stuck open (vent)											●

Y A106731E11

ES

NEXT

2	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of 5 steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.**
- **Do not run the engine during this operation.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear the DTCs (See page ES-45).

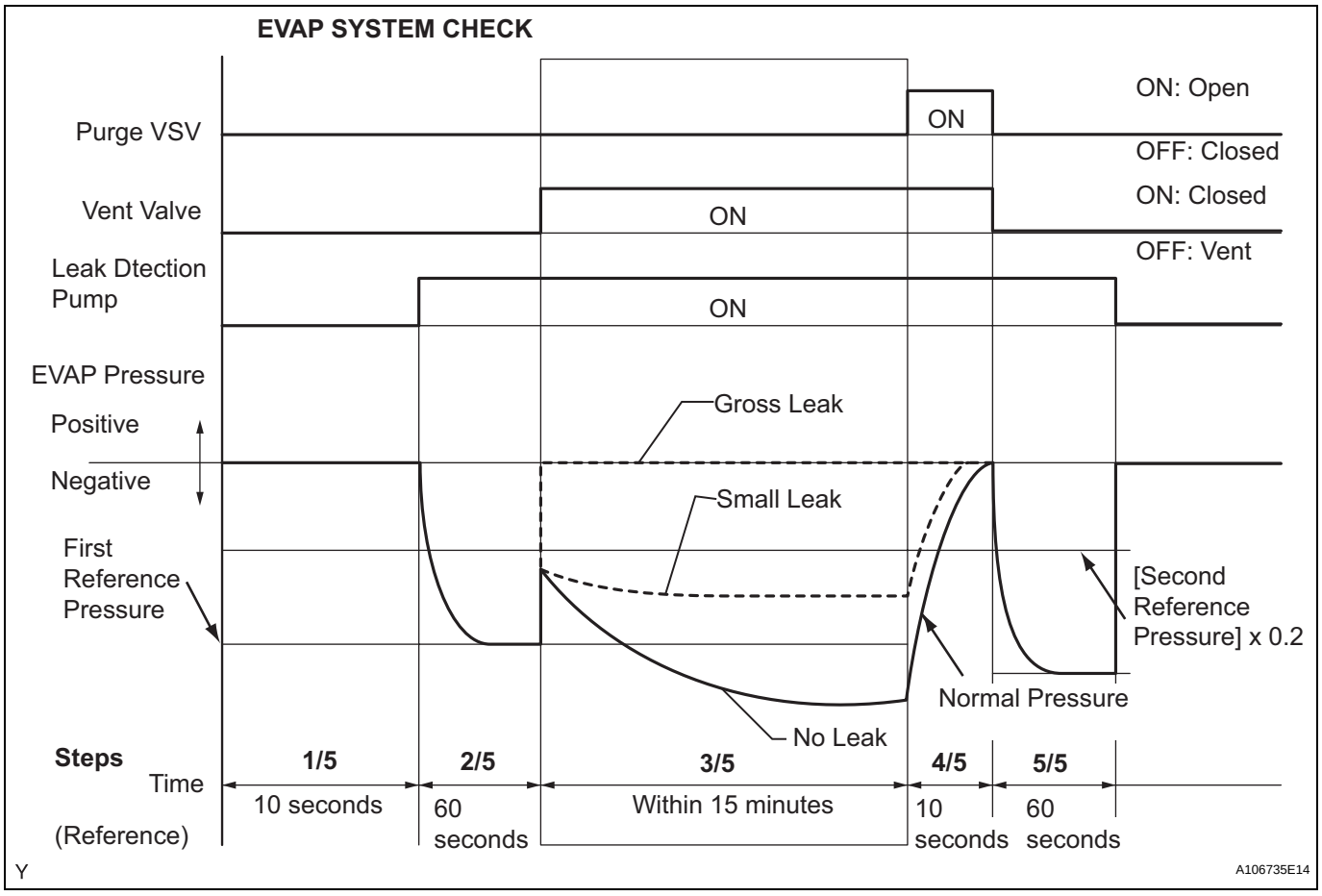
(b) On the tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

(c) After the EVAP SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTCs are displayed, perform the MONITOR CONFIRMATION (see "Diagnostic Help" menu). After this confirmation, check for pending DTCs. If no DTCs are displayed, the EVAP system is normal.

NEXT

ES

3	PERFORM EVAP SYSTEM CHECK (MANUAL OPERATION)



NOTICE:

- **In the EVAP SYSTEM CHECK (MANUAL OPERATION), perform the series of 5 EVAP SYSTEM CHECK steps manually using the intelligent tester.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.**
- **Do not run the engine during this operation.**

- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

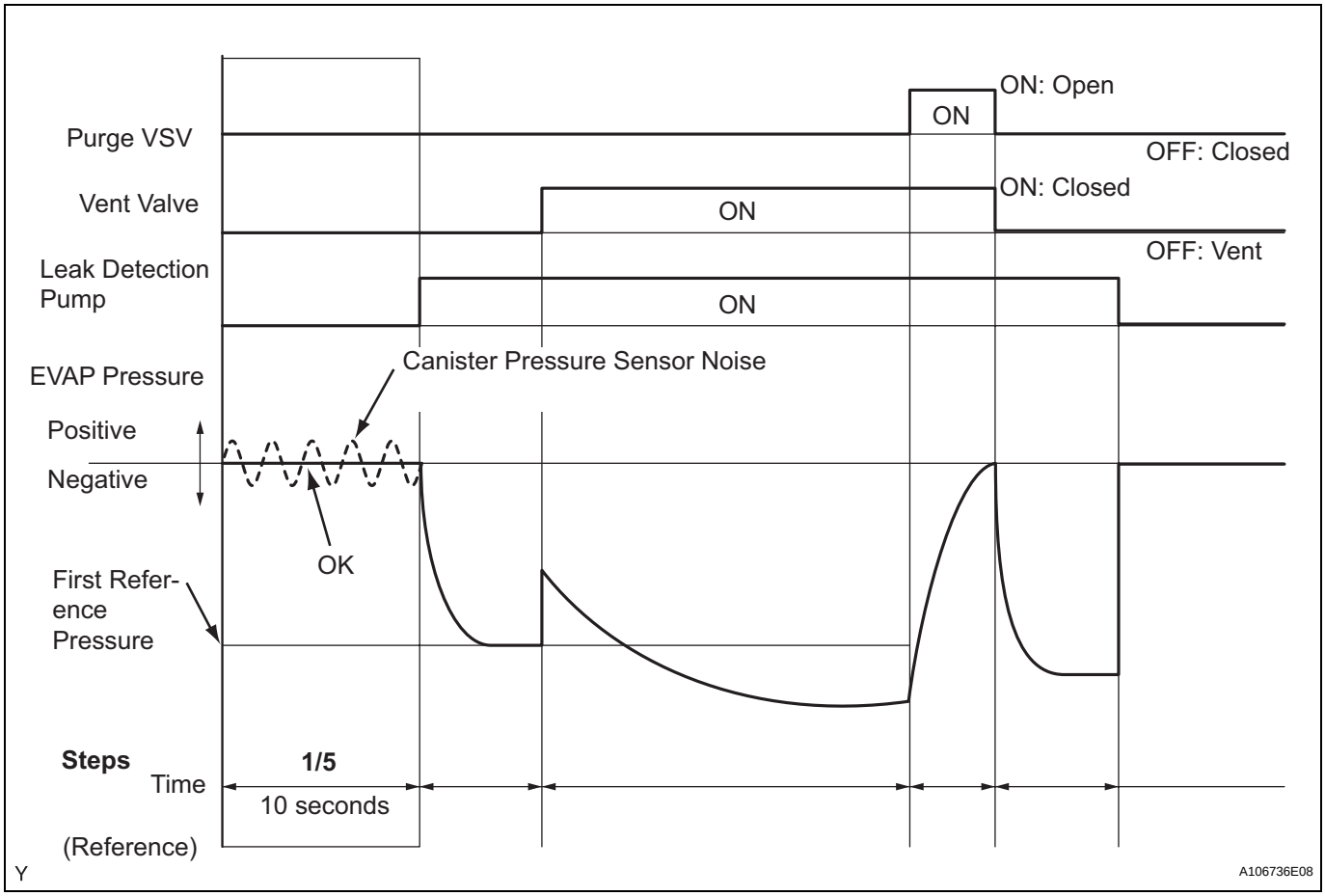
(a) Clear the DTCs (See page ES-45).

(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / MANUAL OPERATION.

NEXT

4	PERFORM EVAP SYSTEM CHECK (STEP 1/5)

ES



(a) Check the EVAP pressure in step 1/5.

Result

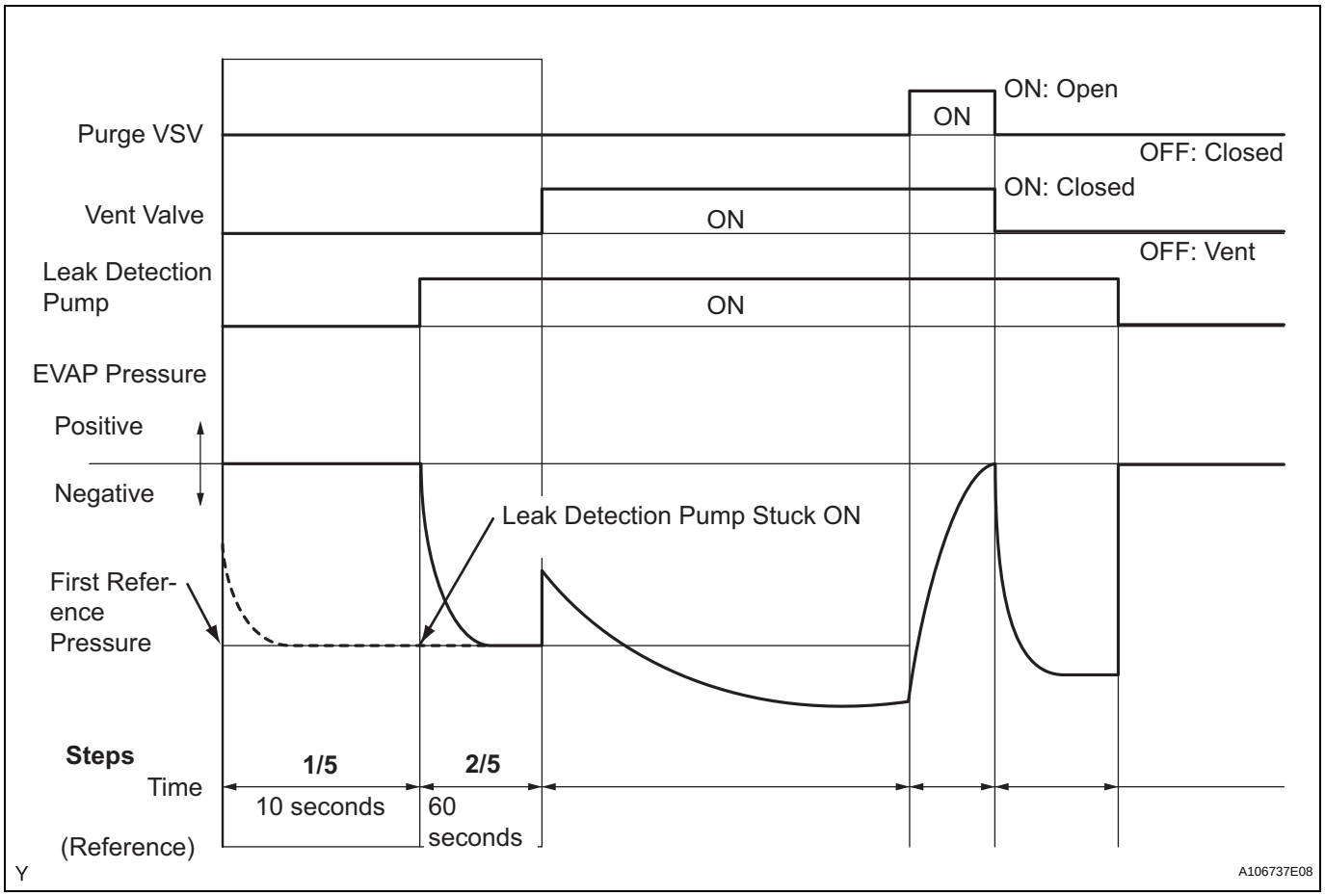
DTCs*	Test Results	Suspected Trouble Areas	Proceed to
-	Virtually no variation in EVAP pressure	Not yet determined	A
P0451	EVAP pressure fluctuates by +-0.3 kPa-g (2.25 mmHg-g) or more	Canister pressure sensor noise	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B	Go to step 29

A

5	PERFORM EVAP SYSTEM CHECK (STEP 1/5 TO 2/5)



(a) Check the EVAP pressure in steps 1/5 and 2/5.

Result

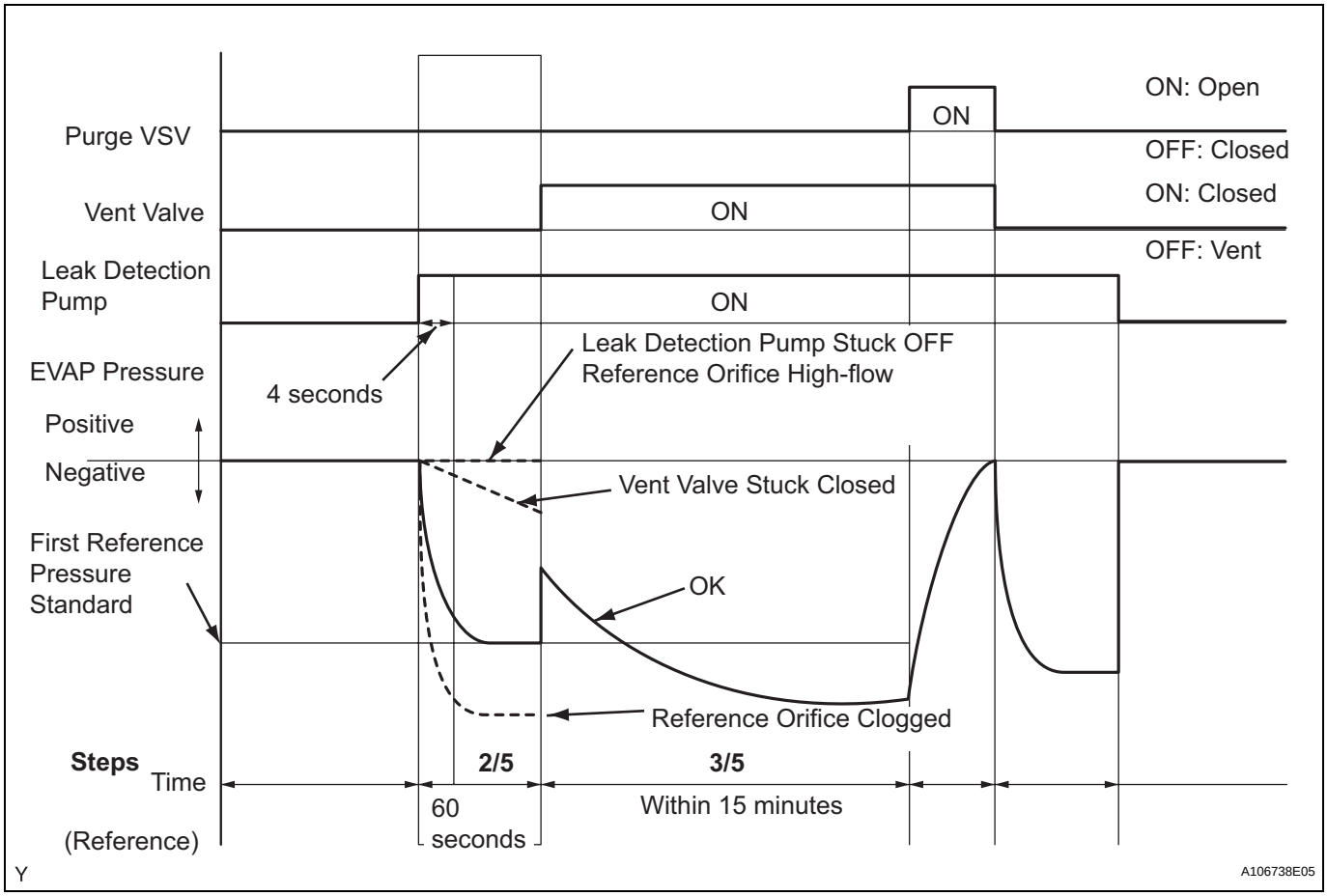
DTCs*	Test Results	Suspected Trouble Areas	Proceed to
-	Virtually no variation in EVAP pressure during step 1/5. Then decreases to reference pressure	Not yet determined	A
P2402	Small difference between EVAP pressures during steps 1/5 and 2/5	Leak detection pump stuck ON	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.
HINT:
The first reference pressure is the value determined in step 2/5.

B → Go to step 22

A

6	PERFORM EVAP SYSTEM CHECK (STEP 2/5)



HINT:
Make a note of the pressures checked in steps "A" and "B" below.
(a) Check the EVAP pressure 4 seconds after the leak detection pump is activated* (Step "A").
*: The leak detection pump begins to operate as step 1/5 finishes and step 2/5 starts.
(b) Check the EVAP pressure again when it has stabilized. This pressure is the reference pressure (Step "B").

Result

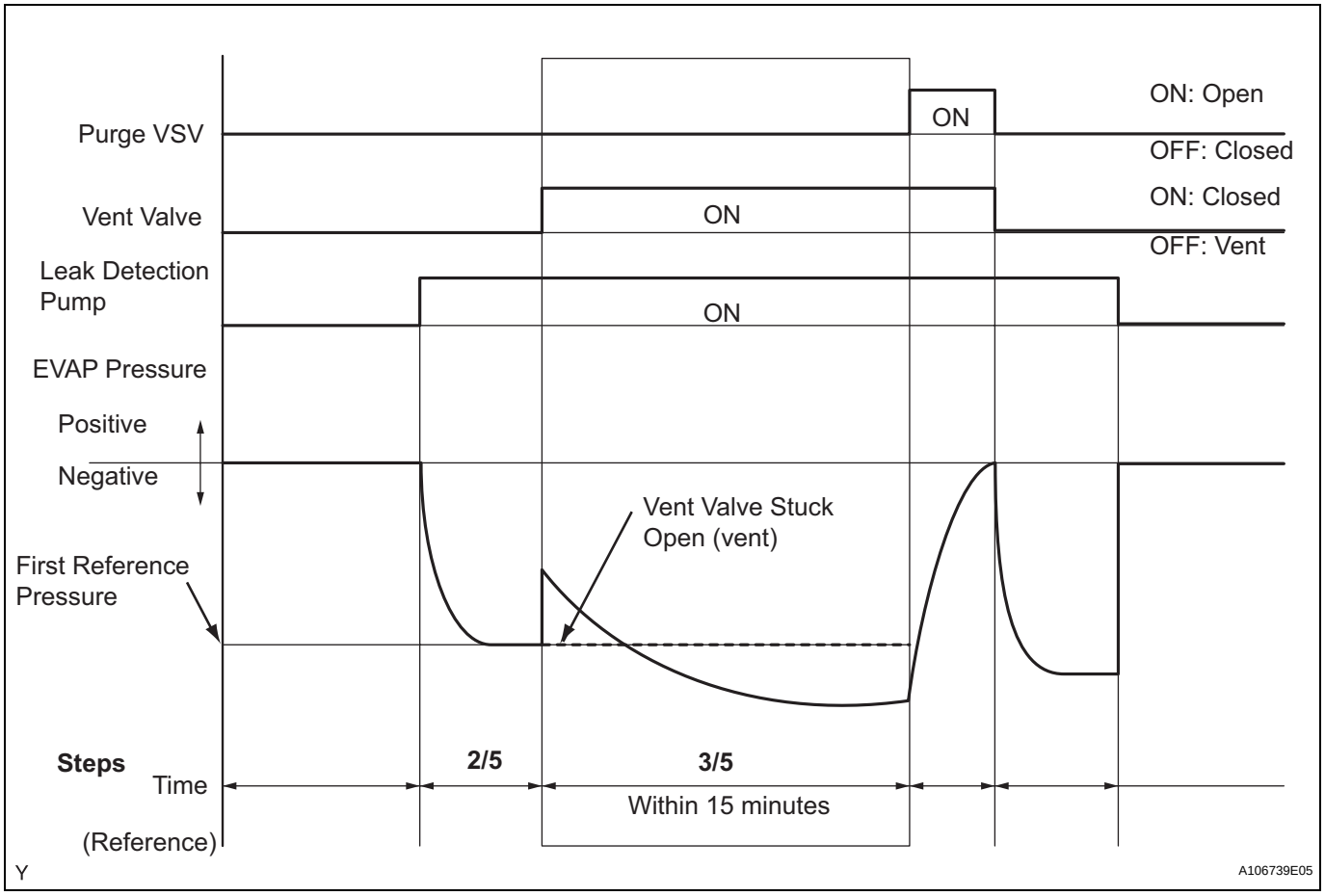
DTCs*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure in step (b) between -4.85 kPa-g and -1.057 kPa-g (-36.4 mmHg-g and -7.93 mmHg-g)	Not yet determined	A
P043F and P2401	EVAP pressure in step (b) -1.057 kPa-g (-7.93 mmHg-g) or more	• Reference orifice high-flow • Leak detection pump stuck OFF	B
P043E	EVAP pressure in step (b) below -4.85 kPa-g (-36.4 mmHg-g)	Reference orifice clogged	C
P2419	EVAP pressure in step (a) more than -1.057 kPa-g (-7.93 mmHg-g)	Vent valve stuck closed	D

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B	Go to step 11
C	Go to step 29
D	Go to step 20

A

7	PERFORM EVAP SYSTEM CHECK (STEP 2/5 TO 3/5)



(a) Check the EVAP pressure increase in step 3/5.

Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 2/5 to step 3/5	Not yet determined	A
P2420	No variation in EVAP pressure despite proceeding from step 2/5 to step 3/5	Vent valve stuck open (vent)	B
P0451	No variation in EVAP pressure during steps 1/5 through 3/5	Canister pressure sensor malfunction fixed	C

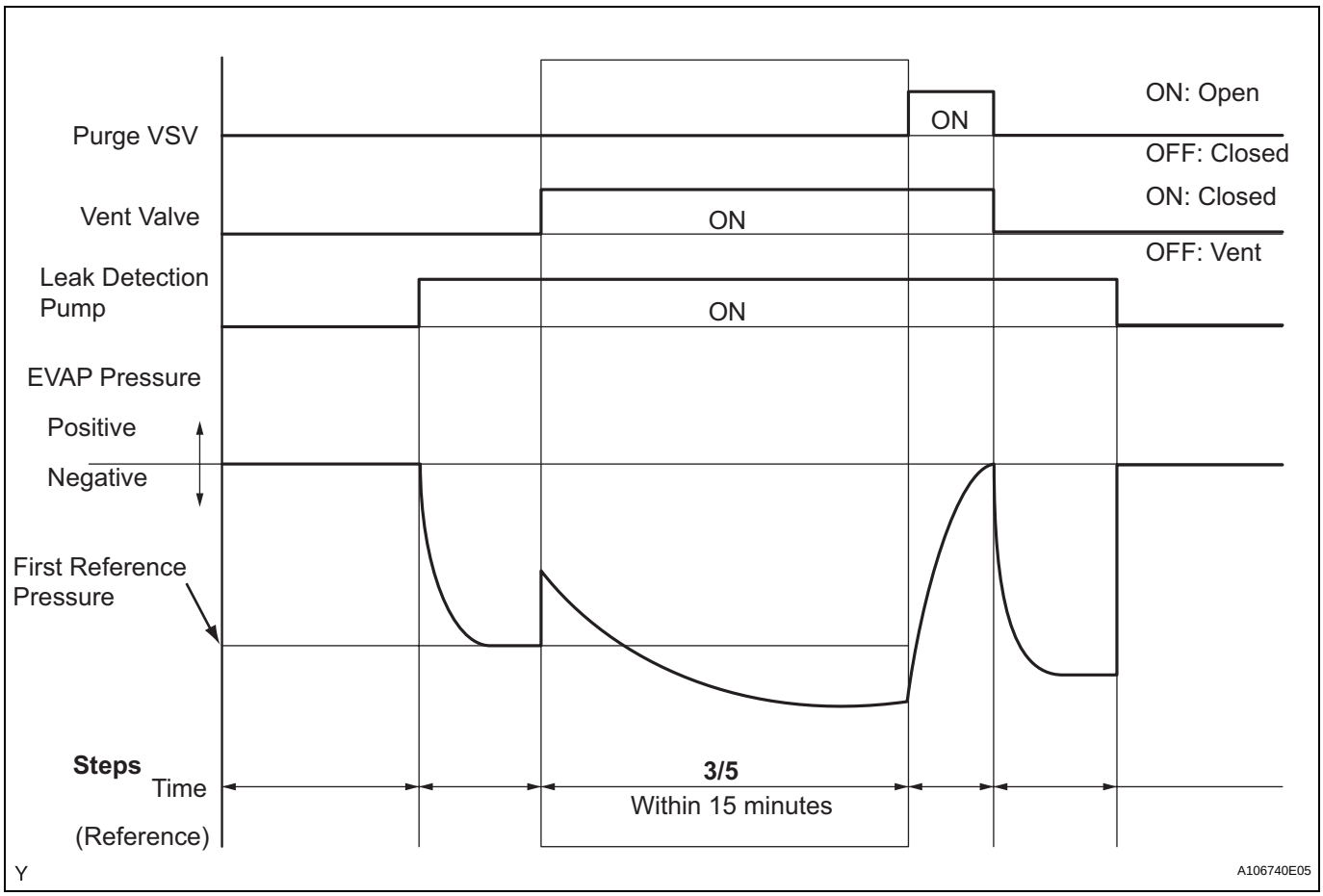
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B	Go to step 19

C → Go to step 29

A

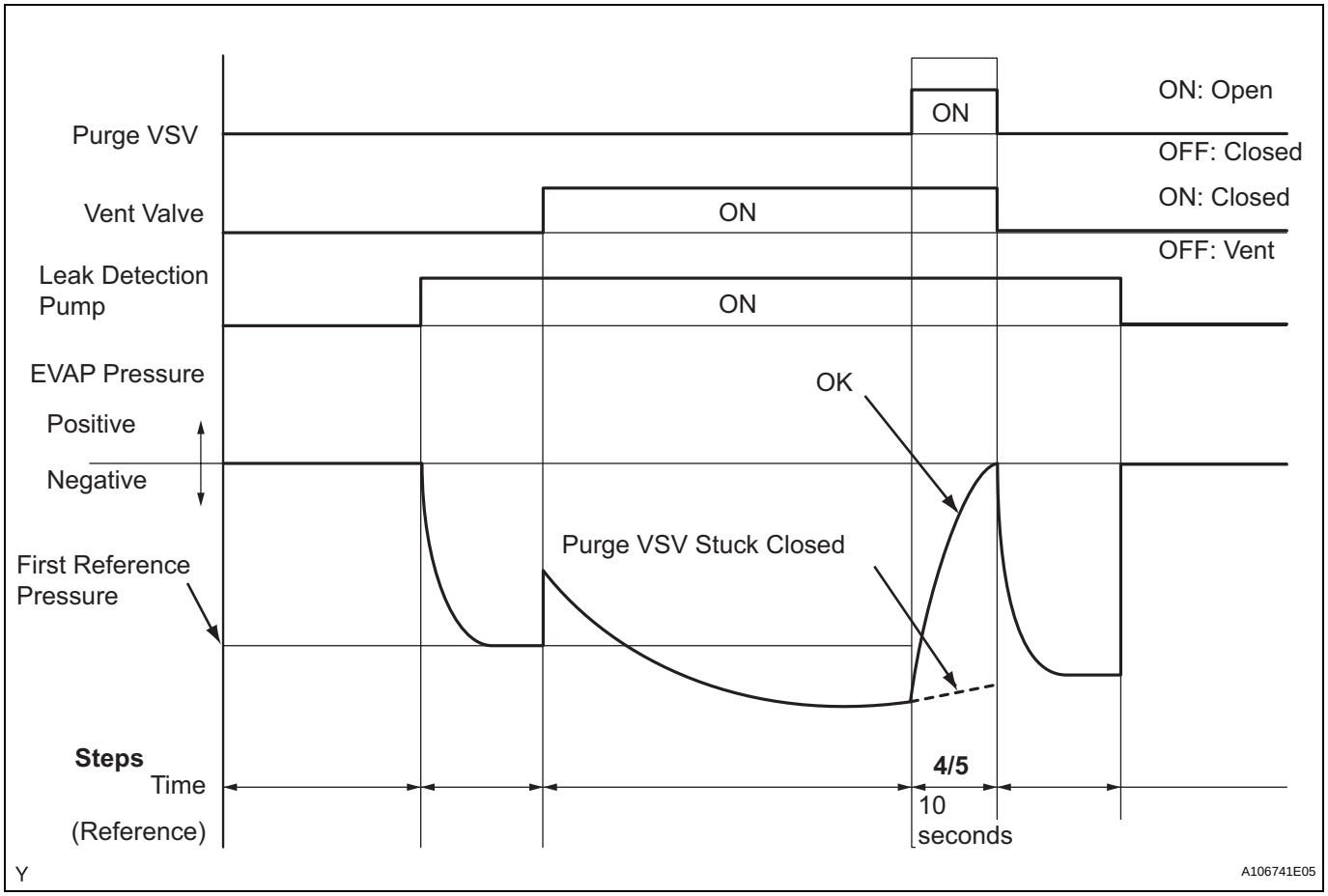
8	PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(a) Wait until the EVAP pressure change is less than 0.1 kPa-g (0.75 mmHg-g) for 30 seconds.
(b) Measure the EVAP pressure and record it.
HINT:
A few minutes are required for the EVAP pressure to become saturated. When there is little fuel in the fuel tank, it takes up to 15 minutes.

NEXT

9	PERFORM EVAP SYSTEM CHECK (STEP 4/5)



(a) Check the EVAP pressure in step 4/5.

Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Not yet determined	A
P0441	EVAP pressure increases by 0.3 kPa-g (2.25 mmHg-g) or more within 10 seconds of proceeding from step 3/5 to step 4/5	Problems in EVAP hose between purge VSV and intake manifold	B
P0441	Variation in EVAP pressure less than 0.3 kPa-g (2.25 mmHg-g) for 10 seconds, after proceeding from step 3/5 to step 4/5	Purge VSV stuck closed	C

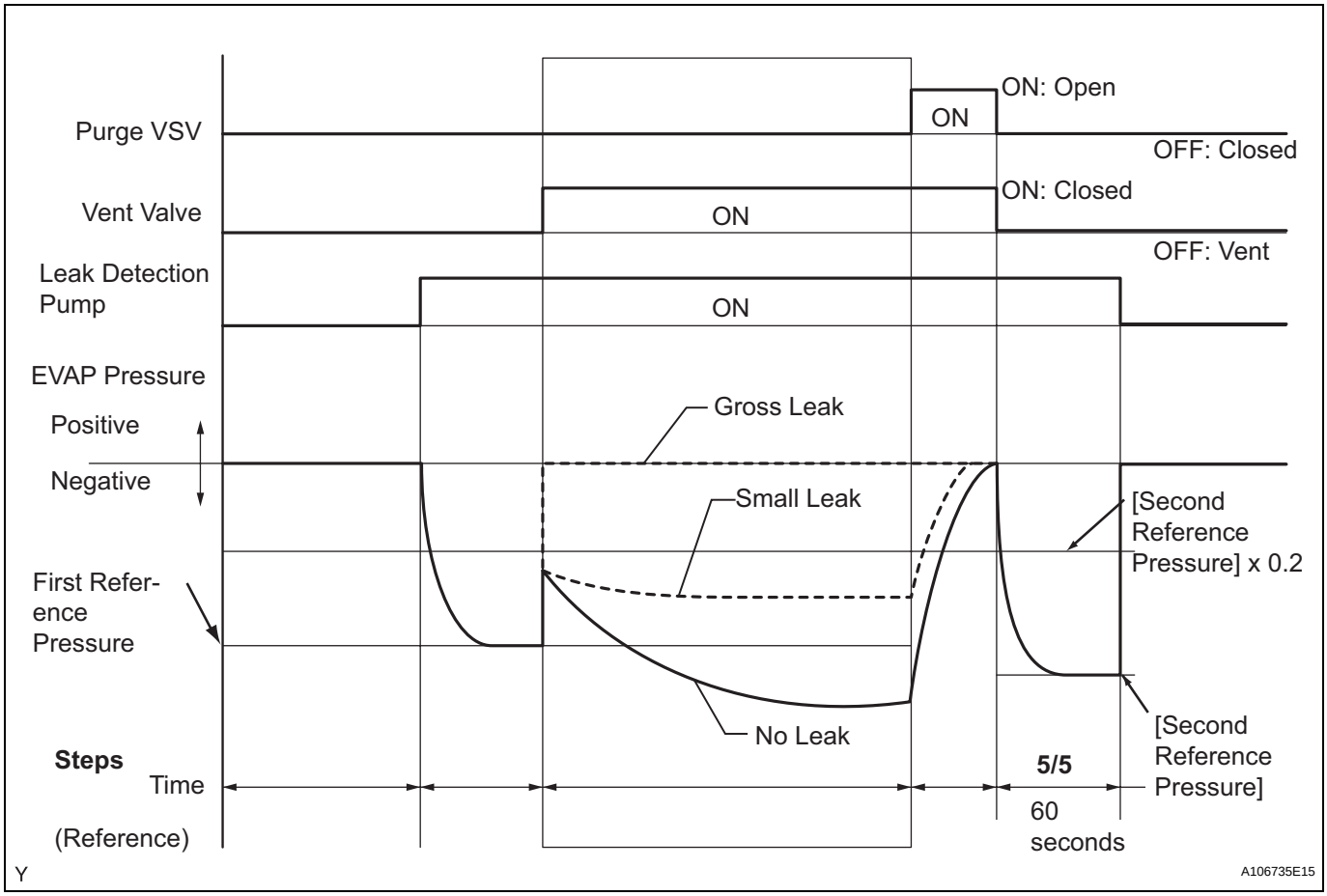
*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

B → Go to step 15

C → Go to step 12

A

10	PERFORM EVAP SYSTEM CHECK (STEP 5/5)



(a) Check the EVAP pressure in step 5/5.
(b) Compare the EVAP pressure in step 3/5 and the second reference pressure (step 5/5).

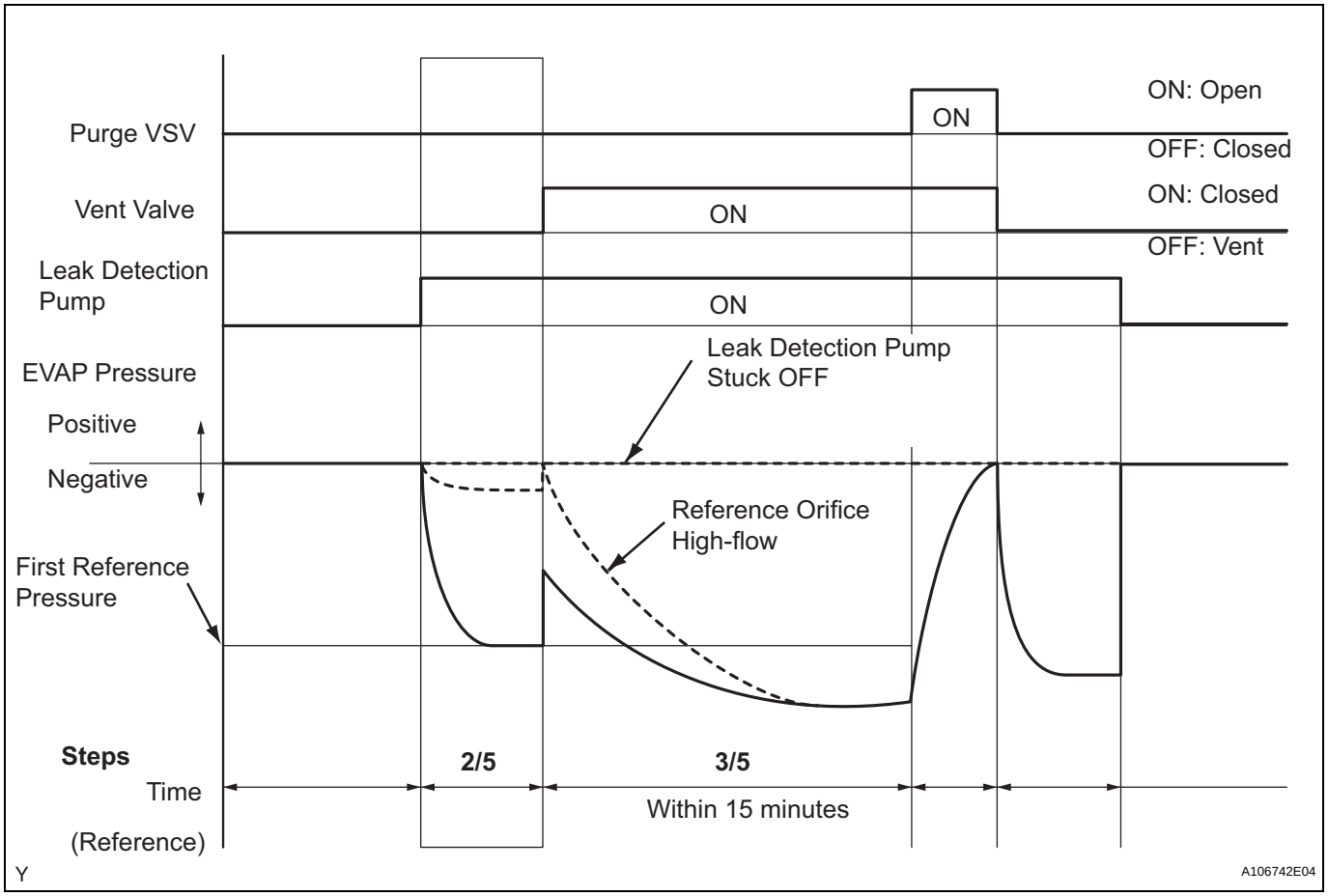
Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed to
-	EVAP pressure (step 3/5) lower than second reference pressure (step 5/5)	Not yet determined (no leakage from EVAP system)	A
P0441 and P0455	EVAP pressure (step 3/5) higher than [second reference pressure (step 5/5) x 0.2]	• Purge VSV stuck open • EVAP gross leak	B
P0456	EVAP pressure (step 3/5) higher than second reference pressure (step 5/5)	EVAP small leak	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.

A	Go to step 35
B	Go to step 12

11	PERFORM EVAP SYSTEM CHECK (STEP 3/5)



(a) Check the EVAP pressure in step 3/5.

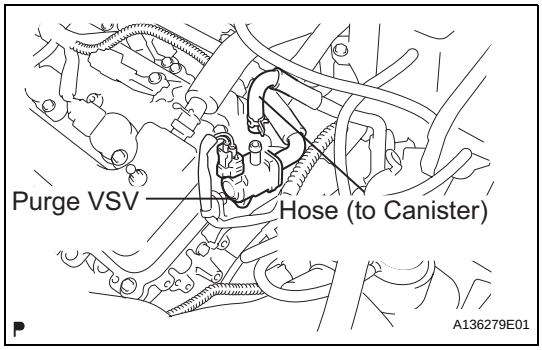
Result

DTCs*	Test Results	Suspected Trouble Areas	Proceed to
P043F	EVAP pressure less than [reference pressure] measured at 2/5	Reference orifice high-flow	A
P2401	EVAP pressure almost same as [reference pressure] measured at 2/5	Leak detection pump stuck OFF	B

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "CONFIRM DTC" procedures above.
HINT:
The first reference pressure is the value determined in step 2/5.

A	Go to step 29
B	Go to step 22

12	PERFORM ACTIVE TEST USING INTELLIGENT TESTER (PURGE VSV)



(a) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / EVAP VSV (ALONE).
(b) Disconnect the hose (connected to the canister) from the purge VSV.
(c) Start the engine.
(d) Using the tester, turn off the purge VSV (EVAP VSV: OFF).
(e) Use your finger to confirm that the purge VSV has no suction.
(f) Using the tester, turn on the purge VSV (EVAP VSV: ON).
(g) Use your finger to confirm that the purge VSV has suction.

ES

Result

Test Results	Suspected Trouble Areas	Proceed to
No suction when purge VSV turned OFF, and suction applied when turned ON	Purge VSV normal	A
Suction applied when purge VSV turned OFF	Purge VSV stuck open	B
No suction when purge VSV turned ON	• Purge VSV stuck closed • Problems with EVAP hose between purge VSV and intake manifold	C

(h) Reconnect the hose.

B	Go to step 14
C	Go to step 15

A

13	CHECK FUEL CAP ASSEMBLY

(a) Check that the fuel cap is correctly installed and confirm the fuel cap meets OEM specifications.
(b) Tighten the fuel cap until a few click sounds are heard.
HINT:
If an EVAP tester is available, check the fuel cap using the tester.
1. Remove the fuel cap and install it onto a fuel cap adapter.
2. Connect an EVAP tester pump hose to the adapter, and pressurize the cap to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.
3. Seal the adapter and wait for 2 minutes.
4. Check the pressure. If the pressure is 2 kPa (15 mmHg) or more, the fuel cap is normal.

Result

Test Results	Suspected Trouble Areas	Proceed to
Fuel cap correctly installed	-	A

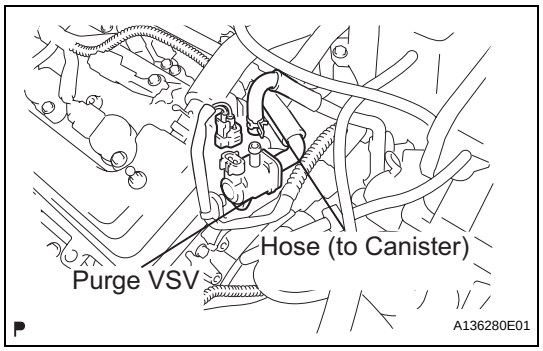
Test Results	Suspected Trouble Areas	Proceed to
Fuel cap loose	• Fuel cap improperly installed • Defective fuel cap • Fuel cap does not meet OEM specifications	B
Defective fuel cap	-	B
No fuel cap	-	C

(c) Reinstall the fuel cap.

A	Go to step 28
B	Go to step 26
C	Go to step 27

ES

14 INSPECT DUTY VACUUM SWITCHING VALVE (PURGE VSV)



(a) Turn the ignition switch off.
(b) Disconnect the C6 purge VSV connector.
(c) Disconnect the hose (connected to the canister) from the purge VSV.
(d) Start the engine.
(e) Use your finger to confirm that the purge VSV has no suction.

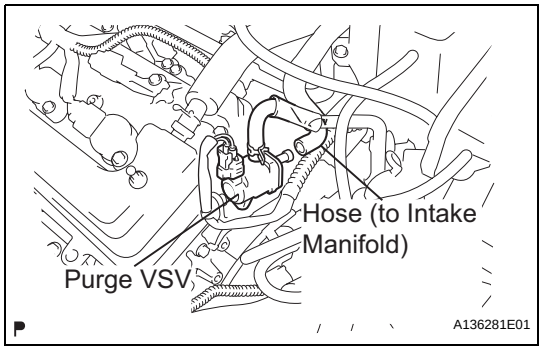
Result

Test Results	Suspected Trouble Areas	Proceed to
No suction	ECM	A
Suction applied	Purge VSV	B

(f) Reconnect the purge VSV connector.
(g) Reconnect the hose.

A	Go to step 34
B	Go to step 30

15 CHECK EVAP HOSE (PURGE VSV - INTAKE MANIFOLD)



(a) Disconnect the hose (connected to the intake manifold) from the purge VSV.
(b) Start the engine.
(c) Use your finger to confirm that the hose has suction.

Result

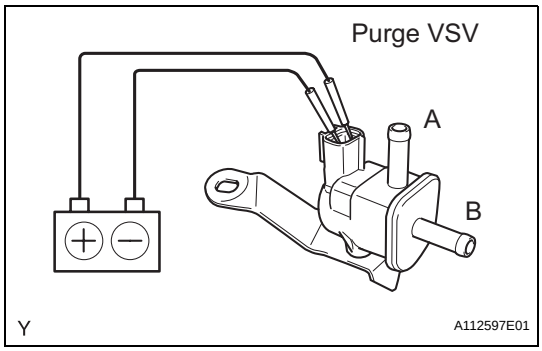
Test Results	Suspected Trouble Areas	Proceed to
Suction applied	EVAP hose between purge VSV and intake manifold normal	A
No suction	• Intake manifold port • EVAP hose between purge VSV and intake manifold	B

(d) Reconnect the hose.

B → Go to step 25

A

16 INSPECT DUTY VACUUM SWITCHING VALVE (PURGE VSV)



(a) Remove the purge VSV.
(b) Apply the battery voltage to the terminals of the purge VSV.
(c) Using an air gun, confirm that air flows from port A to port B.

Result

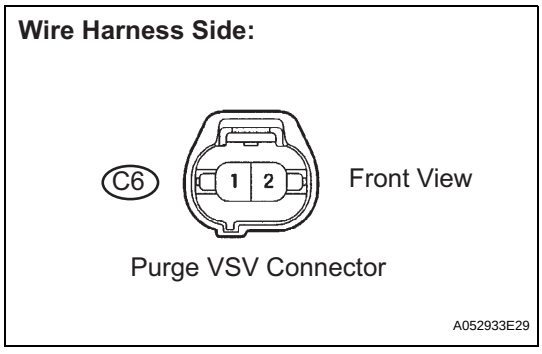
Test Results	Suspected Trouble Areas	Proceed to
Air flows	Purge VSV normal	A
No air flow	Purge VSV	B

(d) Install the purge VSV.

B → Go to step 30

A

17 CHECK HARNESS AND CONNECTOR (POWER SOURCE OF PURGE VSV)



(a) Disconnect the C6 purge VSV connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between terminal 2 of the purge VSV connector and body ground.

Result

Test Results	Suspected Trouble Areas	Proceed to
9 to 14 V	Normal	A
Other than result above	Wire harness or connectors between purge VSV and ECM	B

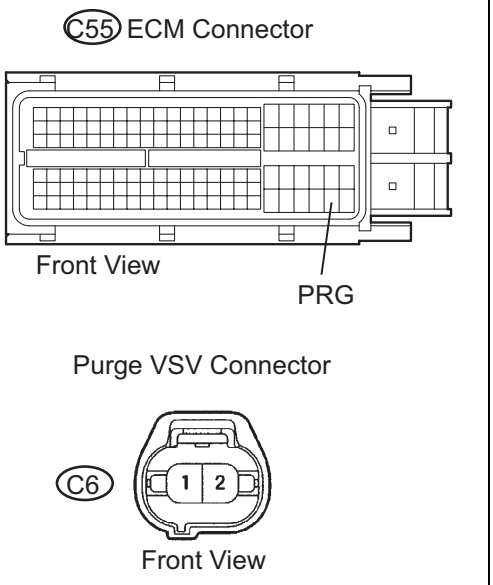
(d) Reconnect the purge VSV connector.

B	Go to step 31

A

18 CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM)

Wire Harness Side:



(a) Disconnect the C55 ECM connector and the C6 purge VSV connector.
(b) Measure the resistance.

Standard resistance

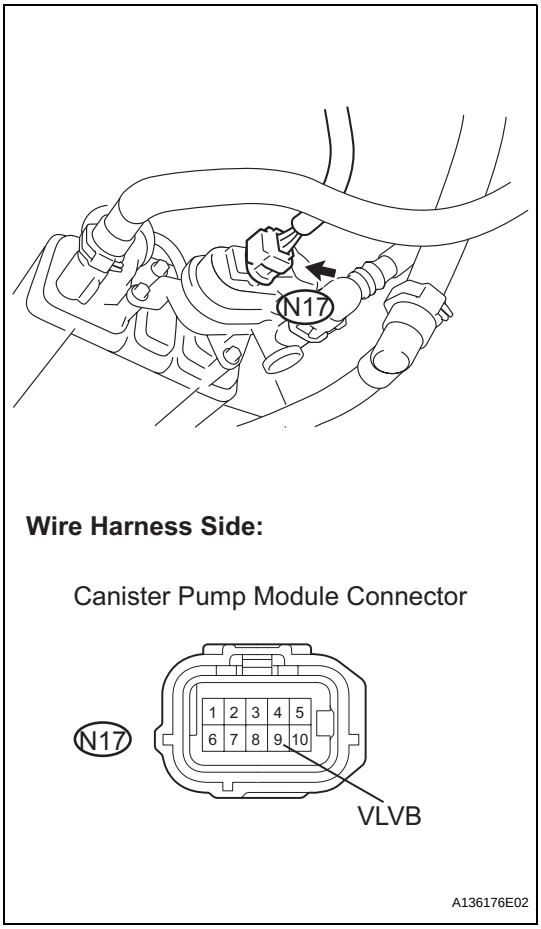
Tester Connections	Specified Conditions
C55-108 (PRG) - C6-2 (Purge VSV)	Below 1 Ω
C55-108 (PRG) - Body ground	10 kΩ or higher
C6-2 (Purge VSV) - Body ground	10 kΩ or higher

(c) Reconnect the purge VSV connector.
(d) Reconnect the ECM connector.

OK	Go to step 34
NG	Go to step 31

ES

19	INSPECT CANISTER PUMP MODULE (POWER SOURCE FOR VENT VALVE)



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage between the VLVB terminal of the canister pump module connector and body ground.

Result

Test Results	Suspected Trouble Areas	Proceed to
9 to 14 V	1. Wire harness between vent valve and ECM 2. Vent valve 3. ECM	A
Below 3 V	Power source wire harness of vent valve	B

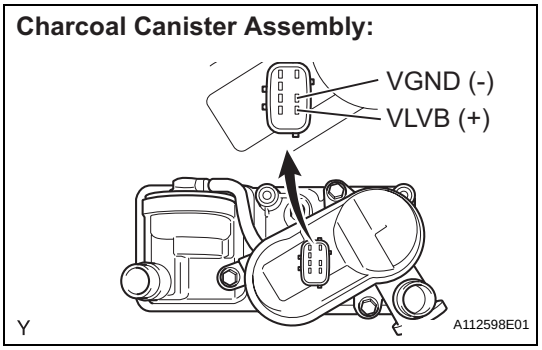
(e) Reconnect the canister pump module connector.

B → Go to step 31

A

20 INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION)

Charcoal Canister Assembly:



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Apply battery voltage to the VLVB and VGND terminals of the canister pump module.
(d) Touch the canister pump module to confirm the vent valve operation.

Result

Test Results	Suspected Trouble Areas	Proceed to
Operating	1. Wire harness between vent valve and ECM 2. ECM	A
Not operating	Vent valve	B

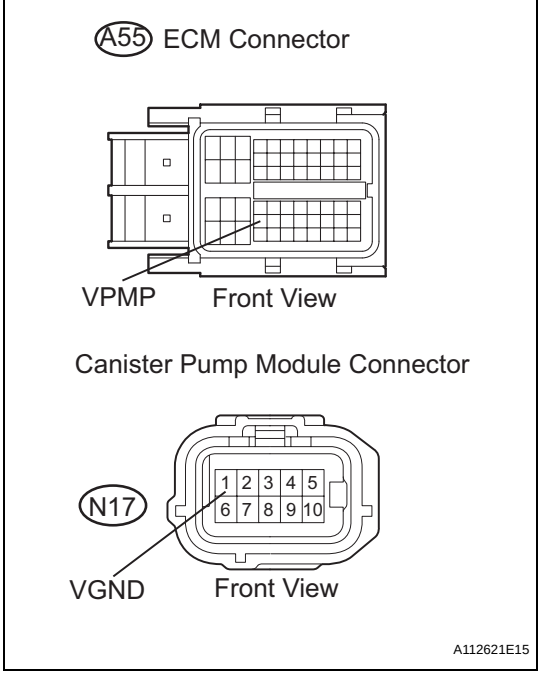
(e) Reconnect the canister connector.

B → **Go to step 29**

A

21 CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)

Wire Harness Side:



(a) Disconnect the A55 ECM connector.
(b) Disconnect the N17 canister pump module connector.
(c) Measure the resistance between the VPMP terminal of the ECM connector and the VGND terminal of the canister pump module connector.

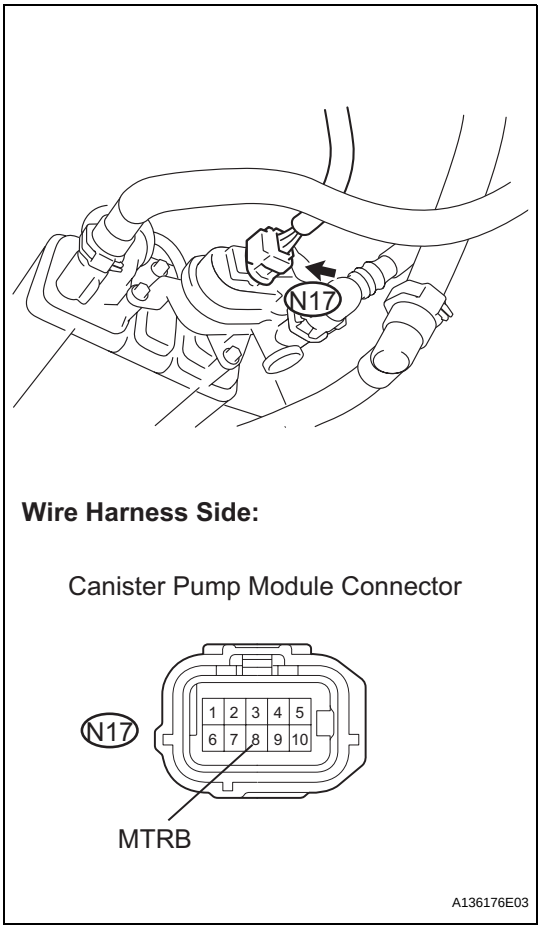
Result

Test Results	Suspected Trouble Areas	Proceed to
Below 1 Ω	ECM	A
10 kΩ or higher	Wire harness between ECM and canister pump module	B

(d) Reconnect the ECM connector.
(e) Reconnect the canister pump module connector.

A	Go to step 34
B	Go to step 31

22 PERFORM ACTIVE TEST USING INTELLIGENT TESTER (VACUUM PUMP (ALONE))



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Turn the ignition switch on (IG).
(d) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VACUUM PUMP.
(e) Measure the voltage between MTRB terminal 1 of the canister pump module connector and body ground when the leak detection pump is turned ON and OFF using the tester.

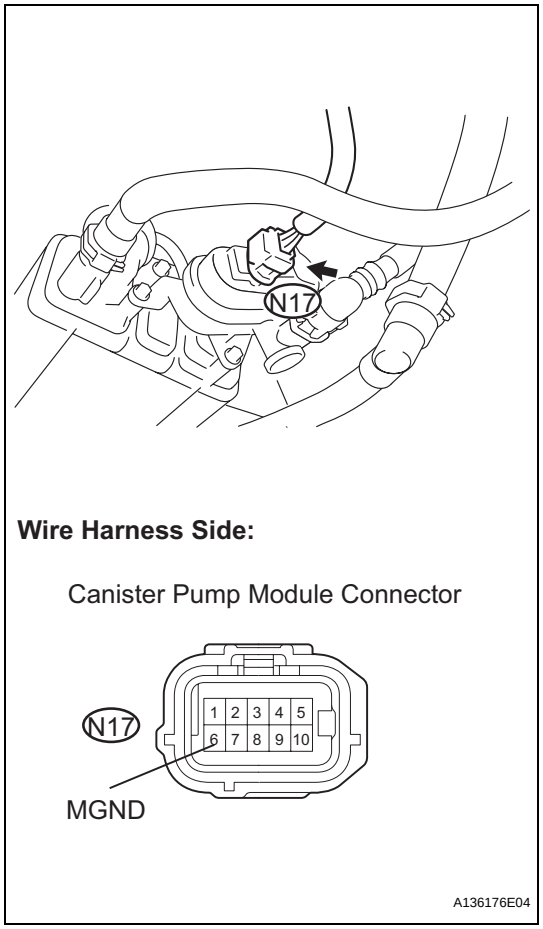
Result

Test Results	Suspected Trouble Areas	Proceed to
Below 3 V when OFF 9 to 14 V when ON	1. Wire harness between leak detection pump and body ground 2. Leak detection pump	A
Below 3 V when OFF and ON	1. Wire harness between leak detection pump and ECM 2. ECM	B

B	Go to step 24

A

23	CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - BODY GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Measure the resistance between the MGND terminal of the canister pump module connector and body ground.

Result

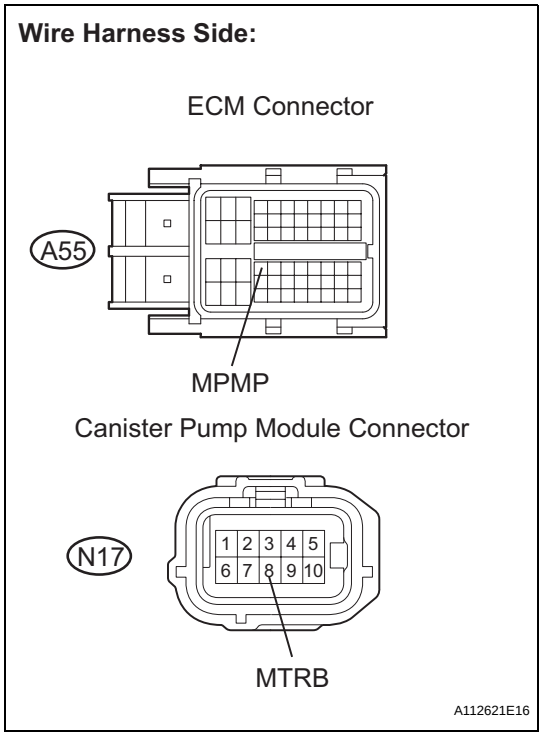
Test Results	Suspected Trouble Areas	Proceed to
Below 1 Ω	**Leak detection pump**	**A**
10 kΩ or higher	**Wire harness between canister pump module and body ground**	**B**

(d) Reconnect the canister pump module connector.

A	**Go to step 29**
B	**Go to step 31**

ES

24 CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)



(a) Turn the ignition switch off.
(b) Disconnect the N17 canister pump module connector.
(c) Disconnect the C55 ECM connector.
(d) Measure the resistance between the MPMP terminal of the ECM connector and the MTRB terminal of the canister pump module connector.

Result

Test Results	Suspected Trouble Areas	Proceed to
Below 1 Ω	ECM	A
10 kΩ or higher	Wire harness between ECM and canister pump module	B

(e) Reconnect the canister pump module connector.
(f) Reconnect the ECM connector.

A	Go to step 34
B	Go to step 31

25 INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

(a) Stop the engine.
(b) Disconnect the EVAP hose from the intake manifold.
(c) Start the engine.
(d) Use your finger to confirm that the port of the intake manifold has suction.

Result

Test Results	Suspected Trouble Areas	Proceed to
Suction applied	EVAP hose between intake manifold and purge VSV	A
No suction	Intake manifold	B

(e) Reconnect the EVAP hose.

A	Go to step 32
B	Go to step 33

26	CORRECTLY REINSTALL OR REPLACE FUEL CAP

HINT:
- When reinstalling the fuel cap, tighten it until a few click sounds are heard.
- When replacing the fuel cap, use a fuel cap that meets OEM specifications, and install it until a few click sounds are heard.

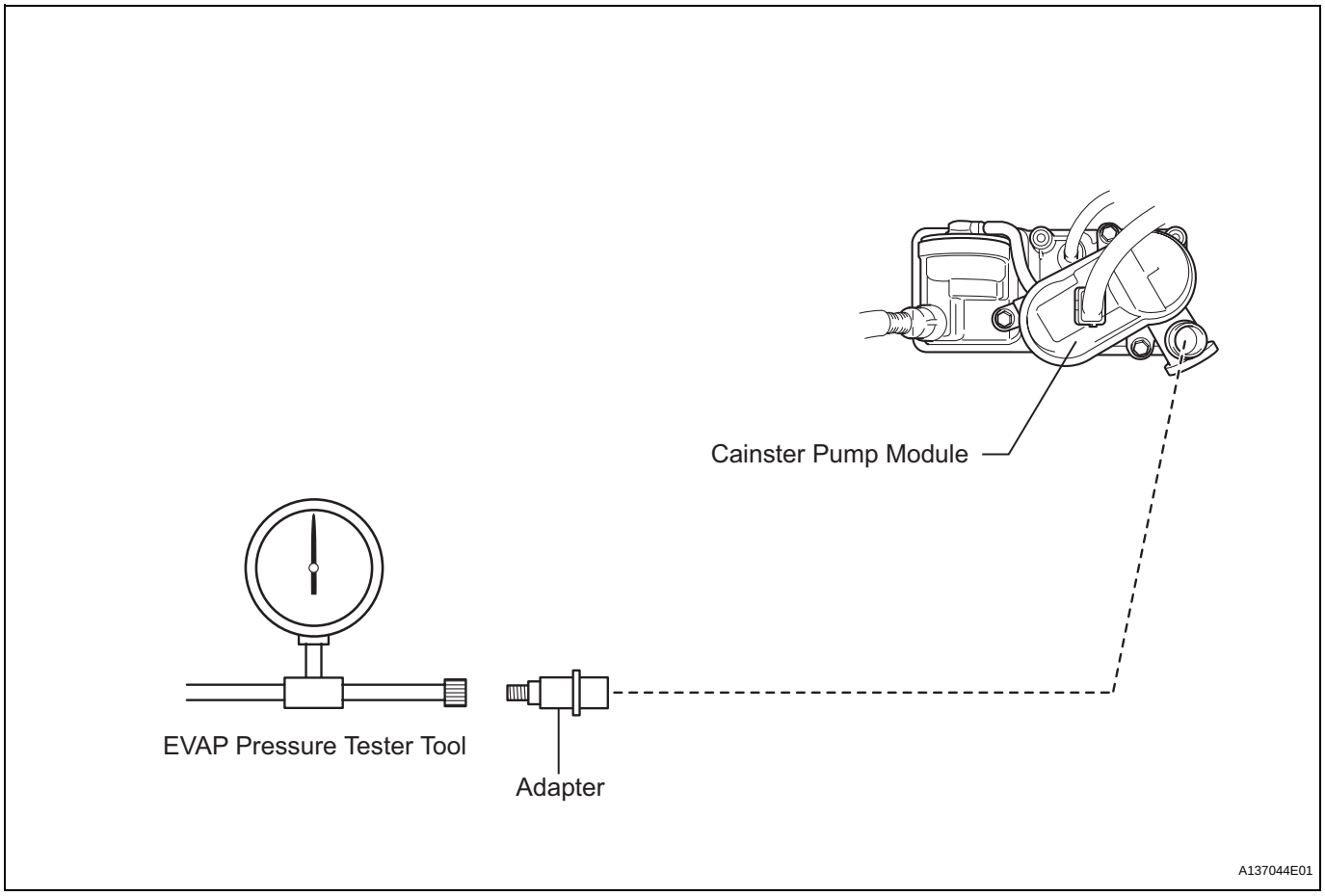
NEXT	Go to step 36

27	REPLACE FUEL CAP

HINT:
When installing the fuel cap, tighten it until a few click sounds are heard.

NEXT	Go to step 36

28	LOCATE EVAP LEAK PART



(a) Disconnect the vent hose.
(b) Connect the EVAP pressure tester tool to the canister pump module with the adapter.

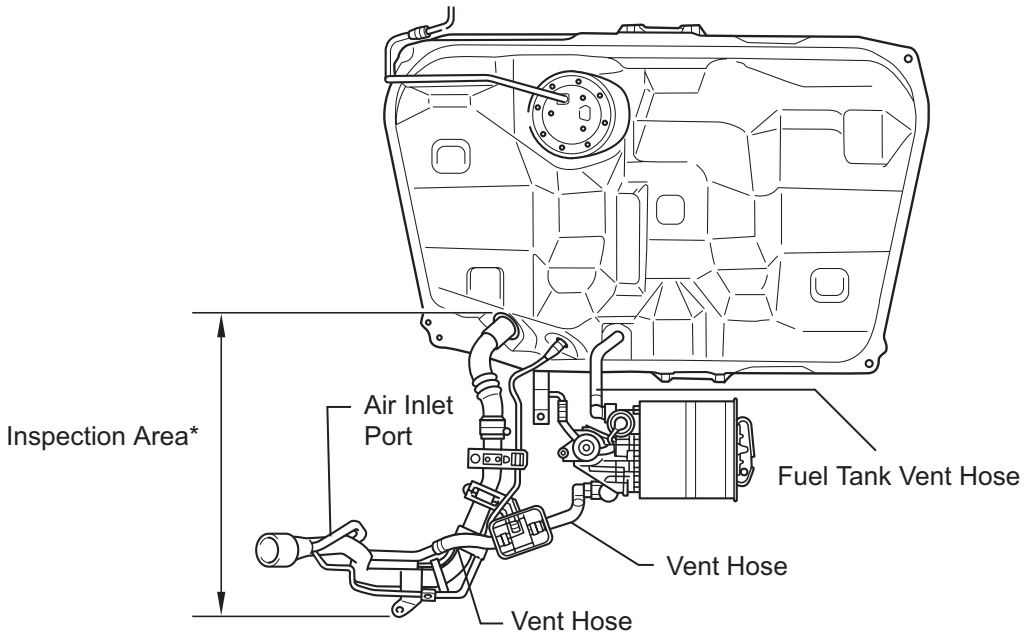
(c) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).
(d) Apply soapy water to the piping and connecting parts of the EVAP system.
(e) Look for areas where bubbles appear. This indicates the leak point.
(f) Repair or replace the leak point.
HINT:
Disconnect the hose between the canister and the fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

NEXT	Go to step 36

ES

29	REPLACE CHARCOAL CANISTER ASSEMBLY

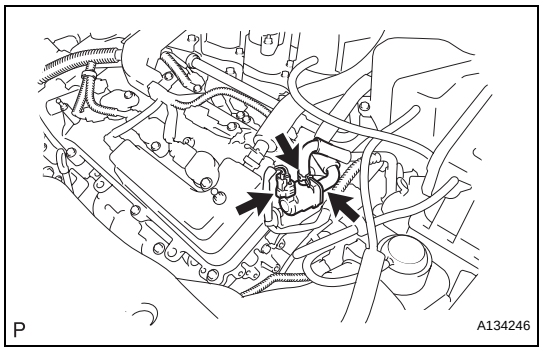
(a) Replace the canister assembly (See page EC-9).



NOTICE:
When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.

NEXT → Go to step 36

30 REPLACE DUTY VACUUM SWITCHING VALVE (PURGE VSV)



(a) Disconnect the connector and the hoses from the purge VSV.
(b) Remove the purge VSV (See page EC-13).
(c) Install a new purge VSV (See page EC-14).
(d) Reconnect the connector and hoses.

NEXT → Go to step 36

ES

31 REPAIR OR REPLACE HARNESS OR CONNECTOR

NEXT → Go to step 36

32 REPLACE EVAP HOSE (INTAKE MANIFOLD - PURGE VSV)

NEXT → Go to step 36

33 INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

(a) Check that the EVAP purge port of the intake manifold is not clogged. If necessary, replace the intake manifold.

NEXT → Go to step 36

34 REPLACE ECM

(a) Replace the ECM (See page ES-518).

NEXT → Go to step 36

35 REPAIR OR REPLACE PARTS AND COMPONENTS INDICATED BY OUTPUT DTCS

(a) Repair the malfunctioning areas indicated by the DTCs that had been confirmed when the vehicle was brought in.

NEXT → Go to step 36

36	PERFORM EVAP SYSTEM CHECK (AUTO OPERATION)

NOTICE:

- **The EVAP SYSTEM CHECK (AUTO OPERATION) consists of 5 steps performed automatically by the intelligent tester. It takes a maximum of approximately 18 minutes.**
- **Do not perform the EVAP SYSTEM CHECK when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.**
- **Do not run the engine in this step.**
- **When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an EVAP SYSTEM CHECK, keep the temperature below 35°C (95°F).**

(a) Clear the DTCs (See page ES-45).

(b) On the intelligent tester, select the following menu items: DIAGNOSIS / ENHANCED OBD II / SYSTEM CHECK / EVAP SYS CHECK / AUTO OPERATION.

(c) After the SYSTEM CHECK is completed, check for pending DTCs by selecting the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
HINT:
If no pending DTCs are found, the repair has been successfully completed.

NEXT

COMPLETED

CONFIRMATION DRIVING PATTERN

HINT:
After a repair, check Monitor Status by performing the Key-Off Monitor Confirmation and Purge Flow Monitor Confirmation described below.

1. KEY-OFF MONITOR CONFIRMATION

(a) Preconditions
The monitor will not run unless:
- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway).
- The fuel tank is less than 90 % full.
- The altitude is less than 8,000 ft (2,400 m).
- The Engine Coolant Temperature (ECT) is between 4.4°C and 35°C (40°F and 95°F).
- The Intake Air Temperature (IAT) is between 4.4°C and 35°C (40°F and 95°F).
- The vehicle remains stationary (the vehicle speed is 0 mph (0 km/h)).

(b) Monitor Conditions
1. Allow the engine to idle for at least 5 minutes.
2. Turn the ignition switch off and wait for 6 hours (8 or 10.5 hours).
HINT:
Do not start the engine until checking MONITOR STATUS. If the engine is started, the steps described above must be repeated.

(c) Monitor Status
1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the tester on.
3. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
4. Check the Monitor Status displayed on the tester.
HINT:
If INCMP is displayed, the monitor is not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

2. PURGE FLOW MONITOR CONFIRMATION (P0441)

HINT:
Perform this monitor confirmation after the Key-Off Monitor Confirmation shows COMPL (complete).

(a) Preconditions
The monitor will not run unless:
- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway)
- The ECT is between 4.4°C and 35°C (40°F and 95°F)
- The IAT is between 4.4°C and 35°C (40°F and 95°F)

(b) Monitor Conditions
1. Release the pressure from the fuel tank by removing and reinstalling the fuel cap.
2. Warm the engine up until the ECT reaches more than 75°C (167°F).
3. Increase the engine speed to 3,000 rpm once.
4. Allow the engine to idle and turn A/C ON for 1 minute.

(c) Monitor Status
1. Turn the ignition switch off (if ON or the engine is running).
2. Connect the intelligent tester to the DLC3.
3. Turn the ignition switch on (IG) and turn the tester on.
4. Select the following menu items: DIAGNOSIS / ENHANCED OBD II / MONITOR STATUS.
5. Check the Monitor Status displayed on the tester.
HINT:
If INCMP is displayed, the monitor is not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

MONITOR RESULT

Refer to CHECKING MONITOR STATUS (See page ES-25).

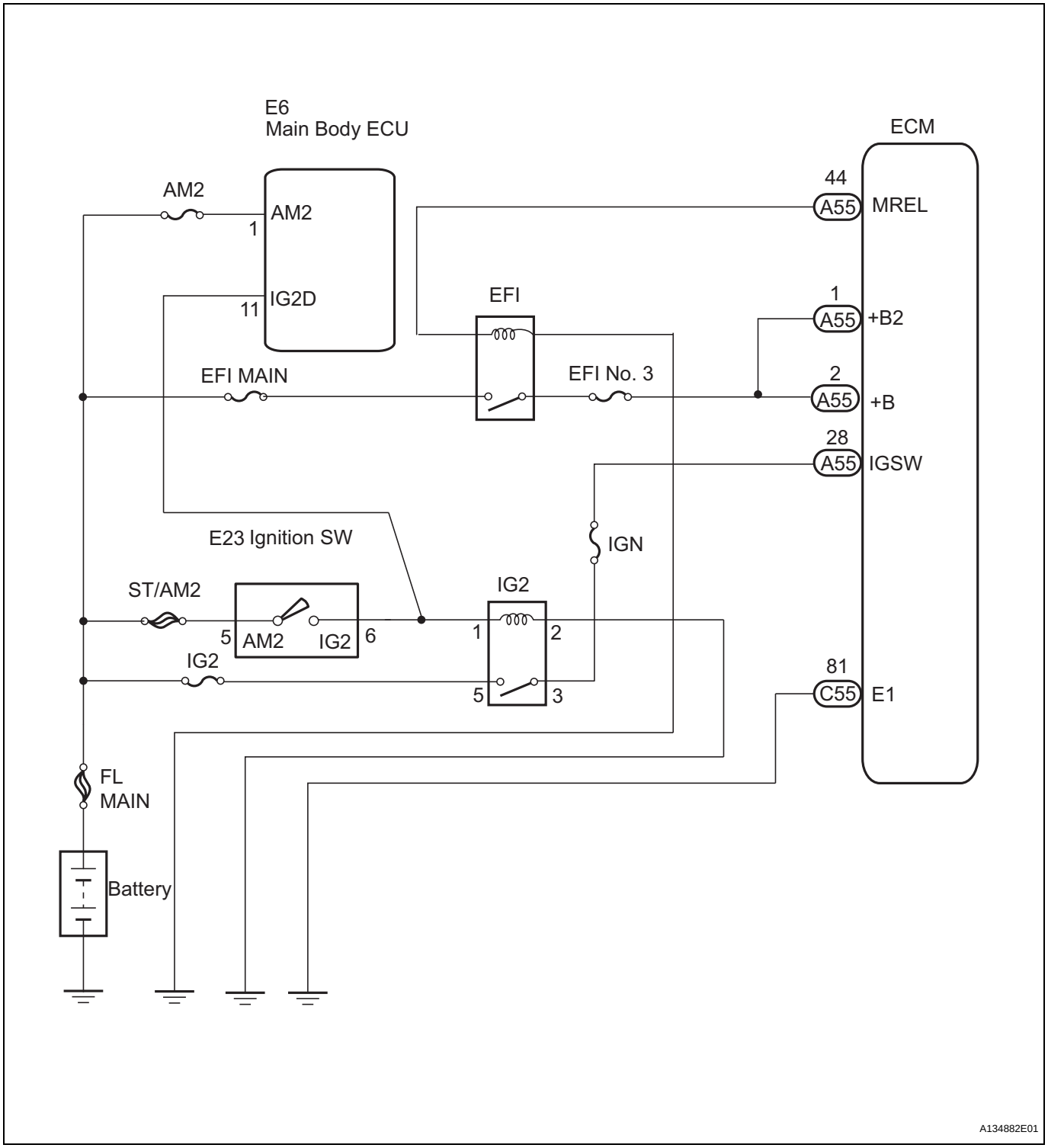
ES

ECM Power Source Circuit

DESCRIPTION

When the ignition switch is turned on (IG), the battery voltage is applied to terminal IGSW of the ECM. The ECM MREL output signal causes a current to flow to the coil, closing the contacts of the EFI MAIN relay and supplying power to terminal +B of the ECM.
If the ignition switch is turned off, the ECM holds the EFI MAIN relay ON for a maximum of 2 seconds to allow for the initial setting of the throttle valve.
When the ignition switch is turned on (IG), voltage from the ECM's MREL terminal applies to the engine room junction block (EFI relay). This causes the contacts of the engine room junction block (EFI relay) to close, which supplies power to terminal +B or +B1 of the ECM.

WIRING DIAGRAM

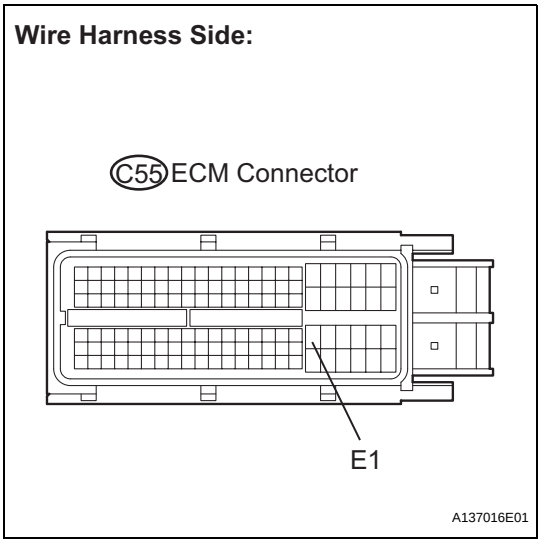


ES

INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (ECM - BODY GROUND)

Wire Harness Side:



(a) Disconnect the C55 ECM connector.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
E1 (C55-81) - Body ground	Below 1 Ω

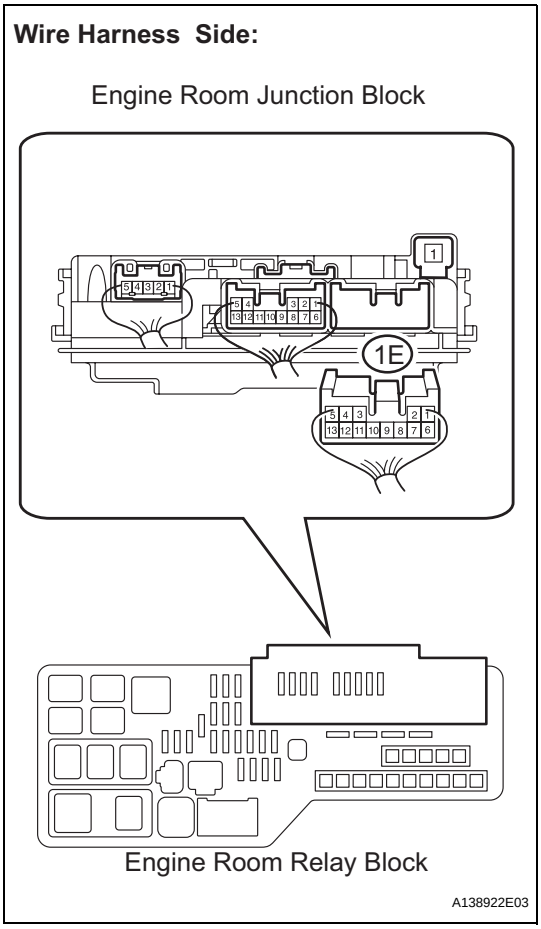
(c) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK ENGINE ROOM JUNCTION BLOCK (EFI RELAY VOLTAGE)

Wire Harness Side:



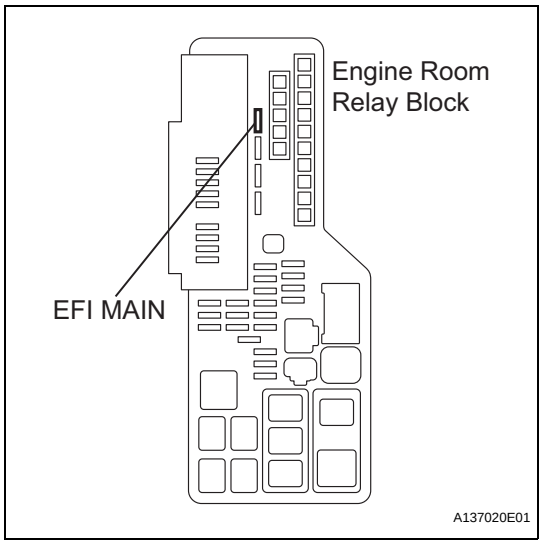
(a) Remove the engine room junction block from the engine room R/B.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage between the terminals.
Standard voltage

Tester Connection	Specified Condition
1E-6 - Body ground	9 to 14 V

OK → **Go to step 5**

NG

3 INSPECT EFI MAIN FUSE

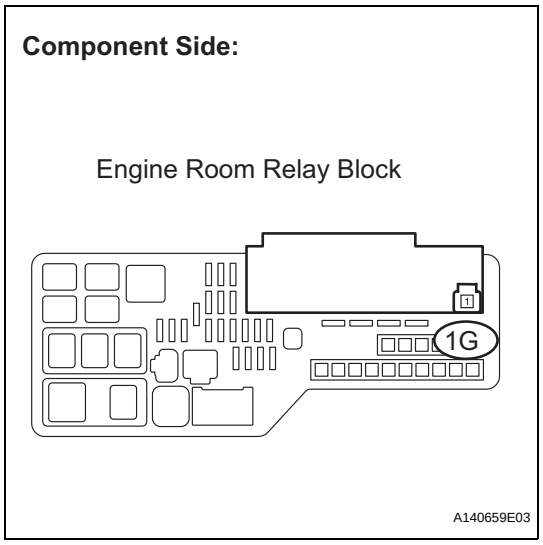


(a) Remove the EFI MAIN fuse from the engine room R/B.
(b) Measure the EFI MAIN fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the EFI MAIN fuse.

NG → **REPLACE EFI MAIN FUSE**

OK

4 CHECK HARNESS AND CONNECTOR (ENGINE ROOM RELAY BLOCK - BATTERY)



(a) Disconnect the negative battery terminal.
(b) Disconnect the positive battery terminal.
(c) Remove the engine room junction block from the engine room R/B.
(d) Measure the resistance between the terminals.
Standard resistance (Check for open)

Tester Connection	Specified Condition
1G-1 - Positive battery terminal	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
1G-1 or Positive battery terminal - Body ground	10 kΩ or higher

(e) Reinstall the engine room junction block.
(f) Reconnect the positive battery terminal.
(g) Reconnect the negative battery terminal.

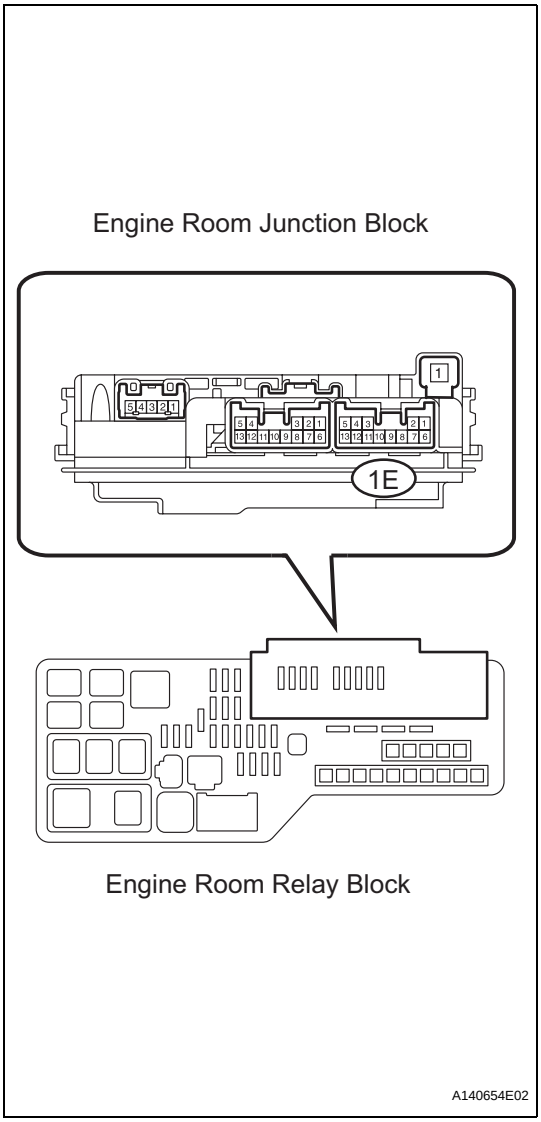
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ES-33)

ES

5	INSPECT ENGINE ROOM JUNCTION BLOCK (EFI RELAY)



(a) Remove the engine room junction block from the engine room R/B.
(b) Measure the resistance between the terminals.
Standard resistance

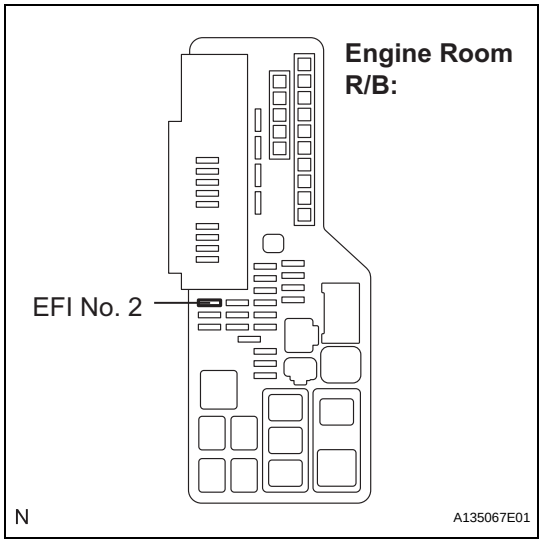
Tester Connection	Specified Condition
1E-6 - 1E-12	10 kΩ or higher
1E-6 - 1E-12	Below 1 Ω (Apply battery voltage between terminals 1E-9 and 1E-11)

(c) Reinstall the engine room junction block.

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

6	INSPECT EFI NO. 2 FUSE



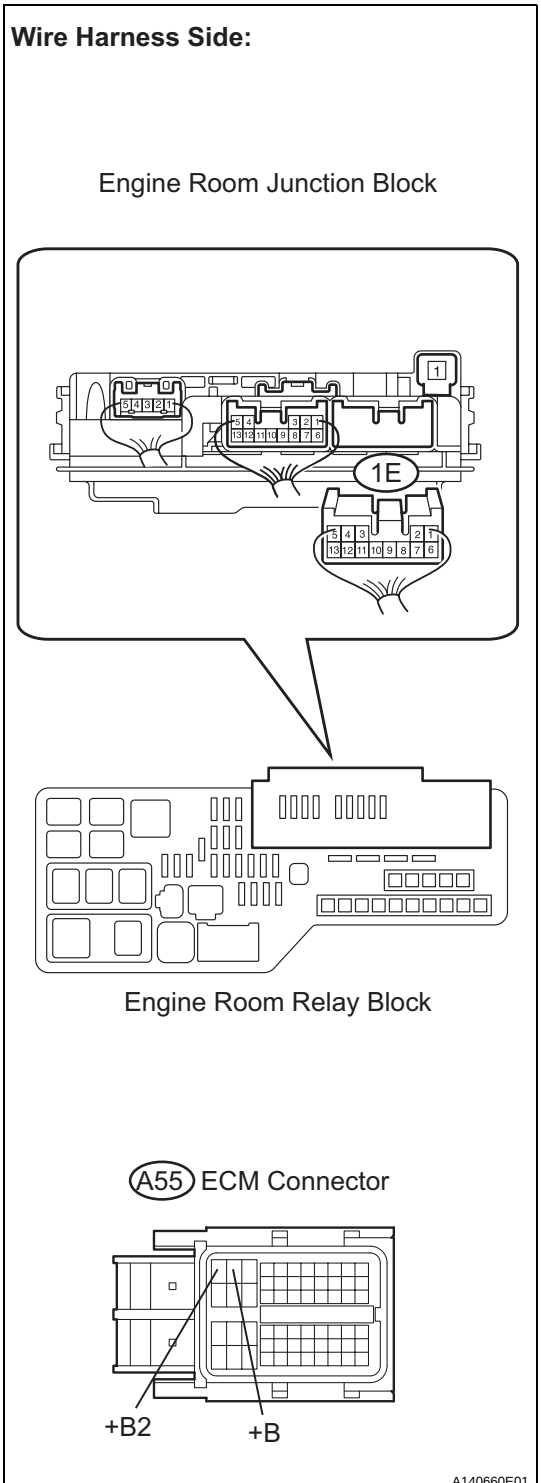
(a) Remove the EFI No. 2 fuse from the engine room R/B.
(b) Measure the EFI No. 2 fuse resistance.
Standard resistance:
Below 1 Ω
(c) Reinstall the EFI No. 2 fuse.

NG → **REPLACE EFI NO 2 FUSE**

OK

7	CHECK HARNESS AND CONNECTOR (ECM - ENGINE ROOM JUNCTION BLOCK)

Wire Harness Side:



(a) Disconnect the A55 ECM connector.
(b) Remove the engine room junction block from the engine room R/B.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
1E-6 - +B (A55-2)	Below 1 Ω
1E-6 - +B2 (A55-1)	Below 1 Ω

Standard resistance (Check for short)

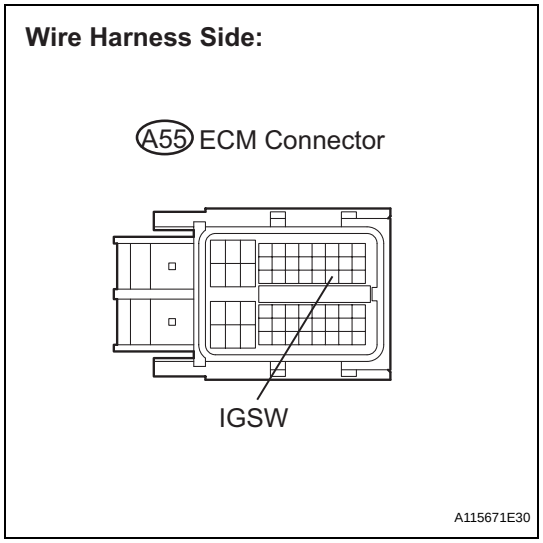
Tester Connection	Specified Condition
1E-6 or +B (A55-2) - Body ground	10 kΩ or higher
1E-6 or +B2 (A55-1) - Body ground	10 kΩ or higher

(d) Reinstall the engine room junction block.
(e) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

8 INSPECT ECM (IGSW VOLTAGE)



(a) Disconnect the A55 ECM connector.
(b) Measure the voltage between the terminals.
Standard voltage

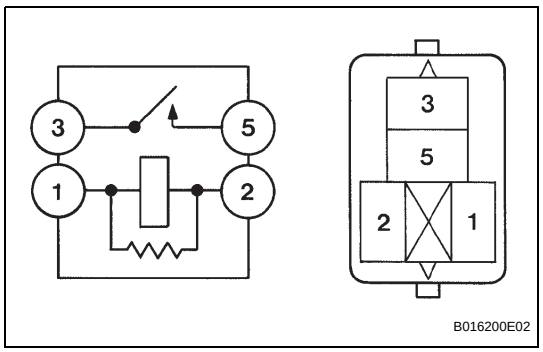
Tester Connection	Specified Condition
IGSW (A55-28) - Body ground	9 to 14 V

(c) Reconnect the ECM connector.

OK → **Go to step 12**

NG

9 INSPECT IG2 RELAY



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage between terminals 1 and 2)

(c) Reinstall the IG2 relay.

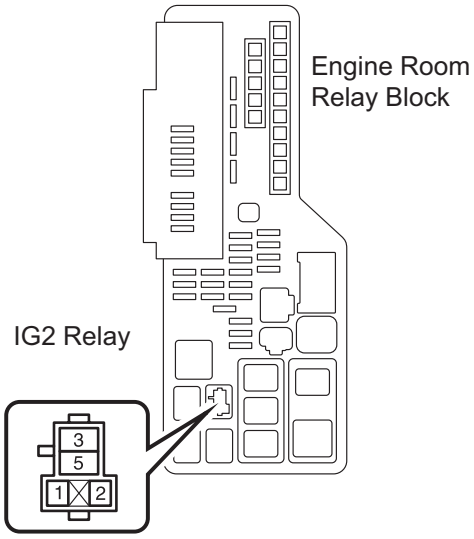
NG → **REPLACE IG2 RELAY**

OK

ES

10 CHECK HARNESS AND CONNECTOR (IG2 RELAY - BODY GROUND)

Wire Harness Side:



A137039E01

(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
IG2 relay terminal 2 - Body ground	Below 1 Ω

(c) Reinstall the IG2 relay.
Result

Result	Proceed to
OK (Without smart key system)	A
OK (With smart key system)	B
NG	C

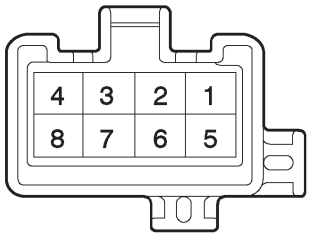
B → **GO TO SMART ACCESS SYSTEM WITH PUSH-BUTTON START**

C → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

A

11 INSPECT IGNITION SWITCH ASSEMBLY

Component Side:



A056879E35

(a) Disconnect the E23 ignition switch connector.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Ignition Switch Position	Specified Condition
All terminals	LOCK	10 kΩ or higher
2 - 4	ACC	Below 1 Ω
1 - 2 - 4, 5 - 6	ON	
1 - 3 - 4, 5 - 6 - 7	START	

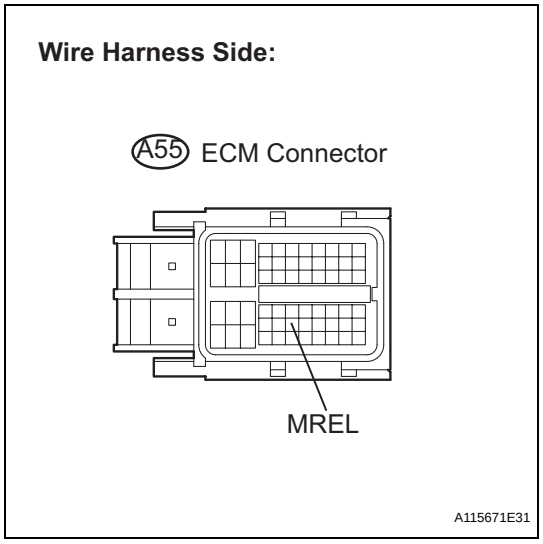
(c) Reconnect the ignition switch connector.

NG → **REPLACE IGNITION SWITCH ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BATTERY)

12	CHECK HARNESS AND CONNECTOR (ECM - BODY GROUND)



(a) Disconnect the A55 ECM connector.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
MREL (A55-24) - Body ground	Below 1 Ω

(c) Reconnect the ECM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

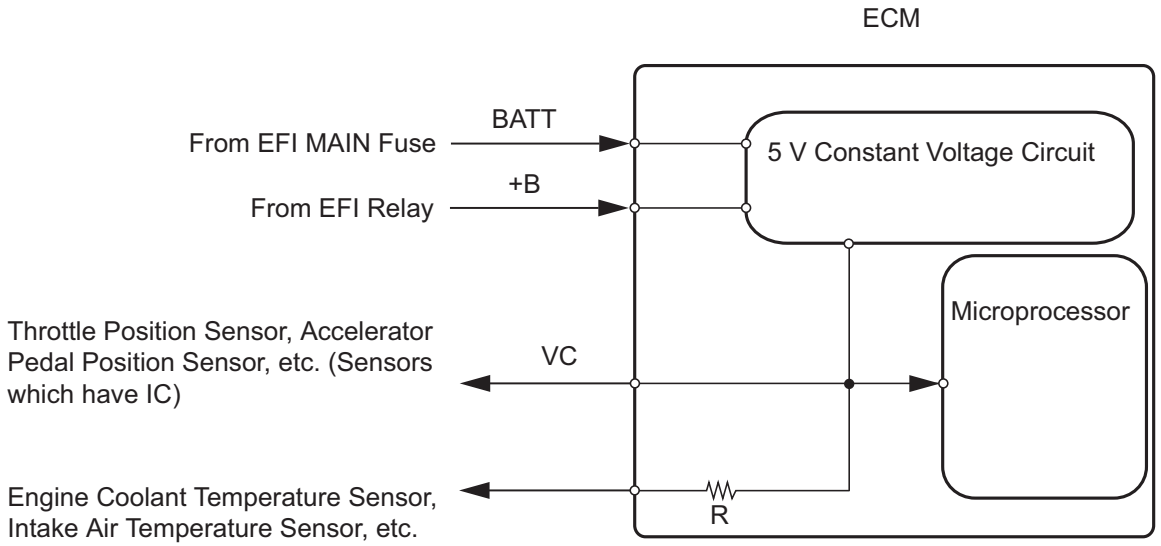
REPLACE ECM (See page ES-518)

ES

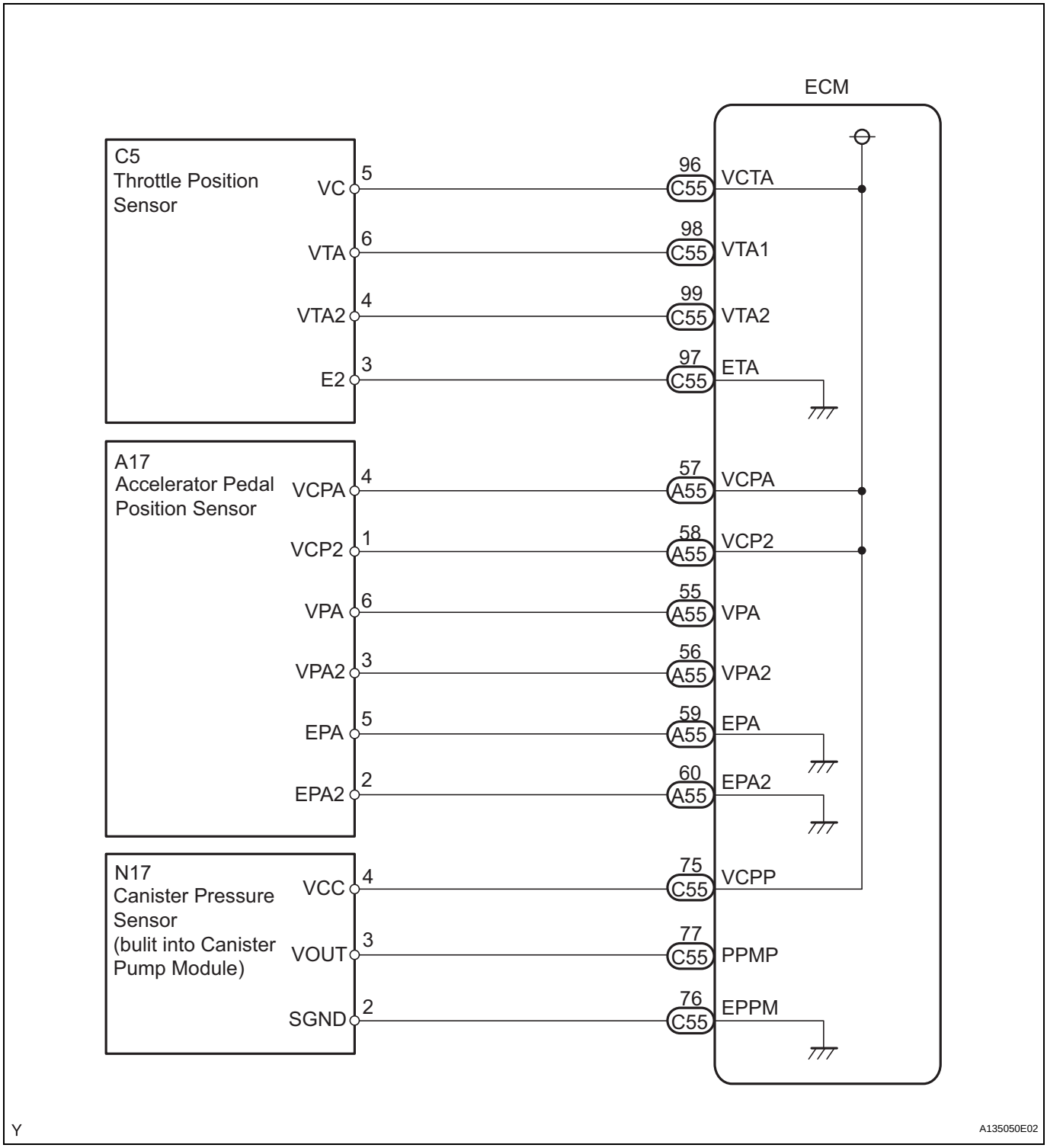
VC Output Circuit

DESCRIPTION

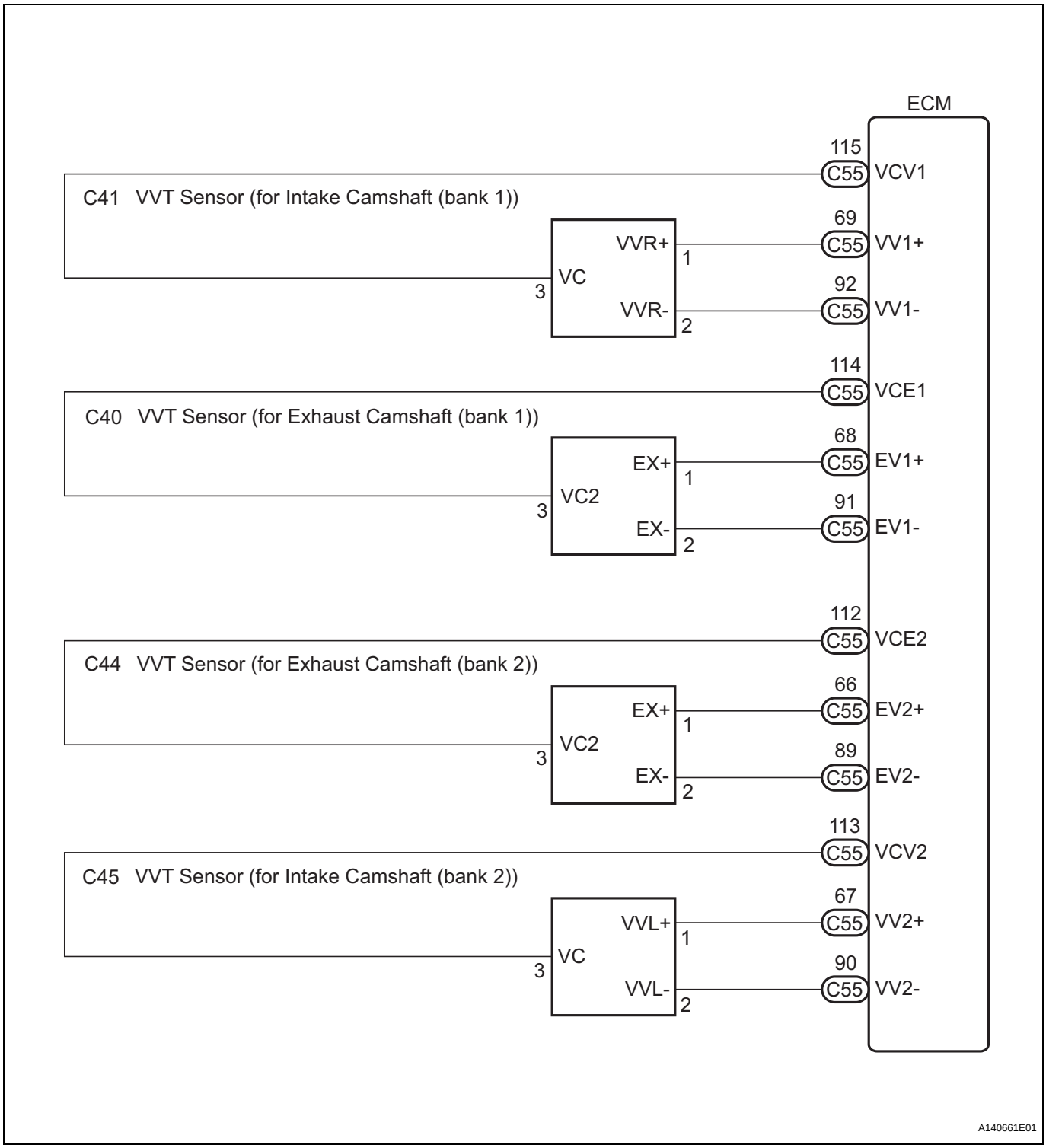
The ECM constantly uses 5 V from the battery voltages supplied to the +B (BATT) terminal to operate the microprocessor. The ECM also provides this power to the sensors through the VC output circuit.
When the VC circuit is short-circuited, the microprocessor in the ECM and sensors that are supplied power through the VC circuit are inactivated because the power is not supplied from the VC circuit. Under this condition, the system does not start up and the MIL does not illuminate even if the system malfunctions.
HINT:
Under normal conditions, the MIL is illuminated for several seconds when the ignition switch is first turned on (IG). The MIL goes off when the engine is started.



WIRING DIAGRAM



ES



INSPECTION PROCEDURE

1	**CHECK MIL**

(a) Check that Malfunction Indicator Lamp (MIL) lights up when turning the ignition switch on (IG).
OK:
MIL lights up.

OK → GO TO MIL CIRCUIT (See page ES-471)

NG

2 CHECK CONNECTION BETWEEN INTELLIGENT TESTER AND ECM

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and tester on.
(c) Check the communication between the tester and ECM.

Result

Result	Proceed to
Communication is possible	A
Communication is not possible	B

A → GO TO MIL CIRCUIT (See page ES-471)

B

3 CHECK THROTTLE BODY ASSEMBLY (CHECK MIL ILLUMINATED)

(a) Disconnect the throttle body connector.
(b) Turn the ignition switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the throttle body connector.

A → REPLACE THROTTLE BODY ASSEMBLY (See page ES-503)

B

4 CHECK ACCELERATOR PEDAL ASSEMBLY (CHECK MIL ILLUMINATED)

(a) Disconnect the accelerator pedal position sensor connector.
(b) Turn the ignition switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the accelerator pedal position sensor connector.

A → REPLACE ACCELERATOR PEDAL ASSEMBLY (See page ES-521)

B

5	CHECK VVT SENSOR FOR INTAKE CAMSHAFT BANK 1 (CHECK MIL ILLUMINATED)

(a) Disconnect the VVT sensor for intake camshaft bank 1 connector.
(b) Turn the ignition switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the VVT sensor for intake camshaft bank 1 connector.

A → **REPLACE VVT SENSOR FOR INTAKE CAMSHAFT BANK 1 (See page ES-489)**

B

6	CHECK VVT SENSOR FOR EXHAUST CAMSHAFT BANK 1 (CHECK MIL ILLUMINATED)

(a) Disconnect the VVT sensor for exhaust camshaft bank 1 connector.
(b) Turn the ignition switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the VVT sensor for exhaust camshaft bank 1 connector.

A → **REPLACE VVT SENSOR FOR EXHAUST CAMSHAFT BANK 1 (See page ES-489)**

B

7	CHECK VVT SENSOR FOR INTAKE CAMSHAFT BANK 2 (CHECK MIL ILLUMINATED)

(a) Disconnect the VVT sensor for intake camshaft bank 2 connector.
(b) Turn the ignition switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the VVT sensor for intake camshaft bank 2 connector.

A → REPLACE VVT SENSOR FOR INTAKE CAMSHAFT BANK 2 (See page ES-489)

B

8	CHECK VVT SENSOR FOR EXHAUST CAMSHAFT BANK 2 (CHECK MIL ILLUMINATED)

(a) Disconnect the VVT sensor for exhaust camshaft bank 2 connector.
(b) Turn the ignition switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

(d) Reconnect the VVT sensor for exhaust camshaft bank 2 connector.

A → REPLACE VVT SENSOR FOR EXHAUST CAMSHAFT BANK 2 (See page ES-489)

B

9	CHECK CHARCOAL CANISTER ASSEMBLY (CHECK MIL ILLUMINATED)

(a) Disconnect the canister pump module connector.
(b) Turn the ignition switch on (IG).
(c) Check the MIL.

Result

Result	Proceed to
MIL illuminates	A
MIL does not illuminate	B

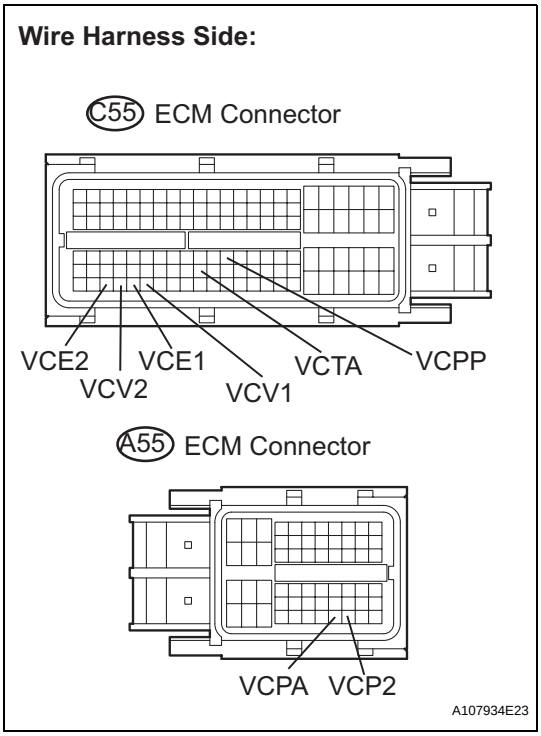
(d) Reconnect the canister pump module connector.

A → REPLACE CHARCOAL CANISTER ASSEMBLY (See page EC-9)

B

ES

10	CHECK HARNESS AND CONNECTOR



(a) Disconnect the throttle body connector.
(b) Disconnect the accelerator pedal position sensor connector.
(c) Disconnect the VVT sensor for intake camshaft bank 1 connector.
(d) Disconnect the VVT sensor for exhaust camshaft bank 1 connector.
(e) Disconnect the VVT sensor for intake camshaft bank 2 connector.
(f) Disconnect the VVT sensor for exhaust camshaft bank 2 connector.
(g) Disconnect the canister pump module connector.
(h) Disconnect the C55 and A55 ECM connectors.
(i) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connections	Specified Conditions
VCTA (C55-96) - Body ground	10 kΩ or higher
VCV1 (C55-115) - Body ground	10 kΩ or higher
VCV2 (C55-113) - Body ground	10 kΩ or higher
VCE1 (C55-114) - Body ground	10 kΩ or higher
VCE2 (C55-112) - Body ground	10 kΩ or higher
VCPA (A55-57) - Body ground	10 kΩ or higher
VCP2 (A55-58) - Body ground	10 kΩ or higher
VCPP (C55-75) - Body ground	10 kΩ or higher

(j) Reconnect the ECM connectors.
(k) Reconnect the canister pump module connector.
(l) Reconnect the fuel pressure sensor connector.
(m) Reconnect the VVT sensor for exhaust camshaft bank 2 connector.
(n) Reconnect the VVT sensor for intake camshaft bank 2 connector.
(o) Reconnect the VVT sensor for exhaust camshaft bank 1 connector.
(p) Reconnect the VVT sensor for intake camshaft bank 1 connector.
(q) Reconnect the accelerator pedal position sensor connector.
(r) Reconnect the throttle body connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

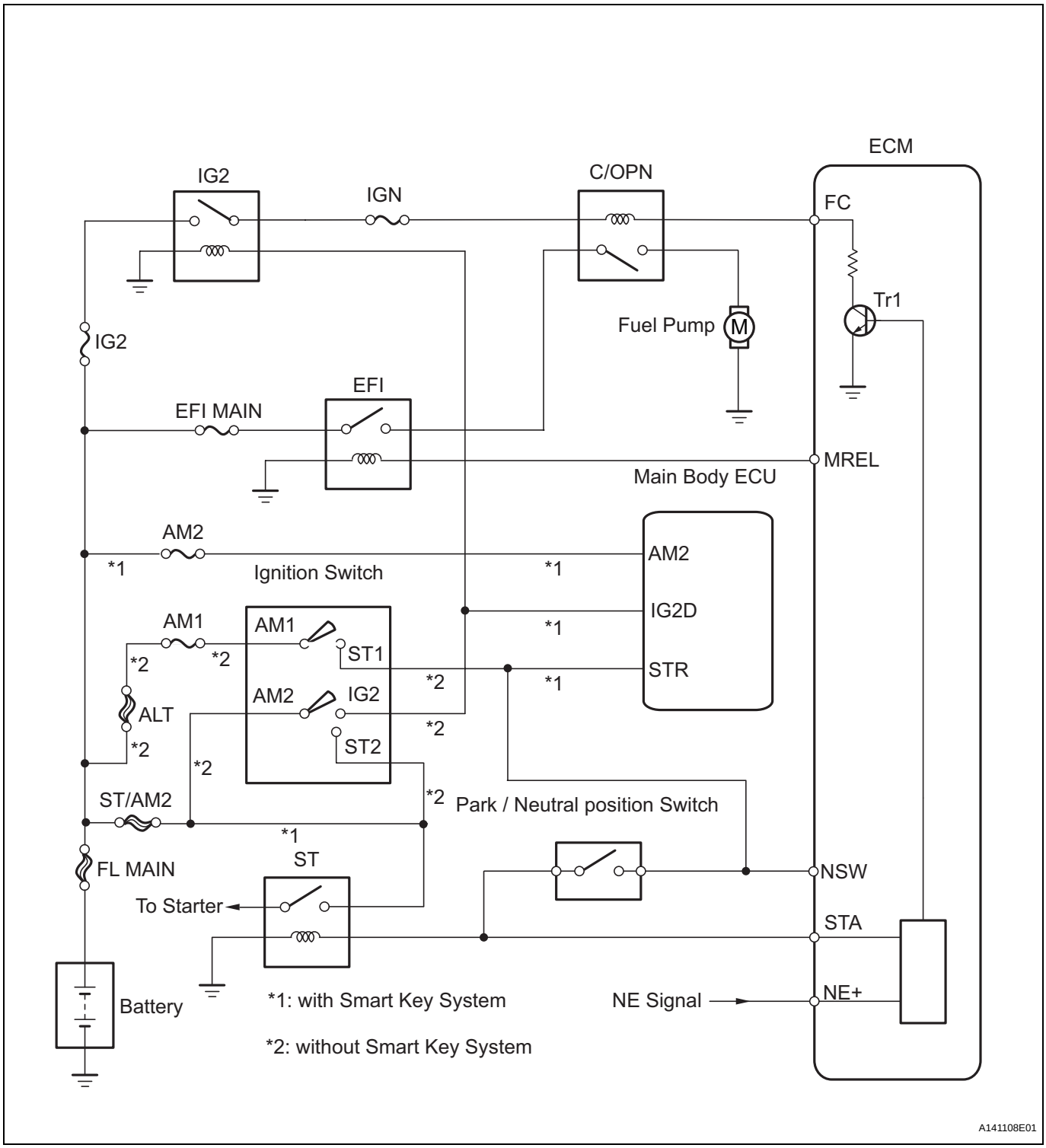
OK

REPLACE ECM (See page ES-518)

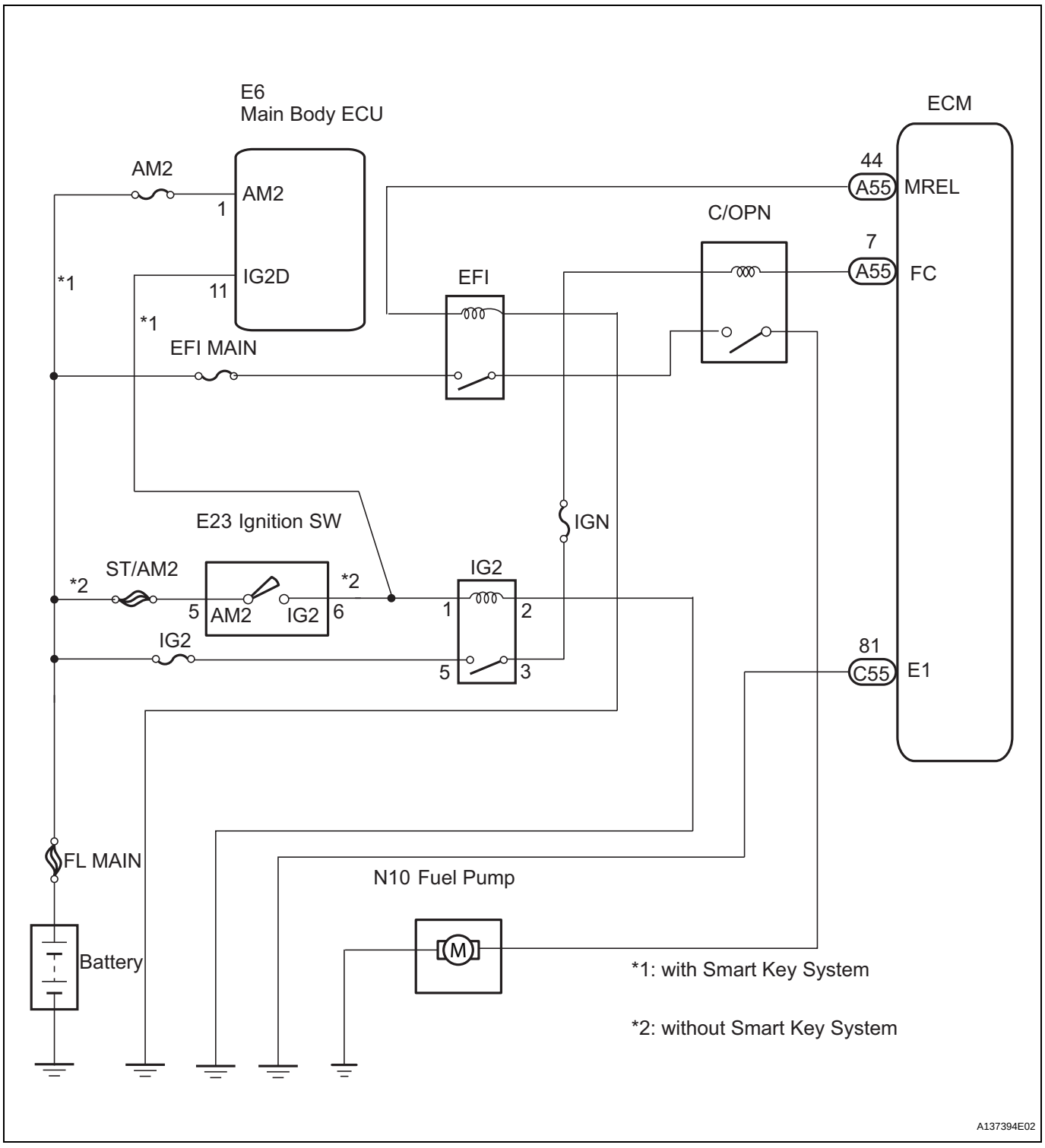
Fuel Pump Control Circuit

DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST1 (STR) of the ignition switch (power source control ECU) to the starter relay (Marking: ST) coil and also current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr is turned ON, current flows to coil of the circuit opening relay (Marking: C/OPN), the relay switches on, power is supplied to the fuel pump and the fuel pump operates.
While the NE signal is generated (engine running), the ECM keeps Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.


ECM
IG2
IGN
C/OPN
FC
Tr1
Fuel Pump
M
IG2
EFI
EFI MAIN
MREL
Main Body ECU
AM2
*1
Ignition Switch
*1
AM2
IG2D
STR
AM1
AM1
ST1
*2
*2
*2
*1
AM2
IG2
ALT
*2
*2
ST2
*2
*2
ST/AM2
Park / Neutral position Switch
*1
ST
FL MAIN
NSW
To Starter
STA
Battery
*1: with Smart Key System
NE Signal
NE+
*2: without Smart Key System
A141108E01

WIRING DIAGRAM



ES

INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE C/OPN RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and tester on.

(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
(d) Check whether the fuel pump operation sound occurs when performing the Active Test on the tester.
OK:
Fuel pump operating sound occurs.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ES-33)

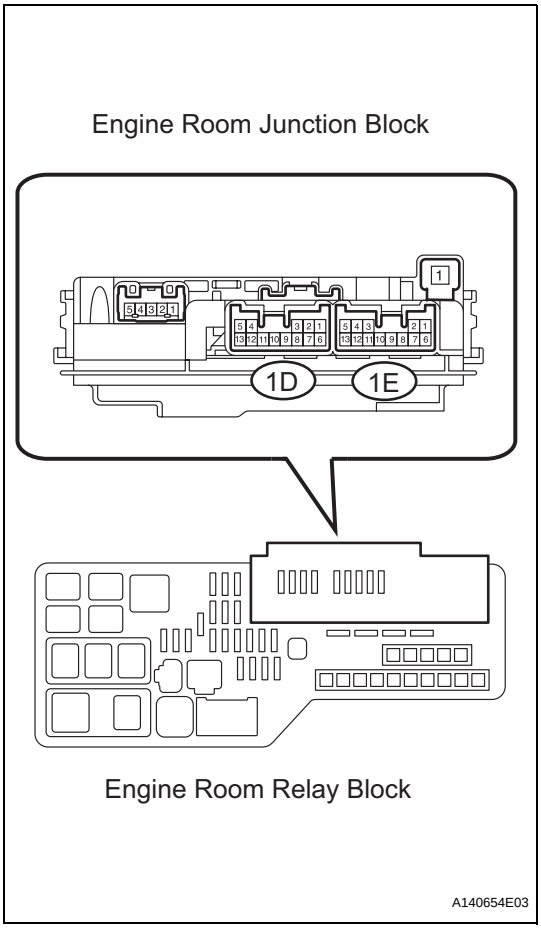
ES

2	CHECK ECM POWER SOURCE CIRCUIT

NG → **REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT**

OK

3	INSPECT ENGINE ROOM JUNCTION BLOCK (C/OPN RELAY)



(a) Remove the integration relay from the engine room relay block.
(b) Inspect the C/OPN relay.
(1) Measure the C/OPN relay resistance.
Standard resistance

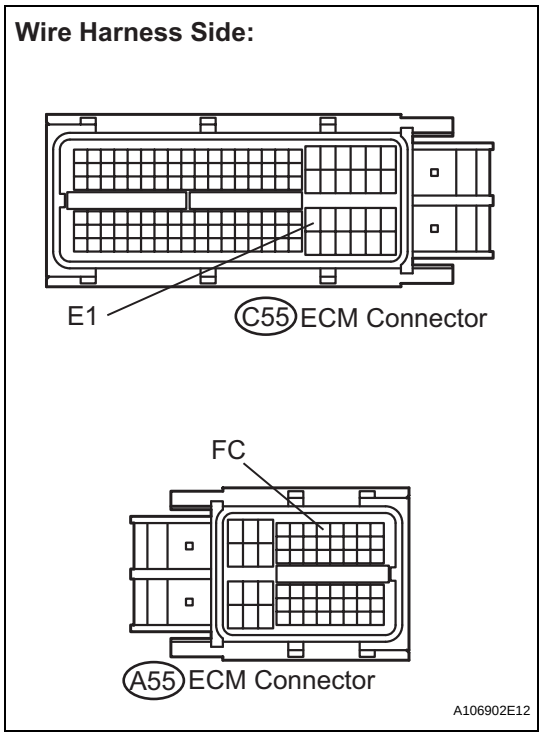
Tester Connections	Specified Conditions
1E-7 - 1E-13	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1D-12 and 1E-8)

(c) Reinstall the integration relay.

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK**

OK

4	INSPECT ECM (FC VOLTAGE)



(a) Disconnect the A55 and C55 ECM connectors.
(b) Measure the voltage between the terminals of the A24 and C24 ECM connectors.
Standard voltage

Tester Connection	Specified Condition
A55-7 (FC) - C55-81 (E1)	9 to 14 V

(c) Reconnect the ECM connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BATTERY)**

ES

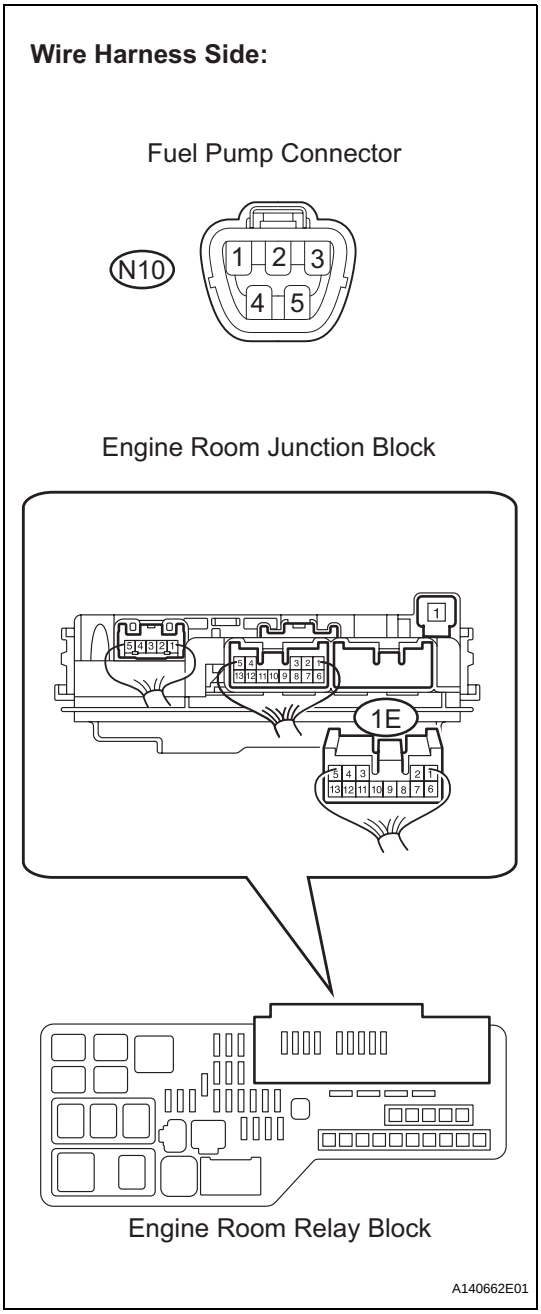
OK

5	INSPECT FUEL PUMP

NG → **REPLACE FUEL PUMP (See page FU-27)**

OK

6	CHECK HARNESS AND CONNECTOR (C/OPN RELAY - FUEL PUMP - BODY GROUND)



(a) Check the harness and the connectors between the engine room relay block and the fuel pump.
  (1) Disconnect the integration relay connector.
  (2) Disconnect the N10 fuel pump connector.
  (3) Measure the resistance.

Standard resistance (Check for open)

Tester Connections	Specified Conditions
1E-13 - N10-4 (Fuel pump)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
1E-13 or N10-4 (Fuel pump) - Body ground	10 kΩ or higher

(b) Check the harness and the connectors between the fuel pump and body ground.
  (1) Disconnect the N10 fuel pump connector.
  (2) Measure the resistance.

Standard resistance (Check for open)

Tester Connection	Specified Condition
N10-5 (Fuel pump) - Body ground	Below 1 Ω

(c) Reconnect the integration relay connector.
(d) Reconnect the fuel pump connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

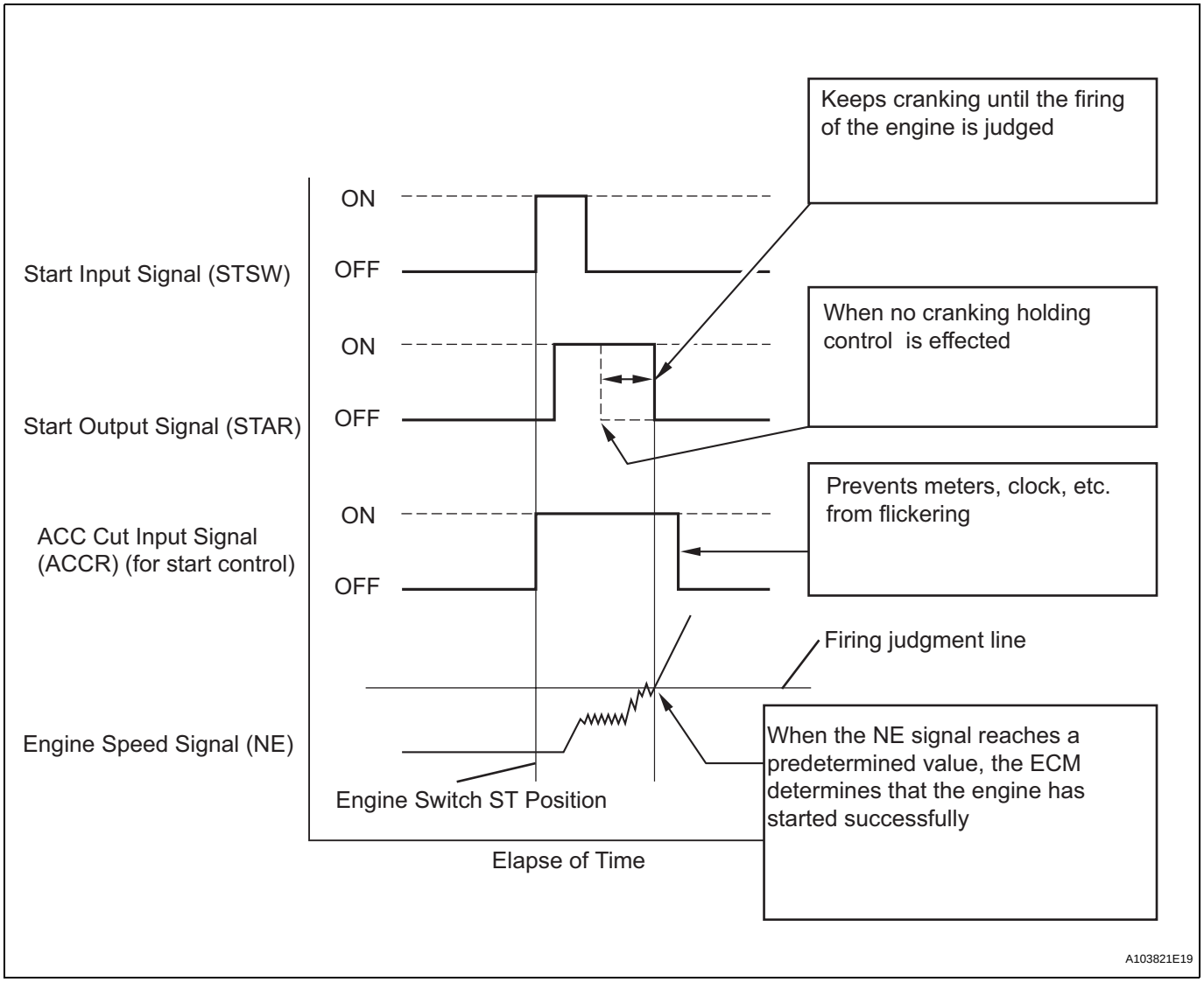
OK

REPLACE ECM (See page ES-518)

Cranking Holding Function Circuit

DESCRIPTION

The cranking holding control system provides current to the starter when the ECM detects the engine switch's start signal (STSW). When the ECM performs a firing judgment, the system cuts current to the starter. When an ECM receives the STSW signal, it turns on the ST CUT relay, which prevents flickering of the combination meter, clock, audio system, etc. Also, the ECM sends a signal to the ECM's STAR terminal. Then the STAR output signal travels through the park/neutral position (PNP) switch to the STARTER relay, causing the starter to activate.
When the engine is cranking, the starter operation signal is sent to the ECM's STA terminal.



WIRING DIAGRAM

Refer to DTC P0617 (See page ES-305).

INSPECTION PROCEDURE

1	CHECK CRANKING

(a) When starting the engine, check whether the starter motor starts.

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

2	READ VALUE OF INTELLIGENT TESTER (STA SIGNAL)

ES

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the intelligent tester on.
(d) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG. Read the values.
(e) Check the result when the ignition switch is turned on (IG) and when the engine is started.

Standard

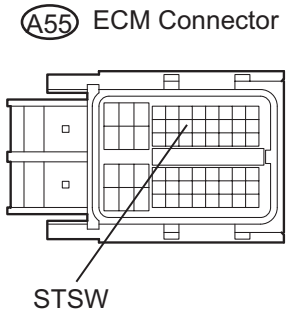
Display (STARTER SIG)	Ignition Switch Position
OFF	ON
ON	START

OK → Go to step 7

NG

3	INSPECT ECM (STSW VOLTAGE)

Wire Harness Side:



A115671E32

(a) Disconnect the A55 ECM Connector.
(b) Measure the voltage between the terminals of the ECM connector and body ground while cranking the engine.
Standard voltage

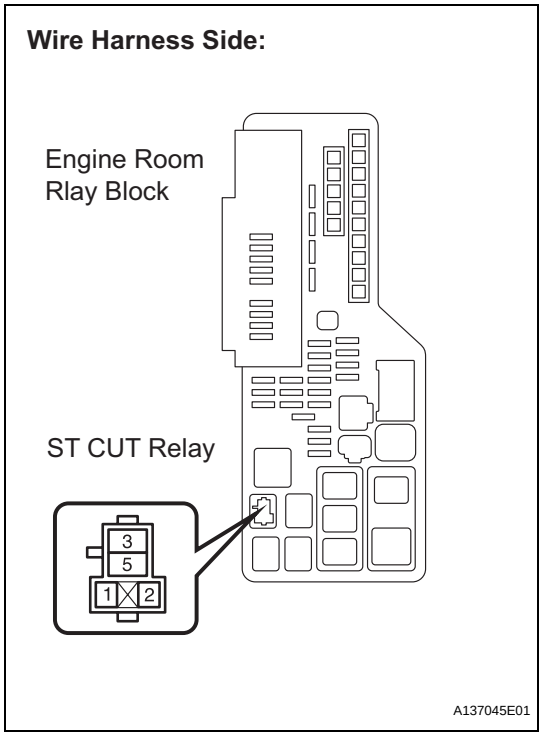
Tester Connection	Specified Condition
STSW (A55-14) - Body ground	9 to 14 V

(c) Reconnect the ECM connector.

OK → Go to step 11

OK

4 INSPECT ECM (STAR VOLTAGE)



(a) Remove the ST CUT relay from the engine room R/B.
(b) Measure the voltage between the terminals of the engine room R/B and body ground while cranking the engine.
Standard voltage

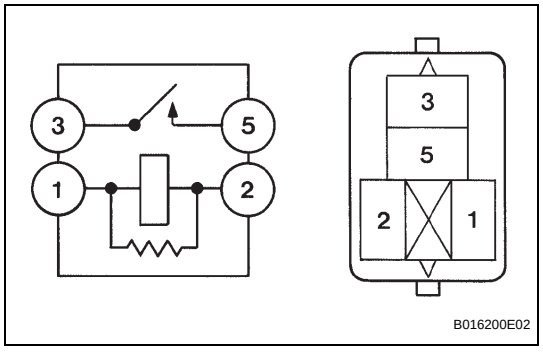
Tester Connection	Specified Condition
ST CUT relay (3) - Body ground	9 to 14 V

(c) Reinstall the ST CUT relay.

NG → **Go to step 8**

OK

5 INSPECT ST CUT RELAY



(a) Remove the ST CUT relay from the engine room R/B.
(b) Measure the resistance between the terminals.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage applied to terminals 1 and 2)

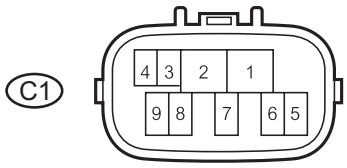
(c) Reinstall the ST CUT relay.

NG → **REPLACE ST CUT RELAY**

OK

6 INSPECT PARK/NEUTRAL SWITCH ASSEMBLY

Component Side:



Park / Neutral Position Switch

A107908E03

(a) Inspect the Park / Neutral Position (PNP) switch.
(1) Disconnect the C1 switch connector.
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Gear Selector Lever Position	Tester Connection	Specified Condition
P	4 - 5	Below 1 Ω
N	4 - 5	Below 1 Ω

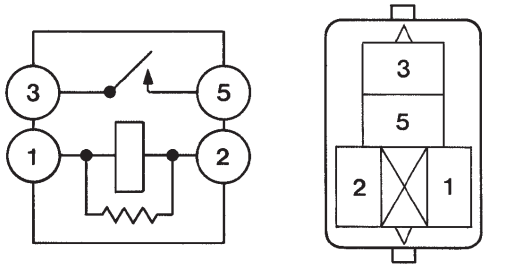
(3) Reconnect the PNP switch connector.

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY (See page AX-174)**

OK

CHECK HARNESS AND CONNECTOR

7 INSPECT STARTER RELAY



B016200E02

(a) Remove the ST relay from the engine room R/B.
(b) Measure the resistance between the terminals.

Standard resistance

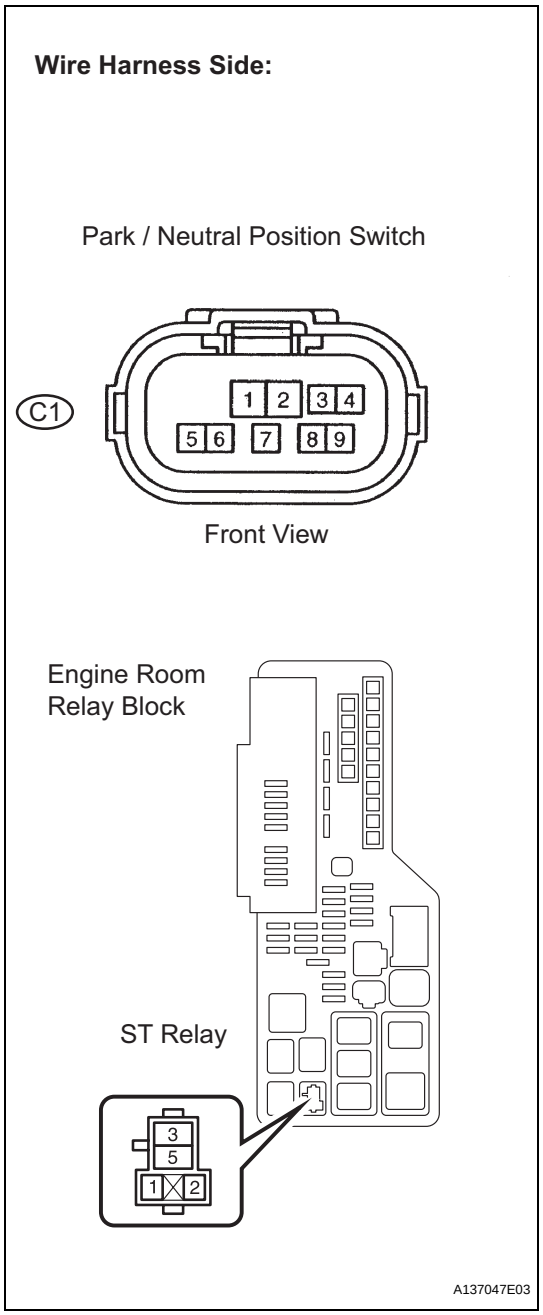
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage applied to terminals 1 and 2)

(c) Reinstall the ST relay.

NG → **REPLACE STARTER RELAY**

OK

8	CHECK HARNESS AND CONNECTOR (PARK / NEUTRAL POSITION SWITCH - STARTER RELAY)



(a) Disconnect the C1 park/neutral position switch connector.
(b) Remove the ST relay from the engine room R/B.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
C1-9 - ST relay terminal (5)	Below 1 Ω

Standard resistance (Check for open)

Tester Connection	Specified Condition
C1-9 or ST relay terminal (5) - Body ground	10 kΩ or higher

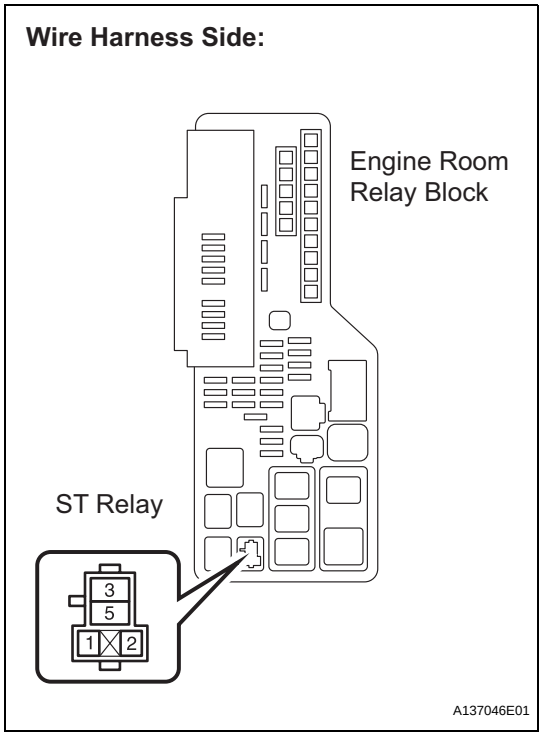
(d) Reinstall the ST relay.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ES

9	INSPECT ENGINE ROOM RELAY BLOCK (STARTER RELAY VOLTAGE)



(a) Remove the ST relay from the engine room R/B.
(b) Measure the voltage between the terminals of the engine room R/B and body ground.

Standard voltage

Tester Connection	Specified Condition
ST relay (5) - Body ground	9 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10	INSPECT STARTER ASSEMBLY

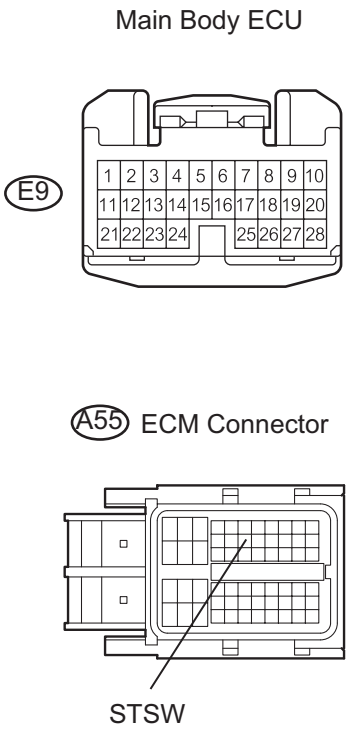
NG → **REPAIR OR REPLACE STARTER ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (STARTER RELAY - STARTER, STARTER - BATTERY)

11	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - ECM)

Wire Harness Side:



(a) Disconnect the E6 main body ECU connector.
(b) Disconnect the A55 ECM connector.
(c) Measure the resistance between the terminals.

Standard resistance (Check for open)

Tester Connection	Specified Condition
STSW (E9-4) - STSW (A55-14)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
STSW (E9-4) or STSW (A55-14) - Body ground	10 kΩ or higher

(d) Reconnect the main body ECU connector.
(e) Reconnect the ECM connector.

ES

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

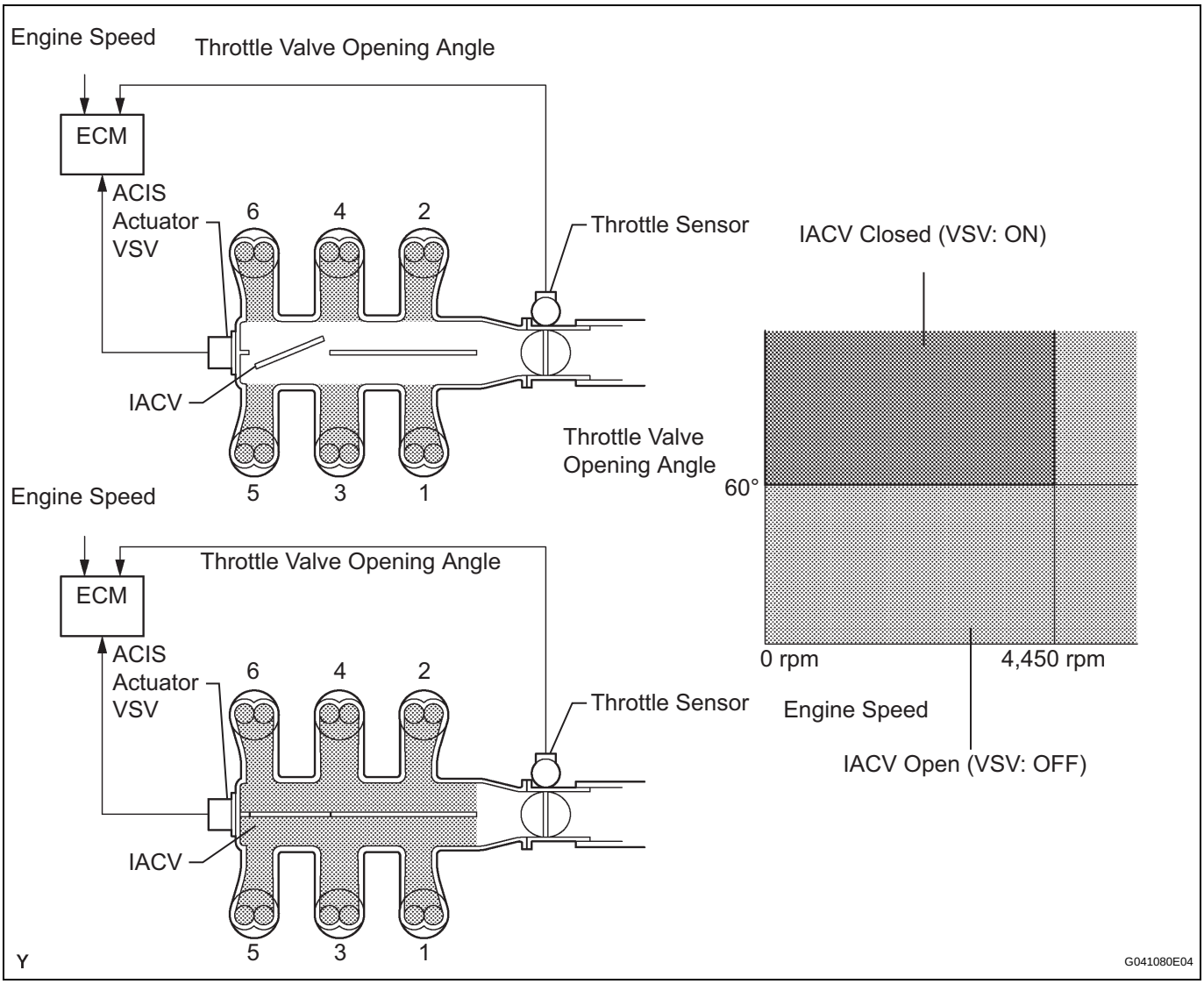
OK

GO TO SMART KEY SYSTEM

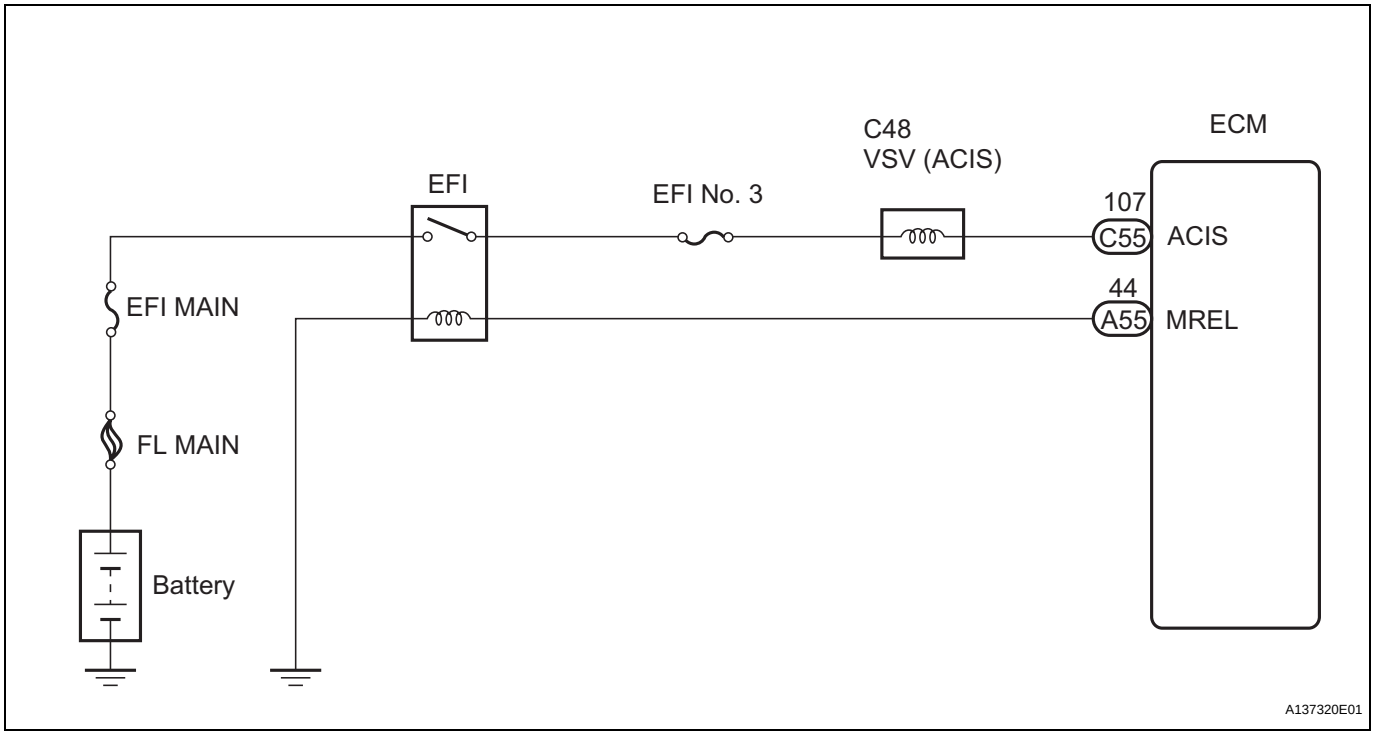
ACIS Control Circuit

DESCRIPTION

This circuit opens and closes the Intake Air Control Valve (IACV) in response to changes in the engine load in order to increase the intake efficiency (ACIS: Acoustic Control Induction System).
When the engine speed is between 0 and 4,450 rpm and the throttle valve opening angle is 60° or more, the ECM supplies current to the VSV (ON status), to close the IACV. Under other conditions, the VSV is usually OFF and the IACV is open.



WIRING DIAGRAM



ES

INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (OPERATE VSV FOR ACIS)

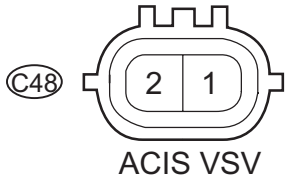
(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INTAKE CTL VSC48. Operate the VSV for AICS.
OK:
Operational noise can be heard.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page ES-33)**

NG

2	CHECK INTAKE AIR CONTROL VALVE (OPERATION)

Component Side:



E121181E02

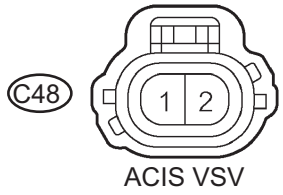
(a) Disconnect the C48 air intake valve connector.
(b) Apply battery voltage between the terminals of the air intake valve connector.
(c) Check the air intake valve operation.
OK:
Operational noise can be heard.

NG → **REPLACE INTAKE AIR SURGE TANK**

ES **OK**

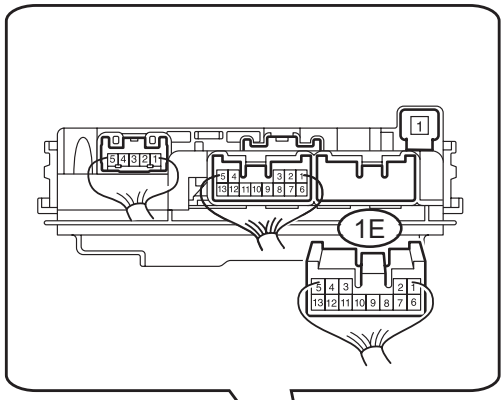
3	CHECK HARNESS AND CONNECTOR (VSV FOR ACIS - ECM, VSV FOR ACIS - EFI RELAY)

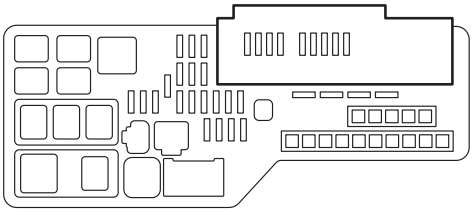
Wire Harness Side:



ACIS VSV

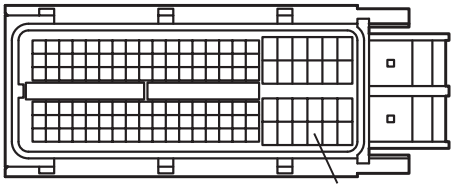
Engine Room Junction Block





Engine Room Relay Block

C55 ECM Connector



ACIS

A137082E01

(a) Check the wire harness and connectors between the VSV for ACIS and ECM.
  (1) Disconnect the C48 VSV for ACIS connector.
  (2) Disconnect the C55 ECM connector.
  (3) Measure the resistance between the terminals of the VSV for ACIS connector and ECM connector.
  Standard resistance (Check for open)

Tester Connections	Specified Conditions
VSV for ACIS (C48-1) - ACIS (C55-107)	Below 1 Ω

Standard resistance (Check for short)

Tester Connections	Specified Conditions
VSV for ACIS (C48-1) or ACIS (C55-107) - Body ground	10 kΩ or higher

  (4) Reconnect the VSV for ACIS connector.
  (5) Reconnect the ECM connector.

(b) Check the EFI No. 3 fuse.
  (1) Remove the EFI No. 3 fuse from the engine room R/B.
  (2) Measure the EFI No. 3 fuse resistance.
  Standard resistance:
  Below 1 Ω
  (3) Reinstall the EFI No. 3 fuse

(c) Check the wire harness between the VSV for ACIS connector and EFI MAIN relay.
  (1) Remove the engine room junction block from the engine room R/B.
  (2) Disconnect the C48 VSV connector.
  (3) Measure the resistance between the terminals.
  Standard resistance (Check for open)

Tester Connections	Specified Conditions
VSV for ACIS (C48-2) - 1E-6	Below 1 Ω

  (4) Reinstall the engine room junction block.
  (5) Reconnect the VSV connector.

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

ES

OK

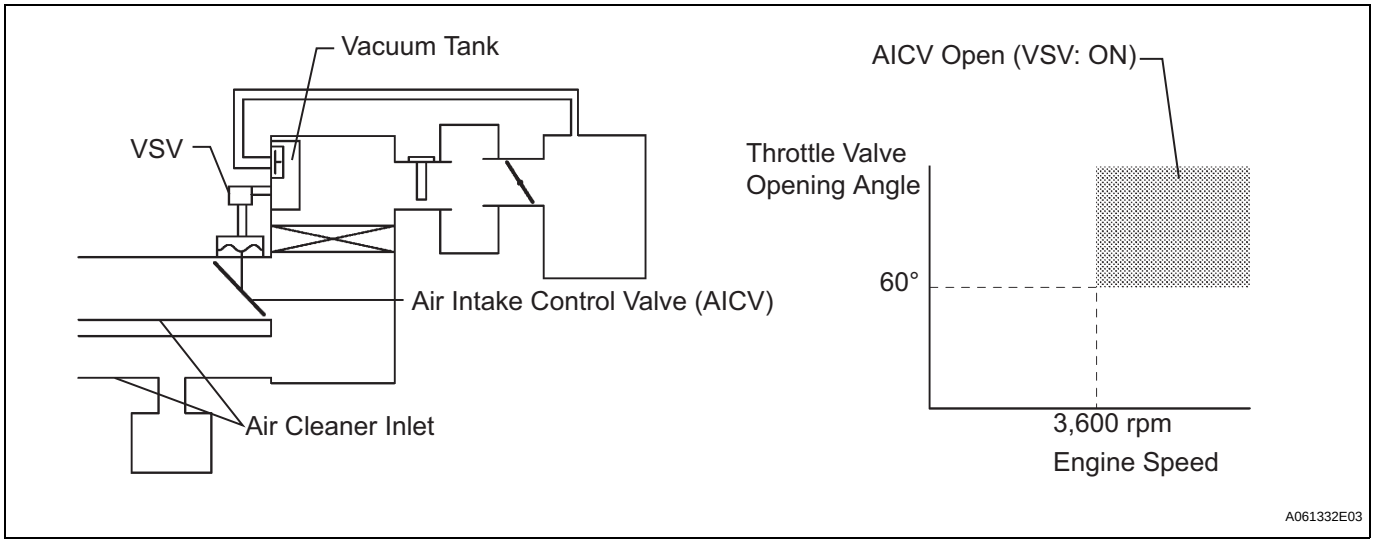
REPLACE ECM (See page ES-518)

Air Intake Control Circuit

DESCRIPTION

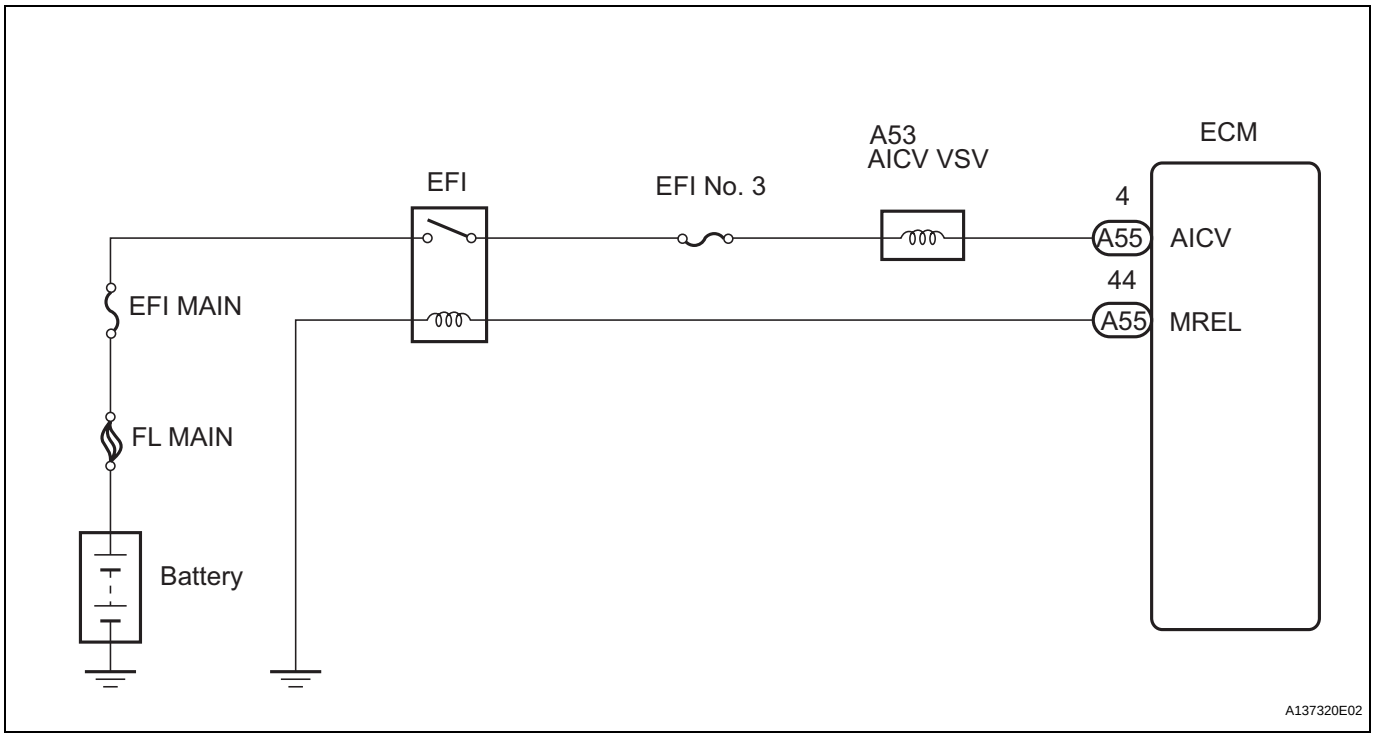
The air cleaner is equipped with two inlets, one of which is opened or closed by the Air Intake Control Valve (AICV). This system reduces intake noise and increases engine power at low-to-high engine speeds range.

When the engine is operating in the low-to-mid speed range, this control operates the AICV to close one of the air cleaner inlets. When the engine speed is more than 3,600 rpm and the opening angle of the throttle valve is more than 60°, the ECM activates the VSV and opens the AICV.



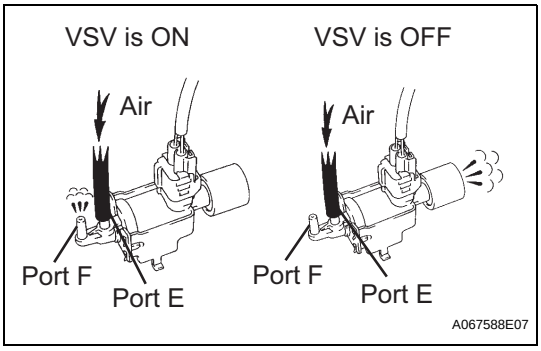
ES

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (VSV FOR AICV)



(a) Turn the ignition switch on (IG) and turn the intelligent tester ON.
(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INTAKE CTL VSV1 and operate the VSV for AICV.
(c) Check the operation of the VSV when the VSV is operated by the intelligent tester.

Standard

Tester Operation	Specified Condition
VSV is ON	Air from port E flows out through port F
VSV is OFF	Air from port E flows out through the air filter

OK → **Go to step 4**

NG

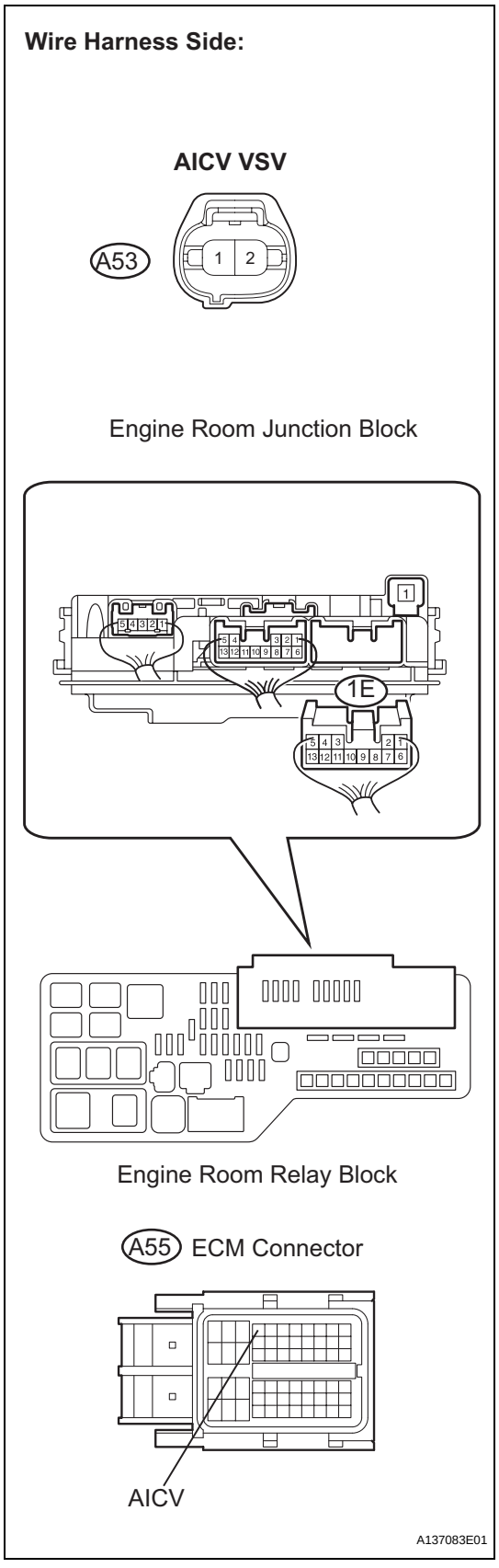
2	CHECK VSV (FOR AICV)

(a) Inspect the intake air control valve assembly (See page IT-5).

NG → **REPLACE INTAKE AIR CONTROL VALVE ASSEMBLY**

OK

3	CHECK HARNESS AND CONNECTOR (VSV FOR AICV - ECM, VSV FOR AICV - EFI RELAY)



(a) Check the wire harness between the VSV for AICV connector and the ECM connector.
  (1) Disconnect the A53 VSV for AICV connector.
  (2) Disconnect the A55 ECM connector.
  (3) Measure the resistance between the terminals of the wire harness side connectors and body ground.
  Standard resistance (Check for open)

Tester Connection	Specified Condition
VSV for AICV (A53-2) - AICV (A55-4)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
VSV for AICV (A53-2) or AICV (A55-4) - Body ground	10 kΩ or higher

  (4) Reconnect the ECM connector.

(b) Check the EFI No. 3 fuse.
  (1) Remove the EFI No. 3 fuse from the engine room R/B.
  (2) Measure the resistance EFI No. 3 fuse.
  Standard resistance:
  Below 1 Ω
  (3) Reinstall the EFI No. 3 fuse.

(c) Check the wire harness between the VSV for AICV and the EFI relay.
  (1) Remove the engine room junction block from the engine room R/B.
  (2) Measure the resistance between the terminals of the wire harness side connectors.
  Standard resistance (Check for open)

Tester Connection	Specified Condition
VSV for AICV (A53-1) - 1E-6	Below 1 Ω

  (3) Reconnect the VSV for AICV connector.
  (4) Reinstall the engine room junction block.

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

ES

OK

4	INSPECT VACUUM TANK

(a) Inspect the vacuum tank (See page IT-3).

NG → REPAIR OR REPLACE AIR CLEANER CAP

OK

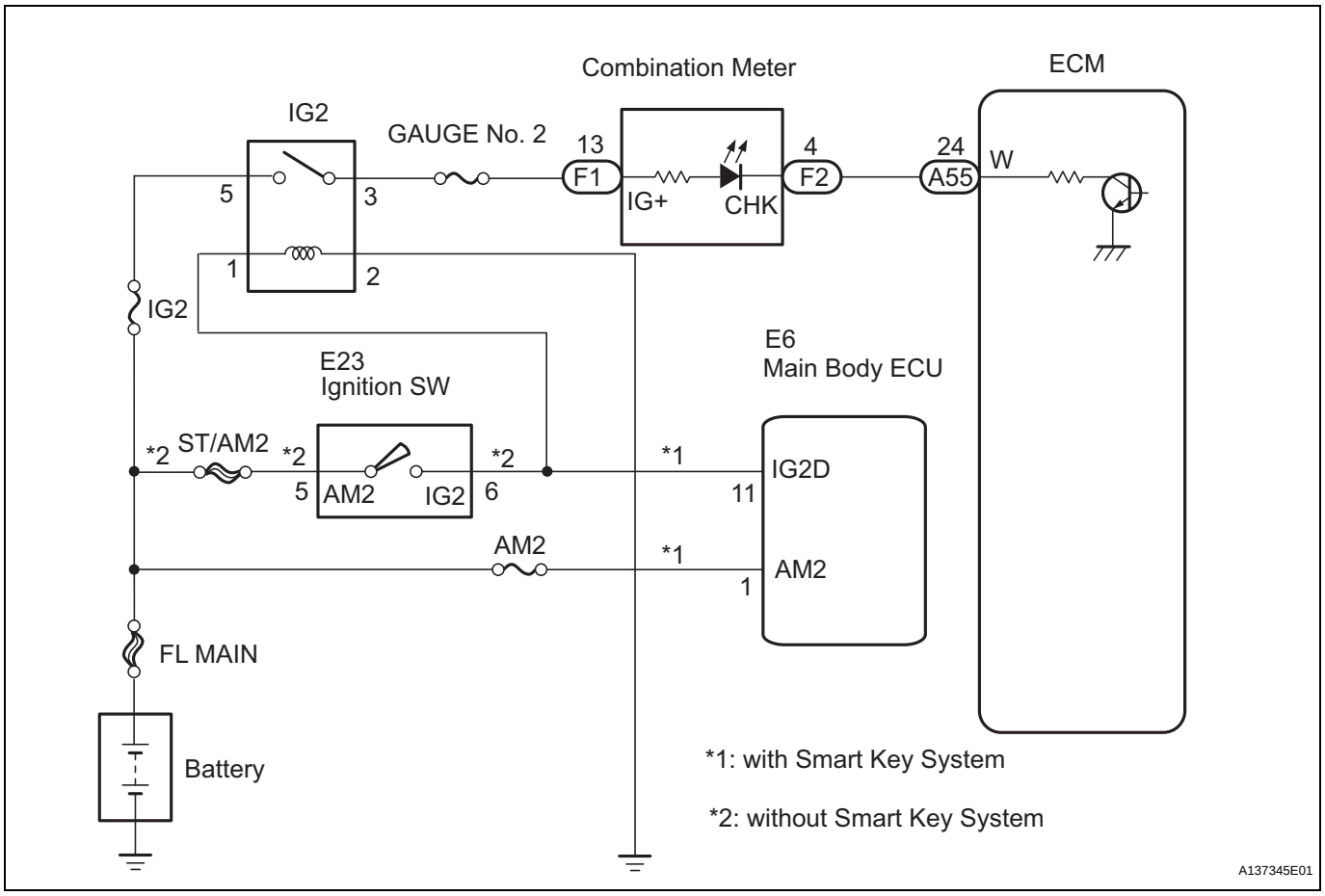
REPLACE ECM (See page ES-518)

MIL Circuit

DESCRIPTION

The MIL (Malfunction Indicator Lamp) is used to indicate vehicle malfunctions detected by the ECM. When the ignition switch is turned on (IG), power is supplied to the MIL circuit, and the ECM provides the circuit ground which illuminates the MIL.
The MIL operation can be checked visually: When the ignition switch is first turned on (IG), the MIL should be illuminated and should then turn off. If the MIL remains illuminated or is not illuminated, conduct the following troubleshooting procedure using the intelligent tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK THAT MIL IS ILLUMINATED

(a) Perform troubleshooting in accordance with the table below:
Result

Conditions	Proceed to
MIL remains ON	A
MIL does not illuminate	B

B	Go to step 5

A

2	CHECK WHETHER MIL TURNS OFF

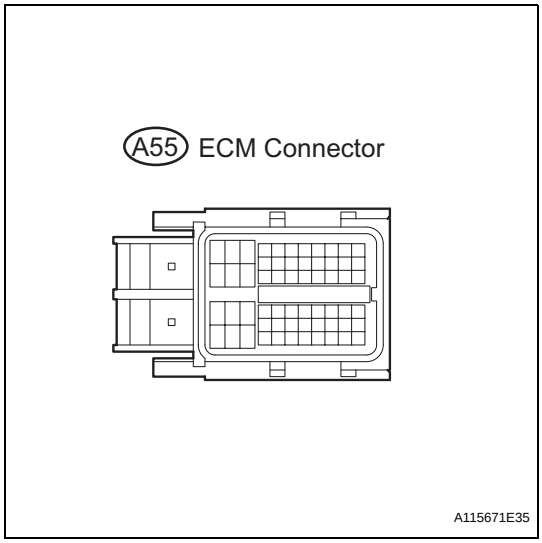
(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the tester on.
(c) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Check if any DTCs have been stored. Note down any DTCs.
(e) Clear the DTCs (See page ES-38).
(f) Check if the MIL goes off.
Standard:
MIL goes off.

ES

OK → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (See page ES-63)**

NG

3	CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT IN WIRE HARNESS)

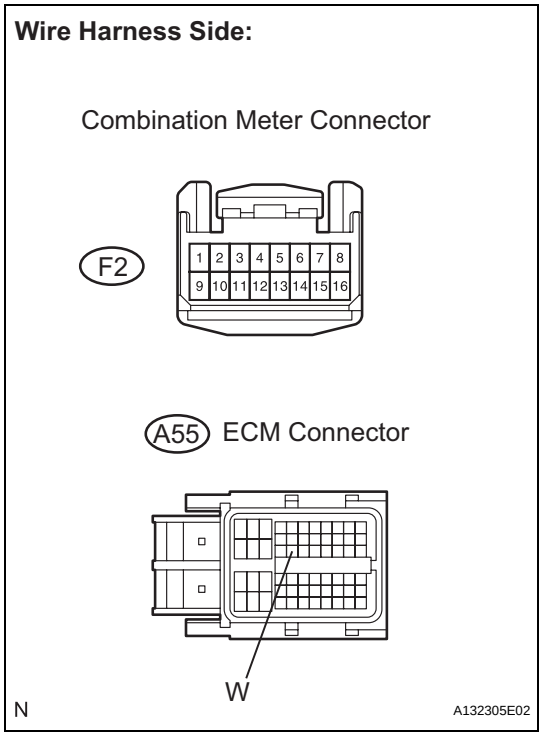


(a) Disconnect the A55 ECM connector.
(b) Turn the ignition switch on (IG).
(c) Check that the MIL is not illuminated.
OK:
MIL is not illuminated.
(d) Reconnect the ECM connector.

OK → **REPLACE ECM (See page ES-518)**

NG

4	CHECK HARNESS AND CONNECTOR (COMBINATION METER - ECM)



(a) Disconnect the A55 ECM connector.
(b) Disconnect the F2 combination meter connector.
(c) Measure the resistance.
Standard resistance (Check for short)

Tester Connection	Specified Condition
A55-24 (W) or F2-4 (CHK) - Body ground	10 kΩ or higher

(d) Reconnect the ECM connector.
(e) Reconnect the combination meter connector.

OK → **REPAIR OR REPLACE COMBINATION METER ASSEMBLY**

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

5	CHECK THAT MIL IS ILLUMINATED

(a) Check if the MIL is illuminated when the ignition switch is turned on (IG).
OK:
MIL is illuminated.

OK → **SYSTEM OK**

NG

6	CHECK THAT ENGINE STARTS

(a) Turn the ignition switch on (IG).
(b) Start the engine.
Result

Result	Proceed to
Engine starts	A
Engine does not start*	B

ES

HINT:
*: The intelligent tester cannot communicate with the ECM.

B → GO TO VC OUTPUT CIRCUIT (See page ES-442)

A

7	INSPECT COMBINATION METER ASSEMBLY (MIL CIRCUIT)

(a) Check the MIL circuit (See page ME-19).

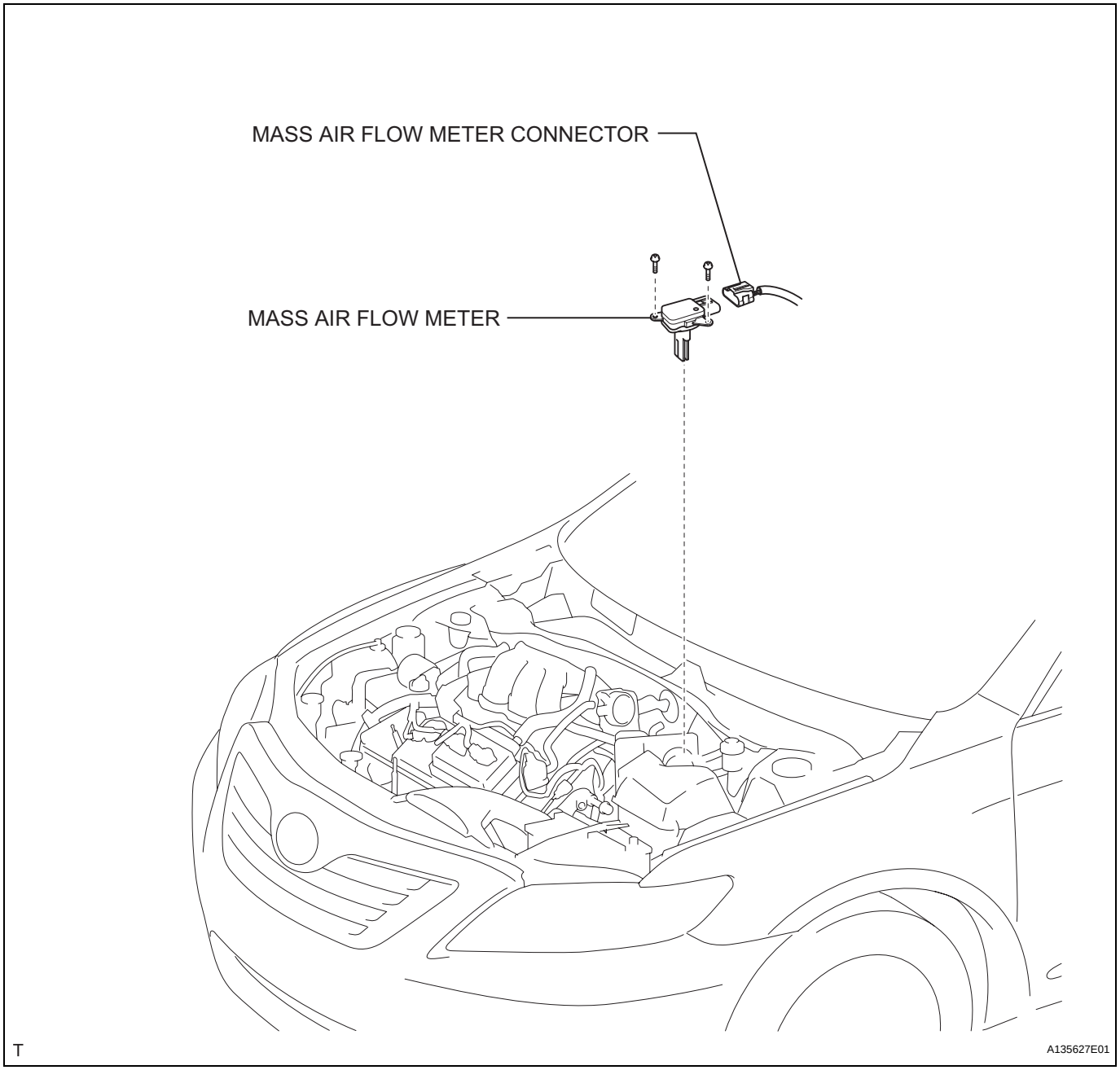
NG → REPAIR OR REPLACE COMBINATION METER ASSEMBLY

OK

CHECK AND REPLACE HARNESS AND CONNECTOR (COMBINATION METER - ECM)

MASS AIR FLOW METER

COMPONENTS

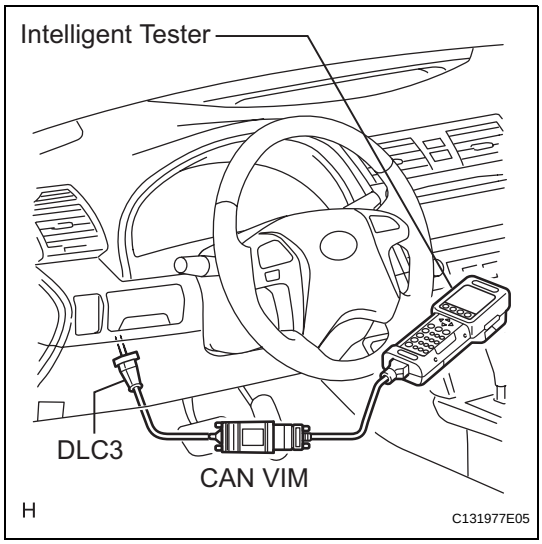


ON-VEHICLE INSPECTION

1. CHECK MASS AIR FLOW METER

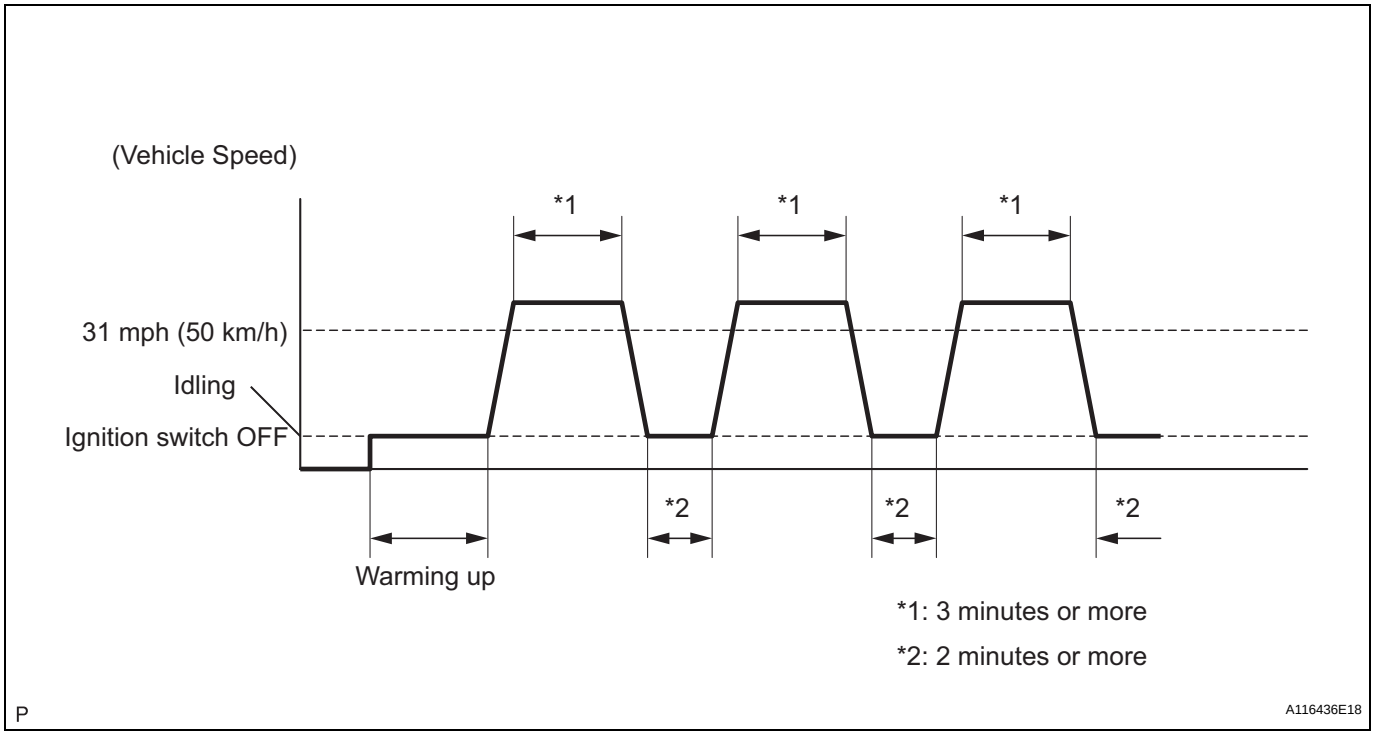
NOTICE:

- **Perform the MAF meter inspection by following the procedures below.**
- **Only replace the MAF meter when both the LONG FT#1 value and MAF value in the DATA LIST (with the engine stopped) are not within the normal operating range.**



(a) Perform confirmation driving pattern.

(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Turn the tester on.
(4) Clear the DTCs (See page ES-45).
(5) Start the engine and warm it up with all accessory switches off (until the engine coolant temperature is 75 °C(167°F) or more).
(6) Drive the vehicle at 31 mph (50 km/h) or more for 3 minutes or more (*1).
(7) Allow the engine to idle (accelerator pedal fulley released) for 2 minutes or more (*2).
(8) Perform steps (*1) and (*2) at least 3 times or more.



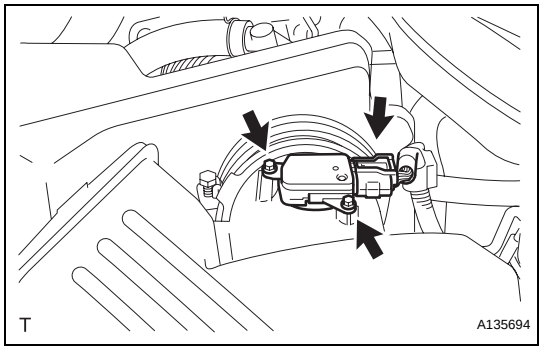
(b) Read values using the intelligent tester (LONG FT#1).

(1) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / LONG FT#1.

(2) Read the values displayed on the tester.
Standard value:
Within -15 to +15 %
If the result is not within the specified range, perform the inspection below.

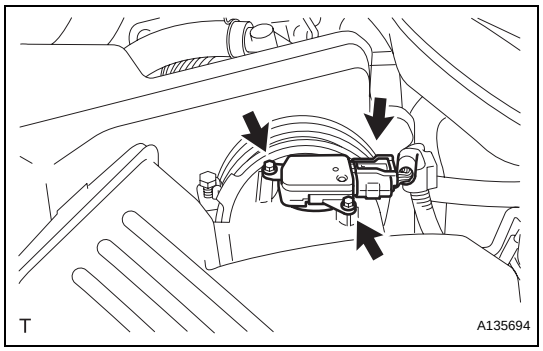
(c) Read values using the intelligent tester (MAF).
NOTICE:
- **Turn off the engine.**
- **Perform the inspection with the vehicle indoors and on a level surface.**
- **Perform the inspection of the MAF meter while it is installed to the air cleaner case (installed to the vehicle).**
- **During the test, do not use the exhaust air duct to perform suction on the exhaust pipe.**

(1) Turn off the engine (do not run the engine).
(2) Turn the ignition switch on (IG).
(3) Turn the tester on.
(4) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / PRIMARY / MAF.
(5) Wait 30 seconds, and read the values on the intelligent tester.
Standard condition:
Less than 0.56 g/sec
- If the result is not as specified, replace the MAF meter.
- If the result is within the specified range, inspect the cause of the extremely rich or lean air fuel ratio (See page EC-19).



REMOVAL

1. REMOVE MASS AIR FLOW METER
(a) Disconnect the mass air flow meter connector.
(b) Remove the 2 screws and mass air flow meter.

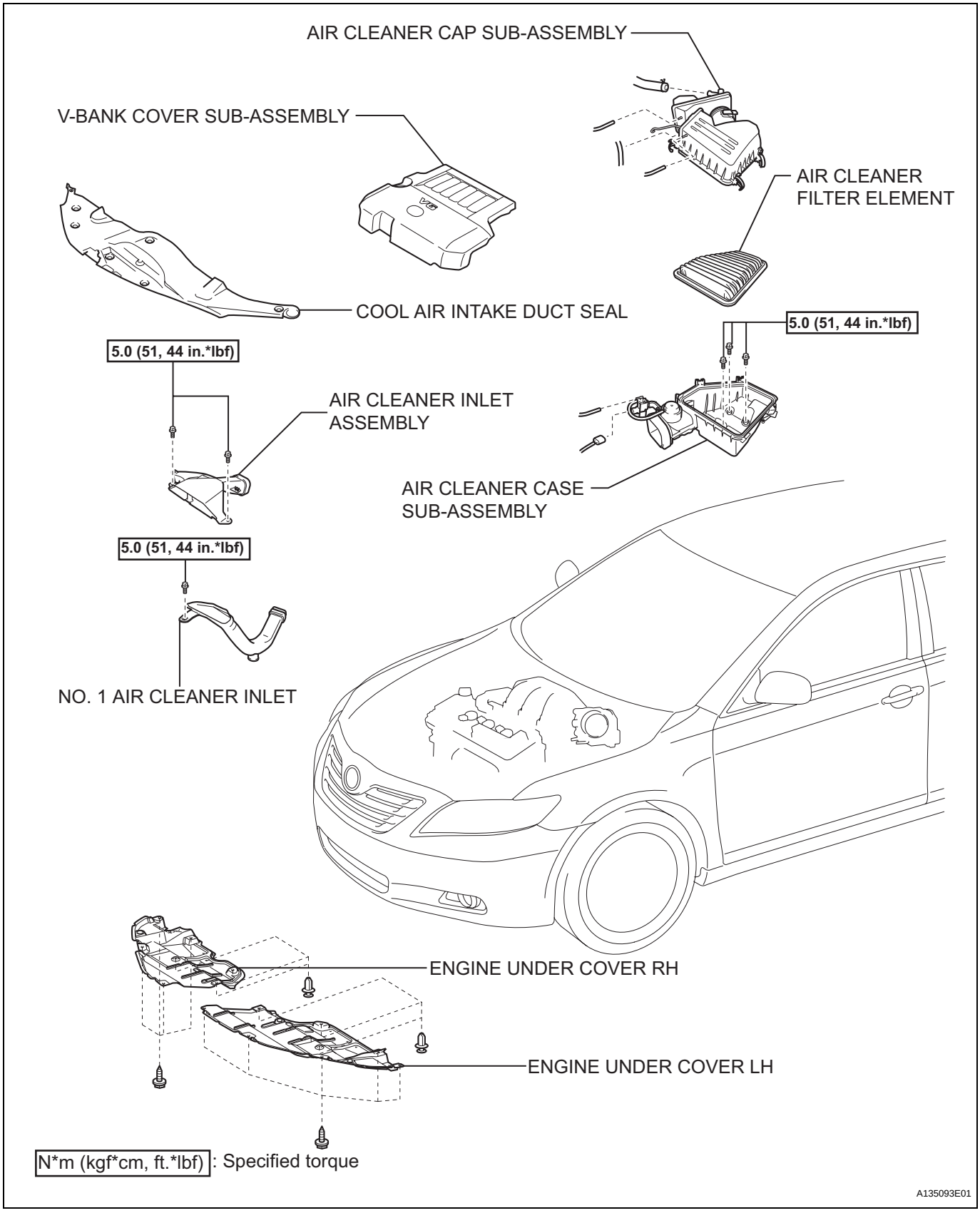


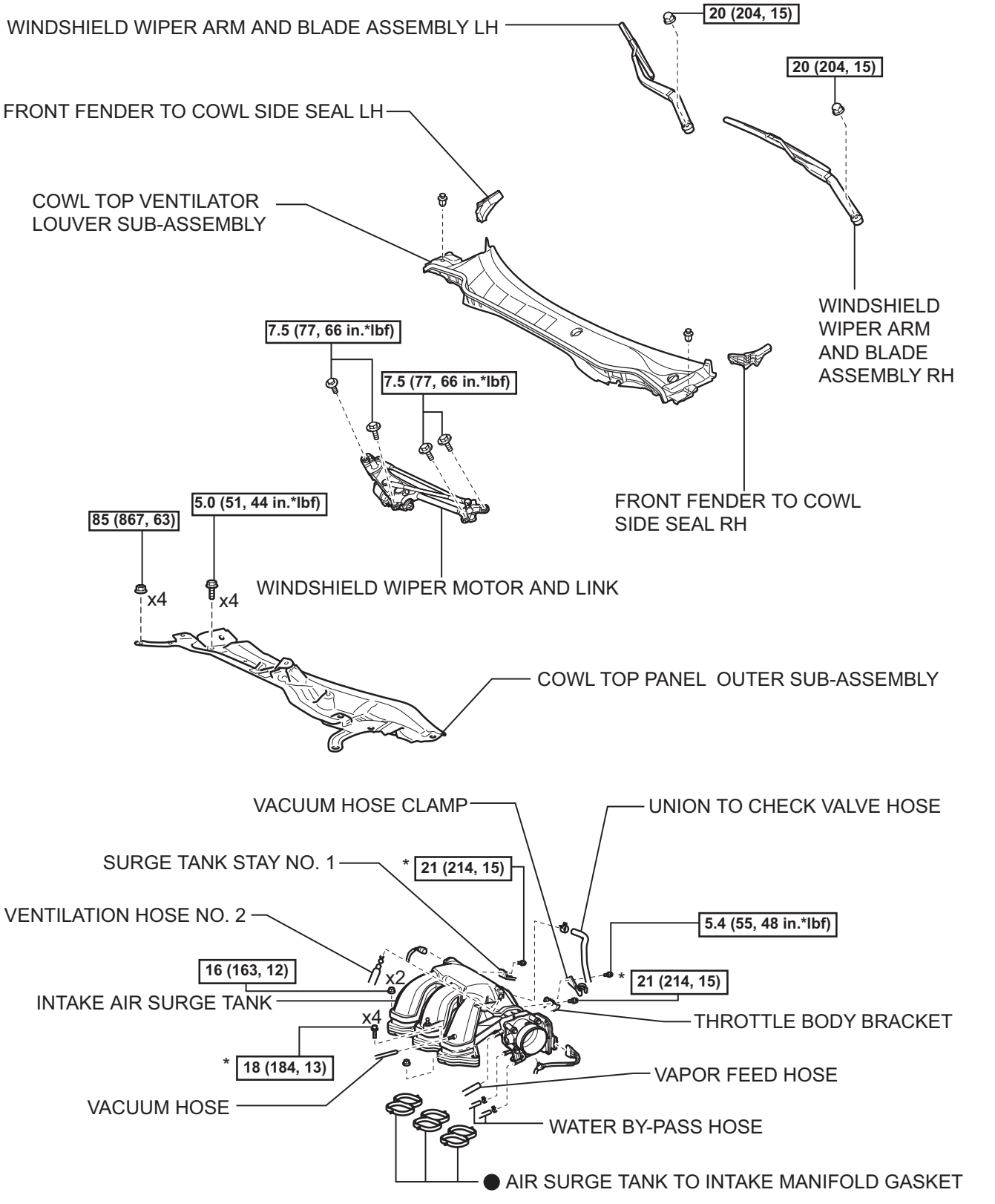
INSTALLATION

1. INSTALL MASS AIR FLOW METER
(a) Install the mass air flow meter with the 2 screws.
(b) Connect the mass air flow meter connector.

CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

COMPONENTS



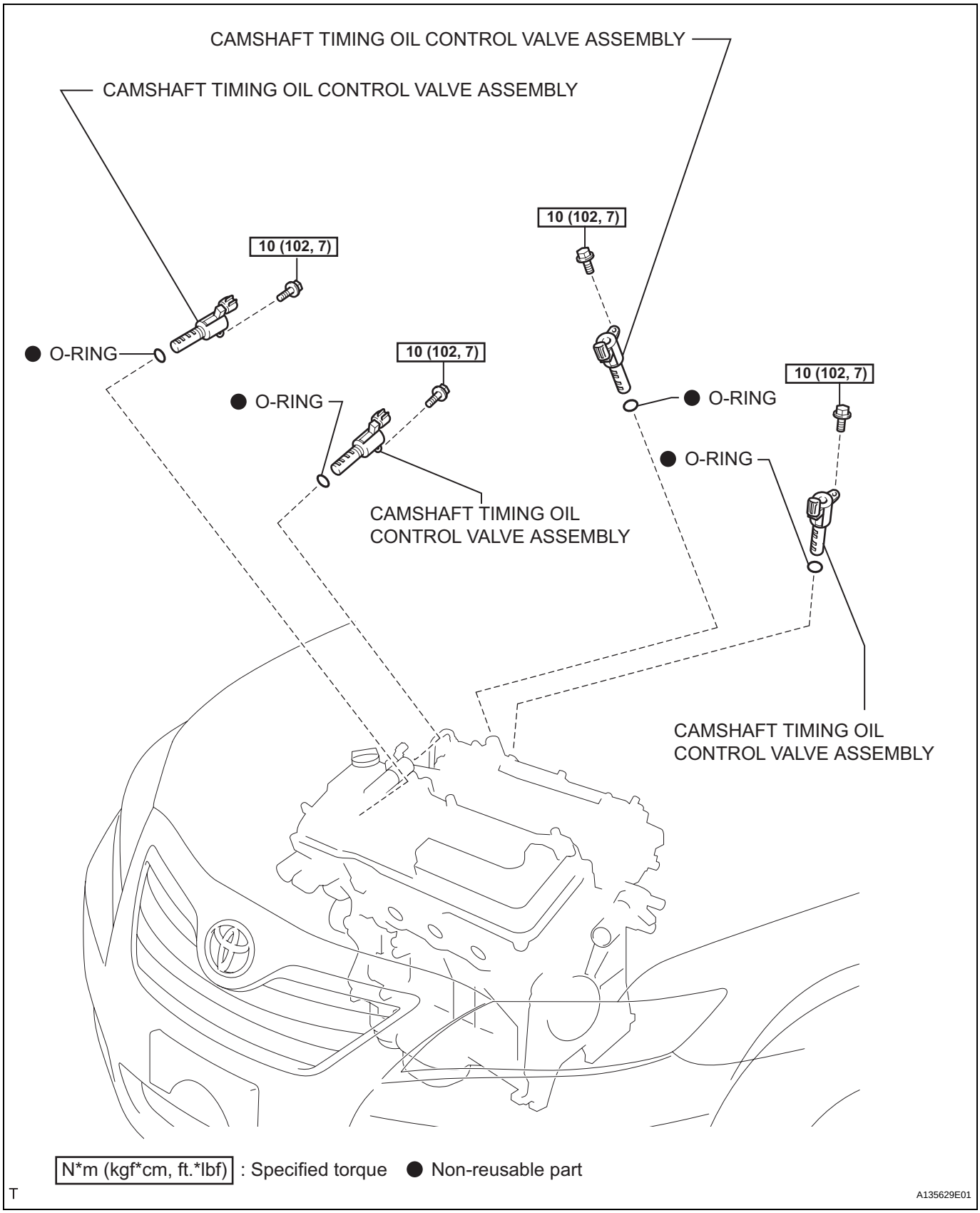


N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part * DO NOT apply oil

T

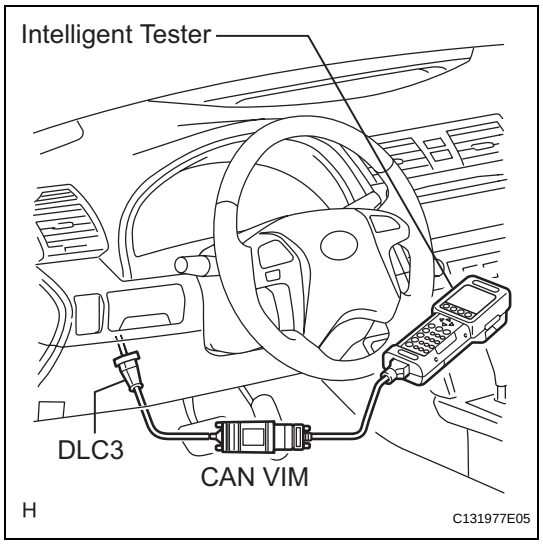
A135104E01

ES


CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
10 (102, 7)
10 (102, 7)
O-RING
10 (102, 7)
O-RING
10 (102, 7)
O-RING
O-RING
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
A135629E01

ES

T



ON-VEHICLE INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

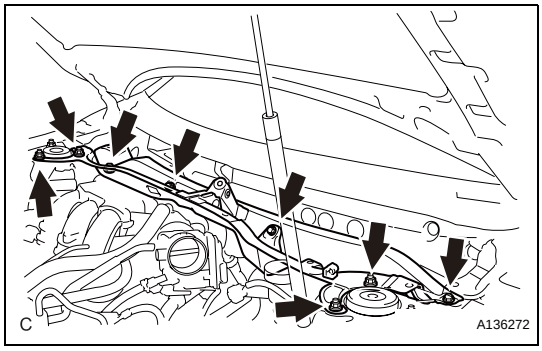
(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Start and warm up the engine.
(d) Connect the intelligent tester and select VVT from the ACTIVE TEST menu.
(e) Check the engine speed when the OCV is operated with the intelligent tester.
OK

Condition	Specified Condition
VVT system is OFF (OCV is OFF)	Normal engine speed
VVT system is ON (OCV is ON)	Rough idle or engine stalled

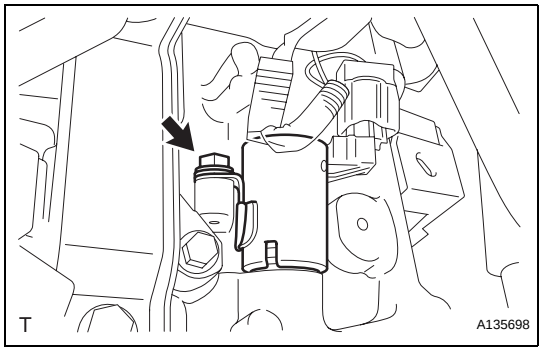
ES

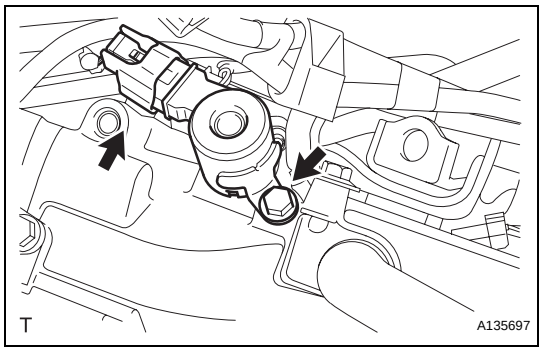
REMOVAL

1. **REMOVE ENGINE UNDER COVER LH**
2. **REMOVE ENGINE UNDER COVER RH**
3. **DRAIN ENGINE COOLANT (See page CO-5)**
4. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
5. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
6. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
8. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
9. **REMOVE WINDSHIELD WIPER MOTOR AND LINK (See page WW-10)**
10. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY**
    (a) Remove the 4 bolts, 4 nuts and cowl top panel outer sub-assembly.



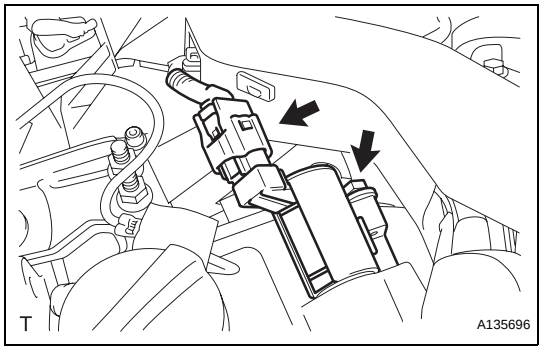
11. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
12. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
13. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
14. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
15. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
16. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
17. **REMOVE INTAKE AIR SURGE TANK (See page FU-13)**
18. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 1 Exhaust Side)**
    (a) Disconnect the camshaft timing oil control valve connector.
    (b) Remove the bolt and camshaft timing oil control valve.
    (c) Remove the O-ring from the camshaft timing oil control valve.





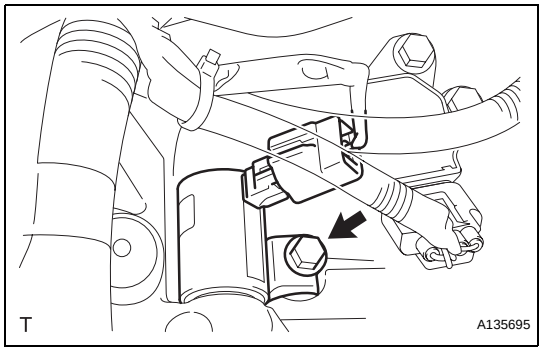
19. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 1 Intake Side)

(a) Disconnect the camshaft timing oil control valve connector.
(b) Remove the bolt and camshaft timing oil control valve.
(c) Remove the O-ring from the camshaft timing oil control valve.



20. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 2 Exhaust Side)

(a) Disconnect the camshaft timing oil control valve connector.
(b) Remove the bolt and camshaft timing oil control valve.
(c) Remove the O-ring from the camshaft timing oil control valve.



21. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 2 Intake Side)

(a) Disconnect the camshaft timing oil control valve connector.
(b) Remove the bolt and camshaft timing oil control valve.
(c) Remove the O-ring from the camshaft timing oil control valve.

INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

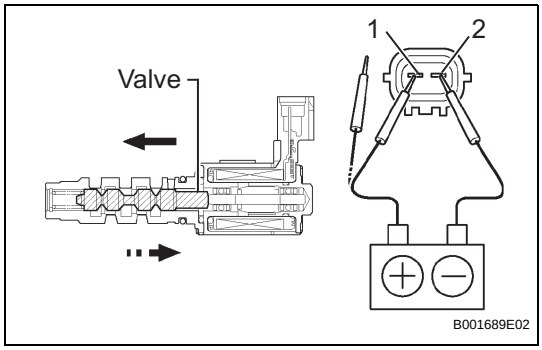
(a) Resistance inspection.

(1) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance:

6.9 to 7.9 Ω at 20°C (68°F)

If necessary, replace the camshaft timing oil control valve assembly.



(b) Movement inspection.

(1) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check the movement of the valve.

NOTICE:

Confirm that the valve moves freely and does not stick in any position.

If necessary, replace the camshaft timing oil control valve assembly.

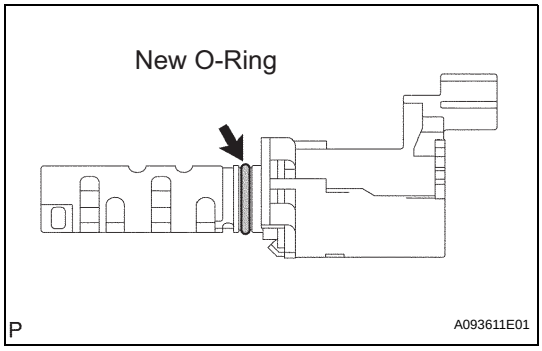
HINT:

Accumulation of foreign objects causes subtle pressure leaks. The subtle pressure leaks will cause the camshaft to advance, and this will cause a DTC to be set.

INSTALLATION

1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 2 Intake Side)

(a) Apply a light coat of engine oil to a new O-ring and install it to the camshaft timing oil control valve.

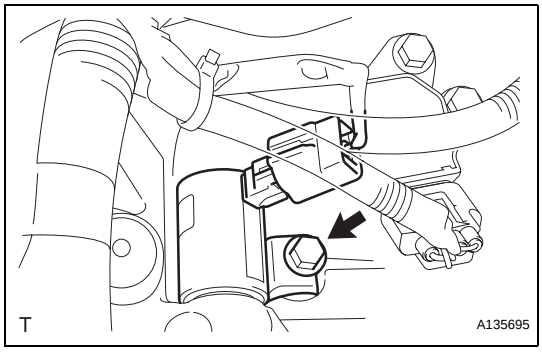


(b) Install the camshaft timing oil control valve with the bolt.

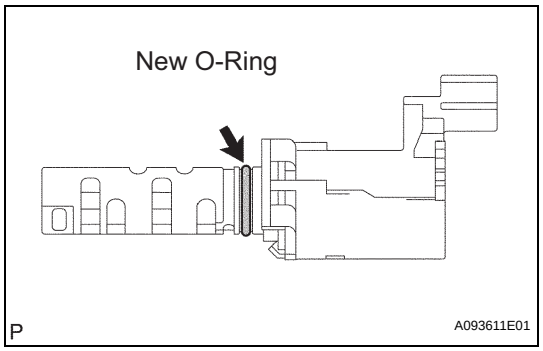
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

NOTICE:

Make sure that the O-ring is not cracked or jammed when installing the oil control valve.

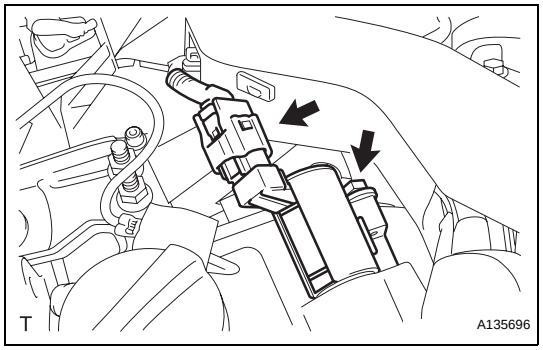


(c) Connect the camshaft timing oil control valve connector.



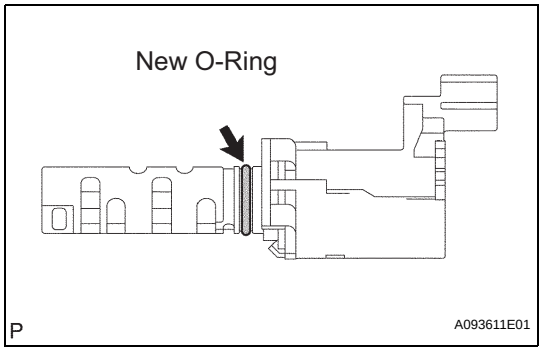
2. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 2 Exhaust Side)

(a) Apply a light coat of engine oil to a new O-ring and install it to the camshaft timing oil control valve.



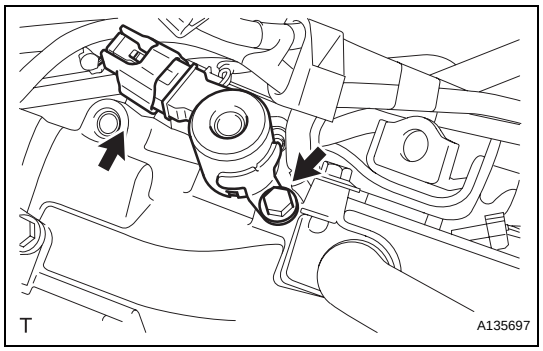
(b) Install the camshaft timing oil control valve with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
NOTICE:
Make sure that the O-ring is not cracked or jammed when installing the oil control valve.

(c) Connect the camshaft timing oil control valve connector.



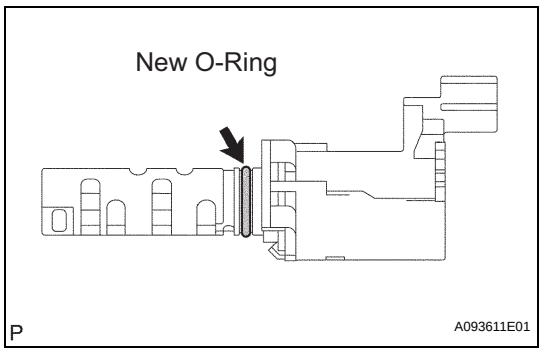
3. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 1 Intake Side)

(a) Apply a light coat of engine oil to a new O-ring and install it to the camshaft timing oil control valve.



(b) Install the camshaft timing oil control valve with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
NOTICE:
Make sure that the O-ring is not cracked or jammed when installing the oil control valve.

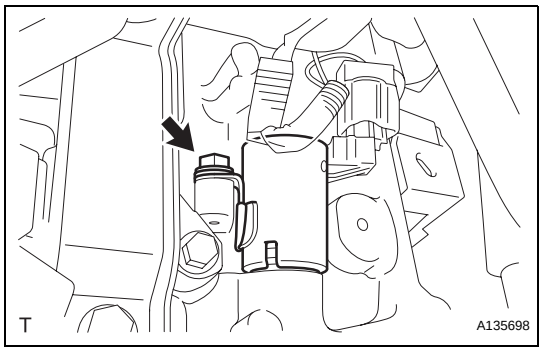
(c) Connect the camshaft timing oil control valve connector.



4. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE (for Bank 1 Exhaust Side)

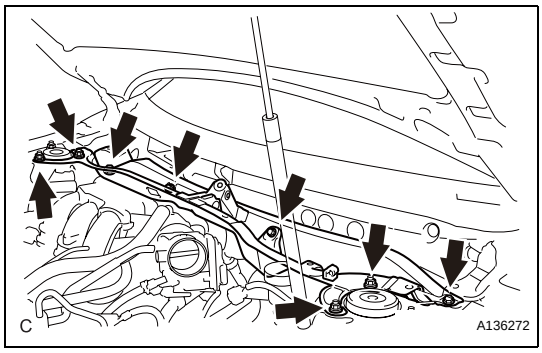
(a) Apply a light coat of engine oil to a new O-ring and install it to the camshaft timing oil control valve.

ES



(b) Install the camshaft timing oil control valve with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
NOTICE:
Make sure that the O-ring is not cracked or jammed when installing the oil control valve.
(c) Connect the camshaft timing oil control valve connector.

5. **INSTALL INTAKE AIR SURGE TANK (See page FU-18)**
6. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
7. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
8. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
9. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
10. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
11. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**



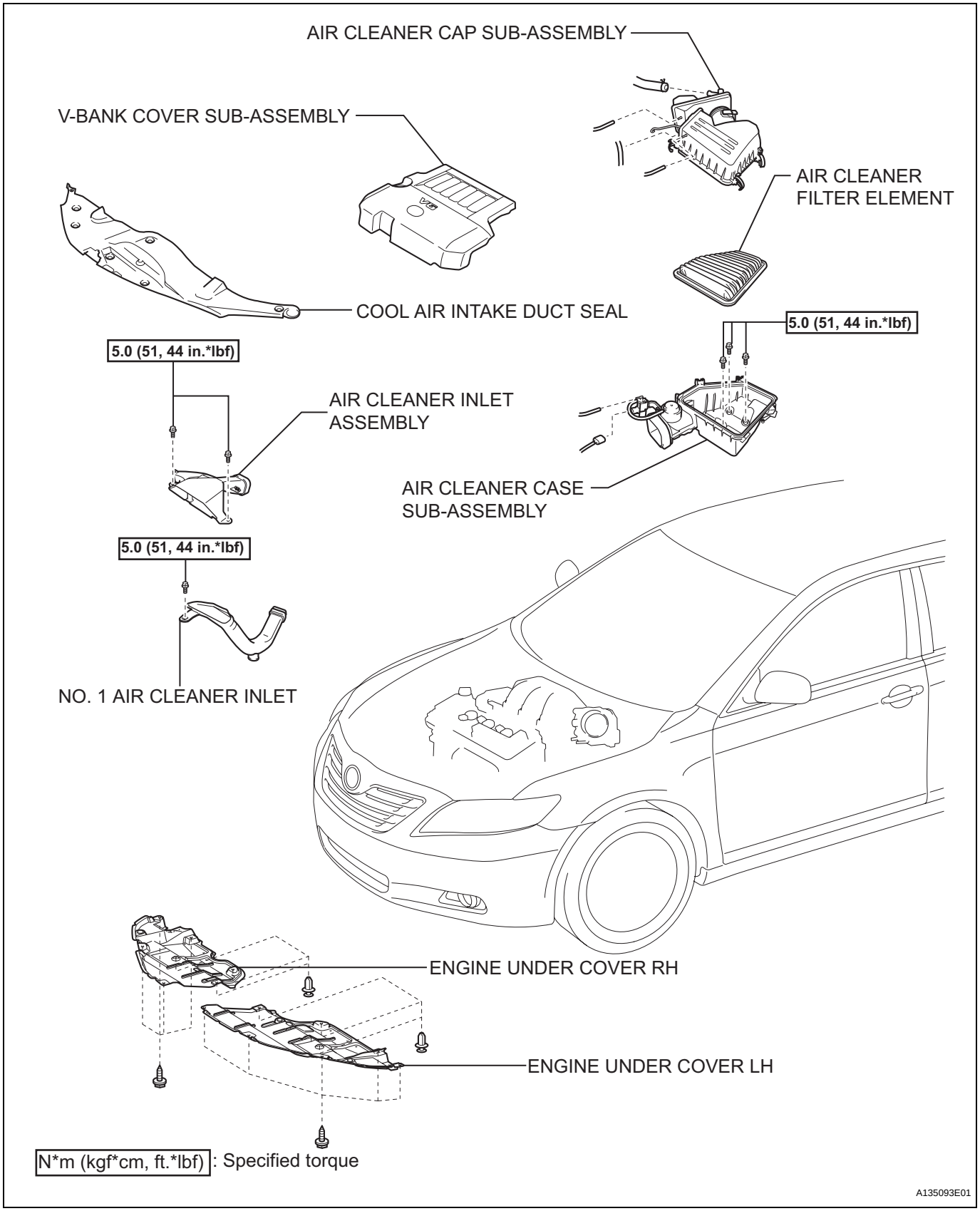
12. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY**
(a) Install the cowl top panel outer sub-assembly with the 4 bolts and 4 nuts.
Torque: Bolt
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Nut
85 N*m (867 kgf*cm, 63 ft.*lbf)
13. **INSTALL WINDSHIELD WIPER MOTOR AND LINK (See page WW-14)**
14. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)**
15. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
16. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
17. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**
18. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**
19. **ADD ENGINE COOLANT (See page CO-6)**
20. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
21. **INSTALL ENGINE UNDER COVER RH**

ES

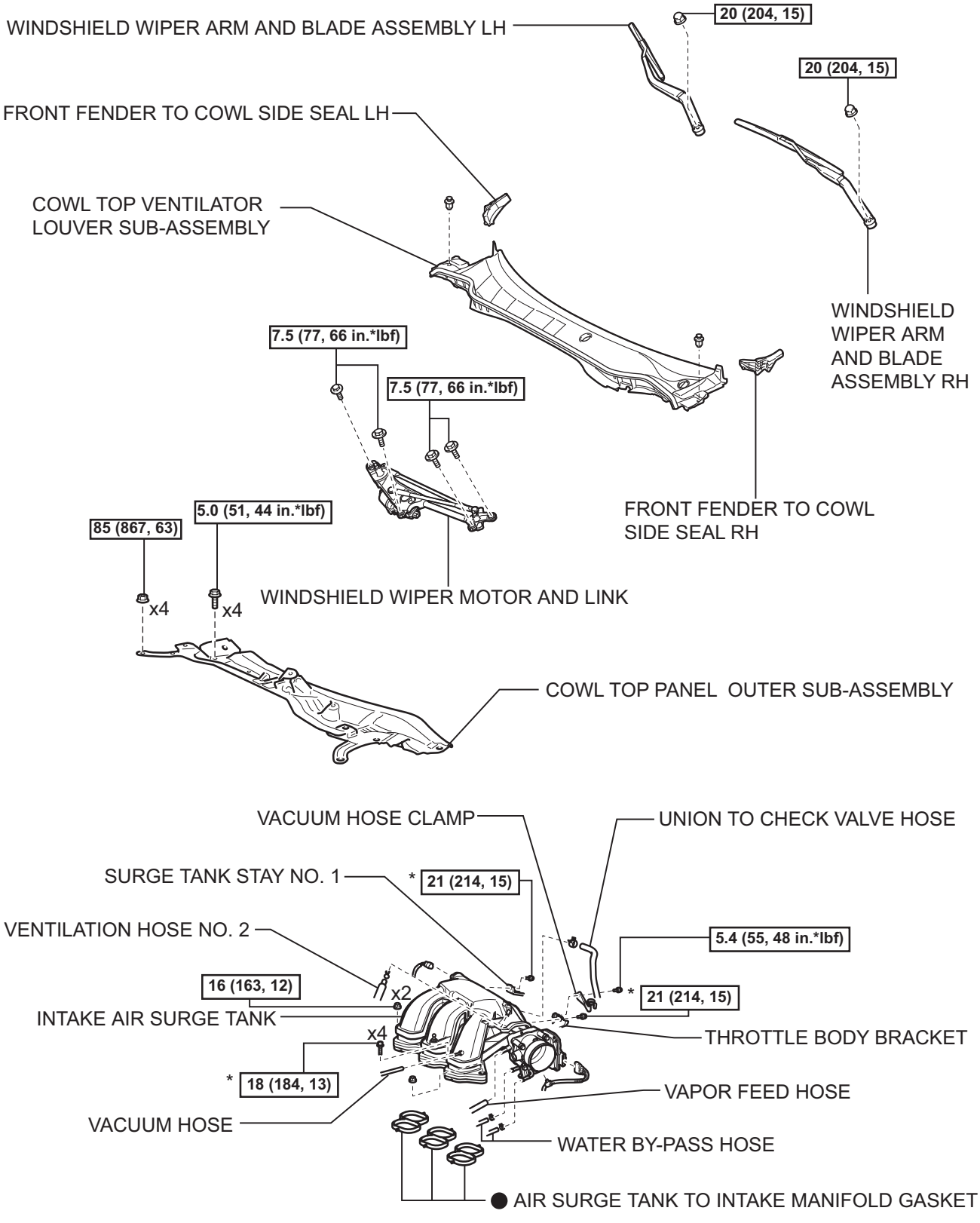
22. INSTALL ENGINE UNDER COVER LH

VVT SENSOR

COMPONENTS



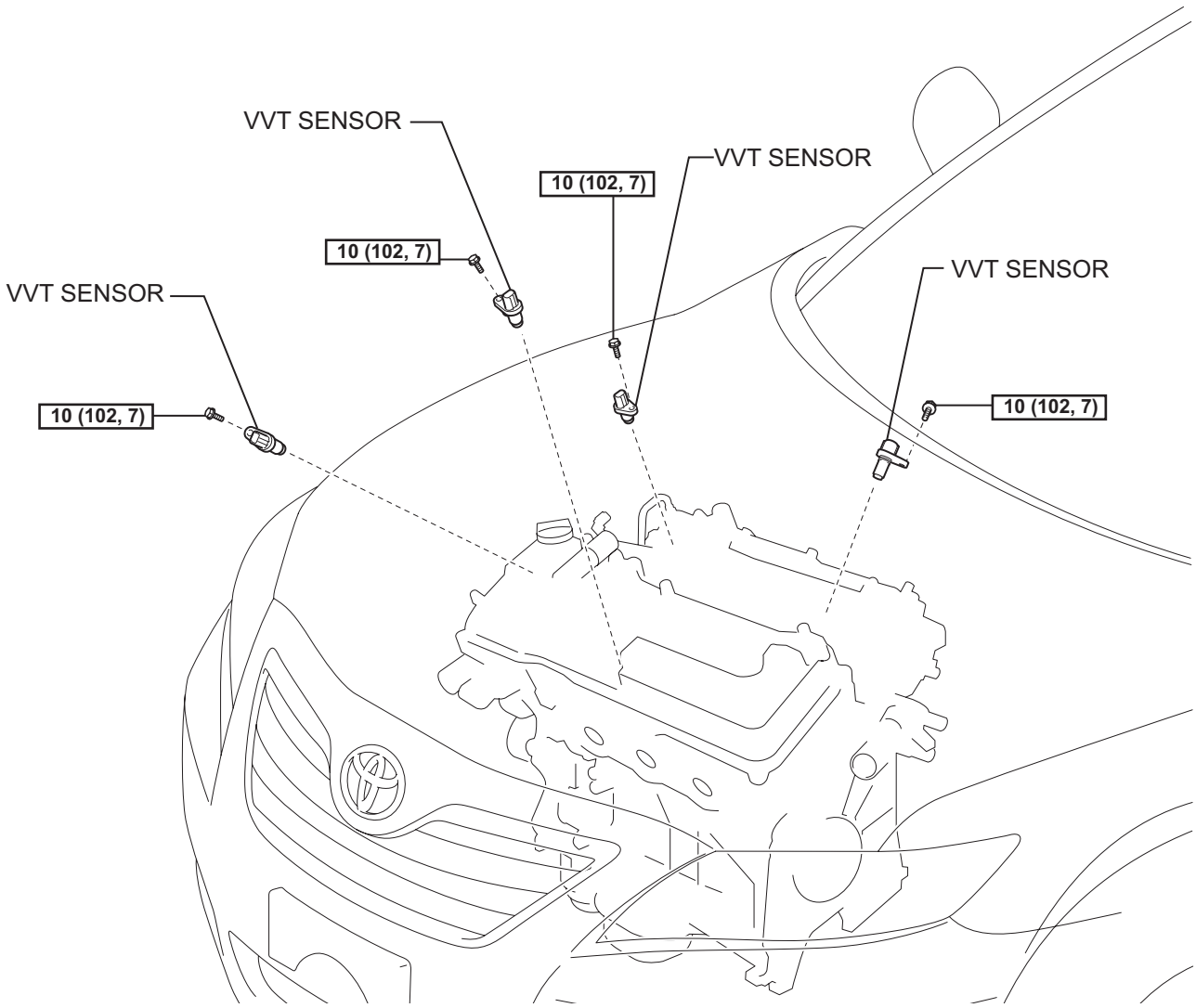
ES



N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part * DO NOT apply oil

T

A135104E01

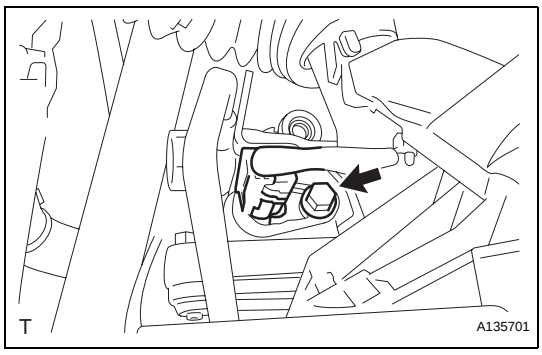

VVT SENSOR
VVT SENSOR
10 (102, 7)
10 (102, 7)
VVT SENSOR
VVT SENSOR
10 (102, 7)
10 (102, 7)
N*m (kgf*cm, ft.*lbf): Specified torque
T
A132949E01

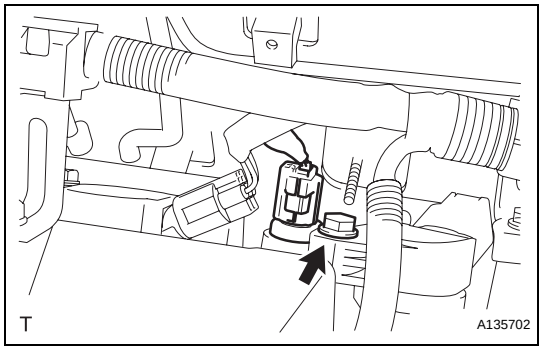
ES

ES

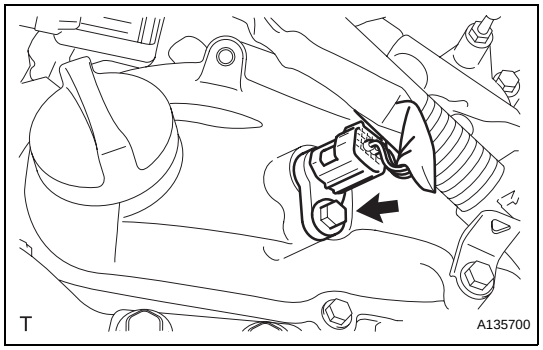
REMOVAL

1. **REMOVE ENGINE UNDER COVER LH**
2. **REMOVE ENGINE UNDER COVER RH**
3. **DRAIN ENGINE COOLANT (See page CO-5)**
4. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
5. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
6. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
8. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
9. **REMOVE WINDSHIELD WIPER MOTOR AND LINK (See page WW-10)**
10. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-481)**
11. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
12. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
13. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
14. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
15. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
16. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
17. **REMOVE INTAKE AIR SURGE TANK ASSEMBLY (See page FU-13)**
18. **REMOVE VVT SENSOR (for Bank 1 Intake Side)**
    (a) Disconnect the VVT sensor connector.
    (b) Remove the bolt and VVT sensor.

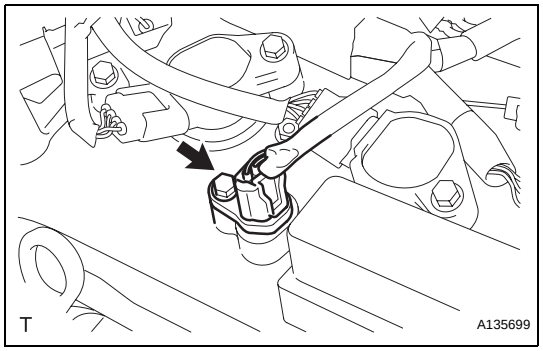




19. REMOVE VVT SENSOR (for Bank 1 Exhaust Side)
(a) Disconnect the VVT sensor connector.
(b) Remove the bolt and VVT sensor.

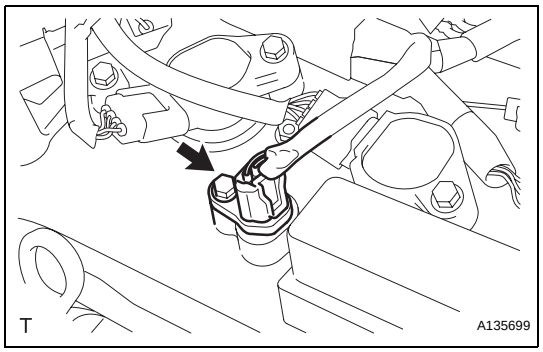


20. REMOVE VVT SENSOR (for Bank 2 Intake Side)
(a) Disconnect the VVT sensor connector.
(b) Remove the bolt and VVT sensor.

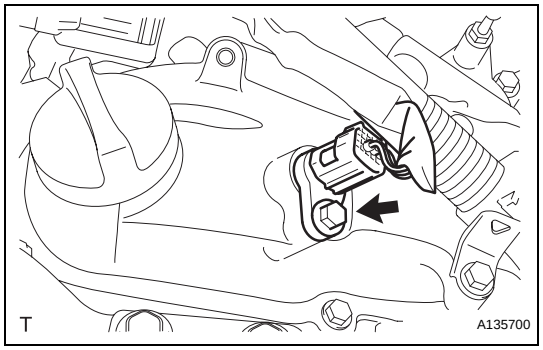


21. REMOVE VVT SENSOR (for Bank 2 Exhaust Side)
(a) Disconnect the VVT sensor connector.
(b) Remove the bolt and VVT sensor.

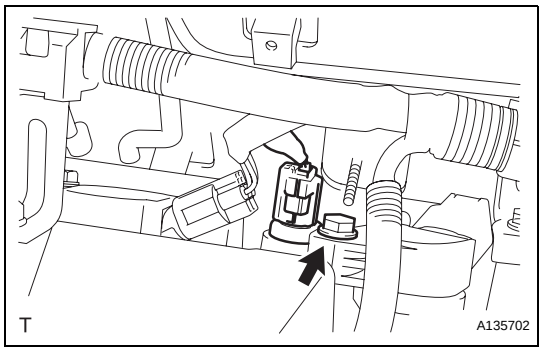
INSTALLATION



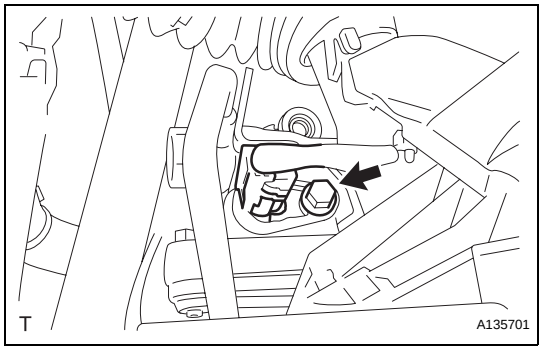
1. INSTALL VVT SENSOR (for Bank 2 Exhaust Side)
(a) Install the VVT sensor with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
(b) Connect the VVT sensor connector.



2. INSTALL VVT SENSOR (for Bank 2 Intake Side)
(a) Install the VVT sensor with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
(b) Connect the VVT sensor connector.



3. **INSTALL VVT SENSOR (for Bank 1 Exhaust Side)**
   (a) Install the VVT sensor with the bolt.
   Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
   (b) Connect the VVT sensor connector.



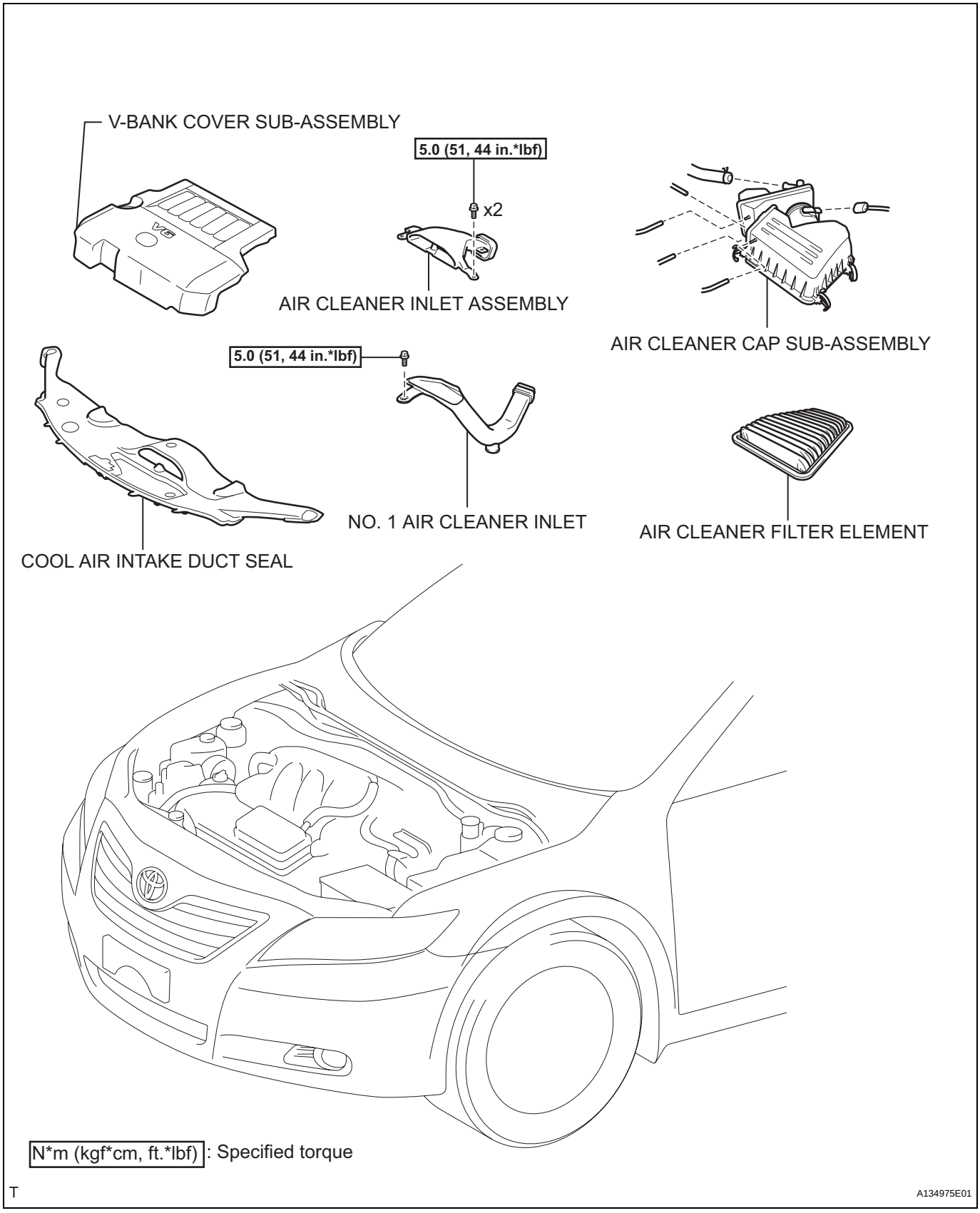
4. **INSTALL VVT SENSOR (for Bank 1 Intake Side)**
   (a) Install the VVT sensor with the bolt.
   Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
   (b) Connect the VVT sensor connector.
5. **INSTALL INTAKE AIR SURGE TANK ASSEMBLY (See page FU-18)**
6. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
7. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
8. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
9. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
10. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
11. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
12. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)**
13. **INSTALL WINDSHIELD WIPER MOTOR AND LINK (See page WW-14)**
14. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)**
15. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
16. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
17. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**
18. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**
19. **ADD ENGINE COOLANT (See page CO-6)**
20. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
21. **INSTALL ENGINE UNDER COVER RH**

ES

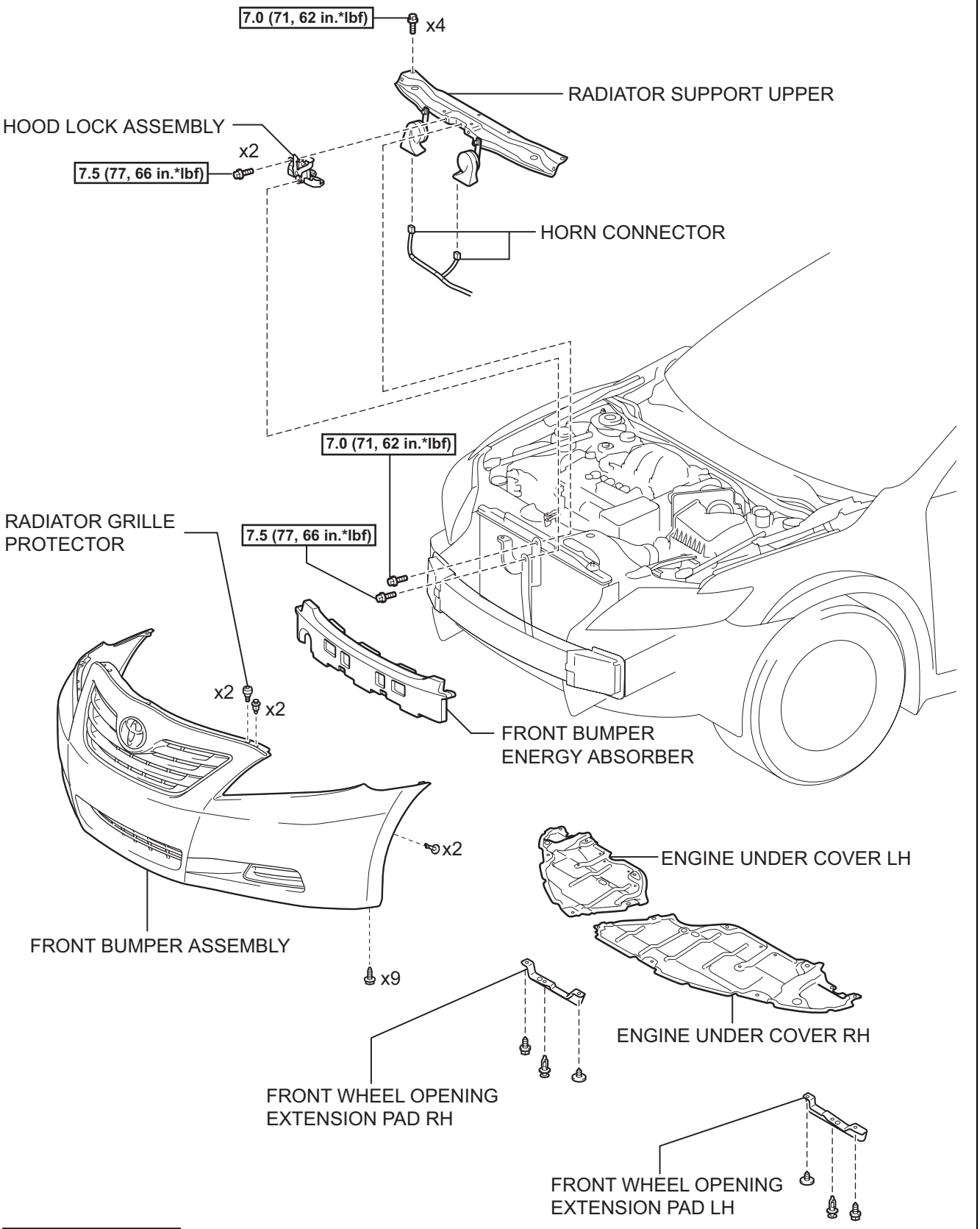
22. INSTALL ENGINE UNDER COVER LH

CRANKSHAFT POSITION SENSOR

COMPONENTS



ES



N*m (kgf*cm, ft.*lbf) : Specified torque

T

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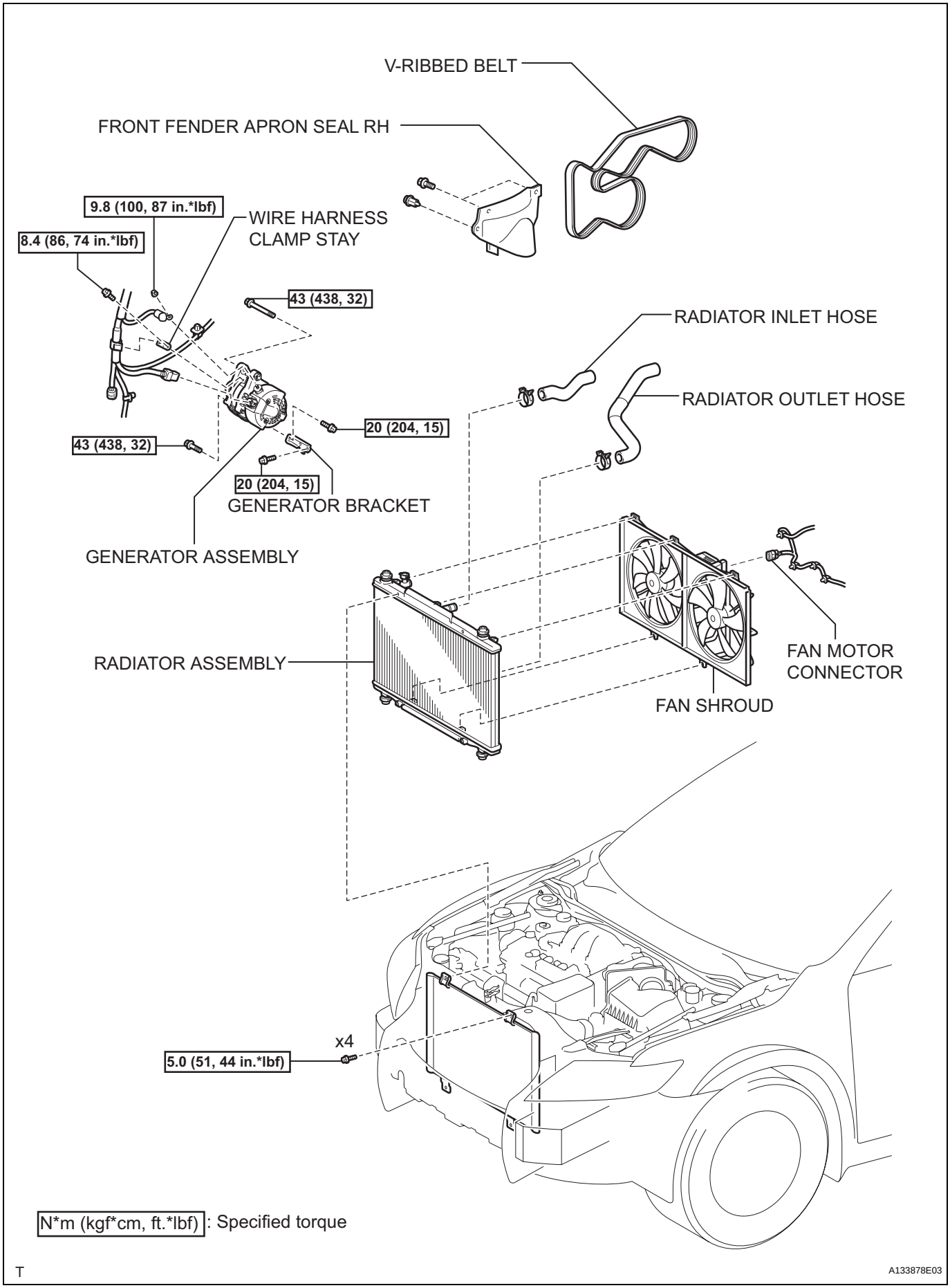
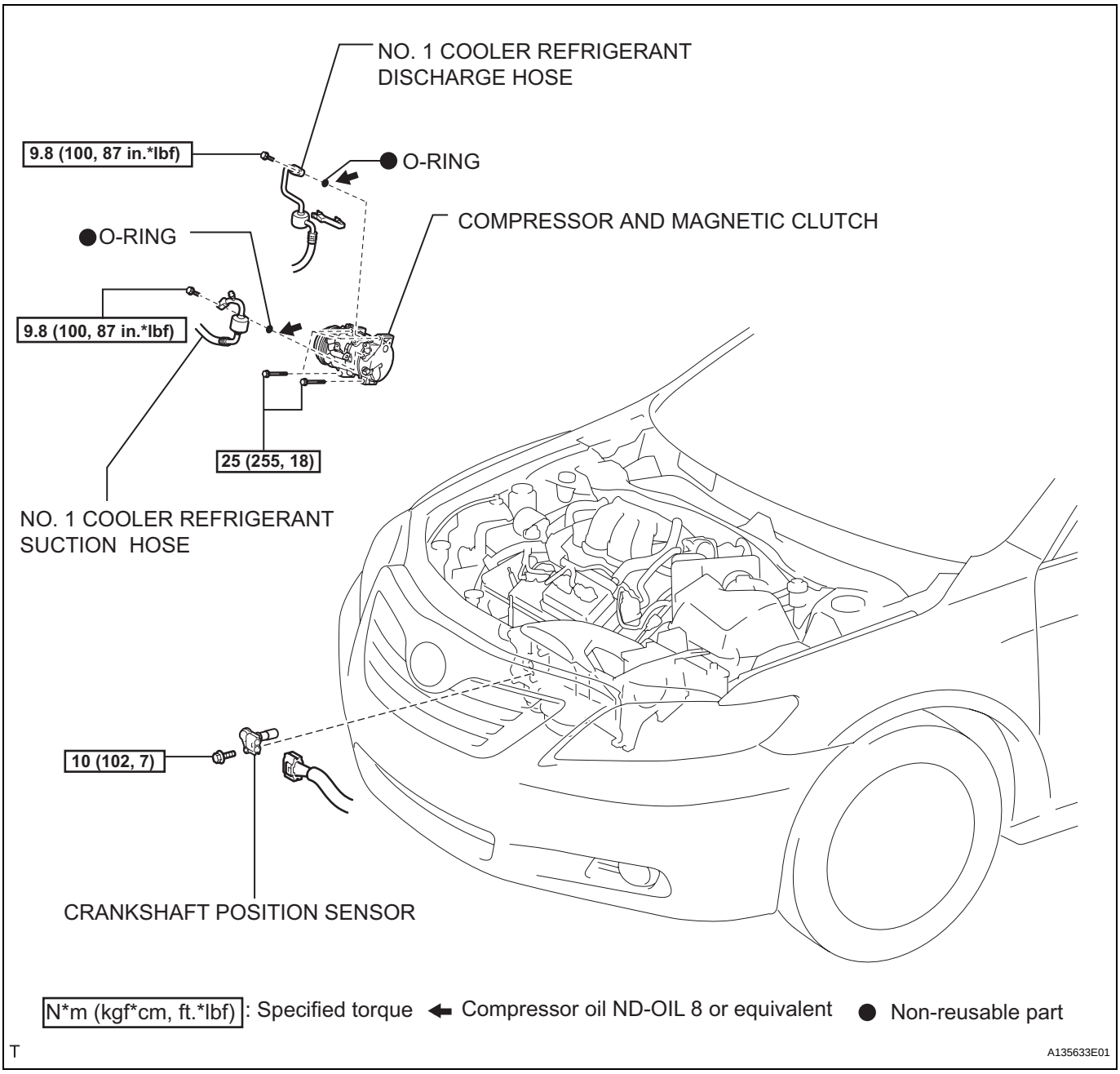
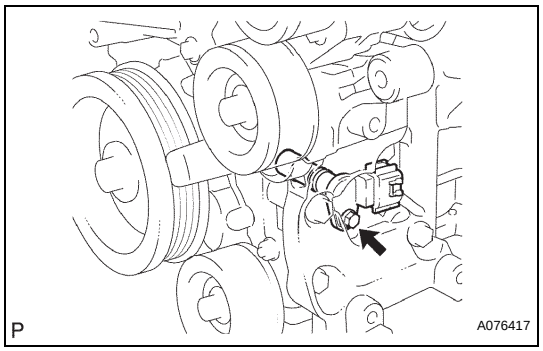

V-RIBBED BELT
FRONT FENDER APRON SEAL RH
9.8 (100, 87 in.*lbf)
WIRE HARNESS CLAMP STAY
8.4 (86, 74 in.*lbf)
43 (438, 32)
RADIATOR INLET HOSE
RADIATOR OUTLET HOSE
20 (204, 15)
43 (438, 32)
20 (204, 15)
GENERATOR BRACKET
GENERATOR ASSEMBLY
RADIATOR ASSEMBLY
FAN MOTOR CONNECTOR
FAN SHROUD
x4
5.0 (51, 44 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque
T
A133878E03

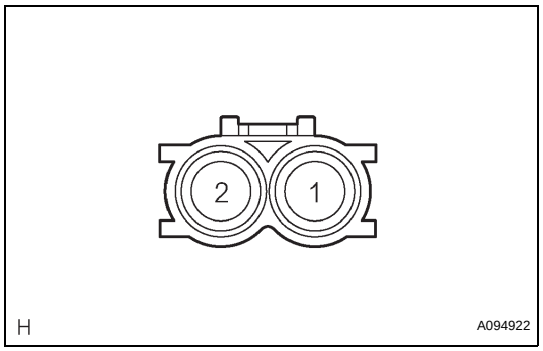

NO. 1 COOLER REFRIGERANT DISCHARGE HOSE
9.8 (100, 87 in.*lbf)
O-RING
O-RING
COMPRESSOR AND MAGNETIC CLUTCH
9.8 (100, 87 in.*lbf)
25 (255, 18)
NO. 1 COOLER REFRIGERANT SUCTION HOSE
10 (102, 7)
CRANKSHAFT POSITION SENSOR
N*m (kgf*cm, ft.*lbf): Specified torque
Compressor oil ND-OIL 8 or equivalent
Non-reusable part
T
A135633E01

ES

REMOVAL

1. **REMOVE GENERATOR ASSEMBLY**
   HINT:
   (See page CH-13)
2. **DISCONNECT COOLER COMPRESSOR ASSEMBLY**
   HINT:
   (See page AC-219)
3. **REMOVE CRANKSHAFT POSITION SENSOR**
   (a) Disconnect the crankshaft position sensor connector.
   (b) Remove the bolt and crankshaft position sensor.



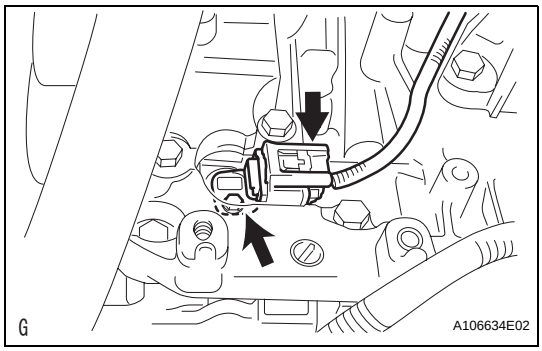


INSPECTION

1. **INSPECT CRANKSHAFT POSITION SENSOR**
   (a) Using an ohmmeter, measure the resistance between the terminals.
   Resistance:
   1,630 to 2,740 Ω at cold
   2,065 to 3,225 Ω at hot
   NOTICE:
   The terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10 to 50°C (14 to 122°F). "Hot" means approximately 50 to 100°C (122 to 212°F).
   If the resistance is not as specified, replace the sensor.

ES

INSTALLATION



1. INSTALL CRANKSHAFT POSITION SENSOR

(a) Apply a light coat of engine oil to the O-ring of the crankshaft position sensor.

(b) Install the crankshaft position sensor with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

(c) Connect the crankshaft position sensor connector.

2. INSTALL COOLER COMPRESSOR ASSEMBLY

HINT:
(See page AC-225)

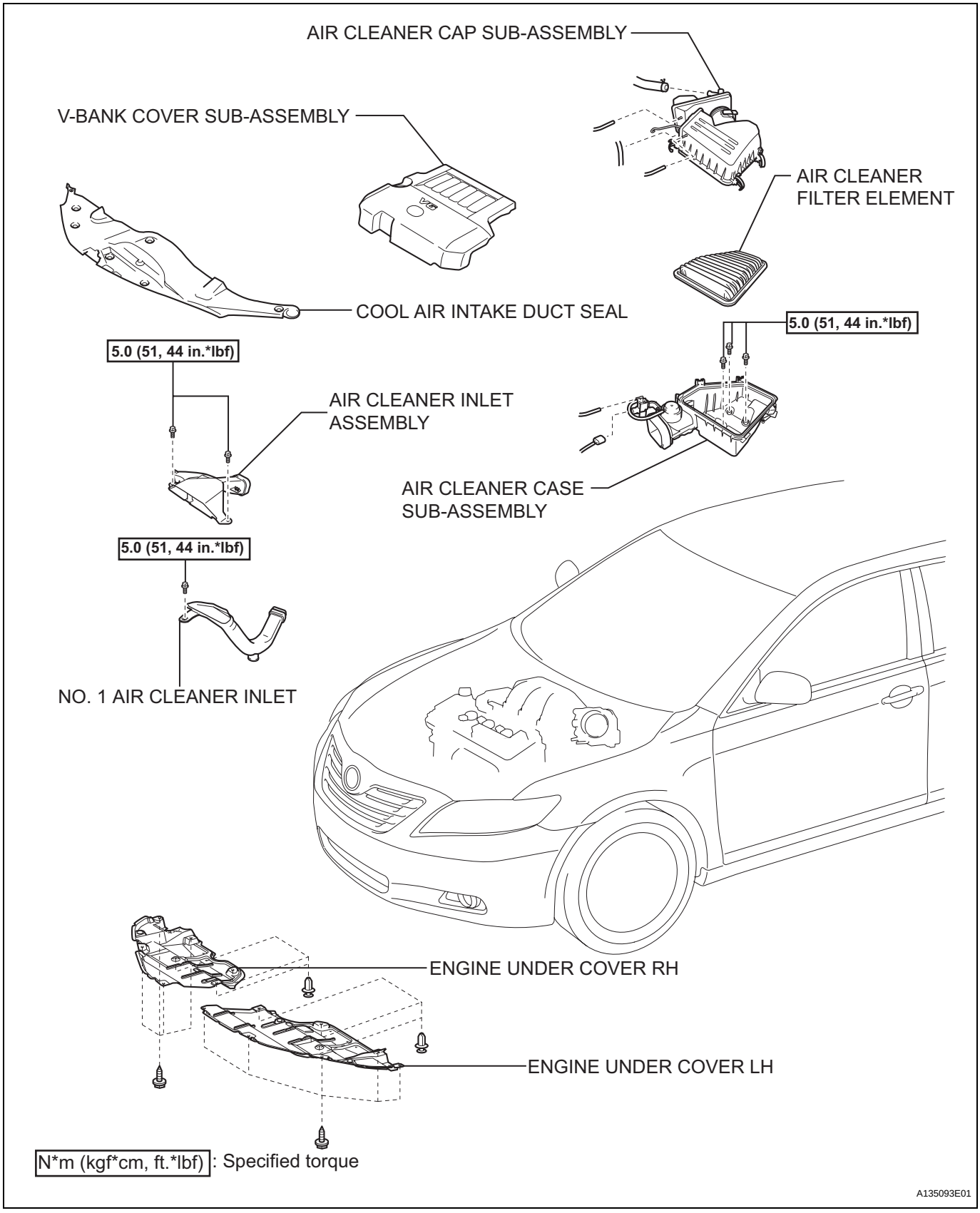
3. INSTALL GENERATOR ASSEMBLY

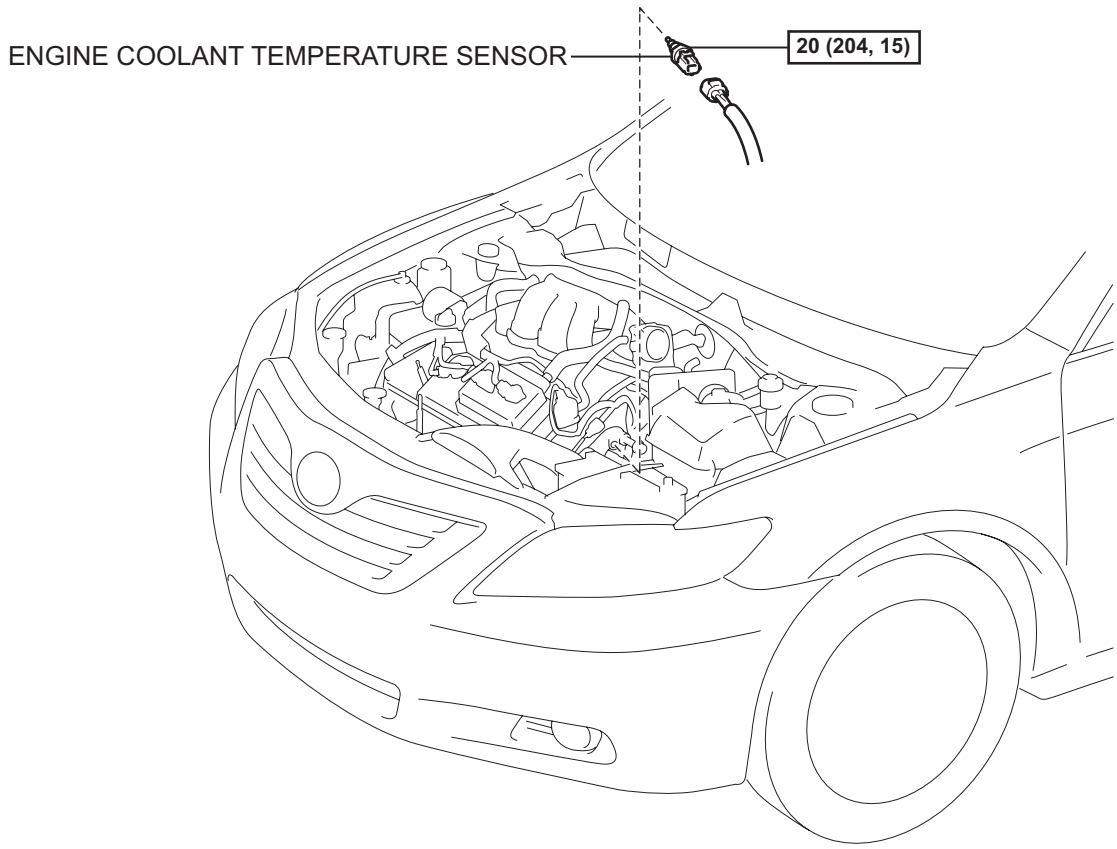
HINT:
(See page CH-22)

ES

ENGINE COOLANT TEMPERATURE SENSOR

COMPONENTS





N*m (kgf*cm, ft.*lbf): Specified torque

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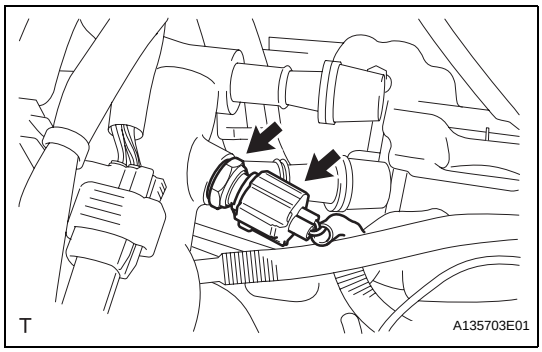
ES

REMOVAL

1. **REMOVE ENGINE UNDER COVER LH**
2. **REMOVE ENGINE UNDER COVER RH**
3. **DRAIN ENGINE COOLANT (See page CO-5)**
4. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
5. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
6. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
7. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
8. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
9. **REMOVE ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Remove the engine coolant temperature sensor connector.
   (b) Remove the engine coolant temperature sensor.



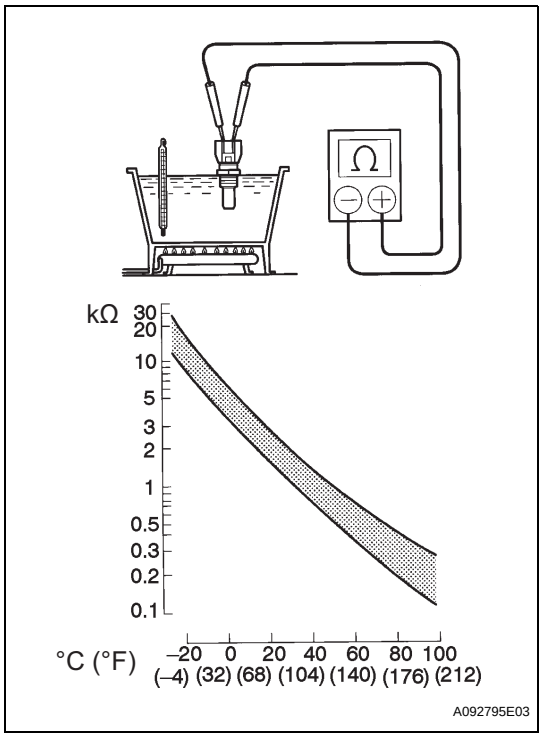
INSPECTION

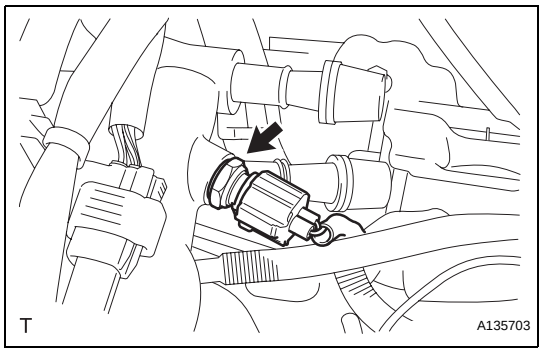
1. **INSPECT ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Measure the resistance between the terminals.
   Standard resistance

Condition	Specified Condition
Approx. 20°C (68°F)	2.32 to 2.59 kΩ
Approx. 80°C (176°F)	0.31 to 0.326 kΩ

If the result is not as specified, replace the sensor.

NOTICE:
If checking the ECT sensor in the water, keep the terminals dry. After checking, dry the sensor.



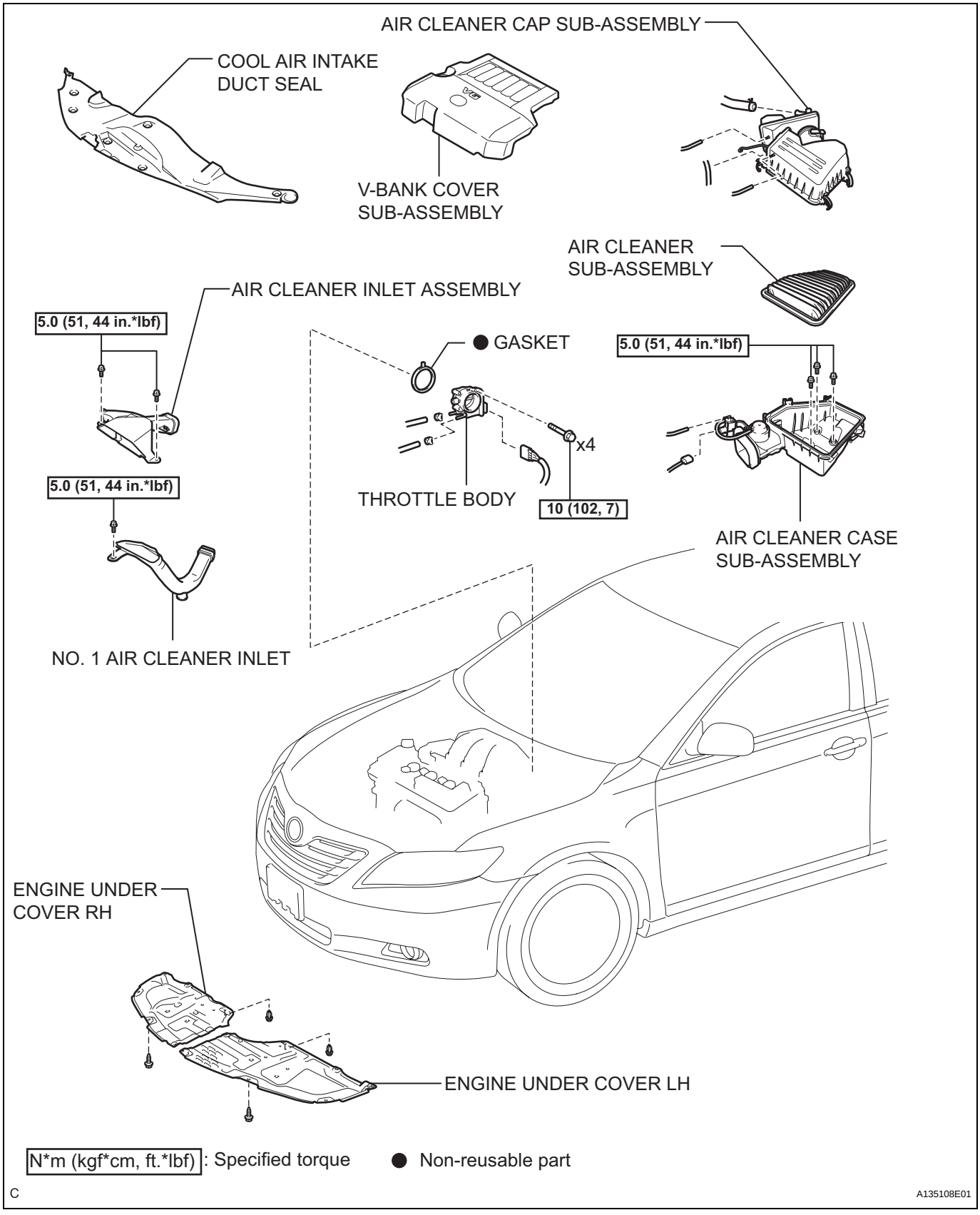


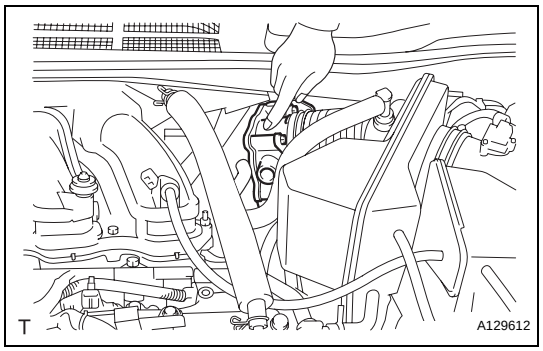
INSTALLATION

1. **INSTALL ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Install a new gasket to the engine coolant temperature sensor.
   (b) Install the engine coolant temperature sensor.
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
   (c) Connect the engine coolant temperature sensor connector.
2. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
5. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
6. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
7. **ADD ENGINE COOLANT (See page CO-6)**
8. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
9. **INSTALL ENGINE UNDER COVER RH**
10. **INSTALL ENGINE UNDER COVER LH**

THROTTLE BODY

COMPONENTS





ON-VEHICLE INSPECTION

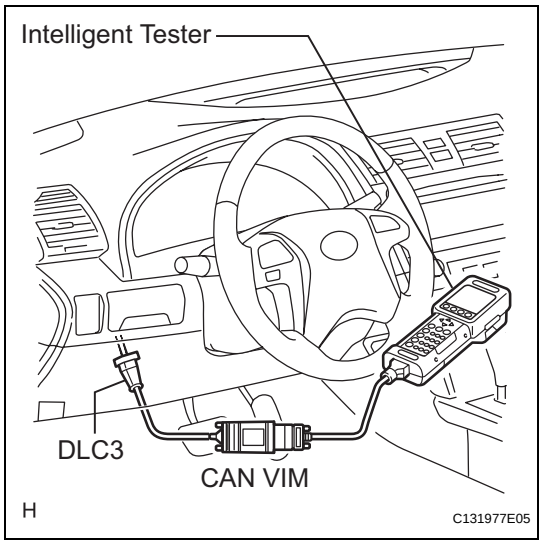
1. INSPECTION THROTTLE BODY

(a) Inspect the throttle control motor for operating sounds.

(1) Turn the ignition switch on (IG).

(2) When turning the accelerator pedal position sensor lever, check for running sounds of the motor. The motor should be running smoothly without friction sounds.

If operation is not as specified, check the throttle control motor, wiring and ECM (See page ES-505).



(b) Inspect the throttle position sensor.

(1) Connect the intelligent tester (with CAN VIM) to the DLC3.

(2) Turn the ignition switch on (IG).

(3) Check that the MIL is off.

(4) Check that, under the CURRENT DATA, THROTTLE POS (throttle valve opening percentage) is within the standard range below.

Standard throttle valve opening percentage:
60 % or more

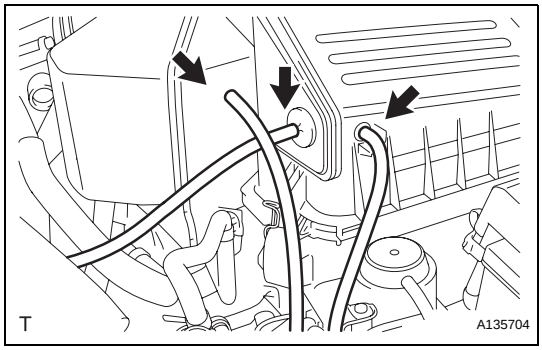
If operation is not as specified, check the throttle position sensor, wiring and ECM (See page ES-505).

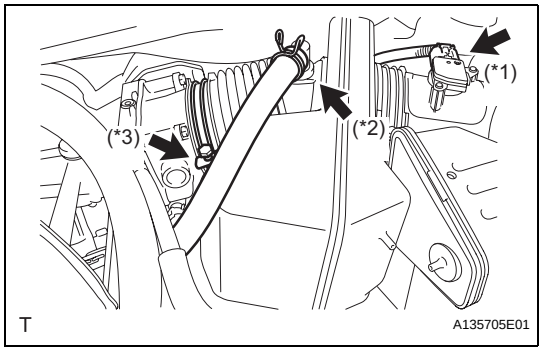
ES

ES

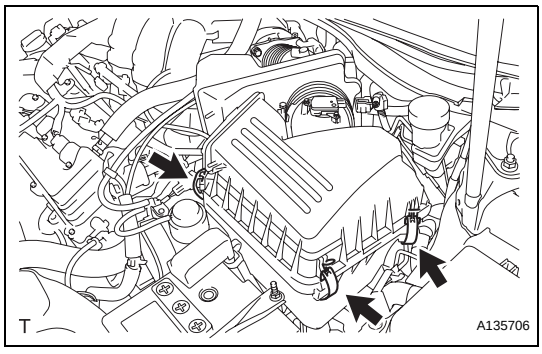
REMOVAL

1. **REMOVE ENGINE UNDER COVER LH**
2. **REMOVE ENGINE UNDER COVER RH**
3. **DRAIN ENGINE COOLANT (See page CO-5)**
4. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
5. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
6. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
7. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY**
   (a) Disconnect the 3 vacuum hoses.

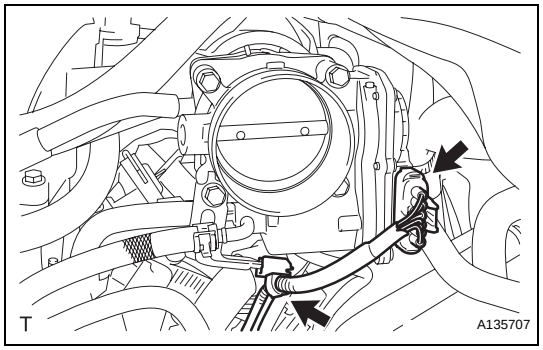




   (b) Disconnect the mass air flow meter connector (*1).
   (c) Disconnect the No. 2 ventilation hose (*2).
   (d) Disconnect the hose band (*3).

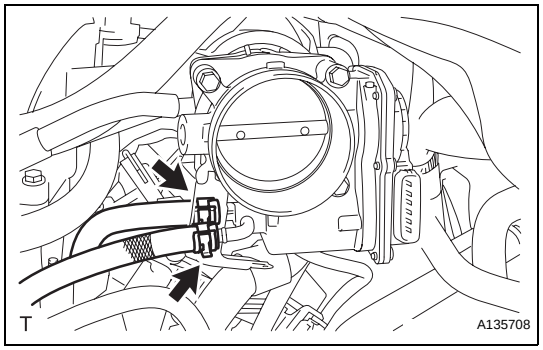


   (e) Disconnect the 3 bands, and remove the air cleaner cap sub-assembly.
8. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
9. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**

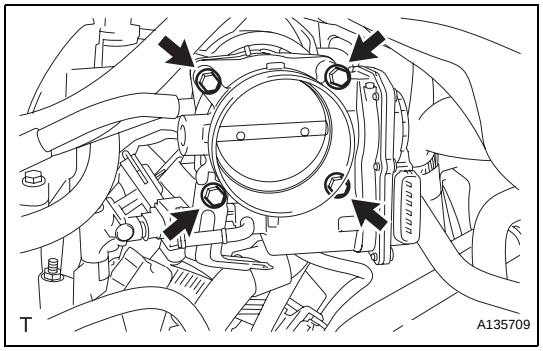


10. REMOVE THROTTLE BODY

(a) Disconnect the throttle body connector and clamp.

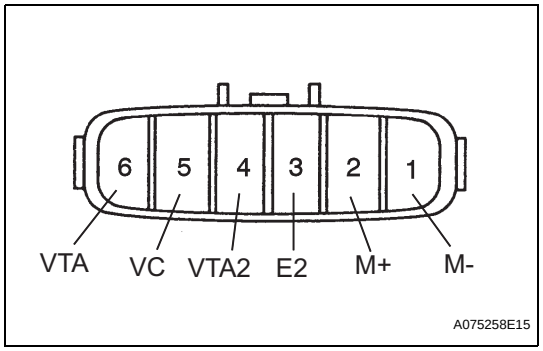


(b) Disconnect the 2 water by-pass hoses from the throttle body.



(c) Remove the 4 bolts and throttle body.

(d) Remove the throttle body gasket from the intake air surge tank.



INSPECTION

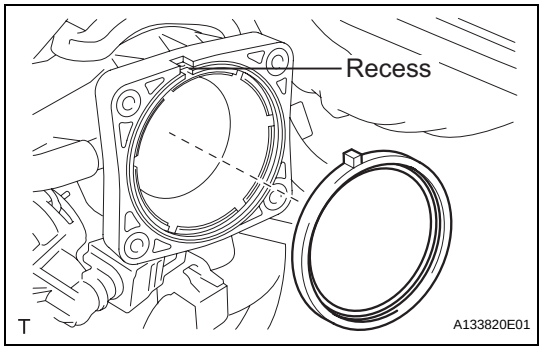
1. INSPECT THROTTLE BODY

(a) Measure the resistance between the terminals.

Standard resistance

Tester Connection	Condition	Specified Condition
2 (M+) - 1 (M-)	20°C (68°F)	0.3 to 100 Ω
5 (VC) - 3 (E2)	20°C (68°F)	1.2 to 3.2 kΩ

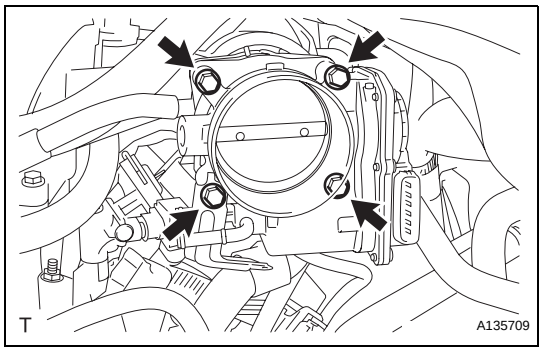
If the result is not as specified, replace the throttle body assembly.



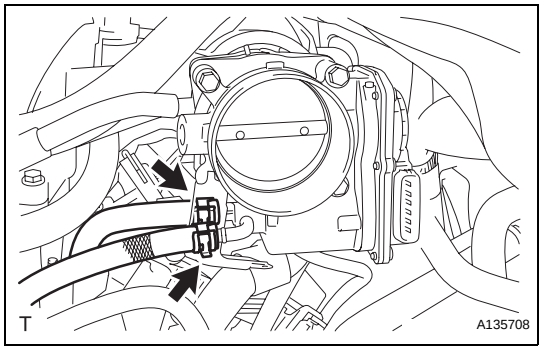
INSTALLATION

1. INSTALL THROTTLE BODY

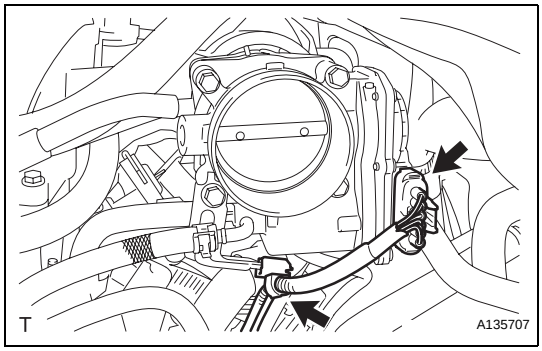
(a) Install a new throttle body gasket to the intake air surge tank.



(b) Install the throttle body with the 4 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



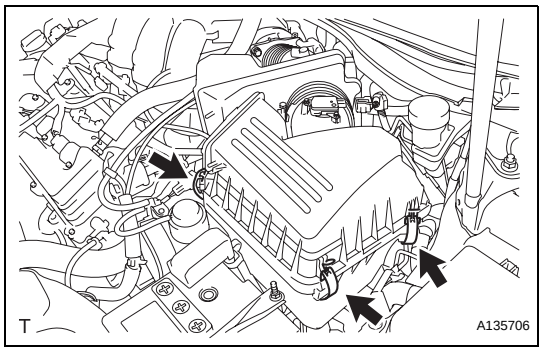
(c) Connect the 2 water by-pass hoses.



(d) Connect the throttle body connector and clamp.

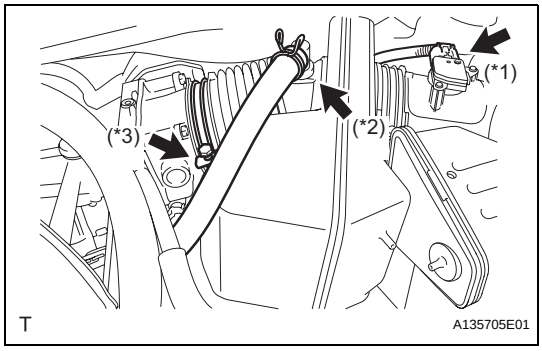
2. INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)

3. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)



4. INSTALL AIR CLEANER CAP SUB-ASSEMBLY

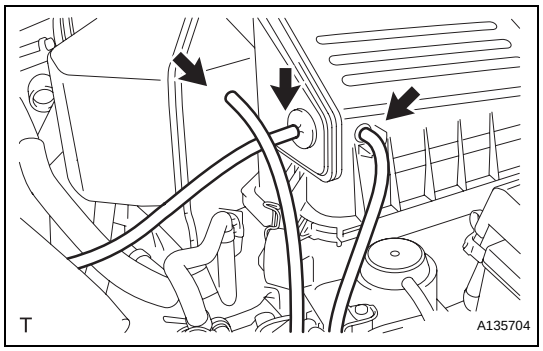
(a) Install the air cleaner cap sub-assembly, and connect the 3 bands.



(b) Connect the mass air flow meter connector (*1).

(c) Connect the No. 2 ventilation hose (*2).

(d) Connect the hose band (*3).

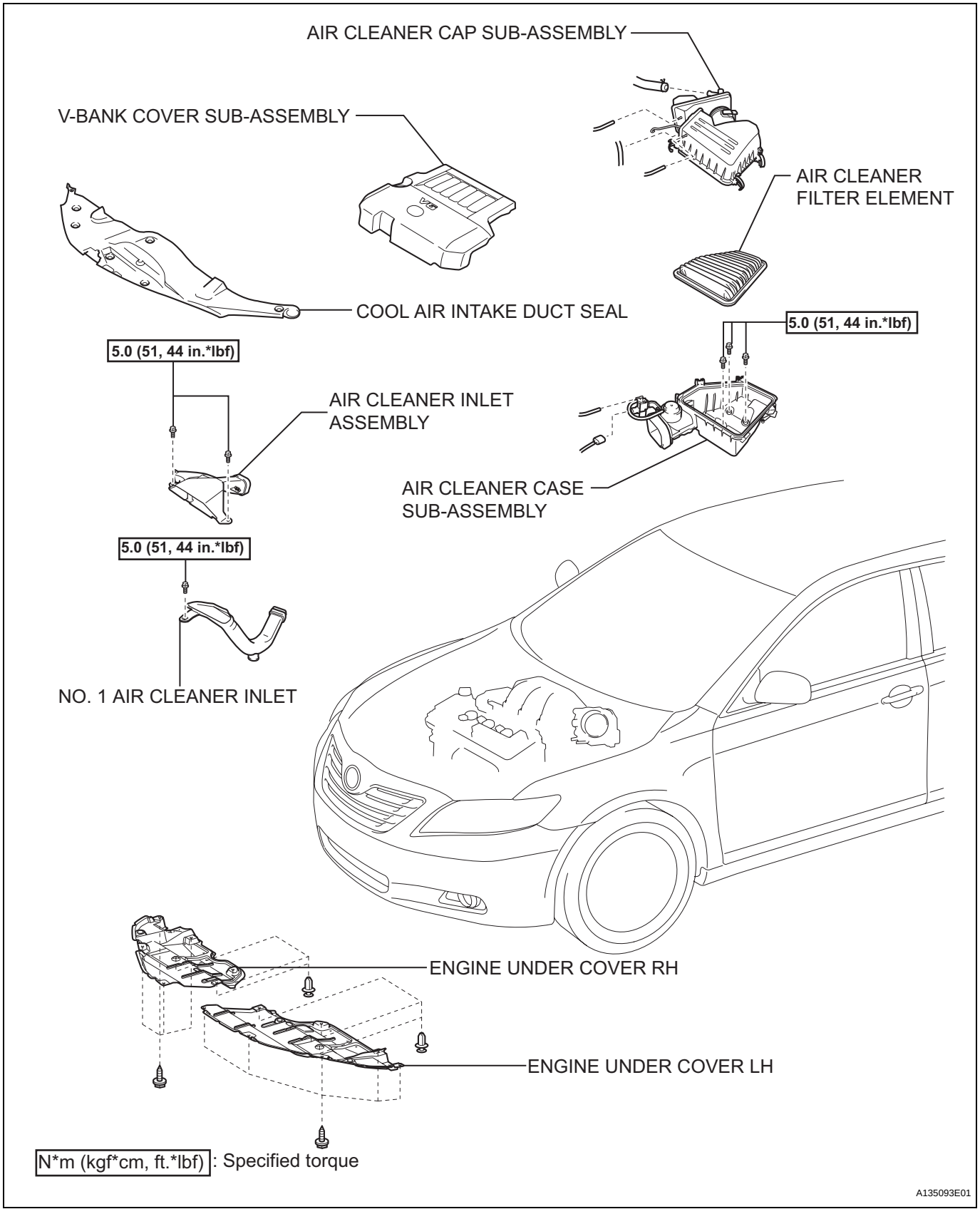


(e) Connect the 3 vacuum hoses.

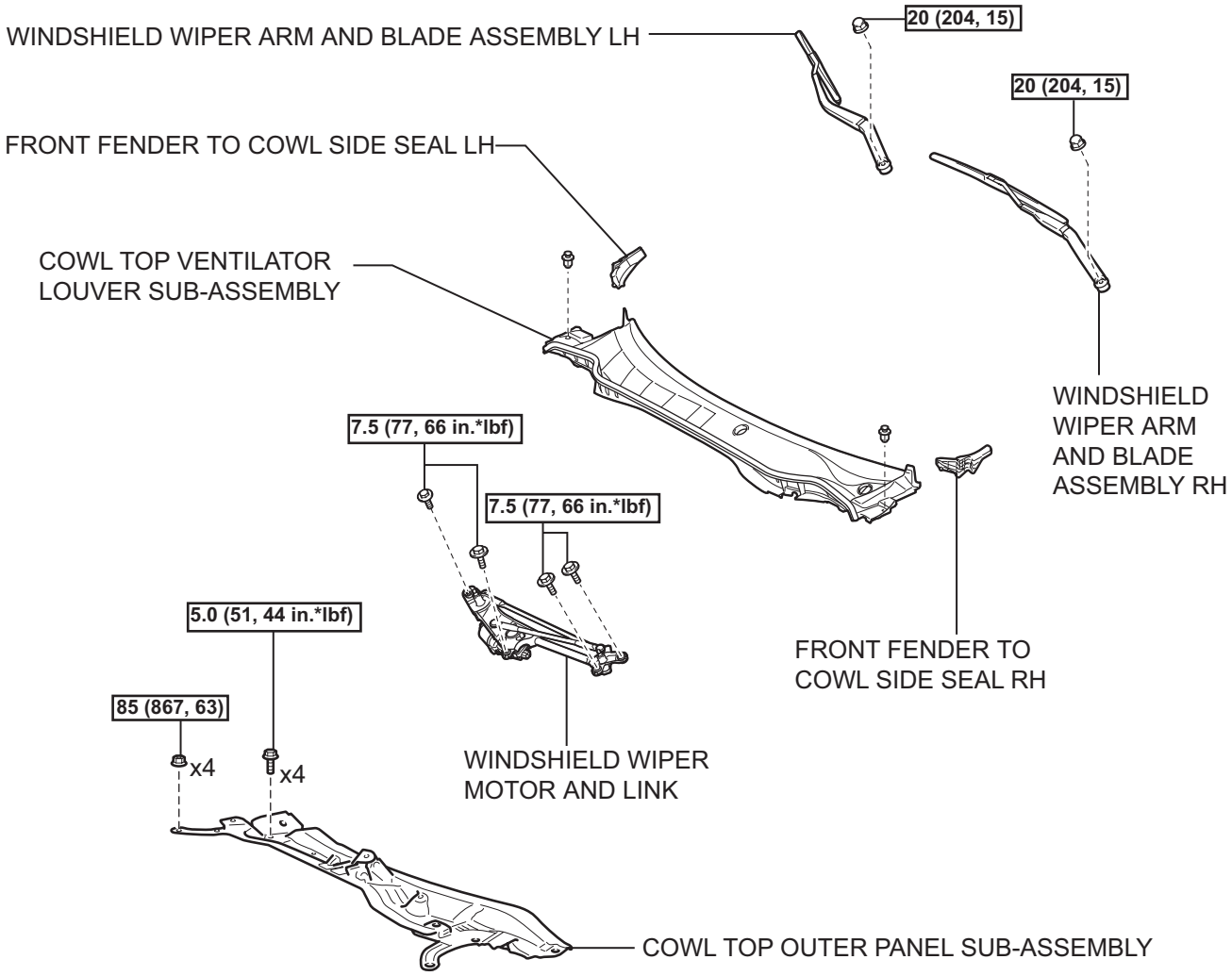
5. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
6. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
7. **ADD ENGINE COOLANT (See page CO-6)**
8. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
9. **CHECK FUNCTION OF THROTTLE BODY (See page ES-503)**
10. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**

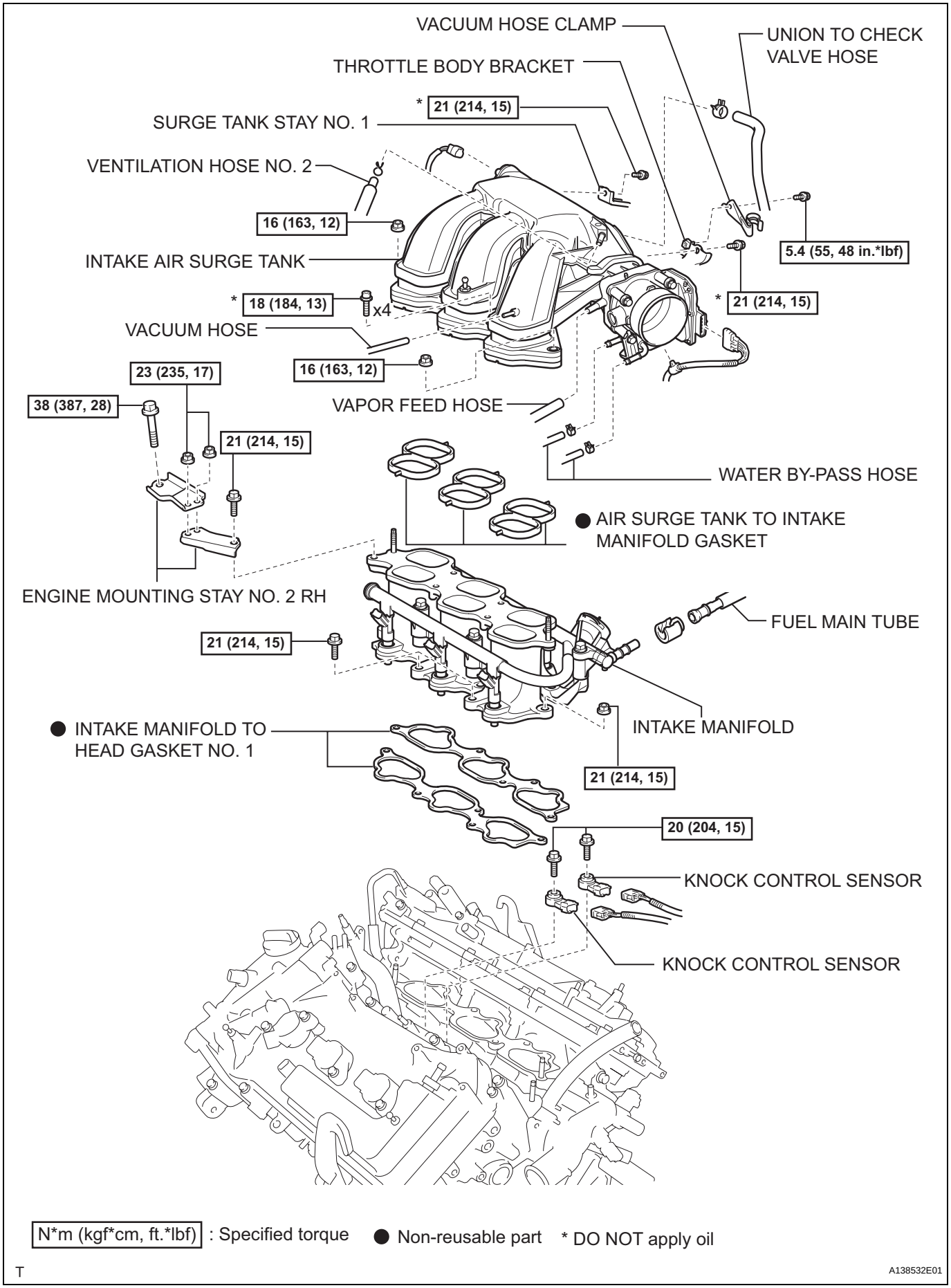
KNOCK SENSOR

COMPONENTS



ES


WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH
20 (204, 15)
20 (204, 15)
FRONT FENDER TO COWL SIDE SEAL LH
COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY
WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH
7.5 (77, 66 in.*lbf)
7.5 (77, 66 in.*lbf)
5.0 (51, 44 in.*lbf)
85 (867, 63)
x4
x4
FRONT FENDER TO COWL SIDE SEAL RH
WINDSHIELD WIPER MOTOR AND LINK
COWL TOP OUTER PANEL SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
A135105E01



N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part * DO NOT apply oil

T

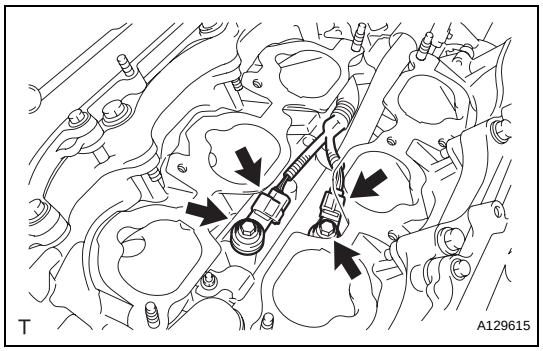
A138532E01

ES

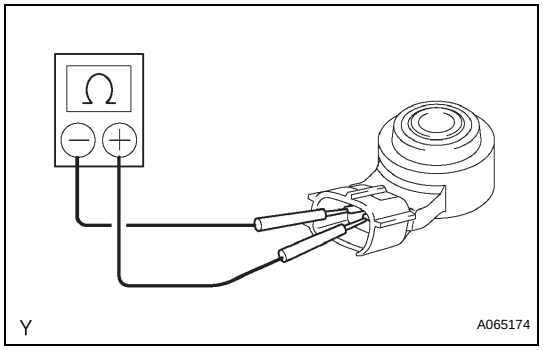
ES

REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE (See page FU-13)
2. REMOVE ENGINE UNDER COVER LH
3. REMOVE ENGINE UNDER COVER RH
4. DRAIN ENGINE COOLANT (See page CO-5)
5. REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)
6. REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)
7. REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)
8. REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)
9. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)
10. REMOVE WINDSHIELD WIPER MOTOR AND LINK (See page WW-10)
11. REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-481)
12. REMOVE COOL AIR INTAKE DUCT SEAL (See page ES-481)
13. REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)
14. REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)
15. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)
16. REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)
17. REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)
18. REMOVE INTAKE AIR SURGE TANK (See page FU-13)
19. SEPARATE FUEL TUBE SUB-ASSEMBLY (See page EM-28)
20. REMOVE INTAKE MANIFOLD (See page EM-32)

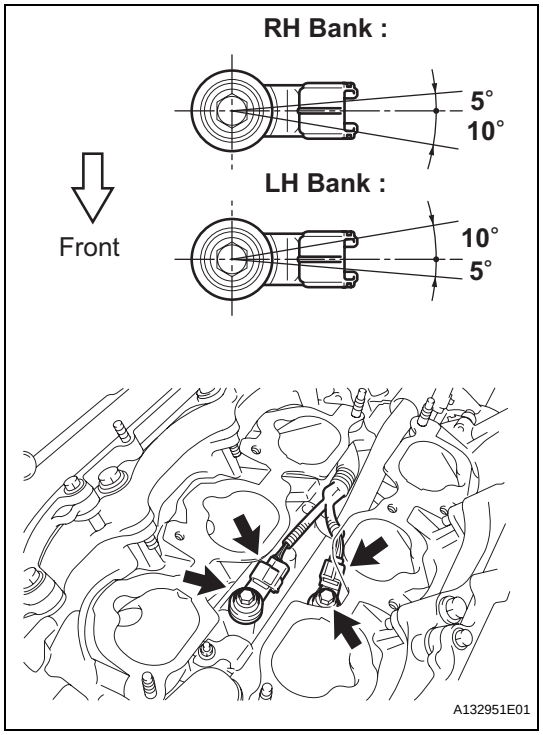


21. **REMOVE KNOCK CONTROL SENSOR**
    (a) Disconnect the 2 knock control sensor connectors.
    (b) Remove the 2 bolts and 2 knock control sensors.



INSPECTION

1. **INSPECT KNOCK CONTROL SENSOR**
    (a) Using an ohmmeter, measure the resistance between the terminals.
    Standard resistance:
    120 to 280 kΩ at 20°C (68°F)
    If the result is not as specified, replace the sensor.

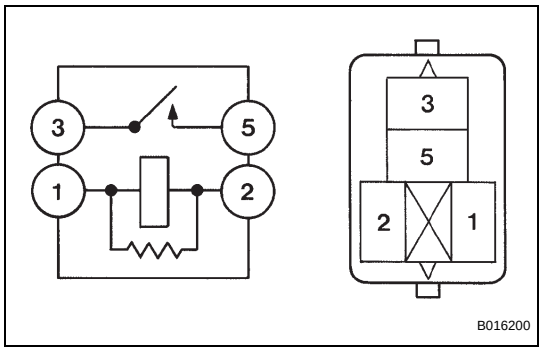


INSTALLATION

1. **INSTALL KNOCK CONTROL SENSOR**
    (a) Install the 2 knock control sensors with the 2 bolts as shown in the illustration.
    Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
    (b) Connect the 2 knock control sensor connectors.
2. **INSTALL INTAKE MANIFOLD (See page EM-41)**
3. **CONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-46)**
4. **INSTALL INTAKE AIR SURGE TANK (See page FU-18)**
5. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
6. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
7. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
8. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
9. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
10. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
11. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)**
12. **INSTALL WINDSHIELD WIPER MOTOR AND LINK (See page WW-14)**

ES

13. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)**
14. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
15. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
16. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**
17. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**
18. **ADD ENGINE COOLANT (See page CO-6)**
19. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
20. **CHECK FOR FUEL LEAKS (See page FU-8)**
21. **INSTALL ENGINE UNDER COVER RH**
22. **INSTALL ENGINE UNDER COVER LH**



IG2 RELAY

INSPECTION

1. INSPECT IG2 RELAY

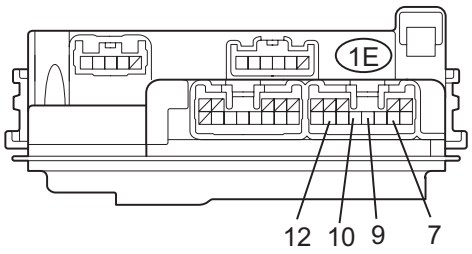
(a) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Battery voltage applied between terminals 1 and 2)

If the result is not as specified, replace the relay.

Engine Room R/B Unit D:



A137364E01

EFI RELAY

INSPECTION

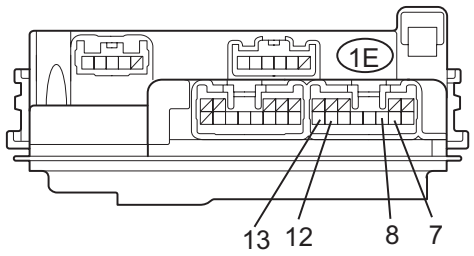
1. INSPECT EFI RELAY

(a) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Specified Condition
1E-9 - 1E-10	Below 1 Ω
1E-7 - 1E-12	10 kΩ or higher
1E-7 - 1E-12	Below 1 Ω (Battery voltage applied between terminals 1E-9 and 1E-10)

Engine Room R/B Unit D:



A137364E02

CIRCUIT OPENING RELAY

INSPECTION

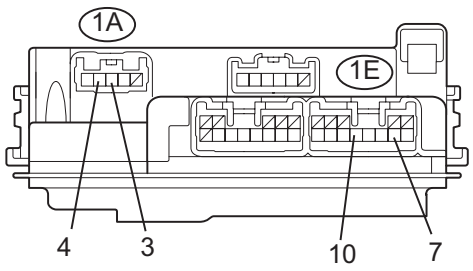
1. INSPECT CIRCUIT OPENING RELAY

(a) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Specified Condition
1E-8 - 1E-12	Below 1 Ω
1E-7 - 1E-13	10 kΩ or higher
1E-7 - 1E-13	Below 1 Ω (Battery voltage applied between terminals 1E-8 and 1E-12)

Engine Room R/B Unit D:



A137364E03

AIR FUEL RATIO SENSOR RELAY

INSPECTION

1. INSPECT AIR FUEL RATIO SENSOR RELAY

(a) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

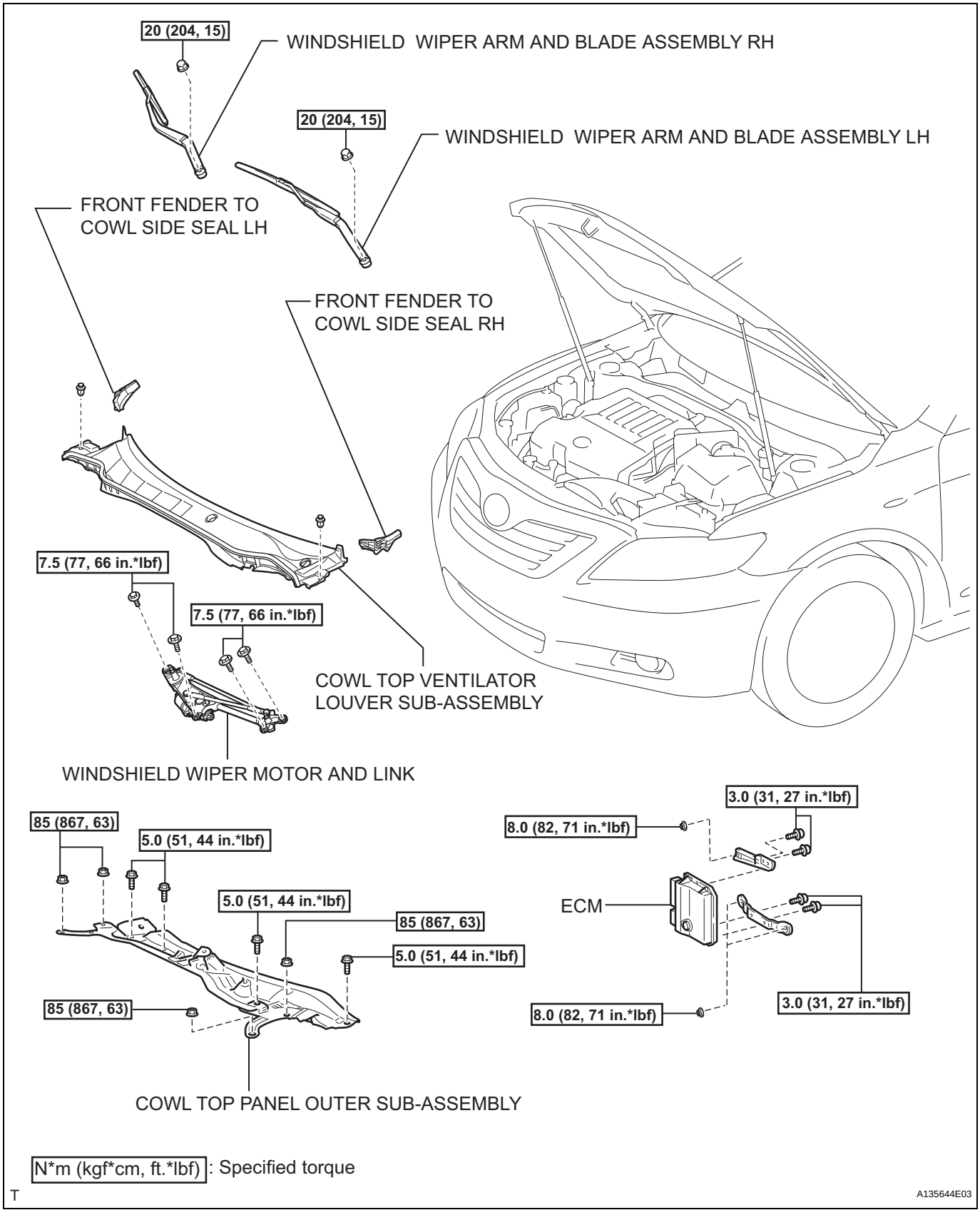
Standard resistance

Tester connection	Specified Condition
1E-7 - 1E-10	Below 1 Ω
1A-3 - 1A-4	10 kΩ or higher
1A-3 - 1A-4	Below 1 Ω (Battery voltage applied between terminals 1E-7 and 1E-10)

ES

ECM

COMPONENTS

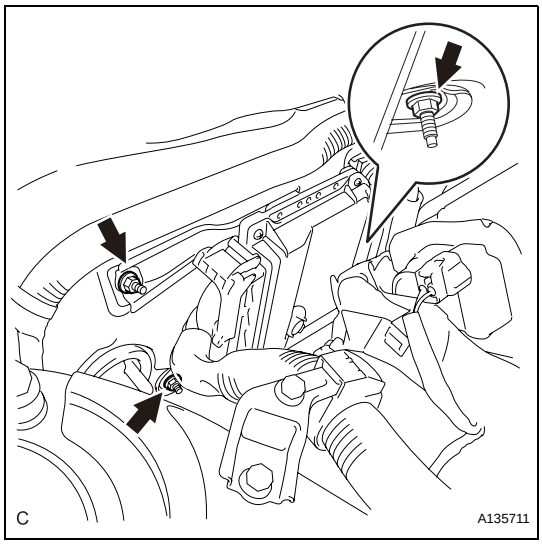


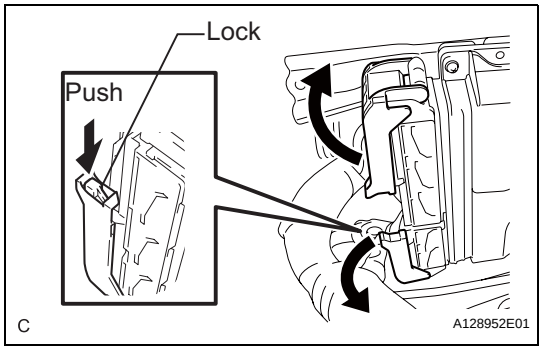
ES

REMOVAL

1. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
2. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
3. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
4. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
5. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
6. **REMOVE WINDSHIELD WIPER MOTOR AND LINK (See page WW-10)**
7. **REMOVE COWL TOP OUTER PANEL SUB-ASSEMBLY (See page ES-481)**
8. **REMOVE ECM**

(a) Remove the 3 nuts.



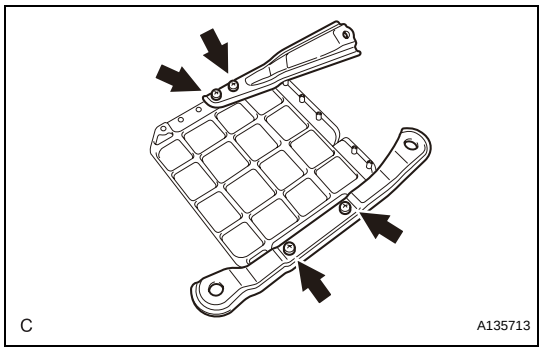


(b) Disconnect the 2 ECM connectors and remove the ECM.

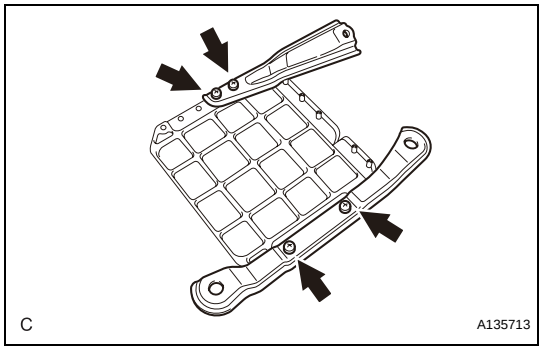
(1) Raise the 2 levers while pushing the locks on the 2 levers, and disconnect the 2 ECM connectors.

NOTICE:
After disconnecting the connector, make sure that dirt, water and other foreign matter do not contact the connecting part of the connector.

(2) Remove the ECM.



(c) Remove the 4 screws and 2 ECM brackets.



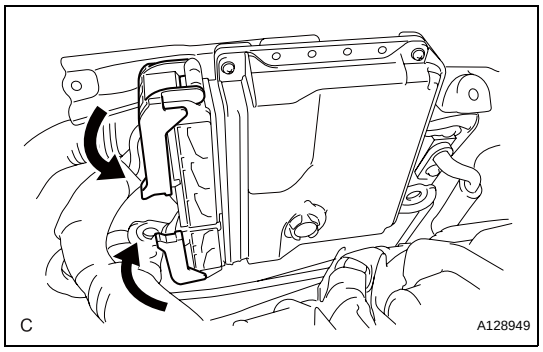
INSTALLATION

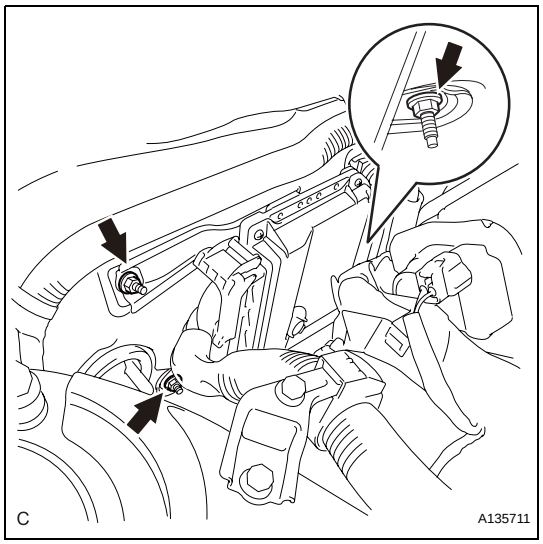
1. INSTALL ECM

(a) Install the ECM bracket with the 4 screws.
Torque: 3.0 N*m (31 kgf*cm, 27 in.*lbf)

(b) Connect the 2 ECM connectors.
NOTICE:
When connecting the connector, make sure that dirt, water and other foreign matter do not become stuck between the connector and other parts.

(1) Connect the 2 ECM connectors and lower the 2 levers.
NOTICE:
Make sure that the 2 levers are securely lowered.





(c) Install the ECM with the 3 nuts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

2. INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)

3. INSTALL WINDSHIELD WIPER MOTOR AND LINK (See page WW-14)

4. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)

5. INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)

6. INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)

7. INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)

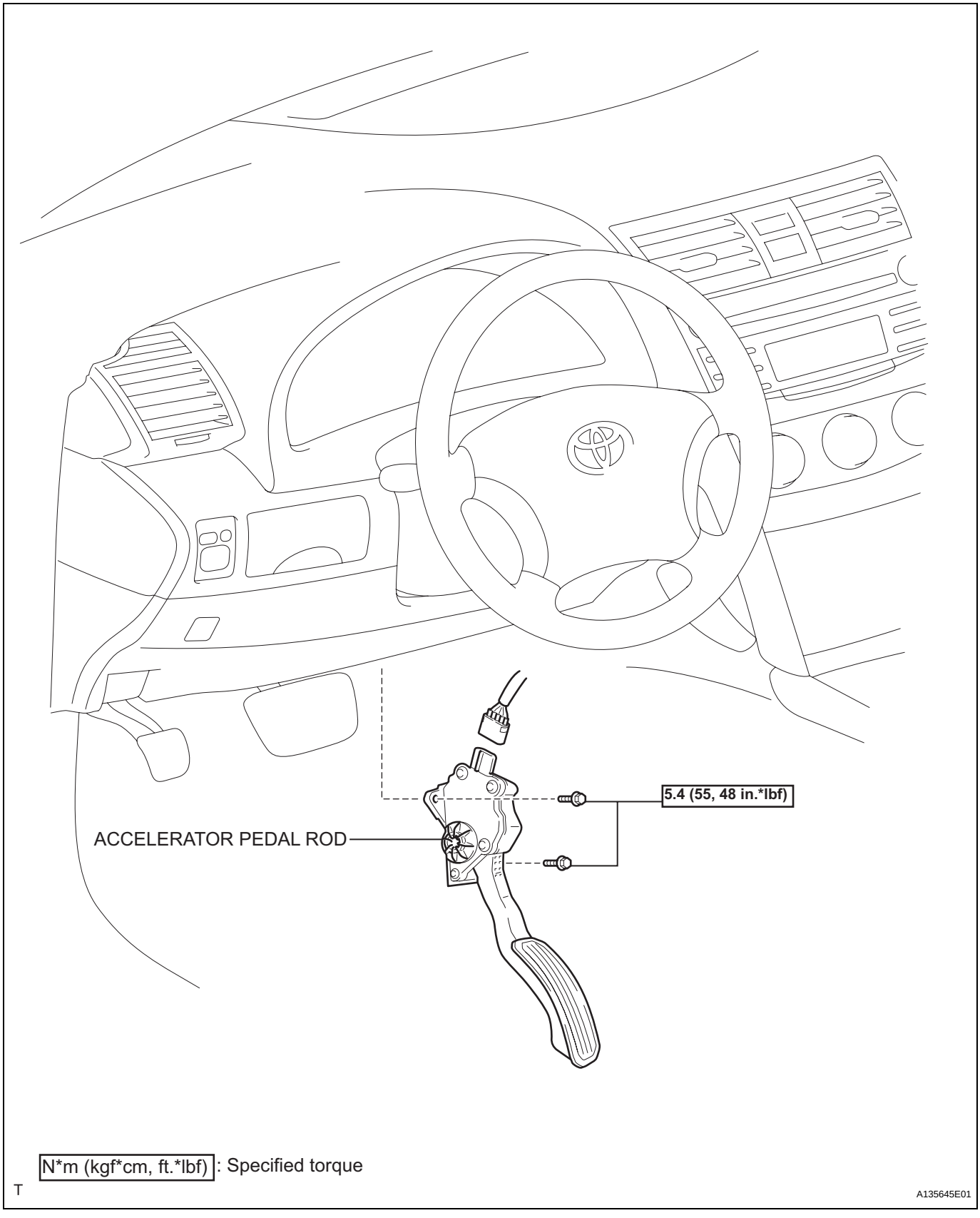
8. INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)

9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)

ACCELERATOR PEDAL

COMPONENTS

ES



N*m (kgf*cm, ft.*lbf): Specified torque

T

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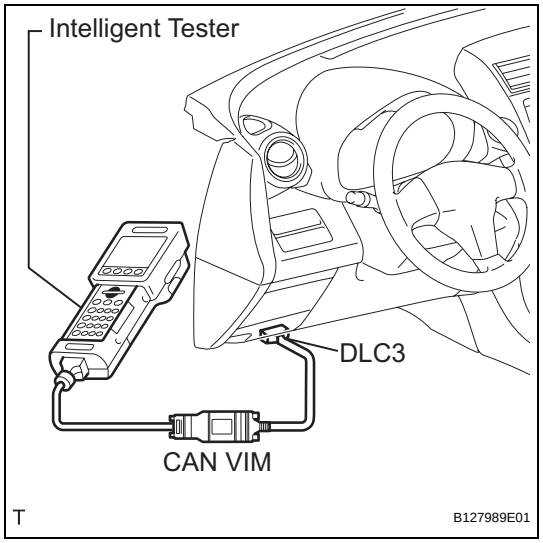


ON-VEHICLE INSPECTION

1. CHECK ACCELERATOR PEDAL ROD

(a) Measure the voltage.

(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch on (IG).

(3) Turn the intelligent tester ON.

(4) Select the menu items: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ACCEL POS #1, ACCEL POS #2.

(5) Operate the accelerator pedal, and then check that the ACCEL POS #1 and ACCEL POS #2 values are within the specifications.

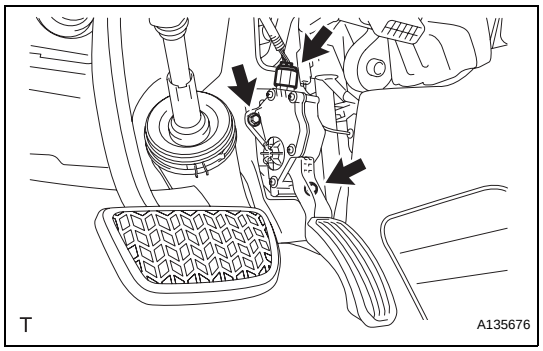
Standard voltage (ACCEL POS #1)

Accelerator Pedal Condition	Specified Condition
Released	0.5 to 1.1 V
Depressed	2.5 to 4.5 V

Standard voltage (ACCEL POS #2)

Accelerator Pedal Condition	Specified Condition
Released	1.2 to 2.0 V
Depressed	3.4 to 5.0 V

If the result is not as specified, check the accelerator pedal rod, wire harness or ECM.



REMOVAL

1. REMOVE ACCELERATOR PEDAL

(a) Disconnect the accelerator pedal connector.

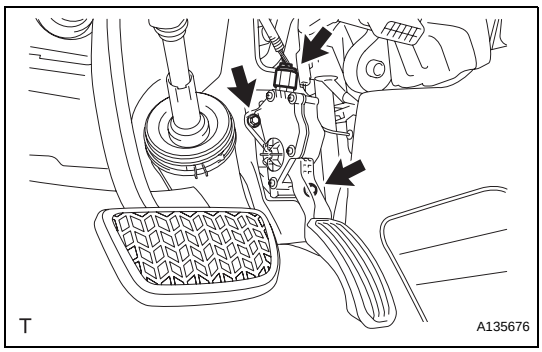
(b) Remove the 2 bolts and the accelerator pedal assembly.

INSTALLATION

1. INSTALL ACCELERATOR PEDAL

NOTICE:

- **Avoid physical shock to the accelerator pedal assembly.**
- **Do not disassemble the accelerator pedal assembly.**



(a) Install the accelerator pedal assembly with the 2 bolts.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

(b) Connect the accelerator pedal connector.

ENGINE

ON-VEHICLE INSPECTION

1. INSPECT ENGINE COOLANT

(a) Inspect the engine coolant (See page CO-1).

2. INSPECT ENGINE OIL

(a) Inspect the engine oil (See page LU-1).

3. INSPECT BATTERY

(a) Inspect the battery (See page CH-4).

4. INSPECT SPARK PLUGS

(a) Inspect the spark plugs (See page IG-5).

5. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Remove the air cleaner filter element sub-assembly.

(b) Visually check that there is no dirt, blockage, and/or damage to the air cleaner filter element.
HINT:
- If there is any dirt or a blockage in the air cleaner filter element, clean it with compressed air.
- If any dirt or a blockage remains even after cleaning the air cleaner filter element with compressed air, replace it.

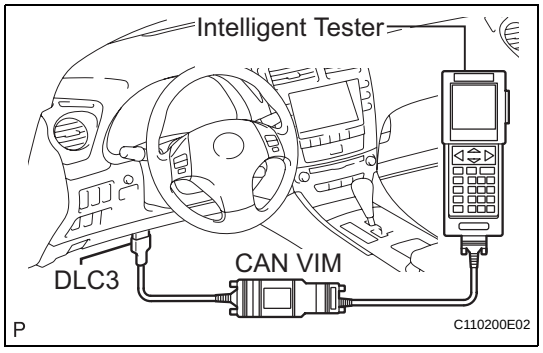
6. INSPECT VALVE LASH ADJUSTER NOISE

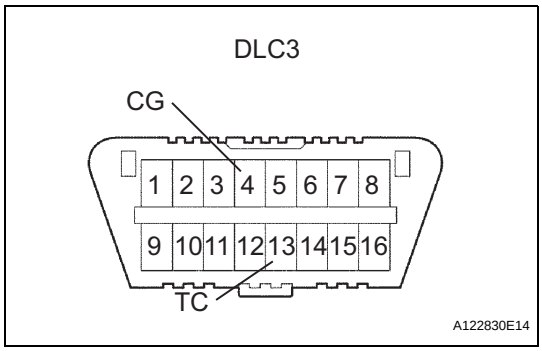
(a) Rev up the engine several times. Check that the engine does not emit unusual noises.
If unusual noises occur, warm up the engine and idle it for over 30 minutes. Then repeat this procedure.
HINT:
If any defects or problems are found during the inspection above, perform lash adjuster inspection (See page EM-87).

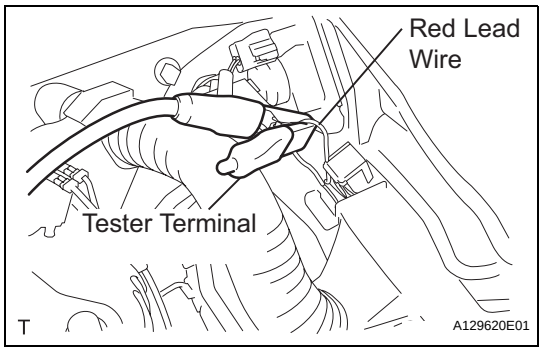
7. INSPECT IGNITION TIMING

(a) Warm up the engine.

(b) When using the intelligent tester:
Check the ignition timing.
(1) Connect the intelligent tester to the DLC3.
(2) Enter DATA LIST mode with the intelligent tester.
Ignition timing:
8 to 12° BTDC at idle
HINT:
Refer to the intelligent tester operator's manual for help when selecting the DATA LIST.





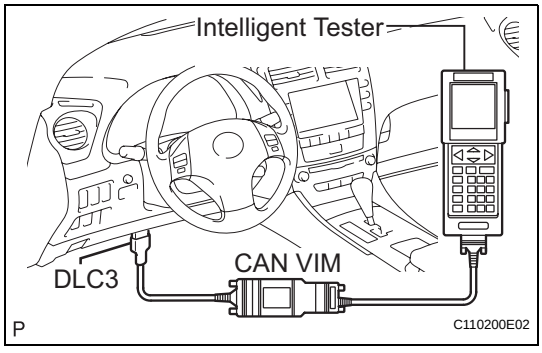


(c) When not using the intelligent tester:
Check the ignition timing.
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
NOTICE:
- **Confirm the terminal numbers before connecting them. Connection with a wrong terminal can damage the engine.**
- **Turn off all electrical systems before connecting the terminals.**
- **Perform this inspection after the cooling fan motor is turned off.**

(2) Remove the V-bank cover.
(3) Pull out the red lead wire harness.
(4) Connect the tester terminal of the timing light to the red lead wire as shown in the illustration.
NOTICE:
Use a timing light which can detect the first signal.
(5) Check the ignition timing at idle.
Ignition timing:
8 to 12° BTDC at idle
NOTICE:
When checking the ignition timing, the transmission should be in neutral.
HINT:
Run the engine at 1,000 to 1,300 rpm for 5 seconds, and then check that the engine rpm returns to idle speed.
(6) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
(7) Check the ignition timing at idle.
Ignition timing:
12 to 22° BTDC at idle
(8) Confirm that the ignition timing moves to the advanced angle side when the engine rpm is increased.
(9) Remove the timing light.

8. INSPECT ENGINE IDLE SPEED

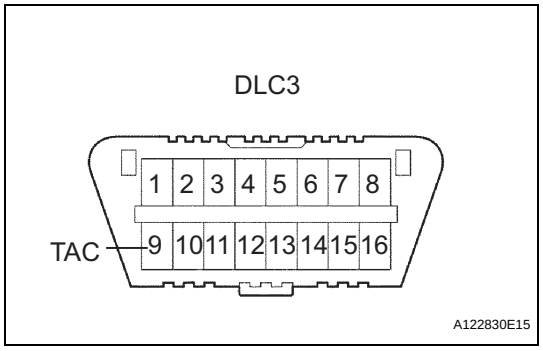
(a) Warm up the engine.



(b) When using the intelligent tester:
Check the idle speed.
(1) Connect the intelligent tester to the DLC3.
(2) Enter DATA LIST mode with the intelligent tester.
Idle speed:
600 to 700 rpm
NOTICE:
- **When checking the idle speed, the transmission should be in neutral.**
- **Check the idle speed with the cooling fan off.**

- **Switch off all accessories and air conditioning before connecting the intelligent tester.**

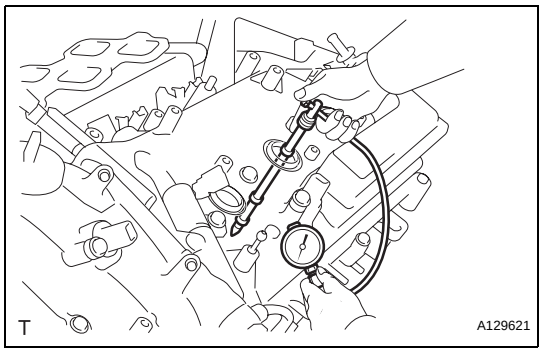
HINT:
Refer to the intelligent tester operator's manual for further details.



(c) When not using the intelligent tester:
Check the idle speed.
(1) Using SST, connect the tachometer test probe to terminal 9 (TAC) of the DLC3.
SST 09843-18030
(2) Check the idle speed.
Idle speed:
600 to 700 rpm

9. INSPECT COMPRESSION

(a) Warm up and stop the engine.
(b) Disconnect the injector connectors.
(c) Remove the intake air surge tank (See page FU-13).
(d) Remove the 6 ignition coils.
(e) Remove the 6 spark plugs.



(f) Check the cylinder compression pressure.
(1) Insert a compression gauge into the spark plug hole.
(2) While cranking the engine, measure the compression pressure.
Compression pressure:
1.4 MPa (14 kgf/cm^2, 199 psi)
Minimum pressure:
0.98 MPa (10 kgf/cm^2, 142 psi)
Difference between each cylinder:
0.1 MPa (1.0 kgf/cm^2, 15 psi)
NOTICE:
- **Always use a fully charged battery to obtain an engine speed of 250 rpm or more.**
- **Check the other cylinders' compression pressure in the same way.**
- **This measurement must be done as quickly as possible.**

(3) If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole and inspect again.
HINT:
- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If pressure stays low, a valve may be stuck or seated improperly, or there may be leakage in the gasket.

(g) Install the 6 spark plugs.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

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(h) Install the 6 ignition coils.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
(i) Install the intake air surge tank. (See page FU-17).

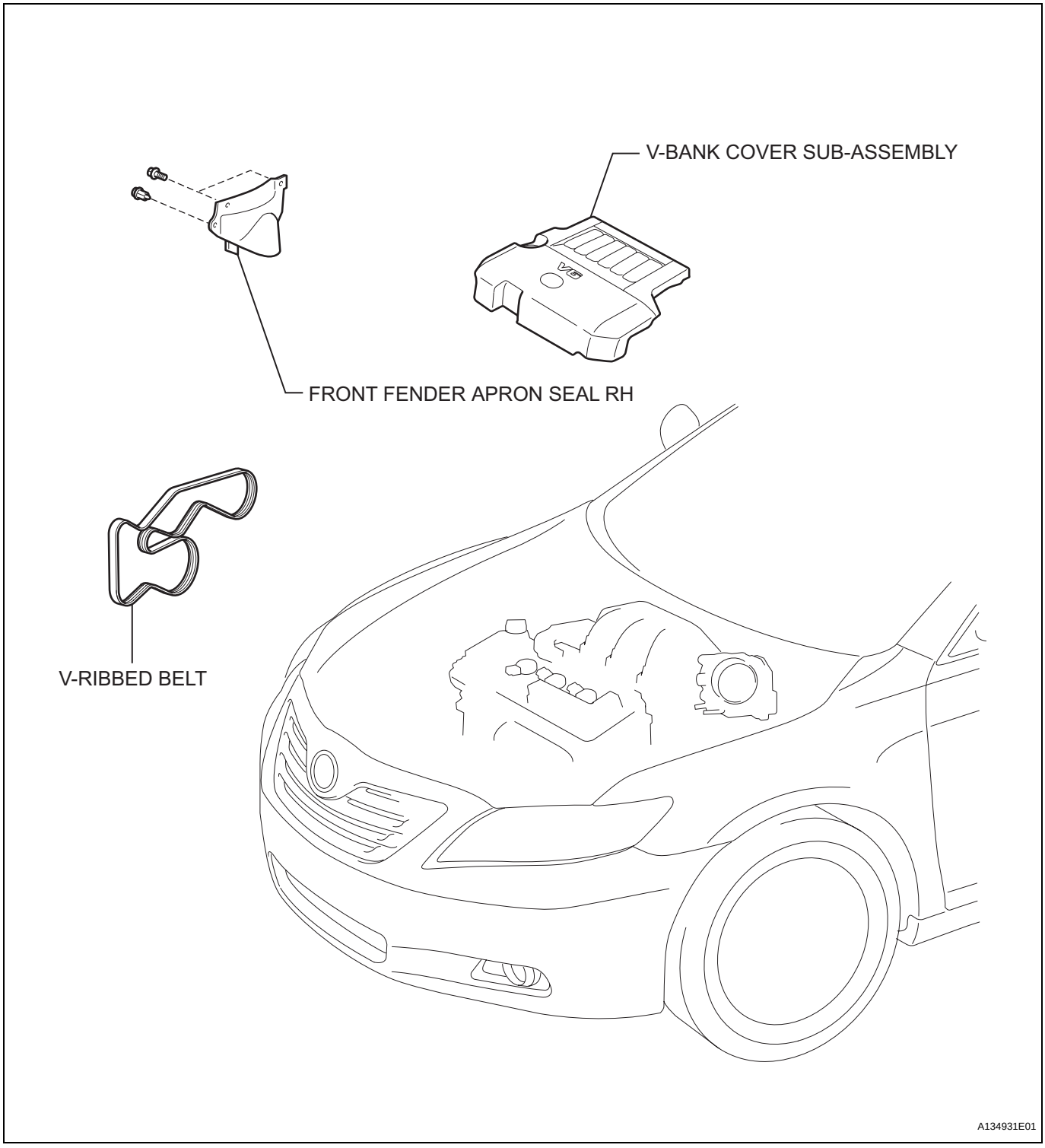
10. INSPECT CO/HC

(a) Start the engine.
(b) Run the engine at 2,500 rpm for approximately 180 seconds.
(c) Insert the CO/HC meter testing probe at least 40 cm (1.3 ft) into the tailpipe during idling.
(d) Check CO/HC concentration at idle and/or 2,500 rpm.
HINT:
Check regulations and restrictions in your area when performing 2 mode CO/HC concentration testing (engine check at both idle speed and at 2,500 rpm).
If the CO/HC concentration does not comply with regulations, perform troubleshooting in the order given below.
(1) Check A/F sensor and heated oxygen sensor operation.
(2) See the table below for possible causes, and then inspect and repair.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: – Incorrect timing – Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaks in intake and exhaust valves 4. Leaks in cylinders
Low	High	Rough idle (fluctuating HC reading)	1. Vacuum leaks: – PCV hoses – Intake manifold – Throttle body – Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI system: – Faulty fuel pressure regulator – Defective ECT sensor – Defective MAF meter – Faulty ECM – Faulty injectors – Faulty throttle position sensor

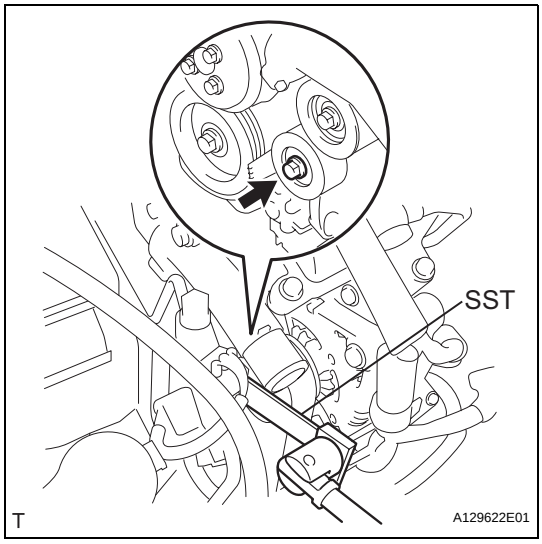
DRIVE BELT

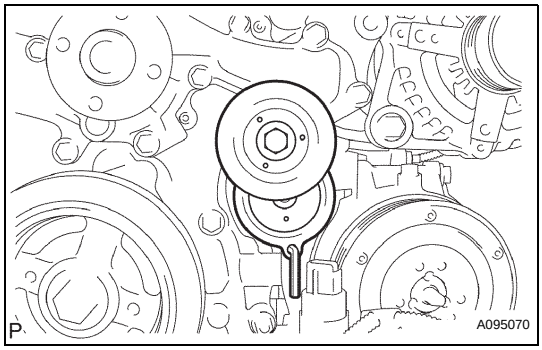
COMPONENTS



REMOVAL

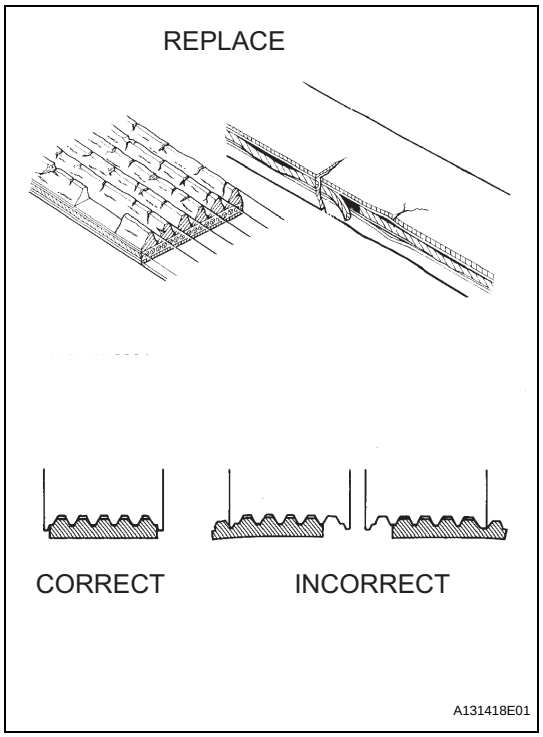
1. **REMOVE FRONT WHEEL RH**
2. **REMOVE FRONT FENDER APRON SEAL RH**
3. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
4. **REMOVE V-RIBBED BELT**
   (a) Using SST, release the belt tension by turning the belt tensioner counterclockwise, and remove the V-ribbed belt from the belt tensioner.
   SST 09249-63010





(b) While turning the belt tensioner counterclockwise, align with its holes, and then insert the 5 mm bi-hexagon wrench into the holes to fix the V-ribbed belt tensioner.

EM



INSPECTION

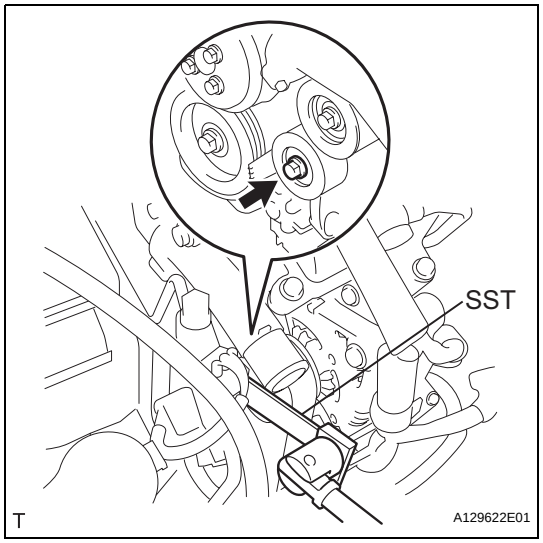
1. INSPECT V-RIBBED BELT

(a) Visually check the V-ribbed belt for excessive wear, frayed cords, etc.
If any defect has been found, replace the V-ribbed belt.
HINT:
Cracks on the rib side of a V-ribbed belt are considered acceptable.
If the drive belt has chunks missing from its ribs, it should be replaced.
HINT:
- A "new belt" is a belt which has been used for less than 5 minutes with the engine running.
- A "used belt" is a belt which has been used for 5 minutes or more with the engine running.

2. INSPECT V-RIBBED BELT TENSIONER ASSEMBLY

(a) Check that nothing gets caught in the tensioner by turning it clockwise and counterclockwise.
If a malfunction exitsts, replace the tensioner.

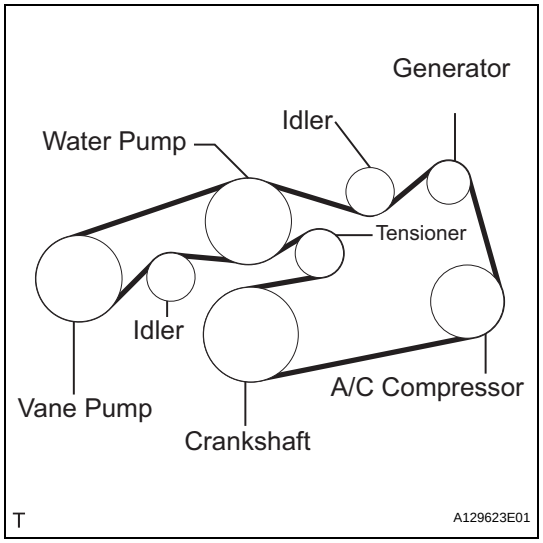
EM



INSTALLATION

1. INSTALL V-RIBBED BELT

(a) Install the V-ribbed belt.
(b) Using SST, turn the belt tensioner counterclockwise and remove the bar.
SST 09249-63010



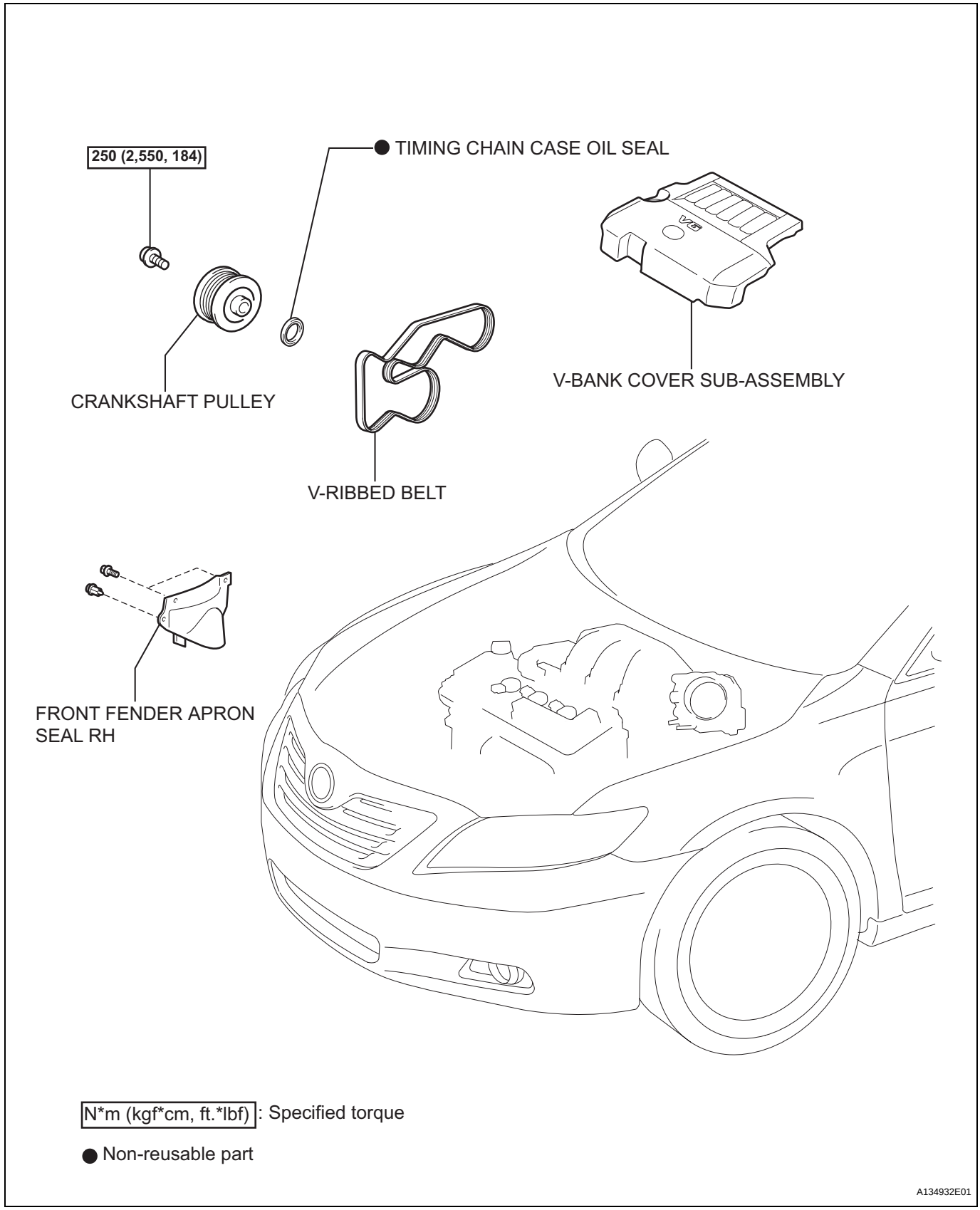
(c) If it is difficult to install the V-ribbed belt, perform the following procedure:
(1) Put the V-ribbed belt on every pulley except the tensioner pulley as shown in the illustration.
(2) While releasing the belt tension by turning the belt tensioner counterclockwise, put the V-ribbed belt on the tensioner pulley.
NOTICE:
- **Put the backside of the V-ribbed belt on the tensioner pulley and idler pulley.**
- **Check that the V-ribbed belt is properly set to each pulley.**

(3) After installing the V-ribbed belt, check that it fits properly in the ribbed grooves. Confirm that the belt has not slipped out of the grooves on the bottom of the crank pulley by hand.

2. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
3. **INSTALL FRONT FENDER APRON SEAL RH**
4. **INSTALL FRONT WHEEL RH**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

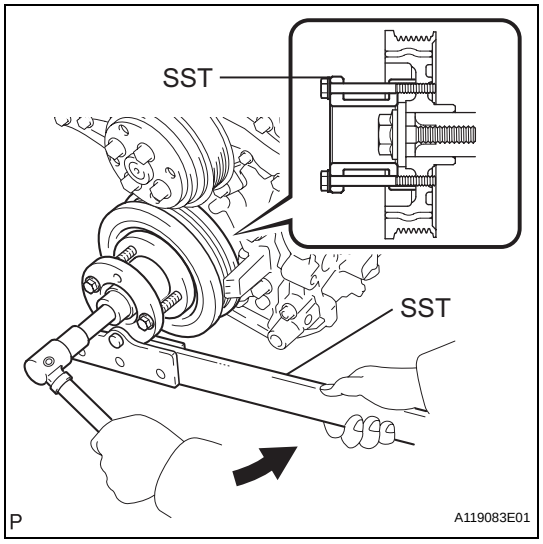
ENGINE FRONT OIL SEAL

COMPONENTS

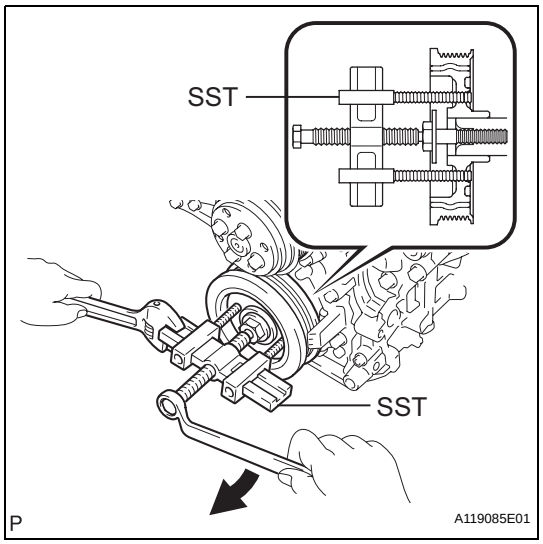


REMOVAL

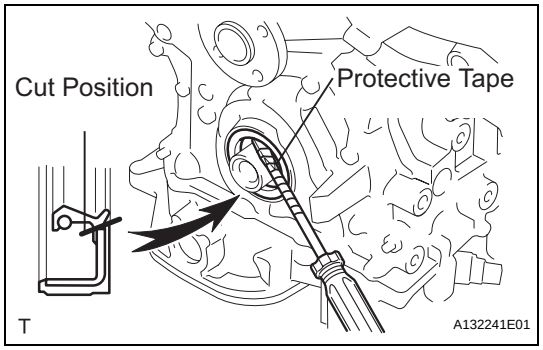
1. **REMOVE FRONT WHEEL RH**
2. **REMOVE FRONT FENDER APRON SEAL RH**
3. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
4. **REMOVE V-RIBBED BELT (See page EM-6)**
5. **REMOVE CRANKSHAFT PULLEY**
   (a) Using SST, loosen the crankshaft pulley bolt.
   SST 09213-70011 (09213-70020), 09330-00021



   (b) Using SST, remove the crankshaft pulley bolt and crankshaft pulley.
   SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)



6. **REMOVE TIMING CHAIN CASE OIL SEAL**
   (a) Using a screwdriver, pry out the oil seal.
   HINT:
   Tape the screwdriver tip before use.
   NOTICE:
   After the removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.



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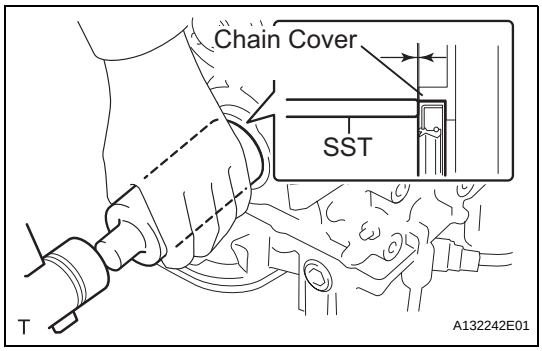
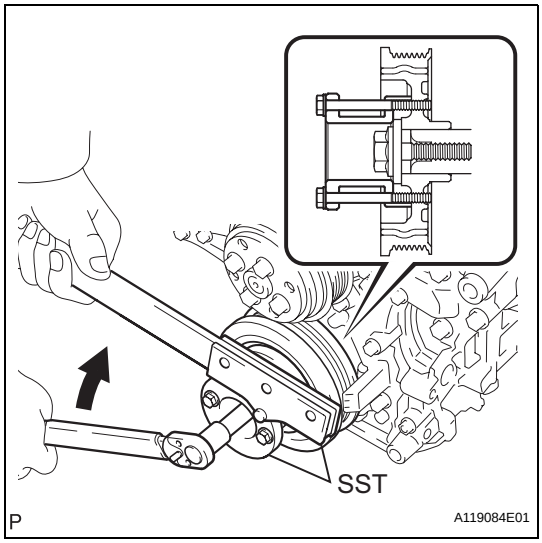




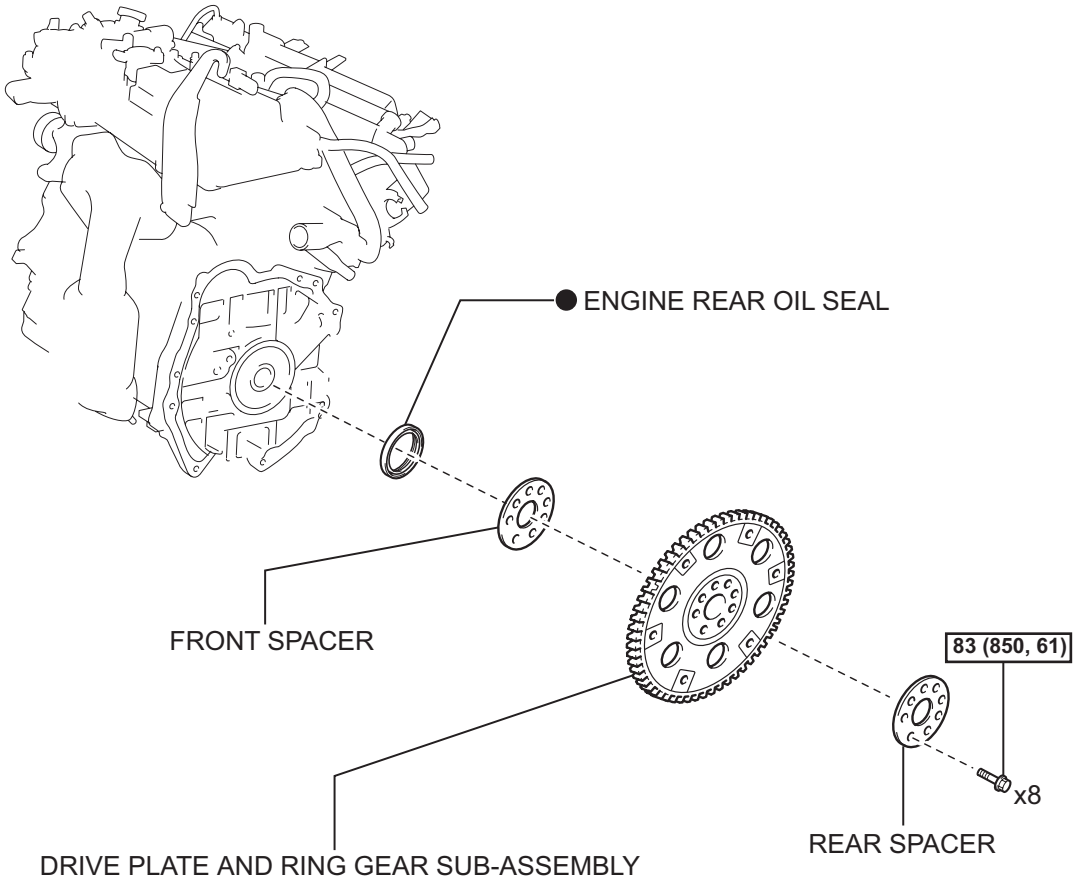
INSTALLATION

1. **INSTALL TIMING CHAIN CASE OIL SEAL**
   (a) Apply MP grease to a new oil seal lip.
   (b) Using SST and a hammer, tap in the oil seal until its surface is flush with the timing chain cover edge.
   SST 09316-60011 (09316-00011)
   NOTICE:
   - **Keep the lip free of foreign matter.**
   - **Do not tap the oil seal at an angle.**
2. **INSTALL CRANKSHAFT PULLEY**
   (a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.
   (b) Using SST, install the pulley bolt.
   SST 09213-70011 (09213-70020), 09330-00021
   Torque: 250 N*m (2,550 kgf*cm, 184 ft.*lbf)
3. **INSTALL V-RIBBED BELT (See page EM-7)**
4. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
5. **INSTALL FRONT FENDER APRON SEAL RH**
6. **INSTALL FRONT WHEEL RH**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

EM

ENGINE REAR OIL SEAL

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

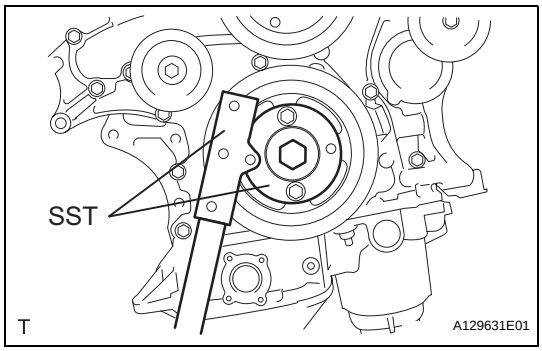
● Non-reusable part

A134930E01

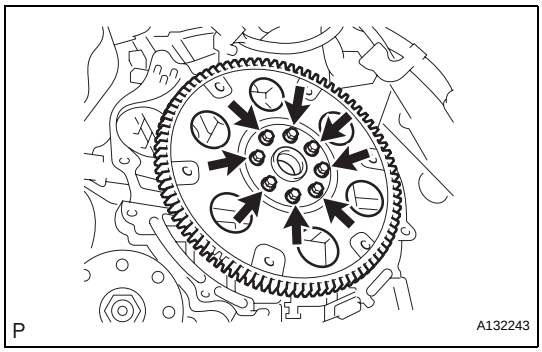
EM

REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   See page AX-207.

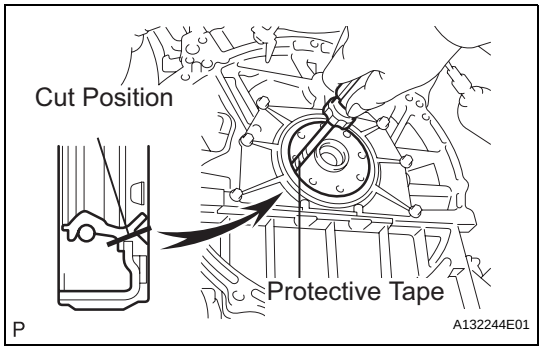


2. **REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY**
   (a) Using SST, hold the crankshaft.
   SST 09213-70011 (09213-70020), 09330-00021



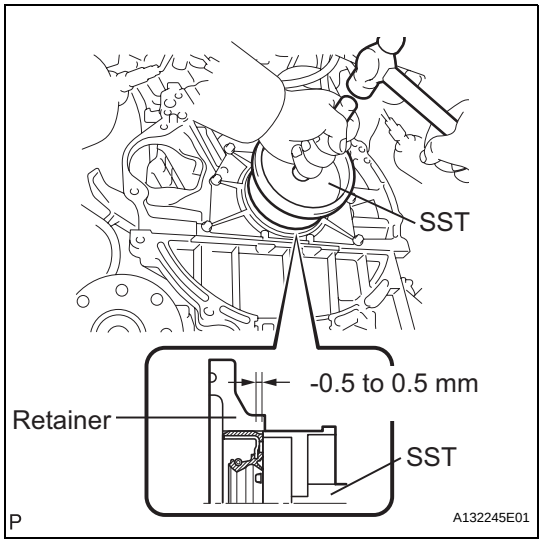
   (b) Remove the 8 bolts, front spacer, drive plate and rear spacer.

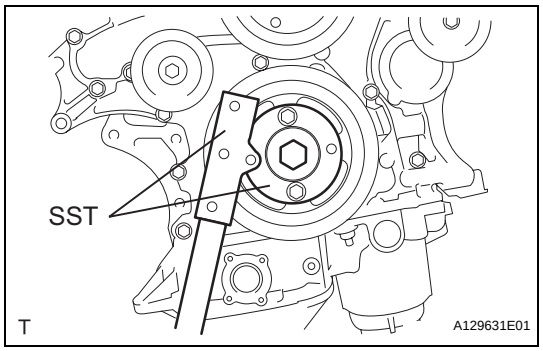
3. **REMOVE ENGINE REAR OIL SEAL**
   (a) Using a knife, cut off the oil seal lip.
   (b) Using a screwdriver, pry out the oil seal.
   NOTICE:
   Be careful not to damage the crankshaft. Tape the screwdriver tip before use.



INSTALLATION

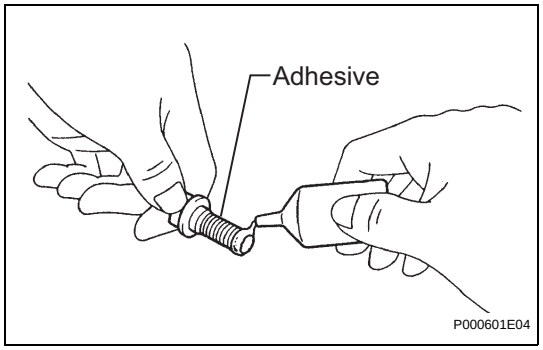
1. **INSTALL ENGINE REAR OIL SEAL**
   (a) Apply MP grease to a new oil seal lip.
   (b) Using SST and a hammer, tap in the oil seal.
   SST 09223-15030, 09950-70010 (09951-07150)
   Oil seal tap in depth:
   -0.5 to 0.5 mm (-0.020 to 0.020 in.)



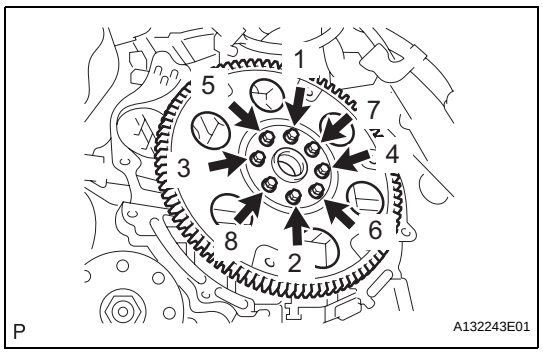


2. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY

(a) Using SST, hold the crankshaft.
SST 09213-70011 (09213-70020), 09330-00021



(b) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent



(1) Install the front spacer, drive plate and rear spacer on the crankshaft.
(2) Install and tighten the 8 mounting bolts uniformly in several steps.
Torque: 83 N*m (850 kgf*cm, 61 ft.*lbf)

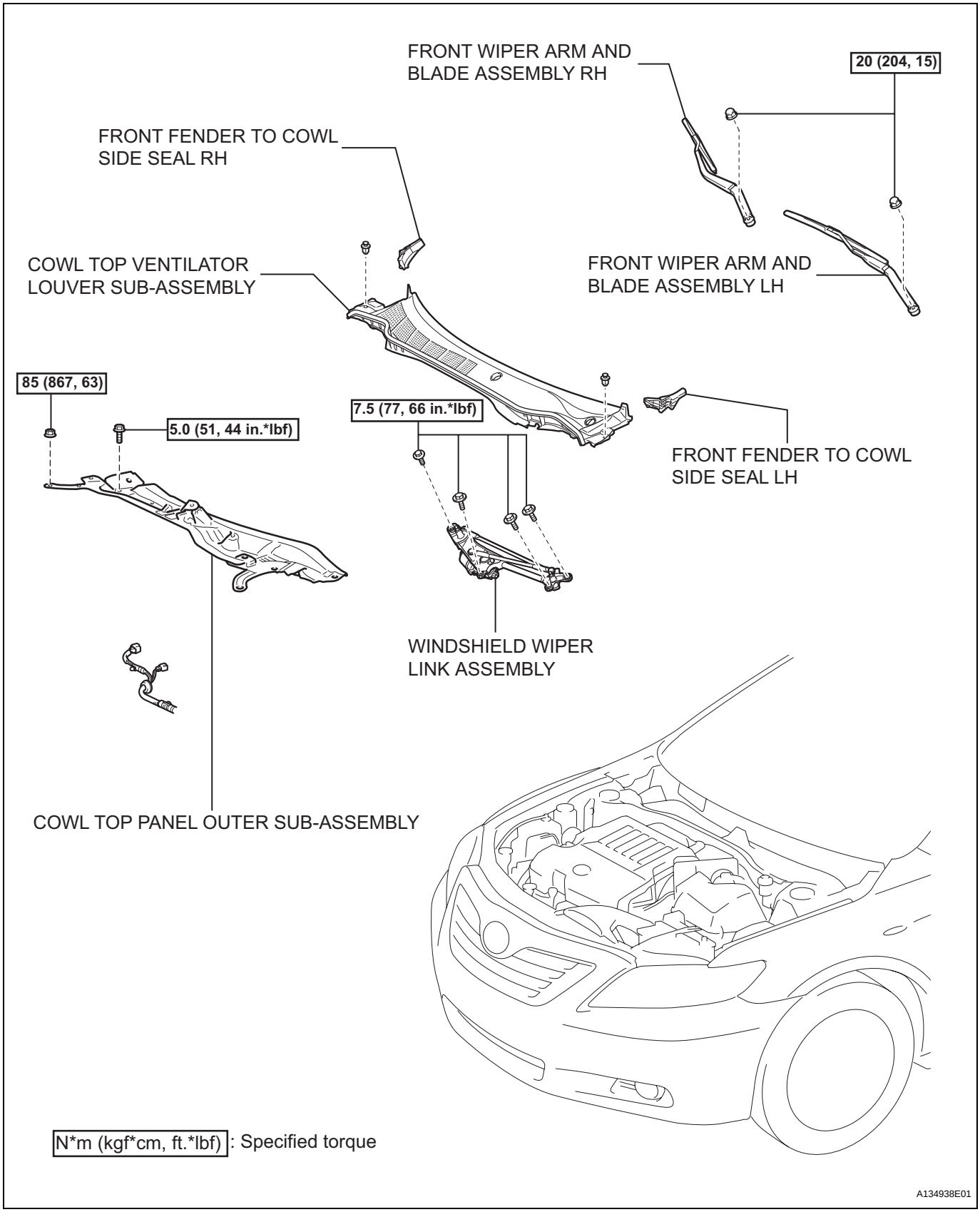
3. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

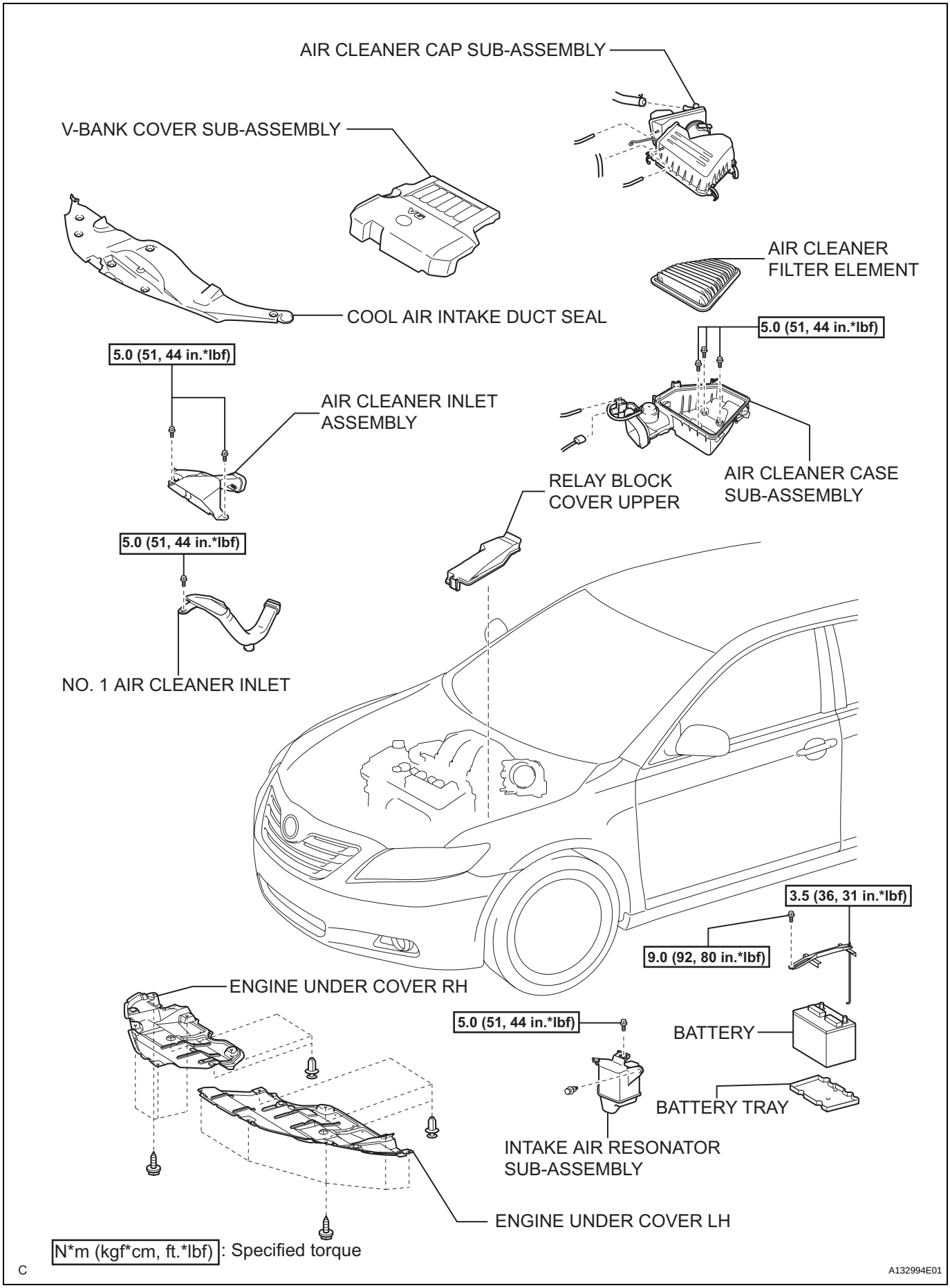
HINT:
See page AX-214.

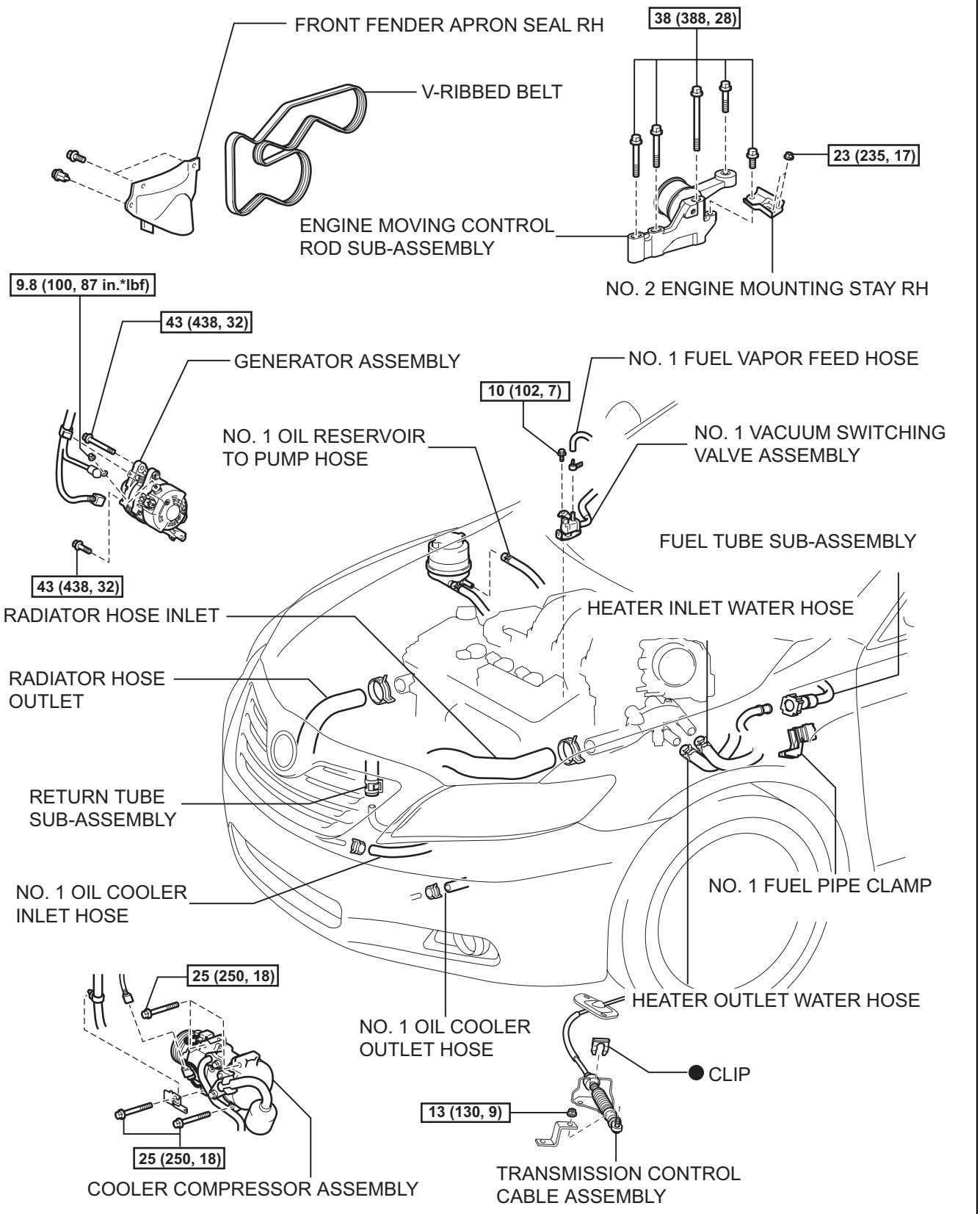
EM

ENGINE ASSEMBLY

COMPONENTS

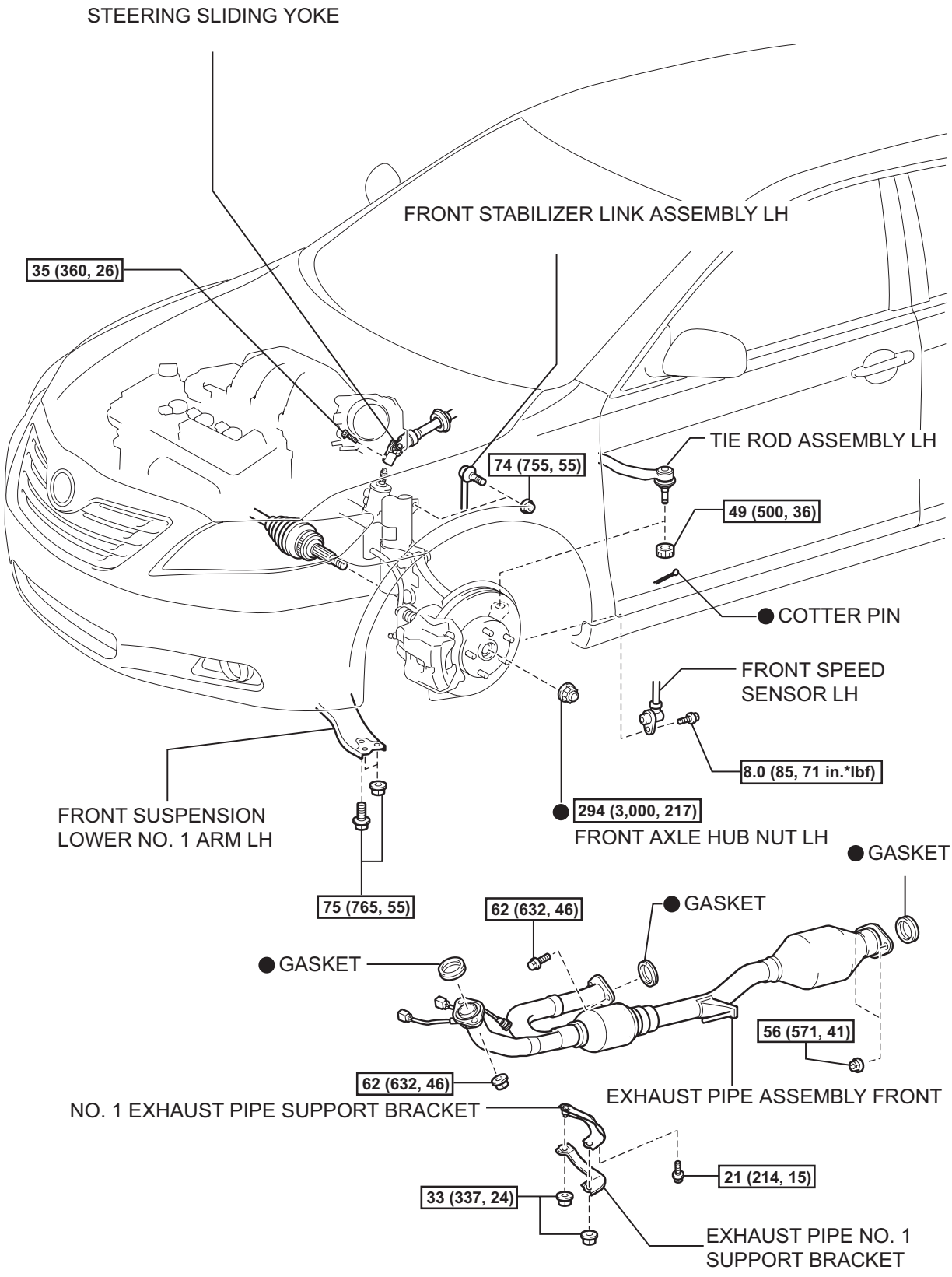



AIR CLEANER CAP SUB-ASSEMBLY
V-BANK COVER SUB-ASSEMBLY
AIR CLEANER FILTER ELEMENT
COOL AIR INTAKE DUCT SEAL
5.0 (51, 44 in.*lbf)
5.0 (51, 44 in.*lbf)
AIR CLEANER INLET ASSEMBLY
AIR CLEANER CASE SUB-ASSEMBLY
RELAY BLOCK COVER UPPER
5.0 (51, 44 in.*lbf)
NO. 1 AIR CLEANER INLET
3.5 (36, 31 in.*lbf)
9.0 (92, 80 in.*lbf)
ENGINE UNDER COVER RH
5.0 (51, 44 in.*lbf)
BATTERY
BATTERY TRAY
INTAKE AIR RESONATOR SUB-ASSEMBLY
ENGINE UNDER COVER LH
N*m (kgf*cm, ft.*lbf): Specified torque
C
A132994E01



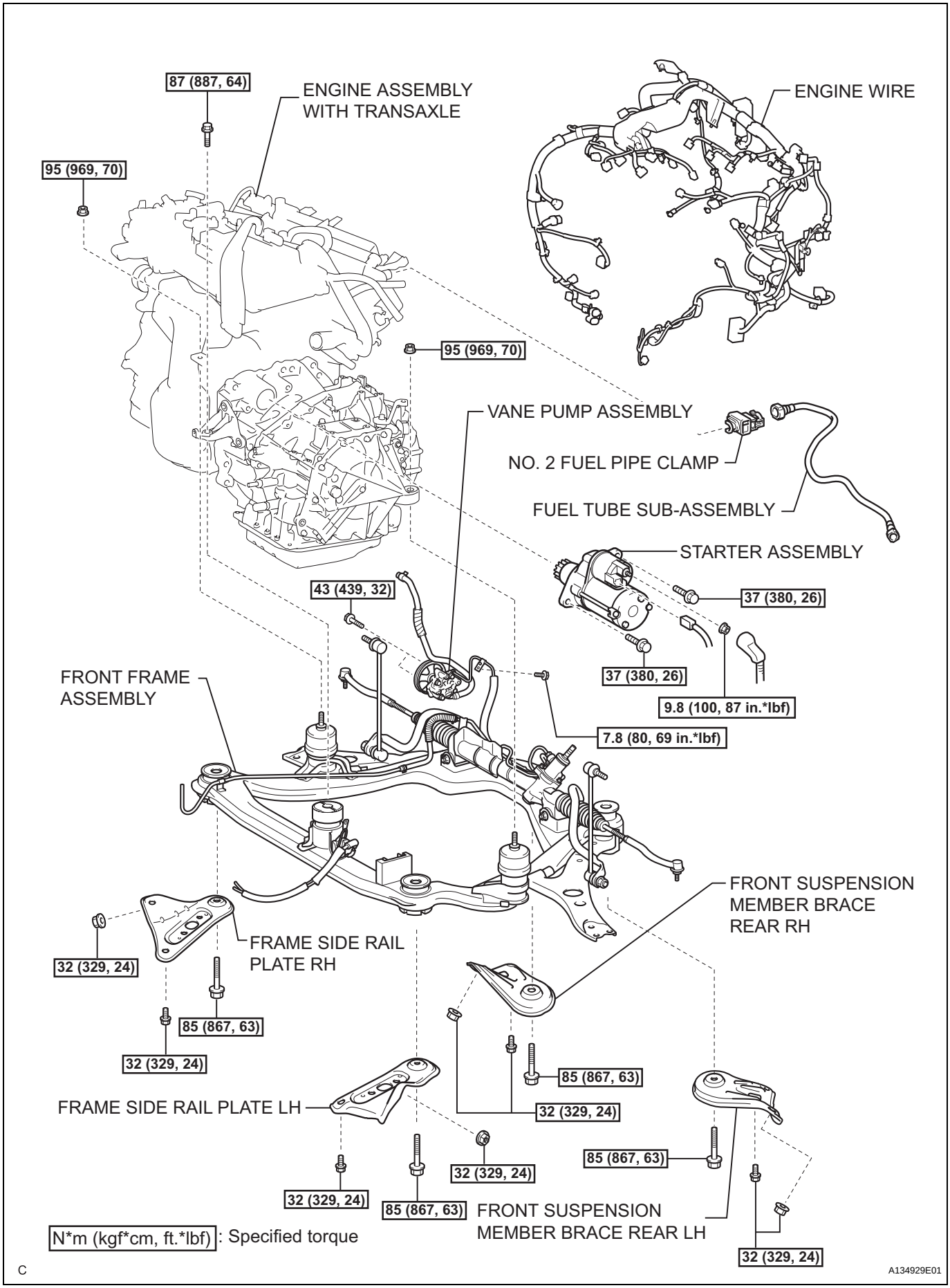
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

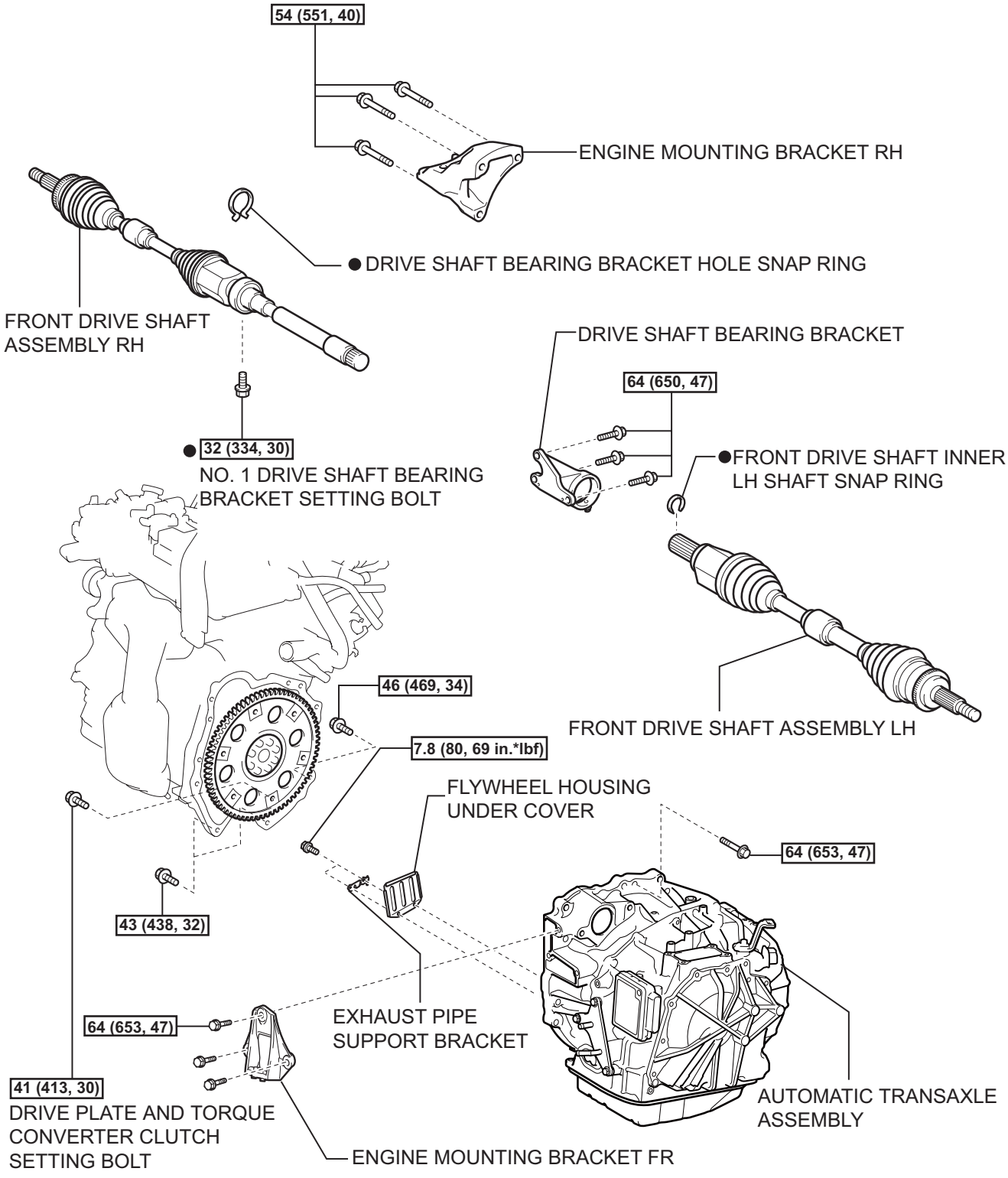
C A132995E01



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C A132996E01

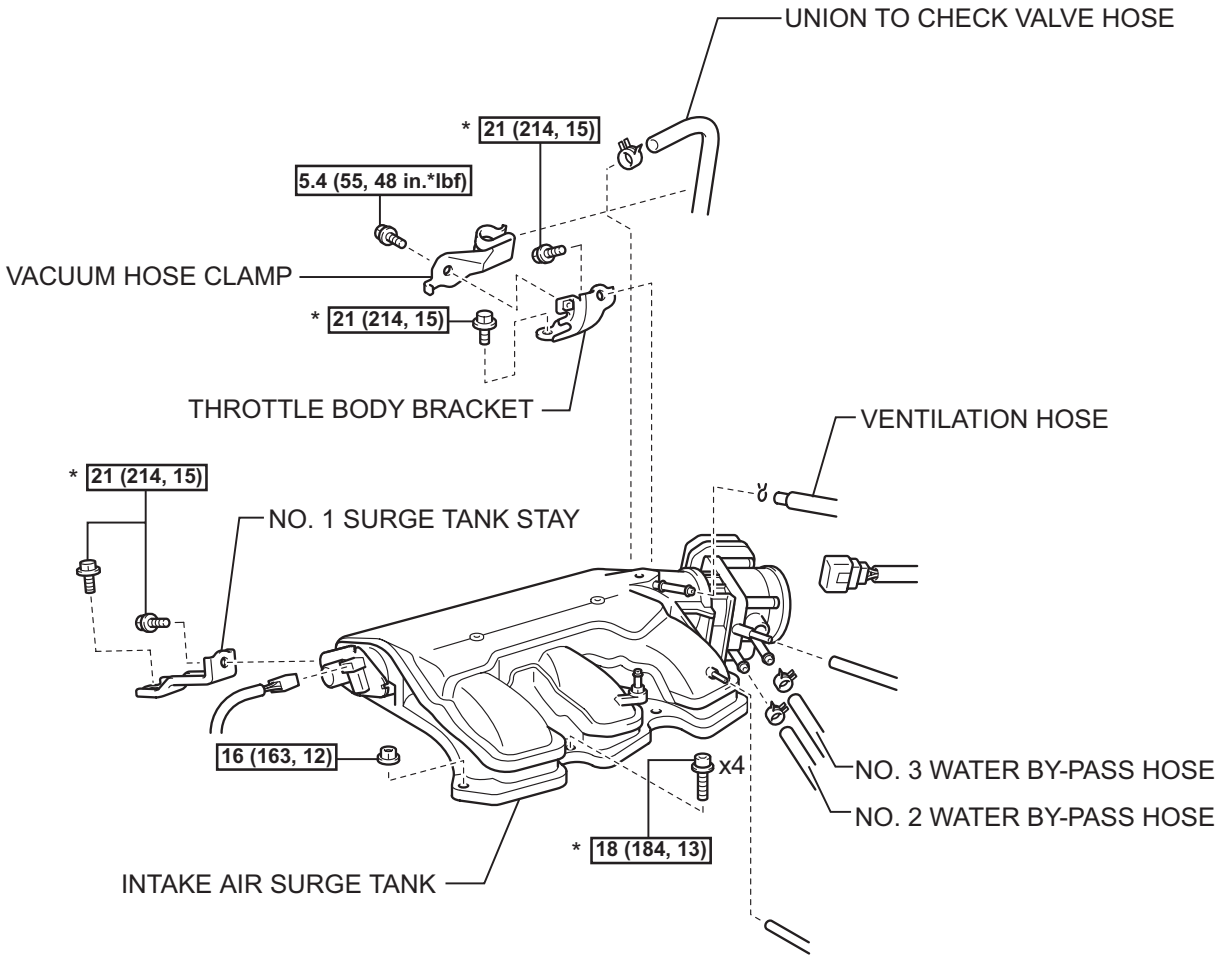

87 (887, 64)
ENGINE ASSEMBLY WITH TRANSAXLE
ENGINE WIRE
95 (969, 70)
95 (969, 70)
VANE PUMP ASSEMBLY
NO. 2 FUEL PIPE CLAMP
FUEL TUBE SUB-ASSEMBLY
STARTER ASSEMBLY
43 (439, 32)
37 (380, 26)
37 (380, 26)
9.8 (100, 87 in.*lbf)
FRONT FRAME ASSEMBLY
7.8 (80, 69 in.*lbf)
FRONT SUSPENSION MEMBER BRACE REAR RH
32 (329, 24)
FRAME SIDE RAIL PLATE RH
85 (867, 63)
32 (329, 24)
85 (867, 63)
FRAME SIDE RAIL PLATE LH
32 (329, 24)
32 (329, 24)
85 (867, 63)
85 (867, 63)
32 (329, 24)
FRONT SUSPENSION MEMBER BRACE REAR LH
32 (329, 24)
N*m (kgf*cm, ft.*lbf): Specified torque
C
A134929E01

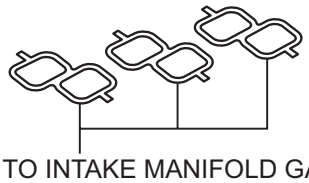


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

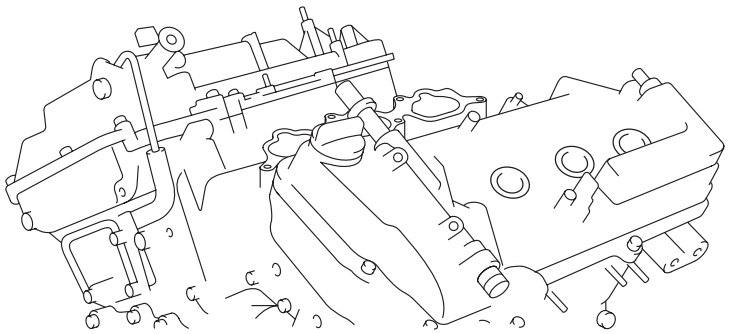
A134940E01

EM





● AIR SURGE TANK TO INTAKE MANIFOLD GASKET

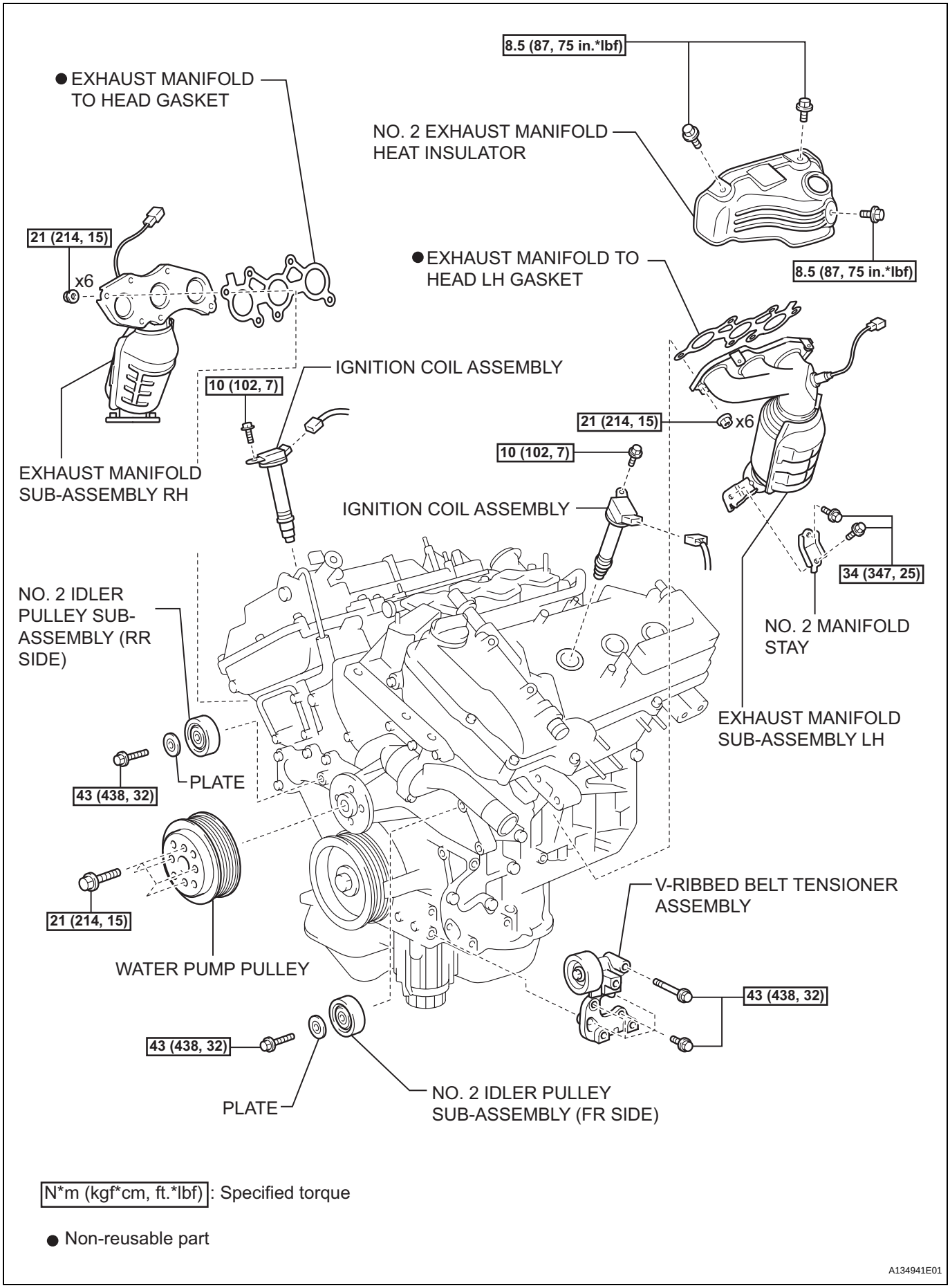


N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

* DO NOT apply oil

A134939E01

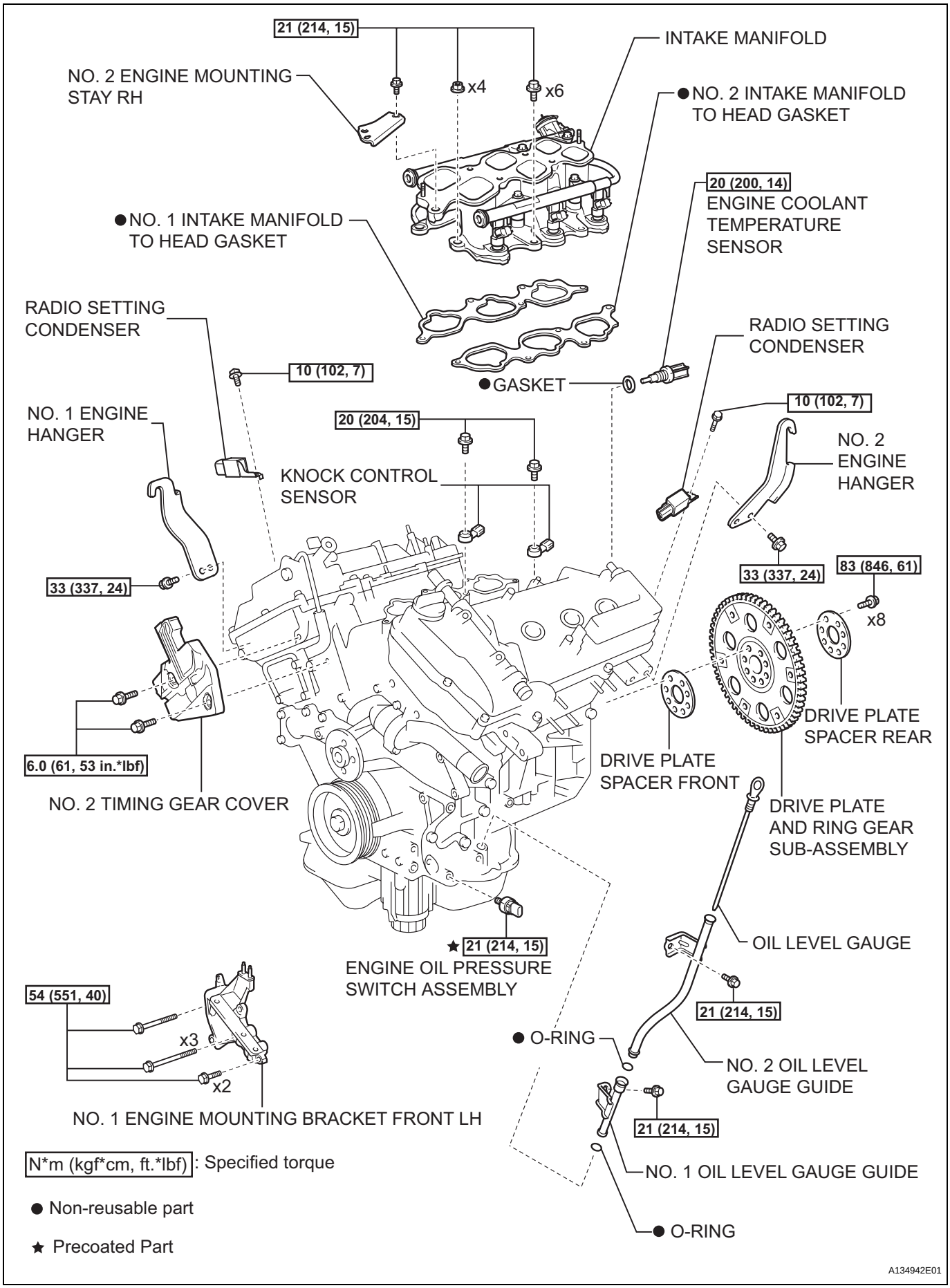


N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

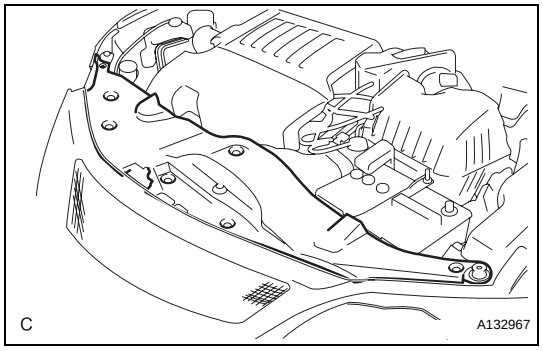
A134941E01

EM

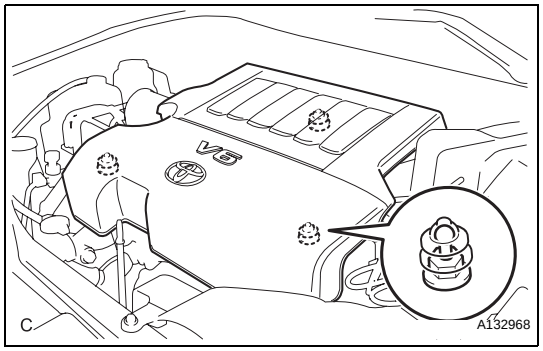

21 (214, 15)
INTAKE MANIFOLD
NO. 2 ENGINE MOUNTING STAY RH
x4
x6
● NO. 2 INTAKE MANIFOLD TO HEAD GASKET
20 (200, 14)
ENGINE COOLANT TEMPERATURE SENSOR
● NO. 1 INTAKE MANIFOLD TO HEAD GASKET
RADIO SETTING CONDENSER
RADIO SETTING CONDENSER
10 (102, 7)
● GASKET
10 (102, 7)
NO. 1 ENGINE HANGER
20 (204, 15)
NO. 2 ENGINE HANGER
KNOCK CONTROL SENSOR
33 (337, 24)
33 (337, 24)
83 (846, 61)
x8
6.0 (61, 53 in.*lbf)
NO. 2 TIMING GEAR COVER
DRIVE PLATE SPACER REAR
DRIVE PLATE SPACER FRONT
DRIVE PLATE AND RING GEAR SUB-ASSEMBLY
★ 21 (214, 15)
ENGINE OIL PRESSURE SWITCH ASSEMBLY
OIL LEVEL GAUGE
21 (214, 15)
54 (551, 40)
x3
x2
● O-RING
NO. 2 OIL LEVEL GAUGE GUIDE
21 (214, 15)
NO. 1 ENGINE MOUNTING BRACKET FRONT LH
NO. 1 OIL LEVEL GAUGE GUIDE
● O-RING
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
★ Precoated Part
A134942E01

REMOVAL

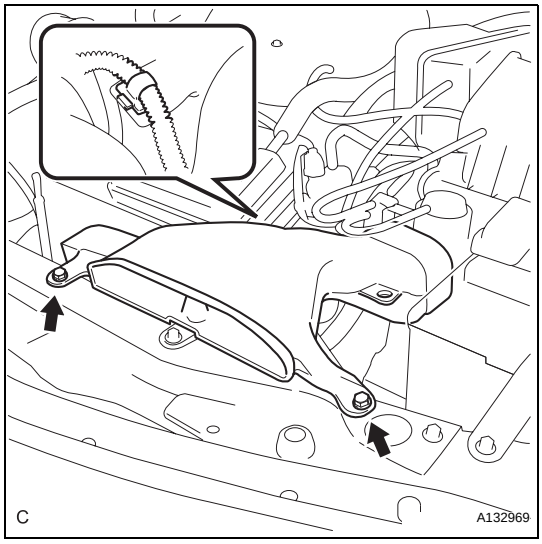
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **DRAIN ENGINE OIL (See page LU-4)**
9. **DRAIN ENGINE COOLANT (See page CO-5)**
10. **DRAIN AUTOMATIC TRANSAXLE FLUID (See page AX-207)**
11. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
    See page WW-9.
12. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-481)**
13. **REMOVE COOL AIR INTAKE DUCT SEAL**
    (a) Remove the 7 clips and intake duct seal.



14. **REMOVE V-BANK COVER SUB-ASSEMBLY**
    (a) Hold the front of the V-bank cover and raise it to disengage the 2 clips on the front of the cover. Continue to raise the cover to disengage the clip on the rear of the cover and remove the cover.
    NOTICE:
    Attempting to disengage both front and rear clips at the same time may cause the cover to break.



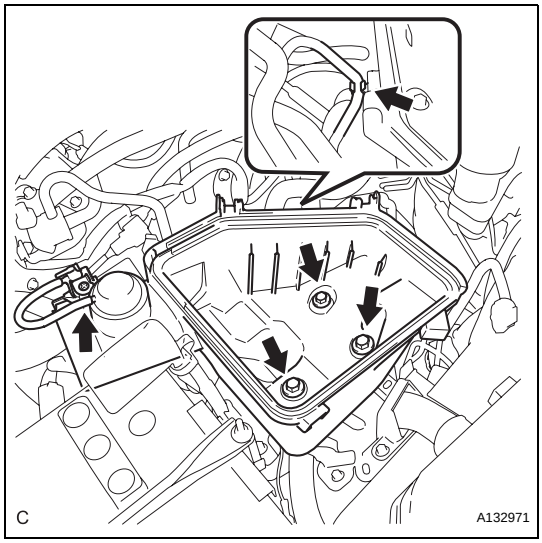
15. **REMOVE V-RIBBED BELT (See page EM-6)**



16. REMOVE AIR CLEANER INLET ASSEMBLY

(a) Remove the 2 bolts, clamp and air cleaner inlet.

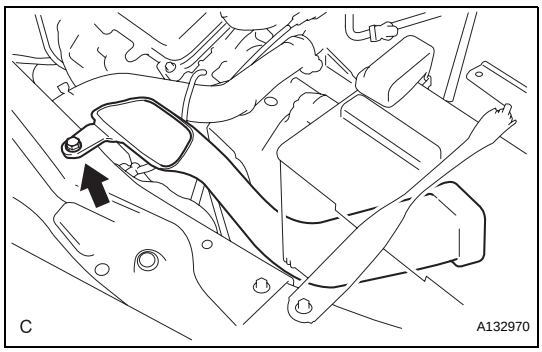
17. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)



18. REMOVE AIR CLEANER CASE SUB-ASSEMBLY

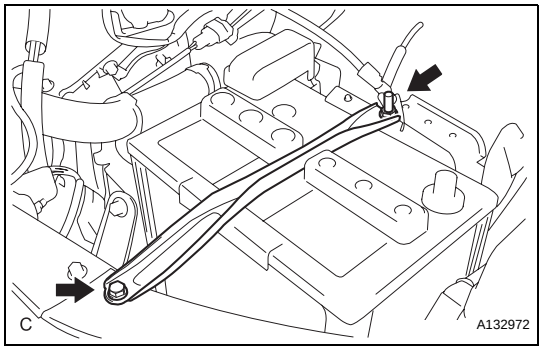
(a) Disconnect the vacuum hose and hose clamp.

(b) Remove the 3 bolts and air cleaner case.



19. REMOVE NO. 1 AIR CLEANER INLET

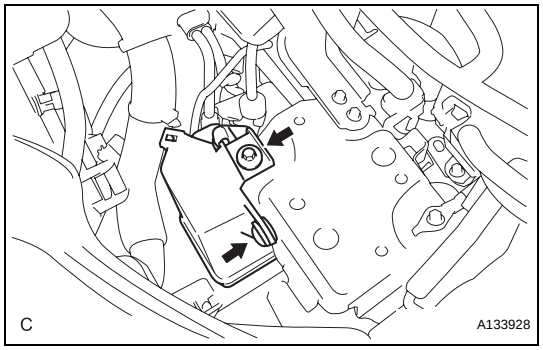
(a) Remove the bolt and No. 1 air cleaner inlet.



20. REMOVE BATTERY

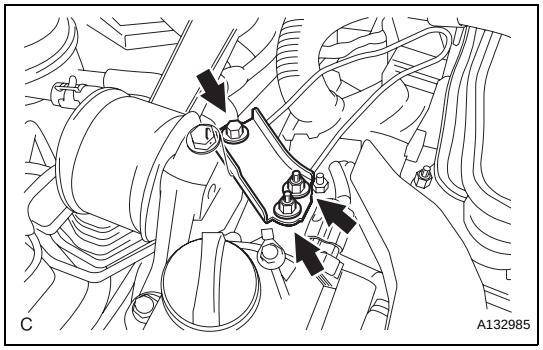
(a) Loosen the bolt and nut, and remove the battery clamp.

(b) Remove the battery and battery tray.



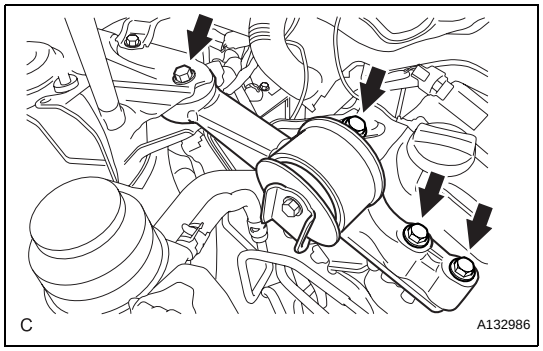
21. REMOVE INTAKE AIR RESONATOR SUB-ASSEMBLY

(a) Remove the clip, bolt and intake air resonator.



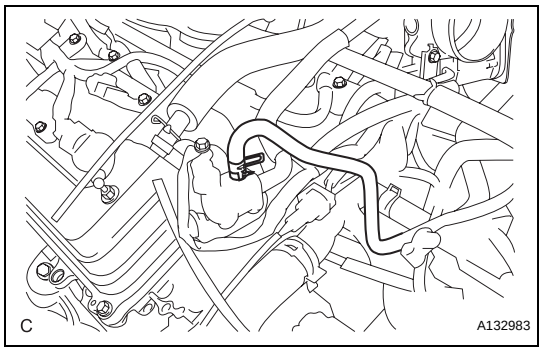
22. REMOVE NO. 2 ENGINE MOUNTING STAY RH

(a) Remove the bolt, 2 nuts, and No. 2 mounting stay RH.



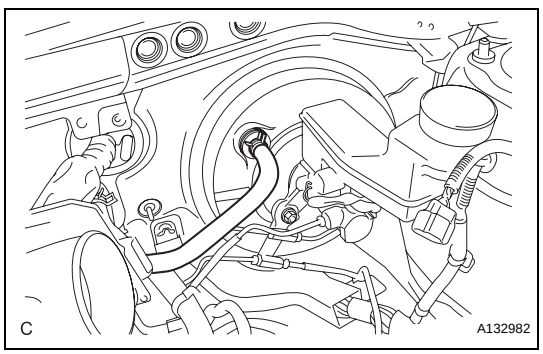
23. REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY

(a) Remove the 4 bolts and engine moving control rod.



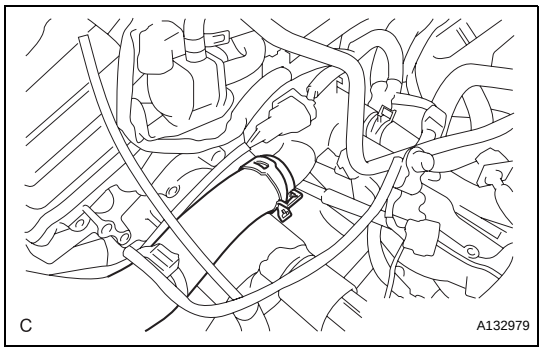
24. DISCONNECT NO. 1 FUEL VAPOR FEED HOSE

(a) Remove the clamp and disconnect the No. 1 fuel vapor feed hose.



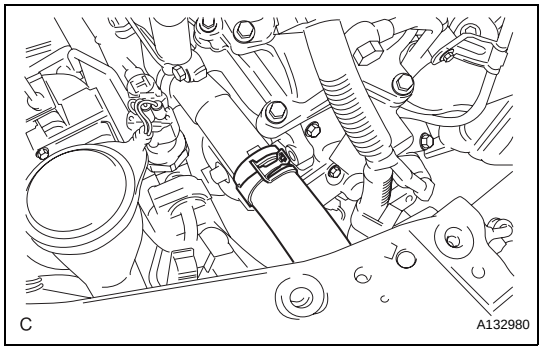
25. DISCONNECT CHECK VALVE TO BRAKE BOOSTER HOSE

(a) Remove the clamp and disconnect the check valve to brake booster hose.



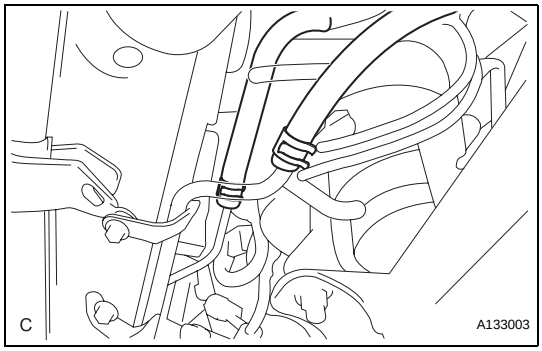
26. REMOVE RADIATOR HOSE INLET

(a) Remove the clamp and disconnect the radiator hose inlet.



27. REMOVE RADIATOR HOSE OUTLET

(a) Remove the clamp and disconnect the radiator hose outlet.

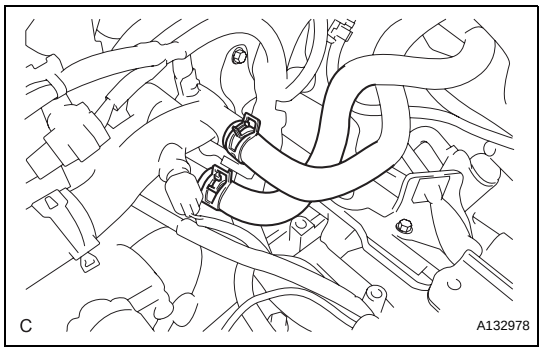


28. DISCONNECT NO. 1 OIL COOLER INLET HOSE

(a) Remove the clamp and disconnect the oil cooler inlet hose.

29. DISCONNECT NO. 1 OIL COOLER OUTLET HOSE

(a) Remove the clamp and disconnect the oil cooler outlet hose.



30. DISCONNECT HEATER INLET WATER HOSE

(a) Disconnect the heater inlet water hose.

31. DISCONNECT HEATER OUTLET WATER HOSE

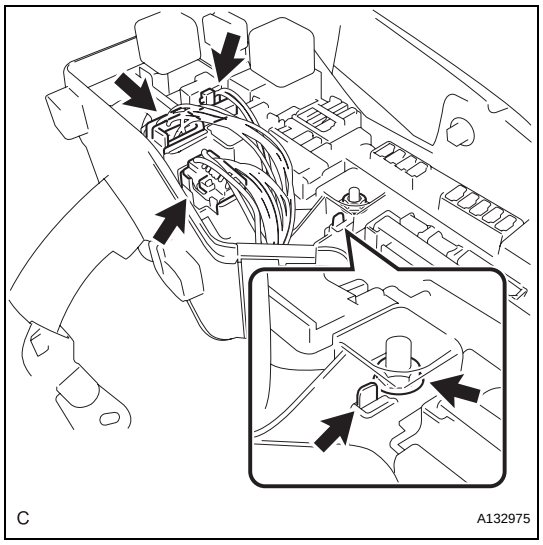
(a) Disconnect the heater outlet water hose.

32. REMOVE ECM

HINT:

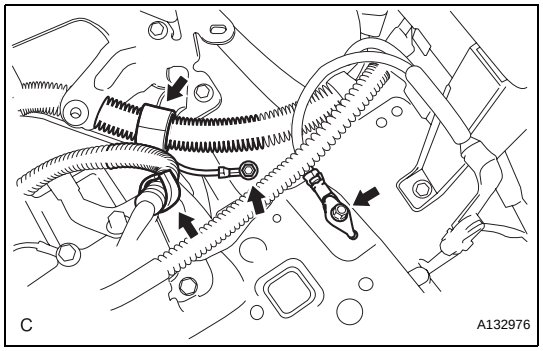
See page ES-518.

33. REMOVE RELAY BLOCK COVER UPPER

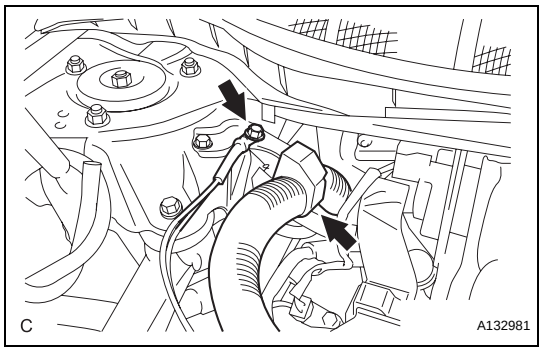


34. DISCONNECT ENGINE WIRE

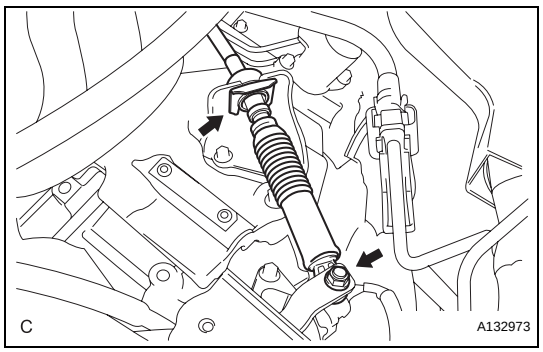
(a) Disconnect the engine wire from the engine room junction block.
  (1) Remove the nut and separate the wire harness.
  (2) Using a screwdriver, unlock the engine room J/B. Pull the engine room J/B upward.
  (3) Disconnect the engine wire connectors.



(b) Remove the 2 bolts and 2 clamps from the body.

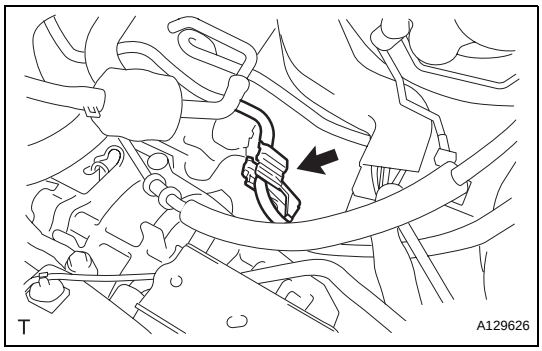


(c) Remove the bolt and clamp from the bracket.



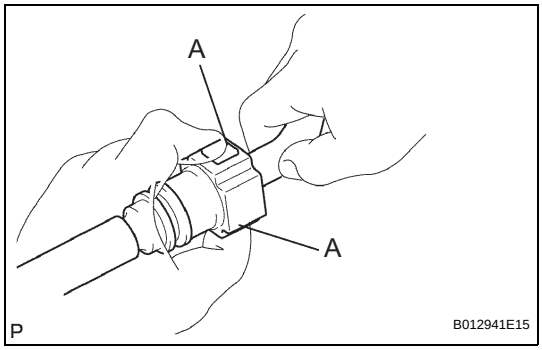
35. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Remove the clip and nut, and separate the cable from the transaxle.



36. SEPARATE FUEL TUBE SUB-ASSEMBLY

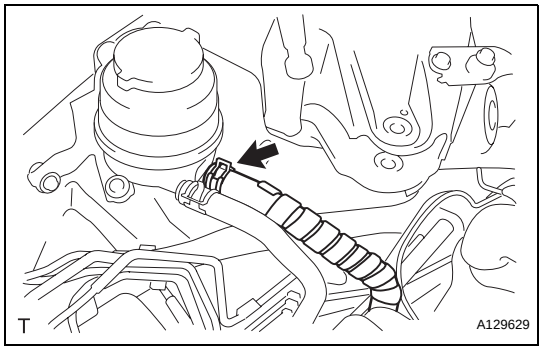
(a) Remove the No. 1 fuel pipe clamp.



(b) Disconnect the connector from the tube while pinching part A with your fingers as shown in the illustration.

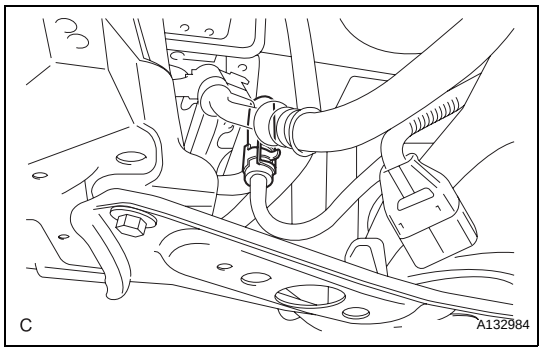
NOTICE:

- **Check for contamination in the pipe and around the connector. Clean if necessary and then disconnect the connector.**
- **Disconnect the connector by hand.**
- **Do not bend, fold or rotate the nylon tube.**
- **If the pipe and connector are stuck together, push and pull the connector until it becomes free.**
- **Put the pipe and connector ends in vinyl bags to prevent damage and contamination.**



37. DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

(a) Disconnect the No. 1 oil reservoir to pump hose.



38. DISCONNECT RETURN TUBE SUB-ASSEMBLY

(a) Disconnect the return tube sub-assembly.

39. REMOVE EXHAUST PIPE NO. 1 SUPPORT BRACKET (See page EX-3)

40. REMOVE EXHAUST PIPE ASSEMBLY FRONT (See page EX-2)

41. REMOVE FRONT AXLE HUB NUT LH (See page DS-7)

42. REMOVE FRONT AXLE HUB NUT RH

HINT:

Use the same procedures described for the LH side.

43. DISCONNECT FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)

44. DISCONNECT FRONT STABILIZER LINK ASSEMBLY RH

HINT:
Use the same procedures described for the LH side.

45. DISCONNECT FRONT SPEED SENSOR LH (See page DS-7)

46. DISCONNECT FRONT SPEED SENSOR RH

HINT:
Use the same procedures described for the LH side.

47. DISCONNECT TIE ROD ASSEMBLY LH (See page DS-8)

48. DISCONNECT TIE ROD ASSEMBLY RH

HINT:
Use the same procedures described for the LH side.

49. DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)

50. DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM RH

HINT:
Use the same procedures described for the LH side.

51. SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)

52. SEPARATE FRONT AXLE ASSEMBLY RH

HINT:
Use the same procedures described for the LH side.

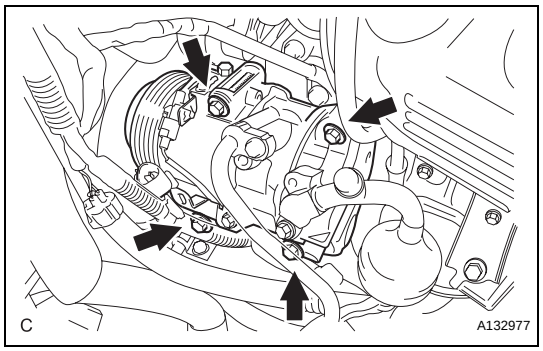
53. REMOVE NO. 1 EXHAUST PIPE SUPPORT BRACKET

(a) Remove the No. 1 exhaust pipe support bracket with the 2 bolts.

54. REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (See page AX-211)

55. DISCONNECT STEERING SLIDING YOKE (See page PS-40)

56. REMOVE GENERATOR ASSEMBLY (See page CH-14)

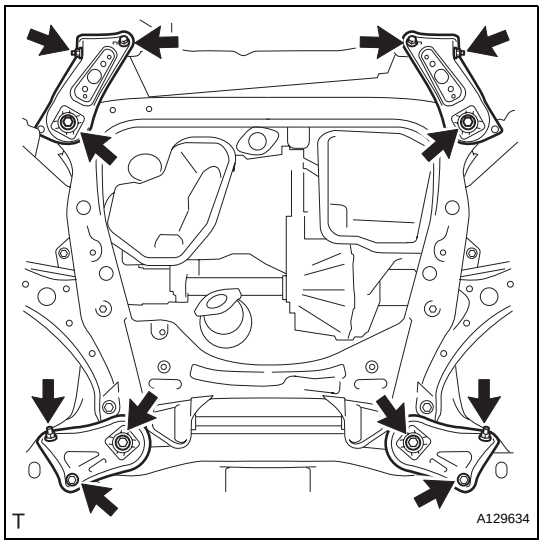


57. SEPARATE COOLER COMPRESSOR ASSEMBLY

(a) Remove the 2 connector clamps.
(b) Remove the 4 bolts and separate the compressor.
HINT:
Hang up the hoses instead of detaching them.

58. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

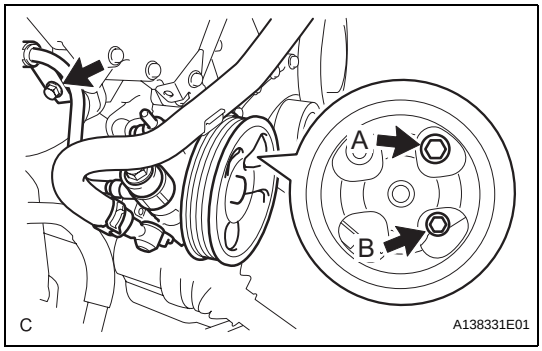
(a) Set the engine lifter.



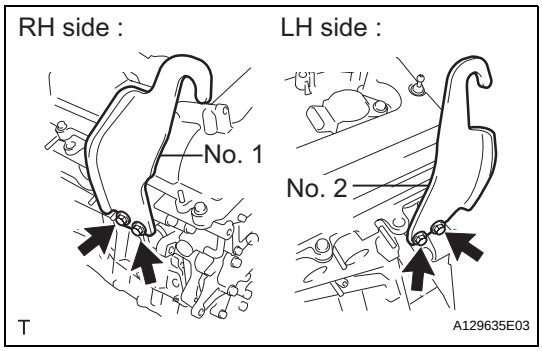
(b) Remove the 4 bolts, 2 nuts, and frame side rail plates RH and LH.
(c) Remove the 4 bolts, 2 nuts, and front suspension member brace rear RH and LH.
(d) Operate the engine lifter, then remove the engine assembly from the vehicle.
NOTICE:
Make sure that the engine is clear of all wiring and hoses.

59. REMOVE VANE PUMP ASSEMBLY

(a) Disconnect the power steering oil pressure switch connector.

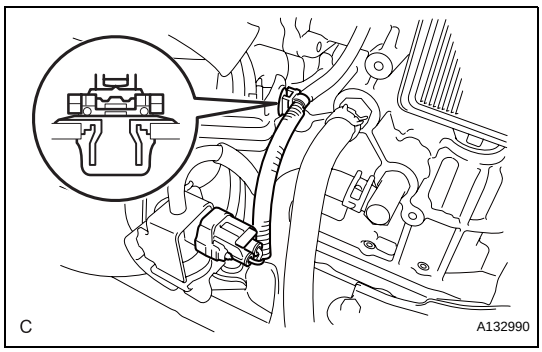


(b) Remove the pressure feed tube clamp bolt.
(c) Loosen the bolt A.
(d) Remove the bolt B and vane pump.



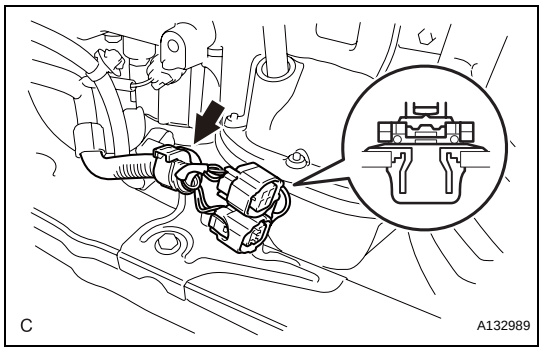
60. INSTALL ENGINE HANGERS

(a) Install the 2 engine hangers with the 4 bolts as shown in the illustration.
Part No.:
No. 1 Engine hanger 12281-31070
No. 2 Engine hanger 12282-31050
Bolts 91671-10825
Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)
(b) Attach the engine sling device and hang the engine with the chain block.

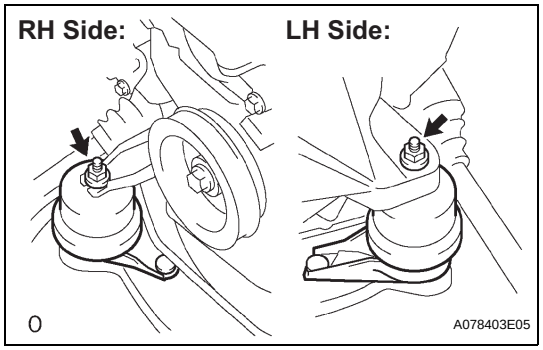


61. REMOVE FRONT FRAME ASSEMBLY

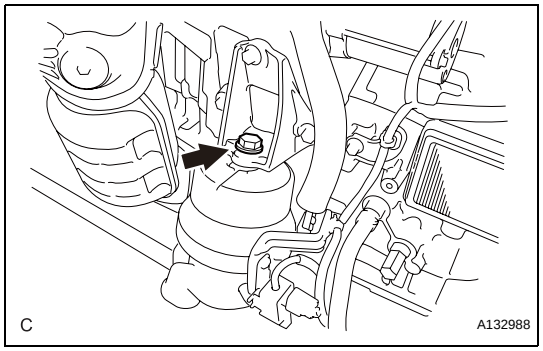
(a) Disconnect the connector and clamp.



(b) Disconnect the 2 clamps.



(c) Remove the 2 nuts and disconnect the engine mounting insulators RH and LH.



(d) Remove the bolt and disconnect the engine mounting insulator FR.

62. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)

63. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)

64. REMOVE ENGINE WIRE

65. REMOVE STARTER ASSEMBLY (See page ST-141)

66. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

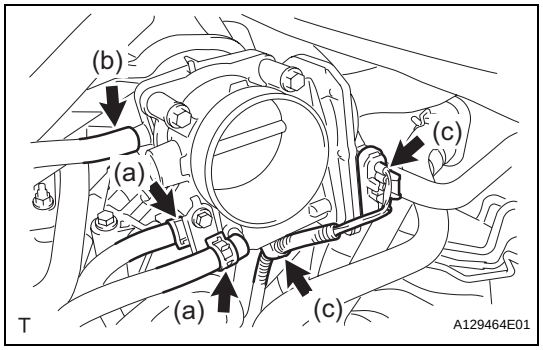
HINT:

See page AX-207.

67. REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (See page EM-12)

68. SECURE ENGINE

(a) Secure the engine onto an engine stand with the bolts.



69. REMOVE INTAKE AIR SURGE TANK ASSEMBLY

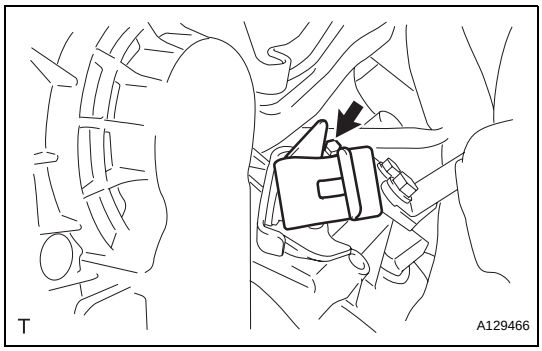
(a) Disconnect the 2 water by-pass hoses from the throttle with motor body assembly.

(b) Disconnect the vapor feed hose.

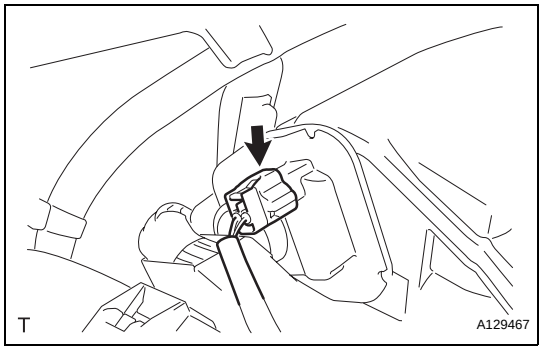
(c) Disconnect the throttle with motor body assembly connector and clamp.

(d) Disconnect the No. 1 ventilation hose.

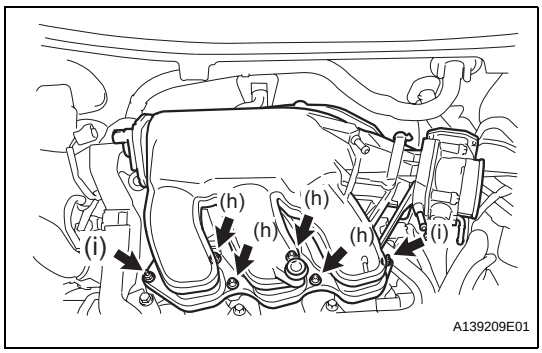
EM



(e) Remove the bolt and vacuum hose clamp.



(f) Disconnect the connector.
(g) Remove the 4 bolts, No. 1 surge tank stay and throttle body bracket.



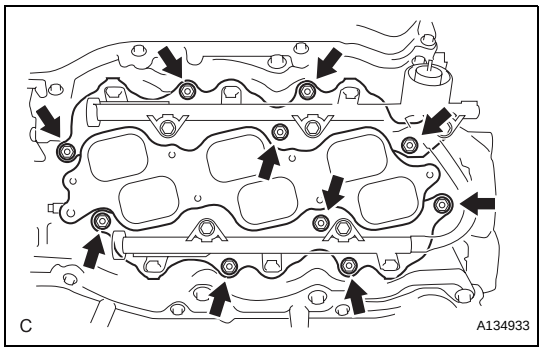
(h) Using a 5 mm socket hexagon wrench, remove the 4 bolts.
(i) Remove the 2 nuts and intake air surge tank.
(j) Remove the gasket from the intake air surge tank.

70. REMOVE IGNITION COIL ASSEMBLY

(a) Remove the 6 bolts and 6 ignition coils.

71. REMOVE NO. 2 ENGINE MOUNTING STAY RH

(a) Remove the bolt and No. 2 engine mounting stay RH.

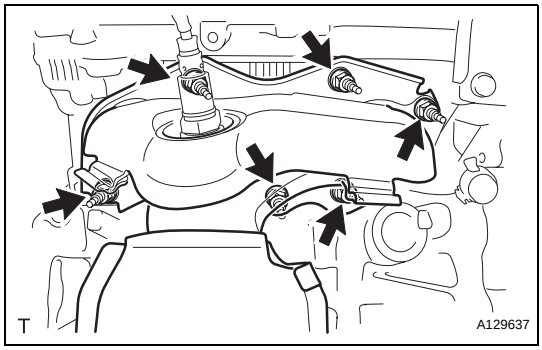


72. REMOVE INTAKE MANIFOLD

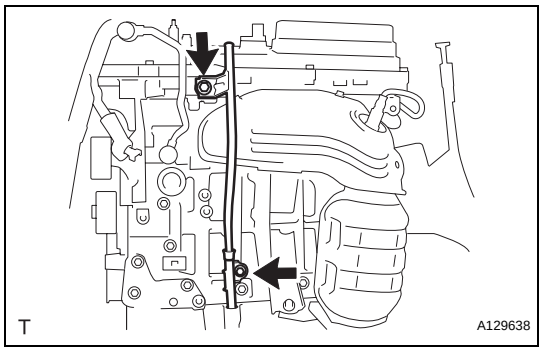
(a) Uniformly loosen and remove the 6 bolts and 4 nuts.
(b) Remove the intake manifold and 2 gaskets.

73. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH

(a) Disconnect the A/F sensor connector clamp.

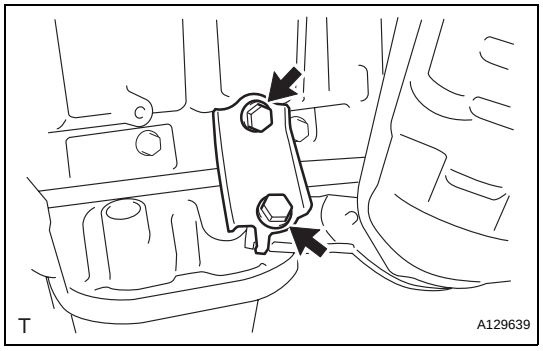


(b) Uniformly loosen and remove the 6 nuts.
(c) Remove the manifold and gasket.



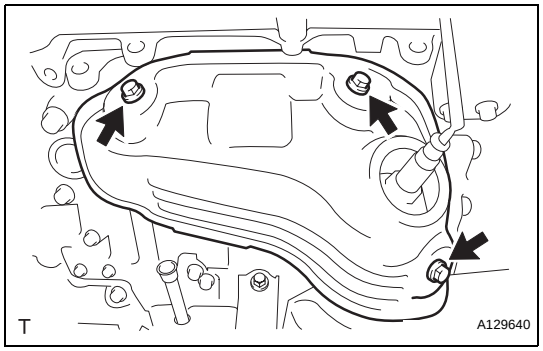
74. REMOVE OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY

(a) Remove the oil level gauge.
(b) Remove the 2 bolts, oil level gauge guides No. 1 and No. 2.
(c) Remove the O-rings from the oil level gauge guide.



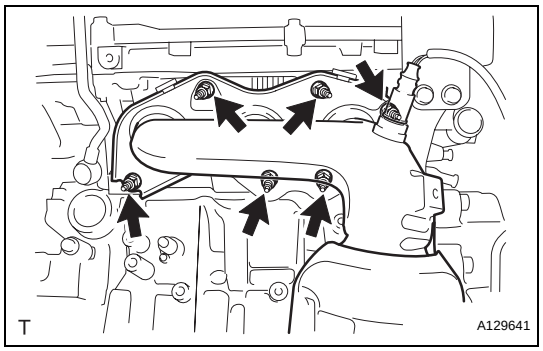
75. REMOVE NO. 2 MANIFOLD STAY

(a) Remove the 2 bolts and No. 2 manifold stay.



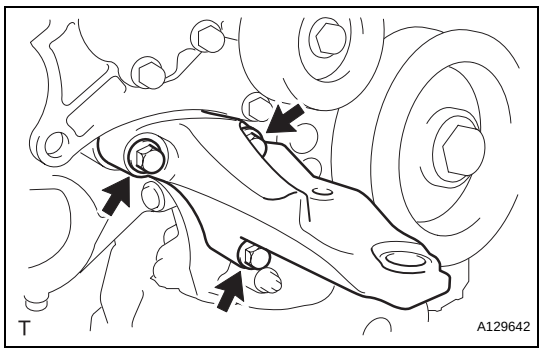
76. REMOVE NO. 2 EXHAUST MANIFOLD HEAT INSULATOR

(a) Remove the 3 bolts and No. 2 insulator.



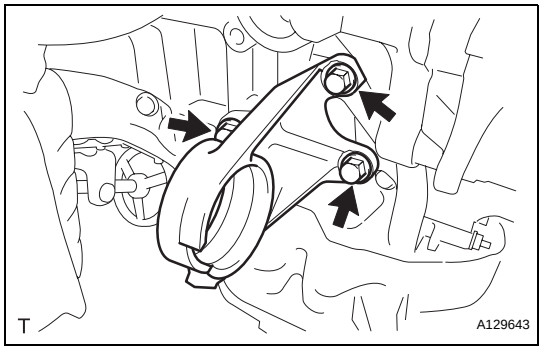
77. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY LH

(a) Uniformly loosen and remove the 6 nuts.
(b) Remove the manifold and gasket.



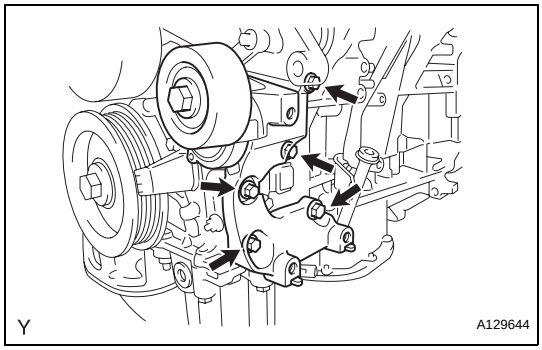
78. REMOVE ENGINE MOUNTING BRACKET RH

(a) Remove the 3 bolts and engine mounting bracket RH.



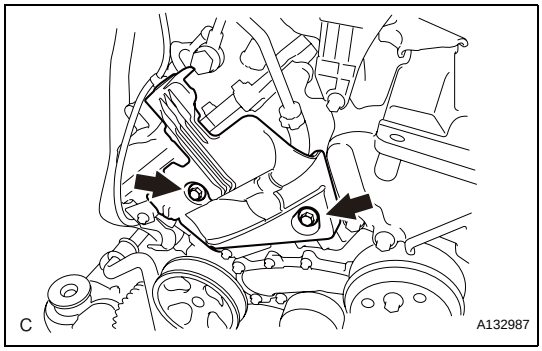
79. REMOVE DRIVE SHAFT BEARING BRACKET

(a) Remove the 3 bolts and drive shaft bearing bracket.



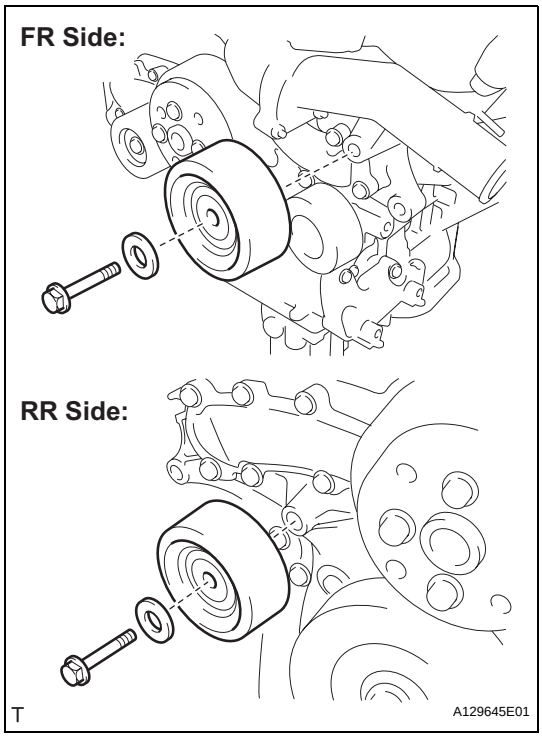
80. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

(a) Remove the 5 bolts and V-ribbed belt tensioner assembly.



81. REMOVE NO. 2 TIMING GEAR COVER

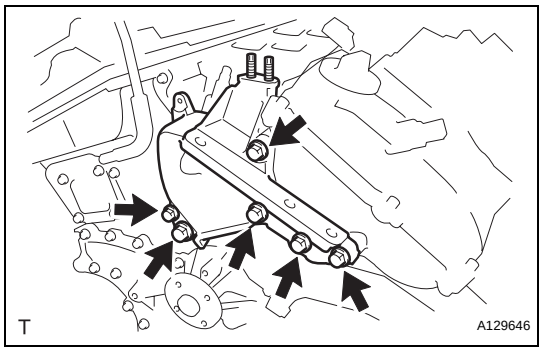
(a) Remove the 2 bolts and No. 2 timing gear cover.



82. REMOVE NO. 2 IDLER PULLEY SUB-ASSEMBLY

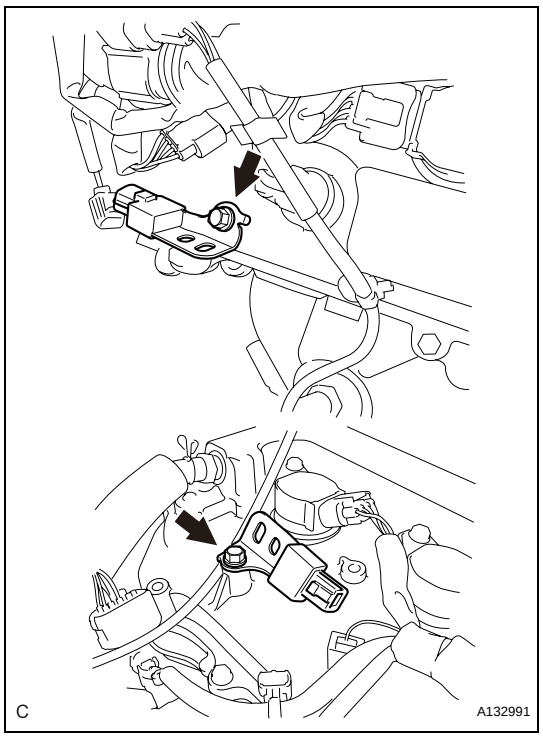
(a) Remove the bolt, plate and No. 2 idler pulley sub-assembly.

83. REMOVE WATER PUMP PULLEY (See page CO-8)



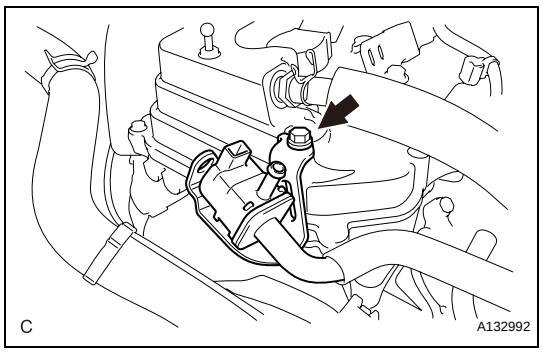
84. REMOVE NO. 1 ENGINE MOUNTING BRACKET FRONT LH

(a) Remove the 6 bolts and No. 1 engine mounting bracket front LH.



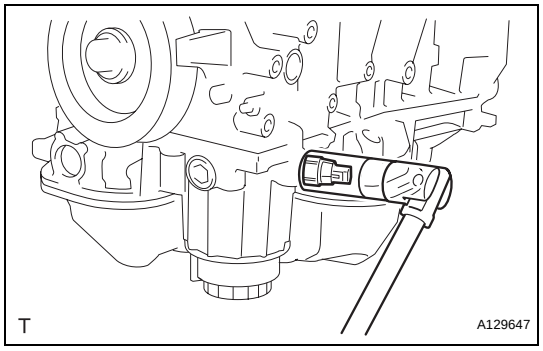
85. REMOVE RADIO SETTING CONDENSER

(a) Remove the 2 bolts and 2 radio setting condensers.



86. REMOVE NO. 1 VACUUM SWITCHING VALVE ASSEMBLY

(a) Remove the bolt and No. 1 vacuum switching valve.

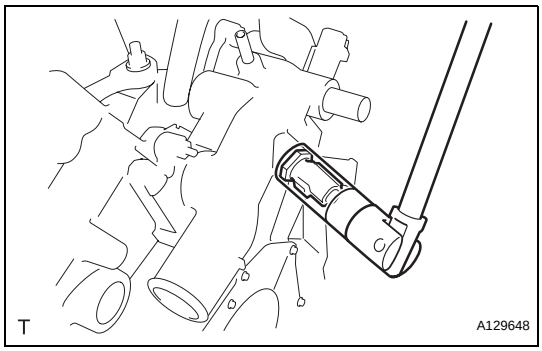


87. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Using a 24 mm deep socket wrench, remove the engine oil pressure switch assembly.

88. REMOVE KNOCK CONTROL SENSOR (See page ES-511)

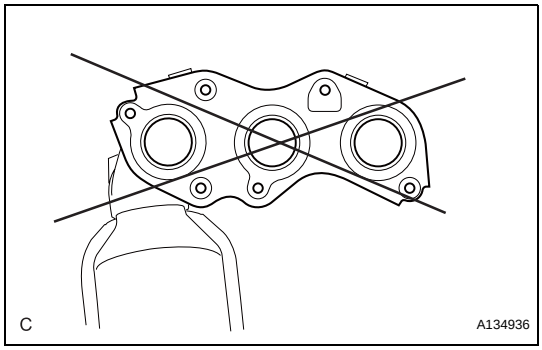
EM



89. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

(a) Using a 19 mm deep socket wrench, remove the EFI engine coolant temperature sensor and gasket.

INSPECTION



1. INSPECT EXHAUST MANIFOLD SUB-ASSEMBLY LH

(a) Using a precision straightedge and feeler gauge, measure the warpage on the contact surface of the cylinder head.

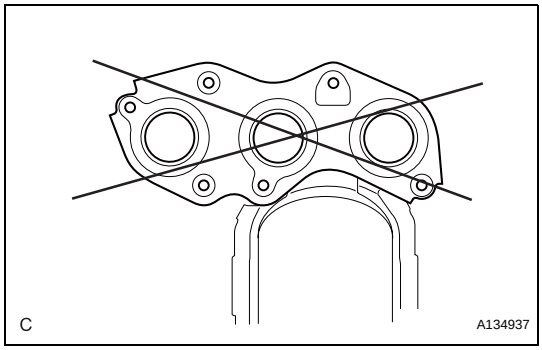
Maximum warpage:

0.7 mm (0.028 in.)

HINT:

The maximum allowable warpage of each installation surface is 0.3 mm (0.012 in.).

If the warpage is greater than the maximum, replace the manifold.



2. INSPECT EXHAUST MANIFOLD SUB-ASSEMBLY RH

(a) Using a precision straightedge and feeler gauge, measure the warpage on the contact surface of the cylinder head.

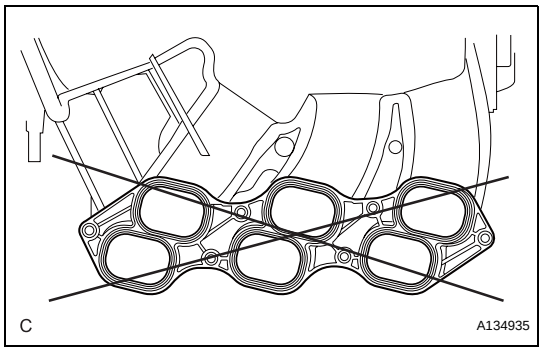
Maximum warpage:

0.7 mm (0.028 in.)

HINT:

The maximum allowable warpage of each installation surface is 0.3 mm (0.012 in.).

If the warpage is greater than the maximum, replace the manifold.



3. INSPECT INTAKE AIR SURGE TANK ASSEMBLY

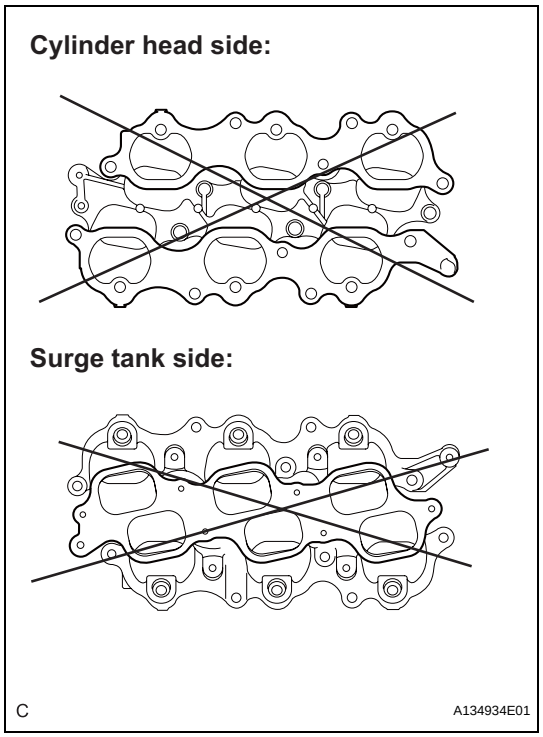
(a) Using a precision straightedge and feeler gauge, measure the warpage on the contact surface of the intake manifold.

Maximum warpage:

2.5 mm (0.098 in.)

If the warpage is greater than the maximum, replace the surge tank.

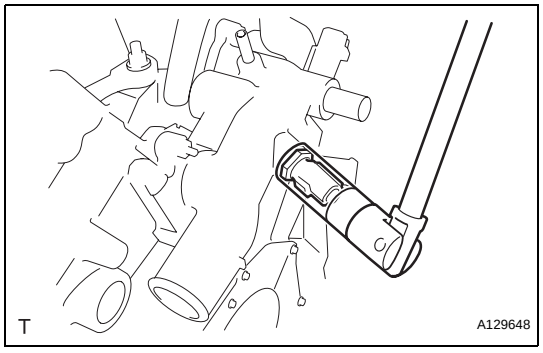
EM



4. **INSPECT INTAKE MANIFOLD**
   (a) Cylinder head side:
      (1) Using a precision straightedge and feeler gauge, measure the surface contacting the cylinder head for warpage.
      Maximum warpage:
      0.1 mm (0.003 in.)
      If the warpage is greater than the maximum, replace the intake manifold.
   (b) Surge tank side:
      (1) Using a precision straightedge and feeler gauge, measure the surface contacting the surge tank for warpage.
      Maximum warpage:
      0.1 mm (0.003 in.)
      If the warpage is greater than the maximum, replace the intake manifold.

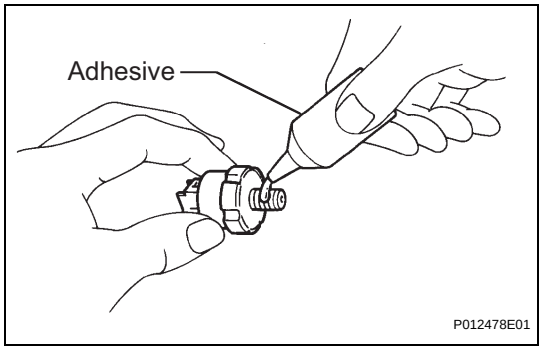
EM

INSTALLATION

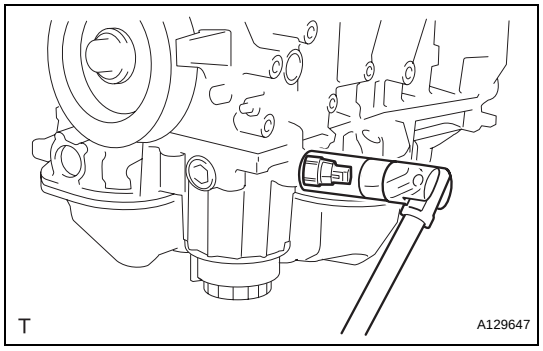


1. **INSTALL ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Using a 19 mm deep socket wrench, install the engine coolant temperature sensor and a new gasket.
   Torque: 20 N*m (200 kgf*cm, 14 ft.*lbf)

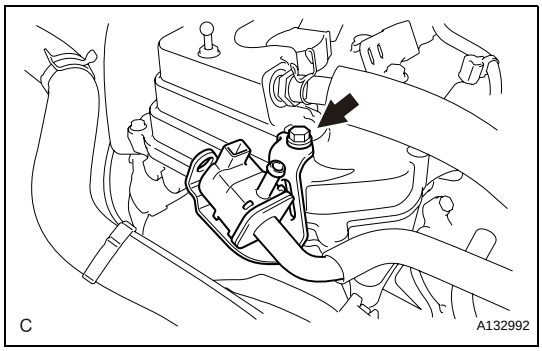
2. **INSTALL KNOCK CONTROL SENSOR (See page ES-511)**



3. **INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY**
   (a) Clean the threads of the oil pressure switch. Apply adhesive to 2 or 3 threads of the oil pressure switch.
   Adhesive:
   Part No. 08833-00080 THREE BOND 1344, LOCTITE 242 or equivalent

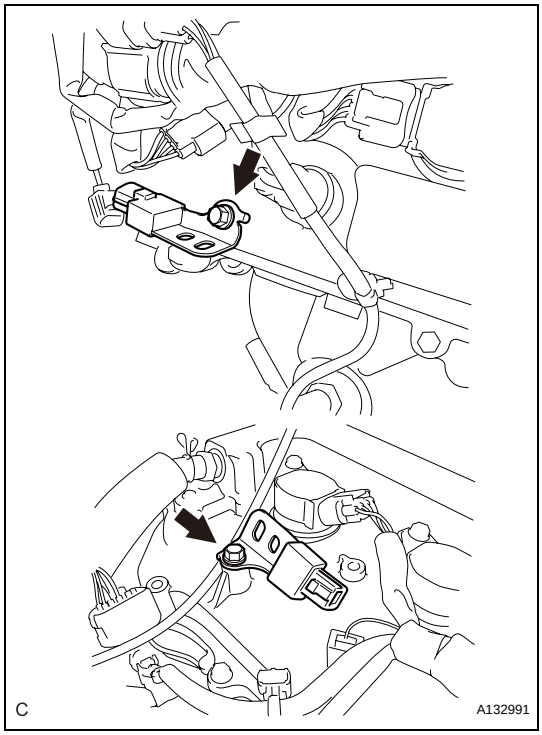


   (b) Using a 24 mm deep socket wrench, install the oil pressure switch.
   Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
   NOTICE:
   Do not start the engine within 1 hour after installation to prevent oil leaks.



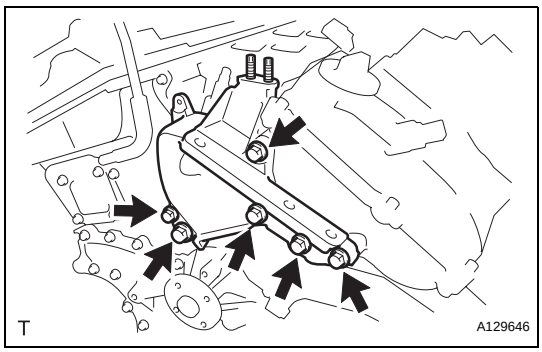
4. INSTALL NO. 1 VACUUM SWITCHING VALVE ASSEMBLY

(a) Install the bolt and No. 1 vacuum switching valve.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



5. INSTALL RADIO SETTING CONDENSER

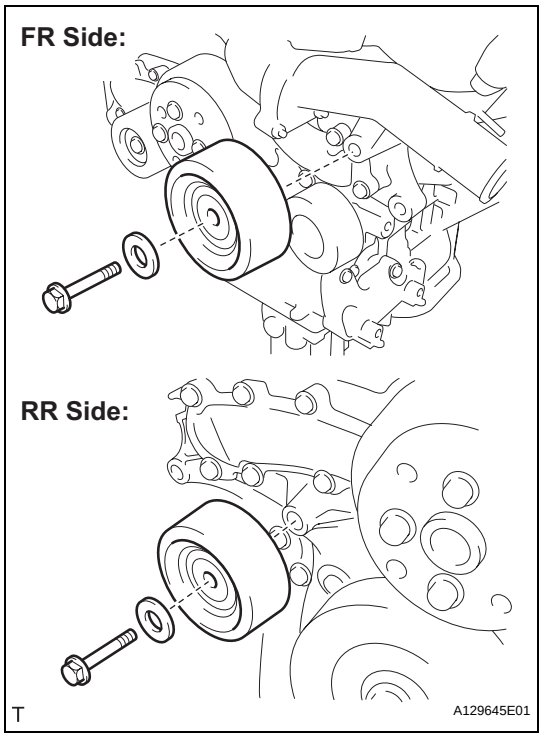
(a) Install the 2 bolts and 2 radio setting condensers.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



6. INSTALL NO. 1 ENGINE MOUNTING BRACKET FRONT LH

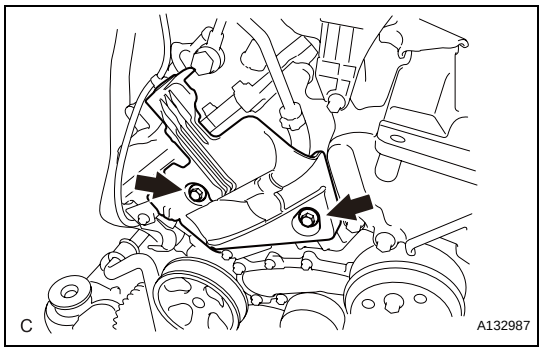
(a) Install the No. 1 engine mounting bracket front LH with the 6 bolts.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

7. INSTALL WATER PUMP PULLEY (See page CO-10)



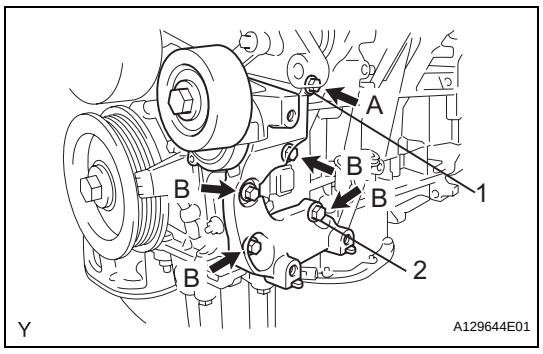
8. INSTALL NO. 2 IDLER PULLEY SUB-ASSEMBLY

(a) Install the No. 2 idler pulley sub-assembly and cover plate with the bolt.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



9. INSTALL NO. 2 TIMING GEAR COVER

(a) Install the No. 2 timing gear cover with the 2 bolts.
Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

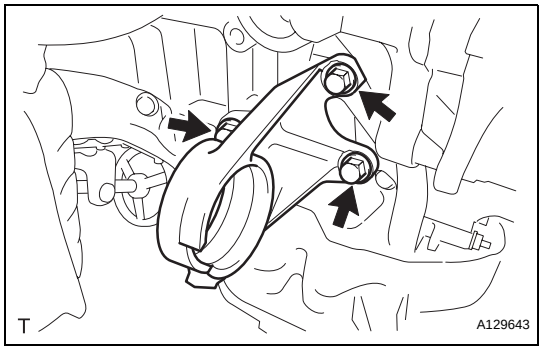


10. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

(a) Temporarily install the V-ribbed belt tensioner with the 5 bolts.
HINT:
Each bolt length is as follows:
A: 70 mm (2.76 in.)
B: 33 mm (1.30 in.)

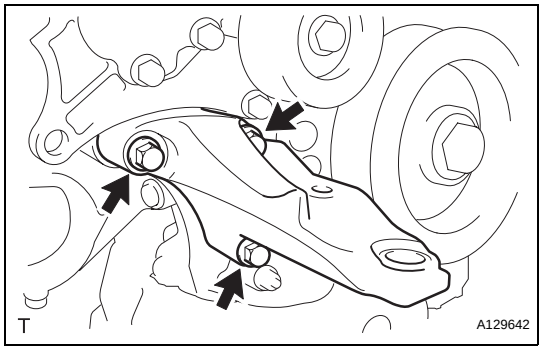
(b) Install the V-ribbed belt tensioner by tightening the bolt 1 and bolt 2 in the order shown in the illustration.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

(c) Tighten the other bolts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



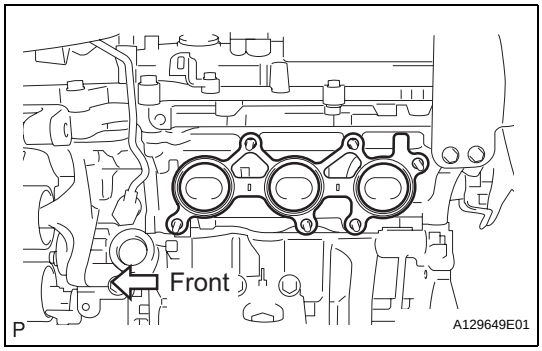
11. INSTALL DRIVE SHAFT BEARING BRACKET

(a) Install the drive shaft bearing bracket with the 3 bolts.
Torque: 64 N*m (650 kgf*cm, 47 ft.*lbf)



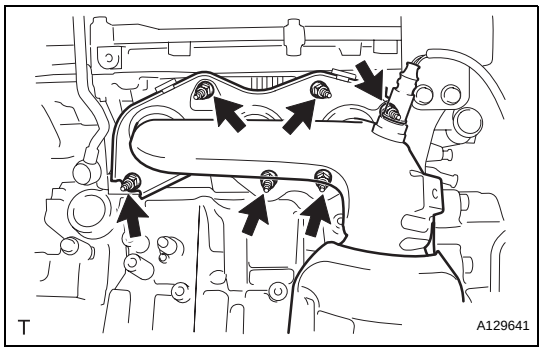
12. INSTALL ENGINE MOUNTING BRACKET RH

(a) Install the engine mounting bracket RH with the 3 bolts.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

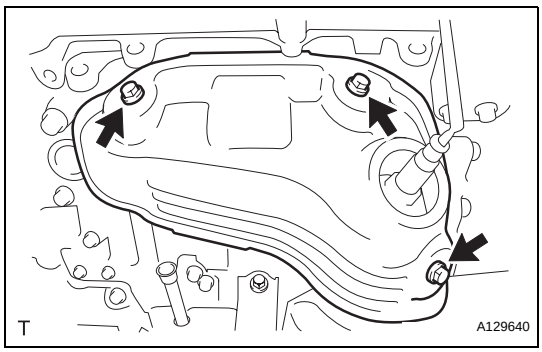


13. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY LH

(a) Install a new gasket as shown in the illustration.

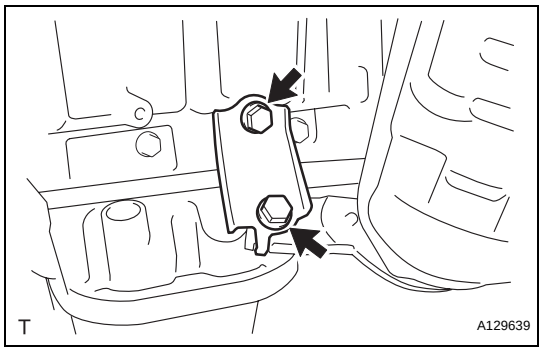


(b) Install the exhaust manifold sub-assembly LH with the 6 nuts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)



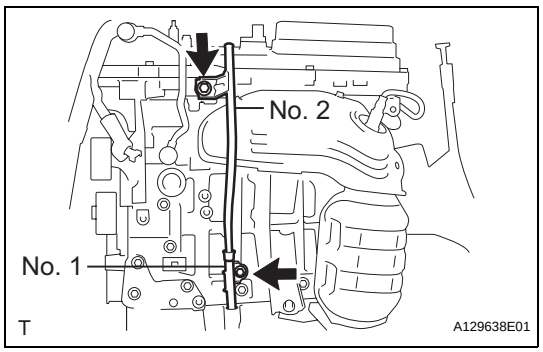
14. INSTALL NO. 2 EXHAUST MANIFOLD HEAT INSULATOR

(a) Install the No. 2 insulator with the 3 bolts.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)



15. INSTALL NO. 2 MANIFOLD STAY

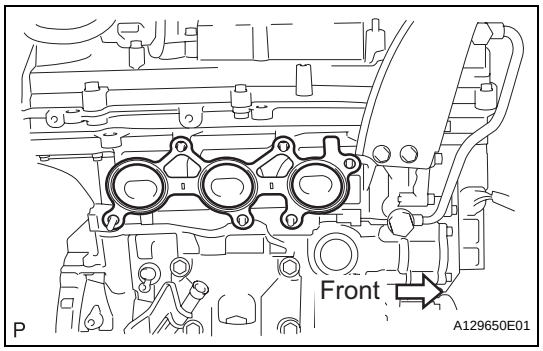
(a) Install the No. 2 manifold stay with the 2 bolts.
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)



16. INSTALL OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY

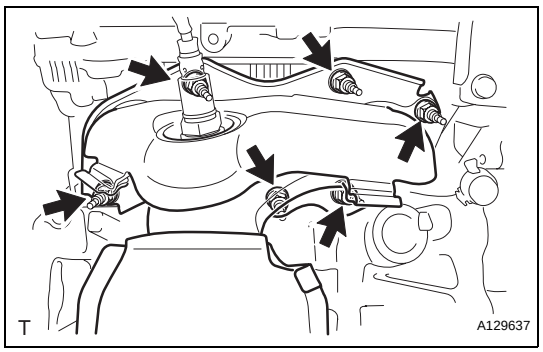
(a) Install 2 new O-rings to the oil level gauge guide.
(b) Apply a light coat of engine oil to the O-rings.
(c) Push in the oil level gauge guide end into the guide hole.
(d) Install the oil level gauge guide No. 1 with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
(e) Install the oil level gauge guide No. 2 with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
(f) Install the oil level gauge.

EM

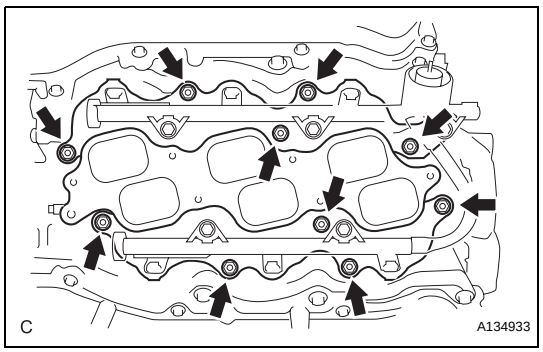


17. INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY RH

(a) Install a new gasket as shown in the illustration.



(b) Install the exhaust manifold sub-assembly RH with the 6 nuts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)



18. INSTALL INTAKE MANIFOLD

(a) Set a new gasket on each cylinder head.
NOTICE:
- **Align the port holes of the gasket and cylinder head.**
- **Make sure that the gasket is installed in the correct direction.**

(b) Set the intake manifold on the cylinder heads.

(c) Install and tighten the 6 bolts and 4 nuts uniformly in several steps.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

19. INSTALL NO. 2 ENGINE MOUNTING STAY RH

(a) Install the No. 2 mounting stay RH with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

20. INSTALL IGNITION COIL ASSEMBLY

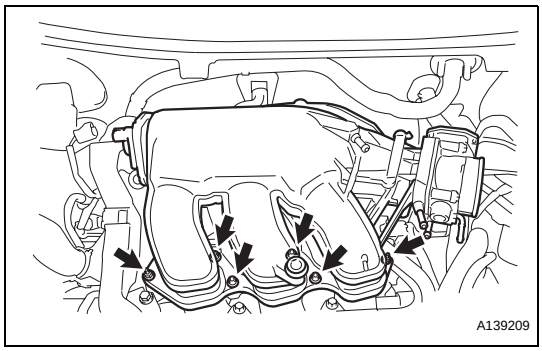
(a) Install the 6 ignition coil assemblies with the 6 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

21. INSTALL INTAKE AIR SURGE TANK ASSEMBLY
NOTICE:
DO NOT apply oil to the bolts as listed below

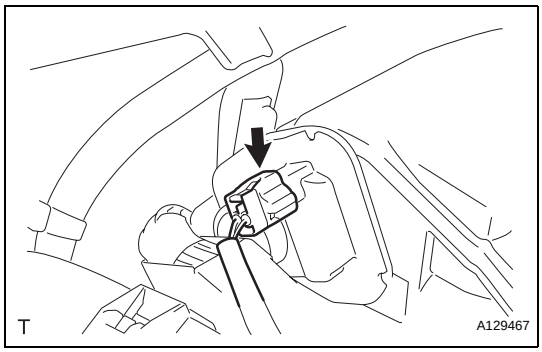
Tightening Parts	Torque N*m (kgf*cm, ft.*lbf)	QTY
Surge Tank and Intake Manifold	18 (184, 13)	4
No. 1 Surge Tank Stay and Cylinder Head Cover	21 (214, 15)	1
No. 1 Surge Tank Stay and Surge Tank	21 (214, 15)	1
Throttle Body Bracket and Cylinder Head Cover	21 (214, 15)	1
Throttle Body Bracket and Surge Tank	21 (214, 15)	1

(a) Install a new gasket to the intake air surge tank.

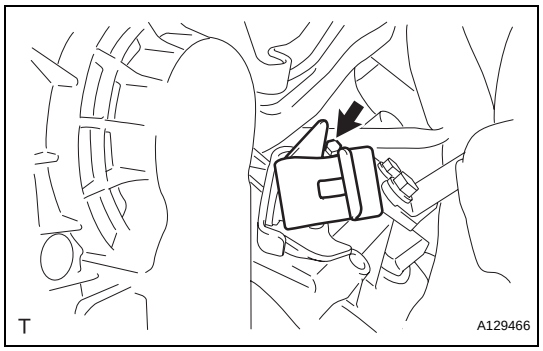
(b) Using a 5 mm hexagon socket wrench, install the 4 bolts and 2 nuts.
Torque: Bolt
18 N*m (184 kgf*cm, 13 ft.*lbf)
Nut
16 N*m (163 kgf*cm, 12 ft.*lbf)



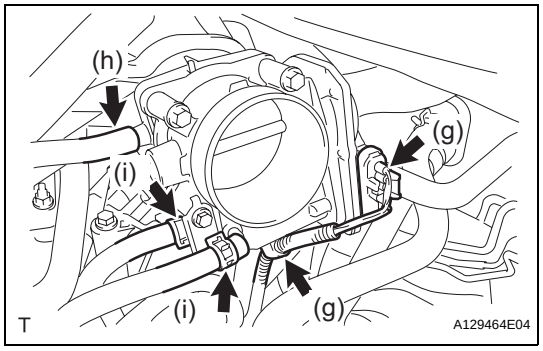
(c) Install the throttle body bracket, No. 1 surge tank stay and 4 bolts.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)



(d) Connect the connector.



(e) Install the vacuum hose clamp with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
(f) Connect the No. 1 ventilation hose.



(g) Install the clamp and connect the throttle with motor body assembly connector.
(h) Connect the vapor feed hose.
(i) Connect the 2 water by-pass hoses to the throttle with motor body assembly.

22. REMOVE ENGINE STAND

23. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (See page EM-13)

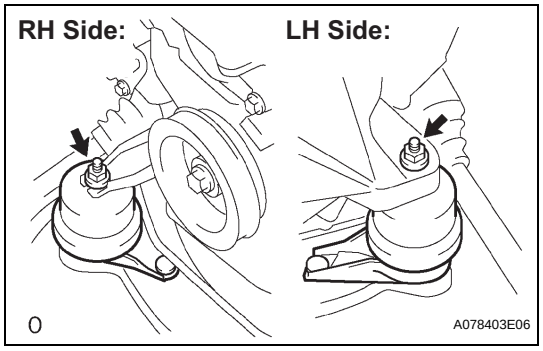
24. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY
HINT:
See page AX-214.

25. INSTALL STARTER ASSEMBLY (See page ST-148)

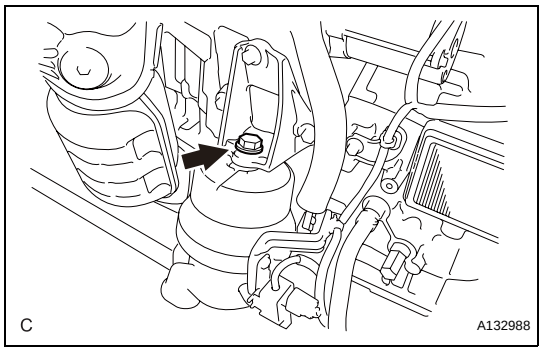
26. INSTALL ENGINE WIRE

27. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)

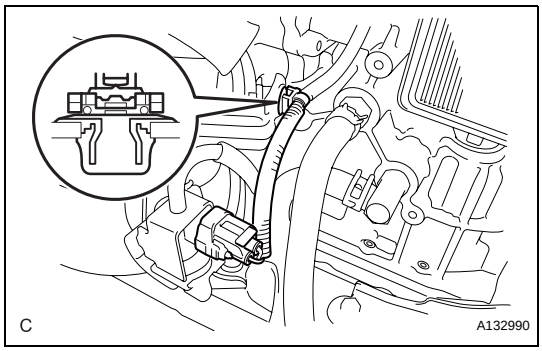
28. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)



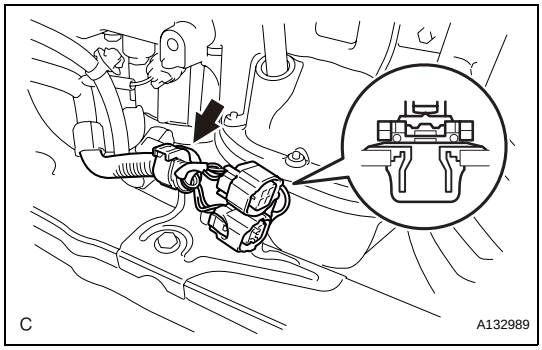
29. INSTALL FRONT FRAME ASSEMBLY
(a) Install the engine mounting insulators RH and LH with the 2 nuts.
Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)



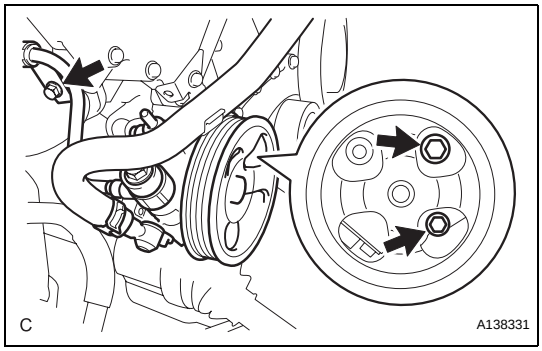
(b) Install the engine mounting insulator FR with the bolt.
Torque: 87 N*m (887 kgf*cm, 64 ft.*lbf)



(c) Connect the connector and clamp.



(d) Connect the 2 clamps.

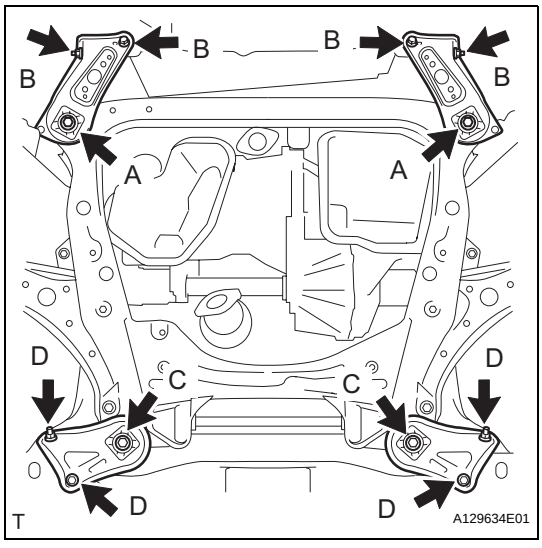


30. INSTALL VANE PUMP ASSEMBLY

(a) Install the vane pump with the 2 bolts.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

(b) Install the pressure feed tube clamp bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

(c) Connect the power steering oil pressure switch connector.



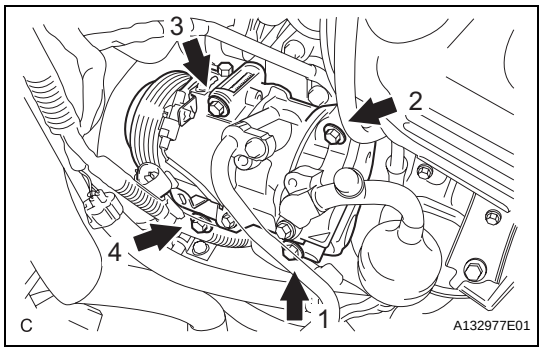
31. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine assembly with transaxle on the engine lifter.

(b) Install the engine assembly to the vehicle.

(c) Install the frame side rail plates RH and LH with the 4 bolts and 2 nuts.
Torque: A
85 N*m (867 kgf*cm, 63 ft.*lbf)
B
32 N*m (329 kgf*cm, 24 ft.*lbf)

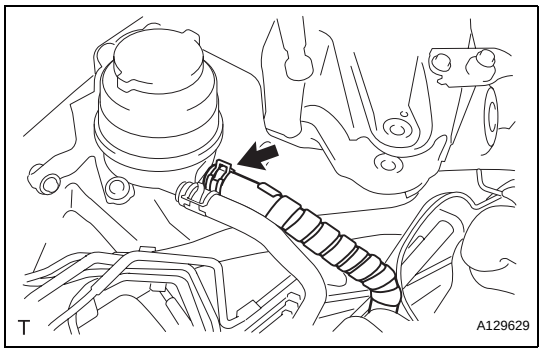
(d) Install the front suspension member brace rear RH and LH with the 4 bolts and 2 nuts.
Torque: C
85 N*m (867 kgf*cm, 63 ft.*lbf)
D
32 N*m (329 kgf*cm, 24 ft.*lbf)



32. **INSTALL COOLER COMPRESSOR ASSEMBLY**
    (a) Temporarily install the cooler compressor with the 4 bolts.
    (b) Install the compressor with the 4 bolts by tightening the bolts in the order shown in the illustration.
    Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)
    (c) Install the 2 connector clamps.
33. **INSTALL GENERATOR ASSEMBLY (See page CH-22)**
34. **INSTALL STEERING SLIDING YOKE (See page PS-65)**
35. **INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT (See page AX-218)**
36. **INSTALL NO. 1 EXHAUST PIPE SUPPORT BRACKET**
    (a) Install the No. 1 exhaust pipe support bracket with the bolt.
    Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
37. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)**
38. **INSTALL FRONT AXLE ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
39. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)**
40. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH**
    HINT:
    Use the same procedures described for the LH side.
41. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**
42. **INSTALL TIE ROD ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
43. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**
44. **INSTALL FRONT SPEED SENSOR RH**
    HINT:
    Use the same procedures described for the LH side.
45. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**
46. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
47. **INSTALL FRONT AXLE HUB NUT LH (See page DS-22)**
48. **INSTALL FRONT AXLE HUB NUT RH**
    HINT:
    Use the same procedures described for the LH side.

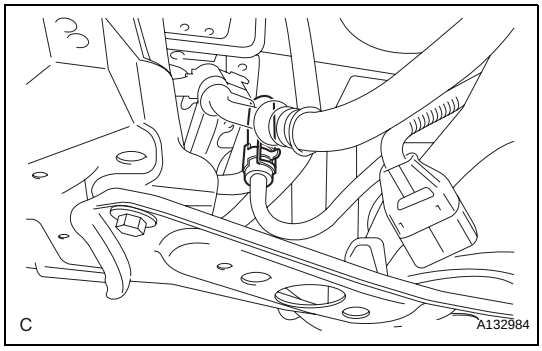
49. INSTALL EXHAUST PIPE ASSEMBLY FRONT (See page EX-4)

50. INSTALL EXHAUST PIPE NO. 1 SUPPORT BRACKET (See page EX-4)



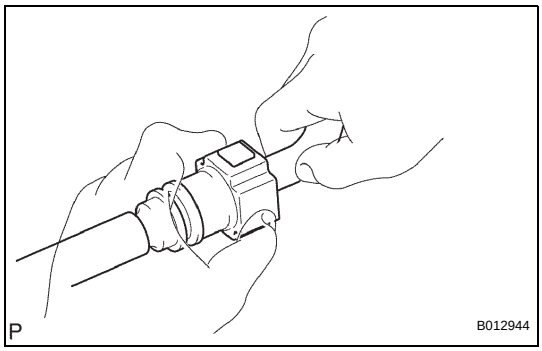
51. CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE

(a) Connect the No. 1 oil reservoir to pump hose.



52. CONNECT RETURN TUBE SUB-ASSEMBLY

(a) Connect the return tube sub-assembly.



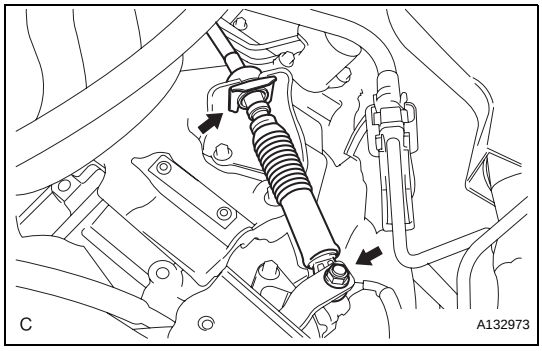
53. CONNECT FUEL TUBE SUB-ASSEMBLY

(a) Push in the fuel tube connector to the fuel pipe until the connector makes a "click" sound.

NOTICE:

- **Check for damage or contamination on the connected part of the pipe.**
- **Check if the pipe and the connector are securely connected by trying to pull them apart.**

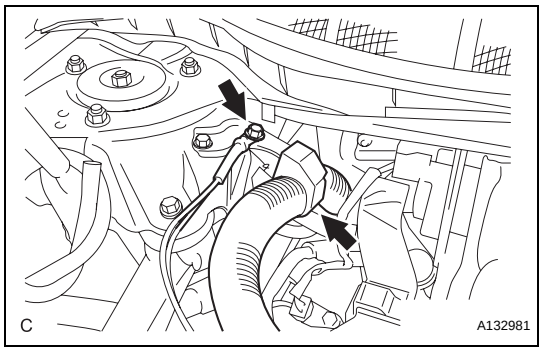
(b) Install the No. 1 fuel pipe clamp.



54. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

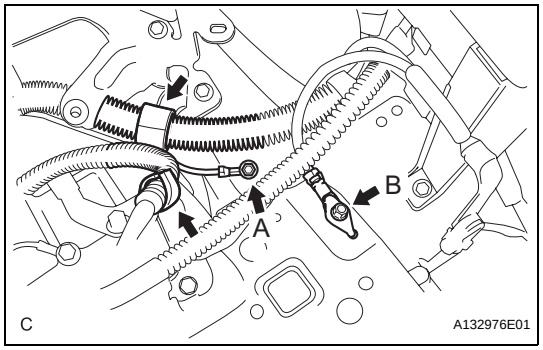
(a) Install the clip and nut, and connect the cable to the transaxle.

Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



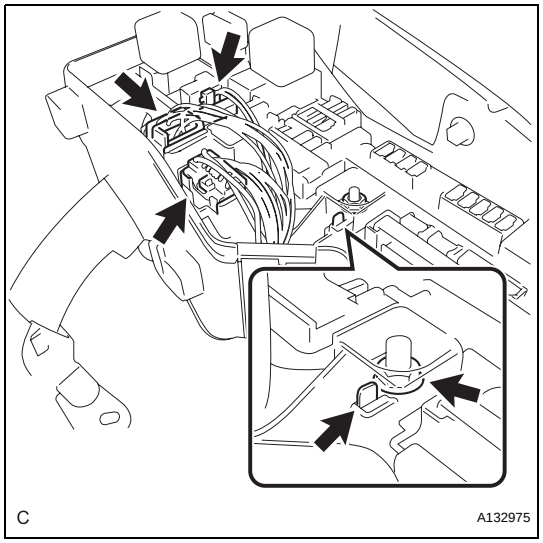
55. CONNECT ENGINE WIRE

(a) Install the bolt and clamp to the bracket.
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)



(b) Install the 2 bolts and 2 clamps to the body.
Torque: Bolt A
12 N*m (123 kgf*cm, 9 ft.*lbf)
Bolt B
8.4 N*m (85 kgf*cm, 74 in.*lbf)

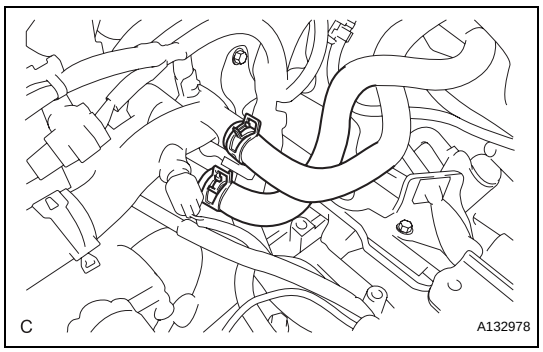
EM



(c) Connect the wire to the engine room junction block. Then, install it with the nut and 3 connectors.
Torque: 8.4 N*m (85 kgf*cm, 74 in.*lbf)

56. INSTALL RELAY BLOCK COVER UPPER

57. INSTALL ECM (See page ES-519)

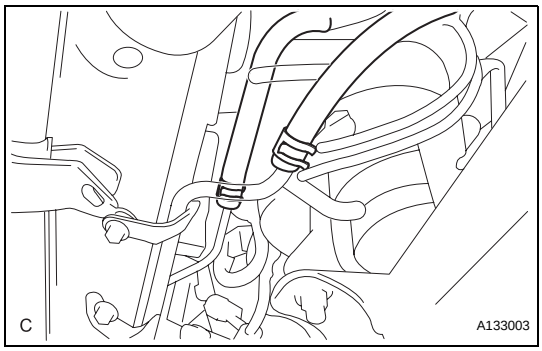


58. CONNECT HEATER INLET WATER HOSE

(a) Connect the heater inlet water hose.

59. CONNECT HEATER OUTLET WATER HOSE

(a) Connect the heater outlet water hose.

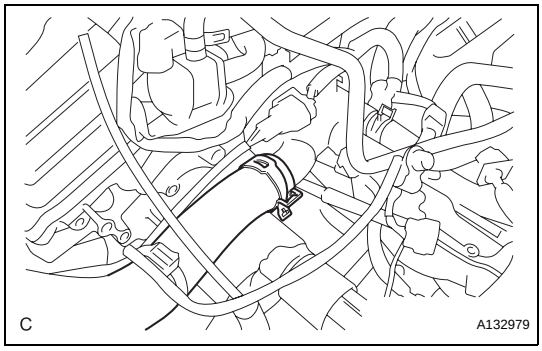


60. CONNECT NO. 1 OIL COOLER INLET HOSE

(a) Install the clamp and connect the oil cooler inlet hose.

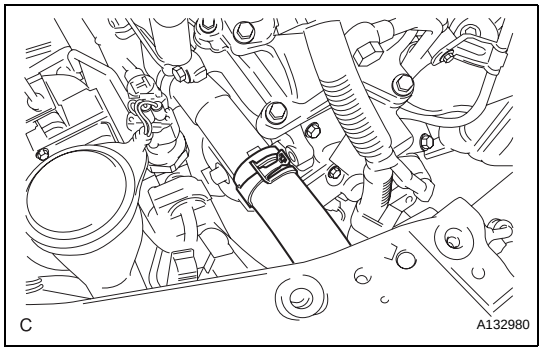
61. CONNECT NO. 1 OIL COOLER OUTLET HOSE

(a) Install the clamp and connect the oil cooler outlet hose.



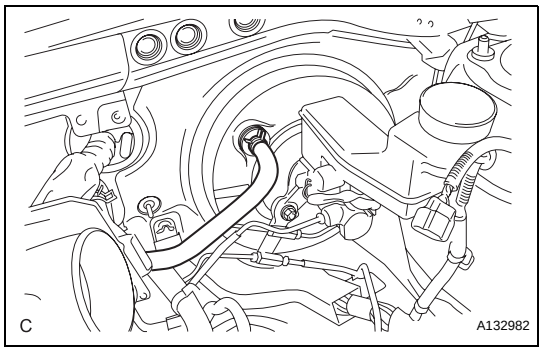
62. INSTALL RADIATOR HOSE INLET

(a) Install the clamp and connect the radiator hose inlet.



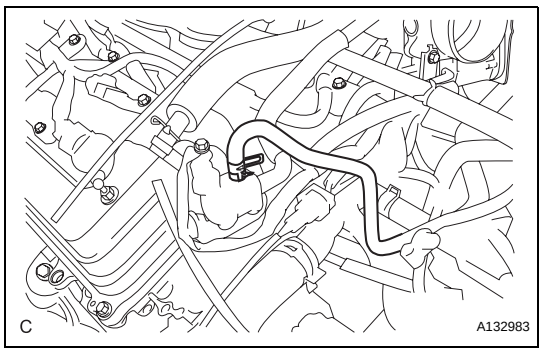
63. INSTALL RADIATOR HOSE OUTLET

(a) Install the clamp and connect the radiator hose outlet.



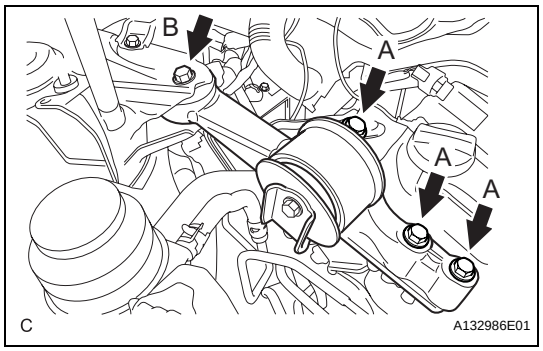
64. CONNECT CHECK VALVE TO BRAKE BOOSTER HOSE

(a) Install the clamp and connect the check valve to brake booster hose.



65. CONNECT NO. 1 FUEL VAPOR FEED HOSE

(a) Install the clamp and connect the No. 1 fuel vapor feed hose.

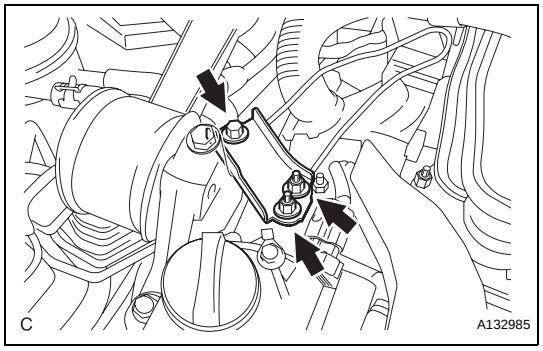


66. INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY

(a) Temporarily install the engine moving control rod with the 4 bolts.

(b) First install the bolts A, and then the remaining bolt B.

Torque: 38 N*m (388 kgf*cm, 28 ft.*lbf)



67. INSTALL NO. 2 ENGINE MOUNTING STAY RH

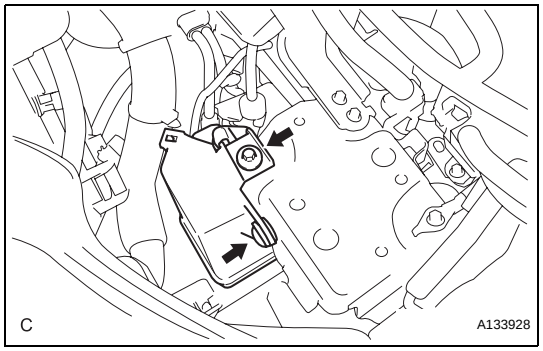
(a) Temporarily install the No. 2 engine mounting stay RH with the bolt.

Torque: 38 N*m (388 kgf*cm, 28 ft.*lbf)

(b) Tighten the 2 nuts.

Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

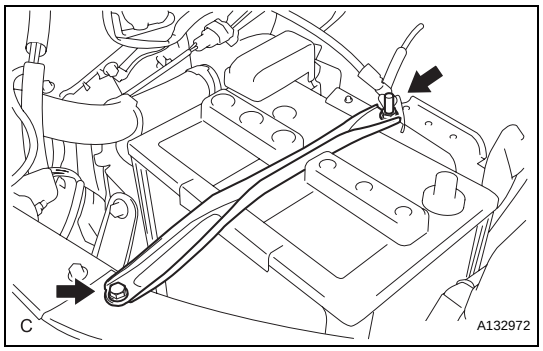
EM



68. INSTALL INTAKE AIR RESONATOR SUB-ASSEMBLY

(a) Install the intake air resonator with the bolt and clip.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



69. INSTALL BATTERY

(a) Install the battery and battery tray.

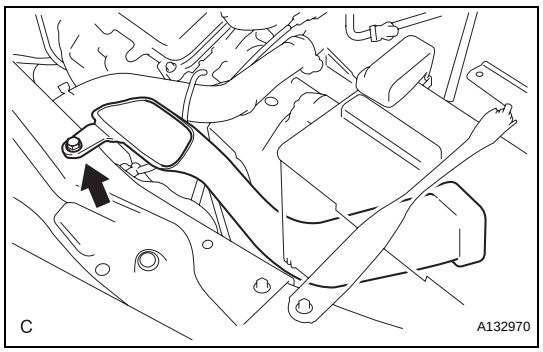
(b) Install the battery clamp with the bolt and nut.

Torque: Bolt

9.0 N*m (92 kgf*cm, 80 in.*lbf)

Nut

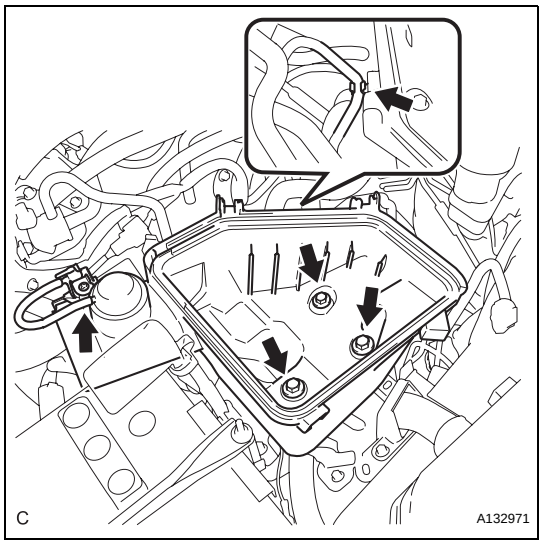
3.5 N*m (36 kgf*cm, 31 in.*lbf)



70. INSTALL NO. 1 AIR CLEANER INLET

(a) Install the No. 1 air cleaner inlet with the bolt.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

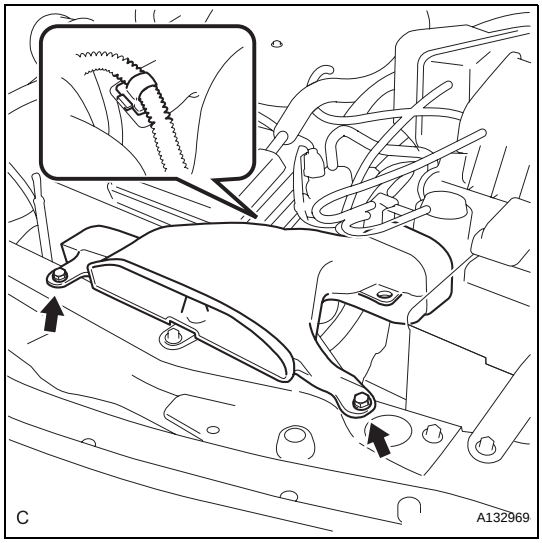


71. INSTALL AIR CLEANER CASE SUB-ASSEMBLY

(a) Install the air cleaner case with the 3 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

(b) Connect the vacuum hose and hose clamp.

72. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)

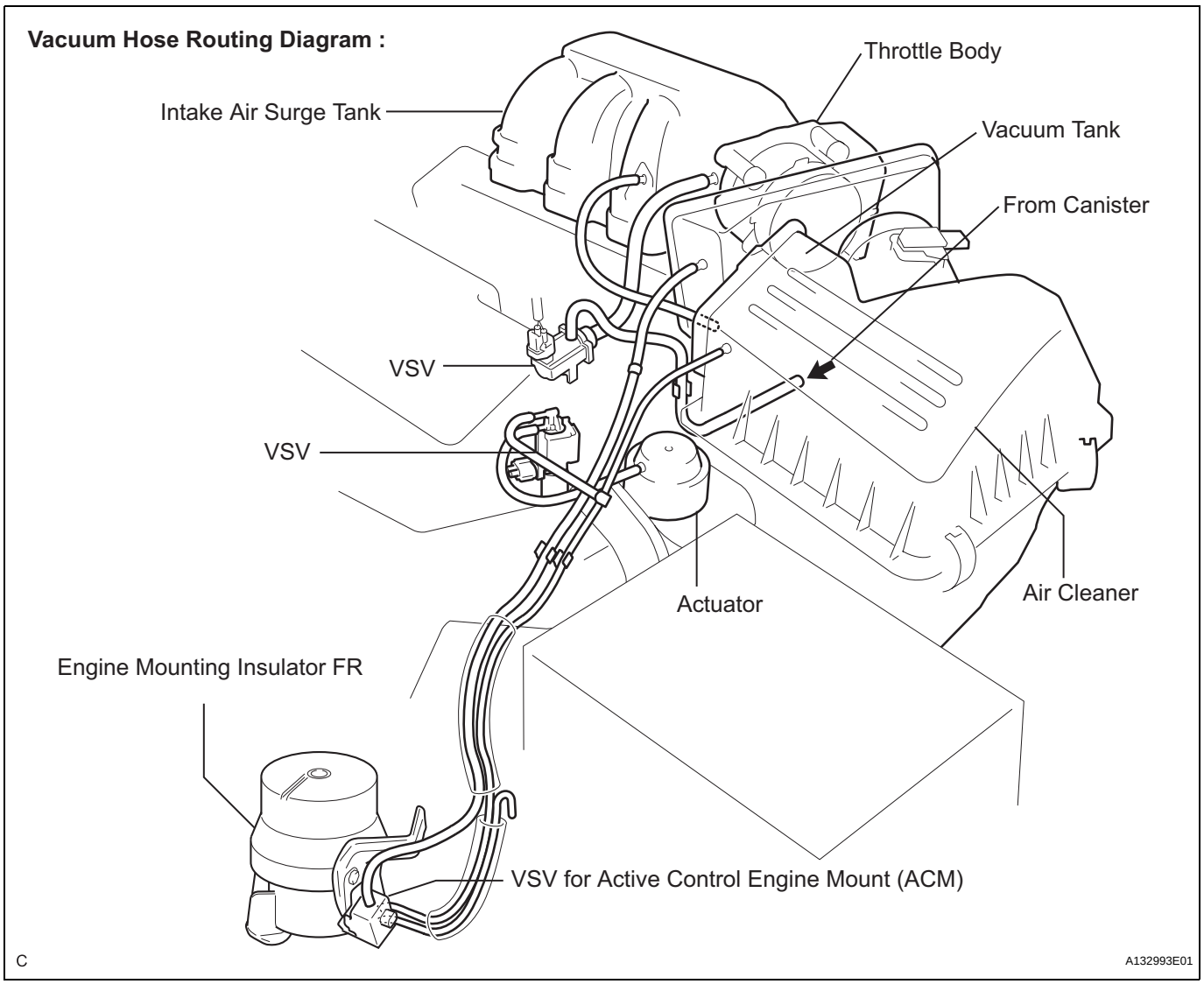


73. INSTALL AIR CLEANER INLET ASSEMBLY

(a) Install the air cleaner inlet with the clamp and 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

EM

74. CONNECT VACUUM HOSES



EM

75. **INSTALL V-RIBBED BELT (See page EM-7)**

76. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)**

77. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY**
HINT:
See page WW-13.

78. **INSTALL FRONT WHEELS**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

79. **ADD ENGINE OIL**

80. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

81. **ADD ENGINE COOLANT (See page CO-6)**

82. **ADD AUTOMATIC TRANSAXLE FLUID (See page AX-220)**

83. **ADD POWER STEERING FLUID**

84. BLEED POWER STEERING FLUID (See page PS-7)

85. CHECK FOR FUEL LEAKS (See page FU-8)

86. CHECK FOR ENGINE OIL LEAKS

87. CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)

88. CHECK FOR EXHAUST GAS LEAKS

89. CHECK SHIFT LEVER POSITION (See page AX-191)

90. CHECK AND ADJUST FRONT WHEEL ALIGNMENT
HINT:
See page SP-4.

91. CHECK IGNITION TIMING (See page EM-1)

92. CHECK ENGINE IDLE SPEED (See page EM-2)

93. CHECK CO/HC (See page EM-4)

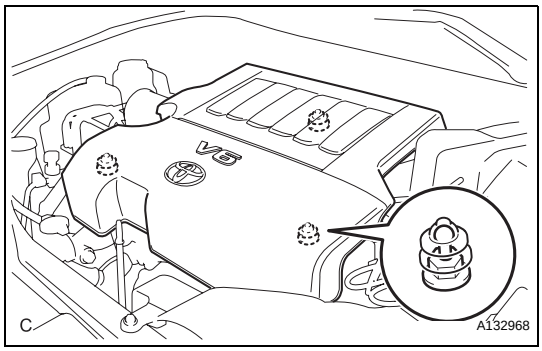
94. CHECK FUNCTION OF THROTTLE BODY (See page ES-503)

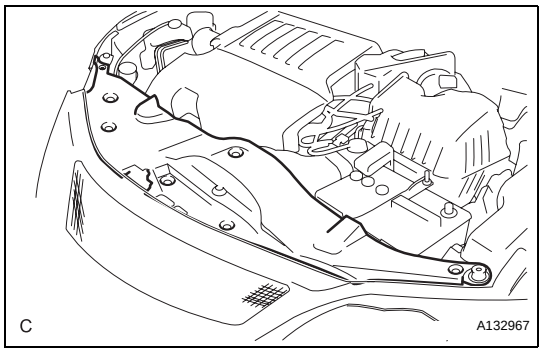
95. INSTALL FRONT FENDER APRON SEAL RH

96. INSTALL ENGINE UNDER COVER LH

97. INSTALL ENGINE UNDER COVER RH

98. INSTALL V-BANK COVER SUB-ASSEMBLY
(a) Fit the 3 retainers and install the V-bank cover.





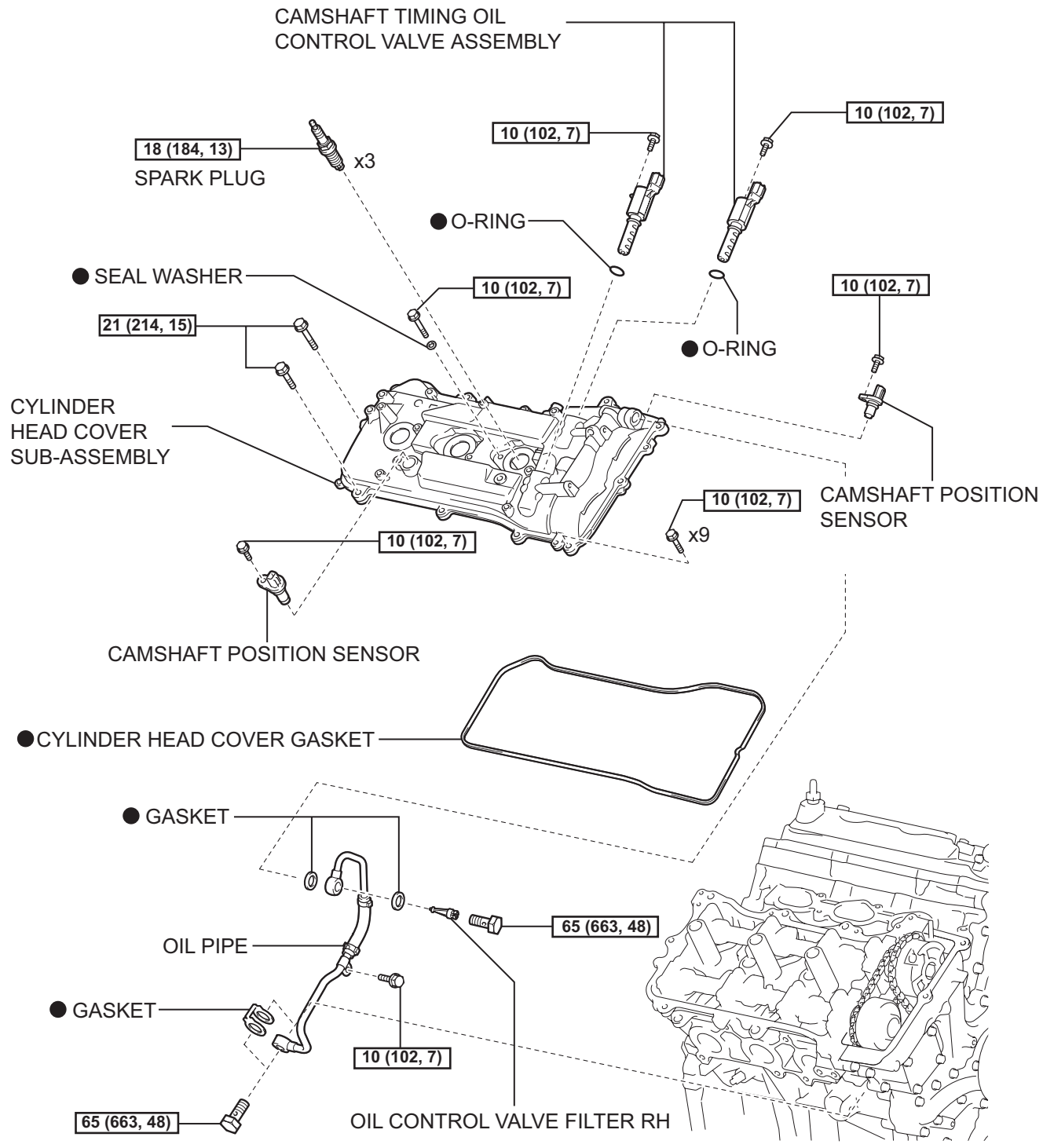
99. INSTALL COOL AIR INTAKE DUCT SEAL
(a) Install the intake duct seal with the 7 clips.

100. CHECK ABS SPEED SENSOR SIGNAL
(a) ABS: (See page BC-11).
(b) VSC (for BOSCH): (See page BC-290).
(c) VSC (for ADVICS): (See page BC-123).

ENGINE UNIT

COMPONENTS

RH SIDE:

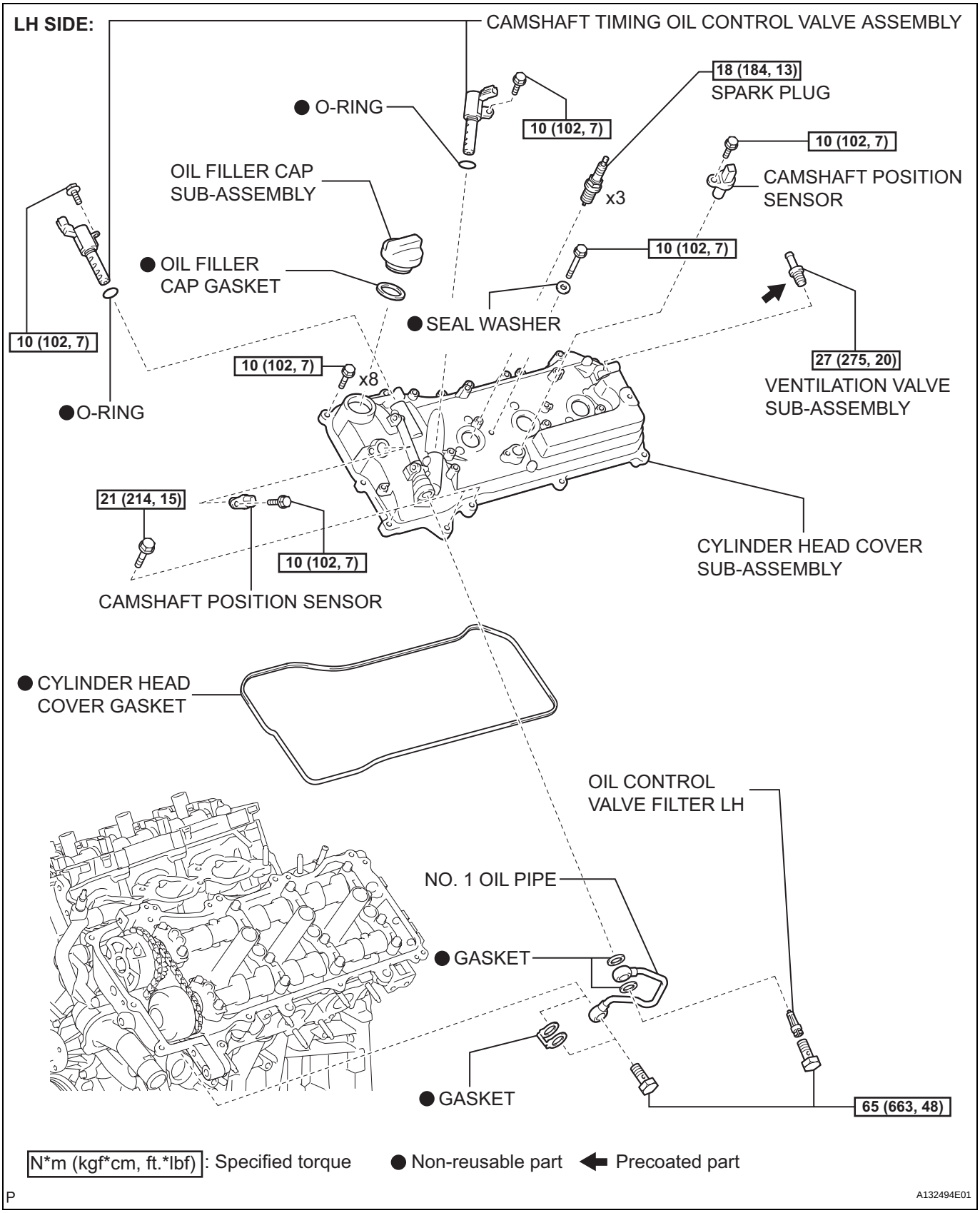


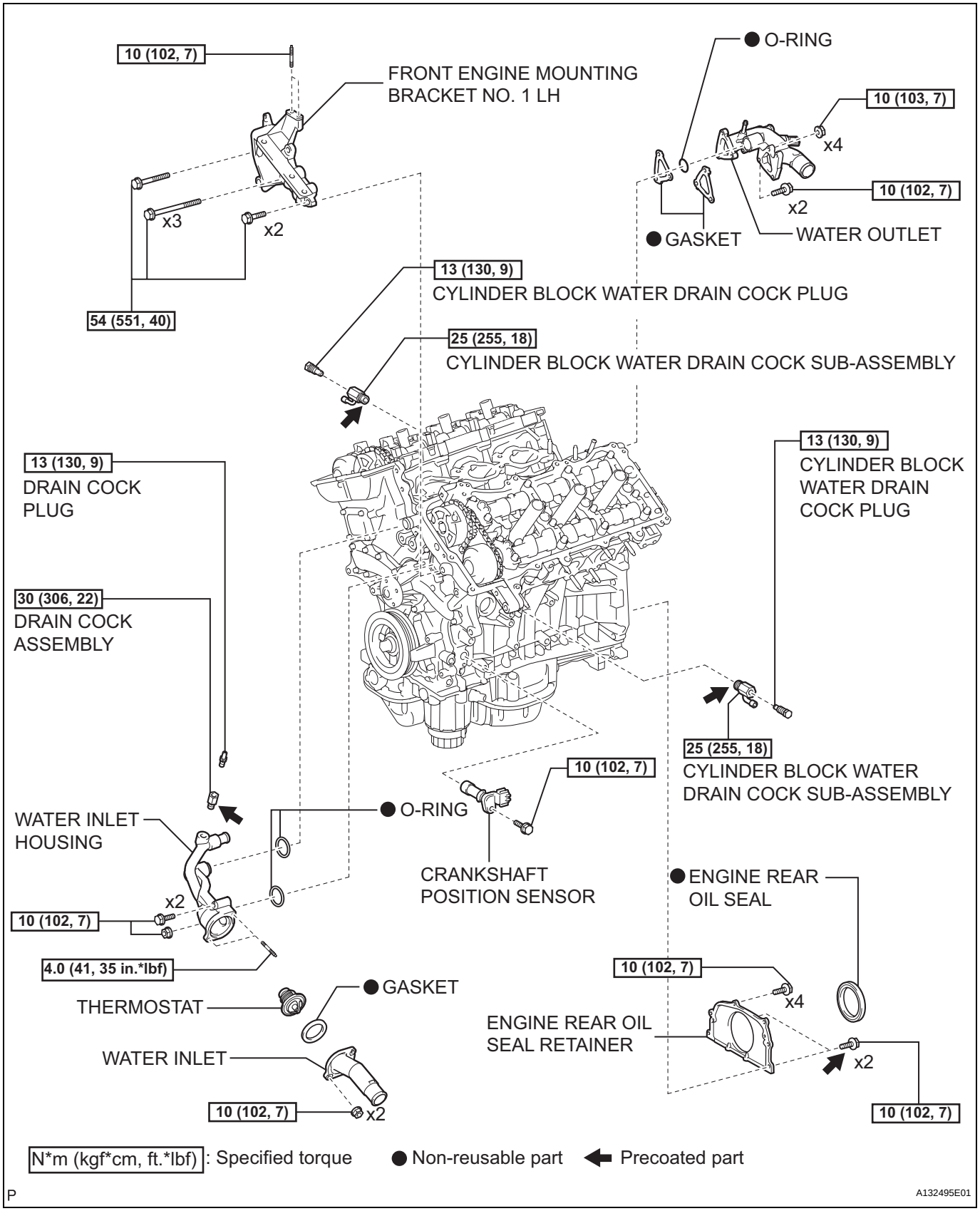
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

P

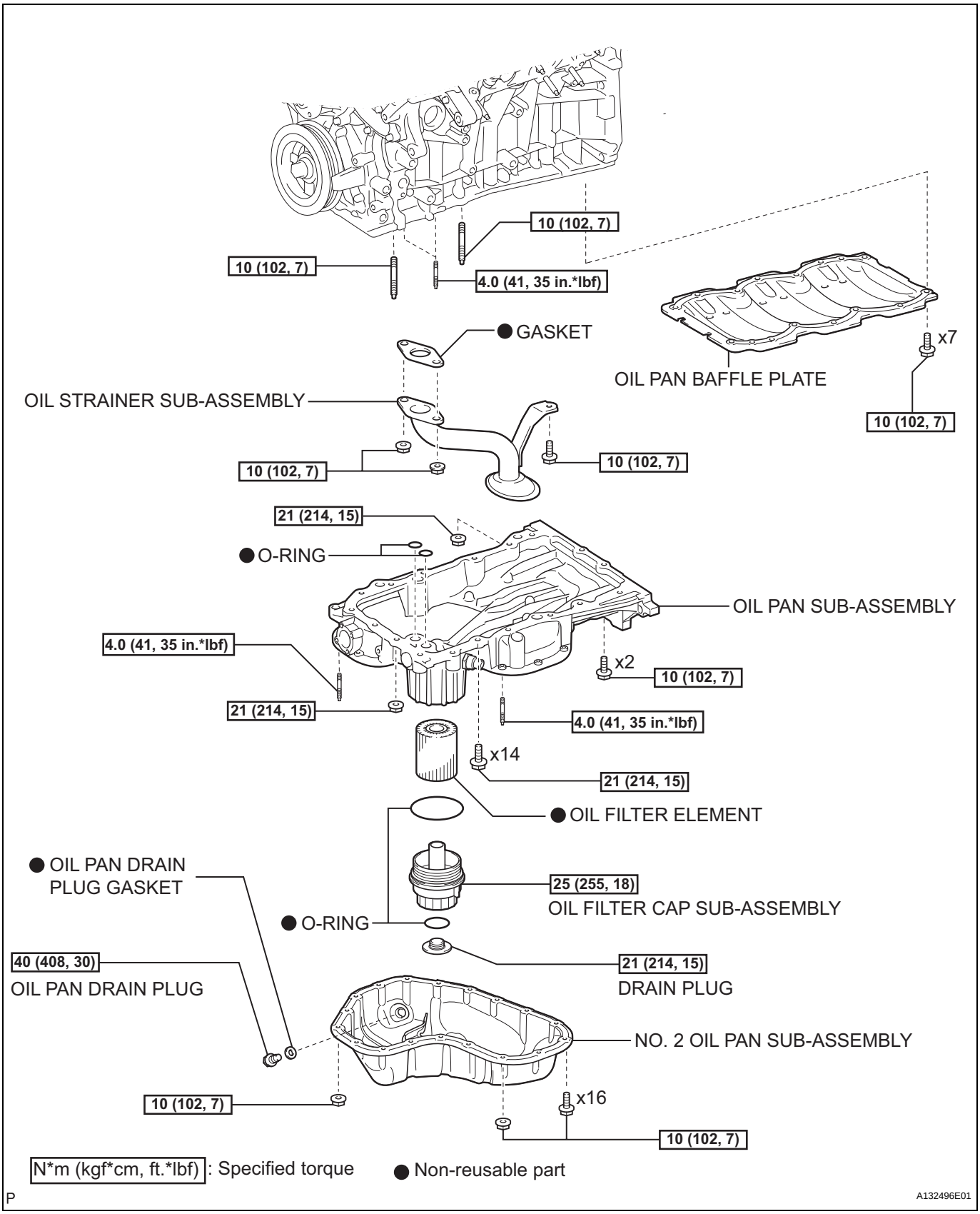
A132493E01

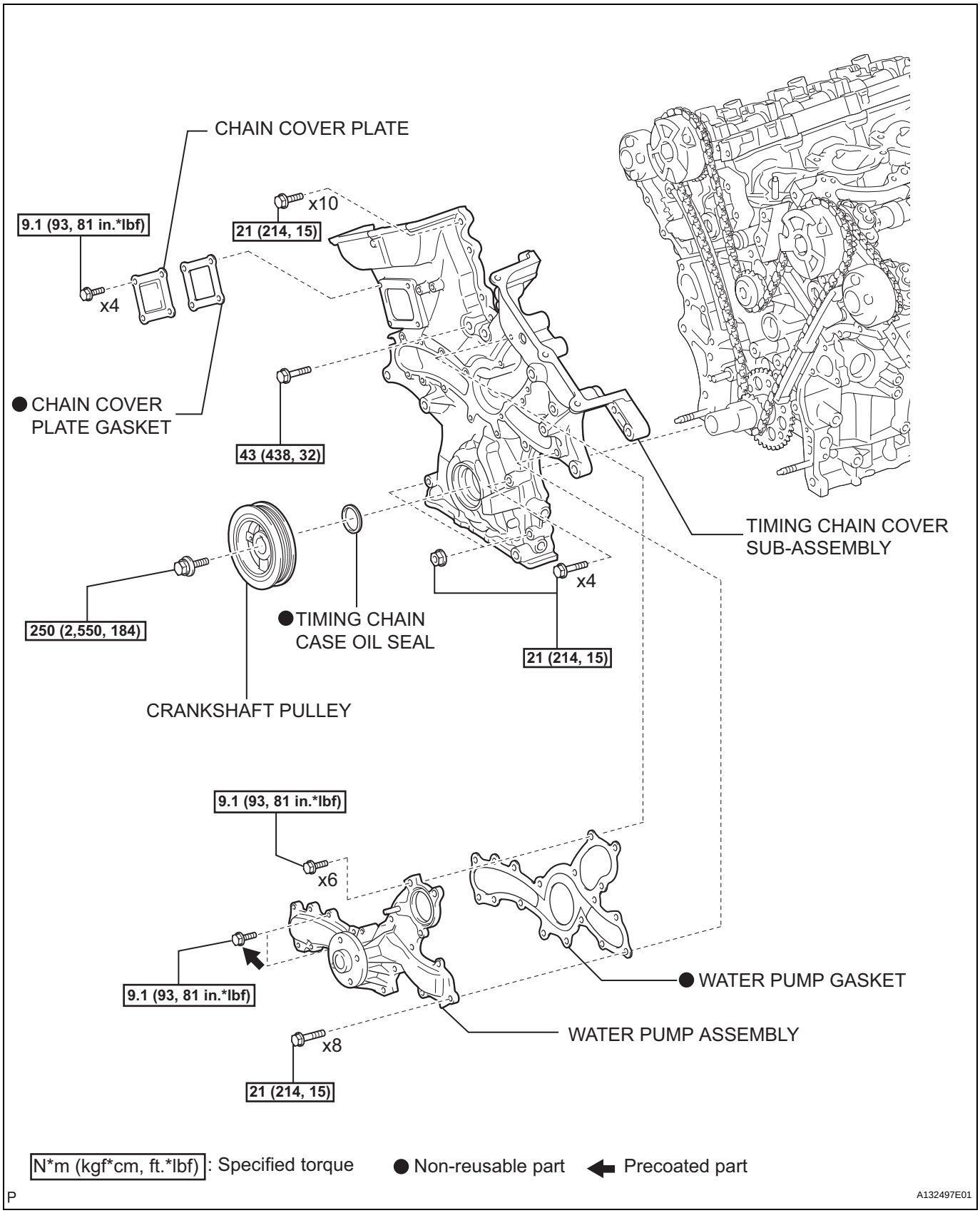
EM


LH SIDE:
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
● O-RING
10 (102, 7)
18 (184, 13)
SPARK PLUG
x3
10 (102, 7)
CAMSHAFT POSITION SENSOR
OIL FILLER CAP SUB-ASSEMBLY
● OIL FILLER CAP GASKET
10 (102, 7)
● SEAL WASHER
10 (102, 7)
10 (102, 7)
x8
27 (275, 20)
VENTILATION VALVE SUB-ASSEMBLY
● O-RING
21 (214, 15)
10 (102, 7)
CAMSHAFT POSITION SENSOR
CYLINDER HEAD COVER SUB-ASSEMBLY
● CYLINDER HEAD COVER GASKET
OIL CONTROL VALVE FILTER LH
NO. 1 OIL PIPE
● GASKET
● GASKET
65 (663, 48)
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
P
A132494E01

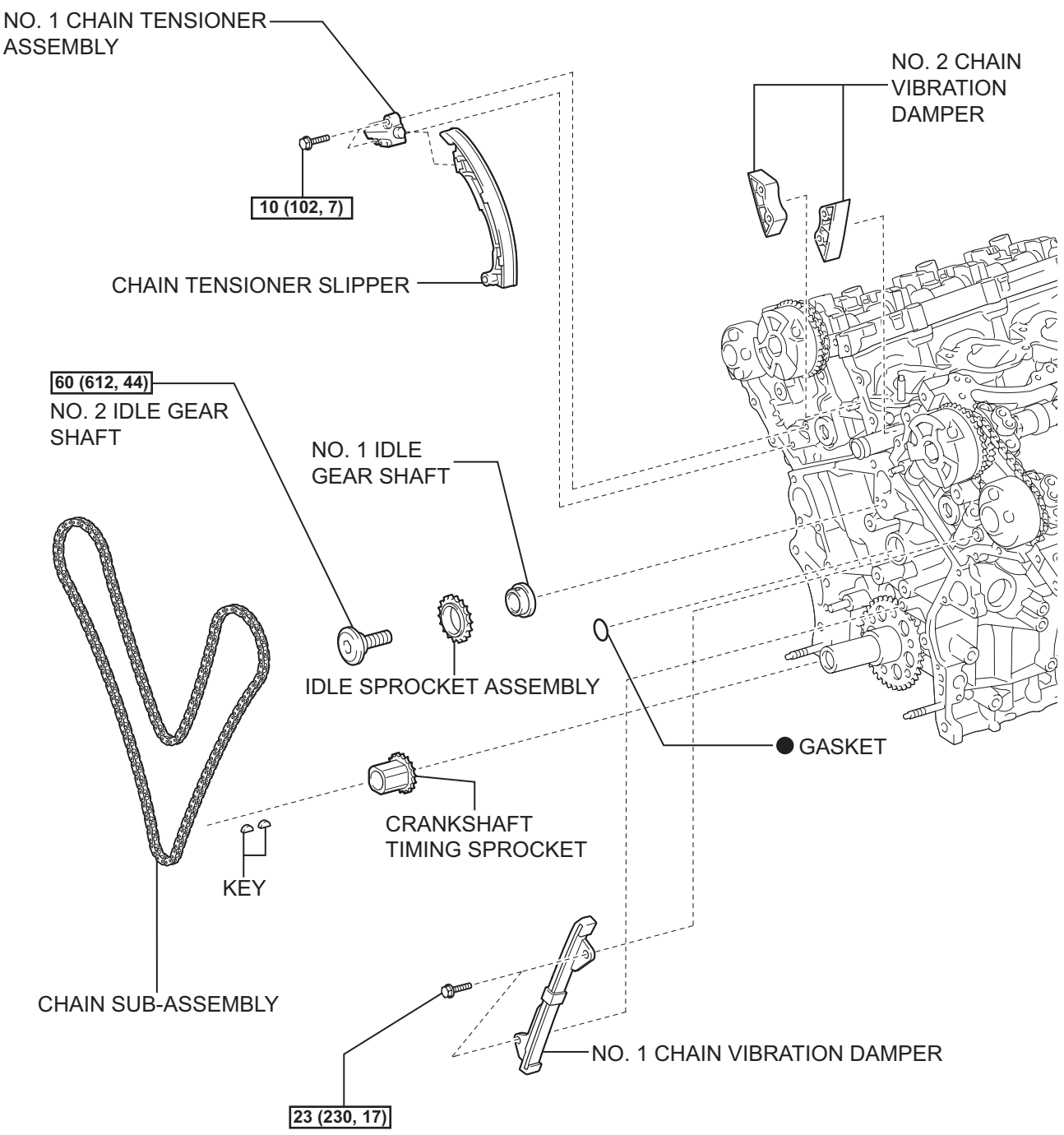

10 (102, 7)
FRONT ENGINE MOUNTING BRACKET NO. 1 LH
x3
x2
54 (551, 40)
O-RING
10 (103, 7)
x4
10 (102, 7)
x2
GASKET
WATER OUTLET
13 (130, 9)
CYLINDER BLOCK WATER DRAIN COCK PLUG
25 (255, 18)
CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY
13 (130, 9)
DRAIN COCK PLUG
30 (306, 22)
DRAIN COCK ASSEMBLY
13 (130, 9)
CYLINDER BLOCK WATER DRAIN COCK PLUG
25 (255, 18)
CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY
10 (102, 7)
O-RING
WATER INLET HOUSING
x2
10 (102, 7)
4.0 (41, 35 in.*lbf)
CRANKSHAFT POSITION SENSOR
ENGINE REAR OIL SEAL
10 (102, 7)
x4
ENGINE REAR OIL SEAL RETAINER
x2
10 (102, 7)
GASKET
THERMOSTAT
WATER INLET
10 (102, 7)
x2
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
Precoated part
P
A132495E01

EM


10 (102, 7)
10 (102, 7)
4.0 (41, 35 in.*lbf)
● GASKET
OIL PAN BAFFLE PLATE
x7
10 (102, 7)
OIL STRAINER SUB-ASSEMBLY
10 (102, 7)
10 (102, 7)
21 (214, 15)
● O-RING
OIL PAN SUB-ASSEMBLY
4.0 (41, 35 in.*lbf)
x2
10 (102, 7)
21 (214, 15)
4.0 (41, 35 in.*lbf)
x14
21 (214, 15)
● OIL FILTER ELEMENT
● OIL PAN DRAIN PLUG GASKET
25 (255, 18)
OIL FILTER CAP SUB-ASSEMBLY
● O-RING
21 (214, 15)
DRAIN PLUG
40 (408, 30)
OIL PAN DRAIN PLUG
NO. 2 OIL PAN SUB-ASSEMBLY
10 (102, 7)
x16
10 (102, 7)
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
A132496E01


CHAIN COVER PLATE
9.1 (93, 81 in.*lbf)
x10
21 (214, 15)
x4
● CHAIN COVER PLATE GASKET
43 (438, 32)
TIMING CHAIN COVER SUB-ASSEMBLY
x4
250 (2,550, 184)
● TIMING CHAIN CASE OIL SEAL
21 (214, 15)
CRANKSHAFT PULLEY
9.1 (93, 81 in.*lbf)
x6
9.1 (93, 81 in.*lbf)
● WATER PUMP GASKET
WATER PUMP ASSEMBLY
x8
21 (214, 15)
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
P
A132497E01

EM

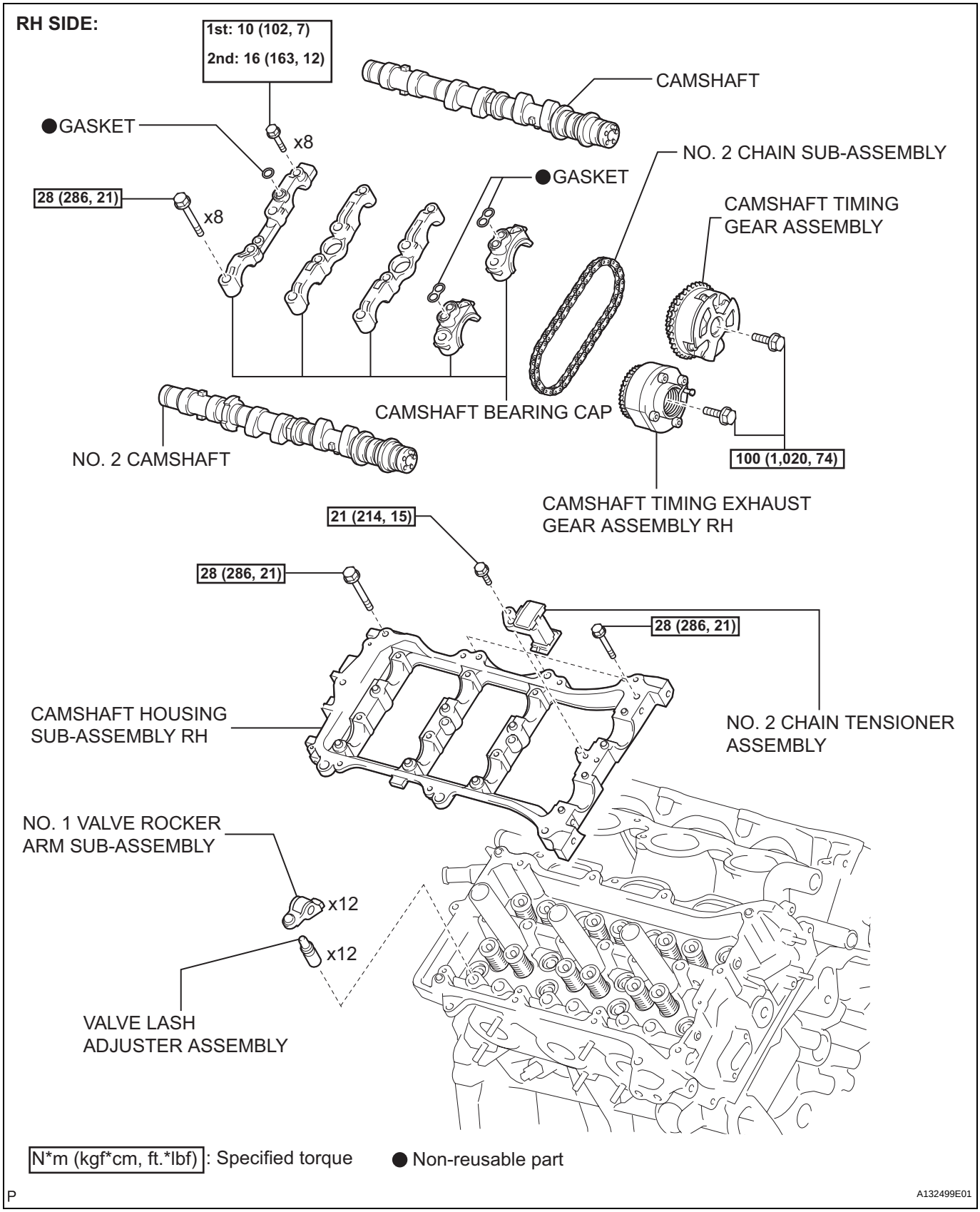


EM

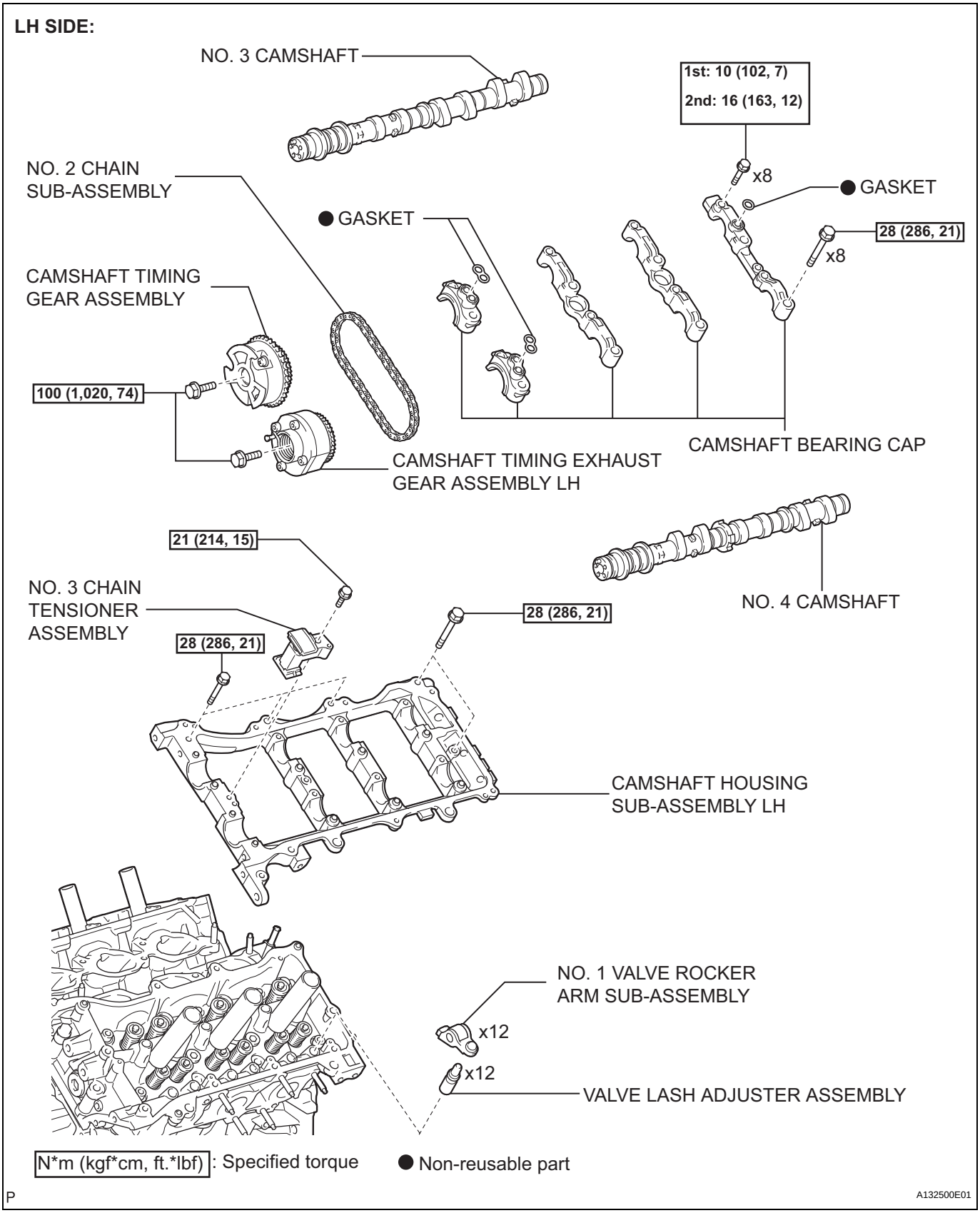
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

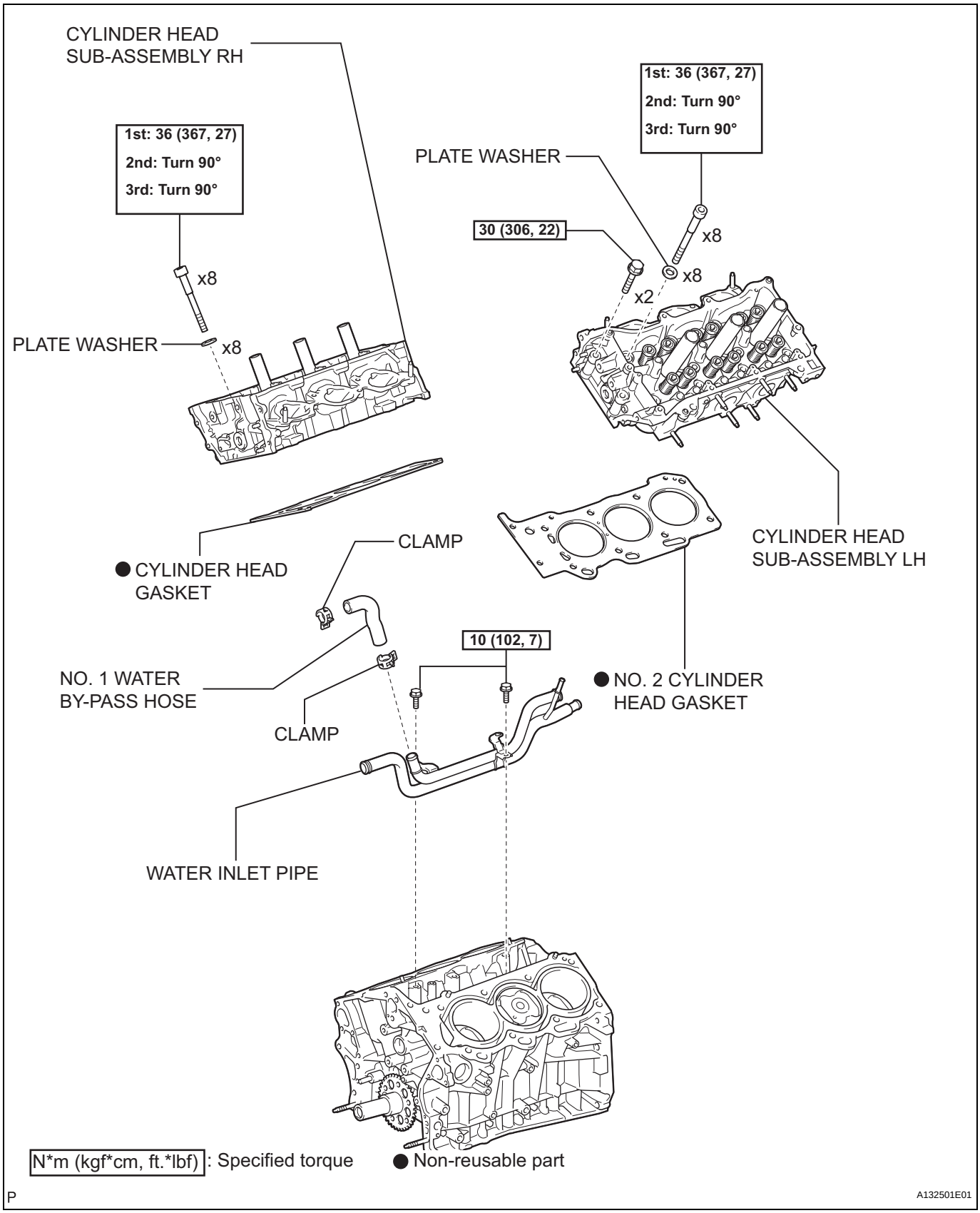
P

A132498E01


RH SIDE:
1st: 10 (102, 7)
2nd: 16 (163, 12)
CAMSHAFT
●GASKET
x8
NO. 2 CHAIN SUB-ASSEMBLY
●GASKET
28 (286, 21)
x8
CAMSHAFT TIMING GEAR ASSEMBLY
CAMSHAFT BEARING CAP
NO. 2 CAMSHAFT
100 (1,020, 74)
CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY RH
21 (214, 15)
28 (286, 21)
28 (286, 21)
CAMSHAFT HOUSING SUB-ASSEMBLY RH
NO. 2 CHAIN TENSIONER ASSEMBLY
NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY
x12
x12
VALVE LASH ADJUSTER ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
P
A132499E01

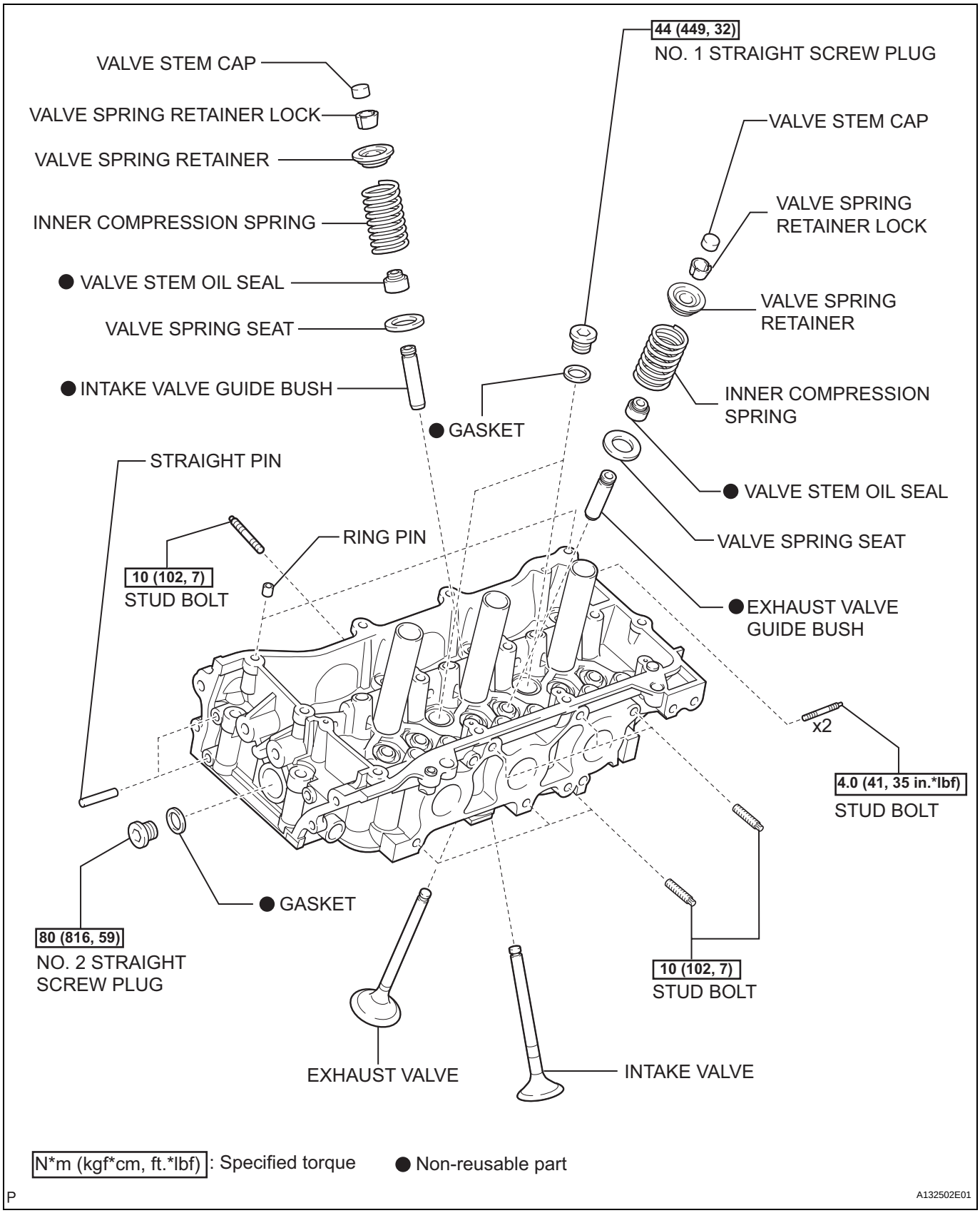
EM


LH SIDE:
NO. 3 CAMSHAFT
1st: 10 (102, 7)
2nd: 16 (163, 12)
x8
GASKET
NO. 2 CHAIN SUB-ASSEMBLY
GASKET
28 (286, 21)
x8
CAMSHAFT TIMING GEAR ASSEMBLY
100 (1,020, 74)
CAMSHAFT BEARING CAP
CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY LH
21 (214, 15)
NO. 4 CAMSHAFT
NO. 3 CHAIN TENSIONER ASSEMBLY
28 (286, 21)
28 (286, 21)
CAMSHAFT HOUSING SUB-ASSEMBLY LH
NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY
x12
x12
VALVE LASH ADJUSTER ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
A132500E01


CYLINDER HEAD SUB-ASSEMBLY RH
1st: 36 (367, 27)
2nd: Turn 90°
3rd: Turn 90°
x8
PLATE WASHER
x8
● CYLINDER HEAD GASKET
1st: 36 (367, 27)
2nd: Turn 90°
3rd: Turn 90°
PLATE WASHER
30 (306, 22)
x8
x8
x2
CYLINDER HEAD SUB-ASSEMBLY LH
CLAMP
NO. 1 WATER BY-PASS HOSE
CLAMP
10 (102, 7)
● NO. 2 CYLINDER HEAD GASKET
WATER INLET PIPE
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
A132501E01

EM

P

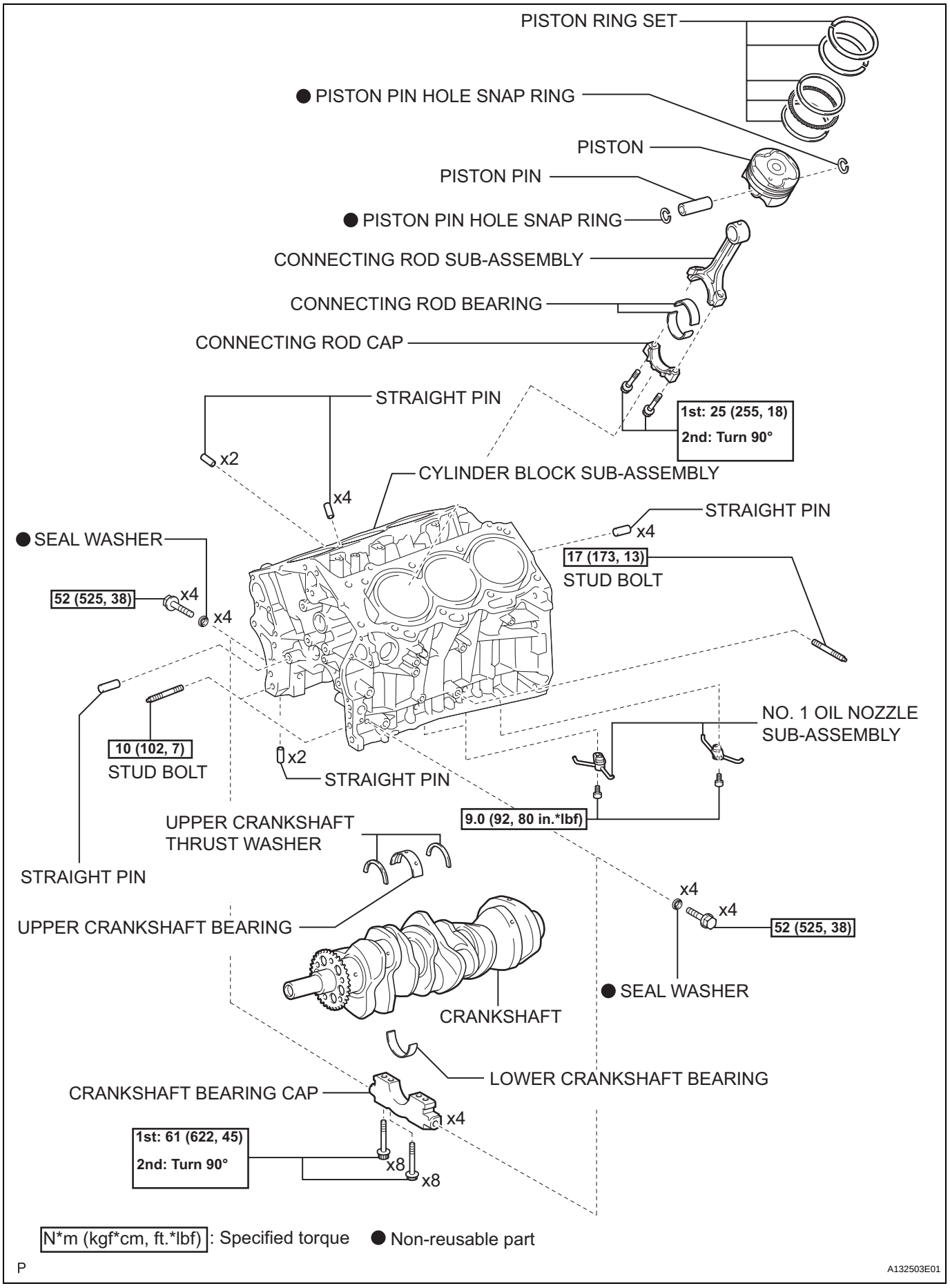


EM

N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

P

A132502E01


PISTON RING SET
● PISTON PIN HOLE SNAP RING
PISTON
PISTON PIN
● PISTON PIN HOLE SNAP RING
CONNECTING ROD SUB-ASSEMBLY
CONNECTING ROD BEARING
CONNECTING ROD CAP
STRAIGHT PIN
x2
1st: 25 (255, 18)
2nd: Turn 90°
CYLINDER BLOCK SUB-ASSEMBLY
x4
STRAIGHT PIN
x4
● SEAL WASHER
17 (173, 13)
STUD BOLT
52 (525, 38)
x4
x4
10 (102, 7)
STUD BOLT
x2
STRAIGHT PIN
NO. 1 OIL NOZZLE SUB-ASSEMBLY
9.0 (92, 80 in.*lbf)
UPPER CRANKSHAFT THRUST WASHER
STRAIGHT PIN
UPPER CRANKSHAFT BEARING
x4
x4
52 (525, 38)
● SEAL WASHER
CRANKSHAFT
LOWER CRANKSHAFT BEARING
CRANKSHAFT BEARING CAP
x4
1st: 61 (622, 45)
2nd: Turn 90°
x8
x8
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
P
A132503E01

EM

DISASSEMBLY

1. REMOVE OIL FILLER CAP SUB-ASSEMBLY

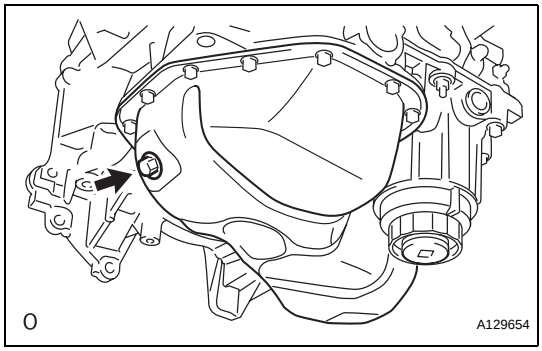
(a) Remove the oil filler cap and gasket.

2. REMOVE SPARK PLUG

(a) Remove the spark plugs.

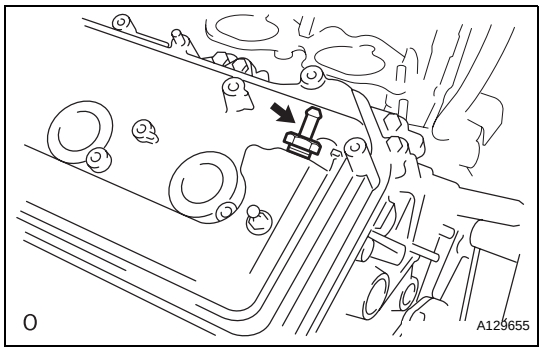
3. REMOVE OIL PAN DRAIN PLUG

(a) Remove the drain plug and gasket.



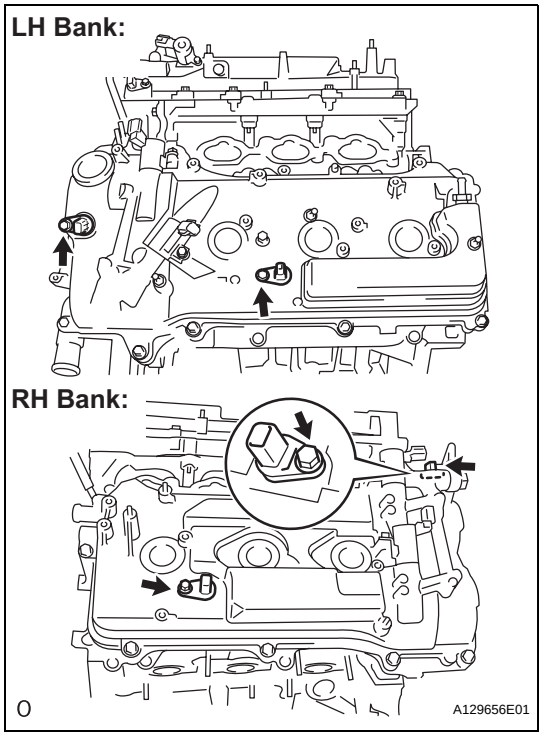
4. REMOVE VENTILATION VALVE SUB-ASSEMBLY

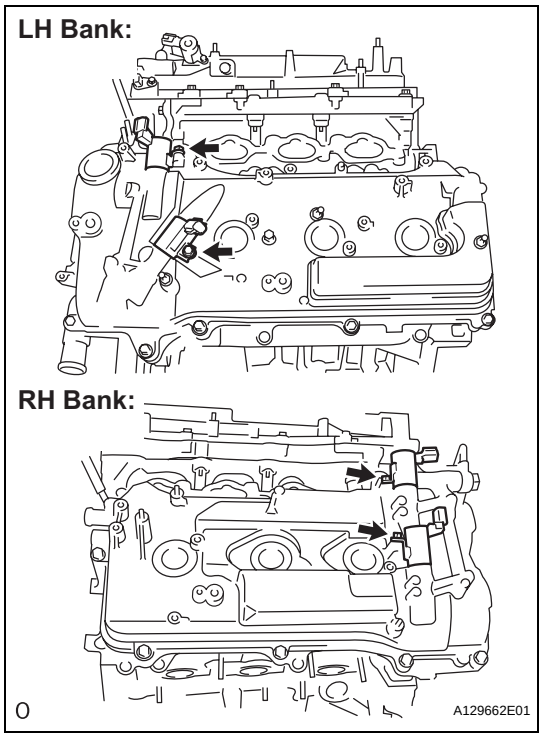
(a) Remove the ventilation valve.



5. REMOVE CAMSHAFT POSITION SENSOR

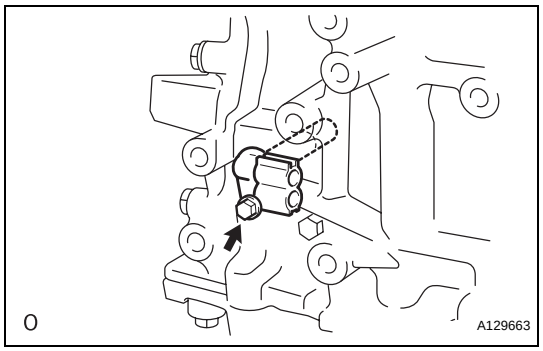
(a) Remove the 4 bolts and 4 sensors.





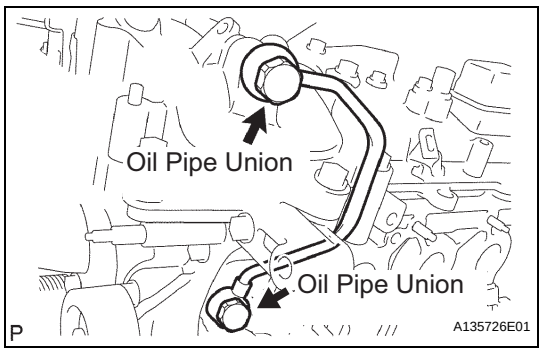
6. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Remove the 4 bolts and 4 oil control valves.



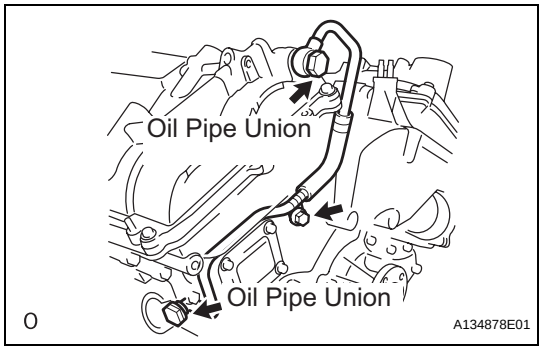
7. REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the bolt and sensor.



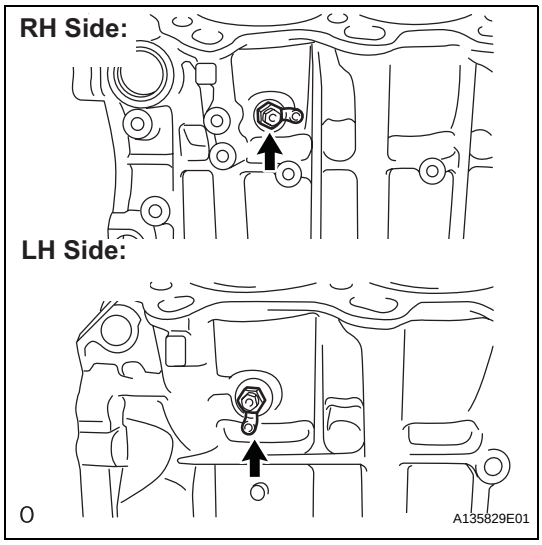
8. REMOVE NO. 1 OIL PIPE

(a) Remove the 2 oil pipe unions and oil pipe.
(b) Remove the oil control valve filter LH and gaskets.



9. REMOVE OIL PIPE

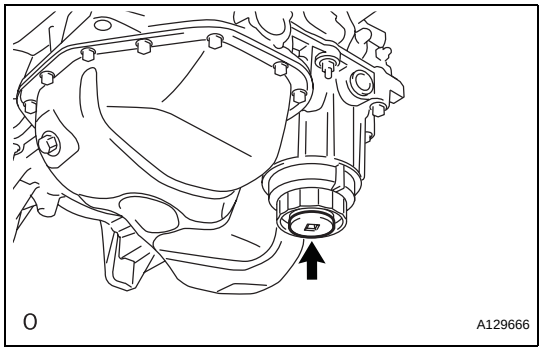
(a) Remove the bolt.
(b) Remove the 2 oil pipe unions and oil pipe.
(c) Remove the oil control valve filter RH and gaskets.



10. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

(a) Remove the water drain cocks from the cylinder block.

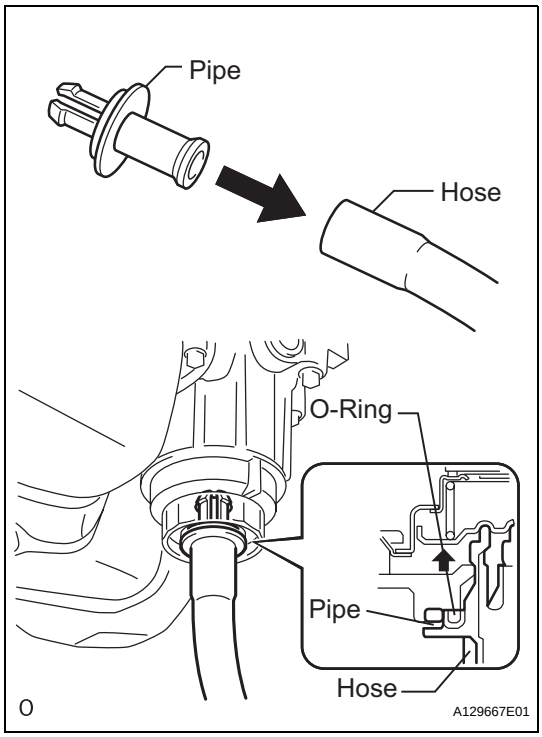
(b) Remove the water drain cock plugs from the water drain cocks.



11. REMOVE OIL FILTER ELEMENT

(a) Remove the drain plug.

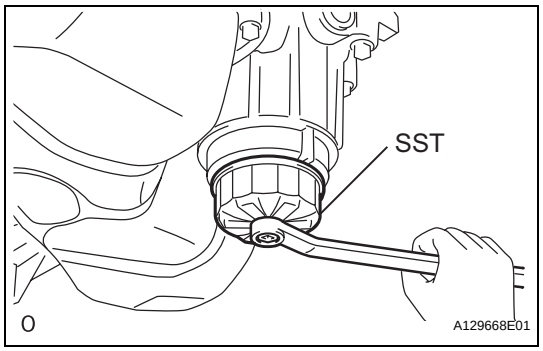
NOTICE:
Do not remove the O-ring from the oil filter cap.



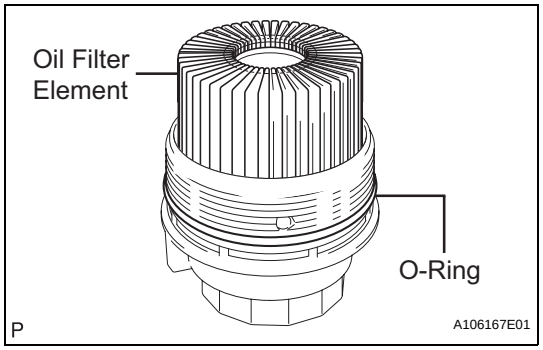
(b) Connect the hose to the pipe.

(c) Insert the pipe with the hose into the oil filter cap.

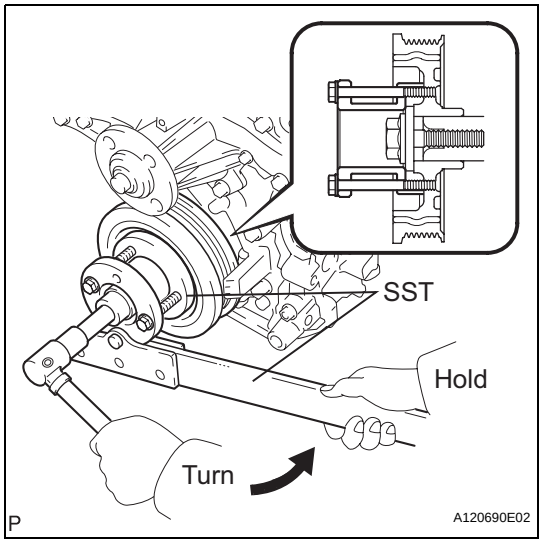
(d) Make sure that the oil is completely drained and remove the pipe and O-ring.



(e) Using SST, remove the oil filter cap.
SST 09228-06501

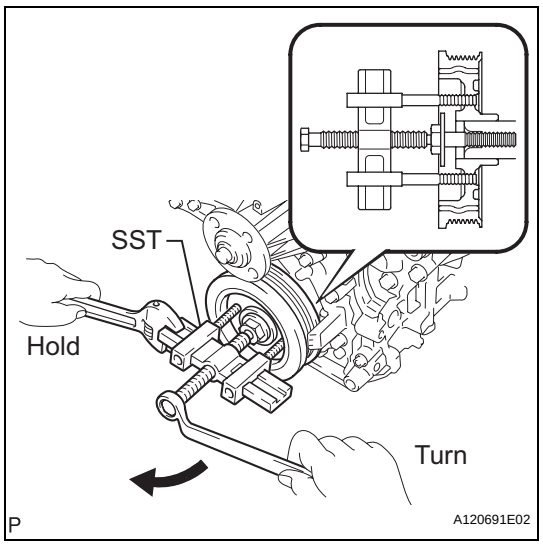


(f) Remove the oil filter element and O-ring from the oil filter cap.
NOTICE:
Do not use any tools when removing the O-ring to prevent the O-ring groove from being damaged.

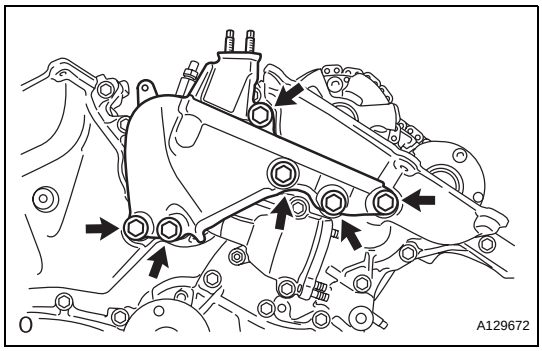


12. REMOVE CRANKSHAFT PULLEY

(a) Using SST, loosen the crankshaft pulley bolt.
SST 09213-70011 (09213-70020), 09330-00021

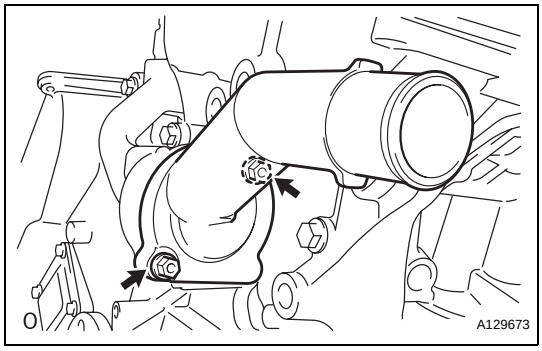


(b) Using SST, remove the crankshaft pulley bolt and crankshaft pulley.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)



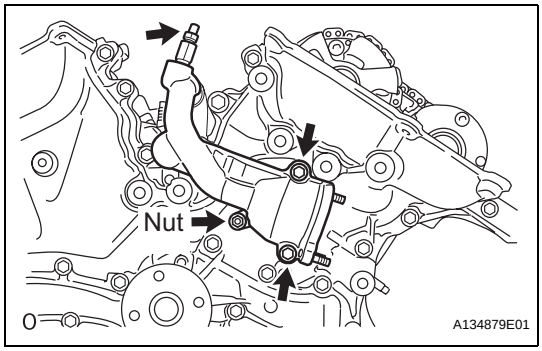
13. REMOVE FRONT ENGINE MOUNTING BRACKET NO. 1 LH

(a) Remove the 6 bolts and engine mounting bracket.
(b) Using "Torx" socket wrench E8, remove the 2 stud bolts.

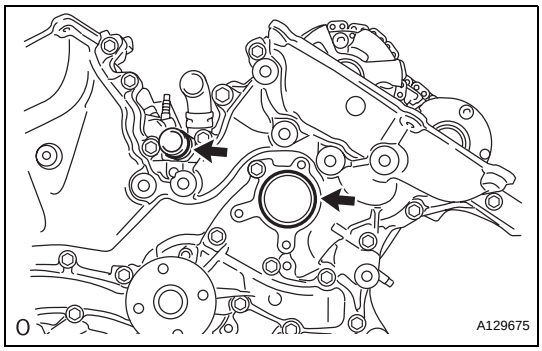


14. REMOVE WATER INLET HOUSING

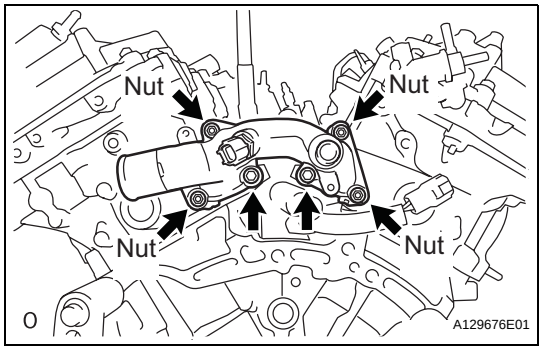
(a) Remove the 2 nuts, water inlet and thermostat.
(b) Remove the gasket.
(c) Remove the housing plug.
(d) Remove the housing drain cock.
(e) Remove the 2 stud bolts.
(f) Separate the water by-pass hose No. 1.



(g) Remove the 2 bolts, nut, and water inlet housing.

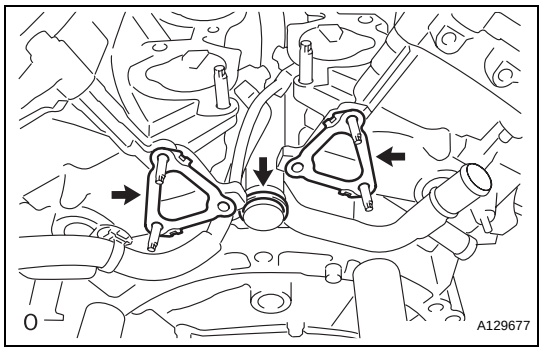


(h) Remove the 2 O-rings.

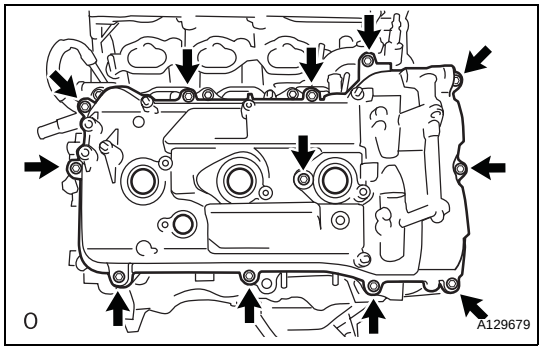


15. REMOVE WATER OUTLET

(a) Remove the 2 bolts, 4 nuts and water outlet.

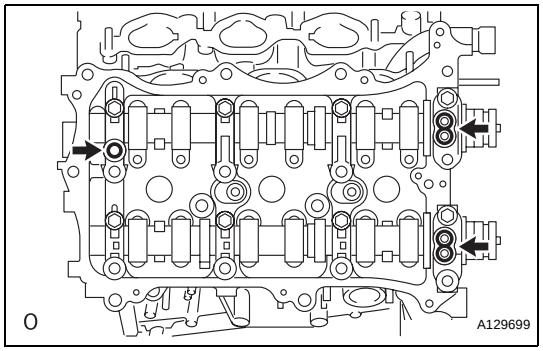


(b) Remove the 2 gaskets and O-ring.

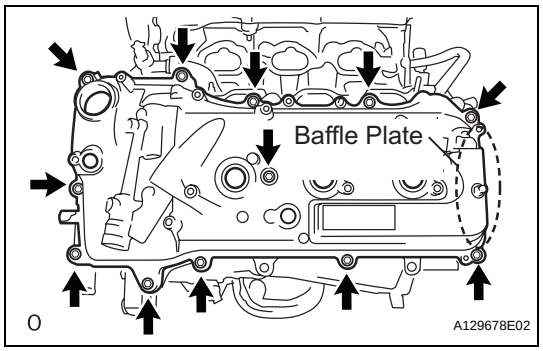


16. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1)

(a) Remove the 12 bolts, seal washer, head cover and gasket.



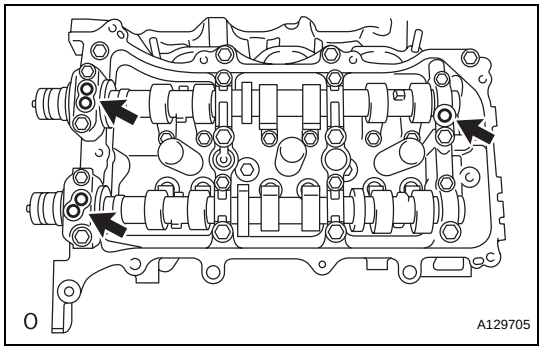
(b) Remove the 3 gaskets.



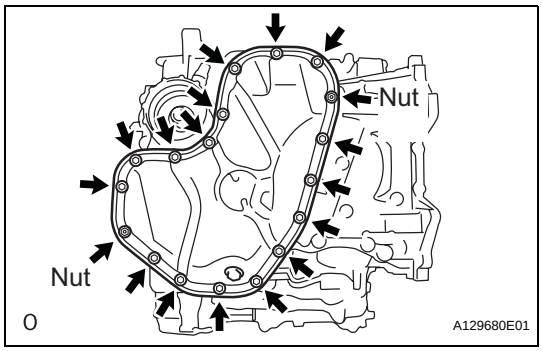
17. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2)

(a) Remove the 12 bolts, seal washer, head cover and gasket.

NOTICE:
The baffle plate is located on the back of the portion shown in the illustration. Do not damage the baffle plate when removing the head cover.

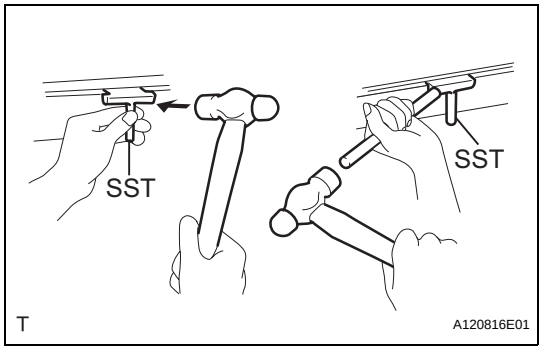


(b) Remove the 3 gaskets.



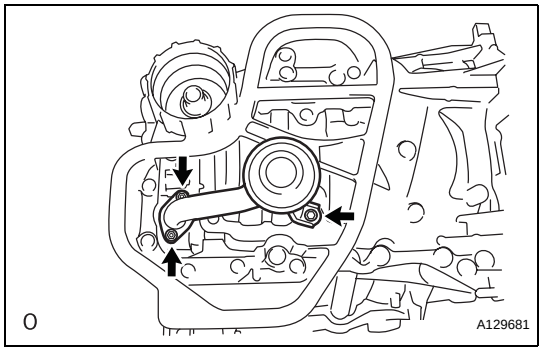
18. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY

(a) Remove the 16 bolts and 2 nuts.



(b) Insert the blade of SST between the oil pans. Cut through the applied sealer and remove the No. 2 oil pan sub-assembly.
SST 09032-00100
NOTICE:
Be careful not to damage the contact surfaces of the oil pans.

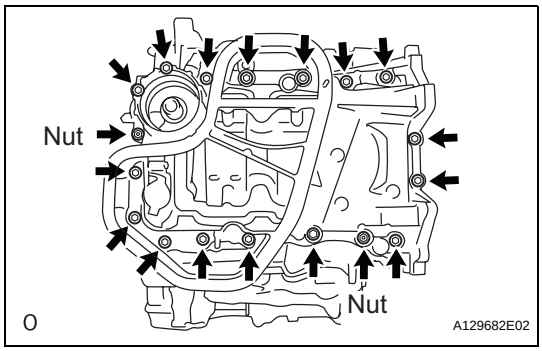
(c) Using "Torx" socket wrench E6, remove the 2 stud bolts.



19. REMOVE OIL STRAINER SUB-ASSEMBLY

(a) Remove the bolt, 2 nuts, oil strainer and gasket.

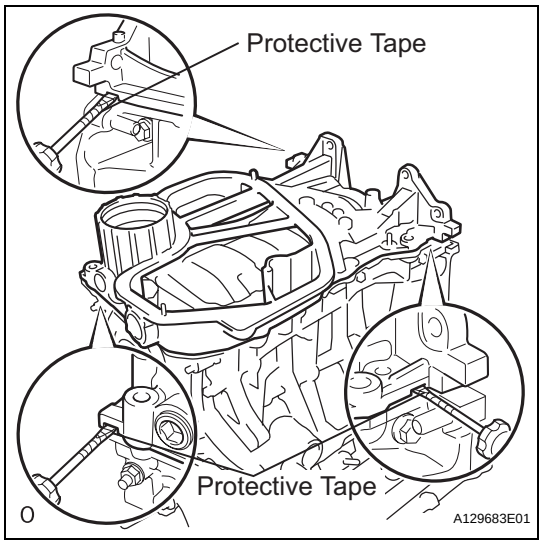
(b) Using "Torx" socket wrench E6, remove the 2 stud bolts.



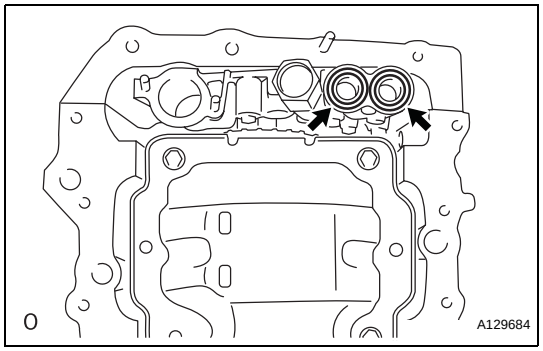
20. REMOVE OIL PAN SUB-ASSEMBLY

(a) Remove the 16 bolts and 2 nuts.
HINT:
Be sure to clean the bolts and stud bolts and check the threads for cracks or other damage.

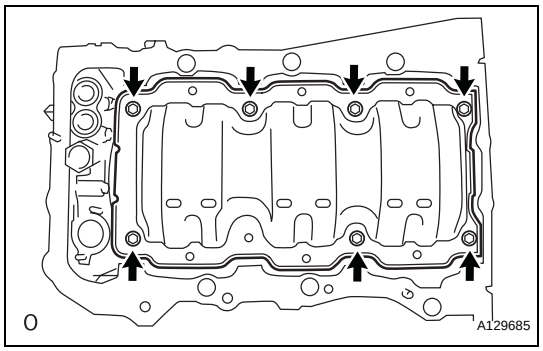
EM



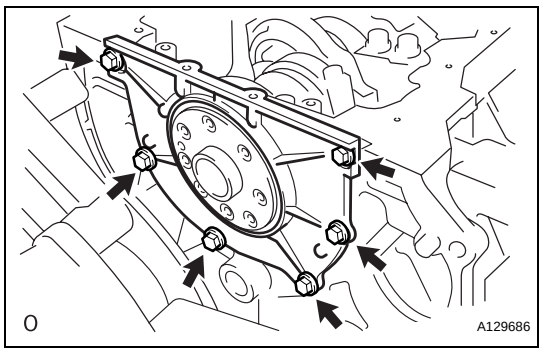
(b) Remove the oil pan by prying between the oil pan and cylinder block with a screwdriver.
NOTICE:
Be careful not to damage the contact surfaces of the cylinder block and oil pan.
HINT:
Tape the screwdriver tip before use.



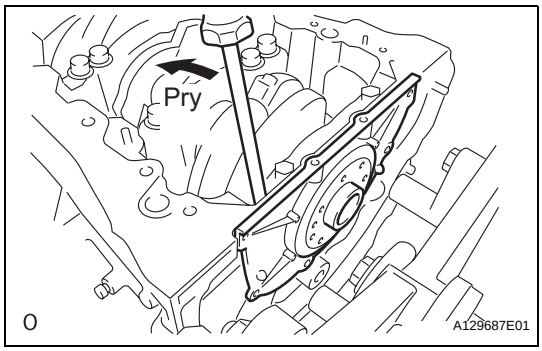
(c) Remove the 2 O-rings.
(d) Using "Torx" socket wrench E8, remove the 2 stud bolts.



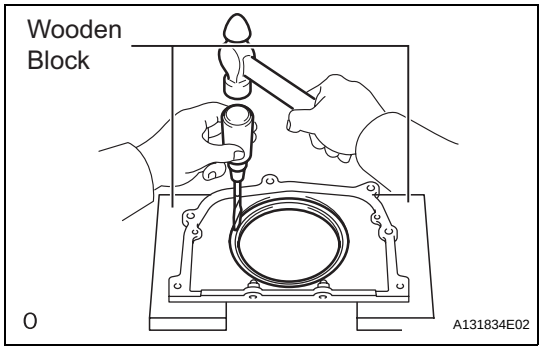
21. REMOVE OIL PAN BAFFLE PLATE
(a) Remove the 7 bolts and baffle plate.



22. REMOVE ENGINE REAR OIL SEAL RETAINER
(a) Remove the 6 bolts.



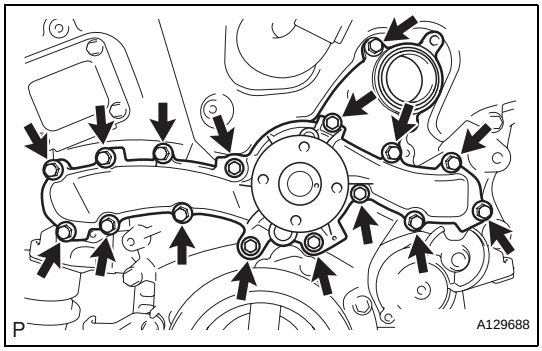
(b) Using a screwdriver, pry out the oil seal retainer.
NOTICE:
Be careful not to damage the engine rear oil seal retainer.
HINT:
Tape the screwdriver tip before use.



23. REMOVE ENGINE REAR OIL SEAL

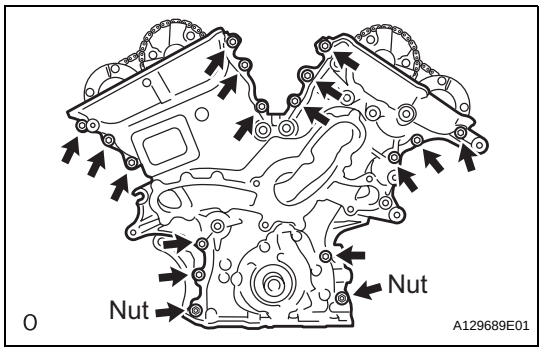
(a) Place the oil seal retainer on wooden blocks.
NOTICE:
Be careful not to damage the engine rear oil seal retainer.

(b) Using a screwdriver and a hammer, tap out the oil seal.
HINT:
Tape the screwdriver tip before use.



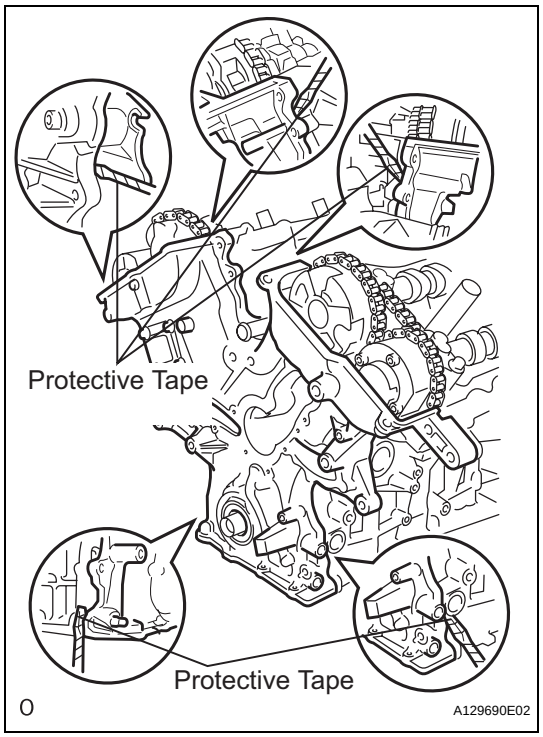
24. REMOVE WATER PUMP ASSEMBLY

(a) Remove the 16 bolts, water pump and gasket.



25. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY

(a) Remove the 15 bolts and 2 nuts as shown in the illustration.



(b) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

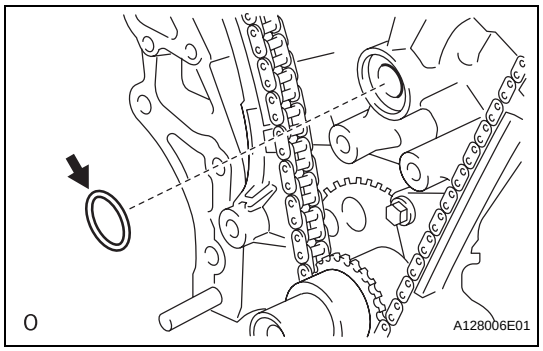
NOTICE:

Be careful not to damage the contact surfaces of the cylinder head, cylinder block and chain cover.

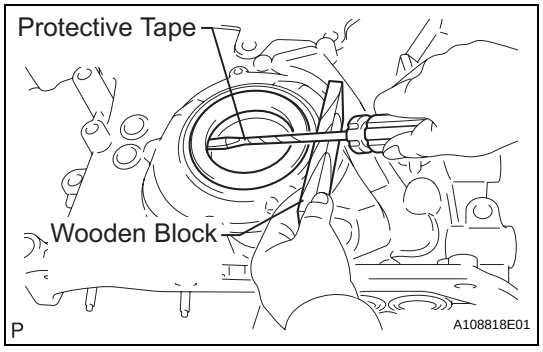
HINT:

Tape the screwdriver tip before use.

(c) Remove the 4 bolts, chain cover plate and gasket.



(d) Remove the gasket.



26. REMOVE TIMING CHAIN CASE OIL SEAL

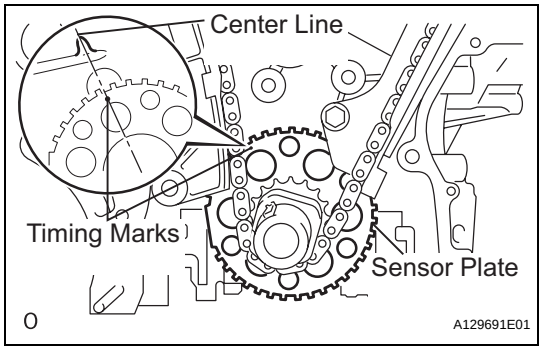
(a) Using a screwdriver, pry out the oil seal.

HINT:

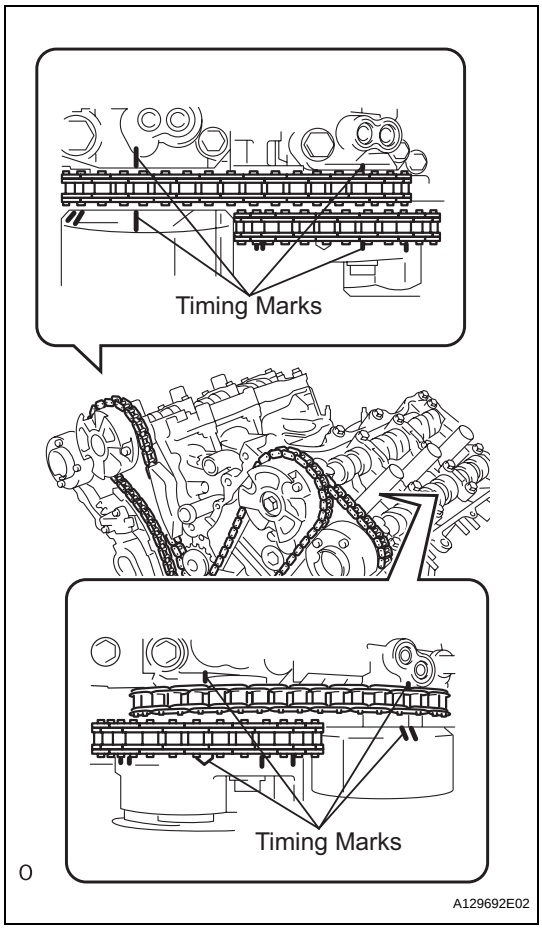
Tape the screwdriver tip before use.

27. SET NO. 1 CYLINDER TO TDC / COMPRESSION

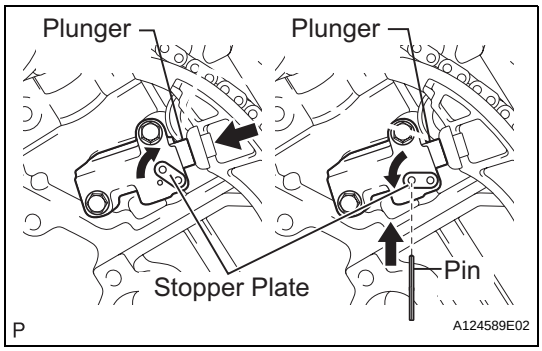
(a) Temporarily tighten the pulley set bolt.



(b) Set the timing mark on the crank angle sensor plate to the RH block bore center line (TDC / compression).



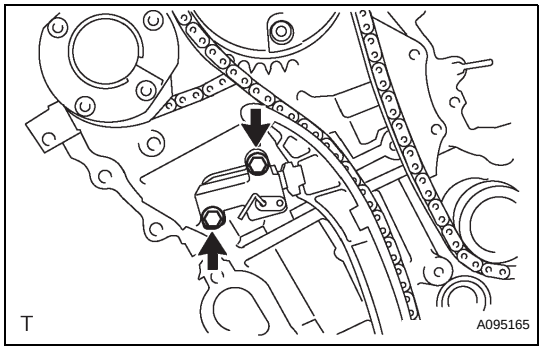
(c) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°) and align the timing marks as above.



28. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY

(a) Move the stopper plate upward to release the lock, and push the plunger deep into the tensioner.

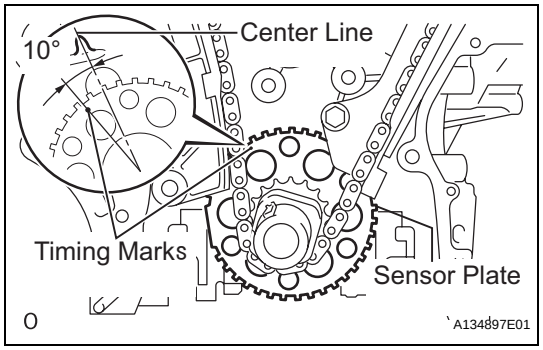
(b) Move the stopper plate downward to set the lock, and insert a pin of ϕ1.27 mm (0.05 in.) into the stopper plate's hole.



(c) Remove the 2 bolts and chain tensioner.

29. REMOVE CHAIN TENSIONER SLIPPER

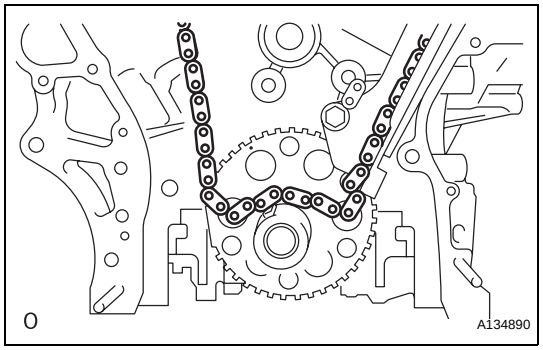
(a) Remove the chain tensioner slipper.



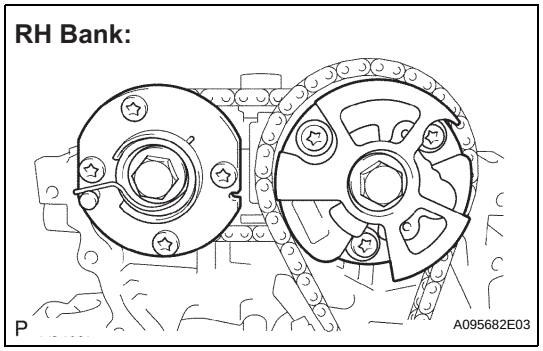
30. REMOVE CHAIN SUB-ASSEMBLY

(a) Turn the crankshaft counterclockwise 10° to loosen the chain of the crankshaft timing sprocket.

(b) Remove the pulley set bolt.

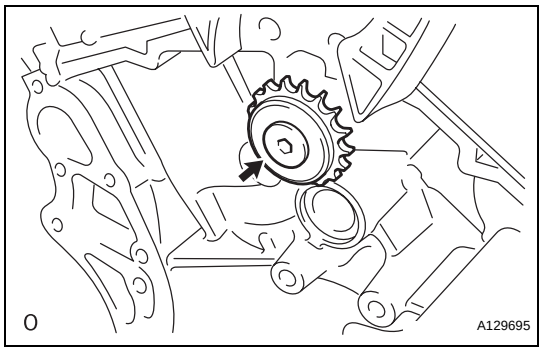


(c) Remove the chain from the crankshaft timing sprocket and place it on the crankshaft.



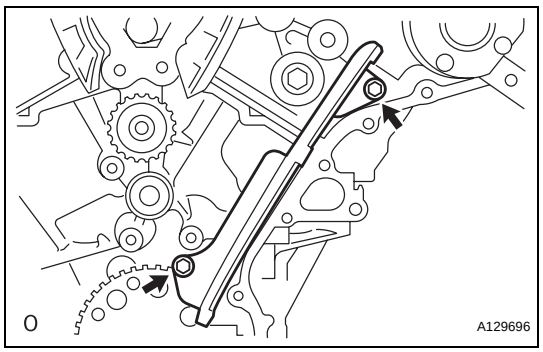
(d) Turn the camshaft timing gear assembly on the RH bank clockwise (approximately 60°) and set it as shown in the illustration. Be sure to loosen the chain between the banks.

(e) Remove the chain.



31. REMOVE IDLE SPROCKET ASSEMBLY

(a) Using a 10 mm hexagon wrench, remove the No. 2 idle gear shaft, sprocket and No. 1 idle gear shaft.



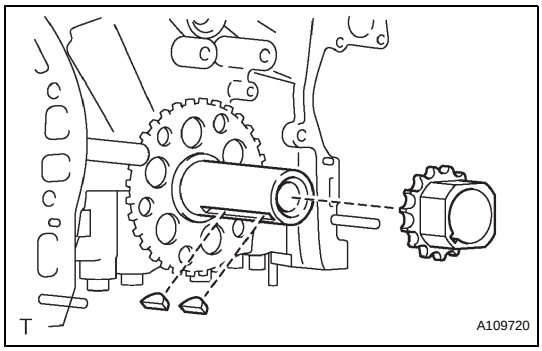
32. REMOVE NO. 1 CHAIN VIBRATION DAMPER

(a) Remove the 2 bolts and vibration damper.

33. REMOVE NO. 2 CHAIN VIBRATION DAMPER

(a) Remove the 2 vibration dampers.

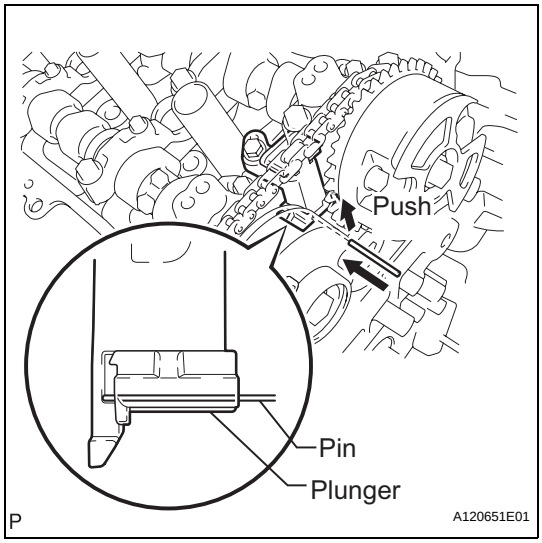
EM



34. REMOVE CRANKSHAFT TIMING SPROCKET

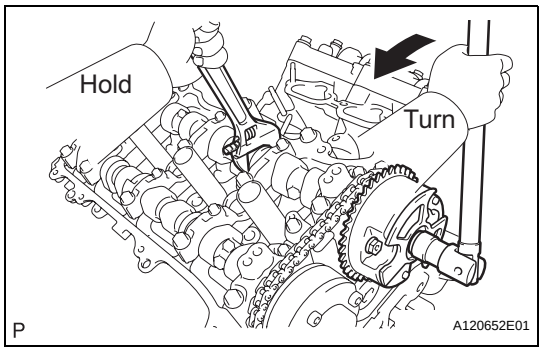
(a) Remove the crankshaft timing sprocket from the crankshaft.

(b) Remove the 2 pulley set keys from the crankshaft.



35. REMOVE CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 1)

(a) While raising the No. 2 chain tensioner, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to fix the No. 2 chain tensioner.

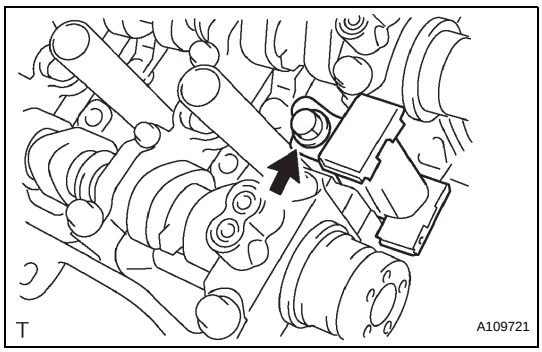


(b) Hold the hexagonal portion of the camshaft with a wrench, and remove the 2 bolts and 2 camshaft timing gear assemblies.

NOTICE:

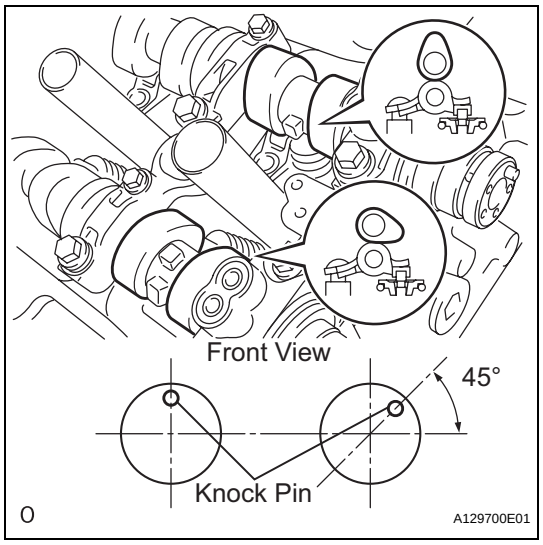
- **Be careful not to damage the cylinder head with the wrench.**
- **Do not disassemble the camshaft timing gear assemblies.**

(c) Remove the No. 2 chain.



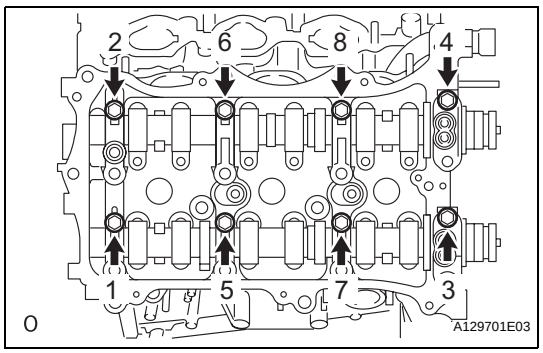
36. REMOVE NO. 2 CHAIN TENSIONER ASSEMBLY

(a) Remove the bolt and No. 2 chain tensioner.

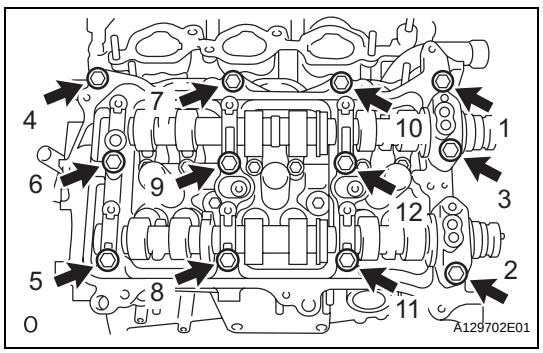


37. REMOVE CAMSHAFT BEARING CAP (for Bank 1)

(a) Check that the camshafts are positioned as shown in the illustration.



(b) Uniformly loosen and remove the 8 bearing cap bolts in the sequence shown in the illustration.



(c) Uniformly loosen and remove the 12 bearing cap bolts in the sequence shown in the illustration.
NOTICE:
Uniformly loosen the bolts while keeping the camshaft level.

(d) Remove the 5 bearing caps.

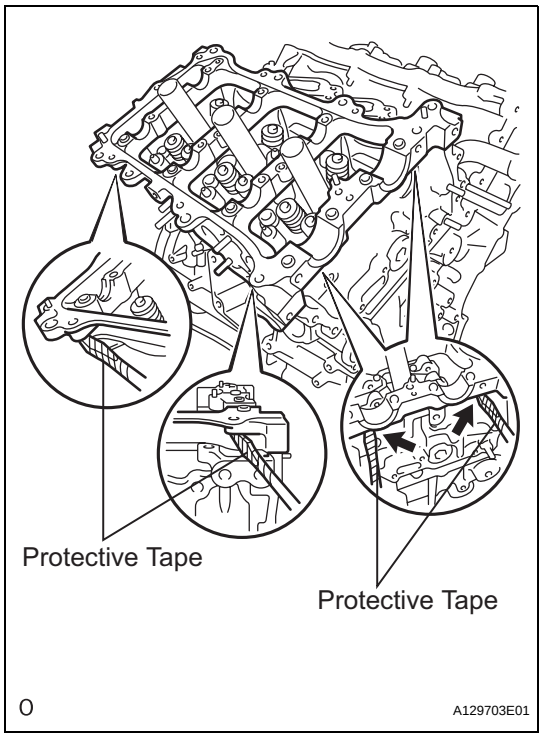
38. REMOVE CAMSHAFT

(a) Remove the camshaft.

39. REMOVE NO. 2 CAMSHAFT

(a) Remove the No. 2 camshaft.

EM



40. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY RH

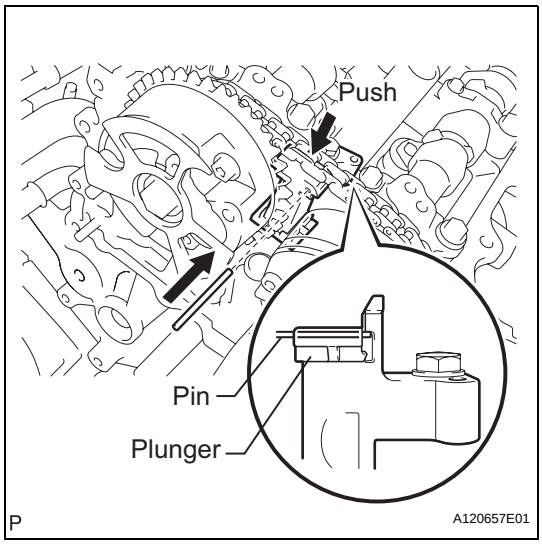
(a) Remove the camshaft housing sub-assembly RH by prying between the cylinder head and camshaft housing sub-assembly RH with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

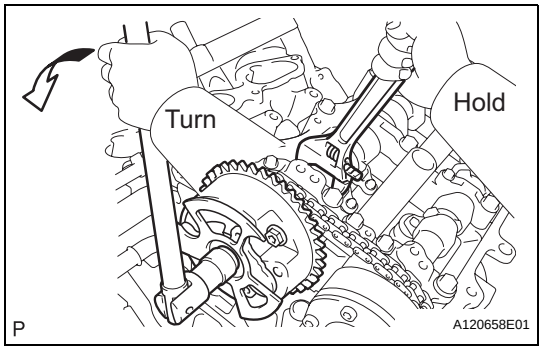
HINT:

Tape the screwdriver tip before use.



41. REMOVE CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 2)

(a) While pushing down the No. 3 chain tensioner, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to fix the No. 3 chain tensioner.

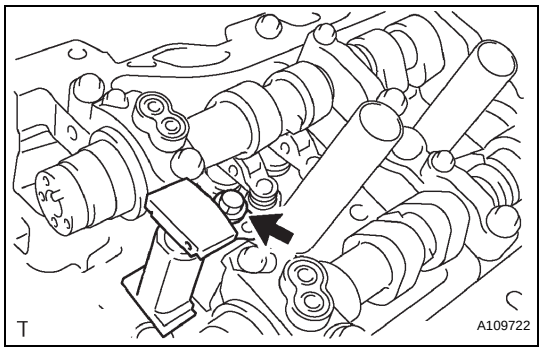


(b) Hold the hexagonal portion of the camshaft with a wrench, and remove the 2 bolts and 2 camshaft timing gear assemblies.

NOTICE:

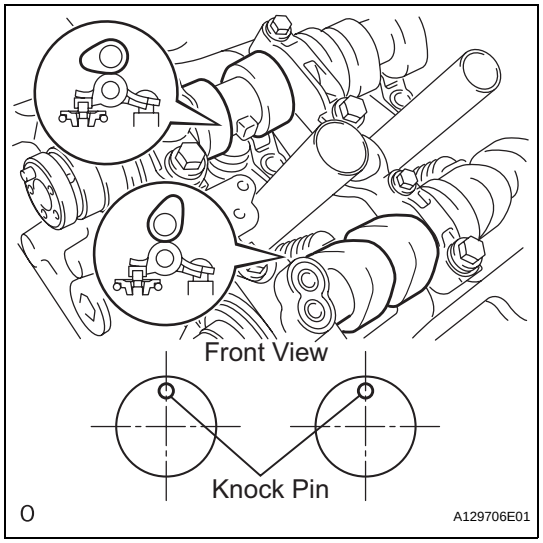
- **Be careful not to damage the cylinder head with the wrench.**
- **Do not disassemble the camshaft timing gear assemblies.**

(c) Remove the No. 2 chain.



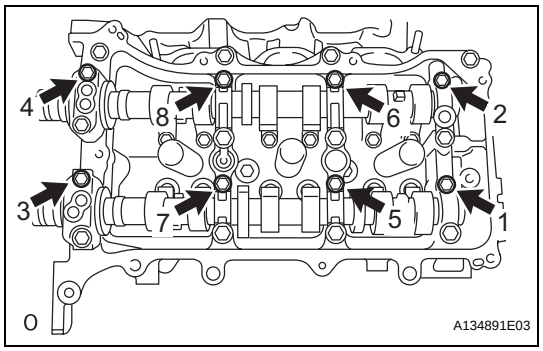
42. REMOVE NO. 3 CHAIN TENSIONER ASSEMBLY

(a) Remove the bolt and No. 3 chain tensioner.

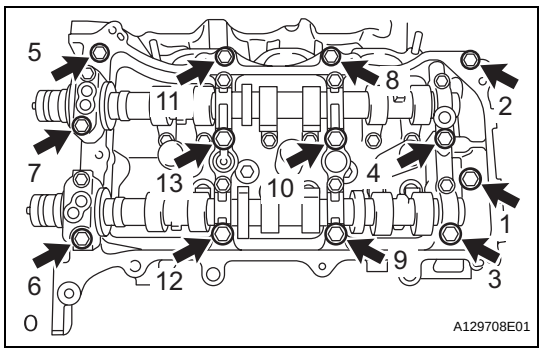


43. REMOVE CAMSHAFT BEARING CAP (for Bank 2)

(a) Check that the camshafts are positioned as shown in the illustration.



(b) Uniformly loosen and remove the 8 bearing cap bolts in the sequence shown in the illustration.



(c) Uniformly loosen and remove the 13 bearing cap bolts in the sequence shown in the illustration.
NOTICE:
Uniformly loosen the bolts while keeping the camshaft level.

(d) Remove the 5 bearing caps.

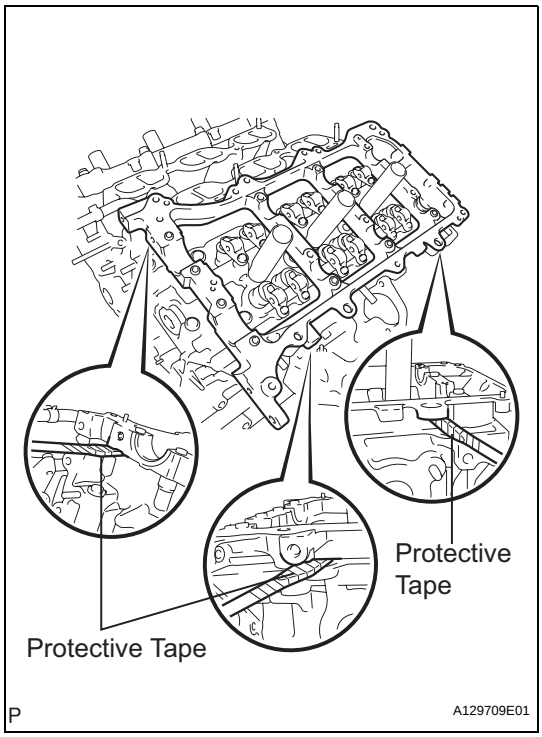
44. REMOVE NO. 3 CAMSHAFT

(a) Remove the No. 3 camshaft.

45. REMOVE NO. 4 CAMSHAFT

(a) Remove the No. 4 camshaft.

EM



46. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY LH

(a) Remove the camshaft housing by prying between the cylinder head and camshaft housing with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

HINT:

Tape the screwdriver tip before use.

47. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

(a) Remove the 24 valve rocker arms.

HINT:

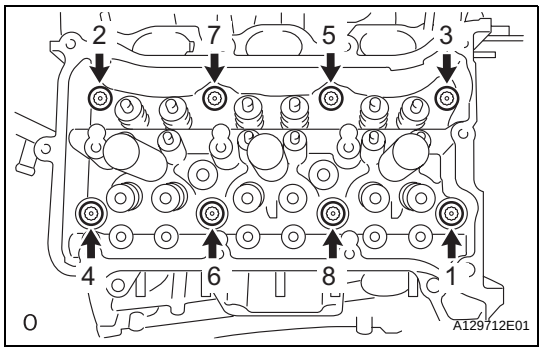
Arrange the removed parts in the correct order.

48. REMOVE VALVE LASH ADJUSTER ASSEMBLY

(a) Remove the 24 valve lash adjusters from the cylinder head.

HINT:

Arrange the removed parts in the correct order.



49. REMOVE CYLINDER HEAD SUB-ASSEMBLY RH

(a) Using a 10 mm bi-hexagon wrench, uniformly loosen the 8 bolts in the sequence shown in the illustration. Remove the 8 cylinder head bolts and plate washers.

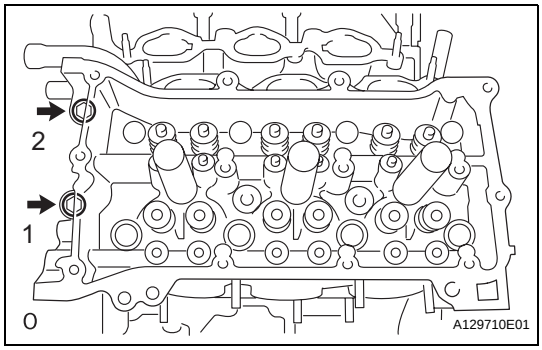
NOTICE:

- **Be careful not to drop washers into the cylinder head.**
- **Cylinder head warpage or cracking could result from removing bolts in an incorrect order.**

HINT:

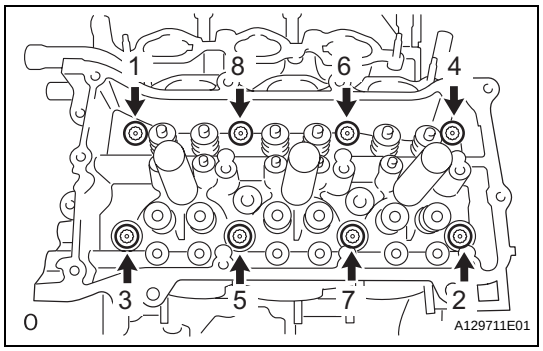
Be sure to keep separate the removed parts for each installation position.

(b) Remove the cylinder head and gasket.



50. REMOVE CYLINDER HEAD SUB-ASSEMBLY LH

(a) Uniformly loosen and remove the bolts in the sequence shown in the illustration.



(b) Using a 10 mm bi-hexagon wrench, uniformly loosen the 8 bolts in the sequence shown in the illustration. Remove the 8 cylinder head bolts and plate washers.

NOTICE:

- **Be careful not to drop washers into the cylinder head.**
- **Cylinder head warpage or cracking could result from removing bolts in an incorrect order.**

HINT:

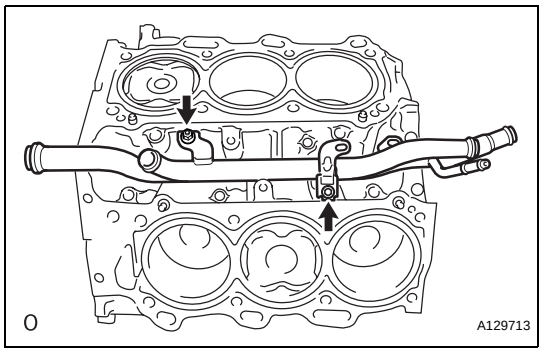
Be sure to keep separate the removed parts for each installation position.

(c) Remove the cylinder head and gasket.

51. REMOVE WATER INLET PIPE

(a) Separate the No. 1 water by-pass hose.

(b) Remove the 2 bolts and water inlet pipe.

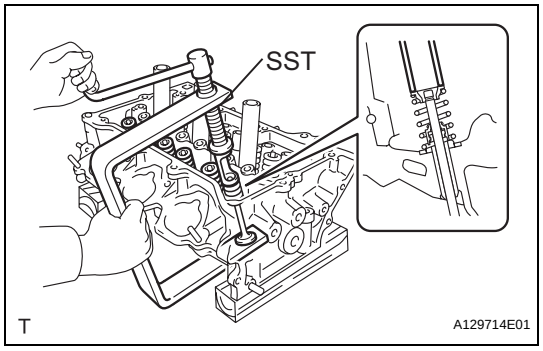


52. REMOVE VALVE STEM CAP

(a) Remove the valve stem caps from the cylinder heads.

HINT:

Arrange the removed parts in the correct order.



53. REMOVE INTAKE VALVE

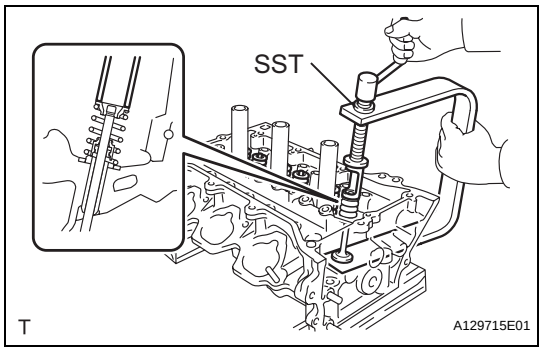
(a) Using SST, compress the compression spring and remove the valve spring retainer locks.

SST 09202-70020 (09202-00010)

(b) Remove the retainer, compression spring and valve.

HINT:

Arrange the removed parts in the correct order.



54. REMOVE EXHAUST VALVE

(a) Using SST, compress the compression spring and remove the valve spring retainer locks.

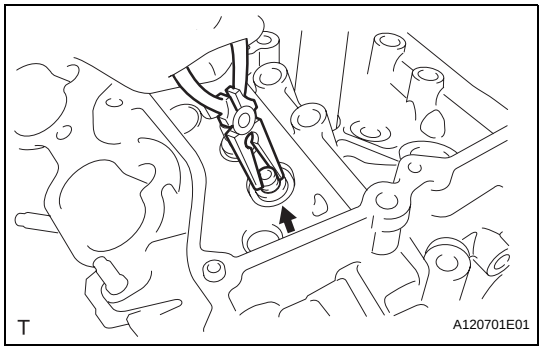
SST 09202-70020 (09202-00010)

(b) Remove the retainer, compression spring and valve.

HINT:

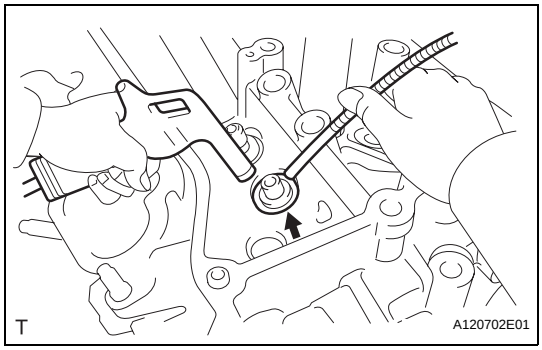
Arrange the removed parts in the correct order.

EM



55. REMOVE VALVE STEM OIL SEAL

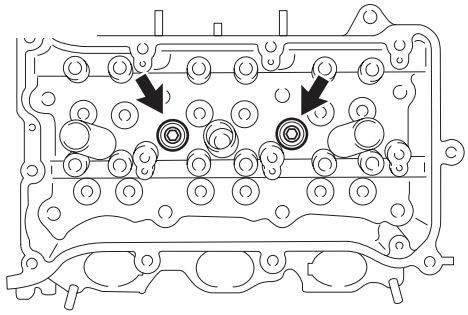
(a) Using needle-nose pliers, remove the oil seals.



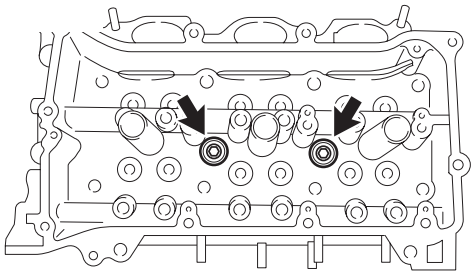
56. REMOVE VALVE SPRING SEAT

(a) Using compressed air and a magnetic finger, remove the valve spring seats by blowing air onto them.

RH Bank:



LH Bank:

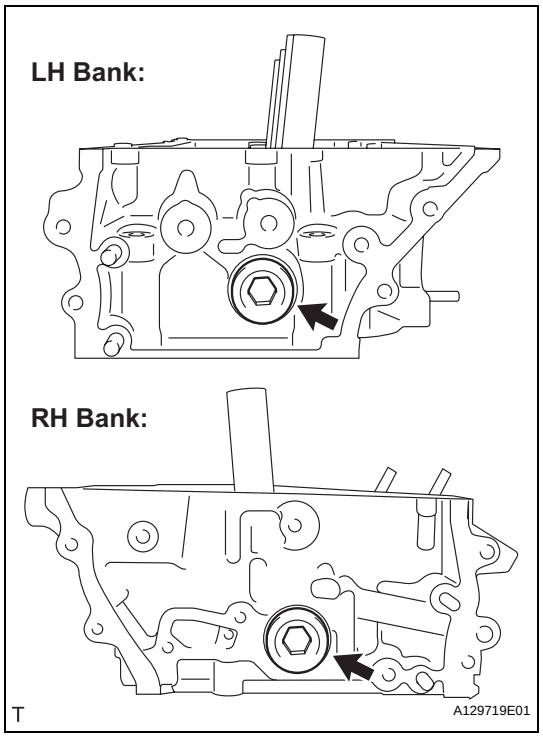


57. REMOVE NO. 1 STRAIGHT SCREW PLUG

(a) Using a 10 mm hexagon wrench, remove the 4 screw plugs and 4 gaskets.

NOTICE:

If water leaks from the straight screw plug or the plug corrodes, replace it.



58. REMOVE NO. 2 STRAIGHT SCREW PLUG

(a) Using a 14 mm hexagon wrench, remove the screw plugs and gaskets.

NOTICE:

If water leaks from the straight screw plug or the plug corrodes, replace it.

59. REMOVE RING PIN

NOTICE:

It is not necessary to remove the ring pin unless it is being replaced.

60. REMOVE STUD BOLT

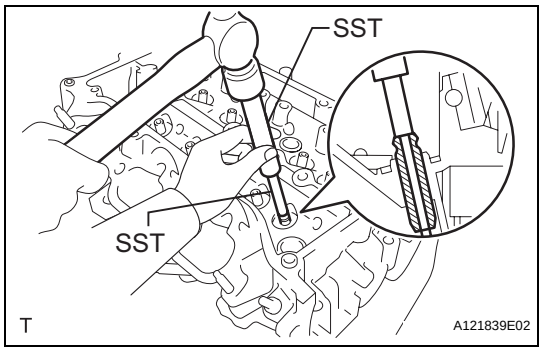
NOTICE:

If the stud bolt is deformed or the threads are damaged, replace it.

61. REMOVE INTAKE VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



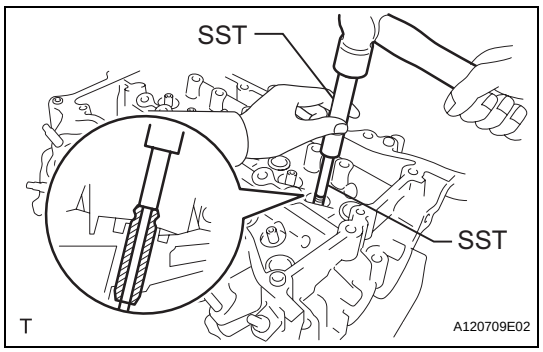
(c) Using SST and a hammer, tap out the guide bushes.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

62. REMOVE EXHAUST VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



(c) Using SST and a hammer, tap out the guide bushes.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

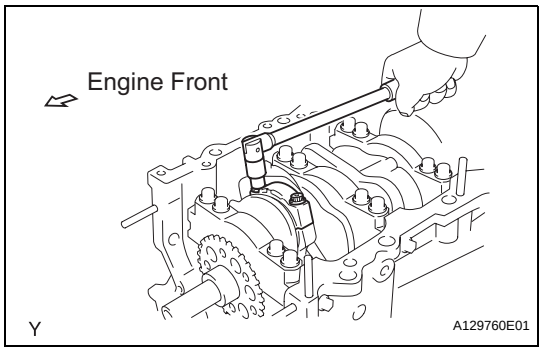
63. REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD

(a) Check that the matchmarks on the connecting rod and cap are aligned.

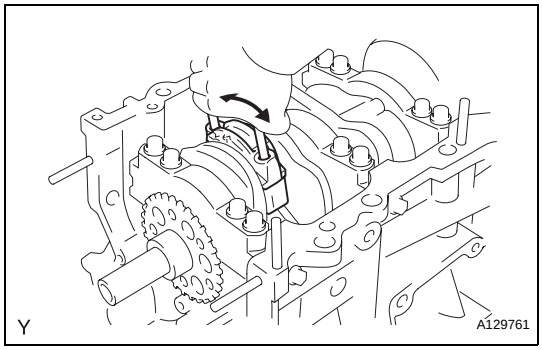
HINT:

The matchmarks on the connecting rods and caps are for ensuring the correct reassembly.

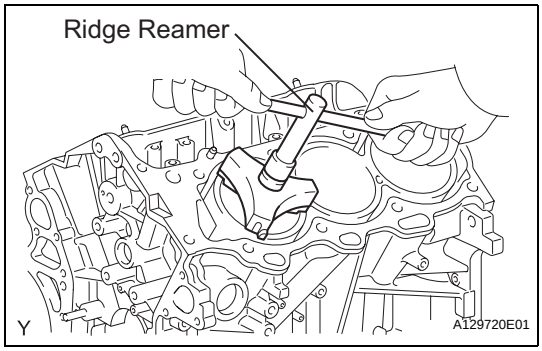
EM



(b) Remove the 2 connecting rod cap bolts.

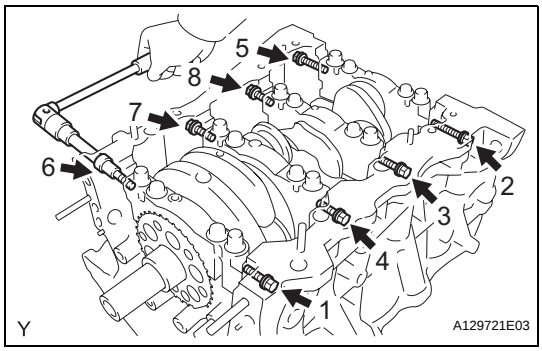


(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.
HINT:
Keep the lower bearing inserted to the connecting rod cap.

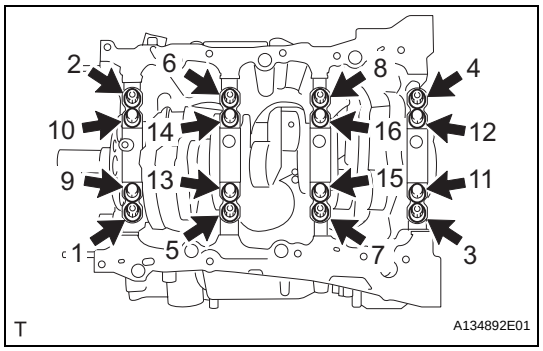


(d) Using a ridge reamer, remove all the carbon from the top of the cylinder.
(e) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.
HINT:
- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

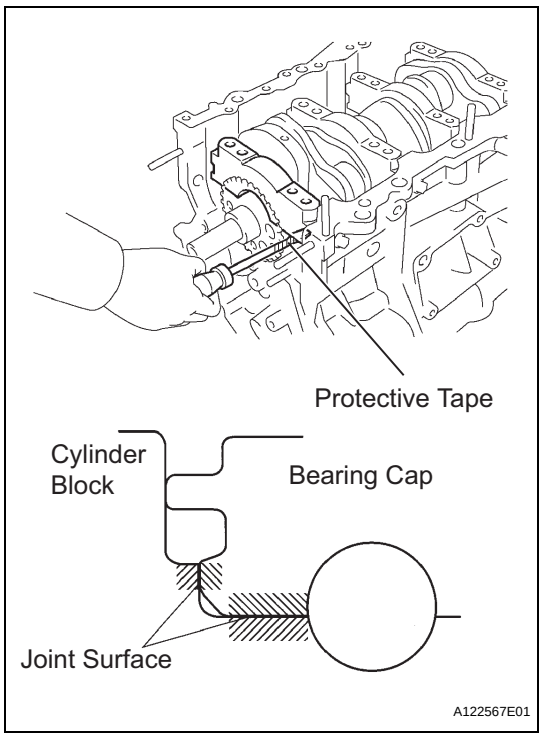
64. REMOVE CONNECTING ROD BEARING
NOTICE:
Arrange the removed parts in the correct order.



65. REMOVE CRANKSHAFT
(a) Uniformly loosen and remove the 8 main bearing cap bolts and seal washers in the several steps and in the sequence shown in the illustration.



(b) Uniformly loosen the 16 bearing cap bolts, in several steps and in the sequence shown in the illustration.

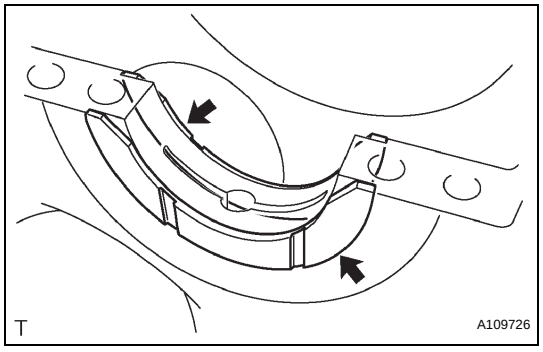


(c) Using a screwdriver, pry out the main bearing caps. Remove the 4 main bearing caps and lower bearings.
NOTICE:
- **Push up on the cap little by little, from the right and left side alternately so that the cap can be removed.**
- **Be careful not to damage the joint surface of the cylinder block and the main bearing cap.**

(d) Remove the crankshaft.

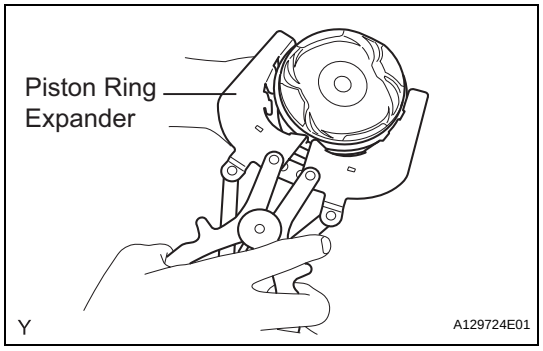
66. REMOVE CRANKSHAFT BEARING

HINT:
Arrange the removed parts in the correct order.



67. REMOVE CRANKSHAFT THRUST WASHER SET

(a) Remove the upper bearings and upper thrust washers from the cylinder block.

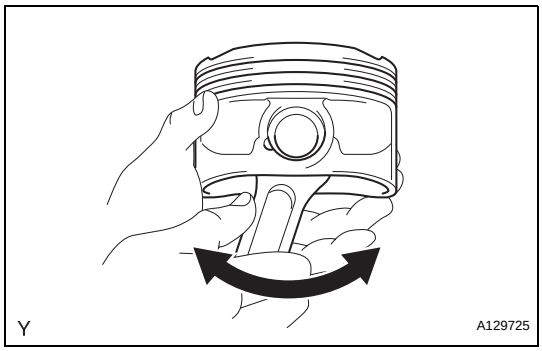


68. REMOVE PISTON RING SET

(a) Using a piston ring expander, remove the 2 compression rings.

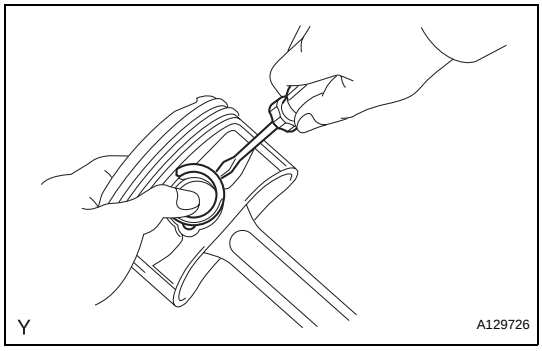
(b) Remove the oil ring expander and 2 side rails by hand.
HINT:
Arrange the removed parts in the correct order.

EM

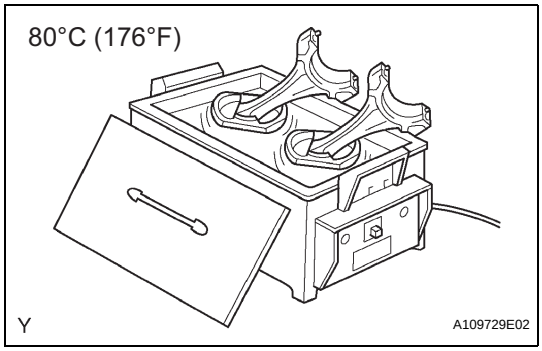


69. REMOVE PISTON SUB-ASSEMBLY WITH PIN

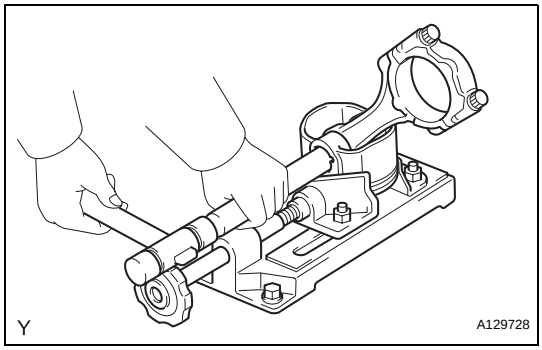
(a) Check the fitting condition between the piston and piston pin.
   (1) Try to move the piston back and forth on the piston pin.
   If any movement is felt, replace the piston and pin as a set.



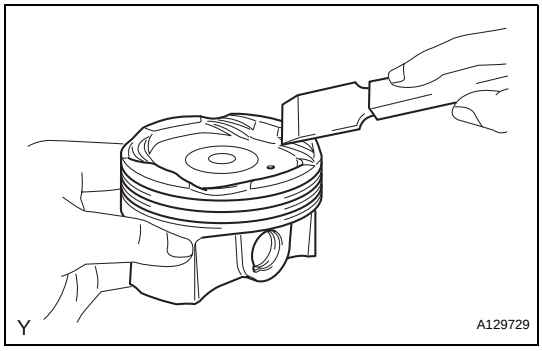
(b) Disconnect the connecting rod from the piston.
   (1) Using a screwdriver, pry off the snap rings from the piston.



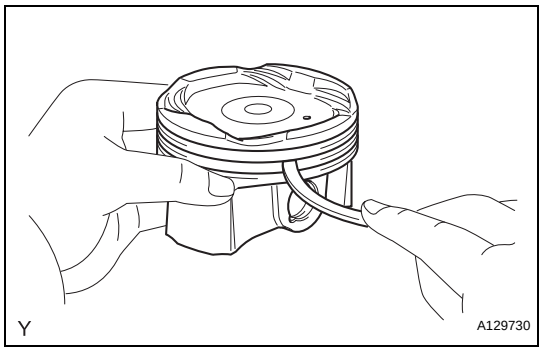
   (2) Gradually heat the piston to approximately 80°C (176°F).



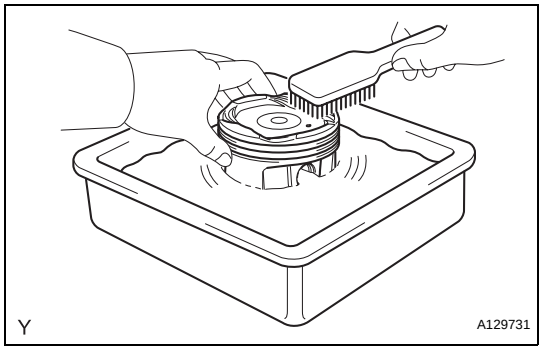
   (3) Using a brass bar and plastic hammer, lightly tap out the piston pin and remove the connecting rod.
   HINT:
   - The piston and pin are a matched set.
   - Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.



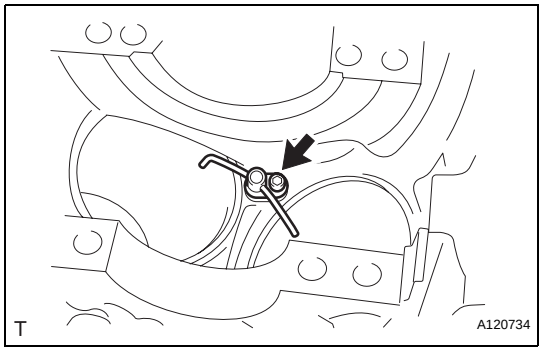
(c) Using a gasket scraper, remove the carbon from the piston top.



(d) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



(e) Using solvent and a brush, thoroughly clean the piston.
NOTICE:
Do not use a wire brush.

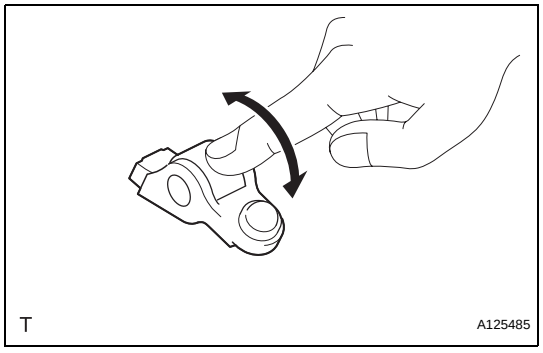


70. REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY

(a) Using a 5 mm hexagon wrench, remove the bolts and oil nozzles.

(b) Check the 3 oil nozzles for damage or clogging. If necessary, replace the oil nozzle.

71. CLEAN CYLINDER BLOCK



INSPECTION

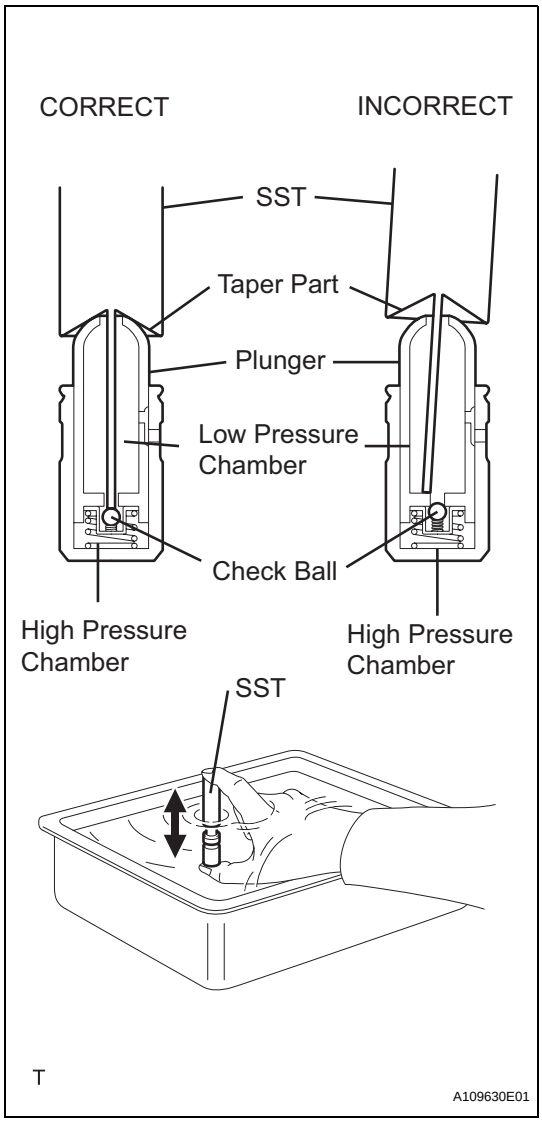
1. INSPECT NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

(a) Turn the roller by hand to check that it turns smoothly.
HINT:
If the roller does not turn smoothly, replace the valve rocker arm sub-assembly.

2. INSPECT VALVE LASH ADJUSTER ASSEMBLY
NOTICE:

- **Keep the lash adjuster free of dirt and foreign objects.**
- **Only use clean engine oil.**

(a) Place the lash adjuster into a container filled with engine oil.



(b) Insert the SST's tip into the lash adjuster's plunger and use the tip to press down on the check ball inside the plunger.
SST 09276-75010

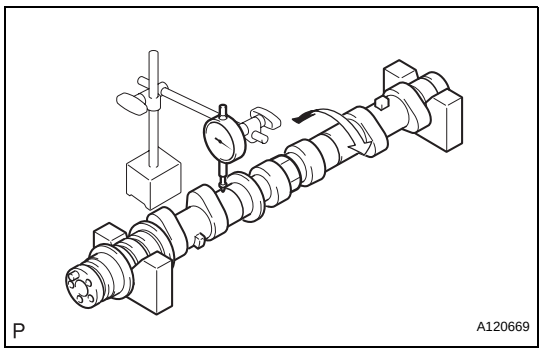
(c) Squeeze the SST and lash adjuster together to move the plunger up and down 5 to 6 times.

(d) Check the movement of the plunger and bleed the air.
OK:
Plunger moves up and down.
NOTICE:
When bleeding air from the high-pressure chamber, make sure that the tip of the SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, air will not bleed.

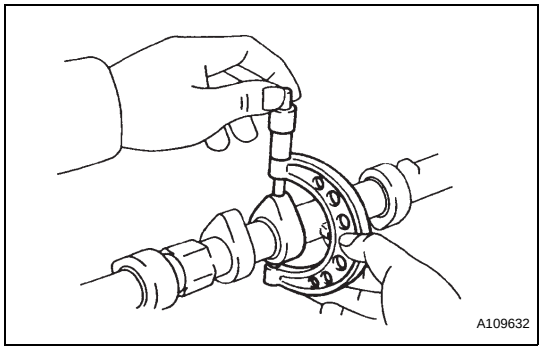
(e) After bleeding the air, remove the SST. Then try to quickly and firmly press the plunger with a finger.
OK:
Plunger is very difficult to move.
If the result is not as specified, replace the lash adjuster.

3. INSPECT CAMSHAFT

(a) Inspect the camshaft for runout.
(1) Place the camshaft on V-blocks.



(2) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.04 mm (0.0016 in.)
If the circle runout is greater than the maximum, replace the camshaft.
HINT:
Check the oil clearance after replacing the camshaft.

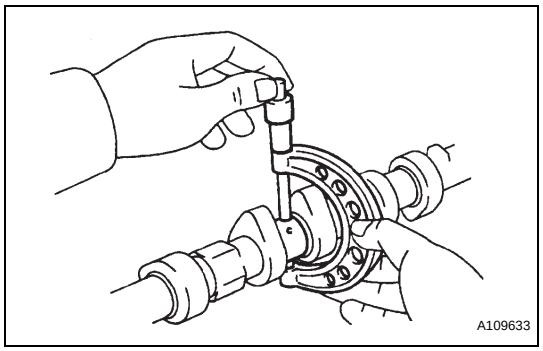


(b) Using a micrometer, measure the cam lobe height.
Standard cam lobe height

Item	Specification
Intake camshaft	44.316 to 44.416 mm (1.7447 to 1.7487 in.)
Exhaust camshaft	44.262 to 44.362 mm (1.7426 to 1.7465 in.)

Maximum cam lobe height

Item	Specification
Intake camshaft	44.166 mm (1.7388 in.)
Exhaust camshaft	44.112 mm (1.7367 in.)



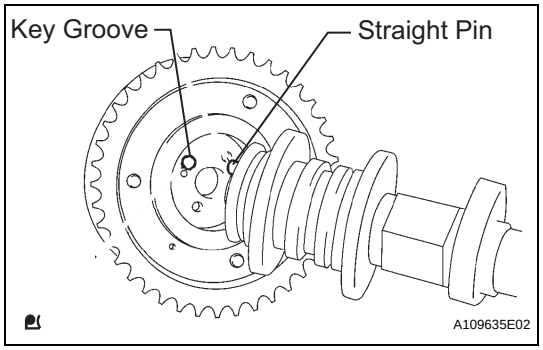
(c) Using a micrometer, measure the journal diameter.
Standard journal diameter

Item	Specification
No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
Other journals	25.959 to 25. 975 mm (1.0220 to 1.0226 in.)

If the journal diameter is not as specified, check the oil clearance.

4. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

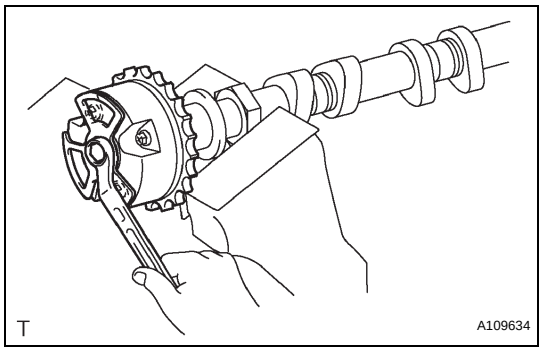
(a) Clamp the camshaft in a vise.
NOTICE:
Be careful not to damage the camshaft in the vise.



(b) Put the camshaft timing gear and camshaft together by aligning the key groove and straight pin.

(c) Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.
NOTICE:
Be sure not to turn the camshaft timing gear in the retard direction (the right angle).

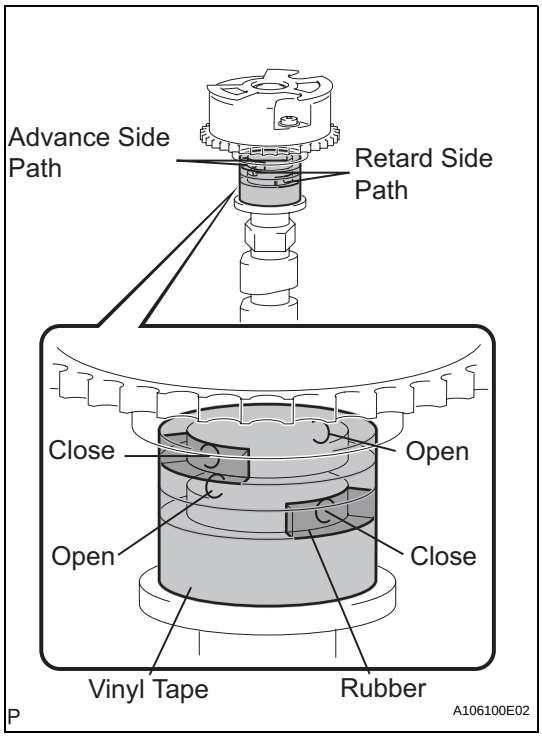
(d) Check that there is no clearance between the gear's flange and the camshaft.



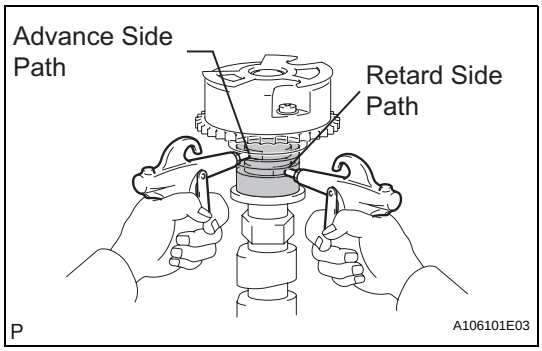
(e) Tighten the flange bolt with the camshaft timing gear fixed.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

(f) Check the lock of the camshaft timing gear.
(1) Clamp the camshaft in a vise, and confirm that the camshaft timing gear is locked.
NOTICE:
Be careful not to damage the camshaft.

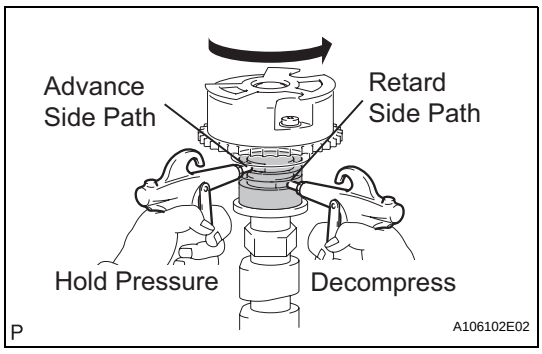
EM



(g) Release the lock pin.
(1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.
HINT:
2 advance side paths are provided in the groove of the camshaft. Plug one of the paths with a rubber piece.
(2) Break through the tape of the advance side path and the retard side path on the opposite side to the hole of the advance side path, as shown in the illustration.



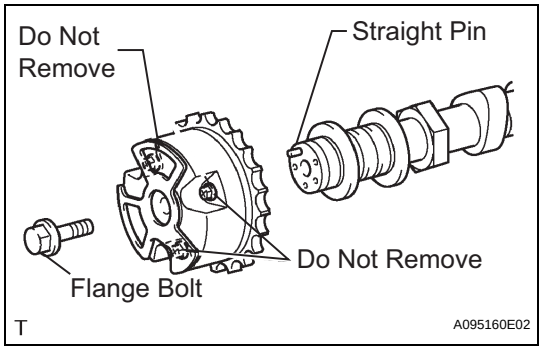
(3) Apply approximately 200 kPa (2.0 kgf/cm^2, 28 psi) of air pressure to the 2 broken paths.
CAUTION:
Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.



(4) Check that the camshaft timing gear revolves in the advance direction when reducing the air pressure applied to the retard side path.
HINT:
This operation releases the lock pin for the most retarded position.
(5) When the camshaft timing gear reaches the most advanced position, release the air pressure from the retard side path and advance side path, in that order.
NOTICE:
Do not release the air pressure from the advance side path first. The gear may abruptly shift in the retard direction and break the lock pin.

(h) Check for smooth rotation.
(1) Turn the camshaft timing gear within its movable range (21°) 2 or 3 times, but do not turn it to the most retarded position. Make sure that the gear turns smoothly.
NOTICE:
Do not use air pressure to perform the smooth operation check.

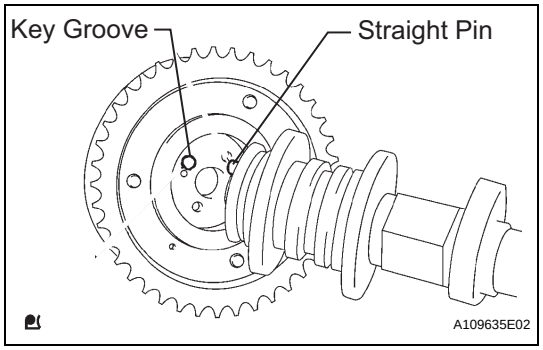
(i) Check the lock in the most retarded position.
(1) Confirm that the camshaft timing gear is locked at the most retarded position.



(j) Remove the flange bolt and camshaft timing gear.
NOTICE:
- **Do not remove the other 3 bolts.**
- **If planning to reuse the gear, be sure to release the straight pin lock before installing the gear.**

5. INSPECT CAMSHAFT TIMING EXHAUST GEAR ASSEMBLY

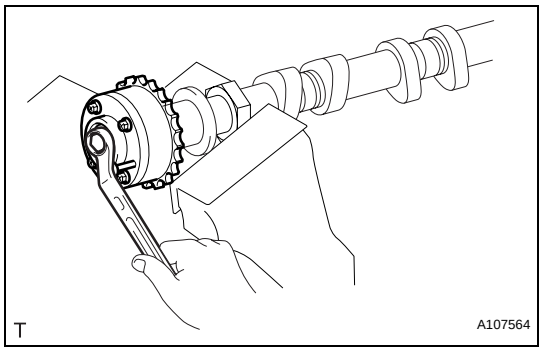
(a) Clamp the camshaft in a vise.
NOTICE:
Be careful not to damage the camshaft in the vise.



(b) Put the camshaft timing exhaust gear and camshaft together by aligning the key groove and straight pin.

(c) Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.
NOTICE:
Be sure not to turn the camshaft timing exhaust gear in the retard direction (the right angle).

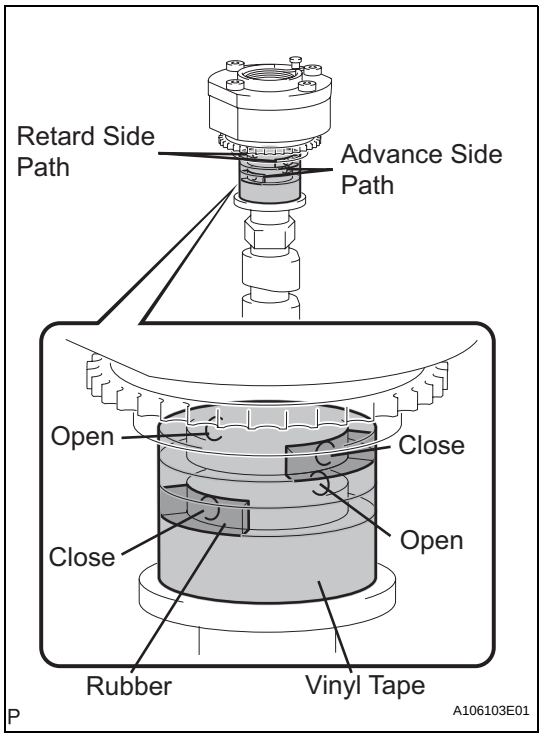
(d) Check that there is no clearance between the gear's flange and the camshaft.



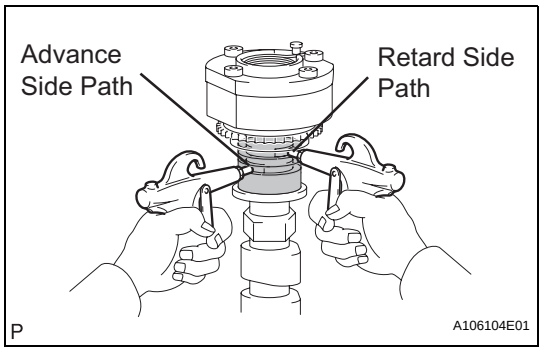
(e) Tighten the flange bolt with the camshaft timing exhaust gear fixed.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

(f) Check the camshaft timing exhaust gear lock.
(1) Make sure that the camshaft timing exhaust gear is locked.

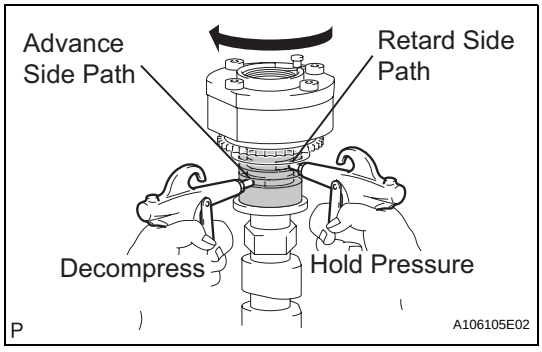
EM



(g) Release the lock pin.
(1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.
HINT:
4 oil paths are provided in the groove. Plug 2 paths with rubber pieces.
(2) Prick a hole in the tape placed on the advance side path. Prick a hole in the tape placed on the retard side path, on the opposite side to that of the advance side path, as shown in the illustration.



(3) Apply approximately 200 kPa (2.0 kgf/cm^2, 28 psi) of air pressure to the 2 broken paths (the advance side path and the retard side path).
CAUTION:
Cover the paths with a piece of cloth when applying pressure to keep oil from splashing.

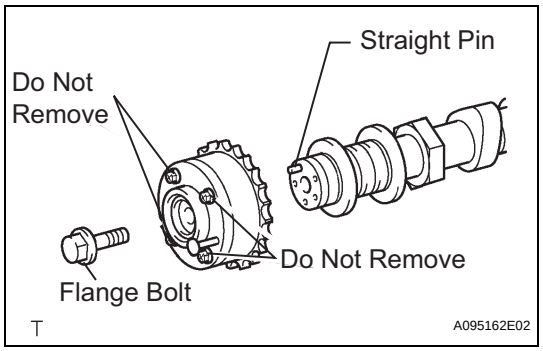


(4) Make sure that the camshaft timing exhaust gear turns in the retard direction when reducing the air pressure applied to the advance side path.
HINT:
The lock pin is released and the camshaft timing exhaust gear turns in the retard direction.
(5) When the camshaft timing exhaust gear moves to the most retarded position, release the air pressure from the advance side path, and then release the air pressure from the retard side path.
NOTICE:
Be sure to release the air pressure from the advance side path first. If the air pressure of the retard side path is released first, the camshaft timing exhaust gear may abruptly shift in the advance direction and break the lock pin or other parts.

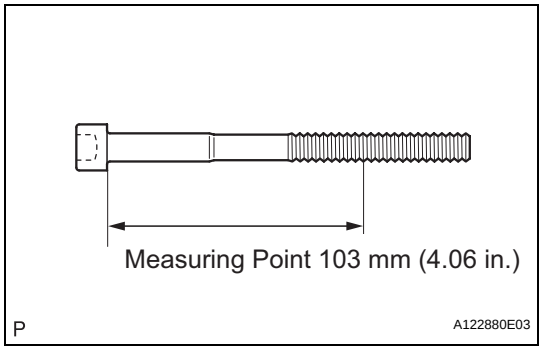
EM

(h) Check for smooth rotation.
(1) Turn the camshaft timing exhaust gear within its movable range (18.5°) 2 or 3 times, but do not turn it to the most advanced position. Make sure that the gear turns smoothly.
NOTICE:
When the air pressure is released from the advance side path and then from the retard side path, the gear automatically returns to the most advanced position due to the advance assist spring operation and locks. Gradually release the air pressure from the retard side path before performing the smooth rotation check.

(i) Check the lock at the most advanced position.
(1) Make sure that the camshaft timing exhaust gear is locked at the most advanced position.

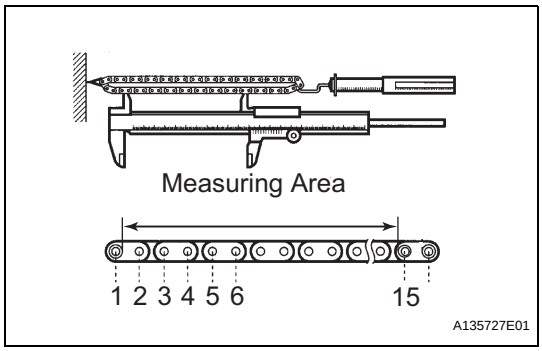


(j) Remove the flange bolt and camshaft timing exhaust gear.
NOTICE:
- **Be sure not to remove the other 4 bolts.**
- **If planning to reuse the gear, be sure to release the straight pin lock before installing the gear.**



6. INSPECT CYLINDER HEAD SET BOLT

(a) Using vernier calipers, measure the minimum diameter of the elongated thread at the measuring point.
Standard outside diameter:
10.85 to 11.00 mm (0.4272 to 0.4331 in.)
Minimum outside diameter:
10.70 mm (0.4213 in.)
Measuring Point:
103 mm (4.06 in.)
HINT:
If a visual check reveals no excessively thin areas, check the center of the bolt and find the area that has the lowest diameter.
If the diameter is less than the minimum, replace the cylinder head bolt.

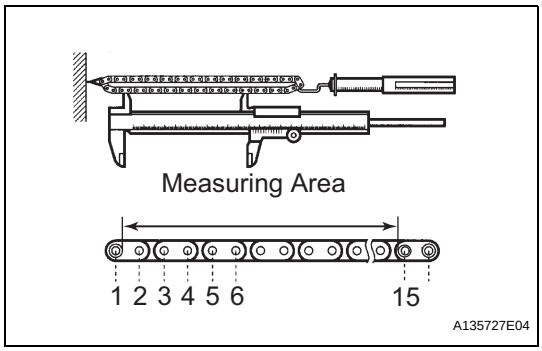


7. INSPECT CHAIN SUB-ASSEMBLY

(a) Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.

(b) Using vernier calipers, measure the length of 15 links.

Maximum chain elongation:
136.9 mm (5.390 in.)
NOTICE:
Perform the measurement at 3 random places.
Use the average of the measurements.
If the elongation is greater than the maximum, replace the chain.



8. INSPECT NO. 2 CHAIN SUB-ASSEMBLY

(a) Pull the chain with a force of 147 N (15 kgf, 33 lbf) as shown in the illustration.

(b) Using vernier calipers, measure the length of 15 links.

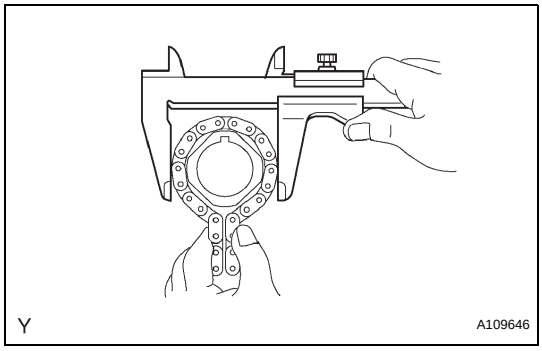
Maximum chain elongation:
137.6 mm (5.417 in.)
NOTICE:
Perform the measurement at 3 random places.
Use the average of the measurements.
If the elongation is greater than the maximum, replace the chain.

9. INSPECT CRANKSHAFT TIMING SPROCKET

(a) Wrap the chain around the sprocket.

(b) Using vernier calipers, measure the sprocket diameter with the chain.

Minimum sprocket diameter (with chain):
61.4 mm (2.417 in.)
HINT:
The vernier calipers must contact the chain rollers for the measurement.
If the diameter is less than the minimum, replace the chain and sprocket.

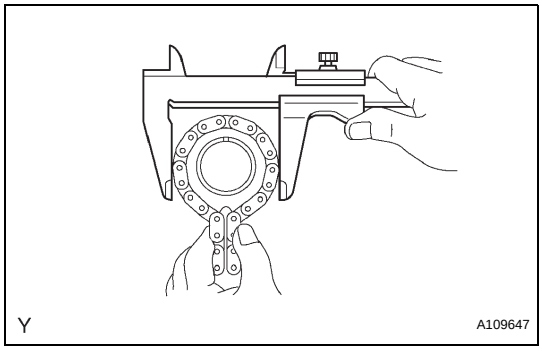


10. INSPECT IDLE SPROCKET ASSEMBLY

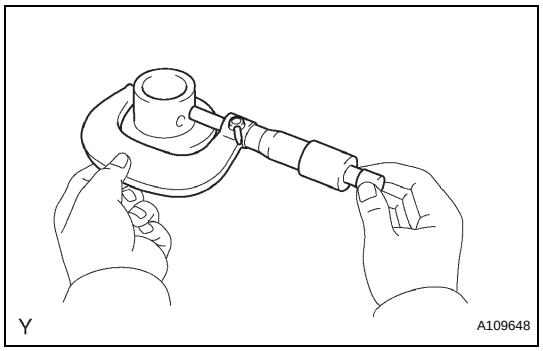
(a) Wrap the chain around the sprocket.

(b) Using vernier calipers, measure the sprocket diameter with the chain.

Minimum sprocket diameter (with chain):
61.4 mm (2.417 in.)
HINT:
The vernier calipers must contact the chain rollers for the measurement.
If the diameter is less than the minimum, replace the chain and sprocket.



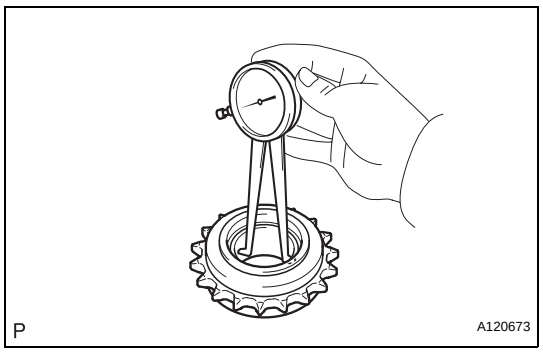
EM



11. INSPECT IDLE GEAR SHAFT OIL CLEARANCE

(a) Using a micrometer, measure the idle gear shaft diameter.

Idle gear shaft diameter:
22.987 to 23.000 mm (0.9050 to 0.9055 in.)



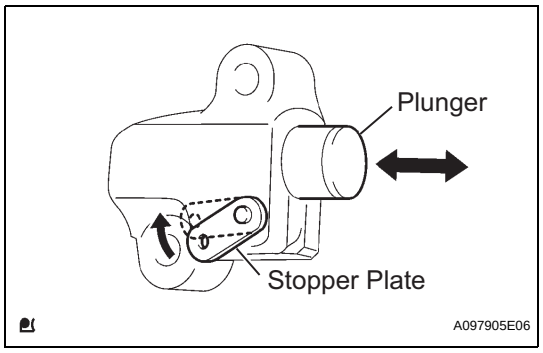
(b) Using a caliper gauge, measure the inside diameter of the idle gear.

Idle gear inside diameter:
23.020 to 23.030 mm (0.9063 to 0.9067 in.)

(c) Subtract the idle gear shaft diameter measurement from the idle gear inside diameter measurement.

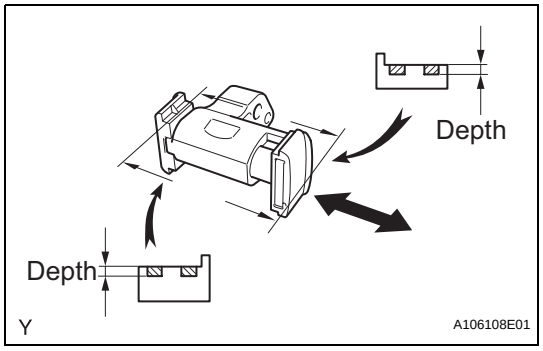
Standard oil clearance:
0.020 to 0.043 mm (0.0008 to 0.0017 in.)
Maximum oil clearance:
0.093 mm (0.0037 in.)

If the thrust oil clearance is greater than the maximum, replace the idle gear shaft and idle gear.



12. INSPECT NO. 1 CHAIN TENSIONER ASSEMBLY

(a) Move the stopper plate upward to release the lock. Push the plunger and check that it moves smoothly. If necessary, replace the chain tensioner assembly.



13. INSPECT NO. 2 CHAIN TENSIONER ASSEMBLY

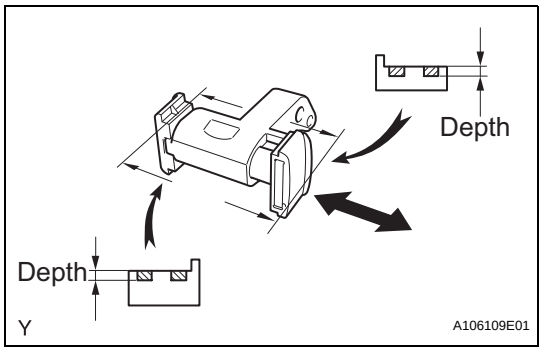
(a) Check that the plunger moves smoothly.

(b) Measure the worn depth of the chain tensioner.

Maximum depth:
0.9 mm (0.035 in.)

If the depth is greater than the maximum, replace the chain tensioner assembly.

EM



14. INSPECT NO. 3 CHAIN TENSIONER ASSEMBLY

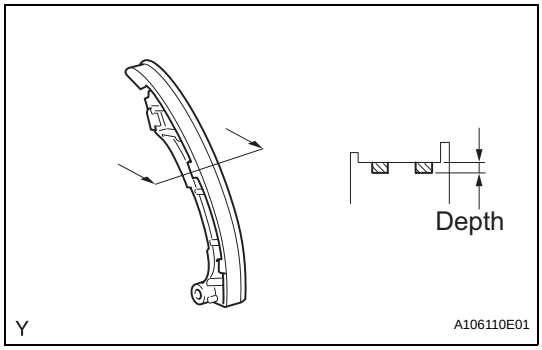
(a) Check that the plunger moves smoothly.

(b) Measure the worn depth of the chain tensioner.

Maximum depth:

0.9 mm (0.035 in.)

If the depth is greater than the maximum, replace the chain tensioner assembly.



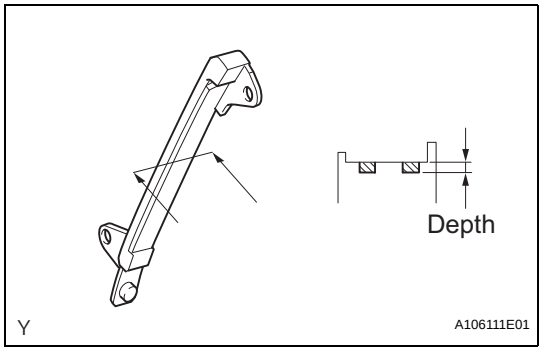
15. INSPECT CHAIN TENSIONER SLIPPER

(a) Measure the worn depth of the chain tensioner slipper.

Maximum depth:

1.0 mm (0.039 in.)

If the depth is greater than the maximum, replace the chain tensioner slipper.



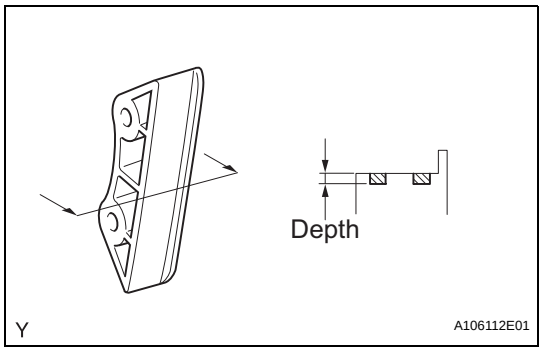
16. INSPECT NO. 1 CHAIN VIBRATION DAMPER

(a) Measure the worn depth of the chain vibration damper.

Maximum depth:

1.0 mm (0.039 in.)

If the depth is greater than the maximum, replace the chain vibration damper.



17. INSPECT NO. 2 CHAIN VIBRATION DAMPER

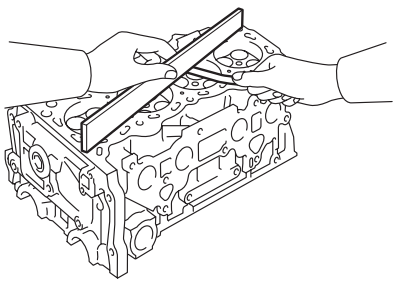
(a) Measure the worn depth of the chain vibration damper.

Maximum depth:

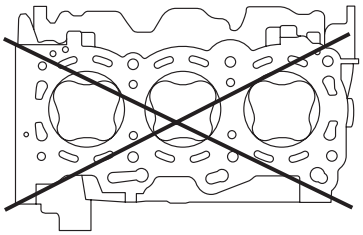
1.0 mm (0.039 in.)

If the depth is greater than the maximum, replace the chain vibration damper.

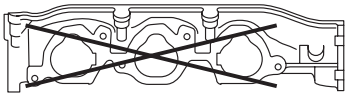
EM



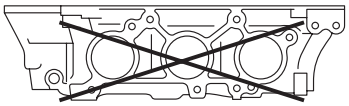
Cylinder head lower side:



Intake side:



Exhaust side:



T A129747E01

18. INSPECT CYLINDER HEAD ASSEMBLY

(a) Using a precision straight edge and feeler gauge, measure the warpage of the contact surface of the cylinder block and manifolds.

Standard warpage

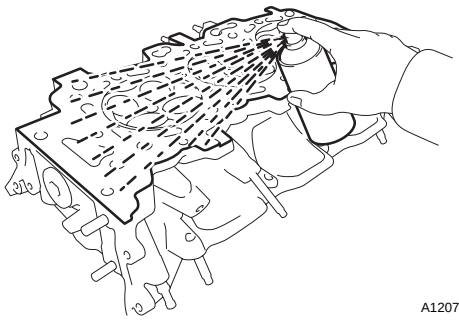
Item	Warpage
Cylinder head lower	0.05 mm (0.0020 in.)
Intake	0.08 mm (0.0031 in.)
Exhaust	0.08 mm (0.0031 in.)

Maximum warpage

Item	Warpage
Cylinder head lower	0.10 mm (0.0039 in.)
Intake	0.10 mm (0.0039 in.)
Exhaust	0.10 mm (0.0039 in.)

If the warpage is greater than the maximum, replace the cylinder head assembly.

EM



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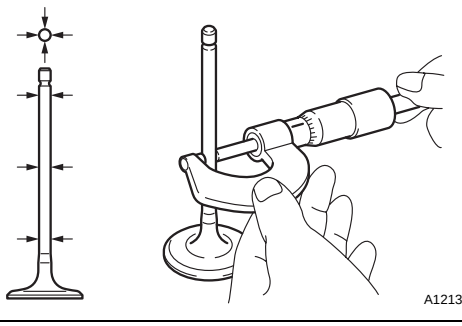
(b) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks. If cracked, replace the cylinder head assembly.



T A121378

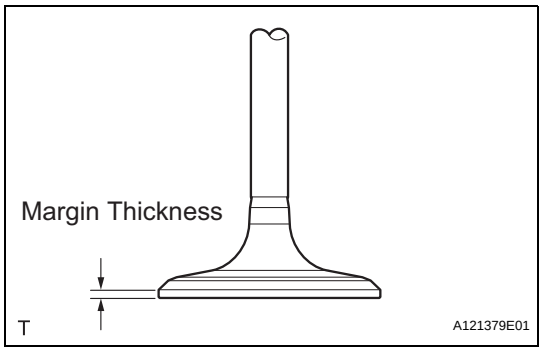
19. INSPECT INTAKE VALVE

(a) Using a micrometer, measure the diameter of the valve stem.

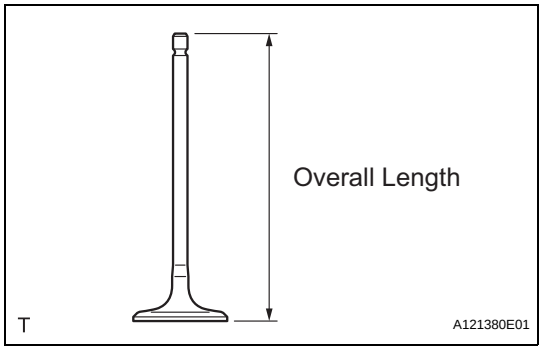
Valve stem diameter:

5.470 to 5.485 mm (0.2154 to 0.2159 in.)

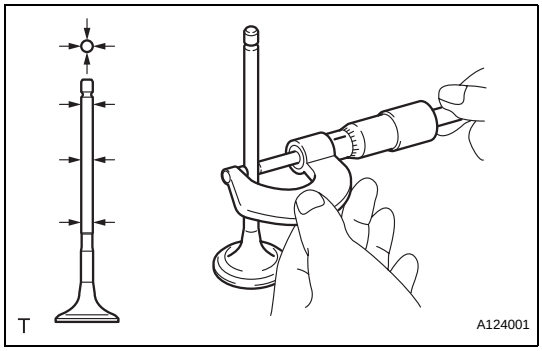
If the valve stem is not as specified, check the oil clearance.



(b) Using vernier calipers, measure the valve head margin thickness.
Standard margin thickness:
1.0 mm (0.03937 in.)
Minimum margin thickness:
0.5 mm (0.0197 in.)
If the margin thickness is less than the minimum, replace the intake valve.

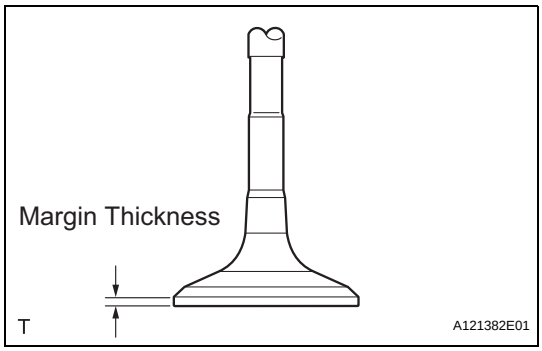


(c) Using vernier calipers, measure the valve's overall length.
Standard overall length:
105.85 mm (4.1673 in.)
Minimum overall length:
105.35 mm (4.1476 in.)
If the overall length is less than the minimum, replace the intake valve.

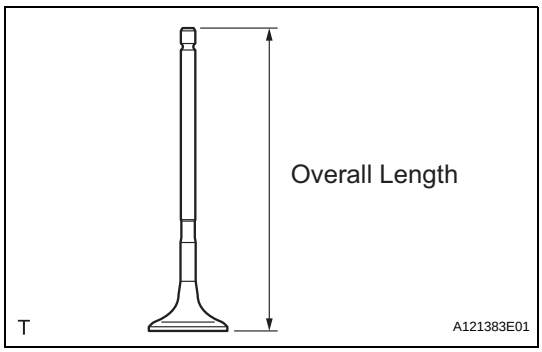


20. INSPECT EXHAUST VALVE

(a) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
5.465 to 5.480 mm (0.2151 to 0.2157 in.)
If the valve stem is not as specified, check the oil clearance.



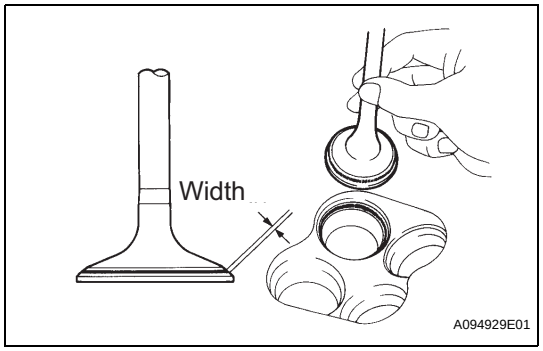
(b) Using vernier calipers, measure the valve head margin thickness.
Standard margin thickness:
1.0 mm (0.0397 in.)
Minimum margin thickness:
0.5 mm (0.0197 in.)
If the margin thickness is less than the minimum, replace the exhaust valve.



(c) Using vernier calipers, measure the valve's overall length.
Standard overall length:
110.40 mm (4.3464 in.)
Minimum overall length:
109.90 mm (4.3268 in.)
If the overall length is less than the minimum, replace the exhaust valve.

21. INSPECT INTAKE VALVE SEAT

(a) Apply a light coat of Prussian blue to the valve face.



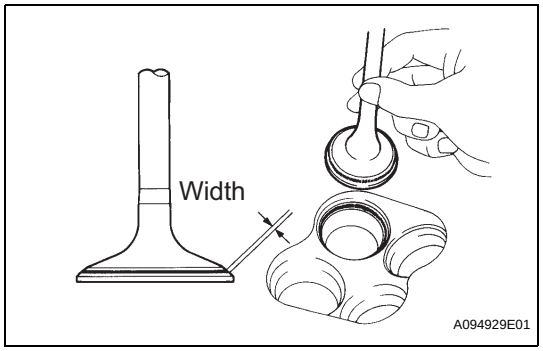
(b) Lightly press the valve face against the valve seat.

(c) Check the valve face and valve seat by using the following procedure.
   (1) If Prussian blue appears around the entire valve face, the valve face is concentric. If not, replace the valve.
   (2) If Prussian blue appears around the entire valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
   (3) Check that the valve seat contacts in the middle of the valve face with the width between 1.1 and 1.5 mm (0.043 and 0.059 in.).

22. INSPECT EXHAUST VALVE SEAT

(a) Apply a light coat of Prussian blue to the valve face.

(b) Lightly press the valve face against the valve seat.



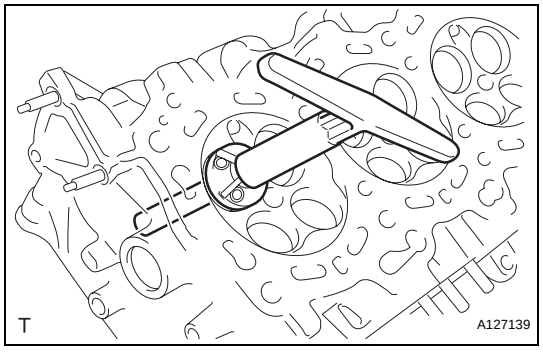
(c) Check the valve face and valve seat by using the following procedure.
   (1) If Prussian blue appears around the entire valve face, the valve face is concentric. If not, replace the valve.
   (2) If Prussian blue appears around the entire valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
   (3) Check that the valve seat contacts in the middle of the valve face with the width between 1.1 and 1.5 mm (0.043 and 0.059 in.).

EM

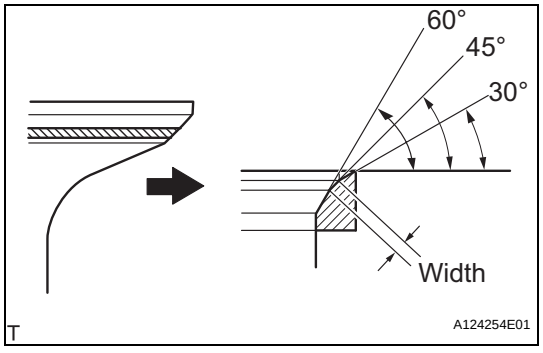
23. REPAIR INTAKE VALVE SEAT

NOTICE:

- **Repair the seat while checking the seating position.**
- **Keep the lip free of foreign matter.**



(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.



(b) Using 30° and 60° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Width:

1.1 to 1.5 mm (0.043 to 0.059 in.)

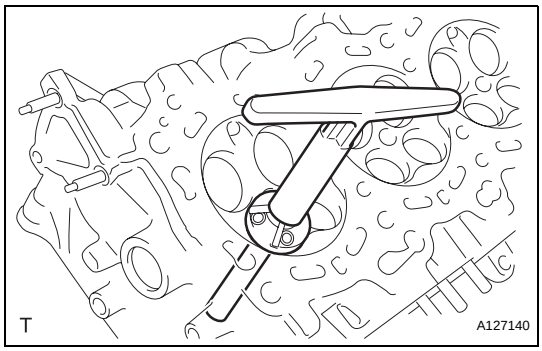
(c) Handrub the valve and valve seat with an abrasive compound.

(d) Check the valve seating position.

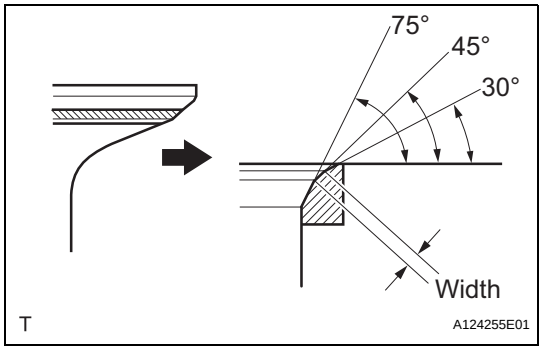
24. REPAIR EXHAUST VALVE SEAT

NOTICE:

- **Repair the seat while checking the seating position.**
- **Keep the lip free of foreign matter.**



(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.



(b) Using 30° and 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

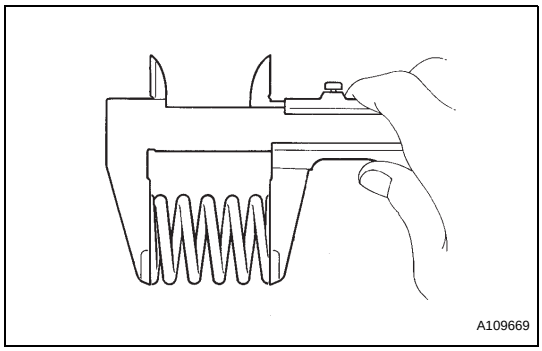
Width:

1.1 to 1.5 mm (0.043 to 0.059 in.)

(c) Handrub the valve and valve seat with an abrasive compound.

(d) Check the valve seating position.

25. INSPECT COMPRESSION SPRING

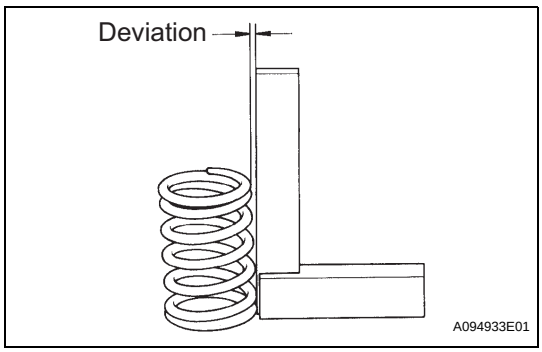


(a) Using vernier calipers, measure the free length of the compression spring.

Free length:

45.46 mm (1.7898 in.)

If the free length is not as specified, replace the spring.



(b) Using a steel square, measure the deviation of the inner compression spring.

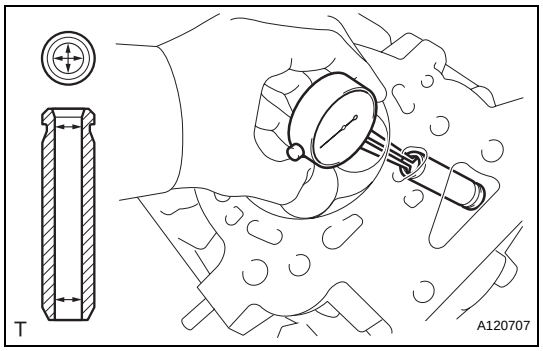
Maximum deviation:

1.0 mm (0.039 in.)

Maximum angle (reference):

2°

If the deviation is greater than the maximum, replace the spring.



26. INSPECT VALVE GUIDE BUSH OIL CLEARANCE

(a) Using a caliper gauge, measure the inside diameter of the guide bush.

Bush inside diameter:
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

Standard clearance

Item	Clearance
Intake	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust	0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum oil clearance

Item	Clearance
Intake	0.08 mm (0.0032 in.)
Exhaust	0.10 mm (0.0039 in.)

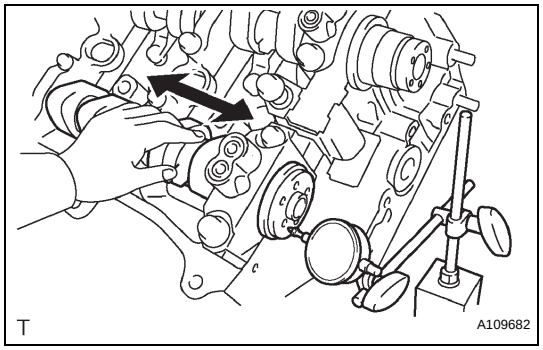
For intake side:
If the clearance is greater than the maximum, replace the intake valve and intake guide bush.
For exhaust side:
If the clearance is greater than the maximum, replace the exhaust valve and exhaust guide bush.

EM

27. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Inspect the RH bank camshaft thrust clearance.

(1) Install the RH bank camshafts (See page EM-113).



(2) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:
0.08 to 0.13 mm (0.0031 to 0.0051 in.)
Maximum thrust clearance:
0.15 mm (0.006 in.)
If the thrust clearance is greater than the maximum, replace the cylinder head. If the thrust surface is damaged, replace the camshaft.

(b) Inspect the LH bank camshaft thrust clearance.

(1) Install the LH bank camshafts (See page EM-113).

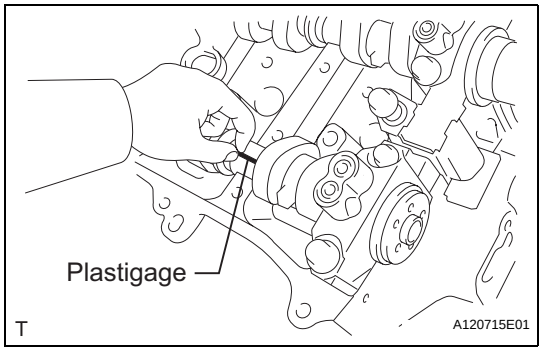
(2) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:
0.08 to 0.13 mm (0.0031 to 0.0051 in.)
Maximum thrust clearance:
0.15 mm (0.006 in.)
If the thrust clearance is greater than the maximum, replace the cylinder head. If the thrust surface is damaged, replace the camshaft.

28. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the bearing caps, camshaft housing and camshaft journals.

(b) Place the camshafts on the camshaft housing.

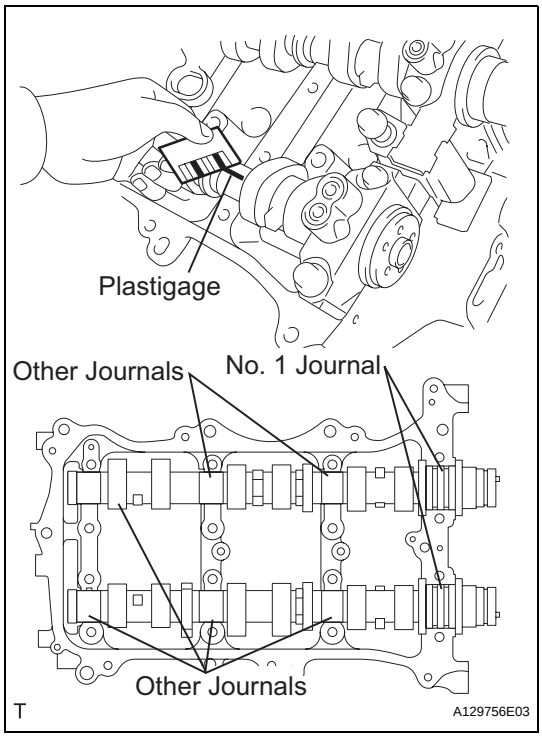


(c) Lay a strip of Plastigage across each of the camshaft journals.

(d) Install the bearing caps (See page EM-113).

NOTICE:
Do not turn the camshaft.

(e) Remove the bearing caps (See page EM-64).



(f) Measure the Plastigage at its widest point.

Standard oil clearance

Item	Oil Clearance
No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
Other journals	0.025 to 0.062 mm (0.00098 to 0.0024 in.)

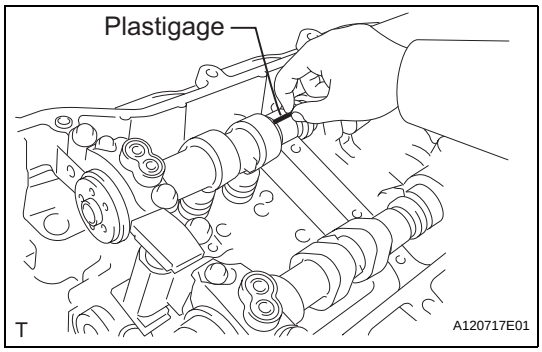
Maximum oil clearance

Item	Oil Clearance
No. 1 journal	0.10 mm (0.0039 in.)
Other journals	0.09 mm (0.0035 in.)

If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the camshaft housing.

(g) Clean the bearing caps, camshaft housing and camshaft journals.

(h) Place the camshafts on the camshaft housing.

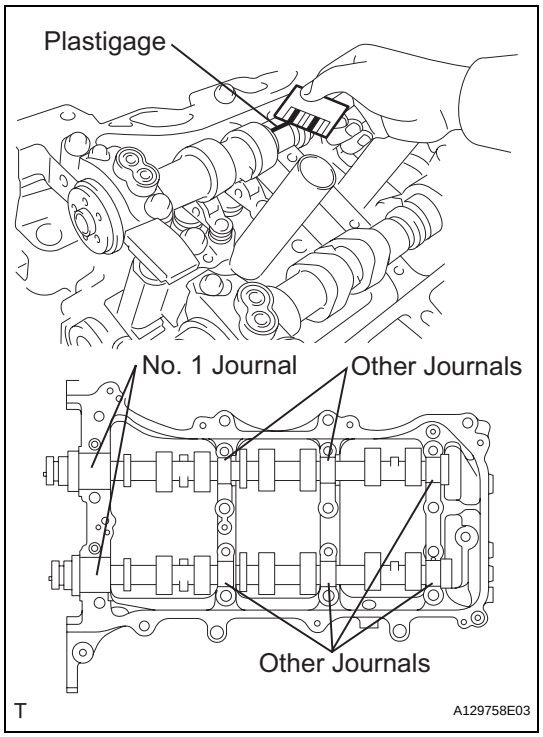


(i) Lay a strip of Plastigage across each of the camshaft journals.

(j) Install the bearing caps (See page EM-113).

NOTICE:
Do not turn the camshaft.

(k) Remove the bearing caps (See page EM-64).



(l) Measure the Plastigage at its widest point.

Standard oil clearance

Item	Oil Clearance
No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
Other journals	0.025 to 0.062 mm (0.00098 to 0.0024 in.)

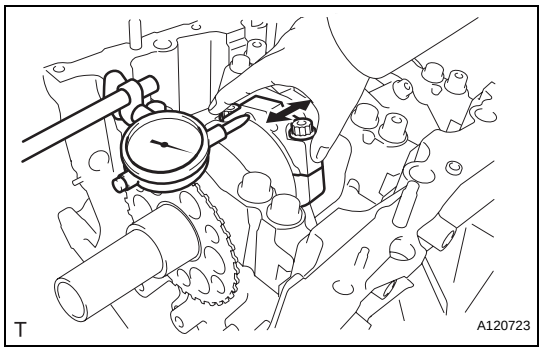
Maximum oil clearance

Item	Oil Clearance
No. 1 journal	0.10 mm (0.0039 in.)
Other journals	0.09 mm (0.0035 in.)

If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the camshaft housing.

29. INSPECT CONNECTING ROD THRUST CLEARANCE

(a) Install the connecting rod cap (See page EM-113).



(b) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

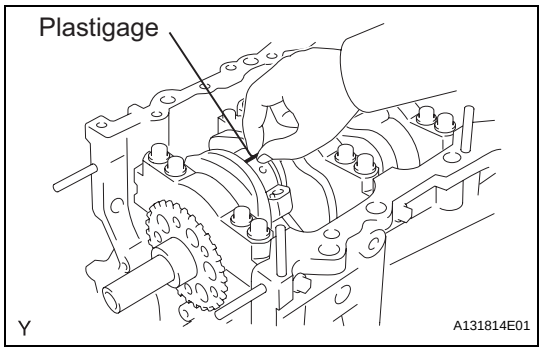
Standard thrust clearance:
0.15 to 0.40 mm (0.0059 to 0.0157 in.)
Maximum thrust clearance:
0.50 mm (0.020 in.)

If the thrust clearance is greater than the maximum, replace the connecting rod assemblies as necessary. If necessary, replace the crankshaft.

30. INSPECT CONNECTING ROD OIL CLEARANCE

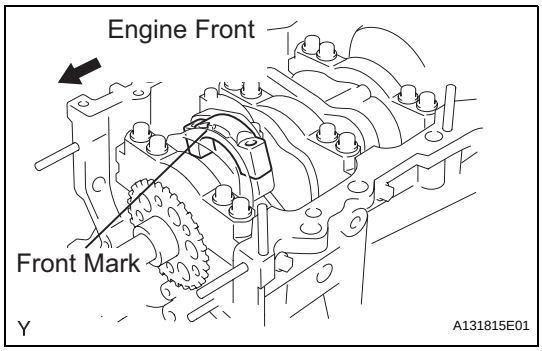
(a) Clean the crank pin and bearing.

(b) Check the crank pin and bearing for pitting and scratches.



(c) Lay a strip of Plastigage on the crank pin.

EM

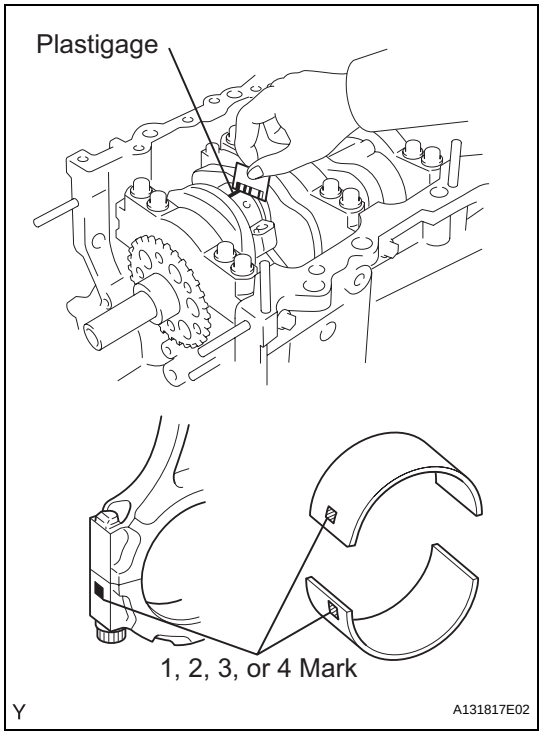


(d) Check that the front mark of the connecting rod cap is facing forward.

(e) Install the connecting rod cap (See page EM-113).

NOTICE:
Do not turn the crankshaft.

(f) Remove the 2 bolts and connecting rod cap (See page EM-64).



(g) Measure the Plastigage at its widest point.

Standard oil clearance:
0.045 to 0.067 mm (0.0018 to 0.0026 in.)
Maximum oil clearance:
0.070 mm (0.0028 in.)

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.

HINT:
If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing's standard thickness is indicated by a 1, 2, 3 or 4 mark on its surface.

Connecting rod diameter

Mark	Diameter
1	56.000 to 56.006 mm (2.2047 to 2.2050 in.)
2	56.007 to 56.012 mm (2.2050 to 2.2052 in.)
3	56.013 to 56.018 mm (2.2052 to 2.2054 in.)
4	56.019 to 56.024 mm (2.2055 to 2.2057 in.)

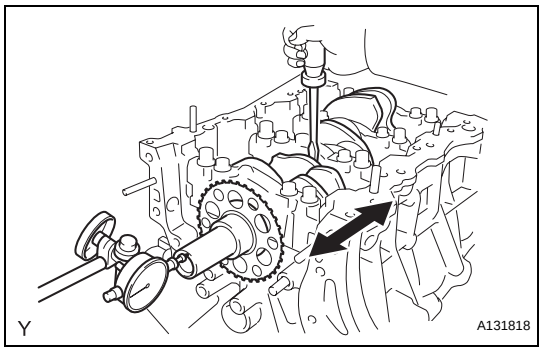
Connecting rod bearing center wall thickness

Mark	Thickness
1	1.481 to 1.484 mm (0.0583 to 0.0584 in.)
2	1.484 to 1.487 mm (0.0584 to 0.0585 in.)
3	1.487 to 1.490 mm (0.0585 to 0.0587 in.)
4	1.490 to 1.493 mm (0.0587 to 0.0588 in.)

Crankshaft pin diameter:
52.992 to 53.000 mm (2.0863 to 2.0866 in.)
NOTICE:
Completely remove the Plastigage after the measurement.

31. INSPECT CRANKSHAFT THRUST CLEARANCE

(a) Install the main bearing cap (See page EM-113).

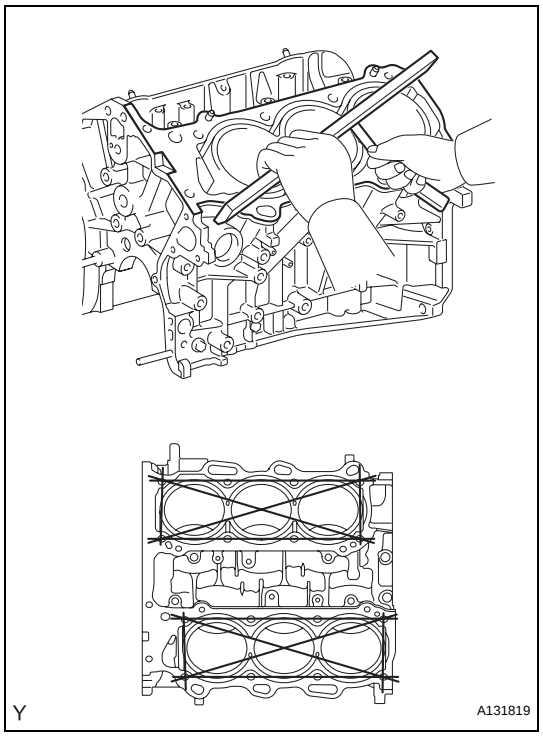


(b) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.04 to 0.24 mm (0.0016 to 0.0094 in.)
Maximum thrust clearance:
0.30 mm (0.0118 in.)

If the thrust clearance is greater than the maximum, replace the thrust washers as a set. If necessary, replace the crankshaft.

Thrust washer thickness:
2.43 to 2.48 mm (0.0957 to 0.0976 in.)

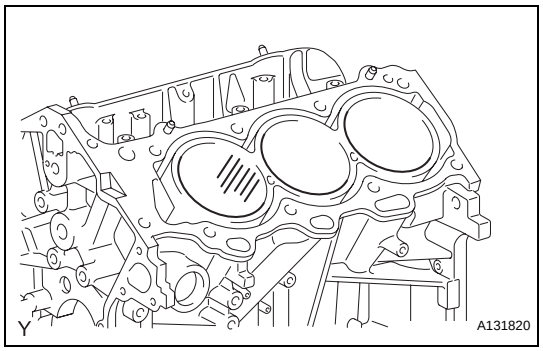


32. INSPECT CYLINDER BLOCK FOR WARPAGE

(a) Using a precision straight edge and feeler gauge, measure the warpage of the contact surface of the cylinder head gasket.

Maximum warpage:
0.07 mm (0.0028 in.)

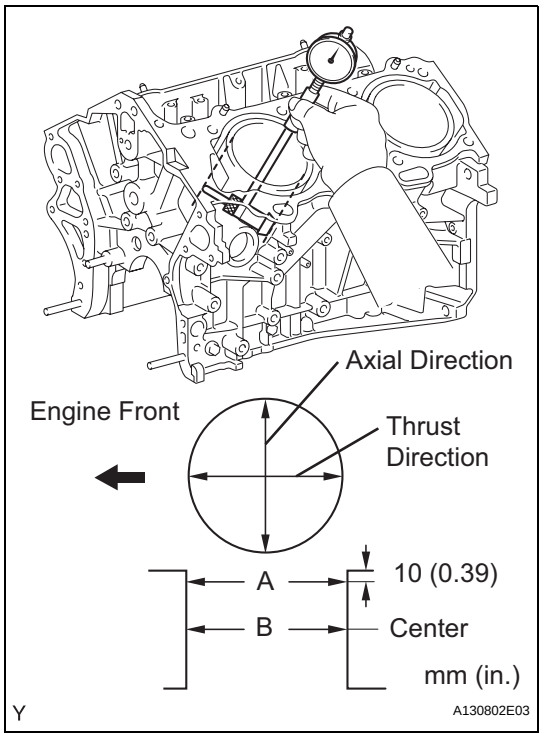
If the warpage is greater than the maximum, replace the cylinder block.



33. INSPECT CYLINDER BORE

(a) Visually check the cylinder for vertical scratches. If deep scratches are present, rebore all the 6 cylinders. If necessary, replace the cylinder block.

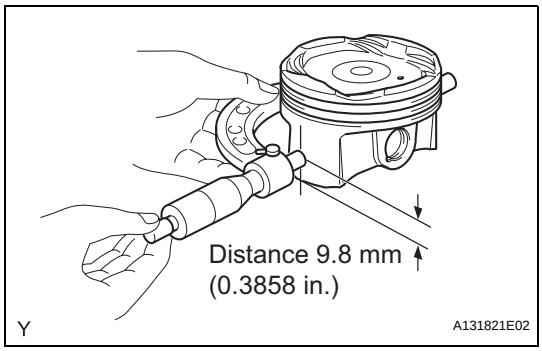
EM



(b) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in the thrust and axial directions.

Standard diameter:
94.000 to 94.012 mm (3.7008 to 3.7013 in.)
Maximum diameter:
94.200 mm (3.7087 in.)

If the average diameter of 4 positions is greater than the maximum, replace the cylinder block.



34. INSPECT PISTON SUB-ASSEMBLY WITH PIN

(a) Using a micrometer, measure the piston diameter at right angles to the piston center line where the distance from the piston end is as specified.

Distance:
9.8 mm (0.3858 in.)
Standard diameter:
93.960 to 93.980 mm (3.6992 to 3.7000 in.)
Maximum diameter:
93.830 mm (3.6941 in.)

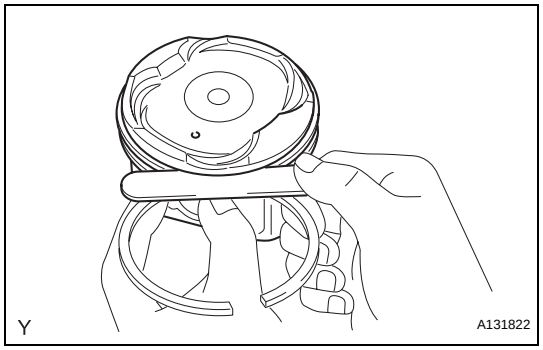
35. INSPECT PISTON OIL CLEARANCE

(a) Measure the cylinder bore diameter in the thrust directions.

(b) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:
0.020 to 0.052 mm (0.0008 to 0.0020 in.)
Maximum oil clearance:
0.060 mm (0.0024 in.)

If the oil clearance is greater than the maximum, replace all the pistons. If necessary, replace the cylinder block.



36. INSPECT RING GROOVE CLEARANCE

(a) Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.

Ring groove clearance

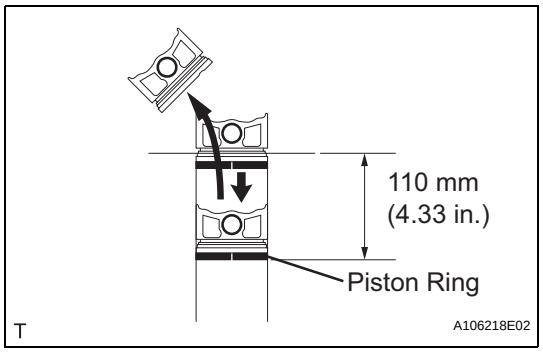
Item	Clearance
No. 1	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
No. 2	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
Oil	0.070 to 0.150 mm (0.0028 to 0.0059 in.)

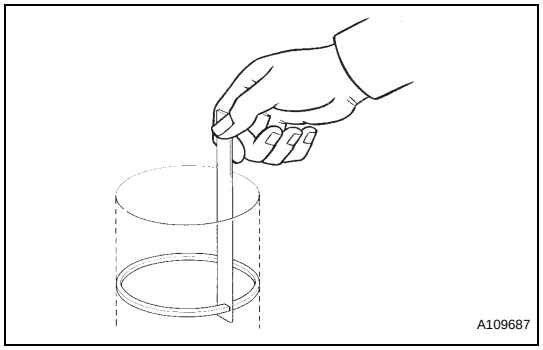
If the clearance is not as specified, replace the piston.

37. INSPECT PISTON RING END GAP

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.





(c) Using a feeler gauge, measure the end gap.

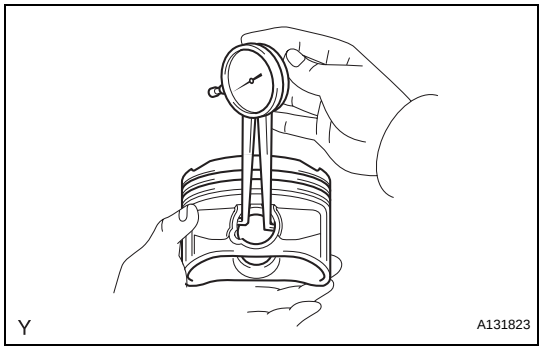
Standard end gap

Item	End Gap
No. 1	0.25 to 0.35 mm (0.0098 to 0.0138 in.)
No. 2	0.50 to 0.60 mm (0.0197 to 0.0236 in.)
Oil	0.10 to 0.40 mm (0.0039 to 0.0157 in.)

Maximum end gap

Item	End Gap
No. 1	0.50 mm (0.0197 in.)
No. 2	0.85 mm (0.0335 in.)
Oil	0.60 mm (0.0236 in.)

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum even with a new piston ring, rebore all the 6 cylinders or replace the cylinder block.

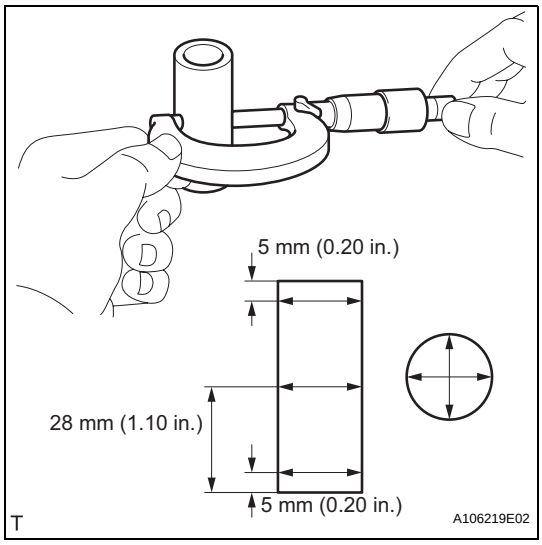


38. INSPECT PISTON PIN OIL CLEARANCE

(a) Using a caliper gauge, measure the inside diameter of the piston pin hole.

Piston pin hole inside diameter

Mark	Diameter
A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
B	22.004 to 22.007 mm (0.8663 to 0.8664 in.)
C	22.007 to 22.010 mm (0.8664 to 0.8665 in.)



(b) Using a micrometer, measure the piston pin diameter.

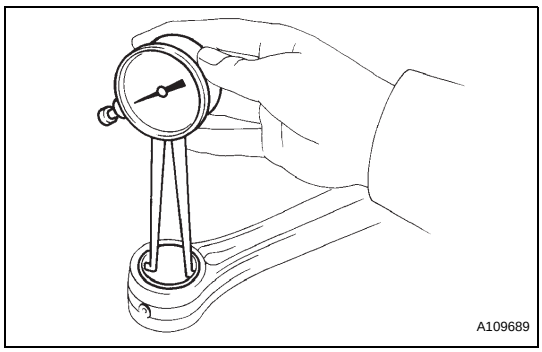
Piston pin diameter

Mark	Diameter
A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
B	22.000 to 22.003 mm (0.8661 to 0.8663 in.)
C	22.003 to 22.006 mm (0.8663 to 0.8664 in.)

(c) Subtract the piston pin diameter measurement from the piston pin hole diameter measurement.

Standard oil clearance:
0.001 to 0.007 mm (0.00004 to 0.00028 in.)
Maximum oil clearance:
0.015 mm (0.0006 in.)

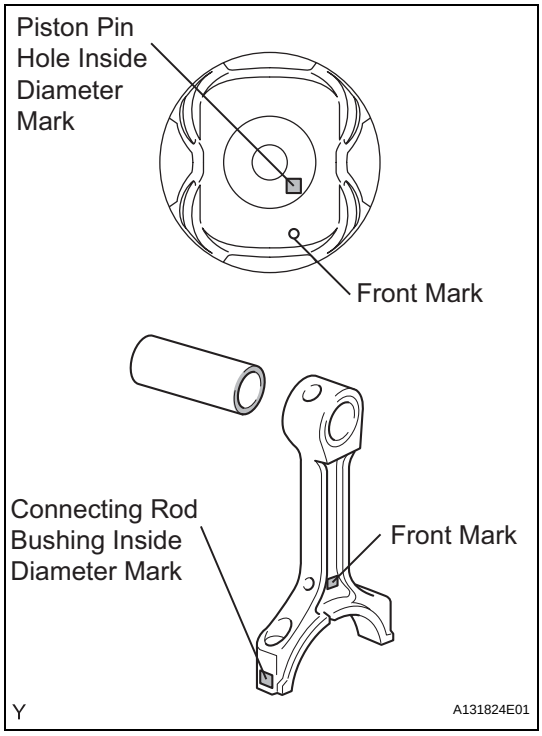
If the oil clearance is greater than the maximum, replace the piston and piston pin as a set.



(d) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter

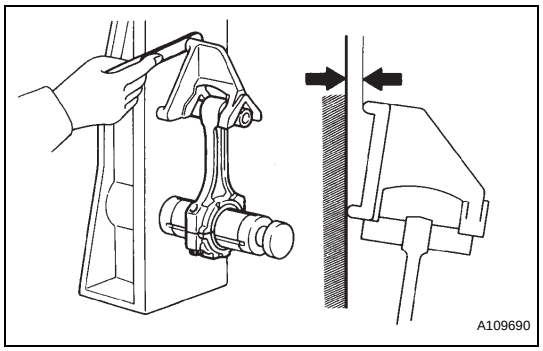
Mark	Diameter
A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)



(e) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

Standard oil clearance:
0.005 to 0.011 mm (0.0002 to 0.0004 in.)
Maximum oil clearance:
0.030 mm (0.0012 in.)

If the oil clearance is greater than the maximum, replace the bushing. If necessary, replace the connecting rod and piston pin as a set.



39. INSPECT CONNECTING ROD

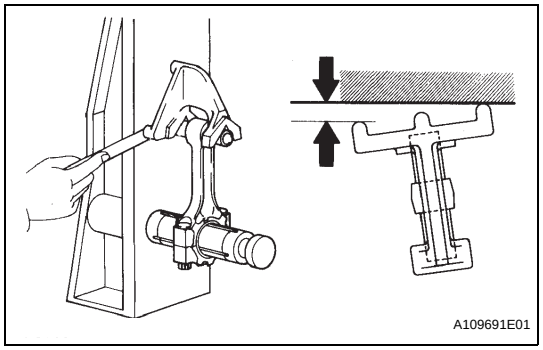
(a) Using a rod aligner and feeler gauge, check the connecting rod alignment.

(1) Check for out-of-alignment.

Maximum out-of-alignment:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the out-of-alignment is greater than the maximum, replace the connecting rod assembly.



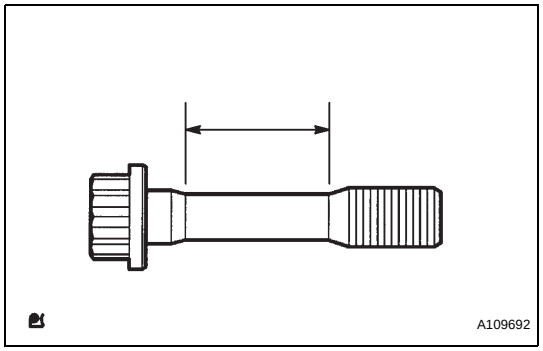
(2) Check for twist.

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If the twist is greater than the maximum, replace the connecting rod assembly.

EM



40. INSPECT CONNECTING ROD BOLT

(a) Using vernier calipers, measure the tension portion diameter of the bolt.

Standard diameter:

7.2 to 7.3 mm (0.284 to 0.287 in.)

Minimum diameter:

7.0 mm (0.276 in.)

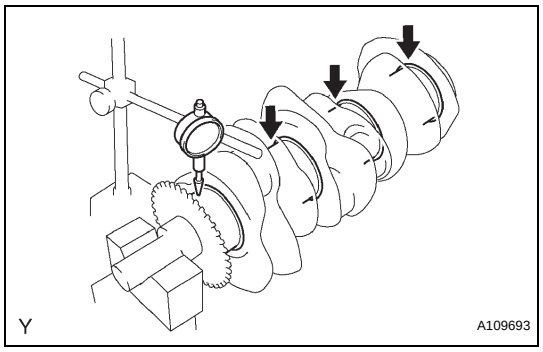
If the diameter is less than the minimum, replace the bolt.

41. INSPECT CRANKSHAFT

(a) Inspect for circle runout.

(1) Clean the crank journal.

(2) Place the crankshaft on V-blocks.

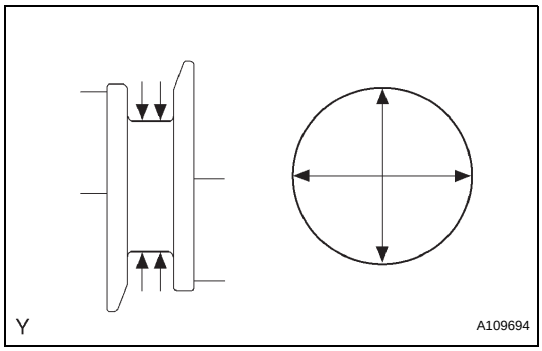


(3) Using a dial indicator, measure the circle runout at the center journal.

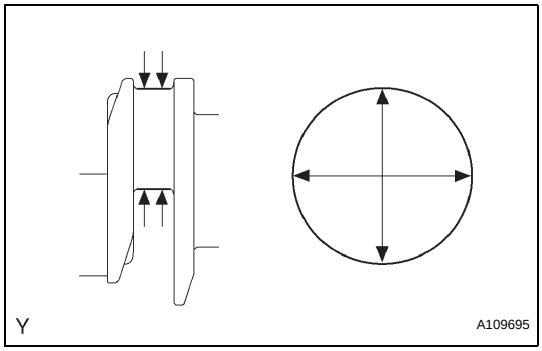
Maximum circle runout:

0.06 mm (0.0024 in.)

If the circle runout is greater than the maximum, replace the crankshaft.



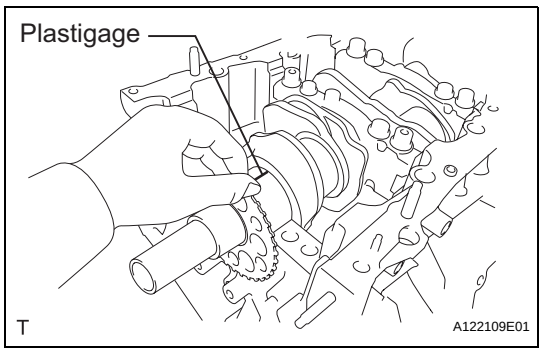
(b) Inspect the main journals.
(1) Using a micrometer, measure the diameter of each main journal.
Standard journal diameter:
60.988 to 61.000 mm (2.4011 to 2.4016 in.)
If the diameter is not as specified, check the oil clearance. If necessary, replace the crankshaft.
(2) Check each main journal for taper and out-of-round as shown in the illustration.
Maximum taper and out-of-round:
0.02 mm (0.0008 in.)
If the taper and out-of-round is greater than the maximum, replace the crankshaft.



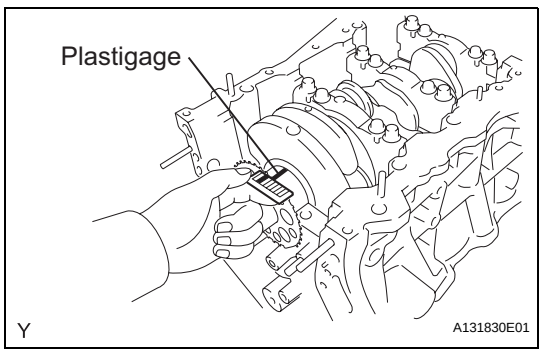
(c) Inspect the crank pin.
(1) Using a micrometer, measure the diameter of each crank pin.
Crankshaft pin diameter:
52.992 to 53.000 mm (2.0863 to 2.0866 in.)
If the diameter is not as specified, check the oil clearance. If necessary, replace the crankshaft.
(2) Check each crank pin for taper and out-of-round as shown in the illustration.
Maximum taper and out-of-round:
0.02 mm (0.0008 in.)
If the taper and out-of-round is greater than the maximum, replace the crankshaft.

42. INSPECT CRANKSHAFT OIL CLEARANCE

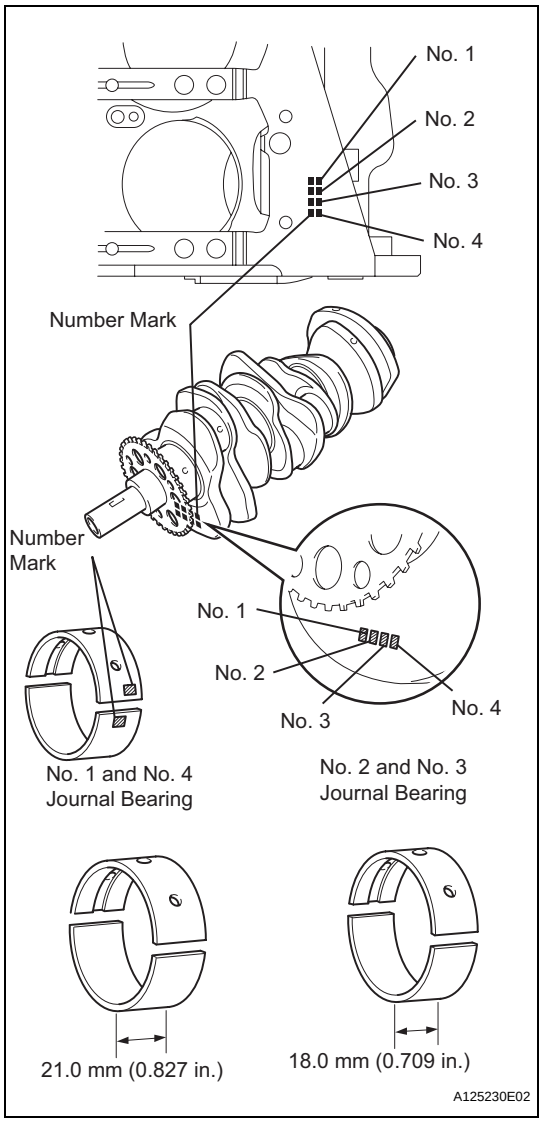
(a) Check the crank journal and bearing for pitting and scratches.
(b) Install the crankshaft bearing (See page EM-113).
(c) Place the crankshaft on the cylinder block.



(d) Lay a strip of Plastigage across each journal.
(e) Examine the front marks and numbers and install the bearing caps on the cylinder block.
HINT:
A number is marked on each main bearing cap to indicate the installation position.
(f) Install the main bearing cap (See page EM-113).
NOTICE:
Do not turn the crankshaft.
(g) Remove the main bearing caps (See page EM-64).



(h) Measure the Plastigage at its widest point.
Standard oil clearance:
0.026 to 0.047 mm (0.0010 to 0.0019 in.)
Maximum oil clearance:
0.050 mm (0.0020 in.)
If the oil clearance is greater than the maximum, replace the bearings. If necessary, replace the crankshaft.
NOTICE:
Completely remove the Plastigage after the measurement.



(i) If replacing a bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

Journal bearings:

Cylinder block + Crankshaft	0 - 5	6 - 11	12 - 17	18 - 23	24 - 28
Bearing to be used	"1"	"2"	"3"	"4"	"5"

HINT:
EXAMPLE: Cylinder block "11" + Crankshaft "06" = Total number 17 (Use bearing "3")

Crankshaft main journal diameter

Mark	Diameter
"00"	**60.999 to 61.000 mm (2.4015 to 2.4016 in.)**
"01"	**60.998 to 60.999 mm (2.4015 to 2.4015 in.)**
"02"	**60.997 to 60.998 mm (2.4015 to 2.4015 in.)**
"03"	**60.996 to 60.997 mm (2.4014 to 2.4015 in.)**
"04"	**60.995 to 60.996 mm (2.4014 to 2.4014 in.)**
"05"	**60.994 to 60.995 mm (2.4013 to 2.4014 in.)**
"06"	**60.993 to 60.994 mm (2.4013 to 2.4013 in.)**
"07"	**60.992 to 60.993 mm (2.4013 to 2.4013 in.)**
"08"	**60.991 to 60.992 mm (2.4012 to 2.4013 in.)**
"09"	**60.990 to 60.991 mm (2.4012 to 2.4012 in.)**
"10"	**60.989 to 60.990 mm (2.4011 to 2.4012 in.)**
"11"	**60.988 to 60.989 mm (2.4011 to 2.4011 in.)**

Standard upper bearing center wall thickness (No. 1 and No. 4 journal)

Mark	Thickness
"1"	**2.500 to 2.503 mm (0.0984 to 0.0985 in.)**
"2"	**2.503 to 2.506 mm (0.0985 to 0.0987 in.)**
"3"	**2.506 to 2.509 mm (0.0987 to 0.0988 in.)**
"4"	**2.509 to 2.512 mm (0.0988 to 0.0989 in.)**
"5"	**2.512 to 2.515 mm (0.0989 to 0.0990 in.)**

Standard lower bearing center wall thickness (No. 1 and No. 4 journal)

Mark	Thickness
"1"	**2.478 to 2.481 mm (0.0976 to 0.0977 in.)**
"2"	**2.481 to 2.484 mm (0.0977 to 0.0978 in.)**
"3"	**2.484 to 2.487 mm (0.0978 to 0.0979 in.)**
"4"	**2.487 to 2.490 mm (0.0979 to 0.0980 in.)**
"5"	**2.490 to 2.493 mm (0.0980 to 0.0981 in.)**

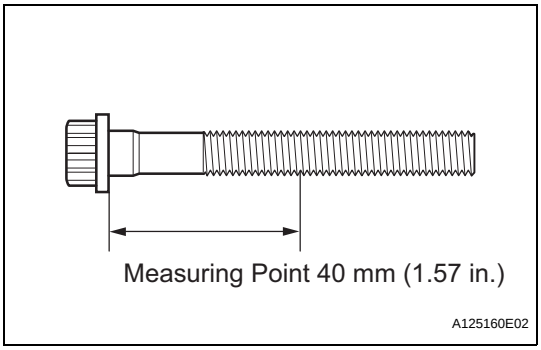
Standard upper bearing center wall thickness (No. 2 and No. 3 journal)

Mark	Thickness
"1"	2.478 to 2.481 mm (0.0976 to 0.0977 in.)
"2"	2.481 to 2.484 mm (0.0977 to 0.0978 in.)
"3"	2.484 to 2.487 mm (0.0978 to 0.0979 in.)
"4"	2.487 to 2.490 mm (0.0979 to 0.0980 in.)
"5"	2.490 to 2.493 mm (0.0980 to 0.0981 in.)

Standard lower bearing center wall thickness (No. 2 and No. 3 journal)

Mark	Thickness
"1"	2.500 to 2.503 mm (0.0984 to 0.0985 in.)
"2"	2.503 to 2.506 mm (0.0985 to 0.0987 in.)
"3"	2.506 to 2.509 mm (0.0987 to 0.0988 in.)
"4"	2.509 to 2.512 mm (0.0988 to 0.0989 in.)
"5"	2.512 to 2.515 mm (0.0989 to 0.0990 in.)

EM



43. INSPECT CRANKSHAFT BEARING CAP SET BOLT

(a) Using vernier calipers, measure the minimum diameter of the compressed thread at the measuring point.

Standard diameter:
10.8 to 11.0 mm (0.4252 to 0.4331 in.)
Minimum diameter:
10.7 mm (0.4213 in.)
Measuring Point:
40 mm (1.57 in.)

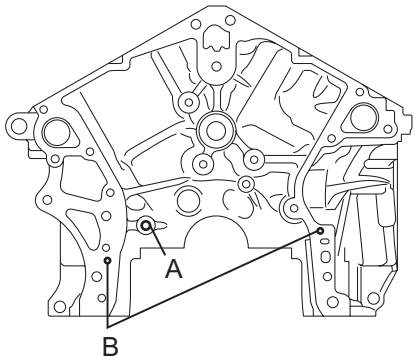
If the diameter is less than the minimum, replace the bolt.

REASSEMBLY

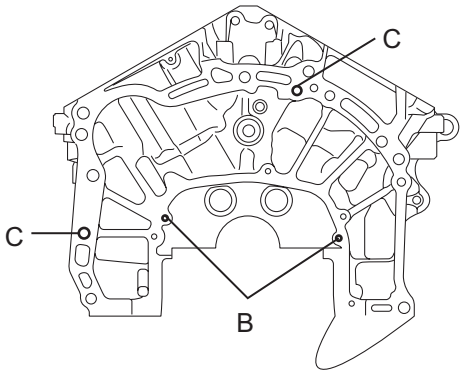
1. INSTALL STRAIGHT PIN

(a) Using a plastic hammer, tap in new straight pins to the cylinder block.

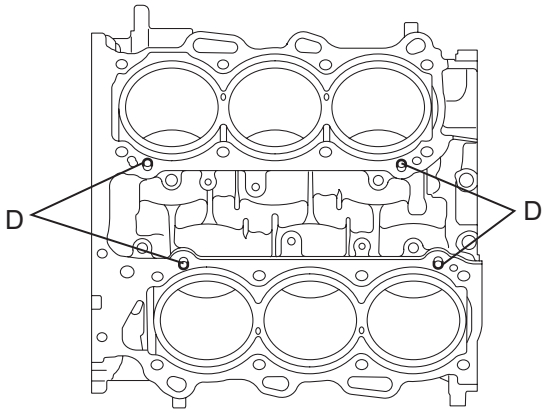
Front Cylinder Block:



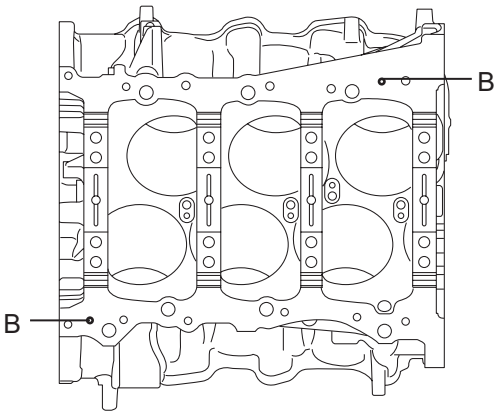
Rear Cylinder Block:



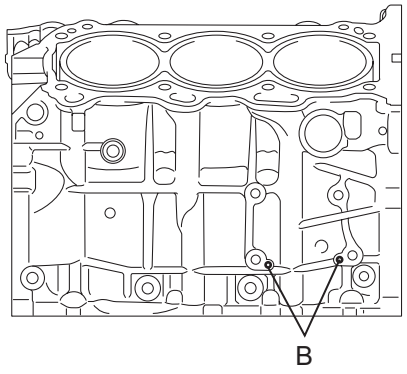
Upper Cylinder Block:

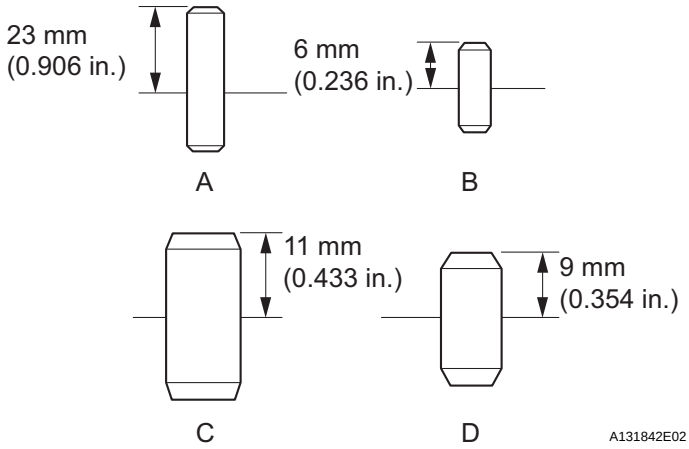


Lower Cylinder Block:



Cylinder Block RH Side:





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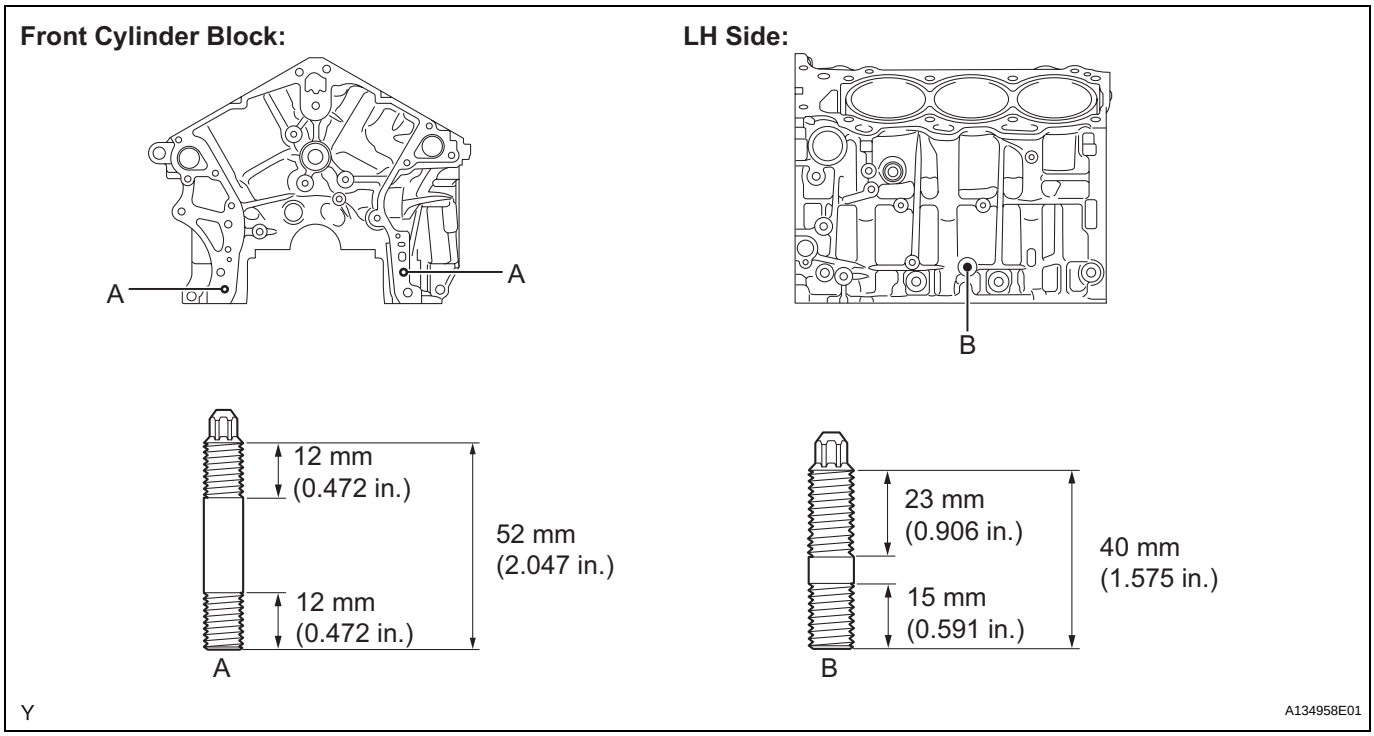
Standard protrusion

Item	Protrusion
Pin A	23 mm (0.906 in.)
Pin B	6 mm (0.236 in.)
Pin C	11 mm (0.433 in.)

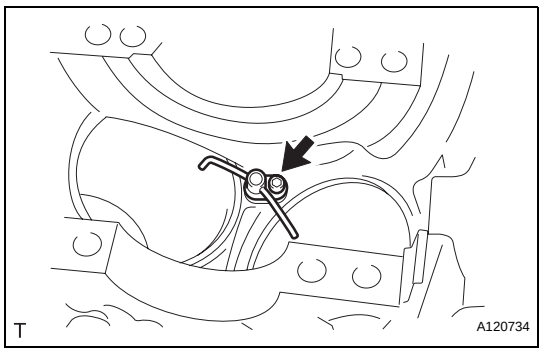
Item	Protrusion
Pin D	9 mm (0.354 in.)

2. INSTALL STUD BOLT

(a) Using E8 and E10 "torx" sockets, install the stud bolts.

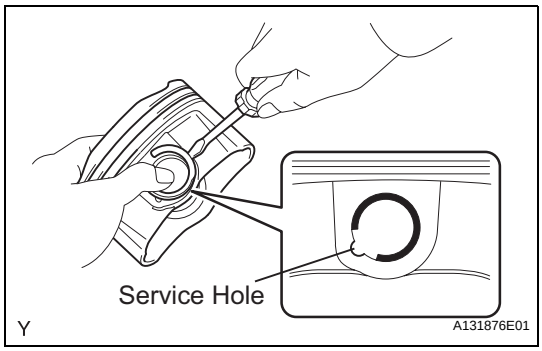


Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf) for bolt A
17 N*m (173 kgf*cm, 13 ft.*lbf) for bolt B



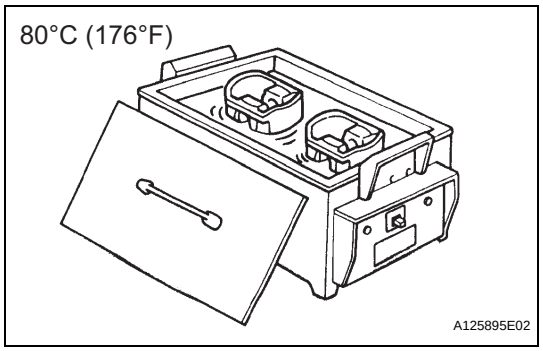
3. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY

(a) Using a 5 mm hexagon wrench, install the oil nozzles.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

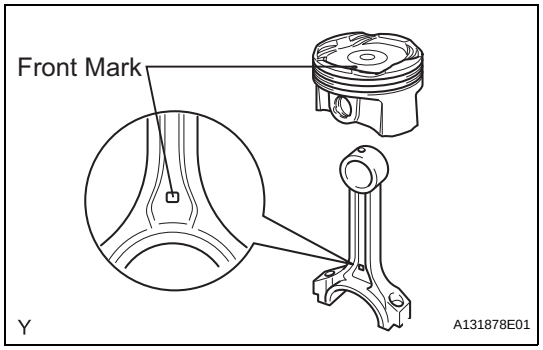


4. INSTALL PISTON SUB-ASSEMBLY WITH PIN

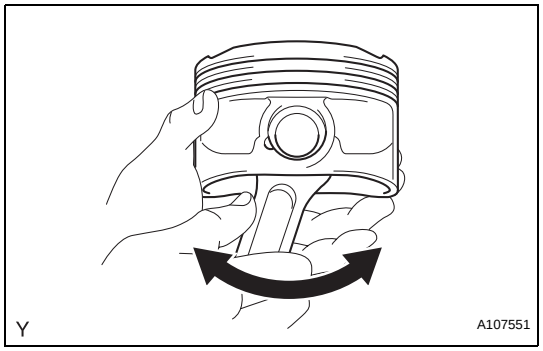
(a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.
HINT:
Be sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



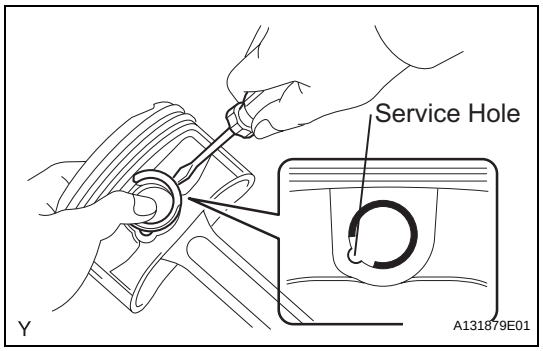
(b) Gradually heat the piston to approximately 80°C (176°F).
(c) Coat the piston pin with engine oil.



(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.
HINT:
The piston and pin are a matched set.



(e) Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.

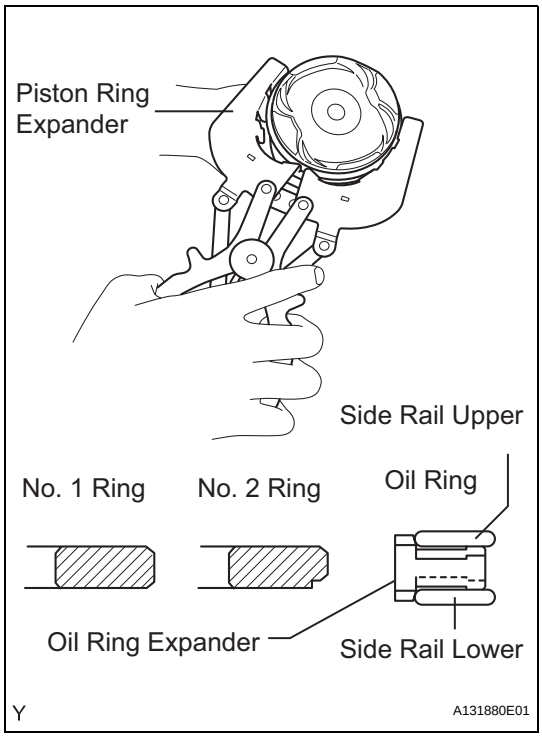


(f) Using a screwdriver, install a new snap ring at the other end of the piston pin hole.
HINT:
Be sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

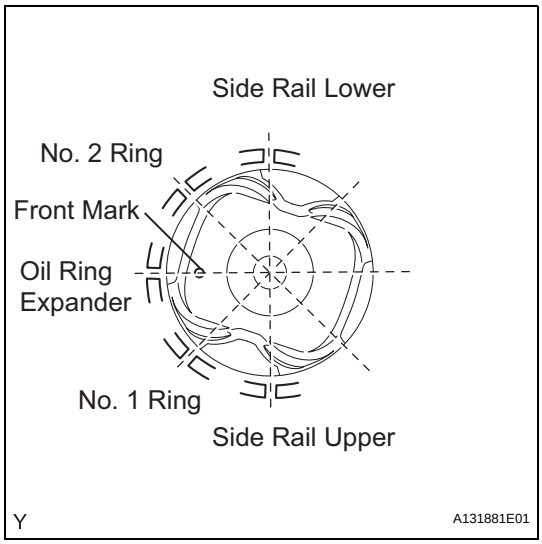
5. INSTALL PISTON RING SET

(a) Install the oil ring expander and 2 side rails by hand.

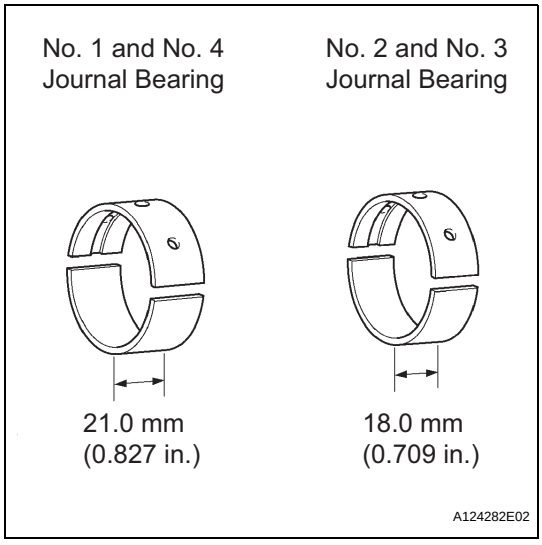
EM



(b) Using a piston ring expander, install the oil ring rail as shown in the illustration.

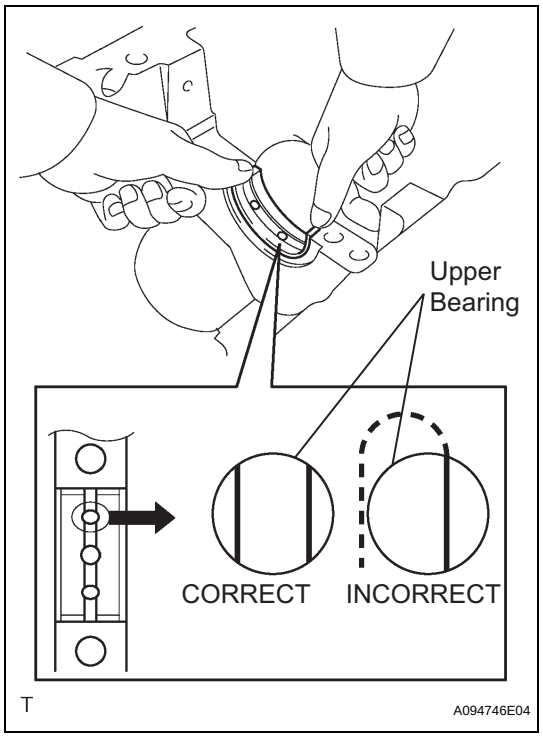


(c) Position the piston rings so that the ring ends are as shown in the illustration.
NOTICE:
Do not align the ring ends.

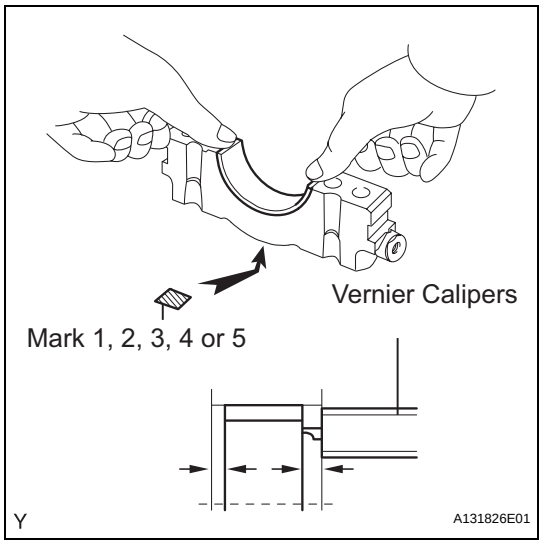


6. INSTALL CRANKSHAFT BEARING

(a) Clean the main journal and both surfaces of the bearing.
NOTICE:
Main bearings come in widths between 18.0 mm (0.709 in.) and 21.0 mm (0.827 in.). Install the 21.0 mm (0.827 in.) bearings in the No. 1 and No. 4 cylinder block journal positions with the main bearing cap. Install the 18.0 mm (0.709 in.) bearings in the No. 2 and No. 3 positions.

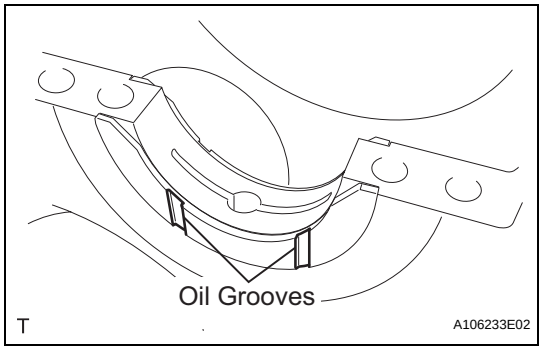


(b) Install the upper bearing.
(1) Install the upper bearings to the cylinder block as shown in the illustration.
NOTICE:
- **Do not apply engine oil to the bearings and the contact surfaces.**
- **Both sides of the oil groove in the cylinder block should be visible through the oil feed holes in the bearing. The amount visible on each side of the holes should be equal.**



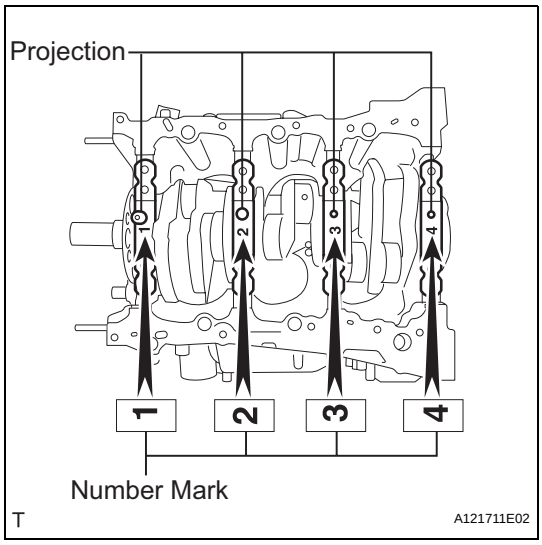
(c) Install the lower bearing.
(1) Install the lower bearings to the bearing caps.
(2) Using vernier calipers, measure the distance between the bearing cap's edge and the lower bearing's edge.
Dimension (A - B):
0.7 mm (0.0276 in.) or less
NOTICE:
Do not apply engine oil to the bearings and the contact surfaces.

7. INSTALL CRANKSHAFT THRUST WASHER SET
(a) Apply engine oil to the crankshaft thrust washer.



(b) Install the 2 thrust washers under the No. 2 journal position of the cylinder block with the oil grooves facing outward.

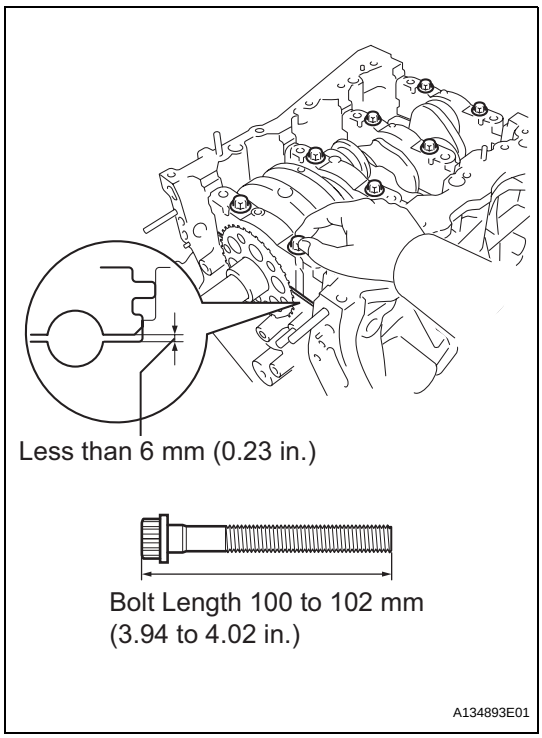
8. INSTALL CRANKSHAFT
(a) Apply engine oil to the upper bearing, then place the crankshaft on the cylinder block.



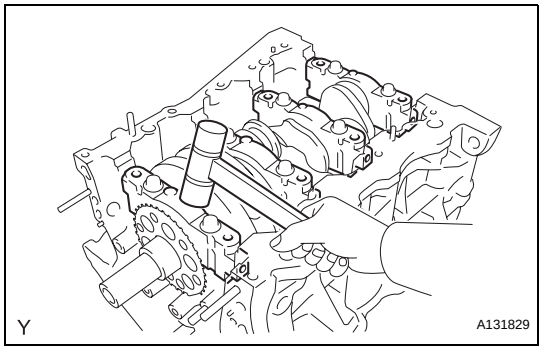
(b) Confirm the projection and numbers of the main bearing caps and install the bearing caps on the cylinder block.
HINT:
A number is marked on each main bearing cap to indicate the installation position.

(c) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.

(d) Temporarily install the 8 main bearing cap bolts to the inside positions.

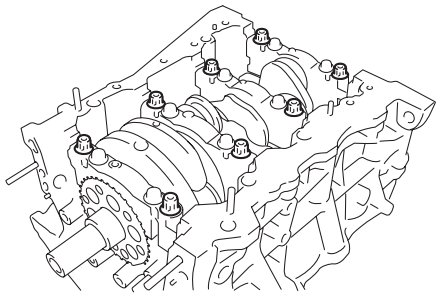


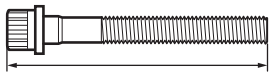
(e) Insert the main bearing cap with your hand until the clearance between the main bearing cap and the cylinder block is less than 6 mm (0.23 in.) by marking the 2 internal bearing cap bolts as a guide.
Bolt length:
100 to 102 mm (3.94 to 4.02 in.)



(f) Using a plastic hammer, lightly tap the bearing cap to ensure a proper fit.

(g) Apply a light coat of engine oil to the threads and under the heads of the 8 main bearing cap bolts.





Bolt Length 105.5 to 107.5 mm
(4.15 to 4.23 in.)

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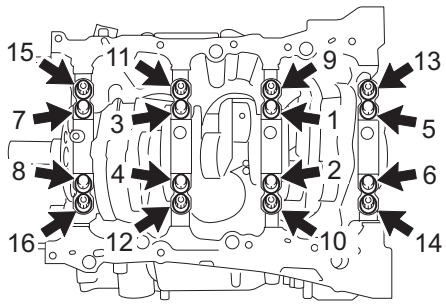
(h) Install the 8 main bearing cap bolts to the outside positions.

(i) Install the crankshaft bearing cap bolts.
HINT:
The main bearing cap bolts are tightened in 2 progressive steps.



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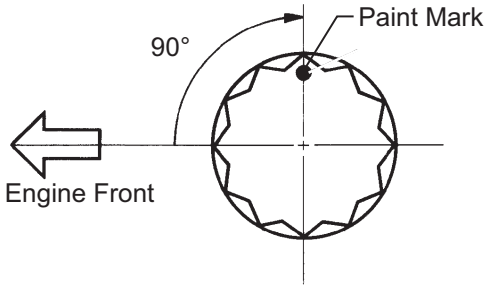
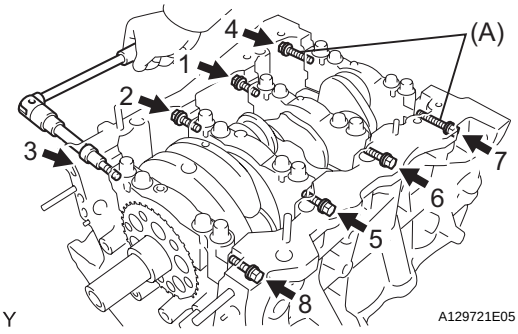
A134892E02

(j) Step 1
(1) Install and uniformly tighten the 16 main bearing cap bolts in the sequence shown in the illustration.
Torque: 61 N*m (622 kgf*cm, 45 ft.*lbf)
If any of the main bearing cap bolts does not meet the torque specified, replace it.



A051462E03

(k) Step 2
(1) Mark the front of the bearing cap bolts with paint.
(2) Retighten the bearing cap bolts by 90° in the order above.
(3) Check that the painted mark is now at a 90° angle to the front.



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A129721E05

(l) Install 8 new seal washers and uniformly tighten the 8 main bearing cap bolts in several steps and in the sequence shown in the illustration.
Torque: 52 N*m (525 kgf*cm, 38 ft.*lbf)
Bolt length

Item	Length
Bolt A	45 mm (1.77 in.)
Except bolt A	30 mm (1.18 in.)

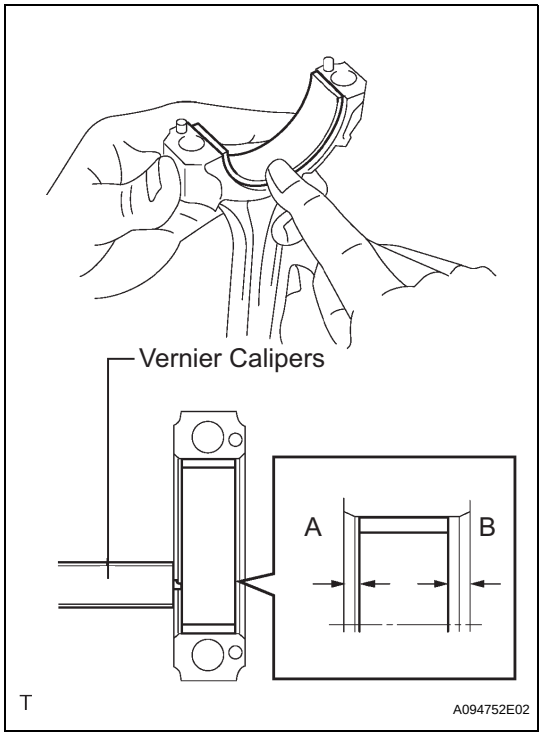
(m) Check that the crankshaft turns smoothly.

(n) Check the crankshaft thrust clearance (See page EM-104).

9. INSTALL CONNECTING ROD BEARING

(a) Install the connecting rod bearing to the connecting rod and bearing cap.

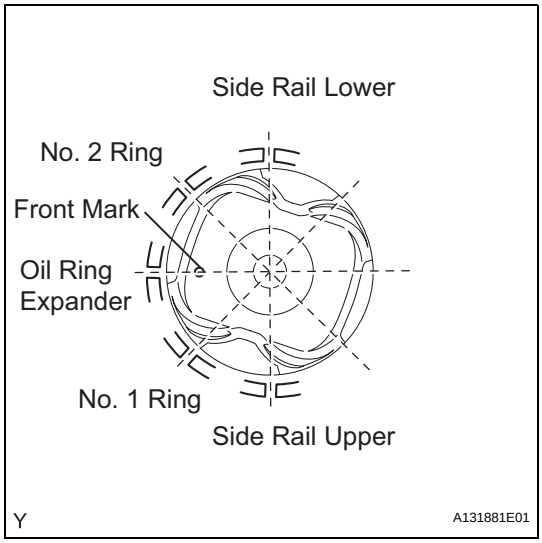
(b) Using vernier calipers, measure the distance between the connecting rod's and bearing cap's edges and the connecting rod bearing's edge.
Dimension (A - B):
0.7 mm (0.0276 in.) or less
NOTICE:
Do not apply engine oil to the bearings and the contact surfaces.

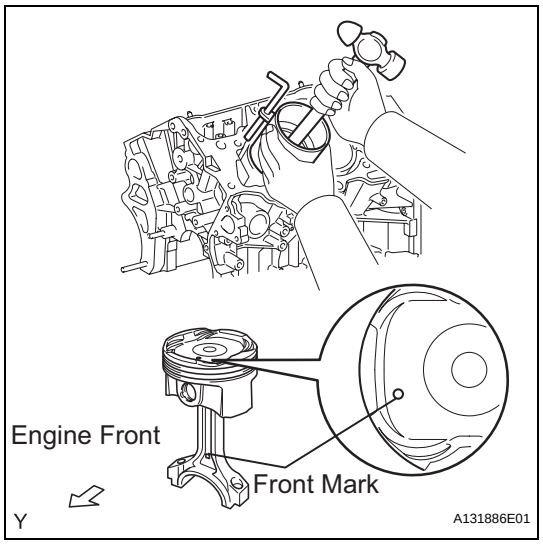


10. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD

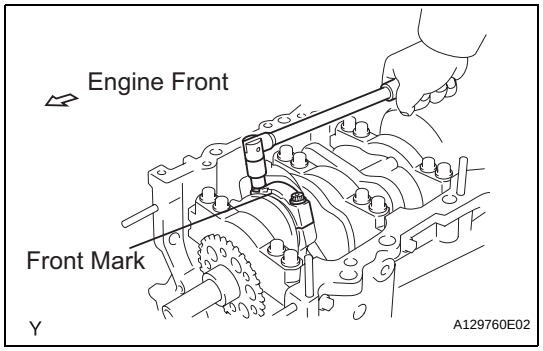
(a) Apply engine oil to the cylinder walls, the pistons, and the surfaces of the connecting rod bearings.

(b) Position the piston rings so that the ring ends are as shown in the illustration.
NOTICE:
Do not align the ring ends.

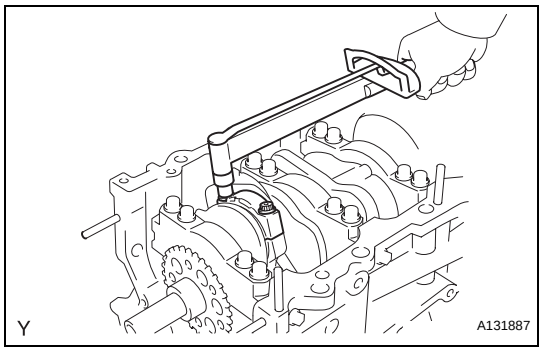




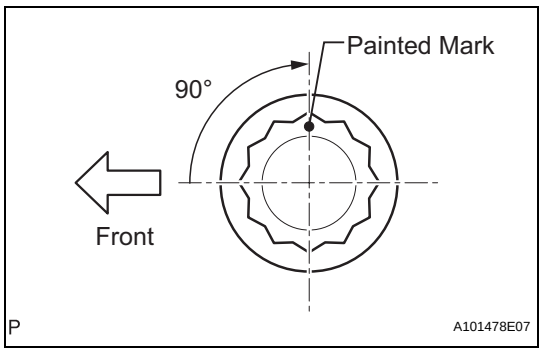
(c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assembly into the cylinder with the front mark of the piston facing forward.
NOTICE:
Match the numbered connecting rod cap with the connecting rod.



(d) Check that the front mark of the connecting rod cap is facing forward.
(e) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.
(f) Install the connecting cap bolts.
HINT:
The connecting cap bolts are tightened in 2 progressive steps.

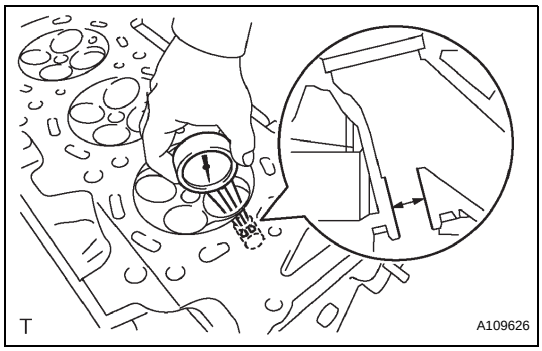


(g) Step 1
(1) Install and alternately tighten the bolts of the connecting rod cap in several steps.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)



(h) Step 2
(1) Mark the front side of each connecting cap bolt with paint.
(2) Retighten the cap bolts by 90° as shown in the illustration.
(3) Check the painted mark is now at a 90° angle to the front.
(i) Check that the crankshaft turns smoothly.
(j) Check the connecting rod thrust clearance (See page EM-103).

EM



11. INSTALL INTAKE VALVE GUIDE BUSH

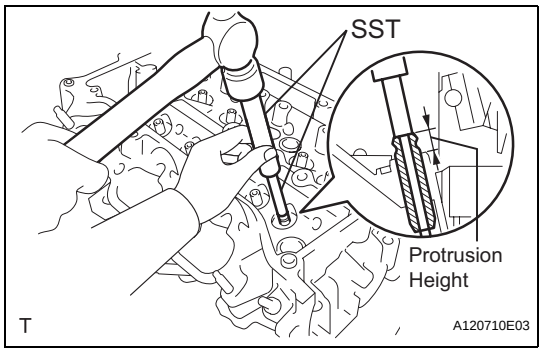
(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Cylinder bore diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a new guide bush (STD or O/S 0.05)

Bush size	Bush bore diameter
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

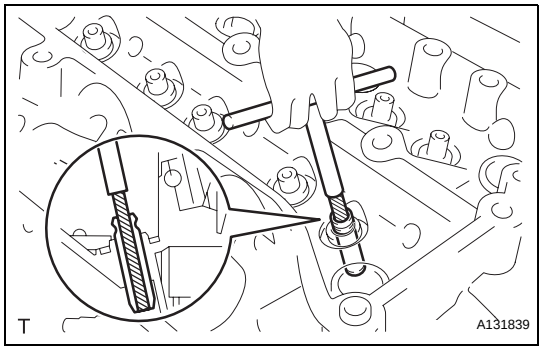
If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install a O/S 0.05 valve guide bush.
If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

(b) Heat the cylinder head to 80 to 100°C (176 to 212°F).

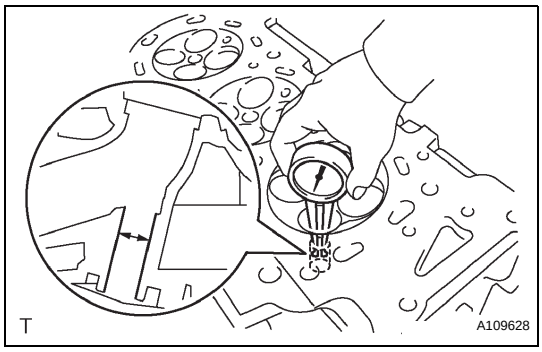
(c) Place the cylinder head on wooden blocks.



(d) Using SST, tap in new valve guide bushes to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Protrusion height:
9.30 to 9.70 mm (0.3661 to 0.3819 in.)



(e) Using a sharp 5.5 mm reamer, ream the valve guide bushings to obtain the specified clearance.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0023 in.)



12. INSTALL EXHAUST VALVE GUIDE BUSH

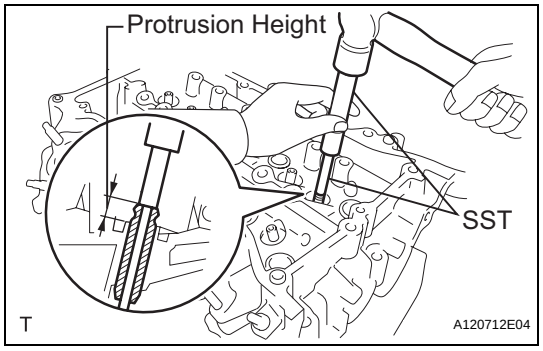
(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Cylinder bore diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Select a new guide bush (STD or O/S 0.05)

Bush size	Bush bore diameter
STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to the dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) to install a O/S 0.05 valve guide bush.
If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

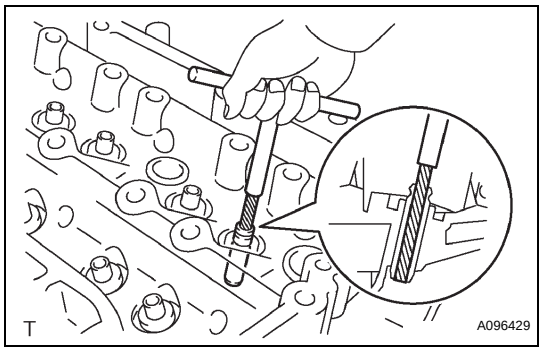
(b) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(c) Place the cylinder head on wooden blocks.

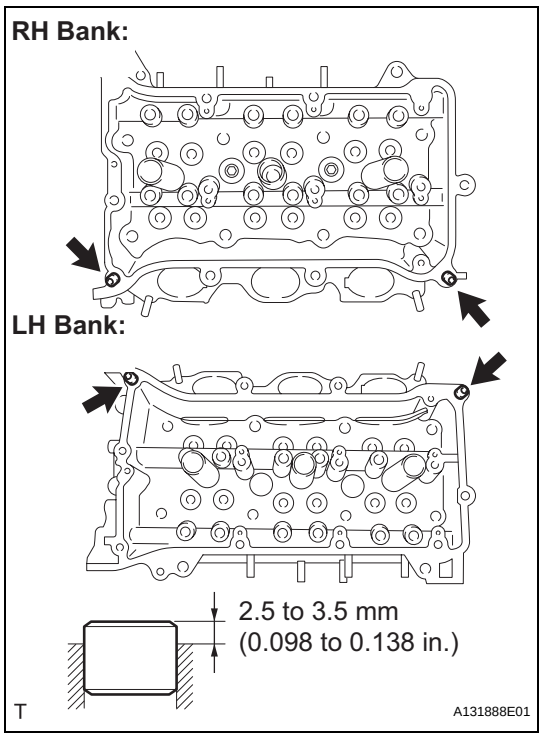


(d) Using SST, tap in new valve guide bushes to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Protrusion height:
9.30 to 9.70 mm (0.3661 to 0.3819 in.)

EM

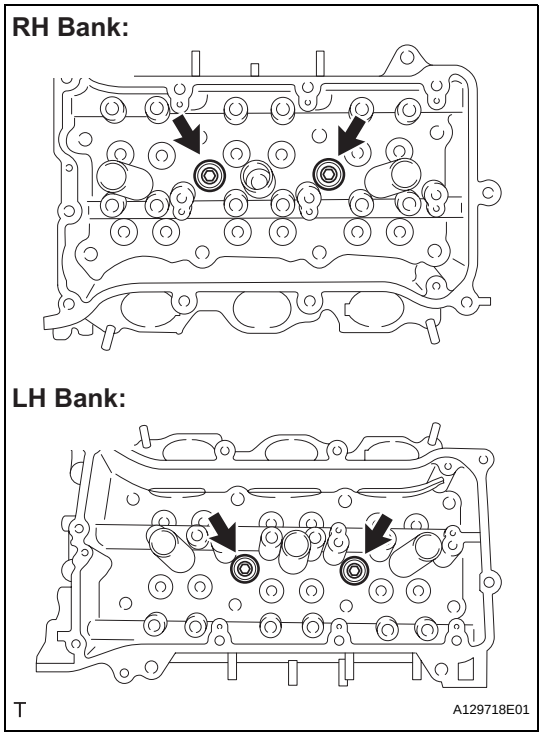


(e) Using a sharp 5.5 mm reamer, ream the valve guide bushings to obtain the specified clearance.
Standard oil clearance:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)



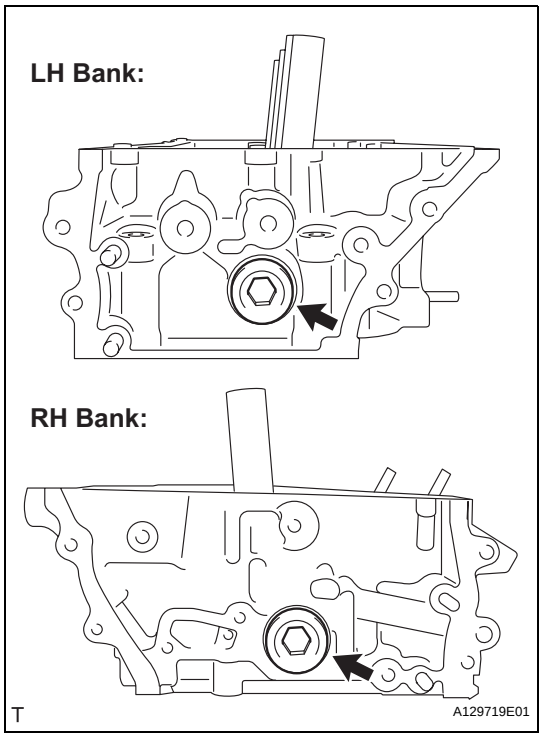
13. INSTALL RING PIN

(a) Using a plastic hammer, tap in new ring pins to the specified protrusion height.
Specified protrusion height:
2.5 to 3.5 mm (0.098 to 0.138 in.)



14. INSTALL NO. 1 STRAIGHT SCREW PLUG

(a) Using a 10 mm hexagon wrench, install 4 new gaskets and the straight screw plugs.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)



15. INSTALL NO. 2 STRAIGHT SCREW PLUG

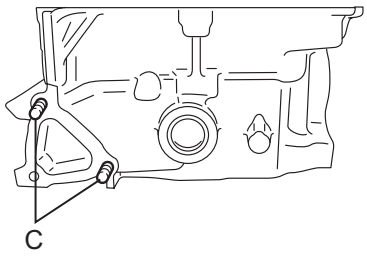
(a) Using a 14 mm hexagon wrench, install 2 new gaskets and the 2 straight screw plugs.
Torque: 80 N*m (816 kgf*cm, 59 ft.*lbf)

16. INSTALL STUD BOLT

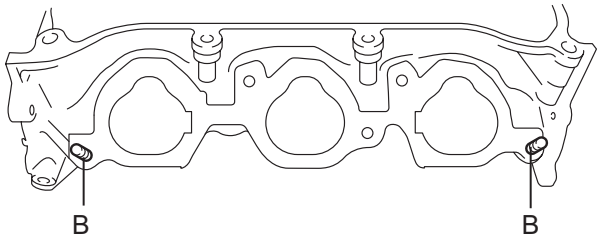
NOTICE:
If the stud bolt is deformed or the threads are damaged, replace it.

(a) Using E6 and E8 "torx" sockets, install the stud bolts.

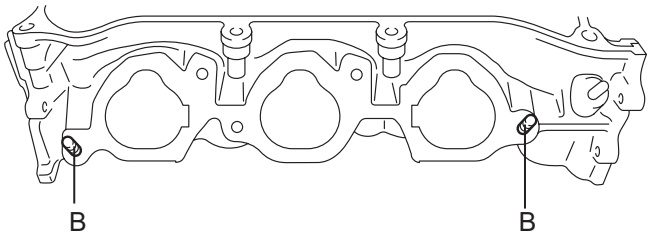
Rear Side RH:



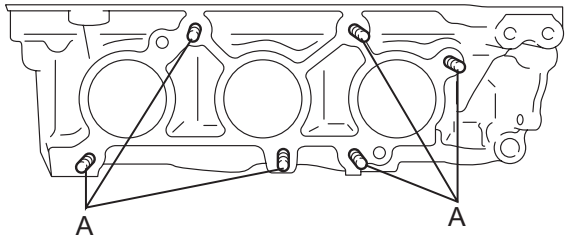
Intake Side RH:



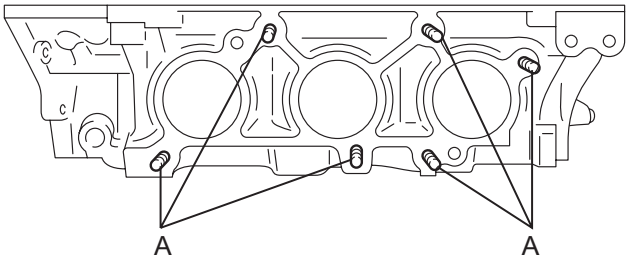
Intake Side LH:



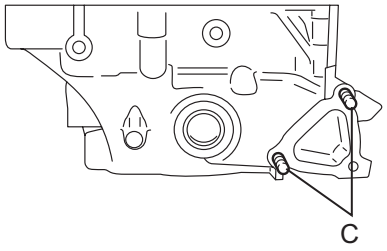
Exhaust Side RH:

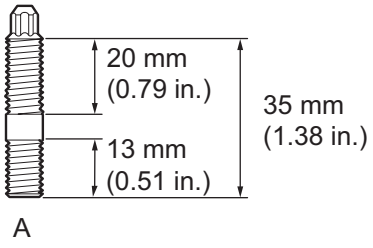


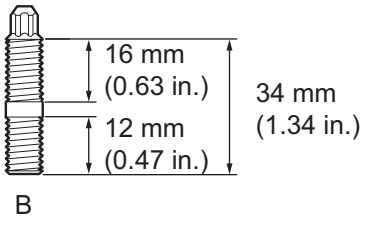
Exhaust Side LH:

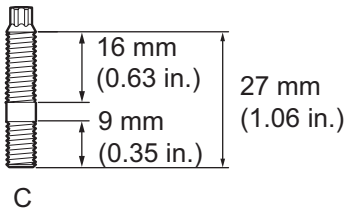


Rear Side LH:









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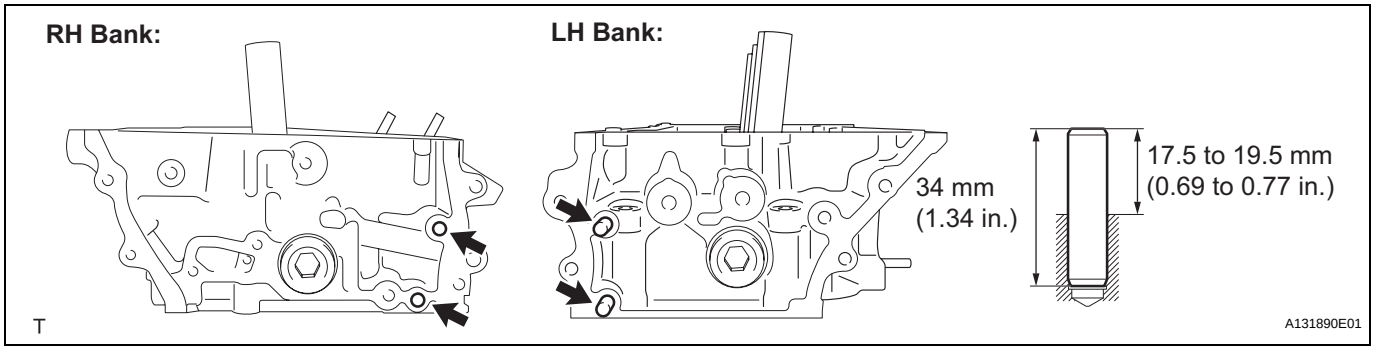
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf) for bolts A and B
4.0 N*m (41 kgf*cm, 35 in.*lbf) for bolt C

17. INSTALL STRAIGHT PIN

(a) Using a plastic hammer, tap in new straight pins as shown in the illustration.



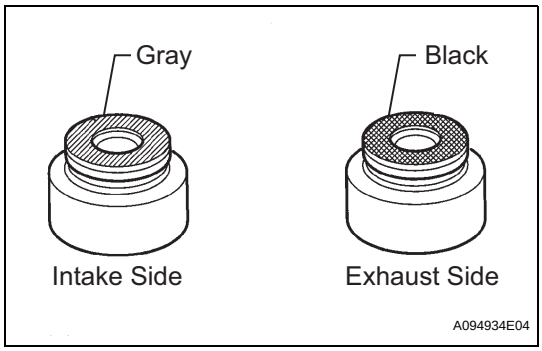
Protrusion height:
17.5 to 19.5 mm (0.689 to 0.768 in.)

18. INSTALL VALVE SPRING SEAT

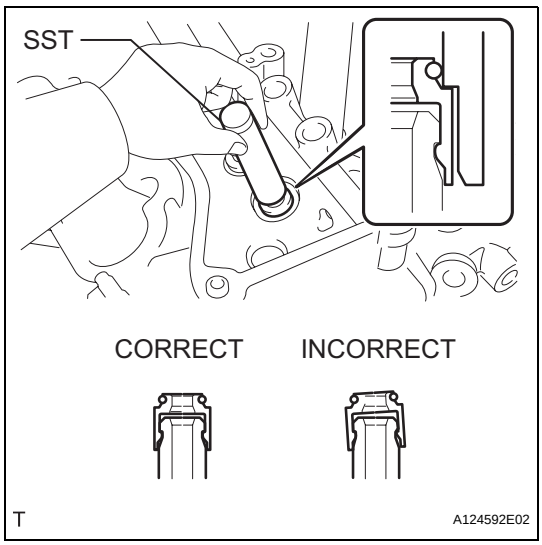
(a) Install the valve spring seats to the cylinder head.

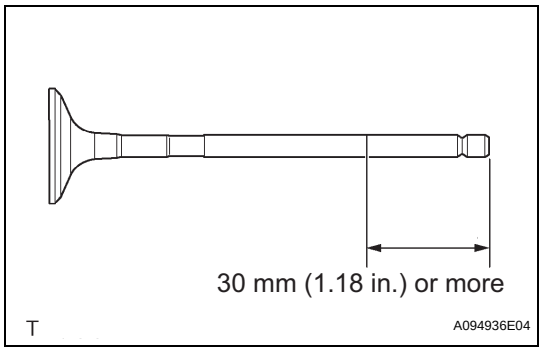
19. INSTALL VALVE STEM OIL SEAL

(a) Apply a light coat of engine oil to new oil seals.
NOTICE:
Pay attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal into the exhaust side or installing the exhaust oil seal to the intake side can cause installation problems later.
HINT:
The intake valve oil seals are gray and the exhaust valve oil seals are black.



(b) Using SST, push in the oil seals.
SST 09201-41020
NOTICE:
Failure to use SST will cause the seal to be damaged or improperly seated.





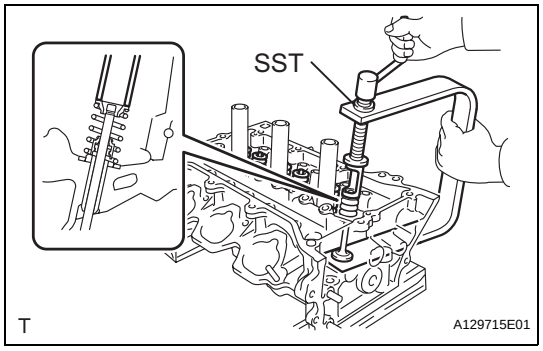
20. INSTALL EXHAUST VALVE

(a) Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.

(b) Install the valve, compression spring and spring retainer to the cylinder head.

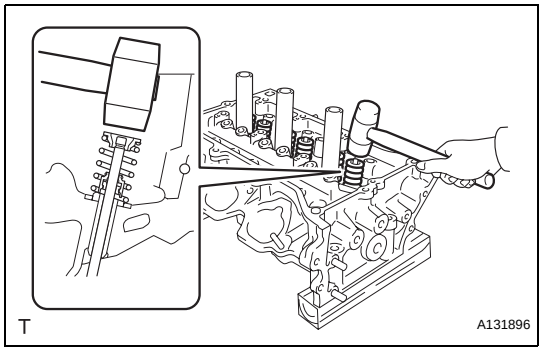
NOTICE:

Install the same parts in the same combination to the original locations.



(c) Using SST, compress the spring and install the 2 retainer locks.

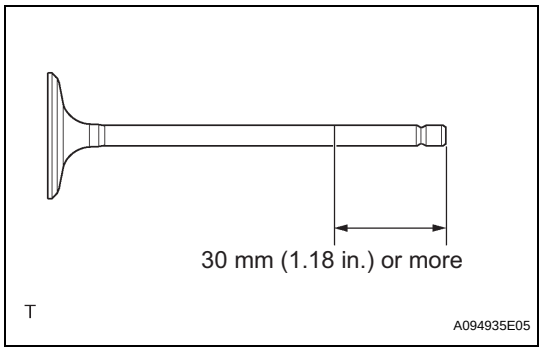
SST 09202-70020 (09202-00010)



(d) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

Be careful not to damage the retainer.



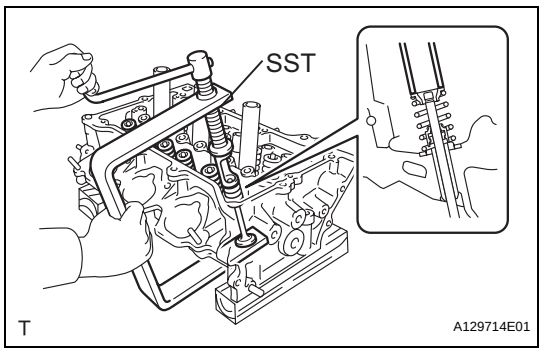
21. INSTALL INTAKE VALVE

(a) Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.

(b) Install the valve, compression spring and spring retainer to the cylinder head.

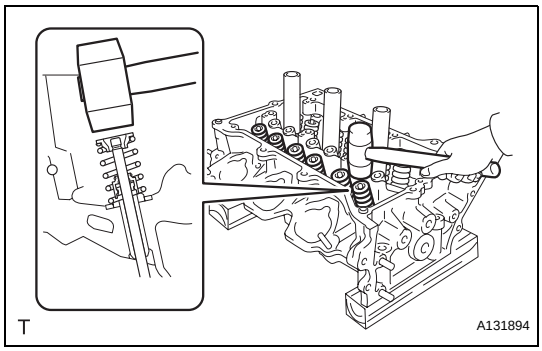
NOTICE:

Install the same parts in the same combination to the original locations.



(c) Using SST, compress the spring and install the 2 retainer locks.

SST 09202-70020 (09202-00010)



(d) Using a plastic hammer, lightly tap the valve stem tip to ensure a proper fit.
NOTICE:
Be careful not to damage the retainer.

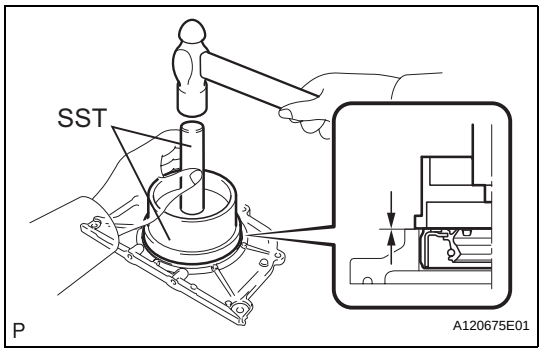
22. INSTALL VALVE STEM CAP

(a) Apply a light coat of engine oil to the valve stem caps.

(b) Install the valve stem caps on the valves.

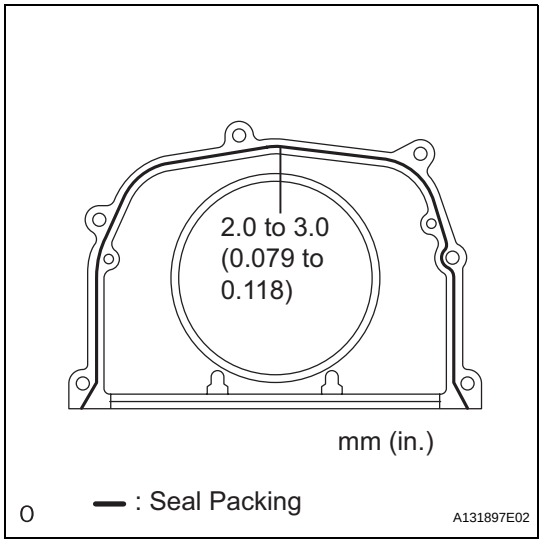
23. INSTALL ENGINE REAR OIL SEAL

(a) Place the oil seal retainer on wooden blocks.



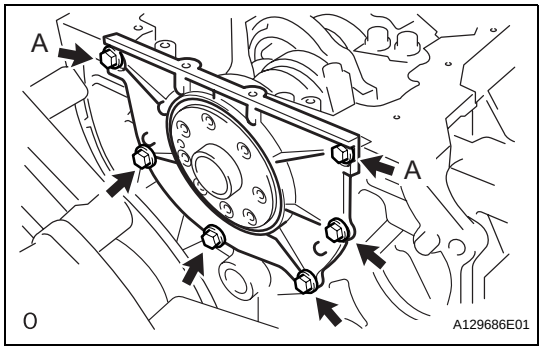
(b) Using SST, tap in a new oil seal until its surface is flush with the oil seal retainer edge.
SST 09223-15030, 09950-70010 (09951-07100)
NOTICE:
- **Keep the lip free of foreign matter.**
- **Do not tap on the oil seal at an angle.**

EM

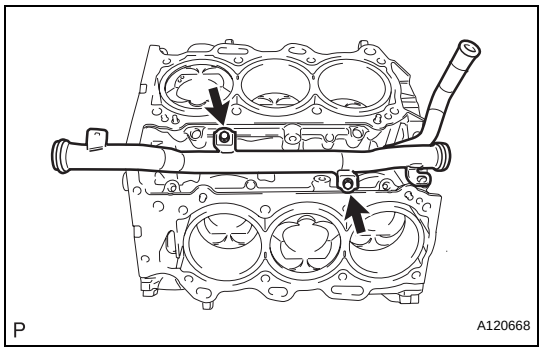


24. INSTALL ENGINE REAR OIL SEAL RETAINER

(a) Apply seal packing in a continuous line as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Seal Diameter:
2.0 to 3.0 mm (0.079 to 0.118 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the oil seal retainer within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installation.**



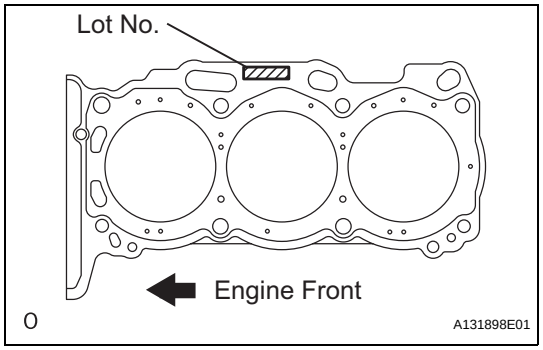
(b) Install the oil seal retainer with the 6 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
NOTICE:
Be sure to apply adhesive 1324 to the bolts in the places indicated by A before installing them.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent



25. INSTALL WATER INLET PIPE

(a) Install the water inlet pipe with the 2 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

(b) Install the water by-pass hose No. 1.

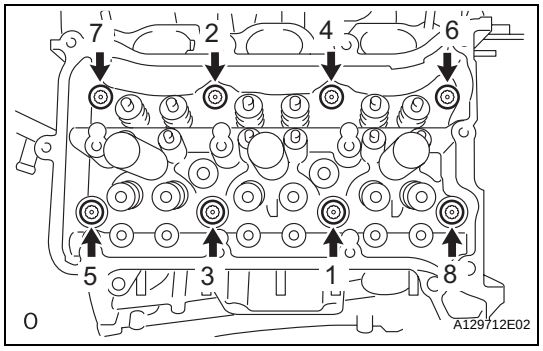


26. INSTALL CYLINDER HEAD SUB-ASSEMBLY RH

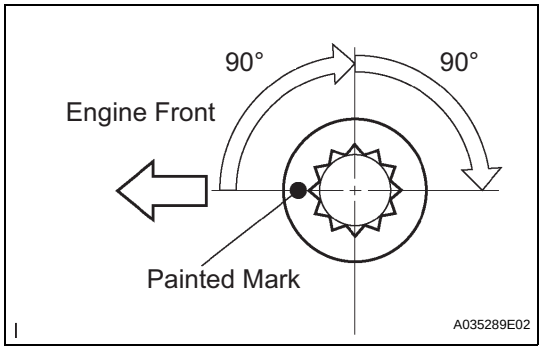
(a) Place the cylinder head gasket on the cylinder block surface with the Lot No. stamp upward.
NOTICE:
- **Be careful of the installation direction.**
- **Gently place the cylinder head in order not to damage the gasket with the bottom part of the head.**

(b) Place the cylinder head on the cylinder block.
NOTICE:
Be careful not to allow oil to adhere to the bottom part of the cylinder head.
HINT:
The cylinder head bolts are tightened in 3 progressive steps.

(c) Apply a light coat of engine oil to the threads and under the heads of the cylinder head bolts.



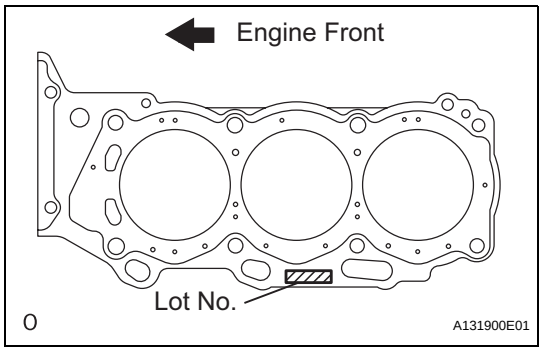
(d) Step 1
(1) Using a 10 mm bi-hexagon wrench, install and uniformly tighten the 8 cylinder head bolts with the plate washers in several steps and in the sequence shown in the illustration.
Torque: 36 N*m (367 kgf*cm, 27 ft.*lbf)



(e) Step 2
(1) Mark the cylinder head bolt head with paint as shown in the illustration.
(2) Tighten the cylinder head bolts another 90°.

(f) Step 3
(1) Tighten the cylinder head bolts by an additional 90°.
(2) Check that the painted mark is now facing rearward.

EM



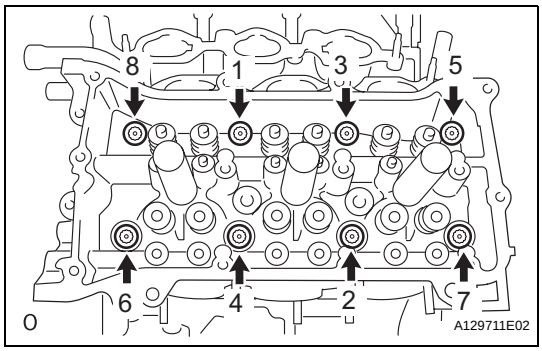
27. INSTALL CYLINDER HEAD SUB-ASSEMBLY LH

(a) Place the cylinder head gasket on the cylinder block surface with the Lot No. stamp upward.
NOTICE:
- **Be careful of the installation direction.**
- **Gently place the cylinder head in order not to damage the gasket with the bottom part of the head.**

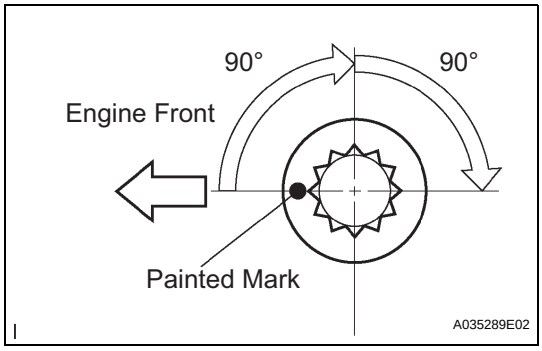
(b) Place the cylinder head on the cylinder block.
NOTICE:
Be careful not to allow oil to adhere to the bottom part of the cylinder head.
HINT:
The cylinder head bolts are tightened in 3 progressive steps.

(c) Apply a light coat of engine oil to the threads and under the heads of the cylinder head bolts.

EM

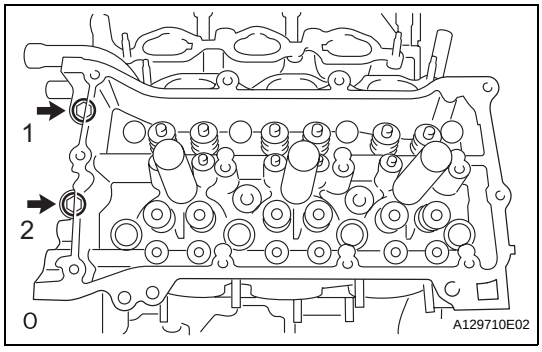


(d) Step 1
(1) Using a 10 mm bi-hexagon wrench, install and uniformly tighten the 8 cylinder head bolts with the plate washers in several steps in the sequence shown in the illustration.
Torque: 36 N*m (367 kgf*cm, 27 ft.*lbf)



(e) Step 2
(1) Mark the cylinder head bolt head with paint as shown in the illustration.
(2) Tighten the cylinder head bolts by 90°.

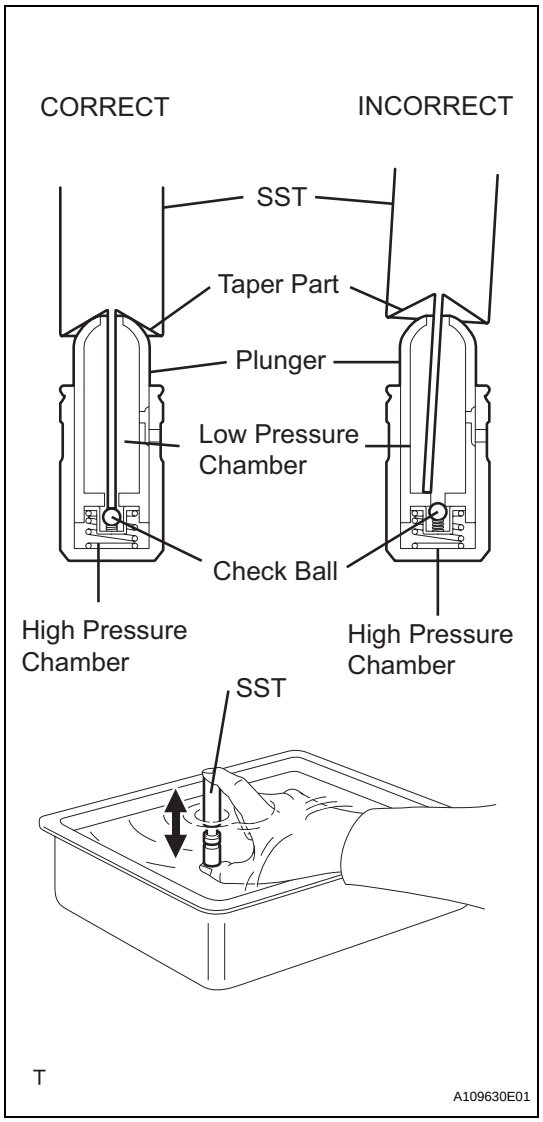
(f) Step 3
(1) Tighten the cylinder head bolts by an additional 90°.
(2) Check that the painted mark is now facing rearward.



(g) Tighten the 2 bolts in the order shown in the illustration.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

28. INSTALL VALVE LASH ADJUSTER ASSEMBLY
NOTICE:
- **Keep the lash adjuster free of dirt and foreign objects.**
- **Only use clean engine oil.**

(a) Place the lash adjuster into a container filled with engine oil.



(b) Insert the SST's tip into the lash adjuster's plunger and use the tip to press down on the check ball inside the plunger.
SST 09276-75010

(c) Squeeze the SST and lash adjuster together to move the plunger up and down 5 to 6 times.

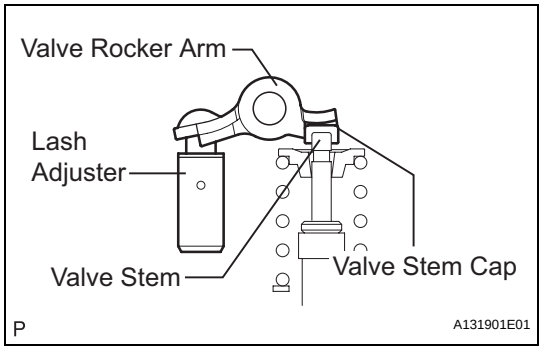
(d) Check the movement of the plunger and bleed the air.
OK:
Plunger moves up and down.
NOTICE:
When bleeding air from the high-pressure chamber, make sure that the tip of the SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, air will not bleed.

(e) After bleeding the air, remove the SST. Then, try to press the plunger quickly and firmly with a finger.
OK:
Plunger is very difficult to move.
If the result is not as specified, replace the lash adjuster.

(f) Install the lash adjusters.
NOTICE:
Install the lash adjuster to the same place it was removed from.

29. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

(a) Apply engine oil to the lash adjuster tip and valve stem cap end.

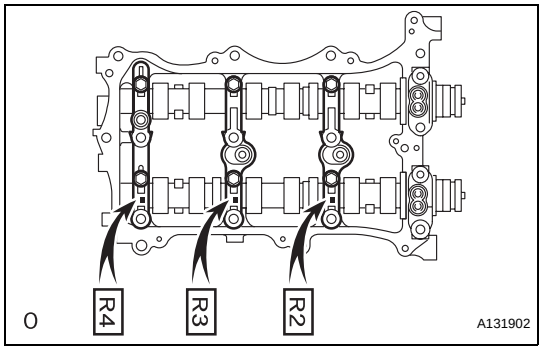


(b) Make sure that the valve rocker arms are installed as shown in the illustration.

30. INSTALL CAMSHAFT BEARING CAP (for Bank 1)

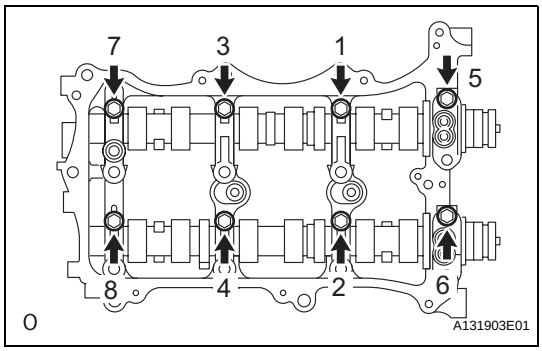
(a) Apply engine oil to the camshaft journals, camshaft housing and bearing caps.

(b) Install the camshaft and No. 2 camshaft to the camshaft housing RH.



(c) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.

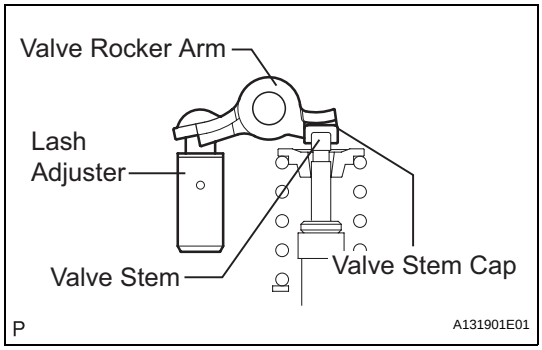
EM



(d) Temporarily tighten the 8 bolts in the order shown in the illustration.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

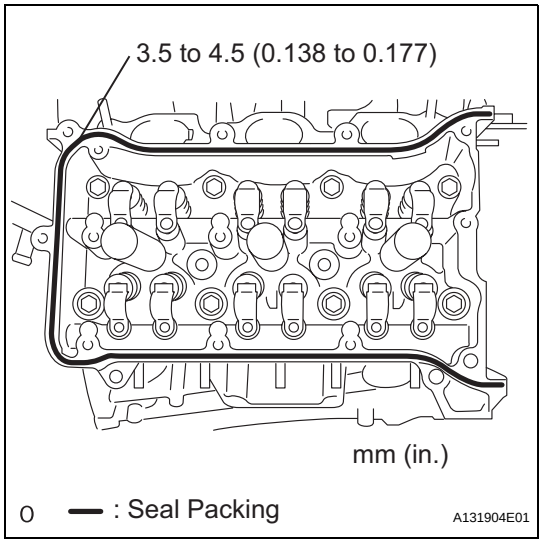
31. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY RH

(a) Make sure that the valve rocker arm is installed as shown in the illustration.

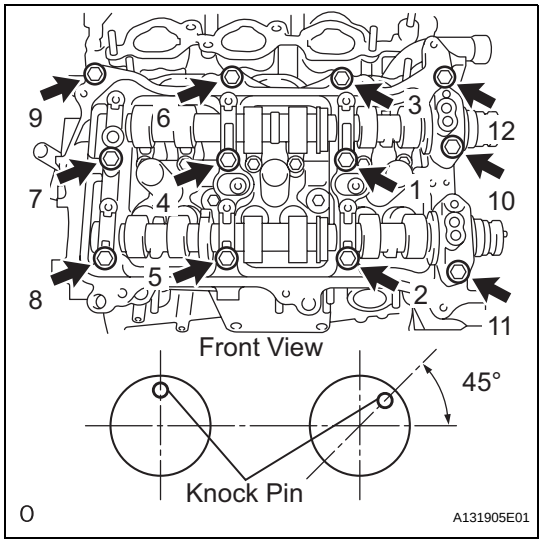


EM

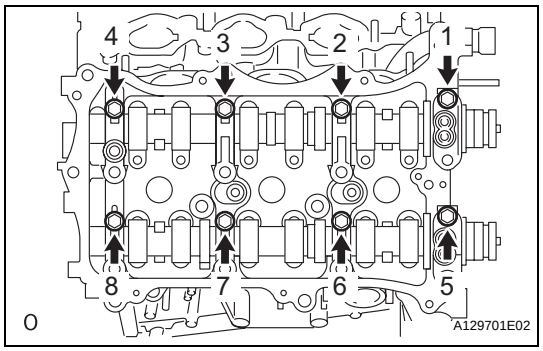
(b) Apply seal packing in a continuous line as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Seal diameter:
3.5 to 4.5 mm (0.138 to 0.177 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the camshaft housing sub-assembly RH within 3 minutes.**
- **Do not start the engine for at least 2 hours after installing.**



(c) Install the camshaft housing RH and tighten the 12 bolts in the order shown in the illustration.
Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)
NOTICE:
- **When installing the camshaft housing RH, it is necessary to correctly position the camshafts as shown in the illustration. Failure to correctly position these parts may result in damage due to contact between the pistons and valves. If a camshaft is rotated with a piston at TDC, valve contact will occur.**
- **If any of the bolts are loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.**



- **If the camshaft housing is removed because any of the bolts are loosened during installation, make sure that the previously applied seal packing does not enter any oil passages.**

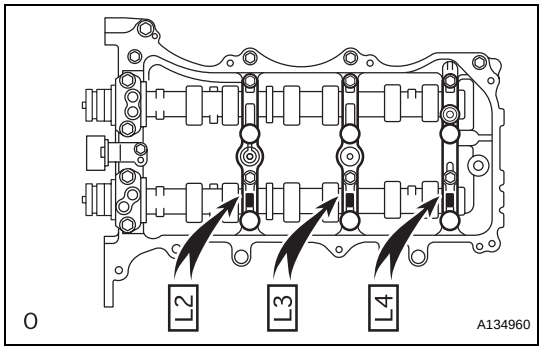


(d) Tighten the 8 bolts in the order shown in the illustration.
Torque: 16 N*m (163 kgf*cm, 12 ft.*lbf)

32. INSTALL CAMSHAFT BEARING CAP (for Bank 2)

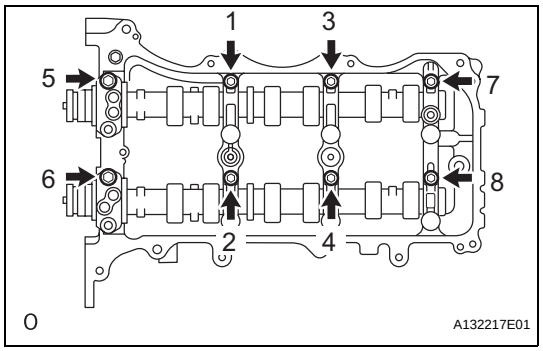
(a) Apply engine oil to the camshaft journals, camshaft housing and bearing caps.

(b) Install the No. 3 camshaft and No. 4 camshaft to the camshaft housing LH.

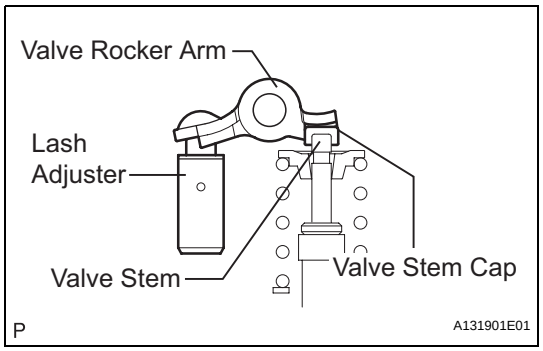


(c) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.

EM

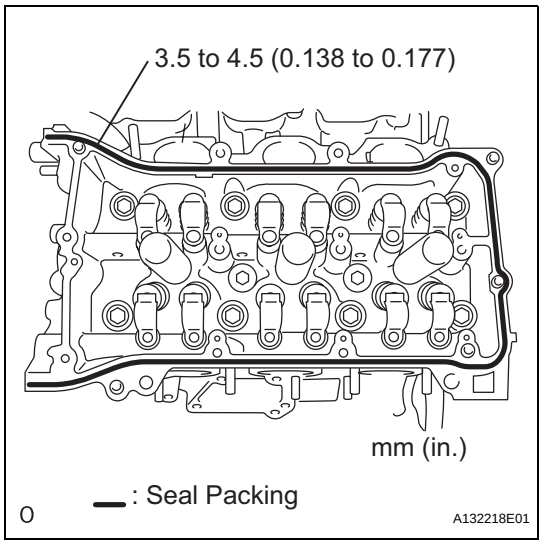


(d) Temporarily tighten the 8 bolts in the order shown in the illustration.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



33. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY LH

(a) Make sure that the valve rocker arm is installed as shown in the illustration.



(b) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:

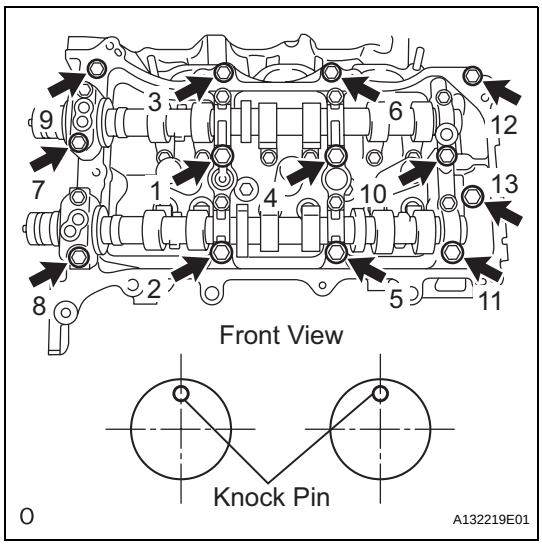
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Seal diameter:

3.5 to 4.5 mm (0.138 to 0.177 in.)

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the camshaft housing sub-assembly LH within 3 minutes.**
- **Do not start the engine for at least 2 hours after installing.**

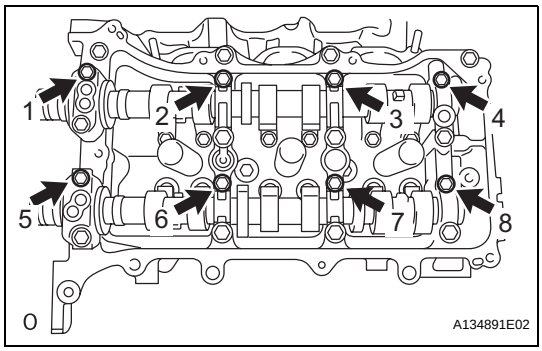


(c) Install the camshaft housing LH and tighten the 13 bolts in the order shown in the illustration.

Torque: 28 N*m (286 kgf*cm, 21 ft.*lbf)

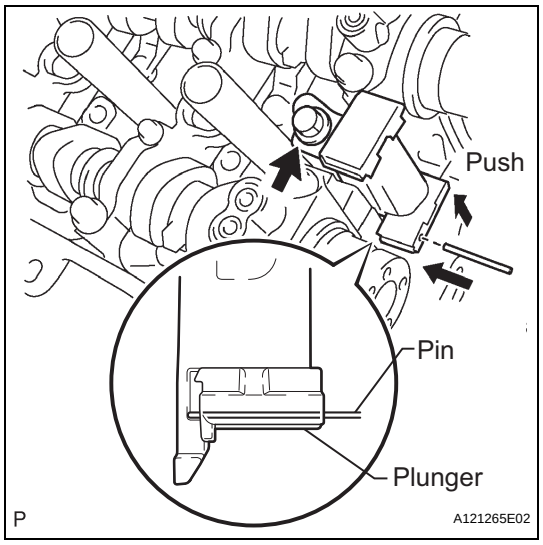
NOTICE:

- **When installing the camshaft housing LH, it is necessary to correctly position the camshafts as shown in the illustration. Failure to correctly position these parts may result in damage due to contact between the pistons and valves. If a camshaft is rotated with a piston at TDC, valve contact will occur.**
- **If any of the bolts are loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.**
- **If the camshaft housing is removed because any of the bolts are loosened during installation, make sure that the previously applied seal packing does not enter any oil passages.**



(d) Tighten the 8 bolts in the order shown in the illustration.

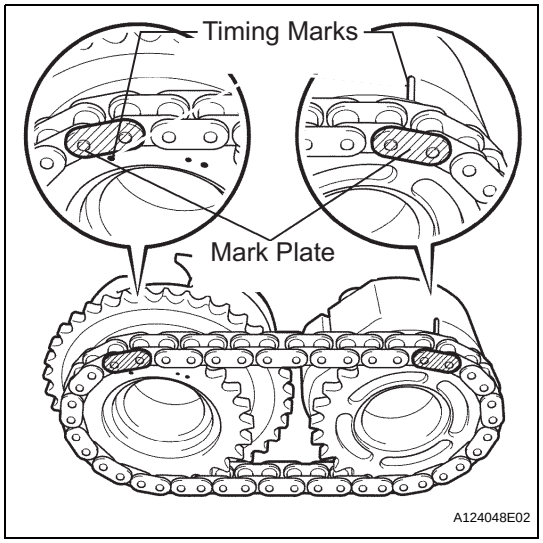
Torque: 16 N*m (163 kgf*cm, 12 ft.*lbf)



34. INSTALL NO. 2 CHAIN TENSIONER ASSEMBLY

(a) Install the No. 2 chain tensioner with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

(b) While pushing in the tensioner, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to fix it.

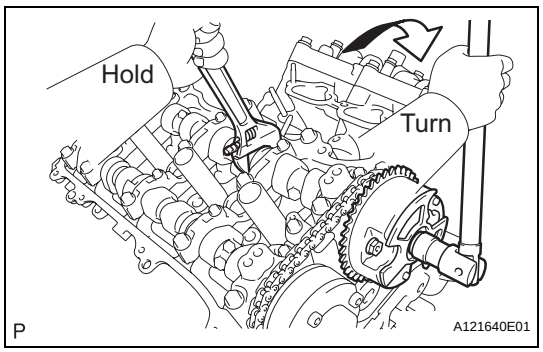


35. INSTALL CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 1)

(a) Align the mark plate (yellow) with the timing marks (1-dot mark) of the camshaft timing gears as shown in the illustration.

(b) Apply a light coat of engine oil to the bolt threads and bolt-seating surface.

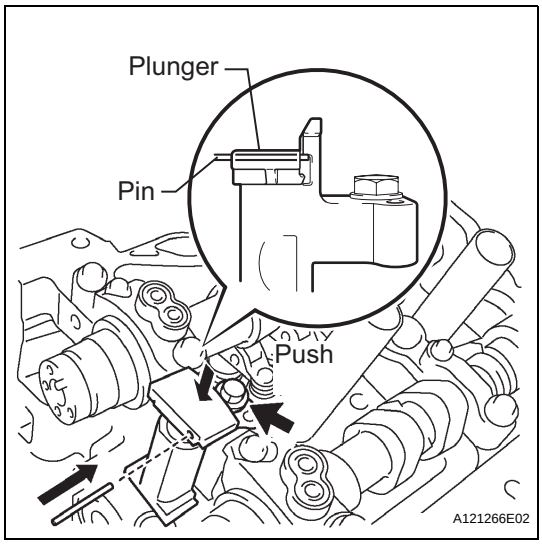
(c) Align the knock pin of the camshaft with the pin hole of the camshaft timing gear. Install the camshaft timing gear and camshaft timing exhaust gear RH with the No. 2 chain installed.



(d) Hold the hexagonal portion of the camshaft with a wrench, and tighten the 2 bolts.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

(e) Remove the pin from the chain tensioner.

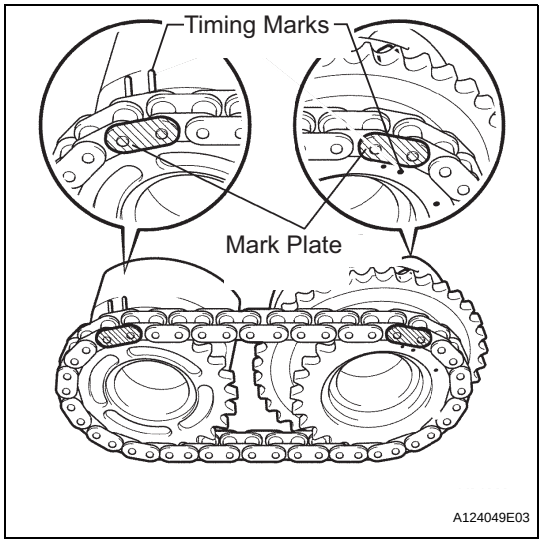
EM



36. INSTALL NO. 3 CHAIN TENSIONER ASSEMBLY

(a) Install the chain tensioner with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

(b) While pushing in the tensioner, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to hold it.

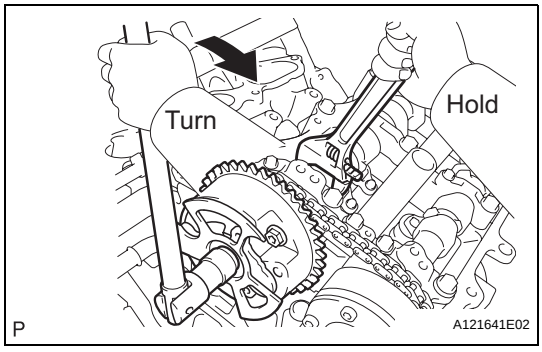


37. INSTALL CAMSHAFT TIMING GEARS AND NO. 2 CHAIN (for Bank 2)

(a) Align the mark plate (yellow) with the timing marks (2-dot mark) of the camshaft timing gears as shown in the illustration.

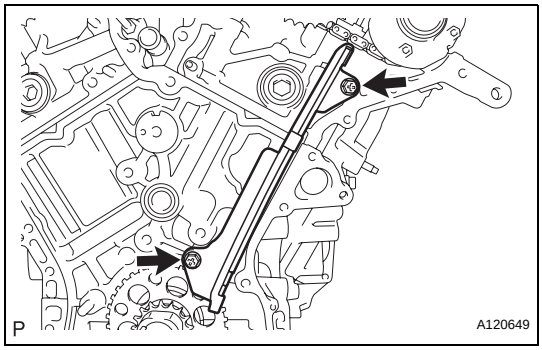
(b) Apply a light coat of engine oil to the bolt threads and bolt-seating surface.

(c) Align the knock pin of the camshaft with the pin hole of the camshaft timing gear. Install the camshaft timing gear and camshaft timing exhaust gear LH with the No. 2 chain installed.



(d) Hold the hexagonal portion of the camshaft with a wrench, and tighten the 2 bolts.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

(e) Remove the pin from the chain tensioner.

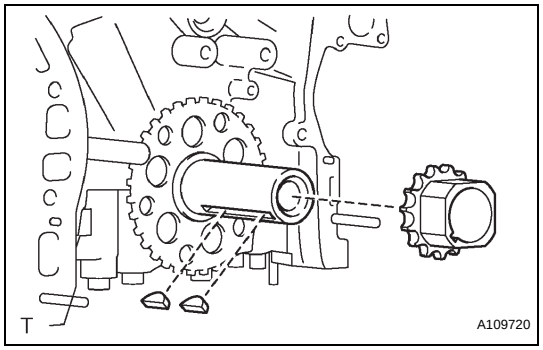


38. INSTALL NO. 1 CHAIN VIBRATION DAMPER

(a) Install the chain vibration damper with the 2 bolts.
Torque: 23 N*m (230 kgf*cm, 17 ft.*lbf)

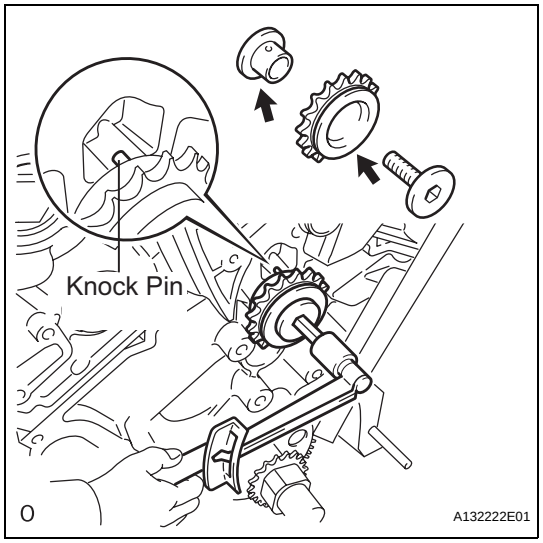
39. INSTALL NO. 2 CHAIN VIBRATION DAMPER

(a) Install the 2 chain vibration dampers.



40. INSTALL CRANKSHAFT TIMING SPROCKET

(a) Install the 2 timing gear set keys and timing sprocket as shown in the illustration.



41. INSTALL IDLE SPROCKET ASSEMBLY

(a) Apply a light coat of engine oil to the rotating surface of the No. 1 idle gear shaft.

(b) Temporarily install the No. 1 idle gear shaft and idle sprocket with the No. 2 idle gear shaft while aligning the knock pin of the No. 1 idle gear with the knock pin groove of the cylinder block.

NOTICE:

Be careful of the idle gear direction.

HINT:

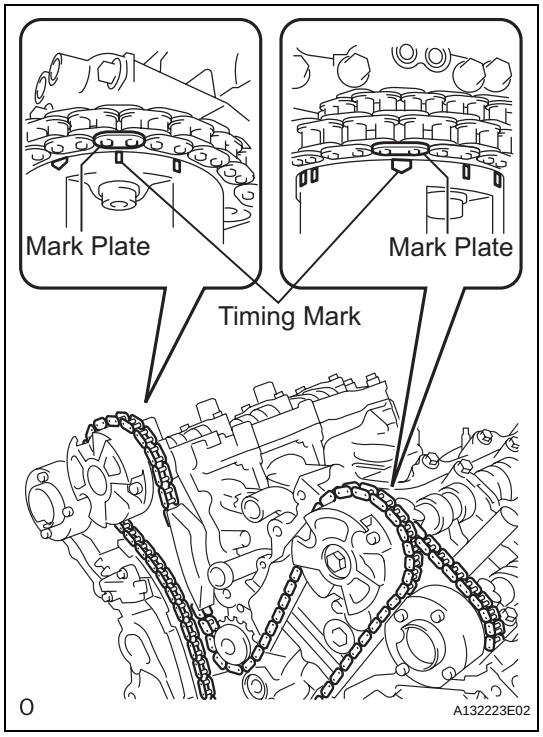
Check that no foreign objects are on the idle gear shafts No. 1 and No. 2.

(c) Using a 10 mm hexagon wrench, tighten the No. 2 idle gear shaft.

Torque: 60 N*m (612 kgf*cm, 44 ft.*lbf)

HINT:

After installing the idle sprocket assembly, check that the idle sprocket turns smoothly.



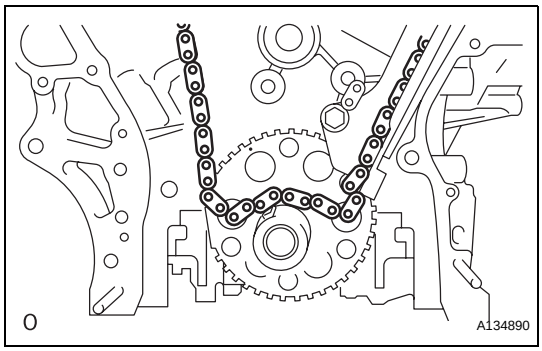
42. INSTALL CHAIN SUB-ASSEMBLY

(a) Align the mark plate and timing marks as shown in the illustration and install the chain.

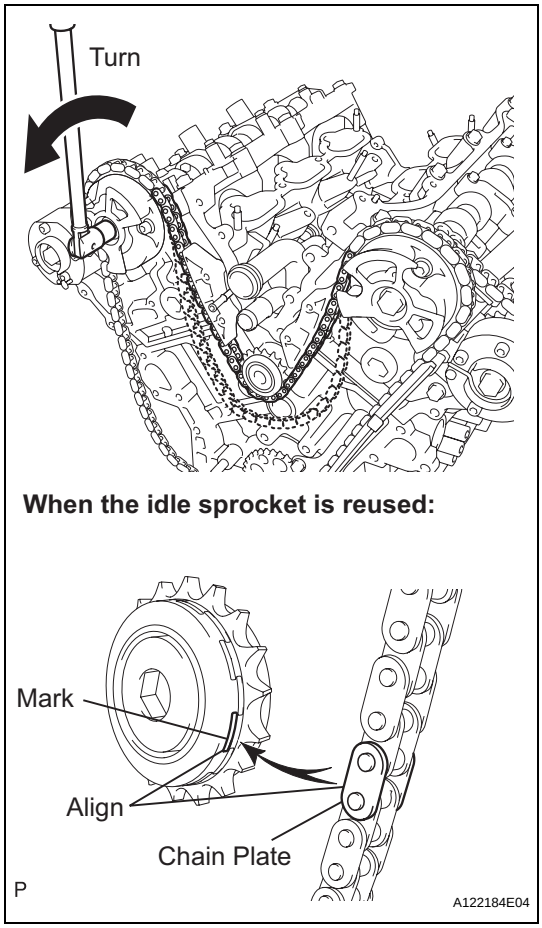
HINT:

The camshaft mark plate is orange.

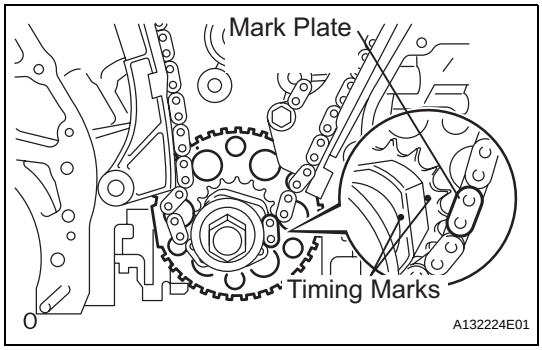
EM



(b) Do not pass the chain over the crankshaft, just put it on it.

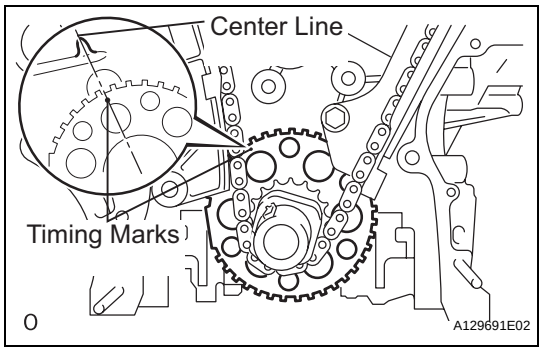


(c) Turn the camshaft timing gear assembly on the RH bank counterclockwise to tighten the chain between the banks.
NOTICE:
When the idle sprocket is reused, align the chain plate with the mark where the plate had been in order to tighten the chain between the banks.



(d) Align the mark plate and timing mark as shown in the illustration and install the chain onto the crankshaft timing sprocket.
HINT:
The crankshaft mark plate is yellow.

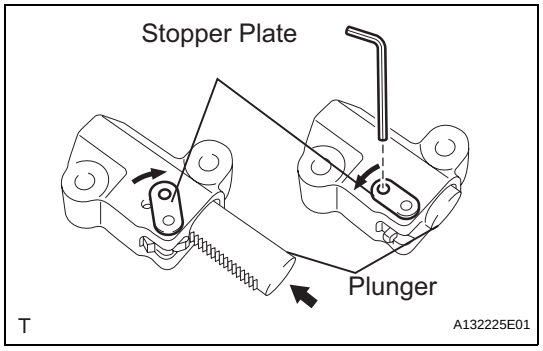
(e) Temporarily tighten the pulley set bolt.



(f) Turn the crankshaft clockwise to set it to the RH block bore center line (TDC / compression).

43. INSTALL CHAIN TENSIONER SLIPPER

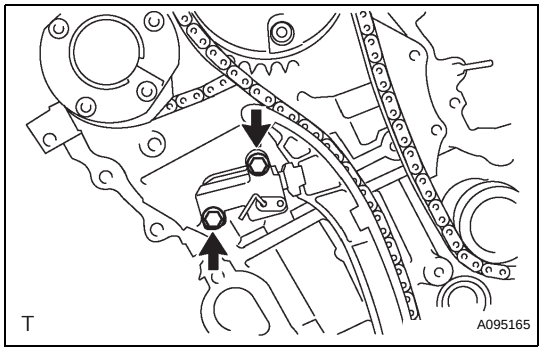
(a) Install the chain tensioner slipper.



44. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY

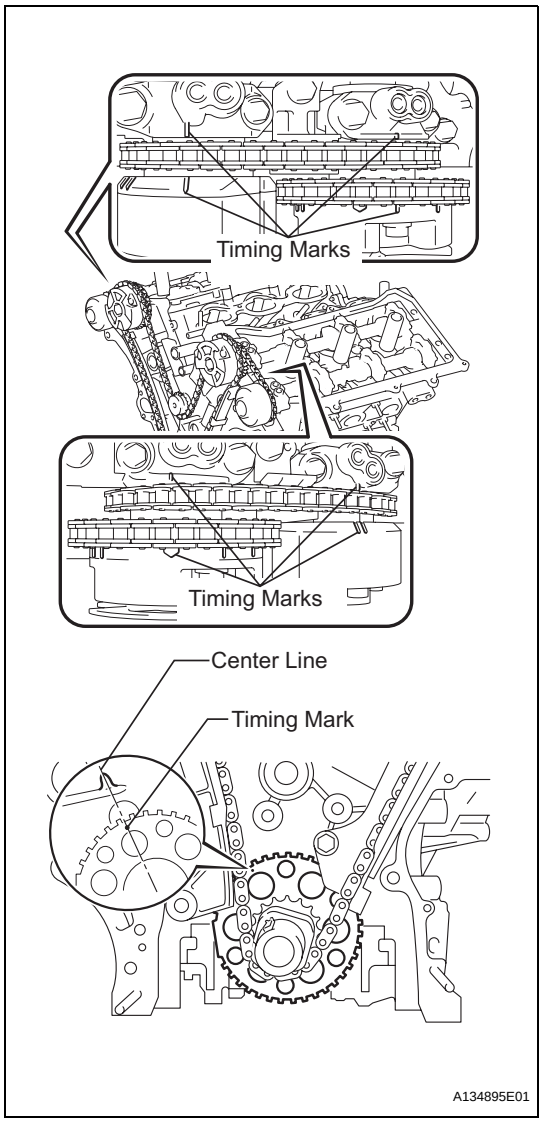
(a) Move the stopper plate upward to release the lock, and push the plunger deep into the tensioner.

(b) Move the stopper plate downward to set the lock, and insert a hexagon wrench into the hole of the stopper plate.

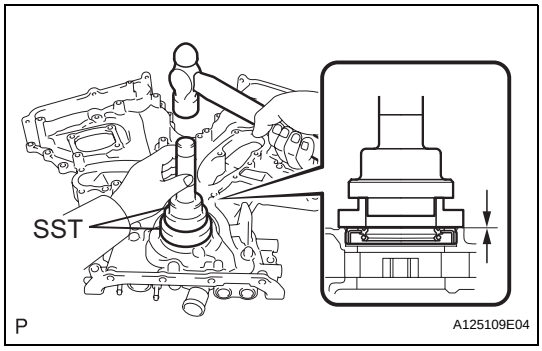


(c) Install the chain tensioner with the 2 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

EM

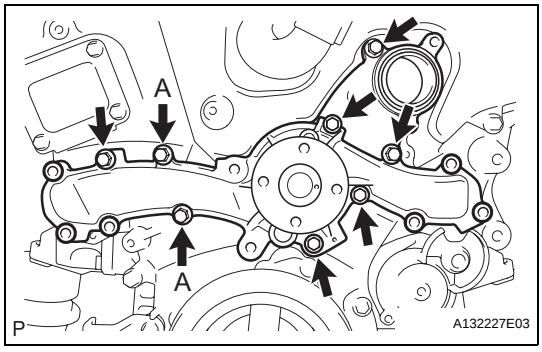


(d) Remove the hexagon wrench of the chain tensioner. Check that each timing mark is aligned with the crankshaft at the TDC / compression.
(e) Remove the pulley set bolt.



45. INSTALL TIMING CHAIN CASE OIL SEAL

(a) Using SST, tap in a new oil seal until its surface is flush with the timing gear case edge.
SST 09223-22010, 09506-35010
NOTICE:
- **Keep the lip free of foreign matter.**
- **Do not tap on the oil seal at an angle.**
- **Make sure that the oil seal edge does not stick out of the timing chain case.**

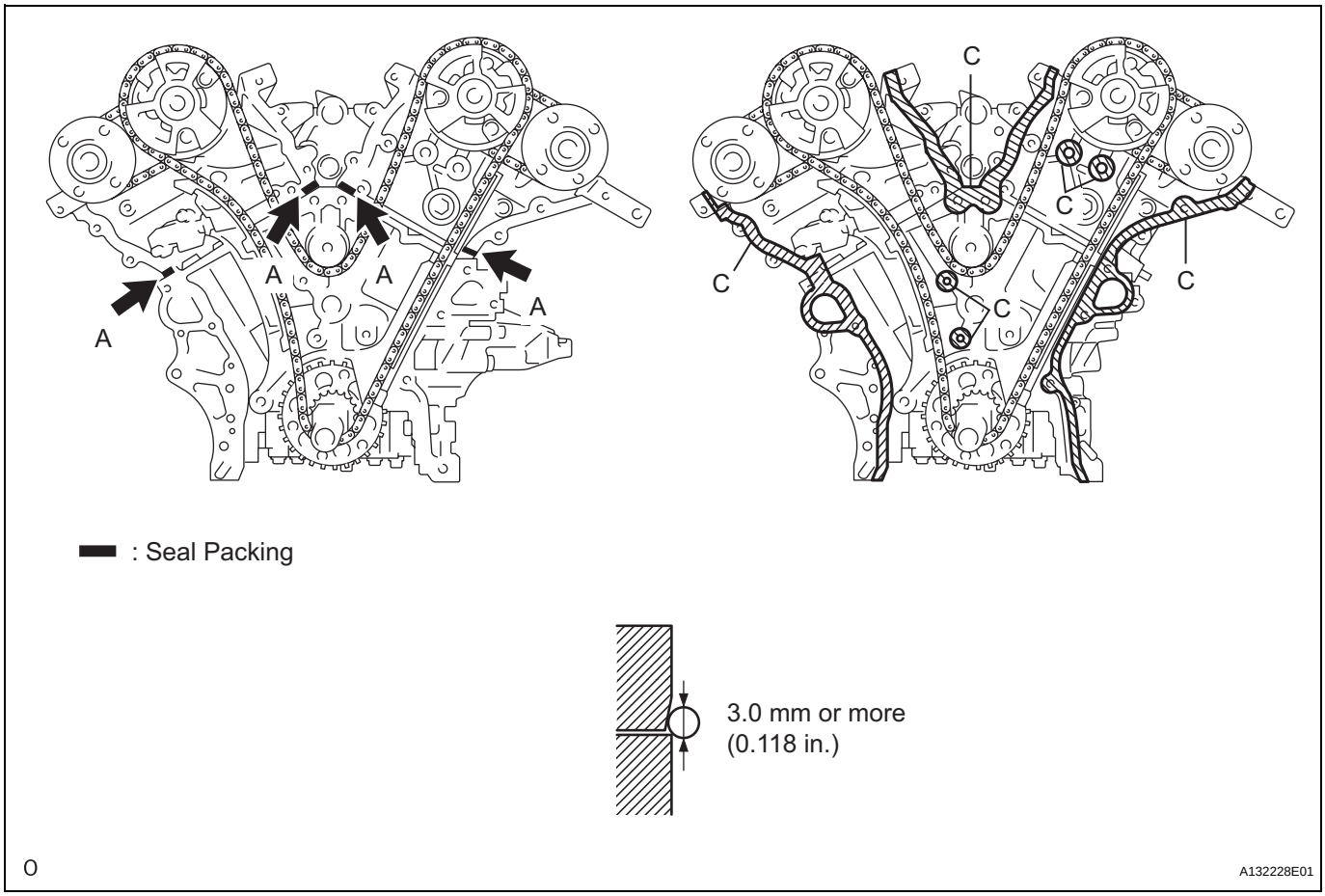


46. INSTALL WATER PUMP ASSEMBLY

(a) Install a new gasket and the water pump with the 8 bolts.
Torque: 9.1 N*m (93 kgf*cm, 81 in.*lbf)
NOTICE:
Be sure to replace the bolts indicated by A with new ones or reuse them after applying adhesive 1344.

47. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

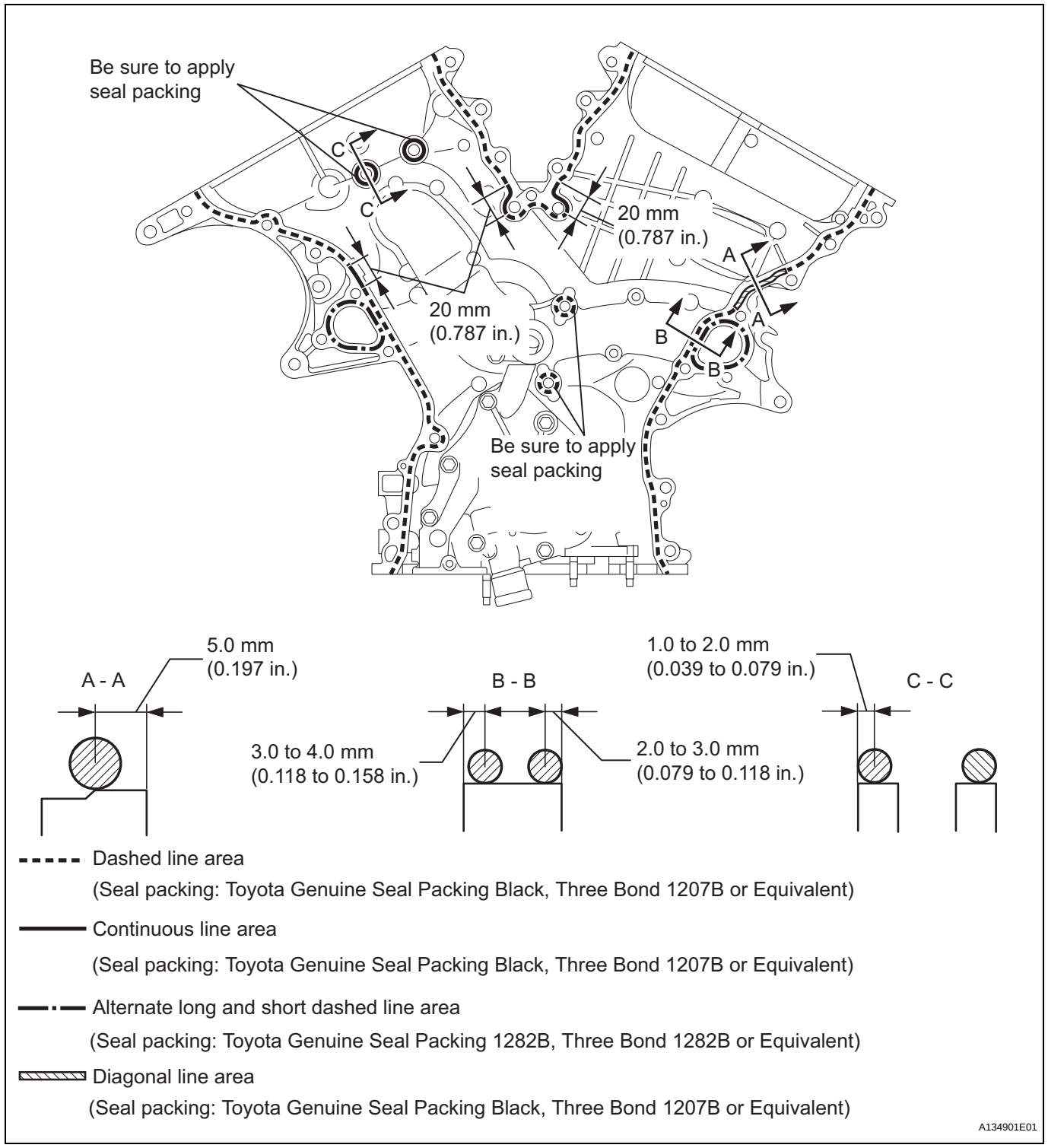
(a) Apply seal packing in a continuous line to the engine unit as shown in the following illustration.



Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Seal diameter:
3.0 mm (0.118 in.)
NOTICE:

- **Be sure to clean and degrease the contact surfaces, especially the surfaces indicated by C in the illustration.**
- **When the contact surfaces are wet, wipe them with an oil-free cloth before applying seal packing.**
- **Install the chain cover within 3 minutes.**
- **Do not start the engine for at least 2 hours after installing.**

(b) Apply seal packing in a continuous line to the timing chain cover as shown in the following illustration.



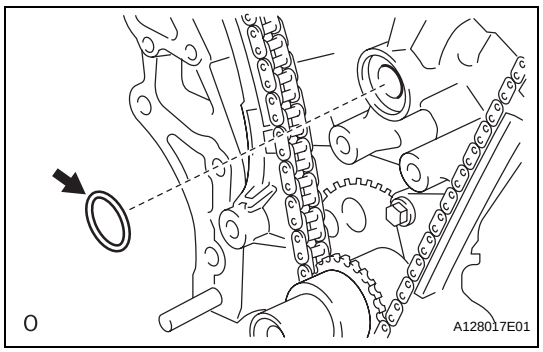
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Toyota Genuine Seal Packing Black 1282B, Three Bond 1282B or equivalent

NOTICE:

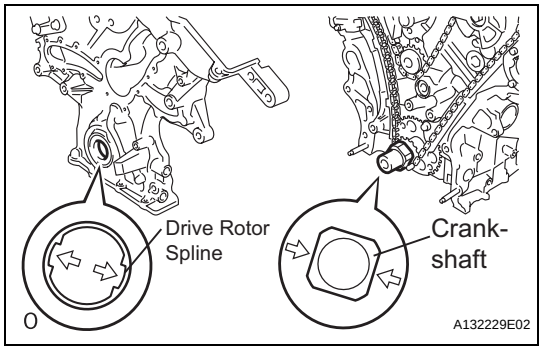
- **When the contact surfaces are wet, wipe them with an oil-free cloth before applying seal packing.**
- **Install the chain cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

Apply seal packing as follows

Area	Seal Packing Diameter	Application Position from Inside Seal Line
Continuous Line Area	4.5 mm or more (0.177 in.)	3.0 to 4.0 mm (0.118 to 0.158 in.)
Alternate Long and Dashed Line Area	3.5 mm or more (0.138 in.)	2.0 to 3.0 mm (0.079 to 0.118 in.)
Dashed Line Area	3.5 mm or more (0.138 in.)	3.0 to 4.0 mm (0.118 to 0.158 in.)
Diagonal Line Area	6.0 mm or more (0.236 in.)	5.0 mm (0.197 in.)

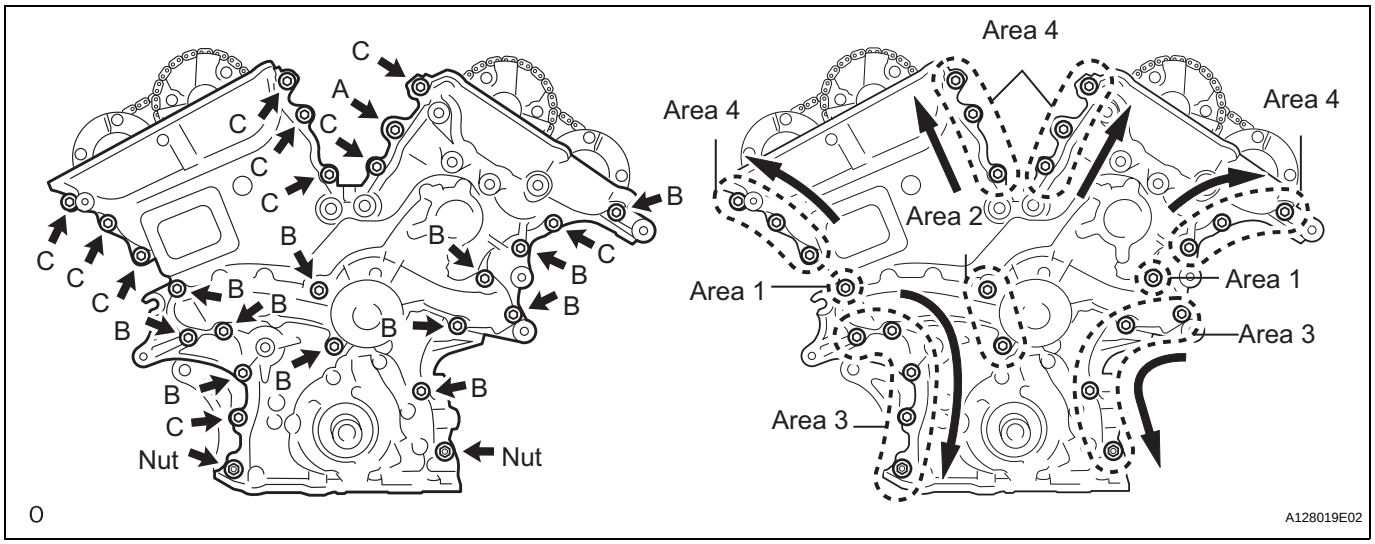


(c) Install a new gasket.



(d) Align the oil pump's drive rotor spline and the crankshaft as shown in the illustration. Install the spline and chain cover to the crankshaft.

(e) Temporarily tighten the timing chain cover with the 23 bolts and 2 nuts.



Bolt length

Item	Length
Bolt A	40 mm (1.57 in.)
Bolt B	55 mm (2.17 in.)
Bolt C	25 mm (0.98 in.)

NOTICE:
Make sure that there is no oil on the bolt threads.

(f) Fully tighten the bolts in this order: Area 1 and Area 2.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

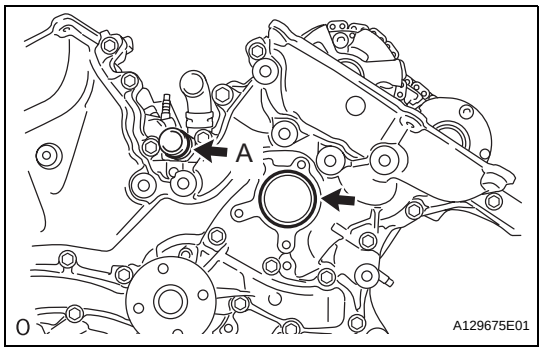
(g) Fully tighten the bolts and nuts in this order: Area 3.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
HINT:
Tighten the bolts and nuts in the order of upper to lower as shown in the illustration.

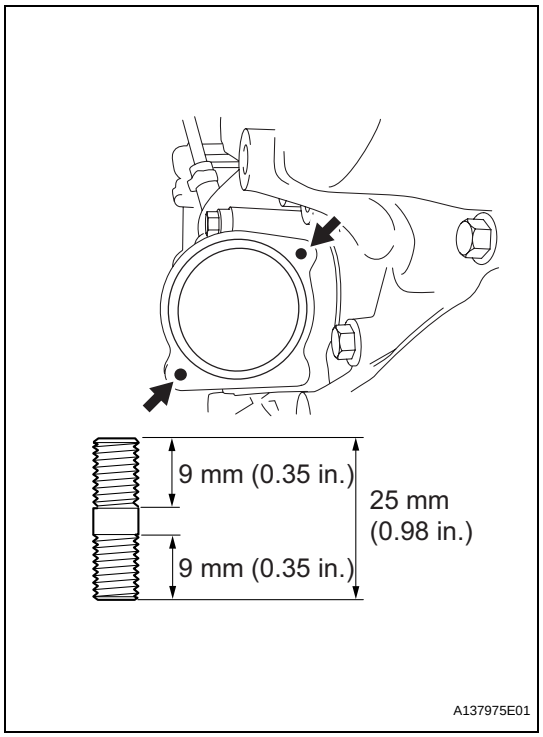
(h) Fully tighten the bolts in this order: Area 4.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf) for bolt A
21 N*m (214 kgf*cm, 15 ft.*lbf) for bolts except bolt A
HINT:
Tighten the bolts in the order of lower to upper as shown in the illustration.

(i) Install a new gasket and the chain cover plate with the 4 bolts.
Torque: 9.1 N*m (93 kgf*cm, 81 in.*lbf)

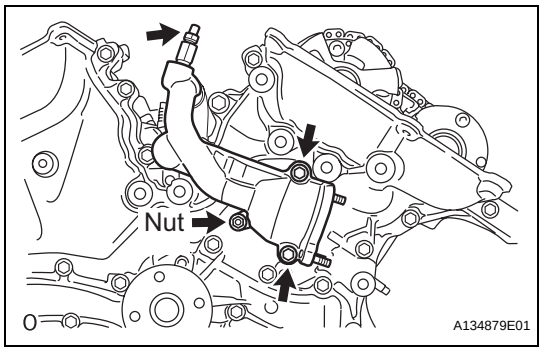
48. INSTALL WATER INLET HOUSING

(a) Install 2 new O-rings.
HINT:
Apply a small amount of water or soapy water to O-ring (A) in the illustration before installing it.





(b) Install the stud bolts.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)



(c) Install the water inlet with the 2 bolts and nut.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
NOTICE:
Be careful that the O-ring does not get caught between the parts.

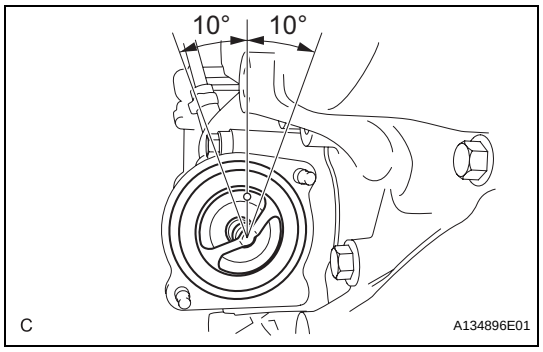
(d) Connect the water by-pass hose No. 1.

(e) Apply adhesive around the drain cock.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent

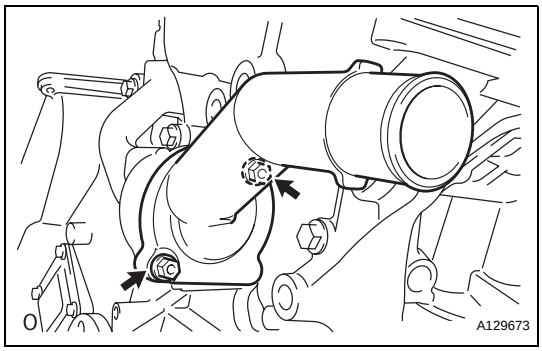
(f) Install the housing drain cock to the water inlet housing.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

(g) Install the housing plug to the water drain cock.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

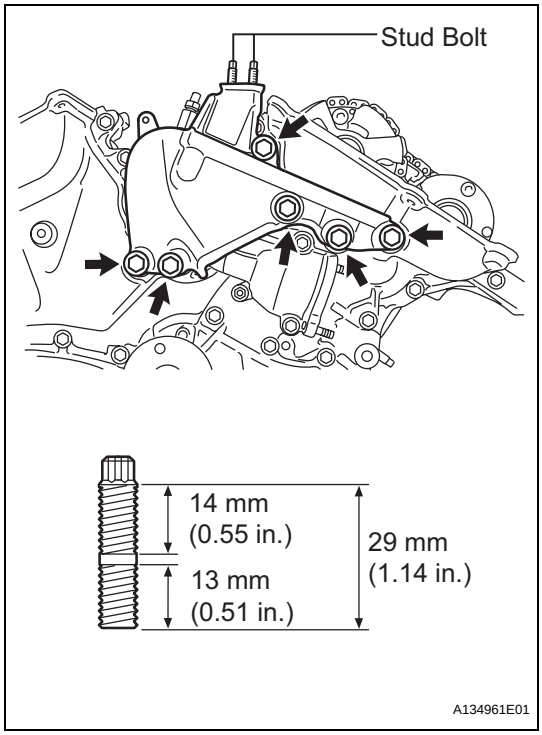
(h) Install a new gasket to the thermostat.



(i) Align the thermostat jiggle valve with the upper stud bolt, and insert the thermostat in the water inlet housing.
HINT:
The jiggle valve may be set within 10° of either side of the prescribed positions.



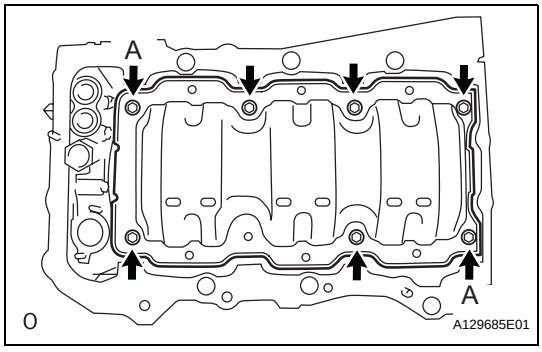
(j) Install the water inlet with the 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



49. INSTALL FRONT ENGINE MOUNTING BRACKET NO. 1 LH

(a) Install the engine mounting bracket with the 6 bolts.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)
NOTICE:
- **Install the water inlet and mounting bracket within 15 minutes after installing the chain cover.**
- **Do not start the engine for at least 2 hours after installation.**

(b) When replacing a stud bolt, install it by using an E8 "torx" socket wrench.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

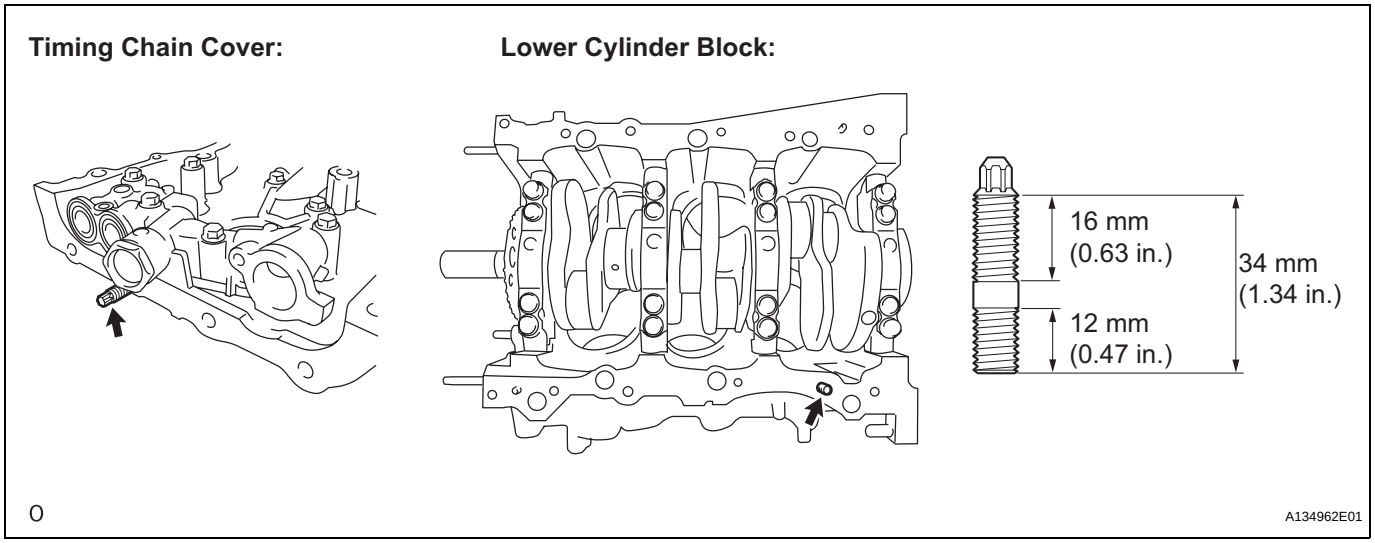


50. INSTALL OIL PAN BAFFLE PLATE

(a) Install the oil pan baffle plate with the 7 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
HINT:
Temporarily tighten the 7 bolts. Fully tighten 2 bolts A as shown in the illustration before tightening the other bolts.

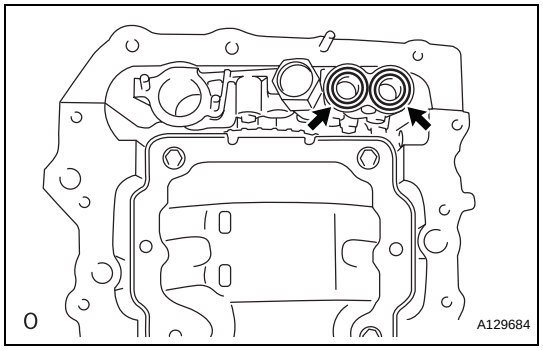
51. INSTALL OIL PAN SUB-ASSEMBLY

(a) When replacing a stud bolt, install it by using an E8 "torx" socket wrench.



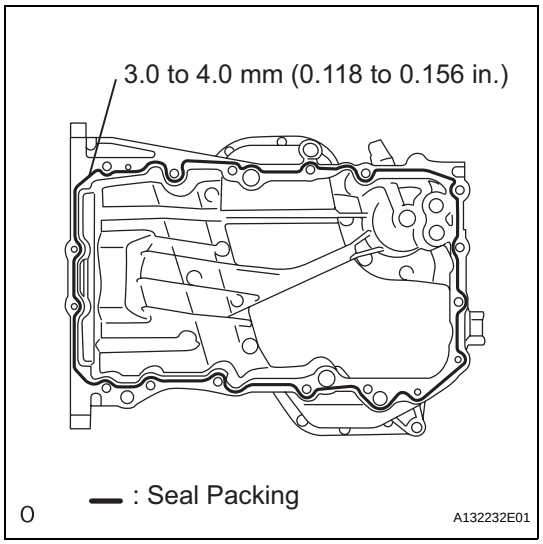
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

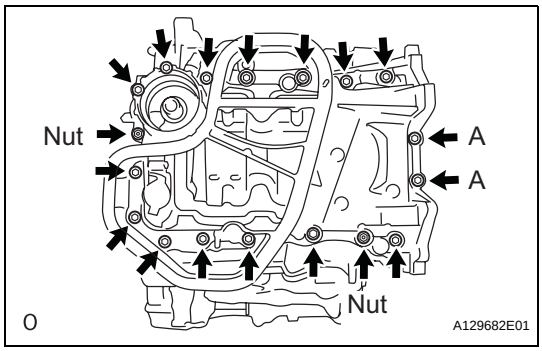
(b) Install 2 new O-rings.



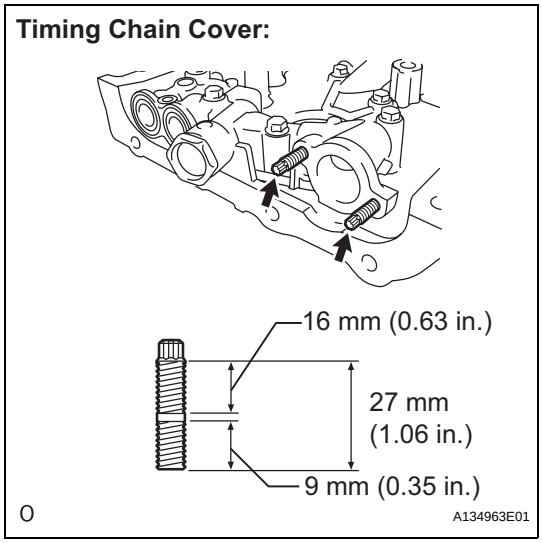
(c) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Seal diameter:
3.0 to 4.0 mm (0.118 to 0.156 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**



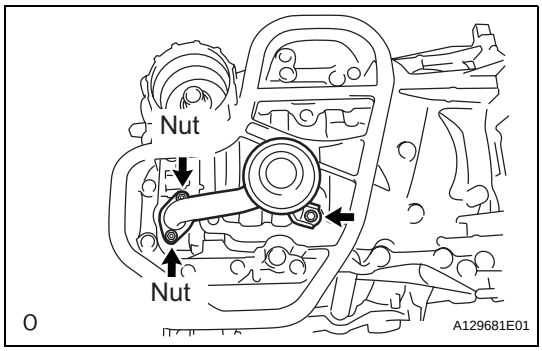


(d) Install the oil pan with the 16 bolts and 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf) for bolt A
21 N*m (214 kgf*cm, 15 ft.*lbf) for bolts except A

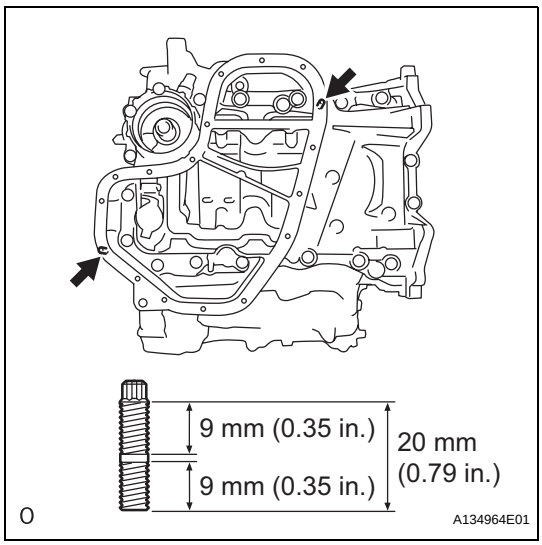


52. INSTALL OIL STRAINER SUB-ASSEMBLY

(a) Using an E6 "torx" socket, install the stud bolts as shown in the illustration.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

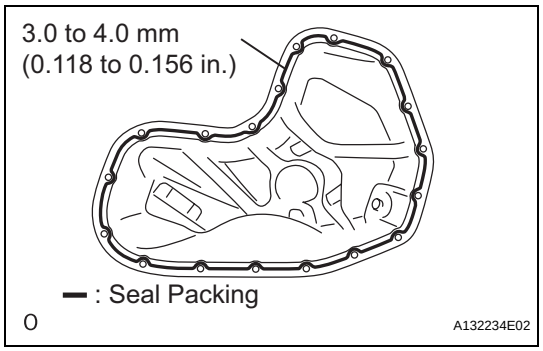


(b) Install a new gasket and the oil strainer with the bolt and 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

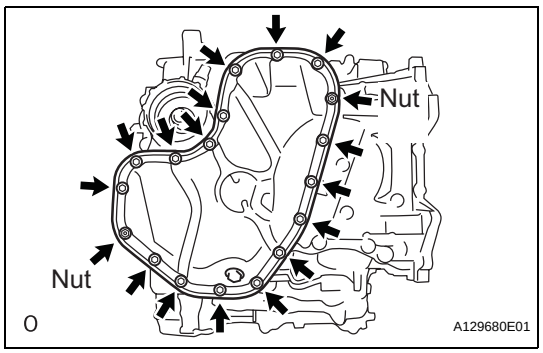


53. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY

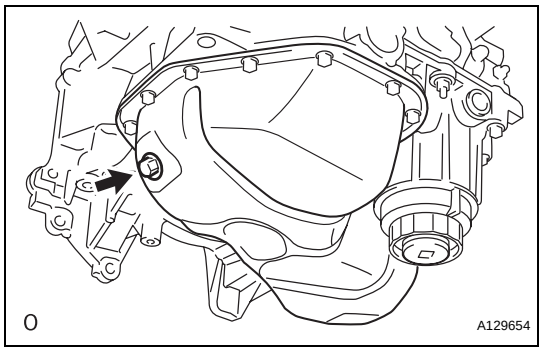
(a) Using an E6 "torx" socket, install the stud bolts as shown in the illustration.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)



(b) Apply seal packing in a continuous line as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Seal diameter:
3.0 to 4.0 mm (0.118 to 0.156 in.)
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the oil pan No. 2 within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

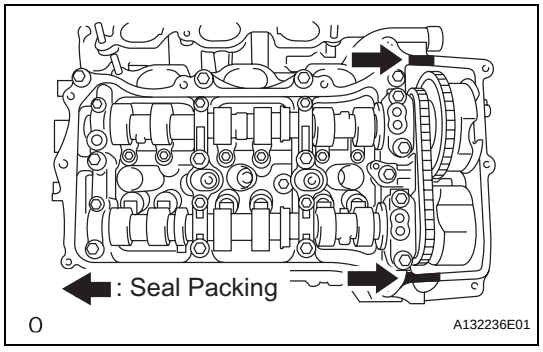


(c) Install the oil pan with the 16 bolts and 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



54. INSTALL OIL PAN DRAIN PLUG

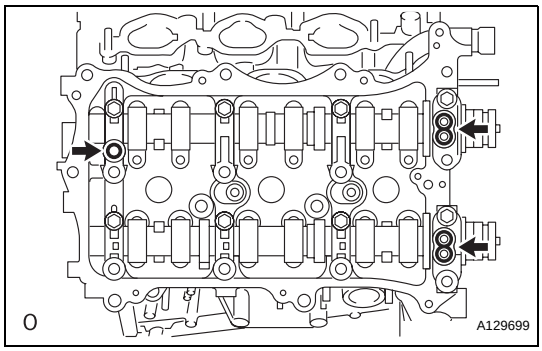
(a) Install a new gasket and the drain plug.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)



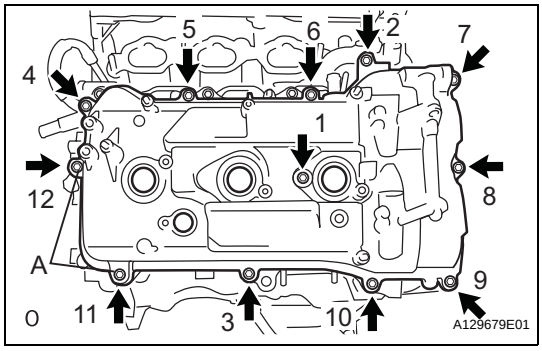
55. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1)

(a) Apply seal packing as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the head cover within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

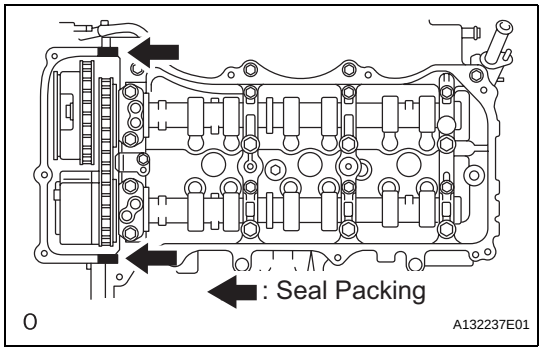
EM



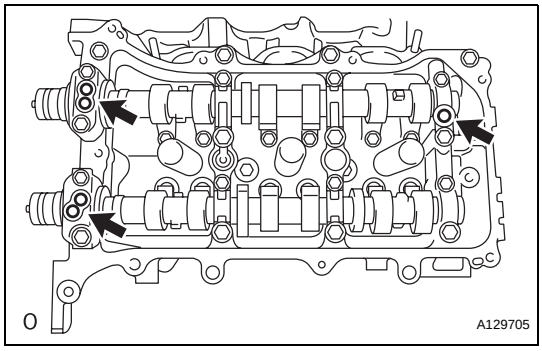
(b) Install 3 new gaskets as shown in the illustration.
(c) Install a new gasket to the head cover.



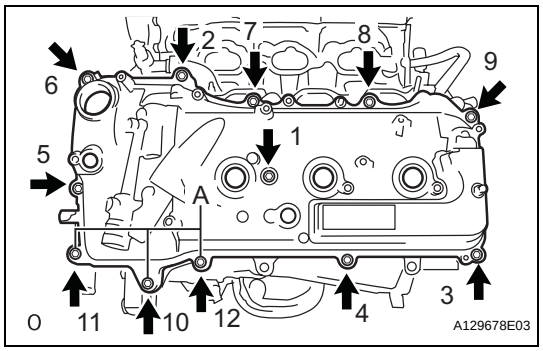
(d) Install a head cover with the 12 bolts and a new washer.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf) for bolt A
10 N*m (102 kgf*cm, 7 ft.*lbf) for bolts except A
HINT:
Make sure the tightening torque of bolt 1.



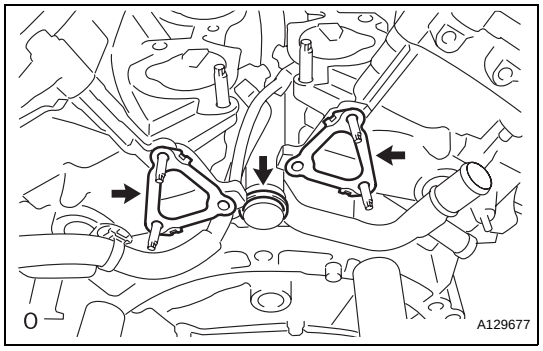
56. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2)
(a) Apply seal packing as shown in the illustration.
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the head cover within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**



(b) Install 3 new gaskets as shown in the illustration.
(c) Install a new gasket to the head cover.

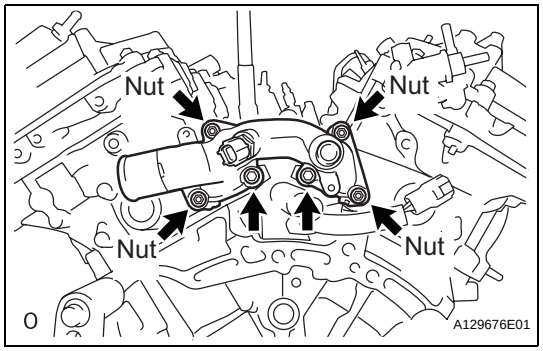


(d) Install the head cover with the 12 bolts and a new washer.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf) for bolt A
10 N*m (102 kgf*cm, 7 ft.*lbf) for bolts except A
HINT:
Make sure the tightening torque of bolts 1 and 10.



57. INSTALL WATER OUTLET

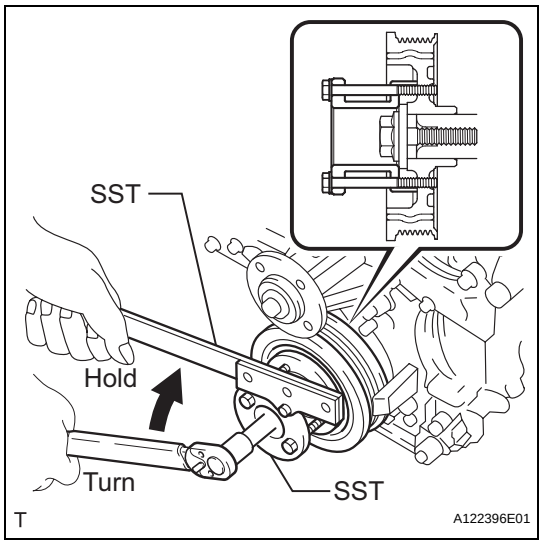
(a) Install 2 new gaskets and a new O-ring.
HINT:
Apply soapy water to the O-ring.



(b) Install the water by-pass joint with the 2 bolts and 4 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf) for bolts
10 N*m (103 kgf*cm, 7 ft.*lbf) for nuts
NOTICE:
Be careful that the O-ring does not get caught between the parts.

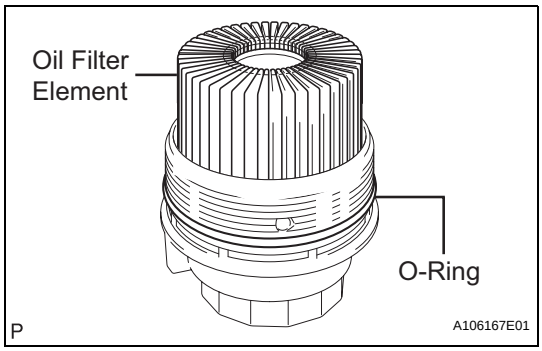
58. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.



(b) Using SST, install the pulley bolt.
SST 09213-70011 (09213-70020), 09330-00021
Torque: 250 N*m (2,550 kgf*cm, 184 ft.*lbf)

EM



59. INSTALL OIL FILTER ELEMENT

(a) Clean the inside of the oil filter cap, the threads and O-ring groove.

(b) Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.

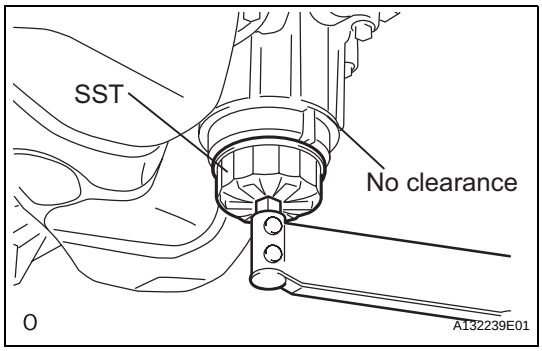
(c) Set a new oil filter element to the oil filter cap.

(d) Remove dirt or foreign matter from the installation surface of the engine.

(e) Apply a light coat of engine oil to the O-ring again and install the oil filter cap.

NOTICE:

- **Be careful that the O-ring does not get caught between the parts.**
- **The O-ring must not be twisted on the groove.**



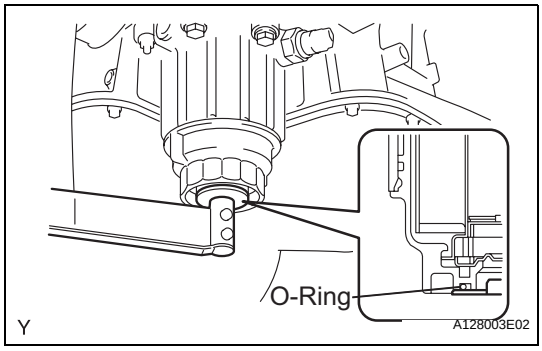
(f) Using SST, tighten the oil filter cap.

SST 09228-06501

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTICE:

Make sure that the oil filter is installed securely as shown in the illustration.



(g) Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.

NOTICE:

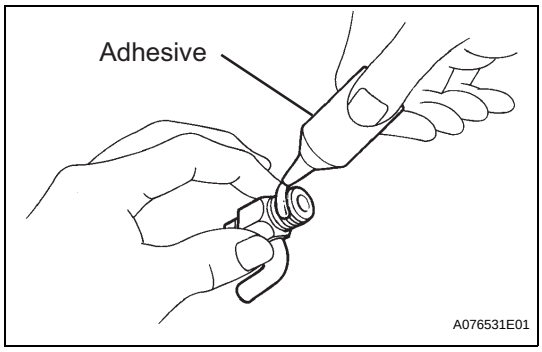
Remove all dirt and foreign matter from the installation surface.

(h) Install the oil filter drain plug to the oil filter cap.

Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

NOTICE:

Make sure that the O-ring does not get caught between the parts.



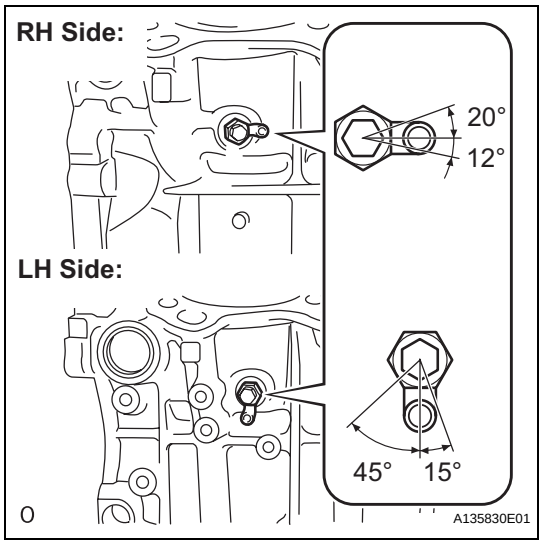
60. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

(a) Apply adhesive around the drain cocks.

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent

EM

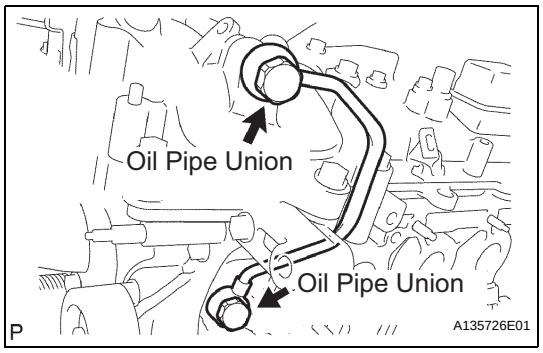


(b) Install the water drain cocks as shown in the illustration.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
NOTICE:
Do not rotate the drain cocks more than 1 revolution (360°) after tightening the drain cocks with the specified torque.

(c) Install the water drain cock plugs to the water drain cocks.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

61. INSTALL NO. 1 OIL PIPE

(a) Make sure that there is no foreign matter on the mesh of the oil control valve filter LH.
NOTICE:
Do not touch the mesh when installing the oil control valve filter.



(b) Install the oil control valve filter LH to the oil pipe union. Install new gaskets and temporarily install the oil pipe (on the head cover side).

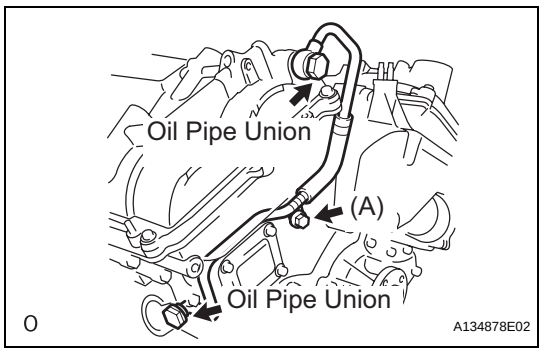
(c) Install a new gasket and temporarily install the oil pipe (on the cylinder head side) with the oil check valve bolt.

(d) Tighten the oil pipe union (on the head cover side).
Torque: 65 N*m (663 kgf*cm, 48 ft.*lbf)

(e) Tighten the oil pipe union (on the cylinder head side).
Torque: 65 N*m (663 kgf*cm, 48 ft.*lbf)
NOTICE:
If the link that connects the gaskets is broken, remove the connecting link by using nippers or similar tools.

62. INSTALL OIL PIPE

(a) Make sure that there is no foreign matter on the mesh of the oil control valve filter RH.
NOTICE:
Do not touch the mesh when installing the oil control valve filter.



(b) Install the oil control valve filter RH to the oil pipe union. Install new gaskets and temporarily install the oil pipe (on the head cover side).

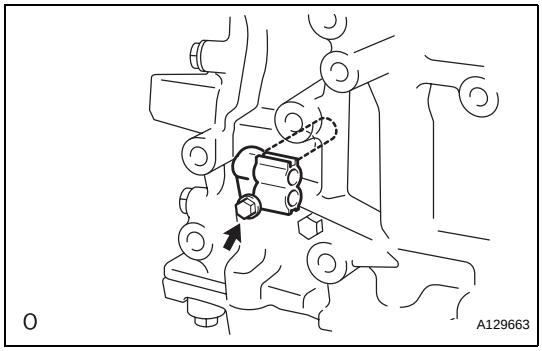
(c) Install a new gasket and temporarily install the oil pipe (on the cylinder head side) with the oil check valve bolt.

(d) Install the bolt (A) to the cylinder head.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

(e) Tighten the oil pipe union (on the head cover side).
Torque: 65 N*m (663 kgf*cm, 48 ft.*lbf)

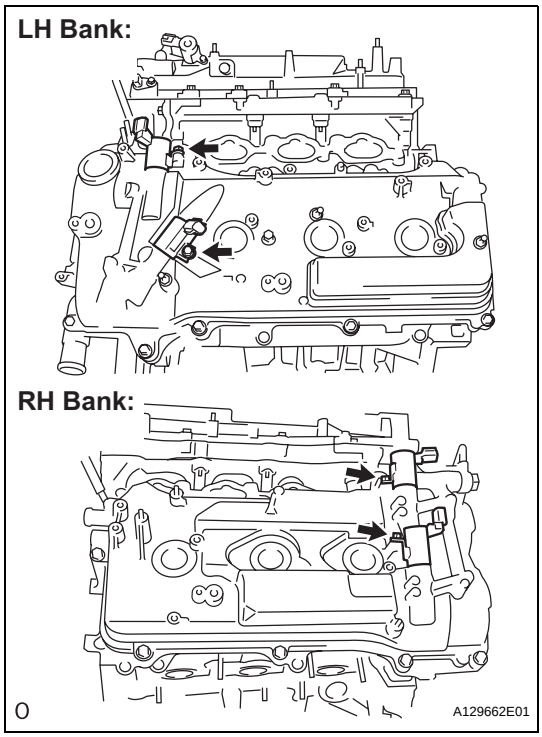
(f) Tighten the oil pipe union (on the cylinder head side).
Torque: 65 N*m (663 kgf*cm, 48 ft.*lbf)

NOTICE:
If the link that connects the gaskets is broken, remove the connecting link by using nippers or similar tools.



63. INSTALL CRANKSHAFT POSITION SENSOR

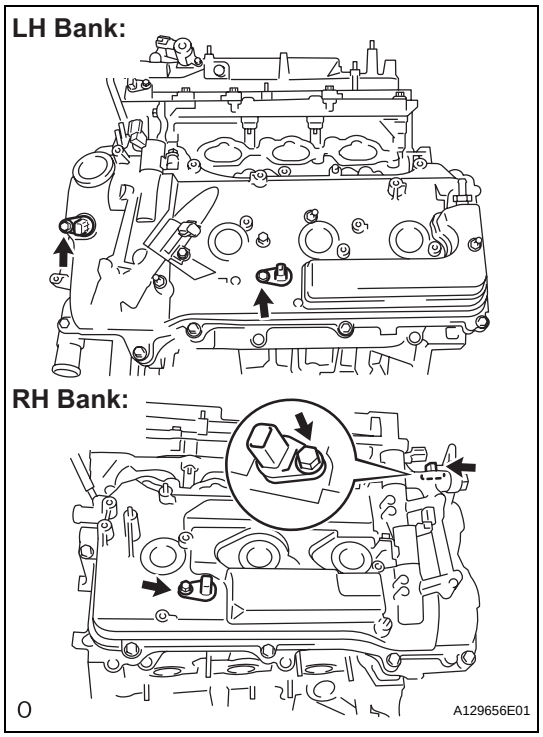
(a) Install the sensor with the bolt.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



64. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Install the 4 oil control valves with the 4 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

EM

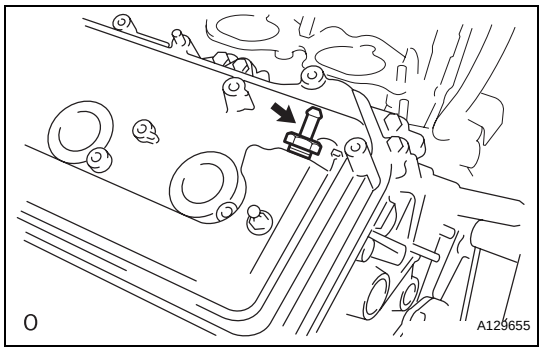


65. INSTALL CAMSHAFT POSITION SENSOR

(a) Install the 4 sensors with the 4 bolts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

66. INSTALL VENTILATION VALVE SUB-ASSEMBLY

(a) Apply adhesive around the ventilation valve.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent



(b) Install the ventilation valve.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

67. INSTALL SPARK PLUG

(a) Install the 6 spark plugs.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

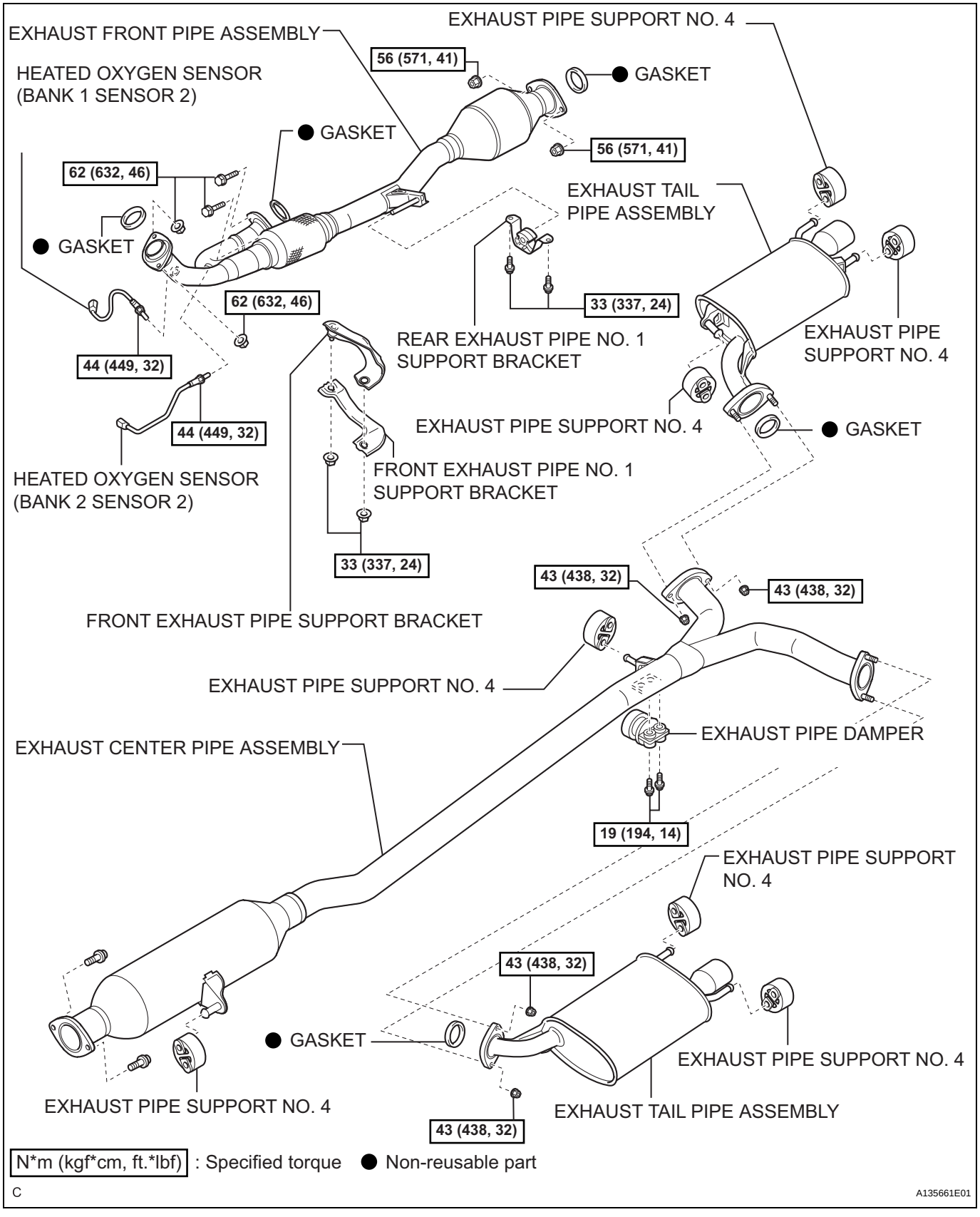
68. INSTALL OIL FILLER CAP SUB-ASSEMBLY

(a) Install a new gasket.
(b) Install the oil filler cap.

EM

EXHAUST PIPE

COMPONENTS

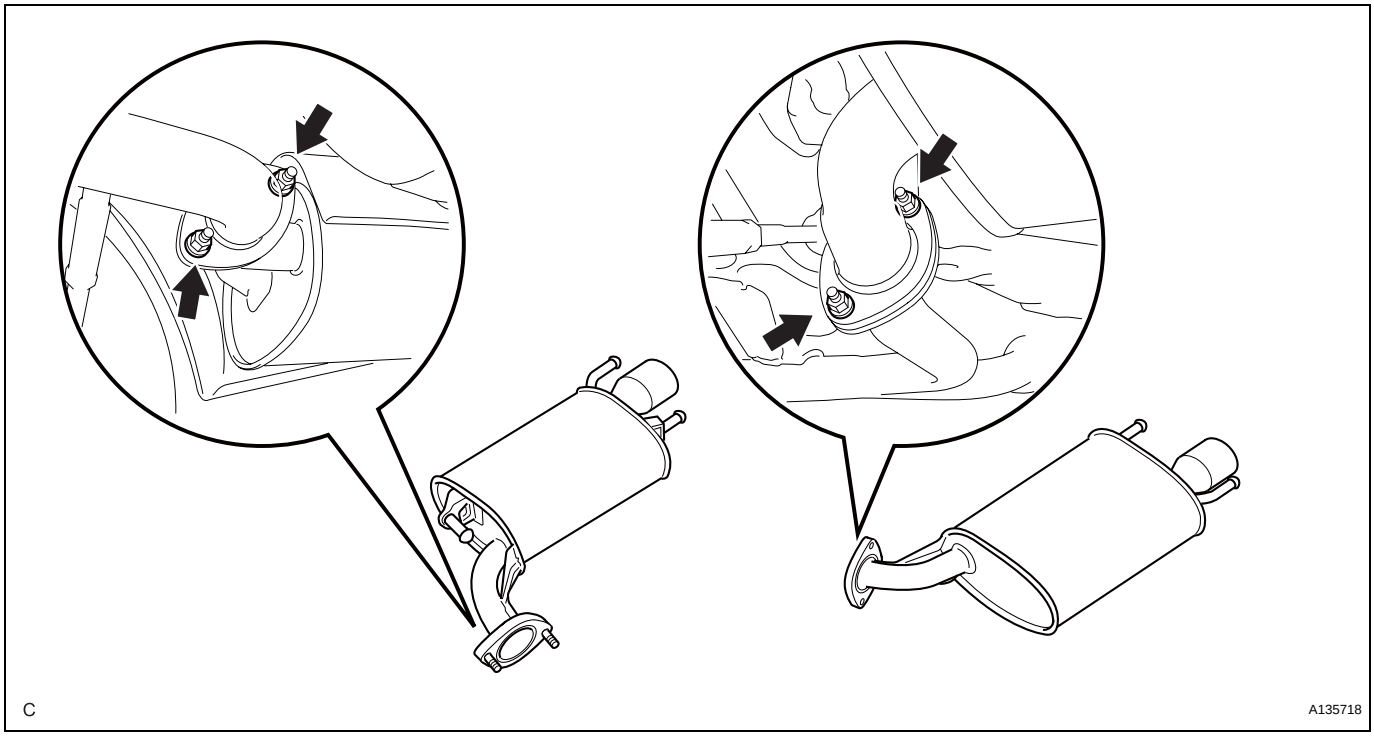


EX

REMOVAL

1. REMOVE EXHAUST TAIL PIPE ASSEMBLY

(a) Remove the 4 nuts and 2 exhaust tail pipes.

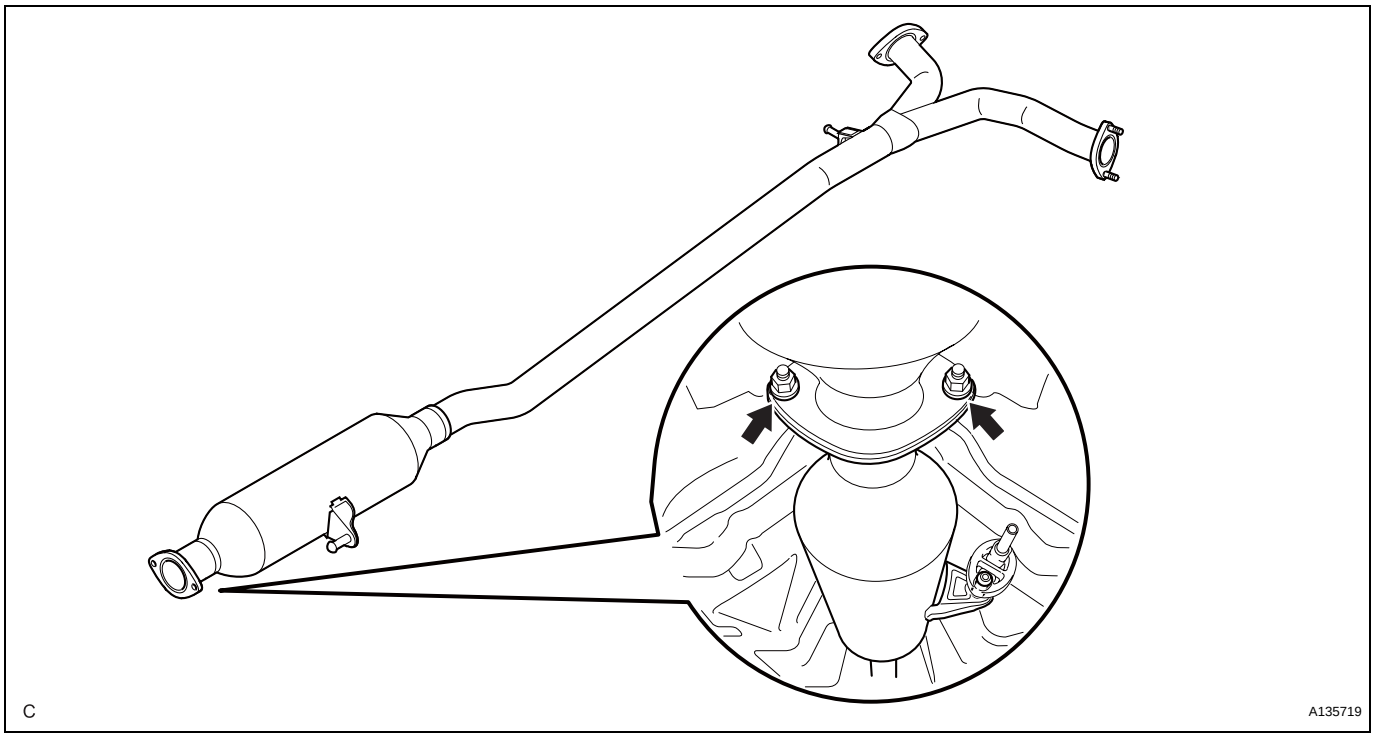


(b) Remove the 2 gaskets from the exhaust center pipe assembly.

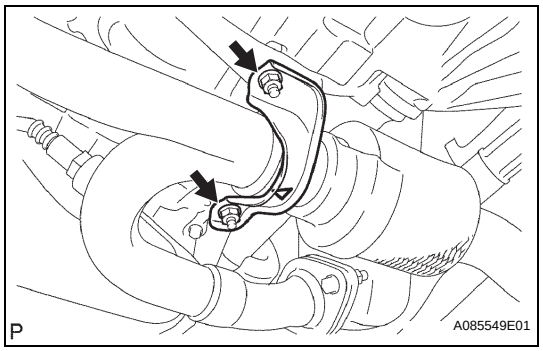
2. REMOVE EXHAUST CENTER PIPE ASSEMBLY

(a) Remove the 2 bolts, 2 nuts and exhaust center pipe assembly.

EX



(b) Remove the gasket from the exhaust pipe assembly.



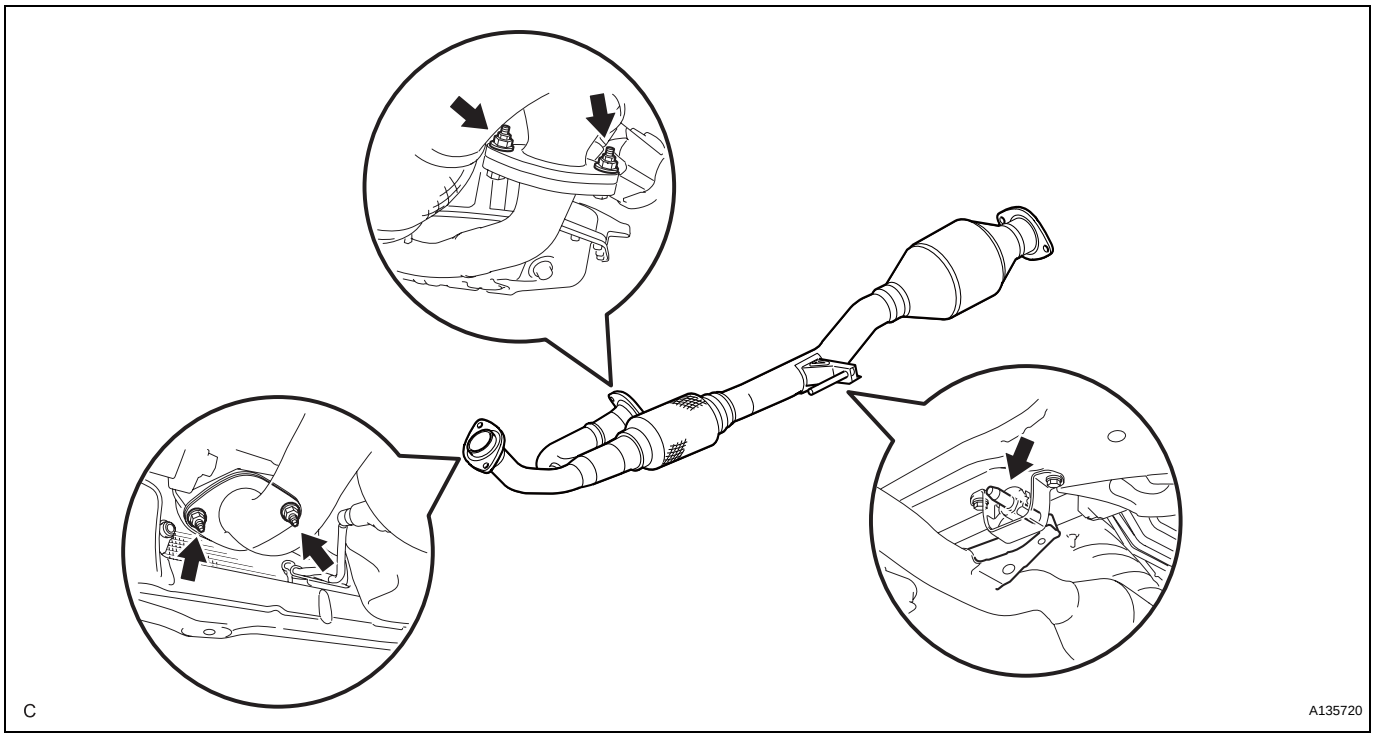
3. REMOVE FRONT EXHAUST PIPE NO. 1 SUPPORT BRACKET

(a) Remove the 2 nuts and front support brackets.

4. REMOVE EXHAUST FRONT PIPE ASSEMBLY

(a) Disconnect the 2 heated oxygen sensor (bank 1, 2 sensor 2) connectors.

(b) Remove the 2 nuts from the exhaust front pipe (left bank exhaust manifold side).

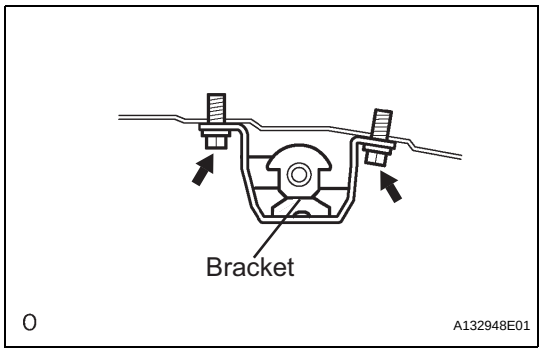


(c) Remove the 2 nuts from the exhaust front pipe (right bank exhaust pipe manifold side).

(d) Remove the exhaust front pipe.

(e) Remove the 2 gaskets from the exhaust front pipe.

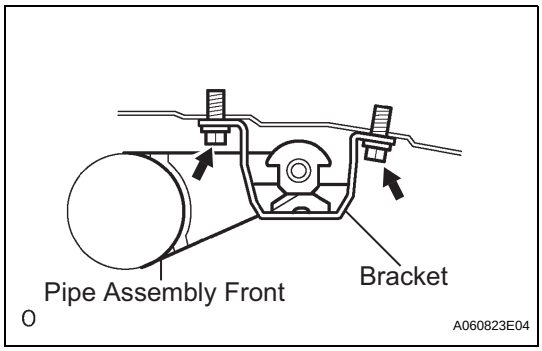
5. REMOVE HEATED OXYGEN SENSOR (See page EC-21)



6. REMOVE REAR EXHAUST PIPE NO. 1 SUPPORT BRACKET

(a) Remove the 2 bolts and rear support bracket.

EX

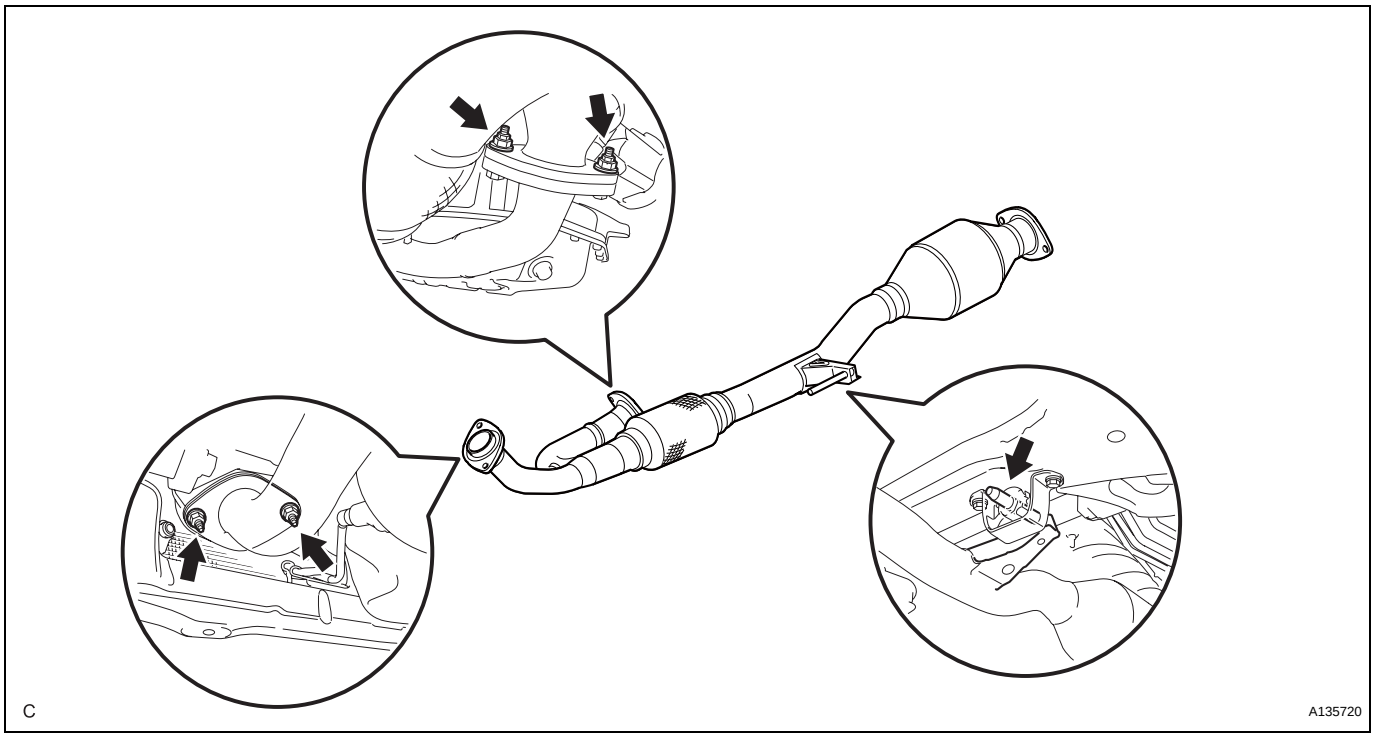


INSTALLATION

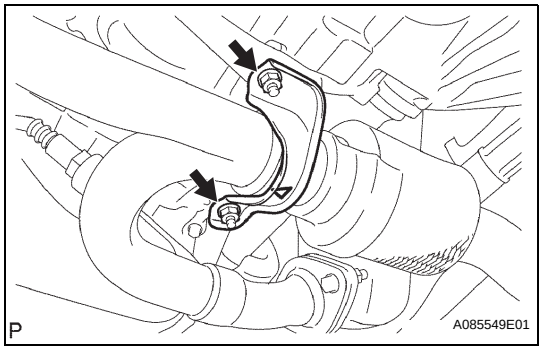
1. **INSTALL REAR EXHAUST PIPE NO. 1 SUPPORT BRACKET**
   (a) Install the rear support bracket with the 2 bolts.
   Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)
   NOTICE:
   Be sure to install the bracket in the correct direction.

2. **INSTALL HEATED OXYGEN SENSOR (See page EC-21)**

3. **INSTALL EXHAUST FRONT PIPE ASSEMBLY**
   (a) Install 2 new gaskets to the exhaust front pipe.
   (b) Install the exhaust front pipe to the exhaust manifolds with the 4 nuts.



Torque: 62 N*m (632 kgf*cm, 46 ft.*lbf)

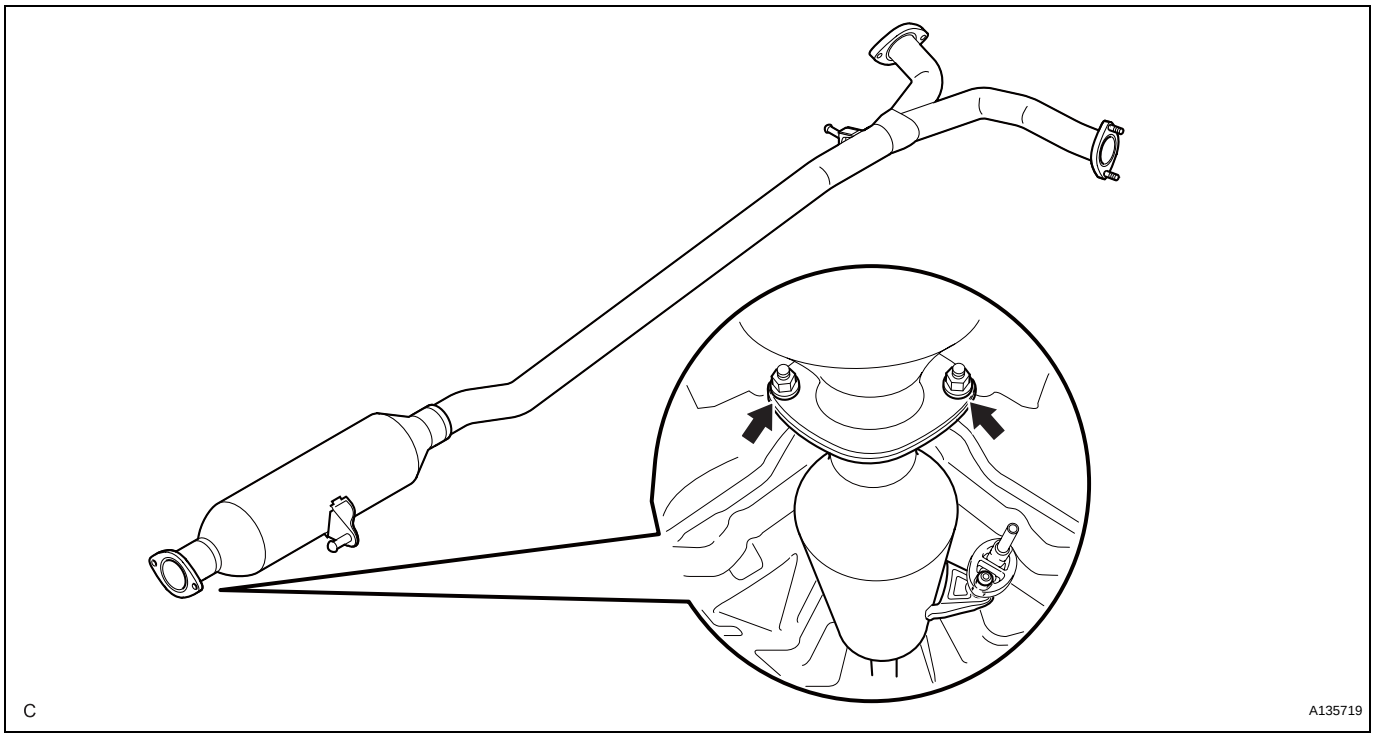


4. **INSTALL FRONT EXHAUST PIPE NO. 1 SUPPORT BRACKET**
   (a) Install the front support brackets with the 2 nuts.
   Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)
   NOTICE:
   Be sure to install the support brackets in the correct direction.

5. **INSTALL EXHAUST CENTER PIPE ASSEMBLY**
   (a) Install a new gasket to the exhaust center pipe assembly.

EX

(b) Install the exhaust center pipe to the exhaust front pipe with the 2 nuts and 2 bolts.

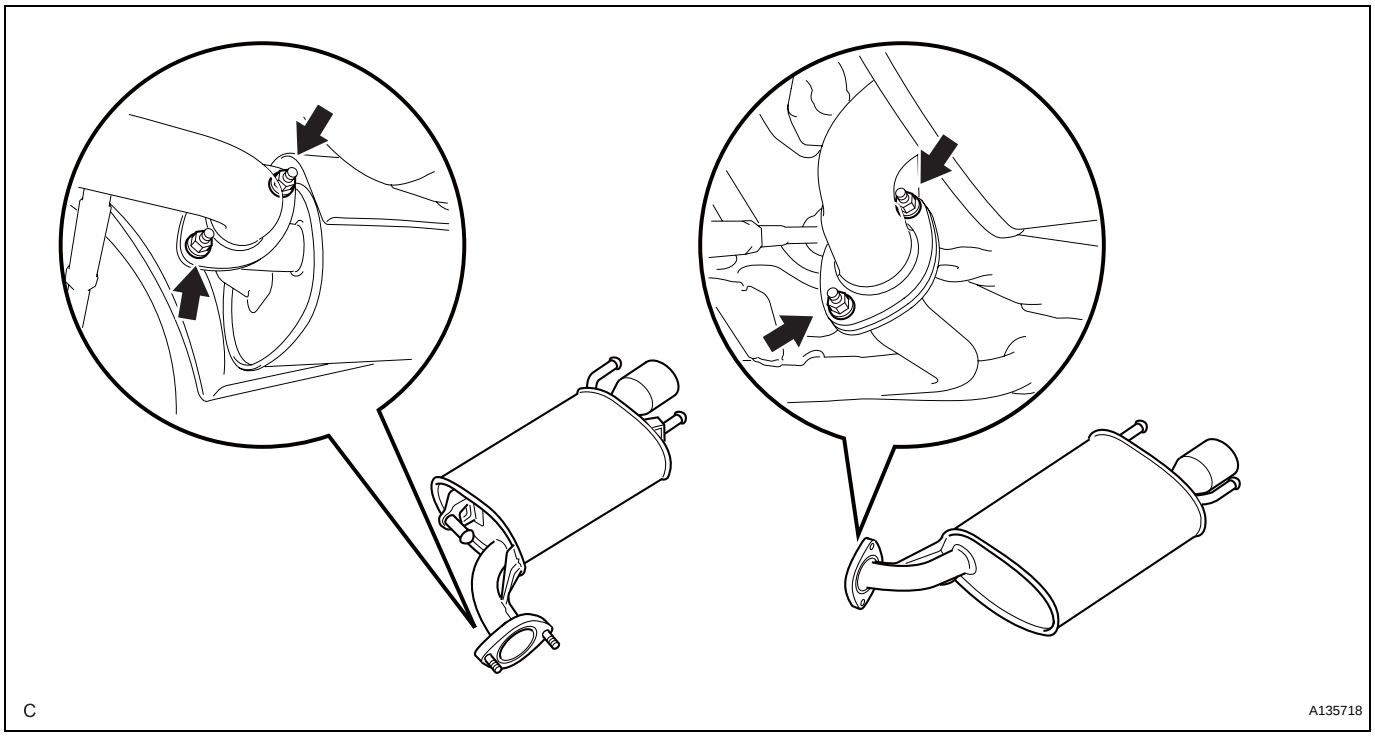


Torque: 56 N*m (571 kgf*cm, 41 ft.*lbf)

6. INSTALL EXHAUST TAIL PIPE ASSEMBLY

(a) Install 2 new gaskets to the exhaust tail pipes.

(b) Install the 2 exhaust tail pipes with the 4 nuts.



Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

7. CHECK FOR EXHAUST GAS LEAKS

If gas is leaking, tighten the areas necessary to stop the leak. Replace the damaged parts as necessary.

EX

FUEL SYSTEM

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

(a) The type of the ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this section.

Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition Switch off	LOCK	Off
	Ignition Switch on (IG)	ON	On (IG)
	Ignition Switch on (ACC)	ACC	On (ACC)
	Engine Start	START	Start

2. PRECAUTION

(a) Before inspecting and repairing the fuel system, disconnect the negative (-) battery terminal.

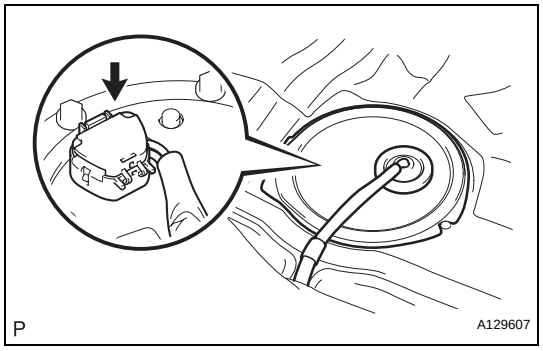
(b) Do not smoke or work near fire when handling the fuel system.

(c) Keep gasoline away from rubber or leather parts.

3. DISCHARGE FUEL SYSTEM PRESSURE

CAUTION:

- **Perform the following procedures to prevent fuel from spilling out before removing any fuel system parts.**
- **Pressure will still remain in the fuel line even after performing the following procedures. When disconnecting the fuel line, cover it with a shop rag or a piece of cloth to prevent fuel from spraying or coming out.**



(a) Disconnect the fuel pump connector.

(1) Remove the rear seat cushion assembly.

(2) Remove the rear floor service hole cover.

(3) Disconnect the fuel pump connector.

(4) Start the engine.

(5) After the engine stops, turn the ignition switch off.

HINT:

DTC P0171/25 (fuel problem) and/or P0191/49 (fuel pressure sensor signal error) may be detected.

(6) Crank the engine again. Check that the engine does not start.

(7) Remove the fuel tank cap to discharge pressure from the fuel tank.

(8) Disconnect the negative (-) battery terminal cable.

(9) Reconnect the fuel pump connector.

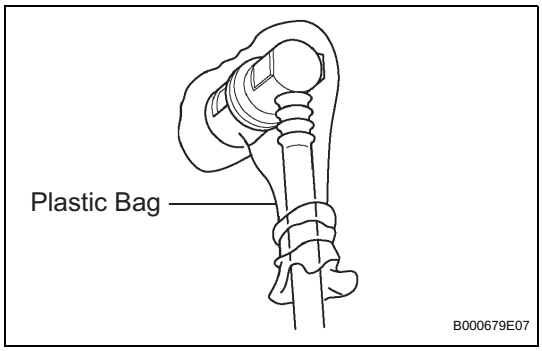
(10) Install the rear floor service hole cover.

(11) Install the rear seat.

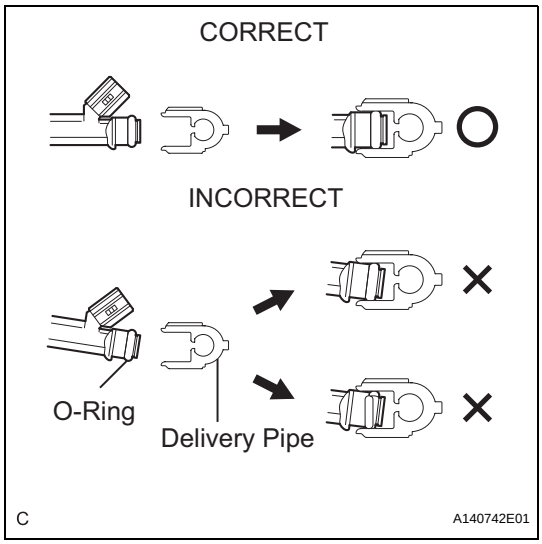
FU

4. FUEL SYSTEM

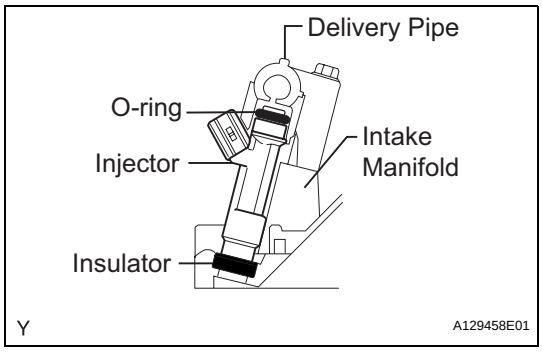
(a) When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe the following procedures:
(1) Discharge the fuel system pressure. (step 3)
(2) Disconnect the fuel pump tube (See page FU-27).
(3) Drain the fuel that remains inside the fuel pump tube.
(4) To protect the disconnected fuel pump tube from damage and contamination, cover it with a plastic bag.
(5) Put a container under the connection part.

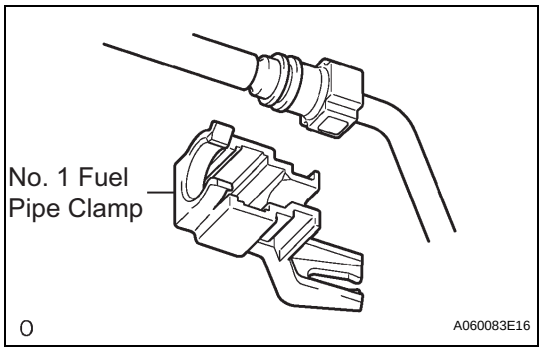


(b) Observe the following precautions when removing and installing the fuel injectors:
(1) Never reuse an O-ring.
(2) When placing a new O-ring on the injector, do not damage the O-ring.
(3) Coat a new O-ring with spindle oil or gasoline before installing it.
NOTICE:
Do not use engine oil, gear oil or brake fluid.

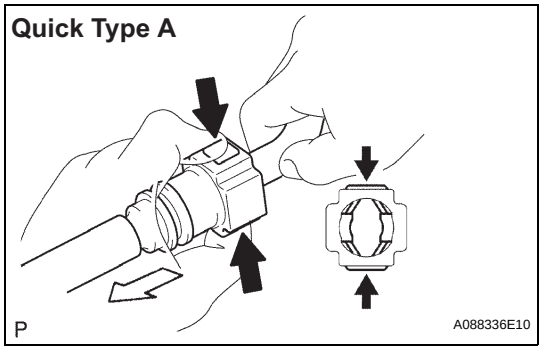


(c) Install the injector to the delivery pipe and lower intake manifold as shown in the illustration.
NOTICE:
Before installing the injector, be sure to apply grease or gasoline to the place where the delivery pipe or cylinder head contacts the O-ring of the injector.

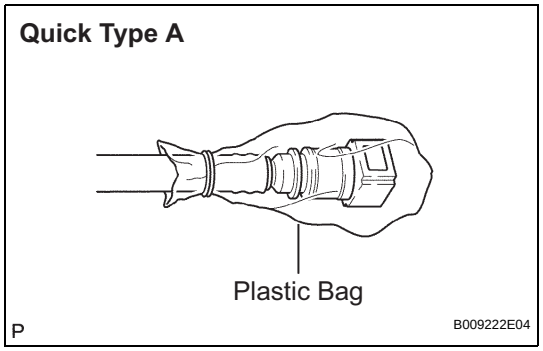




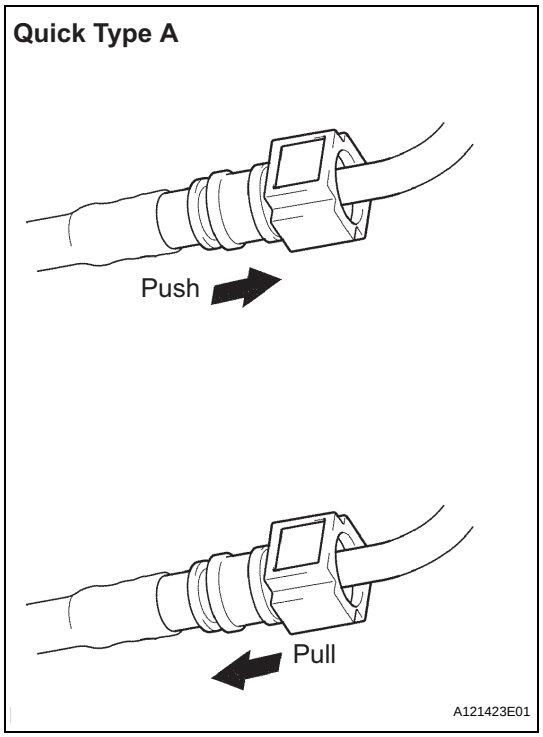
(d) Observe the following precautions when disconnecting the fuel tube connectors (Quick type A):
(1) Remove the No. 1 fuel pipe clamp.
(2) Check that there is no dirt or other foreign objects on the pipe and around the connector before disconnecting them. Clean them if necessary.



(3) Disconnect the connector from the pipe by hand.
(4) When the connector and the pipe are stuck, push in and pull on the connector to release it. Pull the connector out of the pipe carefully.
(5) Check that there is no dirt or other foreign objects on the sealing surface of the disconnected pipe. Clean it away if necessary.

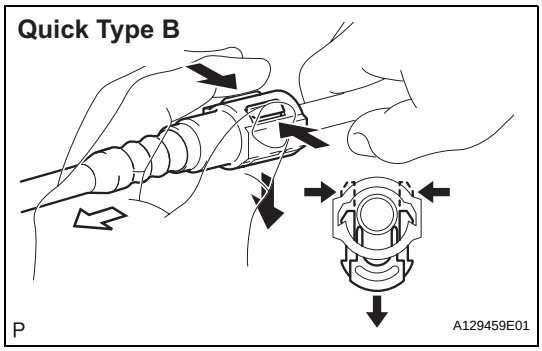


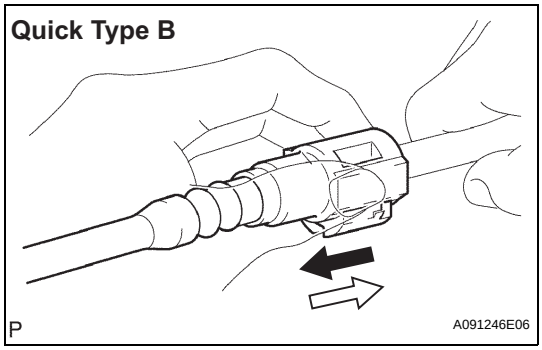
(6) Do not damage the disconnected pipe and connector, and prevent entry of foreign objects by covering them with a plastic bag.

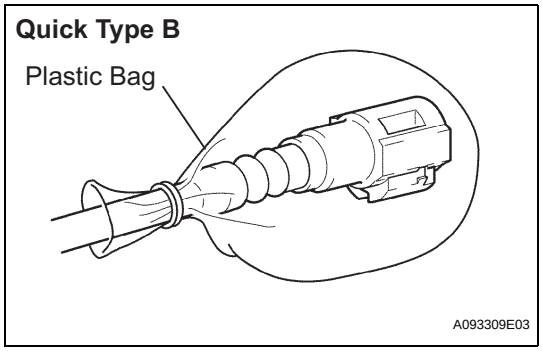


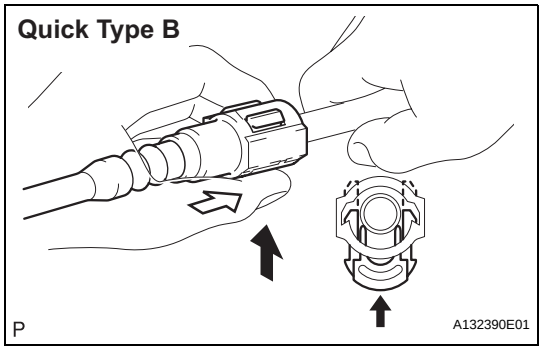
(e) Observe the following precautions when connecting the fuel tube connectors (Quick Type A):
(1) Check if there is any damage or foreign objects on the connecting parts of the pipes.
(2) Line up the two parts of the pipes to be connected, and push them together until the connector makes a "click" sound. If the pipe is difficult to push into the connector, apply a small amount of clean engine oil to the tip of the pipe and reinsert it.
(3) After connecting the pipes, check that the pipe and connector are securely connected by pulling on them.
(4) Check for fuel leaks.

FU









(f) Observe the following precautions when disconnecting the fuel tube connector (Quick type B):
(1) Before disconnecting the connector, clean off any dirt that may be present.
(2) Pinch the tabs of the fuel tube retainer to disengage the 2 claws. Push the retainer down as shown in the illustration.
HINT:
Be sure to disconnect the connector by hand.
(3) If the connector and pipe are stuck, hold the fuel pipe by hand, and push and pull on the connector. Pull the two pipes apart to separate the connector.
(4) If there is any dirt or any other foreign objects on the sealing surfaces of the disconnected pipes, clean them if necessary.
(5) Do not damage the disconnected pipe and connector, and prevent entry of foreign objects by covering them with a plastic bag.

(g) Observe the following precautions when connecting the fuel tube connector (Quick Type B):
(1) Line up the two parts of the pipes to be connected, and fully push the fuel tube connector and pipe together until they are fully seated. Next, push the retainer into the connector until its claws lock. If the pipe is difficult to push in to the connector, apply a small amount of clean engine oil to the tip of the pipe and reinsert it.
(2) After connecting the pipes, check that the pipe and connector are securely connected by pulling on them.
(3) Check for fuel leaks.
(h) Observe the following precautions when handling a nylon tube:
CAUTION:
- **Do not twist the connection part of the nylon tube and the quick connector when connecting them.**
- **Do not bend or twist the nylon tube.**

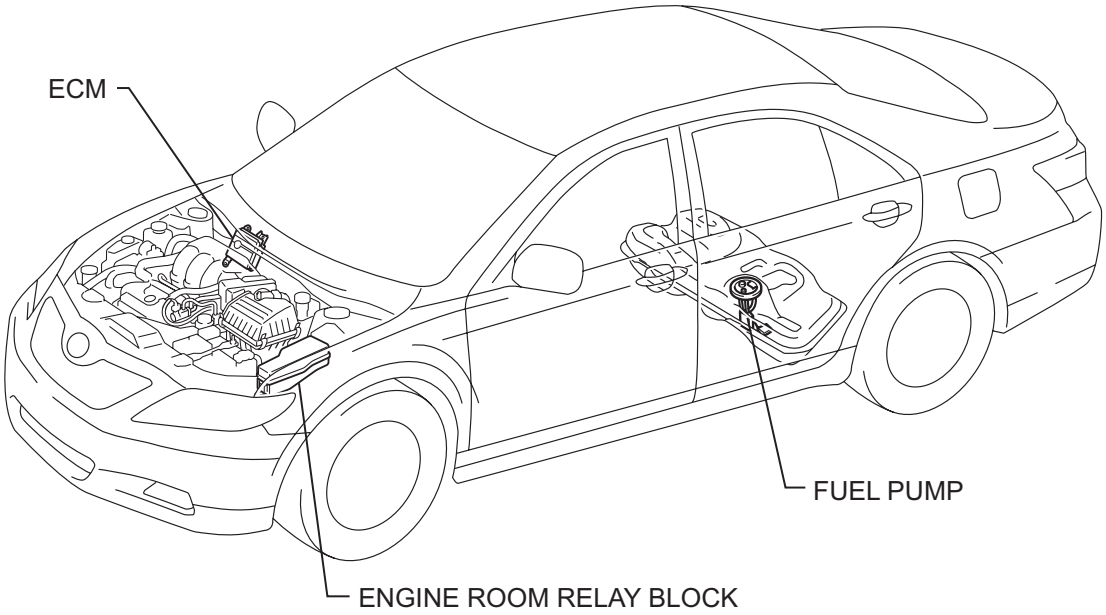
FU

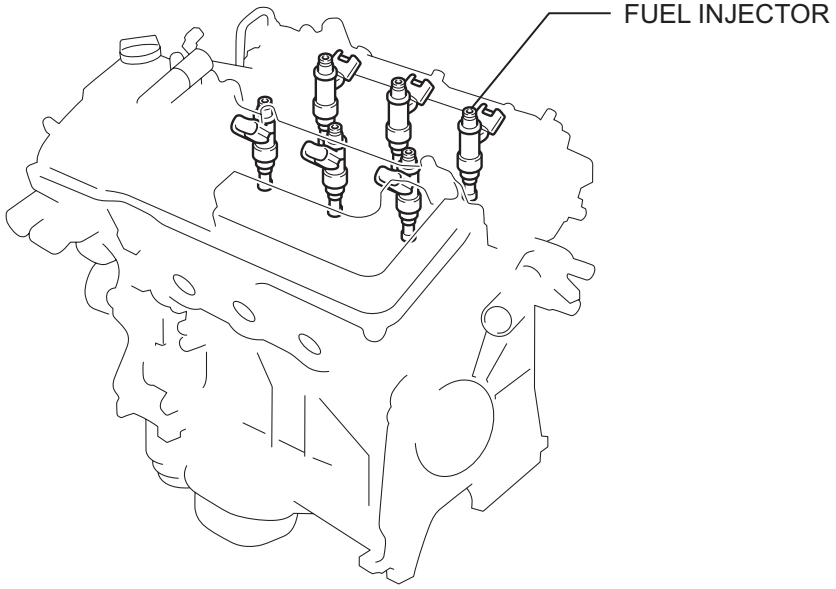
- **Do not remove the EPDM protector on the outside of the nylon tube.**
- **Do not close the piping by bending the nylon tube.**

5. CHECK FOR FUEL LEAKS

(a) Check that there are no fuel leaks from the fuel system after doing any maintenance or repairs (See page FU-8).

PARTS LOCATION





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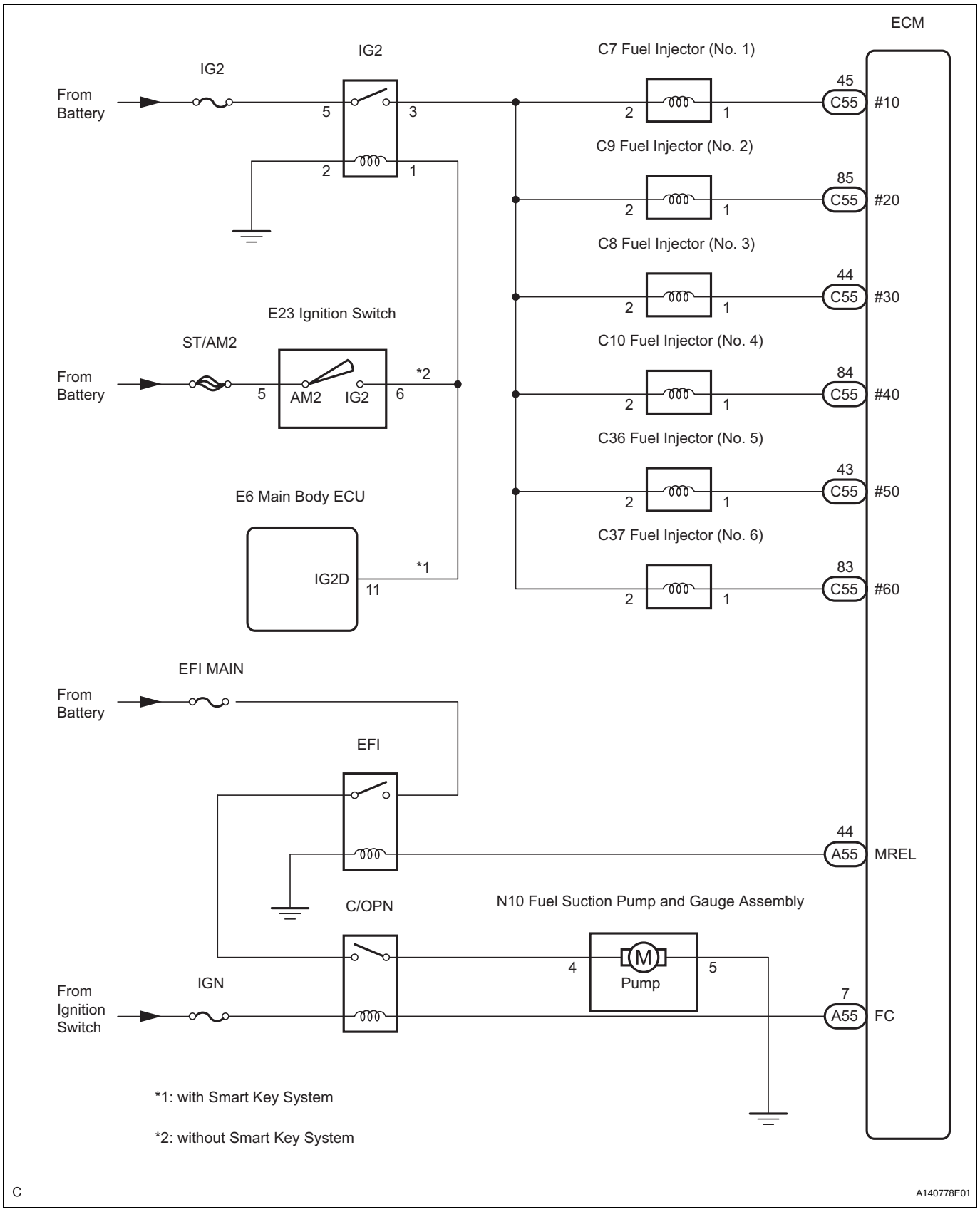
SYSTEM DIAGRAM



FU

ON-VEHICLE INSPECTION

1. CHECK FOR FUEL PUMP OPERATION AND FUEL LEAKS

(a) Check fuel pump operation.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch on (IG) and push the intelligent tester main switch on.
  NOTICE:
  Do not start the engine.
  (3) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.
  (4) Check for pressure in the fuel inlet tube from the fuel line. Check that sound of fuel flowing in the fuel tank can be heard. If no sound can be heard, check the integration relay, fuel pump, ECM and wiring connector.

(b) Check for fuel leaks.
  (1) Check that there are no fuel leaks anywhere on the system after performing maintenance. If there is a fuel leak, repair or replace parts as necessary.

(c) Turn the ignition switch off.

(d) Disconnect the intelligent tester from the DLC3.

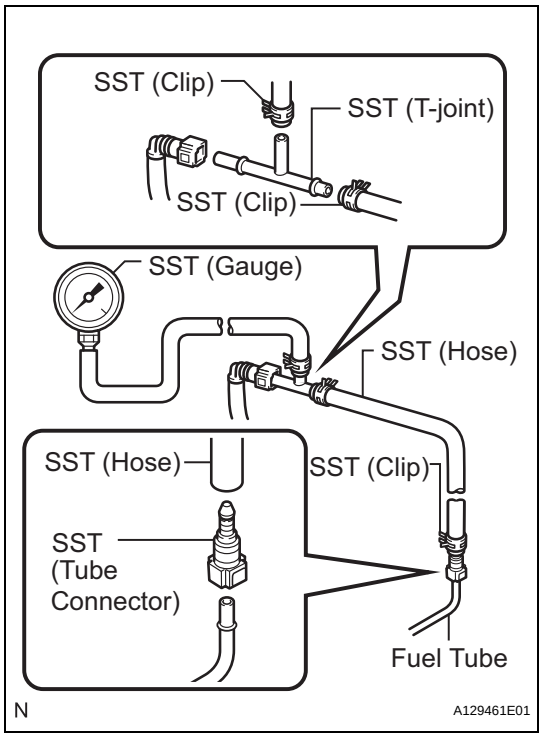
2. CHECK FUEL PRESSURE

(a) Discharge the fuel system pressure (See page FU-1).

(b) Using a voltmeter, measure the battery voltage.
  Standard voltage:
  11 to 14 V

(c) Disconnect the negative (-) battery terminal.

(d) Disconnect the fuel hose from the fuel main tube (See page FU-1).



(e) Install SST (pressure gauge) using SST and a fuel tube connector as shown in the illustration.
SST 09268-31011 (09268-41500, 90467-13001, 95336-08070), 09268-45014 (09268-41200, 09268-41220, 09268-41250)

(f) Wipe up any gasoline.

(g) Connect the negative (-) battery terminal.

(h) Connect the intelligent tester to the DLC3.

(i) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.

(j) Measure the fuel pressure.
Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf*cm^2, 44.1 to 49.7 psi)

- If the fuel pressure is greater than the standard value, replace the fuel pressure regulator.
- If the fuel pressure is less than the standard value, check the fuel hoses and connections, fuel pump, fuel filter and fuel pressure regulator.

(k) Disconnect the intelligent tester from the DLC3.

(l) Start the engine.

(m) Measure the fuel pressure at idle.
Fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf*cm^2, 44.1 to 49.7 psi)

(n) Stop the engine.

(o) Check that the fuel pressure remains as specified for 5 minutes after the engine stops.
Fuel pressure:

147 kPa (1.5 kgf*cm^2, 21 psi) or more

If the fuel pressure is not as specified, check the fuel pump, pressure regulator and/or fuel injectors.

(p) After checking the fuel pressure, carefully disconnect the negative (-) battery cable, and remove the SST and fuel tube connector to prevent gasoline from splashing.

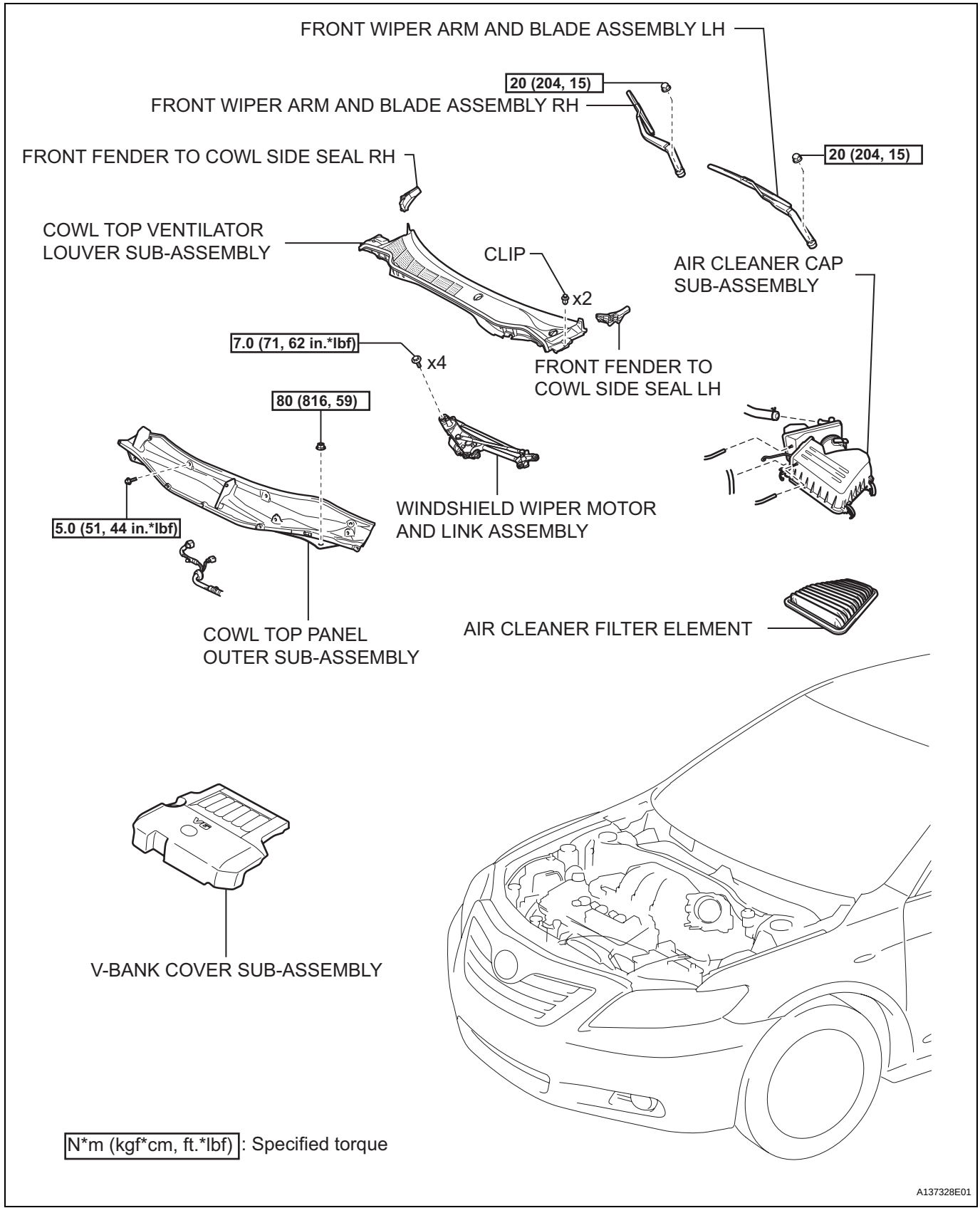
(q) Reconnect the fuel tube to the main fuel tube (fuel tube connector).

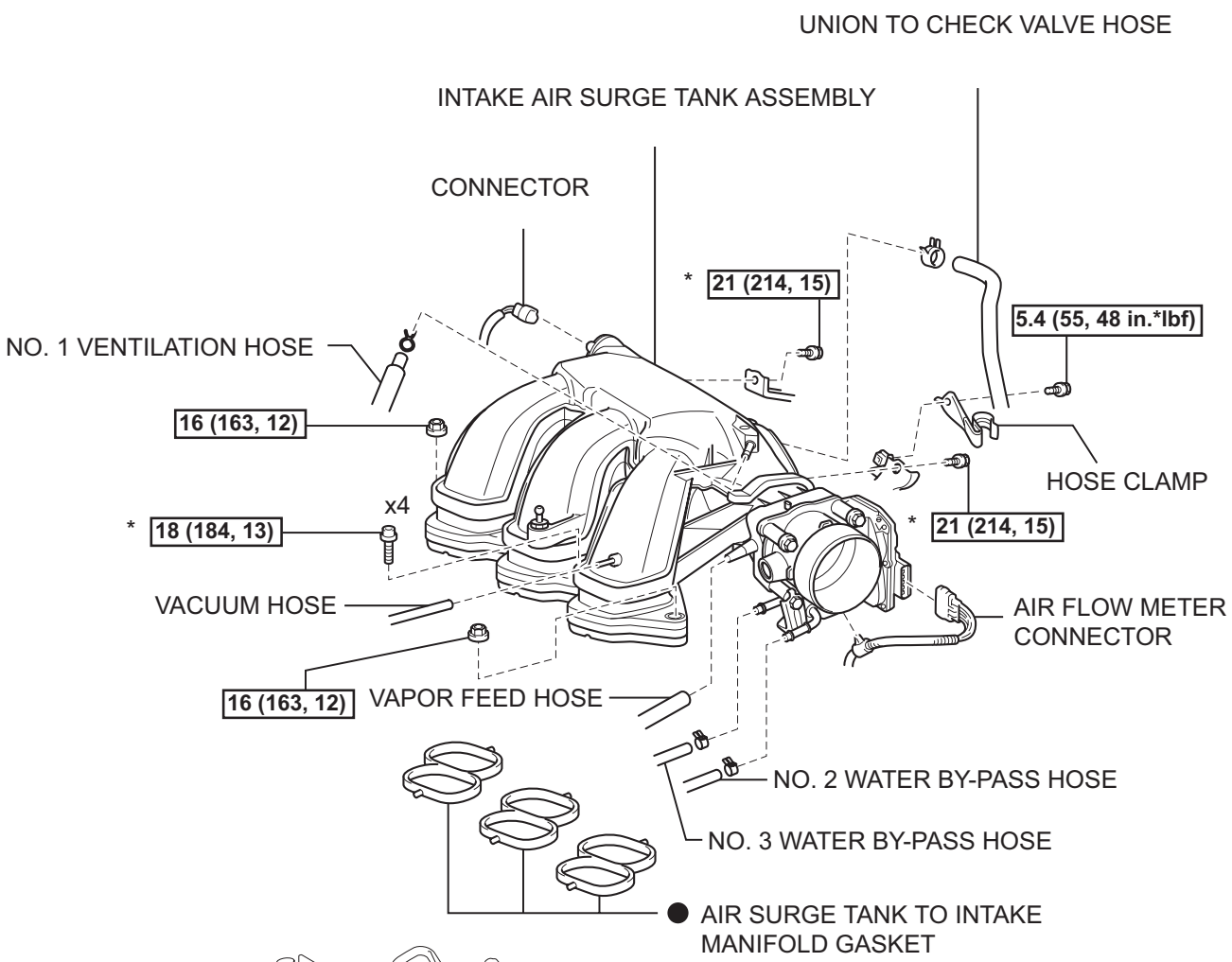
(r) Install the No. 1 fuel pipe clamp to the fuel tube connector.

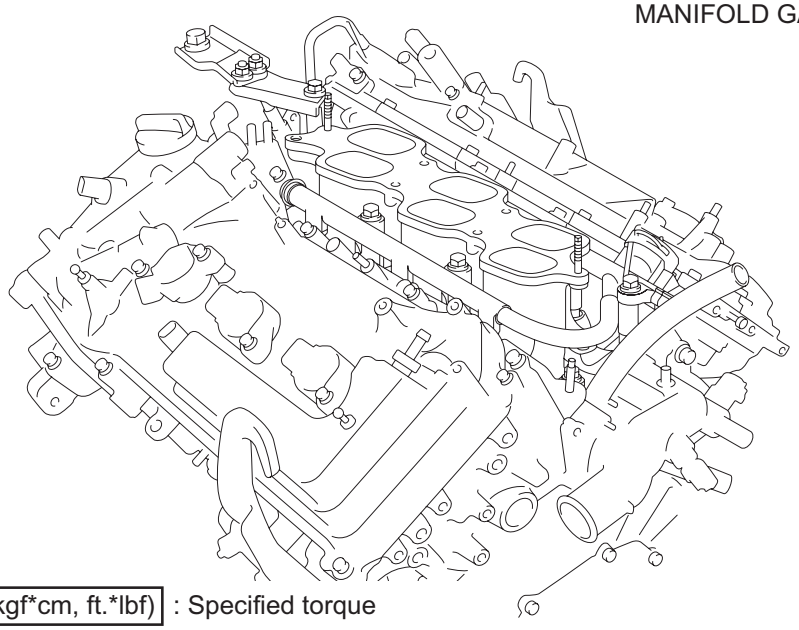
(s) Check for fuel leaks (step 1).

FUEL INJECTOR

COMPONENTS







N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

* DO NOT apply oil

C

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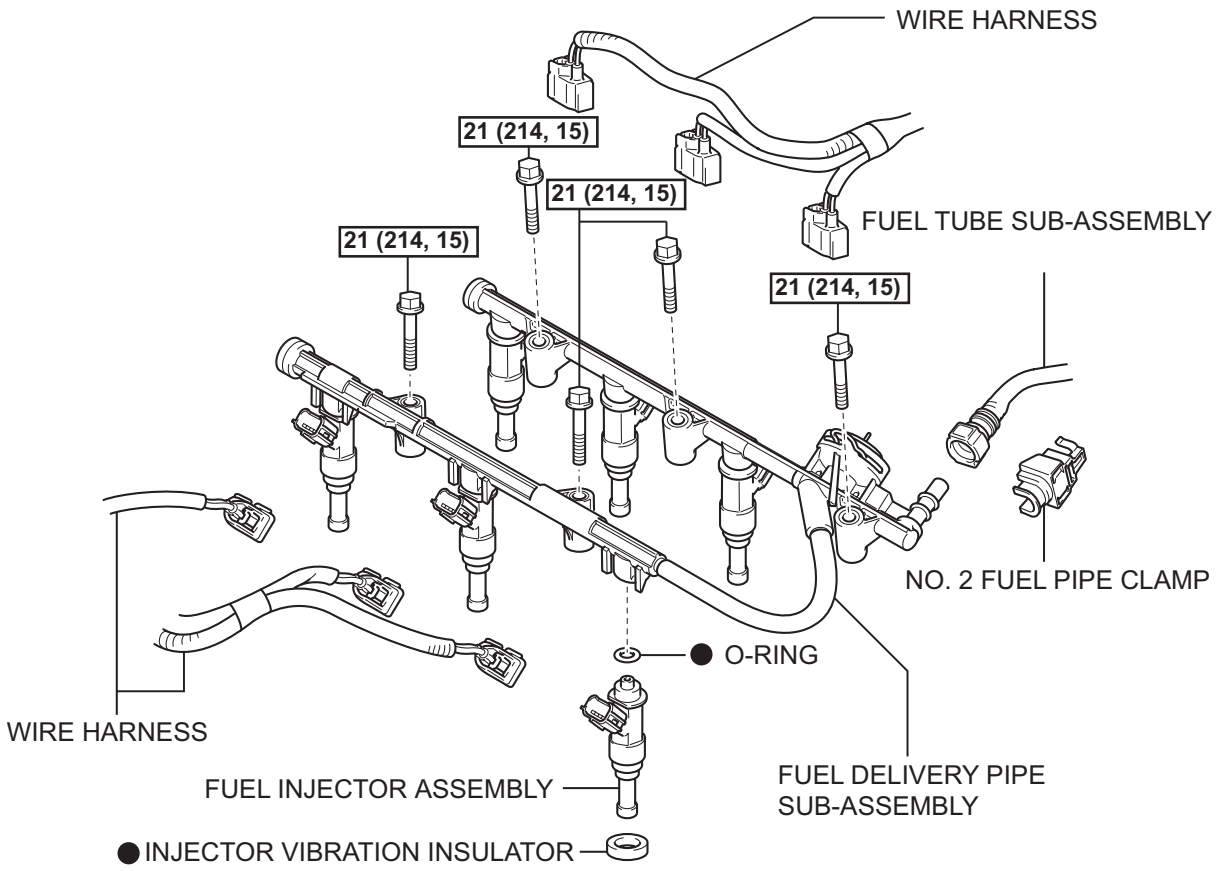
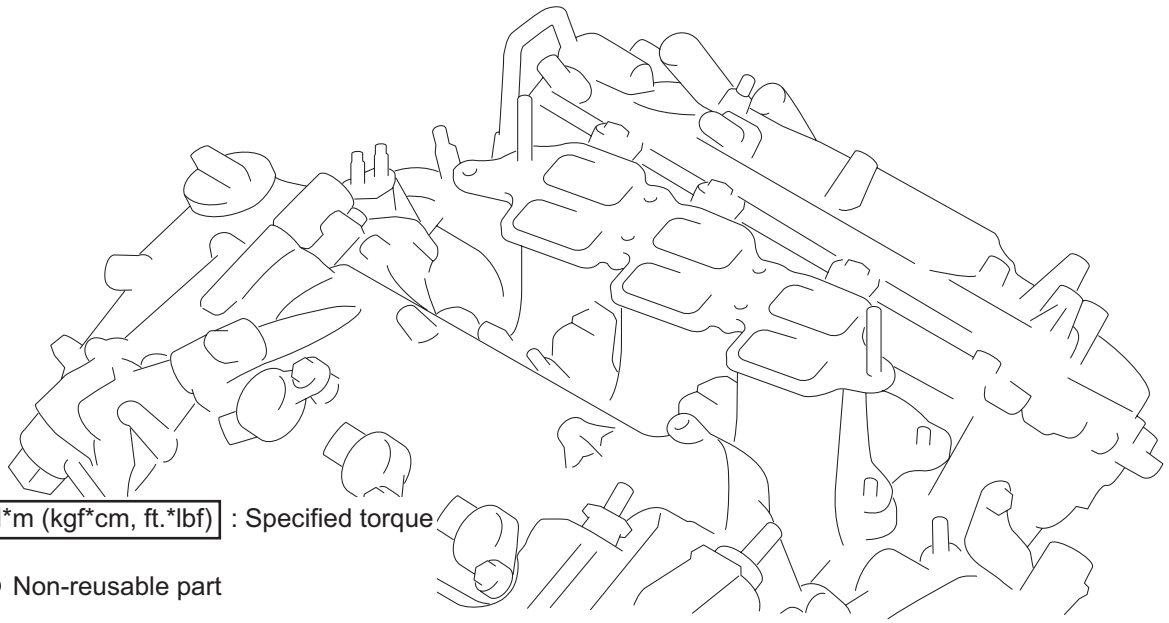
FU





N*m (kgf*cm, ft.*lbf) : Specified torque

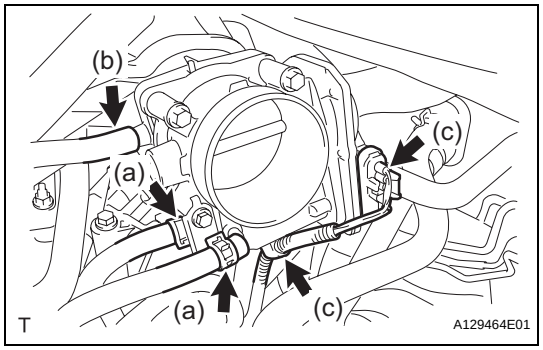
● Non-reusable part

Y

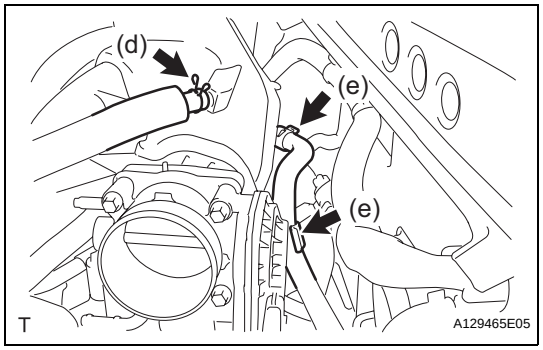
A114552E03

REMOVAL

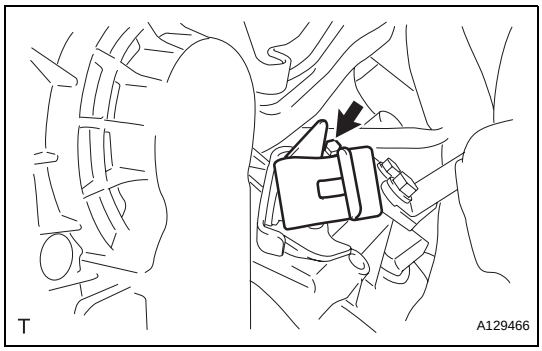
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **DRAIN ENGINE COOLANT (See page CO-5)**
4. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
5. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
6. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
8. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
9. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
10. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-481)**
11. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
12. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
13. **REMOVE INTAKE AIR SURGE TANK ASSEMBLY**
    (a) Disconnect the 2 water by-pass hoses from the throttle with motor body assembly.
    (b) Disconnect the vapor feed hose.
    (c) Disconnect the throttle with motor body assembly connector and clamp.



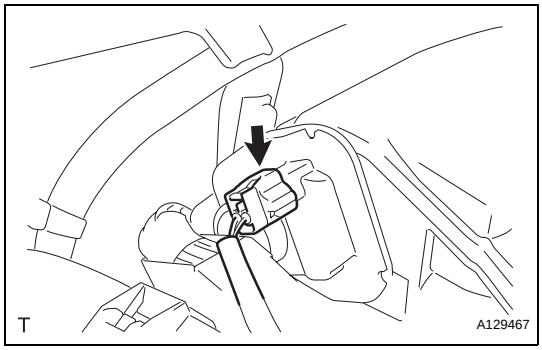
(d) Disconnect the No. 1 ventilation hose.
(e) Disconnect the union to check valve hose.



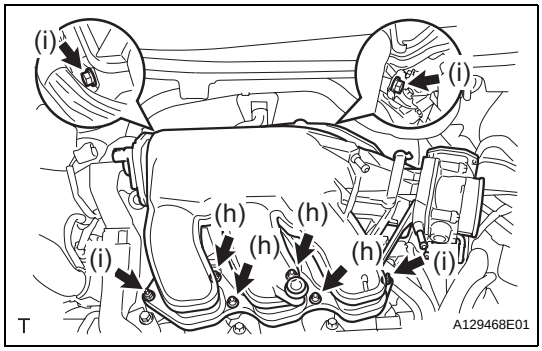
FU



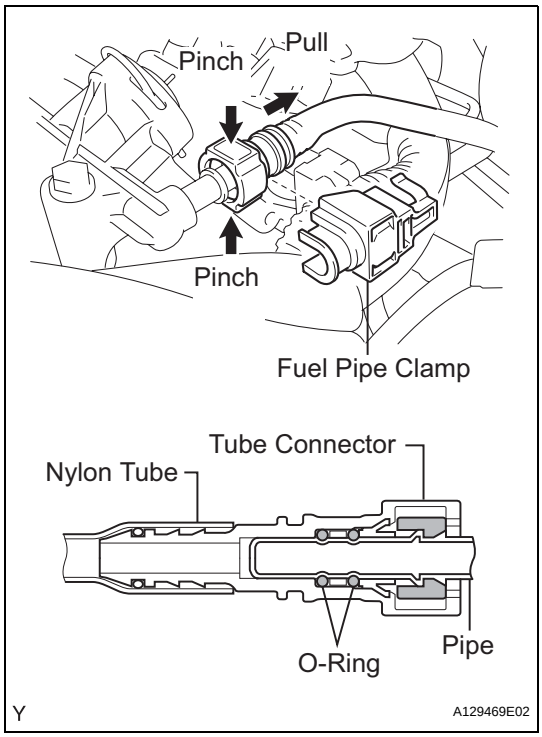
(f) Remove the bolt and vacuum hose clamp.



(g) Disconnect the connector.



(h) Using a 5 mm socket hexagon wrench, remove the 4 bolts.
(i) Remove the 2 nuts, 2 bolts and intake air surge tank.
(j) Remove the gasket from the intake air surge tank.

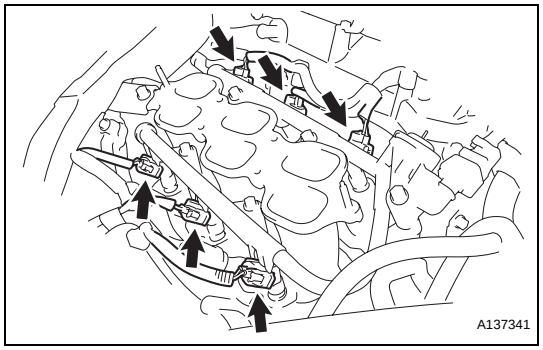


14. DISCONNECT FUEL TUBE SUB-ASSEMBLY

(a) Remove the No. 2 fuel pipe clamp.
(b) Pinch the tube connector and then pull out the fuel pipe.

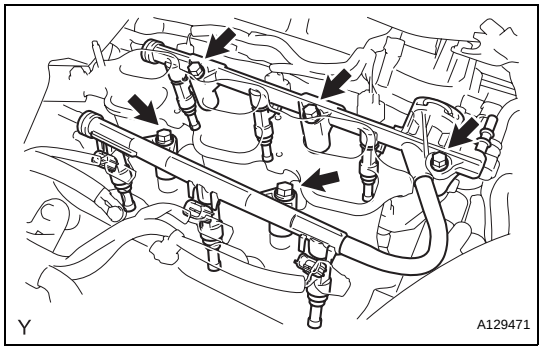
NOTICE:

- **Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector as necessary.**
- **It is necessary to prevent mud or dirt from entering the quick connector. If mud enters the connector, the O-rings may not seal properly.**
- **Remove the quick connector by hand.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**
- **If the pipe and the connector are stuck, try wiggling or pushing and pulling the connector to release it and pull the connector off of the pipe carefully.**



15. REMOVE FUEL INJECTOR ASSEMBLY

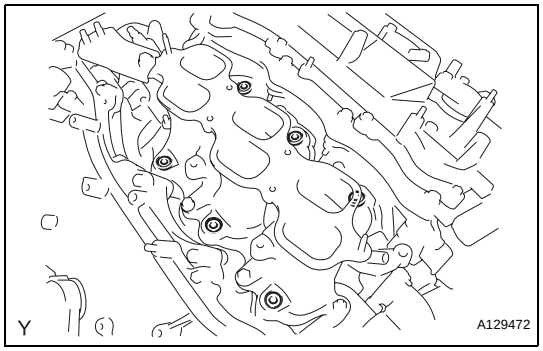
(a) Disconnect the 6 fuel injector connectors.



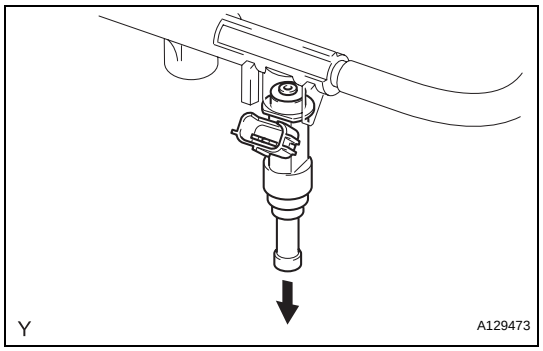
(b) Remove the 5 bolts and fuel delivery pipe together with the 6 fuel injectors.

NOTICE:

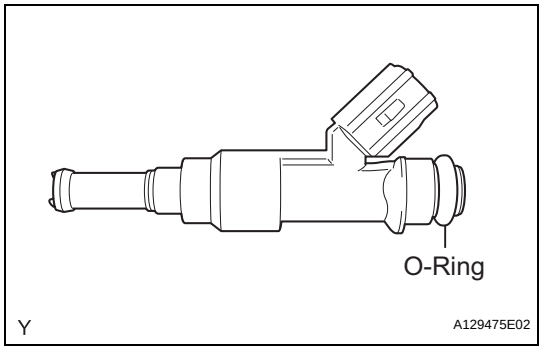
Be careful not to drop the fuel injectors when removing the fuel delivery pipe.



(c) Remove the 6 insulators from the intake manifold.



(d) Pull out the fuel injectors from the fuel delivery pipe.



(e) Remove the 6 O-rings from the injectors.

INSPECTION

1. INSPECT FUEL INJECTOR ASSEMBLY

(a) Inspect injector resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

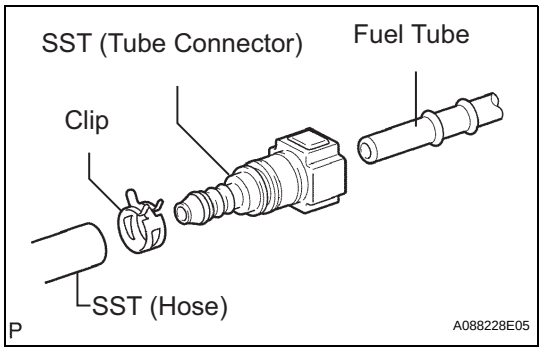
11.6 to 12.4 Ω at 20°C (68°F)

If the resistance is not as specified, replace the injector.

(b) Inspect the injection volume.

CAUTION:

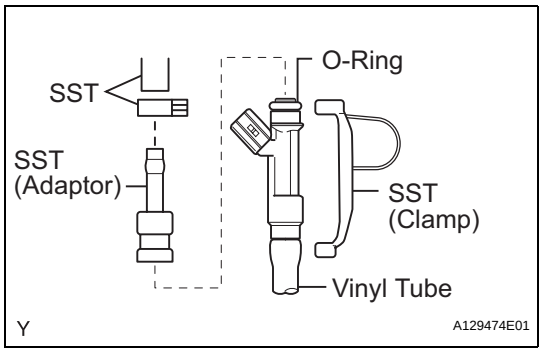
This test involves high-pressure fuel and electricity. Take every precaution regarding safe handling of both the fuel and the electricity. Perform this test in a safe area, and avoid any sparks or flames. Do not smoke.



(1) Install the fuel tube connector to SST (hose), then connect the tube connector to the fuel pipe (vehicle side).

SST 09268-31011 (09268-41500, 90467-13001, 95336-08070)

(2) Install the O-ring to the fuel injector.



(3) Connect SST (adaptor and hose) to the injector, and hold the injector and union with SST (clamp).

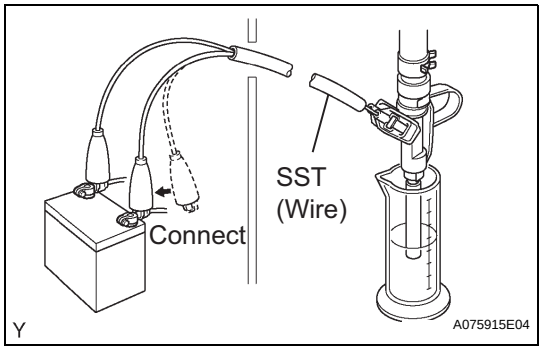
SST 09268-31011 (90467-13001, 95336-08070), 09268-41140, 09268-41400

(4) Put the injector into the graduated cylinder.

CAUTION:

Install a suitable vinyl tube onto the injector to contain gasoline spray.

(5) Operate the fuel pump (See page FU-8).



(6) Connect SST (wire) to the injector and the battery for 15 seconds, and measure the injection volume with the graduated cylinder. Test each injector 2 or 3 times.

SST 09842-30080

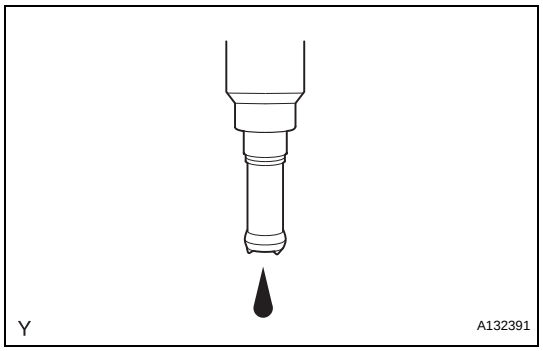
Volume:

84 to 100 cm^3 (5.1 to 6.0 cu in.) in 15 seconds

Difference between each injector:

16 cm^3 (0.98 cu in.) or less

If the injection volume is not as specified, replace the injector.

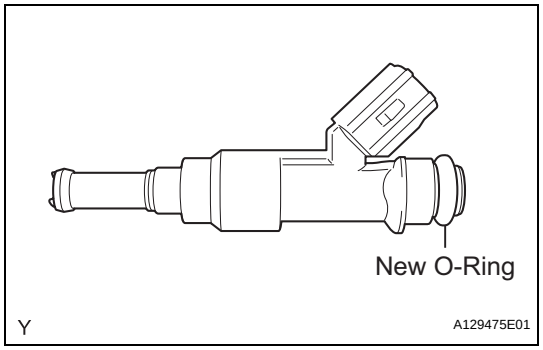


(c) Check for leakage.
(1) In the condition above, disconnect the tester probes of SST (wire) from the battery and check for fuel leakage from the injector.
Fuel drop:
1 drop or less in 16 minutes

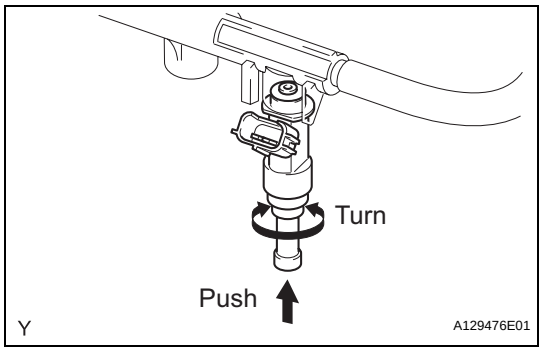
INSTALLATION

1. INSTALL FUEL INJECTOR ASSEMBLY

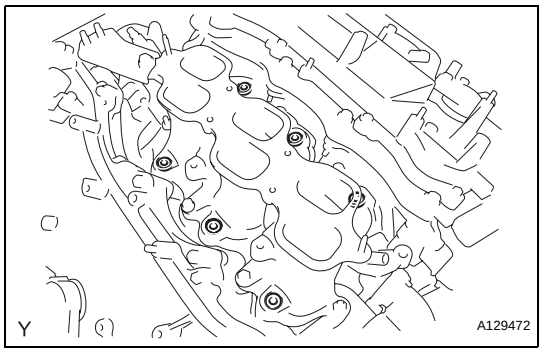
(a) Apply a light coat of spindle oil or gasoline to new O-rings, and install them to each injector.



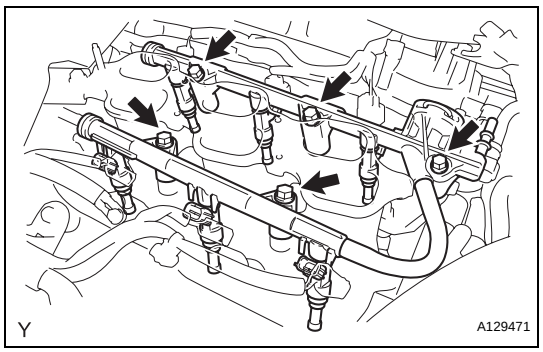
(b) Apply a light coat of spindle oil or gasoline where the fuel delivery pipe contacts the O-ring.
(c) Push the fuel injector while turning it to install the injector in the fuel delivery pipe.
(d) Position the fuel injector connector outward.
NOTICE:
- **Be careful not to twist the O-ring.**
- **After installing the fuel injector, check that it turns smoothly. If not, reinstall it with a new O-ring.**



(e) Install 6 new insulators to the intake manifold.

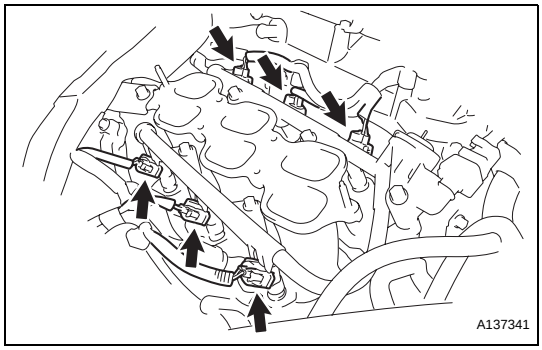


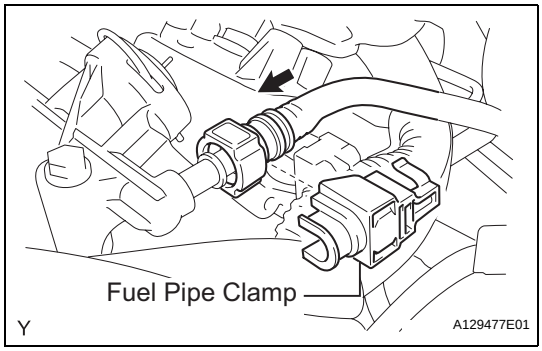
(f) Place the fuel delivery pipe and the 6 fuel injectors together to the intake manifold.
NOTICE:
Be careful not to drop the fuel injectors when installing the fuel delivery pipe.
(g) Temporarily install the 5 bolts which are used to hold the fuel delivery pipe to the intake manifold.
NOTICE:
After installing the fuel injector, check that it turns smoothly. If not, reinstall it with a new O-ring.



(h) Tighten the 5 bolts which are used to hold the fuel delivery pipe to the intake manifold.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

(i) Connect the 6 fuel injector connectors.





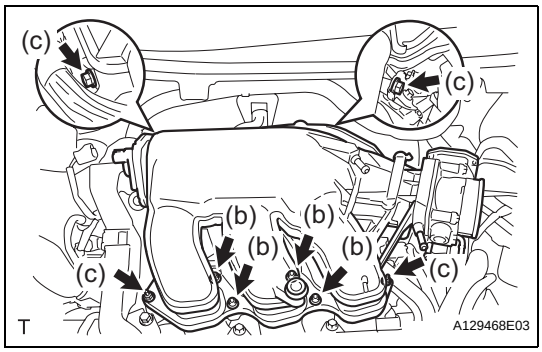
2. CONNECT FUEL TUBE SUB-ASSEMBLY

(a) Push in the tube connector to the pipe until the tube connector makes a "click" sound.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**
- **After connecting, check if the fuel tube connector and the pipe are securely connected by pulling on them.**

(b) Install the No. 2 fuel pipe clamp.

3. INSTALL INTAKE AIR SURGE TANK ASSEMBLY
NOTICE:
DO NOT apply oil to the bolts as listed below

Tightening Parts	Torque N*m (kgf*cm, ft.*lbf)	QTY
Surge Tank and Intake Manifold	18 (184, 13)	4
No. 1 Surge Tank Stay and Surge Tank	21 (214, 15)	1
Throttle Body Bracket and Surge Tank	21 (214, 15)	1

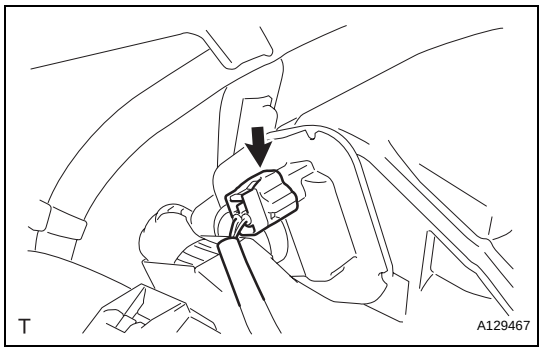


(a) Install a new gasket to the intake air surge tank.

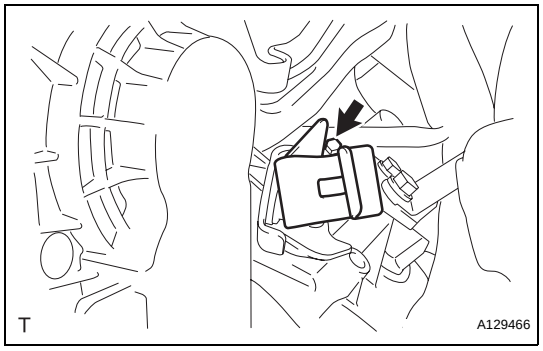
(b) Using a 5 mm hexagon socket wrench, install the 4 bolts.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

(c) Install the intake air surge tank with the 2 nuts and 2 bolts.
Torque: Nut
16 N*m (163 kgf*cm, 12 ft.*lbf)
Bolt
21 N*m (214 kgf*cm, 15 ft.*lbf)

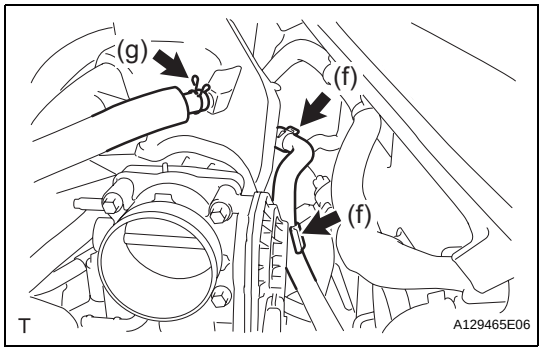
FU



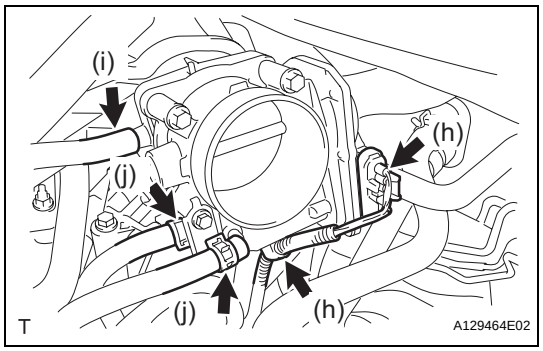
(d) Connect the connector.



(e) Install the vacuum hose clamp with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



(f) Connect the union to check valve hose.
(g) Connect the No. 1 ventilation hose.



(h) Install the clamp and connect the throttle with motor body assembly connector.
(i) Connect the vapor feed hose.
(j) Connect the 2 water by-pass hoses to the throttle with motor body assembly.

4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
5. **ADD ENGINE COOLANT (See page CO-6)**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
8. **CHECK FOR FUEL LEAKS (See page FU-8)**
9. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)**
10. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-14)**

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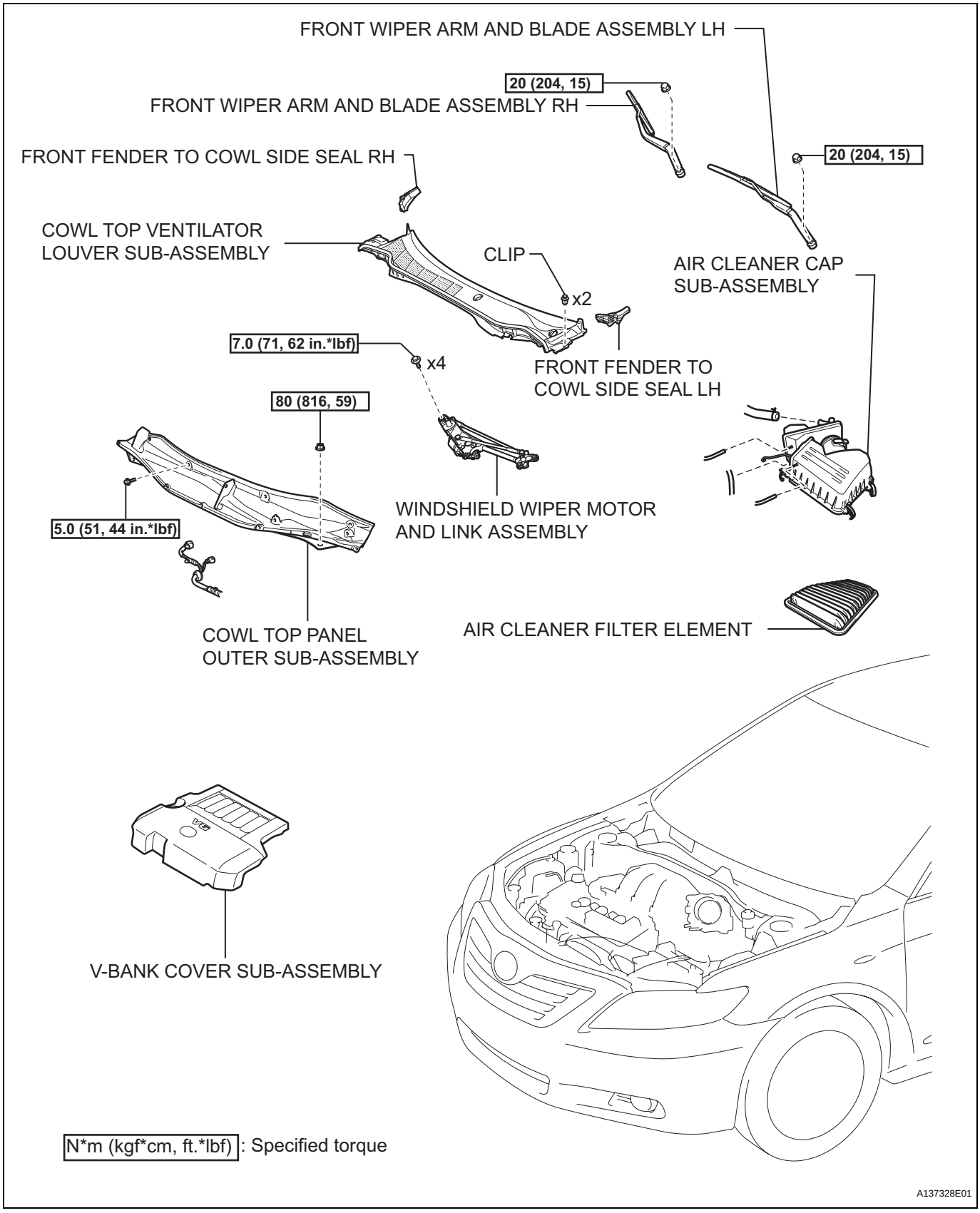
11. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)**
12. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
13. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
14. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**
15. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**
16. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**

FUEL PRESSURE PULSATION DAMPER

COMPONENTS



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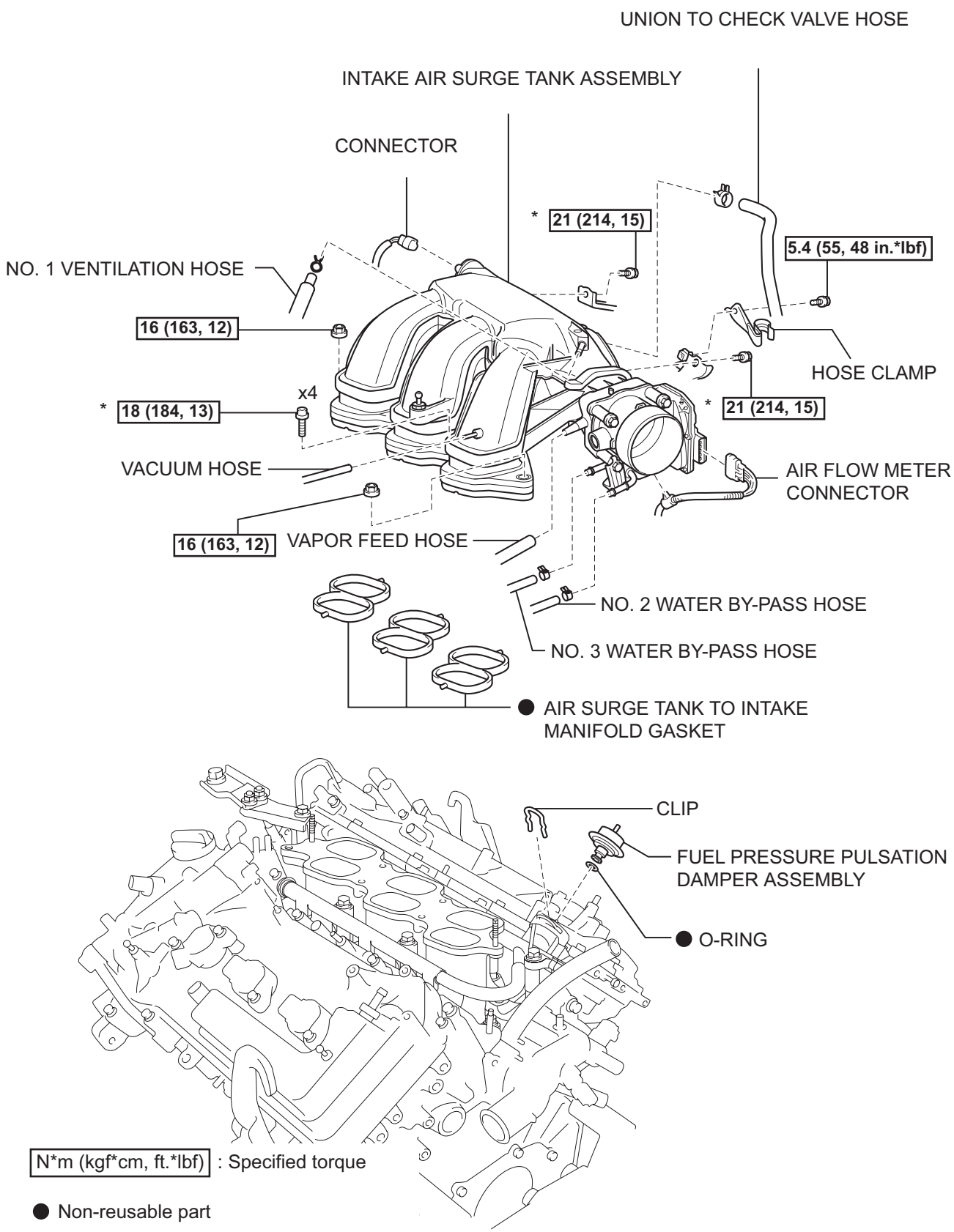

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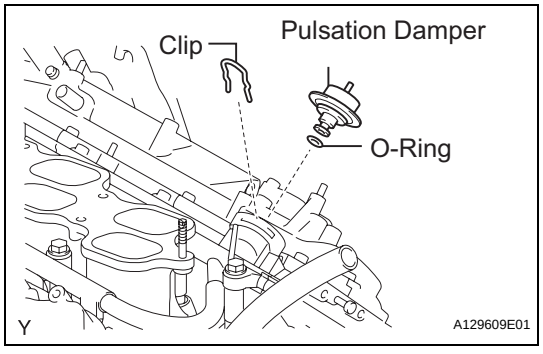
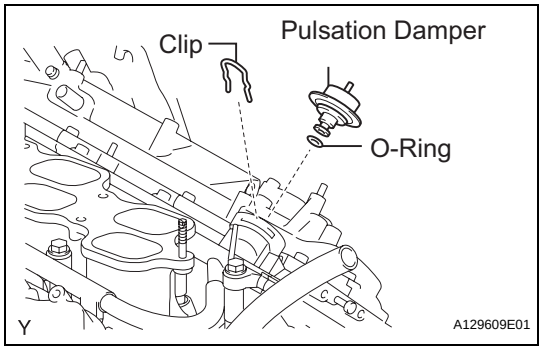
REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **DRAIN ENGINE COOLANT (See page CO-5)**
4. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
5. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
6. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
8. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
9. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
10. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-481)**
11. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
12. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
13. **REMOVE INTAKE AIR SURGE TANK ASSEMBLY (See page FU-13)**
14. **REMOVE FUEL PRESSURE PULSATION DAMPER ASSEMBLY**
    (a) Remove the clip.
    (b) Pull out the fuel pressure pulsation damper from the fuel delivery pipe.
    (c) Remove the O-ring from the fuel pressure pulsation damper.



INSTALLATION

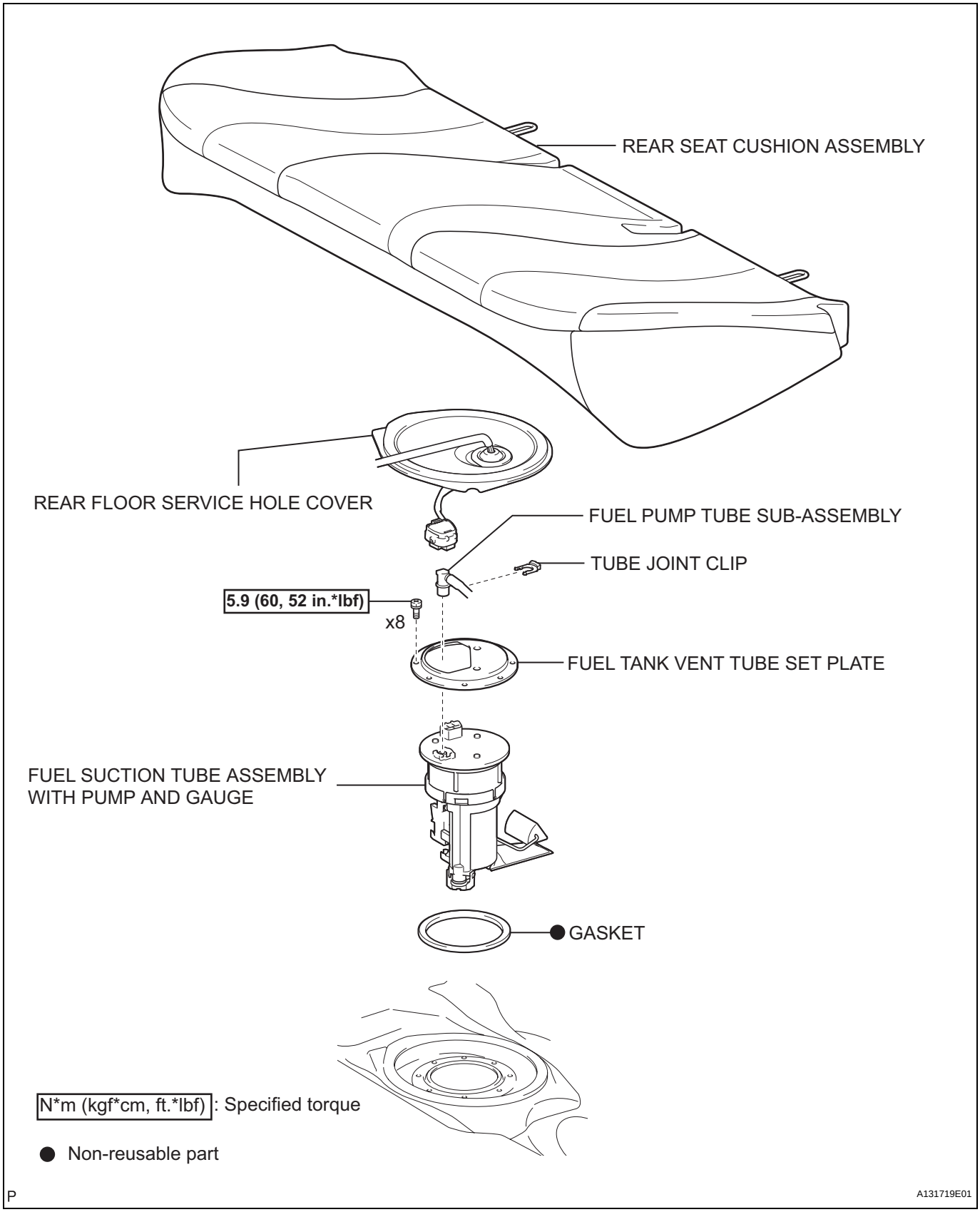
1. **INSTALL FUEL PRESSURE PULSATION DAMPER ASSEMBLY**
   (a) Apply a light coat of spindle oil or gasoline to a new O-ring and install it to the fuel pressure pulsation damper.
   (b) Install the fuel pressure pulsation damper to the fuel delivery pipe.
   (c) Install the clip.



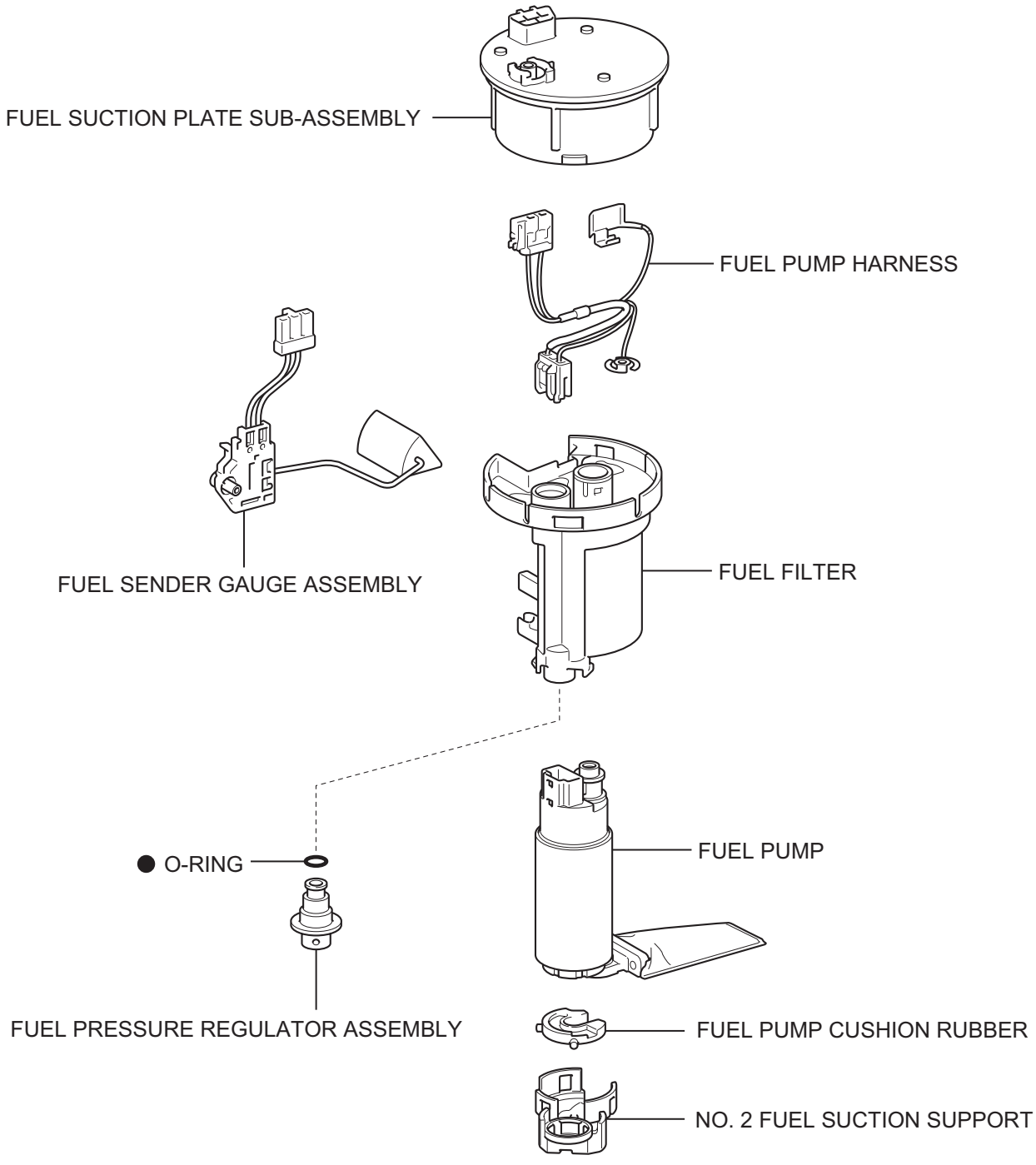
2. INSTALL INTAKE AIR SURGE TANK ASSEMBLY (See page FU-18)
3. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)
4. ADD ENGINE COOLANT (See page CO-6)
5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
6. CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)
7. CHECK FOR FUEL LEAKS (See page FU-8)
8. INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)
9. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-14)
10. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)
11. INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)
12. REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)
13. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)
14. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)
15. INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)

FUEL PUMP

COMPONENTS

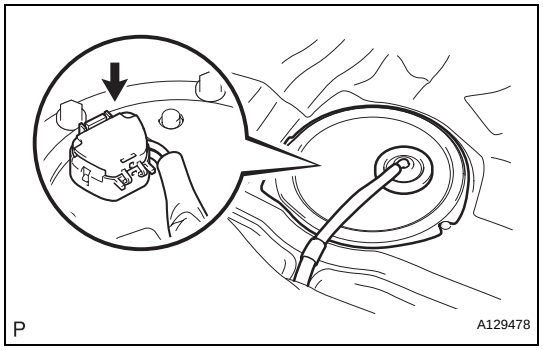


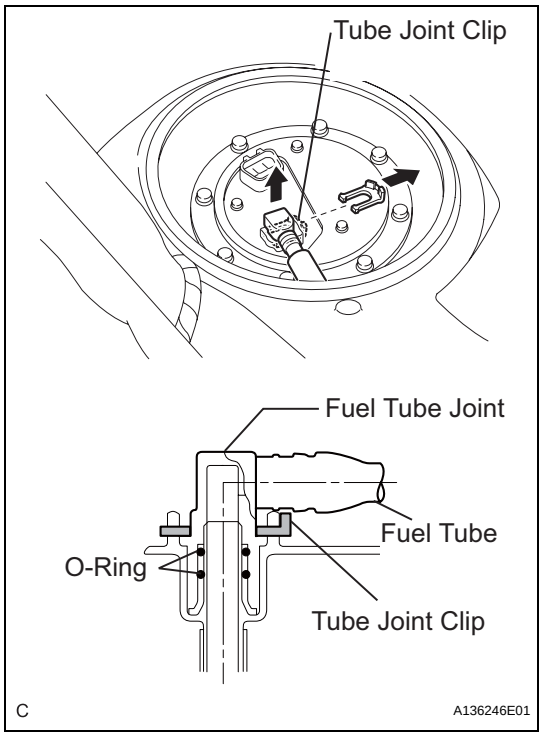
FU


FUEL SUCTION PLATE SUB-ASSEMBLY
FUEL PUMP HARNESS
FUEL SENDER GAUGE ASSEMBLY
FUEL FILTER
● O-RING
FUEL PUMP
FUEL PRESSURE REGULATOR ASSEMBLY
FUEL PUMP CUSHION RUBBER
NO. 2 FUEL SUCTION SUPPORT
● Non-reusable part
C
A136243E01

REMOVAL

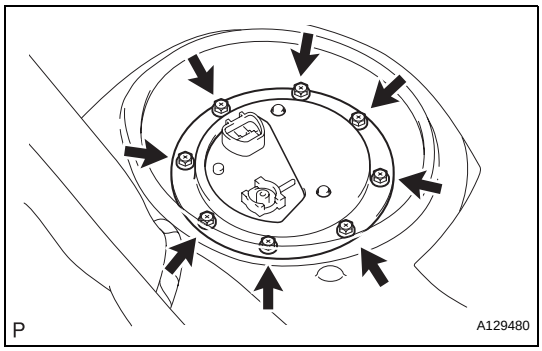
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
4. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
5. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
6. **REMOVE REAR FLOOR SERVICE HOLE COVER**
   (a) Remove the rear floor service hole cover.
   (b) Disconnect the fuel pump connector.





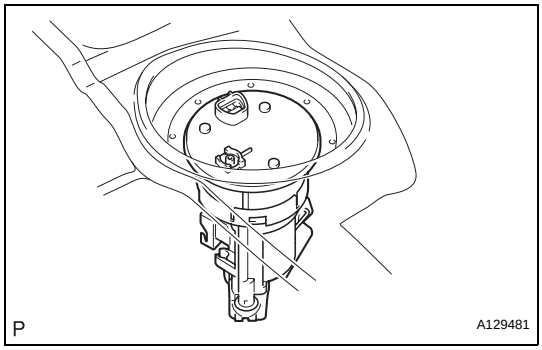
7. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY**
   (a) Remove the tube joint clip, and pull out the fuel pump tube.
   NOTICE:
   - **Check that there is no dirt around the fuel tube joint before this work and clean any dirt away.**
   - **It is necessary to prevent mud or dirt from entering the fuel tube joint. If mud enters the joint, the O-rings may not seal the fuel tube connector and fuel suction plate properly.**
   - **Do not use any tools in this work.**
   - **Do not bend or twist the nylon tube.**
   - **After disconnecting, cover the fuel tube joint with a plastic bag.**
   - **If the fuel tube joint and fuel suction plate are stuck, pinch the fuel tank tube between fingers, and turn it carefully to release. Disconnect the fuel tank tube.**

FU



8. REMOVE FUEL TANK VENT TUBE SET PLATE

(a) Remove the 8 bolts and set plate.



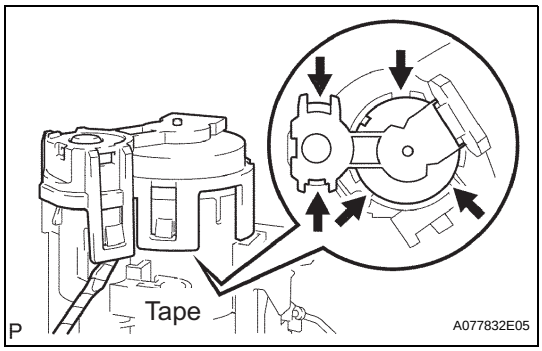
9. REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Pull out the fuel suction tube from the fuel tank.
NOTICE:
- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge does not bend.**

(b) Remove the gasket from the fuel suction tube.

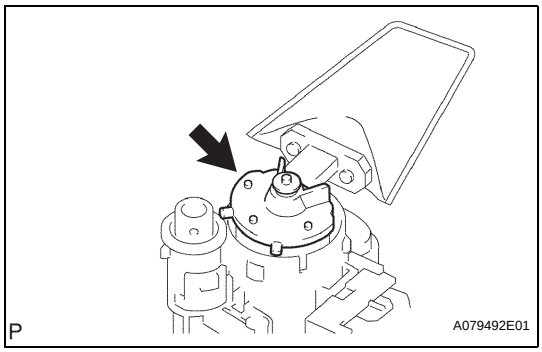
FU

DISASSEMBLY



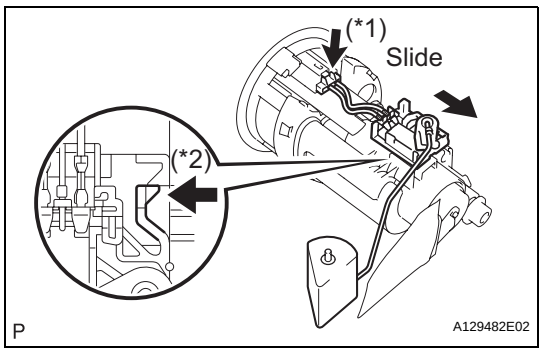
1. REMOVE NO. 2 FUEL SUCTION SUPPORT

(a) Using a screwdriver with its tip wrapped with tape, disengage the 5 snap claws from the claw holes, and remove the No. 2 fuel suction support.
NOTICE:
Do not damage the fuel suction support.



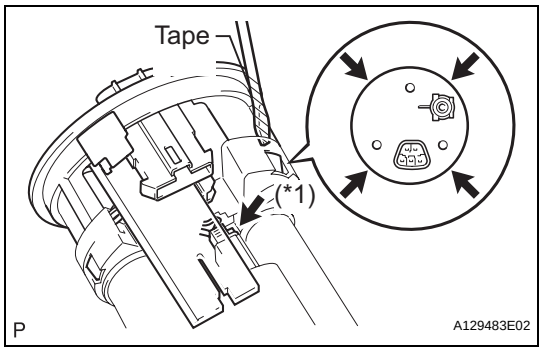
2. REMOVE FUEL PUMP CUSHION RUBBER

(a) Remove the fuel pump cushion rubber from the fuel pump.



3. REMOVE FUEL SENDER GAUGE ASSEMBLY

(a) Disconnect the fuel sender gauge connector (*1).
(b) Unlock the fuel sender gauge, and slide it to remove (*2).



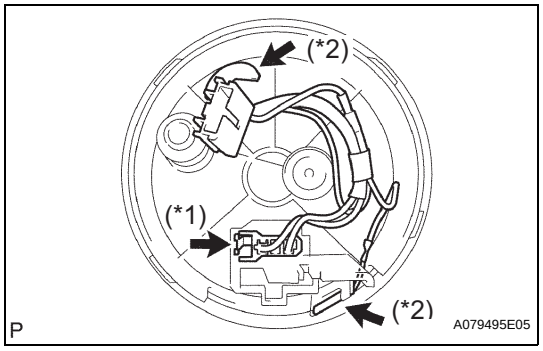
4. REMOVE FUEL SUCTION PLATE SUB-ASSEMBLY

(a) Disconnect the fuel pump connector (*1).

(b) Using a screwdriver with its tip wrapped with tape, disengage the 4 snap claws from the claw holes, and pull out the fuel suction plate.

NOTICE:

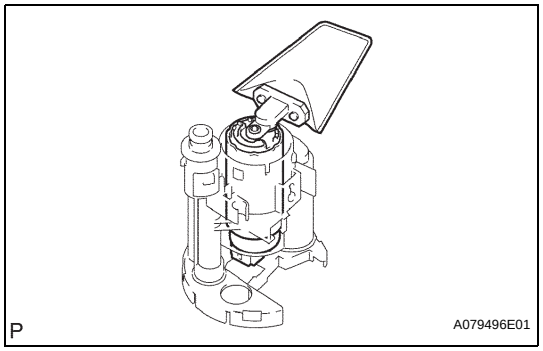
Do not damage the fuel suction support.



5. REMOVE FUEL PUMP HARNESS

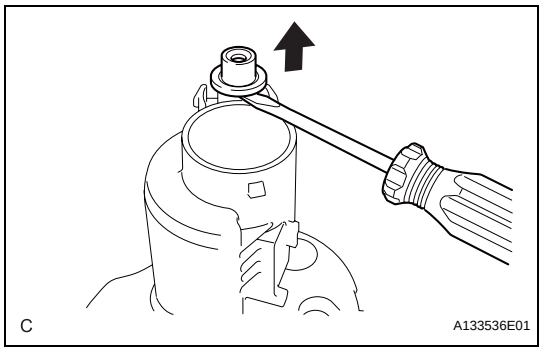
(a) Disconnect the connector (*1).

(b) Using a screwdriver, pry out the fuel pump harness (*2).



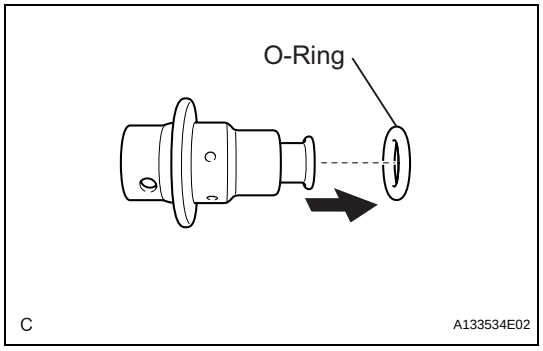
6. REMOVE FUEL PUMP

(a) Pull out the fuel pump from the fuel filter.



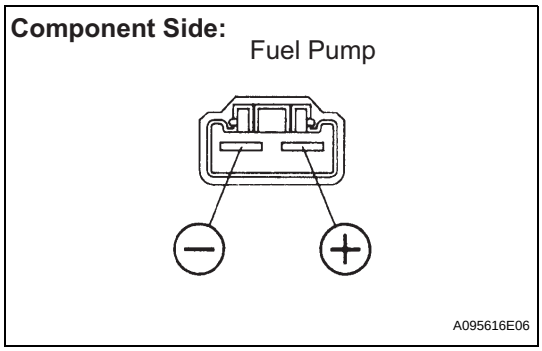
7. REMOVE FUEL PRESSURE REGULATOR ASSEMBLY

(a) Pull out the fuel pressure regulator from the fuel filter.



(b) Remove the O-ring from the fuel pressure regulator.

FU



INSPECTION

1. INSPECT FUEL PUMP

(a) Inspect fuel pump resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

0.2 to 3.0 Ω at 20°C (68°F)

If the result is not as specified, replace the fuel pump assembly.

(b) Inspect fuel pump operation.

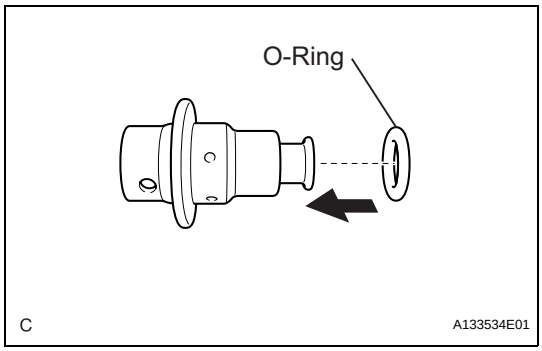
(1) Apply battery voltage to both the terminals. Check that the pump operates.

NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent damage to the pump.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always switch the voltage on and off on the battery side, not on the fuel pump side.**

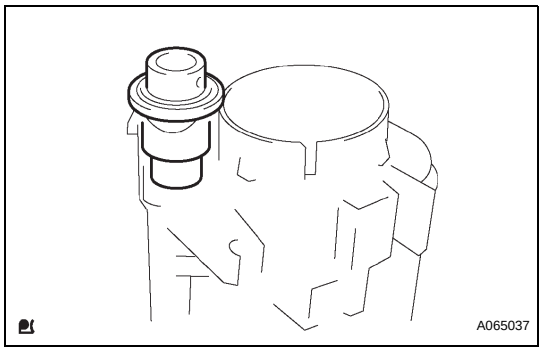
If the pump does not operate, replace the fuel pump assembly.

REASSEMBLY

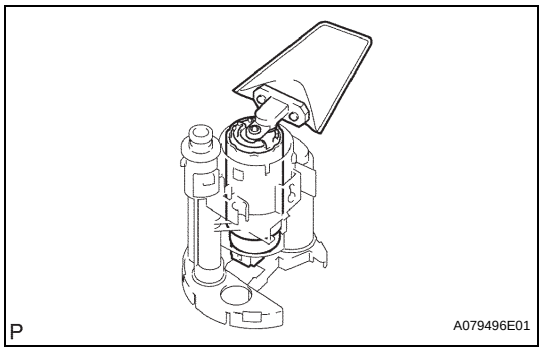


1. INSTALL FUEL PRESSURE REGULATOR ASSEMBLY

(a) Apply a light coat of spindle oil or gasoline to a new O-ring, and install it to the fuel pressure regulator.



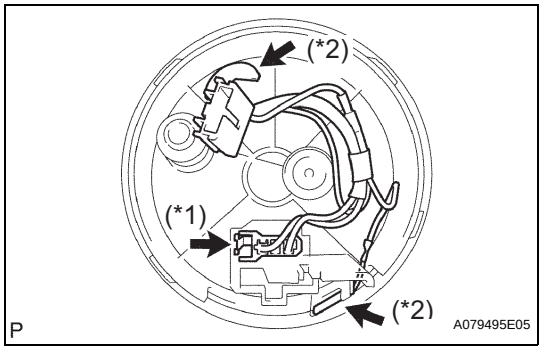
(b) Push in the fuel pressure regulator to the fuel filter.



2. INSTALL FUEL PUMP

(a) Apply a light coat of gasoline or grease to the O-ring of the fuel pump.

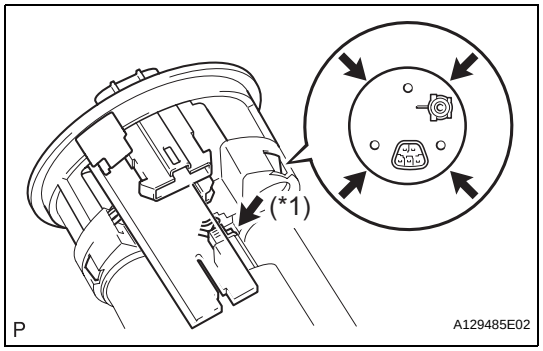
(b) Push in the fuel pump to the fuel filter.



3. INSTALL FUEL PUMP HARNESS

(a) Connect the connector (*1).

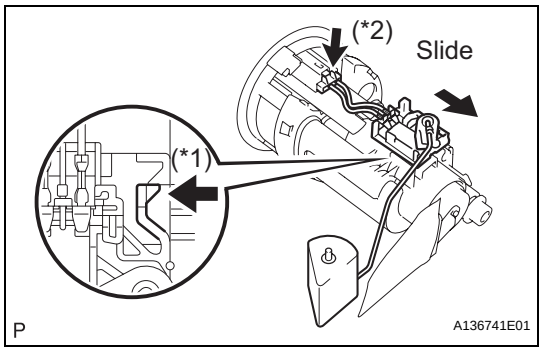
(b) Install the fuel pump harness (*2).



4. INSTALL FUEL SUCTION PLATE SUB-ASSEMBLY

(a) Connect the fuel pump connector (*1).

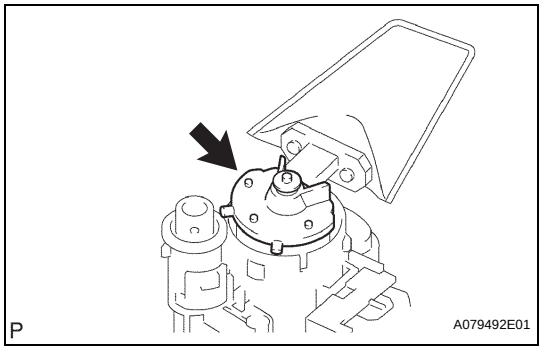
(b) Install the fuel suction plate.



5. INSTALL FUEL SENDER GAUGE ASSEMBLY

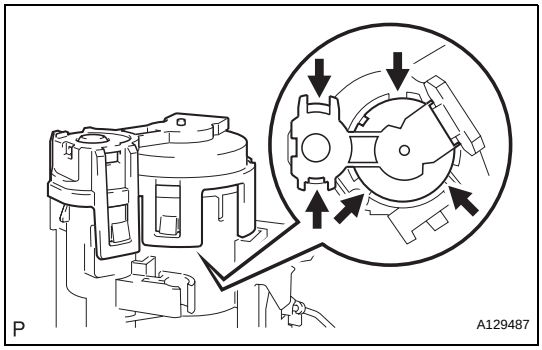
(a) Slide the fuel sender gauge to engage with the claw (*1).

(b) Connect the fuel sender gauge connector (*2).



6. INSTALL FUEL PUMP CUSHION RUBBER

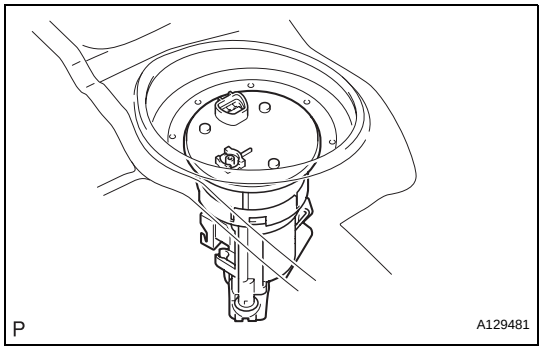
(a) Install the fuel pump cushion rubber to the fuel pump.



7. INSTALL NO. 2 FUEL SUCTION SUPPORT

(a) Install the No. 2 fuel suction support.

INSTALLATION



1. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

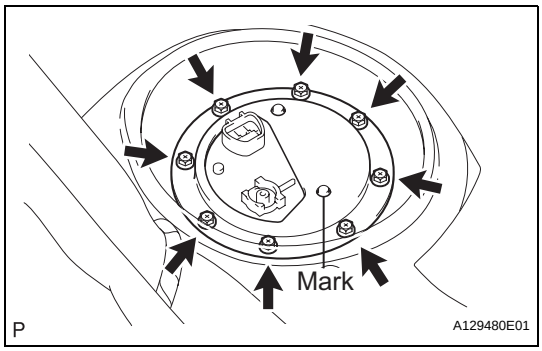
(a) Install a new gasket to the fuel suction tube.

(b) Install the fuel suction tube.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge does not bend.**

FU

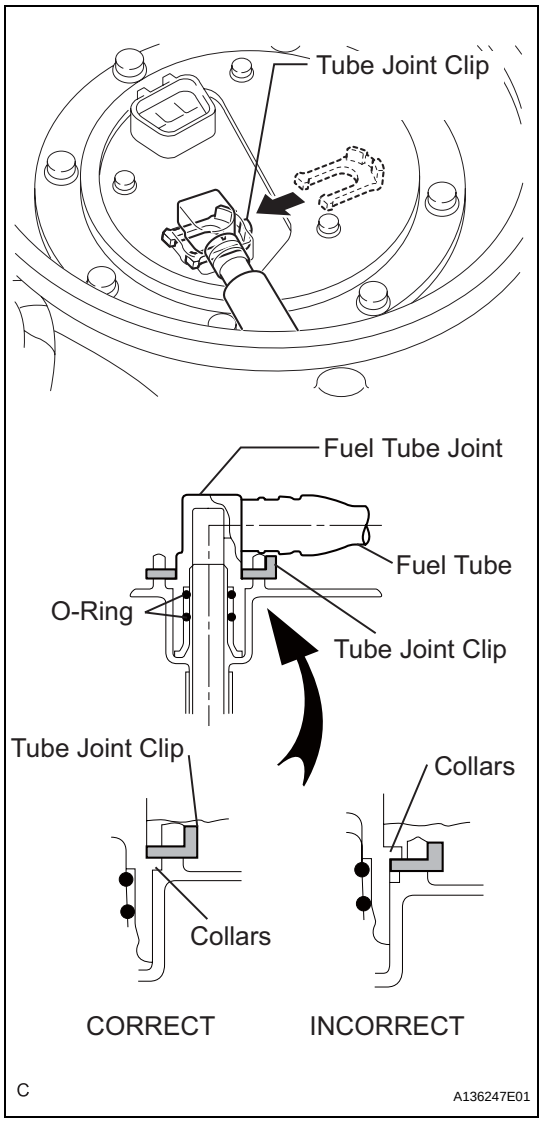


2. INSTALL FUEL TANK VENT TUBE SET PLATE

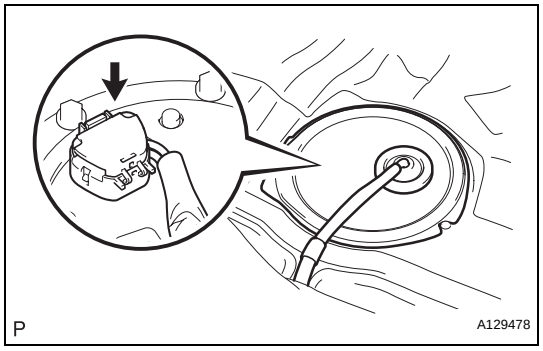
(a) Align the mark of the set plate with the fuel suction tube.

(b) Install the set plate with the 8 bolts.

Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)



3. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY**
   (a) Install the fuel pump tube with the tube joint clip.
   NOTICE:
   - **Check that there are no scratches or foreign objects on the connecting part.**
   - **Check that the fuel tube joint is inserted securely.**
   - **Check that the tube joint clip is on the collar of the fuel tube joint.**
   - **After installing the tube joint clip, check that the fuel tube joint is pulled off.**
4. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
5. **CHECK FOR FUEL LEAKS (See page FU-8)**

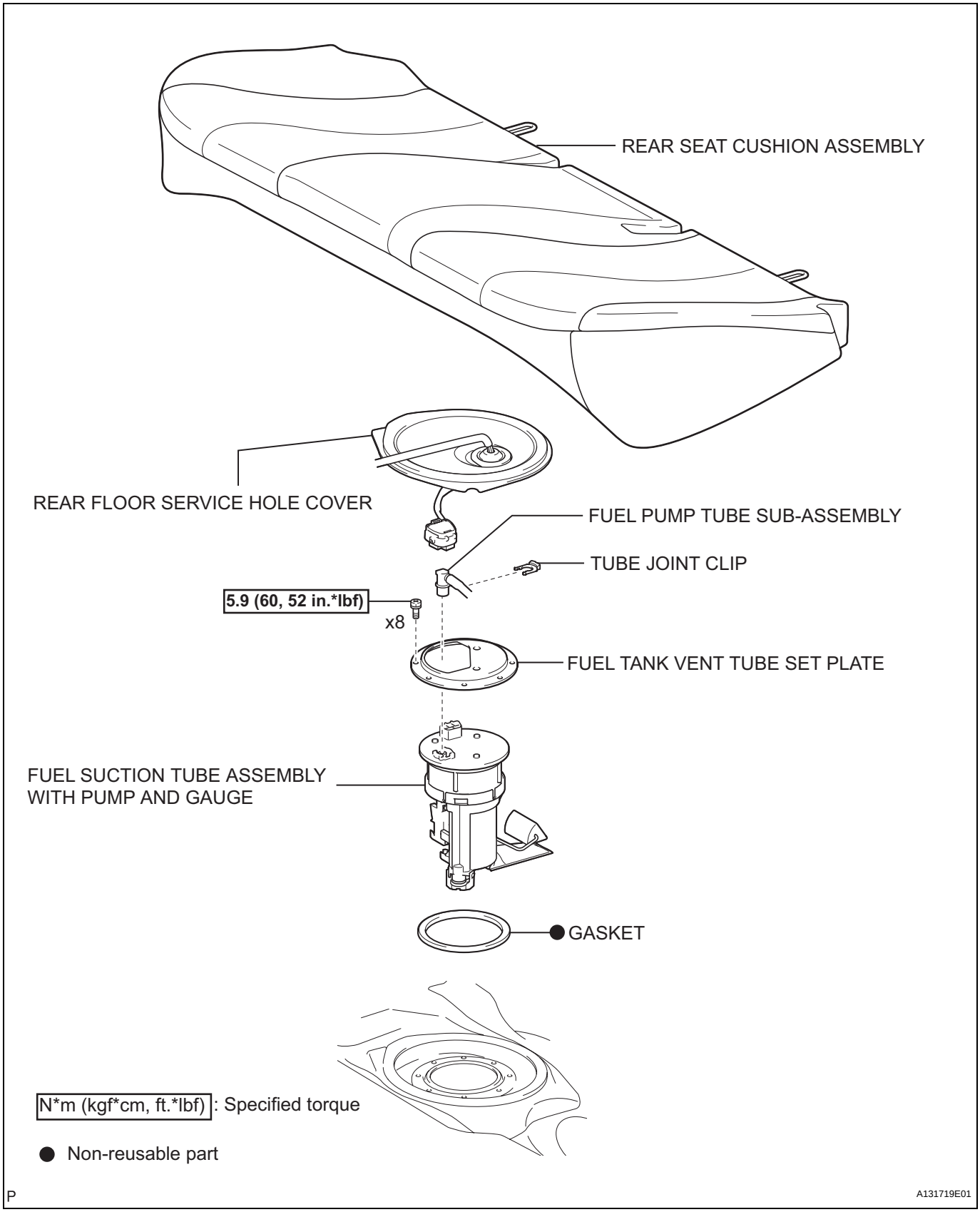


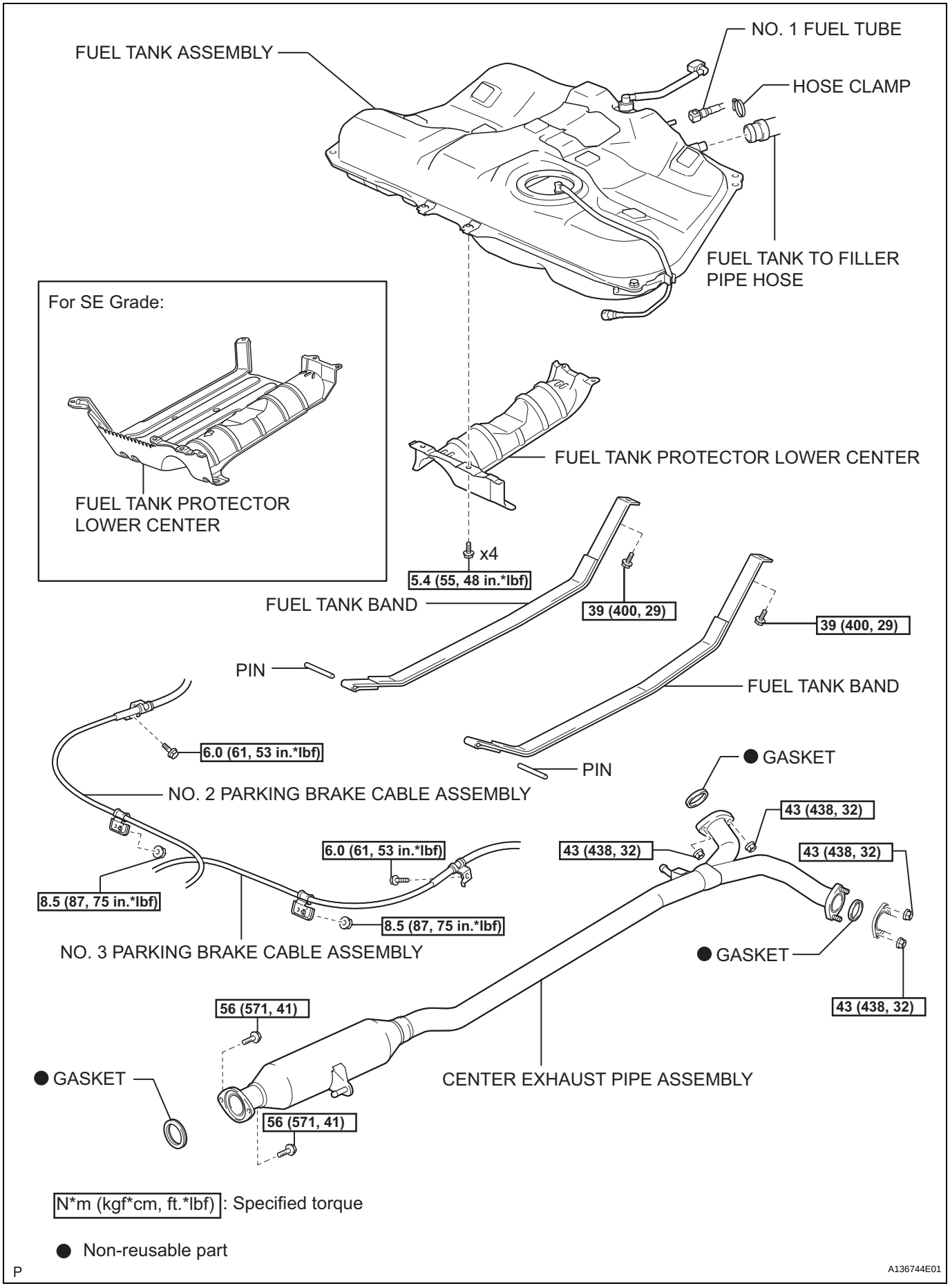
6. **INSTALL REAR FLOOR SERVICE HOLE COVER**
   (a) Connect the fuel pump connector.
   (b) Install the rear floor service hole cover with new butyl tape.
7. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
8. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**
9. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**

FU

FUEL TANK

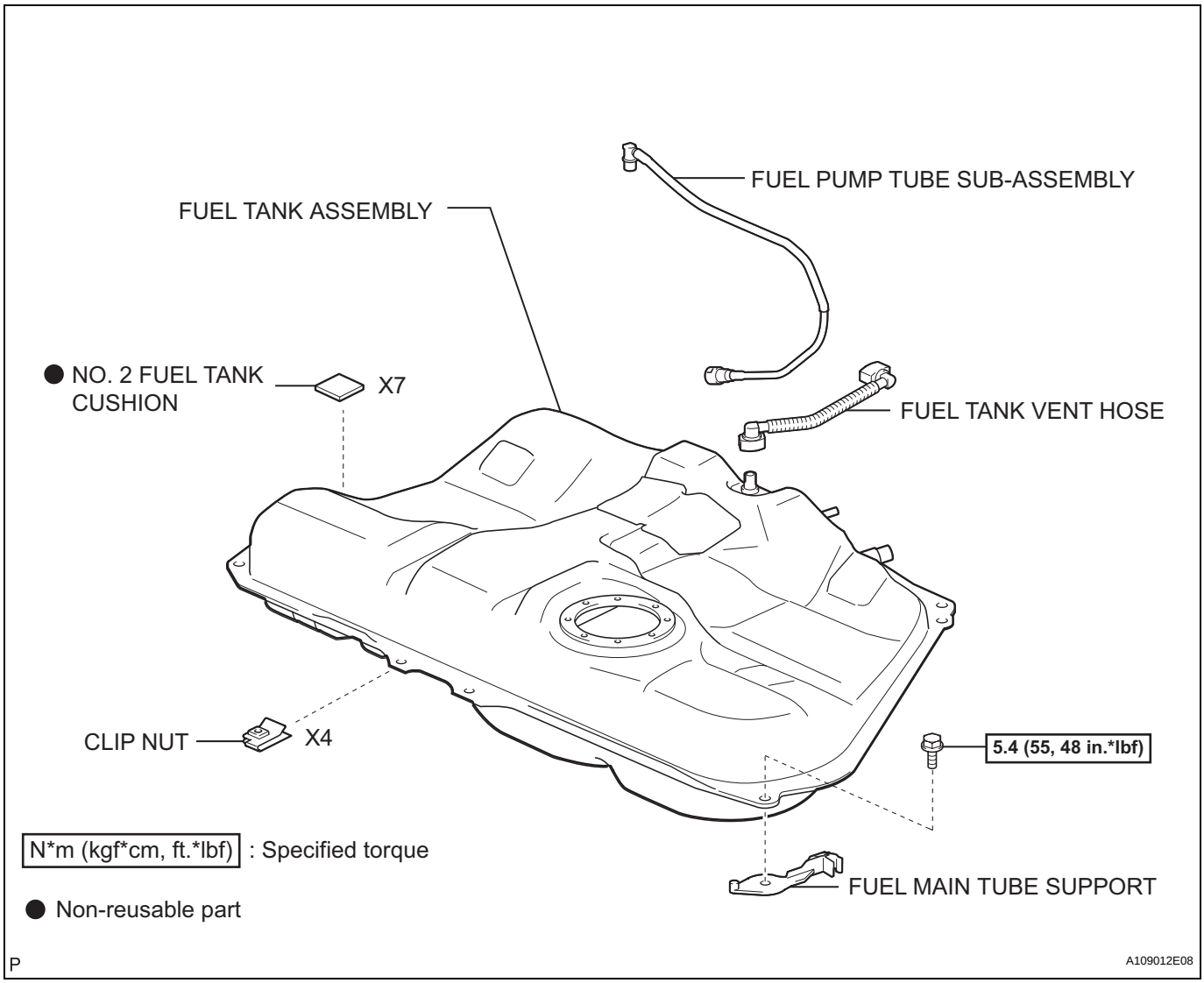
COMPONENTS




FUEL TANK ASSEMBLY
NO. 1 FUEL TUBE
HOSE CLAMP
FUEL TANK TO FILLER PIPE HOSE
For SE Grade:
FUEL TANK PROTECTOR LOWER CENTER
FUEL TANK PROTECTOR LOWER CENTER
x4
5.4 (55, 48 in.*lbf)
FUEL TANK BAND
39 (400, 29)
39 (400, 29)
PIN
FUEL TANK BAND
6.0 (61, 53 in.*lbf)
PIN
GASKET
NO. 2 PARKING BRAKE CABLE ASSEMBLY
43 (438, 32)
6.0 (61, 53 in.*lbf)
43 (438, 32)
43 (438, 32)
8.5 (87, 75 in.*lbf)
8.5 (87, 75 in.*lbf)
NO. 3 PARKING BRAKE CABLE ASSEMBLY
GASKET
43 (438, 32)
56 (571, 41)
GASKET
CENTER EXHAUST PIPE ASSEMBLY
56 (571, 41)
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
A136744E01

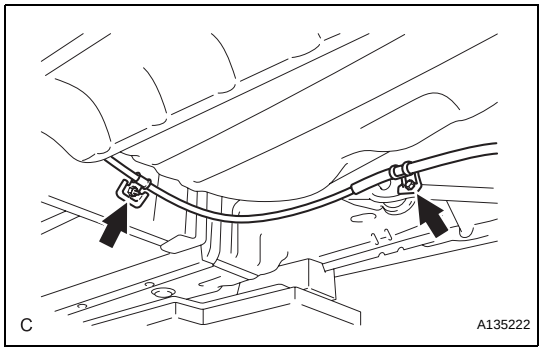
FU

P

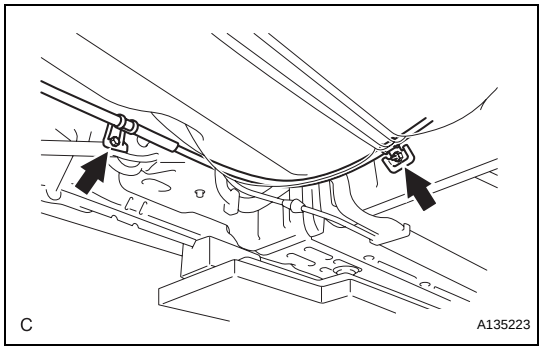

FUEL PUMP TUBE SUB-ASSEMBLY
FUEL TANK ASSEMBLY
● NO. 2 FUEL TANK CUSHION
X7
FUEL TANK VENT HOSE
CLIP NUT
X4
5.4 (55, 48 in.*lbf)
FUEL MAIN TUBE SUPPORT
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
P
A109012E08

REMOVAL

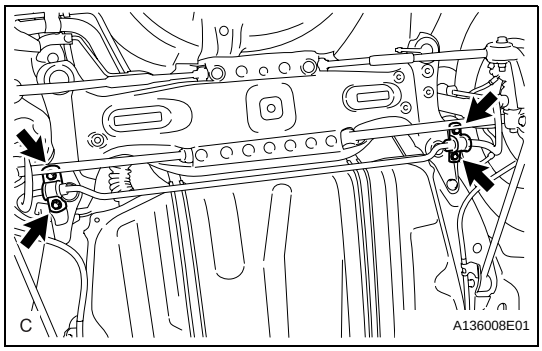
1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
4. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
5. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
6. **REMOVE REAR FLOOR SERVICE HOLE COVER (See page FU-27)**
7. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-27)**
8. **REMOVE FUEL TANK VENT TUBE SET PLATE (See page FU-28)**
9. **REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-28)**
10. **DRAIN FUEL**
11. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (See page EX-2)**
12. **DISCONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the set bolt and set nut of the No. 2 parking brake cable assembly.



13. **DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the set bolt and set nut of the No. 3 parking brake cable assembly.

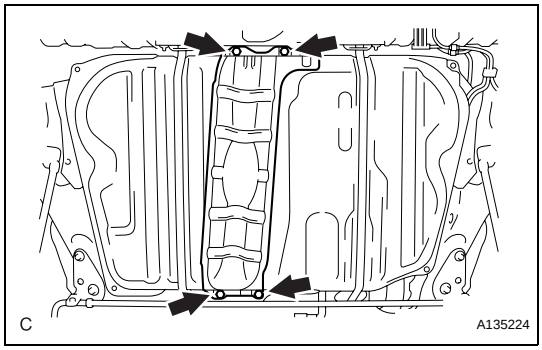


FU



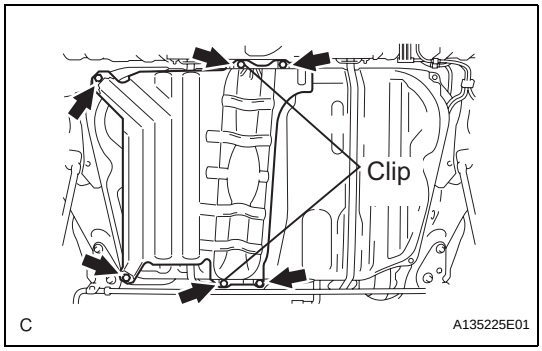
14. REMOVE REAR STABILIZER BAR NO. 1 BRACKET

(a) Remove the 4 bolts and 2 rear stabilizer bar No. 1 brackets.



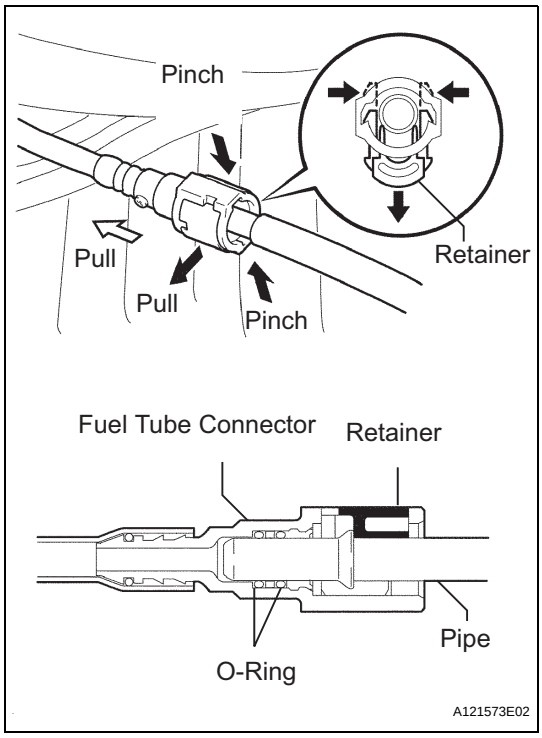
15. REMOVE FUEL TANK PROTECTOR LOWER CENTER

(a) Remove the 4 bolts and fuel tank protector (Except SE Grade).



(b) Remove the 4 bolts and 2 clips (for SE Grade).

(c) Remove the fuel tank protector (for SE Grade).



16. REMOVE FUEL TANK ASSEMBLY

(a) Disconnect the fuel pump tube.

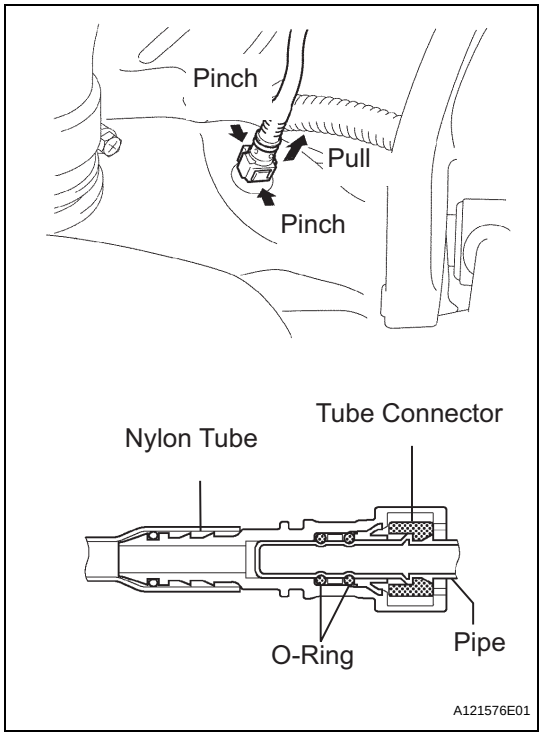
(1) Pinch the tab of the retainer to disengage the lock claws and pull it down as shown in the illustration.

(2) Pull out the fuel tank main tube.

NOTICE:

- **Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector if necessary.**
- **It is necessary to prevent mud or dirt from entering the quick connector. If mud enters the connector, the O-rings may not seal properly.**
- **Remove the quick connector by hand.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**

- **If the pipe and connector are stuck, try wiggling or pushing and pulling the connector to release it and pull the connector off of the pipe carefully.**

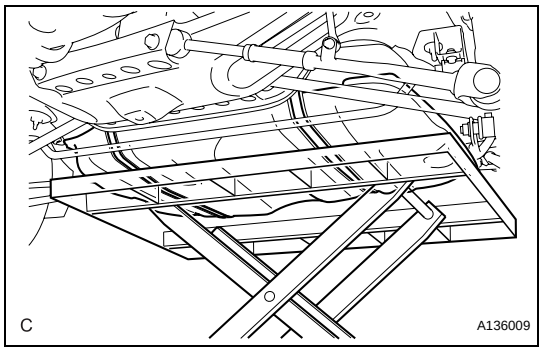


(b) Disconnect the No. 1 fuel tube.

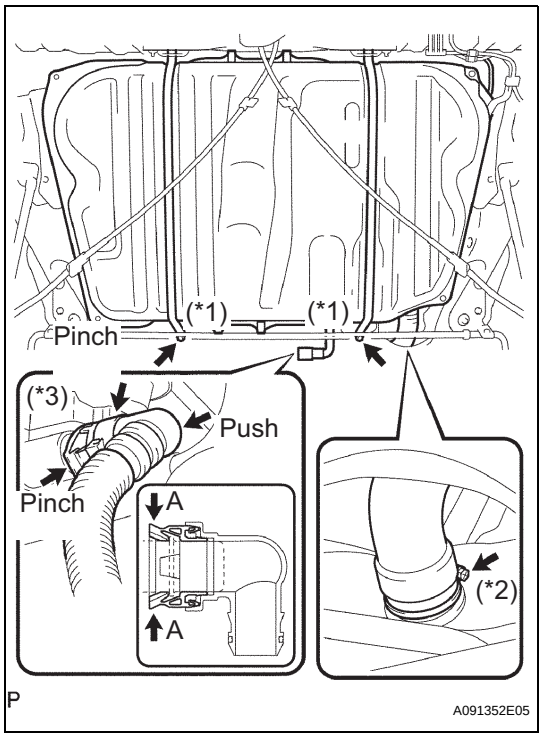
(1) Pinch the tube connector and then pull out the No. 1 fuel tube.

NOTICE:

- **Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector as necessary.**
- **It is necessary to prevent mud or dirt from entering the quick connector. If mud enters the connector, the O-rings may not seal properly.**
- **Remove the quick connector by hand.**
- **Do not bend or twist the nylon tube. Protect the connector by covering it with a plastic bag.**
- **If the pipe and connector are stuck, try wiggling or pushing and pulling the connector to release it and pull the connector off of the pipe carefully.**

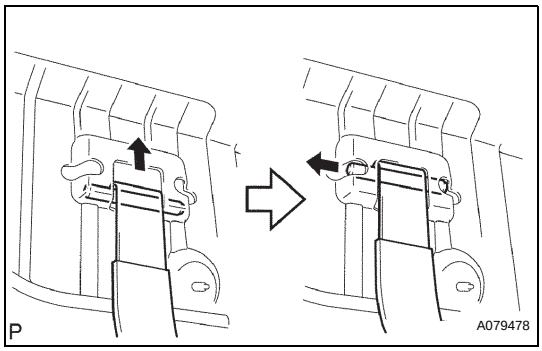


(c) Place a engine lifter under the fuel tank assembly.

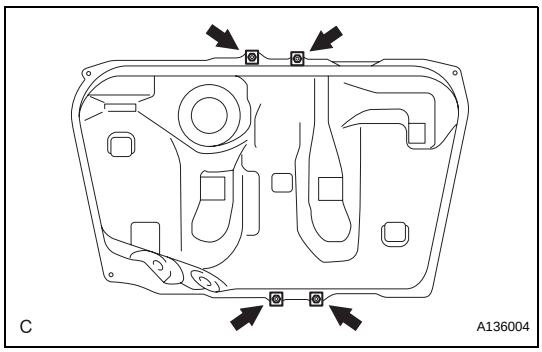


(d) Remove the 2 set bolts of the fuel tank bands. (*1)
(e) Remove the hose clamp and disconnect the fuel tank to filter pipe hose. (*2)
(f) Slightly lower the transmission jack.
(g) Disconnect the fuel tank vent hose from the charcoal canister. (*3)
  (1) Push the connector deep into the charcoal canister to release the locking pin.
  (2) Pinch portion A.
  (3) Pull out the connector.
(h) Remove the fuel tank.

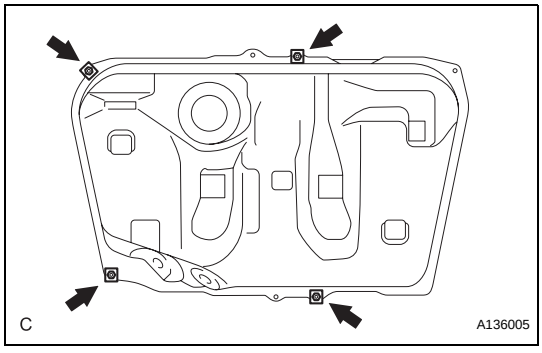
FU



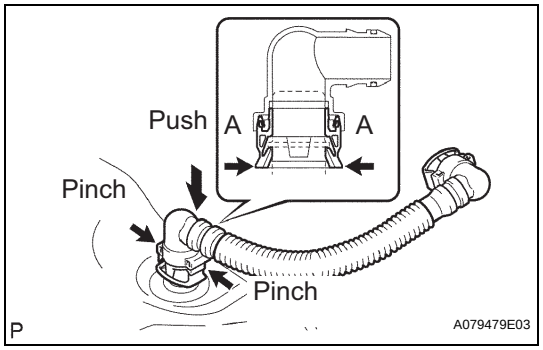
(i) Remove the 2 pins and 2 fuel tank bands as shown in the illustration.



(j) Remove the 4 clip nuts (Except SE Grade).

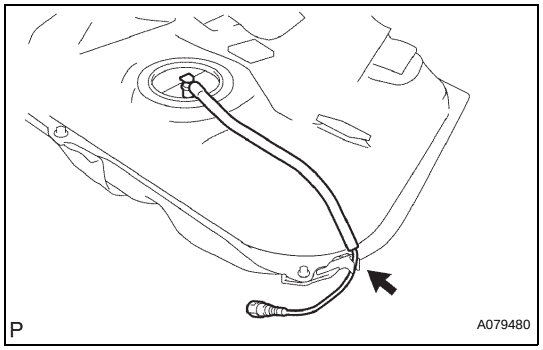


(k) Remove the 4 clip nuts (for SE Grade).



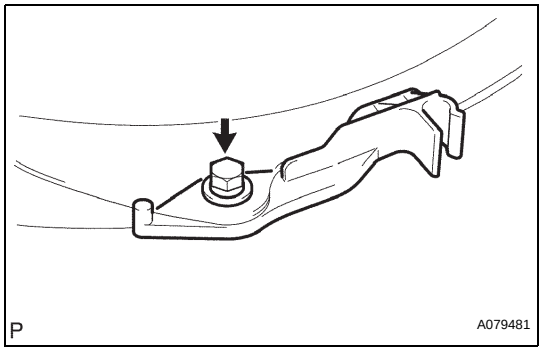
17. REMOVE FUEL TANK VENT HOSE

(a) Push the connector deep into the charcoal canister to release the locking pin.
(b) Pinch portion A.
(c) Pull out the connector.



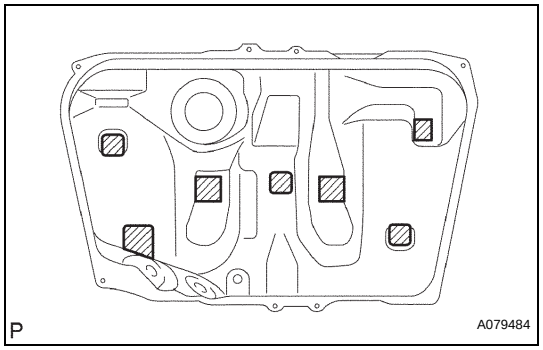
18. REMOVE FUEL PUMP TUBE SUB-ASSEMBLY

(a) Remove the fuel pump tube from the fuel main tube support.



19. REMOVE FUEL MAIN TUBE SUPPORT

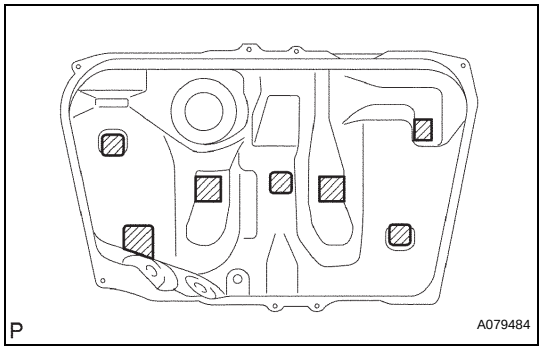
(a) Remove the bolt and tube support.



20. REMOVE NO. 2 FUEL TANK CUSHION

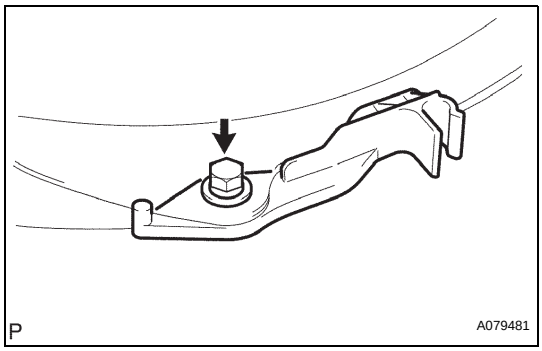
(a) Remove the 7 No. 2 fuel tank cushions.

INSTALLATION



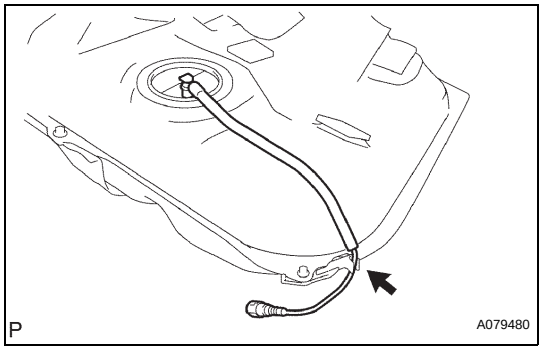
1. INSTALL NO. 2 FUEL TANK CUSHION

(a) Install 7 new No. 2 fuel tank cushions to the fuel tank.



2. INSTALL FUEL MAIN TUBE SUPPORT

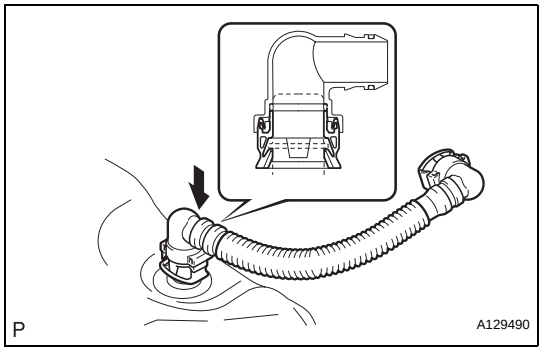
(a) Install the fuel main tube support with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



3. INSTALL FUEL PUMP TUBE SUB-ASSEMBLY

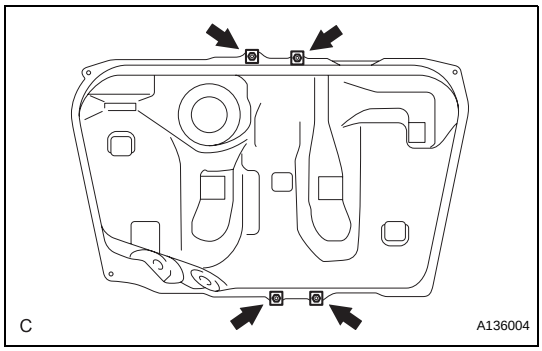
(a) Install the fuel pump tube to the fuel main tube support.

FU



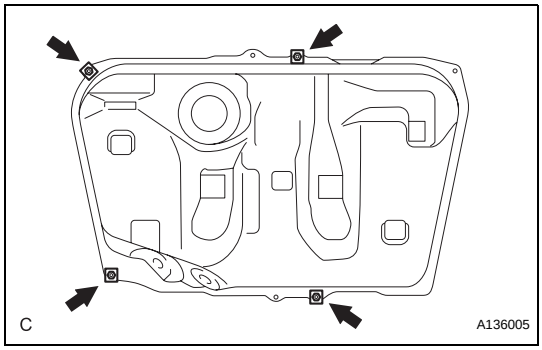
4. INSTALL FUEL TANK VENT HOSE

(a) Install the fuel tank vent hose.

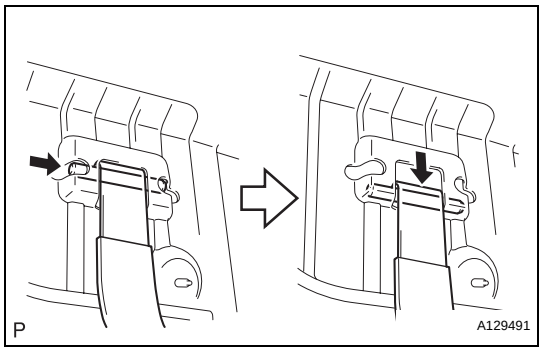


5. INSTALL FUEL TANK ASSEMBLY

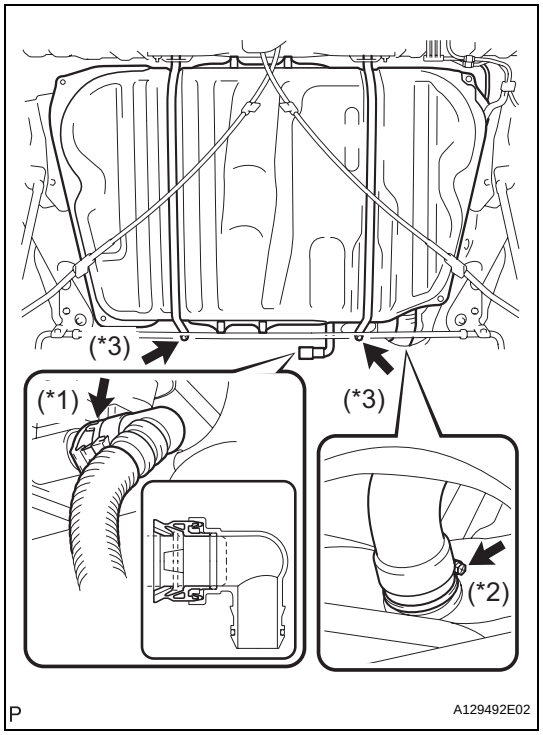
(a) Install the 4 clip nuts (Except SE Grade).



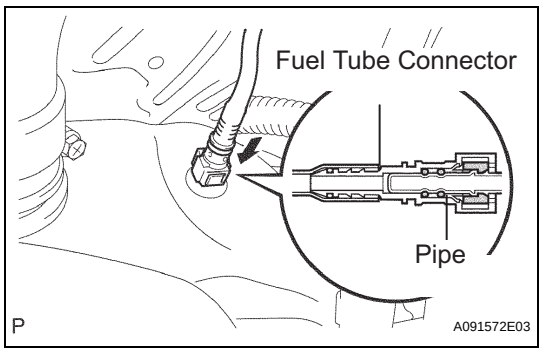
(b) Install the 4 clip nuts (for SE Grade).



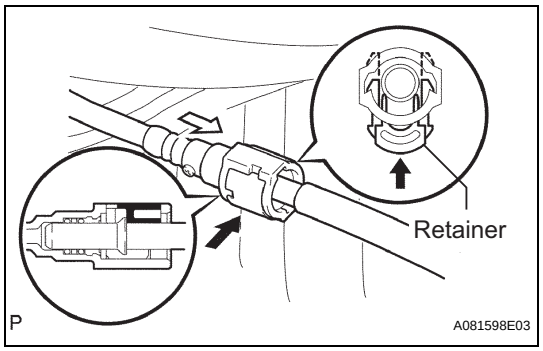
(c) Install the 2 fuel tank bands with the 2 pins.
(d) Set the fuel tank assembly onto the transmission jack.



(e) Raise the transmission jack so that the fuel tank vent hose can be connected. (*1)
NOTICE:
Slowly raise the jack to prevent the fuel tank assembly from dropping.
(f) Connect the fuel tank inlet pipe with the fuel filter pipe clamp. (*2)
(g) Tighten the 2 set bolts of the fuel tank bands. (*3)
Torque: 39 N*m (400 kgf*cm, 29 ft.*lbf)



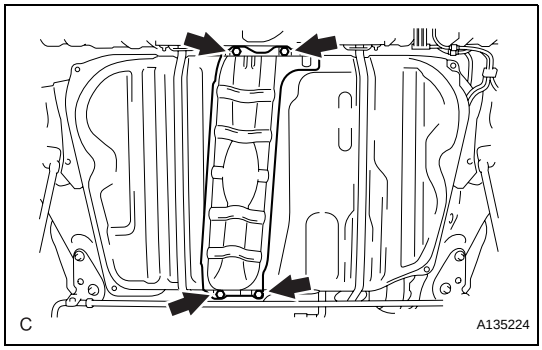
(h) Connect the No. 1 fuel tube.
(1) Push the fuel tube connector into the pipe until the fuel tube connector makes a "click" sound.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**
- **After connecting, check if the fuel tube connector and the pipe are securely connected by pulling on them.**



(i) Connect the fuel pump tube.
(1) Push the fuel tube connector into the pipe and push up the retainer so that the claws engage.
NOTICE:
- **Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.**

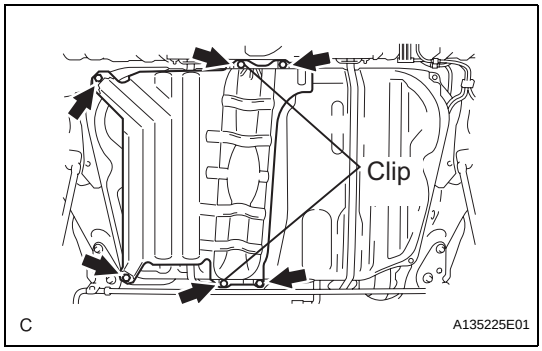
FU

- **After connecting, check if the fuel tube connector and the pipe are securely connected by pulling on them.**

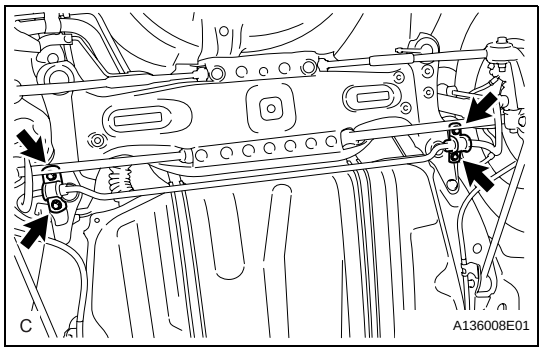


6. INSTALL FUEL TANK PROTECTOR LOWER CENTER

(a) Install the 4 bolts and fuel tank protector (Except SE Grade).
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

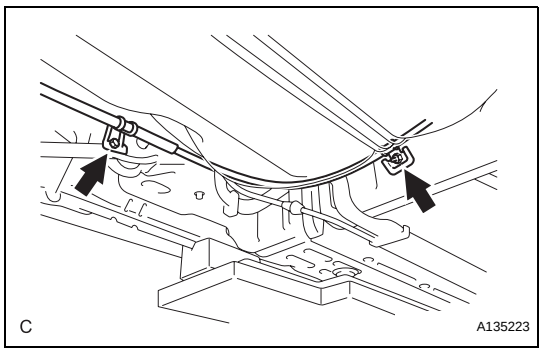


(b) Install the fuel tank protector with the 4 bolts and 2 clips (for SE Grade).
Torque: Bolt
5.4 N*m (55 kgf*cm, 48 in.*lbf)



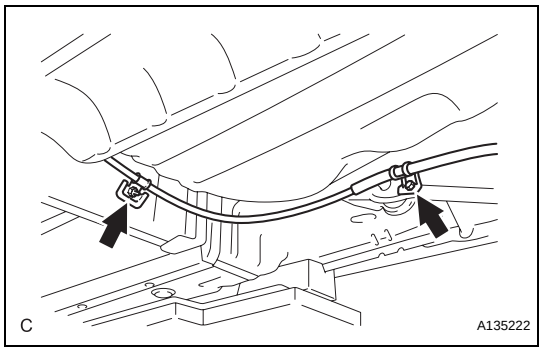
7. INSTALL REAR STABILIZER BAR NO. 1 BRACKET

(a) Install the 2 rear stabilizer bar No. 1 brackets with the 4 bolts.
Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)



8. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

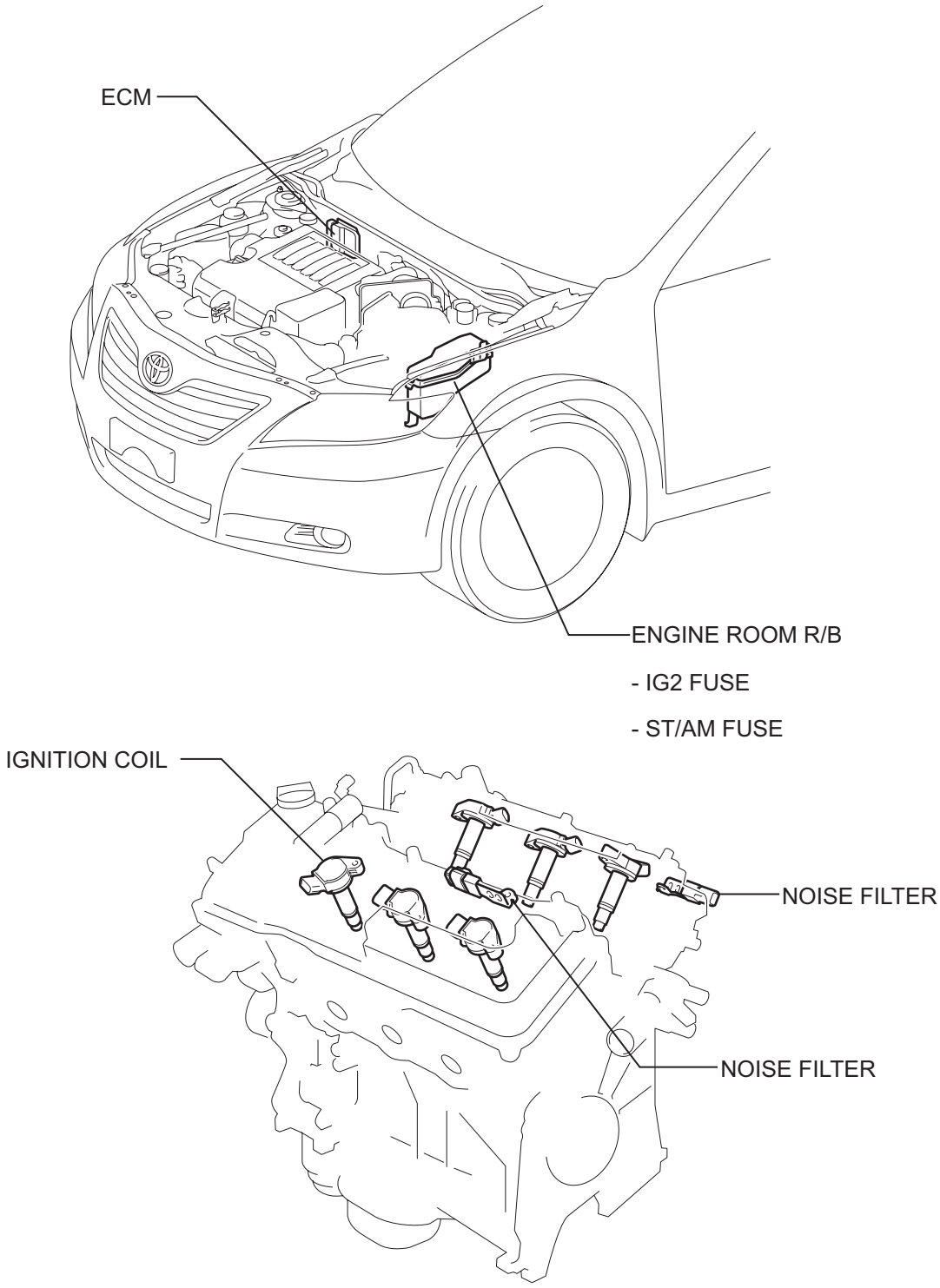
(a) Install the No. 3 parking brake cable assembly with the bolt and nut.
Torque: Bolt
6.0 N*m (61 kgf*cm, 53 in.*lbf)
Nut
8.5 N*m (87 kgf*cm, 75 in.*lbf)



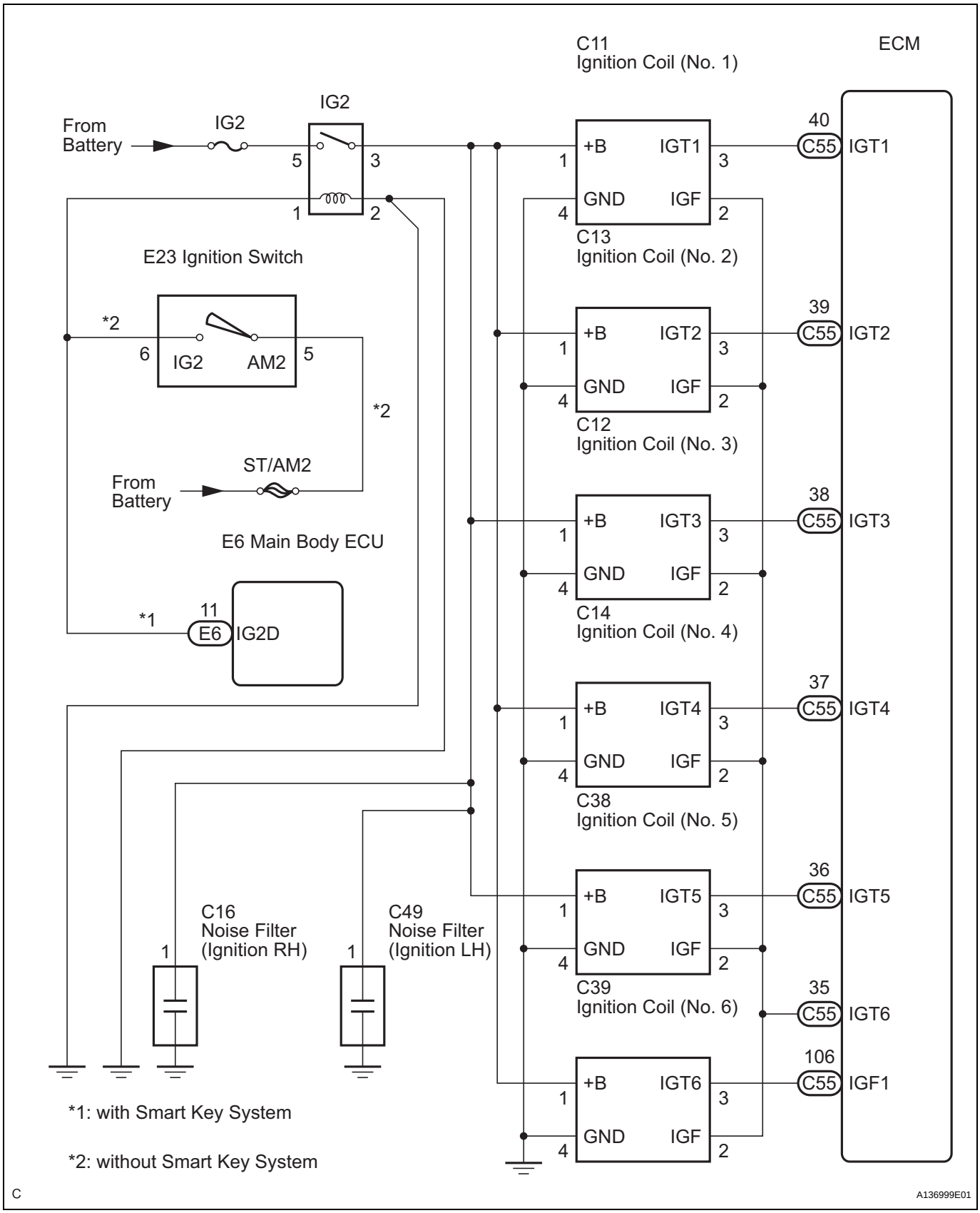
9. **INSTALL NO. 2 PARKING BRAKE CABLE ASSEMBLY**
   (a) Install the No. 2 parking brake cable assembly with the bolt and nut.
   Torque: Bolt
   6.0 N*m (61 kgf*cm, 53 in.*lbf)
   Nut
   8.5 N*m (87 kgf*cm, 75 in.*lbf)
10. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (See page EX-4)**
11. **INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-32)**
12. **INSTALL FUEL TANK VENT TUBE SET PLATE (See page FU-32)**
13. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-33)**
14. **ADD FUEL**
15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
16. **CHECK FOR FUEL LEAKS (See page FU-8)**
17. **CHECK FOR EXHAUST GAS LEAKS**
18. **INSTALL REAR FLOOR SERVICE HOLE COVER (See page FU-33)**
19. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
20. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**
21. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**

IGNITION SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM



IG

ON-VEHICLE INSPECTION

NOTICE:
In this section, the terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10°C (14°F) to 50°C (122°F). "HOT" means approximately 50°C (122°F) to 100°C (212°F).

1. INSPECT IGNITION COIL ASSEMBLY

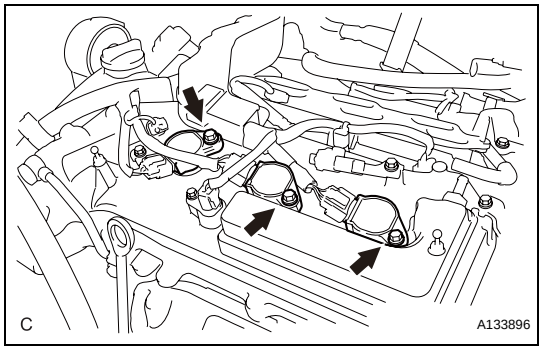
(a) Check for DTCs.
NOTICE:
If any DTC is present, perform troubleshooting in accordance with the procedures for that DTC.

(b) Check that sparks occur.

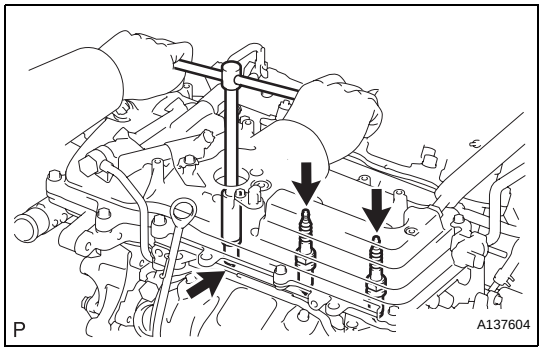
(1) Remove the intake air surge tank (See page FU-13).

(2) Remove the No. 1 surge tank stay (see page IG-10).

(3) Disconnect the 6 ignition coil connectors and remove the 6 bolts and 6 ignition coils.

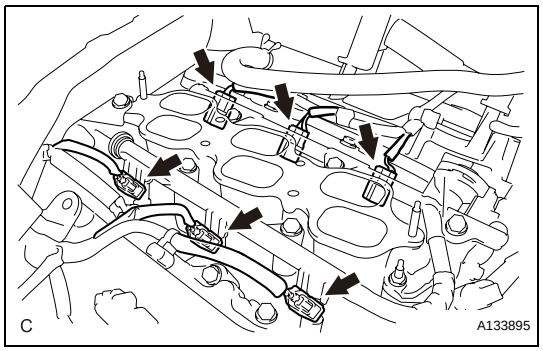


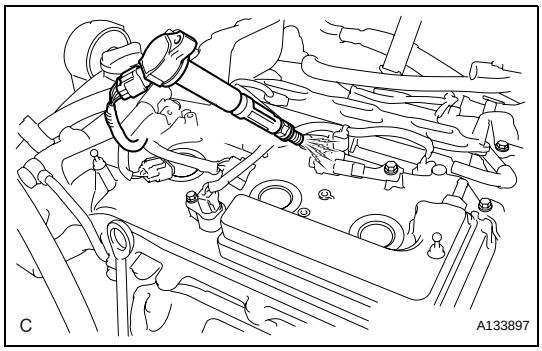
(4) Using a 16 mm (0.63 in.) plug wrench, remove the 6 spark plugs.



(5) Disconnect the 6 fuel injector connectors.

(6) Install the spark plugs to each ignition coil, and connect the ignition coil connectors.





(7) Ground the spark plugs.
(8) Check if a spark occurs at each spark plug while the engine is being cranked.
NOTICE:
- **Be sure to ground the spark plugs when checking.**
- **Replace the ignition coil if it receives an impact.**
- **Do not crank the engine for more than 2 seconds.**

(c) Perform the spark test according to the flowchart below.
(1) Check that the ignition coil connector is securely connected.
Result

Result	Proceed to
NG	Connect securely
OK	Go to next step

(2) Perform a speak test on each ignition coil.
1. Replace the ignition coil with a normal one.
2. Perform the spark test again.
Result

Result	Proceed to
OK	Replace ignition coil
NG	Go to next step

(3) Check the power supply to the ignition coil.
1. Turn the ignition switch on (IG).
2. Check that there is battery voltage at the ignition coil positive (+) terminal.
Result

Result	Proceed to
NG	Check wiring between ignition switch and ignition coil
OK	Go to next step

(4) Check the VVT sensor output voltage.
Result

Result	Proceed to
NG	Check that there is resistance between ECM and VVT sensor. If there is no resistance, replace VVT sensor. If there is resistance, repair wiring between VVT sensor and ECM.
OK	Go to next step

(5) Measure the resistance of the crankshaft position sensor.
Standard resistance

Temperature	Specified Condition
Cold	1,630 to 2,740 Ω
Hot	2,065 to 3,225 Ω

Result

Result	Proceed to
NG	Replace crankshaft position sensor
OK	Go to next step

(6) Check the IGT signal from the ECM.
Result

Result	Proceed to
NG	Check ECM (See page ES-234)
OK	Repair wiring between ignition coil and ECM

(d) Using a 16 mm (0.63 in.) plug wrench, install the spark plugs.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

(e) Install the 6 ignition coils with the 6 bolts and connect the 6 ignition coil connectors.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

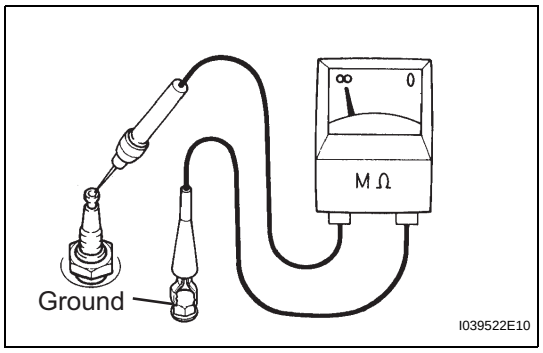
(f) Connect the 6 fuel injector connectors.

(g) Install the No. 1 surge tank stay (See page IG-11).

(h) Install the intake air surge tank (See page FU-18).

2. INSPECT SPARK PLUG

NOTICE:
- **Never use a wire brush for cleaning.**
- **Never attempt to adjust the electrode gap on a used spark plug.**



(a) Check the electrode.

(1) Using a megohmmeter, measure the insulation resistance.
Standard insulation resistance:
10 MΩ or higher
HINT:
- If the result is 10 MΩ or less, clean the plug and measure the resistance again.
- If a megohmmeter is not available, perform the following simple inspection instead.

(b) Alternative inspection method:

(1) Quickly accelerate the engine to 4,000 rpm 5 times.

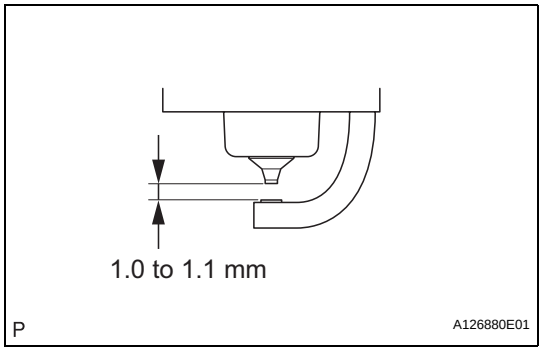
(2) Remove the spark plugs.

(3) Visually check the spark plug.
If the electrode is dry, the spark plug is functioning properly. If the electrode is damp, proceed to the next step.

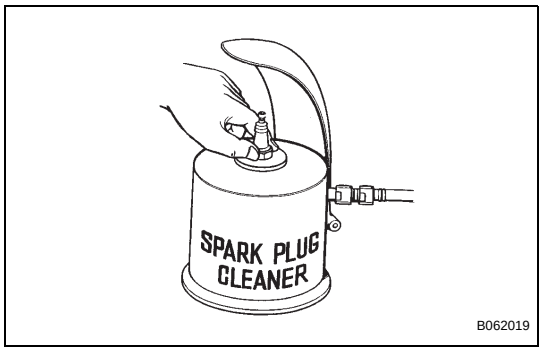
(c) Check the spark plug for any damage to its threads and insulator. If there is damage, replace the spark plug.
Require spark plug

Manufacturer	Spark plug type
DENSO made	FK20HR11

NOTICE:
Use only the listed spark plug or equivalent to ensure engine performance and smooth driveability.



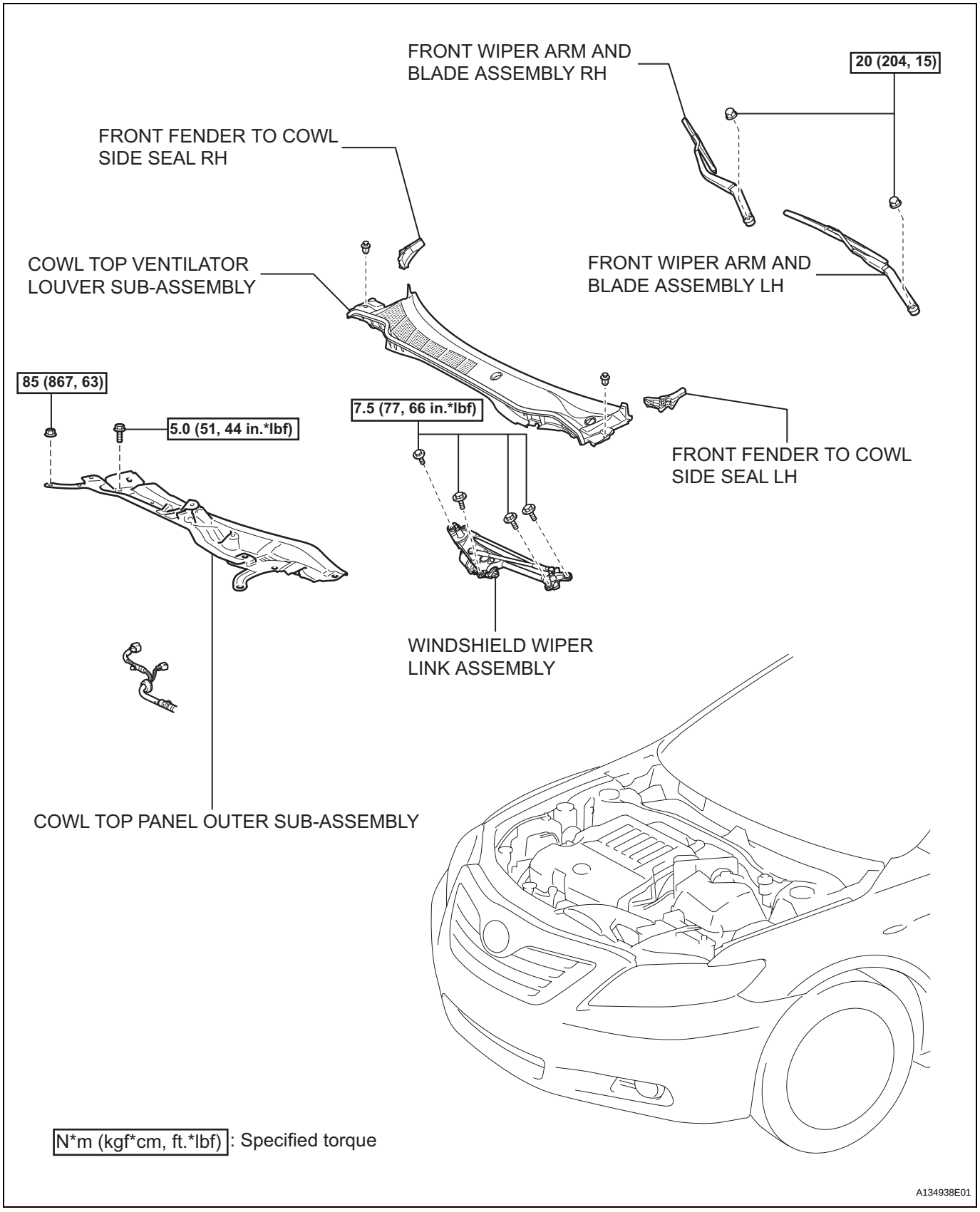
(d) Check the spark plug electrode gap.
Maximum electrode gap for used spark plug:
1.4 mm (0.055 in.)
If the gap is greater than the maximum, replace the spark plug.
Electrode gap for new spark plug:
1.0 to 1.1 mm (0.039 to 0.043 in.)



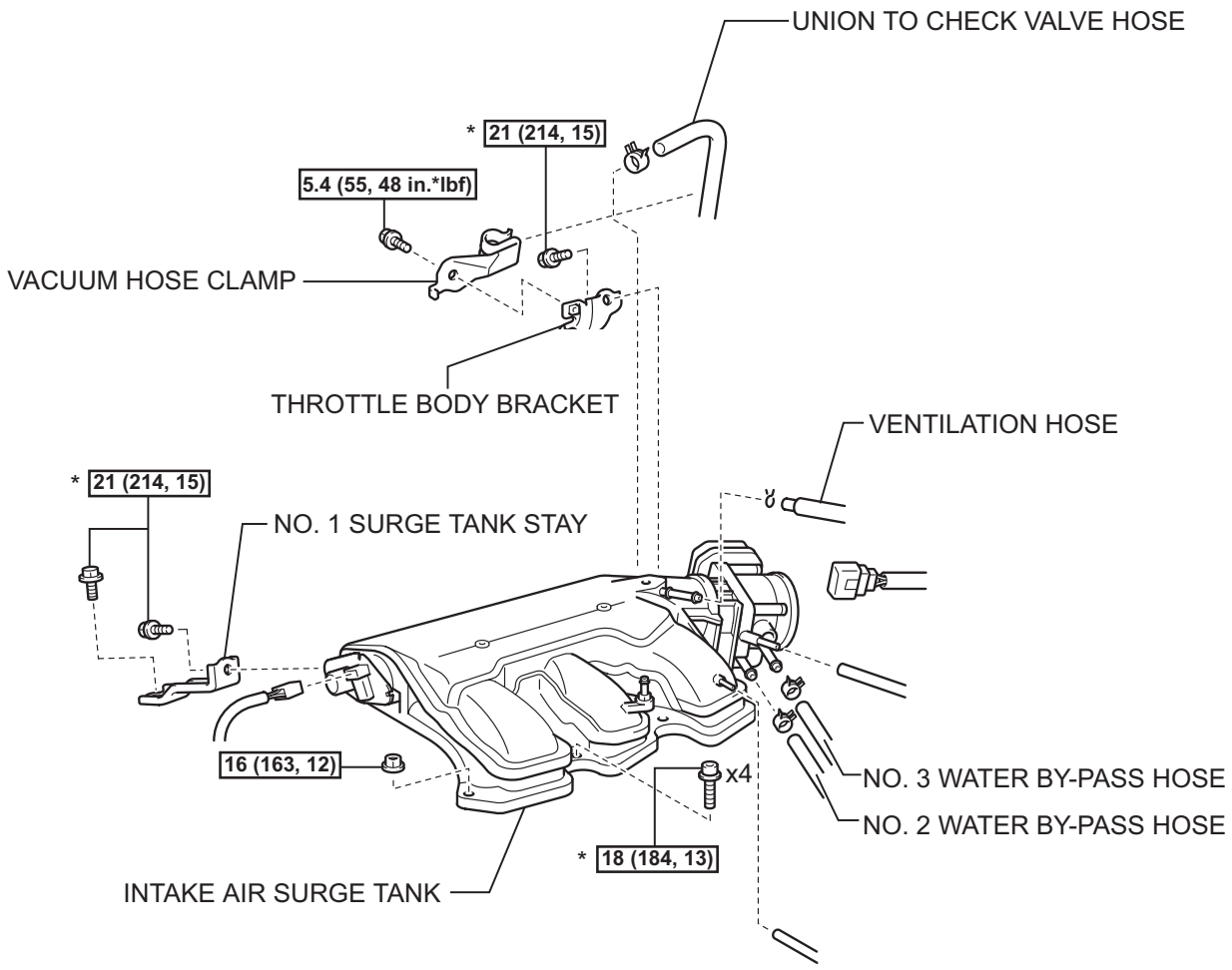
(e) Clean the spark plugs.
If the electrode has traces of wet carbon, clean the electrode with a spark plug cleaner and then dry it.
Standard air pressure:
588 kPa (6 kgf*cm^2, 85 psi)
Standard duration:
20 seconds or less
HINT:
Only use the spark plug cleaner when the electrode is free of oil. If the electrode has traces of oil, use gasoline to clean off the oil before using the spark plug cleaner.

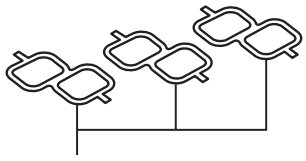
IGNITION COIL

COMPONENTS

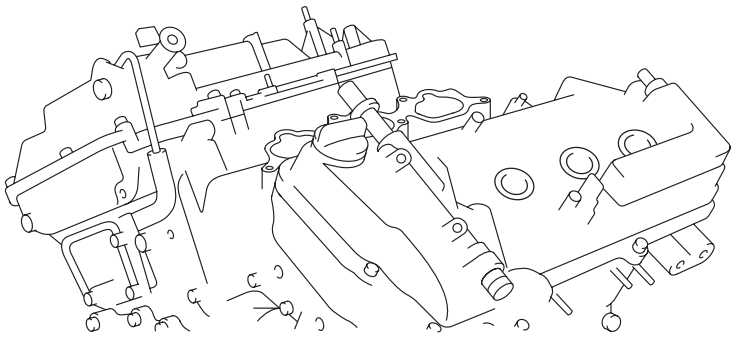


IG





● AIR SURGE TANK TO INTAKE MANIFOLD GASKET



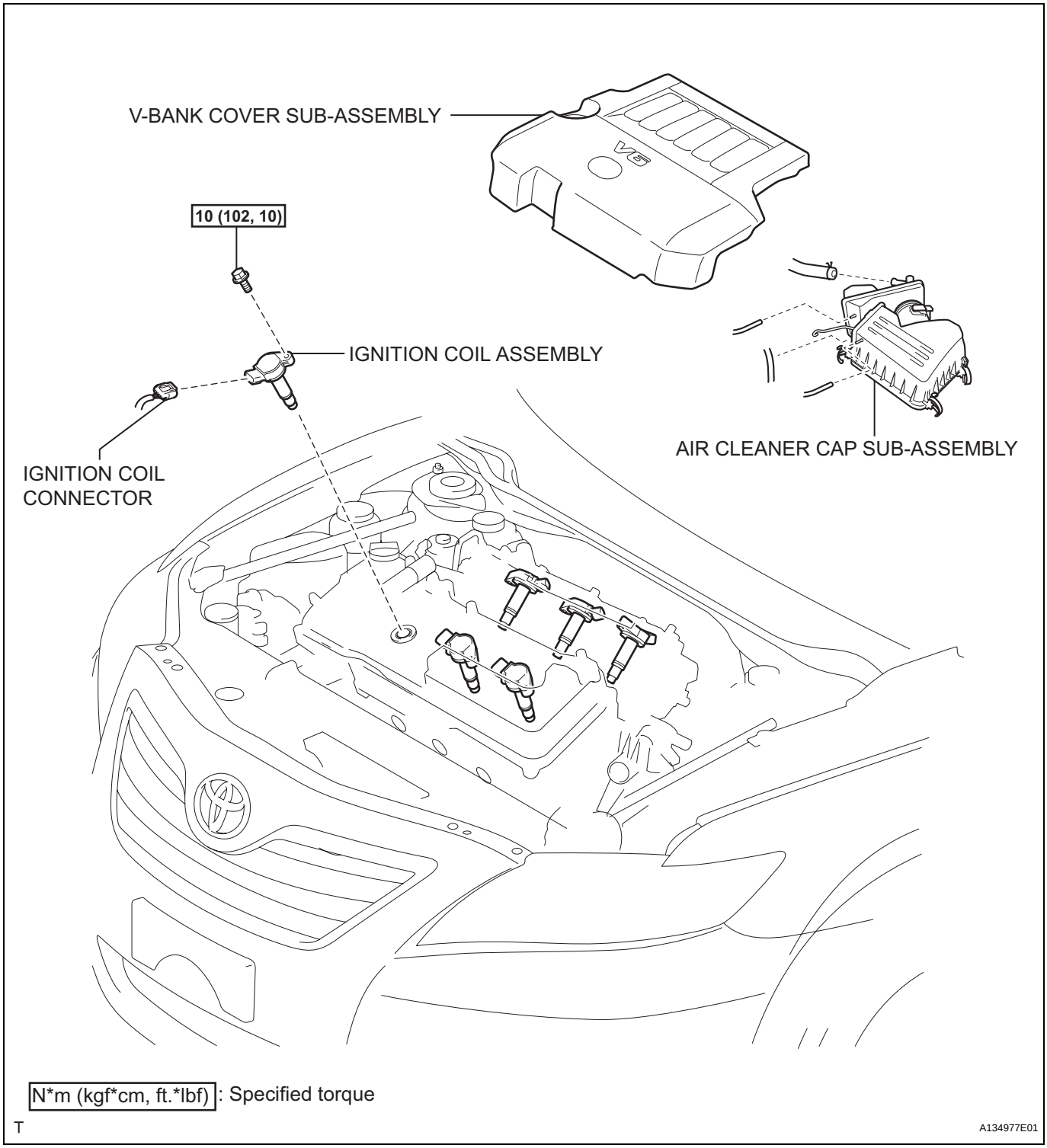
N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

* DO NOT apply oil

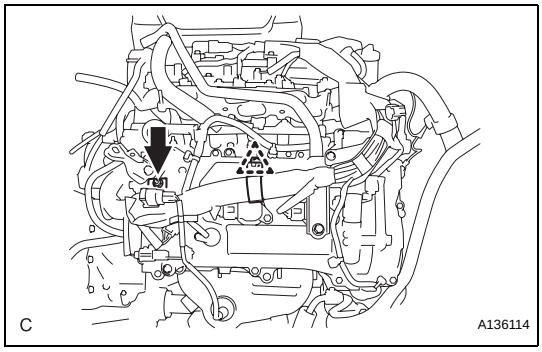
A141148E01

IG

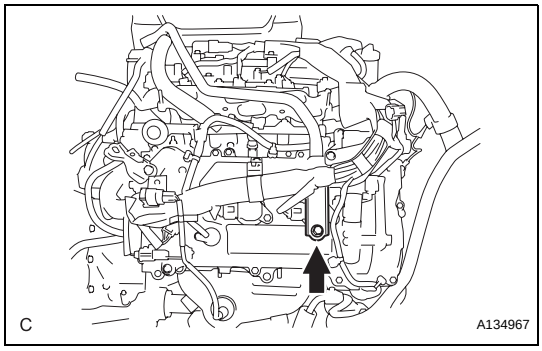

V-BANK COVER SUB-ASSEMBLY
10 (102, 10)
IGNITION COIL ASSEMBLY
IGNITION COIL
CONNECTOR
AIR CLEANER CAP SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
T
A134977E01

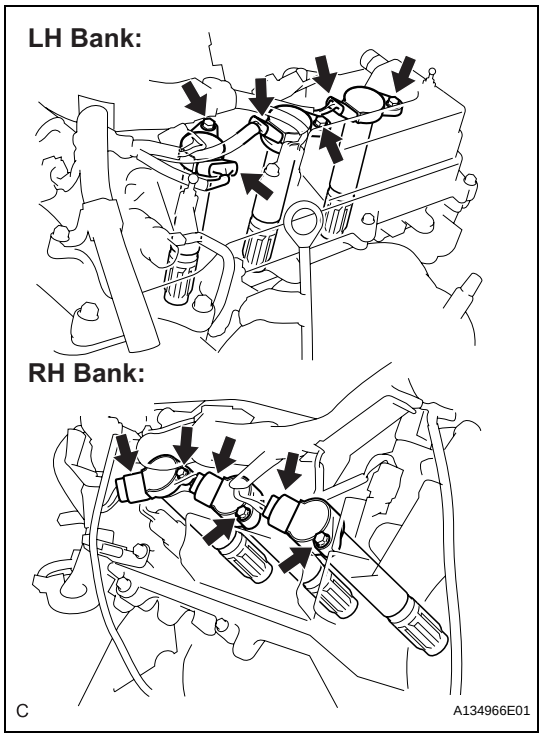
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **DRAIN ENGINE COOLANT (See page CO-5)**
3. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY** (See page WW-9)
4. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-424)**
5. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
6. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
7. **REMOVE INTAKE AIR SURGE TANK ASSEMBLY (See page EM-31)**
8. **REMOVE NO. 1 SURGE TANK STAY**
   (a) Remove the bolt and disconnect the harness clamp.



   (b) Remove the bolt and No. 1 surge tank stay.



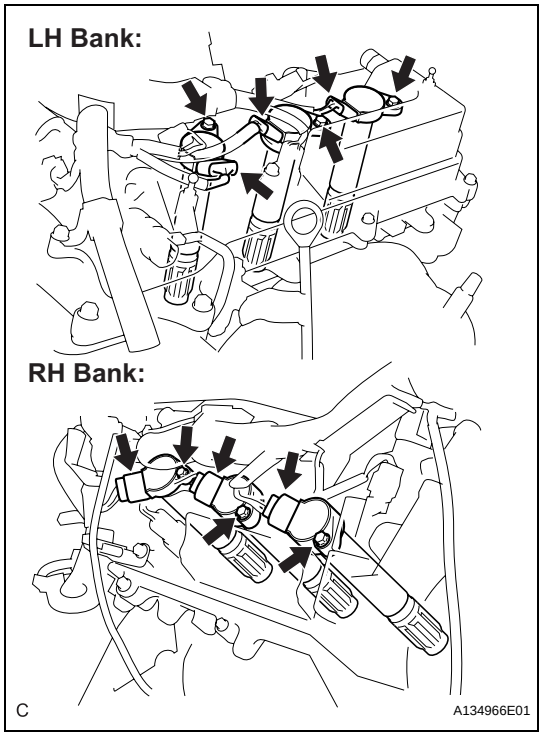


9. REMOVE IGNITION COIL ASSEMBLY

(a) Disconnect the 6 ignition coil connectors.

(b) Remove the 6 bolts and 6 ignition coils.

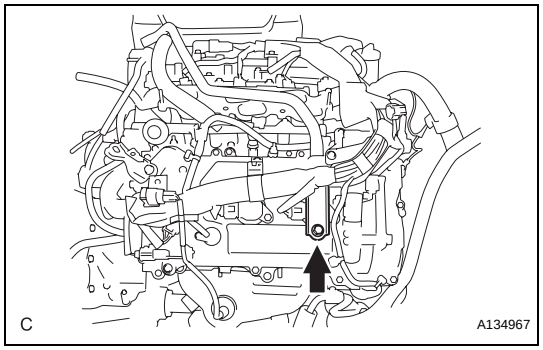
INSTALLATION



1. INSTALL IGNITION COIL ASSEMBLY

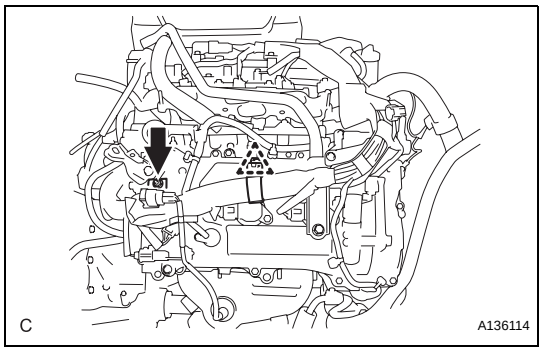
(a) Install the 6 ignition coils with the 6 bolts.
Torque: 10 N*m (102 kgf*cm, 10 ft.*lbf)

(b) Connect the 6 ignition coil connectors.



2. INSTALL NO. 1 SURGE TANK STAY

(a) Install the No. 1 surge tank stay with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
NOTICE:
Make sure that there is no oil on the bolt threads.

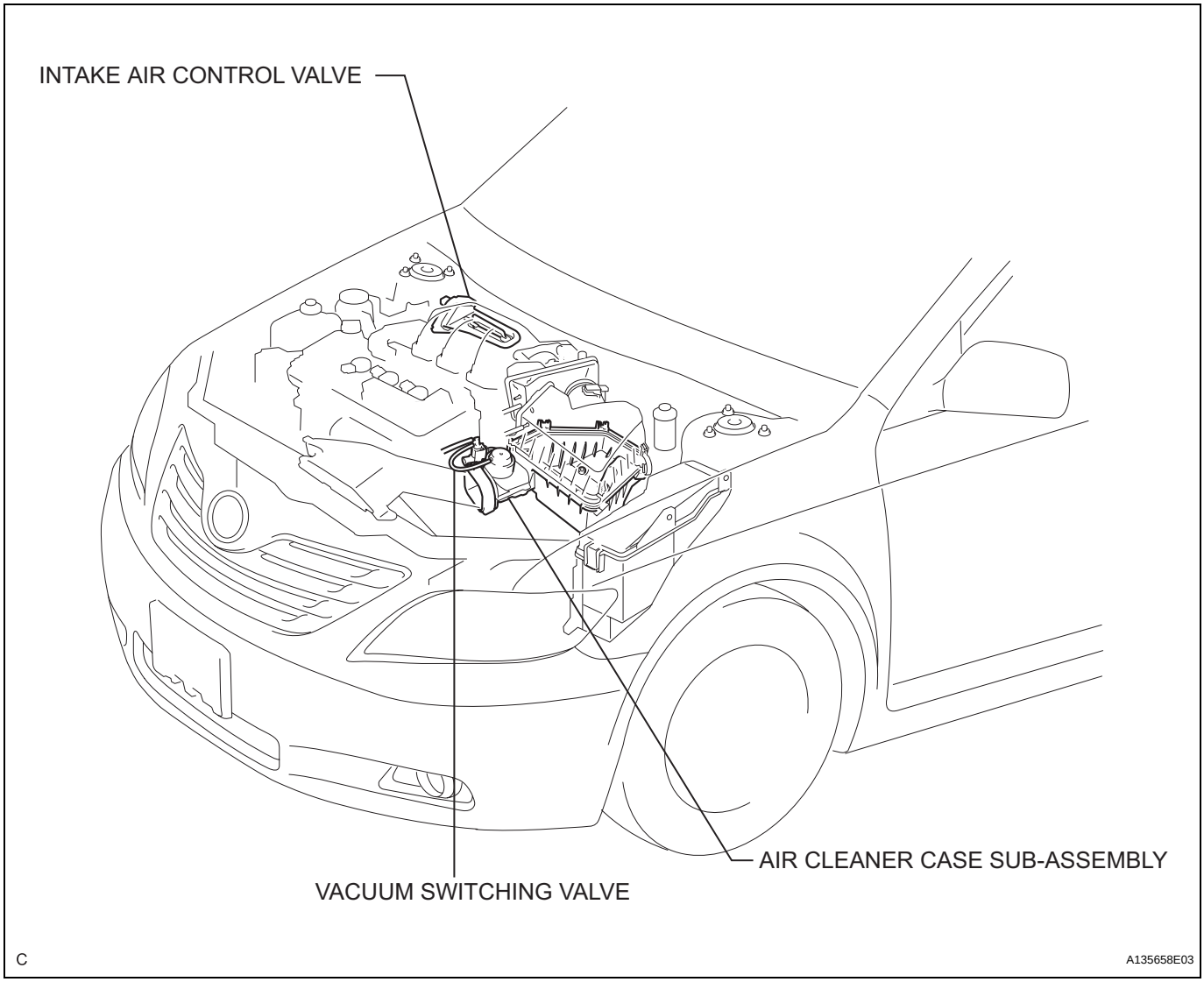


(b) Install the bolt and clamp.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)

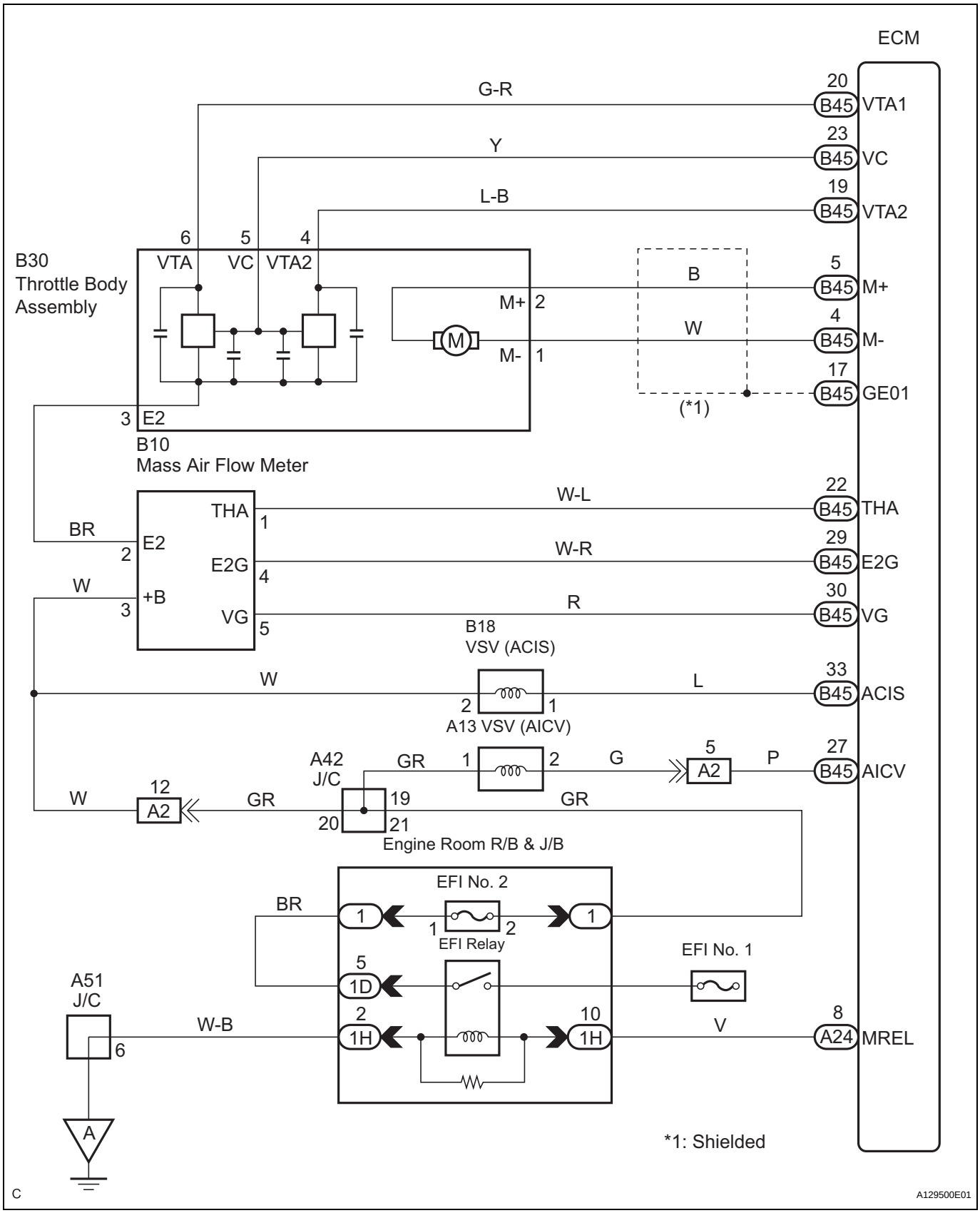
3. **INSTALL INTAKE AIR SURGE TANK ASSEMBLY (See page EM-42)**
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)**
6. **ADD ENGINE COOLANT (See page CO-6)**
7. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
8. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-426)**
9. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY** (See page WW-13)
10. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**

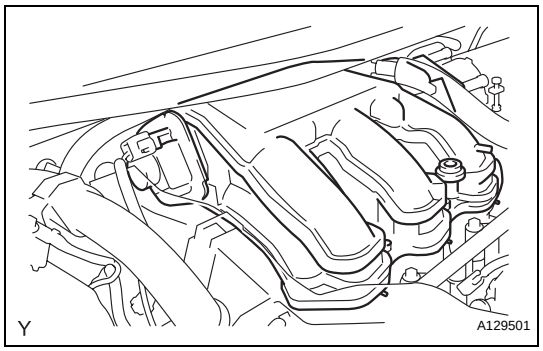
INTAKE AIR CONTROL SYSTEM

PARTS LOCATION



SYSTEM DIAGRAM

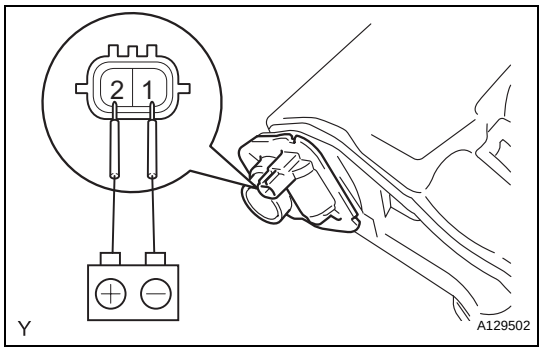




ON-VEHICLE INSPECTION

1. INSPECT INTAKE AIR CONTROL VALVE ASSEMBLY

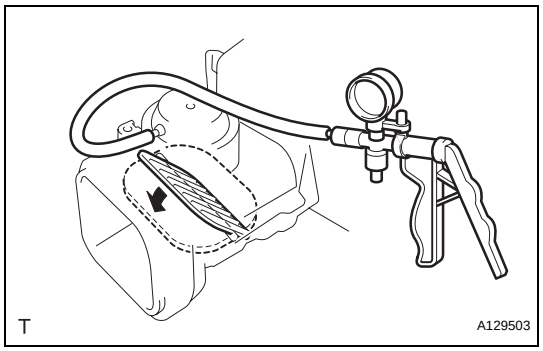
(a) Inspection procedure when using the intelligent tester:
  (1) Warm up the engine.
  (2) Stop the engine.
  (3) Connect the intelligent tester to the DLC3.
  (4) Turn the ignition switch on (IG).
  (5) Turn the tester on.
  (6) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / INTAKE CTL VSV1. Press the right or left button.
  (7) Make sure that a clicking sound is heard from the intake air control valve when current flows. If the result is not as specified, replace the intake air surge tank.



INSPECTION

1. INSPECT INTAKE AIR CONTROL VALVE

(a) Inspection procedure when applying voltage between the terminals:
  (1) Disconnect the connector from the intake air control valve.
  (2) Apply battery voltage between terminals 1 (-) and 2 (+) of the intake air control valve. Check that a clicking sound is heard from the intake air control valve.
  If the result is not as specified, replace the intake air surge tank.



2. INSPECT AIR CLEANER ASSEMBLY

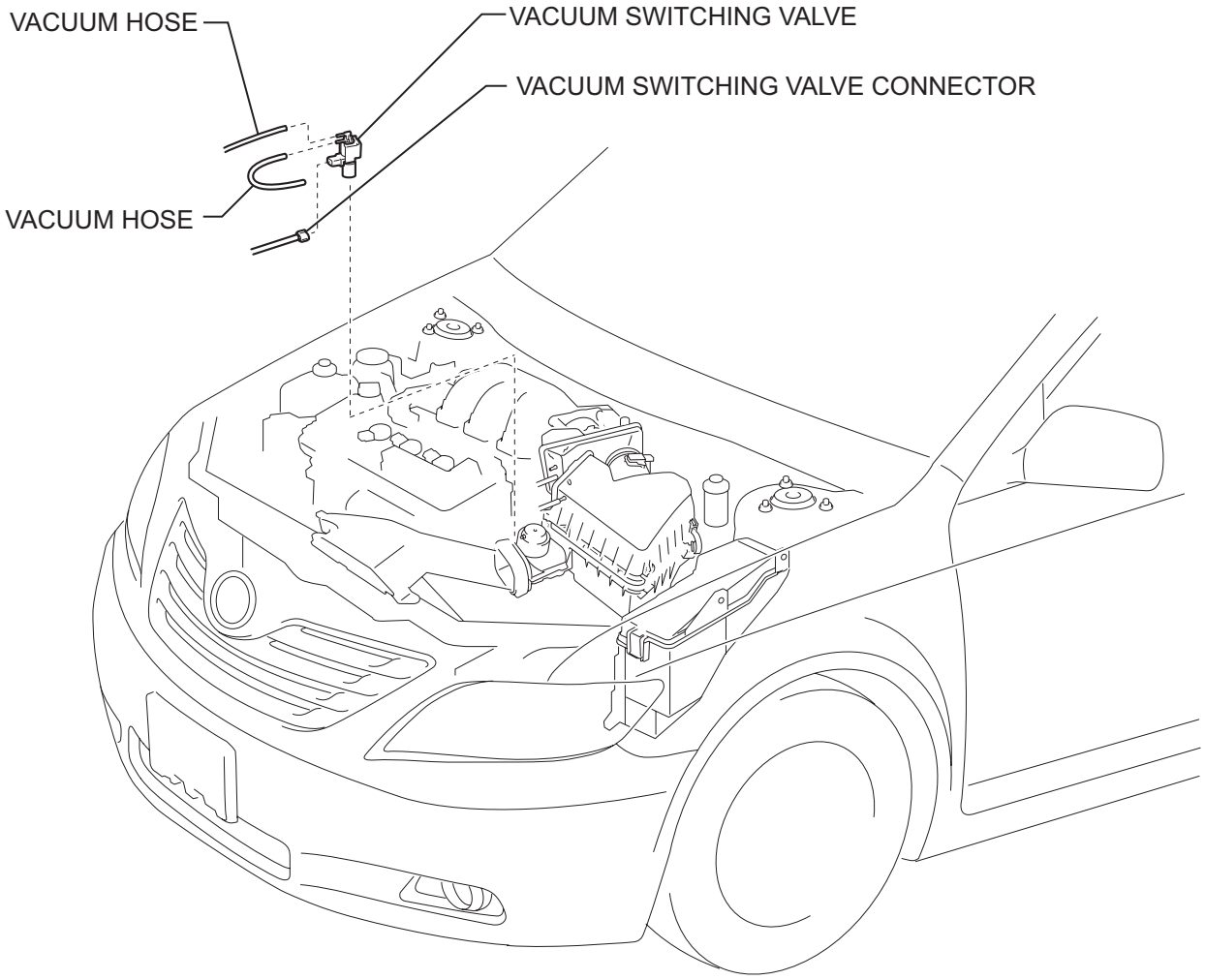
(a) Apply 26.6 kPa (200 mmHg, 7.9 in. Hg) of vacuum to the actuator. Check if the valve rotates open, as shown in the illustration.

(b) Apply vacuum for 1 minute. The actuator should continue to keep the valve open.
  If the result is not as specified, replace the air cleaner assembly.

IT

VACUUM SWITCHING VALVE

COMPONENTS

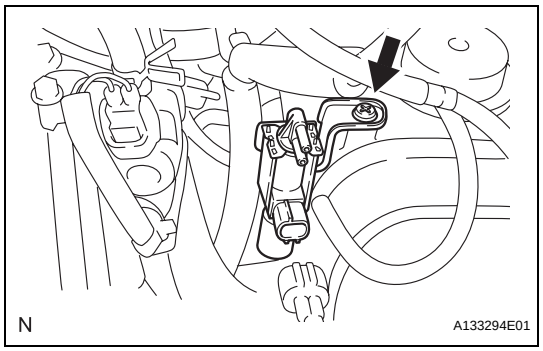


REMOVAL

1. REMOVE VACUUM SWITCHING VALVE

(a) Remove the 2 vacuum hoses and vacuum switching valve connector.

(b) Remove the screw and vacuum switching valve.



INSPECTION

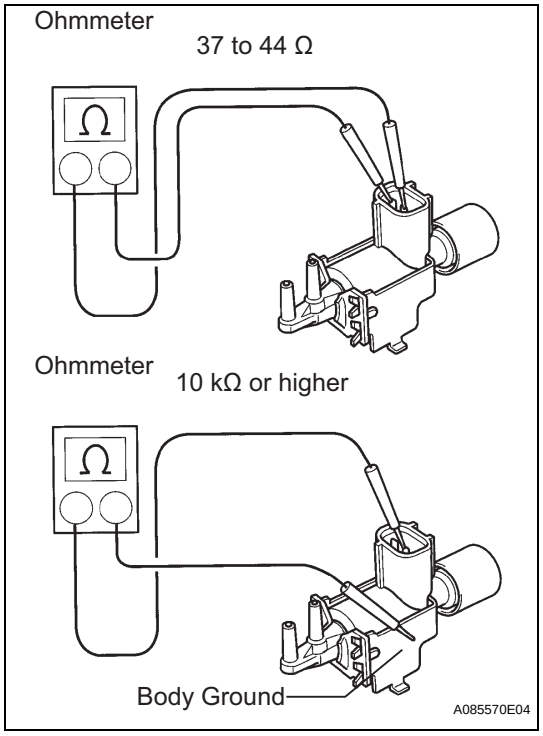
1. INSPECT VACUUM SWITCHING VALVE

(a) Measure the VSV resistance.

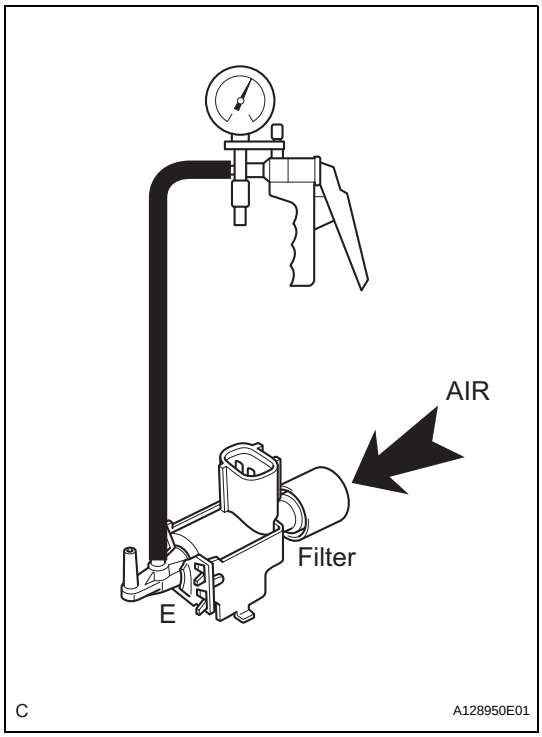
Standard resistance

Tester Connection	Specified Condition
1-2	37 to 44 Ω at 20 °C (68°F)
1 - Body ground 2 - Body ground	10 kΩ or higher

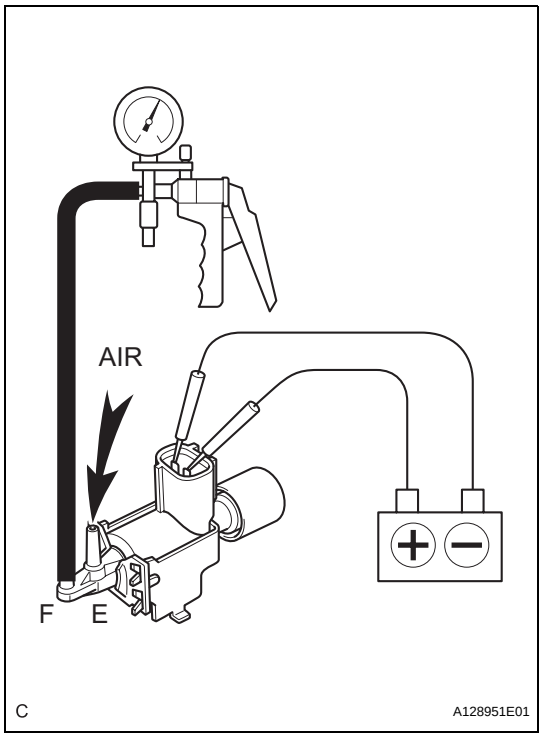
If the result is not as specified, replace the VSV.



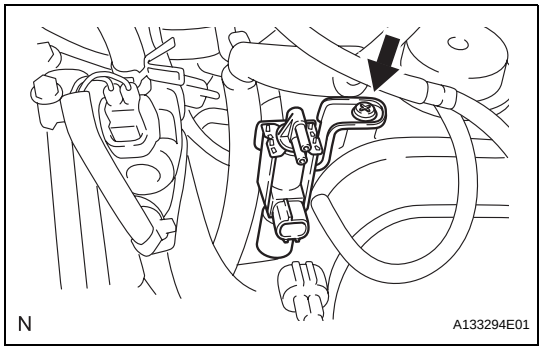
IT



(b) Check VSV operation.
(1) When vacuum is applied to the E port, check that air is sucked into the filter.
If the result is not as specified, replace the VSV.



(2) Apply battery voltage across the terminals.
When vacuum is applied to the F port, check that air is sucked into the E port.
If the result is not as specified, replace the VSV.



INSTALLATION

1. REMOVE VACUUM SWITCHING VALVE

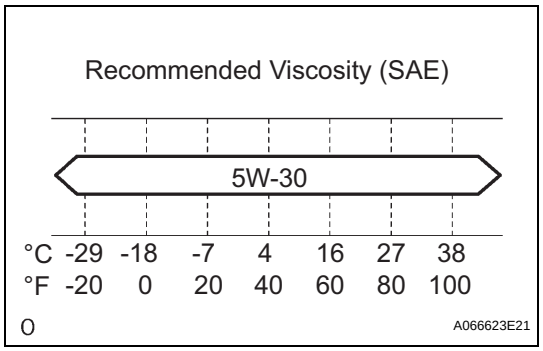
(a) Install the vacuum switching valve with the screw.
(b) Install the 2 vacuum hoses and vacuum switching valve.

LUBRICATION SYSTEM

ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

(a) Warm up the engine, stop it and wait 5 minutes. The oil level should be between the dipstick's low level mark and full level mark.
If low, check for leakage and add oil up to the full level mark.
NOTICE:
Do not fill above the full level mark.

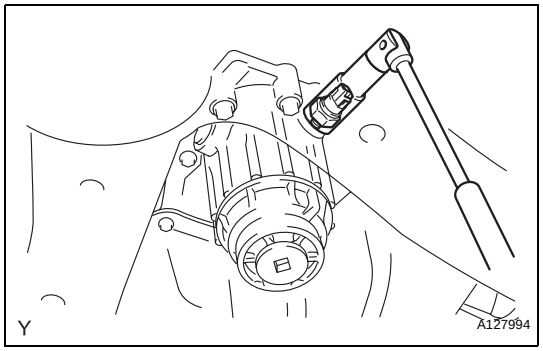


2. CHECK ENGINE OIL QUALITY

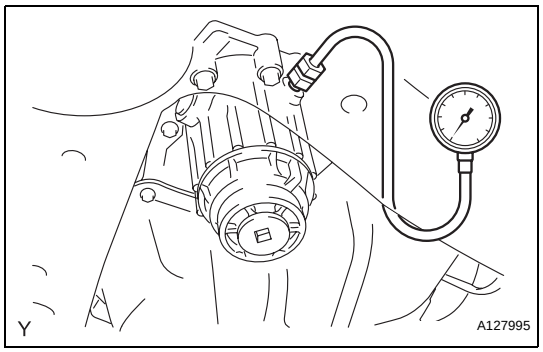
(a) Check the oil for deterioration, water contamination, discoloring or thinning.
If the quality is visibly poor, replace the oil.
Oil grade:
Use ILSAC multigrade engine oil. SAE 5W-30 engine oil may be used. However, SAE 5W-30 is the best choice for good fuel economy and good starting in cold weather.

3. CHECK OIL PRESSURE

(a) Remove the engine under cover LH.
(b) Remove the engine under cover RH.
(c) Disconnect the oil pressure switch connector.
(d) Using a 24 mm deep socket wrench, remove the oil pressure switch.



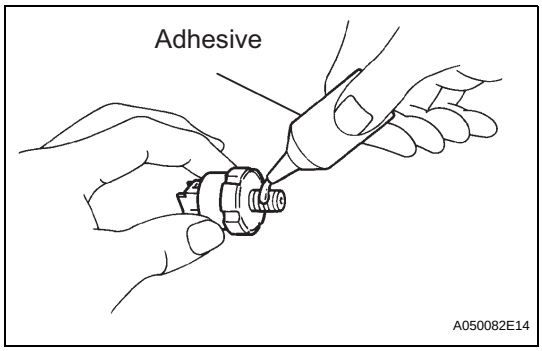
(e) Install the oil pressure gauge with adapter.
(f) Warm up the engine.
(g) Measure the oil pressure.
Standard oil pressure



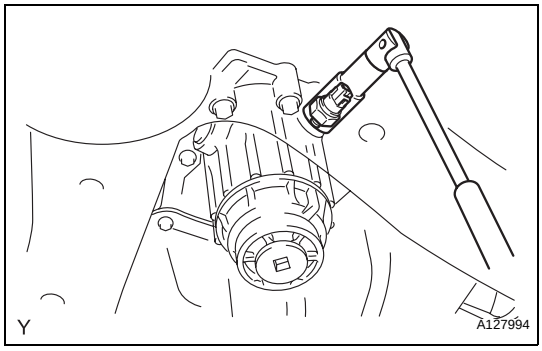
Engine Condition	Oil Pressure
Idle	80 kPa (0.8 kgf*cm^2, 11.6 psi) or more
6,000 rpm	380 kPa (3.9 kgf*cm^2, 55.5 psi) or more

If the oil pressure is not as specified, check the oil pump (See page LU-13).

LU



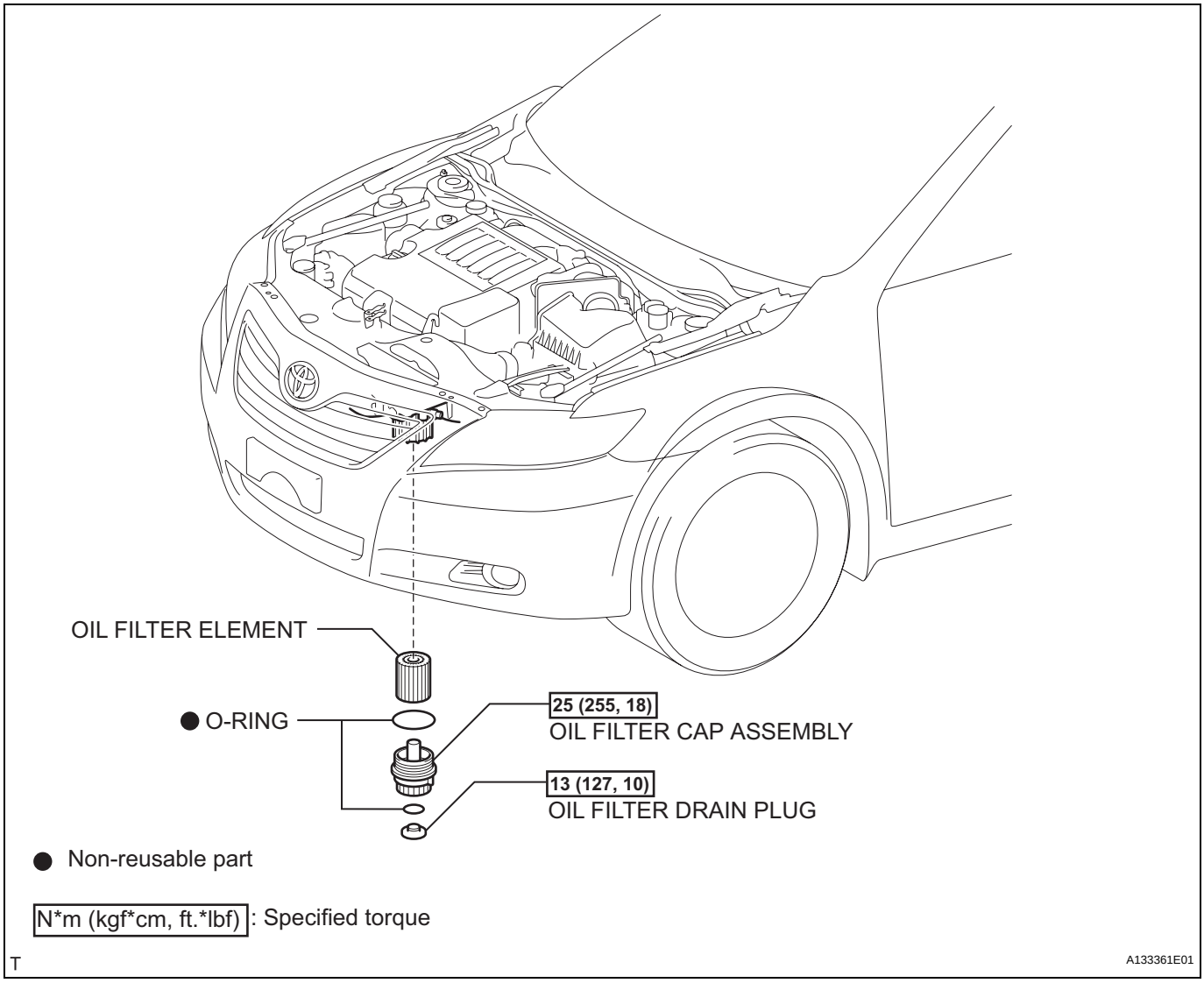
(h) Remove the oil pressure gauge.
(i) Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent



(j) Using a 24 mm deep socket wrench, install the oil pressure switch.
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)
NOTICE:
Do not start the engine within 1 hour after installation.
(k) Connect the oil pressure switch connector.
(l) Check for engine oil leaks.
(m) Remove the engine under cover RH.
(n) Remove the engine under cover LH.

OIL FILTER

COMPONENTS



REPLACEMENT

CAUTION:

- **Prolonged and repeated contact with engine oil will result in the removal of natural oils from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Precautions should be taken when replacing engine oil to minimize the risk of your skin making contact with used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be washed with soap and water, or use water-less hand cleaner, to remove any used engine oil thoroughly. Do not use gasoline, thinners, or solvents.**
- **In order to preserve the environment, used oil and used oil filters must be disposed of at designated disposal sites.**

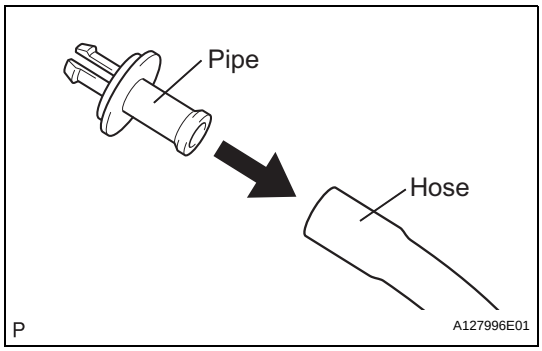
1. DRAIN ENGINE OIL

(a) Remove the oil filler cap.

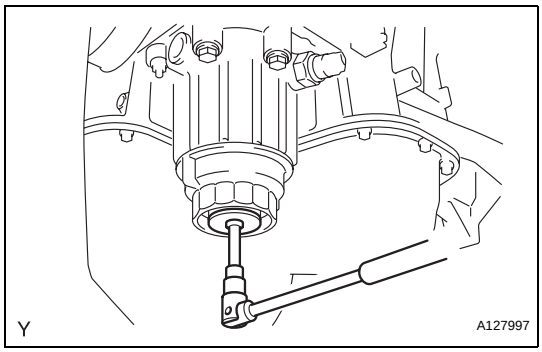
(b) Remove the oil drain plug and drain the oil into a container.

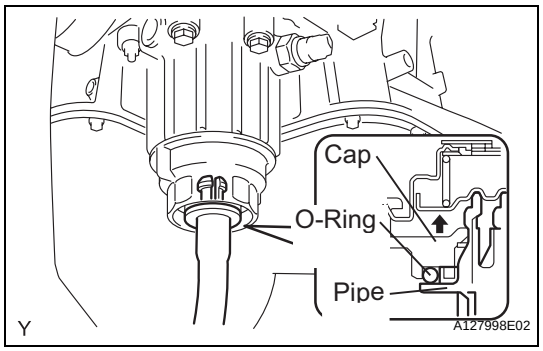
2. REMOVE OIL FILTER ELEMENT

(a) Connect the hose with an inside diameter of 15 mm (0.59 in.) to the pipe.

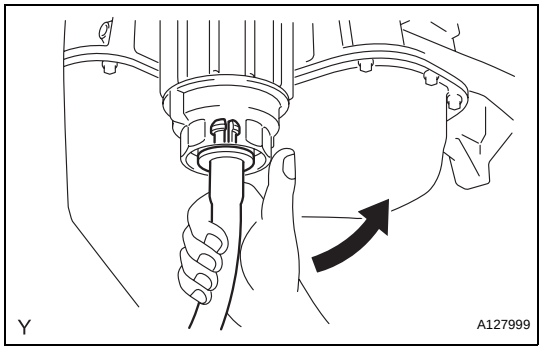


(b) Remove the oil filter drain plug from the oil filter cap.

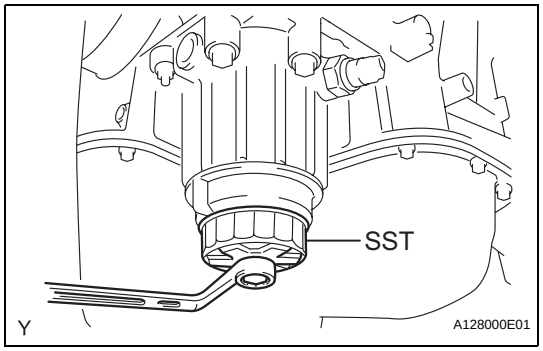




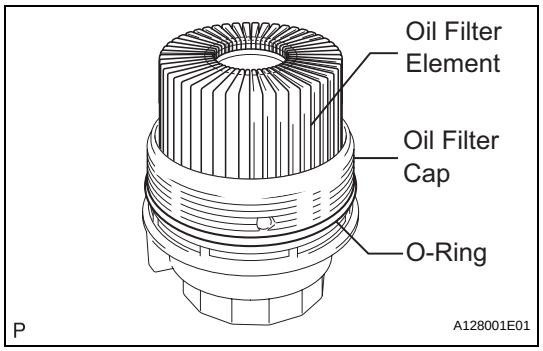
(c) Insert the pipe with the hose into the oil filter cap.
NOTICE:
Be sure to insert the pipe with the O-ring installed on the oil filter cap side.
HINT:
Place the hose end into a container before draining the oil from the hose.



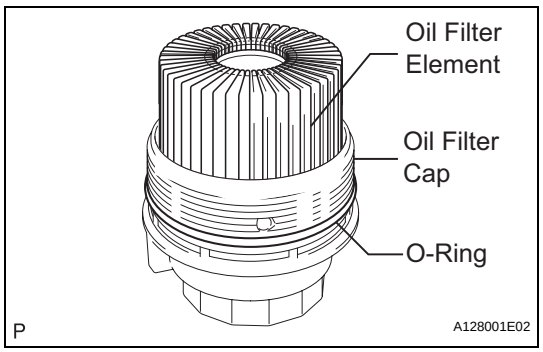
(d) Make sure that oil is completely drained, and remove the pipe and O-ring.
HINT:
Be sure to turn the pipe in the direction of the arrow to remove it.



(e) Using SST, remove the oil filter cap.
SST 09228-06501



(f) Remove the oil filter element and O-ring from the oil filter cap.
NOTICE:
Do not use any tools to remove the O-ring in order to prevent the cap from being damaged. Be sure to remove it by hand.



3. INSTALL OIL FILTER ELEMENT

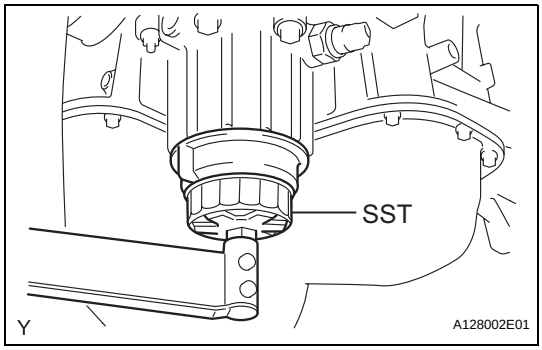
(a) Clean the inside of the oil filter cap, threads, and O-ring groove.

(b) Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.
NOTICE:
Make sure that the O-ring does not get twisted on the groove.

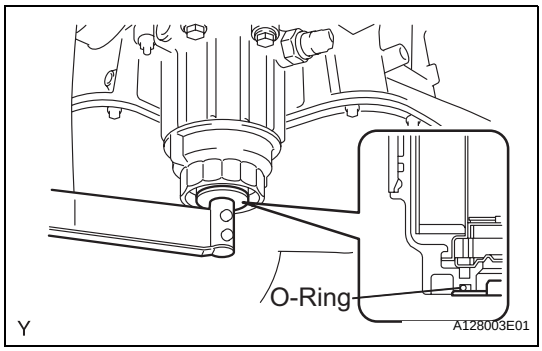
(c) Install a new oil filter element to the oil filter cap.

(d) Remove all dirt and foreign matter from the installation surface and the inside of the cap on the engine side.

(e) Apply a light coat of engine oil to the O-ring again and install the oil filter cap.
NOTICE:
Make sure that the O-ring does not get caught between the parts.



(f) Using SST, install the oil filter cap.
SST 09228-06501
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
NOTICE:
Make sure that there is no clearance between the parts after tightening the oil filter cap.



(g) Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.
NOTICE:
Remove all dirt and foreign matter from the installation surface.

(h) Install the oil filter drain plug to the oil filter cap.
Torque: 13 N*m (127 kgf*cm, 10 ft.*lbf)
NOTICE:
Make sure that the O-ring does not get caught between the parts.

4. ADD ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

(b) Add new oil.
Standard capacity

Item	Standard Condition
Drain and refill with oil filter change	6.1 liters (6.4 US qts, 5.4 lmp. qts)
Drain and refill without oil filter change	5.7 liters (6.0 US qts, 5.0 lmp. qts)
Dry fill	6.5 liters (6.9 US qts, 5.7 lmp. qts)

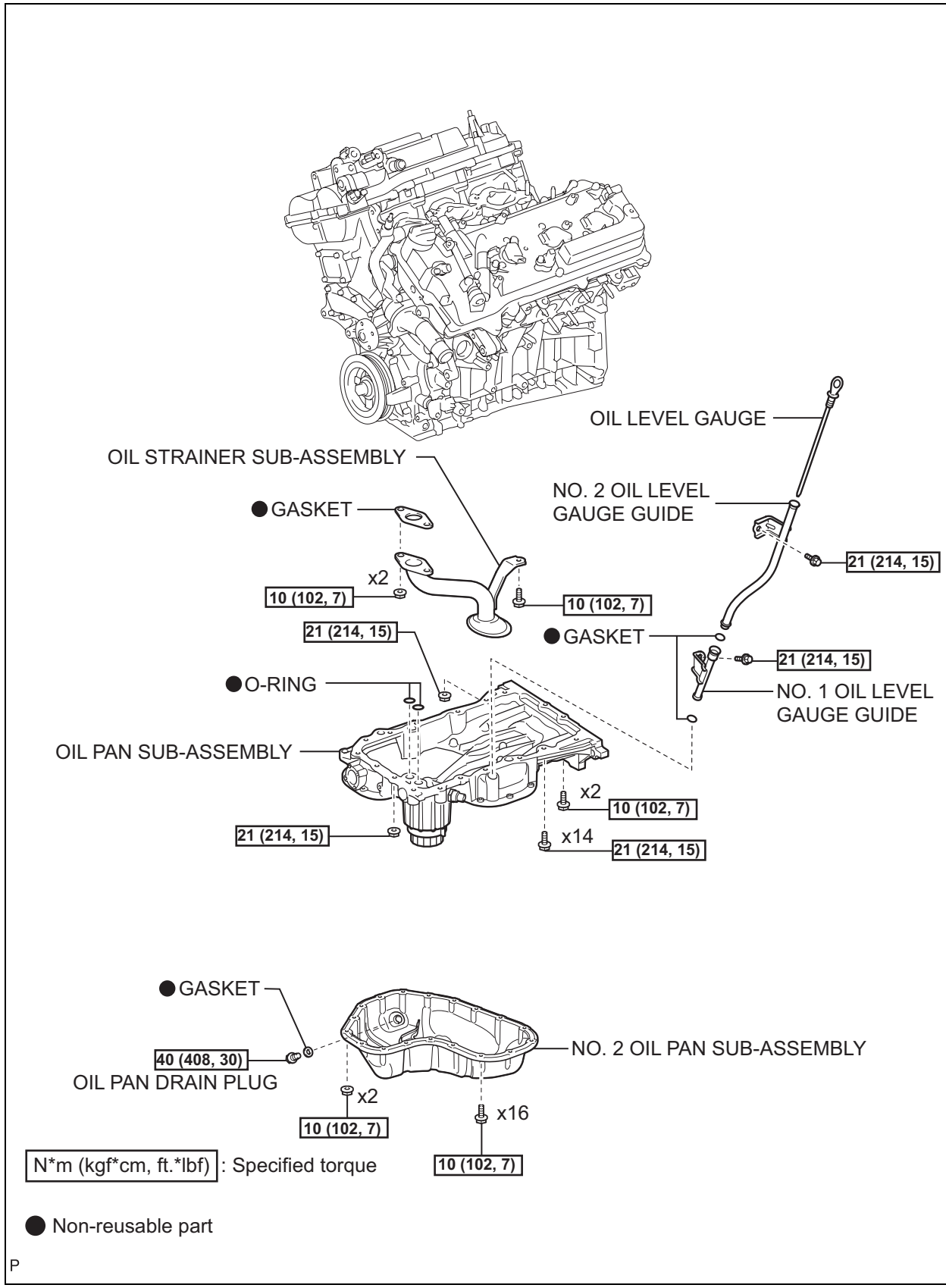
(c) Install the oil filler cap.

5. CHECK FOR ENGINE OIL LEAKS

(a) Start the engine. Check for engine oil leaks from the connected parts of the oil filter cap and oil filter drain plug.

OIL PUMP

COMPONENTS



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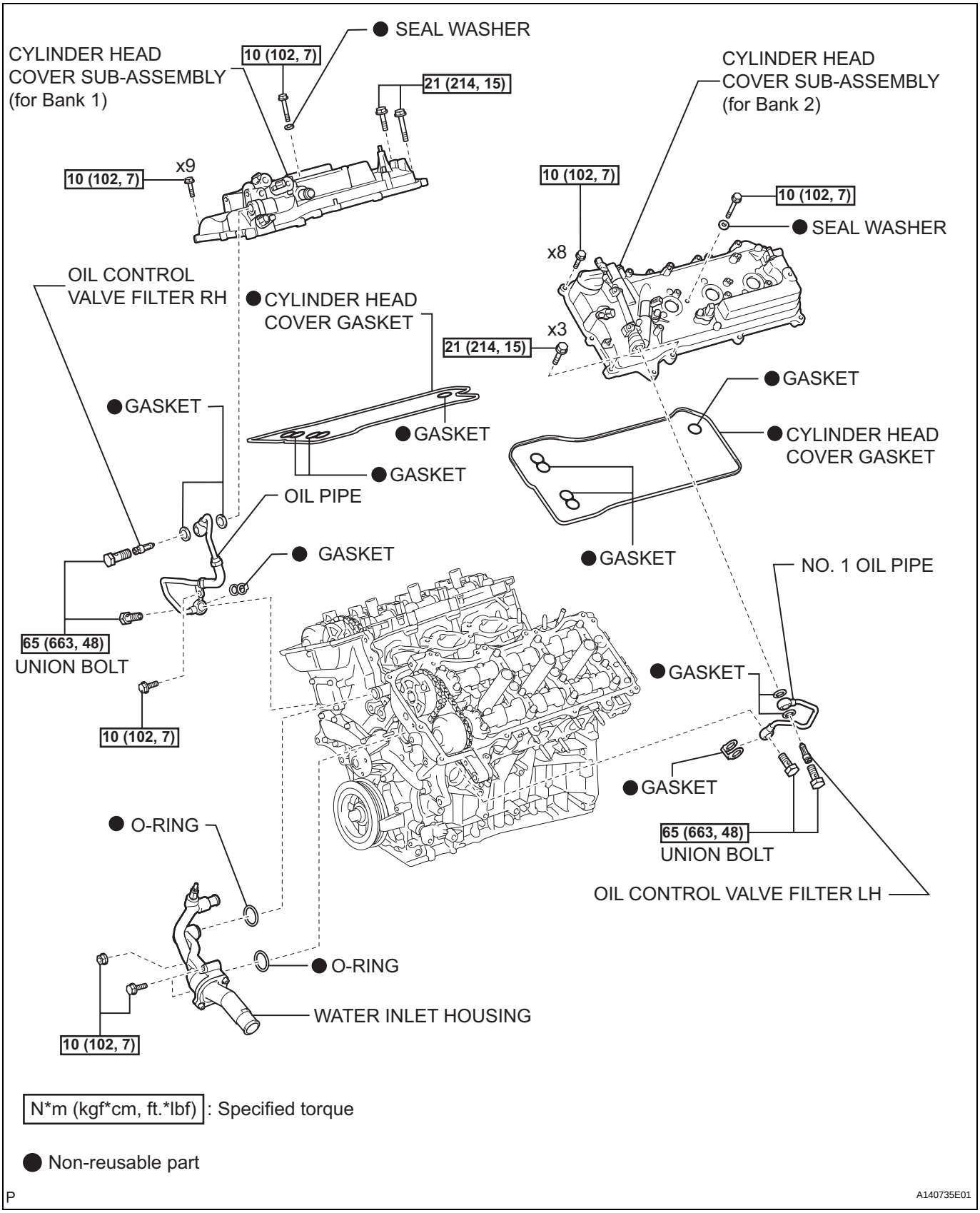
SEAL WASHER
CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1)
10 (102, 7)
21 (214, 15)
x9
10 (102, 7)
CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2)
10 (102, 7)
10 (102, 7)
SEAL WASHER
x8
OIL CONTROL VALVE FILTER RH
CYLINDER HEAD COVER GASKET
x3
21 (214, 15)
GASKET
GASKET
GASKET
GASKET
GASKET
CYLINDER HEAD COVER GASKET
OIL PIPE
GASKET
GASKET
NO. 1 OIL PIPE
65 (663, 48)
UNION BOLT
10 (102, 7)
GASKET
GASKET
65 (663, 48)
UNION BOLT
OIL CONTROL VALVE FILTER LH
O-RING
O-RING
WATER INLET HOUSING
10 (102, 7)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
P
A140735E01

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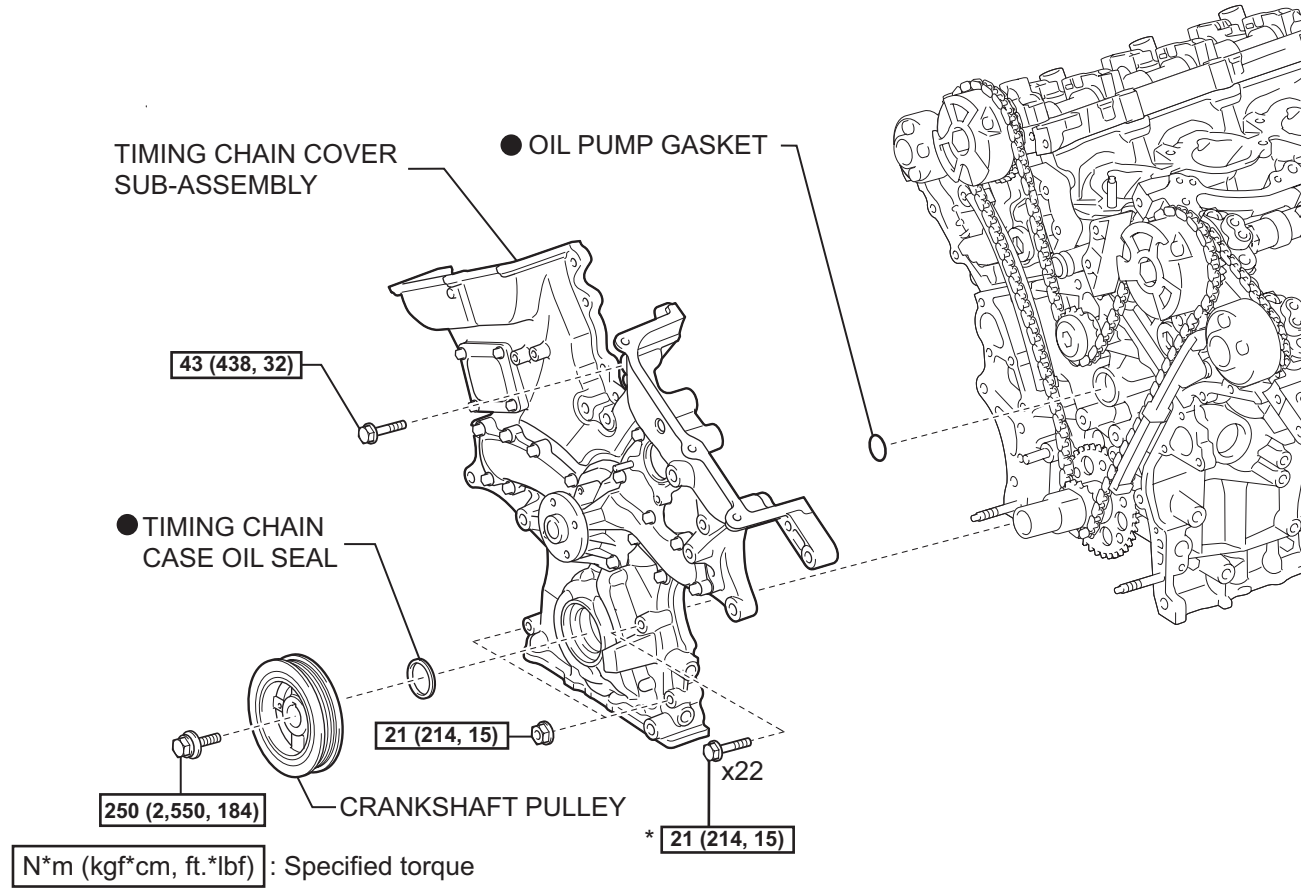
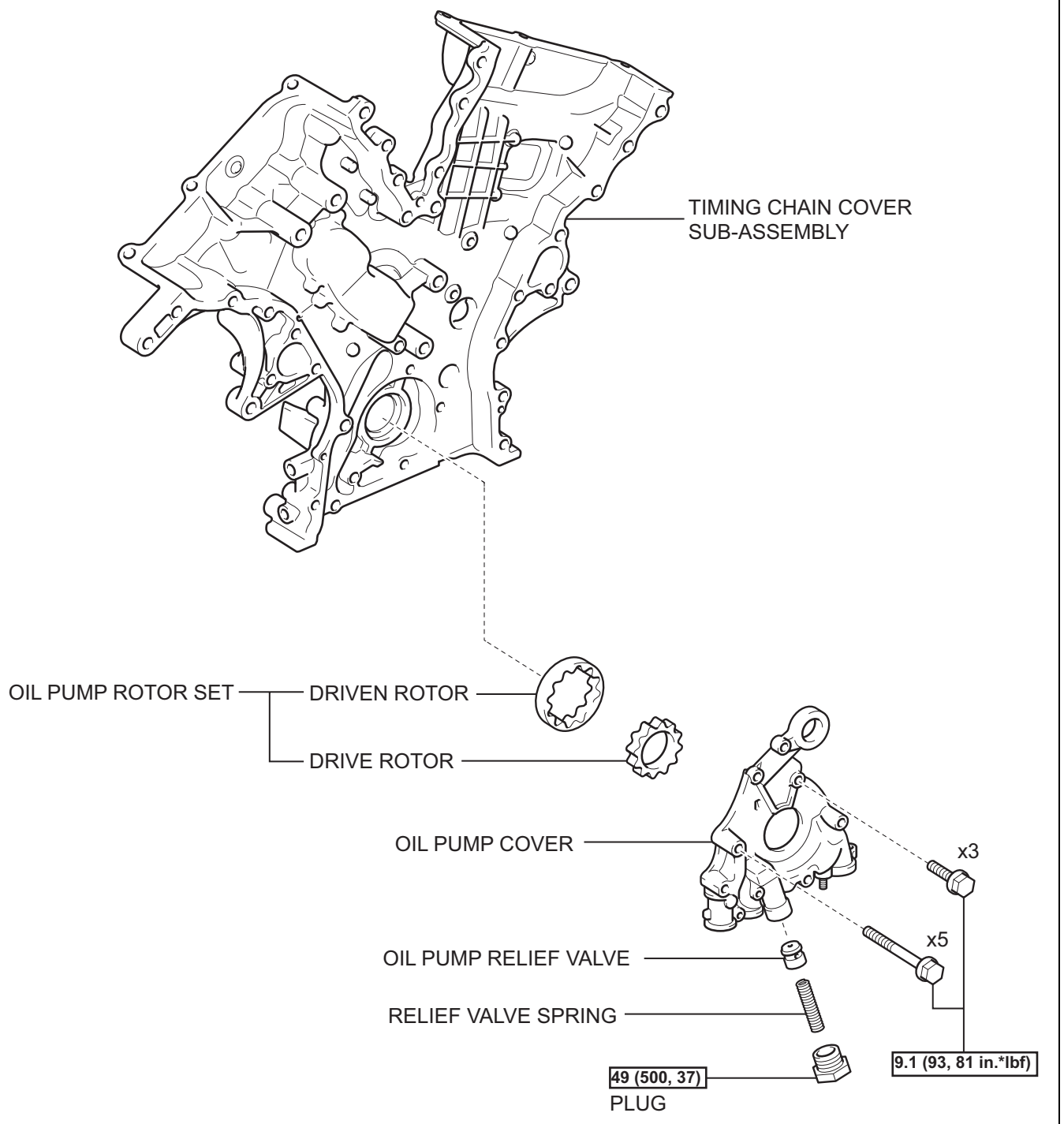

TIMING CHAIN COVER SUB-ASSEMBLY
● OIL PUMP GASKET
43 (438, 32)
● TIMING CHAIN CASE OIL SEAL
21 (214, 15)
x22
250 (2,550, 184)
CRANKSHAFT PULLEY
* 21 (214, 15)
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
* DO NOT apply oil
P
A132051E03


TIMING CHAIN COVER SUB-ASSEMBLY
OIL PUMP ROTOR SET
DRIVEN ROTOR
DRIVE ROTOR
OIL PUMP COVER
x3
x5
OIL PUMP RELIEF VALVE
RELIEF VALVE SPRING
9.1 (93, 81 in.*lbf)
49 (500, 37)
PLUG
N*m (kgf*cm, ft.*lbf) : Specified torque
P
A132054E05

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REMOVAL

1. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE** (See page EM-29)
2. **SECURE ENGINE** (See page EM-30)
3. **REMOVE INTAKE AIR SURGE TANK ASSEMBLY** (See page FU-13)
4. **REMOVE IGNITION COIL ASSEMBLY (See page EM-32)**
5. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-32)**
6. **REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH (See page EM-32)**
7. **REMOVE OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY (See page EM-33)**
8. **REMOVE NO. 2 MANIFOLD STAY (See page EM-33)**
9. **REMOVE NO. 2 EXHAUST MANIFOLD HEAT INSULATOR (See page EM-33)**
10. **REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY LH (See page EM-33)**
11. **REMOVE ENGINE MOUNTING BRACKET RH (See page EM-33)**
12. **REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-34)**
13. **REMOVE NO. 2 TIMING GEAR COVER (See page EM-34)**
14. **REMOVE NO. 2 IDLER PULLEY SUB-ASSEMBLY (See page EM-34)**
15. **REMOVE WATER PUMP PULLEY (See page CO-8)**
16. **REMOVE RADIO SETTING CONDENSER (See page EM-35)**
17. **REMOVE NO. 1 VACUUM SWITCHING VALVE ASSEMBLY (See page EM-35)**
18. **REMOVE NO. 1 OIL PIPE (See page EM-65)**
19. **REMOVE OIL PIPE (See page EM-65)**
20. **REMOVE CRANKSHAFT PULLEY (See page EM-67)**
21. **REMOVE NO. 1 ENGINE MOUNTING BRACKET FRONT LH (See page EM-68)**
22. **REMOVE WATER INLET HOUSING (See page EM-68)**
23. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1) (See page EM-69)**
24. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2) (See page EM-69)**

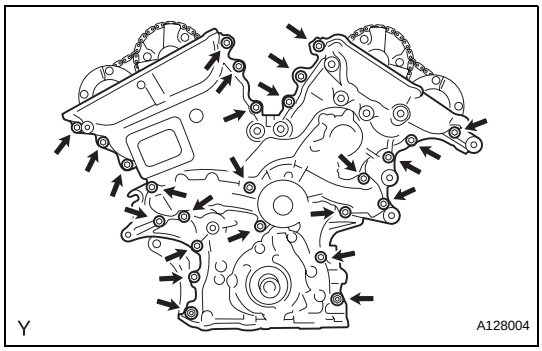
25. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY (See page EM-70)

26. REMOVE OIL STRAINER SUB-ASSEMBLY (See page EM-70)

27. REMOVE OIL PAN SUB-ASSEMBLY (See page EM-70)

28. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY

(a) Remove the 23 bolts and 2 nuts as shown in the illustration.



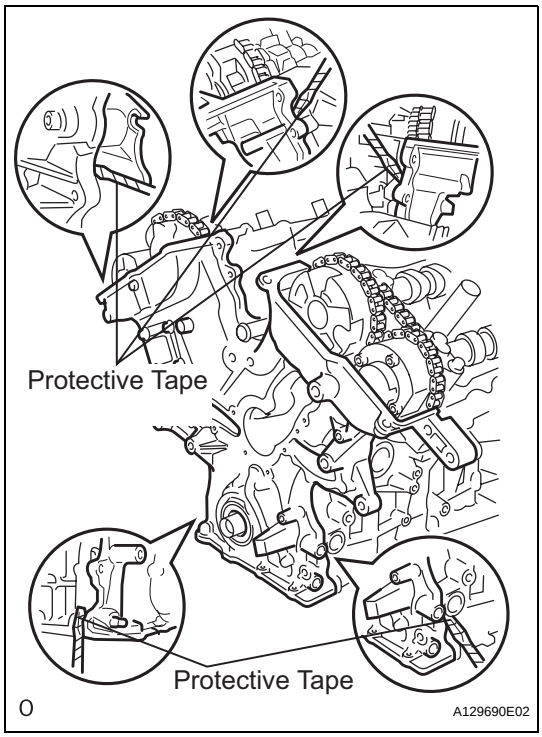
(b) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

NOTICE:

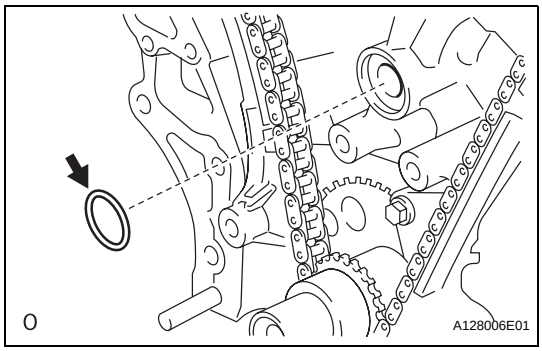
Be careful not to damage the contact surfaces of the cylinder head, cylinder block and chain cover.

HINT:

Tape the screwdriver tip before use.



(c) Remove the gasket.



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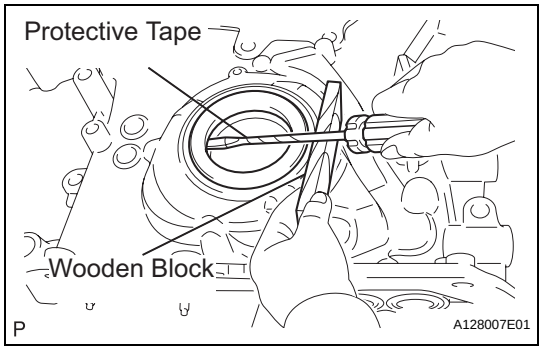
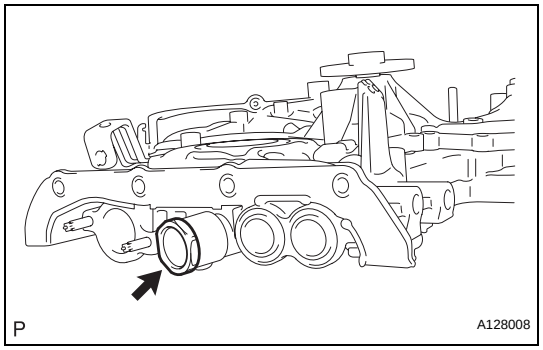


29. REMOVE TIMING CHAIN CASE OIL SEAL

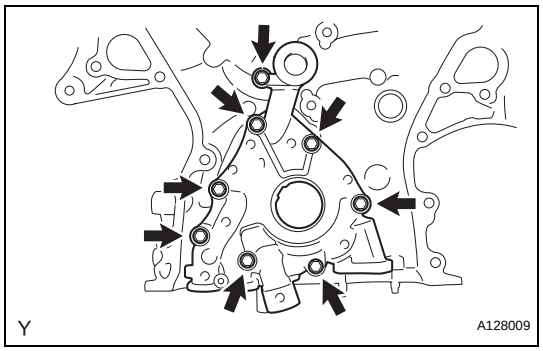
(a) Using a screwdriver, pry out the oil seal.
HINT:
Tape the screwdriver tip before use.

DISASSEMBLY



1. REMOVE OIL PUMP RELIEF VALVE

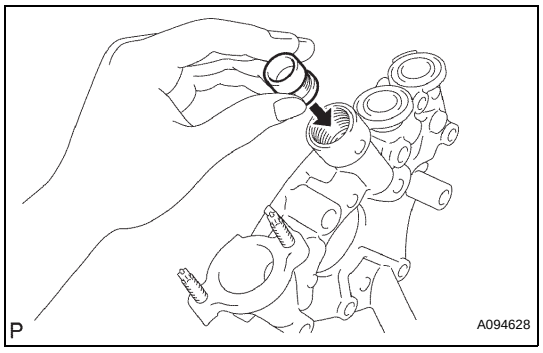
(a) Using a 27 mm socket wrench, remove the relief valve plug.
(b) Remove the valve spring and oil pump relief valve.



2. REMOVE OIL PUMP COVER

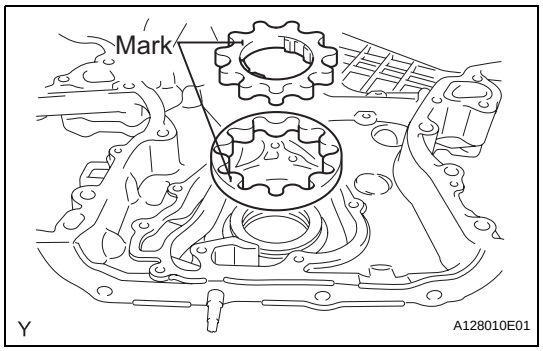
(a) Remove the 8 bolts, oil pump cover and oil pump rotor set.

INSPECTION



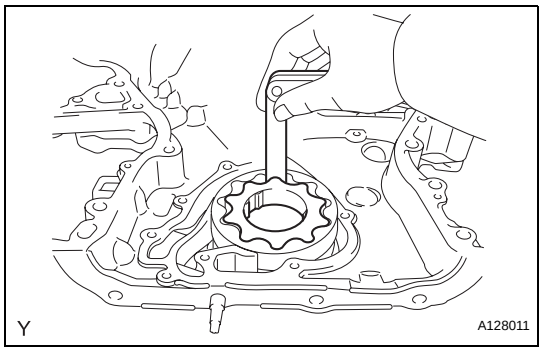
1. INSPECT OIL PUMP RELIEF VALVE

(a) Coat the relief valve with engine oil and check that it falls smoothly into the valve hole under its own weight.
If the valve does not fall smoothly, replace the relief valve. If necessary, replace the oil pump assembly.



2. INSPECT OIL PUMP ROTOR SET

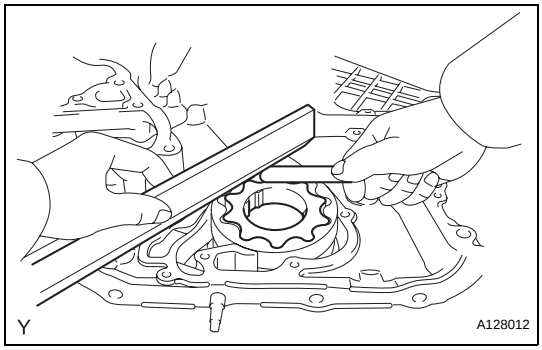
(a) Install the rotors to the timing chain cover with the rotors' marks facing outward. Check that the rotors revolve smoothly.



(b) Check the tip clearance.
(1) Using a feeler gauge, measure the clearance between the drive and driven rotors, as shown in the illustration.
Tip clearance

Standard	Maximum
0.060 to 0.160 mm (0.0024 to 0.0063 in.)	0.16 mm (0.0063 in.)

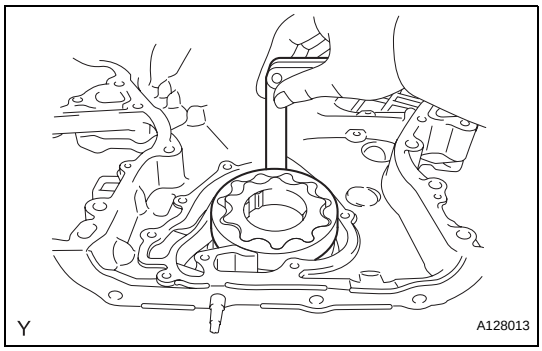
If the clearance is greater than the maximum, replace the drive and driven rotors.



(c) Check the side clearance.
(1) Using a feeler gauge and precision straightedge, measure the clearance between the rotors and precision straightedge, as shown in the illustration.
Side clearance

Standard	Maximum
0.030 to 0.090 mm (0.0012 to 0.0035 in.)	0.090 mm (0.0035 in.)

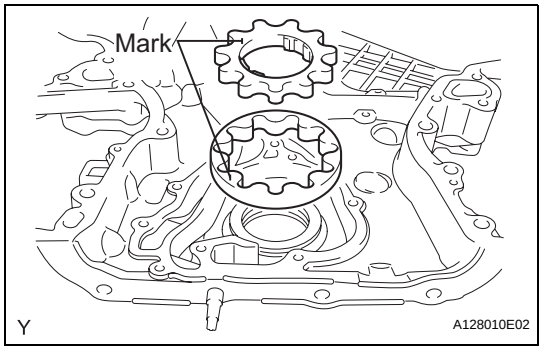
If the side clearance is greater than the maximum, replace the timing chain cover.



(d) Check the body clearance.
(1) Using a feeler gauge, measure the clearance between the timing chain cover and driven rotor, as shown in the illustration.
Body clearance

Standard	Maximum
0.250 to 0.325 mm (0.0098 to 0.0128 in.)	0.325 mm (0.0128 in.)

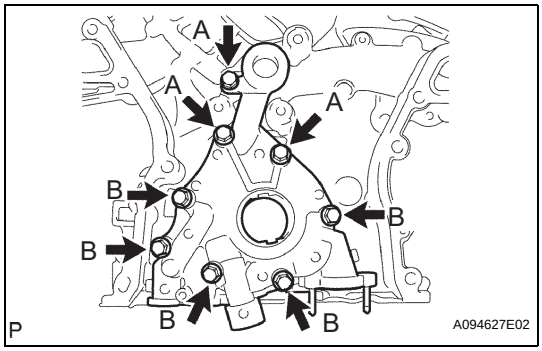
If the body clearance is greater than the maximum, replace the timing chain cover.



REASSEMBLY

1. INSTALL OIL PUMP COVER

(a) Coat the drive and driven rotors with engine oil and place them into the timing chain cover with the marks facing outward (oil pump cover side). Check that the rotors revolve smoothly.



(b) Install the oil pump cover with the 8 bolts.
Torque: 9.1 N*m (93 kgf*cm, 81 in.*lbf)
Bolt length

Item	Length
Bolt A	22 mm (0.87 in.)
Bolt B	40 mm (1.58 in.)

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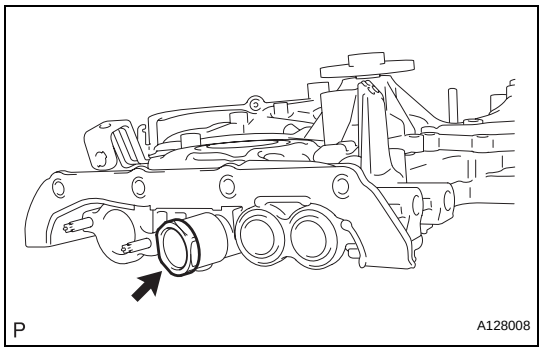
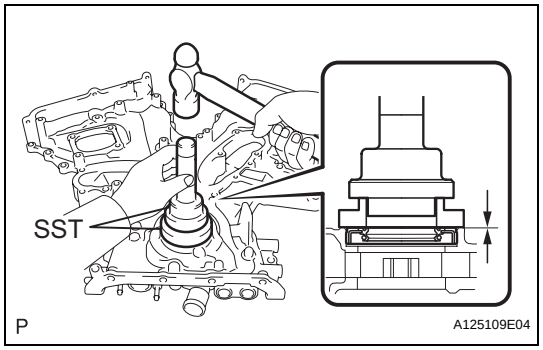


2. INSTALL OIL PUMP RELIEF VALVE

(a) Coat the oil pump relief valve with engine oil.

(b) Insert the relief valve and relief valve spring into the oil pump cover hole.

(c) Using a 27 mm socket wrench, install the plug.
Torque: 49 N*m (500 kgf*cm, 37 ft.*lbf)



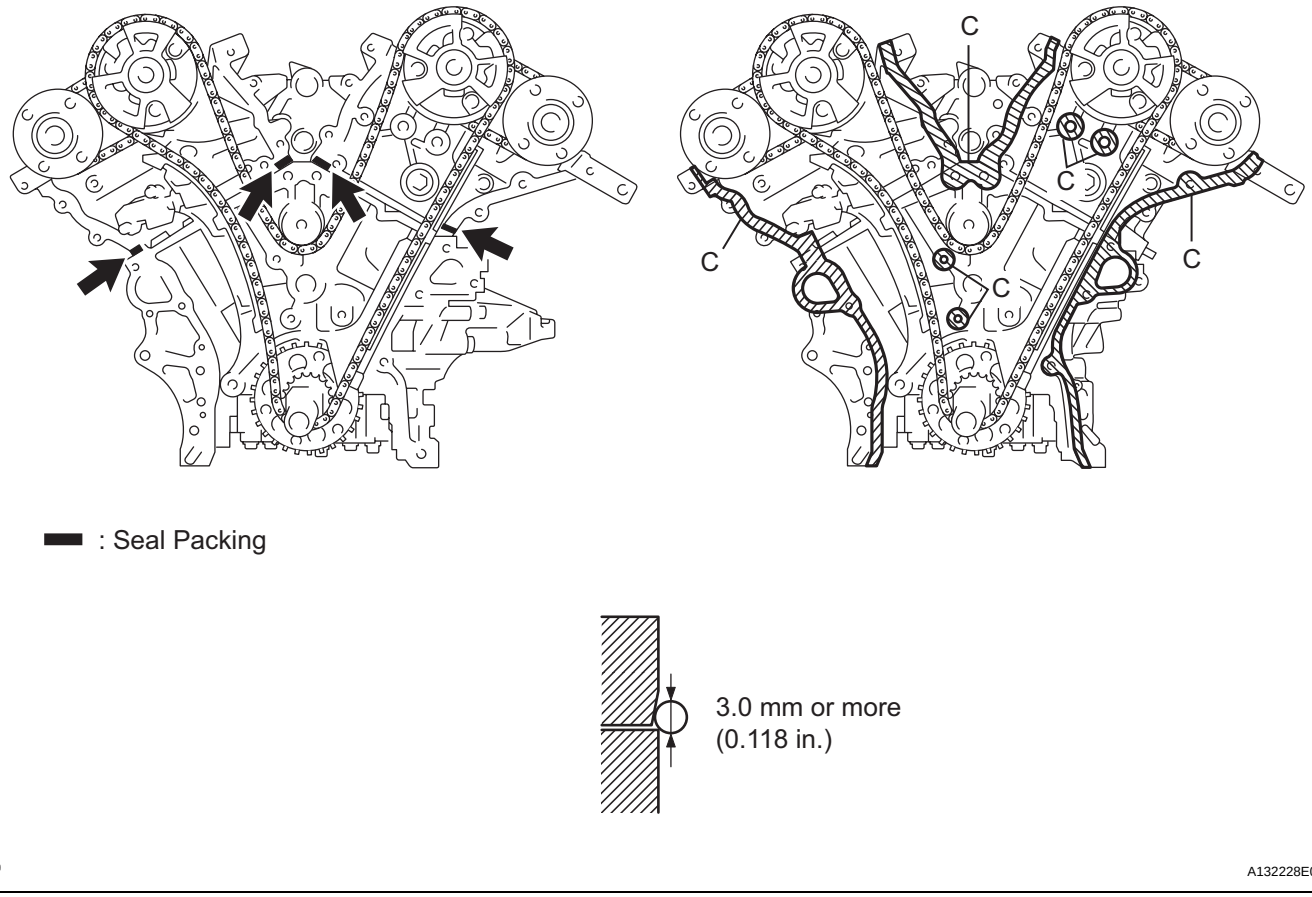
INSTALLATION

1. INSTALL TIMING CHAIN CASE OIL SEAL

(a) Using SST, tap in a new oil seal until its surface is flush with the timing chain case edge.
SST 09223-22010, 09506-35010
NOTICE:
- **Keep the lip free from foreign matter.**
- **Do not tap on the oil seal at an angle.**
- **Make sure that the oil seal edge does not stick out of the timing chain case.**

2. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY

(a) Apply seal packing in a continuous line to the engine unit as shown in the following illustration.



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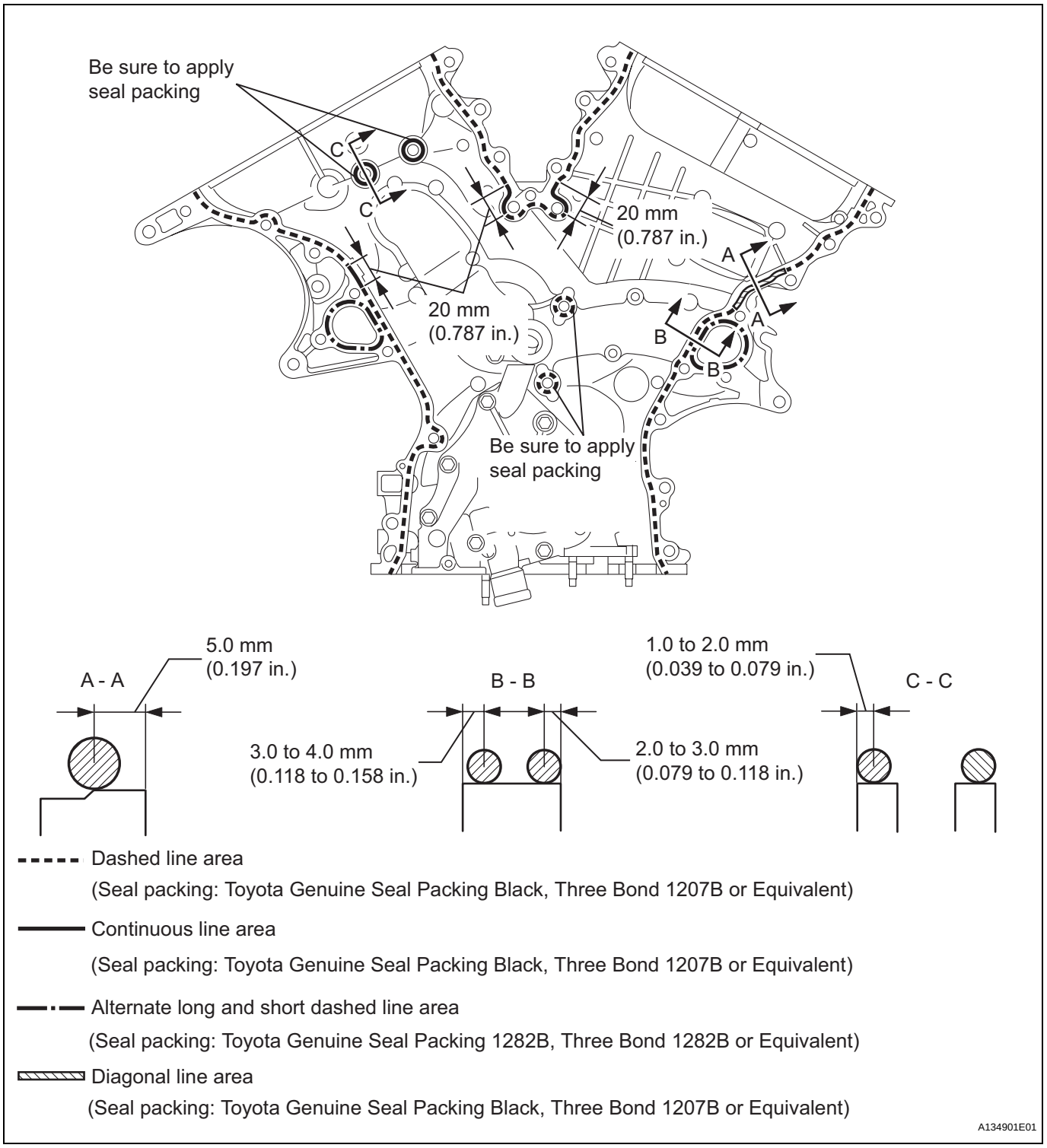
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Seal diameter:
3.0 mm (0.118 in.)
NOTICE:

- **Be sure to clean and degrease the contact surfaces, especially the surfaces indicated by C in the illustration.**
- **When the contact surfaces are wet, wipe them with oil-free cloth before applying seal packing.**
- **Install the chain cover within 3 minutes.**
- **Do not start the engine for at least 2 hours after installing.**

(b) Apply seal packing in a continuous line to the timing chain cover as shown in the following illustration.



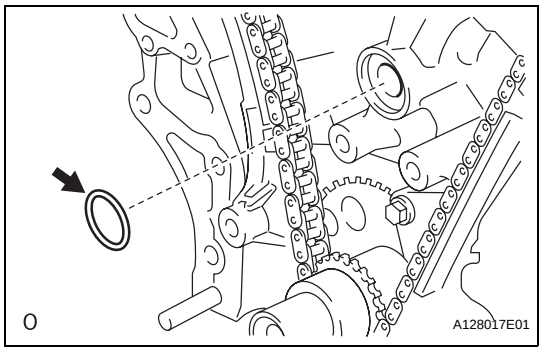
Seal packing:
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent
Toyota Genuine Seal Packing Black 1282B, Three Bond 1282B or equivalent

NOTICE:

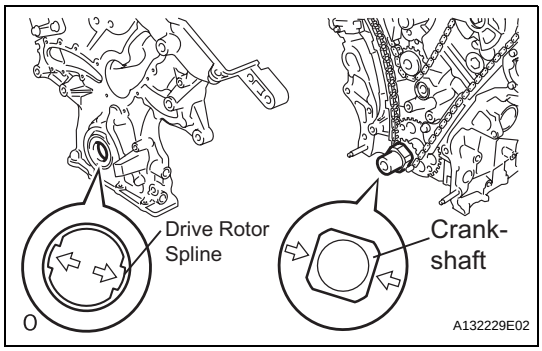
- **When the contact surfaces are wet, wipe them with oil-free cloth before applying seal packing.**
- **Install the chain cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

Apply seal packing as follows

Area	Seal Packing Diameter	Application Position from Inside Seal Line
Continuous Line Area	4.5 mm or more (0.177 in.)	3.0 to 4.0 mm (0.118 to 0.158 in.)
Alternate Long and short Dashed Line Area	3.5 mm or more (0.138 in.)	2.0 to 3.0 mm (0.079 to 0.118 in.)
Dashed Line Area	3.5 mm or more (0.138 in.)	3.0 to 4.0 mm (0.118 to 0.158 in.)
Diagonal Line Area	6.0 mm or more (0.236 in.)	5.0 mm (0.197 in.)



(c) Install a new gasket.



(d) Align the oil pump's drive rotor spline and the crankshaft as shown in the illustration. Install the spline and chain cover to the crankshaft.

(e) Temporarily tighten the timing chain cover with the 23 bolts and 2 nuts.

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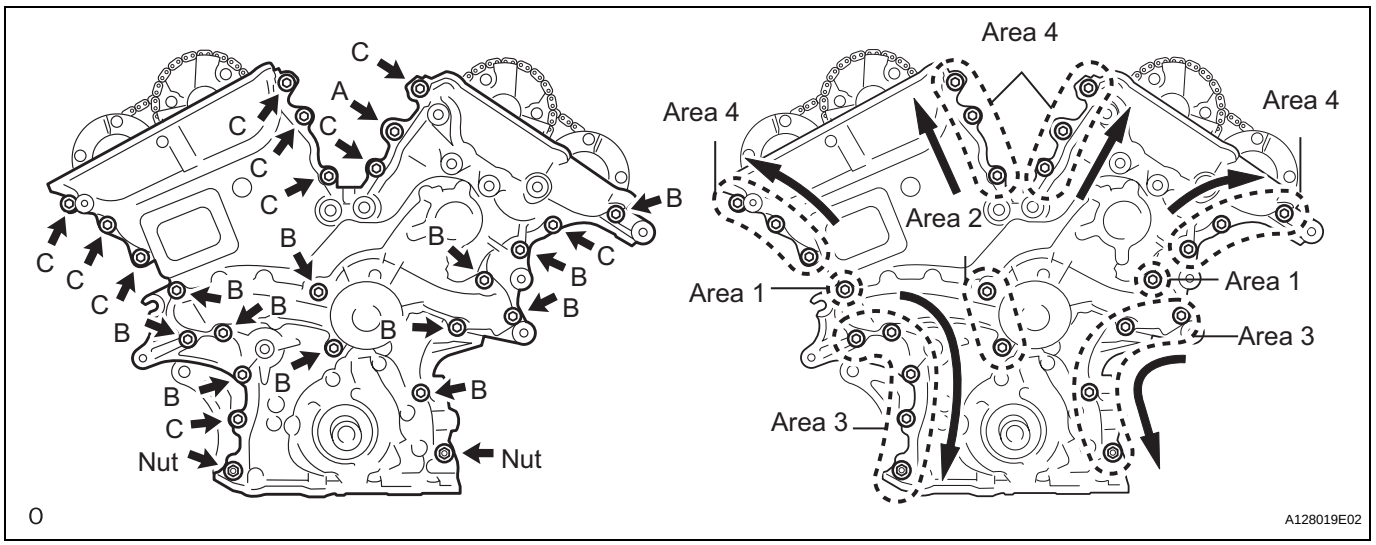


Bolt length

Item	Length
Bolt A	40 mm (1.57 in.)
Bolt B	55 mm (2.17 in.)
Bolt C	25 mm (0.98 in.)

NOTICE:
Make sure that there is no oil on the bolt threads.

(f) Fully tighten the bolts in this order: Area 1 and Area 2.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

(g) Fully tighten the bolts and nuts in this order: Area 3.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)
HINT:
Tighten the bolts and nuts in the order of upper to lower as shown in the illustration.

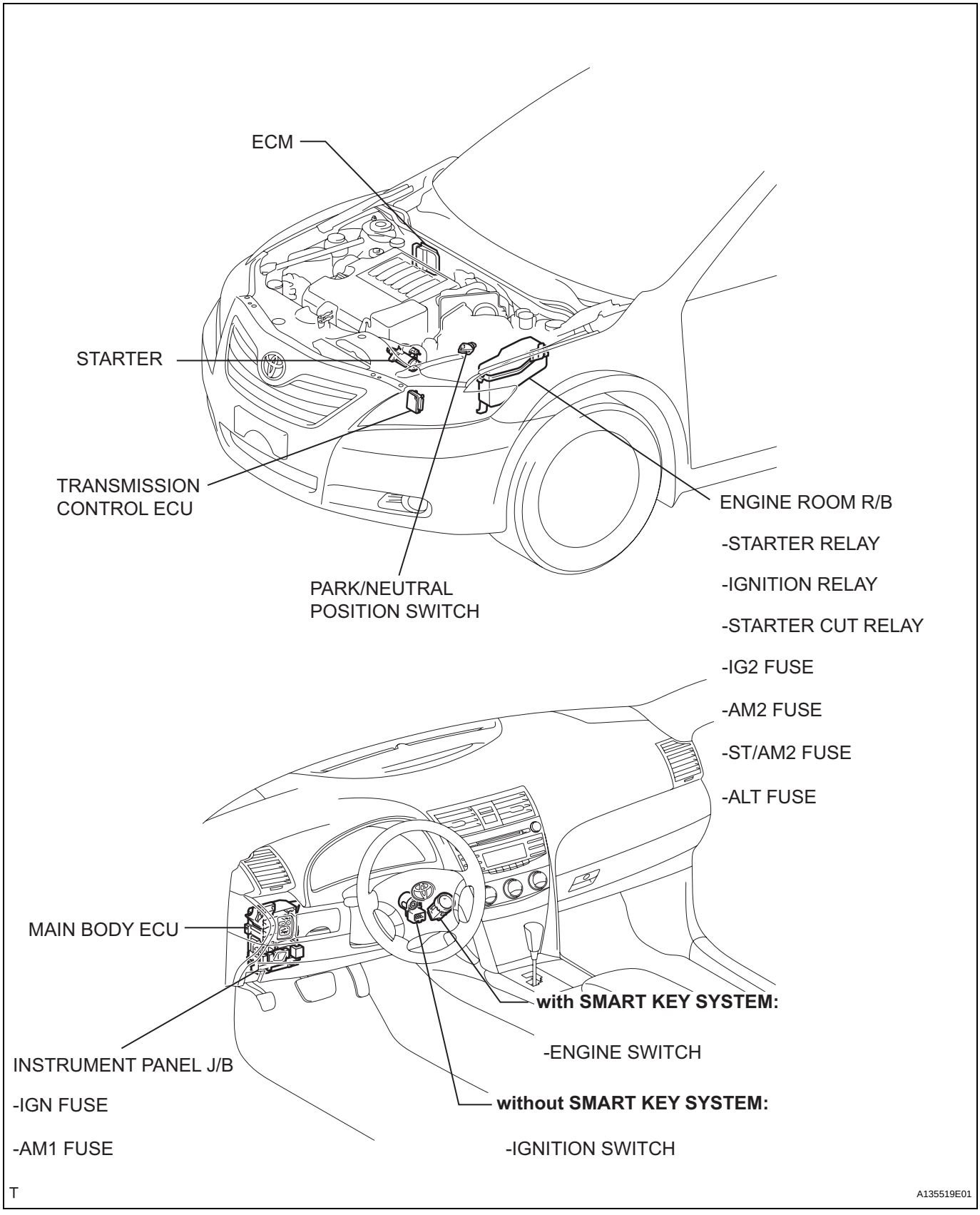
(h) Fully tighten the bolts in this order: Area 4.
Torque: Bolt A
43 N*m (438 kgf*cm, 32 ft.*lbf)
Except bolt A
21 N*m (214 kgf*cm, 15 ft.*lbf)
HINT:
Tighten the bolts in the order of lower to upper as shown in the illustration.

3. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2) (See page EM-150)**
4. **INSTALL WATER INLET HOUSING (See page EM-144)**
5. **REMOVE NO. 1 ENGINE MOUNTING BRACKET FRONT LH (See page EM-38)**
6. **INSTALL OIL PAN SUB-ASSEMBLY (See page EM-147)**
7. **INSTALL OIL STRAINER SUB-ASSEMBLY (See page EM-148)**
8. **INSTALL NO. 2 OIL PAN SUB-ASSEMBLY (See page EM-148)**
9. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1) (See page EM-149)**
10. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2) (See page EM-150)**
11. **INSTALL CRANKSHAFT PULLEY (See page EM-151)**
12. **INSTALL NO. 1 OIL PIPE (See page EM-153)**
13. **INSTALL OIL PIPE (See page EM-153)**
14. **INSTALL NO. 1 VACUUM SWITCHING VALVE (See page EC-14)**
15. **INSTALL RADIO SETTING CONDENSER (See page EM-38)**
16. **INSTALL WATER PUMP PULLEY (See page CO-10)**

17. **INSTALL NO. 2 IDLER PULLEY SUB-ASSEMBLY (See page EM-39)**
18. **INSTALL NO. 2 TIMING GEAR COVER (See page EM-39)**
19. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-39)**
20. **INSTALL ENGINE MOUNTING BRACKET RH (See page EM-40)**
21. **INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY LH (See page EM-40)**
22. **INSTALL NO. 2 EXHAUST MANIFOLD HEAT INSULATOR (See page EM-40)**
23. **INSTALL NO. 2 MANIFOLD STAY (See page EM-41)**
24. **INSTALL OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY (See page EM-41)**
25. **REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH (See page EM-41)**
26. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-42)**
27. **INSTALL IGNITION COIL ASSEMBLY (See page EM-42)**
28. **INSTALL INTAKE AIR SURGE TANK ASSEMBLY** (See page FU-18)
29. **REMOVE ENGINE STAND**
30. **INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (See page EM-13)**
31. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY** (See page AX-214)
32. **INSTALL STARTER ASSEMBLY (See page ST-148)**
33. **INSTALL ENGINE WIRE**
34. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-21)**
35. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-20)**
36. **INSTALL FRONT FRAME ASSEMBLY (See page EM-43)**
37. **INSTALL VANE PUMP ASSEMBLY (See page EM-44)**
38. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE** (See page EM-44)

STARTING SYSTEM

PARTS LOCATION



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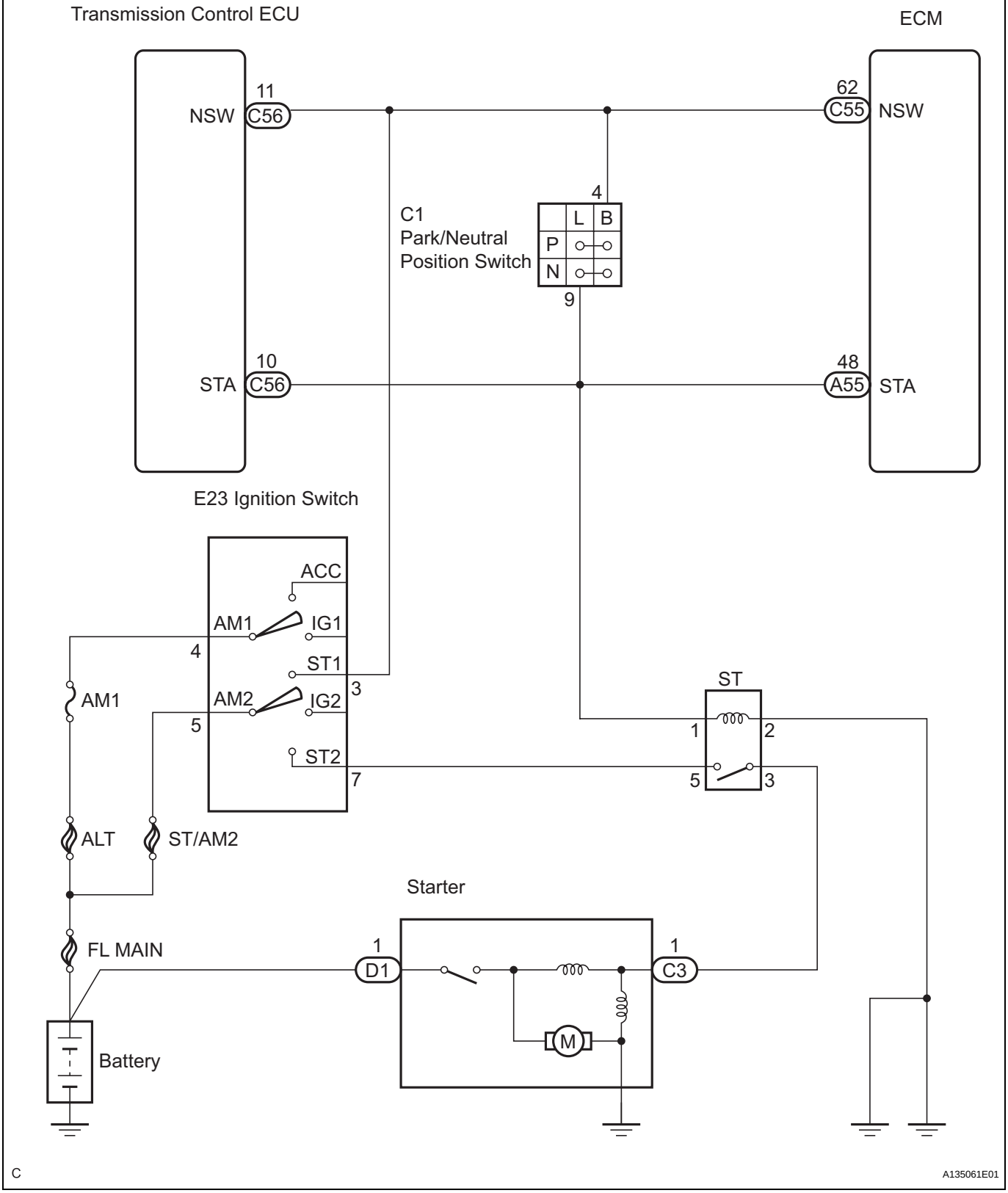
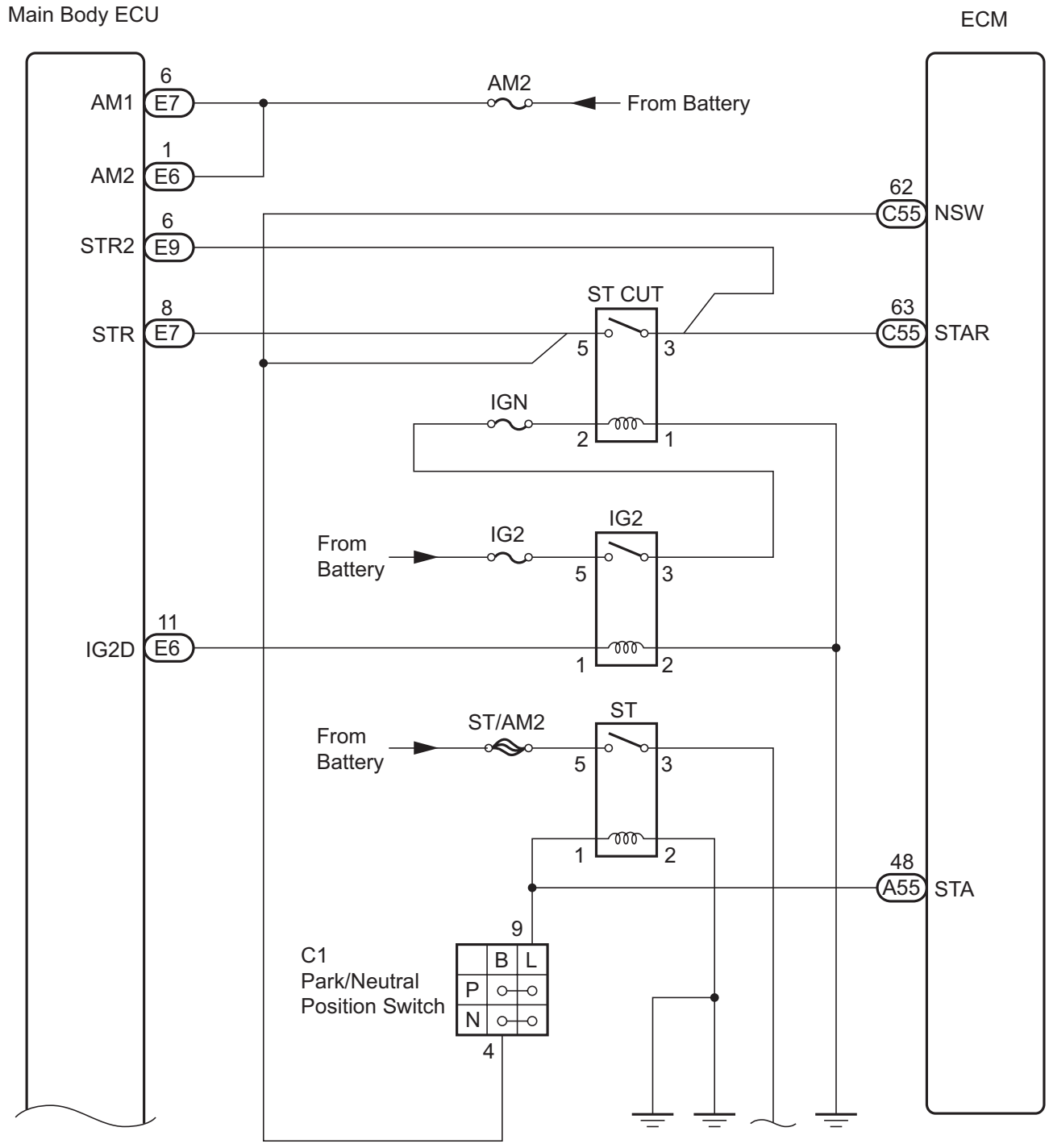
SYSTEM DIAGRAM

without Smart Key System:



with Smart Key System:



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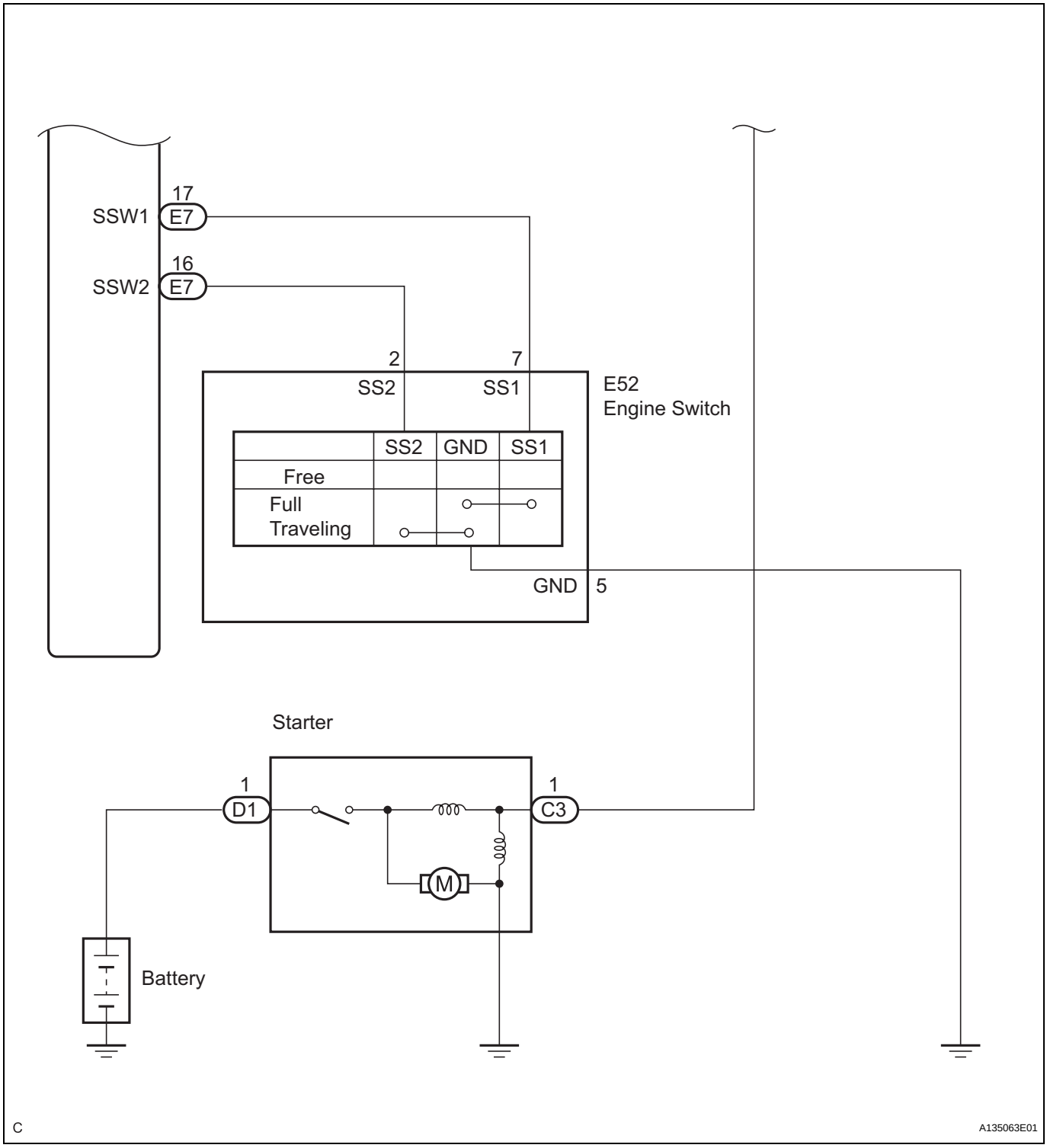
17
SSW1
E7
16
SSW2
E7
2
SS2
7
SS1
E52
Engine Switch
SS2
GND
SS1
Free
Full
Traveling
GND
5
Starter
1
D1
1
C3
M
Battery
C
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SMART KEY SYSTEM

PRECAUTION

1. EMERGENCY ENGINE START CONTROL

(a) If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU. This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.
To activate the starter:
(1) Turn the engine switch from off to on (ACC).
(2) Press and hold the engine switch for 15 seconds.

2. PRECAUTIONS FOR PUSH-BUTTON START FUNCTION:

(a) Before starting the engine, firmly depress the brake pedal until the indicator in the engine switch turns green.

(b) The power source mode (off, on (ACC), on (IG)) is always retained in memory by the vehicle. If the battery is disconnected, the power source mode that was present before disconnection will be restored after the battery is reconnected. Be sure to turn the engine switch off before disconnecting the cable from the negative battery terminal. Be careful if the power source mode of a vehicle with a discharged battery is not known.

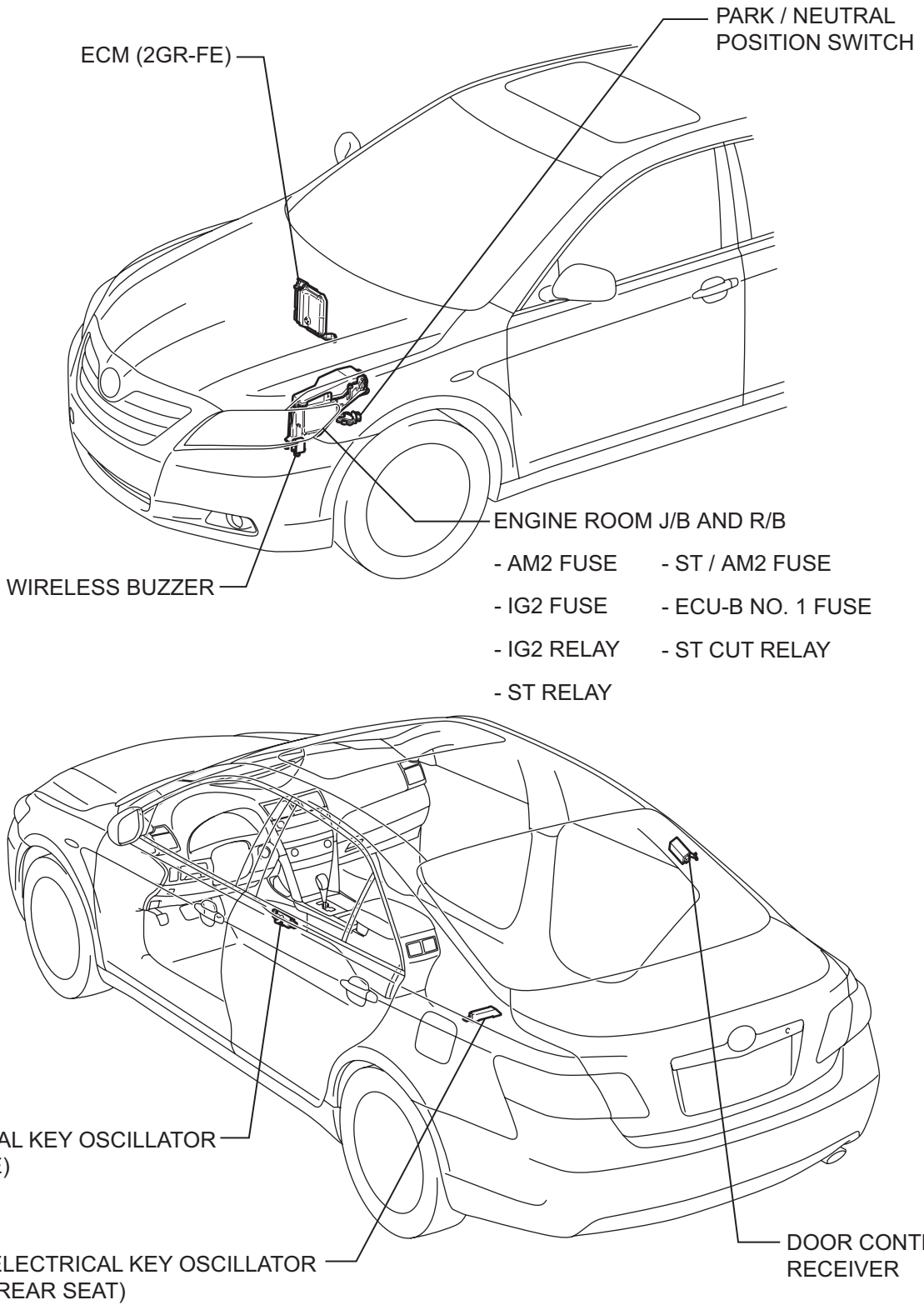
(c) After the battery is reconnected, be sure to wait 10 seconds or more before attempting to start the engine. The engine may not start immediately after the battery is reconnected.

(d) If the electrical key is held near the engine switch to start the engine when the electrical key battery is depleted, the following warnings will sound:
(1) Driver's door open → closed
- An exit warning will sound if the shift lever is in a position other than P and the power source is in a mode other than off.
- An exit warning will sound if the shift lever is in the P position and the power source is in a mode other than off.

(2) Doors other than the driver door open → closed
- A warning will sound to indicate that the electrical key has been taken out of the vehicle.

These warnings will sound because it is not possible for the vehicle to determine if the key is present in the vehicle (due to the depleted key battery). These warnings do not indicate system malfunctions.

PARTS LOCATION



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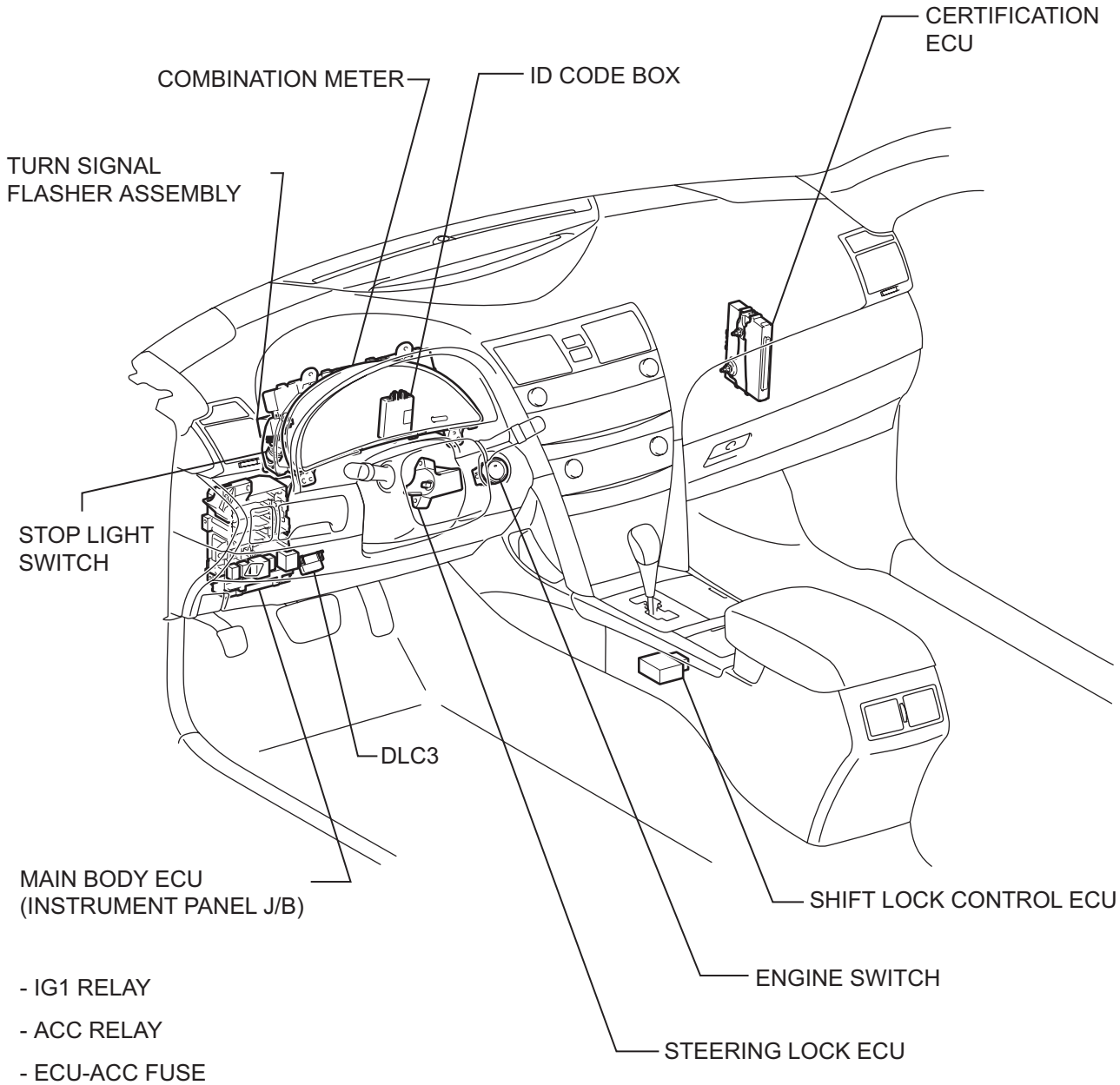
CERTIFICATION ECU
COMBINATION METER
ID CODE BOX
TURN SIGNAL FLASHER ASSEMBLY
STOP LIGHT SWITCH
DLC3
MAIN BODY ECU (INSTRUMENT PANEL J/B)
SHIFT LOCK CONTROL ECU
ENGINE SWITCH
STEERING LOCK ECU
- IG1 RELAY
- ACC RELAY
- ECU-ACC FUSE
- ECU IG NO. 1 FUSE
- DOOR NO. 2 FUSE
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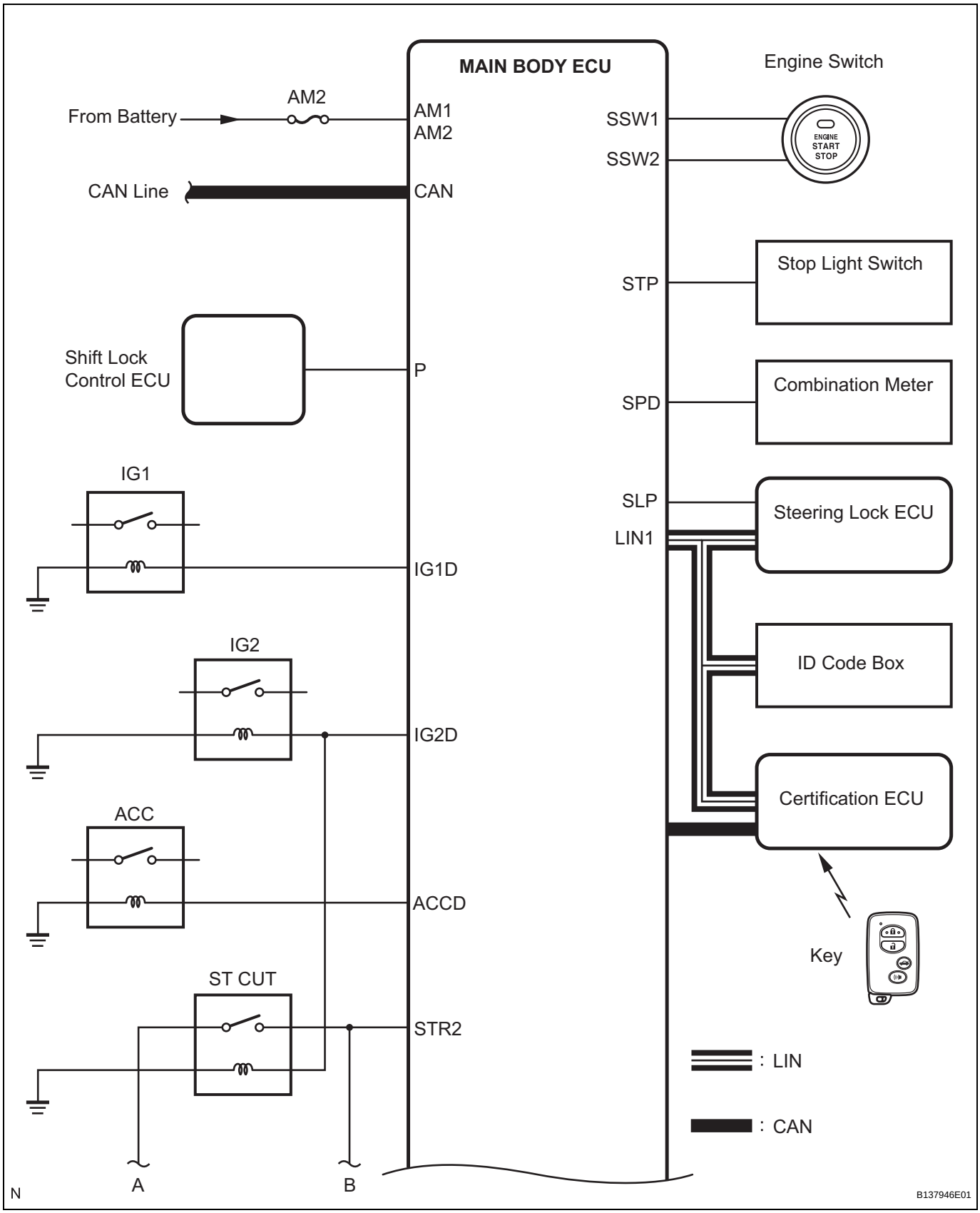
SYSTEM DIAGRAM



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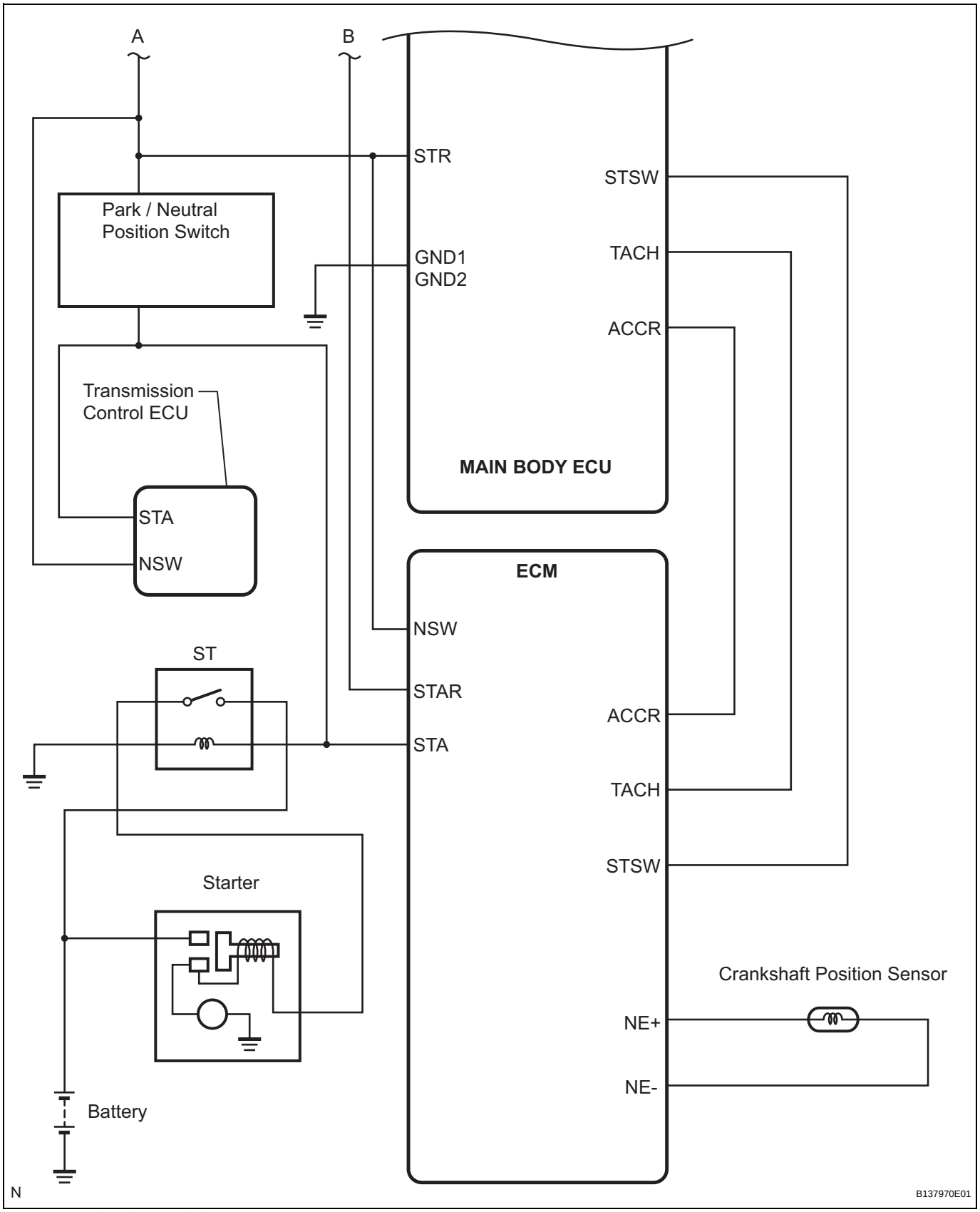


Communication table:

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
Combination meter	Main body ECU	Vehicle speed signal	CAN/Local communication
Steering lock ECU	Main body ECU	Steering lock/unlock signal	LIN/Local communication

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Communication method
ECM	Main body ECU	Starter signal	CAN
		Shift position signal	
		Engine revolution speed signal	
Main body ECU	Certification ECU	Engine switch position signal	CAN
		Courtesy light switch signal	
		Wireless door lock buzzer request signal	
Main body ECU	Combination meter	Entry start key signal	CAN
Main body ECU	Combination meter	Wireless door lock buzzer request signal	CAN
Certification ECU	Main body ECU	Illumination light request signal	CAN
Certification ECU	Driver seat ECU	Memory call replay request signal	CAN
Certification ECU	Main body ECU	Light answer back signal	CAN
Certification ECU	Combination meter	Meter buzzer single-shot request signal	CAN
		Meter buzzer intermittence request signal	
		Meter buzzer continuation request signal	
		Door open display signal	
		Key loss warning signal	
		Low key battery warning signal	
		Shift position warning signal	
		Steering lock abnormal warning	
		Steering lock unlock warning	
Combination meter	Certification ECU/Main body ECU	Vehicle speed signal	CAN
Shift lock control ECU	Main body ECU	Shift position signal	CAN/Local communication
Certification ECU	Main body ECU	Key ID matching request signal	LIN
Main body ECU	Certification ECU	ID required signal	LIN

SYSTEM DESCRIPTION

1. PUSH-BUTTON START FUNCTION DESCRIPTION

(a) The push-button start function uses a push-type engine switch, which the driver can operate by merely carrying the electrical key. This system consists primarily of the main body ECU, engine switch, ID code box, steering lock ECU, electrical key, ACC relay, IG1 relay, IG2 relay and certification ECU. The main body ECU controls the function. This function operates in cooperation with the smart key system.

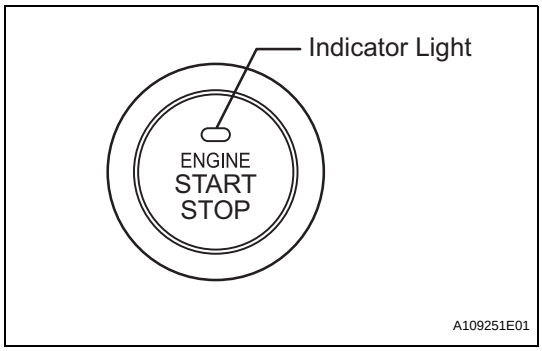
2. FUNCTION OF COMPONENT

Component	Function
Engine Switch • Transponder Key Amplifier	• Transmits engine switch signal to main body ECU. • Informs driver of power source mode or system abnormality with illumination of indicator light. • Receives ID code and transmits it to certification ECU when key battery is low.
Electrical Key	Receives signals from oscillators and returns ID code to entry door control receiver.
Electrical Key Oscillator • Console and Rear Seat	Receives request signals from certification ECU and forms detection area in vehicle interior.
Steering Lock ECU	Receives lock/unlock request signals from certification ECU and main body ECU.
Entry Door Control Receiver	Receives ID code from electrical key and transmits it to certification ECU.
Main body ECU	• Changes power source mode in 4 stages (off, on (ACC), on (IG), start) in accordance with shift position and state of stop light switch. • Controls push-button start function in accordance with signals received from switches and each ECU.
Certification ECU	Certifies ID code received from entry door control receiver and transmits certification results to ID code ECU and steering lock ECU.
Stop Light Switch	Outputs state of brake pedal to main body ECU.
ID Code Box	Receives steering unlock or engine immobiliser unset signals from certification ECU, certifies them, and transmits each unset signal to steering lock ECU or ECM.
ECM	• Receives engine start request signal from main body ECU, turns ON ST relay, and starts engine. • Receives signal from ID code ECU and performs engine ignition and injection.

3. SYSTEM FUNCTION

The electric controls of the push-button start function are described below:

Control	Outline
Engine switch control	• When driver operates engine switch with electrical key in driver's possession, certification ECU starts indoor electrical key oscillator, which transmits request signal to electrical key. Upon receiving this signal, the electrical key transmits ID code signal to main body ECU. • ID code box verifies check results received from certification ECU via LIN and sends them to main body ECU. Based on these results, main body ECU authorizes operation of engine switch.
Diagnosis	When main body ECU detects malfunction, main body ECU diagnoses and memorizes failed section.



4. CONSTRUCTION AND OPERATION

(a) Engine Switch

The engine switch consists of a momentary type switch, 3 color (amber, green, greenish white) LEDs, and a transponder key amplifier.

- The greenish white LED is for illumination.
- The amber and green LEDs are for the indicator lights. The driver can check the present power source mode and whether the engine can start in accordance with the illumination state of the indicator light.
- When the main body ECU detects an abnormality in the push-button start function, it makes the amber indicator light flash. If the engine stopped in this state, it may not be possible to restart it.

(b) Indicator Light Condition

Engine switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P or N
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
Engine running	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

(c) Main body ECU

The main body ECU consists of the IG1 and IG2 relay actuation circuits and CPU.

HINT:

Before removing the battery, make sure to turn the engine switch off. The main body ECU constantly stores the present power source mode in its memory. Therefore, if the main body ECU is interrupted by disconnecting the battery, the main body ECU restores the power source mode after the battery is reconnected. For this reason, if the battery is disconnected when the engine switch is not off, the power will be restored to the vehicle at the same time the power is restored to the main body ECU (by reconnecting the battery).

5. PUSH-BUTTON START FUNCTION OPERATION

(a) This system has different power source mode patterns depending on the brake pedal condition and shift lever position.

ST

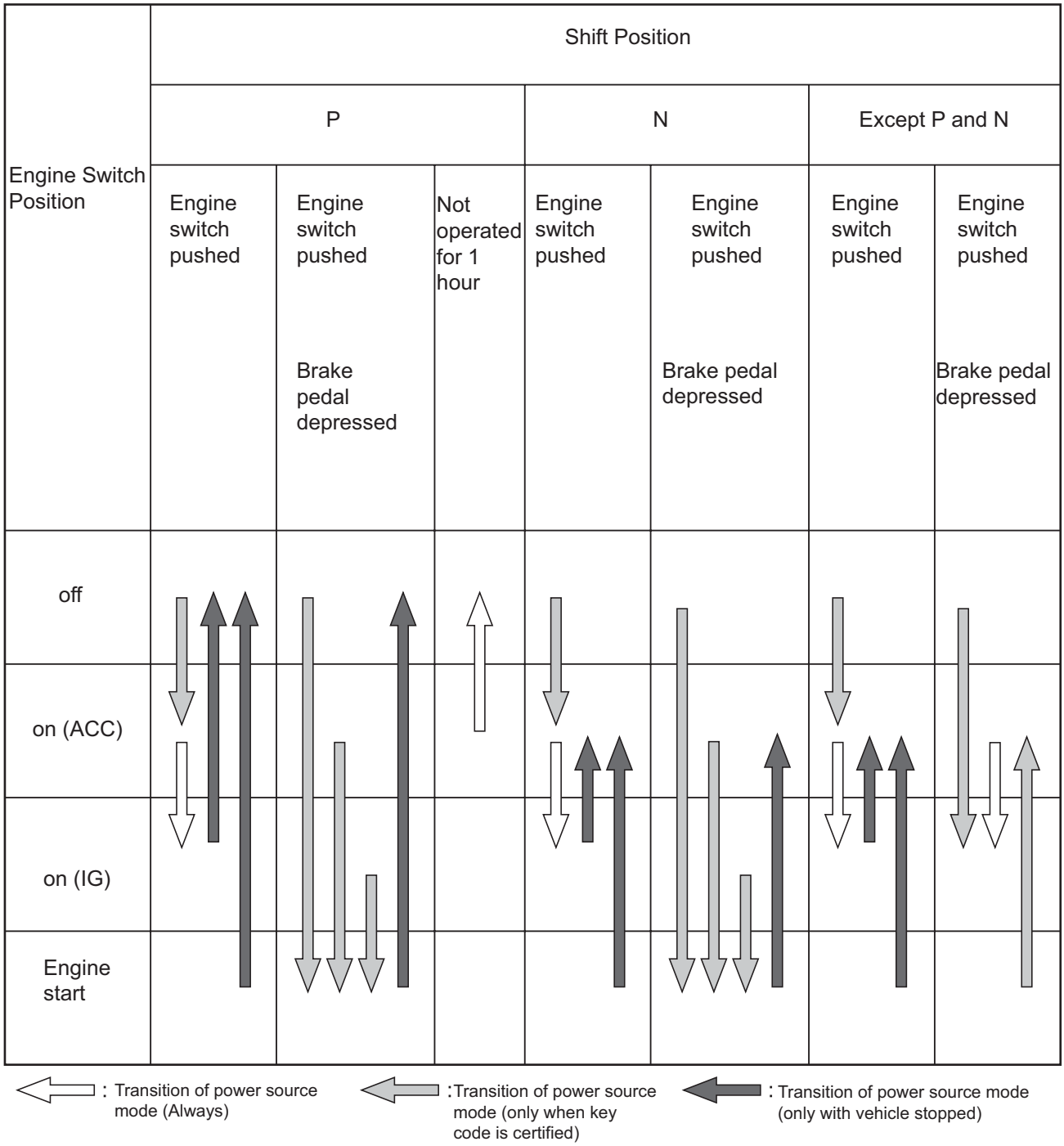
Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P or N position	When the engine switch is pushed once. • off → engine start • on (ACC) → engine start • on (IG) → engine start
Not depressed	P position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → off
	Except P position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → on (ACC)

Brake Pedal	Shift Lever	Power Source Mode Pattern
-	P position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → off
-	Except P position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → on (ACC)

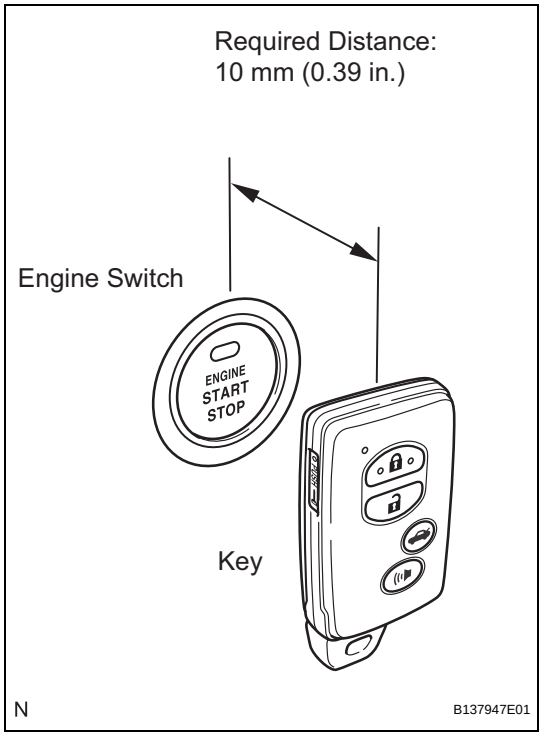
When the battery of the key is low, the push-button start function can be operated by holding the key against the engine switch.

- After approximately 1 hour has passed with the engine switch on (ACC) and the shift position in P, the main body ECU will automatically cut the power supply (the power source mode changes to off).

- The illustration below shows the transition of power source modes.
  Transition of power source mode:



HINT:
While the vehicle is being driven normally, operation of the engine switch is disabled. However, if the engine must be stopped in an emergency while the vehicle is being driven, pressing the engine switch for 3 seconds or more stops the engine. Power source mode changes from start to on (ACC).



6. WHEN KEY BATTERY IS LOW

(a) To operate the push-button start function when the key battery is low, hold the key close to the engine switch with the brake pedal depressed.
(b) The main body ECU transmits a key verification request signal from the stop light switch to the certification ECU.
(c) The certification ECU does not receive an ID code response from the entry door control receiver, so it actuates the transponder key amplifier built into the engine switch.
(d) The transponder key amplifier outputs an engine immobiliser radio wave to the key.
(e) The key receives the radio wave, and returns a radio wave response to the transponder key amplifier.
(f) The transponder key amplifier combines the key ID codes with the radio wave response, and transmits it to the certification ECU.
(g) The certification ECU judges and verifies the ID code, and transmits a key verification OK signal to the main body ECU. The buzzer in the combination meter sounds at the same time.
(h) After the buzzer sounds, if the engine switch is pressed within 5 seconds with the brake pedal not depressed, the power source mode changes to on (ACC) or on (IG), the same as in the normal condition.

7. DIAGNOSIS

The main body ECU can detect malfunctions in the push-button start function when the power source mode is on (IG). When the ECU detects a malfunction, the amber indicator light of the engine switch flashes to warn the driver. At the same time, the ECU stores a 5-digit DTC (Diagnostic Trouble Code) in the memory.

- The indicator light warning continues for 15 seconds even after the power source mode is changed to off.
- The DTC can be read by connecting the intelligent tester to the DLC3.
- The push-button start function cannot be operated if a malfunction occurs.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the push-button start function.
- The intelligent tester should be used in steps 4, 5 and 8.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS CHECK

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

ST

4	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally (See page CA-8).

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → GO TO CAN COMMUNICATION SYSTEM

A

5 CHECK FOR DTC

(a) Check for DTCs and note any codes that are output (See page ST-26).
(b) Delete DTCs.
(c) Recheck for DTCs.

Result

Result	Proceed to
DTC does not reoccur	A
DTC reoccurs	B

B → GO TO DIAGNOSTIC TROUBLE CODE CHART

A

6 INSPECT BASIC OPERATION

(a) Turn the engine switch on (START) and check that the engine starts normally. Make sure the brake pedal is depressed and the shift position is P at this time.
(b) Check that the engine switch mode can be changed by pushing the engine switch.
HINT:
Without depressing the brake pedal, push the engine switch repeatedly. Engine switch mode should turn from off to on (ACC) to on (IG) and back to off.
With the brake pedal depressed, push the engine switch repeatedly. Engine switch mode should turn to ENGINE START from any status.
OK:
Engine can start normally.

NEXT

7 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in the problem symptoms table	A
Fault is listed in the problem symptoms table	B

ST

B → Go to step 9

A

8	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (See page ST-19)
(b) DATA LIST/ACTIVE TEST (See page ST-26)

NEXT

9	REPAIR OR REPLACE

NEXT

10	CONFIRMATION TEST

NEXT

END

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to the system before inspecting the suspected areas below.

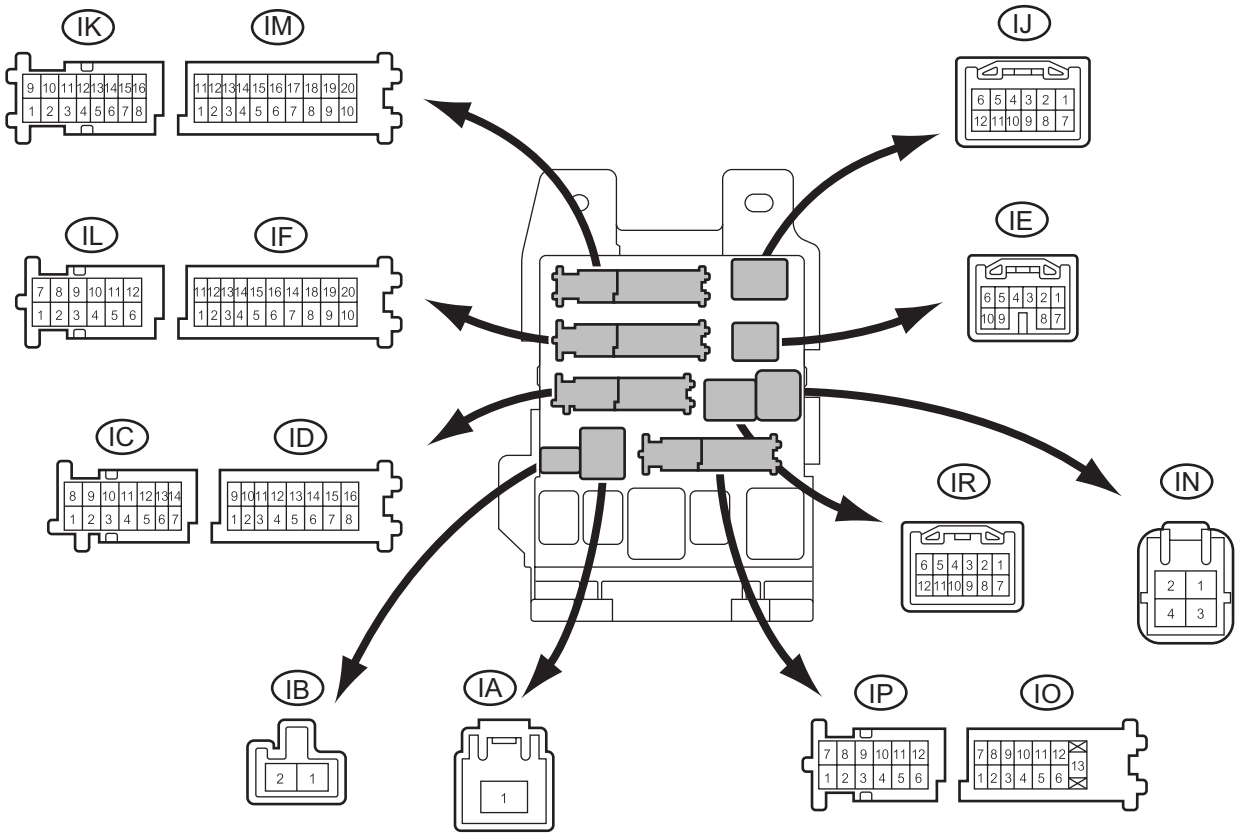
PUSH-BUTTON START FUNCTION:

Symptom	Suspected area	See page
Power does not turn on (neither ACC nor IG is possible).	1. AM2 Fuse	ST-114
	2. Engine Switch	-
	3. Wire Harness or Connector	-
	4. Main Body ECU (Instrument Panel J/B)	-
	5. Certification ECU	-
	6. ID Code Box	-
	7. Steering Lock ECU	-
	8. Smart Key System (Entry Function)	-
Power is not turned on (only ACC is not turned on).	1. AM2 Fuse	ST-131
	2. Wire Harness or Connector	-
	3. Main Body ECU (Instrument Panel J/B)	-
Power is not turned on (only IG is not turned on).	1. AM2 Fuse	ST-122
	2. IG1 Relay	-
	3. IG2 Relay	-
	4. Wire Harness or Connector	-
	5. Main Body ECU (Instrument Panel J/B)	-
Engine does not start.	1. Main Body ECU (Instrument Panel J/B)	ST-95
	2. Certification ECU	-
	3. Shift Lock Control ECU	-
	4. ID Code Box	-
	5. Stop SW Fuse	-
	6. Stop Light Switch	-
	7. Electrical Steering Lock Function	-
	8. Engine Control System	-
	9. Engine Immobiliser System	-
	10. Wire Harness or Connector	-
Engine switch indicator light does not come on.	Engine Switch Indicator Light Circuit	ST-110

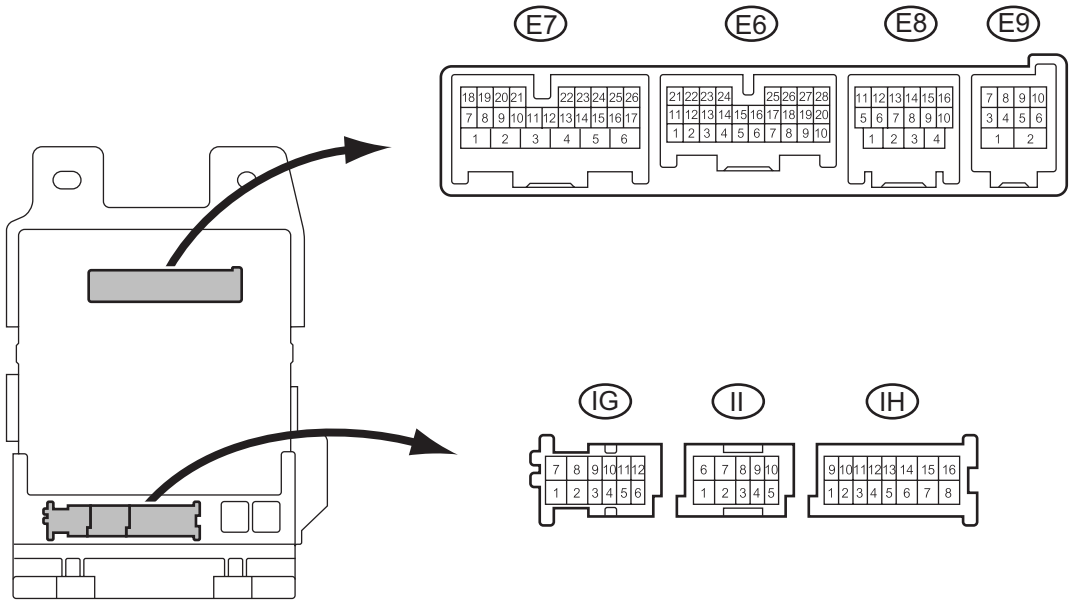
TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

Front Side:



Back Side:



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(a) Disconnect the IR, IA, IK, ID, IF, IM E6, E7 and E8 ECU connectors.

ST

(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AM1 (E7-6) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
AM2 (E6-1) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
SSW1 (E7-17) - Body ground	L - Body ground	Engine switch signal	Engine switch pushed	Below 1 Ω
SSW1 (E7-17) - Body ground	L - Body ground	Engine switch signal	Engine switch not pushed	10 kΩ or higher
SSW2 (E7-16) - Body ground	V - Body ground	Engine switch signal	Engine switch pushed	Below 1 Ω
SSW2 (E7-16) - Body ground	V - Body ground	Engine switch signal	Engine switch not pushed	10 kΩ or higher
GND3 (E8-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LIN1 (IR-9) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
BATB (IA-1) - Body ground	B - Body ground	+B Power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
CANN (E8-15) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher
CANP (E8-16) - Body ground	L - Body ground	CAN Line	Always	10 kΩ or higher
CANH (E8-5) - Body ground	R - Body ground	CAN Line	Always	10 kΩ or higher
CANL (E8-6) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher
ACC (IA-1) - Body ground	B - Body ground	ACC power supply	Always	10 to 14 V
IG (IA-1) - Body ground	B - Body ground	IG power supply	Always	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the ECU connectors.

(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACCD (E7-22) - GND3 (E8-1)	W - W-B	ACC signal	Engine switch on (ACC)	Output voltage at terminal AM1 or AM2 is -2 V or more.
ACCD (E7-22) - GND3 (E8-1)	W - W-B	ACC signal	Engine switch off	Below 1 V
IG1D (E7-3) - GND3 (E8-1)	P - W-B	IG1 signal	Engine switch on (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
IG1D (E7-3) - GND3 (E8-1)	P - W-B	IG1 signal	Engine switch on (ACC)	Below 1 V
IG2D (E6-11) - GND3 (E8-1)	LG - W-B	IG2 signal	Engine switch on (IG)	Output voltage at terminal AM1 or AM2 is -2 V or more.
IG2D (E6-11) - GND3 (E8-1)	LG - W-B	IG2 signal	Engine switch on (ACC)	Below 1 V
STP (IL-7) - GND3 (E8-1)	L - W-B	Stop light signal	Brake pedal depressed	Output voltage at terminal AM1 or AM2 is -2 V or more.
STP (IL-7) - GND3 (E8-1)	L - W-B	Stop light signal	Brake pedal released	Below 1 V
SLR+ (E7-19) - GND3 (E8-1)	BR - W-B	Steering lock motor signal	Steering lock motor operating	Below 1 V
SLR+ (E7-19) - GND3 (E8-1)	BR - W-B	Steering lock motor signal	Steering lock motor does not operate	Output voltage at terminal AM1 or AM2 is -2 V or more.
SLP (E7-18) - GND3 (E8-1)	P - W-B	Steering lock actuator position signal	Steering lock is locked	Pulse generation (See waveform 3)
SLP (E7-18) - GND3 (E8-1)	P - W-B	Steering lock actuator position signal	Steering lock is released	Pulse generation (See waveform 3)
SPD (E8-9) - GND3 (E8-1)	V - W-B	Vehicle speed signal	Engine switch on (IG), rotate rear wheel slowly	Pulse generation (See waveform 1)
TACH (E8-8) - GND3 (E8-1)	B - W-B	Tachometer signal	Engine running	Pulse generation (See waveform 2)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
P (E9-2) - GND3 (E8-1)	G - W-B	Shift lock signal	Shift lever P position	Output voltage at terminal AM1 or AM2 is -2 V or more.
P (E9-2) - GND3 (E8-1)	G - W-B	Shift lock signal	Shift lever not P position	Below 1 V
ACCR (E6-3) - GND3 (E8-1)	P - W-B	Starter assist signal	Brake pedal depressed, shift lever P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V *1 → Output voltage at terminal AM1 or AM2 is -2 V or more.
STSW (E9-4) - GND3 (E8-1)	GR - W-B	Starter activation request signal	Brake pedal depressed, engine switch held on (ST)	Output voltage at terminal AM1 or AM2 is -2 V or more.
STR (E7-8) - GND3 (E8-1)	G - W-B	Park/neutral position switch	Shift lever P or N position	Below 1 V
STR2 (E9-6) - GND3 (E8-1)	V - W-B	Starter signal	Brake pedal depressed, shift lever P or N position, engine switch on (ST)	Output voltage at terminal AM1 or AM2 is -3.5 V or more. *2
INDS (E7-15) - GND3 (E8-1)	LG - W-B	Vehicle condition signal	Brake pedal depressed, shift lever P position.	Output voltage at terminal AM1 or AM2 is -3 V or more.
INDW (E7-14) - GND3 (E8-1)	P - W-B	Warning signal	Brake pedal depressed, shift lever P position, engine switch on (ACC, IG)	Output voltage at terminal AM1 or AM2 is -3 V or more.
SWIL (E7-25) - GND3 (E8-1)	O - W-B	Illumination signal	Light control switch TAIL or HEAD	Output voltage at terminal AM1 or AM2 is -2 V or more.

HINT:

*1: Voltage is output only when the engine is cranking.

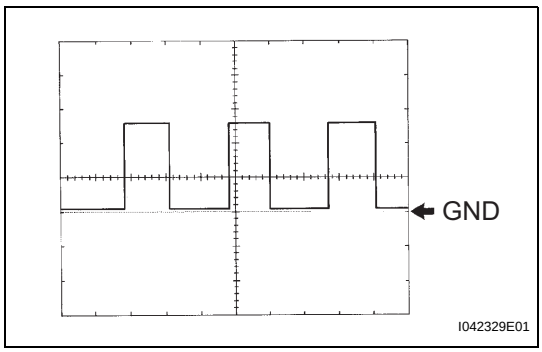
*2: Voltage is output for 0.3 seconds when the engine is cranking to start. Disconnect the C55 connector from the ECM before measuring the voltage.

If the result is not as specified, the ECU may have a malfunction.

(e) Using an oscilloscope, check the signal waveform of the ECU.

(1) Waveform 1

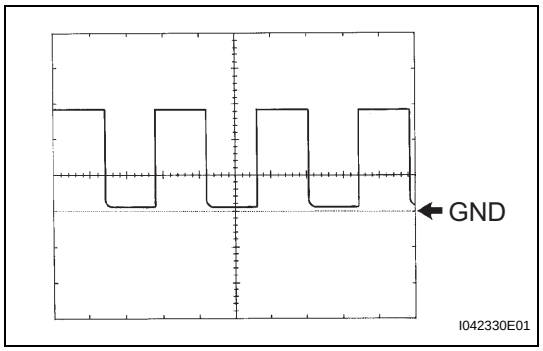
Waveform 1 (Reference):



Terminal No.	E8-9 (SPD) - Body ground
Tool Setting	5 V/DIV., 10 ms./DIV.
Vehicle Condition	Driving at approx. 20 km/h (12 mph)

HINT:

As the vehicle speed increases, the wavelength shortens.

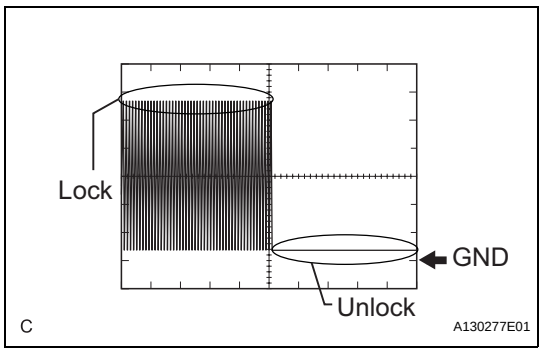


(2) Waveform 2

Waveform 2 (Reference):

Terminal No.	E8-8 (TACH) - Body ground
Tool Setting	5 V/DIV., 10 ms./DIV.
Vehicle Condition	Engine idling

HINT:
As the engine revolution speed increases, the wavelength shortens.

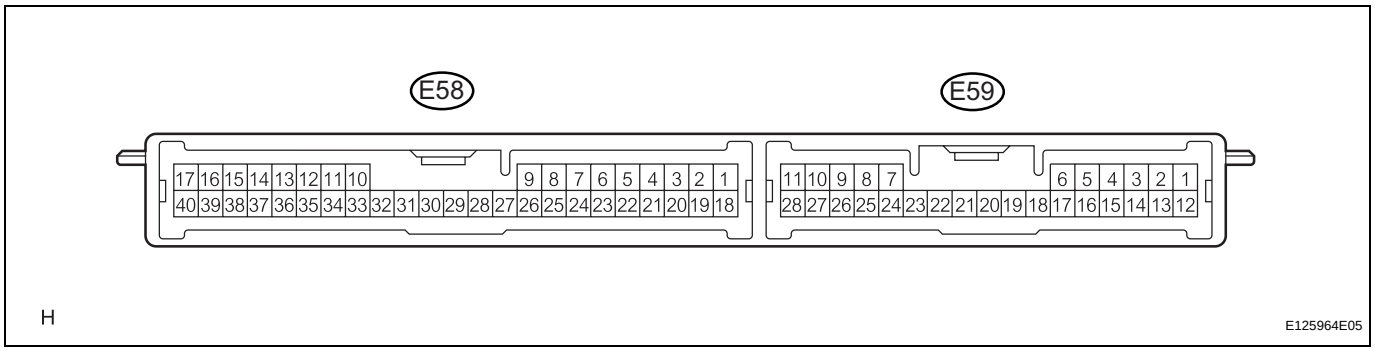


(3) Waveform 3

Waveform 3 (Reference):

Terminal No.	E7-18 (SLP) - Body ground
Tool Setting	2 V/DIV., 100 ms./DIV.
Vehicle Condition	Steering lock/unlock

2. CHECK CERTIFICATION ECU

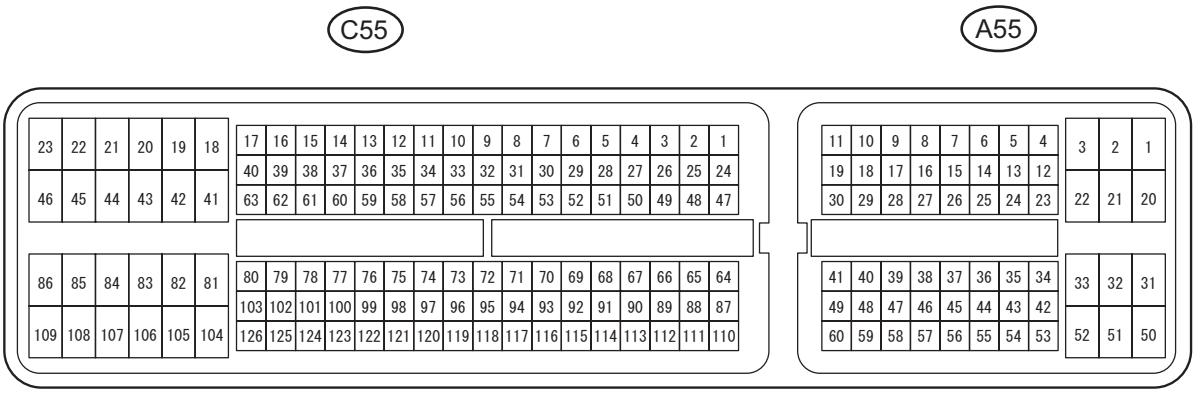


(a) Disconnect the E58 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - Body ground	W - Body ground	+B power supply	Always	10 to 14 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Engine switch on (IG)	10 to 14 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Engine switch off	Below 1 V
LIN (E58-10) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

3. CHECK ECM



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(a) Disconnect the C55 and A55 ECM connectors.
(b) Measure the voltage and resistance of the wire harness side connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (A55-2) - Body ground	R - Body ground	Power source of ECM	Engine switch on (IG)	10 to 14 V
+B2 (A55-1) - Body ground	R - Body ground	Power source of ECM	Engine switch on (IG)	10 to 14 V
IGSW (A55-28) - Body ground	Y - Body ground	Ignition switch signal	Engine switch on (IG)	10 to 14 V
E01 (C55-22) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E02 (C55-21) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E03 (C55-104) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
E04 (C55-23) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E05 (C55-46) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E1 (C55-81) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
ME01 (C55-20) - Body ground	B - Body ground	Ground	Always	Below 1 Ω

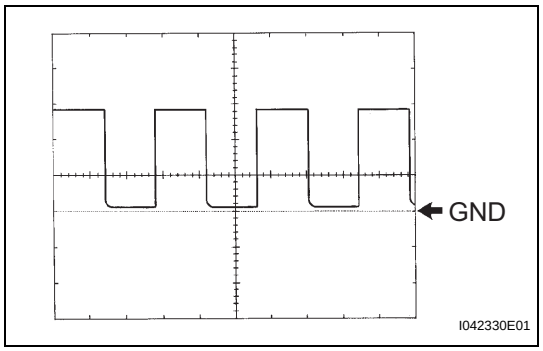
If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the ECM connectors.
(d) Measure the voltage of the connectors.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
STA (A55-48) - E1 (C55-81)	V - W-B	Starter relay operation signal	Cranking	10 to 14 V
ACCR (A55-13) - E1 (C55-81)	B - W-B	ACC relay cut signal (output)	Brake pedal depressed, shift lever P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V *1 → Output voltage at terminal AM1 or AM2 is -2 V or more.
TACH (A55-15) - E1 (C55-81)	B - W-B	Engine revolution signal (output)	Idling	Pulse generation (see waveform 1)
STP (A55-36) - E1 (C55-81)	W - W-B	Stop light switch signal (input)	Brake pedal depressed	7.5 to 14 V
STP (A55-36) - E1 (C55-81)	W - W-B	Stop light switch signal (input)	Brake pedal released	Below 1.5 V
STAR (C55-63) - E1 (C55-81)	R - W-B	PNP switch signal (input)	Engine switch on (IG), shift position P or N	10 to 14 V

HINT:
*1: Voltage is output only when the engine is cranking.

ST

If the result is not as specified, the ECM may have a malfunction.



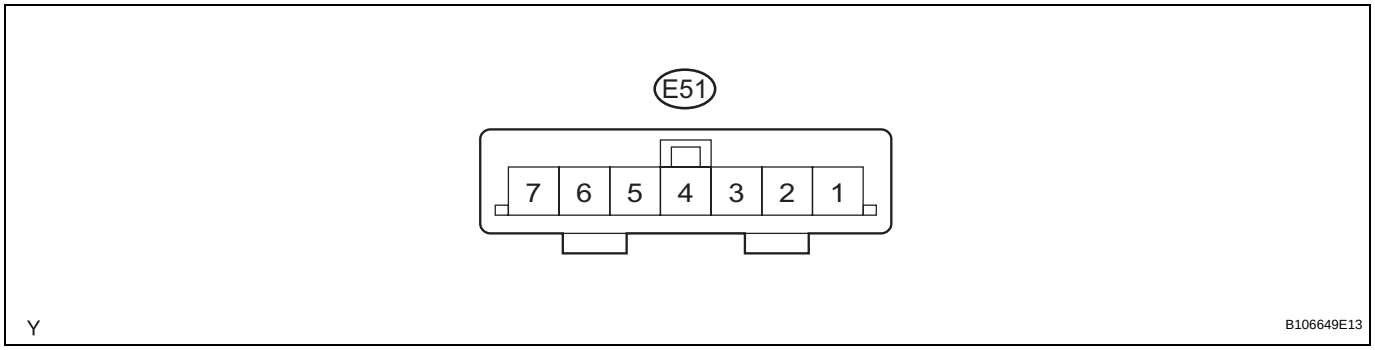
(e) Using an oscilloscope, check the signal waveform of the ECM.

Waveform 1 (Reference):

Terminal No.	A55-15 (TACH) - C55-81 (E1)
Tool Setting	5 V/DIV., 10 ms./DIV.
Vehicle Condition	Engine idling

HINT:
As the vehicle speed increases, the wavelength shortens.

4. CHECK STEERING LOCK ECU



(a) Disconnect the E51 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (E51-7) - Body ground	P - Body ground	+B power supply	Always	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Engine switch on (IG)	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Engine switch off	Below 1 V
GND (E51-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
SGND (E51-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the E51 ECU connector.
(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SLP1 (E51-4) - GND (E51-1)	P - W-B	Steering lock actuator position signal	Steering is locked	10 to 14 V
SLP1 (E51-4) - GND (E51-1)	P - W-B	Steering lock actuator position signal	Steering is released	Below 1 V

If the result is not as specified, the ECU may have a malfunction.

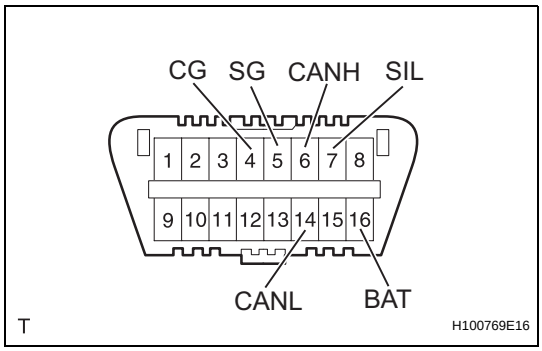
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Push-button start function data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the function seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

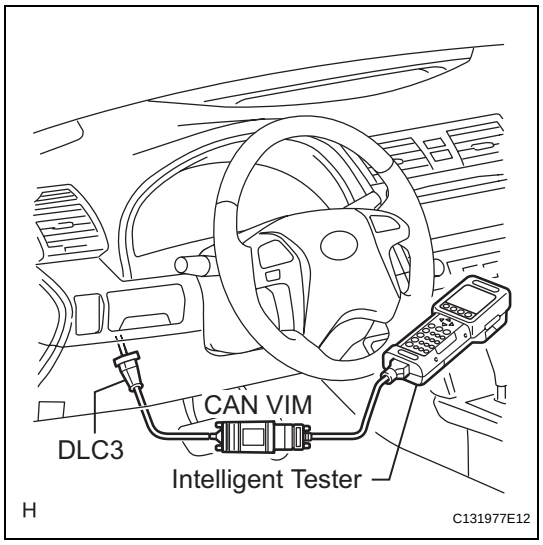
2. CHECK DLC3

HINT:
The ECU uses ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine Switch OFF*	56 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine Switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Engine Switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine Switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine Switch OFF*	6 kΩ or more

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.**
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



HINT:
Connect the cable of the intelligent tester to the DLC3, turn the engine switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

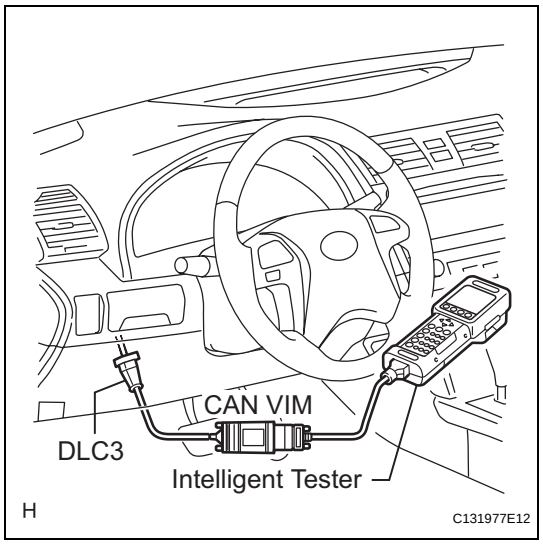
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
(d) Erase the DTC by following the directions on the tester screen.

HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful as intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the DATA LIST information early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 or less second intervals until communication between the tester and vehicle starts.

(b) Turn the engine switch on (IG).

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

(d) Read the DATA LIST.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC SW	Engine switch on (ACC) / ON or OFF	ON: Engine switch on (ACC) OFF: Engine switch off	-
IG SW	Engine switch on (IG) / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
SHIFT P SIG	Shift P position signal / ON or OFF	ON: Shift position is P OFF: Shift position is not P	-
STR UNLOCK SW	Steering lock condition / ON or OFF	ON: Steering is unlocked OFF: Steering is locked	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STSW1	Start switch 1 / ON or OFF	ON: Engine switch is pushed OFF: Engine switch is not pushed	-
START SW2	Start switch 2 / ON or OFF	ON: Engine switch is pushed OFF: Engine switch is not pushed	-
N SW / C SW	Neutral start switch / ON or OFF	ON: Shift position is P or N OFF: Shift position is neither P nor N	-
RATCH CIRCUIT	Ratch circuit / ON or OFF	ON: Engine switch on (IG) or engine running OFF: Engine switch off or on (ACC)	-
IG1 RELAY MON1	IG1 outer relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG1 RELAY MON2	IG1 inner relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG2 RELAY MON1	IG2 outer relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
IG2 RELAY MON2	IG2 inner relay monitor / ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
ST RELAY MON	STARTER relay monitor / ON or OFF	ON: Engine is cranking OFF: Engine is not cranking	Engine is cranking with engine switch on (IG) and shift lever in P or N

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ST REQUEST SIG	Starter request signal monitor / ON or OFF	ON: ST relay is ON OFF: ST relay is OFF	Engine switch pressed and held with shift lever in P or N
ACC RELAY MON	ACC relay monitor / ON or OFF	ON: Engine switch on (ACC) OFF: Engine switch off	-
ACC CUT SIG	ACC relay cut signal / ON or OFF	ON: Engine is cranking OFF: Engine is not cranking	-
E/G COND	Engine condition / STOP or RUN	STOP: Engine is stopped RUN: Engine is running	-
VEHICLE SPD SIG	Vehicle speed signal / STOP or RUN	STOP: Vehicle is stopped RUN: Vehicle is running	-
PWR COND	Power supply condition / ALL, ACC ON, IG1 IG2, ST ON	ALL: All relays are OFF ACC ON: ACC relay is ON IG1: IG1 relay is ON IG2: IG2 relay is ON ST ON: ST request signal is ON	-
READY SIG	Ready Signal / ON or OFF or Unknown		-
COM ENTRY&STRT	Communication for certification ECU / OK or STOP	OK: Communication STOP: No communication	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows the relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3
(b) Turn the engine switch on (IG).
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY:

Item	Test Details	Diagnostic Note
LIGHTING IND	Indicator for lighting ON / OFF	-
IND CONDITION	Engine switch indicator Green / Amber / No Sig	-
STR LOCK PWR	Power supply for steering lock ECU ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

PUSH-BUTTON START FUNCTION:

DTC No.	Detection Item	Trouble Area	See page
B2271	Ignition Hold Monitor Malfunction	1. AM2 fuse 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-31
B2272	Ignition 1 Monitor Malfunction	1. IG1 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-34
B2273	Ignition 2 Monitor Malfunction	1. IG2 relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-39
B2274	ACC Monitor Malfunction	1. ACC relay 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-43
B2275	STSW Monitor Malfunction	1. ECM 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-48
B2276	ACCR Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. ECM 3. Wire harness or connector	ST-51
B2277	Detecting Vehicle Submersion	Main body ECU (Instrument panel J/B)	ST-54
B2278	Engine Switch Circuit Malfunction	1. Engine switch 2. Main body ECU (Instrument panel J/B) 3. Wire harness or connector	ST-55
B2281	"P" Signal Malfunction	1. Main body ECU (Instrument panel J/B) 2. Shift lock control ECU 3. Wire harness or connector	ST-60
B2282	Vehicle Speed Signal Malfunction	1. CAN communication system 2. Combination meter system 3. Main body ECU (Instrument panel J/B) 4. Wire harness or connector	ST-63
B2283	Vehicle Speed Sensor Malfunction	1. B2282 detection area 2. Combination meter 3. Speed sensor 4. Skid control ECU 5. Main body ECU (Instrument panel J/B) 6. Wire harness or connector	ST-69
B2284	Brake Signal Malfunction	1. Stop light switch 2. CAN communication system 3. ECM 4. Main body ECU (Instrument panel J/B) 5 Wire harness or connector	ST-72
B2285	Steering Lock Position Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. Steering lock ECU 3. Wire harness or connector	ST-77
B2286	Runnable Signal Malfunction	1. CAN communication system 2. ECM 3. Main body ECU (Instrument panel J/B) 4. Wire harness or connector	ST-81

DTC No.	Detection Item	Trouble Area	See page
B2287	LIN Communication Master Malfunction	1. Main body ECU (Instrument panel J/B) 2. Certification ECU 3. Wire harness or connector	ST-85
B2288	Steering Lock Signal Circuit Malfunction	1. Main body ECU (Instrument panel J/B) 2. Steering lock ECU 3. Wire harness or connector	ST-88
B2289	Key Collation Waiting Time Over	1. Main body ECU (Instrument panel J/B) 2. Engine immobiliser system 3. Wire harness or connector 4. Certification ECU	ST-91

ON-VEHICLE INSPECTION

1. CHECK POWER SOURCE MODE CHANGE FUNCTION

(a) Check the function of the engine switch.

(1) Check that power source mode changes in accordance with the conditions of the shift position and brake pedal.

Brake Pedal	Shift Lever	Power Source Mode Pattern
Depressed	P or N Position	When the engine switch is pushed once. • off → engine start • on (ACC) → engine start • on (IG) → engine start
Not depressed	P position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → off
	Except P Position	Each time the engine switch is pushed. • off → on (ACC) → on (IG) → on (ACC)
-	P Position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → off
-	Except P Position	When the engine switch is pushed with power source mode on (IG) (engine running). • on (IG) → on (ACC)

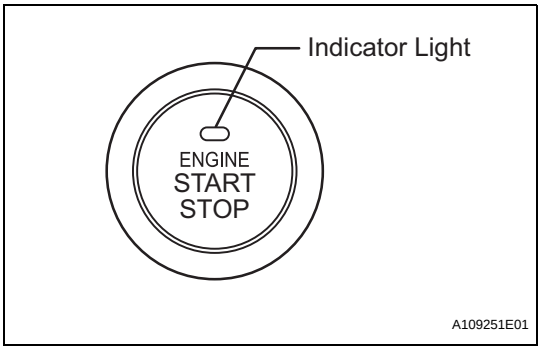
(b) Check if power source mode changes without pressing the engine switch.

(1) With power source mode on (ACC) and the shift position in P, wait for at least 1 hour. Check that power source mode changes from on (ACC) to off automatically.

2. CHECK INDICATOR CONDITION

(a) Check the indicator on the engine switch.

(1) Check that the engine switch indicator turns on and changes color according to the table below.



Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P or N
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
Engine running	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

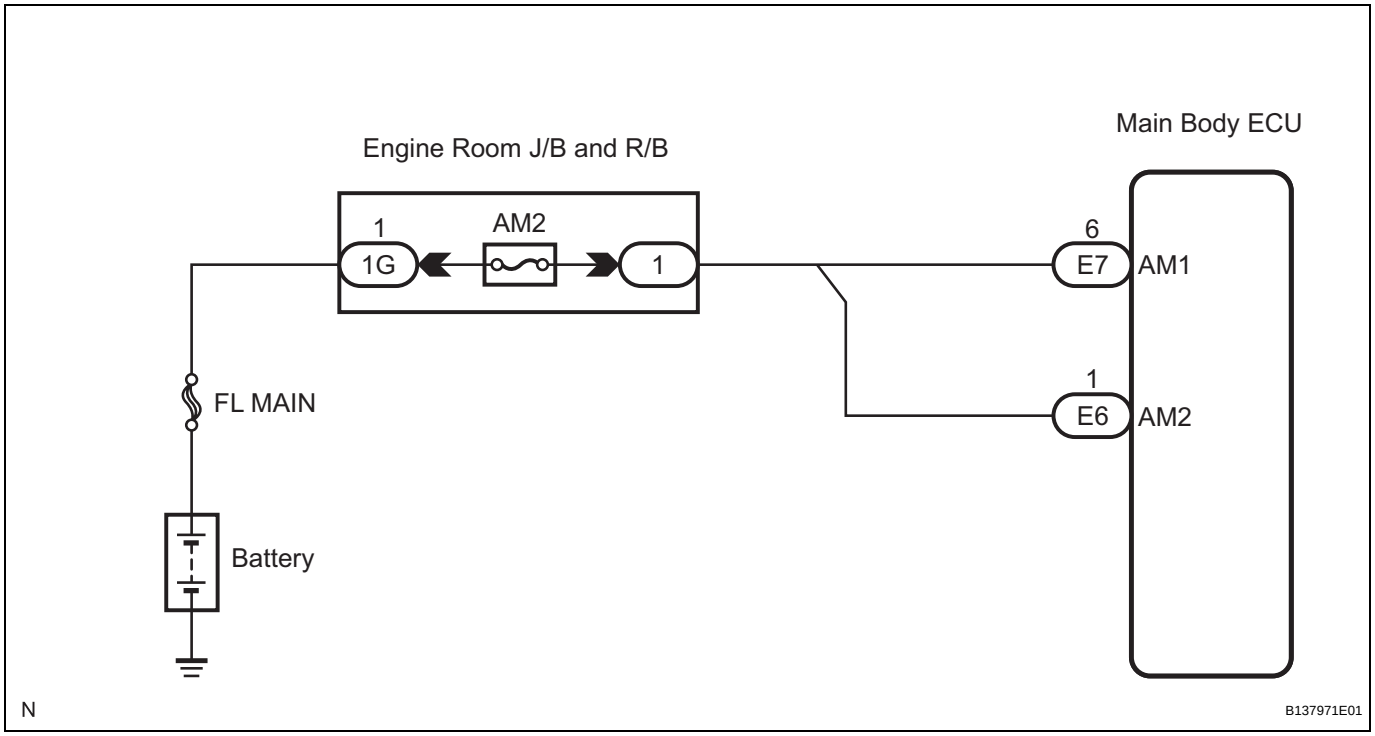
DTC	B2271	Ignition Hold Monitor Malfunction

DESCRIPTION

This DTC is output when a problem such as an open in the AM2 fuse, an open or short in the wire harness between the fuse and main body ECU, a short in the IG output circuit inside the main body ECU, a short between the main body ECU and relay, and a short in the relay is detected.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2271	Hold circuit, IG1 relay actuation circuit or IG2 relay actuation circuit inside main body ECU is open or shorted	• AM2 fuse • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-26).
HINT:
After all DTCs are cleared, check if the trouble occurs again 6 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.

ST

OK:
No DTC is output.

NG → **Go to step 2**

OK ↓

CHECK INTERMITTENT PROBLEMS

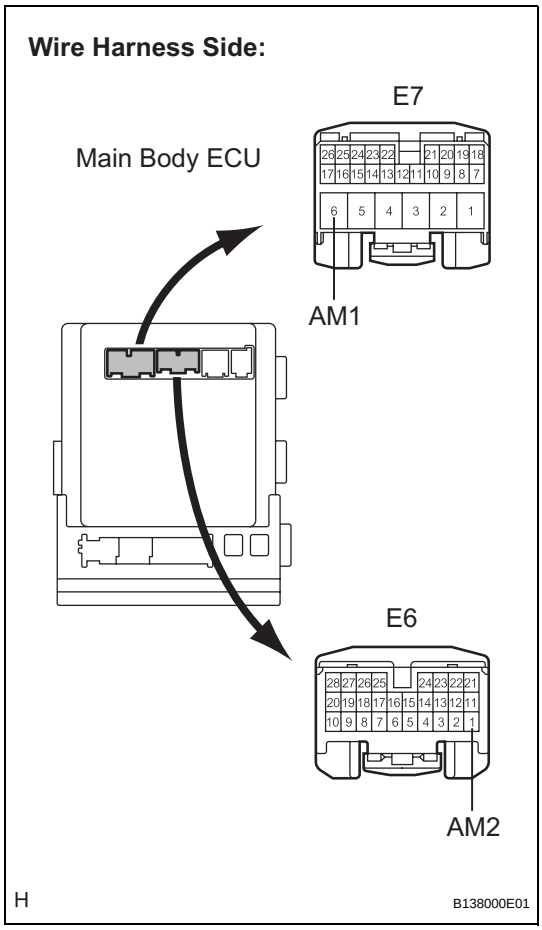
2 **INSPECT FUSE (AM2)**

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK ↓

3 **CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)**



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Terminal No. (Symbol)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ST

OK

REPLACE MAIN BODY ECU

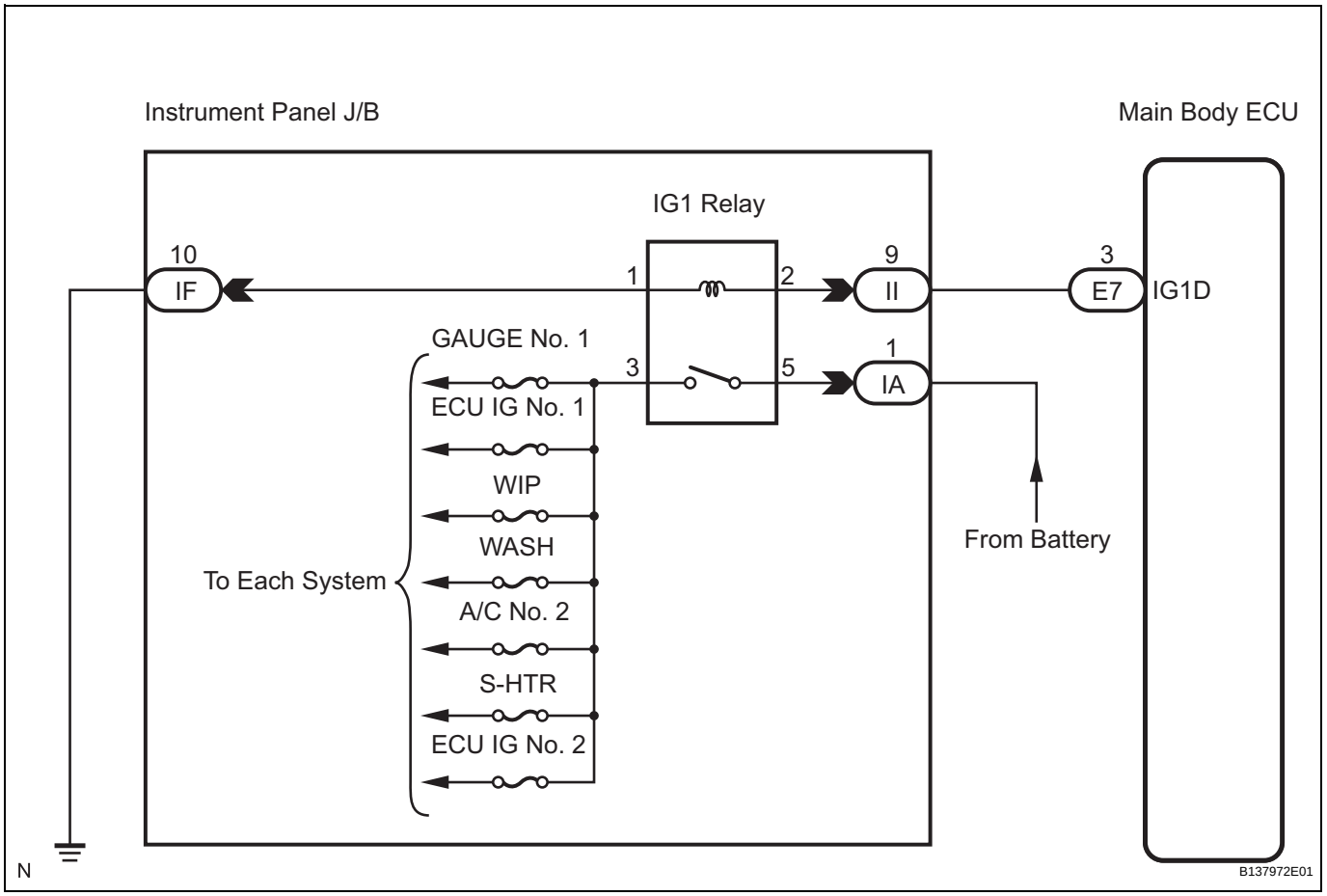
DTC	B2272	Ignition 1 Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the IG1D output circuit, which is from the inside of the main body ECU to the IG1 relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2272	IG1 relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • IG1 relay • Wire harness or connector

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the engine switch on (IG) and turn the intelligent tester main switch on.

(c) Select the item below in the Data List, and read the display on the tester.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG1 RELAY MON1	Status of IG1 relay monitor (outer) / ON or OFF	ON: Engine switch on (IG) (IG1 relay is ON) OFF: Engine switch off (IG1 relay is OFF)	-

OK:
"OK" (engine switch on (IG)) appears on the screen.

NG → **Go to step 3**

OK ↓

2	CHECK ENGINE SWITCH CONDITION

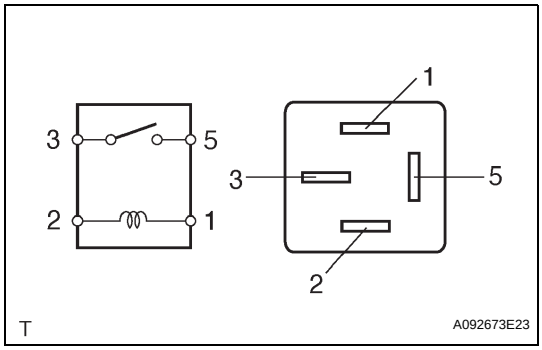
(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-114).
- If power mode does not change to ON (IG) (See page ST-122).

NG → **GO TO OTHER PROBLEM**

OK ↓

ST

3 INSPECT RELAY (IG1 RELAY)



(a) Remove the IG1 relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

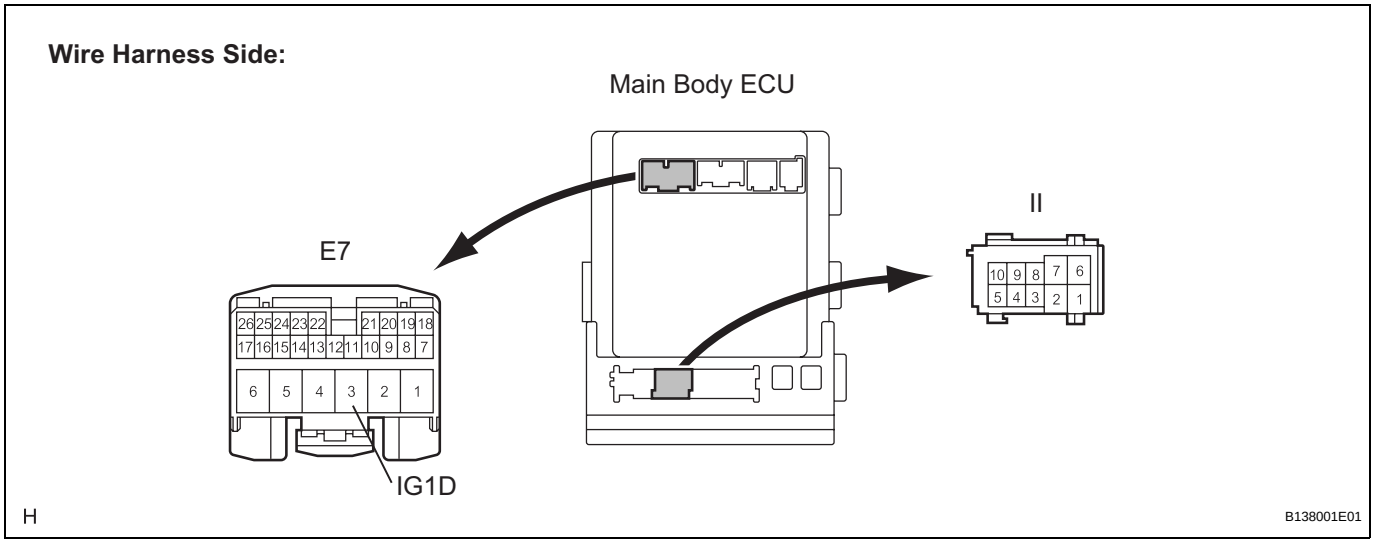
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → REPLACE RELAY

OK

4 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the II J/B connector.



(b) Disconnect the E7 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

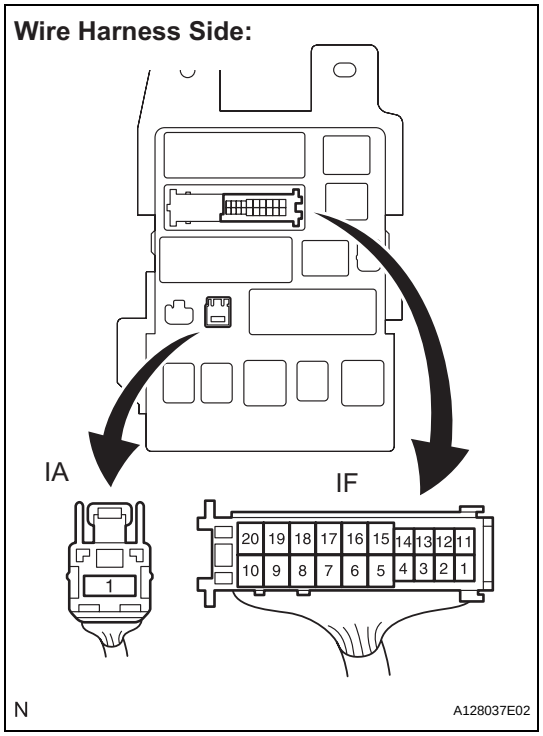
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

5 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified value
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

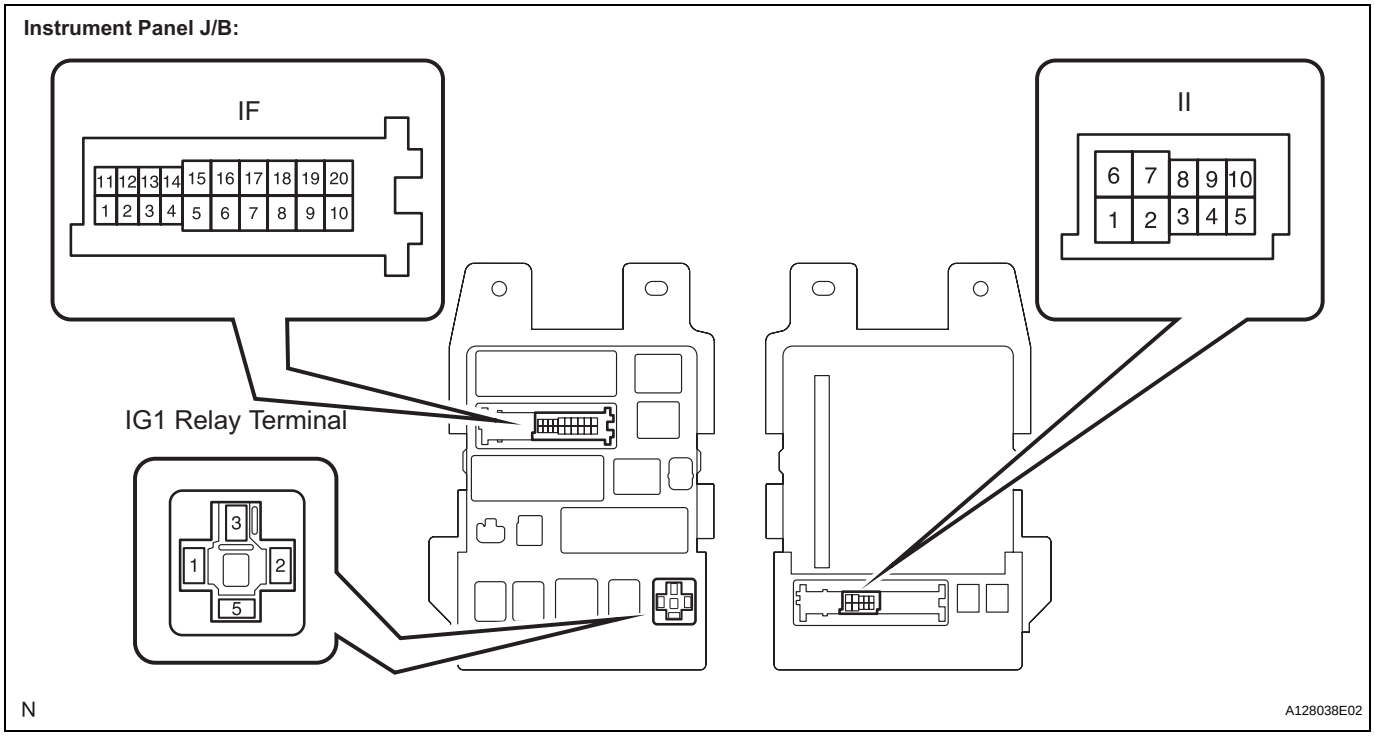
Terminal No.	Condition	Specified value
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



ST

Standard resistance

Terminal No.	Condition	Specified value
IF-10 - IG1 relay terminal-1	Always	Below 1 Ω
II-9 - IG1 relay terminal-2	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

NG → REPLACE INSTRUMENT PANEL J/B

OK

REPLACE MAIN BODY ECU

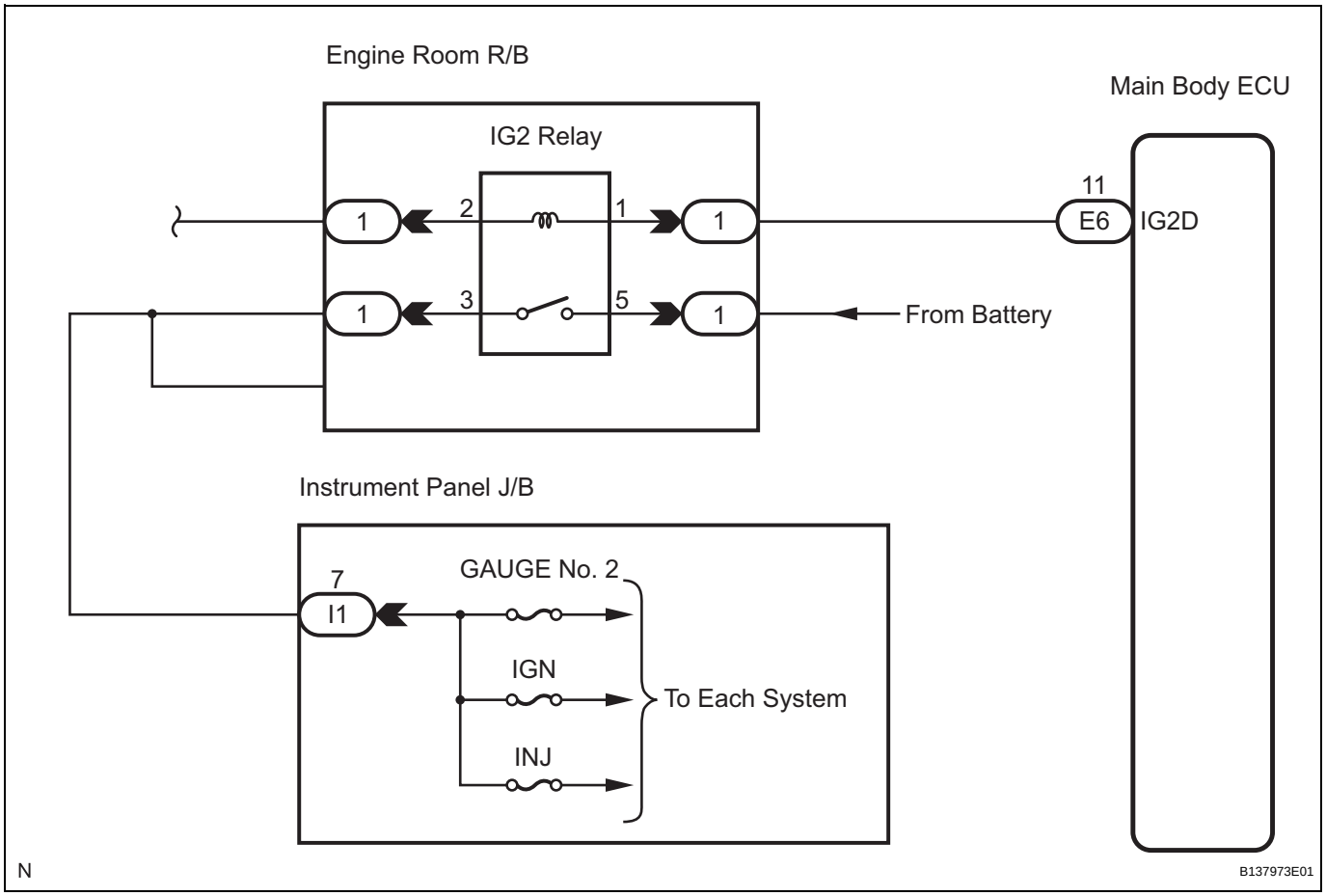
DTC	B2273	Ignition 2 Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the IG2D output circuit, which is from the inside of the main body ECU to the IG2 relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2273	IG2 relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • IG2 relay • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

ST

(b) Turn the engine switch on (IG) and turn the intelligent tester main switch on.
(c) Read the Data List according to the displays on the tester.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG2 RELAY MON1	Status of IG2 relay monitor (outer) / ON or OFF	ON: Engine switch on (IG) (IG2 relay is ON) OFF: Engine switch off (IG2 relay is OFF)	-

OK:
"ON" (Engine switch on (IG)) appears on the screen.

NG → **Go to step 3**

OK

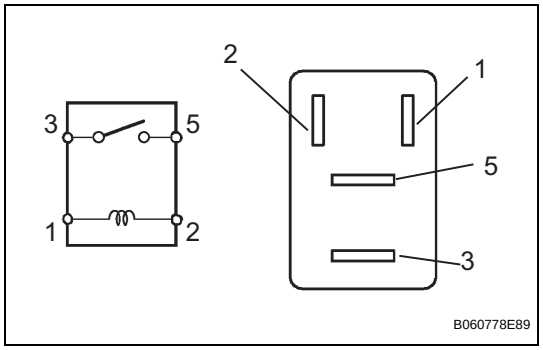
2 CHECK ENGINE SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

NG → **GO TO OTHER PROBLEM**

OK

3	INSPECT RELAY (IG2 RELAY)



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

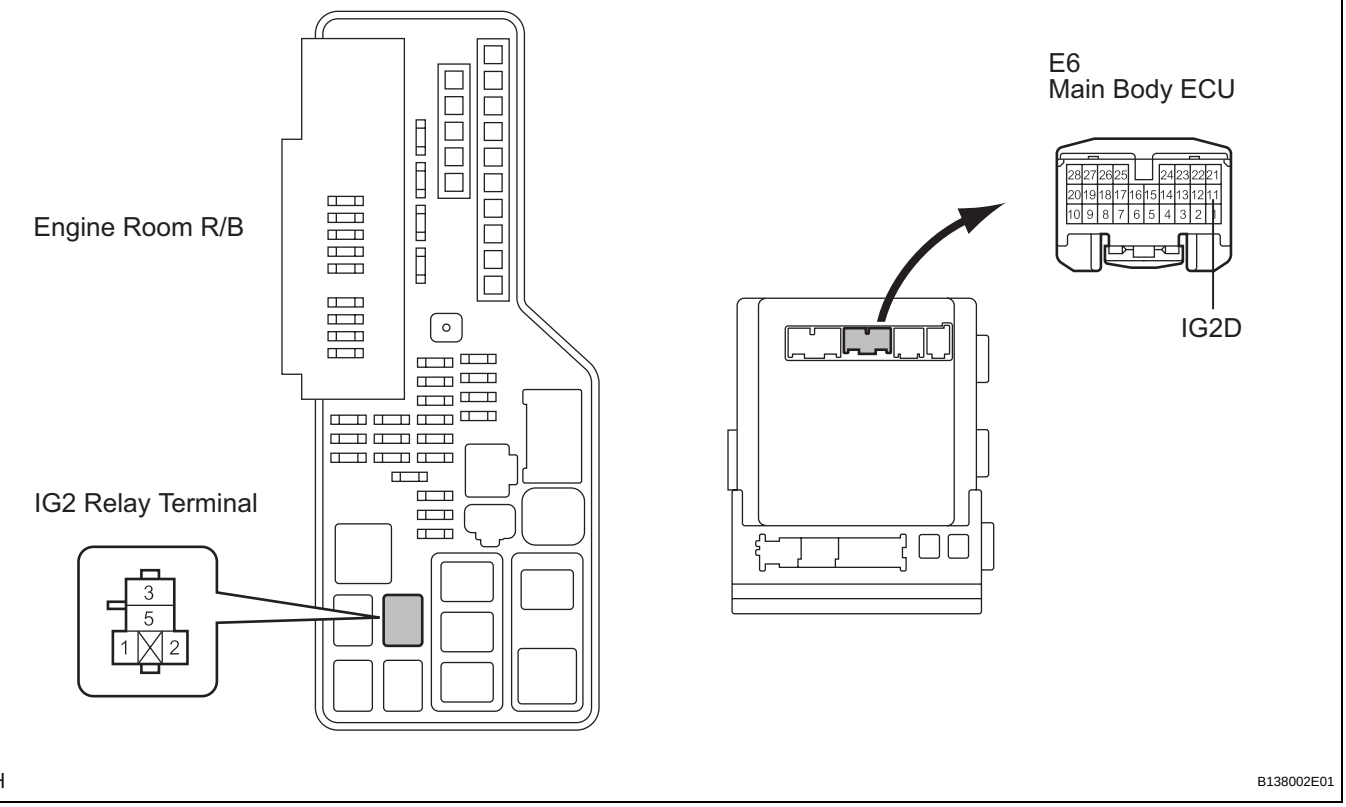
NG → REPLACE RELAY

OK

4	CHECK WIRE HARNESS (ENGINE ROOM R/B - MAIN BODY ECU AND BODY GROUND)

(a) Remove the IG2 relay from the engine room R/B.

Wire Harness Side:



(b) Disconnect the E6 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

ST

Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
Engine Room R/B IG2 relay terminal 1 - E6-11 (IG2D)	Always	Below 1 Ω
Engine Room R/B IG2 relay terminal 2 - Body ground	Always	Below 1 Ω
E6-11 (IG2D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

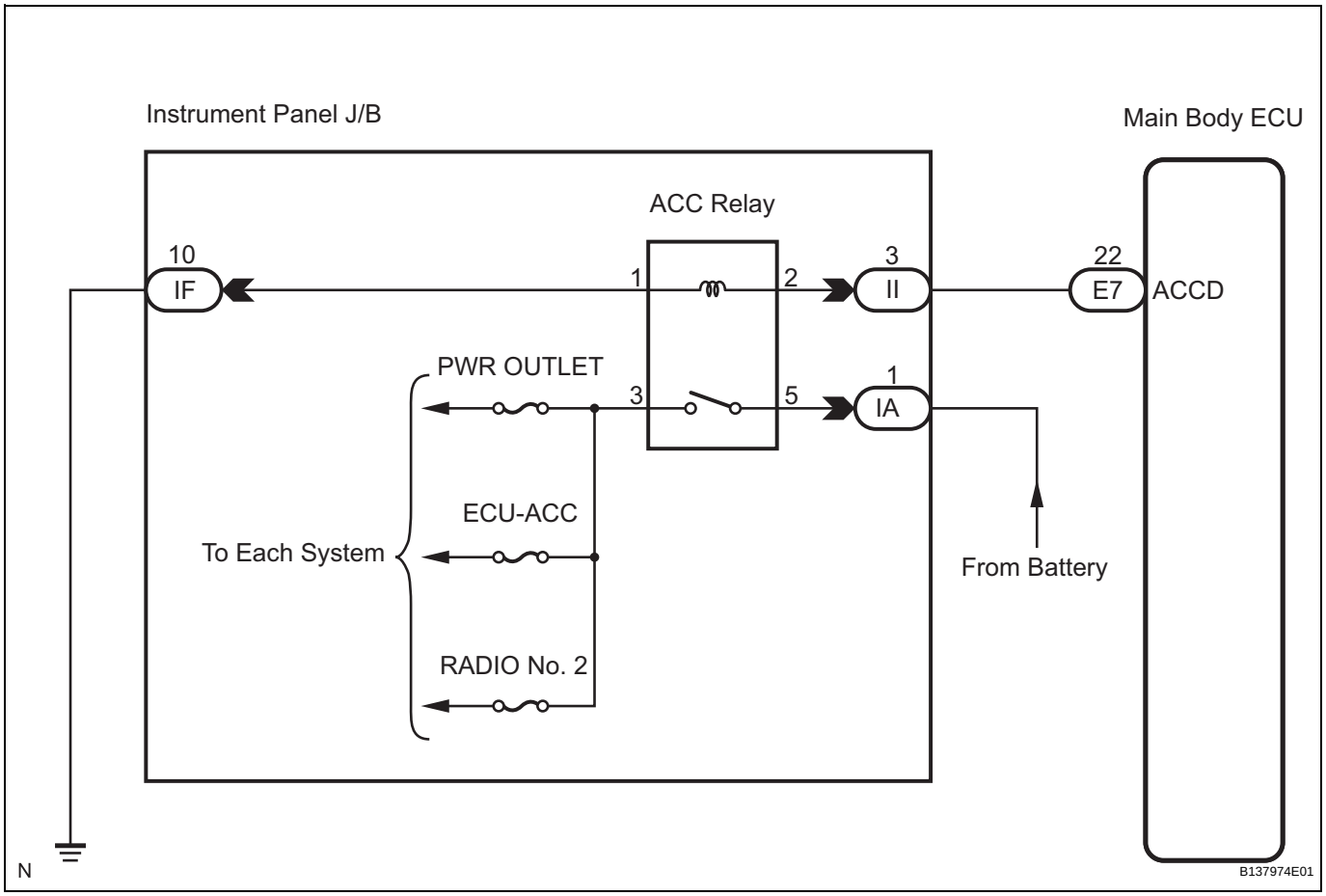
DTC	B2274	ACC Monitor Malfunction

DESCRIPTION

This DTC is output when there is a problem in the ACCD output circuit, which is from the inside of the main body ECU to the ACC relay.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2274	ACC relay actuation circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • ACC relay • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

ST

(b) Turn the engine switch on (IG) and turn the intelligent tester main switch on.
(c) Read the Data List according to the displays on the tester.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC RELAY MON	Status of ACC Relay Monitor / ON or OFF	ON: Engine switch on (ACC) OFF: Engine switch off	-

OK:
"ON" (engine switch on (ACC)) appears on the screen.

NG → **Go to step 3**

OK

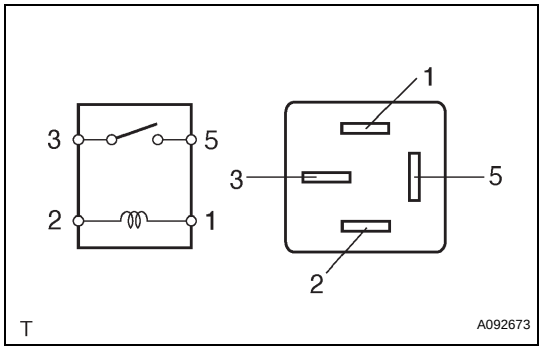
2 CHECK ENGINE SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

NG → **GO TO OTHER PROBLEM**

OK

3 INSPECT RELAY (ACC RELAY)



(a) Remove the ACC relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

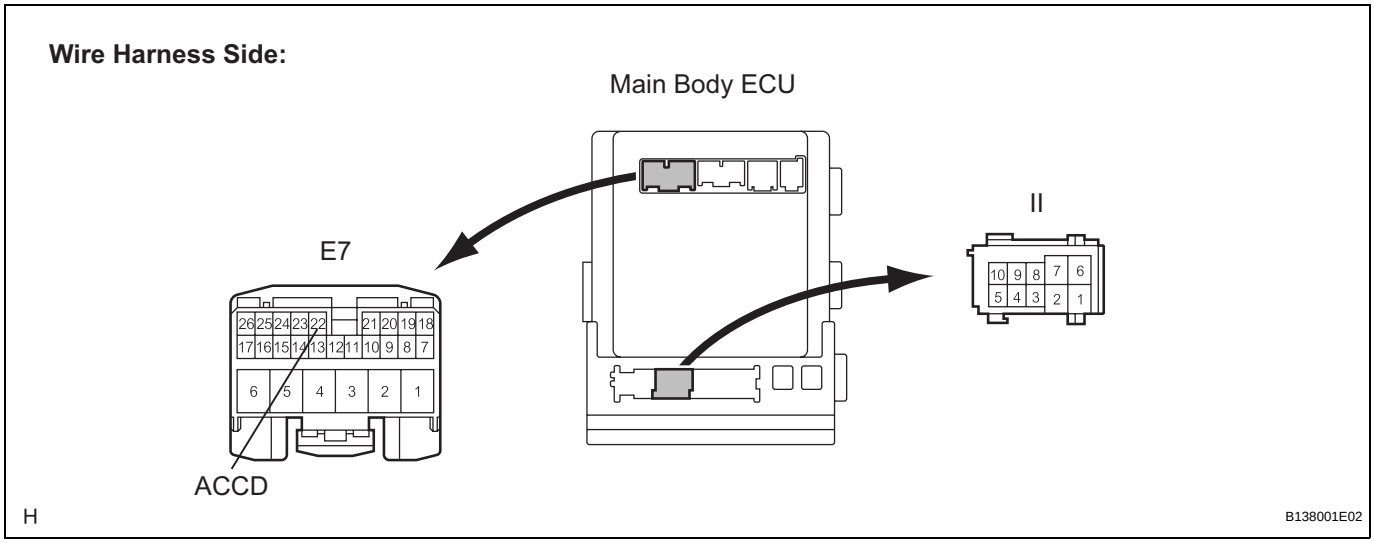
NG → REPLACE RELAY

OK

4 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the E7 ECU connector.

Wire Harness Side:



(b) Disconnect the II J/B connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

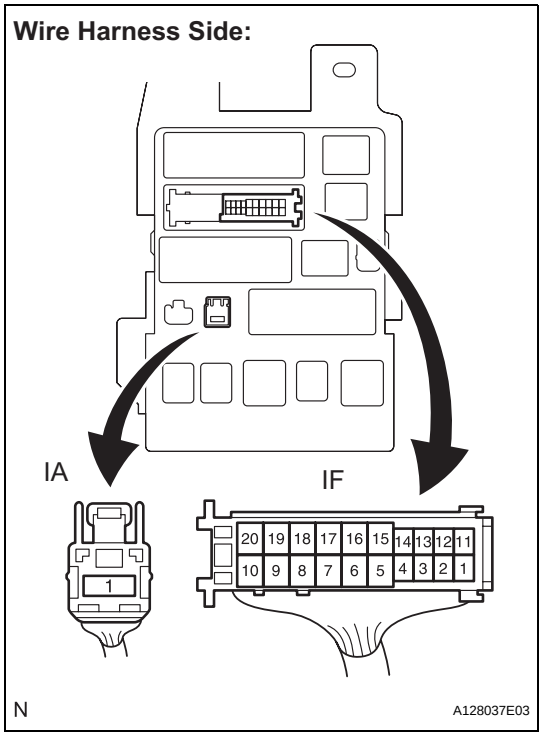
Terminal No. (Symbol)	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
E7-22 or II-3 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

5 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

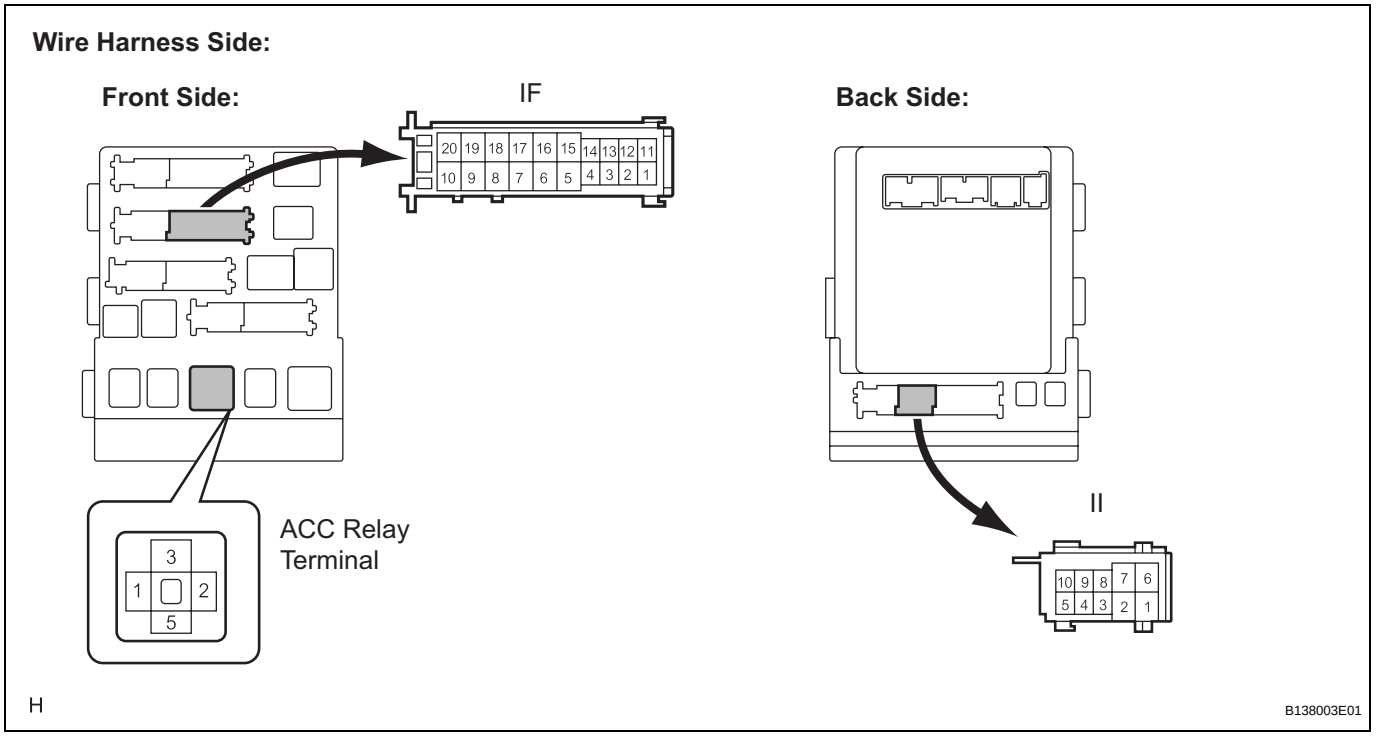
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



ST

Standard resistance

Terminal No.	Condition	Specified Condition
ACC relay terminal 1 - IF-10	Always	Below 1 Ω
ACC relay terminal 2 - II-3	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-3 - Body ground	Always	10 kΩ or higher

NG → REPLACE INSTRUMENT PANEL J/B

OK

REPLACE MAIN BODY ECU

DTC	B2275	STSW Monitor Malfunction

DESCRIPTION

This DTC is output when there is an open, short, or any other problem in the engine start request output circuit inside the main body ECU or in the external circuit.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2275	ST output circuit (engine starting request signal circuit) inside main body ECU or other related circuit is malfunctioning	• Main body ECU • ECM • Wire harness or connector

WIRING DIAGRAM

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-26).
HINT:
After all DTCs are cleared, turn the engine switch on (IG) and depress the brake pedal. After 15 seconds have elapsed, check if the trouble occurs again.
(b) Check for DTCs again.
OK:
No DTC is output.

NG	Go to step 2

ST

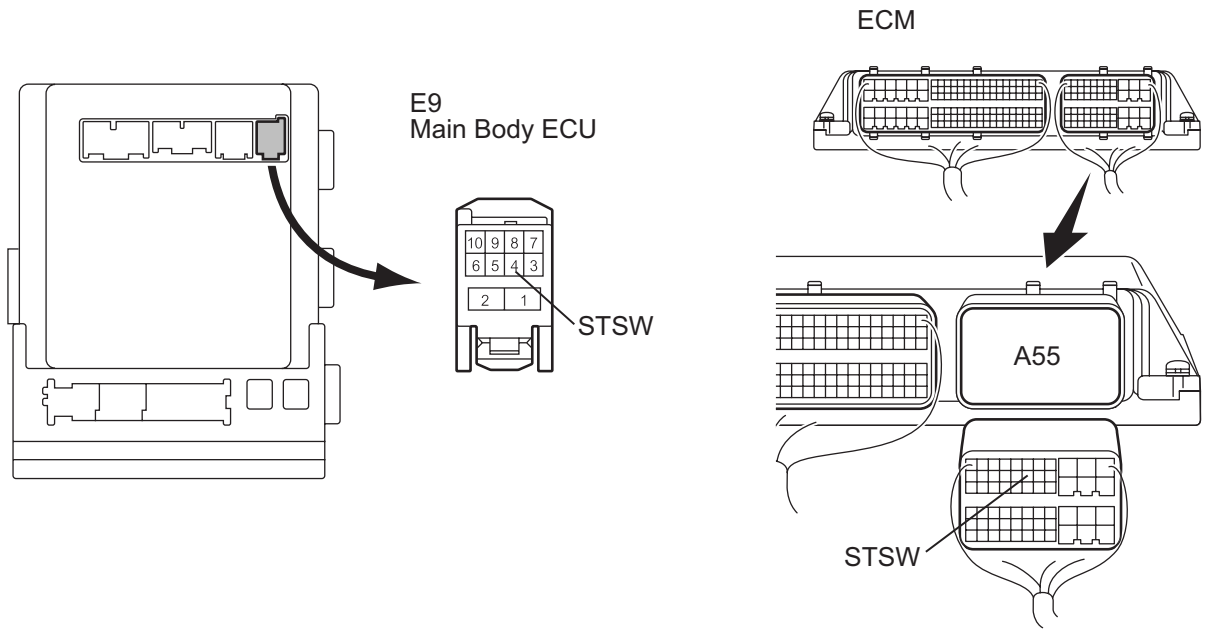
OK

CHECK INTERMITTENT PROBLEMS

2	CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the E9 ECU connector.

Wire Harness Side:



(b) Disconnect the A55 ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

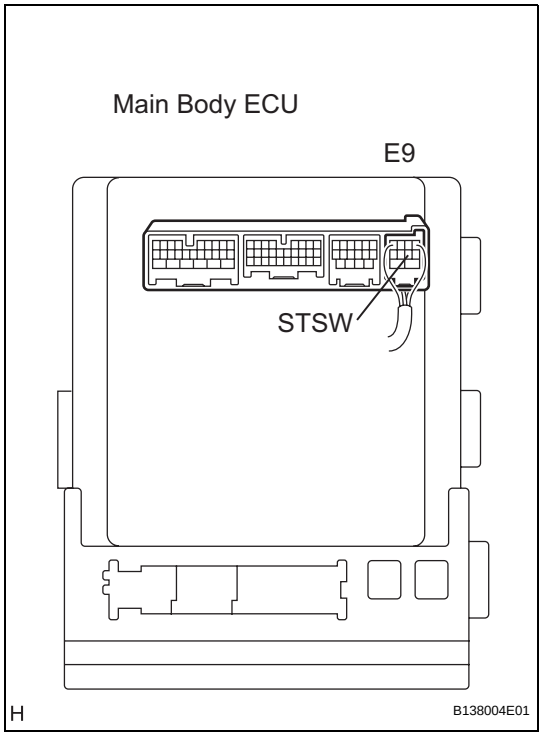
Terminal No. (Symbol)	Condition	Specified Condition
E9-4 (STSW) - A55-14 (STSW)	Always	Below 1 Ω
E9-4 (STSW) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

3	INSPECT MAIN BODY ECU



(a) Reconnect the connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal No. (Symbol)	Condition	Specified Condition
E9-4 (STSW) - Body ground	Brake pedal depressed, Engine switch hold on (ST)	Output voltage at terminal AM1 or AM2 is -2 V or more.

NG → **REPLACE MAIN BODY ECU**

OK

4	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the engine can start.

OK:

Engine can start normally.

NG → **GO TO ENGINE CONTROL SYSTEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2276	ACCR Signal Circuit Malfunction

DESCRIPTION

This DTC is output when the ACCR output circuit inside the main body ECU is open or shorted.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2276	ACCR output circuit inside main body ECU or other related circuit is malfunctioning	• Main body ECU • ECM • Wire harness or connector

WIRING DIAGRAM

INSPECTION PROCEDURE

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-26).
HINT:
After all DTCs are cleared, check if the trouble occurs again 50 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC B2276 is output.

NG → **Go to step 2**

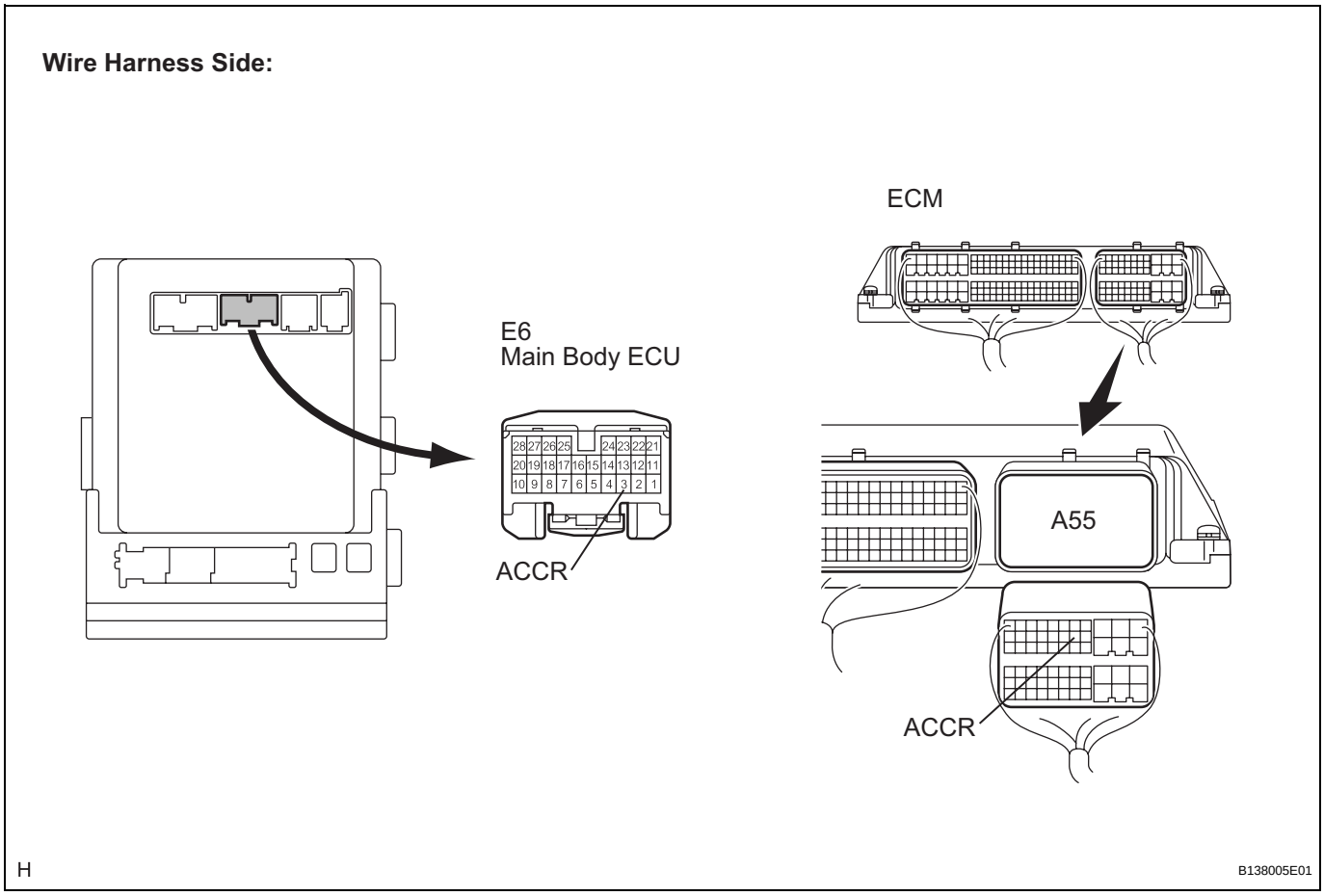
OK

CHECK INTERMITTENT PROBLEMS

ST

2	CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the E6 ECU connector.



(b) Disconnect the A55 ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

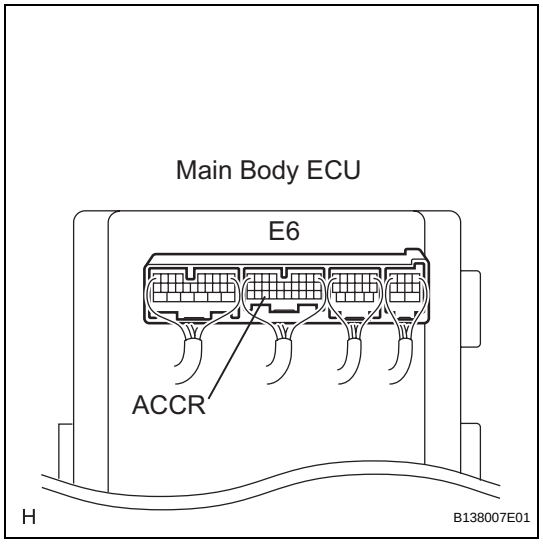
Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
E6-3 (ACCR) - A55-13 (ACCR)	Always	Below 1 Ω
E6-3 (ACCR) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT MAIN BODY ECU



(a) Reconnect the connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal No. (Symbol)	Condition	Specified Condition
E6-3 (ACCR) - Body ground	Brake pedal depressed, shift P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V → output voltage at terminal AM1 or AM2 is -2 V or more.

HINT:
Voltage is output only when the engine is cranking.

NG → **REPLACE MAIN BODY ECU**

OK

4	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the engine starts.

OK:

Engine can start normally.

NG → **REPLACE ECM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2277	Detecting Vehicle Submersion

DESCRIPTION

This DTC is output when the submersion circuit monitor inside the main body ECU detects that the vehicle is submerged in water.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2277	Submersion circuit monitor inside main body ECU detects that vehicle is submerged in water	Main body ECU

INSPECTION PROCEDURE

1 CHECK FOR WATER DAMAGE

(a) Check the main body ECU, peripheral components, and wire harnesses for traces of water.
OK:
There are no traces of water.

NG → **TAKE APPROPRIATE MEASURES AGAINST CAUSE OF WATER DAMAGE AND REPLACE MAIN BODY ECU**

OK ↓

2 CHECK DTC OUTPUT

(a) Delete the DTCs (See page ST-26).
HINT:
After all DTCs are cleared, check if the trouble occurs again 30 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC is output.

NG → **REPLACE MAIN BODY ECU**

OK ↓

END

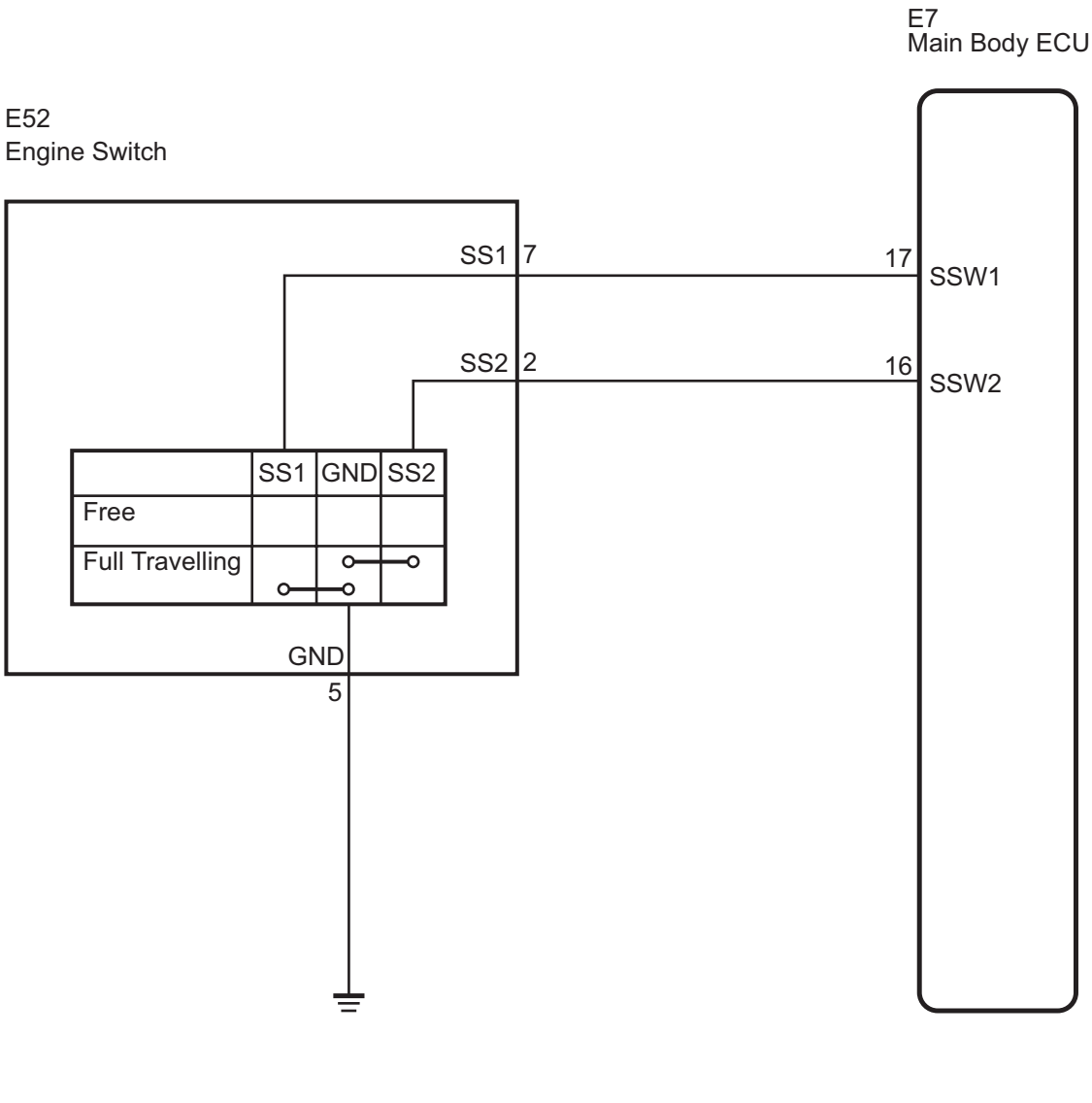
DTC	B2278	Engine Switch Circuit Malfunction

DESCRIPTION

This DTC is output when 1) a malfunction is detected between the main body ECU and the engine switch; or 2) either of the switches inside the engine switch is malfunctioning.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2278	Communication is abnormal between the main body ECU and engine switch or the engine switch is defective	• Engine switch • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (START SWITCH)

ST

(a) Connect the intelligent tester to the DLC3.
(b) Check the DATA LIST for proper functioning of the start switch.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STSW1	Start Switch 1/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
START SW2	Start Switch 2/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-

OK:
ON (engine switch on (IG)) and OFF (engine switch off) appear on the screen.

OK → **Go to step 3**

NG

2 CHECK ENGINE SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

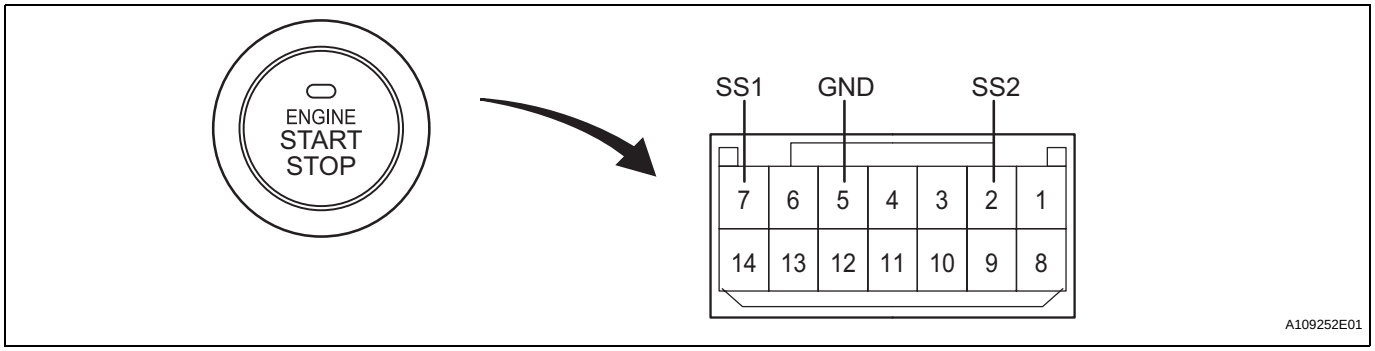
NG → **GO TO OTHER PROBLEM**

OK

END

3 INSPECT ENGINE SWITCH

(a) Remove the engine switch.



(b) Disconnect the switch connector.

ST

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

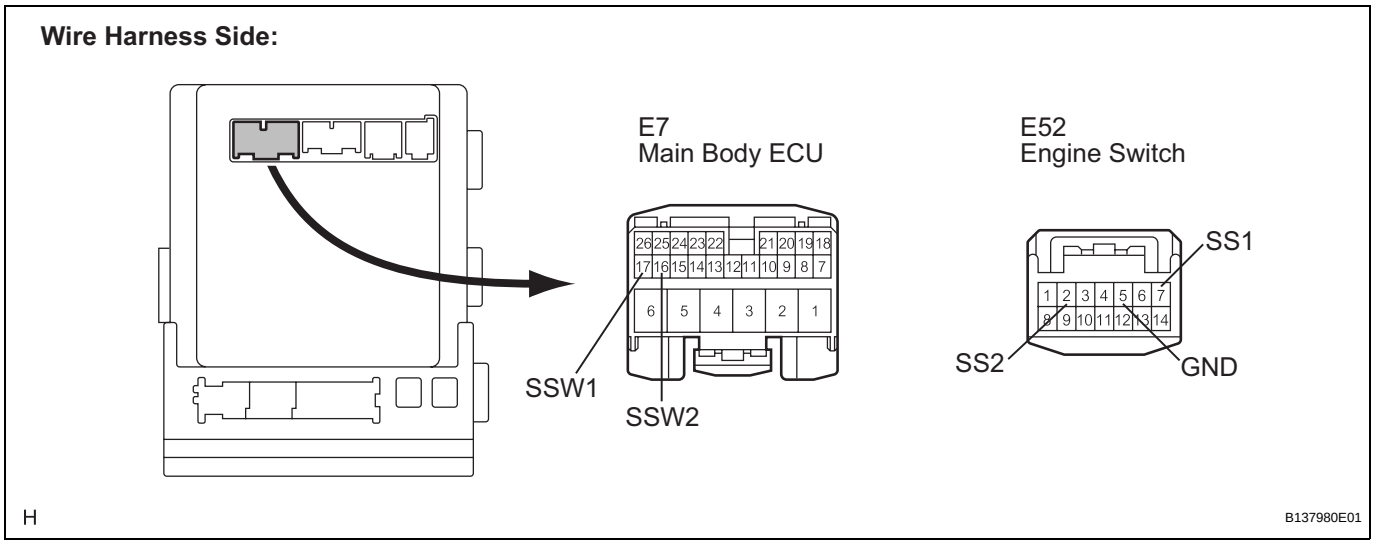
HINT:
This switch is a momentary type switch.

NG → **REPLACE ENGINE SWITCH**

OK

4 CHECK WIRE HARNESS (ENGINE SWITCH - MAIN BODY ECU AND BODY GROUND)

(a) Disconnect the E7 ECU connector.



(b) Disconnect the E52 switch connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E52-7 (SS1) - E7-17 (SSW1)	Always	Below 1 Ω
E52-2 (SS2) - E7-16 (SSW2)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-7 (SS1) or E7-17 (SSW1) - Body ground	Always	10 kΩ or higher
E52-2 (SS2) or E7-16 (SSW2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ST

OK

REPLACE MAIN BODY ECU

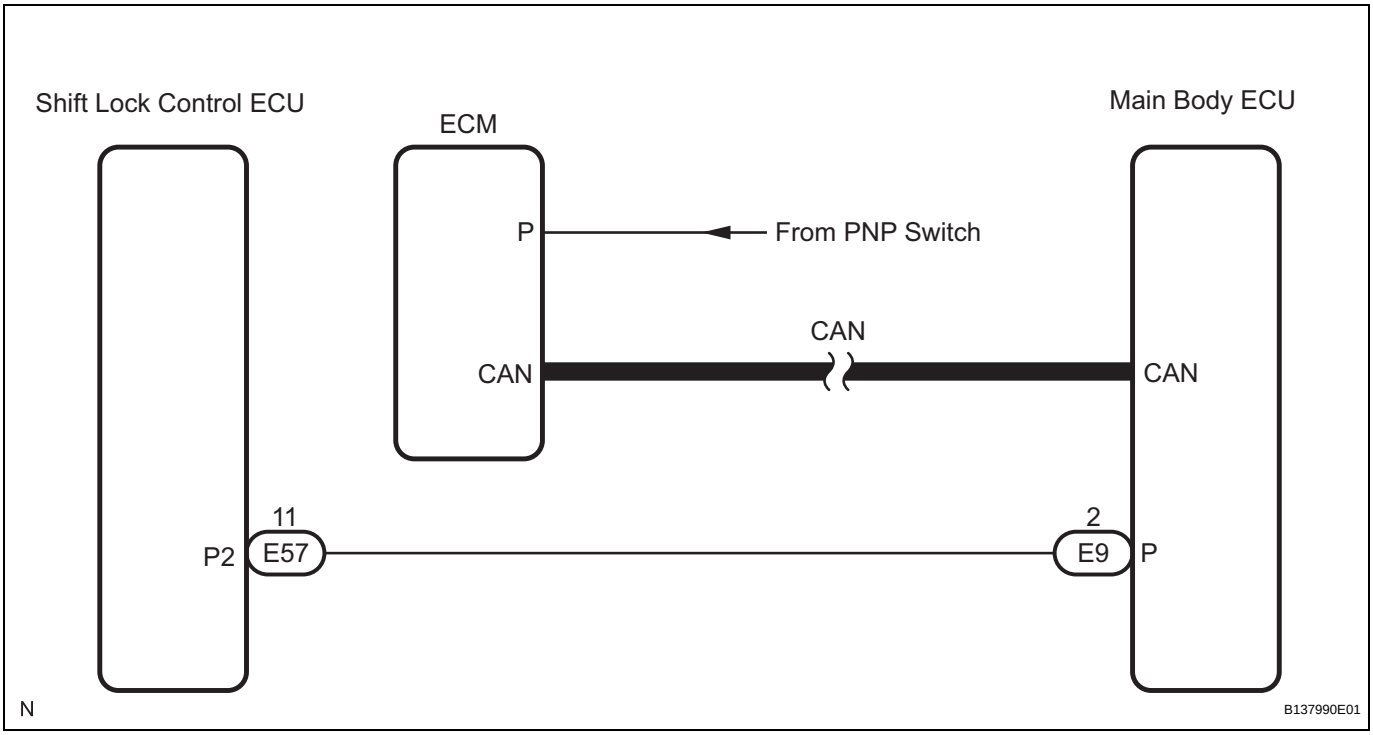
DTC	B2281	"P" Signal Malfunction

DESCRIPTION

The main body ECU and the shift lock control ECU are connected by a cable and the CAN. If the cable information and CAN information are inconsistent, this DTC will be output.
HINT:
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2281	Cable information and CAN information between main body ECU and shift lock control ECU are inconsistent	• Main body ECU • Shift lock control ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG) and turn the intelligent tester main switch on.
(c) Read the DATA LIST according to the displays on the tester.

ST

MAIN BODY:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SHIFT P SIG	Shift P Signal / ON or OFF	ON: Shift P signal ON (Shift position is P) OFF: Shift P signal OFF (Shift position is not P)	-

OK:
"ON" (P signal is ON) and "OFF" (P signal is OFF) appear on the screen.

NG → **Go to step 2**

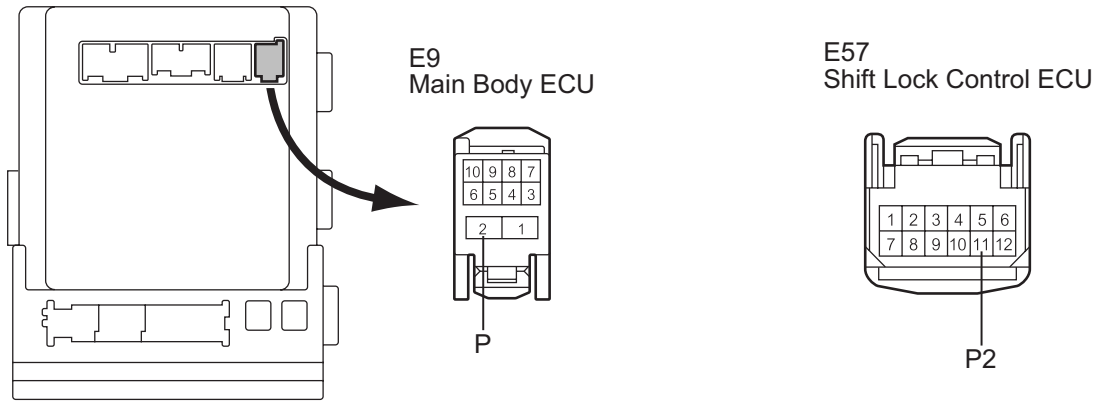
OK

GO TO SHIFT CONTROL SYSTEM

2 CHECK WIRE HARNESS (MAIN BODY ECU - SHIFT LOCK CONTROL ECU)

(a) Disconnect the E9 and E57 ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
E9-2 (P) - E57-11 (P2)	Always	Below 1 Ω
E9-2 (P) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the engine can start normally.

ST

OK:
Engine can start normally.

NG → **GO TO SHIFT CONTROL SYSTEM**

OK

END (MAIN BODY ECU DEFECTIVE)

DTC	B2282	Vehicle Speed Signal Malfunction

DESCRIPTION

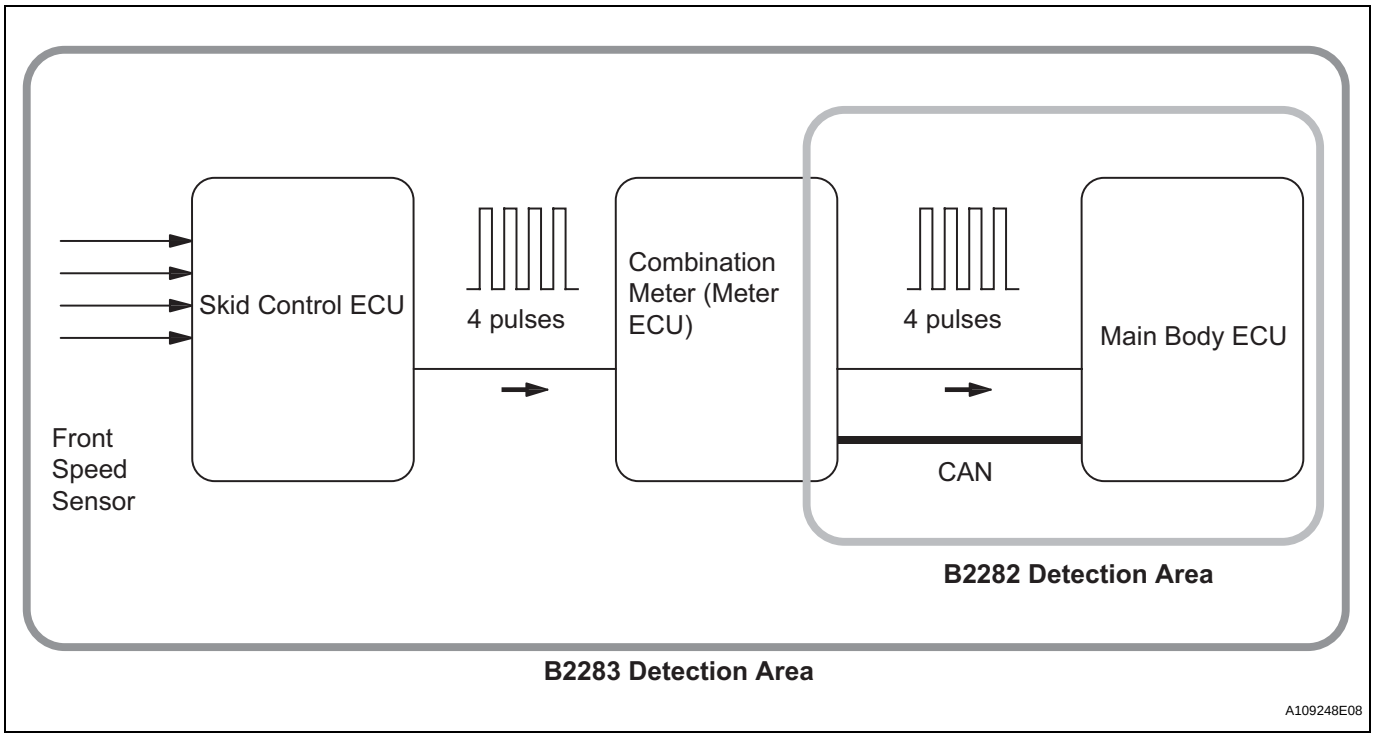
The main body ECU and the combination meter are connected by a cable and the CAN. DTC B2282 is output when: 1) the cable information and CAN information are inconsistent; and 2) a malfunction is detected between the vehicle speed sensor and combination meter.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

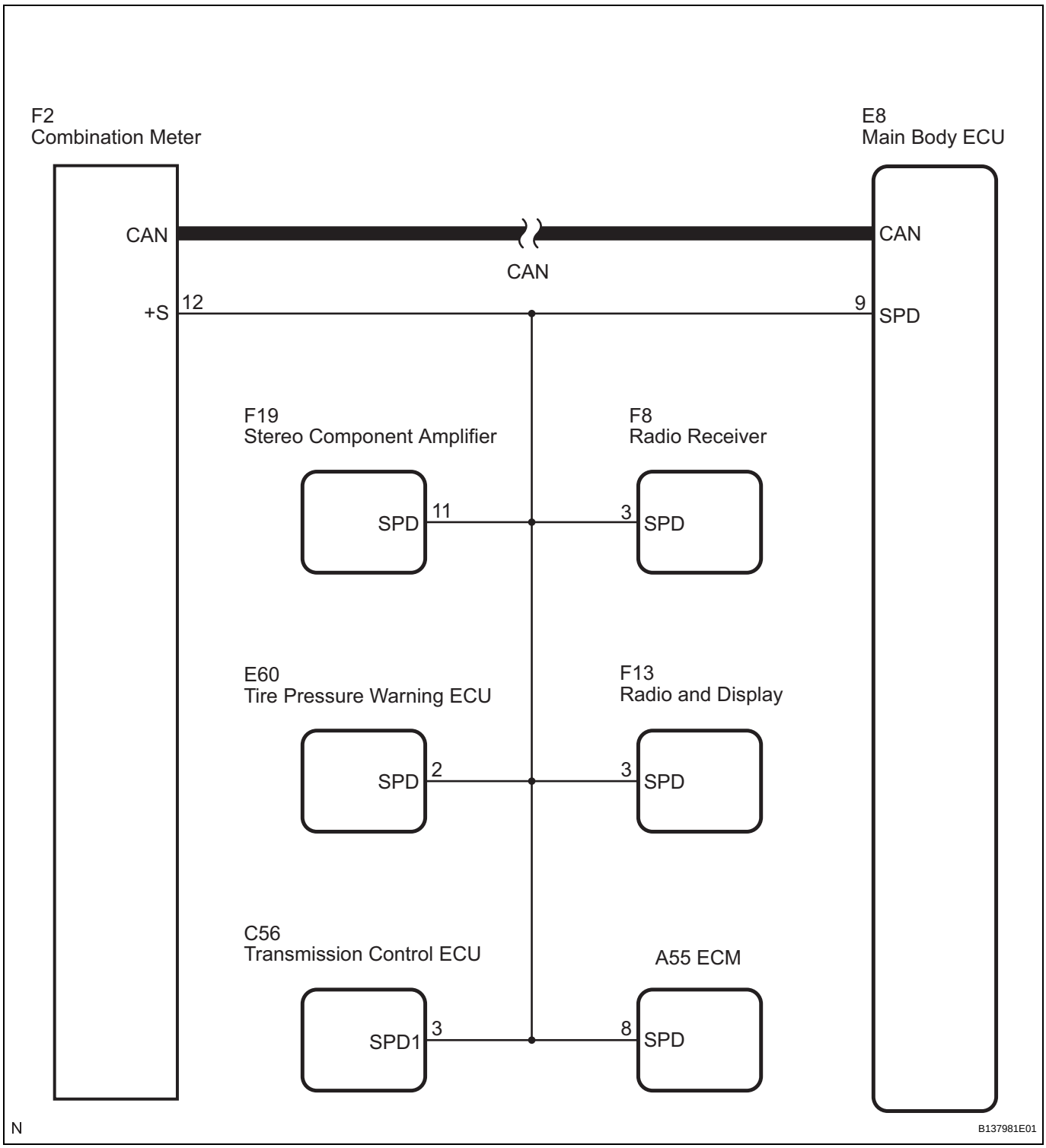
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2282	When both conditions below are met: • Cable information and CAN information between the main body ECU and the combination meter are inconsistent • Malfunction is detected between the vehicle speed sensor and the combination meter	• CAN communication system • Combination meter system • Main body ECU • Wire harness or connector



ST

WIRING DIAGRAM



HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram above will not operate normally.

ST

INSPECTION PROCEDURE

1 CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if the function of the speedometer in the combination meter is normal.
OK:
Actual vehicle speed and the speed indicated on the speedometer are the same.
HINT:
The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **GO TO COMBINATION METER SYSTEM**

OK

2 CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) Check for CAN communication system DTCs.
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-31).
OK:
No DTC is output.

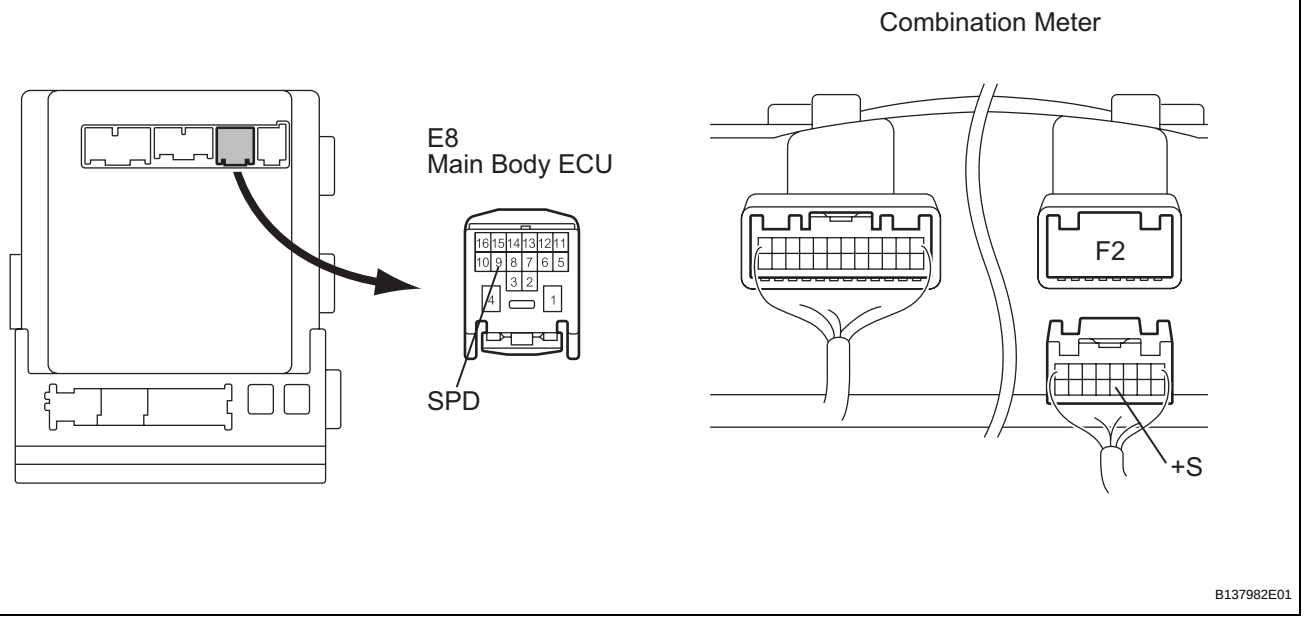
NG → **GO TO CAN COMMUNICATION SYSTEM**

OK

3 CHECK WIRE HARNESS (MAIN BODY ECU - COMBINATION METER)

(a) Disconnect the E8 ECU connector.

Wire Harness Side:



(b) Disconnect the F2 meter connector.
(c) Measure the resistance according to the value(s) in the table below.

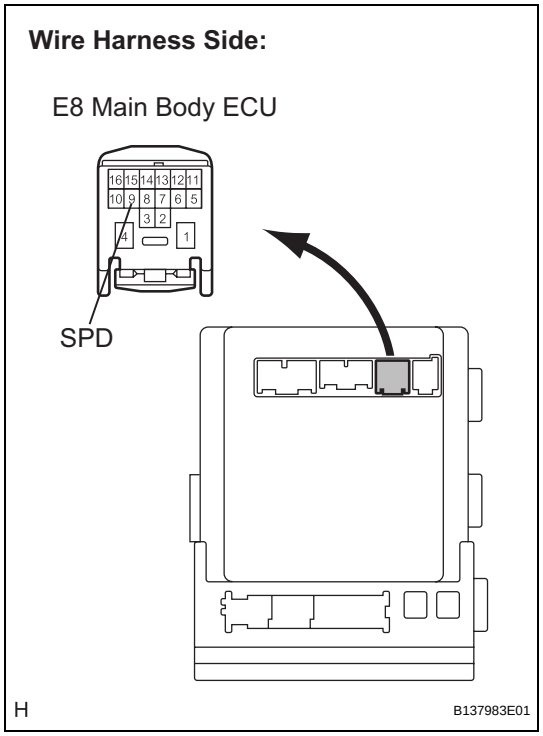
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-9 (SPD) - F2-12 (+S) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-9 (SPD) - Body ground	Always	10 kΩ or higher

HINT:
If the result of the inspection for a short circuit is not as specified, there may be a short in the ECU.

NG → **REPAIR OR REPLACE HARNESS, CONNECTOR OR EACH ECU**

OK

5 READ VALUE OF INTELLIGENT TESTER (VEHICLE SPEED SIGNAL)

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the engine switch on (IG).
(d) Check the DATA LIST for proper functioning of the vehicle speed signal.

MAIN BODY:

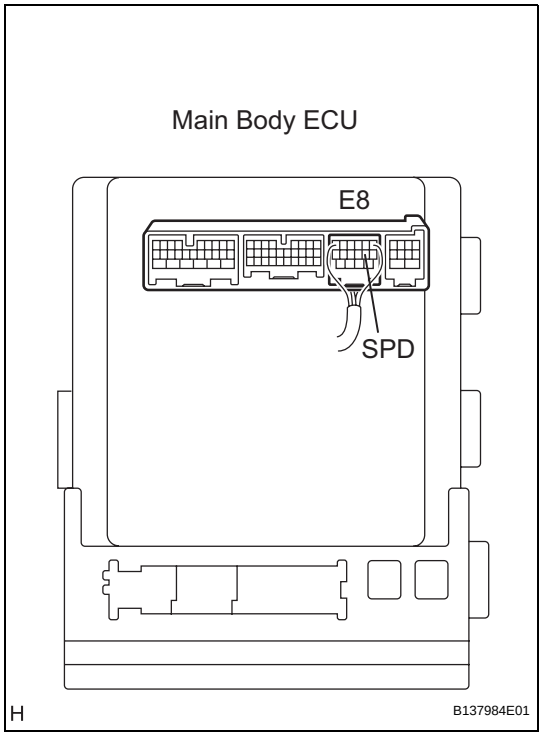
Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD SIG	Vehicle speed signal/STOP or RUN	STOP: Vehicle is stopped RUN: Vehicle is running	-

OK:
STOP (vehicle is stopped) and RUN (vehicle is running) appear on the screen.

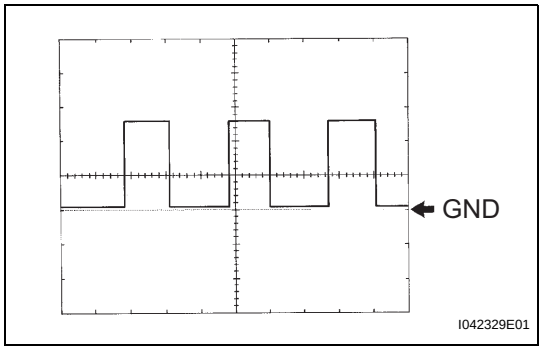
OK → **CHECK INTERMITTENT PROBLEMS**

NG

6	INSPECT MAIN BODY ECU (SPEED SIGNAL)



(a) Check the input signal waveform.
(1) Reconnect the connectors.
(2) Remove the combination meter assembly with the connector(s) still connected.
(3) Connect an oscilloscope to terminal E8-9 (SPD) and body ground.
(4) Turn the engine switch on (IG).
(5) Turn the wheel slowly.



(6) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	5 V/DIV., 10 ms./DIV.
Vehicle condition	Driving at approx. 20 km/h (12 mph)

OK:
The waveform is displayed as shown in the illustration.
HINT:
As the vehicle speed increases, the cycle of the signal waveform narrows.

NG → **REPLACE COMBINATION METER**

OK

REPLACE MAIN BODY ECU

DTC	B2283	Vehicle Speed Sensor Malfunction

DESCRIPTION

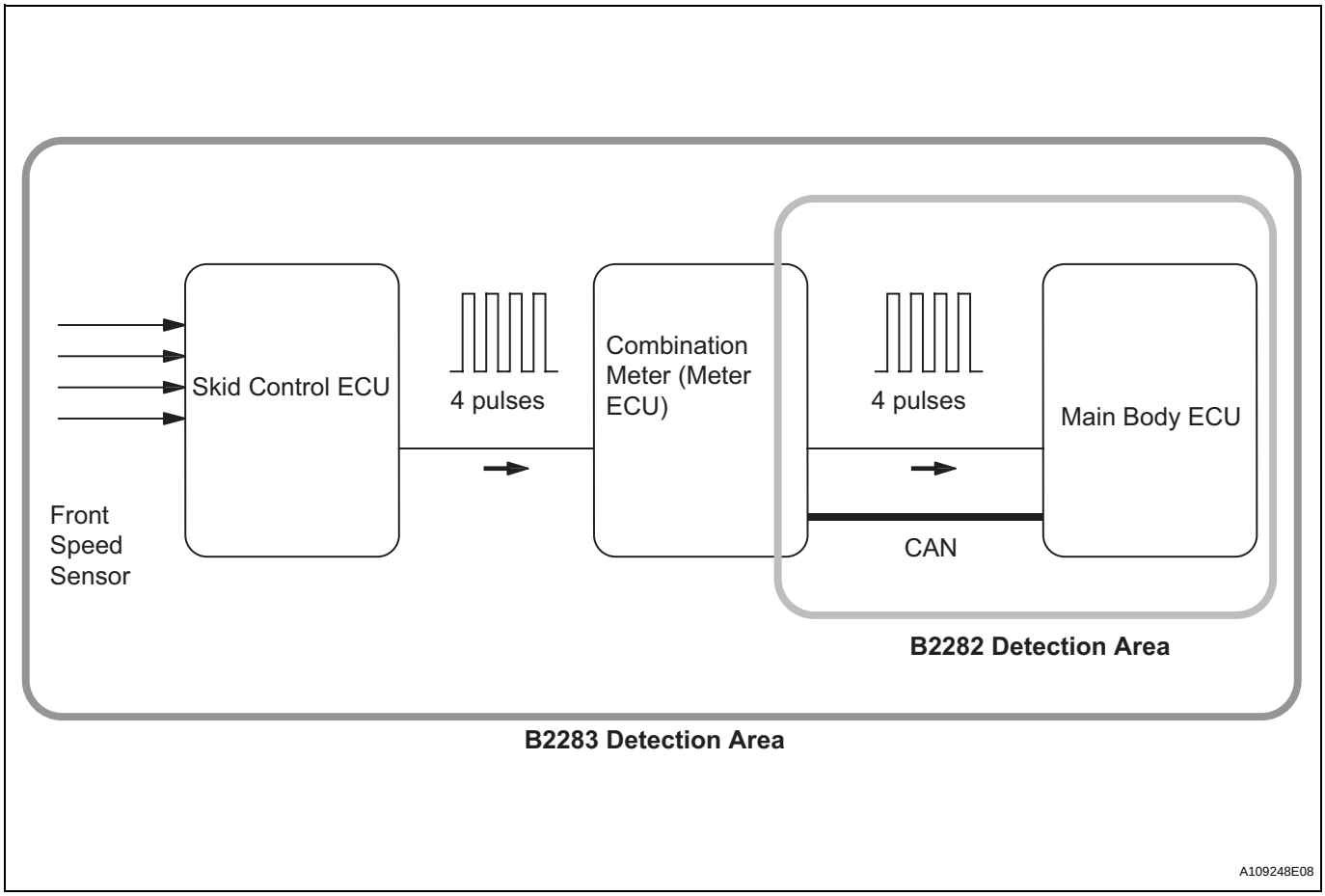
The skid control ECU converts these signals into 4-pulse signals and sends them to the combination meter. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the main body ECU. The main body ECU determines the vehicle speed based on the frequency of these pulse signals.

HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2283	When both conditions below are met: • Over-deceleration in vehicle speed • Vehicle speed and engine speed do not match	• B2282 detection area • Combination meter • Speed sensor • Skid control ECU • Main body ECU • Wire harness or connector



INSPECTION PROCEDURE

1 CHECK DTC OUTPUT (SMART KEY SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) After all DTCs are cleared, check if the trouble occurs again 320 seconds after the engine switch is turned on (IG).
(c) Check for DTC B2282 and DTC B2283.

Result

Display (DTC output)	Proceed to
"DTC B2283" only	A
"DTC B2283" and "DTC B2282"	B
No DTC	C

HINT:
If DTC B2282 and DTC B2283 are output, perform troubleshooting for DTC B2282 first (See page ST-63).

B → **GO TO DTC B2282**

C → **CHECK INTERMITTENT PROBLEMS**

A

2 CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if the function of the speedometer in the combination meter is normal.
OK:
Actual vehicle speed and the speed indicated on the speedometer are the same.
HINT:
The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **GO TO COMBINATION METER SYSTEM**

OK

3 CHECK DTC OUTPUT (BRAKE CONTROL)

(a) Delete the DTCs (See page ST-26).
(b) Check for DTCs.
(w/o VSC: See page BC-27)
(for BOSCH made w/ VSC: See page BC-311)
(for ADVICS made w/ VSC: See page BC-151)
OK:
No DTC is output.

NG → **GO TO BRAKE CONTROL SYSTEM**

ST

OK

REPLACE MAIN BODY ECU

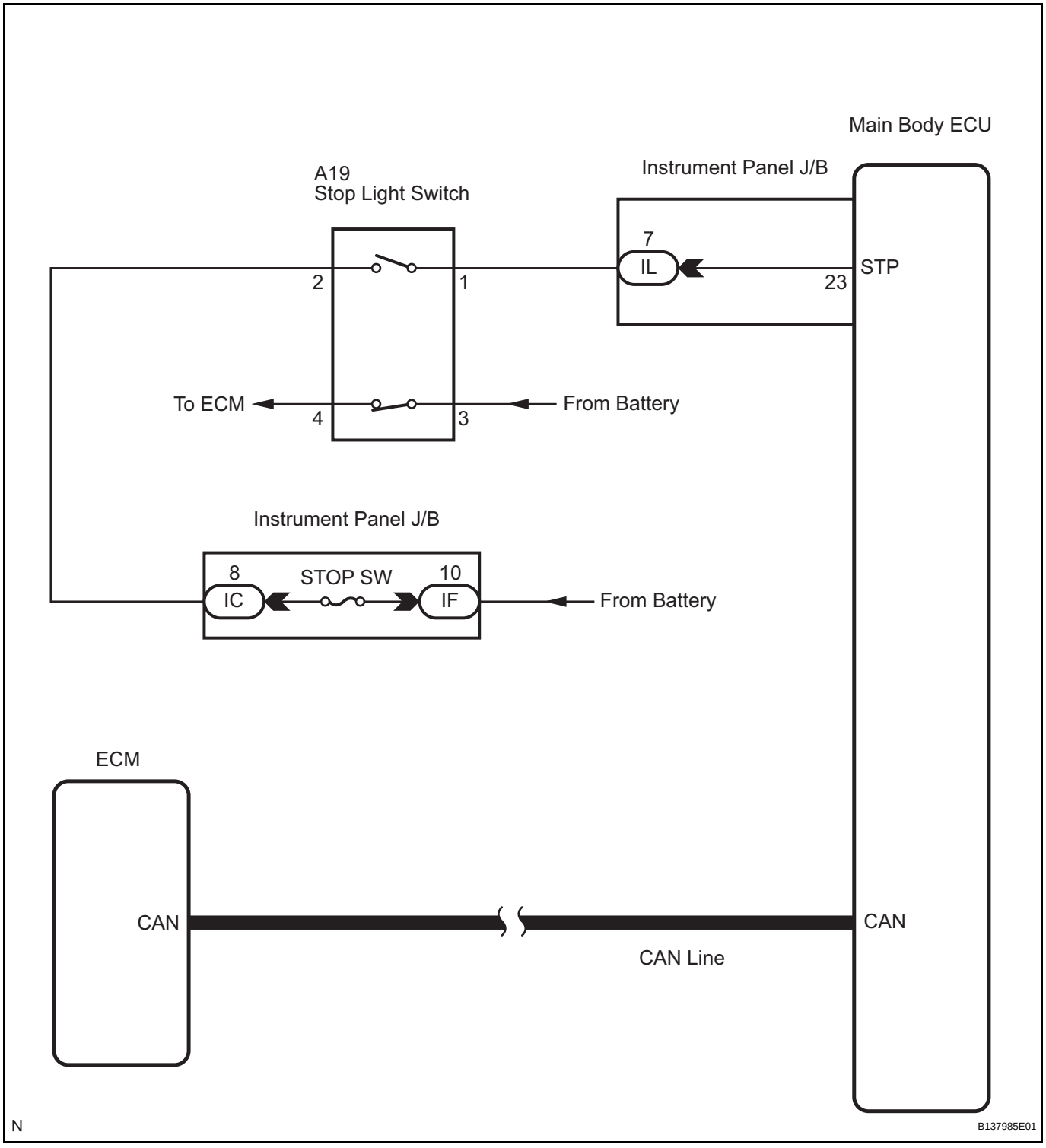
DTC	B2284	Brake Signal Malfunction

DESCRIPTION

This DTC is output when: 1) the brake signal circuit between the main body ECU and the stop light switch is malfunctioning; and 2) the CAN information is inconsistent.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2284	Communication or communication line is abnormal between the main body ECU and the stop light switch	• Stop light switch • CAN communication system • ECM • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

ST

1. EMERGENCY ENGINE START CONTROL

(a) If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU. This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.
To activate the starter:
(1) Turn the engine switch from off to on (ACC).
(2) Press and hold the engine switch for 15 seconds.

HINT:
Before performing the inspection, depress the brake pedal and check that the stop lights come on. If the stop lights do not come on when the brake pedal is depressed, refer to the page shown in the brackets (See page LI-12).

1	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Check the DATA LIST for proper functioning of the stop light switch.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:
ON (brake pedal depressed) and OFF (brake pedal released) appear on the screen.

NG → **Go to step 4**

OK ↓

2	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) Check for CAN communication system DTCs (See page CA-31).
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-31).
OK:
No DTC is output.

NG → **GO TO CAN COMMUNICATION SYSTEM**

OK ↓

3	CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) Check for DTC P0500 and P0503 (See page ES-63).
OK:
No DTC is output.

NG → **GO TO ENGINE CONTROL SYSTEM**

OK ↓

REPLACE MAIN BODY ECU

ST

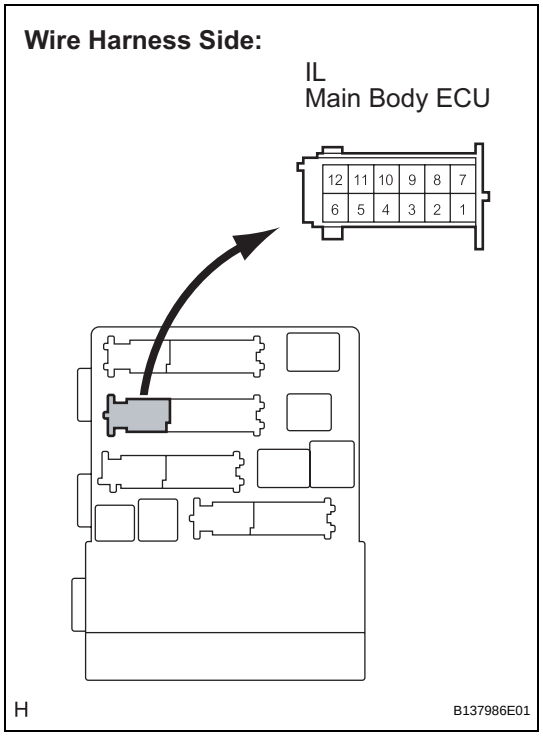
4 **INSPECT FUSE (STOP SW)**

(a) Remove the STOP SW fuse from the instrument panel J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

5 **CHECK WIRE HARNESS (BATTERY - MAIN BODY ECU)**



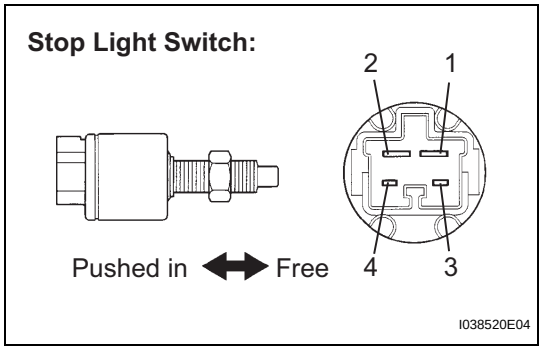
(a) Disconnect the IL ECU connector.
(b) Measure the volage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
IL-7 - Body ground	Brake pedal released	Below 1 V
IL-7 - Body ground	Brake pedal depressed	10 to 14 V

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

6 **INSPECT STOP LIGHT SWITCH**



(a) Remove the switch.
(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
3 - 4	Switch pin free	10 kΩ or higher
1 - 2	Switch pin pushed in	10 kΩ or higher
3 - 4	Switch pin pushed in	Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH**

ST

OK

REPLACE MAIN BODY ECU

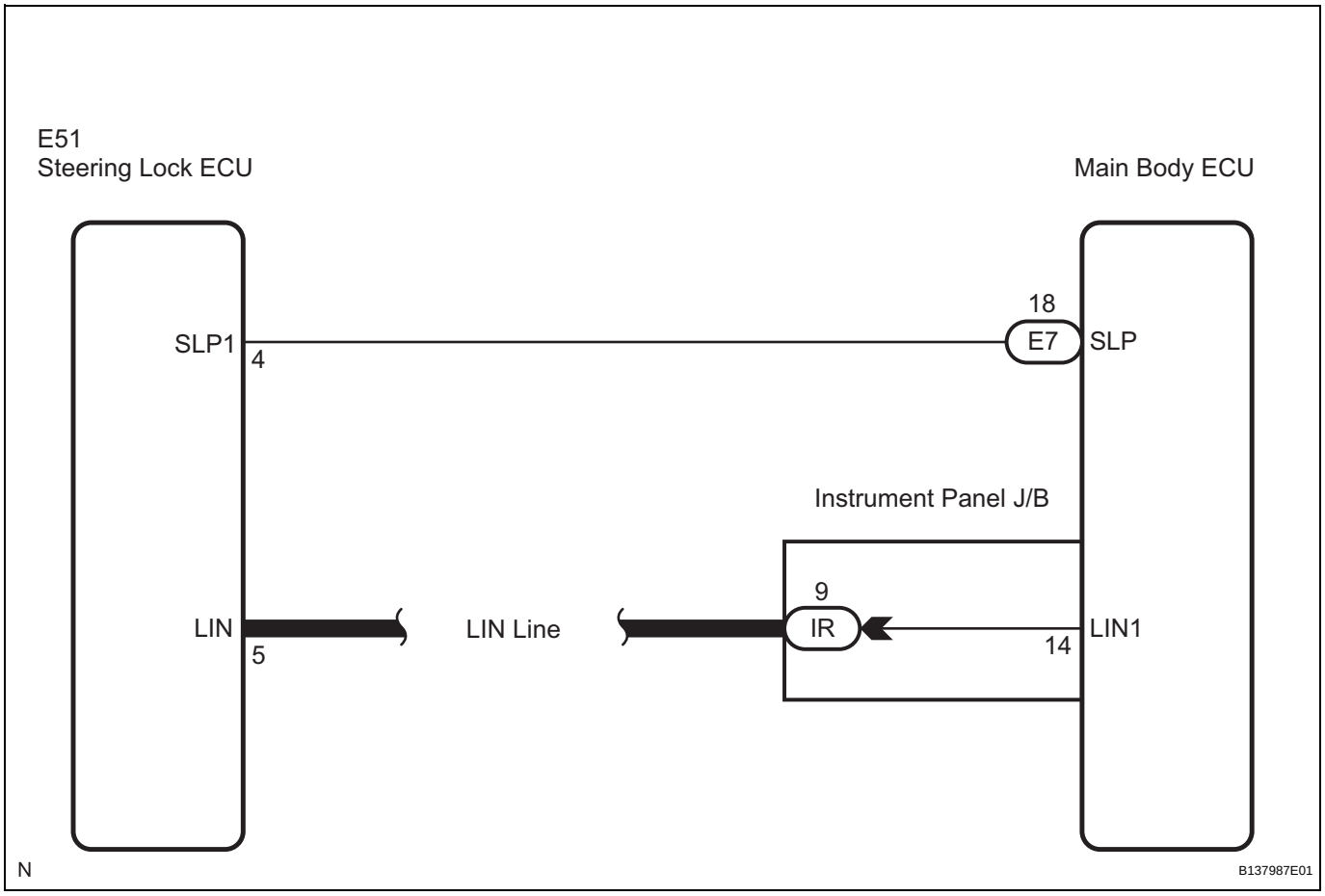
DTC	B2285	Steering Lock Position Signal Circuit Malfunction

DESCRIPTION

This DTC is output when serial communication signals and LIN communication signals in the circuit between the main body ECU and steering lock actuator (steering lock ECU) are inconsistent.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU or steering lock ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2285	Cable and LIN information between the main body ECU and the steering lock ECU are inconsistent	• Main body ECU • Steering lock ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

ST

(b) Check the DATA LIST for proper functioning of the steering lock function.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STR UNLOCK SW	Steering lock condition / ON or OFF	ON: Steering is unlocked OFF: Steering is locked	-

OK:
ON (steering is unlocked) and OFF (steering is locked) appear on the screen.

NG → **Go to step 3**

OK →

2	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
(b) Check for DTC B2285, DTC B2287 and DTC B2785.

Result

Display (DTC output)	Proceed to
"DTC B2285" only	A
"DTC B2287" and/or "DTC B2785"	B
No DTC	C

HINT:
- If DTC B2287 is output (See page ST-85).
- If DTC B2785 is output (See page EI-29).

B → **GO TO DTC CHART**

C → **CHECK INTERMITTENT PROBLEMS**

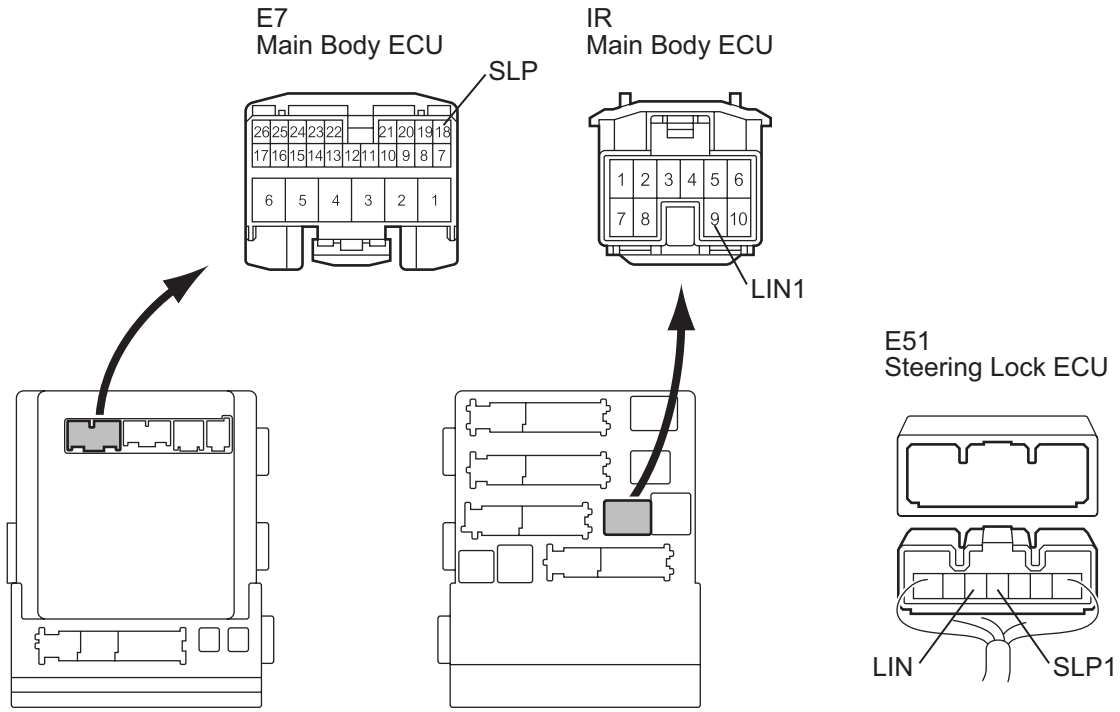
A →

REPLACE MAIN BODY ECU

3	CHECK WIRE HARNESS (MAIN BODY ECU - STEERING LOCK ECU)

(a) Disconnect the E7 and E51 ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E7-18 (SLP) - E51-4 (SLP1)	Always	Below 1 Ω
IR-9 (LIN1) - E51-5 (LIN)	Always	Below 1 Ω
E7-18 (SLP) or E51-4 (SLP1) - Body ground	Always	10 kΩ or higher
IR-9 (LIN1) or E51-5 (LIN) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

4	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the engine starts (See page ST-30).
OK:
Engine can start normally.

NG → **REPLACE STEERING LOCK ECU**

OK ↓

END (MAIN BODY ECU DEFECTIVE)

DTC	B2286	Runnable Signal Malfunction

DESCRIPTION

This DTC is output when serial communication signals and CAN communication signals in the circuit between the main body ECU and ECM are inconsistent.

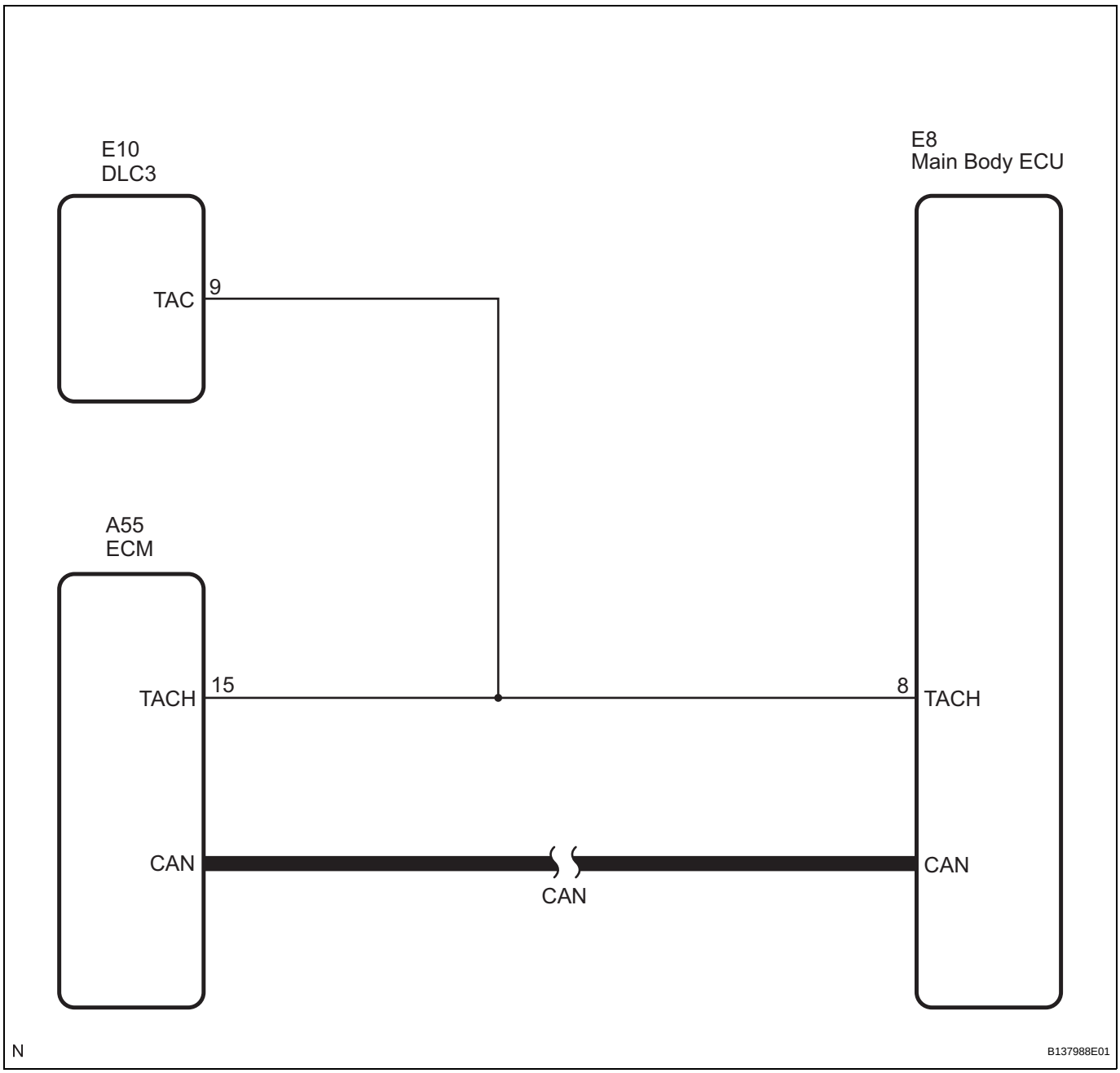
HINT:

When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.

After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2286	Serial communication signals and CAN communication signals in the circuit between the main body ECU and ECM are inconsistent.	• CAN communication system • ECM • Main body ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OPERATION OF TACHOMETER

(a) Run the engine and check if the function of the tachometer in the combination meter is normal.
OK:
Actual engine revolution speed and the revolution indicated on the tachometer are the same.

NG	GO TO COMBINATION METER SYSTEM

ST

OK

2	CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM)

(a) Delete the DTCs (See page ST-26).
(b) Check for CAN communication system DTC U0146.
HINT:
If the DTCs for the CAN communication system malfunction are output, inspect those DTCs first (See page CA-31).
OK:
No DTC is output.

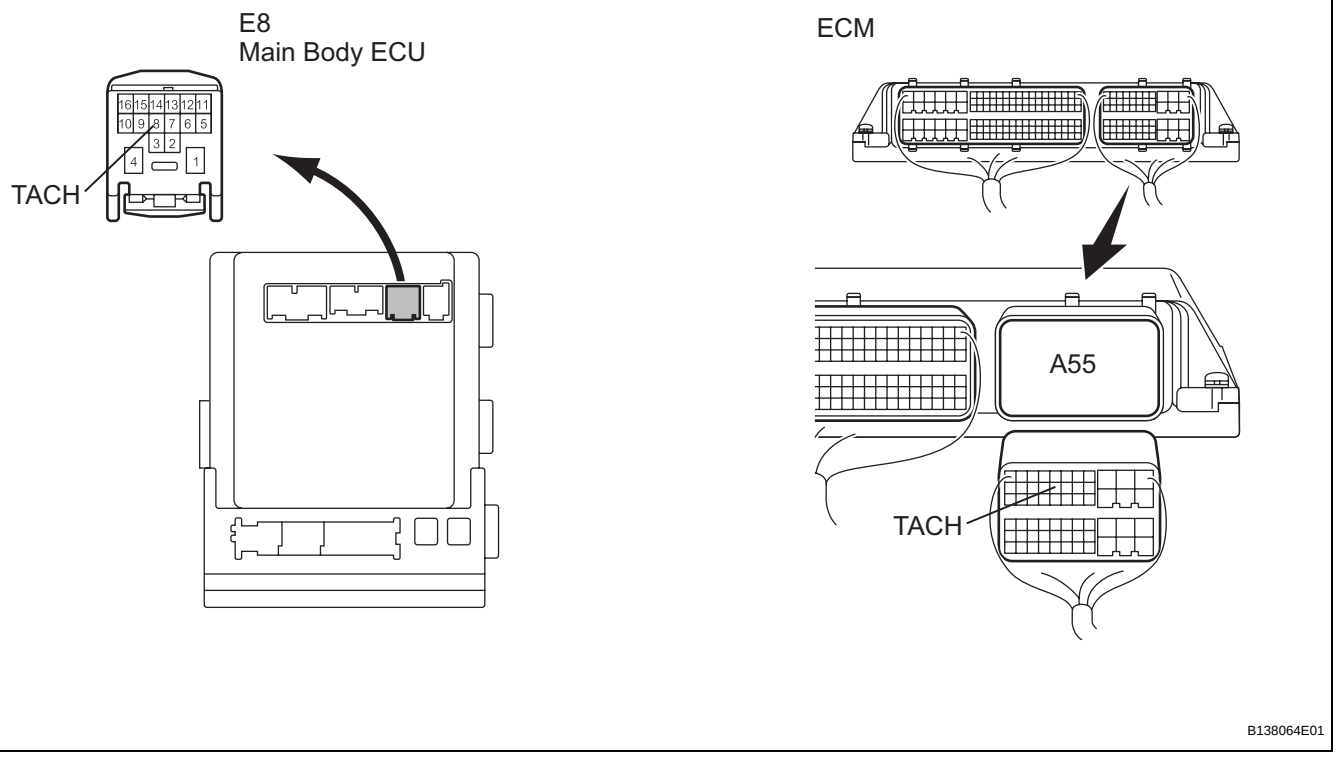
NG → **GO TO CAN COMMUNICATION SYSTEM**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - ECM)

(a) Disconnect the A55 ECM connector.

Wire Harness Side:



(b) Disconnect the E8 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

ST

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E8-8 (TACH) - A55-15 (TACH)	Always	Below 1 Ω
E8-8 (TACH) or A55-15 (TACH) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	READ VALUE OF INTELLIGENT TESTER

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Check the DATA LIST for proper functioning of the engine.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
E/G COND	Engine condition/STOP or RUN	STOP: Engine is stopped RUN: Engine is running	-

OK:
STOP (engine is stopped) and RUN (engine is running) appear on the screen.

NG → **REPLACE ECM**

OK

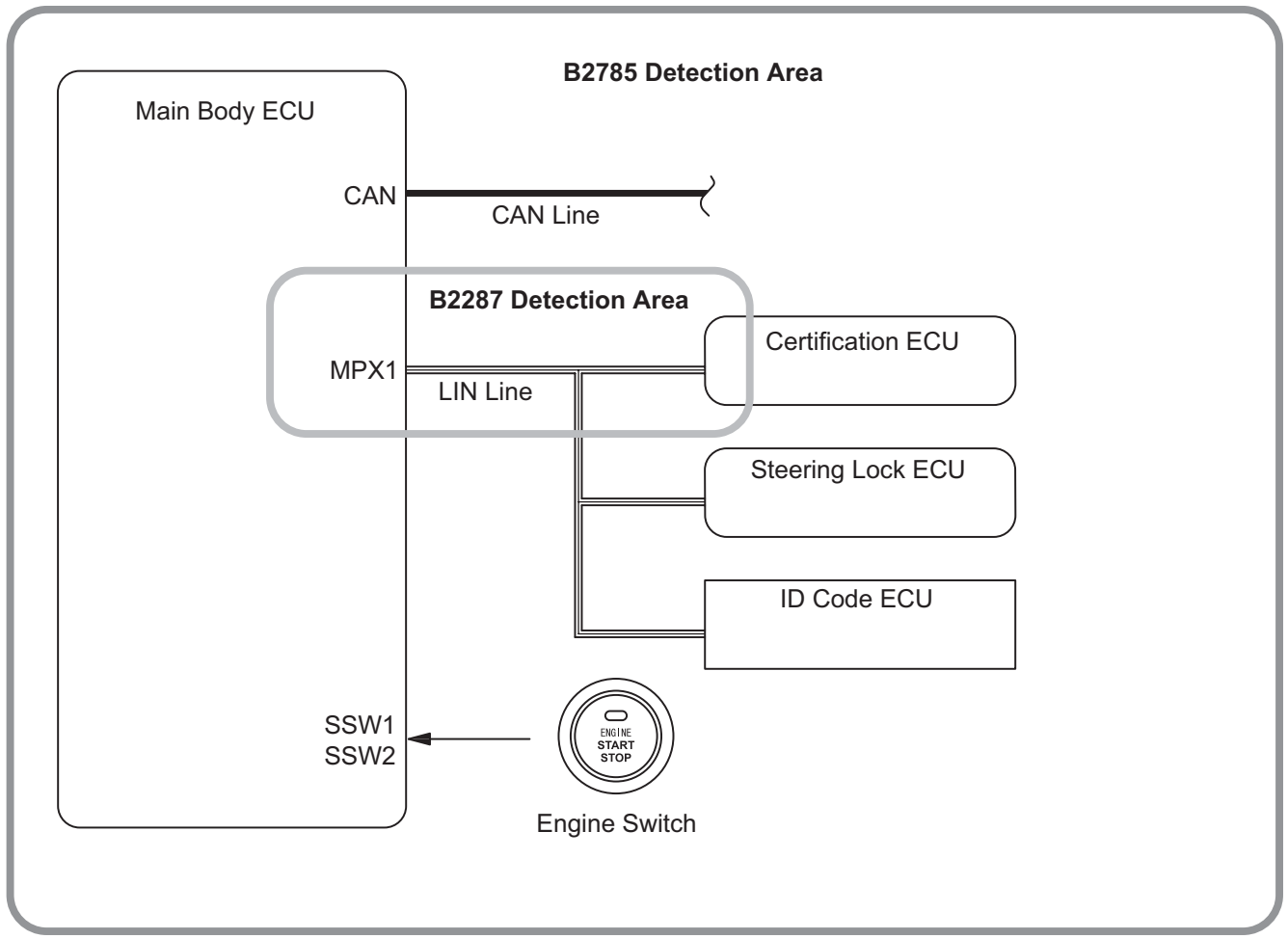
REPLACE MAIN BODY ECU

DTC	B2287	LIN Communication Master Malfunction

DESCRIPTION

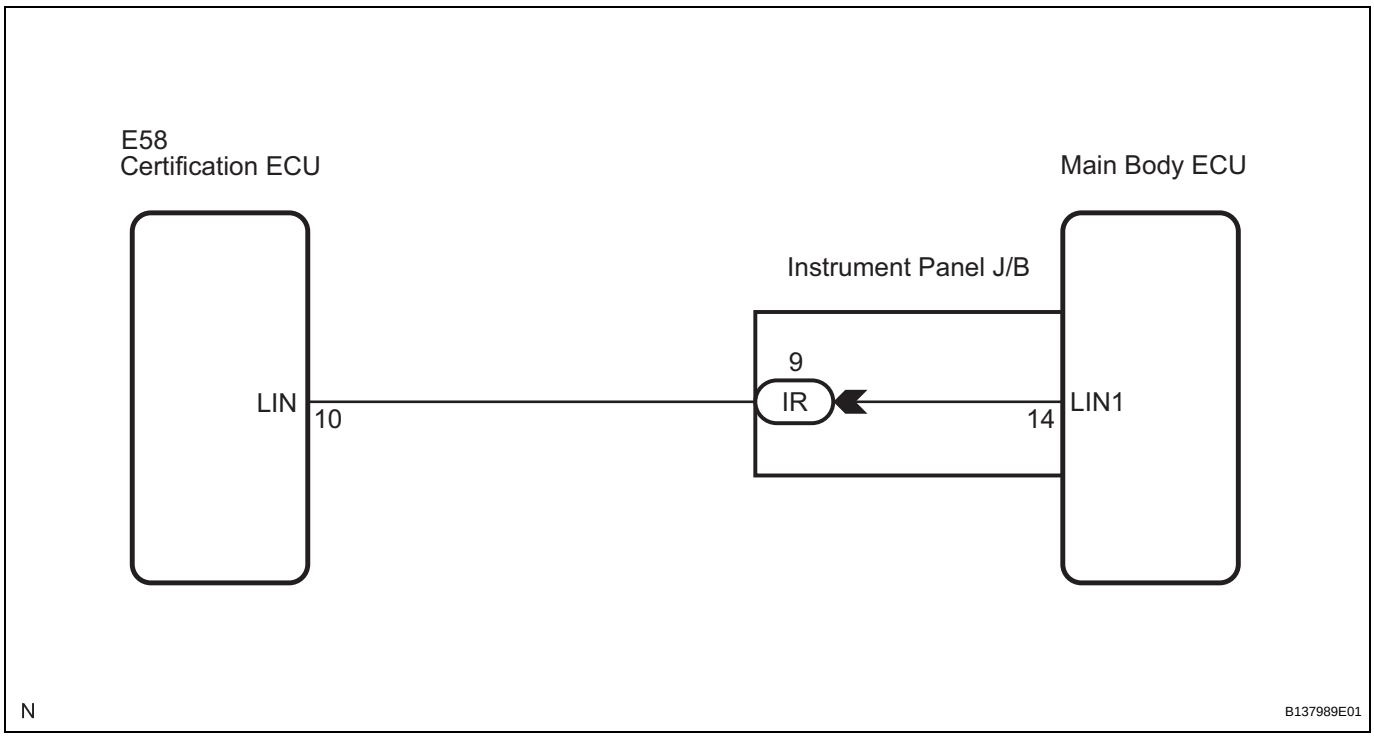
This DTC is output when there is a LIN communication problem between the main body ECU and certification ECU.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU or certification ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2287	Communication or communication line is abnormal between the main body ECU and the certification ECU	• Main body ECU • Certification ECU • Wire harness or connector



ST

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
(b) Check for DTC B2287 and B2785.

Result

Display (DTC output)	Proceed to
"DTC B2287" only	A
"DTC B2287" and "DTC B2785"	B
No DTC	C

HINT:
If DTC B2785 is output, perform troubleshooting for DTC B2785 first (See page EI-29).

B → GO TO DTC B2785

C → CHECK INTERMITTENT PROBLEMS

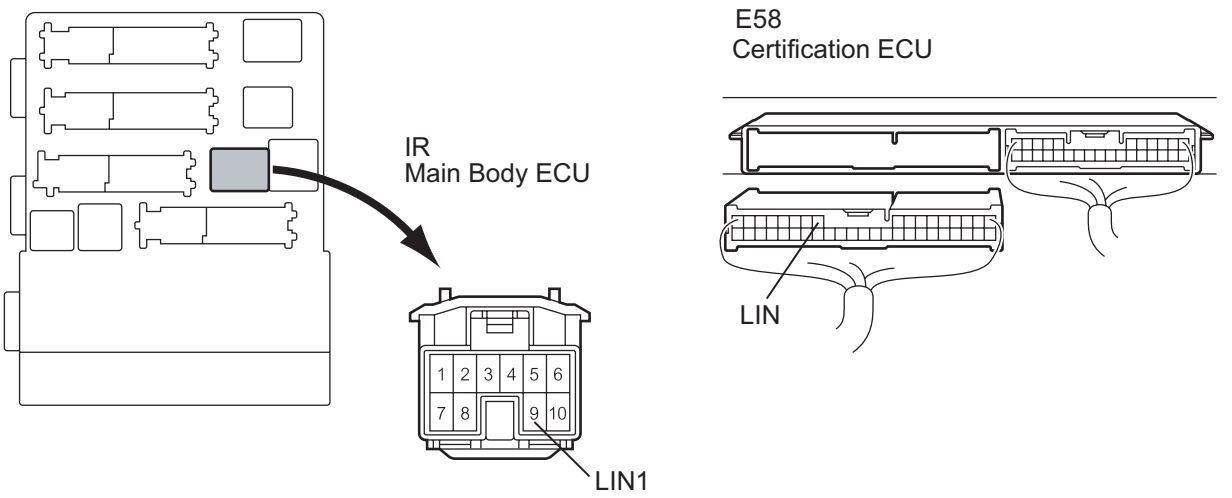
A

ST

2	CHECK WIRE HARNESS (MAIN BODY ECU - CERTIFICATION ECU)

(a) Disconnect the E58 and IR ECU connectors.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IR-9 (LIN1) - E58-10 (LIN)	Always	Below 1 Ω
IR-9 (LIN1) or E58-10 (LIN) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the engine starts (See page ST-30).

OK:

Engine can start normally.

NG → **REPLACE CERTIFICATION ECU**

OK

END (MAIN BODY ECU DEFECTIVE)

ST

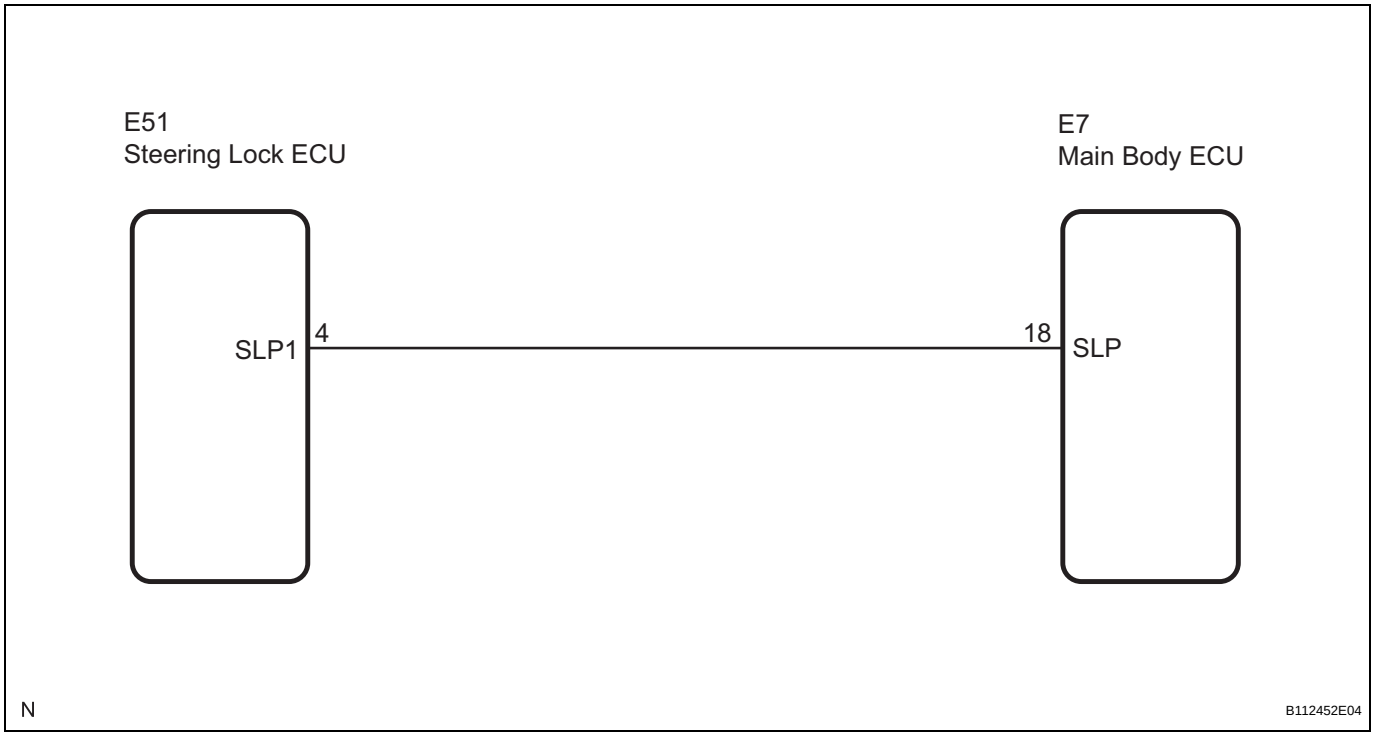
DTC	B2288	Steering Lock Signal Circuit Malfunction

DESCRIPTION

This DTC is output when the main body ECU cannot detect the unlock condition of the steering lock within a specified time.
HINT:
When the main body ECU is replaced with a new one and the negative (-) battery terminal is connected, the power source mode becomes the IG-ON mode. When the battery is removed and reinstalled, the power source mode that was selected when the battery was removed is restored.
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2288	After turning engine switch from off to on (IG), the steering wheel does not unlock for a certain period of time (ECU unlocks steering wheel only when it receives an unlock signal from LIN communication and cable)	• Main body ECU • Steering lock ECU • Wire harness or connector

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
(b) After all DTCs are cleared, check if the trouble occurs again 5 seconds after the engine switch is turned on (IG).
(c) Check for DTCs again.

ST

OK:
DTC B2785, DTC B2287 and DTC B2781 are not output.

HINT:
- If DTC B2785 is output (See page EI-29).
- If DTC B2287 is output (See page ST-85).
- If DTC B2271 is output (See page ST-31).

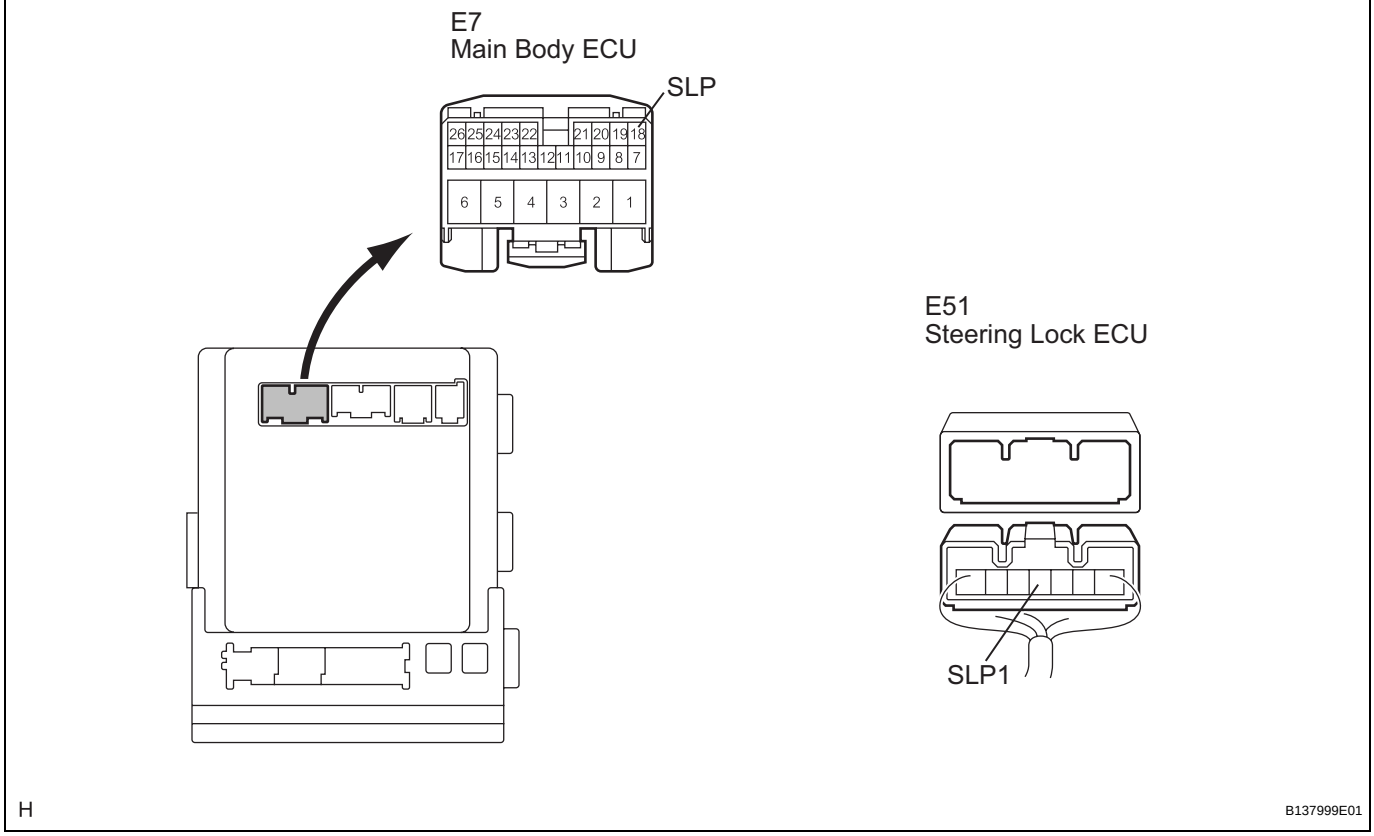
NG → **GO TO DTC CHART**

OK

2	CHECK WIRE HARNESS (MAIN BODY ECU - STEERING LOCK ECU)

(a) Disconnect the E7 and E51 ECU connectors

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E7-18 (SLP) - E51-4 (SLP1)	Always	Below 1 Ω
E7-18 (SLP) or E51-4 (SLP1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

ST

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the steering lock/unlock function operates normally.
OK:
Steering lock/unlock function operates normally.
HINT:
If steering lock/unlock function does not operate, refer to PROBLEM SYMPTOMS TABLE of the electrical steering lock (steering wheel cannot be unlocked) (See page SR-10).

NG → **GO TO ELECTRIC STEERING LOCK**

OK

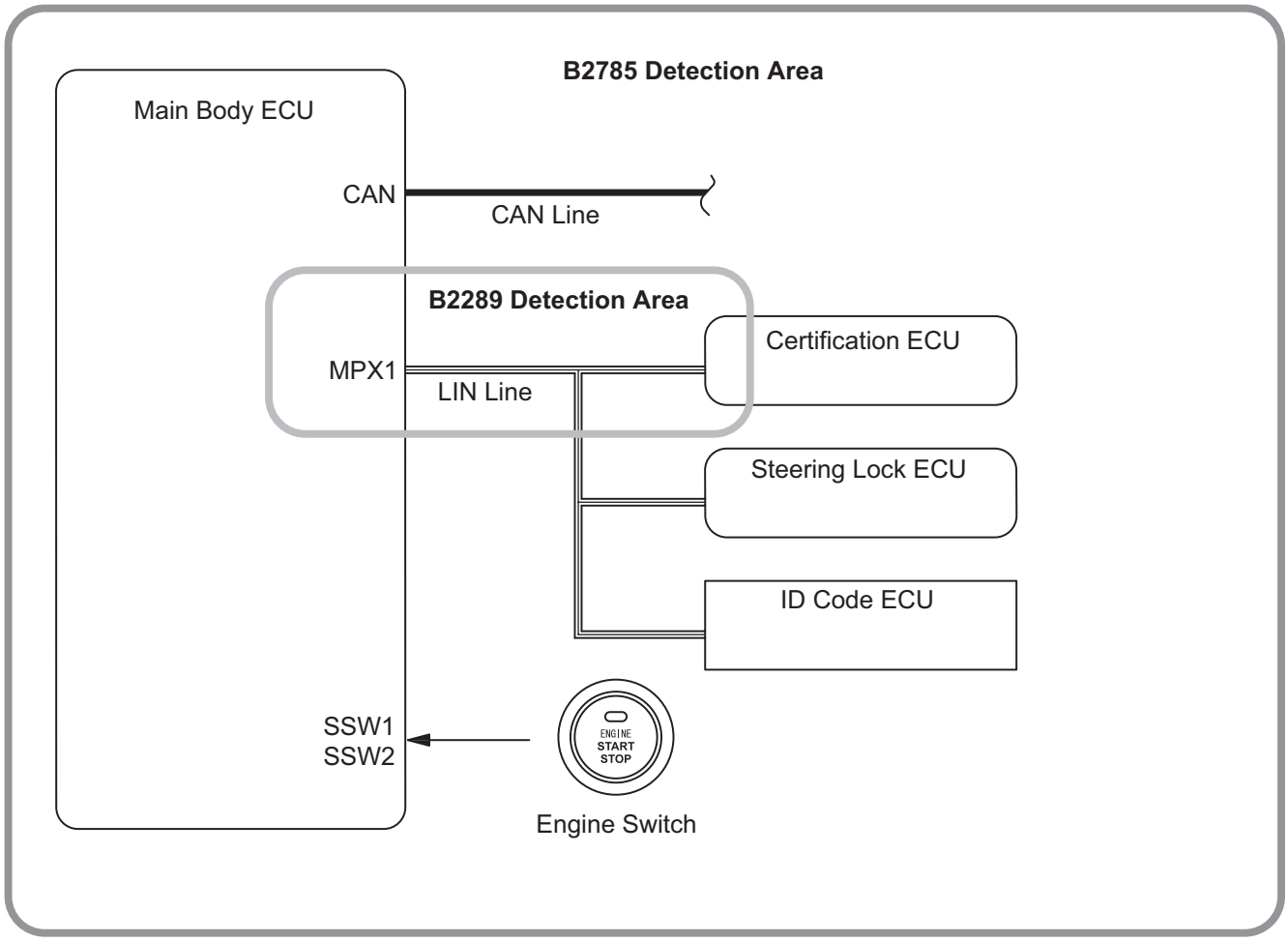
END (MAIN BODY ECU DEFECTIVE)

DTC	B2289	Key Collation Waiting Time Over

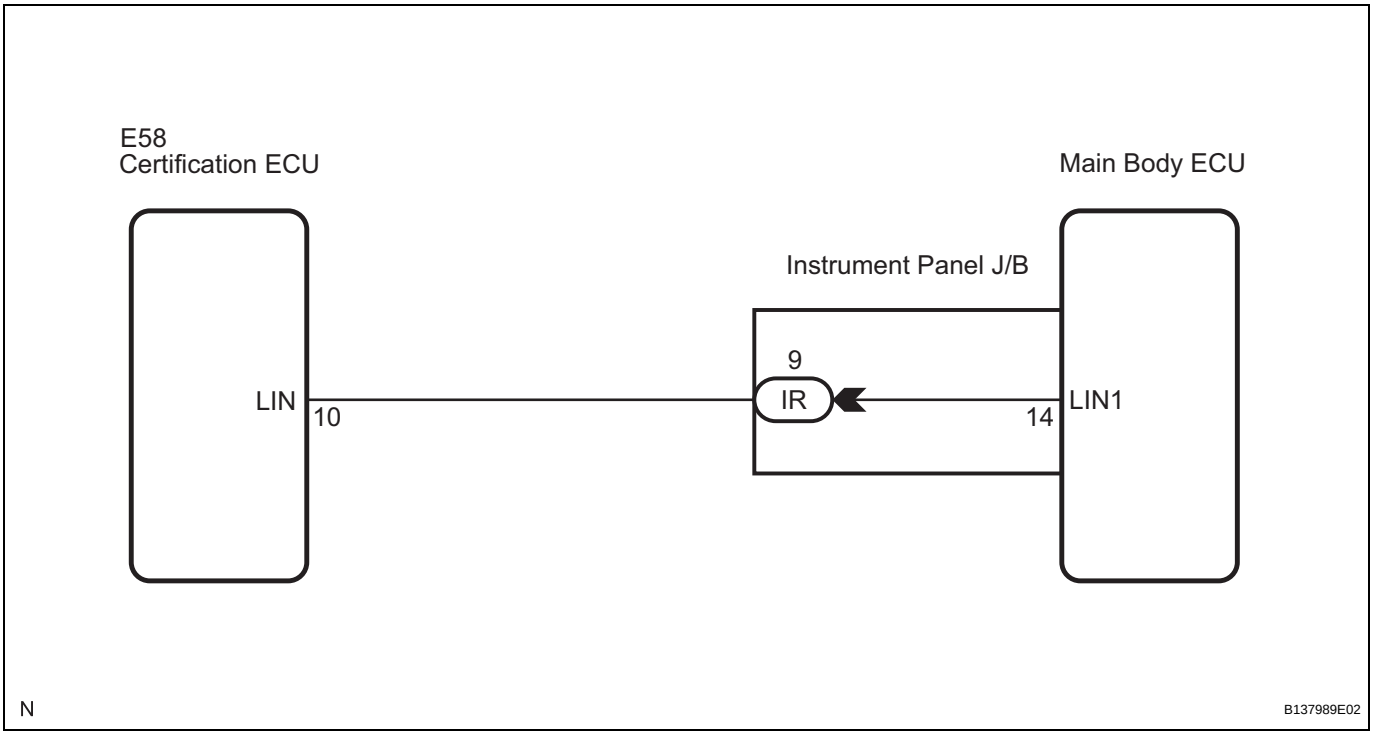
DESCRIPTION

This DTC is output when there is a LIN communication problem between the main body ECU and certification ECU or when there is a problem in the engine immobiliser system.
HINT:
After the main body ECU is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

DTC No.	DTC Detection Condition	Trouble Area
B2289	Either condition below is met: • Cable and CAN are abnormal between the main body ECU and the engine immobiliser system • The engine immobiliser system is malfunctioning	• Main body ECU • Engine immobiliser system • Wire harness or connector • Certification ECU



WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
(b) Check for DTC B2289 and B2785.

Result

Display (DTC output)	Proceed to
"DTC B2289" only	A
"DTC B2785" only	B
No DTC	C

HINT:
- If DTC B2785 is output, perform troubleshooting for DTC B2785 first (See page EI-29).

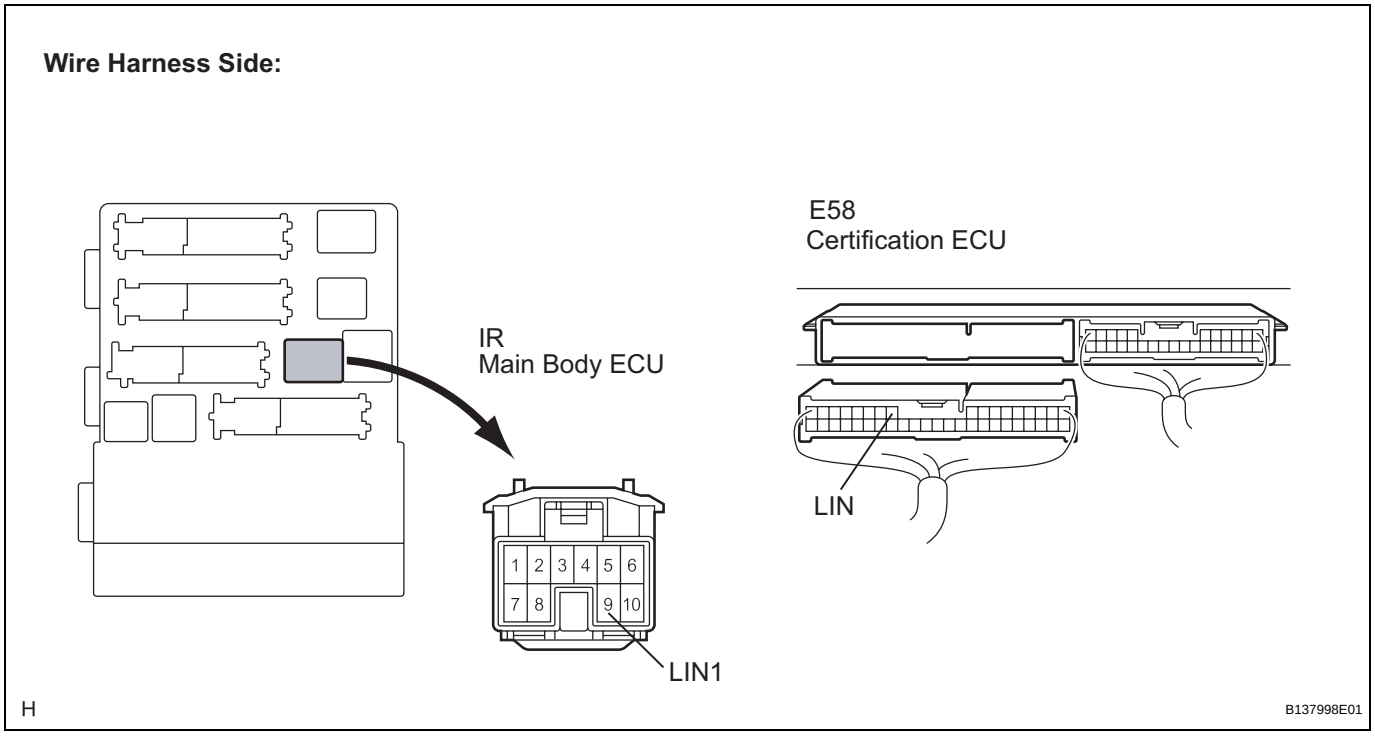
B → GO TO DTC B2785

C → CHECK INTERMITTENT PROBLEMS

A

2	CHECK WIRE HARNESS (MAIN BODY ECU - CERTIFICATION ECU)

(a) Disconnect the E58 and IR ECU connectors.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IR-9 (LIN1) - E58-10 (LIN)	Always	Below 1 Ω
IR-9 (LIN1) or E58-10 (LIN) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK MAIN BODY ECU OPERATION

(a) After replacing the main body ECU with a normally functioning ECU, check that the engine starts.

OK:

Engine can start normally.

HINT:

If the engine does not start, refer to PROBLEM SYMPTOMS TABLE of the smart key system (entry) (matching for the inside of the cabin cannot be performed) (See page DL-147).

NG → **GO TO SMART KEY SYSTEM (ENTRY)**

ST

OK

END (MAIN BODY ECU DEFECTIVE)

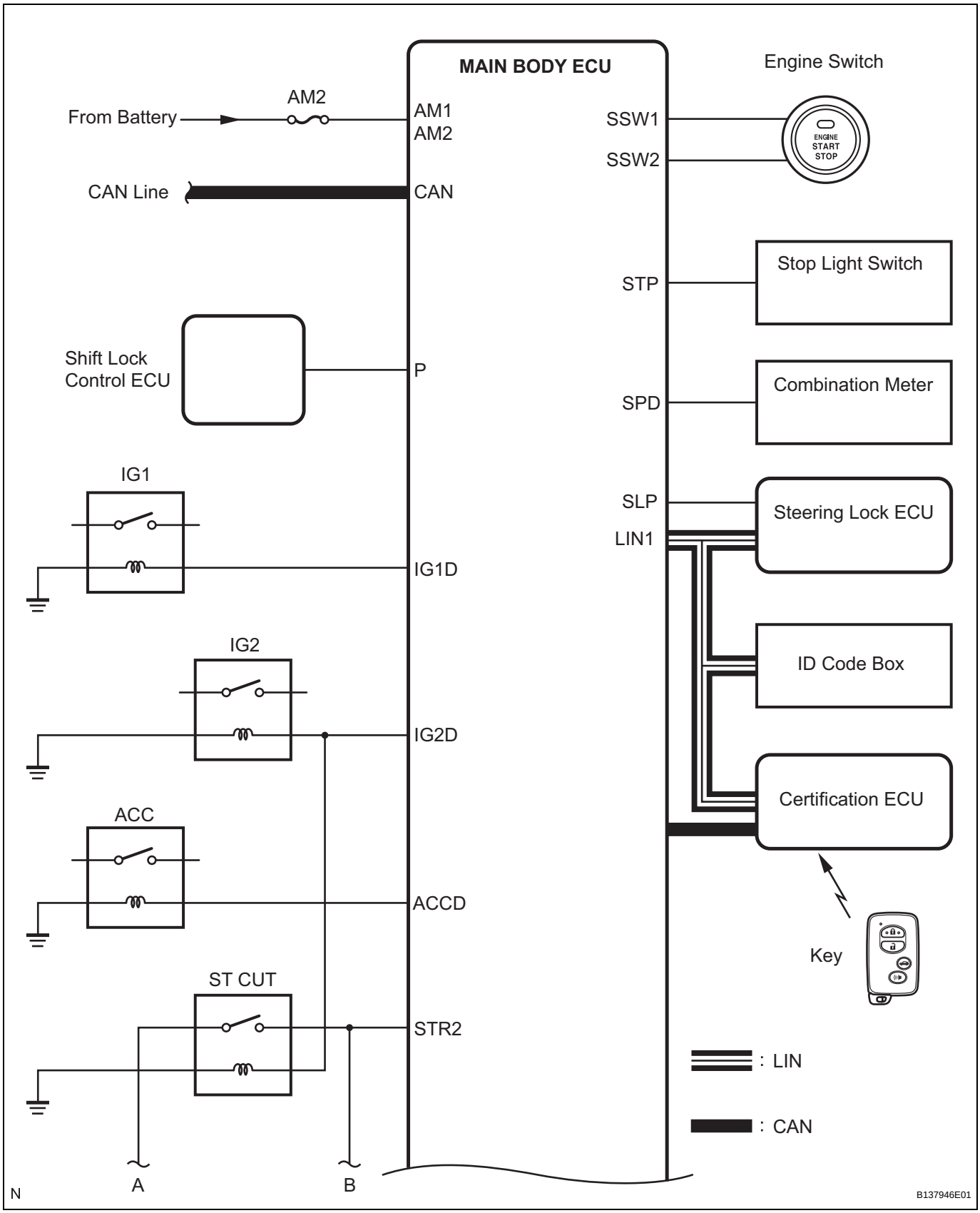
Engine does not Start

DESCRIPTION

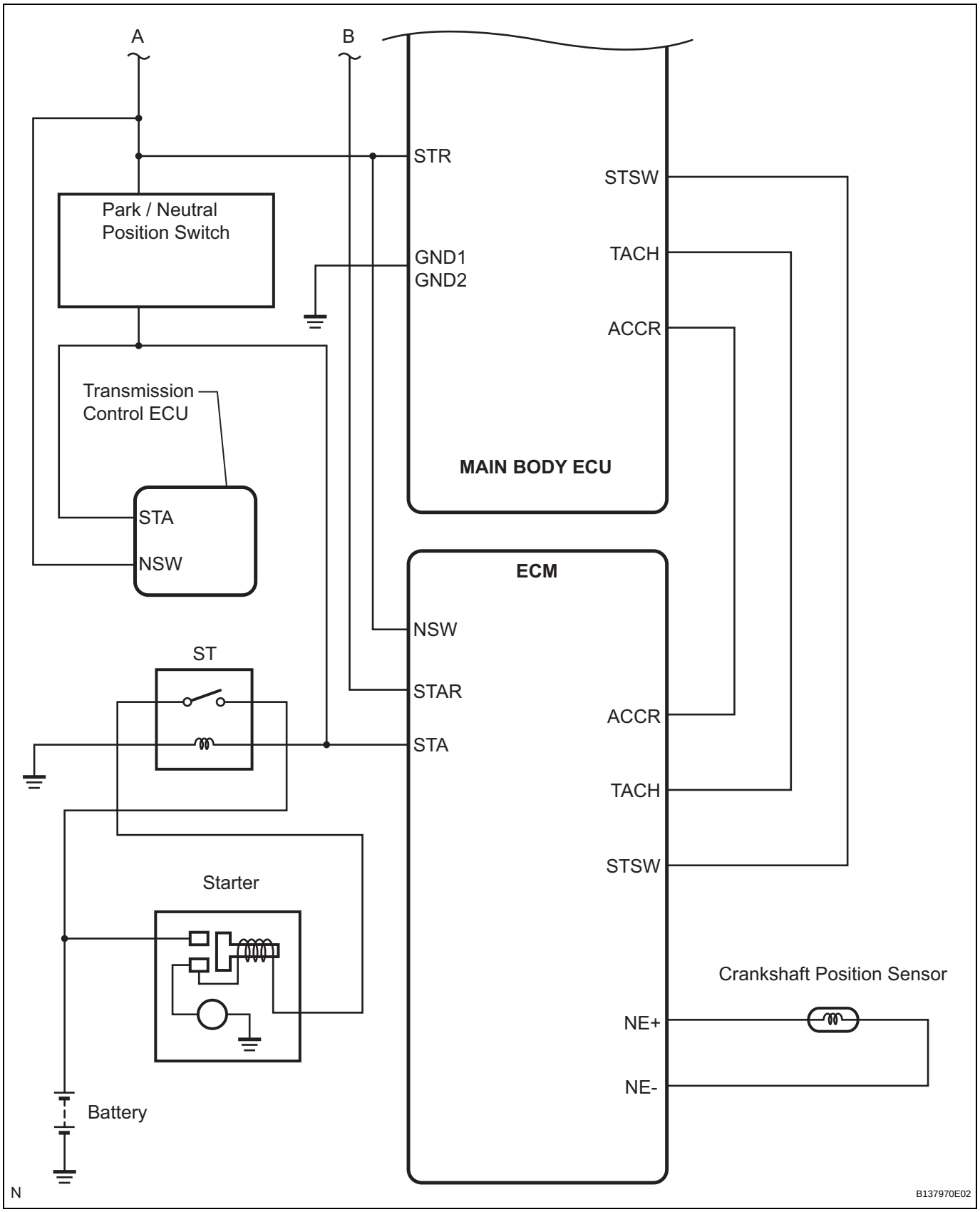
1. ENGINE START SYSTEM FUNCTION

(a) If the engine switch is pressed with the shift lever in the P or N position and the brake pedal depressed, the main body ECU determines that it is an engine start request.
(b) The certification ECU and other ECUs perform key verification via the LIN communication line.
(c) The main body ECU activates the ACC relay.
(d) The main body ECU activates the IG1 and IG2 relays.
(e) The certification ECU outputs a steering UNLOCK signal. The signal is sent to the main body ECU via the steering lock ECU.
(f) The main body ECU sends an engine start request signal to the ECM.
(g) The ECM sends an ACC cut request signal to the main body ECU.
(h) The ECM and main body ECU activate the ST relay.
(i) The main body ECU deactivates the ACC relay until the ECU detects an engine start.
(j) When engine revolution speed reaches 200 rpm, the main body ECU determines that the engine has been started.
The ECU reactivates the ACC relay and turns off the engine switch indicator light.

Symbols of main body ECU	Signals
STP	Stop light switch ON signal
SSW1/SSW2	Engine switch ON signal
ACCD	ACC relay operation signal
IG2D	IG2 relay operation signal
STR2	ST relay operation signal
STR	Park/neutral position switch signal
TACH	Engine start detection signal
STSW	Starter activation request signal
ACCR	ACC cut request signal


MAIN BODY ECU
Engine Switch
From Battery
AM2
AM1
AM2
SSW1
SSW2
ENGINE START STOP
CAN Line
CAN
Stop Light Switch
STP
Shift Lock Control ECU
P
Combination Meter
SPD
IG1
SLP
Steering Lock ECU
LIN1
IG1D
IG2
ID Code Box
IG2D
Certification ECU
ACC
ACCD
Key
ST CUT
STR2
: LIN
: CAN
A
B
N
B137946E01

ST



WIRING DIAGRAM

See CRANKING HOLDING FUNCTION CIRCUIT (See page ES-455).

ST

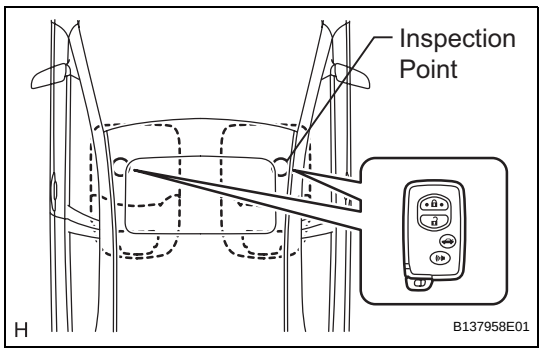
INSPECTION PROCEDURE

1. EMERGENCY ENGINE START CONTROL

(a) If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the main body ECU. This may result in the engine not starting even if the engine switch is pressed while the brake pedal is depressed and the shift lever is in the P position.
To activate the starter:
(1) Turn the engine switch from off to on (ACC).
(2) Press and hold the engine switch for 15 seconds.

HINT:
After the main body ECU, certification ECU, steering lock ECU, ID code box and/or ECM are/is replaced, perform the registration procedures for the engine immobiliser system (See page EI-8).

1	CHECK ENTRY FUNCTION DETECTION AREA



(a) Inspect entry detection area.
(1) When the electrical key is in either of the 2 inspection points in the illustration, the shift lever is in the P position and the brake pedal is depressed, check that the engine switch indicator illuminates in green.
OK:
Engine switch illuminates in green.
HINT:
If the engine switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE (See page ST-17).

NG → **GO TO OTHER PROBLEM**

OK ↓

2	CHECK IF ENGINE STARTS (INITIALIZE STEERING LOCK)

(a) Make sure that the shift lever is in the P position.
(b) Open and close the driver's door with the engine switch off. Check if the engine can be started.
OK:
Engine can be started.
HINT:
After the battery is discharged and then recharged, the engine may not start unless the steering lock is initialized using the above procedure (See page SR-9).

OK → **END**

NG ↓

3	CHECK FOR DTC

(a) Delete the DTCs (See page ST-26).
(b) Check for DTCs again.
OK:
No DTC is output.

HINT:
- If smart key system (start) DTCs are output (See page ST-28).
- If smart key system (entry) DTCs are output (See page DL-159).
- If electrical steering lock DTCs are output (See page EI-25).
- If engine immobiliser system DTCs are output (See page SR-15).
- If engine control system DTCs are output (See page ES-63).

NG → **GO TO DTC CHART**

OK ↓

4	CHECK ENGINE SWITCH CONDITION

(a) Check the power source mode change.
(1) When the key is inside the vehicle and the shift lever is in the P position, check that pressing the engine switch causes the power source mode to change as follows:
OK:
off → on (ACC) → on (IG) → off
HINT:
- If power mode does not change to ON (IG and ACC) (See page ST-114).
- If power mode does not change to ON (IG) (See page ST-122).
- If power mode does not change to ON (ACC) (See page ST-131).

NG → **GO TO OTHER PROBLEM**

OK ↓

5	CHECK CRANKING FUNCTION

(a) Check the engine cranking function.
(1) When there is fuel in the fuel tank, the key is inside the vehicle, and the shift lever is in the P position, check that depressing the brake pedal and pressing the engine switch crank the engine.
OK:
Engine cranks.

OK → **Go to step 21**

NG ↓

6	READ VALUE OF INTELLIGENT TESTER (P SIGNAL)

(a) Connect the intelligent tester to the DLC3.

ST

(b) Turn the engine switch on (IG).
(c) Read the DATA LIST according to the displays on the tester screen.

MAIN BODY:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
SHIFT P SIG	Shift P signal / ON or OFF	ON: Shift position is P OFF: Shift position is not P	-

OK:
ON (P signal is ON) and OFF (P signal is OFF) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2281 first (See page ST-60).

NG → **GO TO DTC B2281**

OK

7 READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Check the DATA LIST for proper functioning of the stop light switch.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STOP LAMP SW	Stop light Switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

OK:
ON (brake pedal depressed) and OFF (brake pedal released) appear on the screen.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2284 first (See page ST-72).

NG → **GO TO DTC B2284**

OK

8 READ VALUE OF INTELLIGENT TESTER (STEERING LOCK)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).

ST

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STR UNLOCK SW	Steering lock condition / ON or OFF	ON: Steering is unlocked OFF: Steering is locked	-

OK:
ON (steering is unlocked) and OFF (steering is locked) appear on the screen.

HINT:
If the result is not as specified, perform troubleshooting for DTCs B2285 and B2288 first (See page ST-28).

NG → GO TO DTC B2285

OK

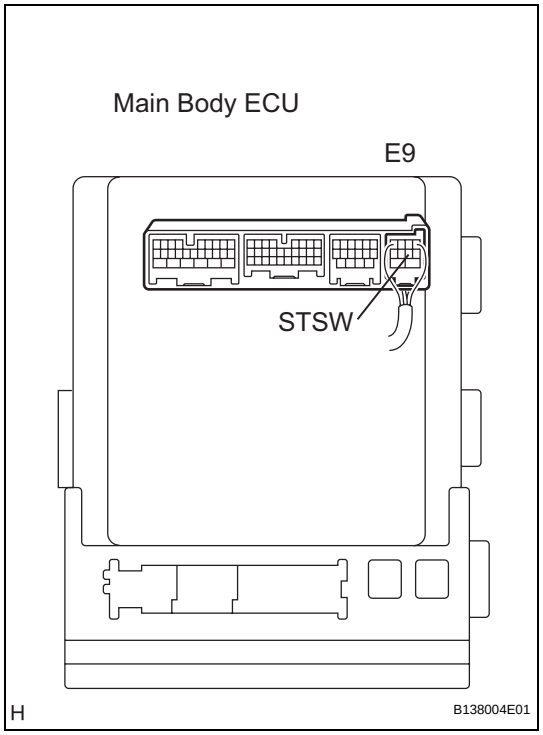
9 CHECK STEERING LOCK

(a) Check if the steering lock is released when turning the engine switch on (ACC).
OK:
The steering lock is released.

NG → GO TO STEERING LOCK SYSTEM

OK

10 INSPECT MAIN BODY ECU (STSW VOLTAGE)



(a) Disconnect the A55 ECM connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E9-4 (STSW) - Body ground	Brake pedal depressed, engine switch held on (ST)	Output voltage at terminal AM1 or AM2 is - 2 V or more.

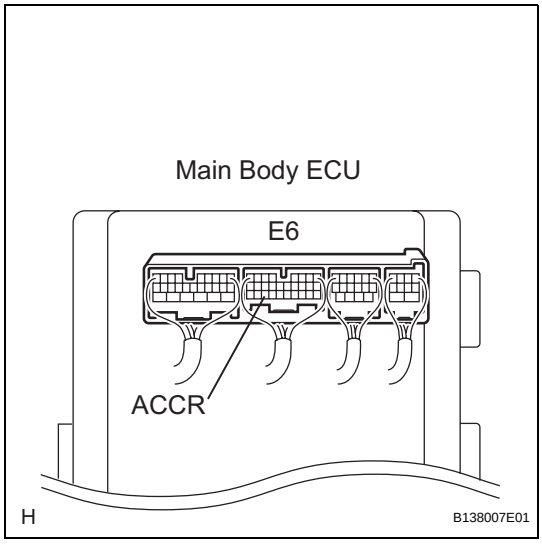
HINT:
If the result is not as specified, perform troubleshooting for DTC B2275 first (See page ST-48).

NG → GO TO DTC B2275

OK

ST

11 INSPECT ECM (ACCR VOLTAGE)



(a) Reconnect the connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

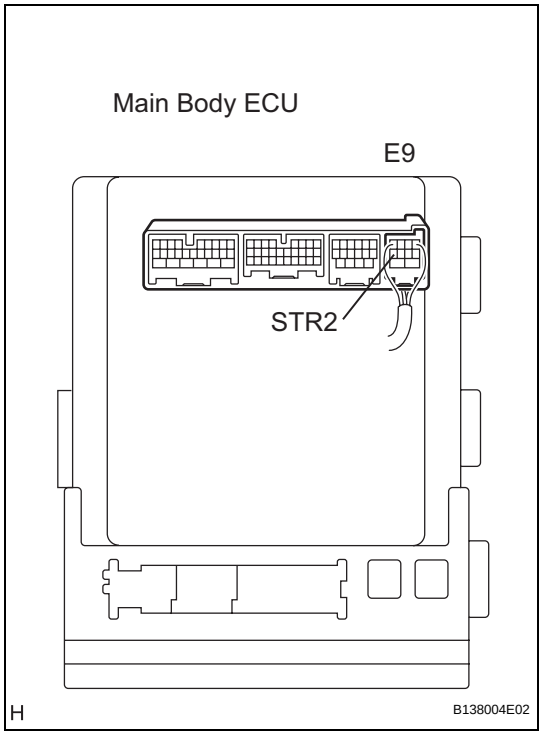
Tester Connection (Symbols)	Condition	Specified Condition
ACCR (E6-3) - GND2 (IM-9)	Brake pedal depressed, shift lever P position, engine switch is pushed once → on (IG)	0.1 to 0.8 V*1 → Output voltage at terminal AM1 or AM2 is -2 V or more.

*1: Voltage is output only when the engine is cranking.
HINT:
If the result is not as specified, perform troubleshooting for DTC B2276 first (See page ST-51).

NG → **GO TO DTC B2276**

OK

12 INSPECT ECM (STR2 VOLTAGE)



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
STR2 (E9-6) - GND2 (IM-9)	Brake pedal depressed, shift lever P or N position, engine switch on (ST)	Output voltage at terminal AM1 or AM2 is -3.5 V or more.*1

*1: Voltage is output for 0.3 seconds when the engine is cranking to start.

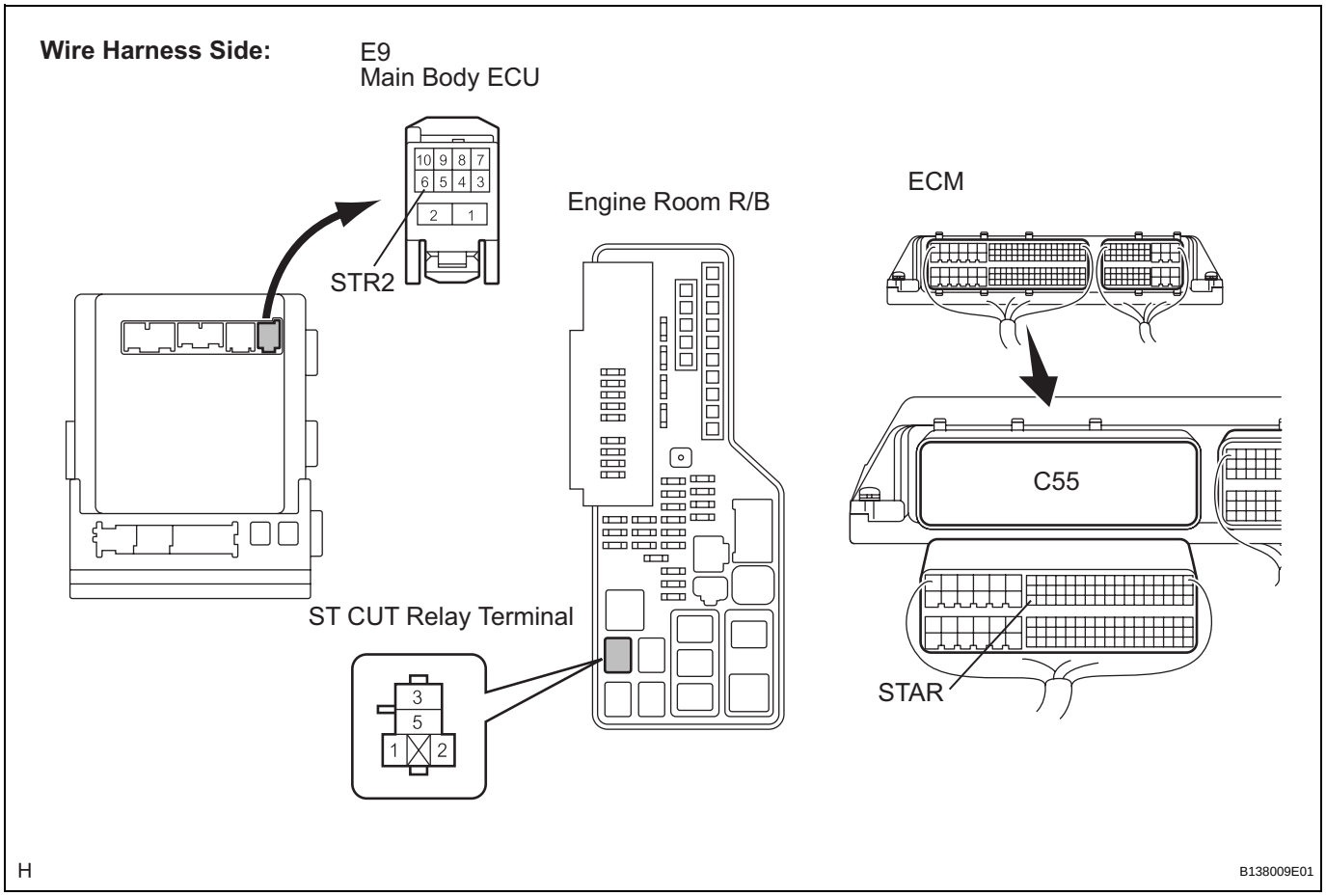
NG → **REPLACE ECM**

OK

13 CHECK WIRE HARNESS (MAIN BODY ECU -ECM - ENGINE ROOM R/B)

(a) Remove the ST CUT relay from the engine room R/B.

ST



(b) Measure the resistance according to the value(s) in the table below.

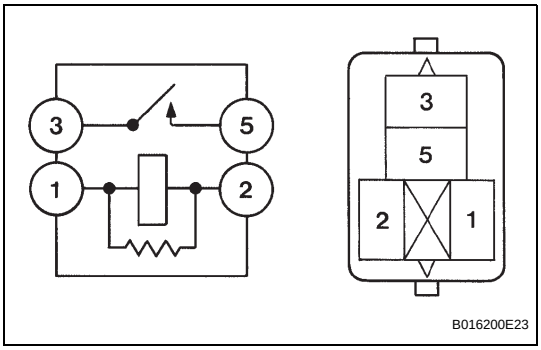
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
C55-63 (STAR) - E9-6 (STR2)	Always	Below 1 Ω
C55-63 (STAR) - ST CUT relay terminal - 3	Always	Below 1 Ω
C55-63 (STAR) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

14 INSPECT RELAY (ST CUT)



(a) Measure the resistance of the ST CUT relay.
Standard resistance

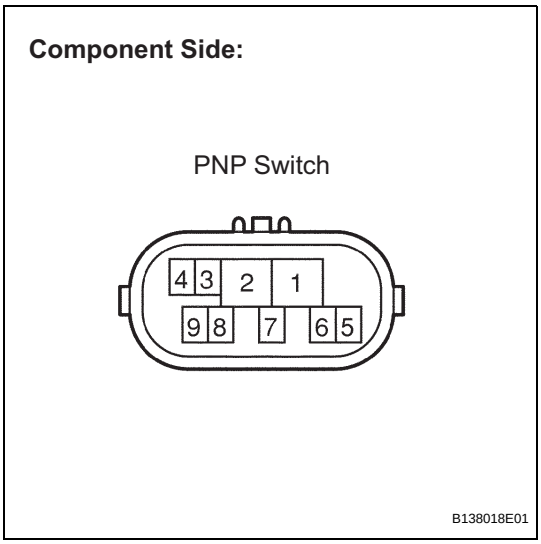
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → **REPLACE RELAY**

OK

15 INSPECT PARK/NEUTRAL POSITION SWITCH

Component Side:



(a) Disconnect the park/neutral position (PNP) switch connector.
(b) Measure the resistance according the the value(s) in the table below.
Standard resistance

Shift Position	Tester Connection	Specified Condition
P	4 - 9	Below 1 Ω
N	4 - 9	Below 1 Ω
Except P and N	4 - 9	10 kΩ or higher

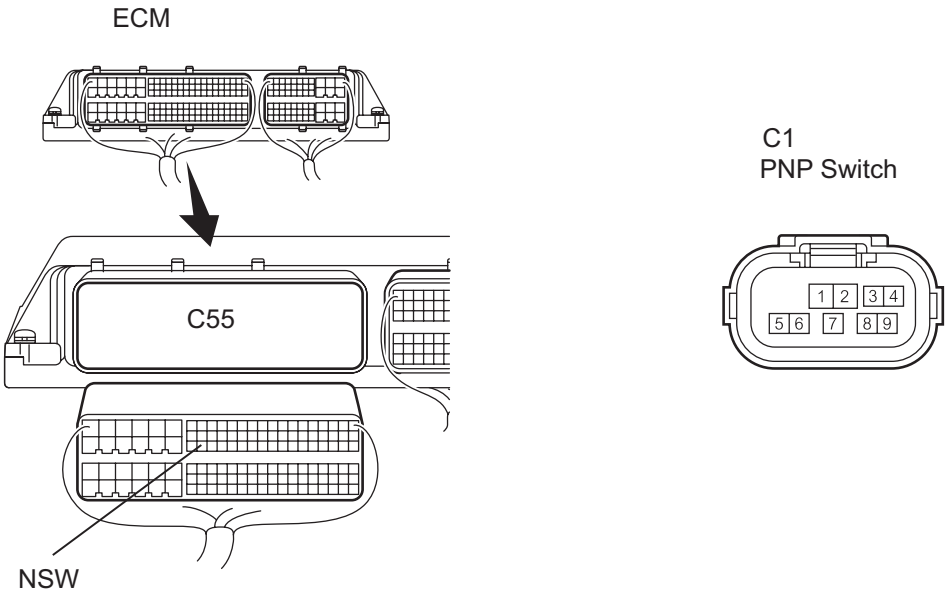
NG → **REPLACE PARK/NEUTRAL POSITION SWITCH**

OK

16 CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)

(a) Disconnect the C55 ECM connector.

Wire Harness Side:



(b) Measure the resistance according to the value(s) in the table below.

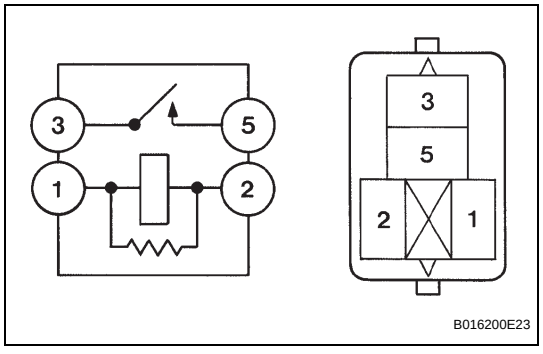
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
C55-62 (NSW) - C1-4	Always	Below 1 Ω
C55-62 (NSW) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

17 INSPECT RELAY (ST)



(a) Remove the starter relay from the engine room R/B.

(b) Measure the resistance of the starter relay.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

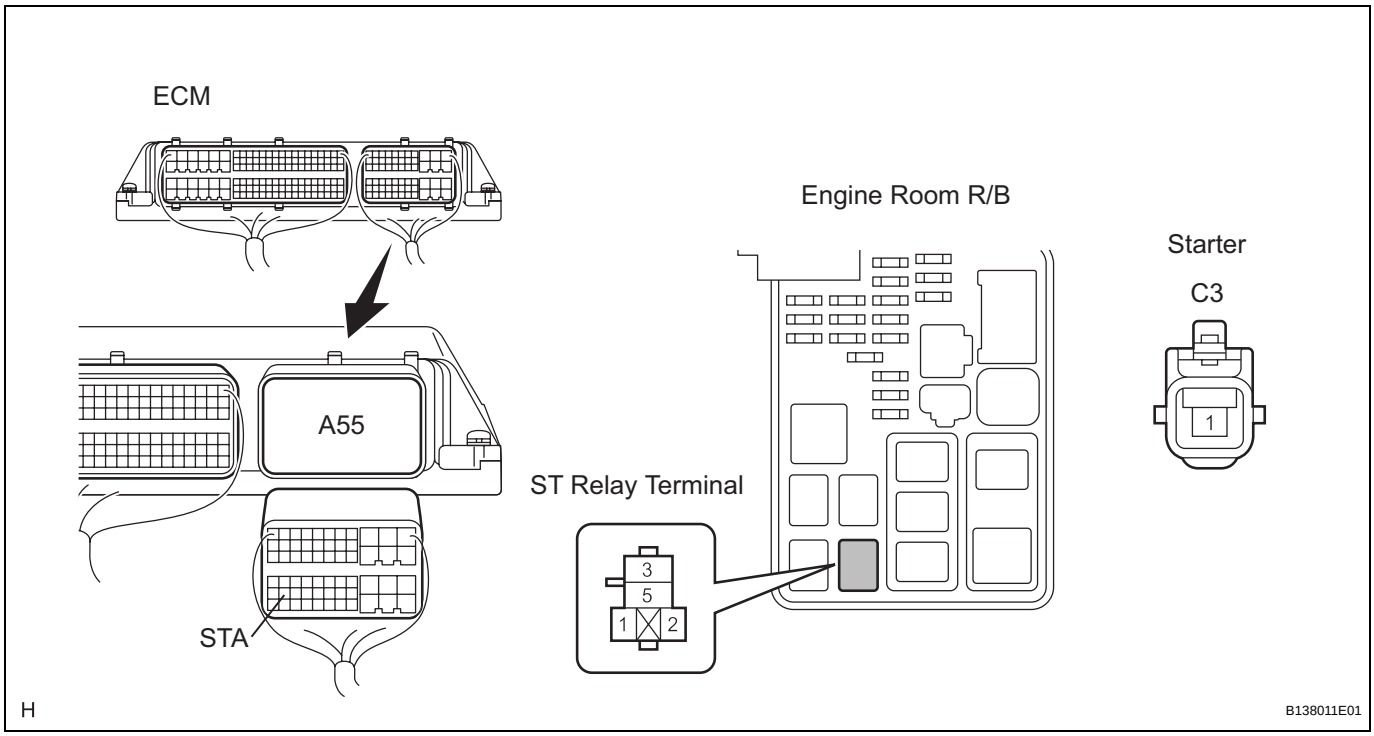
NG → **REPLACE RELAY**

OK

ST

18	CHECK HARNESS AND CONNECTOR (ECM AND STARTER - ST RELAY)

(a) Disconnect the A55 ECM connector.



(b) Disconnect the C3 starter connector.
(c) Measure the resistance according the the value(s) in the table below.

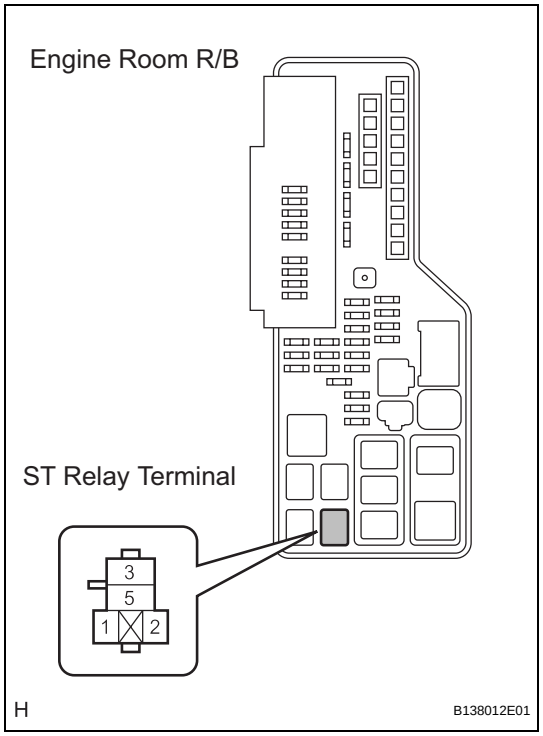
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
A55-48 (STA) - ST relay terminal - 1	Always	Below 1 Ω
A55-48 (STA) - Body ground	Always	10 kΩ or higher
C3-1 - ST relay terminal - 3	Always	Below 1 Ω
C3-1 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

19 INSPECT ENGINE ROOM RELAY BLOCK (ST RELAY VOLTAGE)



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
ST relay terminal - 5 - Body ground	Always	9 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

20 INSPECT STARTER ASSEMBLY

HINT:
See page ST-143.

NG → **REPAIR OR REPLACE STARTER ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (PNP SWITCH - ST RELAY, STARTER - BATTERY)

21 READ VALUE OF INTELLIGENT TESTER (L CODE)

(a) Reconnect the connectors.
(b) Connect the intelligent tester to the DLC3.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

(c) Turn the engine switch on (IG).

SMART ACCESS (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
L CODE CHK	L code check / ON or NG	OK: Normal NG: Malfunction	Electrical key in the cabin

OK:

OK is displayed on the screen.

HINT:

If the result is not as specified, there may be a malfunction with the steering lock ECU or the ID code box.

NG → **GO TO ENGINE IMMOBILISER SYSTEM**

OK

22 READ VALUE OF INTELLIGENT TESTER (ENGINE START REQUEST)

(a) Connect the intelligent tester to the DLC3.

HINT:

When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

(b) Turn the engine switch on (IG).

SMART ACCESS (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
START RQST	Start request signal response / OK or NG	OK: Received NG: Not received	-

OK:

OK (received) and NG (not received) appear on the screen.

NG → **REPLACE CERTIFICATION ECU**

OK

23 READ VALUE OF INTELLIGENT TESTER (S CODE)

(a) Connect the intelligent tester to the DLC3.

HINT:

When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

(b) Turn the engine switch on (IG).

SMART ACCESS (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
S CODE CHK	S code check / OK or NG	OK: Normal NG: Malfunction	-

OK:

OK is displayed on the screen.

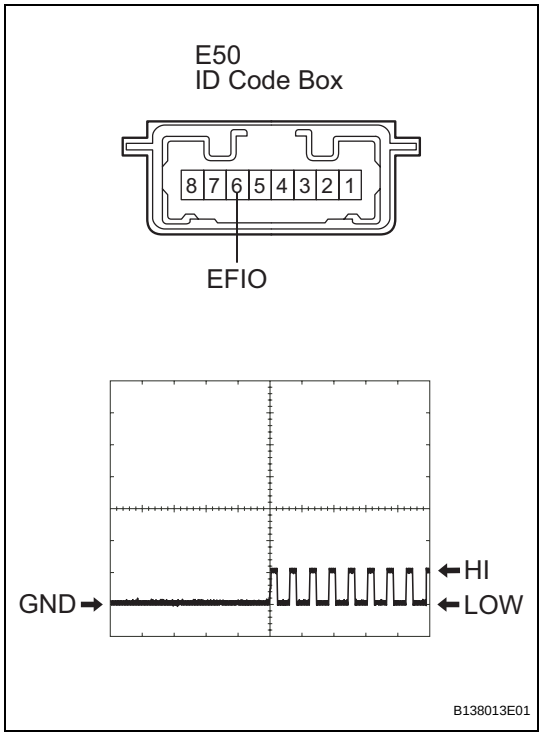
HINT:

If the result is not as specified, there may be a malfunction with the certification ECU or the ID code box.

NG → **GO TO ENGINE IMMOBILISER SYSTEM**

OK

24 INSPECT ID CODE BOX



(a) Check the input signal waveform.

(1) Connect an oscilloscope to terminal E50-6 (EFIO) and body ground.

(2) Turn the engine switch on (IG).

(3) Check the signal waveform according to the condition(s) in the table below.

Item	Condition
Tool setting	10 V/DIV., 100 ms./DIV.
Vehicle condition	Engine switch on (IG)

NG → **REPLACE ID CODE BOX**

OK

END

ST

Engine Switch Indicator Circuit

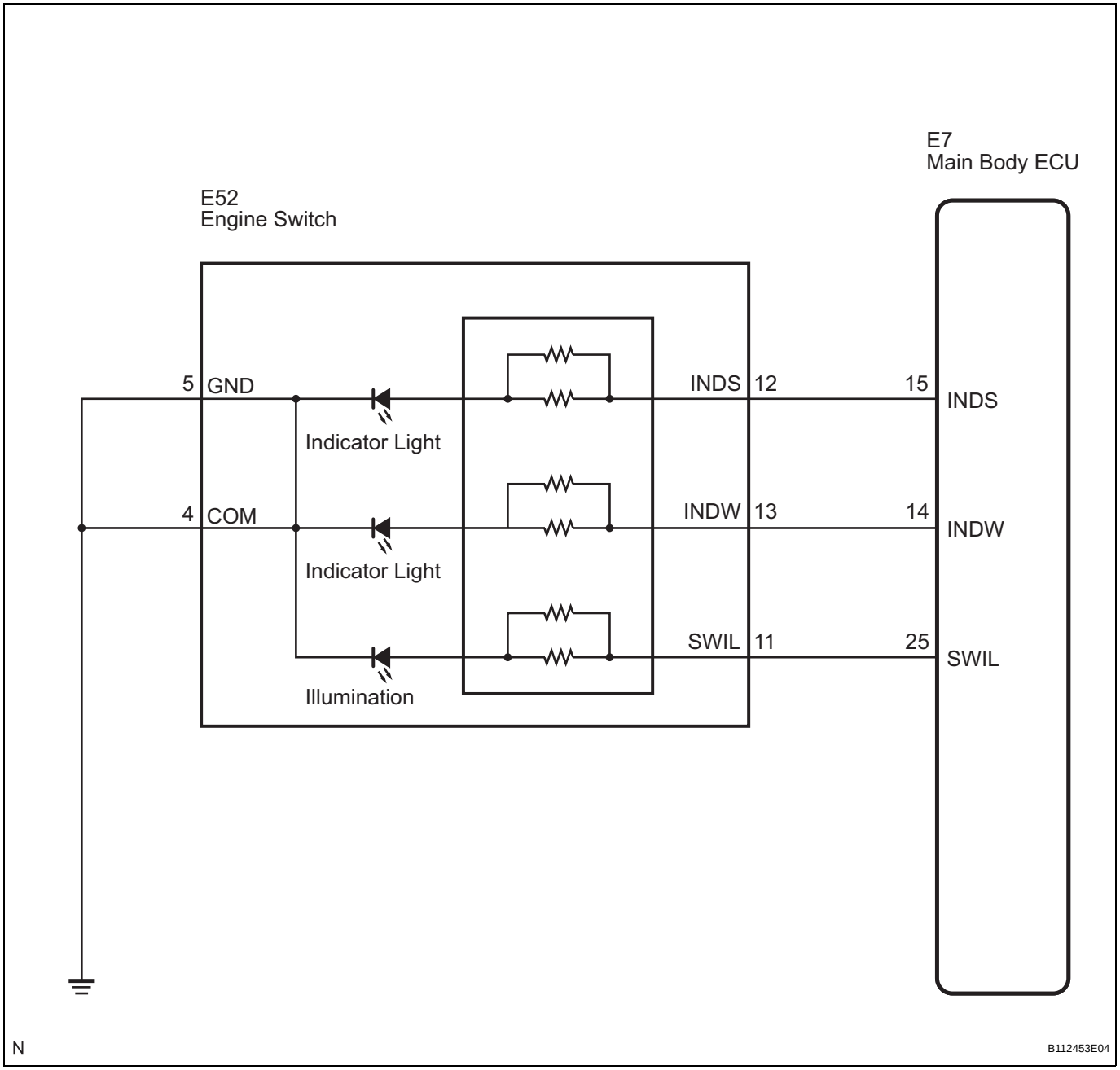
DESCRIPTION

Engine start conditions or system malfunctions can be checked by the status of the engine switch indicator light.

Engine switch indicator light condition:

Power Source Mode/Condition	Indicator Light Condition	
	Brake pedal released	Brake pedal depressed, shift lever in P or N
off	OFF	ON (Green) (When key and vehicle IDs match)
on (ACC, IG)	ON (Amber)	ON (Green)
Engine running	OFF	OFF
Steering lock not unlocked	Flashes (Green) for 15 sec.	Flashes (Green) for 15 sec.
System malfunction	Flashes (Amber) for 15 sec.	Flashes (Amber) for 15 sec.

WIRING DIAGRAM

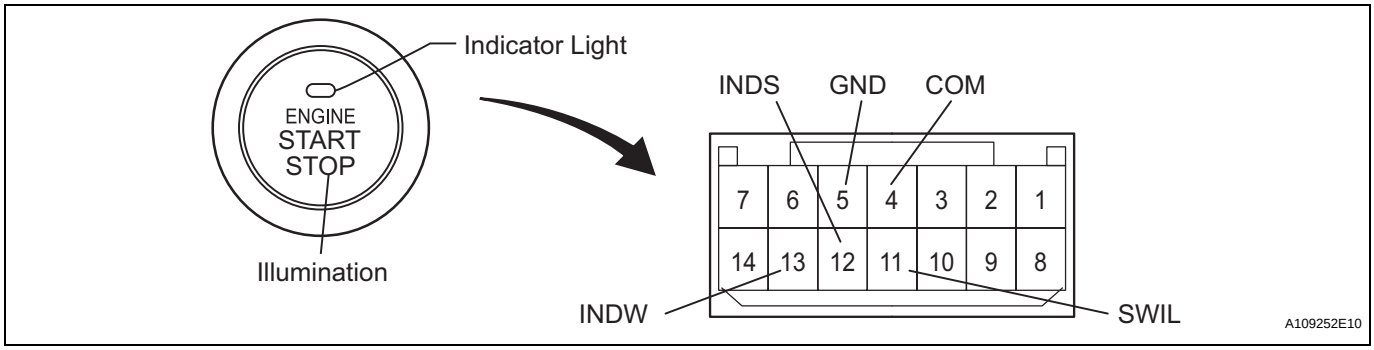


INSPECTION PROCEDURE

1	**INSPECT ENGINE SWITCH**

(a) Remove the engine switch.

ST



(b) Apply battery voltage between the terminals of the switch, and check the illumination condition of the switch.

NOTICE:

- **If the positive (+) lead and the negative (-) lead are incorrectly connected, the engine switch indicator will not illuminate.**
- **If the voltage is too low, the indicator will not illuminate.**

OK

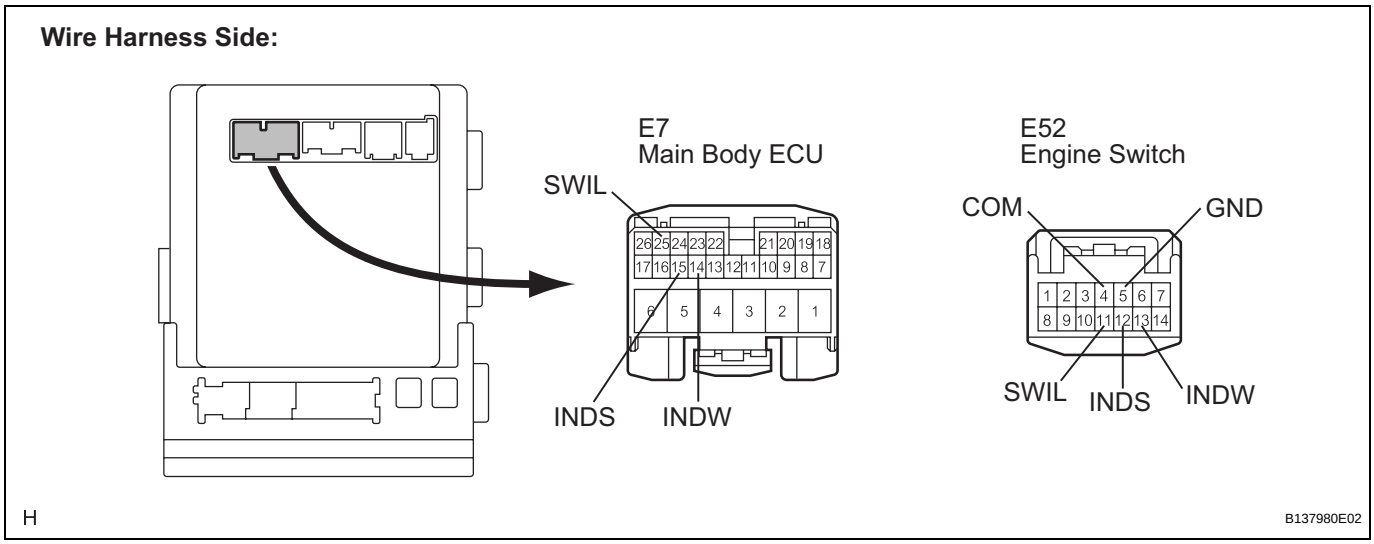
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 11 (SWIL) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 12 (INDS) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 13 (INDW) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates

NG → **REPLACE ENGINE SWITCH**

OK

2	CHECK WIRE HARNESS (ENGINE SWITCH - MAIN BODY ECU AND BODY GROUND)

(a) Disconnect the E52 switch connector.



(b) Disconnect the E7 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

ST

Standard resistance

Tester Connection	Condition	Specified Condition
E52-11 (SWIL) - E7-25 (SWIL)	Always	Below 1 Ω
E52-12 (INDS) - E7-15 (INDS)	Always	Below 1 Ω
E52-13 (INDW) - E7-14 (INDW)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-4 (COM) - Body ground	Always	Below 1 Ω
E52-11 (SWIL) or E7-25 (SWIL) - Body ground	Always	10 kΩ or higher
E52-12 (INDS) or E7-15 (INDS) - Body ground	Always	10 kΩ or higher
E52-13 (INDW) or E7-14 (INDW) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

Power Source Mode does not Change to ON (IG and ACC)

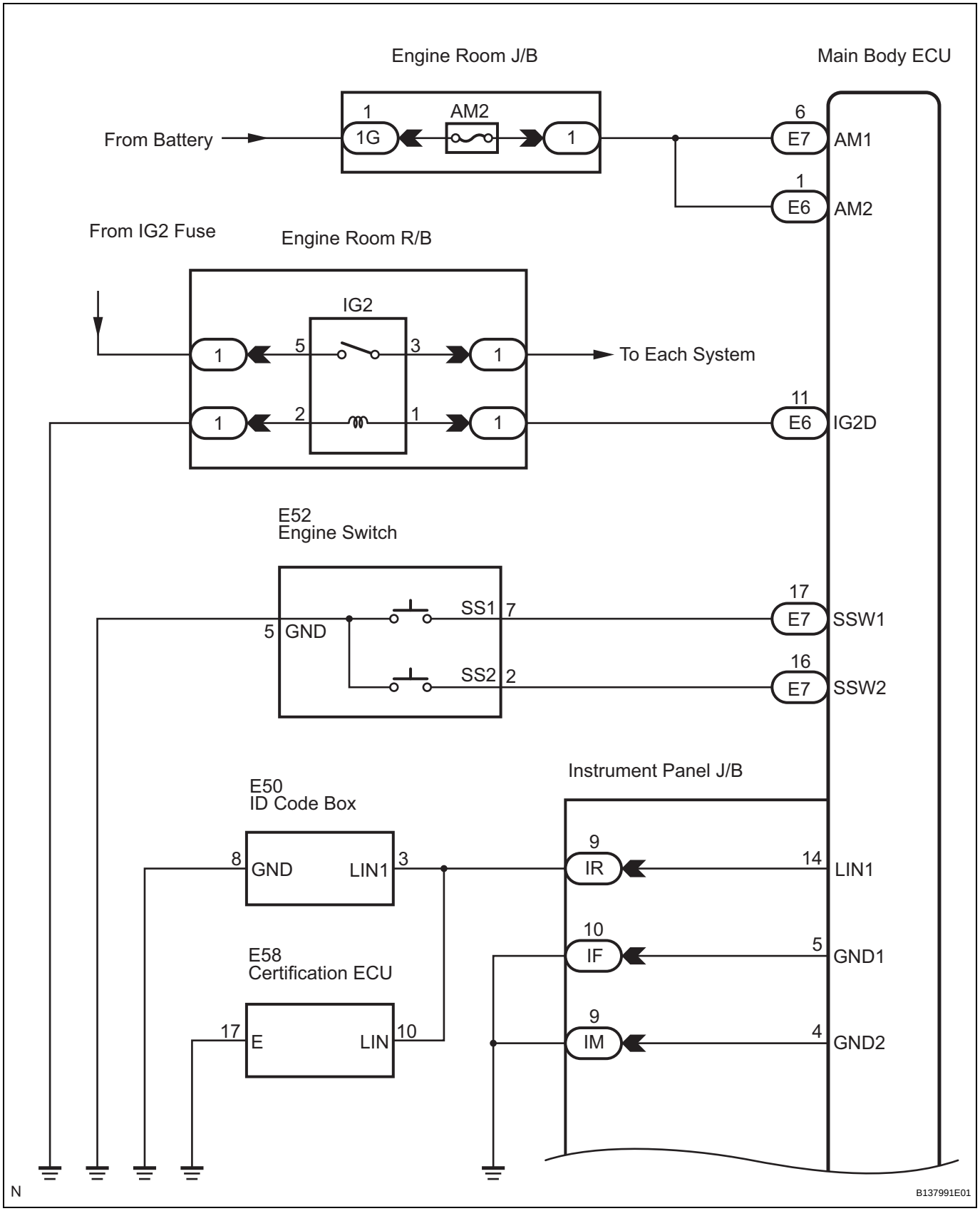
DESCRIPTION

When the engine switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

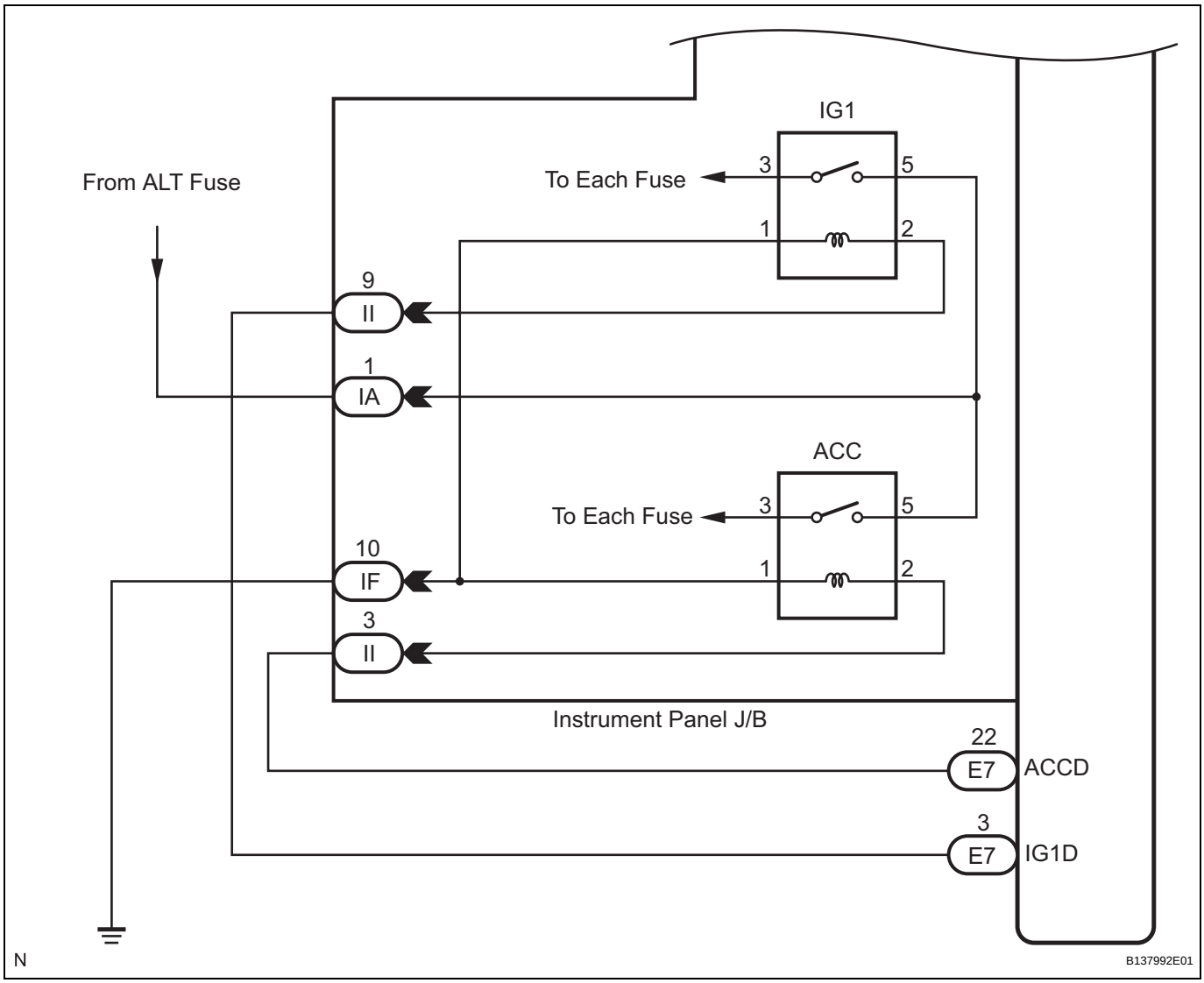
HINT:

To allow use of the intelligent tester to inspect the push-button start function when the engine switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM

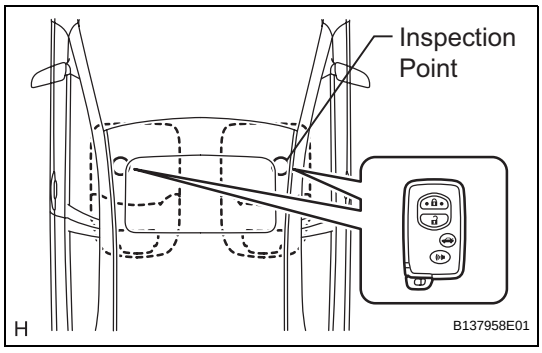


ST



INSPECTION PROCEDURE

1	CHECK ENTRY FUNCTION DETECTION AREA



(a) Inspect entry detection area.
(1) When the electrical key is in either of the 2 inspection points in the illustration, the shift lever is in the P position and the brake pedal is depressed, check that the engine switch indicator illuminates in green.

OK:

Engine switch illuminates in green.

HINT:

If the engine switch does not illuminate, perform troubleshooting according to the PROBLEM SYMPTOMS TABLE (See page ST-17).

NG	GO TO OTHER PROBLEM

ST

OK

2	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

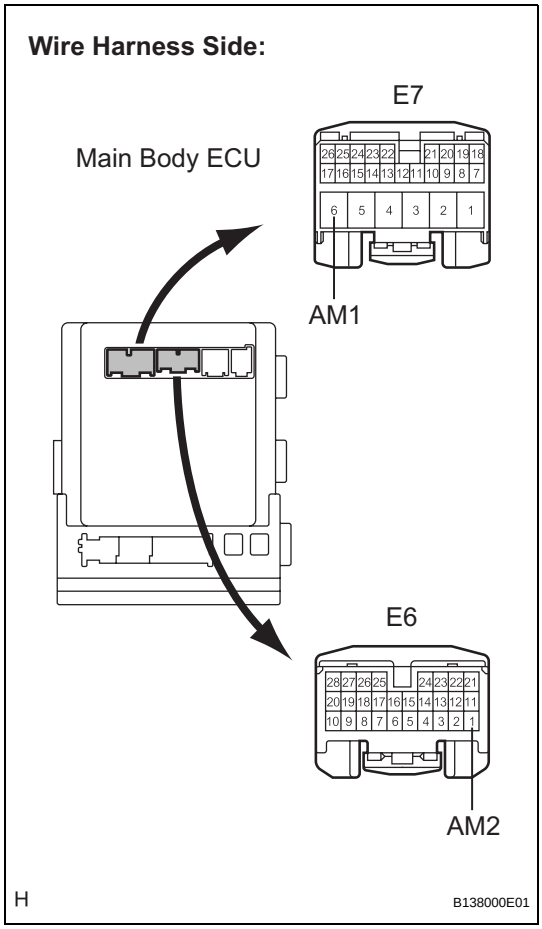
3	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → **REPAIR OR REPLACE CONNECTORS**

OK

4	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

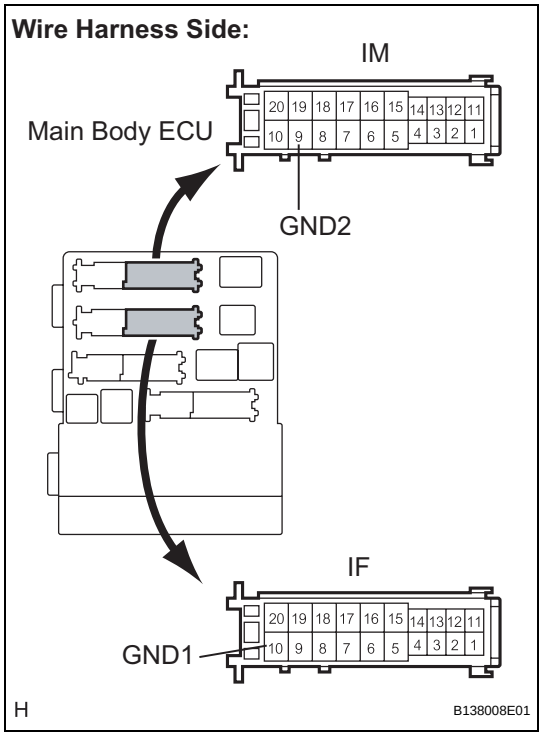
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 CHECK FOR DTCS

(a) Delete the DTCs (See page ST-26).
HINT:
After all the DTCs are cleared, check if the trouble occurs again 5 seconds after the engine switch is turned on (IG).
(b) Check for DTCs again.
OK:
No DTC is output.

NG → **GO TO DTC CHART**

OK

7 READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Check the DATA LIST for proper functioning of the start switches 1 and 2.
HINT:
When using the intelligent tester with the engine switch off, turn on and off any of the door courtesy light switches repeatedly at 1.5 second intervals or less until communication between the tester and vehicle starts.

ST

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
STSW1	Start Switch 1/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-
START SW2	Start Switch 2/ON or OFF	ON: Engine switch on (IG) OFF: Engine switch off	-

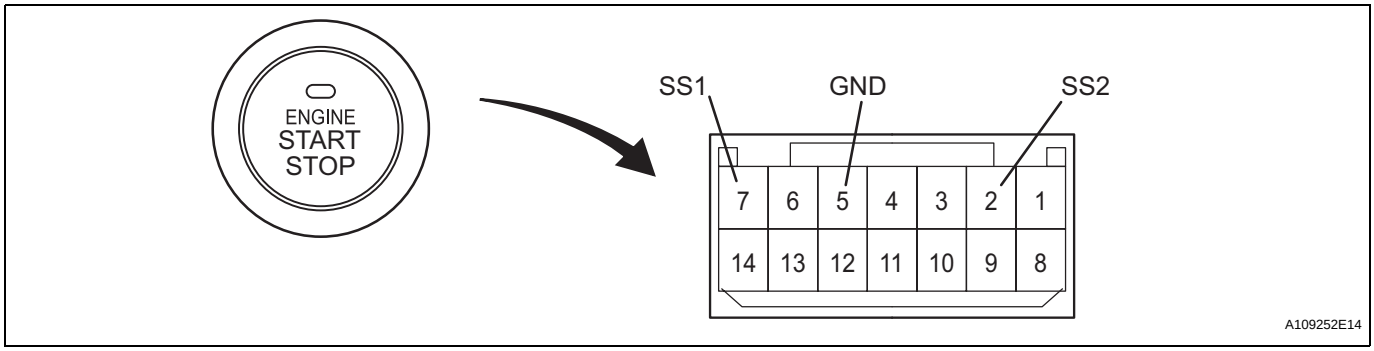
OK:
ON (engine switch on (IG)) and OFF (engine switch off) appear on the screen.

OK → **REPLACE MAIN BODY ECU**

NG

8 INSPECT ENGINE SWITCH

(a) Remove the engine switch.



(b) Measure the resistance of the switch.
Standard resistance

Tester Connection	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

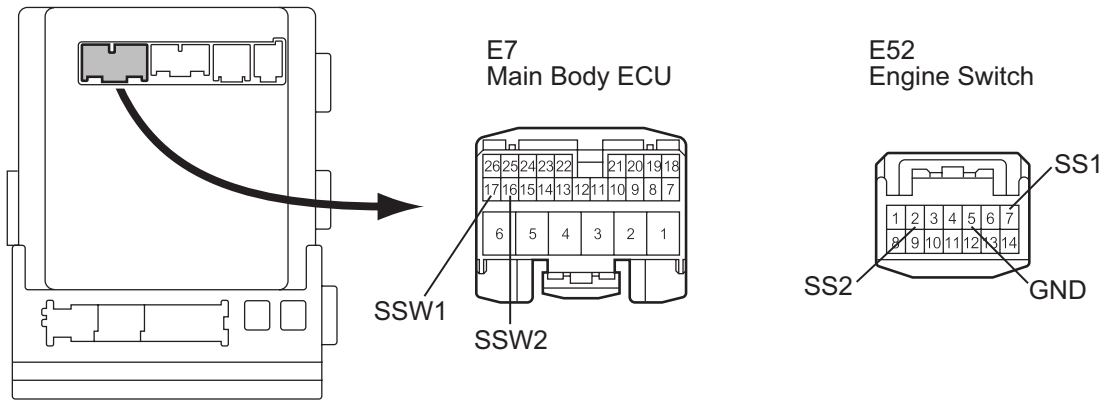
NG → **REPLACE ENGINE SWITCH**

OK

9 CHECK WIRE HARNESS (MAIN BODY ECU AND BODY GROUND - ENGINE SWITCH)

(a) Disconnect the E7 ECU connector.

Wire Harness Side:



H

B137980E01

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E52-7 (SS1) - E7-17 (SSW1)	Always	Below 1 Ω
E52-2 (SS2) - E7-16 (SSW2)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	Below 1 Ω
E52-7 (SS1) or E7-17 (SSW1) - Body ground	Always	10 kΩ or higher
E52-2 (SS2) or E7-16 (SSW2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

Power Source Mode does not Change to ON (IG)

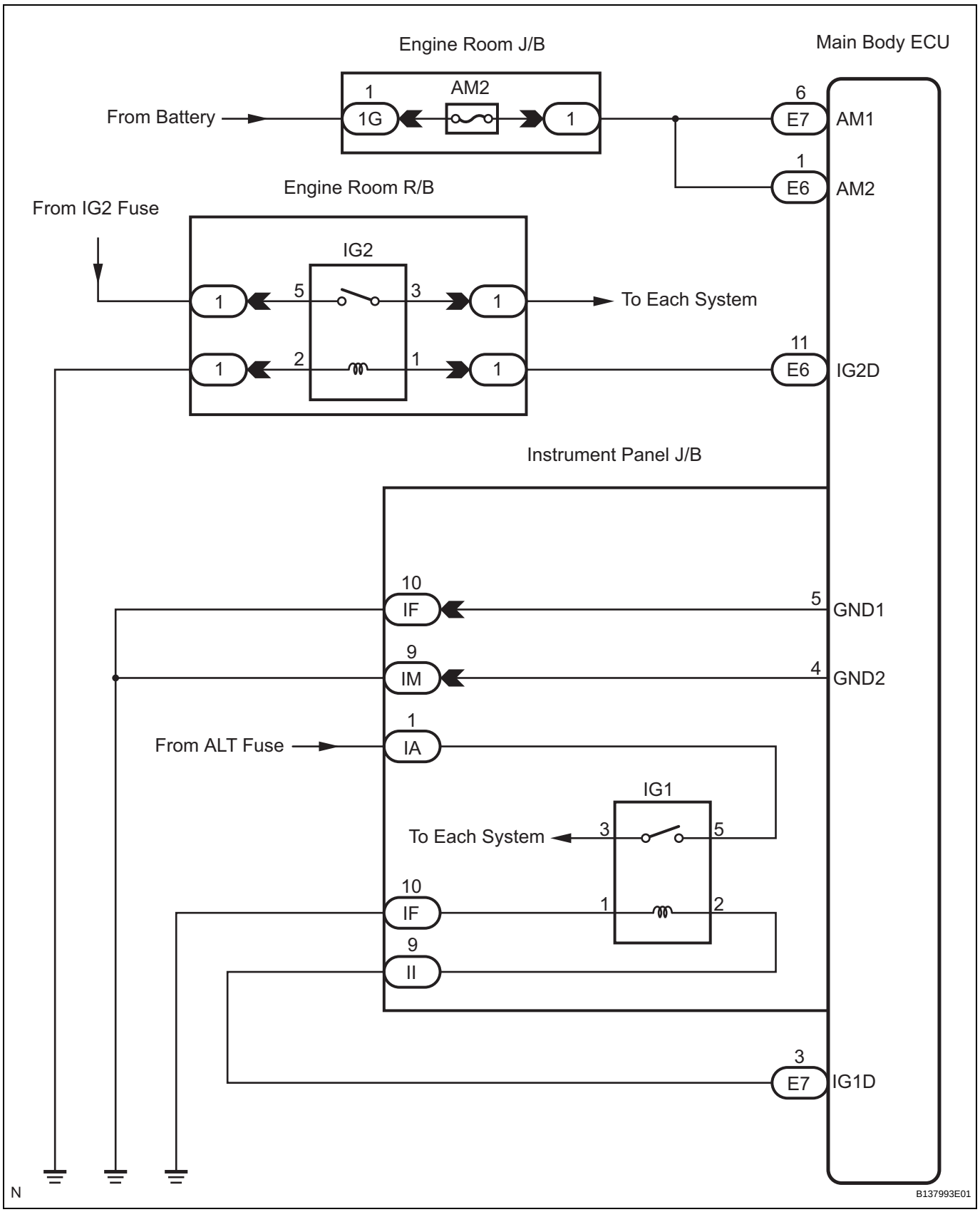
DESCRIPTION

When the engine switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

HINT:

To allow use of the intelligent tester to inspect the push-button start function when the engine switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

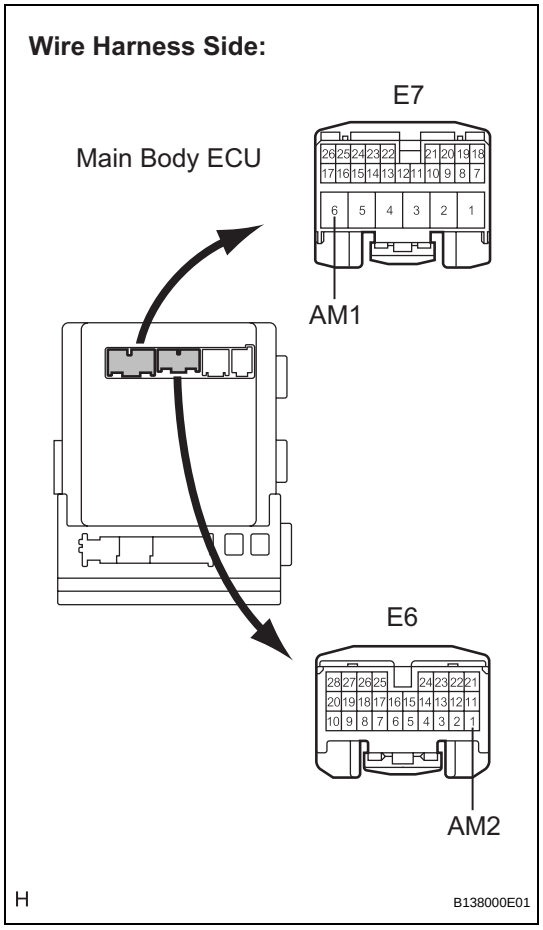
2	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → **REPAIR OR REPLACE CONNECTORS**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

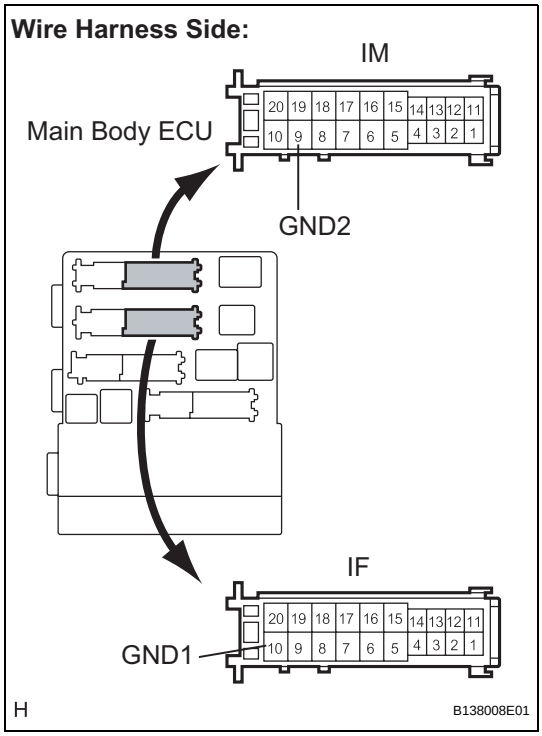
Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

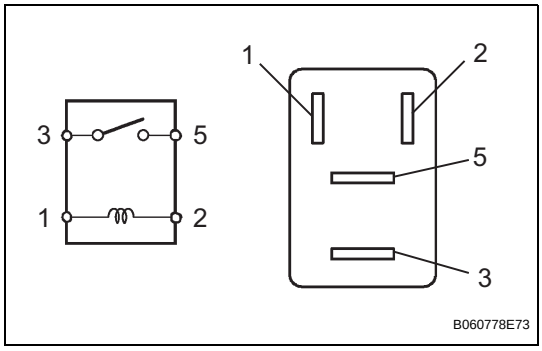
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT RELAY (IG2 RELAY)



(a) Remove the IG2 relay from the engine room R/B No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

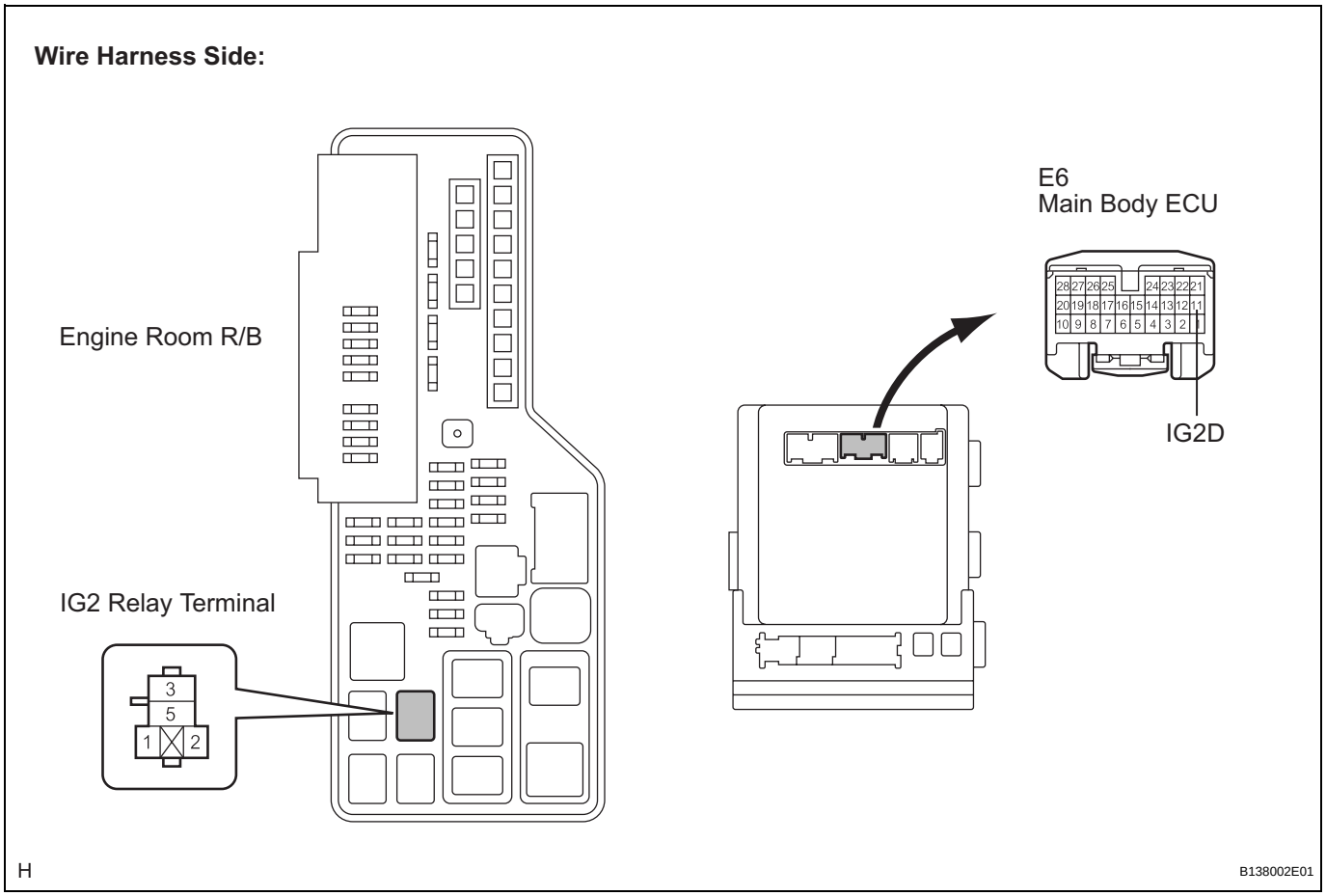
NG → **REPLACE RELAY**

OK

6 CHECK WIRE HARNESS (ENGINE ROOM R/B - MAIN BODY ECU AND BODY GROUND)

(a) Remove the IG2 relay from the engine room R/B.

ST



(b) Disconnect the E6 ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

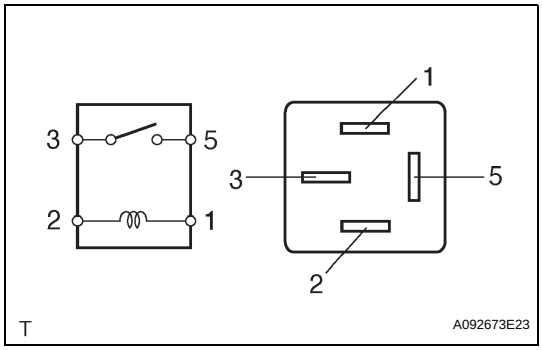
Terminal No. (Symbol)	Specified Condition
Engine room R/B IG2 relay terminal 1 - E6-11 (IG2D)	Below 1 Ω
Engine room R/B IG2 relay terminal 2 - Body ground	Below 1 Ω
E6-11 (IG2D) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

ST

7 INSPECT RELAY (IG1 RELAY)



(a) Remove the IG1 relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

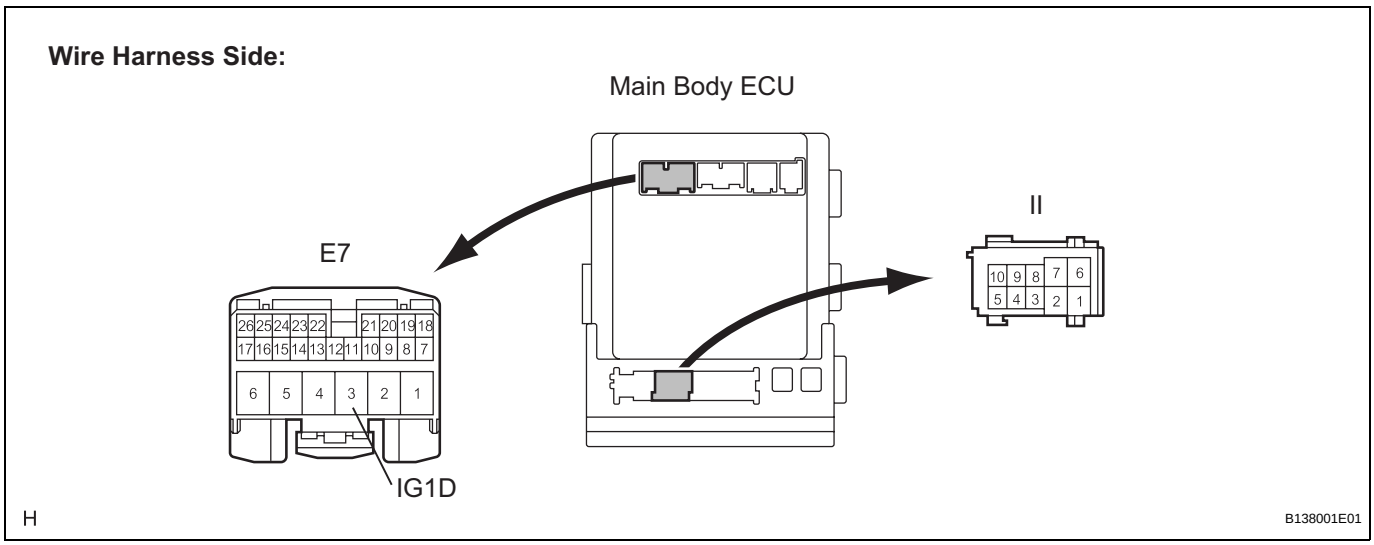
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

NG → REPLACE RELAY

OK

8 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the II J/B connector.



(b) Disconnect the E7 ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

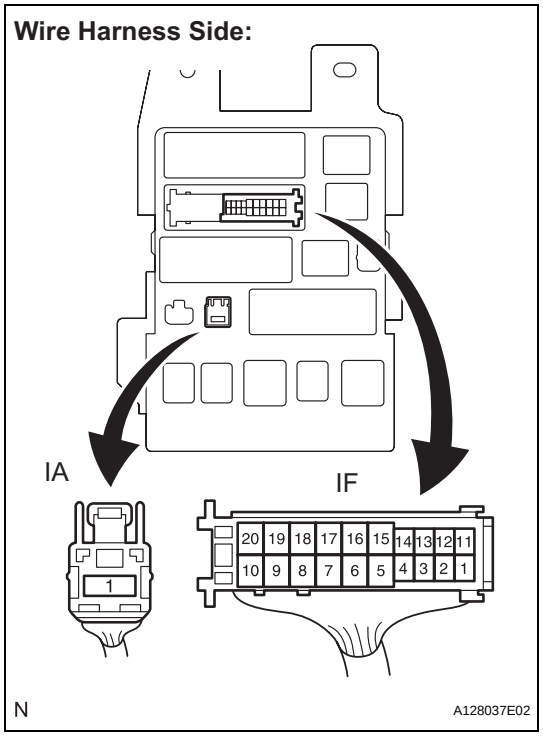
Terminal No. (Symbol)	Condition	Specified Condition
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
E7-3 (IG1D) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

ST

9 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

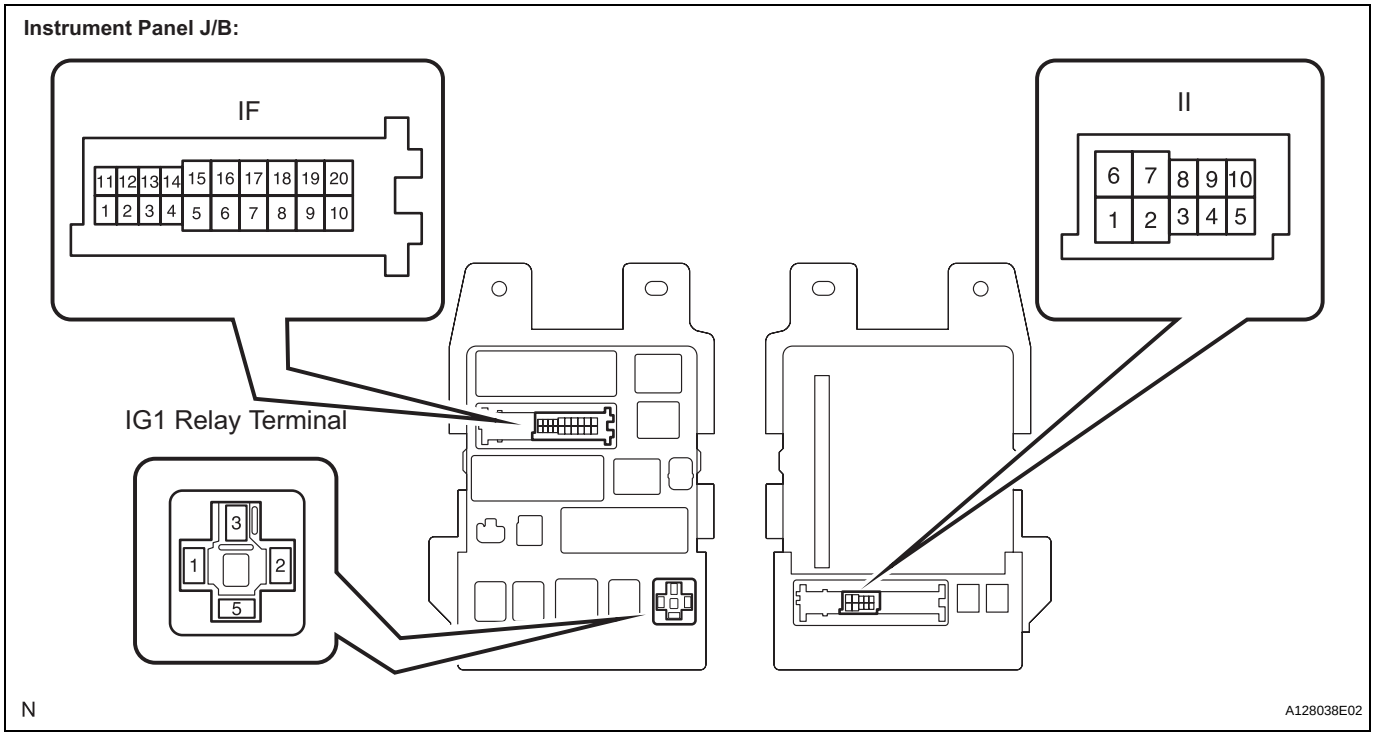
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10 INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



ST

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - IG1 relay terminal-1	Always	Below 1 Ω
II-9 - IG1 relay terminal-2	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

NG → **REPLACE MAIN BODY ECU**

OK

REPLACE INSTRUMENT PANEL J/B

Power Source Mode does not Change to ON (ACC)

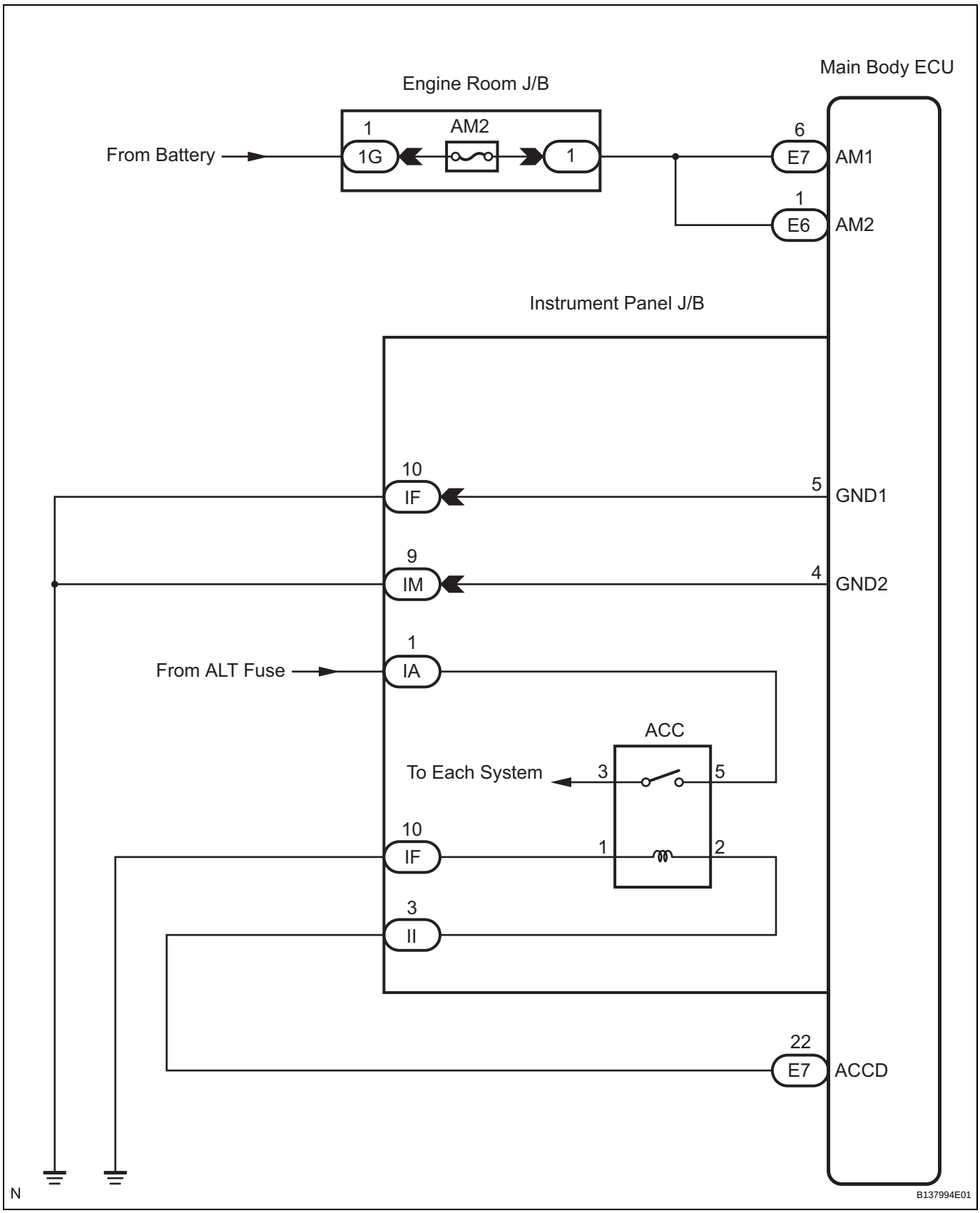
DESCRIPTION

When the engine switch is pushed with the electrical key in the cabin, the main body ECU receives signals to switch the power source mode.

HINT:

To allow use of the intelligent tester to inspect the push-button start function when the engine switch is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the intelligent tester and the main body ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

WIRING DIAGRAM



ST

INSPECTION PROCEDURE

1	INSPECT FUSE (AM2)

(a) Remove the AM2 fuse from the engine room J/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

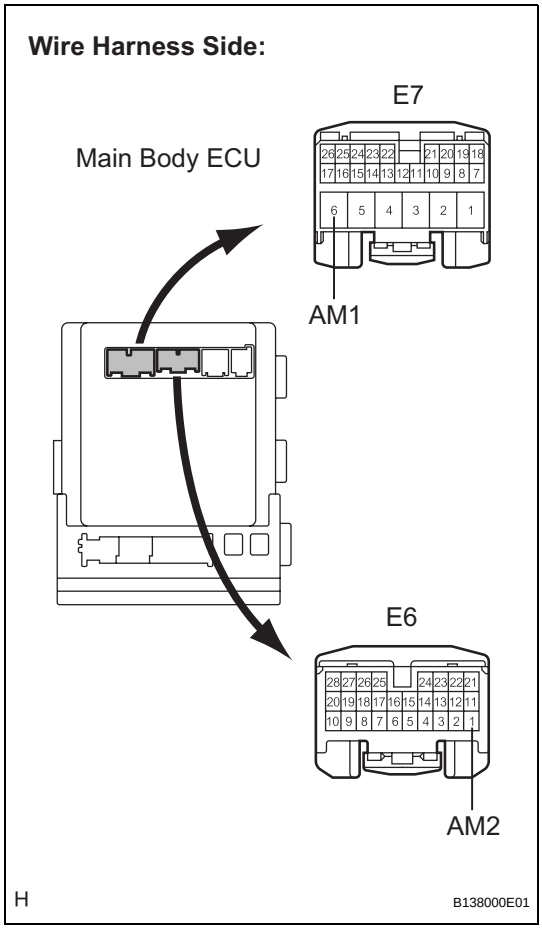
2	CHECK CONNECTORS

(a) Check that the connectors are securely connected and the terminals are not deformed or loose.
OK:
The connectors are securely connected and the terminals are not deformed or loose.

NG → **REPAIR OR REPLACE CONNECTORS**

OK

3	CHECK WIRE HARNESS (MAIN BODY ECU - BATTERY)



(a) Disconnect the E6 and E7 ECU connectors.
(b) Measure the voltage according to the value(s) in the table below.

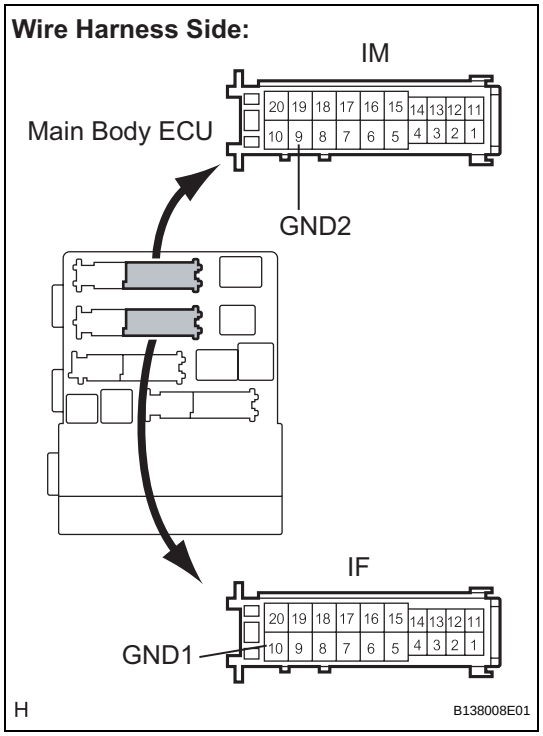
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK WIRE HARNESS (MAIN BODY ECU - BODY GROUND)



(a) Disconnect the IF and IM ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

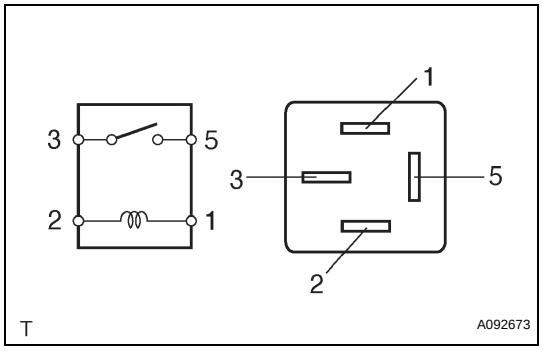
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
IF-10 (GND1) - Body ground	Always	Below 1 Ω
IM-9 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 INSPECT RELAY (ACC RELAY)



(a) Remove the ACC relay from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

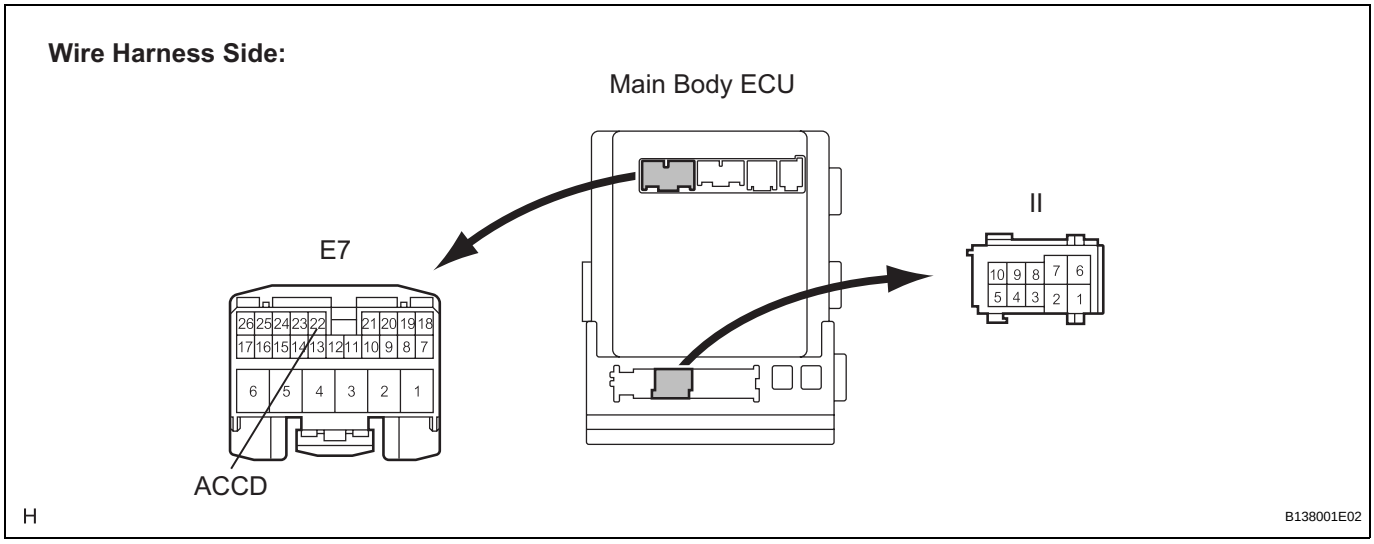
NG → **REPLACE RELAY**

OK

6 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - MAIN BODY ECU)

(a) Disconnect the E7 ECU connector.

ST



(b) Disconnect the II J/B connector.
(c) Measure the resistance according to the value(s) in the table below.

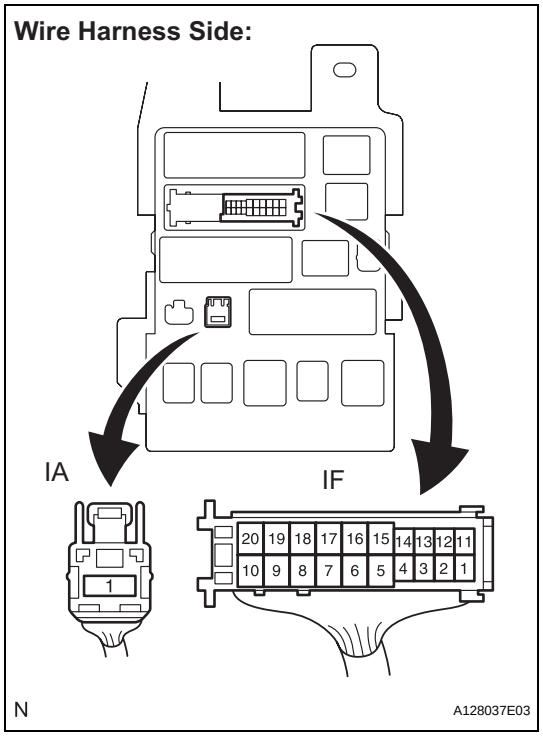
Standard resistance

Terminal No. (Symbol)	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
E7-22 or II-3 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B - BATTERY AND BODY GROUND)



(a) Disconnect the IF and IA J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal No.	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

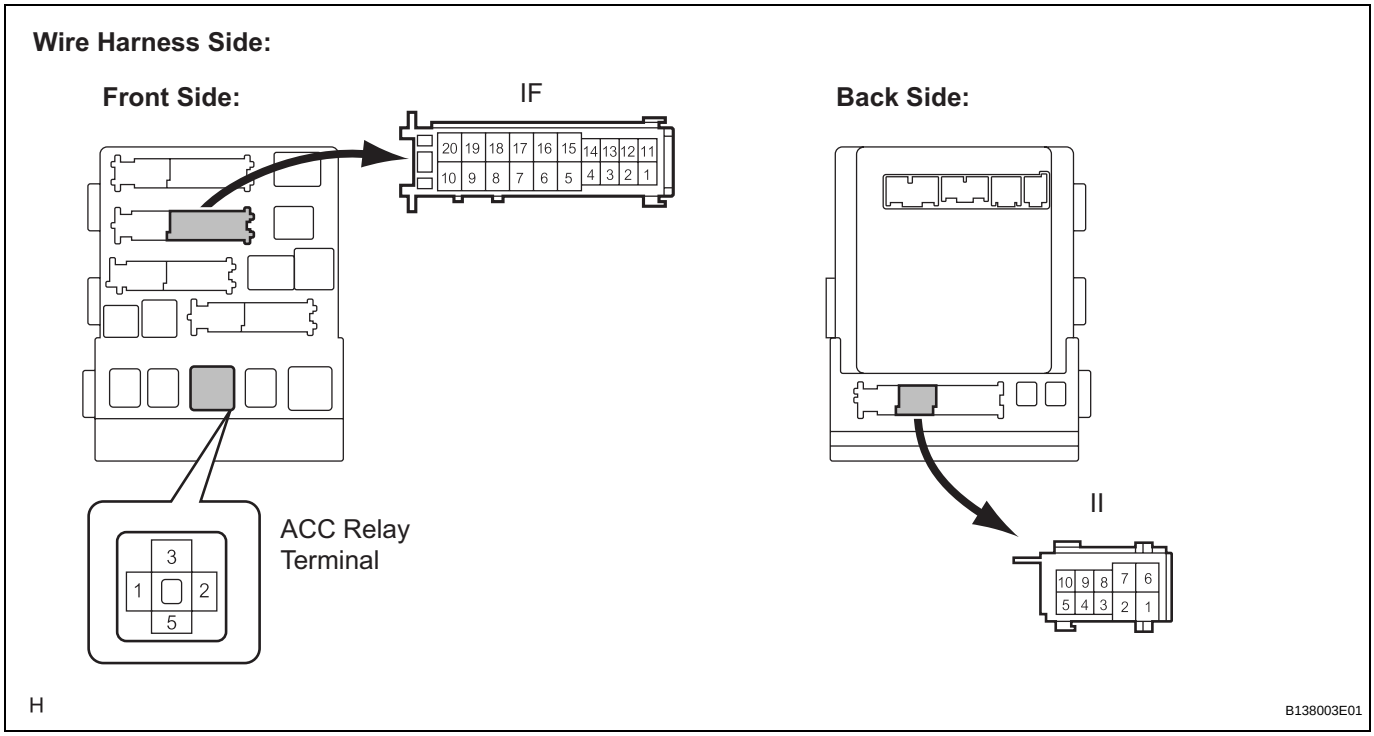
Terminal No.	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

8 INSPECT INSTRUMENT PANEL J/B

(a) Measure the resistance according to the value(s) in the table below.



ST

Standard resistance

Terminal No.	Condition	Specified Condition
ACC relay terminal 1 - IF-10	Always	Below 1 Ω
ACC relay terminal 2 - II-3	Always	Below 1 Ω
IF-10 - Body ground	Always	10 kΩ or higher
II-3 - Body ground	Always	10 kΩ or higher

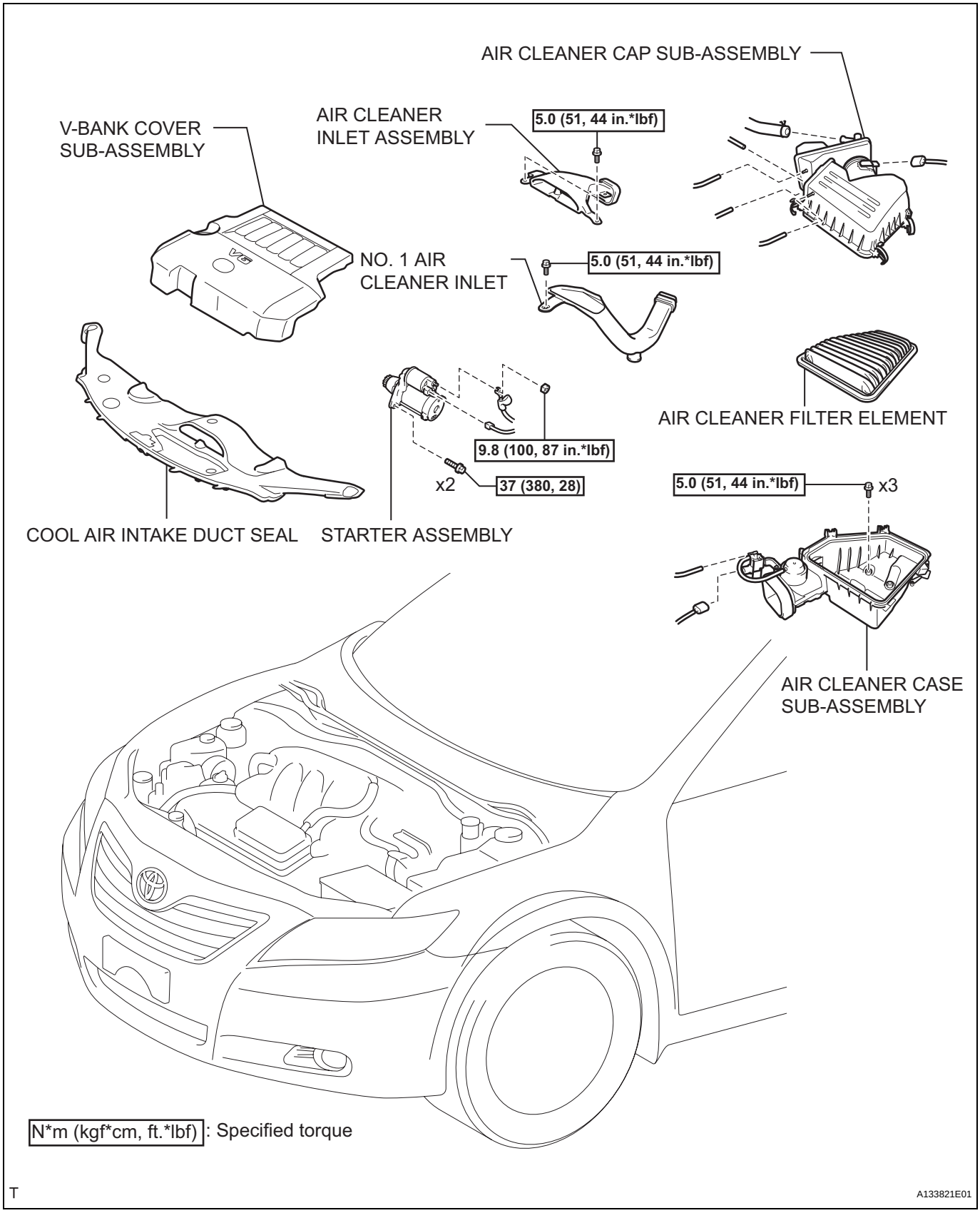
NG → REPLACE INSTRUMENT PANEL J/B

OK

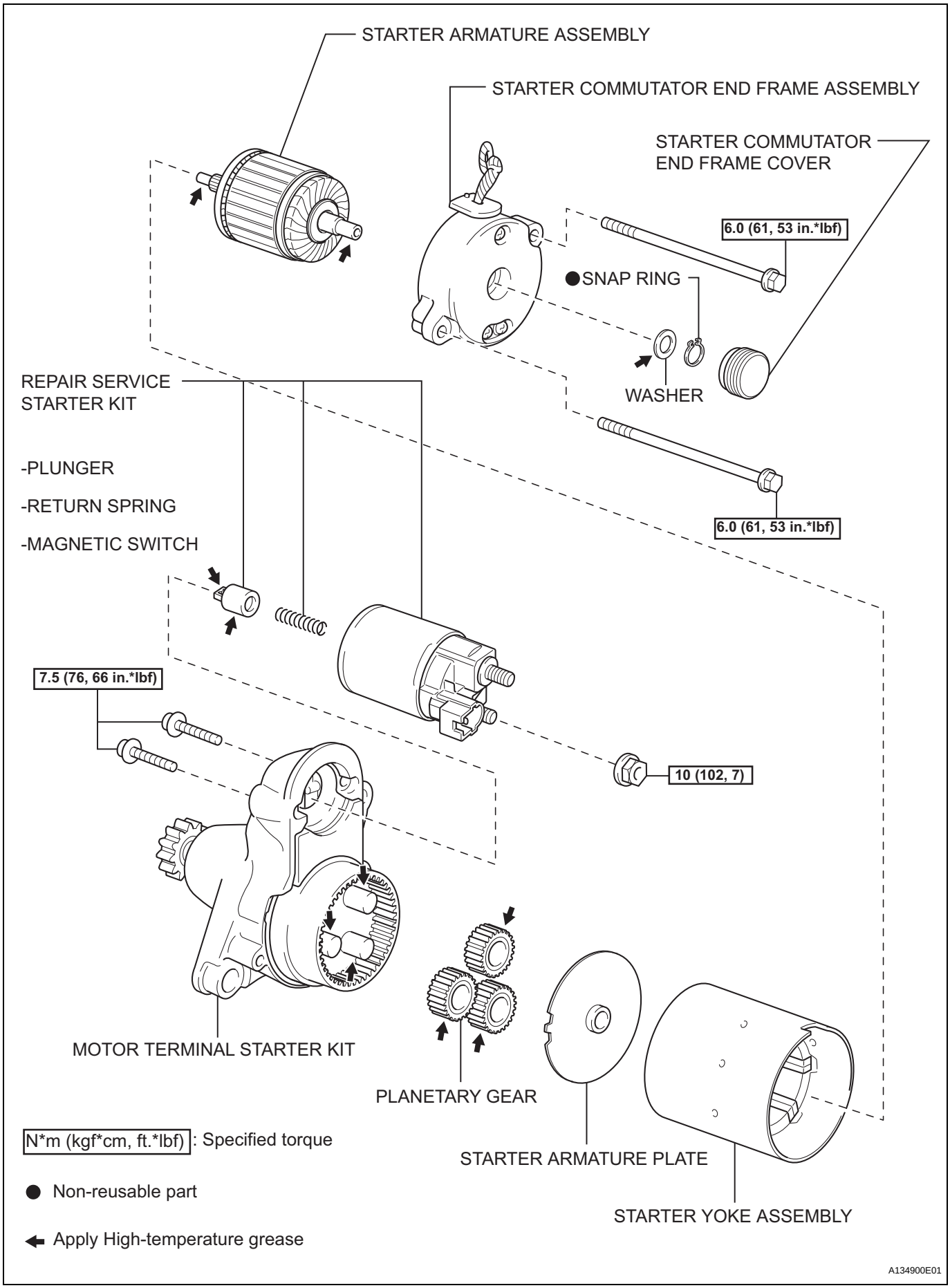
REPLACE MAIN BODY ECU

STARTER

COMPONENTS



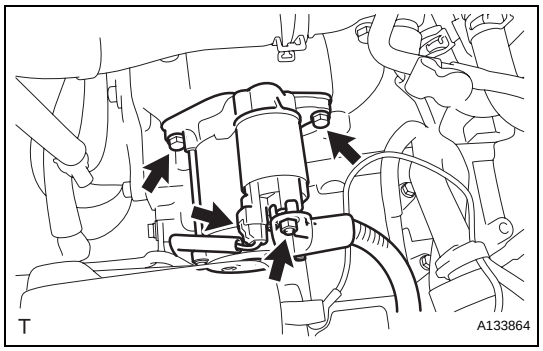
ST


STARTER ARMATURE ASSEMBLY
STARTER COMMUTATOR END FRAME ASSEMBLY
STARTER COMMUTATOR END FRAME COVER
6.0 (61, 53 in.*lbf)
●SNAP RING
WASHER
REPAIR SERVICE STARTER KIT
-PLUNGER
-RETURN SPRING
-MAGNETIC SWITCH
6.0 (61, 53 in.*lbf)
7.5 (76, 66 in.*lbf)
10 (102, 7)
MOTOR TERMINAL STARTER KIT
PLANETARY GEAR
STARTER ARMATURE PLATE
STARTER YOKE ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Apply High-temperature grease
A134900E01

ST

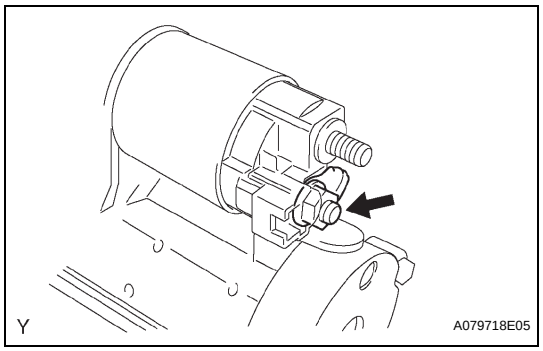
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
3. **REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)**
4. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
5. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
6. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
7. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
8. **REMOVE STARTER ASSEMBLY**
   (a) Disconnect the terminal 50 connector from the starter assembly.
   (b) Remove the nut and disconnect the wire harness from terminal 30.
   (c) Remove the 2 bolts and starter assembly.

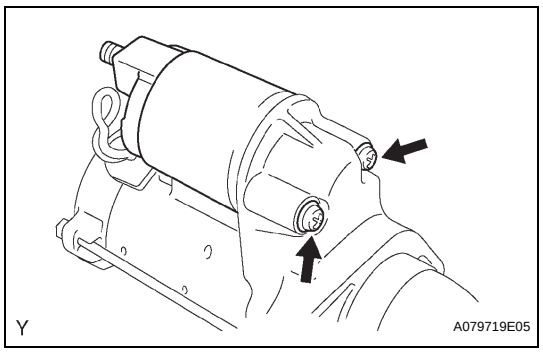


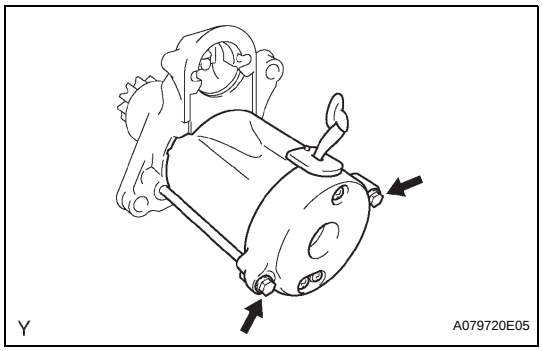
DISASSEMBLY

1. **REMOVE REPAIR SERVICE STARTER KIT**
   (a) Remove the nut and disconnect the lead wire from terminal C.



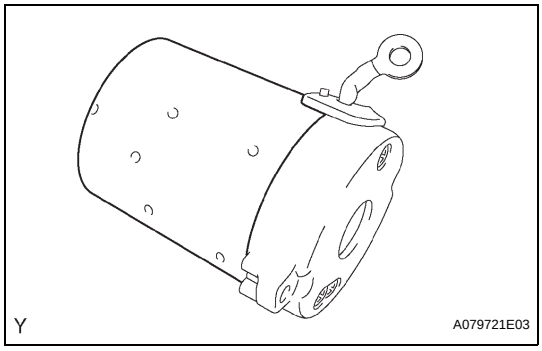
   (b) Remove the 2 screws that hold the magnetic switch to the motor terminal starter kit.
   (c) Remove the repair service starter kit.
   (d) Remove the return spring and the plunger from the repair service starter kit.



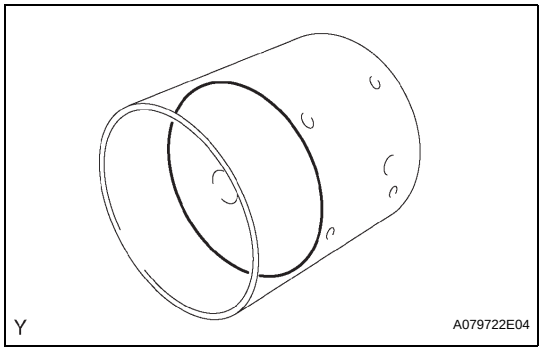


2. REMOVE STARTER YOKE ASSEMBLY

(a) Remove the 2 through bolts and pull out the starter yoke assembly together with the starter commutator end frame assembly.

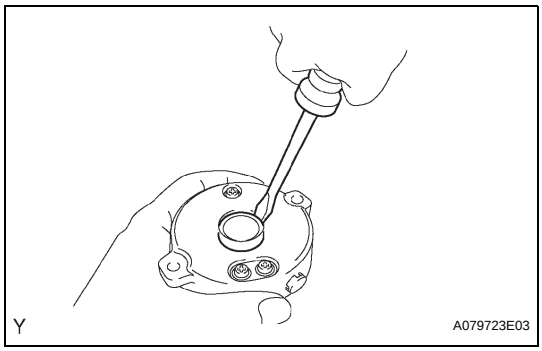


(b) Remove the starter yoke assembly from the starter commutator end frame assembly.



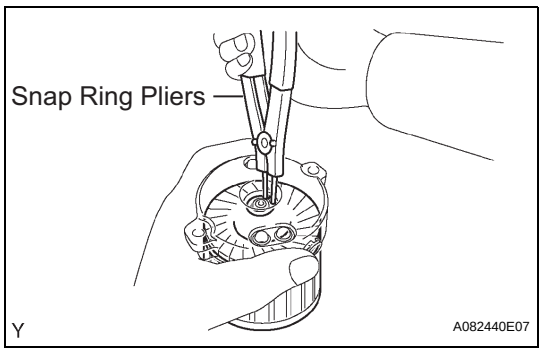
3. REMOVE STARTER ARMATURE PLATE

(a) Remove the starter armature plate from the starter yoke assembly.



4. REMOVE STARTER COMMUTATOR END FRAME COVER

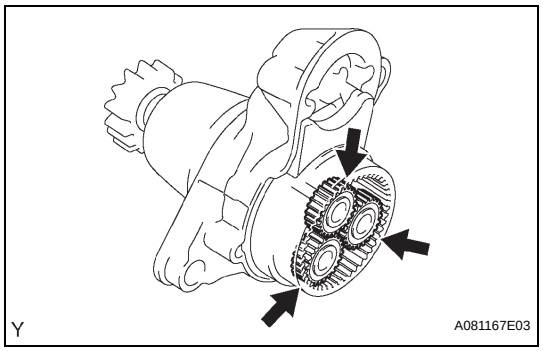
(a) Using a screwdriver, remove the starter commutator end frame cover.



5. REMOVE STARTER ARMATURE ASSEMBLY

(a) Using snap ring pliers, remove the snap ring and plate washer.

(b) Remove the starter armature assembly from the commutator end frame assembly.



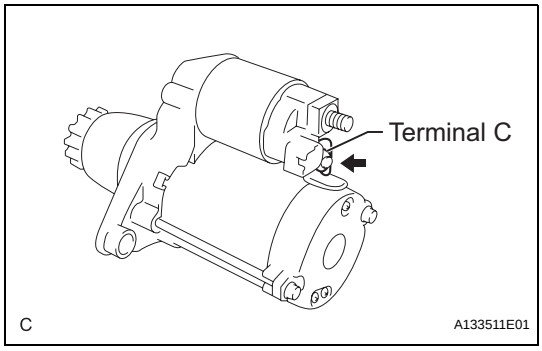
6. REMOVE PLANETARY GEAR

(a) Remove the 3 planetary gears from the motor terminal starter kit.

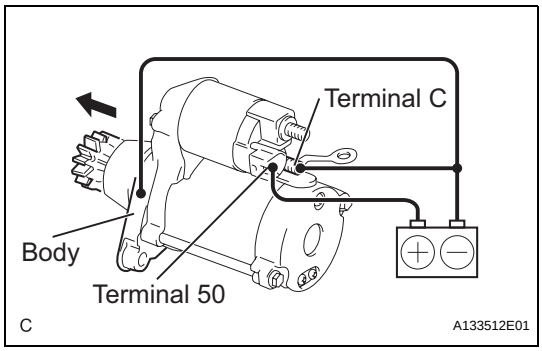
INSPECTION

1. INSPECT STARTER ASSEMBLY

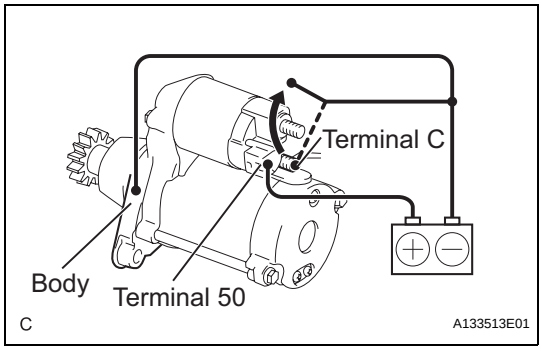
CAUTION:
Make sure to complete each of the following tests within 5 seconds to prevent the coil from burning out.



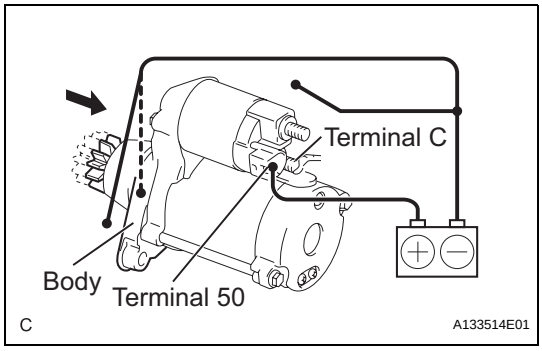
(a) Perform pull-in test:
(1) Disconnect the lead wire from terminal C.



(2) Connect the battery to the magnetic switch as shown in the illustration. Check that the clutch pinion gear moves outward.
If the clutch pinion gear does not move outward, replace the repair service starter kit.

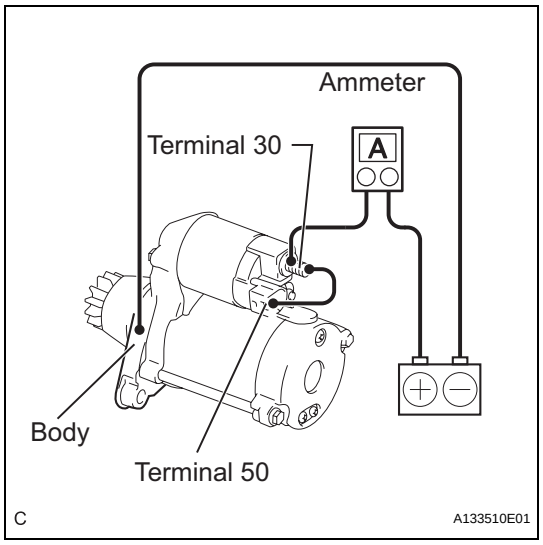


(b) Perform hold-in test:
(1) Disconnect the negative (-) terminal lead from terminal C under the conditions for pull-in test. Check that the pinion gear remains out.
If the clutch pinion gear moves inward, replace the repair service starter kit.



(c) Inspect clutch pinion gear return:
(1) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear moves inward.
If the clutch pinion gear does not move inward, replace the repair service starter kit.

(d) Perform no-load performance test:
(1) Connect the field coil wire to terminal C with the nut. Make sure that the lead is not grounded.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)
(2) Clamp the starter in a vise.

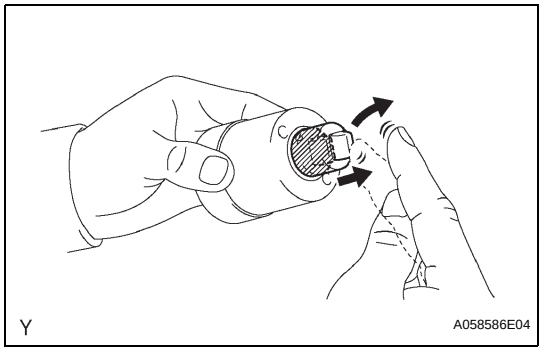


(3) Connect the battery and an ammeter to the starter as shown in the illustration.
(4) Check that the starter rotates smoothly and steadily with the clutch pinion gear extended. Check that the ammeter reads the specified current.

Specified current

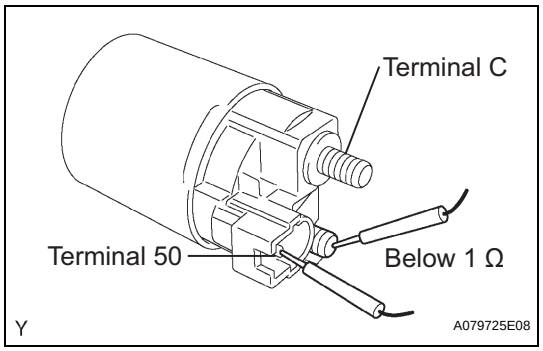
Condition	Specified condition
at 11.5 V	90 A or less

If the result is not as specified, overhaul the starter assembly.



2. INSPECT REPAIR SERVICE STARTER KIT

(a) Check the plunger.
(1) Push in the plunger and check that it returns quickly to its original position.
If necessary, replace the repair service starter kit.

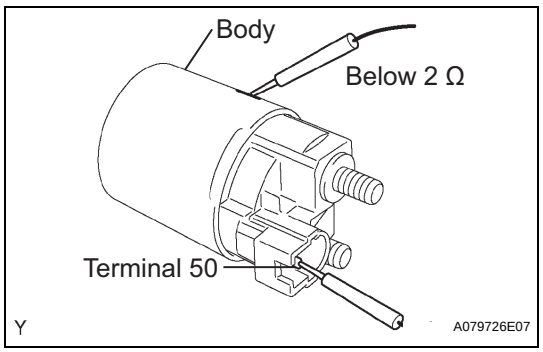


(b) Inspect the resistance of the pull-in coil.
(1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard resistance

Tester connection	Specified condition
Terminal 50 - Terminal C	Below 1 Ω

If the resistance is not as specified, replace the repair service starter kit.



(c) Inspect the resistance of the hold-in coil.
(1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

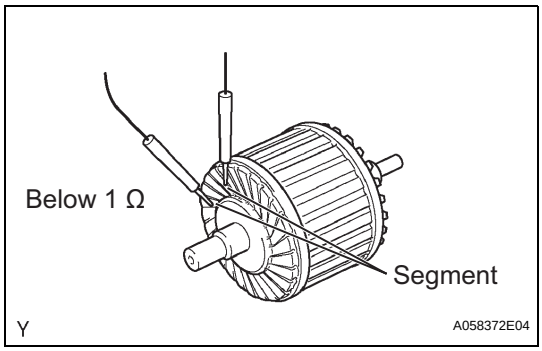
Standard resistance

Tester connection	Specified condition
Terminal 50 - Switch body	Below 2 Ω

If the resistance is not as specified, replace the repair service starter kit.

3. INSPECT STARTER ARMATURE ASSEMBLY

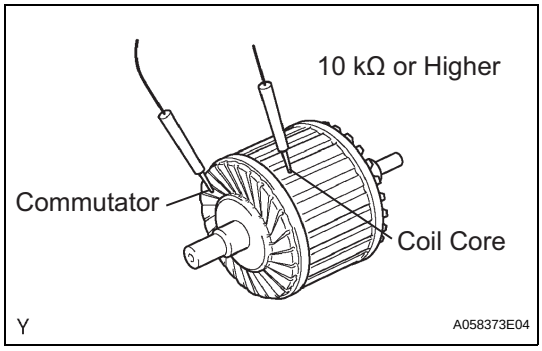
(a) Check the commutator surface for dirt or burning.
If the surface is dirty or burnt, smooth the surface with 400-grit sandpaper or leather.



(b) Inspect the resistance of the commutator.
(1) Using an ohmmeter, measure the resistance between the segments of the commutator.
Standard resistance

Tester connection	Specified condition
Segment - Segment	Below 1 Ω

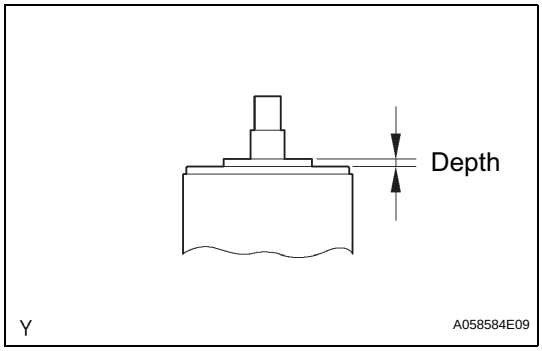
If the resistance is not as specified, replace the starter armature assembly.



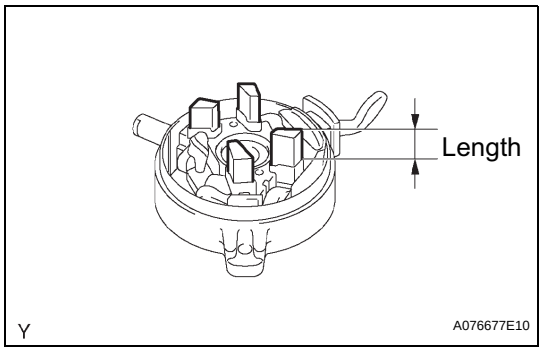
(2) Using an ohmmeter, measure the resistance between the commutator and armature coil core.
Standard resistance

Tester connection	Specified condition
Commutator - Armature coil core	10 kΩ or higher

If the resistance is not as specified, replace the starter armature assembly.

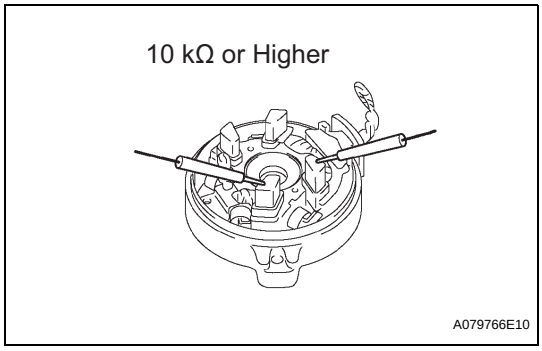


(c) Using vernier calipers, measure the commutator depth.
Specified depth:
3.1 mm (0.122 in.)
Maximum depth:
3.8 mm (0.150 in.)
If the depth is greater than the maximum, replace the starter armature assembly.



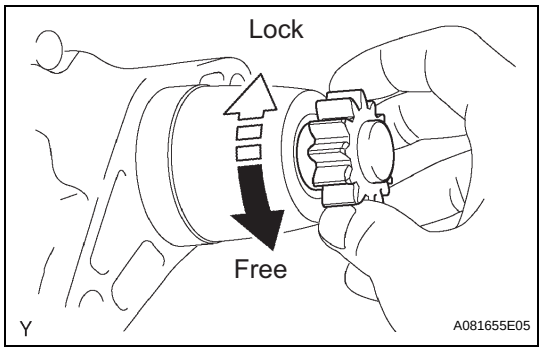
4. INSPECT STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Check the brush length.
(1) Using vernier calipers, measure the brush length.
Specified length:
9.0 mm (0.354 in.)
Maximum length:
4.0 mm (0.157 in.)
If the length is less than the minimum, replace the starter commutator end frame assembly.



(b) Check the resistance.
(1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brushes.
Resistance:
10 kΩ or higher
If the resistance is not as specified, repair or replace the starter commutator end frame assembly.

ST



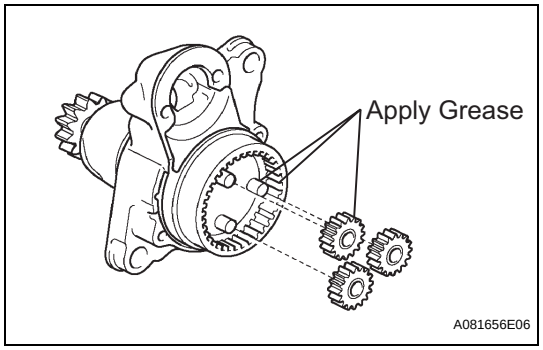
5. INSPECT MOTOR TERMINAL STARTER KIT

(a) Check the starter clutch.

(1) Rotate the clutch pinion gear counterclockwise and check that it turns freely. Try to rotate the clutch pinion gear clockwise and check that it locks.

If necessary, replace the motor terminal starter kit.

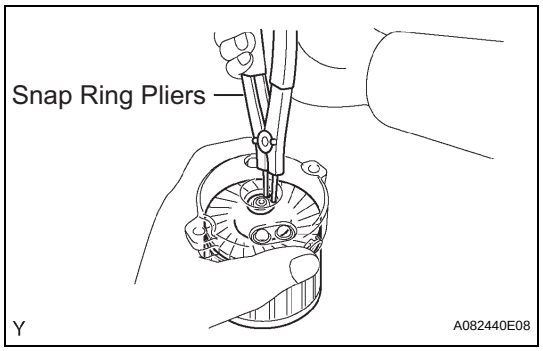
REASSEMBLY



1. INSTALL PLANETARY GEAR

(a) Apply high-temperature grease to the planetary gears and pin parts of the planetary shaft.

(b) Install the 3 planetary gears to the motor terminal starter kit.

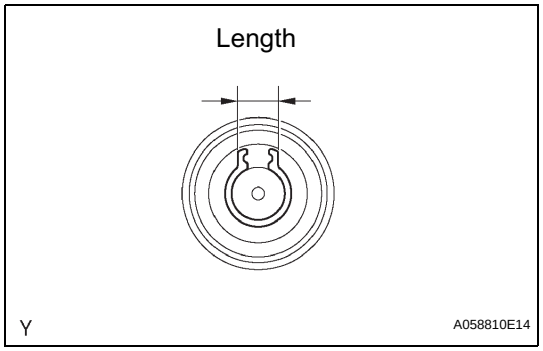


2. INSTALL STARTER ARMATURE ASSEMBLY

(a) Apply high-temperature grease to the plate washer and the armature shaft.

(b) Install the starter armature assembly to the starter commutator end frame assembly.

(c) Using snap ring pliers, install the plate washer and a new snap ring.

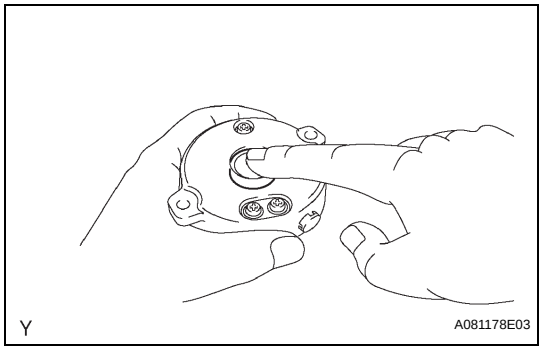


(d) Using vernier calipers, measure the snap ring.

Maximum length:

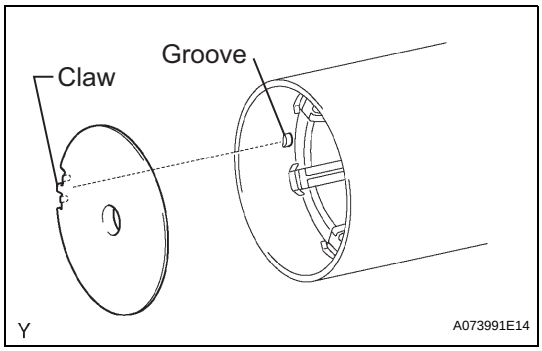
5.0 mm (0.197 in.)

If the length is greater than the maximum, replace the snap ring with a new one.



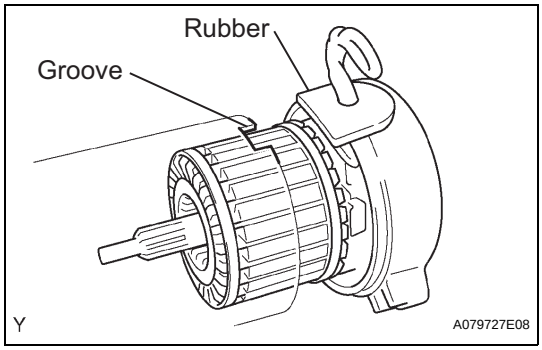
3. INSTALL STARTER COMMUTATOR END FRAME COVER

(a) Install the starter commutator end frame cover to the starter commutator end frame assembly.



4. INSTALL STARTER ARMATURE PLATE

(a) Align the claw of the armature plate with the groove inside the starter yoke assembly, and install the starter armature plate.



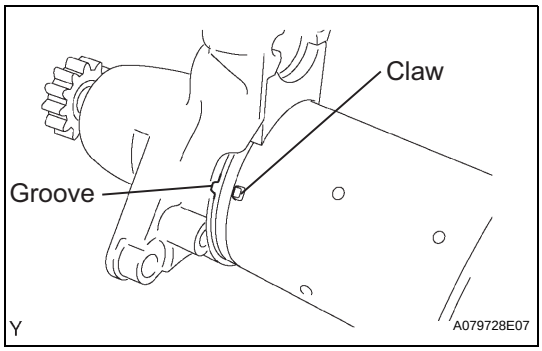
5. INSTALL STARTER COMMUTATOR END FRAME ASSEMBLY

(a) Align the starter commutator end frame rubber with the groove of the starter yoke assembly.

(b) Install the starter commutator end frame assembly to the starter yoke assembly.

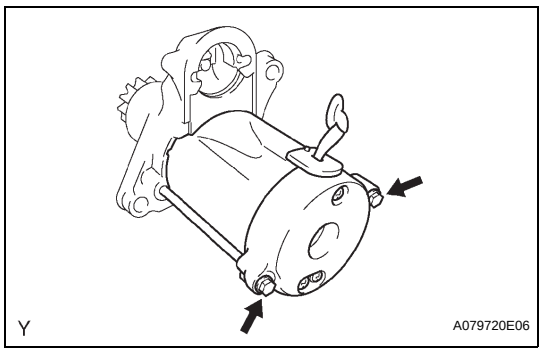
NOTICE:

The magnet of the starter yoke assembly may attract the starter armature assembly when the starter commutator end frame assembly is installed, causing the magnet to break.



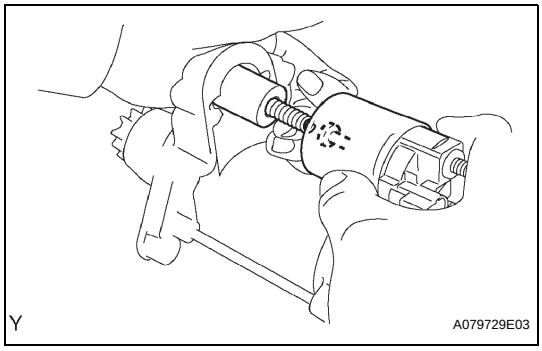
6. INSTALL STARTER YOKE ASSEMBLY

(a) Align the claw of the starter yoke with the groove inside the motor terminal starter kit.



(b) Install the starter yoke with the 2 through bolts.

Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

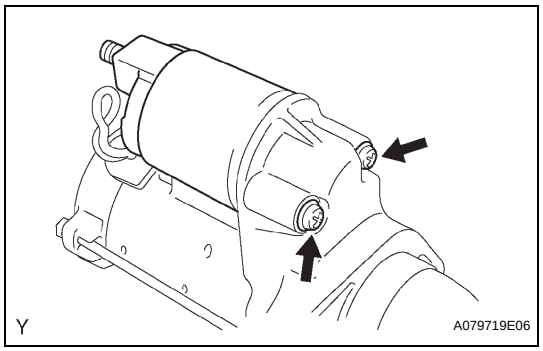


7. INSTALL REPAIR SERVICE STARTER KIT

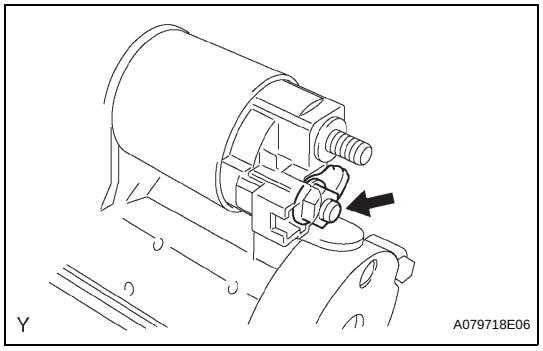
(a) Apply high-temperature grease to the plunger and the hook.

(b) Hang the plunger hook of the repair service starter kit to the drive lever hook.

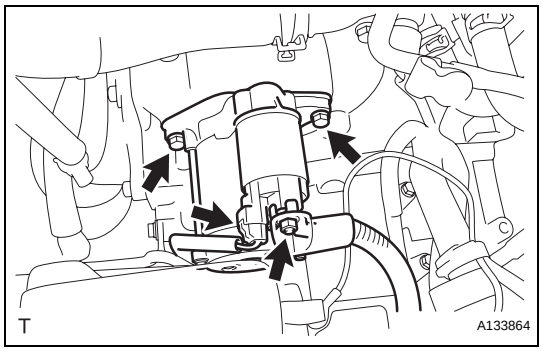
(c) Install the plunger and the return spring.



(d) Install the repair service starter kit with the 2 screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

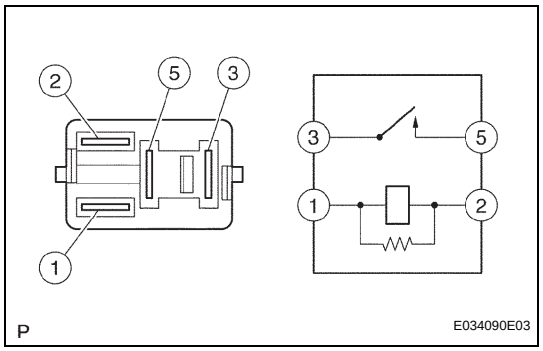


(e) Connect the lead wire to terminal C with the nut.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



INSTALLATION

1. **INSTALL STARTER ASSEMBLY**
   (a) Install the starter assembly with the 2 bolts.
   Torque: 37 N*m (380 kgf*cm, 28 ft.*lbf)
   (b) Connect the wire harness to terminal 30 and install the nut. Then, attach the terminal cap.
   Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
   (c) Connect the terminal 50 connector to the starter assembly.
2. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
5. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
6. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
7. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)**



STARTER RELAY

ON-VEHICLE INSPECTION

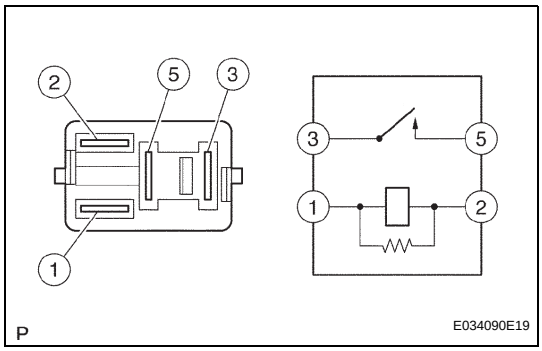
1. INSPECT STARTER RELAY ASSEMBLY

(a) Using an ohmmeter, measure the resistance between each terminal.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the starter relay assembly.



STARTER CUT RELAY (w/ Smart Key System)

ON-VEHICLE INSPECTION

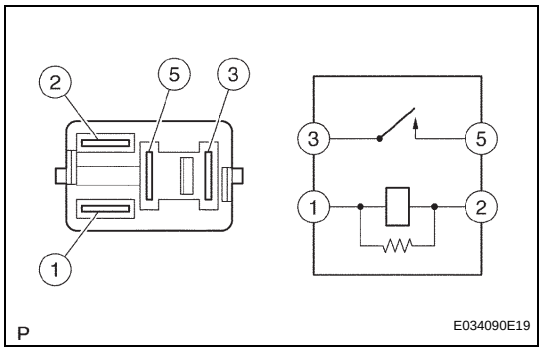
1. INSPECT STARTER CUT RELAY

(a) Using an ohmmeter, measure the resistance between each terminal.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the starter cut relay.



IGNITION RELAY (w/ Smart Key System)

ON-VEHICLE INSPECTION

1. INSPECT NO. 2 IGNITION RELAY

(a) Using an ohmmeter, measure the resistance between each terminal.

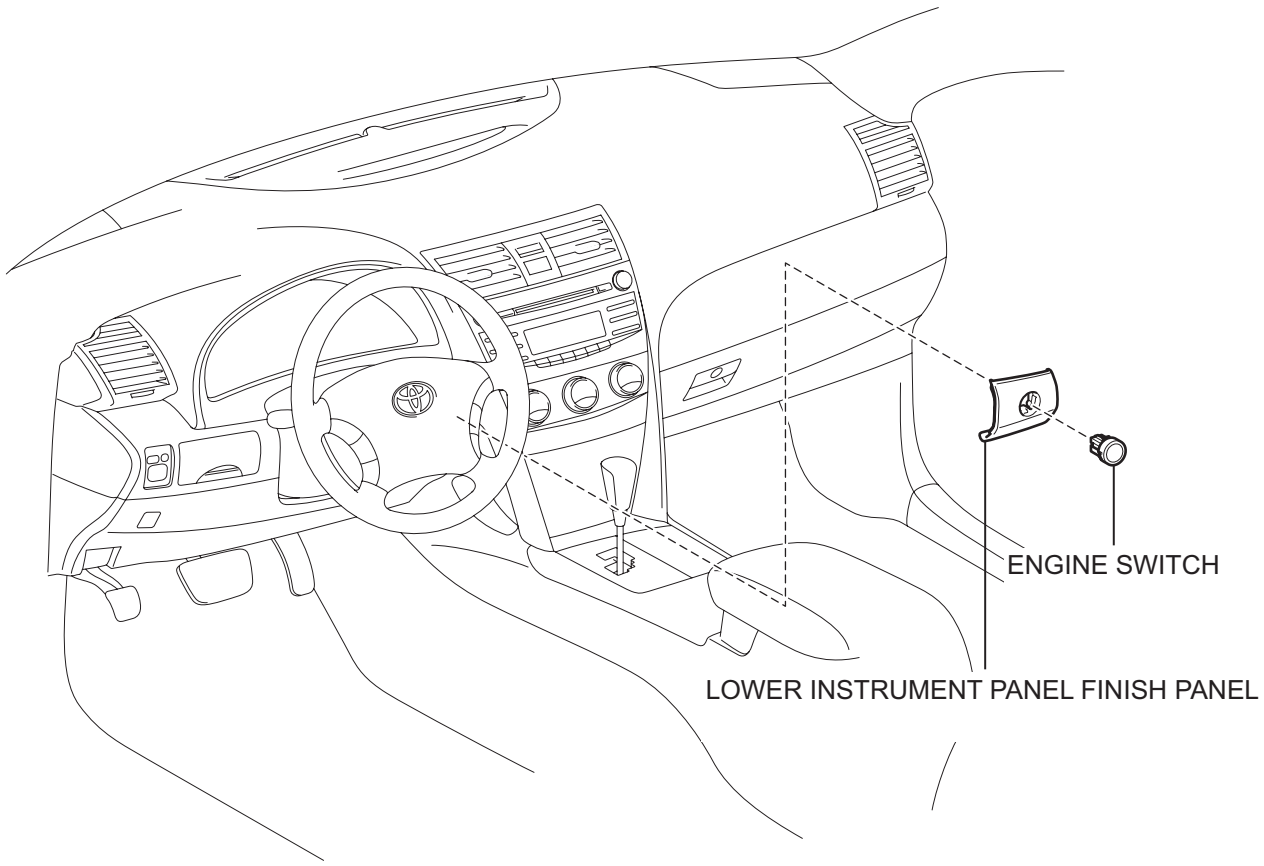
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (Apply battery voltage between terminals 1 and 2)

If the result is not as specified, replace the No. 2 ignition relay.

ENGINE SWITCH (w/ Smart Key System)

COMPONENTS



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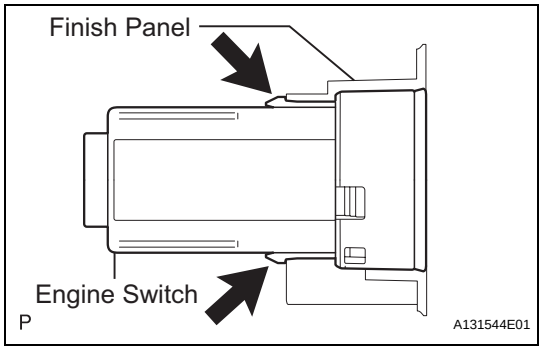
REMOVAL

1. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-22)**

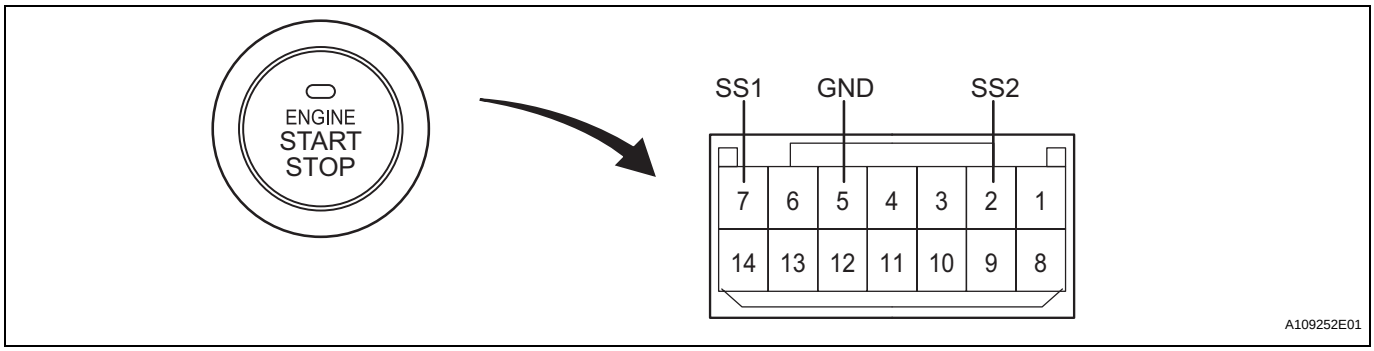
2. **REMOVE ENGINE SWITCH**
   (a) Detach the 2 claws and remove the engine switch from the finish panel.



INSPECTION

1. INSPECT ENGINE SWITCH

(a) Measure the resistance according to the value(s) in the table below.

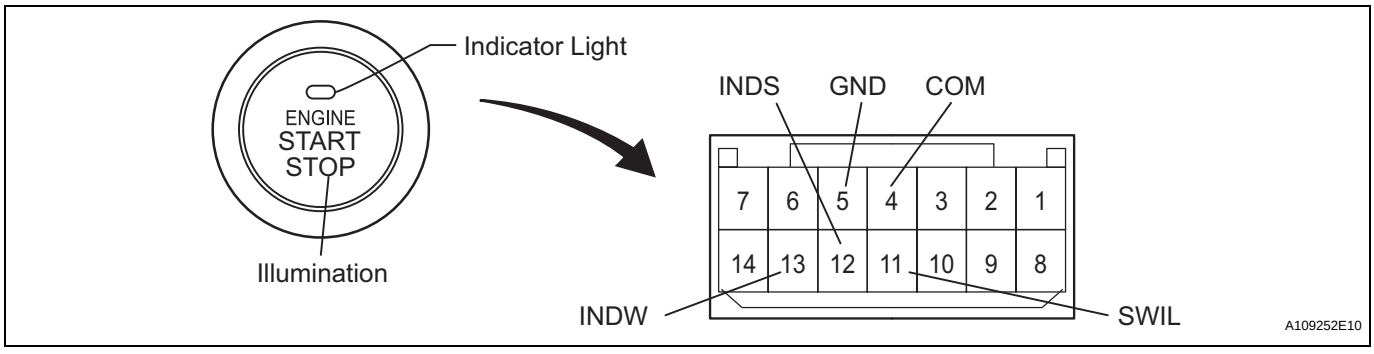


Standard resistance

Tester Connection	Switch Condition	Specified Condition
7 (SS1) - 5 (GND)	Pushed	Below 1 Ω
2 (SS2) - 5 (GND)	Pushed	Below 1 Ω
7 (SS1) - 5 (GND)	Not pushed	10 kΩ or higher
2 (SS2) - 5 (GND)	Not pushed	10 kΩ or higher

If the result is not as specified, replace the engine switch.

(b) Apply battery voltage between the terminals of the switch, and check the illumination condition of the switch.

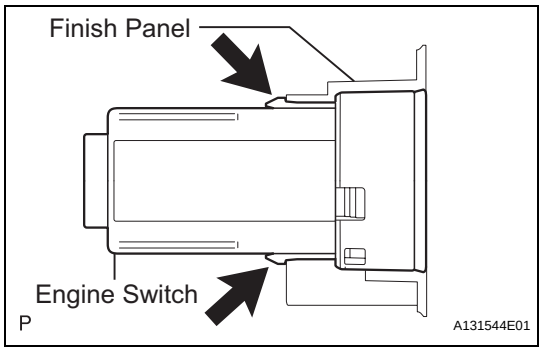


Standard resistance

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 11 (SWIL) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 12 (INDS) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates
Battery positive (+) → Terminal 13 (INDW) Battery negative (-) → Terminal 4 (COM) or 5 (GND)	Illuminates

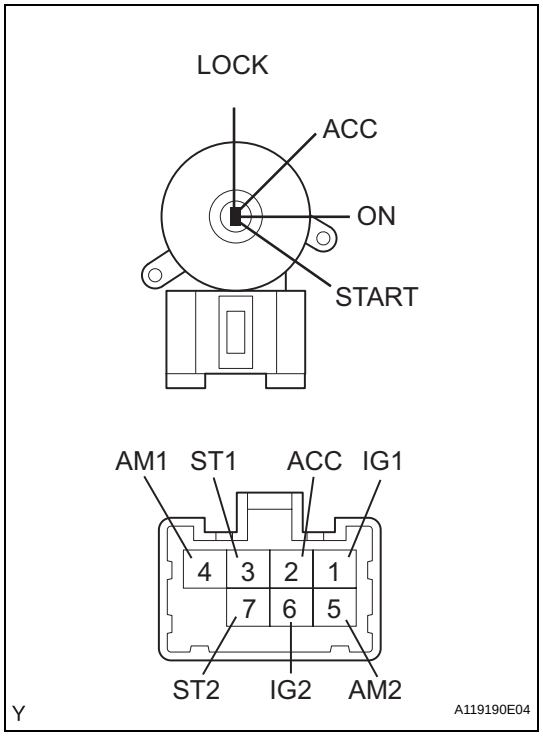
If the result is not as specified, replace the engine switch.

ST



INSTALLATION

1. **INSTALL ENGINE SWITCH**
   (a) Attach the 2 claws to install the switch.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-57)**



IGNITION SWITCH (w/o Smart Key System)

ON-VEHICLE INSPECTION

1. INSPECT IGNITION OR STARTER SWITCH ASSEMBLY

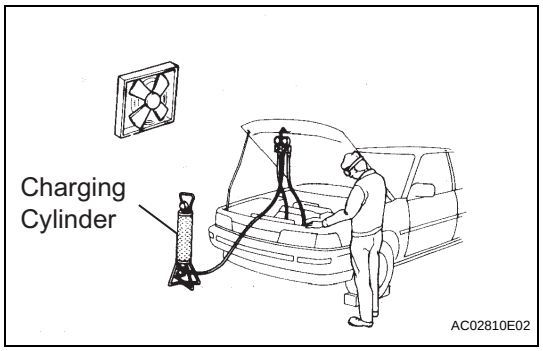
(a) Check the resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

Standard resistance

Condition	Tester Connection	Specified Condition
LOCK	Between all terminals	10 kΩ or higher
ACC	2 - 4	Below 1 Ω
ON	1 - 2 - 4	Below 1 Ω
	5 - 6	
START	1 - 3 - 4	Below 1 Ω
	5 - 6 - 7	

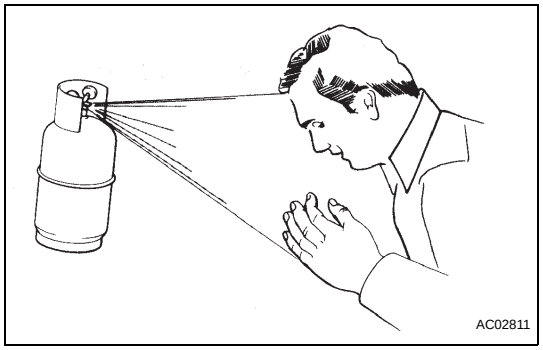
If the result is not as specified, replace the ignition or starter switch.



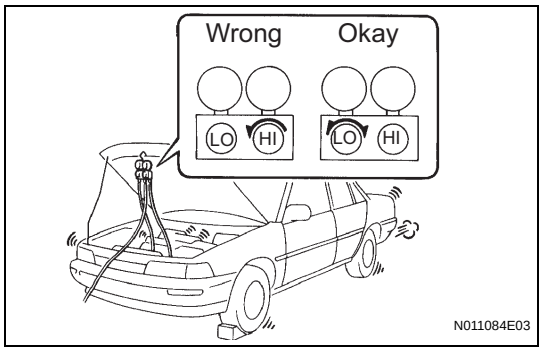
AIR CONDITIONING SYSTEM

PRECAUTION

1. **DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME**
2. **ALWAYS WEAR EYE PROTECTION**



3. **BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN**
   If liquid refrigerant gets in your eyes or on your skin:
   (a) Wash the area with lots of cold water.
   CAUTION:
   Do not rub your eyes or skin.
   (b) Apply clean petroleum jelly to the skin.
   (c) Go immediately to a hospital or see a physician for professional treatment.
4. **NEVER HEAT CONTAINER OR EXPOSE THE CONTAINER TO OPEN FLAME**
5. **BE CAREFUL NOT TO DROP CONTAINER OR APPLY PHYSICAL SHOCKS TO IT**



6. **DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT SYSTEM**
   If there is not enough refrigerant in the A/C system, oil lubrication will be insufficient and the compressor may be damaged.
   Necessary care should be taken to avoid this.
7. **DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING**
   (a) Open and close only the low pressure valve.
   If the high pressure valve is opened, refrigerant flows in the reverse direction causing the charging cylinder to rupture.
8. **BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT**
   If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating, etc.
9. **DO NOT OPERATE ENGINE AND COMPRESSOR WITH NO REFRIGERANT**
   CAUTION:
   Doing so may damage the inside of the compressor because the compressor parts always move regardless of whether the A/C system is turned on or off.

10. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

(a) This vehicle is equipped with an SRS (Supplemental Restraint System) such as the driver, front passenger, side, and curtain shield air bags. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices (See page RS-1).

11. GENERAL PRECAUTION

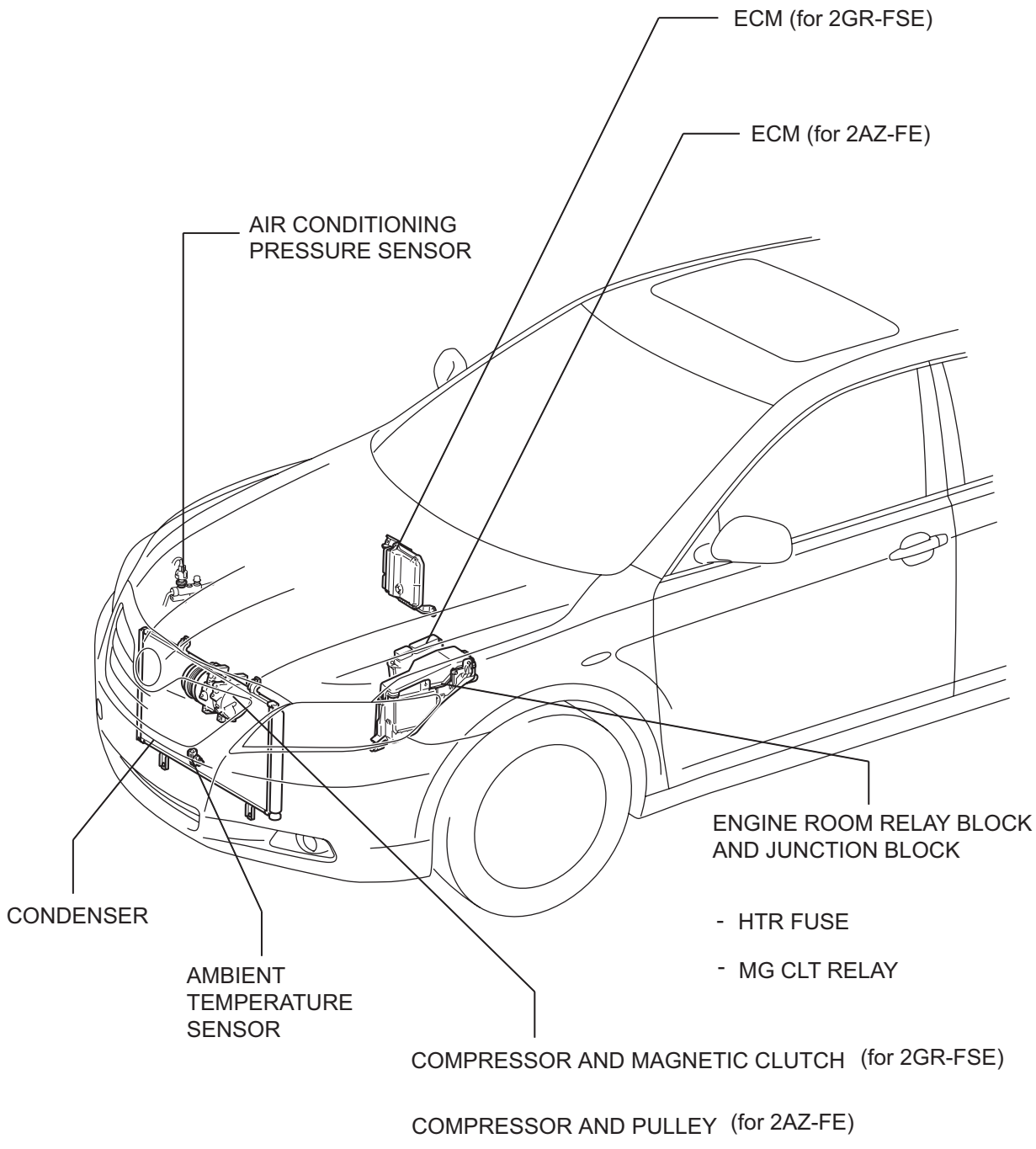
(a) While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

12. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this section.

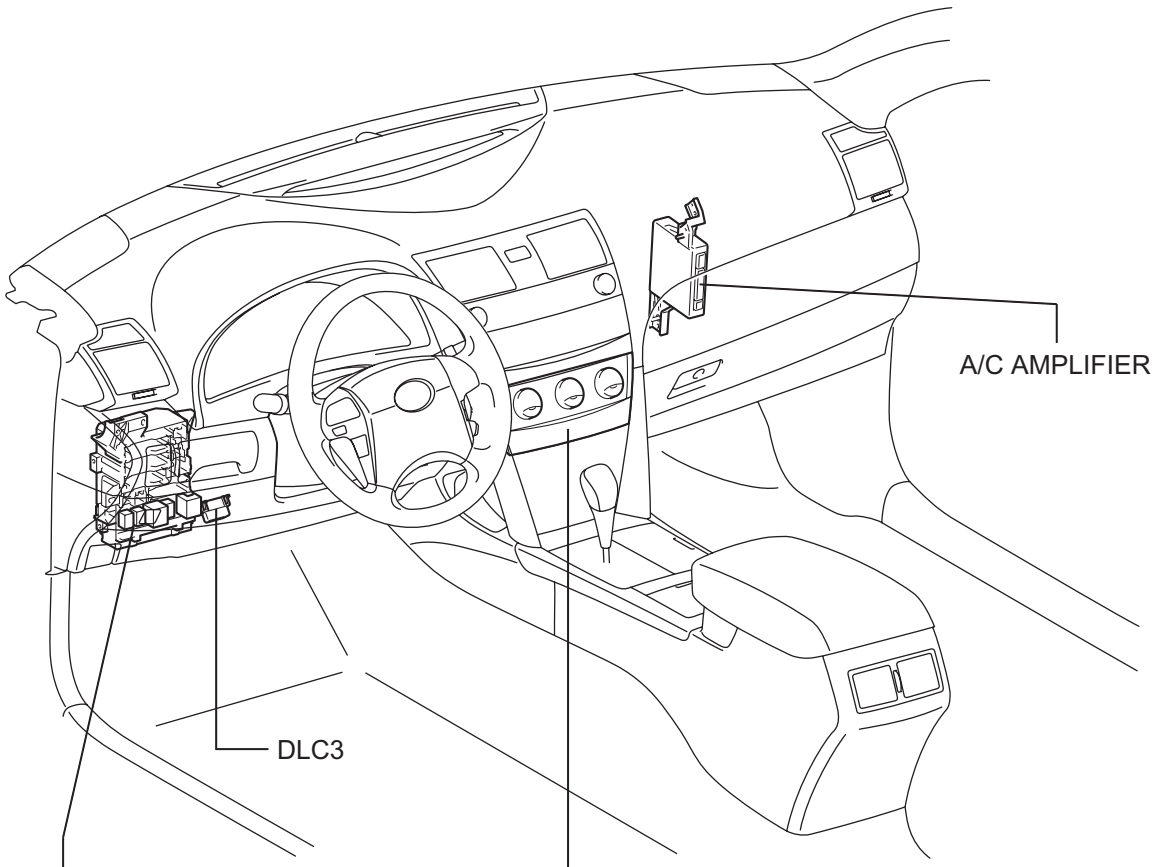
Switch Type		Ignition Switch (Position)	Engine Switch (Condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start

PARTS LOCATION



AC

MANUAL A/C:



- A/C NO. 2 FUSE
- A/C FUSE

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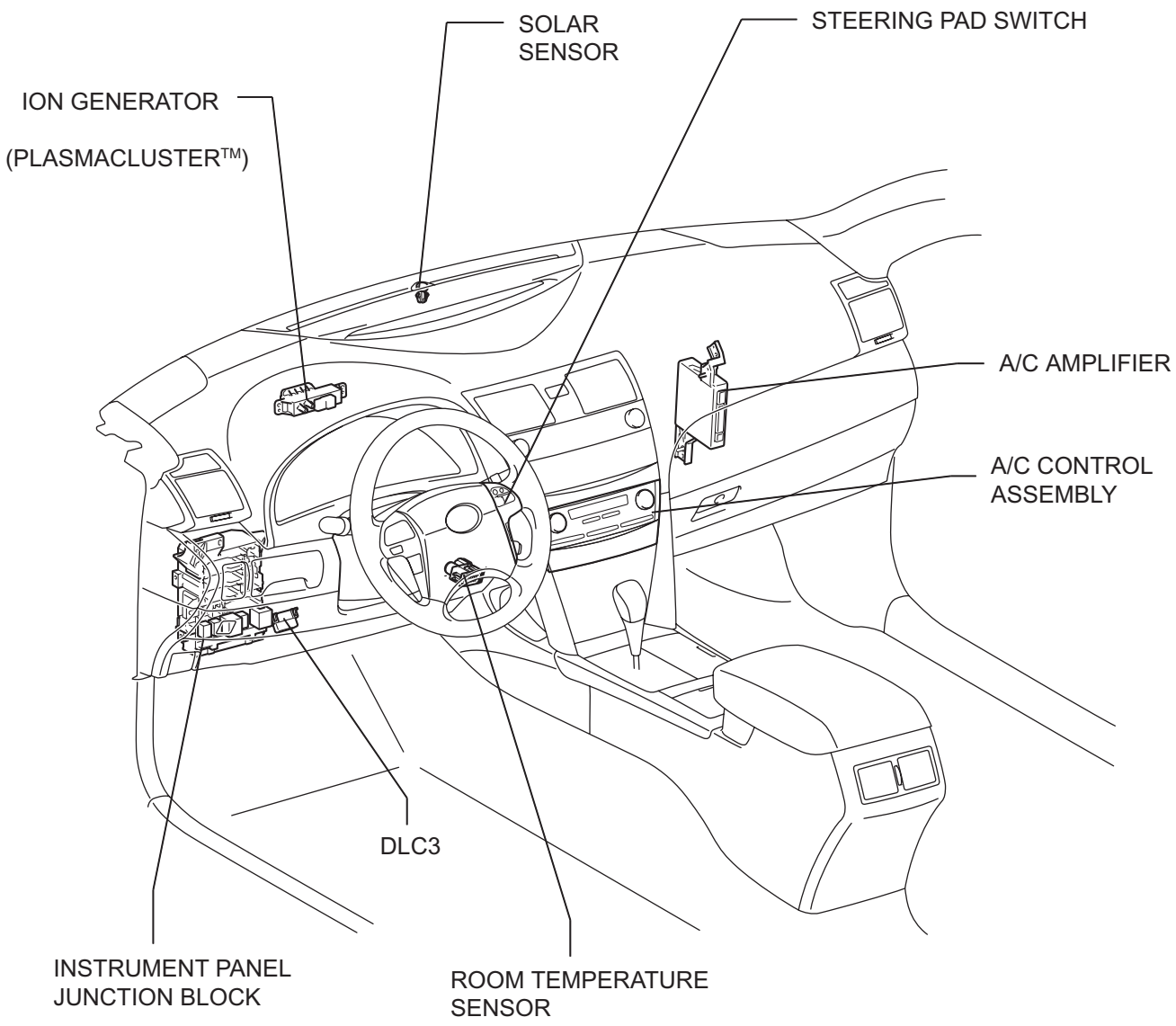
AUTO A/C:



- MAIN BODY ECU
- A/C NO. 2 FUSE
- A/C FUSE

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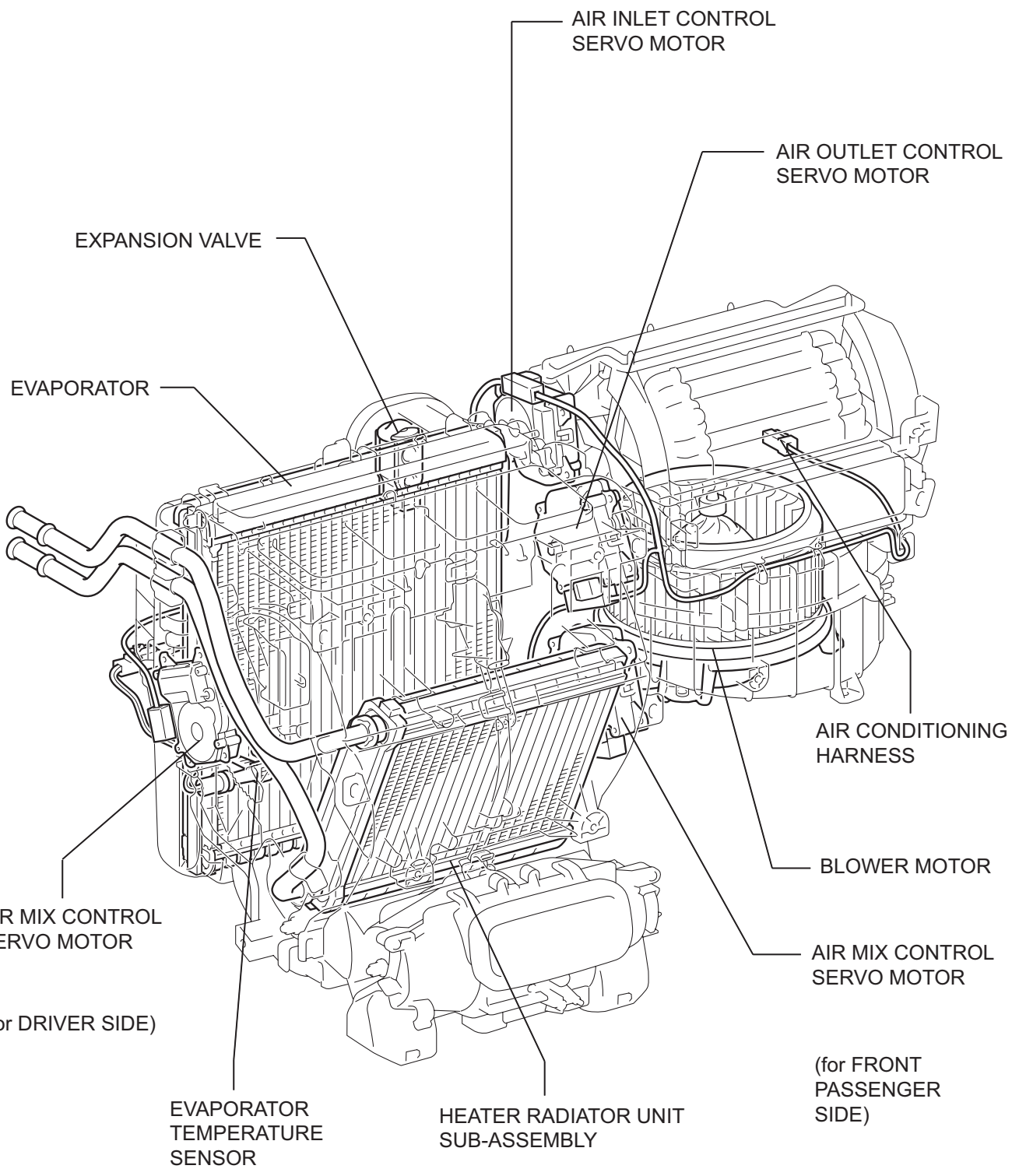
AC



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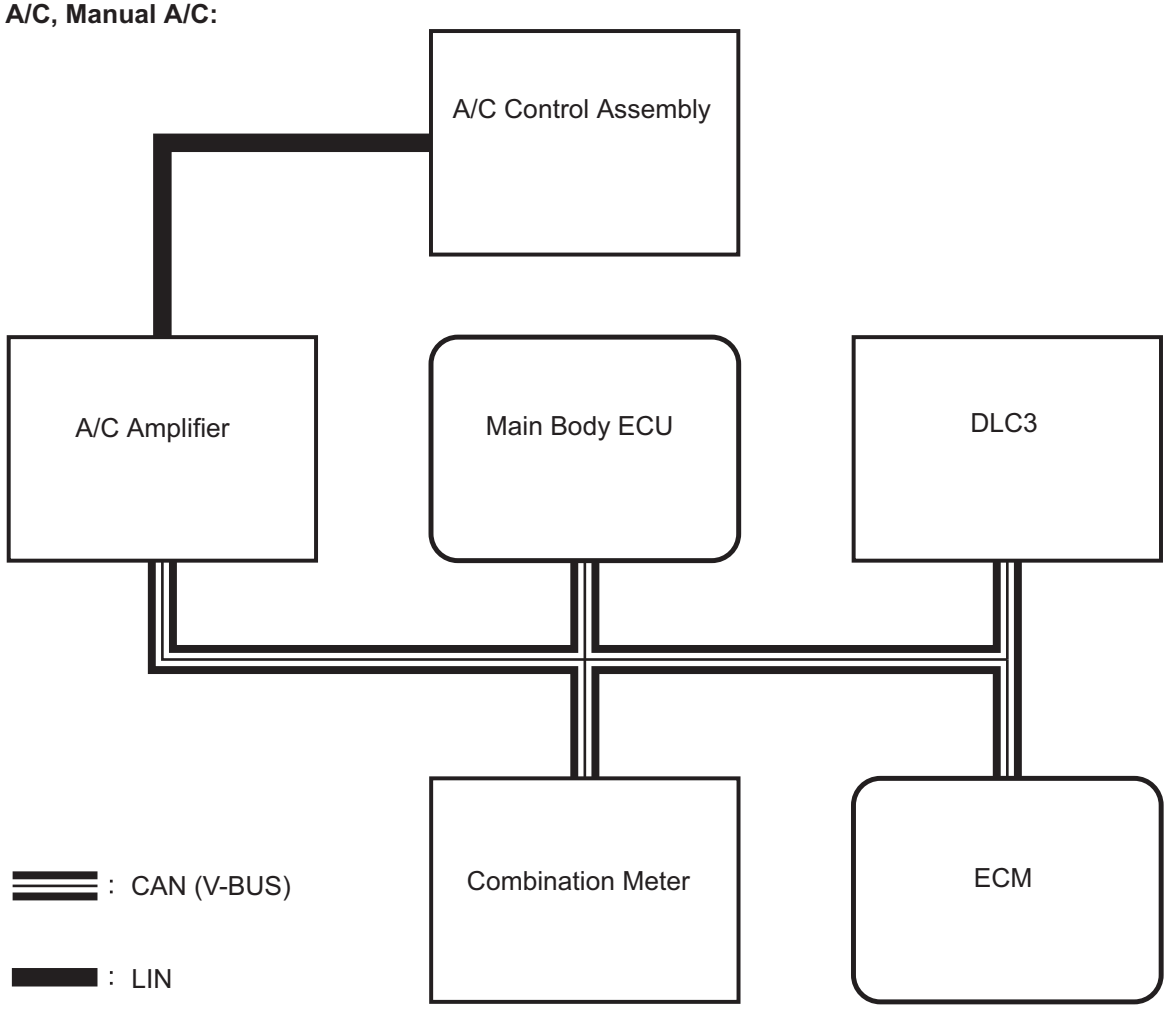
SYSTEM DIAGRAM

Auto A/C, Manual A/C:



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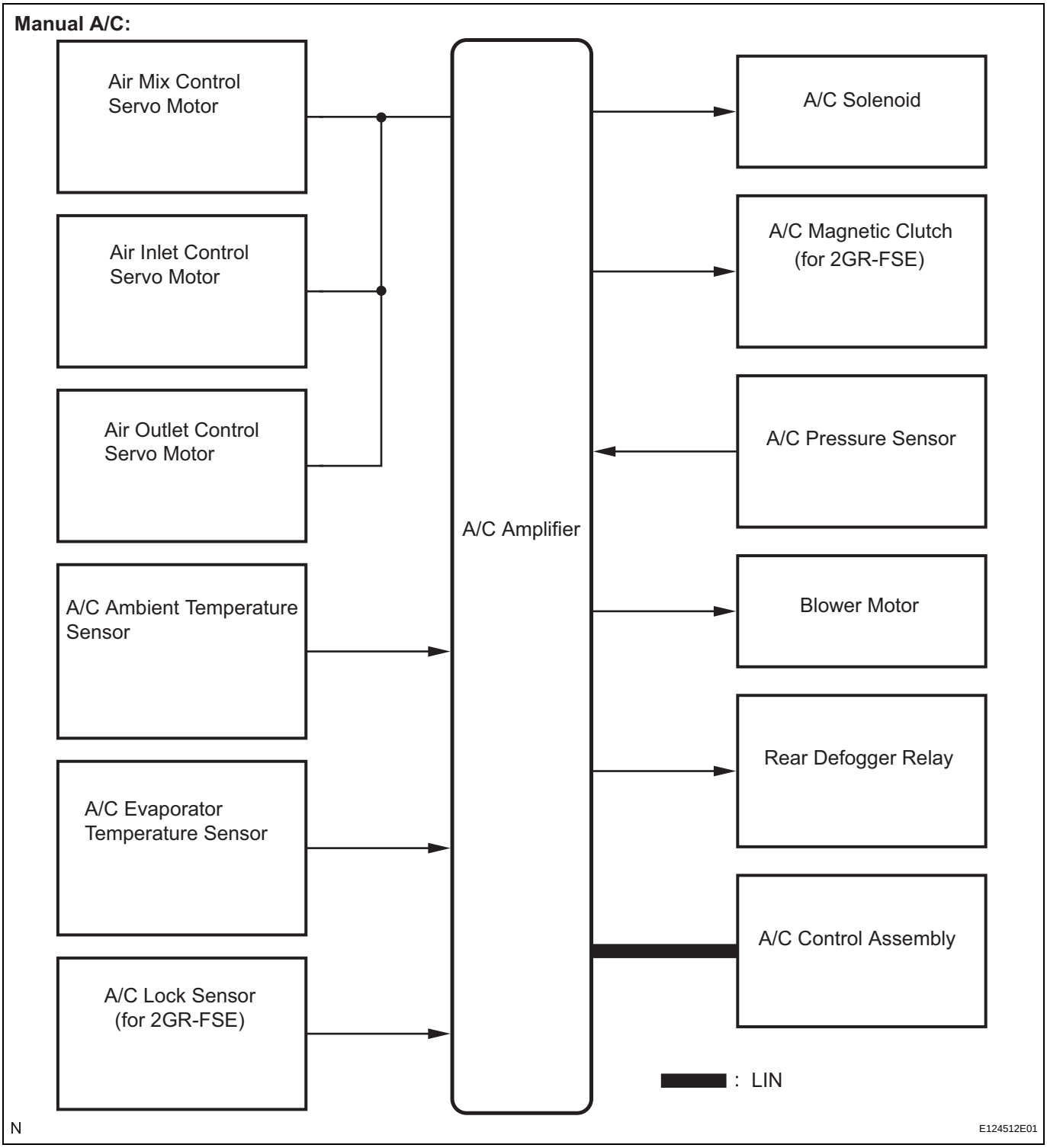
AC

Transmitter	Receiver	Line	Signal
A/C Amplifier	ECM	CAN	Magnetic Clutch Request Signal
			Heater Idle Up Request Signal
			A/C Idle Up Request Signal
			Outside Temperature Data
			External Variable Control Solenoid Current Signal
			Prior A/C Control Request Signal
			Refrigerant Gas Pressure Sensor Signal
A/C Amplifier	Combination Meter	CAN	Outside Temperature Data
A/C Amplifier	DLC3	CAN	Diagnostic Tool Response
A/C Amplifier	A/C Control Assembly	LIN	A/C Operating State Signal
Main Body ECU	A/C Amplifier	CAN	Auto Dimmer Signal
			Destination Package
			Destination Symbol Steering Wheel
Combination Meter	A/C Amplifier	CAN	Vehicle Speed Signal

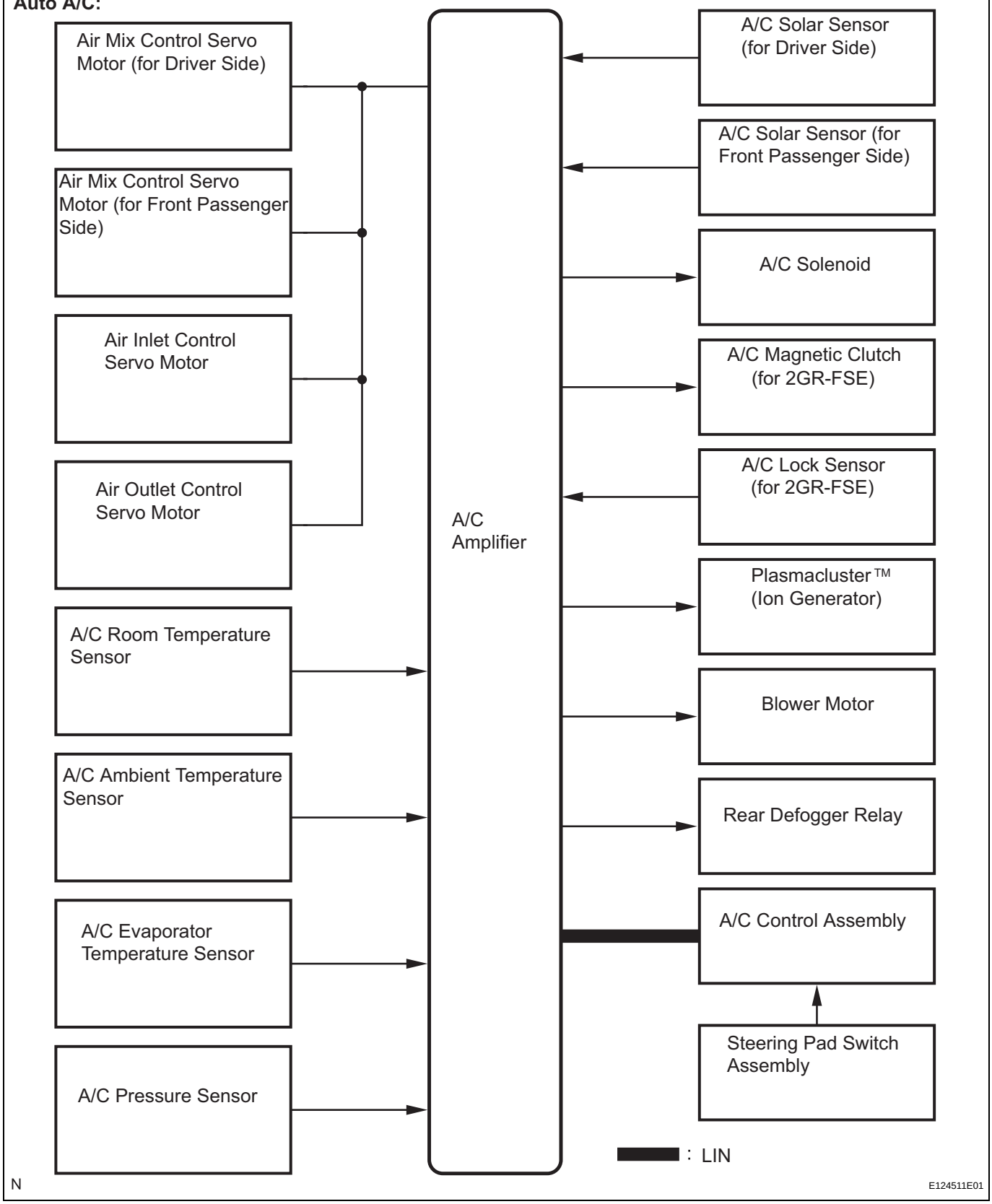
Transmitter	Receiver	Line	Signal
ECM	A/C Amplifier	CAN	Engine Coolant Temperature Signal
			Engine rpm Data
			A/C Control Cut-off Signal
			A/C-E/G Cooperation Control
A/C Control Assembly	A/C Amplifier	LIN	A/C Operation Signal

Manual A/C:



AC

Auto A/C:


Air Mix Control Servo Motor (for Driver Side)
Air Mix Control Servo Motor (for Front Passenger Side)
Air Inlet Control Servo Motor
Air Outlet Control Servo Motor
A/C Room Temperature Sensor
A/C Ambient Temperature Sensor
A/C Evaporator Temperature Sensor
A/C Pressure Sensor
A/C Amplifier
A/C Solar Sensor (for Driver Side)
A/C Solar Sensor (for Front Passenger Side)
A/C Solenoid
A/C Magnetic Clutch (for 2GR-FSE)
A/C Lock Sensor (for 2GR-FSE)
Plasmacluster™ (Ion Generator)
Blower Motor
Rear Defogger Relay
A/C Control Assembly
Steering Pad Switch Assembly
: LIN
N
E124511E01

AC

SYSTEM DESCRIPTION

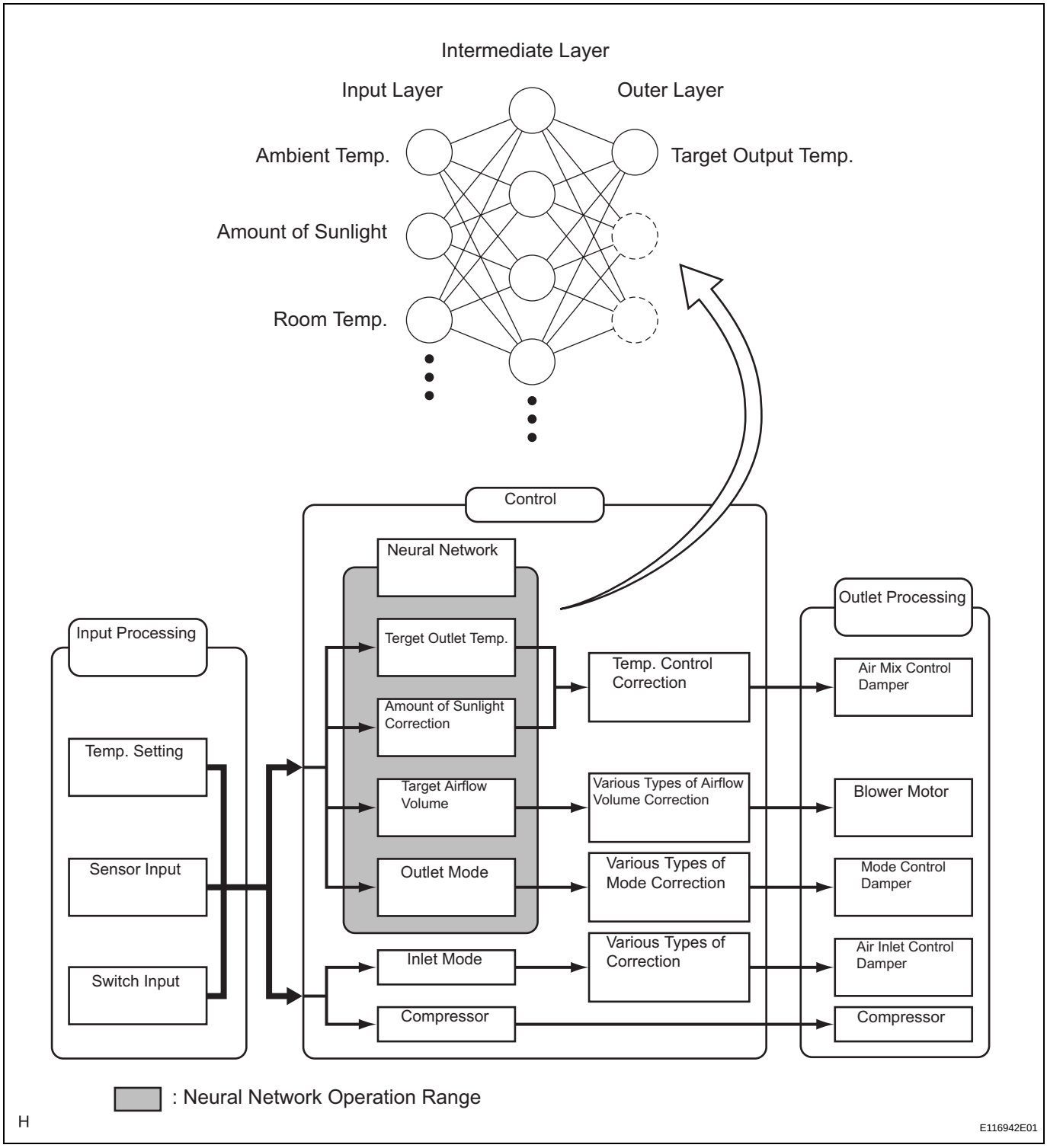
1. GENERAL

The air conditioning system has the following controls:

Control	Outline	Manual A/C	Automatic A/C
Neural Network Control	This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input / output relationship that is similar to a human brain.	-	○
Manual Control	The A/C amplifier controls the damper positions (air inlet control damper, air mix control damper and mode control damper) and blower speed in accordance with the positions of the switches (temperature control switch, blower switch, mode select switch and air inlet control switch).	○	-
Outlet Air Temp. Control	Based on the temperature set at the temperature control switch, the neural network control calculates the outlet air temperature based on the input signals from various sensors.	-	○
	The temperature setting for the driver and front passenger are controlled independently in order to provide a separate vehicle interior temperatures for the right and left side of the cabin. Thus, air conditioning that accommodates the occupants' preferences has been realized.	-	○
Blower Control	Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors.	-	○
Air Outlet Control	Automatically switches the air outlets in accordance with the outlet mode that has been calculated by the neural network control based on the input signals from various sensors.	-	○
	In accordance with the engine coolant temperature, outside air temperature, amount of sunlight, required blower, outlet temperature, and vehicle speed conditions, this control automatically switches the blower outlet to the FOOT / DEF mode to prevent the windows from becoming fogged when the outside air temperature is low.	-	○
Air Inlet Control	Automatically controls the air inlet control damper to achieve the calculated required outlet air temperature.	-	○
	Drives the servo motor (for air inlet) according to the operation of the air inlet control switch and moves the dampers to the FRESH or RECIRC position.	-	○
Compressor Control	Through the calculation of the target evaporator temperature based on various sensor signals, the A/C amplifier optimally controls the discharge capacity by regulating the opening extent of the A/C compressor solenoid valve.	○	○
	The A/C amplifier compares the A/C pulley speed signals, which are transmitted by the lock sensor located on the A/C compressor, with the engine speed signals, which are transmitted by the ECM (crankshaft position sensor). When the A/C amplifier determines that the A/C pulley is locked, it turns off the magnetic clutch. (for 2GR-FE)	○	○
MAX A/C Control	When the temperature control switch is in the MAX A/C position, the A/C amplifier turns the compressor on and activates the servomotor (air inlet) to set the air inlet control damper to the RECIRC position, improving the cooling efficiency.	○	-
Rear Window Defogger Control	Switches the rear defogger and outside rear view mirror heaters on for 15 minutes when the rear defogger button is pressed. Switches them off if the button is pressed while they are operating.	○	○
Outside Temperature Indication Control	Calculates the outside temperature using signals transmitted by the outside temperature sensor. Calculated values are corrected by the A/C amplifier and then indicated on the multi-information display.	○	○
Self-Diagnosis	A DTC (Diagnostic Trouble Code) is stored in the memory when the A/C amplifier detects a problem with the air conditioning system.	○	○

2. NEURAL NETWORK CONTROL

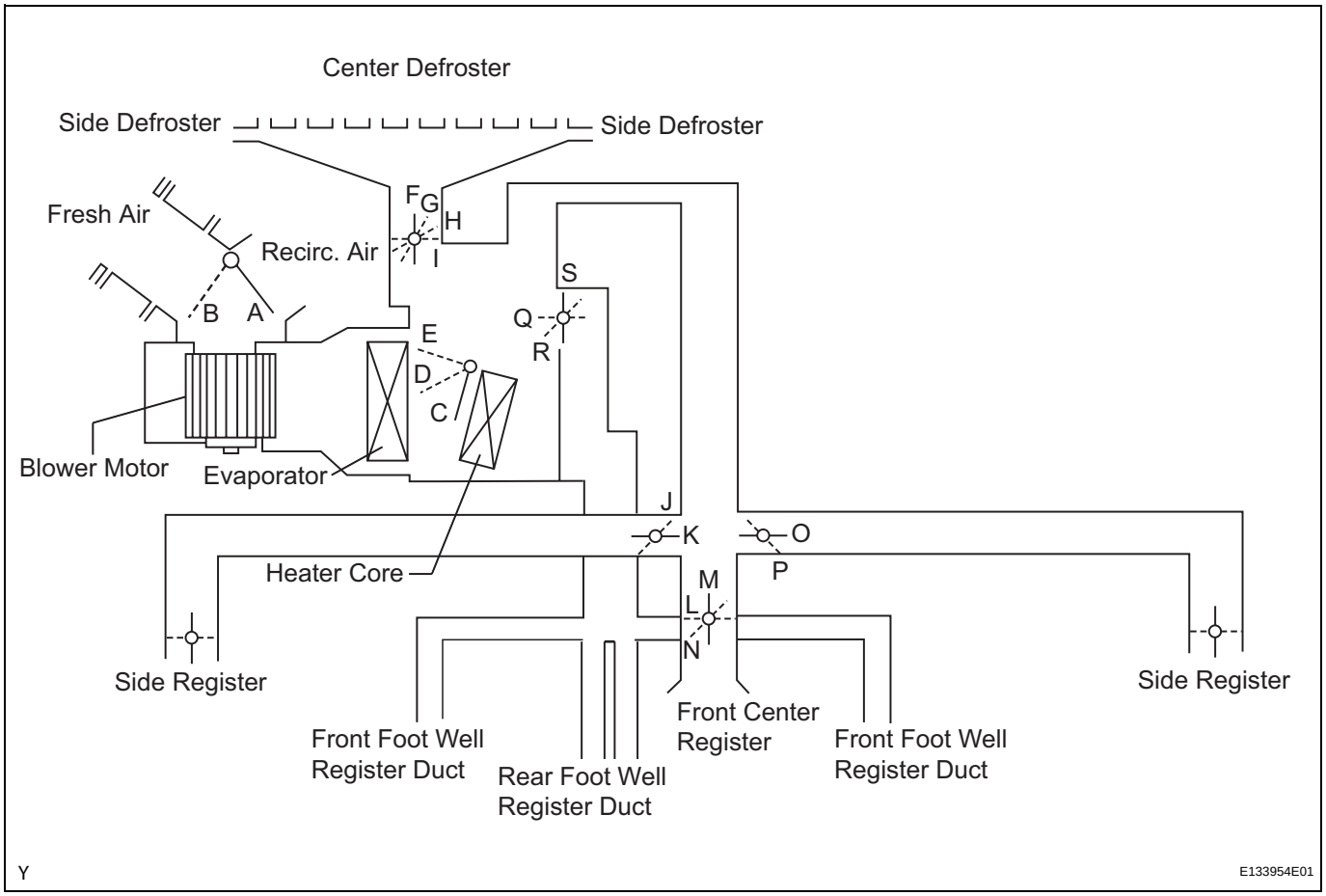
- In previous automatic air conditioning systems, the A/C amplifier determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors. However, because the senses of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of solar radiation can feel comfortably warm in a cold climate, or extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network has been adopted in the automatic air conditioning system. With this technique, the data that has been collected under varying environmental conditions is stored in the A/C amplifier. The A/C amplifier can then effect control to provide enhanced air conditioning comfort.
- The neural network control consists of neurons in the input layer, intermediate layer, and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight, and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume, and outlet mode control volume. Accordingly, the A/C amplifier controls the servo motors and blower motor in accordance with the control volumes that have been calculated by the neural network control.


Intermediate Layer
Input Layer
Outer Layer
Ambient Temp.
Amount of Sunlight
Room Temp.
Target Output Temp.
Control
Neural Network
Input Processing
Terget Outlet Temp.
Amount of Sunlight Correction
Target Airflow Volume
Outlet Mode
Inlet Mode
Compressor
Temp. Setting
Sensor Input
Switch Input
Temp. Control Correction
Various Types of Airflow Volume Correction
Various Types of Mode Correction
Various Types of Correction
Outlet Processing
Air Mix Control Damper
Blower Motor
Mode Control Damper
Air Inlet Control Damper
Compressor
: Neural Network Operation Range
H
E116942E01

AC

3. MODE POSITION AND DAMPER OPERATION

(a) Mode Position and Damper Operation (for Manual A/C)



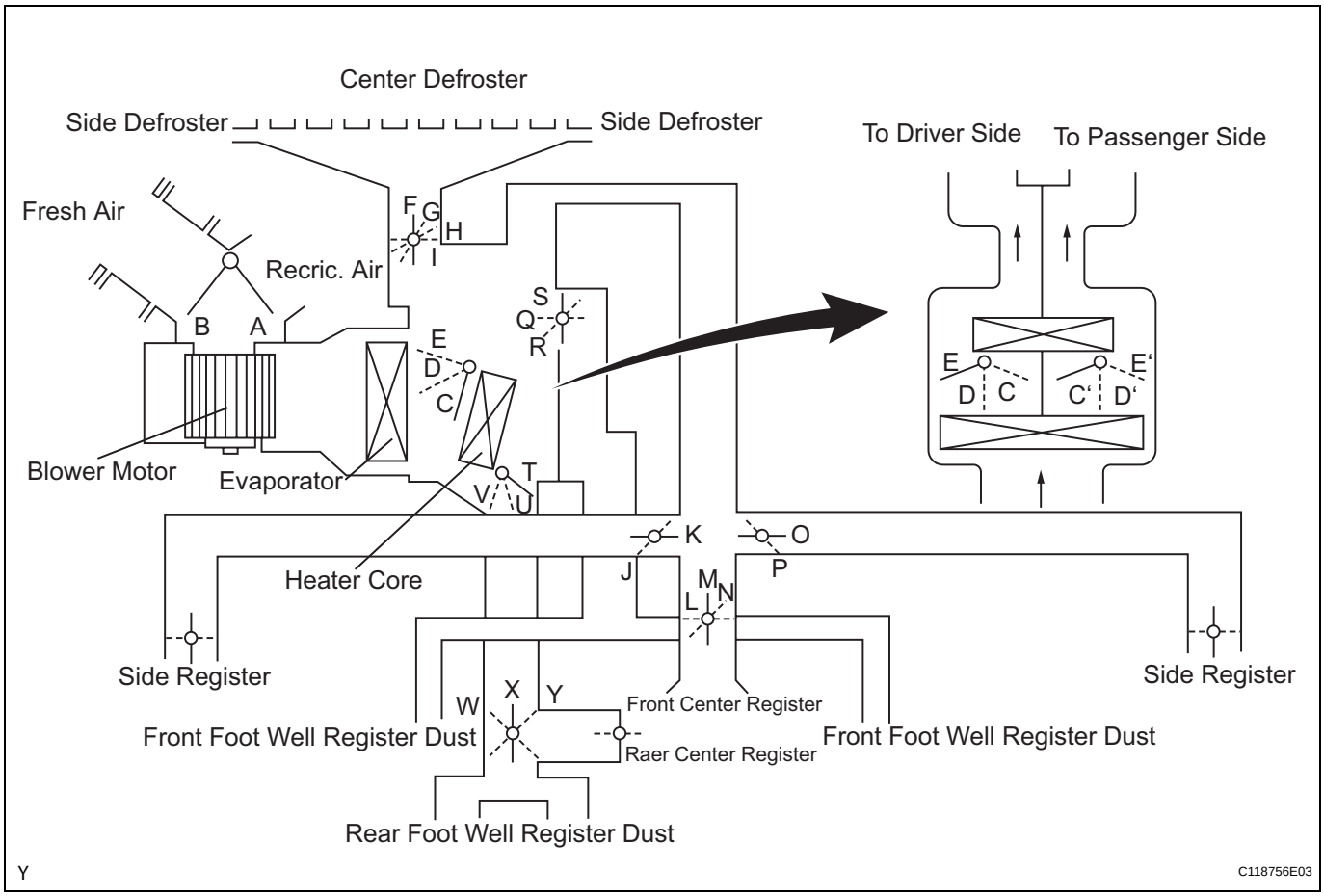
Functions of Main Dampers:

Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.
Air Mix Control Damper	MAX COLD to MAX HOT Temperature Setting	C - D - E	Varies the mixture ratio of the fresh air and the recirculation air in order to regulate the temperature continuously from HOT to COLD.

AC

Control Damper	Operation Position	Damper Position	Operation
Air Outlet Control Damper	DEF	F, J, L, P, S	Defrosts the windshield through the center defroster, side defroster, side register, and rear register.
	FOOT / DEF	G, J, L, P, Q	Defrosts the windshield through the center defroster, side defroster, side register, and rear register, while air is also blown out from the front and rear foot well register ducts.
	FOOT	H, J, L, P, Q	Air blows out of the foot well register duct and side register. In addition, air blows out slightly from the center defroster and side defroster.
	BI-LEVEL	I, K, N, O, R	Air blows out of the front center register, side register and front and rear foot well register ducts.
	FACE	I, K, M, O, S	Air blows out of the front center register and side register.

(b) Mode Position and Damper Operation (for Automatic A/C)



Functions of Main Dampers:

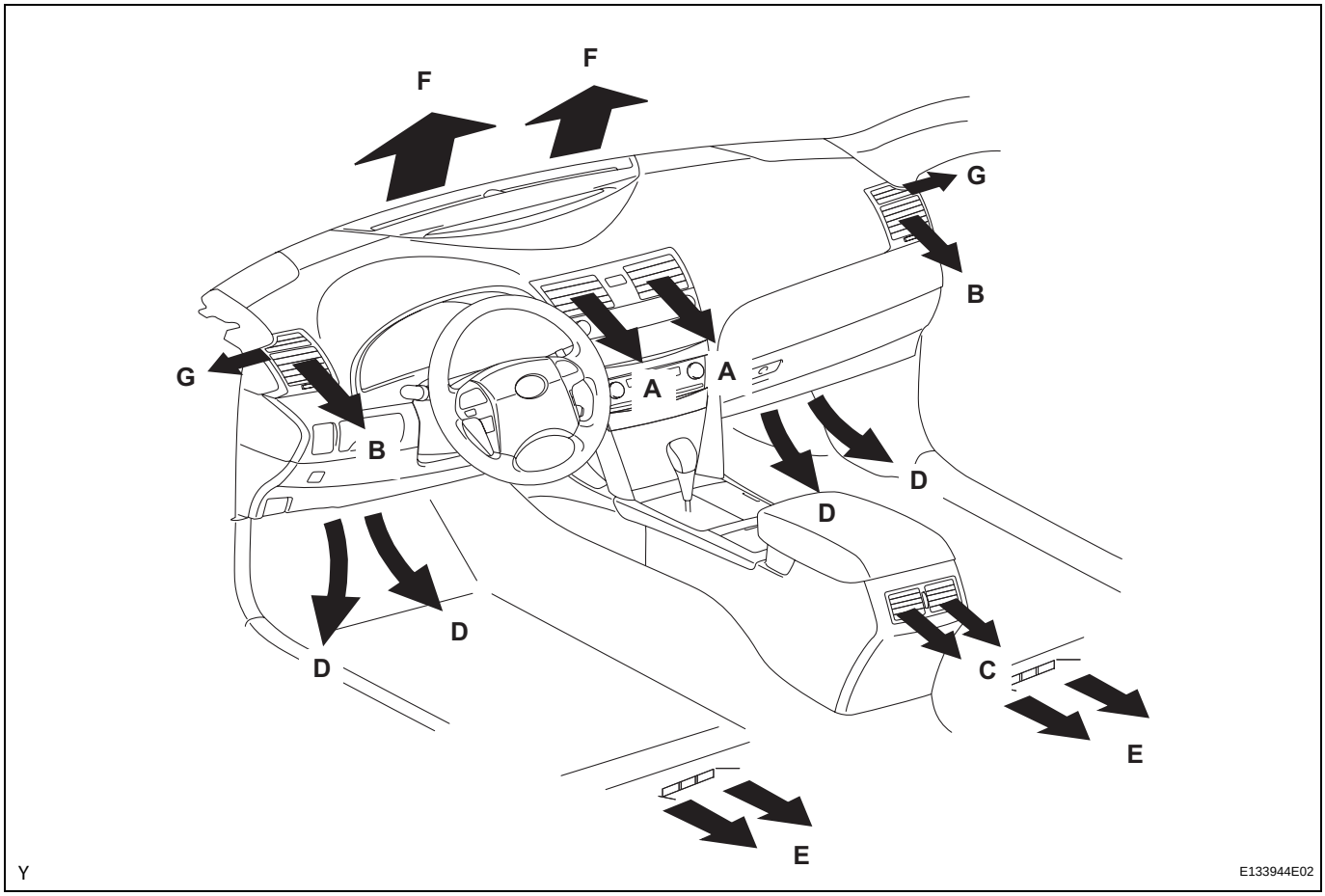
Control Damper	Operation Position	Damper Position	Operation
Air Inlet Control Damper	FRESH	A	Brings in fresh air.
	RECIRC	B	Recirculates internal air.

Control Damper	Operation Position	Damper Position	Operation
Air Mix Control Damper	MAX COLD to MAX HOT Temperature Setting	C - D - E (C' - D' - E') T - U - V	Varies the mixture ratio of the fresh air and the recirculation air in order to regulate the temperature continuously from HOT to COLD.
Air Outlet Control Damper	DEF	F, J, L, P, S, Y	Defrosts the windshield through the center defroster, side defroster, and side register.
	FOOT / DEF	G, J, L, P, Q, X	Defrosts the windshield through the center defroster, side defroster, side register, and rear center register, while air is also blown out from the front and rear foot well register ducts.
	FOOT	H, J, L, P, Q, X	Air blows out of the foot well register dust, and side register. In addition, air blows out slightly from the center defroster and side defroster.
	BI-LEVEL	I, K, N, O, R, X	Air blows out of the front and rear center registers, side register and front and rear foot well register ducts.
	FACE	I, K, M, O, S, W	Air blows out of the front and rear center registers, and side register.

4. AIR OUTLETS AND AIRFLOW VOLUME

(a) Air Outlets and Airflow Volume

AC



INDICATION (MODE)	SELECTION (Auto / Manual)	FACE			FOOT		DEF	
		CTR	SIDE	RR	FR	RR	CTR	SIDE
		A	B	C*6	D	E	F	G
FACE	○ / ○	◯	◯	◯	—	—	—	—
B/L-U*1	○ / ○	◯	◯	◯	○	○	—	—
B/L-L*2	○ / -	○	○	○	◯	◯	—	—
FOOT-F*3	○ / ○	—	○	○	◯	○	○	○
FOOT-R*4	○ / -	—	○	○	◯	◯	○	○
FOOT-D*5	○ / -	—	○	○	○	○	○	○
F/D	○ / ○	—	○	○	◯	◯	○	○
DEF	○ / ○	—	○	—	—	—	◯	◯

The size of the circle ○ indicates the proportion of airflow volume.

*1: Greater airflow volume at the upper area
*2: Greater airflow volume at the lower area
*3: Greater airflow volume at the front
*4: Greater airflow volume at the rear
*5: Greater airflow volume at the defroster
*6: Only for models with automatic air conditioning.

5. PLASMACLUSTER ION GENERATOR CONTROL

(a) General:

(1) A Plasmacluster ion generator is provided inside the air duct of the side register on the driver seat side to improve the air quality and comfort in the cabin.

(2) This generator is controlled by the A/C amplifier and operates in conjunction with the blower motor.

NOTICE:

- **The Plasmacluster ion generator uses a high voltage, which is hazardous. Therefore, if the Plasmacluster ion generator requires repairs, be sure to have them done at a TOYOTA dealer.**

AC

- **Do not apply any type of spray (such as a cleaning solvent or hair spray) or stick any foreign matter into the Plasmacluster ion outlet, as this could cause improper operation or a malfunction.**
- **After use, dust may accumulate around the side register on the driver seat side. If this occurs, press the OFF switch on the heater control panel to stop the blower motor before cleaning the area.**
- **It is normal for the Plasmacluster ion generator to emit a slight sound during operation. This sound is created when electrons collide with the electrode while Plasmacluster ions are being generated.**

HINT:

Plasmacluster™, plasmacluster, and plasmacluster ions are a trademark of the SHARP Corporation.

(b) Operation:

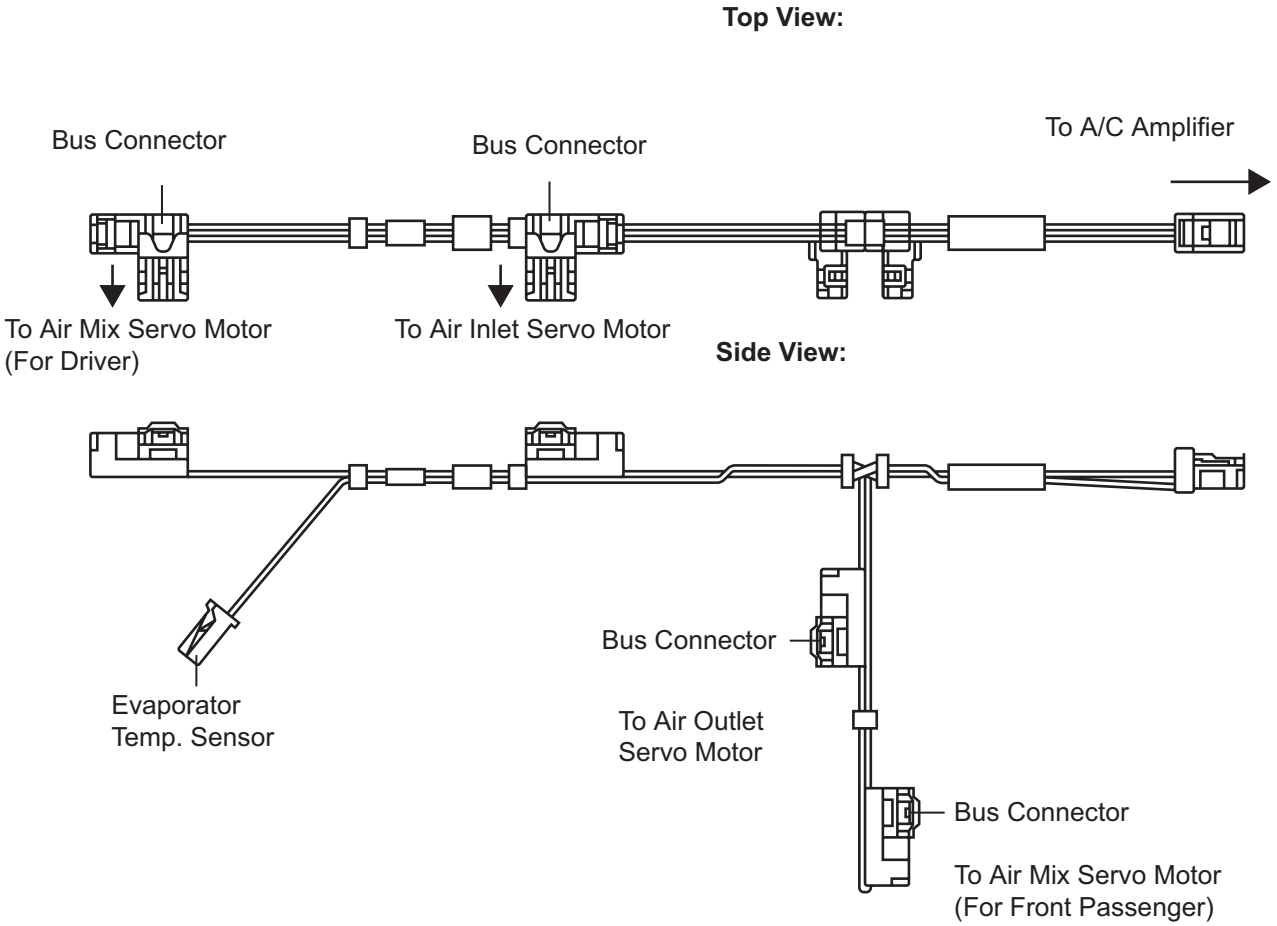
(1) The Plasmacluster ion generator produces positive and negative ions from the water molecules (H2O) and oxygen molecules (O2) in the air, and emits them into the air. These ions reduce airborne germs.

6. BLOWER MOTOR

The blower motor has a built-in blower controller, and is controlled with duty control from the A/C amplifier.

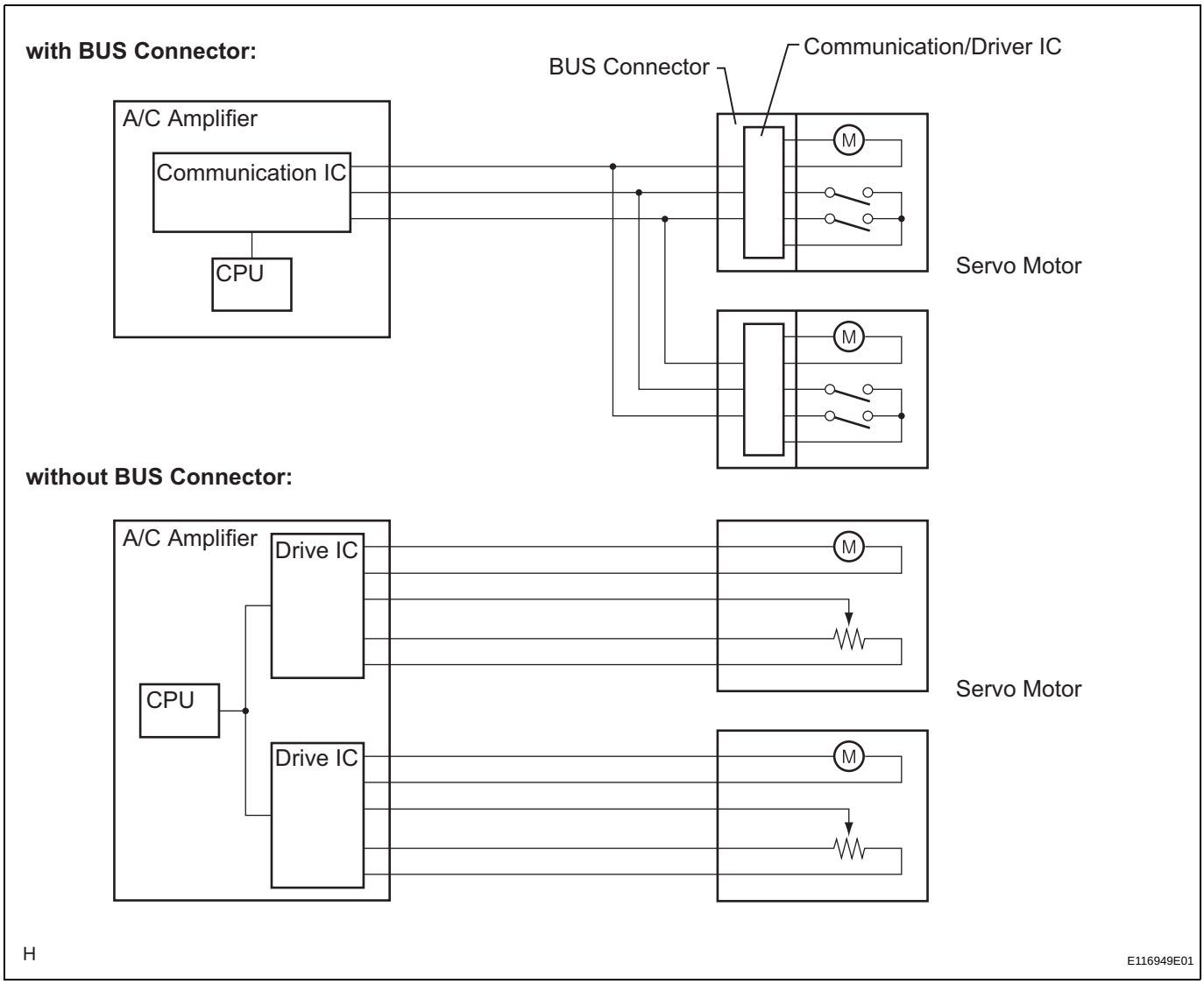
7. BUS CONNECTOR

(a) A BUS connector is used in the wire harness connection that connects the servo motor from the A/C amplifier.



AC

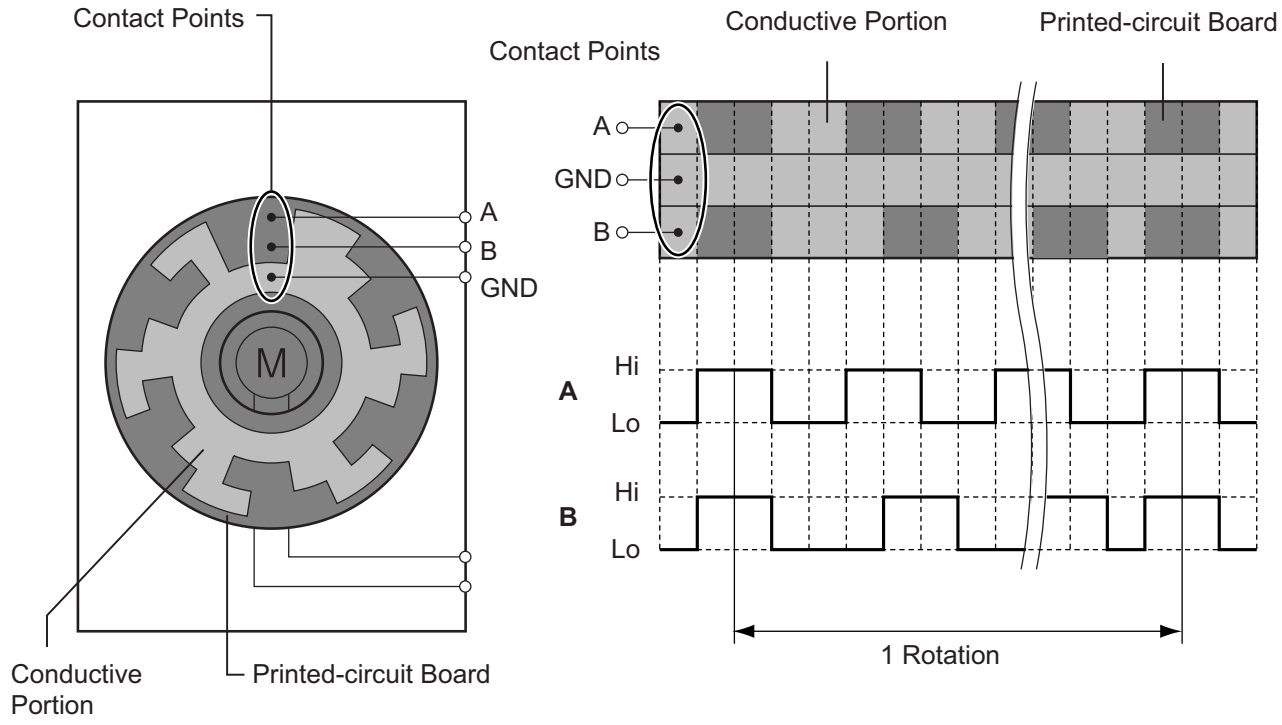
(b) The BUS connector has a built-in communication/ driver IC which communicates with each servo motor connector, actuates the servo motor, and has a position detection function. This enables bus communication for the servo motor wire harness, for a more lightweight construction and a reduced number of wires.



AC

8. SERVO MOTOR

(a) The pulse pattern type servo motor consists of a printed circuit board and servo motor. The printed circuit board has three contact points, and transmits to the A/C amplifier two ON-OFF signals for the difference of the pulse phase. The BUS connector detects the damper position and movement direction with this signal.



9. A/C COMPRESSOR

(a) General

(1) The A/C compressor is a continuously variable capacity type in which its capacity can be varied in accordance with the cooling load of the air conditioning.

(2) This compressor consists of the A/C pulley, shaft, lug plate, swash plate, piston, shoe, crank chamber, cylinder, and solenoid valve.

(3) The A/C pulley with built-in magnetic clutch and the lock sensor that detects whether the magnetic clutch is locked are installed on models with the 2GR-FE.

(4) The DL (Damper Limiter) type A/C pulley is installed on models with the 2AZ-FE.

(5) A solenoid valve that adjusts the suction pressure so that the compressor capacity can be controlled as desired is provided.

AC

(6) The internal valve is provided on models with 2AZ-FE to improve the A/C compressor durability under the high speed and large thermal load conditions. The internal valve is integrated into the solenoid valve.

(b) Solenoid Valve Operation

(1) The crank chamber is connected to the discharge passage. A solenoid valve is provided between the discharge passage (LO pressure) and the discharge passage (HI pressure).

(2) The solenoid valve operates under duty cycle control in accordance with the signals from A/C amplifier.

(3) When the solenoid valve closes (solenoid coil is energized), a difference in pressure is created and the pressure in the crank chamber decreases. Then, the pressure that is applied to the right side of the piston becomes greater than the pressure that is applied to the left side of the piston. This compresses the spring and tilts the swash plate. As a result, the piston stroke increases and the discharge capacity increases.

(4) When the solenoid valve opens (solenoid coil is not energized), the difference in pressure disappears. Then, the pressure that is applied to the left side of the piston becomes the same as the pressure that is applied to the right side of the piston. Thus, the spring elongates and eliminates the tilt of the swash plate. As a result, there is no piston stroke and the discharge capacity is reduced.

(c) Internal Valve Operation (for 2AZ-FE)

(1) The internal valve operates when the A/C compressor speed has increased rapidly, the A/C compressor speed is high, or when thermal load has suddenly changed. As a result, the A/C compressor capacity is reduced, increasing the durability of the A/C compressor.

(d) DL type A/C Pulley (for 2AZ-FE)

(1) This pulley contains a damper to absorb the torque fluctuations of the engine and a limiter mechanism to protect the drive belt in case the compressor locks. In the event that the compressor locks, the limiter mechanism causes the spoke portion of the pulley to break, thus separating the pulley from the compressor.

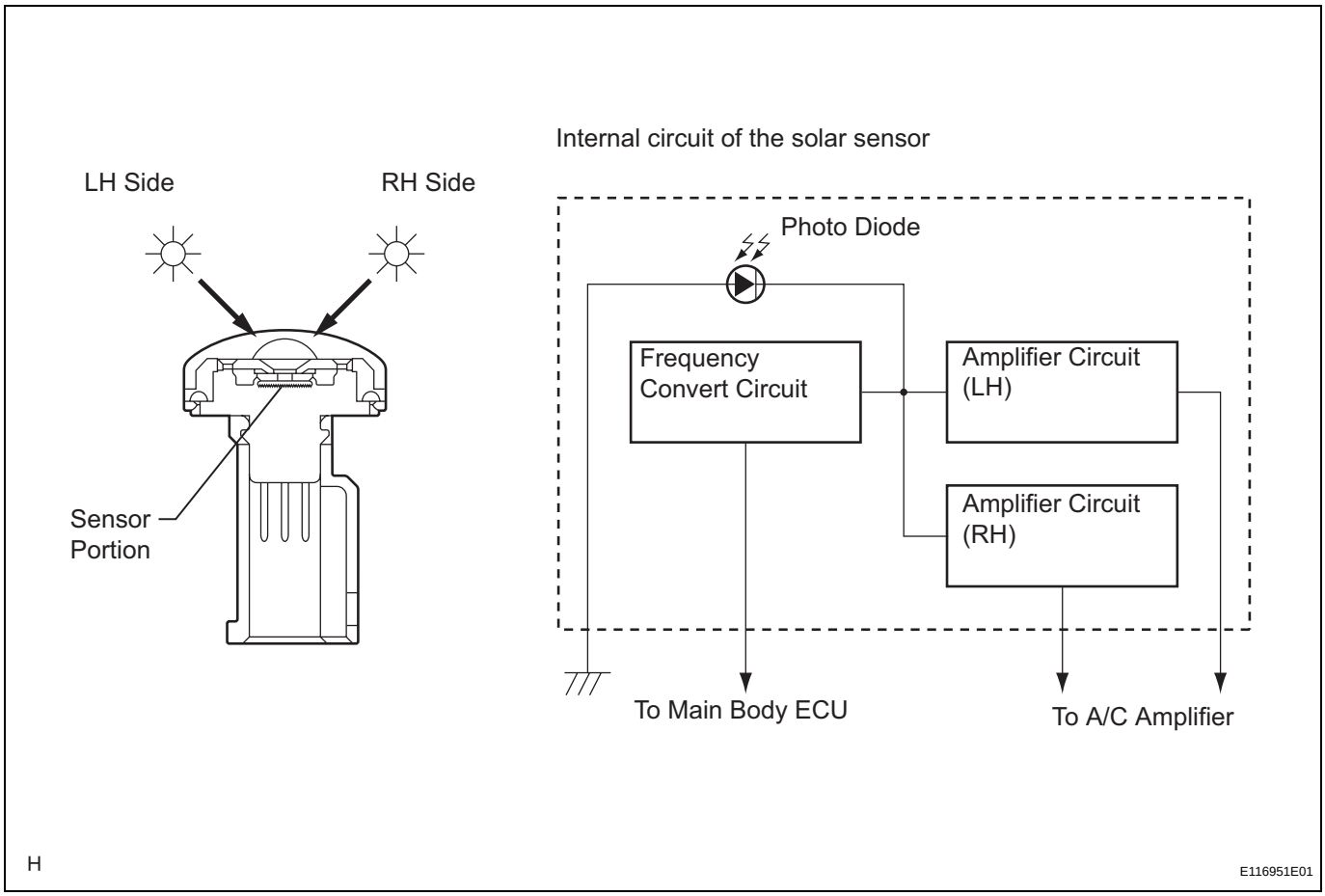
10. LOCK SENSOR (for 2GR-FE)

The lock sensor sends A/C pulley speed signals to the A/C amplifier. The A/C amplifier determines whether the magnetic clutch is locked or not by using those signals and engine speed signals.

11. ROOM TEMPERATURE SENSOR (for AUTO A/C)
The room temperature sensor detects the cabin temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C amplifier.

12. AMBIENT TEMPERATURE SENSOR
The ambient temperature sensor detects the outside temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C amplifier.

13. SOLAR SENSOR (for AUTO A/C)
(a) The solar sensor consists of a photo diode, two amplifier circuits for the solar sensor, and frequency converter circuit for the light control sensor.
(b) A solar sensor detects (in the form of changes in the current that flows through the built-in photo diode) the changes in the amount of sunlight from the LH and RH sides (2 directions) and outputs these sunlight strength signals to the A/C amplifier.



14. EVAPORATOR TEMPERATURE SENSOR
The evaporator temperature sensor detects the temperature of the cool air immediately past the evaporator in the form of resistance changes, and outputs it to the A/C amplifier.

15. A/C PRESSURE SENSOR

The A/C pressure sensor detects the refrigerant pressure and outputs it to the A/C amplifier in the form of voltage changes.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the air conditioning system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

(a) Inspect the battery voltage.
Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM*

AC

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → Go to CAN COMMUNICATION SYSTEM

A

4	CHECK FOR DTC*

(a) Check for DTCs and note any codes that are output.
HINT:
Refer to the DTC CHECK / CLEAR (See page AC-32).
(b) Delete the DTCs.
(c) Recheck for DTCs. Based on the DTCs output above, try to force output of the A/C system DTC by simulating the operation indicated by the DTC.
Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → Go to step 7

A

5	PROBLEM SYMPTOMS TABLE

(a) Refer to the problem symptoms table (See page AC-25).

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 8

A

6	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) Actuator Check (See page AC-43 for AUTO A/C)
(b) DATA LIST / ACTIVE TEST (See page AC-38)
(c) Terminals of ECU (See page AC-29)
(d) On-vehicle Inspection
(e) Inspection

NEXT

7	ADJUST, REPAIR OR REPLACE

AC

NEXT

END

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.
NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

AIR CONDITIONER (AUTO A/C)

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
SET TEMP SHIFT (Set Temperature Shift)	NORMAL	To shift the temperature against the displayed temperature	+2 C / +1 C / NORMAL / -1 C / -2 C
AIR INLET MODE (Air Inlet Mode)	AUTO	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATION mode	MANUAL / AUTO
COMPRESSOR MODE (Compressor Mode)	AUTO	Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF	MANUAL / AUTO
COMPRS / DEF OPER (Compressor / Air Inlet DEF Operation)	LINK	Function to turn the A/C ON automatically linked with the FRONT DEF button when the A/C is OFF	NORMAL / LINK
EVAP CTRL (Evaporator Control)	AUTO	Function to set the evaporator control to the AUTOMATIC position (AUTO) to save power, or to the coldest position (MANUAL) to dehumidify the air and to prevent the windows from fogging up	MANUAL / AUTO
FOOT / DEF MODE (Foot / DEF auto mode)	ON	Function to turn the airflow from FOOT / DEF ON automatically when AUTO MODE is ON	OFF / ON
AUTO BLOW UP (Foot / DEF automatic blower up function)	ON	Function to change the blower level automatically when the defroster is ON	OFF / ON
AMBIENT TMP SFT (Ambient Temperature Shift)	NORMAL	Function to shift the ambient temperature against the displayed ambient temperature	+3 C / +2 C / +1 C / NORMAL / -1 C / -2 C / -3 C

PROBLEM SYMPTOMS TABLE

MANUAL A/C:

Symptom	Suspected area	See page
All functions of the A/C system do not operate	1. IG power source circuit	AC-113
	2. Back-up power source circuit	AC-116
	3. Heater control panel power source circuit	AC-98
	4. LIN communication circuit	AC-118
	5. A/C control assembly	AC-255
	6. A/C amplifier	AC-258
Air Flow Control: No blower operation	1. Blower motor circuit	AC-91
	2. Heater control panel power source circuit	AC-98
	3. LIN communication circuit	AC-118
	4. A/C control assembly	AC-255
	5. A/C amplifier	AC-258
Air Flow Control: No blower control	1. Blower motor circuit	AC-91
	2. Heater control panel power source circuit	AC-98
	3. LIN communication circuit	AC-118
	4. A/C control assembly	AC-255
	5. A/C amplifier	AC-258
Air Flow Control: Insufficient air flow	1. Blower motor circuit	AC-91
	2. A/C amplifier	AC-258
Temperature Control: No cool air comes out	1. Refrigerant volume	AC-120
	2. Refrigerant pressure	AC-120
	3. Pressure switch circuit	AC-65
	4. Air conditioning compressor magnetic clutch circuit (for 2GR-FSE)	AC-100
	5. Compressor lock sensor circuit (for 2GR-FSE)	AC-61
	6. Compressor solenoid circuit	AC-84
	7. Air mix control servo motor circuit	AC-74
	8. Evaporator temperature sensor circuit	AC-53
	9. Ambient temperature sensor circuit	AC-49
	10. Heater control panel power source circuit	AC-98
	11. LIN communication circuit	AC-118
	12. Expansion valve	AC-159
	13. A/C control assembly	AC-255
	14. A/C amplifier	AC-258
	15. ECM (for 2AZ-FE)	ES-432
	16. ECM (for 2GR-FSE)	ES-518
Temperature Control: No warm air comes out	1. Air mix control servo motor circuit	AC-74
	2. Evaporator temperature sensor circuit	AC-53
	3. Ambient temperature sensor circuit	AC-49
	4. A/C amplifier	AC-258
Temperature Control: Output air is warmer or cooler than the set temperature or response is slow.	1. Refrigerant volume	AC-120
	2. Refrigerant pressure	AC-120
	3. Ambient temperature sensor circuit	AC-49
	4. Air mix control servo motor circuit	AC-74
	5. Radiator unit sub-assembly	AC-159
	6. Expansion valve	AC-159
	7. A/C amplifier	AC-258

Symptom	Suspected area	See page
Temperature control: No temperature control (only Max. cool or Max. warm)	1. Air mix control servo motor circuit	AC-74
	2. Ambient temperature sensor circuit	AC-49
	3. Evaporator temperature sensor circuit	AC-53
	4. A/C control assembly	AC-255
	5. A/C amplifier	AC-258
No air inlet control	1. Air inlet control servo motor circuit	AC-77
	2. A/C amplifier	AC-258
No air flow mode control	1. Air outlet control servo motor circuit	AC-79
	2. A/C amplifier	AC-258
Engine idle up does not occur, or is continuous	1. Air conditioning compressor magnetic clutch circuit (for 2GR-FSE)	AC-100
	2. Compressor lock sensor circuit (for 2GR-FSE)	AC-61
	3. Compressor solenoid circuit	AC-84
	4. Heater control panel power source circuit	AC-98
	5. LIN communication circuit	AC-118
	6. A/C control assembly	AC-255
	7. A/C amplifier	AC-258
	8. ECM (for 2AZ-FE)	ES-432
	9. ECM (for 2GR-FSE)	ES-518
Diagnostic trouble codes are not recorded. Set mode is cleared when ignition switch is turned OFF.	1. Back-up power source circuit	AC-116
	2. A/C amplifier	AC-258

AUTO A/C:

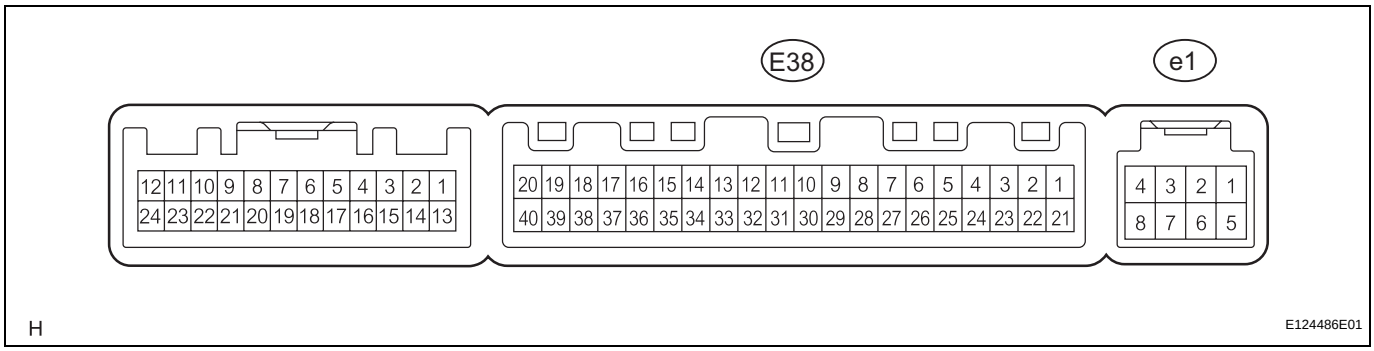
Symptom	Suspected area	See page
All functions of the A/C system do not operate	1. IG power source circuit	AC-113
	2. Back-up power source circuit	AC-116
	3. Heater control panel power source circuit	AC-98
	4. LIN communication circuit	AC-118
	5. Steering pad switch circuit	AC-108
	6. A/C control assembly	AC-255
	7. A/C amplifier	AC-258
Air Flow Control: No blower operation	1. Blower motor circuit	AC-91
	2. Heater control panel power source circuit	AC-98
	3. LIN communication circuit	AC-118
	4. A/C control assembly	AC-255
	5. A/C amplifier	AC-258
Air Flow Control: No blower control	1. Blower motor circuit	AC-91
	2. Heater control panel power source circuit	AC-98
	3. LIN communication circuit	AC-118
	4. A/C control assembly	AC-255
	5. A/C amplifier	AC-258
Air Flow Control: Insufficient air flow	1. Blower motor circuit	AC-91
	2. A/C amplifier	AC-258

Symptom	Suspected area	See page
Temperature Control: No cool air comes out	1. Refrigerant volume	AC-120
	2. Refrigerant pressure	AC-120
	3. Pressure switch circuit	AC-65
	4. Air conditioning compressor magnetic clutch circuit (for 2GR-FSE)	AC-100
	5. Compressor lock sensor circuit (for 2GR-FSE)	AC-61
	6. Compressor solenoid circuit	AC-84
	7. Air mix control servo motor circuit (Driver side)	AC-82
	8. Air mix control servo motor circuit (Passenger side)	AC-74
	9. Evaporator temperature sensor circuit	AC-53
	10. Room temperature sensor circuit	AC-45
	11. Ambient temperature sensor circuit	AC-49
	12. Heater control panel power source circuit	AC-98
	13. LIN communication circuit	AC-118
	14. Expansion valve	AC-159
	15. A/C control assembly	AC-255
	16. A/C amplifier	AC-258
	17. ECM (for 2AZ-FE)	ES-432
	18. ECM (for 2GR-FSE)	ES-518
Temperature Control: No warm air comes out	1. Air mix control servo motor circuit (Driver side)	AC-82
	2. Air mix control servo motor circuit (Passenger side)	AC-74
	3. Evaporator temperature sensor circuit	AC-53
	4. Room temperature sensor circuit	AC-45
	5. Ambient temperature sensor circuit	AC-49
	6. A/C amplifier	AC-258
Temperature Control: Output air is warmer or cooler than the set temperature or response is slow.	1. Refrigerant volume	AC-120
	2. Refrigerant pressure	AC-120
	3. Solar sensor circuit (Driver side)	AC-69
	4. Solar sensor circuit (Passenger side)	AC-56
	5. Room temperature sensor circuit	AC-45
	6. Ambient temperature sensor circuit	AC-49
	7. Air mix control servo motor circuit (Driver side)	AC-82
	8. Air mix control servo motor circuit (Passenger side)	AC-74
	9. Radiator unit sub-assembly	AC-159
	10. Expansion valve	AC-159
	11. A/C amplifier	AC-258
Temperature control: No temperature control (only Max. cool or Max. warm)	1. Air mix control servo motor circuit (Driver side)	AC-82
	2. Air mix control servo motor circuit (Passenger side)	AC-74
	3. Room temperature sensor circuit	AC-45
	4. Ambient temperature sensor circuit	AC-49
	5. Evaporator temperature sensor circuit	AC-53
	6. Solar sensor circuit (Driver side)	AC-69
	7. Solar sensor circuit (Passenger side)	AC-56
	8. A/C control assembly	AC-255
	9. A/C amplifier	AC-258
No air inlet control	1. Air inlet control servo motor circuit	AC-77
	2. A/C amplifier	AC-258
No air flow mode control	1. Air outlet control servo motor circuit	AC-79
	2. A/C amplifier	AC-258

Symptom	Suspected area	See page
Engine idle up does not occur, or is continuous	1. Air conditioning compressor magnetic clutch circuit (for 2GR-FSE)	AC-100
	2. Compressor lock sensor circuit (for 2GR-FSE)	AC-61
	3. Compressor solenoid circuit	AC-84
	4. Heater control panel power source circuit	AC-98
	5. LIN communication circuit	AC-118
	6. A/C control assembly	AC-255
	7. A/C amplifier	AC-258
	8. ECM (for 2AZ-FE)	ES-432
	9. ECM (for 2GR-FSE)	ES-518
Blinking of A/C indicator	1. Compressor solenoid circuit	AC-84
	2. A/C amplifier	AC-258
Unable to control A/C with the steering pad switch	1. Steering pad switch circuit	AC-108
	2. Heater control panel power source circuit	AC-98
	3. LIN communication circuit	AC-118
	4. A/C control assembly	AC-255
	5. A/C amplifier	AC-258
Plasmacluster indicator does not come on (Plasmacluster does not operate)	1. Blower motor circuit	AC-91
	2. Plasmacluster circuit	AC-105
	3. A/C amplifier	AC-258
Diagnostic trouble codes are not recorded. Set mode is cleared when ignition switch is turned OFF.	1. Back-up power source circuit	AC-116
	2. A/C amplifier	AC-258

TERMINALS OF ECU

1. A/C AMPLIFIER



HINT:
Check from the rear of the connector while it is connected to the A/C amplifier.

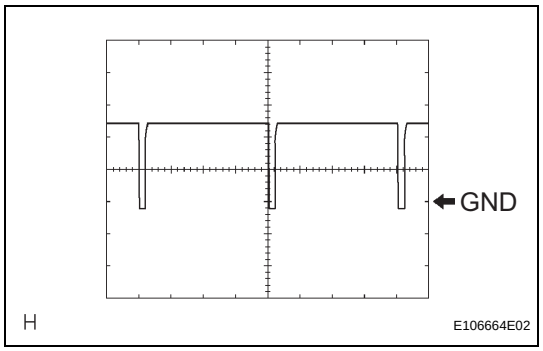
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E38-1 (IG+) - E38-14 (GND)	V - W-B	Power source (IG)	Ignition switch on (IG)	10 to 14 V
E38-1 (IG+) - E38-14 (GND)	V - W-B	Power source (IG)	Ignition switch off	Below 1 V
E38-2 (SOL+) - E38-14 (GND)	W - W-B	A/C compressor operation signal	Engine is running A/C switch: ON Blower switch: LO	Pulse generation (See waveform 1)
E38-5 (TAM) - E38-14 (GND)	P - W-B	A/C ambient temperature sensor signal	Ignition switch on (IG) at 25°C (77°F)	1.35 to 1.75 V
E38-5 (TAM) - E38-14 (GND)	P - W-B	A/C ambient temperature sensor signal	Ignition switch on (IG) at 40°C (104°F)	0.9 to 1.2 V
E38-8 (LOCK)*1 - E38-14 (GND)	G - W-B	A/C compressor lock sensor signal	Engine is running Blower switch: LO A/C switch: ON	Pulse generation (See waveform 2)
E38-9 (PRE) - E38-13 (SG-2)	V - L	A/C pressure sensor signal	Start engine, Operate A/C system, Refrigerant pressure: Abnormal pressure (more than 3,140 kPa (32.0 kgf/cm^2, 455 psi))	4.74 V or higher
E38-9 (PRE) - E38-13 (SG-2)	V - L	A/C pressure sensor signal	Start engine, Operate A/C system, Refrigerant pressure: Abnormal pressure (less than 196 kPa (2.0 kgf/cm^2, 28 psi))	Below 0.76 V
E38-9 (PRE) - E38-13 (SG-2)	V - L	A/C pressure sensor signal	Start engine, Operate A/C system, Refrigerant pressure: Abnormal pressure (more than 3,140 kPa (32.0 kgf/cm^2, 455 psi) and less than 196 kPa (2.0 kgf/cm^2, 28 psi))	0.76 to 4.74 V
E38-10 (S5-3) - E38-13 (SG-2)	BR - L	Power supply for A/C pressure sensor	Ignition switch on (IG) A/C switch: ON	4.5 to 5.5 V
E38-10 (S5-3) - E38-13 (SG-2)	BR - L	Power supply for A/C pressure sensor	Ignition switch on (IG) A/C switch: OFF	Below 1 V
E38-11 (CANH) - E38-12 (CANL)	B - W	CAN communication system	CAN communication circuit	Pulse generation
E38-13 (SG-2) - Body ground	L - Body ground	Ground for A/C pressure sensor, A/C ambient temperature sensor, A/C lock sensor	Always	Below 1 V
E38-14 (GND) - Body ground	W-B - Body ground	Ground for main power supply	Always	Below 1 V

AC

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E38-20 (MGC)*1 - E38-14 (GND)	LG - W-B	A/C compressor magnetic clutch operation signal	Ignition switch on (IG) Blower switch: LO A/C switch: OFF	10 to 14 V
E38-20 (MGC)*1 - E38-14 (GND)	LG - W-B	A/C compressor magnetic clutch operation signal	Ignition switch on (IG) Blower switch: LO A/C switch: ON	Below 1 V
E38-21 (B) - E38-14 (GND)	GR - W-B	Power source (Back-up)	Always	10 to 14 V
E38-23 (BLW) - E38-14 (GND)	R - W-B	Blower motor speed control signal	Ignition switch on (IG) Blower switch: ON	Pulse generation (See waveform 3)
E38-29 (TR)*2 - E38-34 (SG-1)	P - LG	A/C room temperature sensor signal	Ignition switch on (IG) Cabin temperature at 25°C (77°F)	1.8 to 2.2 V
E38-29 (TR)*2 - E38-34 (SG-1)	P - LG	A/C room temperature sensor signal	Ignition switch on (IG) Cabin temperature at 40°C (104°F)	1.2 to 1.6 V
E38-32 (TSP)*2 - E38-14 (GND)	Y - W-B	A/C solar sensor signal (for Front passenger side)	Ignition switch on (IG) Solar sensor is subjected to electric light.	0.8 to 4.3 V
E38-32 (TSP)*2 - E38-14 (GND)	Y - W-B	A/C solar sensor signal (for Front passenger side)	Ignition switch on (IG) Solar sensor is covered with a cloth.	Below 0.8 V
E38-33 (TSD)*2 - E38-14 (GND)	O - W-B	A/C solar sensor signal (for Driver side)	Ignition switch on (IG) Solar sensor is subjected to electric light.	0.8 to 4.3 V
E38-33 (TSD)*2 - E38-14 (GND)	O - W-B	A/C solar sensor signal (for Driver side)	Ignition switch on (IG) Solar sensor is covered with a cloth.	Below 0.8 V
E38-34 (SG-1)*2 - Body ground	LG - Body ground	Ground for A/C room temperature sensor	Always	Below 1 V
E38-37 (LIN1) - E38-14 (GND)	GR - W-B	LIN communication signal	Ignition switch on (IG)	Pulse generation
E38-38 (RDFG) - E38-14 (GND)	G - W-B	DEF relay signal	Ignition switch on (IG) REAR DEF switch: ON	Below 1 V
E38-38 (RDFG) - E38-14 (GND)	G - W-B	DEF relay signal	Ignition switch on (IG) REAR DEF switch: OFF	10 to 14 V
E38-39 (PCD1)*2 - E38-14 (GND)	R - W-B	Plasmacluster™ operation signal	Ignition switch on (IG) Blower switch: OFF (plasmacluster™ not operating)	10 to 14 V
E38-39 (PCD1)*2 - E38-14 (GND)	R - W-B	Plasmacluster™ operation signal	Ignition switch on (IG) Blower switch: ON (plasmacluster™ operating)	Below 1 V
e1-2 (BUS G) - Body ground	-	Ground for BUS IC	Always	Below 1 V
e1-3 (BUS) - e1-2 (BUS G)	-	BUS IC control signal	Ignition switch off → on (IG)	Pulse generation
e1-4 (B BUS) - e1-2 (BUS G)	-	Power supply for BUS IC	Ignition switch off	Below 1 V
e1-4 (B BUS) - e1-2 (BUS G)	-	Power supply for BUS IC	Ignition switch on (IG)	10 to 14 V
e1-5 (SGA) - Body ground	-	Ground for evaporator temperature sensor	Always	Below 1 V
e1-6 (TEA) - e1-5 (SGA)	-	A/C evaporator temperature sensor signal	Ignition switch on (IG) Evaporator temperature at 0°C (32°F)	1.7 to 2.1 V
e1-6 (TEA) - e1-5 (SGA)	-	A/C evaporator temperature sensor signal	Ignition switch on (IG) Evaporator temperature at 15°C (59°F)	0.7 to 1.3 V

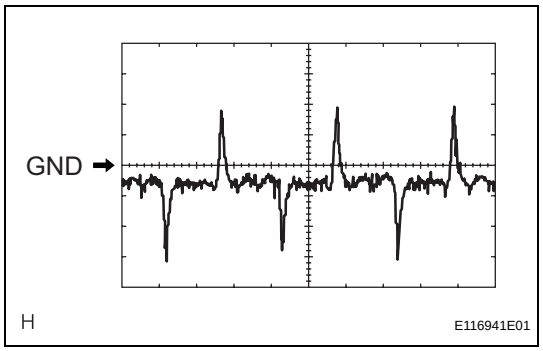
*1: For 2GR-FSE
*2: For AUTO A/C

AC



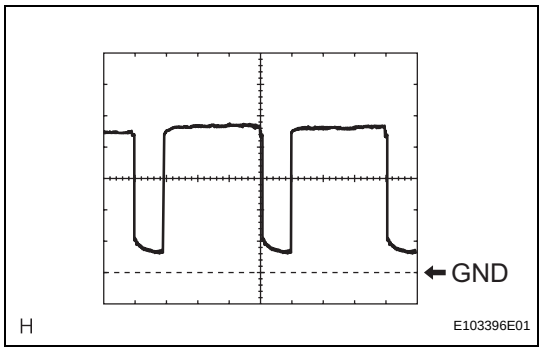
(a) Waveform 1:

Item	Contents
Terminal No. (Symbols)	E38-2 (SOL+) - E38-14 (GND)
Tool Setting	5 V/DIV., 500 μs/DIV.
Vehicle Condition	Engine is running A/C switch: ON



(b) Waveform 2:

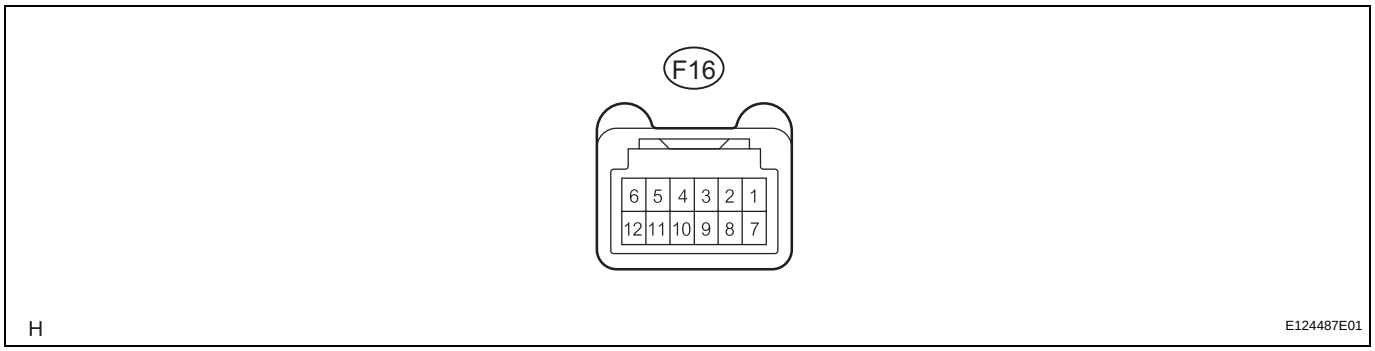
Item	Contents
Terminal No. (Symbols)	E38-8 (LOCK) - E38-14 (GND)
Tool Setting	200 mV/DIV., 10 ms./DIV.
Vehicle Condition	Engine is running Blower switch: LO A/C switch: ON



(c) Waveform 3:

Item	Contents
Terminal No. (Symbols)	E38-23 (BLW) - E38-14 (GND)
Tool Setting	1 V/DIV., 500 μs/DIV.
Vehicle Condition	Ignition switch on (IG) Blower switch: ON

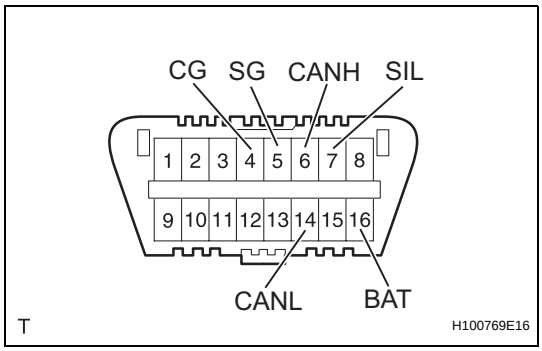
2. A/C CONTROL ASSEMBLY



HINT:
Check from the rear of the connector while it is connected to the A/C control assembly.

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
F16-3 (GND) - Body ground	W-B - Body ground	Ground for A/C control assembly	Always	Below 1 V
F16-4 (TX+) - F16-3 (GND)	L - W-B	LIN communication circuit	Ignition switch on (IG)	Pulse generation
F16-5 (IG+) - F16-3 (GND)	V - W-B	Power source (IG)	Ignition switch off	Below 1 V
F16-5 (IG+) - F16-3 (GND)	V - W-B	Power source (IG)	Ignition switch on (IG)	10 to 14 V

AC



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The vehicle's ECU uses the ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbol (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off*	54 to 69 Ω
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off*	200 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch off*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off*	200 Ω or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches, or the doors.**

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

AC

DTC CHECK / CLEAR

HINT:
*: For AUTO A/C

1. DTC CHECK (SENSOR CHECK)*

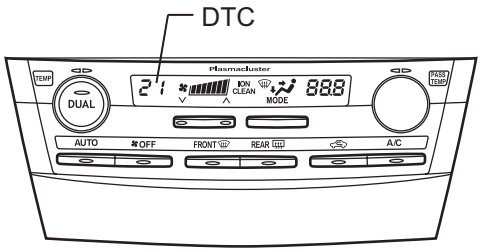
(a) Start the engine and warm it up.

(b) Perform the indicator check (See page AC-34).
HINT:
After the indicator check is completed, the system enters the DTC check mode automatically.

(c) Read the code displayed on the panel. (Trouble codes are output on the temperature display.)
NOTICE:
- **In the sensor check mode, which is automatically transferred from the indicator check mode, troubleshooting may be partially performed. Be sure to perform the actuator check, and then the sensor check again.**
- **If the check is performed in a dark place, DTC 21 or 24 may be displayed even though the system is normal.**

HINT:
Refer to the DTC chart (Diagnostic Trouble Code chart) for details of the codes (See page AC-41).
- When there are no problems, DTC 00 is output.
- As an example, the illustration shows that display code 21 is output.

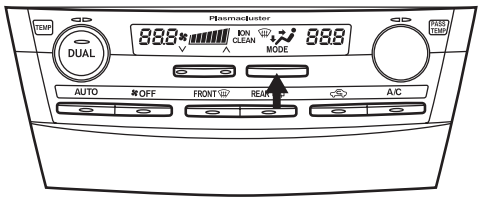
A/C Control Assembly:



H E124467E01

(d) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the actuator check mode.

A/C Control Assembly:



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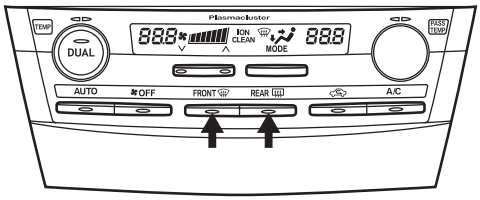
AC

A/C Control Assembly:



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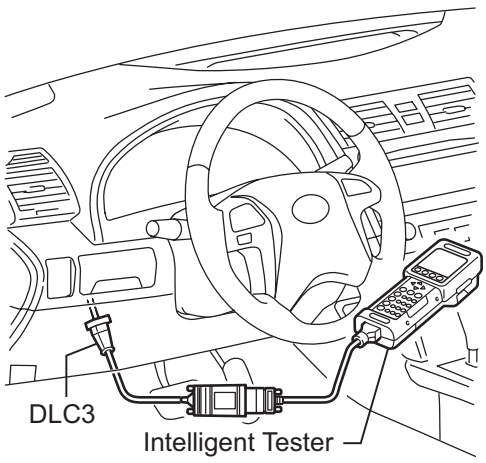
2. CLEARING DTC*

(a) During the sensor check, press the "FRONT DEF" switch and "REAR DEF" switch at the same time.



H C131977E01

3. DTC CHECK USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menu items: DIAGNOSIS / OBD/ MOBD / DTC INFO / CURRENT CODES.
HINT:
Refer to the intelligent tester operator's manual for further details.
(e) Check the details of the DTCs.
(f) Clear the DTCs.
HINT:
After repairing the malfunctions, clear the DTC.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Enter the following menu items: DIAGNOSIS / OBD/MOBD / DTC INFO / CLEAR CODES.
HINT:
Refer to the intelligent tester operator's manual for further details.
(4) Press the YES button.

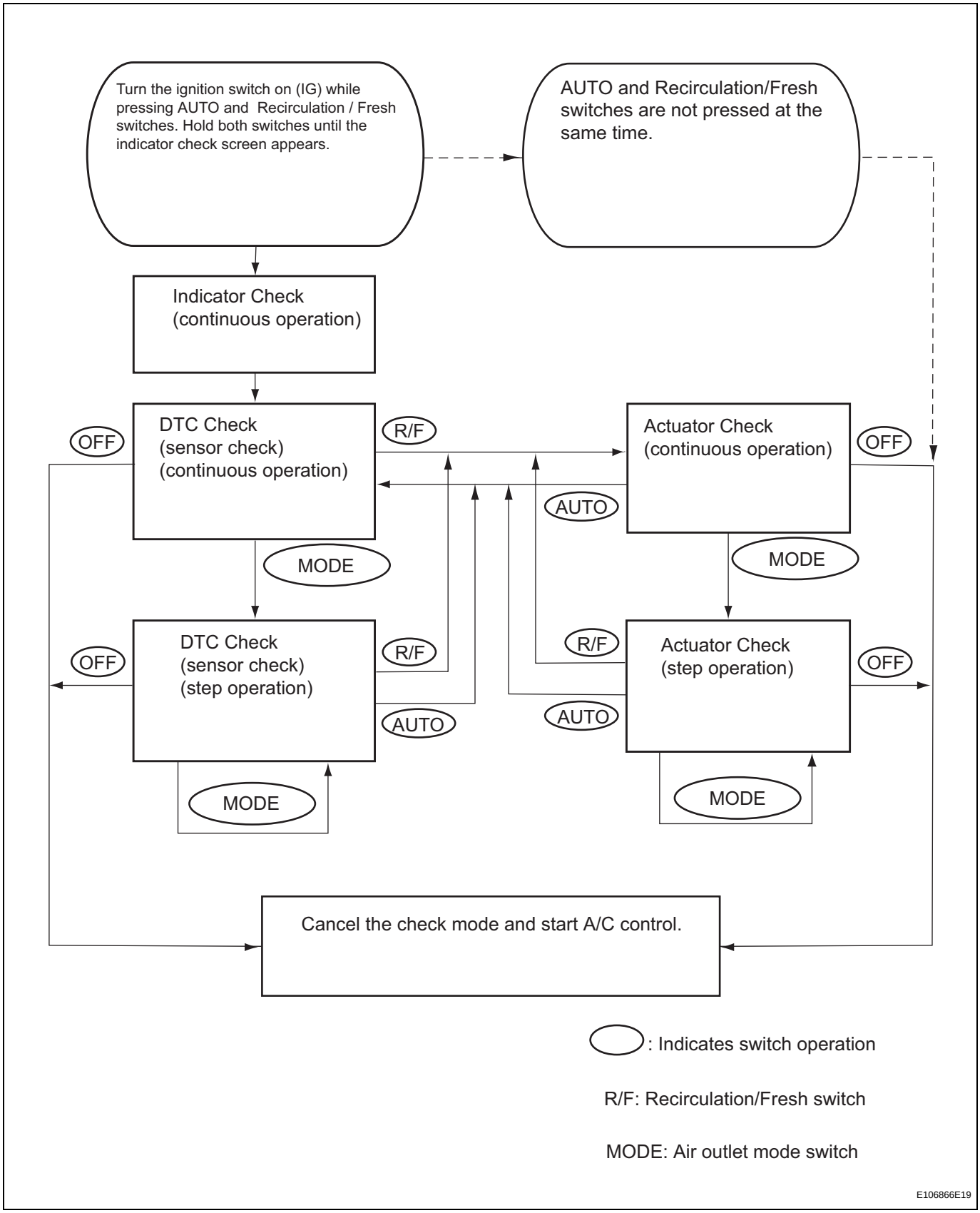
AC

CHECK MODE PROCEDURE

HINT:
*: For AUTO A/C

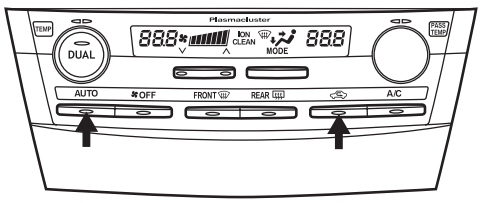
1. LIST OF OPERATION METHODS*

(a) By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnostic check mode.



AC

A/C Control Assembly:



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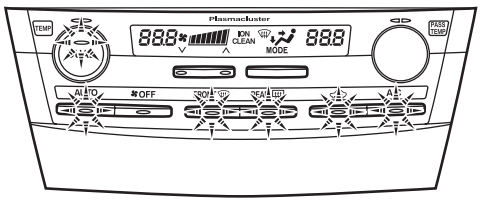
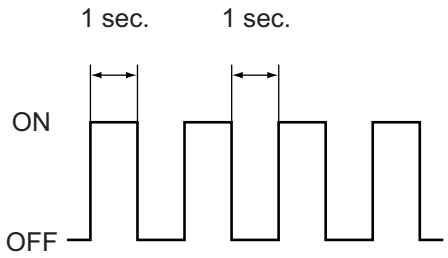
A/C Control Assembly:



Indicator Blinking Pattern:



H E124468E01

2. INDICATOR CHECK*

(a) Turn the ignition switch off.

(b) Turn the ignition switch on (IG) while pressing the A/C control "AUTO" switch and "R/F" switch simultaneously. Hold both switches until the indicator check screen appears.

(c) The indicator check is automatically performed when panel diagnosis is activated. Check that the indicators light up and go off at 1 second intervals 4 times in succession.
HINT:
- The sensor check automatically starts when the indicator check is completed.
- Press the "OFF" switch to cancel the check mode.
- If a navigation system is installed, the indicator will blink and the buzzer will sound.

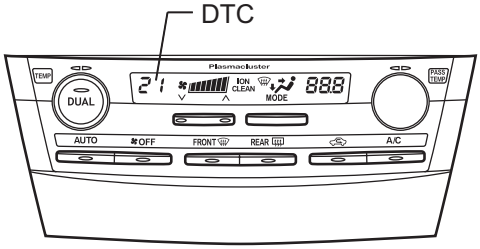
3. DTC CHECK (SENSOR CHECK)*

(a) Start the engine and warm it up.

(b) Perform the indicator check.
HINT:
After the indicator check is completed, the system enters the DTC check mode automatically.

AC

A/C Control Assembly:

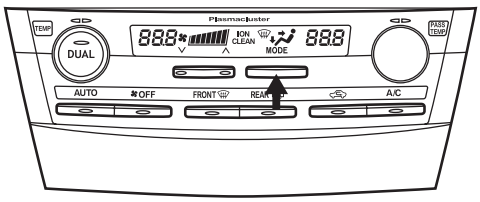


H E124467E01

(c) Read the code displayed on the panel.
NOTICE:
- **In the sensor check mode, which is automatically transferred from the indicator check mode, troubleshooting may be partially performed. Be sure to perform the actuator check, and then the sensor check again.**
- **If the check is performed in a dark place, DTC 21 or 24 may be displayed even though the system is normal.**

HINT:
Refer to the DTC chart (Diagnostic Trouble Code chart) for details of the codes (See page AC-41).
- When there are no problems, DTC 00 is output.
- As an example, the illustration shows that display code 21 is output.

A/C Control Assembly:



H E124466E03

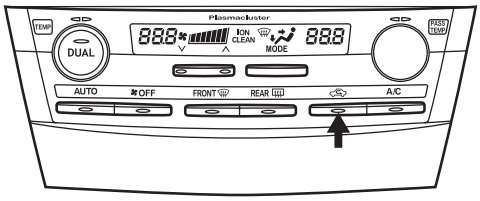
(d) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the actuator check mode.

4. ACTUATOR CHECK*

(a) Start the engine and warm it up.

(b) Perform the indicator check.

A/C Control Assembly:

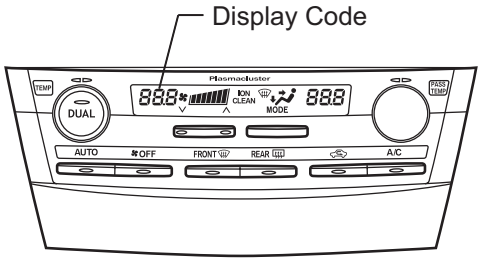


H E124466E02

(c) Push the "R/F" switch to perform the actuator check.
HINT:
Be sure to perform the actuator check after starting the engine.

AC

A/C Control Assembly:

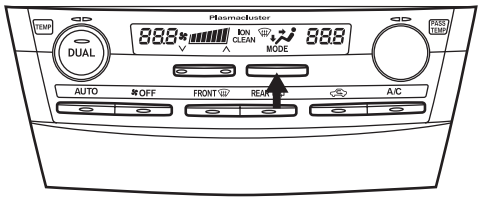


H E124466E06

(d) As the actuator check is repeated from steps 1 to 10 at 1 second intervals, check the temperature and air flow visually and by hand.
HINT:
- The display blinks at 1 second intervals in the step operation.
- Push the "OFF" switch to finish panel diagnosis.
- Push the "AUTO" switch to enter the sensor check mode.

Step No.	Display Code	Conditions				
		Blower Level	Air Mix Damper	Airflow Vent	Air Inlet Damper	Compressor
1	0	0	0% open	FACE	FRESH	OFF
2	1	1	0% open	FACE	FRESH	OFF
3	2	17	0% open	FACE	RECIRCULATION / FRESH	ON
4	3	17	0% open	FACE	RECIRCULATION	ON
5	4	17	50% open	B/L	RECIRCULATION	ON
6	5	17	50% open	B/L	RECIRCULATION	ON
7	6	17	50% open	FOOT	FRESH	ON
8	7	17	100% open	FOOT-0	FRESH	ON
9	8	17	100% open	F/D	FRESH	ON
10	9	31	100% open	DEF	FRESH	ON

A/C Control Assembly:



H E124466E03

(e) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
HINT:
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the sensor check mode.

AC

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / AIR CONDITIONER / DATA LIST.
(e) Check the value(s) by referring to the table below.

AIR CONDITIONER (for MANUAL A/C)

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AMBI TEMP SENS (Ambient temperature sensor)	Ambient temperature sensor / Min.: -23.3°C (-9.94°F), Max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	-
AMBI TEMP (Adjusted ambient temperature)	Adjusted ambient temperature / Min.: -30.8°C (-23.44°F), Max.: 50.8°C (123.44°F)	-	-
EVAP FIN TEMP (Evaporator fin thermistor)	Evaporator fin thermistor / Min.: -29.7°C (-21.46°F), Max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	-
COOLANT TEMP (Engine coolant temperature)	Engine coolant temperature / Min.: 1.3°C (34.34°F), Max.: 90.55°C (194.99°F)	Actual engine coolant temperature is displayed while engine is warmed up	-
REG PRESS SENS (Regulator pressure sensor)	Regulator pressure sensor / Min.: -0.5 kgf/cm^2G, Max.: 37.75 kgf/cm^2G	Actual refrigerant pressure is displayed	-
REG CTRL CURRNT (Regulator control current)	Compressor variable output current / Min.: 0 A, Max.: 0.996 A	-	-
AIR MIX PULSE-D (Air mix servomotor target pulse (D side))	Driver side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX. COLD: 105 (pulse) MAX. HOT: 7 (pulse)	-
AIR OUT PULSE-D (Air out pulse-D)	Driver side air outlet servo motor target pulse / Min.: 0, Max.: 255	FACE: 8 (pulse) B/L: 30 to 38 (pulse) FOOT: 50 to 74 (pulse) FOOT/DEF: 80 (pulse) DEF: 97 (pulse)	-
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	RECIRCULATION: 7 (pulse) FRESH: 28 (pulse)	-
#CODES (Number of trouble codes)	Number of trouble codes / Min.: 0, Max.: 255	Number of DTCs will be displayed	-

AIR CONDITIONER (for AUTO A/C)

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ROOM TEMP (Room temperature sensor)	Room temperature sensor / Min.: -6.5°C (20.3°F), Max.: 57.25°C (135.05°F)	Actual cabin temperature is displayed	-
AMBI TEMP SENS (Ambient temperature sensor)	Ambient temperature sensor / Min.: -23.3°C (-9.94°F), Max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	-
AMBI TEMP (Adjusted ambient temperature)	Adjusted ambient temperature / Min.: -30.8°C (-23.44°F), Max.: 50.8°C (123.44°F)	-	-

AC

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
EVAP FIN TEMP (Evaporator fin thermistor)	Evaporator fin thermistor / Min.: -29.7°C (-21.46°F), Max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	-
SOLAR SENS-D (Solar sensor (D side))	Driver side solar sensor / Min.: 0, Max.: 255	Driver side solar sensor value increases as brightness increases	-
SOLAR SENS-P (Solar sensor (P side))	Passenger side solar sensor / Min.: 0, Max.: 255	Passenger side solar sensor value increases as brightness increases	-
COOLANT TEMP (Engine coolant temperature)	Engine coolant temperature / Min.: 1.3°C (34.34°F), Max.: 90.55°C (194.99°F)	Actual engine coolant temperature is displayed while engine is warmed up	-
SET TEMP-D (Set temperature (D - side))	Driver side set temperature / Min.: 0°C (32°F), Max.: 30°C (54°F)	Driver side set temperature is displayed	-
SET TEMP-P (Set temperature (P - side))	Passenger side set temperature / Min.: 0°C (32°F), Max.: 30°C (54°F)	Passenger side set temperature is displayed	-
ESTIMATE TEMP-D (Estimate temperature (D side)	Driver side estimate temperature / Min.: -358.4°C (-613.12°F), Max.: 358.4°C (677.12°F)	Damper is at "MAX. COOL": -358.4°C (-613.12°F) Damper is at "MAX. HOT": 358.4°C (677.12°F)	-
ESTIMATE TEMP-P (Estimate temperature (P side)	Passenger side estimate temperature / Min.: -358.4, Max.: 358.4	Damper is at "MAX. COOL": -358.4°C (-613.12°F) Damper is at "MAX. HOT": 358.4°C (677.12°F)	-
HAND FREE TEL (Hand free telephone)	Hands free telephone / OFF or ON	-	-
BLOWER LEVEL (Blower motor speed level)	Blower motor speed level / Min.: 0 level, Max.: 31 level	Increases in the range between 0 and 31 as the blower motor speed increases	-
REG PRESS SENS (Regulator pressure sensor)	Regulator pressure sensor / Min.: -0.5 kgf/cm^{2}G, Max.: 37.75 kgf/cm^{2}G	Actual refrigerant pressure is displayed	-
REG CTRL CURRNT (Regulator control current)	Compressor variable output current / Min.: 0 A, Max.: 0.996 A	-	-
AIR MIX PULSE-D (Air mix servomotor target pulse (D side))	Driver side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX. COLD: 5 (pulse) MAX. HOT: 103 (pulse)	-
AIR MIX PULSE-P (Air mix servomotor target pulse (P side))	Passenger side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX. COLD: 105 (pulse) MAX. HOT: 7 (pulse)	-
AIR OUT PULSE-D (Air out pulse-D)	Driver side air outlet servo motor target pulse / Min.: 0, Max.: 255	FACE: 8 (pulse) B/L: 30 to 38 (pulse) FOOT: 50 to 74 (pulse) FOOT/DEF: 80 (pulse) DEF: 97 (pulse)	-
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	RECIRCULATION: 7 (pulse) FRESH: 28 (pulse)	-
#CODES (Number of trouble codes)	Number of trouble codes / Min.: 0, Max.: 255	Number of DTCs will be displayed	-

ENGINE

Item	Measurement Item / (Range) Display	Normal Condition	Diagnostic Note
A/C SIGNAL (A/C signal)	A/C signal / ON or OFF	ON: A/C ON OFF: A/C OFF	-
A/C MAG CLUTCH (A/C magnetic clutch relay)	A/C magnetic clutch relay / ON or OFF	ON: A/C magnetic clutch ON OFF: A/C magnetic clutch OFF	-

2. ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed in the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / AIR CONDITIONER / ACTIVE TEST.
(e) Perform the ACTIVE TEST by referring to the table below.

AIR CONDITIONER (for MANUAL A/C)

Item	Test Details / Display (Range)	Diagnostic Note
DEFOGER RLY-R (Defogger relay (Rear))	Defogger relay (Rear) / OFF, ON	-
AIR MIX PULSE-D (Air mix servomotor pulse (D side))	Driver side air mix servo motor pulse / Min.: 0, Max.: 255	-
AIR OUT PULSE-D (Air outlet servomotor pulse (D side)	Driver side air outlet servo motor pulse / Min.: 0, Max.: 255	-
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	-

AIR CONDITIONER (for AUTO A/C)

Item	Test Details / Display (Range)	Diagnostic Note
BLOWER MOTOR (Blower motor)	Blower motor / Min.: Level 0, Max.: Level 31	-
DEFOGER RLY-R (Defogger relay (Rear))	Defogger relay (Rear) / OFF, ON	-
AIR MIX PULSE-D (Air mix servomotor pulse (D side))	Driver side air mix servo motor pulse / Min.: 0, Max.: 255	-
AIR MIX PULSE-P (Air mix servomotor pulse (P side))	Passenger side air mix servo motor pulse / Min.: 0, Max.: 255	-
AIR OUT PULSE-D (Air outlet servomotor pulse (D side)	Driver side air outlet servo motor pulse / Min.: 0, Max.: 255	-
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	-

ENGINE

Item	Test Details / Display (Range)	Diagnostic Note
A/C MAG CLUTCH (Magnetic clutch relay)	Magnetic clutch relay / ON or OFF	-

DIAGNOSTIC TROUBLE CODE CHART

AIR CONDITIONING SYSTEM

DTC No.	Detection Item	Trouble Area	Memory *4	See page
B1411/11 *1, *5	Room Temperature Sensor Circuit	1. Room temperature sensor 2. Harness or connector between room temperature sensor and A/C amplifier 3. A/C amplifier	Memorized (8.5 min. or more)	AC-45
B1412/12	Ambient Temperature Sensor Circuit	1. Ambient temperature sensor 2. Harness or connector between ambient temperature sensor and A/C amplifier 3. A/C amplifier	Memorized (8.5 min. or more)	AC-49
B1413/13	Evaporator Temperature Sensor Circuit	1. Air conditioning harness (evaporator temperature sensor) 2. A/C amplifier	Memorized (8.5 min. or more)	AC-53
B1421/21 *3, *5	Solar Sensor Circuit (Passenger Side)	1. Solar sensor 2. Harness or connector between solar sensor and A/C amplifier 3. Harness or connector between solar sensor and main body ECU 4. A/C amplifier 5. Main body ECU	Memorized (8.5 min. or more) (only when circuit is shorted)	AC-56
B1422/22	Compressor Lock Sensor Circuit	1. A/C compressor (A/C lock sensor) 2. Compressor drive belt 3. Harness or connector between compressor and magnetic clutch (A/C lock sensor) 4. A/C amplifier 5. CAN communication system	-	AC-61
B1423/23	Pressure Switch Circuit	1. Pressure sensor 2. Harness or connector between pressure sensor and A/C amplifier 3. Refrigerant pipe line 4. A/C amplifier	-	AC-65
B1424/24 *3, *5	Solar Sensor Circuit (Driver Side)	1. Solar sensor 2. Harness or connector between solar sensor and A/C amplifier 3. Harness or connector between solar sensor and main body ECU 4. A/C amplifier 5. Main body ECU	Memorized (8.5 min. or more) (only when circuit is shorted)	AC-69
B1441/41	Air Mix Damper Control Servo Motor Circuit (Passenger Side)	1. A/C amplifier 2. Air conditioning harness 3. Air mix control servo motor	Memorized (30 sec.)	AC-74
B1442/42	Air Inlet Damper Control Servo Motor Circuit	1. A/C amplifier 2. Air conditioning harness 3. Air inlet control servo motor	Memorized (30 sec.)	AC-77

DTC No.	Detection Item	Trouble Area	Memory *4	See page
B1443/43	Air Outlet Damper Control Servo Motor Circuit	1. A/C amplifier 2. Air conditioning harness 3. Air outlet control servo motor	Memorized (30 sec.)	AC-79
B1446/46 *5	Air Mix Damper Control Servo Motor Circuit (Driver Side)	1. A/C amplifier 2. Air conditioning harness 3. Air mix control servo motor	Memorized (30 sec.)	AC-82
B1451/51	Compressor Solenoid Circuit	1. A/C compressor 2. Harness or connector between A/C amplifier and solenoid of externally changeable compressor 3. A/C amplifier	-	AC-84
B1497/97	BUS IC Communication Malfunction	1. Air conditioning harness 2. A/C amplifier	Memorized (10 sec. or more)	AC-87
B1499/99	Multiplex Communication Circuit	CAN communication system	Memorized	AC-90

*1: If the room temperature is approx. -18.6°C (-1.48°F) or lower, DTC B1411/11 may be output even though the system is normal.

*2: If the ambient temperature is approx. -52.9°C (-63.22°F) or lower, DTC B1412/12 may be output even though the system is normal.

*3: If the check is performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) may be output even though the system is normal.

*4: The A/C amplifier memorizes the DTC of the respective malfunction if it has occurred for the period of time indicated in the brackets.

*5: For AUTO A/C

ACTUATOR CHECK

HINT:
*: For AUTO A/C

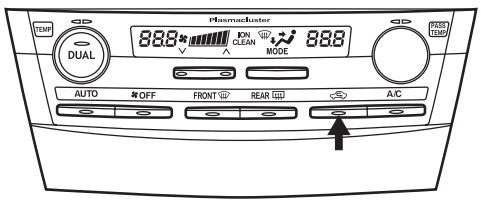
1. ACTUATOR CHECK*

(a) Start the engine and warm it up.

(b) Perform the indicator check (See page AC-34).

(c) Push the "R/F" switch to perform the actuator check.
HINT:
Be sure to perform the actuator check after starting the engine.

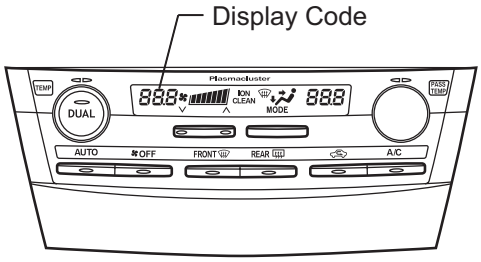
A/C Control Assembly:



H E124466E02

(d) As the actuator check is repeated from steps 1 to 10 at 1 second intervals, check the temperature and air flow visually and by hand.
HINT:
- The display blinks at 1 second intervals in the step operation.
- Push the "OFF" switch to finish panel diagnosis.
- Push the "AUTO" switch to enter the sensor check mode.

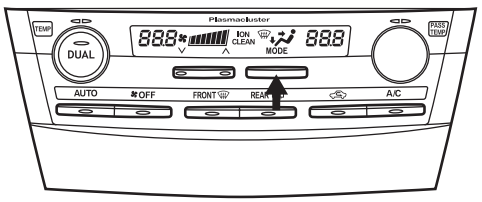
A/C Control Assembly:



H E124466E06

Step No.	Display Code	Conditions				
		Blower Level	Air Mix Damper	Airflow Vent	Air Inlet Damper	Compressor
1	0	0	0% open	FACE	FRESH	OFF
2	1	1	0% open	FACE	FRESH	OFF
3	2	17	0% open	FACE	RECIRCULATION / FRESH	ON
4	3	17	0% open	FACE	RECIRCULATION	ON
5	4	17	50% open	B/L	RECIRCULATION	ON
6	5	17	50% open	B/L	RECIRCULATION	ON
7	6	17	50% open	FOOT	FRESH	ON
8	7	17	100% open	FOOT-0	FRESH	ON
9	8	17	100% open	F/D	FRESH	ON
10	9	31	100% open	DEF	FRESH	ON

A/C Control Assembly:



H E124466E03

(e) If the steps are difficult to read because they change automatically, push the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pushed.
HINT:
- Push the "OFF" switch to finish panel diagnosis.
- Push the "R/F" switch to enter the sensor check mode.

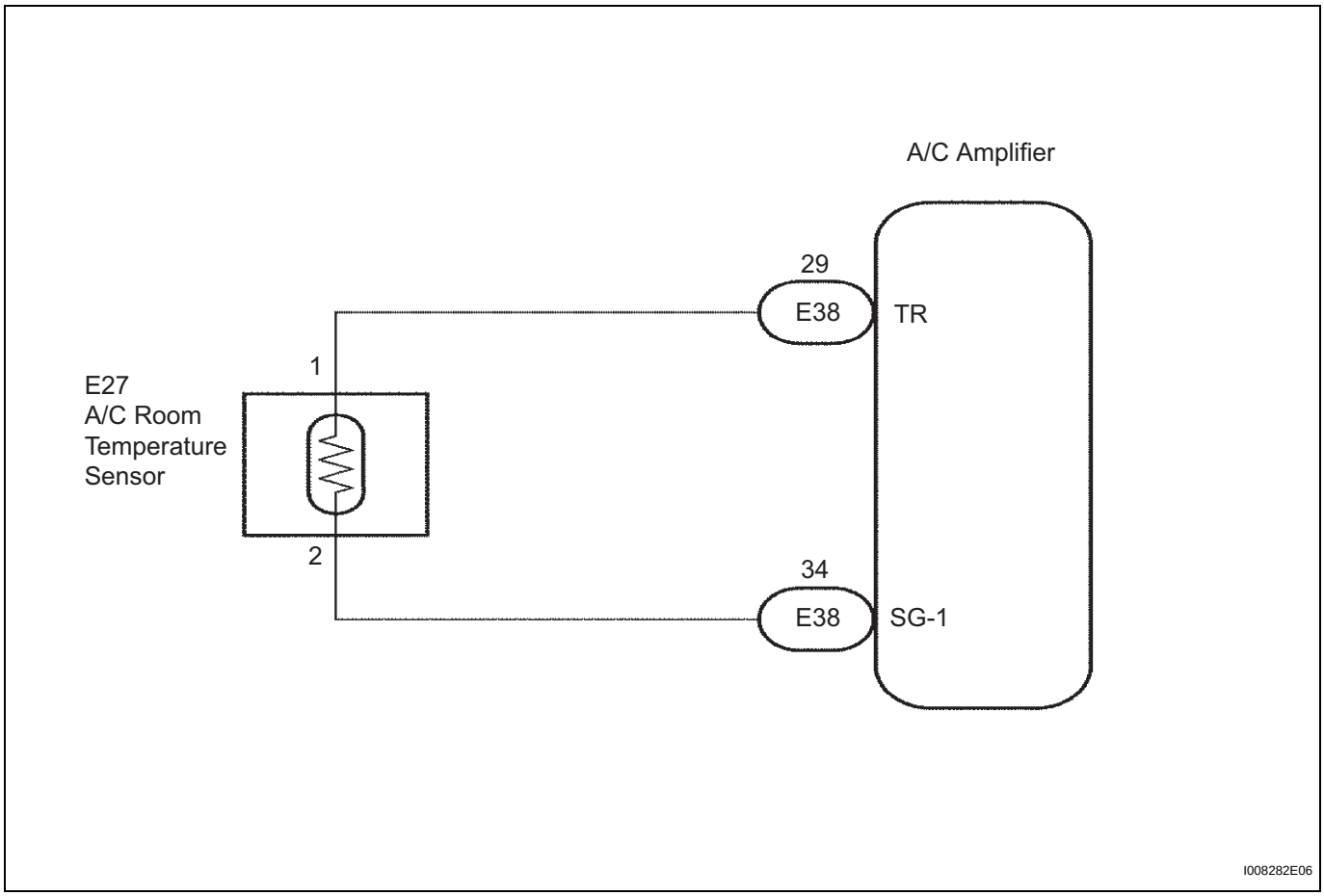
DTC	B1411/11	Room Temperature Sensor Circuit

DESCRIPTION

This sensor detects the cabin temperature that is used as the basis for temperature control and sends a signal to the A/C amplifier.

DTC No.	DTC Detection Condition	Trouble Area
B1411/11	Room temperature sensor circuit (Open or short)	• A/C room temperature sensor • Harness or connector between A/C room temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.

(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ROOM TEMP (Room temperature sensor)	Room temperature sensor / min.: -6.5°C (20.3°F), max.: 57.25°C (135.05°F)	Actual cabin temperature is displayed	-

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

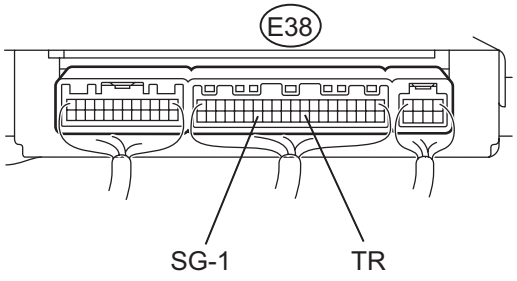
C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 INSPECT AIR CONDITIONING AMPLIFIER

AC

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E02

(a) Remove the A/C amplifier with the connectors still connected.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E38-29 (TR) - E38-34 (SG-1)	Ignition switch on (IG) at 25°C (77°F)	1.35 to 1.75 V
E38-29 (TR) - E38-34 (SG-1)	Ignition switch on (IG) at 40°C (104°F)	0.9 to 1.2 V

HINT:

As the temperature increases, the voltage decreases.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

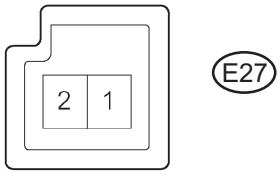
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

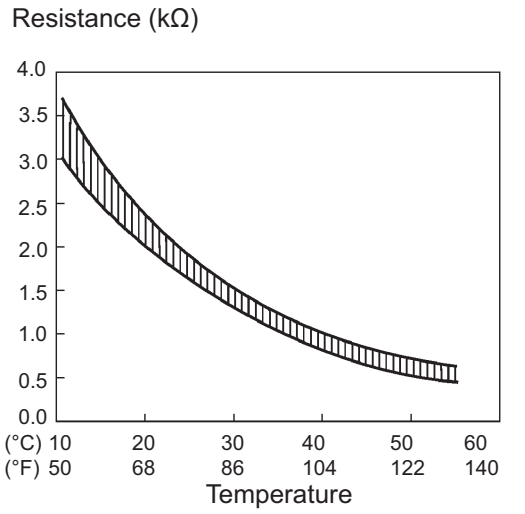
C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

3 INSPECT A/C ROOM TEMPERATURE SENSOR

A/C Room Temperature Sensor Connector Front View:





(a) Remove the A/C room temperature sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E27-1 - E27-2	10°C (50°F)	3.00 to 3.73 kΩ
E27-1 - E27-2	15°C (59°F)	2.45 to 2.88 kΩ
E27-1 - E27-2	20°C (68°F)	1.95 to 2.30 kΩ
E27-1 - E27-2	25°C (77°F)	1.60 to 1.80 kΩ
E27-1 - E27-2	30°C (86°F)	1.28 to 1.47 kΩ
E27-1 - E27-2	35°C (95°F)	1.00 to 1.22 kΩ
E27-1 - E27-2	40°C (104°F)	0.80 to 1.00 kΩ
E27-1 - E27-2	45°C (113°F)	0.65 to 0.85 kΩ
E27-1 - E27-2	50°C (122°F)	0.50 to 0.70 kΩ
E27-1 - E27-2	55°C (131°F)	0.44 to 0.60 kΩ
E27-1 - E27-2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Hold the sensor only by its connector. Touching the sensor may change the resistance value.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph).

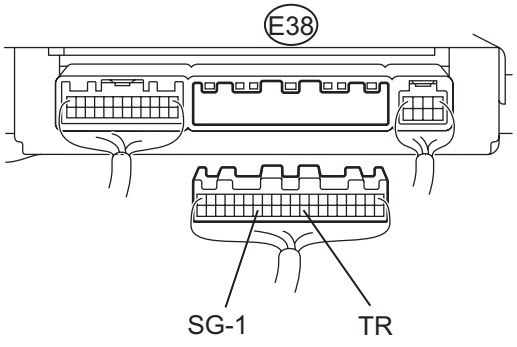
NG → **REPLACE A/C ROOM TEMPERATURE SENSOR**

OK

AC

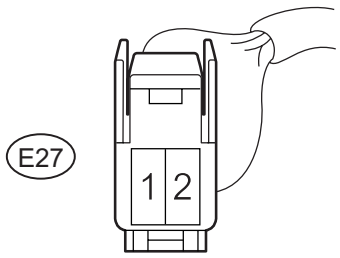
4	CHECK HARNESS AND CONNECTOR (A/C ROOM TEMPERATURE SENSOR - AIR CONDITIONING AMPLIFIER)

A/C Amplifier Connector Wire Harness View:



(a) Disconnect the connector from the A/C amplifier.

A/C Room Temperature Sensor Connector Front View:



(b) Disconnect the connector from the A/C room temperature sensor.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E38-29 (TR) - E27-1	Always	Below 1 Ω
E38-34 (SG-1) - E27-2	Always	Below 1 Ω
E38-29 (TR) - Body ground	Always	10 kΩ or higher
E38-34 (SG-1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

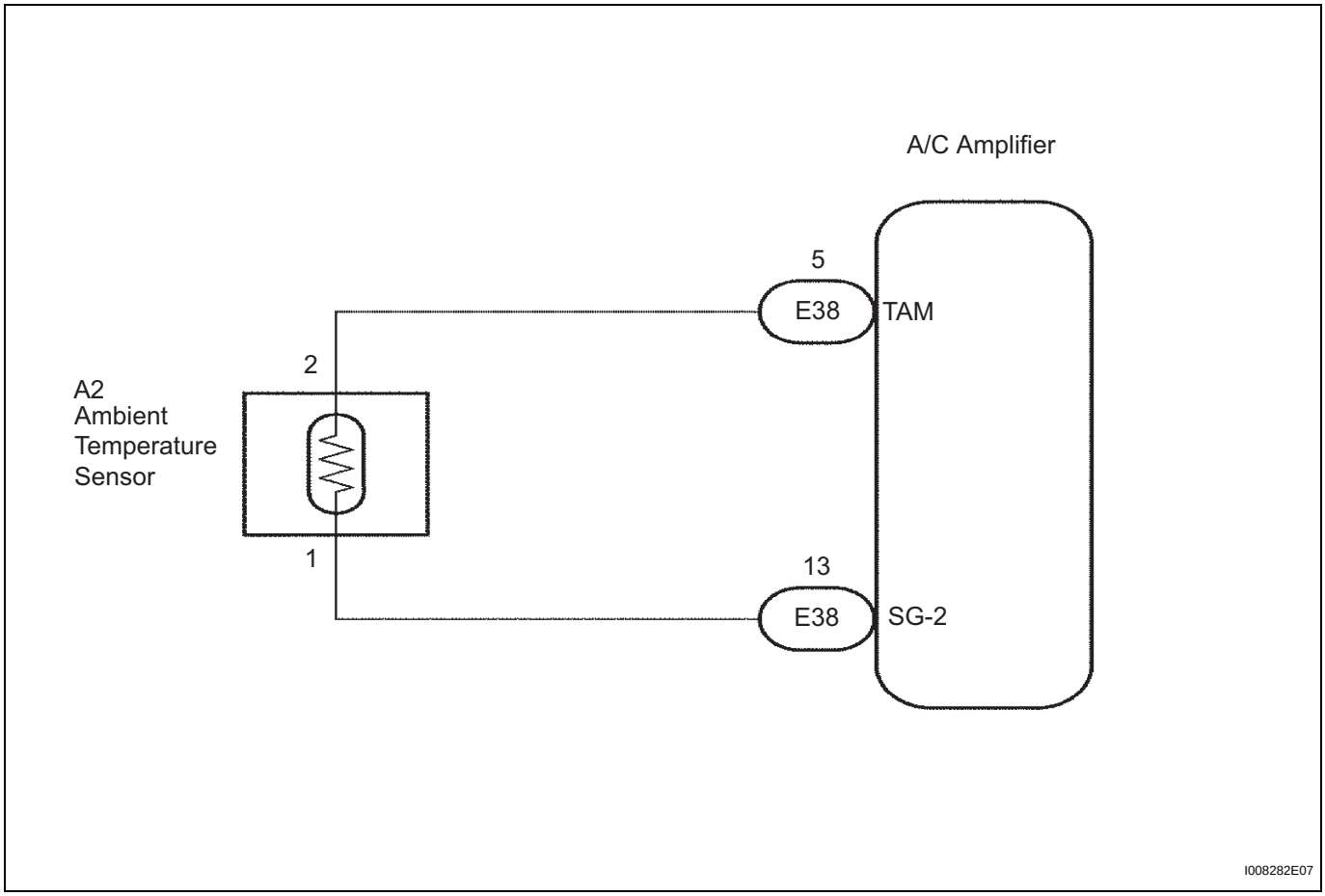
DTC	B1412/12	Ambient Temperature Sensor Circuit

DESCRIPTION

The ambient temperature sensor is installed in front of the condenser to detect the ambient temperature which is used to control the air conditioner "AUTO" mode. This sensor is connected to the A/C amplifier and detects fluctuations in the ambient temperature. This data is used for controlling the cabin temperature. The sensor sends a signal to the A/C amplifier. The resistance of the ambient temperature sensor changes in accordance with the ambient temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.
The A/C amplifier applies voltage (5 V) to the ambient temperature sensor and reads voltage changes as the resistance of the ambient temperature sensor changes.

DTC No.	DTC Detection Condition	Trouble Area
B1412/12	Open or short in ambient temperature sensor circuit	• Ambient temperature sensor • Harness or connector between ambient temperature sensor and A/C amplifier • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AMBI TEMP SENS (Ambient temperature sensor)	Ambient temperature sensor / Min: -23.3°C (-9.94°F), Max: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open in circuit: -23.3°C (-9.94°F) Short in circuit: 65.95°C (150.71°F)

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

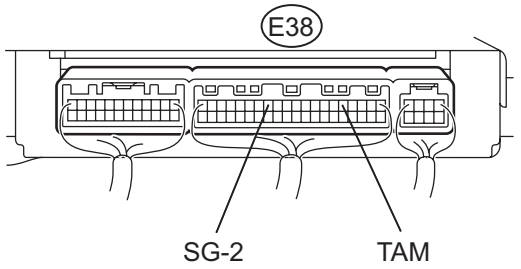
C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

AC

2 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E15

(a) Remove the A/C amplifier connectors still connected.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
E38-5 (TAM) - E38-13 (SG-2)	Ignition switch on (IG) at 25°C (77°F)	1.35 to 1.75 V
E38-5 (TAM) - E38-13 (SG-2)	Ignition switch on (IG) at 40°C (104°F)	0.9 to 1.2 V

HINT:
As the temperature increases, the voltage decreases.
Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

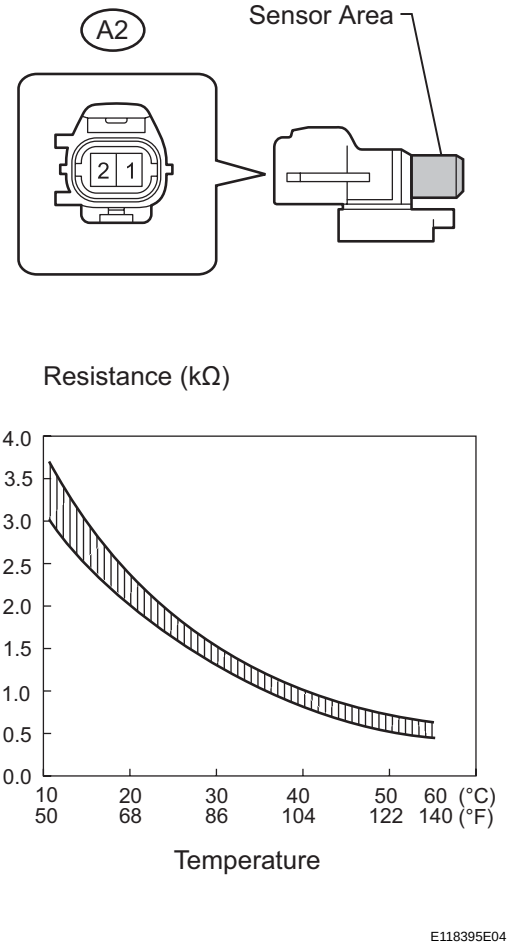
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → REPLACE AIR CONDITIONING AMPLIFIER

A

3 INSPECT AMBIENT TEMPERATURE SENSOR

Ambient Temperature Sensor Connector Front View:



(a) Remove the ambient temperature sensor.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A2-1 - A2-2	10°C (50°F)	3.00 to 3.73 kΩ
A2-1 - A2-2	15°C (59°F)	2.45 to 2.88 kΩ
A2-1 - A2-2	20°C (68°F)	1.95 to 2.30 kΩ
A2-1 - A2-2	25°C (77°F)	1.60 to 1.80 kΩ
A2-1 - A2-2	30°C (86°F)	1.28 to 1.47 kΩ
A2-1 - A2-2	35°C (95°F)	1.00 to 1.22 kΩ
A2-1 - A2-2	40°C (104°F)	0.80 to 1.00 kΩ
A2-1 - A2-2	45°C (113°F)	0.65 to 0.85 kΩ
A2-1 - A2-2	50°C (122°F)	0.50 to 0.70 kΩ
A2-1 - A2-2	55°C (131°F)	0.44 to 0.60 kΩ
A2-1 - A2-2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph).

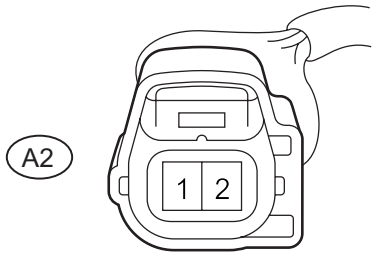
NG → REPLACE AMBIENT TEMPERATURE SENSOR

OK

AC

4	CHECK HARNESS AND CONNECTOR (AMBIENT TEMPERATURE SENSOR - A/C AMPLIFIER)

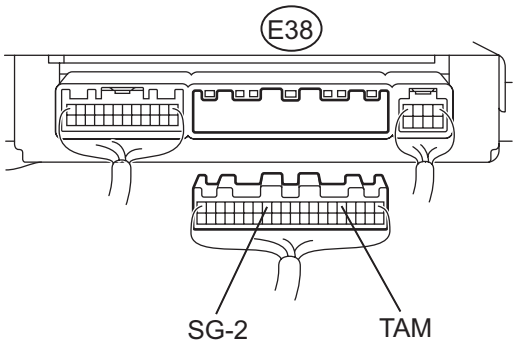
Ambient Temperature Sensor Connector Front View:



H E124473E02

(a) Disconnect the ambient temperature sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E03

(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A2-2 - E38-5 (TAM)	Always	Below 1 Ω
A2-1 - E38-13 (SG-2)	Always	Below 1 Ω
E38-5 (TAM) - Body ground	Always	10 kΩ or higher
E38-13 (SG-2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

DTC	B1413/13	Evaporator Temperature Sensor Circuit

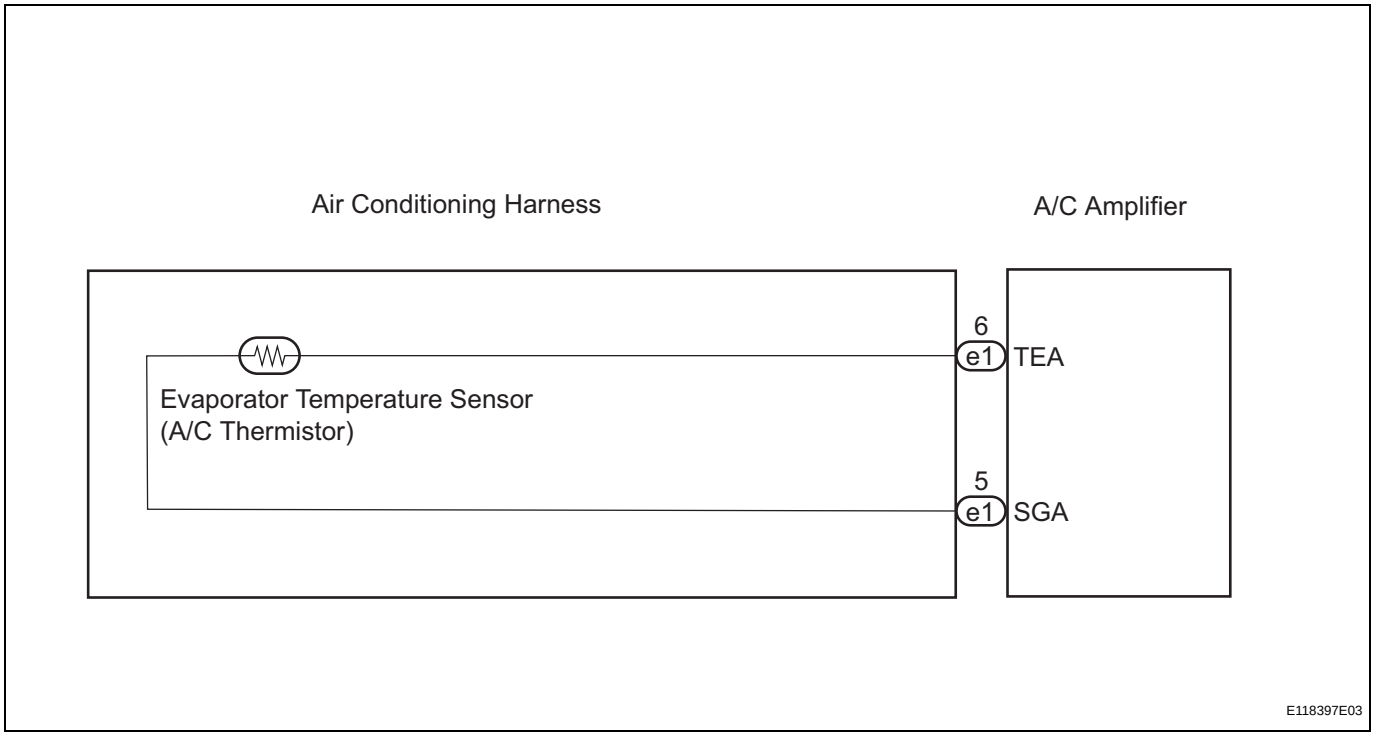
DESCRIPTION

The evaporator temperature sensor (A/C thermistor) is installed on the evaporator in the air conditioning unit. It detects the temperature of the cooled air that has passed through the evaporator and its signal is used to control the air conditioning. It sends a signal to the A/C amplifier. The resistance of the evaporator temperature sensor (A/C thermistor) changes in accordance with the temperature of the cooled air that has passed through the evaporator. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The A/C amplifier applies voltage (5 V) to the evaporator temperature sensor (A/C thermistor) and reads voltage changes as the resistance of the evaporator temperature sensor (A/C thermistor) changes. This sensor is used to prevent the evaporator from freezing.

DTC No.	DTC Detection Condition	Trouble Area
B1413/13	Open or short in evaporator temperature sensor circuit	• Air conditioning harness (evaporator temperature sensor) • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.

(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
EVAP FIN TEMP (Evaporator fin thermistor)	Evaporator fin thermistor / Min.: -29.7°C (-21.46°F), Max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	Open in circuit: -29.7°C (-21.46°F) Short in circuit: 59.55°C (139.19°F)

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

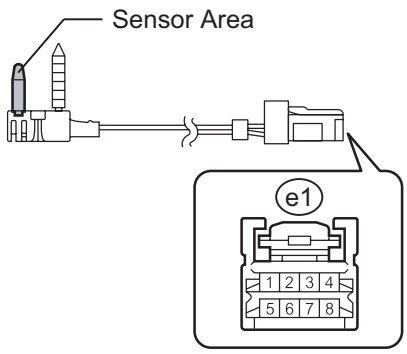
C → REPLACE AIR CONDITIONING AMPLIFIER

A

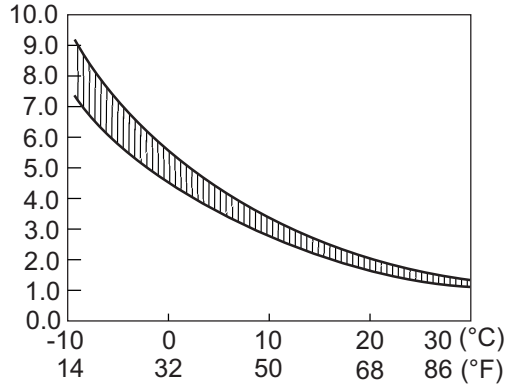
2	INSPECT AIR CONDITIONING HARNESS

Air Conditioning Harness:

(A/C Evaporator Temperature Sensor)



Resistance (kΩ)



Temperature

H

E124474E01

(a) Remove the air conditioning harness (evaporator temperature sensor).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
e1-5 - e1-6	-10°C (14°F)	7.30 to 9.10 kΩ
e1-5 - e1-6	-5°C (23°F)	5.65 to 6.95 kΩ
e1-5 - e1-6	0°C (32°F)	4.40 to 5.35 kΩ
e1-5 - e1-6	5°C (41°F)	3.40 to 4.15 kΩ
e1-5 - e1-6	10°C (50°F)	2.70 to 3.25 kΩ
e1-5 - e1-6	15°C (59°F)	2.14 to 2.58 kΩ
e1-5 - e1-6	20°C (68°F)	1.71 to 2.05 kΩ
e1-5 - e1-6	25°C (77°F)	1.38 to 1.64 kΩ
e1-5 - e1-6	30°C (86°F)	1.11 to 1.32 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE AIR CONDITIONING HARNESS**

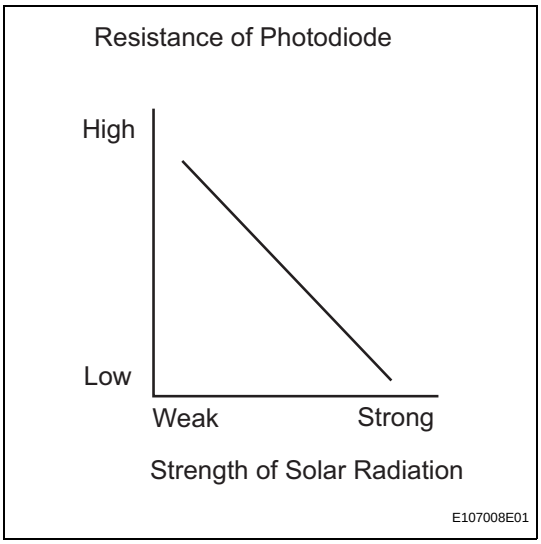
OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

DTC	B1421/21	Solar Sensor Circuit (Passenger Side)

DESCRIPTION

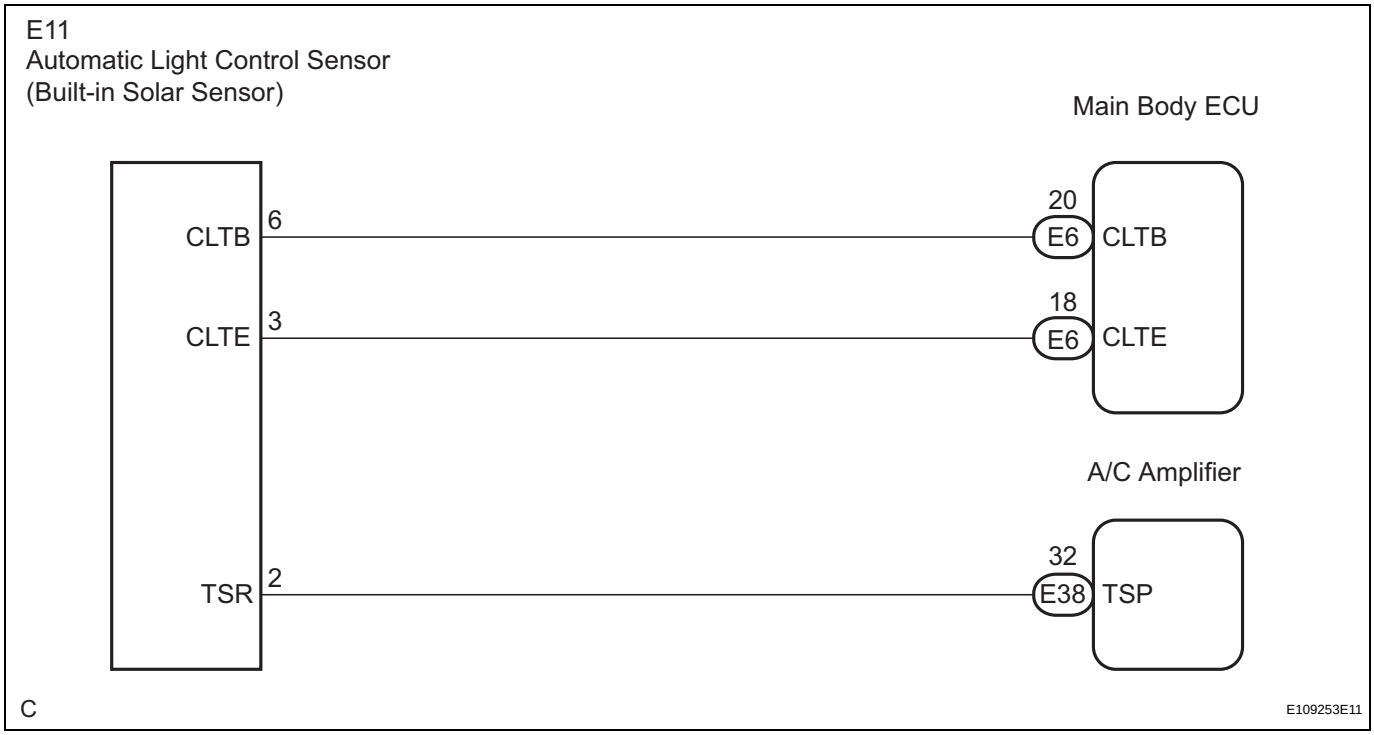


The solar sensor, which is installed on the upper side of the instrument panel, detects sunlight and controls the air conditioning in AUTO mode. The output voltage from the solar sensor varies according to the amount of sunlight. When the sunlight increases, the output voltage increases. As the sunlight decreases, the output voltage decreases. The A/C amplifier detects voltage output from the solar sensor.

DTC No.	DTC Detection Condition	Trouble Area
B1421/21	Open or short in passenger side solar sensor circuit	• Solar sensor • Harness or connector between solar sensor and A/C amplifier • Harness or connector between solar sensor and main body ECU • A/C amplifier • Main body ECU

AC

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC B1244 is output at the same time, troubleshoot DTC B1244 first (See page LI-23).
- If the check is performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) may be output even though the system is normal.

AC

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Expose the sensing portion of the solar sensor to light.
HINT:
Use an incandescent light for inspection.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measure Item / Display (Range)	Normal Condition	Diagnostic Note
SOLAR SENS-P (Solar sensor (P side))	Passenger side solar sensor / Min.: 0, Max.: 255	Passenger side solar sensor value increases as brightness increases	-

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

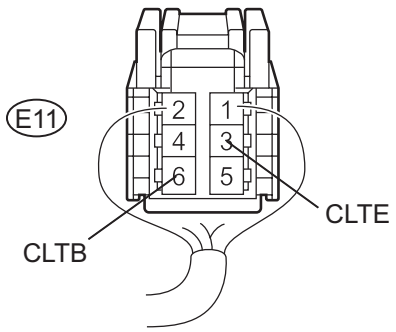
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR)

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(a) Disconnect the solar sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-6 (CLTB) - E11-3 (CLTE)	Ignition switch off	Below 1 V
E11-6 (CLTB) - E11-3 (CLTE)	Ignition switch on (IG)	10 to 14 V

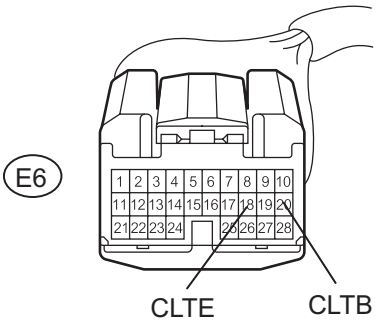
OK → Go to step 4

NG

AC

3 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - SOLAR SENSOR)

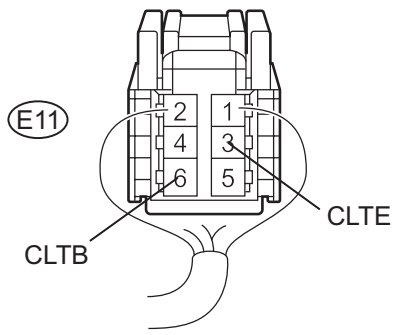
Main Body ECU Connector Front View:



H E124475E02

(a) Disconnect the main body ECU connector.

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E6-20 (CLTB) - E11-6 (CLTB)	Always	Below 1 Ω
E6-18 (CLTE) - E11-3 (CLTE)	Always	Below 1 Ω
E6-20 (CLTB) - Body ground	Always	10 kΩ or higher
E6-18 (CLTE) - Body ground	Always	10 kΩ or higher

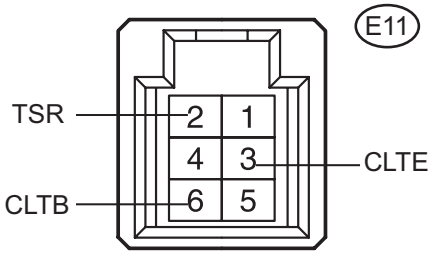
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

4 CHECK SOLAR SENSOR

Solar Sensor Connector Front View:



P E109215E12

(a) Remove the solar sensor with its connector still connected.

(b) Connect the positive (+) lead from the battery to terminal 6 (CLTB), and the negative (-) lead to terminal 3 (CLTE) of the solar sensor.

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-2 (TSR) - E11-3 (CLTE)	Sensor is subjected to electric light	0.8 to 4.3 V
E11-2 (TSR) - E11-3 (CLTE)	Sensor is covered with a cloth	Below 0.8 V

NOTICE:

- **The connection procedure for using a digital tester such as a TOYOTA electrical tester is shown above. When using an analog tester, connect the negative (-) lead to terminal 6, and the positive (+) lead to terminal 3 of the solar sensor.**
- **While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.**

HINT:

- Use an incandescent light for inspection. Bring it within about 30 cm (11.8 in.) of the solar sensor.
- As the inspection light is moved away from the sensor, the voltage increases.

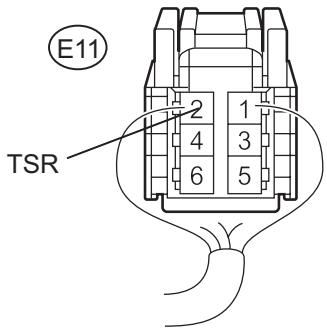
NG → **REPLACE SOLAR SENSOR**

AC

OK

5	CHECK HARNESS AND CONNECTOR (SOLAR SENSOR - A/C AMPLIFIER)

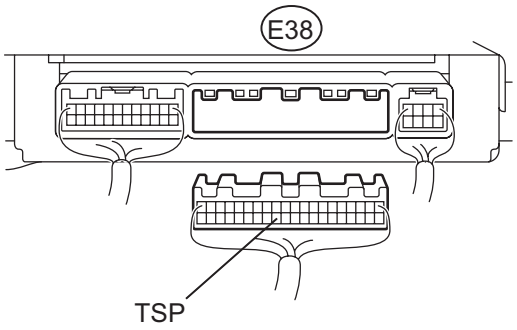
A/C Solar Sensor Connector Wire Harness View:



H E124476E03

(a) Disconnect the solar sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E04

(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-32 (TSP) - E11-2 (TSR)	Always	Below 1 Ω
E38-32 (TSP) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

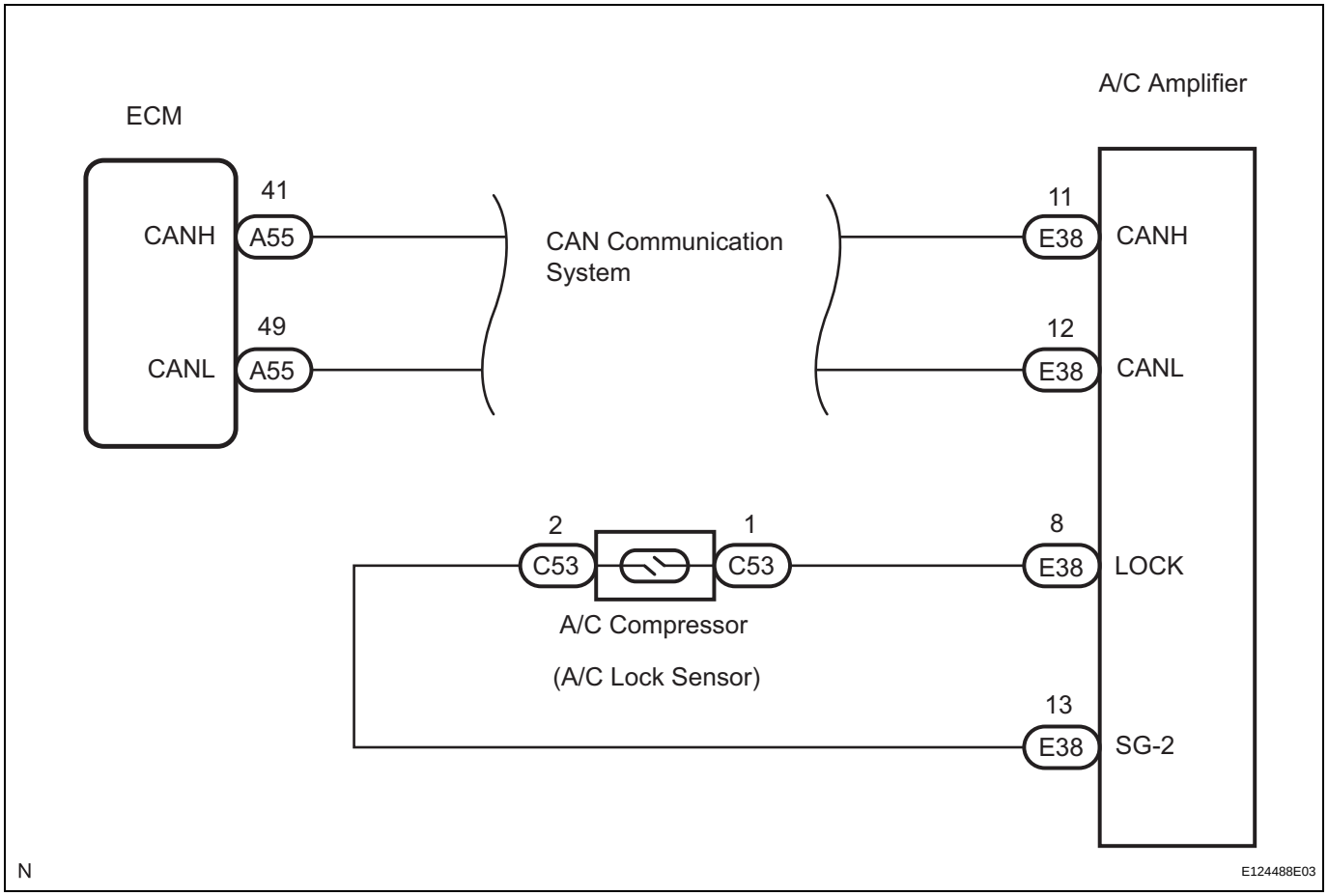
DTC	B1422/22	Compressor Lock Sensor Circuit

SYSTEM DESCRIPTION

The ECM sends a signal to the A/C amplifier via CAN communication.
The A/C amplifier reads the difference between compressor speed and engine speed. When the difference becomes too large, the A/C amplifier determines that the compressor locks, and turns the magnetic clutch off.

DTC No.	DTC Detection Condition	Trouble Area
B1422/22	Open or short in compressor lock sensor circuit	• A/C compressor (A/C lock sensor) • Compressor drive belt • Harness or connector between compressor and magnetic clutch (A/C lock sensor) • A/C amplifier • CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.

Result

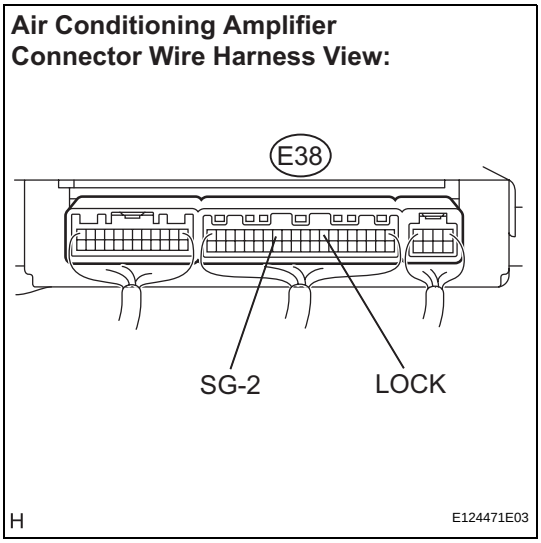
Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → GO TO CAN COMMUNICATION SYSTEM

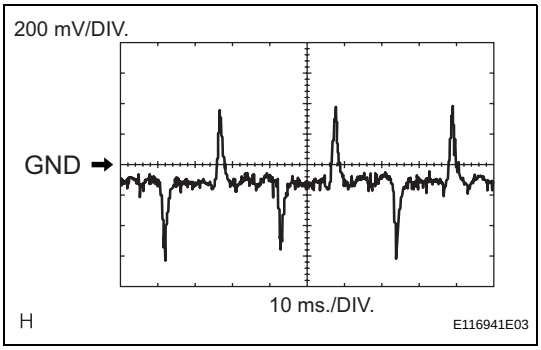
A

2 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with the connectors still connected.



(b) Measure the waveform of the connector.

Item	Contents
Tool setting	200 mV/DIV., 10 ms./DIV.
Vehicle condition	Engine is running A/C switch: ON Blower switch: LO

Standard

Tester Connection (Symbols)	Condition	Specified Condition
E38-8 (LOCK) - E38-13 (SG-2)	Engine is running A/C switch: ON Blower switch: LO	Pulse generation

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

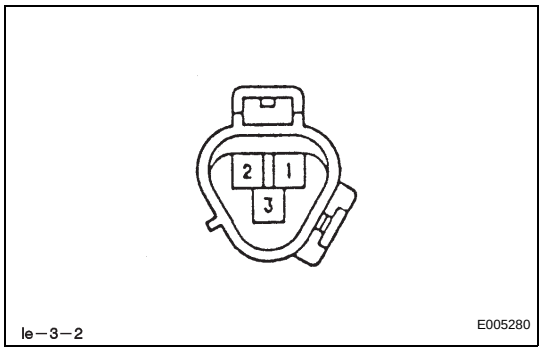
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

AC

A

3 INSPECT COMPRESSOR AND MAGNETIC CLUTCH (A/C LOCK SENSOR)



(a) Disconnect the connector from the A/C compressor.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

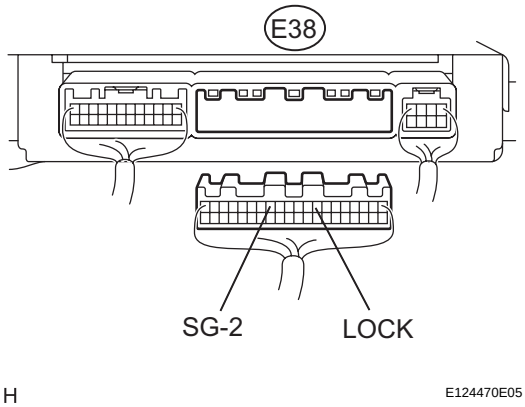
Tester Connection	Condition	Specified Condition
C53-1 (SSR+) - C53-2 (SSR-)	Always (at 20°C (68°F))	165 to 205 Ω

NG → **REPLACE COMPRESSOR AND MAGNETIC CLUTCH (A/C LOCK SENSOR)**

OK

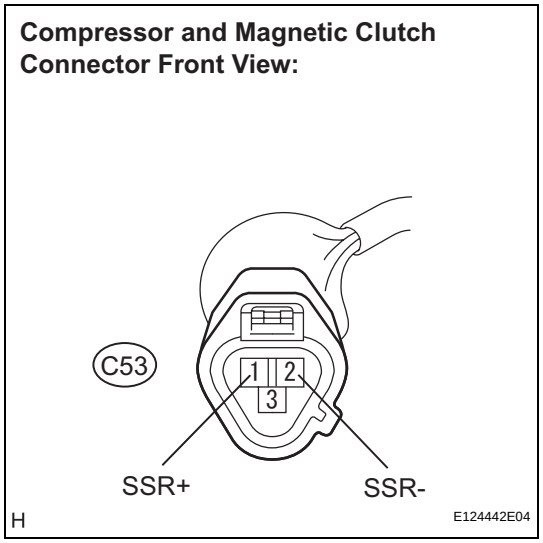
4 CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C LOCK SENSOR)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from the A/C amplifier.

Compressor and Magnetic Clutch Connector Front View:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E38-8 (LOCK) - C53-1 (SSR+)	Always	Below 1 Ω
E38-13 (SG-2) - C53-2 (SSR-)	Always	Below 1 Ω
E38-8 (LOCK) - Body ground	Always	10 kΩ or higher
E38-13 (SG-2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

AC

OK

REPLACE AIR CONDITIONING AMPLIFIER

DTC	B1423/23	Pressure Sensor Circuit

DESCRIPTION

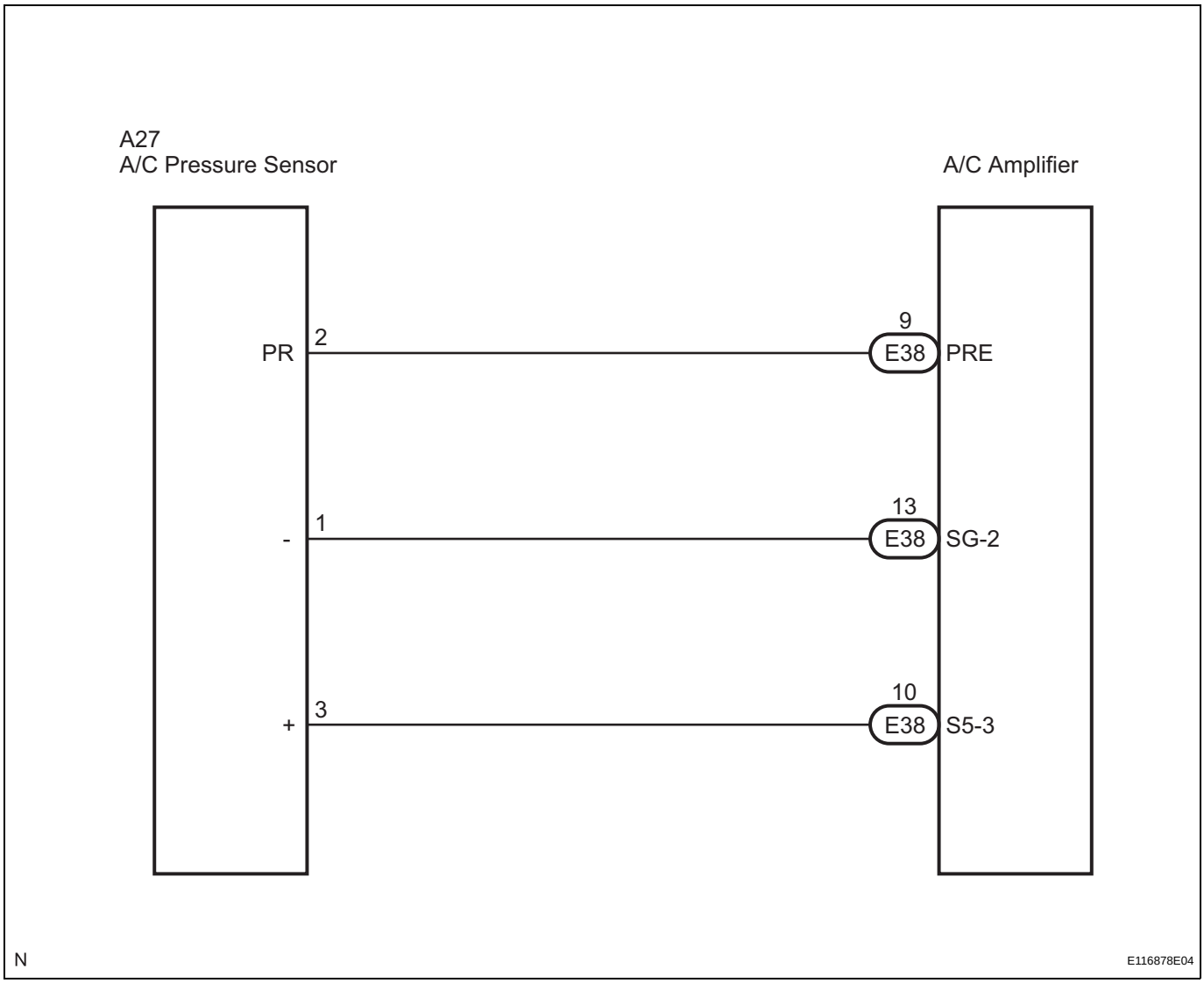
This DTC is output when refrigerant pressure is extremely low (0.19 MPa (2.0 kgf/cm^2, 28 psi) or less) or extremely high (3.14 MPa (32.0 kgf/cm^2, 455 psi) or more). The pressure sensor, which is installed on the pipe of the high pressure side to detect refrigerant pressure, outputs a refrigerant pressure signal to the A/C amplifier. The A/C amplifier converts this signal to pressure according to the sensor characteristics to control the compressor.

HINT:

Be sure to check the refrigerant volume first when this DTC is output because this DTC can also be output if there is no refrigerant in the system.

DTC No.	DTC Detection Condition	Trouble Area
B1423/23	Open or short in pressure switch circuit	• Pressure sensor • Harness or connector between pressure sensor and A/C amplifier • Refrigerant pipe line • A/C amplifier

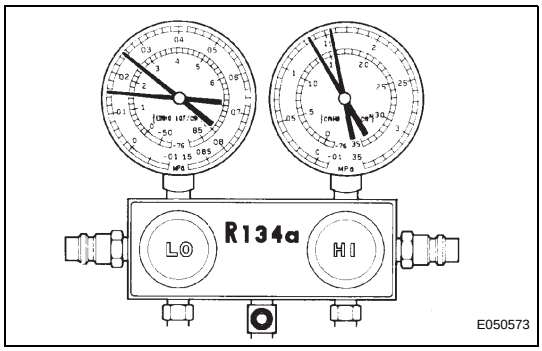
WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK REFRIGERANT PRESSURE



(a) Install the manifold gauge set (See page AC-120).
(b) Read the manifold gauge pressure when the following conditions are established.
  (1) Prepare the vehicle according to the chart below.

Item	Condition
Vehicle Doors	Fully open
Temperature Setting	MAX COLD
Blower Speed	HI
A/C switch	ON
R/F Switch	RECIRCULATION (30 to 35°C (86 to 95°F))

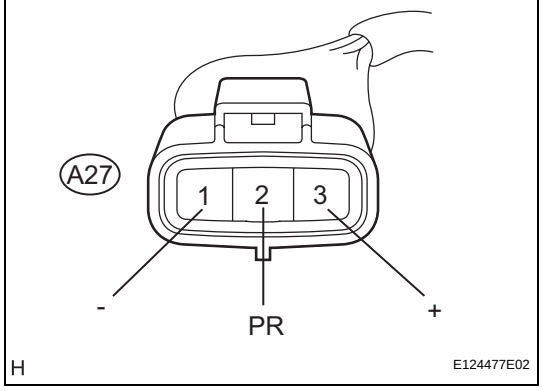
Standard pressure:
Low pressure side:
0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2, 21.3 to 35.6 psi)
High pressure side:
1.37 to 1.57 MPa (14 to 16 kgf/cm^2, 199 to 228 psi)

NG → **CHARGE REFRIGERANT**

AC **OK**

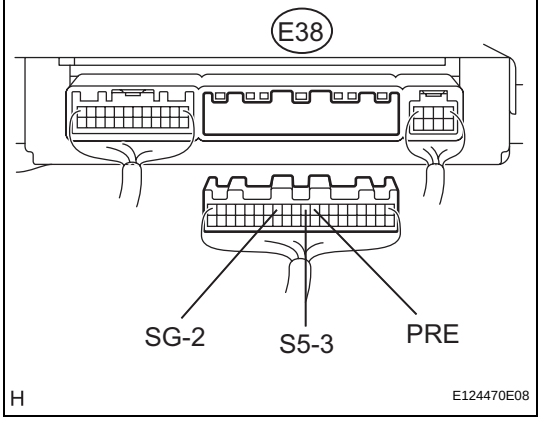
2	CHECK HARNESS AND CONNECTOR (PRESSURE SENSOR - A/C AMPLIFIER)

A/C Pressure Sensor Connector Front View:



(a) Disconnect the pressure sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

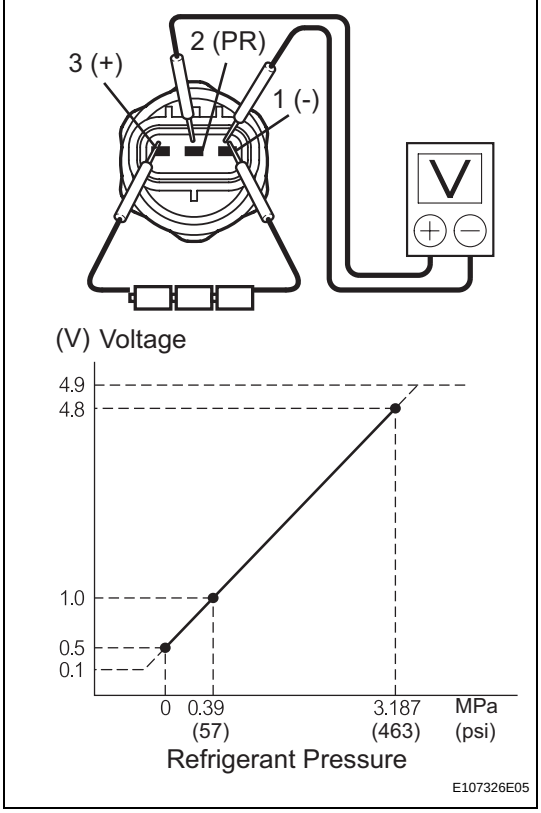
Tester Connection	Condition	Specified Condition
A27-2 (PR) - E38-9 (PRE)	Always	Below 1 Ω
A27-3 (+) - E38-10 (S5-3)	Always	Below 1 Ω
A27-1 (-) - E38-13 (SG-2)	Always	Below 1 Ω
E38-9 (PRE) - Body ground	Always	10 kΩ or higher
E38-10 (S5-3) - Body ground	Always	10 kΩ or higher
E38-13 (SG-2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT PRESSURE SENSOR

A/C Pressure Sensor Connector Front View:



(a) Install the manifold gauge set (See page AC-120).
(b) Connect the three 1.5 V dry cell batterie's positive (+) lead to terminal 3, and the negative (-) lead to terminal 1. Then connect the voltmeter's positive (+) lead to terminal 2, and the negative (-) lead to terminal 1. Measure the voltage.

OK:

The voltage changes according to refrigerant pressure, as shown in the graph.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the DTC)	B
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	C

B → **REPLACE AIR CONDITIONING AMPLIFIER**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

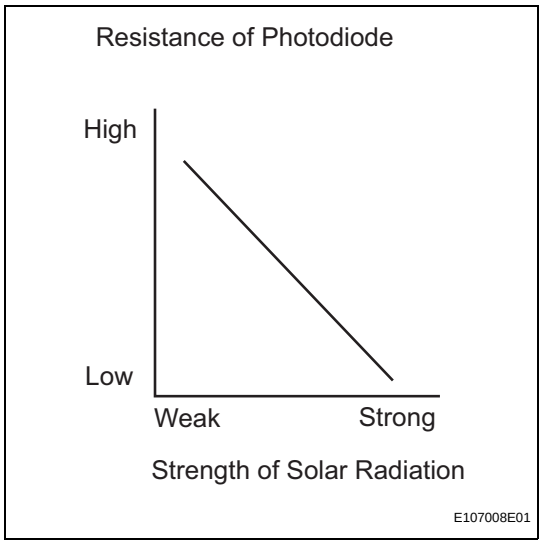
AC

A

REPLACE PRESSURE SENSOR

DTC	B1424/24	Solar Sensor Circuit (Driver Side)

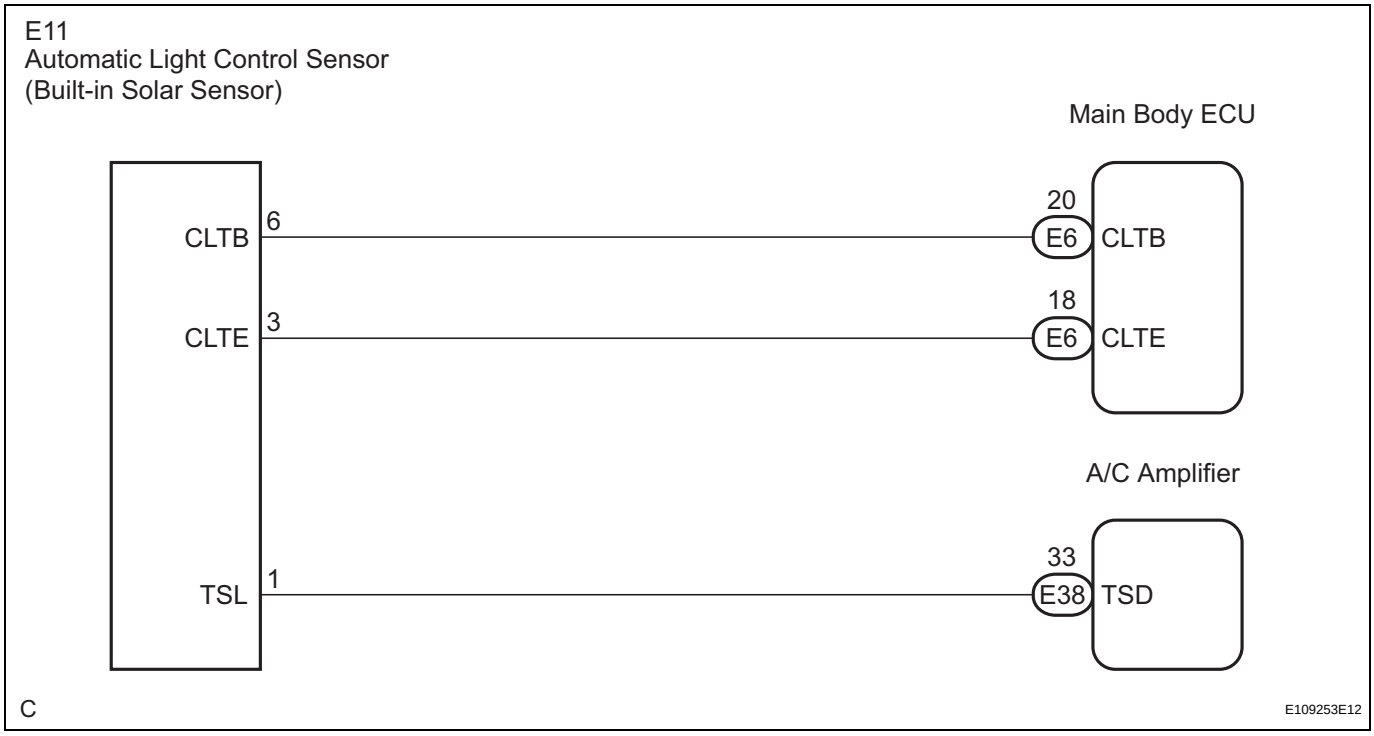
DESCRIPTION



The solar sensor, which is installed on the upper side of the instrument panel, detects sunlight and controls the air conditioning in AUTO mode. The output voltage from the solar sensor varies according to the amount of sunlight. When the sunlight increases, the output voltage increases. As the sunlight decreases, the output voltage decreases. The A/C amplifier detects output voltage from the solar sensor.

DTC No.	DTC Detection Condition	Trouble Area
B1424/24	Open or short in driver side solar sensor circuit	• Solar sensor • Harness or connector between solar sensor and A/C amplifier • Harness or connector between solar sensor and main body ECU • A/C amplifier • Main body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

AC

- If DTC B1244 is output at the same time, troubleshoot DTC B1244 first (See page LI-23).
- If the check is performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) may be output even though the system is normal.

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Expose the sensing portion of the solar sensor to light.
HINT:
Use an incandescent light for inspection.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measure Item / Display (Range)	Normal Condition	Diagnostic Note
SOLAR SENS-D (Solar sensor (D side))	Driver side solar sensor / Min.: 0, Max.: 255	Driver side solar sensor value increases as brightness increases	-

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

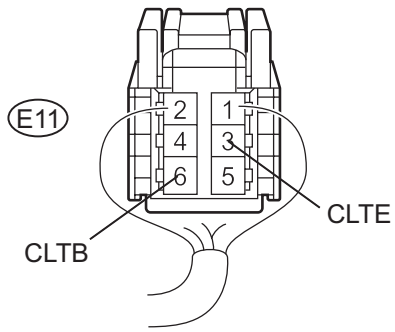
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR)

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(a) Disconnect the solar sensor connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-6 (CLTB) - E11-3 (CLTE)	Ignition switch on (IG)	10 to 14 V
E11-6 (CLTB) - E11-3 (CLTE)	Ignition switch off	Below 1 V

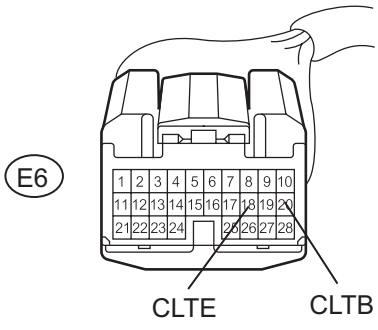
OK → Go to step 4

NG

AC

3 CHECK HARNESS AND CONNECTOR (SOLAR SENSOR - MAIN BODY ECU)

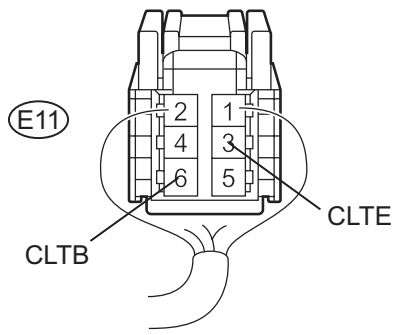
Main Body ECU Connector Front View:



H E124475E02

(a) Disconnect the main body ECU connector.

A/C Solar Sensor Connector Wire Harness View:



H E124476E02

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E6-20 (CLTB) - E11-6 (CLTB)	Always	Below 1 Ω
E6-18 (CLTE) - E11-3 (CLTE)	Always	Below 1 Ω
E6-20 (CLTB) - Body ground	Always	10 kΩ or higher
E6-18 (CLTE) - Body ground	Always	10 kΩ or higher

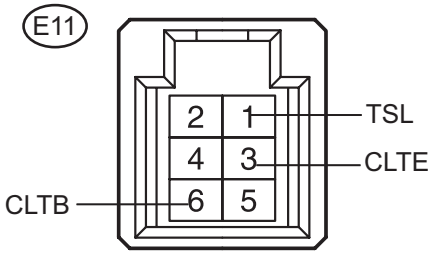
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

4 CHECK SOLAR SENSOR

Solar Sensor Connector Front View:



P E109215E15

(a) Remove the solar sensor with its connector still connected.

(b) Connect the positive (+) lead from the battery to terminal 6 (CLTB), and the negative (-) lead to terminal 3 (CLTE) of the solar sensor.

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-1 (TSL) - E11-3 (CLTE)	Sensor is subjected to electric light	0.8 to 4.3 V
E11-1 (TSL) - E11-3 (CLTE)	Sensor is covered with a cloth	Below 0.8 V

NOTICE:

- **The connection procedure for using a digital tester such as a TOYOTA electrical tester is shown above. When using an analog tester, connect the negative (-) lead to terminal 6, and the positive (+) lead to terminal 3 of the solar sensor.**
- **While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.**

HINT:

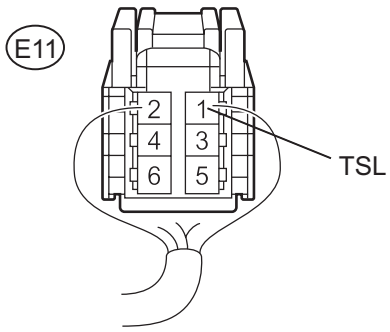
- Use an incandescent light for inspection. Bring it within about 30 cm (11.8 in.) of the solar sensor.
- As the inspection light is moved away from the sensor, the voltage increases.

NG → **REPLACE SOLAR SENSOR**

OK

5	CHECK HARNESS AND CONNECTOR (SOLAR SENSOR - A/C AMPLIFIER)

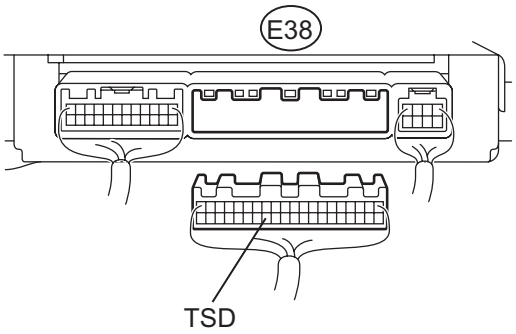
A/C Solar Sensor Connector Wire Harness View:



H E124476E04

(a) Disconnect the solar sensor connector.

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E09

(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E38-33 (TSD) - E11-1 (TSL)	Always	Below 1 Ω
E38-33 (TSD) - Body ground	Always	10 kΩ or higher

AC

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE AIR CONDITIONING AMPLIFIER

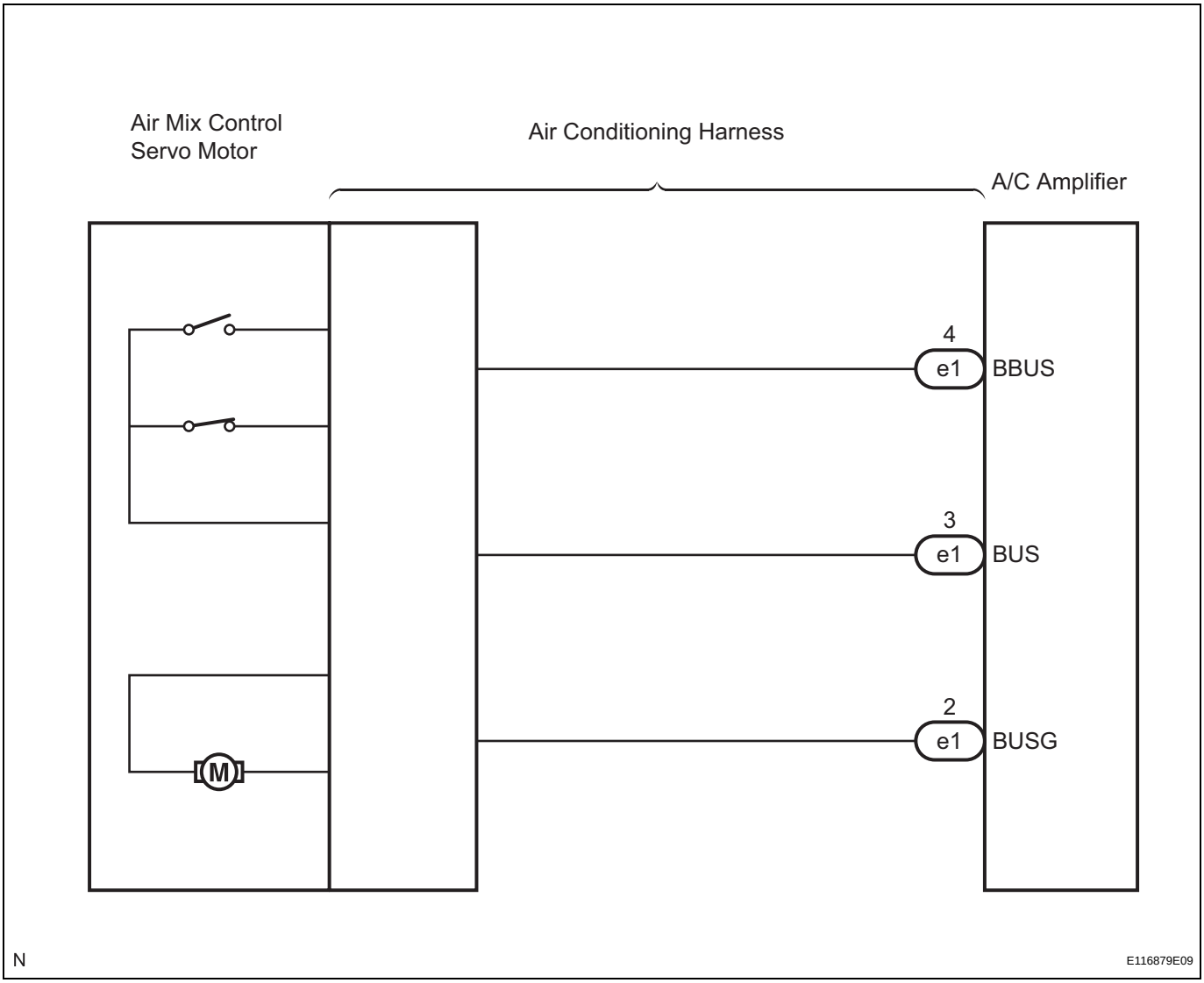
DTC	B1441/41	Air Mix Damper Control Servo Motor Circuit (Passenger Side)

DESCRIPTION

The air mix damper servo sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air mix damper (passenger seat) to any position, which adjusts the amount of air passing the heater core after passing the evaporator to control the blowing temperature.
HINT:
Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1441/41	Air mix damper position sensor value does not change even if air conditioning amplifier operates air mix control servo motor	• Air mix control servo motor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the front passenger side temperature adjustment switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AIR MIX PULSE-P (Air mix servomotor target pulse (P side))	Passenger side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX. COLD: 105 (pulse) MAX. HOT: 7 (pulse)	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

AC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2	REPLACE AIR MIX CONTROL SERVO MOTOR

(a) Replace the air mix control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1441/41 is output	A
DTC B1441/41 is not output	B

B → END

A

REPLACE AIR CONDITIONING HARNESS

DTC	B1442/42	Air Inlet Damper Control Servo Motor Circuit

DESCRIPTION

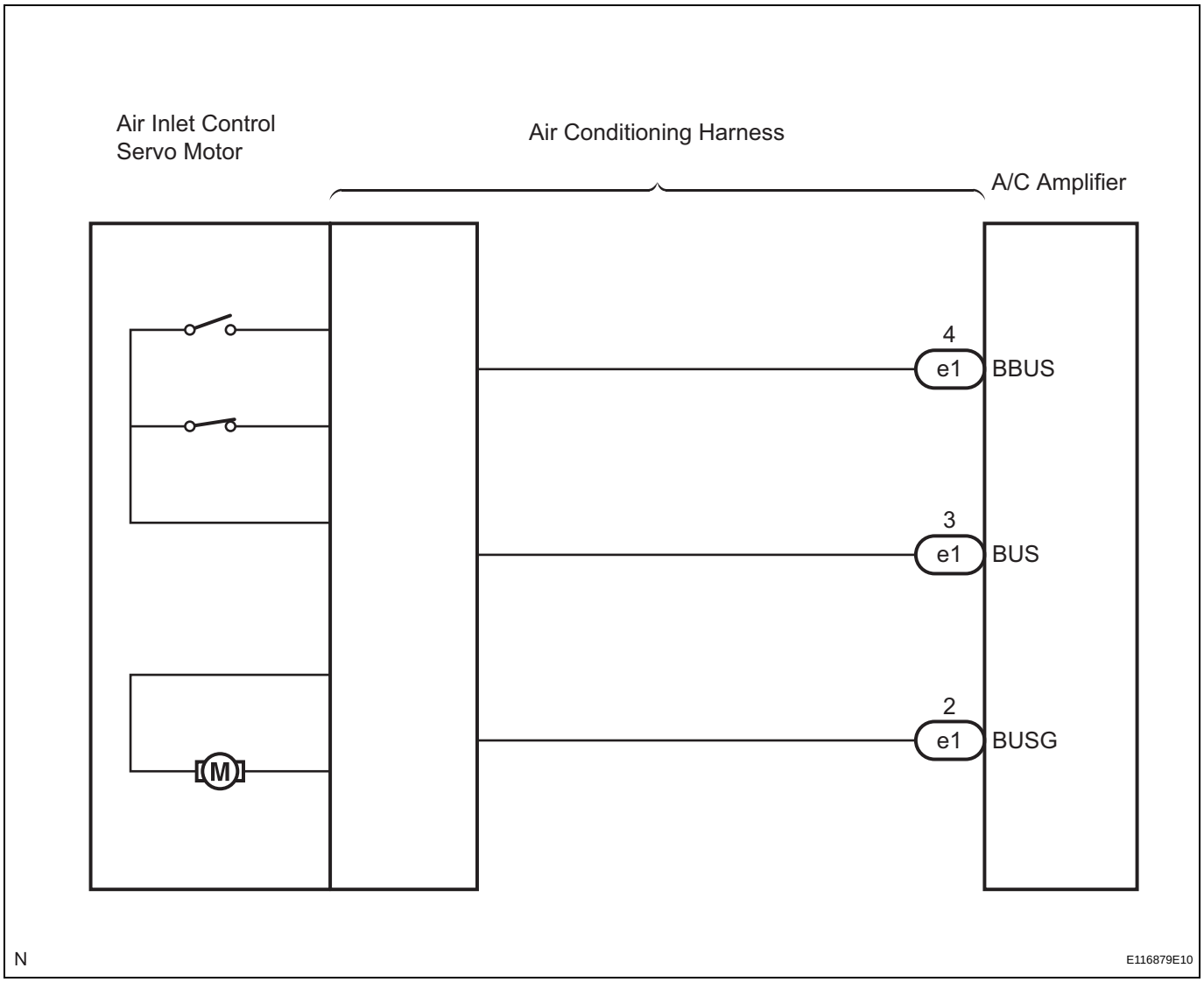
The damper servo (air inlet control) sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air inlet damper to any position, which controls the intake air settings (FRESH, FRESH/ RECIRCULATION, and RECIRCULATION).

HINT:

Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1442/42	Air inlet damper position sensor value does not change even if air conditioning amplifier operates air inlet control servo motor	• Air inlet control servo motor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the R/F (Recirculation/Fresh) switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/I DAMP PLS (Air inlet damper target pulse)	Air inlet damper target pulse / Min.: 0, Max.: 255	RECIRCULATION: 7 (pulse) FRESH: 28 (pulse)	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2	REPLACE AIR INLET CONTROL SERVO MOTOR

(a) Replace the air inlet control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1442/42 is output	A
DTC B1442/42 is not output	B

B → END

A

REPLACE AIR CONDITIONING HARNESS

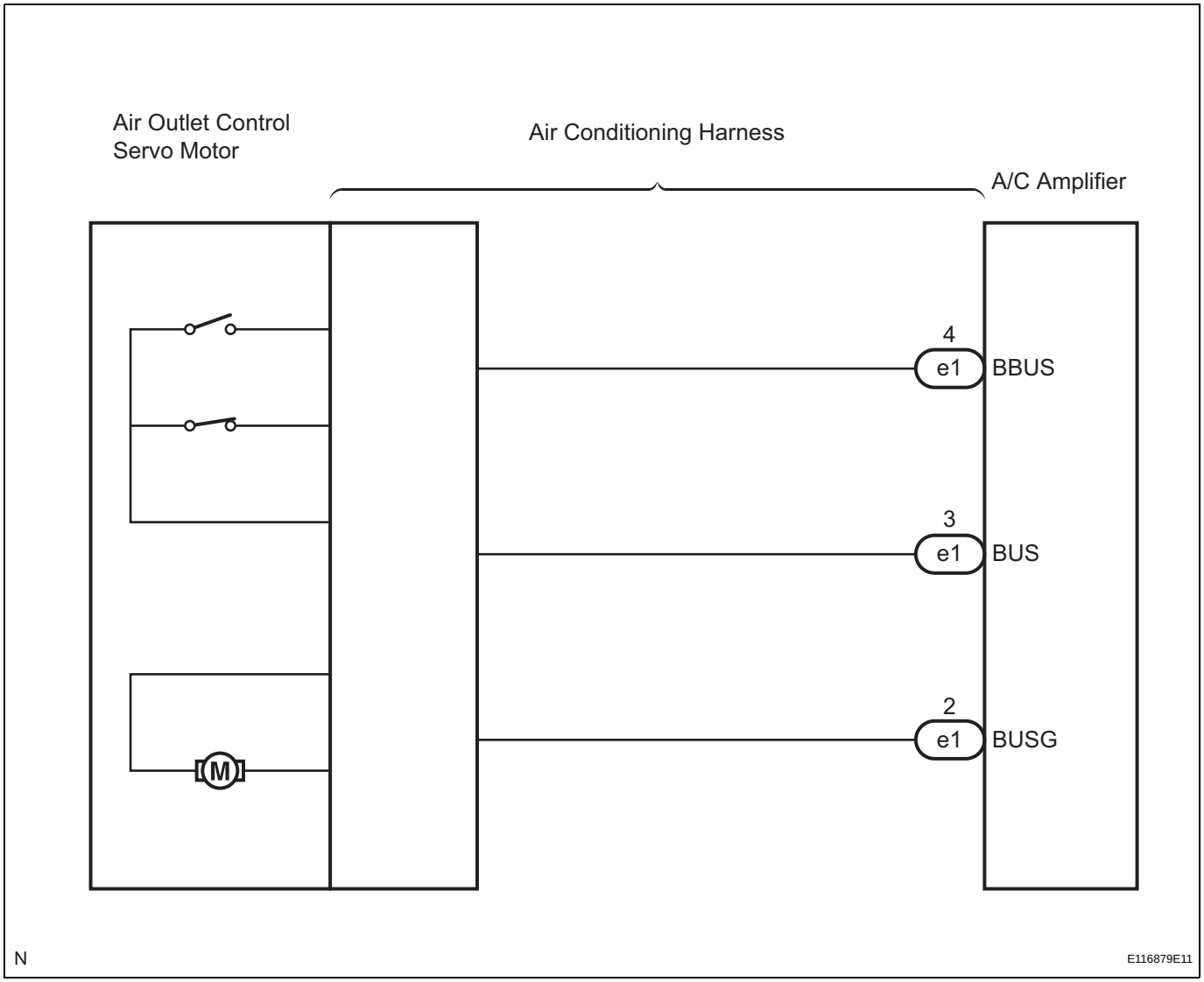
DTC	B1443/43	Air Outlet Damper Control Servo Motor Circuit

DESCRIPTION

The mode damper servo sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air outlet damper to any position, which controls the air outlet switching.
HINT:
Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1443/43	Air outlet damper position sensor value does not change even if air conditioning amplifier operates air outlet control servo motor	• Air outlet control servo motor • Air conditioning harness • A/C amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the MODE switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AIR OUT PULSE-D (Air outlet servomotor target pulse (D side))	Driver side air outlet servo motor target pulse / Min.: 0, Max.: 255	FACE: 8 (pulse) B/L: 30 to 38 (pulse) FOOT: 50 to 74 (pulse) FOOT/DEF: 80 (pulse) DEF: 97 (pulse)	-

OK:
The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

AC

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2	REPLACE AIR OUTLET CONTROL SERVO MOTOR

(a) Replace the air outlet control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1443/43 is output	A
DTC B1443/43 is not output	B

B → **END**

A

REPLACE AIR CONDITIONING HARNESS

DTC	B1446/46	Air Mix Damper Control Servo Motor Circuit (Driver Side)

DESCRIPTION

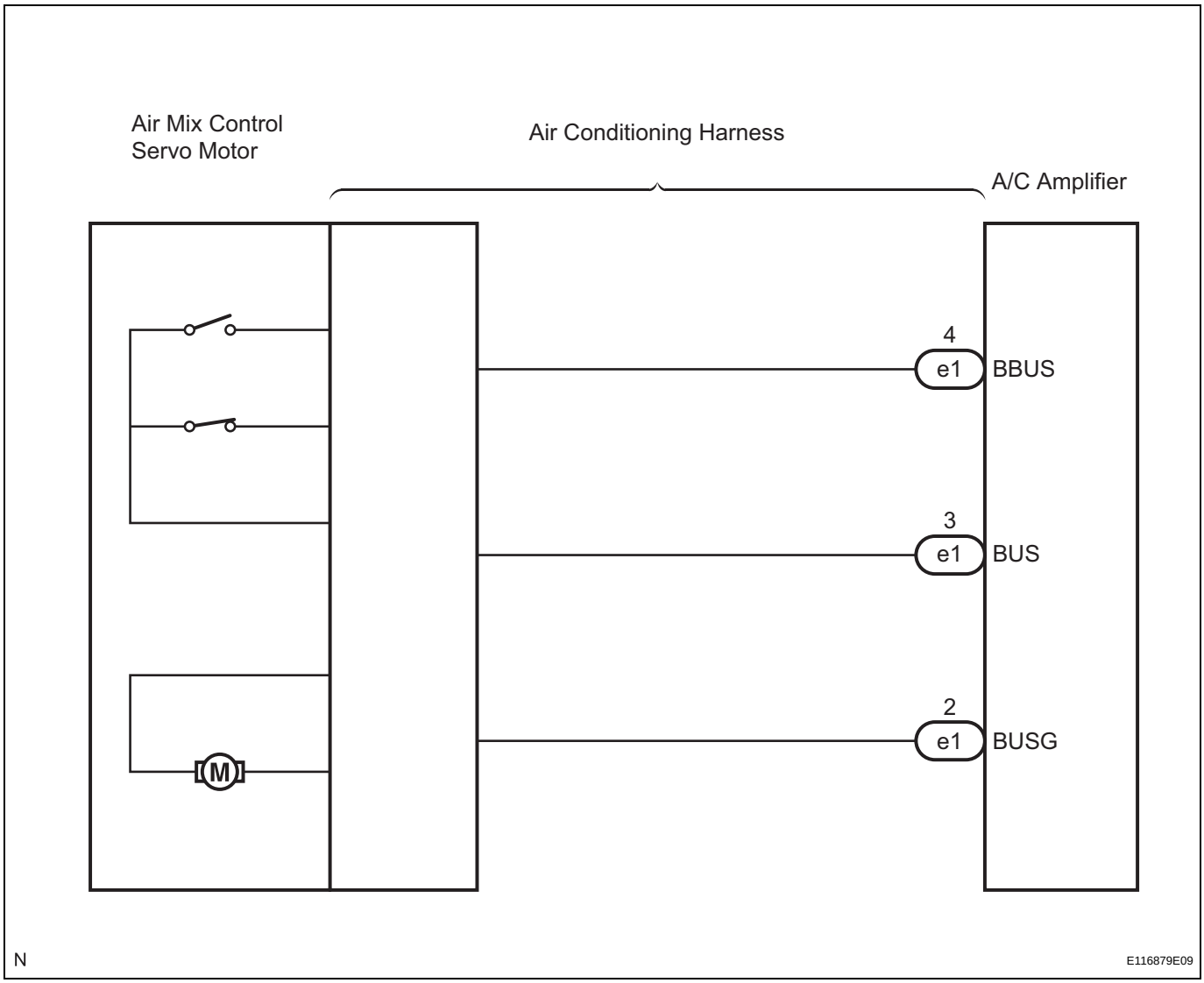
The air mix damper servo sends pulse signals to inform the air conditioning amplifier of the damper position. The air conditioning amplifier activates the motor (normal, reverse) based on the signals to move the air mix damper (driver seat) to any position. As a result, the amount of air passing through the heater core after passing through the evaporator is adjusted, and the temperature of the air blowing toward the driver seat side is controlled.

HINT:

Confirm that no mechanical problem is present because this diagnostic code can be output when either a damper link or damper is mechanically locked.

DTC No.	DTC Detection Condition	Trouble Area
B1446/46	Air mix damper position sensor value does not change even if air conditioning amplifier operates air mix control servo motor	• Air mix control servo motor • Air conditioning harness • Air amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Operate the driver side temperature adjustment switch.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / AIR CONDITIONER:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AIR MIX PULSE-D (Air mix servomotor target pulse (D side))	Driver side air mix servo motor target pulse / Min.: 0, Max.: 255	MAX COLD: 5 (pulse) MAX HOT: 103 (pulse)	-

OK:

The display is as specified in the normal condition column.

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2	REPLACE AIR MIX CONTROL SERVO MOTOR

(a) Replace the air mix control servo motor.
HINT:
Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a normal one and check that the condition returns to normal.
(b) Check for DTCs.
Result

Result	Proceed to
DTC B1446/46 is output	A
DTC B1446/46 is not output	B

B → END

A

REPLACE AIR CONDITIONING HARNESS

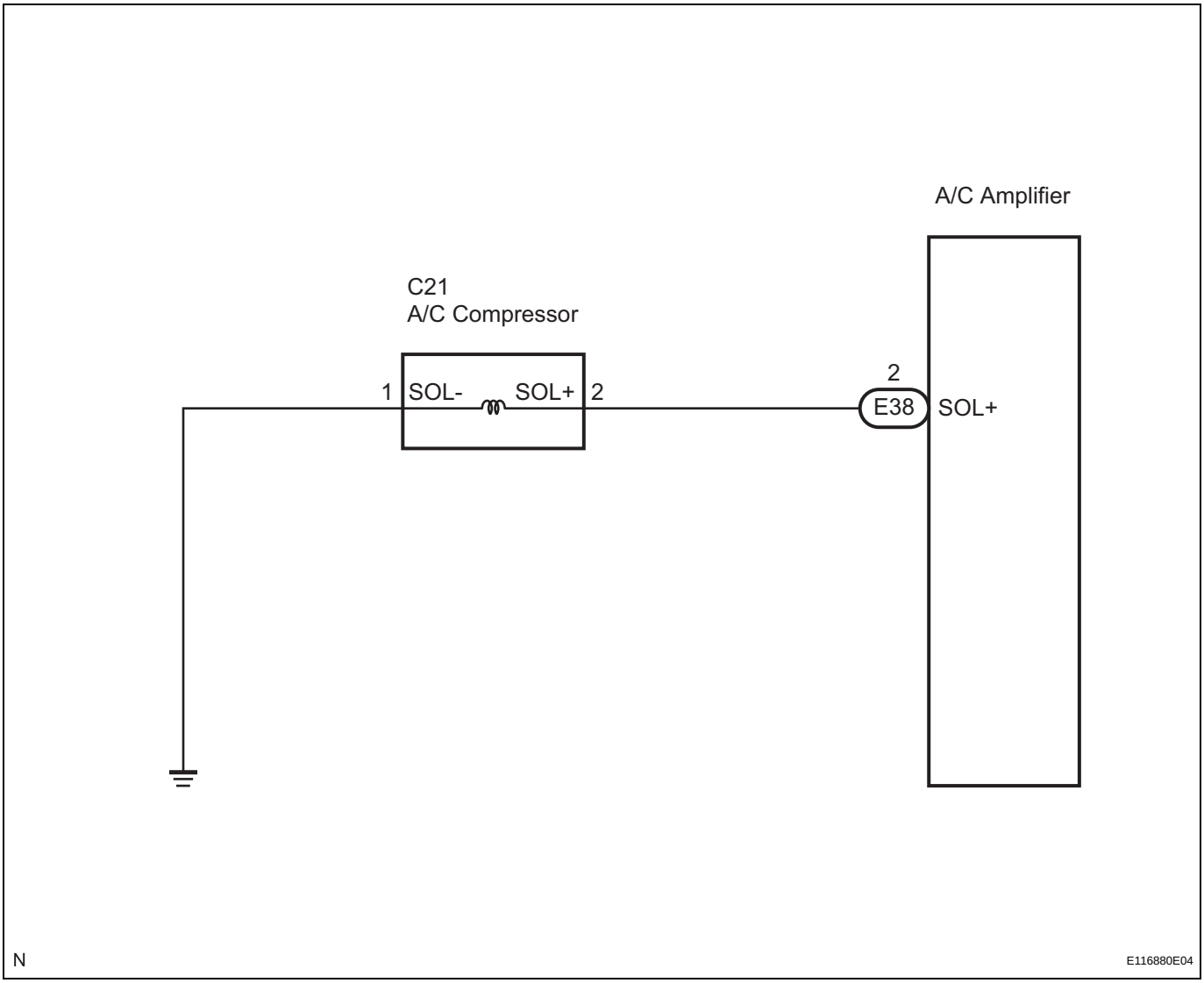
DTC	B1451/51	Compressor Solenoid Circuit

DESCRIPTION

In this circuit, the compressor receives a refrigerant compression demand signal from the air conditioning amplifier.
Based on this signal, the compressor changes the amount of compressor output.

DTC No.	DTC Detection Condition	Trouble Area
B1451/51	Open or short in solenoid of the externally changeable compressor circuit	• A/C compressor • Harness or connector between A/C amplifier and solenoid of externally changeable compressor • A/C amplifier

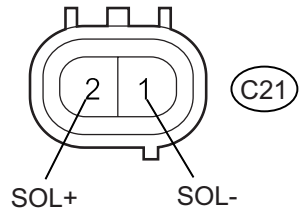
WIRING DIAGRAM



INSPECTION PROCEDURE

1 **INSPECT A/C COMPRESSOR**

A/C Compressor Connector Front View:



H E116970E02

(a) Disconnect the A/C compressor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

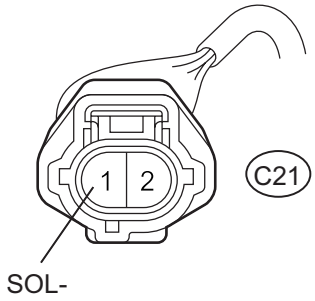
Tester Connection	Condition	Specified Condition
C21-2 (SOL+) - C21-1 (SOL-)	20°C (68°F)	10 to 11 Ω

NG → **REPLACE A/C COMPRESSOR**

OK

2 **CHECK HARNESS AND CONNECTOR (A/C COMPRESSOR - BODY GROUND)**

A/C Compressor Connector Front View:



H E116971E02

(a) Disconnect the A/C compressor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
C21-1 (SOL-) - Body ground	Always	Below 1 Ω

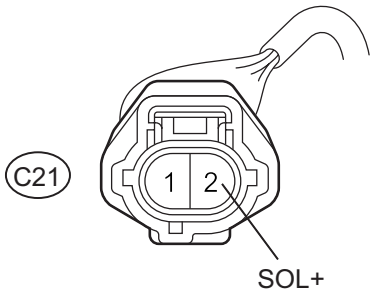
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

AC

3	CHECK HARNESS AND CONNECTOR (A/C COMPRESSOR - A/C AMPLIFIER)

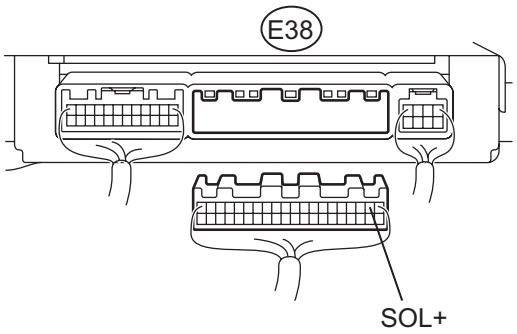
A/C Compressor Connector Front View:



H E116971E03

(a) Disconnect the A/C compressor connector.

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E10

(b) Disconnect the A/C amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E38-2 (SOL+) - C21-2 (SOL+)	Always	Below 1 Ω
E38-2 (SOL+) - Body ground	Always	10 kΩ or higher

Result

Result	Proceed to
NG	A
OK (When troubleshooting according to the PROBLEM SYMPTOMS TABLE)	B
OK (When troubleshooting according to the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

REPAIR OR REPLACE HARNESS OR CONNECTOR

AC

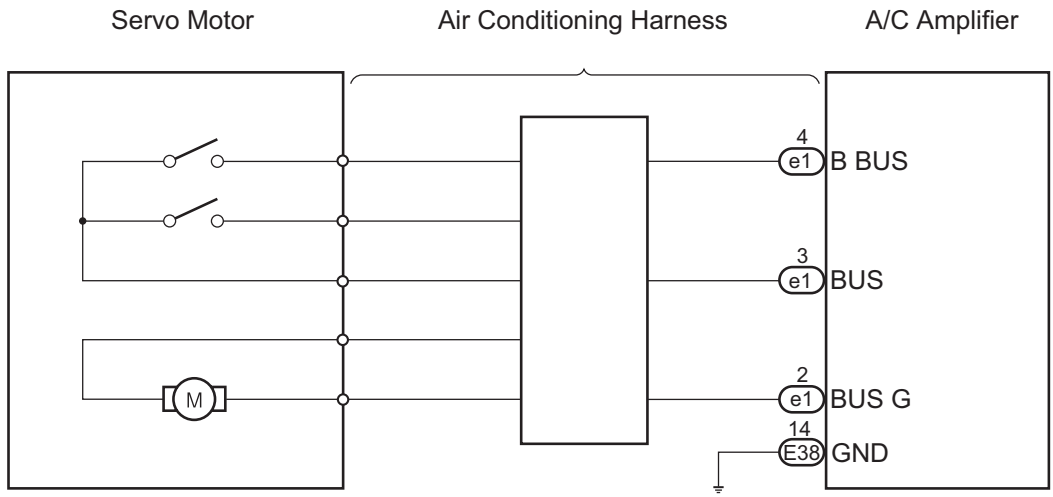
DTC	B1497/97	BUS IC Communication Malfunction

DESCRIPTION

The air conditioning harness connects the air conditioning amplifier and each servo motor. The air conditioning amplifier supplies power and sends operation instructions to each servo motor through the air conditioning harness. Each servo motor sends the damper position information to the air conditioning amplifier.

DTC No.	DTC Detection Condition	Trouble Area
B1497/97	Communication line error or open	• Air conditioning harness • A/C amplifier

WIRING DIAGRAM



H

E130105E01

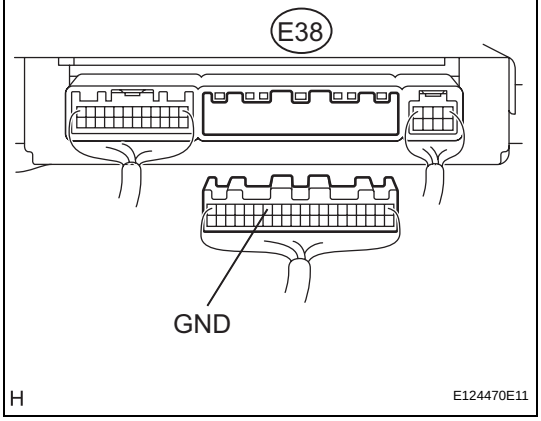
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR

(a) Remove the A/C amplifier.

AC

Air Conditioning Amplifier Connector Wire Harness View:



(b) Disconnect the connector from the A/C amplifier.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

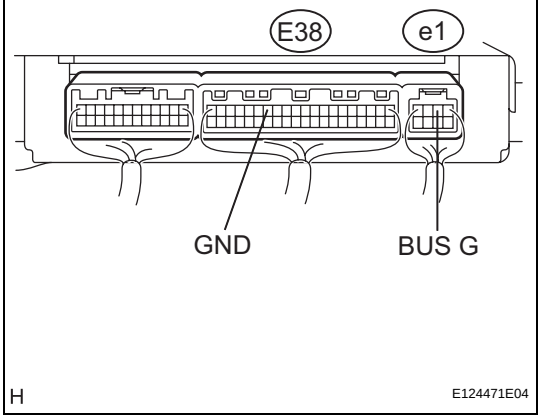
Tester Connection	Condition	Specified Condition
E38-14 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



(a) Reconnect the connector to the A/C amplifier.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
e1-2 (BUS G) - E38-14 (GND)	Always	Below 1 Ω

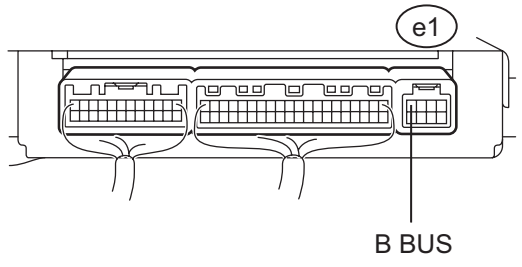
NG → **REPLACE AIR CONDITIONING AMPLIFIER**

OK

AC

3	INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E10

(a) Disconnect the connector (e1) from the A/C amplifier .
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
e1-4 (B BUS) - Body ground	Ignition switch off	Below 1 V
e1-4 (B BUS) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → REPLACE AIR CONDITIONING AMPLIFIER

OK

4	REPLACE AIR CONDITIONING HARNESS

(a) Replace the air conditioning harness.
HINT:
Since the air conditioning harness cannot be inspected while it is removed from the vehicle, replace the air conditioning harness with a normal one and check that the condition returns to normal.
(b) Check for DTCs.

Result

Result	Proceed to
DTC B1497/97 is output.	A
DTC B1497/97 is not output.	B

B → END

A

REPLACE AIR CONDITIONING AMPLIFIER

AC

DTC	B1499/99	Multiplex Communication Circuit

DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B1499/99	Open in CAN communication circuit	CAN communication system

INSPECTION PROCEDURE

1	GO TO CAN COMMUNICATION SYSTEM

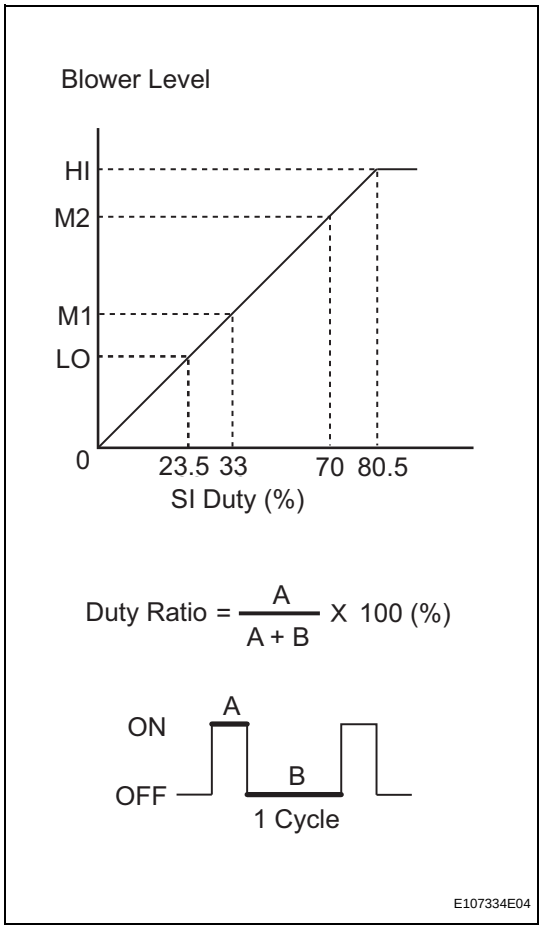
(a) Refer to the CAN communication system (See page CA-8).

NEXT

END

Blower Motor Circuit

DESCRIPTION



The blower motor is operated by signals from the A/C amplifier. The blower motor speed is controlled using various duty ratios.

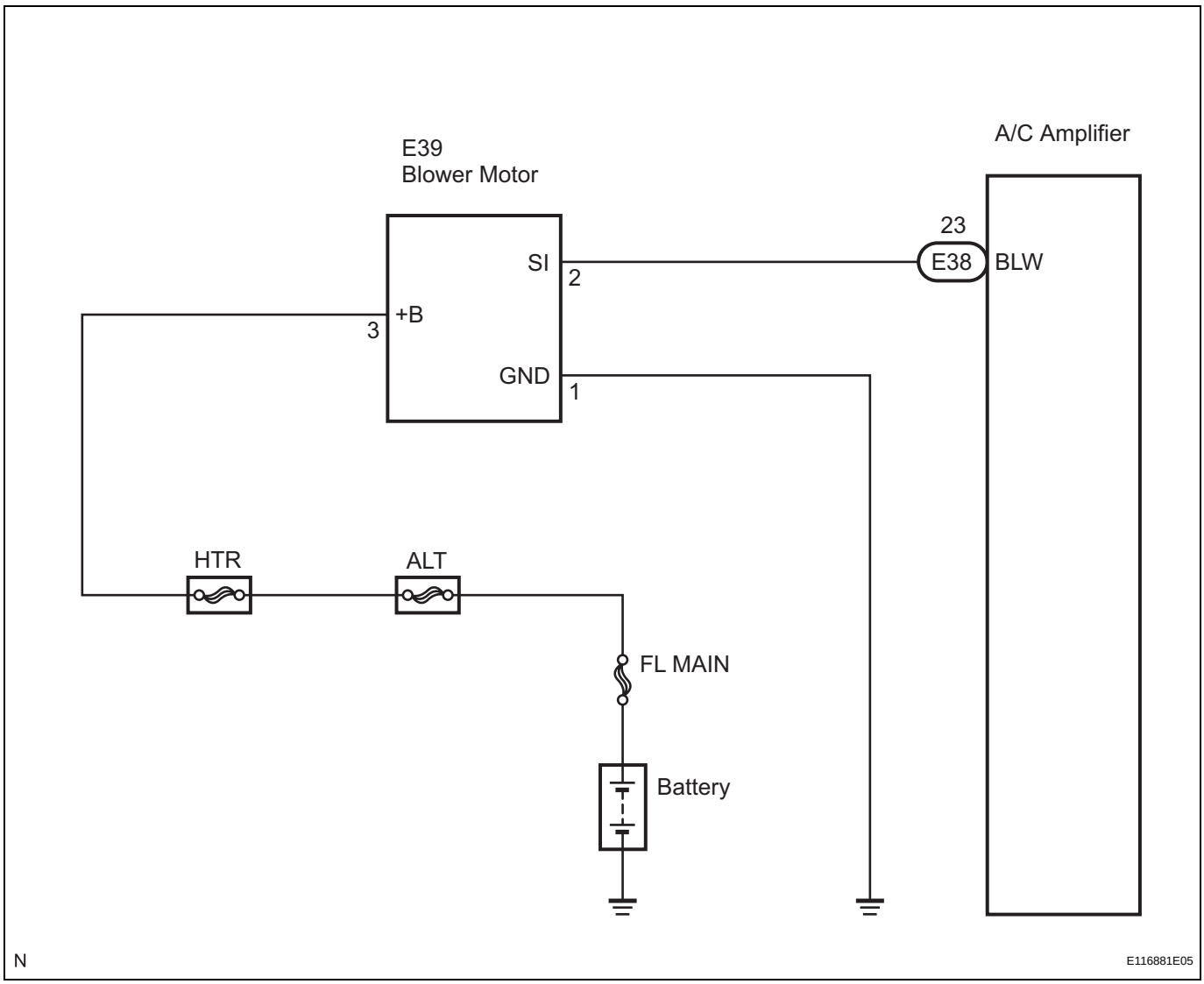
Duty Ratio:

The duty ratio is the ratio of the blower motor ON time (A) to the total of the blower motor ON and OFF time (A + B).

The blower motor controller controls the blower motor speed.

AC

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- AUTO A/C: Start inspection from step 1.
- MANUAL A/C: Start inspection from step 2.

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the blower motor operates.

ACTIVE TEST / AIR CONDITIONER:

Item	Test Details / Display (Range)	Diagnostic Note
BLOWER MOTOR (Blower motor)	Blower motor / Min.: Level 01, Max.: Level 31	-

Result

Result	Proceed to
OK	A
NG (blower motor does not operate)	B
NG (blower motor operates but does not change speed)	C

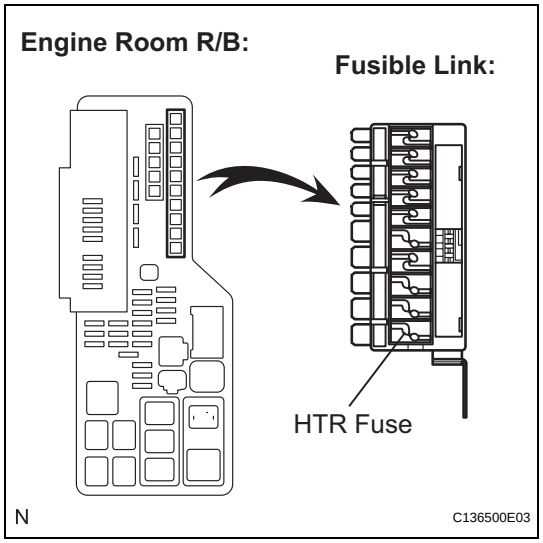
B → Go to step 2

C → Go to step 6

A

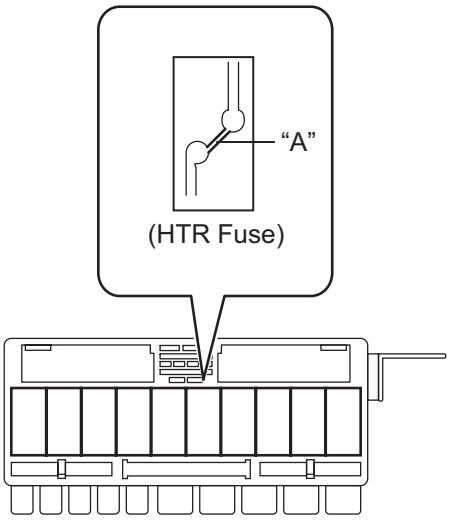
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	INSPECT FUSIBLE LINK (HTR)



(a) Remove the fusible link from the engine room R/B.

Fusible Link:



(b) Check if the fusible link is melted.
OK:
The point indicated by "A" is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

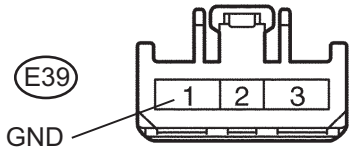
NG → **REPLACE FUSIBLE LINK (HTR)**

OK

3 CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BODY GROUND)

AC

Blower Motor Connector Front View:



(a) Disconnect the blower motor connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

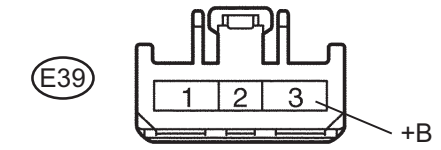
Tester Connection	Condition	Specified Condition
E39-1 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BATTERY)

Blower Motor Connector Front View:



(a) Disconnect the blower motor connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

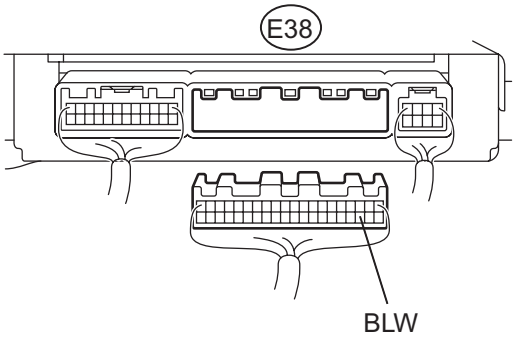
Tester Connection	Condition	Specified Condition
E39-3 (+B) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

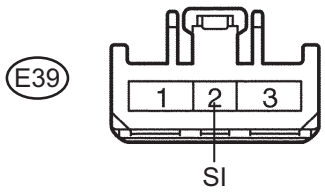
5	CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BLOWER MOTOR)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the A/C amplifier connector.

Blower Motor Connector Front View:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E39-2 (SI) - E38-23 (BLW)	Always	Below 1 Ω
E39-2 (SI) - Body ground	Always	10 kΩ or higher

AC

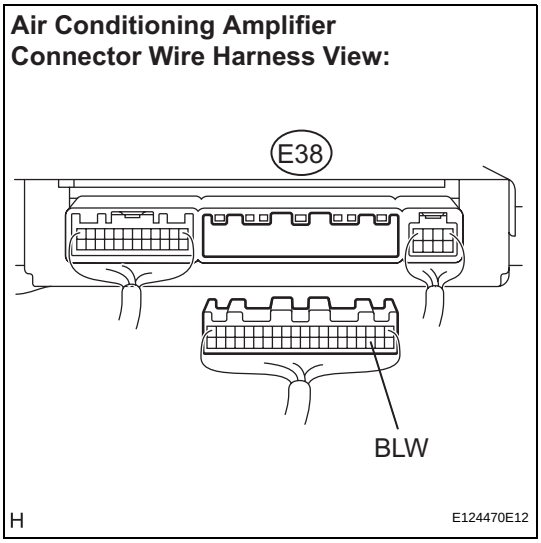
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	INSPECT BLOWER MOTOR

(a) Reconnect the connector to the blower motor.

Air Conditioning Amplifier Connector Wire Harness View:



(b) Measure the voltage on the A/C amplifier connector side according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
E38-23 (BLW) - Body ground	Ignition switch on (IG)	4.5 to 5.5 V

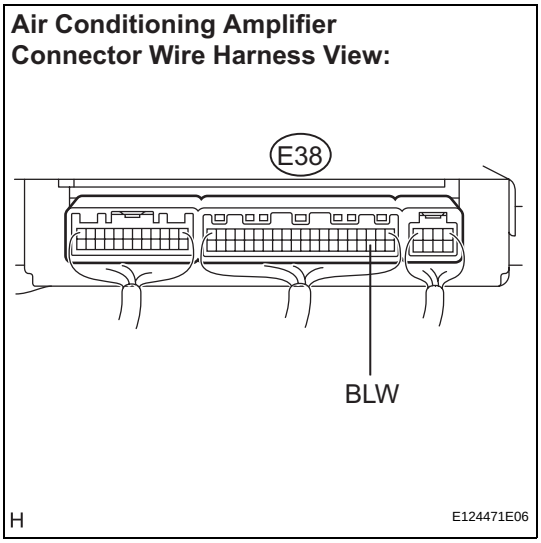
NG → **REPLACE BLOWER MOTOR**

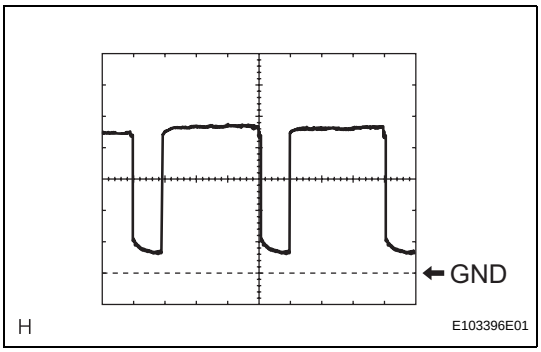
OK

7 INSPECT AIR CONDITIONING AMPLIFIER

(a) Remove the A/C amplifier.
(b) Reconnect the connector to the A/C amplifier.

Air Conditioning Amplifier Connector Wire Harness View:





(c) Turn the ignition switch on (IG) .
(d) Turn the blower switch ON.
(e) Measure the waveform between terminal E38-23 (BLW) of the A/C amplifier and body ground.
OK:
Waveform is as shown in the illustration.
HINT:
Waveform varies with the blower level.

Item	Contents
Tool setting	1 V/DIV., 500 μs/DIV.
Vehicle condition	Ignition switch on (IG) Blower switch: ON

NG → **REPLACE AIR CONDITIONING AMPLIFIER**

AC

OK

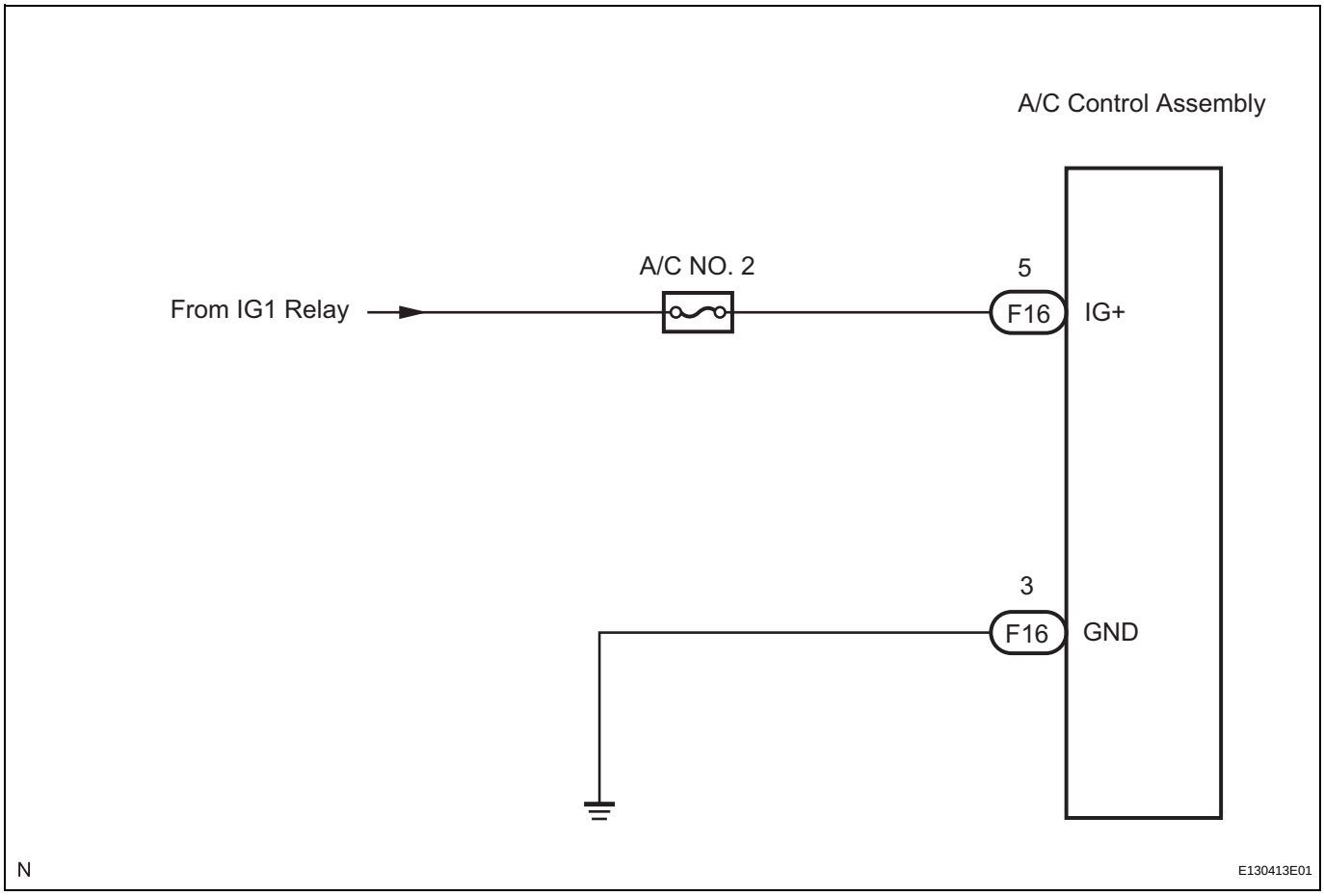
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Heater Control Panel Power Source Circuit

DESCRIPTION

Battery voltage is supplied to the heater control panel (A/C control assembly) through the A/C No. 2 fuse.

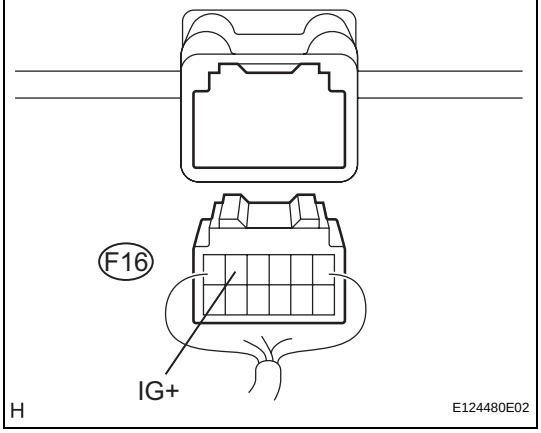
WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR (IG+ - BODY GROUND)

A/C Control Assembly Connector
Wire Harness View:



(a) Disconnect the connector from the heater control panel.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
F16-5 (IG+) - Body ground	Ignition switch on (IG)	10 to 14 V
F16-5 (IG+) - Body ground	Ignition switch off	Below 1 V

Result

Result	Proceed to
OK	A
NG (without Smart key system)	B
NG (with Smart key system)	C

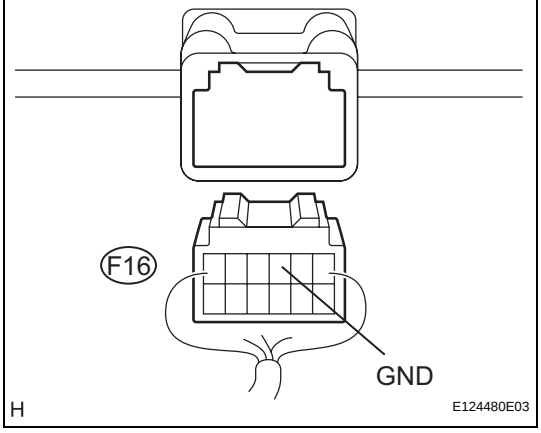
B → GO TO STARTING SYSTEM

C → GO TO PUSH BUTTON START SYSTEM

A

2 CHECK HARNESS AND CONNECTOR (GND - BODY GROUND)

A/C Control Assembly Connector
Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
F16-3 (GND) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

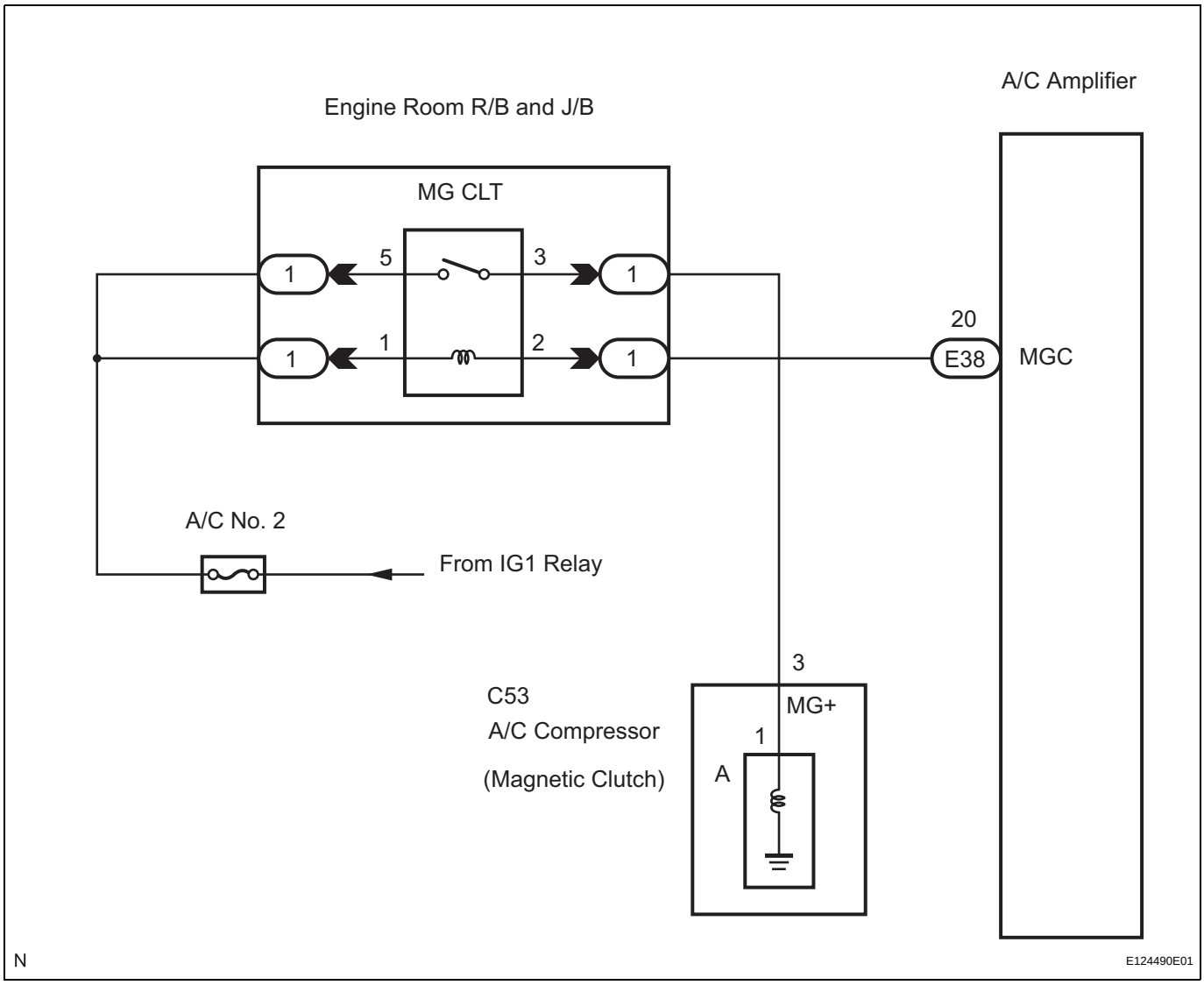
AC

Air Conditioning Compressor Magnetic Clutch Circuit

DESCRIPTION

When the A/C amplifier is turned on, a magnetic clutch ON signal is sent from the MGC terminal of the A/C amplifier. Then, the MG CLT relay turns on to operate the magnetic clutch.

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → GO TO CAN COMMUNICATION SYSTEM

A

2 READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Turn the A/C switch on and off.
(d) Select the item below in the DATA LIST, and read the display on the intelligent tester.

DATA LIST / ENGINE:

Item	Measure Item	Normal Condition	Diagnostic Note
A/C SIGNAL (A/C Signal)	A/C signal / ON or OFF	ON: A/C ON OFF: A/C OFF	-

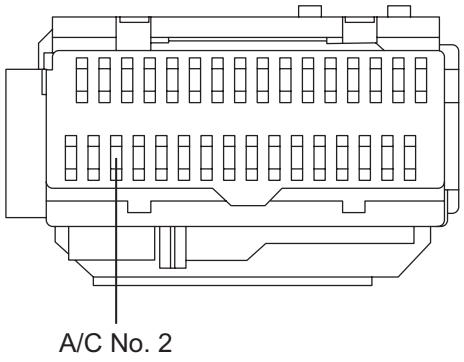
OK:
The display is as specified in the normal condition column.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

3 INSPECT FUSE (A/C NO. 2)

Instrument Panel J/B:



(a) Remove the A/C No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance of the fuse.
Standard resistance

Tester Item	Condition	Specified Condition
A/C No. 2 fuse	Always	Below 1 Ω

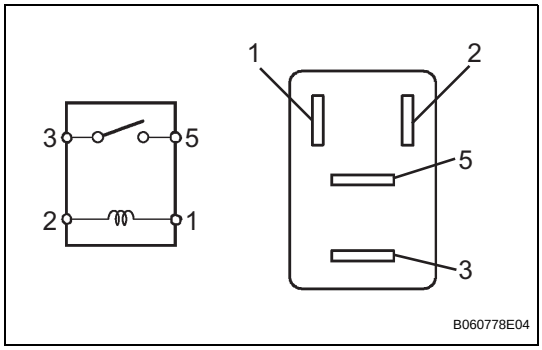
(c) Reconnect the A/C No. 2 fuse to the instrument panel J/B.

NG → **REPLACE FUSE (A/C NO. 2)**

OK

AC

4 INSPECT RELAY (MG CLT)



(a) Remove the MG CLT relay from the engine room R/B and J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

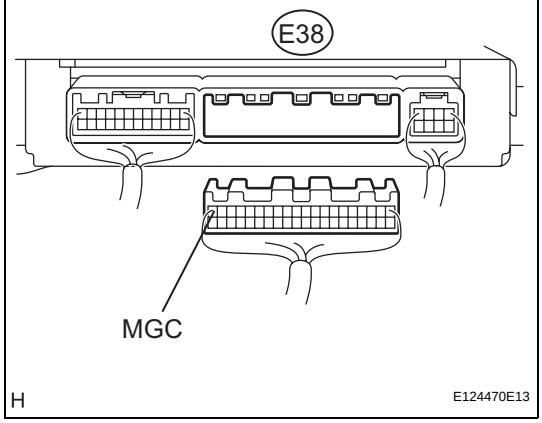
(c) Install the MG CLT relay to the engine room R/B and J/B.

NG → REPLACE RELAY (MG CLT)

OK

5 CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BATTERY)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the connector from the A/C amplifier.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-20 (MGC) - Body ground	Ignition switch off	Below 1 V
E38-20 (MGC) - Body ground	Ignition switch on (IG)	10 to 14 V

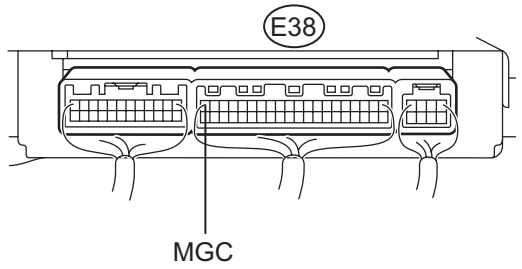
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

AC

6 INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E11

(a) Reconnect the connector to the A/C amplifier.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

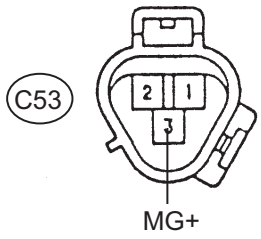
Tester Connection (Symbols)	Condition	Specified Condition
E38-20 (MGC) - Body ground	Ignition switch on (IG) A/C switch: OFF	10 to 14 V
E38-20 (MGC) - Body ground	Ignition switch on (IG) A/C switch: ON	Below 1 V

NG → REPLACE AIR CONDITIONING AMPLIFIER

OK

7 INSPECT A/C COMPRESSOR

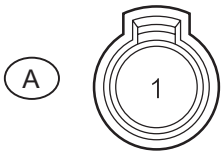
A/C Compressor Connector Front View:



E005280E15

(a) Disconnect the connector from the A/C compressor.

Magnetic Clutch Connector Front View:



H E124482E01

(b) Disconnect the connector from the magnetic clutch.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

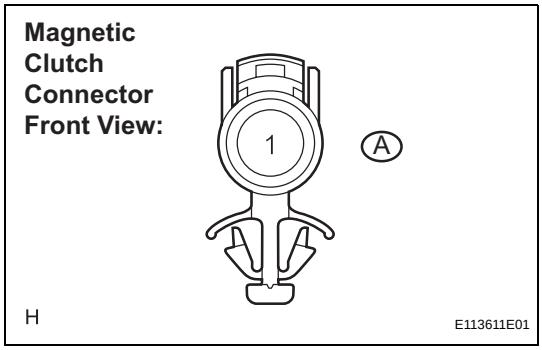
Tester Connection (Symbols)	Condition	Specified Condition
C53-3 (MG+) - A-1	Always	Below 1 Ω
C53-3 (MG+) - Body ground	Always	10 kΩ or higher

NG → REPLACE A/C COMPRESSOR

OK

AC

8 INSPECT MAGNETIC CLUTCH



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

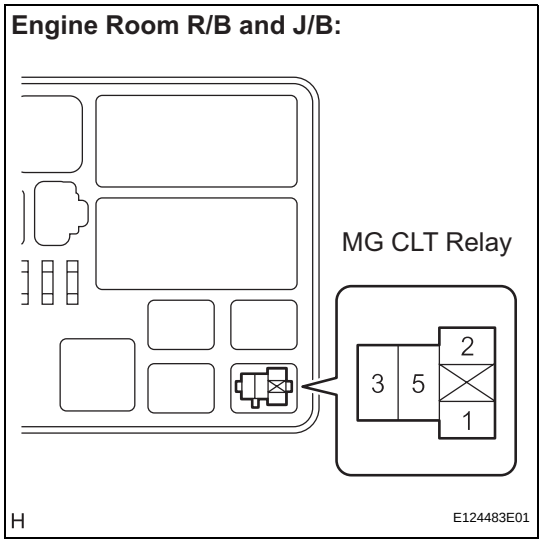
Tester Connection	Condition	Specified Condition
A-1 - Body ground	Always	3.4 to 3.8 Ω

(b) When connector terminal A1 is connected to the positive (+) battery terminal, check that the following occurs: 1) the magnetic clutch's operating sound can be heard, and 2) the magnetic clutch's hub and rotor lock.

NG → **REPLACE MAGNETIC CLUTCH**

OK

9 CHECK HARNESS AND CONNECTOR (ENGINE ROOM R/B AND J/B - BATTERY)



(a) Remove the MG CLT relay from the engine room R/B and J/B.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
Relay block MG CLT relay terminal 5 - Body ground	10 to 14 V
Relay block MG CLT relay terminal 1 - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM R/B AND J/B - A/C COMPRESSOR)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

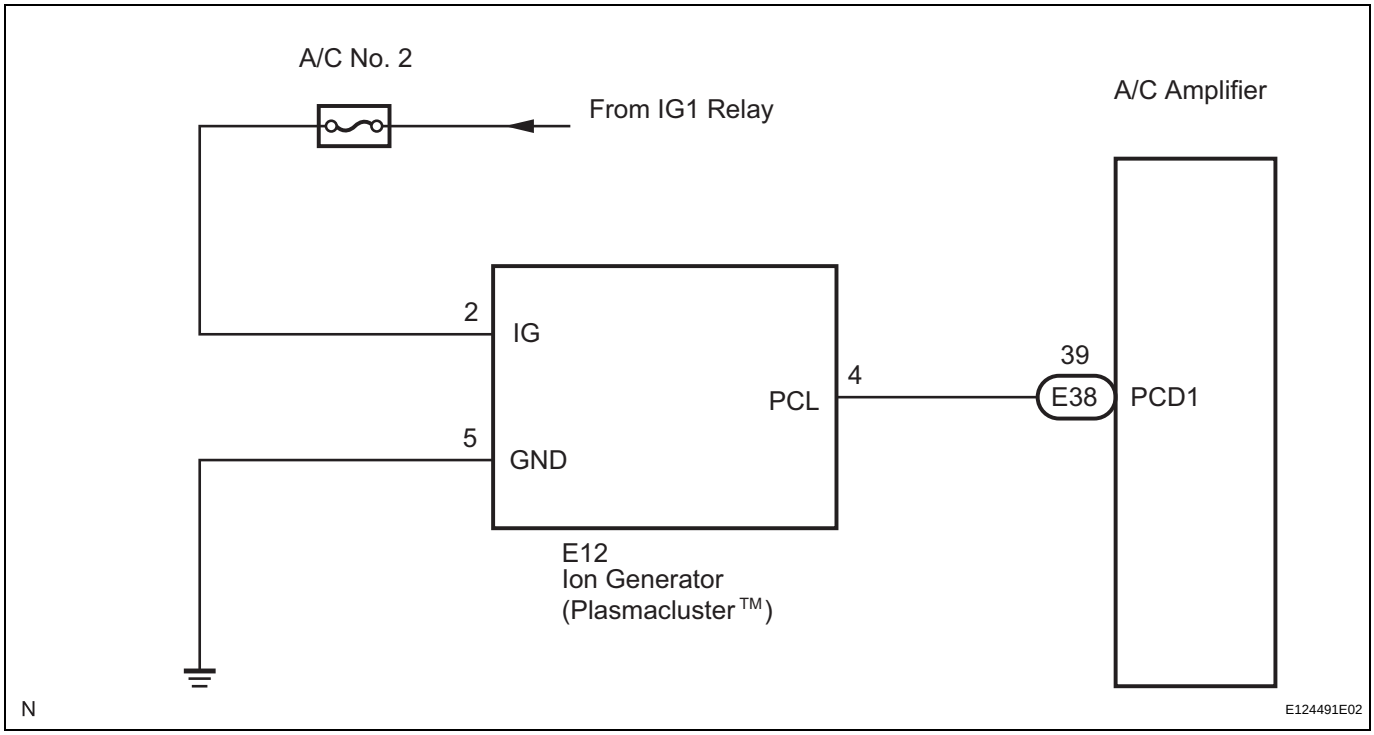
AC

Plasmacluster Circuit

DESCRIPTION

The plasmacluster™ operates in conjunction with blower switch operation. The plasmacluster™ operation indicator (CLEAN) illuminates on the A/C control assembly when the plasmacluster™ is operating.

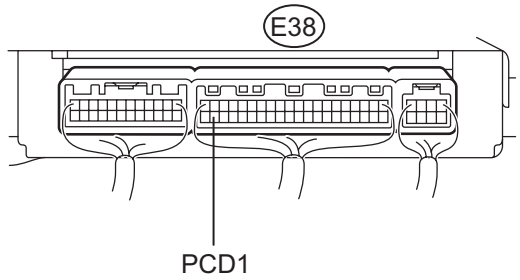
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT AIR CONDITIONING AMPLIFIER

Air Conditioning Amplifier Connector Wire Harness View:



(a) Remove the A/C amplifier with the connectors still connected.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E38-39 (PCD1) - Body ground	Ignition switch on (IG) Blower switch: OFF	10 to 14 V
E38-39 (PCD1) - Body ground	Ignition switch on (IG) Blower switch: ON	Below 1 V

NG	Go to step 2

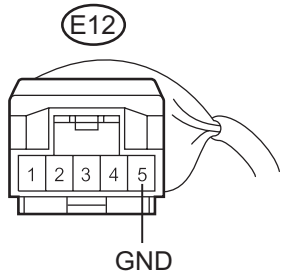
AC

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 CHECK HARNESS AND CONNECTOR (ION GENERATOR - BODY GROUND)

Ion Generator Connector Front View:



(a) Disconnect the connector from the ion generator.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E12-5 (GND) - Body ground	Always	Below 1 Ω

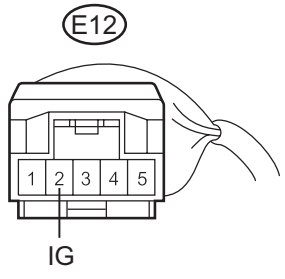
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

AC

3 CHECK HARNESS AND CONNECTOR (ION GENERATOR - BATTERY)

Ion Generator Connector Front View:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

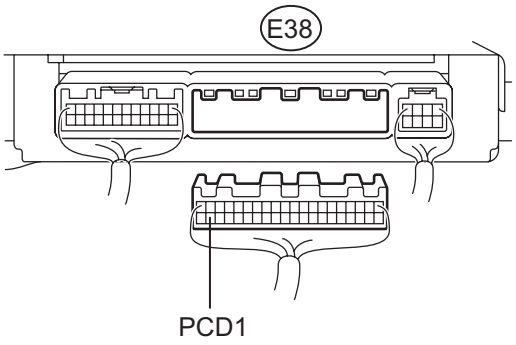
Tester Connection (Symbols)	Condition	Specified Condition
E12-2 (IG) - Body ground	Ignition switch off	Below 1 V
E12-2 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR (ION GENERATOR - A/C AMPLIFIER)

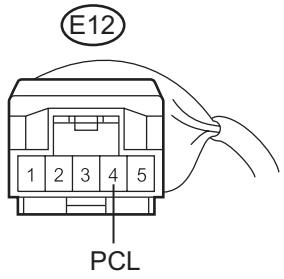
Air Conditioning Amplifier Connector Wire Harness View:



H E124470E14

(a) Disconnect the connector from the A/C amplifier.

Ion Generator Connector Front View:



H E116928E05

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E12-4 (PCL) - E38-39 (PCD1)	Always	Below 1 Ω
E12-4 (PCL) - Body ground	Always	10 kΩ or higher

AC

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ION GENERATOR

Steering Pad Switch Circuit

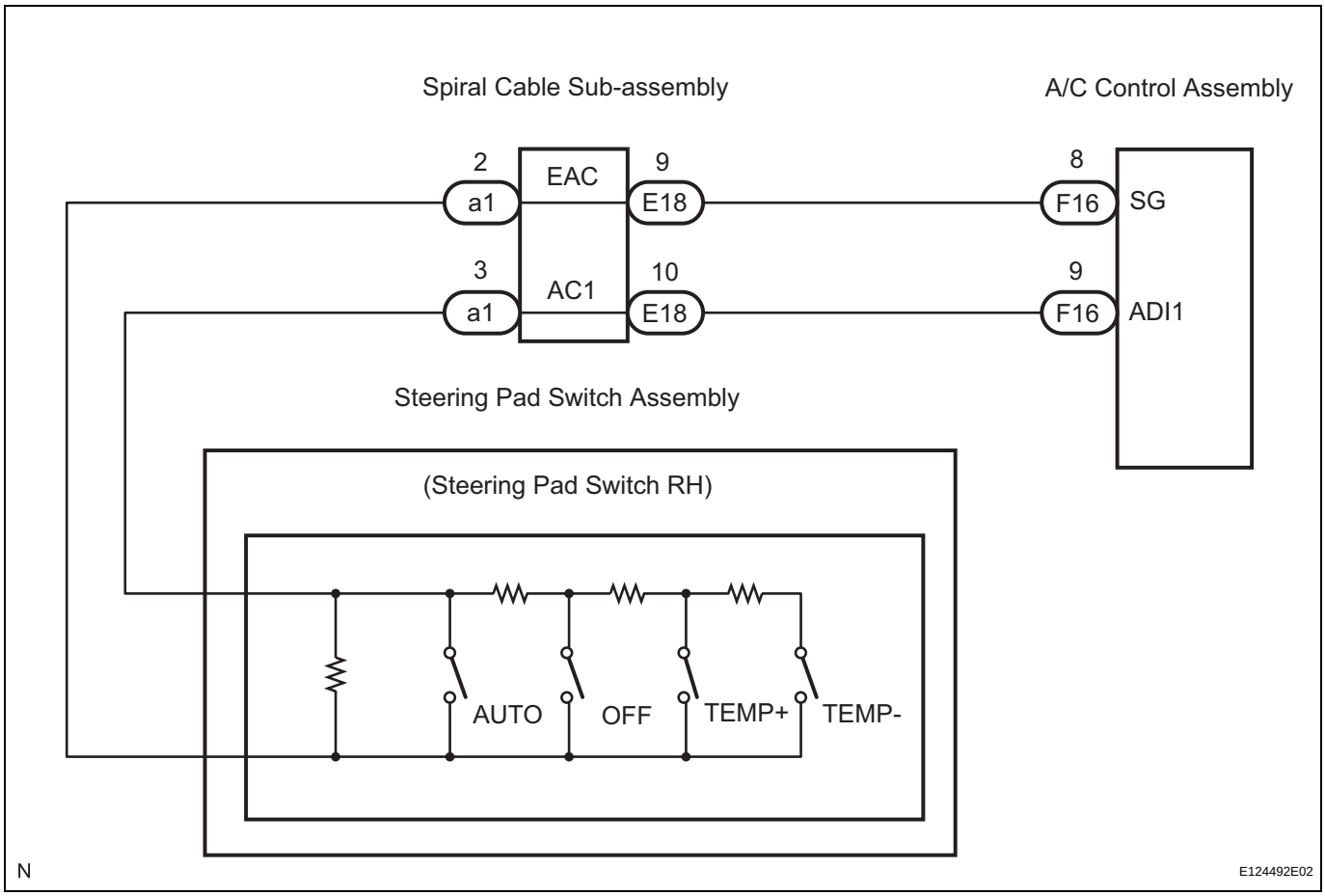
DESCRIPTION

AUTO, OFF, TEMP UP (+), and TEMP DOWN (-) switches are located on the steering pad switch. The resistance of the steering pad switch changes in accordance with switch operation. The A/C control assembly outputs voltage to the steering pad switch and reads voltage changes due to the resistance changes that result from switch operation.

HINT:

If there is an open in the circuit, the A/C system cannot be operated by the steering pad switch assembly. If there is a short in the circuit, the resulting condition is the same as if the switch were continuously depressed. Therefore, the A/C control assembly cannot be operated by the steering pad switch assembly, and the A/C control assembly will not be able to function correctly.

WIRING DIAGRAM

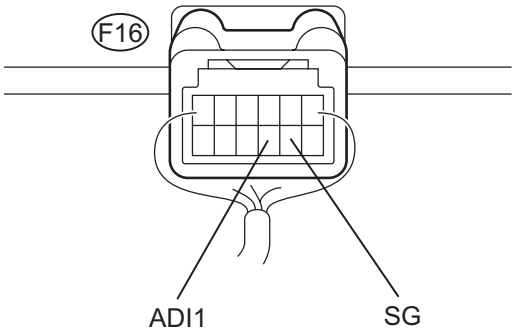


AC

INSPECTION PROCEDURE

1 **INSPECT A/C CONTROL ASSEMBLY**

A/C Control Assembly Connector Wire Harness View:



H E124479E02

(a) Remove the A/C control assembly with the connectors still connected.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
F16-9 (ADI1) - F16-8 (SG)	AUTO switch: ON	Below 2.5 Ω
F16-9 (ADI1) - F16-8 (SG)	OFF switch: ON	Approx. 329 Ω
F16-9 (ADI1) - F16-8 (SG)	TEMP+ switch: ON	Approx. 1,000 Ω
F16-9 (ADI1) - F16-8 (SG)	TEMP- switch: ON	Approx. 3,110 Ω

NG → **Go to step 2**

OK

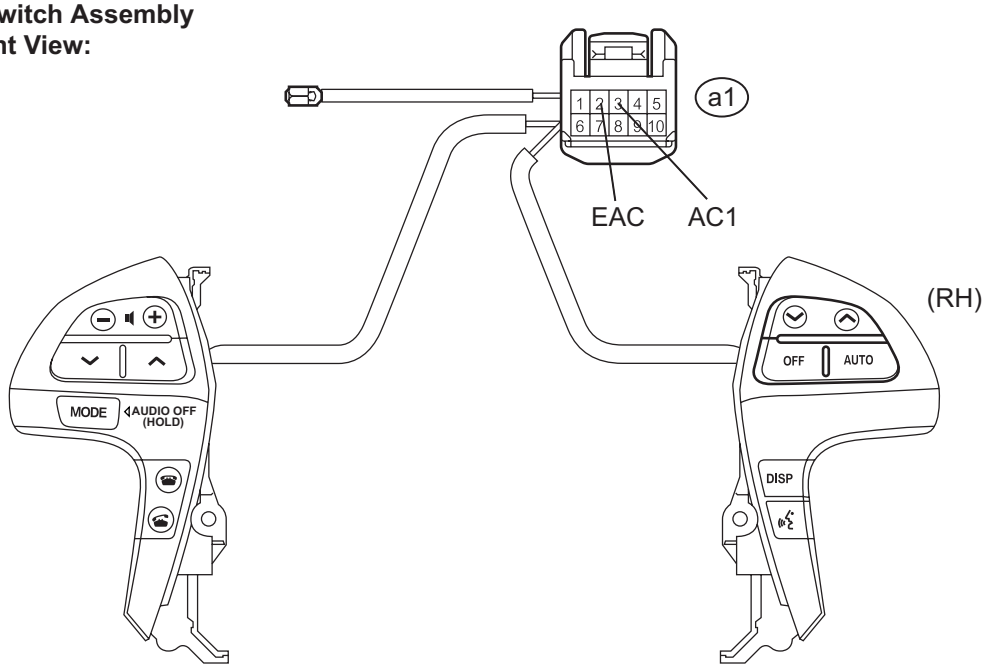
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AC

2 **INSPECT STEERING PAD SWITCH ASSEMBLY**

(a) Remove the steering pad switch assembly.
(b) Disconnect the connector from the steering pad switch assembly.

Steering Pad Switch Assembly Connector Front View:



H

E124484E01

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

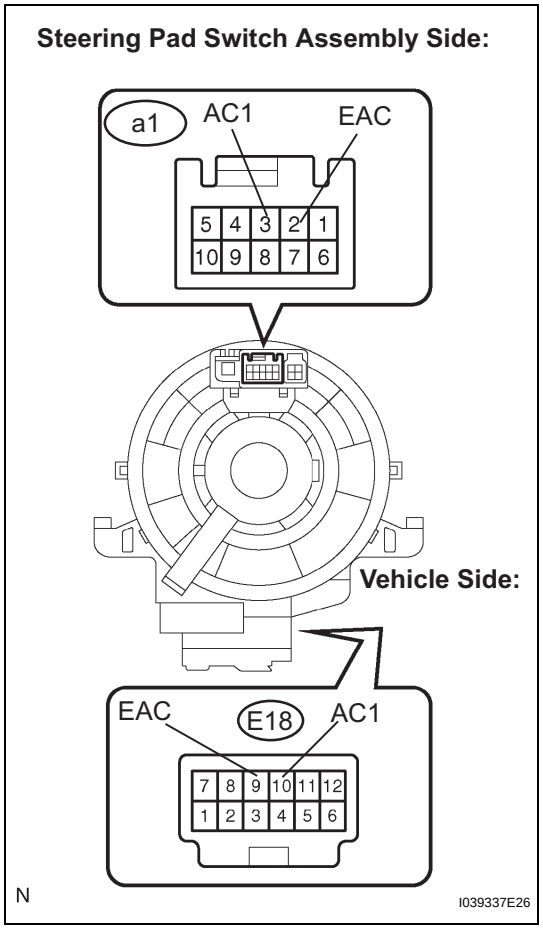
Tester Connection (Symbols)	Condition	Specified Condition
a1-3 (AC1) - a1-2 (EAC)	AUTO switch: ON	Below 2.5 Ω
a1-3 (AC1) - a1-2 (EAC)	OFF switch: ON	Approx. 329 Ω
a1-3 (AC1) - a1-2 (EAC)	TEMP+ switch: ON	Approx. 1,000 Ω
a1-3 (AC1) - a1-2 (EAC)	TEMP- switch: ON	Approx. 3,110 Ω

AC

NG → **REPLACE STEERING PAD SWITCH ASSEMBLY**

OK

3 INSPECT SPIRAL CABLE SUB-ASSEMBLY



(a) Disconnect the connector from the spiral cable sub-assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

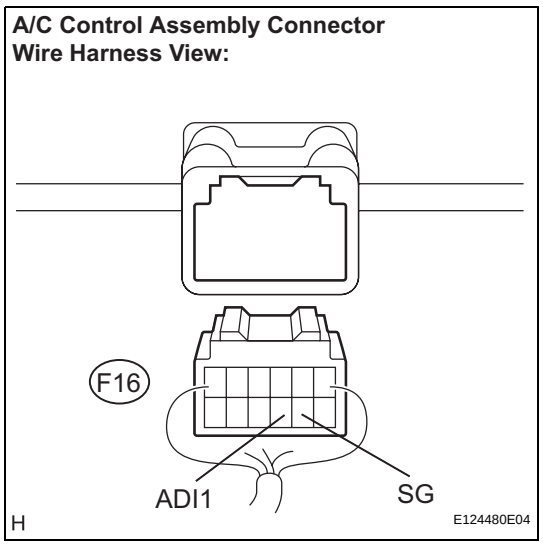
Tester Connection (Symbols)	Condition	Specified Condition
E18-10 (AC1) - a1-3 (AC1)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
E18-9 (EAC) - a1-2 (EAC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

HINT:
The spiral cable makes a maximum of approximately 5 rotations.

NG → REPLACE SPIRAL CABLE SUB-ASSEMBLY

OK

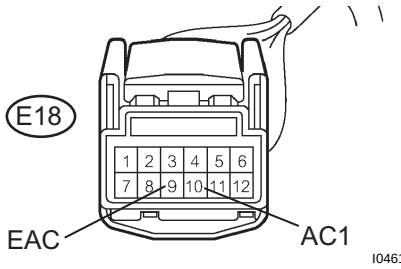
4 CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - SPIRAL CABLE SUB-ASSEMBLY)



(a) Disconnect the connector from the A/C control assembly.

AC

Spiral Cable Sub-assembly Connector Front View:



(b) Disconnect the connector from the spiral cable sub-assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F16-9 (ADI1) - E18-10 (AC1)	Always	Below 1 Ω
F16-8 (SG) - E18-9 (EAC)	Always	Below 1 Ω
F16-9 (ADI1) - E18-10 (AC1)	Always	10 kΩ or higher
F16-8 (SG) - E18-9 (EAC)	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE A/C CONTROL ASSEMBLY

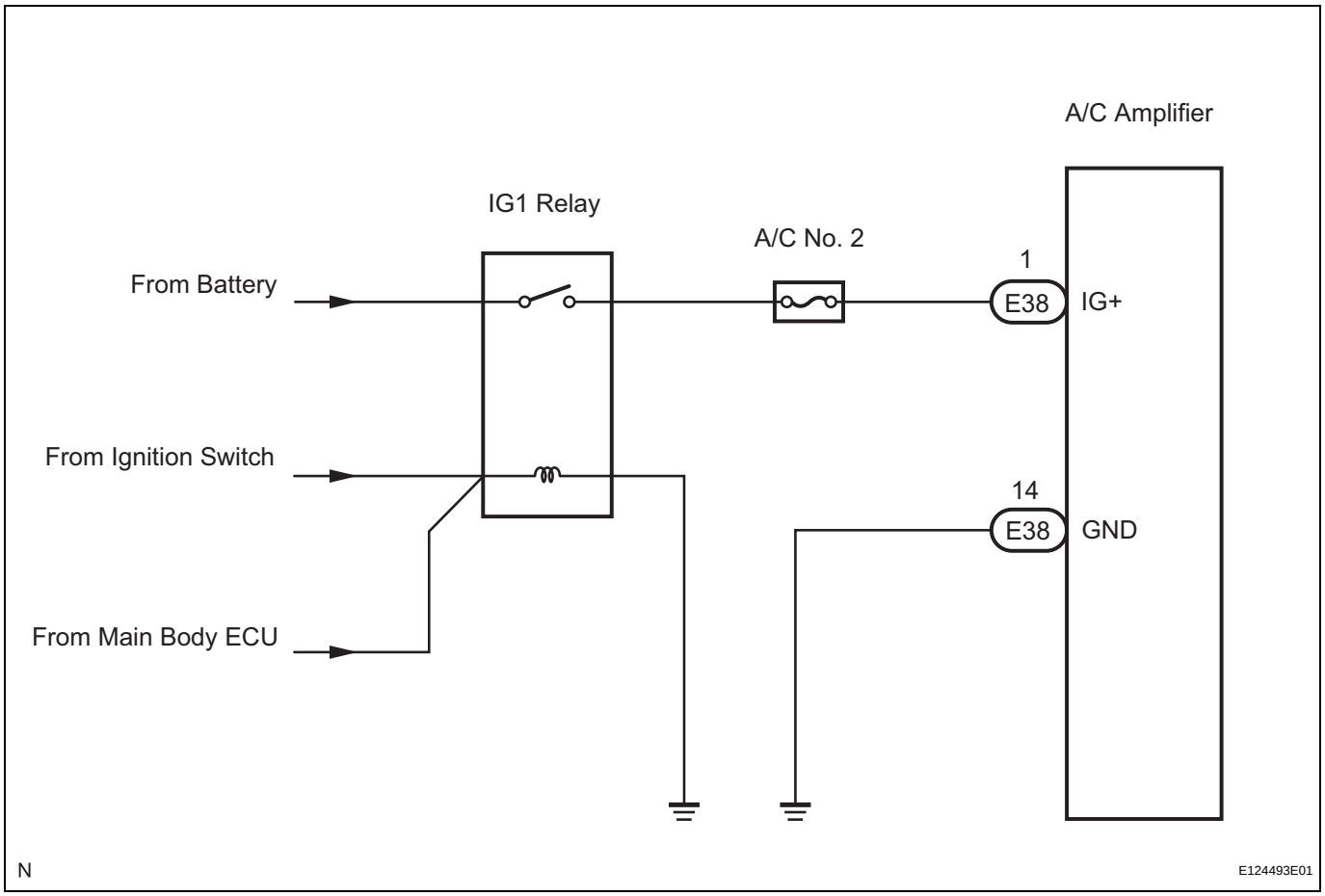
AC

IG Power Source Circuit

DESCRIPTION

The main power source is supplied to the A/C amplifier when the ignition switch is turned on (IG).
The power source is used for operating the A/C amplifier and servo motor, etc.

WIRING DIAGRAM



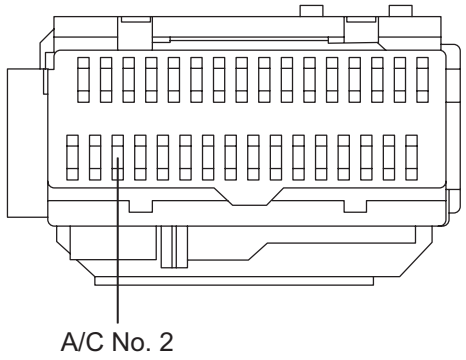
INSPECTION PROCEDURE

HINT:
Start the engine before inspection. Check the IG1 relay or battery if the engine does not start.

AC

1	INSPECT FUSE (A/C NO. 2)

Instrument Panel J/B:



H E124481E02

(a) Remove the A/C No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Item	Condition	Specified Condition
A/C No. 2 fuse	Always	Below 1 Ω

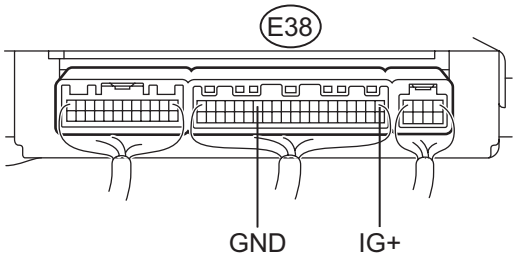
NG → **REPLACE FUSE (A/C NO. 2)**

OK

2	INSPECT AIR CONDITIONING AMPLIFIER (IG+ - GND)

AC

Air Conditioning Amplifier Connector Wire Harness View:



H E124471E09

(a) Remove the A/C amplifier with its connectors still connected.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E38-1 (IG+) - E38-14 (GND)	Ignition switch on (IG)	10 to 14 V

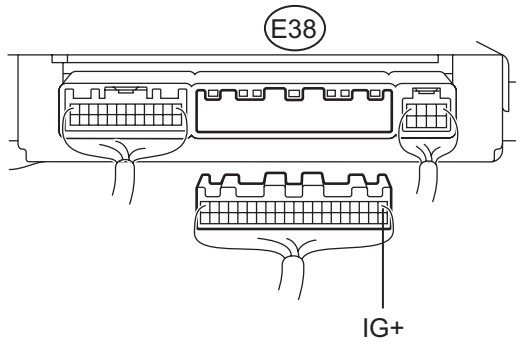
NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

3	CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the A/C amplifier connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

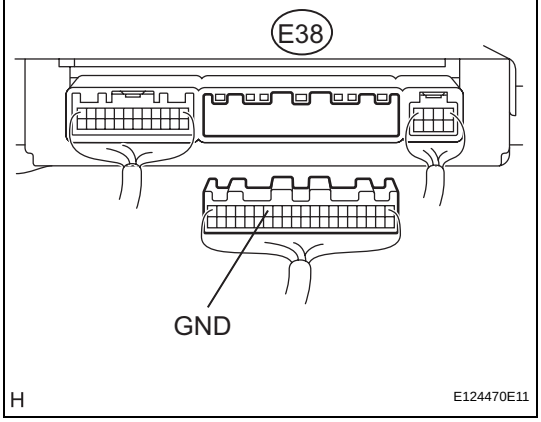
Tester Connection	Condition	Specified Condition
E38-1 (IG+) - Body ground	Ignition switch off	Below 1 V
	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BODY GROUND)

Air Conditioning Amplifier Connector Wire Harness View:



(a) Disconnect the A/C amplifier connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E38-14 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

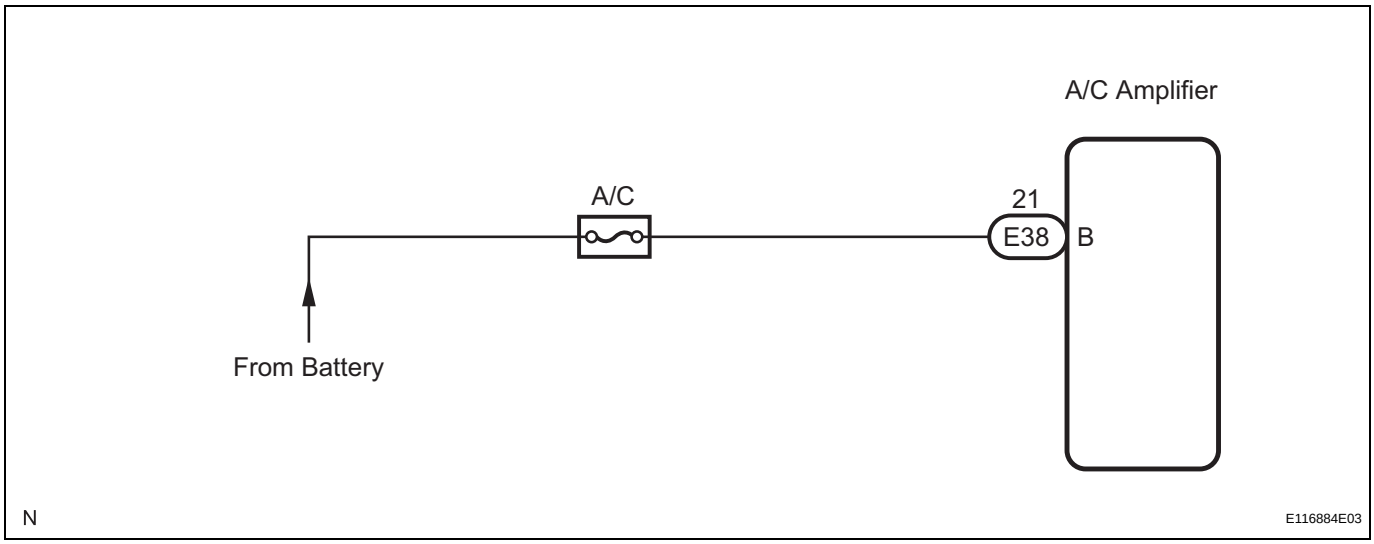
AC

Back-up Power Source Circuit

DESCRIPTION

The back-up power source circuit for the A/C amplifier is shown below. Power is supplied even when turning the ignition switch off and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM

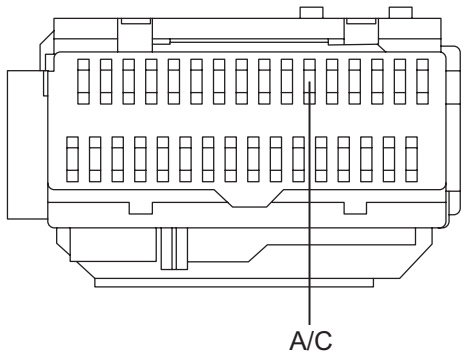


INSPECTION PROCEDURE

AC

1	INSPECT FUSE (A/C)

Instrument Panel J/B:



(a) Remove the A/C fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

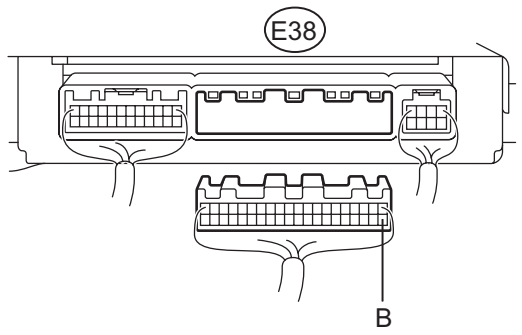
Tester Item	Condition	Specified Condition
A/C fuse	Always	Below 1 Ω

NG → **REPLACE FUSE (A/C)**

OK

2	INSPECT AIR CONDITIONING AMPLIFIER (AIR CONDITIONING AMPLIFIER - BODY GROUND)

Air Conditioning Amplifier Connector Wire Harness View:



H E124470E16

(a) Disconnect the A/C amplifier connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E38-21 (B) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

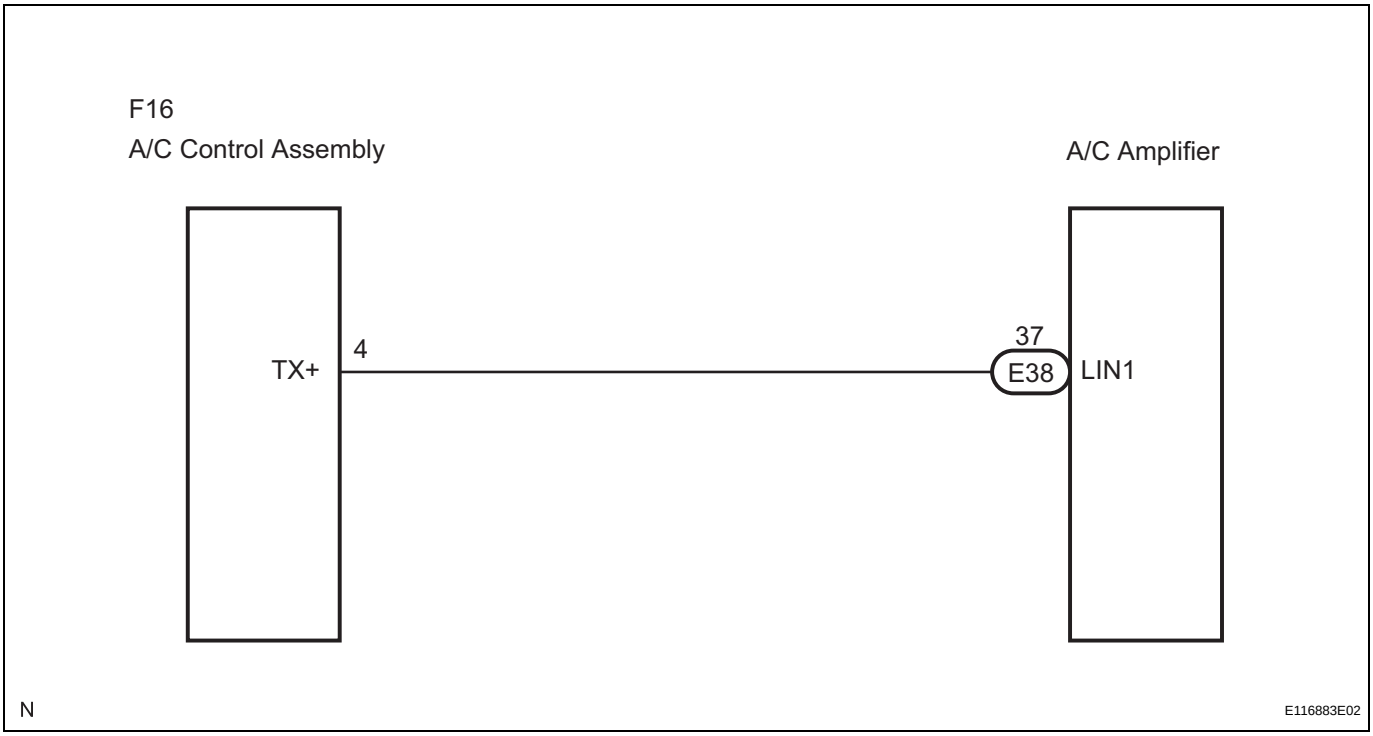
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

LIN Communication Circuit

DESCRIPTION

The operation signal of a switch etc. is exchanged between terminal TX+ of the A/C control assembly and terminal LIN1 of the A/C amplifier.

WIRING DIAGRAM

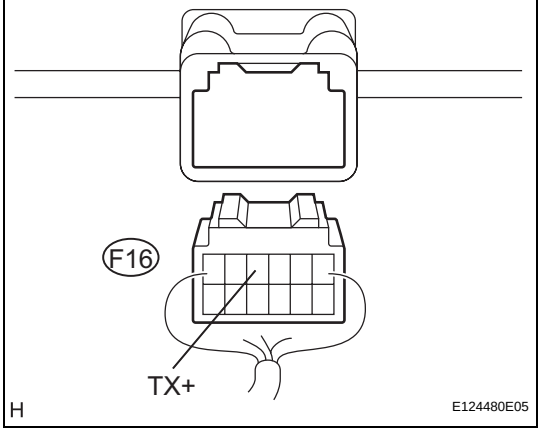


AC

INSPECTION PROCEDURE

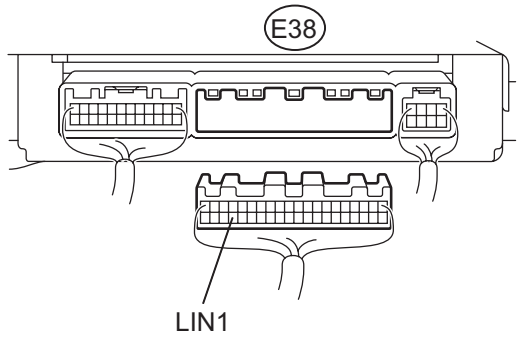
1	CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - AIR CONDITIONING AMPLIFIER)

A/C Control Assembly Connector Wire Harness View:



(a) Disconnect the connector from the A/C control assembly.

Air Conditioning Amplifier Connector Wire Harness View:



(b) Disconnect the connector from the A/C amplifier.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
E38-37 (LIN1) - F16-4 (TX+)	Always	Below 1 Ω
E38-37 (LIN1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AC

REFRIGERANT

ON-VEHICLE INSPECTION

1. INSPECT REFRIGERANT VOLUME

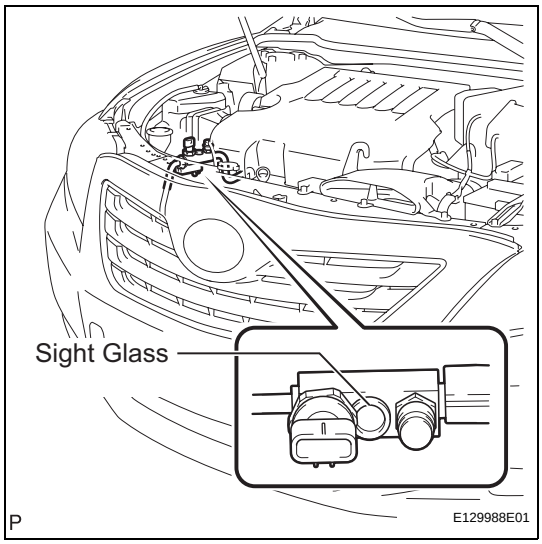
HINT:

Vehicles manufactured by TMC are equipped with a sight glass. A simple inspection of refrigerant volume can be performed using this sight glass. The inspection procedure is as follows.

(a) Check the sight glass on the air conditioning tube & accessory assembly.

(1) Prepare the vehicle according to the chart below.

Item	Condition
Vehicle door	Fully open
Temperature setting	MAX COLD
Blower speed	HI
A/C	ON



(2) Compare the sight glass to the following chart.

AC

Item	Symptom	Amount of refrigerant	Corrective Actions
1	Bubbles exist	Insufficient*	1. Check for gas leakage and repair if necessary 2. Recharge with proper amount of refrigerant
2	No bubbles exist (DTC 76 is output)	Empty, insufficient, or excessive	Refer to 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	1. Check for gas leakage and repair if necessary 2. Evacuate the AC system and recharge with the proper amount of refrigerant
4	Considerable temperature difference between compressor inlet and outlet	Proper or excessive	Refer to 5 and 6
5	Immediately after air conditioning is turned off, refrigerant remains clear	Excessive	1. Recover refrigerant 2. Evacuate the AC system and recharge with the proper amount of refrigerant
6	Immediately after air conditioning is turned off, refrigerant foams and then becomes clear	Proper	-

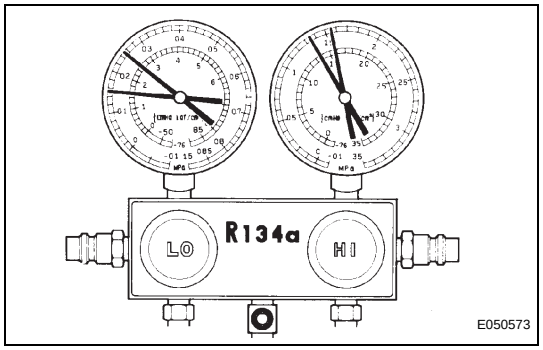
*: Bubbles in the sight glass with the vehicle's interior temperature above 35°C (95°F) can be considered normal if cooling is sufficient.

2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

HINT:

This is a method where a manifold gauge set is used to help locate the problem.

(a) Read the manifold gauge pressure when the following conditions are established.
Test conditions:
- Temperature at the air inlet with the switch set at RECIRC is 30 to 35°C (86 to 95°F)
- Engine is running at 1,500 rpm
- Blower speed control switch is at "HI"
- Temperature control dial is at "COOL"
- A/C switch is ON
- Doors are fully open
- Ignition switch is in a position that enables the AC compressor to run.



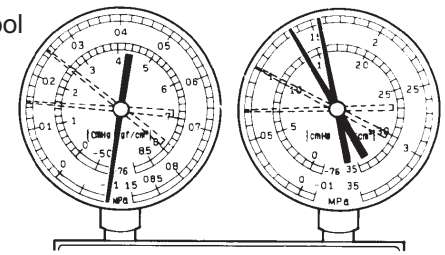
E050573

(1) Normally functioning refrigeration system
Gauge reading

Pressure side	Refrigerant volume
Low	0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2, 21.3 to 35.5 psi)
High	1.37 to 1.57 MPa (14 to 16 kgf/cm^2, 199.1 to 227.5 psi)

(2) Moisture is present in refrigeration system.

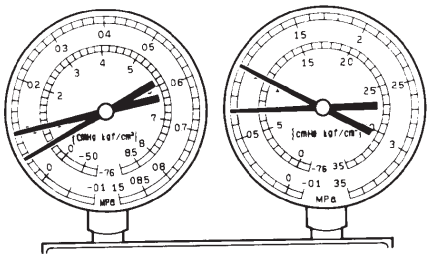
Condition:
Periodically cools and then fails to cool


I022117E21

Symptom	Probable Cause	Diagnosis	Corrective Actions
During operation, pressure on low pressure side cycles between normal and vacuum	Moisture in AC system will freeze at the expansion valve orifice, causing the refrigeration cycle to temporarily stop After the system stops, and warms up again, the ice will melt and normal operation will be temporarily restored	• Cooler dryer (integrated into condenser tank) in oversaturated state • Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant	1. Replace cooler dryer 2. Remove moisture in system by repeatedly evacuating air 3. Supply a proper amount of new refrigerant

(3) Insufficient cooling

Condition: Cooling system does not function effectively.

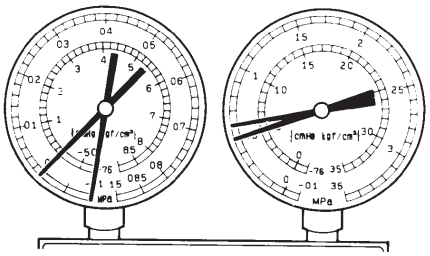

I022118E13

AC

Symptom	Probable Cause	Diagnosis	Corrective Actions
• Pressure is low on both low and high pressure sides • Bubbles are seen through sight glass continuously • Insufficient cooling performance	Gas leakage from the refrigeration system	• Insufficient refrigerant • Refrigerant leaking	1. Check for gas leakage and repair if necessary 2. Supply a proper amount of new refrigerant 3. If the gauge indicates a pressure of close to 0, then it will be necessary to evacuate the system after repairing the leak

(4) Poor circulation of refrigerant

Condition: Cooling system does not function effectively.



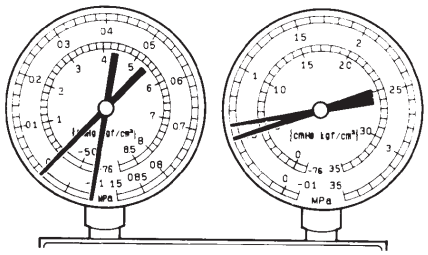
I022119E14

Symptom	Probable Cause	Diagnosis	Corrective Actions
• Pressure is low on both low and high pressure sides • Frost exists on pipe from condenser to unit	Refrigerant flow is obstructed by dirt inside the pipes of the condenser core	Receiver is clogged	Replace condenser

(5) Refrigerant does not circulate.

AC

Condition : Cooling system does not function. (Sometimes it may function.)

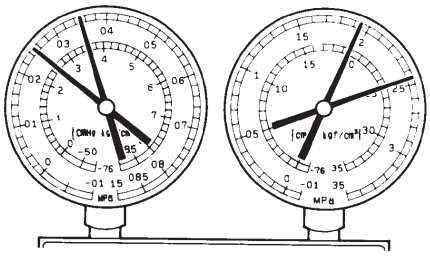


I022120E14

Symptom	Probable Cause	Diagnosis	Corrective Actions
• Vacuum is indicated on low pressure side and very low pressure is indicated on high pressure side • Frost or condensation is seen on piping on both sides of receiver/drier or expansion valve	• Refrigerant flow is obstructed by moisture or dirt in refrigeration system • Refrigerant flow is disrupted by gas leaking internally through the expansion valve	Refrigerant does not circulate	1. Check the expansion valve 2. Replace expansion valve 3. Replace condenser 4. Evacuate air and supply a proper amount of new refrigerant 5. For internal gas leak at expansion valve, replace expansion valve

(6) Refrigerant is overcharged or cooling effectiveness of condenser is insufficient.

Condition: Cooling system does not function.



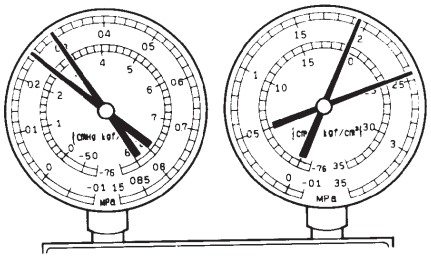
I022121E14

Symptom	Probable Cause	Diagnosis	Corrective Actions
• Pressure is too high on both low and high pressure sides • No air bubbles are seen through sight glass even when engine rpm lowers	• Unable to develop sufficient performance due to excessive use of refrigeration system • Cooling effectiveness of condenser is insufficient	• Excessive refrigerant in cycle → excessive refrigerant was added during recharging • Condenser cooling effectiveness is insufficient → condenser fins are clogged at cooling fan	1. Clean condenser 2. Check the operation of the condenser cooling fan 3. If 1 and 2 are normal state, check the amount of refrigerant and supply proper amount of refrigerant

(7) Air is present in refrigeration system.

Condition: Cooling system does not function.

NOTE: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging.

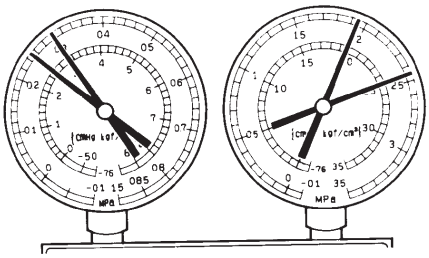


I022122E06

Symptom	Probable Cause	Diagnosis	Corrective Actions
• Pressure is too high on both low and high pressure sides • The low pressure piping is too hot to touch • Bubbles can be seen through sight glass	Air in system	• Air present in refrigeration system • Insufficient vacuum purging	1. Check compressor oil to see if it is dirty or insufficient 2. Evacuate the system and recharge it with new or purified refrigerant

(8) Expansion valve malfunction

Condition: Insufficient cooling

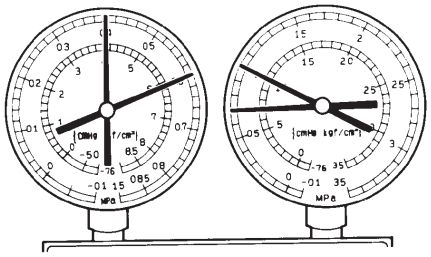


I022123E05

Symptom	Probable Cause	Diagnosis	Corrective Actions
• Pressure is too high on both low and high pressure sides • Frost or a large amount of condensation on piping on low pressure side	Expansion valve may be sticking	• Excessive refrigerant in low pressure piping • Expansion valve opened too wide	Check expansion valve

(9) Insufficient compressor compression

Condition: Insufficient cooling



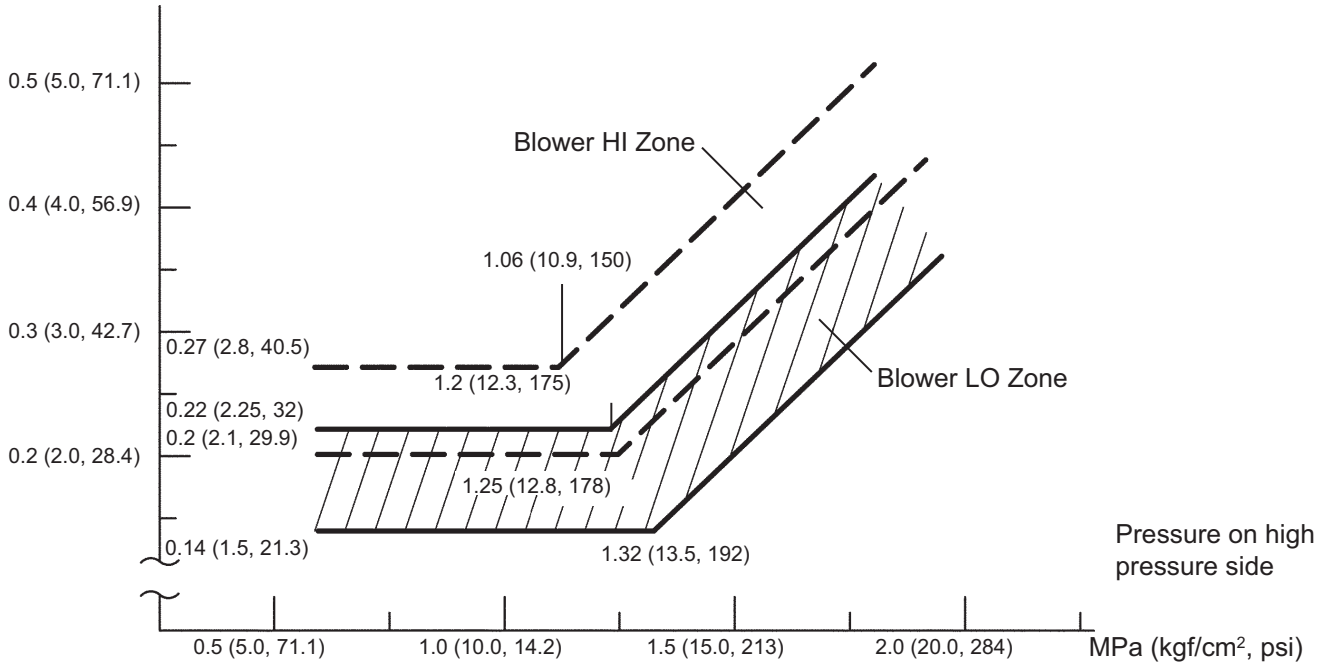
I022124E05

Symptom	Probable Cause	Diagnosis	Corrective Actions
• Pressure is too high both on low and high pressure sides • Pressure is too low on high pressure side	Internal leak in compressor	• Low compression • Leak from a damaged valve, or parts may be broken	Replace compressor

Gauge readings (Reference)

Pressure on low pressure side

AC



I030081E07

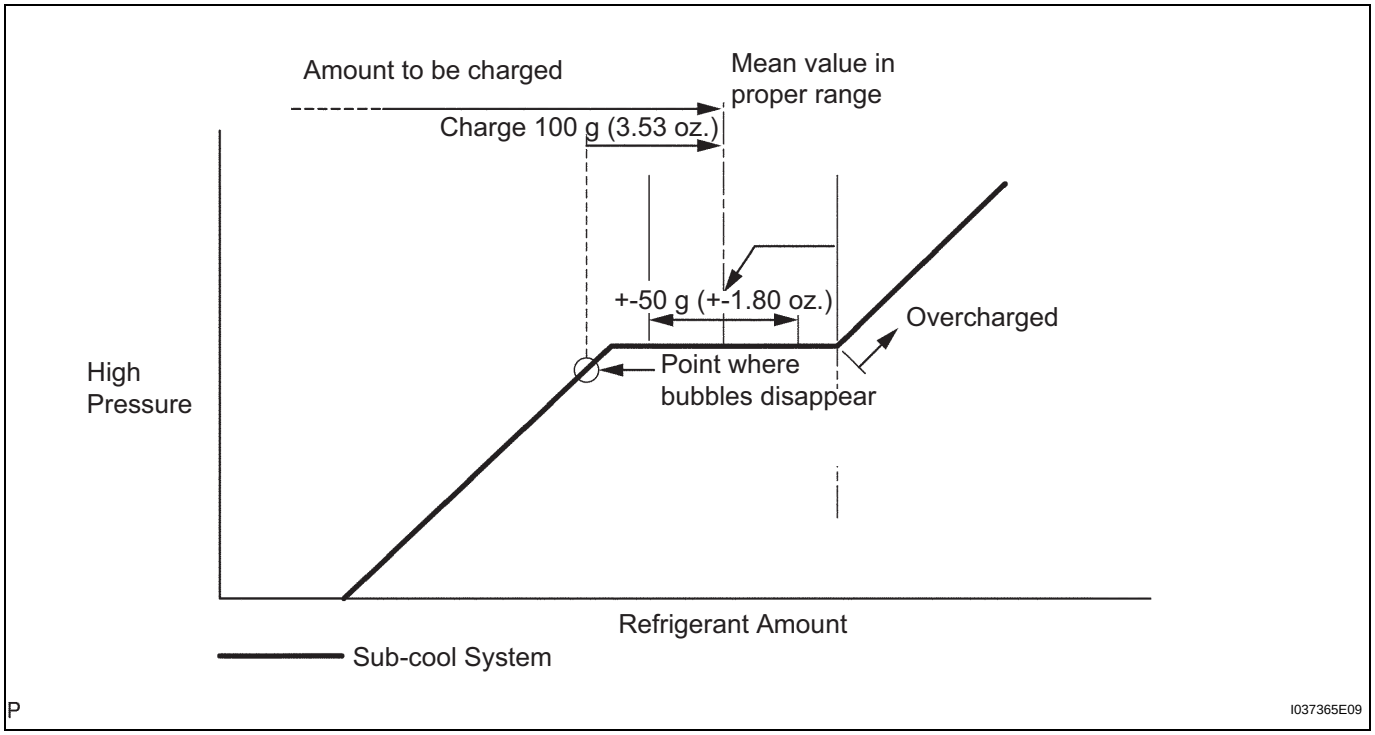
REPLACEMENT

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM

(a) Start up the engine.
(b) Turn the A/C switch on.
(c) Operate the cooler compressor at an engine speed of approximately 1,000 rpm for 5 to 6 minutes to circulate the refrigerant. This causes most of the compressor oil from the various components of the A/C system to collect in the A/C compressor.
(d) Stop the engine.
(e) Recover the refrigerant from the A/C system using a refrigerant recovery unit.

2. CHARGE WITH REFRIGERANT

(a) Perform vacuum purging using a vacuum pump.
(b) Charge with refrigerant HFC-134a (R134a).



Standard:
450 to 550 g (15.9 to 19.4 oz.)

SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)

NOTICE:

- **Do not turn the A/C on before charging with refrigerant. Doing so will cause the cooler compressor to work without refrigerant, resulting in overheating of the cooler compressor.**

AC

- **Approximately 100 g (3.53 oz.) of refrigerant may need to be charged after bubbles disappear.**
  The refrigerant amount should be checked by quantity, not with the sight glass.

HINT:
Ensure that sufficient refrigerant is available to recharge the system when using a refrigerant recovery unit. Refrigerant recovery units are not always able to recover 100 % of the refrigerant from an A/C system.

3. WARM UP ENGINE

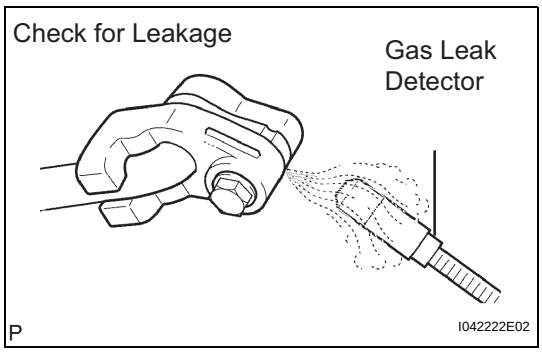
(a) Keep the A/C switch on for at least 2 minutes to warm up the compressor.
NOTICE:
Be sure to warm up the compressor when turning the A/C on after removing and installing the cooler refrigerant lines (including the compressor), to prevent damage to the compressor.

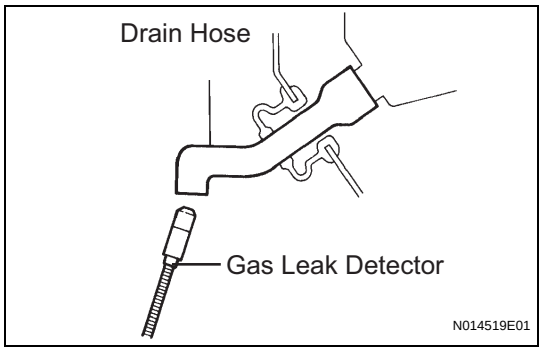
4. CHECK FOR LEAKAGE OF REFRIGERANT

(a) After recharging with refrigerant gas, check for leakage of refrigerant gas using a halogen leak detector.

(b) Carry out the test under the following conditions:
- IG OFF
- Secure good ventilation (the gas leak detector may react to volatile gases which are not refrigerant, such as evaporated gasoline and exhaust gas).
- Repeat the test 2 or 3 times.
- Make sure that there is some refrigerant remaining in the refrigeration system.
  When the compressor is off: approx. 392 to 588 kPa (4 to 6 kgf/cm^2, 57 to 85 psi)

(c) Using a gas leak detector, check for leakage from the refrigerant lines.





(d) Bring the gas leak detector close to the drain hose with the detector's power off, and then turn the detector on.
HINT:
- After the blower motor has stopped, let the cooling unit stand for more than 15 minutes.
- Bring the gas leak detector sensor under the drain hose.
- When bringing the gas leak detector close to the drain hose, make sure that the gas leak detector does not react to volatile gases.
  If it is not possible to avoid interference from volatile gases, the vehicle should be lifted up to allow testing.

(e) If a gas leak is not detected from the drain hose, remove the blower motor control from the cooling unit. Insert the gas leak detector sensor into the unit and perform the test.

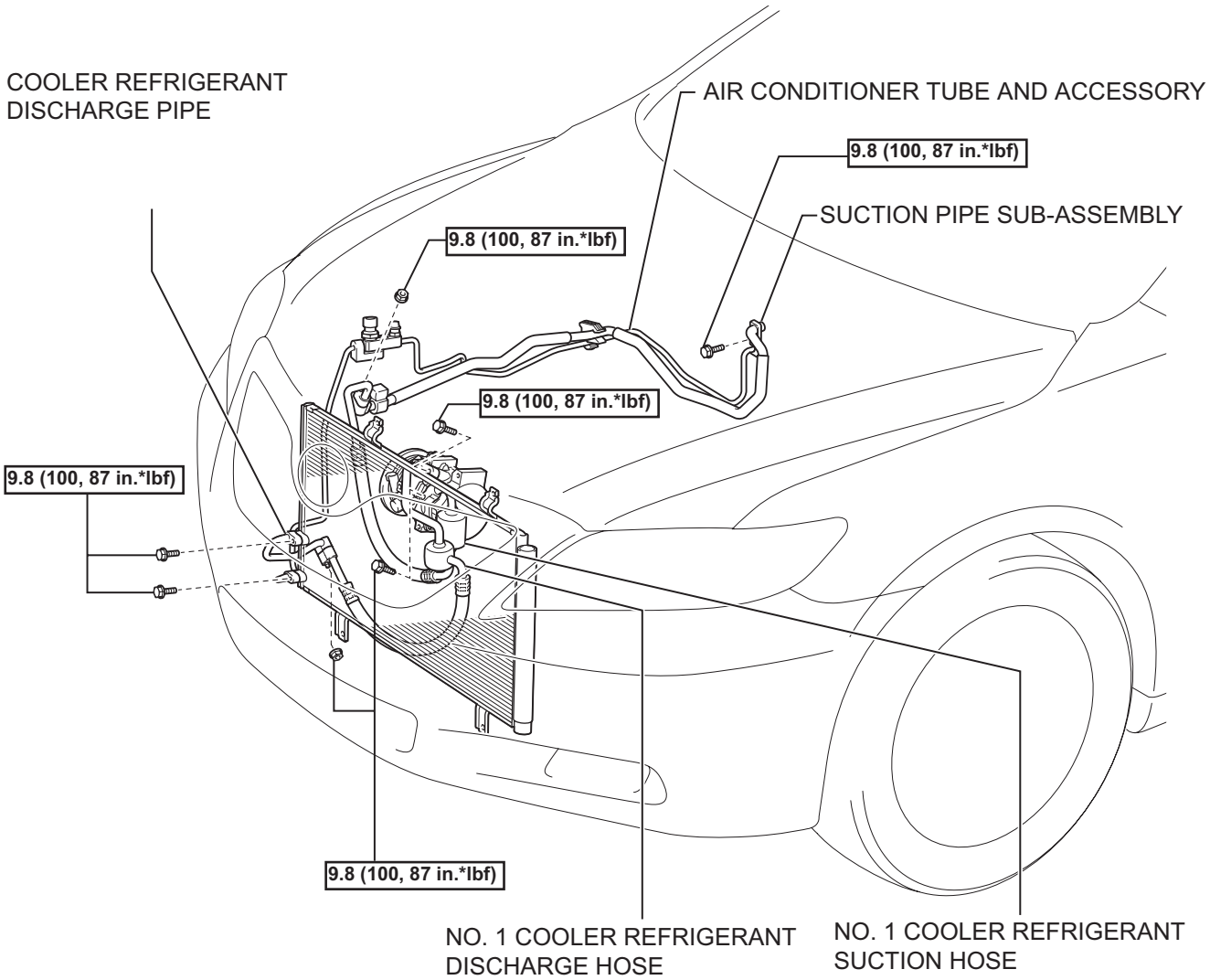
(f) Disconnect the pressure switch connector and leave it for approximately 20 minutes. Bring the gas leak detector close to the pressure switch and perform the test.

AC

REFRIGERANT LINE

COMPONENTS

for TMC Made 2AZ-FE:



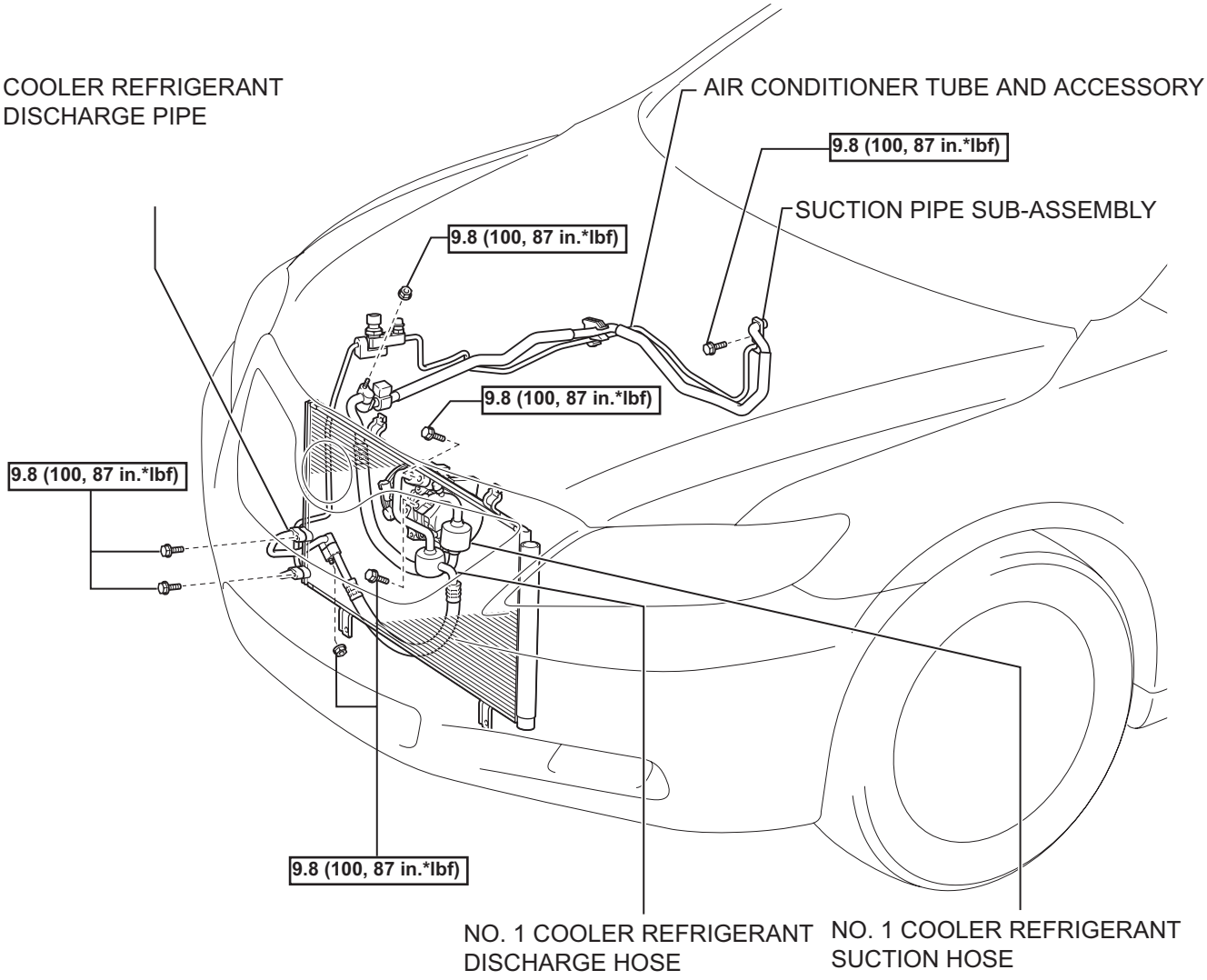
AC

N*m (kgf*cm, ft.*lbf) : Specified torque

P

E128497E01

for TMC Made 2GR-FE:



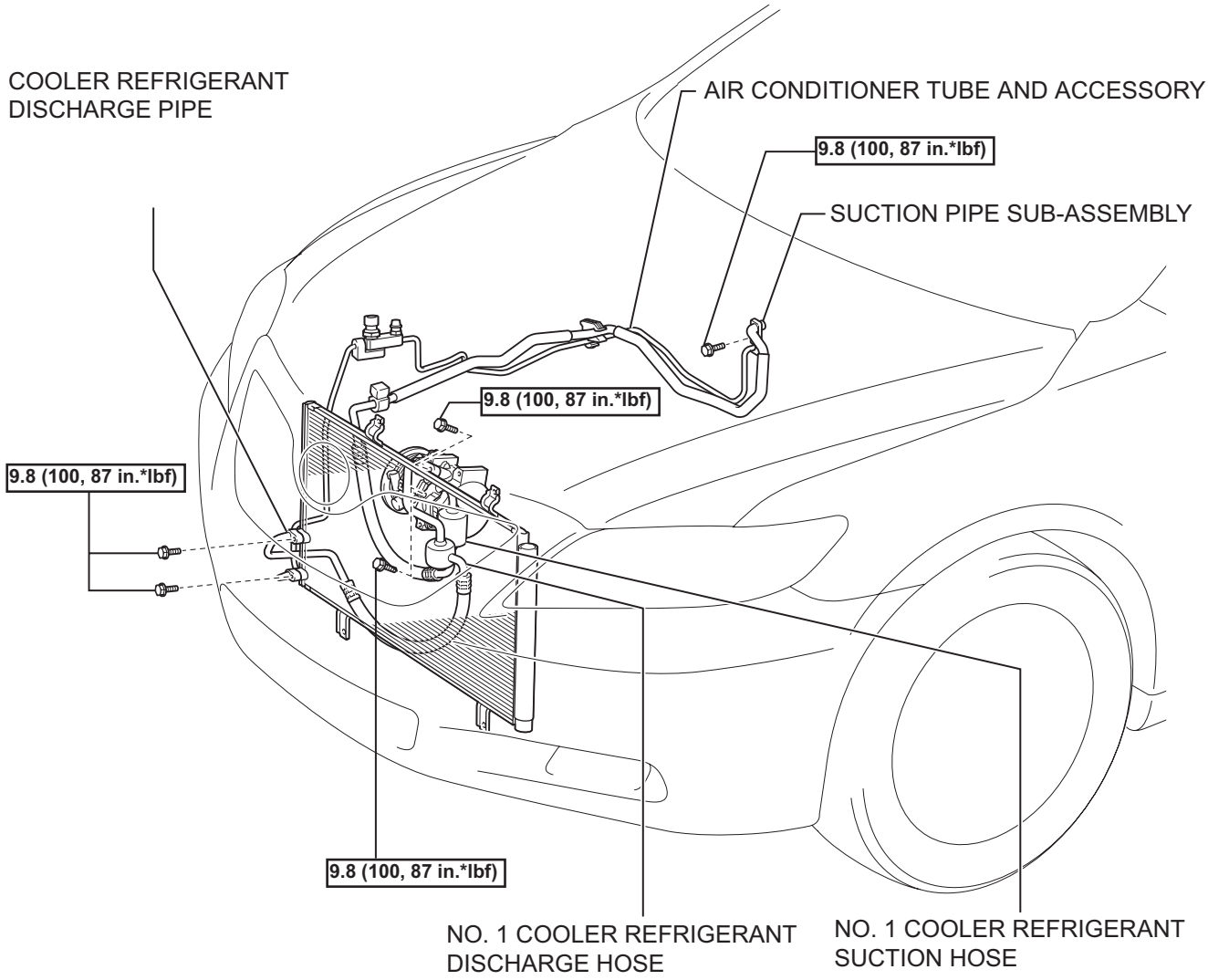
N*m (kgf*cm, ft.*lbf): Specified torque

P

E128496E01

AC

for TMMK Made 2AZ-FE:



N*m (kgf*cm, ft.*lbf) : Specified torque

P

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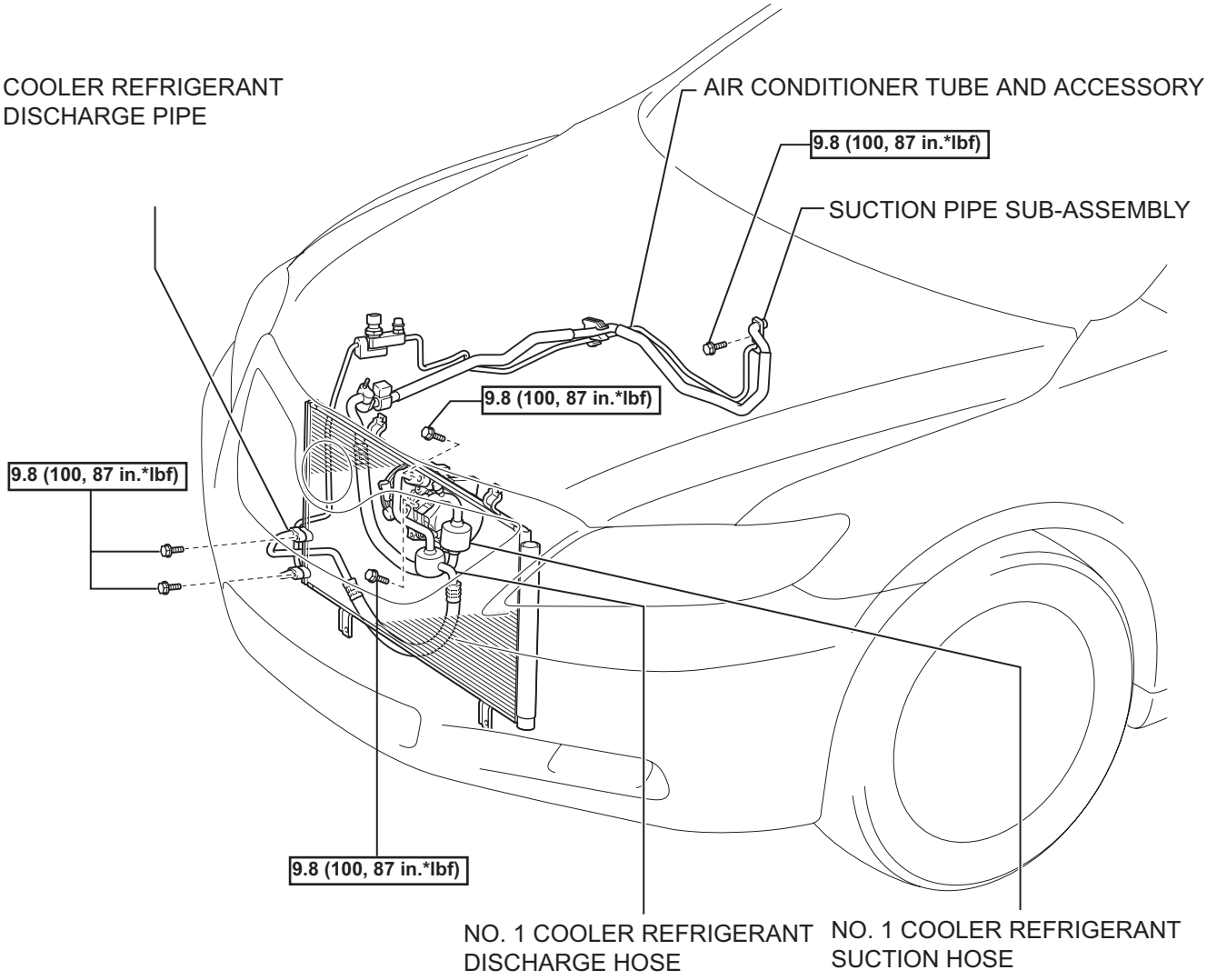

N*m (kgf*cm, ft.*lbf) : Specified torque

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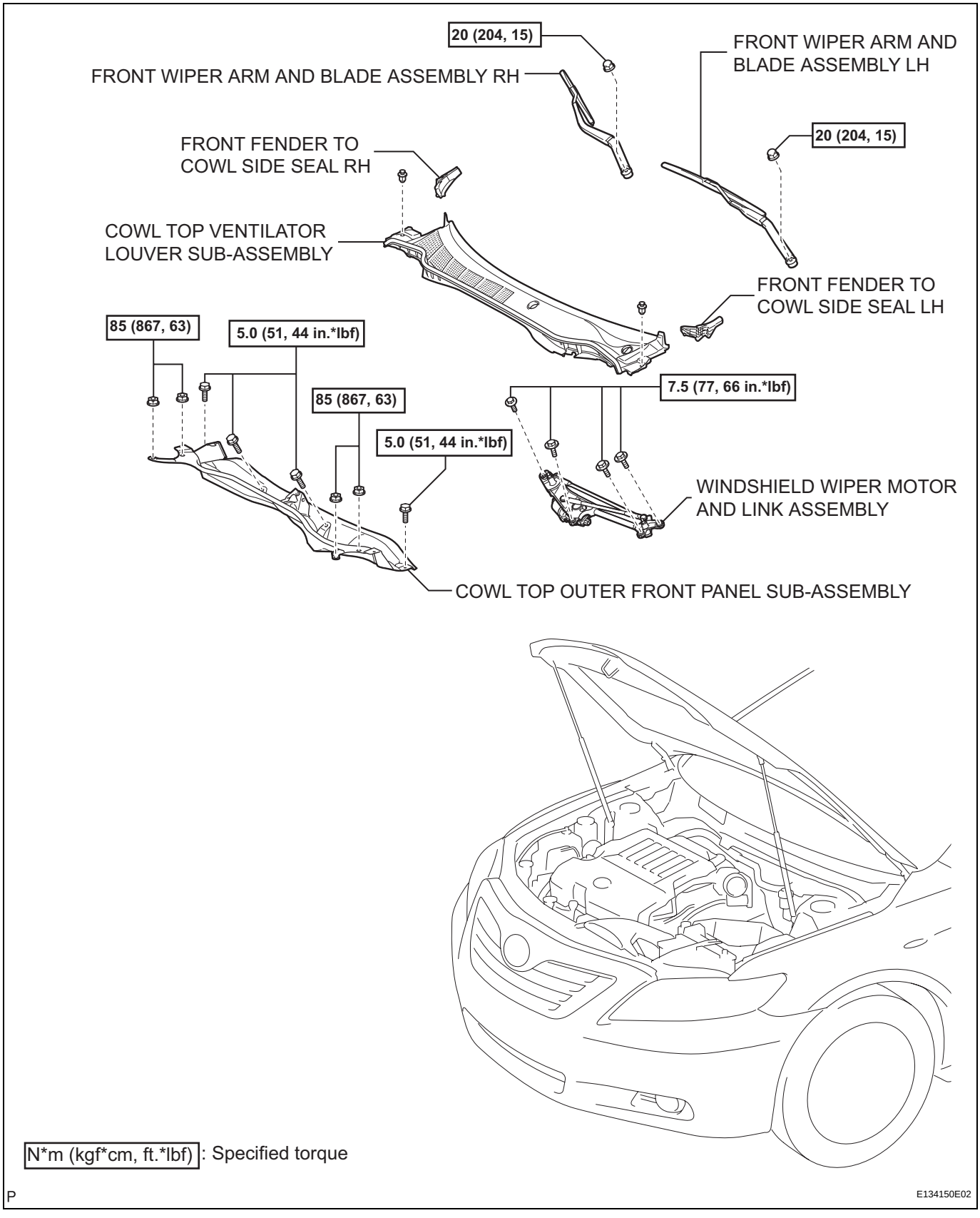
E130000E01

AC

AIR CONDITIONING UNIT

COMPONENTS



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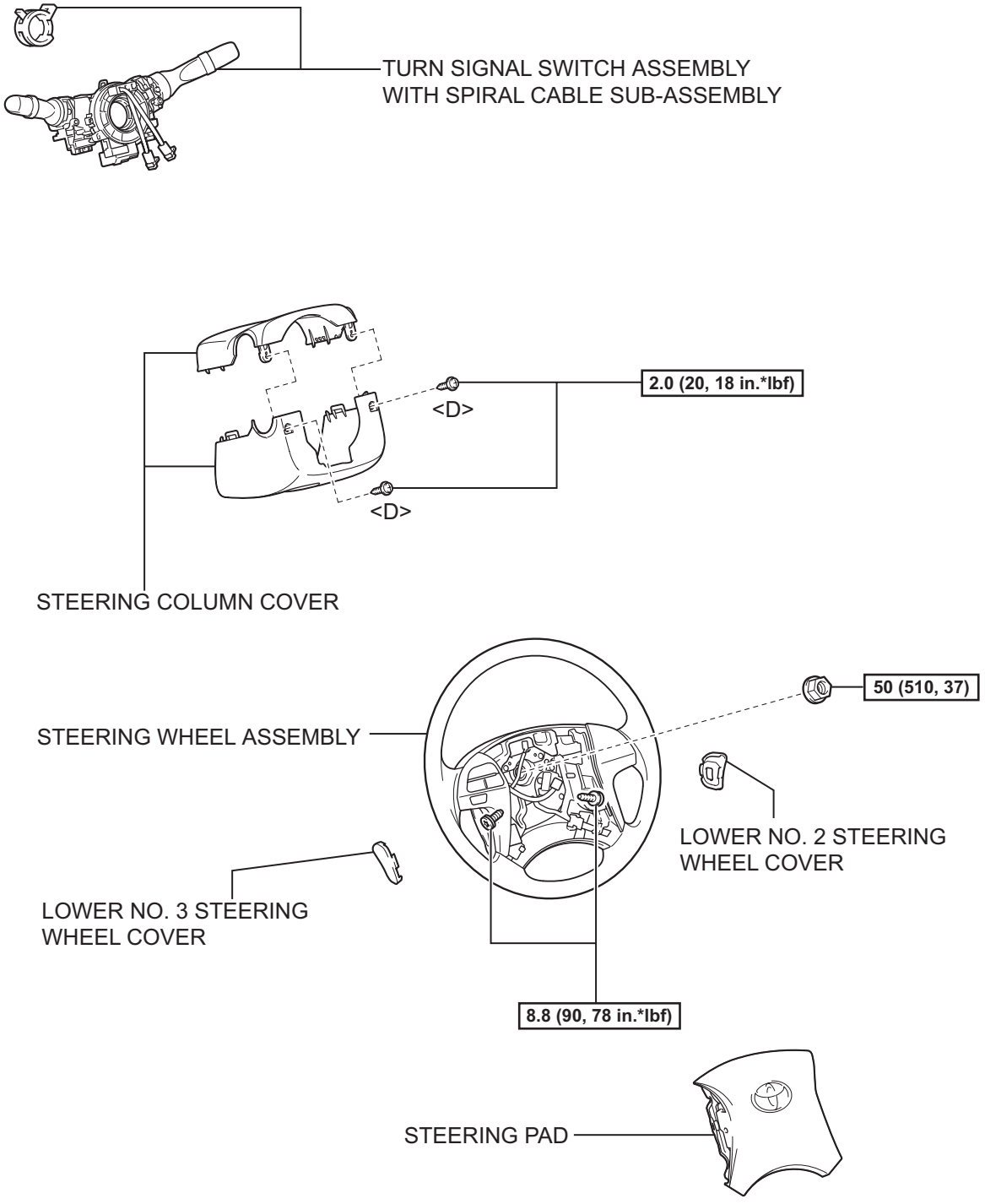
for TMC Made:



AC

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137279E01

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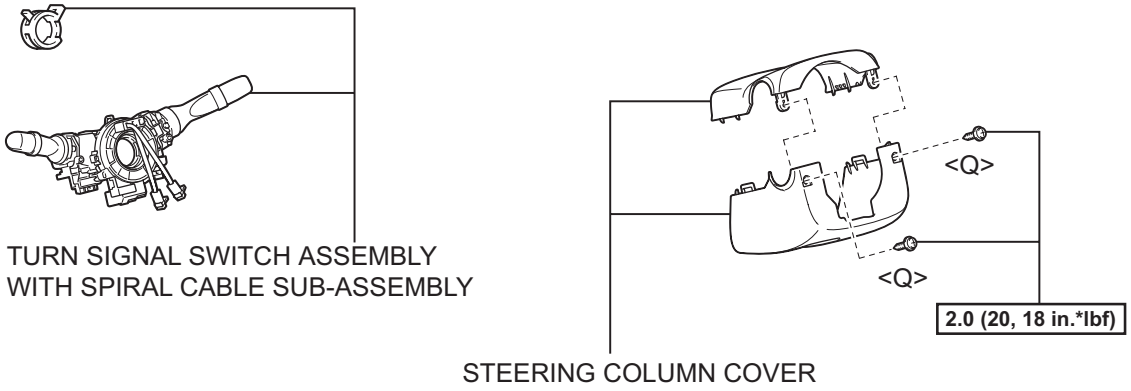

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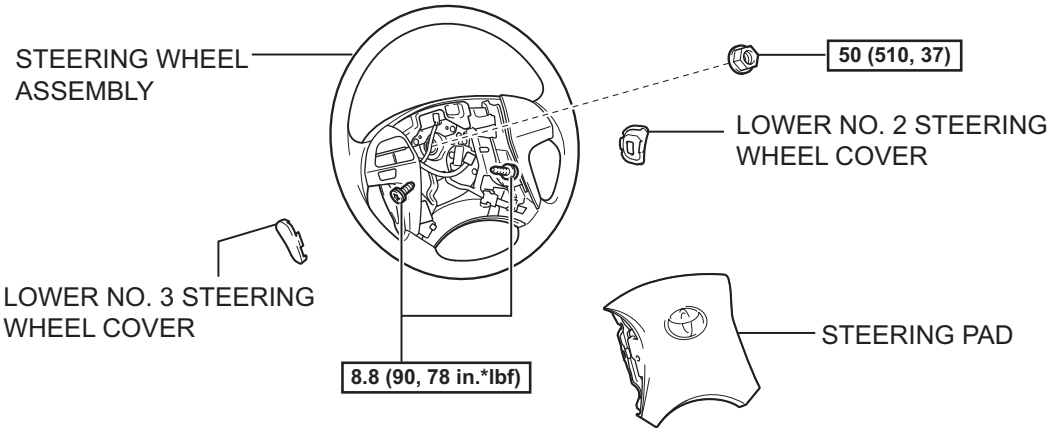

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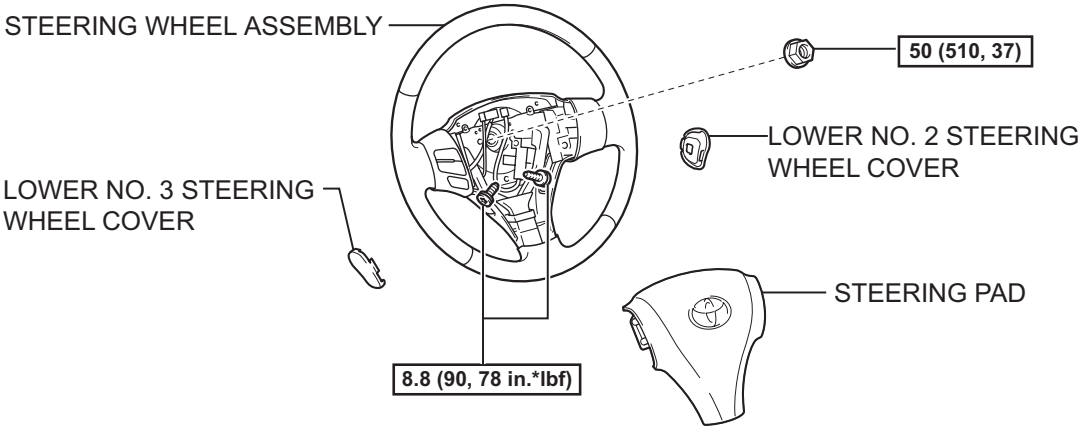

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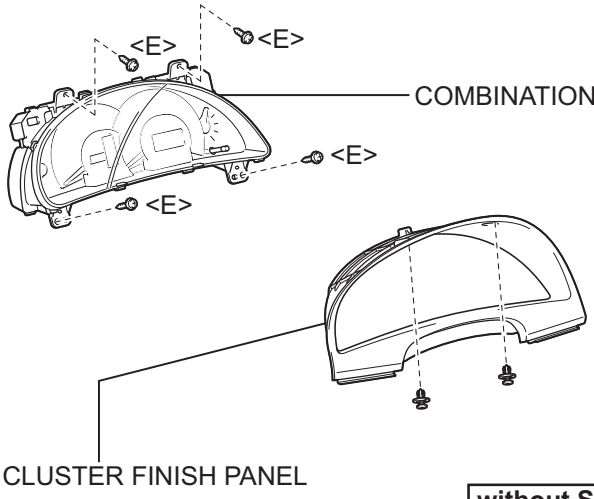
N*m (kgf*cm, ft.*lbf) : Specified torque

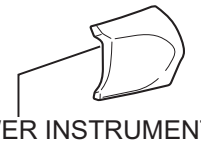
P

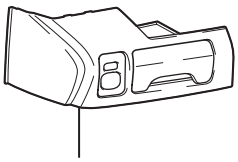
B137280E01

for TMC Made:



without Smart Key System:





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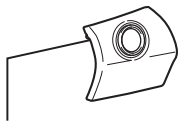
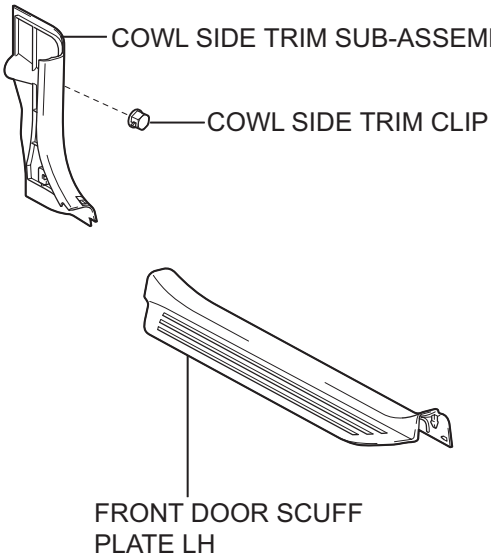
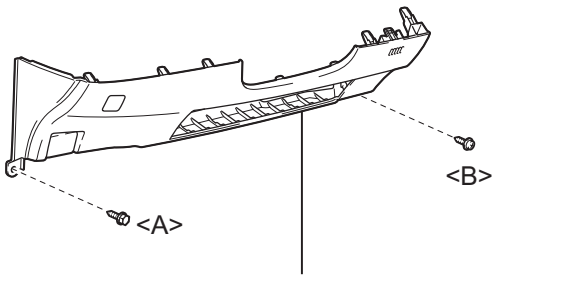




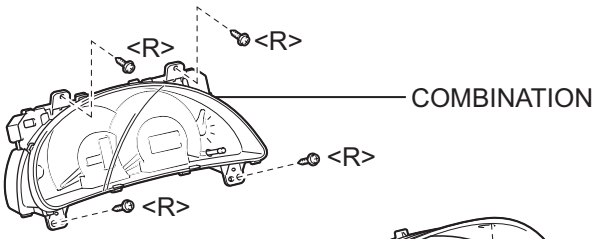


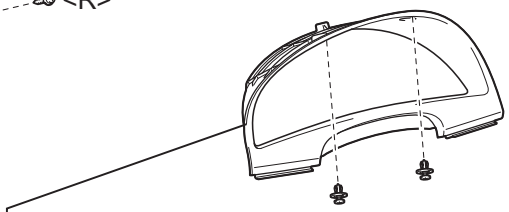
AC

P

B137281E01

for TMMK Made:

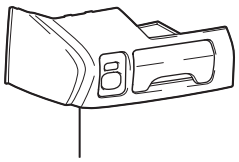




INSTRUMENT CLUSTER FINISH PANEL

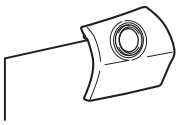
without Smart Key System:

LOWER INSTRUMENT PANEL FINISH PANEL



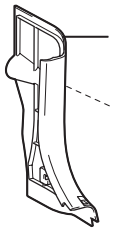
NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY

with Smart Key System:



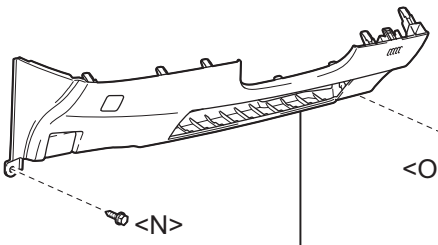
LOWER INSTRUMENT PANEL FINISH PANEL

AC

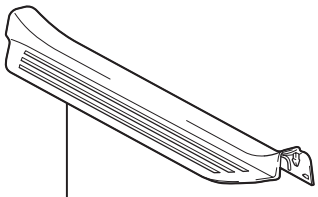


COWL SIDE TRIM SUB-ASSEMBLY LH

COWL SIDE TRIM CLIP



LOWER INSTRUMENT PANEL FINISH PANEL LH

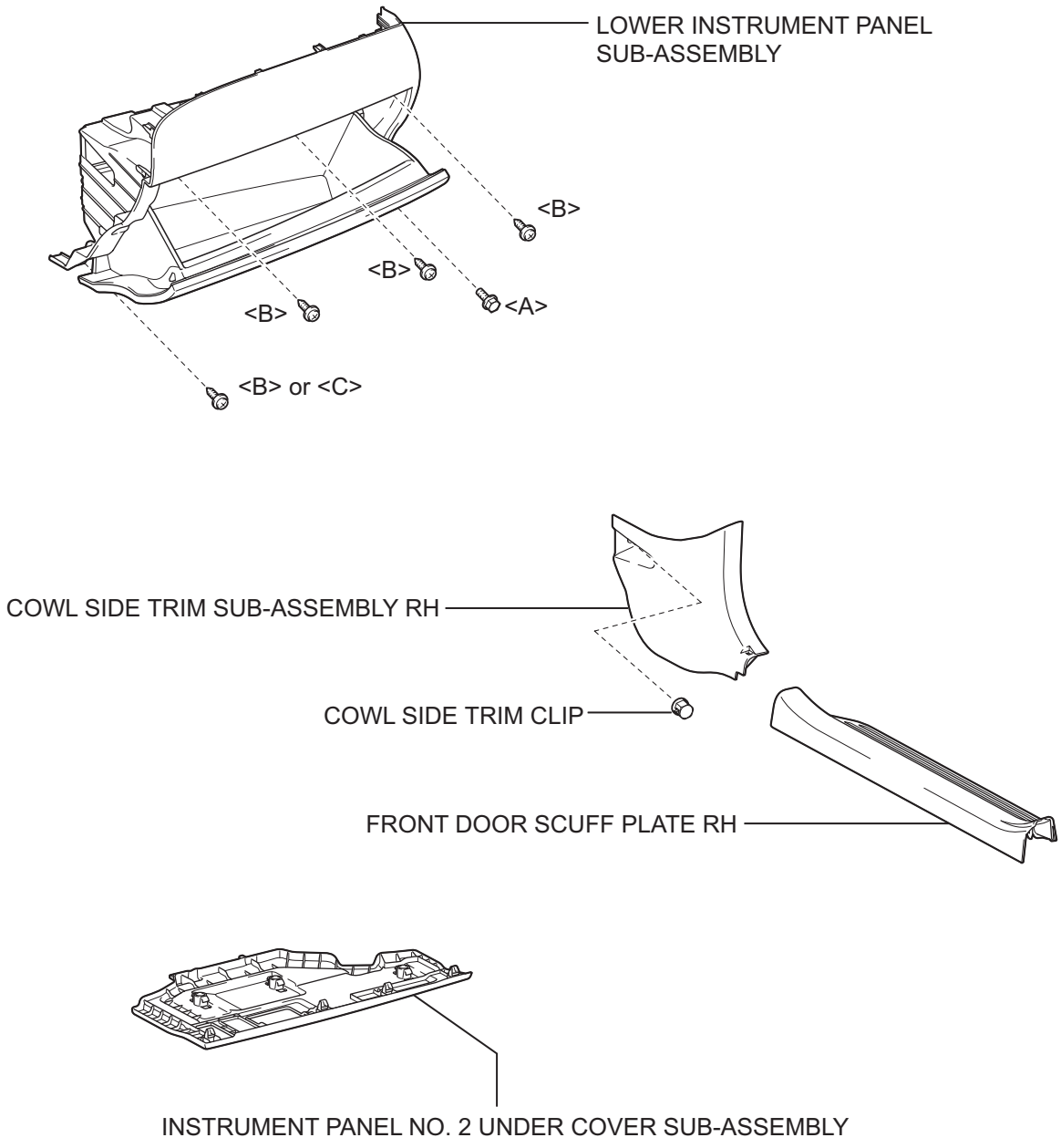


FRONT DOOR SCUFF PLATE LH

P

B137281E03

for TMC Made:



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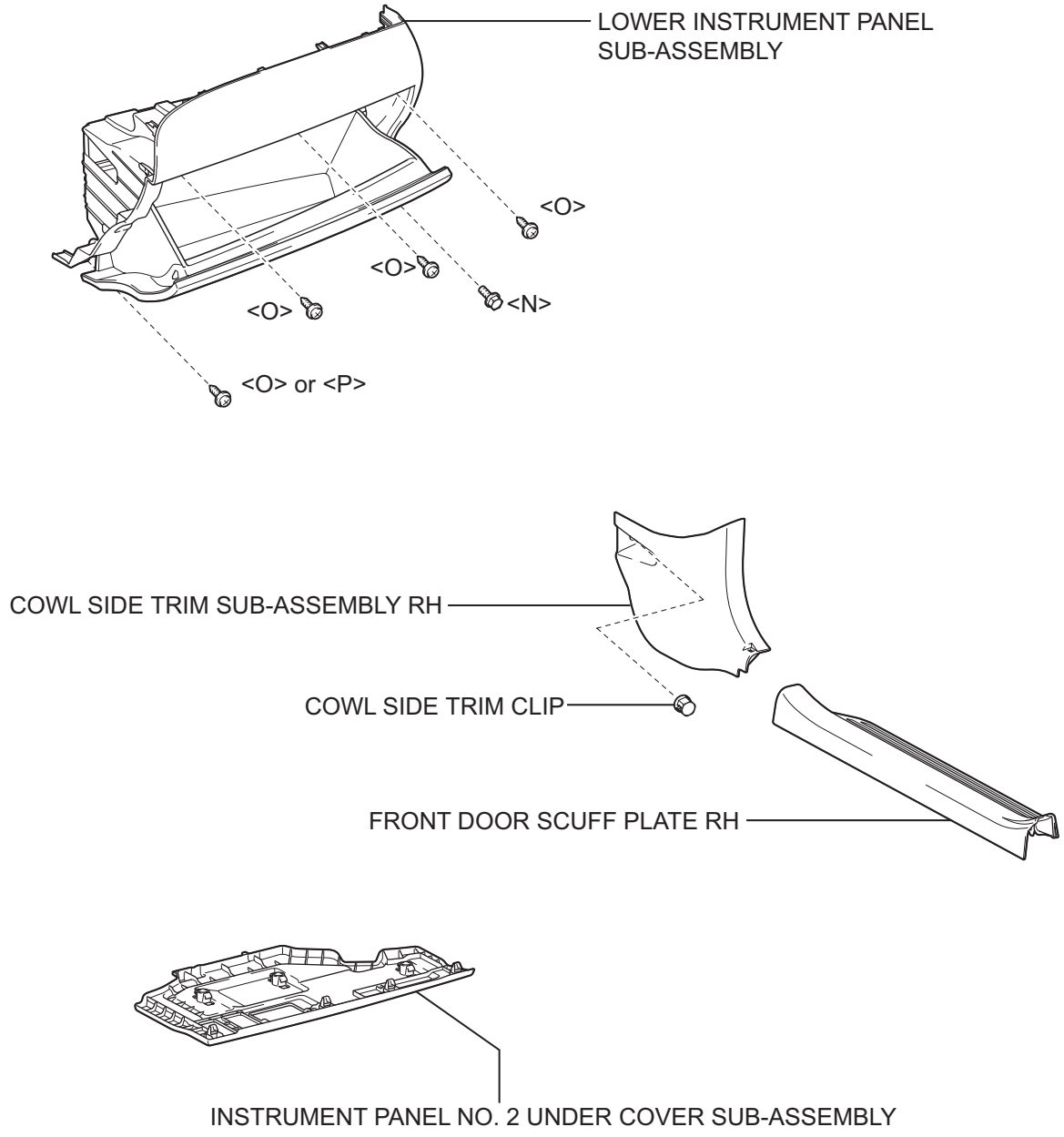
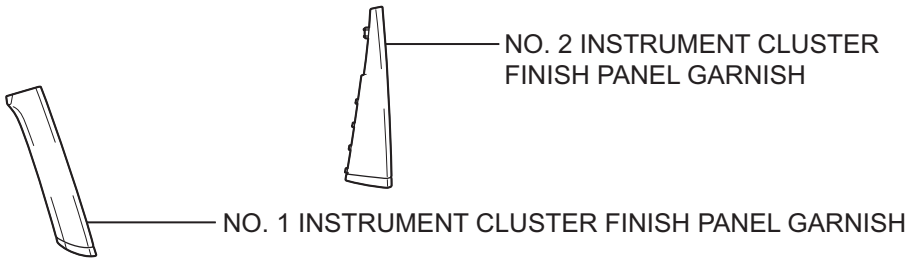


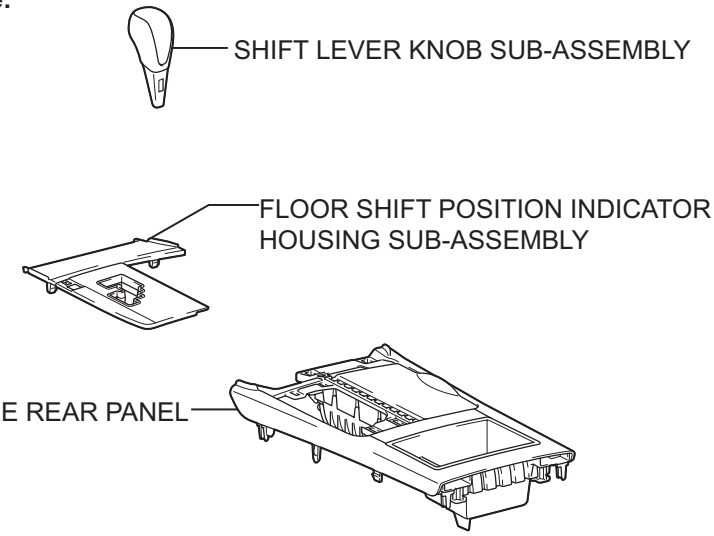
P

B137282E03

AC



for Automatic Transaxle:



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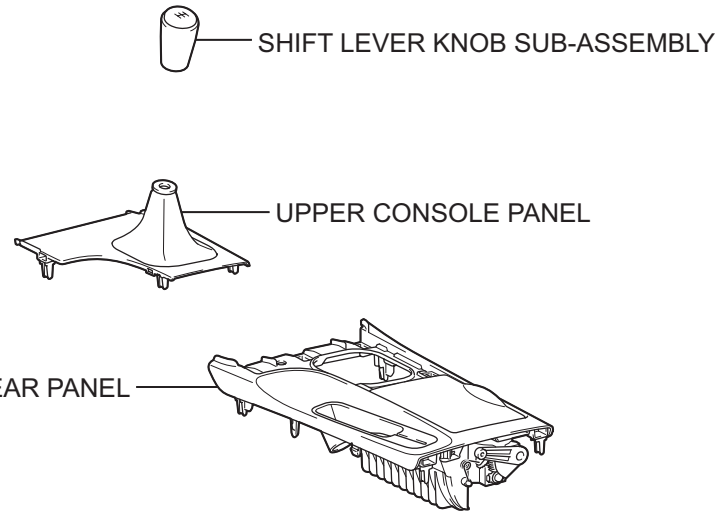

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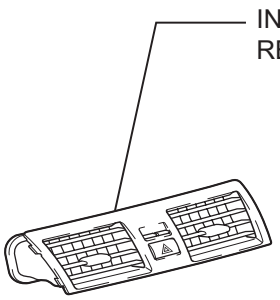
for TMC Made:



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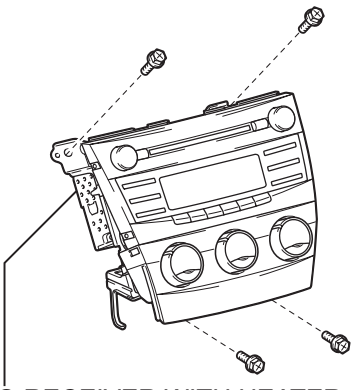

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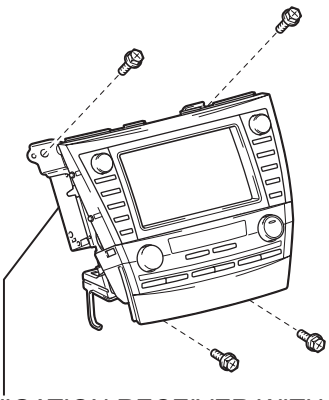

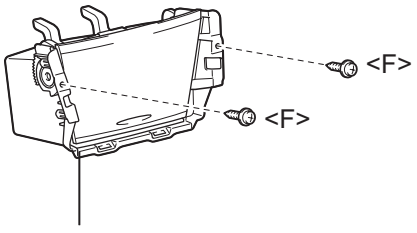

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B137284E01

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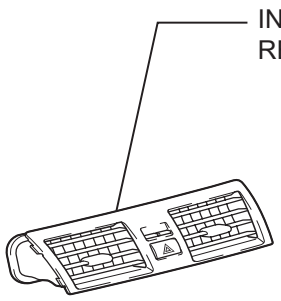
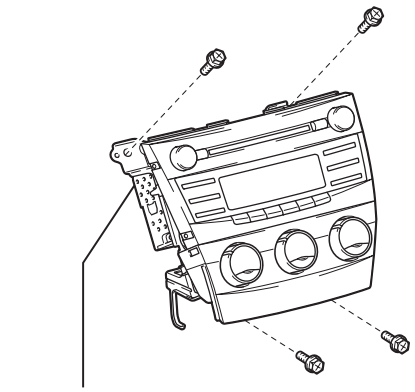
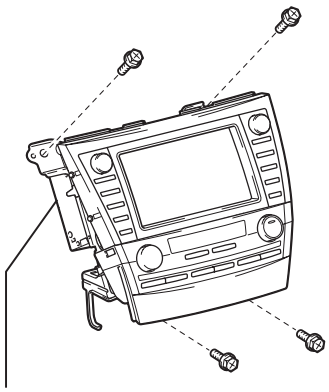
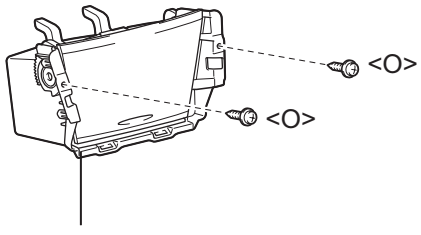


without Navigation System:	**with Navigation System:**
	
RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY	NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY



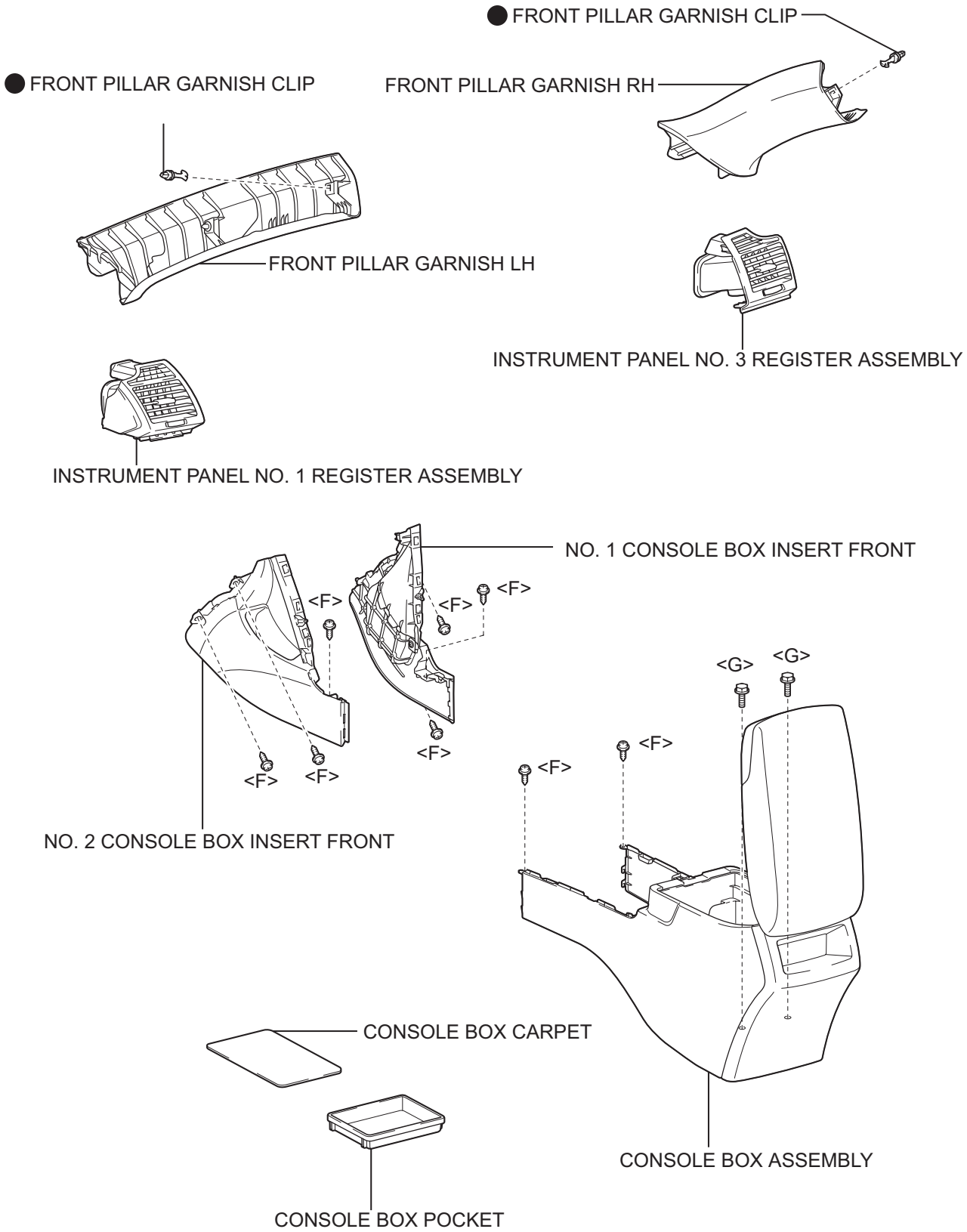
UPPER CONSOLE PANEL SUB-ASSEMBLY

AC

P

B137284E03

for TMC Made:



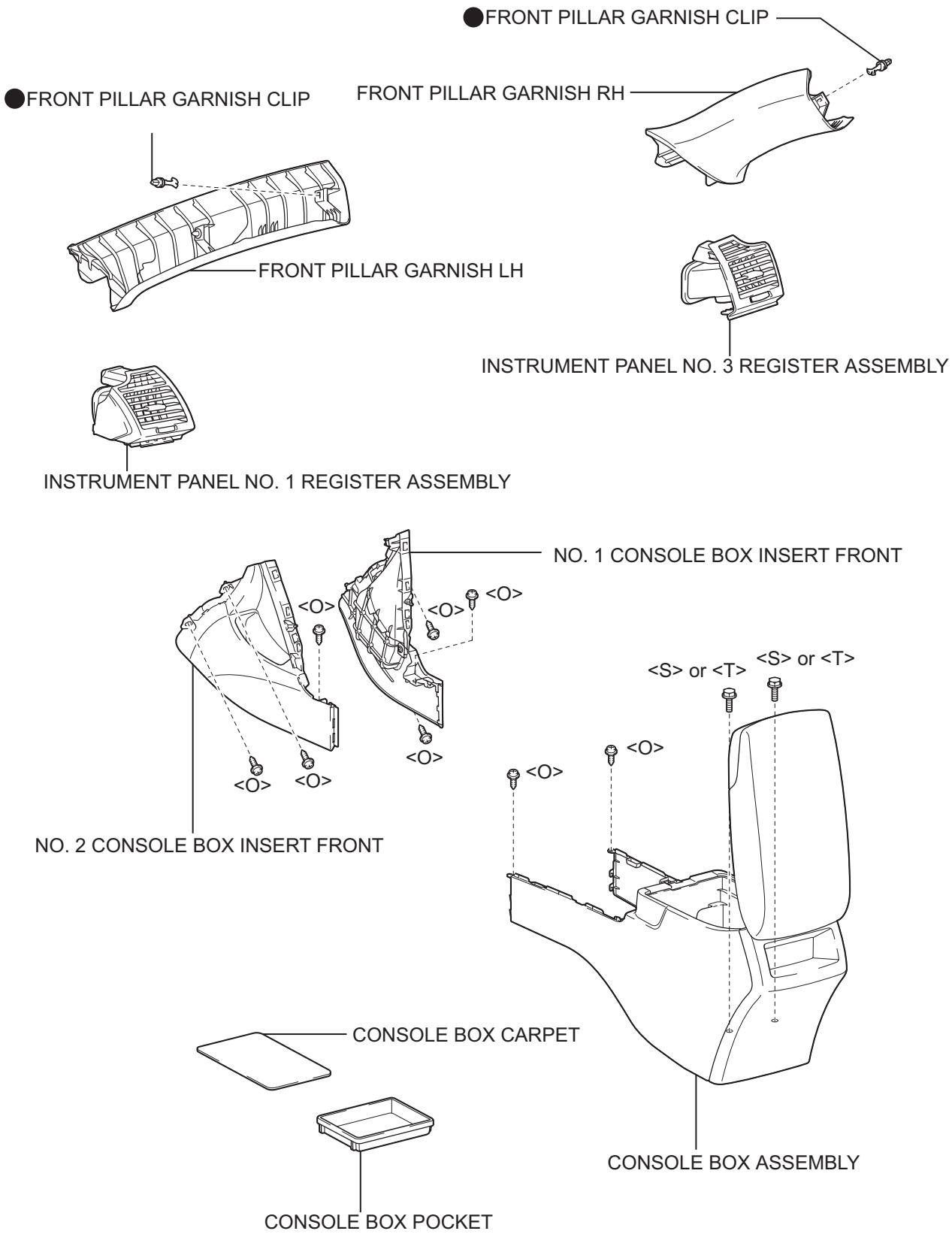
AC

● Non-reusable part

P

B137285E01

for TMMK Made:



● Non-reusable part

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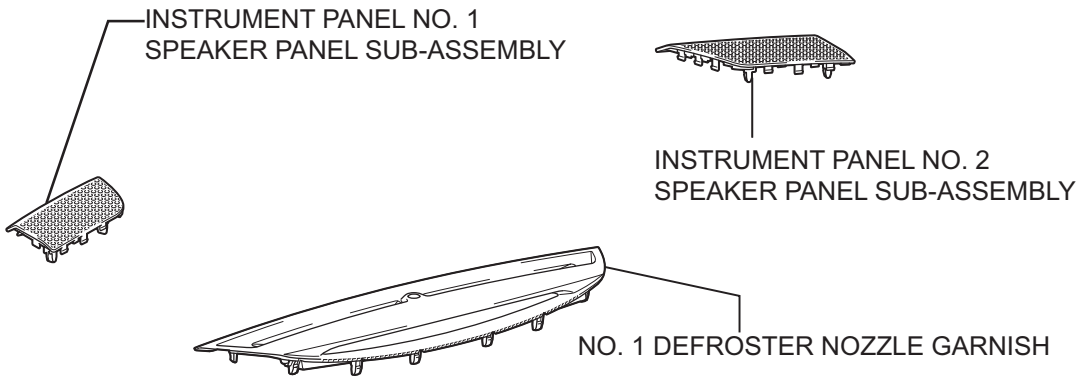
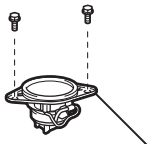
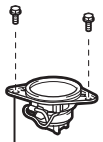
for TMC Made:



for LH Side:



for RH Side:



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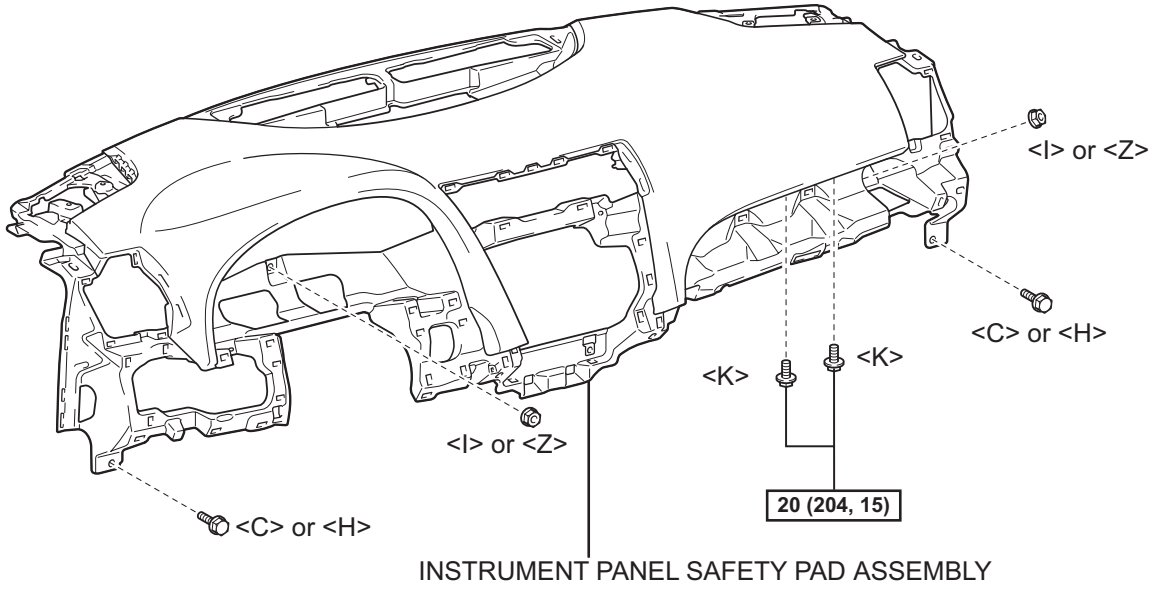
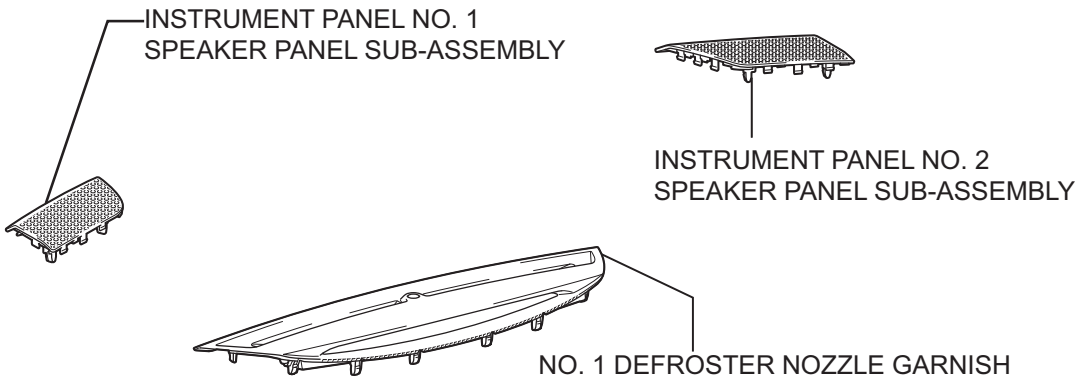


N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137286E01

for TMMK Made:



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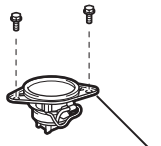
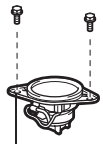
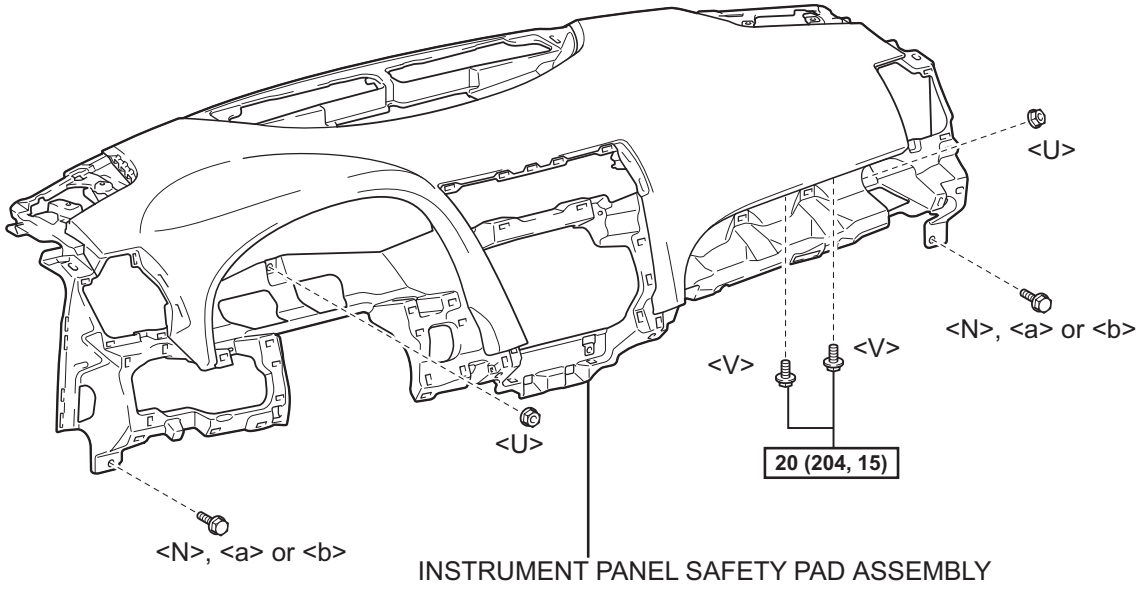


for RH Side:





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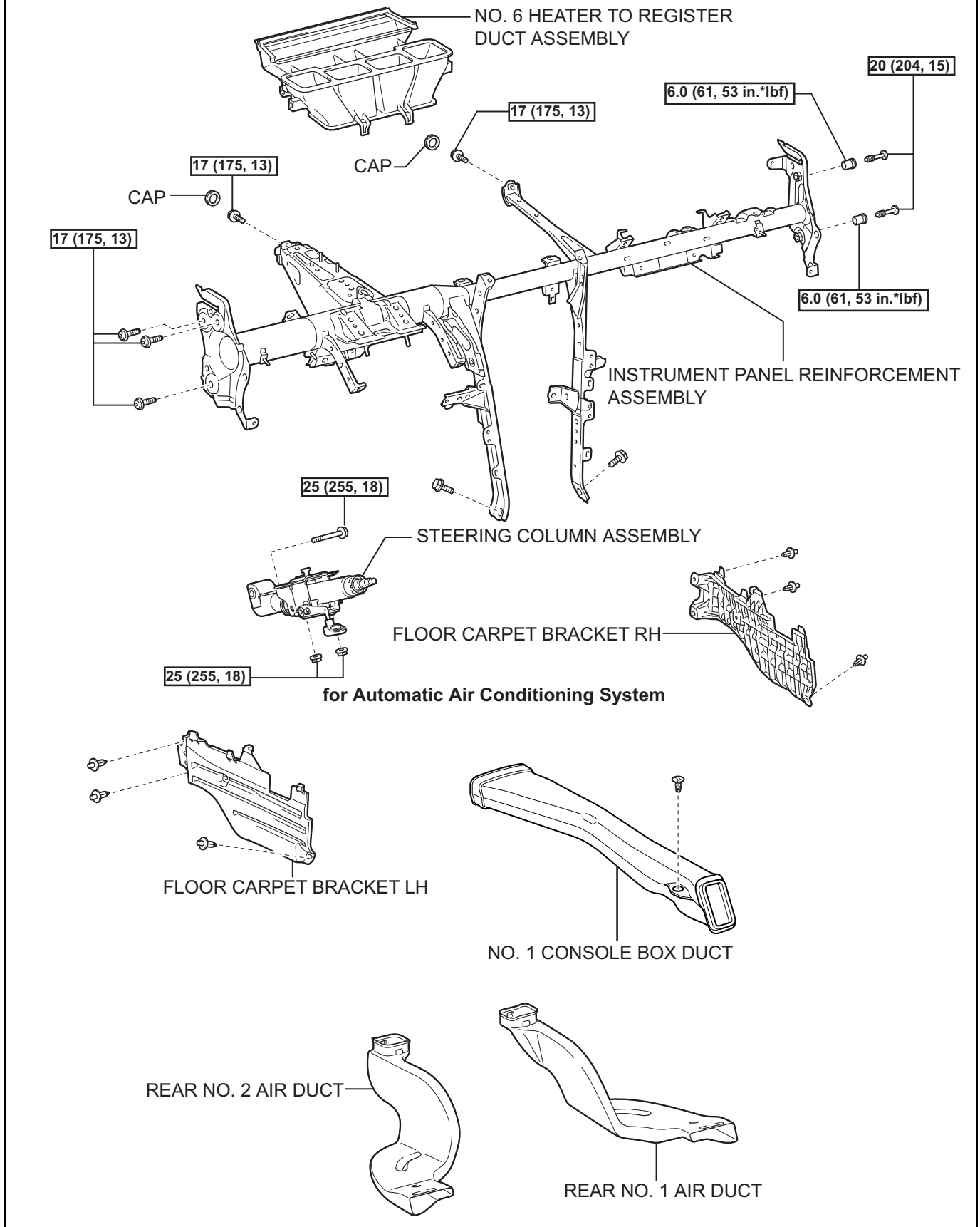
N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137286E03



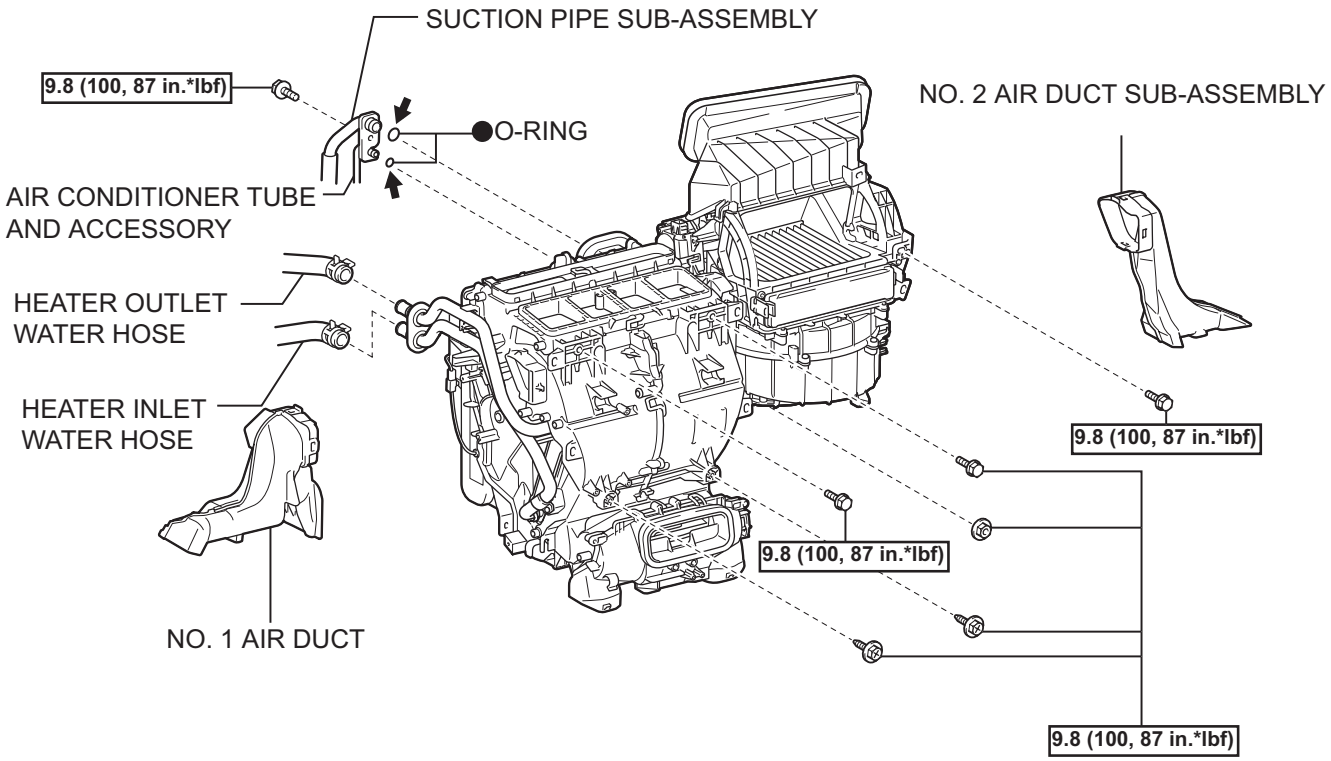
AC

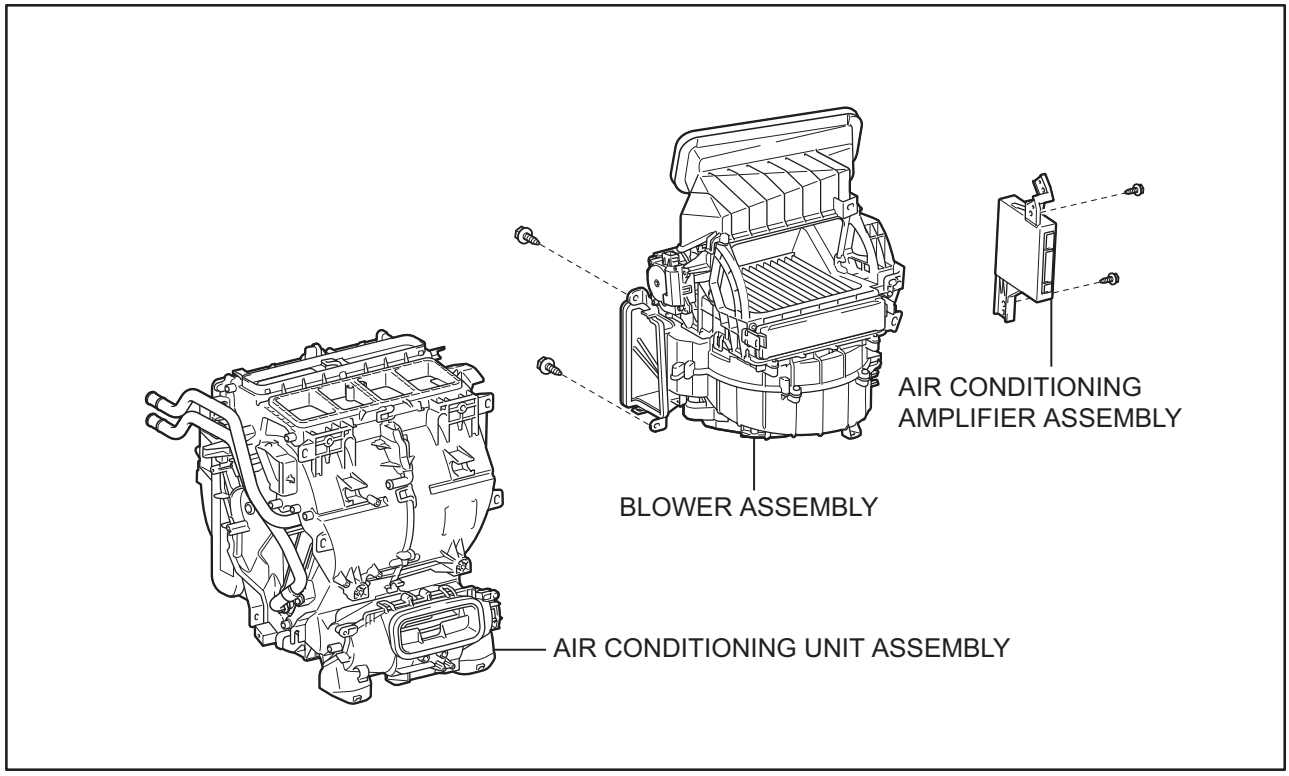
N*m (kgf*cm, ft.*lbf) : Specified torque

P

E128500E01

for TMC Made:





AC

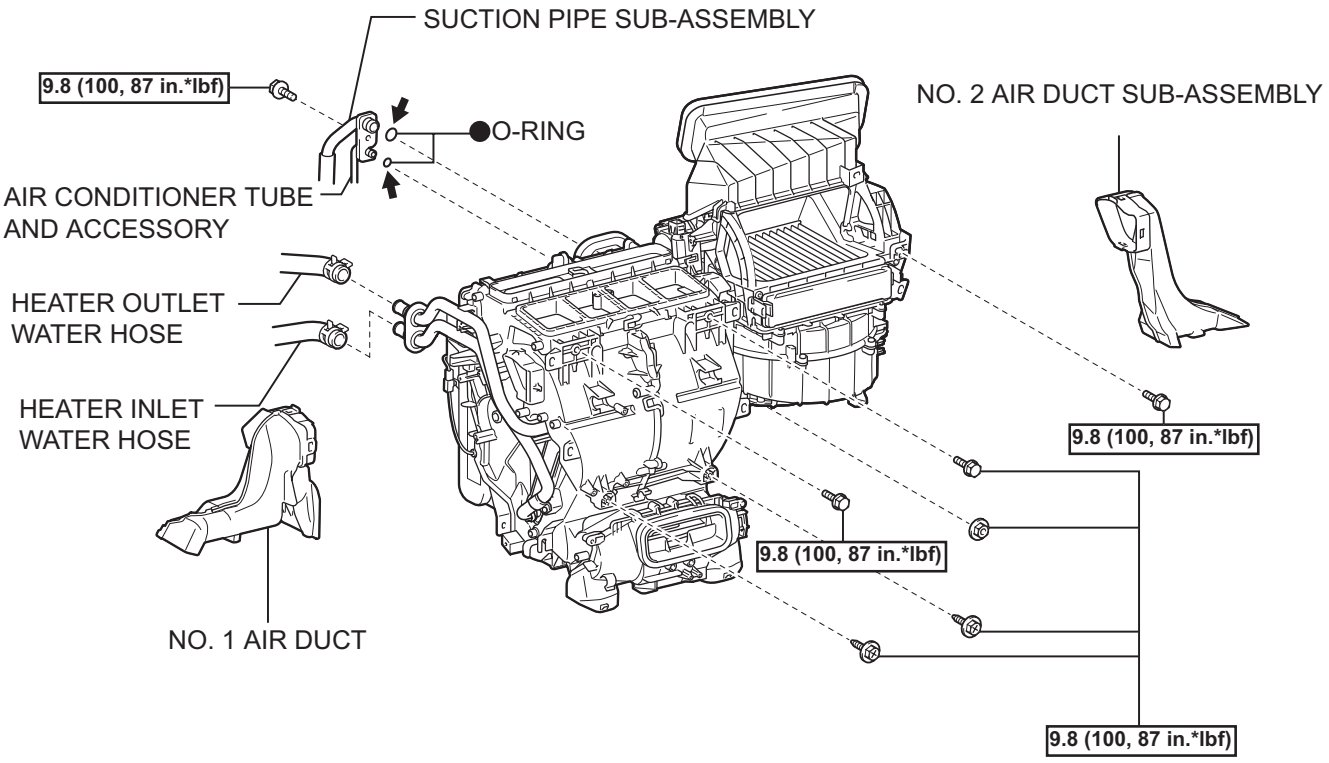
⬅ Compressor oil ND-OIL 8 or equivalent

● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

P

E128501E01

for TMMK Made:



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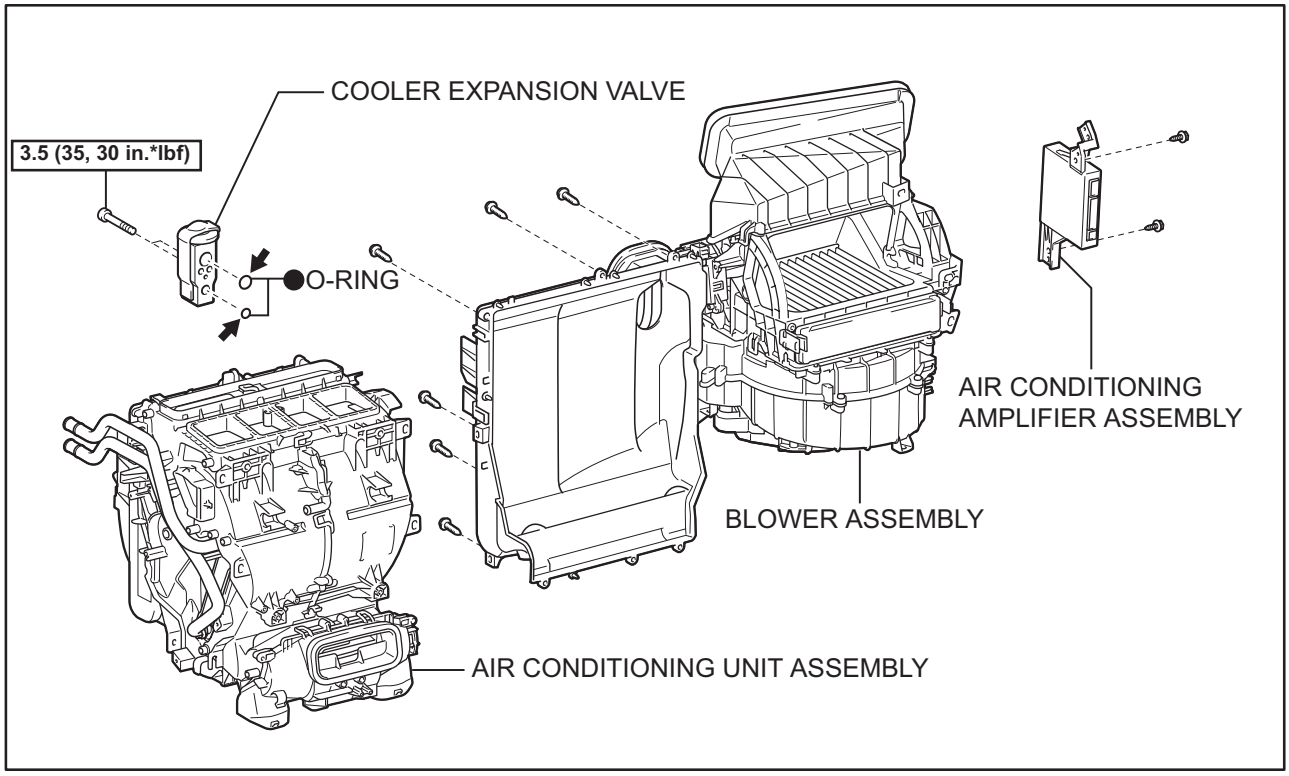
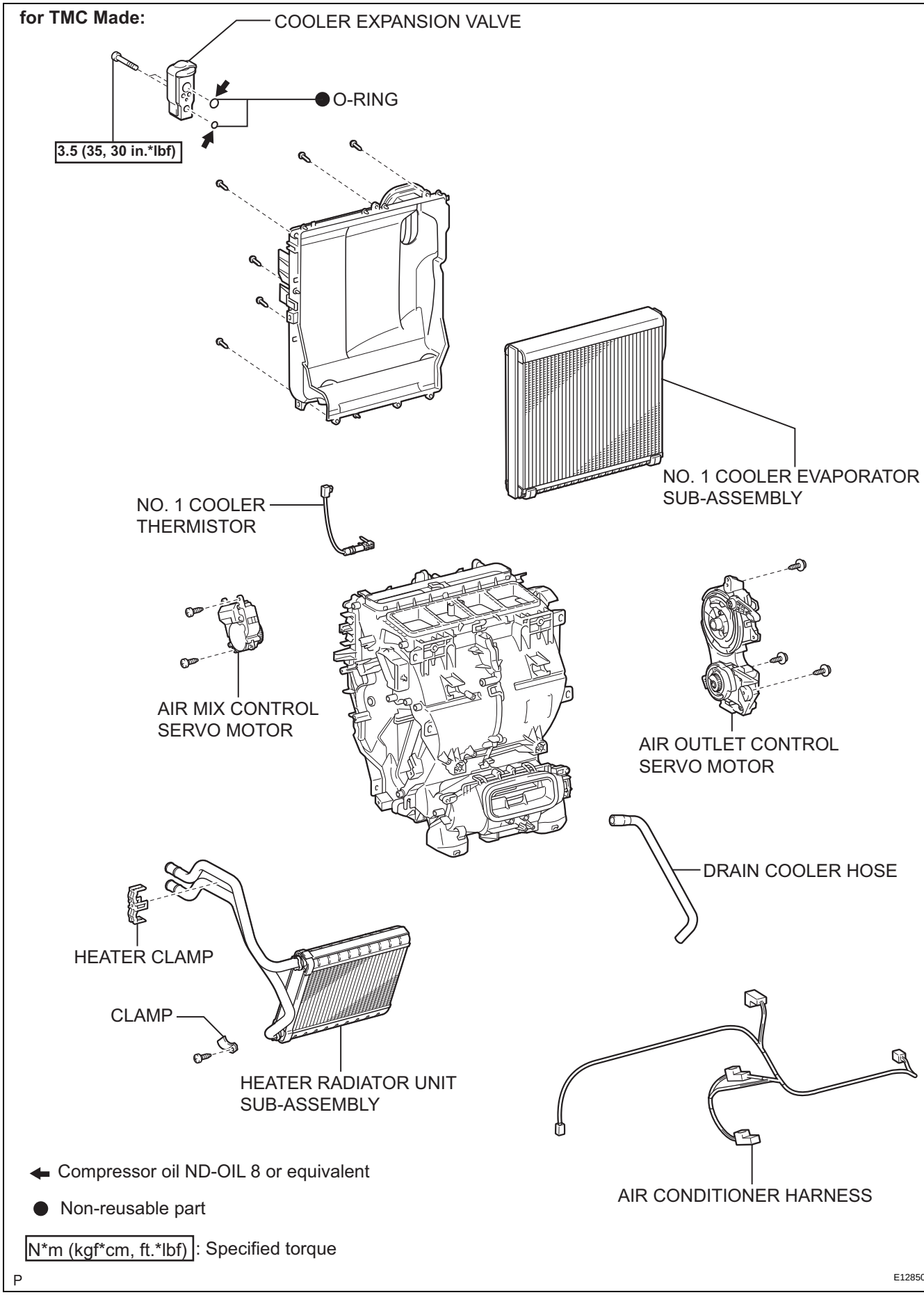


◀ Compressor oil ND-OIL 8 or equivalent

● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

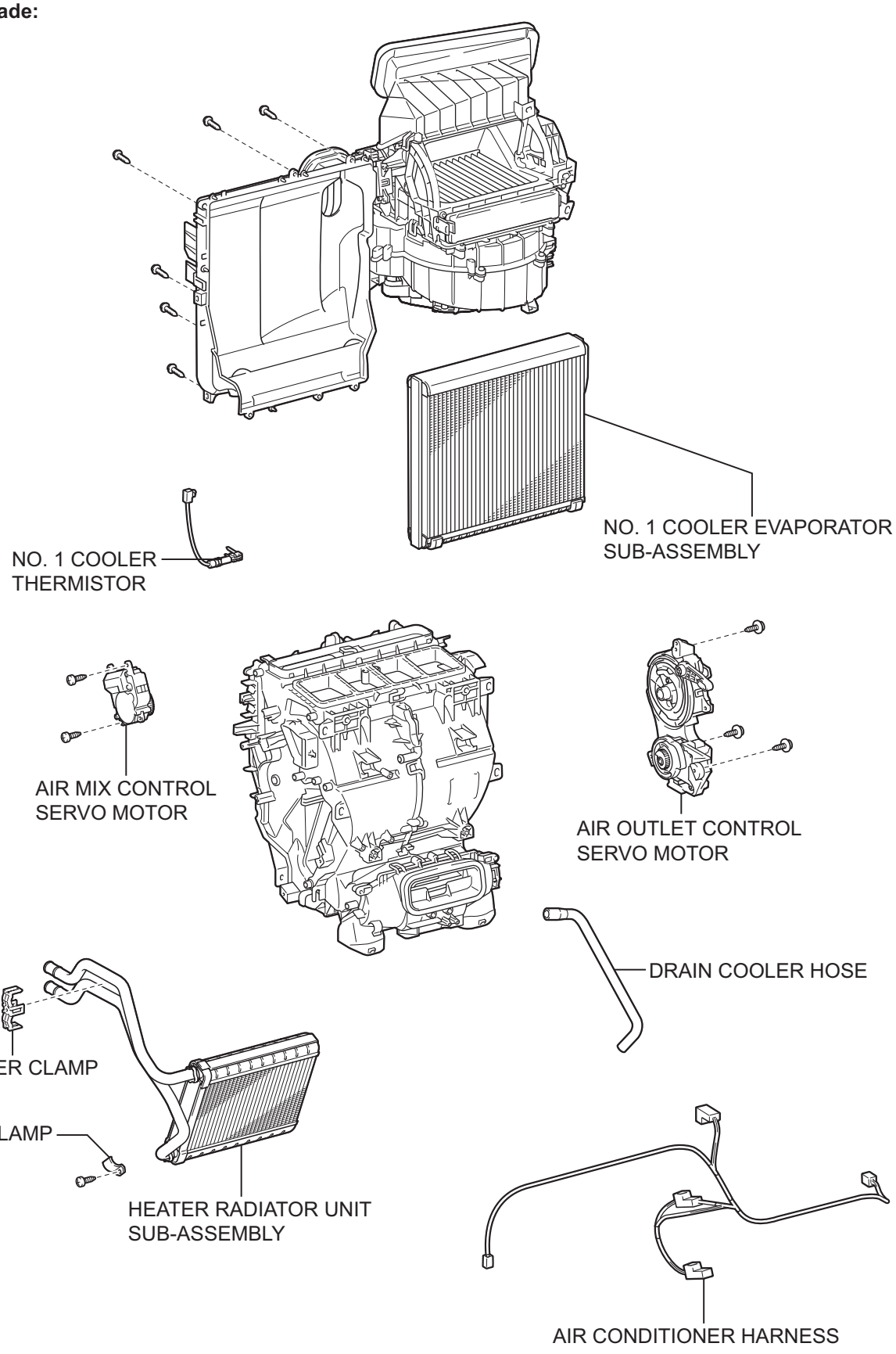
P

E129993E01


for TMC Made:
COOLER EXPANSION VALVE
O-RING
3.5 (35, 30 in.*lbf)
NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY
NO. 1 COOLER THERMISTOR
AIR MIX CONTROL SERVO MOTOR
AIR OUTLET CONTROL SERVO MOTOR
DRAIN COOLER HOSE
HEATER CLAMP
CLAMP
HEATER RADIATOR UNIT SUB-ASSEMBLY
AIR CONDITIONER HARNESS
Compressor oil ND-OIL 8 or equivalent
Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
P
E128502E01

AC

for TMMK Made:



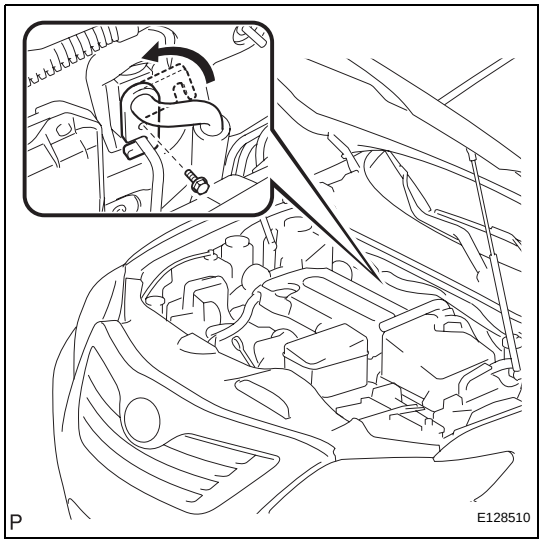
AC

P

E129998E01

REMOVAL

1. **RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-125)**
2. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT BATTERY NEGATIVE TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the terminal to prevent the airbag from deploying. (See page RS-1)
4. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
5. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
6. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
8. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
9. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
10. **REMOVE COWL TOP OUTER FRONT PANEL SUB-ASSEMBLY (See page BR-29)**
11. **DISCONNECT SUCTION PIPE SUB-ASSEMBLY**
    (a) Remove the bolt, and slide the hook connector.
    (b) Disconnect the suction pipe sub-assembly.
    (c) Remove the O-ring from the suction hose sub-assembly.
    NOTICE:
    Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.
12. **DISCONNECT AIR CONDITIONER TUBE AND ACCESSORY**
    (a) Disconnect the air conditioner tube and accessory.
    (b) Remove the O-ring from the air conditioner tube and accessory.
    NOTICE:
    Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.



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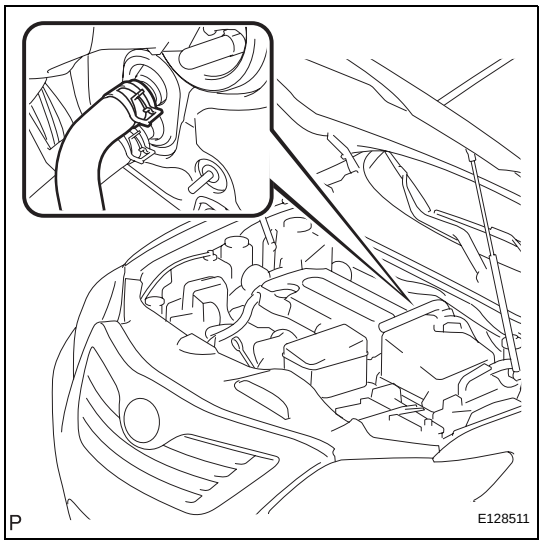


13. **DISCONNECT HEATER OUTLET WATER HOSE**
    (a) Using pliers, grip the claws of the clip and slide the clip to disconnect the heater outlet water hose.
    NOTICE:
    - **Do not apply excessive force to the heater outlet water hose.**
    - **Prepare a drain pan or cloth in case the coolant leaks.**
14. **DISCONNECT HEATER INLET WATER HOSE**
    HINT:
    Disconnection procedure for the heater inlet water hose is the same as that for the heater outlet water hose.
15. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)**
16. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)**
17. **REMOVE STEERING PAD (See page RS-350)**
18. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
19. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
20. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
21. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
22. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
23. **REMOVE STEERING COLUMN COVER (for TMC Made) (See page IP-21)**
24. **REMOVE STEERING COLUMN COVER (for TMMK Made) (See page IP-21)**
25. **REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)**
26. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
27. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
28. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
29. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)**
30. **REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)**
31. **REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)**

32. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)
33. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)
34. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)
35. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)
36. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)
37. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)
38. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)
39. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
40. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
41. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)
42. REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)
43. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)
44. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)
45. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)
46. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)
47. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)
48. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-146)
49. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-195)
50. REMOVE CONSOLE BOX POCKET (See page IP-28)
51. REMOVE CONSOLE BOX CARPET (See page IP-28)
52. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
53. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)

54. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)**

55. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

56. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)**

57. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

58. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**

59. **REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-31)**

60. **REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-31)**

61. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**

62. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**

63. **REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-31)**

64. **REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-32)**

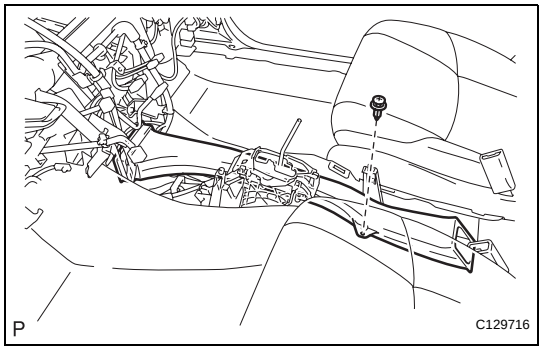
65. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-32)**

66. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-32)**

67. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-32)**

68. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-34)**

69. **REMOVE NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System)**
    (a) Remove the clip and No. 1 console box duct .



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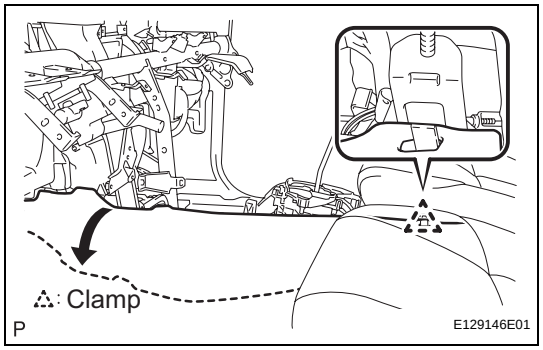
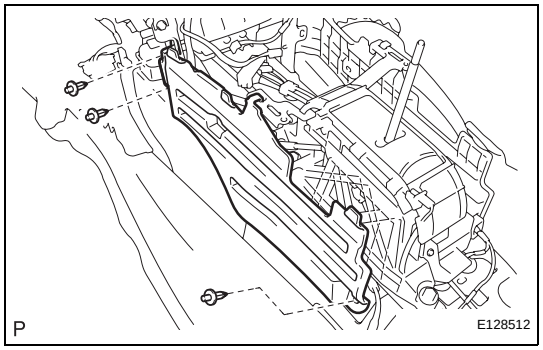
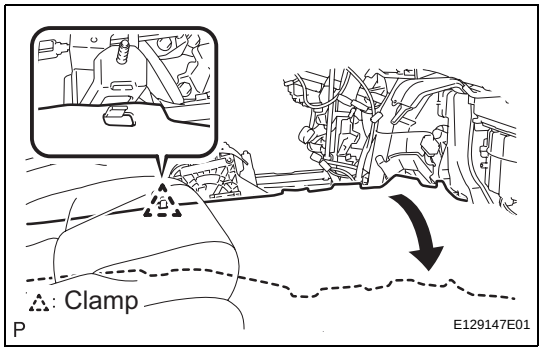


70. REMOVE FLOOR CARPET BRACKET LH

(a) Release the clamp.
(b) Turn back the floor carpet.



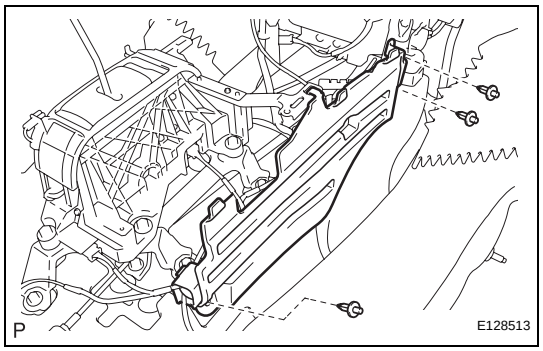
(c) Remove the 3 clips.
(d) Remove the floor carpet bracket LH.



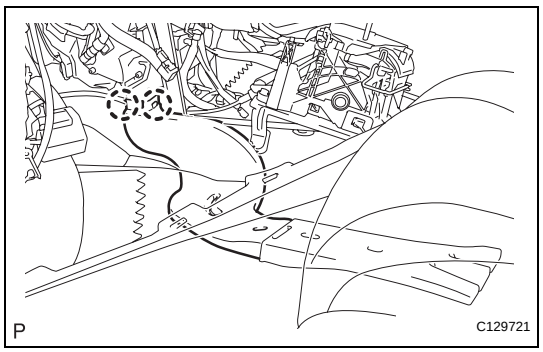
71. REMOVE FLOOR CARPET BRACKET RH

(a) Release the clamp.
(b) Turn back the floor carpet.

AC

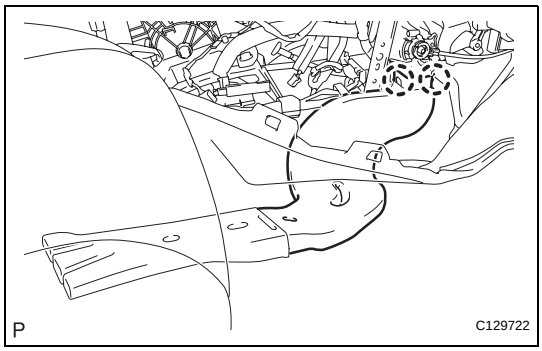


(c) Remove the 3 clips.
(d) Remove the floor carpet bracket RH.



72. REMOVE REAR NO. 2 AIR DUCT

(a) Release the 2 claws and remove the rear No. 2 air duct.



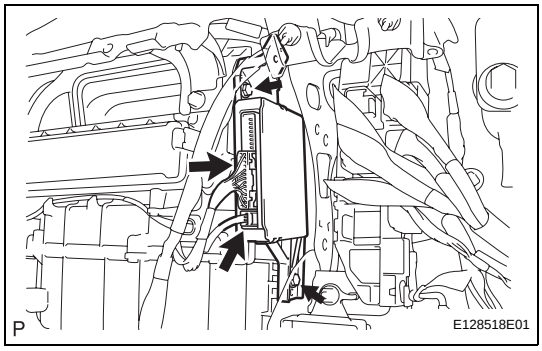
73. REMOVE REAR NO. 1 AIR DUCT

(a) Release the 2 claws and remove the rear No. 1 air duct.

74. REMOVE NO. 1 AIR DUCT (See page SR-39)

75. SEPARATE STEERING COLUMN ASSEMBLY (for TMC Made) (See page SR-39)

76. REMOVE STEERING POST ASSEMBLY (for TMMK Made) (See page SR-41)



77. REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY

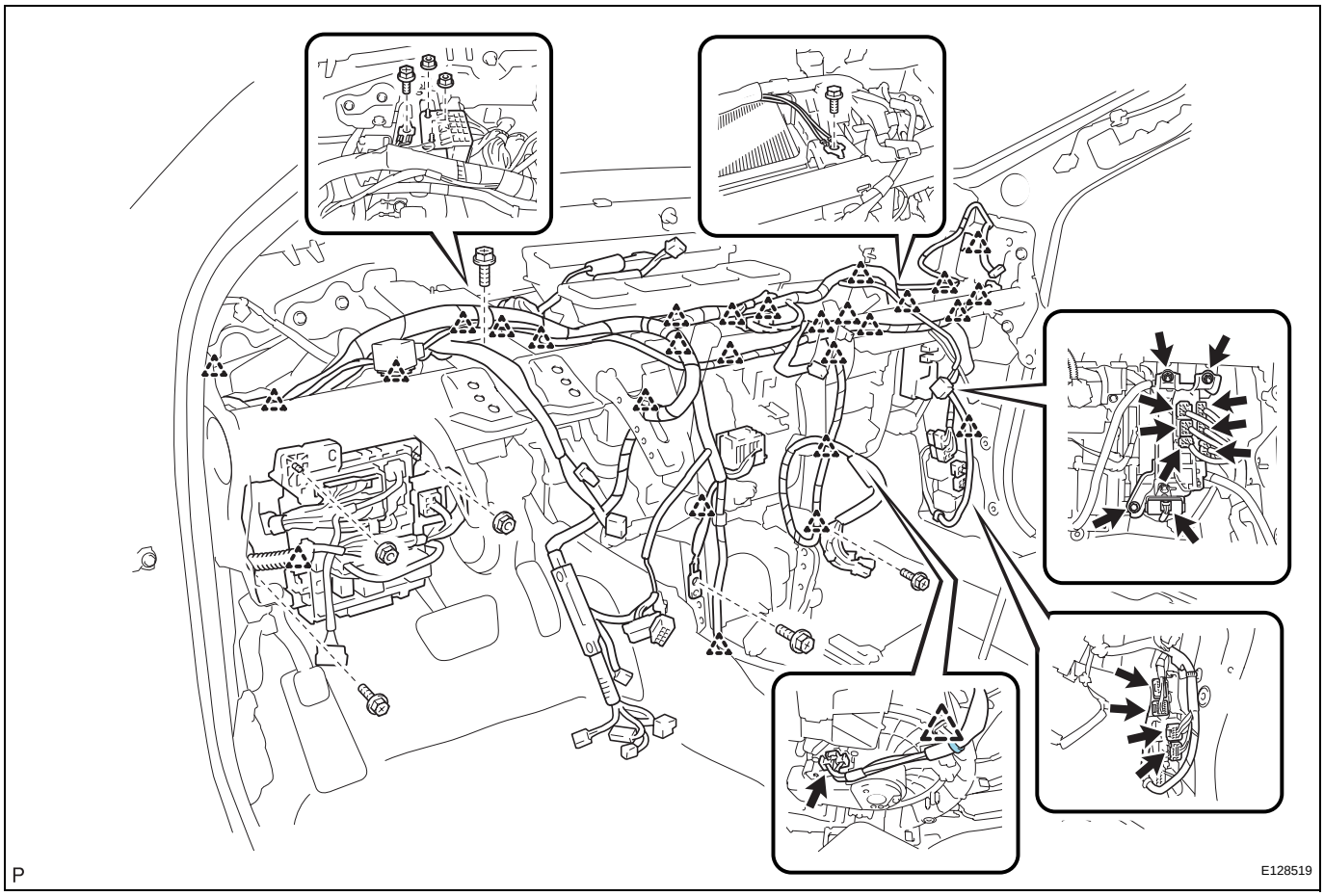
(a) Disconnect the 2 connectors.

(b) Remove the 2 bolts and air conditioning amplifier assembly.

78. REMOVE INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

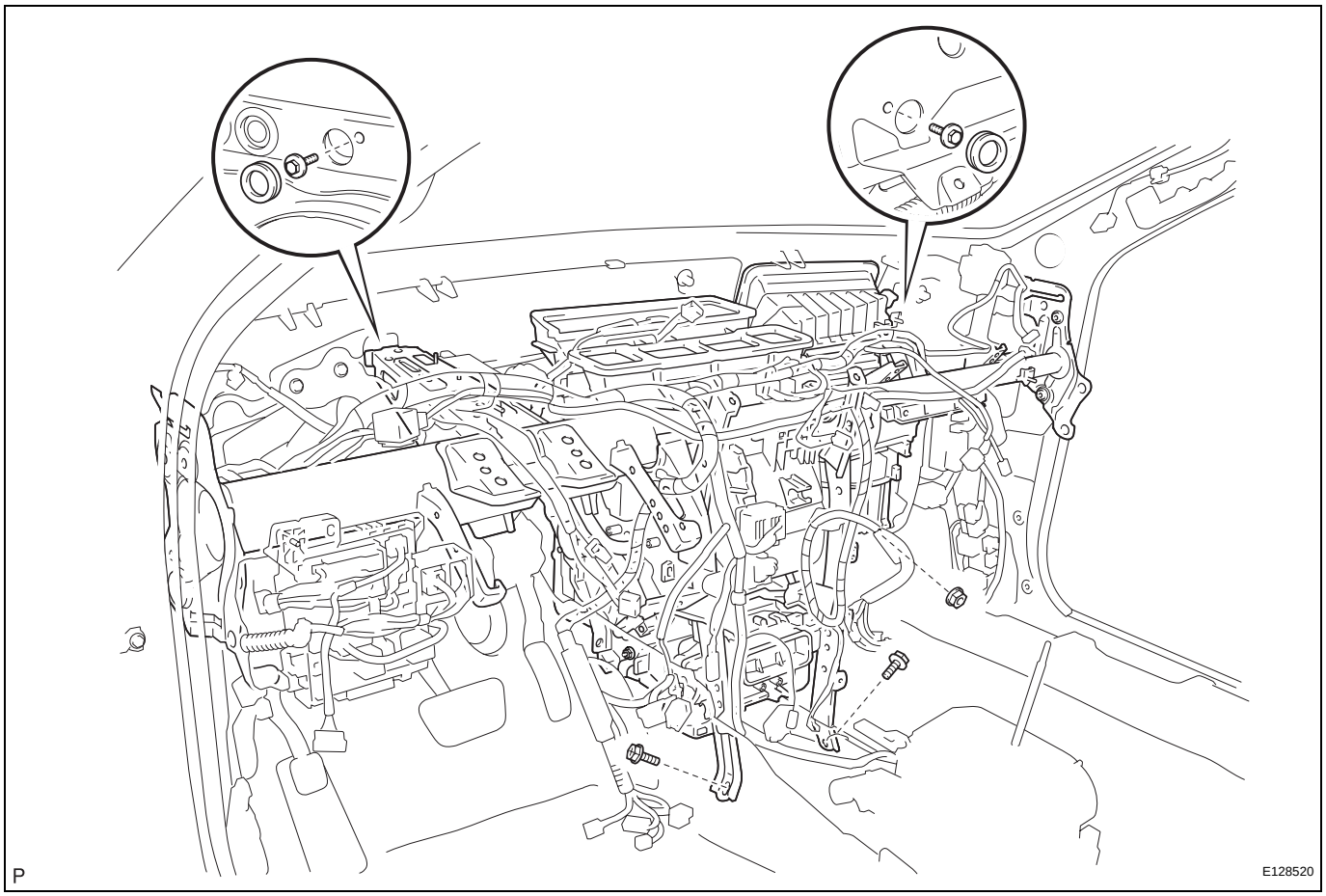
(a) Remove the 28 clamps, disconnect the 11 connectors, and then disconnect the wire harness.

(b) Remove the 6 nuts, 7 bolts, and junction block.



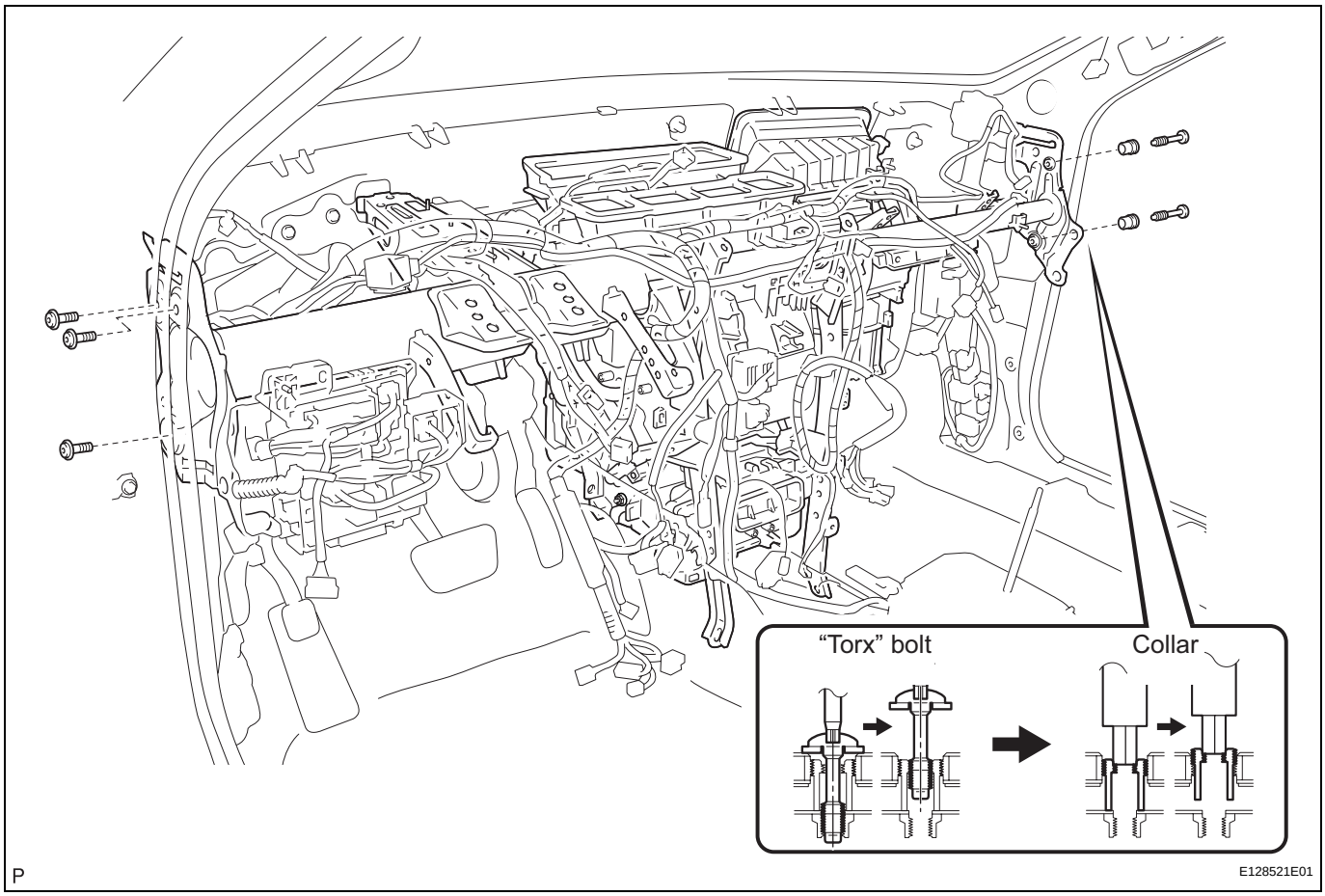
AC

(c) Remove the 2 caps and 2 bolts from the engine compartment side.



(d) Remove the 2 bolts and nut.

(e) Using a "Torx" socket wrench (T40), remove the 5 "Torx" bolts.

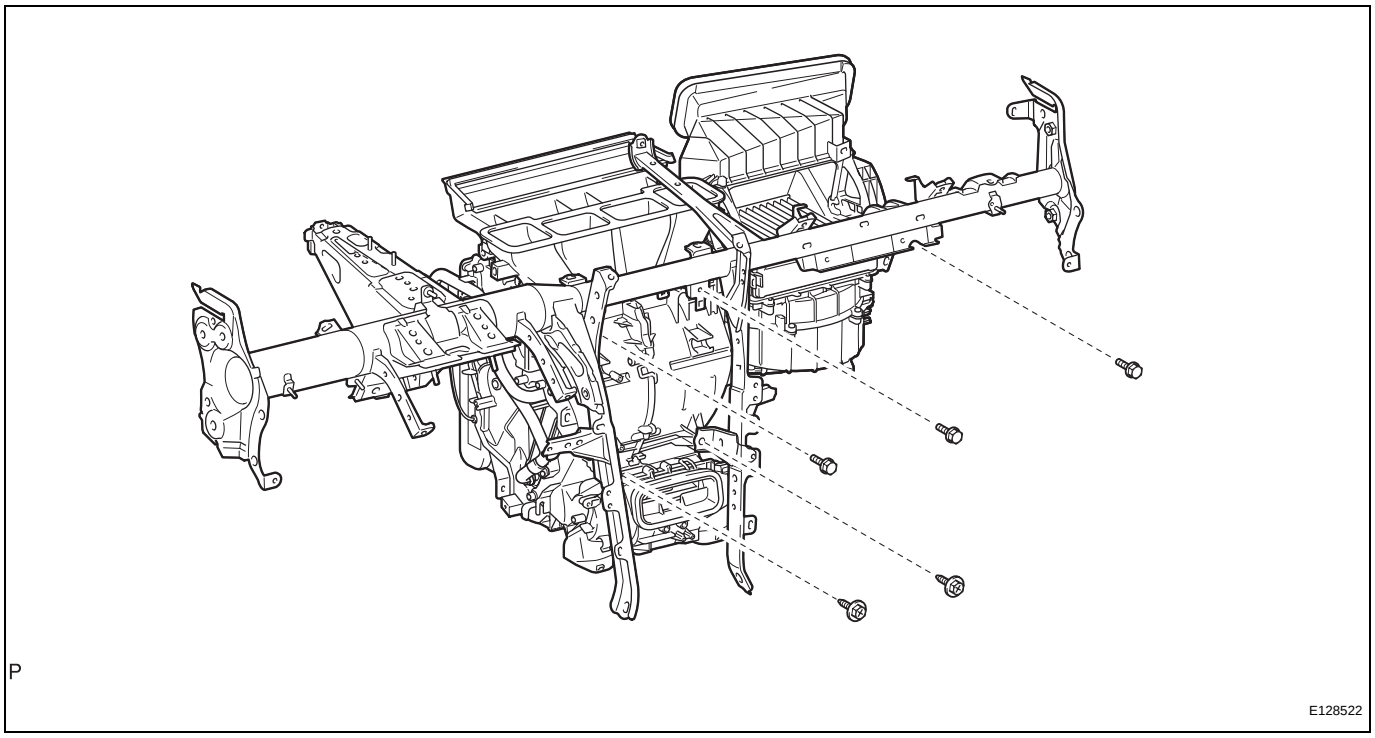


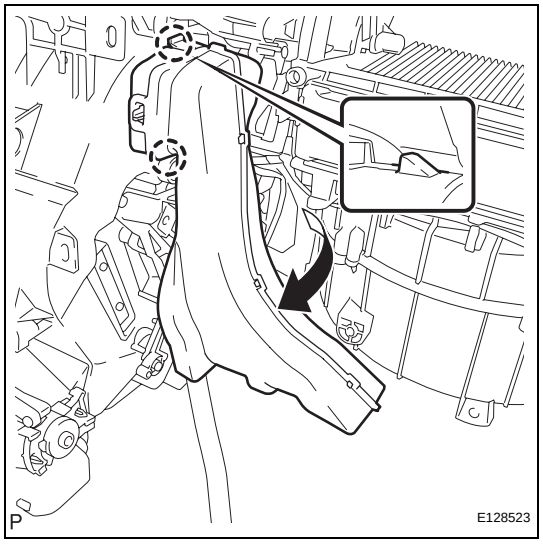
HINT:
The "Torx" bolts on the passenger side can be removed with the collars for adjustment.

(f) Using a hexagon wrench 12 mm, remove the 2 collars and instrument panel reinforcement assembly with the air conditioner unit assembly.

AC

(g) Remove the 3 bolts, 2 screws, and instrument panel reinforcement assembly.





DISASSEMBLY

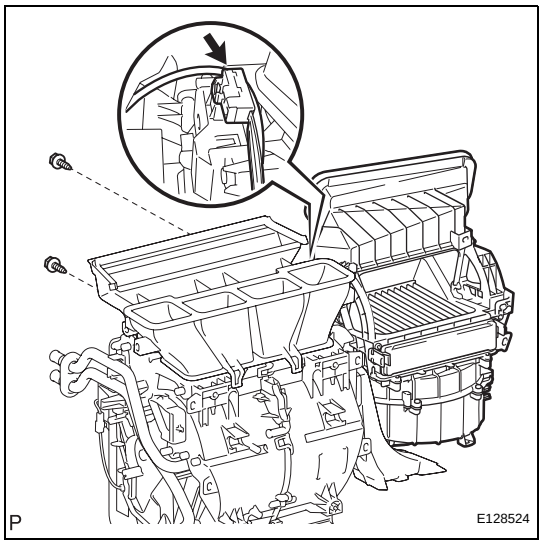
1. REMOVE NO. 2 AIR DUCT SUB-ASSEMBLY (for TMC Made)

(a) Release the 2 claws and remove the No. 2 air duct sub-assembly as shown in the illustration.

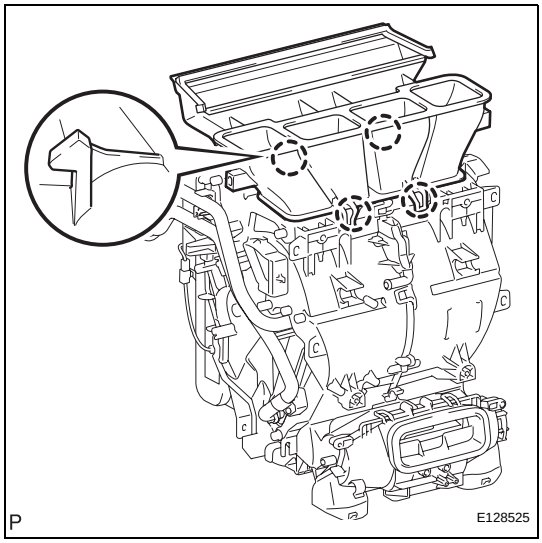
2. REMOVE BLOWER ASSEMBLY (for TMC Made)

(a) Disconnect the connector.

AC

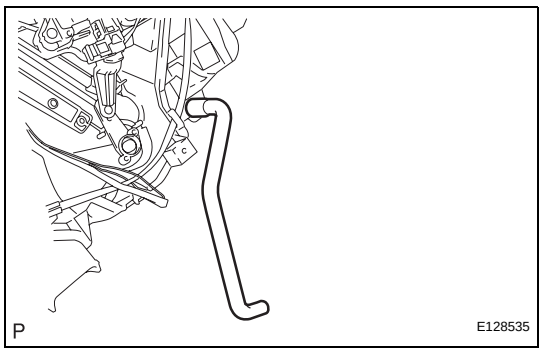


(b) Remove the 2 screws and blower assembly.



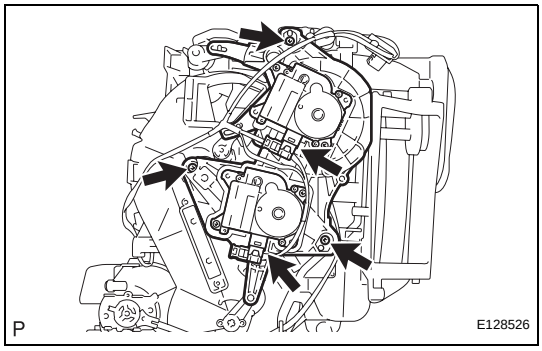
3. REMOVE NO. 6 HEATER TO REGISTER DUCT ASSEMBLY (for TMC Made)

(a) Release the 4 claws and remove the No. 6 heater to register duct assembly.



4. REMOVE DRAIN COOLER HOSE (for TMC Made)

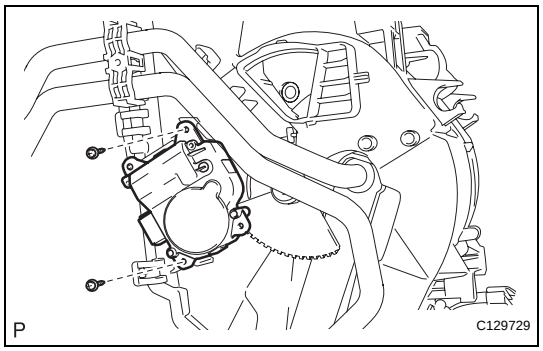
(a) Remove the drain cooler hose from the air conditioning radiator assembly.



5. REMOVE AIR OUTLET CONTROL SERVO MOTOR (for TMC Made)

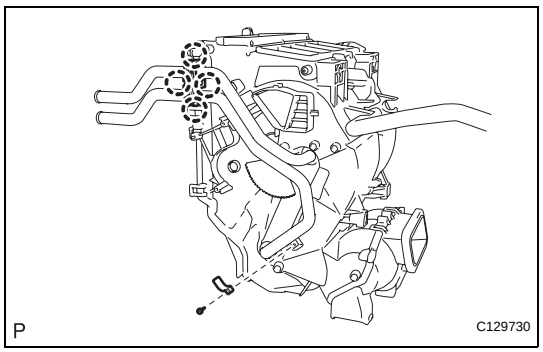
(a) Disconnect the 2 connectors and remove the air conditioner harness.

(b) Remove the 3 screws and then remove the air outlet control servo motor.



6. REMOVE AIR MIX CONTROL SERVO MOTOR (for Automatic Air Conditioning System)

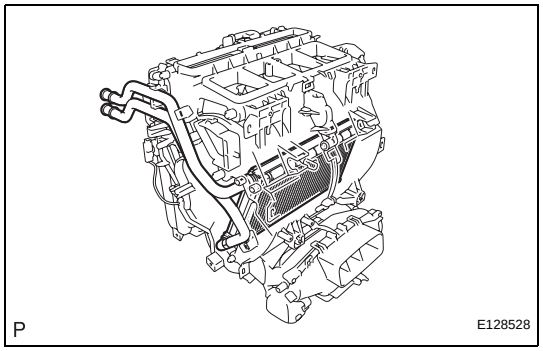
(a) Remove the 2 screws and air mix control servo motor.



7. REMOVE HEATER RADIATOR UNIT SUB-ASSEMBLY (for TMC Made)

(a) Remove the screw and clamp.

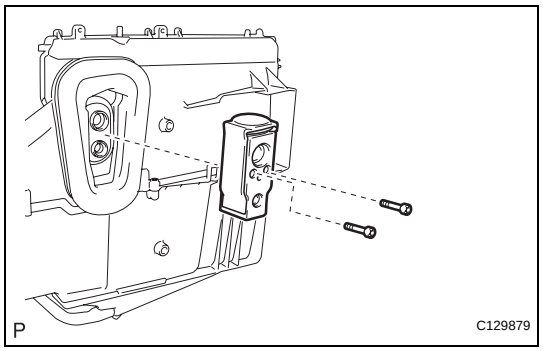
(b) Release the 4 claws and remove the clamp.



(c) Remove the heater radiator unit sub-assembly from the air conditioning radiator assembly.

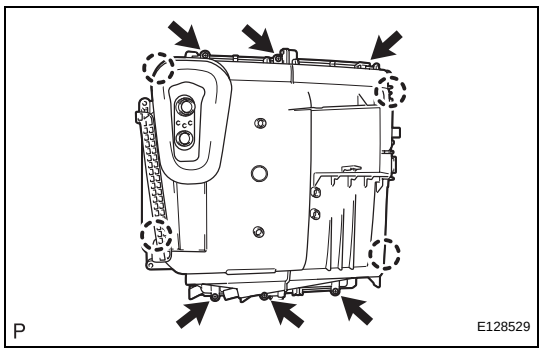
NOTICE:

Prepare a drain pan or cloth in case the cooling water leaks.



8. REMOVE COOLER EXPANSION VALVE (for TMC Made)

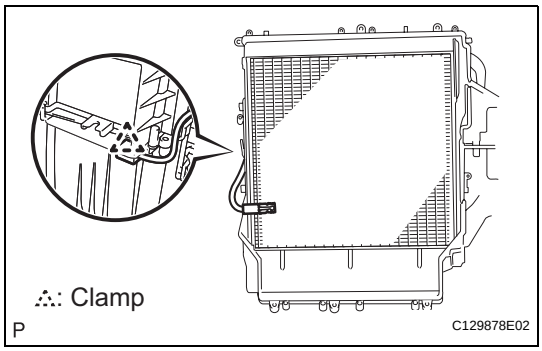
(a) Using a 4 mm hexagon wrench, remove the 2 hexagon bolts and cooler expansion valve.



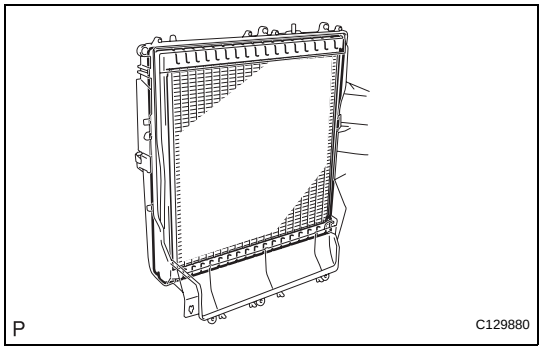
9. REMOVE NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY (for TMC Made)

(a) Remove the 6 screws, release the 4 claws, and remove the plate cover.

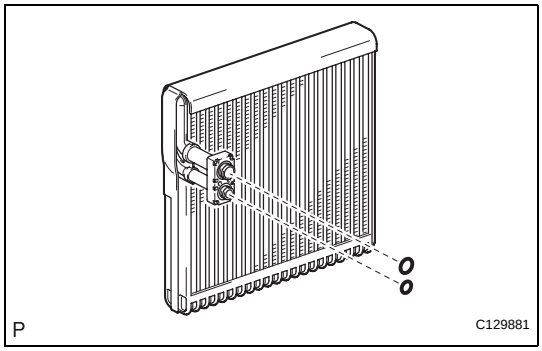
AC



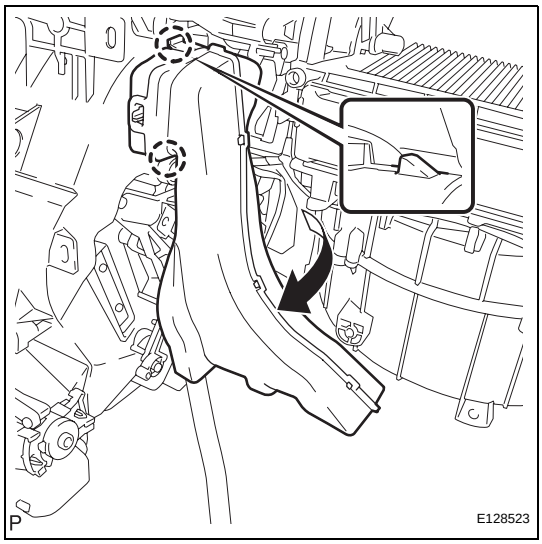
(b) Remove the clamp and No. 1 cooler thermistor.



(c) Remove the No. 1 cooler evaporator sub-assembly.

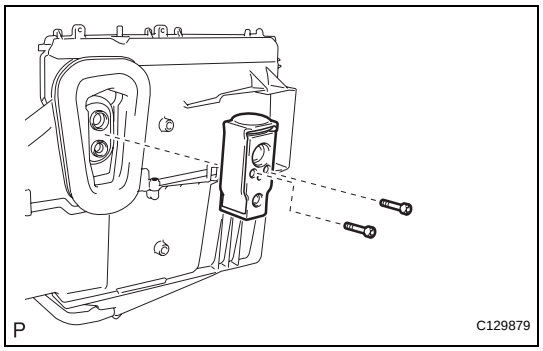


(d) Remove the 2 O-rings from the No. 1 cooler evaporator sub-assembly.



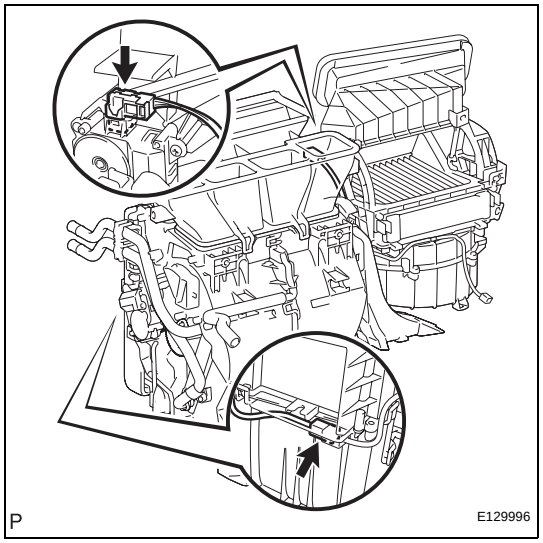
10. REMOVE NO. 2 AIR DUCT SUB-ASSEMBLY (for TMMK Made)

(a) Release the 2 claws and remove the No. 2 air duct sub-assembly as shown in the illustration.



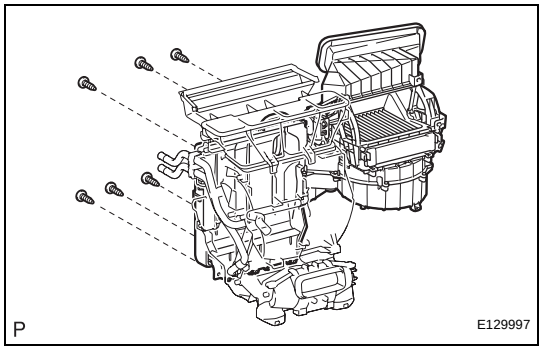
11. REMOVE COOLER EXPANSION VALVE (for TMMK Made)

(a) Using a 4 mm hexagon wrench, remove the 2 hexagon bolts and cooler expansion valve.

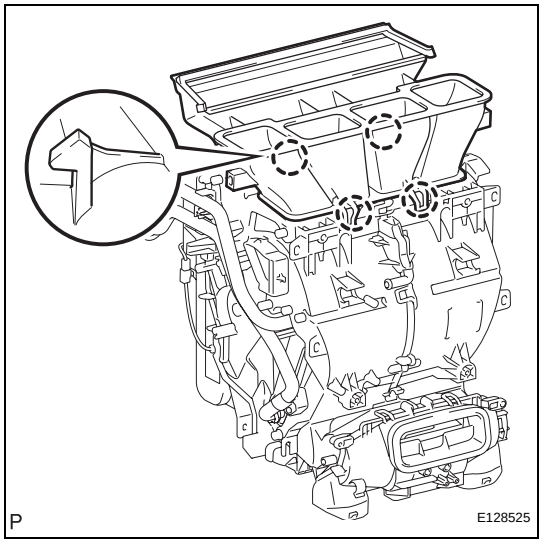


12. REMOVE BLOWER ASSEMBLY (for TMMK Made)

(a) Remove the connector and clamp, and disconnect the wire harness.



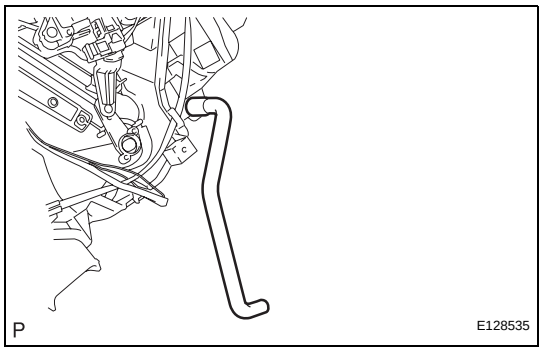
(b) Remove the 6 screws and then the blower assembly with the cooler evaporator sub-assembly.



13. REMOVE NO. 6 HEATER TO REGISTER DUCT ASSEMBLY (for TMMK Made)

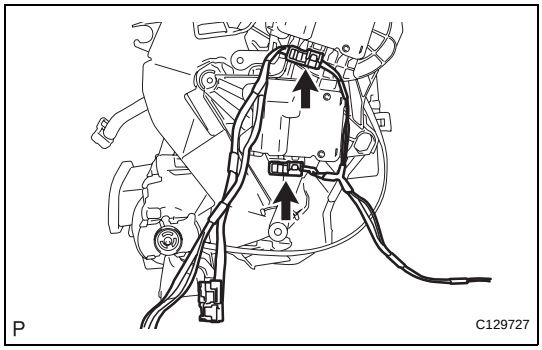
(a) Release the 4 claws and remove the No. 6 heater to register duct assembly.

AC



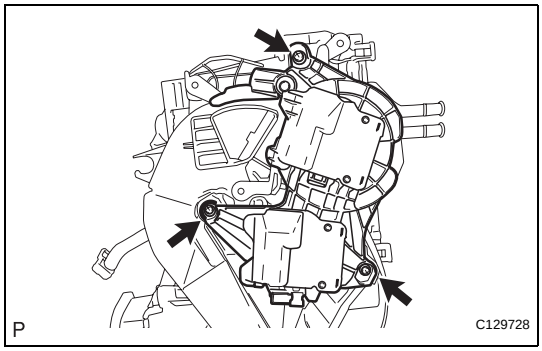
14. REMOVE DRAIN COOLER HOSE (for TMMK Made)

(a) Remove the drain cooler hose from the air conditioning radiator assembly.

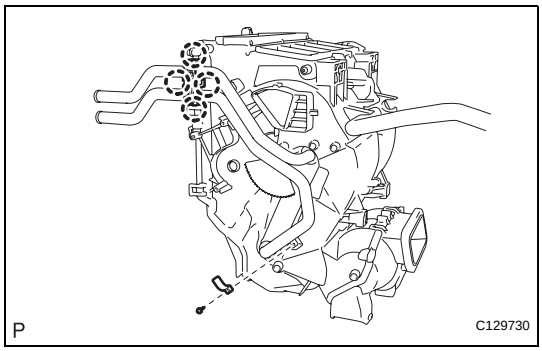


15. REMOVE AIR OUTLET CONTROL SERVO MOTOR (for TMMK Made)

(a) Disconnect the 2 connectors and remove the air conditioner harness.



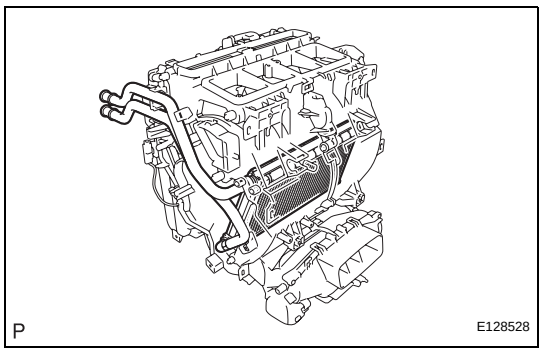
(b) Remove the 3 screws and then the air outlet control servo motor.



16. REMOVE HEATER RADIATOR UNIT SUB-ASSEMBLY (for TMMK Made)

(a) Remove the screw and clamp.

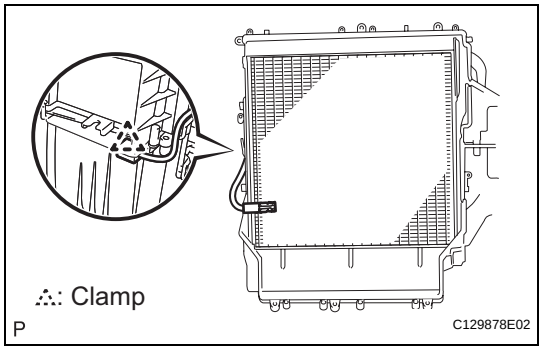
(b) Release the 4 claws and remove the clamp.



(c) Remove the heater radiator unit sub-assembly from the air conditioning radiator assembly.

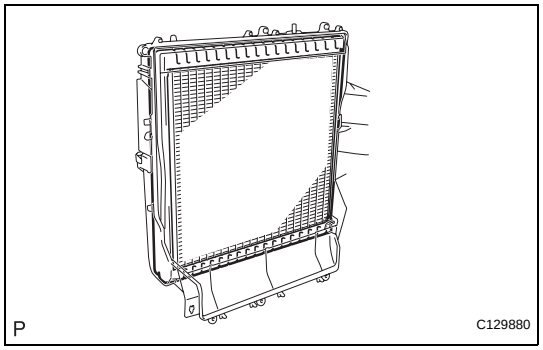
NOTICE:

Prepare a drain pan or cloth in case the cooling water leaks.

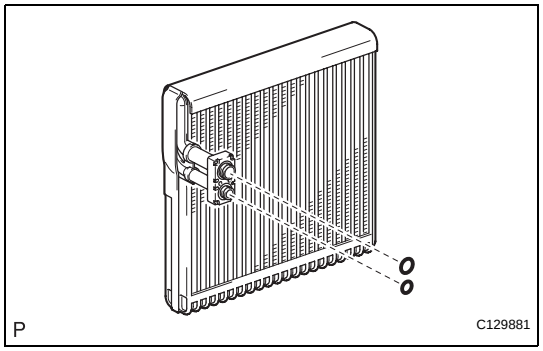


17. REMOVE NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY (for TMMK Made)

(a) Remove the clamp and No. 1 cooler thermistor.



(b) Remove the No. 1 cooler evaporator sub-assembly.



(c) Remove the 2 O-rings from the No. 1 cooler evaporator sub-assembly.

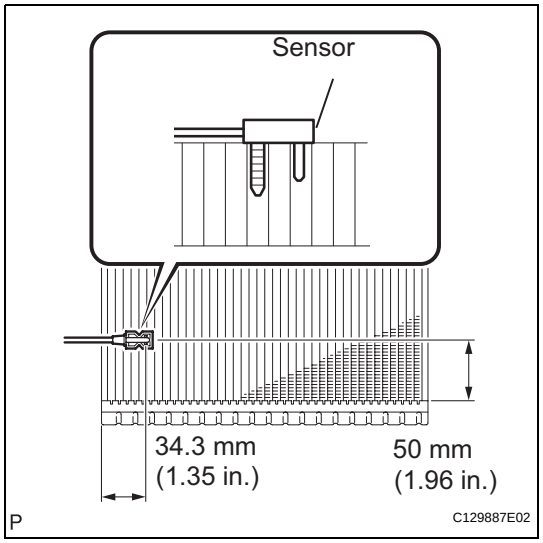
AC

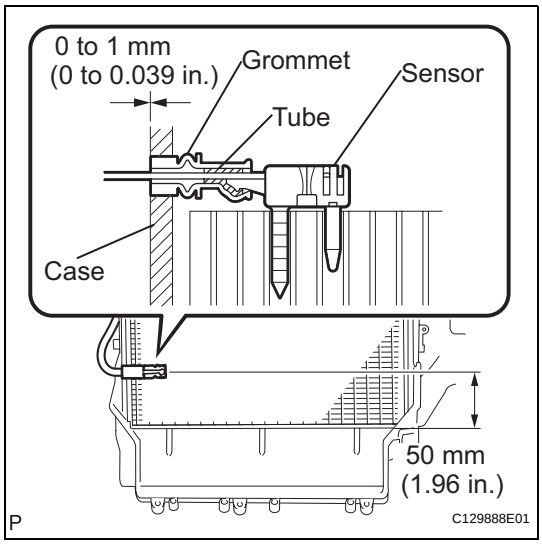
REASSEMBLY

1. INSTALL NO. 1 COOLER THERMISTOR (for TMC Made)

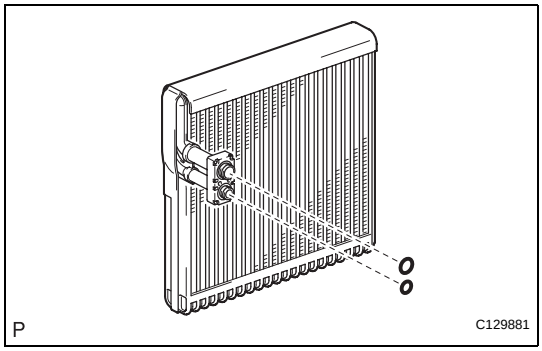
(a) If using a new evaporator:

(1) Install the No. 1 cooler thermistor to the evaporator as shown in the illustration.





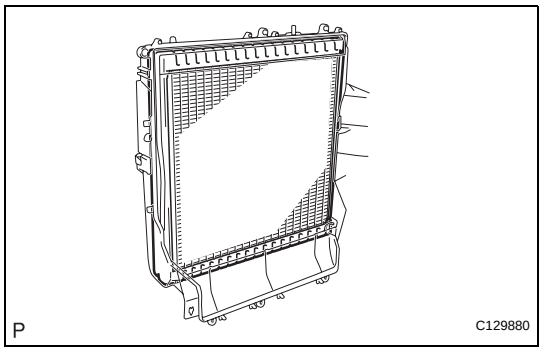
(b) If reusing the evaporator:
(1) Install the No. 1 cooler thermistor to the evaporator as shown in the illustration.



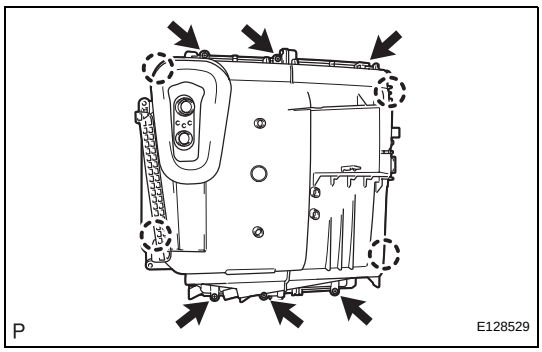
2. INSTALL NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY (for TMC Made)

(a) Sufficiently apply compressor oil to 2 new O-rings and the fitting surfaces. Install the 2 O-rings to the No. 1 cooler evaporator sub-assembly.
Compressor oil:
ND-OIL 8 or equivalent

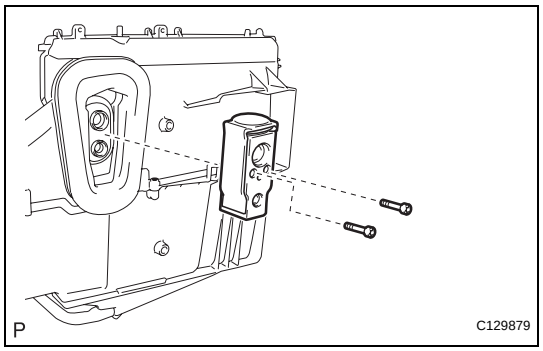
AC



(b) Install the No. 1 cooler evaporator sub-assembly.

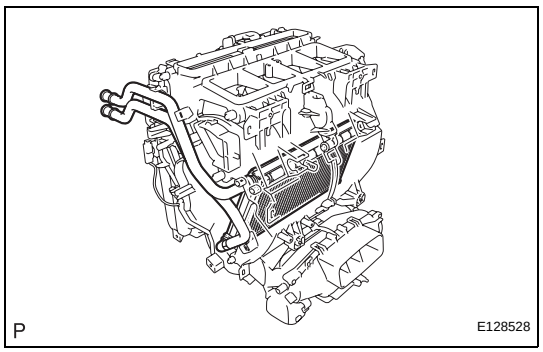


(c) Engage the 4 claws and install the plate cover with the 6 screws.



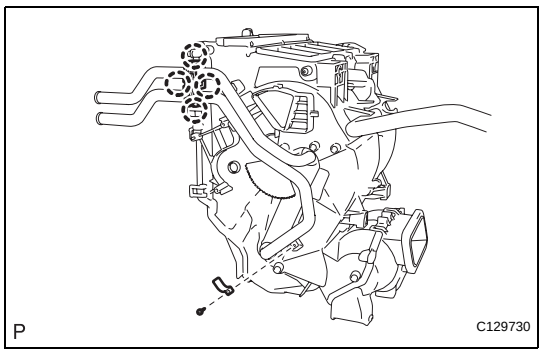
3. INSTALL COOLER EXPANSION VALVE (for TMC Made)

(a) Using a 4 mm hexagon wrench, install the cooler expansion valve with the 2 hexagon bolts.
Torque: 3.5 N*m (35 kgf*cm, 30 in.*lbf)

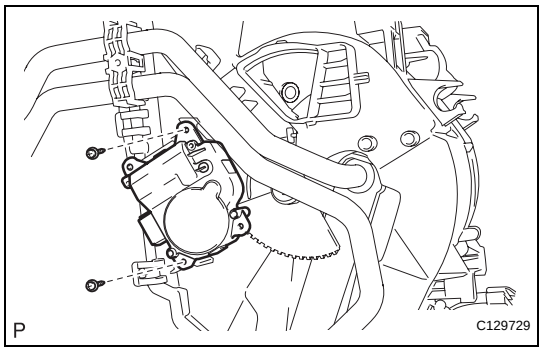


4. INSTALL HEATER RADIATOR UNIT SUB-ASSEMBLY (for TMC Made)

(a) Install the heater radiator unit sub-assembly to the air conditioner radiator assembly.

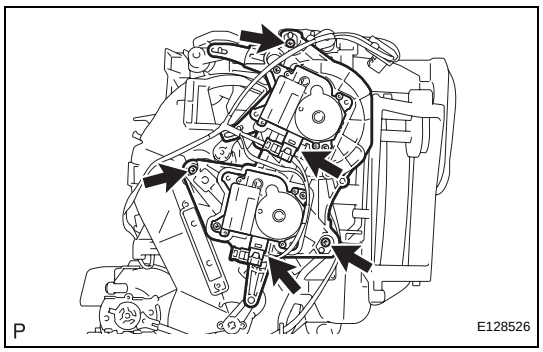


(b) Install the clamp with the screw.
(c) Engage the 4 claws and install the heater clamp.



5. INSTALL AIR MIX CONTROL SERVO MOTOR (for Automatic Air Conditioning System)

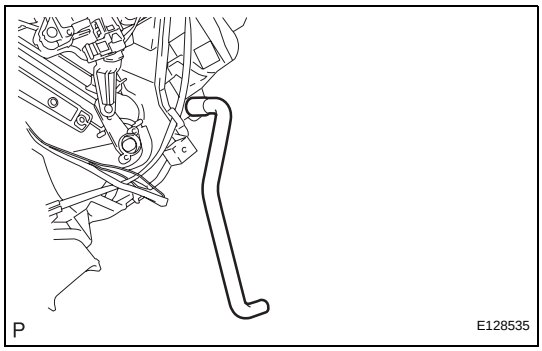
(a) Install the air mix control servo motor with the 2 screws.



6. INSTALL AIR OUTLET CONTROL SERVO MOTOR (for TMC Made)

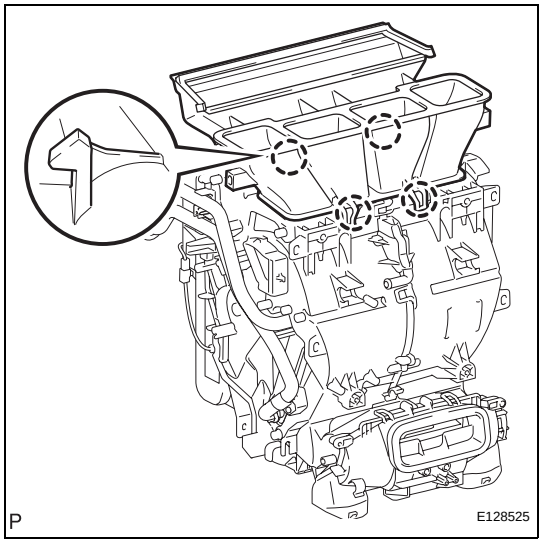
(a) Install the air outlet control servo motor with the 3 screws.
(b) Connect the 2 connectors and install the air conditioner harness.

AC



7. INSTALL DRAIN COOLER HOSE (for TMC Made)

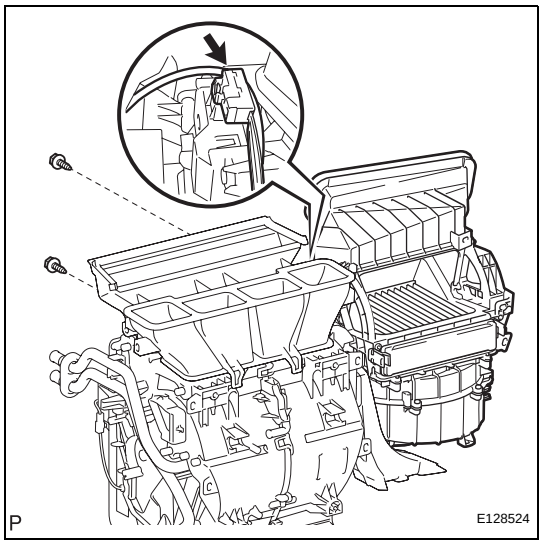
(a) Install the drain cooler hose to the air conditioner radiator assembly.



8. INSTALL NO. 6 HEATER TO REGISTER DUCT ASSEMBLY (for TMC Made)

(a) Engage the 4 claws to install the No. 6 heater to register duct assembly.

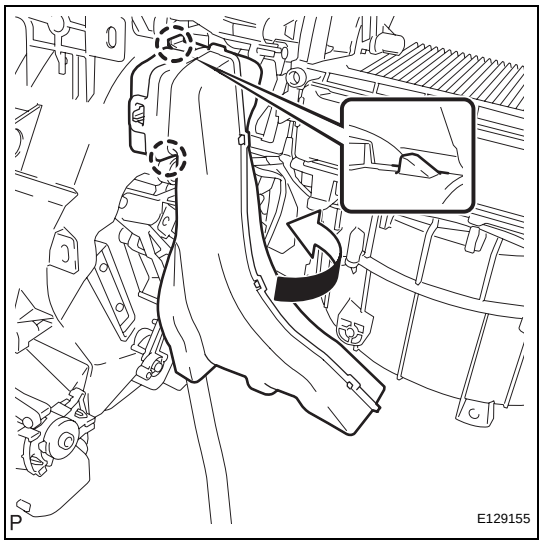
AC



9. INSTALL BLOWER ASSEMBLY (for TMC Made)

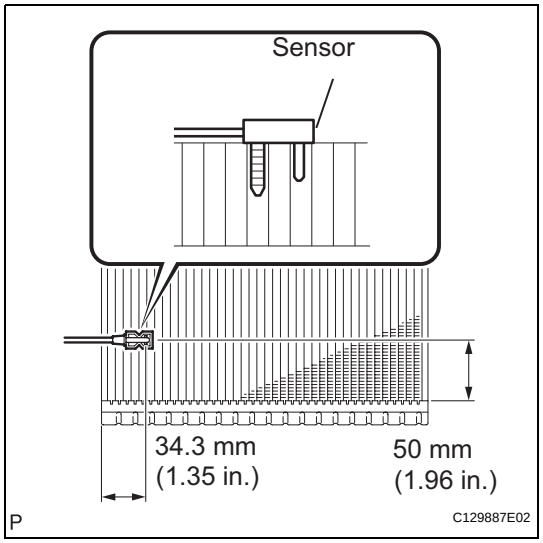
(a) Install the blower assembly with the 2 screws.

(b) Connect the connector.



10. INSTALL NO. 2 AIR DUCT SUB-ASSEMBLY (for TMC Made)

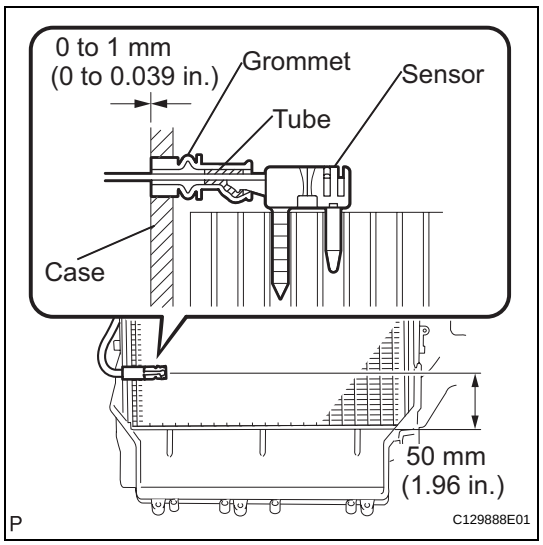
(a) Engage the 2 claws to install the No. 2 air duct sub-assembly.



11. INSTALL NO. 1 COOLER THERMISTOR (for TMMK Made)

(a) If using a new evaporator:

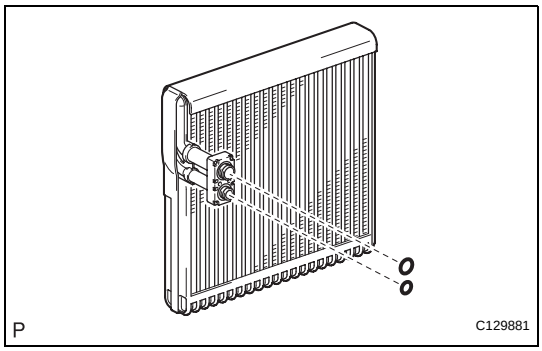
(1) Install the No. 1 cooler thermistor to the evaporator as shown in the illustration.



(b) If reusing the evaporator:

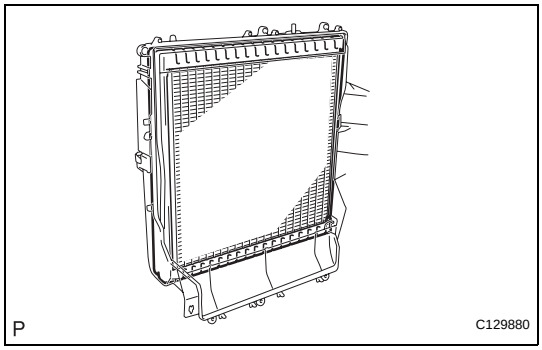
(1) Install the No. 1 cooler thermistor to the evaporator as shown in the illustration.

AC

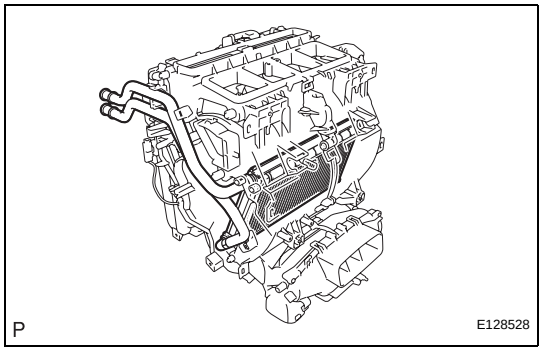


12. INSTALL NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY (for TMMK Made)

(a) Sufficiently apply compressor oil to 2 new O-rings and the fitting surfaces. Install the 2 O-rings to the No. 1 cooler evaporator sub-assembly.
Compressor oil:
ND-OIL 8 or equivalent

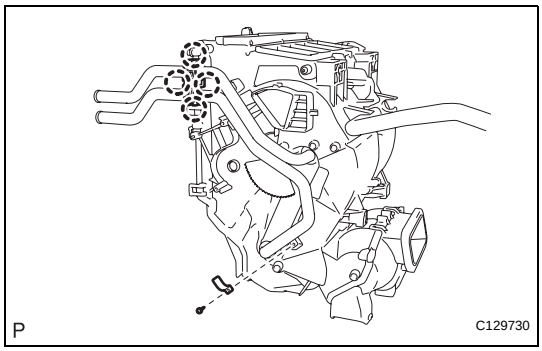


(b) Install the No. 1 cooler evaporator sub-assembly.

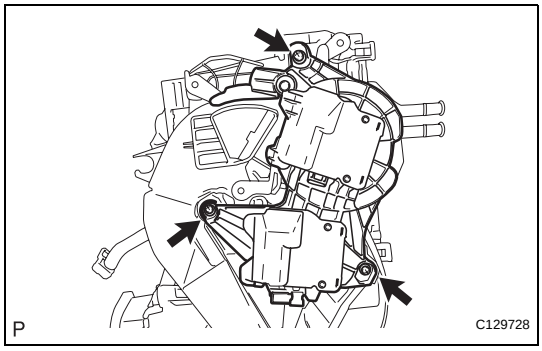


13. INSTALL HEATER RADIATOR UNIT SUB-ASSEMBLY (for TMMK Made)

(a) Install the heater radiator unit sub-assembly to the air conditioner radiator assembly.



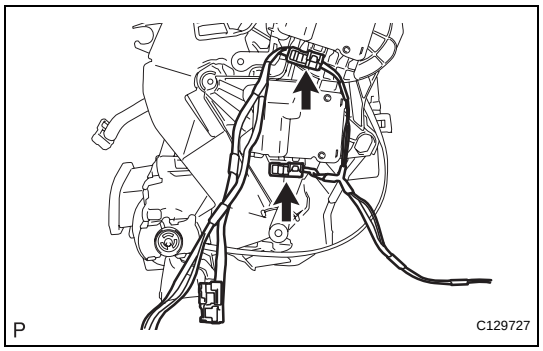
(b) Install the clamp with the screw.
(c) Engage the 4 claws and install the heater clamp.



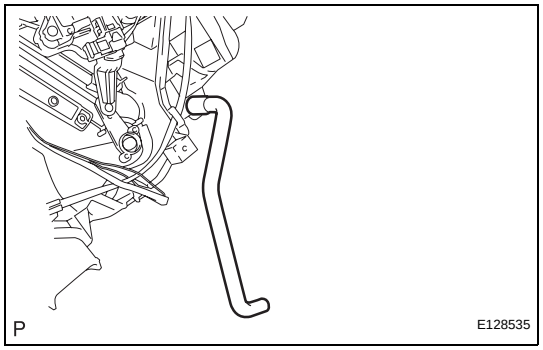
14. INSTALL AIR OUTLET CONTROL SERVO MOTOR (for TMMK Made)

(a) Install the air outlet control servo motor with the 3 screws.

AC

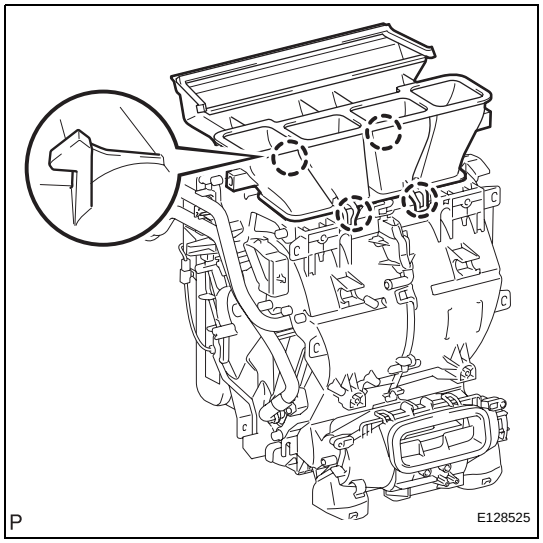


(b) Connect the 2 connectors and install the air conditioner harness.



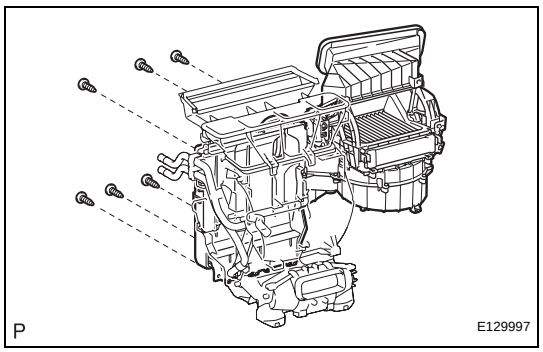
15. INSTALL DRAIN COOLER HOSE (for TMMK Made)

(a) Install the drain cooler hose to the air conditioner radiator assembly.



16. INSTALL NO. 6 HEATER TO REGISTER DUCT ASSEMBLY (for TMMK Made)

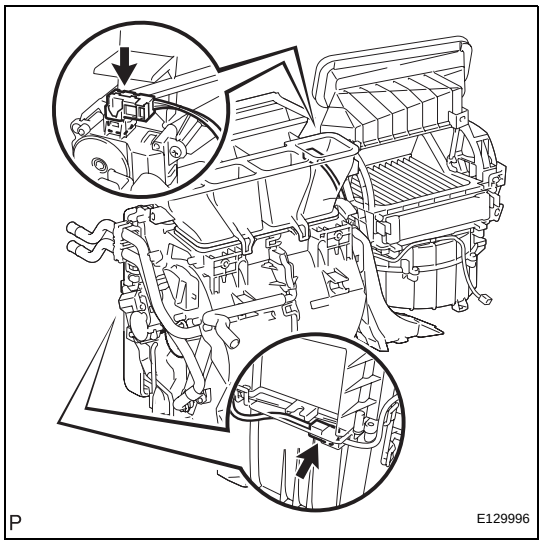
(a) Engage the 4 claws to install the No. 6 heater to register duct assembly.



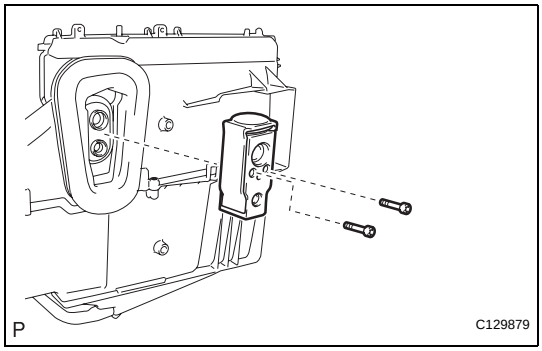
17. INSTALL BLOWER ASSEMBLY (for TMMK Made)

(a) Install the blower assembly with the 6 screws.

AC



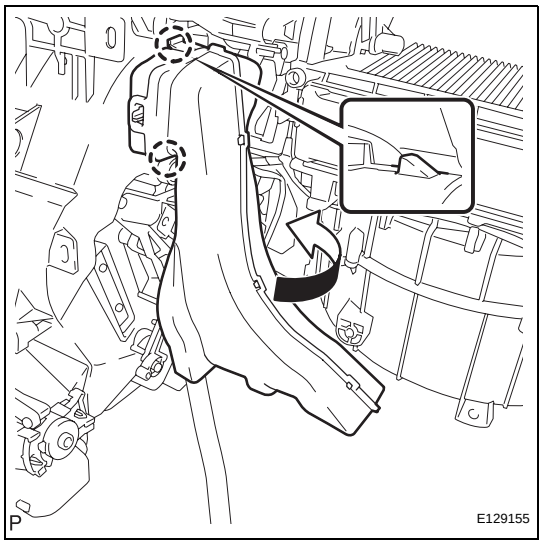
(b) Connect the connector.



18. INSTALL COOLER EXPANSION VALVE (for TMMK Made)

(a) Using a 4 mm hexagon wrench, install the cooler expansion valve with the 2 hexagon bolts.
Torque: 3.5 N*m (35 kgf*cm, 30 in.*lbf)

AC



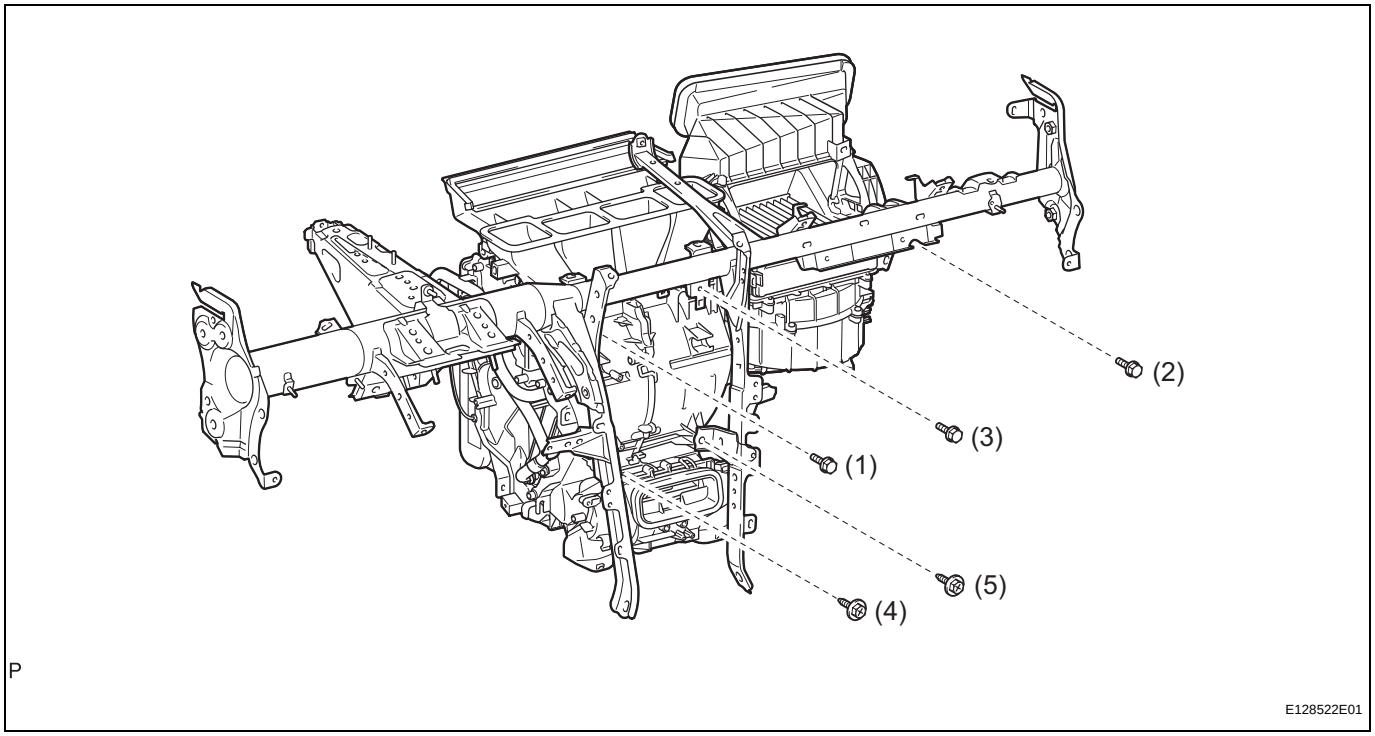
19. INSTALL NO. 2 AIR DUCT SUB-ASSEMBLY (for TMMK Made)

(a) Engage the 2 claws to install the No. 2 air duct sub-assembly.

INSTALLATION

1. INSTALL INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

(a) Install the conditioner unit assembly to the instrument panel reinforcement assembly with the 2 screws and 3 bolts.



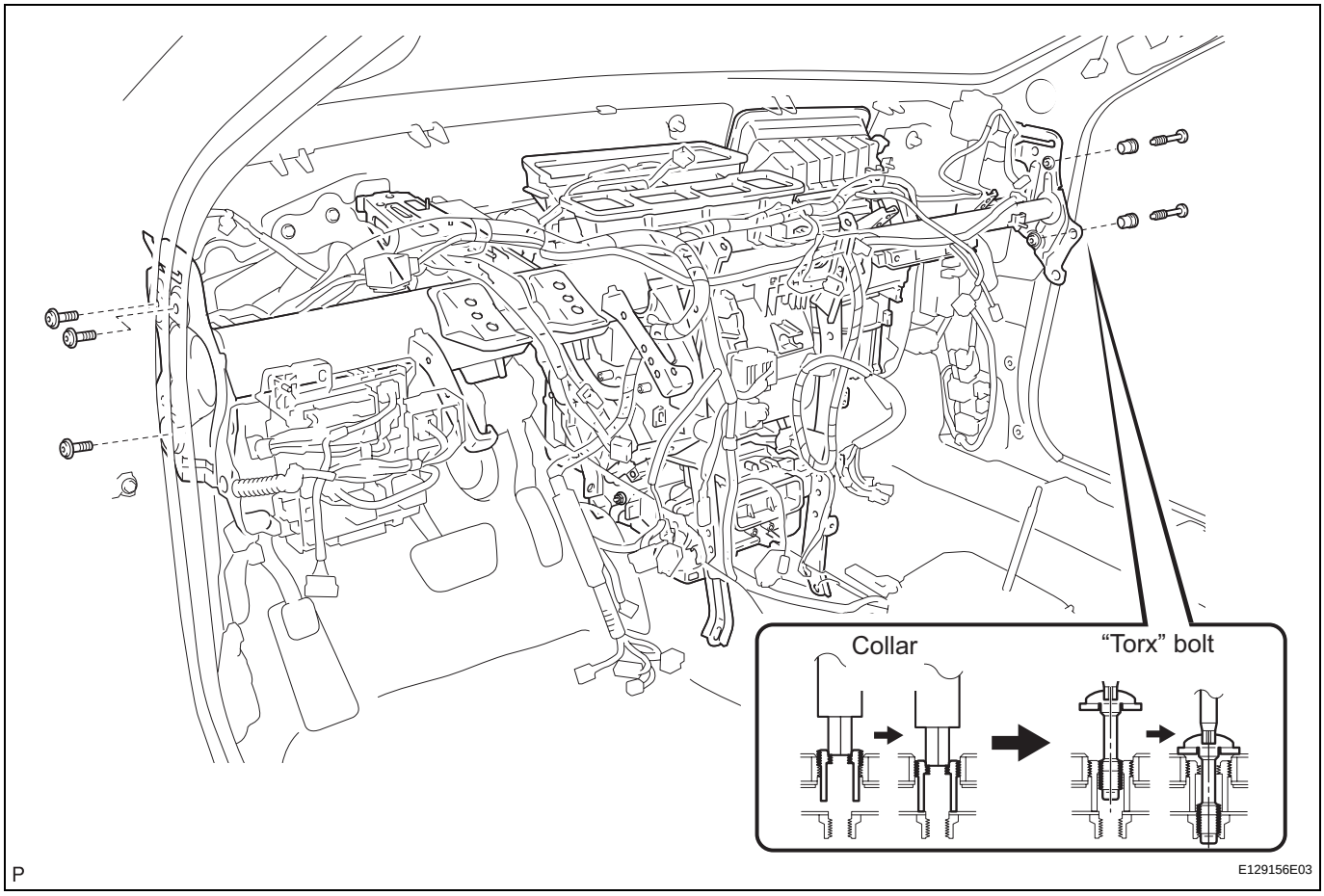
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

NOTICE:

Tighten the bolts and screws in the order shown in the illustration to install the air conditioner unit assembly.

(b) Driver seat:

(1) Using a "Torx" socket wrench (T40), install the instrument panel reinforcement assembly with the 3 "Torx" bolts.



Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)

(c) Passenger seat:

(1) Using a 12 mm hexagon wrench, adjust the position of the 2 collars.

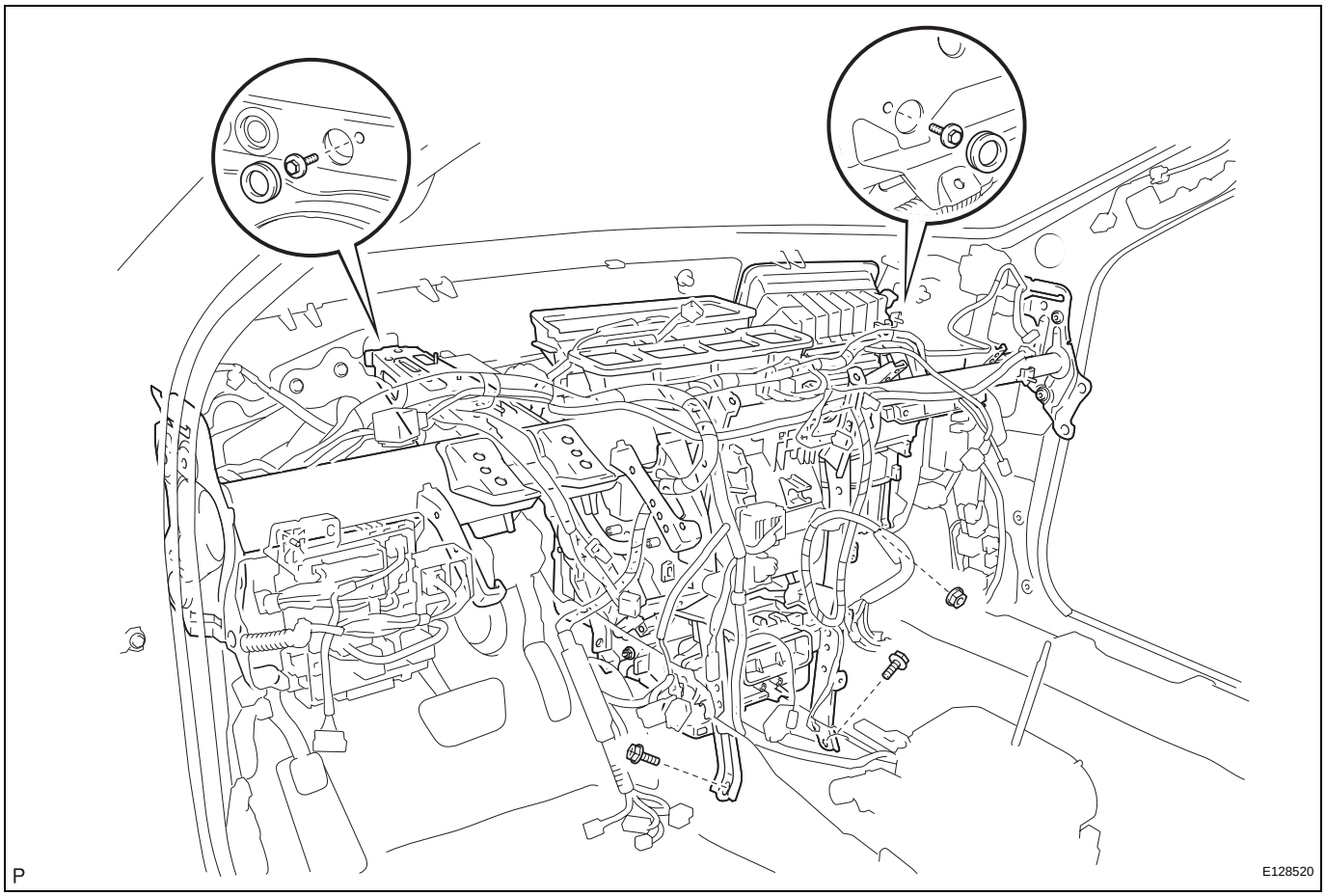
Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

(2) Using a "Torx" socket wrench (T40), install the instrument panel reinforcement assembly with the 2 "Torx" bolts.

Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

AC

(d) Install the instrument panel reinforcement assembly with the 2 bolts and nut.

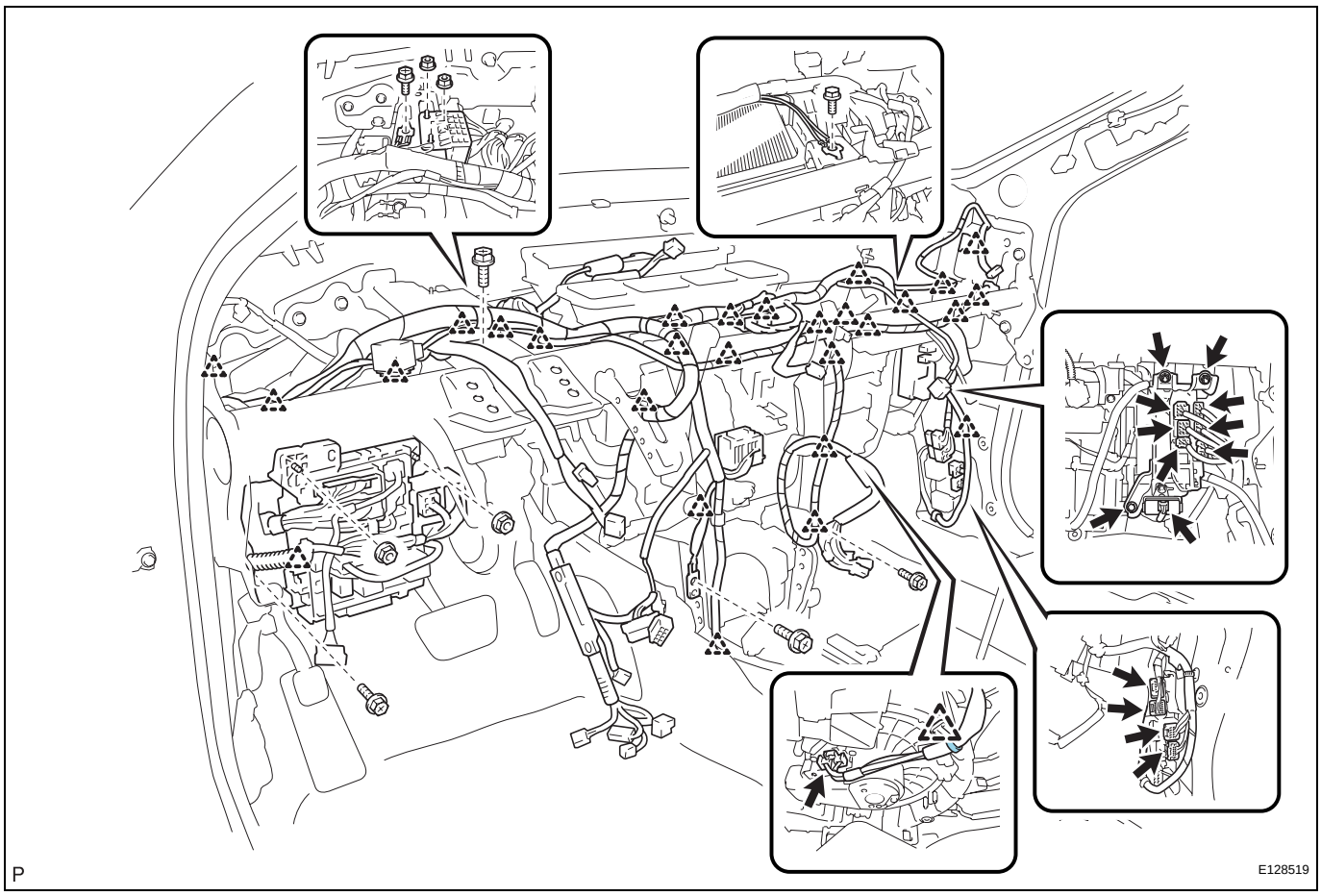


Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf) (NUT)

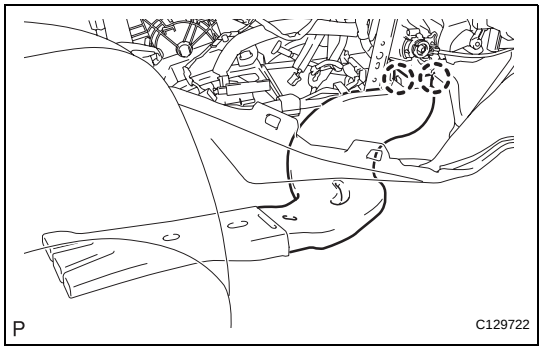
(e) Install the 2 bolts and 2 caps.

(f) Connect the connectors and clamps.

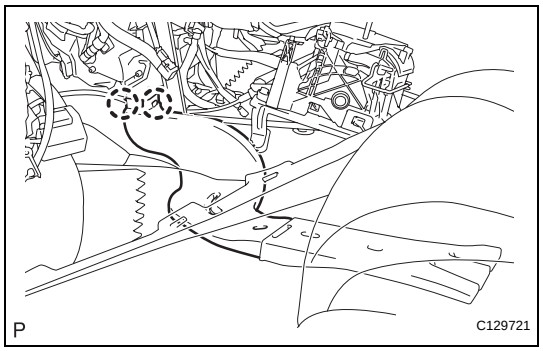
(g) Install the 6 nuts and 7 bolts.



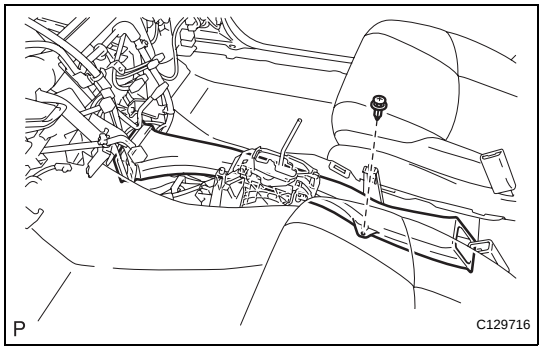
2. **INSTALL STEERING COLUMN ASSEMBLY (for TMC Made) (See page SR-47)**
3. **INSTALL STEERING POST ASSEMBLY (for TMMK Made) (See page SR-49)**
4. **INSTALL NO. 1 AIR DUCT (See page SR-50)**
5. **INSTALL REAR NO. 1 AIR DUCT**
   (a) Engage the 2 claws to install the rear No. 1 air duct.



AC



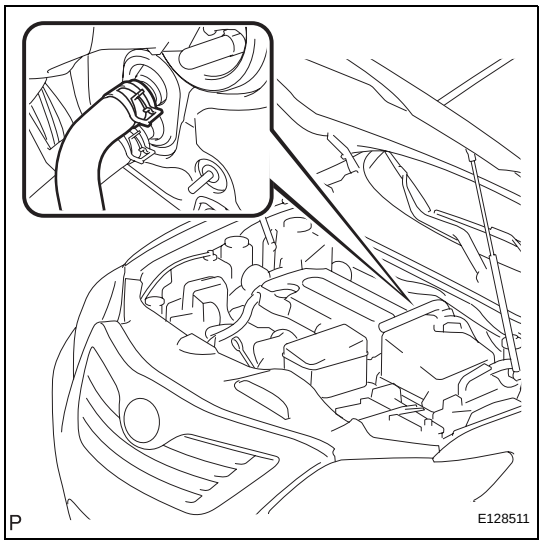
6. **INSTALL REAR NO. 2 AIR DUCT**
   (a) Engage the 2 claws to install the rear No. 2 air duct.
7. **INSTALL FLOOR CARPET BRACKET RH**
8. **INSTALL FLOOR CARPET BRACKET LH**



9. **INSTALL NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System)**
   (a) Install the No. 1 console box duct with the clip.
10. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-44)**
11. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-45)**
12. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-48)**
13. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**
14. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-48)**
15. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-48)**
16. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**
17. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-48)**
18. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-49)**
19. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-49)**
20. **INSTALL FRONT PILLAR GARNISH RH (See page IR-52)**
21. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)**
22. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
23. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
24. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
25. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**

26. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
27. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
28. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
29. **INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-147)**
30. **INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-196)**
31. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)**
32. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)**
33. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
34. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
35. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
36. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
37. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
38. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
39. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
40. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
41. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**
42. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
43. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
44. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
45. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
46. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**

47. INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)
48. INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)
49. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)
50. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)
51. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)
52. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)
53. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-50)
54. ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)
55. INSTALL STEERING COLUMN COVER (for TMC Made) (See page IP-58)
56. INSTALL STEERING COLUMN COVER (for TMMK Made) (See page IP-58)
57. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)
58. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)
59. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
60. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
61. INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)
62. INSTALL STEERING PAD (See page RS-350)
63. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)
64. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)

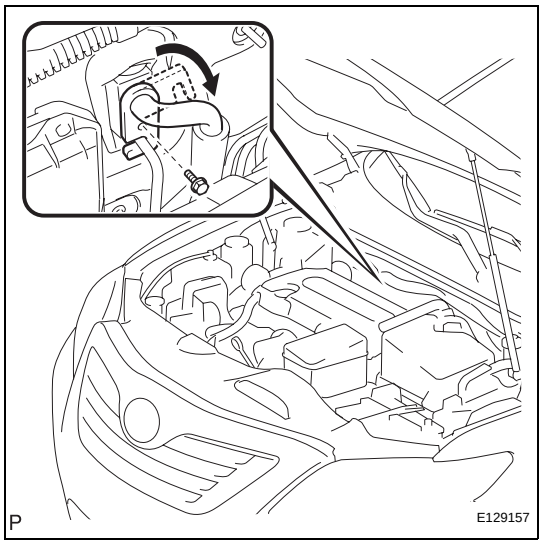


65. INSTALL HEATER INLET WATER HOSE
(a) Install the water hose and attach the clip.

66. INSTALL HEATER OUTLET WATER HOSE
(a) Use the same procedures described for the heater inlet water hose.

67. INSTALL AIR CONDITIONER TUBE AND ACCESSORY
(a) Remove the attached vinyl tape from the tube.
(b) Sufficiently apply compressor oil to a new O-ring and fitting surface of the air conditioning tube assembly.
Compressor oil:
ND-OIL 8 or equivalent
(c) Install the O-ring on the air conditioner tube and accessory.
(d) Install the air conditioner tube and accessory.

68. INSTALL SUCTION HOSE SUB-ASSEMBLY
(a) Remove the attached vinyl tape from the hose.
(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the suction hose sub-assembly.
Compressor oil:
ND-OIL 8 or equivalent
(c) Install the O-ring on the suction hose sub-assembly.
(d) Move the hook connector in the direction indicated by the arrow in the illustration.
(e) Insert the pipe joint into the fitting hole securely and tighten the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



69. INSTALL COWL TOP OUTER FRONT PANEL SUB-ASSEMBLY (See page BR-36)

70. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-14)

71. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)

72. INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)

73. INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)

74. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)

75. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)

76. CONNECT NEGATIVE BATTERY TERMINAL

77. INSPECT STEERING PAD (See page RS-352)

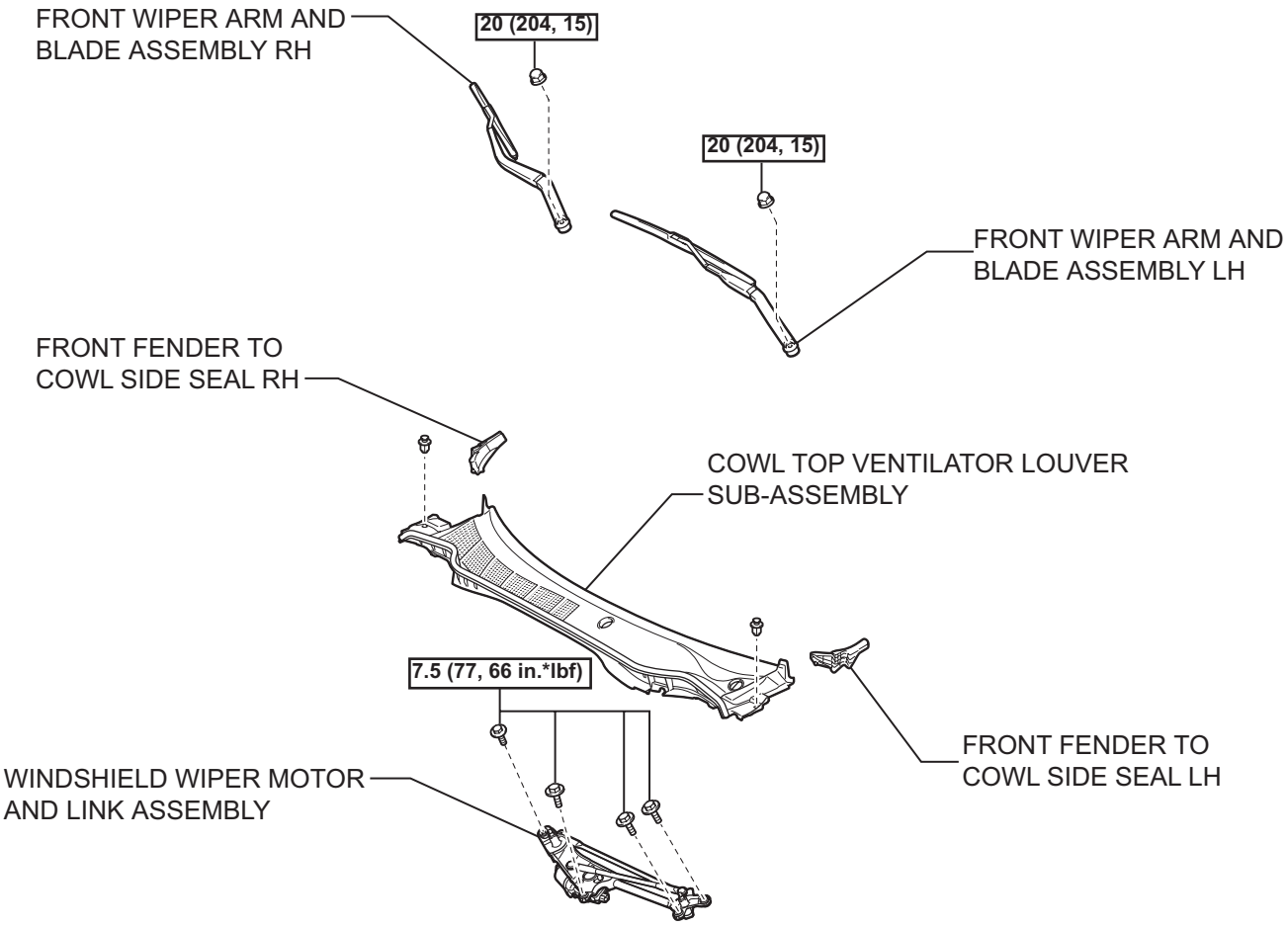
78. INSPECT SRS WARNING LIGHT
(See page RS-32)

AC

79. **ADD ENGINE COOLANT (for 2AZ-FE) (See page CO-5)**
80. **ADD ENGINE COOLANT (for 2GR-FE) (See page CO-6)**
81. **CHECK FOR ENGINE COOLANT LEAKS**
82. **CHARGE WITH REFRIGERANT (See page AC-125)**
83. **WARM UP ENGINE (See page AC-126)**
84. **CHECK FOR REFRIGERANT LEAKS (See page AC-126)**

BLOWER UNIT

COMPONENTS



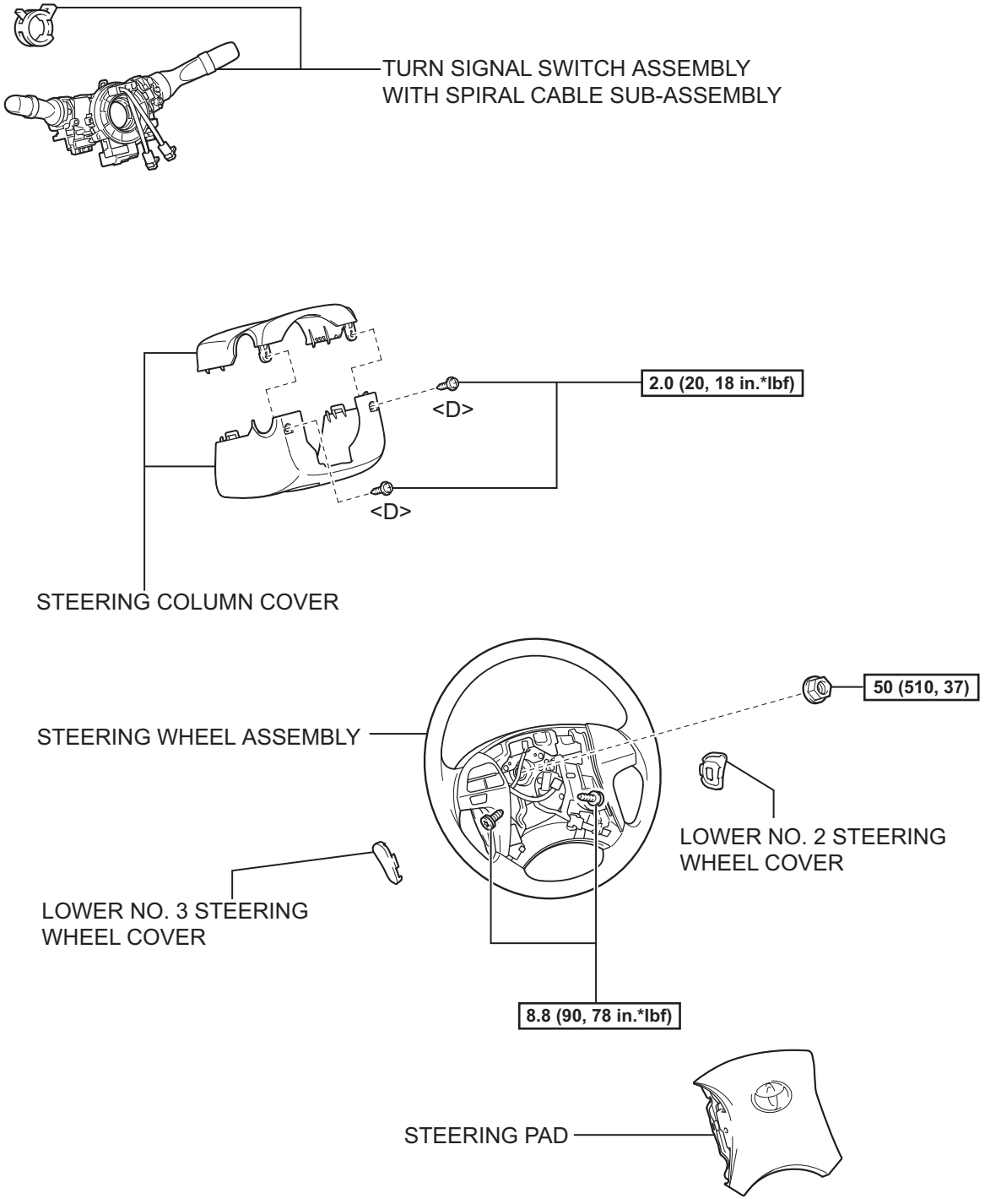
N*m (kgf*cm, ft.*lbf): Specified torque

P

E133392E01

AC

for TMC Made:



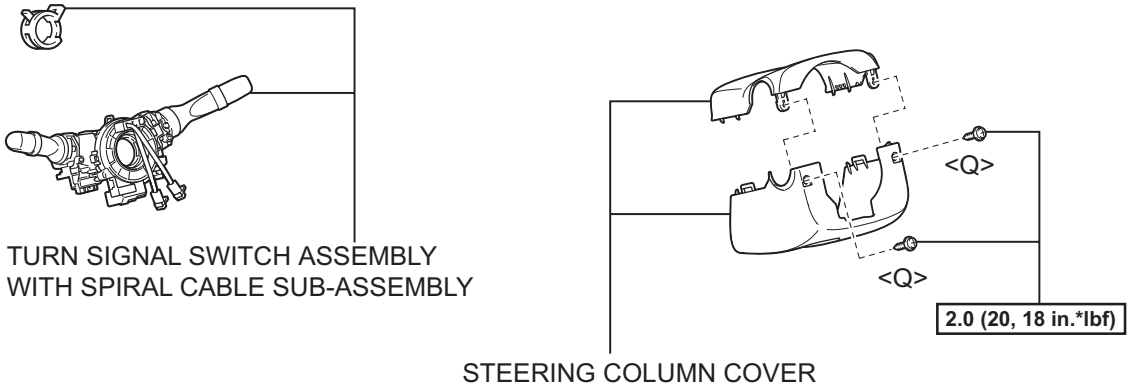
AC

N*m (kgf*cm, ft.*lbf) : Specified torque

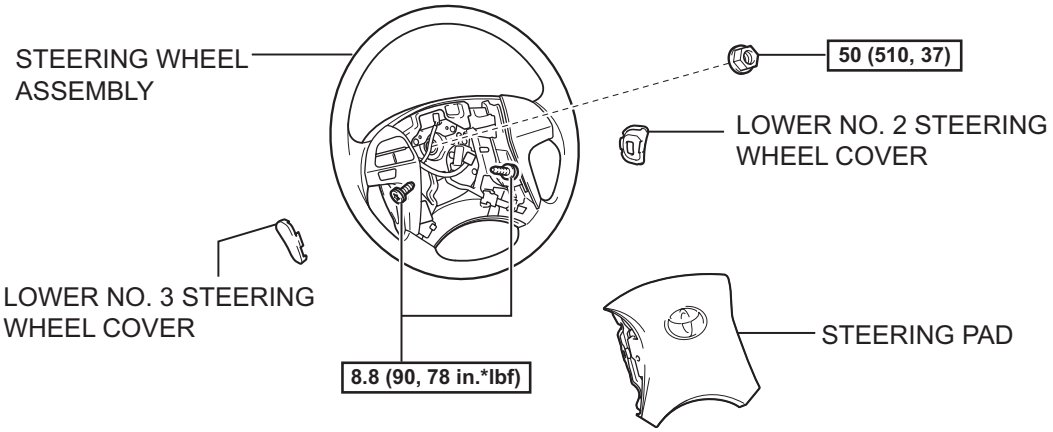
P

B137279E01

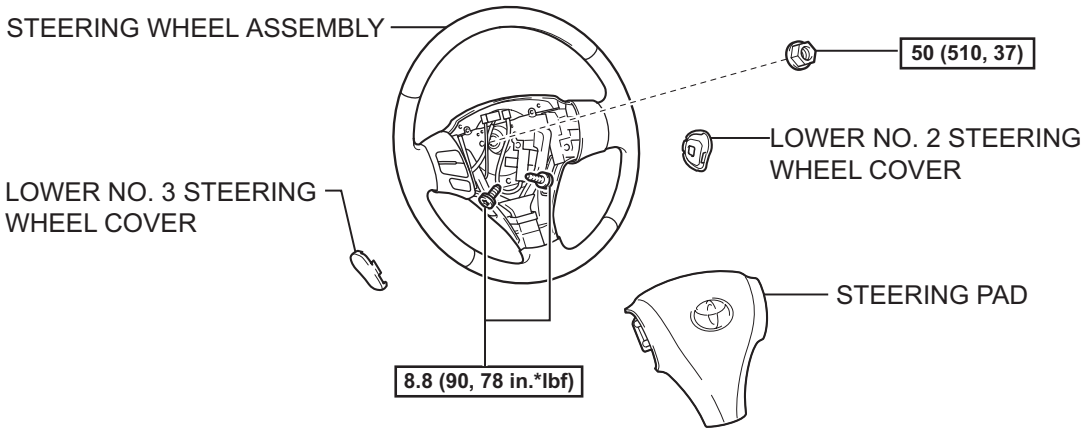
for TMMK Made:



for 4 Spoke:



for 3 Spoke:

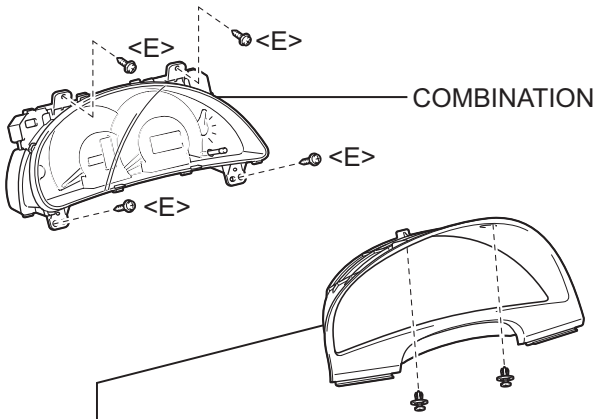


N*m (kgf*cm, ft.*lbf) : Specified torque

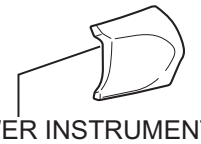
P

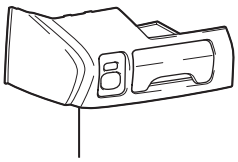
B137280E01

for TMC Made:

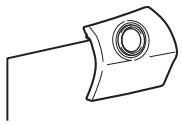


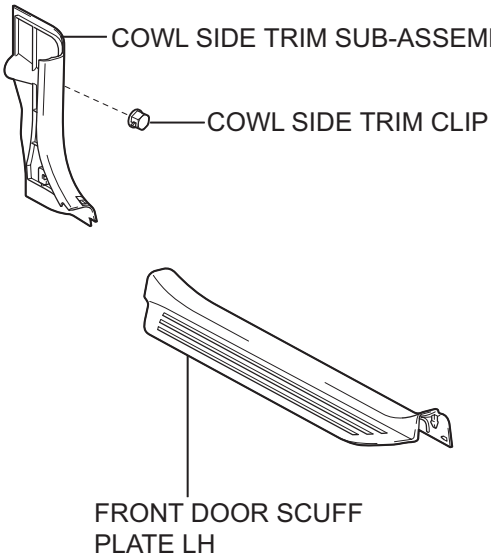
without Smart Key System:

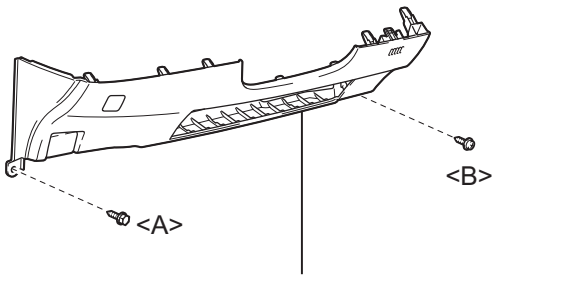




with Smart Key System:





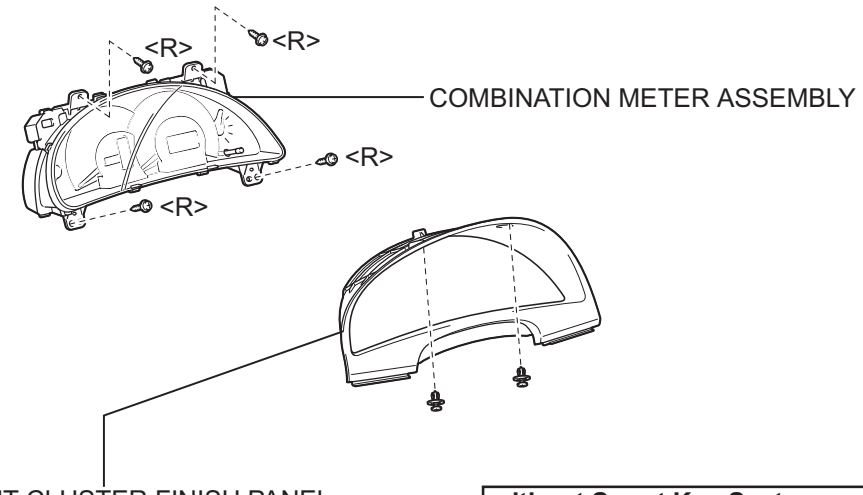


AC

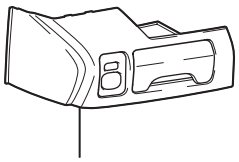
P

B137281E01

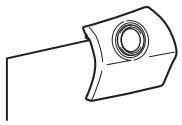
for TMMK Made:

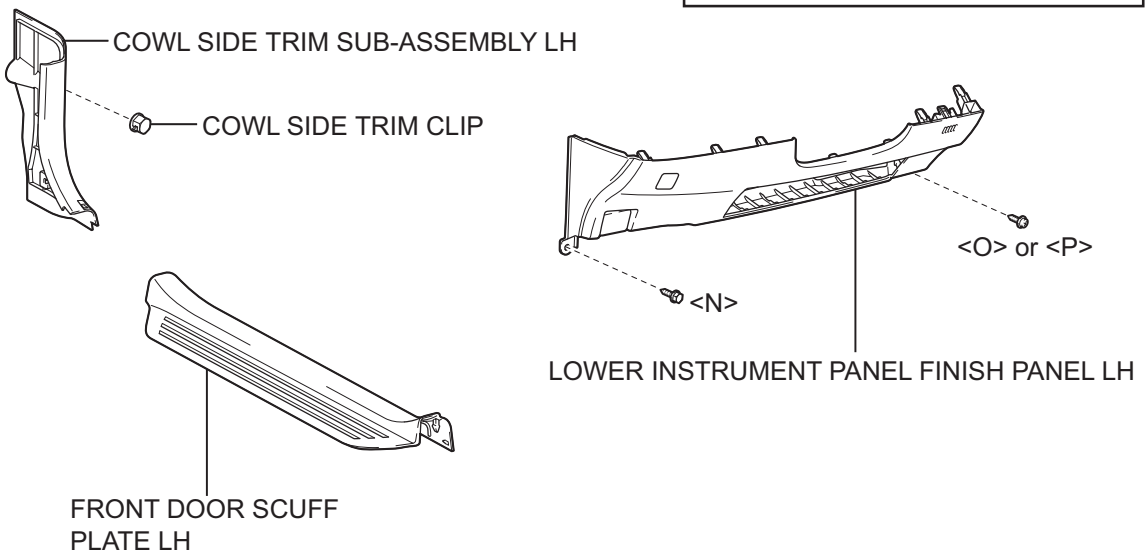


without Smart Key System:



with Smart Key System:



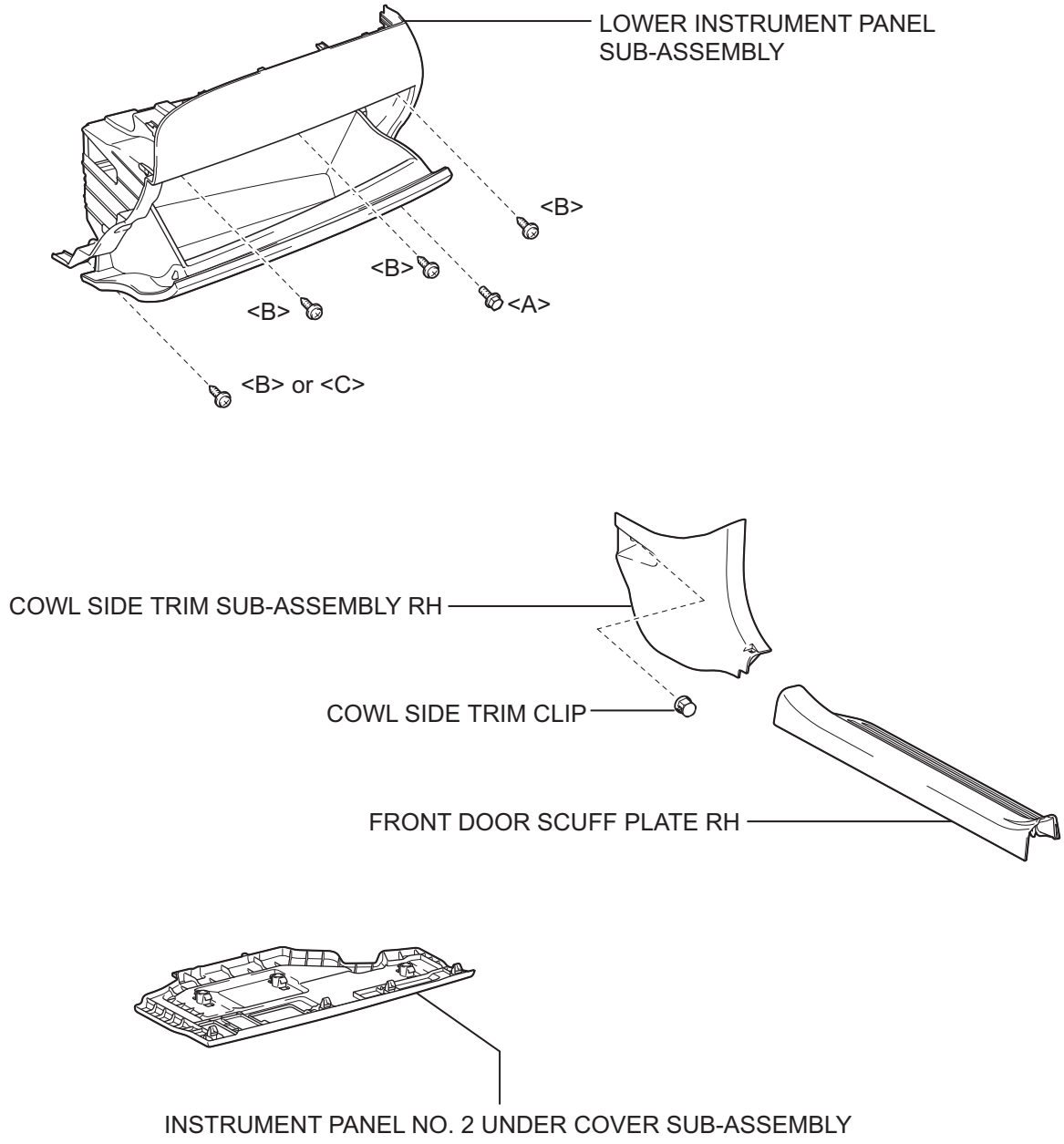


AC

P

B137281E03

for TMC Made:

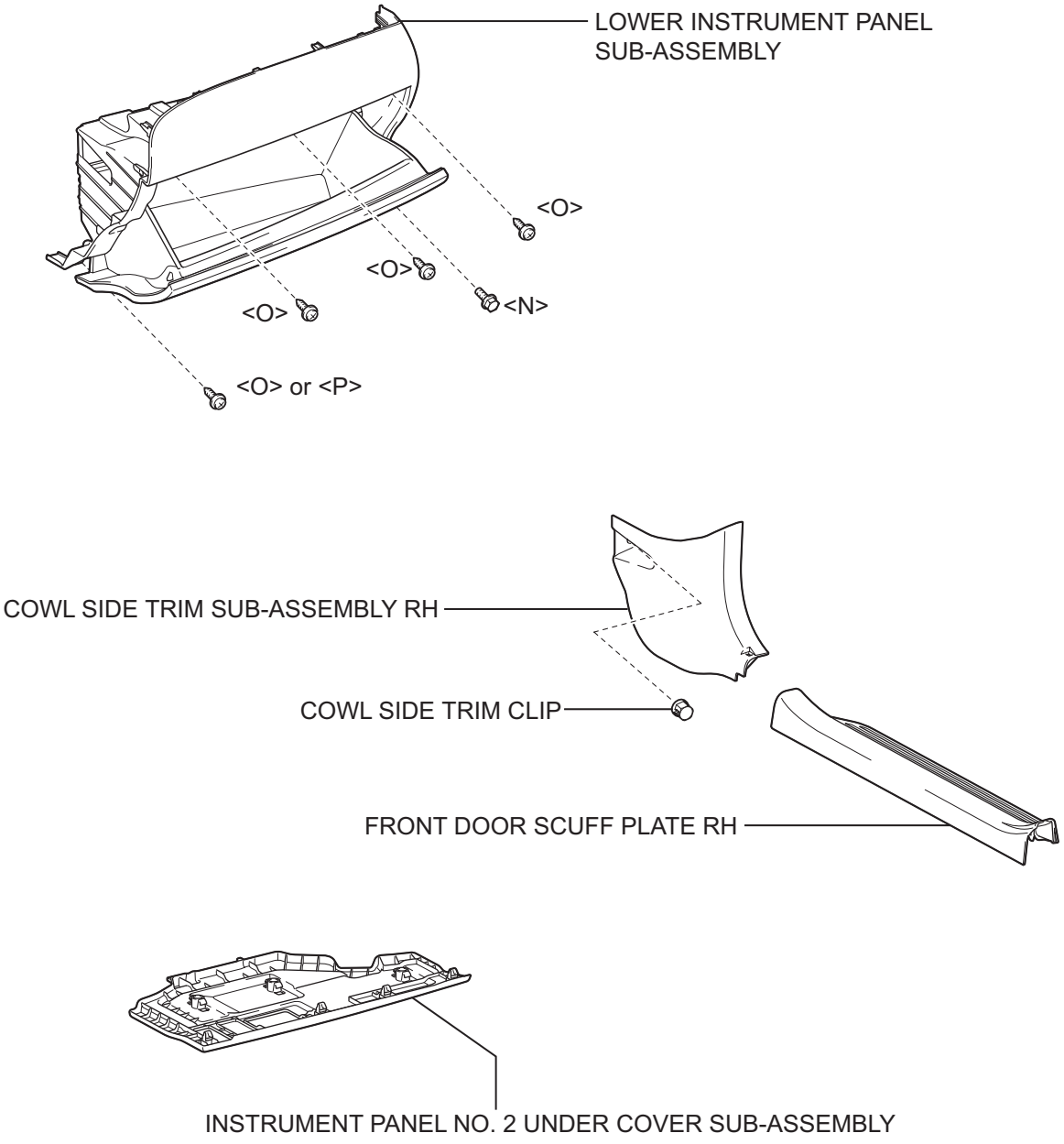


P

B137282E01

AC

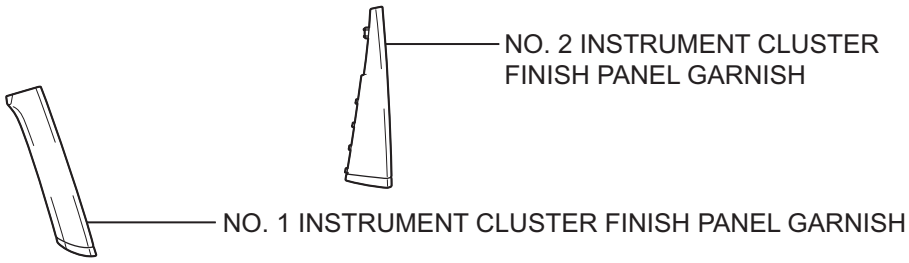
for TMMK Made:



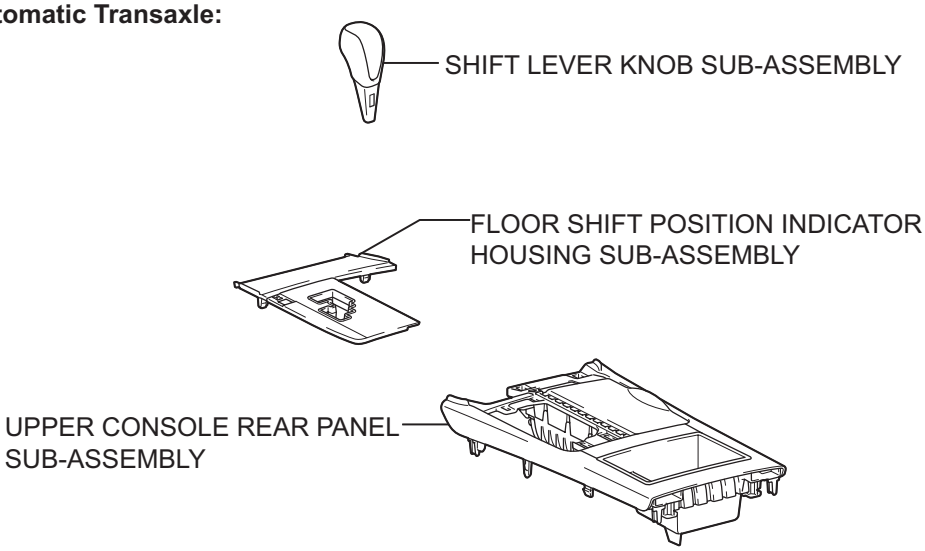
P

B137282E03

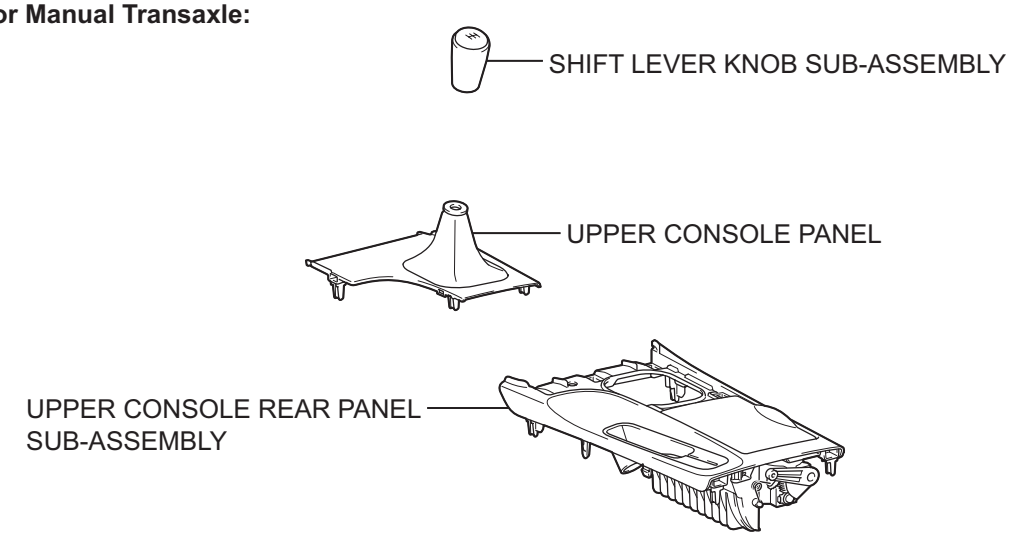
AC



for Automatic Transaxle:



for Manual Transaxle:

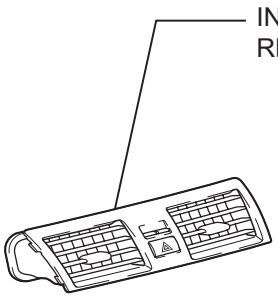


AC

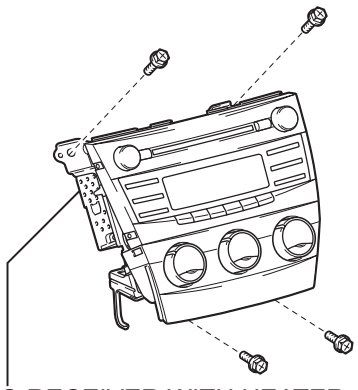
P

B137283E01

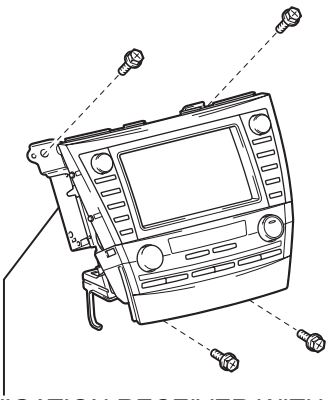
for TMC Made:

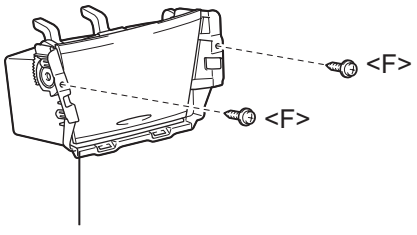


without Navigation System:



with Navigation System:



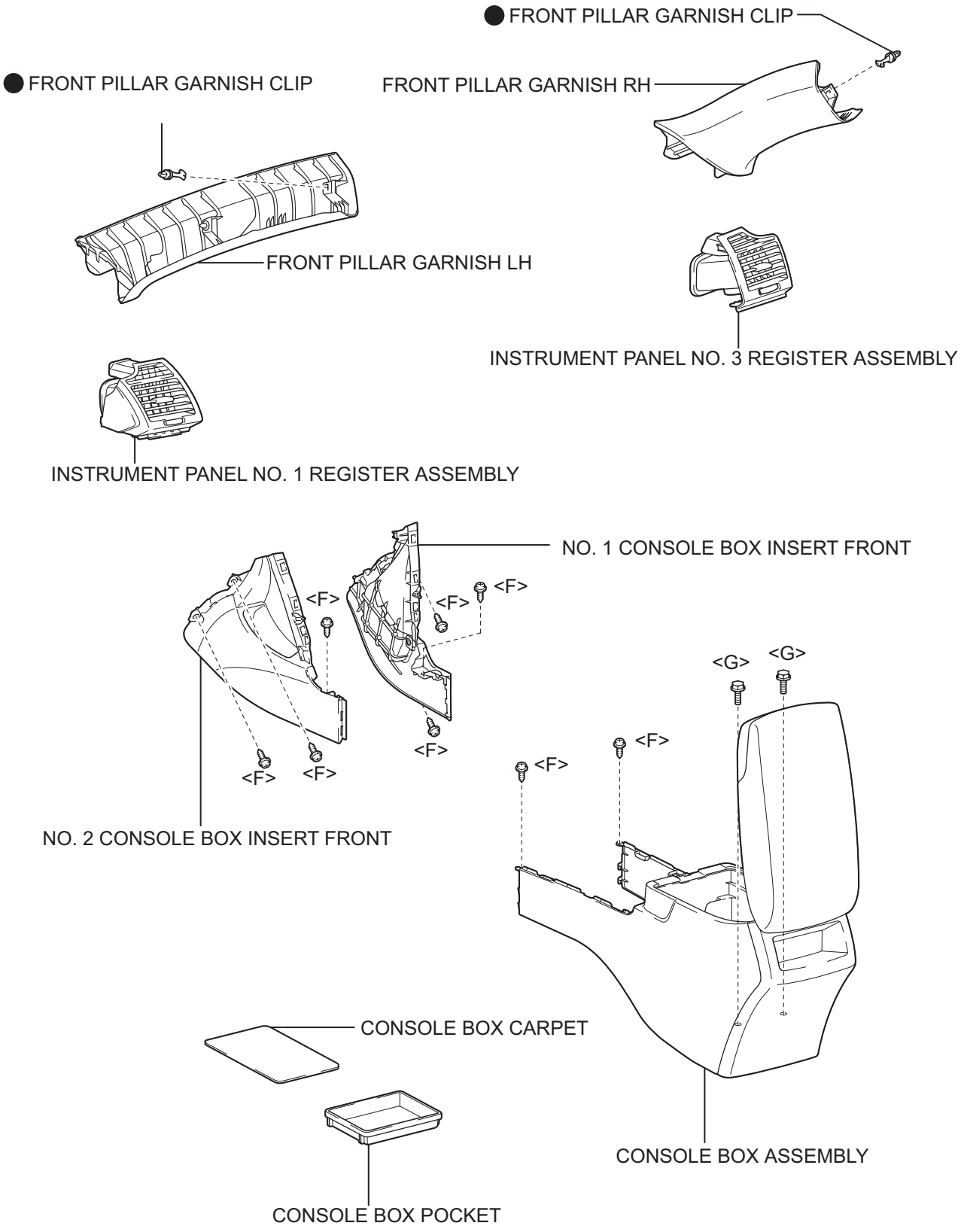


AC

P

B137284E01

for TMC Made:



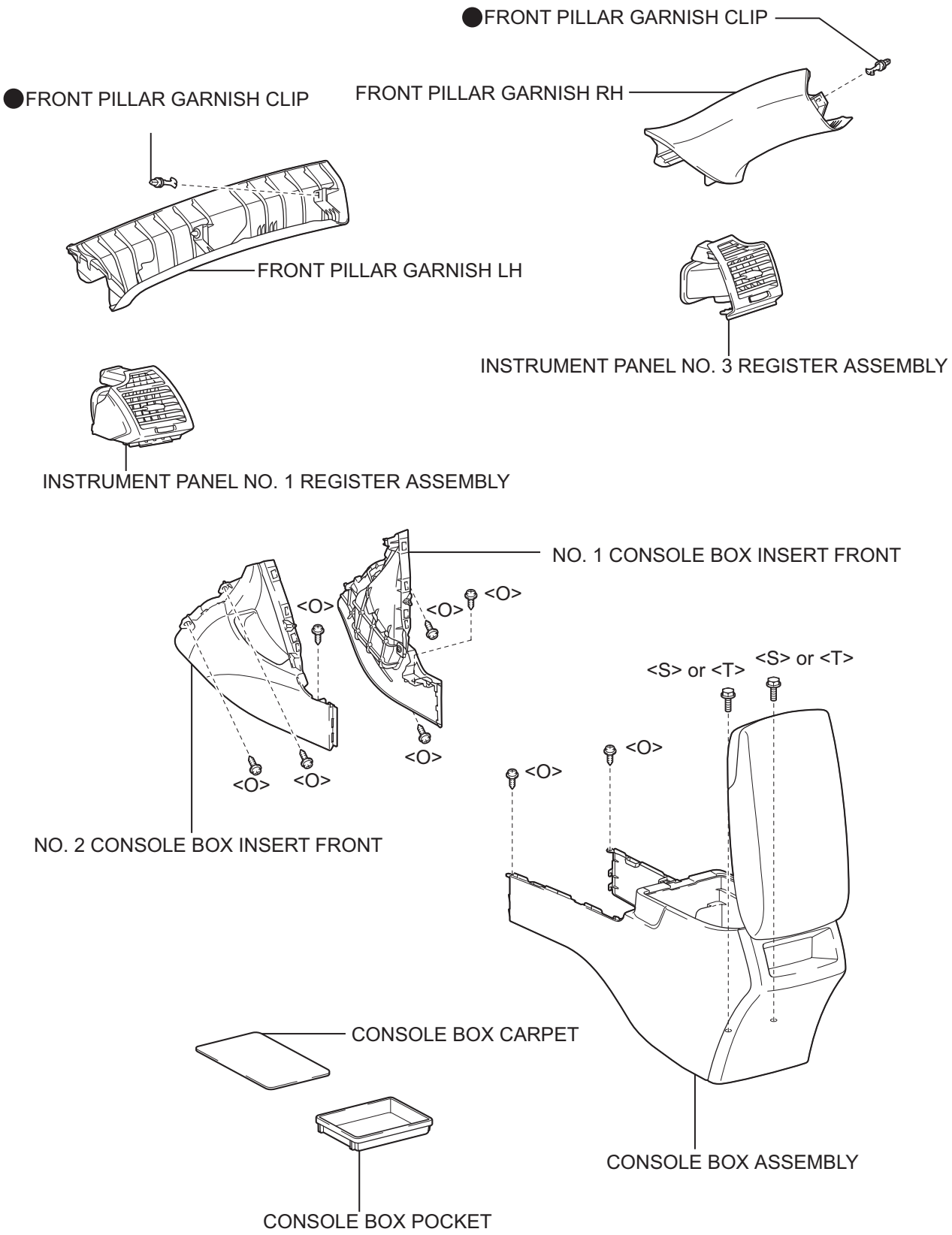
● Non-reusable part

P

B137285E01

AC

for TMMK Made:



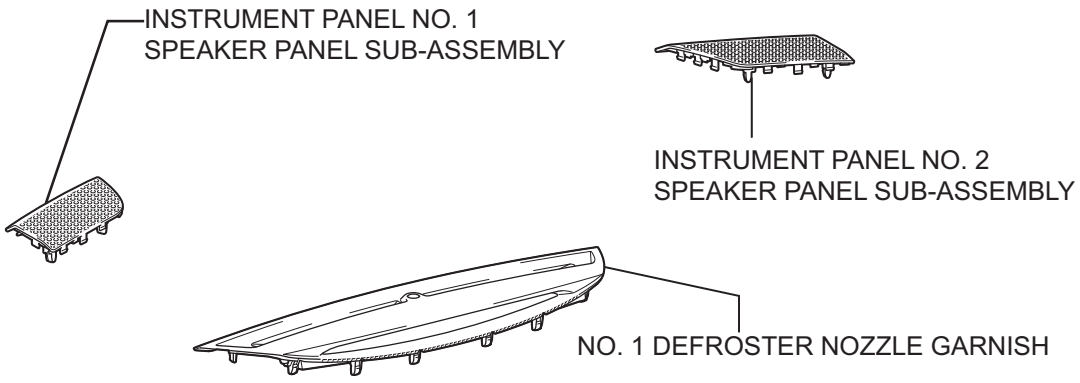
AC

● Non-reusable part

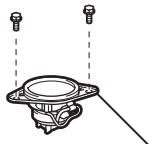
P

B137285E03

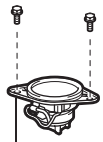
for TMC Made:

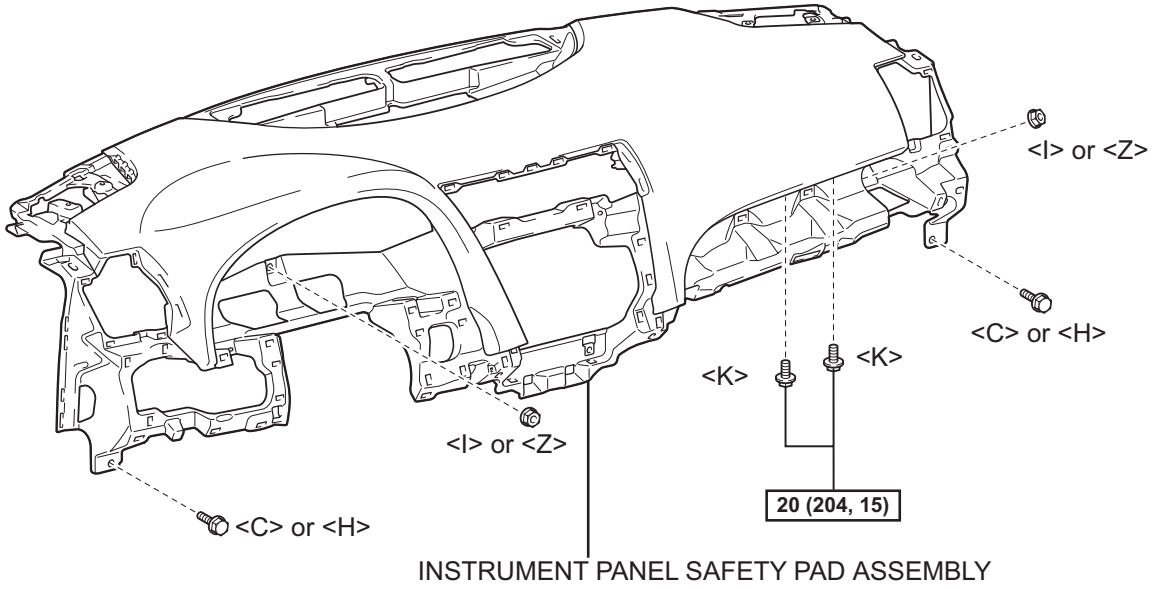


for LH Side:



for RH Side:





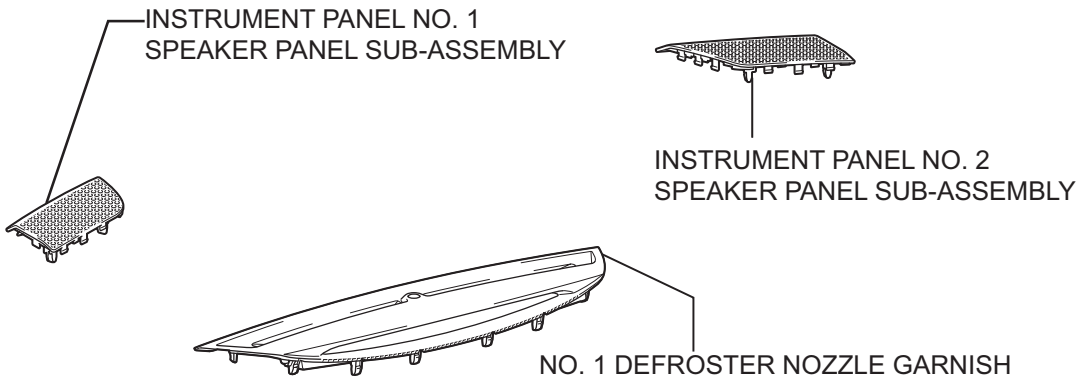
AC

N*m (kgf*cm, ft.*lbf) : Specified torque

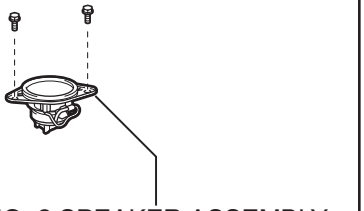
P

B137286E01

for TMMK Made:

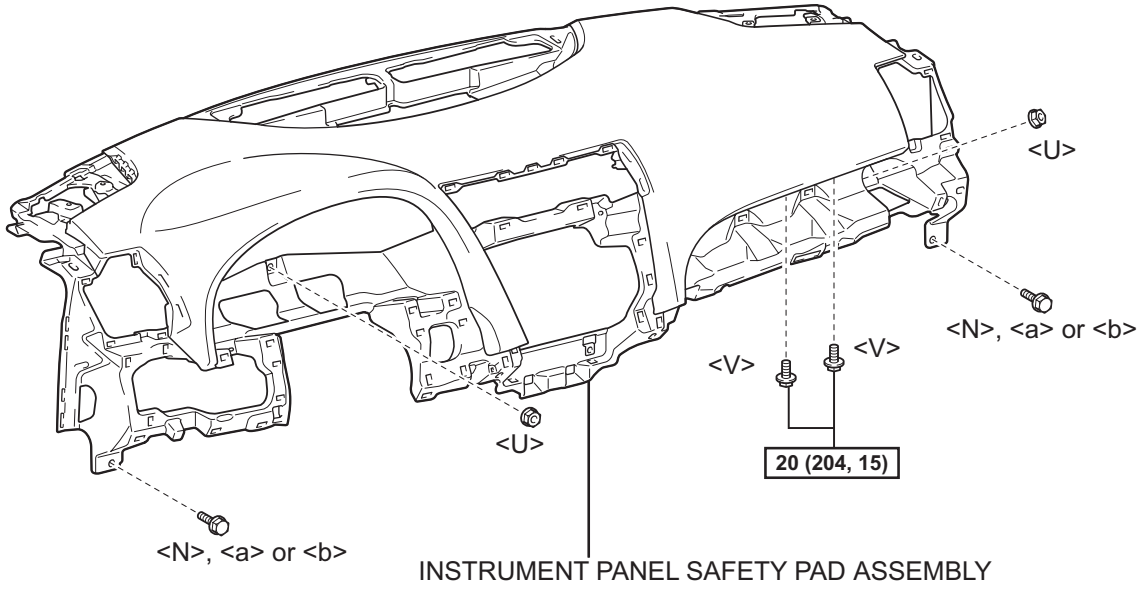


for LH Side:



for RH Side:

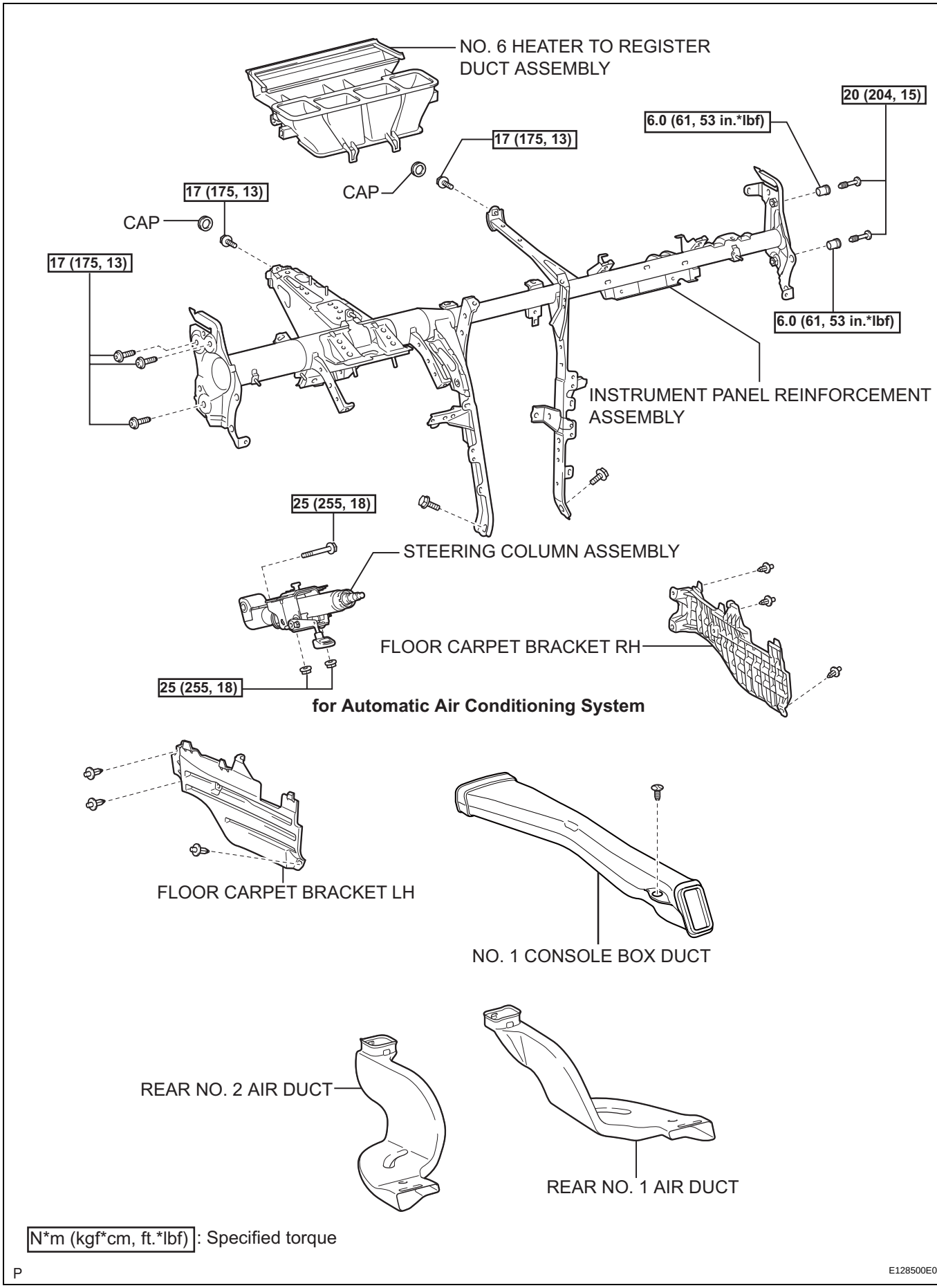
AC



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137286E03



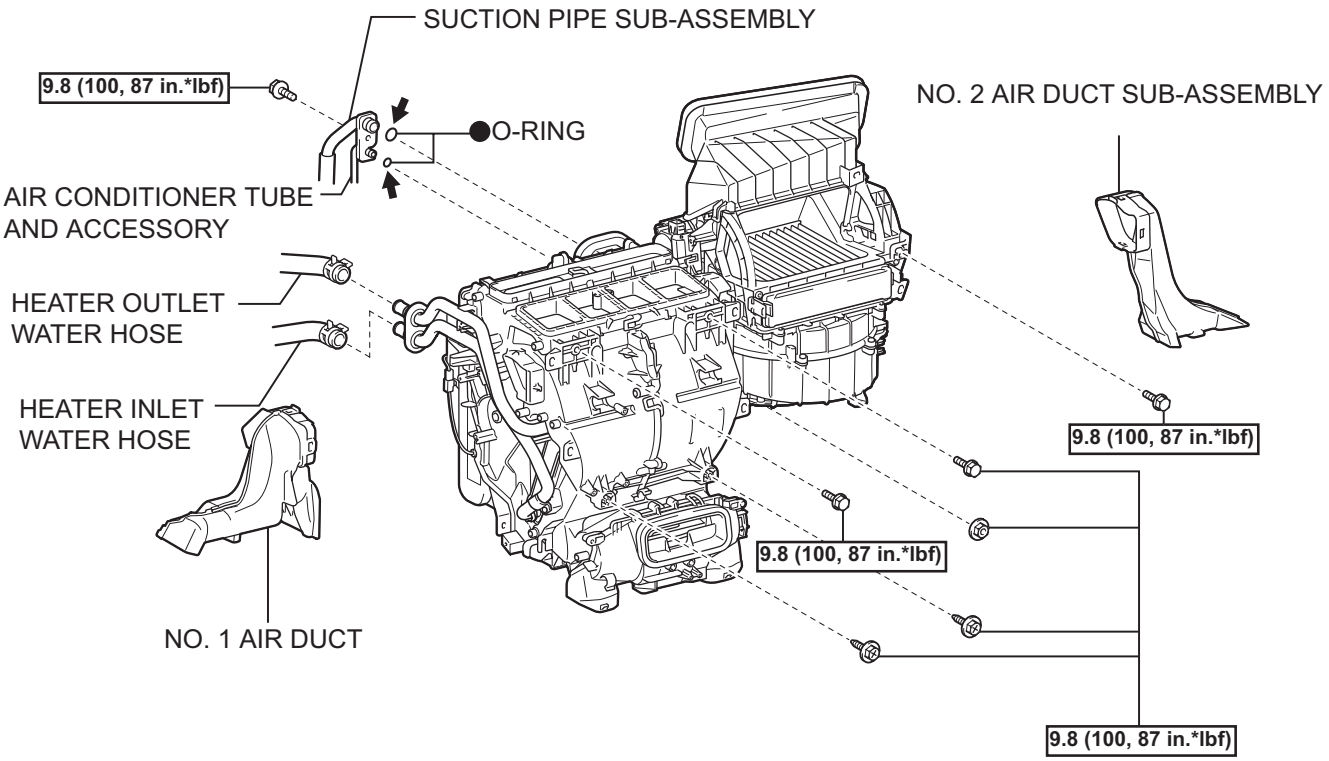
AC

N*m (kgf*cm, ft.*lbf) : Specified torque

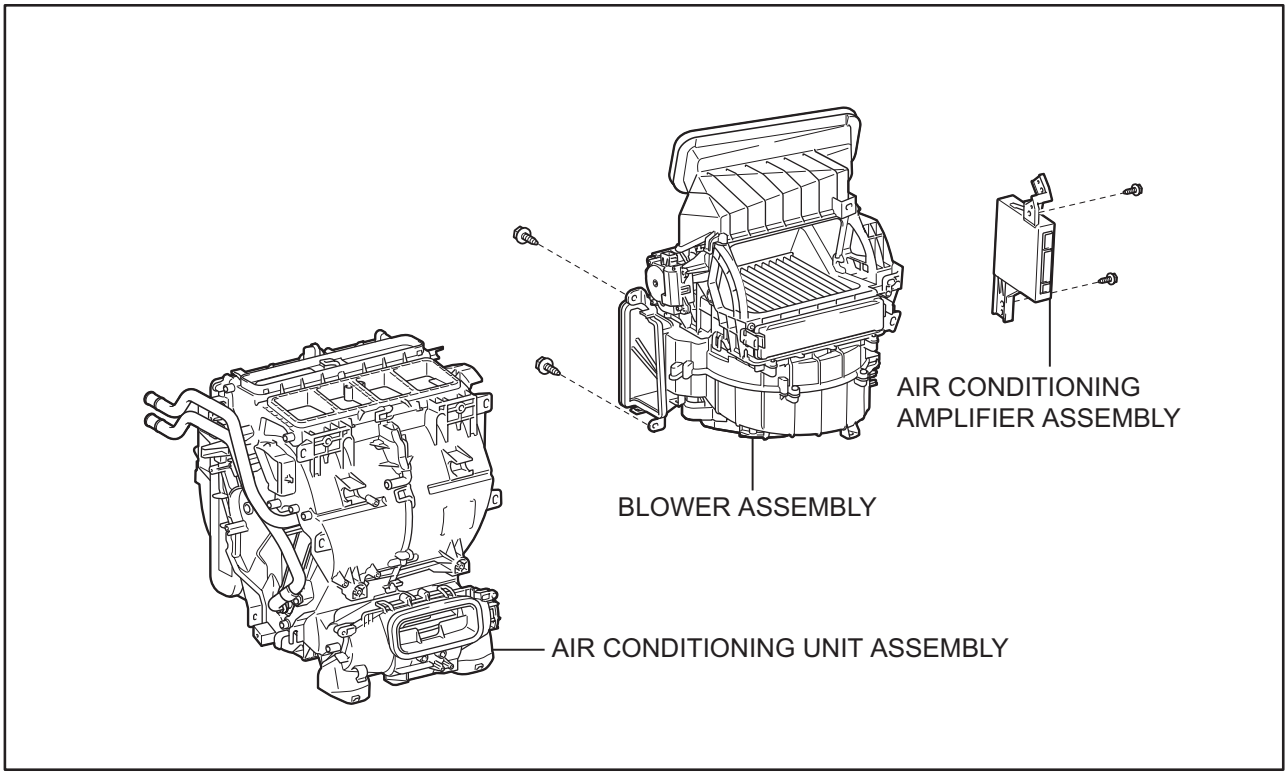
P

E128500E01

for TMC Made:



AC



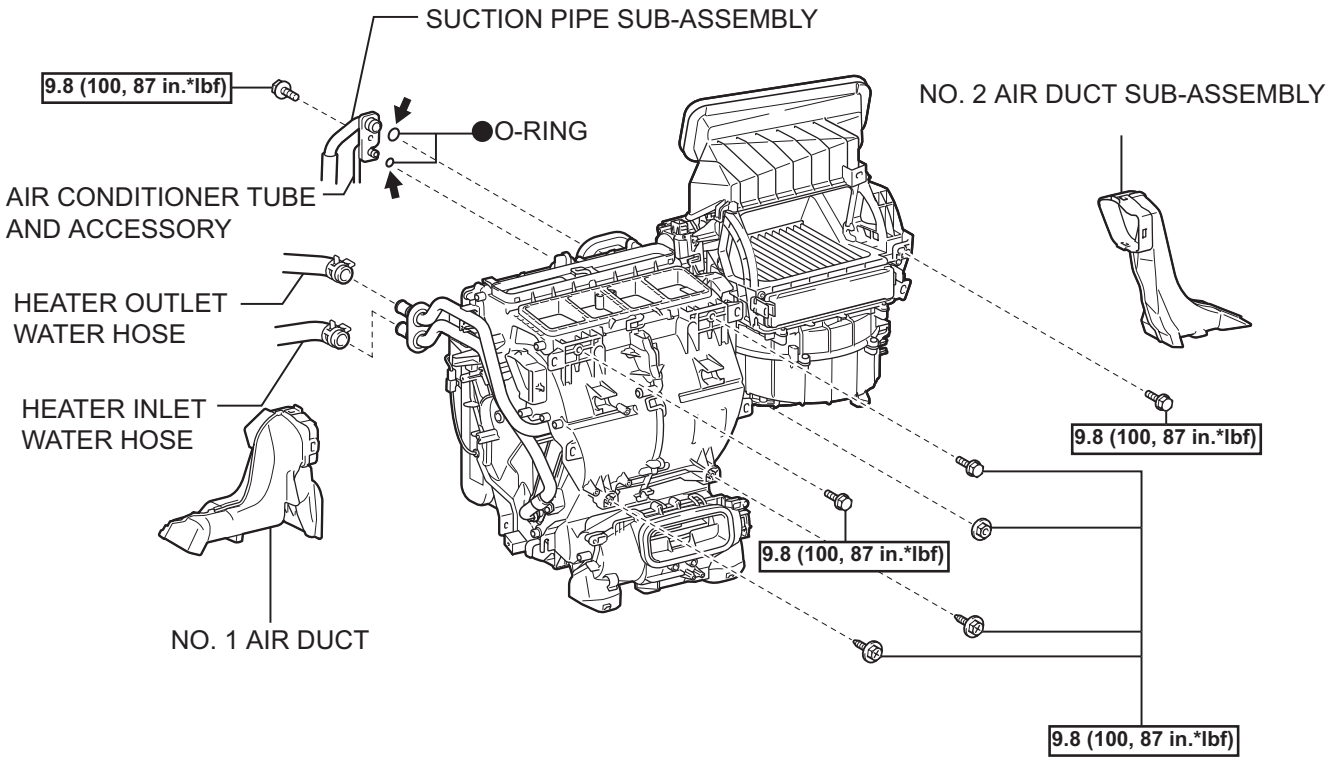
◀ Compressor oil ND-OIL 8 or equivalent

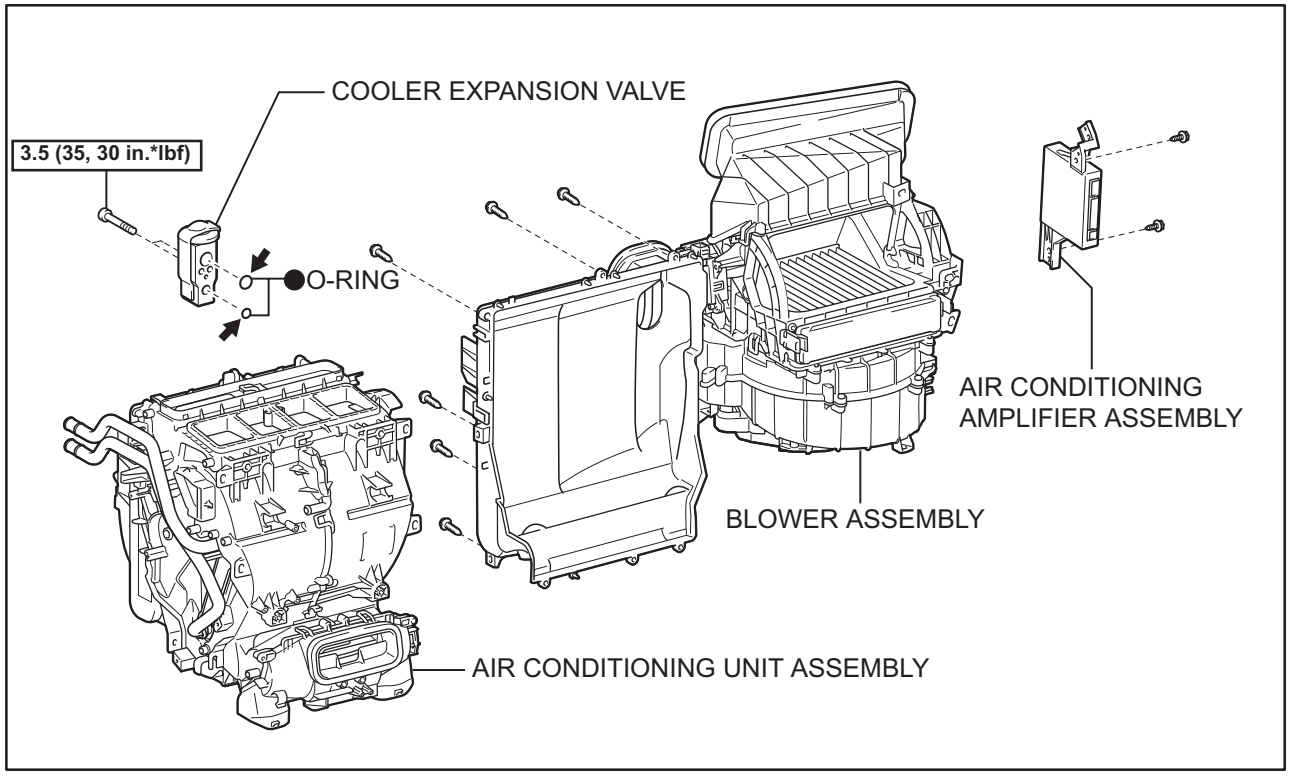
● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

P

E128501E01

for TMMK Made:





AC

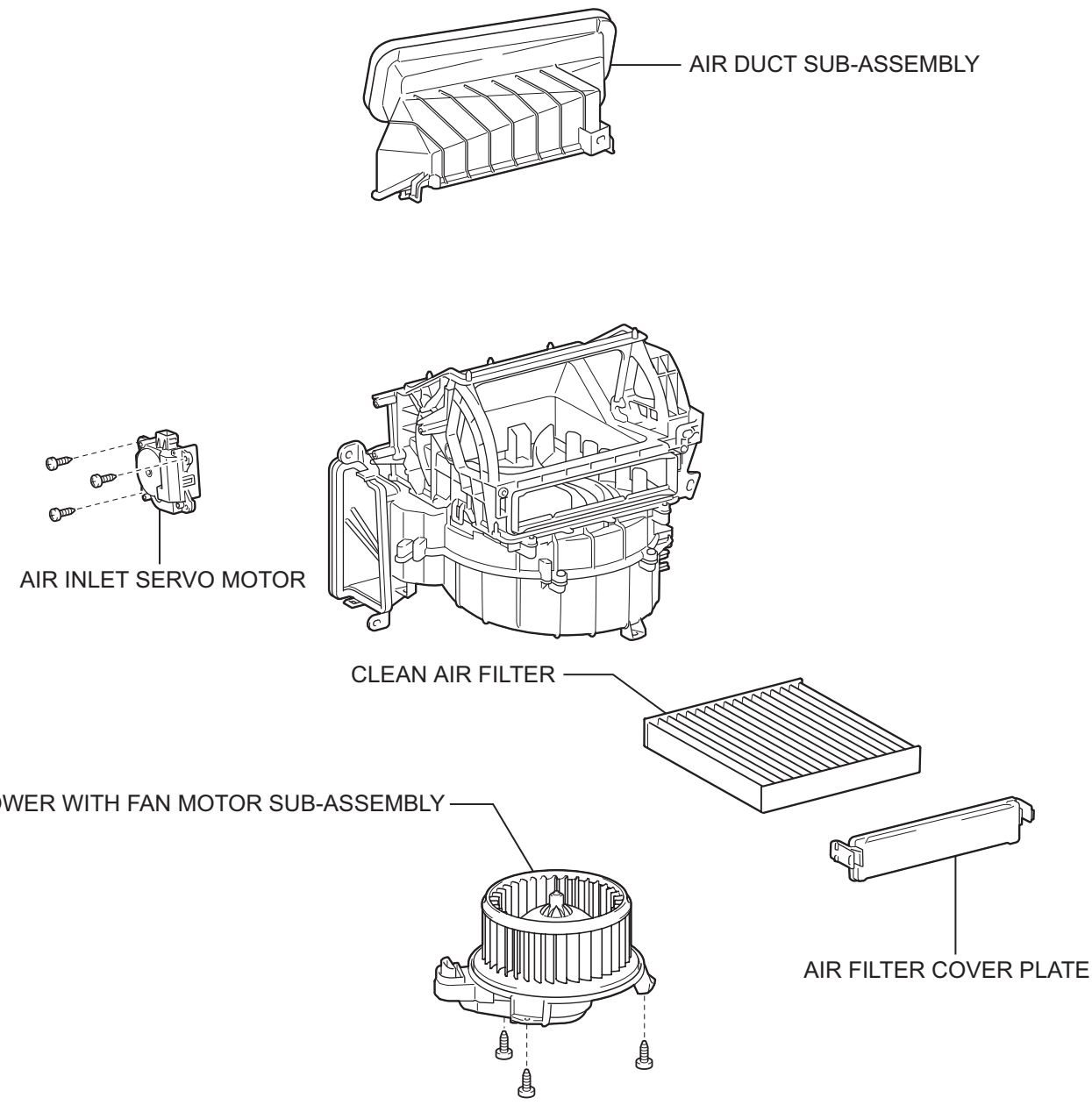
⬅ Compressor oil ND-OIL 8 or equivalent

● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

P

E129993E01

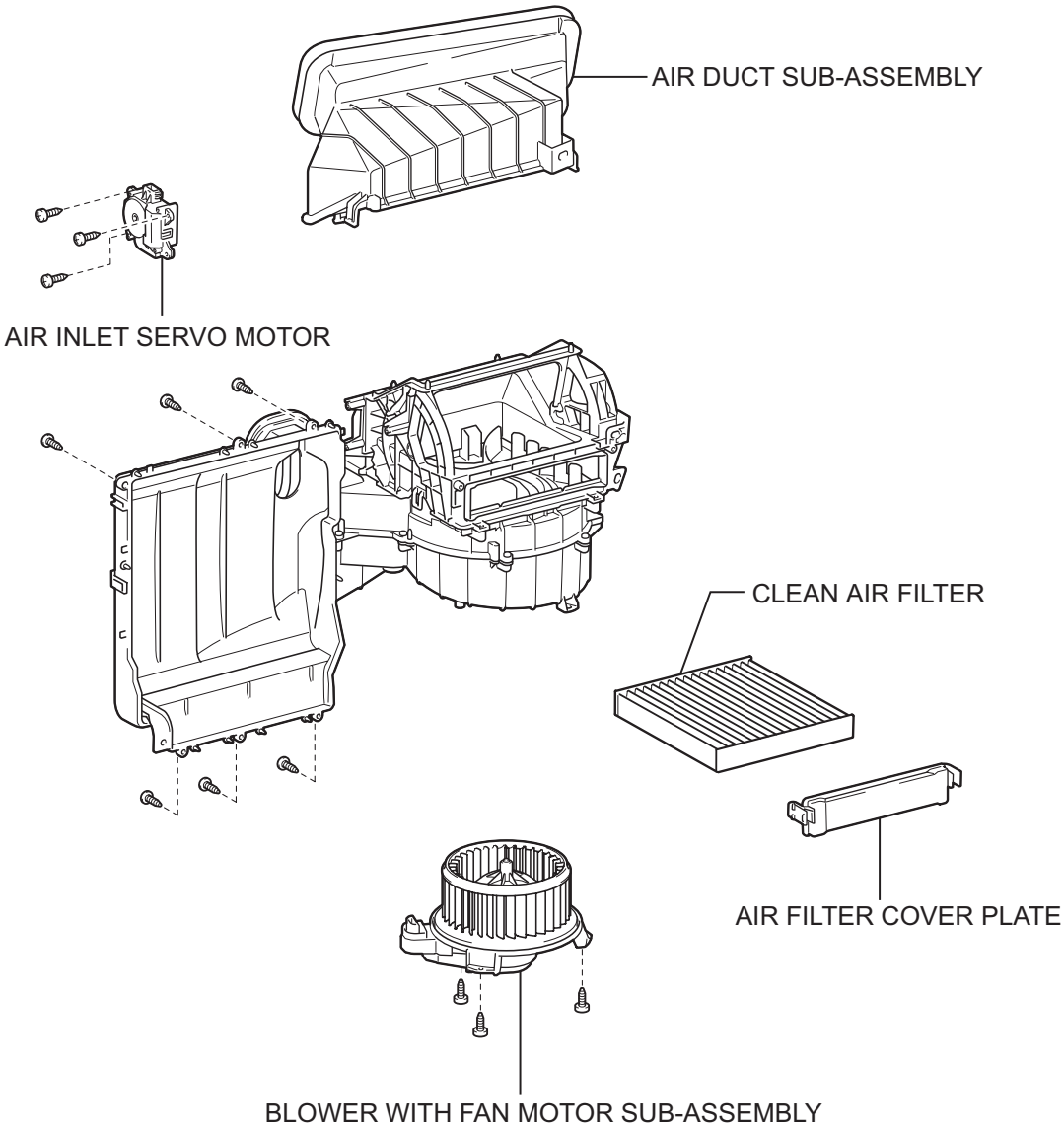
for TMC Made:



AC

P

E128503E01


AIR DUCT SUB-ASSEMBLY
AIR INLET SERVO MOTOR
CLEAN AIR FILTER
AIR FILTER COVER PLATE
BLOWER WITH FAN MOTOR SUB-ASSEMBLY
P
E129995E01

AC

REMOVAL

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-125)
2. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD
3. DISCONNECT BATTERY NEGATIVE TERMINAL
   CAUTION:
   Wait for 90 seconds after disconnecting the terminal to prevent the airbag from deploying. (See page RS-1)
4. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)
5. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)
6. REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)
7. REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)
8. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)
9. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)
10. REMOVE COWL TOP OUTER FRONT PANEL SUB-ASSEMBLY (See page BR-29)
11. DISCONNECT SUCTION PIPE SUB-ASSEMBLY (See page AC-151)
12. DISCONNECT AIR CONDITIONER TUBE AND ACCESSORY (See page AC-151)
13. DISCONNECT HEATER OUTLET WATER HOSE (See page AC-152)
14. DISCONNECT HEATER INLET WATER HOSE (See page AC-152)
15. REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)
16. REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)
17. REMOVE STEERING PAD (See page RS-350)
18. REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)
19. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)
20. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)
21. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)

22. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)
23. REMOVE STEERING COLUMN COVER (for TMC Made) (See page IP-21)
24. REMOVE STEERING COLUMN COVER (for TMMK Made) (See page IP-21)
25. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)
26. REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)
27. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)
28. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)
29. REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)
30. REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)
31. REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)
32. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)
33. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)
34. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)
35. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)
36. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)
37. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)
38. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)
39. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
40. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
41. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)
42. REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)

43. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)
44. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)
45. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)
46. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)
47. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)
48. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-146)
49. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-195)
50. REMOVE CONSOLE BOX POCKET (See page IP-28)
51. REMOVE CONSOLE BOX CARPET (See page IP-28)
52. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
53. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)
54. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)
55. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
56. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)
57. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
58. REMOVE FRONT PILLAR GARNISH LH (See page IR-27)
59. REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-31)
60. REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-31)
61. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)
62. REMOVE FRONT PILLAR GARNISH RH (See page IR-27)
63. REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-31)
64. REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-32)

65. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**

66. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-32)**

67. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-32)**

68. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-34)**

69. **REMOVE NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-154)**

70. **REMOVE FLOOR CARPET BRACKET LH (See page AC-155)**

71. **REMOVE FLOOR CARPET BRACKET RH (See page AC-155)**

72. **REMOVE REAR NO. 2 AIR DUCT (See page AC-155)**

73. **REMOVE REAR NO. 1 AIR DUCT (See page AC-156)**

74. **REMOVE NO. 1 AIR DUCT (See page SR-39)**

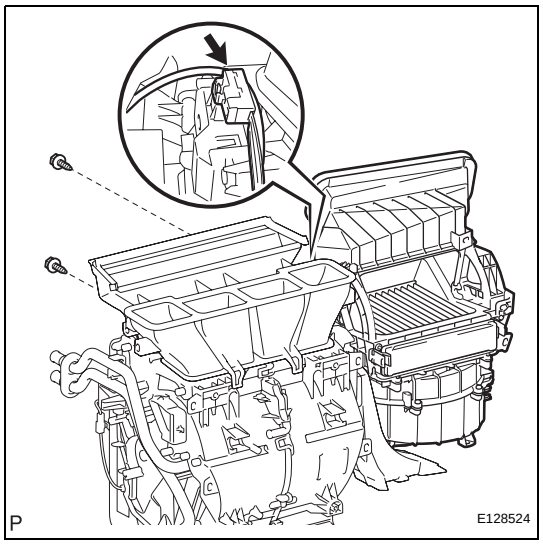
75. **SEPARATE STEERING COLUMN ASSEMBLY (for TMC Made) (See page SR-39)**

76. **REMOVE STEERING POST ASSEMBLY (for TMMK Made) (See page SR-41)**

77. **REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY (See page AC-259)**

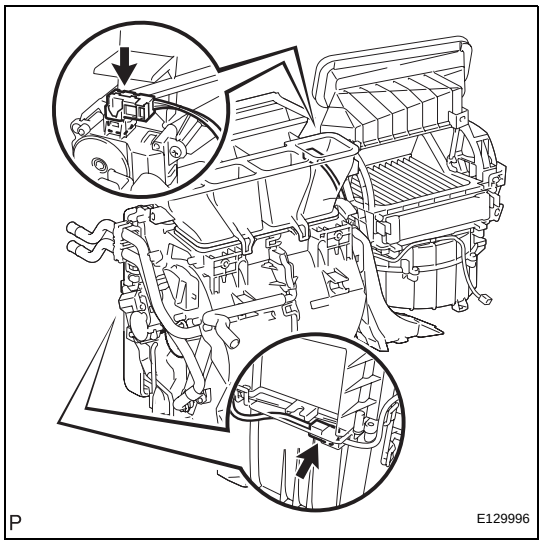
78. **REMOVE INSTRUMENT PANEL REINFORCEMENT ASSEMBLY (See page AC-156)**

79. **REMOVE BLOWER ASSEMBLY (for TMC Made)**
    (a) Disconnect the connector.
    (b) Remove the 2 screws and blower assembly.



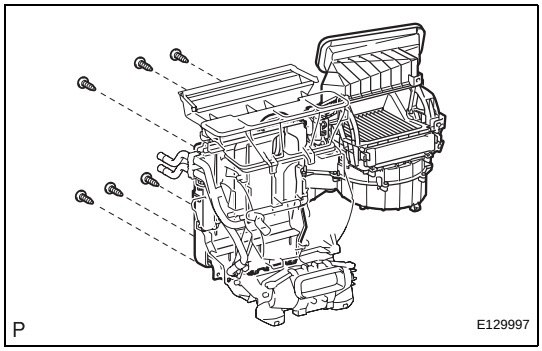
80. **REMOVE COOLER EXPANSION VALVE (for TMMK Made) (See page AC-163)**

AC

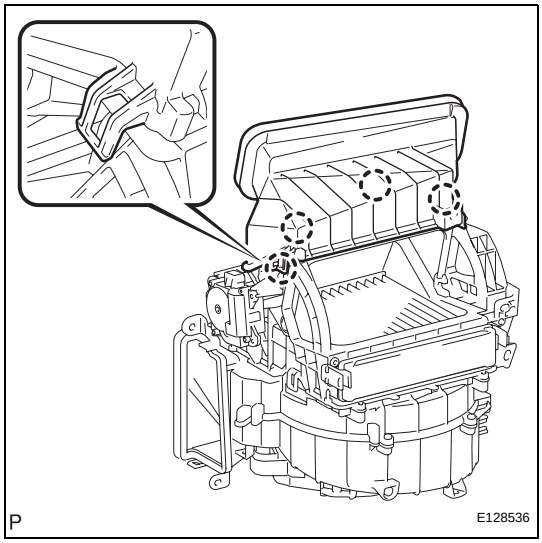


81. REMOVE BLOWER ASSEMBLY (for TMMK Made)

(a) Remove the connector and clamp, and disconnect the wire harness.



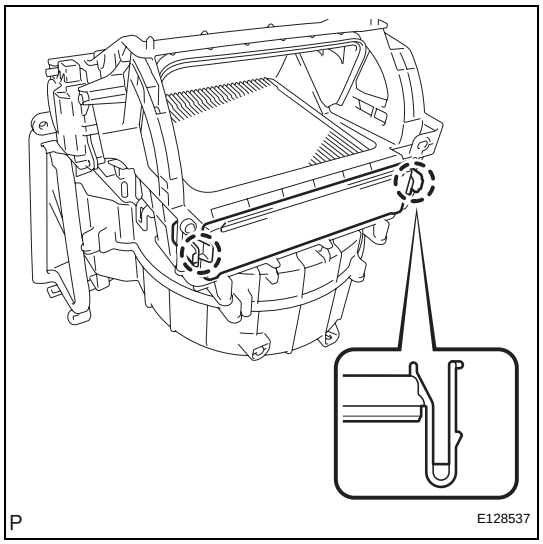
(b) Remove the 6 screws and then the blower assembly with the cooler evaporator sub-assembly.



DISASSEMBLY

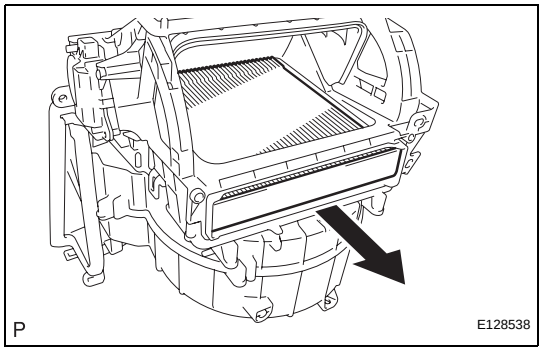
1. REMOVE AIR DUCT SUB-ASSEMBLY (for TMC Made)

(a) Release the 4 claws and remove the air duct sub-assembly.



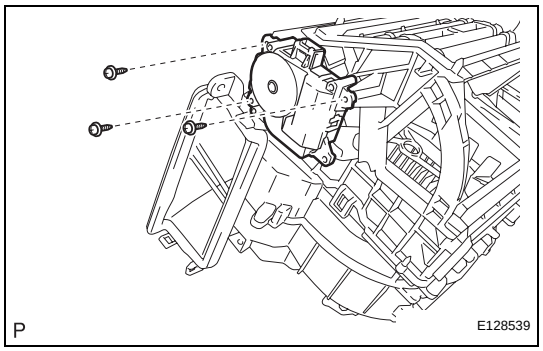
2. REMOVE AIR FILTER COVER PLATE (for TMC Made)

(a) Release the 2 claws and remove the air filter cover plate.



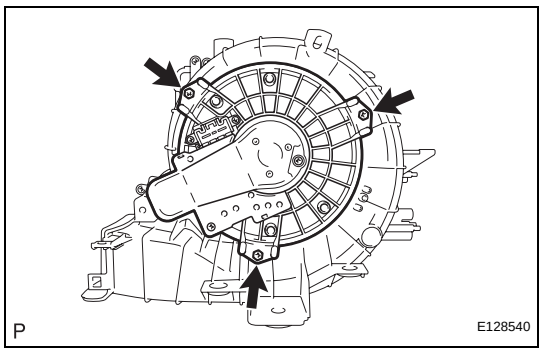
3. REMOVE CLEAN AIR FILTER (for TMC Made)

(a) Remove the clean air filter as shown in the illustration.



4. REMOVE AIR INLET SERVO MOTOR (for TMC Made)

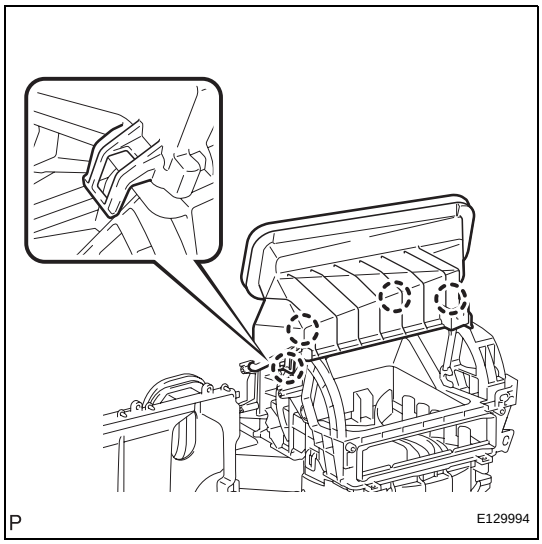
(a) Remove the 3 screws and air inlet servo motor.



5. REMOVE BLOWER WITH FAN MOTOR SUB-ASSEMBLY (for TMC Made)

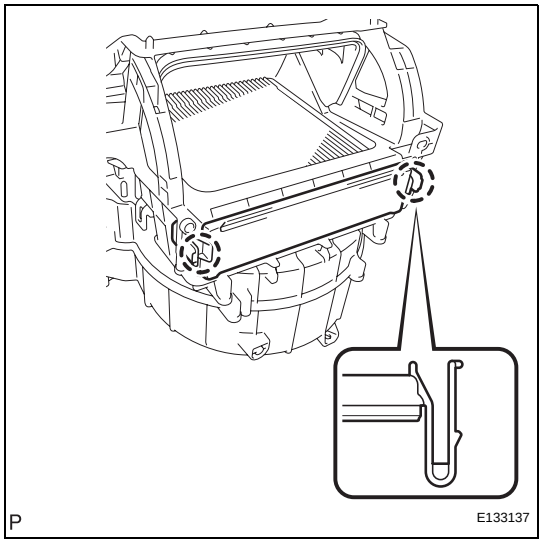
(a) Remove the 3 screws and blower with fan motor sub-assembly.

AC



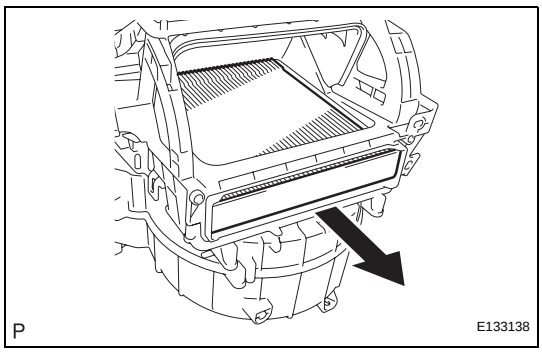
6. REMOVE AIR DUCT SUB-ASSEMBLY (for TMMK Made)

(a) Disengage the 4 claws and then remove the air duct sub-assembly.



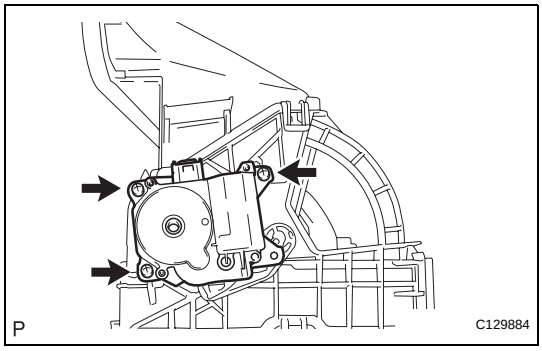
7. REMOVE AIR FILTER COVER PLATE (for TMMK Made)

(a) Release the 2 claws and remove the air filter cover plate.



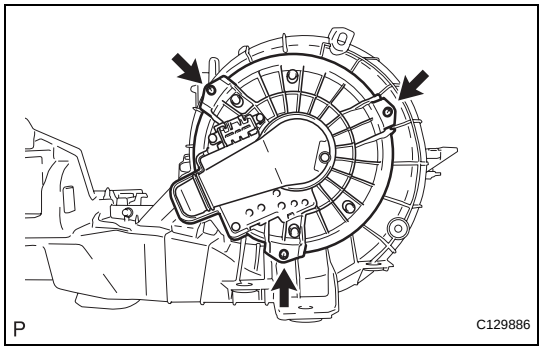
8. REMOVE CLEAN AIR FILTER (for TMMK Made)

(a) Remove the clean air filter as shown in the illustration.



9. REMOVE AIR INLET SERVO MOTOR (for TMMK Made)

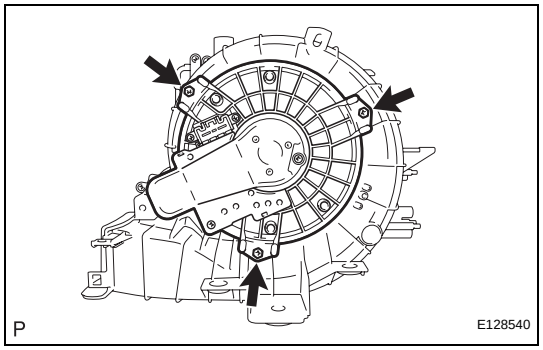
(a) Remove the 3 screws and air inlet servo motor.



10. REMOVE BLOWER WITH FAN MOTOR SUB-ASSEMBLY (for TMMK Made)

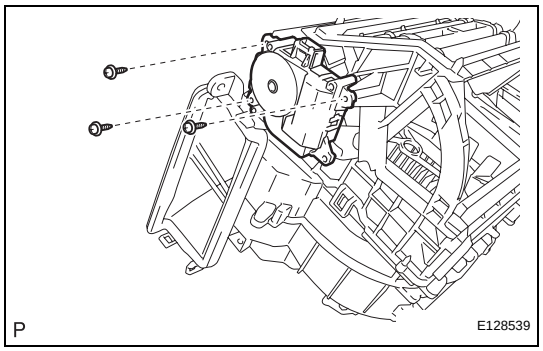
(a) Remove the 3 screws and blower with fan motor sub-assembly.

REASSEMBLY



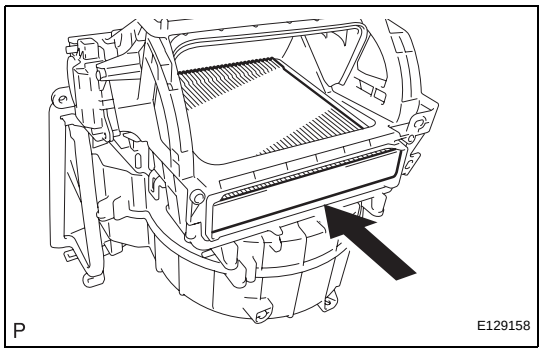
1. INSTALL BLOWER WITH FAN MOTOR SUB-ASSEMBLY (for TMC Made)

(a) Install the blower with fan motor sub-assembly with the 3 screws.



2. INSTALL AIR INLET SERVO MOTOR (for TMC Made)

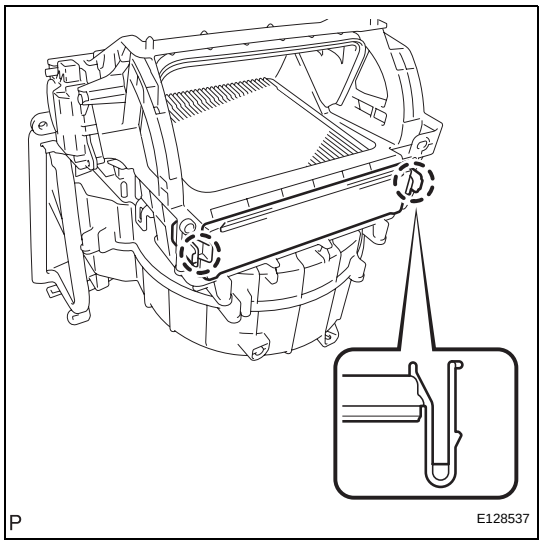
(a) Install the air inlet servo motor with the 3 screws.



3. INSTALL CLEAN AIR FILTER (for TMC Made)

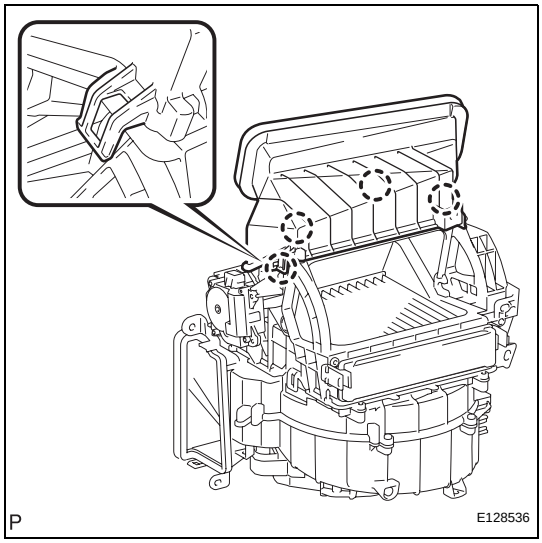
(a) Install the clean air filter as shown in the illustration.

AC



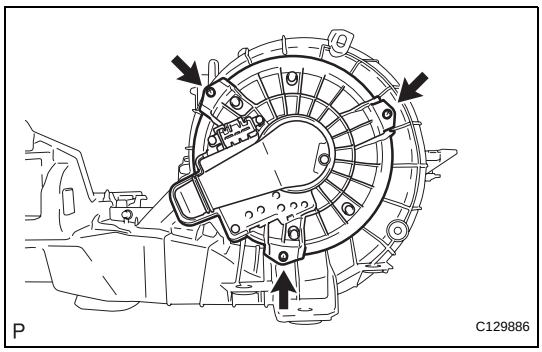
4. INSTALL AIR FILTER COVER PLATE (for TMC Made)

(a) Engage the 2 claws to install the air filter cover plate.



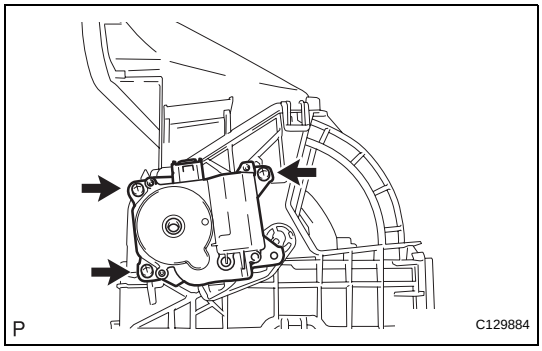
5. INSTALL AIR DUCT SUB-ASSEMBLY (for TMC Made)

(a) Engage the 4 claws to install the air duct sub-assembly.



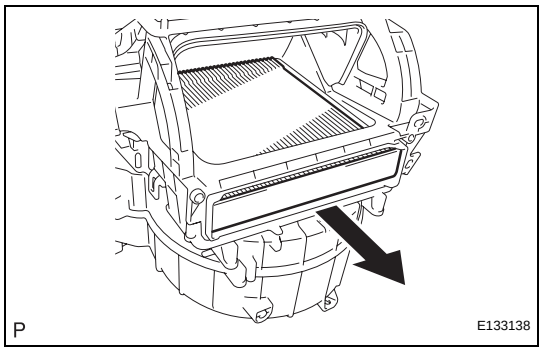
6. INSTALL BLOWER WITH FAN MOTOR SUB-ASSEMBLY (for TMMK Made)

(a) Install the blower with fan motor sub-assembly with the 3 screws.



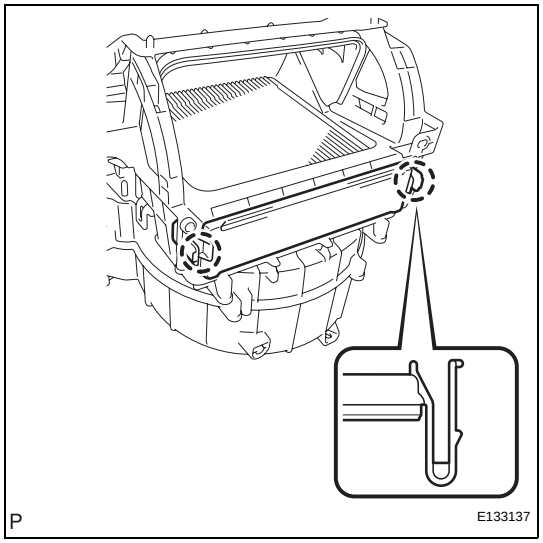
7. INSTALL AIR INLET SERVO MOTOR (for TMMK Made)

(a) Install the air inlet servo motor with the 3 screws.



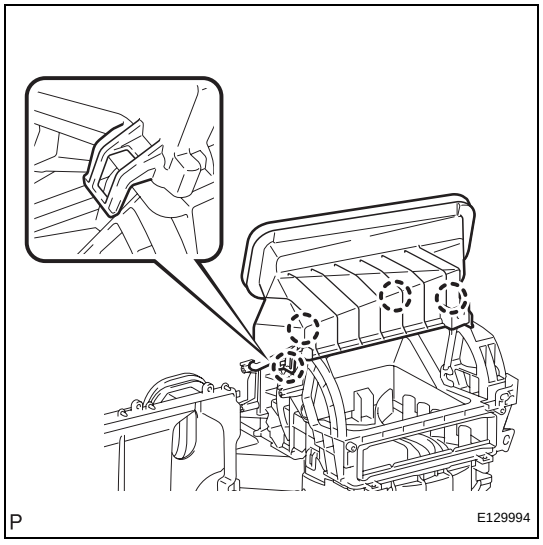
8. INSTALL CLEAN AIR FILTER (for TMMK Made)

(a) Install the clean air filter as shown in the illustration.



9. INSTALL AIR FILTER COVER PLATE (for TMMK Made)

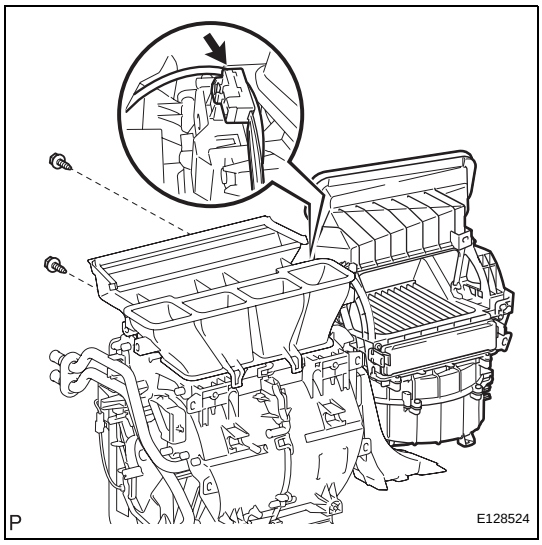
(a) Engage the 2 claws to install the air filter cover plate.



10. INSTALL AIR DUCT SUB-ASSEMBLY (for TMMK Made)

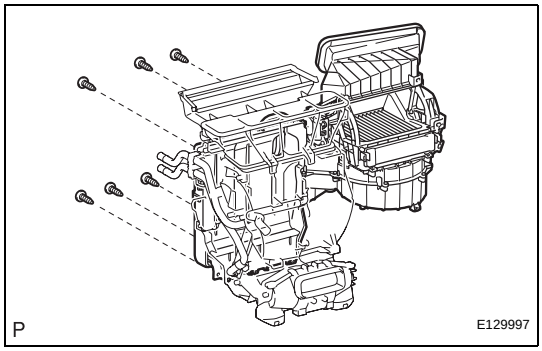
(a) Engage the 4 claws to install the air duct sub-assembly.

AC



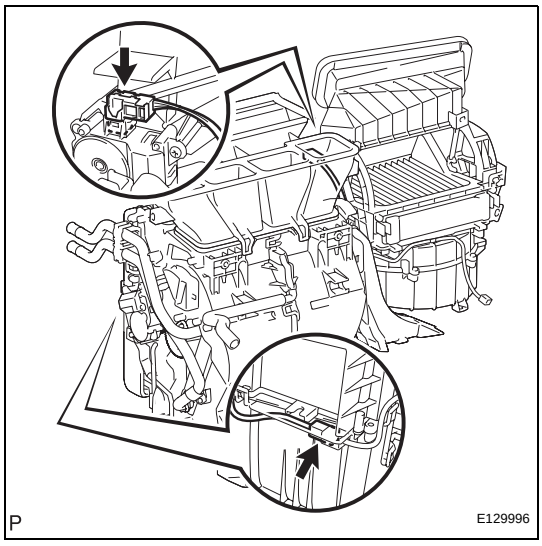
INSTALLATION

1. **INSTALL BLOWER ASSEMBLY (for TMC Made)**
   (a) Install the blower assembly with the 2 screws.
   (b) Connect the connector.
2. **INSTALL COOLER EXPANSION VALVE (for TMMK Made) (See page AC-172)**



3. **INSTALL BLOWER ASSEMBLY (for TMMK Made)**
   (a) Install the blower assembly with the 6 screws.

AC



   (b) Connect the connector.
4. **INSTALL INSTRUMENT PANEL REINFORCEMENT ASSEMBLY (See page AC-173)**
5. **INSTALL STEERING COLUMN ASSEMBLY (for TMC Made) (See page SR-47)**
6. **INSTALL STEERING POST ASSEMBLY (for TMMK Made) (See page SR-49)**
7. **INSTALL NO. 1 AIR DUCT (See page SR-50)**
8. **INSTALL REAR NO. 1 AIR DUCT (See page AC-176)**
9. **INSTALL REAR NO. 2 AIR DUCT (See page AC-177)**
10. **INSTALL FLOOR CARPET BRACKET RH**
11. **INSTALL FLOOR CARPET BRACKET LH**
12. **INSTALL NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-177)**
13. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-44)**
14. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-45)**
15. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-48)**

16. INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)
17. INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-48)
18. INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-48)
19. INSTALL FRONT PILLAR GARNISH LH (See page IR-51)
20. INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-48)
21. INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-49)
22. INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-49)
23. INSTALL FRONT PILLAR GARNISH RH (See page IR-52)
24. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)
25. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)
26. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)
27. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)
28. INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)
29. INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)
30. INSTALL CONSOLE BOX CARPET (See page IP-51)
31. INSTALL CONSOLE BOX POCKET (See page IP-51)
32. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-147)
33. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-196)
34. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)
35. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)
36. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)
37. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)

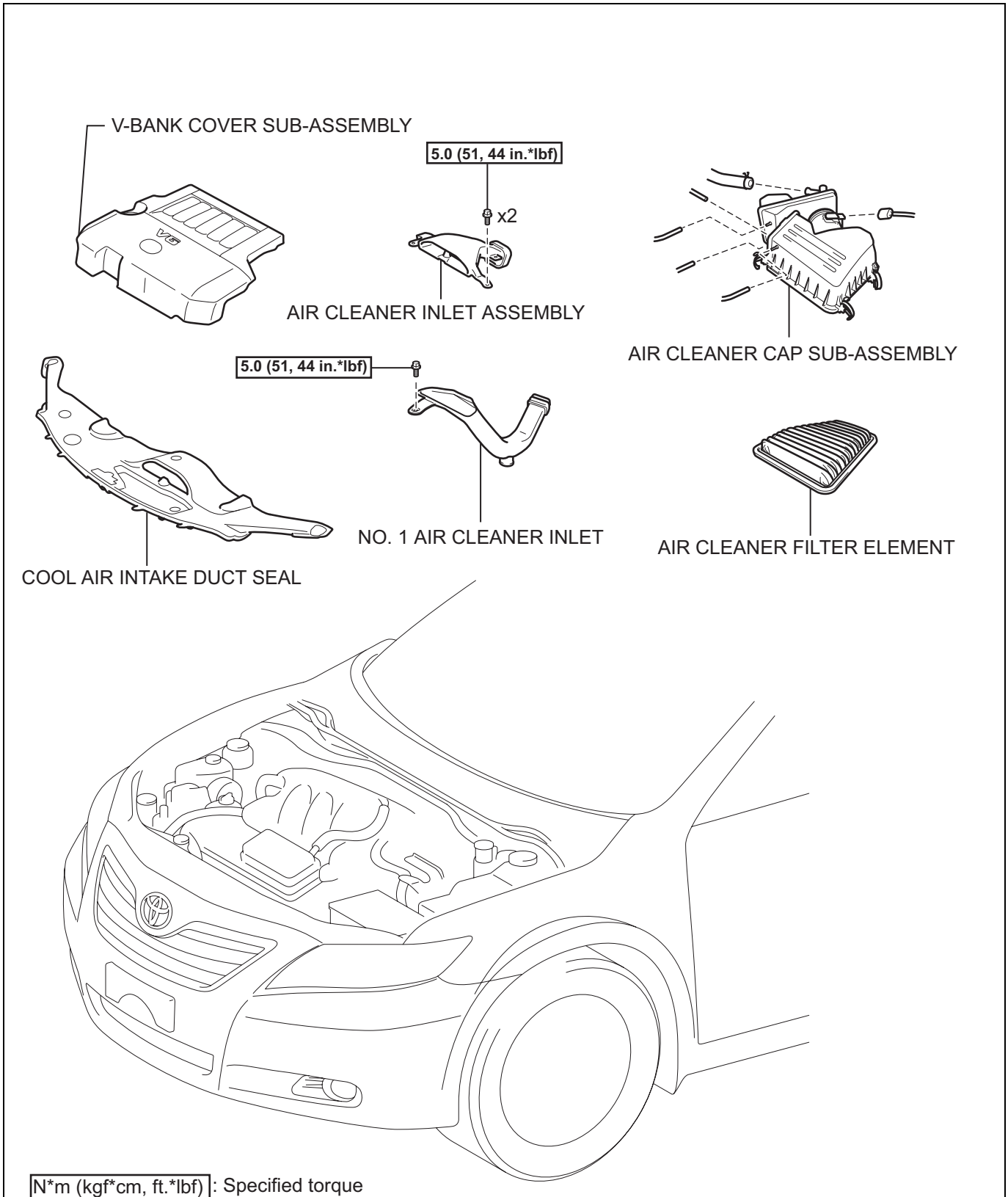
38. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
39. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
40. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
41. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
42. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
43. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
44. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**
45. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
46. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
47. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
48. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
49. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
50. **INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)**
51. **INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)**
52. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)**
53. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
54. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
55. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
56. **INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-50)**
57. **ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)**
58. **INSTALL STEERING COLUMN COVER (for TMC Made) (See page IP-58)**
59. **INSTALL STEERING COLUMN COVER (for TMMK Made) (See page IP-58)**

60. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)
61. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)
62. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
63. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
64. INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)
65. INSTALL STEERING PAD (See page RS-352)
66. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)
67. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)
68. INSTALL HEATER INLET WATER HOSE (See page AC-180)
69. INSTALL HEATER OUTLET WATER HOSE (See page AC-180)
70. INSTALL AIR CONDITIONER TUBE AND ACCESSORY (See page AC-180)
71. INSTALL SUCTION HOSE SUB-ASSEMBLY (See page AC-180)
72. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-14)
73. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)
74. INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)
75. INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)
76. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)
77. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)
78. CONNECT NEGATIVE BATTERY TERMINAL
79. INSPECT STEERING PAD (See page RS-352)
80. INSPECT SRS WARNING LIGHT (See page AC-180)
81. ADD ENGINE COOLANT (for 2AZ-FE) (See page CO-5)
82. ADD ENGINE COOLANT (for 2GR-FE) (See page CO-6)
83. CHECK FOR ENGINE COOLANT LEAKS

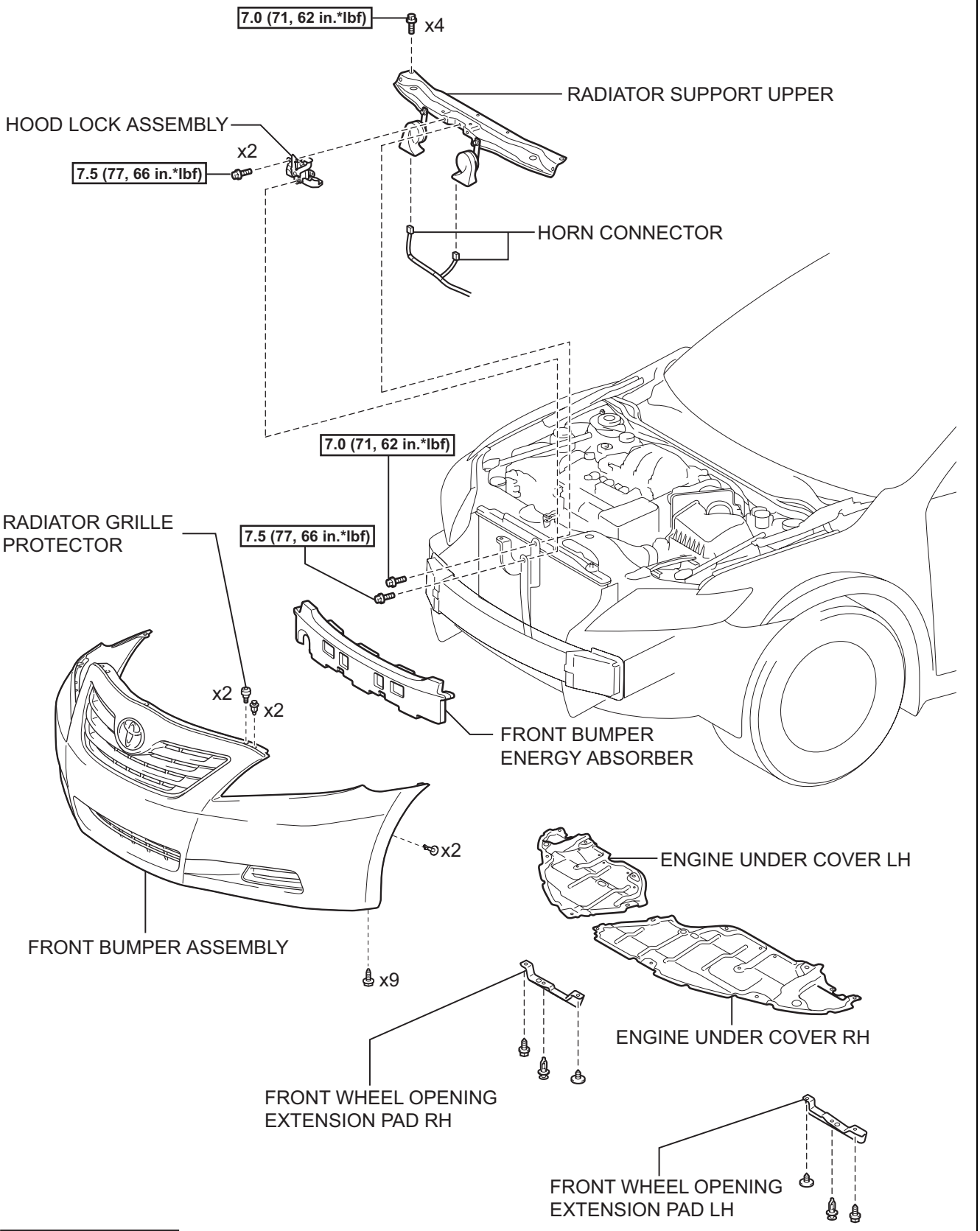
84. **CHARGE WITH REFRIGERANT (See page AC-125)**
85. **WARM UP ENGINE (See page AC-126)**
86. **CHECK FOR REFRIGERANT LEAKS (See page AC-126)**

COMPRESSOR AND MAGNETIC CLUTCH (for 2GR-FE)

COMPONENTS



AC

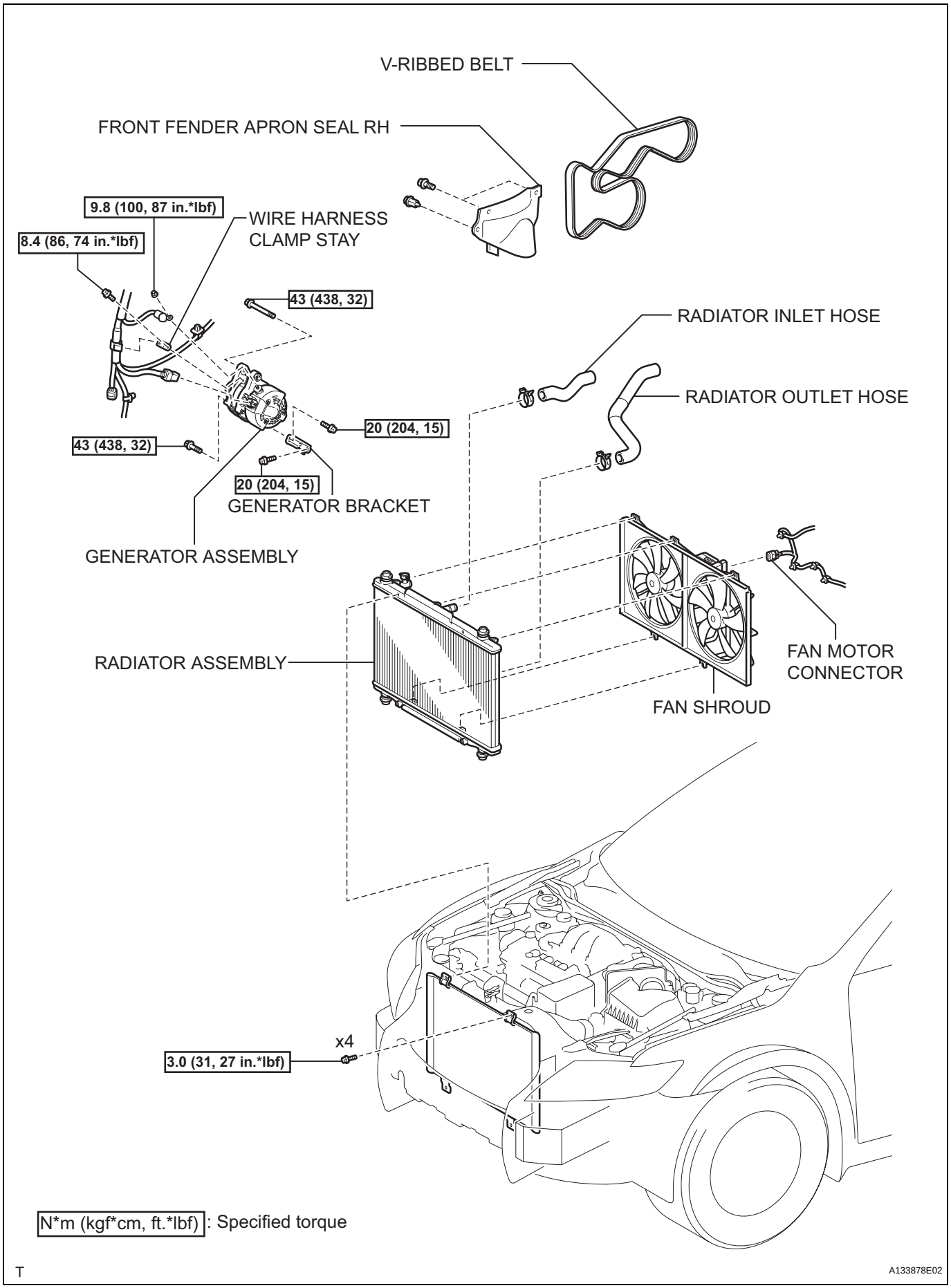


AC

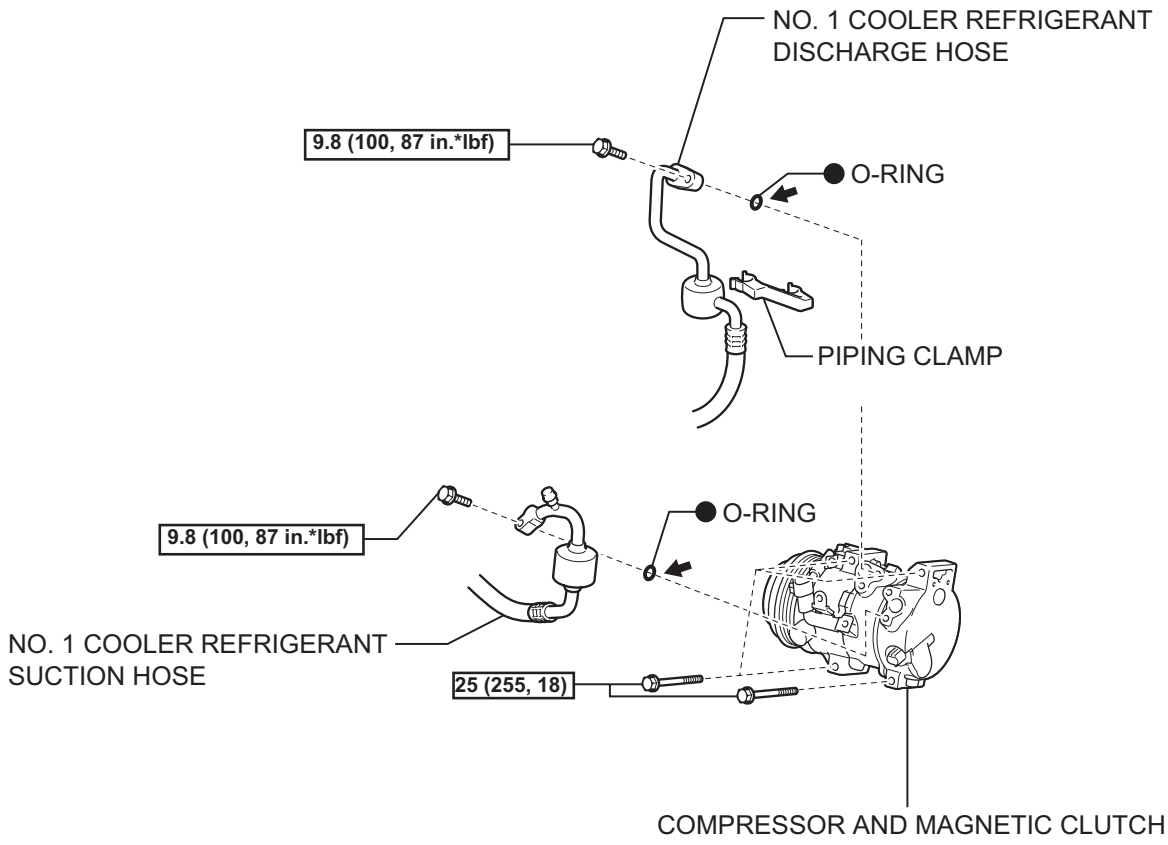
N*m (kgf*cm, ft.*lbf) : Specified torque

T

A133359E06


V-RIBBED BELT
FRONT FENDER APRON SEAL RH
9.8 (100, 87 in.*lbf)
WIRE HARNESS CLAMP STAY
8.4 (86, 74 in.*lbf)
43 (438, 32)
RADIATOR INLET HOSE
RADIATOR OUTLET HOSE
20 (204, 15)
43 (438, 32)
20 (204, 15)
GENERATOR BRACKET
GENERATOR ASSEMBLY
RADIATOR ASSEMBLY
FAN MOTOR CONNECTOR
FAN SHROUD
x4
3.0 (31, 27 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque
T
A133878E02

AC



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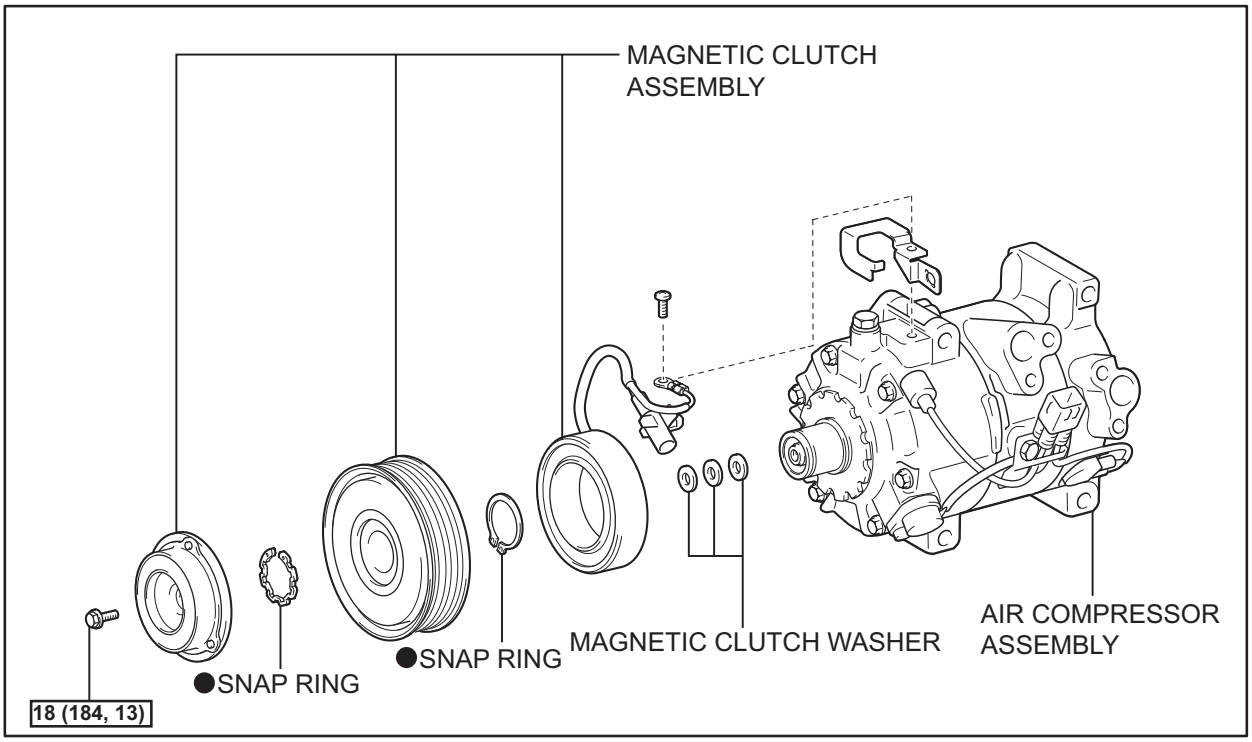


◄ Compressor oil ND-OIL 8 or equivalent

● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

P

E128508E01

REMOVAL

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-125)
2. DISCONNECT BATTERY NEGATIVE TERMINAL
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1)
3. REMOVE FRONT WHEEL RH
4. REMOVE FRONT FENDER APRON SEAL RH
5. REMOVE FRONT WHEEL OPENING EXTENSION PAD RH
6. REMOVE FRONT WHEEL OPENING EXTENSION PAD LH
7. REMOVE ENGINE UNDER COVER RH
8. REMOVE ENGINE UNDER COVER LH
9. DRAIN ENGINE COOLANT (See page CO-5)
10. REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)
11. REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)
12. REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)
13. REMOVE AIR CLEANER CAP SUB-ASSEMBLY
14. REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)
15. REMOVE FRONT BUMPER COVER (w/o Fog Light) (See page ET-5)
16. REMOVE FRONT BUMPER COVER (w/ Fog Light) (See page ET-6)
17. REMOVE FRONT BUMPER ENERGY ABSORBER (See page ET-9)
18. SEPARATE RADIATOR RESERVE TANK HOSE (See page CO-24)
19. SEPARATE RADIATOR INLET HOSE (See page CO-24)
20. SEPARATE RADIATOR OUTLET HOSE (See page CO-24)
21. REMOVE NO. 1 OIL COOLER INLET HOSE (for Automatic Transaxle) (See page CO-25)
22. REMOVE NO. 1 OIL COOLER OUTLET HOSE (for Automatic Transaxle) (See page CO-25)
23. REMOVE RADIATOR SUPPORT UPPER (See page CO-25)

24. REMOVE FAN SHROUD (See page CO-26)

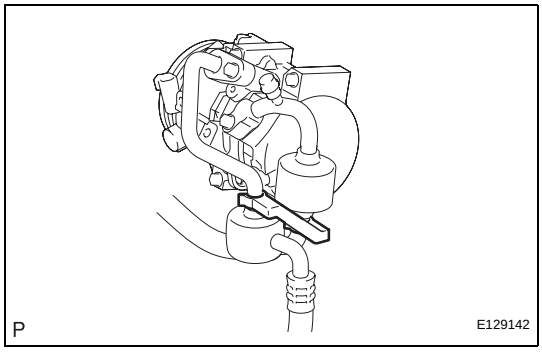
25. REMOVE RADIATOR ASSEMBLY (See page CO-26)

26. REMOVE V-RIBBED BELT (See page EM-6)

27. REMOVE GENERATOR ASSEMBLY (See page CH-14)

28. REMOVE PIPING CLAMP

(a) Remove the piping clamp from the No. 1 cooler refrigerant discharge hose and No. 1 cooler refrigerant suction hose.

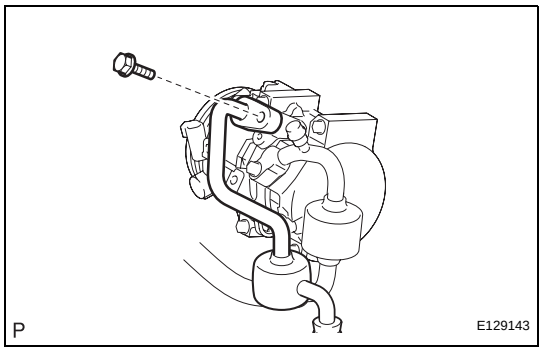


29. DISCONNECT NO. 1 COOLER REFRIGERANT DISCHARGE HOSE

(a) Remove the bolt and disconnect the No. 1 cooler refrigerant discharge hose from the compressor.

(b) Remove the O-ring from the discharge hose sub-assembly.

NOTICE:
Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

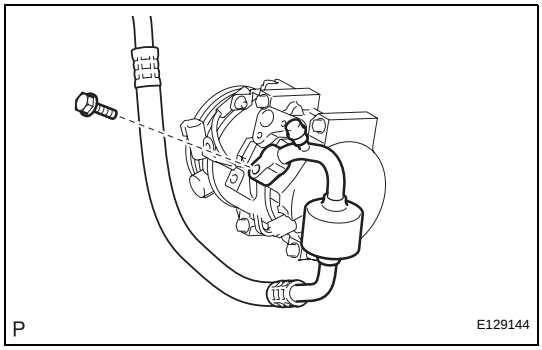


30. DISCONNECT NO. 1 COOLER REFRIGERANT SUCTION HOSE

(a) Remove the bolt and disconnect the No. 1 cooler refrigerant suction hose from the compressor.

(b) Remove the O-ring from the cooler refrigerant suction hose.

NOTICE:
Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

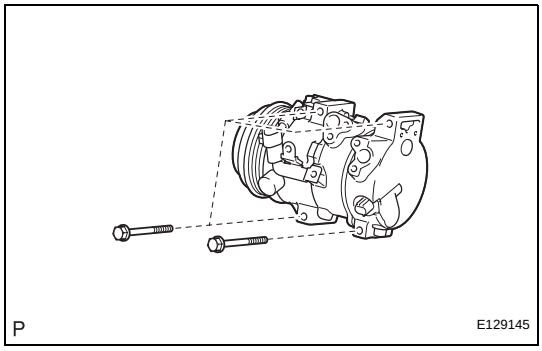


31. REMOVE COMPRESSOR AND MAGNETIC CLUTCH

(a) Disconnect the magnetic clutch connector.

(b) Remove the 4 bolts.

(c) Remove the compressor and magnetic clutch.



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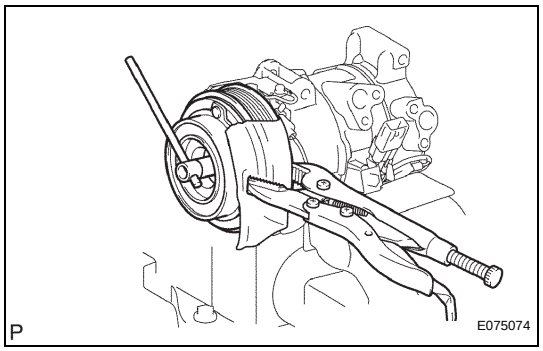


DISASSEMBLY

1. REMOVE MAGNETIC CLUTCH ASSEMBLY

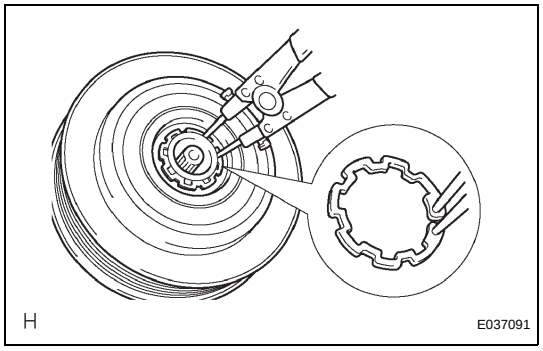
(a) Place the compressor and magnetic clutch in a vise.

(b) Using locking pliers, hold the magnetic clutch hub.

(c) Remove the bolt, magnetic clutch hub, and magnetic clutch washers.

HINT:

There is no set number of magnetic clutch washers because they are used for adjustment.



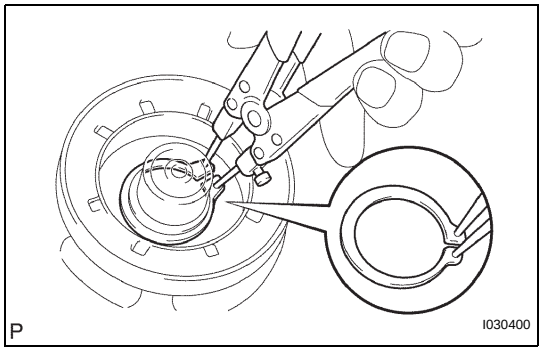
(d) Using a snap ring expander, remove the snap ring and then remove the magnetic clutch rotor.

NOTICE:

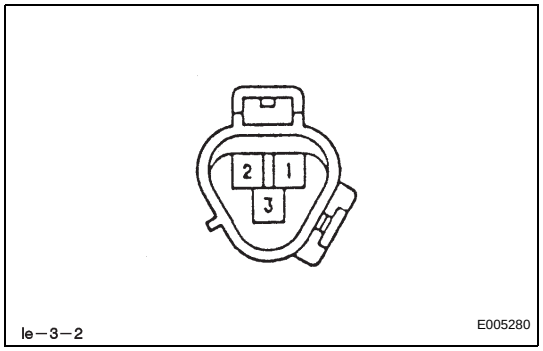
Take care not to damage the seal cover of the bearing when removing the snap ring.

(e) Disconnect the connector.

(f) Remove the screw.



(g) Using a snap ring expander, remove the snap ring and magnetic clutch stator.



INSPECTION

1. INSPECT COMPRESSOR AND MAGNETIC CLUTCH (A/C LOCK SENSOR)

(a) Measure the resistance according to the value(s) in the table below.

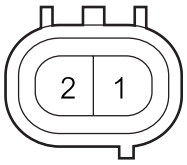
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Always (at 20°C (68°F))	165 to 205 Ω

If the resistance is not as specified, replace the compressor and magnetic clutch.

AC

Compressor and Magnetic Clutch Connector Front View:



H E116970E04

2. INSPECT COMPRESSOR AND MAGNETIC CLUTCH (A/C COMPRESSOR SOLENOID)

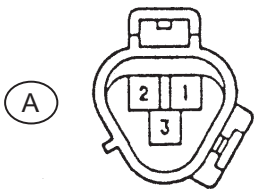
(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
2 - 1	20°C (68°F)	10 to 11 Ω

If the resistance is not as specified, replace the compressor and magnetic clutch.

A/C Compressor Connector Front View:



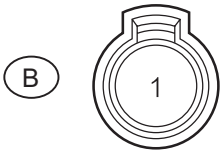
Ie–3–2 E005280E18

3. INSPECT COMPRESSOR AND MAGNETIC CLUTCH

(a) Disconnect the connector from the compressor and magnetic clutch.

AC

Magnetic Clutch Connector Front View:



H E124482E03

(b) Disconnect the connector from the magnetic clutch.

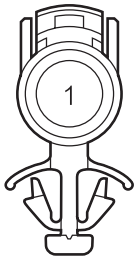
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A-3 - B-1	Always	Below 1 Ω
A-3 - Body ground	Always	10 kΩ or higher

If the resistance is not as specified, replace the compressor and magnetic clutch.

Magnetic Clutch Connector Front View:



H E113611E02

4. INSPECT MAGNETIC CLUTCH

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Body ground	Always	3.4 to 3.8 Ω

If the resistance is not as specified, replace the magnetic clutch.

(b) When connector terminal 1 is connected to the positive (+) battery terminal, check that the following occurs: 1) the magnetic clutch's operating sound can be heard, and 2) the magnetic clutch's hub and rotor lock.

OK:

1):

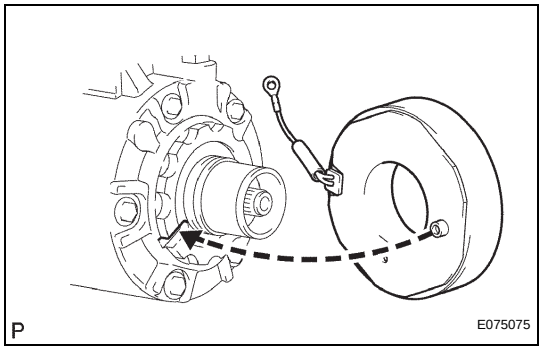
The magnetic clutch's operating sound can be heard.

2):

The magnetic clutch's hub and rotor lock.

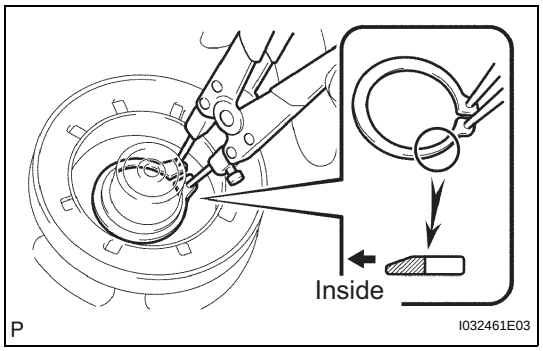
If the result is not as specified, replace the magnetic clutch.

REASSEMBLY



1. INSTALL MAGNETIC CLUTCH ASSEMBLY

(a) Install the magnetic clutch stator while aligning the protrusion on the stator with the notch on the air compressor assembly as shown in the illustration.

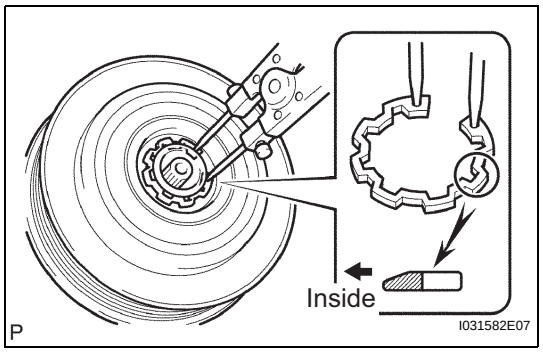


(b) Using a snap ring expander, install a new snap ring with the chamfered side facing up.

NOTICE:

Take care not to damage the seal cover of the bearing when installing the snap ring.

(c) Connect the connector.



(d) Using a snap ring expander, install the magnetic clutch rotor and a new snap ring with the chamfered side facing up.

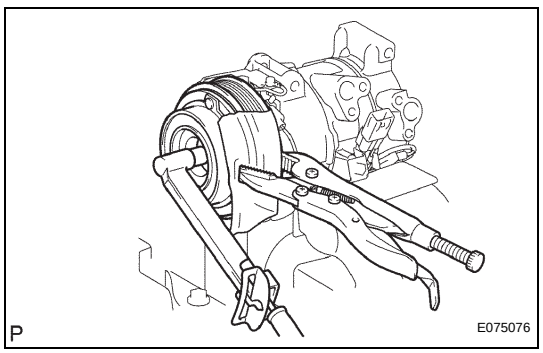
NOTICE:

- **Do not expand the snap ring by more than 35.5 mm (1.39 in.) when installing it.**
- **Do not damage the seal cover of the bearing when installing the snap ring.**

(e) Install the magnetic clutch washer and magnetic clutch hub.

NOTICE:

Do not change the combination of the magnetic clutch washers used before disassembly.



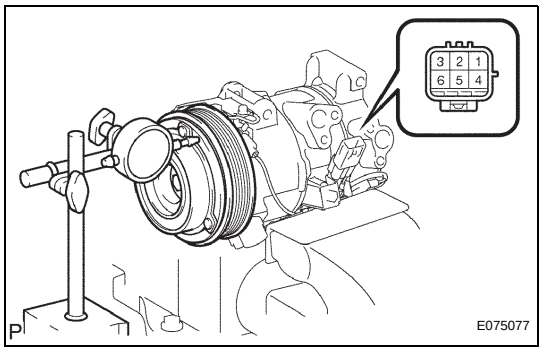
(f) Using vise pliers, hold the magnetic clutch hub and install the bolt.

Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

NOTICE:

Make sure that there is no foreign matter or oil on the compressor shaft, bolt, and clutch hub.

AC



2. INSPECT MAGNETIC CLUTCH CLEARANCE

(a) Set the dial indicator to the magnetic clutch hub.

(b) Connect the battery positive lead to terminal 1 of the magnetic clutch connector, and the negative lead to the ground wire. Turn the magnetic clutch on and off and measure the clearance.

Standard clearance:

0.26 to 0.60 mm (0.010 to 0.024 in.)

If the measured value is not within the standard range, remove the magnetic clutch hub and adjust it with magnetic clutch washers.

NOTICE:

Adjustment should be performed with 3 or less magnetic clutch washers.

(c) Remove the compressor and magnetic clutch from the vise.

3. ADJUST COMPRESSOR OIL LEVEL

(a) When replacing the compressor and magnetic clutch with a new one, gradually discharge the inert gas (helium) from the service valve, and drain the following amount of oil from the new compressor and magnetic clutch before installation.

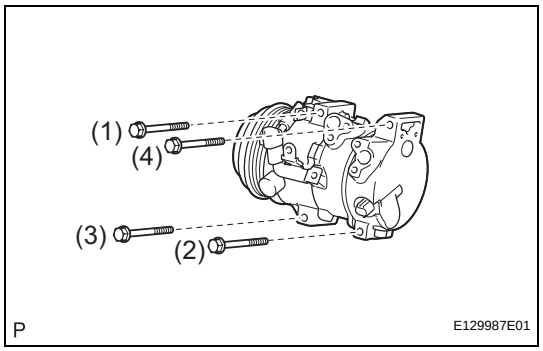
Standard:

(Oil capacity inside the new compressor and magnetic clutch: 130 + 15 cc (4.6 + 0.51 fl.oz.)) - (Remaining oil amount in the removed compressor and magnetic clutch) = (Oil amount to be removed from the new compressor when replacing)

NOTICE:

- **When checking the compressor oil level, observe the precautions on the cooler removal/installation.**
- **If a new compressor and magnetic clutch is installed without removing some oil, due to the oil remaining in the pipes of the vehicle, the oil amount will be too large. This prevents heat exchange in the refrigerant cycle and causes refrigerant failure.**
- **If the volume of oil remaining in the removed compressor and magnetic clutch is too small, check for oil leakage.**
- **Be sure to use ND-OIL 8 or equivalent for compressor oil.**

AC



INSTALLATION

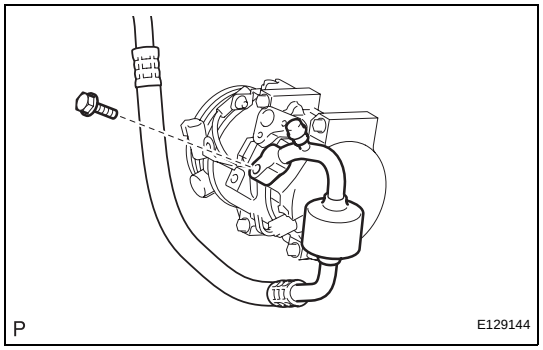
1. INSTALL COMPRESSOR AND MAGNETIC CLUTCH

(a) Install the compressor and magnetic clutch with the 4 bolts.

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTICE:

Tighten the bolts in the order shown in the illustration to install the compressor and magnetic clutch.



2. INSTALL NO. 1 COOLER REFRIGERANT SUCTION HOSE

(a) Remove the attached vinyl tape from the hose.

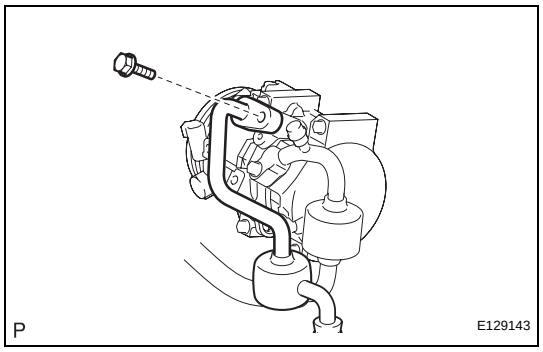
(b) Apply sufficient compressor oil to a new O-ring and the fitting surface of the compressor and magnetic clutch.

Compressor oil:
ND-OIL 8 or equivalent

(c) Install the O-ring onto the No. 1 cooler refrigerant suction hose.

(d) Install the No. 1 cooler refrigerant suction hose onto the compressor and magnetic clutch with the bolt.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



3. INSTALL NO. 1 COOLER REFRIGERANT DISCHARGE HOSE

(a) Remove the attached vinyl tape from the hose.

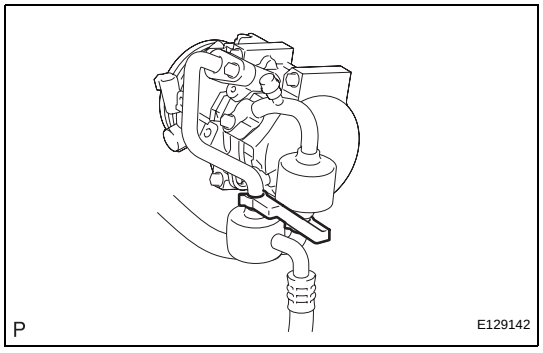
(b) Apply sufficient compressor oil to a new O-ring and the fitting surface of the compressor and magnetic clutch.

Compressor oil:
ND-OIL 8 or equivalent

(c) Install the O-ring onto the No. 1 cooler refrigerant discharge hose sub-assembly.

(d) Install the No. 1 cooler refrigerant discharge hose onto the compressor and magnetic clutch with the bolt.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



4. INSTALL PIPING CLAMP

(a) Install the piping clamp to the No. 1 cooler refrigerant suction hose and No. 1 cooler refrigerant discharge hose.

5. INSTALL GENERATOR ASSEMBLY (See page CH-22)

6. INSTALL V-RIBBED BELT (See page EM-7)

7. INSTALL RADIATOR ASSEMBLY (See page CO-31)

8. INSTALL FAN SHROUD (See page CO-32)

9. INSTALL RADIATOR SUPPORT UPPER (See page CO-32)

10. INSTALL NO. 1 OIL COOLER OUTLET TUBE (for Automatic Transaxle) (See page CO-33)

AC

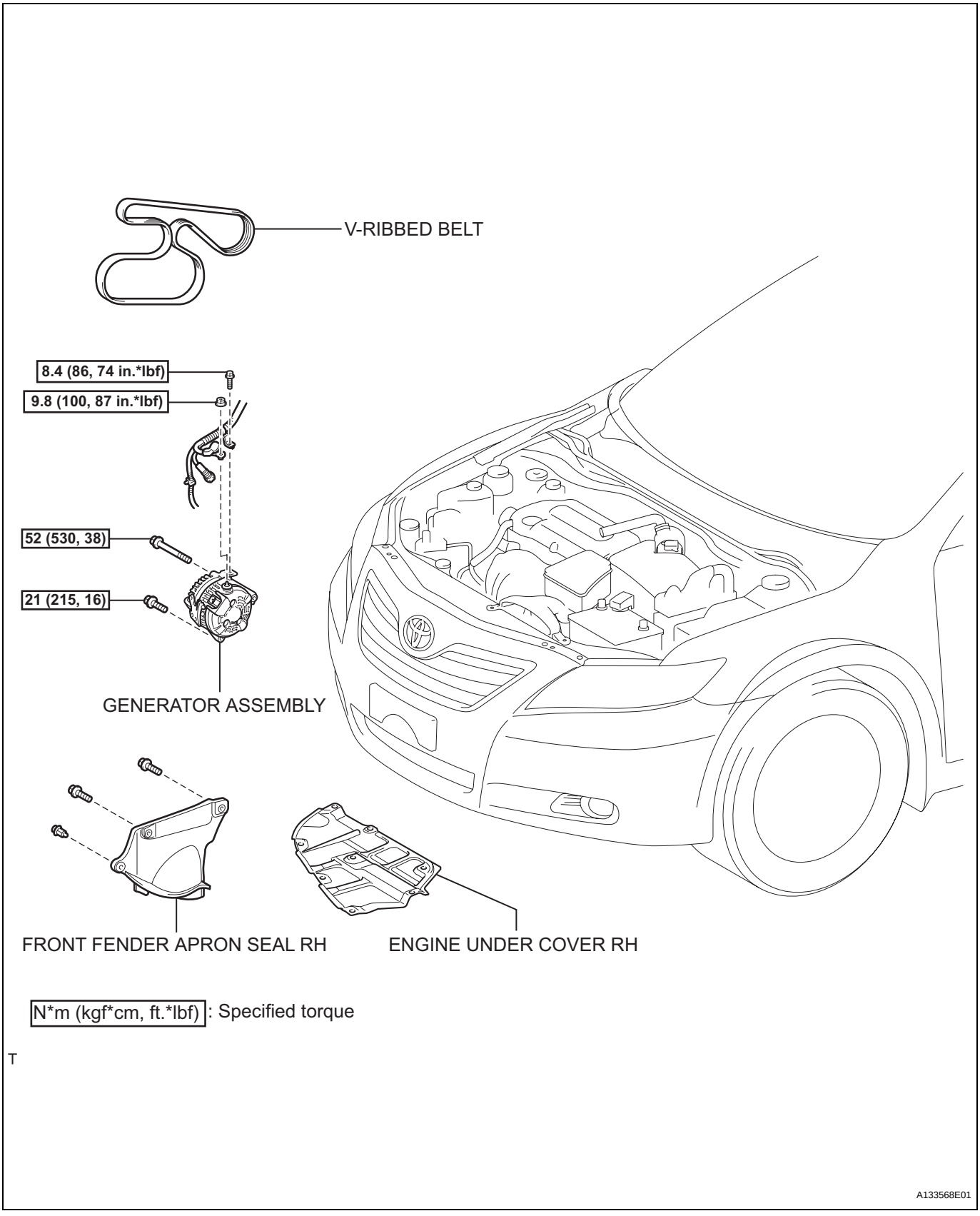
11. INSTALL NO. 1 OIL COOLER INLET TUBE (for Automatic Transaxle) (See page CO-33)
12. CONNECT RADIATOR OUTLET HOSE (See page CO-33)
13. CONNECT RADIATOR INLET HOSE (See page CO-33)
14. CONNECT RADIATOR RESERVE TANK HOSE (See page CO-34)
15. INSTALL FRONT BUMPER ENERGY ABSORBER (See page ET-10)
16. INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)
17. INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)
18. INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)
19. INSTALL AIR CLEANER CAP SUB-ASSEMBLY
20. INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)
21. CONNECT BATTERY NEGATIVE TERMINAL
22. ADD ENGINE COOLANT (See page CO-6)
23. CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)
24. CHARGE WITH REFRIGERANT (See page AC-125)
25. WARM UP ENGINE (See page AC-126)
26. CHECK FOR REFRIGERANT LEAKS (See page AC-126)
27. INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)
28. INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)
29. INSTALL ENGINE UNDER COVER RH
30. INSTALL ENGINE UNDER COVER LH
31. INSTALL FRONT WHEEL OPENING EXTENSION PAD RH
32. INSTALL FRONT WHEEL OPENING EXTENSION PAD LH
33. INSTALL FRONT FENDER APRON SEAL RH
34. INSTALL FRONT WHEEL RH
35. VEHICLE PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-79)
36. PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-80)

37. **INSPECT FOG LIGHT AIMING (w/ Fog Light) (See page LI-81)**

38. **ADJUST FOG LIGHT AIMING (w/ Fog Light) (See page LI-82)**

COMPRESSOR AND PULLEY (for 2AZ-FE)

COMPONENTS



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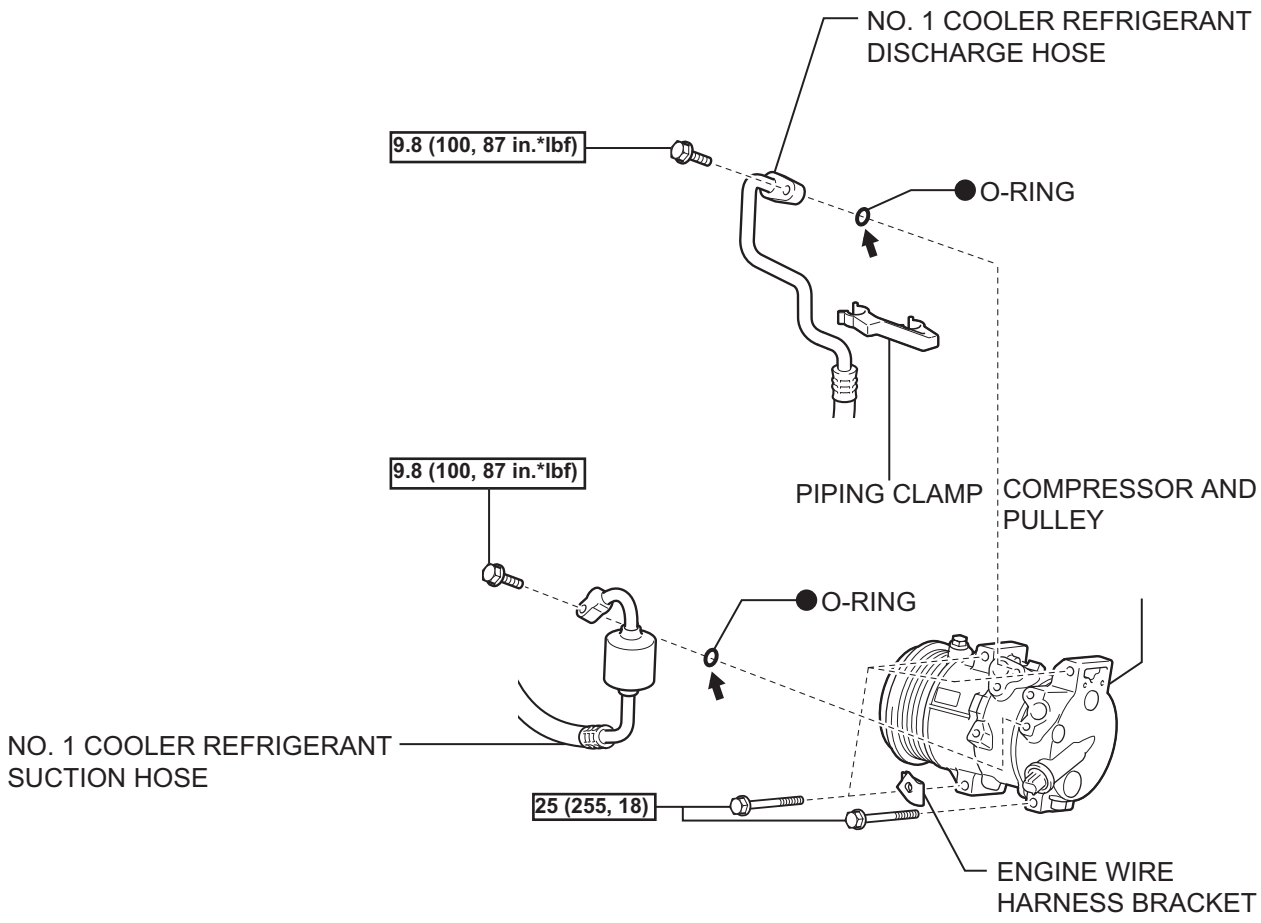

AC

← Compressor oil ND-OIL 8 or equivalent

● Non-reusable part

N*m (kgf*cm, ft.*lbf)

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E129149E01

ON-VEHICLE INSPECTION

1. INSPECT COMPRESSOR FOR METALLIC SOUND

(a) Check if there is abnormal metallic sound from the compressor when the A/C switch is on and the compressor operates.
If abnormal metallic sound is heard, replace the compressor and pulley.

2. INSPECT REFRIGERANT PRESSURE

HINT:
(See page AC-120)

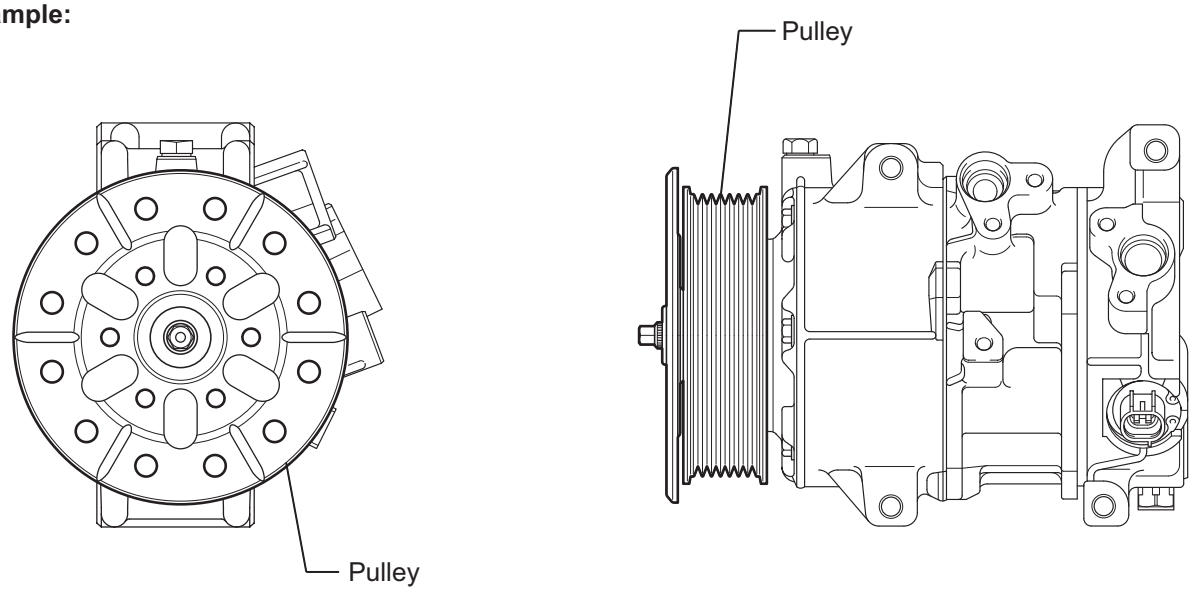
3. INSPECT FOR LEAKAGE OF REFRIGERANT

(a) Using a gas leak detector, check for leakage of refrigerant.
If there is any leakage, replace the compressor and pulley.

4. INSPECT COMPRESSOR AND PULLEY

(a) Check operation of compressor and pulley.
(1) Start the engine.
(2) Inspect the compressor pulley.

Example:



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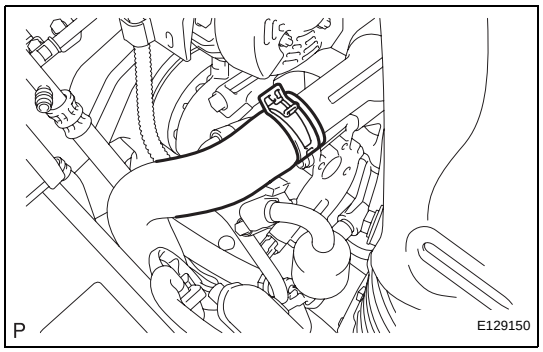
Standard:

The compressor shaft rotates along with the pulley.

If the result is not as specified, replace the compressor and pulley.

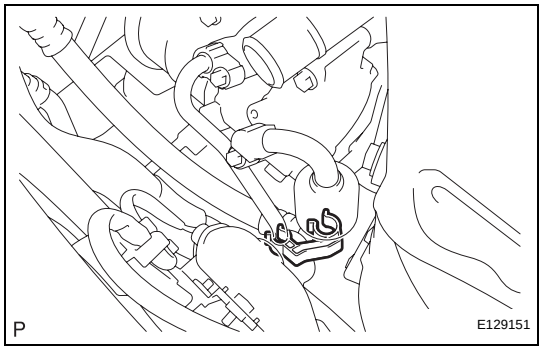
REMOVAL

1. **RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-125)**
2. **DISCONNECT REFRIGERANT FROM REFRIGERATION SYSTEM**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1)
3. **DRAIN ENGINE COOLANT (See page CO-5)**
4. **REMOVE FRONT WHEEL RH**
5. **REMOVE ENGINE UNDER COVER RH**
6. **REMOVE FRONT FENDER APRON SEAL RH**
7. **REMOVE V-RIBBED BELT (See page EM-6)**
8. **REMOVE GENERATOR ASSEMBLY (See page CH-11)**
9. **DISCONNECT RADIATOR HOSE OUTLET**
   (a) Using pliers, grip the claws of the clip and slide the clip to disconnect the radiator hose outlet.

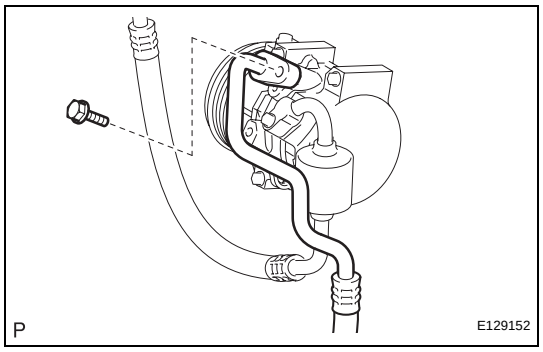


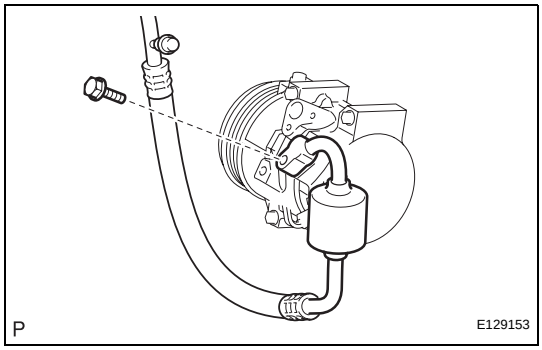
AC

10. **REMOVE PIPING CLAMP**
    (a) Remove the piping clamp from the No. 1 cooler refrigerant discharge hose and No. 1 cooler refrigerant suction hose.



11. **DISCONNECT NO. 1 COOLER REFRIGERANT DISCHARGE HOSE**
    (a) Remove the bolt and disconnect the No. 1 cooler refrigerant discharge hose from the compressor and pulley.
    (b) Remove the O-ring from the No. 1 cooler refrigerant discharge hose.
    NOTICE:
    Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.





12. DISCONNECT NO. 1 COOLER REFRIGERANT SUCTION HOSE

(a) Remove the bolt and disconnect the No. 1 cooler refrigerant suction hose from the compressor and pulley.

(b) Remove the O-ring from the No. 1 cooler refrigerant suction hose.

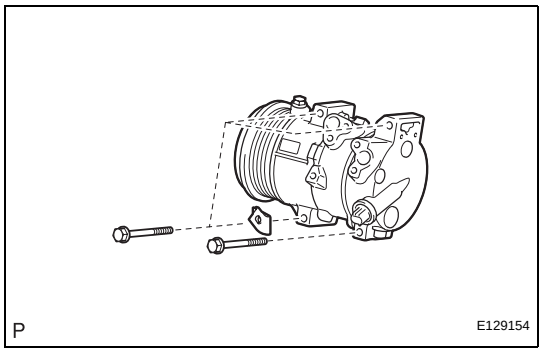
NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

13. REMOVE COMPRESSOR AND PULLEY

(a) Disconnect the connector.

(b) Remove the 4 bolts, engine wire harness bracket, and the compressor and pulley.



INSPECTION

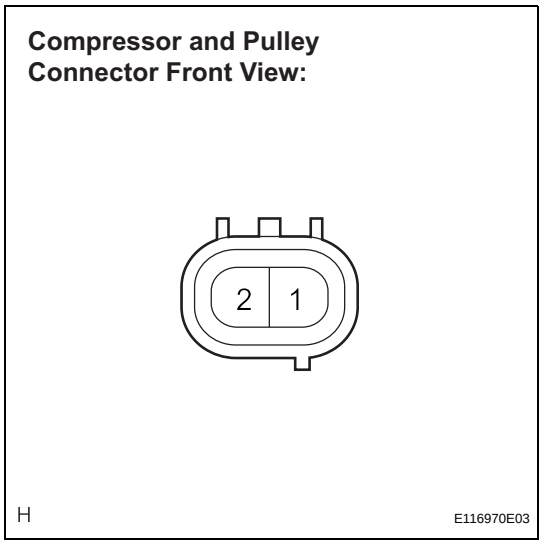
1. INSPECT COMPRESSOR AND PULLEY (A/C COMPRESSOR SOLENOID)

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
2 - 1	20°C (68°F)	10 to 11 Ω

If the resistance is not as specified, replace the compressor and pulley.



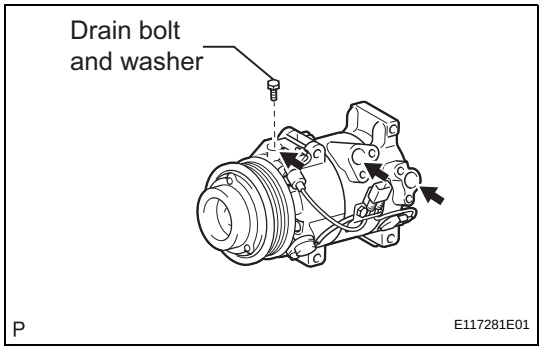
INSTALLATION

1. ADJUST COMPRESSOR OIL LEVEL

(a) When replacing the cooler compressor assembly with a new one, gradually discharge the inert gas (helium) from the service valve, and drain the following amount of oil from the vents indicated by the arrows in the illustration before installation.

HINT:

The drain bolt and washer can be reused.

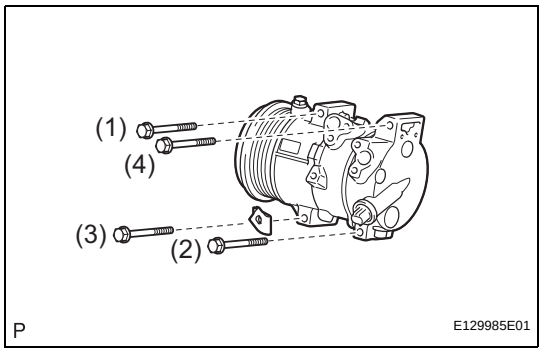


Standard:

AC (Oil capacity inside the new compressor and magnetic clutch: 160 + 15 cc (5.4 + 0.51 fl.oz.)) - (Remaining oil amount in the removed compressor and magnetic clutch) = (Oil amount to be removed from the new compressor when replacing)

NOTICE:

- **If a new compressor and magnetic clutch is installed without removing some oil, due to the oil remaining in the pipes of the vehicle, the oil amount will be too large. This prevents heat exchange in the refrigerant cycle and causes refrigeration system failure.**
- **If the volume of oil remaining in the removed compressor and magnetic clutch is too small, check for oil leakage.**
- **Be sure to use ND-OIL 8 or equivalent for compressor oil.**



2. INSTALL COMPRESSOR AND PULLEY

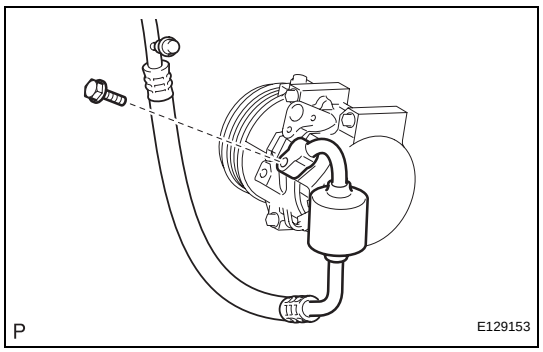
(a) Install the compressor and pulley and the engine wire harness bracket with the 4 bolts.

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTICE:

Tighten the bolts in the order shown in the illustration to install the compressor and pulley.

AC



3. INSTALL NO. 1 COOLER REFRIGERANT SUCTION HOSE

(a) Remove the attached vinyl tape from the hose.

(b) Apply sufficient compressor oil to a new O-ring and the fitting surface of the compressor and magnetic clutch.

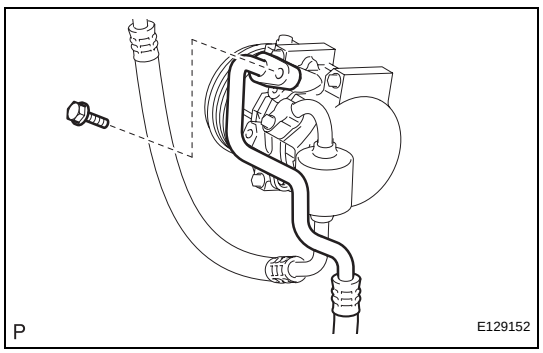
Compressor oil:

ND-OIL 8 or equivalent

(c) Install the O-ring onto the No. 1 cooler refrigerant suction hose.

(d) Install the No. 1 cooler refrigerant suction hose onto the compressor and magnetic clutch with the bolt.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



4. INSTALL NO. 1 COOLER REFRIGERANT DISCHARGE HOSE

(a) Remove the attached vinyl tape from the hose.

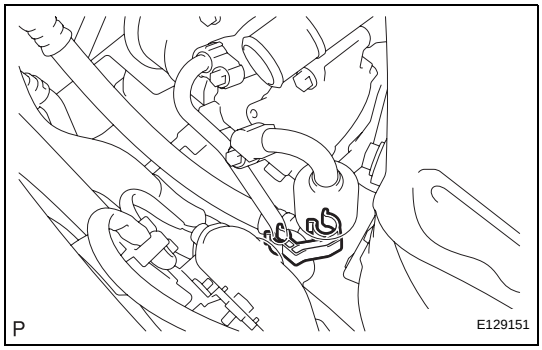
(b) Apply sufficient compressor oil to a new O-ring and the fitting surface of the compressor and magnetic clutch.

Compressor oil:

ND-OIL 8 or equivalent

(c) Install the O-ring onto the No. 1 cooler refrigerant discharge hose.

(d) Install the discharge hose sub-assembly onto the compressor and magnetic clutch with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



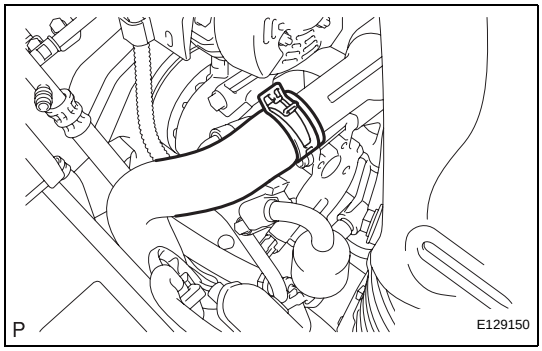
5. INSTALL PIPING CLAMP

(a) Install the piping clamp to the No. 1 cooler refrigerant suction hose and No. 1 cooler refrigerant discharge hose.

6. INSTALL GENERATOR ASSEMBLY (See page CH-19)

7. INSTALL V-RIBBED BELT (See page EM-6)

8. INSTALL FRONT FENDER APRON SEAL RH



9. INSTALL RADIATOR HOSE OUTLET

(a) Install the radiator hose outlet and attach the clip.

10. CONNECT BATTERY NEGATIVE TERMINAL

11. ADD ENGINE COOLANT (See page CO-5)

12. CHECK FOR ENGINE COOLANT LEAKS
NOTICE:
Do not turn the A/C on before charging with refrigerant. Doing so will cause the cooler compressor to work without refrigerant, resulting in overheating of the cooler compressor.

13. INSTALL ENGINE UNDER COVER RH

14. INSTALL FRONT WHEEL RH

15. CHARGE WITH REFRIGERANT (See page AC-125)

16. WARM UP ENGINE (See page AC-126)

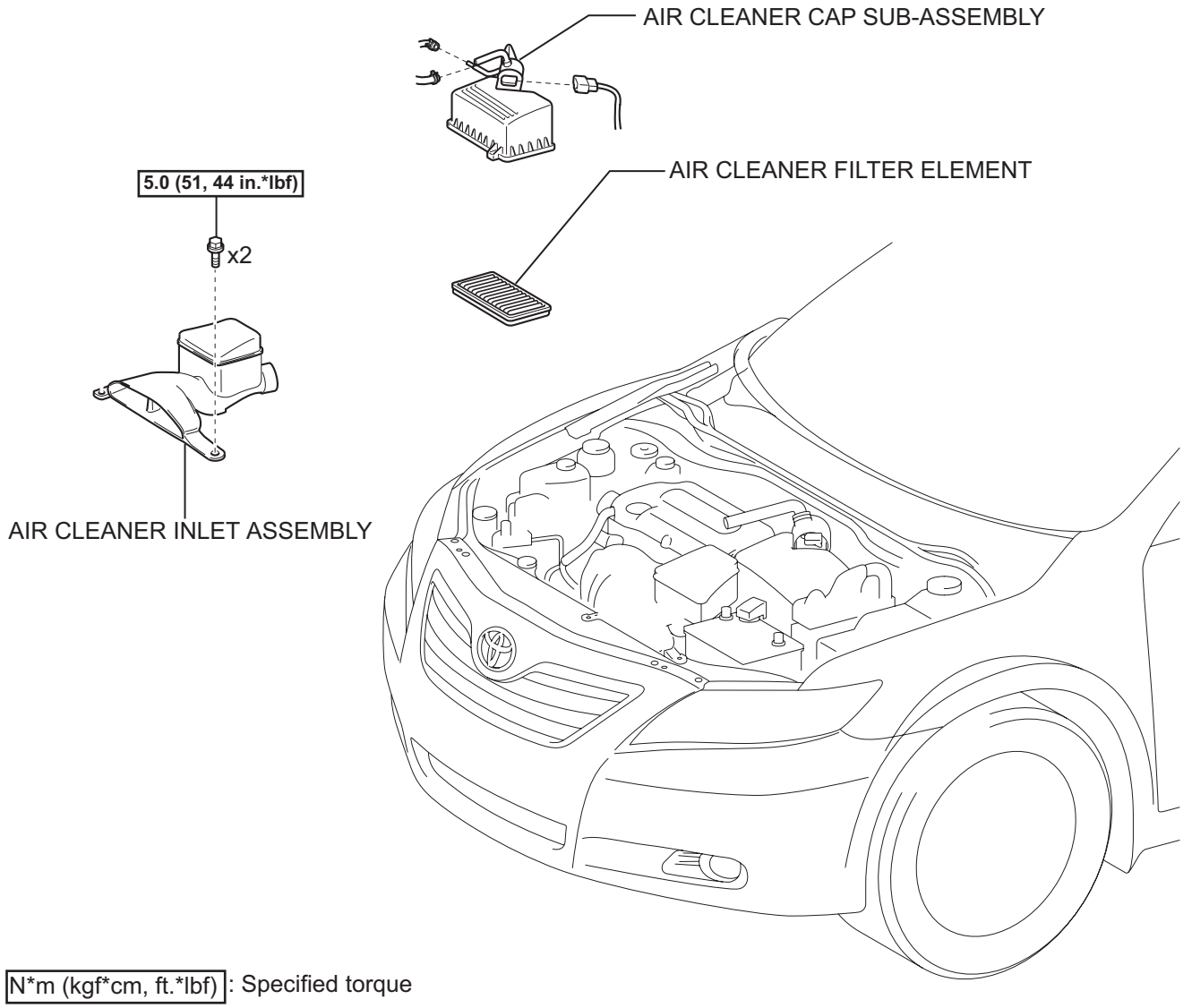
17. CHECK FOR REFRIGERANT LEAKS (See page AC-126)

AC

CONDENSER

COMPONENTS

2AD-FE:



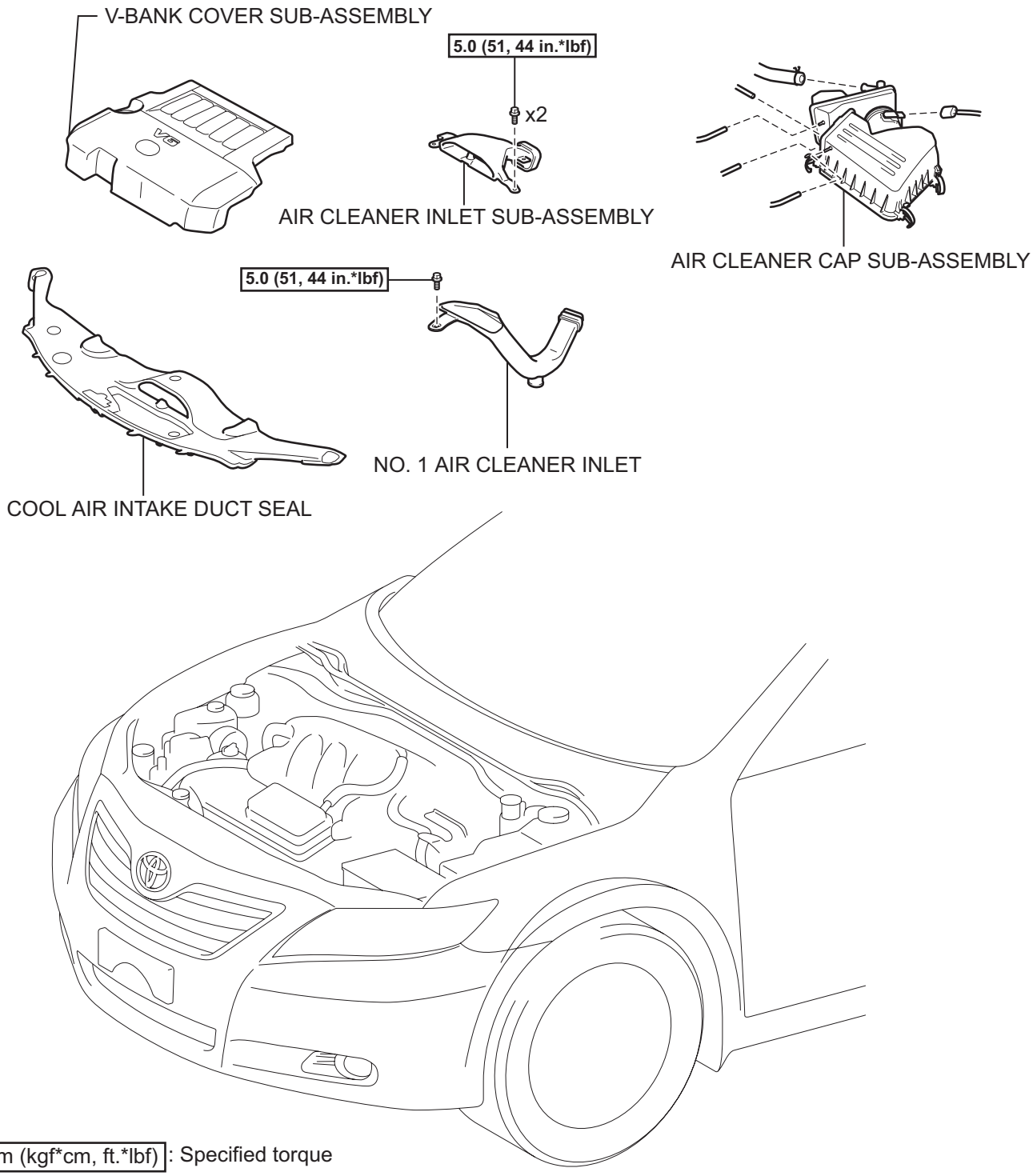
N*m (kgf*cm, ft.*lbf): Specified torque

P

E133914E01

AC

2GR-FE:

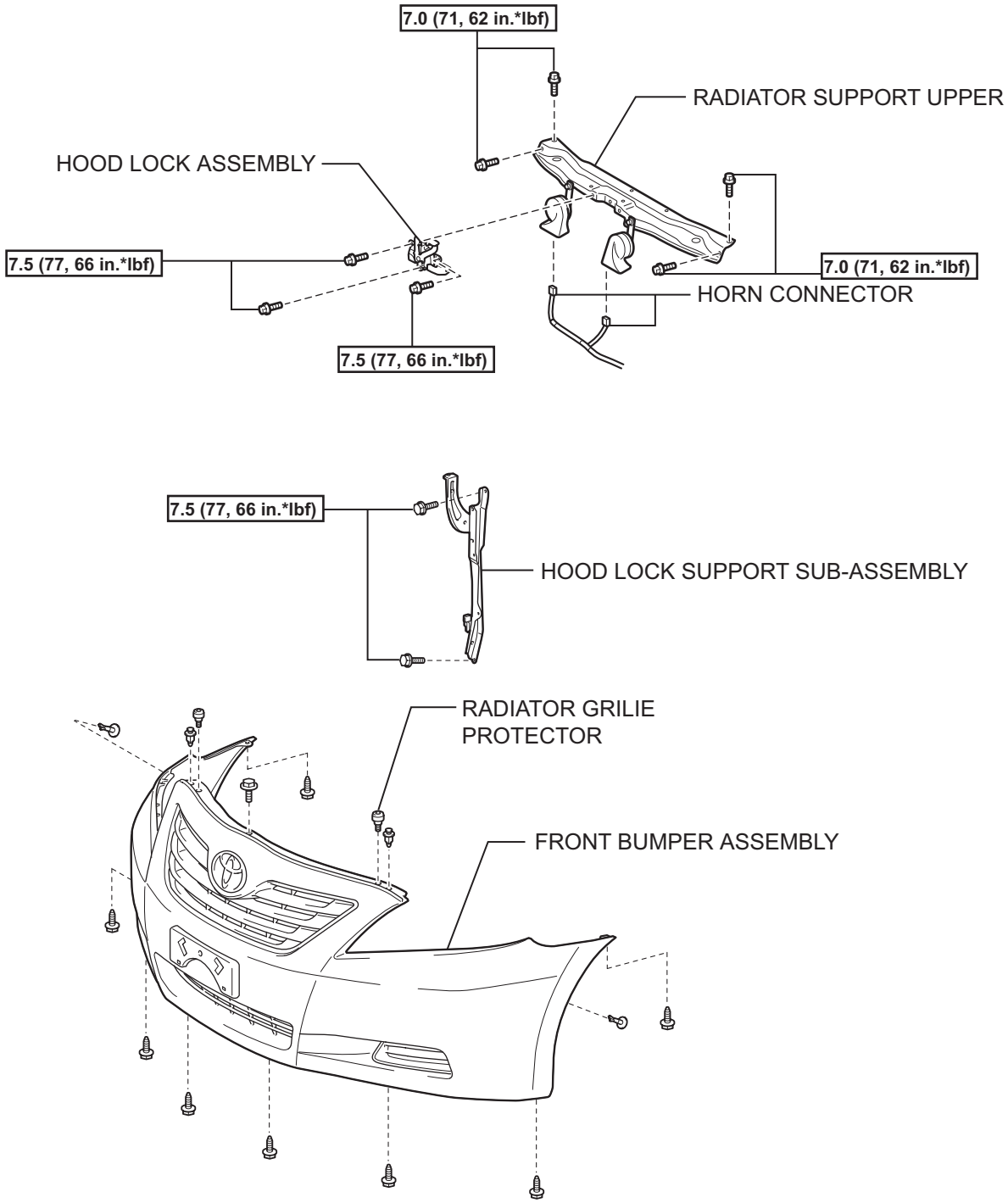


AC

N*m (kgf*cm, ft.*lbf): Specified torque

P

E133915E01

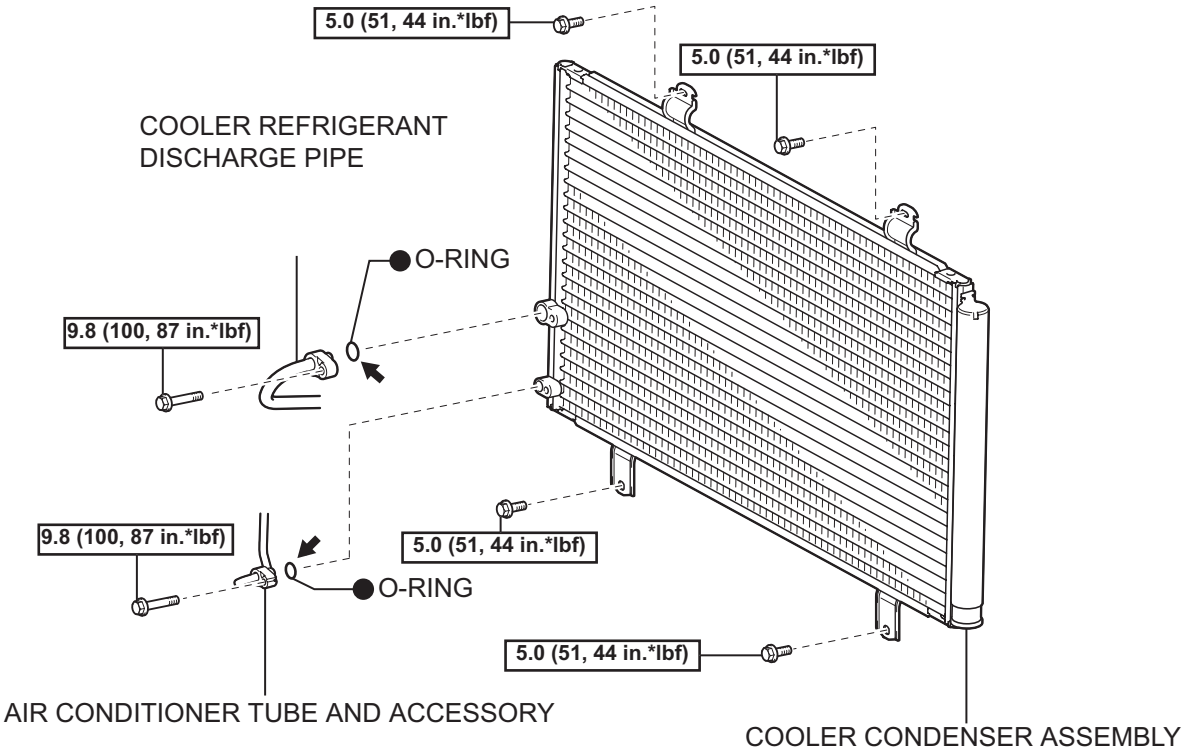


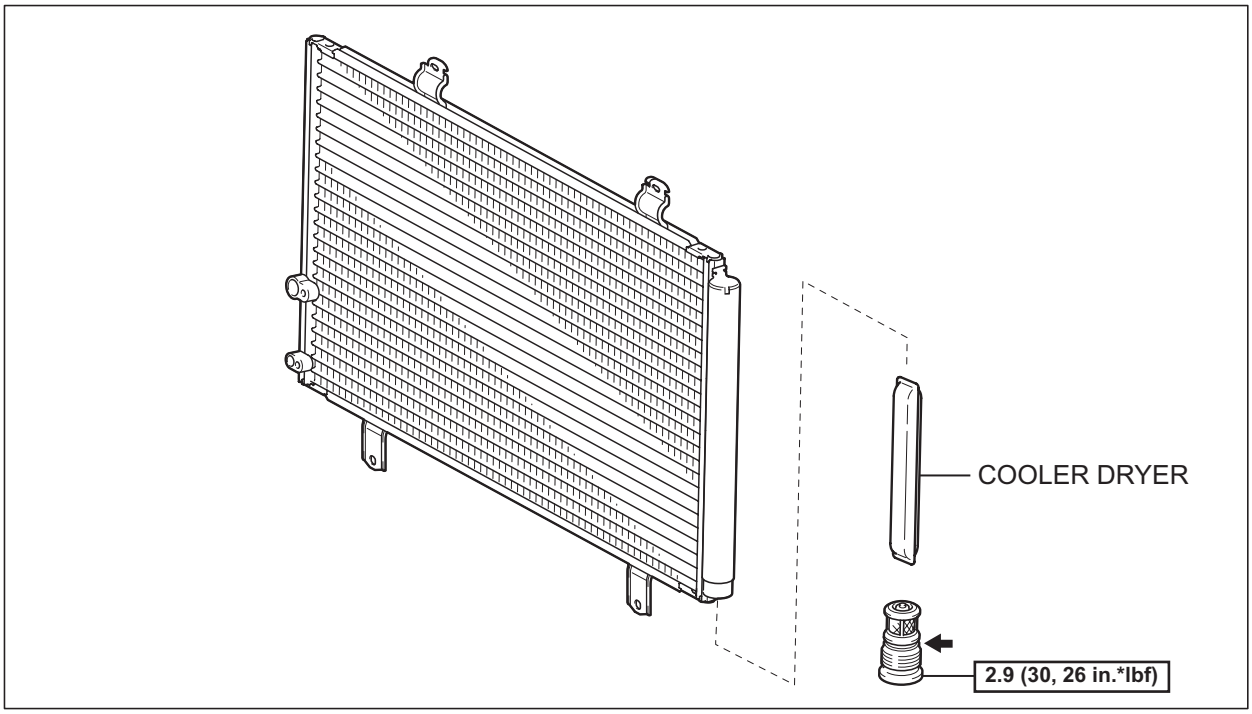
AC

N*m (kgf*cm, ft.*lbf) : Specified torque

P

E129982E01





AC

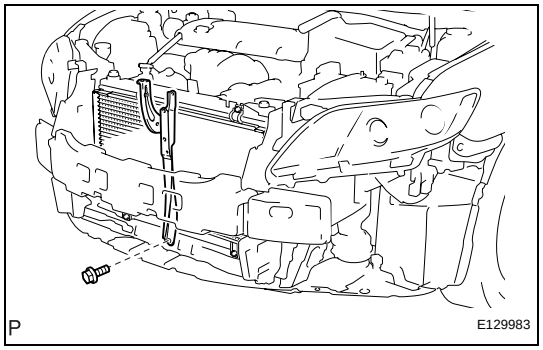
◀ Compressor oil ND-OIL 8 or equivalent N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

P

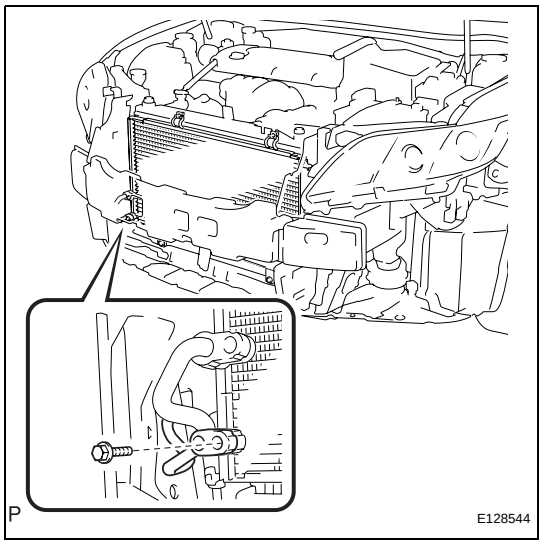
E128507E01

REMOVAL

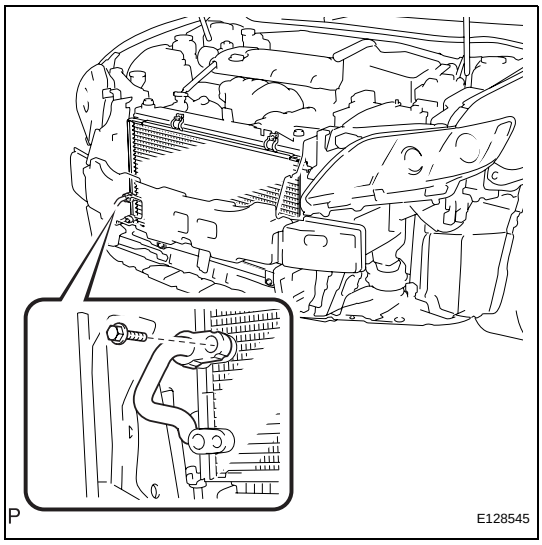
1. **RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM**
2. **REMOVE V-BANK COVER SUB-ASSEMBLY (for 2GR-FE) (See page EM-23)**
3. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page EM-23)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (for 2AZ-FE) (See page ES-416)**
5. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (for 2GR-FE) (See page ES-503)**
6. **REMOVE AIR CLEANER INLET ASSEMBLY (for 2AZ-FE) (See page EM-94)**
7. **REMOVE AIR CLEANER INLET SUB-ASSEMBLY (for 2GR-FE) (See page EM-24)**
8. **REMOVE NO. 1 AIR CLEANER INLET (for 2GR-FE) (See page EM-24)**
9. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**
10. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
11. **REMOVE RADIATOR SUPPORT UPPER**
12. **REMOVE HOOD LOCK SUPPORT SUB-ASSEMBLY**
    (a) Remove the bolt and hood lock support sub-assembly.



13. **DISCONNECT AIR CONDITIONER TUBE AND ACCESSORY**
    (a) Remove the bolt and disconnect the air conditioning tube assembly from the condenser.
    (b) Remove the O-ring from the air conditioning tube assembly.
    NOTICE:
    Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.



AC



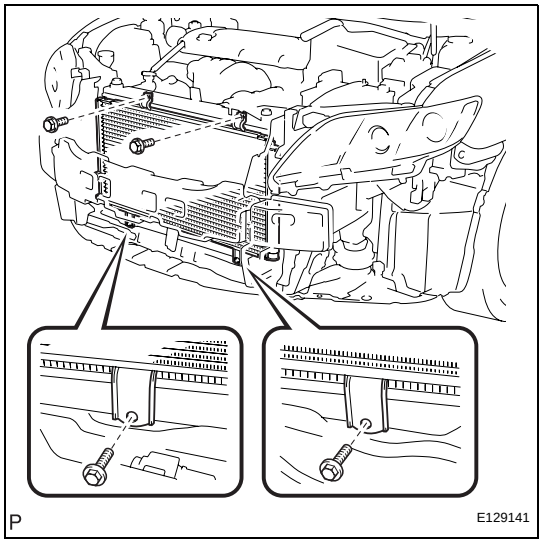
14. DISCONNECT COOLER REFRIGERANT DISCHARGE PIPE

(a) Remove the bolt and disconnect the cooler refrigerant discharge pipe from the condenser.

(b) Remove the O-ring from the cooler refrigerant discharge pipe.

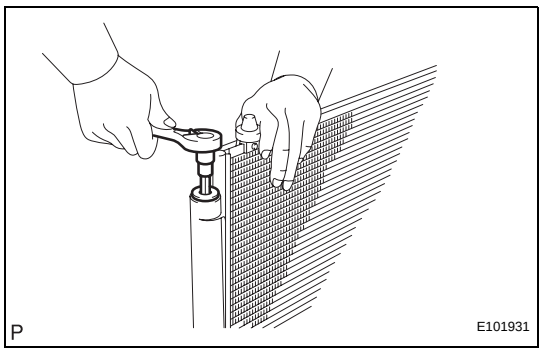
NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.



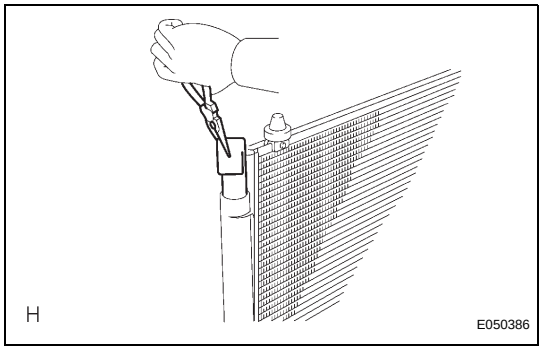
15. REMOVE COOLER CONDENSER ASSEMBLY

(a) Remove the 4 bolts and condenser.



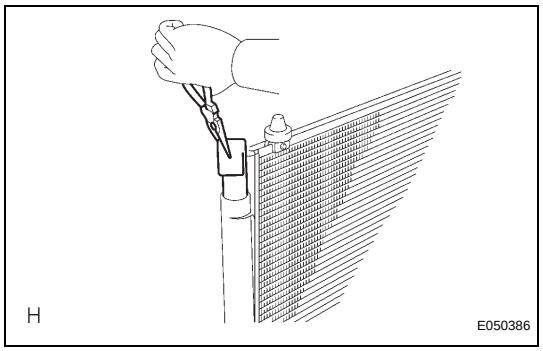
16. REMOVE COOLER DRYER

(a) Using a 14 mm straight hexagon wrench, remove the cap from the modulator.



(b) Using pliers, remove the cooler dryer.

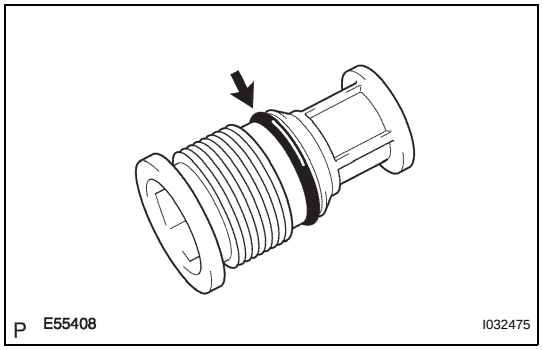
AC



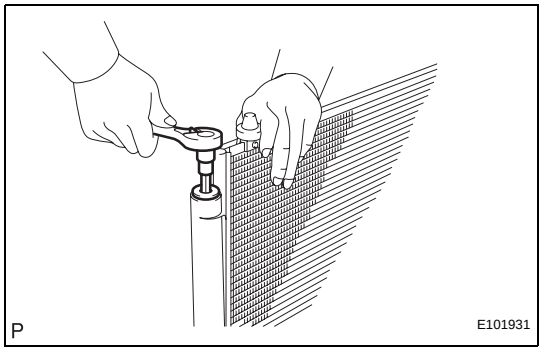
INSTALLATION

1. INSTALL COOLER DRYER

(a) Using pliers, install the cooler dryer to the modulator.

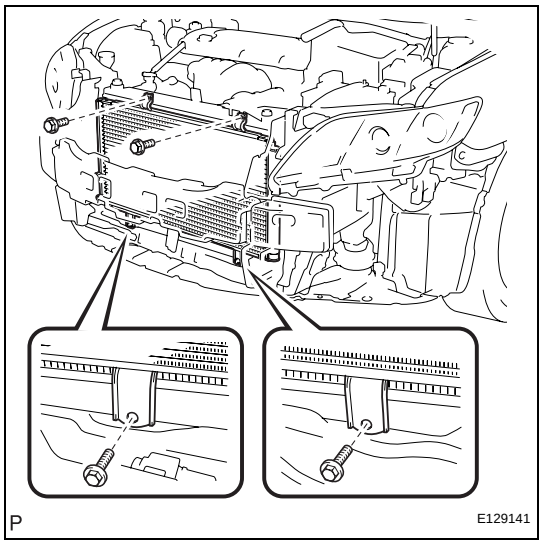


(b) Apply sufficient compressor oil to an O-ring and cap fitting surface.
Compressor oil:
ND-OIL 8 or equivalent



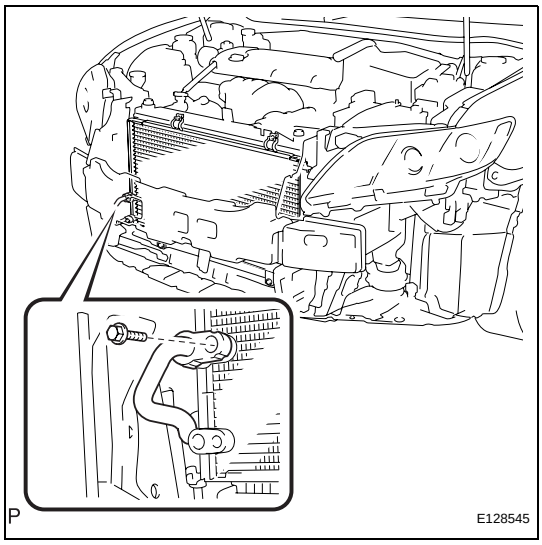
(c) Using a straight hexagon wrench 14 mm, install the cap to the cooler condenser core.
Torque: 2.9 N*m (30 kgf*cm, 26 in.*lbf)

AC

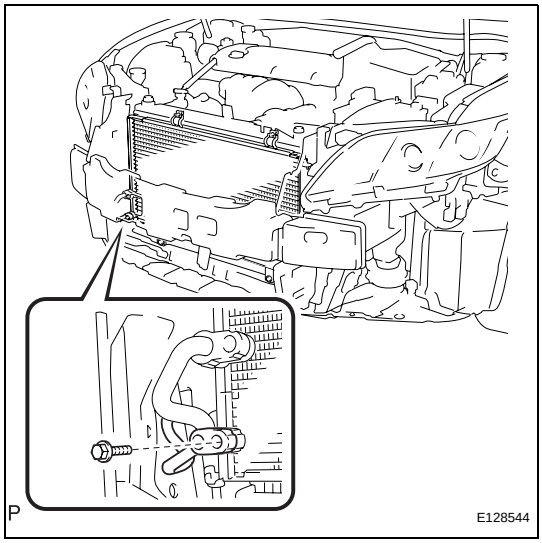


2. INSTALL COOLER CONDENSER ASSEMBLY

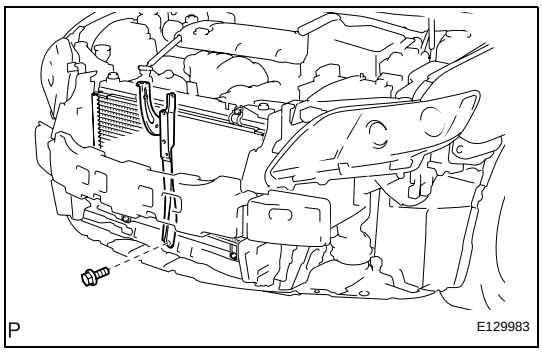
(a) Install the cooler condenser assembly with the 4 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
HINT:
If the condenser is replaced with a new one, add compressor oil to the new condenser.
Capacity:
40 cc (1.4 fl. oz.)
Compressor oil:
ND-8 or equivalent



3. **INSTALL COOLER REFRIGERANT DISCHARGE PIPE**
   (a) Remove the attached vinyl tape from the pipe and the connecting part of the cooler condenser assembly.
   (b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the pipe joint.
   Compressor oil:
   ND-OIL 8 or equivalent
   (c) Install the O-ring on the cooler refrigerant discharge pipe.
   Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



4. **INSTALL AIR CONDITIONER TUBE AND ACCESSORY**
   (a) Remove the attached vinyl tape from the tube and the connecting part of the cooler condenser assembly.
   (b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the tube joint.
   Compressor oil:
   ND-OIL 8 or equivalent
   (c) Install the O-ring on the air conditioning tube assembly.
   (d) Install the air conditioning tube assembly on the cooler condenser assembly with the bolt.
   Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



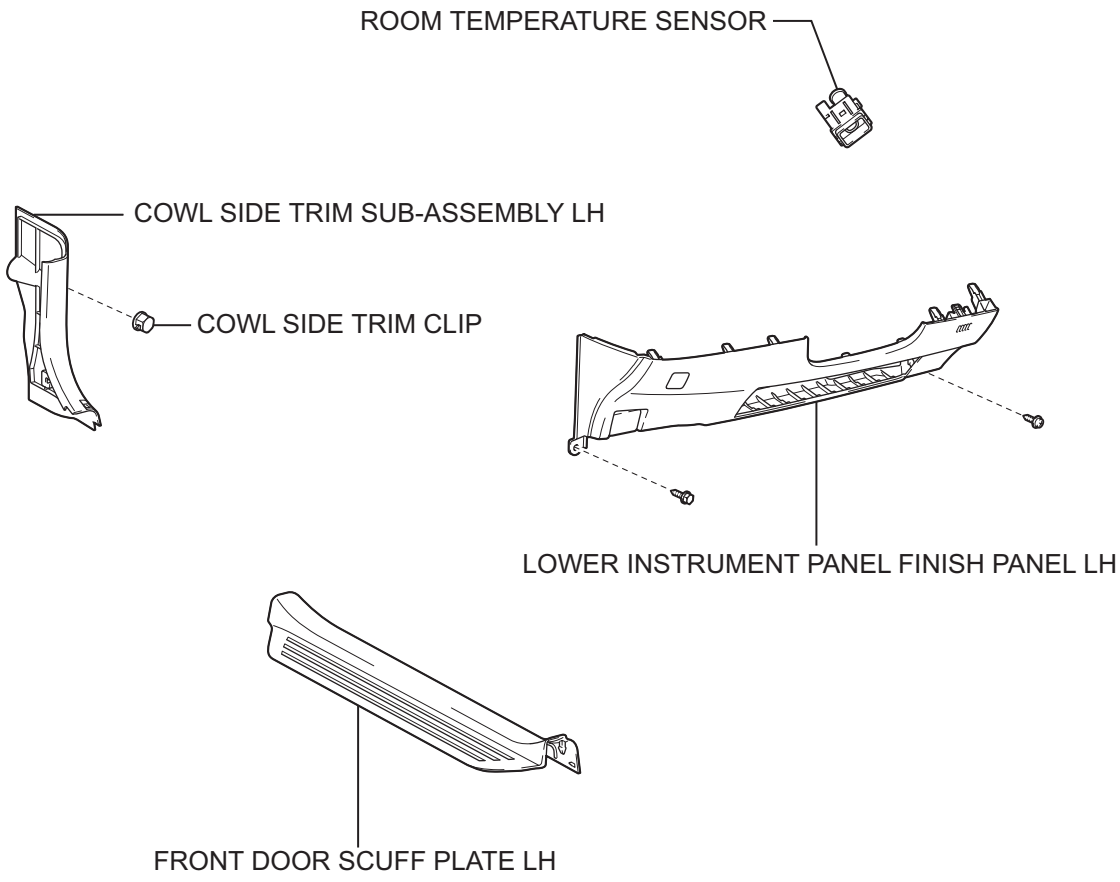
5. **INSTALL HOOD LOCK SUPPORT SUB-ASSEMBLY**
   (a) Install the hood lock support sub-assembly with the bolt.
   Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
6. **INSTALL RADIATOR SUPPORT UPPER**
7. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
8. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
9. **INSTALL NO. 1 AIR CLEANER INLET (for 2GR-FE) (See page EM-49)**
10. **INSTALL AIR CLEANER INLET ASSEMBLY (for 2AZ-FE) (See page EM-120)**
11. **INSTALL AIR CLEANER INLET SUB-ASSEMBLY (for 2GR-FE) (See page EM-50)**
12. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (for 2AZ-FE) (See page ES-419)**

AC

13. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (for 2GR-FE) (See page ES-506)**
14. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page EM-52)**
15. **INSTALL V-BANK COVER SUB-ASSEMBLY (for 2GR-FE) (See page EM-52)**
16. **ADD ENGINE COOLANT (for 2AZ-FE) (See page CO-5)**
17. **ADD ENGINE COOLANT (for 2GR-FE) (See page CO-6)**
18. **CHECK FOR ENGINE COOLANT LEAKS**
19. **CHARGE WITH REFRIGERANT (See page AC-125)**
20. **WARM UP ENGINE (See page AC-126)**
21. **CHECK FOR REFRIGERANT LEAKS (See page AC-126)**

ROOM TEMPERATURE SENSOR

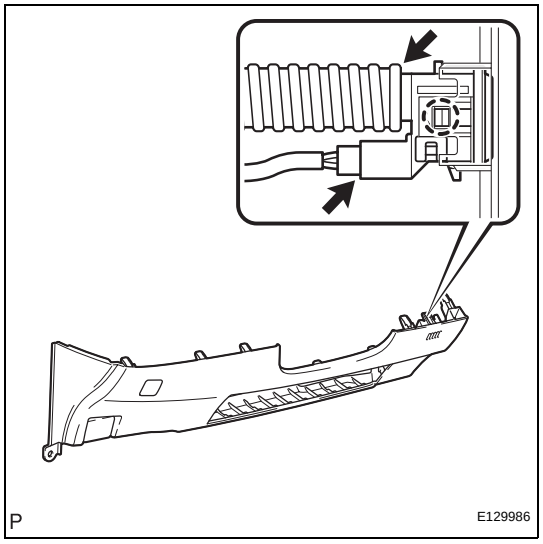
COMPONENTS



AC

REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
3. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-20)**
4. **REMOVE ROOM TEMPERATURE SENSOR**
   (a) Disconnect the connector and air hose.
   (b) Release the claw and remove the sensor.



INSPECTION

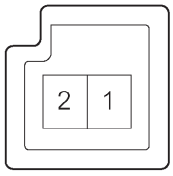
1. **INSPECT ROOM TEMPERATURE SENSOR**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

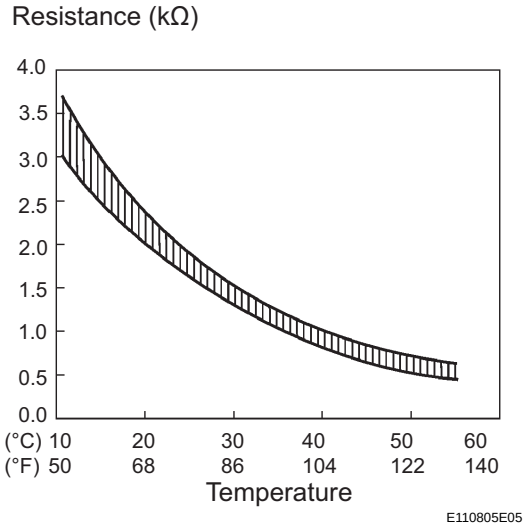
Tester Connection	Condition	Specified Condition
1 - 2	10°C (50°F)	3.00 to 3.73 kΩ
1 - 2	15°C (59°F)	2.45 to 2.88 kΩ
1 - 2	20°C (68°F)	1.95 to 2.30 kΩ
1 - 2	15°C (77°F)	1.60 to 1.80 kΩ
1 - 2	30°C (86°F)	1.28 to 1.47 kΩ
1 - 2	35°C (95°F)	1.00 to 1.22 kΩ
1 - 2	40°C (104°F)	0.80 to 1.00 kΩ
1 - 2	45°C (113°F)	0.65 to 0.85 kΩ
1 - 2	50°C (122°F)	0.50 to 0.70 kΩ
1 - 2	55°C (131°F)	0.44 to 0.60 kΩ
1 - 2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:
- **Hold the sensor only by its connector. Touching the sensor may change the resistance value.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

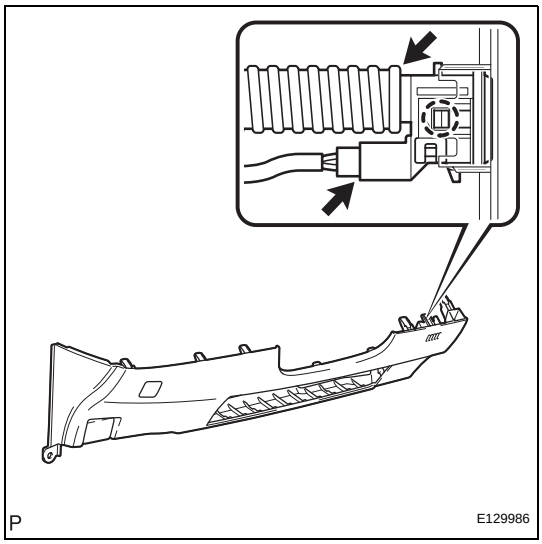
HINT:
As the temperature increases, the resistance decreases (see the graph).

A/C Room Temperature Sensor Connector Front View:





If the resistance is not as specified, replace the room temperature sensor.

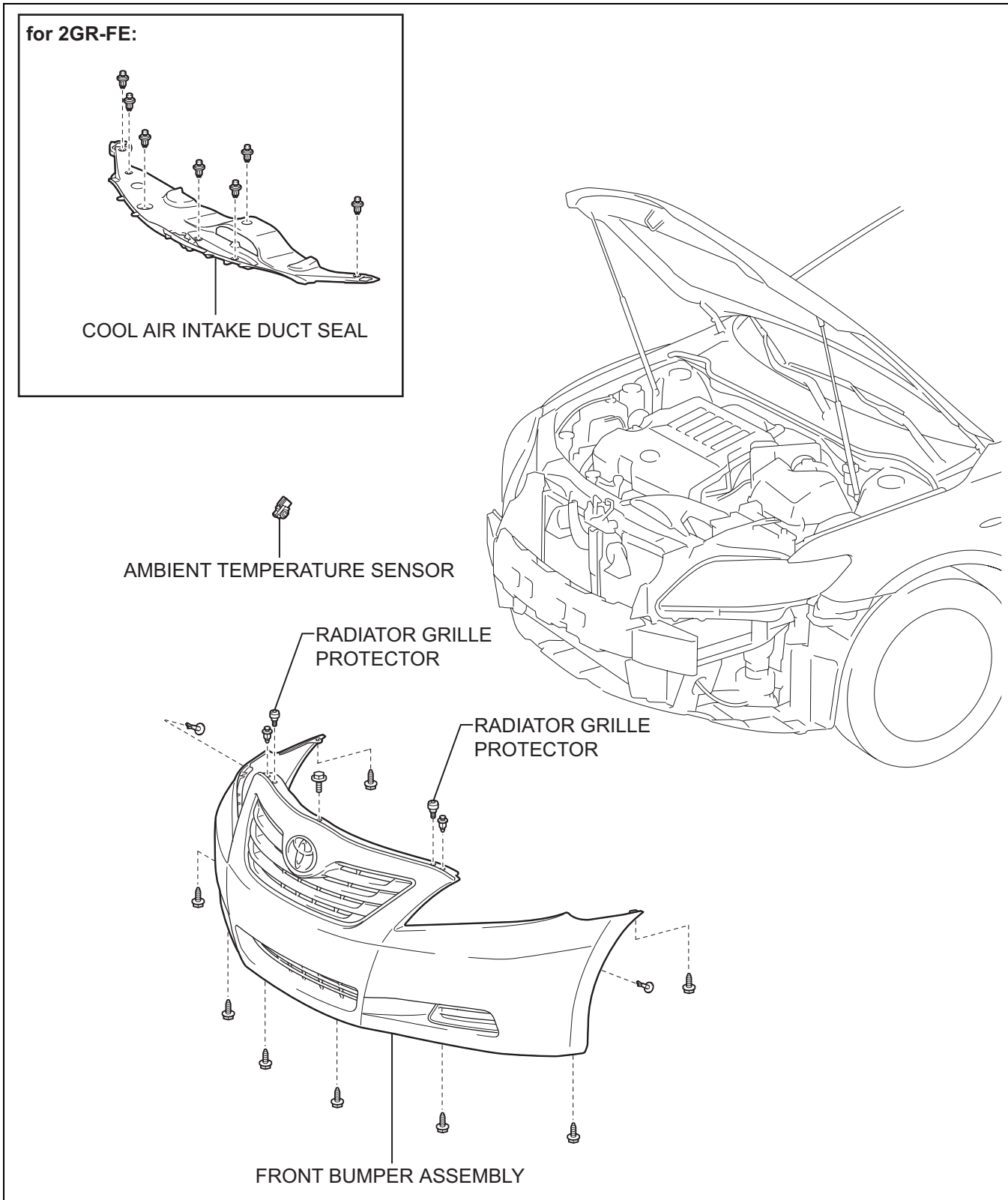


INSTALLATION

1. **INSTALL ROOM TEMPERATURE SENSOR**
   (a) Engage the claw to install the sensor.
   (b) Connect the connector and attach the air hose.
2. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-58)**
3. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
4. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**

AMBIENT TEMPERATURE SENSOR

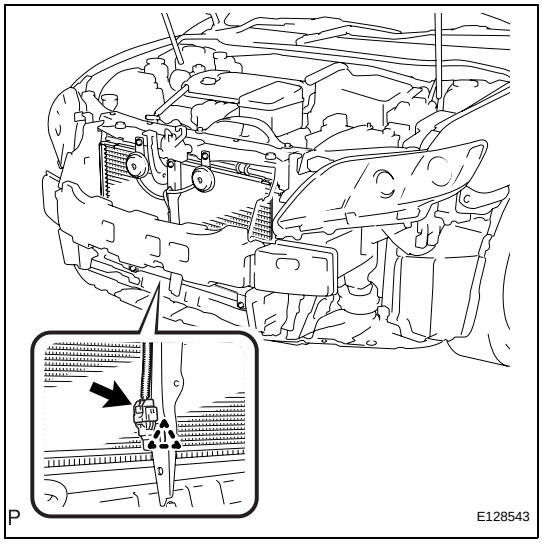
COMPONENTS



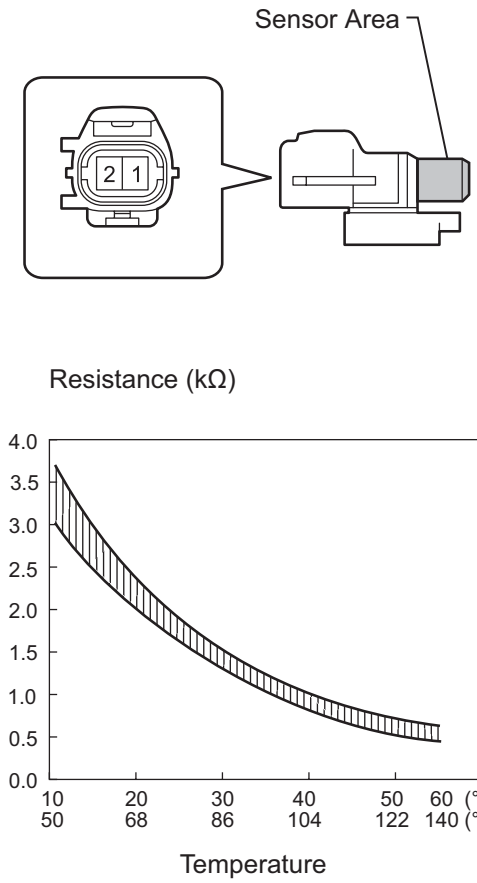
AC

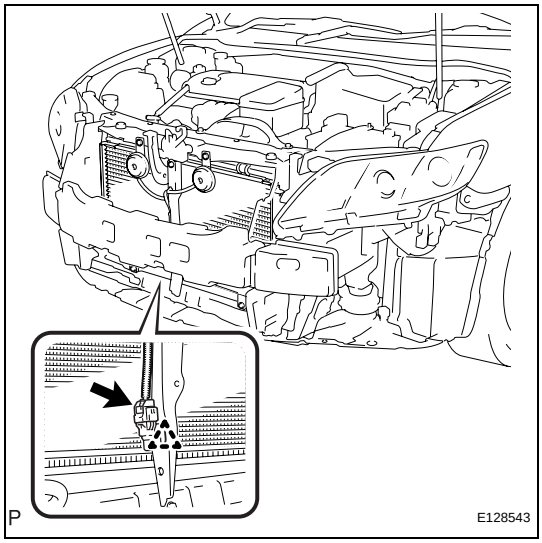
REMOVAL

1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**
3. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
4. **REMOVE AMBIENT TEMPERATURE SENSOR**
   (a) Disconnect the connector and detach the clamp.
   (b) Remove the ambient temperature sensor.



Ambient Temperature Sensor Connector Front View:





INSPECTION

1. **INSPECT AMBIENT TEMPERATURE SENSOR**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	10°C (50°F)	3.00 to 3.73 kΩ
1 - 2	15°C (59°F)	2.45 to 2.88 kΩ
1 - 2	20°C (68°F)	1.95 to 2.30 kΩ
1 - 2	25°C (77°F)	1.60 to 1.80 kΩ
1 - 2	30°C (86°F)	1.28 to 1.47 kΩ
1 - 2	35°C (95°F)	1.00 to 1.22 kΩ
1 - 2	40°C (104°F)	0.80 to 1.00 kΩ
1 - 2	45°C (113°F)	0.65 to 0.85 kΩ
1 - 2	50°C (122°F)	0.50 to 0.70 kΩ
1 - 2	55°C (131°F)	0.44 to 0.60 kΩ
1 - 2	60°C (140°F)	0.36 to 0.50 kΩ

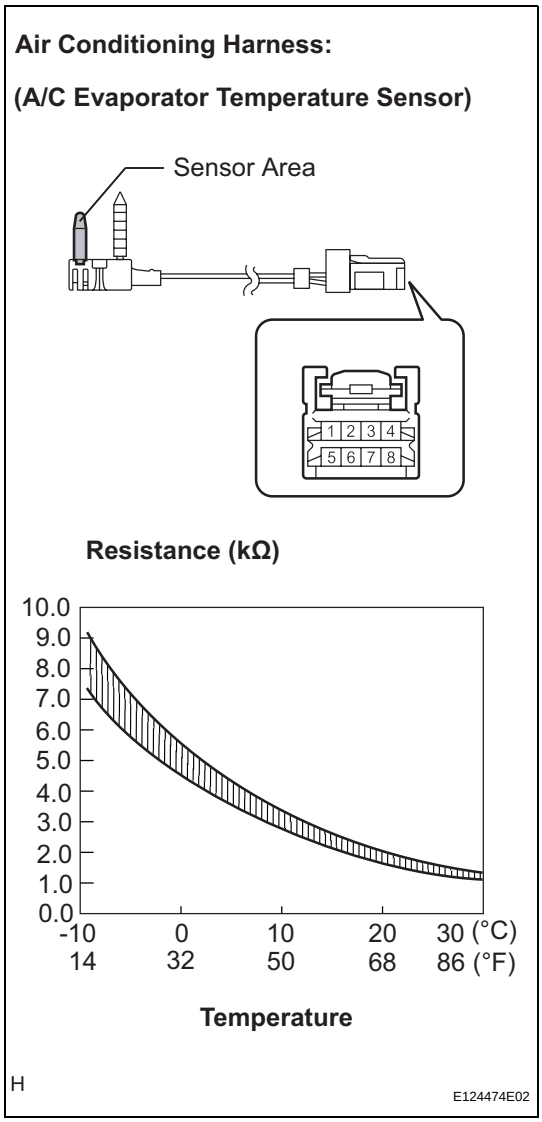
NOTICE:
- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:
As the temperature increases, the resistance decreases (see the graph).
If the resistance is not as specified, replace the ambient temperature sensor.

AC

INSTALLATION

1. **INSTALL AMBIENT TEMPERATURE SENSOR**
   (a) Install the ambient temperature sensor with the clamp.
   (b) Connect the connector.
2. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
3. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
4. **INSTALL COOL AIR INTAKE DUCT SEAL**
5. **VEHICLE PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-79)**
6. **PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-80)**
7. **INSPECT FOG LIGHT AIMING (w/ Fog Light) (See page LI-81)**
8. **ADJUST FOG LIGHT AIMING (w/ Fog Light) (See page LI-82)**



EVAPORATOR TEMPERATURE SENSOR

ON-VEHICLE INSPECTION

1. INSPECT EVAPORATOR TEMPERATURE SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
5 - 6	-10°C (14°F)	7.30 to 9.10 kΩ
5 - 6	-5°C (23°F)	5.65 to 6.95 kΩ
5 - 6	0°C (32°F)	4.40 to 5.35 kΩ
5 - 6	5°C (41°F)	3.40 to 4.15 kΩ
5 - 6	10°C (50°F)	2.70 to 3.25 kΩ
5 - 6	15°C (59°F)	2.14 to 2.58 kΩ
5 - 6	20°C (68°F)	1.71 to 2.05 kΩ
5 - 6	25°C (77°F)	1.38 to 1.64 kΩ
5 - 6	30°C (86°F)	1.11 to 1.32 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases (see the graph).

If the resistance is not as specified, replace the evaporator temperature sensor.

AC

AIR CONDITIONING PRESSURE SENSOR

ON-VEHICLE INSPECTION

1. INSPECT PRESSURE SENSOR

(a) Install the manifold gauge set (See page AC-120).

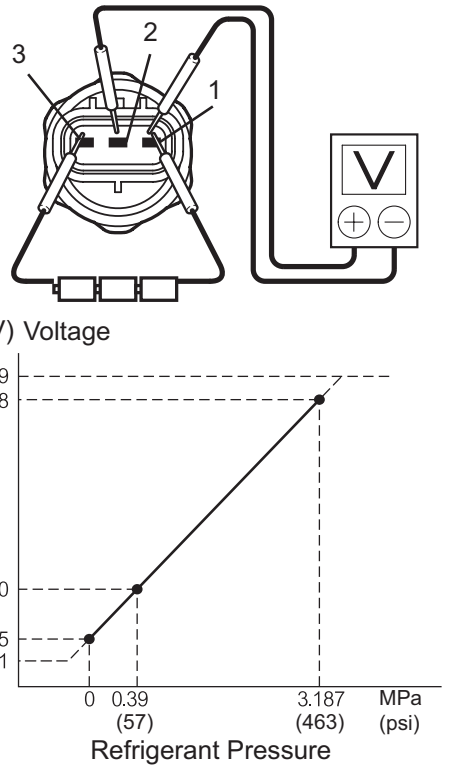
(b) Connect the three 1.5 V dry cell batterie's positive (+) lead to terminal 3 and the negative (-) lead to terminal 1. Then connect the voltmeter's positive (+) lead to terminal 2 and the negative (-) lead to terminal 1. Measure the voltage.

OK:

The voltage changes according to refrigerant pressure, as shown in the graph.

If the voltage is not as specified, replace the pressure sensor.

A/C Pressure Sensor Connector Front View:

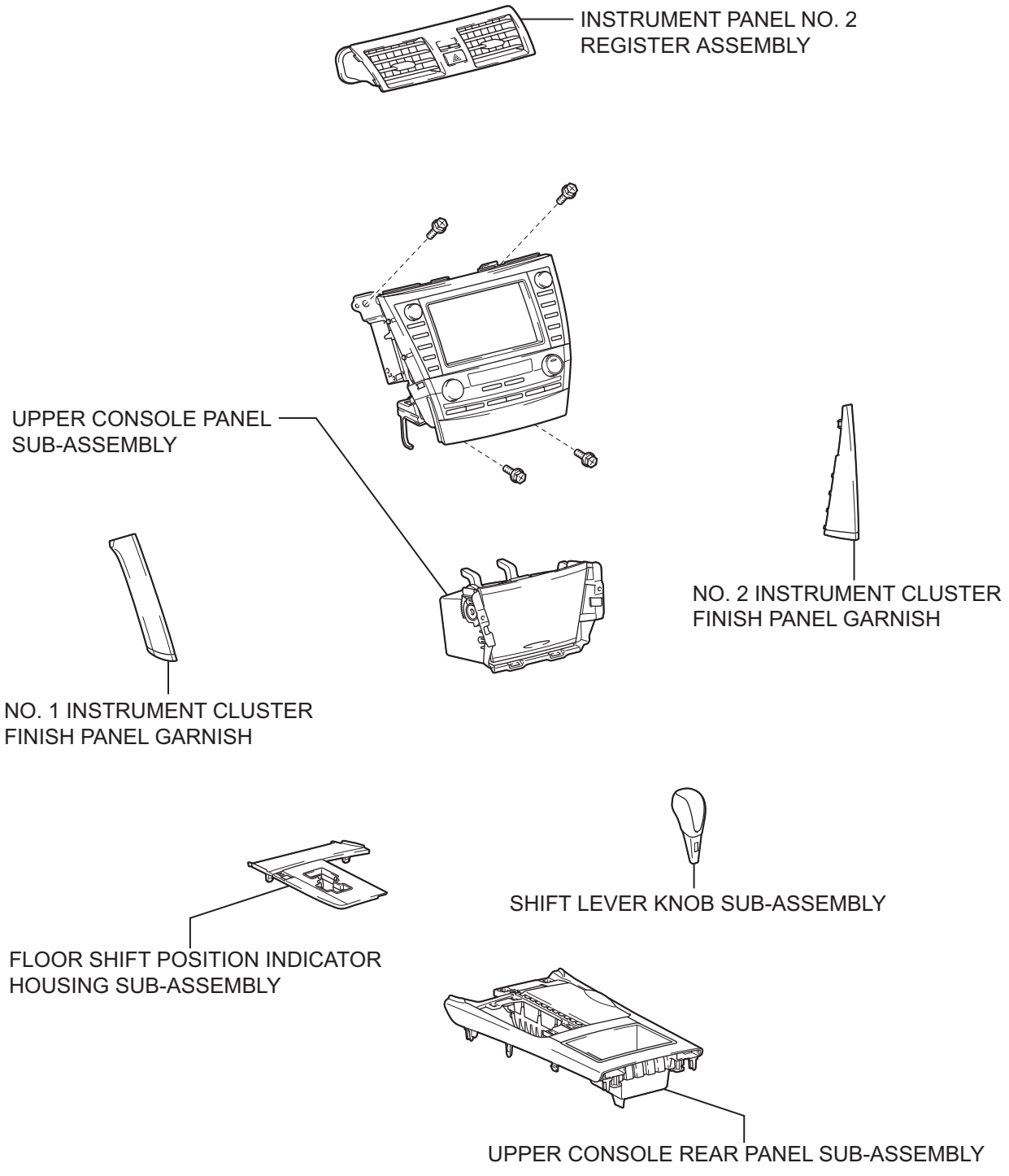


AC

AIR CONDITIONING CONTROL ASSEMBLY

COMPONENTS

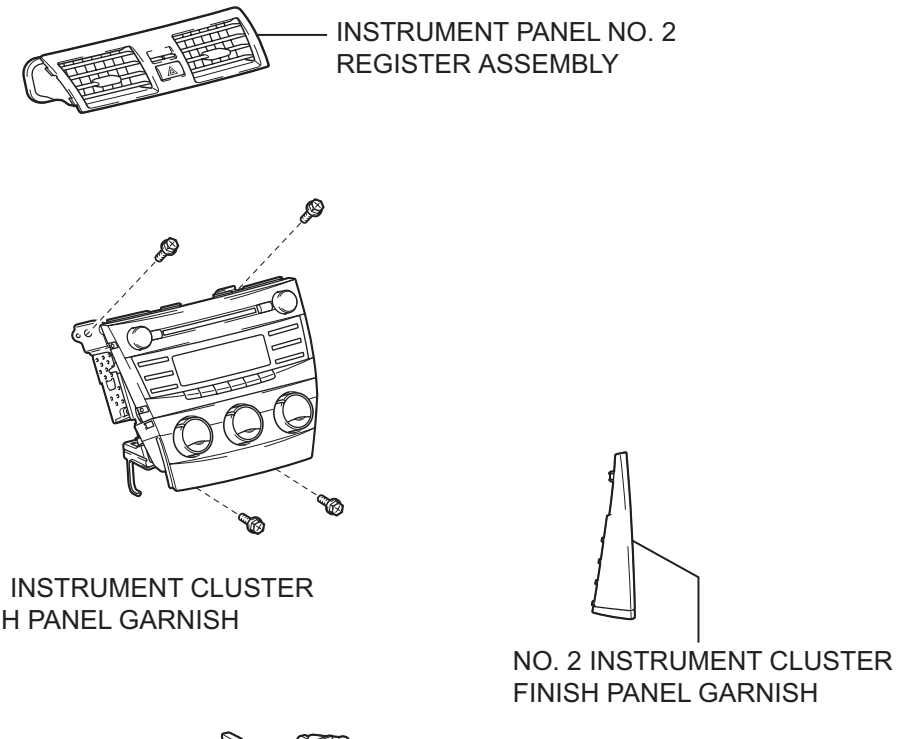
Automatic Air Conditioning System:



P

E129159E01

Manual Air Conditioning System:



AC

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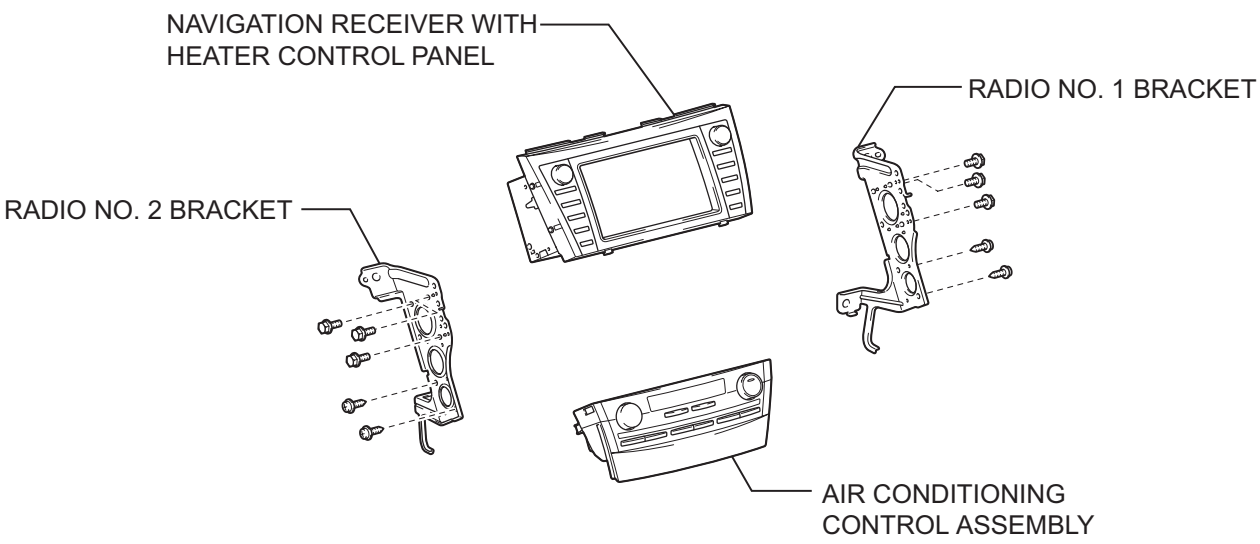
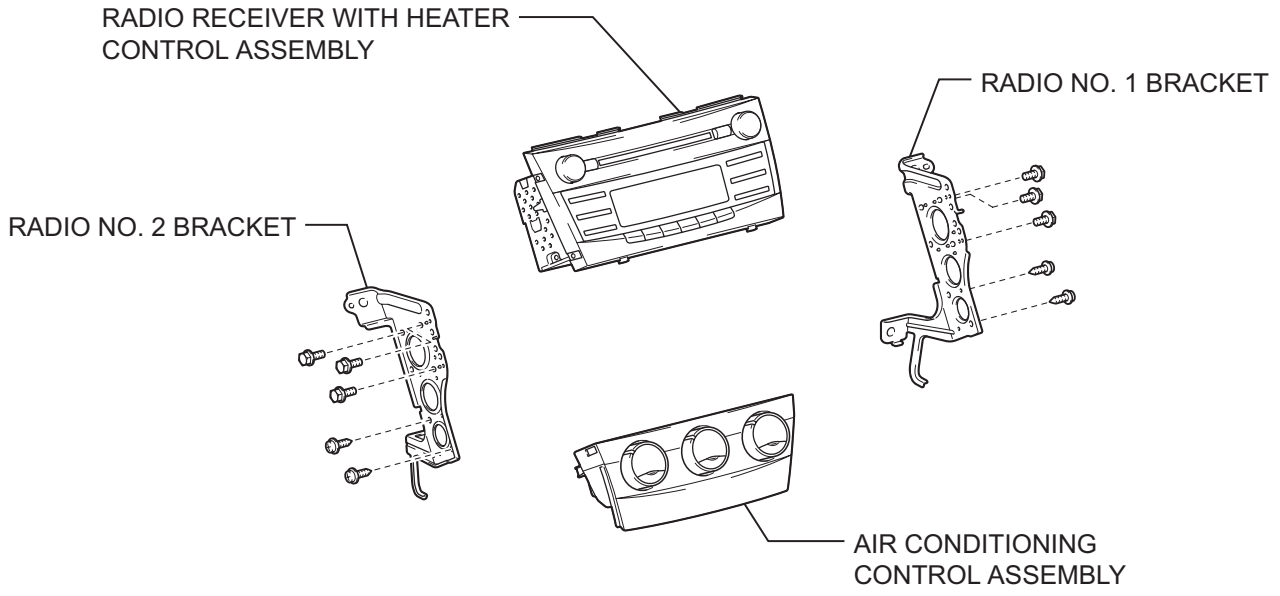
E129160E01

for Automatic Air Conditioning System:



for Manual Air Conditioning System:

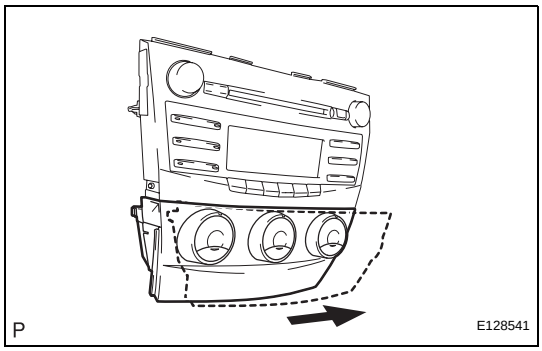


P

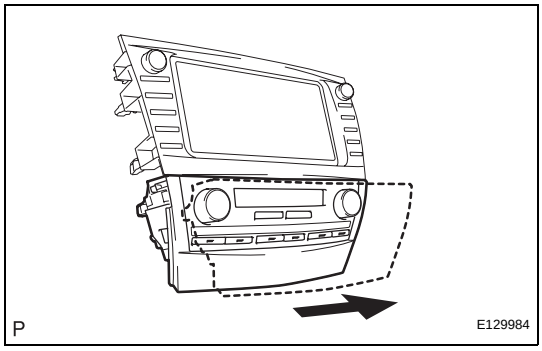
E128505E01

REMOVAL

1. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)
2. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)
3. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
4. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
5. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)
6. REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)
7. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)
8. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)
9. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-27)
10. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)
11. REMOVE RADIO RECEIVER WITH HEATER CONTROL ASSEMBLY (for Manual Air Conditioning System) (See page AV-146)
12. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL (for Automatic Air Conditioning System) (See page NS-195)
13. REMOVE RADIO NO. 1 BRACKET (for Manual Air Conditioning System) (See page AV-146)
14. REMOVE RADIO NO. 1 BRACKET (for Automatic Air Conditioning System) (See page NS-195)
15. REMOVE RADIO NO. 2 BRACKET (for Manual Air Conditioning System) (See page AV-146)
16. REMOVE RADIO NO. 2 BRACKET (for Automatic Air Conditioning System) (See page NS-195)

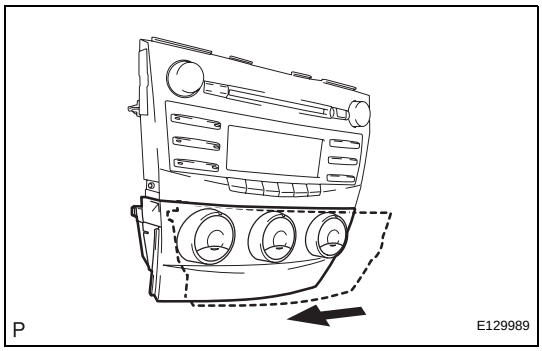


17. **REMOVE AIR CONDITIONING CONTROL ASSEMBLY (for Manual Air Conditioning System)**
    (a) Remove the air conditioning control assembly as shown in the illustration.

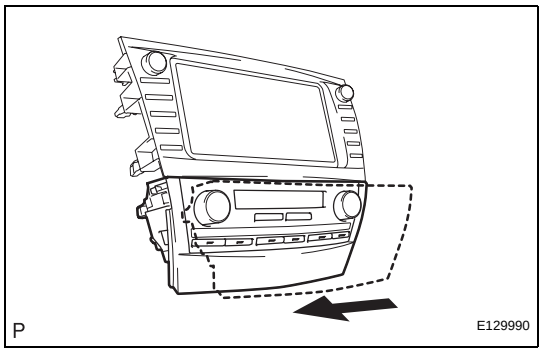


18. **REMOVE AIR CONDITIONING CONTROL ASSEMBLY (for Automatic Air Conditioning System)**
    (a) Remove the air conditioning control assembly as shown in the illustration.

INSTALLATION



1. **INSTALL AIR CONDITIONING CONTROL ASSEMBLY (for Manual Air Conditioning System)**
    (a) Install the air conditioning control assembly as shown in the illustration.



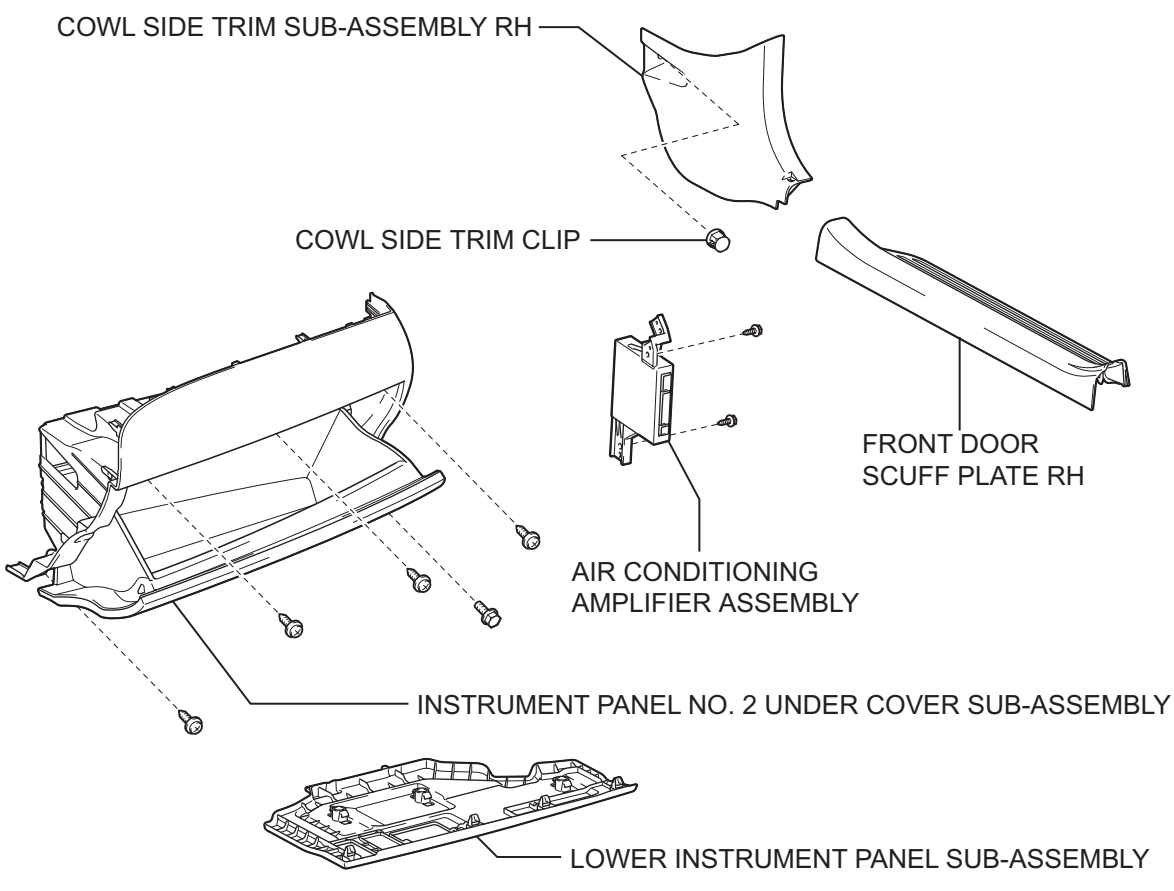
2. **INSTALL AIR CONDITIONING CONTROL ASSEMBLY (for Automatic Air Conditioning System)**
    (a) Install the air conditioning control assembly as shown in the illustration.
3. **INSTALL RADIO NO. 2 BRACKET (for Manual Air Conditioning System) (See page AV-147)**
4. **INSTALL RADIO NO. 2 BRACKET (for Automatic Air Conditioning System) (See page NS-196)**
5. **INSTALL RADIO NO. 1 BRACKET (for Manual Air Conditioning System) (See page AV-147)**
6. **INSTALL RADIO NO. 1 BRACKET (for Automatic Air Conditioning System) (See page NS-196)**
7. **INSTALL RADIO RECEIVER WITH HEATER CONTROL ASSEMBLY (for Manual Air Conditioning System) (See page AV-147)**
8. **INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL (for Automatic Air Conditioning System) (See page NS-196)**

AC

9. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)**
10. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-52)**
11. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
12. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
13. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
14. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
15. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
16. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
17. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
18. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**

AIR CONDITIONING AMPLIFIER

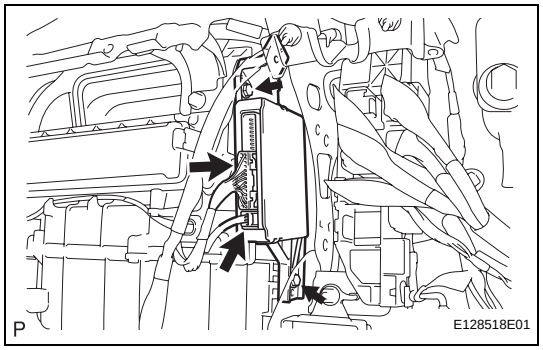
COMPONENTS



AC

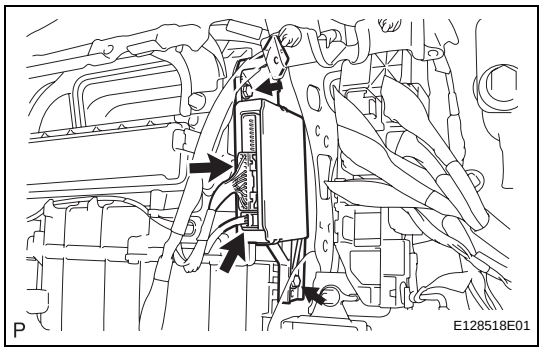
REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
3. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**
4. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-23)**
5. **REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY**
   (a) Disconnect the connectors.
   (b) Remove the 2 bolts and air conditioning amplifier assembly.



INSTALLATION

1. **INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY**
   (a) Install the air conditioning amplifier assembly with the 2 bolts.
   (b) Connect the connectors.
2. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-55)**
3. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
4. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
5. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**



REMOVAL

1. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD
2. DISCONNECT BATTERY NEGATIVE TERMINAL
   NOTICE:
   Wait for 90 seconds after disconnecting the terminal to prevent the airbag from deploying. (See page RS-1)
3. REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)
4. REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)
5. REMOVE STEERING PAD (See page RS-350)
6. REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)
7. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)
8. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)
9. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)
10. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)
11. REMOVE STEERING COLUMN COVER (for TMC Made) (See page IP-21)
12. REMOVE STEERING COLUMN COVER (for TMMK Made) (See page IP-21)
13. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)
14. REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)
15. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)
16. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)
17. REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)
18. REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)
19. REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)
20. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)
21. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH

22. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)
23. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)
24. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)
25. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)
26. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)
27. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
28. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
29. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)
30. REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)
31. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)
32. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)
33. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)
34. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)
35. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)
36. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-146)
37. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-195)
38. REMOVE CONSOLE BOX POCKET (See page IP-28)
39. REMOVE CONSOLE BOX CARPET (See page IP-28)
40. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
41. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)
42. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)
43. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)

44. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)**

45. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

46. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**

47. **REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-31)**

48. **REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-31)**

49. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**

50. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**

51. **REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-31)**

52. **REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-32)**

53. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-32)**

54. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-32)**

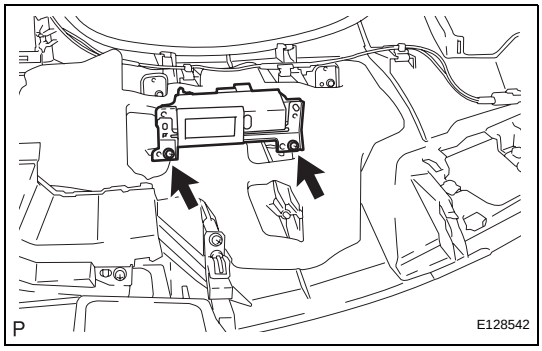
55. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-32)**

56. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-34)**

57. **REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (See page IP-37)**

58. **REMOVE NO. 1 HEATER TO REGISTER DUCT (See page IP-38)**

59. **REMOVE PLASMACLUSTER**
    (a) Remove the 2 screws and "Plasmacluster".



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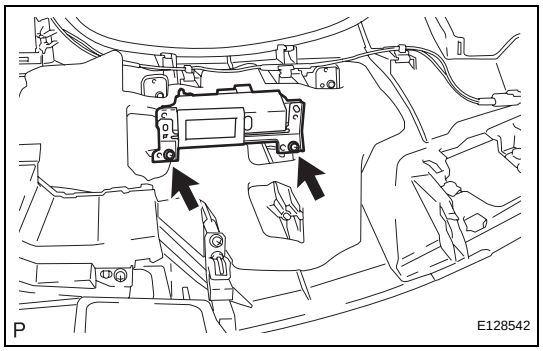


INSTALLATION

1. **INSTALL PLASMACLUSTER**
   (a) Install the "Plasmacluster" with the 2 screws.
   Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
2. **INSTALL NO. 1 HEATER TO REGISTER DUCT (See page IP-42)**
3. **INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (See page IP-43)**
4. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-44)**
5. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-45)**
6. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-48)**
7. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**
8. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-48)**
9. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-48)**
10. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**
11. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page IP-48)**
12. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-49)**
13. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-49)**
14. **INSTALL FRONT PILLAR GARNISH RH (See page IR-52)**
15. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)**
16. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
17. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
18. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
19. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**
20. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
21. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
22. **INSTALL CONSOLE BOX POCKET (See page IP-51)**

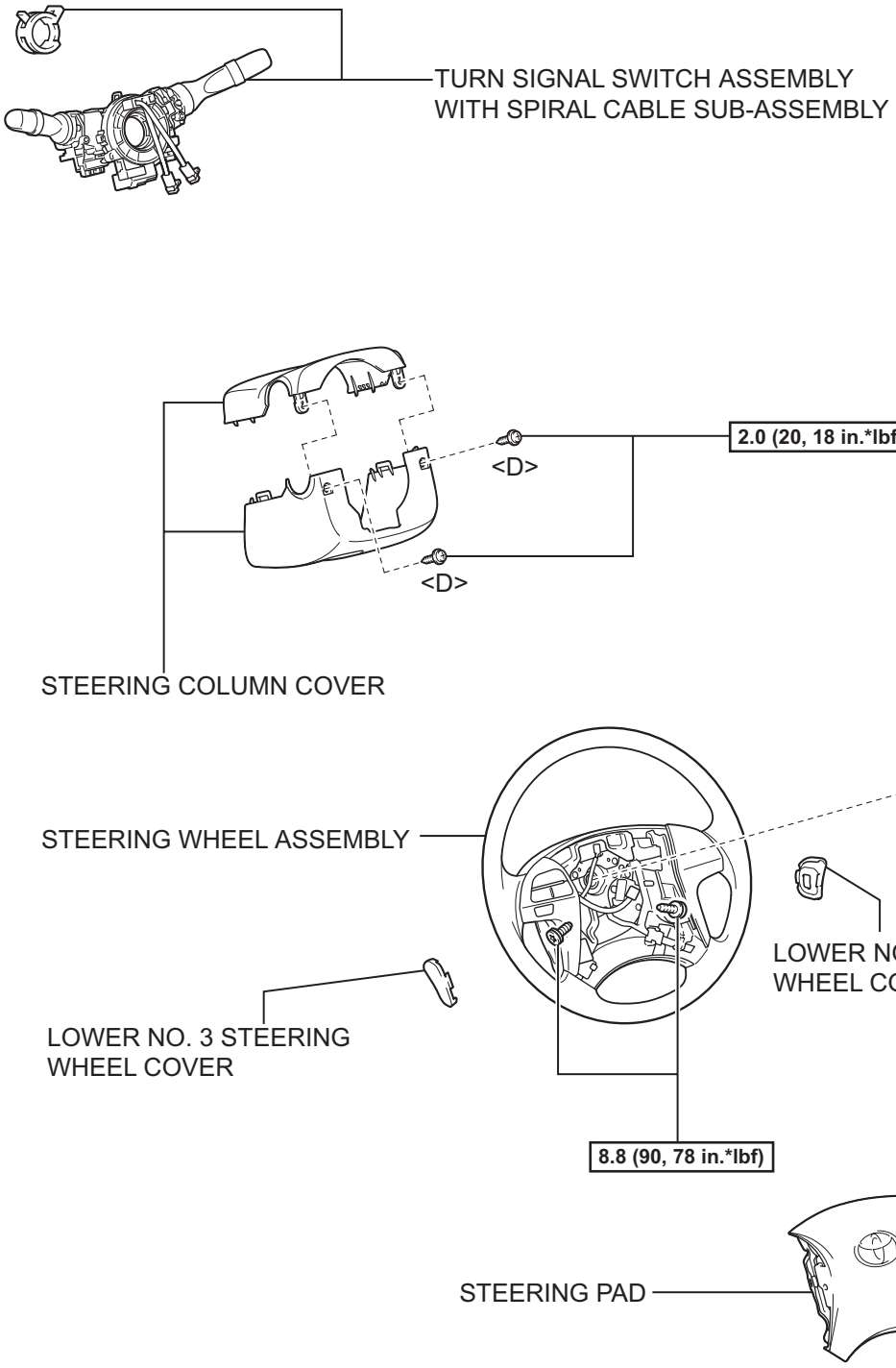
23. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-147)
24. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-196)
25. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)
26. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)
27. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)
28. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)
29. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)
30. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)
31. INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)
32. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)
33. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)
34. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)
35. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)
36. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)
37. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)
38. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)
39. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)
40. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)
41. INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)
42. INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)

43. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)
44. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)
45. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)
46. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)
47. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-50)
48. ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)
49. INSTALL STEERING COLUMN COVER (for TMC Made) (See page IP-58)
50. INSTALL STEERING COLUMN COVER (for TMMK Made) (See page IP-58)
51. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)
52. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)
53. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
54. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
55. INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)
56. INSTALL STEERING PAD (See page RS-350)
57. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)
58. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)
59. CONNECT NEGATIVE BATTERY TERMINAL
60. INSPECT STEERING PAD (See page RS-352)
61. INSPECT SRS WARNING LIGHT (See page IP-59)

PLASMACLUSTER

COMPONENTS

for TMC Made:



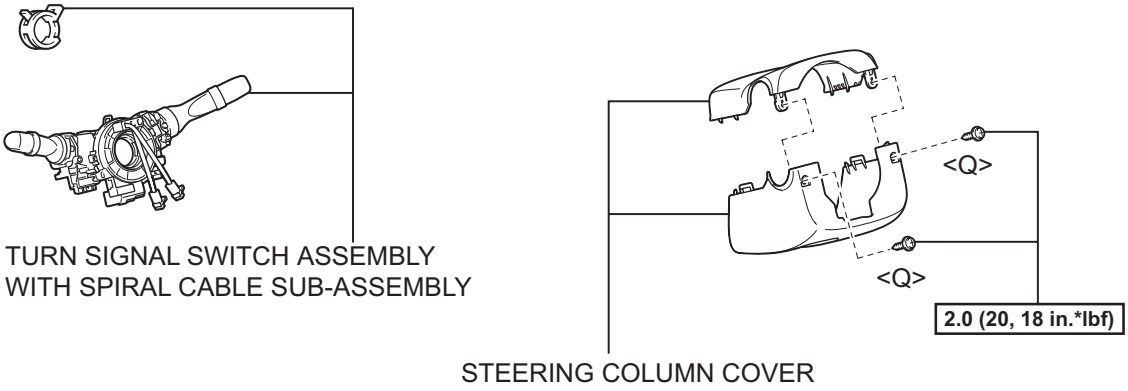
N*m (kgf*cm, ft.*lbf) : Specified torque

P

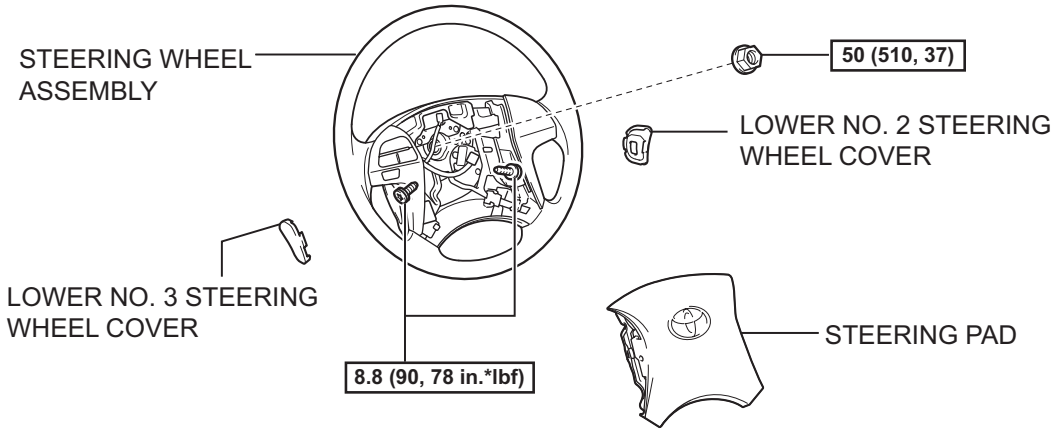
B137279E01

AC

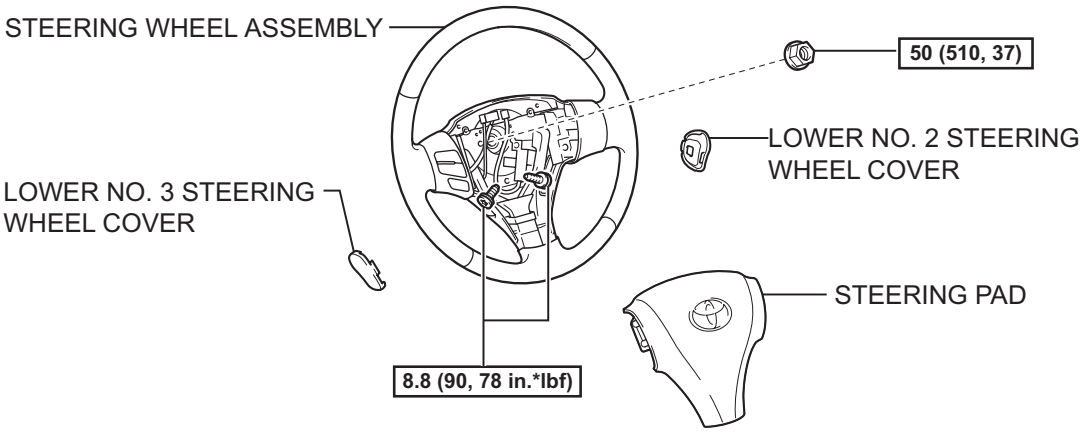
for TMMK Made:



for 4 Spoke:



for 3 Spoke:



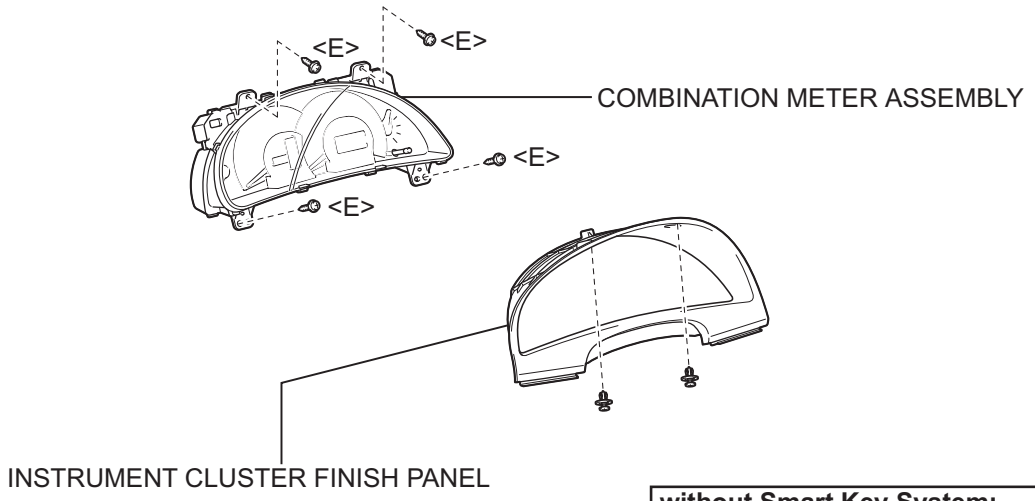
N*m (kgf*cm, ft.*lbf) : Specified torque

P

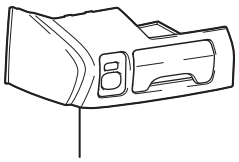
B137280E01

AC

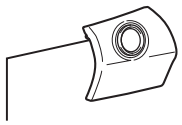
for TMC Made:



without Smart Key System:



with Smart Key System:



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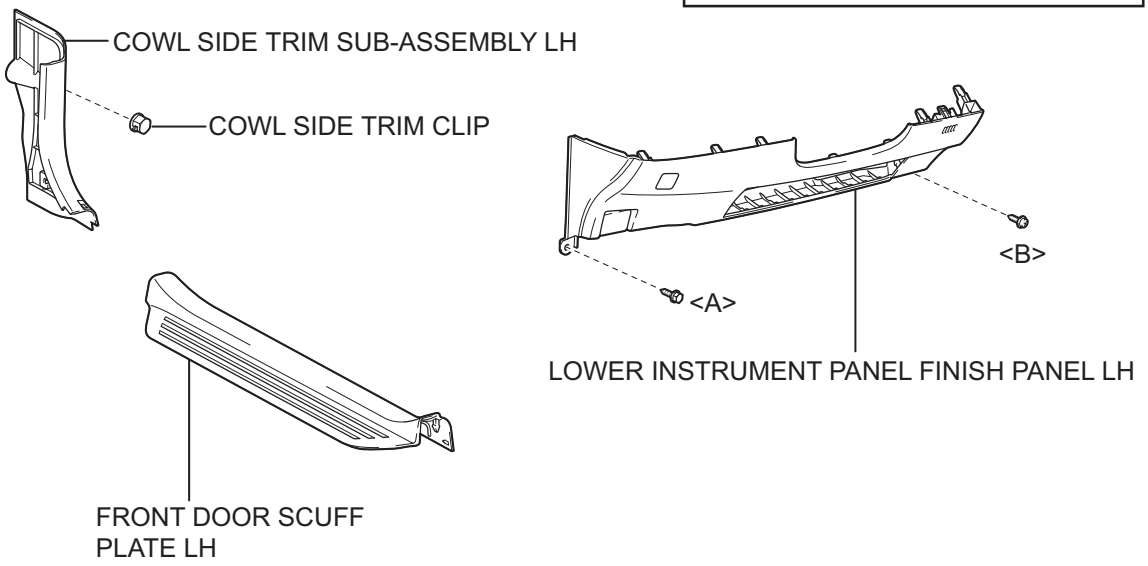
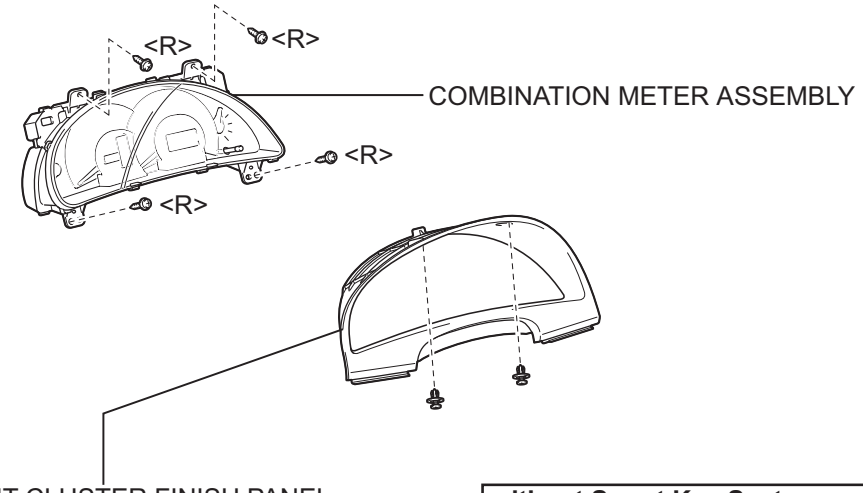


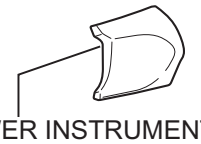
P

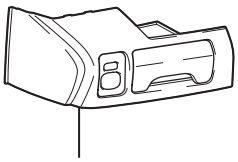
B137281E01

for TMMK Made:

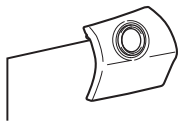


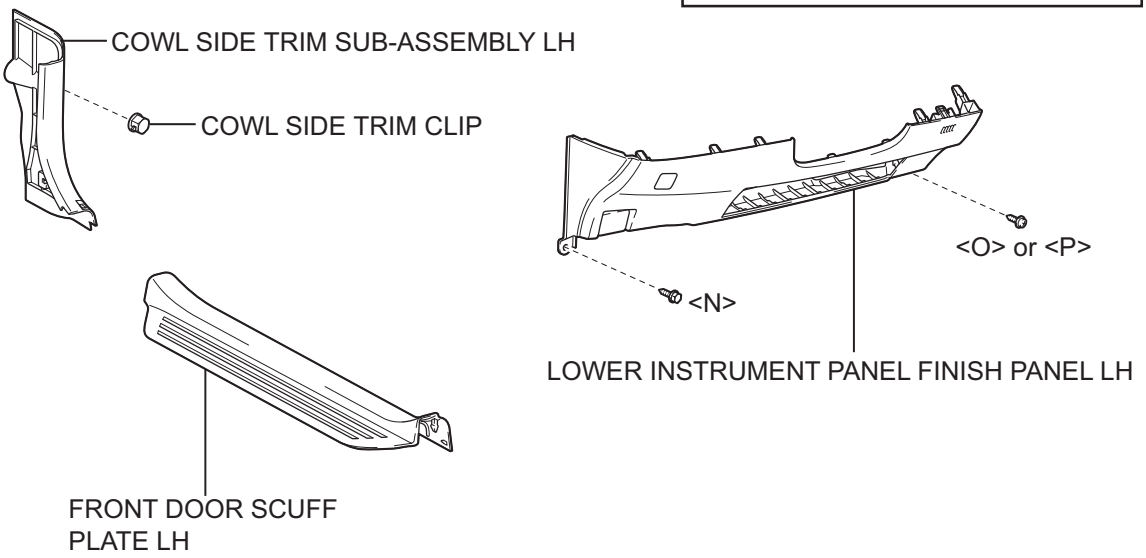
without Smart Key System:





with Smart Key System:



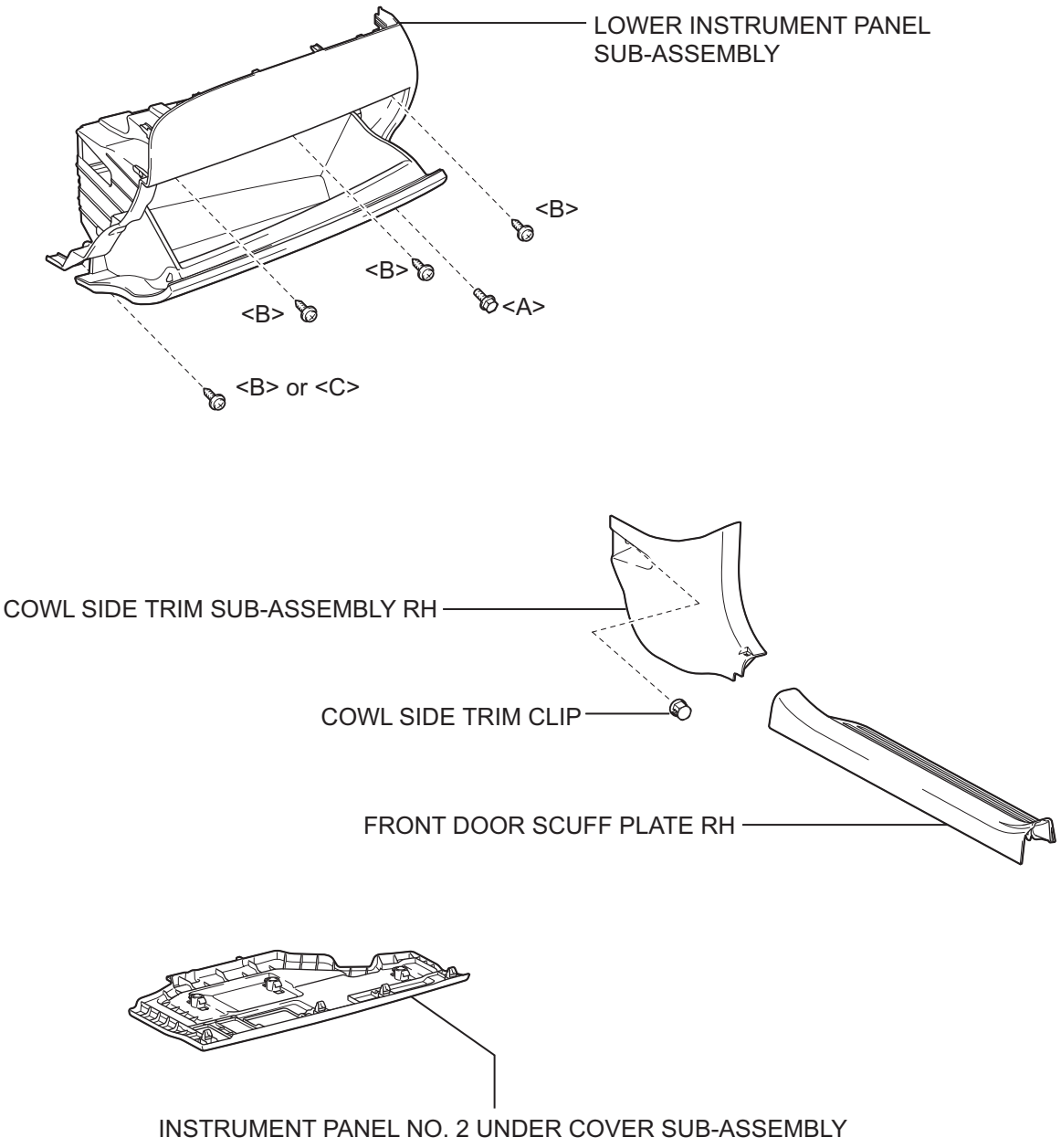


P

B137281E03

AC

for TMC Made:



P

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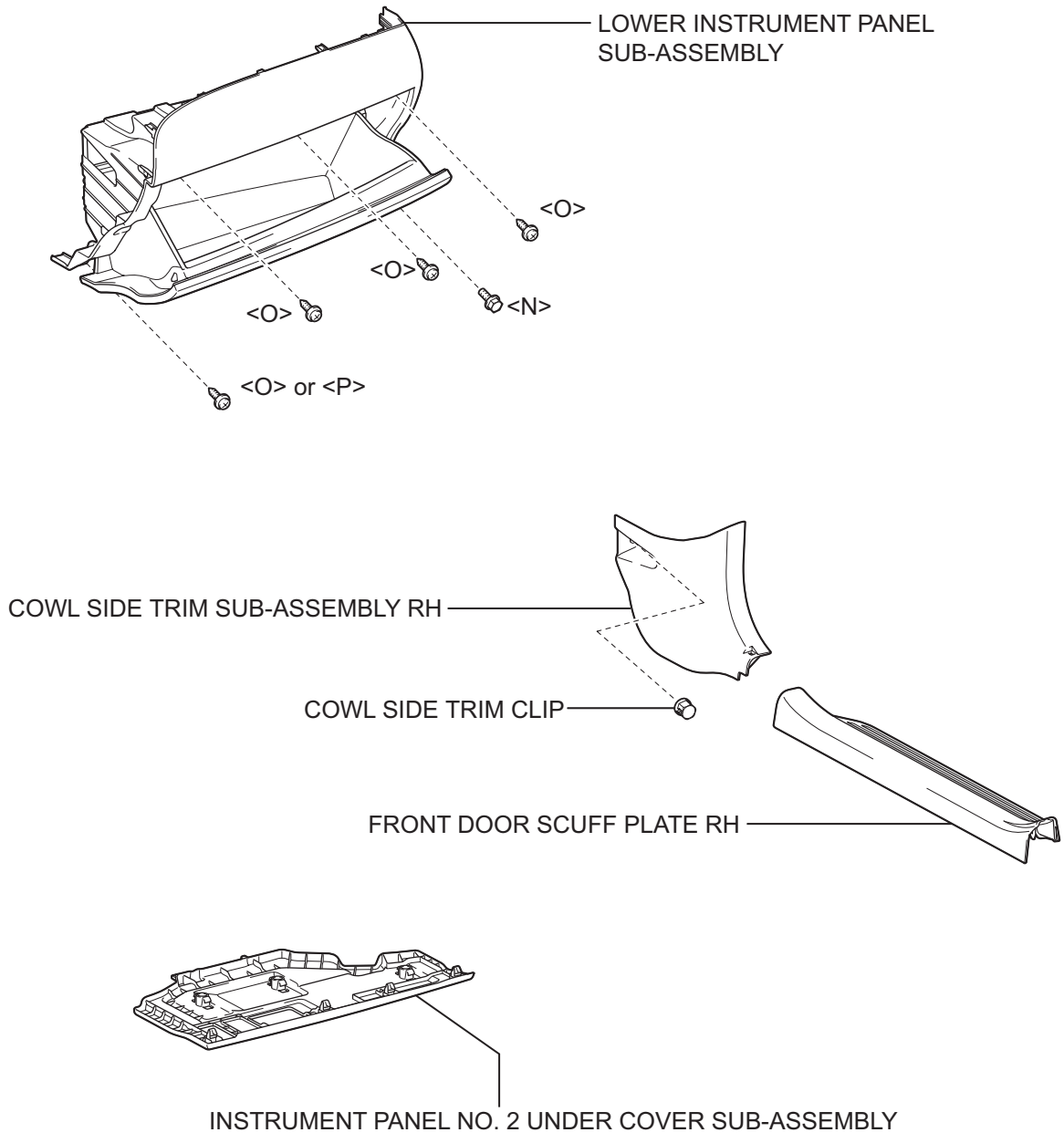
for TMMK Made:



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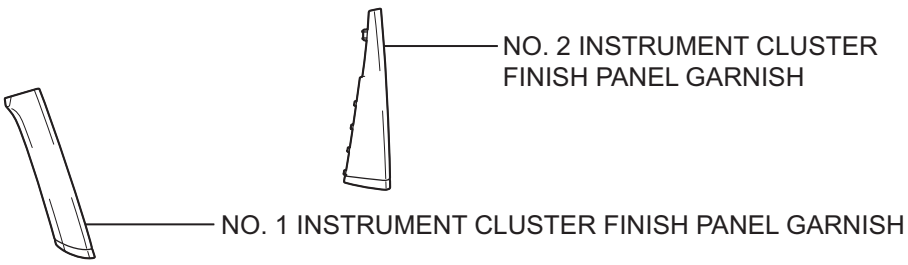
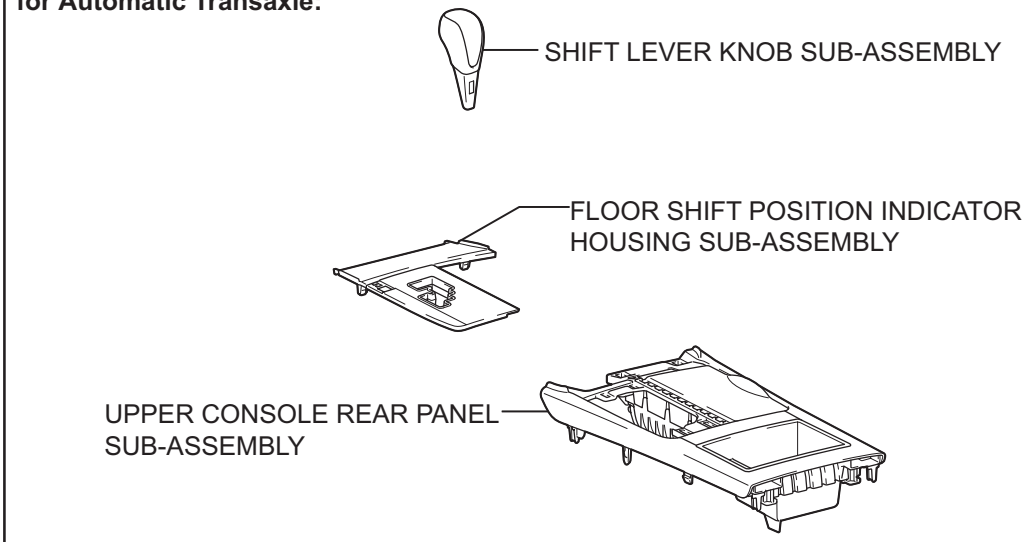
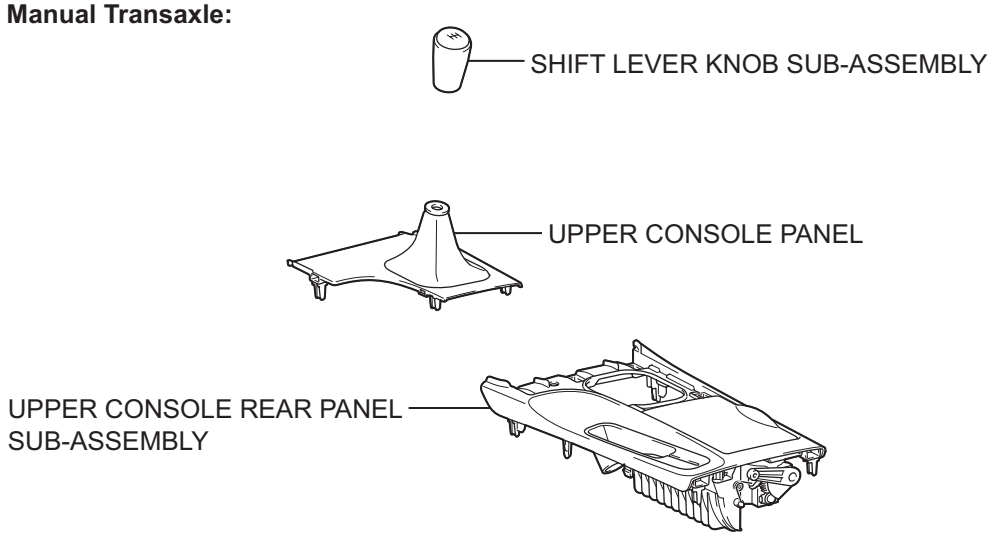


for Automatic Transaxle:



for Manual Transaxle:

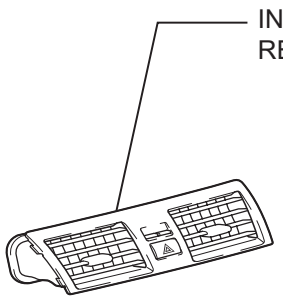


AC

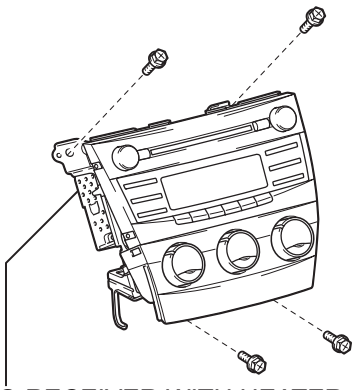
P

B137283E01

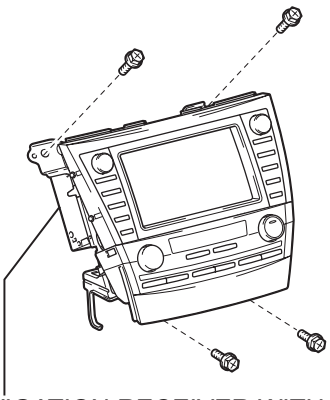
for TMC Made:

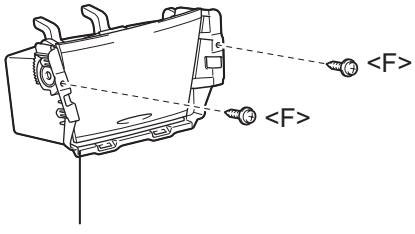


without Navigation System:



with Navigation System:





AC

P

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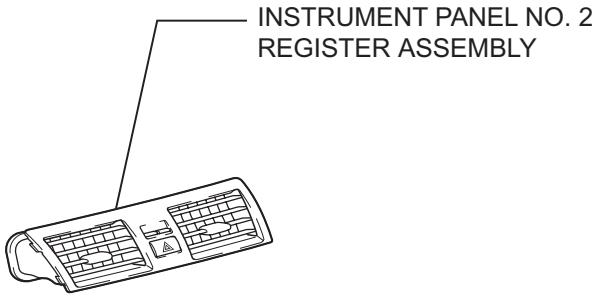

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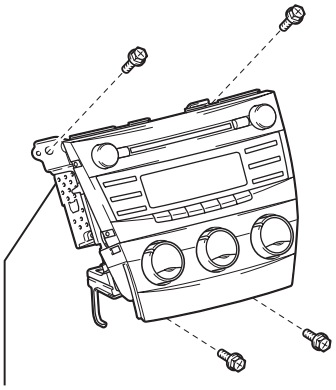

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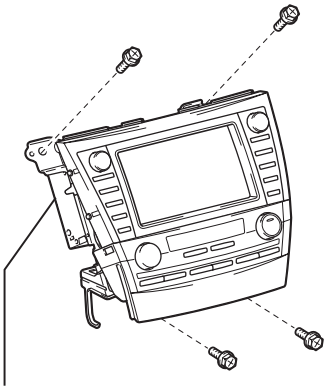
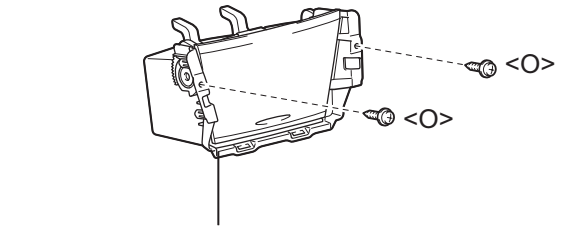


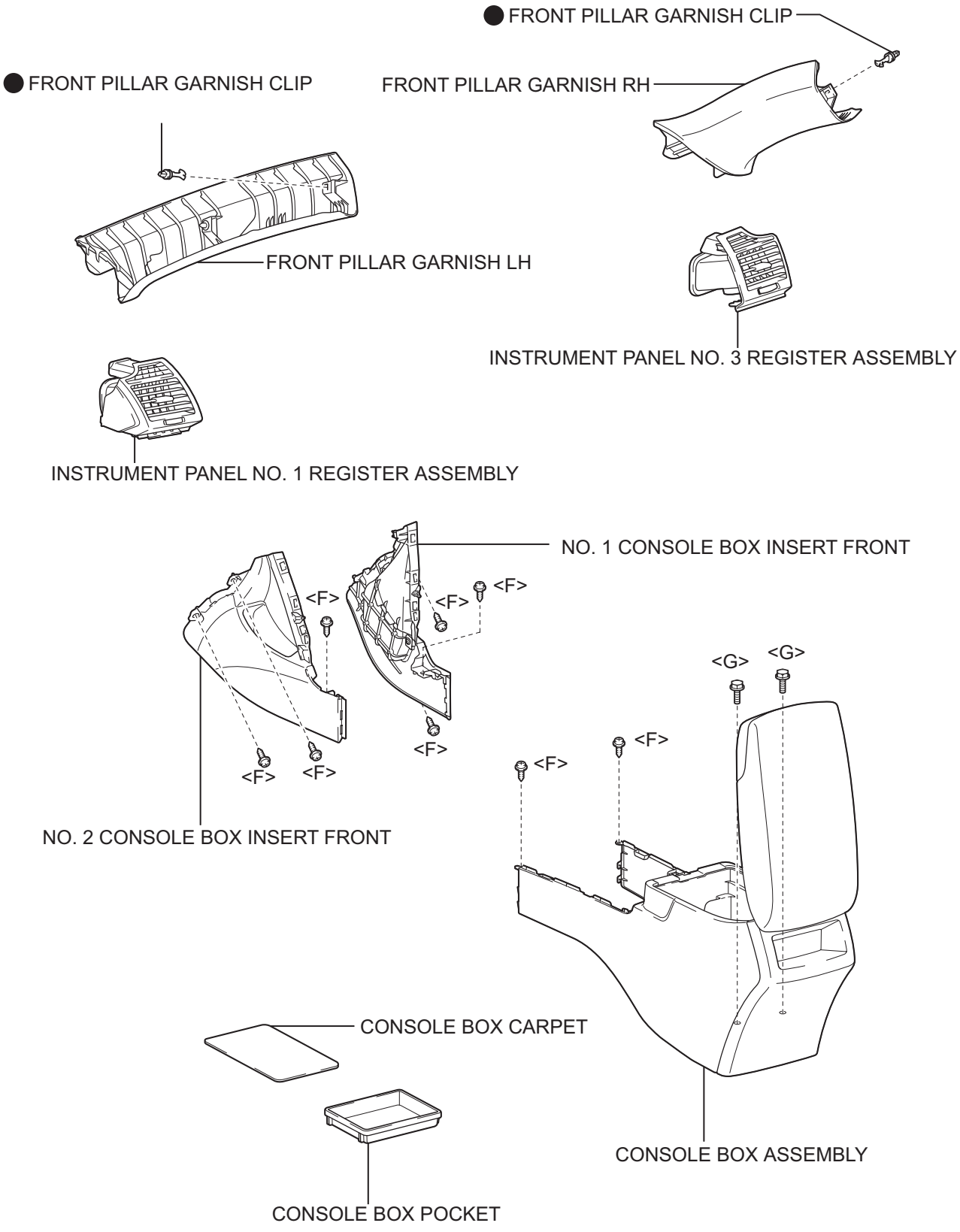


AC

P

B137284E03

for TMC Made:



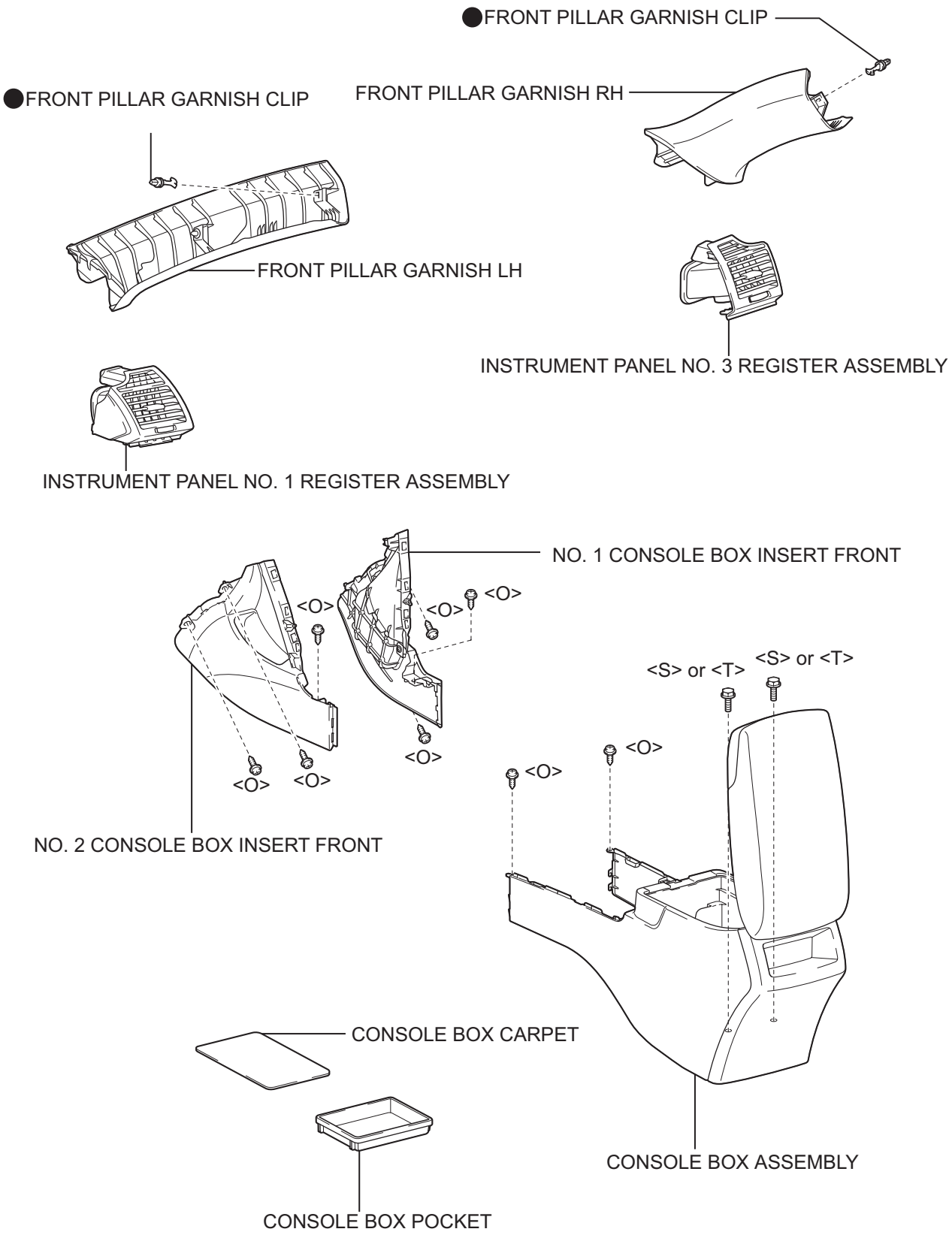
● Non-reusable part

P

B137285E01

AC

for TMMK Made:



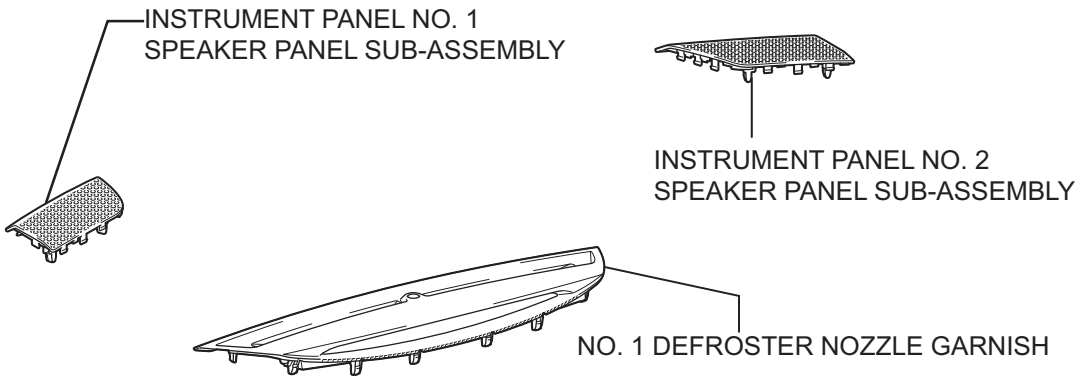
AC

● Non-reusable part

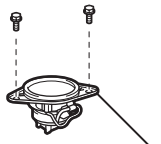
P

B137285E03

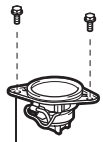
for TMC Made:

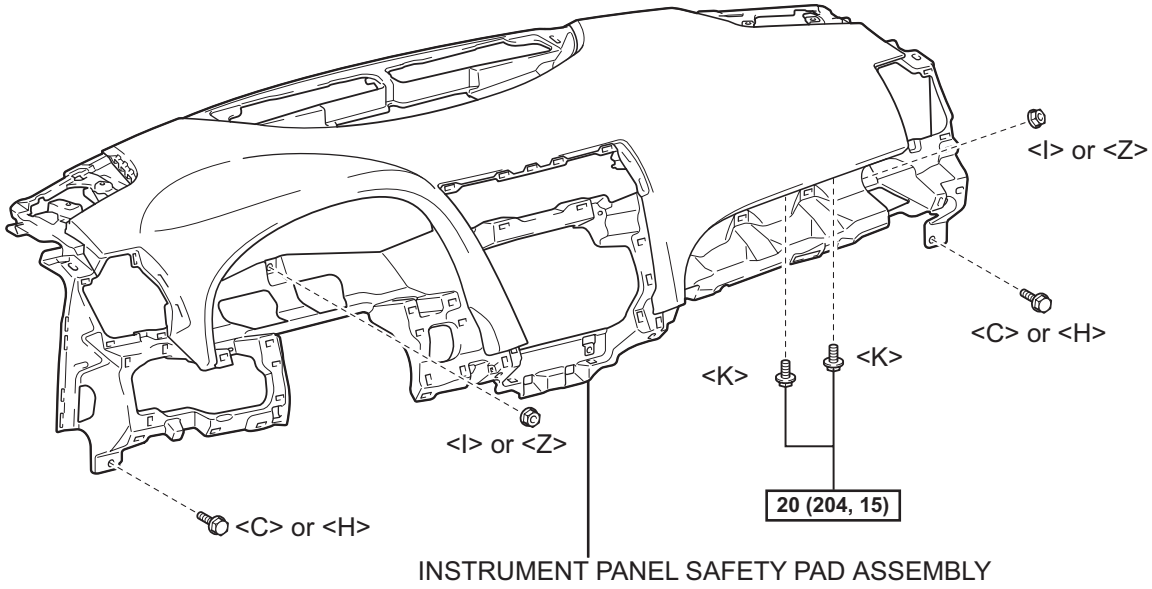


for LH Side:



for RH Side:





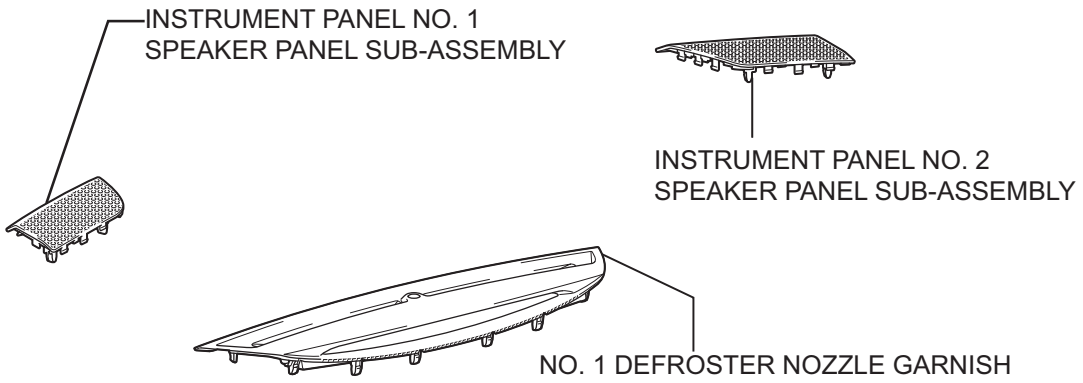
AC

N*m (kgf*cm, ft.*lbf) : Specified torque

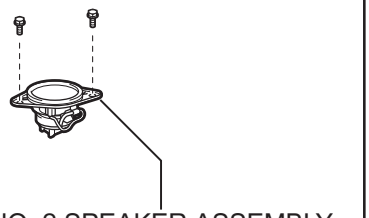
P

B137286E01

for TMMK Made:

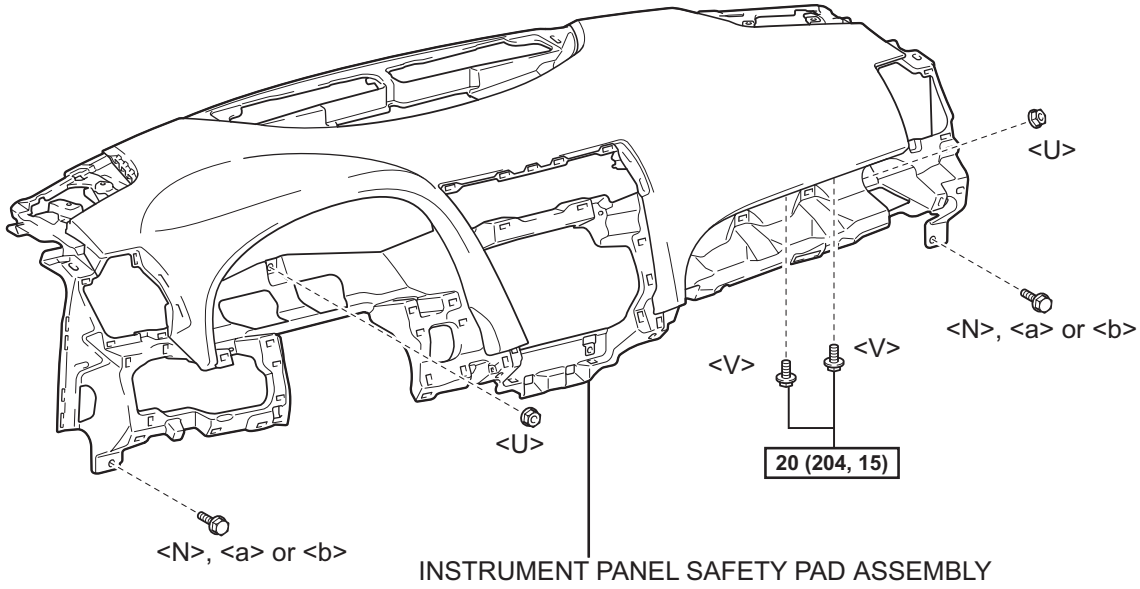


for LH Side:



for RH Side:

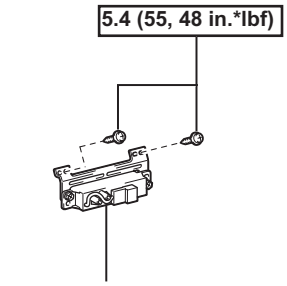
AC

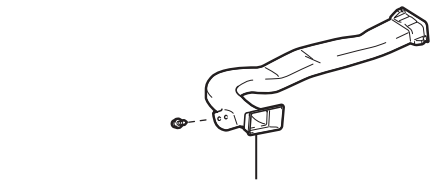


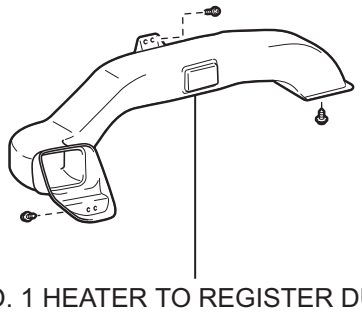
N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137286E03







N*m (kgf*cm, ft.*lbf): Specified torque

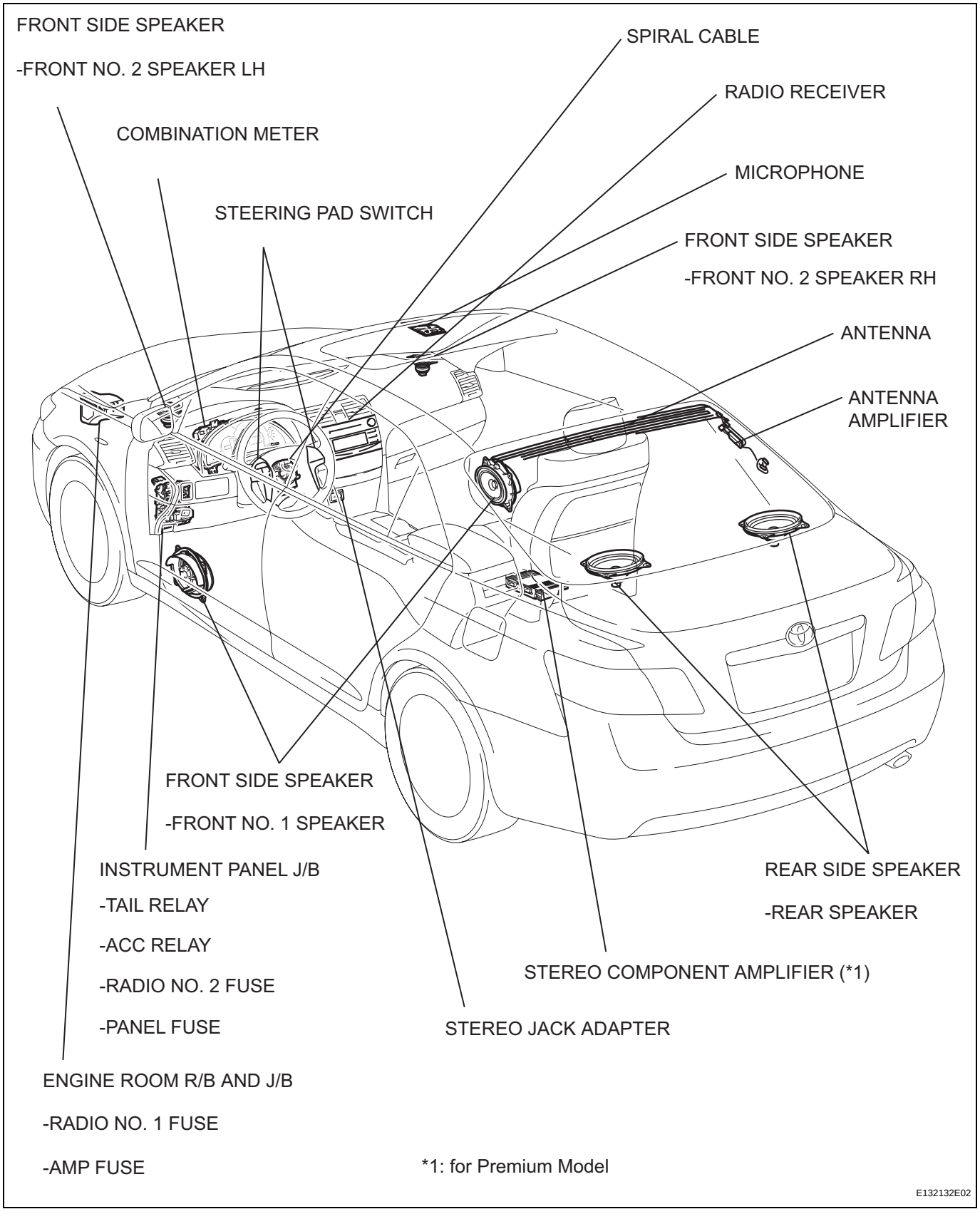
P

E129992E01

AC

AUDIO AND VISUAL SYSTEM

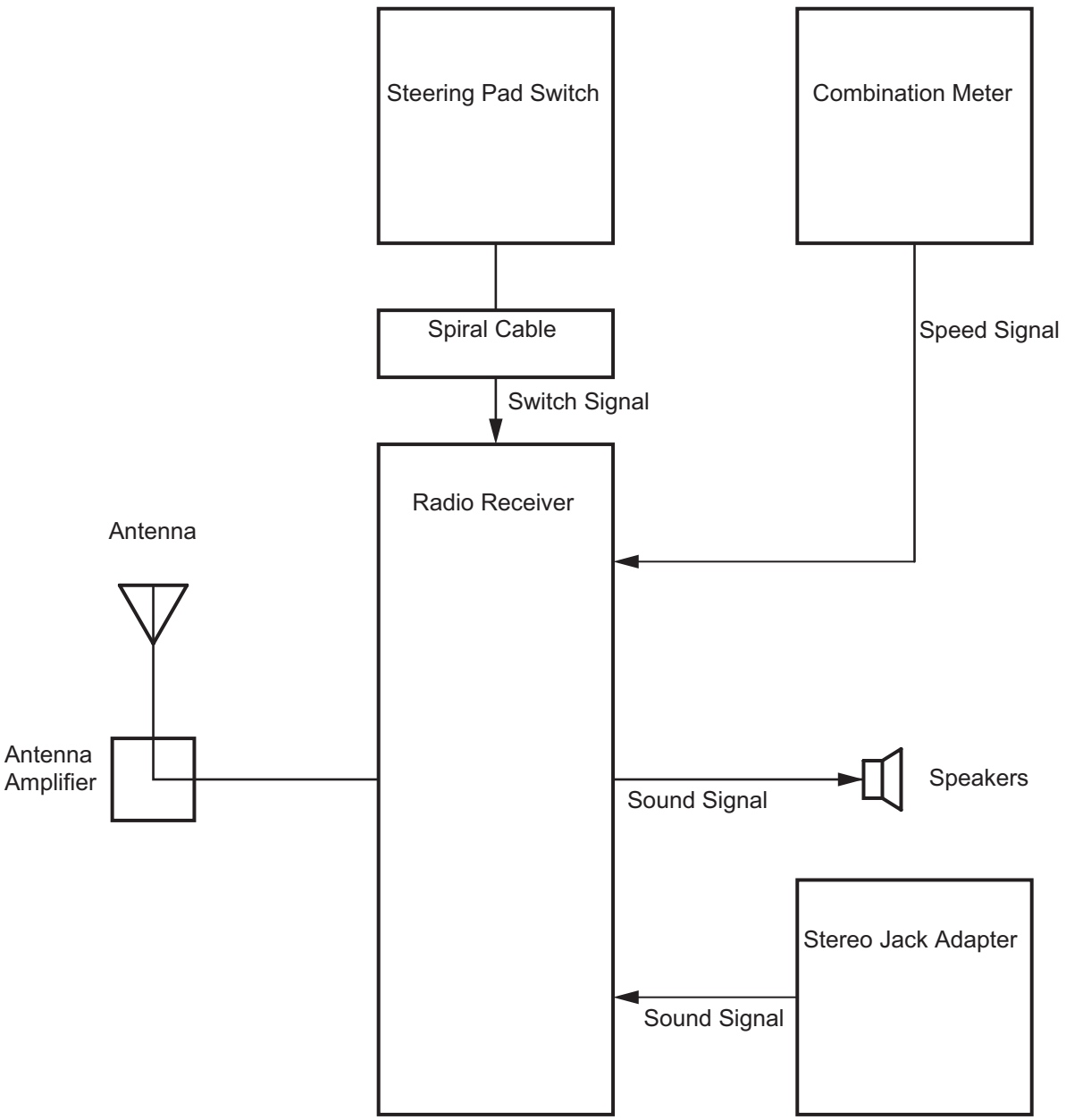
PARTS LOCATION



AV

SYSTEM DIAGRAM

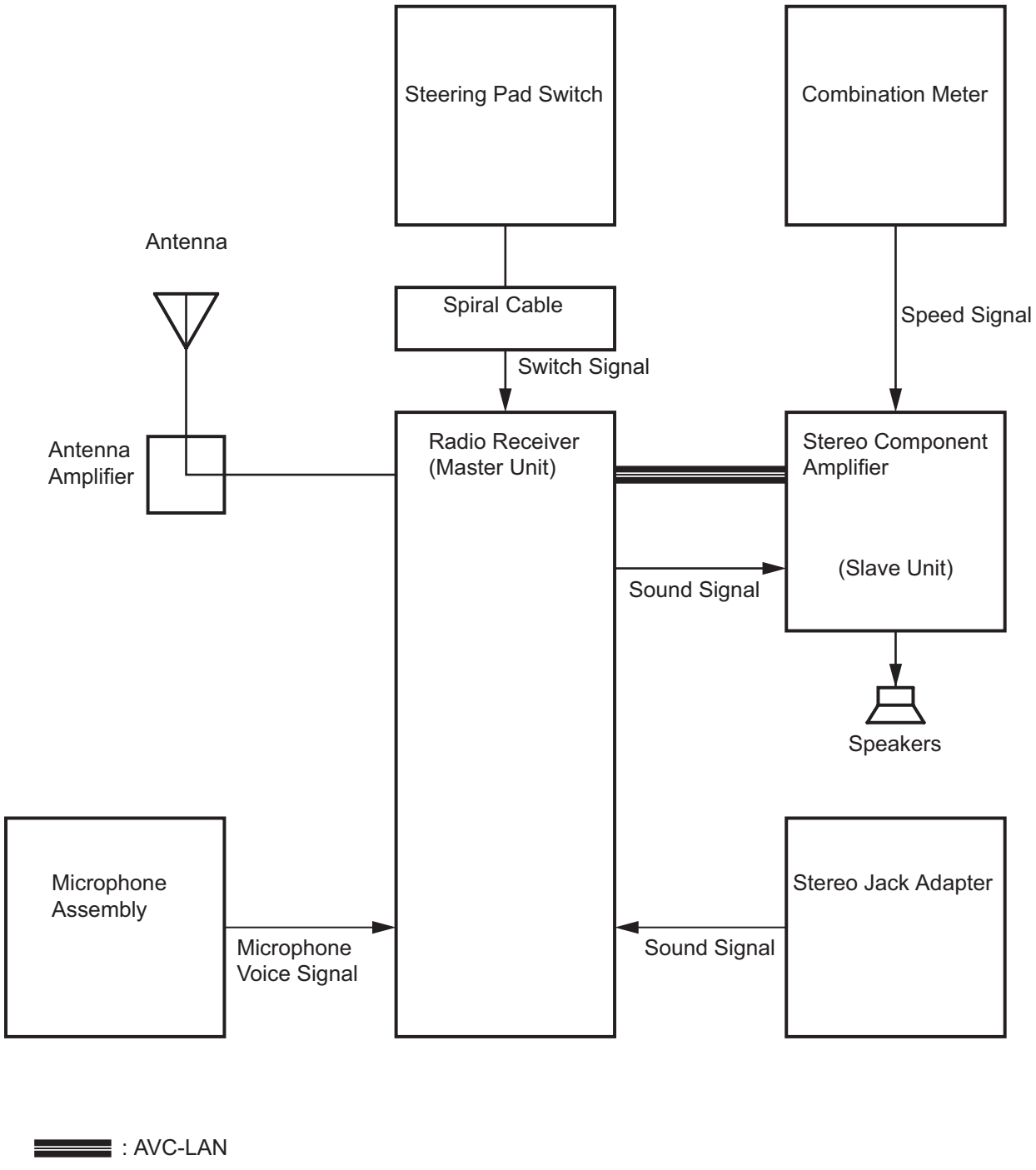
Standard Model:



P

E129797E03

Premium Model:



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AV

SYSTEM DESCRIPTION

1. DISC PLAYER OUTLINE

(a) A CD player uses a laser pickup to read digital signals recorded on CDs. By converting the digital signals to analog, music and other content can be played.

CAUTION:

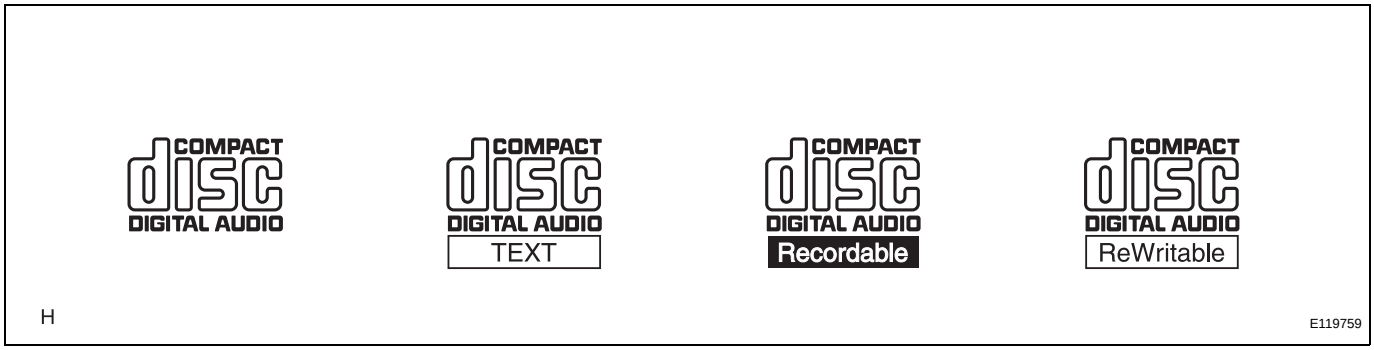
Do not look directly at the laser pickup because the CD player uses an invisible laser beam. Be sure to operate the player only as instructed.

NOTICE:

- **Do not disassemble any part of the CD player.**
- **Do not apply oil to the CD player.**
- **Do not insert anything but a CD into the CD player.**

(b) Usable discs

(1) The CD player can only play audio CDs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) that have any of the following marks:



(c) Precautions for use of discs

NOTICE:

- **Copy-protected CDs cannot be played.**
- **CD-Rs and CD-RWs may not be played depending on the recording conditions or characteristics of the discs, or due to damage, dirt, or deterioration caused by leaving the discs in the cabin for a long time.**
- **Unfinalized CD-Rs and CD-RWs cannot be played.**
- **Keep the discs away from dirt. Be careful not to damage the discs or leave your fingerprints on them.**
- **Hold discs by the outer edge and center hole with the label side up.**
- **Leaving the disc exposed halfway out of the slot for a long time after pressing the disc eject button may cause deformation of the disc, making the disc unusable.**
- **If discs have adhesive tape, stickers, CDR labels, or any traces of such labels attached, the discs may not be ejected or player malfunctions may result.**

- **Keep the discs away from direct sunlight. (Exposure to direct sunlight may cause deformation of the disc, making the disc unusable.)**
- **Do not use odd-shaped CDs because these may cause player malfunctions.**
- **Do not use discs whose recording portion is transparent or translucent because they may not be inserted, ejected, or played normally.**

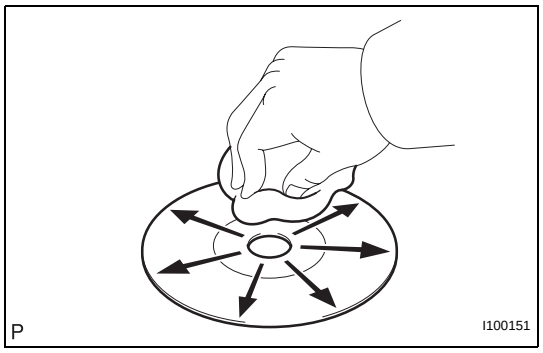
HINT:

- When it is cold or it is raining, if the windows mist up, mist and also dew may form in the player. In such a case, the CD may skip or the CD may stop in the middle of play. Ventilate or dehumidify the cabin for a while before using the player.
- The CD may skip if the player experiences strong vibrations when the vehicle is driven on rough road or similar uneven surface(s).

(d) Cleaning

NOTICE:

Do not use a lens cleaner because it may cause a malfunction in the pickup portion of the player.



(1) If dirt is on the disc surface, wipe it clean with a soft dry cloth such as an eyeglass cleaner for plastic lenses from the inside to the outside in a radial direction.

NOTICE:

- **Pressing on the disc by hand or rubbing the disc with a hard cloth may scratch the disc surface.**
- **Use of solvent such as a record spray, antistatic agent, alcohol, benzine, and thinner, or a chemical cloth may cause damage to the disc, making the disc unusable.**

2. MP3/WMA OUTLINE

(a) Playable MP3 file standards

Compatible standard	MP3 (MPEG1 LAYER3, MPEG2 LSF LAYER 3)
Compatible sampling frequency	• MPEG1 LAYER3: 32, 44.1, 48 (kHz) • MPEG2 LSF LAYER3: 16, 22.05, 24 (kHz)
Compatible bit rate	• MPEG1 LAYER3: 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 (kbps) • MPEG2 LSF LAYER3: 64, 80, 96, 112, 128, 144, 160 (kbps) • Compatible with VBR
Compatible channel mode	Stereo, joint stereo, dual channel, monaural

(b) Playable WMA file standards

Compatible standard	WMA Ver. 7, 8, and 9
Compatible sampling frequency	32, 44.1, 48 (kHz)
Compatible bit rate	• Ver. 7, 8: CBR48, 64, 80, 96, 128, 160, 192 (kbps) • Ver. 9: CBR48, 64, 80, 96, 128, 160, 192, 256, 320 (kbps) • Compatible with playback of channel 2 only

(c) ID3 tag and WMA tag
(1) Additional textual information called ID3 tag can be input to MP3 files. Information such as song titles and artist names can be stored.
HINT:
This player is compatible with the ID3 tags of ID3 Ver. 1.0 and 1.1, and ID3 Ver. 2.2 and 2.3. (Number of characters complies with ID3 Ver. 1.0 and 1.1.)
(2) Additional textual information called WMA tag can be input to WMA files. Information such as song titles and artist names can be stored.

(d) Usable media
(1) Only CD-ROMs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) can be used to play MP3/WMA files.
NOTICE:
- **CD-Rs and CD-RWs are more easily affected by a hot and humid environment than discs used for normal audio CDs. For this reason, some CD-Rs and CD-RWs may not be played.**
- **If there are fingerprints or scratches on the disc, the disc may not be played or the CD may skip.**
- **Some CD-Rs and CD-RWs deteriorate if they are left in the cabin for a long time.**
- **Keep CD-Rs and CD-RWs in a storage case that is impenetrable to light.**

(e) Usable media format
(1) Usable media format

Disc format	CD-ROM Mode 1, CD-ROM XA Mode 2 Form1
File format	ISO9660 Level 1 and Level 2 (Joliet, Romeo)

HINT:
- As for MP3/WMA files written in any format other than those above, the contents of the files may not be played normally or the file names or folder names may not be displayed correctly.
- This player is compatible with multi-session discs and can play CD-Rs and CD-RWs on which MP3/WMA files are added. However, only the first session can be played.
- Discs whose first session includes both music data and MP3 or WMA format data cannot be played.

(2) Standard and restrictions

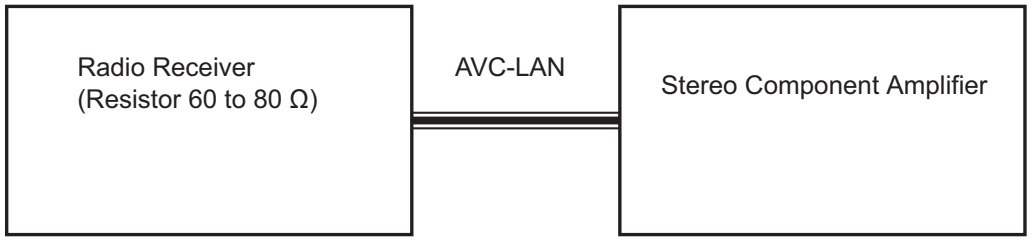
Maximum directory levels	8 levels
Maximum number of characters for a folder name/file name	32 characters
Maximum number of folders	192 (Including empty folders, route folders, and folders that do not contain MP3/WMA files)
Maximum number of files in a disc	255 (Including non-MP3/WMA files)

(f) File names
(1) Only files with an extension of ".mp3" or ".wma" can be recognized and played as MP3 or WMA files.
(2) Save MP3 or WMA files with an extension of ".mp3" or ".wma".
NOTICE:
If saving non-MP3 or non-WMA files with an extension of ".mp3" or ".wma", those files are wrongly recognized as MP3 or WMA files and played. A loud noise may occur and damage to the speaker may result.

3. AVC-LAN DESCRIPTION

(a) What is AVC-LAN?

Example:



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AVC-LAN, an abbreviation for "Audio Visual Communication Local Area Network", is a united standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

(b) Purpose:
Recently, car audio systems have rapidly developed and the functions have vastly changed. The conventional car audio system is being integrated with multi-media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows:
(1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.
(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.
HINT:
- If a short to +B or short to ground is detected in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

AV

- If the audio system has a navigation system installed, the multi-display unit acts as the master unit. If the navigation system is not installed, the audio head unit acts as the master unit instead. If the radio and navigation assembly is installed, it is the master unit.
- The radio receiver contains a resistor that is necessary to enable communication on the different AVC-LAN circuits.
- The car audio system with an AVC-LAN circuit has a diagnostic function.
- Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

4. COMMUNICATION SYSTEM OUTLINE

(a) Components of the audio system communicate with each other via the AVC-LAN.

(b) The master component of the AVC-LAN is a radio receiver with a 60 to 80 Ω resistor. This is essential for communication.

(c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

5. DIAGNOSTIC FUNCTION OUTLINE

(a) The audio system has a diagnostic function (the result is indicated on the master unit).

(b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.

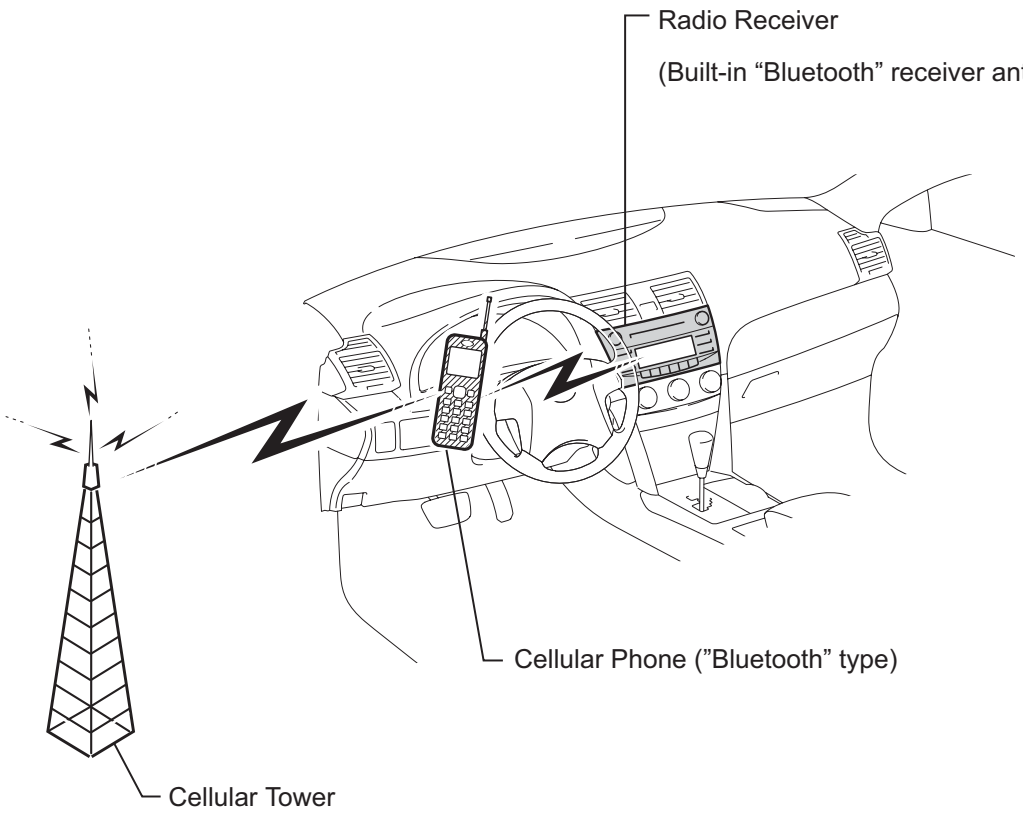
6. "BLUETOOTH" OUTLINE

(a) "Bluetooth" is a trademark owned by Bluetooth SIG. Inc.

(b) "Bluetooth" is a new wireless connection technology that uses the 2.4 GHz frequency band. This makes it possible to connect a cellular phone ("Bluetooth" compatible phone *1) to the radio receiver (the "Bluetooth" system is built in), and use the handsfree function of the cellular phone, even if it is in a pocket or bag. As a result, it is not necessary to use a connector attached directly to the cellular phone.

*1: Some versions of "Bluetooth" compatible cellular phones may not function.

Example:



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HINT:
The communication performance of "Bluetooth" may vary depending on obstructions or radio wave conditions between communication devices, electromagnetic radiation, communication device sensitivity, or antenna capacity.

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

3	BASIC INSPECTION

(a) Turn the ignition switch on (IG).
(b) Check whether or not the radio receiver turns on.

Result

Result	Proceed to
Radio receiver turns on	A
Radio receiver does not turn on	B

B → **Go to step 6**

A

4	CHECK FOR DTC

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTCs.
(c) Recheck for DTCs by simulating the operation indicated by the DTCs.
HINT:
- If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits and repair or replace the problem part.
- Even if the malfunction symptom is not confirmed, check the DTCs. This is because the system stores past DTCs.
- Check and clear past DTCs. Then check for DTCs.

Result

Result	Proceed to
DTC is output again	A
DTC is not output	B

B → Go to step 6

A

5 DIAGNOSTIC TROUBLE CODE CHART

Find the output code in the diagnostic trouble code chart (See page AV-27).

NEXT

Go to step 8

6 PROBLEM SYMPTOMS TABLE

Refer to the problem symptoms table (See page AV-13).

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 8

A

7 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (See page AV-15).

NEXT

8 ADJUST, REPAIR OR REPLACE

NEXT

9 CONFIRMATION TEST

NEXT

END

IDENTIFICATION OF NOISE SOURCE

1. Radio Description

(a) Radio frequency band

(1) Radio broadcasts use the radio frequency bands shown in the table below.

Frequency	30 kHz	300 kHz	30 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio Wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency MF: Medium Frequency HF: High Frequency VHF: Very High Frequency

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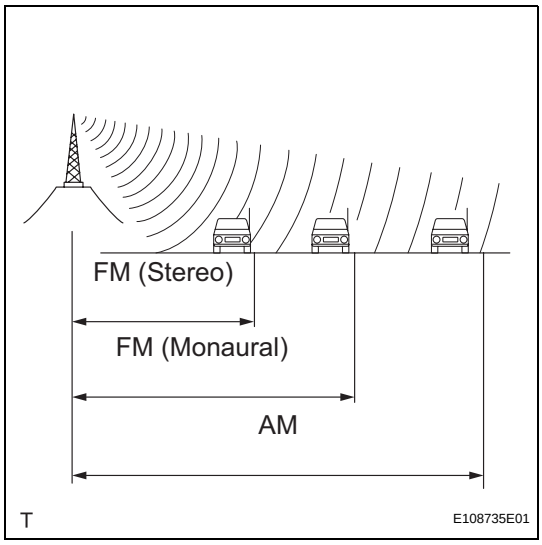


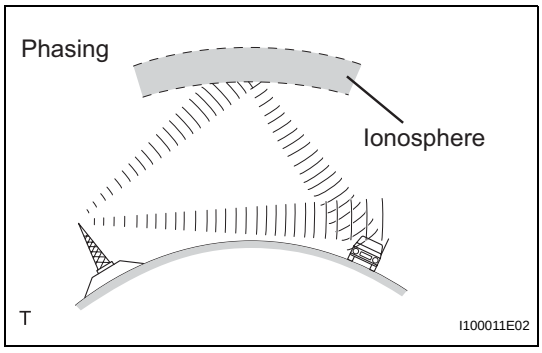
(b) Service area

(1) The service areas of AM and FM broadcasts are vastly different. Sometimes an AM broadcast can be received very clearly but an FM stereo cannot. FM stereo has the smallest service area, and is prone to pick up static and other types of interference such as noise.

(c) Radio reception problems

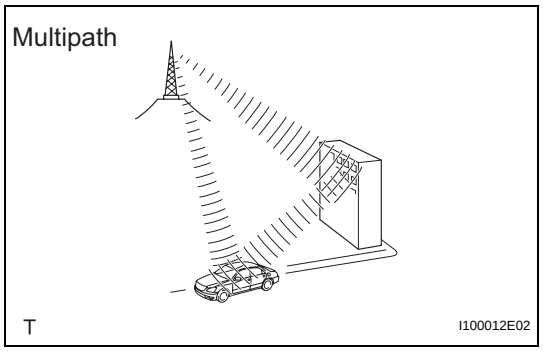
HINT:

In addition to static, other problems such as "phasing", "multipath", and "fade out" exist. These problems are not caused by electrical noise, but by the radio signal propagation method itself.

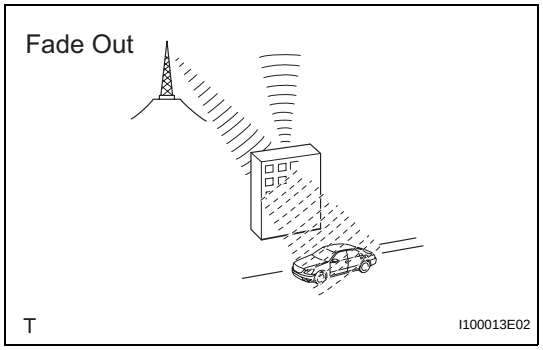


(1) Phasing

AM broadcasts are susceptible to electrical interference and another kind of interference called phasing. Occurring only at night, phasing is the interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off the ionosphere and the other signal is received directly from the transmitter.



(2) Multipath
Multipath is a type of interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off buildings or mountains and the other signal is received directly from the transmitter.



(3) Fade out
Fade out is caused by objects (buildings, mountains, and other such large obstacles) that deflect away part of a signal, resulting in a weaker signal when the object is between the transmitter and vehicle. High frequency radio waves, such as FM broadcasts, are easily deflected by obstructions. Low frequency radio waves, such as AM broadcasts, are much more difficult to deflect.

(d) Noise problem
Technicians must have a clear understanding about each customer's noise complaint. Use the following table to diagnose noise problems.

Radio Frequency	Noise Occurrence Condition	Presumable Cause
AM	Noise occurs in a specified area	Foreign noise
AM	Noise occurs when listening to an intermittent broadcast	An identical program transmitted from multiple towers can cause noise where the signals overlap
AM	Noise occurs only at night	Music beat from a distant broadcast
FM	Noise occurs while driving in a specified area	Multipath or phasing noise resulting from a change in FM frequency

HINT:
If the noise does not match the examples above, refer to the descriptions about phasing and multipath.

PROBLEM SYMPTOMS TABLE

HINT:

- Before inspecting the suspected areas listed in the table below, check the fuse and relay.
- Before inspecting the suspected areas listed in the table below, check for DTCs.
- Methods used to verify the cause of the problem are listed in order of probability in the suspected area column.

Audio Function:

Symptom	Suspected area	See page
Pressing power switch does not turn on system.	1. Proceed to "Pressing Power Switch does not Turn on System"	AV-68
	2. Radio receiver power source circuit	AV-140
	3. AVC-LAN circuit	AV-118
	4. Radio receiver	AV-145
Panel switch does not function.	1. Steering pad switch circuit	AV-91
	2. AVC-LAN circuit	AV-118
	3. Radio receiver	AV-145
No sound can be heard from speakers. (Audio is mute.) (for premium model)	1. Radio receiver power source circuit	AV-140
	2. Proceed to "No Sound can be Heard from Speakers"	AV-69
	3. Stereo component amplifier power source circuit	AV-142
	4. Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-111
	5. Speaker circuit	AV-103
	6. Proceed to "Mute Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-115
	7. Stereo component amplifier	AV-150
	8. Radio receiver	AV-145
No sound can be heard from speakers. (Audio is mute.) (for standard model)	1. Radio receiver power source circuit	AV-140
	2. Proceed to "No Sound can be Heard from Speakers"	AV-69
	3. Speaker circuit	AV-103
	4. Radio receiver	AV-145
Sound quality is bad in all modes. (Volume is too low.) (for premium model)	1. Proceed to "Poor Sound Quality in All Modes (Low Volume)"	AV-80
	2. Speaker circuit.	AV-103
	3. Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-111
	4. Proceed to "Mute Signal Circuit between Radio Receiver and Stereo Component Amplifier"	AV-115
	5. Stereo component amplifier	AV-150
	6. Radio receiver	AV-145
Sound quality is bad in all modes. (Volume is too low.) (for standard model)	1. Proceed to "Poor Sound Quality in All Modes (Low Volume)"	AV-80
	2. Speaker circuit	AV-103
	3. Radio receiver	AV-145
ASL does not function. (for premium model)	Proceed to "Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter"	AV-120
ASL does not function. (for standard model)	Proceed to "Vehicle Speed Signal Circuit between Radio Receiver and Combination Meter"	AV-87
External device sound cannot be heard or sound quality is bad. (Stereo jack is used.)	1. Radio receiver power source circuit	AV-140
	2. Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Jack Adapter"	AV-113
	3. Stereo jack adapter	AV-223
	4. Radio receiver	AV-145

Symptom	Suspected area	See page
Abnormal noise occurs. (for premium model)	1. Proceed to "Noise occurs"	AV-66
	2. Stereo component amplifier	AV-150
	3. Radio receiver	AV-145
Abnormal noise occurs. (for standard model)	1. Proceed to "Noise occurs"	AV-66
	2. Radio receiver	AV-145
Radio broadcast cannot be received or poor reception.	Proceed to "Radio Broadcast cannot be Received or Poor Reception"	AV-76
CD cannot be inserted / played or CD is ejected right after insertion.	1. Radio receiver power source circuit	AV-140
	2. Proceed to "CD cannot be Inserted / Played or CD is Ejected Right After Insertion"	AV-72
CD cannot be ejected.	1. Radio receiver power source circuit	AV-140
	2. Proceed to "CD cannot be Ejected"	AV-71
Sound quality is bad only when CD is played. (Volume is too low.)	Proceed to "Sound Quality is Bad Only when CD is Played (Volume is Too Low)"	AV-70
CD sound skips.	Proceed to "CD Sound Skips"	AV-74
Radio receiver cannot be illuminated at night.	1. Illumination circuit	AV-96
	2. Radio receiver	AV-145

Steering Pad Switch Function:

Symptom	Suspected area	See page
Audio system cannot be operated with steering pad switch.	1. Steering pad switch circuit	AV-91
	2. Radio receiver	AV-145
Steering pad switch cannot be illuminated at night.	1. Illumination circuit	AV-96
	2. Radio receiver	AV-145

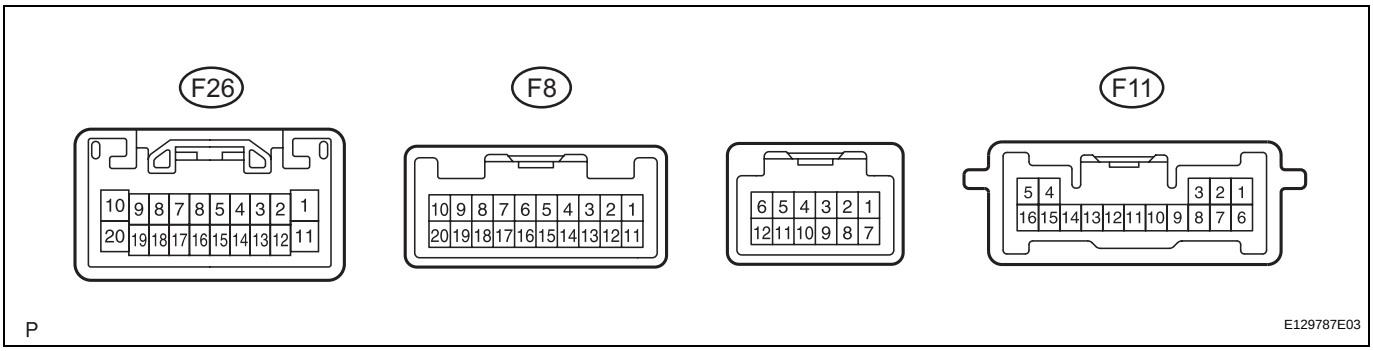
"Bluetooth" Function (*1):

Symptom	Suspected area	See page
Cellular phone registration failure, phone directory transfer failure.	Proceed to "Cellular Phone Registration Failure, Phone Directory Transfer Failure"	AV-81
Cellular phone cannot send / receive.	1. Proceed to "Cellular Phone cannot Send / Receive"	AV-83
	2. Steering pad switch circuit	AV-91
	3. Radio receiver	AV-145
The other caller's voice cannot be heard, is too quiet, or distorted.	1. Proceed to "The Other Caller's Voice cannot be Heard, is too Quiet, or Distorted"	AV-85
	2. Proceed to "Cellular Phone Voice Circuit between Radio Receiver and Stereo Component Amplifier"	AV-124
	3. Radio receiver	AV-145
	4. Stereo component amplifier	AV-150
The other caller cannot hear your voice, or your voice is too quiet or distorted.	1. Proceed to "The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted"	AV-86
	2. Proceed to "Microphone Circuit between Microphone and Radio Receiver"	AV-126
	3. Microphone	AV-232
	4. Radio receiver	AV-145

*1: for Premium Model

TERMINALS OF ECU

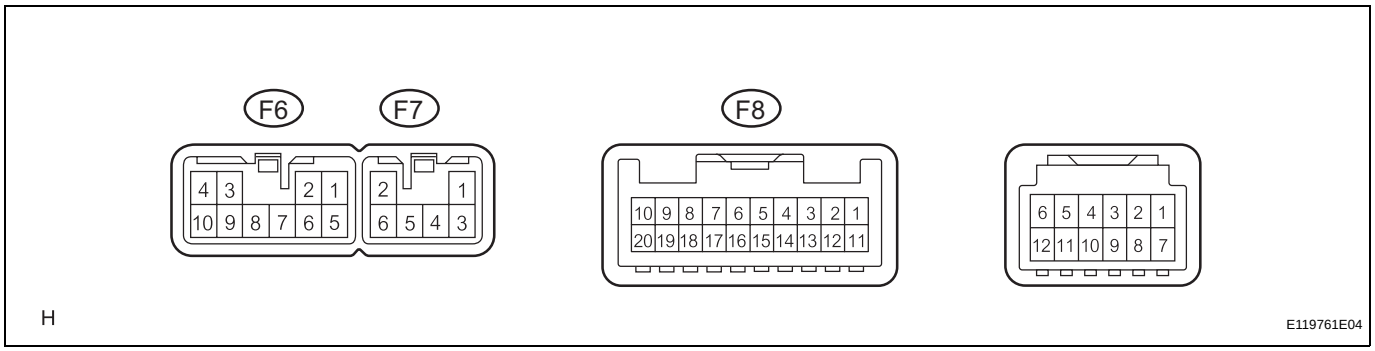
1. RADIO RECEIVER (PREMIUM MODEL)



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
B (F26-1) - GND (F26-20)	L-Y - BR	Battery	Always	10 to 14 V
ILL+ (F26-2) - GND (F26-20)	G - BR	Illumination signal	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
ATX+ (F26-5) - GND (F26-20)	R - BR	AVC-LAN communication signal	Turn ignition switch on (ACC)	2 to 3 V
MUTE (F26-7) - GND (F26-20)	O - BR	MUTE signal	Audio system is playing → Changing	Above 3.5 V → Below 1 V
R+ (F26-8) - GND (F26-20)	R - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L+ (F26-9) - GND (F26-20)	B - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
SLD (F26-10) - Body ground	Shielded - Body ground	Shield ground	Always	Below 1 V
ACC (F26-11) - GND (F26-20)	GR - BR	Accessory (ON)	Turn ignition switch on (ACC)	10 to14 V
ILL- (F26-12) - GND (F26-20)	W-B - BR	Illumination (rheostat) signal	Light control switch OFF → TAIL	Below 1 V → Pulse generation
ANT (F26-13) - GND (F26-20)	O - BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
ATX- (F26-15) - GND (F26-20)	G - BR	AVC-LAN communication signal	Turn ignition switch on (ACC)	2 to 3 V
R- (F26-18) - GND (F26-20)	G - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L- (F26-19) - GND (F26-20)	W - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (F26-20) - Body ground	BR - Body ground	Ground	Always	Below 1 V
SWG (F8-6) - GND (F26-20)	P - BR	Steering pad switch ground	Always	Below 1 V
SW1 (F8-7) - GND (F26-20)	O - BR	Steering pad switch signal	Steering pad switch not operated → SEEK+ switch pushed → SEEK- switch pushed → VOL+ switch pushed → VOL- switch pushed	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
SW2 (F8-8) - GND (F26-20)	Y - BR	Steering pad switch signal	Steering pad switch not operated → MODE switch pushed → ON HOOK switch pushed → OFF HOOK switch pushed	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V
IVO+ (F8-11) - GND (F26-20)	R - BR	Voice signal	"Bluetooth" handsfree voice signal is playing	A waveform synchronized with sounds is output

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
IVO- (F8-12) - GND (F26-20)	G - BR	Voice signal	"Bluetooth" handsfree voice signal is playing	A waveform synchronized with sounds is output
SLD (F8-13) - Body ground	Shielded - Body ground	Shield ground	Always	Below 1 V
ARI (F8-15) - GND (F26-20)	G - BR	Sound signal (Right)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
ASGN (F8-16) - GND (F26-20)	BR - BR	Shield ground	Always	Below 1 V
ALI (F8-17) - GND (F26-20)	R - BR	Sound signal (Left)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
AUXI (F8-19) - GND (F26-20)	G - BR	External device connection detection signal	External device is connected	Below 1 V
MIC- (F11-1) - GND (F26-20)	R - BR	Microphone voice signal	Bluetooth handsfree function is ON	A waveform synchronized with sounds is output
MIC+ (F11-2) - GND (F26-20)	G - BR	Microphone voice signal	Bluetooth handsfree function is ON	A waveform synchronized with sounds is output
+B (F11-5) - GND (F26-20)	L - BR	Battery	Always	10 to 14 V
MCVD (F11-7) - GND (F26-20)	LG - BR	Microphone AMP power supply	Turn ignition switch off → on (IG)	Below 1 V → 5 V
GND (F11-14) - Body ground	BR - Body ground	Ground	Always	Below 1 V
ACC (F11-16) - GND (F26-20)	GR - BR	Accessory (ON)	Turn ignition switch off → on (ACC)	Below 1 V → 10 to 14 V

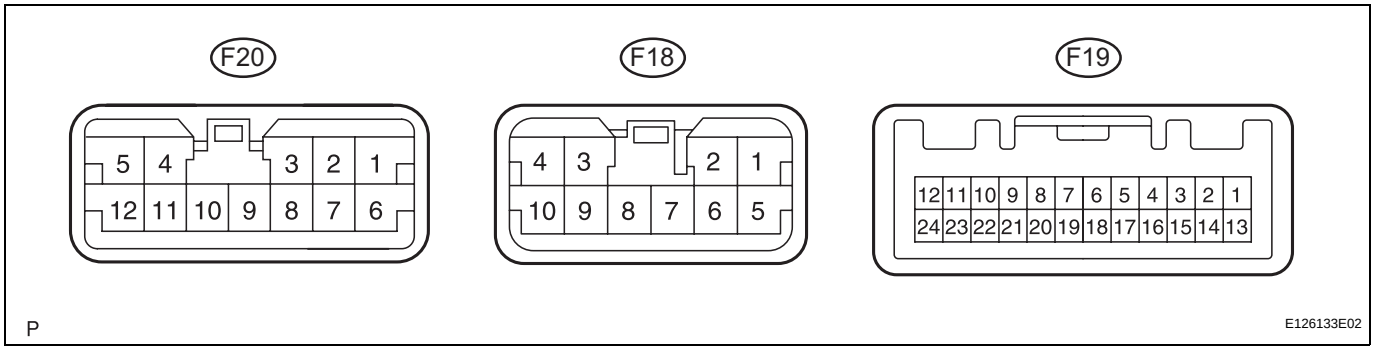
2. RADIO RECEIVER (STANDARD MODEL)



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
FR+ (F6-1) - GND (F6-7)	LG - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
FL+ (F6-2) - GND (F6-7)	P - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
ACC (F6-3) - GND (F6-7)	GR - BR	Accessory (ON)	Turn ignition switch off→ on (ACC)	Below 1 V → 10 to 14 V
B (F6-4) - GND (F6-7)	L-Y - BR	Battery	Always	10 to 14 V
FR- (F6-5) - GND (F6-7)	L - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
FL- (F6-6) - GND (F6-7)	V - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (F6-7) - Body ground	BR - Body ground	Ground	Always	Below 1 V
ANT (F6-8) - GND (F6-7)	O - BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
ILL+ (F6-10) - GND (F6-7)	G - BR	Illumination signal	Light control switch OFF → TAIL or HEAD	Below 1 V → 10 to 14 V
RR+ (F7-1) - GND (F6-7)	R - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
RL+ (F7-2) - GND (F6-7)	B - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
RR- (F7-3) - GND (F6-7)	W - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
ILL- (F7-5) - GND (F6-7)	W-B - BR	Illumination (rheostat) signal	Light control switch OFF → TAIL or HEAD	Below 1 V → Pulse generation
RL- (F7-6) - GND (F6-7)	Y - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
SPD (F8-3) - GND (F6-7)	V - BR	Speed signal from combination meter	Turn ignition switch on (IG). Turn drive wheels slowly.	Pulse generation
SWG (F8-6) - GND (F6-7)	P - BR	Steering pad switch ground	Always	Below 1 V
SW1 (F8-7) - GND (F6-7))	O - BR	Steering pad switch signal	Steering pad switch not operated → SEEK+ switch pushed → SEEK- switch pushed → VOL+ switch pushed → VOL- switch pushed	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
SW2 (F8-8) - GND (F6-7)	Y - BR	Steering pad switch signal	Steering pad switch not operated → MODE switch pushed	4 V or more → Below 2.5 V
ARI (F8-15) - GND (F6-7)	O - BR	Sound signal (Right)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
ASGN (F8-16) - GND (F6-7)	BR - BR	Shield ground	Always	Below 1 V
ALI (F8-17) - GND (F6-7)	R - BR	Sound signal (Left)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
AUXI (F8-19) - GND (F6-7)	G - BR	External device connection detection signal	External device is connected	Below 1 V

3. STEREO COMPONENT AMPLIFIER (PREMIUM MODEL)

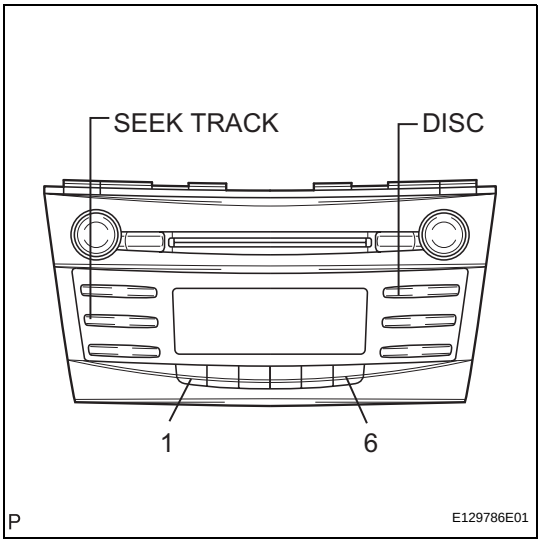


Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
MUTE (F19-1) - GND (F20-6)	O - BR	Mute signal from radio receiver	Audio system is playing → Changing	Above 3.5 V → Below 1 V
L- (F19-2) - GND (F20-6)	W - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
L+ (F19-3) - GND (F20-6)	B - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
R- (F19-4) - GND (F20-6)	G - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
R+ (F19-5) - GND (F20-6)	R - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
SLD (F19-6) - Body ground	Shielded - Body ground	Shield ground	Always	Blow 1 V
TX- (F19-7) - GND (F20-6)	G - BR	AVC-LAN communication signal	Turn ignition switch on (ACC)	2 to 3 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
TX+ (F19-8) - GND (F20-6)	R - BR	AVC-LAN communication signal	Turn ignition switch on (ACC)	2 to 3 V
SPD (F19-11) - GND (F20-6)	V - BR	Speed signal from combination meter	Turn ignition switch on (IG). Turn drive wheels slowly.	Pulse generation
ACC (F19-12) - GND (F20-6)	GR - BR	Accessory (ON)	Turn ignition switch off → on (ACC)	Below 1 V → 10 to 14 V
INT- (F19-22) - GND (F20-6)	G - BR	Voice signal	Navigation or "Bluetooth " handsfree voice signal is provided	A waveform synchronized with sounds is output
INT+ (F19-23) - GND (F20-6)	R - BR	Voice signal	Navigation or "Bluetooth " handsfree voice signal is provided	A waveform synchronized with sounds is output
+B (F18-1) - GND (F20-6)	GR - BR	Battery	Always	10 to 14 V
FR+ (F18-2) - GND (F20-6)	LG - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
RL+ (F18-3) - GND (F20-6)	B - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
RR- (F18-4) - GND (F20-6)	W - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
+B2 (F18-5) - GND (F20-6)	GR - BR	Battery	Always	10 to 14 V
FR- (F18-6) - GND (F20-6)	L - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
FL- (F18-7) - GND (F20-6)	V - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
FL+ (F18-8) - GND (F20-6)	P - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
RL- (F18-9) - GND (F20-6)	Y - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
RR+ (F18-10) - GND (F20-6)	R - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
WFL- (F20-1) - GND (F20-6)	V - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
WFL+ (F20-2) - GND (F20-6)	P - BR	Sound signal (Front Left)	Audio system is playing	A waveform synchronized with sounds is output
WFR- (F20-3) - GND (F20-6)	L - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
SL+ (F20-4) - GND (F20-6)	G-W - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
SR+ (F20-5) - GND (F20-6)	L - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output
GND (F20-6) - Body ground	BR - Body ground	Ground	Always	Below 1 V
E (F20-7) - Body ground	BR - Body ground	Ground	Always	Below 1 V
WFR+ (F20-9) - GND (F20-6)	LG - BR	Sound signal (Front Right)	Audio system is playing	A waveform synchronized with sounds is output
SL- (F20-10) - GND (F20-6)	BR - BR	Sound signal (Rear Left)	Audio system is playing	A waveform synchronized with sounds is output
SR- (F20-12) - GND (F20-6)	Y - BR	Sound signal (Rear Right)	Audio system is playing	A waveform synchronized with sounds is output

DTC CHECK / CLEAR

HINT:
If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits and repair or replace the problem part. (See page AV-118)

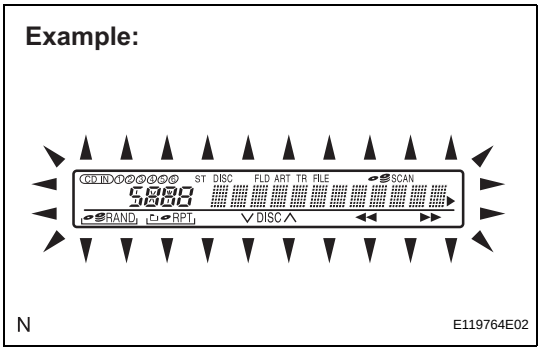


1. STARTING DIAGNOSTIC MODE

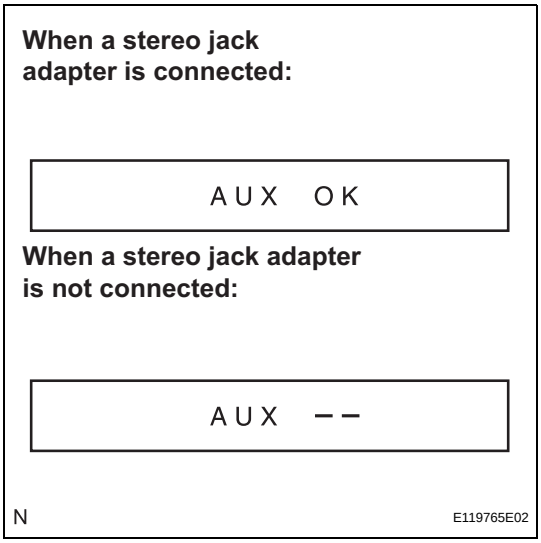
(a) Turn the ignition switch on (ACC).
(b) Turn off the audio system.
(c) While pressing the preset switches "1" and "6" at the same time, press the "DISC" switch 3 times.
HINT:
A beep is emitted 3 times and the diagnostic function is activated. The system enters the all element illumination mode and the switch check mode.

2. ALL ELEMENT ILLUMINATION MODE AND SWITCH CHECK MODE

HINT:
Illumination status of all switches and operations of the panel switches can be checked.



(a) Check that all elements are on.
(b) When pressing each panel switch, check that a beep is emitted.
NOTICE:
Pressing the "SEEK TRACK UP" switch transfers the screen to the stereo jack adapter connection check screen. Check the operation of this switch by confirming the transfer of the screen.



3. STEREO JACK ADAPTER CONNECTION CHECK MODE

(a) Press the "SEEK TRACK UP" switch.
(b) Check if the stereo jack adapter is recognized.
HINT:
Vehicles that do not have a stereo jack adapter also have this function.
NOTICE:
This function is not to check connection information on an external device, but to check recognition information on a stereo jack adapter.

4. SERVICE CHECK MODE

(a) Press the "SEEK TRACK UP" switch.
HINT:
For details of the service check mode, refer to "6. CHECK DTC" and "7. DTC CLEAR/RECHECK".

5. FINISHING DIAGNOSTIC MODE

(a) Press the "DISC" switch for 2 seconds or more, or turn the ignition switch off.

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6. CHECK DTC

HINT:

Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

(a) Reference:

In the system check mode, the system check and the diagnostic memory check are performed, and the check results are displayed in ascending order of the component codes (physical address).

Terms	Meaning
Component code (Physical address)	Three-digit code (in hexadecimal) given to each device comprising AVC-LAN. Corresponding to its function, individual symbol is provided.
Logical address	Two-digit code (in hexadecimal) given to each function and device unit in each device comprising AVC-LAN.

(b) Service check result display

Display	Previous term	Meaning	Action to be taken
good	Good (normal)	No DTCs are detected in both "System Check Mode" and "Diagnostic Memory Mode".	-
nCon	No connection	The system recognized the component when it was registered, but the component gives no response to the "Diagnostic Mode ON Request".	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).
ECHn	Exchange	One or more DTCs for "Exchange" are detected in either "System Check Mode" or "Diagnostic Memory Mode".	Go to the detailed information mode to check the trouble area referring to the DTC list.
CHEC	Check	When no DTCs are detected for "Exchange", one or more DTCs for "Check" are detected in either "System Check Mode" or "Diagnostic Memory Mode".	Go to the detailed information mode to check the trouble area referring to the DTC list.
OLd	Old version	Old DTC application is identified and DTC is detected in either "System Check Mode" or "Diagnostic Memory Mode".	-
nrES	No response	The device gives no response to any one of "System Check Mode ON Request", "System Check Result Request", and "Diagnostic Memory Request".	Check the power source circuit and the communication circuit of the component indicated by the component code (physical address).

(c) Device name and physical address

Physical address No.	Name
190	Radio receiver
440	Stereo component amplifier
19D	"Bluetooth" handsfree module

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(d) Service check mode

(1) Press the "SEEK TRACK" switch to see the check result of each component.

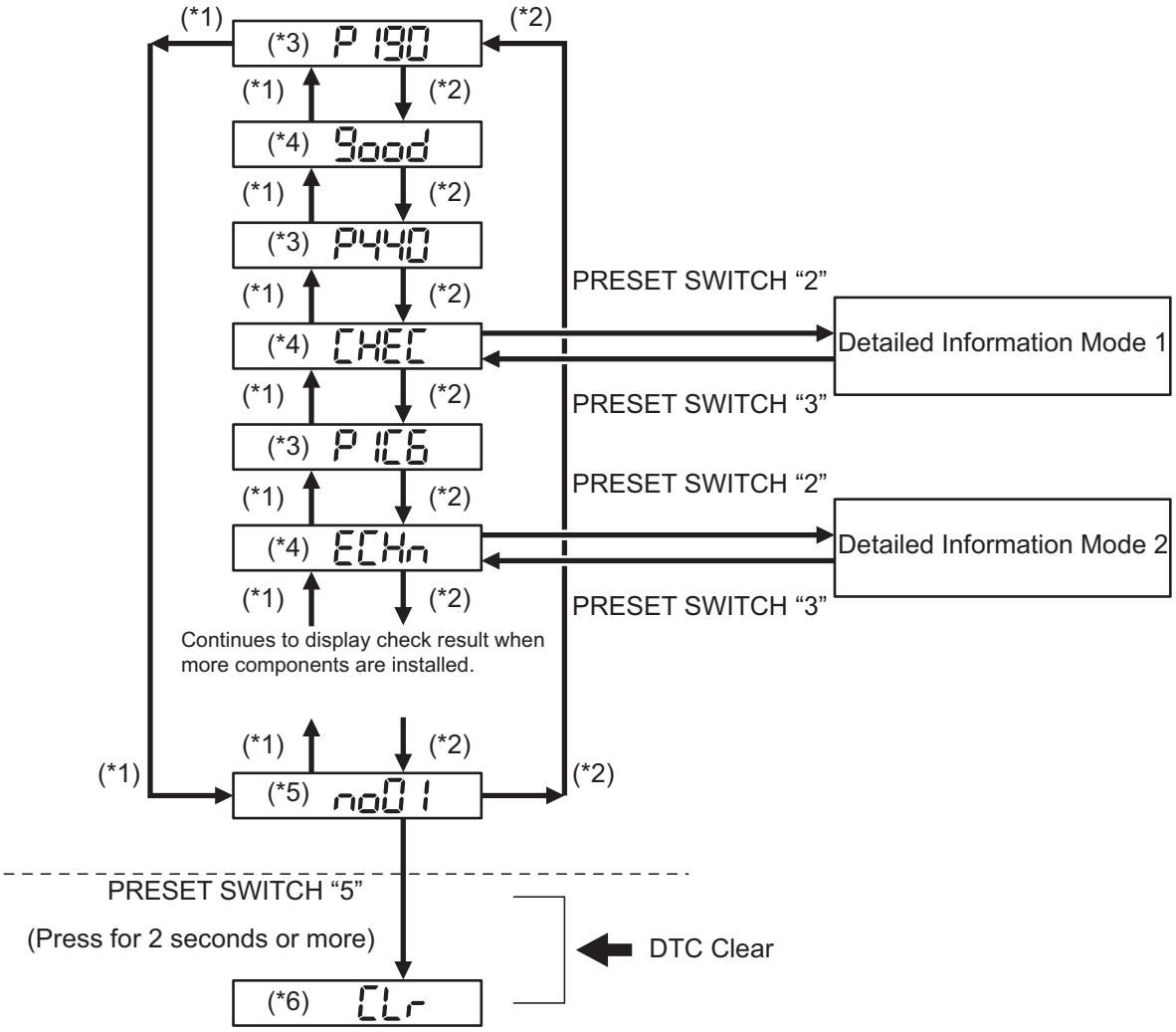
(2) The component code (physical address) is displayed first, and then the check result follows.

HINT:

- If all check results are "good", the system judges that no DTC exists.

- If the preset switch "1" is pressed in the service check mode, service check is performed again.
- This illustration is only an example and may differ in cases such as for each option part and output DTCs.

Service Check Mode:



*1: SEEK TRACK DOWN

*2: SEEK TRACK UP

*3: P...Indicates physical address

190/440/1C6...Physical address

*4: Result

*5: Up-to-date connection check number

*6: Memory clear

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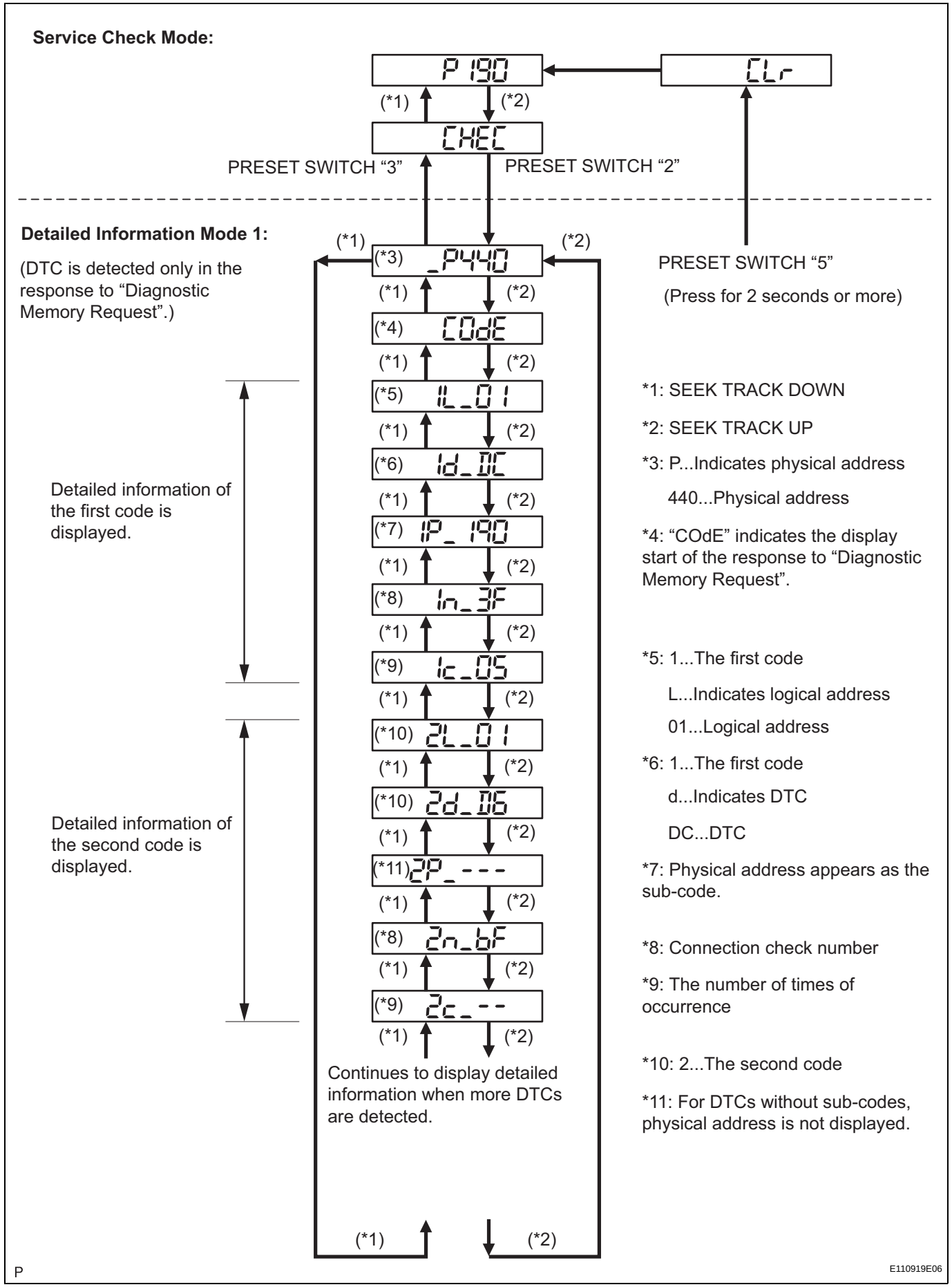
(e) Detailed information mode 1
HINT:
- "Detailed Information Mode 1" is displayed when there is no response to "System Check Result Request" and DTC is detected only in "Diagnostic Memory Request".
- The component device code (physical address) is displayed first, and then the check result follows.
- This illustration is only an example and may differ in cases such as for each option part and output DTCs.

(1) Press the preset switch "2" to go to the "Detailed Information Mode 1".
(2) Press the "SEEK TRACK" switch to display the physical address and DTC of the component.
(3) Press the preset switch "3" to go to the "Service Check Mode".
(4) Distinguish between the displays of the responses to "System Check Result Request" and "Diagnostic Memory Request". In order to distinguish the information detected in "System Check Mode" and "Diagnostic Memory Mode" in "ECHn", "CHEC", and "OLd" in "Detailed Information Mode 1", refer to the following:
- "SyS" is displayed before the detailed codes detected as a result of "System Check Result Request" are displayed.
- "COdE" is displayed before the detailed codes detected as a result of "Diagnostic Memory Request" are displayed.

HINT:
- The response to "System Check Result Request" is the current information given from each ECU as a result of the system check.
- The response to "Diagnostic Memory Request" contains the information received from each ECU or stored in each ECU in the past.
- The response to "Diagnostic Memory Request" is the output DTCs as a result of the diagnostic memory check or the DTCs received from each ECU.
- "System Check Result Request (SyS)" is displayed first, and then the logical address and DTC appear in order.
- "Diagnostic Memory Request (COdE)" is displayed first, and then the logical address, DTC, sub-code, connection check number, and the number of occurrence appear in order.


Service Check Mode:
P190
CLr
(*1)
(*2)
CHEC
PRESET SWITCH "3"
PRESET SWITCH "2"
Detailed Information Mode 1:
(DTC is detected only in the response to "Diagnostic Memory Request".)
(*3) _P440
PRESET SWITCH "5"
(Press for 2 seconds or more)
(*4) COdE
(*5) 1L_01
(*6) 1d_DC
(*7) 1P_190
(*8) 1n_3F
(*9) 1c_05
(*10) 2L_01
(*10) 2d_D6
(*11) 2P_---
(*8) 2n_bF
(*9) 2c_--
Detailed information of the first code is displayed.
Detailed information of the second code is displayed.
Continues to display detailed information when more DTCs are detected.
*1: SEEK TRACK DOWN
*2: SEEK TRACK UP
*3: P...Indicates physical address
440...Physical address
*4: "COdE" indicates the display start of the response to "Diagnostic Memory Request".
*5: 1...The first code
L...Indicates logical address
01...Logical address
*6: 1...The first code
d...Indicates DTC
DC...DTC
*7: Physical address appears as the sub-code.
*8: Connection check number
*9: The number of times of occurrence
*10: 2...The second code
*11: For DTCs without sub-codes, physical address is not displayed.
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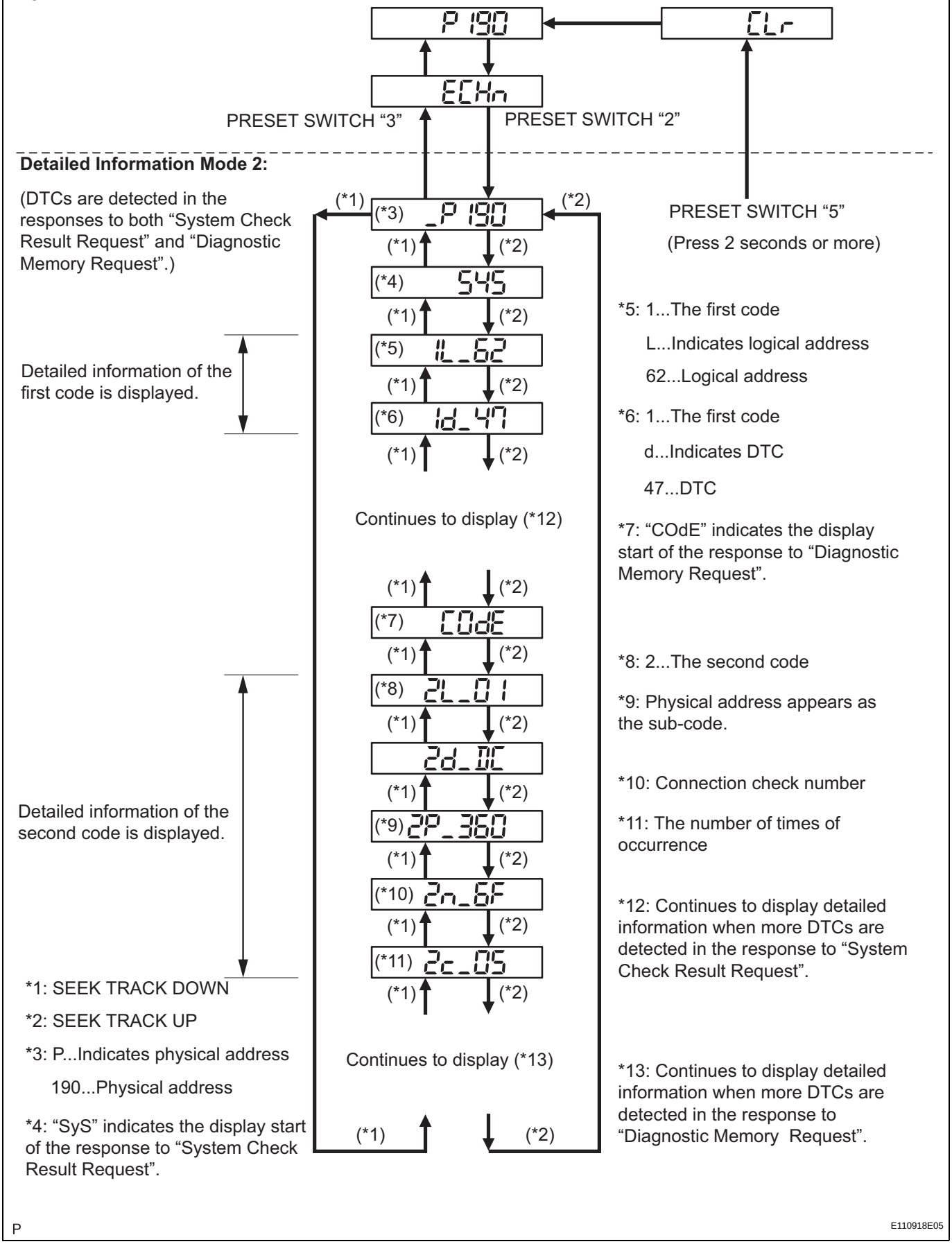
(f) Detailed information mode 2
HINT:
- "Detailed Information Mode 2" is displayed when DTCs are detected in the responses to both "System Check Result Request" and "Diagnostic Memory Request".
- The component device code (physical address) is displayed first, and then the check result follows.
- This illustration is only an example and may differ in cases such as for each option part and output DTCs.

(1) Press the preset switch "2" to go to the "Detailed Information Mode 2".
(2) Press the "SEEK TRACK" switch to display the physical address and DTC of the component.
(3) Press the preset switch "3" to go to the "Service Check Mode".
(4) Distinguish between the displays of the responses to "System Check Result Request" and "Diagnostic Memory Request". In order to distinguish the information detected in "System Check Mode" and "Diagnostic Memory Mode" in "ECHn", "CHEC", and "OLd" in "Detailed Information Mode 2", refer to the following:
- "SyS" is displayed before the detailed codes detected as a result of "System Check Result Request" are displayed.
- "COdE" is displayed before the detailed codes detected as a result of "Diagnostic Memory Request" are displayed.
HINT:
- The response to "System Check Result Request" is the current information given from each ECU as a result of the system check.
- The response to "Diagnostic Memory Request" contains the information received from each ECU or stored in each ECU in the past.
- The response to "Diagnostic Memory Request" is the output DTCs as a result of the diagnostic memory check or the DTCs received from each ECU.
- "System Check Result Request (SyS)" is displayed first, and then the logical address and DTC appear in order.
- "Diagnostic Memory Request (COdE)" is displayed first, and then the logical address, DTC, sub-code, connection check number, and the number of occurrence appear in order.

System Check Mode:



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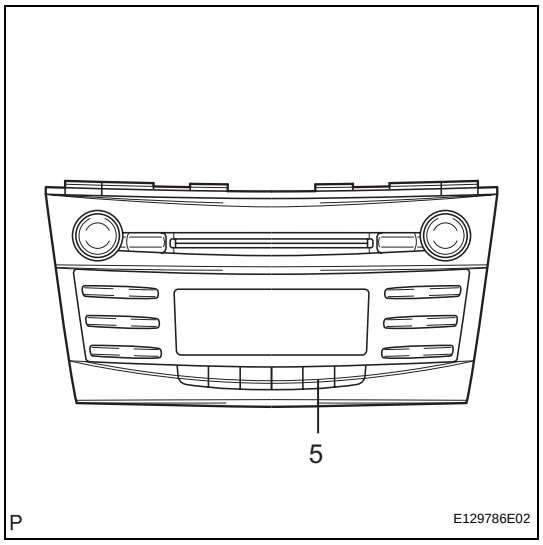


7. DTC CLEAR/RECHECK

(a) Clearing All DTC Memory (when clearing all the memory of the DTCs previously detected).

(1) When the preset switch "5" is pressed for 2 seconds or more during "Service Check Mode", the DTCs for all components are cleared. ("CLr" is displayed at this time.)

HINT:

- A beep sound is emitted once when the DTC memory is completely cleared.
- When the DTC memory for all the components is cleared, only the component codes (physical address) are displayed.
- After the DTC memory is cleared, the "Service Check Mode" is restored.

(b) Clearing Individual DTC Memory (when clearing the memory of the DTC previously detected individually).

(1) When the preset switch "5" is pressed for 2 seconds or more during "Detailed Information Mode 1" or "Detailed Information Mode 2", the DTCs for the target component are cleared.

HINT:

- A beep sound is emitted once when the DTC memory is completely cleared.
- When the DTC memory is cleared, only the component code (physical address) is displayed for the target component.
- After the DTC memory is cleared, the "Service Check Mode" is restored.
- To check DTCs, press the preset switch "1" and perform the system check again.

(c) Press the preset switch "1" to perform the service check again, and check that no DTCs are displayed for all the component codes (physical address).

DIAGNOSTIC TROUBLE CODE CHART

COMMUNICATION DIAGNOSIS:

DTC No.	Detection Item	Trouble Area	See page
01-21	ROM Error	Radio receiver	AV-31
01-22	RAM Error	Radio receiver	AV-31
01-D5	Absence of Registration Unit	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-32
01-D6	No Master	1. Radio receiver power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio receiver and the component which has stored this code 4. Component which has stored this code 5. Radio receiver	AV-34
01-D7	Connection Check Error	1. Radio receiver power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio receiver and the component which has stored this code 4. Component which has stored this code 5. Radio receiver	AV-34
01-D8	No Response for Connection Check	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-32
01-D9	Last Mode Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-32
01-DA	No Response Against ON / OFF Command	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-32

DTC No.	Detection Item	Trouble Area	See page
01-DB	Mode Status Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-32
01-DC	Transmission Error	If the same sub-code is recorded in other components, check harness for power supply and communication system of all components shown by code	AV-39
01-DD	Master Reset	1. Radio receiver power source circuit 2. AVC-LAN circuit between the radio receiver and the component which has stored this code 3. Radio receiver 4. Component which has stored this code	AV-42
01-DE	Slave Reset	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio receiver and the component shown by the sub-code 3. Component shown by the sub-code	AV-32
01-DF	Master Error	1. Radio receiver power source circuit 2. AVC-LAN circuit between the radio receiver and the component which has stored this code 3. Radio receiver 4. Component which has stored this code	AV-47
01-E0	Registration Complete Indication Error	-	AV-51
01-E1	Voice Processing Device ON Error	1. Radio receiver power source circuit 2. AVC-LAN circuit between the radio receiver and the component which has stored this code 3. Radio receiver 4. Component which has stored this code	AV-42
01-E2	ON / OFF Indication Parameter Error	Radio receiver	AV-52
01-E3	Registration Demand Transmission	-	AV-51
01-E4	Multiple Frame Incomplete	-	AV-51

CD PLAYER

DTC No.	Detection Item	Trouble Area	See page
62-10	CD Player Mechanical Error	Radio receiver	AV-54
62-11	CD Insertion and Ejection Error	Radio receiver	AV-54
62-12	CD Reading Abnormal	Radio receiver	AV-54
62-41	Wrong Disc	1. CD 2. Radio receiver	AV-55
62-42	Disc cannot be Read	1. CD 2. Radio receiver	AV-55

DTC No.	Detection Item	Trouble Area	See page
62-43	CD-ROM Abnormal	1. CD 2. Radio receiver	AV-57
62-44	CD Abnormal	Radio receiver	AV-59
62-45	Eject Error	Radio receiver	AV-60
62-46	Scratched / Reversed Disc	1. CD 2. Radio receiver	AV-61
62-47	High Temperature	Radio receiver	AV-63
62-48	Excess Current	Radio receiver	AV-59
62-50	Tray Insertion / Ejection Error	Radio receiver	AV-59
62-51	Elevator Error	Radio receiver	AV-60
62-52	Clamp Error	Radio receiver	AV-60
62-78	DSP Error	-	AV-64
62-7D	Disc cannot be Played	1. CD 2. Radio receiver	AV-65
62-7E	No Playable Files	1. CD 2. Radio receiver	AV-65
62-7F	Copyright Protection Error	1. CD 2. Radio receiver	AV-65

IN-DASH CD CHANGER

DTC No.	Detection Item	Trouble Area	See page
63-10	CD Changer Mechanical Error	Radio receiver	AV-54
63-11	CD Insertion and Ejection Error	Radio receiver	AV-54
63-12	CD Reading Abnormal	Radio receiver	AV-54
63-41	Wrong Disc	1. CD 2. Radio receiver	AV-55
63-42	Disc cannot be Read	1. CD 2. Radio receiver	AV-55
63-43	CD-ROM Abnormal	1. CD 2. Radio receiver	AV-57
63-44	CD Abnormal	Radio receiver	AV-59
63-45	Eject Error	Radio receiver	AV-60
63-46	Scratched / Reversed Disc	1. CD 2. Radio receiver	AV-61
63-47	High Temperature	Radio receiver	AV-63
63-48	Excess Current	Radio receiver	AV-59
63-50	Tray Insertion / Ejection Error	Radio receiver	AV-59
63-51	Elevator Error	Radio receiver	AV-60
63-52	Clamp Error	Radio receiver	AV-60
63-78	DSP Error	-	AV-64
63-7D	Disc cannot be Played	1. CD 2. Radio receiver	AV-65
63-7E	No Playable Files	1. CD 2. Radio receiver	AV-65
63-7F	Copyright Protection Error	1. CD 2. Radio receiver	AV-65

TELEPHONE:

DTC No.	Detection Item	Trouble Area	See page
57-47	Bluetooth Module Initialization Failed	Radio receiver	AV-53

DTC	01-21	ROM Error

DTC	01-22	RAM Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-21	A malfunction exists in ROM.	Radio receiver
01-22	A malfunction exists in RAM.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO RECEIVER

NEXT

END

DTC	01-D5	Absence of Registration Unit

DTC	01-D8	No Response for Connection Check

DTC	01-D9	Last Mode Error

DTC	01-DA	No Response Against ON / OFF Command

DTC	01-DB	Mode Status Error

DTC	01-DE	Slave Reset

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D5 *1, *3	A device that the sub-code shows is (was) disconnected from the system when turning the ignition switch on (ACC or IG). The communication condition with the device that the code shows cannot be obtained when the engine starts.	• Power source circuit of the component shown by the sub-code • AVC-LAN circuit between the radio receiver and the component shown by the sub-code • Component shown by the sub-code
01-D8 *2, *3	The device indicated by the sub-code is (was) disconnected from the system after the engine starts.	
01-D9 *1, *3	The device that had functioned before the engine stopped is (was) disconnected from the system when turning the ignition switch is on (ACC or IG).	
01-DA *3	No response is identified when changing mode. Sound and image do not change by switch operation.	
01-DB *1, *3	A dual alarm is detected.	
01-DE *3, *4	A slave device has been disconnected after the engine starts	

HINT:

- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: If the power connector is disconnected after the engine starts, this code is stored after 180 seconds.
- *3: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.
- *4: This code may be stored if the engine is started and the ignition switch is turned to the START position again. (Key type ignition switch only)

NOTICE:

- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:

Be sure to read DESCRIPTION before performing the following procedures.

1	**CHECK "RADIO RECEIVER COMMUNICATION ERROR" IN FLOW CHART**

Refer to the radio receiver communication error (See page AV-129).

NEXT

END

DTC	01-D6	No Master

DTC	01-D7	Connection Check Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D6 *1	When either of the following conditions is met: • The device that stores (stored) the code has (had) been disconnected when the ignition switch is turned on (ACC or IG). • The master device has (had) been disconnected when this code is stored.	• Radio receiver power source circuit • Power source circuit of the component which has stored this code • AVC-LAN circuit between the radio receiver and the component which has stored this code • Component which has stored this code • Radio receiver
01-D7 *2	When either of the following conditions is met: • The device that stored the code has (had) been disconnected after the engine starts (started). • The master device has (had) been disconnected when this code is (was) stored.	

HINT:
- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the ignition switch on (ACC or IG), this code is stored.

NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

1	CHECK RADIO RECEIVER POWER SOURCE CIRCUIT

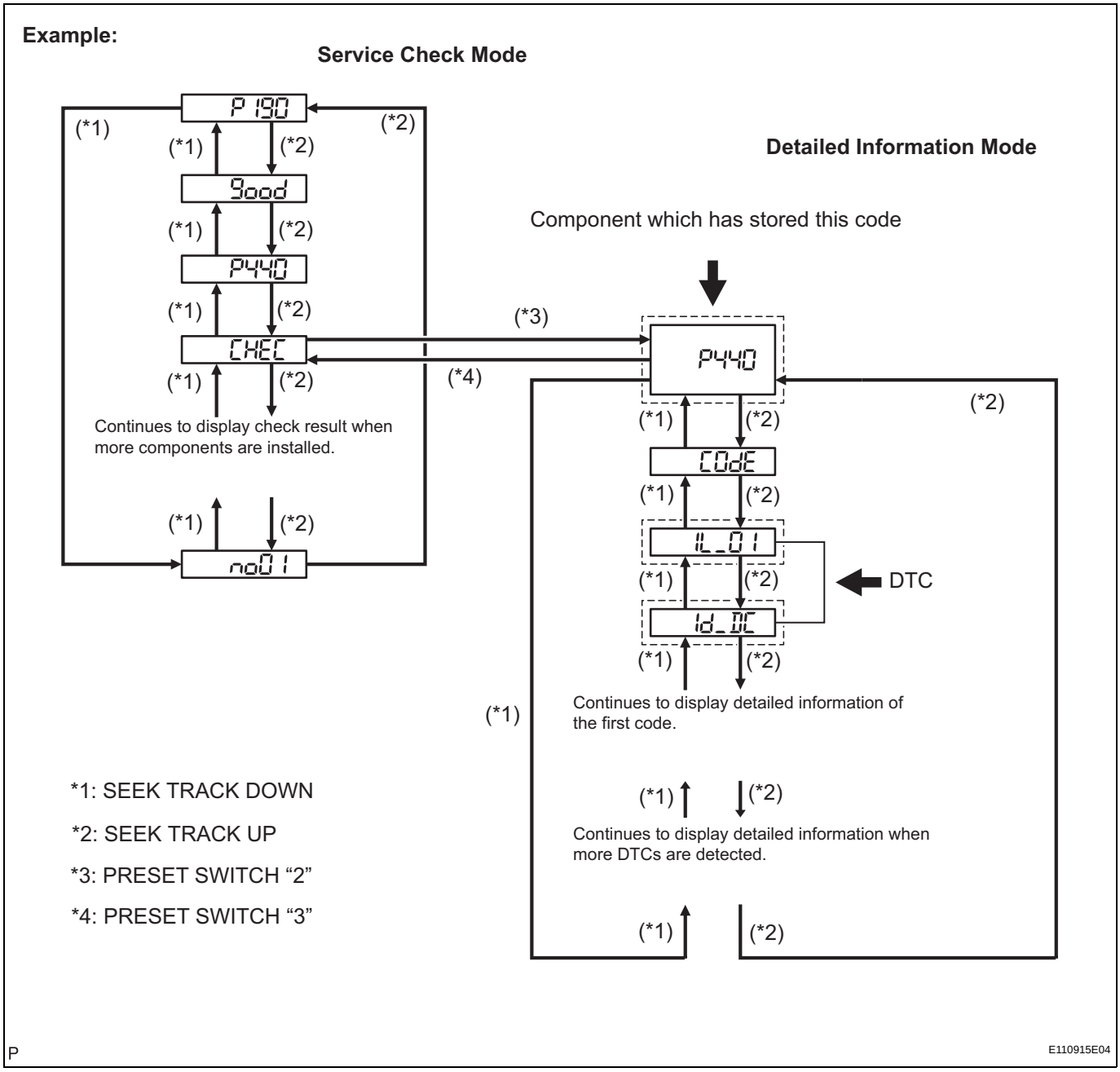
Refer to the radio receiver power source circuit (See page AV-140).
If the power source circuit is operating normally, proceed to the next step.

NEXT

AV

2	IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".

(c) Identify the component which has stored this code.

Component Table:

Component	Physical address
Stereo component amplifier	440
"Bluetooth" handsfree module	19D

HINT:

- "440 (stereo component amplifier)" is the component which has stored this code in the example shown in the illustration.
- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-19).

AV

NEXT

3	CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver. If there is a problem between the "Bluetooth" handsfree module and radio receiver, replace the radio receiver.

Component Table:

Component	Proceed to
"Bluetooth" handsfree module	A
Except "Bluetooth" handsfree module	B

A → REPLACE RADIO RECEIVER

B

4	CHECK POWER SOURCE CIRCUIT OF COMPONENT WHICH HAS STORED THIS CODE

(a) Inspect the power source circuit of the component which has stored this code.
If the power source circuit is operating normally, proceed to the next step.

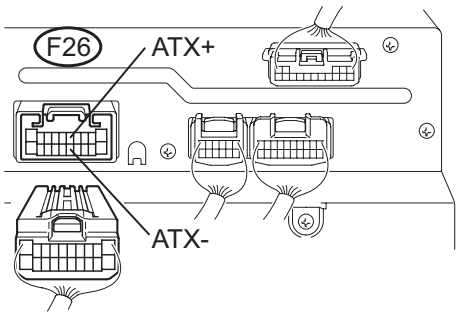
Component Table:

Component	Proceed to
Stereo component amplifier	Stereo component amplifier power source circuit (See page AV-142)

NEXT

5	INSPECT RADIO RECEIVER

Premium Model Wire Harness View:



P E129798E04

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

NG → REPLACE RADIO RECEIVER

OK

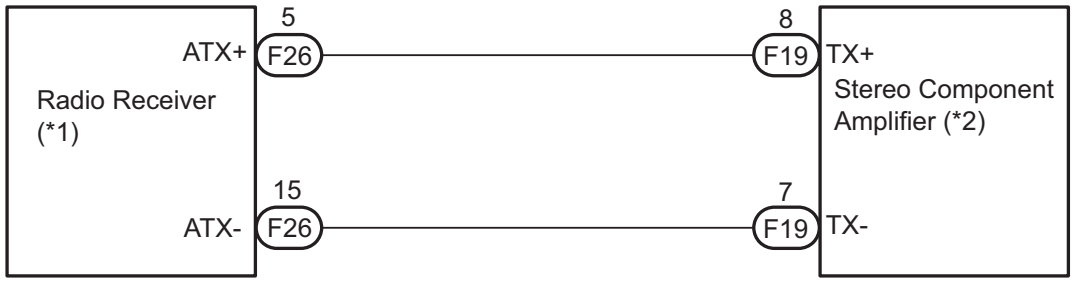
6	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - COMPONENT WHICH HAS STORED THIS CODE)

HINT:
For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  (1) Disconnect all connectors between the radio receiver and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  OK:
  There is no open or short circuit.

AVC-LAN WIRING DIAGRAM

Premium Model:



*1: Master Unit

*2: Slave Unit

P

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NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7	REPLACE COMPONENT WHICH HAS STORED THIS CODE

(a) Replace the component which has stored this code with a normal one and check if the same problem occurs again.

AV

OK:
Same problem does not occur.

NG → **REPLACE RADIO RECEIVER**

OK

END

DTC 01-DC Transmission Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DC *1	Transmission to component shown by sub-code failed (Detecting this DTC does not always mean actual failure)	If the same sub-code is recorded in other components, check harness for power supply and communication system of all components shown by code

HINT:
*1: This code may be stored if the engine is started, idled for 60 seconds and then the ignition switch is turned to the START position again. (Key type ignition switch only)
NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

1 CHECK FOR DTC OF OTHER COMPONENTS

(a) Check if the component shown by the sub-code is displayed in the check result of the other components.
  (1) Check if "01-DC" is output for the other components.
  (2) If "01-DC" is output for any other components, check if the same physical address is displayed.
  Result

Result	Proceed to
"01-DC" is output and the same physical address is displayed	**A**
"01-DC" is not output or the same physical address is not displayed	**B**

HINT:
For the list of the components shown by sub-codes, refer to the table in step 2.

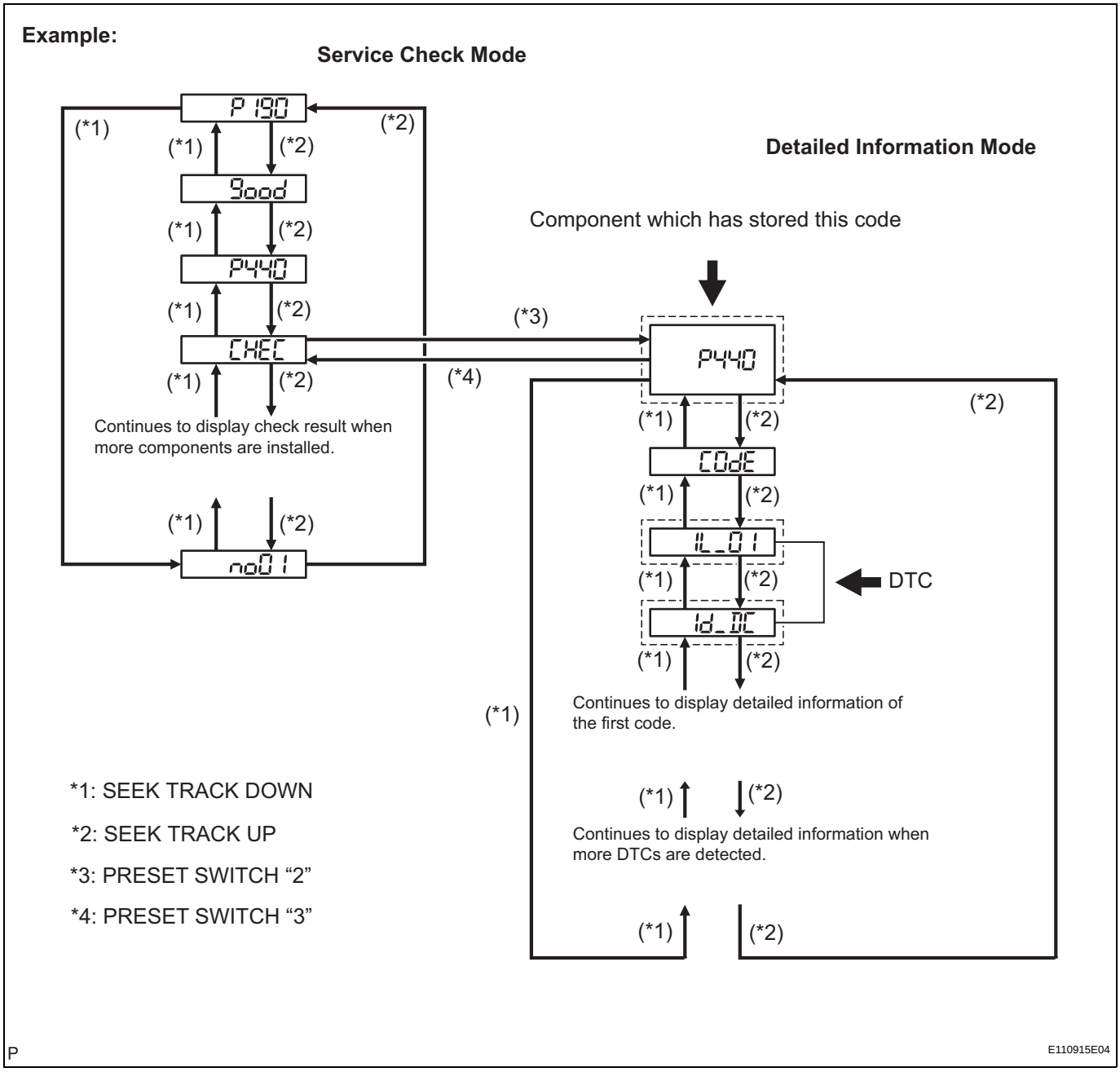
B → **Go to step 4**

A

2 IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

(a) Enter the diagnostic mode.

AV



(b) Press the preset switch "3" to change to "Detailed Information Mode".

(c) Identify the component which has stored this code.

Component Table:

Component	Physical address
Stereo component amplifier	440
"Bluetooth" handsfree module	19D
Radio receiver	190

HINT:

- "440 (stereo component amplifier)" is the component which has stored this code in the example shown in the illustration.
- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-19).

AV

NEXT

3	CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.

Component Table:

Component	Proceed to
Stereo component amplifier	Stereo component amplifier communication error (See page AV-133)
"Bluetooth" handsfree module	"Bluetooth" handsfree module communication error (See page AV-136)
Radio receiver	Radio receiver communication error (See page AV-129)

NEXT

END

4	CLEAR DTC

(a) Clear the DTCs (See page AV-19).
HINT:
If "01-DC" is output for only one component, this may not indicate a malfunction.

NEXT

5	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

NG → **Go to step 3**

OK

END

DTC	01-DD	Master Reset

DTC	01-E1	Voice Processing Device ON Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DD *1	The device that should be the master has been disconnected after engine start.	• Radio receiver power source circuit • AVC-LAN circuit between the radio receiver and the component which has stored this code • Radio receiver • Component which has stored this code
01-E1 *2	The AMP device records that the AMP output does not function even while the source device operates.	

HINT:
*1: This code may be stored if the engine is started and the ignition switch is turned to START position again. (Key type ignition switch only)
*2: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

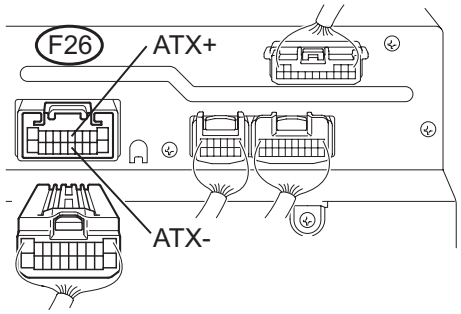
1	CHECK RADIO RECEIVER POWER SOURCE CIRCUIT

Refer to the radio receiver power source circuit (See page AV-140).
If the power source circuit is operating normally, proceed to the next step.

NEXT

2	INSPECT RADIO RECEIVER

Premium Model Wire Harness View:



P E129798E04

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

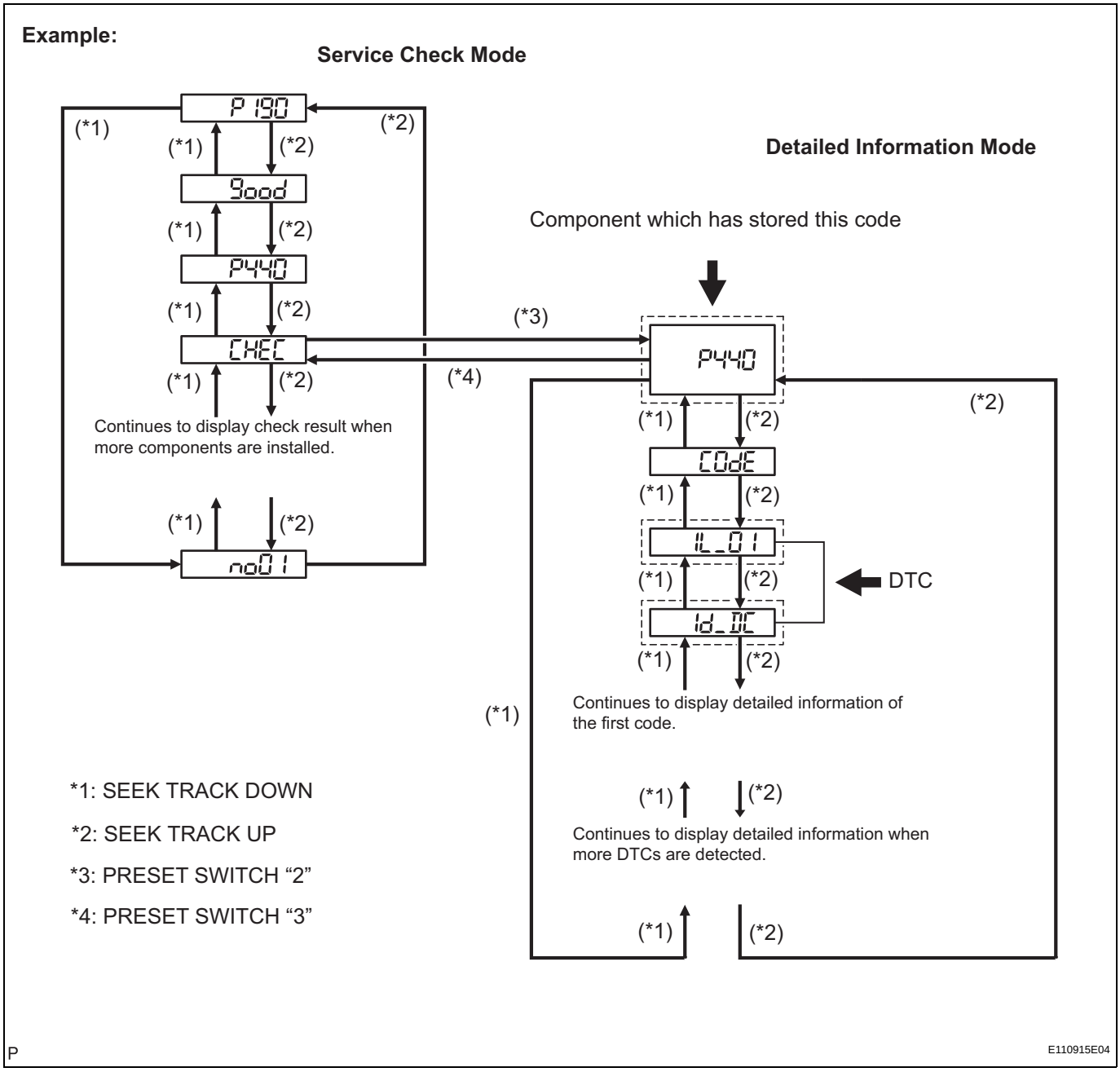
Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO RECEIVER**

OK

3	IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".
(c) Identify the component which has stored this code.

Component Table:

Component	Physical address
Stereo component amplifier	440
"Bluetooth" handsfree module	19D

HINT:

- "440 (stereo component amplifier)" is the component which has stored this code in the example shown in the illustration.
- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-19).

NEXT

4	CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver. If there is a problem between the "Bluetooth" handsfree module and radio receiver, replace the radio receiver.

Component Table:

Component	Proceed to
"Bluetooth" handsfree module	A
Except "Bluetooth" handsfree module	B

A → **REPLACE RADIO RECEIVER**

B

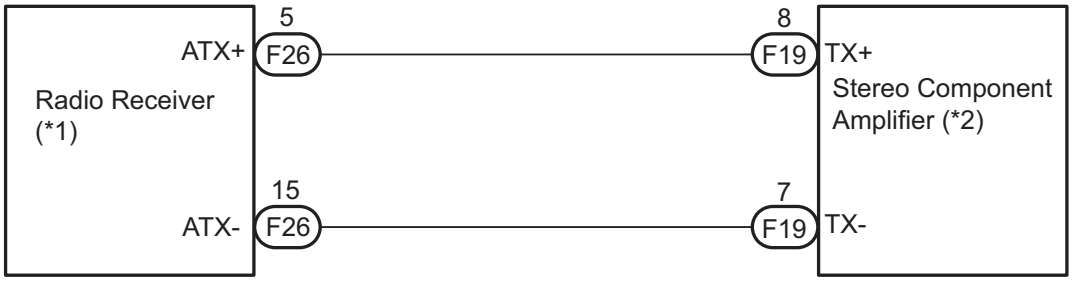
5	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - COMPONENT WHICH HAS STORED THIS CODE)

HINT:
For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  (1) Disconnect all connectors between the radio receiver and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  OK:
  There is no open or short circuit.

AVC-LAN WIRING DIAGRAM

Premium Model:



*1: Master Unit

*2: Slave Unit

P

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NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	REPLACE RADIO RECEIVER

(a) Replace the radio receiver with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE COMPONENT WHICH HAS STORED THIS CODE**

OK

END

DTC	01-DF	Master Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DF *1	The device with a display fails and the master is switched to the audio device. Also when a communication error between the sub-master (audio) and master occurs, this code is stored.	• Radio receiver power source circuit • AVC-LAN circuit between the radio receiver and the component which has stored this code • Radio receiver • Component which has stored this code

HINT:
*1: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the ignition switch on (ACC or IG), this code is stored.

NOTICE:

- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio receiver is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:

Be sure to read DESCRIPTION before performing the following procedures.

1	CHECK RADIO RECEIVER POWER SOURCE CIRCUIT

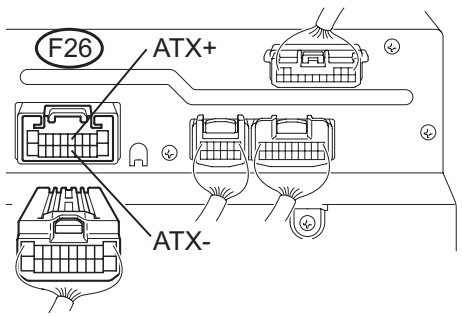
Refer to the radio receiver power source circuit (See page AV-140).

If the power source circuit is operating normally, proceed to the next step.

NEXT

2	INSPECT RADIO RECEIVER

Premium Model Wire Harness View:



P E129798E04

(a) Disconnect the radio receiver connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

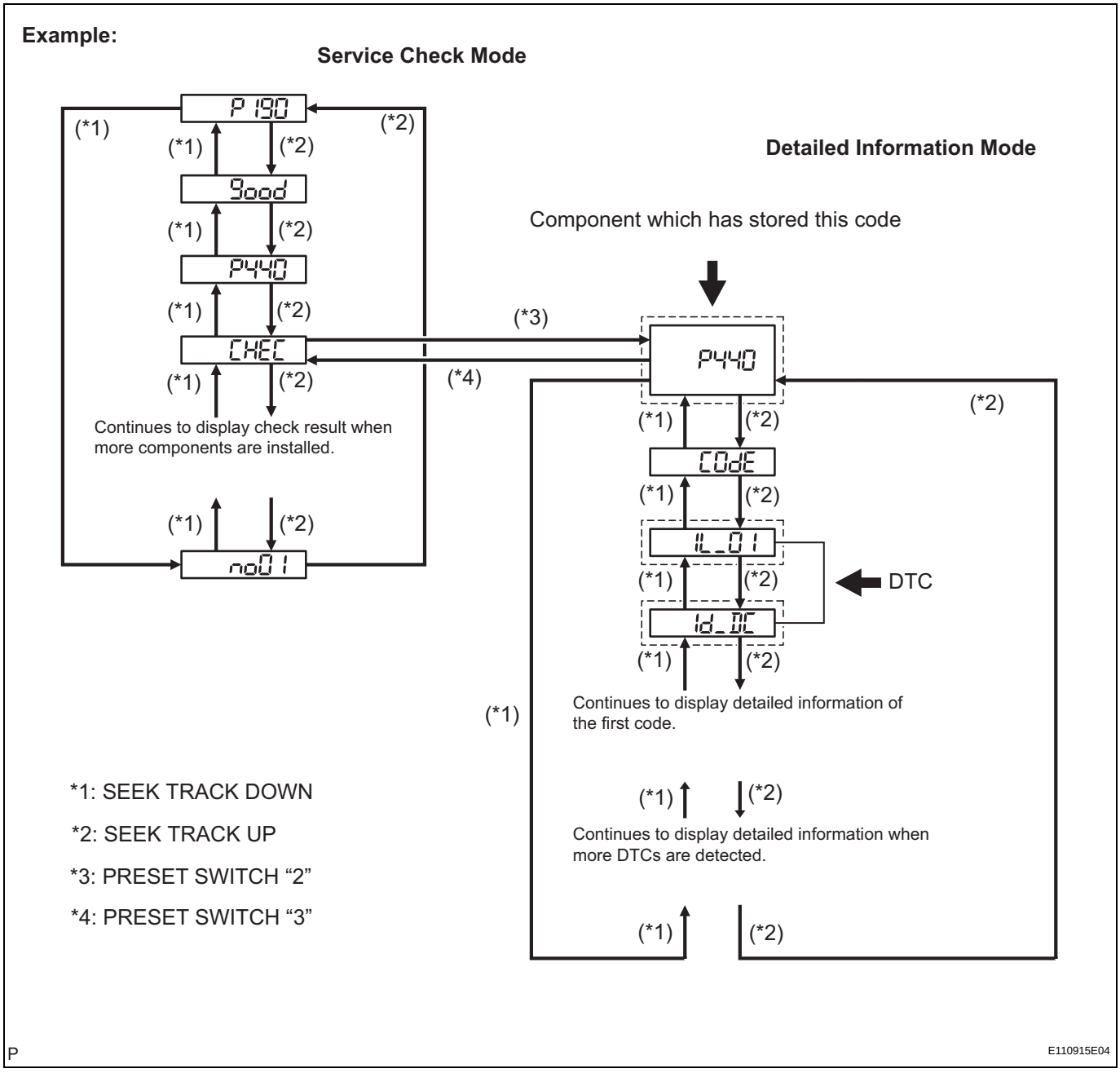
NG → REPLACE RADIO RECEIVER

AV

OK

3	IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".

(c) Identify the component which has stored this code.

Component Table:

Component	Physical address
Stereo component amplifier	440
"Bluetooth" handsfree module	19D

AV

HINT:

- "440 (stereo component amplifier)" is the component which has stored this code in the example shown in the illustration.
- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-19).

NEXT

4	CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver. If there is a problem between the "Bluetooth" handsfree module and radio receiver, replace the radio receiver.

Component Table:

Component	Proceed to
"Bluetooth" handsfree module	A
Except "Bluetooth" handsfree module	B

A → REPLACE RADIO RECEIVER

B

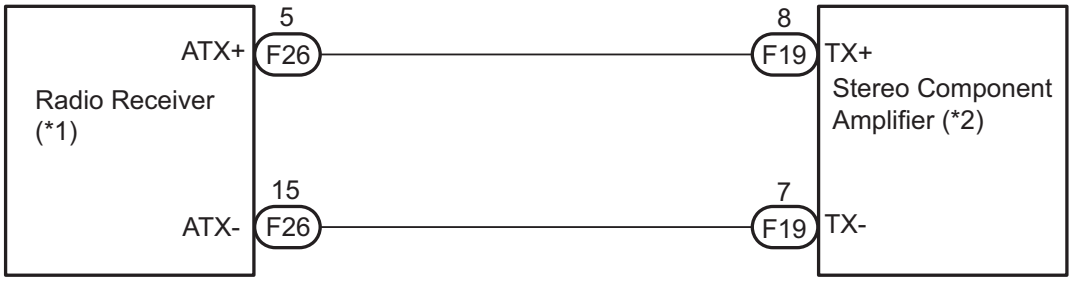
5	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - COMPONENT WHICH HAS STORED THIS CODE)

HINT:
For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  (1) Disconnect all connectors between the radio receiver and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio receiver and the component which has stored this code.
  OK:
  There is no open or short circuit.

AVC-LAN WIRING DIAGRAM

Premium Model:



*1: Master Unit

*2: Slave Unit

P

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NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	REPLACE RADIO RECEIVER

(a) Replace the radio receiver with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE COMPONENT WHICH HAS STORED THIS CODE**

OK

END

DTC	01-E0	Registration Complete Indication Error

DTC	01-E3	Registration Demand Transmission

DTC	01-E4	Multiple Frame Incomplete

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-E0	"Registration complete" signal from the master device cannot be received.	-
01-E3	The registration demand signal from the slave device is output. Or the registration demand signal is output by receiving connection confirmation signal from the sub-master device.	-
01-E4	The multiple frame transmission is incomplete.	-

HINT:
Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs. These DTCs do not indicate a malfunction.

DTC	01-E2	ON / OFF Indication Parameter Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-E2	The command for ON/OFF control from the master device has a problem.	Radio receiver

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO RECEIVER

NEXT

END

DTC	57-47	Bluetooth Module Initialization Failed

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
57-47	• "Bluetooth" module is not installed. • Problem with "Bluetooth" module • Problem in communication line to "Bluetooth" module	Radio receiver

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO RECEIVER

NEXT

END

DTC	**62-10**	**CD Player Mechanical Error**
DTC	**62-11**	**CD Insertion and Ejection Error**
DTC	**62-12**	**CD Reading Abnormal**
DTC	**63-10**	**CD Changer Mechanical Error**
DTC	**63-11**	**CD Insertion and Ejection Error**
DTC	**63-12**	**CD Reading Abnormal**

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-10	A mechanical error in the CD player is detected while the CD is not being inserted or ejected.	Radio receiver
62-11	CD insertion or ejection is failed.	
62-12	CD read problem occurs.	
63-10	A mechanical error in the CD changer is detected while the CD is not being inserted or ejected.	
63-11	CD insertion or ejection is failed.	
63-12	CD read problem occurs.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	**REPLACE RADIO RECEIVER**

NEXT

END

DTC	62-41	Wrong Disc

DTC	62-42	Disc cannot be Read

DTC	63-41	Wrong Disc

DTC	63-42	Disc cannot be Read

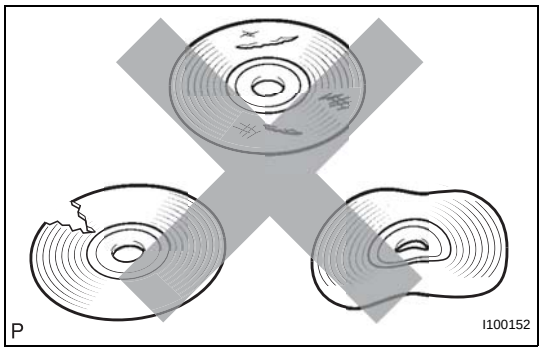
DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-41	An unsuitable disc is inserted.	• CD • Radio receiver
62-42	The disc cannot be read.	
63-41	An unsuitable disc is inserted.	
63-42	The disc cannot be read.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK DISC

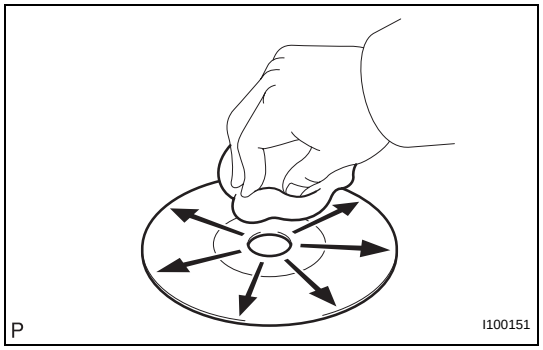


(a) Check that the disc is not deformed or cracked.
OK:
No deformation or cracks on the disc.

NG → **CHANGE DISC**

OK

2	DISC CLEANING



(a) Disc cleaning
(1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

NEXT

AV

3	CLEAR DTC

(a) Clear the DTCs (See page AV-19).

NEXT

4	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.

OK:

Malfunction disappears.

OK → END

NG

5	REPLACE DISC WITH ANOTHER AND RECHECK

(a) Replace the disc with another and recheck.
   (1) Replace the disc with another normal one.
   (2) Clear the DTCs (See page AV-19).
   (3) Recheck for DTCs and check if the same trouble occurs again.

OK:

Malfunction disappears.

NG → REPLACE RADIO RECEIVER

OK

END

DTC	62-43	CD-ROM Abnormal

DTC	63-43	CD-ROM Abnormal

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-43	CD-ROM operation is abnormal	• CD • Radio receiver
63-43	CD-ROM operation is abnormal	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK IF A PROPER CD IS INSERTED

(a) Make sure that the CD is an audio CD or a CD with an MP3 or WMA file, and that it is not deformed, flawed, stained, burred, or otherwise defective.
OK:
Normal CD
HINT:
- Translucent or uniquely-shaped CDs cannot be played.
- CDs with adhesive paper labels should not be played.
- Commercial audio CDs can be played.
- CD-DA files on CD-ROMs, CD-Rs, and CD-RWs can be played.
- MP3 and WMA files on CD-ROMs, CD-Rs, and CD-RWs can be played.
- For details on playable CDs, refer to the Owner's Manual.

NG → **CHANGE DISC**

OK

2	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
(1) Replace the CD with another normal one.
(2) Clear the DTCs (See page AV-19).
(3) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

NG → **REPLACE RADIO RECEIVER**

OK

END

DTC	62-44	CD Abnormal

DTC	62-48	Excess Current

DTC	62-50	Tray Insertion / Ejection Error

DTC	63-44	CD Abnormal

DTC	63-48	Excess Current

DTC	63-50	Tray Insertion / Ejection Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-44	Operation error in the CD mechanism	Radio receiver
62-48	Excess current is present in the CD player	
62-50	Malfunction in insertion/ejection system	
63-44	Operation error in the CD mechanism	
63-48	Excess current is present in the CD changer	
63-50	Malfunction in insertion/ejection system	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CLEAR DTC

(a) Clear the DTCs (See page AV-19).

NEXT

2	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
HINT:
If DTCs are detected frequently, replace the radio receiver.
OK:
Malfunction disappears.

NG → **REPLACE RADIO RECEIVER**

OK

END

AV

DTC	**62-45**	**Eject Error**
DTC	**62-51**	**Elevator Error**
DTC	**62-52**	**Clamp Error**
DTC	**63-45**	**Eject Error**
DTC	**63-51**	**Elevator Error**
DTC	**63-52**	**Clamp Error**

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-45	Disc cannot be ejected.	Radio receiver
62-51	Mechanical error occurs during elevator operation.	
62-52	Error occurs in CD player clamp.	
63-45	Magazine cannot be ejected.	
63-51	Mechanical error occurs during elevator operation.	
63-52	Error occurs in CD changer clamp.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	**CHECK RADIO RECEIVER**

(a) Check if a disc can be changed, inserted or ejected normally.
OK:
Malfunction disappears.

NG → **REPLACE RADIO RECEIVER**

OK

END

DTC	62-46	Scratched / Reversed Disc

DTC	63-46	Scratched / Reversed Disc

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-46	Scratches or dirt is found on CD surface or CD is set upside down.	• CD • Radio receiver
63-46	Scratches or dirt is found on CD surface or CD is set upside down.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

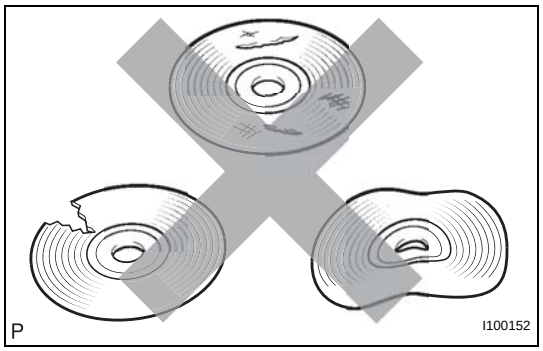
1	CHECK THAT CD IS INSERTED PROPERLY

(a) Check whether or not the CD is inserted upside down.
OK:
CD is properly inserted.

NG → **REINSERT DISC PROPERLY**

OK

2	CHECK DISC



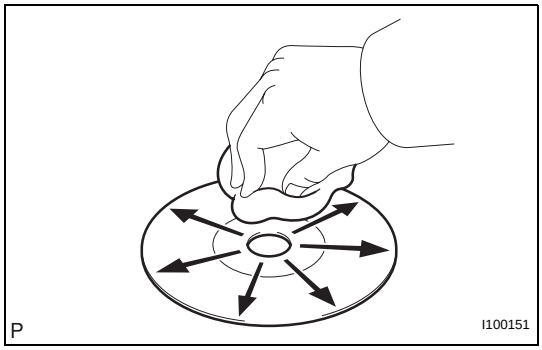
(a) Check that the disc is not deformed or cracked.
OK:
No deformation or cracks on the disc.

NG → **CHANGE DISC**

OK

AV

3	DISC CLEANING



(a) Disc cleaning
  (1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.
  NOTICE:
  Do not use a conventional record cleaner or anti-static preservative.

NEXT

4	CLEAR DTC

(a) Clear the DTCs (See page AV-19).

NEXT

5	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.

OK:
Malfunction disappears.

OK → END

NG

6	REINSERT DISC PROPERLY

(a) Replace the disc with another and recheck.
  (1) Replace the disc with another normal one.
  (2) Clear the DTCs (See page AV-19).
  (3) Recheck for DTCs and check if the same trouble occurs again.
  OK:
  Malfunction disappears.

NG → REPLACE RADIO RECEIVER

OK

END

DTC	62-47	High Temperature

DTC	63-47	High Temperature

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-47	Sensor detects that CD unit temperature is high. (Over 80°C)	Radio receiver
63-47	Sensor detects that CD unit temperature is high. (Over 80°C)	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK RADIO RECEIVER

(a) Park the vehicle in a cool place.
(b) Check that the temperature of the radio receiver becomes sufficiently low, and start the engine. Check that the malfunction disappears.
OK:
Malfunction disappears.

NG → **REPLACE RADIO RECEIVER**

OK

END

DTC	62-78	DSP Error

DTC	63-78	DSP Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-78	An error occurs during the decode process (MP3/ WMA).	-
63-78	An error occurs during the decode process (MP3/ WMA).	-

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.
NOTICE:
- **These codes may be output even if there is no malfunction.**
- **If these codes are output frequently, replace the radio receiver.**

1	CLEAR DTC

(a) Clear the DTCs (See page AV-19).

NEXT

2	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

NG → REPLACE RADIO RECEIVER

OK

END

DTC	62-7D	Disc cannot be Played

DTC	62-7E	No Playable Files

DTC	62-7F	Copyright Protection Error

DTC	63-7D	Disc cannot be Played

DTC	63-7E	No Playable Files

DTC	63-7F	Copyright Protection Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
62-7D	• An incompatible MP3/WMA file is used. • Although the file has an extension of ".mp3" or ".wma", the header information cannot be read.	• CD • Radio receiver
62-7E	• A disc with no music data is used. • Playable files are not on the disc (MP3/WMA).	
62-7F	A copy-protected file, which cannot be played, is used.	
63-7D	• An incompatible MP3/WMA file is used • Although the file has an extension of ".mp3" or ".wma", the header information cannot be read.	
63-7E	• A disc with no music data is used. • Playable files are not on the disc (MP3/WMA).	
63-7F	A copy-protected file, which cannot be played, is used.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHANGE DISC

(a) Insert a disc with a playable file and check if the disc can be played correctly.
HINT:
For details on playable files and discs, refer to the Owner's Manual.
OK:
The disc can be played correctly.

NG → **REPLACE RADIO RECEIVER**

OK

END

AV

Noise Occurs

INSPECTION PROCEDURE

1 **NOISE CONDITION**

(a) Check from which direction the noise comes (front left or right, or rear left or right).
(1) Check from which direction the noise comes.
OK:
The location of the noise source can be determined.

NG → **Go to step 3**

OK

2 **CHECK SPEAKERS**

(a) Check the installation conditions of the speaker units that are located near the noise source and that there are no cracks, scratches, deformation, or other failures.

Result

Condition	Proceed to
A speaker is installed incorrectly	A
Foreign objects are in the speaker	B
A speaker cone paper is broken	C
No malfunction is found	D

A → **REINSTALL SPEAKER**

B → **REMOVE FOREIGN OBJECT**

C → **REPLACE SPEAKER**

D

3 **CHECK NOISE CONDITIONS**

(a) Check the noise condition.
HINT:
The radio has a noise prevention function to reduce noise when listening to the radio. If a loud noise occurs, check whether the ground at the antenna mounting base and the noise prevention unit are installed and wired correctly.

Conditions under which noise occurs	Noise source
Noise increases when the accelerator pedal is depressed, but stops when the engine is stopped.	Generator
Noise occurs during A/C or heater operation.	Blower motor
Noise occurs when the vehicle accelerates rapidly on an unpaved road or after the ignition switch is turned on (IG or ACC).	Fuel pump

Conditions under which noise occurs	Noise source
Noise occurs when the horn switch is pressed and released or when pressed and held.	Horn
Noise occurs synchronously with the blink of the turn signal.	Flasher
Noise occurs during window washer operation.	Washer
Noise occurs while the engine is running, and continues even after the engine is stopped.	Water temperature sensor
Noise occurs during wiper operation.	Wiper
Noise occurs when the brake pedal is depressed.	Stop light switch
Others	Static electricity

HINT:

- In the chart's left column, find the situation that matches the customer's complaint. Then, in the right column, find the part that is causing the noise. Check the noise filter on or for the part.
- To save time and avoid a misdiagnosis, first make sure that the noise is not coming from outside the vehicle.
- Noise should be removed in descending order of loudness.
- Setting the radio to a frequency where no signal is received may make recognition of the noise problem easier.

OK:

The noise source cannot be determined.

NG → **REPAIR OR REPLACE NOISE SOURCE**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Pressing Power Switch does not Turn on System

INSPECTION PROCEDURE

1	CHECK VEHICLE CONDITION

(a) Check that conditions in the cabin are not likely to cause condensation.
HINT:
This problem occurs when the cabin is humid and the temperature changes rapidly. This may produce condensation, resulting in a short circuit.
OK:
Condensation is not likely to be produced.

NG → **DRY OUT CABIN AND RECHECK CONDITION**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

No Sound can be Heard from Speakers

INSPECTION PROCEDURE

1	CHECK RADIO RECEIVER

(a) Check radio receiver setting.
  (1) Check that the volume is not set to "0".
  (2) Check that "MUTE" is off.
  OK:
  The volume is not set to "0" and "MUTE" is off.

OK → **END**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Sound Quality is Bad Only when CD is Played (Volume is Too Low)

INSPECTION PROCEDURE

1	**REPLACE CD WITH ANOTHER AND RECHECK**

(a) Replace the CD with another one and recheck.
(1) Check if the problem recurs using another CD.
OK:
Malfunction disappears.

NG → **REPLACE RADIO RECEIVER**

OK

END

CD cannot be Ejected

INSPECTION PROCEDURE

1	**PRESS "EJECT" AND CHECK OPERATION**

(a) Press the CD EJECT switch of the radio receiver for 2 seconds or more and check that the CD is ejected.
OK:
CD is ejected.

NG → **REPLACE RADIO RECEIVER**

OK

2	**REPLACE CD WITH ANOTHER AND RECHECK**

(a) Insert another CD and check if it is ejected.
OK:
CD is ejected.

NG → **REPLACE RADIO RECEIVER**

OK

END

CD cannot be Inserted / Played or CD is Ejected Right After Insertion

INSPECTION PROCEDURE

1	CHECK IF A PROPER CD IS INSERTED

(a) Make sure that the CD is an audio CD or a CD with an MP3 or WMA file, and that it is not deformed, flawed, stained, burred, or otherwise defective.
OK:
Normal CD.
HINT:
- Translucent or uniquely-shaped CDs cannot be played.
- CDs with adhesive paper labels should not be played.
- Commercial audio CDs can be played.
- CD-DA files on CD-ROMs, CD-Rs, and CD-RWs can be played.
- MP3 and WMA files on CD-ROMs, CD-Rs, and CD-RWs can be played.
- For details on playable CDs, refer to the Owner's Manual.

NG → **CHANGE DISC**

OK

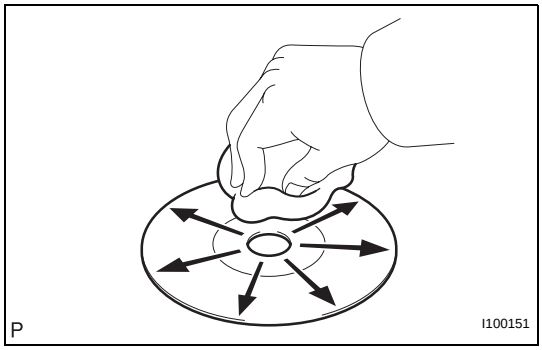
2	CHECK THAT CD IS INSERTED PROPERLY

(a) Check whether or not the CD is inserted upside down.
OK:
CD is properly inserted.

NG → **INSERT CD PROPERLY**

OK

3	CHECK CD



(a) Clean the disc by wiping it with a soft cloth from the inside to the outside in a radial direction.
OK:
Malfunction disappears.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

NG → **Go to step 4**

AV

OK

END

4	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with a normal one and check that the malfunction disappears.
OK:
Malfunction disappears.

NG → **REPLACE RADIO RECEIVER**

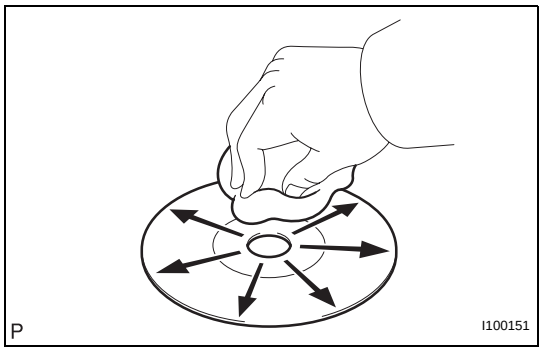
OK

END

CD Sound Skips

INSPECTION PROCEDURE

1	CHECK CD

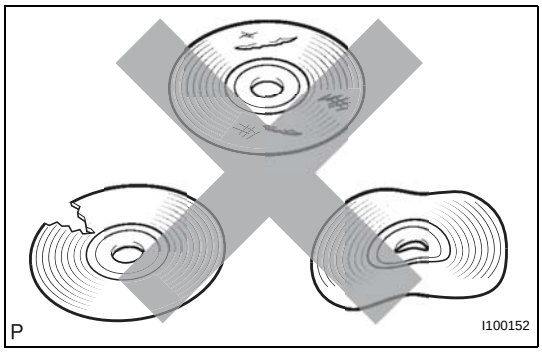


(a) Check the CD.
OK:
The CD is clean.
HINT:
If dirt is on the CD surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

NG → **CLEAN CD**

OK

2	CHECK CD



(a) Check that the CD is not deformed or cracked.
OK:
No deformation or cracks on the CD.

NG → **CHANGE DISC**

OK

3	CHECK OPERATION USING ANOTHER CD

(a) Check using another CD.
(1) Check if the problem recurs using another CD.
OK:
The problem does not occur.

OK → **END**

NG

4	CHECK RADIO RECEIVER

(a) Check the radio receiver installation condition.
(1) Check that the radio receiver is properly installed.
OK:
Radio receiver is properly installed.

NG → **REINSTALL RADIO RECEIVER PROPERLY**

OK

REPLACE RADIO RECEIVER

Radio Broadcast cannot be Received or Poor Reception

INSPECTION PROCEDURE

1	CHECK RADIO RECEIVER

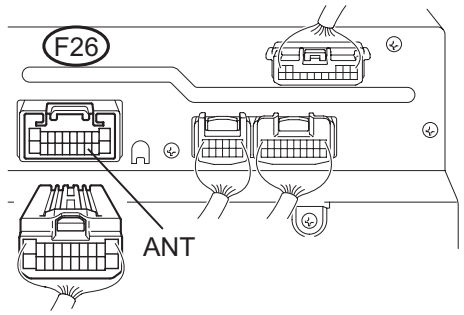
(a) Check the radio's automatic station search function.
(1) Check the radio's automatic station search function by activating it.
OK:
The radio's automatic station search function works properly.

OK → **REPLACE RADIO RECEIVER**

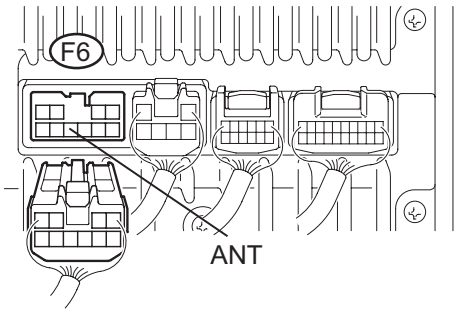
NG

2	INSPECT RADIO RECEIVER

Wire Harness View (Premium Model):



Wire Harness View (Standard Model):



P E129799E03

(a) Disconnect the radio receiver connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester connection	Condition	Specified condition
ANT - Body ground	Ignition SW on (IG) Radio SW ON	10 to 14 V

NG → **REPLACE RADIO RECEIVER**

AV

OK

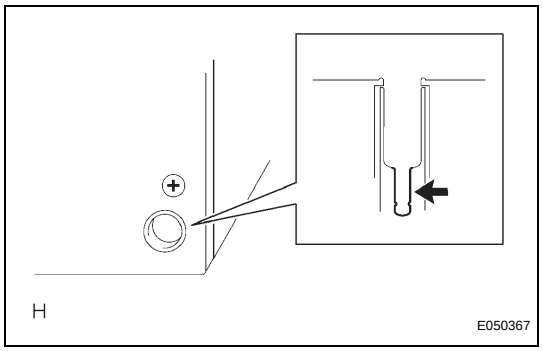
3	CHECK OPTIONAL COMPONENTS

(a) Check optional components (sun-shade film, telephone antenna, etc.).
  (1) Check if any optional components, such as sunshade film or telephone antenna that may decrease reception capacity, are installed.
  OK:
  Optional components are installed.
  NOTICE:
  Do not remove any optional components installed by the customer without his or her consent.

OK → **REMOVE OPTIONAL COMPONENTS AND CHECK AGAIN (SEE NOTICE ABOVE)**

NG

4	CHECK RADIO RECEIVER

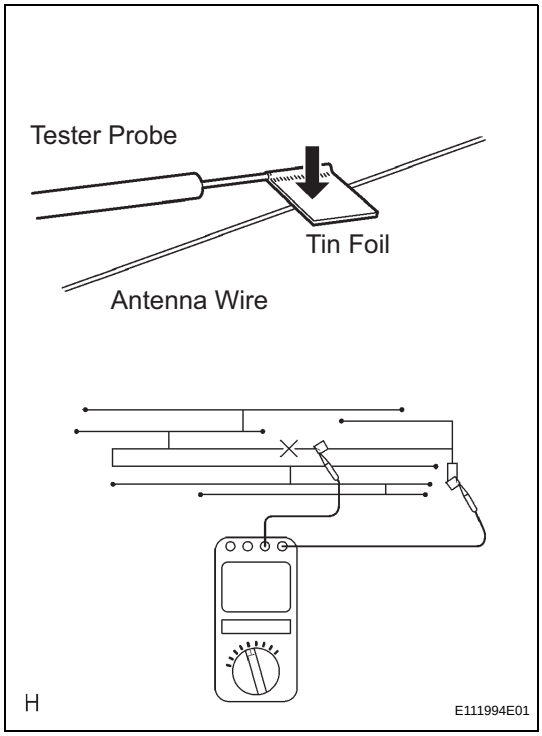


(a) Preparation for check
  (1) Remove the antenna plug from the radio receiver.
(b) Check for noise
  (1) Turn the ignition switch on (ACC) with the radio receiver connector connected.
  (2) Turn the radio on and put into AM mode.
  (3) Place a screwdriver, thin wire, or other metal object on the radio receiver's antenna jack and check that noise can be heard from the speaker.
  OK:
  Noise occurs.

NG → **REPLACE RADIO RECEIVER**

OK

5	CHECK GLASS ANTENNA



(a) Check for continuity of the antenna.
HINT:
Check for continuity at the center of each antenna wire as shown in the illustration.
NOTICE:
When cleaning the glass, wipe it in the direction of the wire with a soft dry cloth. Take care not to damage the wire. Do not use detergents or glass cleaners with abrasive ingredients. When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown in the illustration.
OK:
There is continuity in the antenna.

NG → **REPAIR GLASS ANTENNA**

OK

6	CHECK ANTENNA CORD

(a) Remove the antenna plug of the radio receiver and antenna.
(b) Measure the resistance between the antenna and radio receiver to check for an open circuit in the antenna cord.
Standard resistance:
Below 1 Ω
(c) Measure the resistance between the antenna cord and body ground to check for a short circuit in the antenna cord.
Standard resistance:
10 kΩ or higher

NG → **REPLACE ANTENNA CORD**

OK

7	REPLACE AMPLIFIER ANTENNA

(a) Replace the amplifier antenna and check if radio broadcasts can be received normally.
OK:
Radio broadcasts can be received.

OK → **NORMAL OPERATION**

AV

NG

REPLACE RADIO RECEIVER

Poor Sound Quality in All Modes (Low Volume)

INSPECTION PROCEDURE

1	CHECK AUDIO SETTINGS

(a) Set "BASS", "MID", and "TREB" to the initial values and check that sound is normal.
OK:
Malfunction disappears.

OK → **END**

NG

2	COMPARE WITH ANOTHER VEHICLE OF SAME MODEL

(a) Compare with another vehicle of the same model.
(1) Compare with another vehicle of the same model which does not have trouble to see if there is any difference in the sound quality.
OK:
No difference is found.

OK → **END**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Cellular Phone Registration Failure, Phone Directory Transfer Failure

INSPECTION PROCEDURE

1 CHECK CURRENT CONDITIONS

(a) Proceed to the next step according to the table below.

RESULT

Conditions	Proceed to
Another "Bluetooth" compatible cellular phone is present.	A
Another "Bluetooth" compatible vehicle is present.	B
None of the above	C

B → Go to step 3

C → Go to step 4

A

2 CHECK USING ANOTHER CELLULAR PHONE

(a) Check if the system functions using another "Bluetooth" compatible cellular phone.
HINT:
- Confirm that either the same or a different version of another "Bluetooth" compatible cellular phone complies with the system.
- Depending on the version, some "Bluetooth" compatible cellular phones cannot be used.

OK:
The system functions.

NG → REPLACE RADIO RECEIVER

OK

USE A "BLUETOOTH" COMPATIBLE CELLULAR PHONE

3 CHECK USING ANOTHER "BLUETOOTH" COMPATIBLE VEHICLE

(a) Register the cellular phone with another vehicle and check if the system functions normally.
HINT:
Depending on the version, some "Bluetooth" compatible cellular phones cannot be used.

OK:
The system functions.

OK → REPLACE RADIO RECEIVER

NG

USE A "BLUETOOTH" COMPATIBLE CELLULAR PHONE

4	CHECK CELLULAR PHONE

(a) Check if the cellular phone is "Bluetooth" compatible.
HINT:
Some versions of "Bluetooth" compatible cellular phones may not function.
OK:
The phone is Bluetooth compatible.

NG → **USE A "BLUETOOTH" COMPATIBLE CELLULAR PHONE**

OK

5	CHECK CELLULAR PHONE

(a) Check if a call can be made from the cellular phone.
HINT:
When the battery is low, registration or directory transfer cannot be done.
OK:
A call can be made from the cellular phone.

NG → **REPAIR OR REPLACE CELLULAR PHONE**

OK

REPLACE RADIO RECEIVER

Cellular Phone cannot Send / Receive

INSPECTION PROCEDURE

1	CHECK "BLUETOOTH" SETTINGS

(a) Check if the "Bluetooth" settings are correct.
OK:
"Bluetooth" settings are correct.

NG → **SET SETTINGS CORRECTLY**

OK

2	CHECK CELLULAR PHONE

(a) Check if the cellular phone is "Bluetooth" compatible.
HINT:
Some versions of "Bluetooth" compatible cellular phones may not function.
OK:
Phone is "Bluetooth" compatible.

NG → **END (ONLY A "BLUETOOTH" COMPATIBLE CELLULAR PHONE CAN BE USED)**

OK

3	CHECK SETTINGS

(a) Check if the cellular phone functions.
HINT:
The cellular phone is unable to call under any of the following conditions.
- The cellular phone is locked.
- The directory is being transferred.
- The line is crossed.
- Transmission is regulated.
- The power is off.
- The cellular phone is not connected to "Bluetooth" ("BT" is displayed while connected).

OK:
None of the above conditions exist.

NG → **SET CORRECTLY**

OK

4	CHECK CELLULAR PHONE

(a) Check if the cellular phone can make a call.

AV

HINT:
When the battery is low, calls cannot be made or received.
OK:
Cellular phone can make a call.

NG → **REPAIR OR REPLACE CELLULAR PHONE**

OK

5	**CHECK RECEPTION**

(a) Set the cellular phone so that it can receive calls.
(b) Place the cellular phone close to the radio receiver.
(c) Check if the cellular phone has reception according to the radio receiver.
OK:
Cellular phone has reception.

NG → **REPLACE RADIO RECEIVER**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

The Other Caller's Voice cannot be Heard, is too Quiet, or Distorted

INSPECTION PROCEDURE

1 CHECK CELLULAR PHONE

(a) Check if the voice on the other side can be heard using a cellular phone.
OK:
Voice can be heard.

NG → **REPAIR OR REPLACE CELLULAR PHONE**

OK

2 CHECK AUDIO AND VISUAL SYSTEM

(a) Check that audio sound can be heard from the driver side speaker.
OK:
Audio sound can be heard.
HINT:
If audio sound cannot be heard, proceed to "No sound can be heard from speakers. (Audio is mute.)" in the PROBLEM SYMPTOMS TABLE (See page AV-13).

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

3 CHECK SETTINGS

(a) Check that the received voice level setting on the cellular phone is not too low.
OK:
The received voice level setting is not too low.

NG → **SET VOLUME TO HIGH**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted

INSPECTION PROCEDURE

1	**CHECK CELLULAR PHONE**

(a) Check if the other side can hear your voice properly.
OK:
Your voice can be heard correctly.

NG → **REPLACE CELLULAR PHONE**

OK

2	**CHECK SETTINGS**

(a) Check if the mute is set to ON.
OK:
Mute is not set to ON.

NG → **TURN MUTE OFF**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

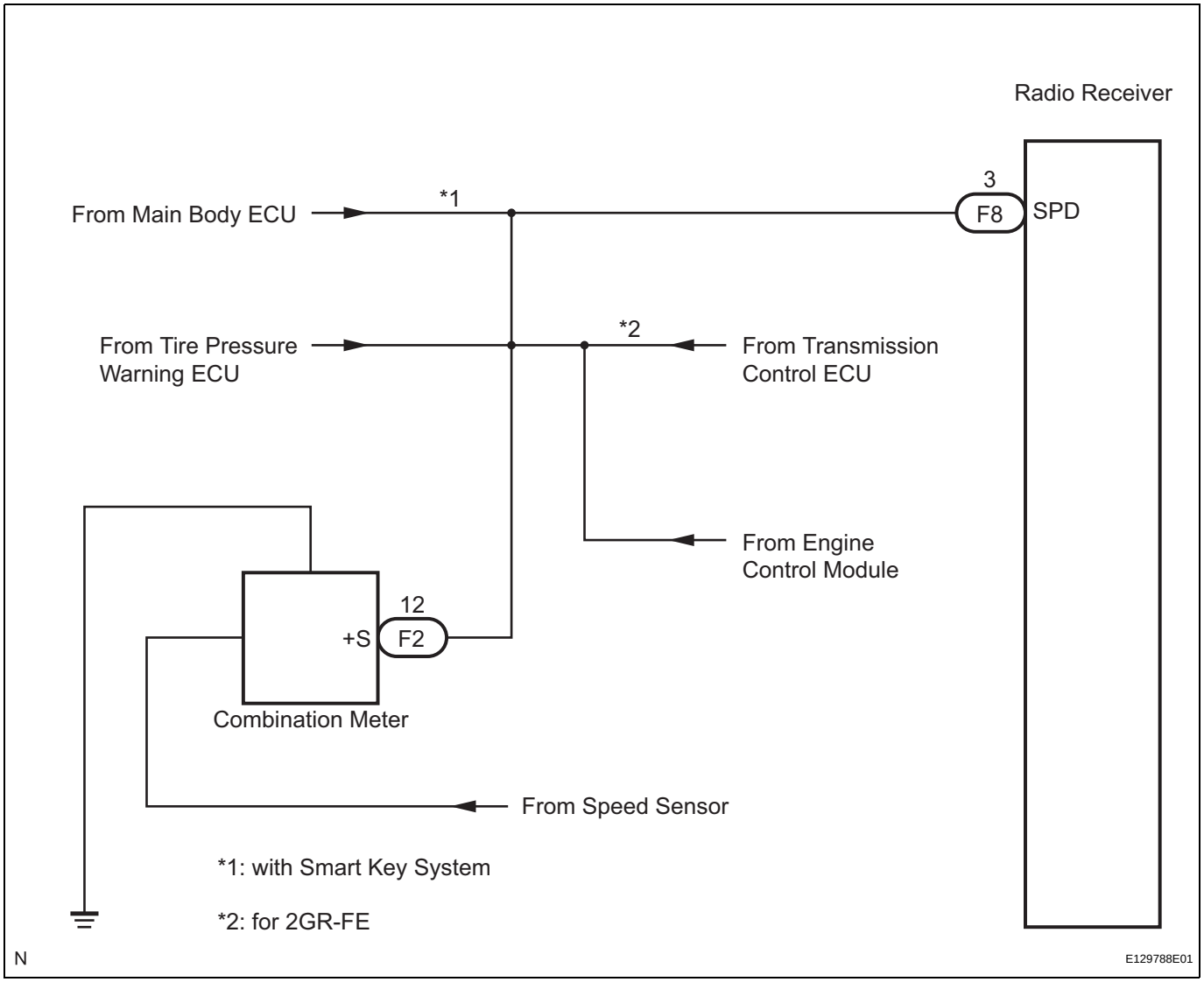
Vehicle Speed Signal Circuit between Radio Receiver and Combination Meter

DESCRIPTION

This circuit is necessary for the ASL (Auto Sound Leveliser) built into the radio receiver.
Speed signals are received from the combination meter and used for the ASL.
The ASL function automatically adjusts the sound data in order to enable hearing the clear audio sound even when vehicle noise increases (as vehicle noise increases, the volume is turned up etc.).
HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram below will not operate normally.

WIRING DIAGRAM



AV

INSPECTION PROCEDURE

1	CHECK OPERATION OF SPEEDOMETER

(a) Drive the vehicle and check if the function of the speedometer on the combination meter is normal.

OK:

Actual vehicle speed and the speed indicated on the speedometer are the same.

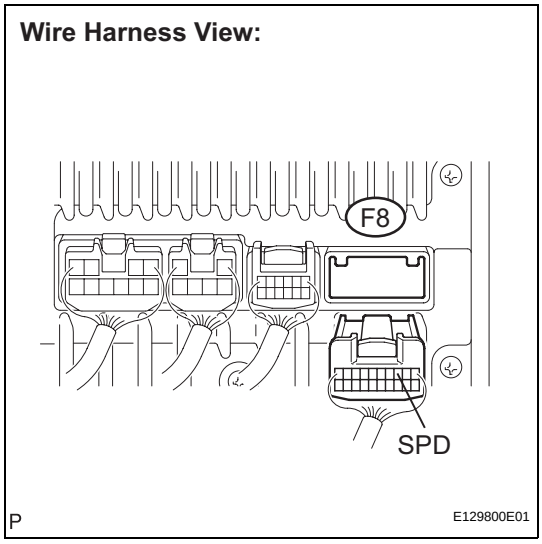
HINT:

The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **CHECK COMBINATION METER**

OK

2	INSPECT RADIO RECEIVER



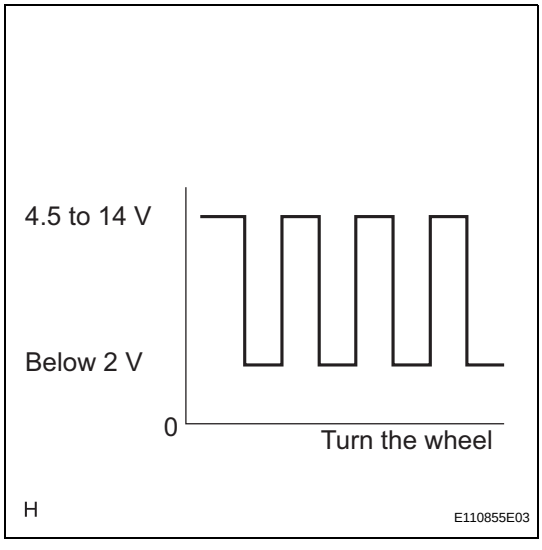
(a) Disconnect the radio receiver connector F8.

(b) Measure the voltage.

(1) Jack up either one of the drive wheels.

(2) Move the shift lever to the neutral position.

(3) Turn the ignition switch on (IG).



(4) Measure the voltage between terminal SPD of the wire harness connector and body ground when the drive wheels are turned slowly.

OK:

Voltage pulses as shown in the illustration.

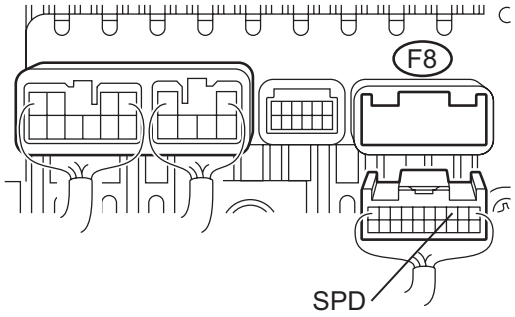
OK → **REPLACE RADIO RECEIVER**

NG

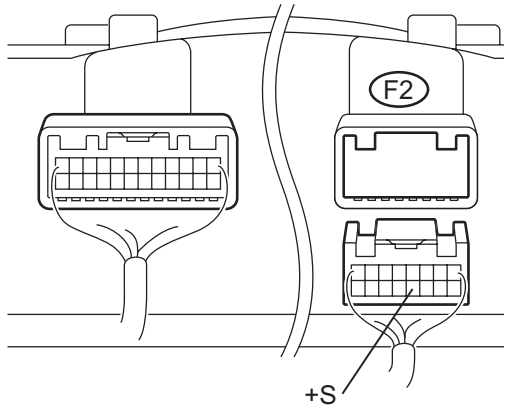
AV

3	CHECK HARNESS AND CONNECTOR (COMBINATION METER - RADIO RECEIVER)

Radio Receiver Wire Harness View:



Combination Meter Wire Harness View:



E129801E01

(a) Disconnect the radio receiver connector F8 and combination meter connector F2.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SPD - +S	Ignition switch off	Below 1 Ω

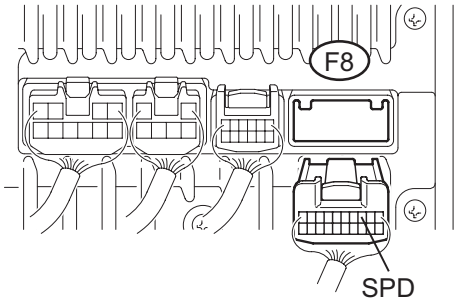
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

AV

4	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - BODY GROUND)

Wire Harness View:



P E129800E01

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SPD - Body ground	Ignition switch off	10 kΩ or higher

HINT:
If the resistance between terminal SPD and body ground is less than 10 kΩ, there may be a short in a wire harness, connector, or an ECU that is connected to the SPD signal wire.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR OR EACH ECU**

OK

REPLACE COMBINATION METER

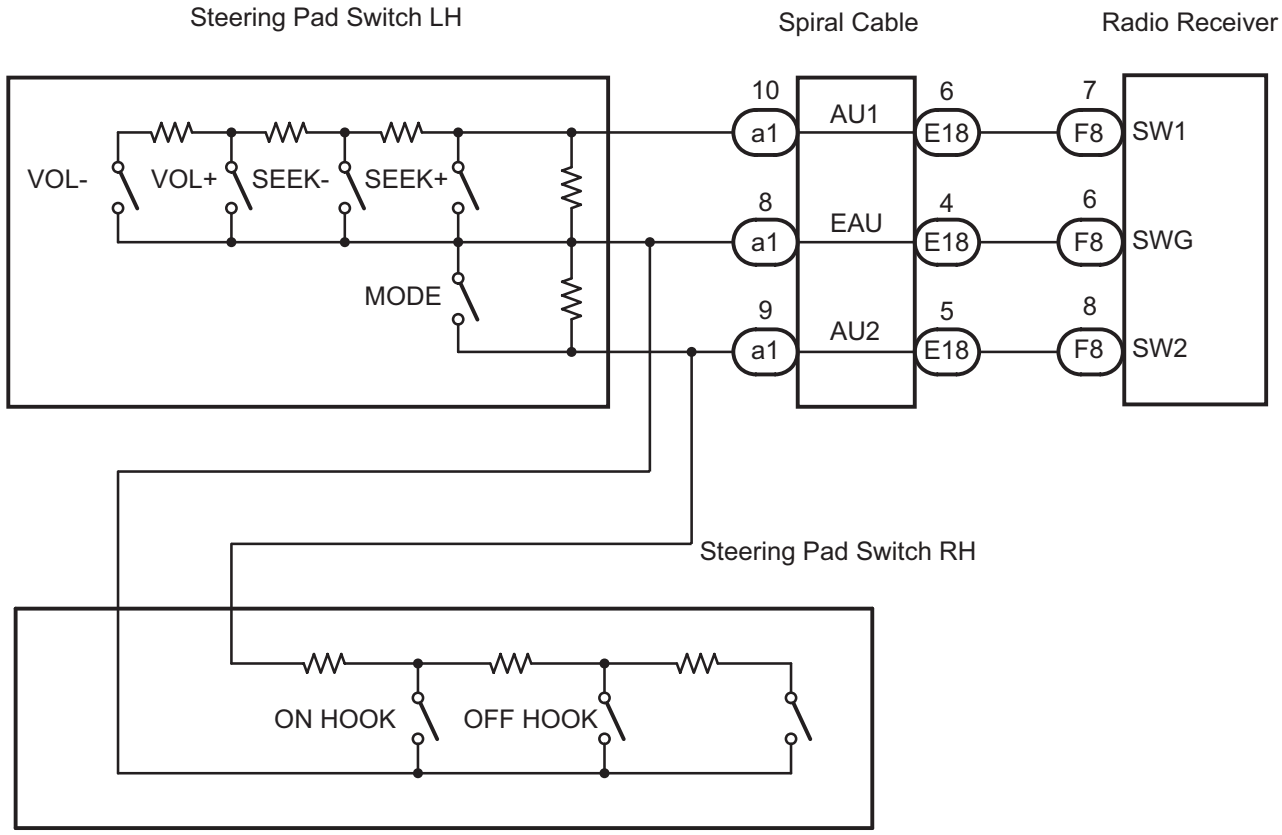
Steering Pad Switch Circuit

DESCRIPTION

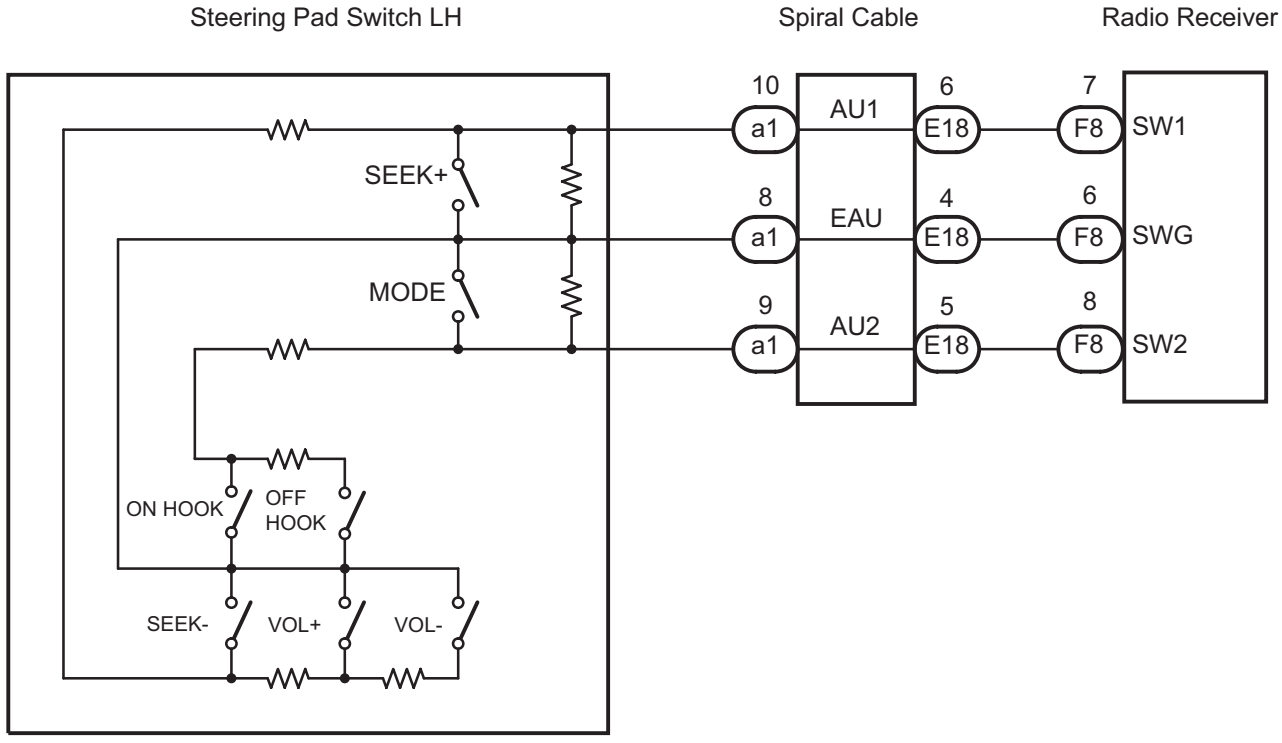
This circuit sends an operation signal from the steering pad switch to the radio receiver.
If there is an open in the circuit, the audio system cannot be operated using the steering pad switch.
If there is a short in the circuit, the same condition as that when the switch is continuously depressed occurs.
Therefore, the radio receiver cannot be operated using the steering pad switch, and also the radio receiver itself cannot function.

WIRING DIAGRAM

3 Spoke Type:



4 Spoke Type:



AV

P

E129802E02

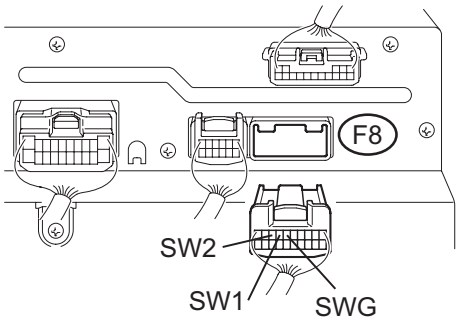
INSPECTION PROCEDURE

NOTICE:

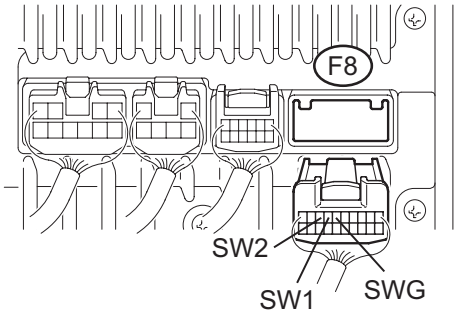
The vehicle is equipped with an SRS (Supplemental Restraint System) which includes components such as airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the Supplemental Restraint System (See page RS-1).

1	INSPECT RADIO RECEIVER

Wire Harness View (Premium Model):



Wire Harness View (Standard Model):



P E129803E02

(a) Disconnect the radio receiver connector F8.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SW1 - SWG	No switch is pushed	Approx. 100 kΩ
SW1 - SWG	SEEK+ switch: push	0 to 2.5 Ω
SW1 - SWG	SEEK- switch: push	Approx. 0.3 kΩ
SW1 - SWG	VOL+ switch: push	Approx. 1 kΩ
SW1 - SWG	VOL- switch: push	Approx. 3.1 kΩ
SW2 - SWG	No switch is pushed	Approx. 100 kΩ
SW2 - SWG	MODE switch: push	0 to 2.5 Ω
SW2 - SWG	ON HOOK switch: push (*1)	Approx. 0.3 kΩ
SW2 - SWG	OFF HOOK switch: push (*1)	Approx. 1 kΩ

*1: for Premium model

NG → **Go to step 2**

OK

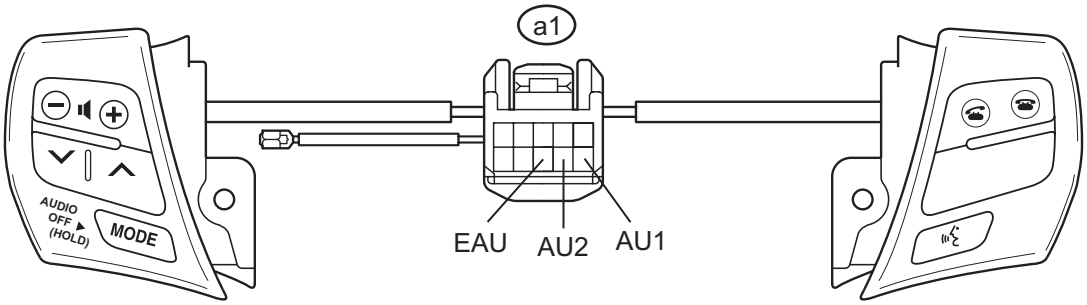
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	INSPECT STEERING PAD SWITCH ASSEMBLY

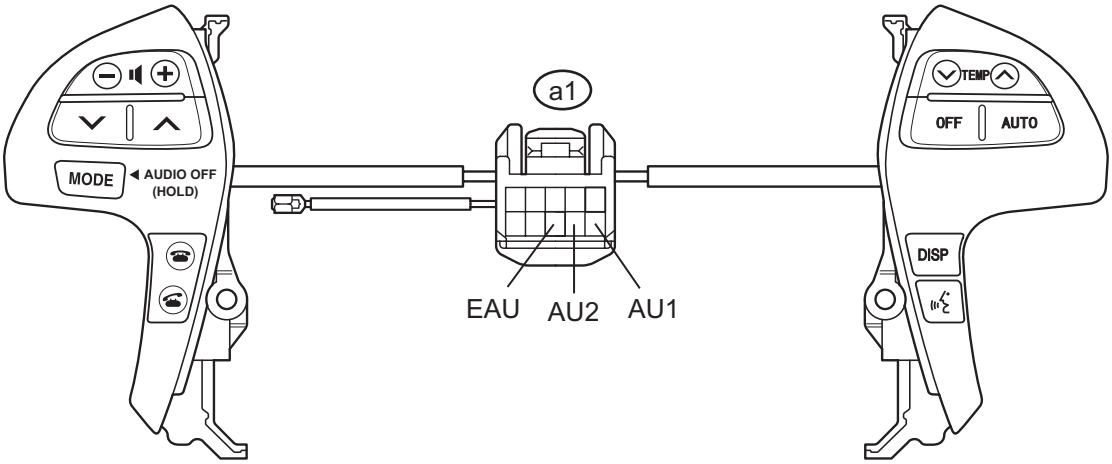
(a) Disconnect the steering pad switch assembly connector.
(b) Measure the resistance according to the values in the table below.

AV

3 Spoke Type:



4 Spoke Type:



P

E129804E01

Standard resistance

Tester connection	Condition	Specified condition
AU1 - EAU	No switch is pushed	Approx. 100 kΩ
AU1 - EAU	SEEK+ switch: push	0 to 2.5 Ω
AU1 - EAU	SEEK- switch: push	Approx. 0.3 kΩ
AU1 - EAU	VOL+ switch: push	Approx. 1 kΩ
AU1 - EAU	VOL- switch: push	Approx. 3.1 kΩ
AU2 - EAU	No switch is pushed	Approx. 100 kΩ
AU2 - EAU	MODE switch: push	0 to 2.5 Ω
AU2 - EAU	ON HOOK switch: push (*1)	Approx. 0.3 kΩ
AU2 - EAU	OFF HOOK switch: push (*1)	Approx. 1 kΩ

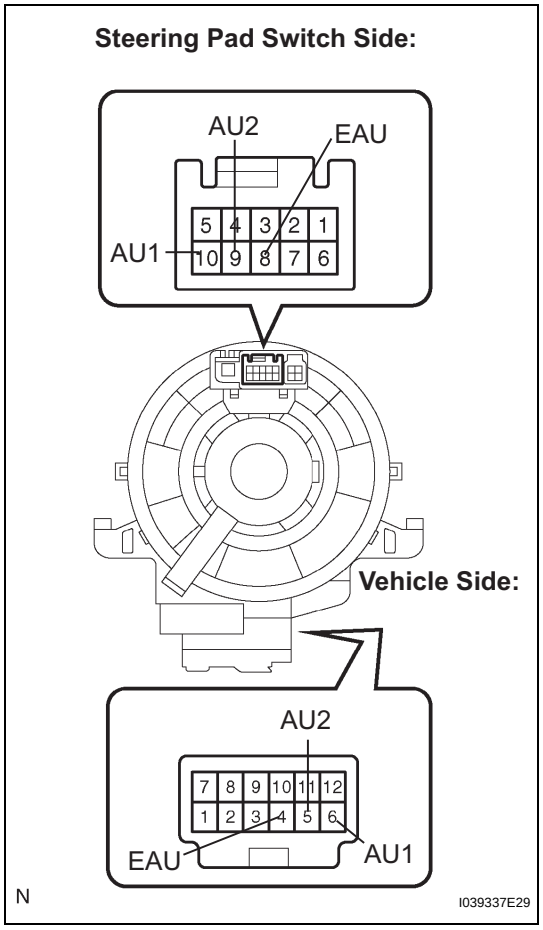
*1: for Premium model

AV

NG → REPLACE STEERING PAD SWITCH ASSEMBLY

OK

3 INSPECT SPIRAL CABLE



(a) Disconnect the steering pad switch and spiral cable connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Spiral cable position	Specified condition
EAU - EAU	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
AU1 - AU1	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
AU2 - AU2	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

NOTICE:
The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may prevent the airbag from deploying. Be sure to read the page shown in the brackets.

HINT:

- Removal (See page RS-363)
- Installation (See page RS-366)

NG → REPLACE SPIRAL CABLE

OK

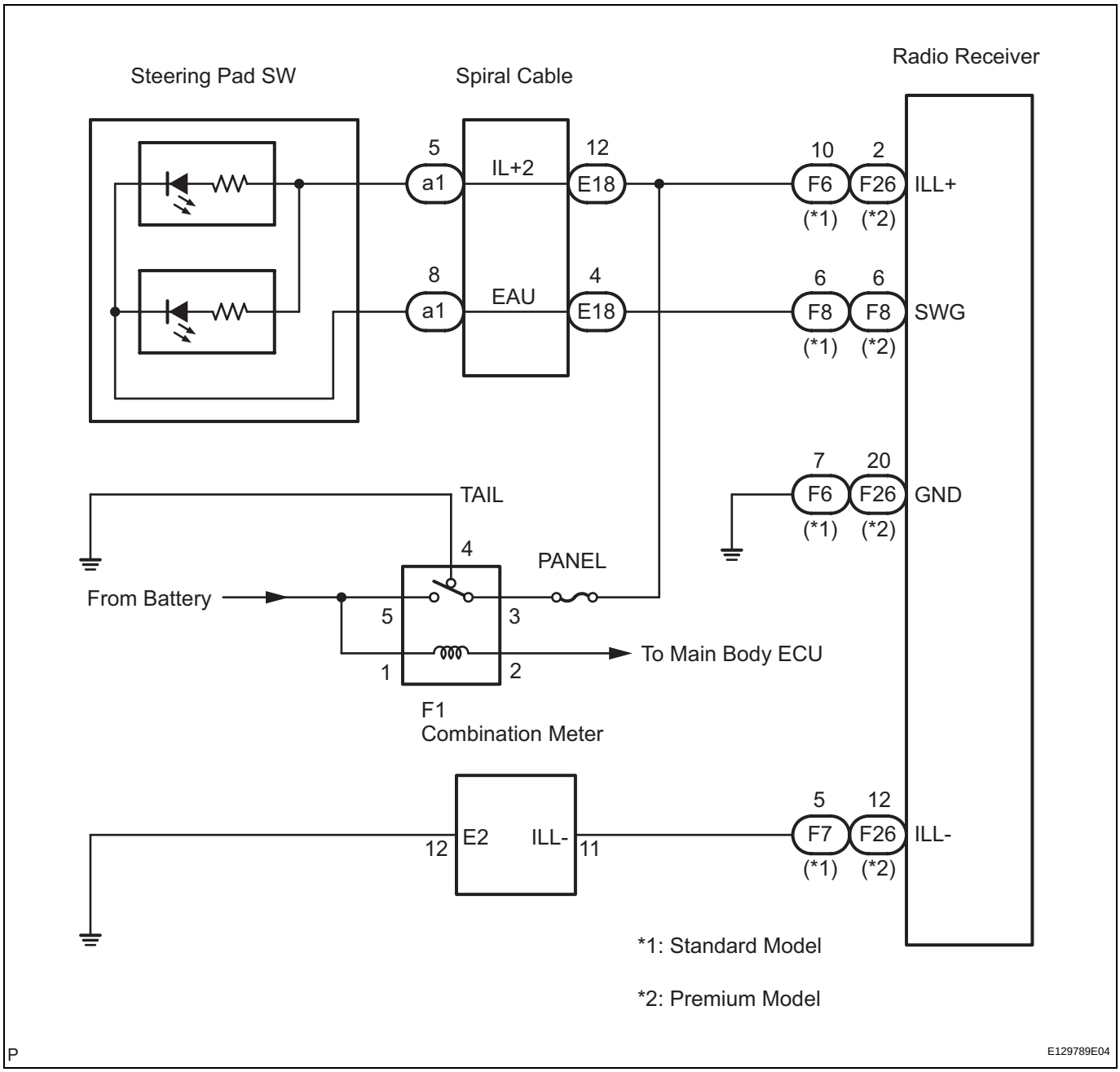
REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL CABLE - RADIO RECEIVER)

Illumination Circuit

DESCRIPTION

Power is supplied to the radio receiver and steering pad switch illumination when the light control switch is in the TAIL or HEAD position.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

The vehicle is equipped with an SRS (Supplemental Restraint System) which includes components such as airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the supplemental restraint system (See page RS-1).

1	CHECK ILLUMINATION

(a) Check if the illumination for the radio receiver, steering pad switch, glove box or others (hazard switch, transmission control switch, etc.) comes on when the light control switch is turned to the HEAD or TAIL position.

Result

Result	Proceed to
Illumination comes on for all components except steering pad switch.	A
Illumination comes on for all components except radio receiver.	B
No illumination comes on (radio receiver, hazard switch, glove box, etc.).	C
Illumination comes on only for glove box and steering pad switch.	D

B → Go to step 6

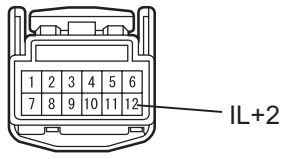
C → GO TO LIGHTING SYSTEM

D → GO TO COMBINATION METER SYSTEM

A

2	CHECK HARNESS AND CONNECTOR (BATTERY - SPIRAL CABLE)

Spiral Cable Connector Front View:



(a) Disconnect the spiral cable connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
IL+2 - Body ground	Light control SW TAIL or HEAD	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

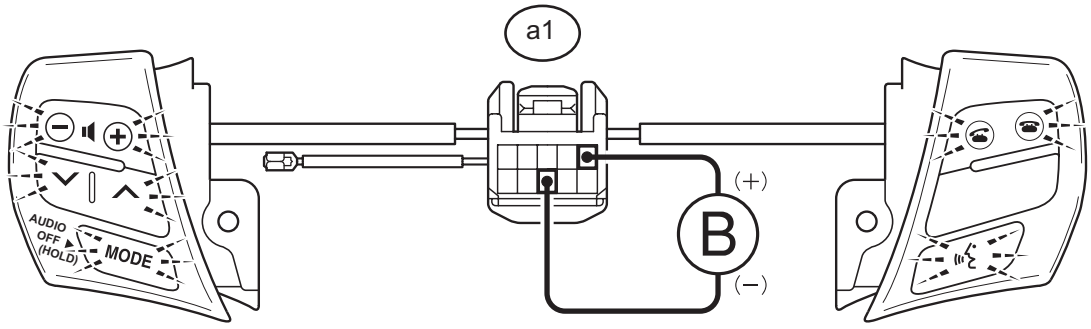
OK

3	INSPECT STEERING PAD SWITCH ASSEMBLY

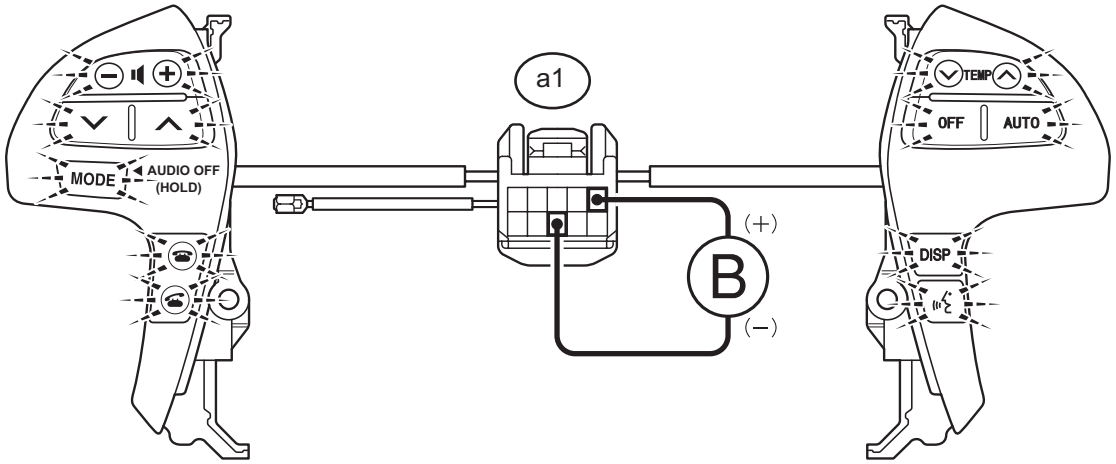
(a) Disconnect the steering pad switch connector.
(b) Connect the positive (+) lead to terminal IL+2 and the negative (-) lead to terminal EAU of the steering pad switch assembly connector.

AV

3 Spoke Type:



4 Spoke Type:



P

E129805E01

(c) Check if the illumination for the steering pad switch assembly comes on.

OK:

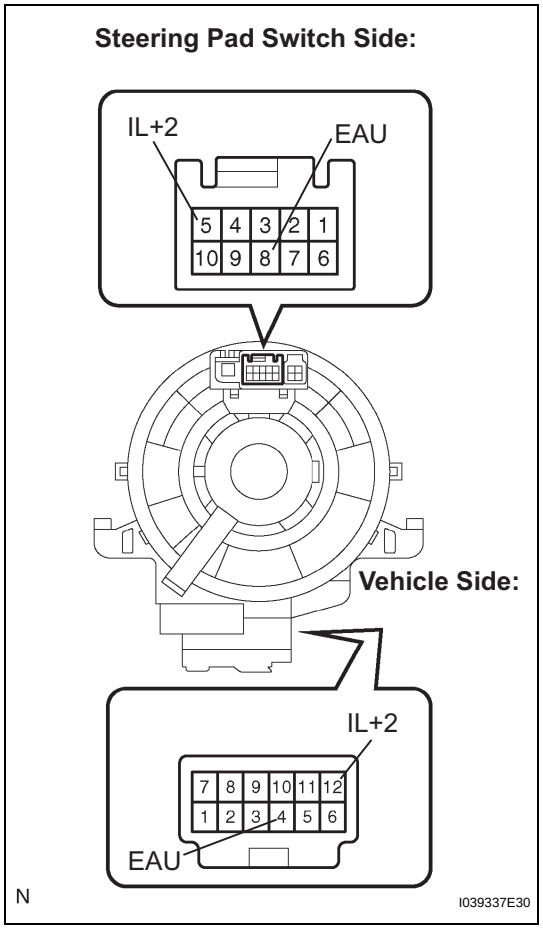
Illumination for the steering pad switch assembly comes on.

AV

NG → **REPLACE STEERING PAD SWITCH ASSEMBLY**

OK

4	INSPECT SPIRAL CABLE



(a) Disconnect the steering pad switch and spiral cable connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Spiral cable position	Specified condition
EAU - EAU	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
IL+2 - IL+2	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

NOTICE:

The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may prevent the airbag from deploying. Be sure to read the page shown in the brackets.

HINT:

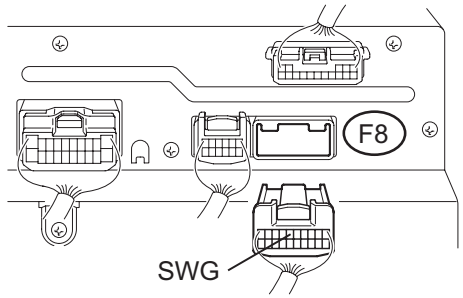
- Removal (See page RS-363)
- Installation (See page RS-366)

NG → **REPLACE SPIRAL CABLE**

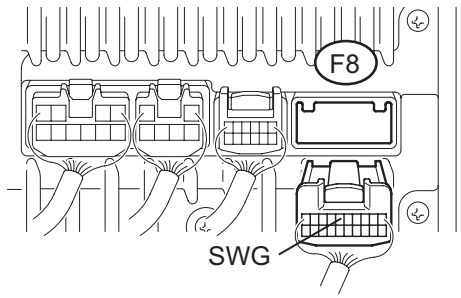
OK

5	CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - RADIO RECEIVER)

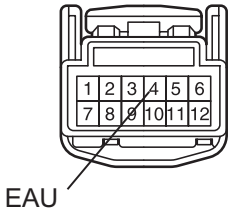
Radio Receiver Wire Harness View (Premium Model):



Radio Receiver Wire Harness View (Standard Model):



Spiral Cable Connector Front View:



P

E129806E02

(a) Disconnect the connectors from the radio receiver and spiral cable.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SWG - EAU	Always	Below 1 Ω
SWG - Body ground	Always	10 kΩ or higher

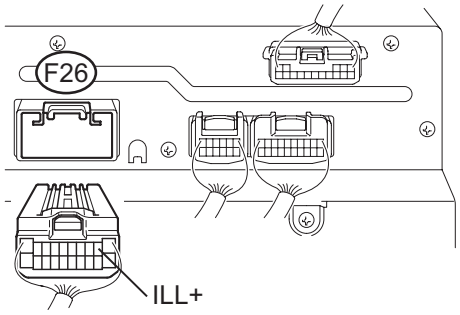
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

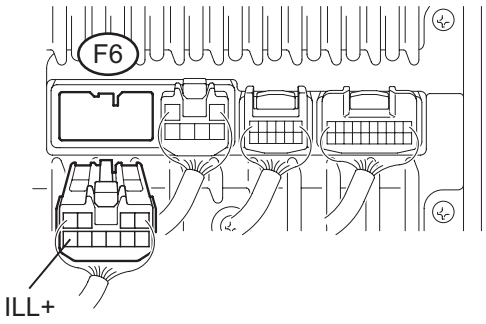
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

6	CHECK HARNESS AND CONNECTOR (BATTERY - RADIO RECEIVER)

Wire Harness View (Premium Model):



Wire Harness View (Standard Model):



P E129807E03

(a) Disconnect the radio receiver connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

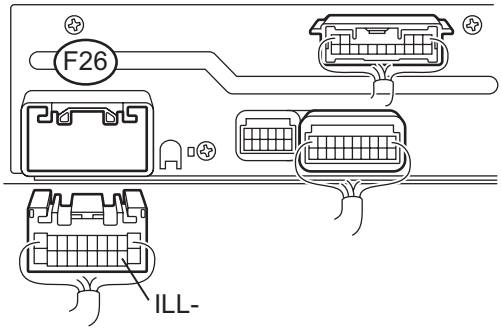
Tester connection	Condition	Specified condition
ILL+ - Body ground	Light control switch TAIL or HEAD	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

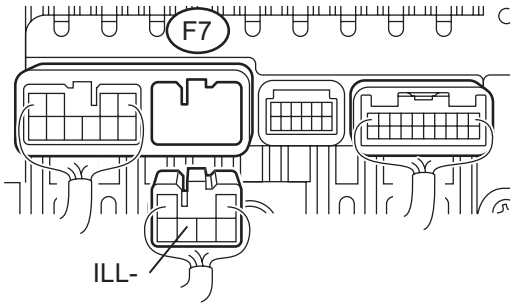
OK

7	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - COMBINATION METER)

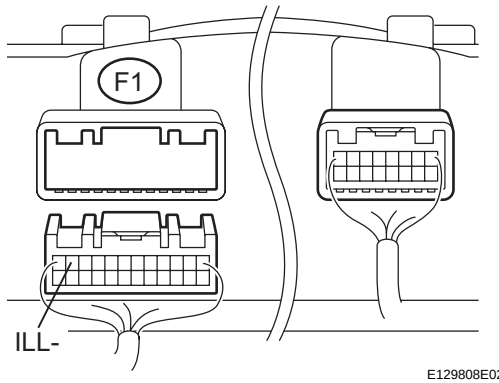
Radio Receiver Wire Harness View (Premium Model):



Radio Receiver Wire Harness View (Standard Model):



Combination Meter Wire Harness View:



E129808E02

(a) Disconnect the radio receiver connector and combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ILL- - ILL-	Always	Below 1 Ω
ILL- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AV

Speaker Circuit

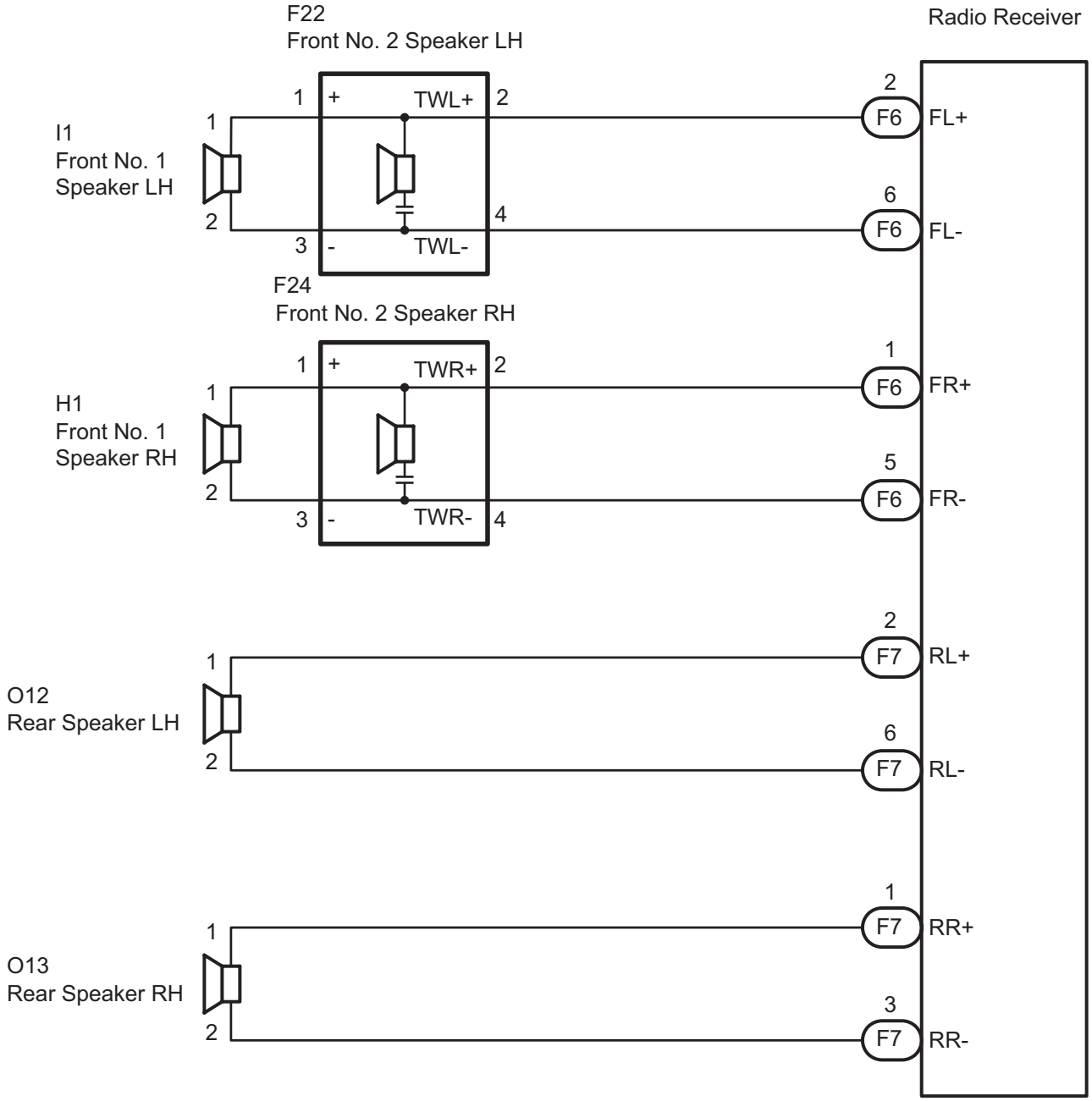
DESCRIPTION

- When the vehicle has a built-in type amplifier, a sound signal is sent from the radio receiver to the speakers via the "Standard Model" circuit.
- When the vehicle has a separate type amplifier, a sound signal from the radio receiver is amplified by the stereo component amplifier and then transmitted to the speaker via the "Premium Model" circuit.

If there is a short in this circuit, the stereo component amplifier detects it and stops output to the speakers. Thus sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier or speakers.

WIRING DIAGRAM

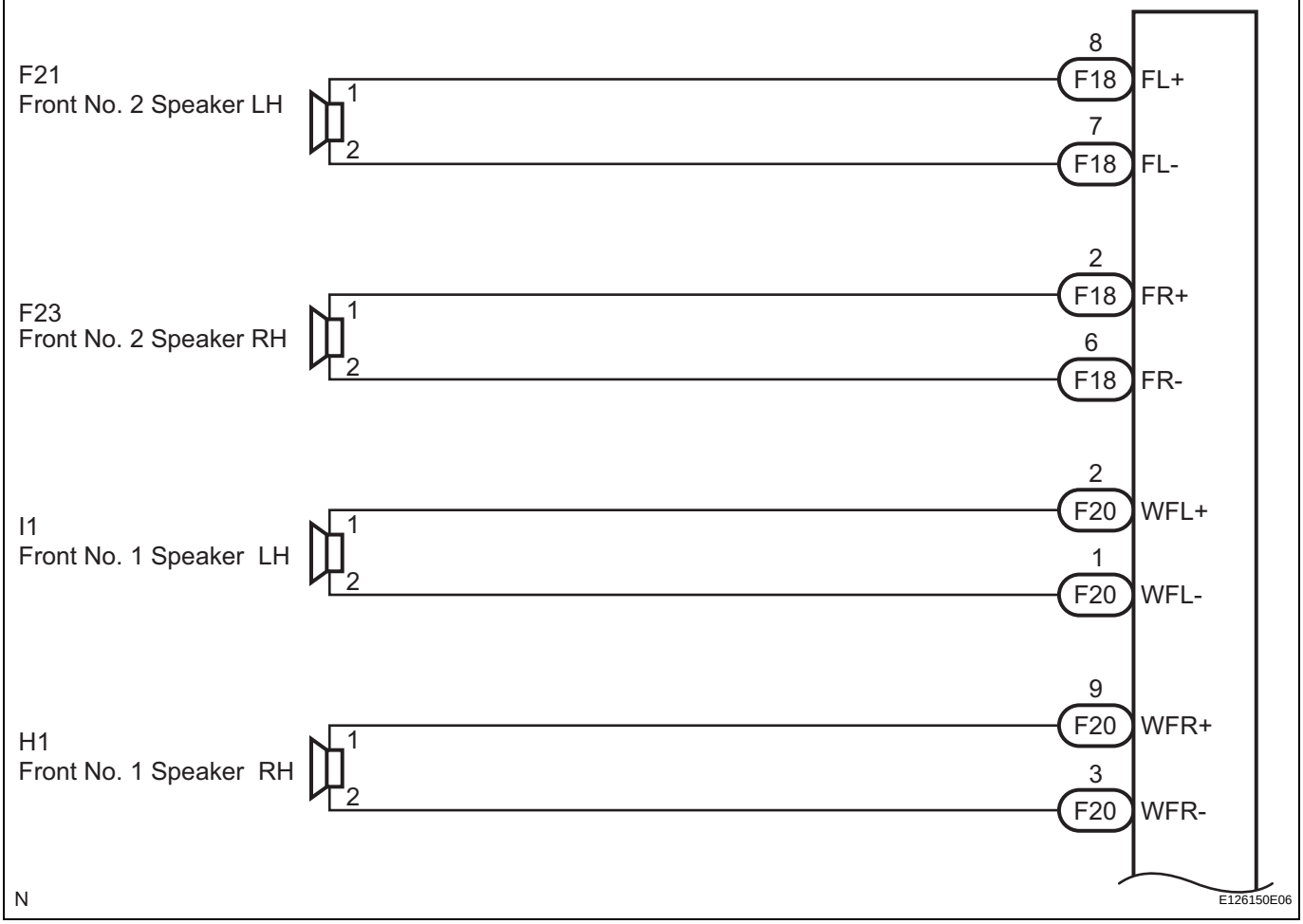
Standard Model:

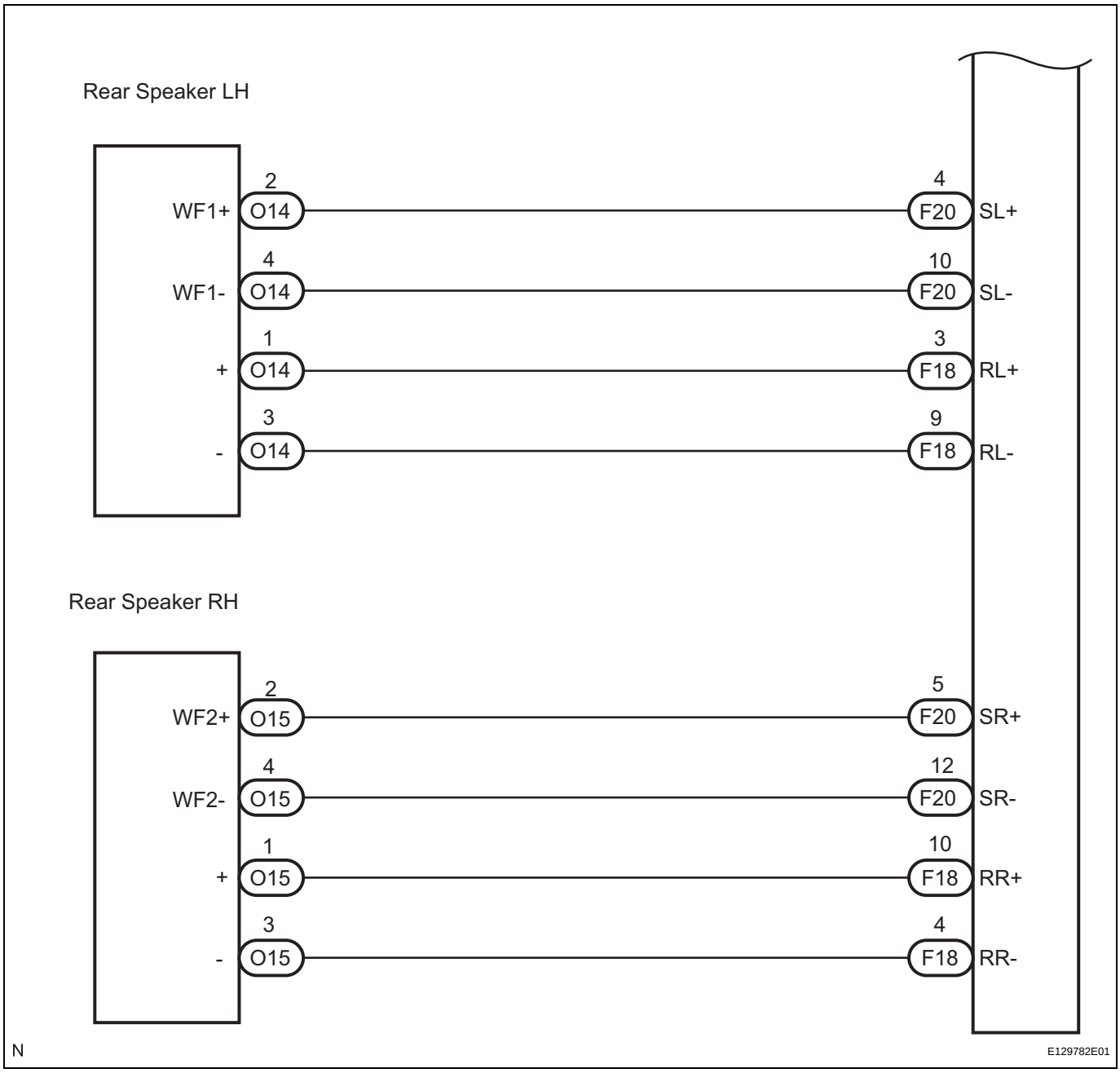


P

E121225E04

Premium Model:

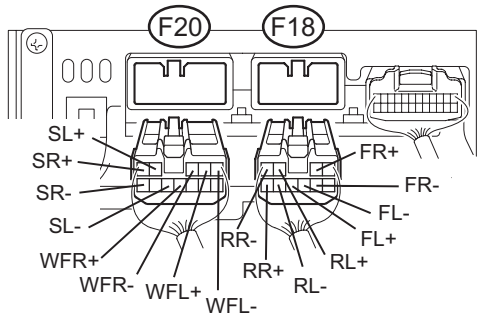



Rear Speaker LH
WF1+
2
O14
4
F20
SL+
WF1-
4
O14
10
F20
SL-
+
1
O14
3
F18
RL+
-
3
O14
9
F18
RL-
Rear Speaker RH
WF2+
2
O15
5
F20
SR+
WF2-
4
O15
12
F20
SR-
+
1
O15
10
F18
RR+
-
3
O15
4
F18
RR-
N
E129782E01

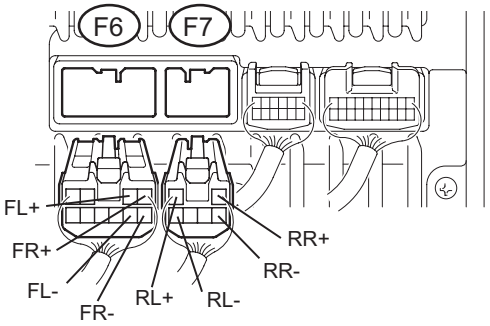
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR

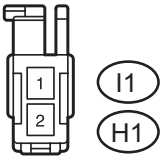
Stereo Component Amplifier Wire Harness View (Premium Model):



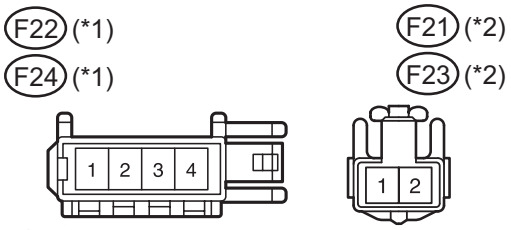
Radio Receiver Wire Harness View (Standard Model):



Front No. 1 Speaker Connector Front View:



Front No. 2 Speaker Connector Front View:



*1: Standard Model

*2: Premium Model

P

E129814E04

(a) Disconnect the connectors shown in the illustration from the stereo component amplifier or radio receiver and speakers.

(b) Premium Model:
Measure the resistance between each of the front No. 2 speakers and the stereo component amplifier to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω

(c) Standard Model:
Measure the resistance between each of the front No. 2 speakers and the radio receiver to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω

(d) Premium Model:
Measure the resistance between each of the front No. 1 speakers and the stereo component amplifier to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω

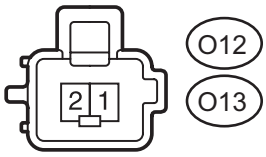
(e) Standard Model:
Measure the resistance between each of the front No. 2 speakers and each of the front No. 1 speakers to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω

(f) Premium Model:
Measure the resistance between each of the rear speakers and the stereo component amplifier to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω

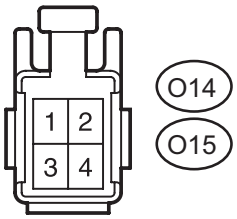
(g) Standard Model:
Measure the resistance between each of the rear speakers and the radio receiver to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω

AV

Rear Speaker Connector Front View (Standard Model):



Rear Speaker Connector Front View (Premium Model):



P E129815E01

(h) Measure the resistance between each speaker and body ground to check for a short circuit in the wire harness.
Standard resistance:
10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT FRONT NO. 1 SPEAKER

(a) Resistance check.
(1) Measure the resistance between the terminals of the speaker.
Standard resistance:
Premium Model:
1.8 to 2.6 Ω
Standard Model:
Approximately 4 Ω

NG → **REPLACE FRONT NO. 1 SPEAKER**

OK

3	INSPECT FRONT NO. 2 SPEAKER

(a) Check that the malfunction disappears when another speaker in good condition is installed.
OK:
Malfunction disappears.
HINT:
- Connect all the connectors to the front No. 2 speaker.
- When there is a possibility that either the right or left front speaker is detective, inspect by interchanging the right one with the left one.
- Perform the above inspection on both LH and RH sides.

OK → **REPLACE FRONT NO. 2 SPEAKER**

AV

NG

4	CONFIRM MODEL

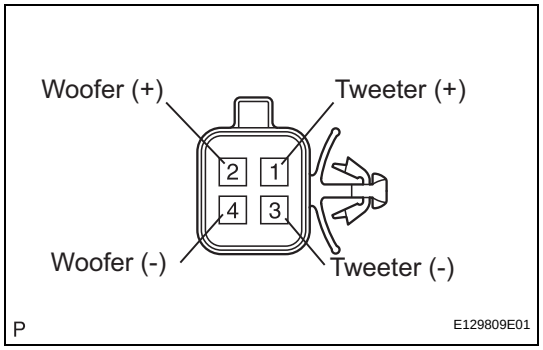
Result

Result	Proceed to
Premium Model	A
Standard Model	B

B → Go to step 6

A

5	INSPECT REAR SPEAKER



(a) Woofer speaker:
(1) Measure the resistance according to the value(s) in the table below.
NOTICE:
The speaker should not be removed for checking.
Standard resistance

Tester connection	Condition	Specified condition
2 - 4	Always	1.8 to 2.6 Ω

(b) Tweeter speaker:
(1) Check that the malfunction disappears when another rear speaker in good condition is installed.

OK:
Malfunction appears.

HINT:
- Connect all the connectors to the rear speaker.
- When there is a possibility that either the right or left rear speaker is detective, inspect by interchanging the right one with the left one.

NG → REPLACE REAR SPEAKER

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AV

6	INSPECT REAR SPEAKER

(a) Resistance check.
(1) Measure the resistance between the terminals of the speaker.
Standard resistance:
Approximately 4 Ω

NG → **REPLACE REAR SPEAKER**

OK

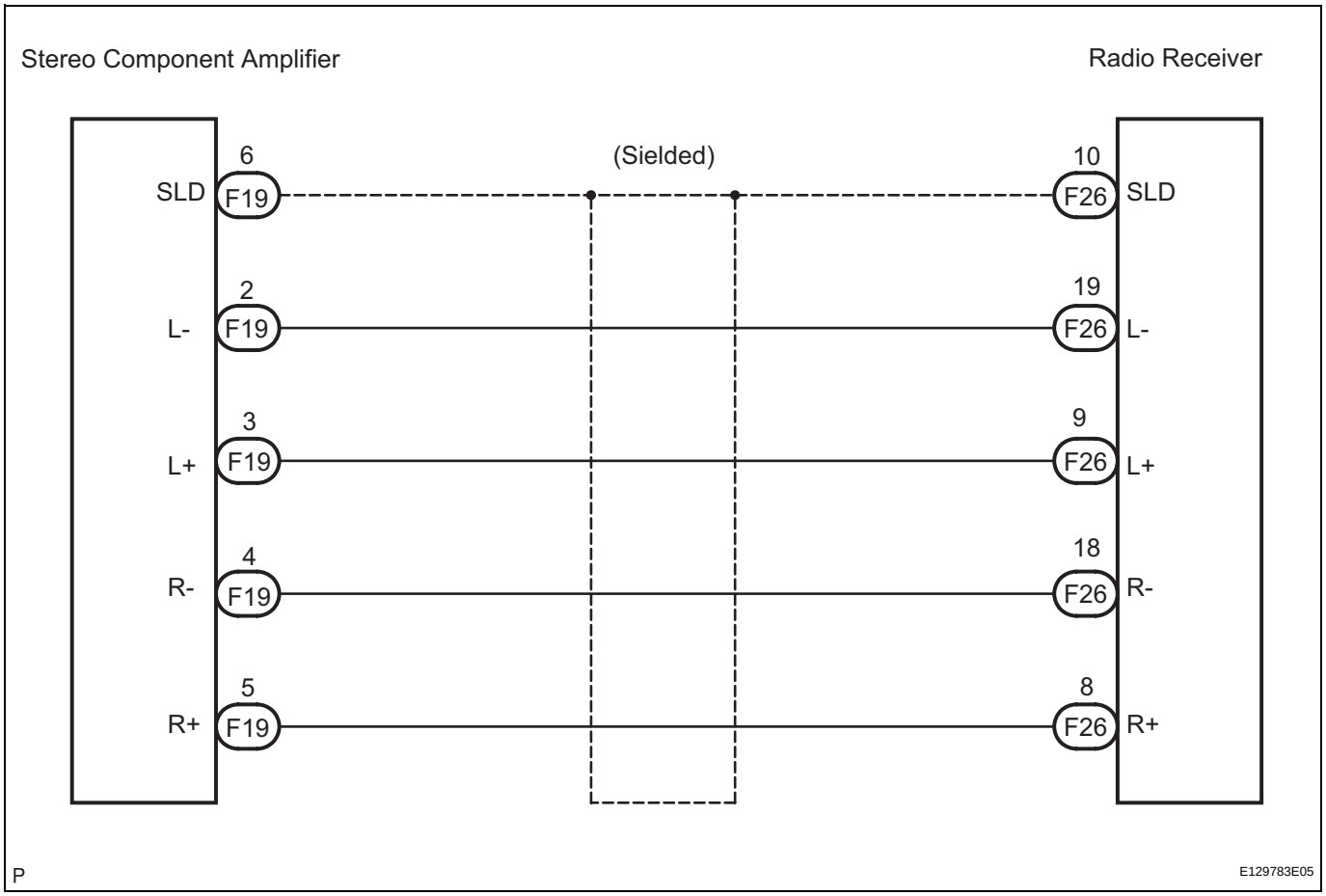
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Sound Signal Circuit between Radio Receiver and Stereo Component Amplifier

DESCRIPTION

The radio receiver sends a sound signal to the stereo component amplifier through this circuit.
The sound signal that has been sent is amplified by the stereo component amplifier, and then is sent to the speakers.
If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier or speakers.

WIRING DIAGRAM

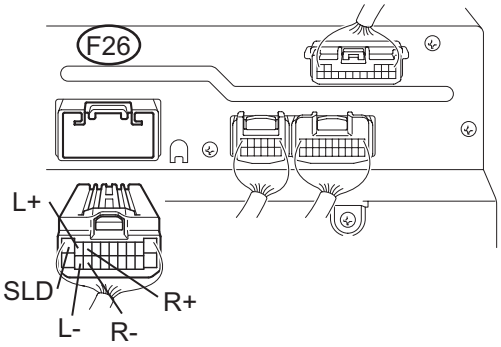


AV

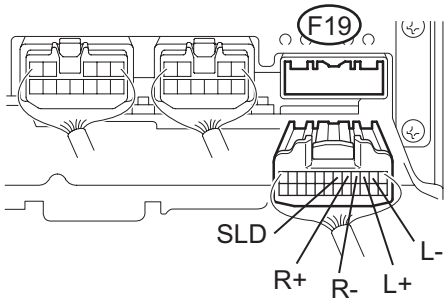
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - STEREO COMPONENT AMPLIFIER)

Radio Receiver Wire Harness View:



Stereo Component Amplifier Wire Harness View:



P E129816E05

(a) Disconnect the connectors from the radio receiver and stereo component amplifier.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
L+ - L+	Always	Below 1 Ω
L- - L-	Always	Below 1 Ω
R+ - R+	Always	Below 1 Ω
R- - R-	Always	Below 1 Ω
SLD - SLD	Always	Below 1 Ω
L+ - Body ground	Always	10 kΩ or higher
L- - Body ground	Always	10 kΩ or higher
R+ - Body ground	Always	10 kΩ or higher
R- - Body ground	Always	10 kΩ or higher
SLD - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

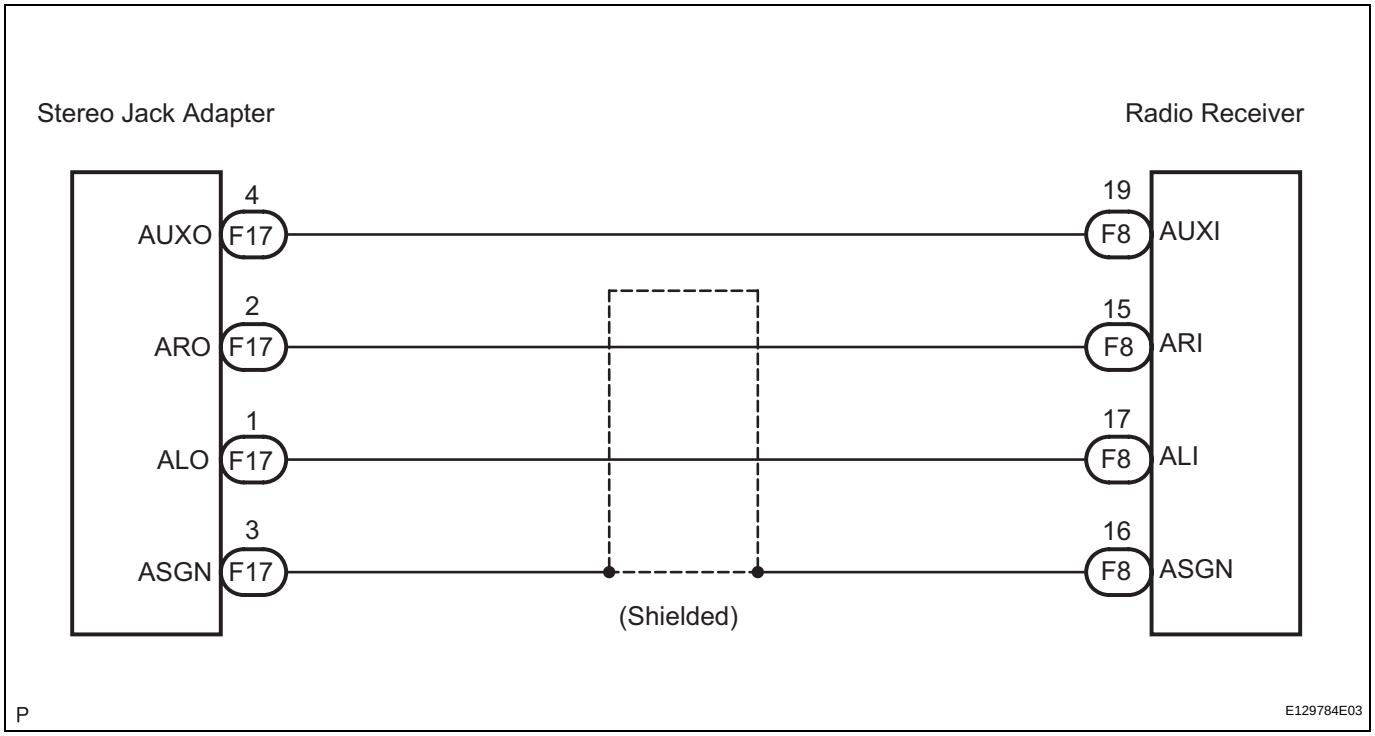
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Sound Signal Circuit between Radio Receiver and Stereo Jack Adapter

DESCRIPTION

The stereo jack adapter sends an external device sound signal to the radio receiver through this circuit. The sound signal that has been sent is amplified by the stereo component amplifier or radio receiver, and then is sent to the speakers.
If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier, radio receiver, or speakers.

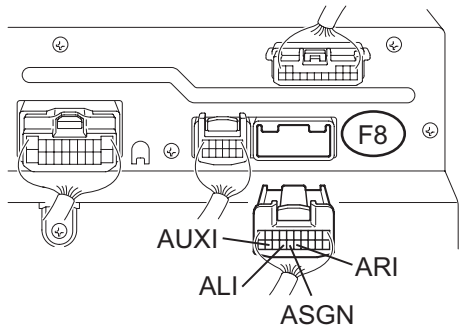
WIRING DIAGRAM



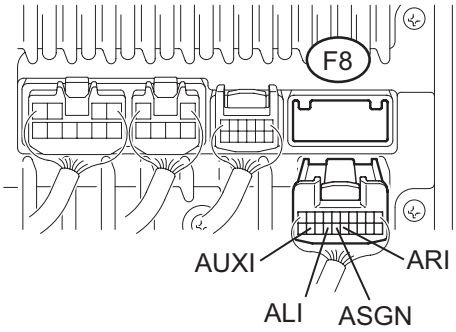
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - STEREO JACK ADAPTER)

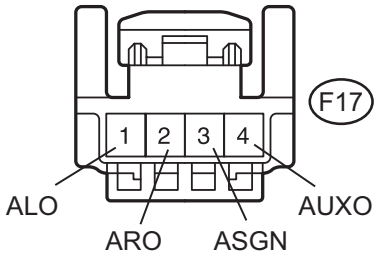
Radio Receiver Wire Harness View (Premium Model):



Radio Receiver Wire Harness View (Standard Model):



Stereo Jack Adapter Connector Front View:



P E129810E01

(a) Disconnect the connectors from the stereo jack adapter and radio receiver.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
AUXO - AUXI	Always	Below 1 Ω
ASGN - ASGN	Always	Below 1 Ω
ARO - ARI	Always	Below 1 Ω
ALO - ALI	Always	Below 1 Ω
AUXO - Body ground	Always	10 kΩ or higher
ASGN - Body ground	Always	10 kΩ or higher
ARO - Body ground	Always	10 kΩ or higher
ALO - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AV

Mute Signal Circuit between Radio Receiver and Stereo Component Amplifier

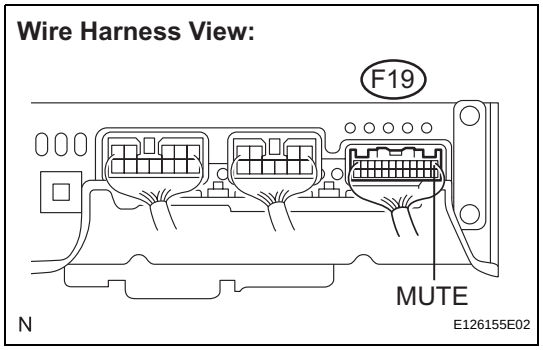
DESCRIPTION

This circuit sends a signal to the stereo component amplifier to mute noise. Because of that, the noise produced by changing the sound source ceases.
If there is an open in the circuit, noise can be heard from the speakers when changing the sound source.
If there is a short in the circuit, even though the stereo component amplifier is normal, no sound, or only an extremely small sound, can be produced.

WIRING DIAGRAM

INSPECTION PROCEDURE

1	INSPECT STEREO COMPONENT AMPLIFIER



(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

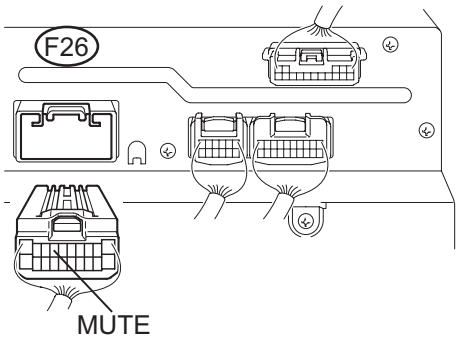
Tester connection	Condition	Specified condition
MUTE - Body ground	Turn ignition switch on (ACC), Audio system is playing → Changing	Above 3.5 V → Below 1 V

OK → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

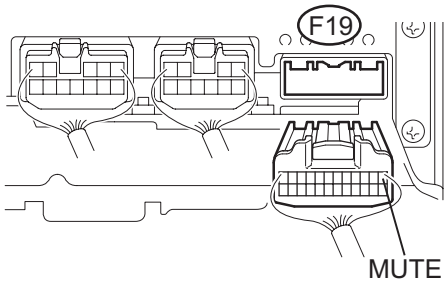
NG

2	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - STEREO COMPONENT AMPLIFIER)

Radio Receiver Wire Harness View:



Stereo Component Amplifier Wire Harness View:



P E129816E06

(a) Disconnect the radio receiver connector F26 and stereo component amplifier connector F19.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

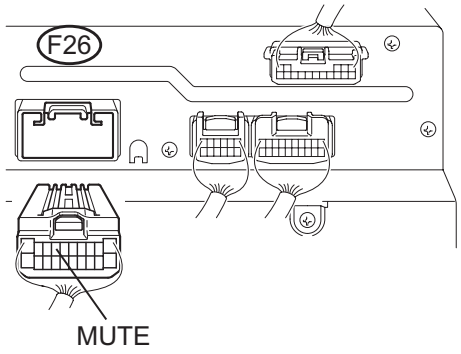
Tester connection	Condition	Specified condition
MUTE - MUTE	Always	Below 1 Ω
MUTE - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	INSPECT STEREO COMPONENT AMPLIFIER (OUTPUT SIGNAL)

Premium Model Wire Harness View:



P E131994E04

(a) Reconnect the stereo component amplifier connector F19.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
MUTE - Body ground	Turn ignition switch on (ACC), Audio system is playing.	Above 3.5 V

NG → **REPLACE STEREO COMPONENT AMPLIFIER**

OK

REPLACE RADIO RECEIVER

AVC-LAN Circuit

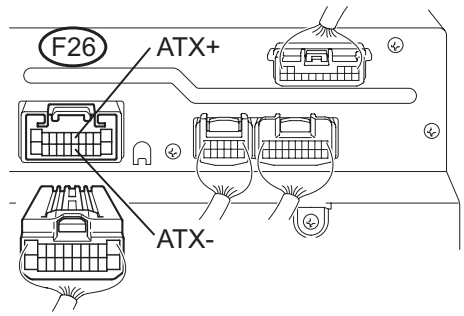
DESCRIPTION

Each unit of the audio system connected to the AVC-LAN (communication bus) transfers the signal of each switch by communication.
When a short to +B or short to ground occurs in this AVC-LAN, the audio system will not function normally as the communication is discontinued.

INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER

Premium Model Wire Harness View:



P E129798E04

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO RECEIVER**

OK

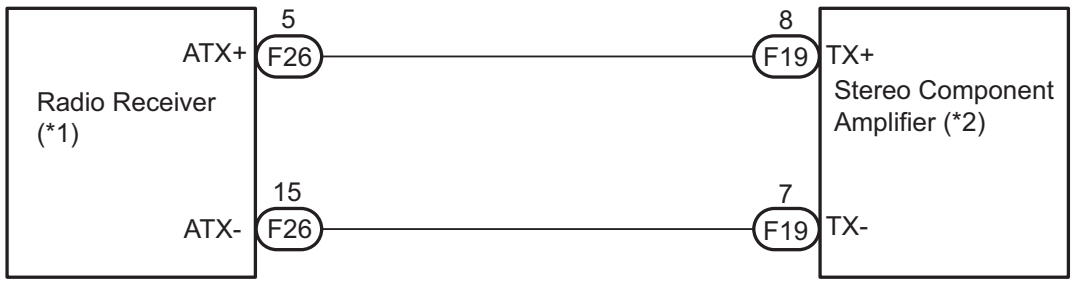
2	CHECK HARNESS AND CONNECTOR

HINT:
For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check all AVC-LAN circuits.
  (1) Disconnect all connectors in all AVC-LAN circuits.
  (2) Check for an open or short in all AVC-LAN circuits.
    OK:
      There is no open or short circuit.

AVC-LAN WIRING DIAGRAM

Premium Model:



*1: Master Unit

*2: Slave Unit

P

E111831E15

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

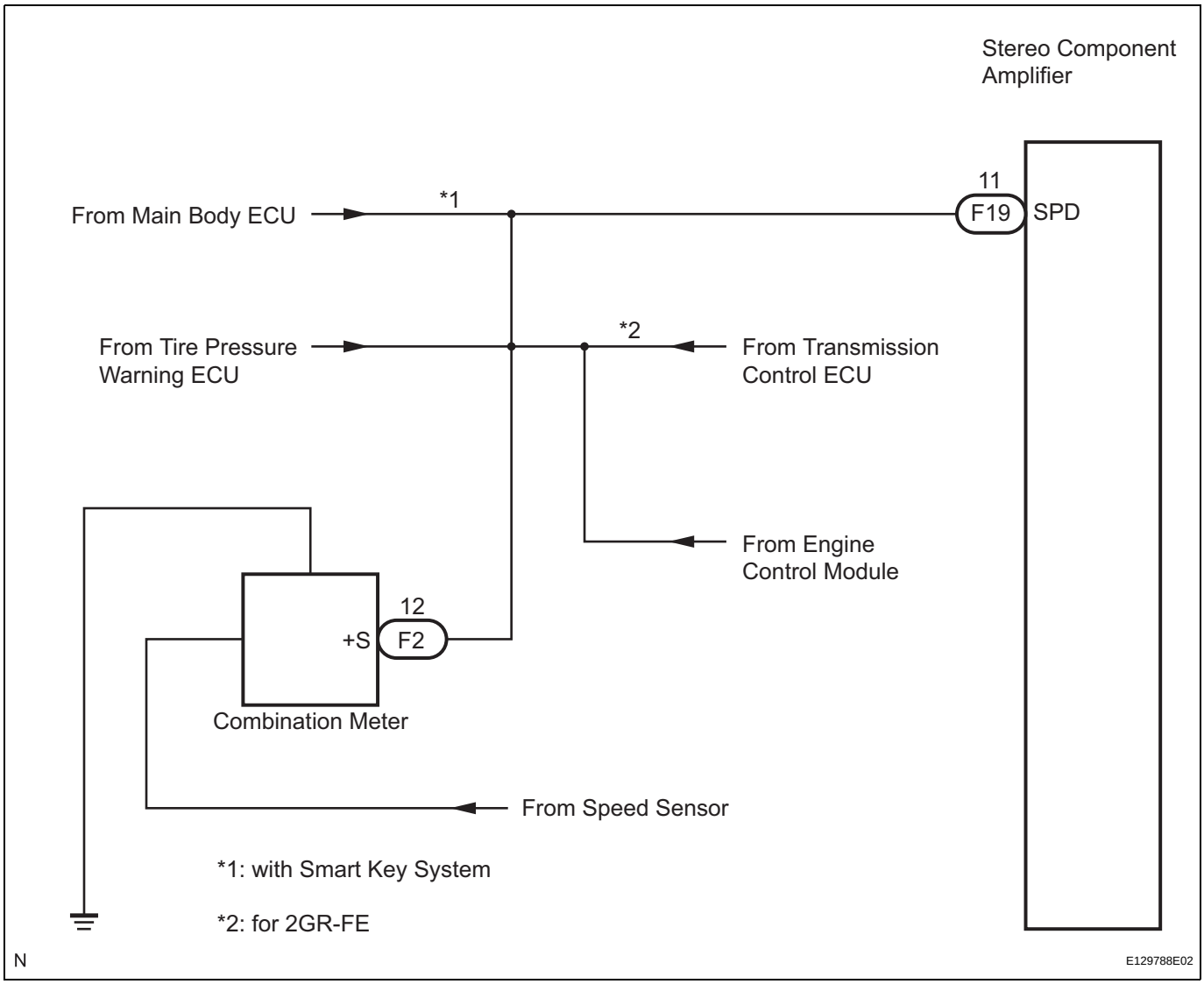
Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter

DESCRIPTION

This circuit is necessary for the ASL (Auto Sound Leveliser) built into the stereo component amplifier. Speed signals are received from the combination meter and used for the ASL.
The ASL function automatically adjusts the sound data in order to enable hearing the clear audio sound even when vehicle noise increases (as vehicle noise increases, the volume is turned up etc.).
HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram below will not operate normally.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	OPERATION OF SPEEDOMETER

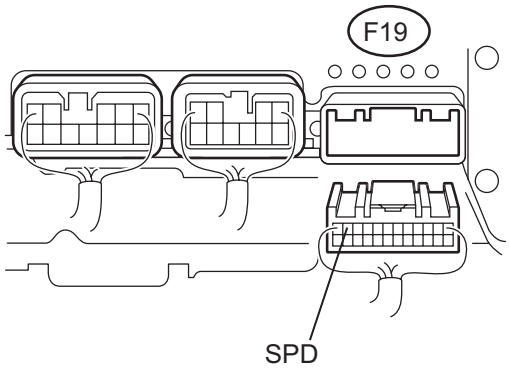
(a) Drive the vehicle and check if the function of the speedometer on the combination meter is normal.
OK:
Actual vehicle speed and the speed indicated on the speedometer are the same.
HINT:
The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **CHECK COMBINATION METER**

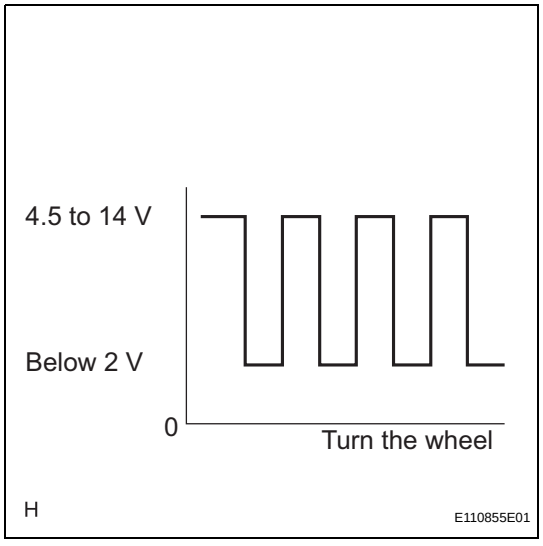
OK

2	INSPECT STEREO COMPONENT AMPLIFIER

Wire Harness View:



(a) Disconnect the stereo component amplifier connector F19.
(b) Measure the voltage.
(1) Jack up either one of the drive wheels.
(2) Move the shift lever to the neutral position.
(3) Turn the ignition switch on (IG).



(4) Measure the voltage between terminal SPD of the wire harness connector and body ground when the drive wheels are turned slowly.
OK:
Voltage pulses as shown in the illustration.

NG → **Go to step 3**

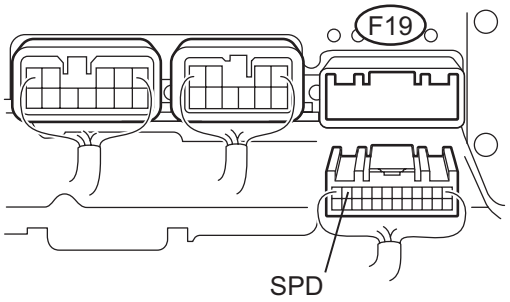
AV

OK

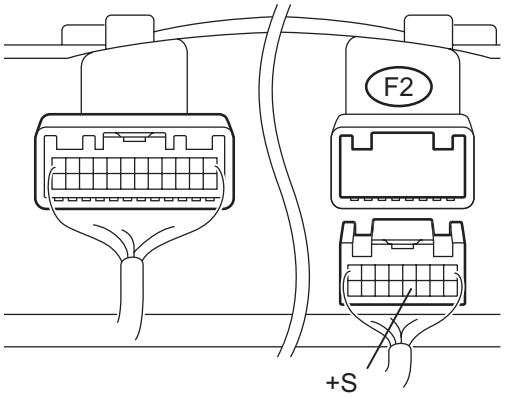
REPLACE STEREO COMPONENT AMPLIFIER

3	CHECK HARNESS AND CONNECTOR (COMBINATION METER - STEREO COMPONENT AMPLIFIER)

Stereo Component Amplifier Wire Harness View:



Combination Meter Wire Harness View:



H E129817E01

(a) Disconnect the stereo component amplifier connector F19 and combination meter connector F2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SPD - +S	Ignition switch off	Below 1 Ω

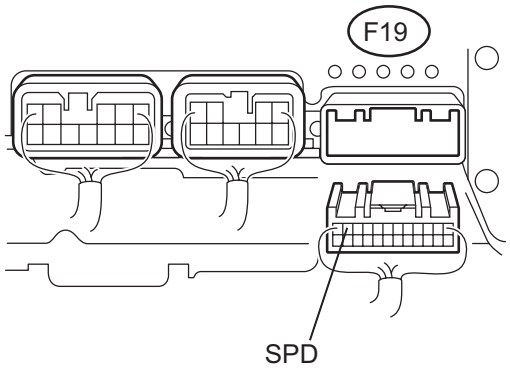
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

AV

4	CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER - BODY GROUND)

Stereo Component Amplifier Wire Harness View:



E132126E09

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SPD - Body ground	Ignition switch off	10 kΩ or higher

HINT:
If the resistance between terminal SPD and body ground is less than 10 kΩ, there may be a short in a wire harness, connector, or an ECU that is connected to the SPD signal wire.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR OR CHECK EACH ECU**

OK

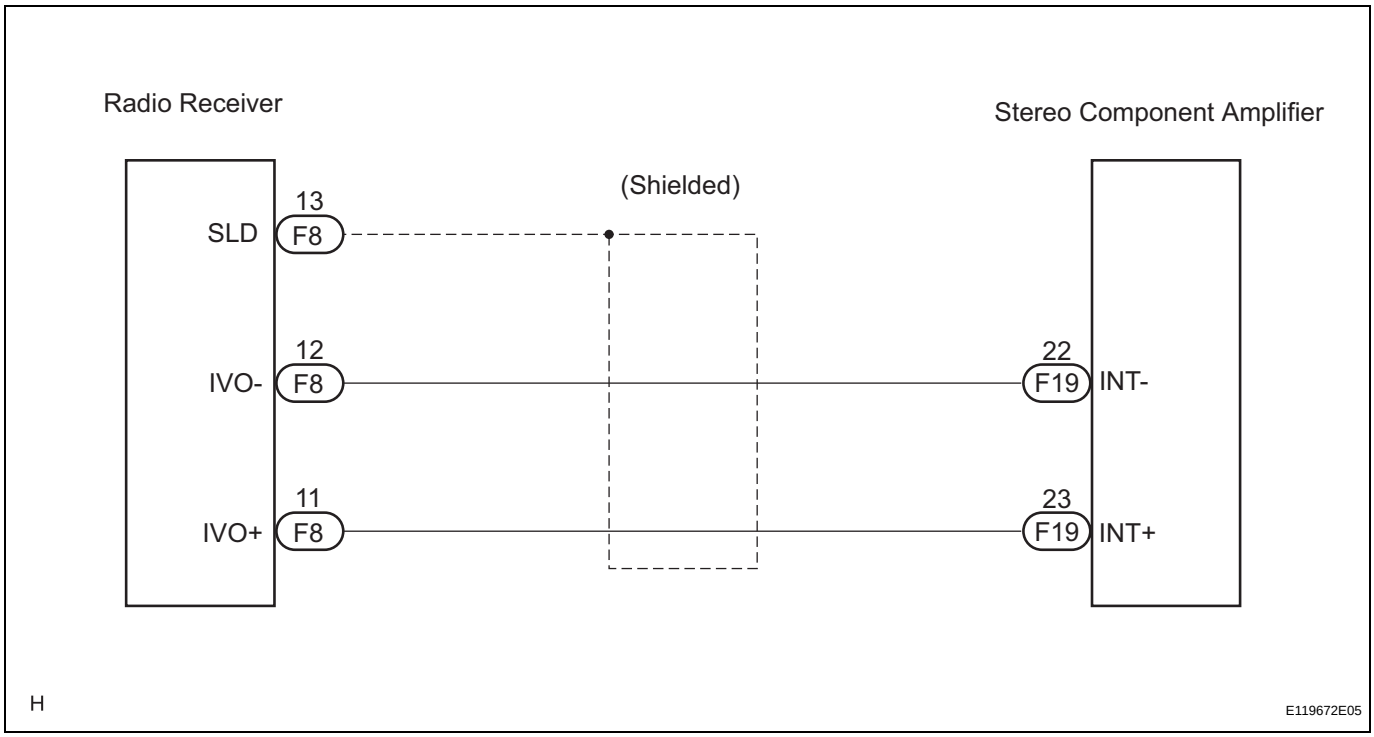
REPLACE COMBINATION METER

Cellular Phone Voice Circuit between Radio Receiver and Stereo Component Amplifier

SYSTEM DESCRIPTION

This circuit is used when the cellular phone voice in the "Bluetooth" handsfree system is on.

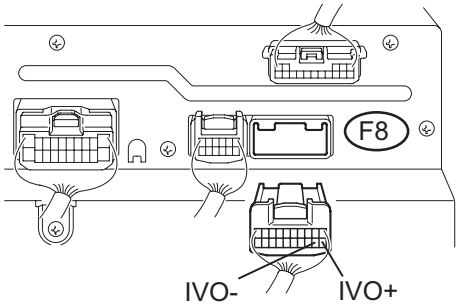
WIRING DIAGRAM



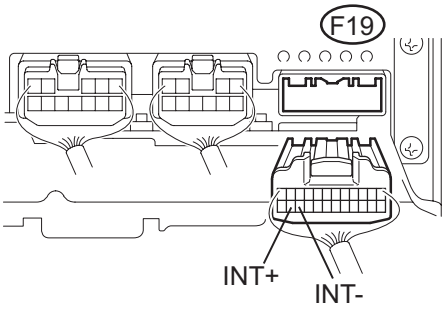
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - STEREO COMPONENT AMPLIFIER)

Radio Receiver Wire Harness View:



Stereo Component Amplifier Wire Harness View:



P E133935E01

(a) Disconnect the radio receiver connector F8 and stereo component amplifier connector F19.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
IVO+ - INT+	Always	Below 1 Ω
IVO- - INT-	Always	Below 1 Ω
IVO+ - Body ground	Always	10 kΩ or higher
IVO- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

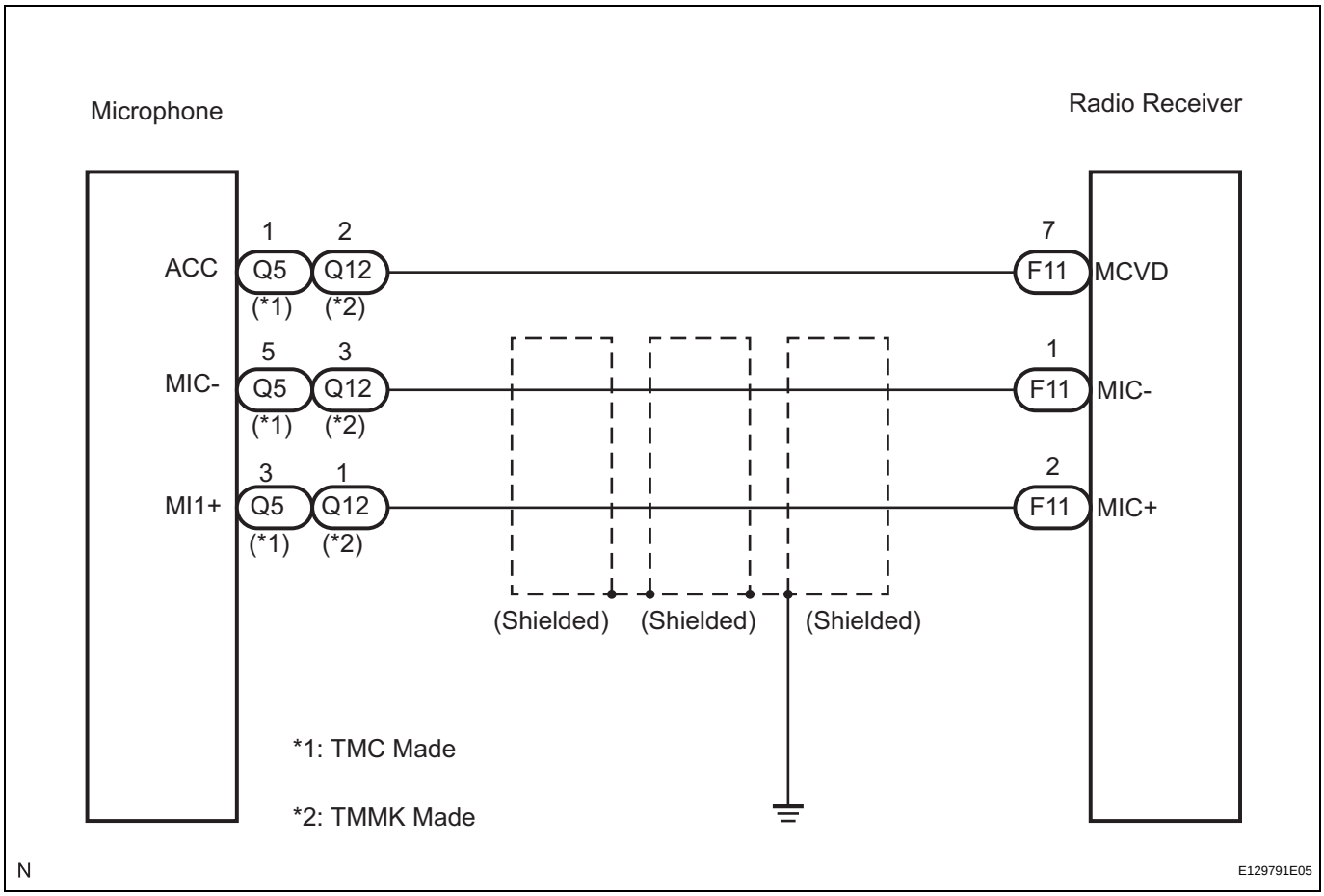
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Microphone Circuit between Microphone and Radio Receiver

DESCRIPTION

This circuit sends a microphone signal from the microphone to the radio receiver.
It also supplies power from the radio receiver to the microphone.

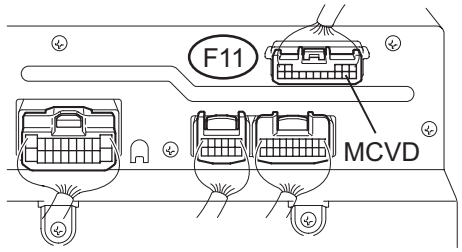
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER

Wire Harness View:



P E129811E02

(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

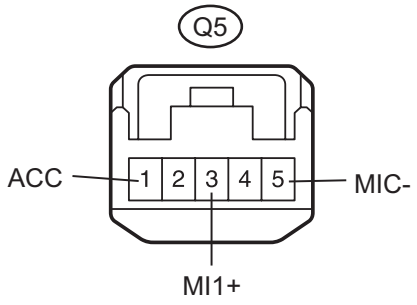
Tester connection	Condition	Specified condition
MCVD - Body ground	Ignition SW on (ACC)	4 to 6 V

NG → **REPLACE RADIO RECEIVER**

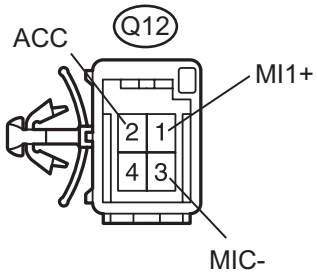
OK

2	CHECK HARNESS AND CONNECTOR (MICROPHONE - RADIO RECEIVER)

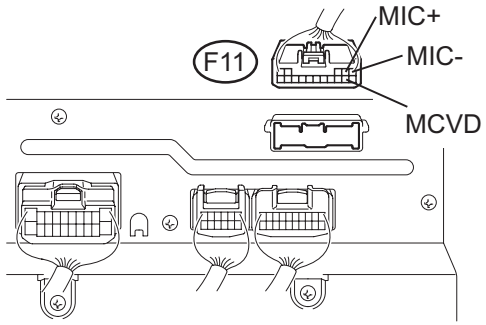
Microphone Connector Front View (TMC Made):



Microphone Connector Front View (TMMK Made):



Radio Receiver Wire Harness View:



P

E131895E02

(a) Disconnect the microphone connector and radio receiver connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ACC - MCVD	Always	Below 1 Ω
MI1+ - MIC+	Always	Below 1 Ω
MIC- - MIC-	Always	Below 1 Ω
ACC - Body ground	Always	10 kΩ or higher
MIC+ - Body ground	Always	10 kΩ or higher
MIC- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

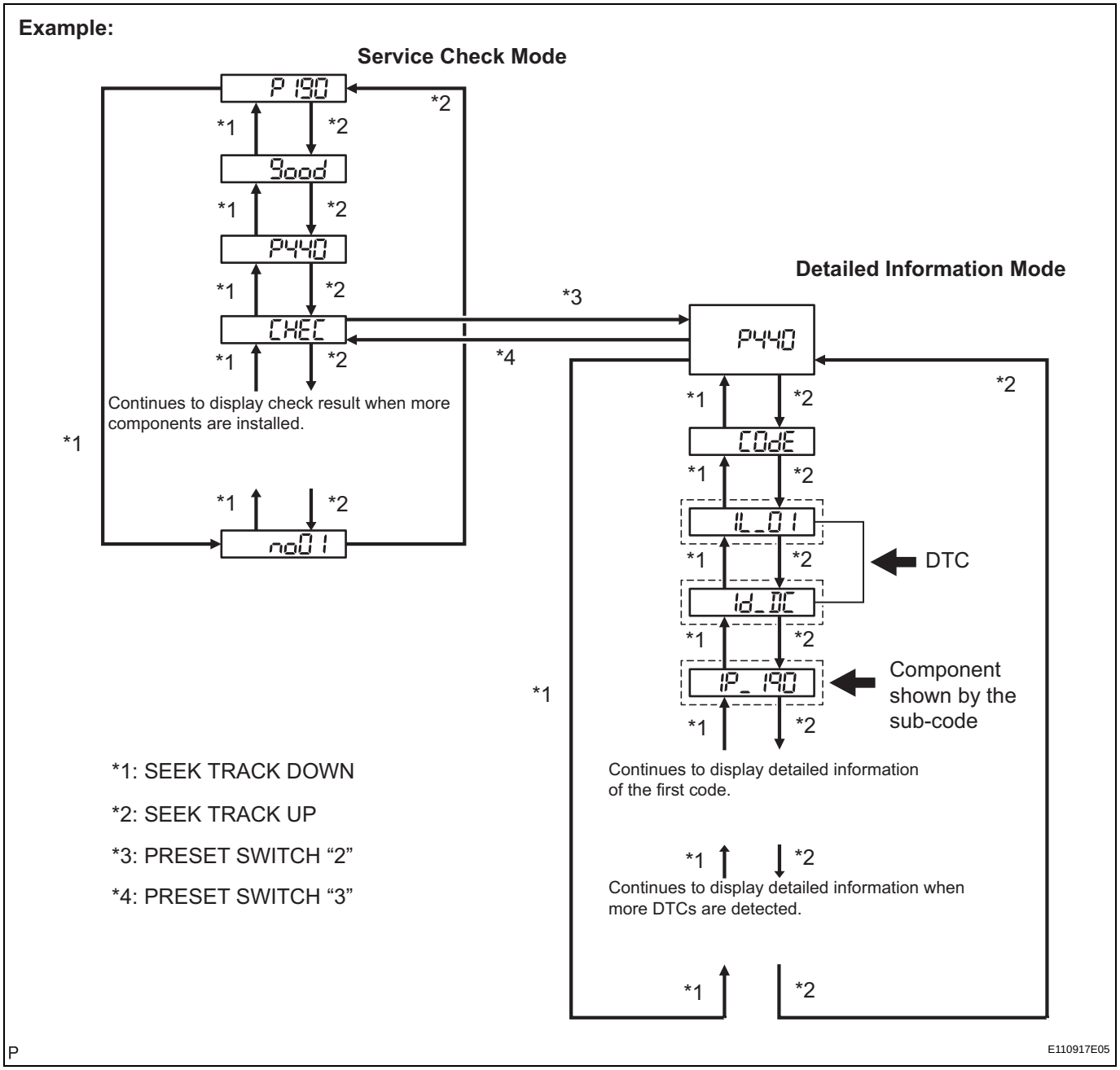
AV

Radio Receiver Communication Error

INSPECTION PROCEDURE

1	IDENTIFY THE COMPONENT SHOWN BY SUB-CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".

(c) Identify the component shown by the sub-code.

HINT:

- "190 (radio receiver)" is the component shown by the sub-code in the example shown in the illustration.

AV

- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-19).

NEXT

2 CHECK COMPONENT SHOWN BY SUB-CODE

(a) Select the component shown by sub-code.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver. If there is a problem between the "Bluetooth" handsfree module and radio receiver, replace the radio receiver.

Component Table:

Component	Proceed to
"Bluetooth" handsfree module (19D)	A
Except "Bluetooth" handsfree module	B

A → REPLACE RADIO RECEIVER

B

3 CHECK POWER SOURCE CIRCUIT OF COMPONENT SHOWN BY SUB-CODE

(a) Inspect the power source circuit of the component shown by the sub-code.
If the power source circuit is operating normally, proceed to the next step.

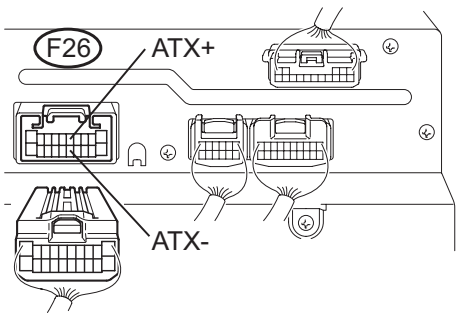
Component Table:

Component	Proceed to
Stereo component amplifier (440)	Stereo component amplifier power source circuit (See page AV-142)

NEXT

4 INSPECT RADIO RECEIVER

Premium Model Wire Harness View:



P E129798E04

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

NG → REPLACE RADIO RECEIVER

AV

OK

5	CHECK HARNESS AND CONNECTOR (RADIO RECEIVER - COMPONENT SHOWN BY SUB-CODE)

HINT:

- Start the check from the circuit that is near the component shown by the sub-code first.
- For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio receiver and the component shown by the sub-code.

(1) Disconnect all connectors between the radio receiver and the component shown by the sub-code.

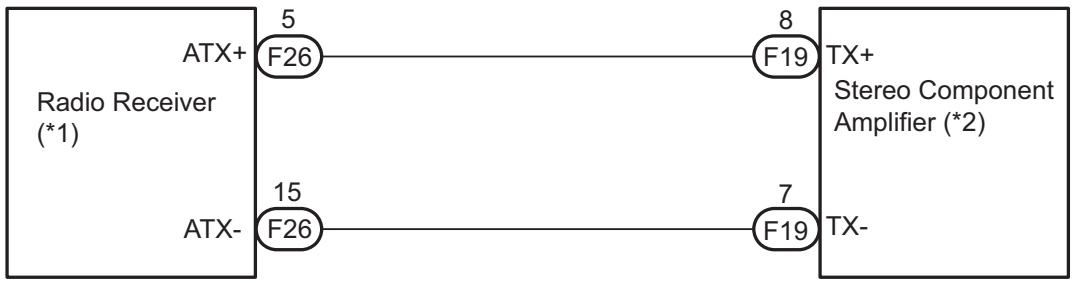
(2) Check for an open or short in the AVC-LAN circuit between the radio receiver and the component shown by the sub-code.

OK:

There is no open or short circuit.

AVC-LAN WIRING DIAGRAM

Premium Model:



*1: Master Unit

*2: Slave Unit

P

E111831E15

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	REPLACE COMPONENT SHOWN BY SUB-CODE

(a) Replace the component shown by the sub-code with a normal one and check if the same problem occurs again.

AV

OK:
Same problem does not occur.

NG → **REPLACE RADIO RECEIVER**

OK

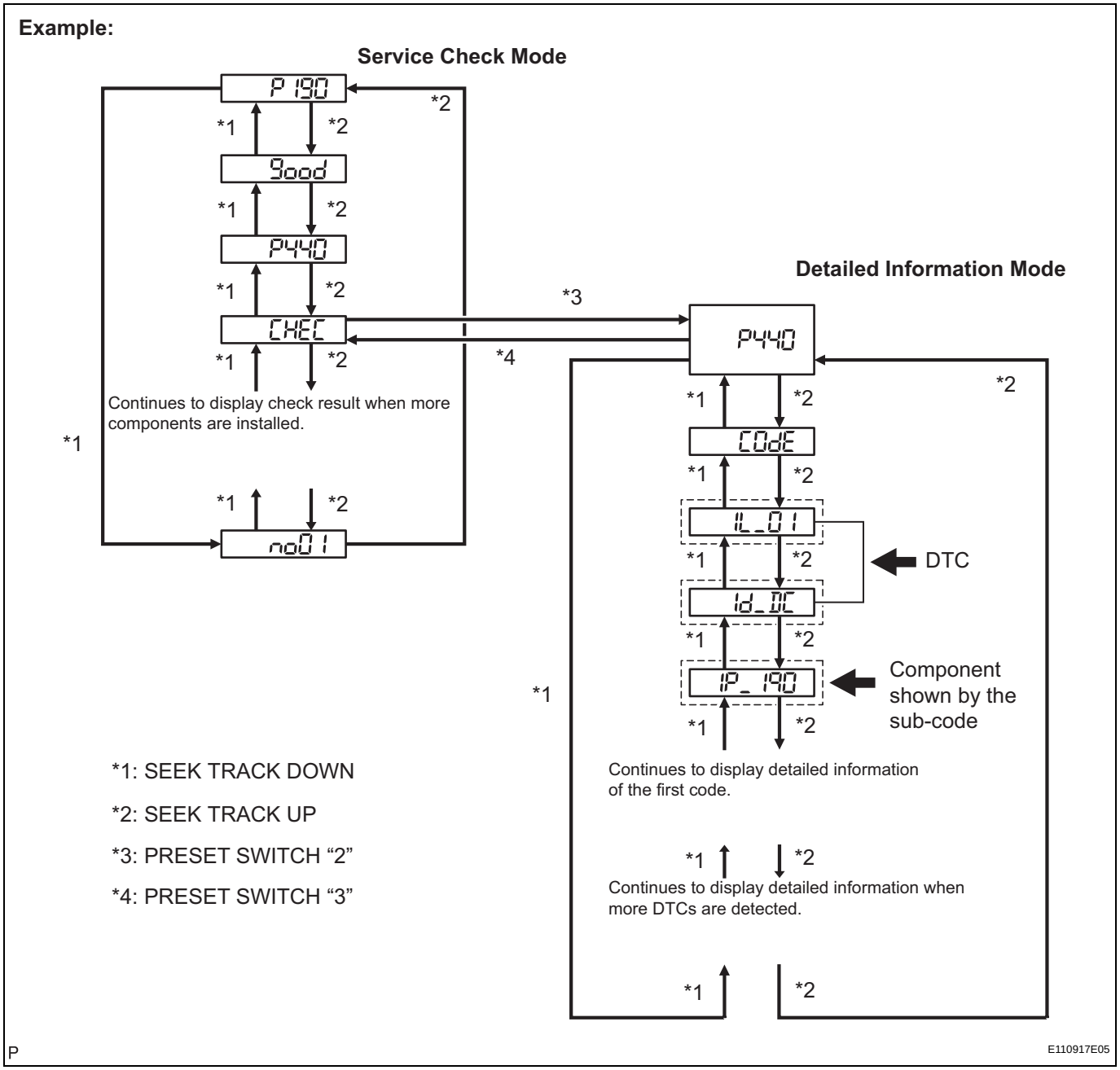
END

Stereo Component Amplifier Communication Error

INSPECTION PROCEDURE

1	IDENTIFY THE COMPONENT SHOWN BY SUB-CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".

(c) Identify the component shown by the sub-code.

HINT:

- "190 (radio receiver)" is the component shown by the sub-code in the example shown in the illustration.

AV

- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-19).

NEXT

2 CHECK POWER SOURCE CIRCUIT OF COMPONENT SHOWN BY SUB-CODE

(a) Inspect the power source circuit of the component shown by the sub-code.
If the power source circuit is operating normally, proceed to the next step.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver.

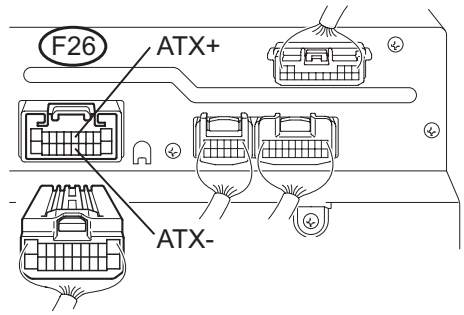
Component Table:

Component	Proceed to
"Bluetooth" handsfree module (19D)	Radio receiver power source circuit (See page AV-140)
Radio receiver (190)	Radio receiver power source circuit (See page AV-140)

NEXT

3 INSPECT RADIO RECEIVER

Premium Model Wire Harness View:



(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

NG → REPLACE RADIO RECEIVER

OK

4 CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER - COMPONENT SHOWN BY SUB-CODE)

HINT:
- Start the check from the circuit that is near the component shown by the sub-code first.
- For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

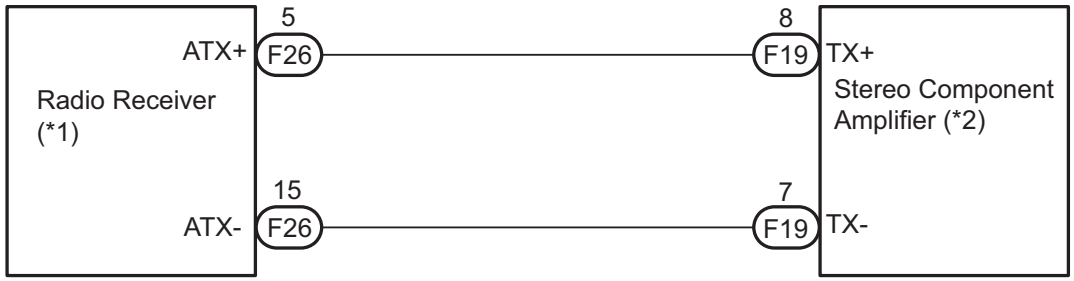
(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the stereo component amplifier and the component shown by the sub-code.

AV

(1) Disconnect all connectors between the stereo component amplifier and the component shown by the sub-code.
(2) Check for an open or short in the AVC-LAN circuit between the stereo component amplifier and the component shown by the sub-code.
OK:
There is no open or short circuit.

AVC-LAN WIRING DIAGRAM

Premium Model:



*1: Master Unit

*2: Slave Unit

P

E111831E15

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	REPLACE COMPONENT SHOWN BY SUB-CODE

(a) Replace the component shown by the sub-code with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE STEREO COMPONENT AMPLIFIER**

OK

END

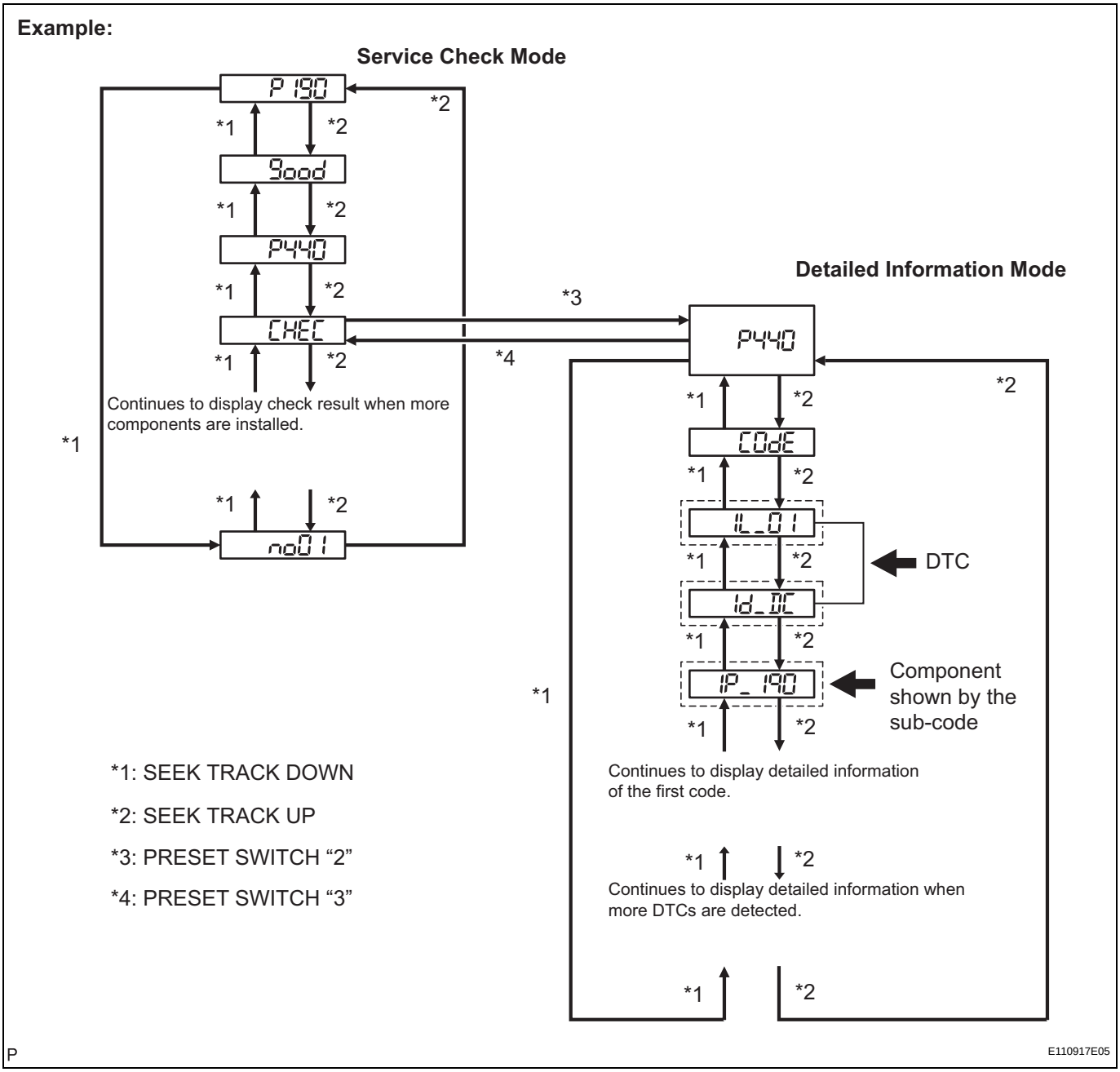
AV

Bluetooth Handsfree Module Communication Error

INSPECTION PROCEDURE

1	IDENTIFY THE COMPONENT SHOWN BY SUB-CODE

(a) Enter the diagnostic mode.



(b) Press the preset switch "3" to change to "Detailed Information Mode".

(c) Identify the component shown by the sub-code.

HINT:

- "190 (radio receiver)" is the component shown by the sub-code in the example shown in the illustration.

AV

- For details of the DTC display, refer to "DTC CHECK/ CLEAR" (See page AV-19).

NEXT

2 CHECK COMPONENT SHOWN BY SUB-CODE

(a) Select the component shown by sub-code.
HINT:
The "Bluetooth" handsfree module is built into the radio receiver. If there is a problem between the "Bluetooth" handsfree module and radio receiver, replace the radio receiver.

Component Table:

Component	Proceed to
Radio Receiver (190)	A
Except Radio Receiver	B

A → REPLACE RADIO RECEIVER

B

3 CHECK POWER SOURCE CIRCUIT OF COMPONENT SHOWN BY SUB-CODE

(a) Inspect the power source circuit of the component shown by the sub-code.
If the power source circuit is operating normally, proceed to the next step.

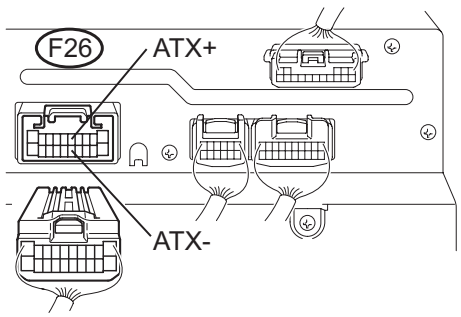
Component Table:

Component	Proceed to
Stereo component amplifier (440)	Stereo component amplifier power source circuit (See page AV-142)

NEXT

4 INSPECT RADIO RECEIVER

Premium Model Wire Harness View:



P E129798E04

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F26-5) - ATX- (F26-15)	Always	60 to 80 Ω

NG → REPLACE RADIO RECEIVER

AV

OK

5	CHECK HARNESS AND CONNECTOR ("BLUETOOTH" HANDSFREE MODULE - COMPONENT SHOWN BY SUB-CODE)

HINT:

- Start the check from the circuit that is near the component shown by the sub-code first.
- For details of the connectors, refer to the "TERMINALS OF ECU" (See page AV-15).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the "Bluetooth" handsfree module and the component shown by the sub-code.

(1) Disconnect all connectors between the "Bluetooth" handsfree module and the component shown by the sub-code.

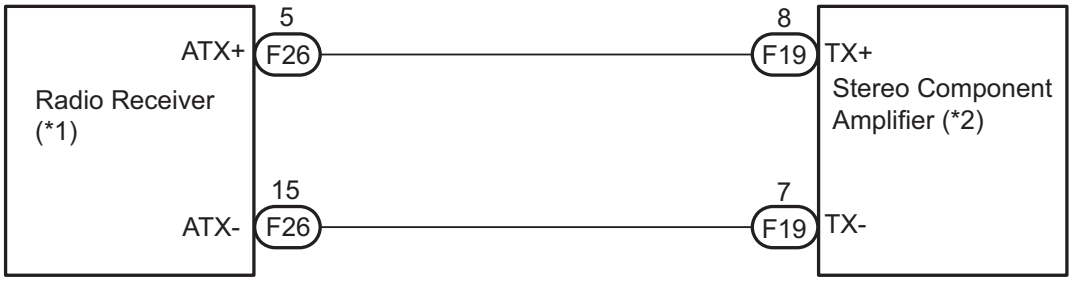
(2) Check for an open or short in the AVC-LAN circuit between the "Bluetooth" handsfree module and the component shown by the sub-code.

OK:

There is no open or short circuit.

AVC-LAN WIRING DIAGRAM

Premium Model:



*1: Master Unit

*2: Slave Unit

P

E111831E15

AV

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

6	REPLACE COMPONENT SHOWN BY SUB-CODE

(a) Replace the component shown by the sub-code with a normal one and check if the same problem occurs again.

OK:
Same problem does not occur.

NG → **REPLACE RADIO RECEIVER (BUILT-IN "BLUETOOTH" HANDSFREE MODULE)**

OK

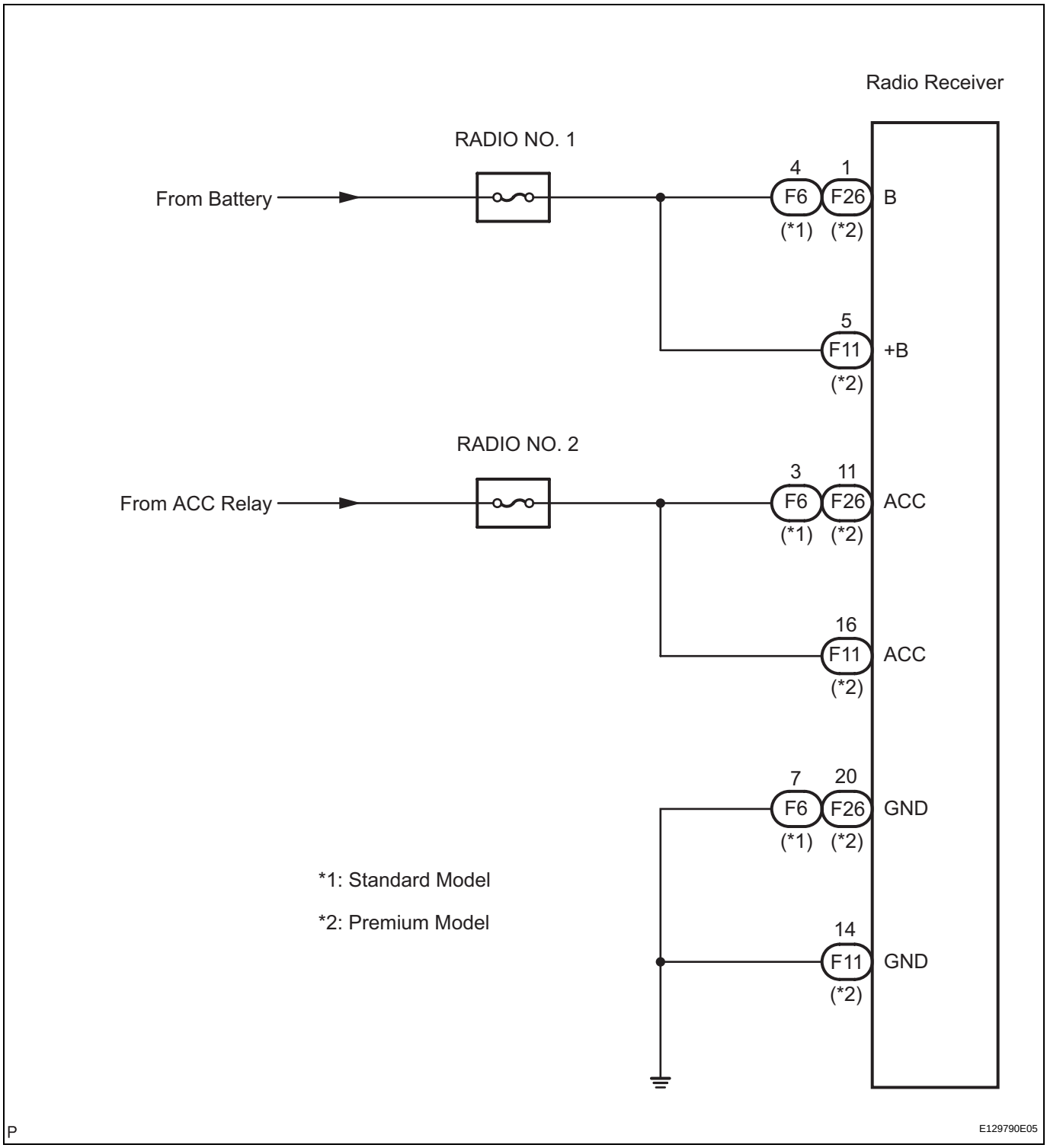
END

Radio Receiver Power Source Circuit

DESCRIPTION

This circuit provides power to the radio receiver.

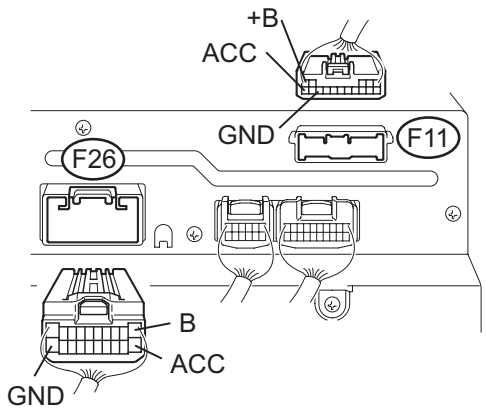
WIRING DIAGRAM



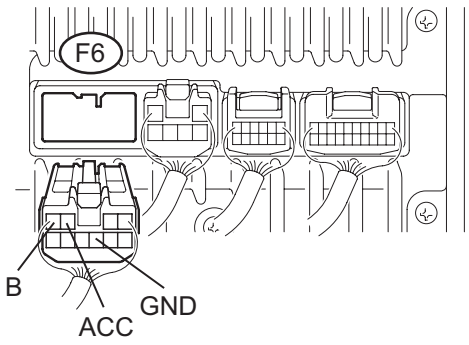
INSPECTION PROCEDURE

1	INSPECT RADIO RECEIVER

Wire Harness View (Premium Model):



Wire Harness View (Standard Model):



P E129813E05

(a) Disconnect the radio receiver connector.
(b) Measure the resistance according to the value in the table below.

Standard resistance

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard voltage

Tester connection	Condition	Specified condition
+B - GND (*1)	Always	10 to 14 V
B - GND	Always	10 to 14 V
ACC - GND	Ignition SW on (ACC)	10 to 14 V

*1: Premium model

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

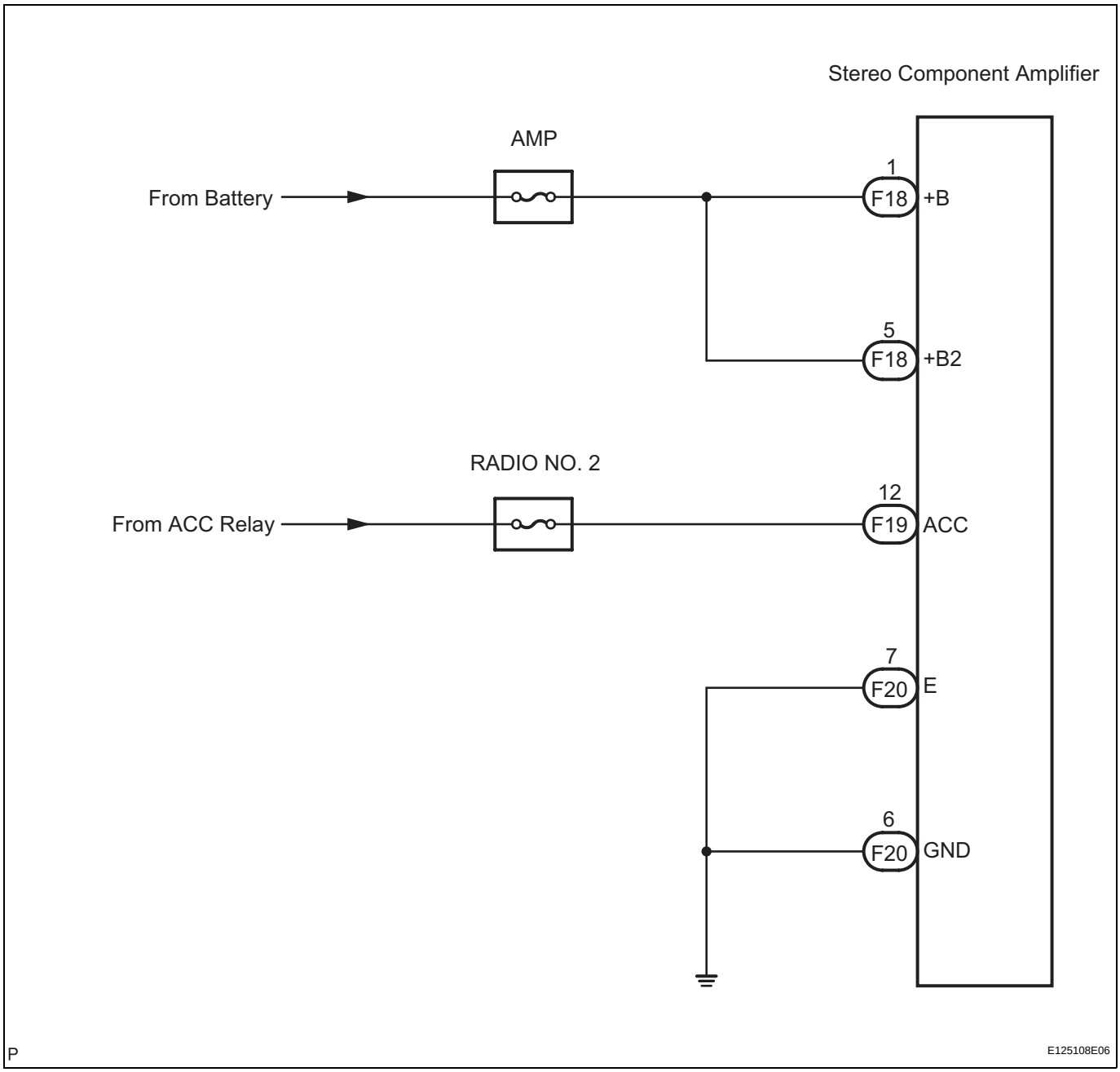
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Stereo Component Amplifier Power Source Circuit

DESCRIPTION

This circuit provides power to the stereo component amplifier.

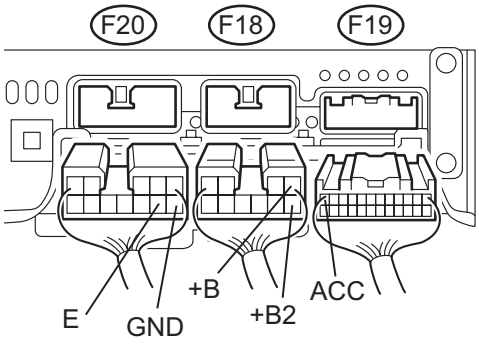
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT STEREO COMPONENT AMPLIFIER

Wire Harness View:



N E126146E03

(a) Disconnect the stereo component amplifier connectors.
(b) Measure the resistance according to the values in the table below.

Standard resistance

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω
E - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the values in the table below.

Standard voltage

Tester connection	Condition	Specified condition
+B - GND	Always	10 to 14 V
+B2 - GND	Always	10 to 14 V
ACC - GND	Ignition SW on (ACC)	10 to 14 V

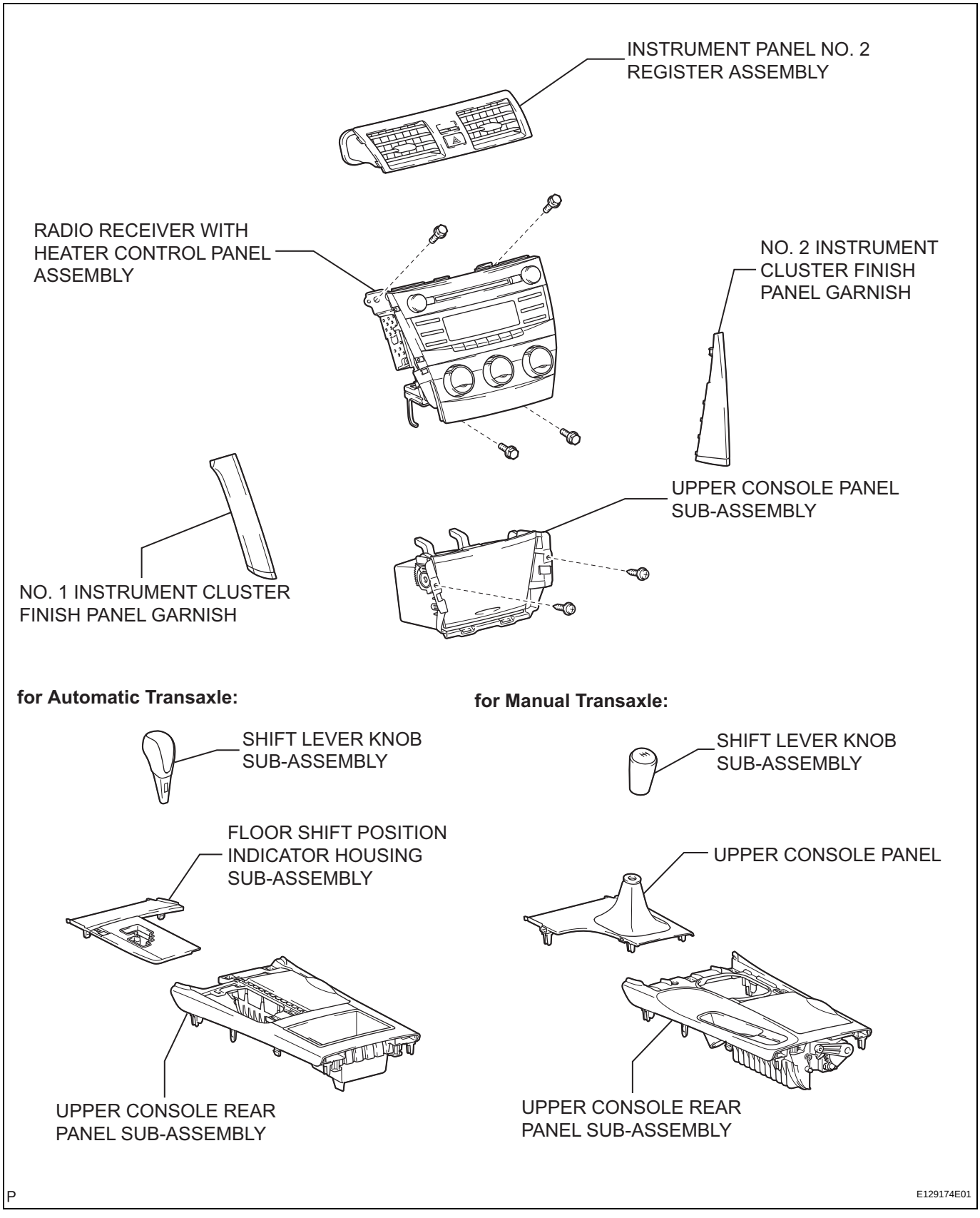
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

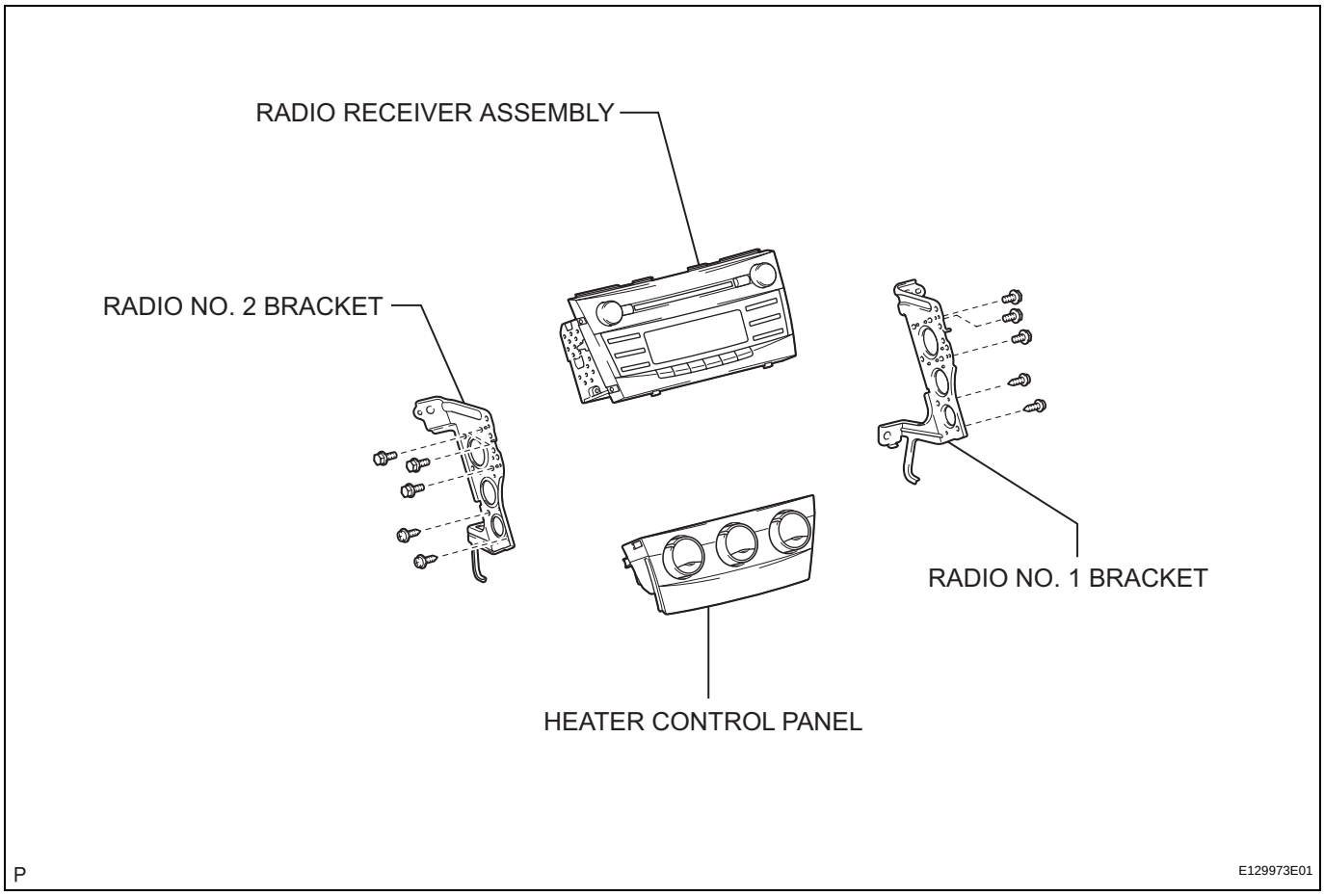
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

RADIO RECEIVER

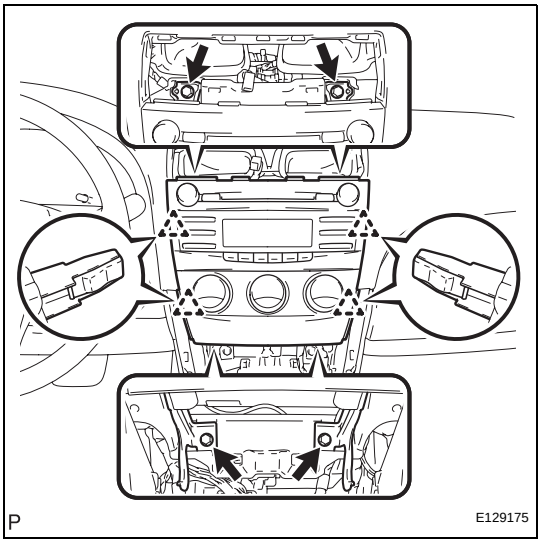
COMPONENTS

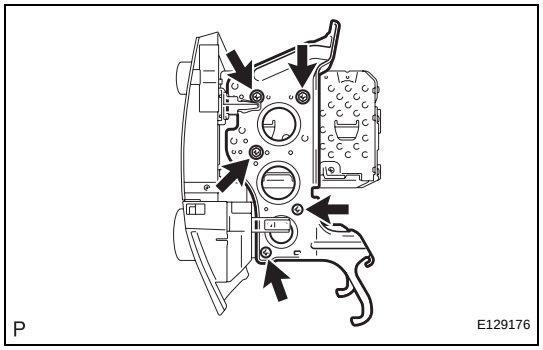



RADIO RECEIVER ASSEMBLY
RADIO NO. 2 BRACKET
RADIO NO. 1 BRACKET
HEATER CONTROL PANEL
P
E129973E01

REMOVAL

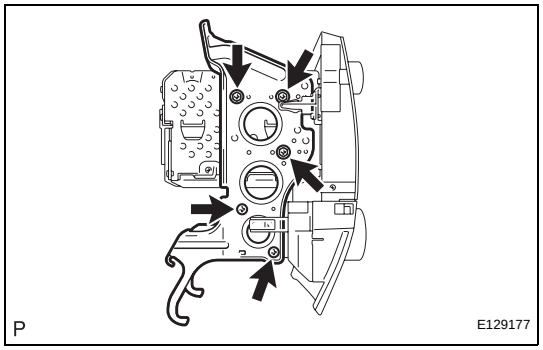
1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
4. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
5. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
6. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
7. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
8. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
9. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-27)**
10. **REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)**
11. **REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY**
    (a) Remove the 4 bolts.
    (b) Pull the radio receiver with heater control panel assembly toward the rear of the vehicle and disengage the 4 clips.
    (c) Disconnect each connector and remove the radio receiver with heater control panel assembly.





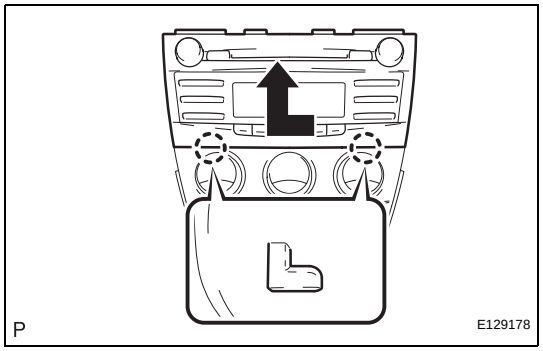
12. REMOVE RADIO NO. 1 BRACKET

(a) Remove the 5 bolts and radio No. 1 bracket.



13. REMOVE RADIO NO. 2 BRACKET

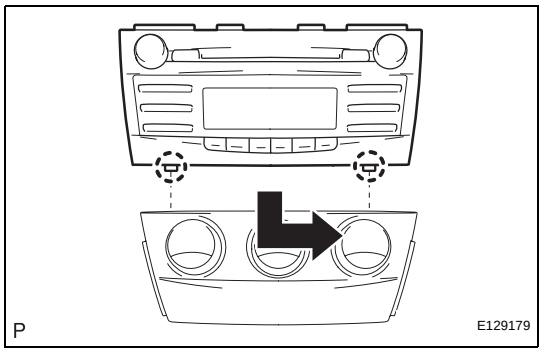
(a) Remove the 5 bolts and radio No. 2 bracket.



14. REMOVE RADIO RECEIVER ASSEMBLY

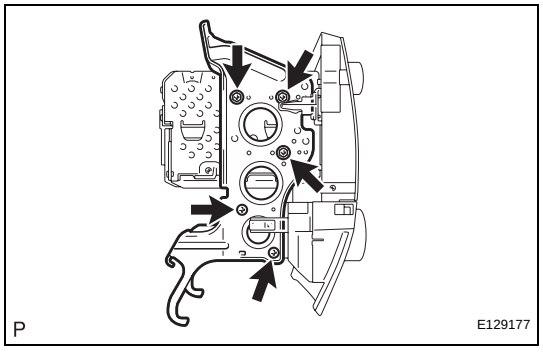
(a) Remove the radio receiver assembly as shown in the illustration.

INSTALLATION



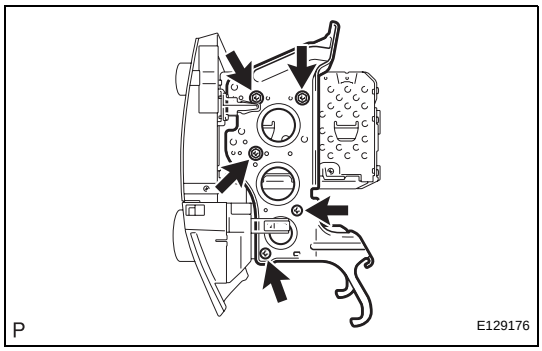
1. INSTALL RADIO RECEIVER ASSEMBLY

(a) Install the radio receiver assembly as shown in the illustration.

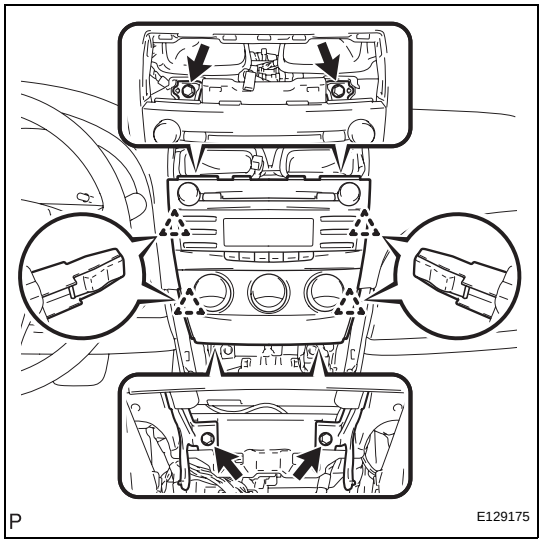


2. INSTALL RADIO NO. 2 BRACKET

(a) Install the radio No. 2 bracket with the 5 bolts.



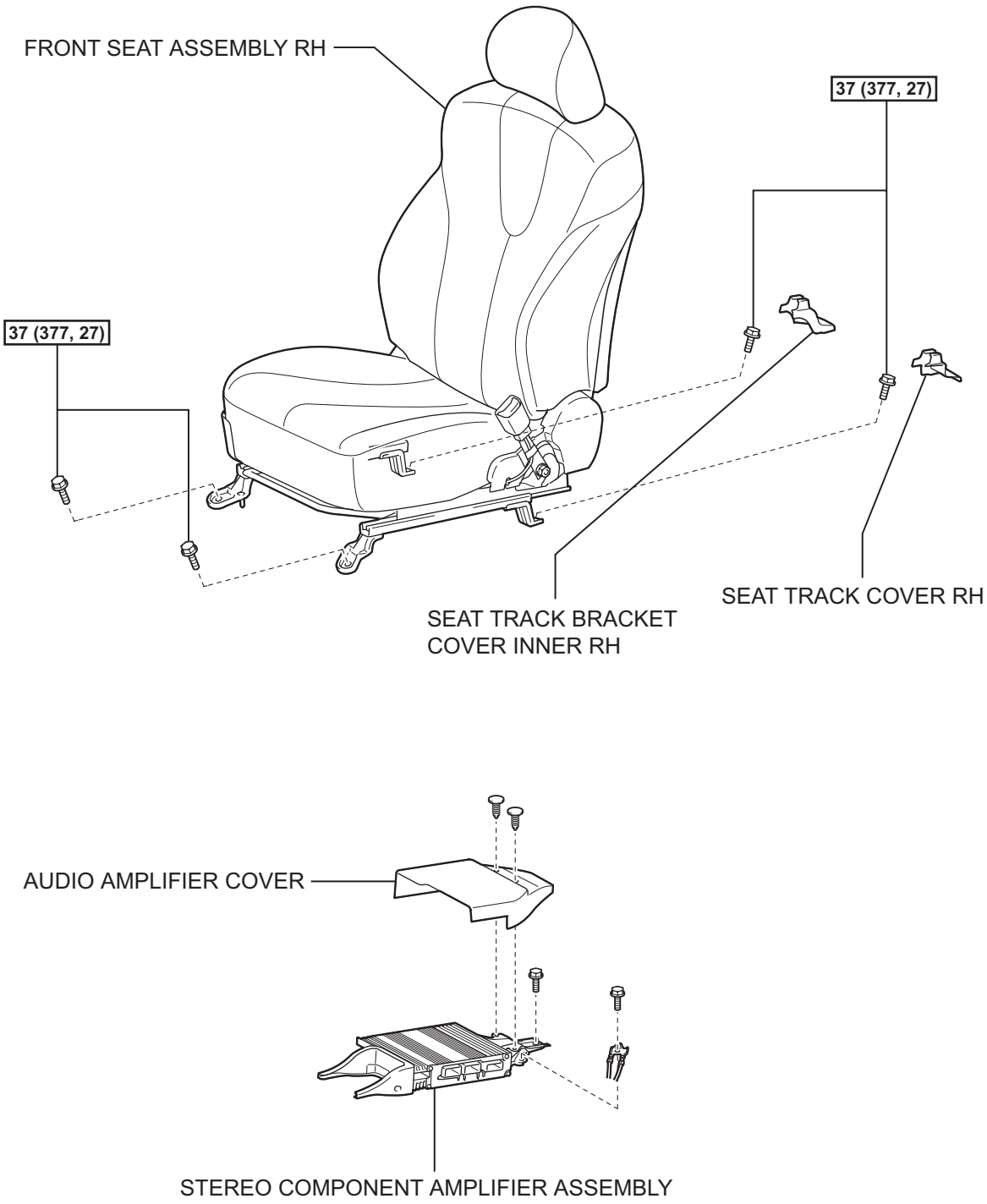
3. **INSTALL RADIO NO. 1 BRACKET**
   (a) Install the radio No. 1 bracket with the 5 bolts.



4. **INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY**
   (a) Connect each connector.
   (b) Engage the 4 clips.
   (c) Install the radio receiver with heater control panel assembly with the 4 bolts.
5. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)**
6. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-52)**
7. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
8. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
9. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
10. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
11. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
12. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
13. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
14. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**

STEREO COMPONENT AMPLIFIER

COMPONENTS



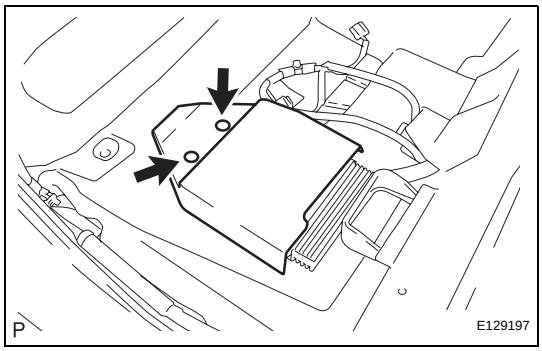
N*m (kgf*cm, ft.*lbf): Specified torque

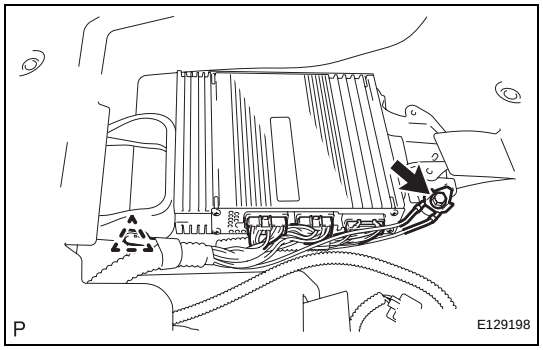
P

E129196E01

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent the airbag working.
2. **REMOVE SEAT TRACK COVER RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-16).
3. **REMOVE SEAT TRACK BRACKET COVER INNER RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-16).
4. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-16).
5. **REMOVE SEAT TRACK COVER RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-30).
6. **REMOVE SEAT TRACK BRACKET COVER INNER RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-30).
7. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-30).
8. **REMOVE AUDIO AMPLIFIER COVER**
   (a) Remove the 2 clips and audio amplifier cover.

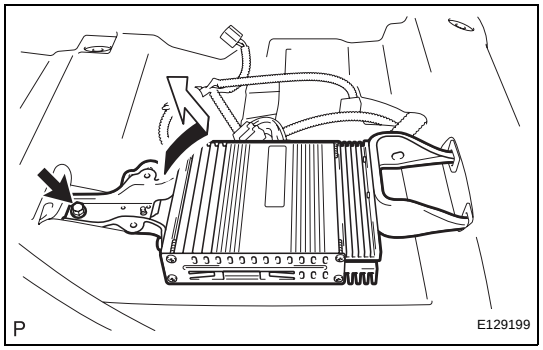




9. REMOVE STEREO COMPONENT AMPLIFIER ASSEMBLY

(a) Disconnect each connector and remove the bolt.

(b) Disengage the clip.

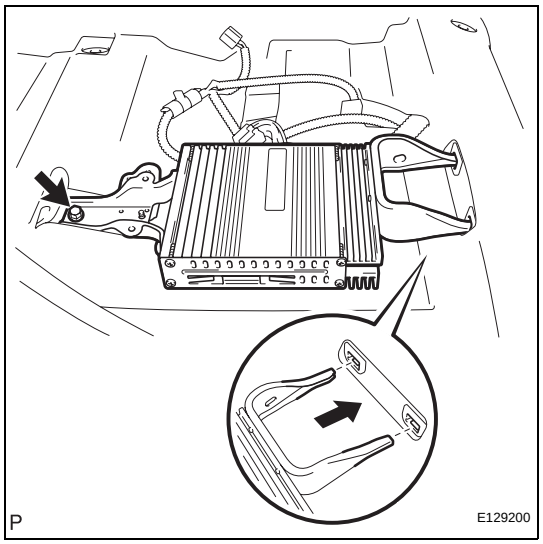


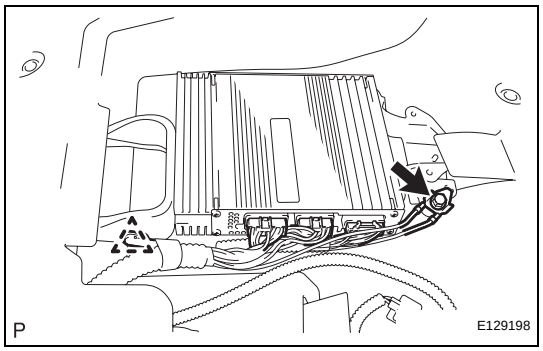
(c) Remove the bolt and stereo component amplifier assembly as shown in the illustration.

INSTALLATION

1. INSTALL STEREO COMPONENT AMPLIFIER ASSEMBLY

(a) Install the stereo component amplifier assembly as shown in the illustration.



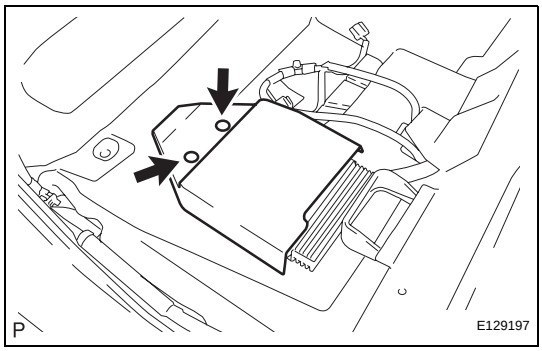


(b) Install the bolt and connect each connector.

(c) Engage the clip.

(d) Install the bolt.

AV



2. **INSTALL AUDIO AMPLIFIER COVER**
   (a) Install the audio amplifier cover with the 2 clips.

3. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-24).

4. **INSTALL SEAT TRACK BRACKET COVER INNER RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-25).

5. **INSTALL SEAT TRACK COVER RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-25).

6. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-41).

7. **INSTALL SEAT TRACK BRACKET COVER INNER RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-42).

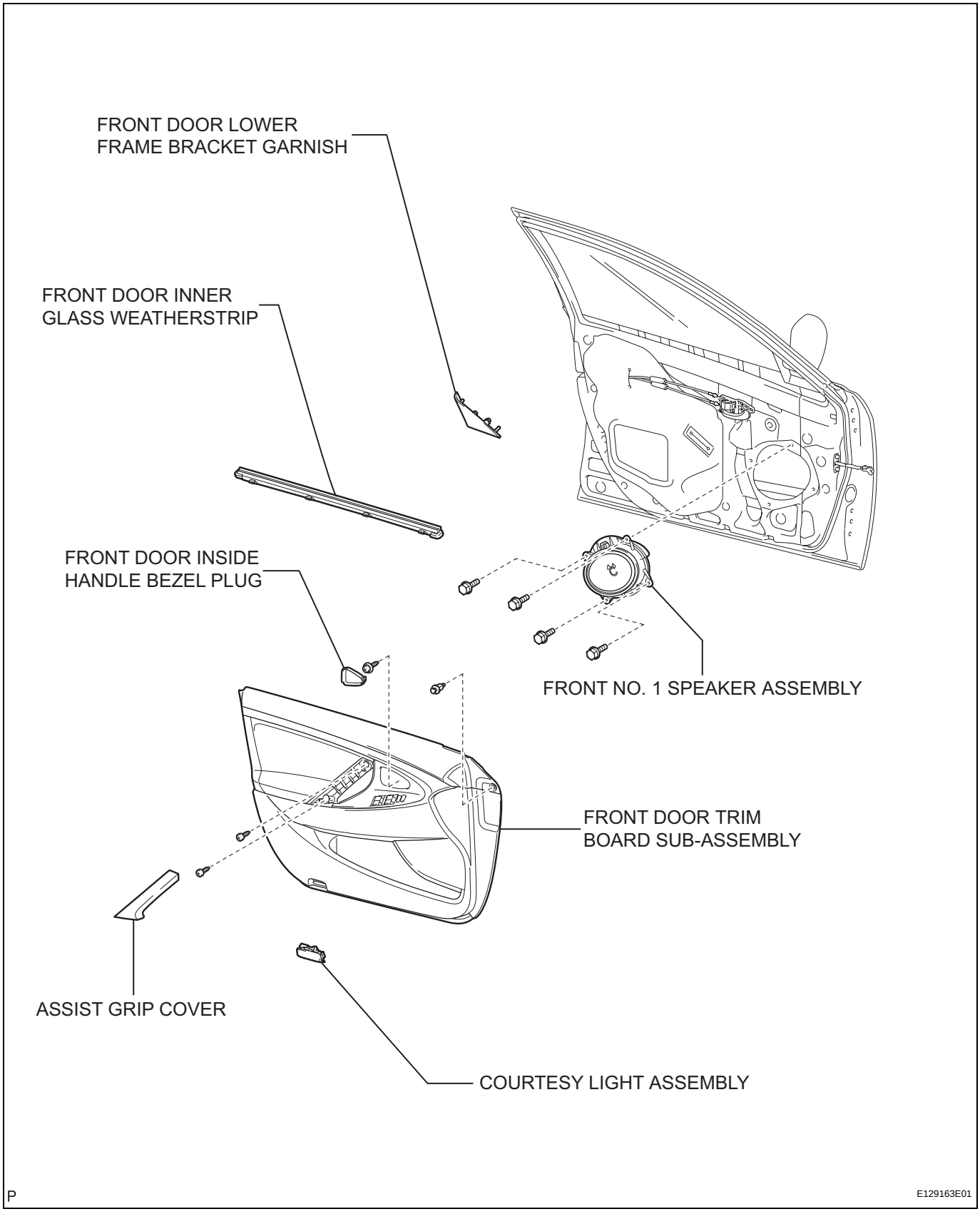
8. **INSTALL SEAT TRACK COVER RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side (see page SE-42).

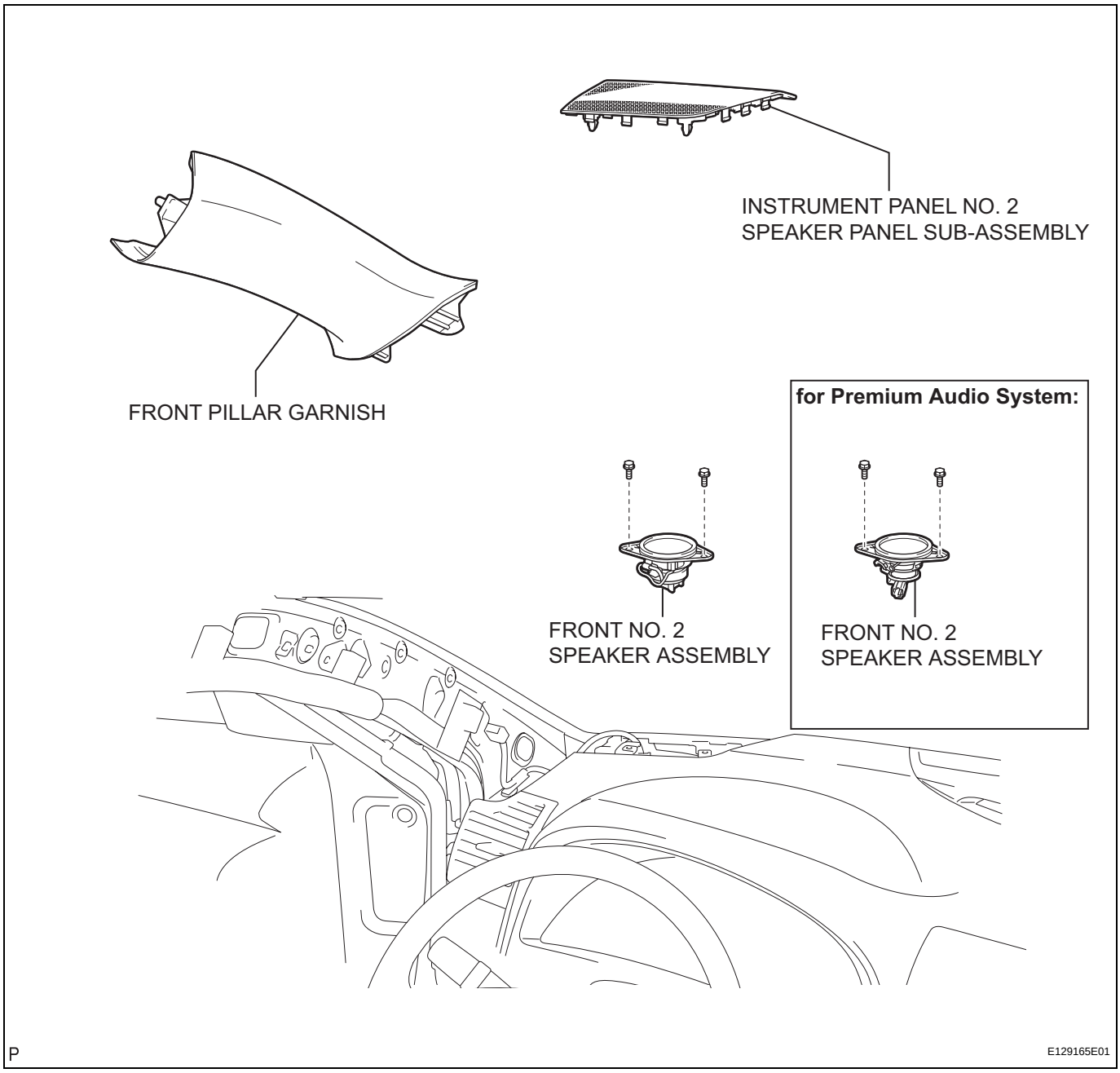
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

10. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
    (See page RS-242)

FRONT SIDE SPEAKER

COMPONENTS




INSTRUMENT PANEL NO. 2
SPEAKER PANEL SUB-ASSEMBLY
FRONT PILLAR GARNISH
for Premium Audio System:
FRONT NO. 2
SPEAKER ASSEMBLY
FRONT NO. 2
SPEAKER ASSEMBLY
P
E129165E01

ON-VEHICLE INSPECTION

1. INSPECT FRONT NO. 1 SPEAKER

HINT:

Remove interior parts so that the front No. 1 speaker can be seen.

(a) Check the speaker installation.

OK:

The speaker is securely installed.

If the result is not as specified, reinstall the front No. 1 speaker.

(b) Visually check the speaker.

OK:

The cone paper of the speaker is not torn.

If the result is not as specified, replace the front No. 1 speaker.

(c) Speaker resistance check

(1) Disconnect the front No. 1 speaker connector.

(2) Measure the resistance between the terminals of the speaker.

Standard resistance:

Premium Model: 1.8 to 2.6 Ω

Standard Model: Approximately 4 Ω

If the result is not as specified, replace the front No. 1 speaker.

2. INSPECT FRONT NO. 2 SPEAKER

HINT:

Remove interior parts so that the front No. 2 speaker can be seen.

(a) Check the speaker installation.

OK:

The speaker is securely installed.

If the result is not as specified, reinstall the front No. 2 speaker.

(b) Visually check the speaker.

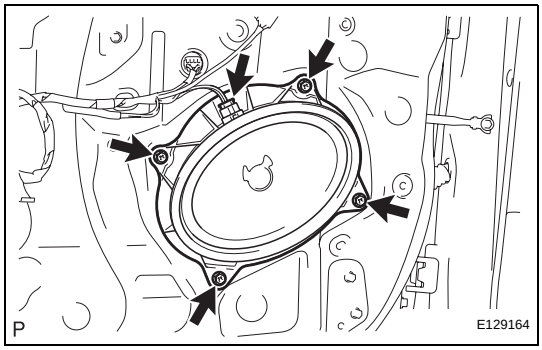
OK:

The cone paper of the speaker is not torn.

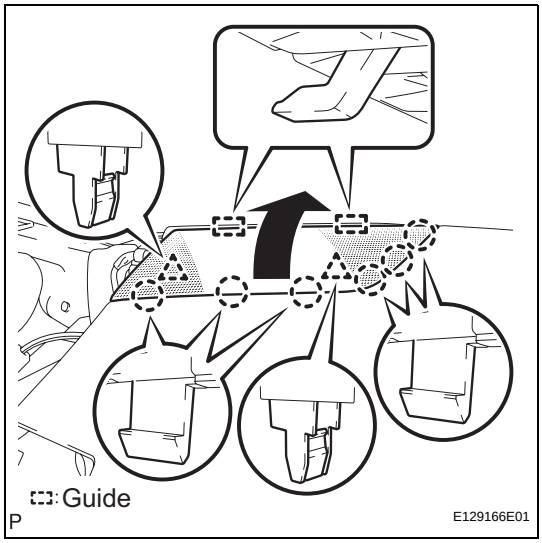
If the result is not as specified, replace the front No. 2 speaker.

REMOVAL

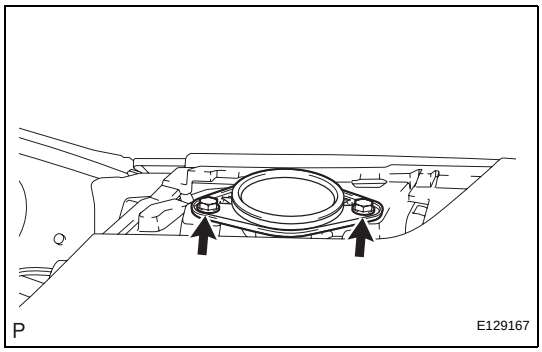
1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)**
3. **REMOVE ASSIST GRIP COVER (See page ED-15)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)**
6. **REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-16)**
7. **REMOVE FRONT NO. 1 SPEAKER ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 4 bolts and front No. 1 speaker assembly.
   NOTICE:
   Do not touch the cone part of the speaker.



8. **REMOVE FRONT PILLAR GARNISH (See page IR-27)**
9. **REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY**
   (a) Engage the 6 claws and 2 clips.
   (b) Remove the instrument panel No. 2 speaker panel sub-assembly.

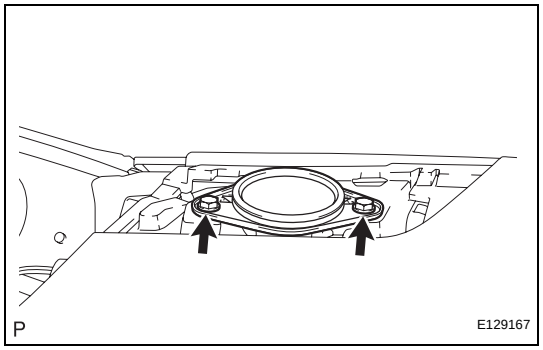


10. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY**
    (a) Remove the 2 bolts and front No. 2 speaker assembly.
    (b) Disconnect the connector.

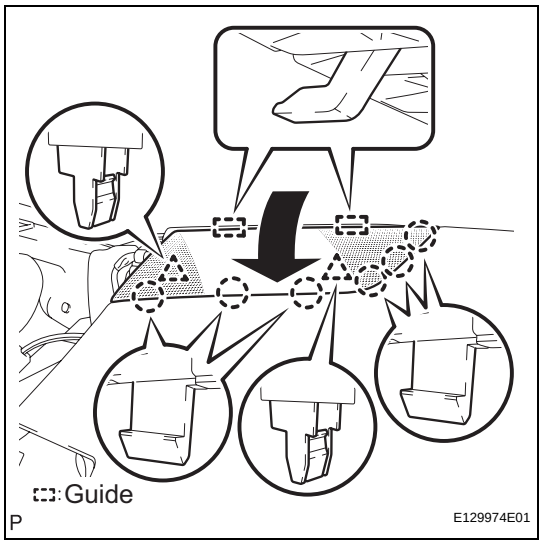


AV

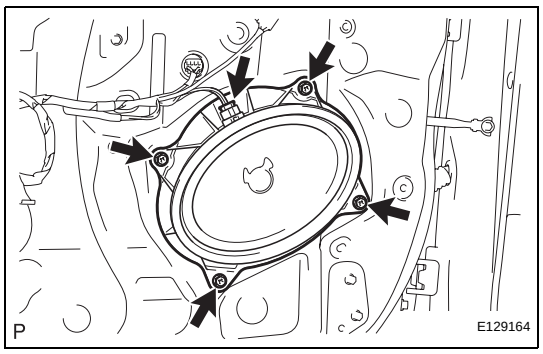
INSTALLATION



1. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY**
   (a) Connect the connector.
   (b) Install the front No. 2 speaker assembly with the 2 bolts.



2. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY**
   (a) Engage the 6 claws and 2 clips and install the instrument panel No. 2 speaker panel sub-assembly.
3. **INSTALL FRONT PILLAR GARNISH (See page IR-51)**

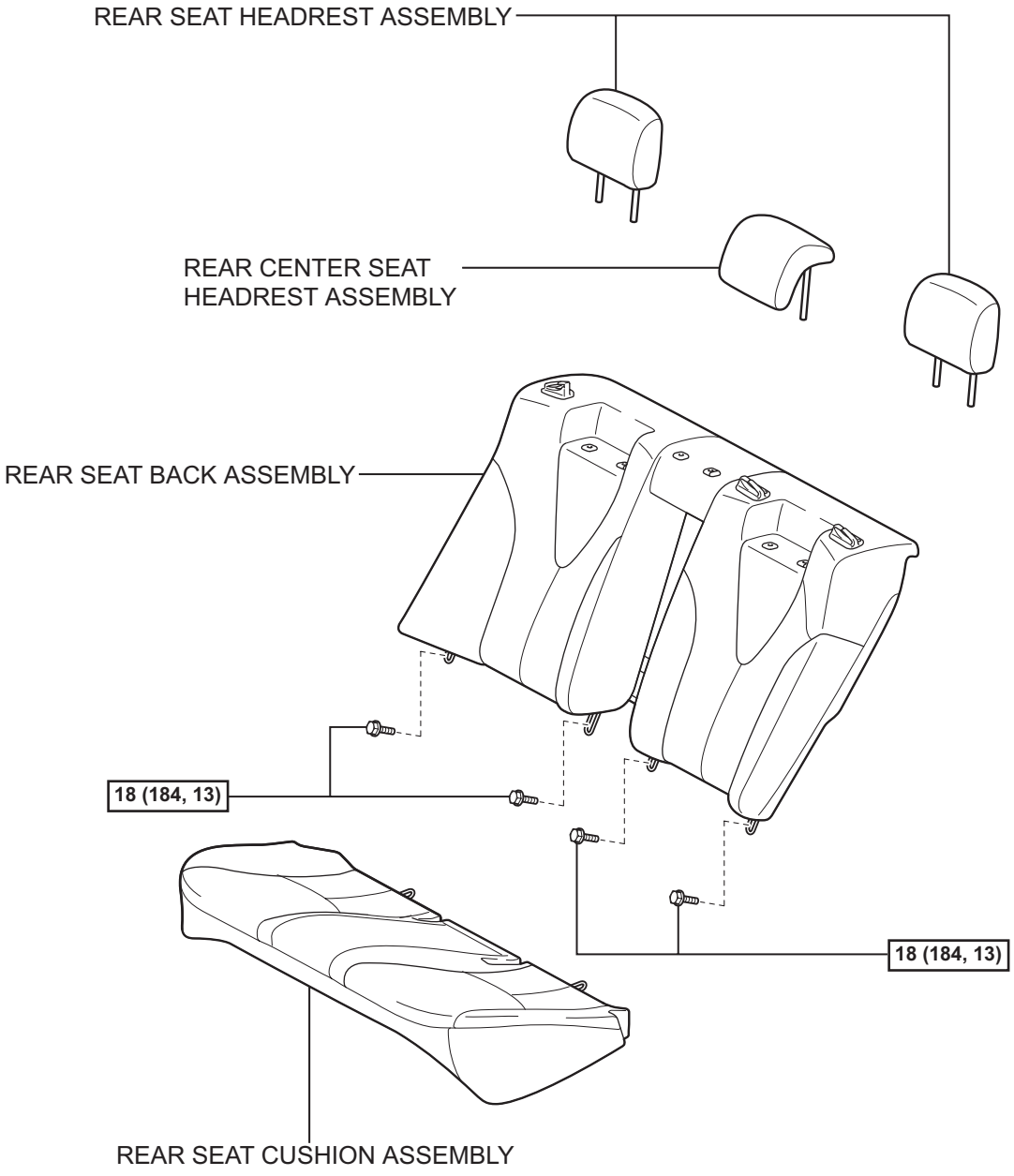


4. **INSTALL FRONT NO. 1 SPEAKER ASSEMBLY**
   (a) Install the front No. 1 speaker assembly with the 4 bolts.
   (b) Connect the connector.
5. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-32)**
6. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**
7. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-34)**
8. **INSTALL ASSIST GRIP COVER (See page ED-34)**
9. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**
10. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

REAR SIDE SPEAKER

COMPONENTS

for Fixed Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

P

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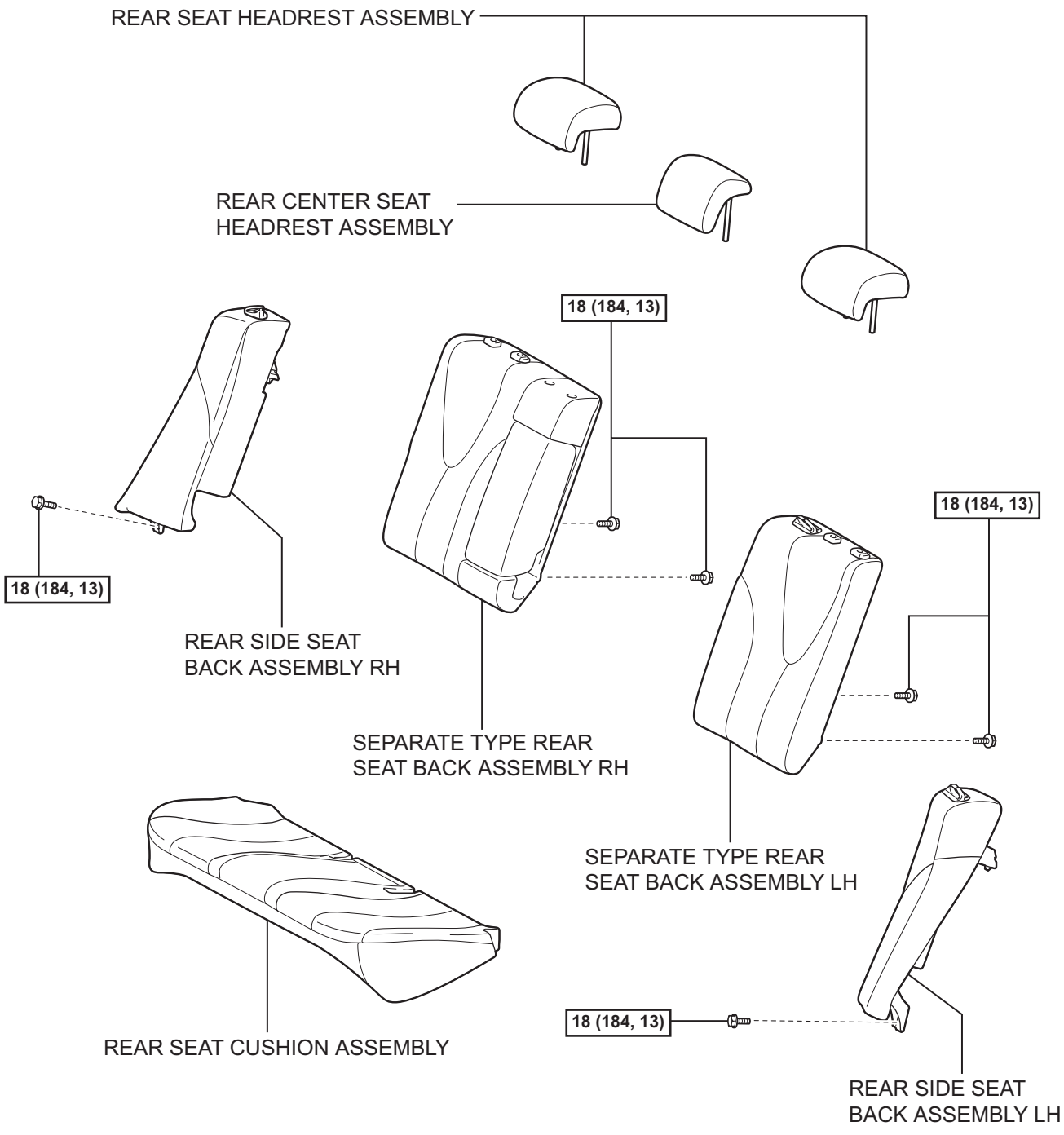
for Fold Down Seat Type:



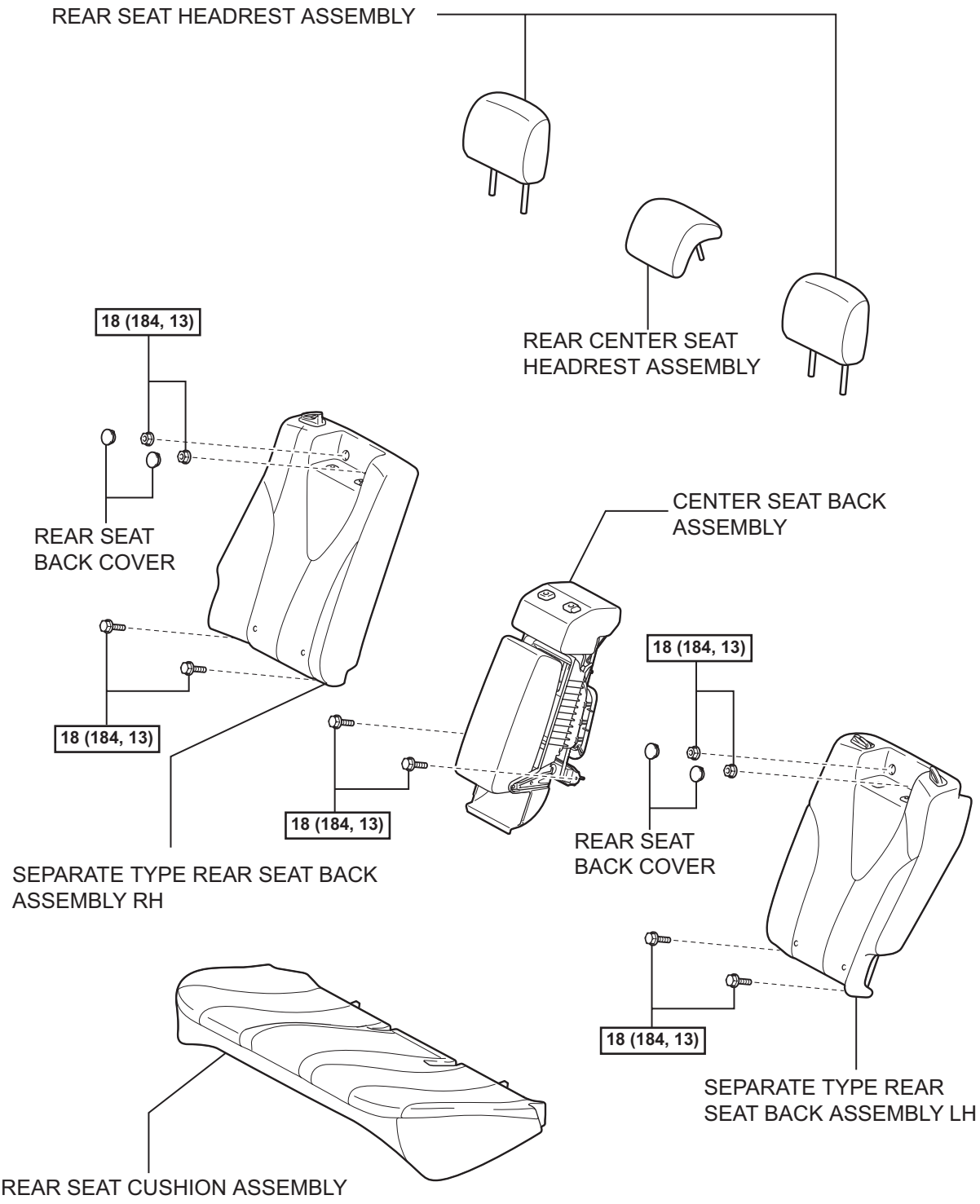
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136564E02

AV

for Reclining Seat Type:

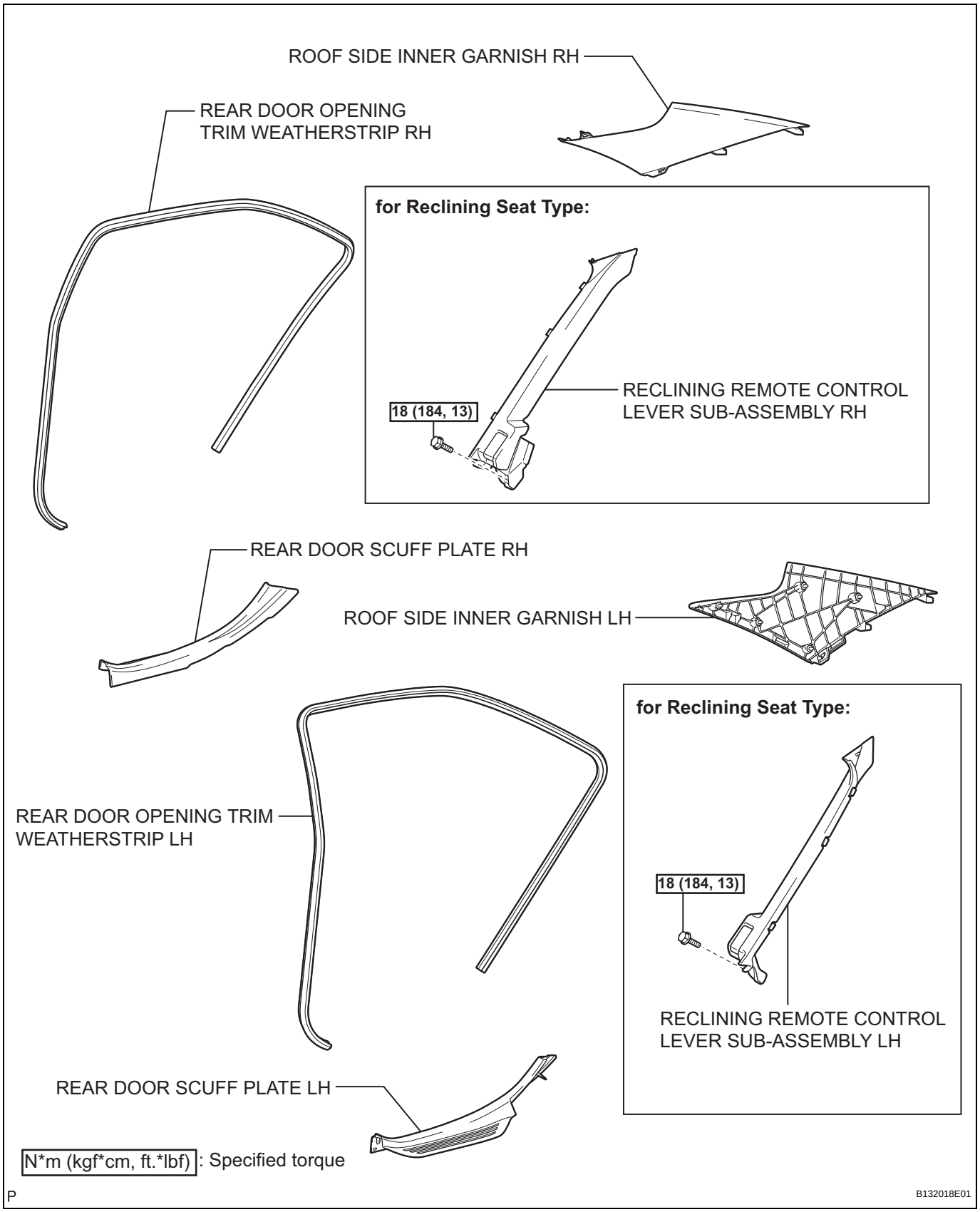


AV

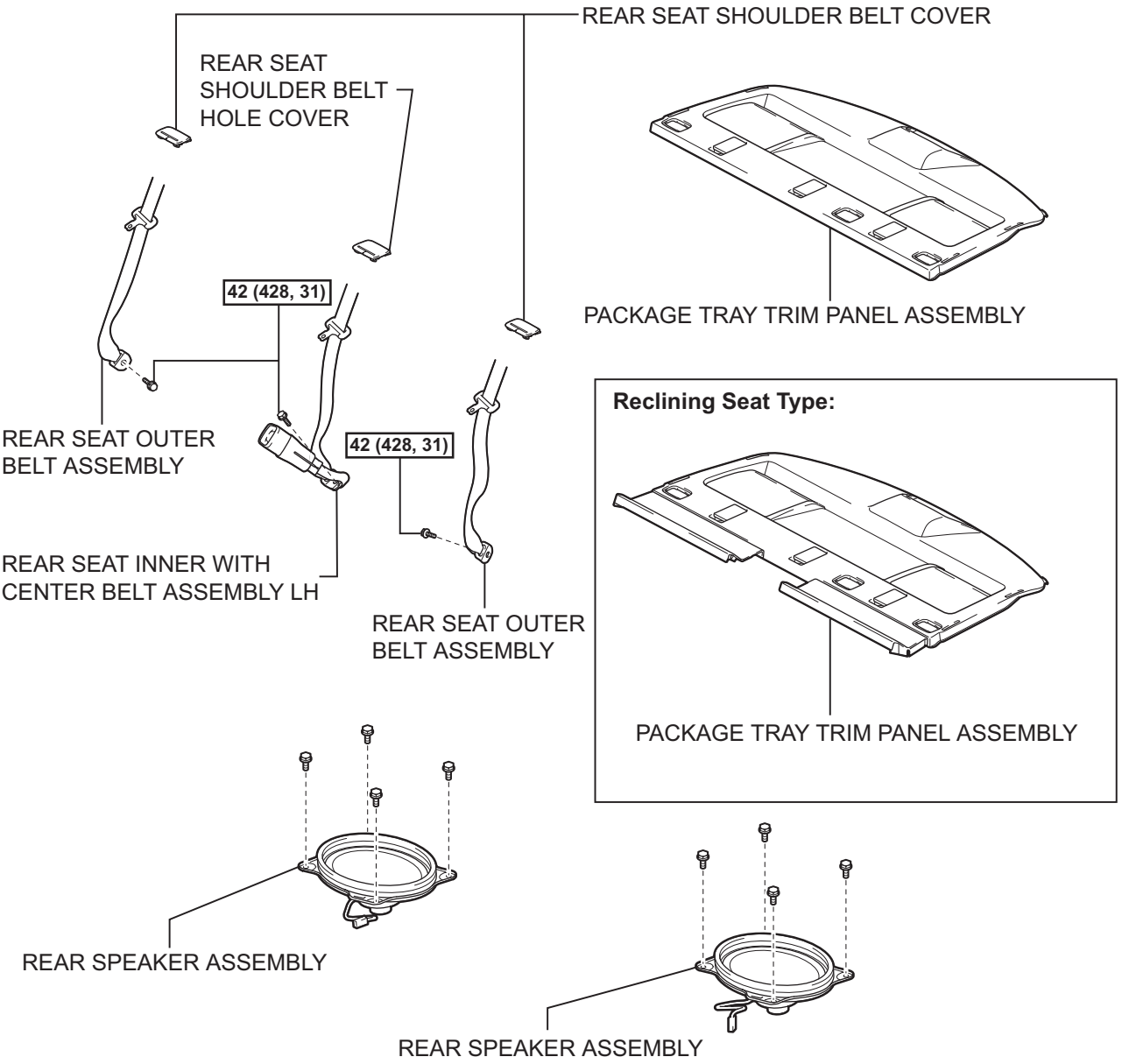
N*m (kgf*cm, ft.*lbf): Specified torque

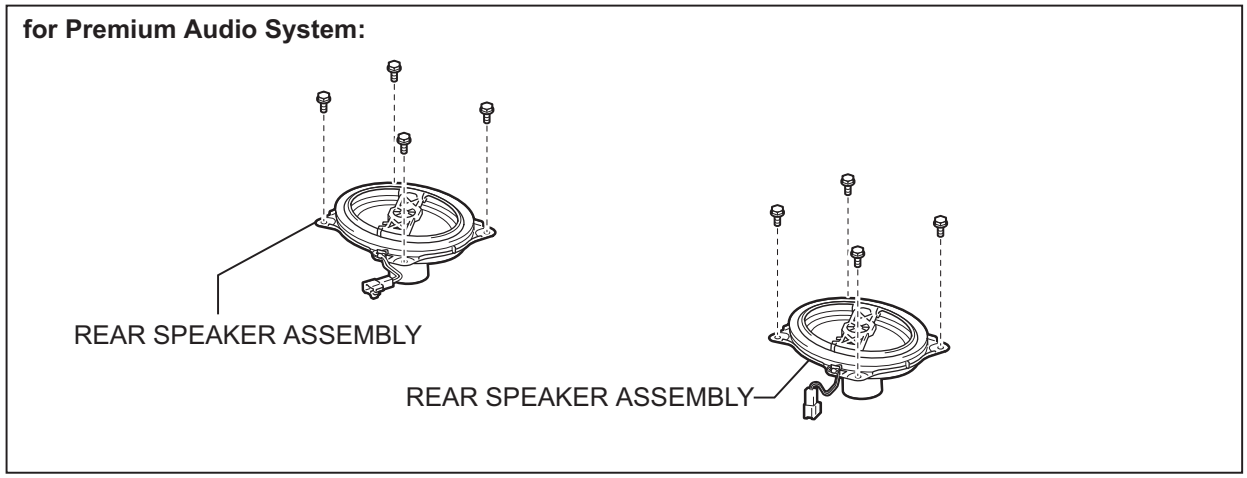
P

B139095E03


ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR SCUFF PLATE RH
ROOF SIDE INNER GARNISH LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132018E01

AV





N*m (kgf*cm, ft.*lbf): Specified torque

AV

P

E129168E01

ON-VEHICLE INSPECTION

1. INSPECT REAR SPEAKER

HINT:

Remove interior parts so that the rear speaker can be seen.

(a) Check the speaker installation.

OK:

The speaker is securely installed.

If the result is not as specified, reinstall the rear speaker.

(b) Visually check the speaker.

OK:

The cone paper of the speaker is not torn.

If the result is not as specified, replace the rear speaker.

(c) Speaker resistance check

(1) Disconnect the rear speaker connector.

(2) Measure the resistance between the terminals of the speaker.

Standard resistance (Premium Model (Only Woofer Speaker))

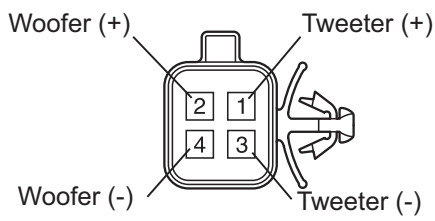
Tester connection	Condition	Specified condition
2 - 4	Always	1.8 to 2.6 Ω

Standard resistance (Standard Model):

Approximately 4 Ω

If the result is not as specified, replace the rear speaker.

Premium Model:



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AV

REMOVAL

1. REMOVE REAR SEAT HEADREST ASSEMBLY
2. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
3. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-62)
4. REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)
5. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)
6. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)
7. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)
8. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)
9. REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)
10. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)
11. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)
12. REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)
13. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)
14. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (for Reclining Seat Type)
15. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)
16. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (for Reclining Seat Type)
17. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)
18. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
19. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-35)

20. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-35)**

21. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)**

22. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)**

23. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-50)**

24. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-50)**

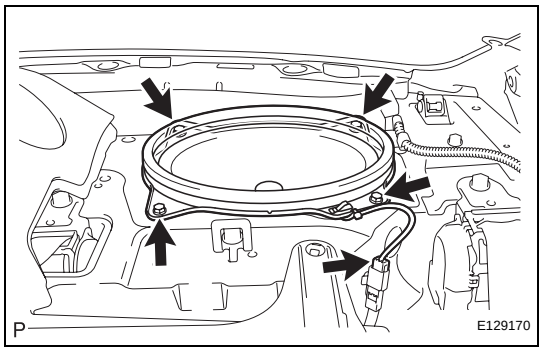
25. **REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-50)**

26. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-51)**

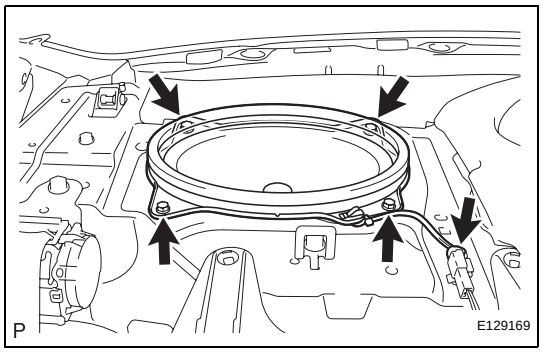
27. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-37)**

28. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-37)**

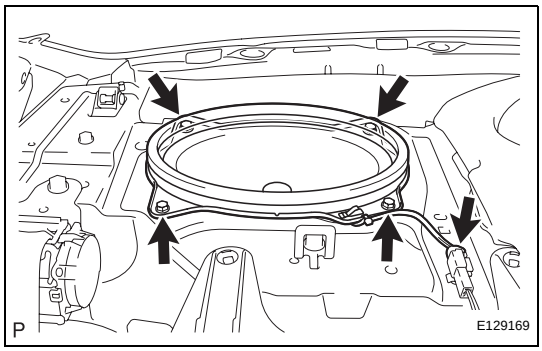
29. **REMOVE REAR SPEAKER ASSEMBLY (for LH Side)**
    (a) Turn up the partition pad.
    (b) Disconnect the connector.
    (c) Remove the 4 bolts and the rear speaker assembly.

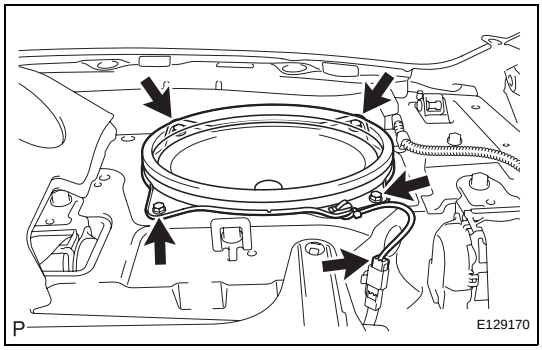


30. **REMOVE REAR SPEAKER ASSEMBLY (for RH Side)**
    (a) Turn up the partition pad.
    (b) Disconnect the connector.
    (c) Remove the 4 bolts and the rear speaker assembly.



AV





INSTALLATION

1. **INSTALL REAR SPEAKER ASSEMBLY (for RH Side)**
   (a) Install the rear speaker assembly with the 4 bolts.
   (b) Connect the connector.
   (c) Install the partition pad.

2. **INSTALL REAR SPEAKER ASSEMBLY (for LH Side)**
   (a) Install the rear speaker assembly with the 4 bolts.
   (b) Connect the connector.
   (c) Install the partition pad.

3. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-38)**

4. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-39)**

5. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-51)**

6. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-52)**

7. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-52)**

8. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-52)**

9. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)**

10. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)**

11. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-40)**

12. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-40)**

13. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)**

14. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type) (See page SB-53)**

15. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (for Reclining Seat Type) (See page IR-55)**

16. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**

17. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (for Reclining Seat Type) (See page IR-56)
18. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)
19. INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)
20. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)
21. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)
22. INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)
23. INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)
24. INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)
25. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)
26. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)
27. INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)
28. INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-58)
29. INSTALL REAR CENTER SEAT HEADREST ASSEMBLY
30. INSTALL REAR SEAT HEADREST ASSEMBLY

REMOVAL

1. **PRECAUTION**
   (See page IP-1)
2. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
4. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)**
5. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)**
6. **REMOVE STEERING PAD (See page RS-350)**
7. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
8. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
9. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
11. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
12. **REMOVE STEERING COLUMN COVER (for TMC Made) (See page IP-21)**
13. **REMOVE STEERING COLUMN COVER (for TMMK Made) (See page IP-21)**
14. **REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)**
15. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
16. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
17. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
18. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)**
19. **REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)**
20. **REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)**
21. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**

22. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH
23. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)
24. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)
25. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)
26. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)
27. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)
28. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
29. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
30. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)
31. REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)
32. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)
33. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)
34. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)
35. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)
36. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)
37. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-146)
38. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-195)
39. REMOVE CONSOLE BOX POCKET (See page IP-28)
40. REMOVE CONSOLE BOX CARPET (See page IP-28)
41. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
42. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)
43. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)

44. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**
45. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)**
46. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**
47. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**
48. **REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-31)**
49. **REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-31)**
50. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**
51. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**
52. **REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-31)**
53. **REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-32)**
54. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**
    HINT:
    Use the same procedures for the RH side and the LH side (See page AV-156).
55. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-32)**
56. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-32)**
57. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-34)**
58. **REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-37)**
59. **REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-37)**
60. **REMOVE SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-38)**
61. **REMOVE SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-38)**
62. **REMOVE DEFROSTER NOZZLE ASSEMBLY (for TMC Made) (See page IP-38)**
63. **REMOVE DEFROSTER NOZZLE ASSEMBLY (for TMMK Made) (See page IP-38)**
64. **REMOVE NO. 1 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-38)**

65. **REMOVE NO. 1 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-39)**

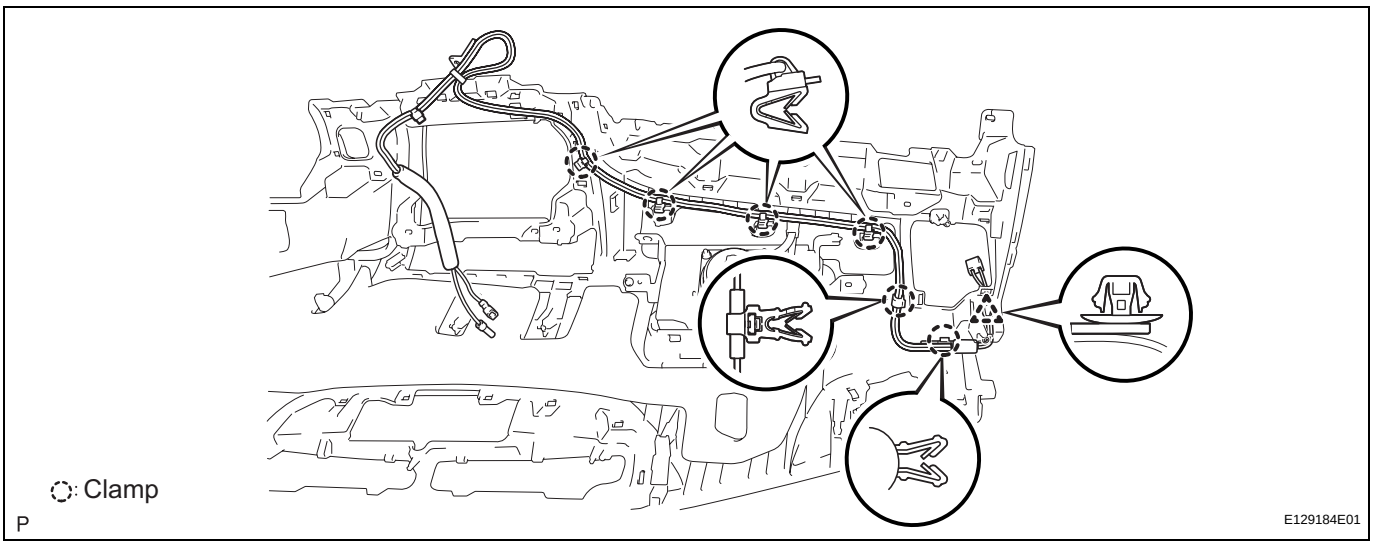
66. **REMOVE NO. 3 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-39)**

67. **REMOVE NO. 3 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-39)**

68. **REMOVE NO. 2 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-39)**

69. **REMOVE NO. 2 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-39)**

70. **REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY**
    (a) Disengage the 6 clamps and clip and remove the No. 2 antenna cord sub-assembly.



71. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

72. **REMOVE SEAT TRACK COVER LH (for Manual Seat) (See page SE-16)**

73. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-16)**

74. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-16)**

75. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

76. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-30)**

77. **REMOVE SEAT TRACK COVER RH (for Power Seat) (See page SE-30)**

78. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-30)**

79. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

80. REMOVE SEAT TRACK COVER RH (for Manual Seat) (See page IR-22)
81. REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page IR-22)
82. REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page IR-22)
83. REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)
84. REMOVE SEAT TRACK COVER RH (for Power Seat) (See page IR-22)
85. REMOVE SEAT TRACK COVER LH (for Power Seat) (See page IR-23)
86. REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat) (See page IR-23)
87. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)
88. REMOVE REAR SEAT HEADREST ASSEMBLY
89. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
90. REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)
91. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)
92. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)
93. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)
94. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)
95. REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)
96. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)
97. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)
98. REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)
99. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)
100. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH

101. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)
102. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH
103. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)
104. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
105. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-38)
106. REMOVE DOOR ASSIST GRIP COVER LH (See page ED-38)
107. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-39)
108. REMOVE REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-40)
109. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)
110. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)
111. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH
112. REMOVE LAP BELT OUTER ANCHOR COVER (See page IR-25)
113. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-25)
114. REMOVE LOWER CENTER PILLAR GARNISH LH (See page IR-25)
115. REMOVE UPPER CENTER PILLAR GARNISH LH (See page IR-26)
116. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)
117. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)
118. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH
119. REMOVE LAP BELT OUTER ANCHOR COVER (See page IR-26)
120. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-26)
121. REMOVE LOWER CENTER PILLAR GARNISH RH (See page IR-26)
122. REMOVE UPPER CENTER PILLAR GARNISH RH (See page IR-26)

123. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)**

124. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)**

125. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**

126. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**

127. **REMOVE ROOF CONSOLE BOX ASSEMBLY (See page IR-28)**

128. **REMOVE VISOR ASSEMBLY LH (See page IR-28)**

129. **REMOVE VISOR ASSEMBLY RH (See page IR-29)**

130. **REMOVE VISOR HOLDER (See page IR-29)**

131. **REMOVE FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**

132. **REMOVE REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**

133. **REMOVE NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-30)**

134. **REMOVE SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-30)**

135. **REMOVE SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof) (See page IR-31)**

136. **REMOVE SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-31)**

137. **REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-31)**

138. **REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-32)**

139. **REMOVE ANTENNA CORD SUB-ASSEMBLY**

(a) Peel the strips of the tape used to secure the antenna cord only to the extent that allows removal of the antenna cord.

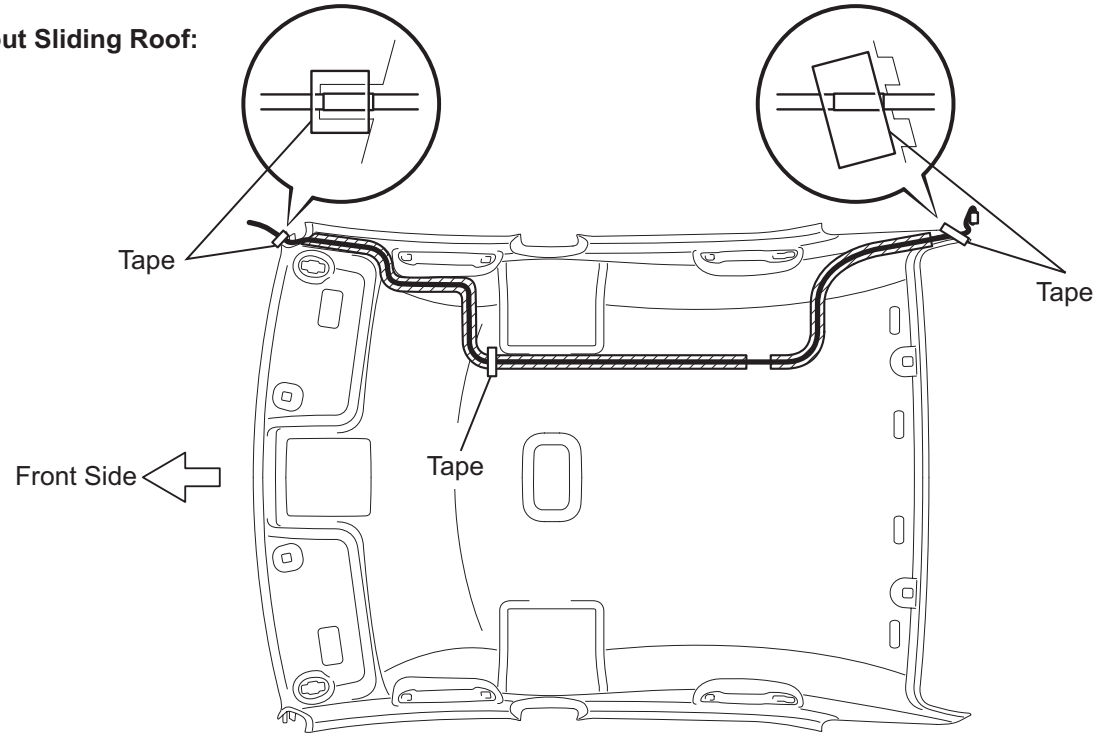
HINT:

Tape is not available as a supply part. Try to leave as much tape as possible on the roof headlining so that the tape can be reused.

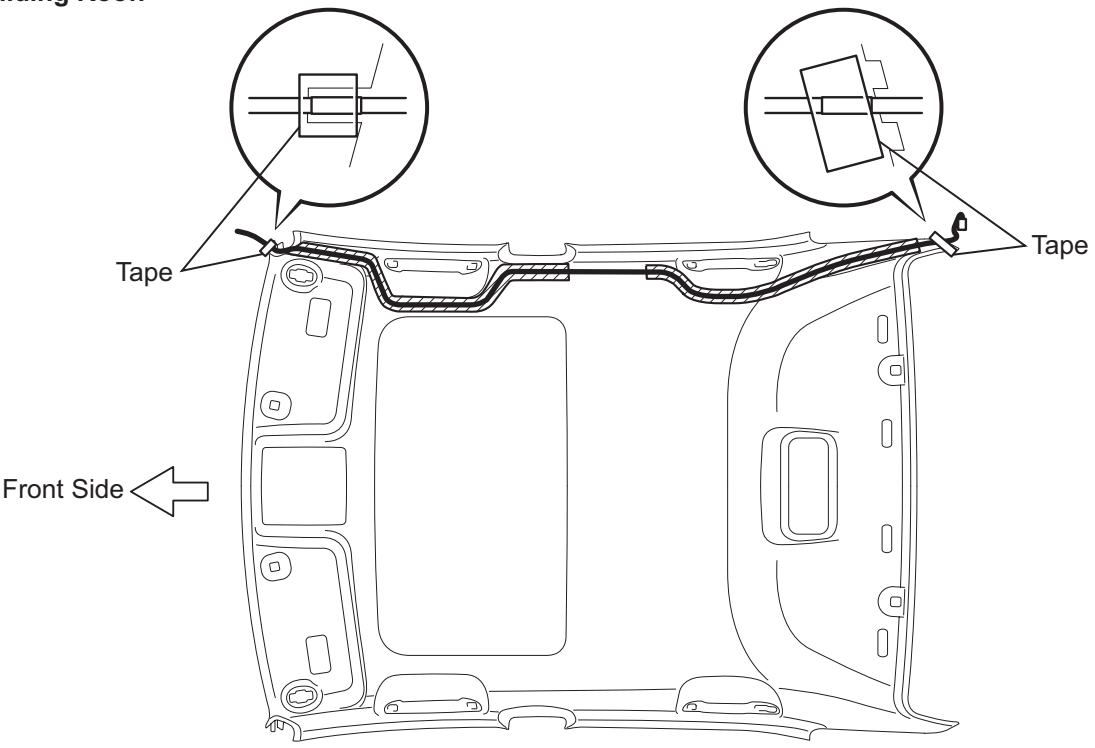
(b) Remove the antenna cord from the roof headlining.

TMC Made:

without Sliding Roof:



with Sliding Roof:

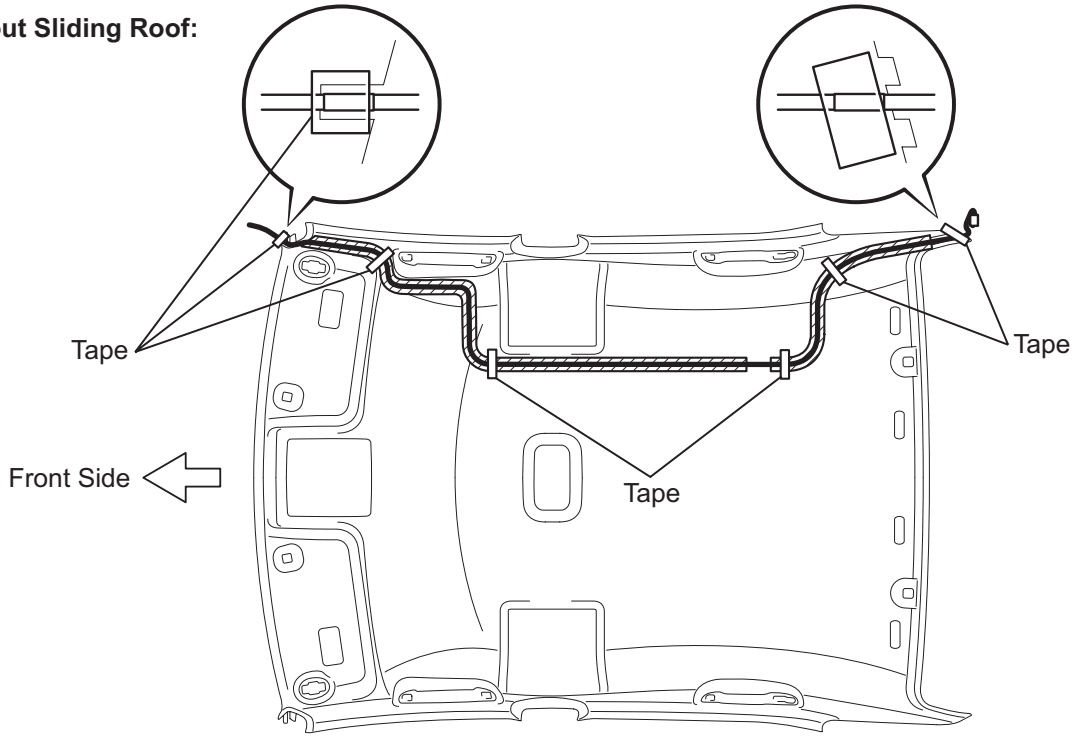


: Double-sided Tape

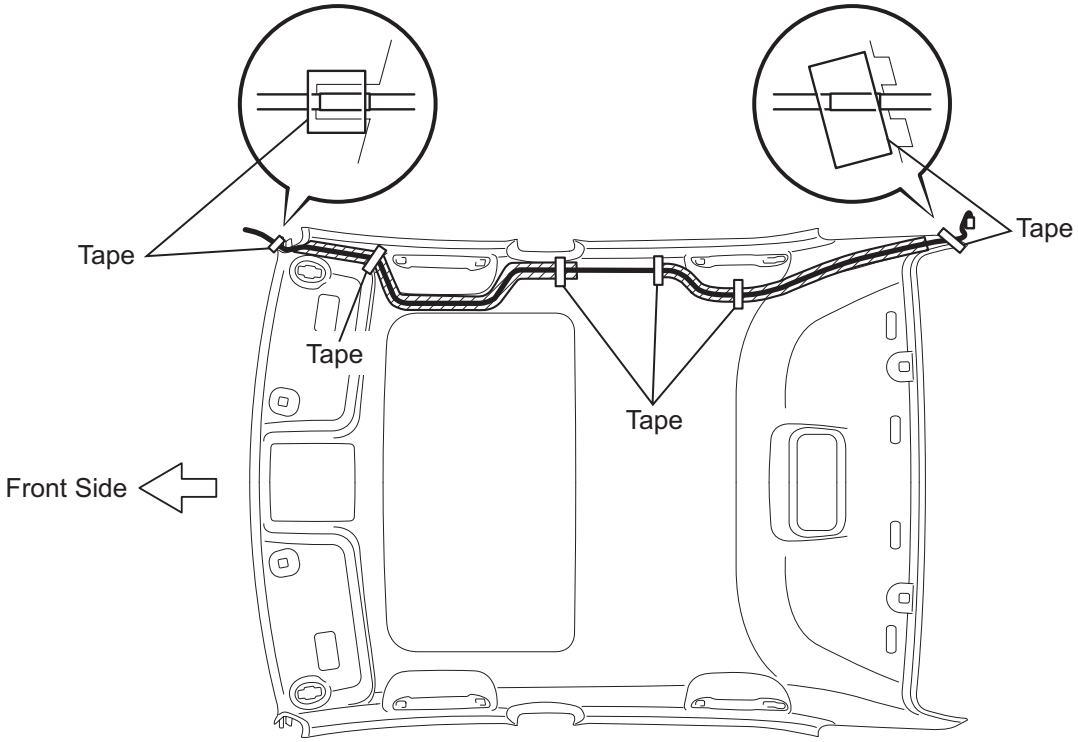
E129975E01

TMMK Made:

without Sliding Roof:



with Sliding Roof:



: Double-sided Tape

P

E129191E02

AV

INSTALLATION

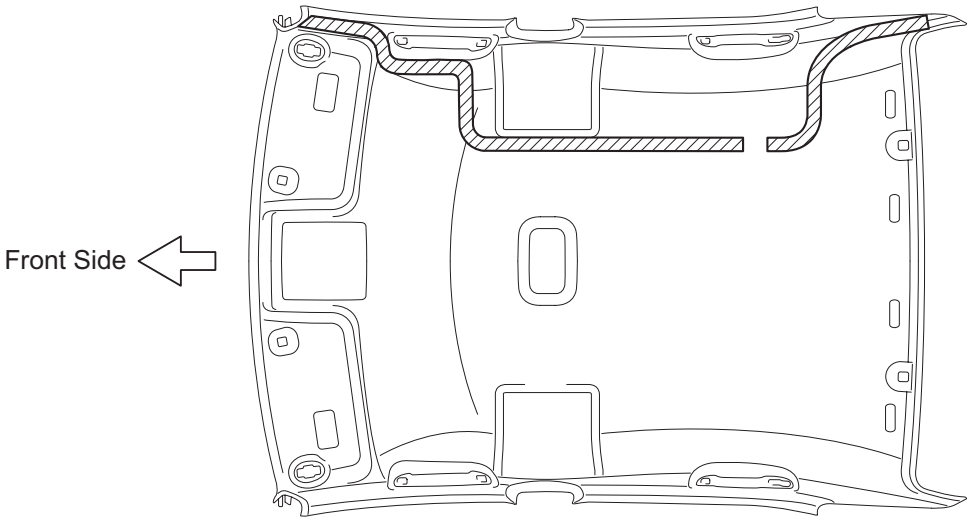
1. INSTALL ANTENNA CORD SUB-ASSEMBLY

HINT:

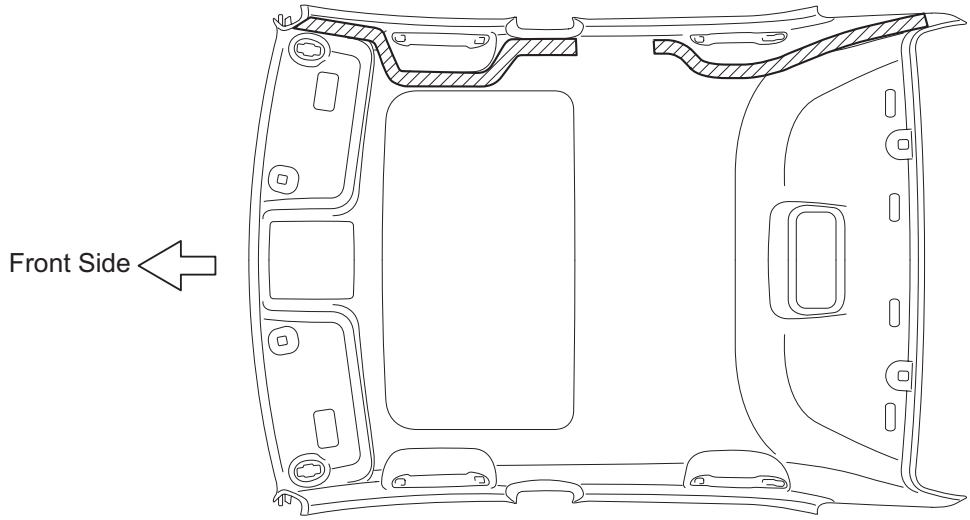
The double-sided tape and tape are not available as supply parts. If these tapes still have enough adhesion to secure the roof headlining and antenna cord, reuse the tapes. If the roof headlining has been replaced with a new one, or if the tape and/or the double-sided tape is no longer sticky, apply new tape following the procedures below.

(a) Apply new double-sided tape.

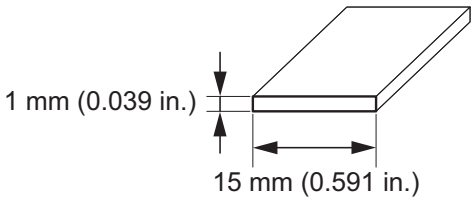
without Sliding Roof:



with Sliding Roof:



Double-sided Tape



: Double-sided Tape

P

E129190E01

(1) Remove the double-sided tape from the roof headlining assembly.

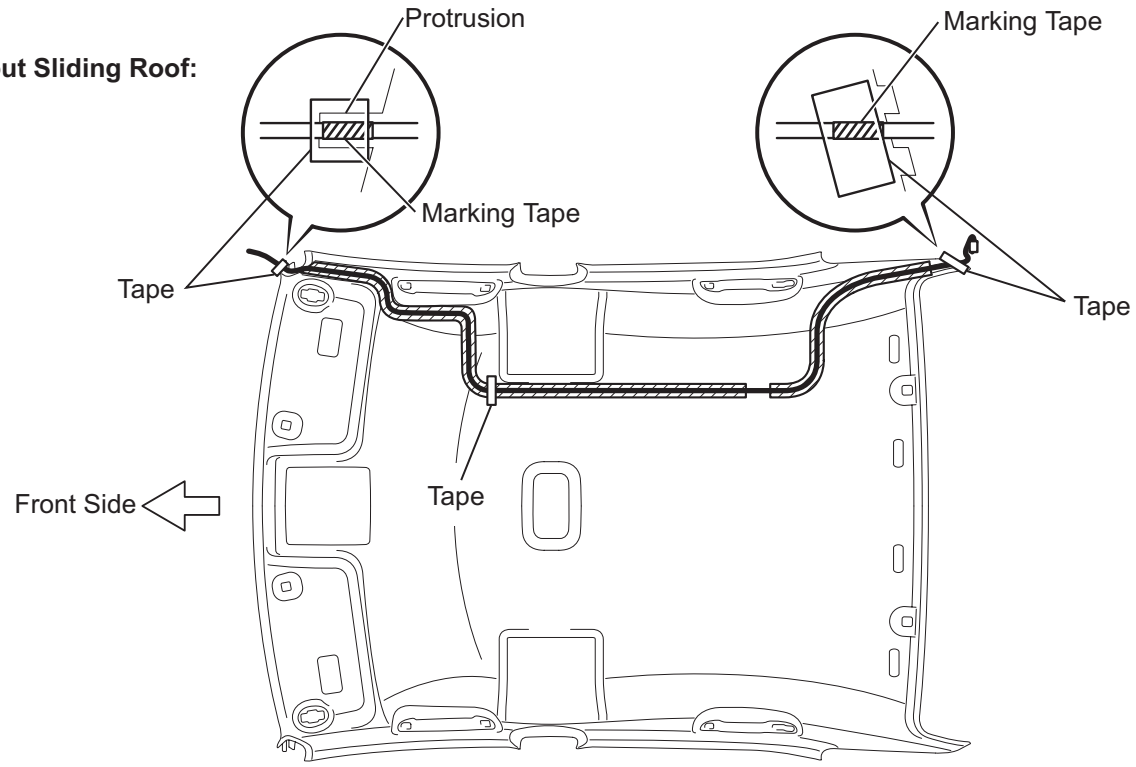
AV

(2) Peel off the appropriate amount of new double-sided tape. Be careful not to touch the adhesive surface.
(3) Apply the double-sided tape to the roof headlining while aligning the tape with the markings on the roof headlining assembly.
(4) Peel off the backing sheet from the double-sided tape.

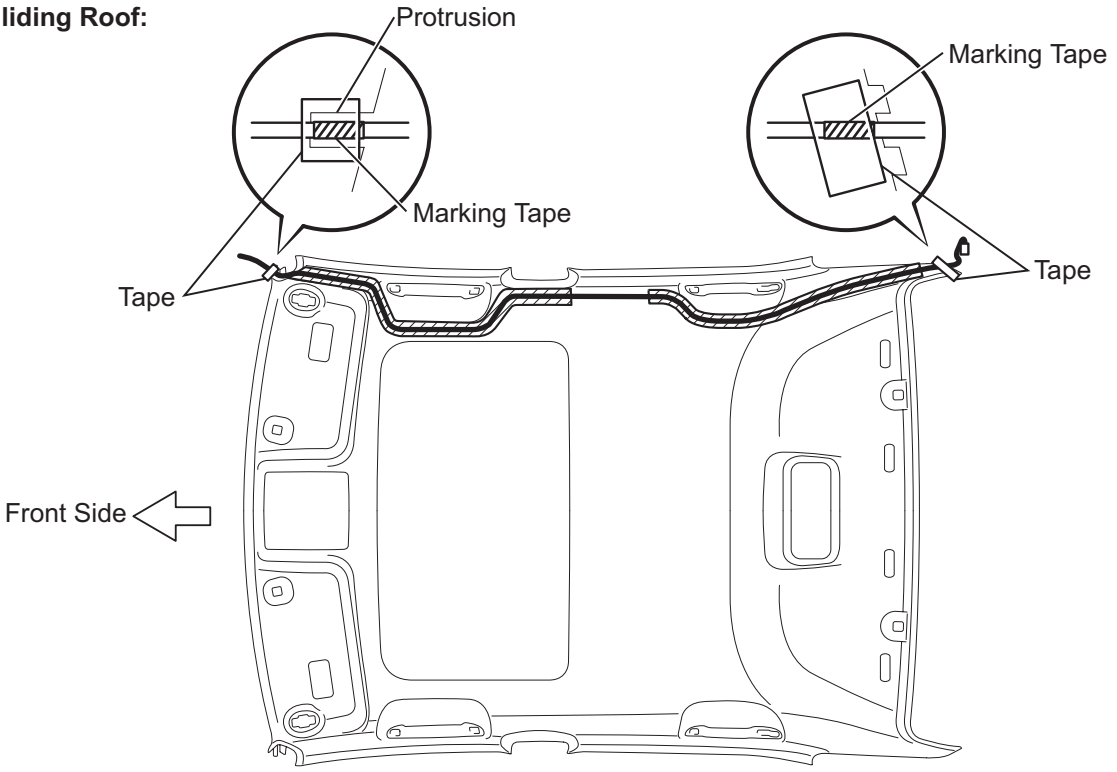
(b) Install the antenna cord to the roof headlining assembly from the front of the vehicle.

TMC Made:

without Sliding Roof:



with Sliding Roof:



: Double-sided Tape

P

E129975E03

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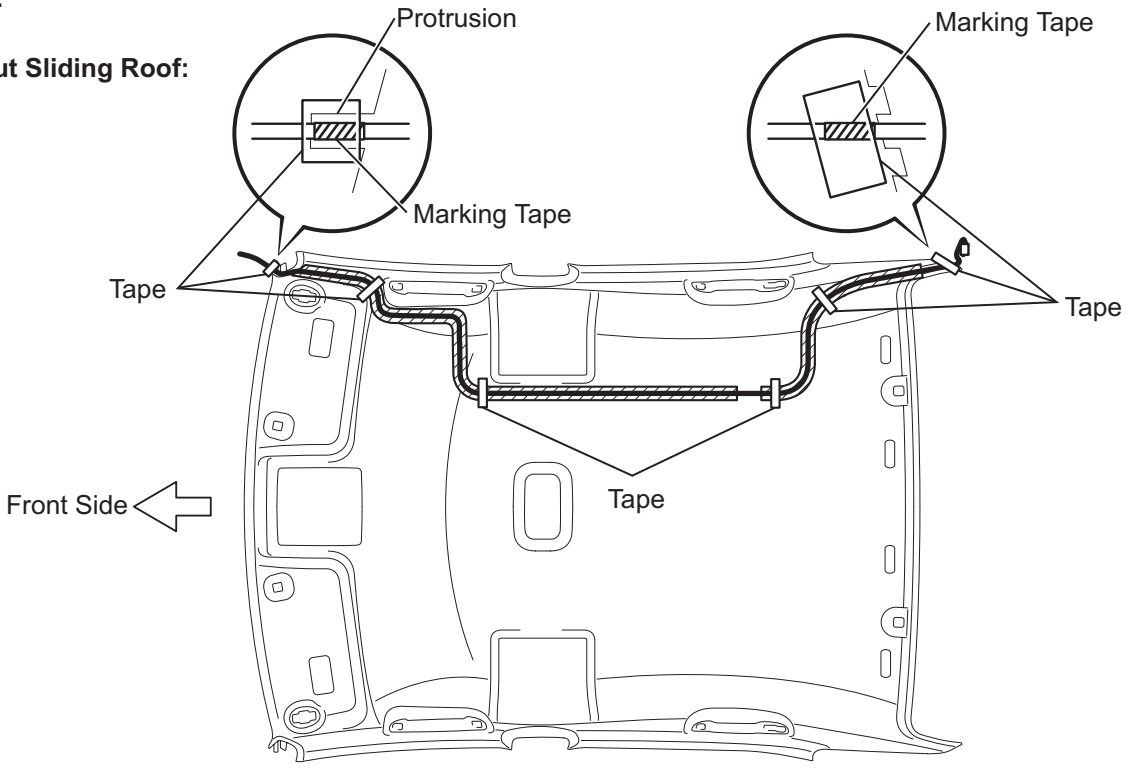
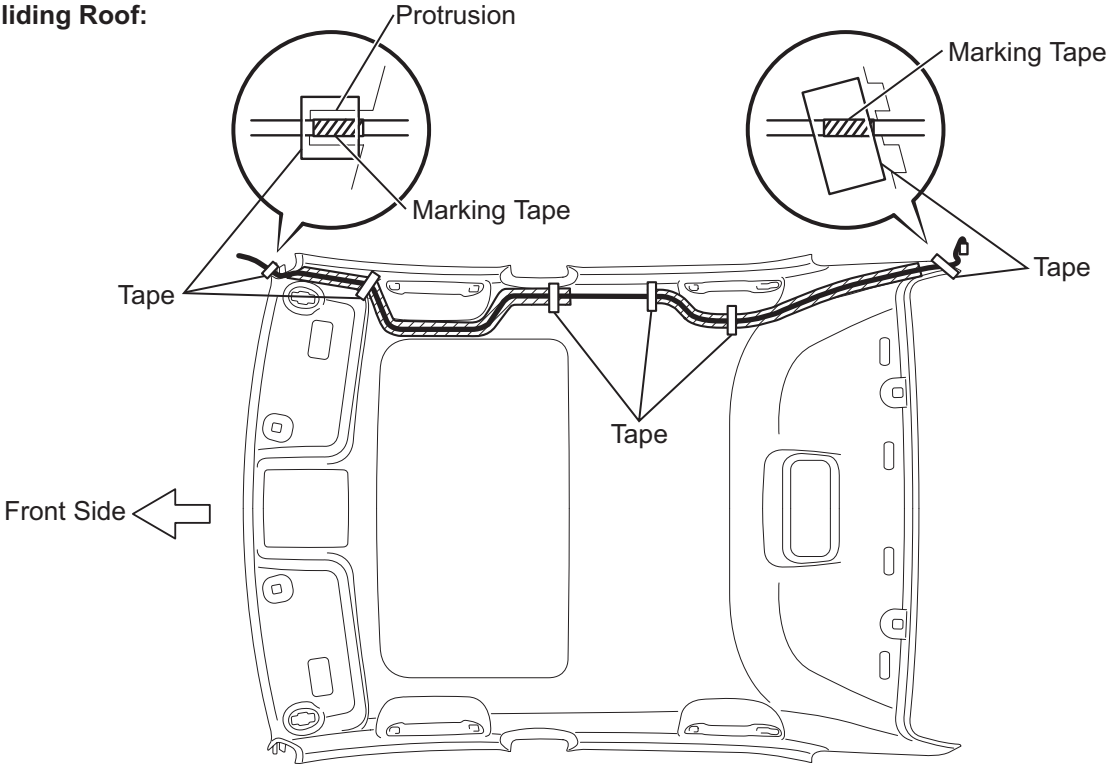
TMMK Made:

without Sliding Roof:



with Sliding Roof:



: Double-sided Tape

P

E129191E03

HINT:
Align the taped part of the antenna cable with the protrusion of the roof headlining, and apply tape to secure the cable to the headlining.

(c) Put the strips of the tape back to the positions shown in the illustration in order to secure the antenna cord to the roof headlining assembly.
HINT:
- If the tape is no longer sticky, use other tape, such as packing tape, that has enough adhesion to secure the antenna cord to the roof headlining assembly.
- For the right front corner of the roof headlining assembly, align the marking tape on the antenna cord with the protrusion of the roof headlining, and wrap tape around the antenna cord and roof headlining assembly once or twice to securely hold them.
- For the right rear corner of the roof headlining assembly, align the marking tape on the antenna cord with the rear edge of the roof headlining, and secure the antenna cord to the roof headlining assembly with tape.

2. **INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-45)**
3. **INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-46)**
4. **INSTALL SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-47)**
5. **INSTALL SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof) (See page IR-47)**
6. **INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-48)**
7. **INSTALL NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-48)**
8. **INSTALL FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-49)**
9. **INSTALL REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-49)**
10. **INSTALL VISOR HOLDER (See page IR-49)**
11. **INSTALL VISOR ASSEMBLY LH (See page IR-50)**
12. **INSTALL VISOR ASSEMBLY RH (See page IR-50)**
13. **INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-50)**
14. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**
15. **INSTALL FRONT PILLAR GARNISH RH (See page IR-52)**
16. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)**

17. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)
18. INSTALL UPPER CENTER PILLAR GARNISH LH (See page IR-53)
19. INSTALL LOWER CENTER PILLAR GARNISH LH (See page IR-53)
20. CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-53)
21. INSTALL LAP BELT OUTER ANCHOR COVER (See page IR-53)
22. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-54)
23. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
24. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
25. INSTALL UPPER CENTER PILLAR GARNISH RH (See page IR-54)
26. INSTALL LOWER CENTER PILLAR GARNISH RH (See page IR-54)
27. CONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-54)
28. INSTALL LAP BELT OUTER ANCHOR COVER (See page IR-54)
29. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-55)
30. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)
31. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)
32. INSTALL REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-54)
33. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-55)
34. INSTALL DOOR ASSIST GRIP COVER LH (See page ED-56)
35. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-56)
36. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)
37. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
38. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)

39. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**
40. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)**
41. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**
42. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**
43. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**
44. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
45. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
46. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
47. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
48. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
49. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
50. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
51. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
52. **INSTALL REAR SEAT HEADREST ASSEMBLY**
53. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-58)**
54. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-41)**
55. **INSTALL SEAT TRACK COVER RH (for Power Seat) (See page SE-42)**
56. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-42)**
57. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
58. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-24)**
59. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-25)**

60. **INSTALL SEAT TRACK COVER LH (for Manual Seat) (See page SE-25)**

61. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

62. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat) (See page IR-57)**

63. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page IR-57)**

64. **INSTALL SEAT TRACK COVER RH (for Power Seat) (See page IR-57)**

65. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

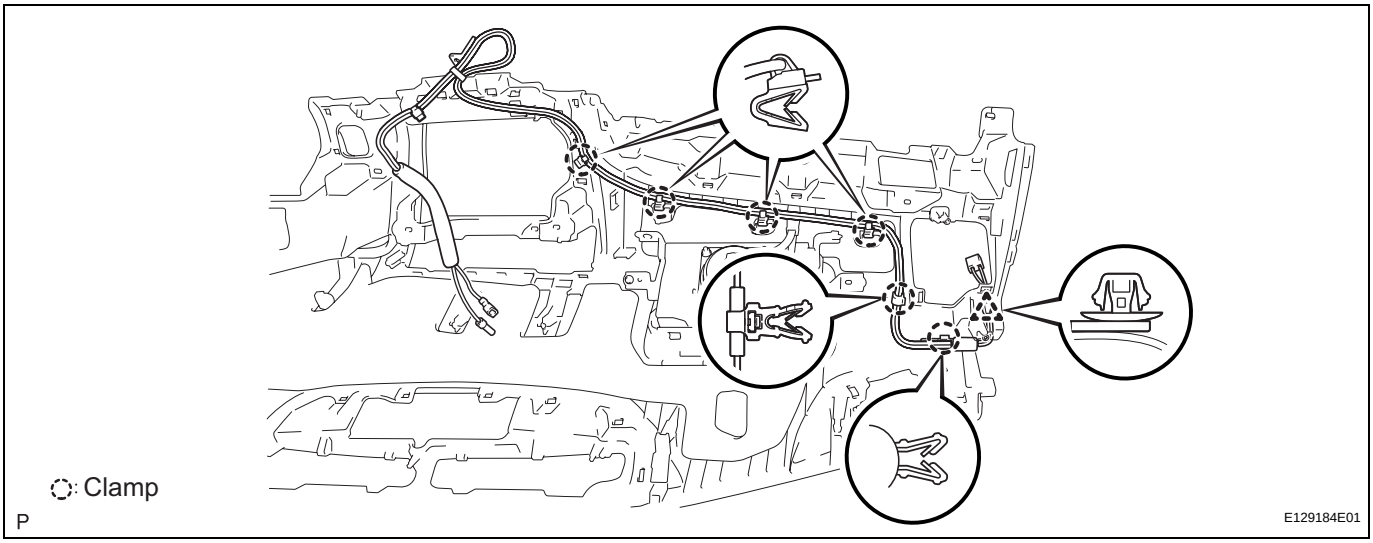
66. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page IR-57)**

67. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page IR-58)**

68. **INSTALL SEAT TRACK COVER RH (for Manual Seat) (See page IR-58)**

69. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

70. **INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY**
    (a) Engage the 6 clamps and clip and install the No. 2 antenna cord sub-assembly.



AV

71. **INSTALL NO. 2 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-41)**

72. **INSTALL NO. 2 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-41)**

73. **INSTALL NO. 3 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-41)**

74. **INSTALL NO. 3 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-41)**

75. **INSTALL NO. 1 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-42)**
76. **INSTALL NO. 1 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-42)**
77. **INSTALL DEFROSTER NOZZLE ASSEMBLY (for TMC Made) (See page IP-42)**
78. **INSTALL DEFROSTER NOZZLE ASSEMBLY (for TMMK Made) (See page IP-42)**
79. **INSTALL SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-42)**
80. **INSTALL SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-43)**
81. **INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-43)**
82. **INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-43)**
83. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-44)**
84. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-45)**
85. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-48)**
86. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**
87. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-48)**
88. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-48)**
89. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**
90. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**
    HINT:
    Use the same procedures for the RH side and the LH side (See page AV-156).
91. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-49)**
92. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-49)**
93. **INSTALL FRONT PILLAR GARNISH RH (See page IR-52)**
94. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)**
95. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**

96. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)
97. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)
98. INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)
99. INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)
100. INSTALL CONSOLE BOX CARPET (See page IP-51)
101. INSTALL CONSOLE BOX POCKET (See page IP-51)
102. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-147)
103. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-196)
104. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)
105. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)
106. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)
107. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)
108. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)
109. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)
110. INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)
111. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)
112. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)
113. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)
114. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)
115. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)
116. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)

117. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)
118. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)
119. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)
120. INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)
121. INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)
122. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)
123. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)
124. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)
125. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)
126. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY
127. ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)
128. INSTALL STEERING COLUMN COVER (for TMC Made) (See page IP-58)
129. INSTALL STEERING COLUMN COVER (for TMMK Made) (See page IP-58)
130. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)
131. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)
132. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
133. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
134. INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)
135. INSTALL STEERING PAD (See page RS-350)
136. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)
137. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)
138. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
139. INSPECT FRONT SEAT ASSEMBLY

140. INSPECT FRONT SEAT ADJUSTER ASSEMBLY

141. INSPECT STEERING PAD (See page RS-352)

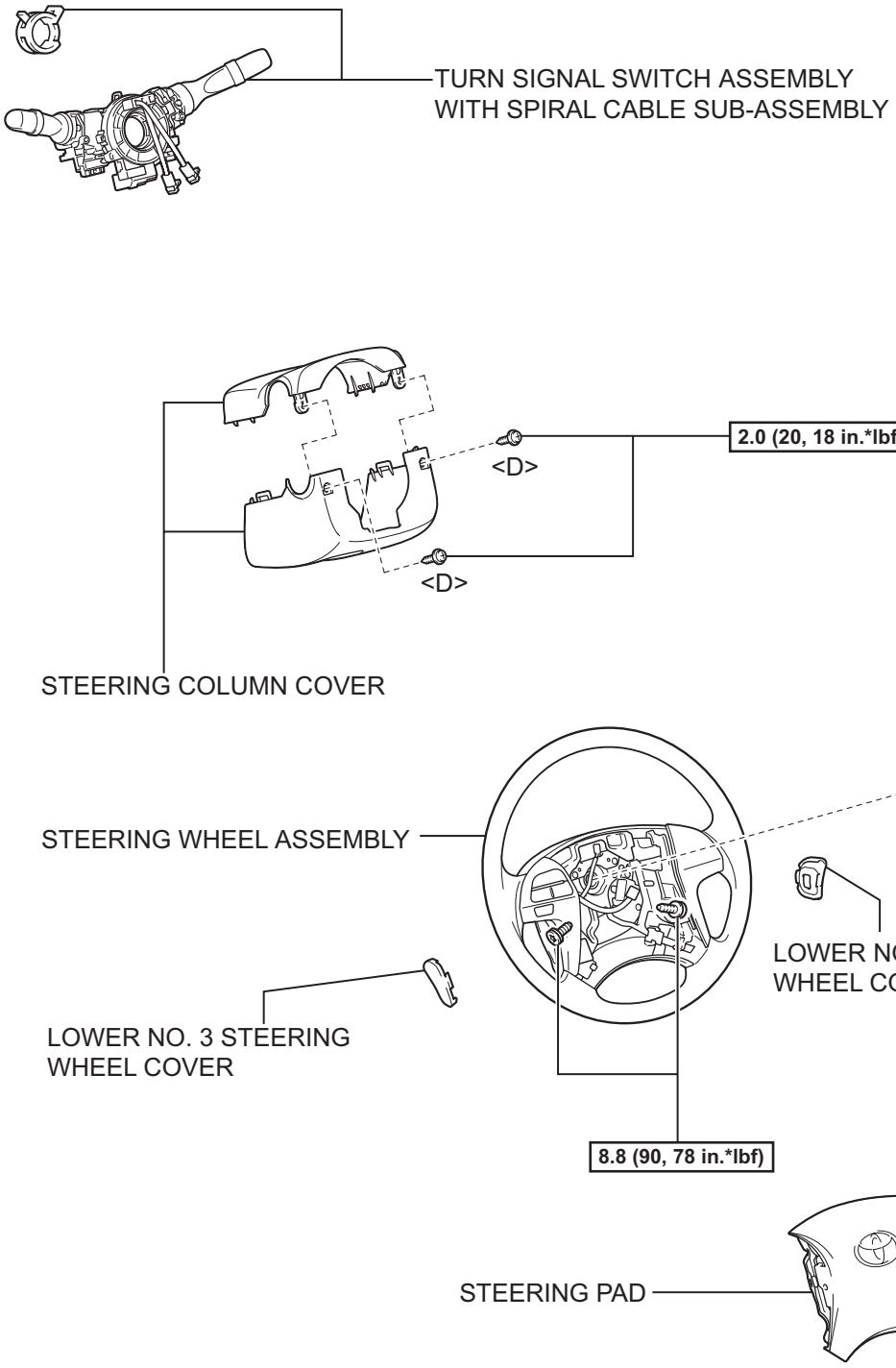
142. PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)
(See page RS-242)

143. INSPECT SRS WARNING LIGHT
(See page RS-32)

RADIO ANTENNA CORD

COMPONENTS

for TMC Made:



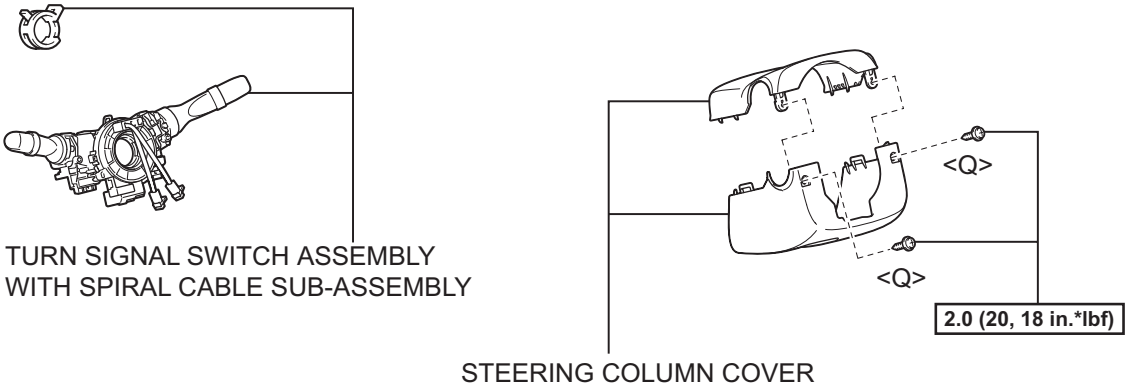
N*m (kgf*cm, ft.*lbf) : Specified torque

P

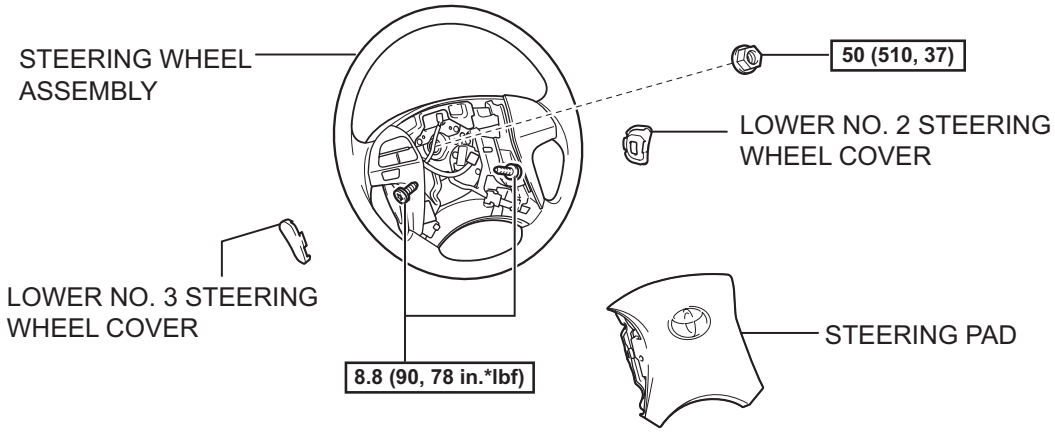
B137279E01

AV

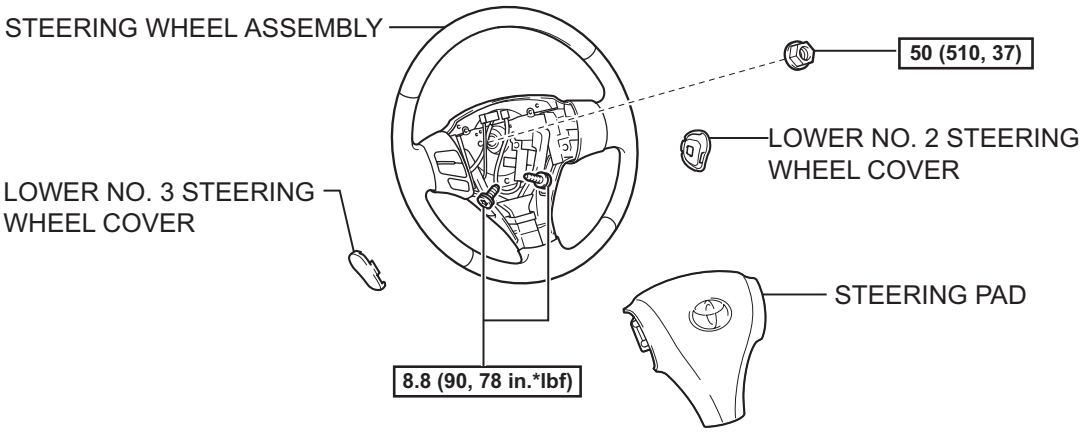
for TMMK Made:



for 4 Spoke:



for 3 Spoke:



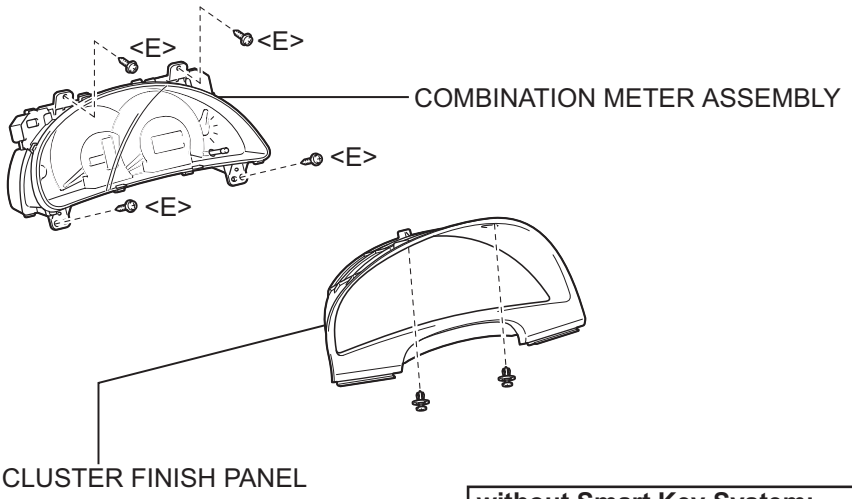
AV

N*m (kgf*cm, ft.*lbf) : Specified torque

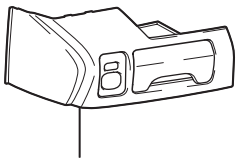
P

B137280E01

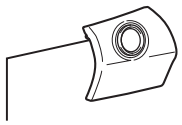
for TMC Made:

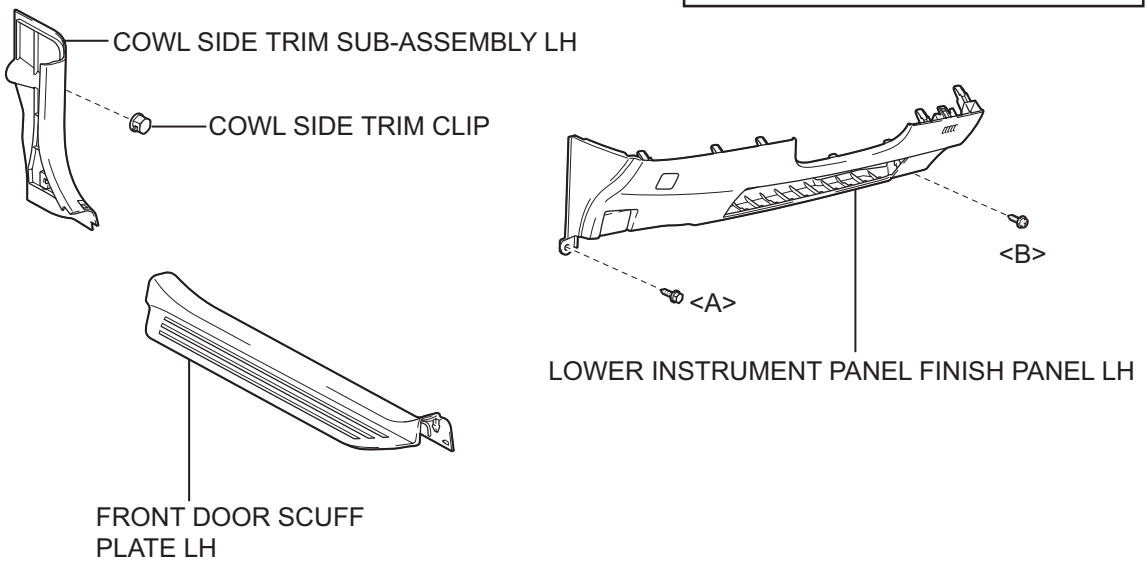


without Smart Key System:



with Smart Key System:





AV

P

B137281E01

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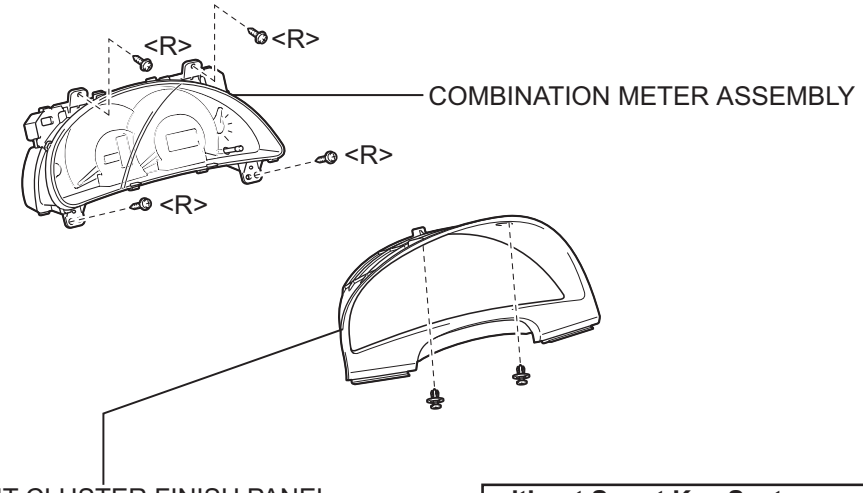
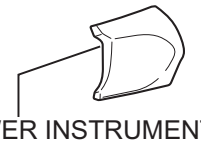
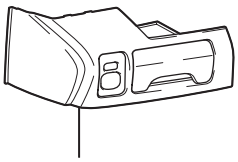
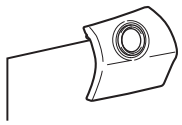


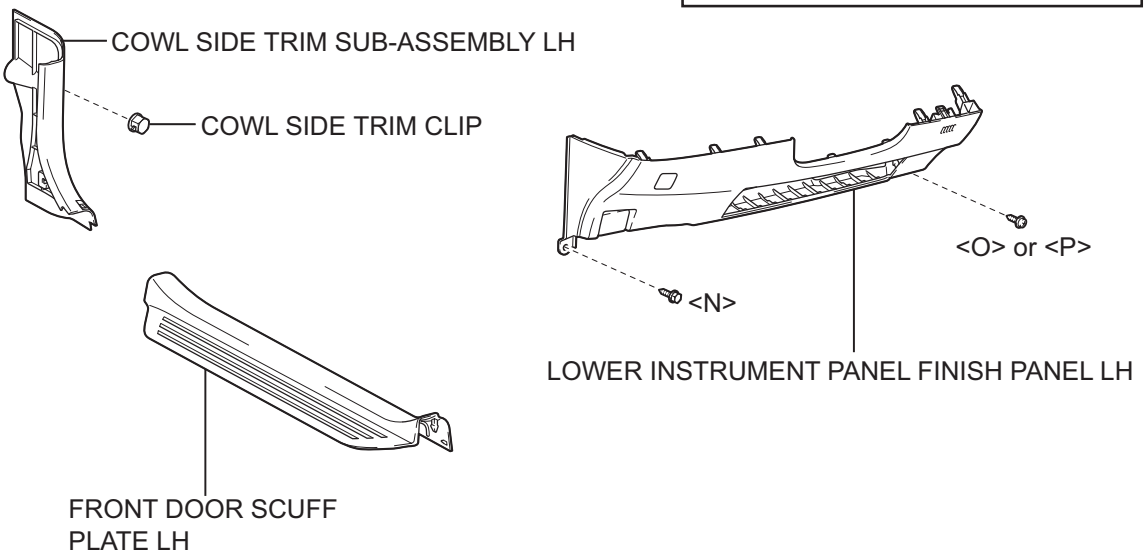
without Smart Key System:





with Smart Key System:





AV

P

B137281E03

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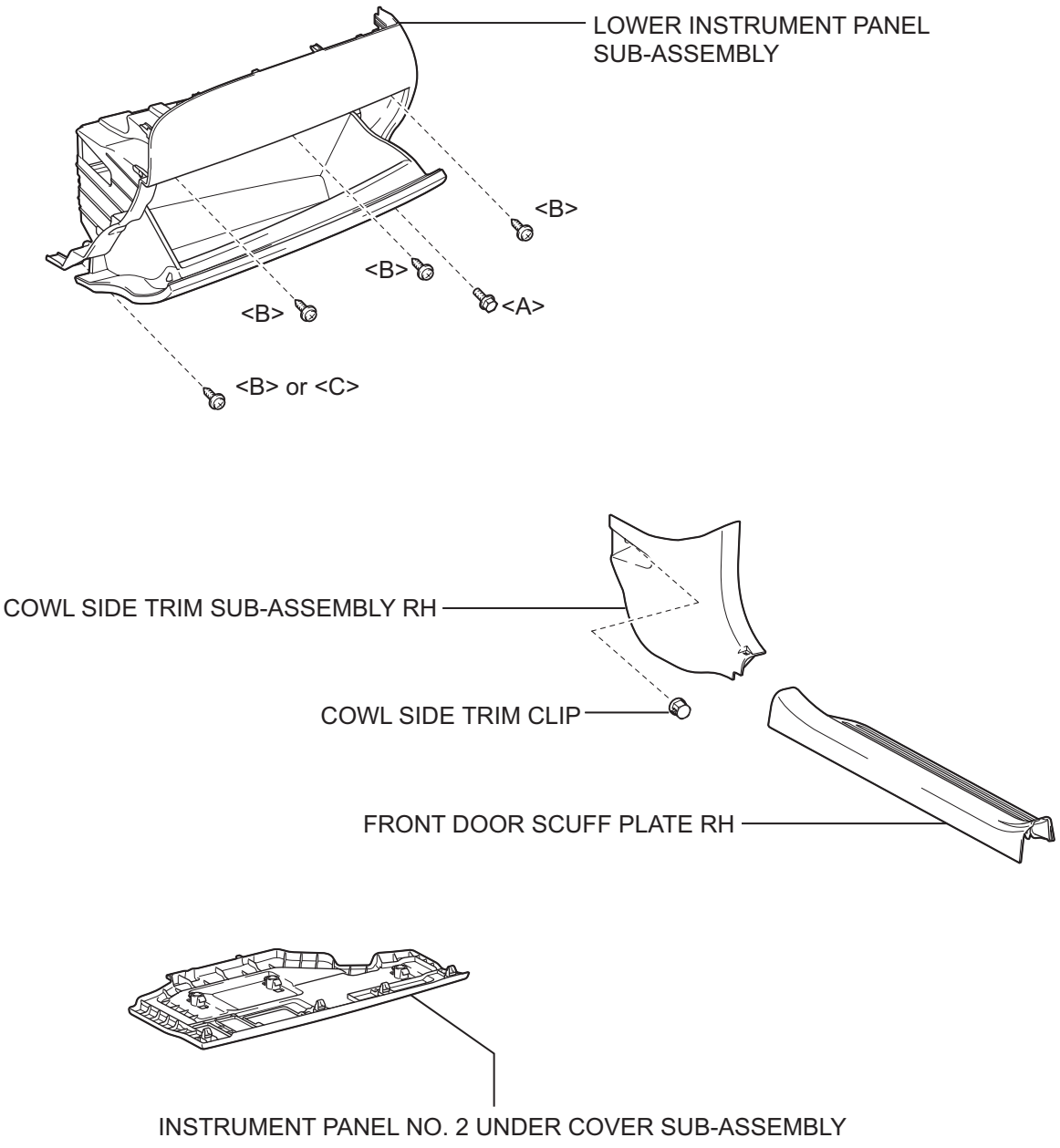

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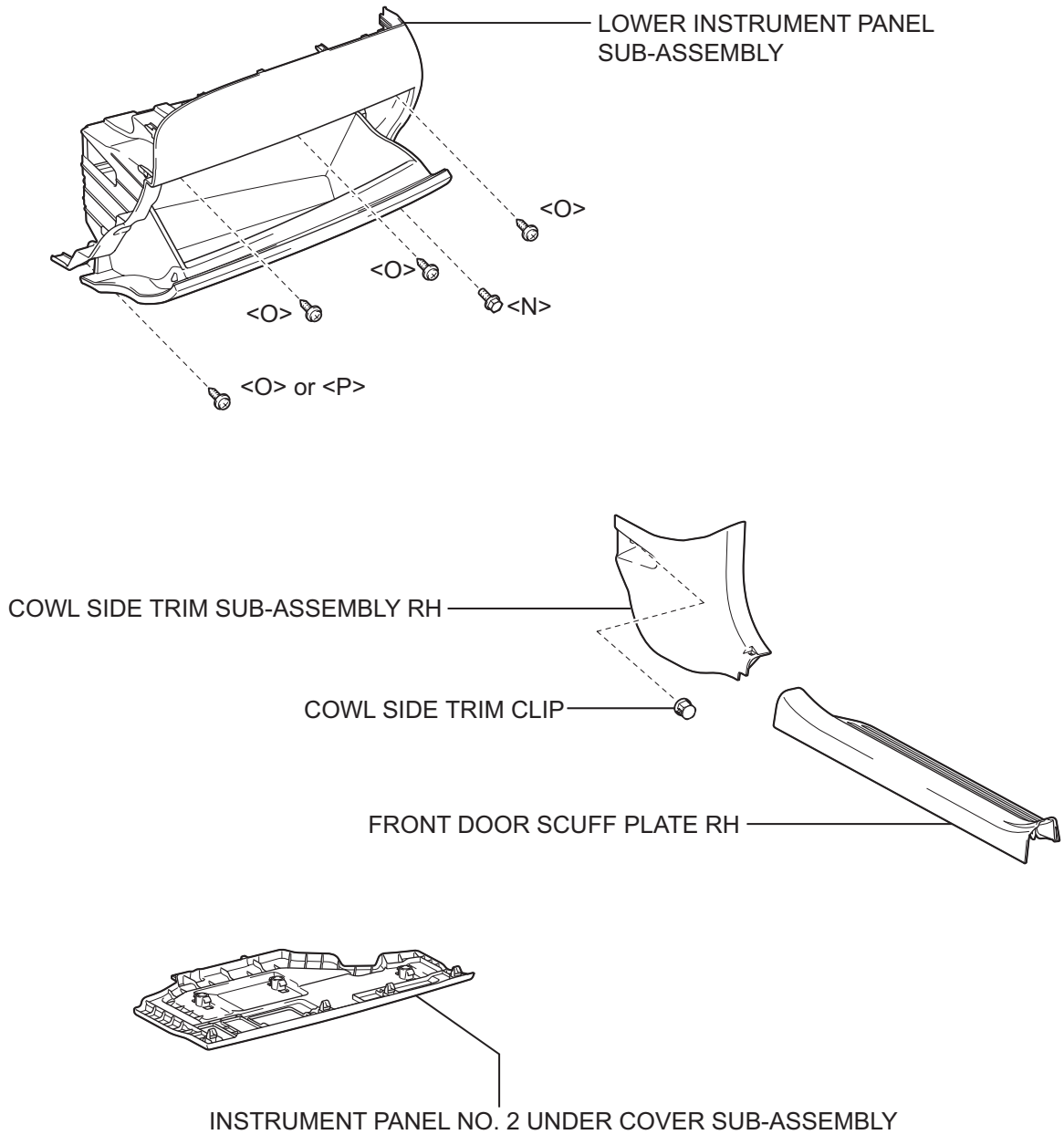

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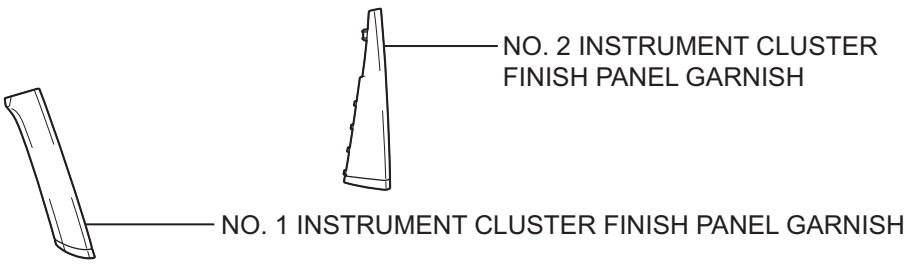
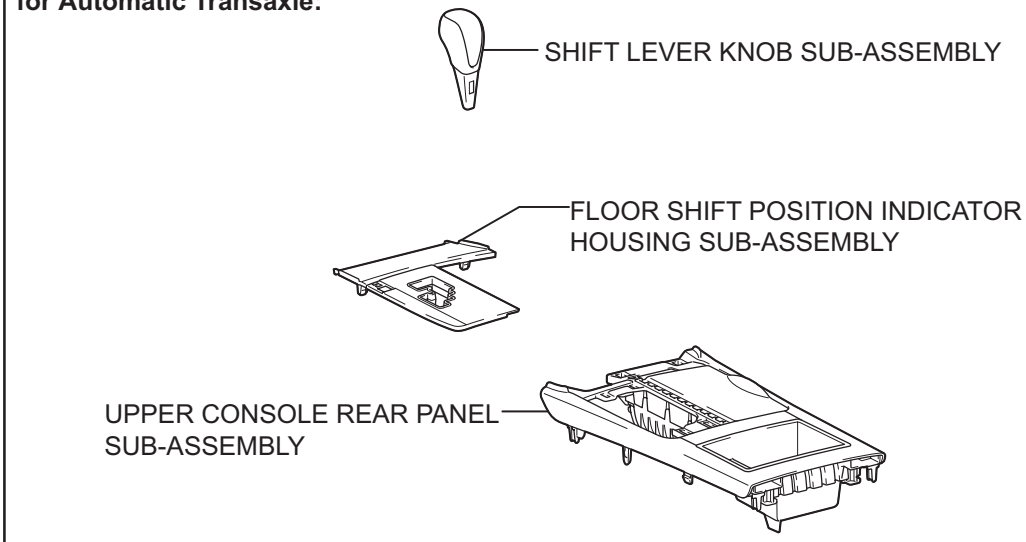


for Automatic Transaxle:



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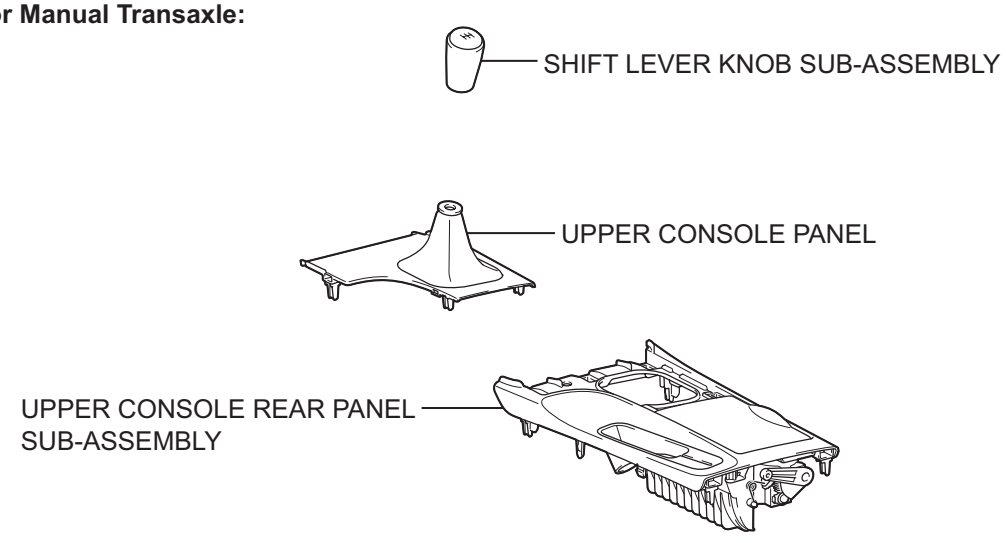
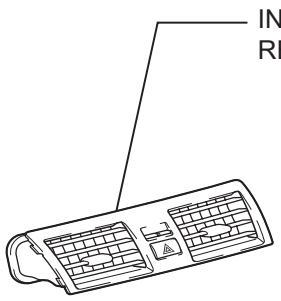


AV

P

B137283E01

for TMC Made:



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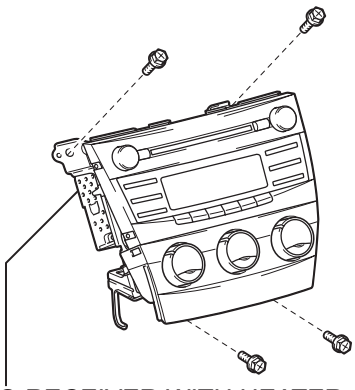

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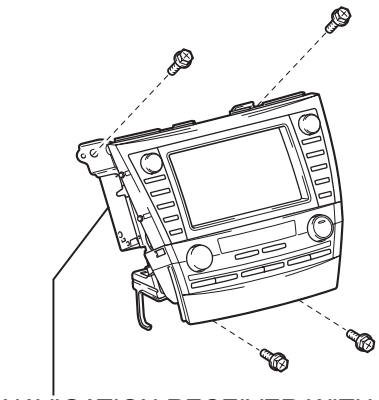

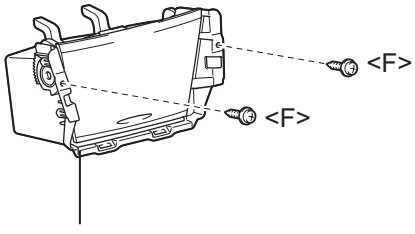

AV

P

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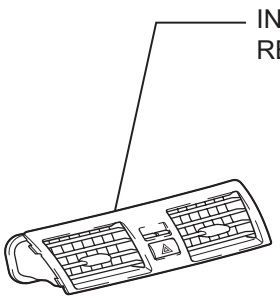

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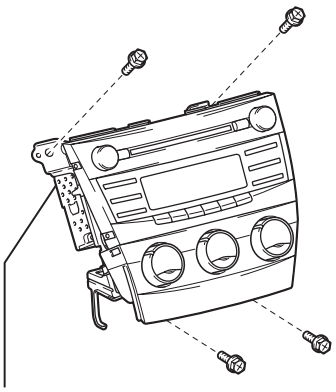

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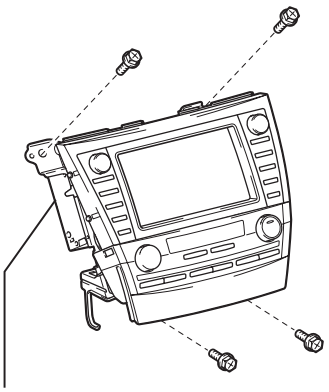
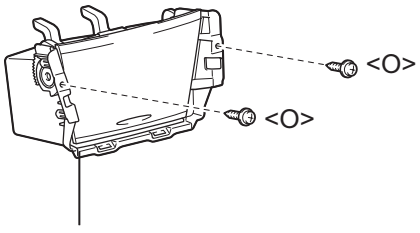


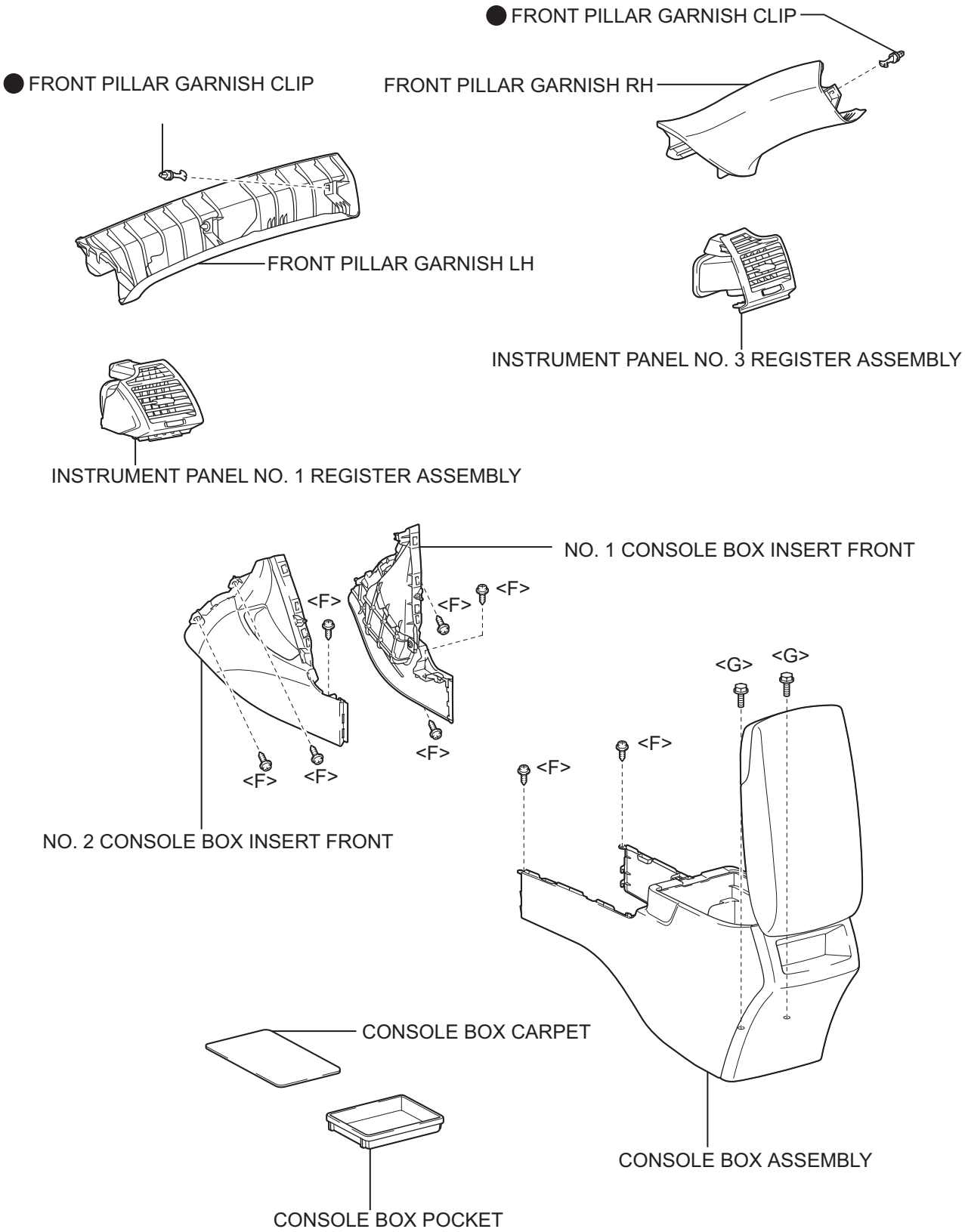


AV

P

B137284E03

for TMC Made:



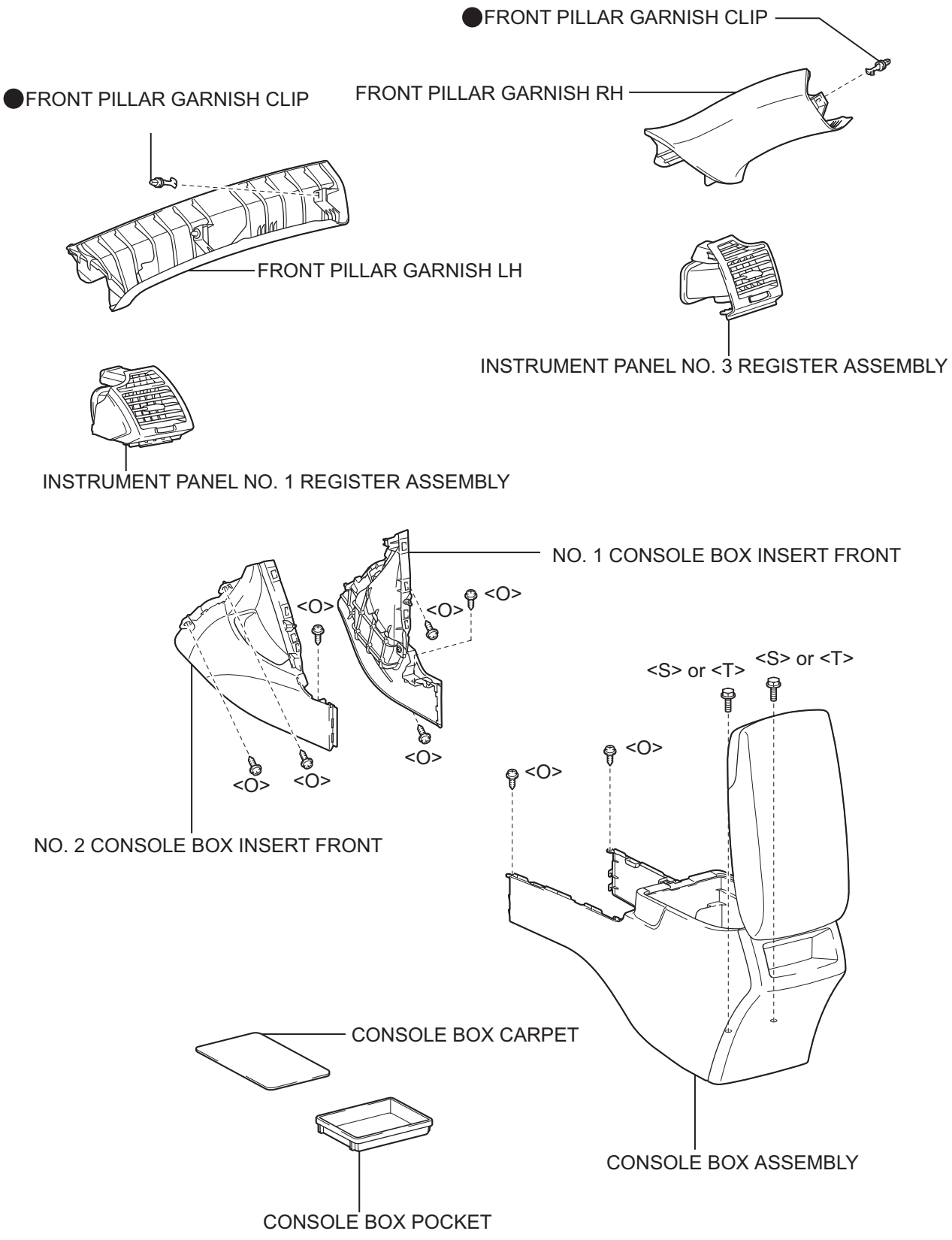
● Non-reusable part

P

B137285E01

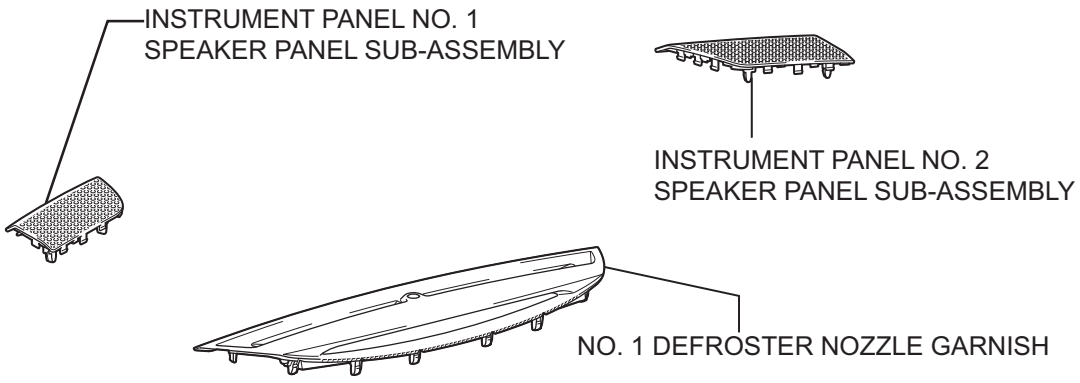
AV

for TMMK Made:

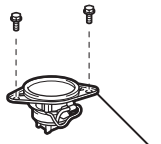


● Non-reusable part

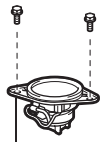
for TMC Made:

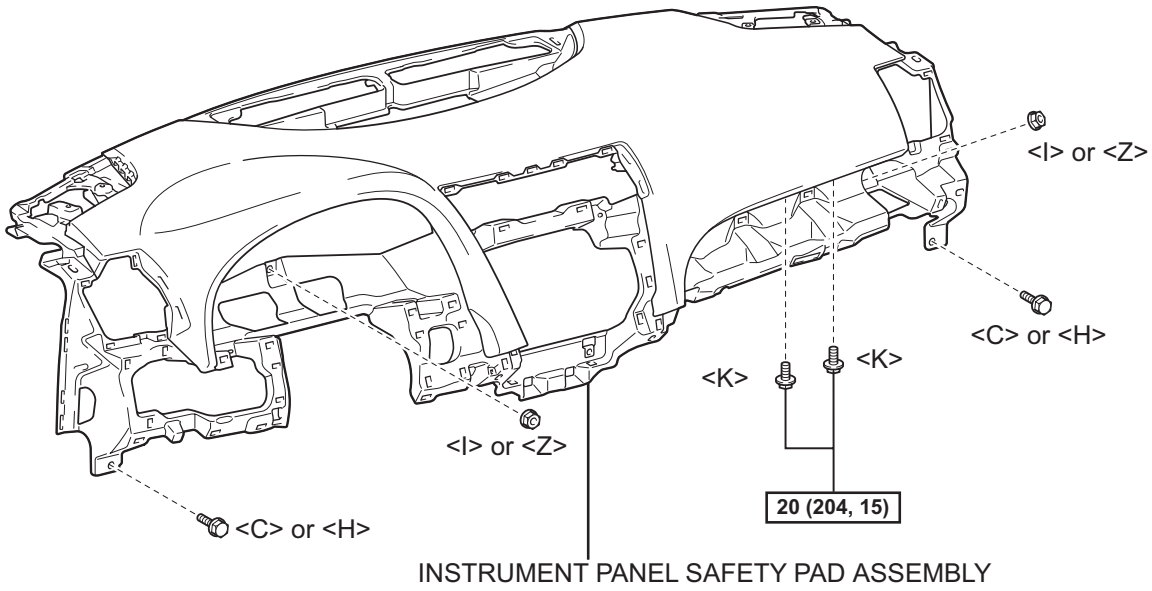


for LH Side:



for RH Side:





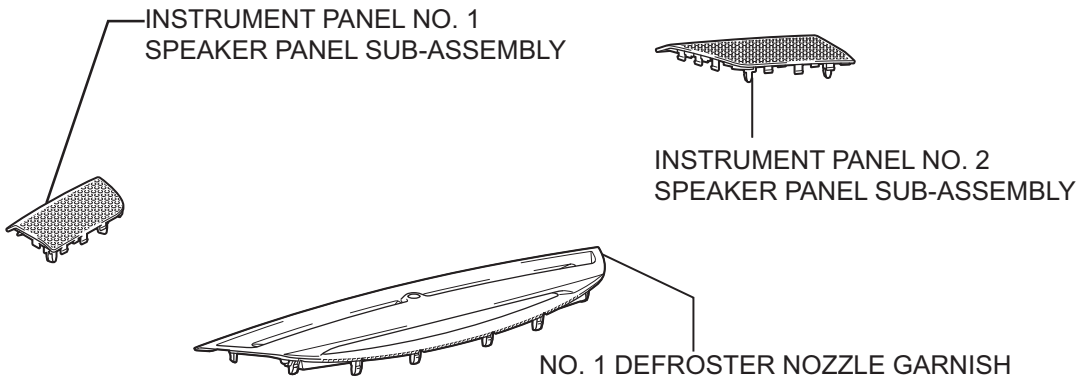
AV

N*m (kgf*cm, ft.*lbf) : Specified torque

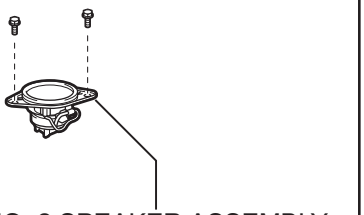
P

B137286E01

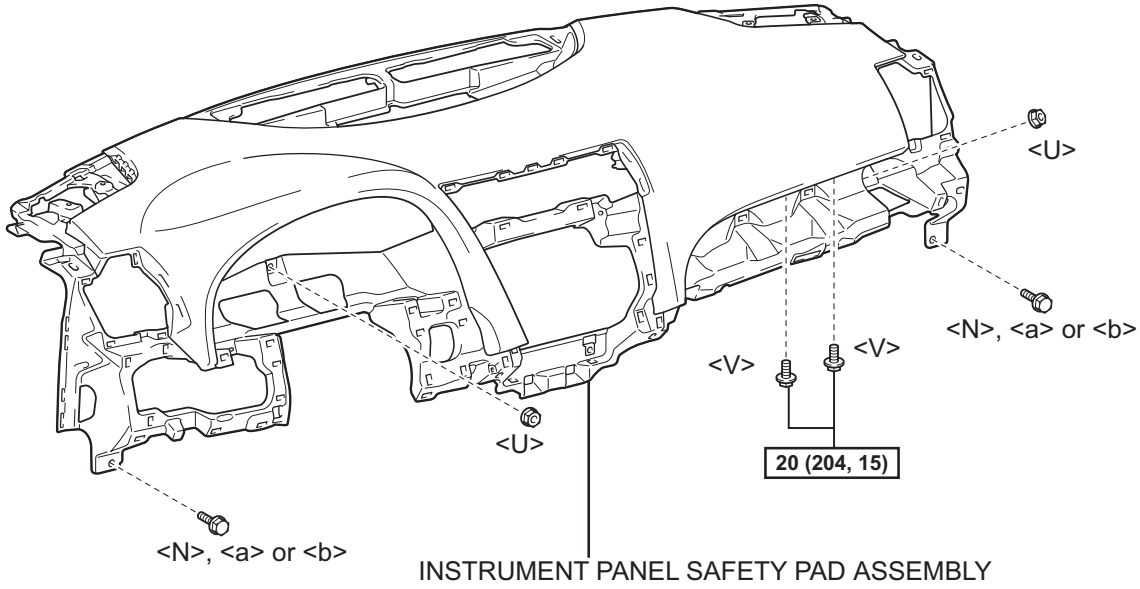
for TMMK Made:



for LH Side:



for RH Side:

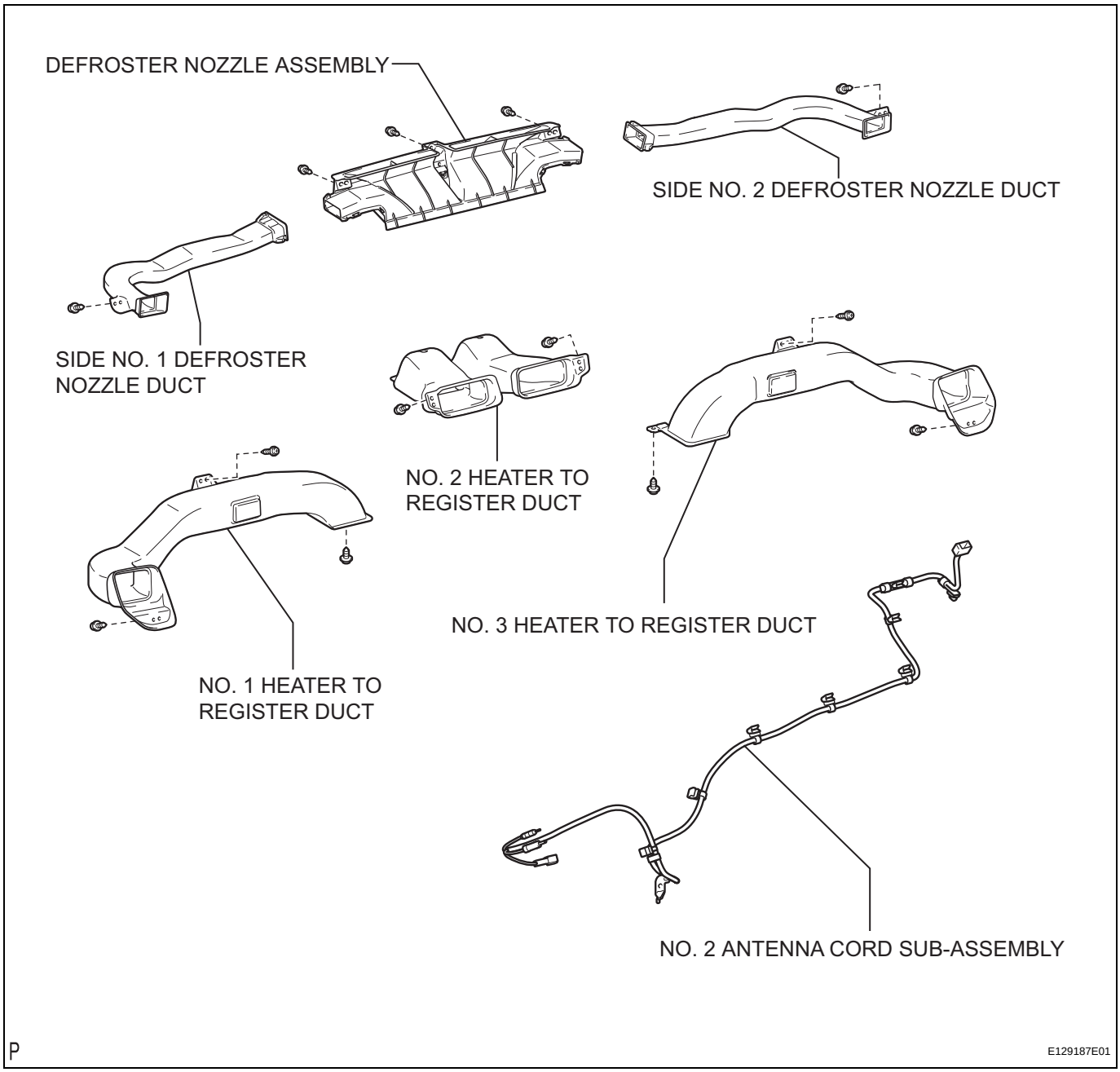


AV

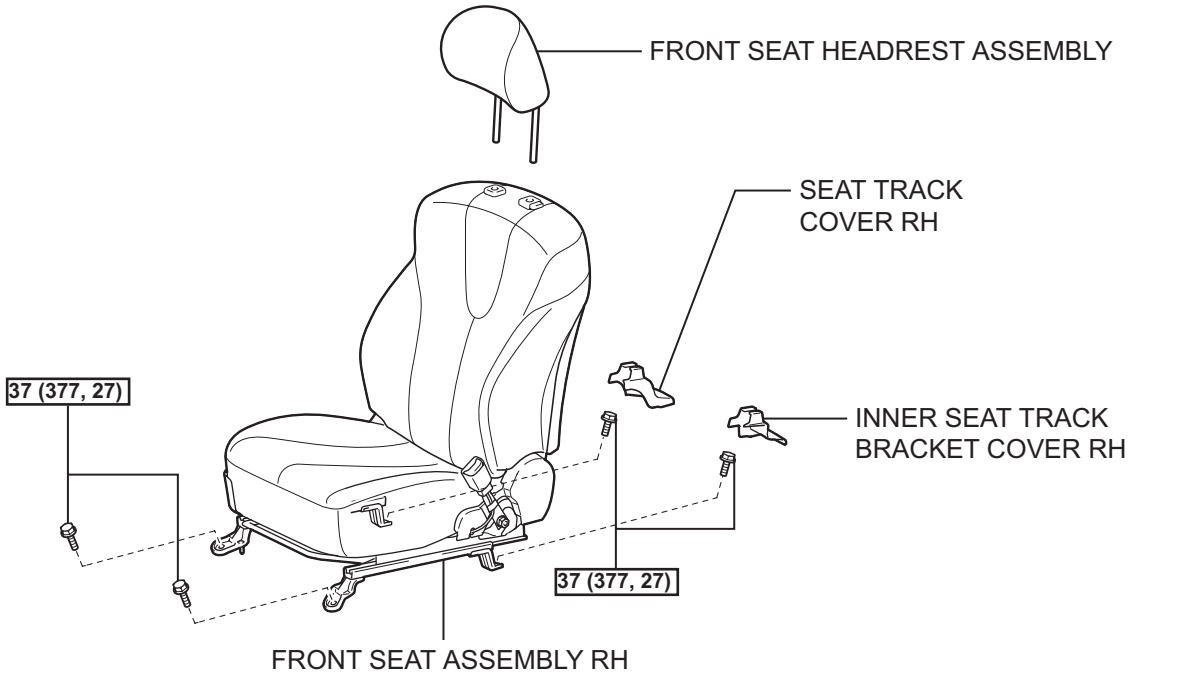
N*m (kgf*cm, ft.*lbf) : Specified torque

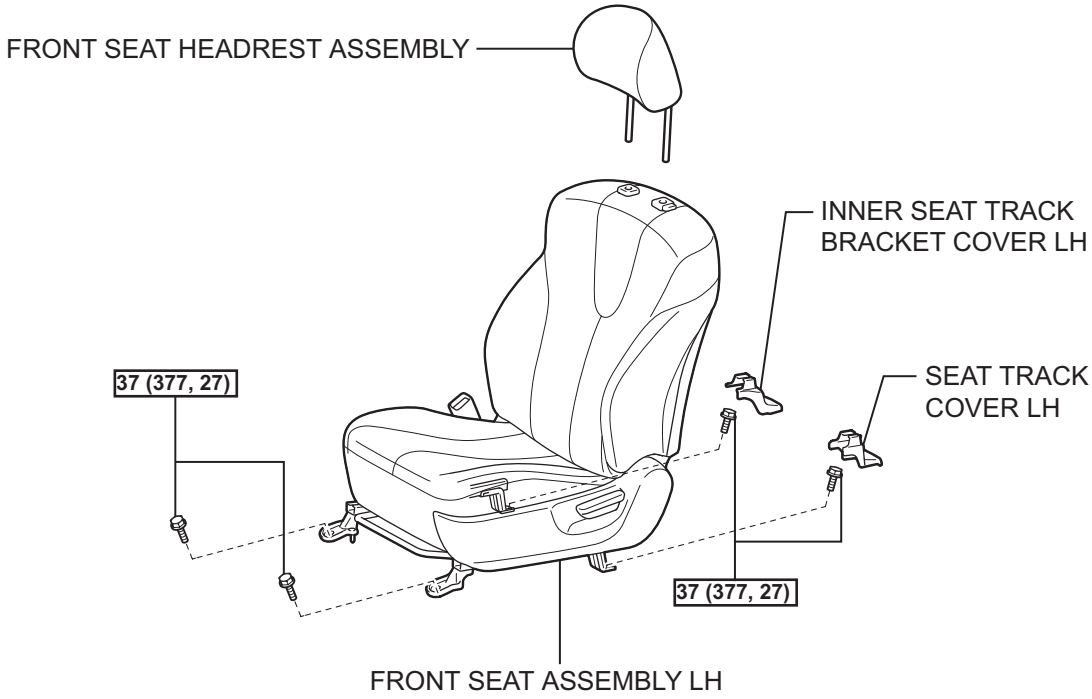
P

B137286E03


DEFROSTER NOZZLE ASSEMBLY
SIDE NO. 2 DEFROSTER NOZZLE DUCT
SIDE NO. 1 DEFROSTER NOZZLE DUCT
NO. 2 HEATER TO REGISTER DUCT
NO. 3 HEATER TO REGISTER DUCT
NO. 1 HEATER TO REGISTER DUCT
NO. 2 ANTENNA CORD SUB-ASSEMBLY
P
E129187E01

for Manual Seat:





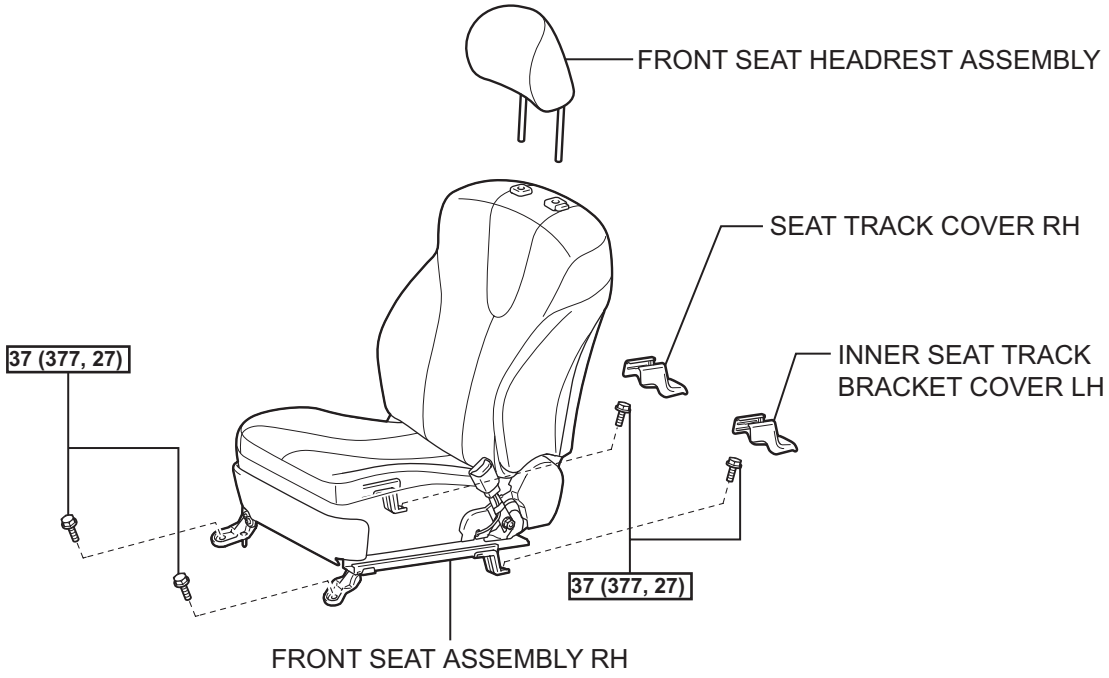
AV

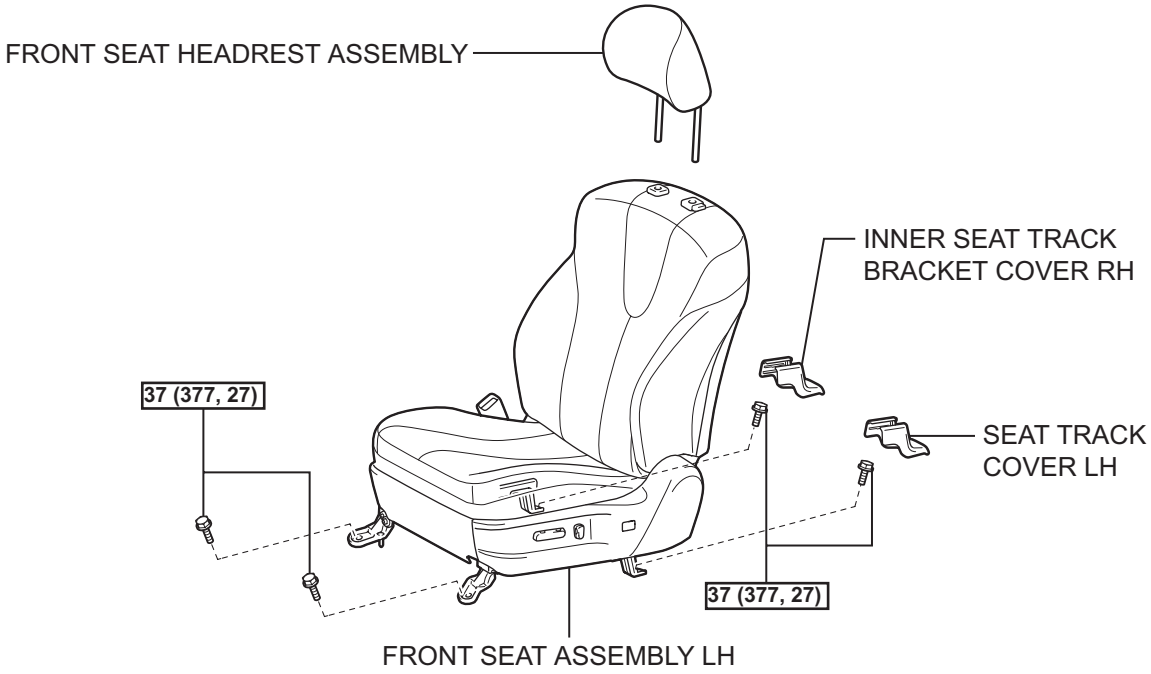
N*m (kgf*cm, ft.*lbf): Specified torque

P

B132048E01

for Power Seat:





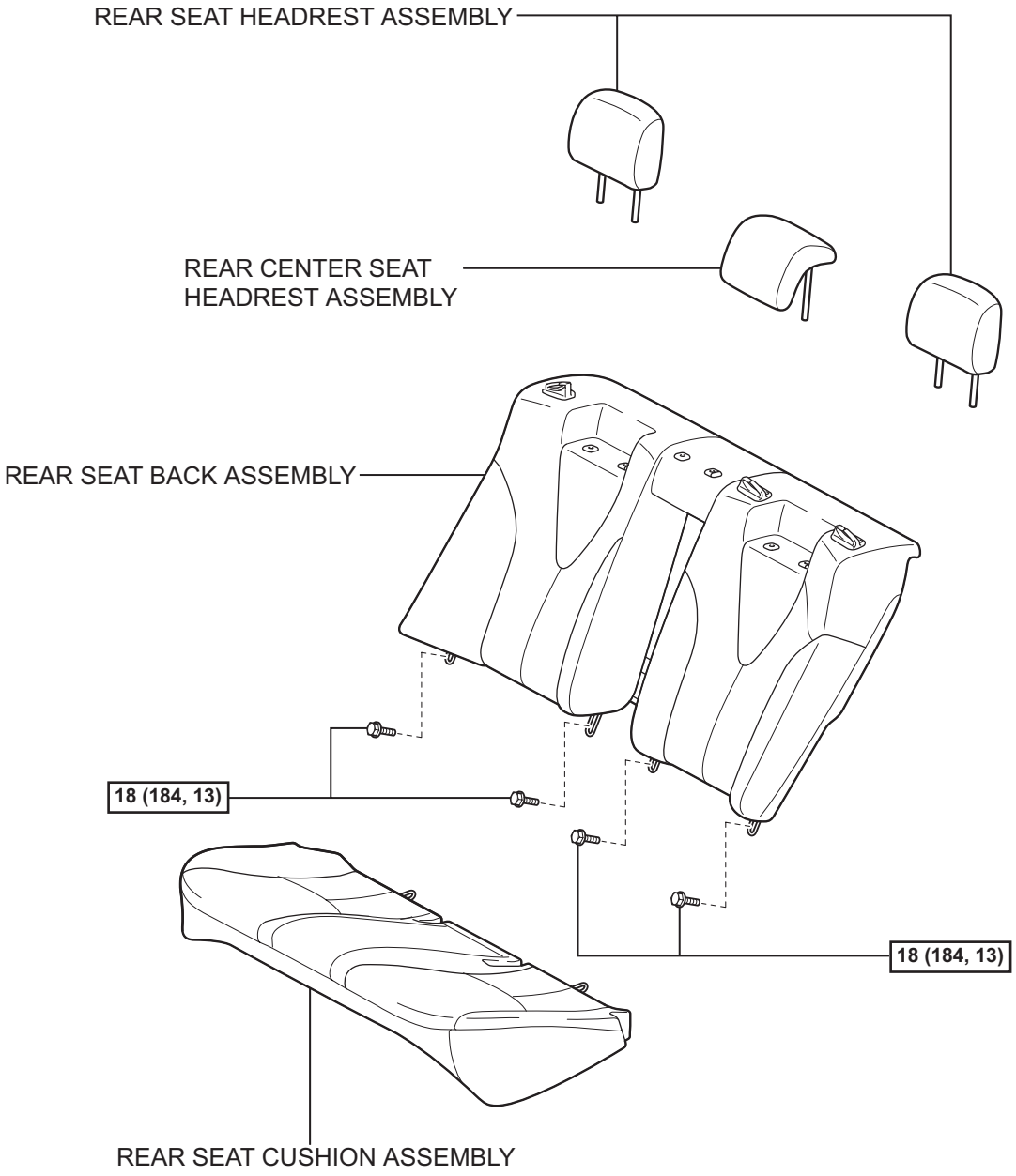
AV

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B132047E01

for Fixed Seat Type:



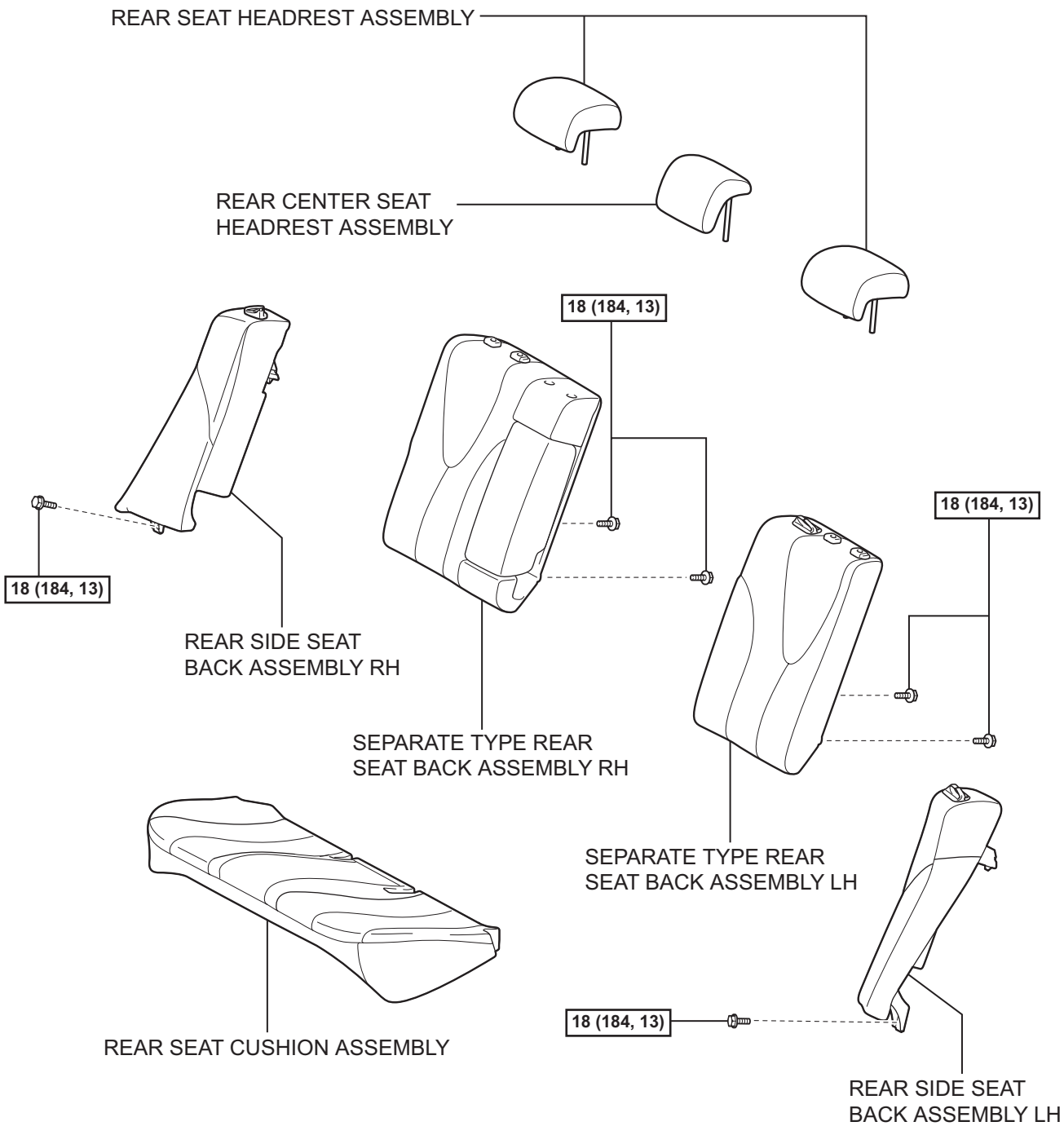
AV

N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

for Fold Down Seat Type:



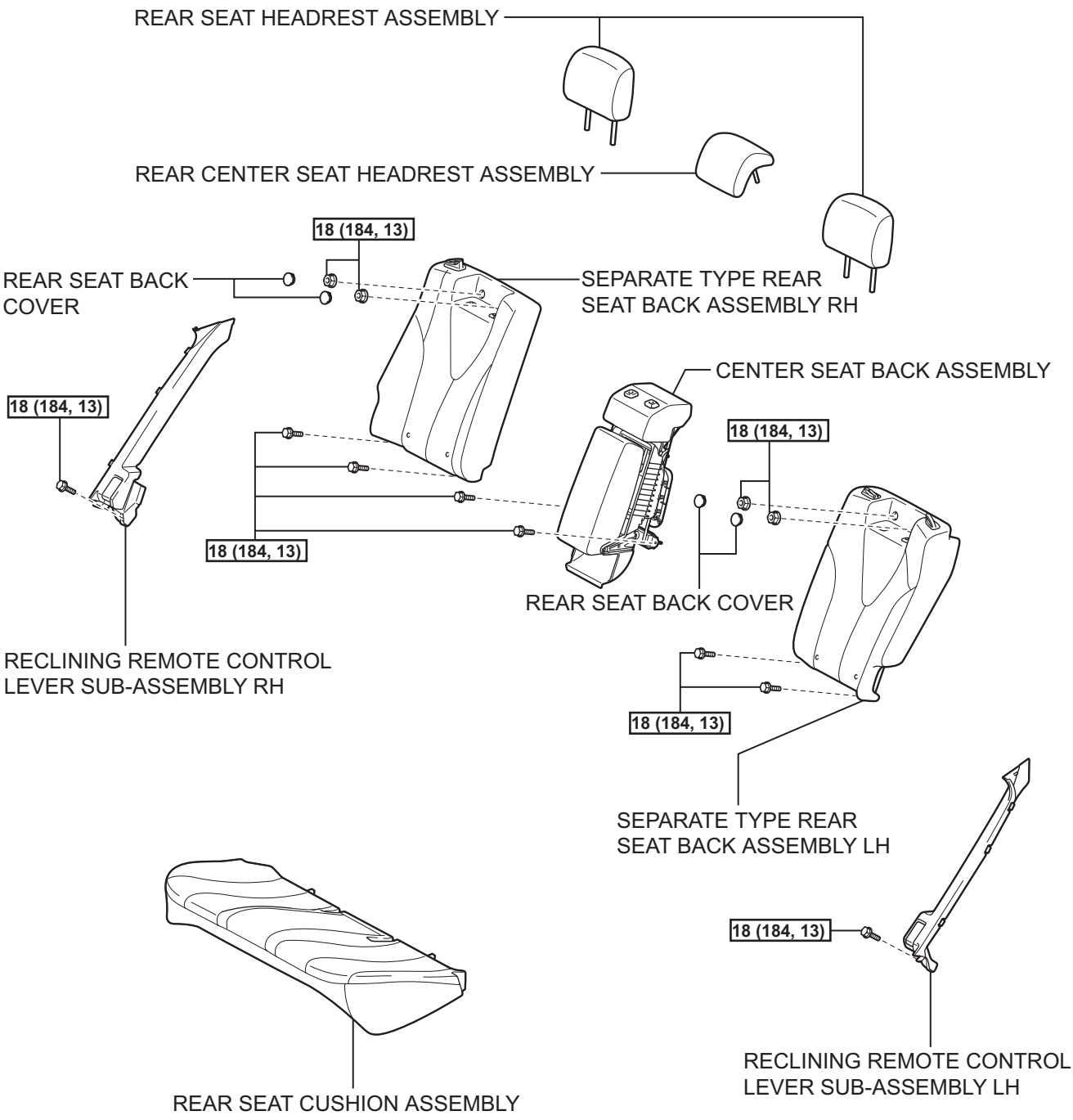
N*m (kgf*cm, ft.*lbf) : Specified torque

P

B136564E02

AV

for Reclining Seat Type:

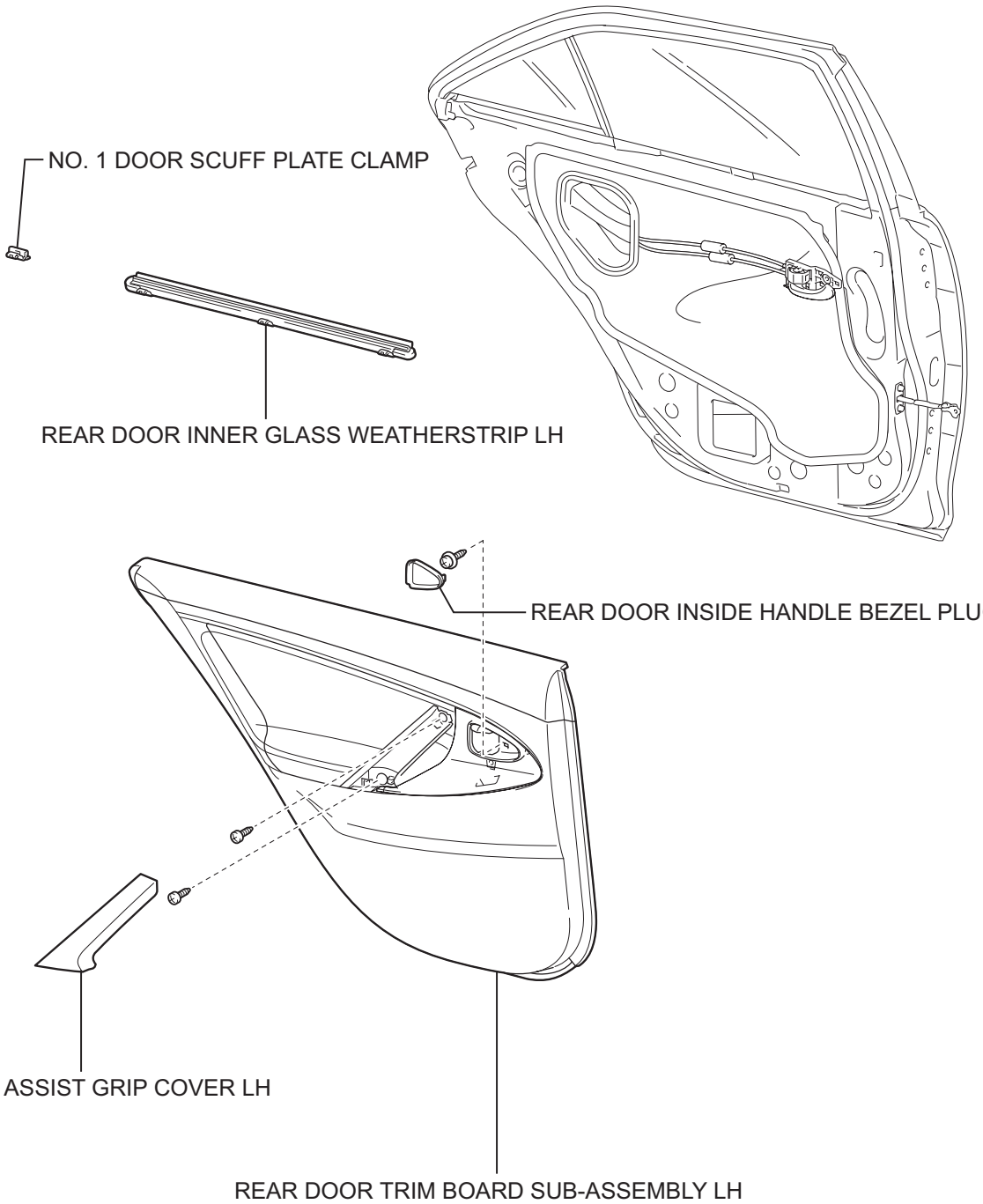


AV

N*m (kgf*cm, ft.*lbf): Specified torque

P

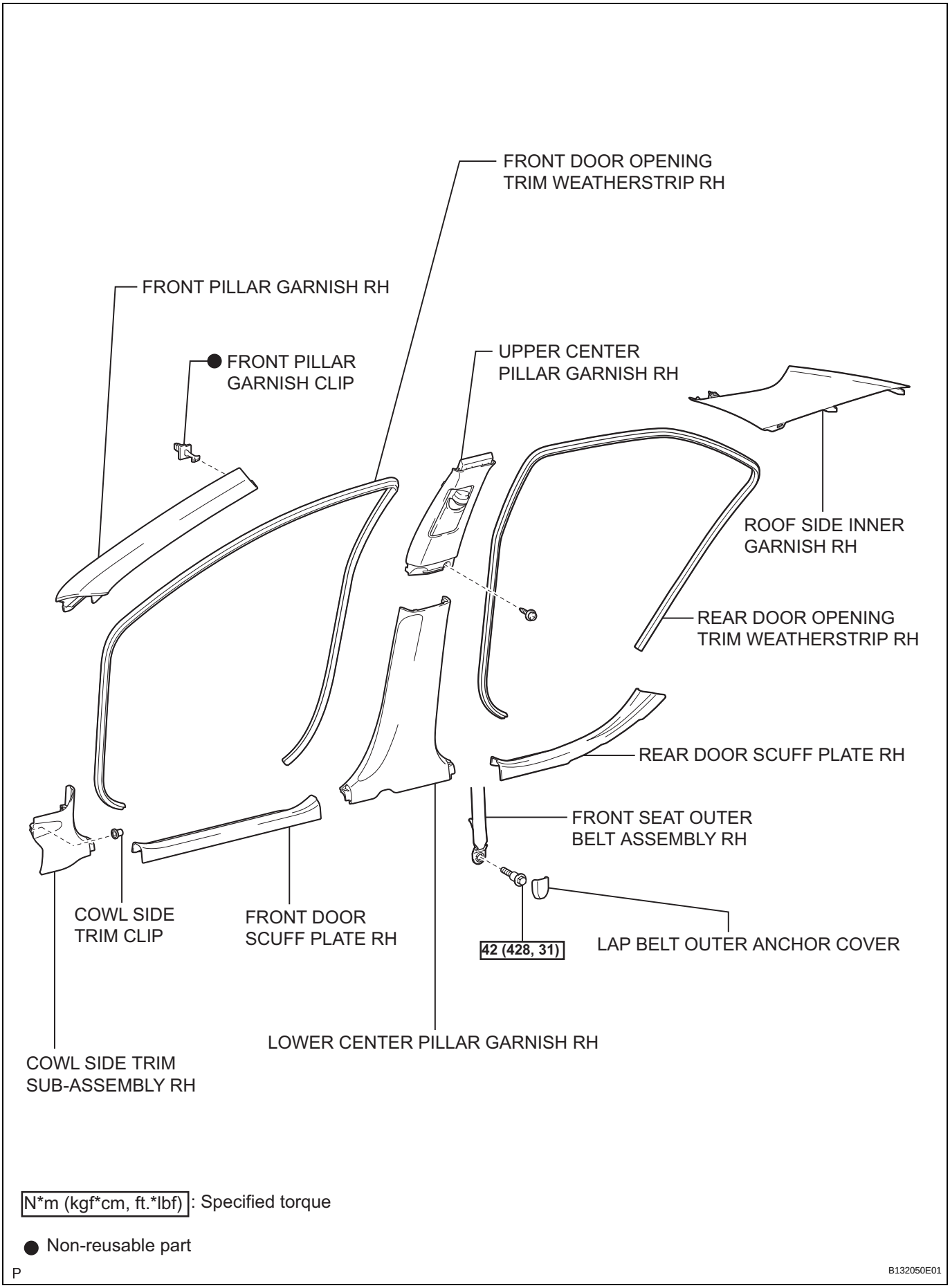
B139577E01



P

B139576E01

AV



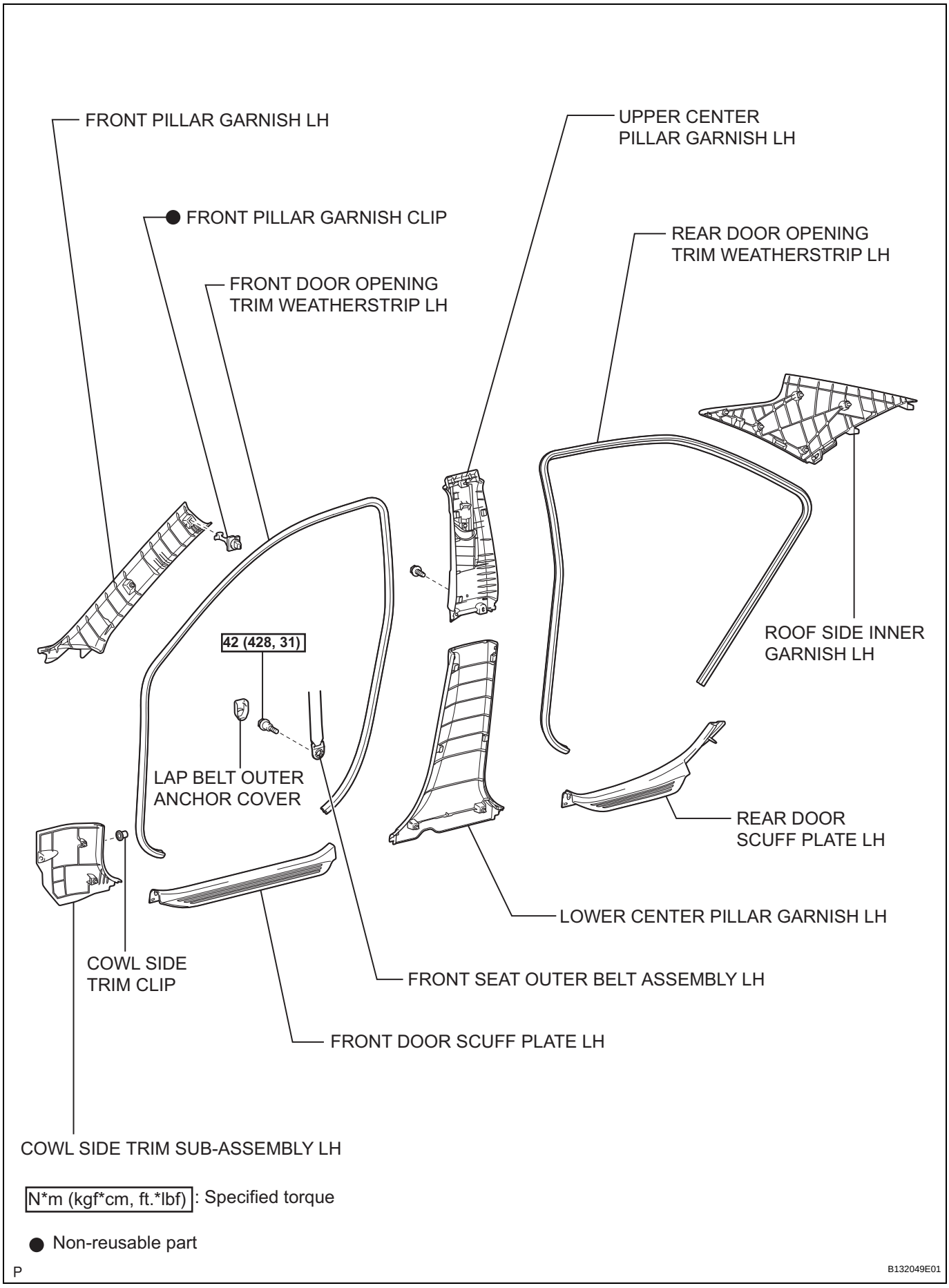
AV

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

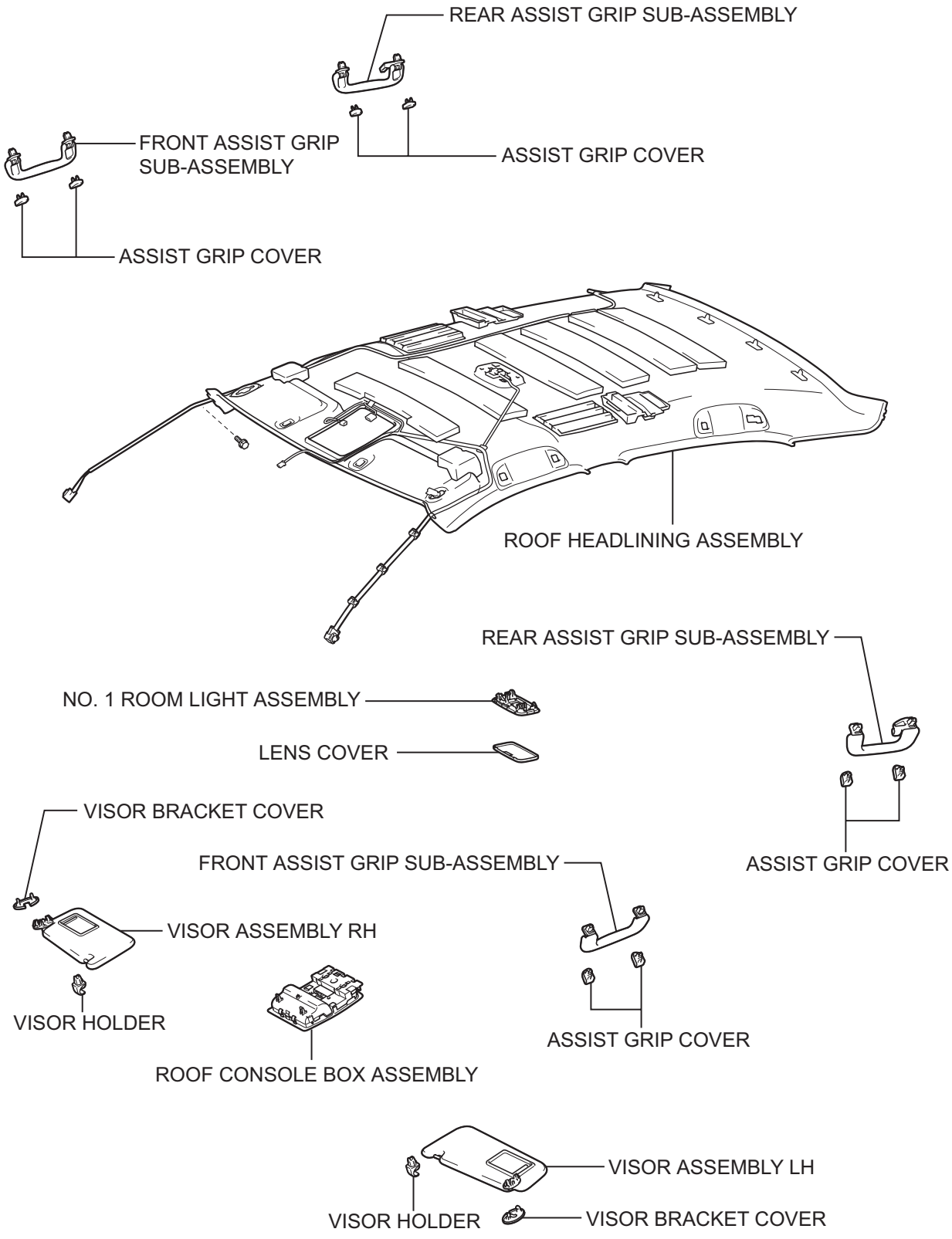
P

B132050E01


FRONT PILLAR GARNISH LH
UPPER CENTER PILLAR GARNISH LH
FRONT PILLAR GARNISH CLIP
REAR DOOR OPENING TRIM WEATHERSTRIP LH
FRONT DOOR OPENING TRIM WEATHERSTRIP LH
ROOF SIDE INNER GARNISH LH
42 (428, 31)
LAP BELT OUTER ANCHOR COVER
REAR DOOR SCUFF PLATE LH
LOWER CENTER PILLAR GARNISH LH
COWL SIDE TRIM CLIP
FRONT SEAT OUTER BELT ASSEMBLY LH
FRONT DOOR SCUFF PLATE LH
COWL SIDE TRIM SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
P
B132049E01

AV

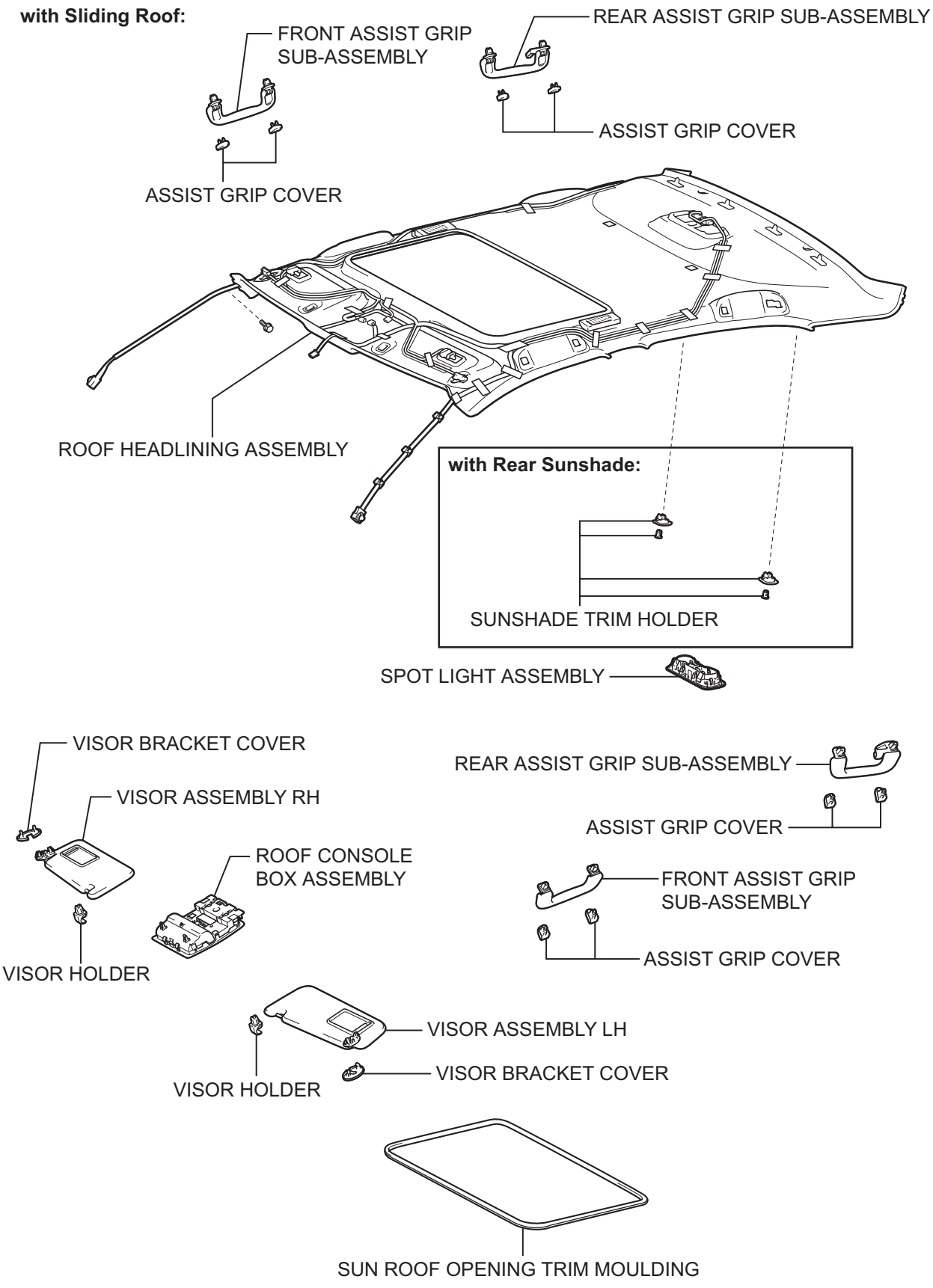
without Sliding Roof:



AV

P

B132051E01

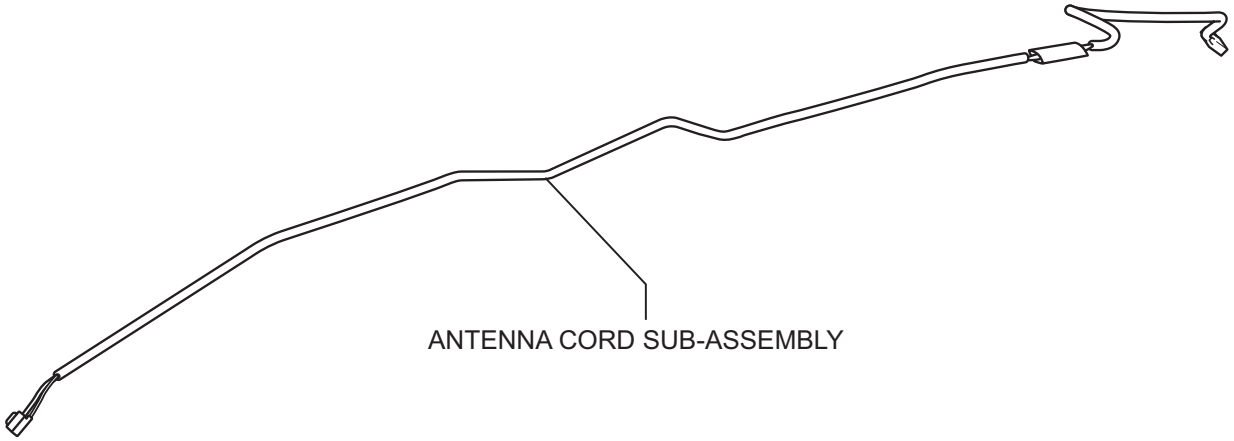


P

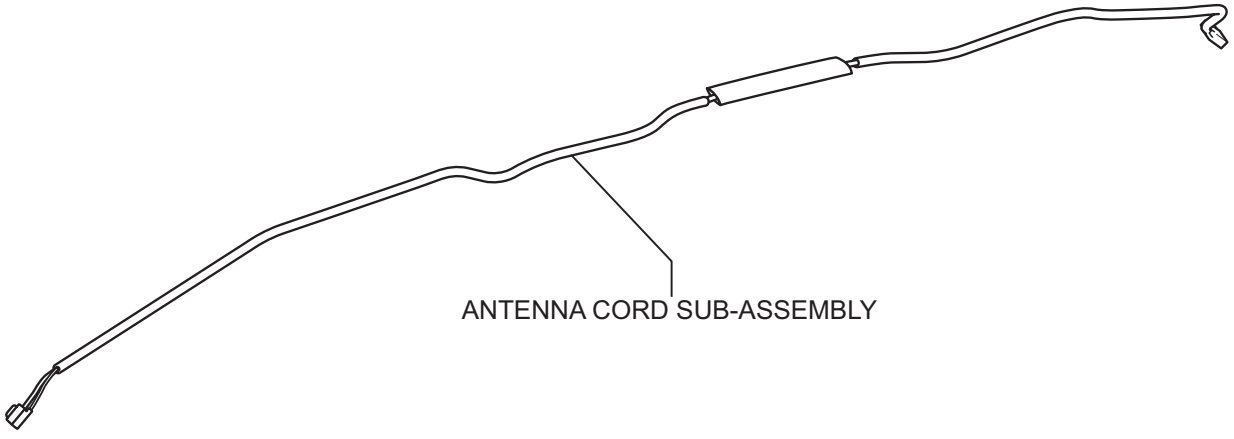
B132052E01

AV

without Sliding Roof:



with Sliding Roof:



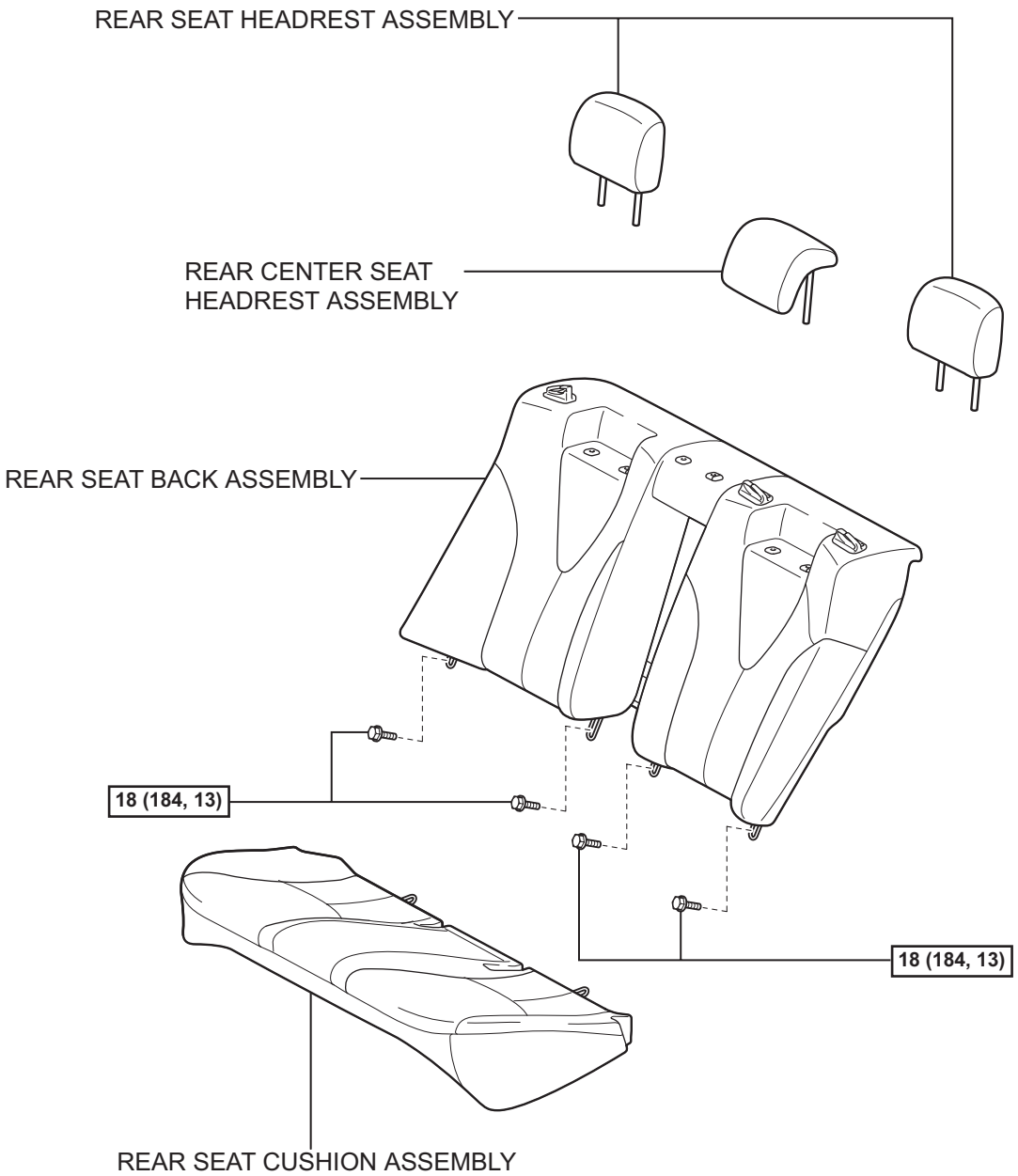
P

E129189E01

AMPLIFIER ANTENNA

COMPONENTS

for Fixed Seat Type:



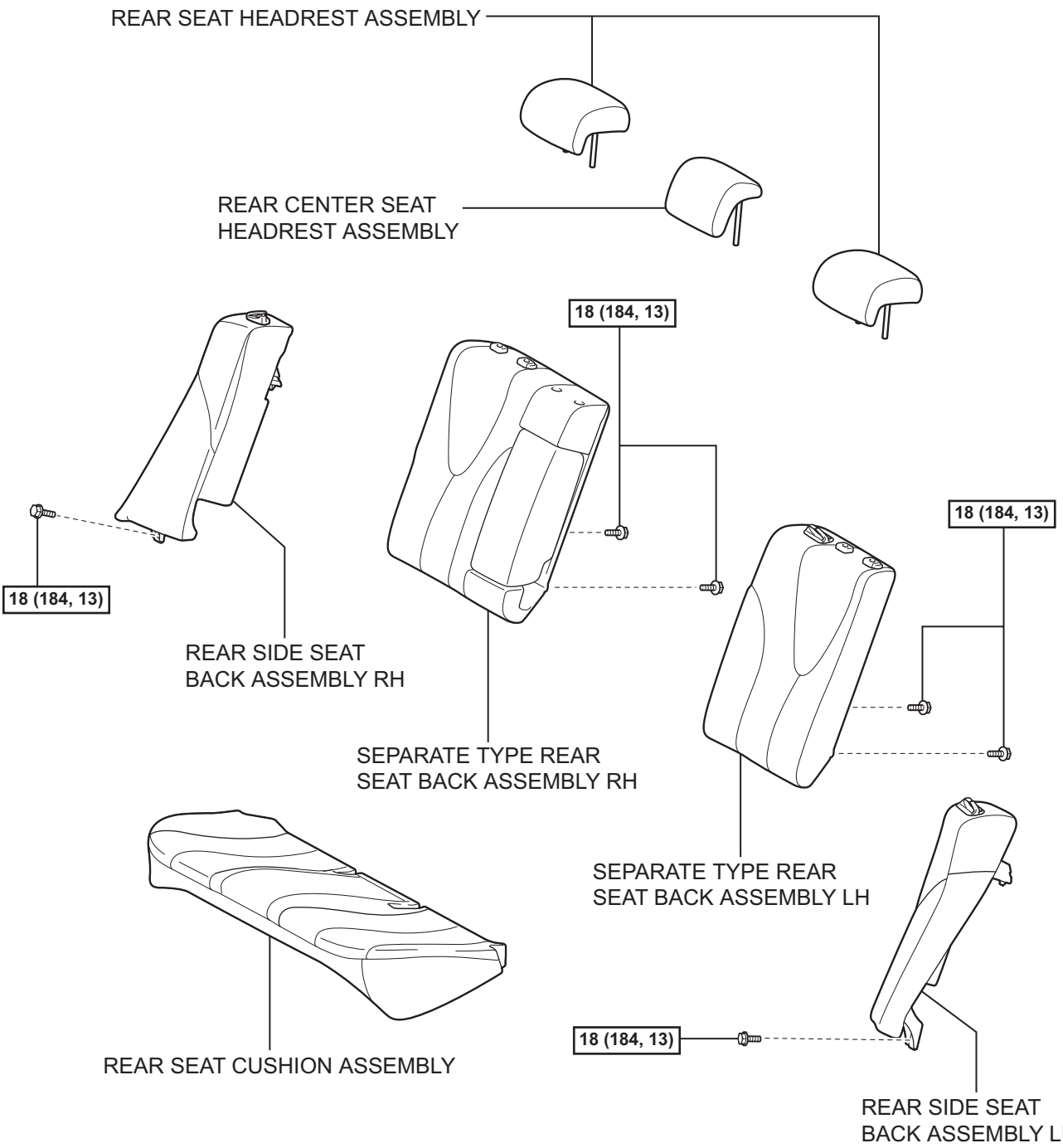
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

AV

for Fold Down Seat Type:



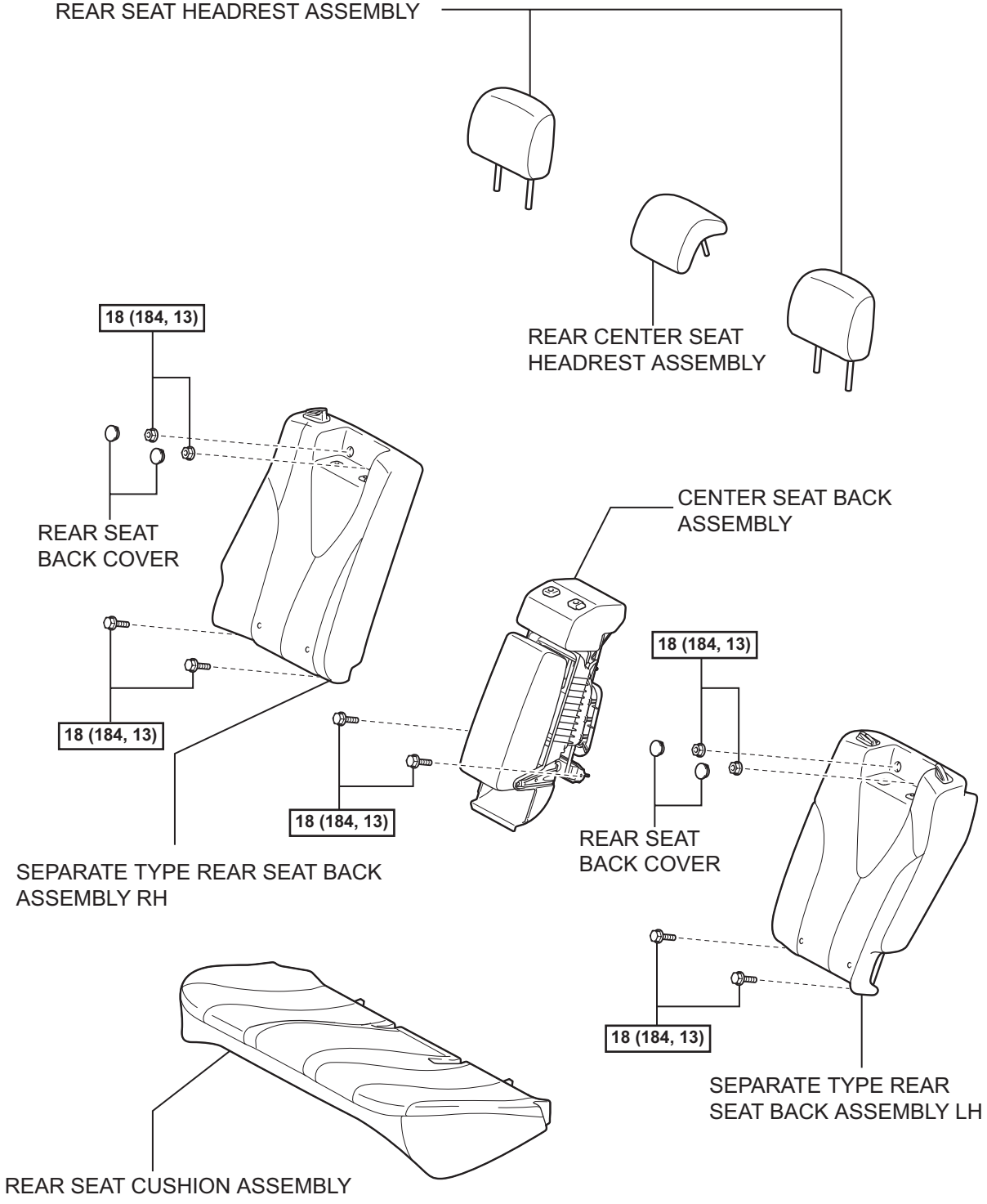
AV

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B136564E02

for Reclining Seat Type:

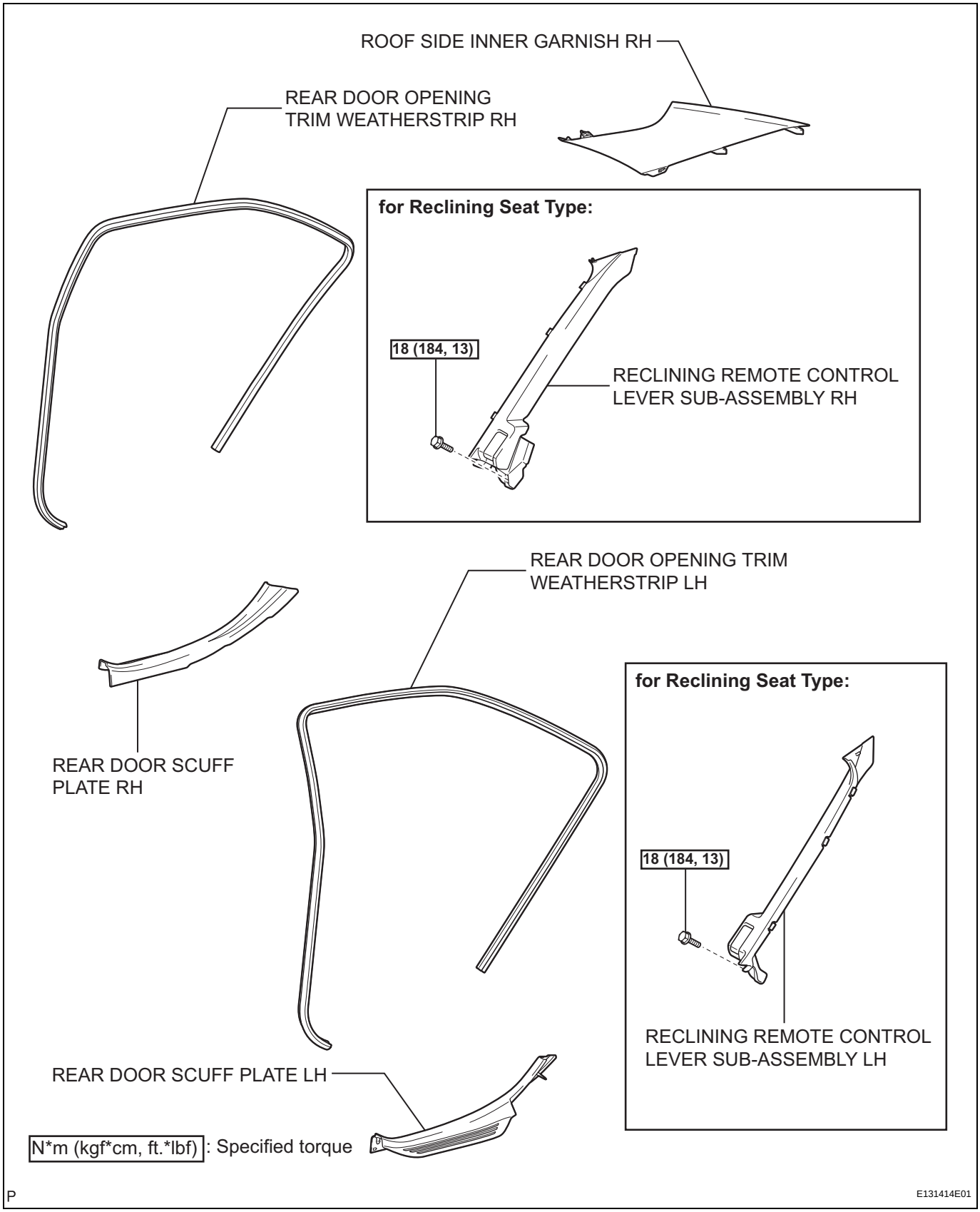


N*m (kgf*cm, ft.*lbf) : Specified torque

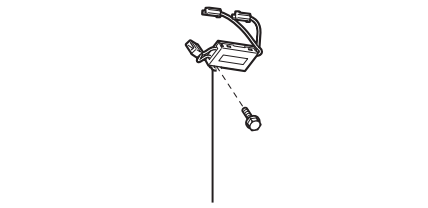
P

B139095E03

AV

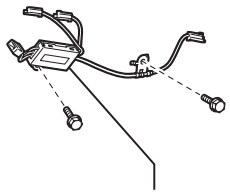

ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
REAR DOOR SCUFF PLATE RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
E131414E01

AV



AMPLIFIER ANTENNA ASSEMBLY

for Premium Audio System:



AMPLIFIER ANTENNA ASSEMBLY

P

E129976E01

REMOVAL

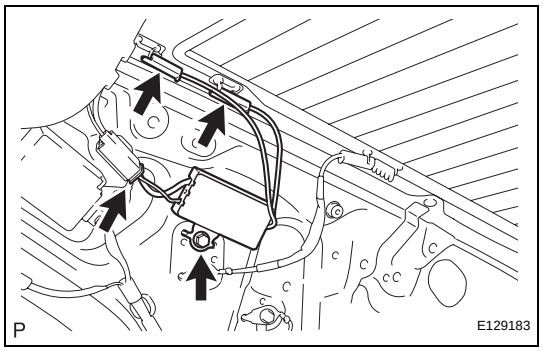
1. **REMOVE REAR SEAT HEADREST ASSEMBLY**
2. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-62)**
4. **REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
5. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)**
6. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)**
7. **REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)**
8. **REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)**
9. **REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)**
10. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)**
11. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)**
12. **REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)**
13. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)**
14. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (for Reclining Seat Type)**
15. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)**
16. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (for Reclining Seat Type)**
17. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)**
18. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
19. **REMOVE ROOF SIDE INNER GARNISH RH**
    HINT:
    Use the same procedures for the RH side and the LH side (see page IR-26).

20. REMOVE AMPLIFIER ANTENNA ASSEMBLY

(a) Disconnect each connector.

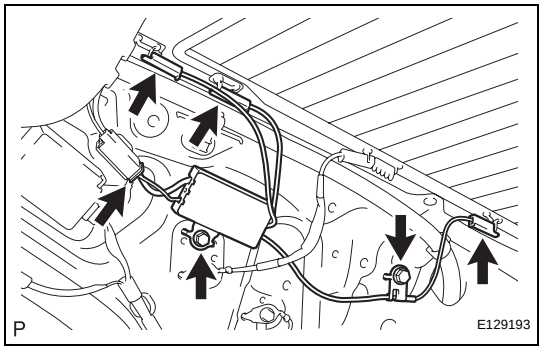
(b) Standard audio system:

(1) Remove the bolt and amplifier antenna assembly.



(c) Premium audio system:

(1) Remove the 2 bolts and amplifier antenna assembly.

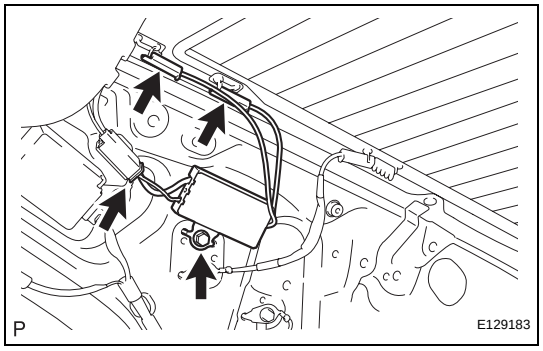


INSTALLATION

1. INSTALL AMPLIFIER ANTENNA ASSEMBLY

(a) Standard audio system:

(1) Install the amplifier antenna assembly with the bolt.



(b) Premium audio system:

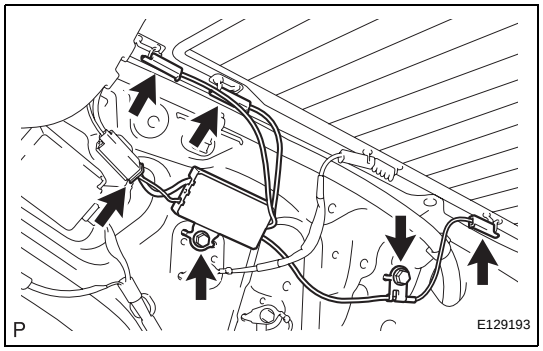
(1) Install the amplifier antenna assembly with the 2 bolts.

(c) Connect each connector.

2. INSTALL ROOF SIDE INNER GARNISH RH

HINT:

Use the same procedures for the RH side and the LH side (see page IR-52).



3. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)

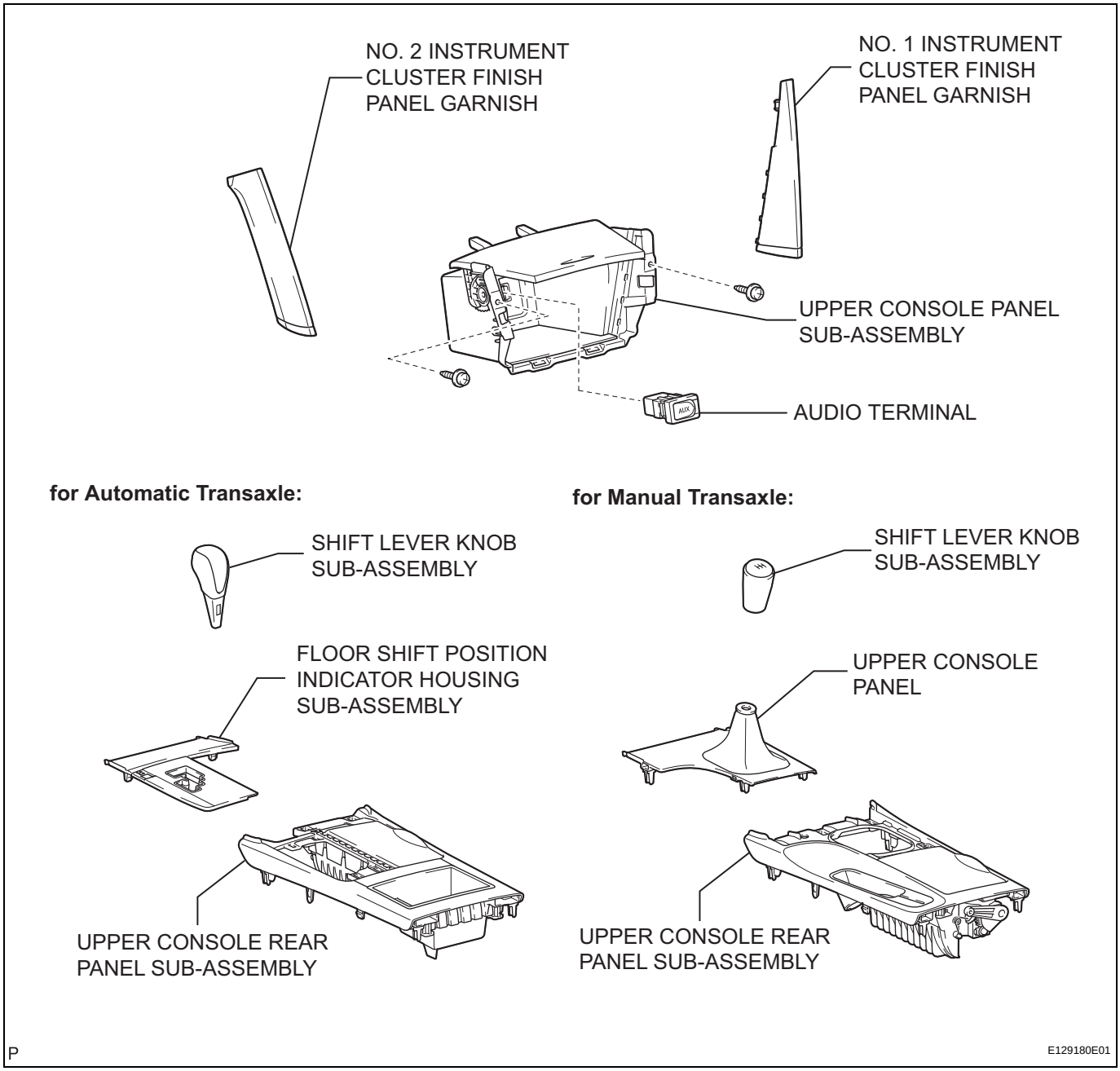
4. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type) (See page SB-53)

5. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (for Reclining Seat Type) (See page IR-55)

6. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**
7. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (for Reclining Seat Type) (See page IR-56)**
8. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**
9. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**
10. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**
11. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
12. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
13. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
14. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
15. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
16. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
17. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
18. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
19. **INSTALL REAR SEAT HEADREST ASSEMBLY**
20. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-58)**

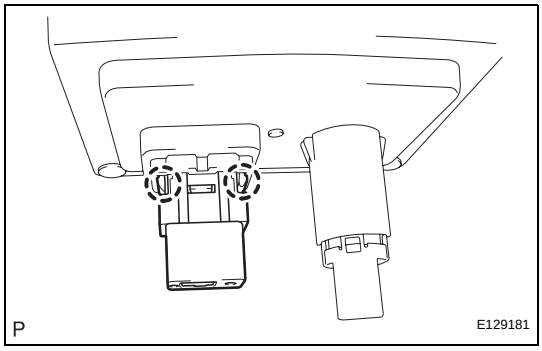
AUDIO TERMINAL

COMPONENTS



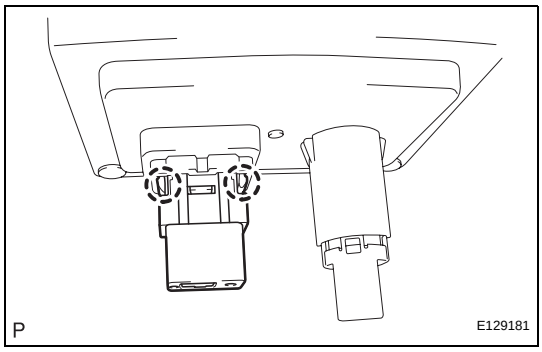
REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
4. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
5. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
6. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
7. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
8. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
9. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-27)**
10. **REMOVE AUDIO TERMINAL**
    (a) Disengage the 2 claws and remove the audio terminal.



INSTALLATION

1. **INSTALL AUDIO TERMINAL**
   (a) Engage the 2 claws and install the audio terminal.
2. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-52)**
3. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
4. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
5. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
6. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**

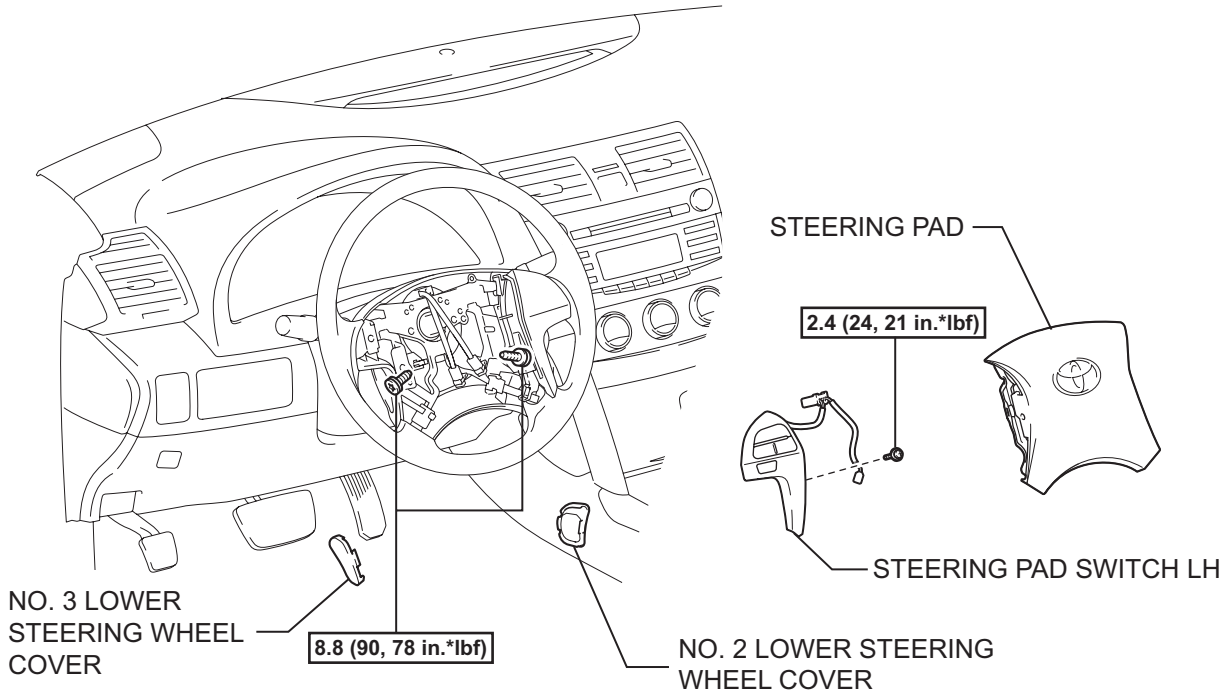


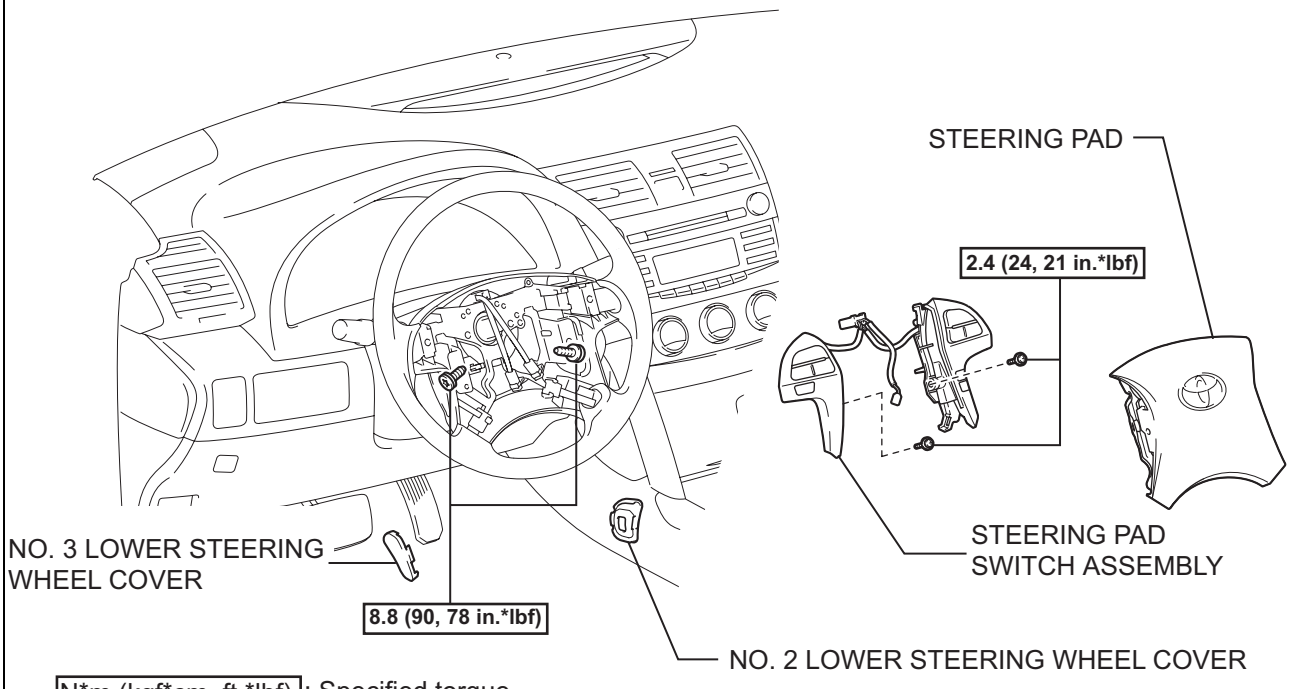
7. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
8. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
9. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
10. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**

STEERING PAD SWITCH

COMPONENTS

for 4 Spoke:





N*m (kgf*cm, ft.*lbf): Specified torque

P

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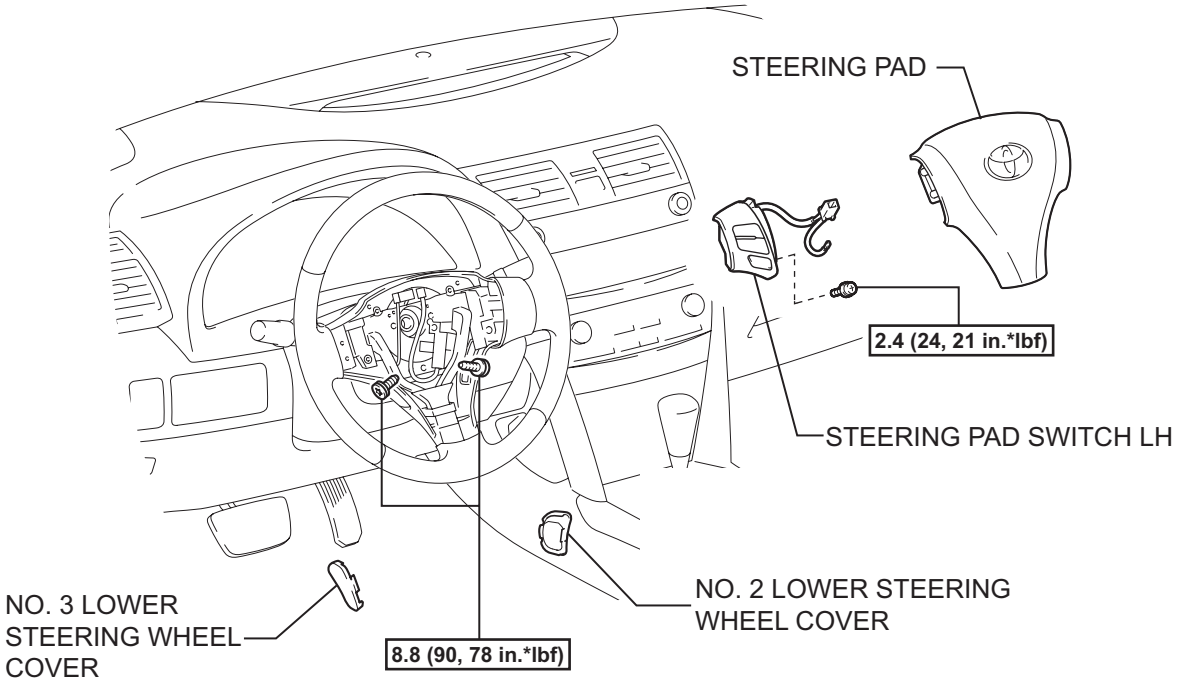
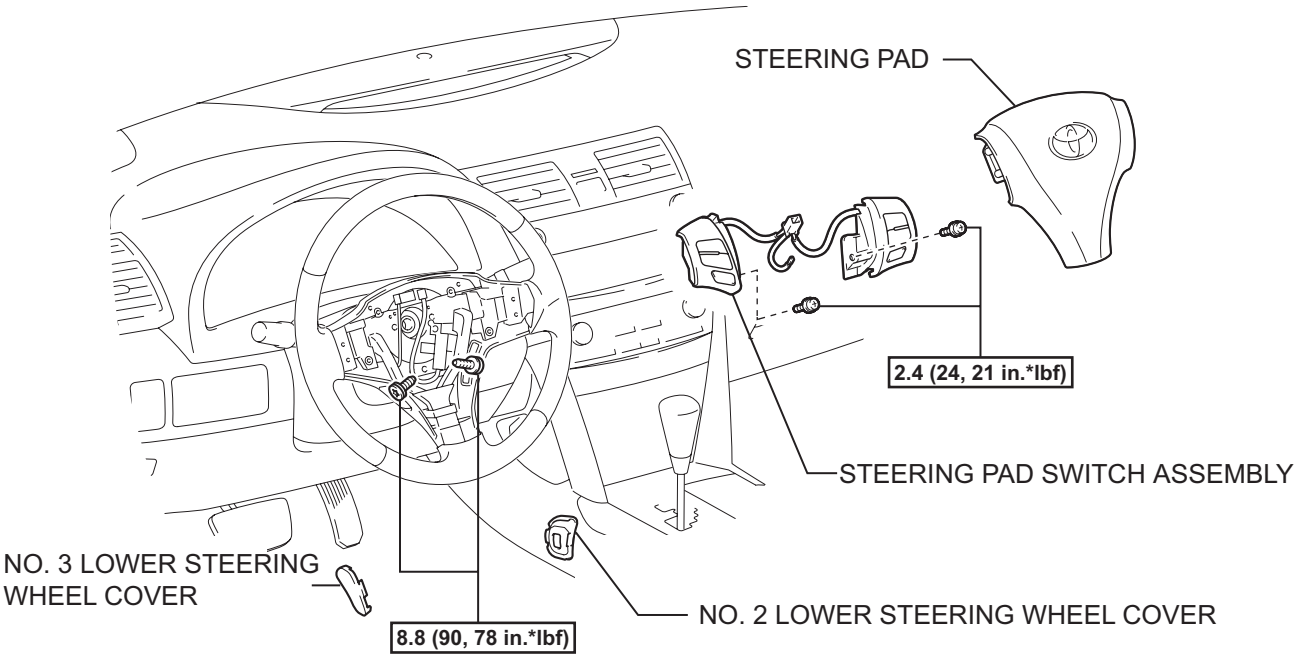
AV

for 3 Spoke:





N*m (kgf*cm, ft.*lbf): Specified torque

P

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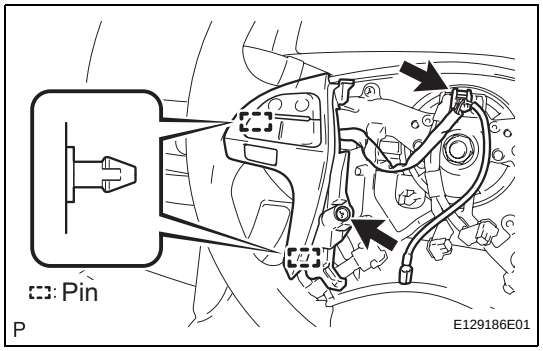
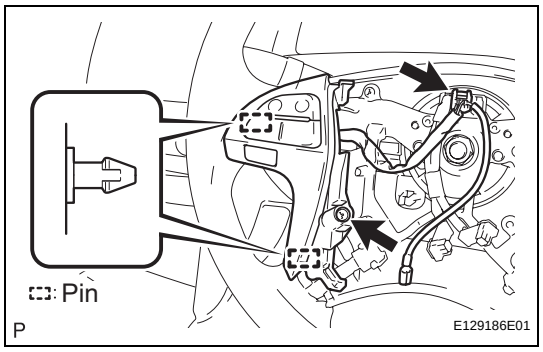
AV

REMOVAL

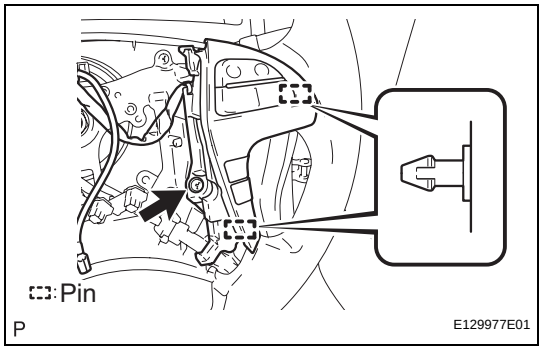
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent the airbag working.
2. **REMOVE NO. 3 LOWER STEERING WHEEL COVER (See page RS-349)**
3. **REMOVE NO. 2 LOWER STEERING WHEEL COVER (See page RS-349)**
4. **REMOVE STEERING PAD (See page RS-350)**
5. **REMOVE STEERING PAD SWITCH LH (for 4 Spoke)**
   (a) Disconnect the pad switch connector from the spiral cable.
   (b) Remove the screw.
   (c) Disengage the 2 pins and remove the steering pad switch LH.

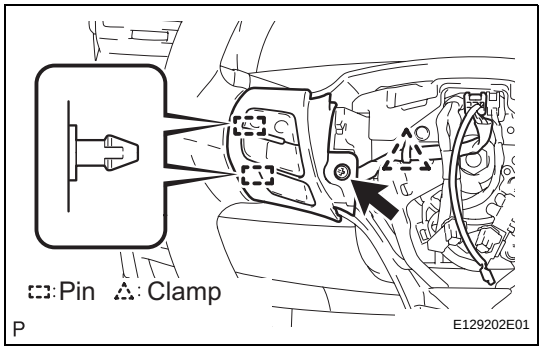


6. **REMOVE STEERING PAD SWITCH ASSEMBLY (for 4 Spoke)**
   (a) Disconnect the pad switch connector from the spiral cable.
   (b) Remove the screw.
   (c) Disengage the 2 pins and remove the steering pad switch.



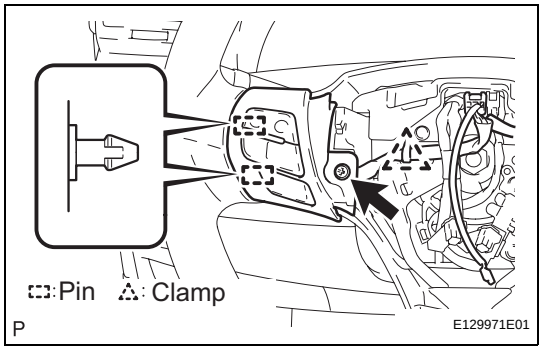
   (d) Remove the screw.
   (e) Disengage the 2 pins and remove the steering pad switch assembly.





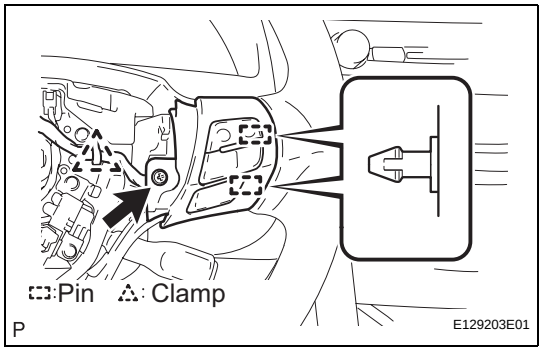
7. REMOVE STEERING PAD SWITCH LH (for 3 Spoke)

(a) Disconnect the pad switch connector from the spiral cable and disengage the clamp.
(b) Remove the screw.
(c) Disengage the 2 pins and remove the steering pad switch LH.



8. REMOVE STEERING PAD SWITCH ASSEMBLY (for 3 Spoke)

(a) Disconnect the pad switch connector from the spiral cable.
(b) Disengage the clamp and remove the screw.
(c) Disengage the 2 pins and remove the steering pad switch.



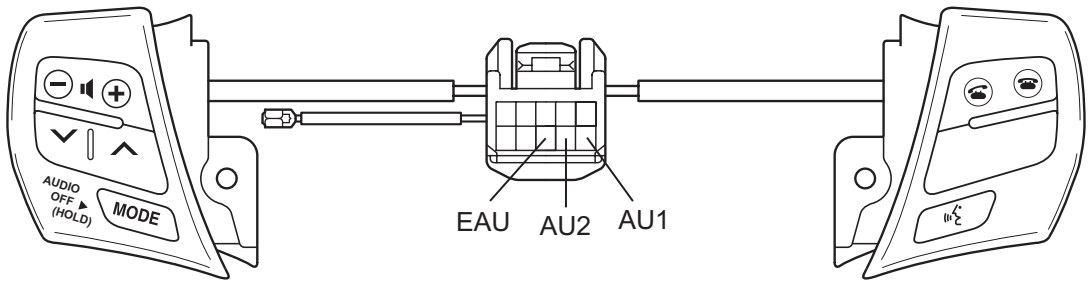
(d) Disengage the clamp and remove the screw.
(e) Disengage the 2 pins and remove the steering pad switch assembly.

INSPECTION

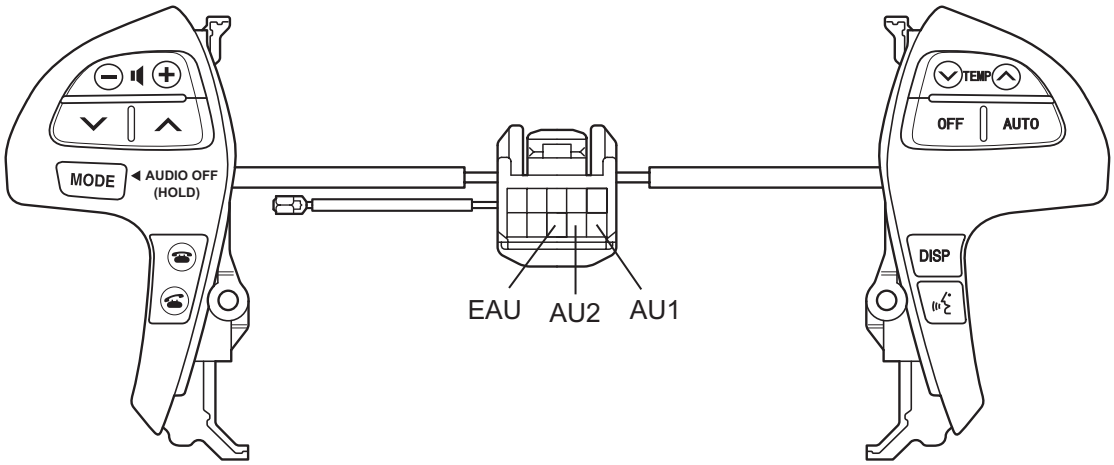
1. INSPECT STEERING PAD SWITCH

(a) Disconnect the steering pad switch assembly connector.

3 Spoke Model:



4 Spoke Model:



P

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(b) Measure the resistance according to the values in the table below.

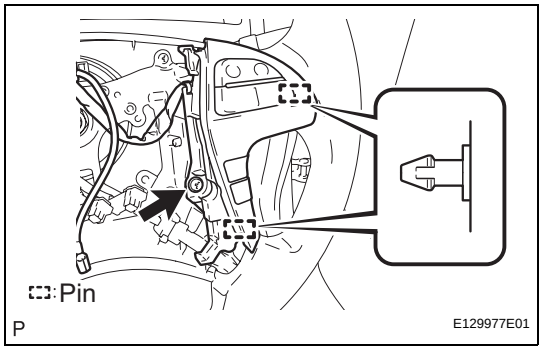
AV

Standard resistance

Tester connection	Condition	Specified condition
AU1 - EAU	No switch is pushed	Approx. 100 kΩ
AU1 - EAU	SEEK+ switch: push	0 to 2.5 Ω
AU1 - EAU	SEEK- switch: push	Approx. 0.3 kΩ
AU1 - EAU	VOL+ switch: push	Approx. 1 kΩ
AU1 - EAU	VOL- switch: push	Approx. 3.1 kΩ
AU2 - EAU	No switch is pushed	Approx. 100 kΩ

Tester connection	Condition	Specified condition
AU2 - EAU	MODE switch: push	0 to 2.5 Ω
AU2 - EAU	VOICE switch: push (*1)	Approx. 3.1 kΩ
AU2 - EAU	ON HOOK switch: push (*2)	Approx. 0.3 kΩ
AU2 - EAU	OFF HOOK switch: push (*2)	Approx. 1 kΩ

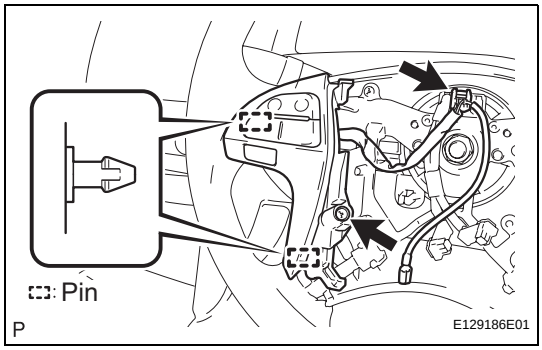
*1: with Navigation System
*2: with "Bluetooth" Module
If the result is not as specified, replace the steering pad switch.



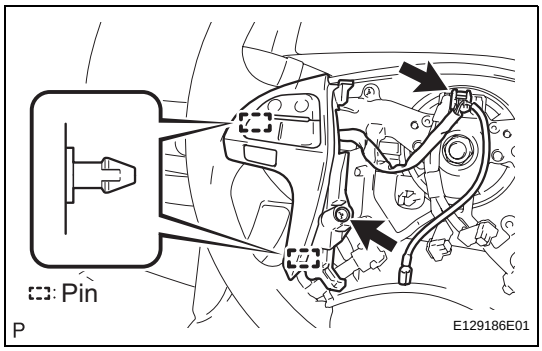
INSTALLATION

1. INSTALL STEERING PAD SWITCH ASSEMBLY (for 4 Spoke)

(a) Engage the 2 pins and install the steering pad switch assembly.
(b) Install the screw.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)

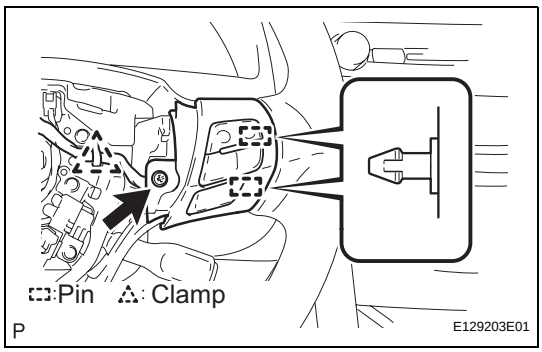


(c) Engage the 2 pins and install the steering pad switch assembly.
(d) Install the screw.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(e) Connect the connector to the spiral cable.



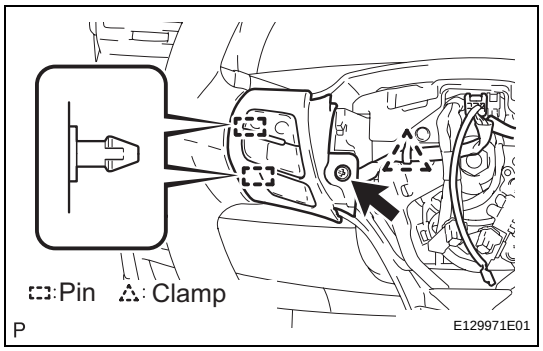
2. INSTALL STEERING PAD SWITCH LH (for 4 Spoke)

(a) Engage the 2 pins and install the steering pad switch LH.
(b) Install the screw.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(c) Connect the connector to the spiral cable.

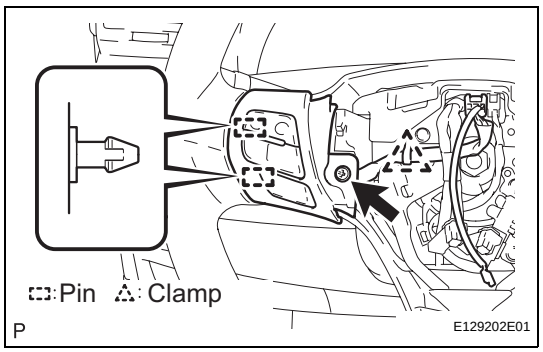


3. INSTALL STEERING PAD SWITCH ASSEMBLY (for 3 Spoke)

(a) Engage the 2 pins and install the steering pad switch assembly.
(b) Install the screw and engage the clamp.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)



(c) Engage the 2 pins and install the steering pad switch assembly.
(d) Install the screw and engage the clamp.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(e) Connect the connector to the spiral cable.



4. **INSTALL STEERING PAD SWITCH LH (for 3 Spoke)**
(a) Engage the 2 pins and install the steering pad switch LH.
(b) Install the screw and engage the clamp.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(c) Connect the connector to the spiral cable.

5. **INSTALL STEERING PAD (See page RS-350)**

6. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-351)**

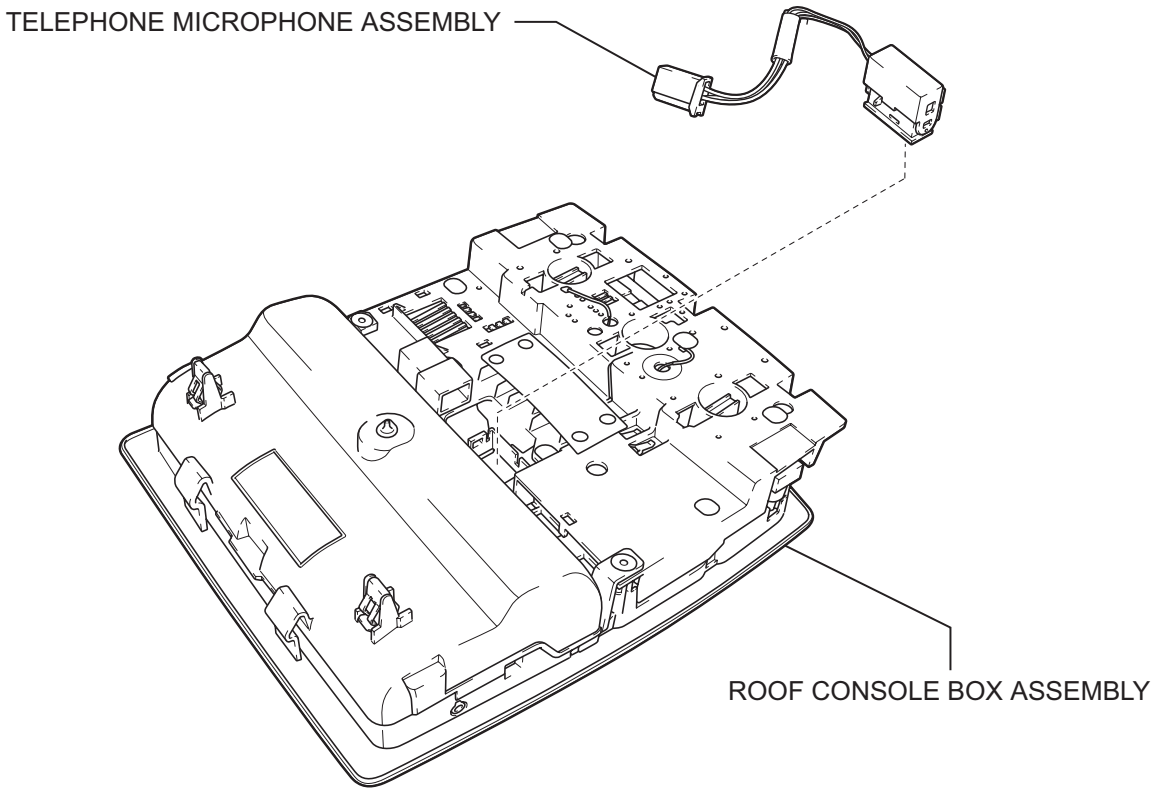
7. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-352)**

8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

9. **INSPECT SRS WARNING LIGHT**
(See page RS-32)

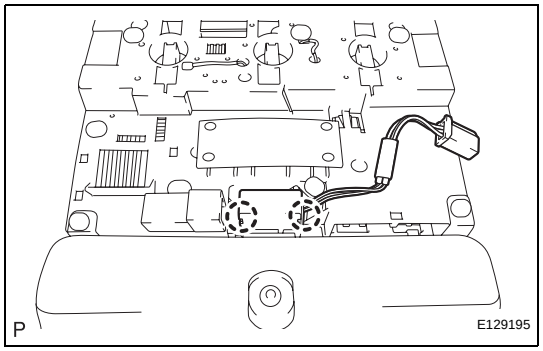
MICROPHONE

COMPONENTS

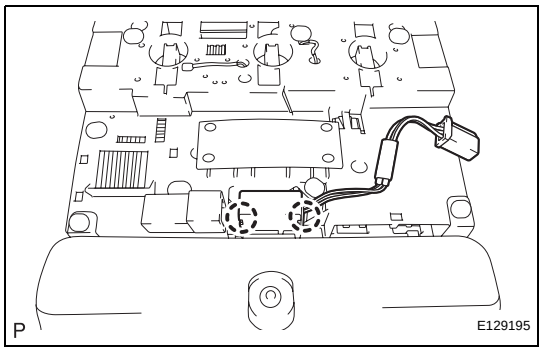


REMOVAL

1. **REMOVE ROOF CONSOLE BOX ASSEMBLY (See page IR-28)**
2. **REMOVE TELEPHONE MICROPHONE ASSEMBLY**
   (a) Disconnect the connector.
   (b) Disengage the 2 claws and remove the telephone microphone assembly.



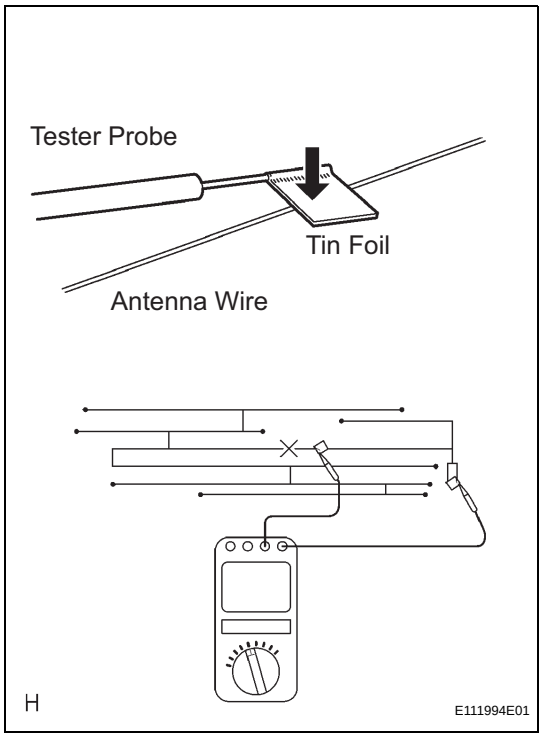
INSTALLATION



1. **INSTALL TELEPHONE MICROPHONE ASSEMBLY**
   (a) Engage the 2 claws and install the telephone microphone assembly.
   (b) Connect the connector.
2. **INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-50)**

WINDOW GLASS ANTENNA WIRE

ON-VEHICLE INSPECTION



1. INSPECT WINDOW GLASS ANTENNA WIRE

(a) Check for continuity of the antenna.

HINT:

Check for continuity at the center of each antenna wire as shown in the illustration.

NOTICE:

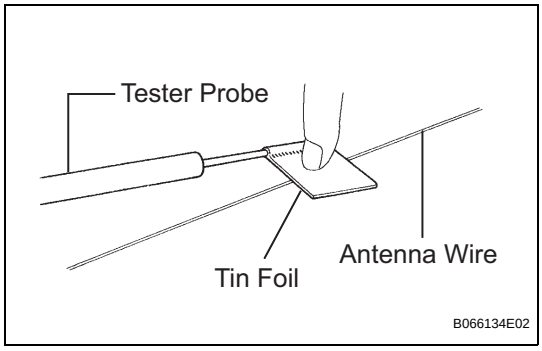
- **When cleaning the glass, wipe it in the direction of the wire with a soft, dry cloth. Take care not to damage the wire. Do not use detergents or glass cleaners with abrasive ingredients.**
- **When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown in the illustration.**

OK:

There is continuity in the antenna.

If the result is not as specified, repair the window glass antenna wire.

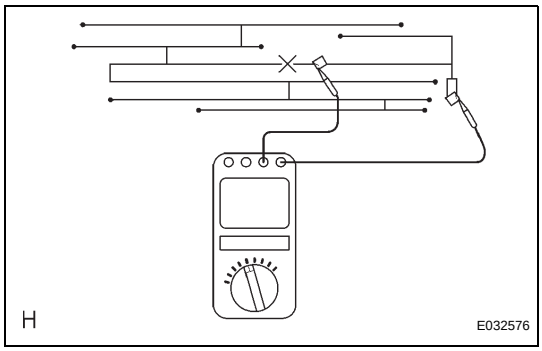
REPAIR



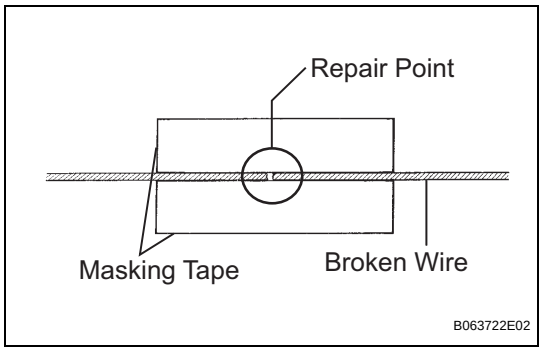
1. WINDOW GLASS ANTENNA WIRE

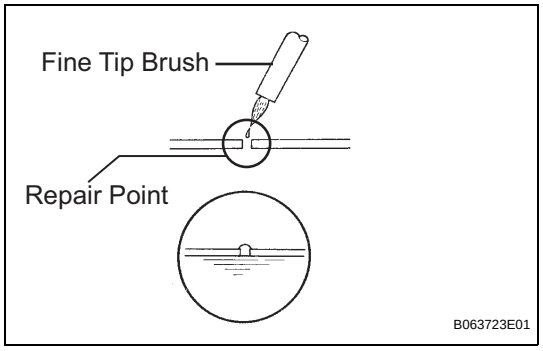
NOTICE:

- **When cleaning the glass, wipe it in the direction of the wire with a soft, dry cloth. Take care not to damage the wire. Do not use detergents or glass cleaners with abrasive ingredients.**
- **When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown in the illustration.**



(a) Check the voltage at the center of each wire, as shown in the illustration.





2. REPAIR WINDOW GLASS ANTENNA WIRE

(a) Clean the broken wire tips with a grease, wax and silicone remover.

(b) Place masking tape along both sides of the wire to be repaired.

(c) Thoroughly mix the repair agent (Dupont paste No. 4817 or equivalent).

(d) Using a fine tip brush, apply a small amount of the repair agent to the wire.

(e) After a few minutes, remove the masking tape.

AXLE SYSTEM

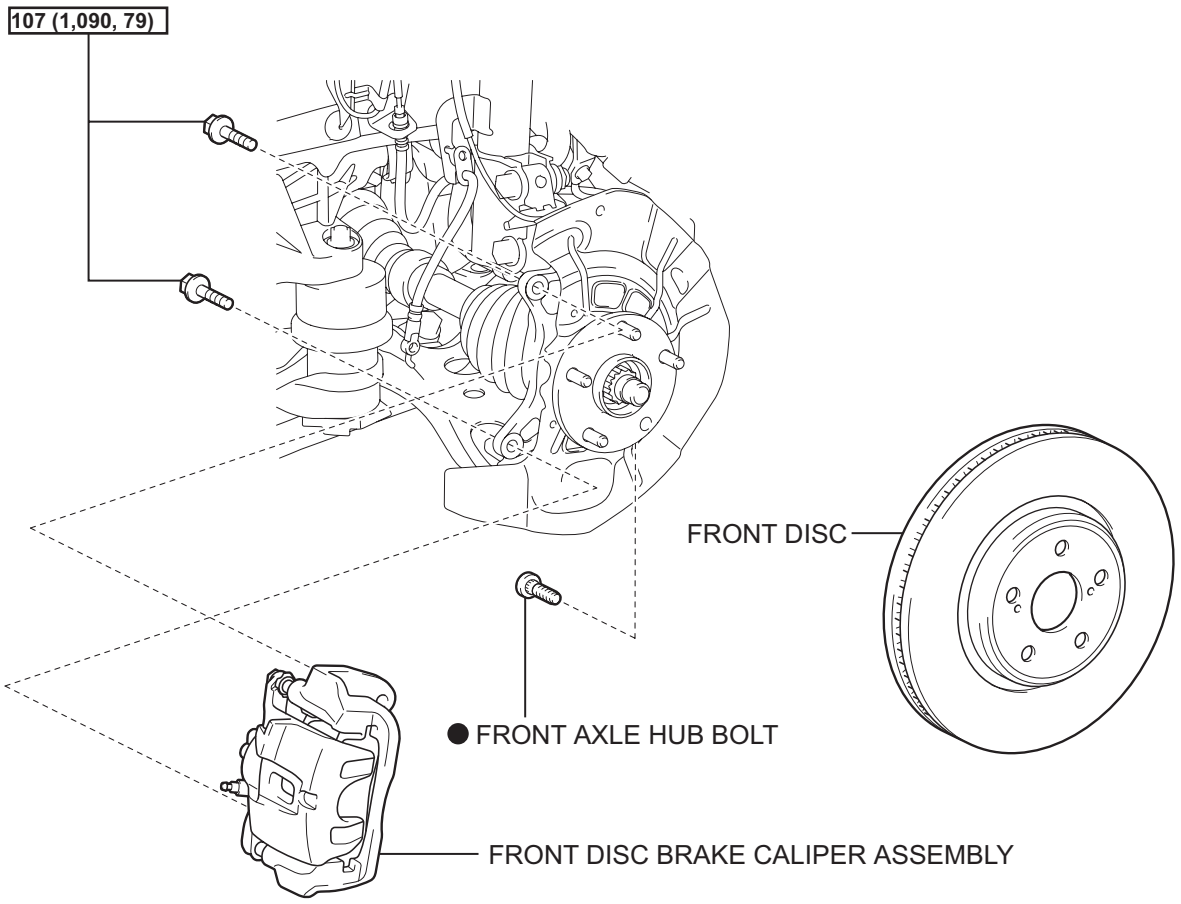
PROBLEM SYMPTOMS TABLE

Use the table below to help find the cause of the problem. Check each part. If necessary, replace these parts.

Symptom	Suspected area	See page
Wander	1. Wheel alignment (Front)	SP-4
	2. Wheel alignment (Rear)	SP-13
	3. Steering linkage	PS-49
	4. Hub bearing (Front)	AH-5
	5. Hub bearing (Rear)	AH-14
	6. Stabilizer bar (Front)	SP-33
	7. Stabilizer bar (Rear)	SP-69
Front wheel shimmy	1. Shock absorber	SP-18
	2. Lower ball joint	SP-28
	3. Hub bearing	AH-5

FRONT AXLE HUB BOLT

COMPONENTS

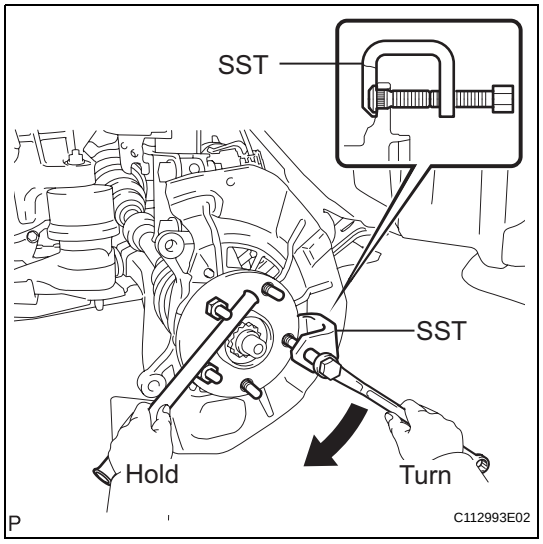


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

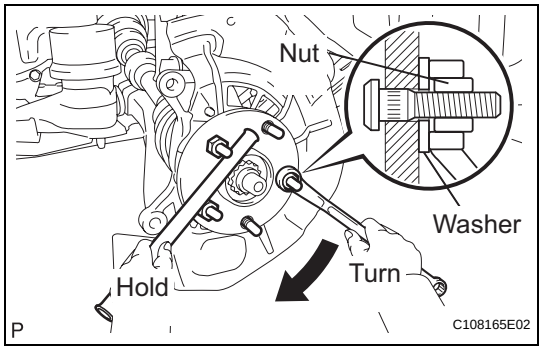
C137195E01

REPLACEMENT

1. **REMOVE FRONT WHEEL**
2. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-6)**
3. **REMOVE FRONT DISC (See page BR-49)**
4. **REMOVE FRONT AXLE HUB BOLT**
   (a) Temporarily install the 2 nuts and washers to the front axle hub bolt as shown in the illustration.
   (b) Using SST and a brass bar or an equivalent tool to hold the front axle, remove the front axle hub bolt.
   SST 09628-10011



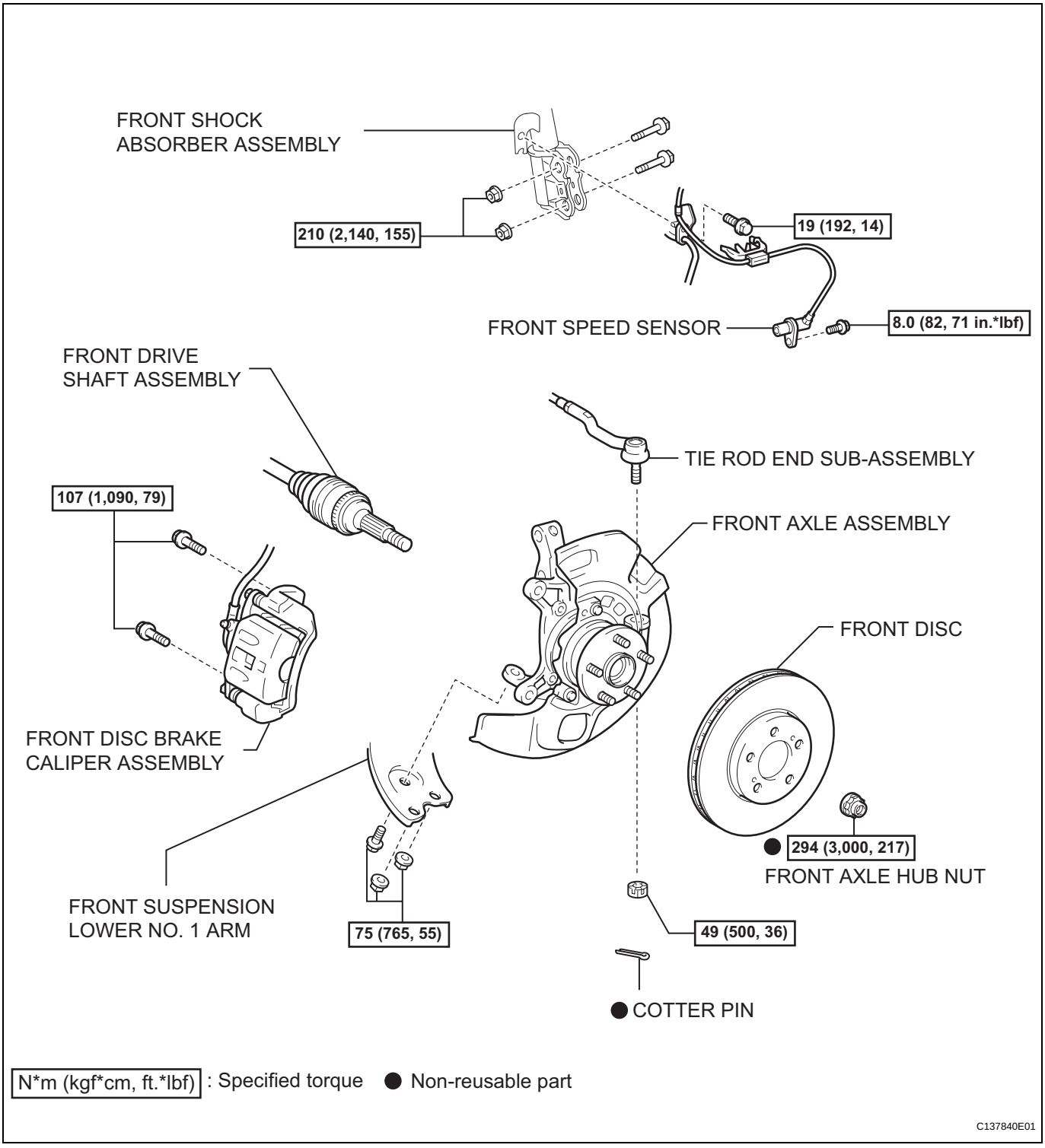
5. **INSTALL FRONT AXLE HUB BOLT**
   (a) Install a washer and nut to a new front axle hub bolt as shown in the illustration.
   (b) Using a brass bar to hold the front axle, install the hub bolt by torquing the nut.
6. **INSTALL FRONT DISC (See page BR-51)**
7. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-10)**
8. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

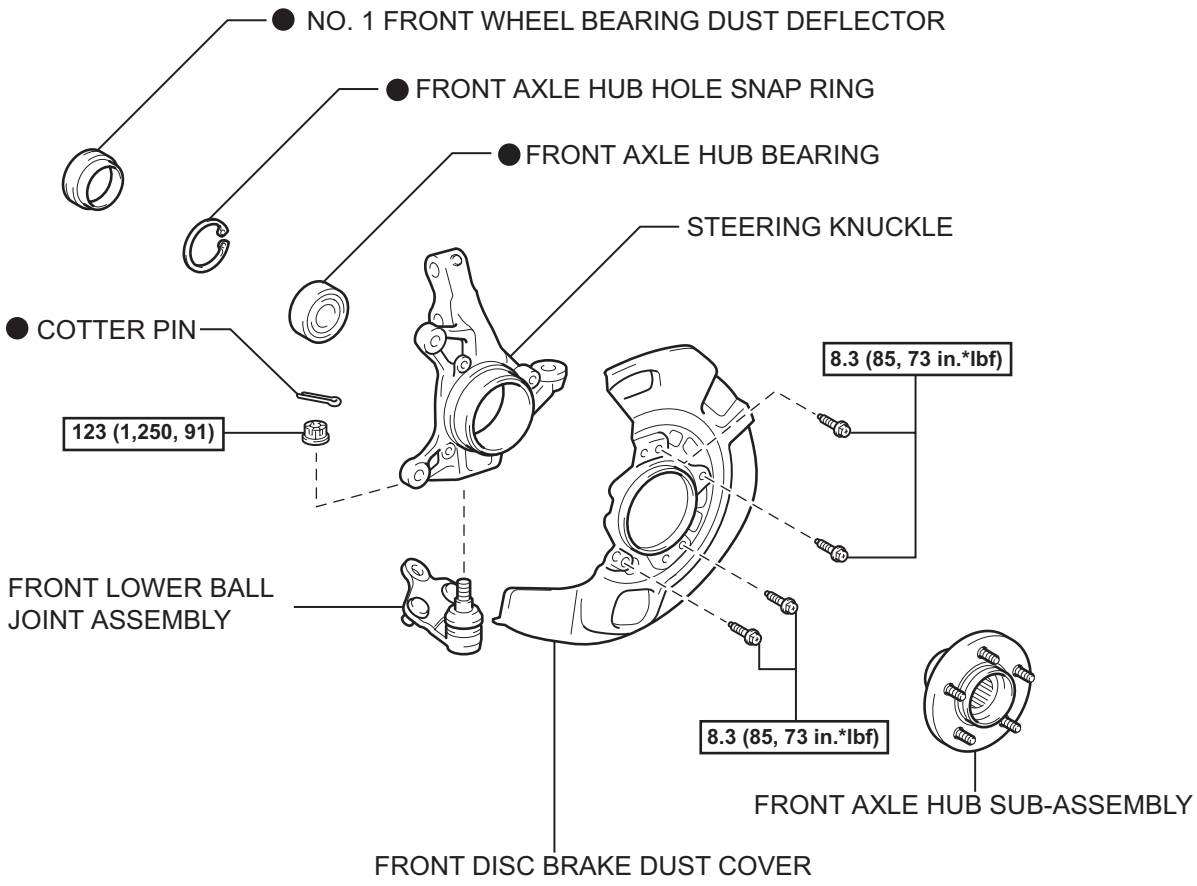


AH

FRONT AXLE HUB

COMPONENTS





N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

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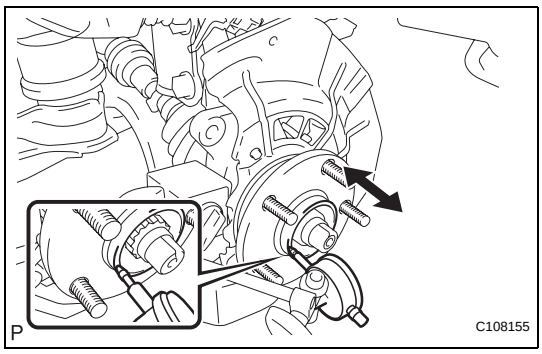
AH

AH

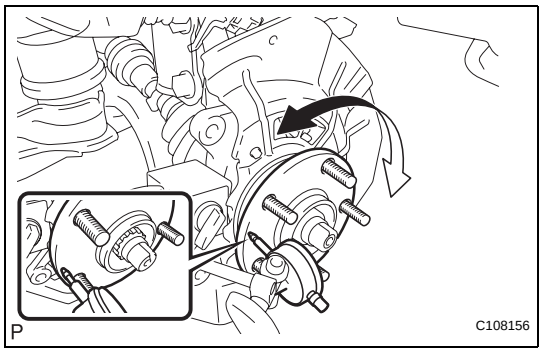
ON-VEHICLE INSPECTION

1. **REMOVE FRONT WHEEL**
2. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-6)**
3. **REMOVE FRONT DISC (See page BR-49)**
4. **INSPECT FRONT AXLE HUB BEARING LOOSENESS**



(a) Using a dial indicator, check for looseness near the center of the axle hub.
Maximum:
0.05 mm (0.0020 in.)
NOTICE:
Ensure that the dial indicator is set perpendicular to the measurement surface.
HINT:
If looseness exceeds the maximum, replace the bearing.

5. **INSPECT FRONT AXLE HUB RUNOUT**



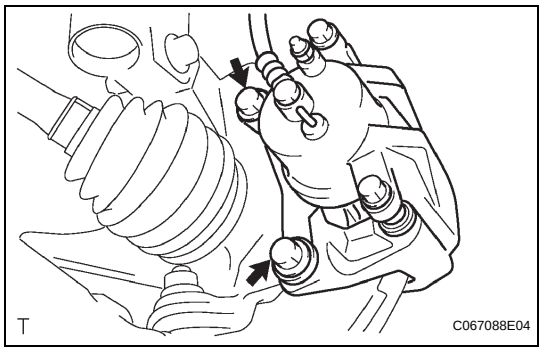
(a) Using a dial indicator, check for runout on the surface of the axle hub outside the hub bolt.
Maximum:
0.05 mm (0.0020 in.)
NOTICE:
Ensure that the dial indicator is set perpendicular to the measurement surface.
HINT:
If runout exceeds the maximum, replace the axle hub.

6. **INSTALL FRONT DISC (See page BR-51)**
7. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-10)**
8. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

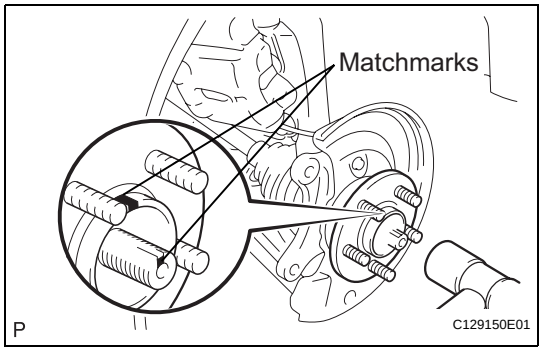
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

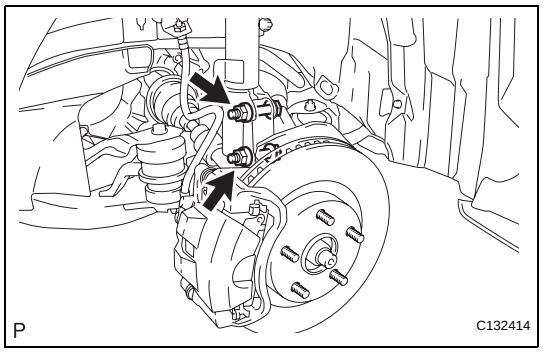
1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT AXLE HUB NUT (See page DS-7)**
3. **SEPARATE FRONT SPEED SENSOR (See page DS-7)**
4. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY**
   (a) Remove the 2 bolts and separate the front disc brake caliper assembly from the steering knuckle.
   NOTICE:
   Use wire or an equivalent tool to keep the brake caliper from hanging down by the flexible hose.



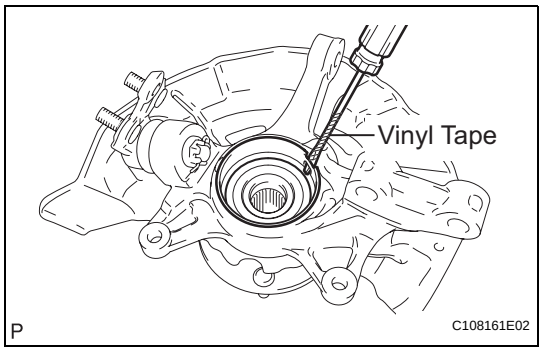
5. **REMOVE FRONT DISC (See page BR-49)**
6. **SEPARATE TIE ROD END SUB-ASSEMBLY (See page DS-8)**
7. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-8)**
8. **REMOVE FRONT AXLE ASSEMBLY**
   (a) Put matchmarks on the front drive shaft assembly and the front axle hub sub-assembly.
   (b) Using a plastic hammer, separate the front drive shaft assembly from the front axle assembly.
   NOTICE:
   Be careful not to damage the drive shaft boot and speed sensor rotor.



   (c) Remove the 2 bolts, 2 nuts, and front axle assembly.



AH

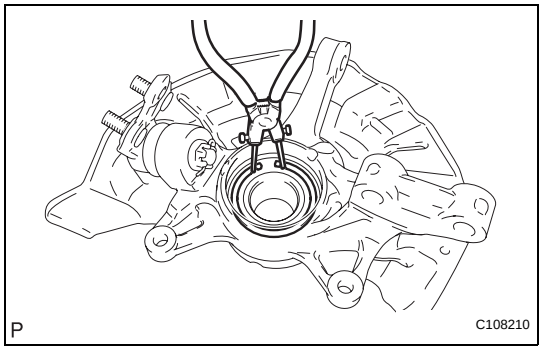


9. REMOVE NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR

(a) Using a screwdriver with its tip wrapped with vinyl tape, remove the No. 1 front wheel bearing dust deflector.

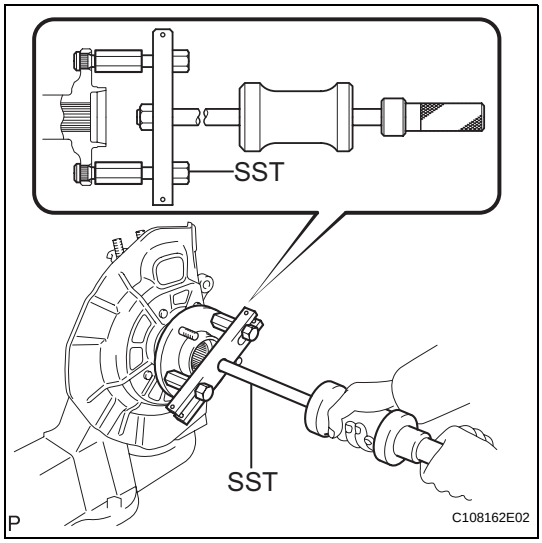
NOTICE:

Be careful not to damage the steering knuckle.



10. REMOVE FRONT AXLE HUB HOLE SNAP RING

(a) Using snap ring pliers, remove the front axle hub hole snap ring.



11. REMOVE FRONT AXLE HUB SUB-ASSEMBLY

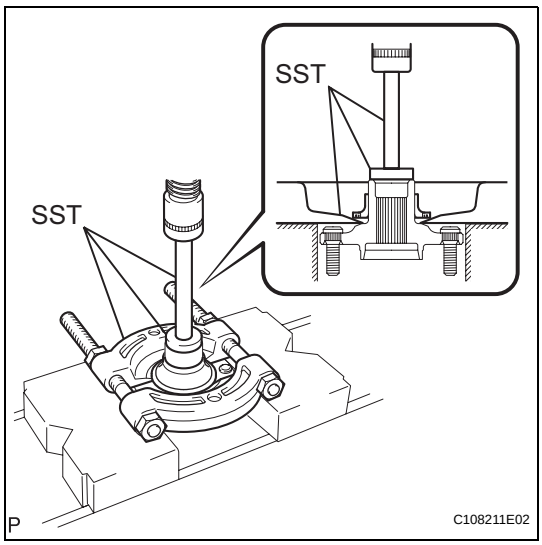
(a) Hold the front axle assembly between aluminium plates in a vise.

NOTICE:

Do not overtighten the vise.

(b) Using SST, remove the front axle hub sub-assembly.

SST 09520-00031



(c) Using SST and a press, remove the bearing inner race (outside) from the front axle hub sub-assembly.

SST 09555-55010, 09950-60010 (09951-00430), 09950-70010 (09951-07100)

NOTICE:

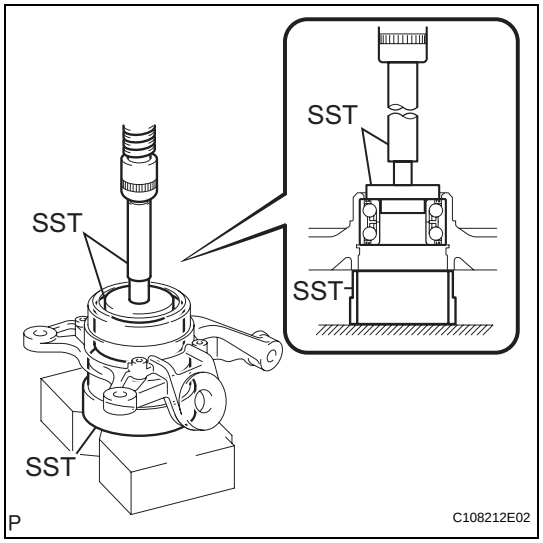
Be careful not to drop the front axle hub sub-assembly.

12. REMOVE FRONT DISC BRAKE DUST COVER

(a) Remove the 4 bolts and disc brake dust cover from the steering knuckle.

13. REMOVE FRONT LOWER BALL JOINT ASSEMBLY

(See page SP-28)

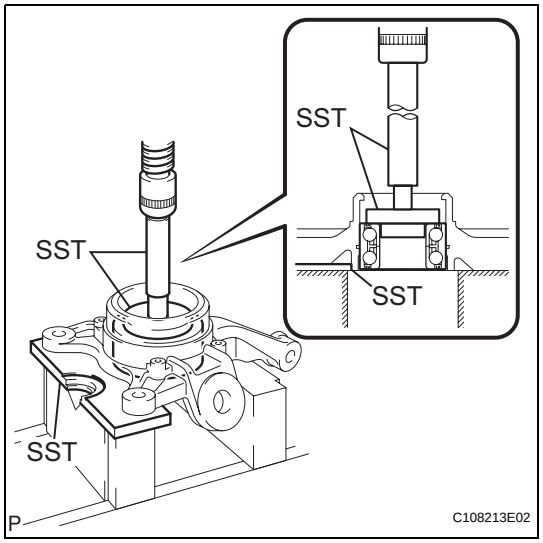


14. REMOVE FRONT AXLE HUB BEARING

(a) Place the bearing inner race (outside) on the front axle hub bearing.

(b) Using SST and a press, press the front axle hub bearing until it contacts the SST.

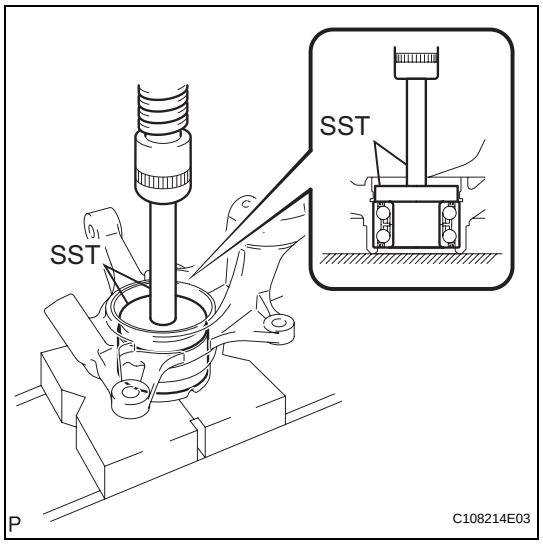
SST 09527-17011, 09950-60010 (09951-00600, 09951-00400, 09952-06010), 09950-70010 (09951-07100)



(c) Using SST to make the steering knuckle horizontal, fix it to the V-block as shown in the illustration.

SST 09527-20011, 09950-60010 (09951-00600, 09951-00400, 09952-06010), 09950-70010 (09951-07100)

(d) Using SST and a press, remove the front axle hub bearing from the steering knuckle.



INSTALLATION

1. INSTALL FRONT AXLE HUB BEARING

(a) Using SST and a press, install a new front axle hub bearing to the steering knuckle.

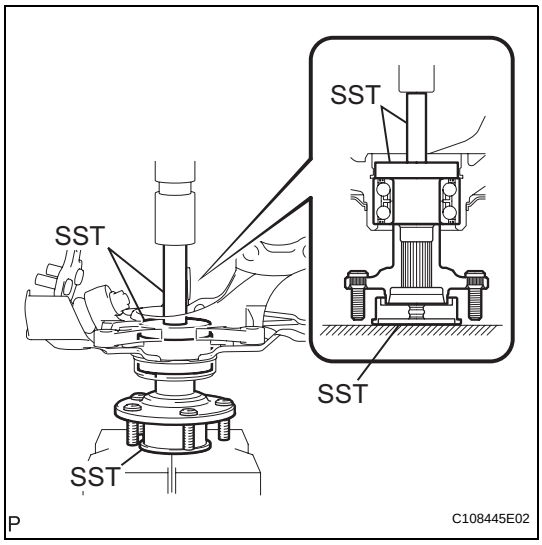
SST 09950-60020 (09951-00810), 09950-70010 (09951-07100)

2. INSTALL FRONT LOWER BALL JOINT ASSEMBLY (See page SP-29)

3. INSTALL FRONT DISC BRAKE DUST COVER

(a) Install the disc brake dust cover to the steering knuckle with the 4 bolts.

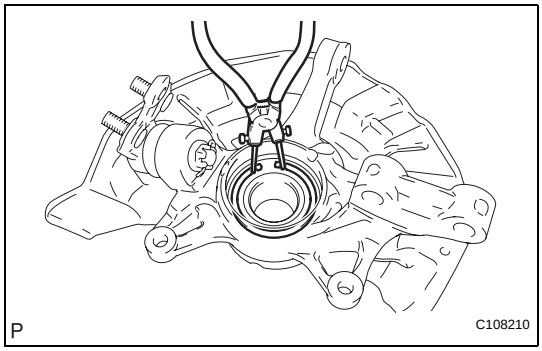
Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)



4. INSTALL FRONT AXLE HUB SUB-ASSEMBLY

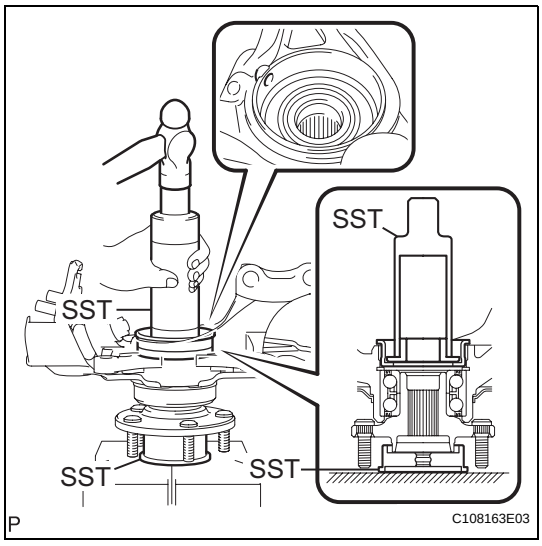
(a) Using SST and a press, install the front axle hub sub-assembly.

SST 09608-32010, 09950-60020 (09951-00810), 09950-70010 (09951-07100)



5. INSTALL FRONT AXLE HUB HOLE SNAP RING

(a) Using snap ring pliers, install a new front axle hub hole snap ring.



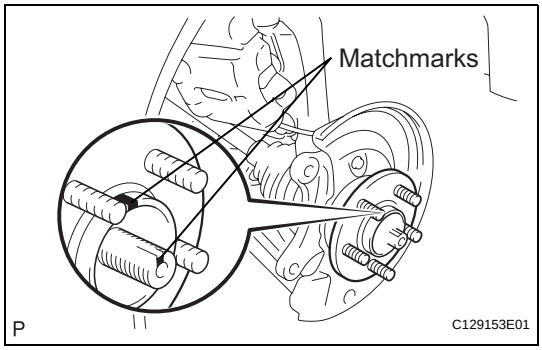
6. INSTALL NO. 1 FRONT WHEEL BEARING DUST DEFLECTOR

(a) Using SST and a hammer, install a new No. 1 front wheel bearing dust deflector.

SST 09316-60011 (09316-00011, 09316-00031), 09608-32010

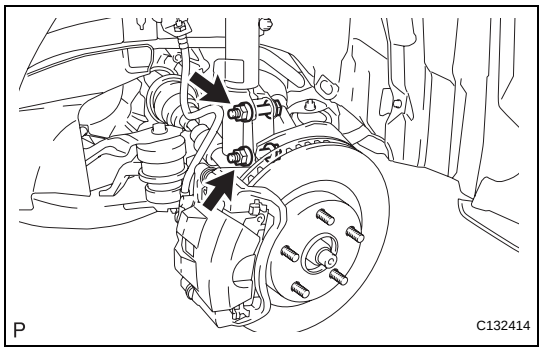
HINT:

Align the hole for the speed sensor in the No. 1 front wheel bearing dust deflector with the steering knuckle.



7. INSTALL FRONT AXLE ASSEMBLY

(a) Align the matchmarks and install the front drive shaft assembly to the front axle hub sub-assembly.

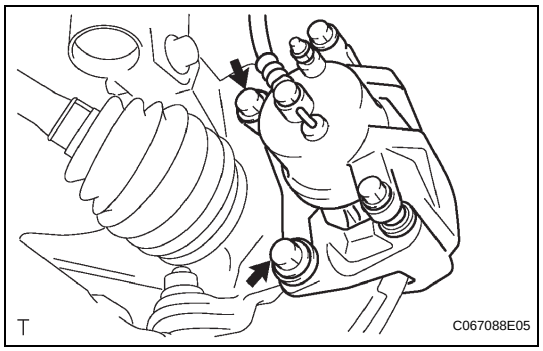


(b) Install the steering knuckle with the front axle assembly to the front shock absorber with the 2 bolts and 2 nuts.
Torque: 210 N*m (2,140 kgf*cm, 155 ft.*lbf)
NOTICE:
- **Only when reusing the bolts and nuts, apply a small amount of engine oil to the threads of the nuts.**
- **Be careful not to damage the drive shaft boot and speed sensor rotor.**

8. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-21)**

9. **INSTALL TIE ROD END SUB-ASSEMBLY (See page DS-21)**

10. **INSTALL FRONT DISC**



11. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY**
(a) Install the front disc brake caliper assembly to the steering knuckle with the 2 bolts.
Torque: 107 N*m (1,090 kgf*cm, 79 ft.*lbf)
NOTICE:
Do not twist the brake hose when installing the front disc brake caliper assembly.

12. **INSTALL FRONT AXLE HUB NUT**
(a) Using a socket wrench (30 mm), install a new axle hub nut.
Torque: 294 N*m (3,000 kgf*cm, 217 ft.*lbf)
HINT:
Stake the nut after inspecting for looseness and runout in the following steps.

13. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY**
(a) Remove the 2 bolts and separate the front disc brake caliper assembly from the steering knuckle.
NOTICE:
Use wire or an equivalent tool to keep the brake caliper from hanging down by the flexible hose.

14. **REMOVE FRONT DISC**

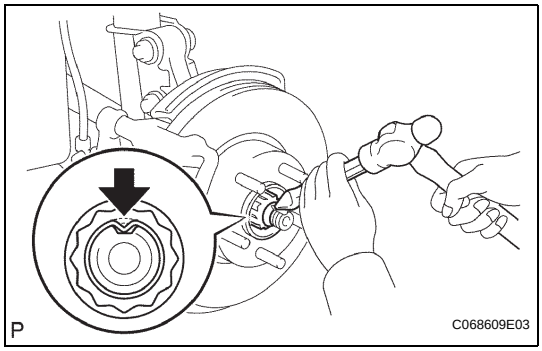
15. **INSPECT FRONT AXLE HUB BEARING LOOSENESS (See page AH-5)**

16. **INSPECT FRONT AXLE HUB RUNOUT (See page AH-6)**

17. **INSTALL FRONT DISC (See page BR-51)**

18. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY**
(a) Install the front disc brake caliper assembly with the 2 bolts to the steering knuckle.
Torque: 107 N*m (1,090 kgf*cm, 79 ft.*lbf)
NOTICE:
Do not twist the brake hose when installing the front disc brake caliper assembly.

AH



19. INSTALL FRONT SPEED SENSOR (See page DS-21)

20. INSTALL FRONT AXLE HUB NUT

(a) Using a chisel and hammer, stake the axle hub nut.

21. INSTALL FRONT WHEEL

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

22. ADJUST FRONT WHEEL ALIGNMENT

HINT:

See page SP-4

23. CHECK ABS SPEED SENSOR SIGNAL

(a) ABS: See page BC-11

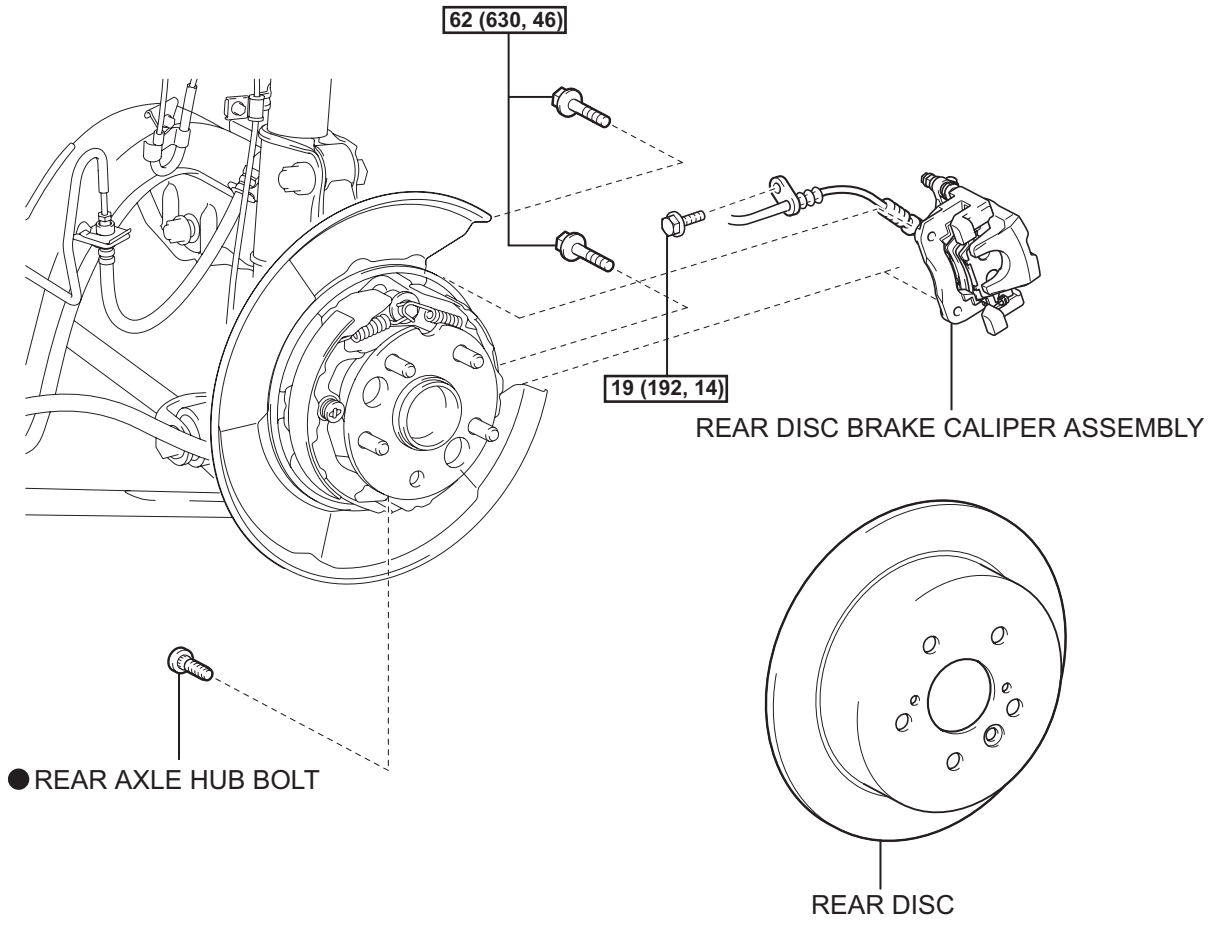
(b) VSC (for BOSCH): See page BC-290

(c) VSC (for ADVICS): See page BC-123

AH

REAR AXLE HUB BOLT

COMPONENTS

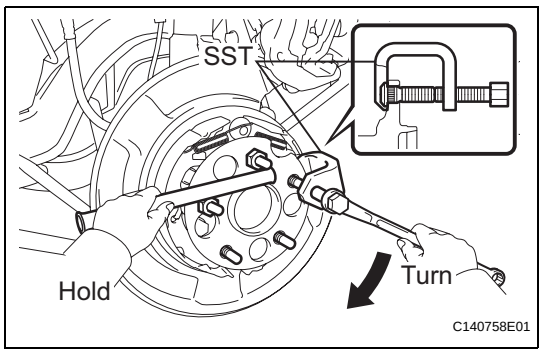


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

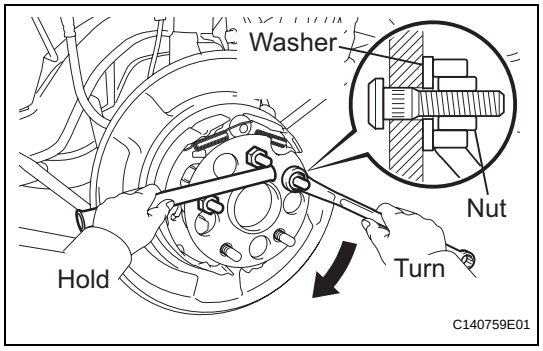
C140859E01

REPLACEMENT

1. **REMOVE REAR WHEEL**
2. **REMOVE REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-18)**
3. **REMOVE REAR DISC (See page PB-58)**
4. **REMOVE REAR AXLE HUB BOLT**
   (a) Temporarily install the 2 nuts and washers to the rear axle hub bolt as shown in the illustration.
   (b) Using SST and a brass bar or an equivalent tool to hold the hub and bearing assembly, remove the rear axle hub bolt.
   SST 09628-10011



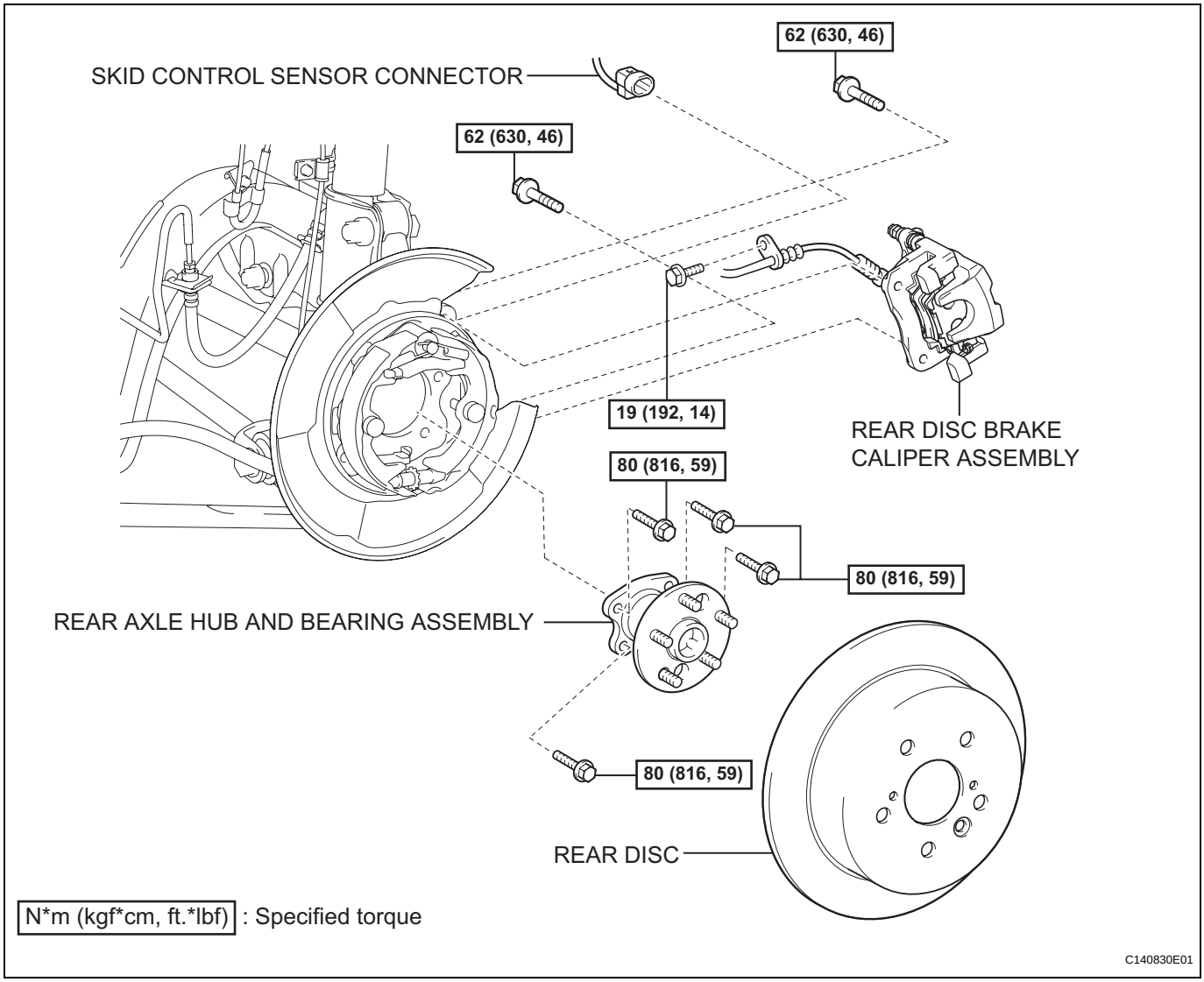
5. **INSTALL REAR AXLE HUB BOLT**
   (a) Install a washer and nut to a new bolt as shown in the illustration.
   (b) Using a brass bar or an equivalent tool to hold the hub and bearing assembly, install the rear axle hub bolt by tightening the nut.



6. **INSTALL REAR DISC (See page BR-63)**
7. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-20)**
8. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REAR AXLE HUB AND BEARING

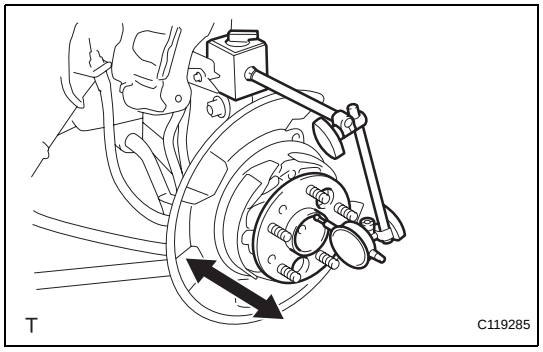
COMPONENTS



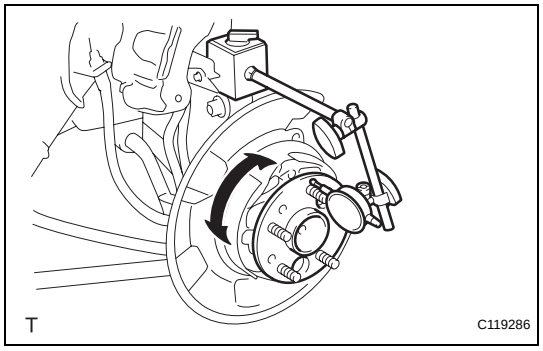
AH

ON-VEHICLE INSPECTION

1. **REMOVE REAR WHEEL**
2. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-18)**
3. **REMOVE REAR DISC (See page PB-58)**
4. **INSPECT REAR AXLE HUB BEARING LOOSENESS**
   (a) Using a dial indicator, check for looseness near the center of the axle hub.
   Maximum:
   0.05 mm (0.0020 in.)
   NOTICE:
   Ensure that the dial indicator is set perpendicular to the measurement surface.
   If looseness exceeds the maximum, replace the axle hub assembly.



5. **INSPECT REAR AXLE HUB RUNOUT**
   (a) Using a dial indicator, check for runout on the surface of the axle hub outside the hub bolt.
   Maximum:
   0.07 mm (0.0027 in.)
   NOTICE:
   Ensure that the dial indicator is set perpendicular to the measurement surface.
   If runout exceeds the maximum, replace the axle hub assembly.



6. **INSTALL REAR DISC (See page BR-63)**
7. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-20)**
8. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

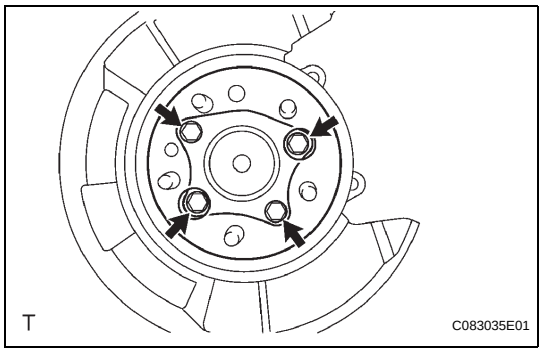
AH

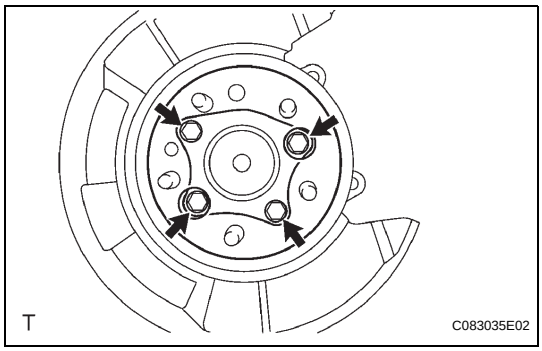
AH

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **REMOVE REAR WHEEL**
2. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-18)**
3. **REMOVE REAR DISC (See page PB-58)**
4. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY**
   (a) Disconnect the skid control sensor connector.
   (b) Remove the 4 bolts and hub and bearing assembly.



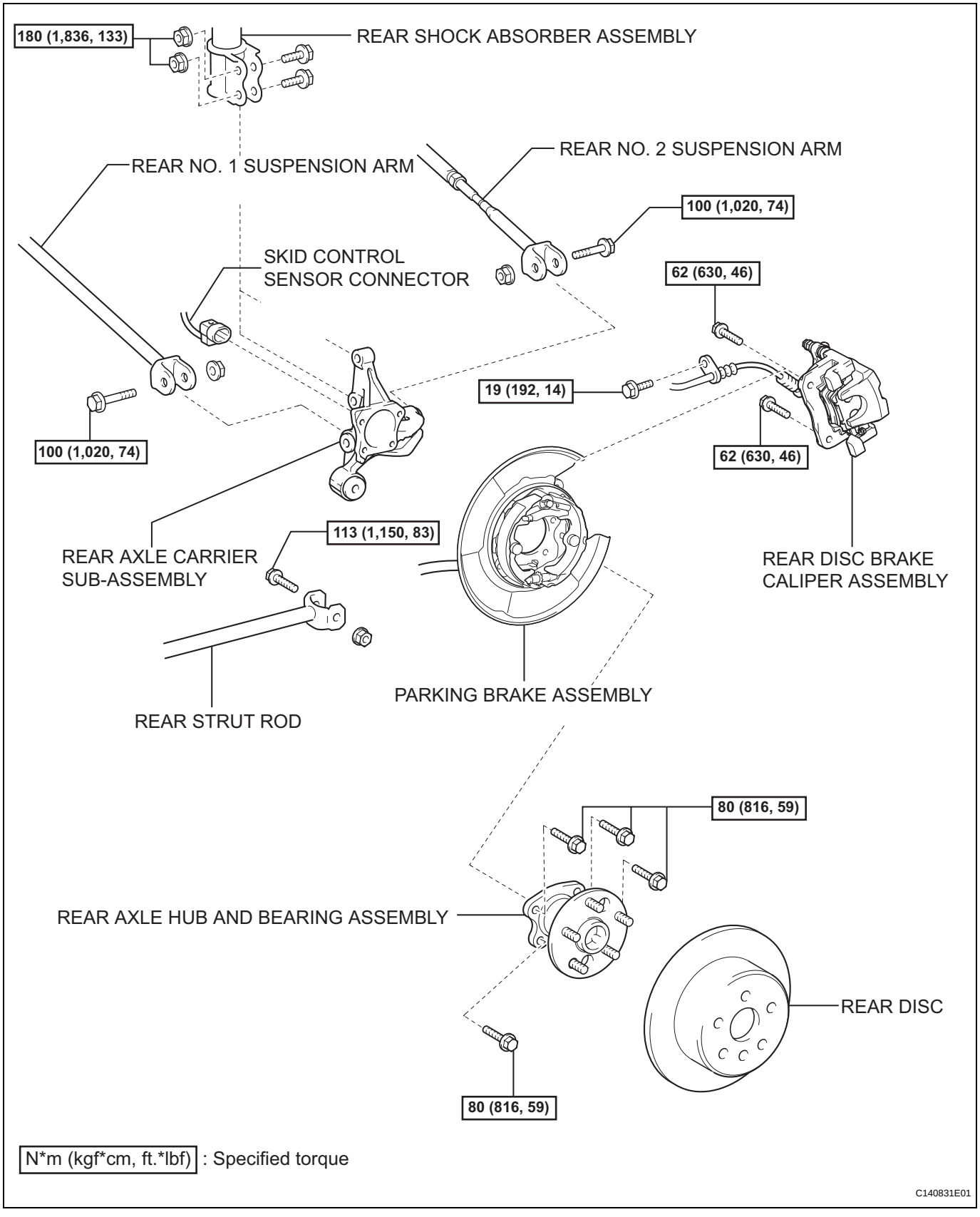


INSTALLATION

1. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY**
   (a) Install the hub and bearing assembly with the 4 bolts.
   Torque: 80 N*m (816 kgf*cm, 59 ft.*lbf)
   (b) Connect the skid control sensor connector.
   NOTICE:
   Do not twist the sensor wire when connecting it.
2. **INSPECT REAR AXLE HUB BEARING LOOSENESS (See page AH-15)**
3. **INSPECT REAR AXLE HUB RUNOUT (See page AH-15)**
4. **INSTALL REAR DISC (See page BR-63)**
5. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-20)**
6. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
7. **CHECK ABS SPEED SENSOR SIGNAL**
   (a) ABS: See page BC-11
   (b) VSC (for BOSCH): See page BC-290
   (c) VSC (for ADVICS): See page BC-123

REAR AXLE CARRIER

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

C140831E01

AH

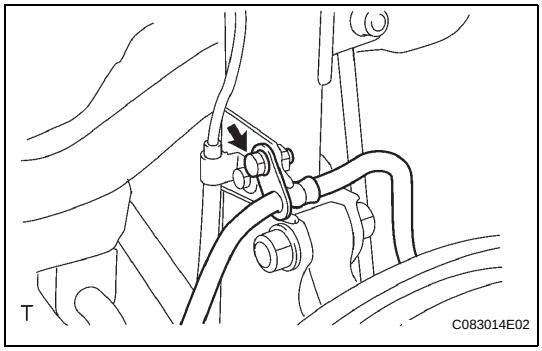
REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE REAR WHEEL

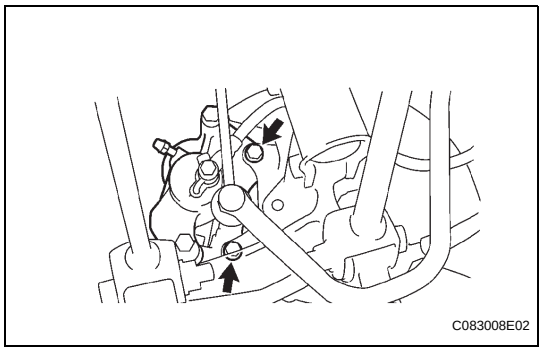
2. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY

(a) Remove the bolt and separate the flexible hose from the shock absorber.



(b) Remove the 2 bolts and separate the rear disc brake caliper assembly.

NOTICE:
Use wire or an equivalent tool to keep the brake caliper from hanging down by the flexible hose.



3. REMOVE REAR DISC (See page PB-58)

4. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY (See page AH-15)

5. SEPARATE REAR STRUT ROD

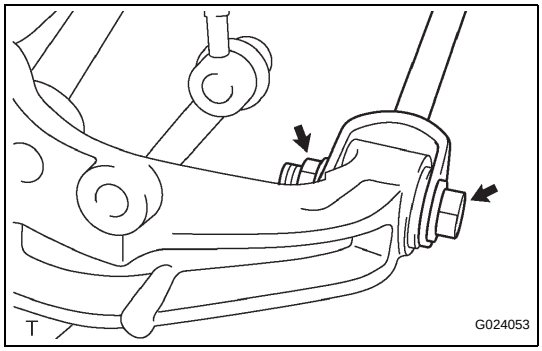
(a) Remove the bolt and nut, and separate the rear strut rod (rear axle carrier side) from the rear axle carrier sub-assembly.

HINT:
When removing the bolt, keep the nut from rotating.

6. SEPARATE REAR NO. 2 SUSPENSION ARM

(a) Remove the bolt and nut, and separate the rear No. 2 suspension arm (rear axle carrier side) from the rear axle carrier sub-assembly.

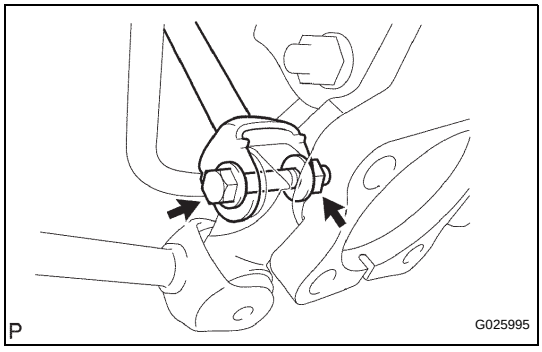
HINT:
When removing the bolt, keep the nut from rotating.

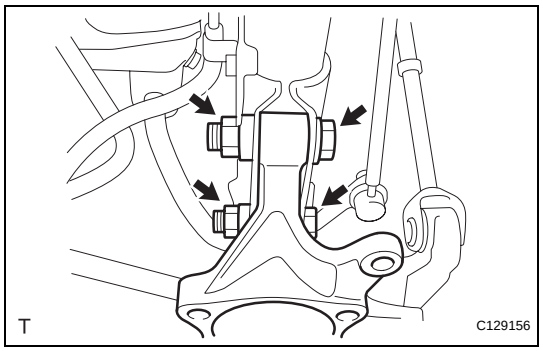


7. SEPARATE REAR NO. 1 SUSPENSION ARM

(a) Remove the bolt and nut, and separate the rear No. 1 suspension arm (rear axle carrier side) from the rear axle carrier sub-assembly.

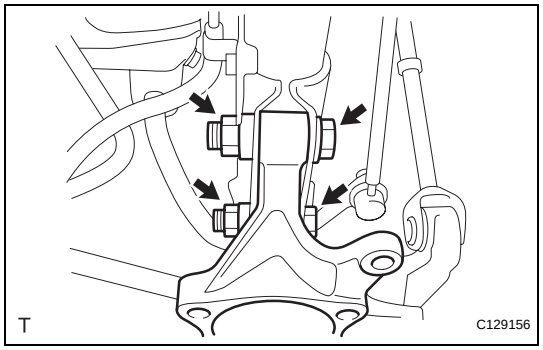
HINT:
When removing the bolt, keep the nut from rotating.



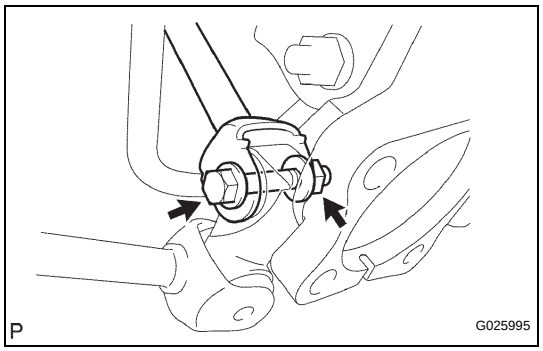


8. **REMOVE REAR AXLE CARRIER SUB-ASSEMBLY**
   (a) Remove the 2 bolts and 2 nuts, and remove the rear axle carrier sub-assembly from the shock absorber.

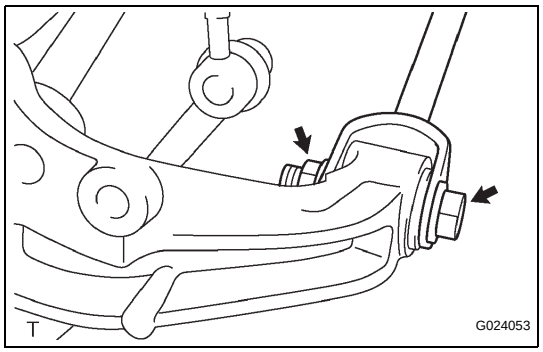
INSTALLATION



1. **INSTALL REAR AXLE CARRIER SUB-ASSEMBLY**
   (a) Install the rear axle carrier sub-assembly to the shock absorber with the 2 bolts and 2 nuts.
   Torque: 180 N*m (1,836 kgf*cm, 133 ft.*lbf)



2. **TEMPORARILY TIGHTEN REAR NO. 1 SUSPENSION ARM**
   (a) Temporarily tighten the rear No. 1 suspension arm with the bolt and nut.
   HINT:
   Insert the bolt from the rear side of the vehicle and temporarily tighten the bolt.



3. **TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM**
   (a) Temporarily tighten the rear No. 2 suspension arm with the bolt and nut.
   HINT:
   Insert the bolt from the rear side of the vehicle and temporarily tighten the bolt.

4. **TEMPORARILY TIGHTEN REAR STRUT ROD**
   (a) Temporarily tighten the rear strut rod with the bolt and nut.
   HINT:
   Insert the bolt from the inside of the vehicle and temporarily tighten the bolt.

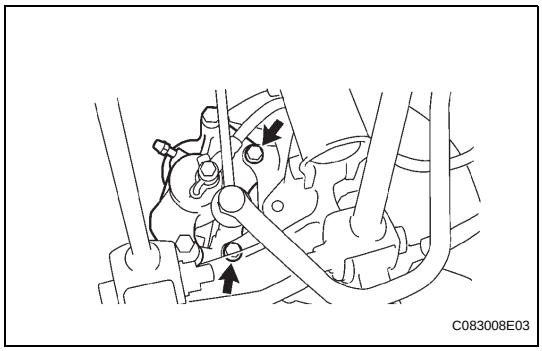
5. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY (See page AH-16)**

6. **INSPECT REAR AXLE HUB BEARING LOOSENESS (See page AH-15)**

7. **INSPECT REAR AXLE HUB RUNOUT (See page AH-15)**

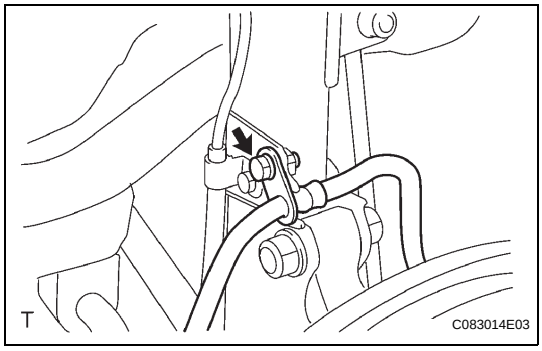
8. **INSTALL REAR DISC (See page BR-63)**

AH



9. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY

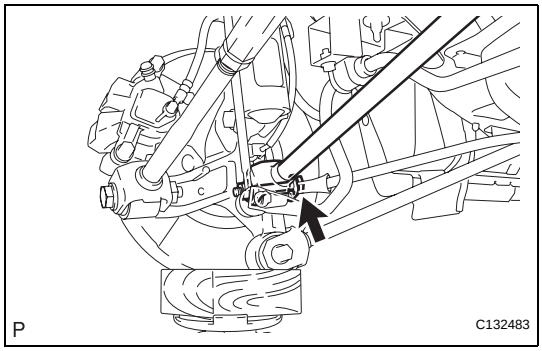
(a) Install the rear disc brake caliper with the 2 bolts.
Torque: 62 N*m (630 kgf*cm, 46 ft.*lbf)
NOTICE:
Do not twist the brake hose when installing the rear disc brake caliper assembly LH.



(b) Install the rear flexible hose with the bolt.
Torque: 19 N*m (192 kgf*cm, 14 ft.*lbf)

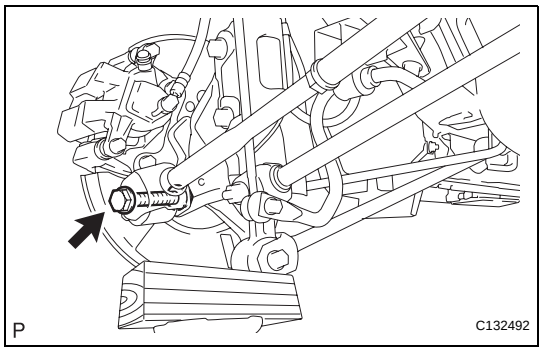
10. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

11. STABILIZE SUSPENSION (See page SP-50)



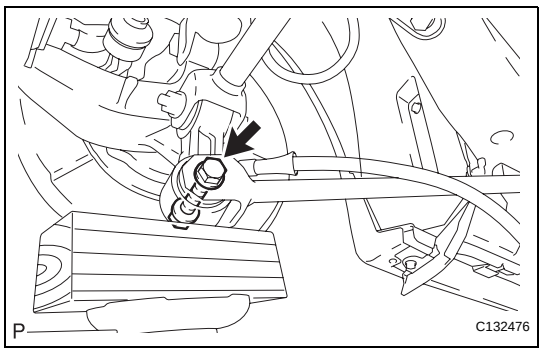
12. FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM

(a) Fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)



13. FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM

(a) Fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)



14. FULLY TIGHTEN REAR STRUT ROD

(a) Fully tighten the bolt.
Torque: 113 N*m (1,150 kgf*cm, 83 ft.*lbf)

15. ADJUST REAR WHEEL ALIGNMENT
HINT:
See page SP-13

16. CHECK ABS SPEED SENSOR SIGNAL

(a) ABS: See page BC-11
(b) VSC (for BOSCH): See page BC-290
(c) VSC (for ADVICS): See page BC-123

ANTI-LOCK BRAKE SYSTEM

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	off
Ignition switch on (IG)	ON	on (IG)
Ignition switch on (ACC)	ACC	on (ACC)
Engine start	START	start

2. TROUBLESHOOTING PRECAUTION

HINT:
The anti-lock brake system includes the ABS and EBD.

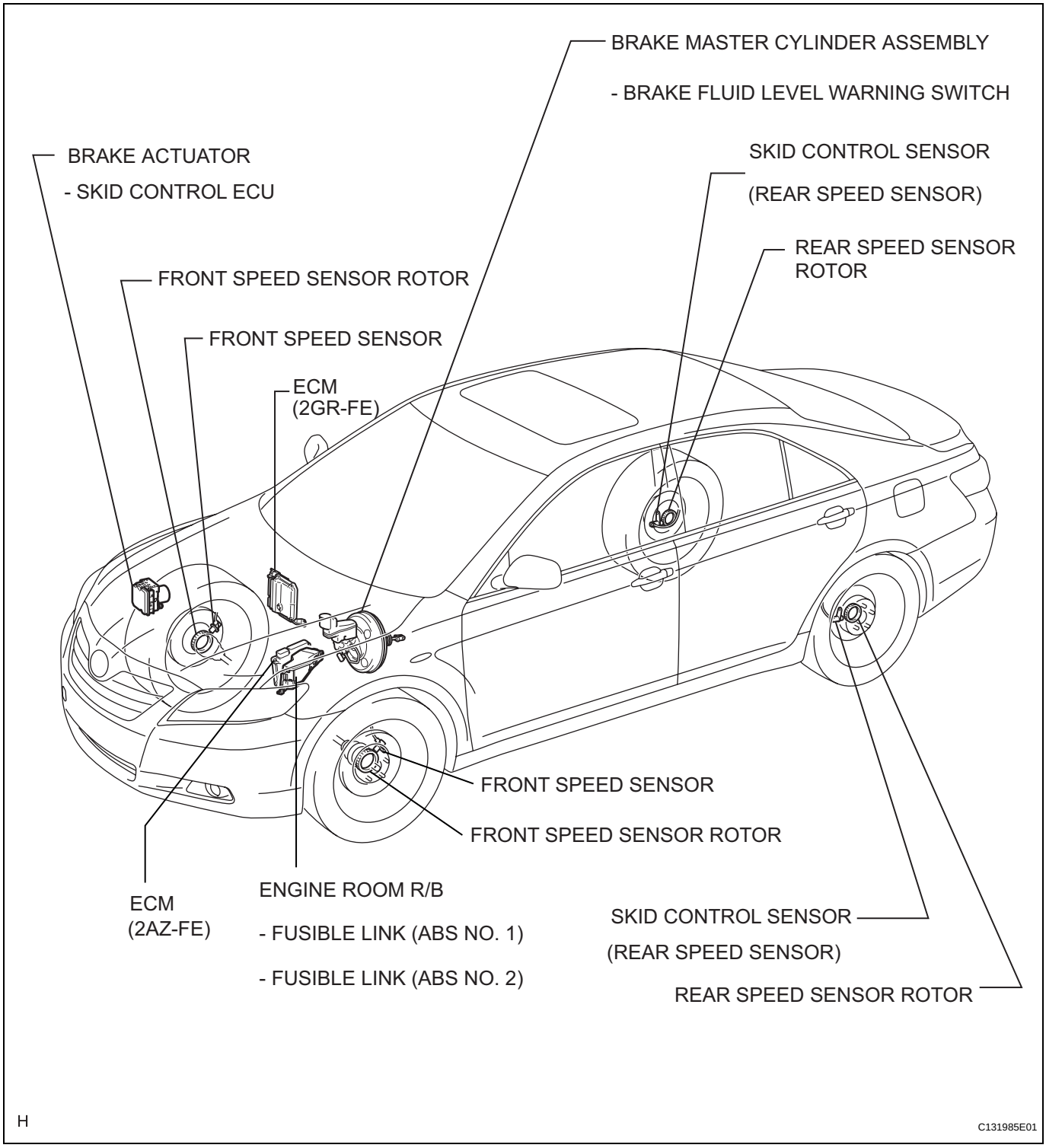
(a) When there is a malfunction in the terminal contact points or installation problems with parts, removing and installing the suspected problem parts may return the system to normal, either completely or temporarily.
(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by the DTC output and the freeze frame data output, and record it before disconnecting each connector or removing and installing parts.
(c) Be sure to remove and install the brake actuator and each individual sensor with the ignition switch off unless otherwise specified in the inspection procedure.
(d) If the brake actuator or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using the intelligent tester, also check that system functions and signals received by the ECU are normal using test mode.

3. CAN COMMUNICATION SYSTEM PRECAUTION

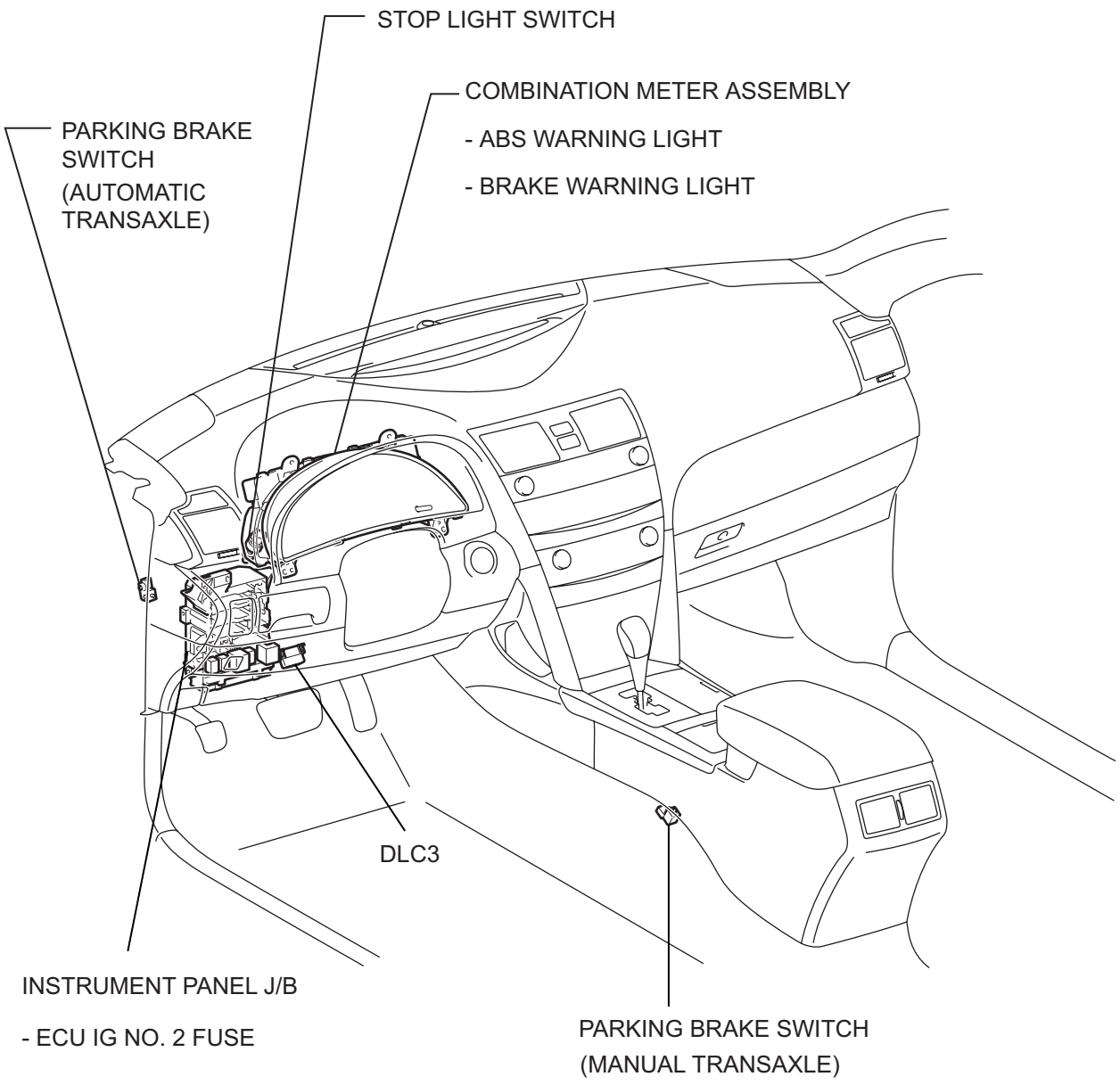
(a) The CAN communication system is used for data communication between each of the ECUs and sensors. If there is trouble in the CAN communication line, a DTC of the communication line is output.
(b) If a DTC of the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the anti-lock brake system.

(c) In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires that have an equal length. A bypass wire should not be used, because the data being transmitted will be corrupted.

PARTS LOCATION

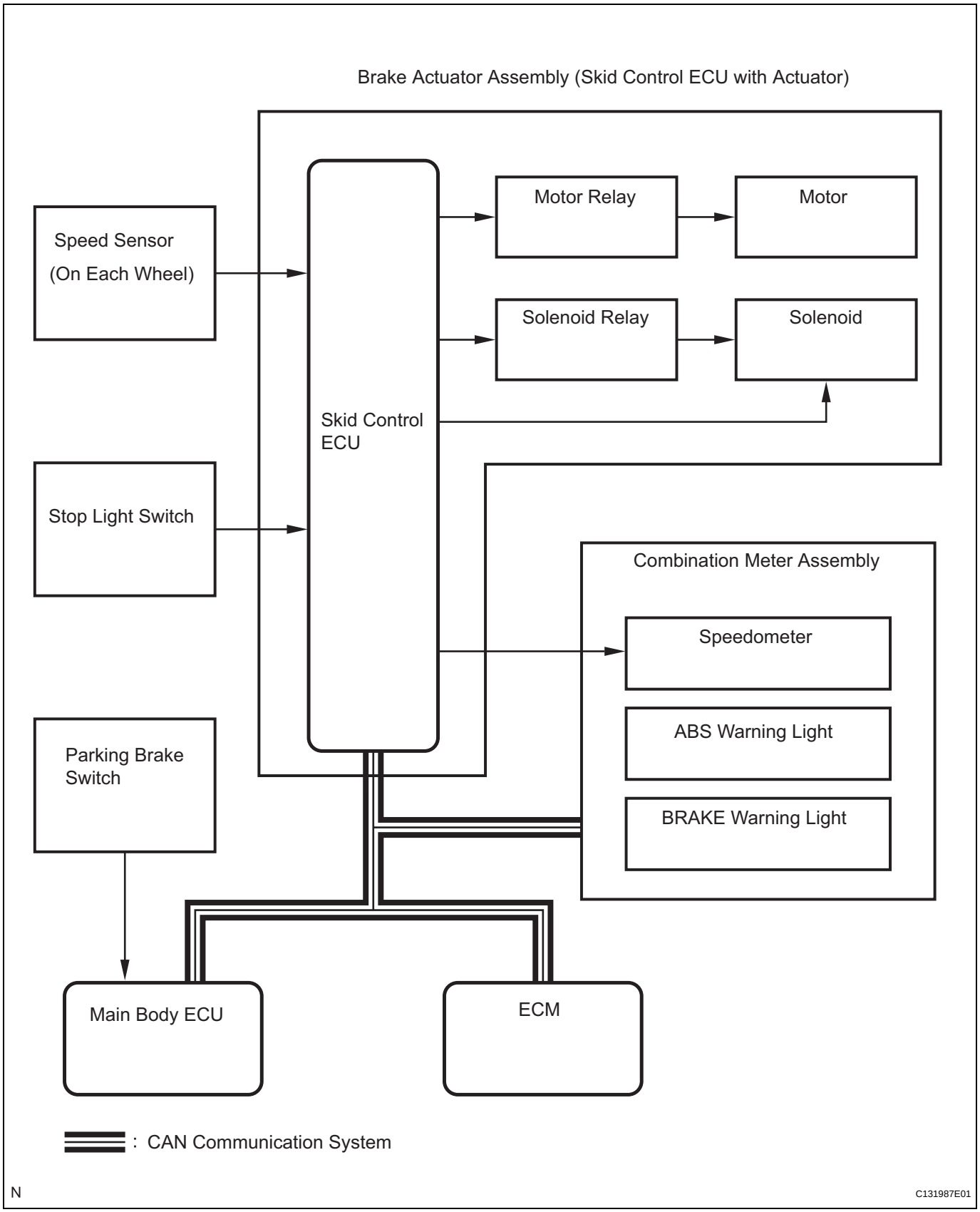


BC


STOP LIGHT SWITCH
COMBINATION METER ASSEMBLY
- ABS WARNING LIGHT
- BRAKE WARNING LIGHT
PARKING BRAKE SWITCH (AUTOMATIC TRANSAXLE)
DLC3
INSTRUMENT PANEL J/B
- ECU IG NO. 2 FUSE
PARKING BRAKE SWITCH (MANUAL TRANSAXLE)
H
C131984E01

BC

SYSTEM DIAGRAM



Transmitting ECU	Receiving ECU	Signals	Communication method
Skid control ECU	Combination meter	• ABS warning light signal • BRAKE warning light signal	CAN communication system

BC

Transmitting ECU	Receiving ECU	Signals	Communication method
ECM	Skid control ECU	Shift position signal	CAN communication system

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

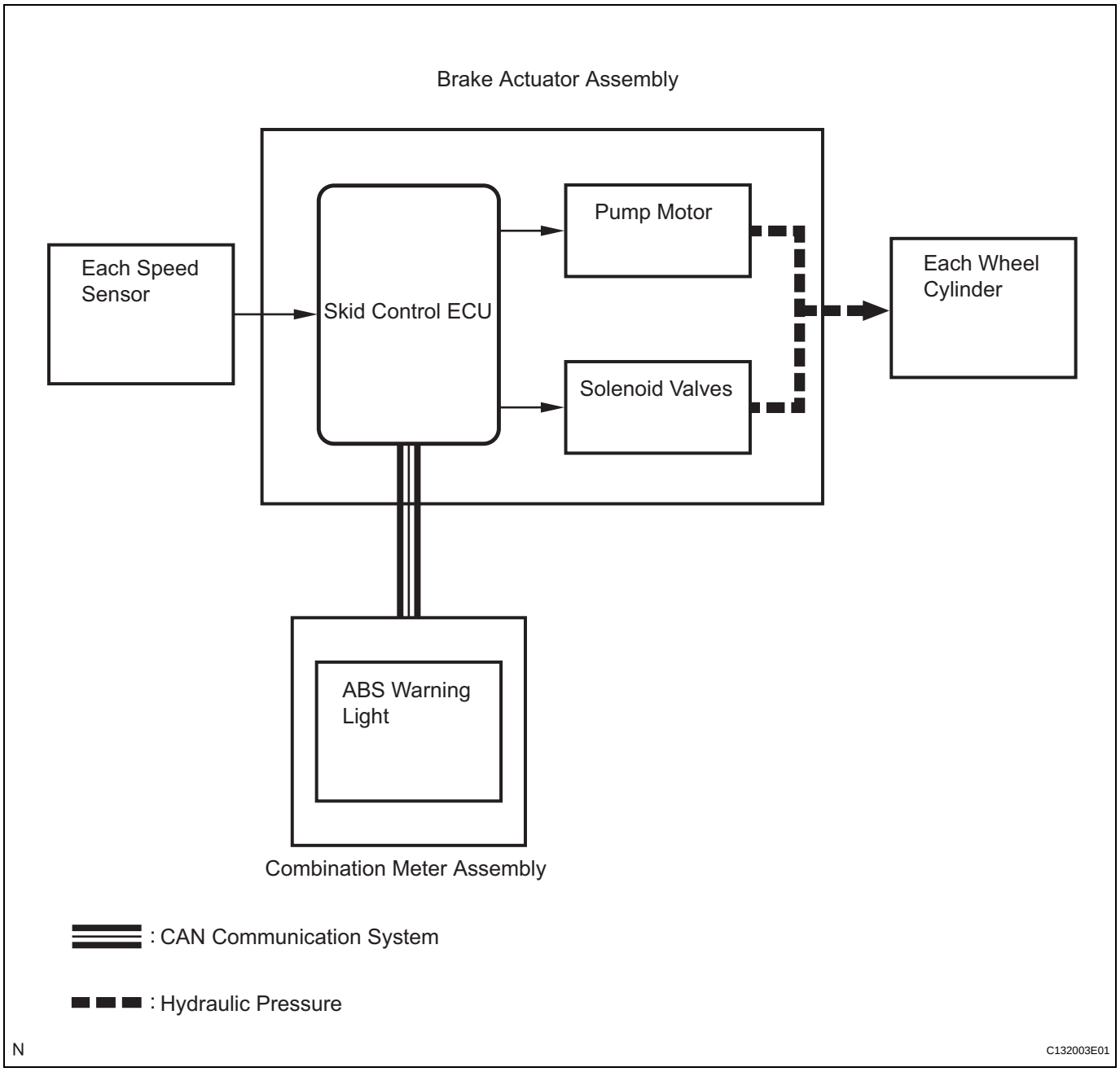
HINT:

The skid control ECU is located within the brake actuator assembly.

(a) ABS

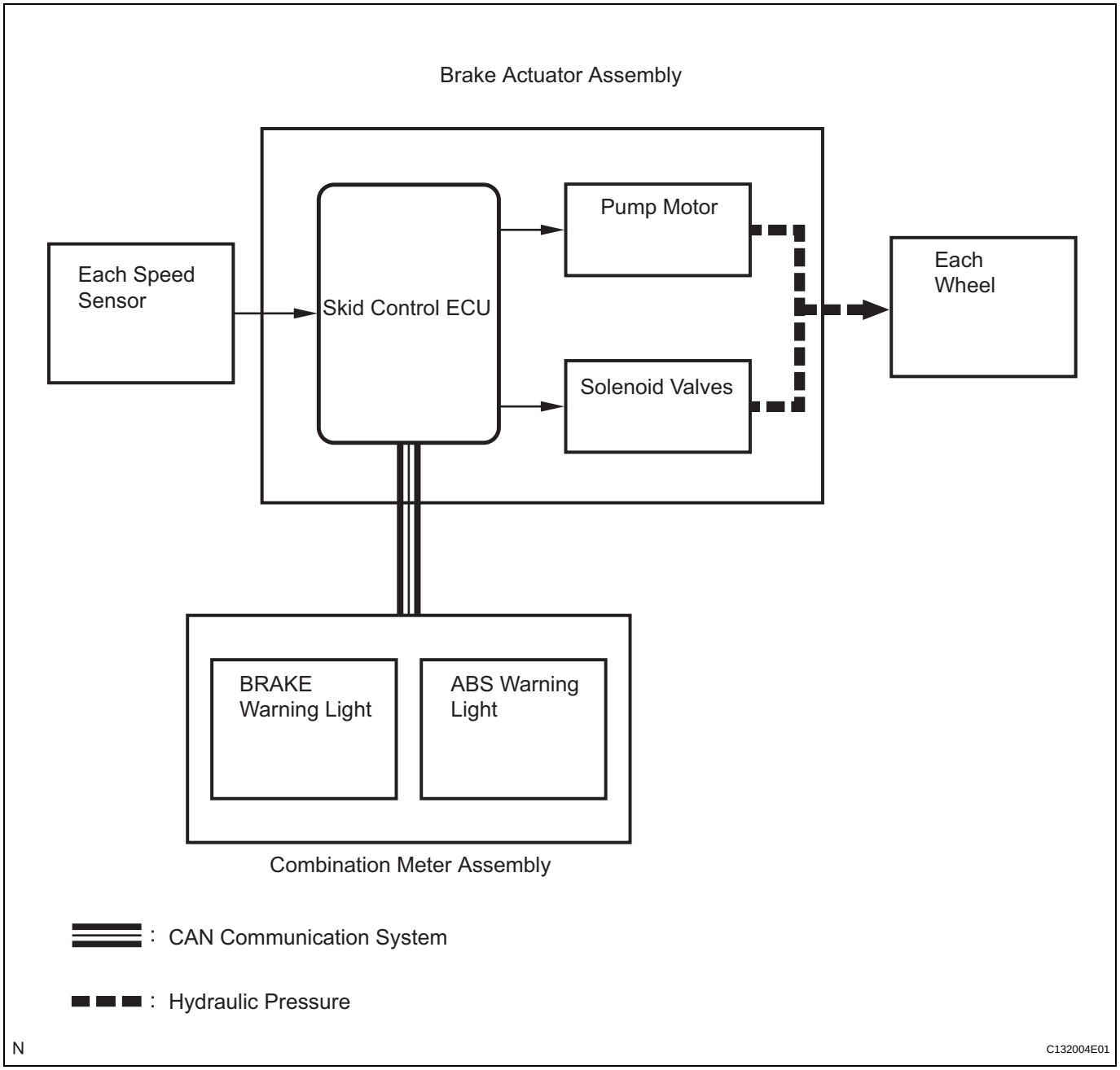
(Anti-lock Brake System)

The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.



Operation description
The skid control ECU detects wheel lock based on speed signals it receives from the wheel speed sensors. Based on this information, the skid control ECU controls the pump motor and solenoid valves. The pump motor and solenoid valves are used to prevent wheel lock by controlling the hydraulic pressure applied to the brakes at each wheel. The ABS warning light will come on when the system is malfunctioning.

(b) EBD
(Electronic Brake force Distribution)
The EBD control utilizes ABS, realizing proper brake force distribution between the front and rear wheels in accordance with driving conditions.
In addition, when braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.



Operation description
The skid control ECU receives a speed signal from each wheel speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves. The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The ABS and BRAKE warning lights come on if there is a malfunction in the EBD system.

2. ABS with EBD OPERATION

(a) Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates the deceleration and speed of each wheel, while monitoring for wheel lock. If wheel lock is occurring, the ECU controls the solenoid valves in the brake actuator in order to adjust the hydraulic pressure applied to the brakes at each wheel.

3. FAIL SAFE FUNCTION

(a) When a failure occurs in the anti-lock brake system, the ABS warning light comes on and operation is prohibited. In addition, when a failure which disables EBD operation occurs, the brake warning light also comes on and operation is prohibited (See page BC-24).

4. INITIAL CHECK

(a) When the vehicle speed first becomes approximately 4 mph (6 km/h) or more after the ignition switch is turned on (IG), each solenoid valve and motor of the brake actuator is sequentially activated to perform an electrical check. During the initial check, the operating sound of solenoid valve and motor can be heard from the engine compartment, but this is not a malfunction.

5. FUNCTION OF COMPONENTS

Components	Function
Brake actuator assembly	• Composed of the holding solenoid valve, pressure reduction solenoid valve, pump motor, reservoir, etc., and adjusts the hydraulic pressure applied to each wheel cylinder. • Houses the skid control ECU.
Skid control ECU	Processes the signals sent from each sensor to control ABS and EBD.
Speed sensor	Detects speed of each wheel and inputs the data into the skid control ECU.
Master cylinder	Generates pressure according to pedal effort.
Stop light switch	Illuminates the stop light when the brake pedal is depressed. (Sends a brake on signal to the skid control ECU)
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
Motor relay	• Supplies power to the pump motor. • Housed in the skid control ECU.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS and EBD has occurred. • Blinks to output DTC.

Components	Function
BRAKE warning light	• Comes on to inform the driver that the parking brake is on when the system is normal or the brake fluid level has decreased. • Comes on to inform the driver that a malfunction in the EBD has occurred.

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble.

NEXT

3	CHECK CAN COMMUNICATION SYSTEM

BC

(a) Check for DTCs (See page BC-21).
HINT:
The skid control ECU is connected to the CAN communication system.
Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → CHECK CAN COMMUNICATION CIRCUIT

A

4	CHECK DTC AND FREEZE FRAME DATA

(a) Check for DTCs and Freeze Frame Data (See page BC-21 for DTC Check / Clear, BC-23 for Freeze Frame Data).
(1) Record the DTCs and Freeze Frame Data.
(b) Clear the DTCs.
(c) Recheck for DTCs.
(1) Reproduce the malfunction and check if the DTCs are output again.

Result

Result	Proceed to
DTC is output	A
DTC is not output (Problem symptom does not occur)	B
DTC is not output (Problem symptom occurs)	C

B → GO TO STEP 9

C → GO TO STEP 10

A

5	DIAGNOSTIC TROUBLE CODE CHART

(a) Go to "DIAGNOSTIC TROUBLE CODE CHART" (See page BC-27).

NEXT

6	CIRCUIT INSPECTION

NEXT

7	REPAIR OR REPLACE

NEXT

8	CONFIRMATION TEST

NEXT

END

9	SYMPTOM SIMULATION

NEXT

10	PROBLEM SYMPTOMS TABLE

(a) Go to "PROBLEM SYMPTOMS TABLE" (See page BC-16).

NEXT

11	CIRCUIT INSPECTION

NEXT

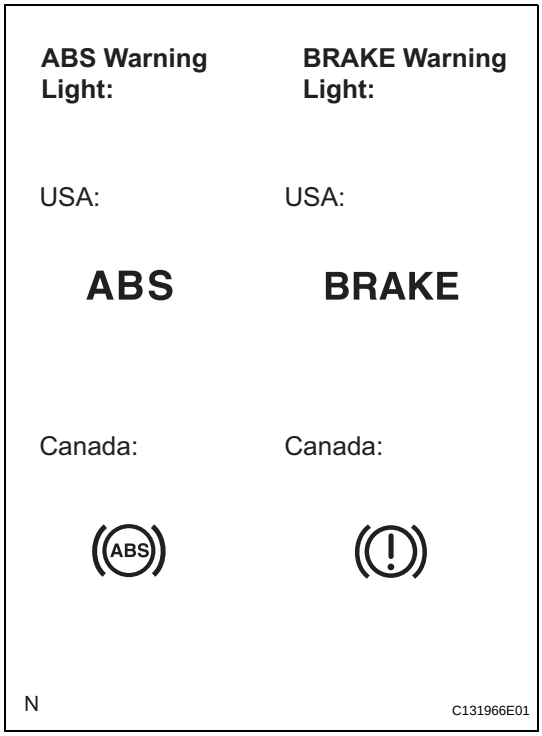
12	REPAIR OR REPLACE

NEXT

13	CONFIRMATION TEST

NEXT

END



TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

Before releasing the parking brake, move the shift lever to the P position for safety (AT model) or set the chocks to hold the vehicle for safety (MT model).

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS warning light comes on for approximately 3 seconds.

HINT:

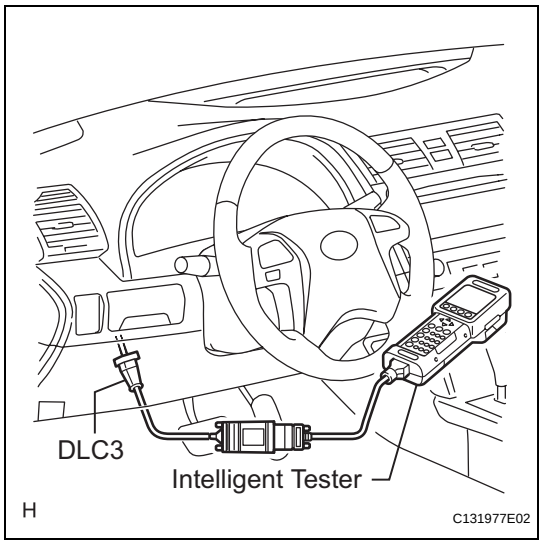
- If the skid control ECU stores any DTCs, the ABS and BRAKE warning lights come on.
- If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

Trouble Area	See procedure
ABS warning light (Remains on)	BC-74
ABS warning light circuit (Does not come on)	BC-78
BRAKE warning light (Remains on)	BC-81
BRAKE warning light (Does not come on)	BC-91

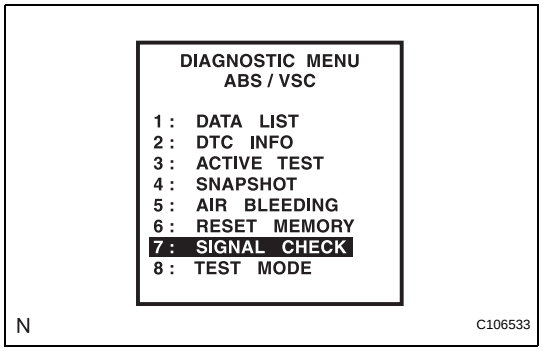
2. SENSOR SIGNAL CHECK USING TEST MODE (SIGNAL CHECK) (INTELLIGENT TESTER)

HINT:

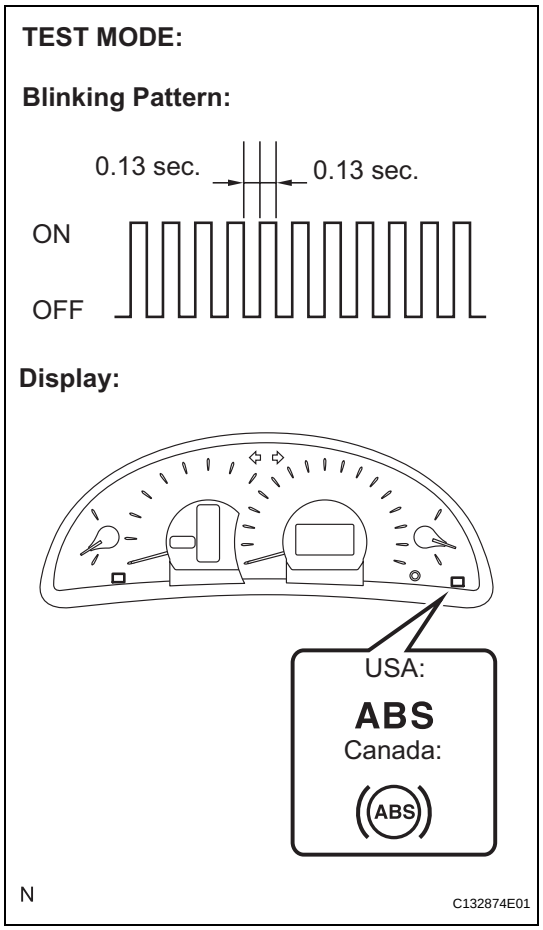
If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check function will be erased.



(a) Procedure to enter Test Mode.
(1) Turn the ignition switch off.
(2) Connect the intelligent tester to the DLC3.
(3) Check that the steering wheel is centered and move the shift lever to the P position (for Automatic Transaxle) or apply the parking brake (Manual Transaxle).
(4) Turn the ignition switch on (IG).



(5) Set the intelligent tester to Test Mode (select "SIGNAL CHECK").
HINT:
Refer to the intelligent tester operator's manual for further details.



(6) Check that the ABS warning light comes on for several seconds and then blinks in test mode.
HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit.

Trouble Area	See procedure
ABS warning light (Does not come on)	BC-78

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheel spin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

BC

(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**

(d) Read the DTC(s) by following the tester screen.
NOTICE:
- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

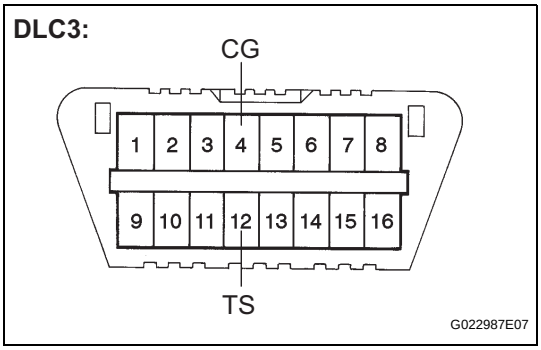
HINT:
See the list of DTCs (See procedure "A").

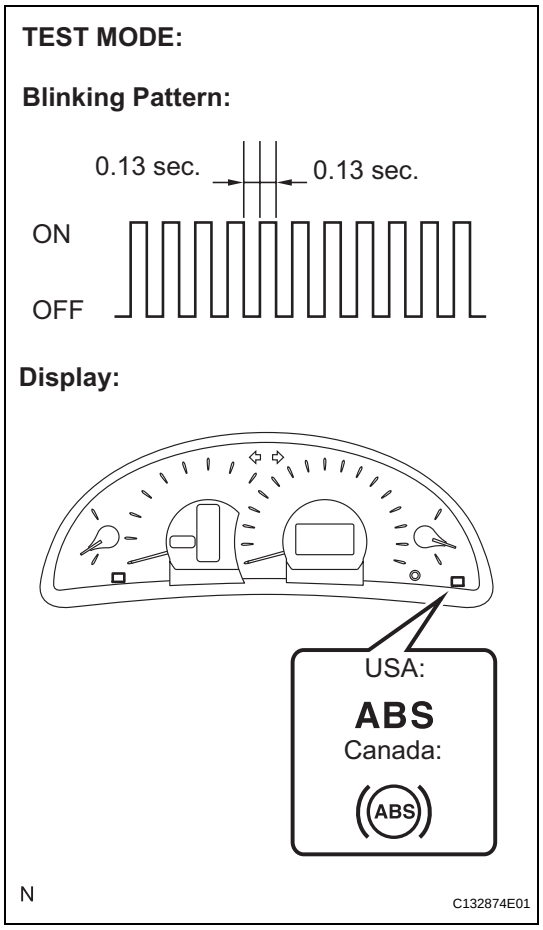
3. SENSOR SIGNAL CHECK BY TEST MODE (SIGNAL CHECK) (SST CHECK WIRE)

HINT:
If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check will be erased.

(a) Procedure for Test Mode.
(1) Turn the ignition switch off.
(2) Check that the steering wheel is centered and move the shift lever to the P position (Automatic Transaxle) or apply the parking brake (Manual Transaxle).
(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040
(4) Turn the ignition switch on (IG).

DLC3:





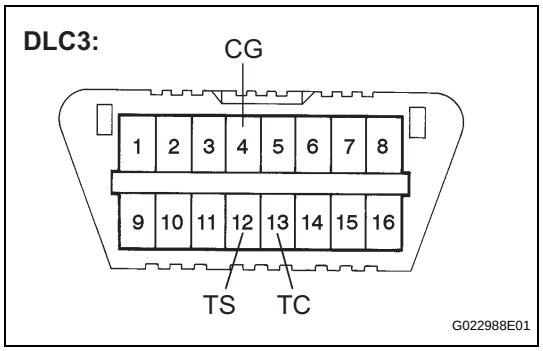
(5) Check that the ABS warning light comes on for several seconds and then blinks in Test Mode.
HINT:
If the ABS warning light does not blink, inspect the TS and CG terminal circuit, and ABS warning light circuit.

Trouble Area	See procedure
TS and CG terminal circuit	BC-97
ABS warning light circuit (Does not come on)	BC-78

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheel spin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**

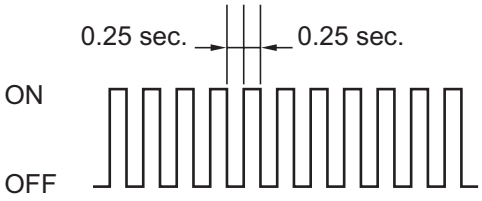
(d) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040



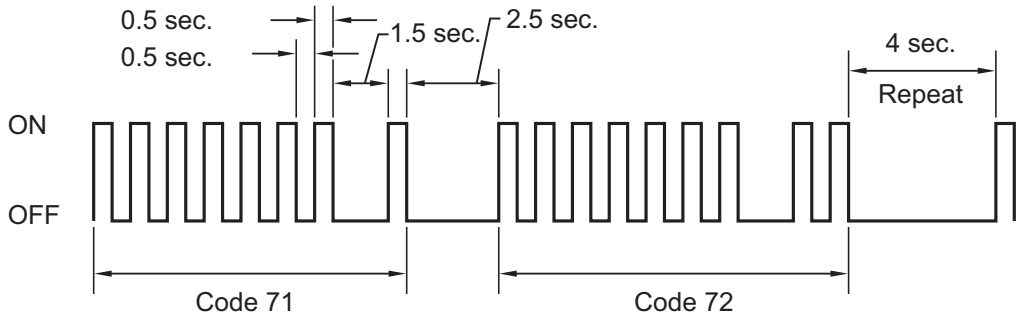
BC

(e) Count the number of blinks of the ABS warning light.

Blinking Pattern of Normal System Code:



Blinking Pattern of Trouble Code (Example Codes 71 and 72):



N

C132876E01

NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTCs (See procedure "A").

(f) After performing the check, disconnect the SST from terminals TS and CG, and TC and CG of the DLC3, and turn the ignition switch off.

(g) Turn the ignition switch on (IG) to cancel the test mode.

HINT:

- If the ignition switch is not turned on (IG) after the SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned on (IG) with terminals TS and CG shorted, the previous Test Mode will continue.

4. DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")

DTC of Test Mode (Signal Check):

Code No.	Diagnosis	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	• Front speed sensor RH • Front speed sensor circuit RH • Sensor installation
C1276/76	Abnormal change in output signal of front speed sensor LH	• Front speed sensor LH • Front speed sensor circuit LH • Sensor installation
C1277/77	Abnormal change in output signal of rear speed sensor RH	• Rear speed sensor RH • Rear speed sensor circuit RH • Sensor installation
C1278/78	Abnormal change in output signal of rear speed sensor LH	• Rear speed sensor LH • Rear speed sensor circuit LH • Sensor installation

HINT:
The codes in this table are output only in Test Mode (signal check).

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the skid control ECU, sensor, etc., turn the ignition switch off.

HINT:

- Inspect the fuses and relays before investigating the suspected areas as shown in the table below.
- Inspect each malfunction circuit in numerical order for the corresponding symptoms.

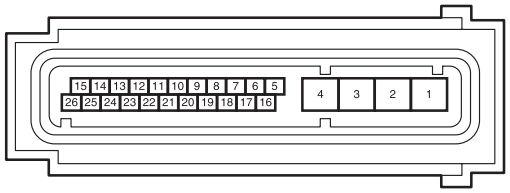
ANTI-LOCK BRAKE SYSTEM:

Symptom	Suspected area	See page
ABS does not operate	1. Check the DTC reconfirming that the normal system code is output	BC-21
	2. IG power source circuit	BC-63
	3. Front speed sensor circuit	BC-30
	4. Rear speed sensor circuit	BC-38
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function) If abnormal, check the hydraulic circuit for leakage	BR-42
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU)	BC-432
ABS does not operate efficiently	1. Check the DTC reconfirming that the normal system code is output.	BC-21
	2. Front speed sensor circuit	BC-30
	3. Rear speed sensor circuit	BC-38
	4. Stop light switch circuit	BC-67
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function)	BR-42
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU)	BC-432
ABS warning light malfunction (Remains on)	1. ABS warning light circuit	BC-74
	2. Brake actuator assembly (skid control ECU)	BC-432
ABS warning light malfunction (Does not come on)	1. ABS warning light circuit	BC-78
Brake warning light malfunction (Remains on)	1. Brake warning light circuit	BC-81
	2. Brake actuator assembly (skid control ECU)	BC-432
Brake warning light malfunction (Does not come on)	1. Brake warning light circuit	BC-91
	2. Brake actuator assembly (skid control ECU)	BC-432
ABS sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output	BC-21
	2. TS and CG terminal circuit	BC-97
	3. TC and CG terminal circuit	BC-94
	4. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU)	BC-432

TERMINALS OF ECU

1. TERMINALS OF ECU

Skid Control ECU (Brake Actuator Assembly):



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C131974E01

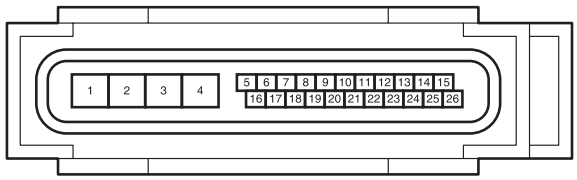
Symbols (Terminal No.)	Terminal Description
GND2 (1)	Actuator pump motor ground
+BM (2)	Motor relay power supply
+BS (3)	Solenoid valves power supply
GND1 (4)	Skid control ground
FL+ (5)	Front LH (+) wheel speed signal input
FL- (6)	Front LH (-) wheel speed signal input
RL+ (7)	Rear LH (+) wheel speed signal input
RR- (8)	Rear RH (-) wheel speed signal input
FR- (9)	Front RH (-) wheel speed signal input
FR+ (10)	Front RH (+) wheel speed signal input
D/G (11)	Diagnosis tester communication line
CANL (15)	CAN communication line L
RL- (17)	Rear LH (-) wheel speed signal input
IG1 (18)	ECU power supply
RR+ (19)	Rear RH (+) wheel speed signal input
STP (20)	Stop light switch input
SP1 (23)	Speed signal output for speedometer
TS (25)	Sensor check input
CANH (26)	CAN communication line H

BC

2. TERMINAL INSPECTION

(a) Disconnect the connector and measure the voltage or resistance on the wire harness side.
HINT:
Voltage cannot be measured with the connector connected to the skid control ECU as the connector is watertight.

Skid Control ECU (Harness Side Connector Front View):



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C131969E01

BC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (1) - Body ground	W-B - Body ground	Actuator pump motor ground	Always	Below 1 Ω
+BM (2) - Body ground	B - Body ground	Motor relay power supply	Always	10 to 14 V
+BS (3) - Body ground	L - Body ground	Solenoid valves power supply	Always	10 to 14 V
GND1 (4) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 Ω
IG1 (18) - Body ground	P - Body ground	ECU power supply	Ignition switch on (IG)	10 to 14 V
STP (20) - Body ground	P - Body ground	Stop light switch input	Stop light switch ON (Brake pedal depressed)	8 to 14 V
STP (20) - Body ground	P - Body ground	Stop light switch input	Stop light switch OFF (Brake pedal released)	Below 3 V

DIAGNOSIS SYSTEM

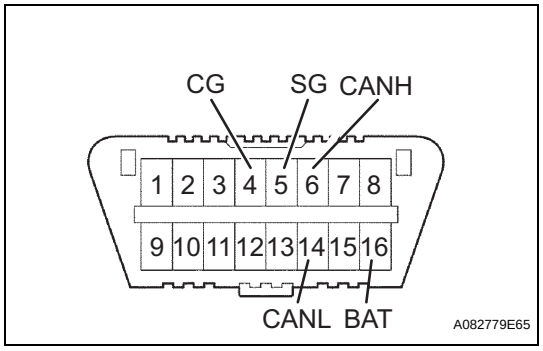
1. DIAGNOSIS SYSTEM

(a) Inspect the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.



(b) The vehicle's ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists on either the vehicle side or the tester side.

If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.

If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

BC

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher

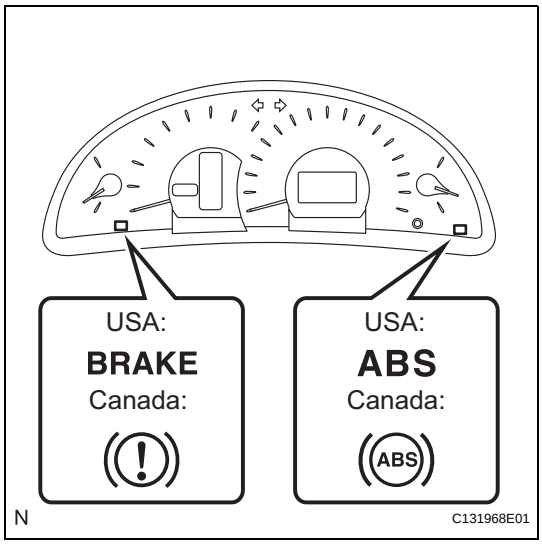
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

2. DIAGNOSIS

NOTICE:

When releasing the parking brake, set chocks to hold the vehicle for safety.



(a) Release the parking brake.
(b) Turn the ignition switch on (IG).
(c) If the skid control ECU detects a malfunction, the ABS warning light and brake warning light will come on to warn the driver. The table below indicates which light will come on when there is a malfunction in a particular function.

Item/Trouble Area	ABS System	EBD System	Skid Control ECU
ABS Warning light	○	○	○
Brake Warning light	-	○	○

○: Light ON
-: Light OFF

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST (09843-18043) between the TC and CG terminals of the DLC3 and observing the blinking pattern of the ABS warning light, or by connecting an intelligent tester (See page BC-21).
- This system has a sensor signal check function (See page BC-11).

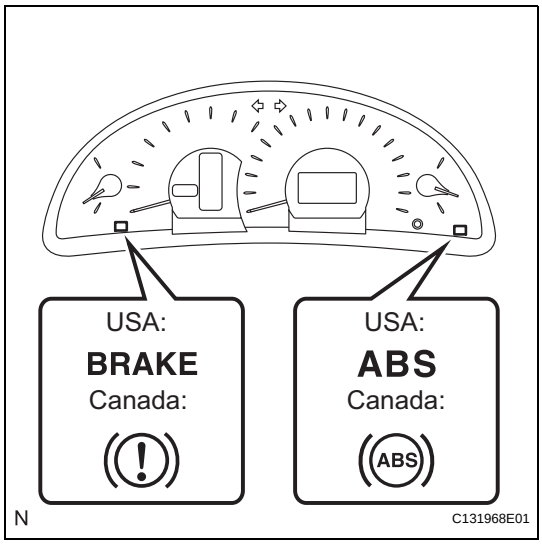
3. WARNING LIGHT INITIAL CHECK

NOTICE:

When releasing the parking brake, set chocks to hold the vehicle for safety.

HINT:

When the parking brake is applied or the level of the brake fluid is low, the brake warning light comes on.



(a) Release the parking brake.
(b) Check that the ABS warning light and brake warning light come on when the ignition switch is turned on (IG) and go off in approximately 3 seconds.
(c) If the warning lights do not come on or remain on, inspect the ABS warning light circuit and/or brake warning light circuit.

Trouble Area	See procedure
ABS warning light circuit (Remains on)	BC-74
ABS warning light circuit (Does not come on)	BC-78
Brake warning light circuit (Remains on)	BC-81
Brake warning light circuit (Does not come on)	BC-91

4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.

(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is turned on (IG)).

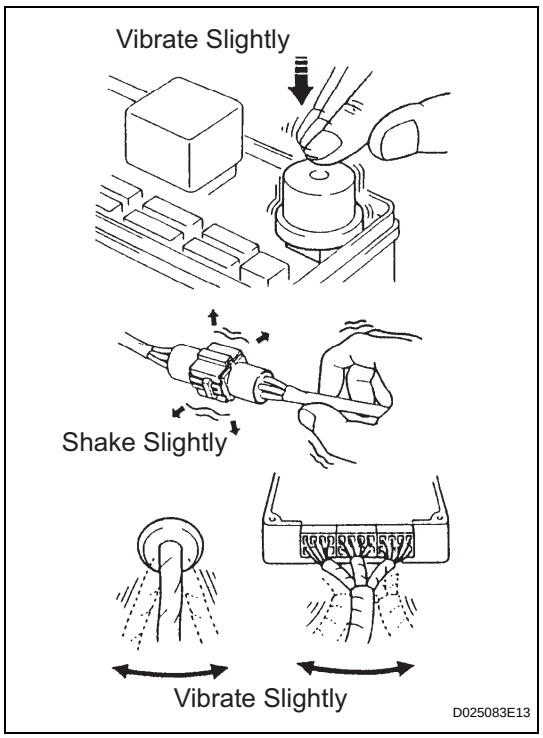
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

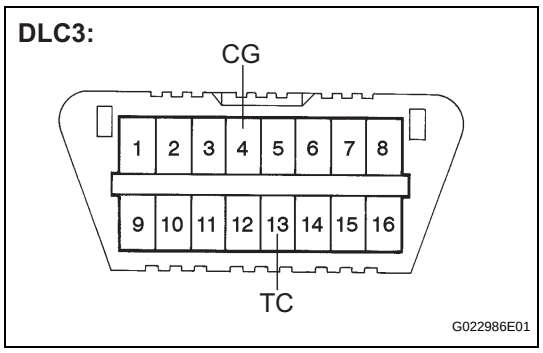
(2) Slightly shake the connector vertically and horizontally.

HINT:

Shaking the relays too strongly may result in open relays.

(3) Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.





DTC CHECK / CLEAR

1. DTC CHECK / CLEAR (SST CHECK WIRE)

(a) DTC check

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the ignition switch on (IG).

(3) Read the DTCs from the ABS warning light on the combination meter.

HINT:

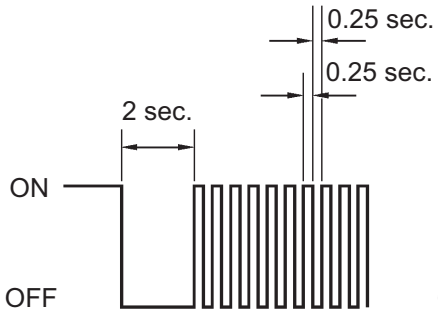
If no code appears, inspect the TC and CG terminal circuit and the ABS warning light circuit.

Trouble Area	See procedure
TC and CG terminal circuit	BC-94
ABS warning light circuit (Remains on)	BC-74
ABS warning light circuit (Does not come on)	BC-78

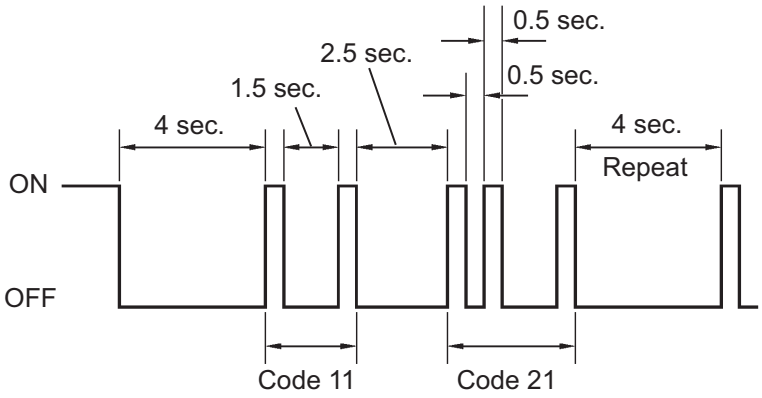
BC

(4) As an example, refer to the chart below for the blinking patterns of the normal system code and trouble codes 11 and 21.

Normal System Code:



Trouble Code (Example Codes 11 and 21):



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BC

(5) The codes are explained in the code table (See page BC-27).

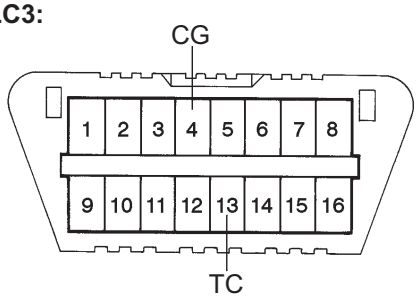
(6) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

(b) DTC clear

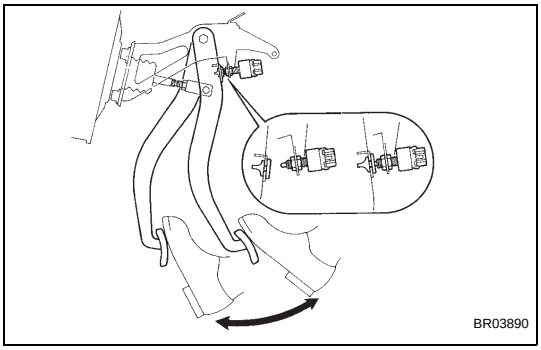
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the ignition switch on (IG).

DLC3:



G022986E01

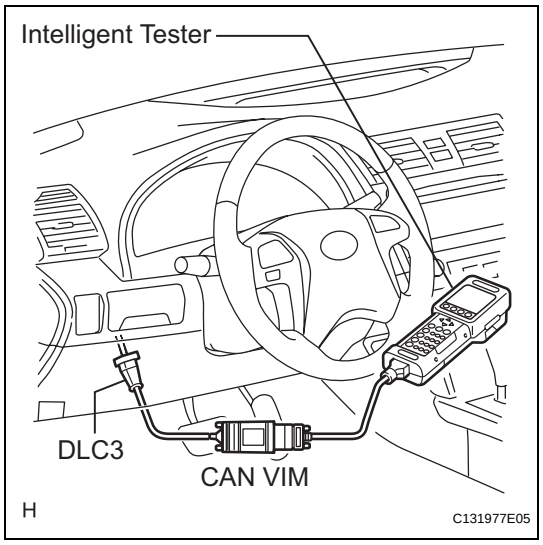


BR03890

(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.

(4) Check that the warning light indicates the normal system code.

(5) Remove the SST from the terminals of the DLC3.
HINT:
Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG fuse.



2. DTC CHECK/CLEAR (WHEN USING INTELLIGENT TESTER:)

(a) DTC check
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch on (IG).
  (3) Read the DTCs by following the prompts on the tester screen.

(b) DTC clear
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch on (IG).
  (3) Operate the intelligent tester to clear the codes.
  HINT:
  Refer to the intelligent tester operator's manual for further details.

3. END OF DTC CHECK/CLEAR

(a) Turn the ignition switch on (IG).

(b) Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

(a) Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) status as Freeze Frame Data.

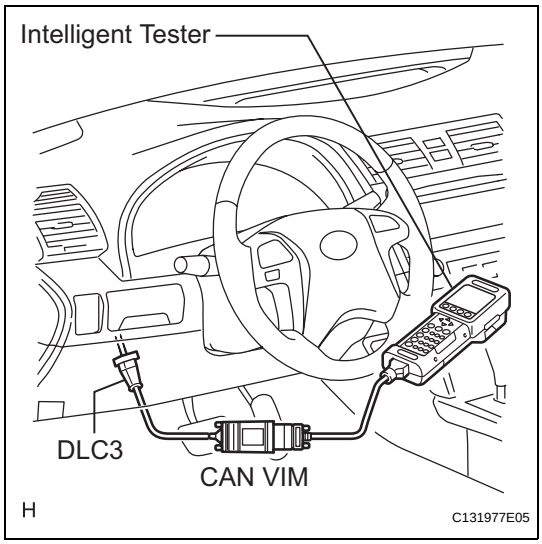
(b) The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to on (IG) since the last time the ABS was activated.
HINT:
- Freeze frame data at the time the ABS operates: The skid control ECU stores and updates data whenever the ABS system operates.
  When the skid control ECU stores data at the time a DTC is detected, the data stored during ABS operation is erased.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(c) Connect the intelligent tester to the DLC3.

(d) Turn the ignition switch on (IG).

(e) Select "DTC INFO" on the tester display.

(f) On the DTC data display screen, select the DTC data display with "*".



Intelligent Tester Display	Measurement Item	Reference Value
TROUBLE CODE	Freeze DTC	min.: 0, max.: 65535
#DTC	Number of trouble codes	min.: 0, max.: 255
FREEZE TIME	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
#IG ON	Number of operations of ignition switch on (IG) after storing freeze frame data	0 to 31
STOP LAMP SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
PARKING BRAKE SW	Parking brake condition	ON: Parking brake on OFF: Parking brake off
OPERATED SYSTEM	Operated system	ABS operated: ABS
FR WHEEL SPD	Front right wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)
FL WHEEL SPD	Front left wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)
RR WHEEL SPD	Rear right wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)

Intelligent Tester Display	Measurement Item	Reference Value
RL WHEEL SPD	Rear left wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)
VEHICLE SPD	Vehicle speed reading	Speed indication on the meter
SPD GRADE	Vehicle speed grade	Min.: -1.869 G, Max.: 1.869 G

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

If there is a problem with sensor signals or brake actuator systems, the skid control ECU will prohibit power supply to the brake actuator and terminate ABS control.

ABS control will be prohibited, but EBD control continues as much as possible. If EBD control is impossible, the brake warning light will come on to warn the driver (See page BC-19).

Malfunction Area	Control Method
ABS system	Prohibits the ABS control
EBD system	Prohibits the ABS and EBD control

HINT:

If the ABS system has a malfunction, the brake system will operate normally without ABS control.

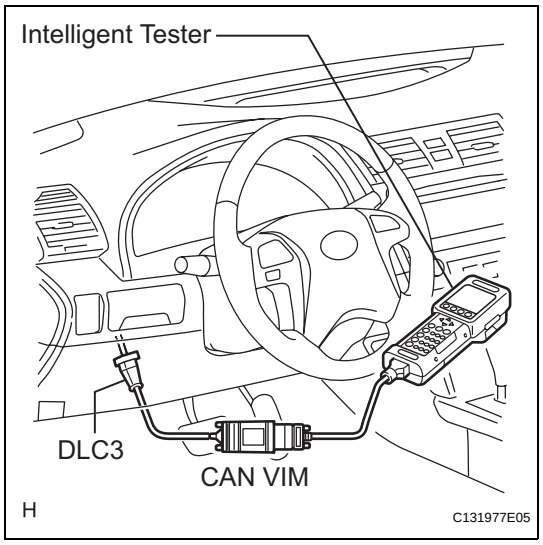
DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the intelligent tester, the value of the switch, sensor, actuator and other items can be read without removing any parts. Reading the DATA LIST as a first step in troubleshooting is one of the methods to save labor time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) According to the display on the tester, read the "DATA LIST".



DATA LIST:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	ON: During pump motor operation OFF: No pump motor operation	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
VEHICLE SPD	Vehicle speed reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL: 9.5 V or over TOO LOW: Below 9.5 V	-
SFRR	ABS solenoid (SFRR) ON / OFF	ON: Operates	-
SFRH	ABS solenoid (SFRH) ON / OFF	ON: Operates	-
SFLR	ABS solenoid (SFLR) ON / OFF	ON: Operates	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SFLH	ABS solenoid (SFLH) ON / OFF	ON: Operates	-
SRRR	ABS solenoid (SRRR (SRR)) ON / OFF	ON: Operates	-
SRRH	ABS solenoid (SRRH (SRH)) ON / OFF	ON: Operates	-
SRLR	ABS solenoid (SRLR) ON / OFF	ON: Operates	-
SRLH	ABS solenoid (SRLH) ON / OFF	ON: Operates	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of DTCs recorded / min.: 0, max.: 255	Min.: 0, max.: 19	-
ABS WARN LAMP	ABS warning light ON /OFF	ON: ABS warning light ON OFF: ABS warning light off	-
BRAKE WARN LAMP	Brake warning light ON / OFF	ON: Brake warning light ON OFF: Brake warning light off	-
FR WHEEL ACCEL	Front right wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
FL WHEEL ACCEL	Front left wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
RR WHEEL ACCEL	Rear right wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
RL WHEEL ACCEL	Rear left wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
FR ABS STATUS	Front right ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
FL ABS STATUS	Front left ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
RR ABS STATUS	Rear right ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
RL ABS STATUS	Rear left ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
FR EBD STATUS	Front right EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-
FL EBD STATUS	Front left EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-
RR EBD STATUS	Rear right EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-
RL EBD STATUS	Rear left EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-

BC

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay, actuator and other items to operate without removing any parts. Performing the ACTIVE TEST as a first step in troubleshooting is one of the methods to save labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) According to the display on the tester, perform the "ACTIVE TEST".

ACTIVE TEST:

Item	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
MOT RELAY	Turns ABS motor relay ON / OFF	Operating sound of motor can be heard
ABS WRN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Turns Brake warning light ON / OFF	Observe combination meter

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

Turn the ignition switch off before removing parts.

HINT:

- If no abnormality is found when inspecting parts, inspect the skid control ECU and ground points for poor contact.
- If a malfunction code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the "See page" for respective "DTC No." in the DTC chart.
- When 2 or more DTCs are detected, perform circuit inspection one by one until the problem is identified.

ANTI-LOCK BRAKE SYSTEM:

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor RH 2. Front speed sensor RH circuit 3. Front speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-30
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor LH 2. Front speed sensor LH circuit 3. Front speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-30
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor RH 2. Rear speed sensor RH circuit 3. Rear speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-38
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor LH 2. Rear speed sensor LH circuit 3. Rear speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-38
C0226/21	SFR Solenoid Circuit	1. SFRR or SFRH circuit 2. Brake actuator assembly	BC-47
C0236/22	SFL Solenoid Circuit	1. SFLR or SFLH circuit 2. Brake actuator assembly	BC-47
C0246/23	SRR Solenoid Circuit	1. SRRR or SRRH circuit 2. Brake actuator assembly	BC-47
C0256/24	SRL Solenoid Circuit	1. SRLR or SRLH circuit 2. Brake actuator assembly	BC-47
C0273/13	Open or Short Circuit in ABS Motor Relay Circuit	1. Brake actuator assembly (motor relay) 2. ABS No. 1 fuse (Fusible link) 3. Wire harness (+BM circuit)	BC-49
C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit	1. Brake actuator assembly (solenoid relay) 2. ABS No. 2 fuse (Fusible link) 3. Wire harness (+BS circuit)	BC-53

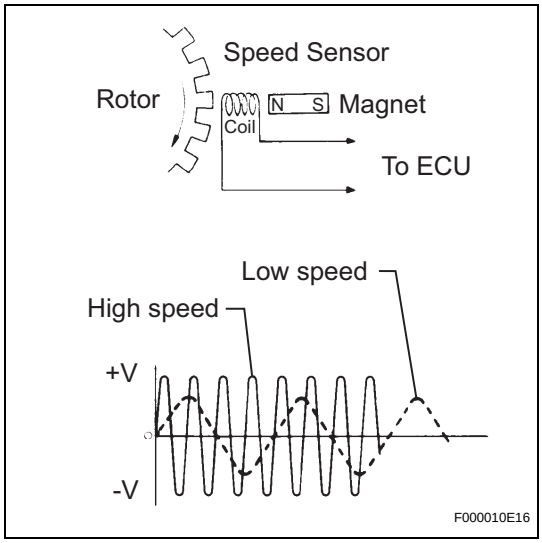
DTC No.	Detection Item	Trouble Area	See page
C1237/37	Speed Sensor Rotor Faulty	1. Brake actuator assembly (skid control ECU) 2. Speed sensor rotor (Front) 3. Rear axle hub and bearing assembly 4. Speed sensor 5. Speed sensor circuit 6. Tire and wheel size 7. Tire deformation	BC-56
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	1. Battery 2. Charging system 3. Power source circuit 4. Brake actuator assembly (Skid control ECU)	BC-63
C1249/49	Open in Stop Light Switch Circuit	1. Stop light switch 2. Stop light switch circuit 3. Brake actuator assembly (Skid control ECU)	BC-67
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Skid control rotor	BC-30
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Skid control rotor	BC-30
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Skid control rotor	BC-38
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Skid control rotor	BC-38
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Front speed sensor circuit RH 3. Sensor installation	BC-30
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Front speed sensor circuit LH 3. Sensor installation	BC-30
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Sensor rotor	BC-38
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Sensor rotor	BC-38
C1300/62	Skid Control ECU Malfunction	Brake actuator assembly (skid control ECU)	BC-72
C1330/35	Right Front Speed Sensor Circuit	1. Front speed sensor RH 2. Front speed sensor RH circuit 3. Sensor installation	BC-30
C1331/36	Left Front Speed Sensor Circuit	1. Front speed sensor LH 2. Front speed sensor LH circuit 3. Sensor installation	BC-30
C1332/38	Right Rear Speed Sensor Circuit	1. Rear speed sensor RH 2. Rear speed sensor RH circuit 3. Sensor installation	BC-38
C1333/39	Left Rear Speed Sensor Circuit	1. Rear speed sensor LH 2. Rear speed sensor LH circuit 3. Sensor installation	BC-38
U0073/94	Control Module Communication Bus OFF	1. Wire harness (CANL, CANH circuit) 2. Brake actuator assembly (skid control ECU)	BC-73

DTC	**C0200/31**	**Right Front Wheel Speed Sensor Signal Malfunction**
DTC	**C0205/32**	**Left Front Wheel Speed Sensor Signal Malfunction**
DTC	**C1271/71**	**Low Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1272/72**	**Low Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1275/75**	**Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1276/76**	**Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1330/35**	**Right Front Speed Sensor Circuit**
DTC	**C1331/36**	**Left Front Speed Sensor Circuit**

BC

DESCRIPTION

The speed sensors detect wheel speed and transmit the signals to the skid control ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71 to C1276/76 can be deleted when the speed sensor sends a wheel speed signal or the test mode ends. DTCs C1271/71 to C1276/76 are output only in the test mode.

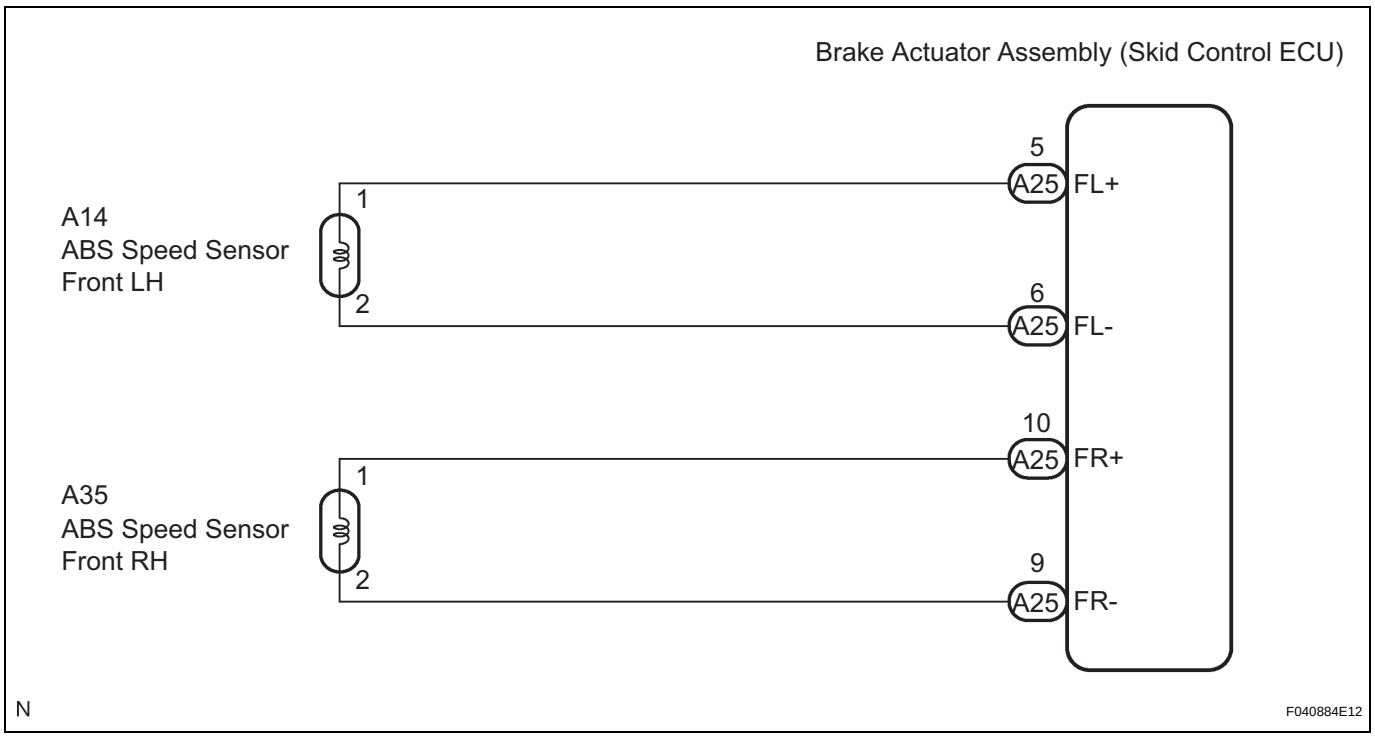


DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h), and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h) after the initial start or restart, a wheel speed of 0 mph (0 km/h) is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Front speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1330/35 C1331/36	Abnormality in the resistance value of each speed sensor is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Sensor installation
C1271/71 C1272/72	Detected only during test mode.	• Front speed sensor • Sensor installation • Sensor rotor
C1275/75 C1276/76	Detected only during test mode.	• Front speed sensor • Front speed sensor circuit • Sensor installation

HINT:
DTC No. C0200/31 and C1330/35 are for the front speed sensor RH.
DTC No. C0205/32 and C1331/36 are for the front speed sensor LH.

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

BC

OK

2 PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-11).

Result

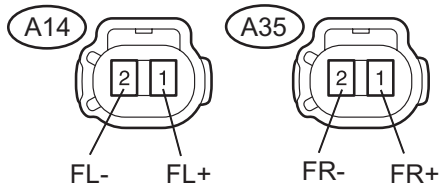
Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

B → **Go to step 5**

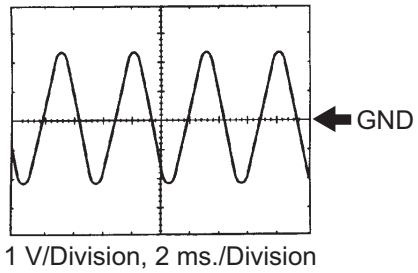
A

3 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Front Speed Sensor (Wire Harness Side) Connector Front View:



Normal Signal Waveform:



C132005E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.
  OK:
  The same waveform is output from front wheels and there is no noise or interference in the waveform.
  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
(c) Connect the connector.

NG → **Go to step 11**

OK

4 RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-21).
  HINT:
  Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output (When troubleshooting in accordance with the DTC CHART)	C

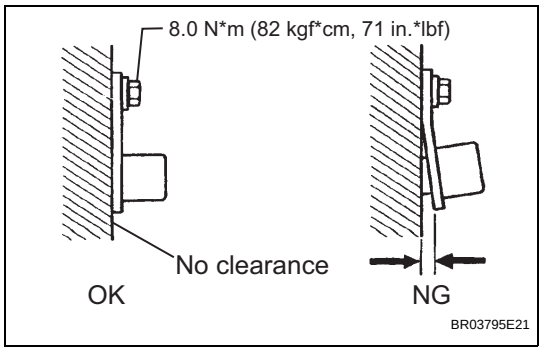
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

C → **END**

BC

A

5 INSPECT FRONT SPEED SENSOR INSTALLATION



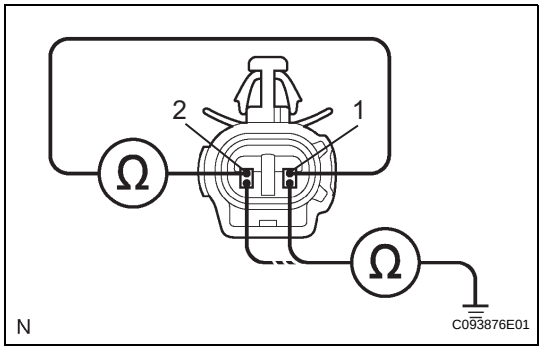
(a) Check the front speed sensor installation.
OK:
The installation bolt is tightened properly.
There is no clearance between the sensor and front steering knuckle.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE FRONT SPEED SENSOR (See page BC-438)**

BC

OK

6 INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.
(b) Disconnect the front speed sensor connectors.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
LH

Tester Connection	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	0.92 to 1.22 kΩ at 20 °C (68°F)
A14-1 (FL+) - Body ground	10 kΩ or higher
A14-2 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A35-1 (FR+) - A35-2 (FR-)	0.92 to 1.22 kΩ at 20 °C(68°F)
A35-1 (FR+) - Body ground	10 kΩ or higher
A35-2 (FR-) - Body ground	10 kΩ or higher

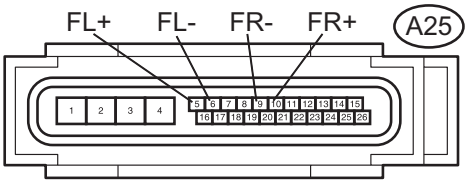
NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE FRONT SPEED SENSOR (See page BC-438)**

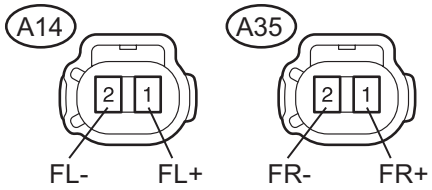
OK

7 CHECK HARNESS AND CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)

Skid Control ECU (Wire Harness Side) Connector Front View:



Front Speed Sensor (Wire Harness Side) Connector Front View:



N

C132908E02

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A25-5 (FL+) - A14-1 (FL+)	Below 1 Ω
A25-6 (FL-) - A14-2 (FL-)	Below 1 Ω
A14-1 (FL+) - Body ground	10 kΩ or higher
A14-2 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A25-10 (FR+) - A35-1 (FR+)	Below 1 Ω
A25-9 (FR-) - A35-2 (FR-)	Below 1 Ω
A35-1 (FR+) - Body ground	10 kΩ or higher
A35-2 (FR-) - Body ground	10 kΩ or higher

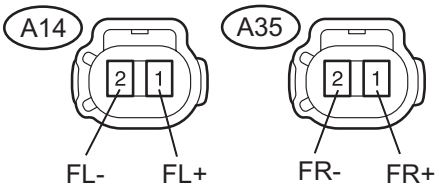
(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)**

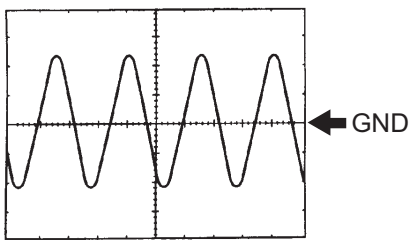
OK

8 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Front Speed Sensor (Wire Harness Side) Connector Front View:



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C132005E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.

  OK:

  The same waveforms is output from front wheels and there is no noise or interference in the waveform.

  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

  (4) Connect the connector.

NG → **Go to step 11**

BC

OK

9	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.
HINT:
If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step before replacing the part (See page BC-16).

BC

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

10	RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output	B

B → **END**

A

11	INSPECT SPEED SENSOR TIP

(a) Remove the front speed sensor (See page BC-438).
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-11).
(c) Install the speed sensor.

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

CLEAN OR REPLACE SPEED SENSOR ROTOR

DTC	**C0210/33**	**Right Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C0215/34**	**Left Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C1273/73**	**Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1274/74**	**Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1277/77**	**Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1278/78**	**Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1332/38**	**Right Rear Speed Sensor Circuit**
DTC	**C1333/39**	**Left Rear Speed Sensor Circuit**

BC

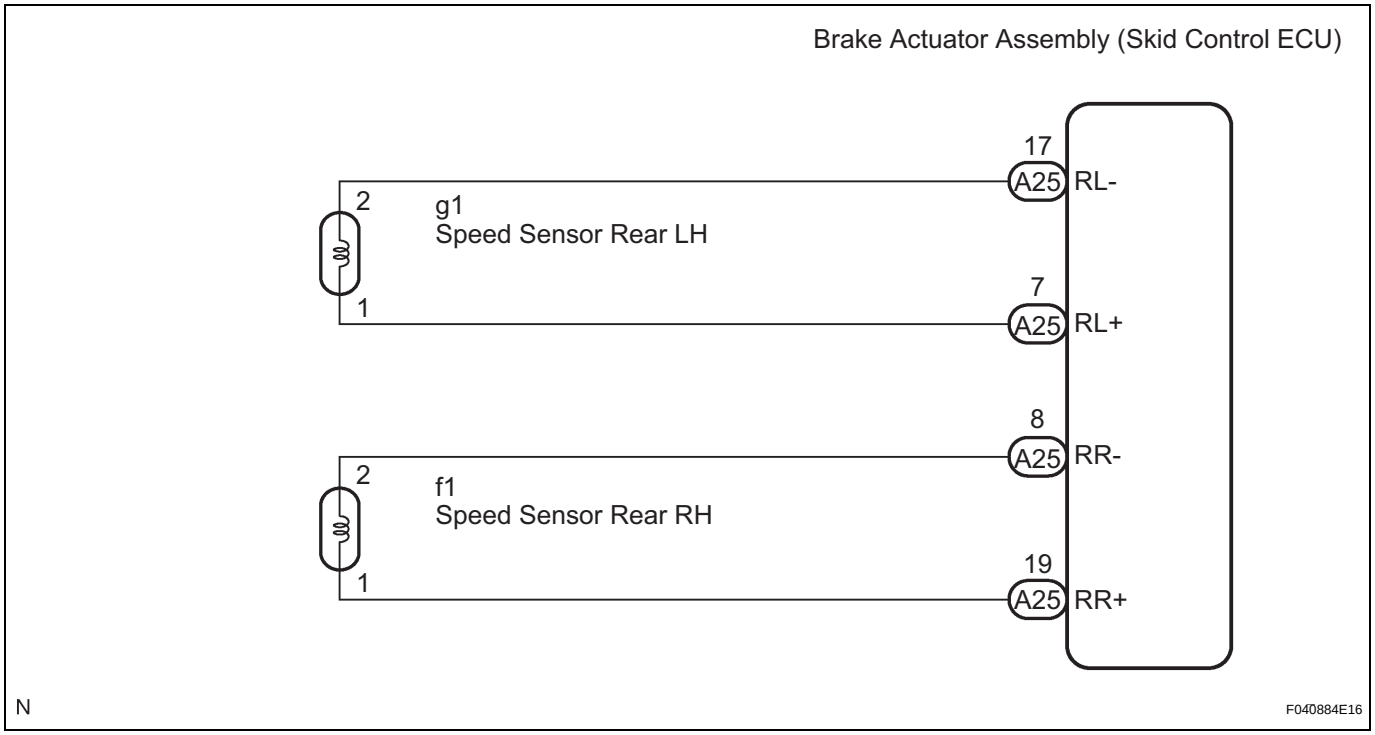
DESCRIPTION

Refer to DTCs C0200/31, C0205/32, C1330/35, and C1331/36 (See page BC-30).
DTCs from C1273/73 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs from C1273/73 to C1278/78 are output only in the test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h), and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h), after the initial start or restart a wheel speed of 0 mph (0 km/h) is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Rear speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1332/38 C1333/39	Abnormality in the resistance value of each speed sensor is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Sensor installation
C1273/73 C1274/74	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor
C1277/77 C1278/78	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor

HINT:
DTC No. C0210/33 and C1332/38 are for the rear speed sensor RH.
DTC No. C0215/34 and C1333/39 are for the rear speed sensor LH.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

OK

2	PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-11).

Result

Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

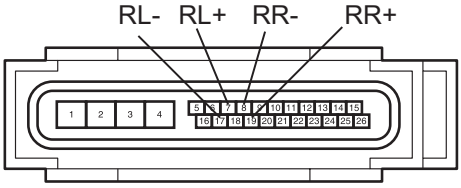
B → **Go to step 5**

A

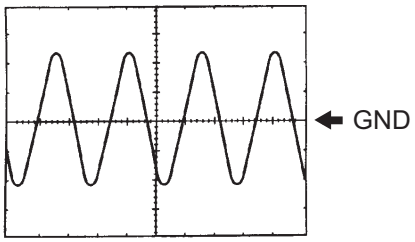
3	INSPECT SPEED SENSOR SIGNAL WAVEFORM

BC

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



C132907E02

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the skid control ECU connector.
  (2) Connect the oscilloscope to terminals of the skid control ECU.
  (3) Check that a waveform is output when the tires are rotated.
    OK:
    The same waveform is output from rear wheels and there is no noise or interference in the waveform.
    HINT:
    - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
    - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connector.

NG → **CLEAN OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

4	RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.

(c) Check if the same DTCs are recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	A
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output (When troubleshooting in accordance with the DTC CHART)	C

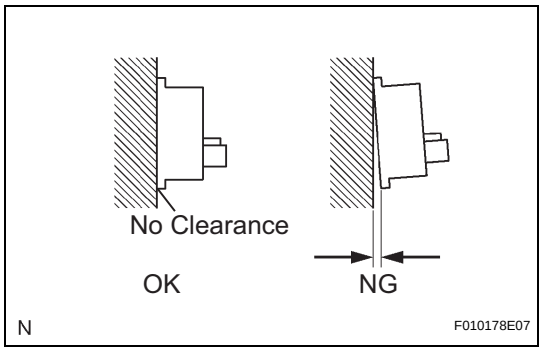
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

C → **END**

BC

A

5 INSPECT SPEED SENSOR INSTALLATION

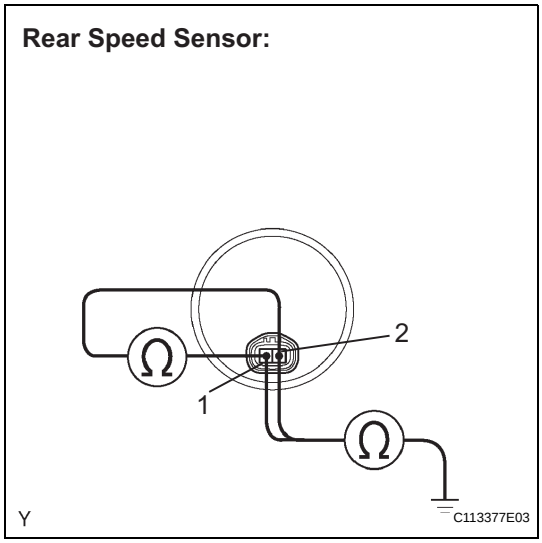


(a) Check the rear speed sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.
NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE REAR SPEED SENSOR (See page BC-443)**

OK

6	INSPECT REAR SPEED SENSOR



(a) Disconnect the rear speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 (RL+) - g1-2 (RL-)	Below 2.2 kΩ
g1-1 (RL+) - Body ground	10 kΩ or higher
g1-2 (RL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 (RR+) - f1-2 (RR-)	Below 2.2 kΩ
f1-1 (RR+) - Body ground	10 kΩ or higher
f1-2 (RR-) - Body ground	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

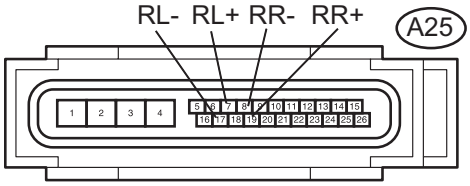
NG → **REPLACE REAR SPEED SENSOR (See page BC-443)**

OK

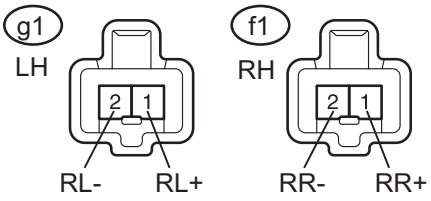
BC

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE TO SKID CONTROL ECU)

Skid Control ECU (Wire Harness Side) Connector Front View:



Front Speed Sensor (Wire Harness Side) Connector Front View:



N

C132909E03

(a) Check harness and connector.
(1) Disconnect the skid control ECU connector.
(2) Disconnect the skid control sensor wire.
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A25-7 (RL+) - g1-1 (RL+)	Below 1 Ω
A25-17 (RL-) - g1-2 (RL-)	Below 1 Ω
g1-1 (RL+) - Body ground	10 kΩ or higher
g1-2 (RL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A25-19 (RR+) - f1-1 (RR+)	Below 1 Ω
A25-8 (RR-) - f1-2 (RR-)	Below 1 Ω
f1-1 (RR+) - Body ground	10 kΩ or higher
f1-2 (RR-) - Body ground	10 kΩ or higher

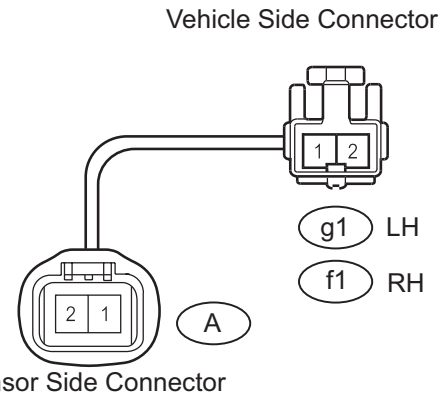
BC

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO SKID CONTROL SENSOR WIRE)**

OK

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE TO REAR SPEED SENSOR)

Skid Control Sensor Wire:



C113396E04

(a) Check harness and connector (skid control sensor wire).
(1) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 - A-1	Below 1 Ω
g1-1 - A-2	10 kΩ or higher
g1-1 - Body ground	10 kΩ or higher
g1-2 - A-2	Below 1 Ω
g1-2 - A-1	10 kΩ or higher
g1-2 - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 - A-1	Below 1 Ω

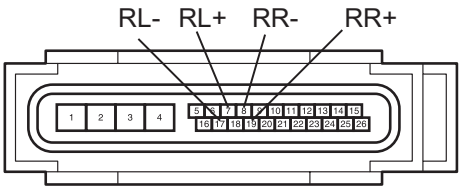
Tester Connection	Specified Condition
f1-1 - A-2	10 kΩ or higher
f1-1 - Body ground	10 kΩ or higher
f1-2 - A-2	Below 1 Ω
f1-2 - A-1	10 kΩ or higher
f1-2 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE SKID CONTROL SENSOR WIRE**

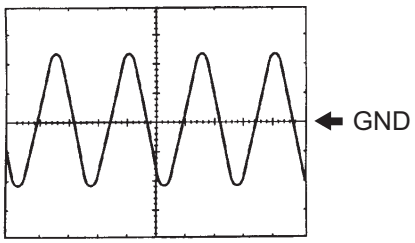
OK

9 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C132907E02

(a) Lift up the vehicle.
(b) Perform the inspection using the oscilloscope.
  (1) Disconnect the skid control ECU connector.
  (2) Connect the oscilloscope to terminals of the skid control ECU.
  (3) Check that a waveform is output when the tires are rotated.
    OK:
    The same waveforms is output from rear wheels and there is no noise or interference in the waveform.
    HINT:
    - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
    - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connectors.

NG → **CLEAN OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

10 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

HINT:

- It is suspected that the DTCs were output due to a bad connection of the connector terminal.
- If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step (See page BC-16).

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

11 RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-21).

HINT:

Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	A
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output	B

B → **END**

A

12 INSPECT SPEED SENSOR ROTOR

(a) Turn the ignition switch off.
(b) Remove the rear axle (See page AH-15).

(c) Check the rotor.
OK:
No scratches, cracks, oil, or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-11).

(d) Install the rear axle (See page AH-16).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

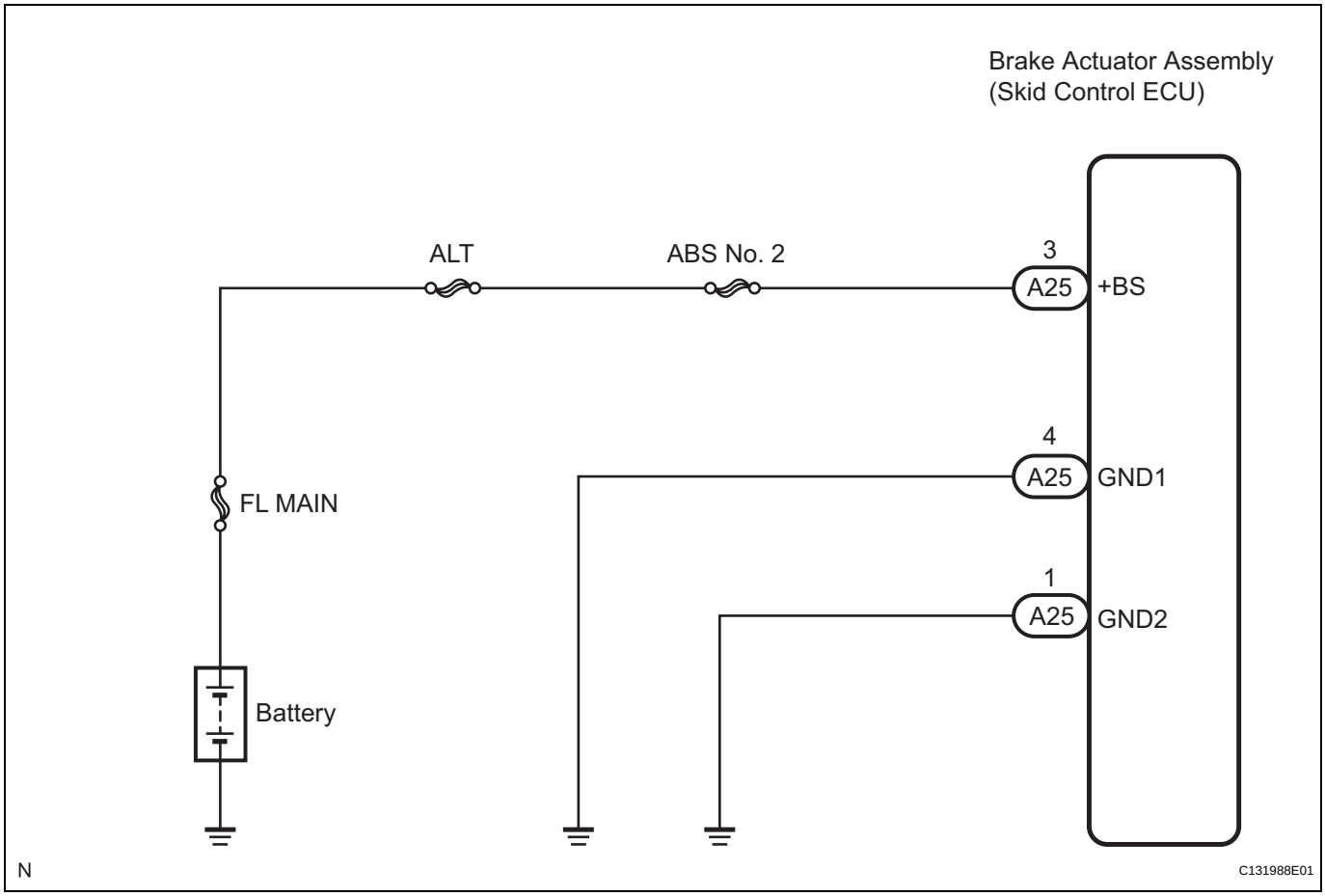
DESCRIPTION

These solenoids turn on when signals are received from the ECU and they control the pressure acting on the wheel cylinders thus controlling braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Solenoid valve signal does not match the check result.	• Each solenoid circuit • Brake actuator assembly

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are detected when a problem is identified in the brake actuator assembly.
The solenoid circuit is in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:

- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPAIR BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

DTC	C0273/13	Open or Short Circuit in ABS Motor Relay Circuit

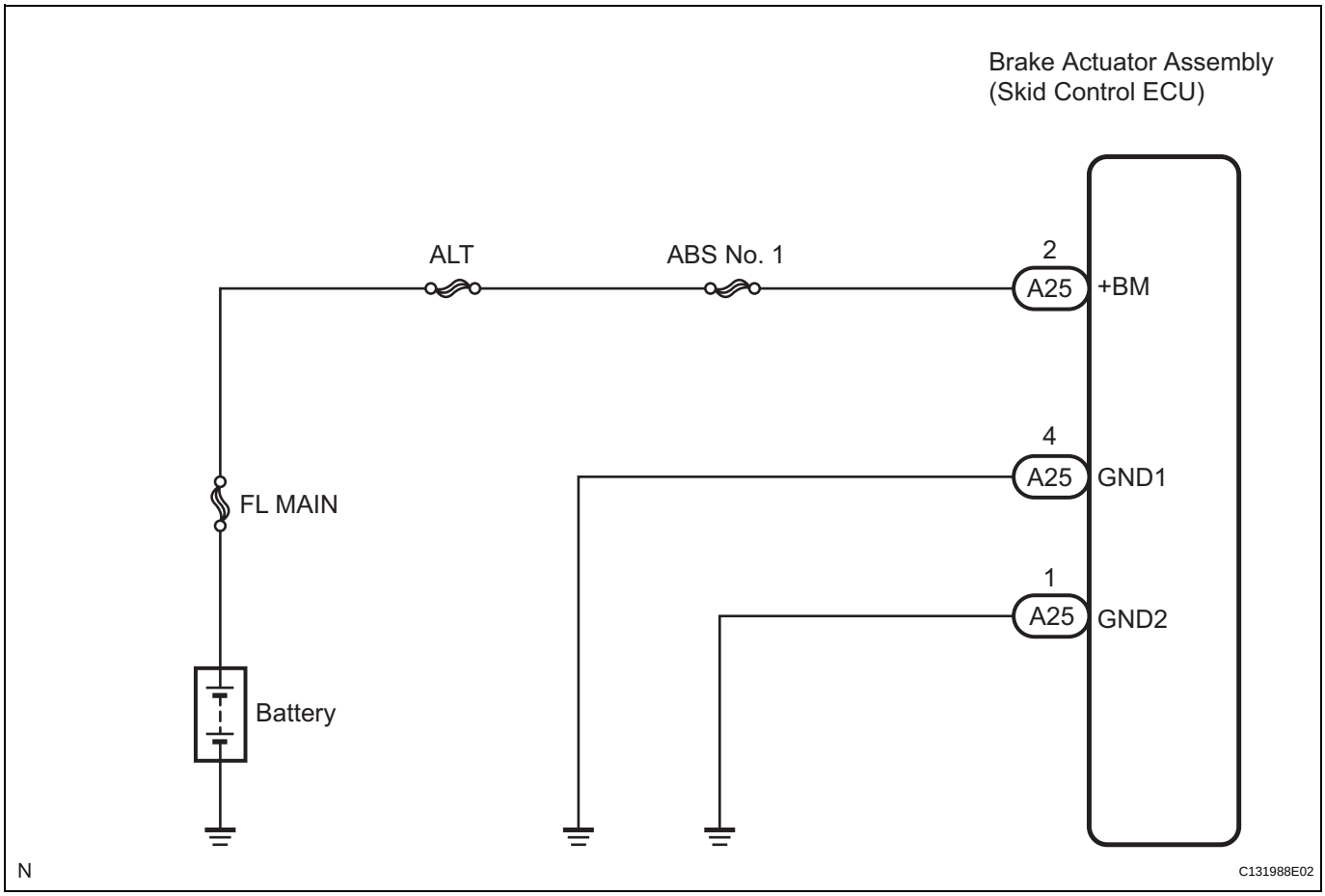
DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU turns the motor relay on and operates the ABS pump motor.
If the voltage supplied to the motor relay (+BM) is below the DTCs detection threshold due to low voltage from the battery or alternator, the DTC may be stored.

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	When any of the following is detected: • When the motor relay is actuated, voltage is not supplied to the pump motor within 0.1 second. • When the motor relay is changed from ON to OFF, the remaining high voltage is more than 2 V for 1 second. • For 30 to 125 msec. after the motor relay is turned from ON to OFF, the remaining high voltage is out of range. The voltage is still out of range when the motor relay is turned from ON to OFF 3 times.	• ABS No. 1 fuse (Fusible link) • Wire harness (+BM circuit) • Brake actuator assembly (motor relay)

BC

WIRING DIAGRAM



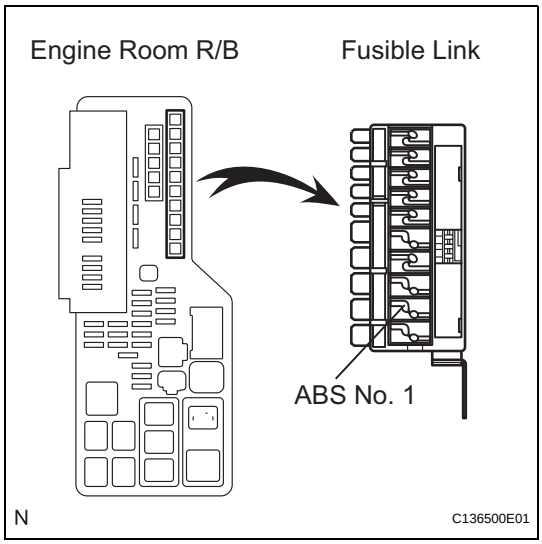
INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0273/13, inspect and repair the trouble areas indicated by C1241/41 (See page BC-63).

- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	INSPECT FUSIBLE LINK (ABS NO. 1 FUSE)



(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is melted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "ACTIVE TEST" on the intelligent tester (See page BC-25).

ACTIVE TEST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
ABS MTR RELAY	Turns ABS motor relay ON / OFF	Operating sound of motor is heard

(d) Check the operating sound of the ABS motor relay when operating it with the intelligent tester.
OK:
The operating sound of the ABS motor relay should be heard.

Result

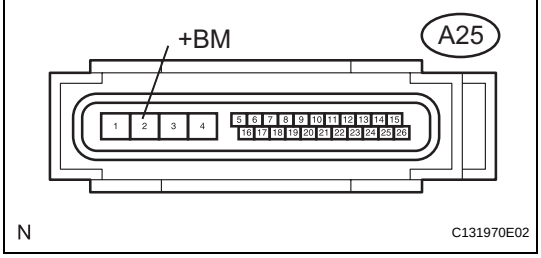
Result	Proceed to
The operating sound is not heard	A
The operating sound is heard	B

B → **Go to step 5**

A

3 INSPECT SKID CONTROL ECU CONNECTOR (+BM TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

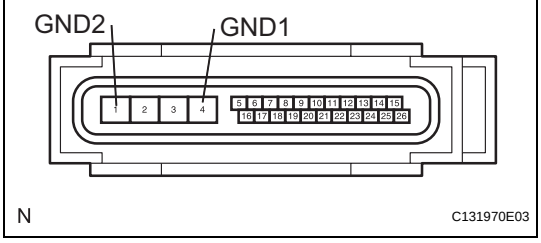
Tester Connection	Condition	Specified Condition
A25-2 (+BM) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BM CIRCUIT)**

OK

4 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

5 RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The ABS motor relay is in the brake actuator assembly. Therefore, ABS motor relay inspection and motor relay unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A

Condition	Proceed to
DTC is output	B

HINT:

- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

BC

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

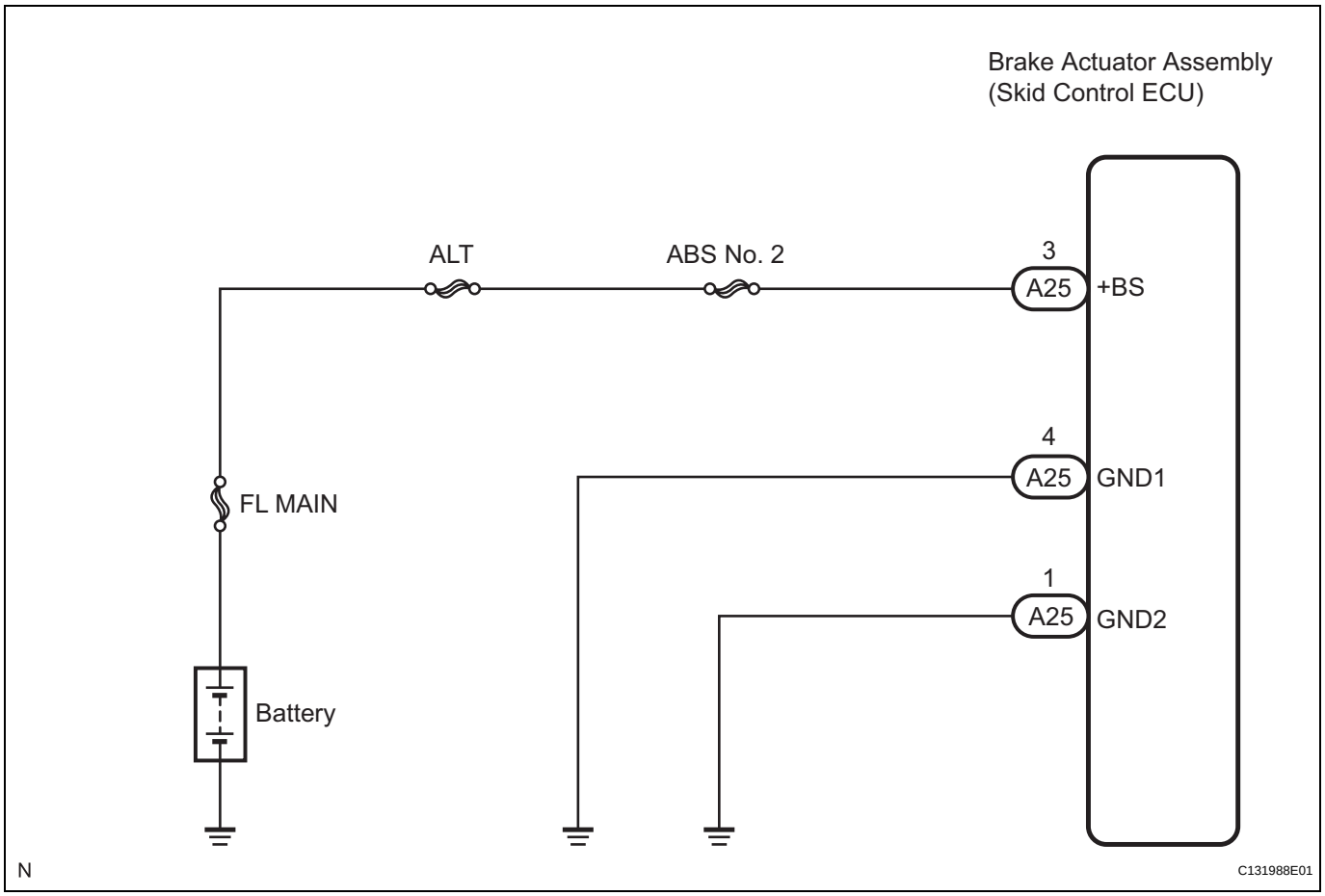
DTC	C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit

DESCRIPTION

This relay supplies power to each ABS solenoid. If the ABS initial check is OK after the ignition switch is turned on (IG), the skid control ECU will turn the ABS solenoid relay on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	When any of the following is detected: • 3 or more solenoid valves are found faulty and simultaneously valve supply voltage is detected to be abnormal. • Solenoid valve relay is not switched off. • Valve relay is stuck open even through the valve relay supply voltage is high.	• Wire harness (+BS circuit) • ABS No. 2 fuse (Fusible link) • Brake actuator assembly (Solenoid relay)

WIRING DIAGRAM

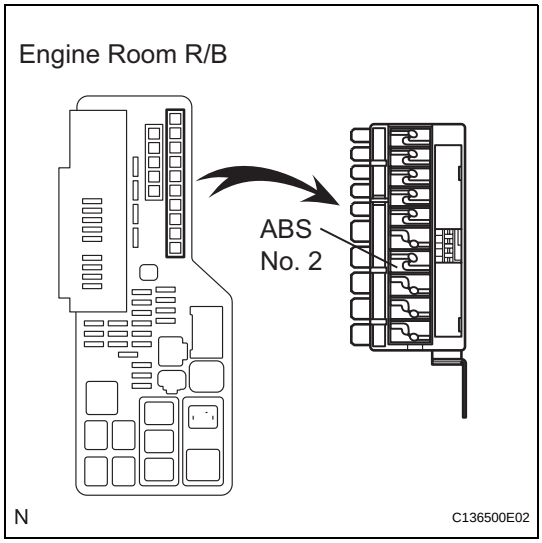


INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0278/11, inspect and repair the trouble areas indicated by C1241/41 (See page BC-63).
- Check the condition of each related circuit before troubleshooting (See page IN-40).

1 INSPECT FUSIBLE LINK (ABS NO. 2 FUSE)



(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is melted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

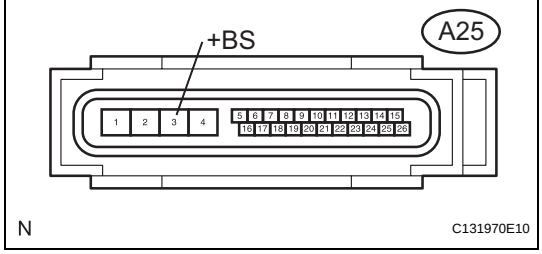
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2 INSPECT SKID CONTROL ECU CONNECTOR (+BS CIRCUIT)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

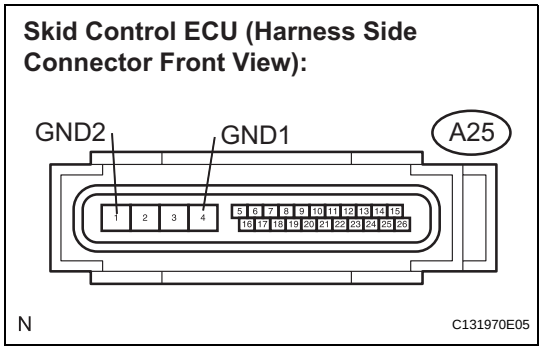
Tester Connection	Condition	Specified Condition
A25-3 (+BS) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4	RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The solenoid circuit is in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

BC

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

DTC	C1237/37	Speed Sensor Rotor Faulty

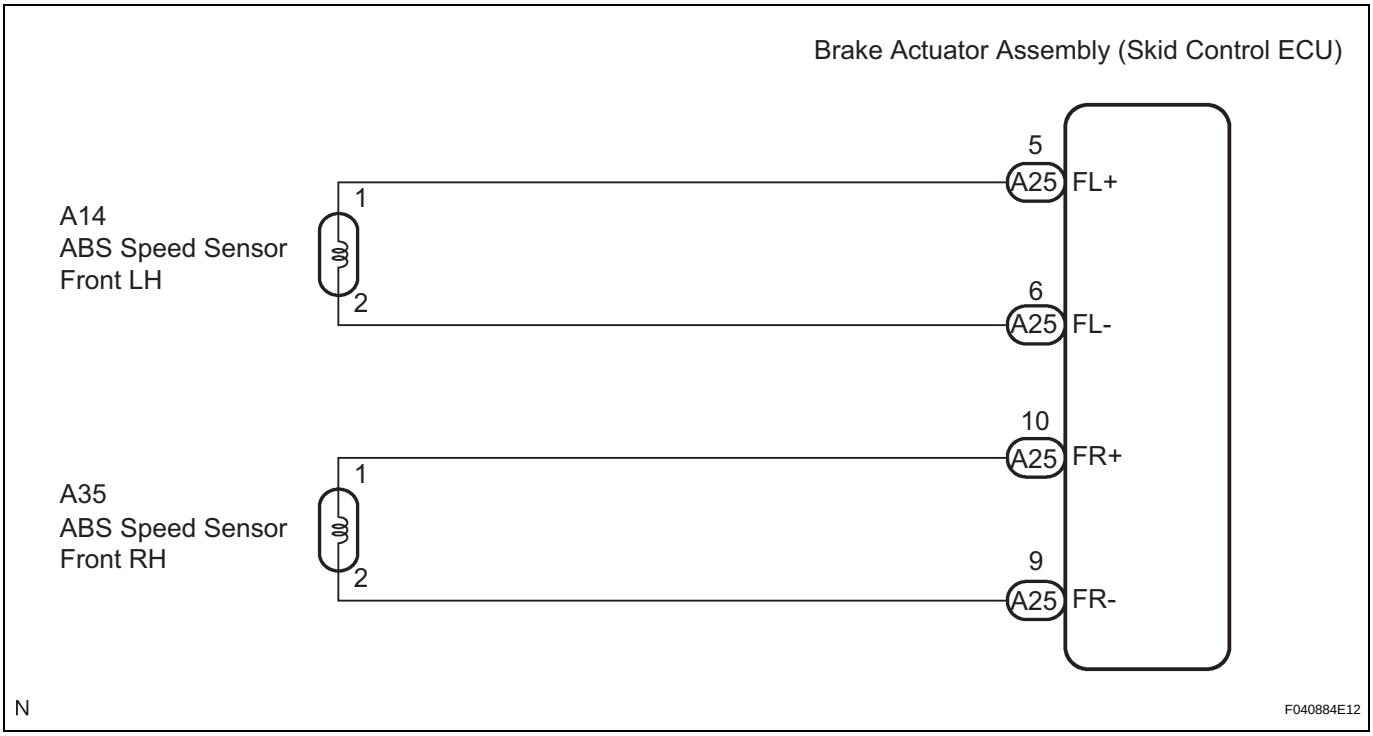
DESCRIPTION

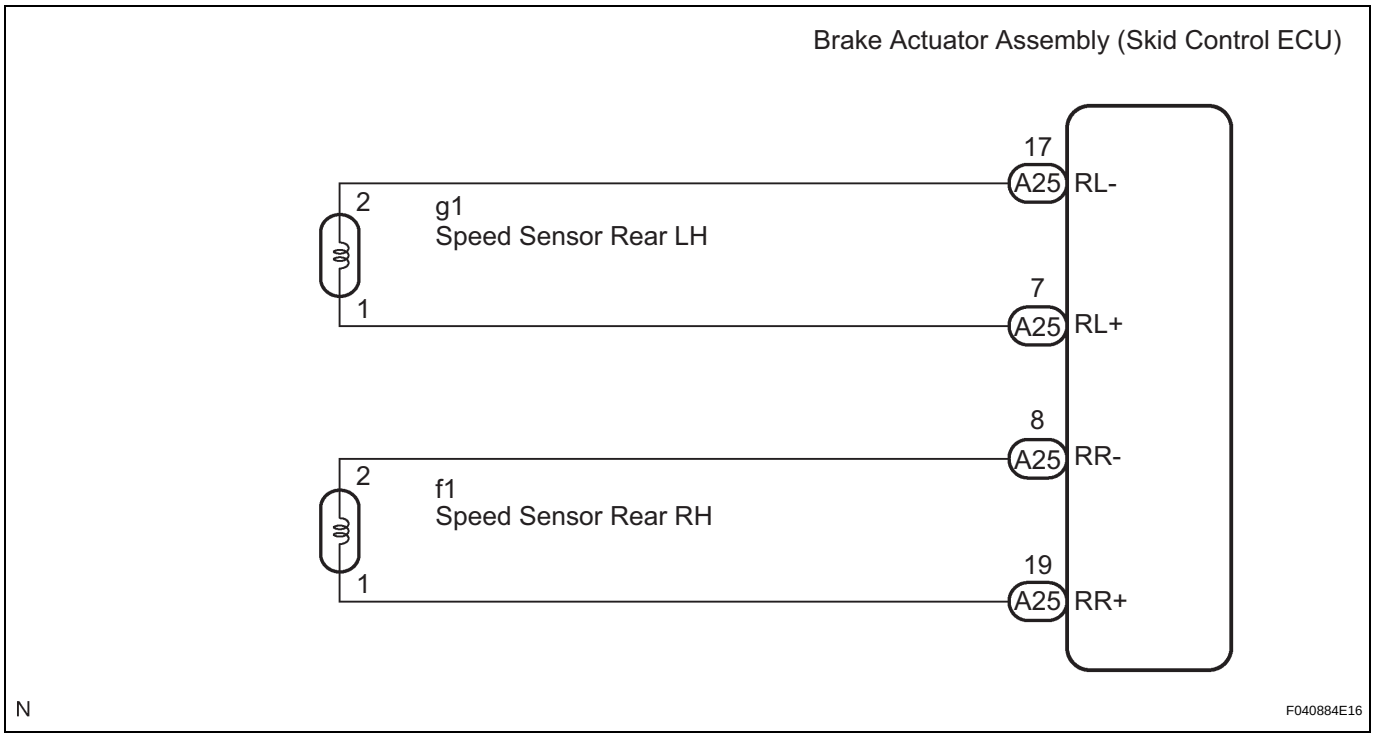
The skid control ECU measures the speed of each wheel by receiving signals from the speed sensor. These signals are used for recognizing that all 4 wheels are operating properly.
Therefore, all wheel signals must be equal.

DTC No.	DTC Detecting Condition	Trouble Area
C1237/37	When any of the following is detected: • Wheel speed difference between the wheels. • Wheel sensor signal failure. • ABS control continues for 60 sec. or more.	• Brake actuator assembly (skid control ECU) • Speed sensor rotor (Front) • Rear axle hub and bearing assembly • Speed sensor • Speed sensor circuit • Tire and wheel size • Tire deformation

WIRING DIAGRAM

BC





BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK TIRES

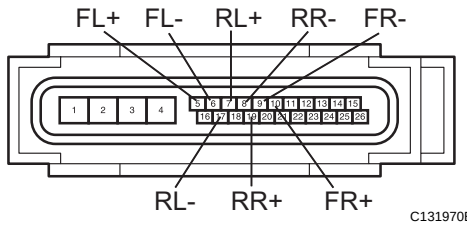
(a) Check the size and condition of all 4 tires (See page TW-3).
HINT:
This DTC is output when tire deformation or a difference in tire size is detected.
OK:
The diameters of all 4 tires and air pressure are the same.

NG → **REPLACE TIRES SO THAT ALL 4 TIRES ARE THE SAME SIZE**

OK

2 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS

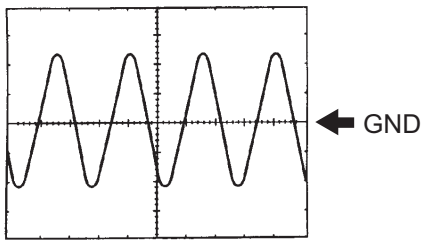
Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Connect the oscilloscope to each speed sensor terminal of the skid control ECU connector.
Terminals

Connector	Circuit
A25-5 (FL+) - A25-6 (FL-)	Front left speed sensor
A25-10 (FR+) - A25-9 (FR-)	Front right speed sensor
A25-7 (RL+) - A25-17 (RL-)	Rear left speed sensor
A25-19 (RR+) - A25-8 (RR-)	Rear right speed sensor

Normal Signal Waveform:



1 V / Division, 2 ms. / Division

(c) Check that a waveform is output when the tires are rotated (by the sensor circuit).
OK:
A waveform as shown in the figure should be output.
HINT:
- Each sensor circuit outputs the same waveform without noise.
- As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

(d) Make sure that the waveform does not change while jiggling a connector or a wire harness.
OK:
The waveform does not change.
HINT:
If the waveform changes while jiggling a connector or a wire harness, there may be a malfunction in the connector or the wire harness.
(e) Connect the connector.

NG → **Go to step 4**

OK

3 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 20 mph (32 km/h) or more for 60 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

4 CHECK SPEED SENSOR ROTOR

(a) Check the speed sensor rotor.
Front Speed Sensor Rotor: (See page DS-25)
Rear Speed Sensor Rotor: (See page AH-15)
OK:
No scratches or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-11).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

5 CHECK SPEED SENSOR TIP

(a) Remove each speed sensor.
(b) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-11).
(c) Install speed sensor.

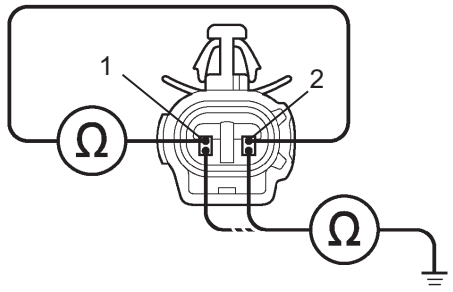
NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

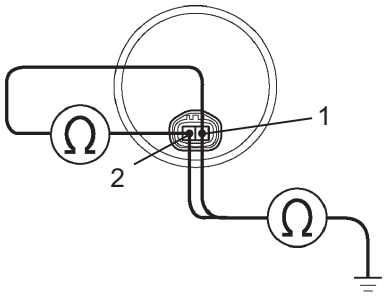
BC

6	INSPECT EACH SPEED SENSOR

Front Speed Sensor:



Rear Speed Sensor:



C136027E01

(a) Disconnect each speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68°F)
A14-1 (FL+) - Body ground	Always	10 kΩ or higher
A14-2 (FL-) - Body ground	Always	10 kΩ or higher
A35-1 (FR+) - A35-2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68°F)
A35-1 (FR+) - Body ground	Always	10 kΩ or higher
A35-2 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
g1-1 (RL+) - g1-2 (RL-)	Always	Below 2.2 kΩ
g1-1 (RL+) - Body ground	Always	10 kΩ or higher
g1-2 (RL-) - Body ground	Always	10 kΩ or higher
f1-1 (RR+) - f1-2 (RR-)	Always	Below 2.2 kΩ
f1-1 (RR+) - Body ground	Always	10 kΩ or higher
f1-2 (RR-) - Body ground	Always	10 kΩ or higher

(c) Connect the connector.

NOTICE:

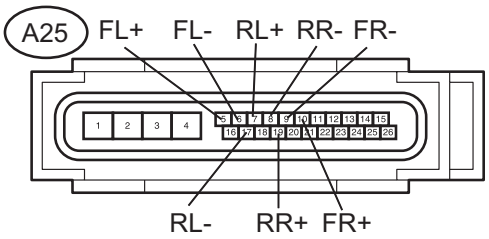
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE EACH SPEED SENSOR**

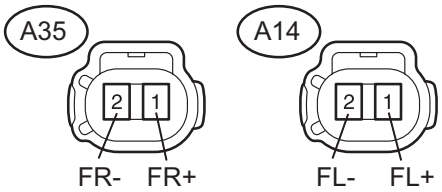
OK

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)

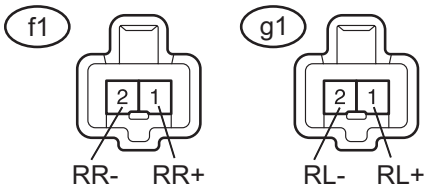
Skid Control ECU Harness Side Connector Front View:



Front Speed Sensor Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



C136491E02

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A25-5 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A25-6 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A25-10 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A25-9 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A25-5 (FL+) - Body ground	Always	10 kΩ or higher
A25-6 (FL-) - Body ground	Always	10 kΩ or higher
A25-10 (FR+) - Body ground	Always	10 kΩ or higher
A25-9 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
A25-7 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A25-17 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A25-19 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A25-8 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A25-7 (RL+) - Body ground	Always	10 kΩ or higher
A25-17 (RL-) - Body ground	Always	10 kΩ or higher
A25-19 (RR+) - Body ground	Always	10 kΩ or higher
A25-8 (RR-) - Body ground	Always	10 kΩ or higher

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)**

OK

8 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Start the engine.

BC

(c) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1237/37) is not output	A
DTC (C1237/37) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)**

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

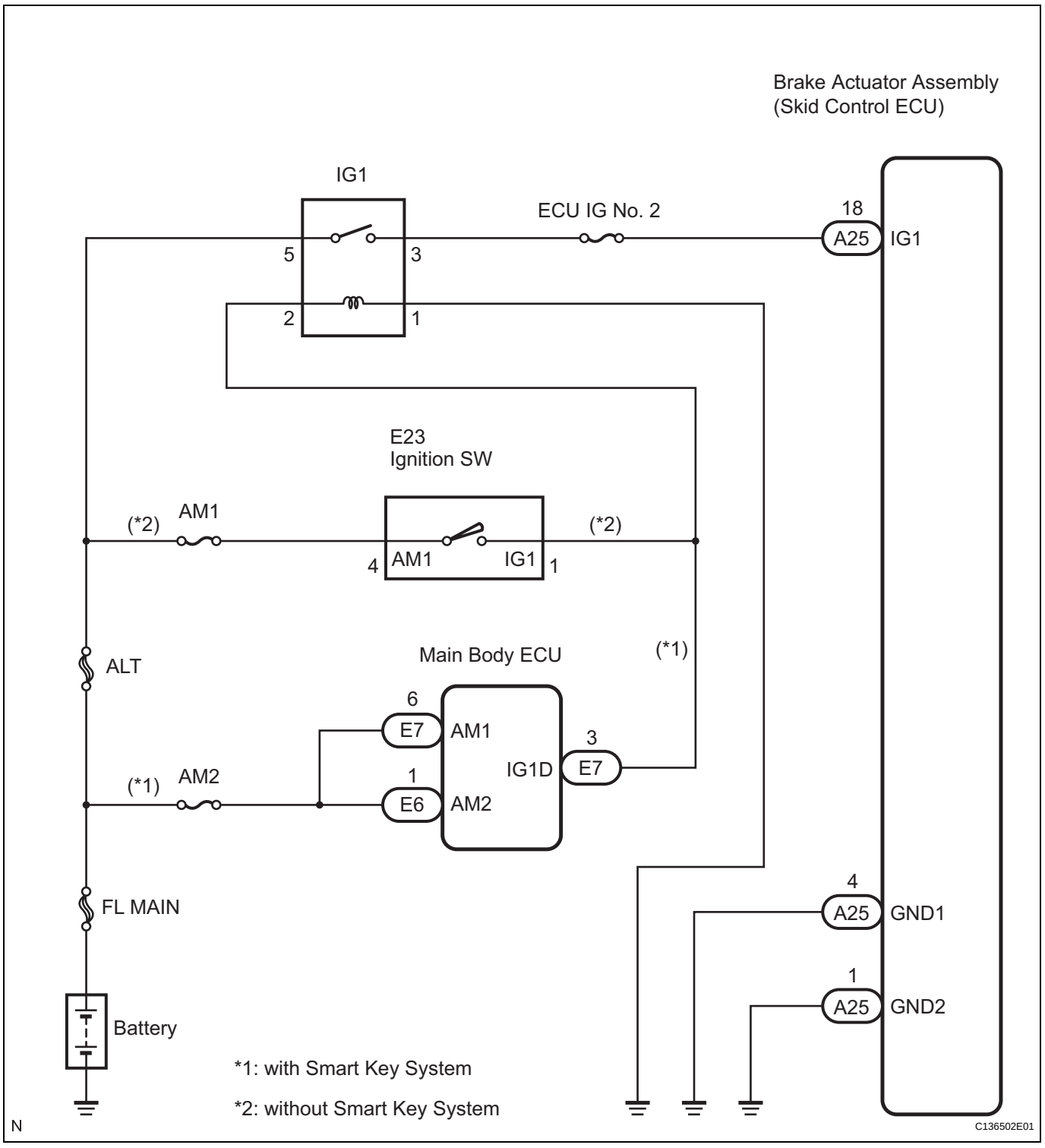
If a malfunction is detected in the power supply circuit of the brake actuator assembly (skid control ECU), the skid control ECU (housed in the actuator assembly) stores this DTC and the fail-safe function prohibits ABS operation (See page BC-24).

This DTC is output when the IG1 terminal voltage deviates from the normal condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit, etc.

This DTC is cancelled when the IG1 terminal voltage returns to normal (only when the voltage returns to normal from a voltage lower than the specified value).

DTC No.	DTC Detecting Condition	Trouble Area
C1241/41	With vehicle speed more than 4 mph (6 km/h), when any of the following is detected: • Battery voltage is 16.9 V or more. • Battery voltage is 9.4 V or less when ABS does not operate. • Battery voltage is 9.2 V or less when ABS operates.	• Battery • Charging system • Power source circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

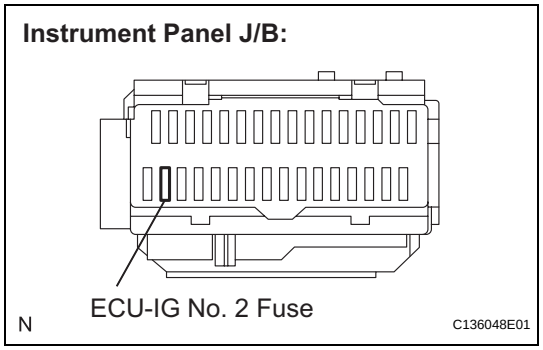


INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 INSPECT FUSE (ECU-IG NO. 2 FUSE)



(a) Remove the ECU-IG No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
ECU-IG No. 2 fuse	Below 1 Ω (Continuity)

(c) Install the fuse.

NG → **REPLACE FUSE**

OK

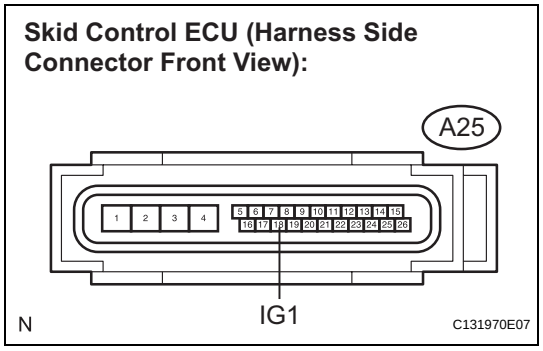
2 INSPECT BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

3 INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

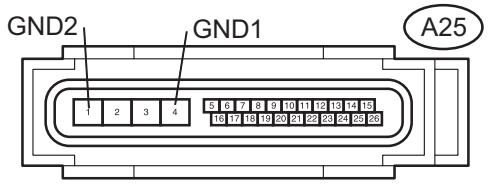
Tester Connection	Condition	Specified Condition
A25-18 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

4 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

5 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1241/41) is output	A
DTC (C1241/41) is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTC (C1241/41) is not output (When troubleshooting in accordance with the DTC CHART)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

C → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

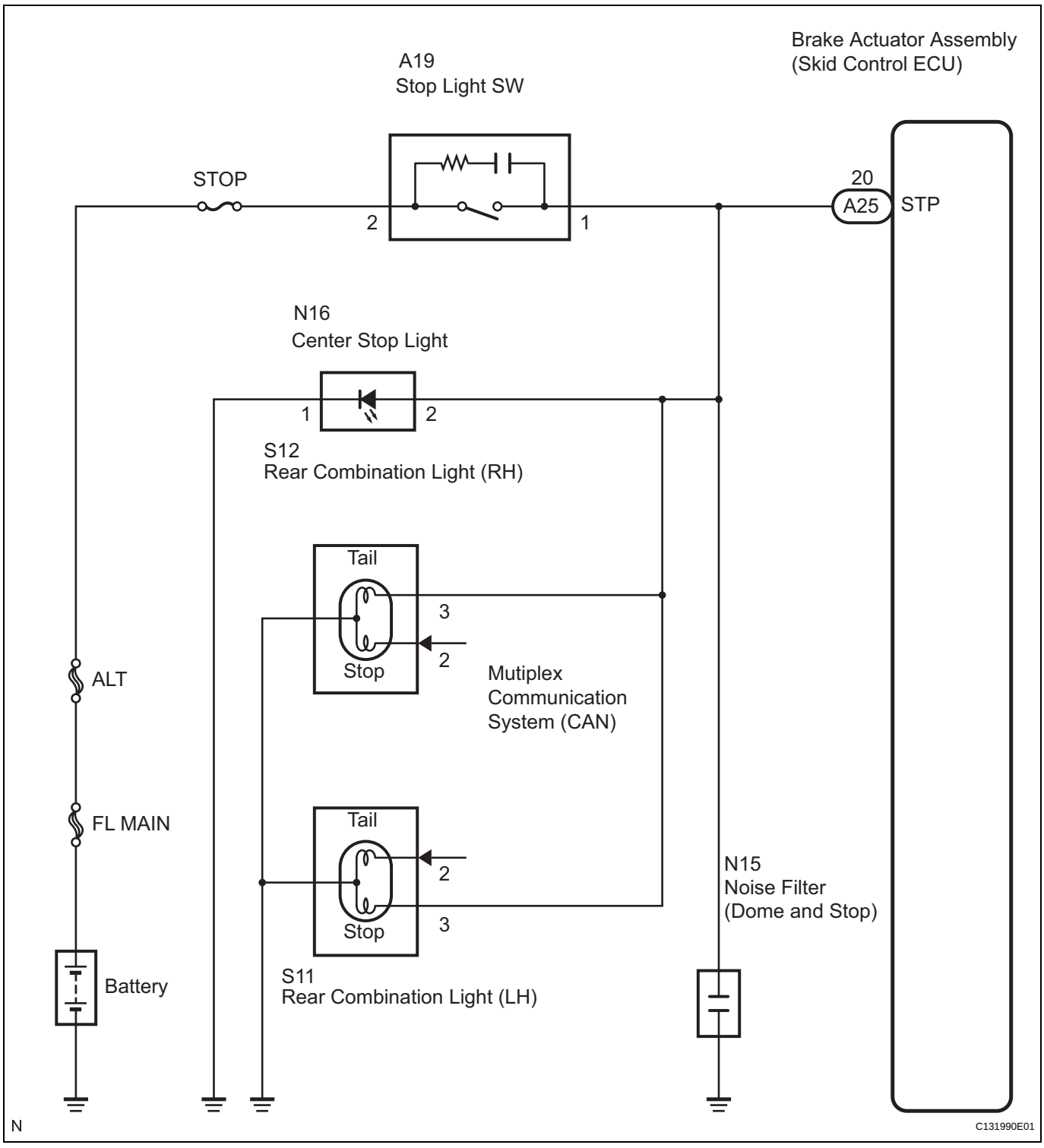
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.
The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light signal input line (STP terminal) or the ground line of the stop light circuit with the stop light switch off (brake pedal not depressed).

DTC No.	DTC Detecting Condition	Trouble Area
C1249/49	Stop light switch circuit is open, and stop light switch voltage is 40% or more and less than 67% of the battery voltage.	• Stop light switch • Stop light switch circuit • Brake actuator assembly (Skid Control ECU)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 CHECK STOP LIGHT SWITCH OPERATION (STOP LIGHT SWITCH CIRCUIT)

(a) Check that the stop lights come on when the brake pedal is depressed and goes off when the brake pedal is released.

OK

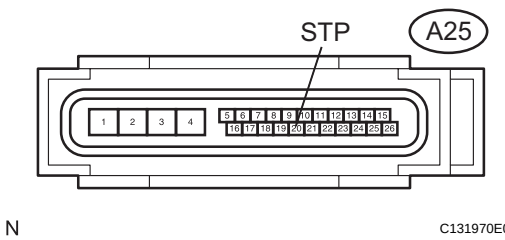
Pedal Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG → **Go to step 5**

OK

2 INSPECT SKID CONTROL ECU CONNECTOR (STP TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

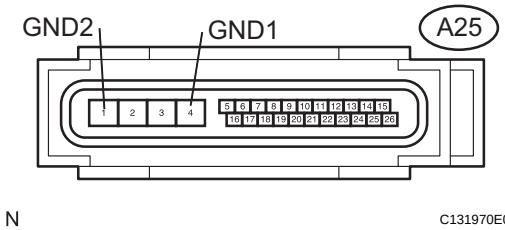
Tester Connection	Switch Condition	Specified Condition
A25-20 (STP) - Body ground	Brake pedal depressed	8 to 14 V
A25-20 (STP) - Body ground	Brake pedal released	Below 4.0 V

NG → **Go to step 7**

OK

3 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Start the engine.

(c) Depress the brake pedal several times to test the stop light circuit.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output (When troubleshooting in accordance with the DTC CHART)	B
DTC is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	C

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

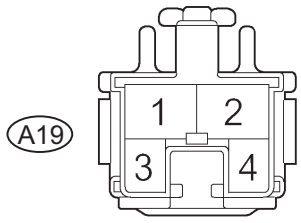
BC

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

5 INSPECT STOP LIGHT SWITCH ASSEMBLY (POWER SOURCE TERMINAL VOLTAGE)

Stop Light Switch (Wire Harness Side) Connector Front View:



I042363E17

(a) Disconnect the stop light switch connector.
(b) Measure the voltage according to the value(s) in the table below.

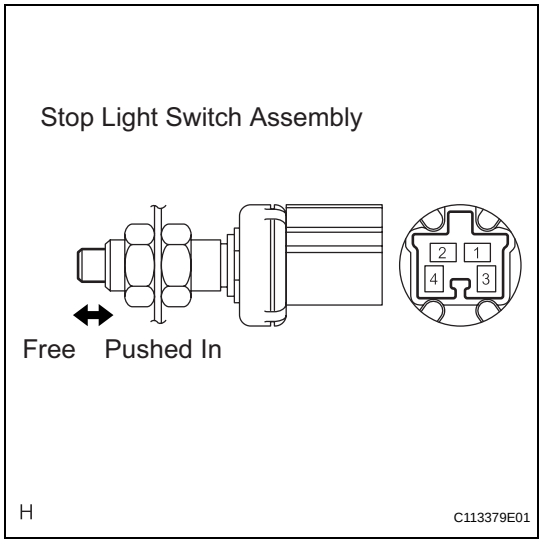
Standard voltage

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

6 INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

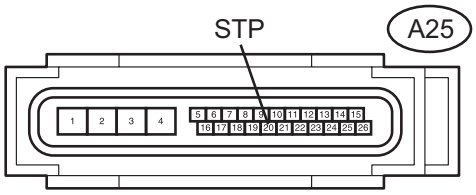
Tester Connection	Condition	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY (See page BR-71)**

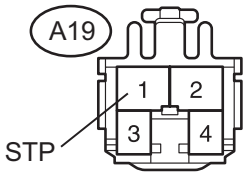
OK

7 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)

Skid Control ECU (Wire Harness Side) Connector Front View:



Stop Light Switch (Wire Harness Side) Connector Front View:



(a) Disconnect the stop light switch connector and skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-20 (STP) - A19-1 (STP)	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CIRCUIT)

BC

DTC	C1300/62	Skid Control ECU Malfunction

DESCRIPTION

The skid control ECU outputs this DTC, if malfunctions are found in the circuit inside the computer by self diagnosis.

DTC No.	DTC Detecting Condition	Trouble Area
C1300/62	Internal failure of the skid control ECU control unit	Brake actuator assembly (skid control ECU)

INSPECTION PROCEDURE

1	REPLACE BRAKE ACTUATOR ASSEMBLY

(a) Replace the brake actuator assembly (skid control ECU) (See page BC-432).
HINT:
This DTC is output when the skid control ECU detects a malfunction in the internal circuit.
(b) Clear the DTC (See page BC-21).

NEXT

END

DTC	U0073/94	Control Module Communication Bus OFF

DESCRIPTION

- The skid control ECU receives the signal sent from the ECM via the CAN communication system.
- When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system before repairing each corresponding sensor.

DTC No.	DTC Detecting Condition	Trouble Area
U0073/94	When any of the following is detected: 1. The skid control ECU cannot send a signal (30 cycles). 2. The condition that bus OFF state occurs for 300 msec.	• Wire harness (CANL, CANH circuit) • Brake actuator assembly (Skid control ECU)

INSPECTION PROCEDURE

Proceed to CAN communication system troubleshooting (See page CA-8).
HINT:
When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system before repairing each corresponding sensor.

ABS Warning Light Remains ON

DESCRIPTION

The skid control ECU sends the indicator signals to the combination meter assembly via the CAN communication system.

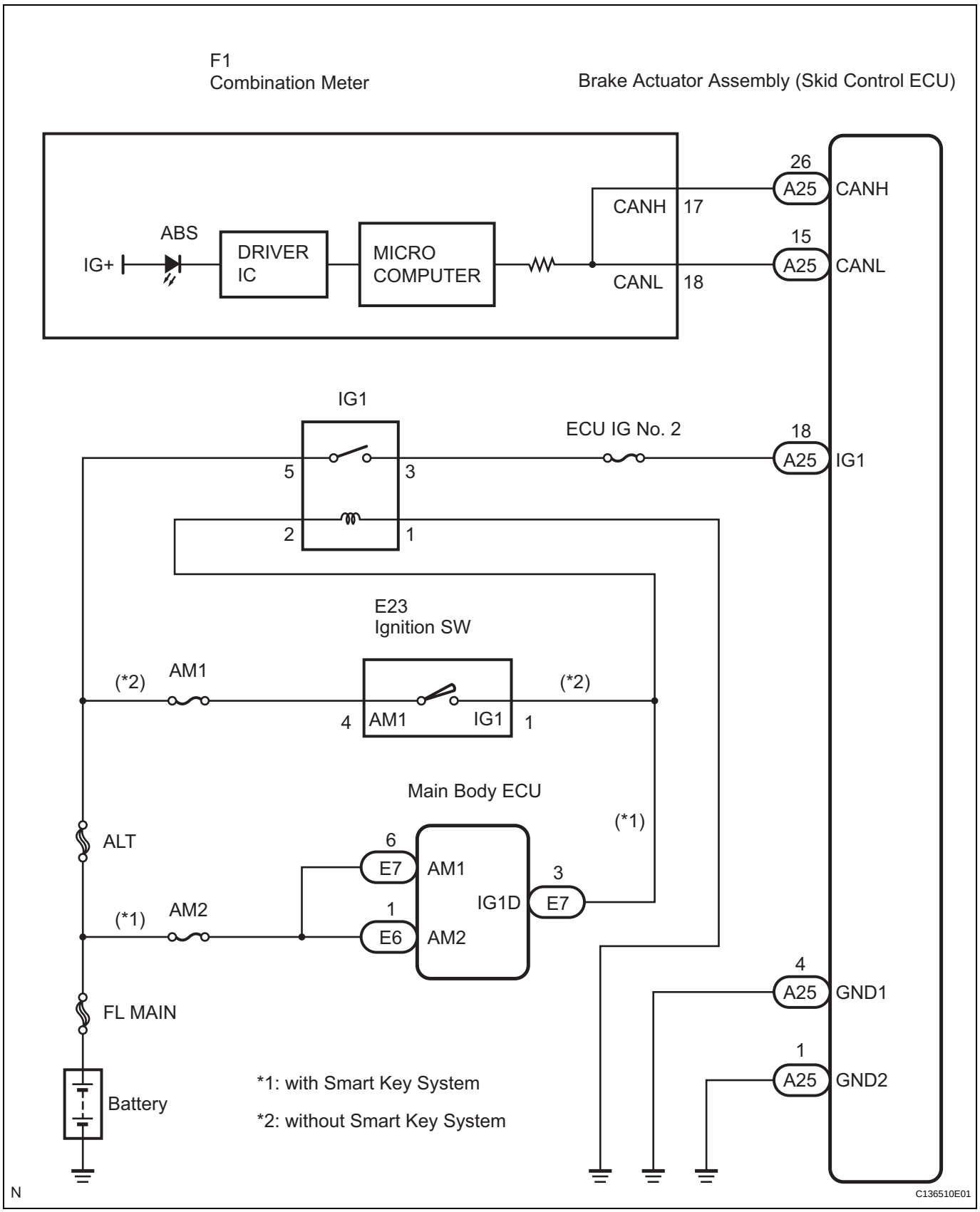
If any of the following is detected, the ABS warning light remains on.

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the wire harness between the combination meter and the skid control ECU.
- The ABS and/or EBD is defective.

HINT:

The intelligent tester may not be used when the skid control ECU is abnormal.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit before troubleshooting (See page IN-40).

1	INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK SKID CONTROL ECU CONNECTOR SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

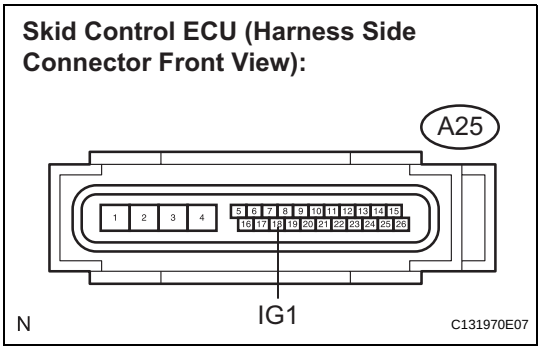
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

4	INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

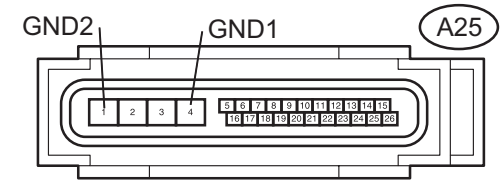
Tester Connection	Condition	Specified Condition
A25-18 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: ABS

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WRN LIGHT	Turn ABS warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

Result

Condition	Proceed to
OK	A
OK (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
NG	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

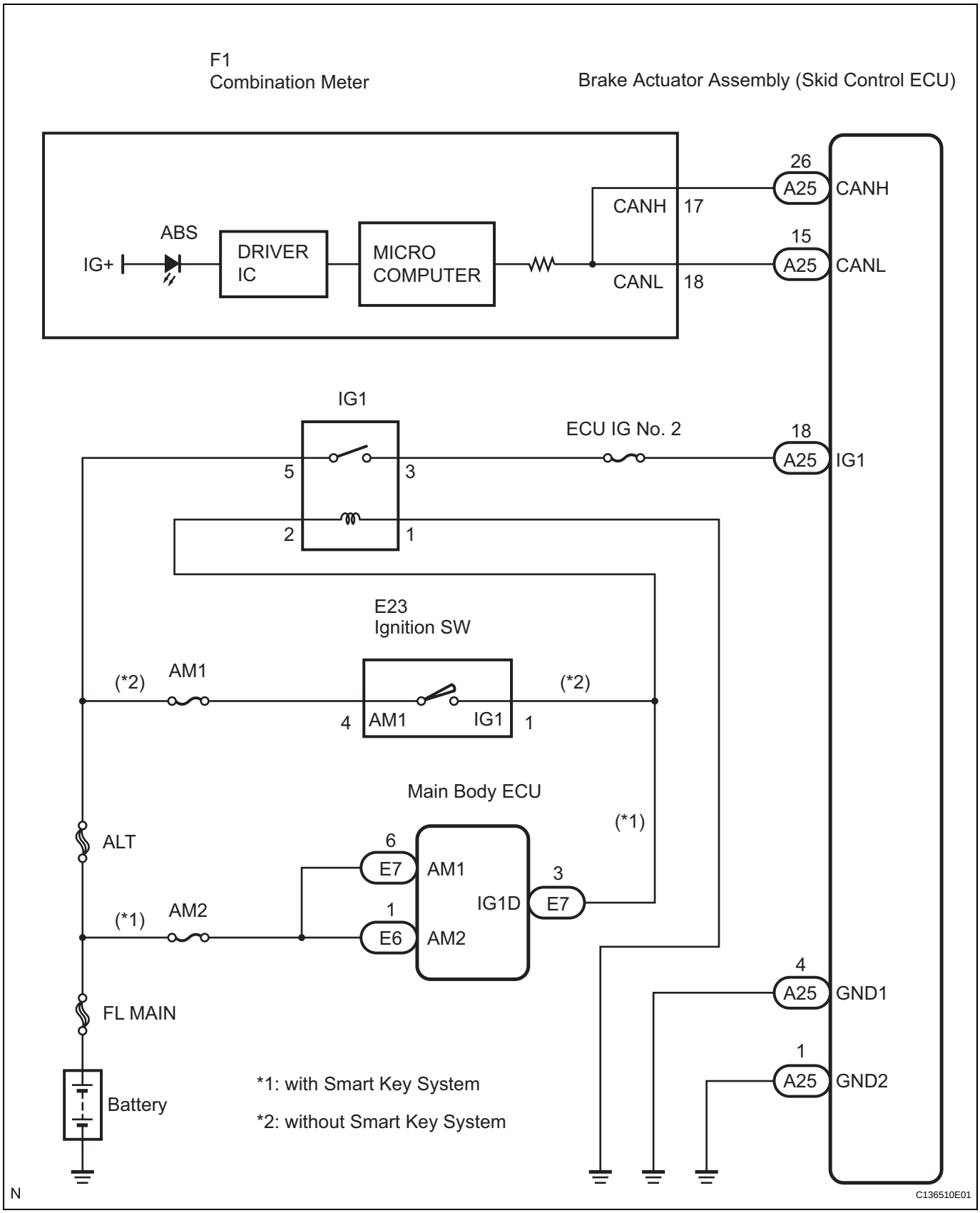
C → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

A

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

ABS Warning Light does not Come ON

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 INSPECT ABS WARNING LIGHT

HINT:
When disconnecting the skid control ECU connector, the ABS warning light comes on.

(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Turn the ignition switch on (IG).
(d) Check that the ABS warning light comes on.
OK:
The ABS warning light comes on.
(e) Connect the connector.

NG → **Go to step 3**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

3 INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: METER

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WRN LIGHT	Turn ABS warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.
OK:
The ABS warning light turns on or off in accordance with the intelligent tester.

NG → REPLACE COMBINATION METER ASSEMBLY (See page ME-63)

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Brake Warning Light Remains ON

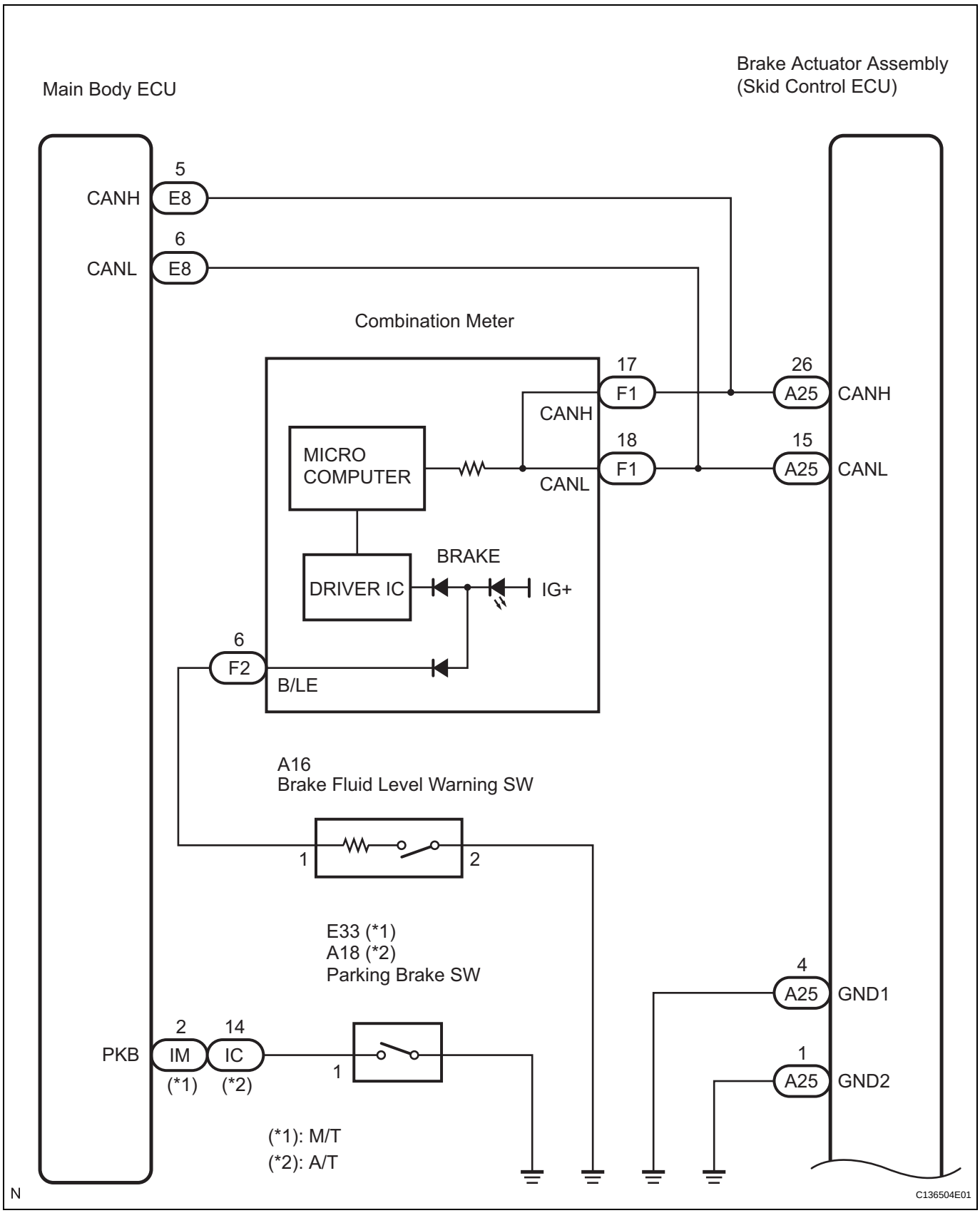
DESCRIPTION

The skid control ECU sends the indicator signals to the combination meter assembly via the CAN communication system.

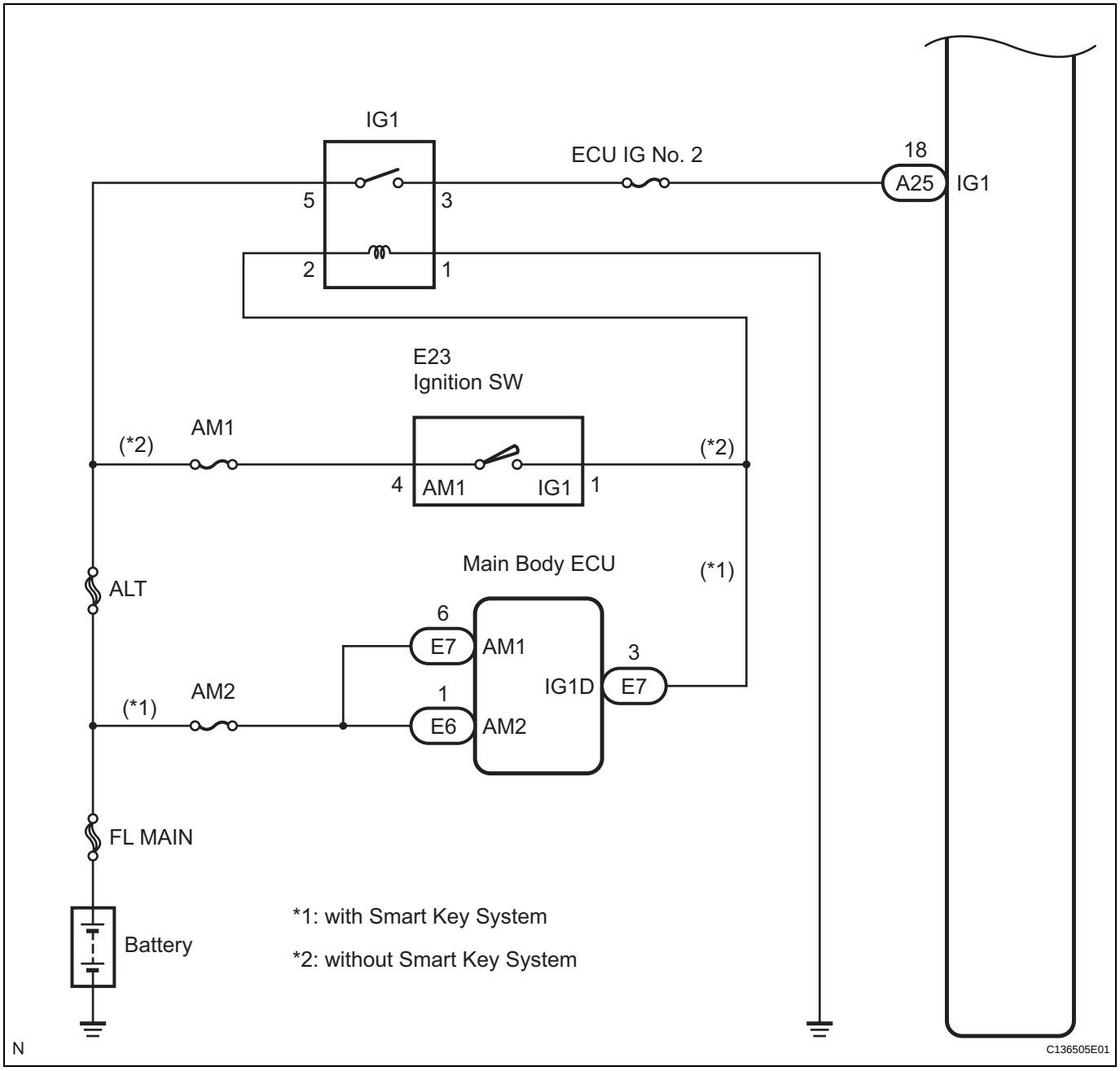
If any of the following is detected, the brake warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM



BC



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK DTC

(a) Check if an ABS DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

BC

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (See page BC-27)**

A

2	INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM (See page CA-8)**

BC

A

3	CHECK IF SKID CONTROL ECU CONNECTOR SECURELY CONNECTED

(a) Check if the skid control ECU connector is connected securely.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

4	CHECK BATTERY

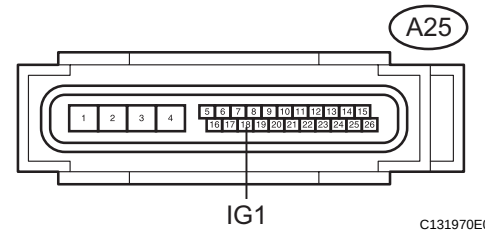
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

5 INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A25-18 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

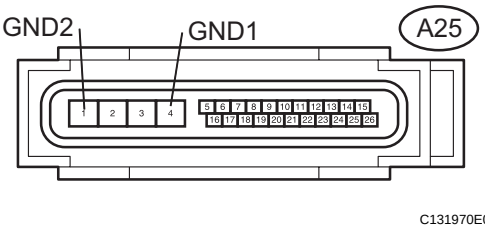
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

6 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

BC

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

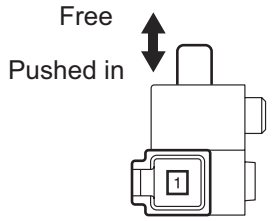
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

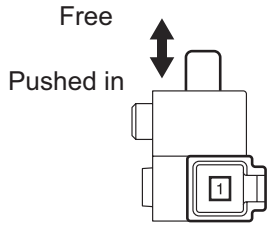
7	**INSPECT PARKING BRAKE SWITCH**

Parking Brake Switch:

Automatic Transaxle:



Manual Transaxle:



N C109430E03

(a) Remove the parking brake switch.
(b) Disconnect the parking brake switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Automatic Transaxle

Tester Connection	Condition	Specified Condition
(A18-1) - Ground part	Free	Below 1 Ω
(A18-1) - Ground part	Pushed in	10 kΩ or higher

Manual Transaxle

Tester Connection	Condition	Specified Condition
(E33-1) - Ground part	Free	Below 1 Ω
(E33-1) - Ground part	Pushed in	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH**

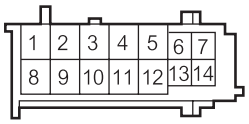
OK

BC

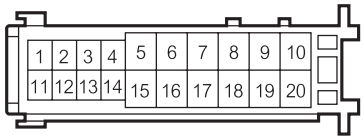
8	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)

Main Body ECU
Wire Harness View:

IC : Automatic Transaxle



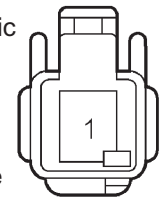
IM : Manual Transaxle



Parking Brake Switch Harness Side Connector Front View:

A18 : Automatic Transaxle

E33 : Manual Transaxle



C136418E03

OK

(a) Disconnect the main body ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Automatic Transaxle

Tester Connection	Specified Condition
IC-14 - A18-1 (PKB)	Below 1 Ω
A18-1 (PKB) - Body ground	10 kΩ or higher

Manual Transaxle

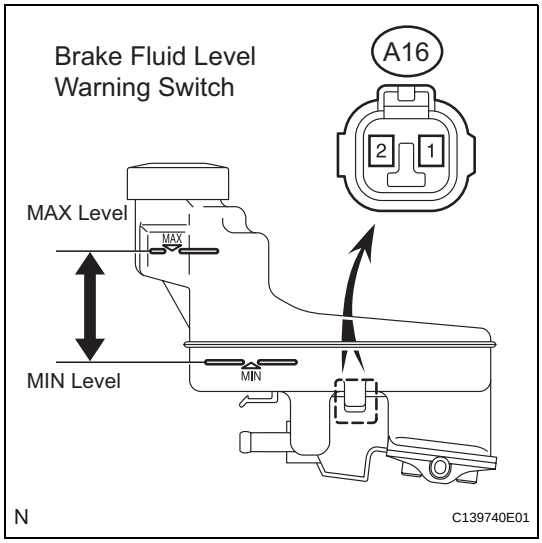
Tester Connection	Specified Condition
IM-2 (PKB) - E33-1 (PKB)	Below 1 Ω
E33-1 (PKB) - Body ground	10 kΩ or higher

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)**

BC

9	**INSPECT BRAKE FLUID LEVEL WARNING SWITCH ASSEMBLY**



(a) Remove the reservoir tank cap.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.
HINT:
A float is located inside the reservoir.
Its position can be changed by increasing or decreasing the level of brake fluid.
Standard resistance

Tester Connection	Condition	Specified Condition
(A16-1) - (A16-2)	Float UP	10 kΩ or higher (No Continuity)
(A16-1) - (A16-2)	Float DOWN	Below 1 Ω (Continuity)

HINT:
If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

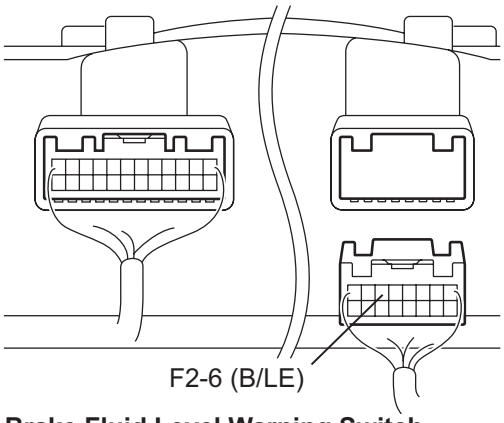
NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)**

OK

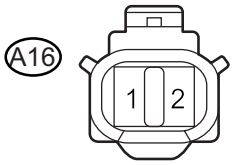
BC

10	CHECK HARNESS AND CONNECTOR (BRAKE FLUID LEVEL WARNING SWITCH TO COMBINATION METER)

Combination Meter Wire Harness View:



Brake Fluid Level Warning Switch Harness Side Connector Front View:



C136033E01

(a) Disconnect the combination meter assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A16-1 - F2-6 (B/LE)	Below 1 Ω
F2-6 (B/LE) - Body ground	10 kΩ or higher
A16-2 - Body ground	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (BRAKE FLUID LEVEL WARNING SWITCH TO COMBINATION METER)**

OK

11	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: ABS

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WARN LIGHT	Turn brake warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

Result

Condition	Proceed to
OK	A
OK (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
NG	C

BC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)

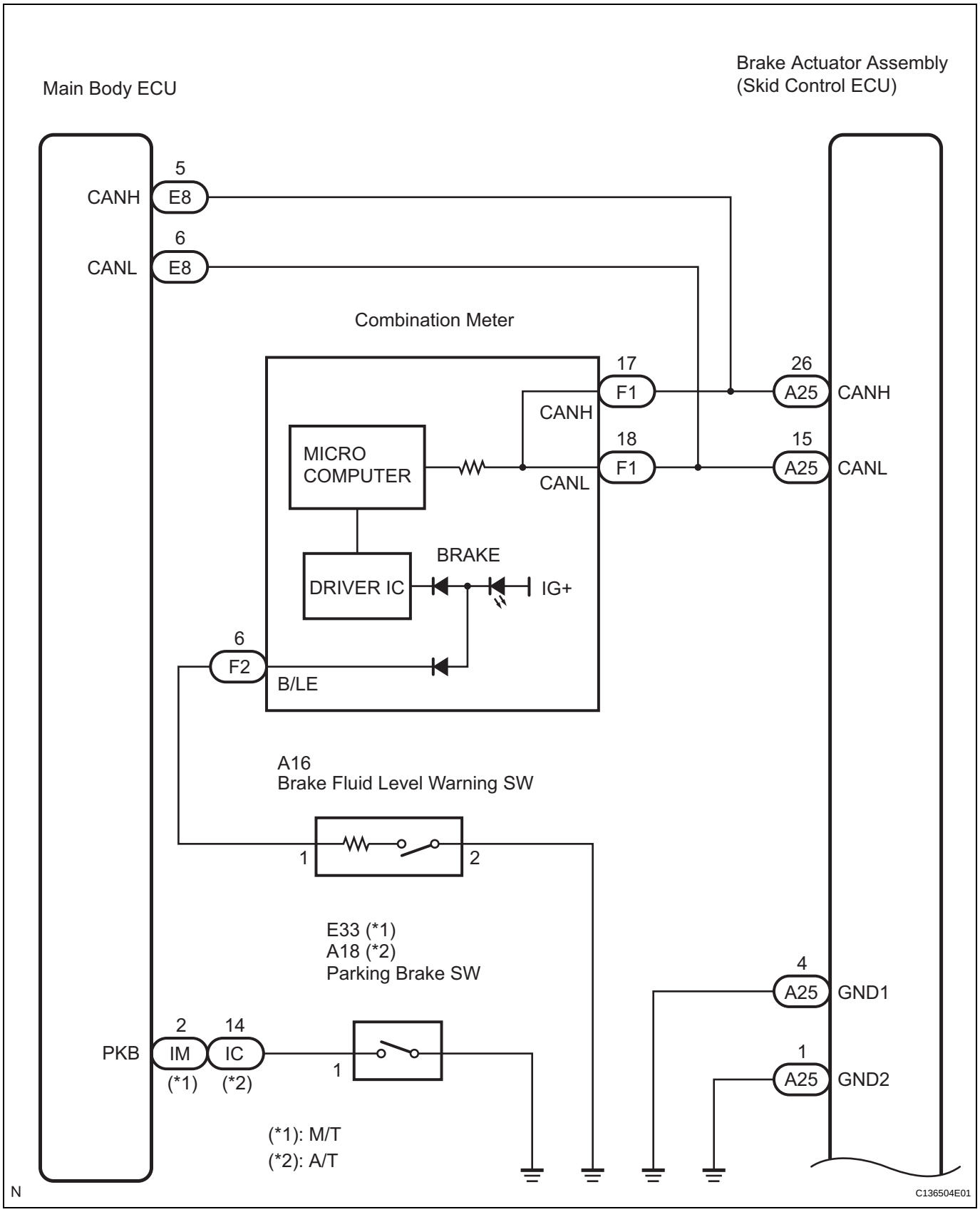
C → REPLACE COMBINATION METER ASSEMBLY (See page ME-63)

A

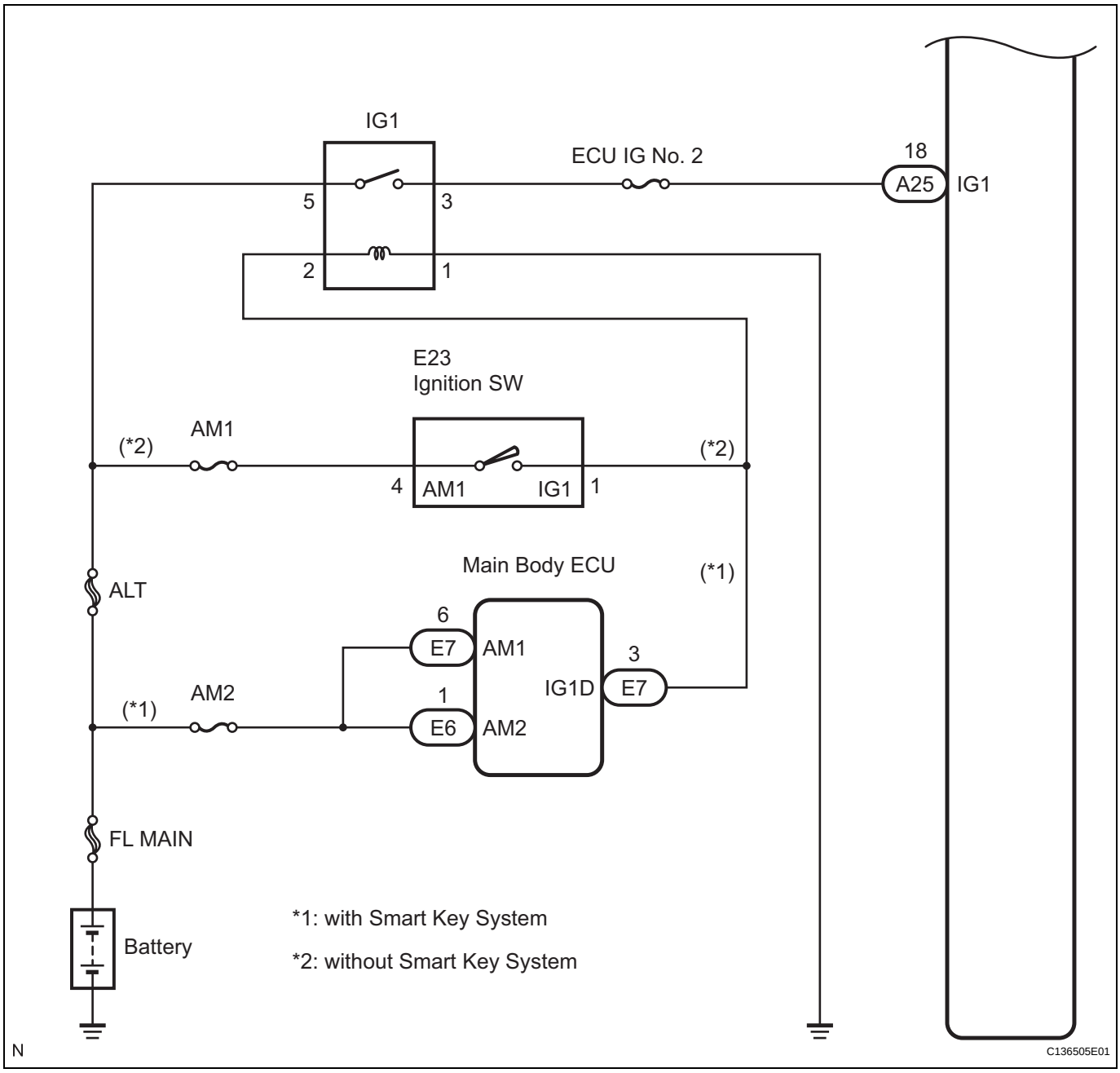
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Brake Warning Light does not Come ON

WIRING DIAGRAM



BC



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	INSPECT BRAKE WARNING LIGHT

HINT:
When disconnecting the skid control ECU connector, the brake warning light comes on.

(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Turn the ignition switch on (IG).
(d) Check that the brake warning light comes on.
OK:
The brake warning light comes on.

NG → **Go to step 3**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

3	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: METER

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WARN LIGHT	Turn brake warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.
OK:
The BRAKE warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

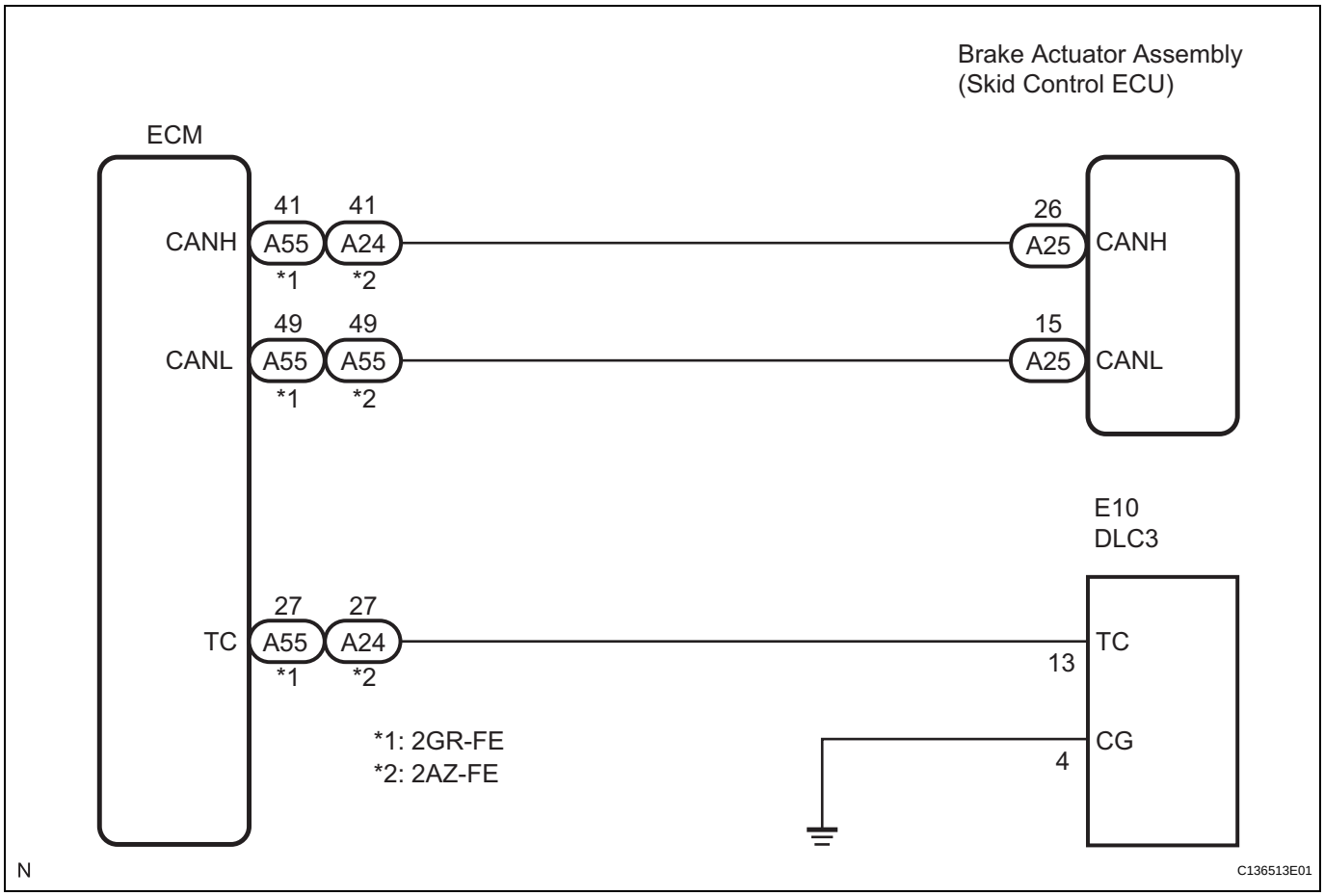
BC

TC and CG Terminal Circuit

DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
DTCs are indicated by the blinking pattern of the ABS warning light.

WIRING DIAGRAM



HINT:
When warning lights continue to blink, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in one or more ECUs is suspected.

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication DTC is output (See page BC-21).

Result

Result	Proceed to
CAN communication system DTC is output	A
CAN communication system DTC is not output	B

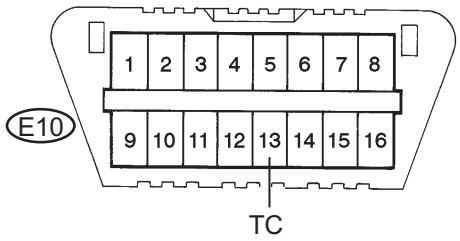
B → Go to step 2

A

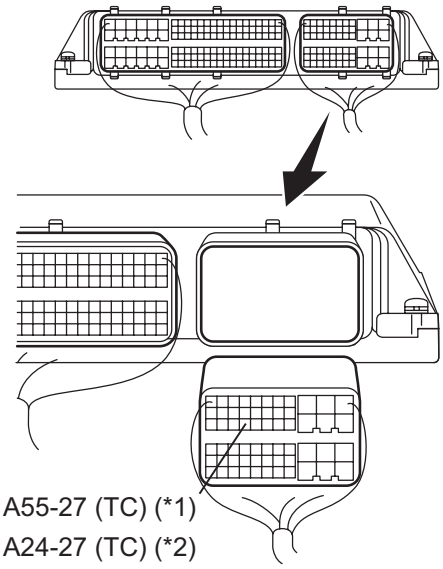
GO TO CAN COMMUNICATION SYSTEM (See page CA-8)

2 CHECK HARNESS AND CONNECTOR (ECM TO DLC3)

DLC3:



ECM Wire Harness View:



(*1): 2GR-FE (*2): 2AZ-FE

C136035E02

(a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

2GR-FE

Tester Connection	Specified Condition
A55-27 (TC) - E10-13 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

2AZ-FE

Tester Connection	Specified Condition
A24-27 (TC) - E10-13 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

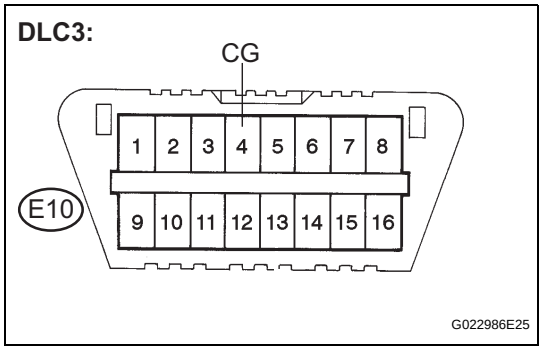
(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)**

OK

BC

3	CHECK HARNESS AND CONNECTOR (DLC3 CG CIRCUIT)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

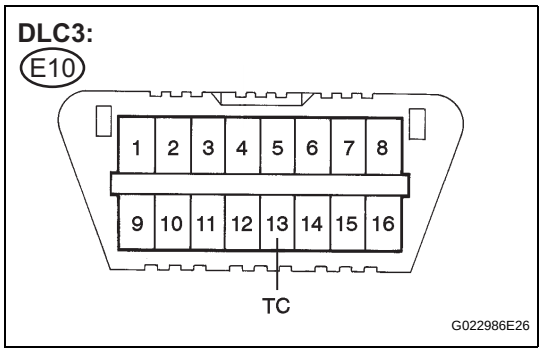
Tester Connection	Specified Condition
E10-4 (CG) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (CG TERMINAL CIRCUIT)**

OK

4	REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)

BC



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E10-13 (TC) - Body ground	10 kΩ or higher

NG → **CHECK HARNESS AND CONNECTOR (TC TERMINAL CIRCUIT)**

OK

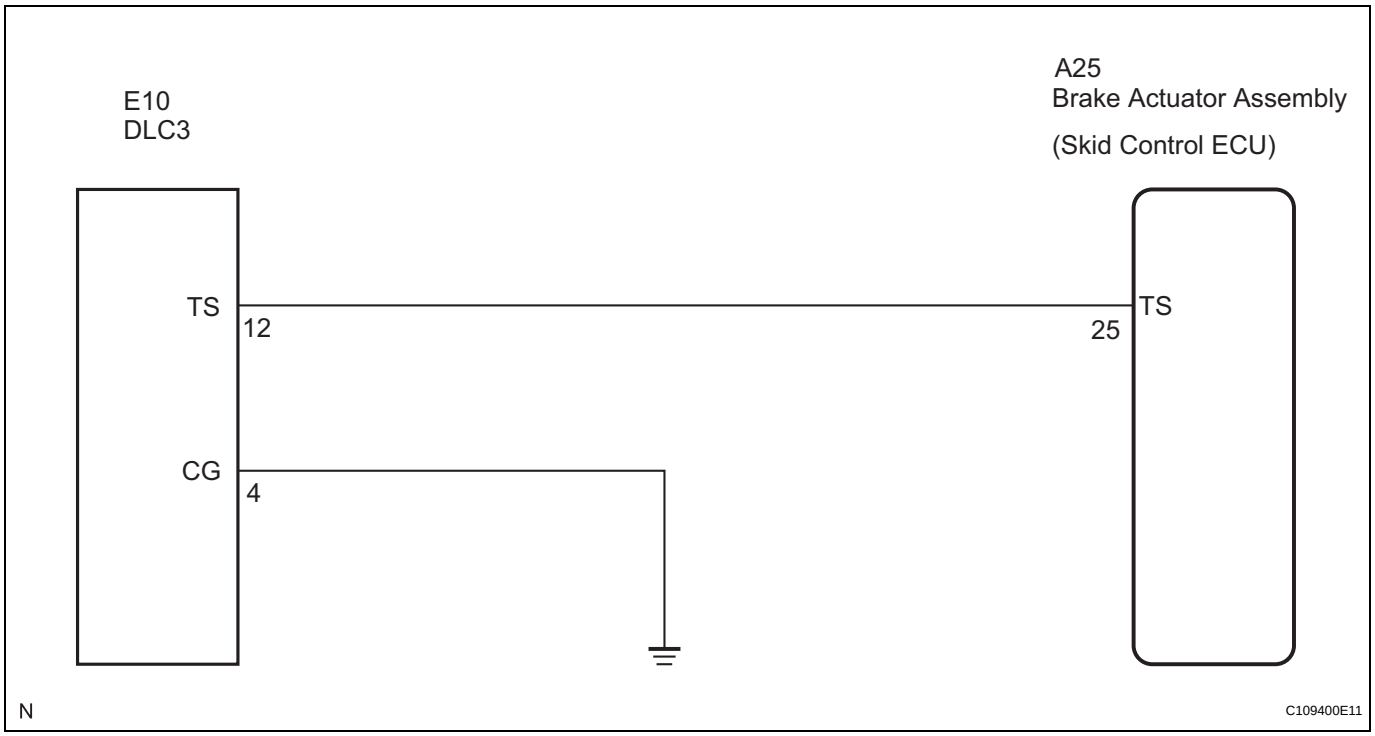
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

TS and CG Terminal Circuit

DESCRIPTION

In the Test Mode (signal check), a malfunction of the speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to on (IG).

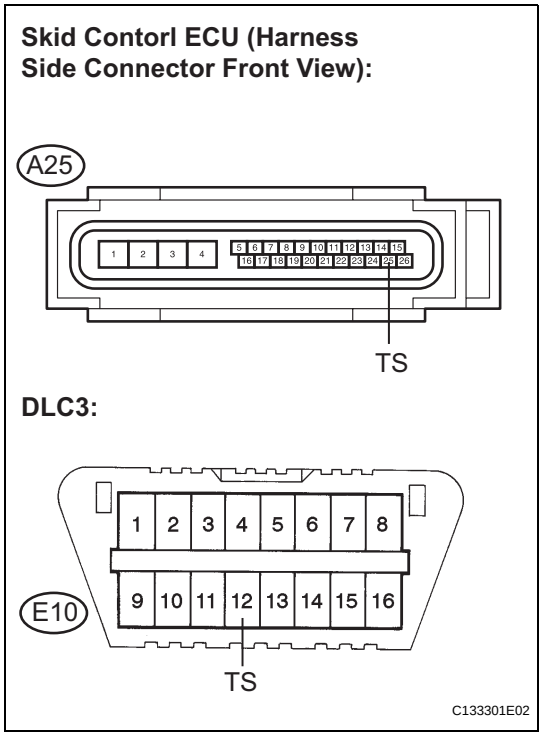
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO DLC3)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

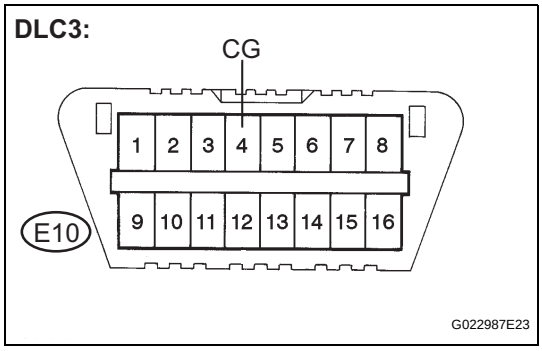
Tester Connection	Condition	Specified Condition
A25-25 (TS) - E10-12 (TS)	Always	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO DLC3)**

OK

2 CHECK HARNESS AND CONNECTOR (DLC3 TO BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

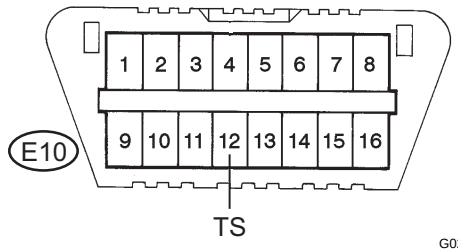
Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 TO BODY GROUND)**

OK

3	CHECK HARNESS AND CONNECTOR (DLC3 TO BODY GROUND)

DLC3:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-12 (TS) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 TO BODY GROUND)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

VEHICLE STABILITY CONTROL SYSTEM (for ADVICS Made)

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	off
Ignition switch on (IG)	ON	on (IG)
Ignition switch on (ACC)	ACC	on (ACC)
Engine start	START	start

BC

2. TROUBLESHOOTING PRECAUTIONS

(a) When there is a malfunction with terminal contact points or part installation problems, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as DTC output and the Freeze Frame Data, and record it before disconnecting each connector or removing and installing parts.
(c) Since the system may be influenced by malfunctions in systems other than the brake control system, be sure to check for DTCs in other systems.

3. HANDLING PRECAUTIONS

(a) Do not remove or install VSC parts such as the steering angle sensor or yaw rate sensor (acceleration sensor included) except when required, as they cannot be adjusted correctly after removal or installation.
(b) Be sure to perform preparation before work and confirmation after work is completed by following the direction in the repair manual when working on the VSC system.
(c) Be sure to remove and install the ECU, actuator, each sensor, etc. with the ignition switch off unless it is not specified in the inspection procedure.
(d) If the ECU, brake actuator, or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using the intelligent tester, also check that system functions and signals received by the ECU are normal using Test Mode.

4. DTC PRECAUTION

(a) Warnings for some DTCs cannot be cleared only by repairing the malfunctioning parts. If the warning is displayed after repair work, the DTC should be cleared after turning the ignition switch off.
NOTICE:
If a DTC for a malfunctioning part reappears after it was cleared, then it has been stored again.

5. CHASSIS DYNAMOMETER PRECAUTION

(a) Enter Test Mode to disable TRAC and VSC control when using a chassis dynamometer.
HINT:
The vehicle may move unexpectedly out of the dynamometer because of TRAC and VSC operations.
NOTICE:
- **Make sure that the VSC warning light is blinking (for vehicles without the multi information display) or "CHECK VSC SYSTEM" is displayed on the multi information display (for vehicles with the multi information display) (Test Mode is achieved).**
- **Secure the vehicle with the lock chain for safety.**

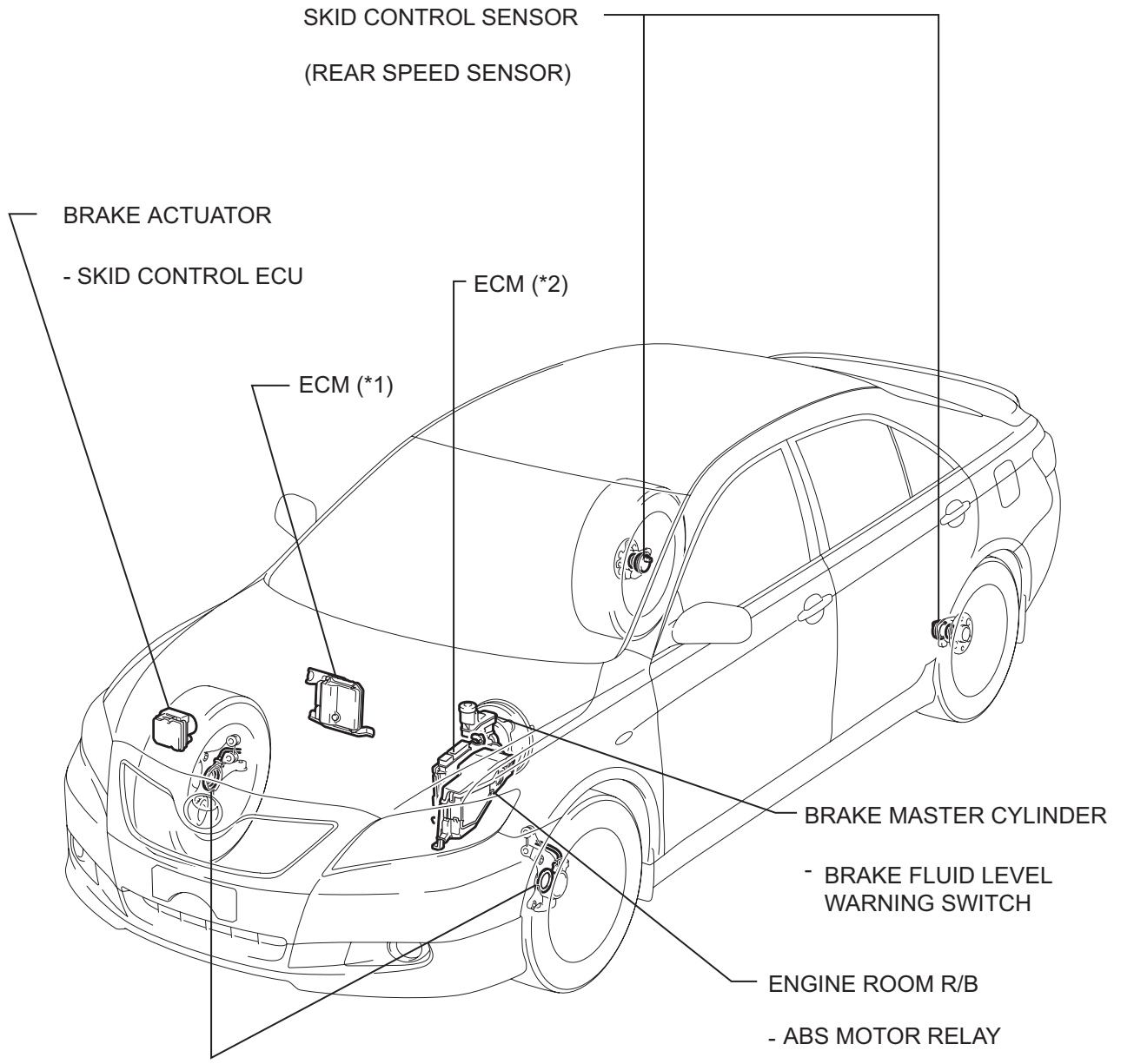
6. CAN COMMUNICATION SYSTEM PRECAUTIONS

(a) The CAN communication system is used for the data communication between the skid control ECU, the steering angle sensor, the yaw rate sensor (acceleration sensor included) and other ECUs. If there is trouble in the CAN communication line, corresponding DTCs in the communication line are output.

(b) If the DTC in the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the VSC system while data communication is normal.

(c) In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires that have an equal length. A bypass wire should not be used, because the data being transmitted will be corrupted.

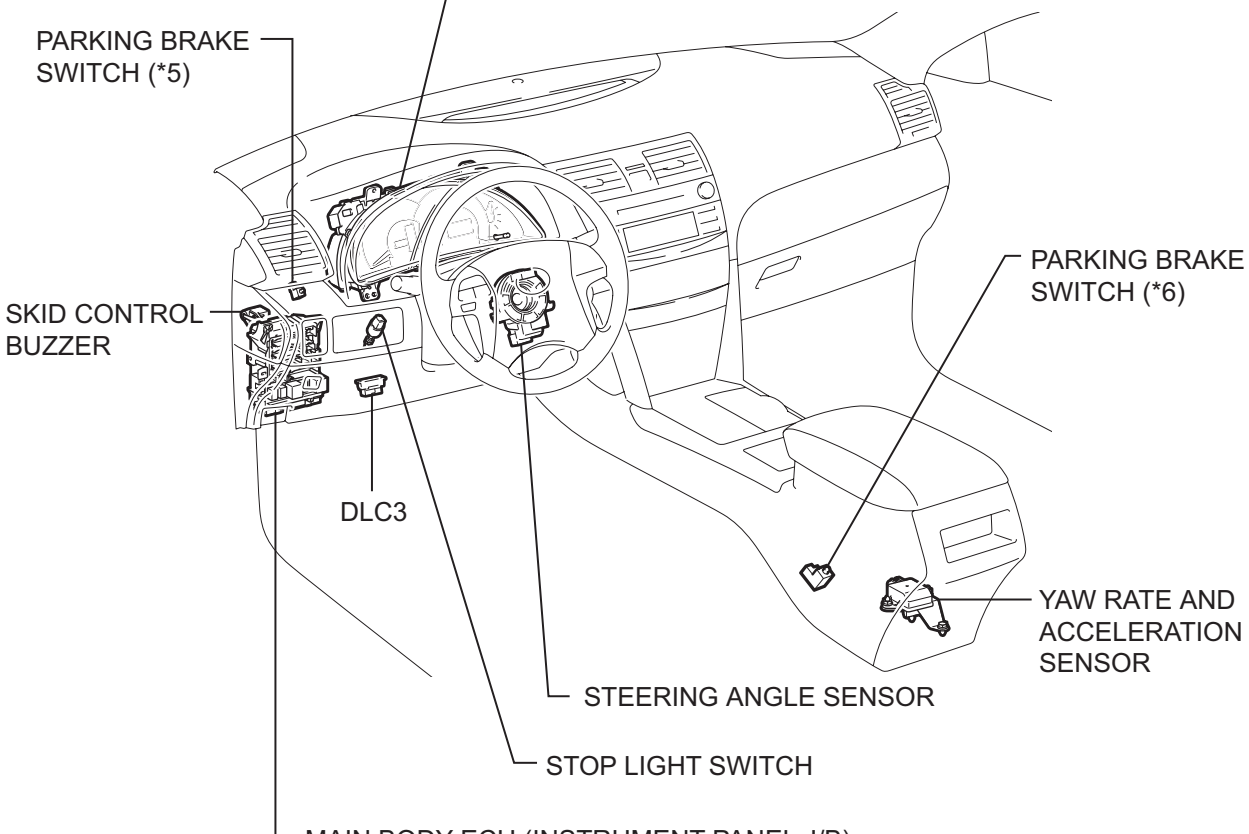
PARTS LOCATION



(*1): 2GR-FE (*2): 2AZ-FE

P

C135800E01



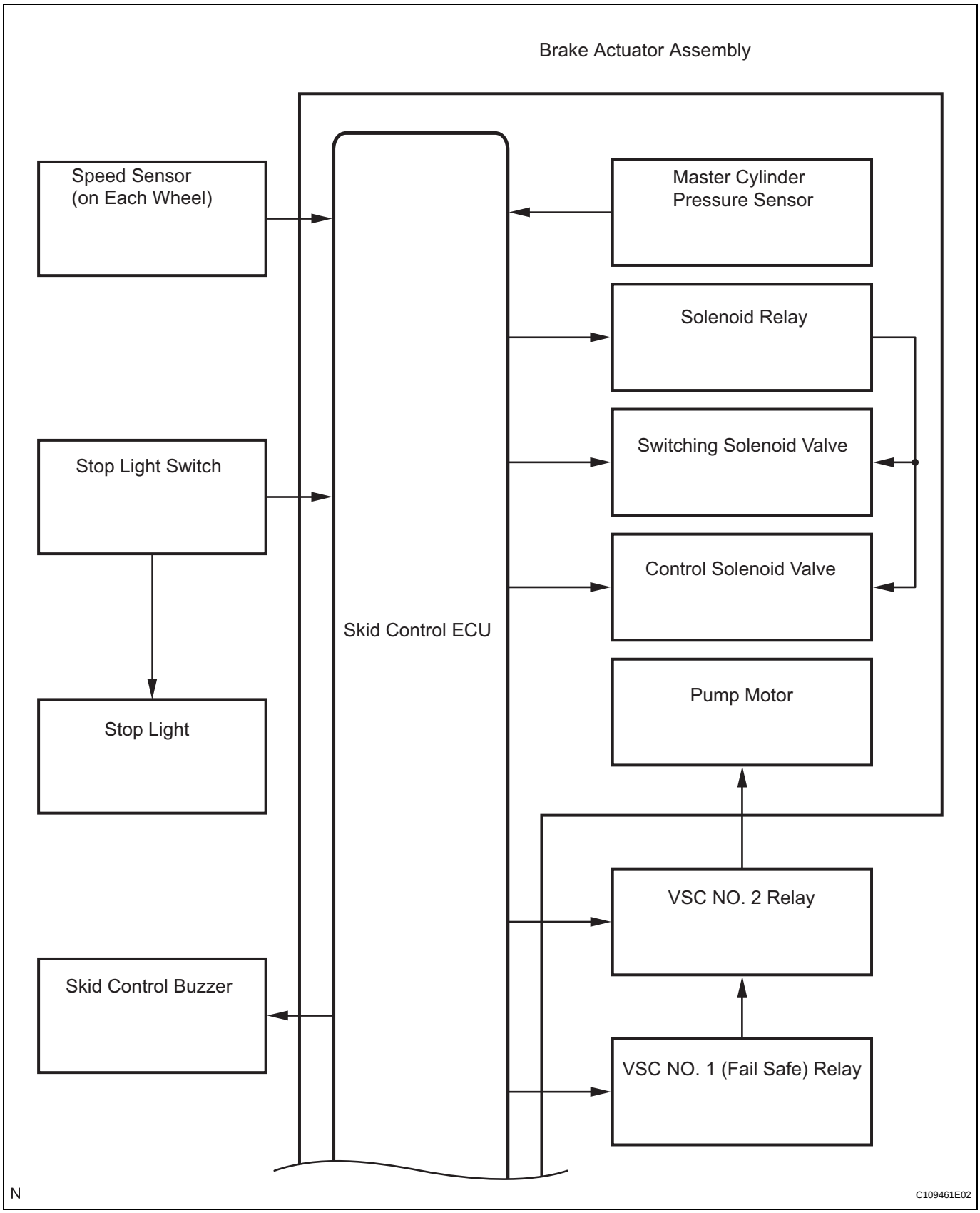
(*3): Models without Multi Information Display (*5): A/T

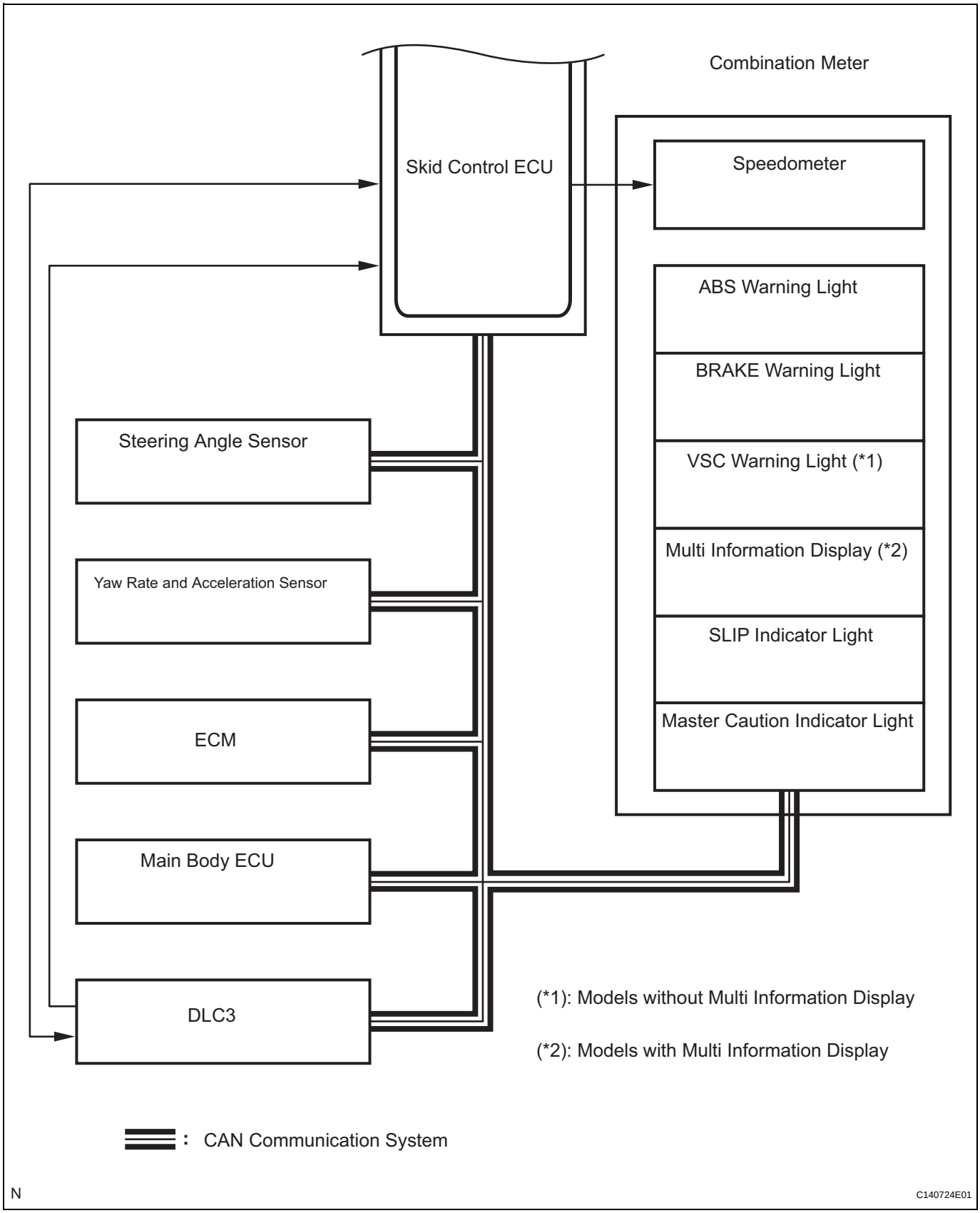
(*4): Models with Multi Information Display (*6): M/T

P C135801E04

BC

SYSTEM DIAGRAM




Combination Meter
Skid Control ECU
Speedometer
ABS Warning Light
BRAKE Warning Light
VSC Warning Light (*1)
Multi Information Display (*2)
SLIP Indicator Light
Master Caution Indicator Light
Steering Angle Sensor
Yaw Rate and Acceleration Sensor
ECM
Main Body ECU
DLC3
(*1): Models without Multi Information Display
(*2): Models with Multi Information Display
: CAN Communication System
N
C140724E01

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
ECM	Skid control ECU	• Shift position signal • Throttle position signal • Engine revolution signal • Intake air temperature signal • Engine torque request signal • Accelerator pedal position signal	CAN communication system
Skid control ECU	Yaw rate and acceleration sensor	Yaw rate and acceleration request signal	CAN communication system
Skid control ECU	Steering angle sensor	Steering angle sensor request signal	CAN communication system
Skid control ECU	ECM	• Wheel speed signal • VSC data signal	CAN communication system
Skid control ECU	Combination meter	• ABS warning light ON signal • BRAKE warning light ON signal • VSC warning light ON signal (*1) • Multi information display ON signal (*2) • SLIP indicator light ON signal • Master caution indicator light ON signal • Wheel speed signal	CAN communication system
Main body ECU	Skid control ECU	Parking brake switch signal	CAN communication system

(*1): Models without multi information display
(*2): Models with multi information display

BC

SYSTEM DESCRIPTION

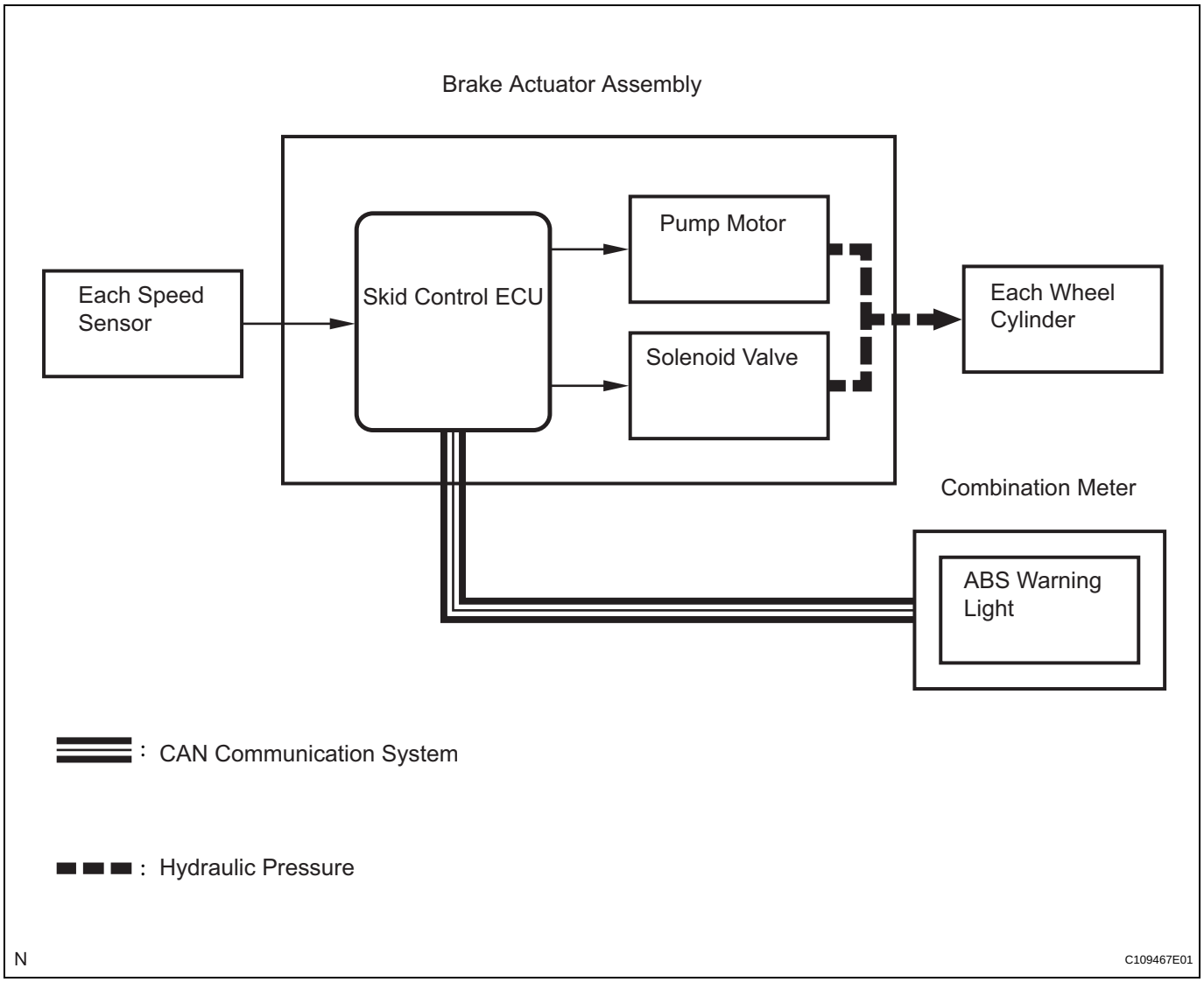
1. FUNCTION DESCRIPTION

HINT:

- The skid control ECU is located within the brake actuator assembly.
- The yaw rate sensor and acceleration sensor are combined in a single unit. This unit communicates with the skid control ECU through CAN communication.

(a) ABS (Anti-lock Brake System)

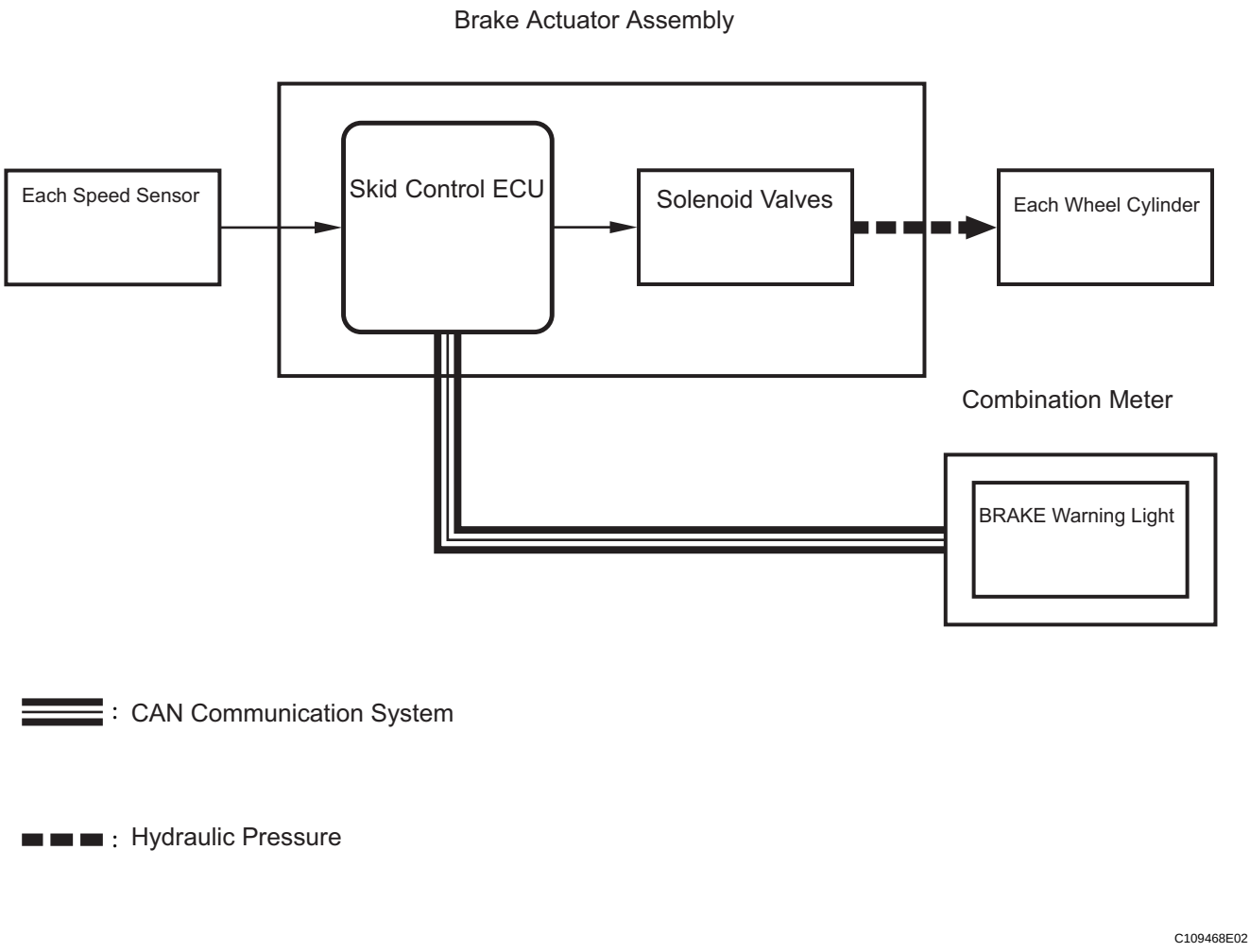
The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.



(1) Operation description
The skid control ECU detects wheel lock based on speed signals it receives from the wheel speed sensors. Based on this information, the skid control ECU controls the pump motor and solenoid valves. The pump motor and solenoid valves are used to prevent wheel lock by controlling the hydraulic pressure applied to the brakes at each wheel. The ABS warning light will come on when the system is malfunctioning.

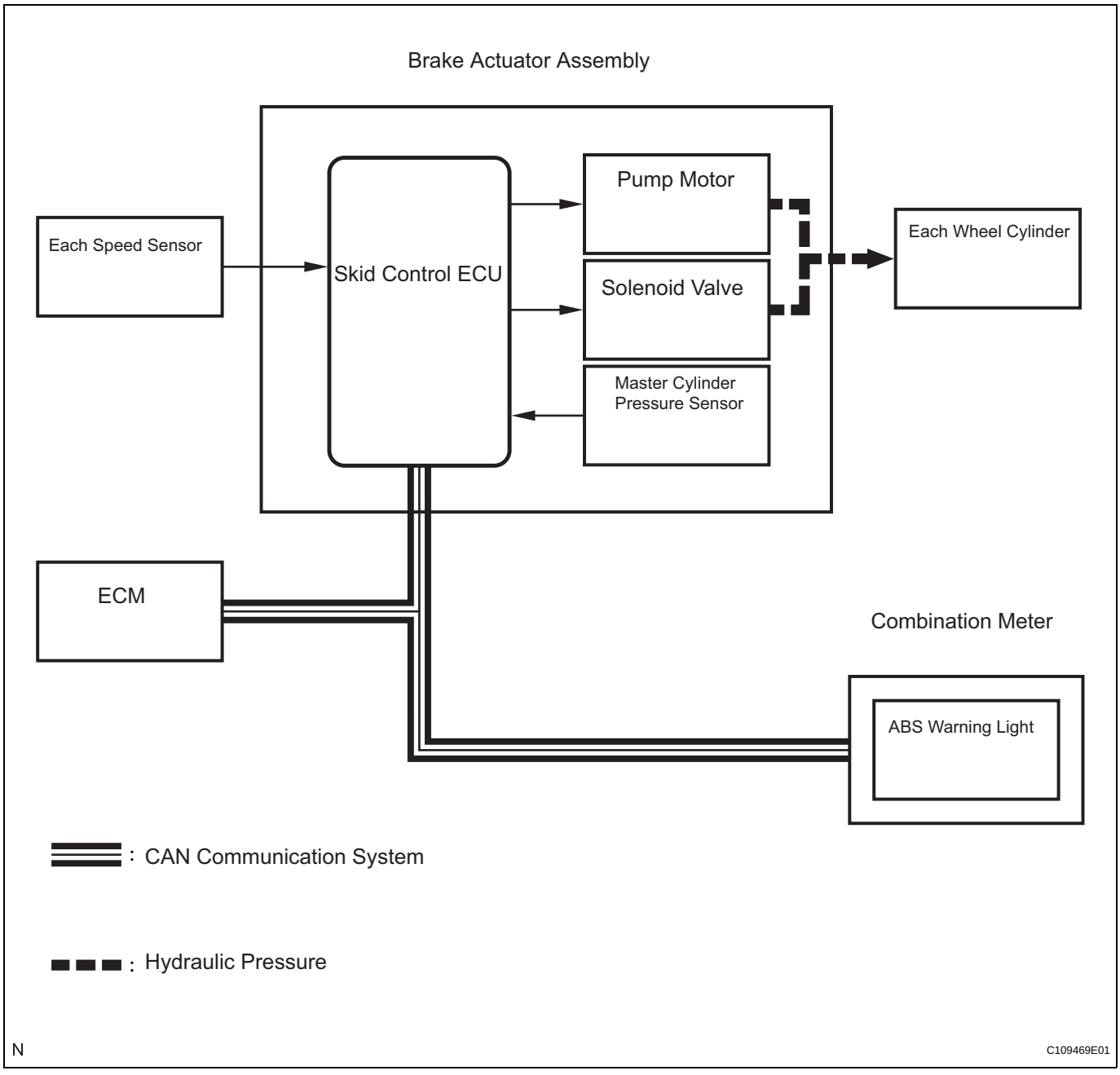
(b) EBD (Electronic Brake force Distribution)
The EBD control utilizes ABS, and performs proper brake force distribution between the front and rear wheels in accordance with driving conditions. When braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.

BC



(1) Operation description
The skid control ECU receives a speed signal from each wheel speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves.
The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The BRAKE warning light will come on if there is a malfunction in the EBD system.

(c) BA (Brake Assist)
The primary purpose of the brake assist system is to provide auxiliary brake force to assist the driver who cannot generate a large enough brake force during emergency braking, thus helping to maximize the brake performance of the vehicle.

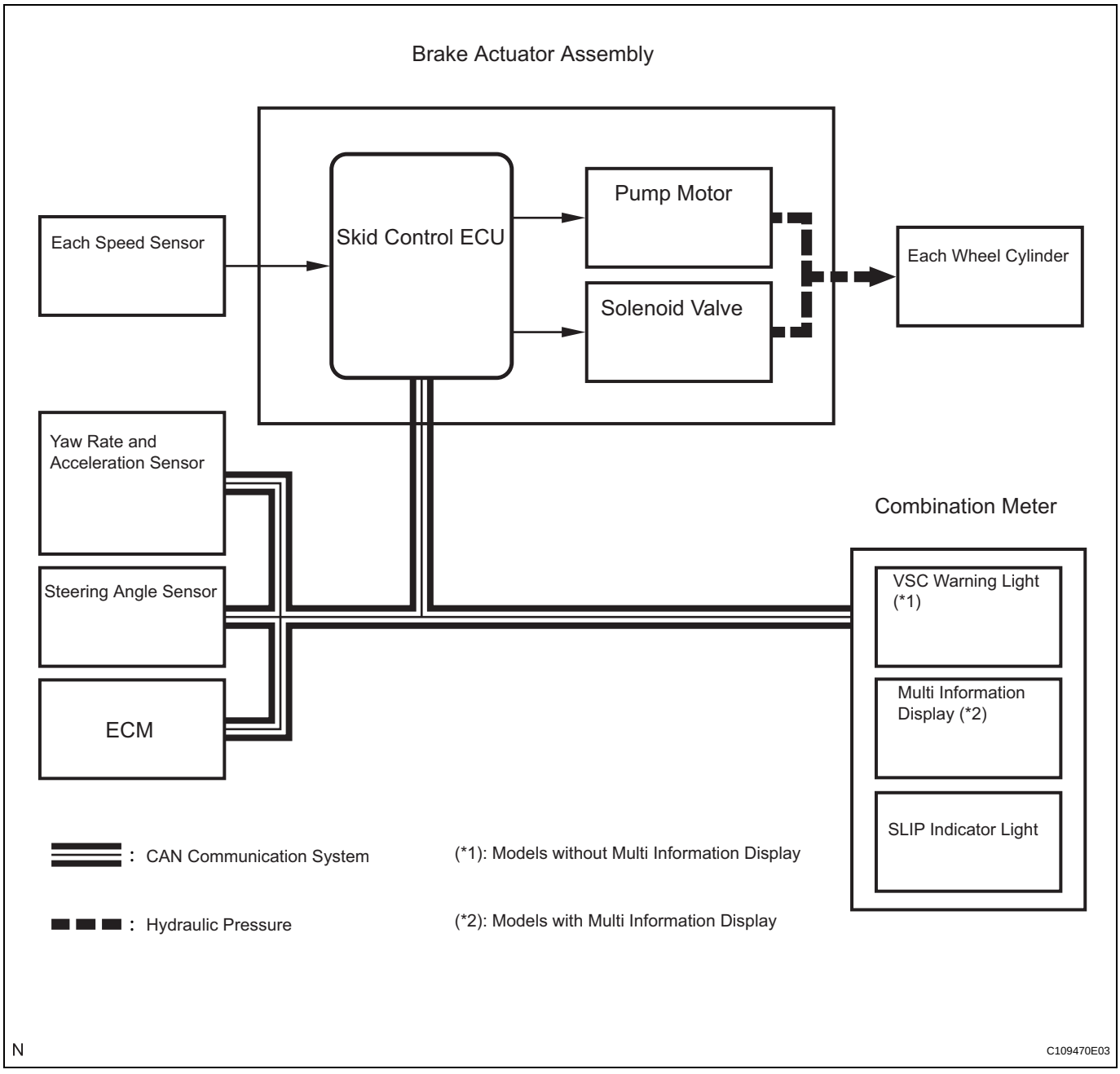


(1) Operation description

The skid control ECU receives the speed signal from each speed sensor and the fluid pressure signal from the master cylinder pressure sensor to determine whether brake assist is necessary. If brake assist is necessary, the skid control ECU sends control signals to the pump motor and solenoid. The pump and the solenoid valve then control the pressure applied to each wheel cylinder.

The ABS warning light comes on to indicate a malfunction in the BA system.

(d) TRAC (Traction Control)
The TRAC system helps prevent the drive wheels from slipping when the driver depresses the accelerator pedal excessively when starting off or accelerating on a slippery surface.



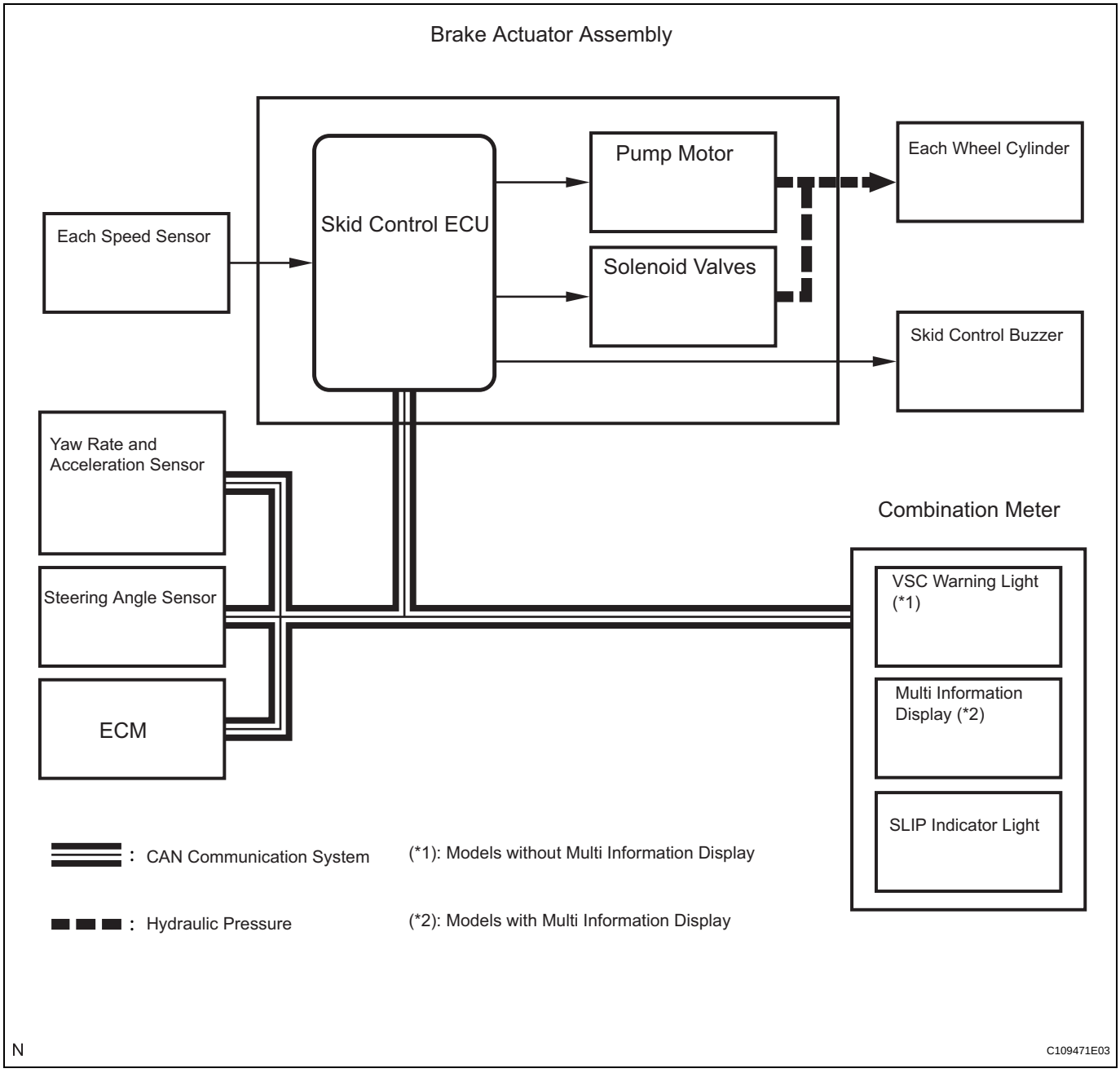
BC

(1) Operation description

The skid control ECU detects wheelspin by receiving signals from each speed sensor and the ECM via CAN communication. The skid control ECU controls engine torque with the ECM via CAN communication and brake hydraulic pressure through the pump and solenoid valve.

The SLIP indicator light blinks when the system is operating. When there is a malfunction in the TRAC system, both VSC warning light (models without multi information display) and SLIP indicator light will come on and the DTC will be displayed on the multi information display (models with multi information display).

(e) VSC (Vehicle Stability Control)
The VSC system helps prevent the vehicle from slipping sideways as a result of strong front or rear wheel skid during cornering.



(1) Operation description

The skid control ECU determines the vehicle operating conditions based on signals received from the wheel speed sensors, yaw rate and acceleration sensor, and steering angle sensor. The skid control ECU sends signals via CAN communication to the ECM in order to control engine torque. The skid control ECU controls brake hydraulic pressure using the pump and solenoid valves.

The SLIP indicator light will blink, and the skid control buzzer will sound when the system is operating. If a malfunction occurs in the VSC system, both the VSC warning light (models without multi information display) and the SLIP indicator light will come on. In addition, the DTC will appear on the multi information display (models with multi information display).

2. ABS with EBD, BA, TRAC and VSC OPERATION

(a) The skid control ECU calculates vehicle stability tendency based on the signals from the speed sensor, yaw rate and acceleration sensor, and steering angle sensor. In addition, it evaluates the results of the calculations to determine whether any control actions (control of the engine output torque by electronic throttle control and of the wheel brake pressure by the brake actuator assembly) should be implemented.

(b) The SLIP indicator blinks and the skid control buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when traction control is operating, and the operation being performed is displayed.

3. FAIL SAFE

(a) When a failure occurs in the ABS with BA, TRAC and VSC systems, the ABS warning, VSC warning (models without multi information display), and SLIP indicator lights come on or the DTC will be displayed on the multi information display (models with multi information display) and ABS with BA, TRAC and VSC operations are prohibited. In addition, when there is a failure that disables the EBD operation, the BRAKE warning light also comes on and the EBD operation is prohibited.

(b) If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.

4. INITIAL CHECK

(a) When the vehicle speed first becomes approximately 4 mph (6 km/h) or more after the ignition switch is turned on (IG), each solenoid valve and motor of the brake actuator is sequentially activated to perform an electrical check. During the initial check, the operating sound of solenoid valve and motor can be heard from the engine compartment, but this is not a malfunction.

5. INSPECTION MODE

(a) VSC operation can be disabled by operating the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.

6. FUNCTION OF COMPONENTS

Components	Function
Speed sensor	Detects the wheel speed and sends the signal to the skid control ECU.
Skid control ECU (housed in brake actuator assembly)	• Processes the signals sent from each sensor to control the ABS, BA, TRAC, and VSC. • Sends and receives the control signals to or from the ECM, yaw rate and acceleration sensor, and steering angle sensor, etc. via CAN communication.
Brake actuator assembly	• Consists of the master cylinder cut solenoid valve, retention solenoid valve, pressure reduction solenoid valve, pump motor, and reservoir, and adjusts the brake fluid pressure applied to each wheel cylinder. • Houses the skid control ECU.
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
Motor relay (VSC NO. 2 relay)	Supplies power to the pump motor.
Fail safe relay (VSC NO. 1 relay)	Cuts off power to the motor when the pump motor circuit malfunctions.
Steering angle sensor	• Installed in the combination switch. • Detects the steering amount and direction and sends the signals to the skid control ECU via CAN communication. • Has the magnetic resistance element which detects the rotation of the magnet housed in the detection gear in order to detect the changes of magnetic resistance and the steering amount and direction.
Yaw rate and acceleration sensor	• Acceleration sensor measures the capacity of the condenser that changes the distance between the electrodes depending on G force, which occurs when the vehicle is accelerated, and converts the measured value into electrical signals. • Yaw rate sensor detects the vehicle's angular velocity (yaw rate) in the vertical direction based on the amount and direction of the piezoelectric ceramics deflection. • Sends signals to the skid control ECU via CAN communication.
Master cylinder pressure sensor	• Detects the fluid pressure in the master cylinder. • Housed in the brake actuator assembly.
Stop light switch	Detects the brake operating conditions and inputs the results to the skid control ECU.
ECM	Controls the engine output when TRAC and VSC are operating with the skid control ECU via CAN communication.
Skid control buzzer	Intermittently sounds to inform the driver that the VSC is operating.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS or BA has occurred. • Blinks to output DTC.
BRAKE warning light	• Comes on to inform the driver that the parking brake is ON when the system is normal, or the brake fluid has decreased. • Comes on to inform the driver that a malfunction in the EBD has occurred.

Components	Function
VSC warning light (*1)	• Comes on to inform the driver that a malfunction in the VSC system has occurred. • Blinks to output DTC.
Multi information display (*2)	• Displays to inform the driver that a malfunction in the VSC system has occurred. • Displays to output DTC.
SLIP indicator light	Blinks to inform the driver that TRAC and VSC are operating.
Master caution indicator light	Comes on to inform the driver that a malfunction.

(*1): Models without multi information display
(*2): Models with multi information display

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The intelligent tester can be used at steps 3, 7, and 10.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer and confirm the trouble (See page IN-45).

NEXT

BC

3	CHECK DTC AND FREEZE FRAME DATA

(a) Check and record a DTC and Freeze Frame Data.
(b) Clear the DTC and Freeze Frame Data (See page BC-141).
(c) Reconfirm the DTC.
  (1) Reconfirm the DTC based on the recorded DTC and Freeze Frame Data (See page BC-141 for DTC Check/Clear, and BC-144 for Freeze Frame Data).
  HINT:
  If any of the DTCs U0100/65, U0123/62, U0124/95, and U0126/63 is output together with a CAN communication DTC, first check the appropriate sensor for a momentary open circuit (See page BC-118).

Result

Condition	Proceed to
DTC is output	A
DTC is not output (Problem symptom does not occur)	B
DTC is not output (Problem symptom occurs)	C

B → GO TO STEP 5

C → GO TO STEP 6

A

4	DIAGNOSTIC TROUBLE CODE CHART

(a) Proceed to Diagnostic Trouble Code Chart (See page BC-151).

NEXT

GO TO STEP 7

5	**SYMPTOM SIMULATION**

(a) Proceed to Diagnosis System (See page BC-138).

NEXT

6	**PROBLEM SYMPTOMS TABLE**

(a) Proceed to Problem Symptoms Table (See page BC-134).

NEXT

7	**CIRCUIT INSPECTION**

NEXT

8	**IDENTIFICATION OF PROBLEM**

NEXT

9	**REPAIR OR REPLACEMENT**

NEXT

10	**CONFIRMATION TEST**

NEXT

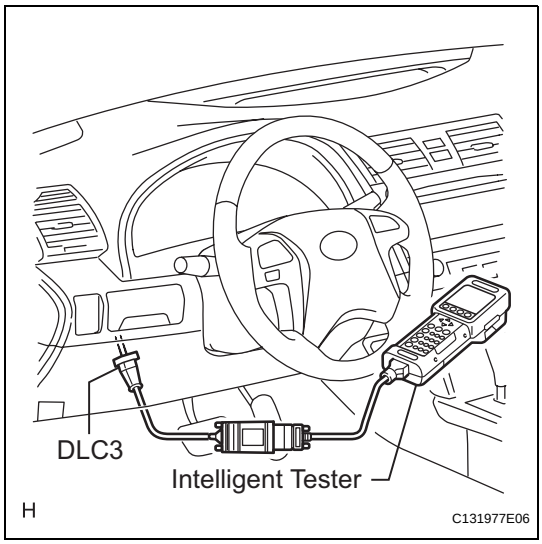
END

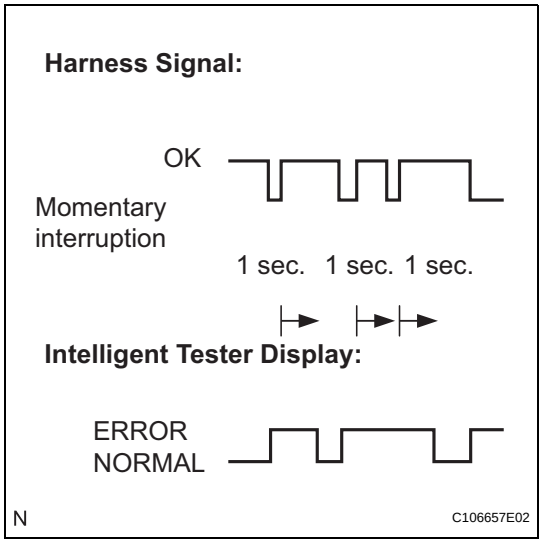
CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

HINT:
A momentary interruption (open circuit) in the connectors and/or wire harness between the sensors and ECUs can be detected using the ECU Data List function of the intelligent tester.

(a) Turn the ignition switch off and connect the intelligent tester to the DLC3.

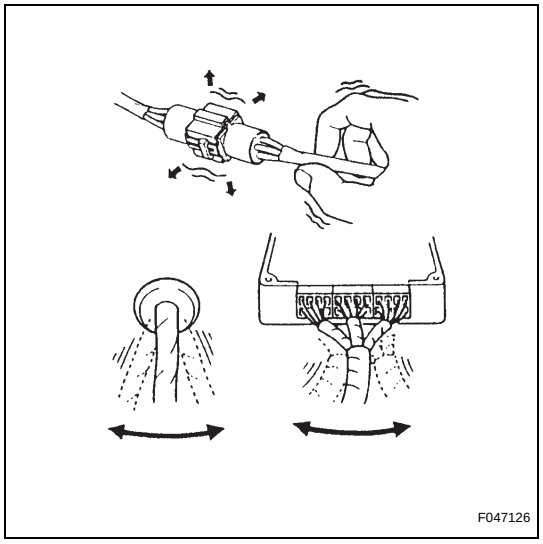




(b) Turn the ignition switch on (IG). Follow the directions on the intelligent tester to display the Data List and select areas where momentary interruption should be monitored.
HINT:
- A momentary interruption (open circuit) cannot be detected for 3 seconds after the ignition switch is turned on (IG) (initial check).
- If the status remains on (ERROR displayed), check the continuity between the ECU and the sensors, or between ECUs.
- The ERROR display on the intelligent tester remains on for 1 second after the harness signal changes from momentary interruption (open circuit) to normal condition.

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C OPN	Master cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-



(c) While observing the screen, gently jiggle the connector or wire harness between the ECU and sensors, or between ECUs.

Result:

ERROR display does not change.

HINT:

The connector and/or wire harness will be in momentary interruption (open circuit) if the display changes. Repair or replace the connector and/or wire harness as one of them is faulty.

BC

CALIBRATION

1. DESCRIPTION

- After replacing the VSC relevant components or performing "Front wheel alignment adjustment", clear and read the sensor calibration data.
- Follow the chart to perform calibration.

Replacing Parts / Operation	Necessary Operation
Skid control ECU	Yaw rate and acceleration sensor zero point calibration.
Yaw rate and acceleration sensor	1. Clearing zero point calibration data. 2. Yaw rate and acceleration sensor zero point calibration.
Front wheel alignment adjustment	1. Clearing zero point calibration data. 2. Yaw rate and acceleration sensor zero point calibration.

2. OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (INTELLIGENT TESTER)

NOTICE:

- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not start the engine.)**
- **Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).**

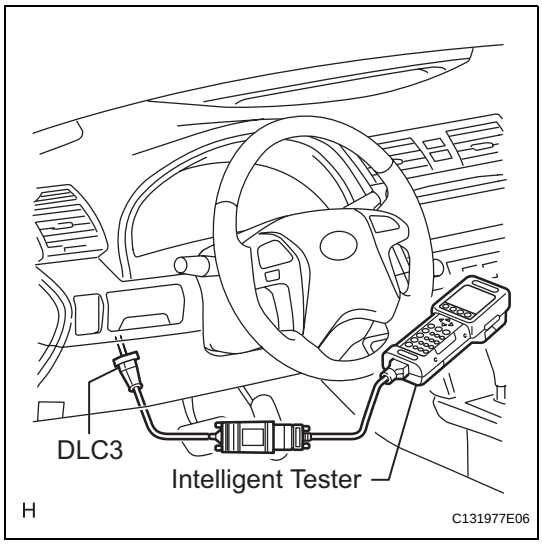
(a) Clear the zero point calibration data.

(1) Turn the ignition switch off.

(2) Connect the intelligent tester to the DLC3.

(3) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).

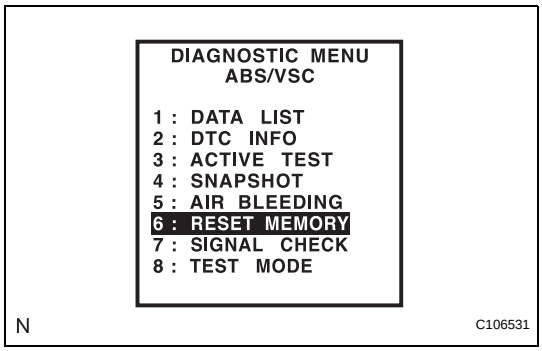
(4) Turn the ignition switch on (IG).



(5) Operate the intelligent tester to erase the codes (select "RESET MEMORY").

HINT:

Refer to the intelligent tester operator's manual for further details.



(6) Turn the ignition switch off.

NOTICE:

If the ignition switch is turned on (IG) for more than 15 seconds with the shift lever in the P position (A/T) or the parking brake applied (M/T) after zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the indicator lights (models without multi information display) or multi information display (models with multi information display).

(b) Perform zero point calibration of the yaw rate and acceleration sensor.

(1) Turn the ignition switch off.

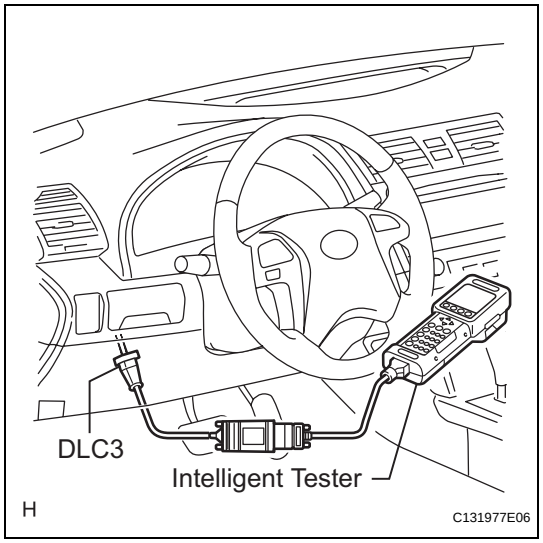
(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).

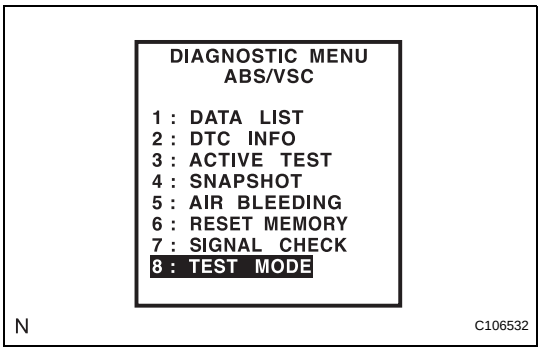
NOTICE:

DTCs C1210/36 and C1336/39 will be recorded if the shift lever is not in the P position (A/T) or the parking brake is not applied (M/T) (See page BC-188).

(3) Connect the intelligent tester to the DLC3.

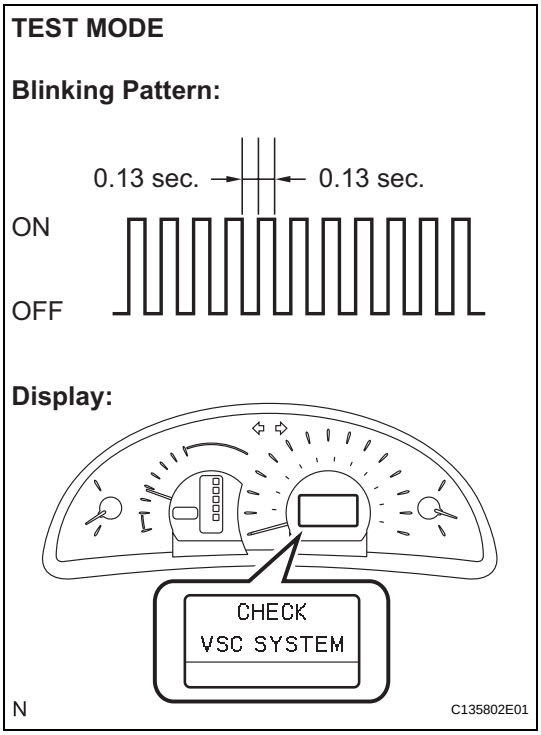
(4) Turn the ignition switch on (IG).





(5) Set the intelligent tester to Test Mode (select "TEST MODE").
HINT:
Refer to the intelligent tester operator's manual for further details.

(6) After the Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.

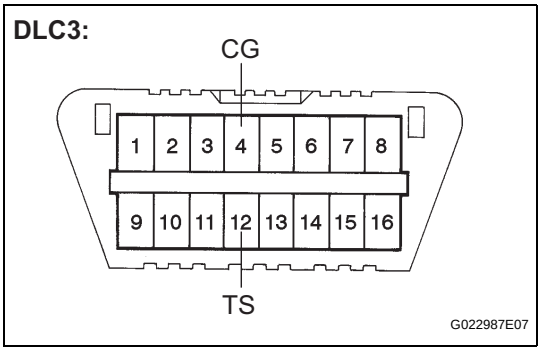


(7) Check that the VSC warning light blinks (models without multi information display) or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the VSC warning light does not blink (models without multi information display) or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), perform zero point calibration again.
- The zero point calibration is performed only once after the system enters the Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(8) Turn the ignition switch off and disconnect the intelligent tester.

3. OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (SST CHECK WIRE)

NOTICE:
- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not start the engine.)**
- **Be sure to perform the procedure on a level surface (with an inclination of less than 1 degree).**

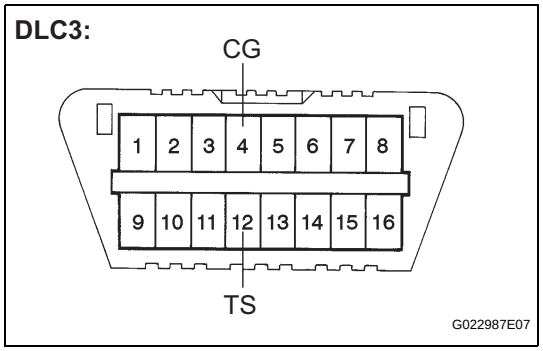


(a) Clear the zero point calibration data.
(1) Turn the ignition switch off.
(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).
(3) Turn the ignition switch on (IG).
(4) The warning light and indicator light come on for 3 seconds to indicate that the initial check is completed.
(5) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.
SST 09843-18040

NOTICE:
If the ignition switch is turned on (IG) for more than 15 seconds with the shift lever in the P position (A/T) or the parking brake applied (M/T) after zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the indicator lights (models without multi information display) or multi information display (models with multi information display).

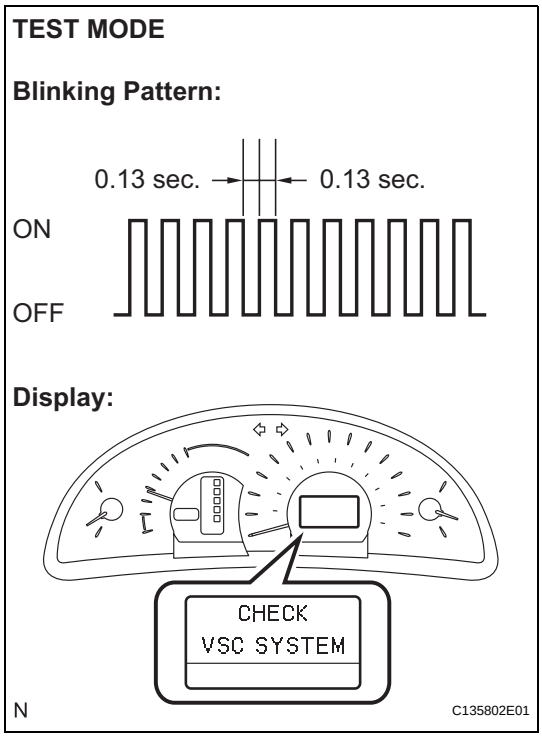
(b) Perform zero point calibration of the yaw rate and acceleration sensor.
(1) Turn the ignition switch off.
(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).
NOTICE:
DTCs C1210/36 and C1336/39 will be recorded if the shift lever is not in the P position (A/T) or the parking brake is not applied (M/T) (See page BC-188).

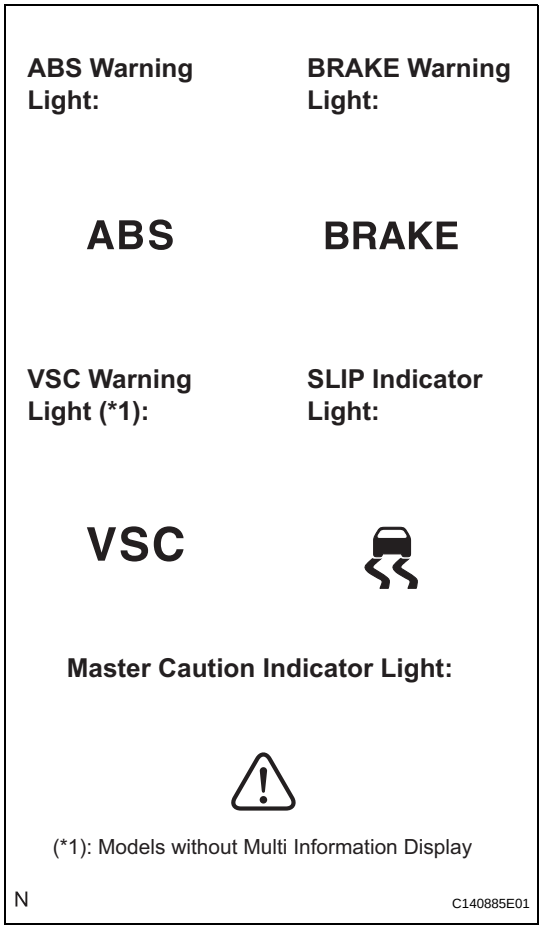
DLC3:



(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040
(4) Turn the ignition switch on (IG).
(5) Keep the vehicle stationary on a level surface for 2 seconds or more.

BC





(6) Check that the VSC warning light blinks (models without multi information display) or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the VSC warning light does not blink (models without multi information display) or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), perform zero point calibration again.
- The zero point calibration is performed only once after the system enters the Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(7) Turn the ignition switch off and disconnect the SST from the DLC3.

TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.
NOTICE:
Before releasing the parking brake, move the shift lever to the P position for safety (A/T) or set the chocks to hold the vehicle for safety (M/T).
HINT:
When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS warning, BRAKE warning, SLIP indicator, and master caution indicator lights come on for approximately 3 seconds. Vehicles equipped with VSC, which are not equipped with a multi information display, the VSC warning light will illuminate instead of the master caution indicator light.
HINT:
If the ECU stores a DTC, the ABS warning, BRAKE warning, VSC warning and SLIP indicator lights will come on.

If the vehicle is equipped with a multi information display, and the vehicle stores a DTC, the master caution indicator light will illuminate, and the multi information display will indicate the malfunction instead of the VSC warning light. In this case, the ABS warning, BRAKE warning, and SLIP indicator lights will also come on.
If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

Trouble Area	See procedure
ABS warning light circuit	BC-229 or BC-233
BRAKE warning light circuit	BC-244 or BC-252
VSC warning light circuit	BC-236 or BC-240
SLIP indicator light circuit	BC-255 or BC-259

2. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (INTELLIGENT TESTER)

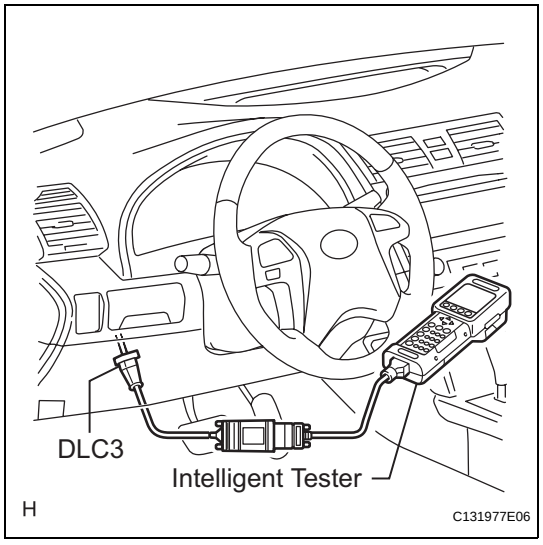
NOTICE:

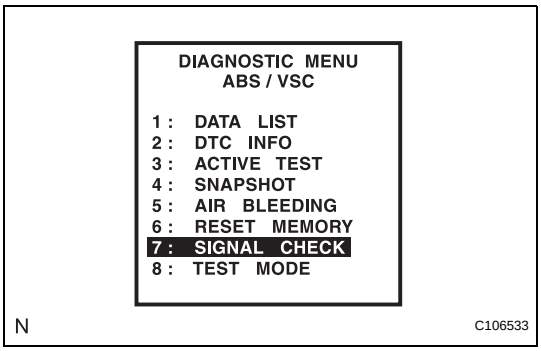
After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.

HINT:

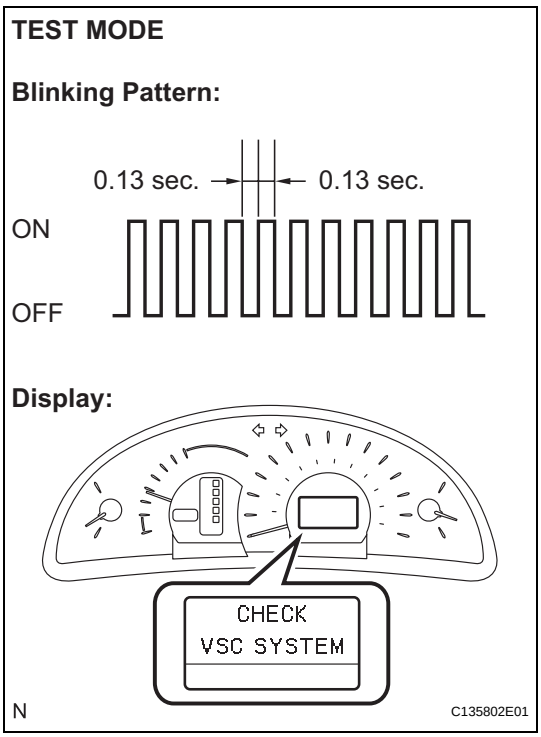
- If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs of the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

(a) Procedure to enter Test Mode.
  (1) Turn the ignition switch off.
  (2) Connect the intelligent tester to the DLC3.
  (3) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).
  (4) Turn the ignition switch on (IG).



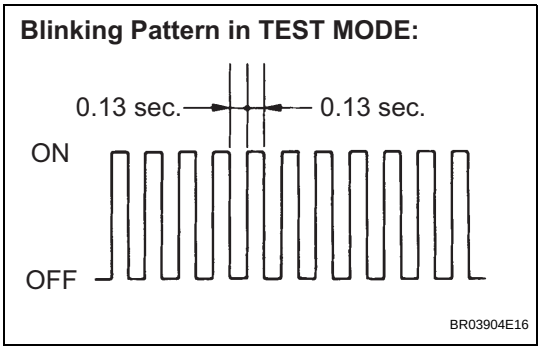


(5) Set the intelligent tester to Test Mode (select "SIGNAL CHECK").
HINT:
Refer to the intelligent tester operator's manual for further details.



(6) Check that the ABS and VSC (models without multi information display) warning lights blink or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the ABS and VSC (models without multi information display) warning lights do not blink or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), inspect the TS and CG terminal circuit, and ABS and VSC warning light circuits.

Trouble Area	See procedure
TS and CG terminal circuit	BC-269
ABS warning light circuit	BC-233
VSC warning light circuit	BC-240



(7) Check the ABS sensor.
HINT:
Check that the ABS warning light is blinking in Test Mode and perform the check.

3. ACCELERATION SENSOR CHECK (INTELLIGENT TESTER)

(a) Keep the vehicle stationary on a level surface for 1 second or more.
HINT:
Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

4. MASTER CYLINDER PRESSURE SENSOR CHECK (INTELLIGENT TESTER)

(a) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.

(b) Check that the ABS warning light stays on for 3 seconds.
HINT:
- Ensure that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time brake pedal operation above is performed.
- If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to be completed.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
- If the brake pedal is strongly depressed when the negative pressure is insufficient, the BRAKE warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

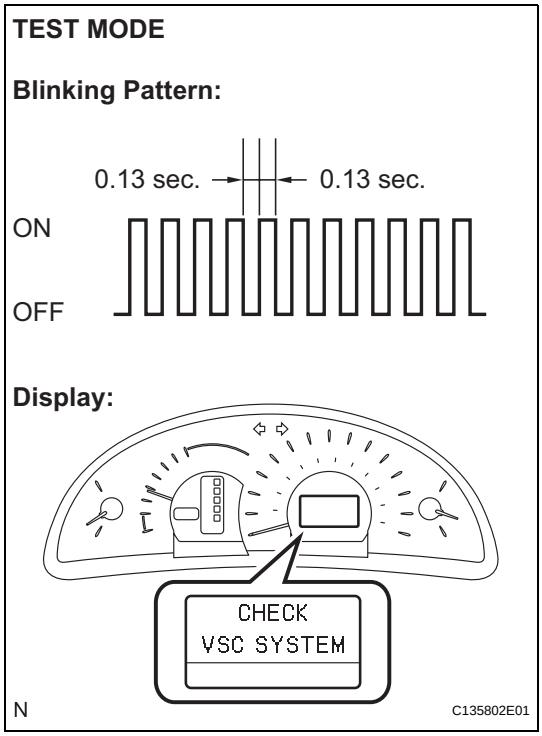
5. SPEED SENSOR CHECK (INTELLIGENT TESTER)

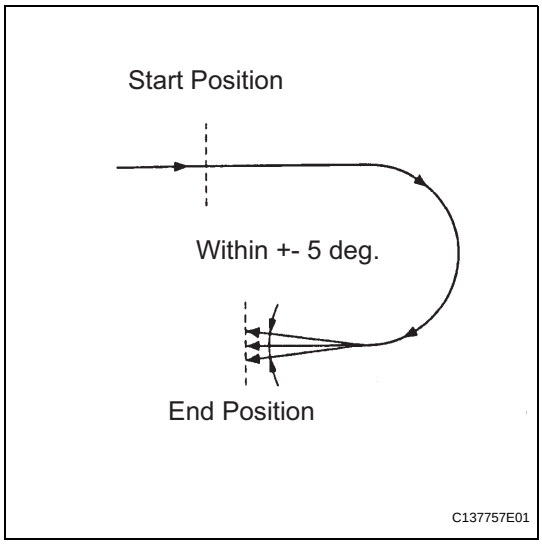
(a) Check the speed sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off.
HINT:
The sensor check may not be completed if wheelspin occurs.

(b) Stop the vehicle.
NOTICE:
- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off and if the vehicle speed exceeds 50 mph (80 km/h), a signal check code will be stored again. Accelerate or stop the vehicle before the speed reaches 50 mph (80 km/h).**
- **If the signal check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:
When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

(c) Check the VSC sensor.
Check that the VSC warning light (models without multi information display) blinks or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display), and perform the check.



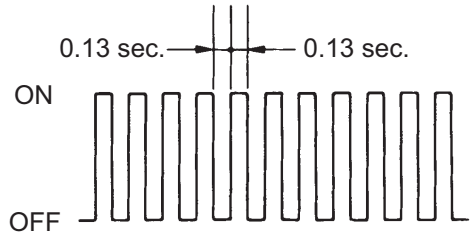


6. YAW RATE SENSOR CHECK (INTELLIGENT TESTER)

(a) Check the output of the yaw rate sensor.
(1) Keep the vehicle in a stationary condition on a level surface for 1 second or more.
(2) Move the shift lever from P to the D position (A/T) or release the parking brake (M/T) and drive the vehicle at a speed of approximately 3 mph (5 km/h), and turn the steering wheel either to the left or right 90° or more until the vehicle makes a 180° turn.
(3) Stop the vehicle and move the shift lever to the P position (A/T) or apply the parking brake (M/T). Check that the skid control buzzer sounds for 3 seconds.
HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-263), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +- 5° of its start position.

- Do not spin the wheels.
- Do not turn the ignition switch off while turning.
- Do not move the shift lever to the P position (A/T) or do not apply the parking brake (M/T) while turning, but changing in the vehicle speed, stopping, or driving in reverse is possible.
- Complete the turn within 20 seconds.

Blinking Pattern in TEST MODE:



7. END OF SENSOR CHECK (INTELLIGENT TESTER)

(a) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTICE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

8. READ DTC OF SIGNAL CHECK FUNCTION (INTELLIGENT TESTER)

(a) Read the DTC(s) by following the tester screen.

NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

See the list of DTC (See procedure "A").

9. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (SST CHECK WIRE)

NOTICE:

After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.

HINT:

- If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs of the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

(a) Procedure to enter Test Mode.

(1) Turn the ignition switch off.

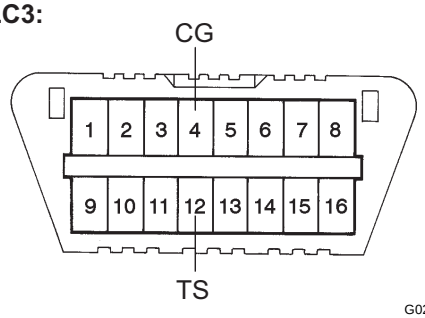
BC

(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).

(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(4) Turn the ignition switch on (IG).

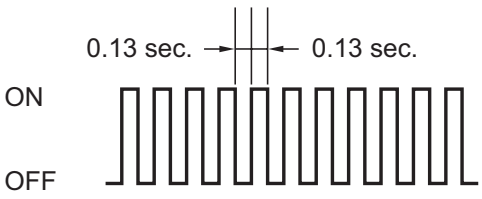
DLC3:



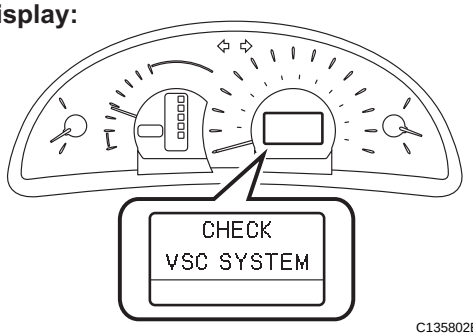
G022987E07

TEST MODE

Blinking Pattern:



Display:



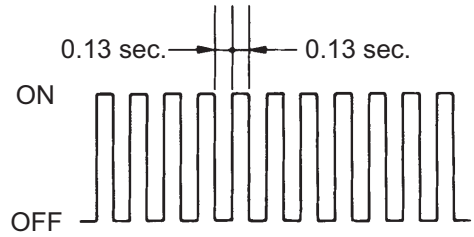
N

C135802E01

(5) Check that the ABS and VSC (models without multi information display) warning lights blink or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the ABS and VSC (models without multi information display) warning lights do not blink or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), inspect the TS and CG terminal circuit, and ABS and VSC warning light circuits.

Trouble Area	See procedure
TS and CG terminal circuit	BC-269
ABS warning light circuit	BC-233
VSC warning light circuit	BC-240

Blinking Pattern in TEST MODE:



BR03904E16

(6) Check the ABS sensor.
HINT:
Check that the ABS warning light is blinking in Test Mode and perform the check.

10. ACCELERATION SENSOR CHECK (SST CHECK WIRE)

(a) Keep the vehicle stationary on a level surface for 1 second or more.
HINT:
Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

11. MASTER CYLINDER PRESSURE SENSOR CHECK (SST CHECK WIRE)

(a) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.

(b) Check that the ABS warning light stays on for 3 seconds.
HINT:
- Ensure that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time the brake pedal operation above is performed.
- If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to be completed.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
- If the brake pedal is strongly depressed when the negative pressure is insufficient, the BRAKE warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

12. SPEED SENSOR CHECK (SST CHECK WIRE)

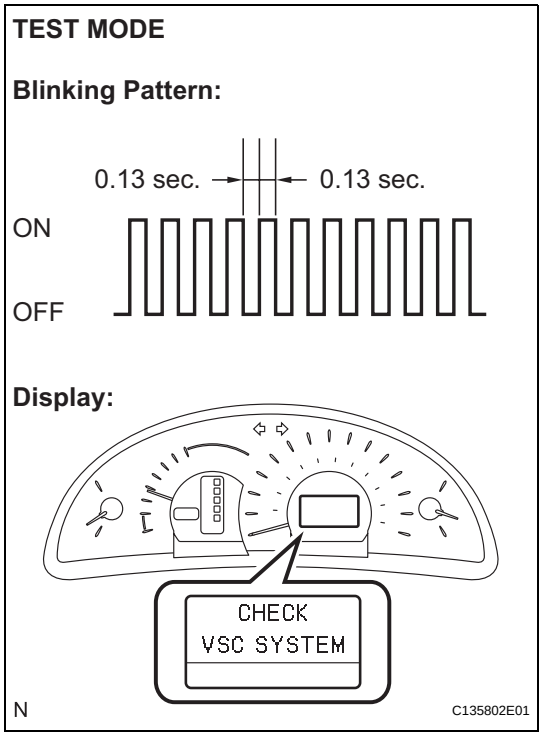
(a) Check the speed sensor signal.

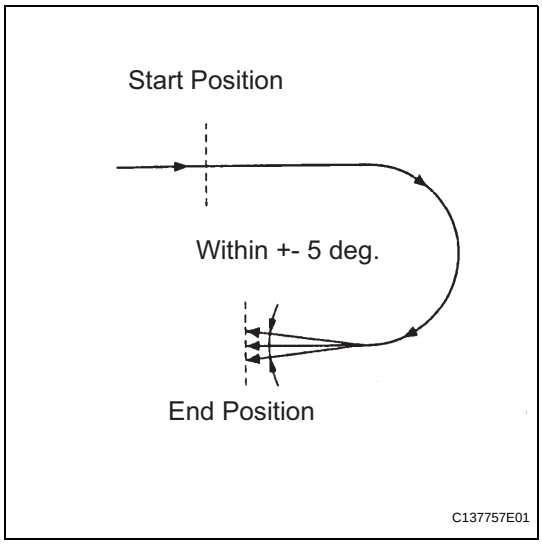
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off.
HINT:
The sensor check may not be completed if wheelspin occurs.

(b) Stop the vehicle.
NOTICE:
- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off, if vehicle speed exceeds 50 mph (80 km/h), a signal check code will be stored again. Accelerate or stop the vehicle before the speed reaches 50 mph (80 km/h).**
- **If the signal check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:
When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

(c) Check the VSC sensor.
Check that the VSC warning light (models without multi information display) blinks or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display), and perform the check.



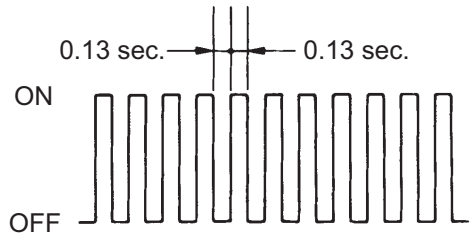


13. YAW RATE SENSOR CHECK (SST CHECK WIRE)

(a) Check the output of the yaw rate sensor.
(1) Keep the vehicle stationary on a level surface for 1 second or more.
(2) Move the shift lever from P to the D position (A/T) or release the parking brake (M/T) and drive the vehicle at a vehicle speed of approximately 3 mph (5 km/h) and turn the steering wheel either to the left or right 90° or more and until the vehicle makes a 180° turn.
(3) Stop the vehicle and move the shift lever to the P position (A/T) or apply the parking brake (M/T). Check that the skid control buzzer sounds for 3 seconds.
HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-263), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +- 5° of its start position.
- Do not spin the wheels.

- Do not turn the ignition switch off while turning.
- Do not move the shift lever to the P position (A/T) or do not apply the parking brake (M/T) while turning, but changing in the vehicle speed, stopping, or driving in reverse is possible.
- Complete the turn within 20 seconds.

Blinking Pattern in TEST MODE:



BR03904E16

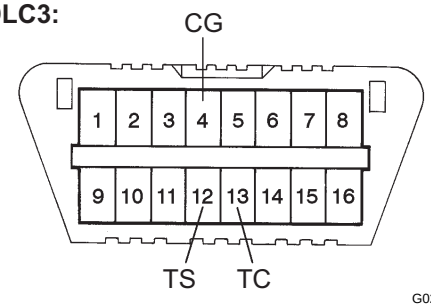
14. END OF SENSOR CHECK (SST CHECK WIRE)

(a) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTICE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

DLC3:



G022988E01

15. READ DTC OF SIGNAL CHECK FUNCTION (SST CHECK WIRE)

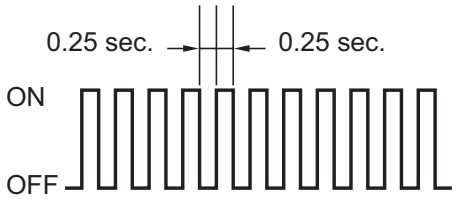
(a) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

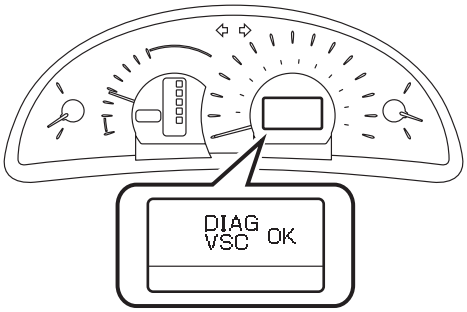
BC

(b) Count the number of blinks of the ABS and VSC (models without multi information display) warning lights or read "DIAG VSC" on the multi information display (models with multi information display).

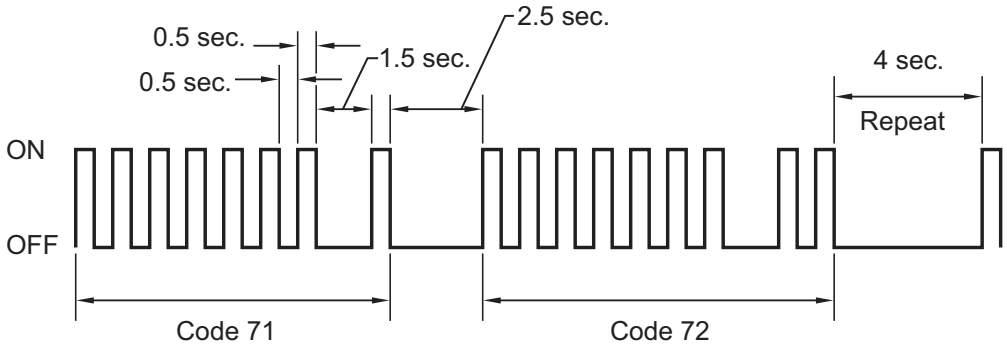
Blinking Pattern in Normal System Code:



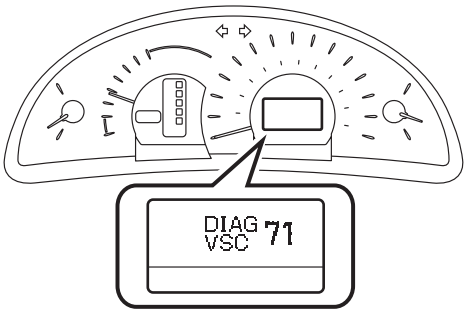
Display of Normal System Code:



Blinking Pattern in Trouble Code (Example Codes 71 and 72):



Display of Trouble Code (Example Code 71):



N

C135803E02

NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTC (See procedure "A").

(c) After performing the check, disconnect the SST from terminals TS and CG, and TC and CG of the DLC3 and turn the ignition switch off.

(d) Turn the ignition switch on (IG).
HINT:
- If the ignition switch is not turned on (IG) after the SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned on (IG) with terminals TS and CG shorted, the previous Test Mode will continue.

16. DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")

ABS sensor:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	Speed sensor rotor
C1276/76	Abnormal change in output signal of front speed sensor LH	Speed sensor rotor
C1277/77	Abnormal change in output signal of rear speed sensor RH	Speed sensor rotor
C1278/78	Abnormal change in output signal of rear speed sensor LH	Speed sensor rotor
C1279/79	Acceleration sensor output voltage malfunction	• Yaw rate and acceleration sensor • Sensor installation
C1281/81	Master cylinder pressure sensor output malfunction	• Stop light switch • Master cylinder pressure sensor

VSC sensor:

Code No.	Diagnosis	Trouble Area
C0371/71	Yaw rate sensor	Yaw rate and acceleration sensor

HINT:
The codes in this table are output only in Test Mode (signal check).

BC

PROBLEM SYMPTOMS TABLE

If there are no DTCs output and the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

- Inspect the fuse and relay before investigating the suspected areas as shown in the table below.
- Inspect each malfunction circuit in numerical order for the corresponding symptom.

Vehicle Stability Control System:

Symptom	Suspected Area	See page
ABS, BA and/or EBD does not operate	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. IG power source circuit	BC-207
	3. Front speed sensor circuit	BC-156
	4. Rear speed sensor circuit	BC-164
	5. Check the brake actuator assembly with the intelligent tester. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leakage.	BC-425
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
ABS, BA and/or EBD does not operate efficiently	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. Front speed sensor circuit	BC-156
	3. Rear speed sensor circuit	BC-164
	4. Stop light switch circuit	BC-213
	5. Check the brake actuator assembly with the intelligent tester. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leakage.	BC-425
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
ABS sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. TC and CG terminal circuit	BC-266
	3. If the symptoms still occur even after the above circuit in suspected areas has been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
ABS warning light abnormal (Remains on)	1. ABS warning light circuit	BC-229
	2. Brake actuator assembly (Skid control ECU)	BC-426
ABS warning light abnormal (Does not come on)	1. ABS warning light circuit	BC-233
	2. Brake actuator assembly (Skid control ECU)	BC-426
BRAKE warning light abnormal (Remains on)	1. BRAKE warning light circuit	BC-244
	2. Brake actuator assembly (Skid control ECU)	BC-426
BRAKE warning light abnormal (Does not come on)	1. BRAKE warning light circuit	BC-252
	2. Brake actuator assembly (Skid control ECU)	BC-426

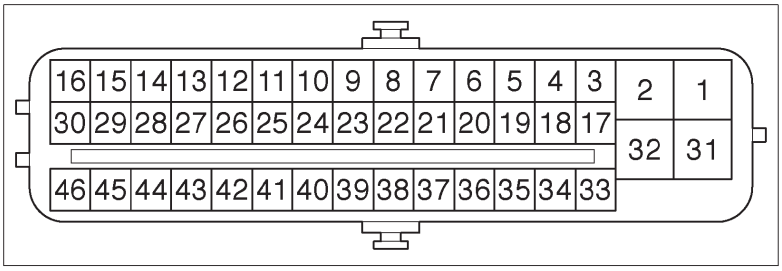
Symptom	Suspected Area	See page
VSC and/or TRAC does not operate	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. IG power source circuit	BC-207
	3. Check the hydraulic circuit for leakage	-
	4. Front speed sensor circuit	BC-156
	5. Rear speed sensor circuit	BC-164
	6. Yaw rate and acceleration sensor circuit	BC-193
	7. Steering angle sensor circuit	BC-190
	8. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
VSC sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. TC and CG terminal circuit	BC-266
	3. If the symptoms still occur even after the above circuit in suspected areas has been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
VSC warning light abnormal (Remains on) (*1)	1. VSC warning light circuit	BC-236
	2. Brake actuator assembly (Skid control ECU)	BC-426
VSC warning light abnormal (Does not come on) (*1)	1. VSC warning light circuit	BC-240
	2. Brake actuator assembly (Skid control ECU)	BC-426
Multi information display abnormal (Remains on) (*2)	1. VSC warning light circuit	BC-236
	2. Brake actuator assembly (Skid control ECU)	BC-426
Multi information display abnormal (Does not come on) (*2)	1. VSC warning light circuit	BC-240
	2. Brake actuator assembly (Skid control ECU)	BC-426
SLIP indicator light abnormal (Remains on)	1. SLIP indicator light circuit	BC-255
	2. Brake actuator assembly (Skid control ECU)	BC-426
SLIP indicator light abnormal (Does not come on)	1. SLIP indicator light circuit	BC-259
	2. Brake actuator assembly (Skid control ECU)	BC-426
Sensor check cannot be done	1. TS and CG terminal circuit	BC-269
	2. Brake actuator assembly (Skid control ECU)	BC-426
Skid control buzzer abnormal	1. Skid control buzzer circuit	BC-263
	2. Brake actuator assembly (Skid control ECU)	BC-426

(*1): Models without multi information display
(*2): Models with multi information display

TERMINALS OF ECU

1. Terminal of ECU

Skid Control ECU:



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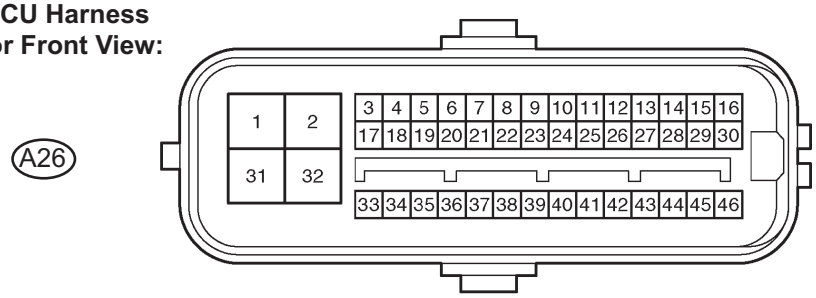
Symbols (Terminal No.)	Terminal Description
GND2 (1)	Pump motor ground
BM (2)	Motor relay input
FR+ (3)	Front wheel speed RH signal power supply output
FL- (4)	Front wheel speed LH signal input
RR+ (5)	Rear wheel speed RH signal power supply output
RL- (6)	Rear wheel speed LH signal input
CANH (11)	CAN communication line H
SP1 (12)	Speed signal output for combination meter
D/G (13)	Diagnosis tester communication line
MRF (14)	Fail safe motor relay output
MR (15)	Motor relay output
FR- (17)	Front wheel speed RH signal input
FL+ (18)	Front wheel speed LH signal power supply output
RR- (19)	Rear wheel speed RH signal input
RL+ (20)	Rear wheel speed LH signal power supply output
TS (24)	Test mode (signal check) input
CANL (25)	CAN communication line L
STP (27)	Stop light switch input
BZ (30)	Skid control buzzer output
+BS (31)	Solenoid relay power supply
GND1 (32)	Skid control ECU ground
WFSE (42)	WFSE input
R+ (45)	Power supply for motor relay
IG1 (46)	IG1 power supply

2. Terminal Inspection

(a) Disconnect the connector and measure the voltage or resistance on the wire harness side.

Skid Control ECU Harness Side Connector Front View:



HINT:
Voltage cannot be measured with the connector connected to the skid control ECU because the connector is watertight.

Standard

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (A26-1) - Body ground	W-B - Body ground	Pump motor ground	Ignition switch off	Below 1 Ω
STP (A26-27) - Body ground	P - Body ground	Stop light switch input	Stop light switch ON → OFF (Brake pedal depressed → released)	8 to 14 V → Below 1.5 V
BZ (A26-30) - Body ground	R - Body ground	Buzzer output	Ignition switch on (IG), when buzzer not sounding	6 to 10 V
+BS (A26-31) - Body ground	L - Body ground	Solenoid relay power supply	Always	10 to 14 V
GND1 (A26-32) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 Ω
IG1 (A26-46) - Body ground	P - Body ground	IG1 power supply	Ignition switch on (IG)	10 to 14 V

DIAGNOSIS SYSTEM

1. DESCRIPTION

When troubleshooting a vehicle with the diagnosis system, the only difference from the usual troubleshooting procedure is connecting the intelligent tester to the vehicle and reading various data output from the vehicle's skid control ECU.

The skid control ECU records DTCs when the computer detects a malfunction in the computer itself or in its circuits.

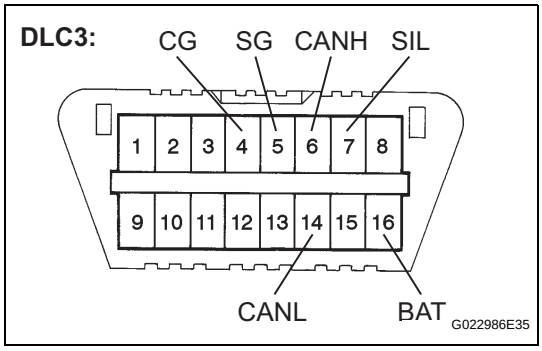
To check the DTCs, connect the intelligent tester to the DLC3 on the vehicle. The intelligent tester enables you to erase the DTCs, activate the various actuators, and check the Freeze Frame Data and Data List.

(a) Check the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.



(b) Check the DLC3.

The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

Verify the conditions listed in the table below.

Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	*Ignition switch off	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	*Ignition switch off	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	*Ignition switch off	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	*Ignition switch off	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	*Ignition switch off	6 kΩ or higher

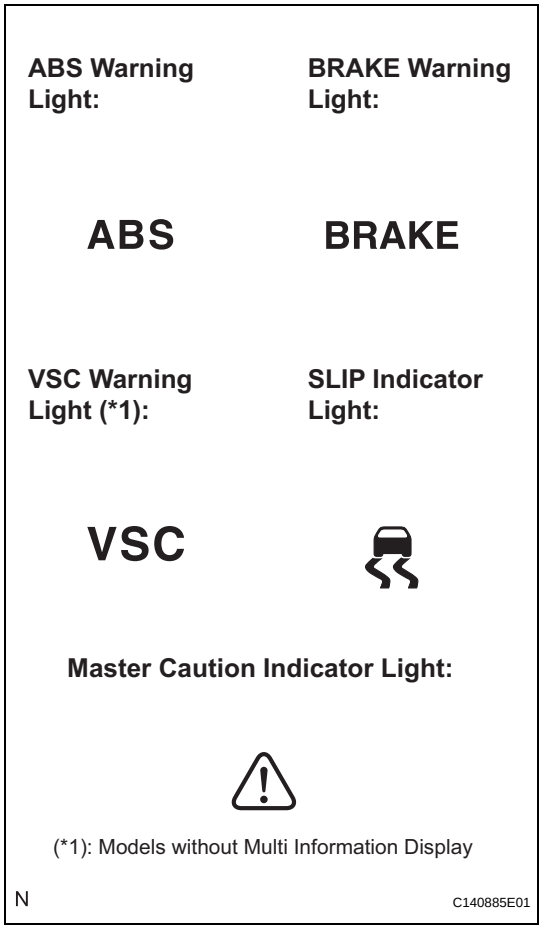
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's operator's manual.

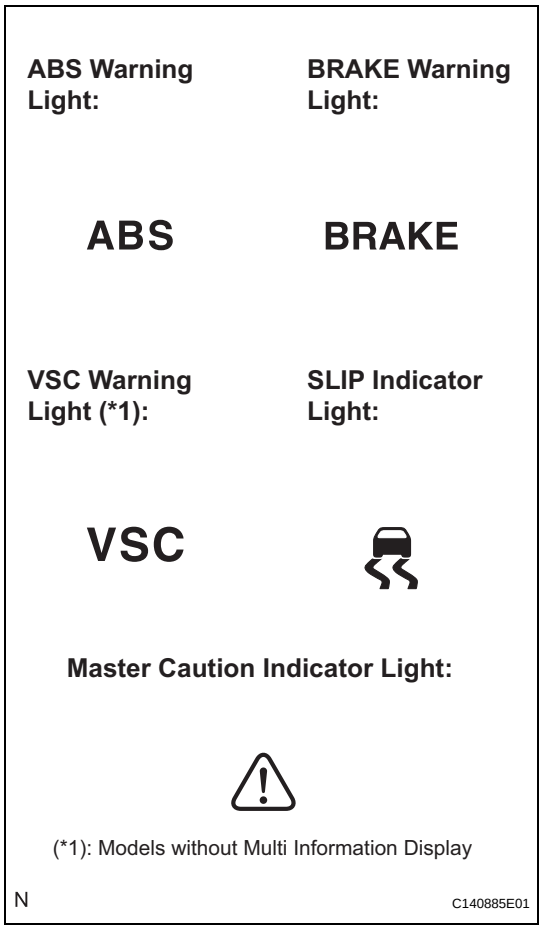


2. DIAGNOSIS

(a) If the skid control ECU detects a malfunction, the ABS, BRAKE, and VSC (models without multi information display) warning lights, and SLIP indicator light will come on and the multi information display (models with multi information display) shows warning messages in order to warn the driver.
The table below indicates which lights will come on when there is a malfunction in a particular function.

BC

Item / Trouble Area	ABS	EBD	BA	TRAC	VSC
ABS warning light	○	○	○	-	-
BRAKE warning light	-	○	-	-	-
VSC warning light (*1)	○	○	○	○	○
Multi information display (*2)	○	○	○	○	○
SLIP indicator light	○	○	○	○	○



○: Light ON
-: Light OFF
(*1): Models without multi information display
(*2): Models with multi information display

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS and VSC (models without multi information display) warning lights, by reading the multi information display (models with multi information display), or by connecting the intelligent tester.
- This system has a Test Mode (signal check) function (See page BC-123).
  The DTC can be read by connecting the intelligent tester and observing the blinking pattern of the ABS and VSC (models without multi information display) warning lights or by reading the multi information display (models with multi information display).

3. WARNING LIGHT AND INDICATOR LIGHT CHECK

(a) Release the parking brake.
NOTICE:
When releasing the parking brake, move the shift lever to the P position for safety (A/T) or set the chocks to hold the vehicle for safety (M/T).
HINT:
When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

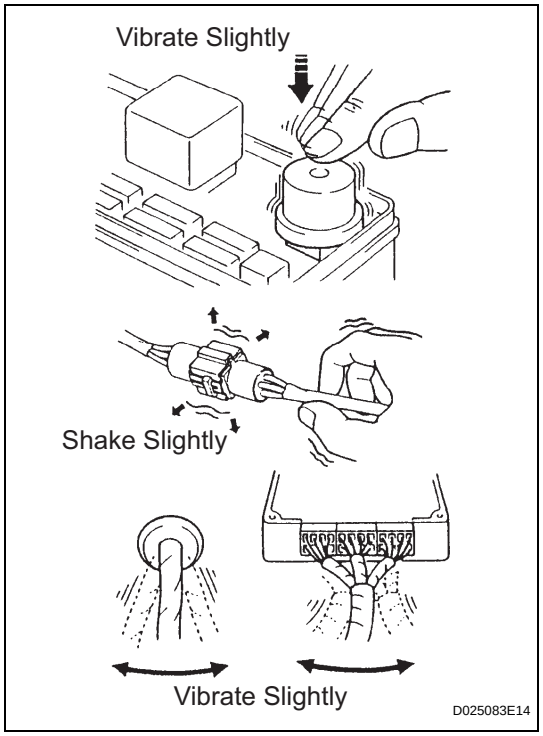
(b) When the ignition switch is turned on (IG), check that the ABS, BRAKE and VSC (models without multi information display) warning lights, and SLIP, and master caution indicator lights come on for approximately 3 seconds.
HINT:
If the warning light and indicator light check result is not normal, proceed to troubleshooting for the ABS, BRAKE and VSC warning light circuits and SLIP indicator light circuit.
If the indicator remains on, proceed to troubleshooting for the light circuit below.

Trouble Area	See procedure
ABS warning light circuit	BC-229
BRAKE warning light circuit	BC-244
VSC warning light circuit	BC-236
SLIP indicator light circuit	BC-255

4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is on (IG)).

(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

(2) Slightly shake the connector vertically and horizontally.

HINT:

Shaking the relays too strongly may result in open relays.

(3) Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

BC

DTC CHECK / CLEAR

1. DTC CHECK/CLEAR (INTELLIGENT TESTER)

(a) Check the DTC.

(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch on (IG).

(3) Read the DTCs following the prompts on the tester screen.

(b) Clear the DTC.

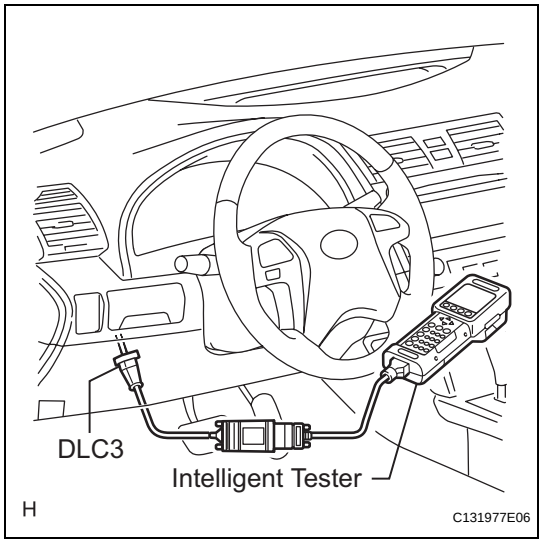
(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch on (IG).

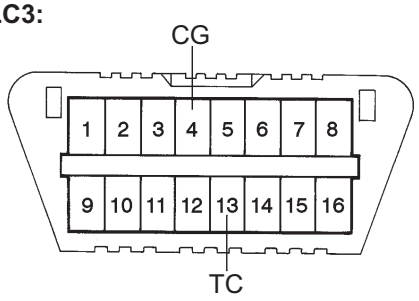
(3) Operate the intelligent tester to clear the codes.

HINT:

Refer to the intelligent tester operator's manual for further details.



DLC3:



2. DTC CHECK/CLEAR (SST CHECK WIRE)

(a) Check the DTC.

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the ignition switch on (IG).

(3) Observe the blinking pattern of the ABS and VSC (models without multi information display) warning lights or read the multi information display (models with multi information display) in order to identify the DTC.

HINT:

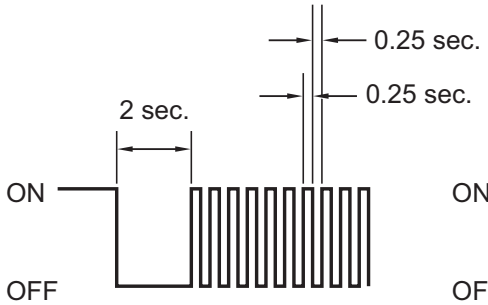
If no code appears, inspect the TC and CG terminal circuit, and ABS and VSC warning light circuits.

Trouble Area	See procedure
TC and CG terminal circuit	BC-266
ABS warning light circuit	BC-229 or BC-233
VSC warning light circuit	BC-236 or BC-240

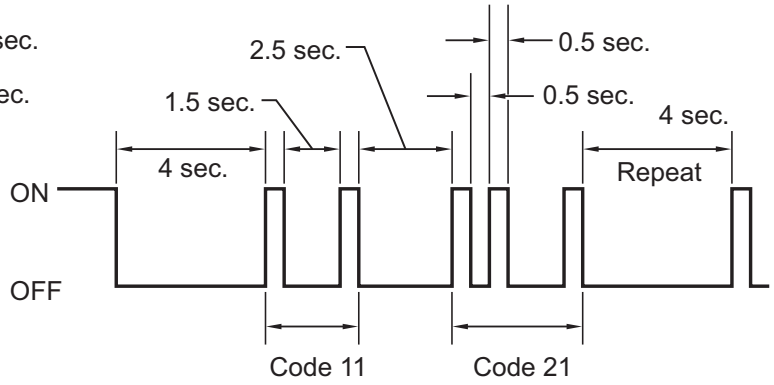
BC

(4) As an example, the illustration below shows the blinking patterns of the normal system code and trouble codes 11 and 21 for ABS and VSC (models without multi information display) warning lights or display of the normal system code and trouble code 43 for the VSC on the multi information display (models with multi information display).

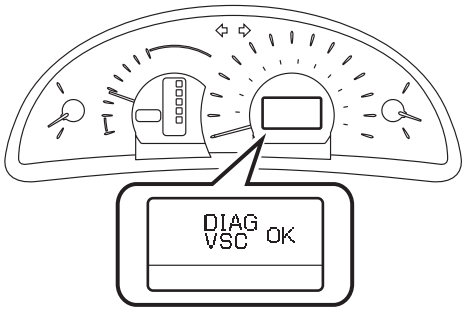
Blinking Pattern in Normal System Code:



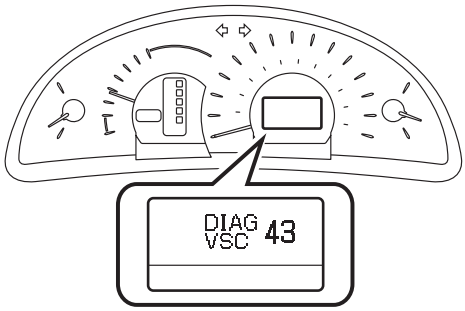
Blinking Pattern in Trouble Code (Example Codes 11 and 21):



Display of Normal System Code:



Display of Trouble Code (Example Code 43):



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(5) The codes are explained in the code table (See page BC-151).

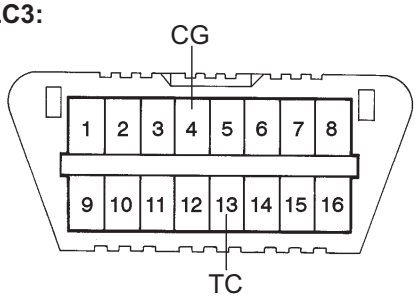
(6) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

(b) Clear the DTC.

(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the ignition switch on (IG).

DLC3:



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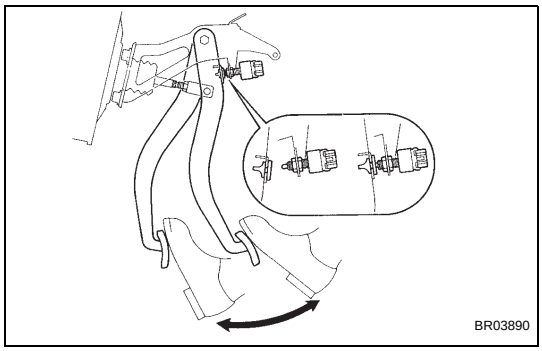


(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(4) Check that the warning light or multi information display indicates the normal system code.
(5) Remove the SST from the terminals of the DLC3.
HINT:
Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG NO. 2 fuse.

3. END OF DTC CHECK/CLEAR

(a) Turn the ignition switch on (IG).
(b) Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

(a) Whenever an ABS DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.
The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to on (IG) since the last time the ABS was activated.
HINT:
- However, if the vehicle is stopped or at a low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will stop counting the number.
- Freeze Frame Data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored during ABS operation is erased.
- Freeze Frame Data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) On the tester display, select the Freeze Frame Data.

Item (Display)	Measurement Item	Reference Value
VEHICLE SPD	Vehicle speed reading	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
STOP LAMP SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
#IG ON	Number of operations of ignition switch on (IG) after storing Freeze Frame Data	0 to 31
MAS CYL PRESS 1	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.5 V
M/C PRESS GRADE	Master cylinder pressure sensor change	Min.: -30 MPa/s, Max.: 225 MPa/s
YAW RATE	Yaw rate sensor reading	Min.: -128 deg/s, Max.: 127 deg/s
STEERING SEN	Steering angle sensor reading	Left turn: Increase Right turn: Decrease
FORWARD & REA G	Forward and backward G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
SPD GRADE	Vehicle speed grade	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
BUZZER	Skid control buzzer signal	Skid control buzzer ON: ON, OFF: OFF
ACCELERATOR %	Accelerator opening angle %	Min.: 0 %, Max.: 128 %
PARKING BRAKE SW	Parking brake switch signal	Parking brake switch ON: ON, OFF: OFF
ENGINE TORQUE	Real engine torque	Min.: -1,024 Nm, Max.: 1,023 Nm
FR WHEEL SPD	FR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
FL WHEEL SPD	FL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
RR WHEEL SPD	RR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)

Item (Display)	Measurement Item	Reference Value
RL WHEEL SPD	RL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
LATERAL G	Lateral G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
GEAR POSITION	Gear position information	FAIL 1st 2nd 3rd 4th 5th 6th P, N R NOT R
LEVER POSITION	Shift lever position information	FAIL 1st 2nd 3rd 4th 5th 6th/B D/M P, N R
OPERATED SYSTEM	Operated system status	ABS activated: ABS VSC activated: VSC TRAC activated: TRAC BA activated: BA Fail safe mode activated: FAIL No system activated: NON System prohibited: SYS
FREEZE TIME	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
TROUBLE CODE	Freeze frame DTC	Displays to output DTC
INSPECTION MODE	Inspection mode	OTHER: Normal, INSPECT: Service

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

- If there is a problem with sensor signals or actuator systems, the skid control ECU prohibits power supply to the brake actuator assembly and informs the ECM of VSC system failure.
  The brake actuator assembly turns off each solenoid and the ECM shuts off VSC control (traction control signal) from the skid control ECU accordingly, which turns out to be as if the ABS, TRAC and VSC systems were not installed.
  The ABS control will be prohibited, but EBD control continues as much as possible. If EBD control is impossible, the BRAKE warning light comes on to warn the driver (See page BC-138).
- If system components have any malfunction before starting control, immediately stop the operation. If system components have any malfunction during control, gradually stop the control so as not to trigger a sudden change in vehicle conditions.
  If it is impossible to control the systems, the warning light comes on to inform the driver of termination of the systems (See page BC-138).

HINT:
If the hydraulic brake booster encounters a malfunction, brake performance is gradually lost and ABS, BA, TRAC and VSC systems are prohibited.

BC

ABS, EBD and BA system:

Malfunction Area	Control Method
ABS system	ABS, BA, TRAC and VSC control prohibited
BA system	ABS, BA, TRAC and VSC control prohibited
EBD system	ABS, EBD, BA, TRAC and VSC control prohibited

HINT:
A malfunction in either the ABS or BA system will result in an identical operation, with ABS, BA, TRAC and VSC system control prohibited.

TRAC and VSC system:

Malfunction Area	Control Method
Engine control system (TRAC and VSC systems)	Before control: Disables control During control: Uses only the brakes to effect control
Brake control system (VSC system)	Before control: Disables control During control: Uses only the engine to effect control
Brake control system (TRAC system)	Before control: Disables control During control: Disables control (by gradually ending control)

HINT:
As for the TRAC and VSC systems, different systems prohibit different controls depending on a malfunctioning part.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

With the intelligent tester connected to the DLC3 and the ignition switch on (IG), the ABS, TRAC and VSC Data List can be displayed. Follow the prompts on the tester screen to access the Data List.

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MTR RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
FAIL MTR RELAY	Fail safe motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
IDLE SW	Main idle switch / ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
ENG REVOLUTIONS	Engine revolutions / min.: 0 r/min, max.: 65535 r/min	-	-
GEAR POSITION	Gear position information / P/N, R, 1st-6th, FAIL, NOT R	-	-
LEVER POSITION	Shift lever position information / P/N, R, D/M, 1st-6th/B, FAIL	-	-
SHIFT INFO	Shift information / ON or OFF	ON: During gear change	-
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
FL WHEEL SPD	FL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
DECELERAT SEN	Acceleration sensor 1 reading / min.: -1.889 G, max.: 1.875 G	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
DECELERAT SEN 2	Acceleration sensor 2 reading / min.: -1.889 G, max.: 1.875 G	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates	-
SRRR	ABS solenoid (SRRR) / ON or OFF	ON: Operates	-
SRRH	ABS solenoid (SRRH) / ON or OFF	ON: Operates	-

BC

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SRLR	ABS solenoid (SRLR) / ON or OFF	ON: Operates	-
SRLH	ABS solenoid (SRLH) / ON or OFF	ON: Operates	-
SM1	Master cut solenoid (SM1) / ON or OFF	ON: Operates	-
SM2	Master cut solenoid (SM2) / ON or OFF	ON: Operates	-
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual vehicle speed	Speed indicated on speedometer
YAW RATE SENS 1	Yaw rate sensor 1 / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
ZERO YAW RATE	Memorized zero value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING SEN	Steering angle sensor / min.: -3,276.8 deg, max.: 3,276.7 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V	Reading increases when brake pedal is depressed
ACCELERATOR %	The difference of a present accelerator / min.: 0%, max.: 128%	-	-
ENGINE TORQUE	Real engine torque / min.: -1,024 N*m, max.: 1,023 N*m	-	-
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C OPN	Master cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
#DTC	Number of DTC / min.: 0, max.: 255	-	-
ABS WARN LAMP	ABS warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
BRAKE WARN LAMP	BRAKE warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
SLIP INDI LAMP	SLIP indicator light / ON or OFF	ON: Indicator light ON OFF: Indicator light OFF	-
BUZZER	Skid control buzzer / ON or OFF	ON: Buzzer ON OFF: Buzzer OFF	-
VSC WARN LAMP	VSC warning light (*1) or multi information display (*2) / ON or OFF	ON: Indicator ON OFF: Indicator OFF	-
ZERO M/C SEN	Memorized zero value / min.: -12.5 MPa, max.: 12.4 MPa	Min.: -12.5 MPa Max.: 12.4 MPa	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
FR WHEEL ACCEL	FR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
FL WHEEL ACCEL	FL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RR WHEEL ACCEL	RR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RL WHEEL ACCEL	RL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
ZERO DECELERAT	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO DECELERAT 2	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO STEERING	Memorized zero value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
LATERAL G	Lateral G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
FORWARD&REA G	Forward and rearward G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
YAW RATE VALUE	Yaw rate value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING ANGLE	Steering angle value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
TRAC STATUS	TRAC control status / ON or OFF	ON: During the control	-
TRAC ENG STATUS	TRAC engine control status / ON or OFF	ON: During the control	-
TRAC BRK STATUS	TRAC brake control status / ON or OFF	ON: During the control	-
FR VSC STATUS	FR wheel VSC control status / ON or OFF	ON: During the control	-
FL VSC STATUS	FL wheel VSC control status / ON or OFF	ON: During the control	-
RR VSC STATUS	RR wheel VSC control status / ON or OFF	ON: During the control	-
RL VSC STATUS	RL wheel VSC control status / ON or OFF	ON: During the control	-
FR ABS STATUS	FR wheel ABS control status / ON or OFF	ON: During the control	-
FL ABS STATUS	FL wheel ABS control status / ON or OFF	ON: During the control	-
RR ABS STATUS	RR wheel ABS control status / ON or OFF	ON: During the control	-
RL ABS STATUS	RL wheel ABS control status / ON or OFF	ON: During the control	-
RR EBD STATUS	RR wheel EBD control status / ON or OFF	ON: During the control	-
RL EBD STATUS	RL wheel EBD control status / ON or OFF	ON: During the control	-
BA STATUS	BA control status / ON or OFF	ON: During the control	-
PBA STATUS	PBA control status / ON or OFF	ON: During the control	-
INSPECTION MODE	Inspection mode / OTHER or INSPECT	-	-
#IG ON2	Number of ignition switch on (IG) after entering the inspection mode / min.: 0, max.: 255	-	-

BC

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
TROUBLE CODE	Freeze frame DTC / min.:0, max.: 65,535	-	-

(*1): Models without multi information display
(*2): Models with multi information display

2. ACTIVE TEST

HINT:
Performing the Active Test using the intelligent tester allows the relay, actuator, and other items to operate without removing any parts. Performing the Active Test as the first step in troubleshooting is one of the methods to save labor time.
It is possible to display the Data List during the Active Test.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) On the tester display, select the Active Test.
HINT:
The ignition switch must be turned on (IG) to proceed to the Active Test using the intelligent tester.

BC

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SMF	Turns master cut solenoid (SM1) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SMR	Turns master cut solenoid (SM2) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SOL RELAY	Turns ABS solenoid relay ON / OFF	-
MOTOR RELAY	Turns ABS motor relay ON / OFF	Operating sound of relay (clicking sound) and motor can be heard
ABS WARN LAMP	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LAMP	Turns VSC warning light (*1) or multi information display (*2) ON / OFF	Observe combination meter
SLIP INDI LAMP	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WARN LAMP	Turns BRAKE warning light ON / OFF	Observe combination meter
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

(*1): Models without multi information display
(*2): Models with multi information display

DIAGNOSTIC TROUBLE CODE CHART

- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the page for the respective "DTC No." in the DTC chart.
- Inspect the fuse and relay before investigating the trouble areas as shown in the table below.

DTC chart of ABS:

DTC No.	Detection Item	Trouble Area	See page
C0200/31 (*1)	Front Speed Sensor RH Circuit	1. Front speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-156
C0205/32 (*1)	Front Speed Sensor LH Circuit	1. Front speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-156
C0210/33 (*1)	Rear Speed Sensor RH Circuit	1. Rear speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-164
C0215/34 (*1)	Rear Speed Sensor LH Circuit	1. Rear speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-164
C0226/21	SFR Solenoid Circuit	1. Brake actuator assembly 2. SFRH or SFRR circuit	BC-172
C0236/22	SFL Solenoid Circuit	1. Brake actuator assembly 2. SFLH or SFLR circuit	BC-172
C0246/23	SRR Solenoid Circuit	1. Brake actuator assembly 2. SRRH or SRRR circuit	BC-172
C0256/24	SRL Solenoid Circuit	1. Brake actuator assembly 2. SRLH or SRLR circuit	BC-172
C0273/13 (*1)	Open in ABS Motor Relay Circuit	1. ABS NO. 1 fuse 2. VSC NO. 2 relay 3. VSC NO. 2 relay circuit 4. Brake actuator assembly	BC-175
C0274/14	Short to B+ in ABS Motor Relay Circuit	1. ABS NO. 1 fuse 2. VSC NO. 2 relay 3. VSC NO. 2 relay circuit 4. Brake actuator assembly	BC-175
C0278/11	Open in ABS Solenoid Relay Circuit	1. ABS NO. 2 fuse 2. ABS solenoid relay 3. ABS solenoid relay circuit 4. Brake actuator assembly	BC-181
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	Brake actuator assembly	BC-181
C1225/25	SM Solenoid Circuit	1. Brake actuator assembly 2. SM1 or SM2 circuit	BC-172
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	1. Front speed sensor RH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197

DTC No.	Detection Item	Trouble Area	See page
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	1. Front speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	1. Rear speed sensor RH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	1. Rear speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197
C1241/41	Low Battery Positive Voltage	1. ECU-IG NO. 2 fuse 2. Battery 3. Charging system 4. Power source circuit 5. Internal power supply circuit of the skid control ECU	BC-207
C1243/43 (*1)	Acceleration Sensor Stuck Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1244/44	Open or Short in Acceleration Sensor Circuit	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1245/45 (*1)	Acceleration Sensor Output Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1246/46 (*2)	Master Cylinder Pressure Sensor Malfunction	1. Master cylinder pressure sensor 2. Master cylinder pressure sensor circuit 3. Stop light switch circuit 4. Brake actuator assembly	BC-210
C1249/49	Open in Stop Light Switch Circuit	1. STOP fuse 2. Stop light switch 3. Stop light switch circuit 4. Brake actuator assembly (Skid control ECU)	BC-213
C1251/51 (*1)	Open in Pump Motor Circuit	1. Brake actuator assembly (GND circuit) 2. Brake actuator assembly (Motor circuit)	BC-219
C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit	1. ABS NO. 1 fuse 2. VSC NO. 1 (fail safe) relay 3. VSC NO. 1 (fail safe) relay circuit 4. Brake actuator assembly	BC-175
C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor power source circuit	BC-193
U0073/94	Control Module Communication Bus OFF	CAN communication system	BC-224
U0124/95	Lost Communication with Lateral Acceleration Sensor Module	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)	BC-224

(*1, *2):

BC

Even after the trouble areas are repaired, the ABS warning light will not go off unless the following operations are performed:

- (*1):
  (a) Drive the vehicle at 12 mph (20 km/h) for 30 seconds or more and check that the ABS warning light goes off.
  (b) Clear the DTC.
- (*2):
  (a) Keep the vehicle stationary for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (b) Drive the vehicle at the vehicle speed of 31 mph (50 km/h) and keep depressing the brake pedal strongly for approximately 3 seconds.
  (c) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (d) Clear the DTC.

HINT:
In some cases, the intelligent tester cannot be used when the ABS warning light remains on.

BC

DTC chart of VSC:

DTC No.	Detection Item	Trouble Area	See page
43	ABS Control System Malfunction	ABS control system	BC-155
C1201/51	Engine Control System Malfunction	Engine control system	BC-186
C1203/53	ECM Communication Circuit Malfunction	ECM	BC-187
C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone	1. Brake actuator assembly (Skid control ECU) 2. Yaw rate and acceleration sensor 3. Zero point calibration undone	BC-188
C1231/31	Steering Angle Sensor Circuit Malfunction	1. Steering angle sensor 2. Steering angle sensor circuit 3. Steering angle sensor power supply 4. Brake actuator assembly (Skid control ECU)	BC-190
C1232/32	Stuck in Acceleration Sensor	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1234/34	Yaw Rate Sensor Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1290/66	Steering Angle Sensor Zero Point Malfunction	1. Yaw rate and acceleration sensor zero point calibration incomplete 2. Poor adjustment of the centered position of the steering wheel 3. Poor adjustment of front wheel alignment	BC-222
C1336/39	Zero Point Calibration of Acceleration Sensor Undone	1. Brake actuator assembly (Skid control ECU) 2. Yaw rate and acceleration sensor 3. Zero point calibration undone	BC-188
U0100/65	Lost Communication with ECM / PCM	CAN communication system (Skid control ECU to ECM)	BC-224

DTC No.	Detection Item	Trouble Area	See page
U0123/62	Lost Communication with Yaw Rate Sensor Module	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)	BC-224
U0126/63	Lost Communication with Steering Angle Sensor Module	CAN communication system (Skid control ECU to steering angle sensor)	BC-224

HINT:
In some cases, the intelligent tester cannot be used when the VSC warning light (models without multi information display) or multi information display (models with multi information display) remains on.

Test Mode DTC of ABS:

DTC No.	Detection Item	Trouble Area	See page
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-156
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-156
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-164
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-164
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	Speed sensor rotor	BC-197
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	Speed sensor rotor	BC-197
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	Speed sensor rotor	BC-197
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	Speed sensor rotor	BC-197
C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)	1. Yaw rate and acceleration sensor 2. Sensor installation	BC-193
C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)	1. Stop light switch 2. Master cylinder pressure sensor	BC-210

Test Mode DTC of VSC:

DTC No.	Detection Item	Trouble Area	See page
C0371/71	Yaw Rate Sensor (Test Mode DTC)	Yaw rate and acceleration sensor	BC-193

DTC	43	ABS Control System Malfunction

DESCRIPTION

This DTC is output when the VSC system detects a malfunction in the ABS control system.

DTC No.	DTC Detection Condition	Trouble Area
43	Malfunction in the ABS control system.	ABS control system

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK ABS CONTROL SYSTEM

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-141).

BC

Result

Condition	Proceed to
DTC (ABS control system DTC) is not output	A
DTC (ABS control system DTC) is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)

A

2	RECONFIRM DTC

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (43) is not output	A
DTC (43) is output	B

B → REPLACE BRAKE ACTUATOR ASSEMBLY

A

USE SIMULATION METHOD TO CHECK

DTC	C0200/31	Front Speed Sensor RH Circuit

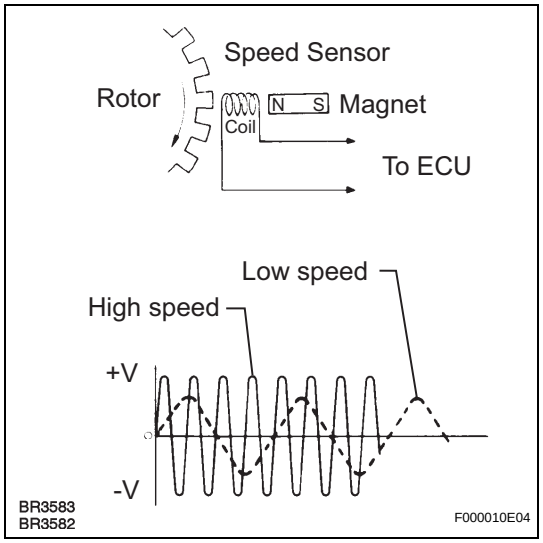
DTC	C0205/32	Front Speed Sensor LH Circuit

DTC	C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)

DTC	C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)

DESCRIPTION

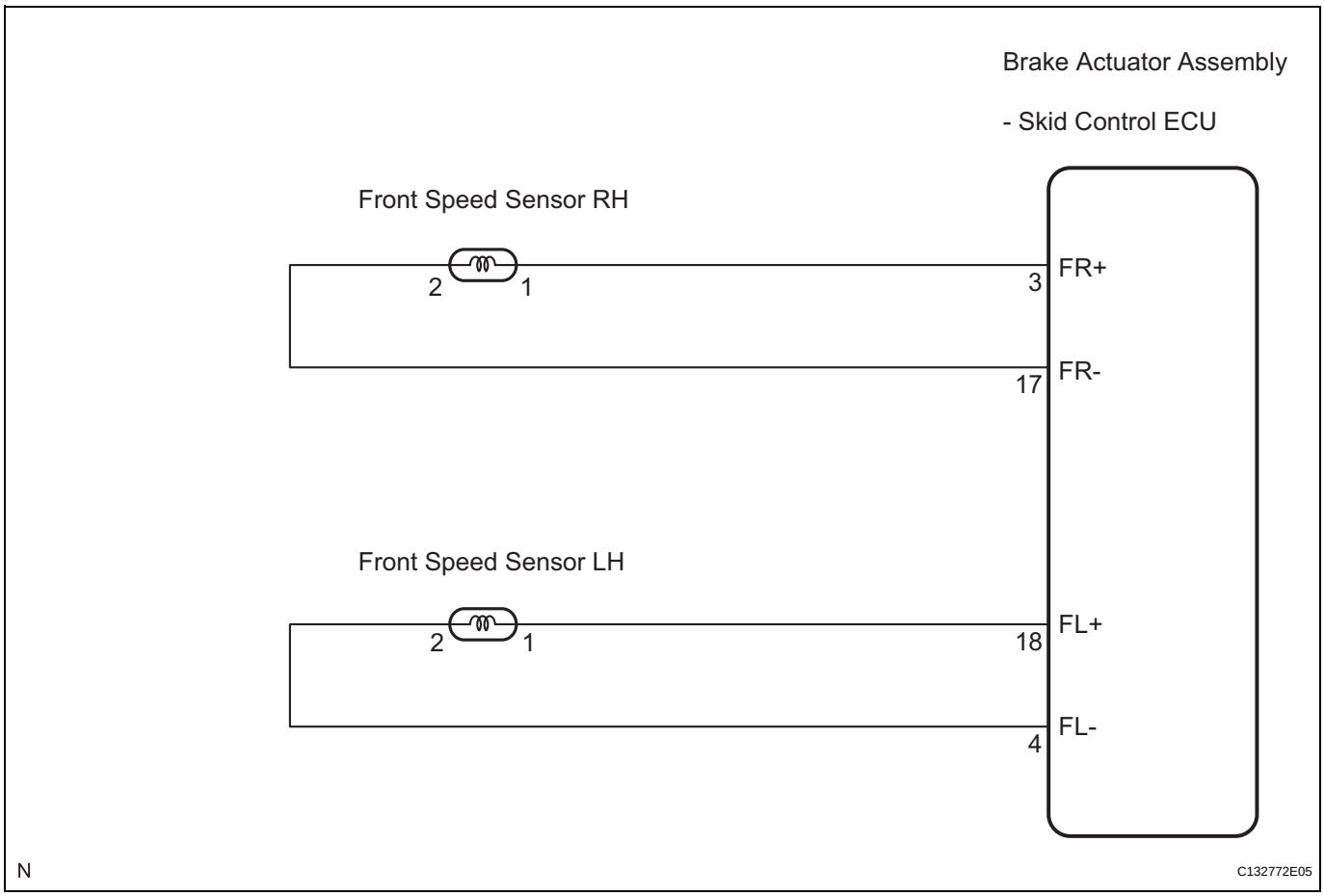
The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71 and C1272/72 can be deleted when the speed sensor sends a wheel speed signal or the Test Mode ends. DTCs C1271/71 and C1272/72 are output only in the Test Mode.



DTC No.	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When any of the following is detected: 1. At a vehicle speed of 6 mph (10 km/h) or more, an open or short in the sensor signal circuit continues for 1 second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 7 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more.	• Front speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)

HINT:
- DTC C0200/31 is for the front speed sensor RH.
- DTC C0205/32 is for the front speed sensor LH.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-118).

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There are no momentary interruptions	**A**
There are momentary interruptions	**B**
There is a constant open circuit	**C**

HINT:

Perform the above inspection before removing the sensor and connector.

B → Go to step 11

C → Go to step 5

A

2 READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Turn the ignition switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Start the engine.
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed
FL WHEEL SPD	FL wheel speed sensor reading /min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed

BC

(e) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → Go to step 5

OK

3 PERFORM TEST MODE (SIGNAL CHECK)

(a) Perform sensor check in the Test Mode procedure (See page BC-123).
OK:
All Test Mode DTCs are erased.

NG → Go to step 5

OK

4 RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are not output	A
DTCs (C0200/31 and/or C0205/32) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

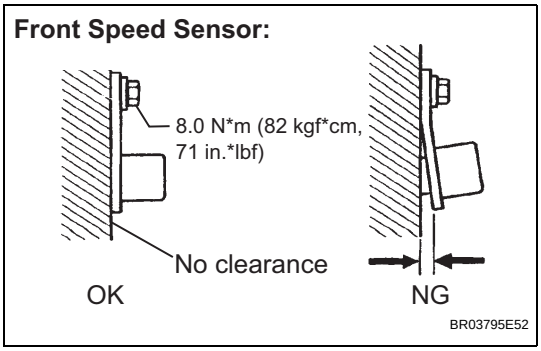
B → **Go to step 7**

A

USE SIMULATION METHOD TO CHECK

BC

5 CHECK FRONT SPEED SENSOR INSTALLATION



(a) Turn the ignition switch off.
(b) Check the speed sensor installation.
OK:
There is no clearance between the sensor and the front steering knuckle.
The installation bolt is tightened properly.
Torque:
8.0 N*m (82 kgf*cm, 71 in.*lbf)

NG → **INSTALL FRONT SPEED SENSOR CORRECTLY**

OK

6 CHECK FRONT SPEED SENSOR TIP

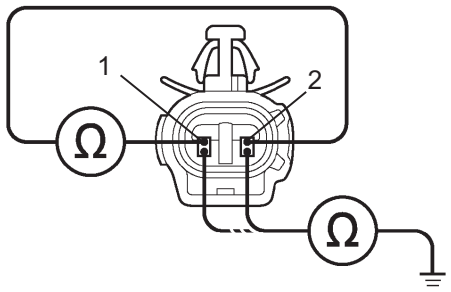
(a) Remove the front speed sensor (See page BC-438).
(b) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-123).

NG → **CLEAN OR REPLACE FRONT SPEED SENSOR**

OK

7	INSPECT FRONT SPEED SENSOR

Front Speed Sensor:



C136017E01

(a) Turn the ignition switch off.
(b) Install the front speed sensor.
(c) Disconnect the front speed sensor connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

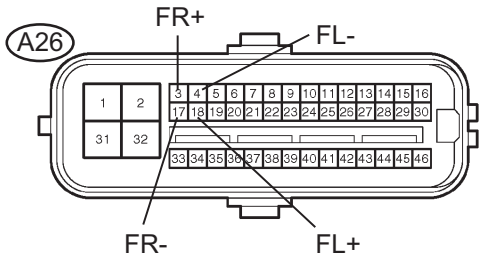
NG → **REPLACE FRONT SPEED SENSOR**

OK

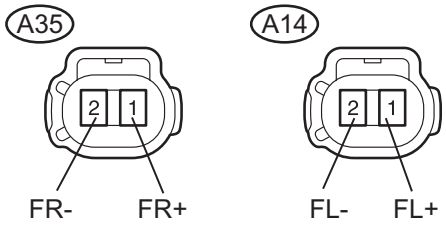
BC

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)

Skid Control ECU Harness Side Connector Front View:



Front Speed Sensor Harness Side Connector Front View:



C136018E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A26-3 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A26-3 (FR+) - Body ground	Always	10 kΩ or higher
A26-17 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A26-17 (FR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
A26-18 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A26-18 (FL+) - Body ground	Always	10 kΩ or higher
A26-4 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A26-4 (FL-) - Body ground	Always	10 kΩ or higher

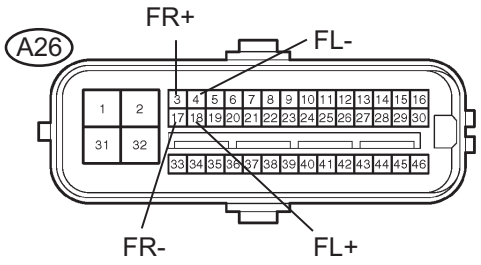
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

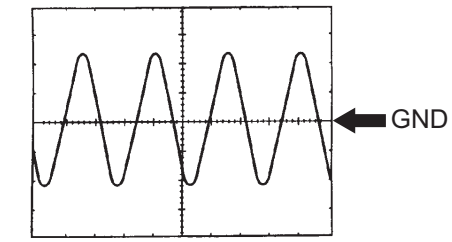
BC

9 CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Harness Side Connector Front View:



Normal Signal Waveform:



1 V/Division, 2 ms/Division

C136019E04

(a) Reconnect the front speed sensor connector.
(b) Connect the oscilloscope to the front speed sensor terminal of the skid control ECU.
(c) Check that a waveform is output when the tires are rotated.

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

10 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are output	A
DTCs (C0200/31 and/or C0205/32) are not output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **USE SIMULATION METHOD TO CHECK**

BC

A

REPLACE BRAKE ACTUATOR ASSEMBLY

11	**REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**

(a) Turn the ignition switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and front speed sensor (See page BC-118).
(d) Check that there is no momentary interruption.

NEXT

BC

12	**RECONFIRM DTC**

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are not output	A
DTCs (C0200/31 and/or C0205/32) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **Go to step 2**

A

END

DTC	C0210/33	Rear Speed Sensor RH Circuit

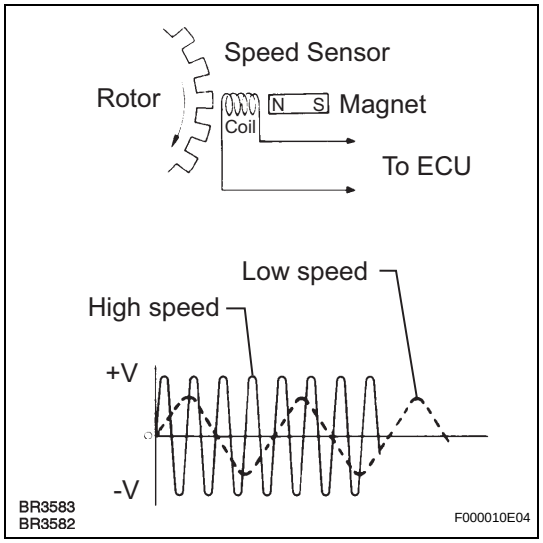
DTC	C0215/34	Rear Speed Sensor LH Circuit

DTC	C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)

DTC	C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DESCRIPTION

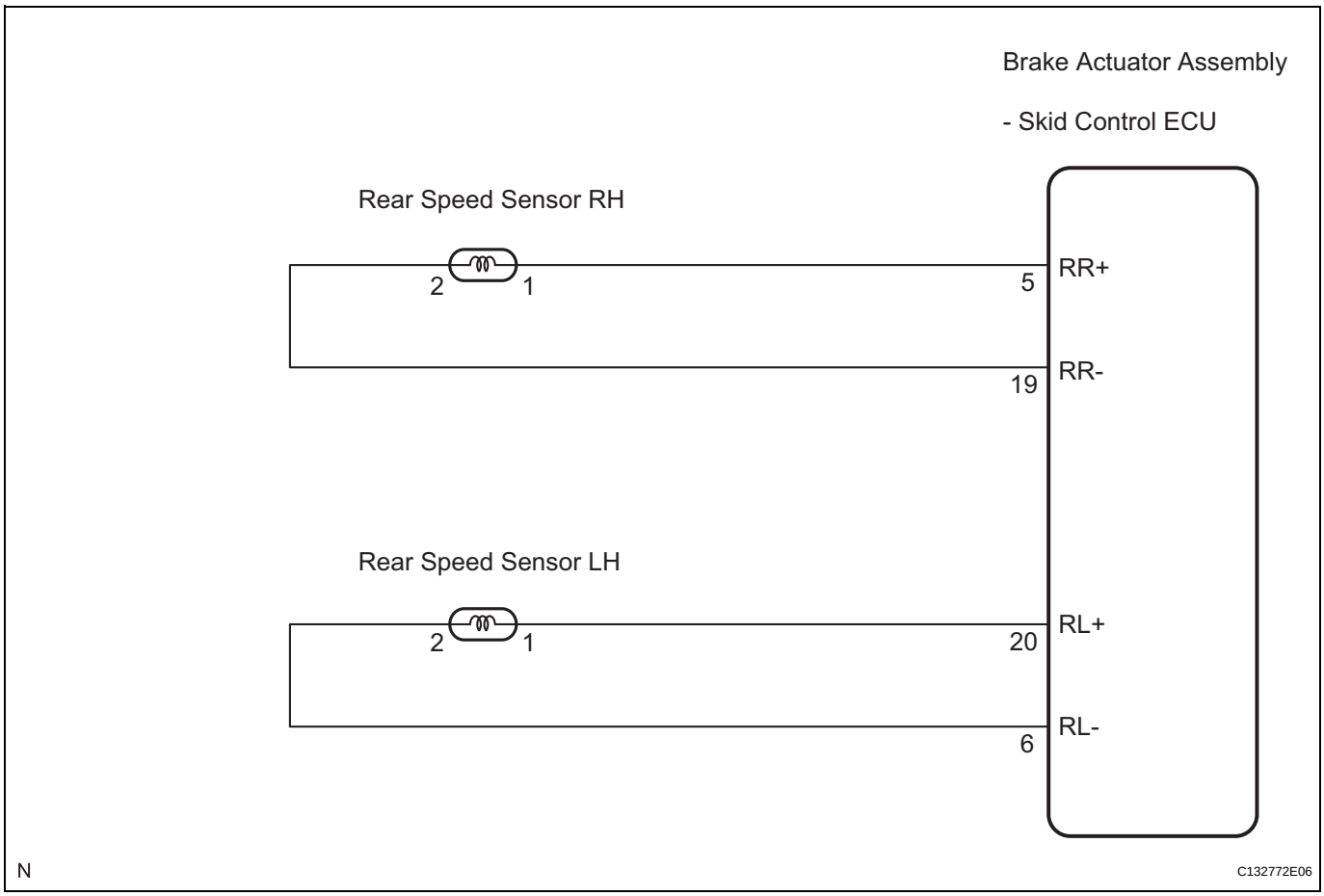
The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1273/73 and C1274/74 can be deleted when the speed sensor sends a wheel speed signal or the Test Mode ends. DTCs C1273/73 and C1274/74 are output only in the Test Mode.



DTC No.	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	When any of the following is detected: 1. At a vehicle speed of 6 mph (10 km/h) or more, an open or short in the sensor signal circuit continues for 1 second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 7 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more.	• Rear speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)

HINT:
- DTC C0210/33 is for the rear speed sensor RH.
- DTC C0215/34 is for the rear speed sensor LH.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-118).

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There are no momentary interruptions	**A**
There are momentary interruptions	**B**
There is a constant open circuit	**C**

HINT:

Perform the above inspection before removing the sensor and connector.

B → Go to step 11

C → Go to step 5

A

2 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Turn the ignition switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Start the engine.
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed

BC

(e) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → Go to step 5

OK

3 PERFORM TEST MODE (SIGNAL CHECK)

(a) Perform sensor check in the Test Mode procedure (See page BC-123).

OK:

All Test Mode DTCs are erased.

NG → Go to step 5

OK

4 RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are not output	A
DTCs (C0210/33 and/or C0215/34) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

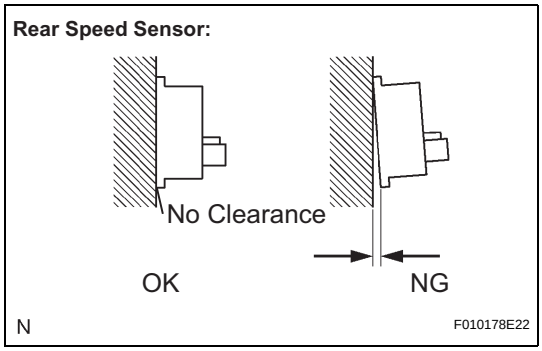
B → **Go to step 6**

A

USE SIMULATION METHOD TO CHECK

BC

5 CHECK REAR SPEED SENSOR INSTALLATION

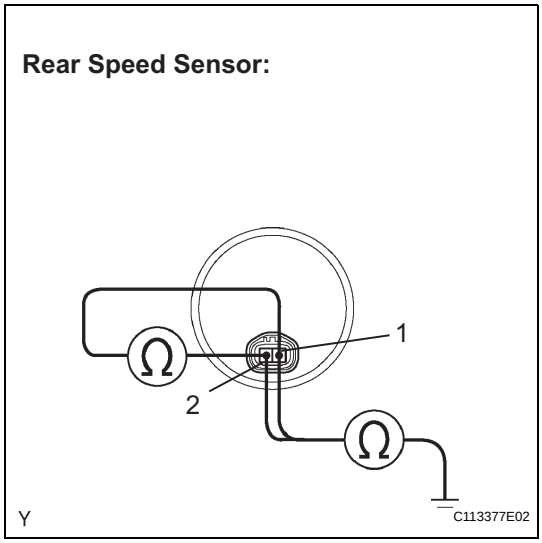


(a) Turn the ignition switch off.
(b) Check the speed sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.

NG → **INSTALL REAR SPEED SENSOR CORRECTLY**

OK

6 INSPECT REAR SPEED SENSOR



(a) Turn the ignition switch off.
(b) Disconnect the rear speed sensor connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
RH

Tester Connection	Condition	Specified Condition
2 (RR+) - 1 (RR-)	Always	0.9 to 2.1 kΩ
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
2 (RL+) - 1 (RL-)	Always	0.9 to 2.1 kΩ
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

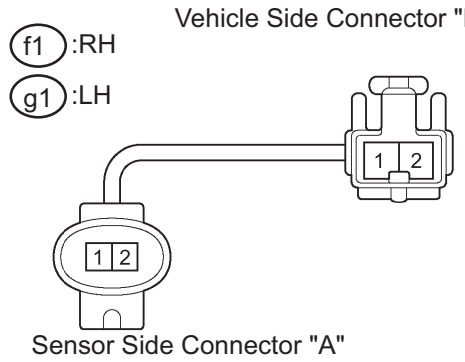
NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

NG → **REPLACE REAR SPEED SENSOR**

OK

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)

Skid Control Sensor Wire:



(a) Disconnect the skid control sensor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
f1 ("A"-1) - f1 ("B"-2)	Always	Below 1 Ω
f1 ("A"-1) - f1 ("B"-1)	Always	10 kΩ or higher
f1 ("A"-1) - Body ground	Always	10 kΩ or higher
f1 ("A"-2) - f1 ("B"-1)	Always	Below 1 Ω
f1 ("A"-2) - f1 ("B"-2)	Always	10 kΩ or higher
f1 ("A"-2) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
g1 ("A"-1) - g1 ("B"-2)	Always	Below 1 Ω
g1 ("A"-1) - g1 ("B"-1)	Always	10 kΩ or higher
g1 ("A"-1) - Body ground	Always	10 kΩ or higher
g1 ("A"-2) - g1 ("B"-1)	Always	Below 1 Ω
g1 ("A"-2) - g1 ("B"-2)	Always	10 kΩ or higher
g1 ("A"-2) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

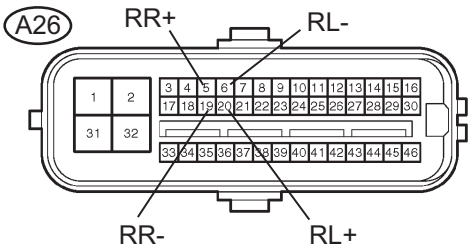
NG → **REPLACE SKID CONTROL SENSOR WIRE**

OK

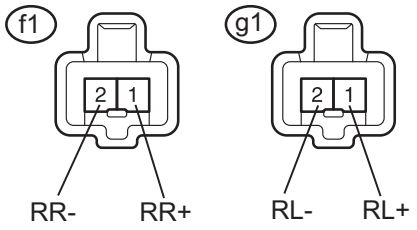
BC

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)

Skid Control ECU Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



N

C136020E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A26-5 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A26-5 (RR+) - Body ground	Always	10 kΩ or higher
A26-19 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A26-19 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
A26-20 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A26-20 (RL+) - Body ground	Always	10 kΩ or higher
A26-6 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A26-6 (RL-) - Body ground	Always	10 kΩ or higher

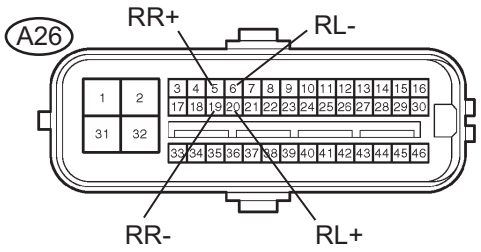
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

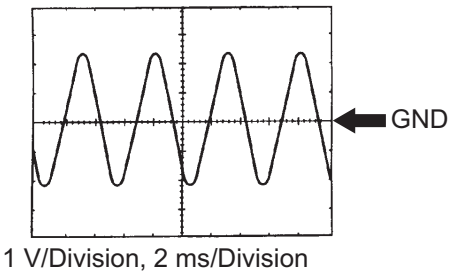
BC

9 CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Harness Side Connector Front View:



Normal Signal Waveform:



C136019E02

(a) Reconnect the skid control sensor wire.
(b) Reconnect the rear speed sensor connector.
(c) Connect the oscilloscope to the rear speed sensor terminal of the skid control ECU.
(d) Check that a waveform is output when the tires are rotated.

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

10 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are output	A
DTCs (C0210/33 and/or C0215/34) are not output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **USE SIMULATION METHOD TO CHECK**

BC

A

REPLACE BRAKE ACTUATOR ASSEMBLY

11 **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**

(a) Turn the ignition switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and rear speed sensor (See page BC-118).
(d) Check that there is no momentary interruption.

NEXT

BC

12 **RECONFIRM DTC**

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are not output	A
DTCs (C0210/33 and/or C0215/34) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **Go to step 2**

A

END

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

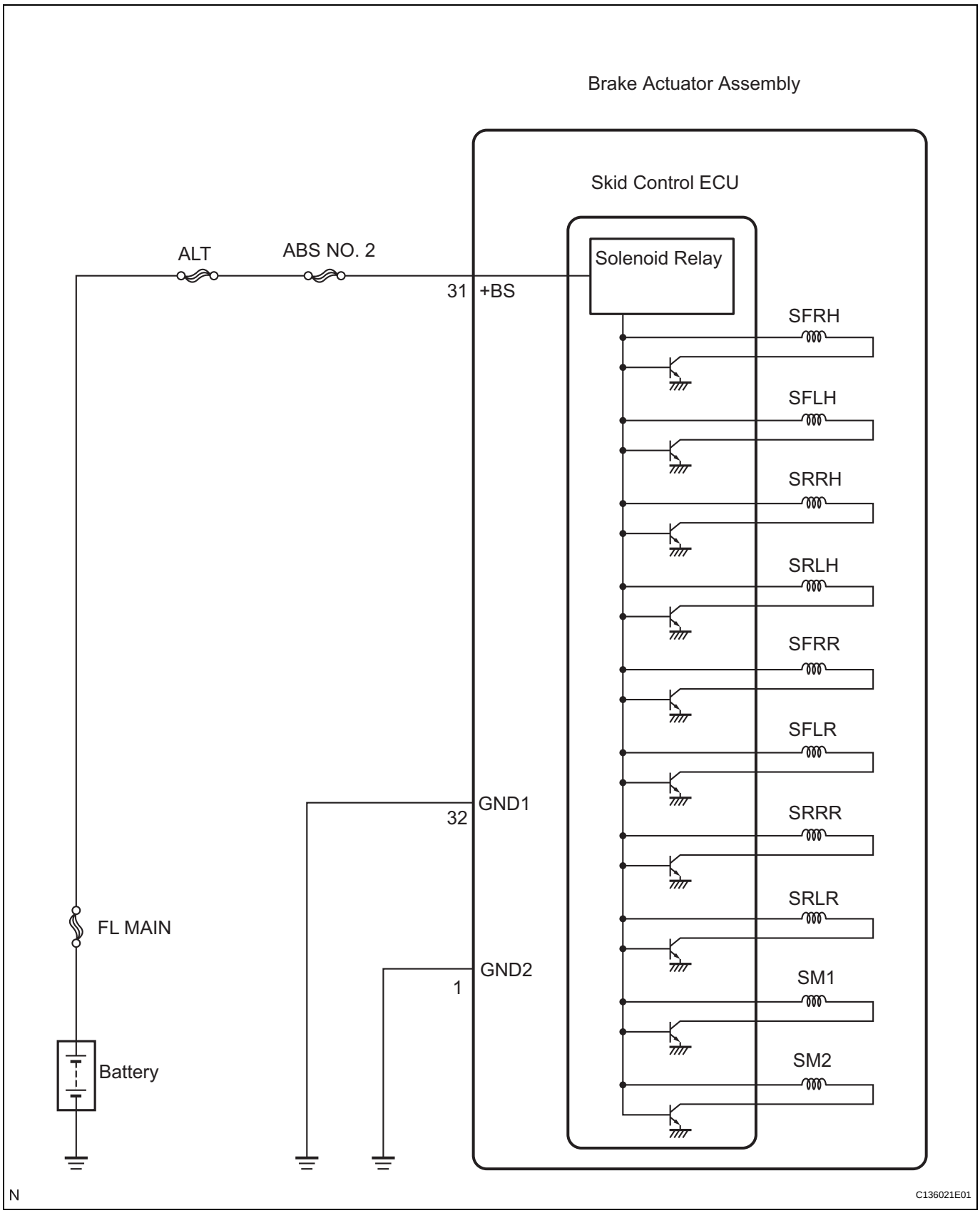
DTC	C1225/25	SM Solenoid Circuit

DESCRIPTION

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Open or short in the solenoid circuit continues for 0.05 seconds or more.	• Brake actuator assembly • Solenoid circuit
C1225/25	When any of the following is detected: • While outputting switching solenoid (SM1 or SM2) ON, overcurrent continues for 0.05 seconds or more. • While outputting switching solenoid (SM1 or SM2) OFF, an open circuit continues for 0.05 seconds or more. • While outputting switching solenoid (SM1 or SM2) ON, an open circuit continues for 0.1 second or more. • While outputting switching solenoid (SM1 or SM2) OFF, current continues to be applied for 0.1 second or more. • Short to GND in the switching solenoid (SM1 or SM2) continues for 0.1 second or more. • Switching solenoids SM1 and SM2 are shorted for 0.1 second or more.	• Brake actuator assembly • SM1 or SM2 circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	**RECONFIRM DTC**

HINT:
These codes are detected when a problem is determined in the brake actuator assembly.
The solenoid circuits are in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if any DTC code is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 4 mph (6 km/h) or more.
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0226/21, C0236/22, C0246/23, C0256/24 and/or C1225/25) are not output	A
DTCs (C0226/21, C0236/22, C0246/23, C0256/24 and/or C1225/25) are output	B

BC

HINT:

- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

DTC	C0273/13	Open in ABS Motor Relay Circuit

DTC	C0274/14	Short to B+ in ABS Motor Relay Circuit

DTC	C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit

DESCRIPTION

If a DTC of the motor line is stored, the VSC NO. 1 (fail safe) relay cuts off the power supply to the VSC NO. 2 relay and performs fail safe.

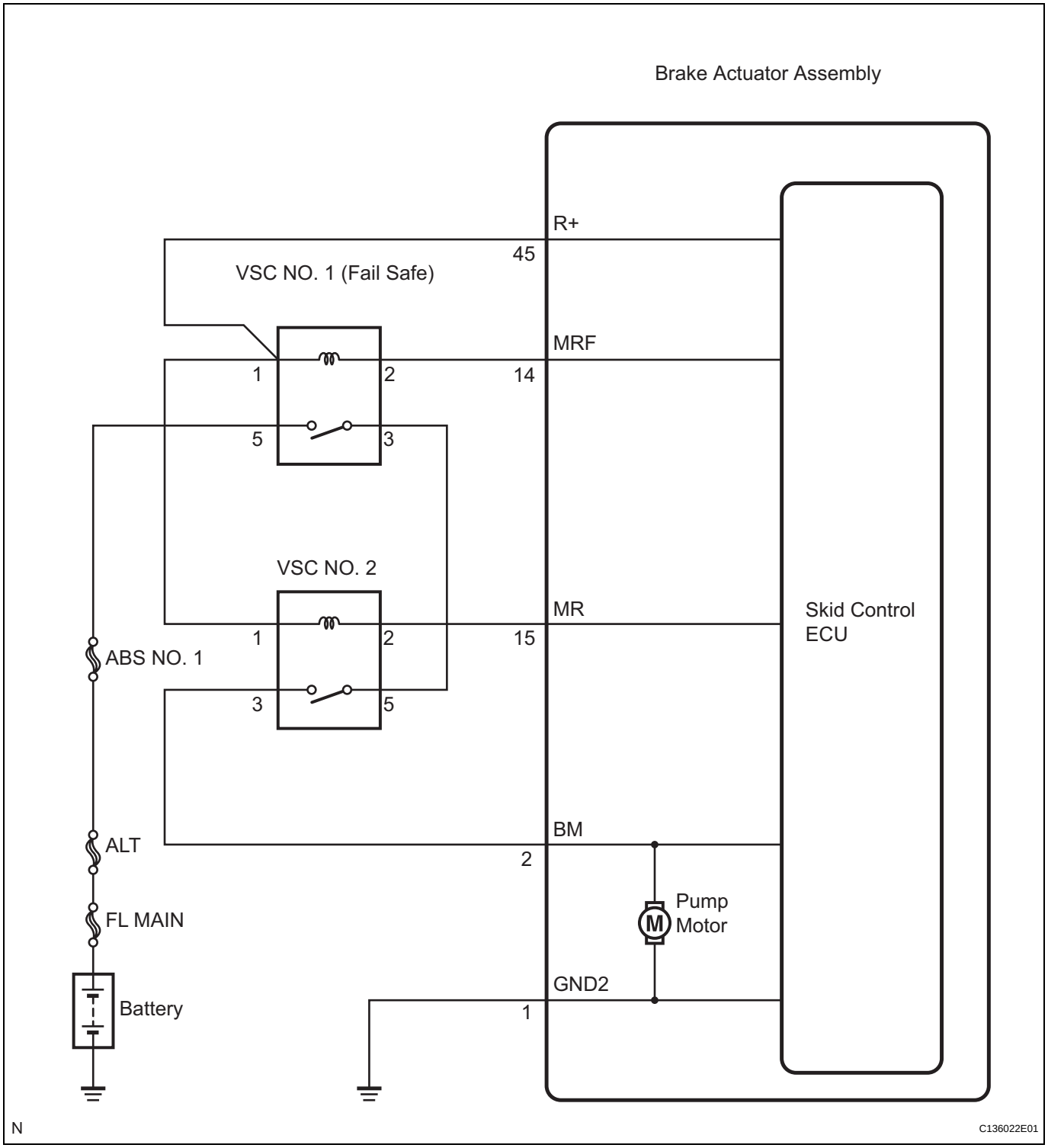
While any of the ABS, TRAC, VSC, or BA is operating, the skid control ECU (housed in the actuator assembly) turns the VSC NO. 2 relay on and activates the pump motor in the brake actuator.

This code may be stored if the motor relay (BM) voltage becomes lower than the DTC detecting condition due to insufficient output from the battery or alternator.

BC

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	When any of the following (1 or 2) is detected: 1. All of the following conditions continue for 0.12 seconds or more. • The IG1 terminal voltage is between 9.5 and 17.2 V. • During initial check and ABS, BA, TRAC, or VSC are operating. • Relay contact is open when the relay is ON. 2. All of the following conditions continue for 0.12 seconds. • The IG1 terminal voltage is 9.5 V or less. • Relay contact remains open when the relay is ON.	• ABS NO. 1 fuse • VSC NO. 2 relay • VSC NO. 2 relay circuit • Brake actuator assembly
C0274/14	When the motor relay is OFF, the VSC NO. 2 relay remains closed for 4 seconds or more.	• ABS NO. 1 fuse • VSC NO. 2 relay • VSC NO. 2 relay circuit • Brake actuator assembly
C1361/91	Immediately after the ignition switch is turned on (IG), the relay contact is closed for 4 seconds when the VSC NO. 1 (fail safe) relay is OFF.	• ABS NO. 1 fuse • VSC NO. 1 (fail safe) relay • VSC NO. 1 (fail safe) relay circuit • Brake actuator assembly

WIRING DIAGRAM

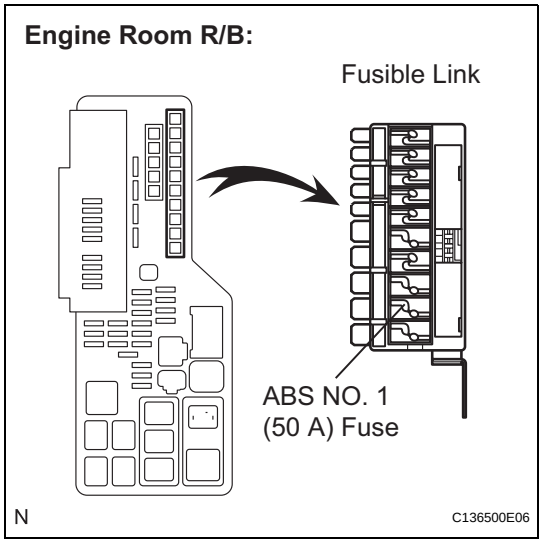


INSPECTION PROCEDURE

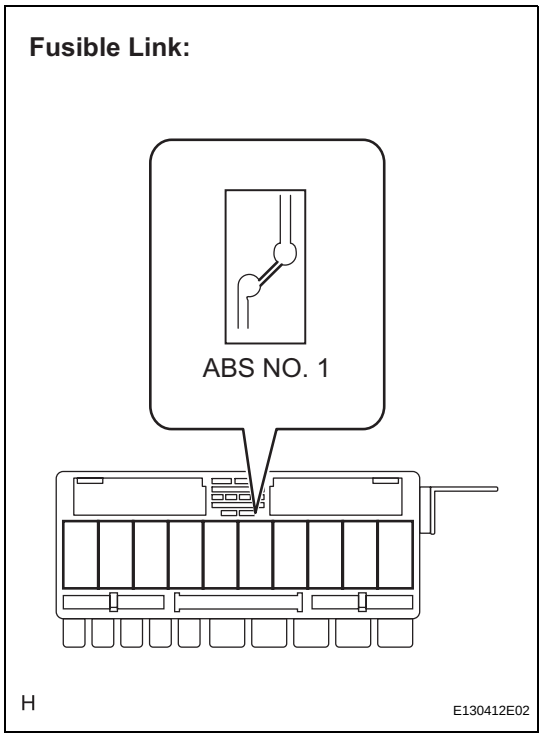
NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	**INSPECT ABS NO. 1 FUSE**



(a) Remove the fusible link from the engine room R/B.



(b) Check if the fusible link is melted.
OK:
The fusible link is melted.

(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

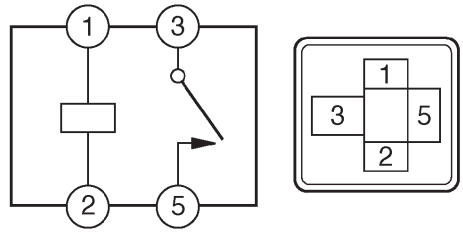
NG → **REPLACE FUSIBLE LINK (ABS NO. 1 FUSE)**

OK

BC

2 INSPECT VSC NO. 2 RELAY

VSC NO. 2 Relay:



F050240E07

(a) Remove the VSC NO. 2 relay.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

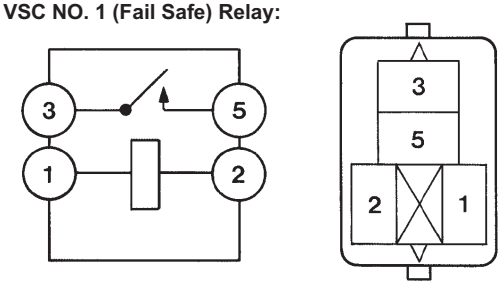
Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **REPLACE VSC NO. 2 RELAY**

OK

3 INSPECT VSC NO. 1 (FAIL SAFE) RELAY

VSC NO. 1 (Fail Safe) Relay:



F050241E11

(a) Remove the VSC NO. 1 (fail safe) relay.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

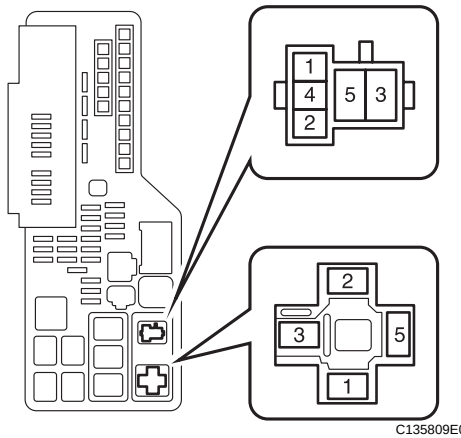
NG → **REPLACE VSC NO. 1 (FAIL SAFE) RELAY**

OK

4 INSPECT ENGINE ROOM RELAY BLOCK (POWER SOURCE TERMINAL)

Engine Room R/B:

VSC NO. 1 (Fail Safe) Relay



C135809E01

(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
VSC NO. 1 (fail safe) relay terminal 5 - Body ground	Always	10 to 14 V

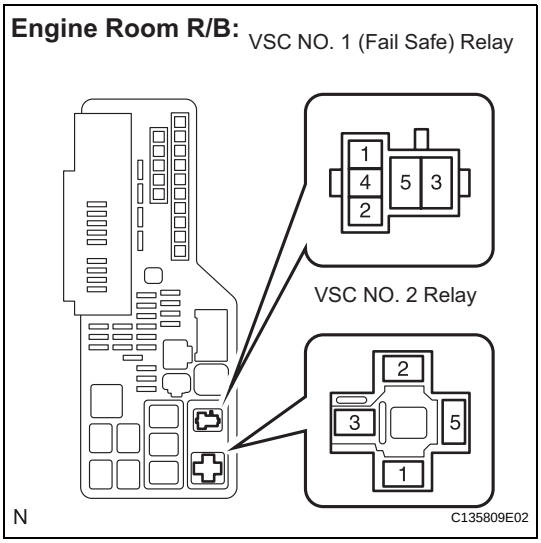
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

BC

5 INSPECT ENGINE ROOM RELAY BLOCK

Engine Room R/B: VSC NO. 1 (Fail Safe) Relay



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

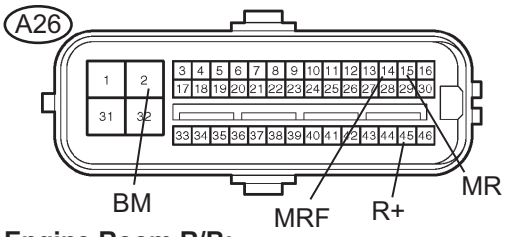
Tester Connection	Condition	Specified Condition
VSC NO. 1 (fail safe) relay terminal 3 - VSC NO. 2 relay terminal 5	Always	Below 1 Ω
VSC NO. 1 (fail safe) relay terminal 3 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE ENGINE ROOM RELAY BLOCK**

OK

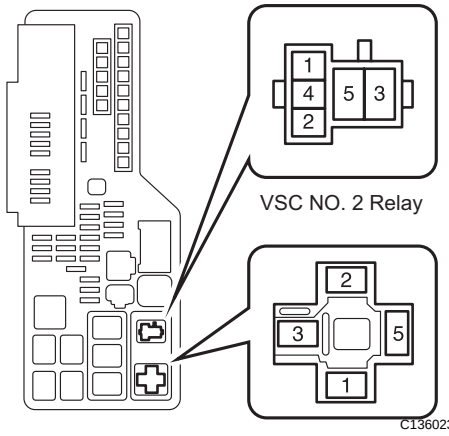
6 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ENGINE ROOM RELAY BLOCK)

Skid Control ECU Harness Side Connector Front View:



Engine Room R/B:

VSC NO. 1 (Fail Safe) Relay



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-2 (BM) - VSC NO. 2 relay terminal 3	Always	Below 1 Ω
A26-2 (BM) - Body ground	Always	10 kΩ or higher
A26-14 (MRF) - VSC NO. 1 (fail safe) relay terminal 2	Always	Below 1 Ω
A26-14 (MRF) - Body ground	Always	10 kΩ or higher
A26-15 (MR) - VSC NO. 2 relay terminal 2	Always	Below 1 Ω
A26-15 (MR) - Body ground	Always	10 kΩ or higher
A26-45 (R+) - VSC NO. 1 (fail safe) relay terminal 1	Always	Below 1 Ω
A26-45 (R+) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

BC

OK

7	RECONFIRM DTC

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 4 mph (6 km/h) or more.
(d) Check if the same DTC is recorded (See page BC-141).
HINT:
Reinstall the relays, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0273/13, C0274/14 and/or C1361/91) are not output	A
DTCs (C0273/13, C0274/14 and/or C1361/91) are output	B

HINT:
- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → REPLACE BRAKE ACTUATOR ASSEMBLY

A

USE SIMULATION METHOD TO CHECK

BC

DTC	C0278/11	Open in ABS Solenoid Relay Circuit

DTC	C0279/12	Short to B+ in ABS Solenoid Relay Circuit

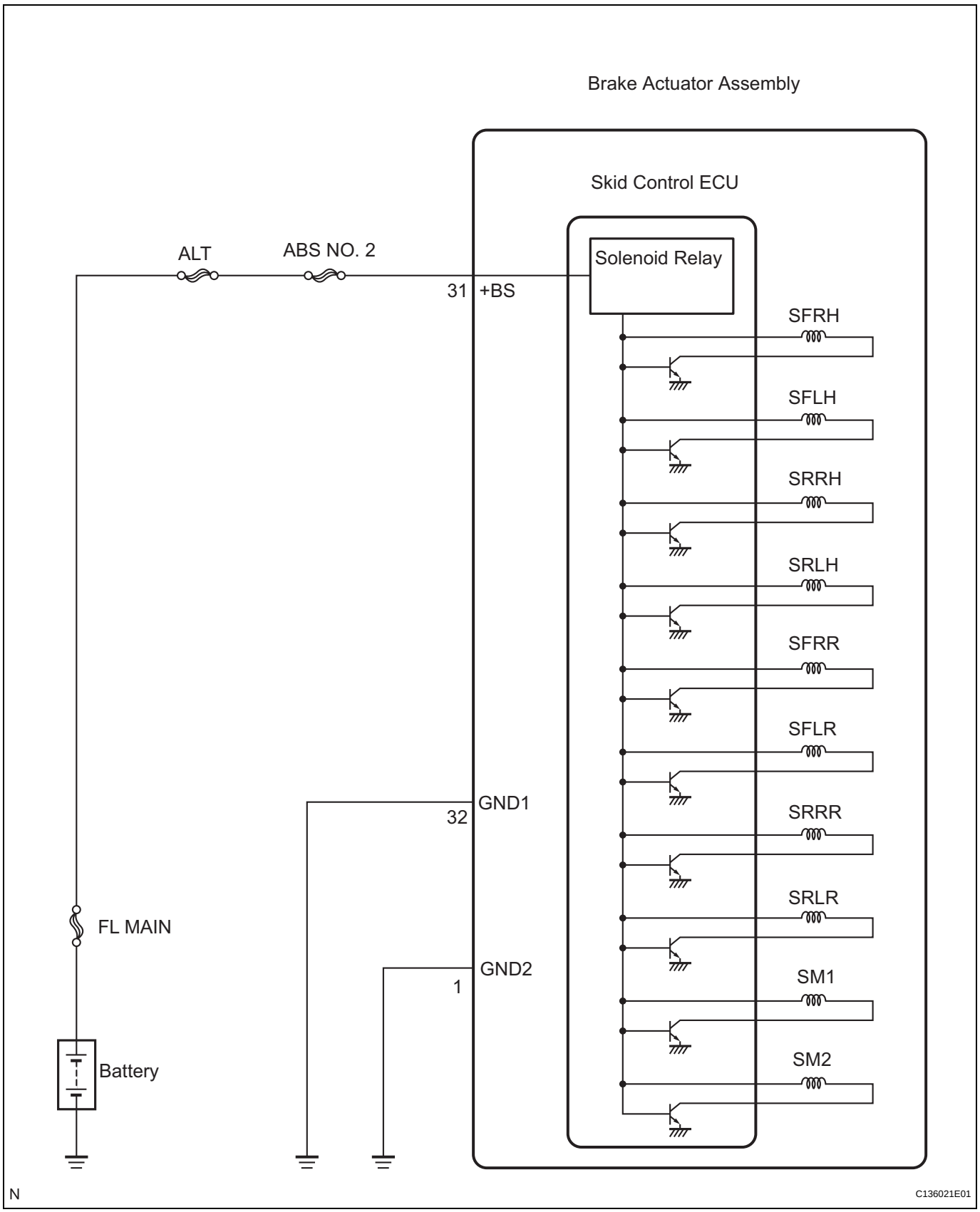
DESCRIPTION

The ABS solenoid relay supplies power to the ABS solenoid and TRAC solenoid.
The solenoid relay is turned on 1.5 seconds after the ignition switch is turned on (IG), and is turned off if an open or short in the solenoid is detected by self diagnosis performed when the vehicle starts running.
The ABS solenoid relay is housed in the skid control ECU in the actuator assembly.
HINT:
If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When any of the following (1 or 2) is detected: 1. Both of the following conditions continue for 0.2 seconds or more. • The IG1 terminal voltage is between 9.5 and 17.2 V. • The solenoid relay contact is open when the relay is ON. 2. Both of the following conditions continue for 0.2 seconds or more. • IG1 terminal voltage becomes lower than 9.5 V or less when the relay is turned on. • The relay contact remains open.	• ABS NO. 2 fuse • ABS solenoid relay • ABS solenoid relay circuit • Brake actuator assembly
C0279/12	Immediately after the ignition switch is turned on (IG), the solenoid relay contact is closed for 0.2 seconds when the relay is turned off.	Brake actuator assembly

BC

WIRING DIAGRAM

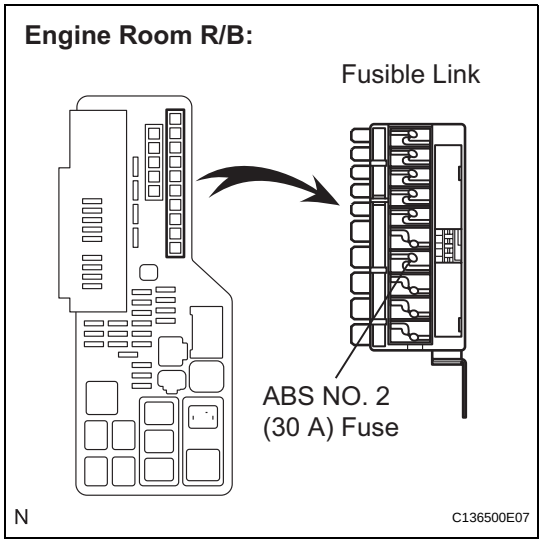


INSPECTION PROCEDURE

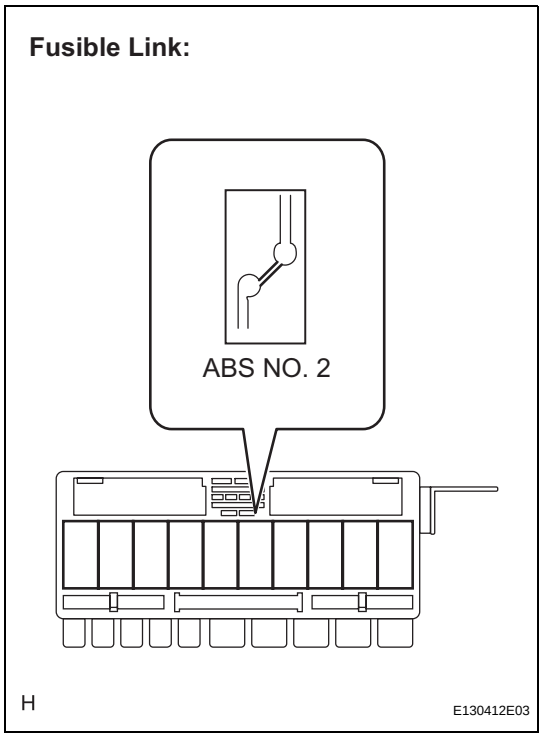
NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	**INSPECT ABS NO. 2 FUSE**



(a) Remove the fusible link from the engine room R/B.



(b) Check if the fusible link is melted.
OK:
The fusible link is melted.

(c) Install the fusible link to the engine room R/B with the nut.

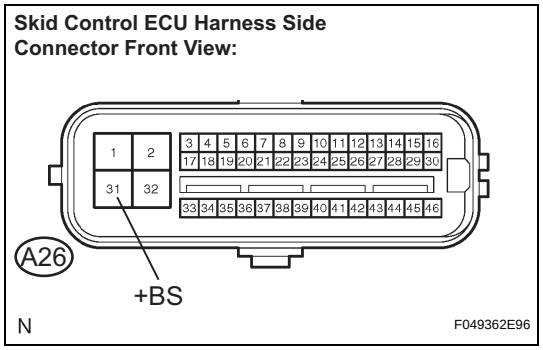
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK (ABS NO. 2 FUSE)**

OK

BC

2 INSPECT SKID CONTROL ECU (+BS TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

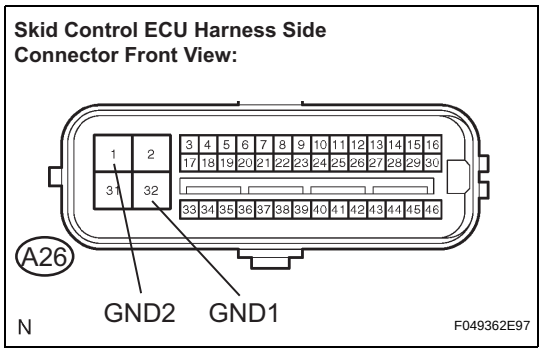
Standard voltage

Tester Connection	Condition	Specified Condition
A26-31 (+BS) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 4 mph (6 km/h) or more.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0278/11 and/or C0279/12) are not output	A
DTCs (C0278/11 and/or C0279/12) are output	B

HINT:

- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.

BC

- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

DTC	C1201/51	Engine Control System Malfunction

DESCRIPTION

If a malfunction in the engine control system is detected, the operations of VSC and TRAC are prohibited by the fail safe function. When the signals from the engine are input normally, the fail safe is cancelled and the DTC is not stored.

DTC No.	DTC Detection Condition	Trouble Area
C1201/51	Engine control system malfunction signal continues for 5 seconds.	Engine control system

INSPECTION PROCEDURE

1	CHECK ENGINE CONTROL SYSTEM

(a) Check if the engine control system DTC is output (See page ES-45 for 2GR-FE, or ES-38 for 2AZ-FE).

BC

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT ENGINE CONTROL SYSTEM

A

REPLACE ECM

DTC	C1203/53	ECM Communication Circuit Malfunction

DESCRIPTION

The circuit is used to send TRAC and VSC control information from the skid control ECU to the ECM, and engine control information from the ECM to the skid control ECU.

DTC No.	DTC Detection Condition	Trouble Area
C1203/53	Engine, drive source and destination variations that are sent from the ECM do not match the ones of the skid control ECU.	ECM

INSPECTION PROCEDURE

1	CHECK PART NUMBER (ECM AND BRAKE ACTUATOR ASSEMBLY)

(a) Check that the proper ECM and brake actuator assembly (skid control ECU) are installed.
OK:
Proper ECUs are installed.

NG → **REPLACE ECUS WITH PROPER ONES**

OK

REPLACE ECM

BC

DTC	C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone

DTC	C1336/39	Zero Point Calibration of Acceleration Sensor Undone

DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.
The yaw rate sensor has the built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2). If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, the DTCs U0123/62 (yaw rate sensor communication trouble) and U0124/95 (acceleration sensor communication trouble) are output.
The DTCs are also output when the calibration has not been completed.

DTC No.	DTC Detection Condition	Trouble Area
C1210/36	Zero point calibration of yaw rate sensor undone.	• Brake actuator assembly (Skid control ECU) • Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal)
C1336/39	When either of the following is detected: 1. The vehicle runs in the normal mode with zero point calibration undone. 2. After the zero point has been obtained, the zero point voltage of the sensor is not between 2.38 and 2.62 V.	• Brake actuator assembly (Skid control ECU) • Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal)

BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

HINT:

When U0123/62, U0124/95 or U0126/63 is output along with C1210/36 or C1336/39, inspect and repair trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.

1	PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR

(a) Perform zero point calibration of the yaw rate and acceleration sensor (See page BC-119).

NEXT

2	RECONFIRM DTC

(a) Clear the DTC (See page BC-141).
(b) Check if the same DTCs are recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1210/36 and/or C1336/39) are output	A
DTCs (C1210/36 and/or C1336/39) are not output	B

HINT:
- The DTCs are recorded because zero point calibration has not been completed.
- End the procedure as the same DTCs are not recorded after completion of zero point calibration.

B → **END**

A

3	CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION

(a) Turn the ignition switch off.
(b) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-448).
OK:
The sensor should be tightened to the specified torque.
The sensor should not be tilted.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

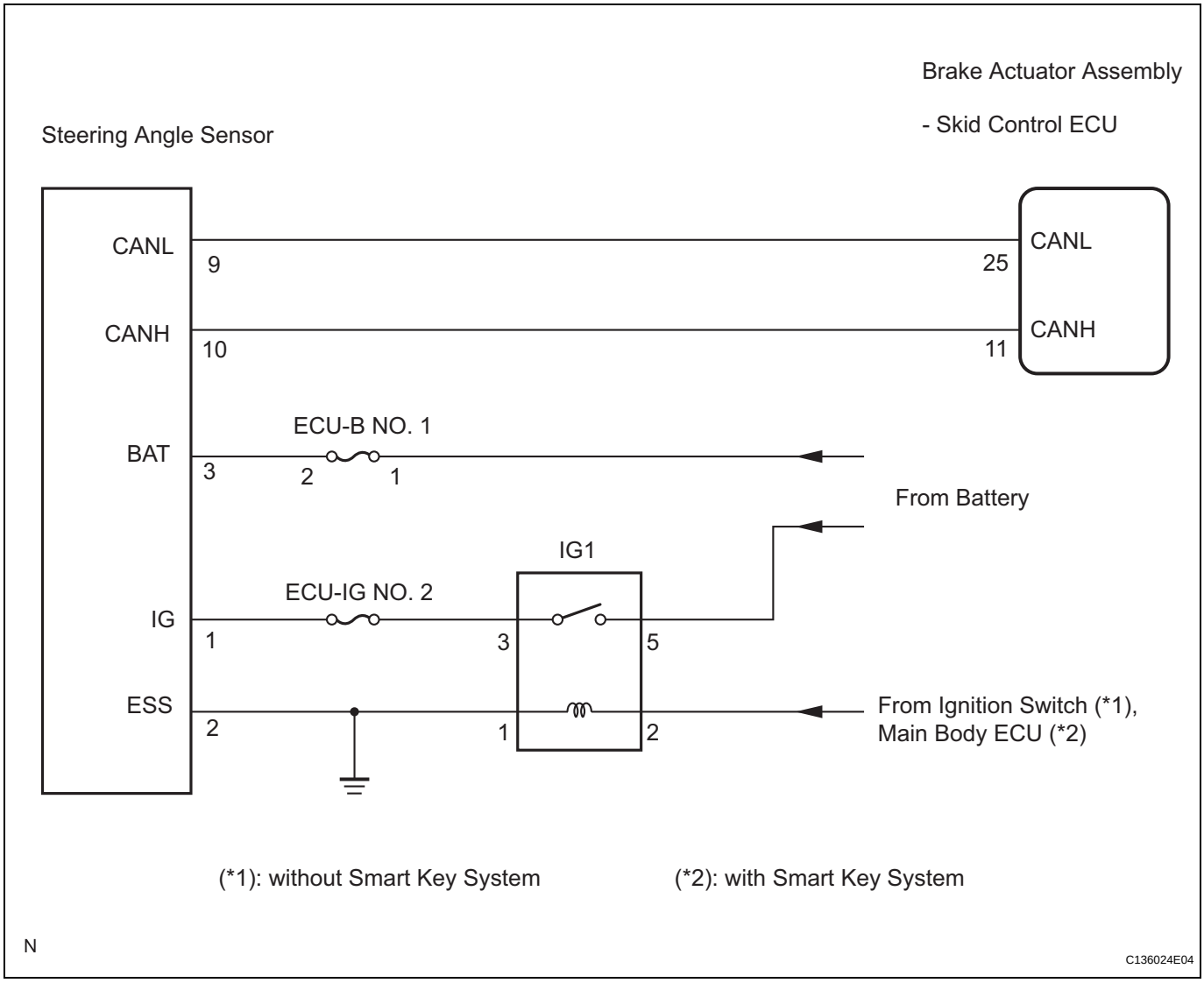
DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU via the CAN communication system. When there is a malfunction in the CAN communication system, it will be detected by the steering angle sensor zero point malfunction diagnostic function.

DTC No.	DTC Detection Condition	Trouble Area
C1231/31	When ECU IG1 terminal voltage is 9.5 V or more, the steering angle sensor malfunction signal is received.	• Steering angle sensor • Steering angle sensor circuit • Steering angle sensor power supply • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- When U0073/94, U0123/62, U0124/95 or U0126/63 is output together with C1231/31, inspect and repair the trouble areas indicated by U0073/94, U0123/62, U0124/95 or U0126/63 first.

- When the speed sensor or the yaw rate sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate sensor first, and then inspect and repair the steering angle sensor.

1 CHECK DTC

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch off.
(c) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output.
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 22 mph (35 km/h) and check that no speed sensor and yaw rate sensor DTCs are output.

Result

Condition	Proceed to
No CAN communication system DTC and the speed sensor or yaw rate sensor DTC are output	A
CAN communication system DTC is output	B
Speed sensor or yaw rate sensor DTC is output	C

BC

HINT:
- If there is a malfunction in the speed sensor or the yaw rate sensor, an abnormal value may be output although the steering angle sensor is normal.
- If the speed sensor and the yaw rate sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor.

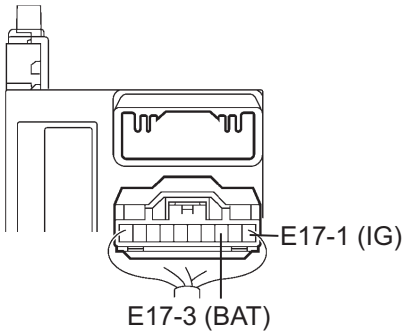
B → **INSPECT CAN COMMUNICATION SYSTEM**

C → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**

A

2 INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL)

Steering Angle Sensor Wire Harness View:



(a) Turn the ignition switch off.
(b) Remove the steering wheel and the column cover lower.
(c) Disconnect the steering angle sensor connector.
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

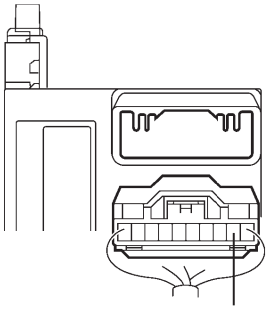
Tester Connection	Condition	Specified Condition
E17-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V
E17-3 (BAT) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3	INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)

Steering Angle Sensor Wire Harness View:



G030156E16

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E17-2 (ESS) - Body ground	Always	Below 1 Ω

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)**

OK

REPLACE STEERING ANGLE SENSOR

BC

DTC	**C1232/32**	**Stuck in Acceleration Sensor**
DTC	**C0371/71**	**Yaw Rate Sensor (Test Mode DTC)**
DTC	**C1234/34**	**Yaw Rate Sensor Malfunction**
DTC	**C1243/43**	**Acceleration Sensor Stuck Malfunction**
DTC	**C1244/44**	**Open or Short in Acceleration Sensor Circuit**
DTC	**C1245/45**	**Acceleration Sensor Output Malfunction**
DTC	**C1279/79**	**Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)**
DTC	**C1381/97**	**Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction**

BC

DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.

The yaw rate sensor has a built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2).

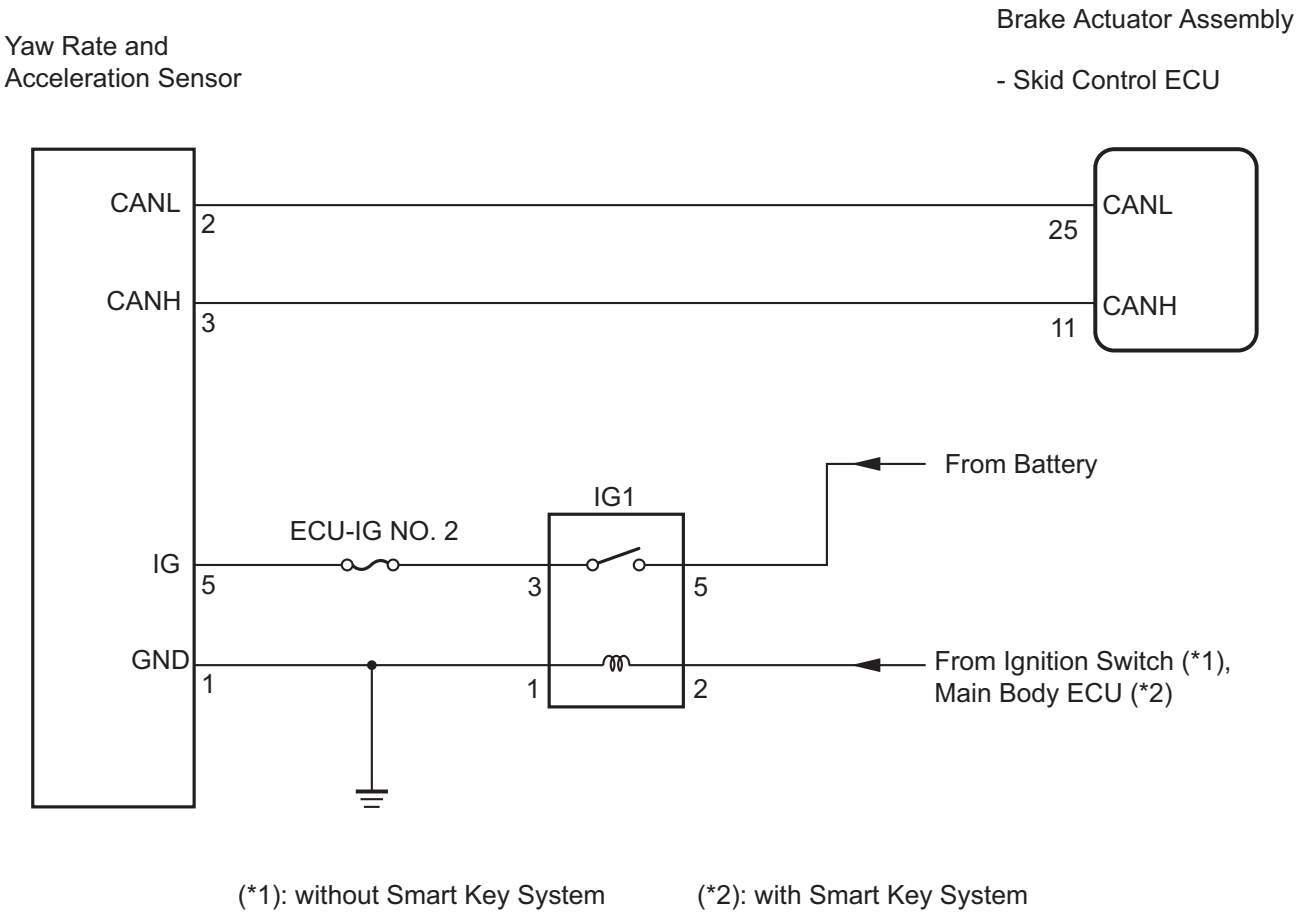
If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, the DTC U0123/62 (malfunction in CAN communication with the yaw rate sensor) and U0124/95 (malfunction in CAN communication with the acceleration sensor) are output.

These DTCs are also output when calibration has not been completed.

DTCs C0371/71 and C1279/79 can be deleted when the yaw rate and acceleration sensor sends a yaw rate and/or acceleration signal or the Test Mode ends. DTCs C0371/71 and C1279/79 are output only in the Test Mode.

DTC No.	DTC Detection Condition	Trouble Area
C1232/32	At a vehicle speed of 6 mph (10 km/h) or more, either GL1 or GL2 (input signal) does not change for 30 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1234/34	Sensor malfunction signal is received from the yaw rate sensor.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1243/43	While the vehicle speed changes from 19 mph (30 km/h) to 0 mph (0 km/h), the condition that the values of GL1 and GL2 do not change occurs 16 times or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1244/44	When either of the following is detected: 1. A data malfunction signal is received from the acceleration sensor. 2. After the difference between GL1 and GL2 becomes 0.6 G or more with the vehicle stationary, the difference remains 0.4 G or more for 60 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1245/45	At a vehicle speed of 19 mph (30 km/h) or more, the difference between the forward and backward G calculated from the acceleration sensor value and that calculated from the vehicle speed sensor exceeds 0.35 G for 60 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1381/97	At a vehicle speed of more than 2 mph (3 km/h), the acceleration sensor power source malfunction signal is received for 10 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor power source circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the yaw rate and acceleration sensor, perform zero point calibration (See page BC-119).

HINT:

When U0123/62, U0124/95 or U0126/63 is output together with C1232/32, C1234/34, C1243/43, C1244/44, C1245/45, or C1381/97, inspect and repair the trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.

1	CHECK DTC

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch off.
(c) At a speed of 19 mph (30 km/h) or more, drive the vehicle, turn the steering wheel, and decelerate the vehicle (depress the brake pedal).

(d) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output.
(e) Check if DTCs for zero point calibration of the yaw rate sensor undone (C1210/36) or for zero point calibration of the acceleration sensor undone (C1336/39) are output.

Result

Condition	Proceed to
DTCs (C1210/36, C1336/39 and/or CAN communication system DTC) are not output	A
CAN communication system DTC is output	B
DTCs (C1210/36 and/or C1336/39) are output	C

B → **INSPECT CAN COMMUNICATION SYSTEM**

C → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**

A

BC

2 CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION

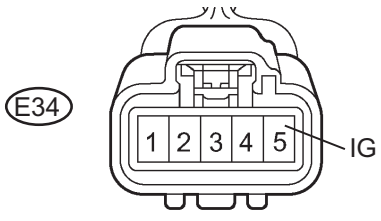
(a) Turn the ignition switch off.
(b) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-448).
OK:
The sensor is tightened to the specified torque.
The sensor is not tilted.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

3 INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)

Yaw Rate and Acceleration Sensor Harness Side Connector Front View:



(a) Disconnect the yaw rate and acceleration sensor connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

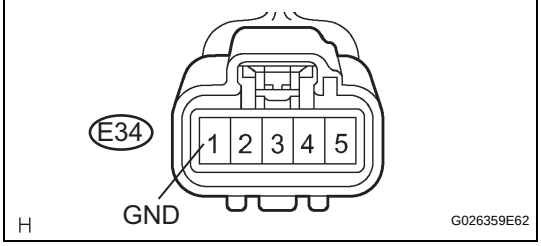
Tester Connection	Condition	Specified Condition
E34-5 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)**

OK

4 INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)

Yaw Rate and Acceleration Sensor Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E34-1 (GND) - Body ground	Always	Below 1 Ω

NOTICE:
Check the yaw rate and acceleration sensor signal after replacement (See page BC-123).
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

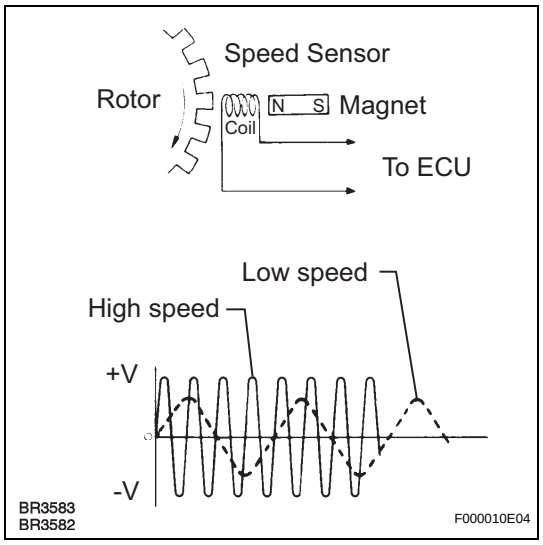
REPLACE YAW RATE AND ACCELERATION SENSOR

BC

DTC	**C1235/35**	**Foreign Object is Attached on Tip of Front Speed Sensor RH**
DTC	**C1236/36**	**Foreign Object is Attached on Tip of Front Speed Sensor LH**
DTC	**C1238/38**	**Foreign Object is Attached on Tip of Rear Speed Sensor RH**
DTC	**C1239/39**	**Foreign Object is Attached on Tip of Rear Speed Sensor LH**
DTC	**C1275/75**	**Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1276/76**	**Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1277/77**	**Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1278/78**	**Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)**

DESCRIPTION

The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1275/75 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs from C1275/75 to C1278/78 are output only in the Test Mode.



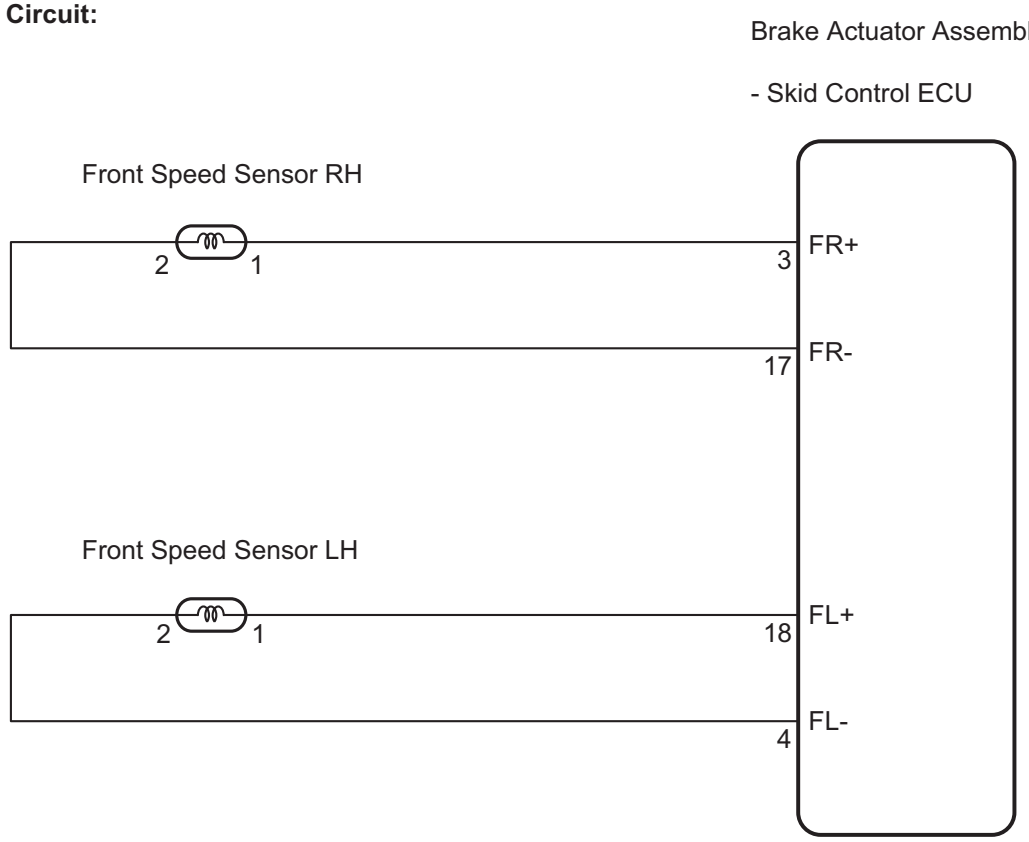
DTC No.	DTC Detection Condition	Trouble Area
C1235/35 C1236/36 C1238/38 C1239/39	At a vehicle speed of 12 mph (20 km/h) or more, noise occurs in the sensor signal from the abnormal wheel for 5 seconds or more.	• Speed sensor • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)

BC

HINT:
- DTC C1235/35 is for the front speed sensor RH.
- DTC C1236/36 is for the front speed sensor LH.
- DTC C1238/38 is for the rear speed sensor RH.
- DTC C1239/39 is for the rear speed sensor LH.

WIRING DIAGRAM

Front Speed Sensor Circuit:

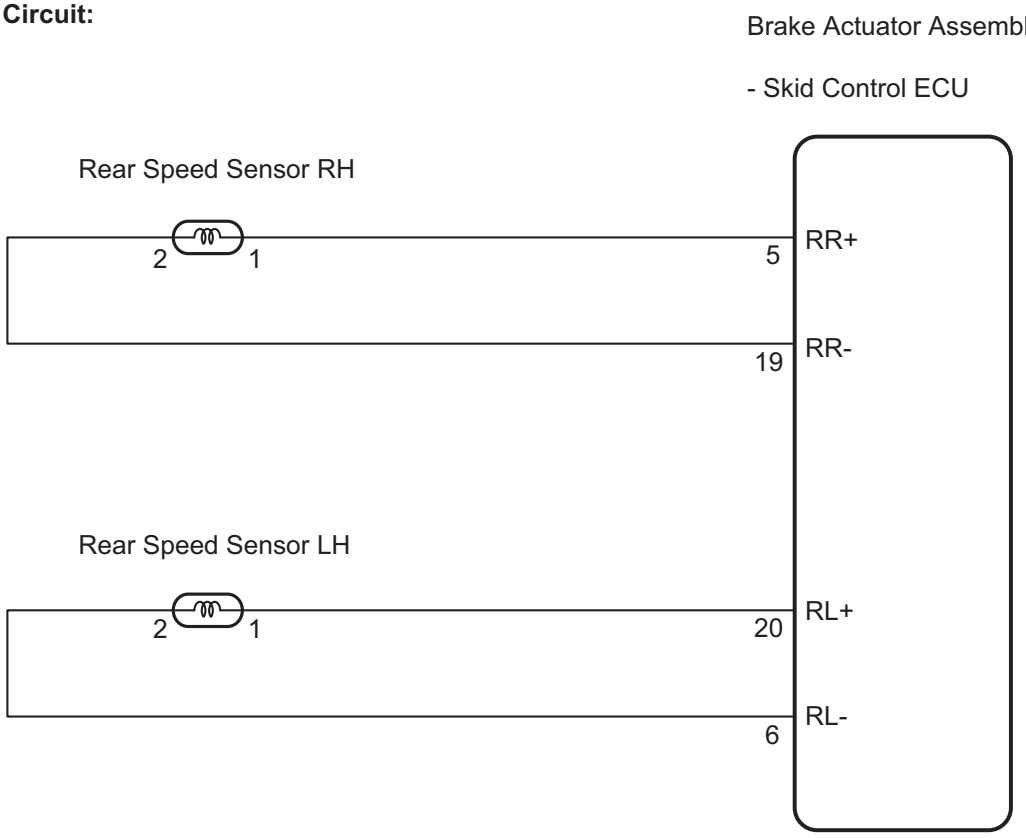


N

C132772E07

BC

Rear Speed Sensor Circuit:



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

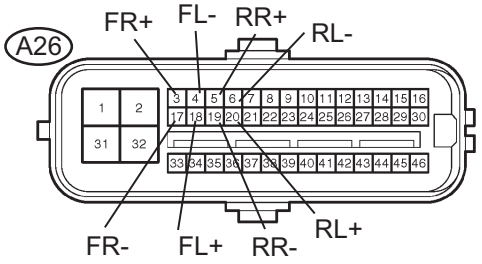
HINT:

When C0200/31, C0205/32, C0210/33, or C0215/34 is output together with C1235/35, C1236/36, C1238/38, or C1239/39, inspect and repair the trouble areas indicated by C0200/31, C0205/32, C0210/33, or C0215/34 first.

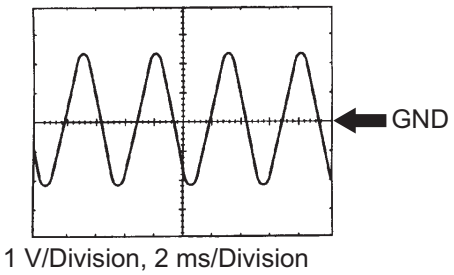
BC

1 CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Harness Side Connector Front View:



Normal Signal Waveform:



C136019E05

(a) Disconnect the skid control ECU connector.
(b) Connect the oscilloscope to each speed sensor terminal of the skid control ECU.
(c) Check that a waveform is output when the tires are rotated (by the sensor circuit).

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

(d) Check that the waveform does not change while jiggling a connector or a wire harness.

OK:

The waveform does not change.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **Go to step 3**

OK

2 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 12 mph (20 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output	B

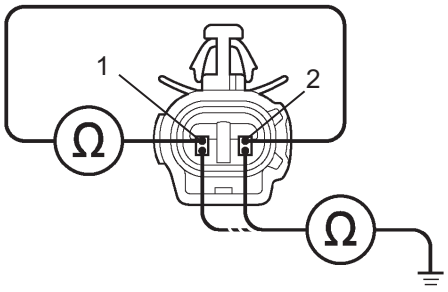
B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

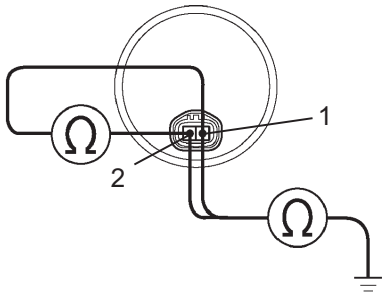
USE SIMULATION METHOD TO CHECK

3 INSPECT EACH SPEED SENSOR

Front Speed Sensor:



Rear Speed Sensor:



C136027E01

(a) Disconnect each speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher
2 (RR+) - 1 (RR-)	Always	0.9 to 2.1 kΩ
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher
2 (RL+) - 1 (RL-)	Always	0.9 to 2.1 kΩ
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

BC

Result

Result	Proceed to
OK (for rear)	A
OK (for front)	B
NG	C

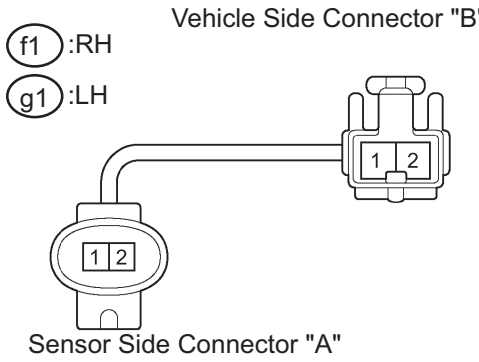
B → Go to step 5

C → REPLACE EACH SPEED SENSOR

A

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)

Skid Control Sensor Wire:



C136026E01

(a) Disconnect the skid control sensor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
f1 ("A"-1) - f1 ("B"-2)	Always	Below 1 Ω
f1 ("A"-1) - f1 ("B"-1)	Always	10 kΩ or higher
f1 ("A"-1) - Body ground	Always	10 kΩ or higher
f1 ("A"-2) - f1 ("B"-1)	Always	Below 1 Ω
f1 ("A"-2) - f1 ("B"-2)	Always	10 kΩ or higher
f1 ("A"-2) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
g1 ("A"-1) - g1 ("B"-2)	Always	Below 1 Ω
g1 ("A"-1) - g1 ("B"-1)	Always	10 kΩ or higher
g1 ("A"-1) - Body ground	Always	10 kΩ or higher
g1 ("A"-2) - g1 ("B"-1)	Always	Below 1 Ω
g1 ("A"-2) - g1 ("B"-2)	Always	10 kΩ or higher
g1 ("A"-2) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

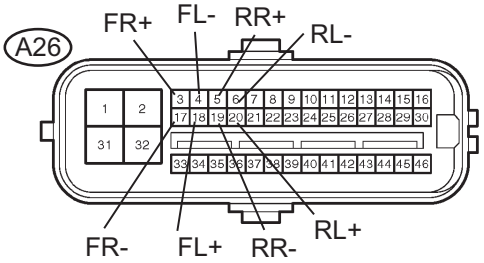
NG → **REPLACE SKID CONTROL SENSOR WIRE**

OK

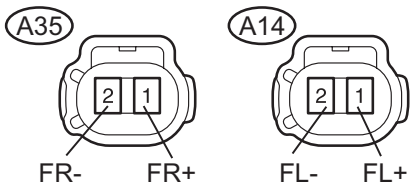
BC

5 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - EACH SPEED SENSOR)

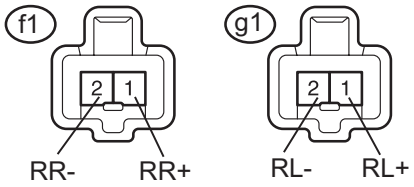
Skid Control ECU Harness Side Connector Front View:



Front Speed Sensor Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



C136025E01

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A26-3 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A26-3 (FR+) - Body ground	Always	10 kΩ or higher
A26-17 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A26-17 (FR-) - Body ground	Always	10 kΩ or higher
A26-5 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A26-5 (RR+) - Body ground	Always	10 kΩ or higher
A26-19 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A26-19 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
A26-18 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A26-18 (FL+) - Body ground	Always	10 kΩ or higher
A26-4 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A26-4 (FL-) - Body ground	Always	10 kΩ or higher
A26-20 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A26-20 (RL+) - Body ground	Always	10 kΩ or higher
A26-6 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A26-6 (RL-) - Body ground	Always	10 kΩ or higher

BC

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 RECONFIRM DTC

(a) Reconnect the skid control sensor wire.
(b) Reconnect the skid control ECU connector and the speed sensor connector.
(c) Clear the DTC (See page BC-141).
(d) Start the engine.
(e) Drive the vehicle at the speed of 12 mph (20 km/h) or more for at least 60 seconds.
(f) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output (for front)	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output (for rear)	B

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	C

B → Go to step 8

C → USE SIMULATION METHOD TO CHECK

A

7 CHECK FRONT SPEED SENSOR TIP

(a) Turn the ignition switch off.
(b) Remove the front speed sensor (See page BC-438).
(c) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-123).

NG → CLEAN OR REPLACE FRONT SPEED SENSOR

OK

8 CHECK EACH SPEED SENSOR ROTOR

(a) Turn the ignition switch off.
(b) Remove each speed sensor rotor.
(c) Check the speed sensor rotor.
OK:
No scratches, missing teeth, or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-123).

NG → CLEAN OR REPLACE EACH SPEED SENSOR ROTOR

OK

9 RECONFIRM DTC

(a) Install the front speed sensor and the speed sensor rotor.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 12 mph (20 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	B

B → **USE SIMULATION METHOD TO CHECK**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C1241/41	Low Battery Positive Voltage

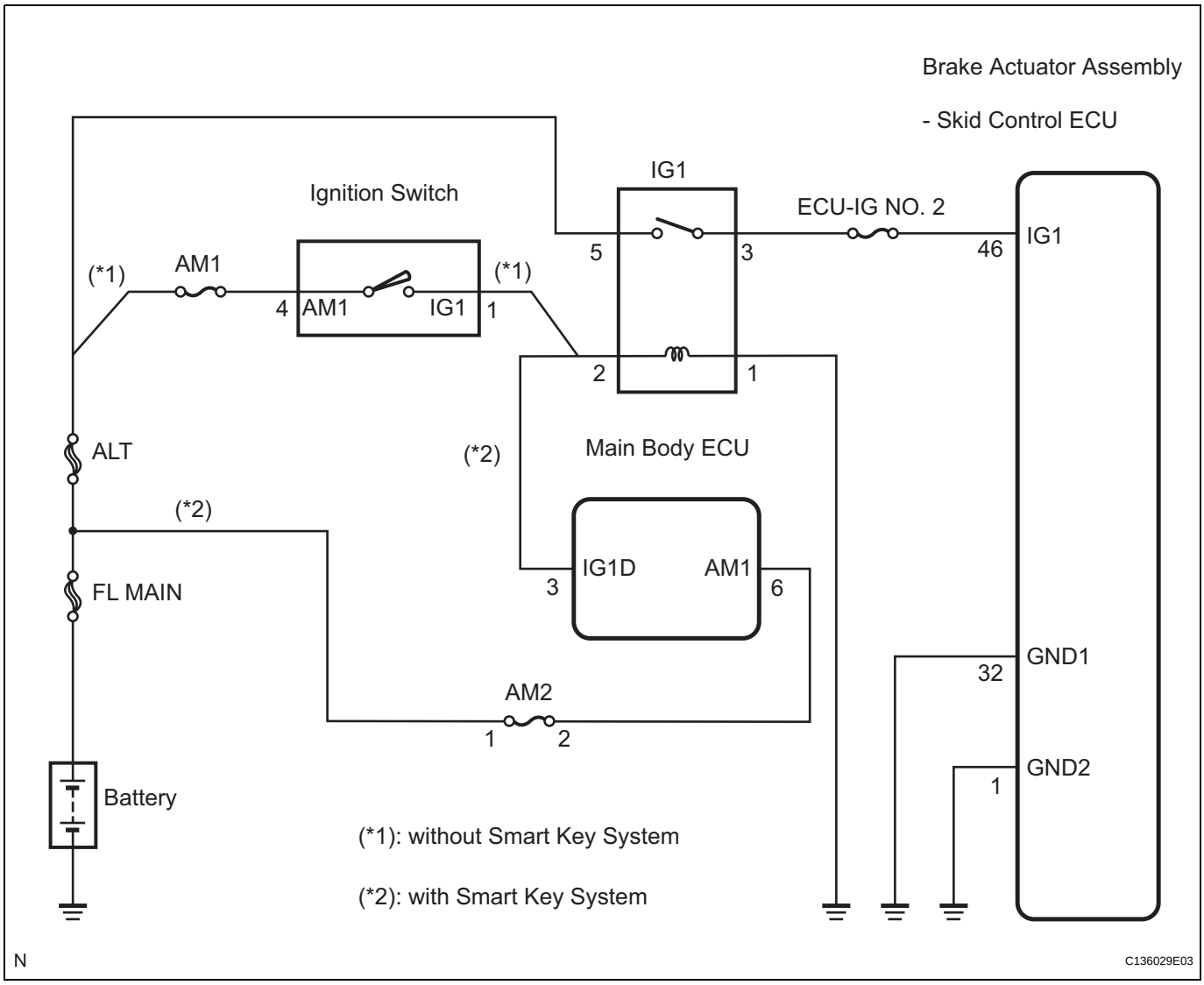
DESCRIPTION

If a malfunction is detected in the power supply circuit, the skid control ECU (housed in the actuator assembly) stores this DTC and the fail safe function prohibits ABS operation.
This DTC is stored when the IG1 terminal voltage deviates from the DTC detection condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit, etc.
The DTC is cancelled when the IG1 terminal voltage returns to normal.

DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When any of the following is detected: 1. At a vehicle speed of 2 mph (3 km/h) or more, the IG1 terminal voltage is 9.5 V or less for 10 seconds or more. 2. When the solenoid relay remains ON and the IG1 terminal voltage is 9.5 V or less, the relay contact is open for 0.2 seconds or more. 3. While the VSC NO. 1 (fail safe) relay is ON after VSC NO. 2 relay ON, the IG1 terminal voltage is 9.5 V or less and the actuator pump drive motor is OFF for 0.1 second or more.	• ECU-IG NO. 2 fuse • Battery • Charging system • Power source circuit • Internal power supply circuit of the skid control ECU

BC

WIRING DIAGRAM



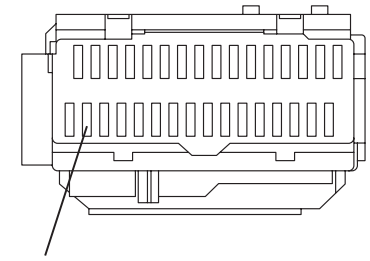
INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1 INSPECT ECU-IG NO. 2 FUSE

Main Body ECU:



N C135806E01

(a) Remove the ECU-IG NO. 2 fuse from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
ECU-IG NO. 2 (7.5 A) fuse	Always	Below 1 Ω

NG → **REPLACE ECU-IG NO. 2 FUSE**

OK

2 CHECK BATTERY

(a) Install the ECU-IG NO. 2 fuse.
(b) Check the battery voltage.

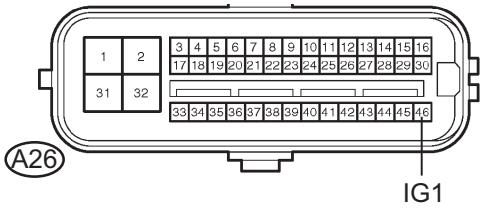
Standard voltage:
10 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

3 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU Harness Side Connector Front View:



N F049362E98

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

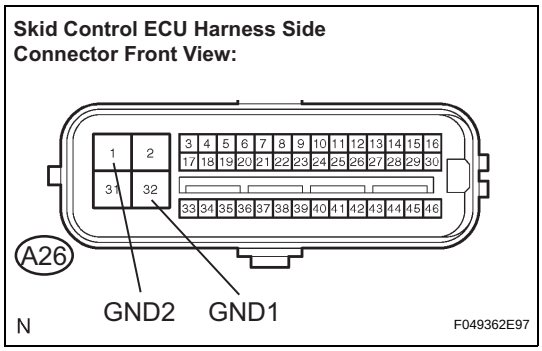
Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

BC

OK

4 INSPECT SKID CONTROL ECU (GND TERMINAL)



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

5 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Turn the ignition switch on (IG).
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1241/41) is not output	A
DTC (C1241/41) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

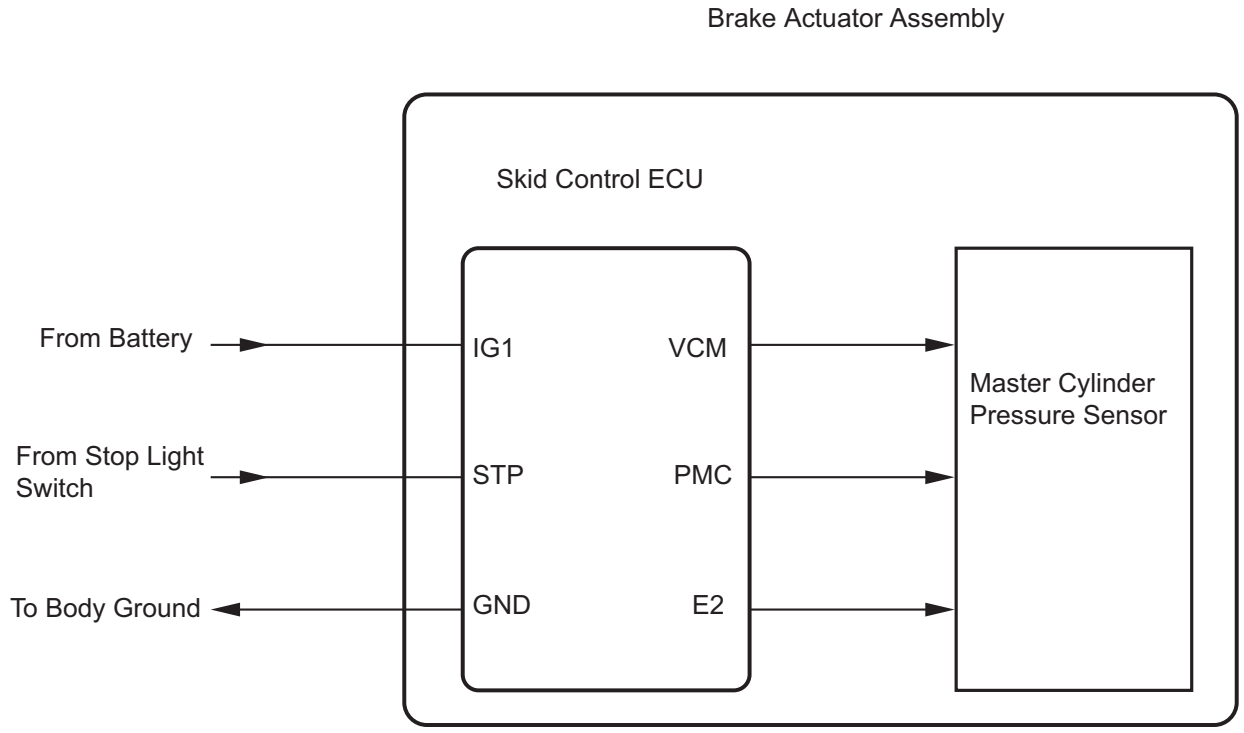
USE SIMULATION METHOD TO CHECK

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DTC	C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)

DESCRIPTION

Master cylinder pressure sensor is connected to the skid control ECU in the brake actuator assembly. DTC C1281/81 can be deleted when the master cylinder pressure sensor sends a master cylinder pressure signal or the Test Mode ends. DTC C1281/81 is output only in the Test Mode.



VCM: Power Supply for Master Cylinder Pressure Sensor

PMC: Master Cylinder Pressure Sensor Input

E2: Master Cylinder Pressure Sensor Ground

N

C106656E05

BC

DTC No.	DTC Detection Condition	Trouble Area
C1246/46	When any of the following is detected: • At a vehicle speed of 4.3 mph (7 km/h) or more, when the PMC terminal voltage is over 0.86 V, it does not change by 0.005 V or more for 30 seconds. • Noise occurs in the PMC terminal 7 times or more within 5 seconds. • When the stop light switch is OFF, the PMC terminal voltage is more than 0.86 V or less than 0.3 V for 5 seconds or more. • With the IG1 terminal voltage between 9.5 and 17.2 V, the VCM terminal voltage is not between 4.4 and 5.6 V for 1.2 seconds or more. • When the VCM terminal voltage between 4.4 and 5.6 V, the PCM terminal voltage is not between 0.14 and 4.85 V for 1.2 seconds or more.	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit • Stop light switch circuit • Brake actuator assembly

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

BC

1 CHECK STOP LIGHT OPERATION

(a) Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK

Condition	Illumination Condition
Brake pedal depressed	**ON**
Brake pedal released	**OFF**

NG → **INSPECT STOP LIGHT CIRCUIT**

OK

2 READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V

(d) Check that the brake fluid pressure value of the master cylinder pressure sensor observed on the intelligent tester changes when the brake pedal is depressed.

OK:

When the pedal is depressed, voltage displayed on the intelligent tester increases.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

3	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released

(b) Check that the stop light condition observed on the intelligent tester changes when the brake pedal is depressed.

OK:

When the brake pedal is depressed, the intelligent tester displays "ON".

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

BC

4	RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) At a speed of 18 mph (30 km/h) or more, drive the vehicle and perform braking test (decelerate the vehicle by depressing the brake pedal).
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1246/46) is not output	A
DTC (C1246/46) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

DTC	C1249/49	Open in Stop Light Switch Circuit

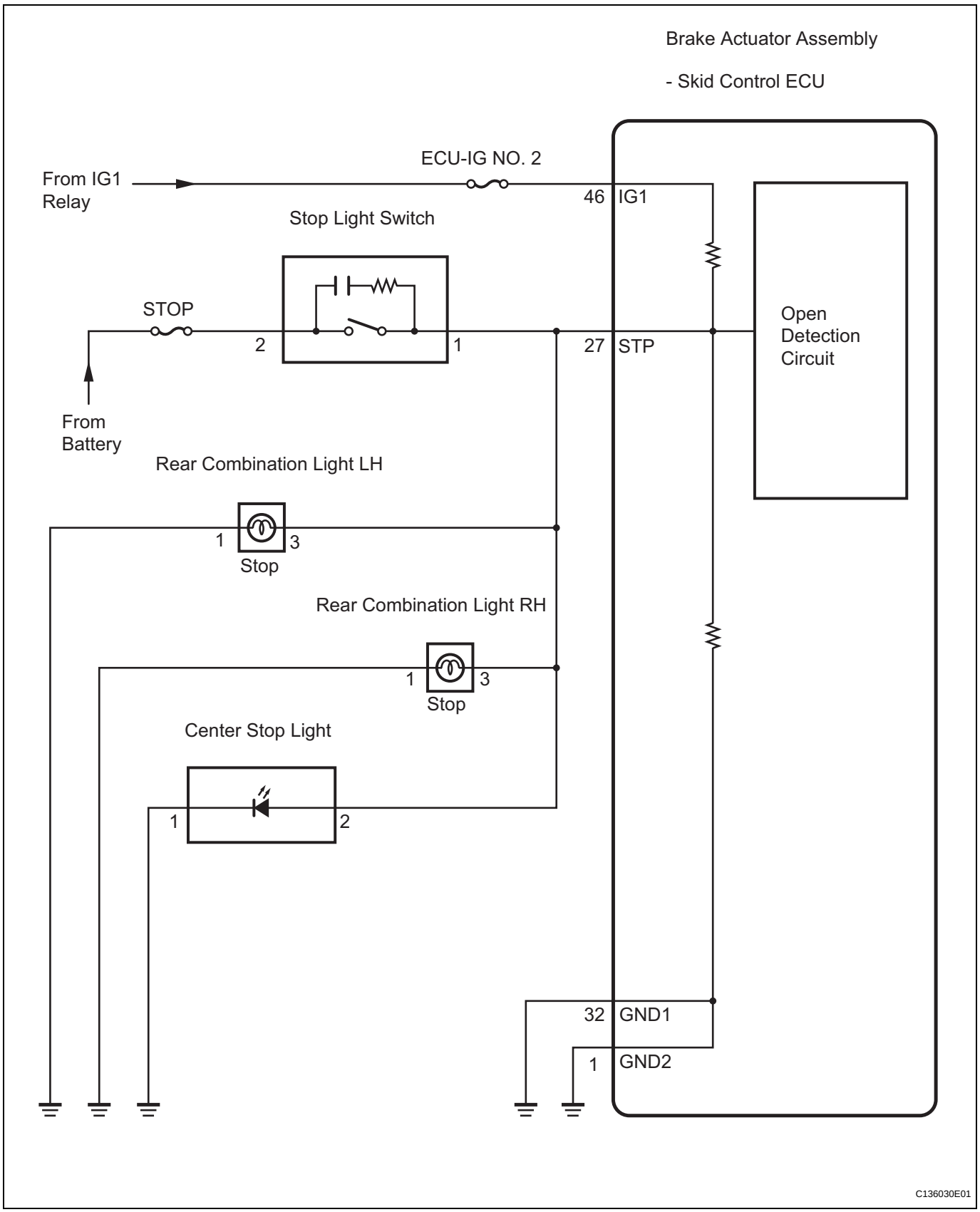
DESCRIPTION

The skid control ECU (housed in the actuator assembly) inputs the stop light switch signal and the condition of brake operation.

The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light input line while the stop light switch is OFF.

DTC No.	DTC Detection Condition	Trouble Area
C1249/49	When IG1 terminal voltage is 9.5 to 17.2 V, an open circuit of the stop light switch continues for 0.3 seconds or more.	• STOP fuse • Stop light switch • Stop light switch circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM



BC

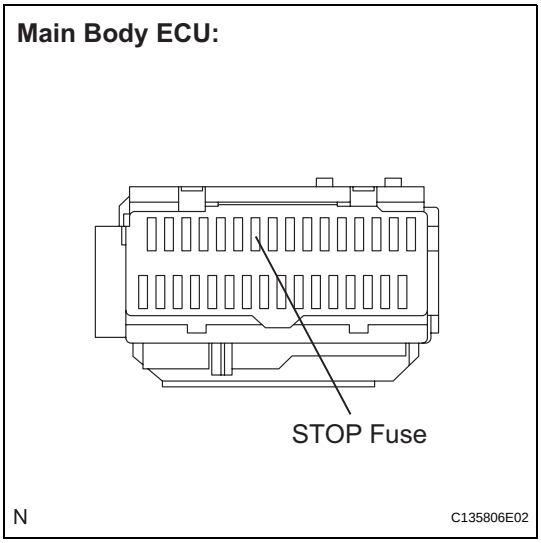
INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1 INSPECT STOP FUSE

Main Body ECU:



(a) Remove the STOP fuse from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
STOP (10 A) fuse	Always	Below 1 Ω

NG → **REPLACE STOP FUSE**

OK

2 CHECK STOP LIGHT OPERATION

(a) Install the STOP fuse.
(b) Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK

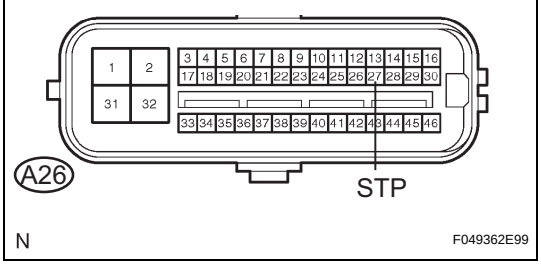
Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG → **Go to step 7**

OK

3 INSPECT SKID CONTROL ECU (STP TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

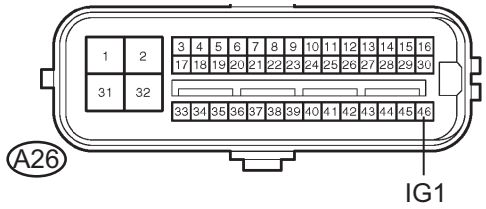
Tester Connection	Condition	Specified Condition
A26-27 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A26-27 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STP CIRCUIT)**

OK

4 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Turn the ignition switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

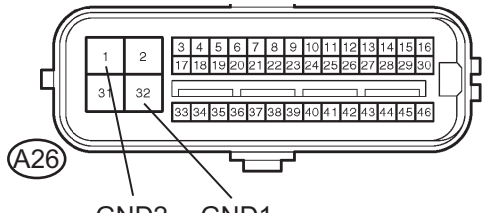
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

BC

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Depress the brake pedal several times to test the stop light circuit.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1249/49) is not output	A
DTC (C1249/49) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

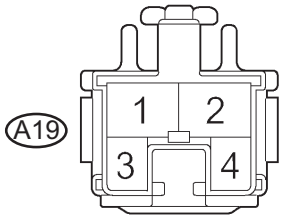
B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

7 INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL)

Stop Light Switch Harness Side Connector Front View:



I042363E16

(a) Disconnect the stop light switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V

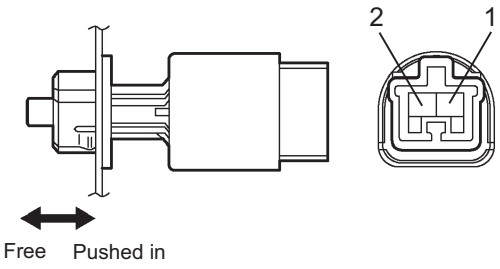
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

BC

OK

8 INSPECT STOP LIGHT SWITCH

Stop Light Switch:



C124796E03

(a) Measure the resistance according to the value(s) in the table below.

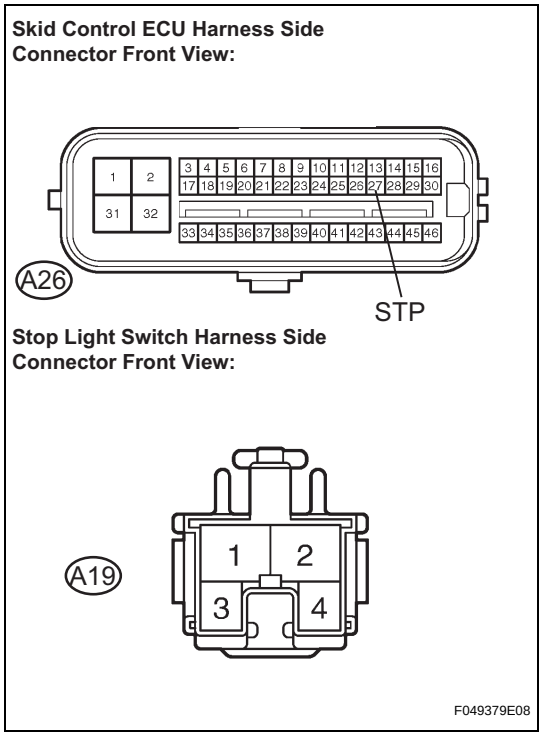
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH**

OK

9 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-27 (STP) - A19-1	Always	Below 1 Ω
A26-27 (STP) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10 RECONFIRM DTC

(a) Reconnect the skid control ECU connector and the stop light switch connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Depress the brake pedal several times to test the stop light circuit.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1249/49) is not output	A
DTC (C1249/49) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

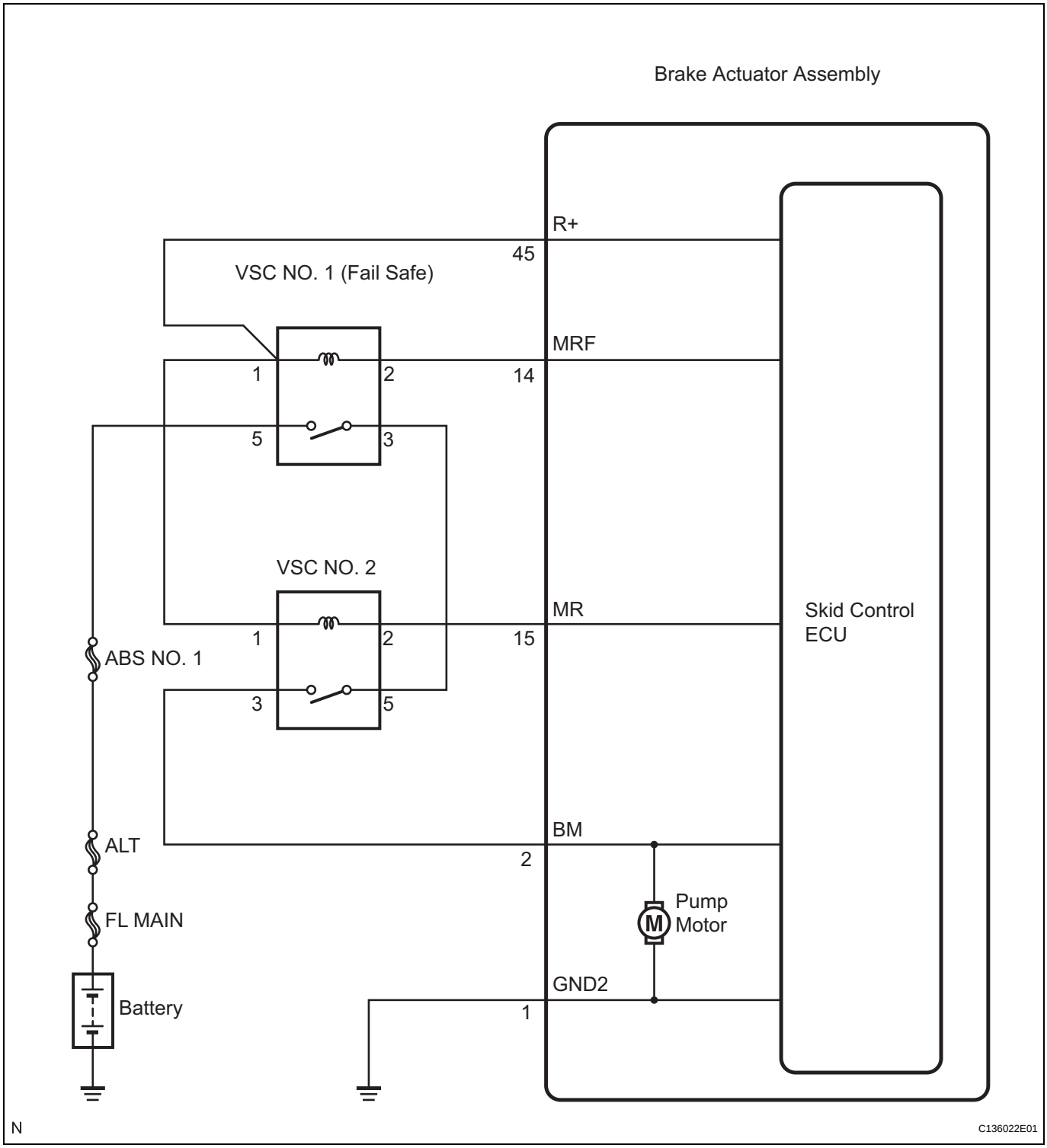
INSPECT LIGHTING SYSTEM (STOP LIGHT CIRCUIT)

DTC C1251/51 Open in Pump Motor Circuit

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1251/51	• Actuator pump motor does not operate properly. • Open in actuator pump motor circuit continues for at least 2 seconds.	• Brake actuator assembly (GND circuit) • Brake actuator assembly (Motor circuit)

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the Active Test mode on the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
MOTOR RELAY	Turns ABS motor relay ON / OFF	Operating sound of relay (clicking sound) and motor can be heard

(d) Check the operating sound of the ABS motor relay and motor when operating it with the intelligent tester.

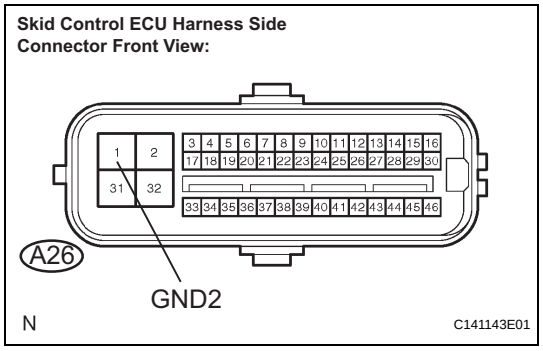
OK:

The operating sound of the ABS motor relay and motor can be heard.

OK → **Go to step 3**

NG

2 INSPECT SKID CONTROL ECU (GND2 TERMINAL)



(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND2 CIRCUIT)**

OK

3 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 4.3 mph (7 km/h) or more.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1251/51) is not output	A
DTC (C1251/51) is output	B

HINT:

- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If a normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

BC

USE SIMULATION METHOD TO CHECK

DTC	C1290/66	Steering Angle Sensor Zero Point Malfunction

DESCRIPTION

The skid control ECU acquires steering angle sensor zero point every time the ignition switch is turned on (IG) and the vehicle is driven at 22 mph (35 km/h) or more for approximately 5 seconds. The ECU also stores the previous zero point.
If front wheel alignment or steering wheel position is adjusted without disconnecting the negative battery terminal, or if yaw rate and acceleration sensor zero point is not acquired after the adjustments have been completed, the skid control ECU detects the difference between the previous zero point and newly acquired zero point and outputs this DTC to indicate a poor adjustment.
Warning of the steering angle sensor zero point malfunction will be cancelled by turning the ignition switch off.

DTC No.	DTC Detection Condition	Trouble Area
C1290/66	The steering angle sensor zero point calibration position vastly differs from the recorded value	• Yaw rate and acceleration sensor zero point calibration incomplete • Poor adjustment of the centered position of the steering wheel • Poor adjustment of front wheel alignment

BC

INSPECTION PROCEDURE

NOTICE:
When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR

(a) Perform zero point calibration of the yaw rate and acceleration sensor (See page BC-119).
HINT:
- When the stored zero point of the yaw rate and acceleration sensor is erased, steering angle sensor zero point will also be erased.
- If the zero point and output value of the yaw rate and acceleration sensor and the output value of the speed sensors are not normal, steering angle sensor zero point cannot be acquired normally even if the vehicle is driven straight ahead at 22 mph (35 km/h) or more.

NEXT

2	CHECK STEERING ANGLE SENSOR ZERO POINT CALIBRATION

(a) Drive the vehicle straight ahead at 22 mph (35 km/h) or more for at least 5 seconds.
(b) Check that the centered position of the steering wheel is correctly set while driving straight ahead.
HINT:
If front wheel alignment and steering position are adjusted as a result of abnormal centered position of the steering wheel, acquire yaw rate and acceleration sensor zero point again after the adjustments are completed.

OK:
The centered position of the steering wheel is correctly set.

NG → **ADJUST FRONT WHEEL ALIGNMENT OR STEERING POSITION**

OK ↓

3	RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 22 mph (35 km/h) or more.
(e) Check if the same DTC is recorded (See page BC-141).

Result

BC

Condition	Proceed to
DTC (C1290/66) is not output	A
DTC (C1290/66) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A ↓

END

DTC	U0073/94	Control Module Communication Bus OFF

DTC	U0100/65	Lost Communication with ECM / PCM

DTC	U0123/62	Lost Communication with Yaw Rate Sensor Module

DTC	U0124/95	Lost Communication with Lateral Acceleration Sensor Module

DTC	U0126/63	Lost Communication with Steering Angle Sensor Module

DESCRIPTION

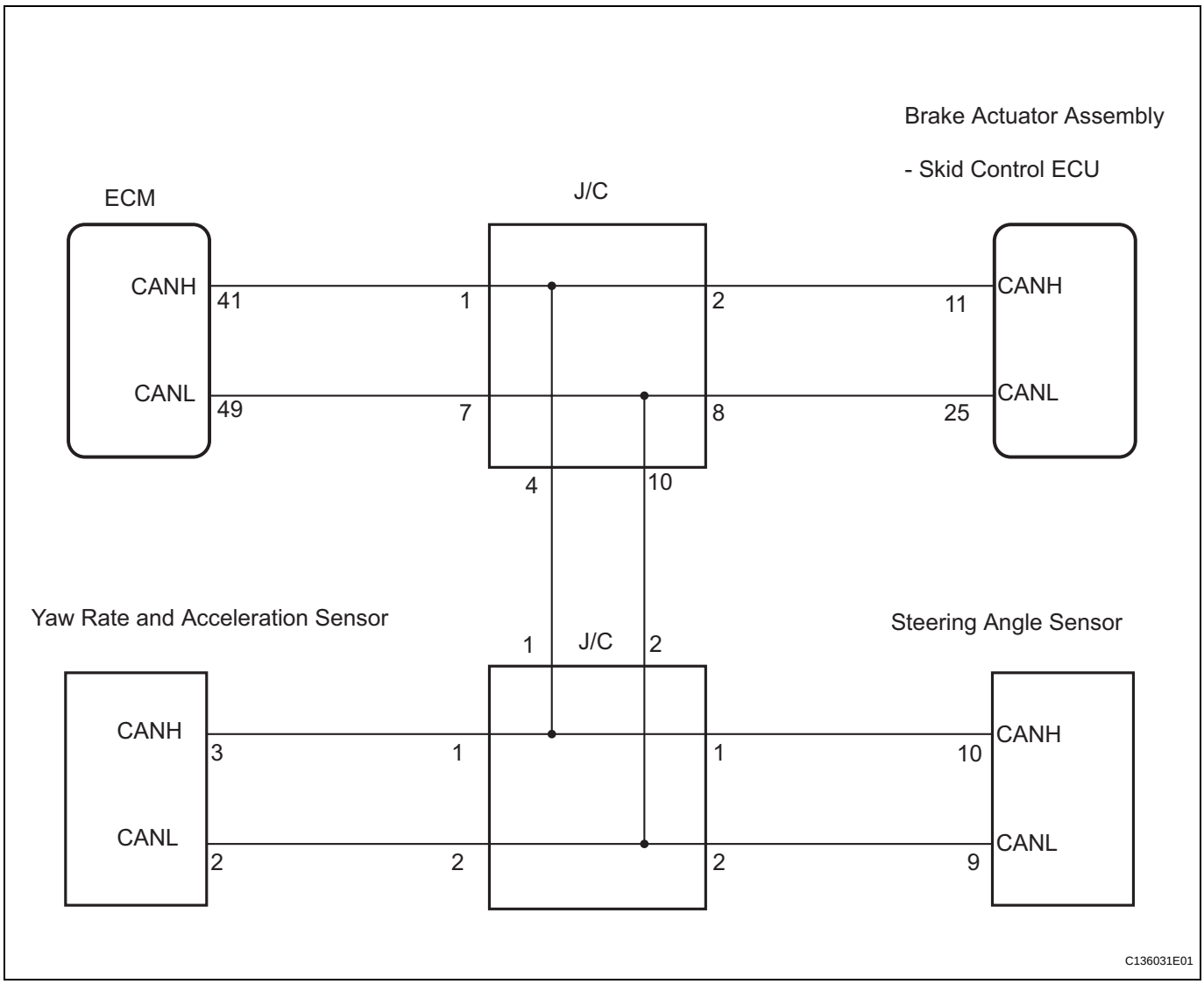
The skid control ECU receives the signals from the ECM, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

BC

DTC No.	DTC Detection Condition	Trouble Area
U0073/94	When any of the following is detected: 1. With the IG1 terminal voltage 10 V or more, after the output of data from the skid control ECU is completed, the sending continues for 5 seconds or more. 2. With the IG1 terminal voltage 10 V or more, the condition that bus OFF state occurs once or more within 100 ms occurs 10 times in succession. (Sent signals cannot be received.) 3. With the IG1 terminal voltage 10 V or more, a delay in receiving data from the yaw rate and acceleration sensor and steering angle sensor continues for 1 second or more. 4. With the IG1 terminal voltage 10 V or more, the condition that a delay in receiving data from the yaw rate and acceleration sensor and steering angle sensor occurs more than once within 5 seconds occurs 10 times in succession within 60 seconds.	CAN communication system
U0100/65	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more and the vehicle speed 9 mph (15 km/h) or more, data cannot be sent to the ECM for 2 seconds or more. 2. The IG1 terminal voltage 10 V or more and the vehicle speed 9 mph (15 km/h) or more for 2 seconds or more.	CAN communication system (Skid control ECU to ECM)
U0123/62	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the yaw rate sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession within 60 seconds. • The condition that data from the yaw rate sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)
U0124/95	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the acceleration sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession within 60 seconds. • The condition that data from the acceleration sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)

DTC No.	DTC Detection Condition	Trouble Area
U0126/63	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the steering angle sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession within 60 seconds. • The condition that data from the steering angle sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to steering angle sensor)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-118).

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
STEERING OPN	Steering sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There is a constant open circuit	**A**
There are no momentary interruptions	**B**
There are momentary interruptions	**C**

HINT:
Perform the above inspection before removing the sensor and connector.

B → **Go to step 3**

C → **Go to step 4**

A

2	CHECK IF EACH SENSOR AND ECM CONNECTOR IS SECURELY CONNECTED

(a) Turn the ignition switch off.
(b) Check if each sensor or ECM connector is securely connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO EACH SENSOR OR ECM CORRECTLY**

OK

3	RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Record the output DTCs (for ABS, VSC, and CAN communication) (See page BC-141).

HINT:
If the CAN communication system DTC and the relevant sensor DTCs are output simultaneously, troubleshoot the relevant sensor DTCs (for ABS and VSC) after the CAN communication system returns to normal.

Result

Condition	Proceed to
DTC (CAN communication system DTC) is output	A
DTC (ABS and/or VSC DTC) is output	B
DTC is not output	C

B → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**

C → **USE SIMULATION METHOD TO CHECK**

A

BC

INSPECT CAN COMMUNICATION SYSTEM

4 REPAIR OR REPLACE HARNESS OR CONNECTOR

(a) Turn the ignition switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and each sensor or ECM (See page BC-118).
(d) Check that there is no momentary interruption.

NEXT

5 RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle and turn the steering wheel to the right and left at a speed of 9 mph (15 km/h) or more.
(e) Check that no CAN communication system DTC is output.
(f) If ABS and VSC DTCs are output, record them.

Result

Condition	Proceed to
DTC output for the CAN communication system	A
No DTC is output (ABS and/or VSC DTC is output)	B
No DTC is output (No ABS and/or VSC DTC is output)	C

HINT:
The CAN communication system must be normal when repairing each sensor DTC (for ABS and VSC).

B	**REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**
C	**END**

A

INSPECT CAN COMMUNICATION SYSTEM

ABS Warning Light Remains ON

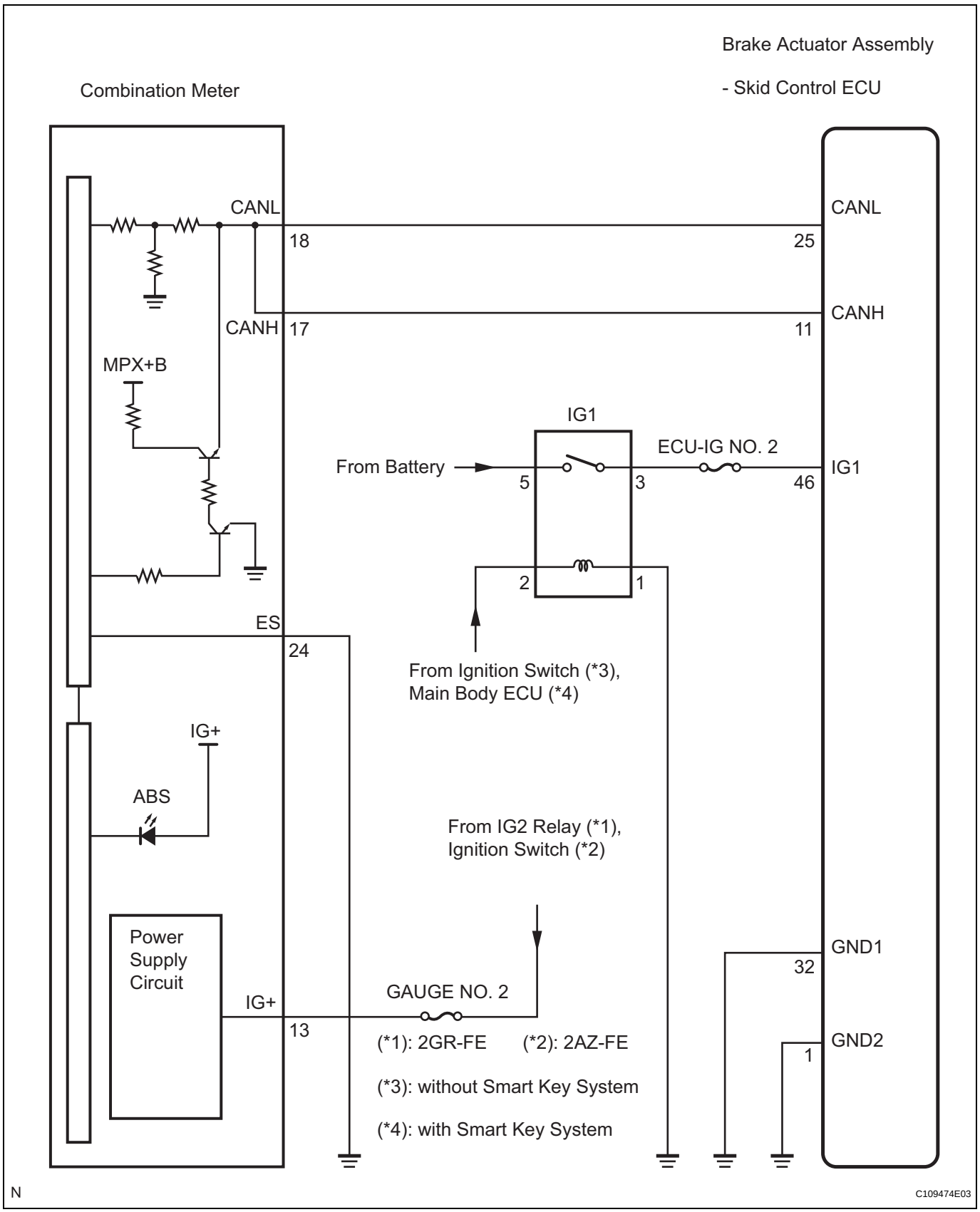
DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If any of the following is detected, the ABS warning light remains on.

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the harness between the combination meter and the skid control ECU.

HINT:
In some cases, the intelligent tester cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

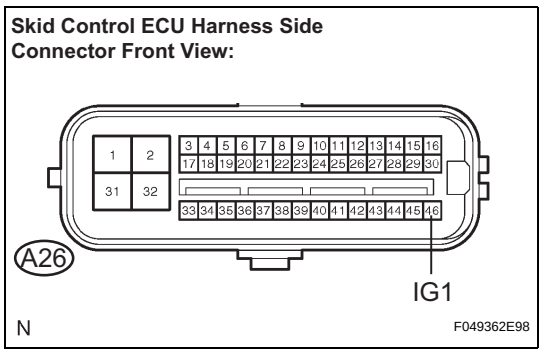
3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT SKID CONTROL ECU (IG1 TERMINAL)



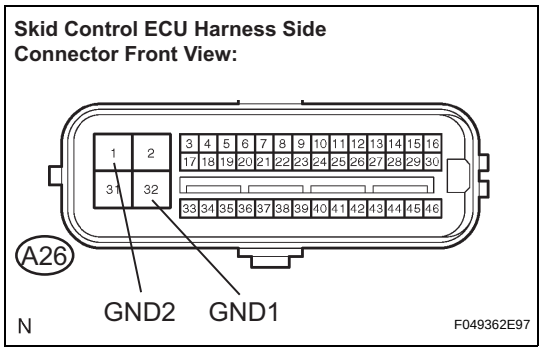
(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

6 INSPECT COMBINATION METER ASSEMBLY

(a) Reconnect the skid control ECU connector.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

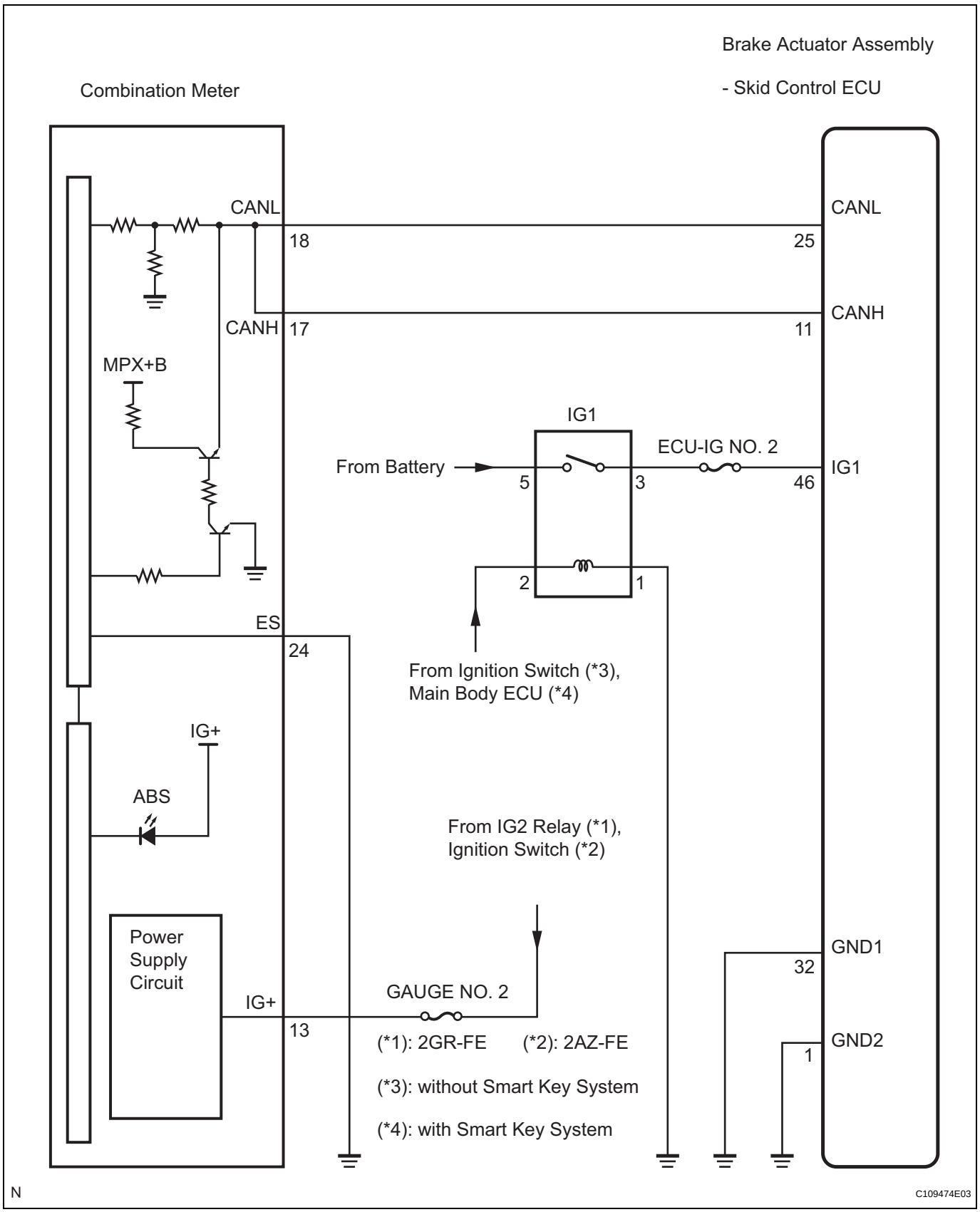
REPLACE BRAKE ACTUATOR ASSEMBLY

ABS Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK ABS WARNING LIGHT

BC

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the ABS warning light comes on.
OK:
The ABS warning light comes on.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.
(b) Reconnect the skid control ECU connector.
(c) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The ABS warning light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → REPLACE COMBINATION METER ASSEMBLY

OK

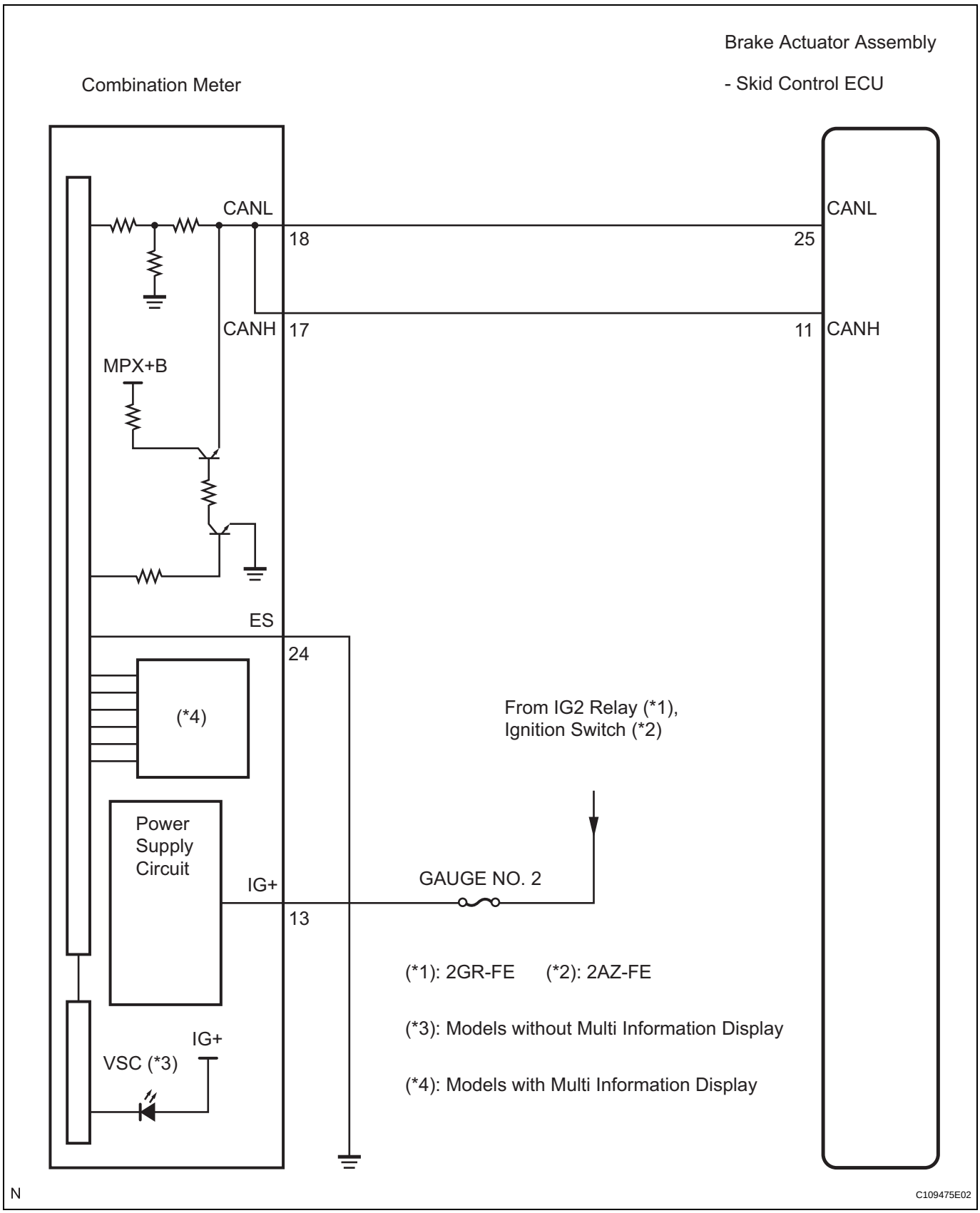
REPLACE BRAKE ACTUATOR ASSEMBLY

VSC Warning Light Remains ON

DESCRIPTION

The skid control ECU communicates with the combination meter via CAN communication. If the ECU stores a DTC, the DTC will be displayed on the multi information display in the combination meter (models with multi information display). On models without a multi information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → CHECK AND REPLACE CHARGING SYSTEM OR BATTERY

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The VSC warning light (models without multi information display) or multi information display (models with multi information display) turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

BC

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

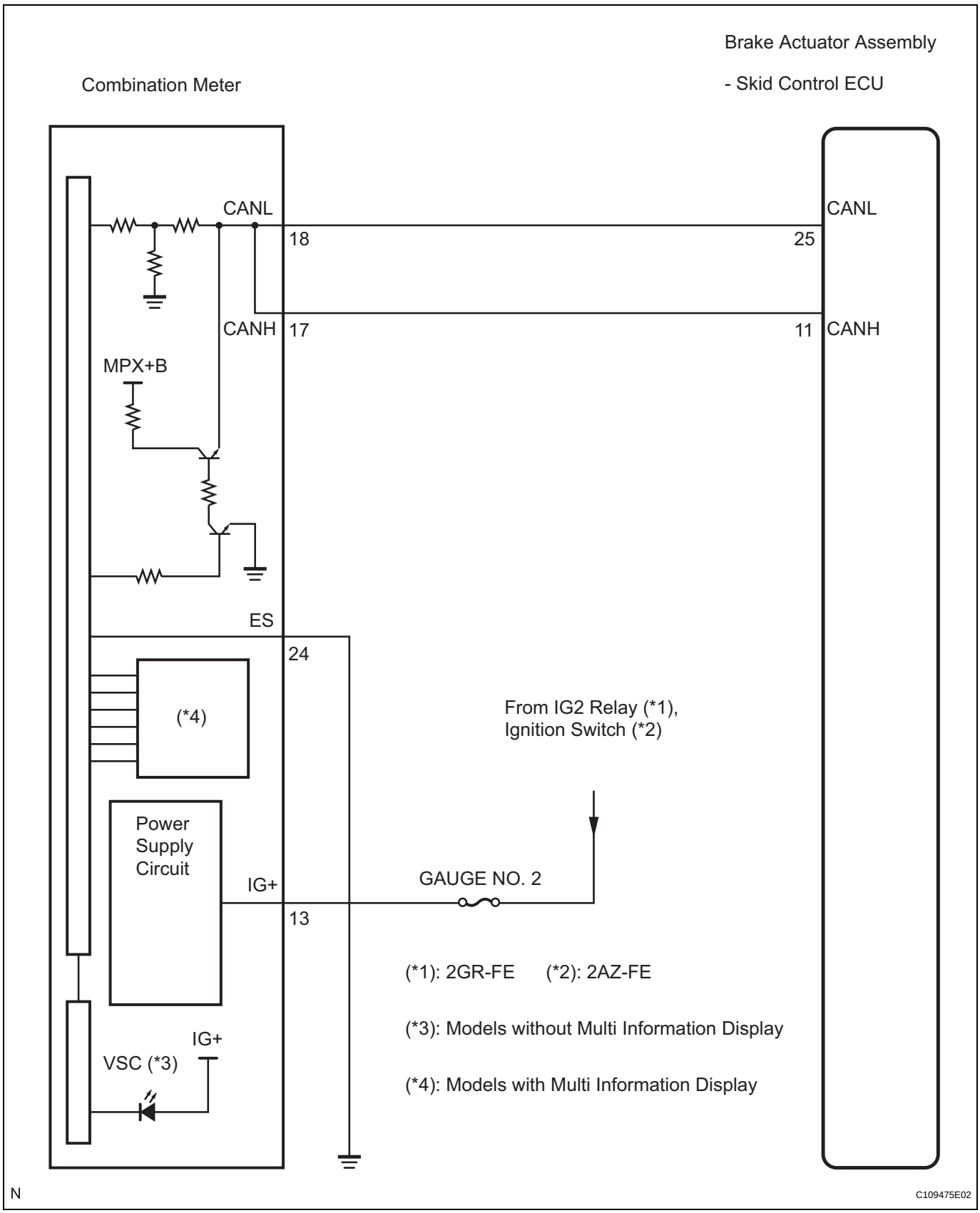
REPLACE BRAKE ACTUATOR ASSEMBLY

VSC Warning Light does not Come ON

DESCRIPTION

The skid control ECU communicates with the combination meter via CAN communication. If the ECU stores a DTC, the DTC will be displayed on the multi information display in the combination meter (models with multi information display). On models without a multi information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK VSC WARNING LIGHT

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "VSC WARN LAMP" in the Active Test and operate the VSC warning light (models without multi information display) or multi information display (models with multi information display) using the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
VSC WARN LAMP	Turn VSC warning light (*1) or multi information display (*2) ON / OFF	Observe combination meter

(*1): Models without multi information display
(*2): Models with multi information display

(d) Check that "ON" and "OFF" of the VSC warning light (models without multi information display) or multi information display (models with multi information display) are indicated on the combination meter when using the intelligent tester.

OK:

The VSC warning light (models without multi information display) or multi information display (models with multi information display) turns on or off in accordance with the intelligent tester.

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.

(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The VSC warning light (models without multi information display) or multi information display (models with multi information display) turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

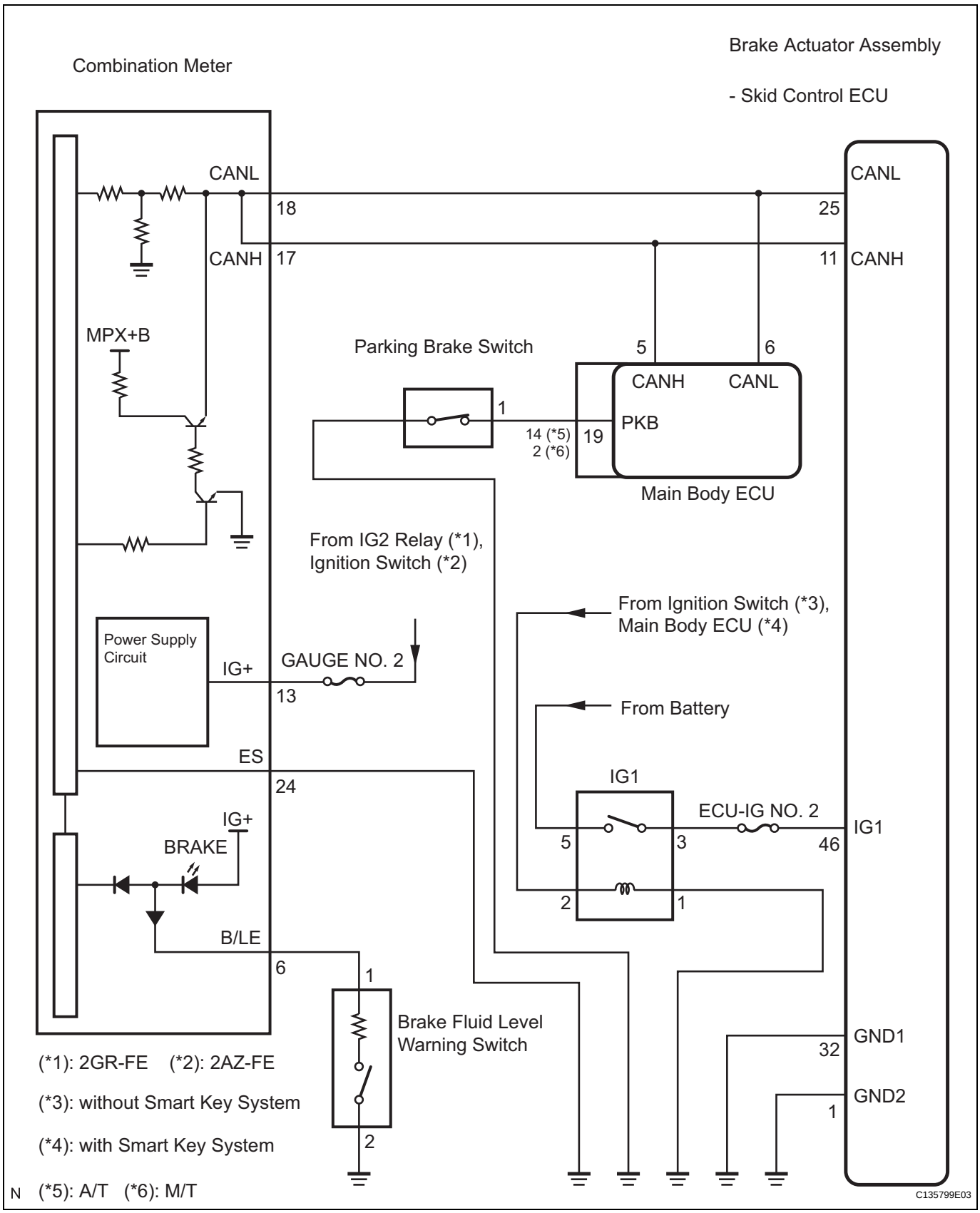
Brake Warning Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If any of the following is detected, the BRAKE warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

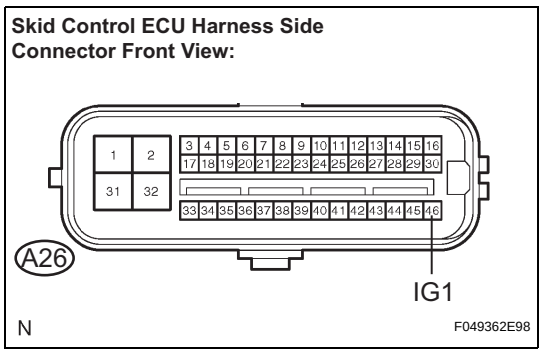
3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → CHECK AND REPLACE CHARGING SYSTEM OR BATTERY

OK

4	INSPECT SKID CONTROL ECU (IG1 TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

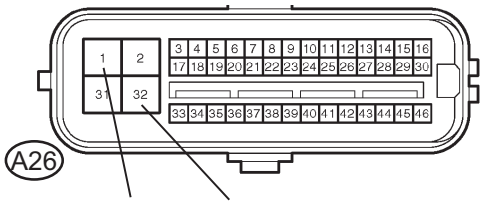
Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

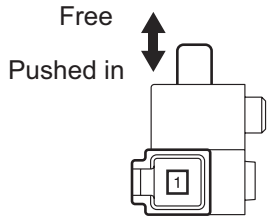
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

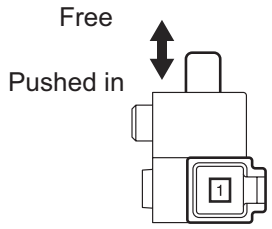
6 INSPECT PARKING BRAKE SWITCH

Parking Brake Switch

A/T:



M/T:



N C109430E02

(a) Disconnect the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Body ground	Parking brake switch ON (Switch pin free)	Below 1 Ω
1 - Body ground	Parking brake switch OFF (Switch pin pushed in)	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH**

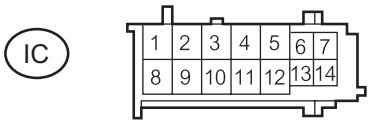
OK

BC

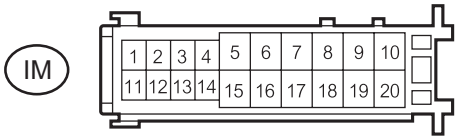
7	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - PARKING BRAKE SWITCH)

Main Body ECU Harness Side Connector Front View

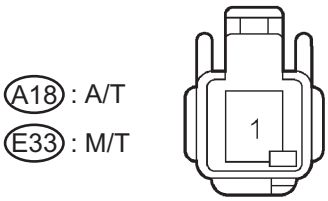
A/T:



M/T:



Parking Brake Switch Harness Side Connector Front View:



C136418E01

(a) Disconnect the main body ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

A/T

Tester Connection	Condition	Specified Condition
IC-14 (PKB) - A18-1	Always	Below 1 Ω
IC-14 (PKB) - Body ground	Always	10 kΩ or higher

M/T

Tester Connection	Condition	Specified Condition
IM-2 (PKB) - E33-1	Always	Below 1 Ω
IM-2 (PKB) - Body ground	Always	10 kΩ or higher

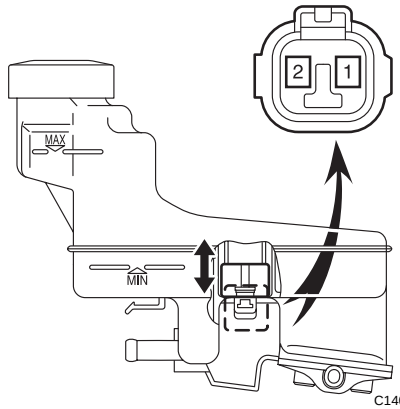
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

8	**INSPECT BRAKE FLUID LEVEL WARNING SWITCH**

Brake Fluid Level Warning Switch:



C140953E01

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.

HINT:
A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Float up (Switch OFF)	1.9 to 2.1 kΩ
1 - 2	Float down (Switch ON)	Below 1 Ω

HINT:
If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

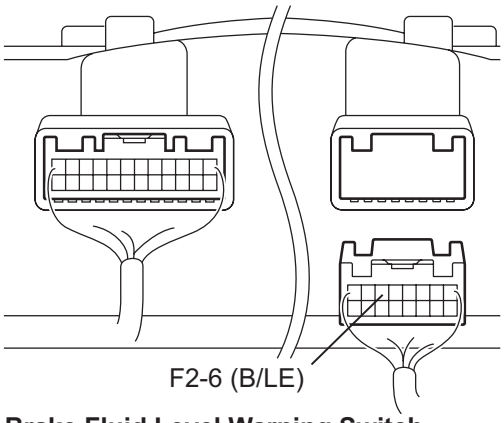
NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)**

OK

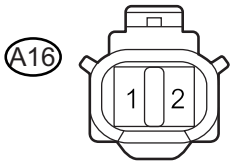
BC

9	CHECK HARNESS AND CONNECTOR (COMBINATION METER - BRAKE FLUID LEVEL WARNING SWITCH)

Combination Meter Wire Harness View:



Brake Fluid Level Warning Switch Harness Side Connector Front View:



C136033E01

(a) Disconnect the combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F2-6 (B/LE) - A16-1	Always	Below 1 Ω
F2-6 (B/LE) - Body ground	Always	10 kΩ or higher
A16-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

HINT:

- Reinstall the connectors and restore the vehicle to its prior condition before checking the combination meter.
- If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

BC

OK

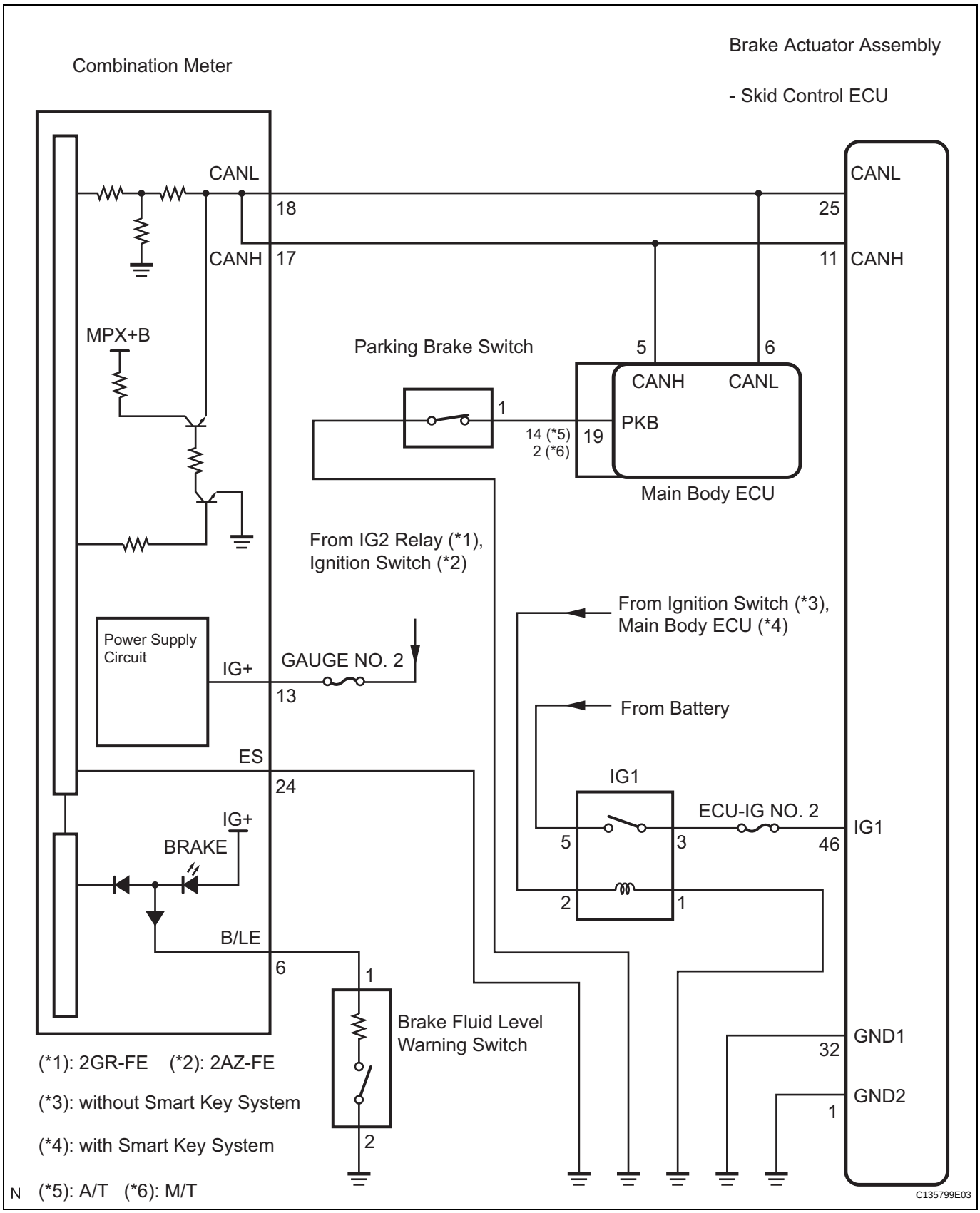
REPLACE BRAKE ACTUATOR ASSEMBLY

Brake Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK BRAKE WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the BRAKE warning light comes on.
OK:
The BRAKE warning light comes on.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.
(b) Reconnect the skid control ECU connector.
(c) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The BRAKE warning light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → REPLACE COMBINATION METER ASSEMBLY

OK

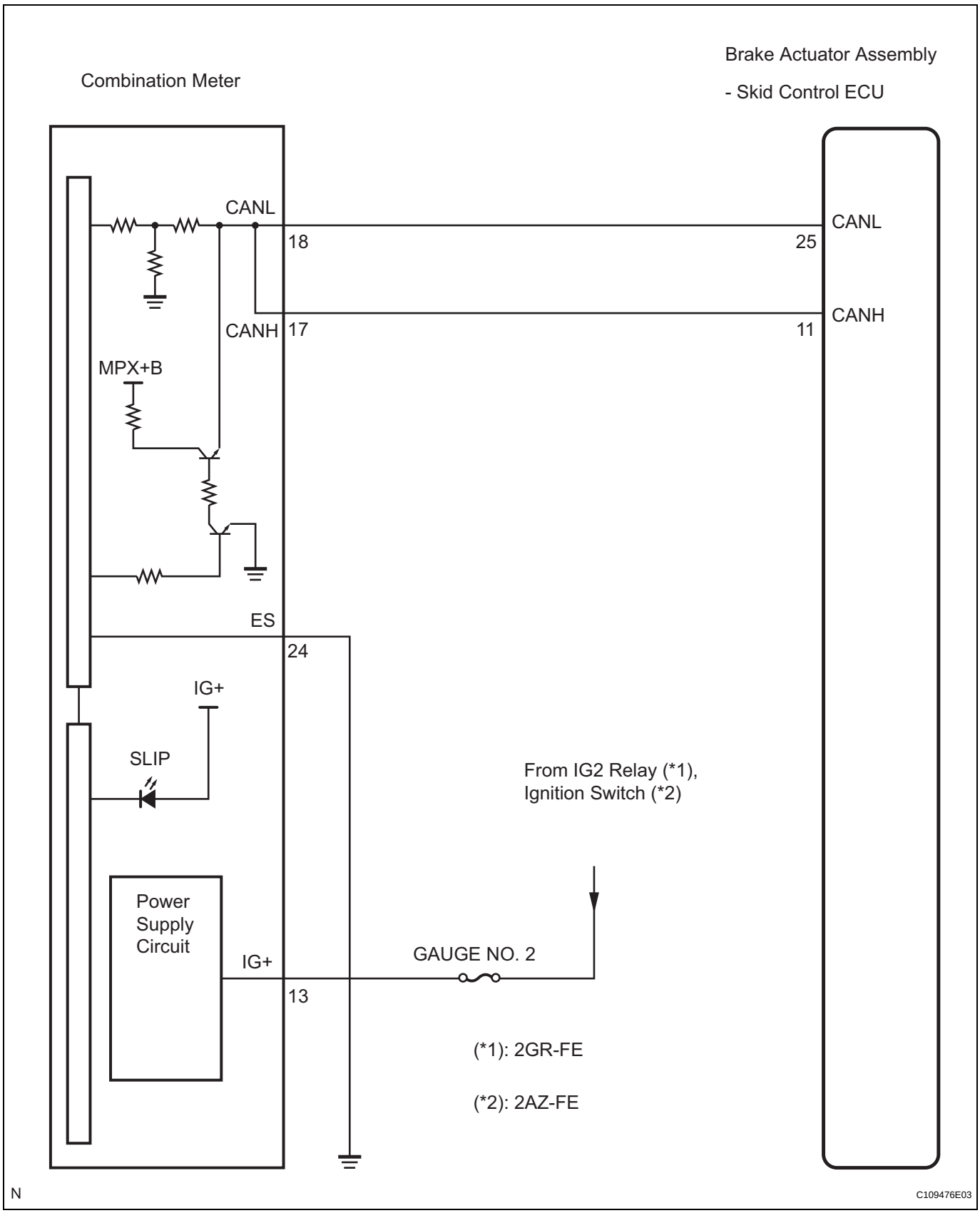
REPLACE BRAKE ACTUATOR ASSEMBLY

Slip Indicator Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-138).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

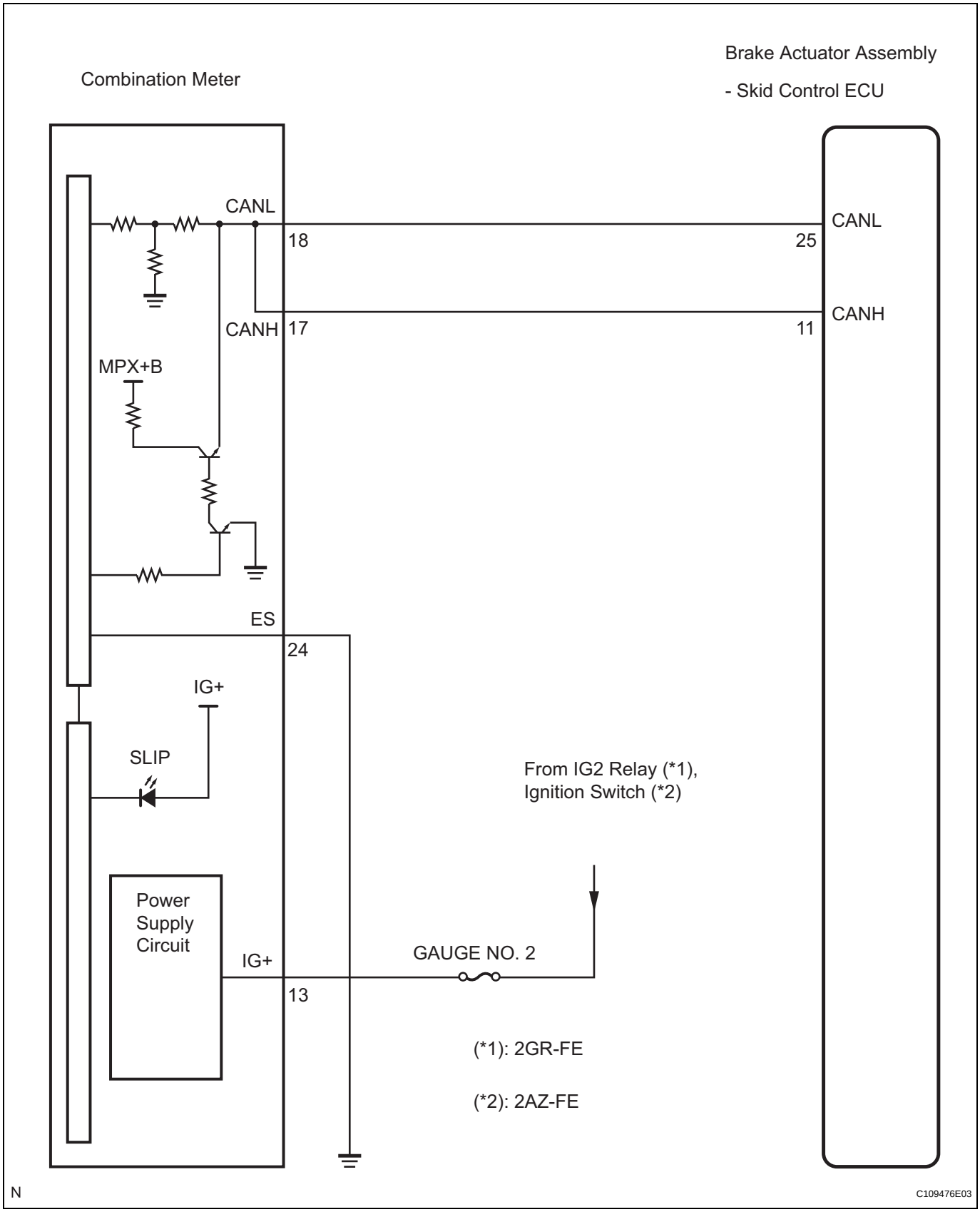
REPLACE BRAKE ACTUATOR ASSEMBLY

Slip Indicator Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-138).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK SLIP INDICATOR LIGHT

BC

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "SLIP INDI LAMP" in the Active Test and operate the SLIP indicator light using the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
SLIP INDI LAMP	Turn SLIP indicator light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the SLIP indicator light are indicated on the combination meter when using the intelligent tester.
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

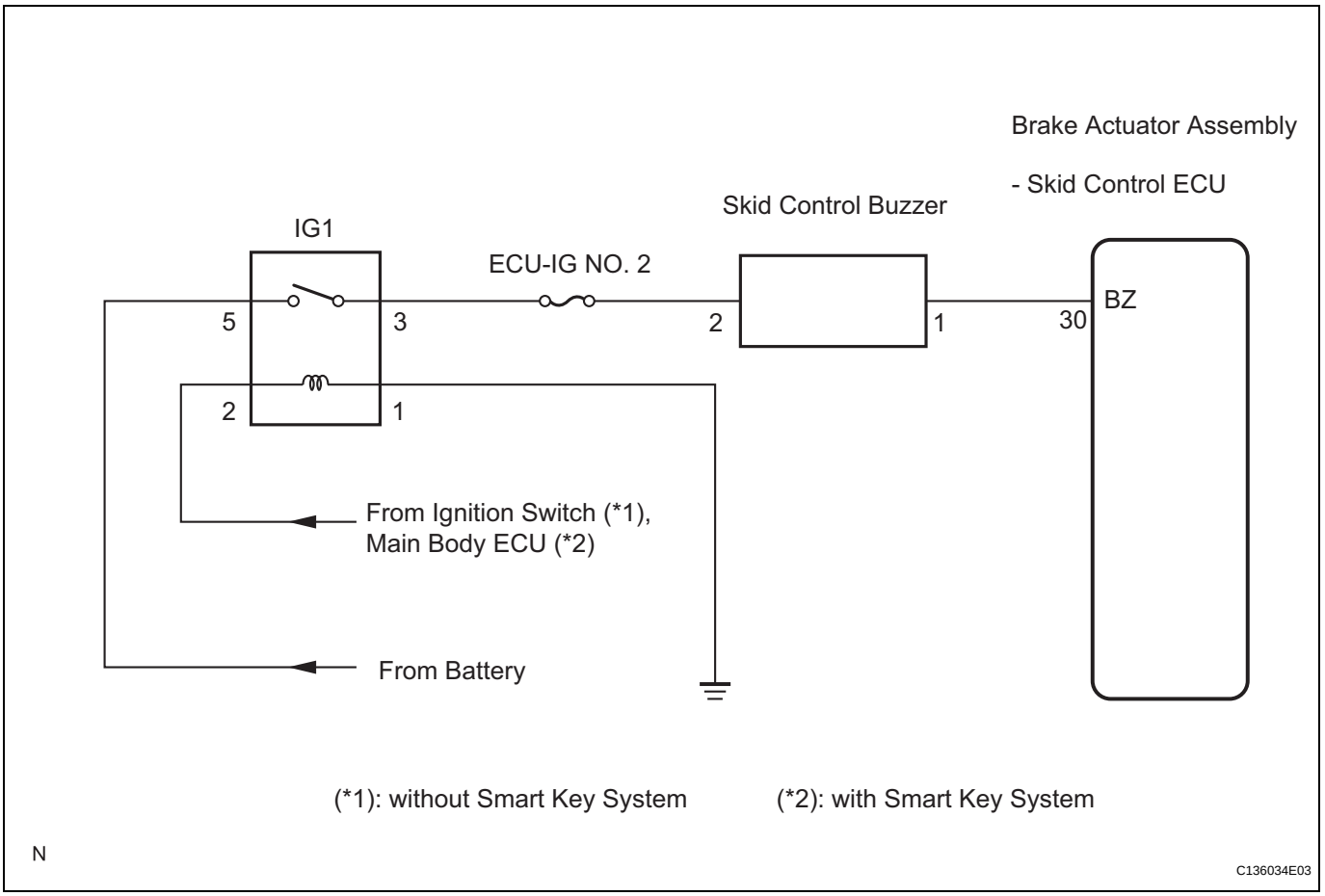
REPLACE BRAKE ACTUATOR ASSEMBLY

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds while the accumulator pressure is abnormally low or when an abnormality causing low fluid pressure occurs, and then the VSC is activated.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the Active Test mode on the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

(d) Check that the buzzer sounds/stops when turning the skid control buzzer on/off by using the intelligent tester.

Result

Condition	Proceed to
Buzzer does not sound or sounds constantly	A
Buzzer sounds/stops	B

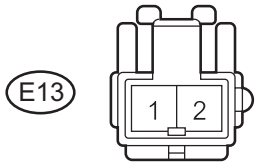
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **END**

A

2 INSPECT SKID CONTROL BUZZER (POWER SOURCE TERMINAL)

Skid Control Buzzer Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Disconnect the skid control buzzer connector.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

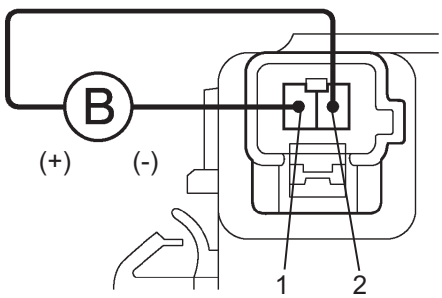
Tester Connection	Condition	Specified Condition
E13-2 - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3 INSPECT SKID CONTROL BUZZER

Skid Control Buzzer:



(a) Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.

OK:

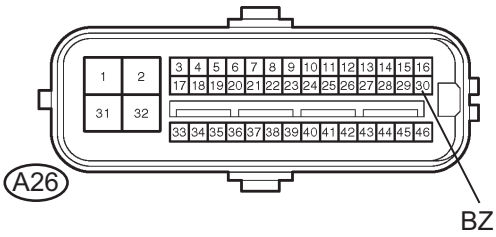
The skid control buzzer sounds.

NG → **REPLACE SKID CONTROL BUZZER**

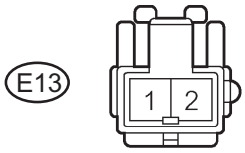
OK

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - SKID CONTROL BUZZER)

Skid Control ECU Harness Side Connector Front View:



Skid Control Buzzer Harness Side Connector Front View:



H

I045407E11

(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-30 (BZ) - E13-1	Always	Below 1 Ω
A26-30 (BZ) - Body ground	Always	10 kΩ or higher

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

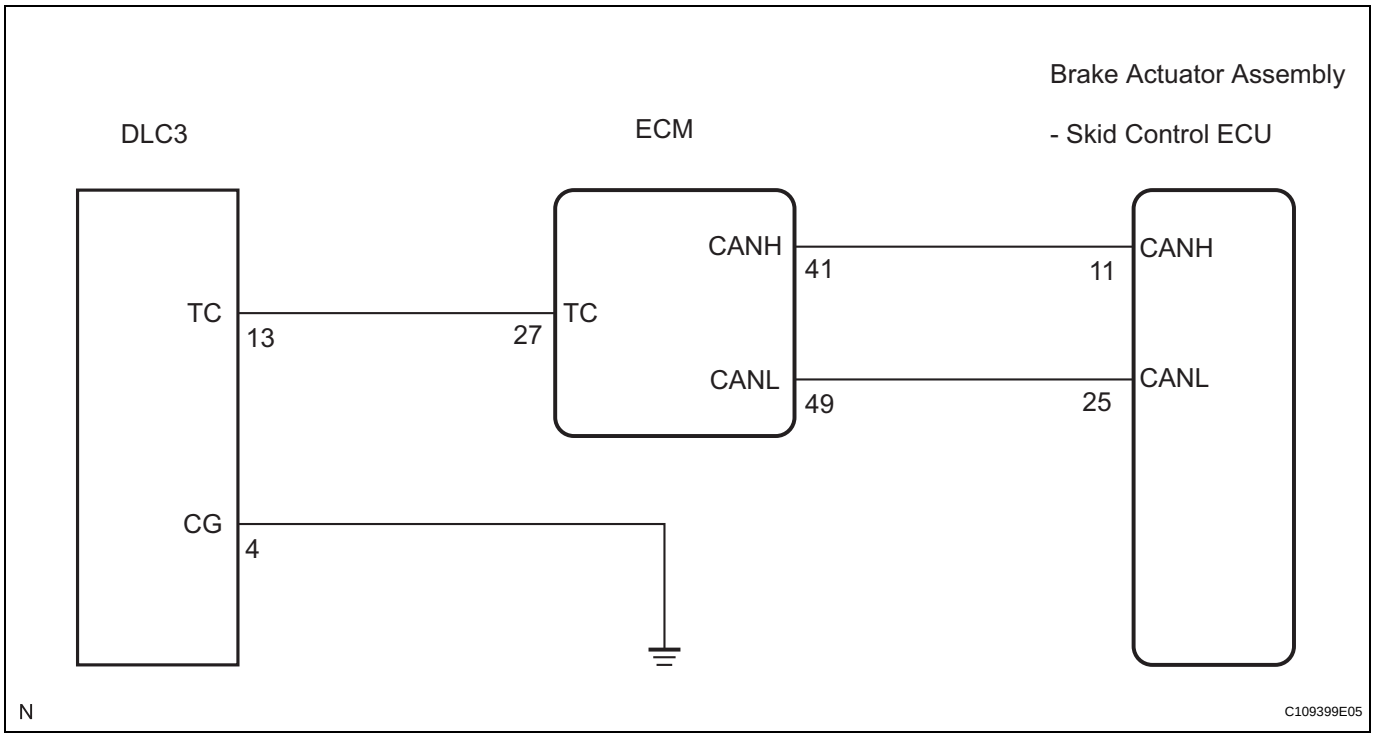
REPLACE BRAKE ACTUATOR ASSEMBLY

TC and CG Terminal Circuit

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by blinking the ABS warning light.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

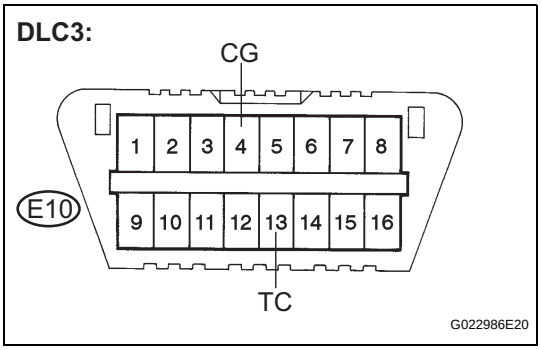
Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	INSPECT DLC3



(a) Turn the ignition switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

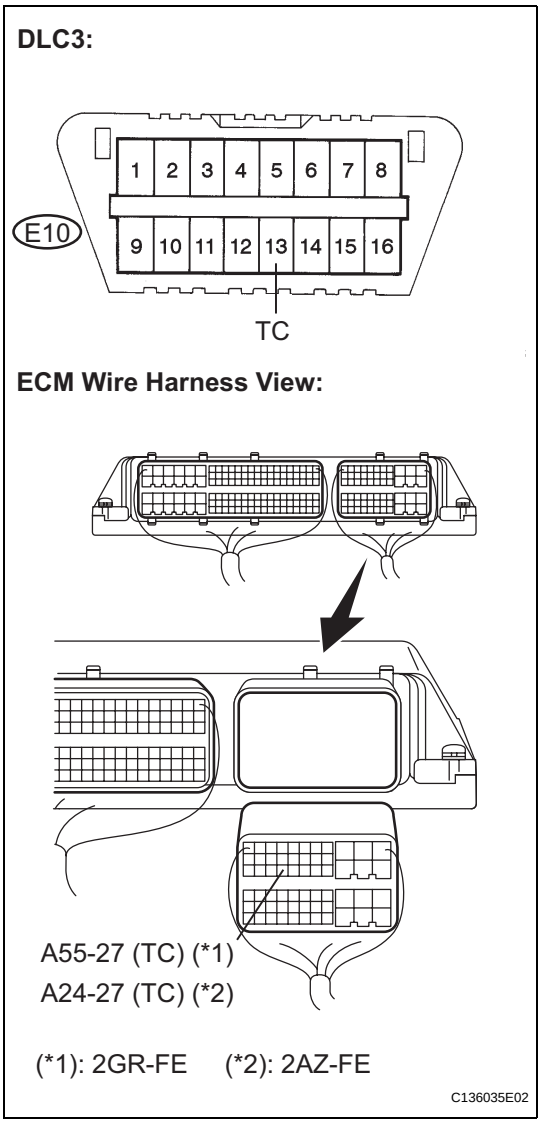
Tester Connection	Condition	Specified Condition
E10-13 (TC) - E10-4 (CG)	Ignition switch on (IG)	10 to 14 V

OK → **Go to step 5**

NG

3	CHECK HARNESS AND CONNECTOR (TC of DLC3 - ECM)

BC



(a) Turn the ignition switch off.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

2GR-FE

Tester Connection	Condition	Specified Condition
E10-13 (TC) - A55-27 (TC)	Always	Below 1 Ω
E10-13 (TC) - Body ground	Always	10 kΩ or higher

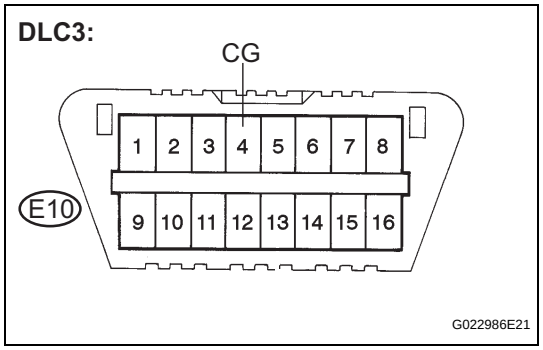
2AZ-FE

Tester Connection	Condition	Specified Condition
E10-13 (TC) - A24-27 (TC)	Always	Below 1 Ω
E10-13 (TC) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

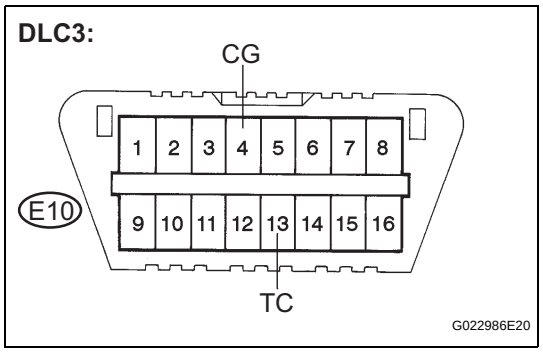
Standard resistance

Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK ECM (TC of DLC3 INPUT)



(a) Turn the ignition switch off.
(b) Reconnect the ECM connector.
(c) Using SST, connect terminals TC and CG of the DLC3.
(d) Turn the ignition switch on (IG).
(e) Check that the check engine warning light is blinking.

Result

Condition	Proceed to
Check engine warning light is blinking	A
Check engine warning light is not blinking	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

B → **REPAIR OR REPLACE WIRE HARNESS OR ECM (TC of ECM CIRCUIT)**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

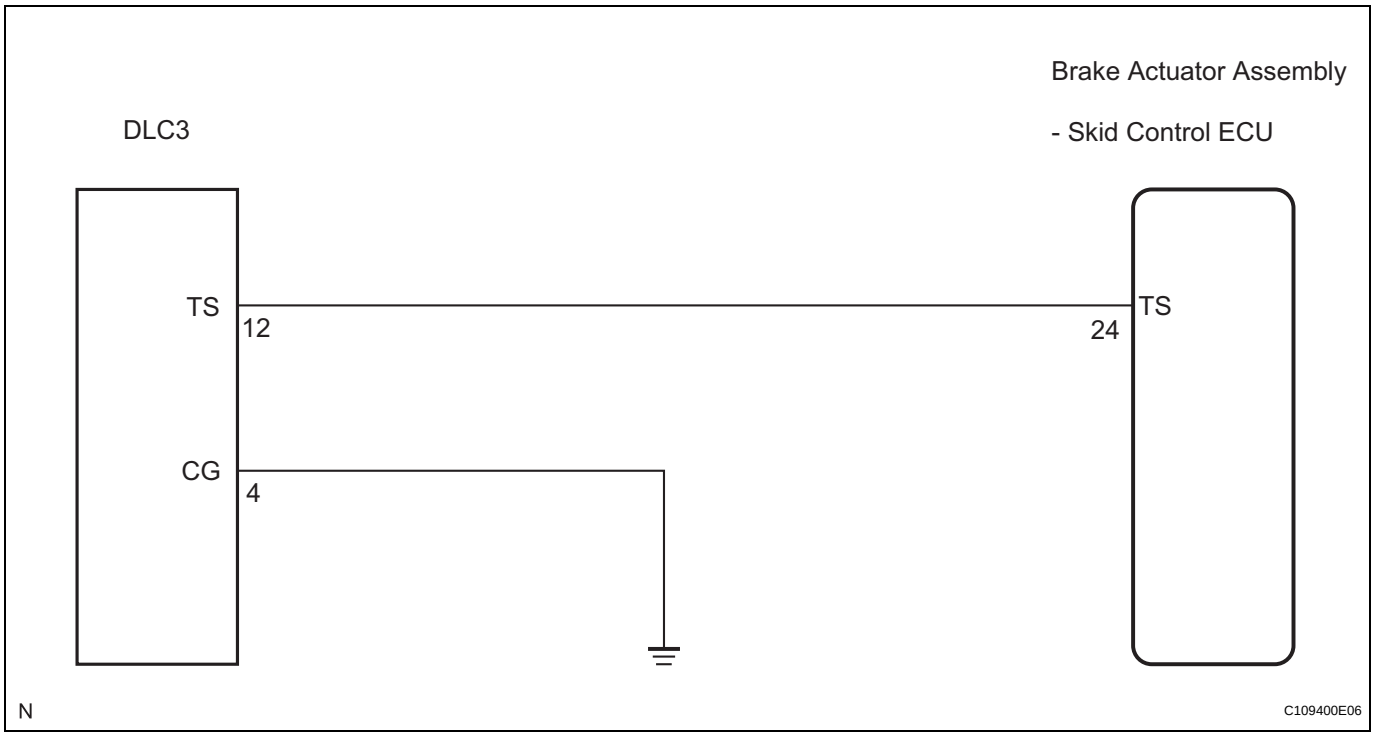
BC

TS and CG Terminal Circuit

DESCRIPTION

In the Test Mode (signal check), a malfunction of the speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to on (IG).

WIRING DIAGRAM

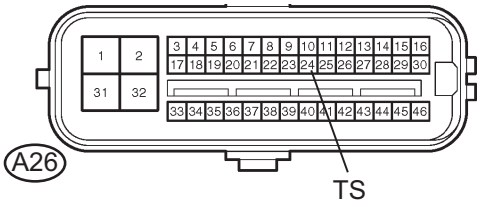


INSPECTION PROCEDURE

NOTICE:
When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

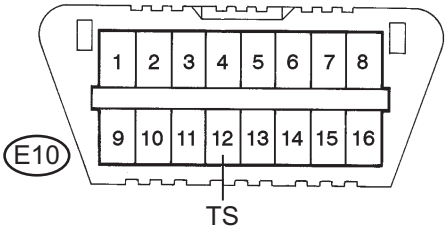
1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - TS of DLC3)

Skid Control ECU Harness Side Connector Front View:



N

DLC3:



C128347E08

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

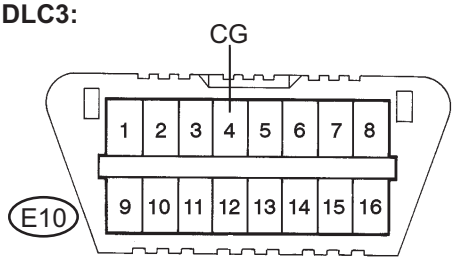
Tester Connection	Condition	Specified Condition
A26-24 (TS) - E10-12 (TS)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)

DLC3:



G022987E21

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

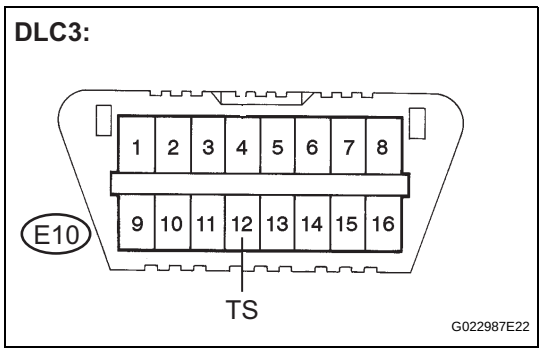
Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

3	CHECK HARNESS AND CONNECTOR (TS of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-12 (TS) - Body ground	Always	10 kΩ or higher

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

BC

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

VEHICLE STABILITY CONTROL SYSTEM (for BOSCH Made)

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	off
Ignition switch on (IG)	ON	on (IG)
Ignition switch on (ACC)	ACC	on (ACC)
Engine start	START	start

BC

2. TROUBLESHOOTING PRECAUTION

(a) When there is a malfunction in the contact point of the terminals or installation problems with parts, the removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.
(c) Since the vehicle stability control system may be influenced by a malfunction in the other systems, be sure to check for DTCs in the other systems.
(d) Be sure to remove and install the brake actuator assembly and each sensor with the ignition switch off unless specified in the inspection procedure.
(e) If the brake actuator or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using the intelligent tester, also check that system functions and signals received by the ECU are normal using test mode.

3. CAN COMMUNICATION SYSTEM PRECAUTION

(a) The CAN communication system is used for data communication between the skid control ECU, the steering angle sensor, and the yaw rate and acceleration sensor. If there is trouble in the CAN communication line, a DTC of the communication line is output.
(b) If a DTC of the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the vehicle stability control system under the condition that data communication is normal.

(c) In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires that have an equal length. A bypass wire should not be used, because the data being transmitted will be corrupted.

4. DTC PRECAUTION

(a) Warnings for some DTCs cannot be cleared by only repairing the malfunctioning parts. If the warning is displayed after repair work, the DTC should be cleared after turning the ignition switch off.

NOTICE:

If a DTC for a malfunctioning part reappears after it was cleared, then it has been stored again.

5. CHASSIS DYNAMOMETER PRECAUTION

(a) Enter Test Mode to disable TRAC and VSC control when using a chassis dynamometer.

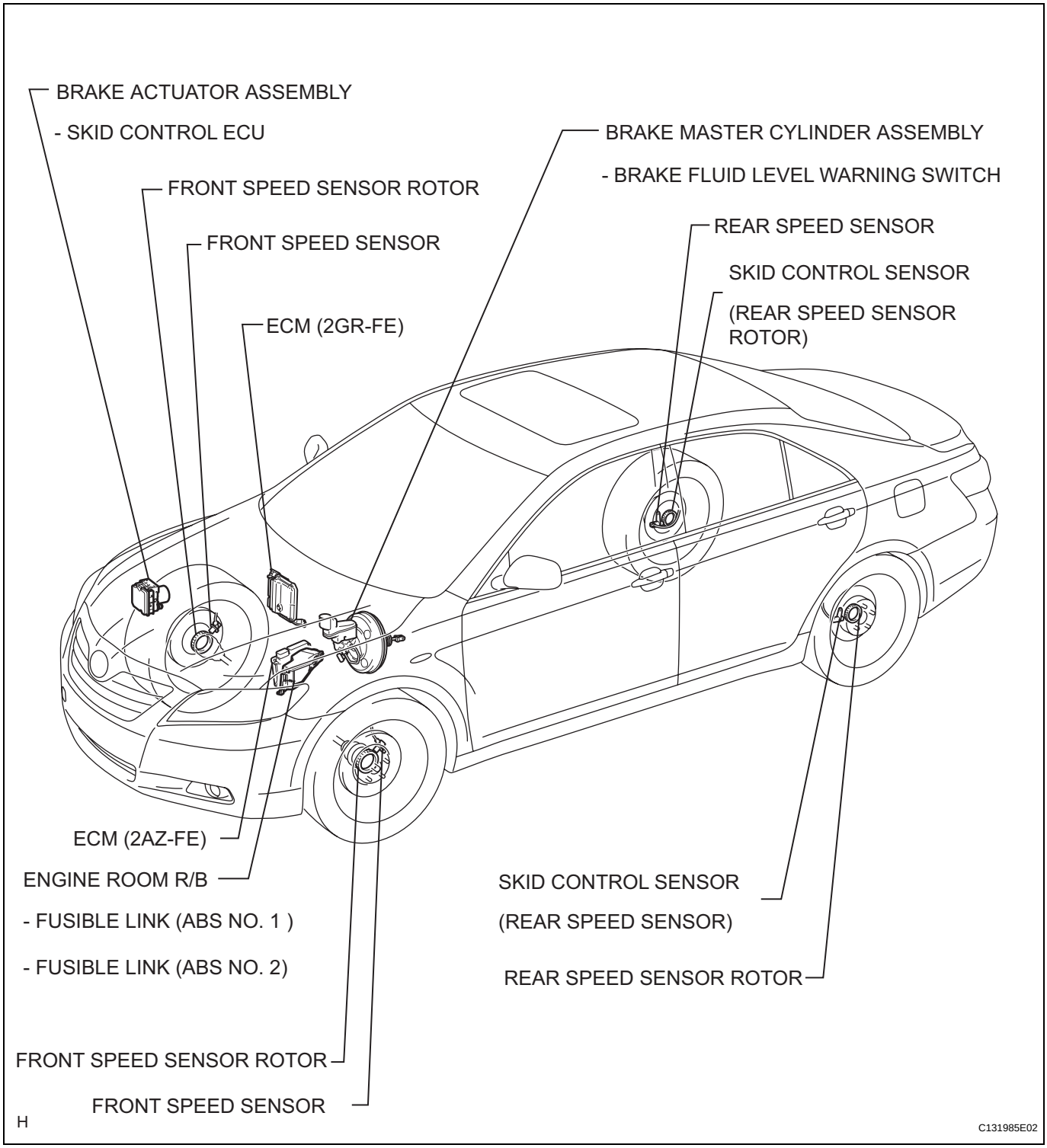
HINT:

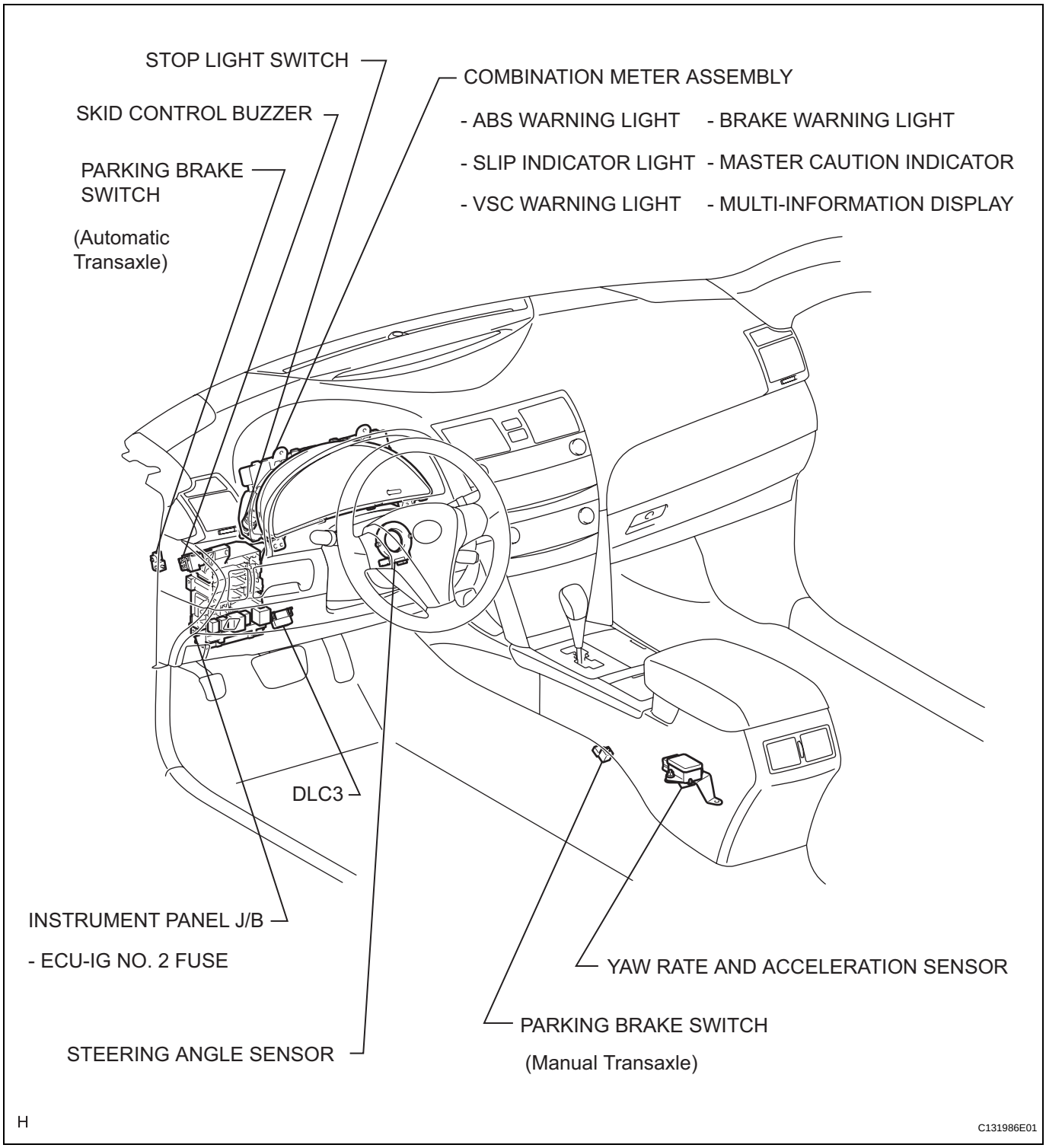
The vehicle may move unexpectedly out of the dynamometer because of TRAC and VSC operations.

NOTICE:

- **Make sure that the VSC warning (multi information display and master caution indicator light) light is blinking (TEST Mode is achieved).**
- **Secure the vehicle with the lock chain for safety.**

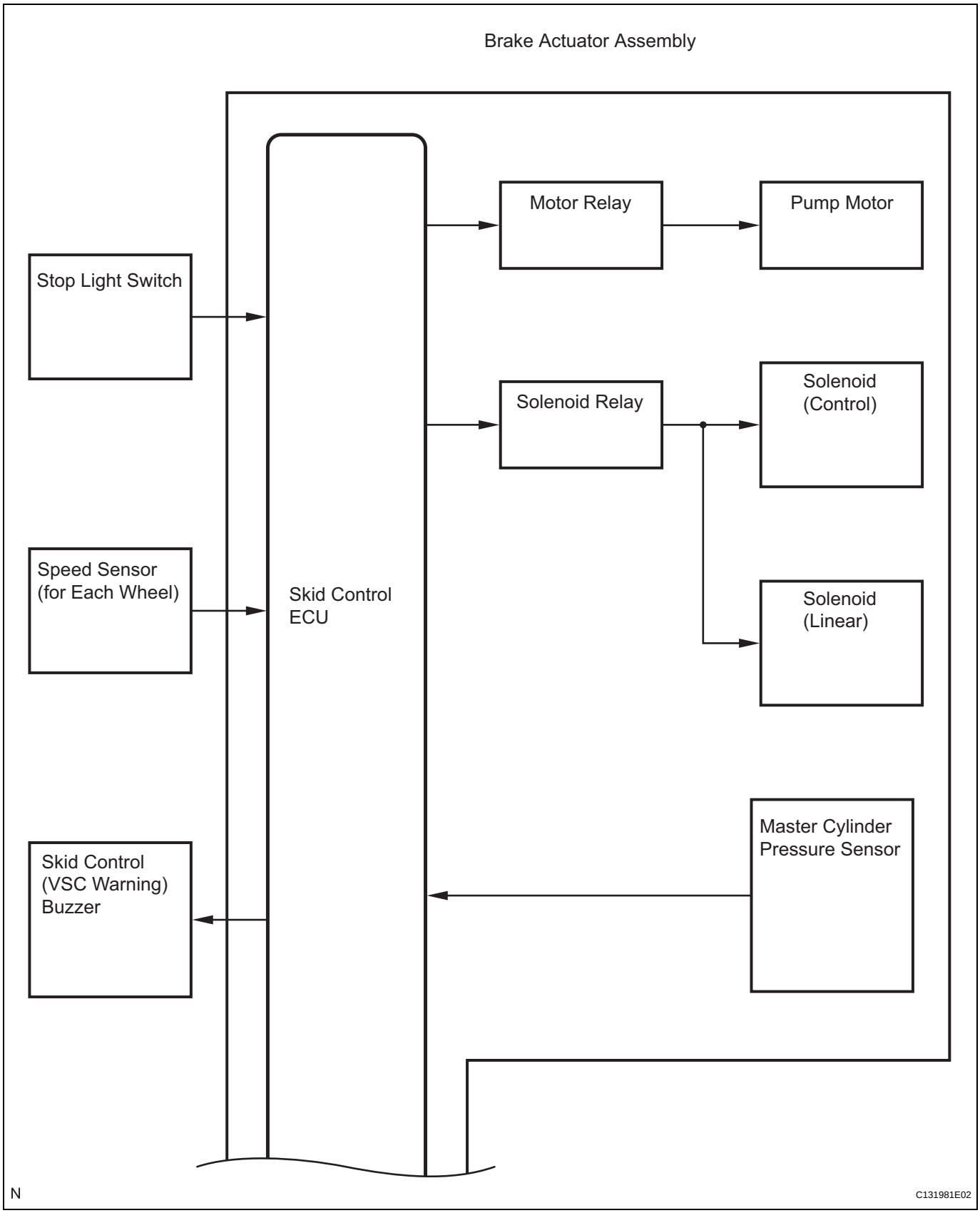
PARTS LOCATION



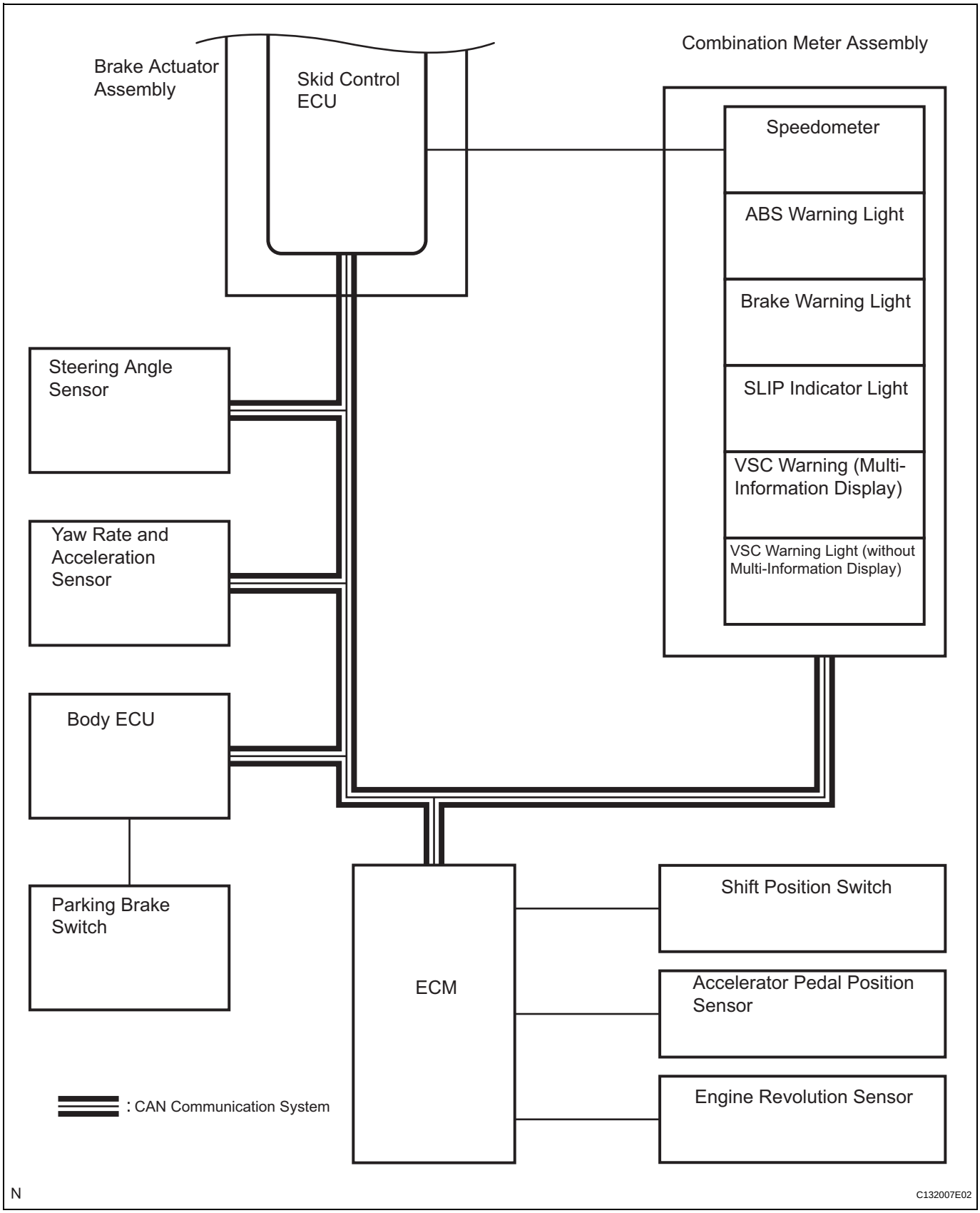

STOP LIGHT SWITCH
SKID CONTROL BUZZER
PARKING BRAKE SWITCH
(Automatic Transaxle)
COMBINATION METER ASSEMBLY
- ABS WARNING LIGHT
- BRAKE WARNING LIGHT
- SLIP INDICATOR LIGHT
- MASTER CAUTION INDICATOR
- VSC WARNING LIGHT
- MULTI-INFORMATION DISPLAY
DLC3
INSTRUMENT PANEL J/B
- ECU-IG NO. 2 FUSE
YAW RATE AND ACCELERATION SENSOR
PARKING BRAKE SWITCH
(Manual Transaxle)
STEERING ANGLE SENSOR
H
C131986E01

BC

SYSTEM DIAGRAM



BC


Brake Actuator Assembly
Skid Control ECU
Combination Meter Assembly
Speedometer
ABS Warning Light
Brake Warning Light
SLIP Indicator Light
VSC Warning (Multi-Information Display)
VSC Warning Light (without Multi-Information Display)
Steering Angle Sensor
Yaw Rate and Acceleration Sensor
Body ECU
Parking Brake Switch
ECM
Shift Position Switch
Accelerator Pedal Position Sensor
Engine Revolution Sensor
: CAN Communication System
N
C132007E02

BC

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
ECM	Skid control ECU	• Shift position signal • Throttle position signal • Engine revolution signal • Intake air temperature signal • Engine torque request signal • Accelerator pedal position signal	CAN communication system
Skid control ECU	Yaw rate and acceleration sensor	Yaw rate and acceleration request signal	CAN communication system
Skid control ECU	Steering angle sensor	Steering angle sensor request signal	CAN communication system
Skid control ECU	ECM	• Wheel speed signal • VSC data signal	CAN communication system
Skid control ECU	Combination meter	• Wheel speed signal • ABS warning light ON signal • BRAKE warning light ON signal • VSC warning light ON signal (*1) • Multi information display ON signal (*2) • SLIP indicator light ON signal • Master caution indicator light ON signal	CAN communication system
Main body ECU	Skid control ECU	Parking brake switch signal	CAN communication system

(*1): without multi-information display (Combination meter)
(*2): with multi-information display (Combination meter)

BC

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

- The skid control ECU is located within the brake actuator assembly.
- The yaw rate sensor and acceleration sensor are combined in a single unit. This unit communicates with the skid control ECU through the CAN communication system.

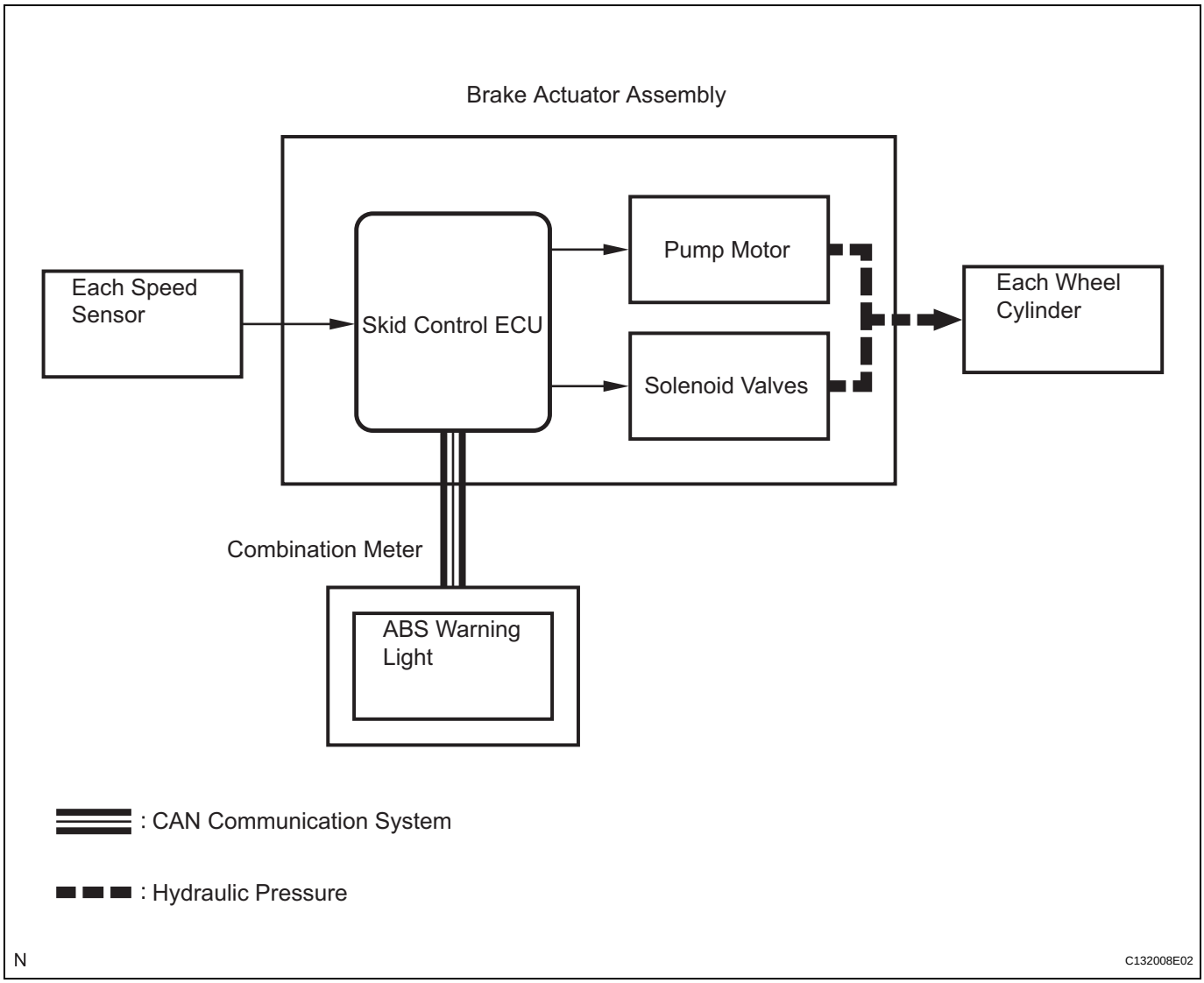
(a) ABS operation

(1) Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates the deceleration and speed of each wheel, while monitoring for wheel lock. If wheel lock is occurring, the ECU controls the solenoid valves in the brake actuator in order to adjust the hydraulic pressure applied to the brakes at each wheel.

2. FUNCTION DESCRIPTION

(a) ABS (Anti-lock Brake System)

The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

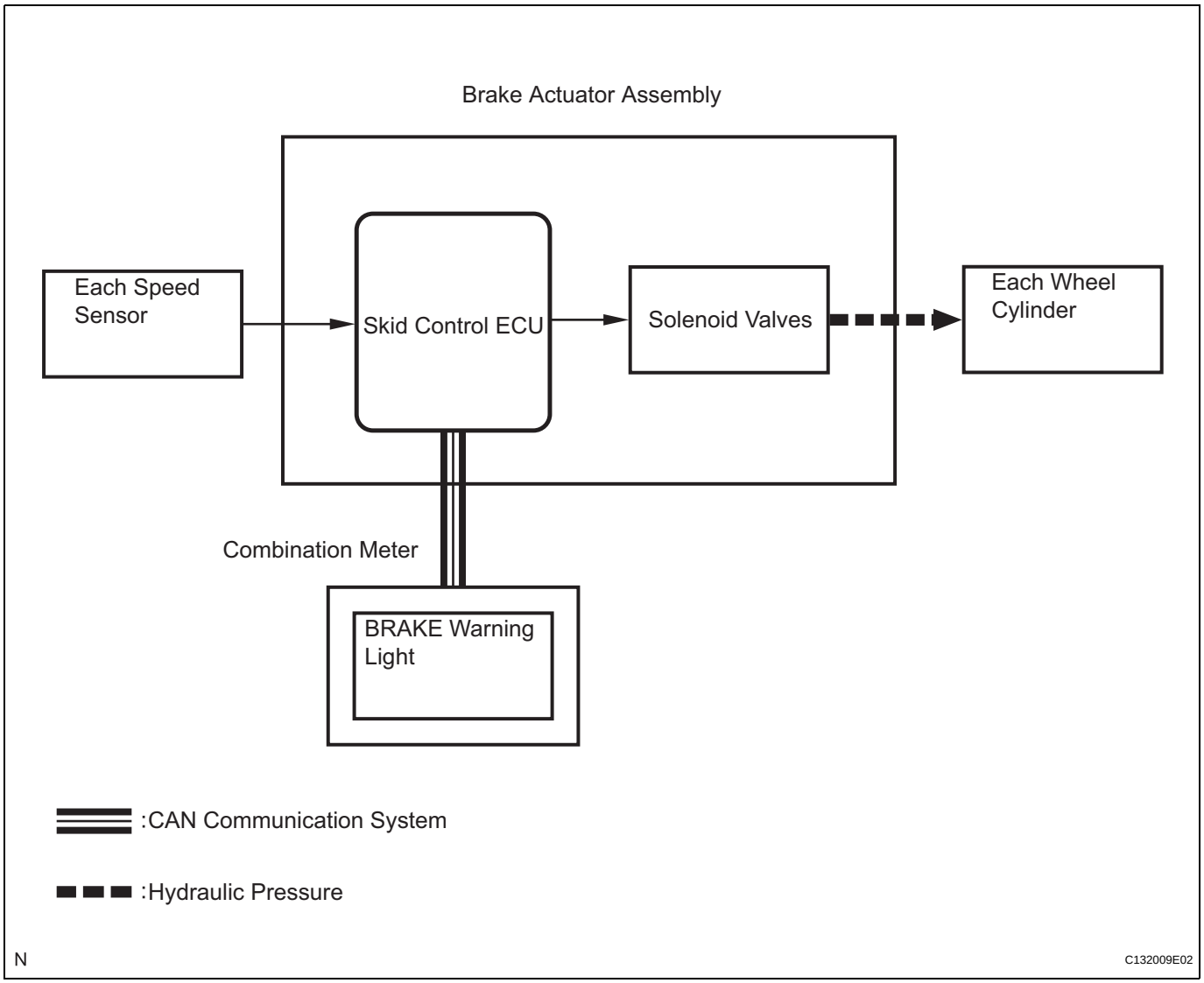


(1) Operation description

The skid control ECU detects wheel lock condition by receiving vehicle speed signals from each speed sensor, and sends control signals to the pump motor and solenoid valves. The pump motor and solenoid valves avoid wheel lock by controlling the hydraulic pressure of each wheel cylinder.

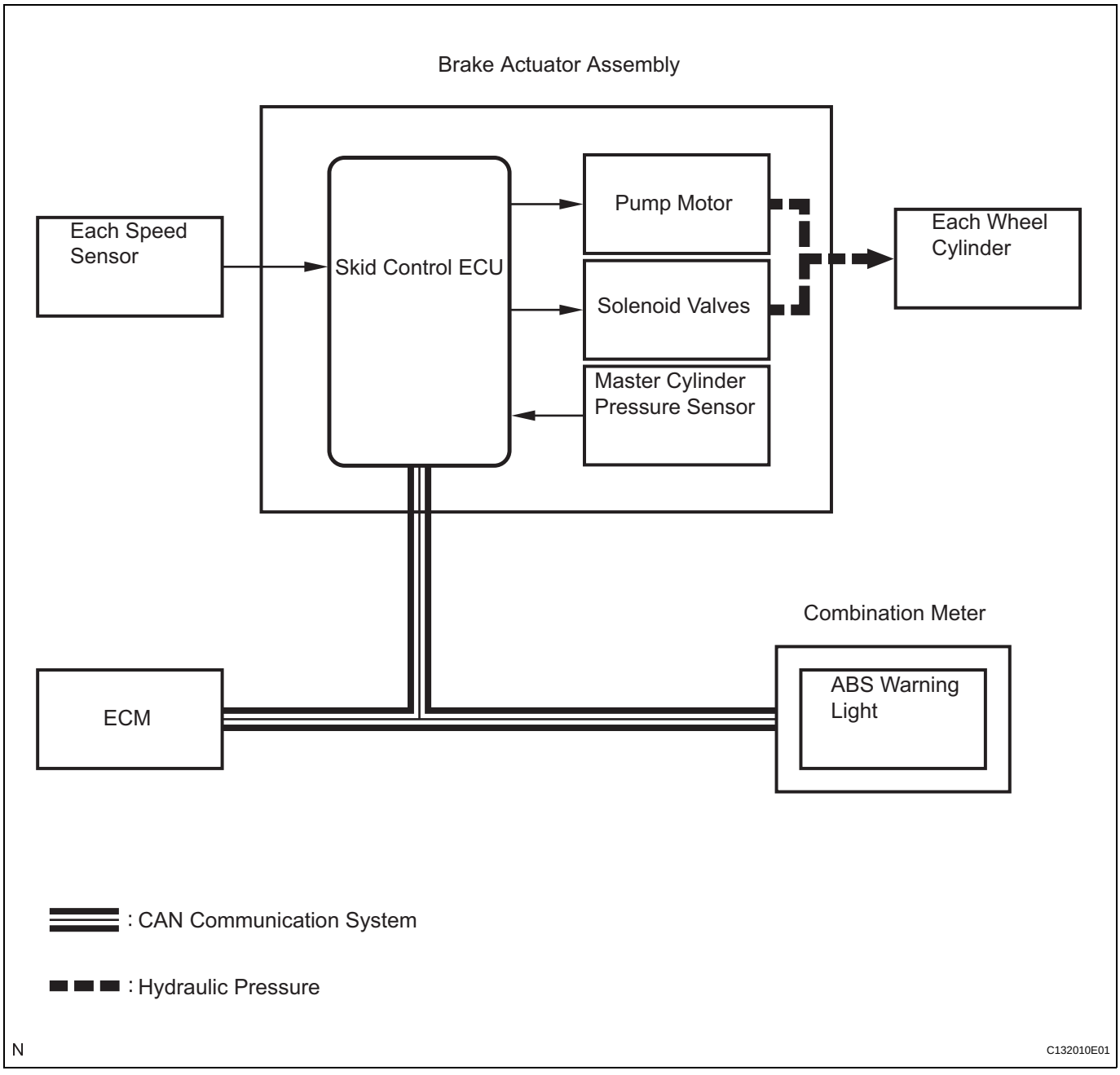
The ABS warning light comes on when the ABS system is malfunctioning.

(b) EBD (Electronic Brake force Distribution)
The EBD control utilizes ABS, which ensures proper brake force distribution between the front and rear wheels in accordance with driving conditions. In addition, when braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.



(1) Operation description
The skid control ECU receives a speed signal from each speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves.
The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The BRAKE warning light comes on if there is a malfunction in the EBD system.

(c) BA (Brake Assist)
The primary purpose of the brake assist system is to provide auxiliary brake force to assist a driver who cannot generate a large enough brake force during emergency braking. This system helps to maximize the brake performance of the vehicle.



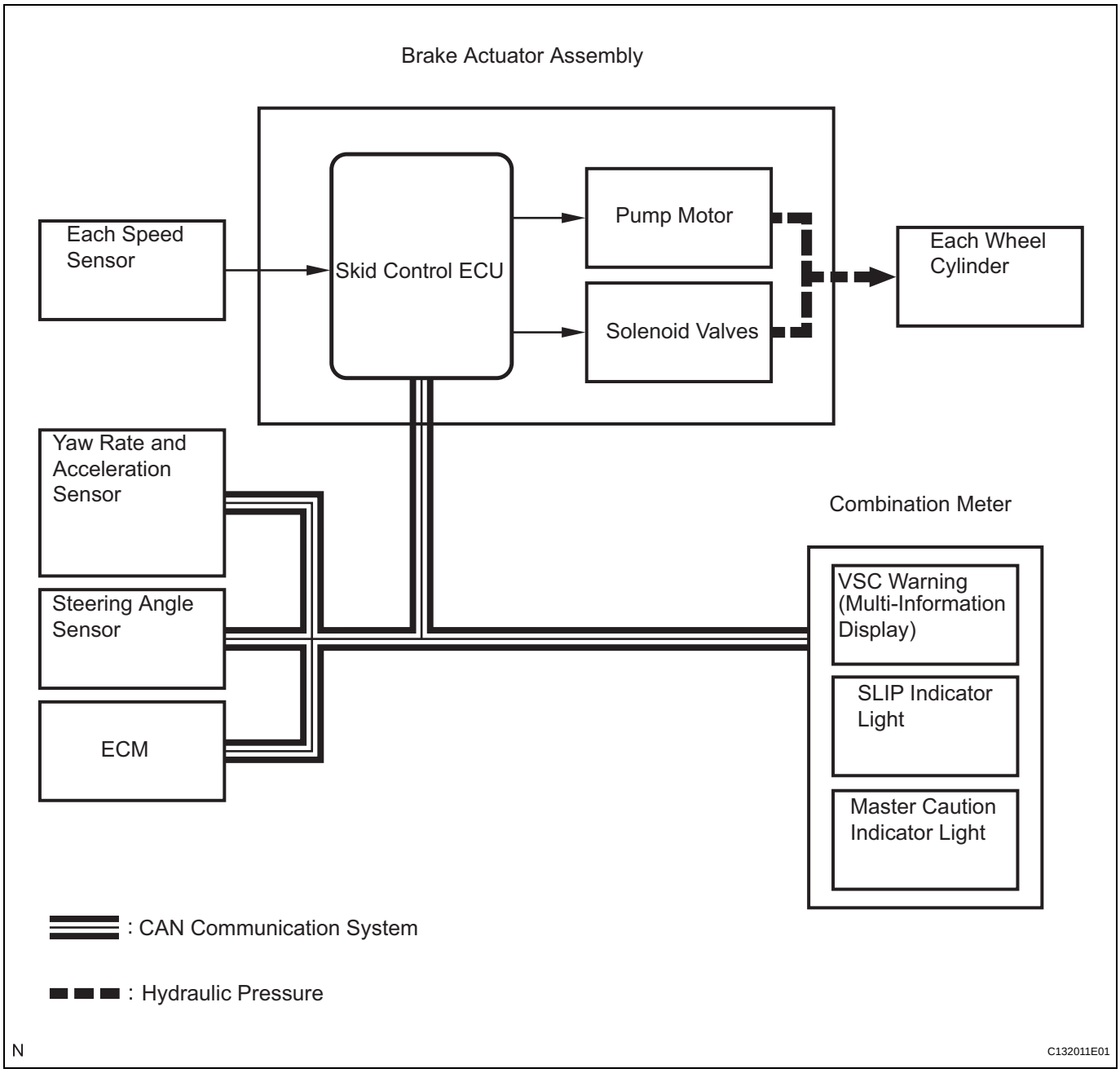
(1) Operation description

The skid control ECU receives the speed signal from each speed sensor and the hydraulic pressure signal from the master cylinder pressure sensor to determine whether brake assist is necessary. If brake assist is considered to be necessary, the skid control ECU sends control signals to the pump motor and solenoid valve.

The pump and solenoid valve then control the pressure applied to each wheel cylinder.

The ABS warning light comes on to indicate a malfunction in the BA (brake assist) system.

(d) TRAC (Traction Control)
The TRAC system helps prevent the drive wheel from slipping if the driver depresses the accelerator pedal excessively when starting off or accelerating on a slippery surface.

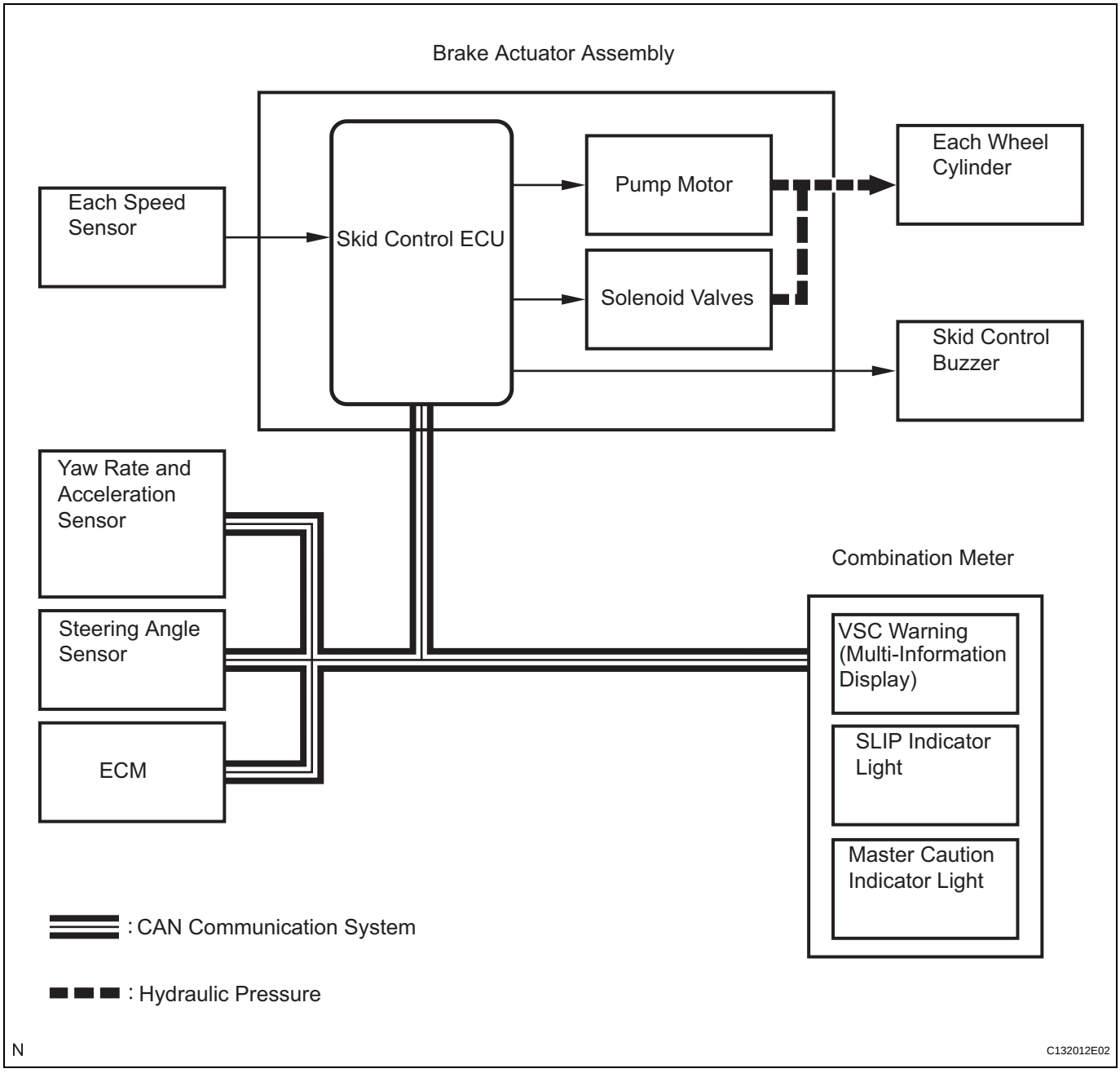


(1) Operation description

The skid control ECU detects wheelspin condition by receiving signals from each speed sensor and the ECM via CAN communication. The skid control ECU controls engine torque with the ECM via CAN communication and brake hydraulic pressure through the pump and solenoid valve.

The SLIP indicator light blinks when the system is operating. If a malfunction occurs in the TRAC system, both master caution and SLIP indicator lights will come on and the DTC will be displayed on the multi-information display.

(e) VSC (Vehicle Stability Control)
The VSC system helps prevent the vehicle from slipping sideways as a result of a strong front or rear wheel skid during cornering.



(1) Operation description

The skid control ECU determines the vehicle operating conditions based on signals received from the wheel speed sensors, yaw rate and acceleration sensor, and steering angle sensor. The skid control ECU sends signals via CAN communication to the ECM in order to control engine torque. The skid control ECU controls brake hydraulic pressure using the pump and solenoid valves.

The SLIP indicator light will blink, and the skid control system buzzer will sound when the system is operating. If a malfunction occurs in the VSC system, both the master caution indicator light and the SLIP indicator light will come on. In addition to this, the DTC will appear on the multi-information display. Vehicles without a multi-information display will illuminate the VSC warning light and SLIP indicator light if a malfunction occurs.

3. ABS with EBD, BA, TRAC and VSC OPERATION

(a) The skid control ECU calculates vehicle stability tendency based on the signals from the speed sensor, yaw rate and acceleration sensor, and steering angle sensor. In addition, it evaluates the results of the calculations to determine whether any control actions (control of the engine output torque by electronic throttle control and of the wheel brake pressure by the brake actuator assembly) should be implemented.

(b) The SLIP indicator blinks and the skid control buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when traction control is operating, and the operation being performed is displayed.

4. FAIL SAFE

(a) When a failure occurs in the ABS with BA, TRAC and VSC systems, the ABS and VSC warning (with multi-information display) lights, and SLIP indicator light come on and ABS with BA, TRAC and VSC operations are prohibited. In addition, when there is a failure that disables the EBD operation, the BRAKE warning light also comes on and the EBD operation is prohibited.

(b) If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.

5. INITIAL CHECK

(a) When the vehicle speed first becomes approximately 4 mph (6 km/h) or more after the ignition switch is turned on (IG), each solenoid valve and motor of the brake actuator assembly is sequentially activated to perform an electrical check. During the initial check, the operating sound of solenoid valve and motor can be heard from the engine compartment, but this is not a malfunction.

6. FUNCTION OF COMPONENTS

Components	Function
Brake actuator assembly	• Changes the fluid path based on the signals from the skid control ECU during the operation of the ABS with EBD & Brake Assist & TRAC & VSC system, in order to control the fluid pressure that is applied to the wheel cylinders. • Houses the skid control ECU.
Skid control ECU (housed in brake actuator assembly)	• Judges the vehicle driving condition based on the signals from each sensor, and controls the brake actuator assembly. • Sends and receives the control signals to or from the ECM, yaw rate and acceleration sensor, and steering angle sensor via CAN communication.
Master cylinder pressure sensor	• Detects the fluid pressure in the master cylinder. • Housed in the brake actuator assembly.
Speed sensor	Detects speed of each wheel and inputs the data into the skid control ECU.
Stop light switch	Illuminates the brake light when the brake pedal is depressed. (Sends a brake on signal to the skid control ECU)
Motor relay	• Supplies power to the pump motor. • Housed in the skid control ECU.
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
ECM	• Controls the engine output based on the signals received from the skid control ECU. • Sends the accelerator pedal position signal and the engine speed signal to the skid control ECU.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS, EBD or BA (Brake Assist) has occurred. • Blinks to output DTC.
BRAKE warning light	• Comes on to inform the driver that the parking brake is ON when the system is normal. • Comes on to inform the driver that a malfunction in the EBD has occurred.
VSC warning light	Comes on to inform the driver that a malfunction in the VSC system has occurred.
SLIP indicator light	Blinks to inform the driver that TRC and VSC are operating.
Brake fluid level warning switch	Detects the brake fluid level.
Skid control buzzer	Intermittently sounds to inform the driver that the VSC is operating.
Yaw rate and acceleration sensor	• Acceleration sensor measures the capacity of the condenser that changes the distance between the electrodes depending on G force, which occurs when the vehicle is accelerated, and converts the measured value into electrical signals. • Yaw rate sensor detects the vehicle's angular velocity (yaw rate) in the vertical direction based on the amount and direction of the piezoelectric ceramics deflection. • Sends signals to the skid control ECU via CAN communication.
Steering angle sensor	• Installed in the steering column. • Detects the steering amount and direction and sends the signals to the skid control ECU via CAN communication. • Has the magnetic resistance element, which detects the rotation of the magnet housed in the detection gear in order to detect the changes in magnetic resistance and the steering amount and direction.

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble.

NEXT

3	CHECK CAN COMMUNICATION SYSTEM

(a) Check for DTCs (See page BC-302).
HINT:
The skid control ECU is connected to the CAN communication system.
Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → CHECK CAN COMMUNICATION CIRCUIT

A

4	CHECK DTC AND FREEZE FRAME DATA

(a) Check for DTCs and Freeze Frame Data (See page BC-302 for DTC Check / Clear, BC-305 for Freeze Frame Data).
(1) Record the DTCs and Freeze Frame Data.
(b) Clear the DTCs.
(c) Recheck for DTCs.
(1) Reproduce the malfunction and check if the DTCs are output again.

Result

Result	Proceed to
DTC is output	A
DTC is not output (Problem symptom does not occur)	B
DTC is not output (Problem symptom occurs)	C

B → GO TO STEP 9

C → **GO TO STEP 10**

A

5	**DIAGNOSTIC TROUBLE CODE CHART**

(a) Go to "DIAGNOSTIC TROUBLE CODE CHART" (See page BC-311).

NEXT

6	**CIRCUIT INSPECTION**

NEXT

BC

7	**REPAIR OR REPLACE**

NEXT

8	**CONFIRMATION TEST**

NEXT

END

9	**SYMPTOM SIMULATION**

NEXT

10	**PROBLEM SYMPTOMS TABLE**

(a) Go to "PROBLEM SYMPTOMS TABLE" (See page BC-295).

NEXT

11	**CIRCUIT INSPECTION**

NEXT

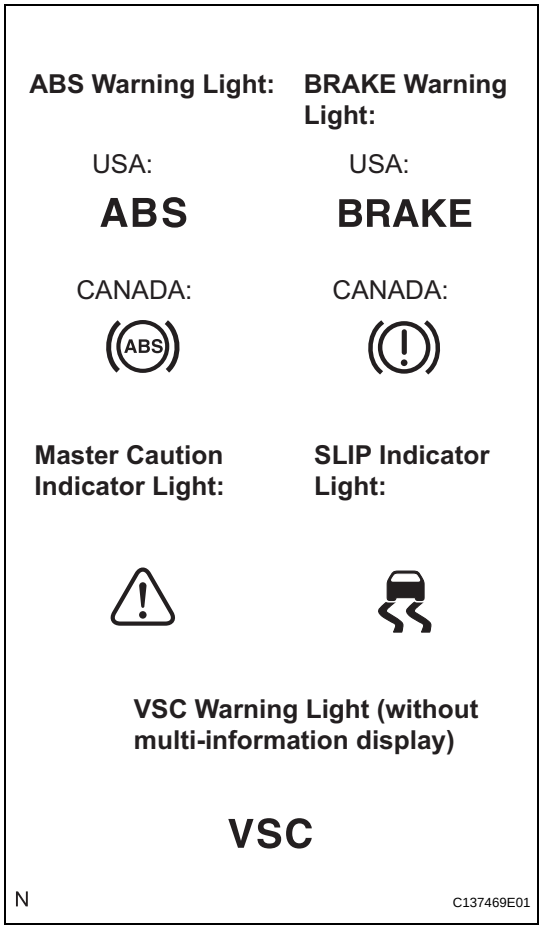
12	REPAIR OR REPLACE

NEXT

13	CONFIRMATION TEST

NEXT

END



TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

Before releasing the parking brake, move the shift lever to the P position for safety (Automatic Transaxle model) or set the chocks to hold the vehicle for safety (Manual Transaxle model).

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS, VSC (without multi-information display), BRAKE warning lights, and master caution, SLIP indicator lights come on for approximately 3 seconds.

HINT:

If the ECU stores any DTCs, the ABS, BRAKE, VSC warning (without multi-information display and master caution indicator light) lights, and SLIP indicator light come on.

If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

Trouble Area	See procedure
ABS warning light (Remains on)	BC-380
ABS warning light (Does not come on)	BC-385
BRAKE warning light (Remains on)	BC-395
BRAKE warning light (Does not come on)	BC-404
VSC warning light (Remains on)	BC-388
VSC warning light (Does not come on)	BC-392
SLIP indicator light (Remains on)	BC-408
SLIP indicator light (Does not come on)	BC-412

2. SENSOR SIGNAL CHECK BY TEST MODE (SIGNAL CHECK) (INTELLIGENT TESTER)

HINT:

If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check function will be erased.

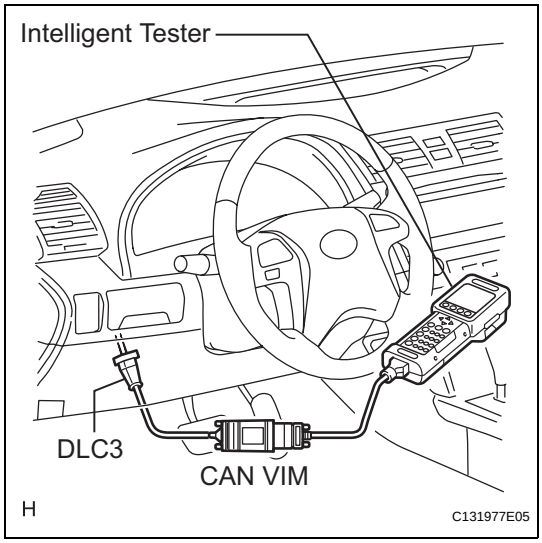
(a) Procedure to enter Test Mode.

(1) Turn the ignition switch off.

(2) Connect the intelligent tester to the DLC3.

(3) Check that the steering wheel is centered and move the shift lever to the P position (Automatic Transaxle) or apply the parking brake (Manual Transaxle).

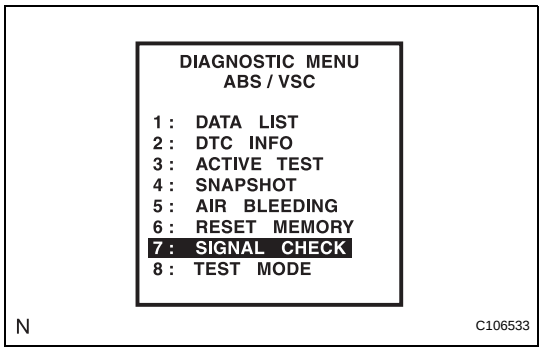
(4) Turn the ignition switch on (IG).

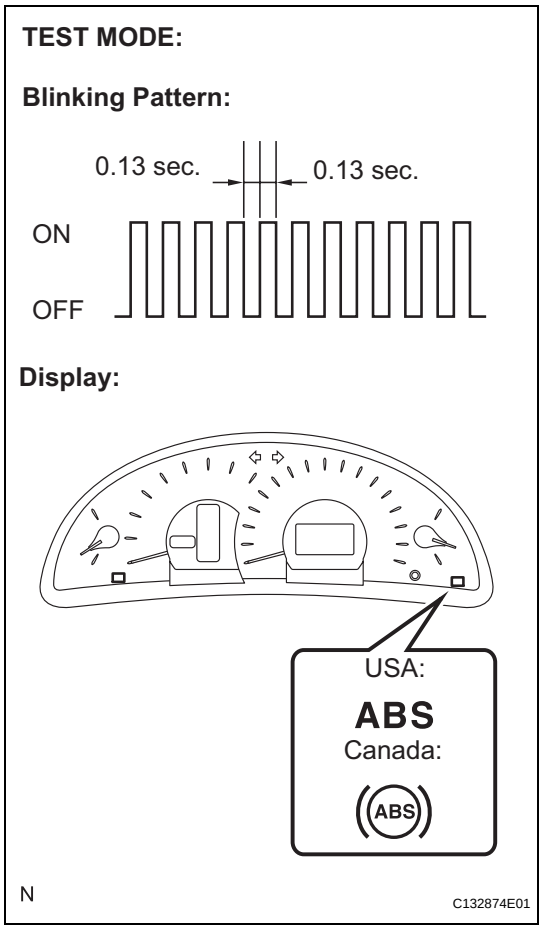


(5) Set the intelligent tester to Test Mode (select "SIGNAL CHECK").

HINT:

Refer to the intelligent tester operator's manual for further details.





(6) Check that the ABS warning light comes on for several seconds and then blinks in Test Mode.
HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit.

Trouble Area	See procedure
ABS warning light (Does not come on)	BC-404

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheelspin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**

(d) Read the DTC(s) by following the tester screen.
NOTICE:
- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:
See the list of DTCs (See procedure "A").

3. SENSOR SIGNAL CHECK BY TEST MODE (SIGNAL CHECK) (SST CHECK WIRE)

HINT:
If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check will be erased.

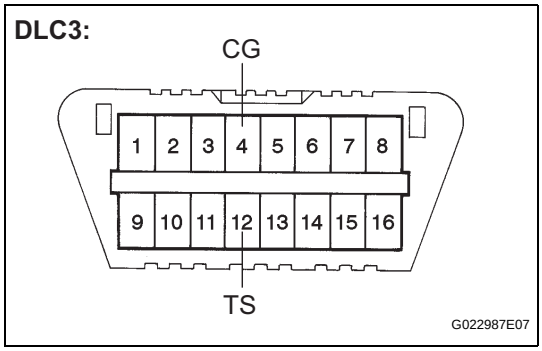
(a) Procedure to enter Test Mode.
(1) Turn the ignition switch off.

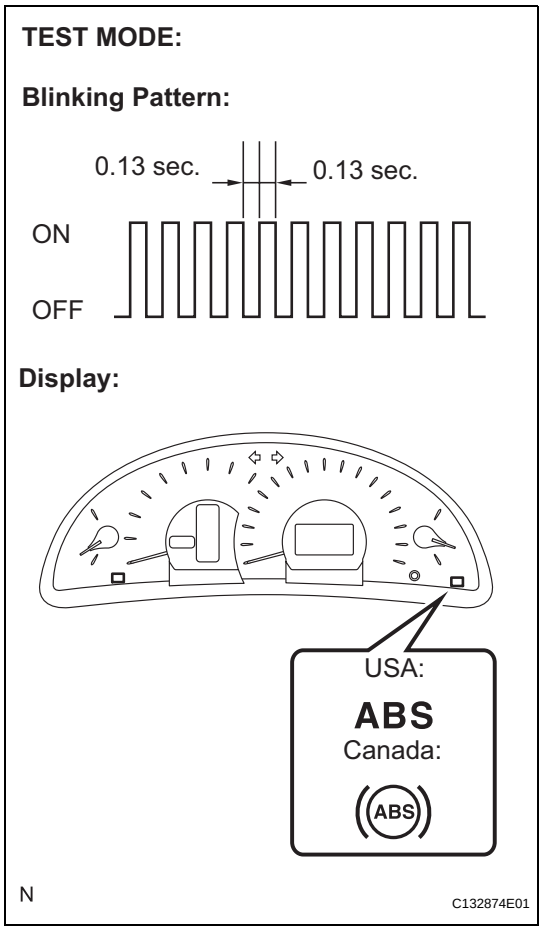
BC

(2) Check that the steering wheel is centered and move the shift lever to the P position (Automatic Transaxle) or apply the parking brake (Manual Transaxle).

(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(4) Turn the ignition switch on (IG).



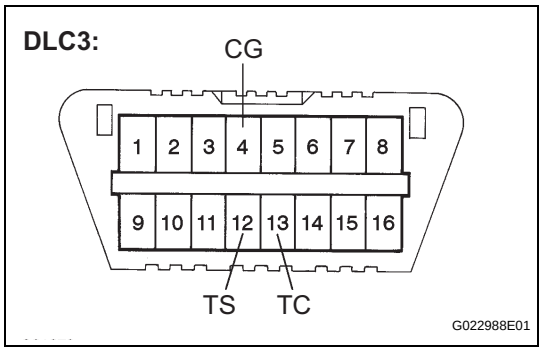


(5) Check that the ABS warning light comes on for several seconds and then blinks in Test Mode.
HINT:
If the ABS warning light does not blink, inspect the TS and CG terminal circuit, and ABS warning light circuit.

Trouble Area	See procedure
TS and CG terminal circuit	BC-421
ABS warning light circuit (Does not come on)	BC-385

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheelspin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

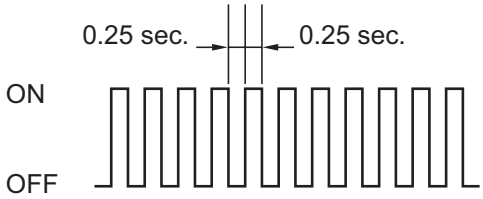
(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**



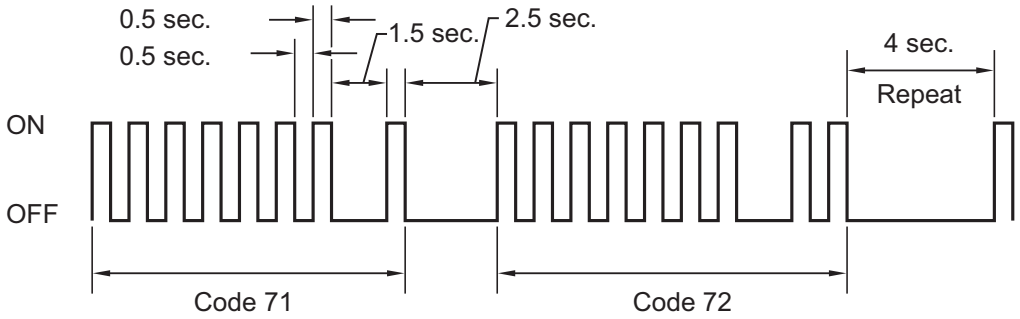
(d) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(e) Count the number of blinks of the ABS warning light.

Blinking Pattern of Normal System Code:



Blinking Pattern of Trouble Code (Example Codes 71 and 72):



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NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTCs (See procedure "A").

(f) After performing the check, disconnect the SST from terminals TS and CG, and TC and CG of the DLC3, and turn the ignition switch off.

BC

(g) Turn the engine switch on (IG) to cancel the Test Mode.
HINT:
- If the ignition switch is not turned on (IG) after the SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned on (IG) with terminals TS and CG shorted, the previous Test Mode will continue.

4. DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")

DTC of Test Mode (Signal Check):

Code No.	Diagnosis	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Sensor rotor
C1276/76	Abnormal change in output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Sensor rotor
C1277/77	Abnormal change in output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Sensor rotor
C1278/78	Abnormal change in output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Sensor rotor

HINT:
The codes in this table are output only in Test Mode (signal check).

5. ENGINE VARIANT LEARNING
- Engine variant learning is automatically performed immediately after the Test Mode is entered.
- The ABS, VSC, BRAKE, and SLIP indicators come on for 3 seconds after learning.

PROBLEM SYMPTOMS TABLE

If there are no DTCs output but the problem still occurs, check the circuits for each problem symptom in the order given in the table below, and proceed to the relevant troubleshooting page.

NOTICE:

Before replacing the brake actuator assembly, sensor, or other related parts, turn the ignition switch off.

Vehicle stability control system:

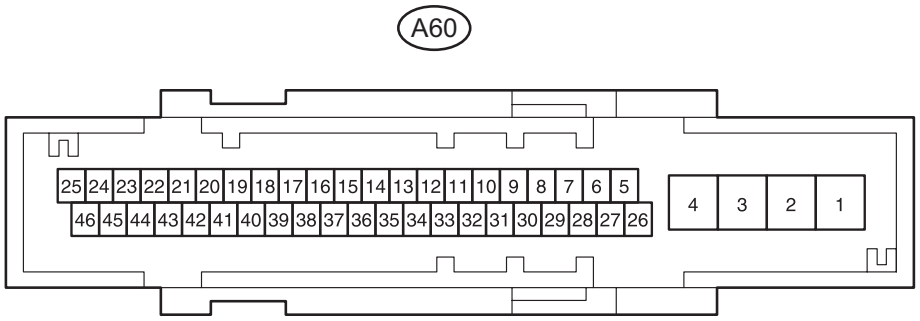
Symptom	Suspected area	See page
ABS, BA and/or EBD does not operate	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. IG power source circuit	BC-361
	3. Front speed sensor circuit	BC-316
	4. Rear speed sensor circuit	BC-324
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function). If abnormal, check the hydraulic circuit for leakage.	BC-431
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
ABS, BA and/or EBD does not operate efficiently	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. Front speed sensor circuit	BC-316
	3. Rear speed sensor circuit	BC-324
	4. Stop light switch circuit	BC-368
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function). If abnormal, check the hydraulic circuit for leakage.	BC-431
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
VSC and/or TRACTION does not operate	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. IG power source circuit	BC-361
	3. Check the hydraulic circuit for leakage.	-
	4. Front speed sensor circuit	BC-316
	5. Rear speed sensor circuit	BC-324
	6. Yaw rate and deceleration sensor circuit	BC-343
	7. Steering angle sensor circuit	BC-350
	8. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
ABS sensor DTC check cannot be done	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. TC and CG terminal circuit	BC-418
	3. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432

Symptom	Suspected area	See page
VSC sensor DTC check cannot be done	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. TC and CG terminal circuit	BC-418
	3. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
Sensor signal check cannot be done	1. TS and CG terminal circuit	BC-421
	2. Brake actuator assembly (skid control ECU)	BC-432
ABS warning light abnormal (Remains on)	ABS warning light circuit	BC-380
ABS warning light abnormal (Does not come on)	ABS warning light circuit	BC-385
VSC warning light abnormal (Remains on)	VSC warning light circuit	BC-388
VSC warning light abnormal (Does not come on)	VSC warning light circuit	BC-392
Brake warning light abnormal (Remains on)	Brake warning light circuit	BC-395
Brake warning light abnormal (Does not come on)	Brake warning light circuit	BC-404
SLIP indicator light abnormal (Remains on)	SLIP indicator light circuit	BC-408
SLIP indicator light abnormal (Does not come on)	SLIP indicator light circuit	BC-412
Skid control buzzer abnormal	Skid control buzzer circuit	BC-415

TERMINALS OF ECU

1. TERMINALS OF ECU

Skid Control ECU:



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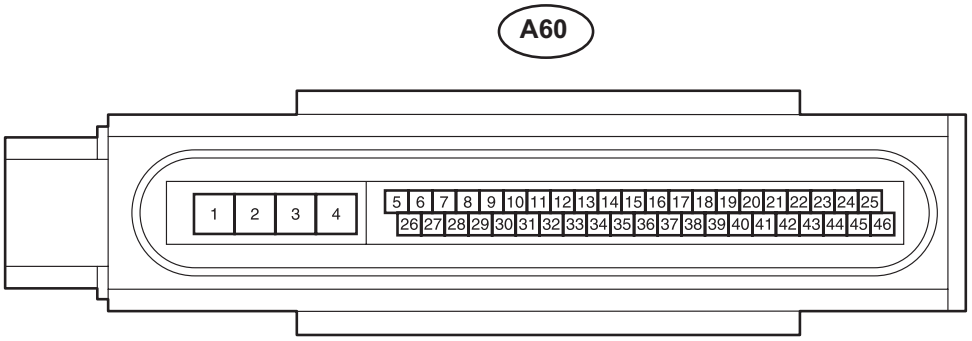
Symbols (Terminal No.)	Terminal Description
GND2 (1)	Skid control ECU ground
+BM (2)	Power supply for motor
+BS (3)	Power supply for solenoid
GND1 (4)	Skid control ECU ground
FL+ (5)	Front left wheel speed sensor input
FL- (6)	Front left wheel speed sensor ground
RL+ (7)	Rear left wheel speed sensor input
RR- (8)	Rear right wheel speed sensor ground
FR- (9)	Front right wheel speed sensor ground
FR+ (10)	Front right wheel speed sensor input
D/G (11)	Diagnosis tester communication line
CANL (14)	CAN communication line L
BZ (23)	Buzzer output
RL- (27)	Rear left wheel speed sensor ground
IG1 (28)	ECU power supply
RR+ (29)	Rear right wheel speed sensor input
STP1 (30)	Stop light switch input
SP1 (33)	Speed signal output
CANH (35)	CAN communication line H
TS (39)	Sensor check switch input

2. TERMINAL INSPECTION

(a) Disconnect the connector and measure the voltage and resistance according to the value(s) in the table below.

Skid Control ECU (Harness Side Connector Front View):



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HINT:
Voltage cannot be measured with the connector connected to the skid control ECU, as the connector is watertight.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (A60-1) - Body ground	W-B - Body ground	Actuator pump motor ground	Always	Below 1 Ω
+BM (A60-2) - Body ground	B - Body ground	Power supply for motor	Always	10 to 14 V
+BS (A60-3) - Body ground	L - Body ground	Power supply for solenoid	Always	10 to 14 V
GND1 (A60-4) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 Ω
BZ (A60-23) - Body ground	R - Body ground	Buzzer warning light output	Ignition switch on (IG), Buzzer does not sound	6 to 10 V
IG1 (A60-28) - Body ground	P - Body ground	IG1 power supply	Ignition switch on (IG)	10 to 14 V
STP1 (A60-30) - Body ground	P - Body ground	Stop light switch input	Stop light switch ON →OFF (Brake pedal depressed → released)	5 to 14 V → Below 3 V

DIAGNOSIS SYSTEM

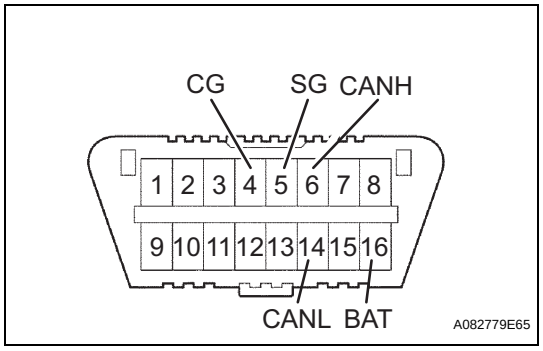
1. DIAGNOSIS SYSTEM

(a) Inspect the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.



(b) The vehicle's ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists on either the vehicle side or the tester side.

If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.

If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

BC

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher

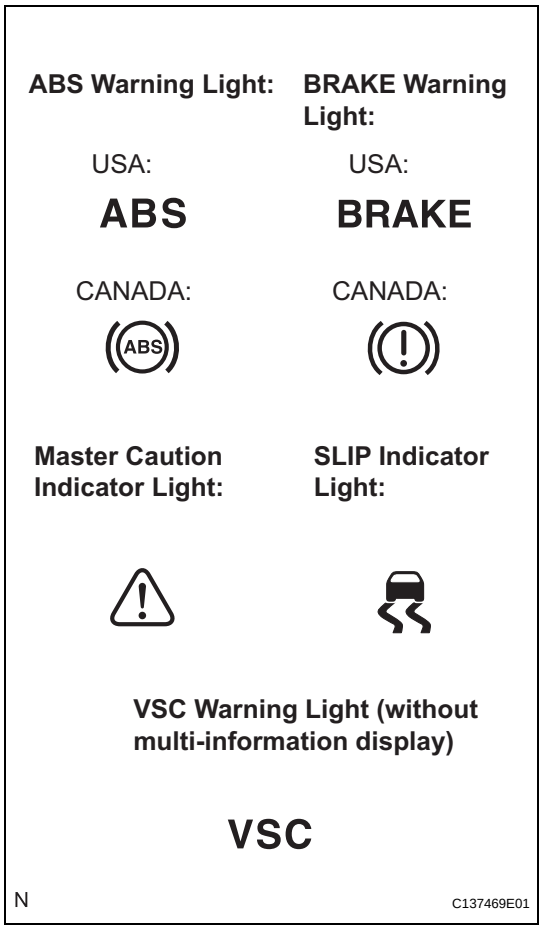
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

2. DESCRIPTION

NOTICE:

When releasing the parking brake, set chocks to hold the vehicle for safety.

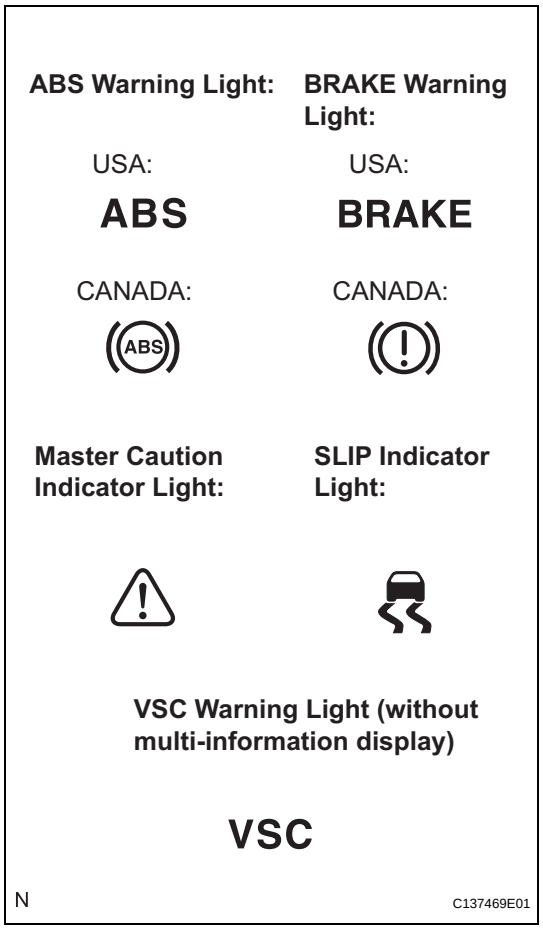


(a) If the skid control ECU detects a malfunction, the ABS, VSC (without multi-information display), and BRAKE warning lights, and master caution and SLIP indicator lights will come on and the multi-information display shows a warning message in order to warn the driver.
The table below indicates which lights will come on when there is a malfunction in a particular function.

Item/Trouble Area	ABS	EBD	BA	TRAC	VSC
ABS Warning Light	O	O	O	-	-
BRAKE Warning Light	-	O	-	-	-
VSC Warning Light (without multi-information display)	O	O	O	O	O
SLIP Indicator Light	O	O	O	O	O

O: Light ON
-: Light OFF

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS warning light by connecting the intelligent tester (See page BC-302).
- This system has a signal check function (TEST MODE) (See page BC-290).
  The DTC can be read by connecting the intelligent tester and observing the blinking pattern of the ABS warning.



3. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

Before releasing the parking brake, move the shift lever to the P position for safety (Automatic Transaxle model) or set the chocks to hold the vehicle for safety (Manual Transaxle model).

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS, VSC (without multi-information display), and BRAKE warning lights, and master caution and SLIP indicator lights come on for approximately 3 seconds.

HINT:

If the ECU stores any DTCs, the ABS, BRAKE, and VSC warning (multi-information display and master caution indicator light) lights, and SLIP indicator light come on.

If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

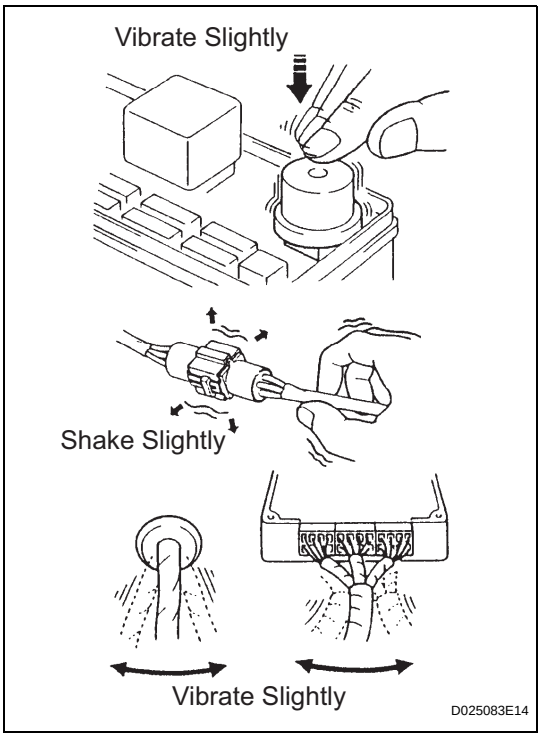
BC

Trouble Area	See procedure
ABS warning light (Remains on)	BC-380
ABS warning light (Does not come on)	BC-385
BRAKE warning light (Remains on)	BC-395
BRAKE warning light (Does not come on)	BC-404
VSC warning light (Remains on)	BC-388
VSC warning light (Does not come on)	BC-392
SLIP indicator light (Remains on)	BC-408
SLIP indicator light (Does not come on)	BC-412

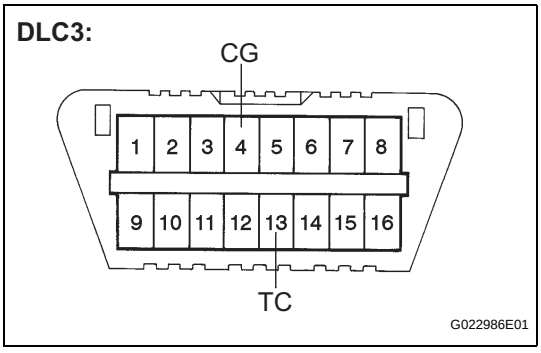
4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.
HINT:
Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is turned on (IG)).
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.
(2) Slightly shake the connector vertically and horizontally.
HINT:
Shaking the relays too strongly may result in open relays.
(3) Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

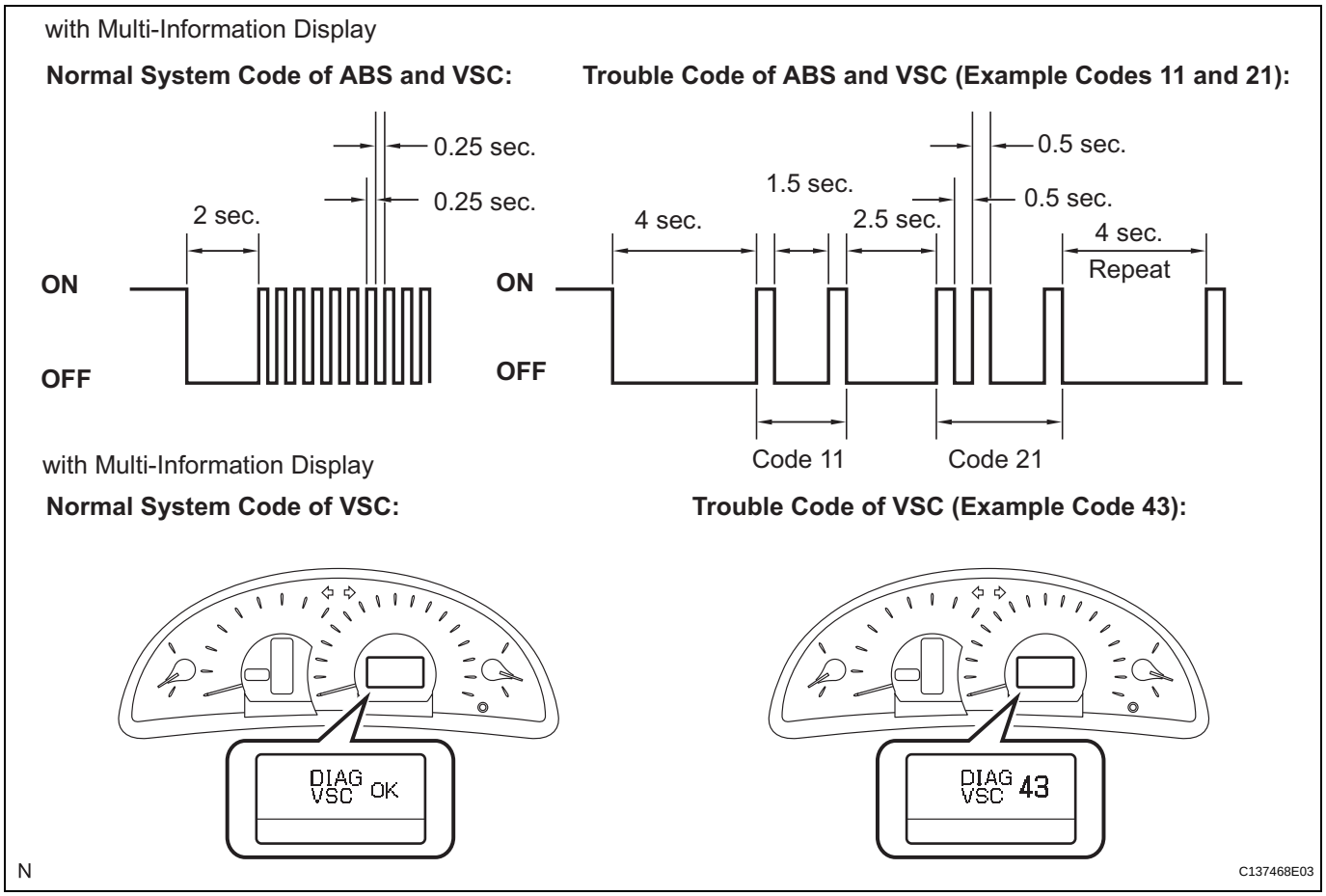


DTC CHECK / CLEAR

1. DTC CHECK/CLEAR (WHEN USING SST CHECK WIRE:)

(a) DTC check
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch on (IG).

(3) Observe the blinking pattern of the ABS and VSC (without multi-information display) warning lights or read the multi information display (with multi-information display) in order to identify the DTC.



HINT:
If no code appears, inspect the TC and CG terminal circuit, the ABS warning light circuit, and the VSC warning light circuit.

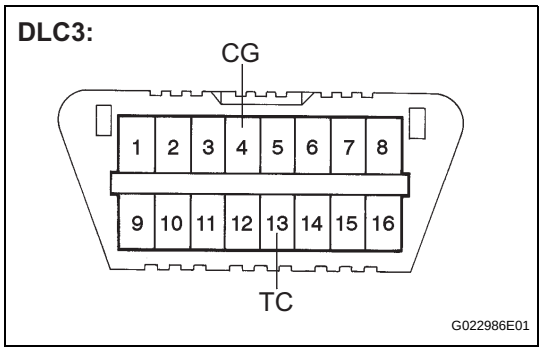
Trouble Area	See procedure
ABS warning light (Remains on)	BC-380
ABS warning light (Does not come on)	BC-385
VSC warning light (Remains on)	BC-388
VSC warning light (Does not come on)	BC-392
TC and CG Terminal Circuit	BC-418

- As an example, the blinking patterns for a normal system code and trouble codes 11 and 21 are shown in the illustration.

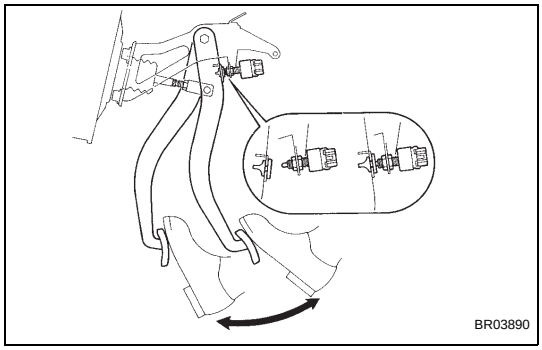
(4) Codes are explained in the code table (See page BC-311).

(5) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

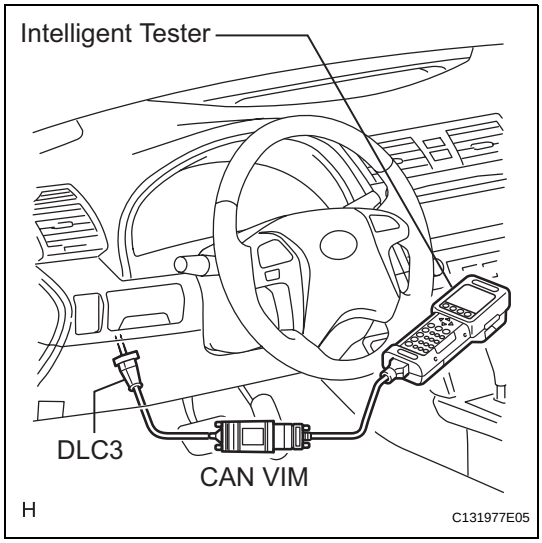
BC



(b) DTC clear
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch on (IG).



(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(4) Check that the warning light indicates a normal system code.
(5) Remove the SST.
HINT:
Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG fuse.



2. DTC CHECK/CLEAR (WHEN USING INTELLIGENT TESTER:)
(a) DTC check
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Read the DTCs by following the prompts on the tester screen.
(b) DTC clear
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Operate the intelligent tester to clear the codes.
HINT:
Refer to the intelligent tester operator's manual for further details.

3. END OF DTC CHECK/CLEAR
(a) Turn the ignition switch on (IG).
(b) Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

(a) Whenever an ABS DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.
The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to on (IG) since the last time the ABS was activated.
HINT:
- However, if the vehicle is stopped or at a low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will stop counting the number.
- Freeze Frame Data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored during ABS operation is erased.
- Freeze Frame Data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Select the "DTC INFO" on the tester display.
(e) On the DTC data display screen, select the DTC data display with "*".

Item (Display)	Measurement Item	Reference Value
VEHICLE SPD	Vehicle speed reading	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
STOP LAMP SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
#IG ON	Number of operations of engine switch on (IG) after storing freeze frame data	0 to 31
MAS CYL PRESS 1	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.5 V
M/C PRESS GRADE	Master cylinder pressure sensor change	Min.: -30 MPa/s, Max.: 225 MPa/s
YAW RATE	Yaw rate sensor reading	Min.: -128 deg/s, Max.: 127 deg/s
STEERING SEN	Steering angle sensor reading	Left turn: Increase Right turn: Decrease
SPD GRADE	Vehicle speed grade	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
BUZZER	Skid control buzzer signal	Skid control buzzer ON: ON, OFF: OFF
PARKING BRAKE SW	Parking brake switch signal	Parking brake switch ON: ON, OFF: OFF
ENGINE TORQUE	Real engine torque	Min.: -1024 Nm, Max.: 1023 Nm
FR WHEEL SPD	FR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
FL WHEEL SPD	FL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
RR WHEEL SPD	RR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
RL WHEEL SPD	RL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)

Item (Display)	Measurement Item	Reference Value
LATERAL G	Lateral G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
GEAR POSITION *	Gear position information	FAIL 1st 2nd 3rd 4th 5th 6th P, N R NOT R
LEVER POSITION *	Shift lever position information	FAIL 1st 2nd 3rd 4th 5th 6th/B D/M P, N R
OPERATED SYSTEM	Operated system status	ABS activated: ABS VSC activated: VSC TRAC activated: TRAC BA activated: BA PB activated: PB Fail safe mode activated: FAIL No system activated: NON System prohibited: SYS
FREEZE TIME	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
TROUBLE CODE	Freeze frame DTC	Displays to output DTC
INSPECTION MODE	Inspection mode	OTHER: Normal, INSPECT: Service

*: Automatic Transaxle

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

(a) If there is a problem with sensor signals or actuator systems, the skid control ECU prohibits power supply to the brake actuator assembly and informs the ECM of the VSC system failure.

(b) The brake actuator assembly turns off each solenoid and the ECM shuts off the VSC control (traction control signal) from the skid control ECU accordingly, which turns out to be as if the vehicle stability control system was not installed.

(c) ABS, VSC, and TRAC control will be prohibited, but EBD control continues as much as possible. If EBD control is impossible, the brake warning light comes on to warn the driver (See page BC-298).

Malfunction	Symptom
ABS system	Prohibits the ABS, BA, TRAC, and VSC control
BA system	Prohibits the ABS, BA, TRAC, and VSC control
EBD system	Prohibits the ABS, EBD, BA, TRAC, and VSC control
TRAC system	Prohibits the TRAC and VSC control
VSC system	Prohibits the TRAC and VSC control

HINT:

- A malfunction in either the ABS or BA system results in an identical operation, with ABS, BA, TRAC, and VSC system control prohibited.
- If control is prohibited due to a malfunction during operation, control will be disabled gradually to prevent the vehicle from becoming unstable suddenly.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

With the intelligent tester connected to the DLC3 and the ignition switch on (IG), the ABS, TRAC and VSC Data List can be displayed. Follow the prompts on the tester screen to access the Data List.

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
MTR RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
IDLE SW	Main idle switch / ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
ENG REVOLUTIONS	Engine revolutions / min.: 0 r/min, max.: 65,535 r/min	-	-
GEAR POSITION *	Gear position information / P/N, R, 1st-6th, FAIL, NOT R	-	-
LEVER POSITION *	Shift lever position information / P/N, R, D/M, 1st-6th/B, FAIL	-	-
SHIFT INFO	Shift information / ON or OFF	ON: During gear change	-
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
FL WHEEL SPD	FL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
DECELERAT SEN	Acceleration sensor 1 reading / min.: -18.52 m/s^2, max.: 18.39 m/s^2	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates	-
SRRR	ABS solenoid (SRRR) / ON or OFF	ON: Operates	-
SRRH	ABS solenoid (SRRH) / ON or OFF	ON: Operates	-
SRLR	ABS solenoid (SRLR) / ON or OFF	ON: Operates	-
SRLH	ABS solenoid (SRLH) / ON or OFF	ON: Operates	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SRM2	Master cut solenoid (SRM2) / ON or OFF	ON: Operates	-
SRM1	Master cut solenoid (SRM1) / ON or OFF	ON: Operated	-
SRC2	Master cut solenoid (SMC2) / ON or OFF	ON: Operates	-
SRC1	Master cut solenoid (SRC1) / ON or OFF	ON: Operates	-
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual vehicle speed	Speed indicated on speedometer
YAW RATE SENS 1	Yaw rate sensor 1 / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
ZERO YAW RATE	Memorized zero value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING SEN	Steering angle sensor / min.: -3,276.8 deg, max.: 3,276.7 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V	Reading increases when brake pedal is depressed
ENGINE TORQUE	Real engine torque / min.: -1024 N*m, max.: 1023 N*m	-	-
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
#DTC	Number of DTC / min.: 0, max.: 255	-	-
ABS WARN LAMP	ABS warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
BRAKE WARN LAMP	BRAKE warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
SLIP INDI LAMP	SLIP indicator light / ON or OFF	ON: Indicator light ON OFF: Indicator light OFF	-
BUZZER	Skid control buzzer / ON or OFF	ON: Buzzer ON OFF: Buzzer OFF	-
VSC WARN LAMP	VSC warning (multi-information display and master caution indicator light) light / ON or OFF	ON: Indicator ON OFF: Indicator OFF	-
FR WHEEL ACCEL	FR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
FL WHEEL ACCEL	FL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RR WHEEL ACCEL	RR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
RL WHEEL ACCEL	RL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
ZERO DECELERAT	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO STEERING	Memorized zero value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
LATERAL G	Lateral G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
FORWARD&REA G	Forward and rearward G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
YAW RATE VALUE	Yaw rate value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING ANGLE	Steering angle value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
TRAC STATUS	TRAC control status / ON or OFF	ON: During the control	-
TRAC ENG STATUS	TRAC engine control status / ON or OFF	ON: During the control	-
TRAC BRK STATUS	TRAC brake control status / ON or OFF	ON: During the control	-
FR VSC STATUS	FR wheel VSC control status / ON or OFF	ON: During the control	-
FL VSC STATUS	FL wheel VSC control status / ON or OFF	ON: During the control	-
RR VSC STATUS	RR wheel VSC control status / ON or OFF	ON: During the control	-
RL VSC STATUS	RL wheel VSC control status / ON or OFF	ON: During the control	-
FR ABS STATUS	FR wheel ABS control status / ON or OFF	ON: During the control	-
FL ABS STATUS	FL wheel ABS control status / ON or OFF	ON: During the control	-
RR ABS STATUS	RR wheel ABS control status / ON or OFF	ON: During the control	-
RL ABS STATUS	RL wheel ABS control status / ON or OFF	ON: During the control	-
FR EBD STATUS	FR wheel EBD control status / ON or OFF	ON: During the control	-
FL EBD STATUS	FL wheel EBD control status / ON or OFF	ON: During the control	-
RR EBD STATUS	RR wheel EBD control status / ON or OFF	ON: During the control	-
RL EBD STATUS	RL wheel EBD control status / ON or OFF	ON: During the control	-
BA STATUS	BA control status / ON or OFF	ON: During the control	-
INSPECTION MODE	Inspection mode / OTHER or INSPECT	-	-
#IG ON2	Number of ignition switch on (IG) after entering the inspection mode / min.: 0, max.: 255	-	-
TROUBLE CODE	Freeze frame DTC / min.: 0, max.: 65,535	-	-

*: Automatic Transaxle

2. ACTIVE TEST

HINT:

Performing the Active Test using the intelligent tester allows the relay, actuator, and other items to operate without removing any parts. Performing the Active Test as the first step in troubleshooting is one of the methods to save labor time.

It is possible to display the Data List during the Active Test.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) From the display on the tester, select the Active Test.

HINT:

The ignition switch must be turned on (IG) to proceed to the Active Test using the intelligent tester.

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRM2	Turns master cut solenoid (SRM2) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRM1	Turns master cut solenoid (SRM1) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRC2	Turns master cut solenoid (SRC2) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRC1	Turns master cut solenoid (SRC1) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
MOTOR RELAY	Turns ABS motor relay ON / OFF	Operating sound of relay (clicking sound) and motor can be heard
ABS WARN LAMP	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LAMP	Turns VSC warning (master caution indicator) light ON / OFF	Observe combination meter
SLIP INDI LAMP	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WARN LAMP	Turns BRAKE warning light ON / OFF	Observe combination meter
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

DIAGNOSTIC TROUBLE CODE CHART

- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the page for the respective "DTC No." in the DTC chart.
- Inspect the fuse and relay before investigating the trouble areas as shown in the table below.

DTC chart of ABS:

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor RH 2. Front speed sensor circuit RH 3. Front speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-316
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor LH 2. Front speed sensor circuit LH 3. Front speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-316
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor RH 2. Rear speed sensor circuit RH 3. Rear speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-324
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor LH 2. Rear speed sensor circuit LH 3. Rear speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-324
C0226/21	SFR Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0236/22	SFL Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0246/23	SRR Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0256/24	SRL Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0273/13	Open or Short Circuit in ABS Motor Relay Circuit	1. ABS No. 1 fuse (Fusible link) 2. Brake actuator assembly (skid control ECU) 3. Motor relay circuit	BC-335
C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit	1. ABS No. 2 fuse (Fusible link) 2. Brake actuator assembly (skid control ECU) 3. Solenoid relay circuit	BC-339
C1225/25	SMC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SMC1 solenoid circuit	BC-348
C1226/26	SMC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SMC2 circuit	BC-348
C1227/27	SRC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SRC1 circuit	BC-348
C1228/28	SRC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SRC2 circuit	BC-348

DTC No.	Detection Item	Trouble Area	See page
C1237/37	Tires of Different Size	1. Brake actuator assembly (skid control ECU) 2. Speed sensor 3. Speed sensor rotor (front) 4. Rear axle hub and bearing assembly 5. Speed sensor circuit 6. Tire and wheel circuit 7. Tire deformation	BC-354
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	1. Battery 2. ECU-IG No. 2 fuse 3. Charging system 4. Power source circuit 5. Brake actuator assembly (internal power source circuit)	BC-361
C1246/46	Master Cylinder Pressure Sensor Malfunction	1. Master cylinder pressure sensor 2. Master cylinder pressure sensor circuit 3. Stop light switch circuit 4. Brake actuator assembly (skid control ECU)	BC-365
C1249/49	Open in Stop Light Switch Circuit	1. Stop light switch 2. Stop light switch circuit 3. Brake actuator assembly (skid control ECU)	BC-368
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-316
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-316
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-324
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-324
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensosr RH 2. Sensor installation 3. Sensor rotor	BC-316
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensosr LH 2. Sensor installation 3. Sensor rotor	BC-316
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensosr RH 2. Sensor installation 3. Sensor rotor	BC-324
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensosr LH 2. Sensor installation 3. Sensor rotor	BC-324
C1288/88	ECU Version Miss Match	ECM	BC-374
C1300/62	Skid Control ECU Malfunction	Brake actuator assembly (skid control ECU)	BC-375
C1330/35	Right Front Speed Sensor Circuit	1. Front speed sensor RH 2. Front speed sensor circuit RH 3. Sensor installation	BC-316
C1331/36	Left Front Speed Sensor Circuit	1. Front speed sensor LH 2. Front speed sensor circuit LH 3. Sensor installation	BC-316
C1332/38	Right Rear Speed Sensor Circuit	1. Rear speed sensor RH 2. Rear speed sensor circuit RH 3. Sensor installation	BC-324

DTC No.	Detection Item	Trouble Area	See page
C1333/39	Left Rear Speed Sensor Circuit	1. Rear speed sensor LH 2. Rear speed sensor circuit LH 3. Sensor installation	BC-324
U0073/94	Control Module Communication Bus OFF	CAN communication system	BC-377

(*1, *2):
Even after the trouble areas are repaired, the ABS warning light will not go off unless the following operations are performed:

- (*1):
  (a) Drive the vehicle at 12 mph (20 km/h) for 30 seconds or more and check that the ABS warning light goes off.
  (b) Clear the DTC.
- (*2):
  (a) Keep the vehicle stationary for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (b) Drive the vehicle at the vehicle speed of 31 mph (50 km/h) and keep depressing the brake pedal strongly for approximately 3 seconds.
  (c) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (d) Clear the DTC.

HINT:
In some cases, the intelligent tester cannot be used when the ABS warning light remains on.

DTC chart of VSC:

DTC No.	Detection Item	Trouble Area	See page
43	ABS Control System Malfunction	ABS control system	BC-315
C0365/28	Malfunction in Deceleration Sensor	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit 3. Sensor installation 4. Brake actuator assembly (skid control ECU)	BC-343
C1201/51	Engine Control System Malfunction	Engine control system	BC-347
C1231/31	Steering Angle Sensor Circuit Malfunction	1. Steering angle sensor 2. Steering angle sensor circuit 3. Steering angle sensor power supply	BC-350
C1234/34	Yaw Rate Sensor Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-343
U0100/65	Lost Communication with ECM / PCM	CAN communication system (skid control ECU to ECM)	BC-377
U0123/62	Lost Communication with Yaw Rate Sensor Module	CAN communication system (skid control ECU to yaw rate and acceleration sensor)	BC-377
U0126/63	Lost Communication with Steering Angle Sensor Module	CAN communication system (skid control ECU to steering angle sensor)	BC-377

DTC	43	ABS Control System Malfunction

DESCRIPTION

This DTC is output when the VSC system detects a malfunction in the ABS control system.

DTC No.	DTC Detection Condition	Trouble Area
43	Malfunction in the ABS control system	ABS control system

INSPECTION PROCEDURE

1	CHECK ABS CONTROL SYSTEM

(a) Clear the DTC (See page BC-302).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC (ABS control system DTC) is not output	A
DTC (ABS control system DTC) is output	B

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (BRAKE CONTROL SYSTEM) (See page BC-311)**

A

2	CONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC (43) is not output	A
DTC (43) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

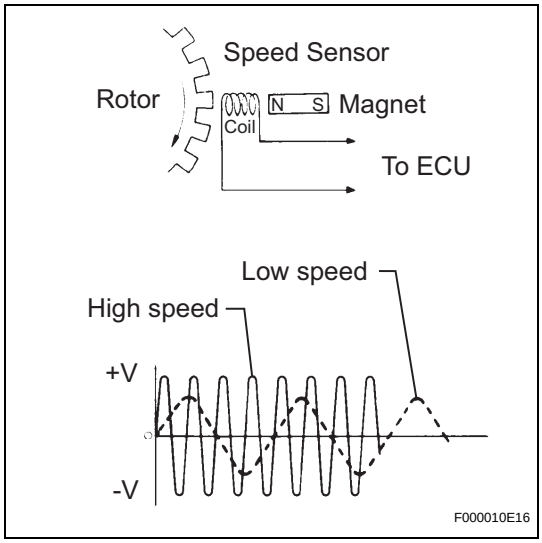
DTC	**C0200/31**	**Right Front Wheel Speed Sensor Signal Malfunction**
DTC	**C0205/32**	**Left Front Wheel Speed Sensor Signal Malfunction**
DTC	**C1271/71**	**Low Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1272/72**	**Low Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1275/75**	**Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1276/76**	**Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1330/35**	**Right Front Speed Sensor Circuit**
DTC	**C1331/36**	**Left Front Speed Sensor Circuit**

BC

DESCRIPTION

The speed sensors detects wheel speed and transmit the signals to the skid control ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTCs C1271/71 to C1276/76 can be deleted when the speed sensor sends a wheel speed signal or the test mode ends. DTCs C1271/71 to C1276/76 are output only in the test mode.

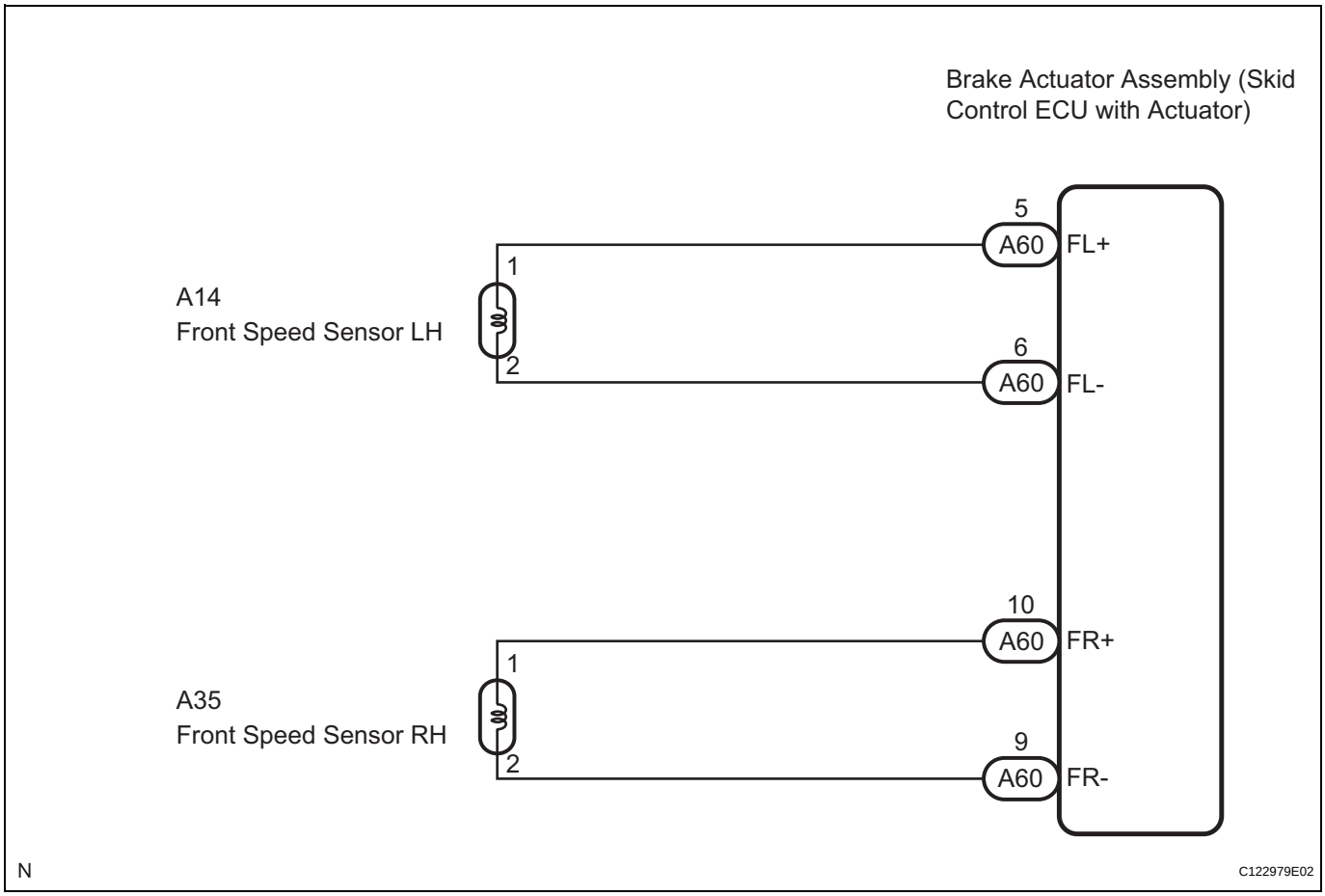


DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h), and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h) after the initial start or restart, a wheel speed of 0 mph (0 km/h) is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Front speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1330/35 C1331/36	Abnormality in the resistance value of each speed sensor is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Sensor installation
C1271/71 C1272/72	Detected only during test mode.	• Front speed sensor • Sensor installation • Sensor rotor
C1275/75 C1276/76	Detected only during test mode.	• Front speed sensor • Sensor installation • Sensor rotor

HINT:
DTC No. C0200/31 and C1330/35 are for the front speed sensor RH.
DTC No. C0205/32 and C1331/36 are for the front speed sensor LH.

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

OK

2	PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-290).

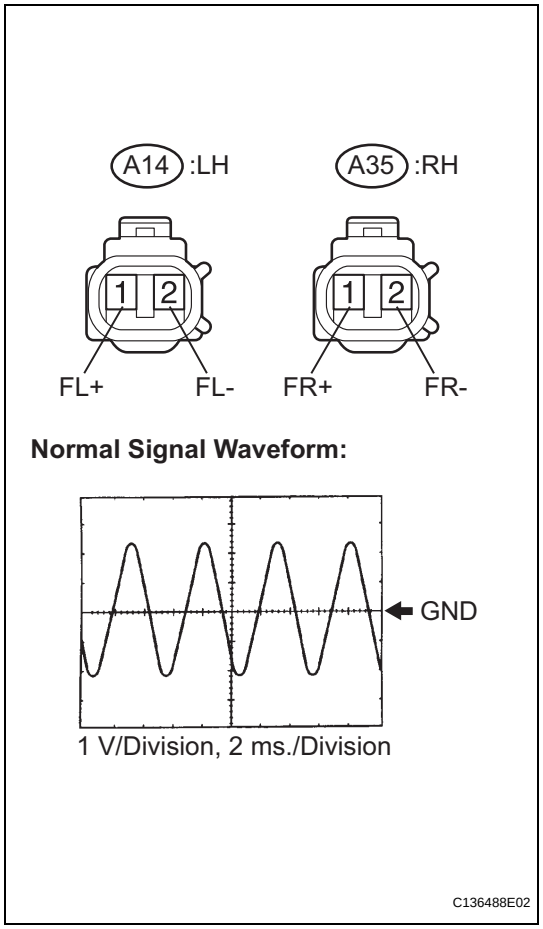
Result

Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

B → **Go to step 5**

A

3 INSPECT SPEED SENSOR SIGNAL WAVEFORM



(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.
  OK:
  The same waveform is output from front wheels and there is no noise or interference in the waveform.
  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connector.

NG	Go to step 11

OK

4 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output (When troubleshooting in accordance with the DTC CHART)	C

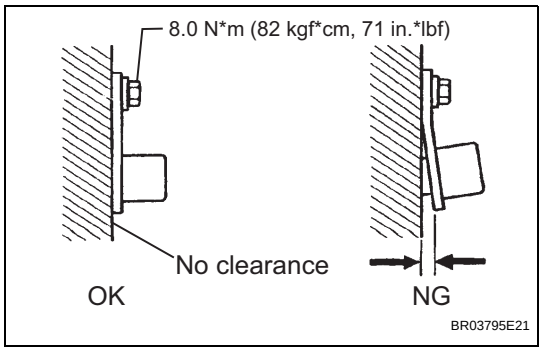
BC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)

C → END

A

5 INSPECT FRONT SPEED SENSOR INSTALLATION



(a) Check the front speed sensor installation.

OK:

The installation bolt is tightened properly.
There is no clearance between the sensor and front steering knuckle.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

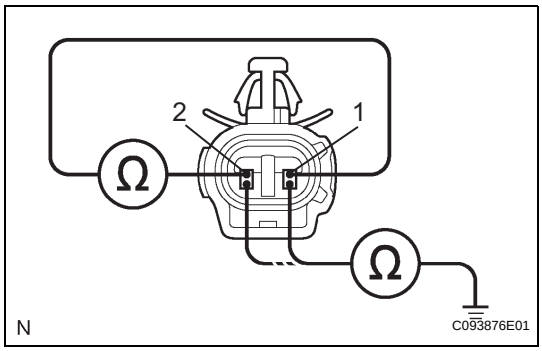
NOTICE:

Check the speed sensor signal after replacement (See page BC-290).

NG → **INSTALL FRONT SPEED SENSOR CORRECTLY (See page BC-440)**

OK

6 INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(b) Disconnect the front speed sensor connectors.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	0.92 to 1.22 kΩ at 20°C
A14-1 (FL+) - Body ground	10 kΩ or higher
A14-2 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A35-1 (FR+) - A35-2 (FR-)	0.92 to 1.22 kΩ at 20°C
A35-1 (FR+) - Body ground	10 kΩ or higher
A35-2 (FR-) - Body ground	10 kΩ or higher

NOTICE:

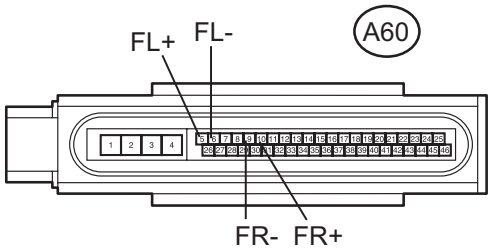
Check the speed sensor signal after replacement (See page BC-290).

NG → **REPLACE FRONT SPEED SENSOR (See page BC-438)**

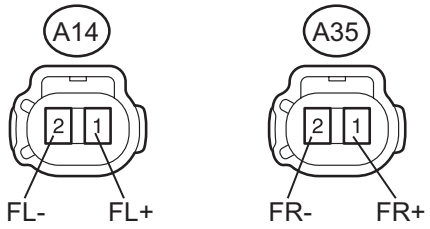
OK

7	CHECK HARNESS AND CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)

Skid Control ECU (Harness Side Connector Front View):



Front Speed Sensor (Harness Side Connecotor Front View):



N

C139143E01

(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A60-5 (FL+) - A14-1 (FL+)	Below 1 Ω
A60-6 (FL-) - A14-2 (FL-)	Below 1 Ω
A60-5 (FL+) - Body ground	10 kΩ or higher
A60-6 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A60-10 (FR+) - A35-1 (FR+)	Below 1 Ω
A60-9 (FR-) - A35-2 (FR-)	Below 1 Ω
A60-10 (FR+) - Body ground	10 kΩ or higher
A60-9 (FR-) - Body ground	10 kΩ or higher

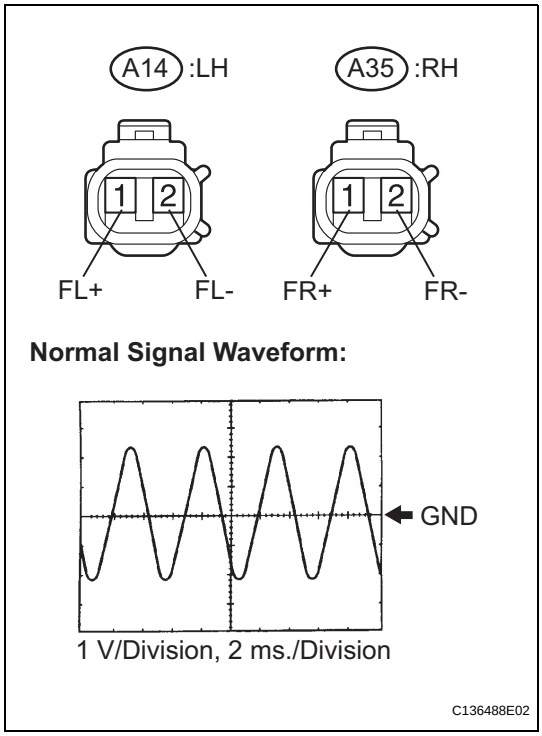
(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)**

OK

BC

8	INSPECT SPEED SENSOR SIGNAL WAVEFORM



(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.
    OK:
    The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.
    HINT:
    - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
    - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connector.

NG → **Go to step 11**

OK

9	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.
HINT:
If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step before replacing the part (See page BC-295).

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

10 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output (When troubleshooting in accordance with the DTC CHART)	C

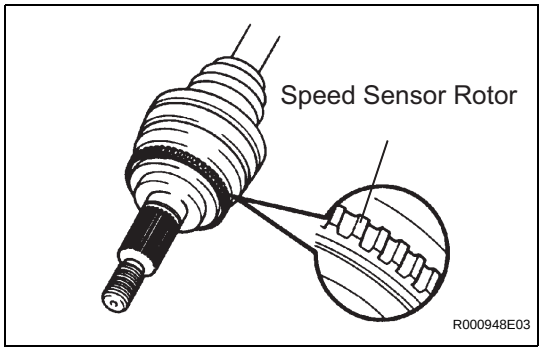
BC

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **END**

A

11 INSPECT SPEED SENSOR TIP



(a) Remove the front speed sensor.
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-290).
(c) Install the speed sensor.

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

CLEAN OR REPLACE SPEED SENSOR ROTOR

DTC	**C0210/33**	**Right Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C0215/34**	**Left Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C1273/73**	**Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1274/74**	**Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1277/77**	**Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1278/78**	**Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1332/38**	**Right Rear Speed Sensor Circuit**
DTC	**C1333/39**	**Left Rear Speed Sensor Circuit**

BC

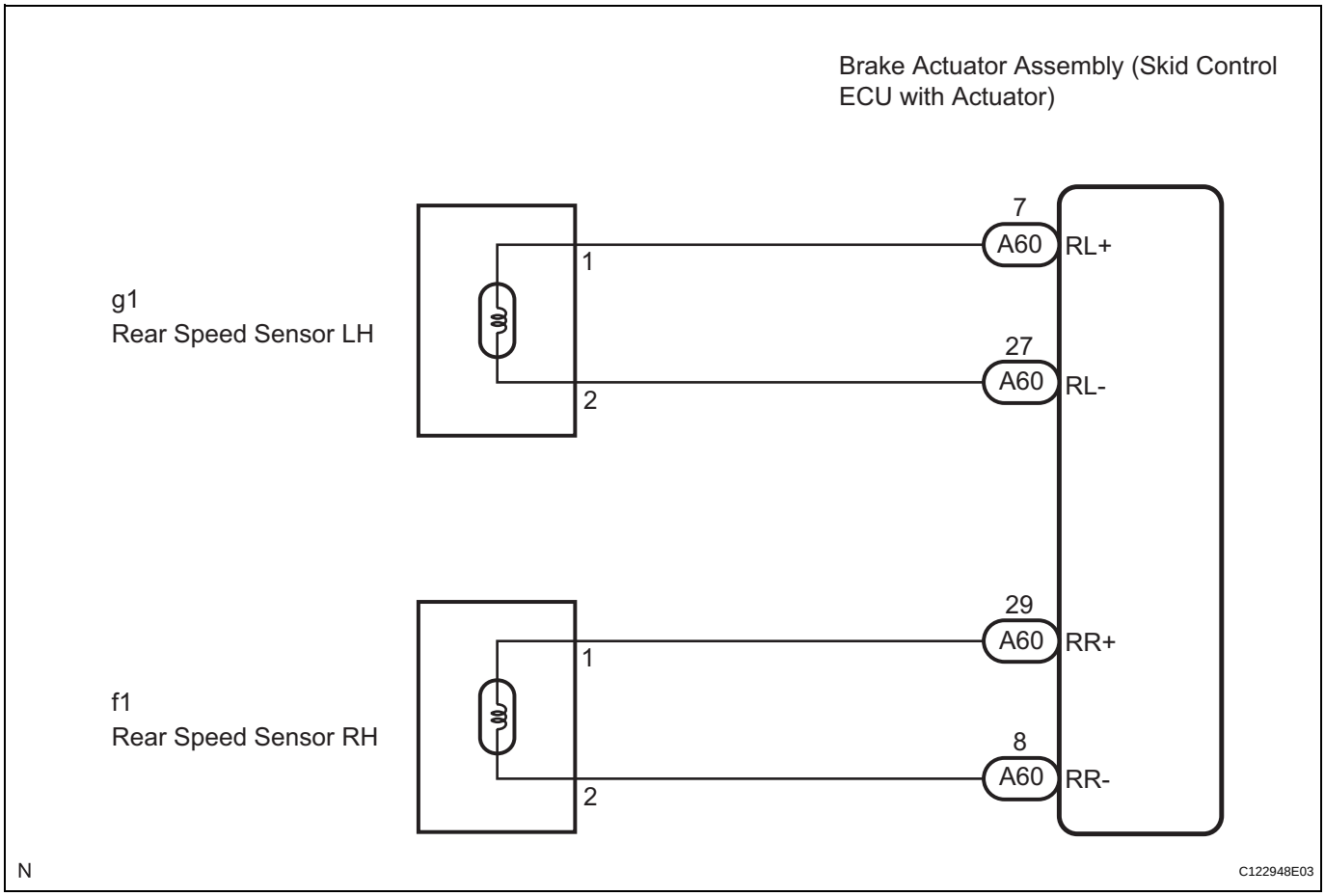
DESCRIPTION

Refer to DTCs C0200/31, C0205/32, C1330/35, and C1331/36 (See page BC-316).
DTCs from C1273/73 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs from C1273/73 to C1278/78 are output only in the test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h) and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h), after the initial start or restart, a wheel speed of 0 mph (0 km/h) is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Rear speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1332/38 C1333/39	Abnormality in the resistance value of each speed sensor is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Sensor installation
C1273/73 C1274/74	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor
C1277/77 C1278/78	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor

HINT:
DTC No. C0210/33 and C1332/38 are for the rear speed sensor RH.
DTC No. C0215/34 and C1333/39 are for the rear speed sensor LH.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

OK

2 PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-290).

Result

Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

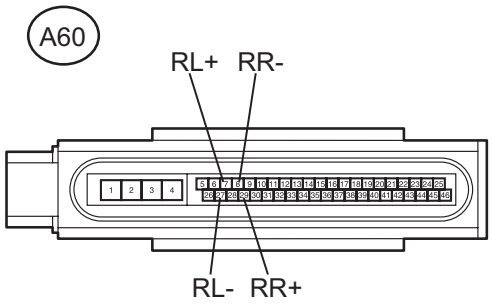
BC

B → **Go to step 5**

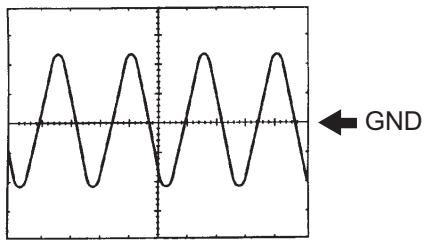
A

3 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C139144E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the skid control ECU connector.
  (2) Connect the oscilloscope to the rear speed sensor terminals of the skid control ECU.
  (3) Check that a waveform is output when the tires are rotated.

  OK:

  The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

  (4) Connect the connector.

NG → **REPAIR OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

4 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	A
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output (When troubleshooting in accordance with the DTC CHART)	C

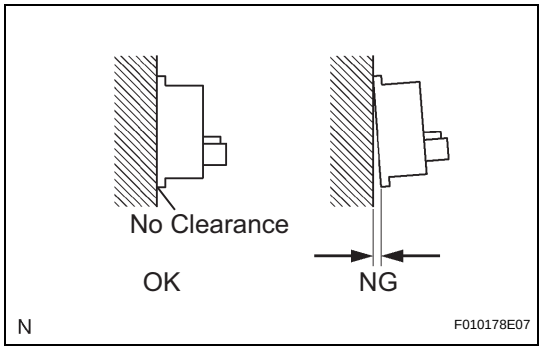
BC

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **END**

A

5 INSPECT SPEED SENSOR INSTALLATION

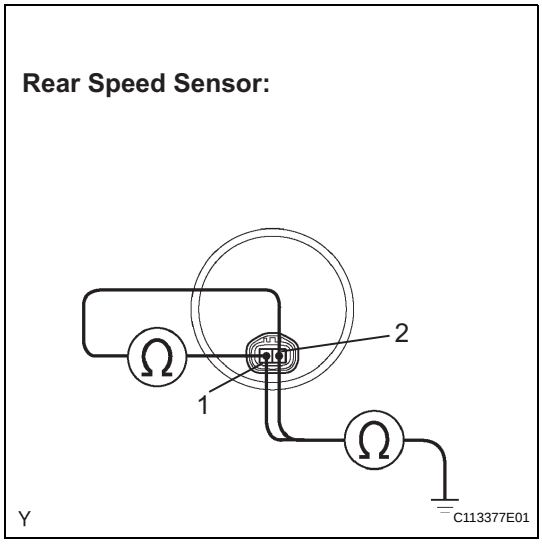


(a) Check the rear speed sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.
NOTICE:
Check the speed sensor signal after replacement (See page BC-290).

NG → **INSTALL REAR SPEED SENSOR CORRECTLY**

OK

6	INSPECT REAR SPEED SENSOR



(a) Disconnect the rear speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 (RR+) - g1-2 (RR-)	Below 2.2 kΩ
g1-1 (RR+) - Body ground	10 kΩ or higher
g1-2 (RR-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 (RL+) - f1-2 (RL-)	Below 2.2 kΩ
f1-1 (RL+) - Body ground	10 kΩ or higher
f1-2 (RL-) - Body ground	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-290).

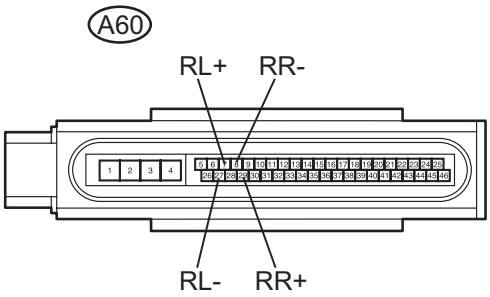
NG → **REPLACE REAR SPEED SENSOR (See page BC-443)**

OK

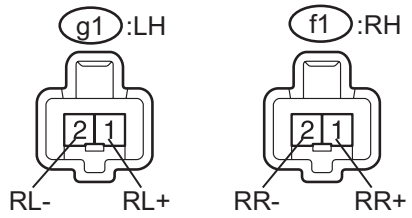
BC

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO SKID CONTROL SENSOR WIRE)

Skid Control ECU (Harness Side Connector Front View):



Rear Speed Sensor (Harness Side Connector Front View):



N

C139145E02

(a) Check the harness and connector.
(1) Disconnect the skid control ECU connector and the rear speed sensor connector.
(2) Disconnect the skid control sensor wire.
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A60-7 (RL+) - g1-1 (RL+)	Below 1 Ω
A60-27 (RL-) - g1-2 (RL-)	Below 1 Ω
A60-7 (RL+) - Body ground	10 kΩ or higher
A60-27 (RL-) - Body ground	10 kΩ or higher

RH

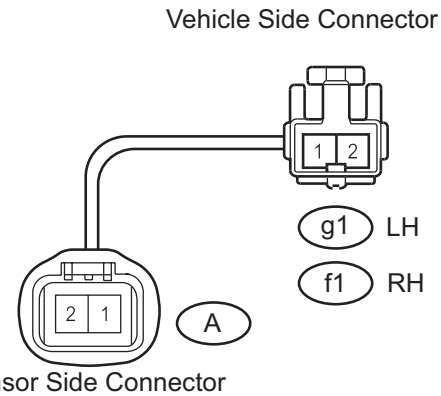
Tester Connection	Specified Condition
A60-29 (RR+) - f1-1 (RR+)	Below 1 Ω
A60-8 (RR-) - f1-2 (RR-)	Below 1 Ω
A60-29 (RR+) - Body ground	10 kΩ or higher
A60-8 (RR-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO SKID CONTROL SENSOR WIRE)**

OK

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE TO REAR SPEED SENSOR)

Skid Control Sensor Wire:



C113396E05

(a) Check harness and connector (skid control sensor wire).
(1) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 - A-1	Below 1 Ω
g1-1 - A-2	10 kΩ or higher
g1-1 - Body ground	10 kΩ or higher
g1-2 - A-2	Below 1 Ω
g1-2 - A-1	10 kΩ or higher
g1-2 - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 - A-1	Below 1 Ω

BC

Tester Connection	Specified Condition
f1-1 - A-2	10 kΩ or higher
f1-1 - Body ground	10 kΩ or higher
f1-2 - A-2	Below 1 Ω
f1-2 - A-1	10 kΩ or higher
f1-2 - Body ground	10 kΩ or higher

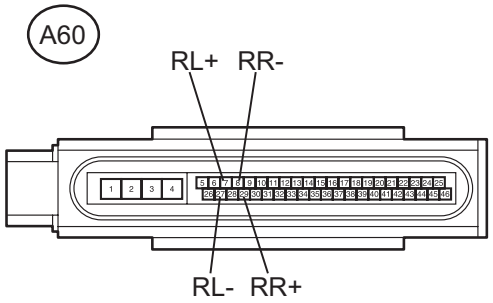
(2) Connect the connector.

NG → **REPAIR OR REPLACE SKID CONTROL SENSOR WIRE**

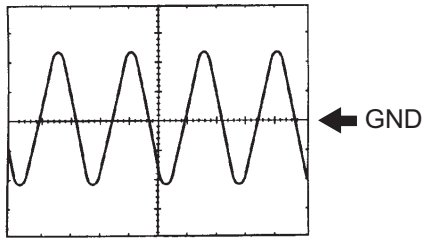
OK

9 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C139144E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
(1) Disconnect the skid control ECU connector.
(2) Connect the oscilloscope to the rear speed sensor terminals of the skid control ECU.
(3) Check that a waveform is output when the tires are rotated.
OK:
The same waveforms is output from rear wheels and there is no noise or interference in the waveform.
HINT:
- As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

(4) Connect the connector.

NG → **CLEAN OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

10 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

HINT:

- It is suspected that the DTCs were output due to a bad connection of the connector terminal.
- If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step (See page BC-295).

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

11 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).

(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.

(c) Check if the same DTCs are recorded (See page BC-302).

HINT:

Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	**A**
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	**B**
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output (When troubleshooting in accordance with the DTC CHART)	**C**

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **END**

A

12	INSPECT SPEED SENSOR ROTOR

(a) Turn the ignition switch off.
(b) Remove the rear axle.
(c) Check the rotor.
OK:
No scratches, cracks, oil, or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-290).
(d) Install the rear axle.

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

BC

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

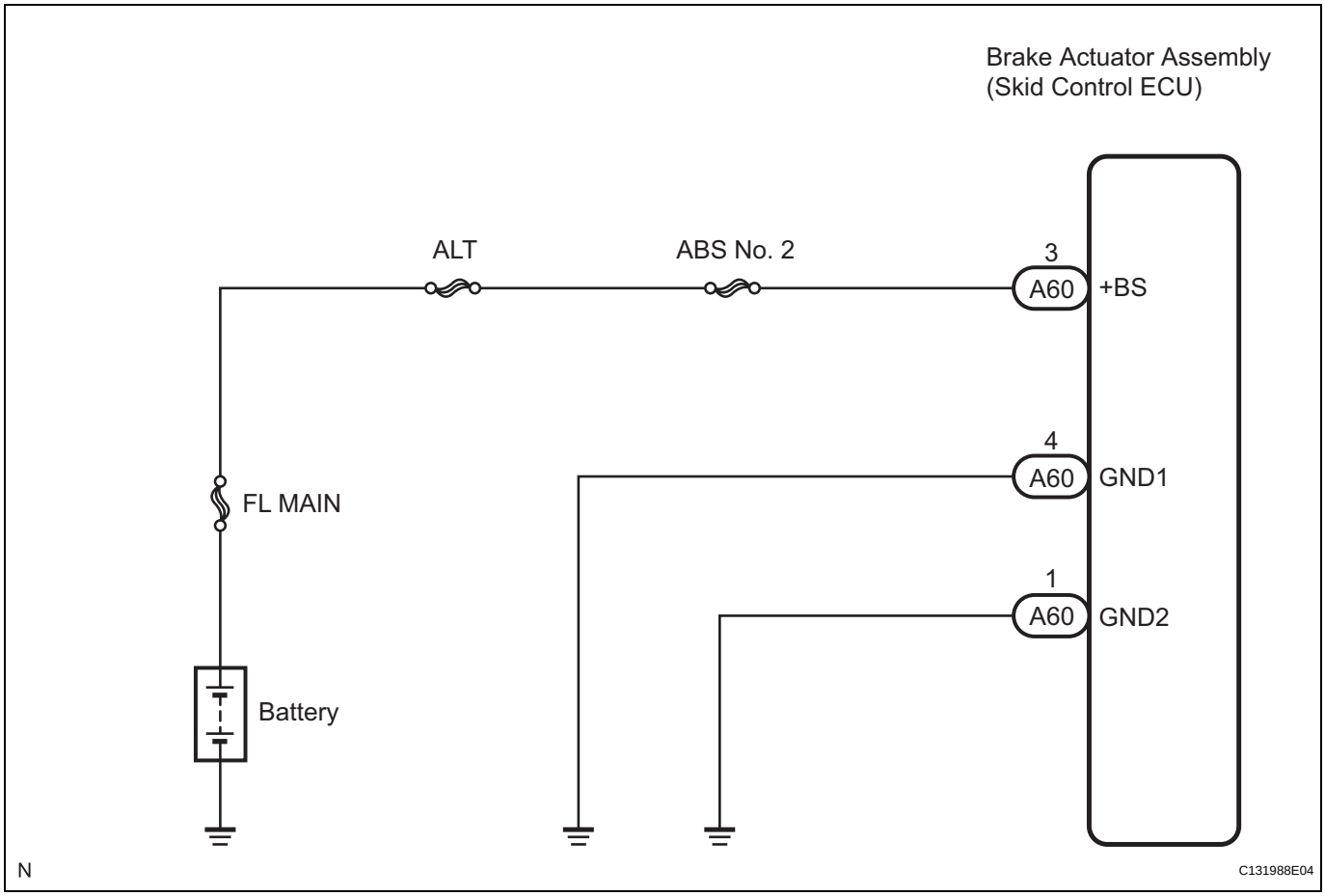
DESCRIPTION

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Solenoid valve signal does not match the check result.	• Each solenoid circuit • Brake actuator assembly

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are detected when a problem is identified in the brake actuator assembly.
The solenoid circuits are located in the brake actuator assembly.
Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).

BC

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly (skid control ECU). Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

DTC	C0273/13	Open or Short Circuit in ABS Motor Relay Circuit

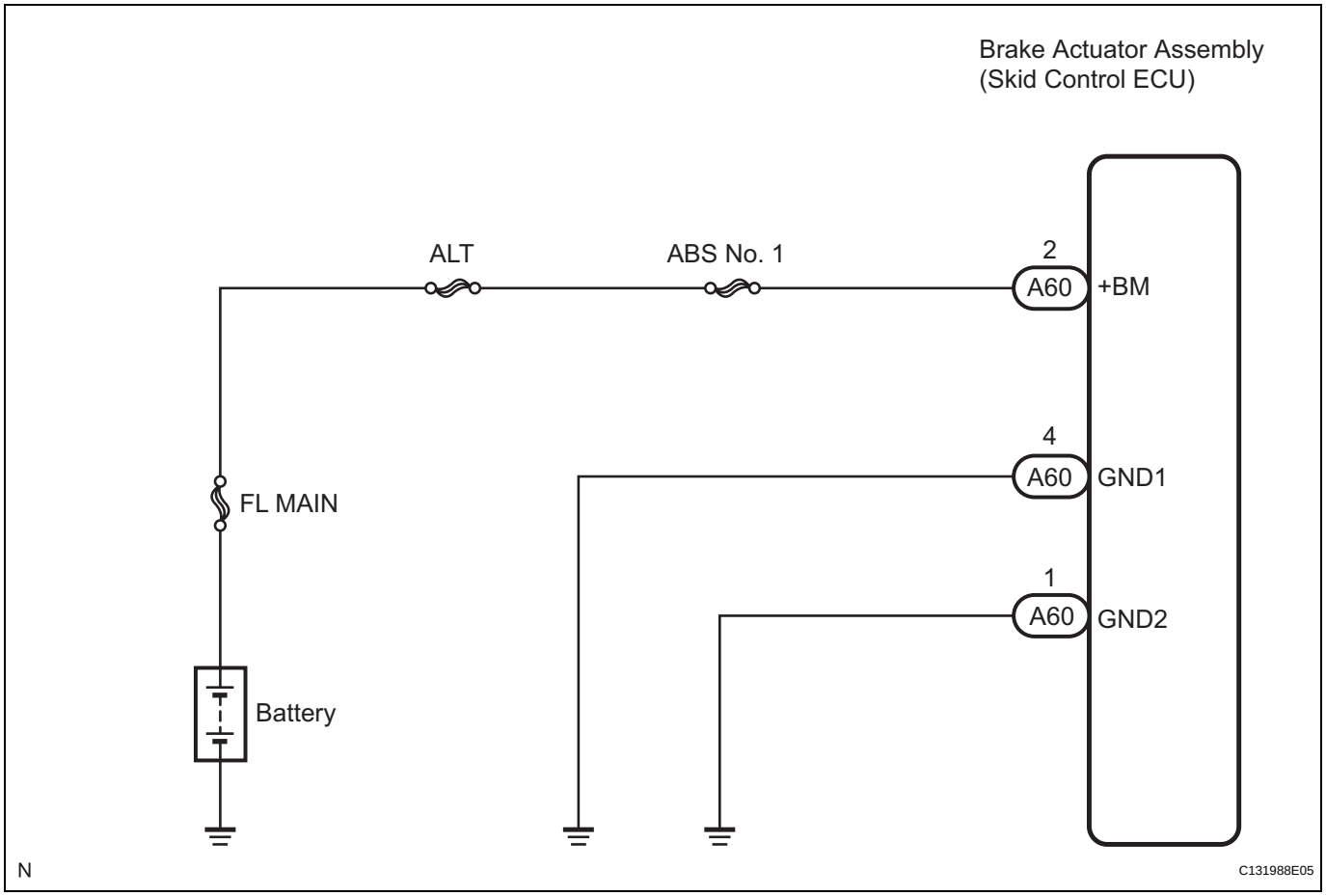
DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the motor relay on and operates the ABS pump motor.
If the voltage supplied to the motor relay (+BM) is below the DTCs detection threshold due to low voltage from the battery or alternator, the DTC may be stored.

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	When any of the following is detected: • When the motor relay is actuated, voltage is not supplied to the pump motor within 0.1 seconds. • For 30 to 125 ms after the motor relay is turned from ON to OFF, the remaining high voltage is out of range. The motor relay is turned from ON to OFF 3 times. If the voltage is still out of range in the 3rd operation, this failure is detected. • When the motor relay is changed from ON to OFF, the remaining high voltage is more than 2 V for 1 second.	• ABS No. 1 fuse (Fusible link) • Brake actuator assembly (skid control ECU) • Motor relay circuit

BC

WIRING DIAGRAM



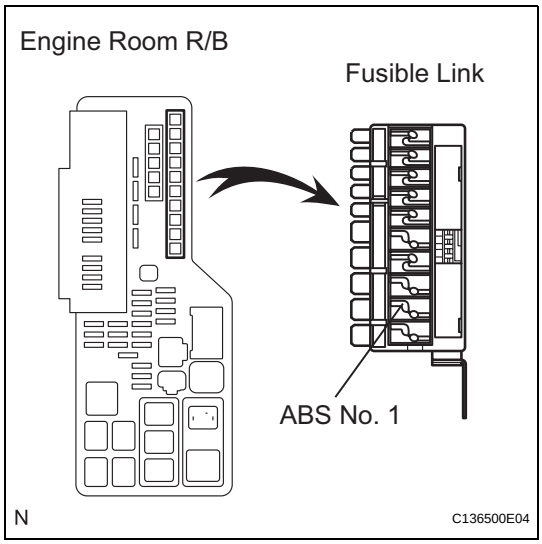
INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0273/13, inspect and repair the trouble areas indicated by C1241/41 (See page BC-361).

- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	INSPECT FUSIBLE LINK (ABS NO. 1 FUSE)



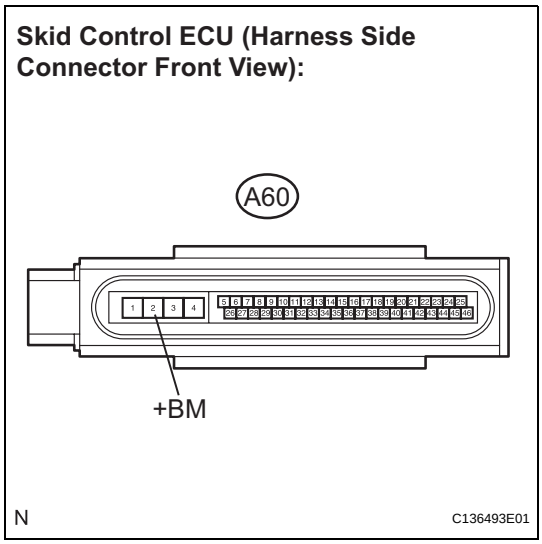
(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is malted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2	INSPECT SKID CONTROL ECU (+BM TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

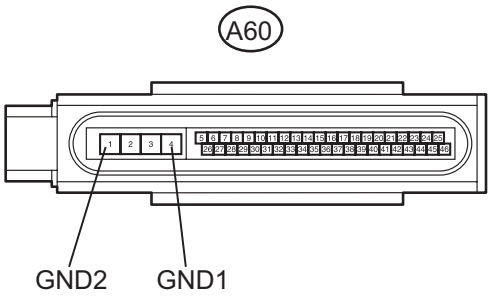
Tester Connection	Condition	Specified Condition
A60-2 (+BM) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BM CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Select "ACTIVE TEST" on the intelligent tester (See page BC-307).

ACTIVE TEST: ABS/TRAC/VSC

Item	Measurement Item/Range (Display)	Normal Condition
ABS MTR RELAY	Turns ABS motor relay ON/OFF	Operating sound of motor is heard.

(d) Check the operating sound of the ABS motor relay when operating it with the intelligent tester.

OK:

The operating sound of the ABS motor relay is heard.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

5 RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The ABS motor relay is located in the brake actuator assembly.
Therefore, ABS motor relay inspection and motor relay unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).

BC

(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly (skid control ECU). Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A →

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

DTC	C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit

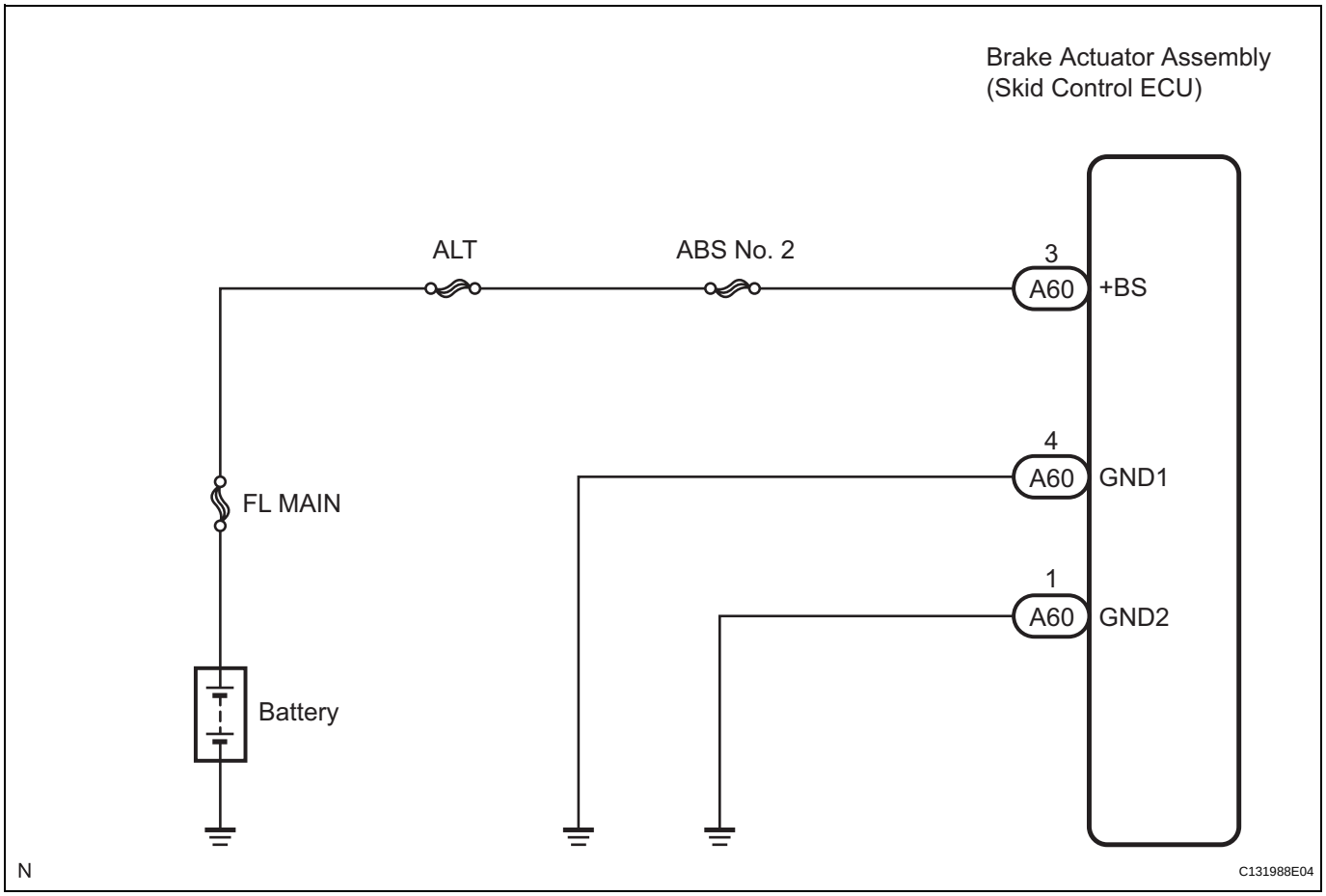
DESCRIPTION

The ABS solenoid relay supplies power to the ABS solenoid.
The solenoid relay is turned on 1.5 seconds after the ignition switch is turned on (IG), and is turned off if an open or short in the solenoid is detected by self diagnosis performed when the vehicle starts running.
The ABS solenoid relay is housed in the skid control ECU in the brake actuator assembly.
HINT:
If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the skid control ECU performs self diagnosis of the motor and solenoid circuits.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When any of the following is detected: • When the relay is ON, the voltage is less than IG terminal voltage x 0.8 V for 0.5 seconds. • When the relay is OFF, the voltage is out of range (IG terminal voltage x 0.1 to IG terminal voltage x 0.8).	• ABS No. 2 fuse (Fusible link) • Brake actuator assembly (skid control ECU) • Solenoid relay circuit

BC

WIRING DIAGRAM

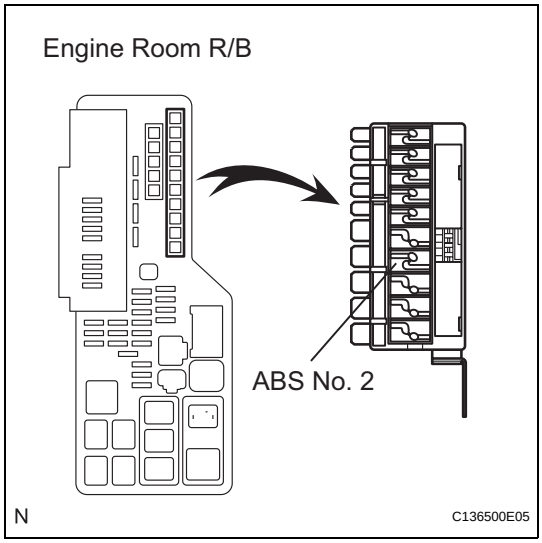


INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0278/11, inspect and repair the trouble areas indicated by C1241/41 (See page BC-361).
- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 INSPECT FUSIBLE LINK (ABS NO. 2 FUSE)



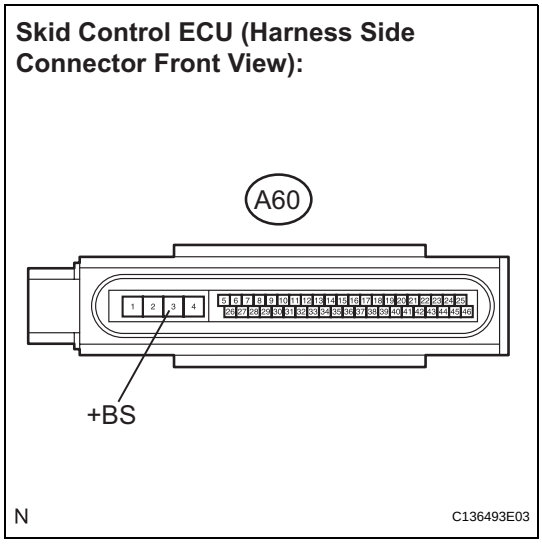
(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is melted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2 INSPECT SKID CONTROL ECU (+BS TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

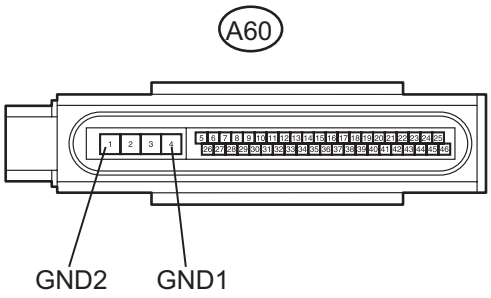
Tester Connection	Condition	Specified Condition
A60-3 (+BS) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The solenoid circuit is located in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

BC

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

DTC	C0365/28	Malfunction in Deceleration Sensor

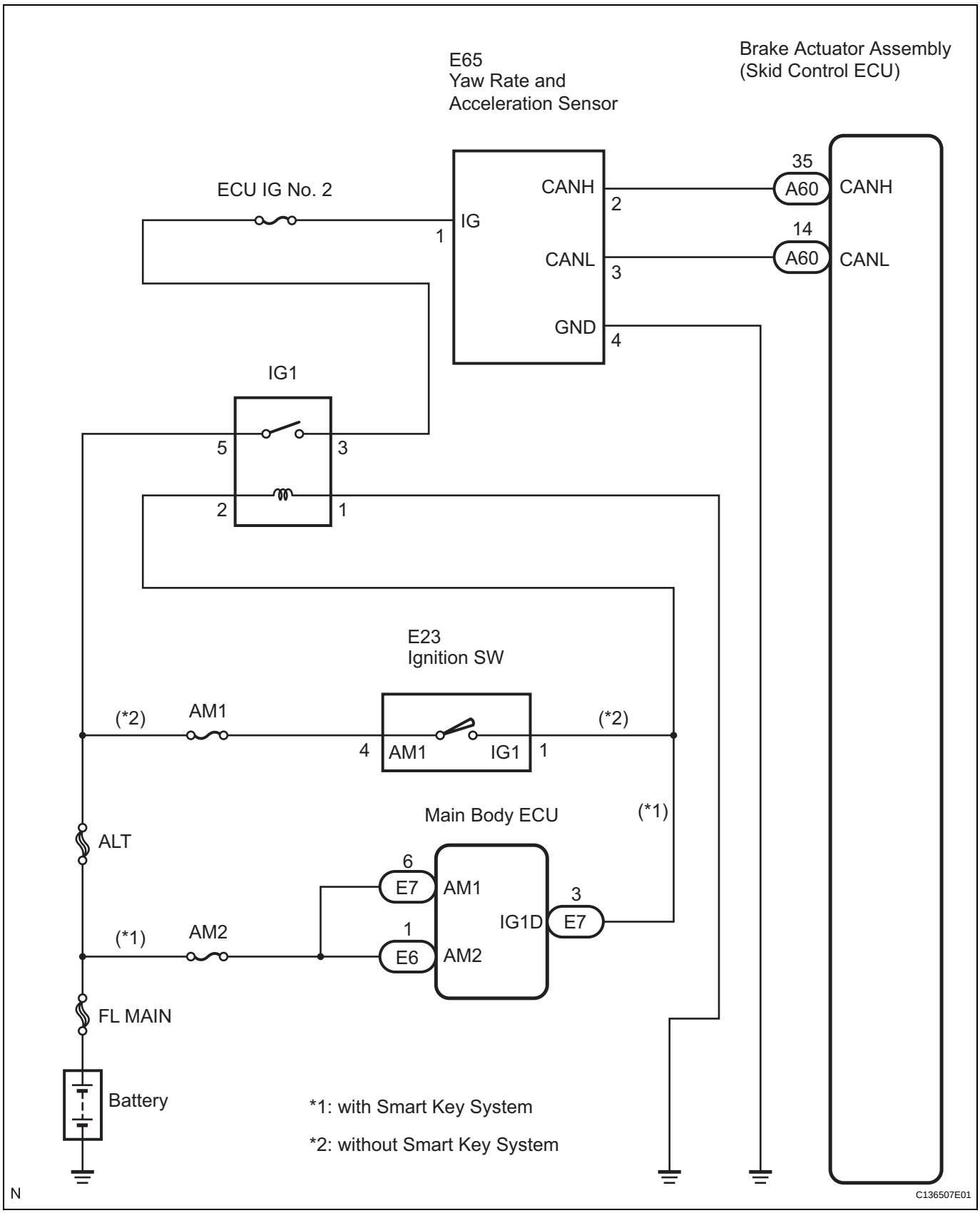
DTC	C1234/34	Yaw Rate Sensor Malfunction

DESCRIPTION

The deceleration sensor is combined with the yaw rate and acceleration sensor.
The brake actuator receives signals from the yaw rate and acceleration sensor via the CAN communication system.
If there is trouble in the CAN communication system, DTCs U0073/94 and U0123/62 are output.

DTC No.	DTC Detection Condition	Trouble Area
C0365/28	When any of the following is detected: • Lateral acceleration difference between sensor signal and reference value is large. • Offset value of sensor signal is higher than the standard value. • Sensor signal is out of range (2.25 m/s^2).	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit • Sensor installation • Brake actuator assembly (skid control ECU)
C1234/34	Sensor malfunction signal is received from the yaw rate sensor.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

- When U0073/94, U0100/65, U0123/62 and/or U0126/63 is output together with C0365/28, inspect and repair the trouble areas indicated by U0073/94, U0100/65, U0123/62 and/or U0126/63 first.

1 CHECK DTC

(a) Clear the DTCs (See page BC-302).
(b) Start the engine.
(c) At a speed of 18 mph (30 km/h) or more, drive the vehicle, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.
(d) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

BC

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 INSPECT YAW RATE AND ACCELERATION SENSOR INSTALLATION

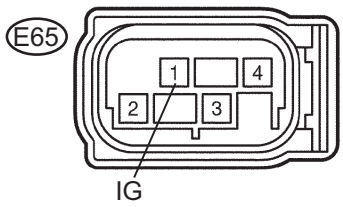
(a) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-448).
OK:
The sensor should be tightened to the specified torque.
The sensor should not be titled.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

3 INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)

Yaw Rate and Acceleration Sensor (Harness Side Connector Front View):



F048983E13

(a) Disconnect the yaw rate and acceleration sensor connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

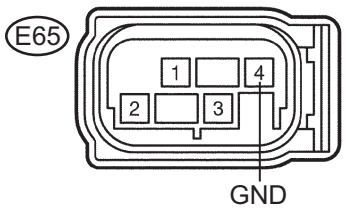
Tester Connection	Condition	Specified Condition
E65-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)**

OK

4 INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)

Yaw Rate and Acceleration Sensor (Harness Side Connector Front View):



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E65-4 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

5 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Start the engine.
(c) At a speed of 18 mph (30 km/h) or more, drive the vehicle, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.
(d) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is output	A
DTC is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTC is not output (When troubleshooting in accordance with the DTC CHART)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)**

A

REPLACE YAW RATE AND ACCELERATION SENSOR (See page BC-447)

DTC	C1201/51	Engine Control System Malfunction

DESCRIPTION

If a malfunction in the engine control system is detected, the operations of VSC and TRAC are prohibited by the fail safe function (See page BC-306).
When the signals from the engine are input normally, the fail safe is cancelled and the DTC is not stored.

DTC No.	DTC Detecting Condition	Trouble Area
C1201/51	A trouble signal in the engine control system is input.	Engine control system

INSPECTION PROCEDURE

1	CHECK DTC (ENGINE CONTROL SYSTEM)

(a) Clear the DTC (engine control system) (See page ES-38 for 2AZ-FE, ES-45 for 2GR-FE).
(b) Perform a road test.
(c) Check for the DTC (engine control system).

BC

Result

Display (DTC Output)	Proceed to
DTC (engine control system) is not output	A
DTC (engine control system) is output	B

B → REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (ENGINE CONTROL SYSTEM)

A → REPLACE ECM

DTC	C1225/25	SMC Solenoid Circuit

DTC	C1226/26	SMC Solenoid Circuit

DTC	C1227/27	SRC Solenoid Circuit

DTC	C1228/28	SRC Solenoid Circuit

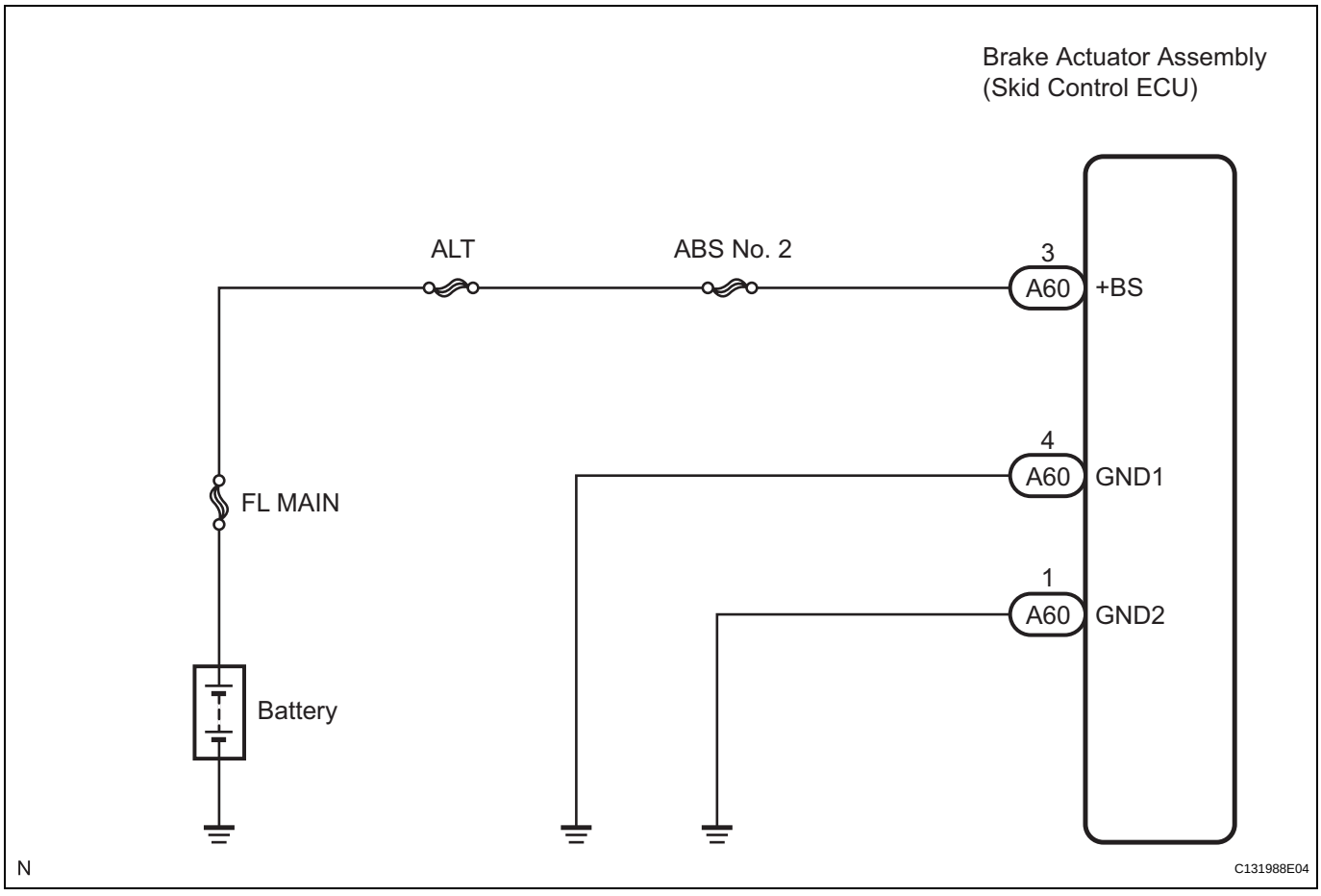
DESCRIPTION

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C1225/25	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SMC1 circuit
C1226/26	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SMC2 circuit
C1227/27	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SRC1 circuit
C1228/28	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SRC2 circuit

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are detected when a problem is identified in the brake actuator assembly.
The solenoid circuits are located in the brake actuator assembly.
Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly (skid control ECU). Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

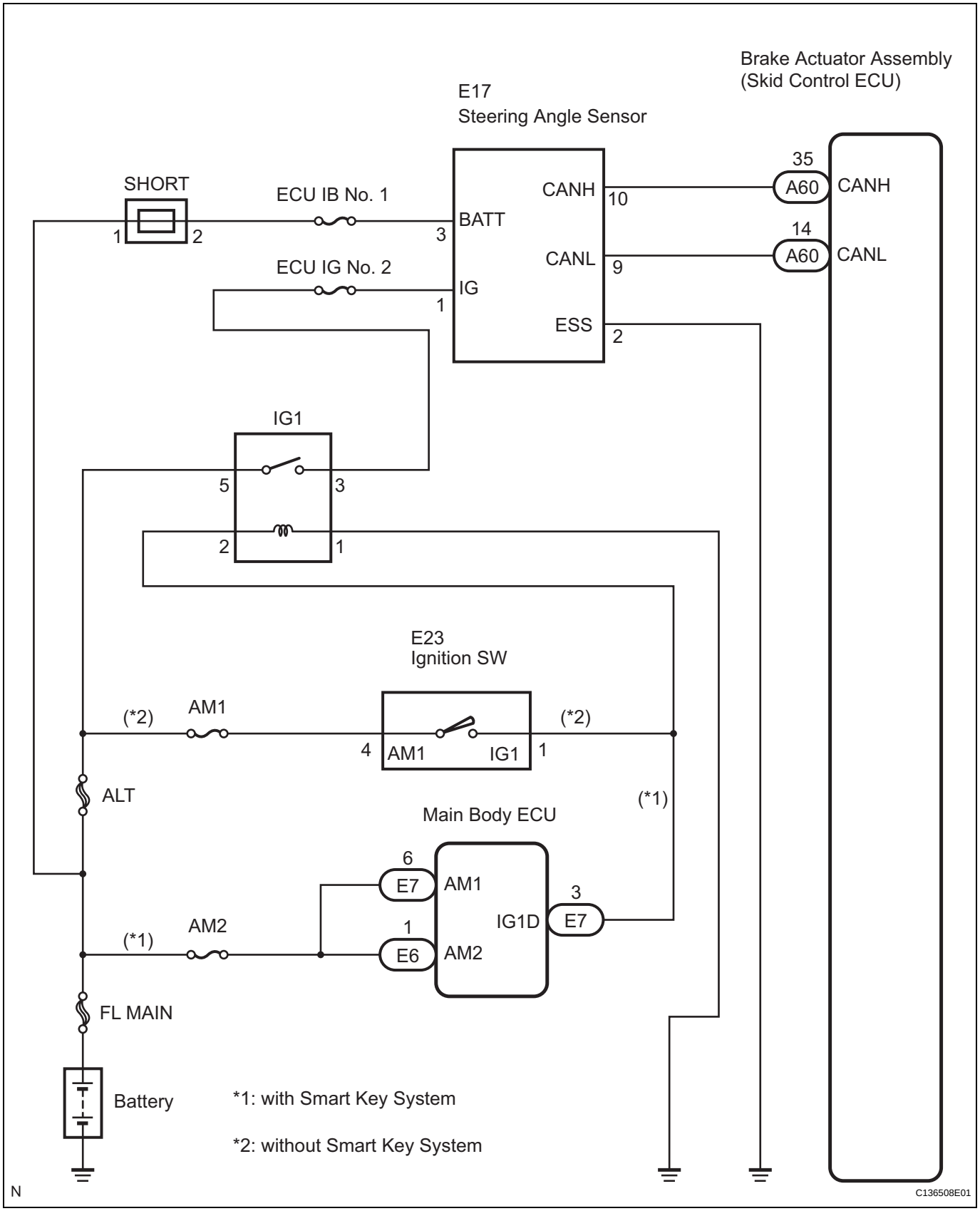
DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU via the CAN communication system. When there is a malfunction in the CAN communication system, it will be detected by the steering angle sensor zero point malfunction diagnostic function.

DTC No.	DTC Detection Condition	Trouble Area
C1231/31	When any of the following is detected: • With ECU terminal IG1 voltage 9.8 V or more, the condition that the ECU does not receive data from the steering angle sensor continues. • Internal sensor failure • The offset value is out of range. • Sensor signal changes too rapidly. • Steering angle value difference between measured and reference is out of range. • Steering angle sensor signal is out of range.	• Steering angle sensor • Steering angle sensor circuit • Steering angle sensor power supply

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

- When U0073/94, U0100/63, U0123/62 and/or U0126/63 is output together with C1231/31, inspect and repair the trouble areas indicated by U0073/94, U0100/65, U0123/62 and/or U0126/63 first.
- When the speed sensor or the yaw rate and acceleration sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate and acceleration sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate and acceleration sensor first, and then inspect and repair the steering angle sensor.
- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK DTC

(a) Clear the DTC (See page BC-302).
(b) Turn the ignition switch off.
(c) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output.
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 22 mph (35 km/h) and check that no speed sensor and yaw rate and acceleration sensor DTCs are output (See page BC-302).

BC

Result

Condition	Proceed to
No CAN communication system DTC and the speed sensor or yaw rate and acceleration sensor DTC are output	A
CAN communication system DTC is output	B
Speed sensor or yaw rate and acceleration sensor DTC is output	C

HINT:

- If there is a malfunction in the speed sensor or the yaw rate and acceleration sensor, an abnormal value may be output although the steering angle sensor is normal.
- If the speed sensor and the yaw rate and acceleration sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor.

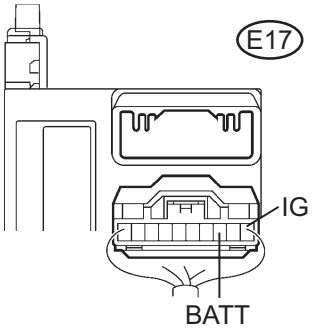
B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

C → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (See page BC-311)**

A

2 INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL)

Steering Angle Sensor Wire Harness View:



G030156E17

(a) Remove the column cover lower.
(b) Disconnect the steering angle sensor connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

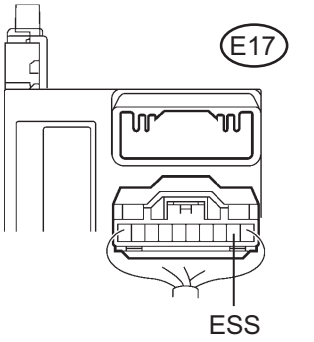
Tester Connection	Condition	Specified Condition
E17-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V
E17-3 (BAT) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3 INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)

Steering Angle Sensor Wire Harness View:



G030156E18

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E17-2 (ESS) - Body ground	Always	Below 1 Ω

(b) Connect the connector.
(c) Install the column cover lower.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)**

OK

REPLACE STEERING ANGLE SENSOR (See page BC-450)

BC

DTC	C1237/37	Tires of Different Size

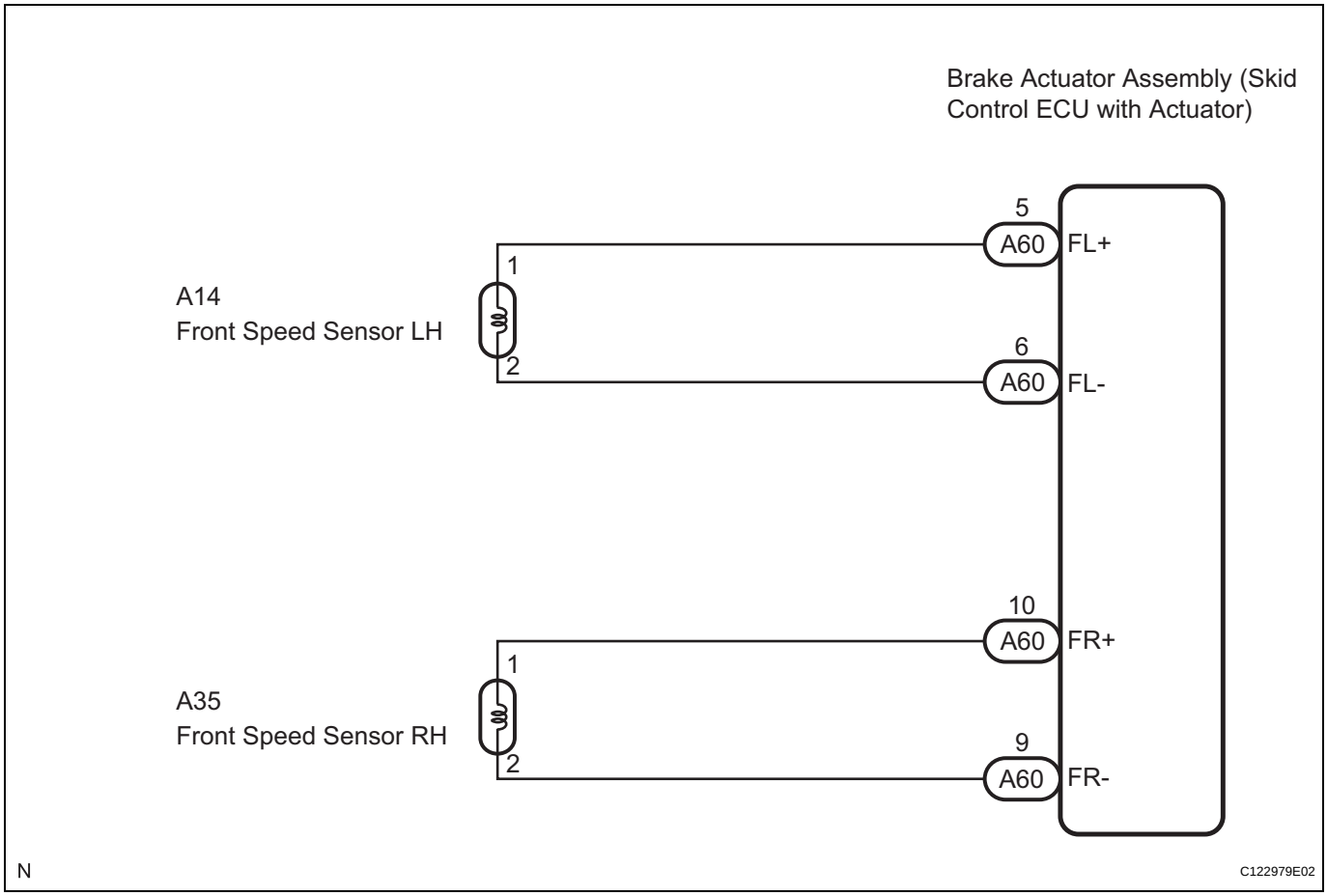
DESCRIPTION

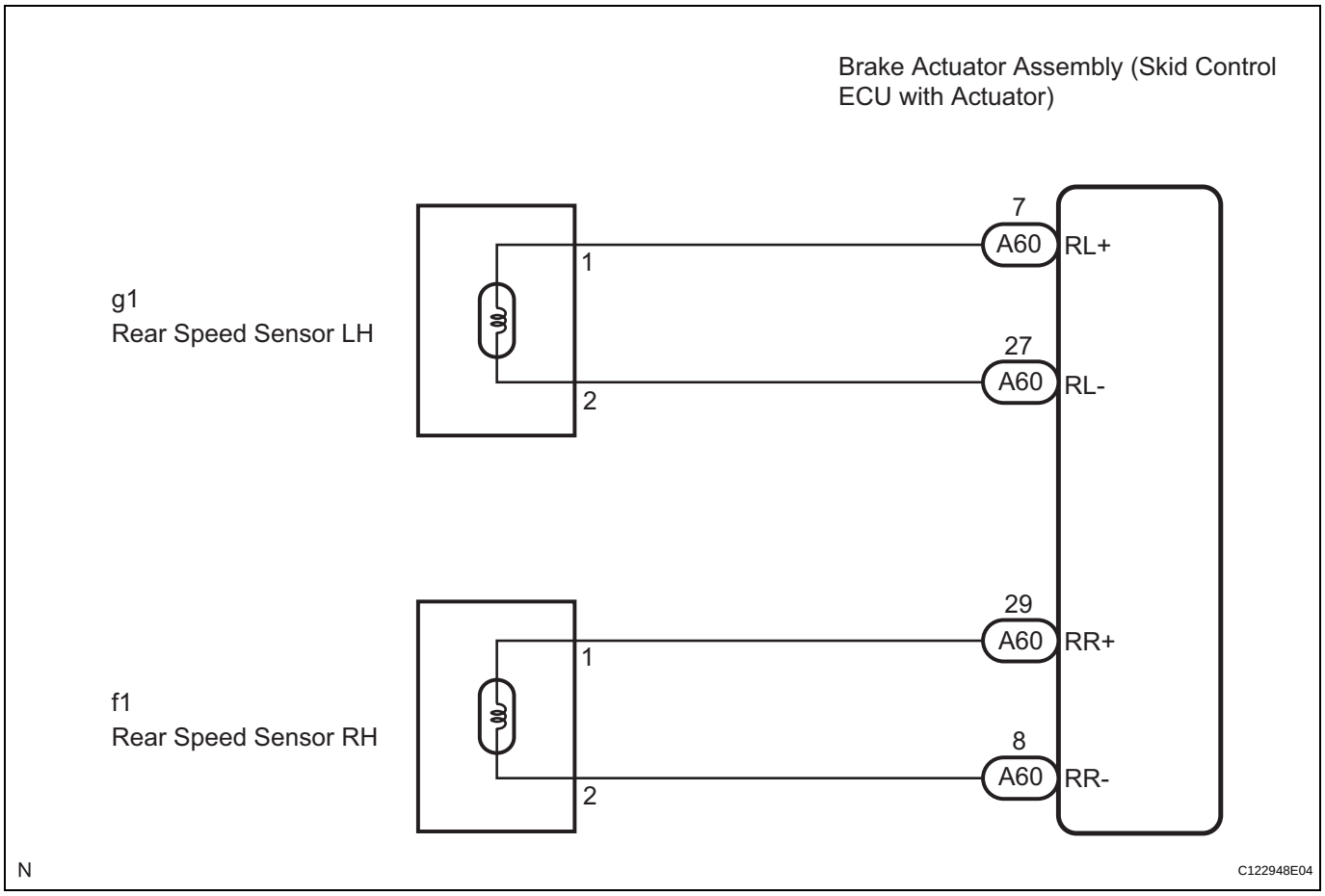
The skid control ECU measures the speed of each wheel by receiving signals from the speed sensor. These signals are used for recognizing that all 4 wheels are operating properly.
Therefore, all wheel signals must be equal.

DTC No.	DTC Detecting Condition	Trouble Area
C1237/37	When any of the following is detected: • Wheel speed difference between the wheels. • Wheel sensor signal failure. • ABS control continues for 60 sec. or more.	• Brake actuator assembly (skid control ECU) • Speed sensor rotor (Front) • Rear axle hub and bearing assembly • Speed sensor • Speed sensor circuit • Tire and wheel size • Tire deformation

WIRING DIAGRAM

BC





BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK TIRES

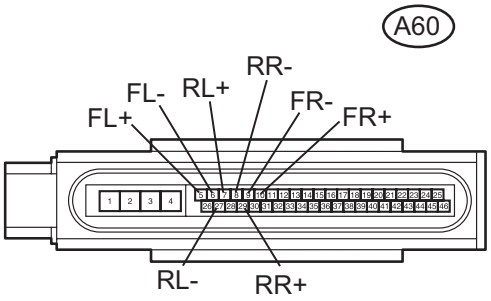
(a) Check the size and condition of all 4 wheels (See page TW-3).
HINT:
The DTC is output when tire deformation or a difference in tire size is detected.
OK:
The diameter of all 4 tires and air pressure are the same.

NG → **REPLACE TIRES SO THAT ALL 4 TIRES ARE THE SAME SIZE**

OK

2 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS

Skid Control ECU (Harness Side Connector Front View):



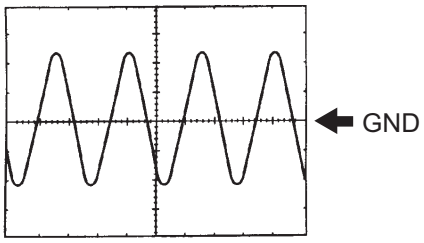
N C136493E04

(a) Lift up the vehicle.
(b) Disconnect the skid control ECU connector.
(c) Connect the oscilloscope to each speed sensor terminal of the skid control ECU connector.

Terminals

Connector	Circuit
A60-5 (FL+) - A60-6 (FL-)	Front left speed sensor
A60-10 (FR+) - A60-9 (FR-)	Front right speed sensor
A60-7 (RL+) - A60-27 (RL-)	Rear left speed sensor
A60-29 (RR+) - A60-8 (RR-)	Rear right speed sensor

Normal Signal Waveform:



1 V/Division, 2 ms./Division

C140980E03

(d) Check that a waveform is output when the tires are rotated (by the sensor circuit).

OK:

A waveform as shown in the figure is output.

HINT:

- Each sensor circuit outputs the same waveform without noise.
- As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

(e) Make sure that the waveform does not change while jiggling a connector or a wire harness.

OK:

The waveform does not change.

HINT:

If the waveform changes while jiggling a connector or a wire harness, there may be a malfunction in the connector or the wire harness.

(f) Connect the connector.

NG → **Go to step 4**

OK

3 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 20 mph (32 km/h) or more for 60 seconds or more.

(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

BC

4 CHECK SPEED SENSOR ROTOR

(a) Check the speed sensor rotor.
Front Speed Sensor Rotor (Front drive outboard joint shaft assembly): (See page DS-23)
Rear Speed Sensor Rotor (Rear axle hub and bearing assembly): (See page AH-14)
OK:
No scratches or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-290).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

5 CHECK SPEED SENSOR TIP

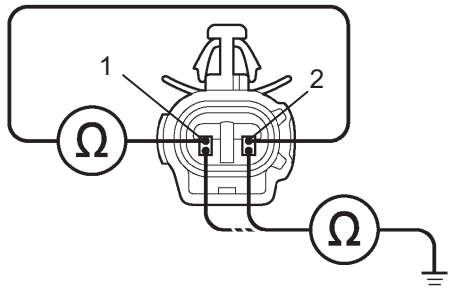
(a) Remove each speed sensor (See page BC-438 for front, BC-443 for rear).
(b) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-290).
(c) Install the speed sensor.

NG → **CLEAN OR REPLACE SPEED SENSOR**

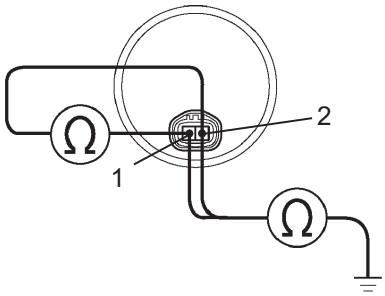
OK

6	INSPECT SPEED SENSOR

Front Speed Sensor:



Rear Speed Sensor:



C136027E02

(a) Disconnect each speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	Always	0.92 to 1.22 kΩ at 20°C
A14-1 (FL+) - Body ground	Always	10 kΩ or higher
A14-2 (FL-) - Body ground	Always	10 kΩ or higher
A35-1 (FR+) - A35-2 (FR-)	Always	0.92 to 1.22 kΩ at 20°C
A35-1 (FR+) - Body ground	Always	10 kΩ or higher
A35-2 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
g1-1 (RL+) - g1-2 (RL-)	Always	Below 2.2 kΩ
g1-1 (RL+) - Body ground	Always	10 kΩ or higher
g1-2 (RL-) - Body ground	Always	10 kΩ or higher
f1-1 (RR+) - f1-2 (RR-)	Always	Below 2.2 kΩ
f1-1 (RR+) - Body ground	Always	10 kΩ or higher
f1-2 (RR-) - Body ground	Always	10 kΩ or higher

NOTICE:

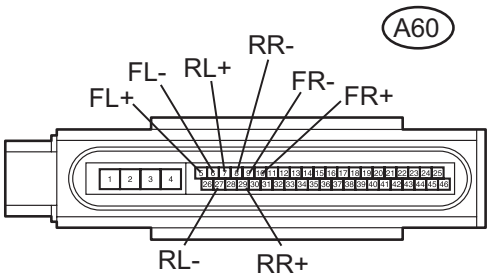
Check the speed sensor signal after replacement (See page BC-290).

NG → **REPLACE EACH SPEED SENSOR**

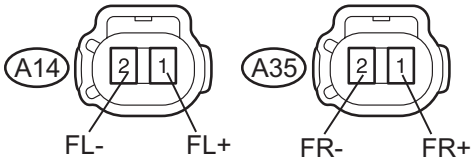
OK

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)

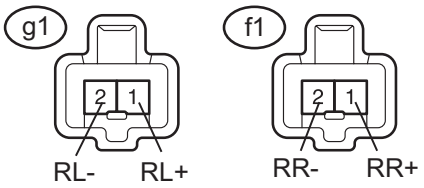
Skid Control ECU (Harness Side Connector Front View):



Front Speed Sensor Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



C139146E02

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A60-5 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A60-5 (FL+) - Body ground	Always	10 kΩ or higher
A60-6 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A60-6 (FL-) - Body ground	Always	10 kΩ or higher
A60-10 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A60-10 (FR+) - Body ground	Always	10 kΩ or higher
A60-9 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A60-9 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
A60-7 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A60-7 (RL+) - Body ground	Always	10 kΩ or higher
A60-27 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A60-27 (RL-) - Body ground	Always	10 kΩ or higher
A60-29 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A60-29 (RR+) - Body ground	Always	10 kΩ or higher
A60-8 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A60-8 (RR-) - Body ground	Always	10 kΩ or higher

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)**

OK

8 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.

BC

(c) Drive the vehicle at a speed of 20 mph (32 km/h) or more for at least 60 seconds.

(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1237/37) is not output	A
DTC (C1237/37) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)**

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

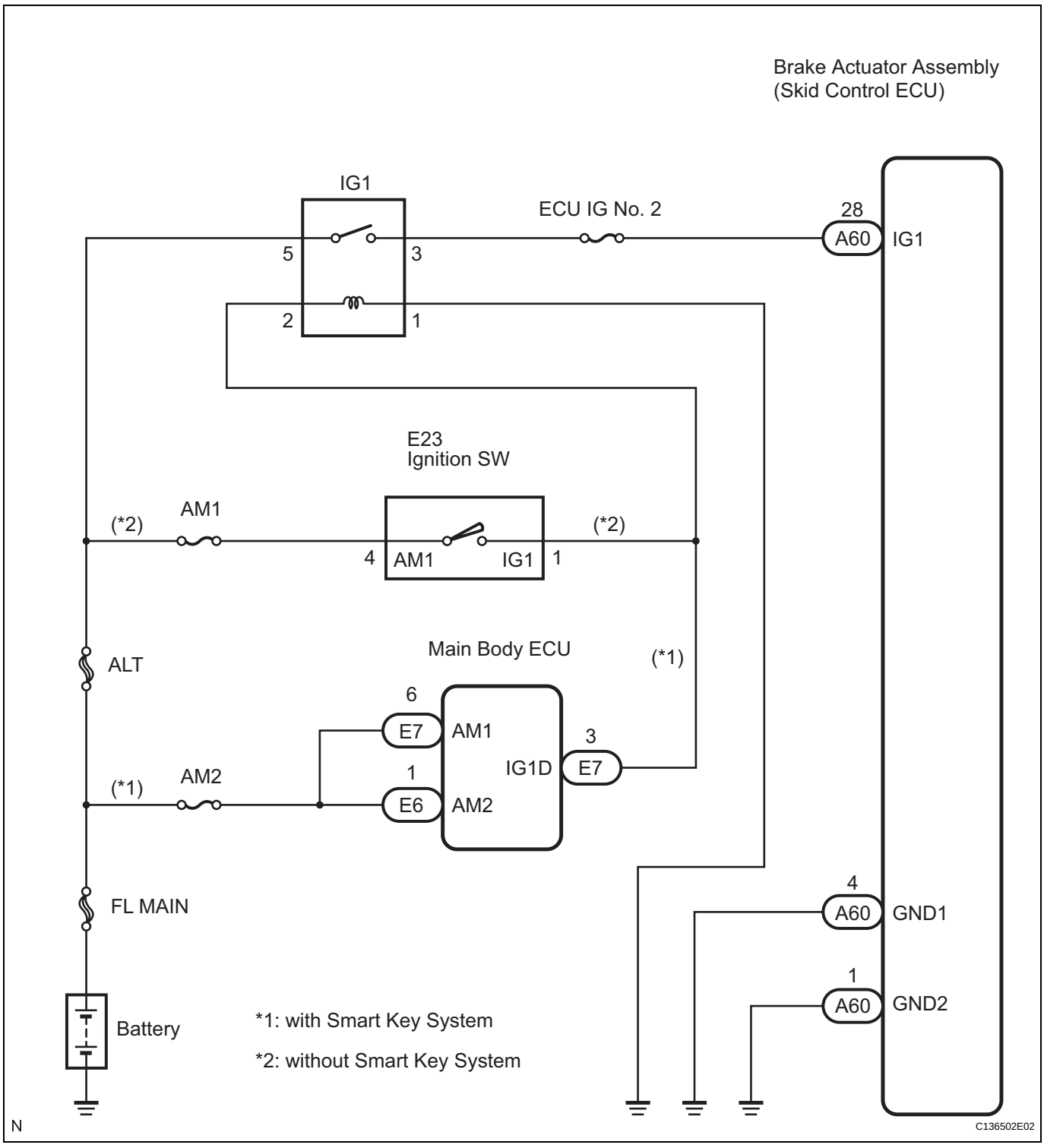
If a malfunction is detected in the power supply circuit of the brake actuator assembly (skid control ECU), the skid control ECU (housed in the actuator assembly) stores this DTC and the fail-safe function prohibits ABS operation.

This DTC is output when the IG1 terminal voltage deviates from the normal condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit.

This DTC is cancelled when the IG1 terminal voltage returns to normal (only when the voltage returns to normal from a voltage lower than the specified value).

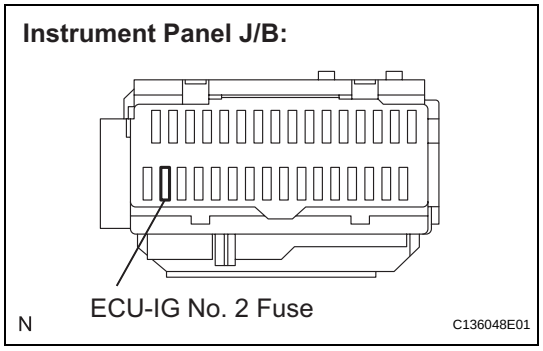
DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When either of the following is detected: • Battery voltage is 16.8 V or more. • Battery voltage is 9.2 V or less.	• Battery • ECU-IG No. 2 fuse • Charging system • Power source circuit • Brake actuator assembly (internal power source circuit)

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT FUSE (ECU-IG NO. 2 FUSE)



(a) Remove the ECU-IG No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
ECU-IG No. 2 fuse	Below 1 Ω (Continuity)

(c) Install the fuse.

NG → **REPLACE FUSE**

OK

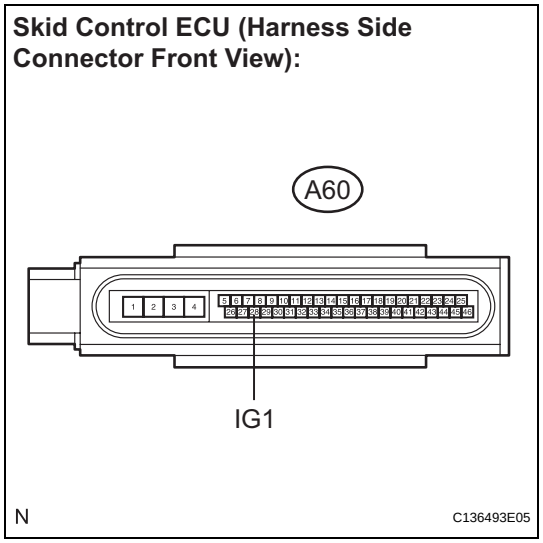
2 INSPECT BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

3 INSPECT SKID CONTROL ECU (IG1 TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

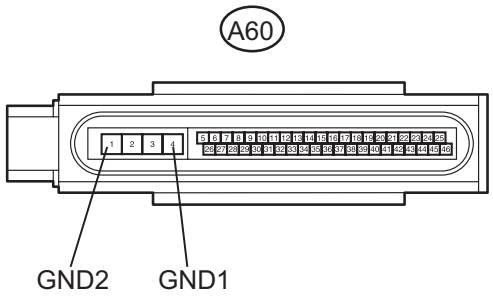
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

BC

4 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

BC

OK

5 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTC is output (When troubleshooting in accordance with the DTC CHART)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

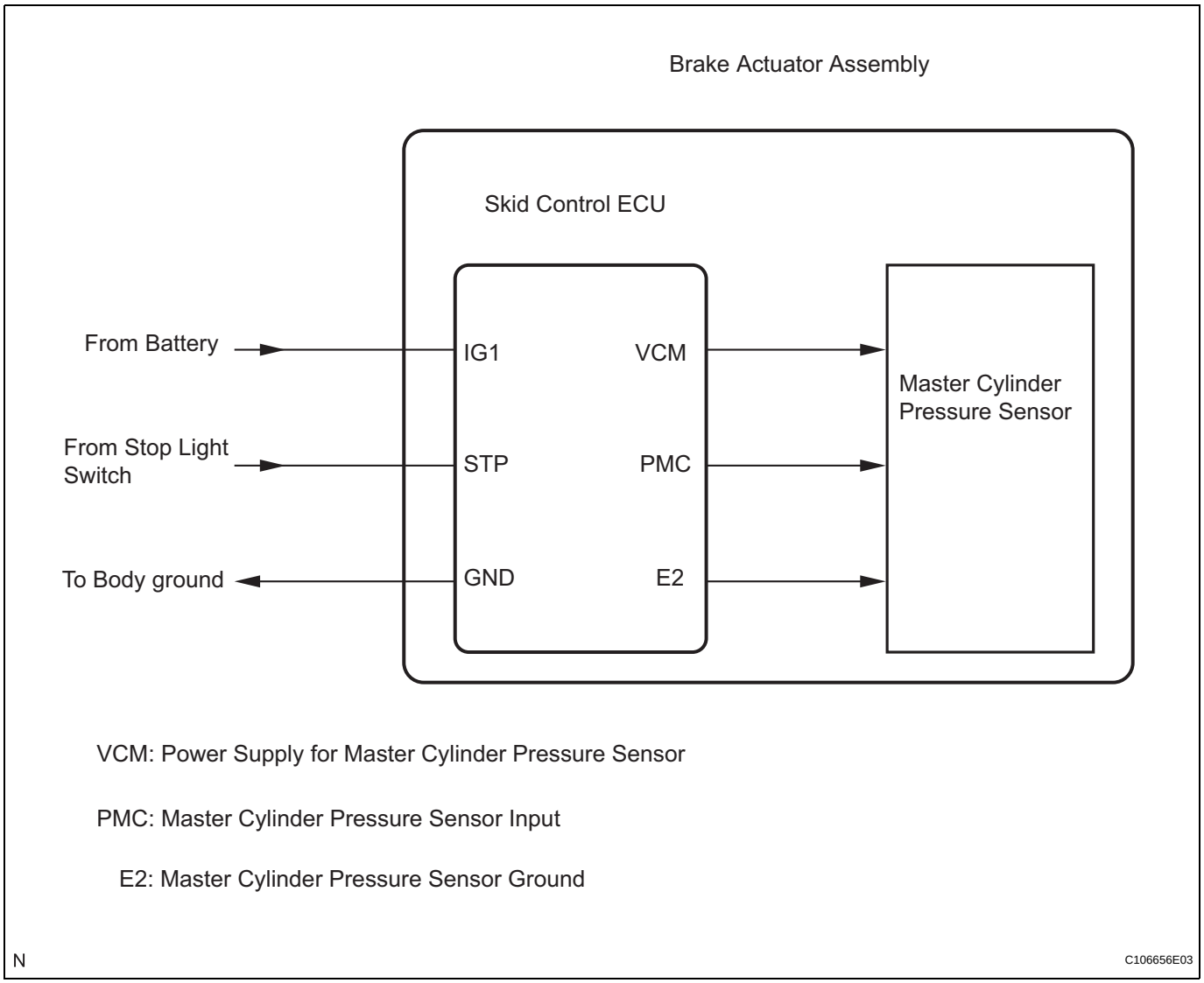
A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DESCRIPTION

The master cylinder pressure sensor is connected to the skid control ECU in the brake actuator assembly.



DTC No.	DTC Detection Condition	Trouble Area
C1246/46	When any of the following is detected: • The voltage of the sensor signal is out of range (less than 0.3 V, more than 4.86 V). • The sensor supply voltage is out of range (above 5.3 V, below 4.7 V). • The sensor signal offset value is out of range. • The sum of signal 1 and signal 2 is out of range (above 5.5 V, below 4.5 V).	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit • Stop light switch circuit • Brake actuator assembly (skid control ECU)

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK STOP LIGHT OPERATION

(a) Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG → **INSPECT STOP LIGHT CIRCUIT**

OK ↓

2	READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

BC

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the "DATA LIST" mode on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item (Display)	Measurement Item / Range (Display)	Normal Condition
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V

(d) Check that the hydraulic pressure value of the master cylinder pressure sensor observed on the intelligent tester changes when the brake pedal is depressed.
OK:
When the pedal is depressed, voltage displayed on the intelligent tester increases.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK ↓

3	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Select the "DATA LIST" mode on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item (Display)	Measurement Item / Range (Display)	Normal Condition
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released

(b) Check that the stop light condition observed on the intelligent tester changes when the brake pedal is depressed.
OK:
When the brake pedal is depressed, the intelligent tester displays "ON".

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

4	RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) At a speed of 18 mph (30 km/h) or more, drive the vehicle and perform braking test (decelerate the vehicle by depressing the brake pedal).
(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1246/46) is not output	A
DTC (C1246/46) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

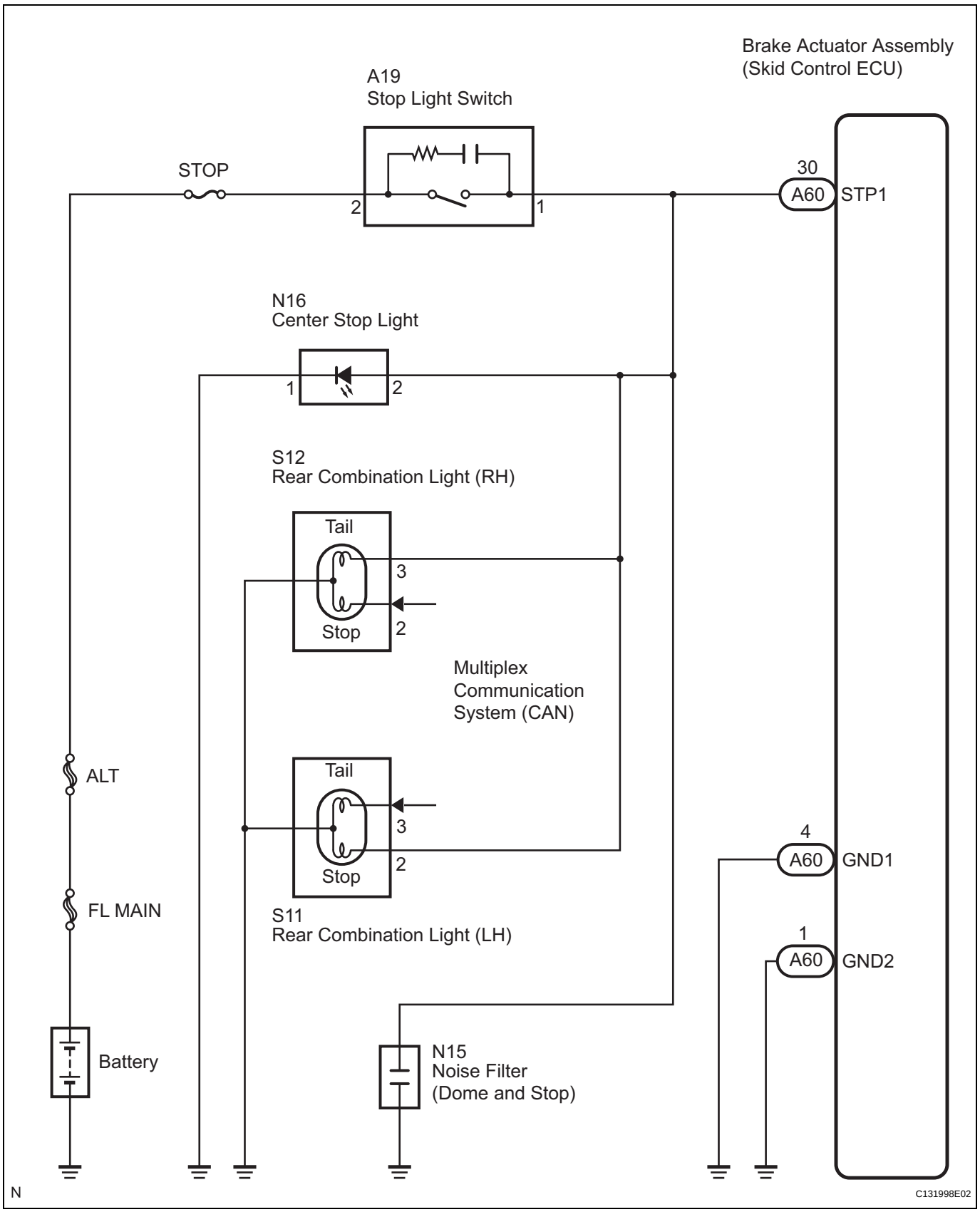
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.
The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light signal input line (STP terminal) or the ground line of the stop light circuit with the stop light switch off (brake pedal not depressed).

DTC No.	DTC Detection Condition	Trouble Area
C1249/49	When either of the following is detected: • After the ignition switch is turned on (IG), the STP terminal voltage of the ECU is 40% to 67% of its supplied voltage for 0.5 seconds. • When STP signal is OFF (release the brake pedal), the pressure sensor value exceeds 725 bar for 1 second.	• Stop light switch • Stop light switch circuit • Brake actuator assembly (skid control ECU)

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK STOP LIGHT SWITCH OPERATION (STOP LIGHT SWITCH CIRCUIT)

(a) Check that the stop lights come on when the brake pedal is depressed and go off when the brake pedal is released.

OK

Pedal Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

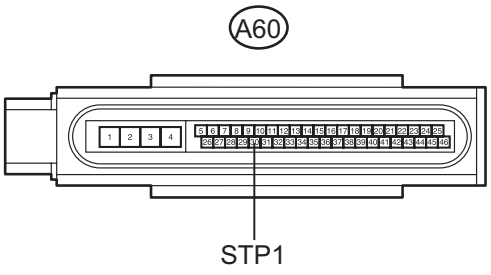
NG → **Go to step 5**

OK

2	INSPECT SKID CONTROL ECU (STP TERMINAL)

BC

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

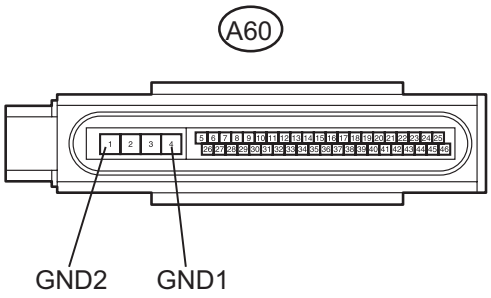
Tester Connection	Switch Condition	Specified Condition
A60-30 (STP1) - Body ground	Brake pedal depressed	8 to 14 V
A60-30 (STP1) - Body ground	Brake pedal released	Below 4.0 V

NG → **Go to step 7**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Depress the brake pedal several times to test the stop light circuit.
(d) Check if the same DTC is recorded (See page BC-302).

HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

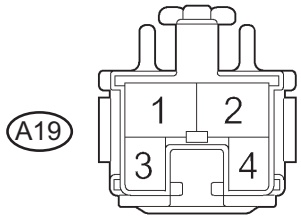
A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

BC

5	CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH POWER SOURCE TERMINAL VOLTAGE)

Stop Light Switch (Harness Side Connector Front View):



I042363E18

(a) Disconnect the stop light switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V

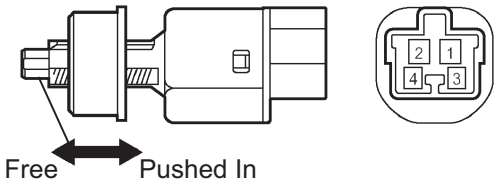
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH POWER SOURCE CIRCUIT)**

OK

BC

6	INSPECT STOP LIGHT SWITCH ASSEMBLY

Stop Light Switch Assembly:



H

F047752E04

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	10 kΩ or higher

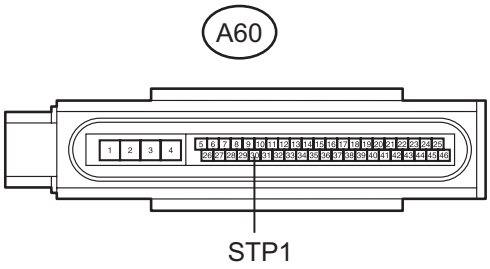
(b) Connect the connector.

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

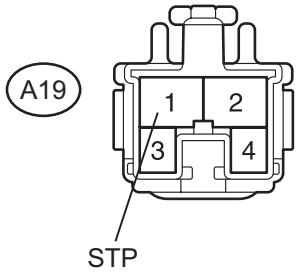
OK

7	CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)

Skid Control ECU (Harness Side Connector Front View):



Stop Lignt Switch (Harness Side Connector Front View):



N C139147E01

(a) Disconnect the stop light switch connector and skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-30 (STP1) - A19-1 (STP1)	Below 1 Ω

(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CIRCUIT)

BC

DTC	C1288/88	ECU Version Miss Match

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1288/88	ECM does not match	ECM

INSPECTION PROCEDURE

1 CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

BC

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 PERFORM ENGINE VARIANT LEARNING

(a) Perform engine variant learning (See page BC-290).

NEXT

3 CONFIRM RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPLACE ECM**

A

END

DTC	C1300/62	Skid Control ECU Malfunction

DESCRIPTION

The skid control ECU is housed in the brake actuator assembly.
The skid control ECU judges the vehicle driving condition based on the signals from each sensor, and controls the brake actuator assembly.

DTC No.	DTC Detection Condition	Trouble Area
C1300/62	Internal failure of the skid control ECU control unit	Brake actuator assembly (skid control ECU)

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK DTC

(a) Check the DTC (See page BC-302).

BC

Result

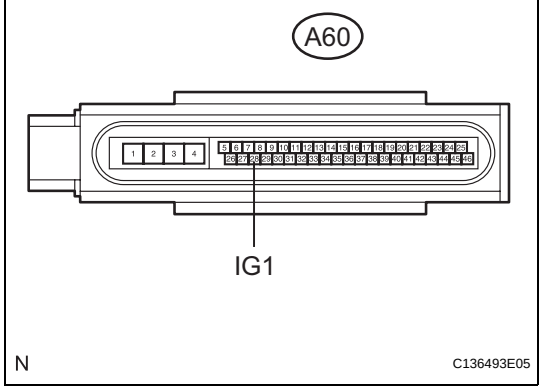
Condition	Proceed to
DTC C1300/62 is output (only C1300/62)	A
Other DTCs are output	B

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (See page BC-302)**

A

2	INSPECT SKID CONTROL ECU (IG1 TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

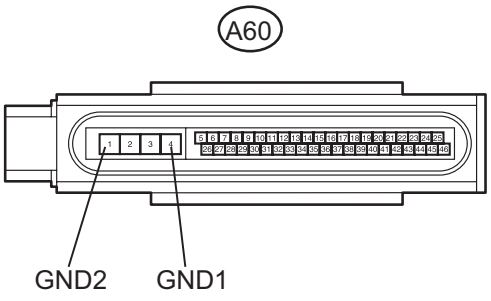
Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

3	INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

BC

DTC	U0073/94	Control Module Communication Bus OFF

DTC	U0100/65	Lost Communication with ECM / PCM

DTC	U0123/62	Lost Communication with Yaw Rate Sensor Module

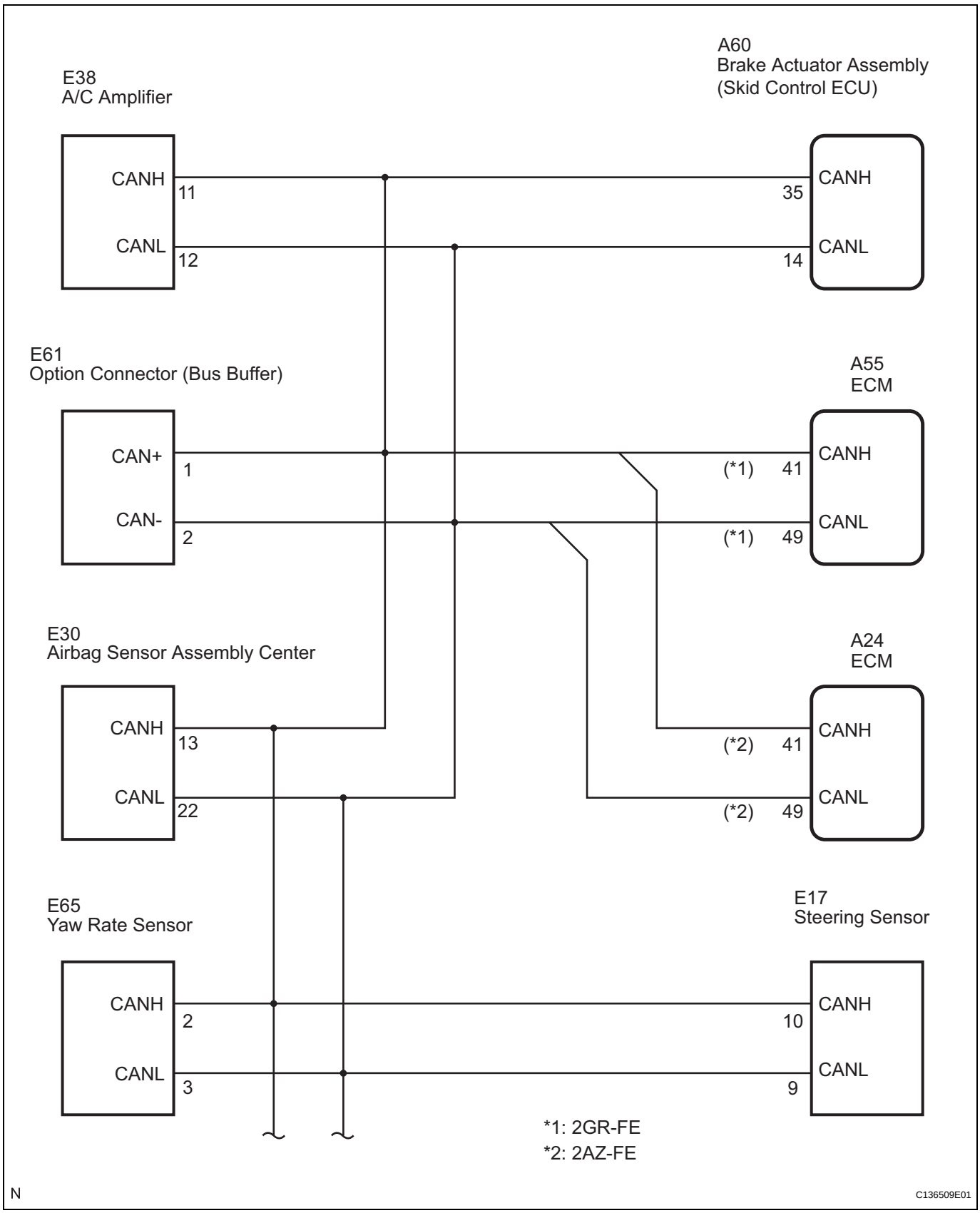
DTC	U0126/63	Lost Communication with Steering Angle Sensor Module

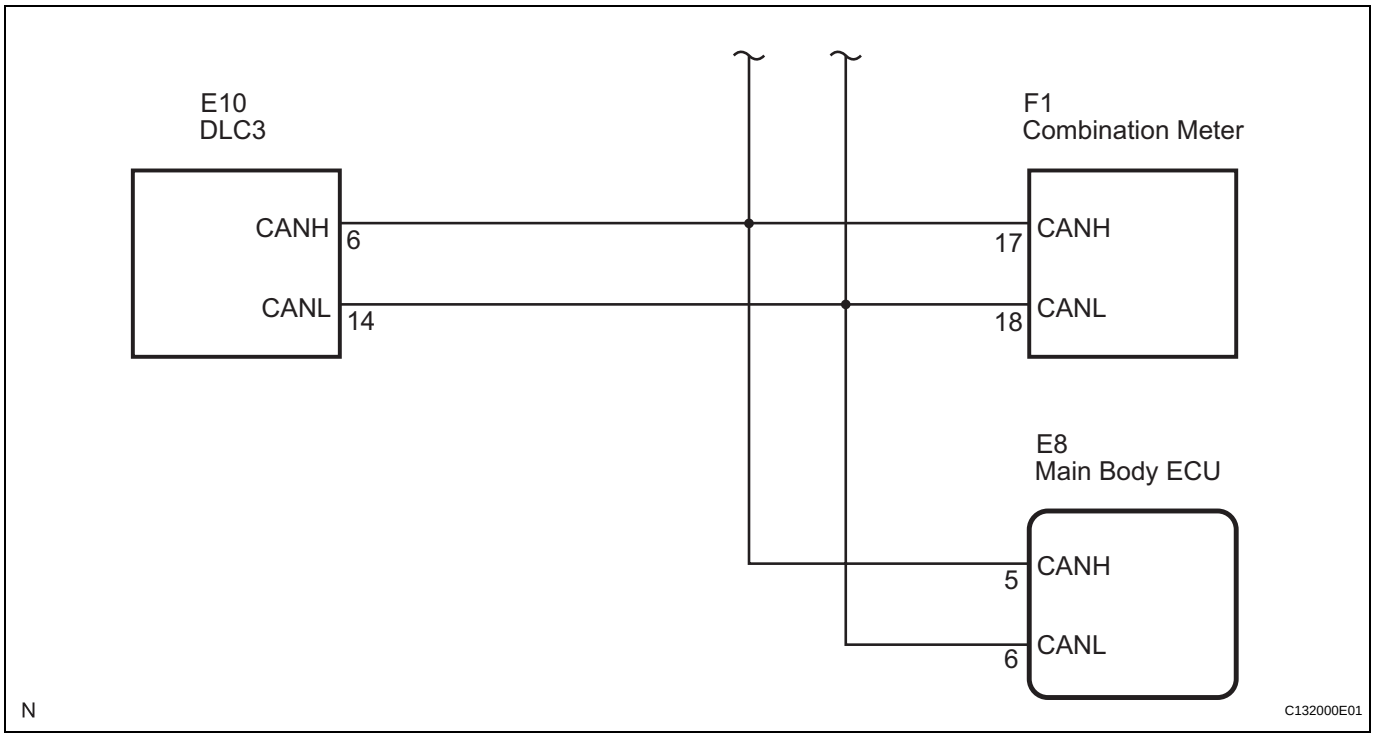
DESCRIPTION

The skid control ECU receives the signals from the ECM, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

DTC No.	DTC Detection Condition	Trouble Area
U0073/94	When either of the following is detected: 1. Bus OFF state continues for 300 msec. 2. The ECU detects that it cannot send a signal.	CAN communication system
U0100/65	When either of the following is detected: 1. At a vehicle speed of 4 mph (6 km/h) or more, the skid control ECU receives data that is out of range from the engine. 2. At a vehicle speed of 4 mph (6 km/h) or more, the skid control ECU receives abnormal data from the engine (5 cycles).	CAN communication system (Skid control ECU to ECM)
U0123/62	When any r of the following is detected: 1. The skid control ECU receives an abnormal signal from the yaw rate sensor (5 cycles). 2. The skid control ECU receives a signal that has a shorter message than normal. 3. The skid control ECU cannot receive a signal from the yaw rate sensor.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)
U0126/63	When any of the following is detected: 1. The skid control ECU receives an abnormal signal from the steering angle sensor (5 cycles). 2. The skid control ECU receives a signal that has a shorter message than normal. 3. The skid control ECU cannot receive a signal from the steering angle sensor.	CAN communication system (Skid control ECU to steering angle sensor)

WIRING DIAGRAM





BC

INSPECTION PROCEDURE

Proceed to CAN communication system troubleshooting (See page CA-8).

HINT:

When a DTC indicating a CAN communication system malfunction is output, repair the CAN communication system before repairing each corresponding sensor.

ABS Warning Light Remains ON

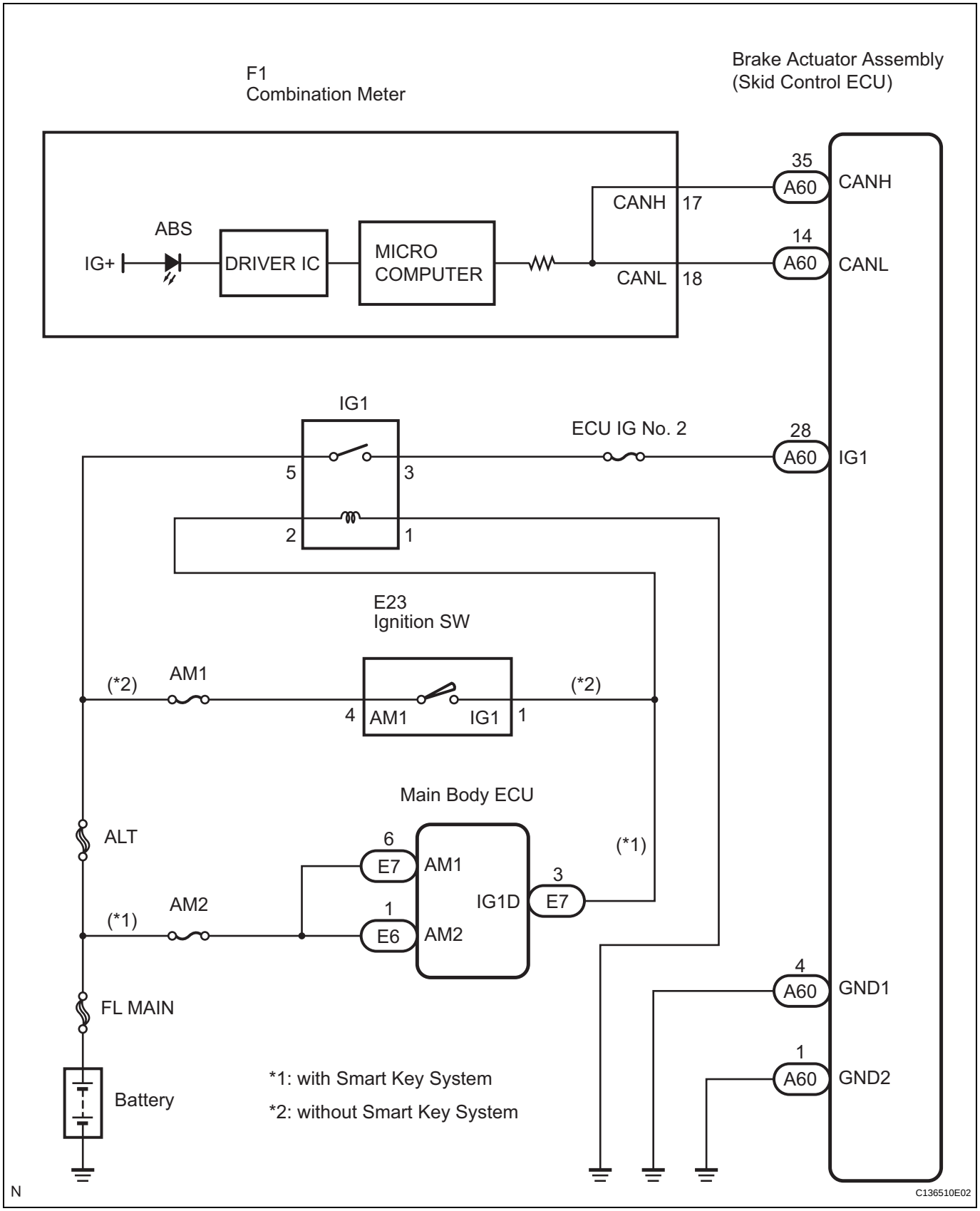
DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
If any of the following is detected, the ABS warning light remains on.

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the wire harness between the combination meter assembly and the skid control ECU.

HINT:
In some cases, the intelligent tester cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

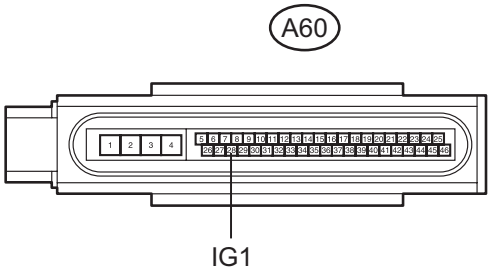
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



N C136493E05

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

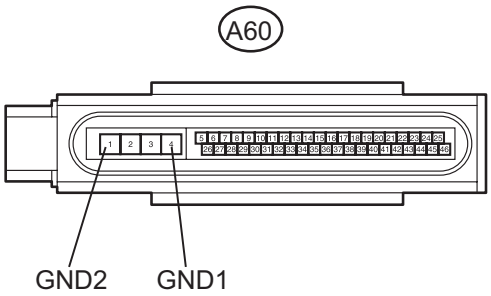
Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A60-4 (GND1) - Body ground	Always	Below 1 Ω
A60-1 (GND2) - Body ground	Always	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check the ABS warning light operation.

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

BC

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

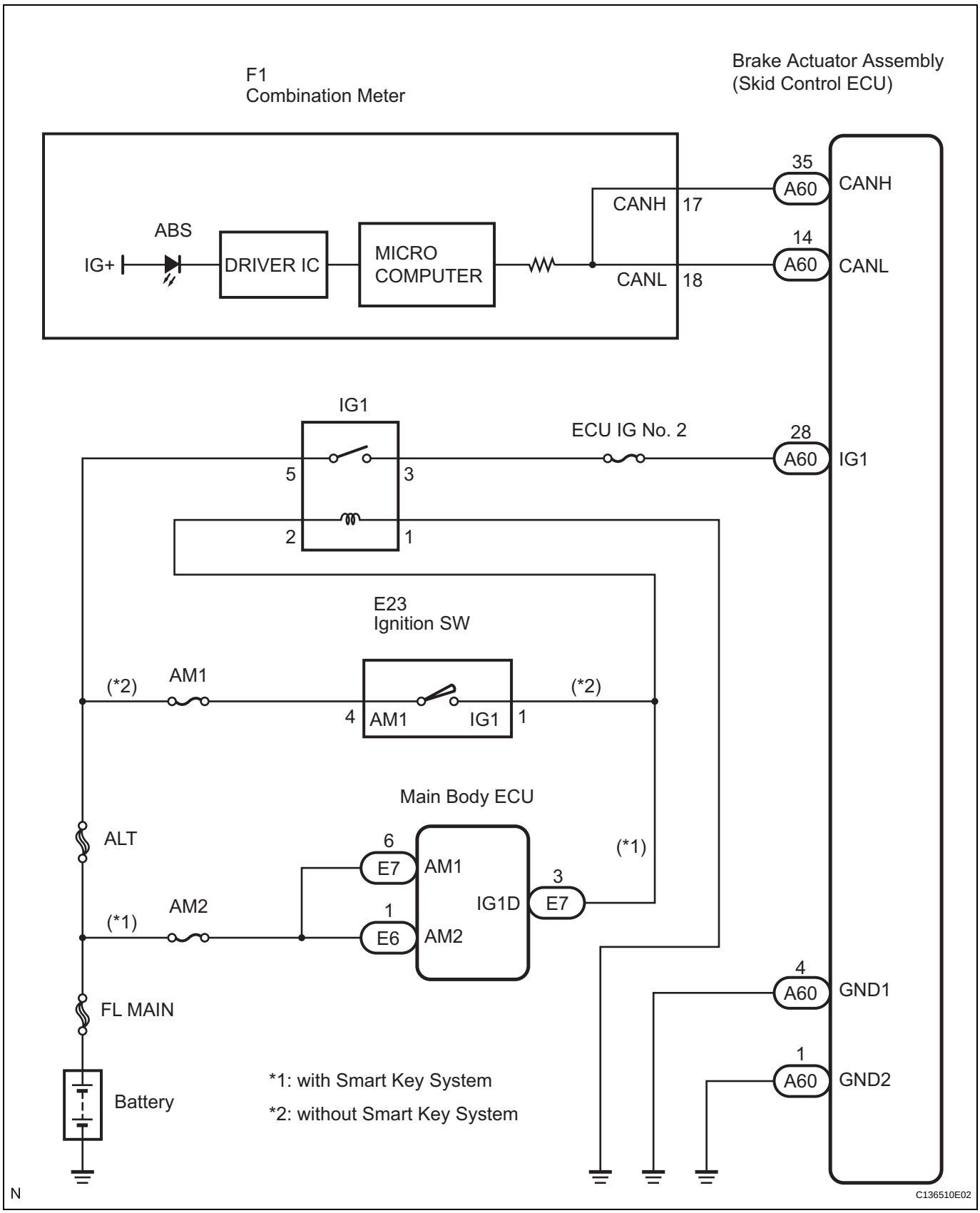
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

ABS Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK ABS WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the ABS warning light comes on.
OK:
The ABS warning light comes on.
(d) Connect the connector.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check ABS warning light operation.
OK:
The ABS warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

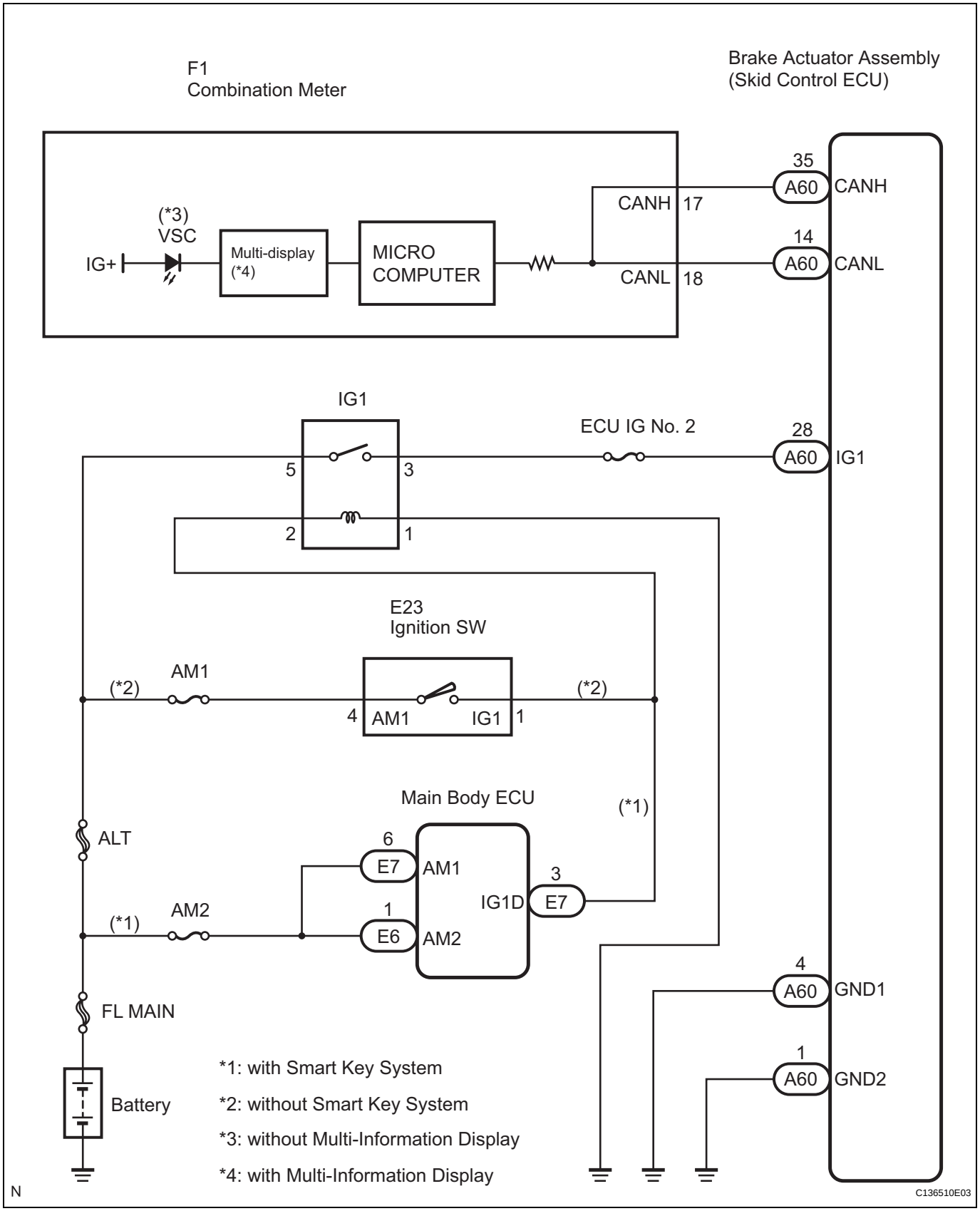
BC

VSC Warning Light Remains ON

DESCRIPTION

The skid control ECU communicates with the combination meter assembly via CAN communication. If the ECU stores a DTC, the master caution indicator light will illuminate, and the DTC will be displayed on the multi-information display in the combination meter (models with multi-information display). On models without a multi-information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check VSC warning (multi-information display)/VSC warning light (without multi-information display) operation.
OK:
The VSC warning (multi-information display) or VSC warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

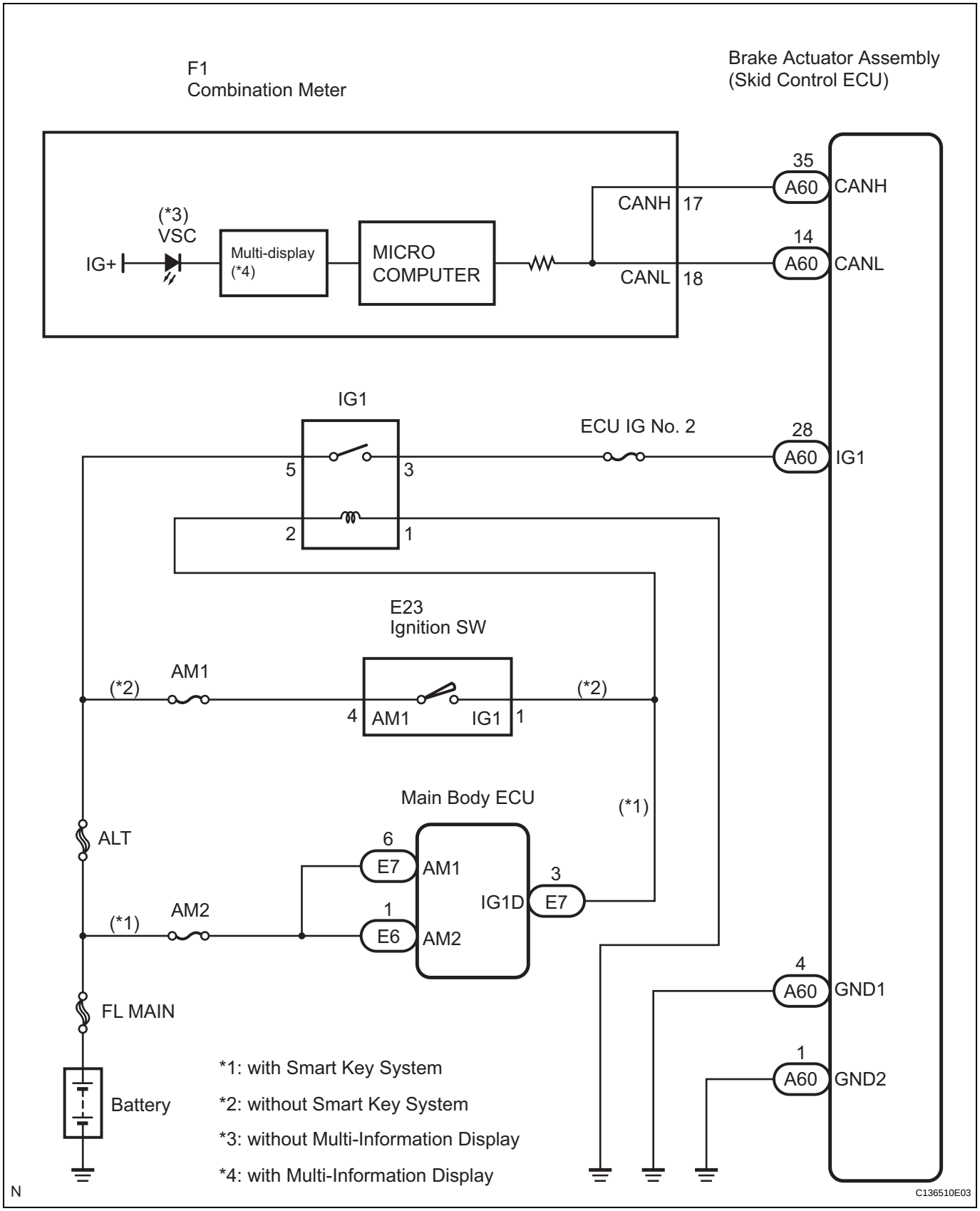
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

VSC Warning Light does not Come ON

DESCRIPTION

The skid control ECU communicates with the combination meter assembly via CAN communication. If the ECU stores a DTC, the master caution indicator light will illuminate, and the DTC will be displayed on the multi-information display in the combination meter (models with multi-information display). On models without a multi-information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check that "ON" and "OFF" of the VSC warning (multi-information display) or VSC warning light are indicated on the combination meter assembly when using the intelligent tester.

OK:

The VSC warning (multi-information display) turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

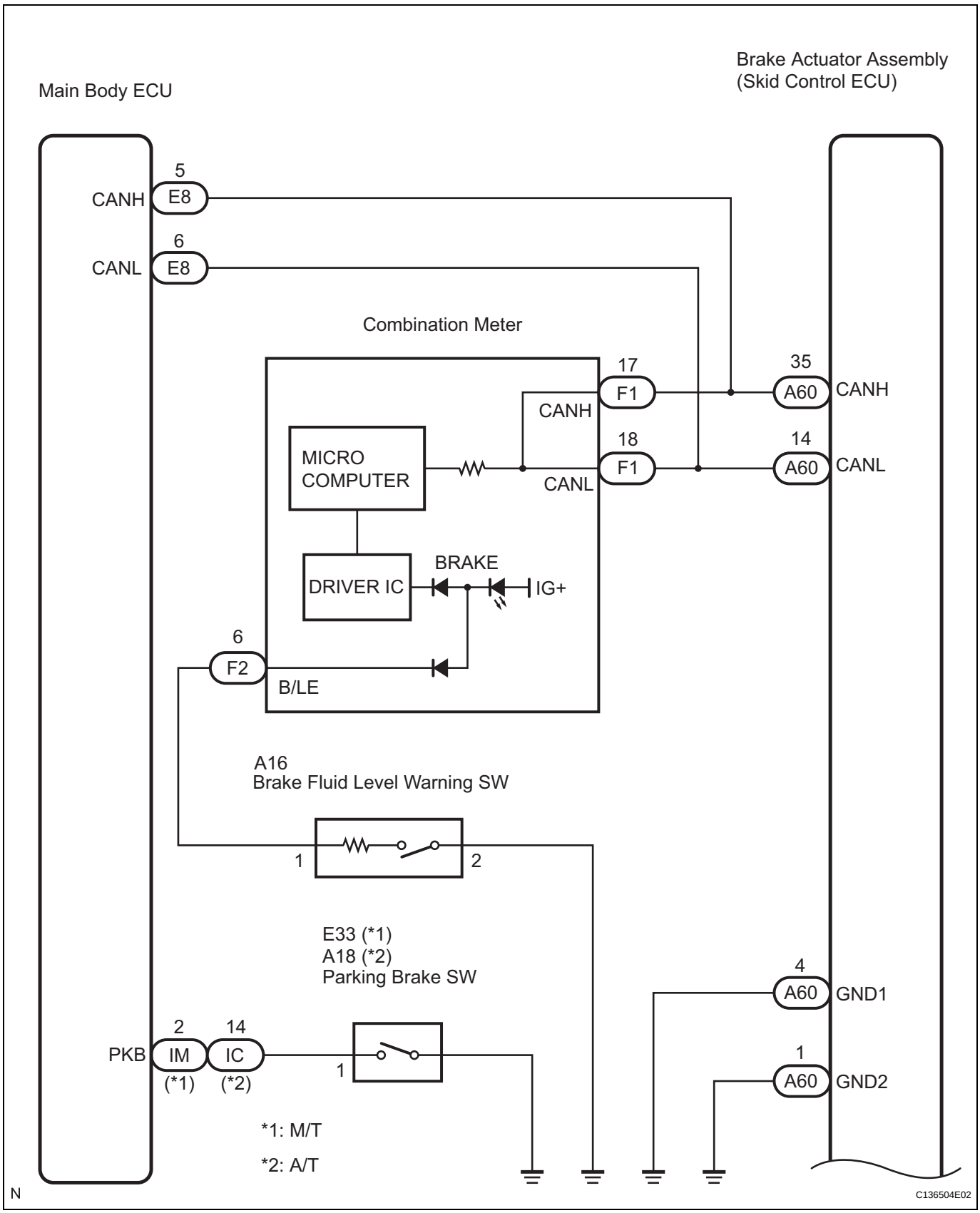
Brake Warning Light Remains ON

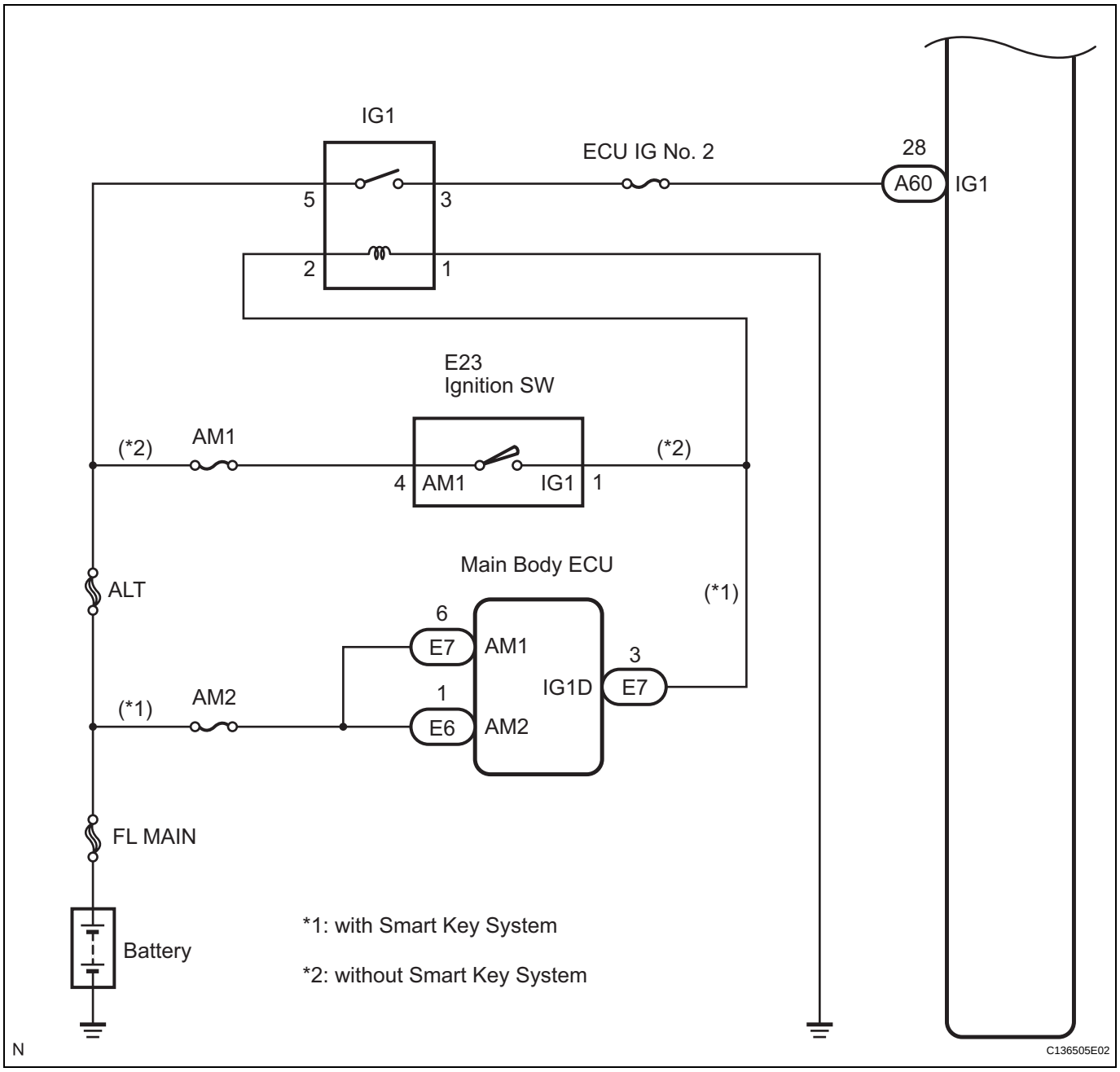
DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
If any of the following is detected, the BRAKE warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM





BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

BC

3 CHECK BATTERY

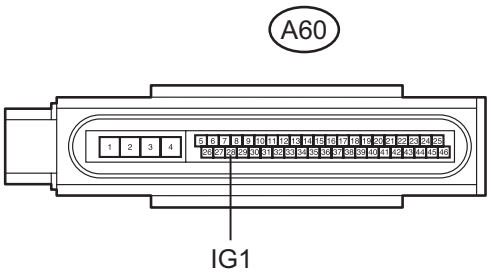
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

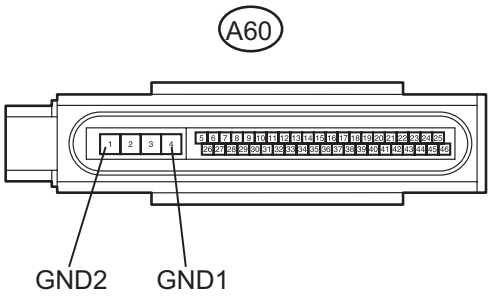
Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A60-4 (GND1) - Body ground	Always	Below 1 Ω
A60-1 (GND2) - Body ground	Always	Below 1 Ω

(c) Connect the connector.

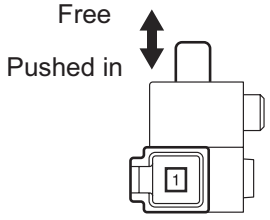
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

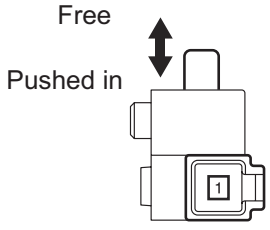
6 INSPECT PARKING BRAKE SWITCH

Parking Brake Switch:

Automatic Transaxle:



Manual Transaxle:



N C109430E03

(a) Disconnect the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Body ground	Parking brake switch ON (Switch pin free)	Below 1 Ω
1 - Body ground	Parking brake switch OFF (Switch pin pushed in)	10 kΩ or higher

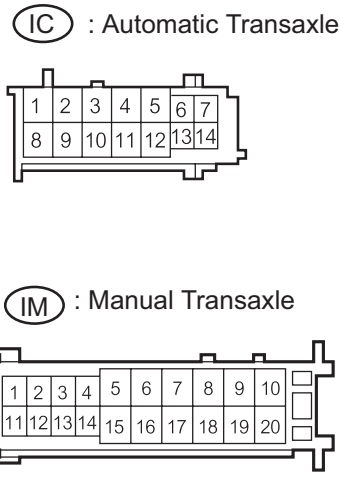
NG → **REPLACE PARKING BRAKE SWITCH**

OK

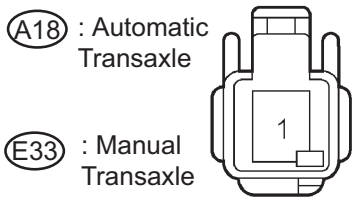
BC

7	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)

Main Body ECU
Wire Harness View:



Parking Brake Switch Harness Side Connector Front View:



C136418E03

OK

(a) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Automatic Transaxle

Tester Connection	Condition	Specified Condition
IC-14 (PKB) - A18-1	Always	Below 1 Ω
IC-14 (PKB) - Body ground	Always	10 kΩ or higher

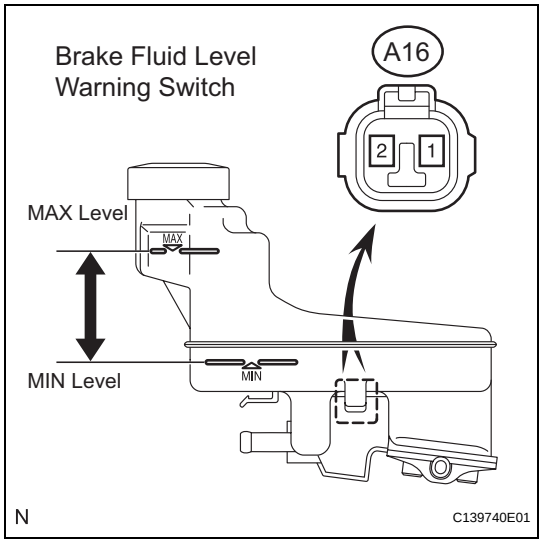
Manual Transaxle

Tester Connection	Condition	Specified Condition
IM-2 (PKB) - E33-1	Always	Below 1 Ω
IM-2 (PKB) - Body ground	Always	10 kΩ or higher

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)**

8	INSPECT BRAKE FLUID LEVEL WARNING SWITCH



(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.
HINT:
A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Float up (Switch OFF)	1.9 to 2.1 kΩ
1 - 2	Float down (Switch ON)	Below 1 Ω

HINT:
If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

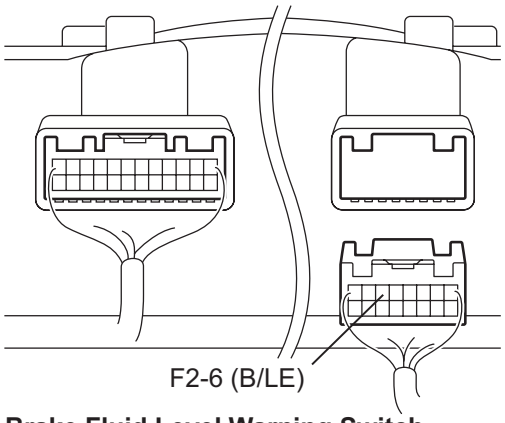
NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)**

OK

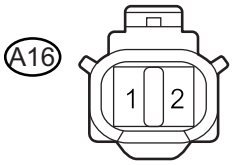
BC

9	CHECK HARNESS AND CONNECTOR (COMBINATION METER TO BRAKE FLUID LEVEL WARNING SWITCH)

Combination Meter Wire Harness View:



Brake Fluid Level Warning Switch Harness Side Connector Front View:



C136033E01

(a) Disconnect the combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F2-6 (B/LE) - A16-1	Always	Below 1 Ω
F2-6 (B/LE) - Body ground	Always	10 kΩ or higher
A16-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (COMBINATION METER TO BRAKE FLUID LEVEL WARNING SWITCH)**

OK

10	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-307).

ACTIVE TEST: ABS/TRAC/VSC

Item	Vehicle Condition/Test Details	Diagnostic Note
BRAKE WRN LIGHT	Turns brake warning light on / off	Observe combination meter

(c) Check BRAKE warning light operation.

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

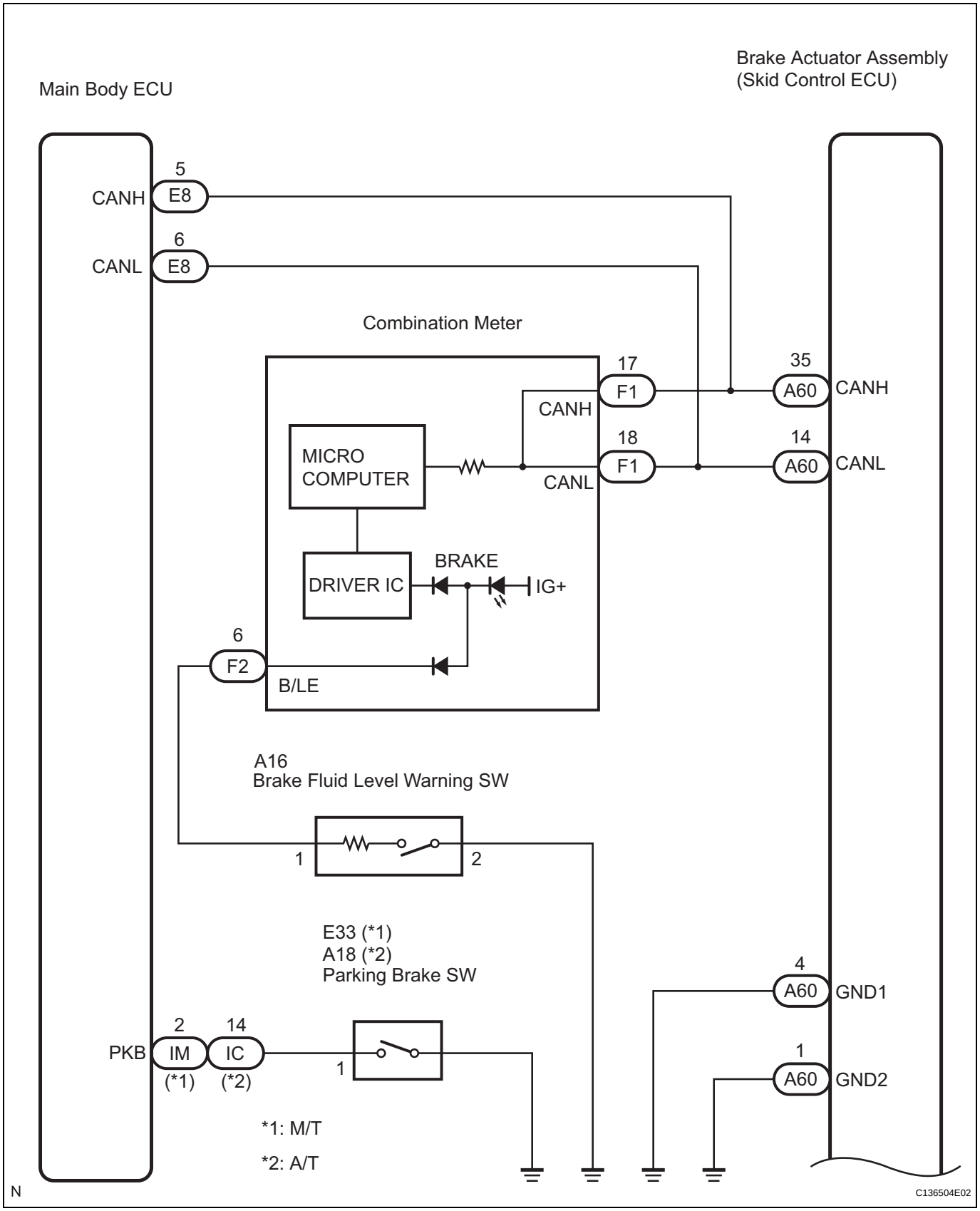
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Brake Warning Light does not Come ON

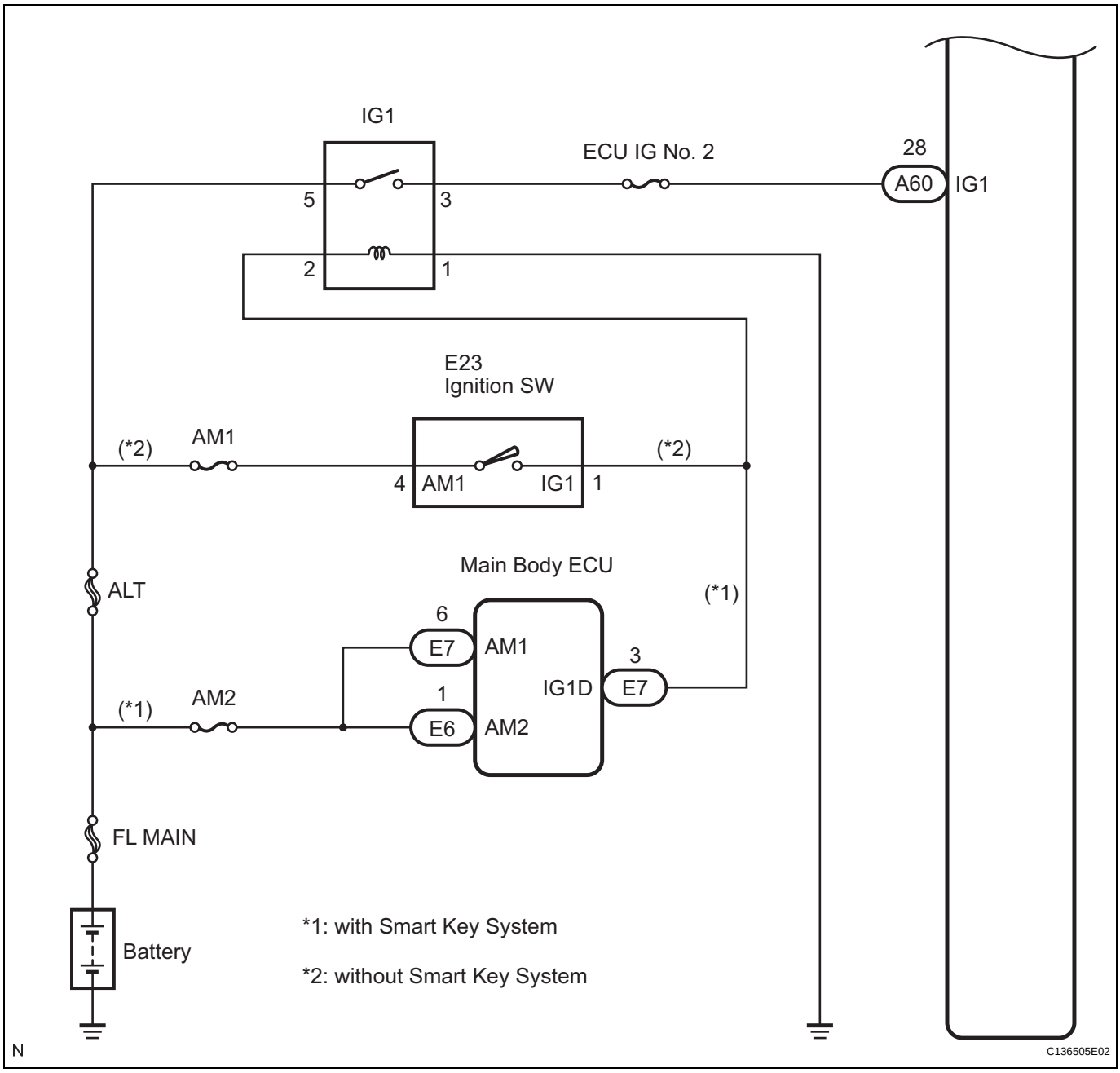
DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.

WIRING DIAGRAM



BC



BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK BRAKE WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the BRAKE warning light comes on.
OK:
The BRAKE warning light comes on.
(d) Connect the connector.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

NG

BC

3	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check BRAKE warning light operation.
OK:
The BRAKE warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

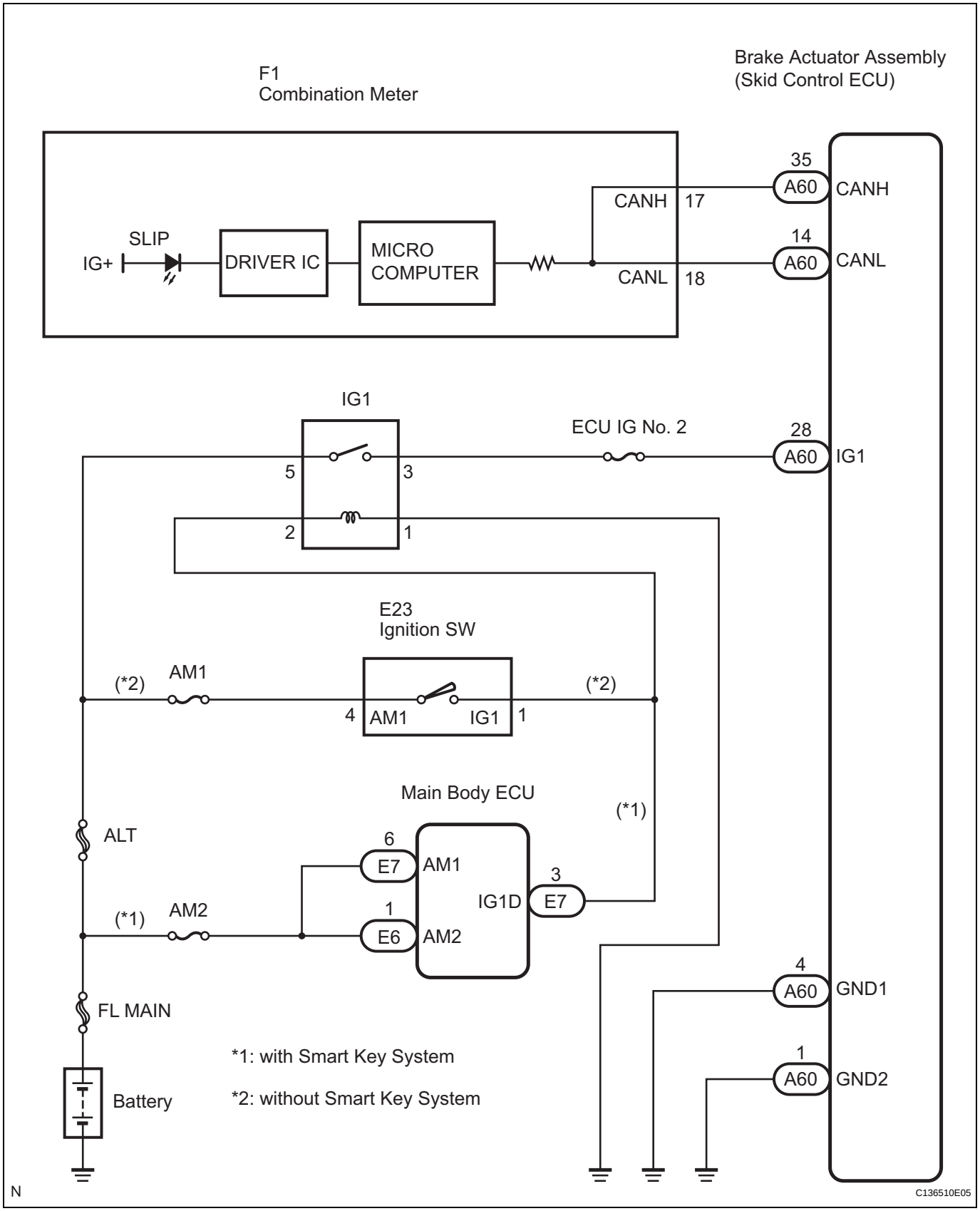
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Slip Indicator Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-278).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check SLIP indicator light operation.
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

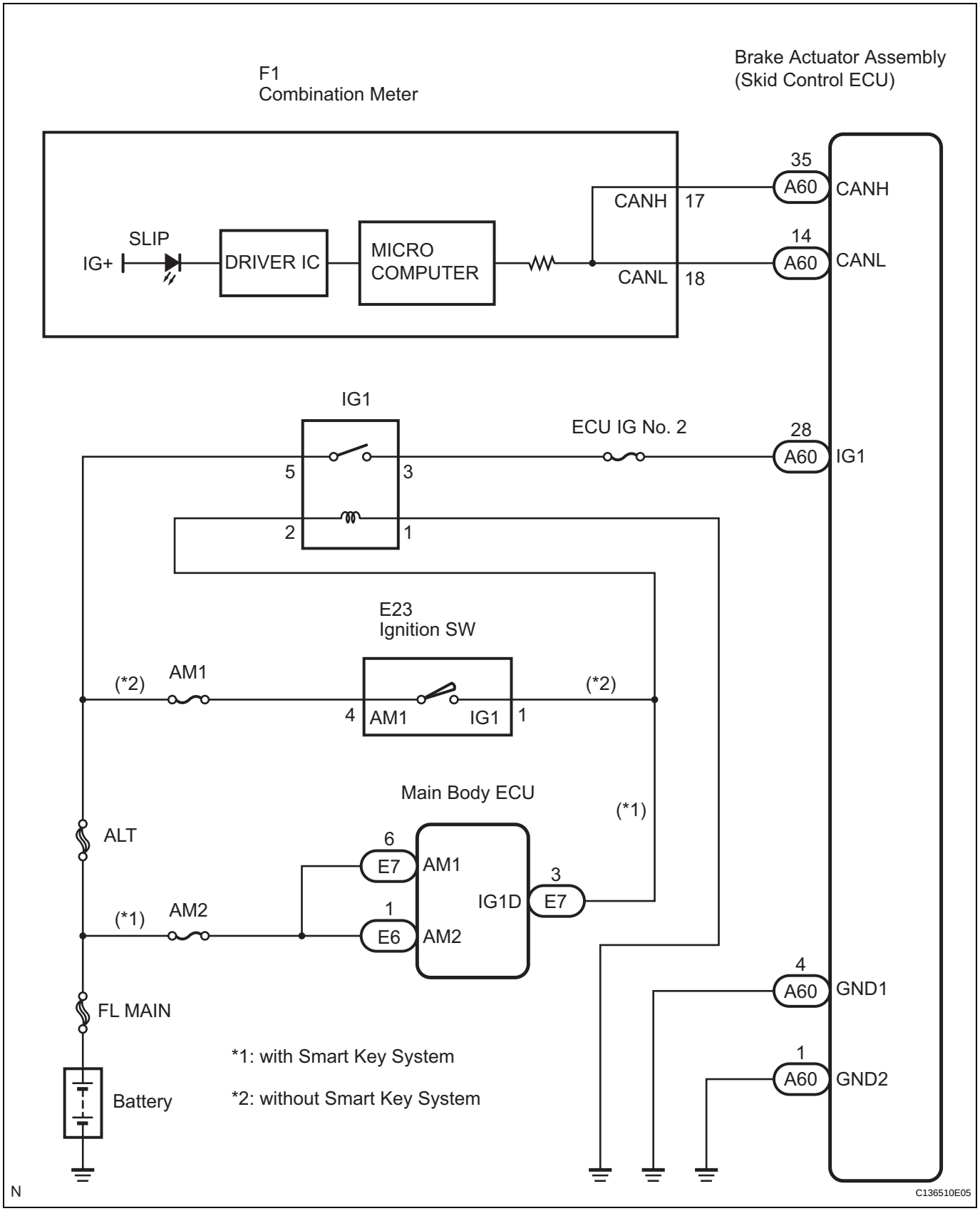
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Slip Indicator Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-278).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check the SLIP indicator light operation.
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

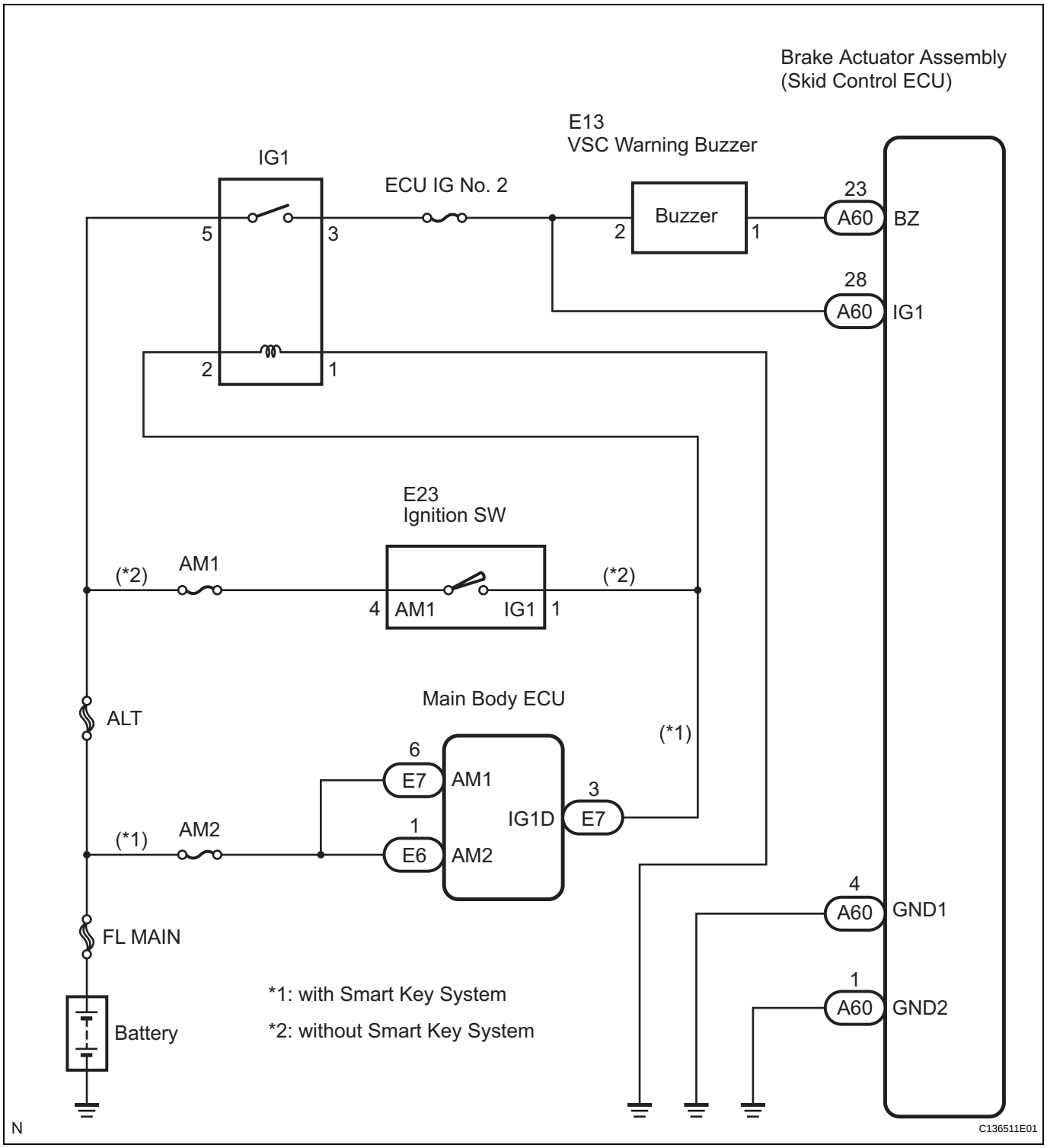
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds and the SLIP indicator light blinks during VSC operation.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the intelligent tester (See page BC-307).

ACTIVE TEST: ABS/TRAC/VSC

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

(c) Check that the buzzer sounds/stops when turning the skid control buzzer on/off by using the intelligent tester.

Result

Condition	Proceed to
Buzzer does not sound or sounds constantly	A
Buzzer sounds/stops	B

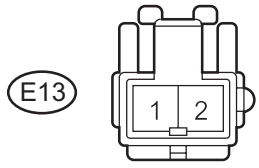
BC

B → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)**

A

2 INSPECT SKID CONTROL BUZZER (POWER SOURCE TERMINAL)

Skid Control Buzzer (Harness Side Connector Front View):



(a) Disconnect the skid control buzzer connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

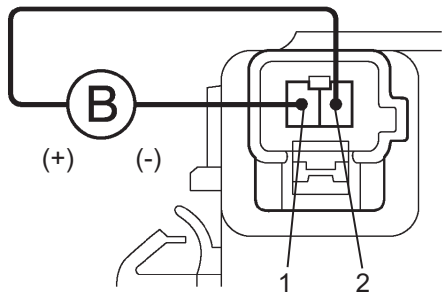
Tester Connection	Condition	Specified Condition
E13-2 - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3	INSPECT SKID CONTROL BUZZER

Skid Control Buzzer:



C125130E01

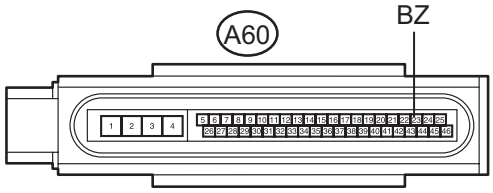
(a) Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.
OK:
The skid control buzzer sounds.

NG → **REPLACE SKID CONTROL BUZZER (See page BC-453)**

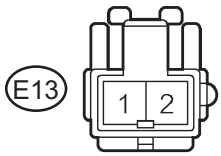
OK

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO SKID CONTROL BUZZER)

Skid Control ECU (Harness Side Connector Front View):



Skid Control Buzzer (Harness Side Connector Front View):



C139149E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
A60-23 (BZ) - E13-1	Always	Below 1 Ω
A60-23 (BZ) - Body ground	Always	10 kΩ or higher

(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO SKID CONTROL BUZZER)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

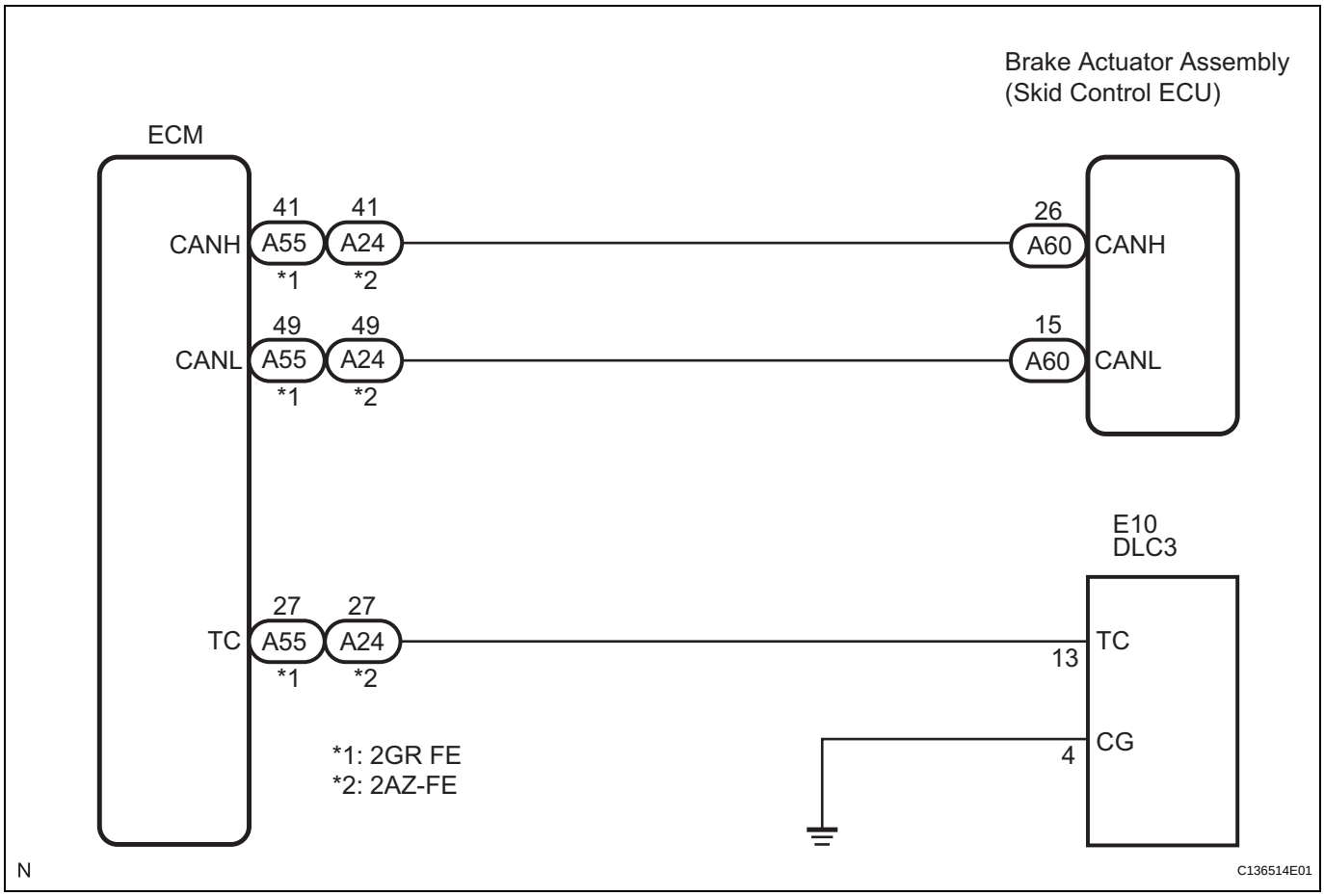
BC

TC and CG Terminal Circuit

DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
DTCs are indicated by the blinking pattern of the ABS warning light.

WIRING DIAGRAM



HINT:
When warning lights continue to blink, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in one or more ECUs is suspected.

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication DTC is output (See page BC-302).

Result

Result	Proceed to
CAN communication system DTC is output	A
CAN communication system DTC is not output	B

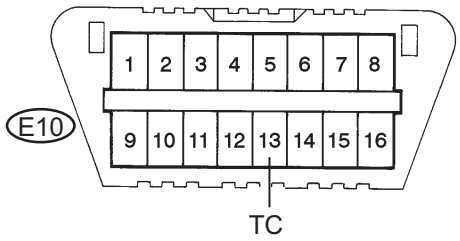
B → Go to step 2

A

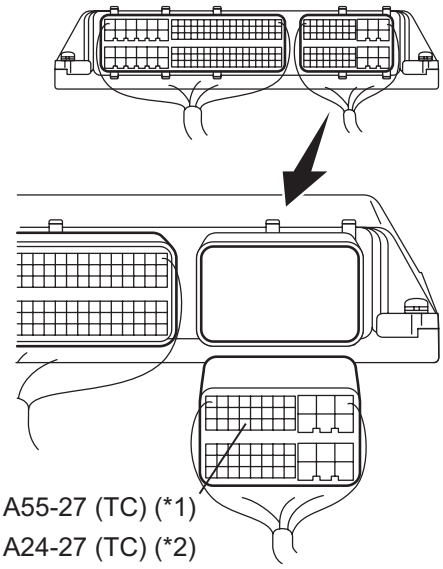
GO TO CAN COMMUNICATION SYSTEM (See page CA-8)

2 CHECK HARNESS AND CONNECTOR (ECM TO DLC3)

DLC3:



ECM Wire Harness View:



(*1): 2GR-FE (*2): 2AZ-FE

C136035E02

(a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

2GR-FE

Tester Connection	Specified Condition
E10-13 (TC) - A55-27 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

2AZ-FE

Tester Connection	Specified Condition
E10-13 (TC) - A24-27 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

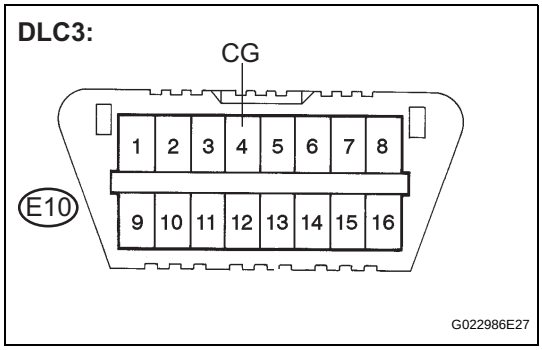
(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)**

OK

BC

3	CHECK HARNESS AND CONNECTOR (DLC3 TO CG CIRCUIT)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

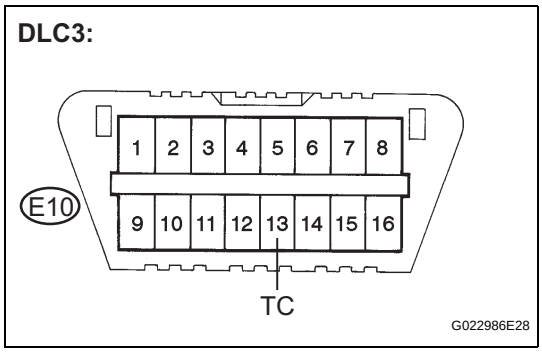
Tester Connection	Specified Condition
E10-4 (CG) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (CG TERMINAL CIRCUIT)**

OK

4	CHECK HARNESS AND CONNECTOR (TC TERMINAL CIRCUIT)

BC



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E10-13 (TC) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)**

OK

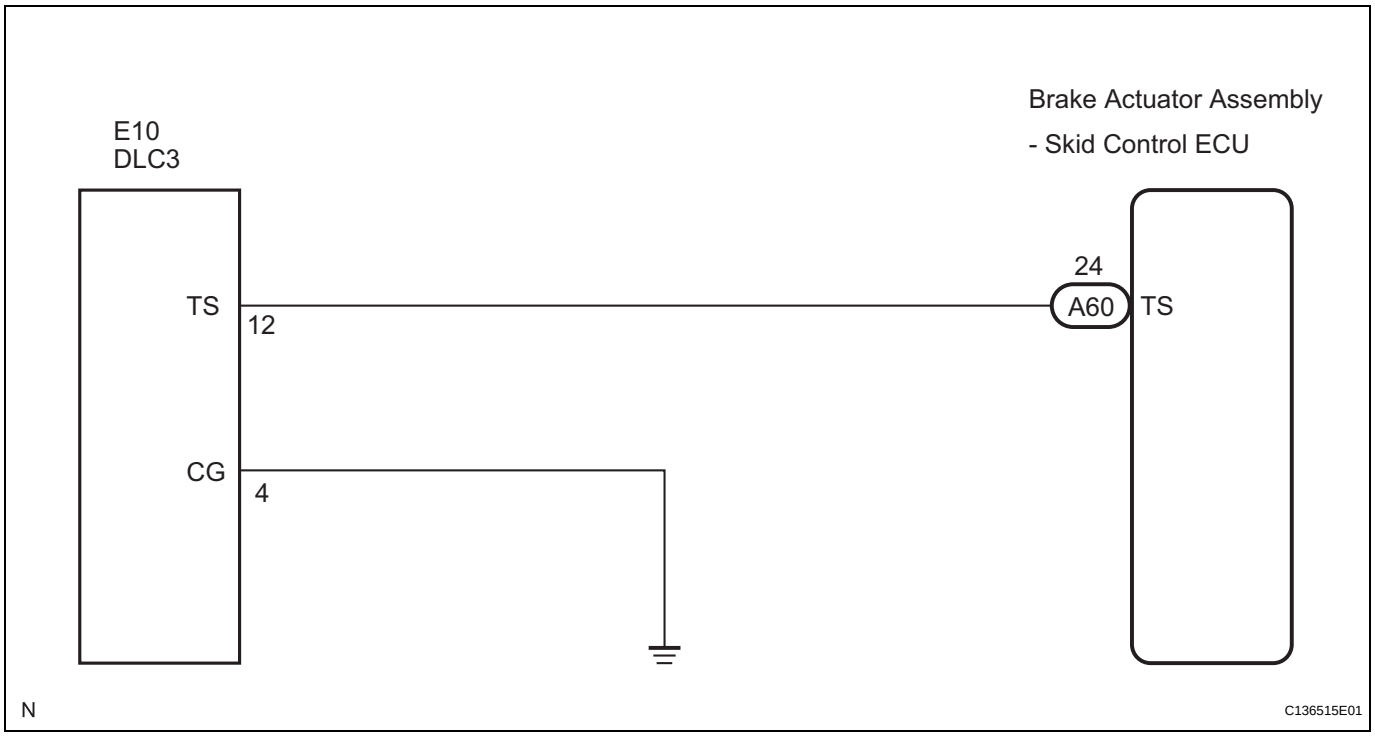
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

TS and CG Terminal Circuit

DESCRIPTION

In the Test Mode (signal check), a malfunction of the speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to on (IG).

WIRING DIAGRAM

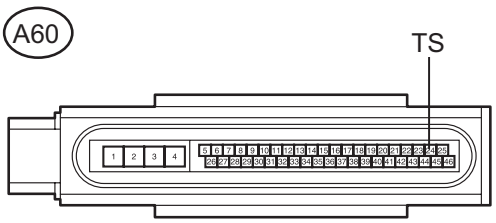


INSPECTION PROCEDURE

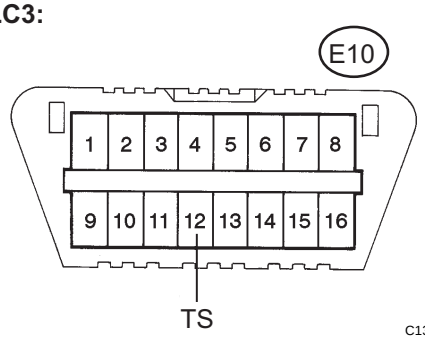
HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO DLC3)

Skid Control ECU (Harness Side Connector Front View):



DLC3:



C139177E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A60-24 (TS) - E10-12 (TS)	Always	Below 1 Ω

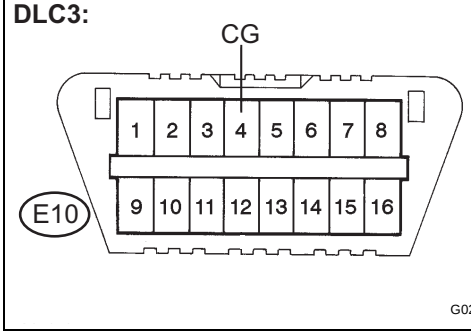
(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO DLC3)**

OK

2 CHECK HARNESS AND CONNECTOR (DLC3 TO BODY GROUND)

DLC3:



G022987E25

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

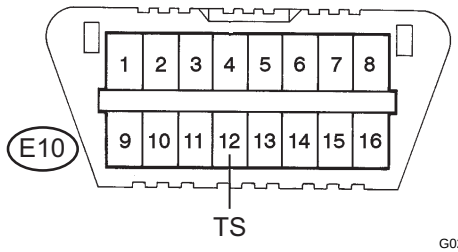
Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 TO BODY GROUND)**

OK

3	CHECK HARNESS AND CONNECTOR (TS TERMINAL CIRCUIT)

DLC3:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-12 (TS) - Body ground	Always	10 kΩ or higher

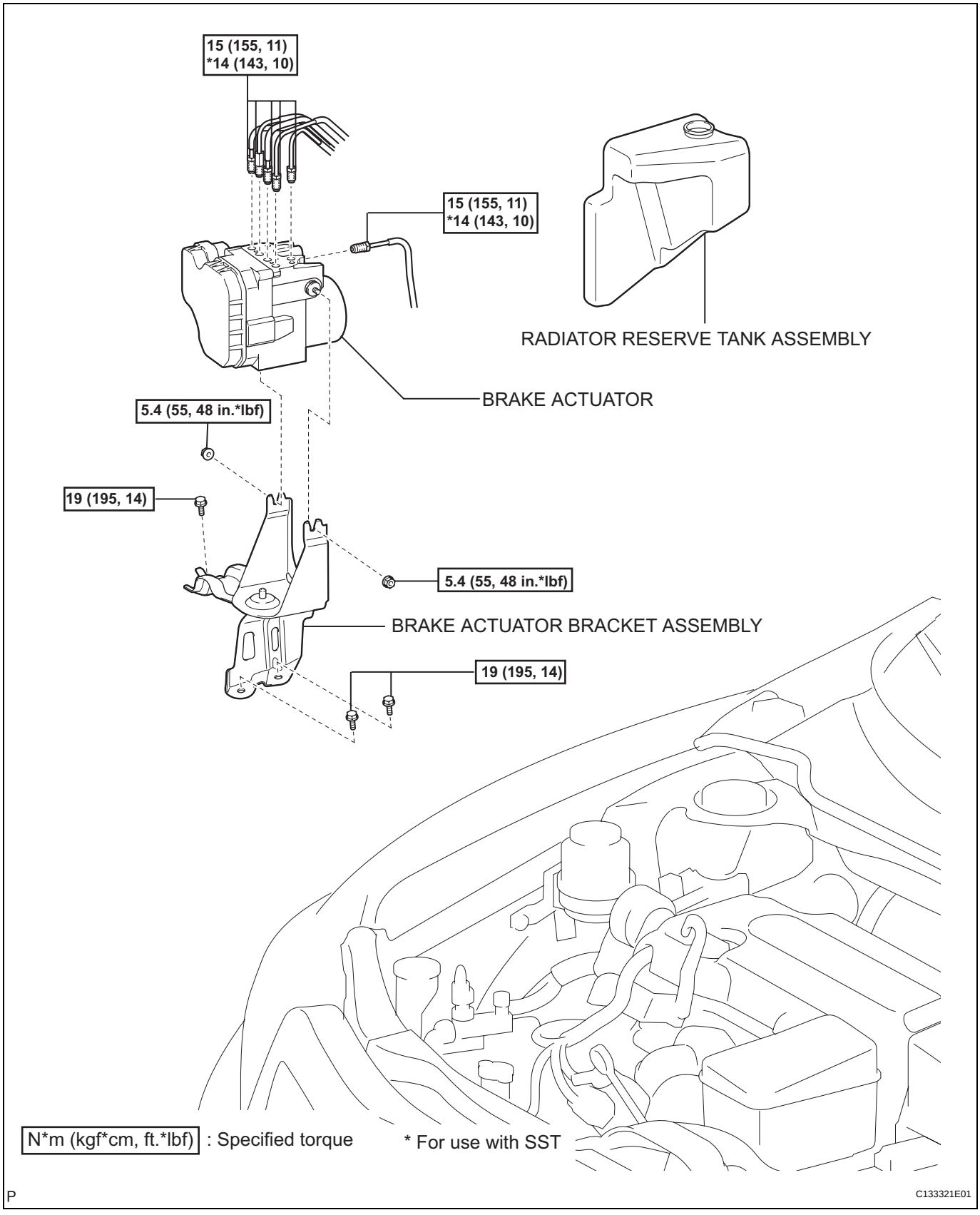
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TS TERMINAL CIRCUIT)**

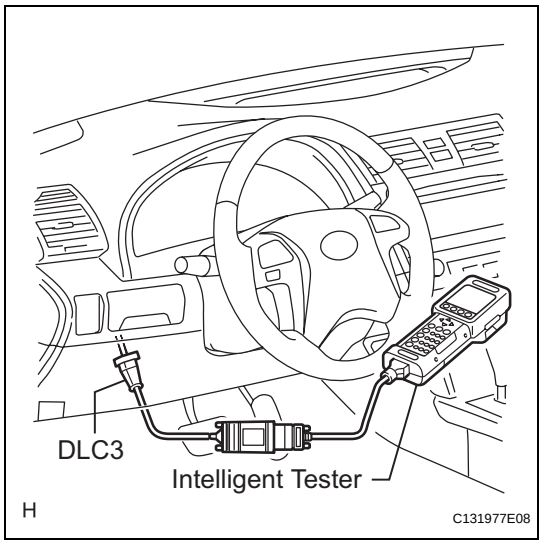
OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

BRAKE ACTUATOR (for ADVICS Made)

COMPONENTS





ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and run it at idle .
(c) Select the Active Test mode on the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. INSPECT ACTUATOR MOTOR OPERATION

NOTICE:
Do not keep a motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.

(a) With the motor relay on, check the actuator motor operation sounds.
(b) Turn the motor relay off.
(c) Depress the brake pedal and hold it for approximately 15 seconds. Check that the brake pedal cannot be depressed farther.
(d) With the motor relay on, check that the pedal does not pulsate.
(e) Turn the motor relay off and release the brake pedal.

3. INSPECT RIGHT FRONT WHEEL OPERATION

NOTICE:
Do not turn on a solenoid in a manner different than described below.

(a) Depress the brake pedal and hold it.
(b) Turn the SFRH and SFRR solenoids on simultaneously, and check that the pedal cannot be depressed.
(c) Turn the SFRH and SFRR solenoids off simultaneously, and check that the pedal can be depressed.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating them continuously, set an interval of more than 20 seconds.
(d) Turn the motor relay on and check that the pedal returns.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

4. INSPECT OTHER WHEEL OPERATION

(a) Using the same procedure, check the solenoids of the other wheels.
HINT:
- Left front wheel: SFLH, SFLR
- Right rear wheel: SRRH, SRRR
- Left rear wheel: SRLH, SRLR

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE RADIATOR RESERVE TANK ASSEMBLY

(a) Separate the radiator reserve tank hose.

(b) Remove the radiator reserve tank assembly.

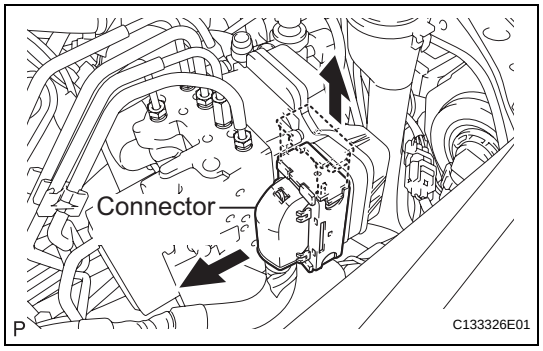
3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately clean it off completely.

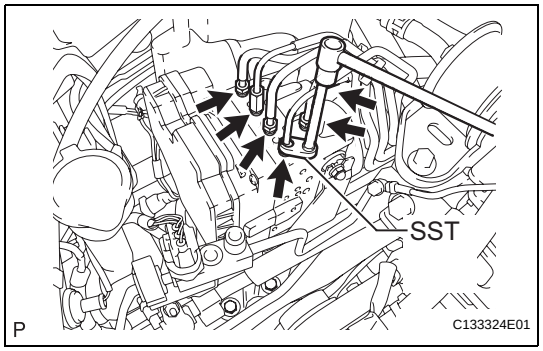
4. REMOVE BRAKE ACTUATOR

(a) Release the lock lever and disconnect the actuator connector.



(b) Using SST, disconnect the 6 brake lines from the actuator assembly with bracket.

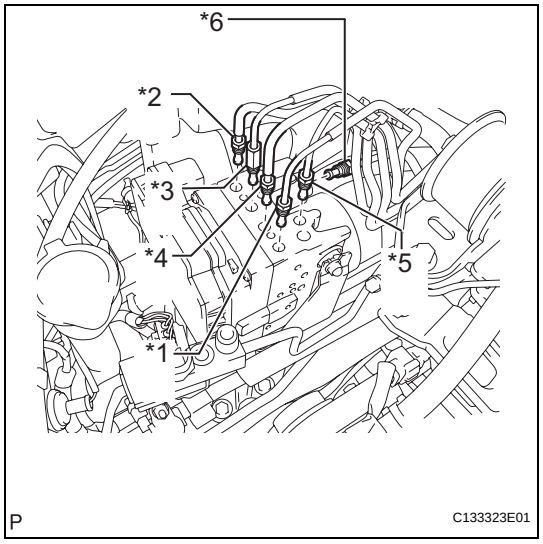
SST 09023-00101

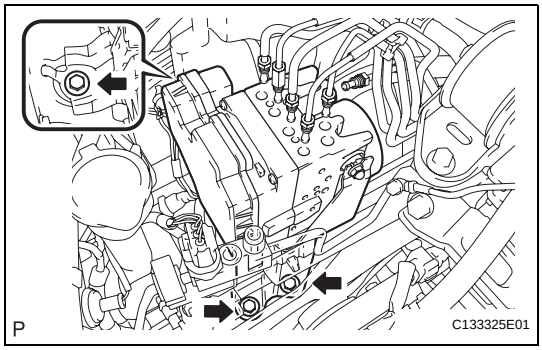


(c) Use tags or make a memo to identify the places to reconnect.

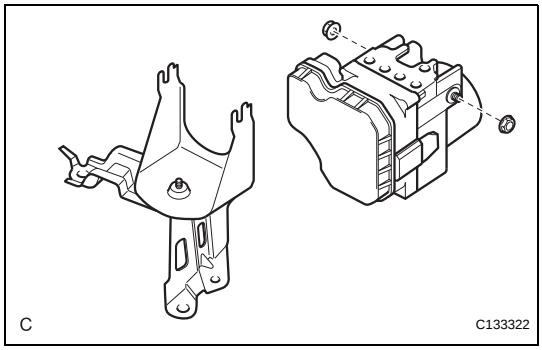
HINT:

- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 1st Master Cylinder
- *6: From 2nd Master Cylinder





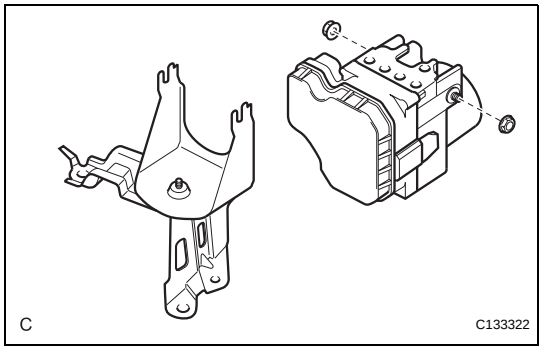
(d) Remove the 3 bolts and brake actuator assembly with bracket from the body.
NOTICE:
Do not damage the brake tubes and wire harness.



DISASSEMBLY

1. REMOVE BRAKE ACTUATOR BRACKET ASSEMBLY

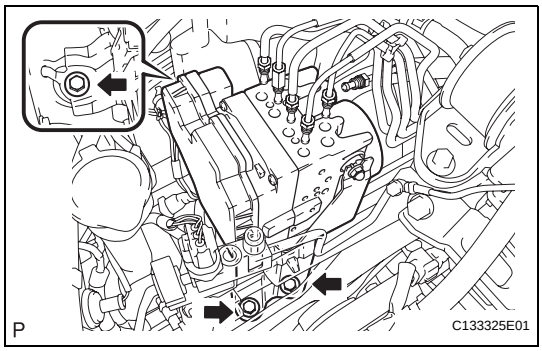
(a) Remove the 2 nuts and the brake actuator assembly from the actuator bracket assembly.



REASSEMBLY

1. INSTALL BRAKE ACTUATOR BRACKET ASSEMBLY

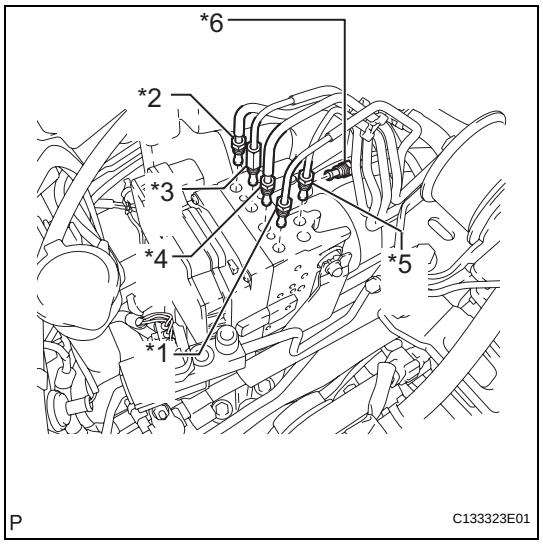
(a) Install the actuator assembly to the brake actuator bracket assembly with the 2 nuts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
NOTICE:
Do not remove the hole plug before installing a new brake actuator because the brake actuator assembly is filled with brake fluid.



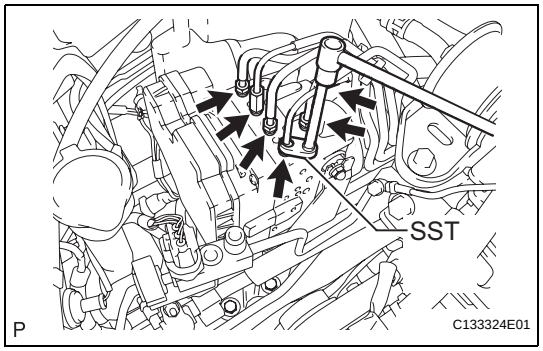
INSTALLATION

1. INSTALL BRAKE ACTUATOR

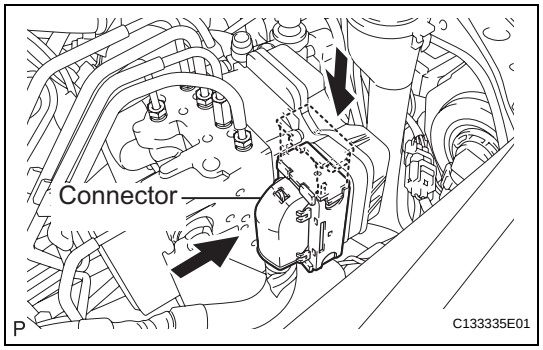
(a) Install the brake actuator assembly with bracket to the body with the 3 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not damage the brake tubes and wire harness.



(b) Temporarily tighten each brake tube to the correct positions of the brake actuator assembly with bracket as shown in the illustration.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 1st Master Cylinder
- *6: From 2nd Master Cylinder



(c) Using SST, fully tighten each brake tube.
SST 09023-00101
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



(d) Connect the actuator connector.
NOTICE:
Make sure that the connector is locked securely.

2. INSTALL RADIATOR RESERVE TANK ASSEMBLY
(a) Install the radiator reserve tank assembly.
(b) Connect the radiator reservoir tank hose.

3. FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)

4. BLEED BRAKE LINE (See page BR-7)

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. BLEED BRAKE ACTUATOR (See page BR-8)

7. INSPECT BRAKE FLUID LEVEL (See page BR-10)

8. INSPECT FOR BRAKE FLUID LEAKAGE

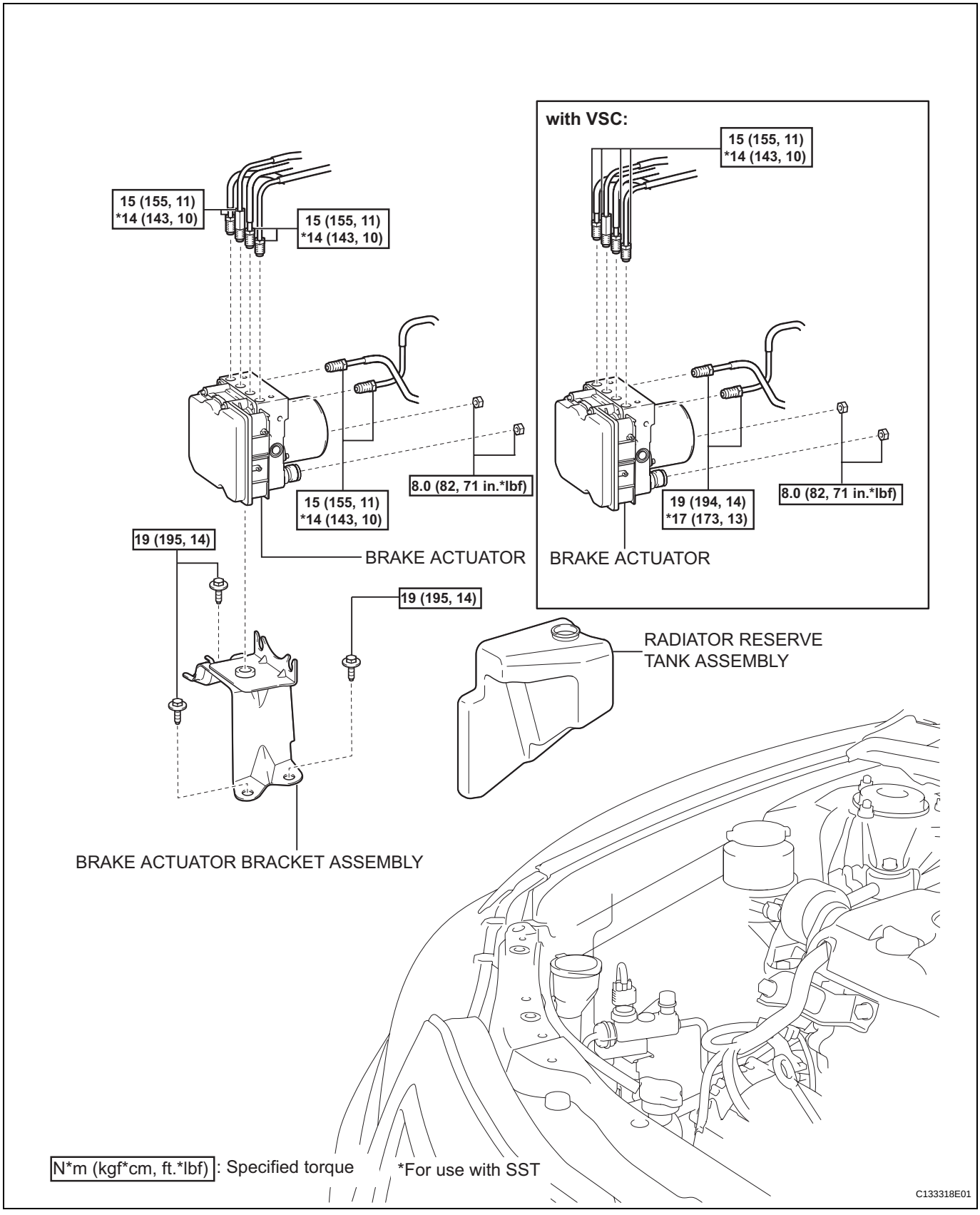
9. PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION
HINT:
(See page BC-119)

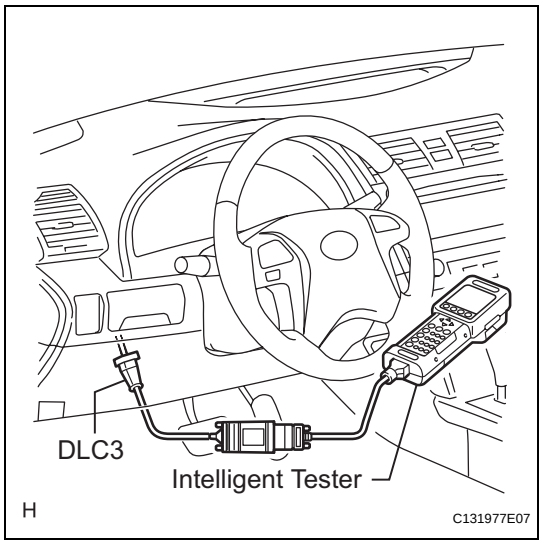
10. INSPECT ACTUATOR WITH INTELLIGENT TESTER
HINT:
(See page BC-425)

BC

BRAKE ACTUATOR (for BOSCH Made)

COMPONENTS





ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and run it at idle.
(c) Select the Active Test mode on the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. INSPECT ACTUATOR MOTOR OPERATION

NOTICE:
Do not keep a motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.

(a) With the motor relay on, check the actuator motor operation sounds.
(b) Turn the motor relay off.
(c) Depress the brake pedal and hold it for approximately 15 seconds. Check that the brake pedal cannot be depressed farther.
(d) With the motor relay on, check that the pedal does not pulsate.
(e) Turn the motor relay off and release the brake pedal.

3. INSPECT RIGHT FRONT WHEEL OPERATION

NOTICE:
Do not turn on a solenoid in a manner different than described below.

(a) Depress the brake pedal and hold it.
(b) Turn the SFRH and SFRR solenoids on simultaneously, and check that the pedal cannot be depressed.
(c) Turn the SFRH and SFRR solenoids off simultaneously, and check that the pedal can be depressed.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating them continuously, set an interval of more than 20 seconds.
(d) Turn the motor relay on and check that the pedal returns.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

4. INSPECT OTHER WHEEL OPERATION

(a) Using the same procedure, check the solenoids of the other wheels.

HINT:

- Left front wheel: SFLH, SFLR
- Right rear wheel: SRRH, SRRR
- Left rear wheel: SRLH, SRLR

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE RADIATOR RESERVE TANK ASSEMBLY

(a) Separate the radiator reserve tank hose.

(b) Remove the radiator reserve tank assembly.

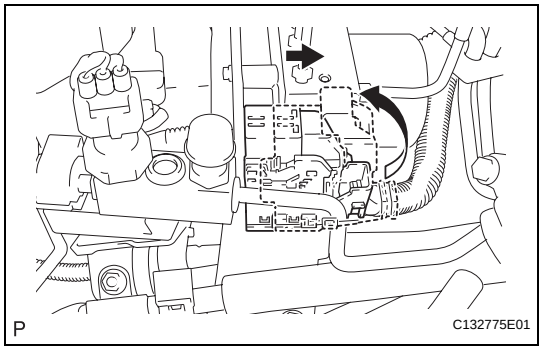
3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately clean it off completely.

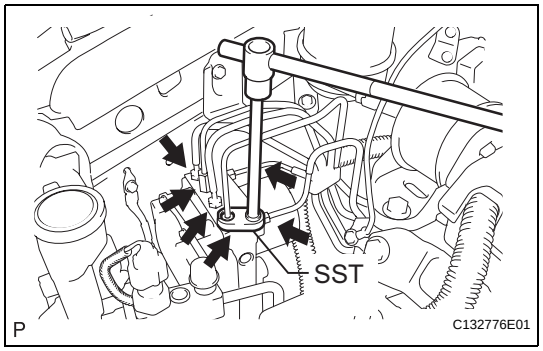
4. REMOVE BRAKE ACTUATOR

(a) Release the lock lever and disconnect the actuator connector.



(b) Using SST, disconnect the 6 brake lines from the actuator assembly with bracket.

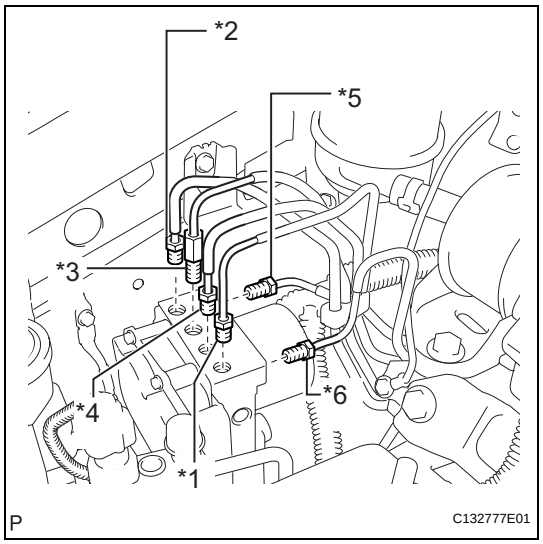
SST 09023-00101

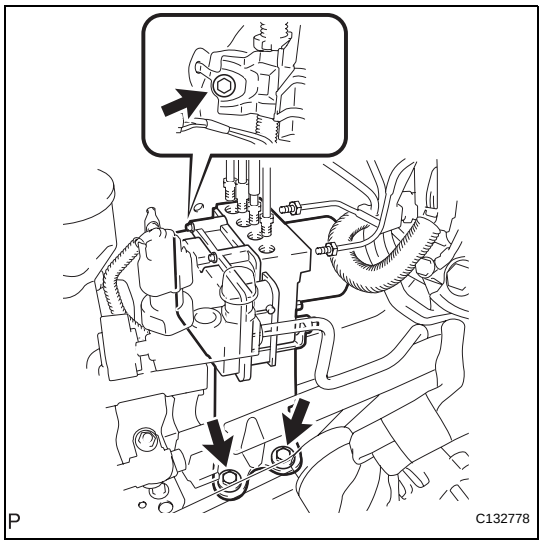


(c) Use tags or make a memo to identify the places to reconnect.

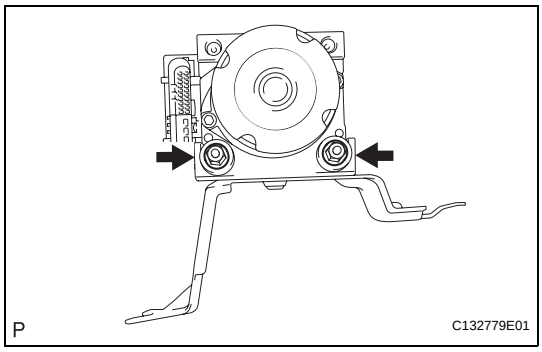
HINT:

- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 2nd Master Cylinder
- *6: From 1st Master Cylinder





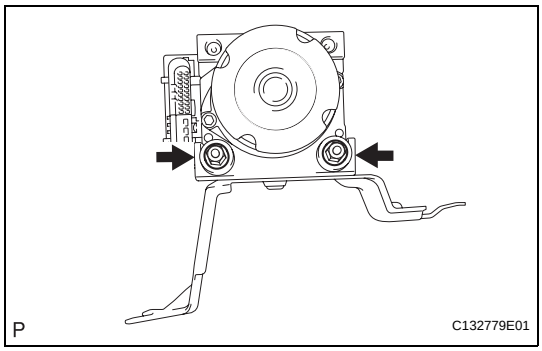
(d) Remove the 3 bolts and actuator assembly from the body with bracket.
NOTICE:
Do not damage the brake tubes and wire harness.



DISASSEMBLY

1. REMOVE BRAKE ACTUATOR BRACKET ASSEMBLY

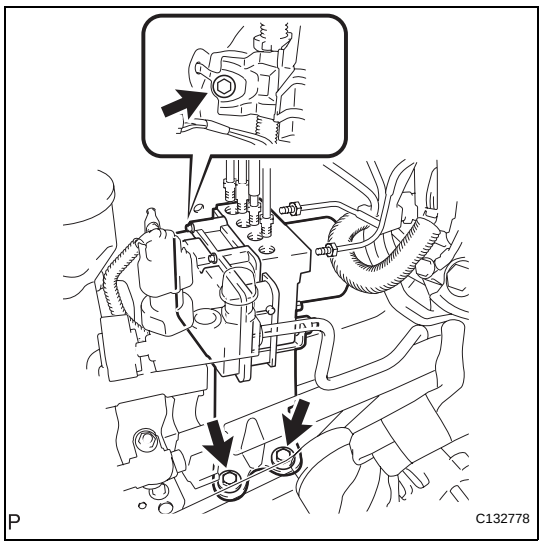
(a) Remove the 2 nuts and the brake actuator assembly from the actuator bracket assembly.



REASSEMBLY

1. INSTALL BRAKE ACTUATOR BRACKET ASSEMBLY

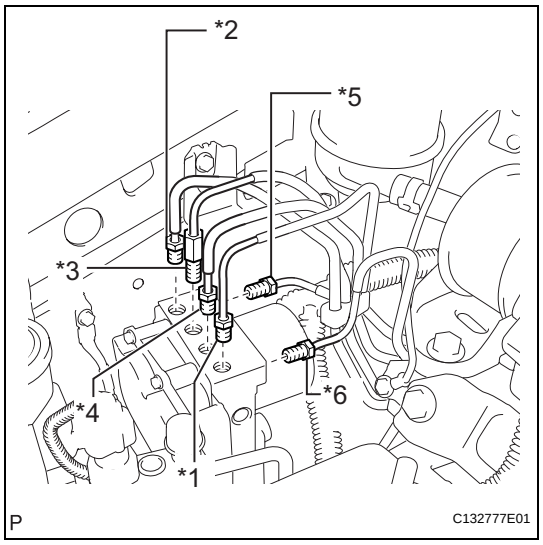
(a) Install the actuator assembly to the actuator bracket assembly with the 2 nuts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Do not remove the hole plug before installing a new brake actuator because the brake actuator assembly is filled with brake fluid.



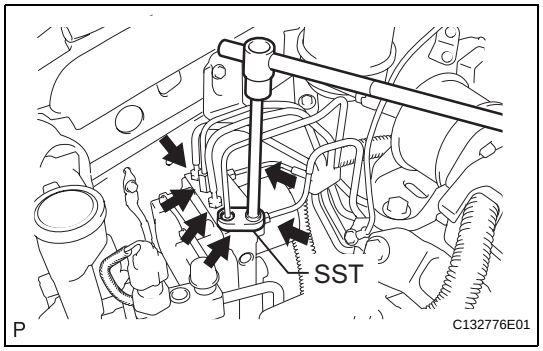
INSTALLATION

1. INSTALL BRAKE ACTUATOR (w/o VSC)

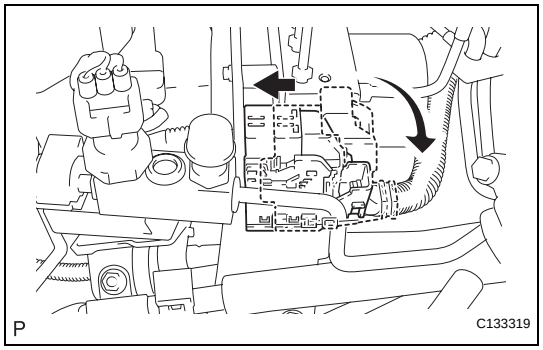
(a) Install the actuator assembly with bracket to the body with the 3 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not damage the brake tubes and wire harness.



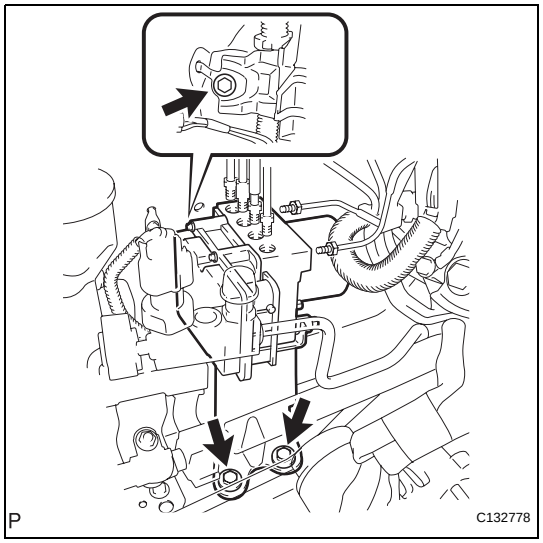
(b) Temporarily tighten each brake tube to the correct positions of the actuator assembly with bracket as shown in the illustration.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 2nd Master Cylinder
- *6: From 1st Master Cylinder



(c) Using SST, fully tighten each brake tube.
SST 09023-00101
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



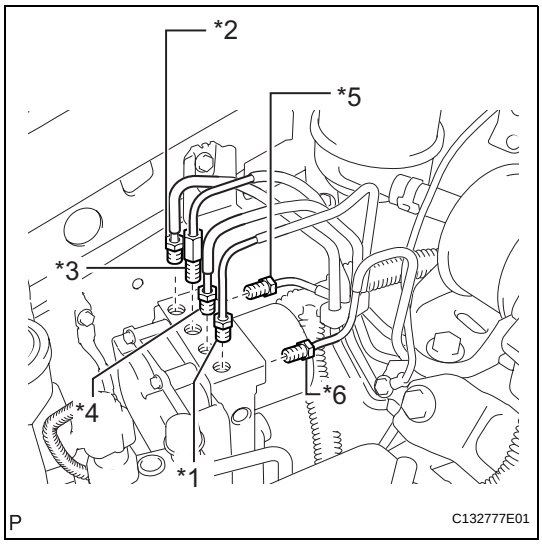
(d) Connect the actuator connector.
NOTICE:
Make sure that the connector is locked securely.



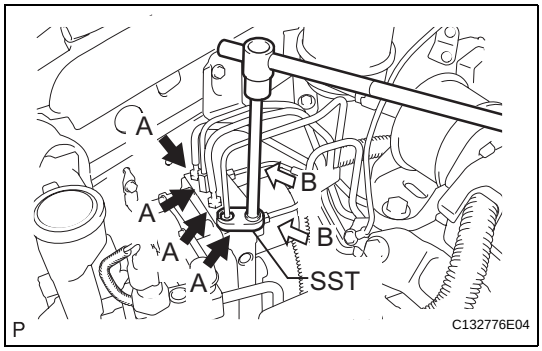
2. INSTALL BRAKE ACTUATOR (w/ VSC)

(a) Install the actuator assembly with bracket to the body with the 3 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not damage the brake tubes.

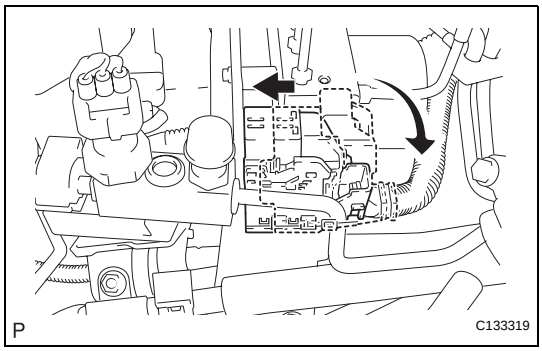
BC



(b) Temporarily tighten each brake tube to the correct positions of the actuator assembly with bracket as shown in the illustration.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 2nd Master Cylinder
- *6: From 1st Master Cylinder



(c) Using SST, fully tighten each brake tube.
SST 09023-00101, 09023-38200
Torque: bolt A M10 without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
bolt A M10 with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
bolt B M12 without SST
19 N*m (194 kgf*cm, 14 ft.*lbf)
bolt B M12 with SST
17 N*m (173 kgf*cm, 13 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



(d) Connect the actuator connector.
NOTICE:
Make sure that the connector is locked securely.

3. **INSTALL RADIATOR RESERVE TANK ASSEMBLY**
(a) Install the radiator reserve tank assembly.
(b) Connect the radiator reservoir tank hose.

4. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)**

5. **BLEED BRAKE LINE (See page BR-7)**

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

7. **BLEED BRAKE ACTUATOR ASSEMBLY (w/ VSC) (See page BR-8)**

8. **INSPECT BRAKE FLUID LEVEL (See page BR-10)**

9. **INSPECT FOR BRAKE FLUID LEAKAGE**

10. **INSPECT ACTUATOR WITH INTELLIGENT TESTER**
HINT:
(See page BC-431)

11. PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION (w/ VSC)

HINT:

(See page BC-278)

12. INSPECT SENSOR SIGNAL

HINT:

- without VSC (see page BC-11)
- with VSC (see page BC-290)

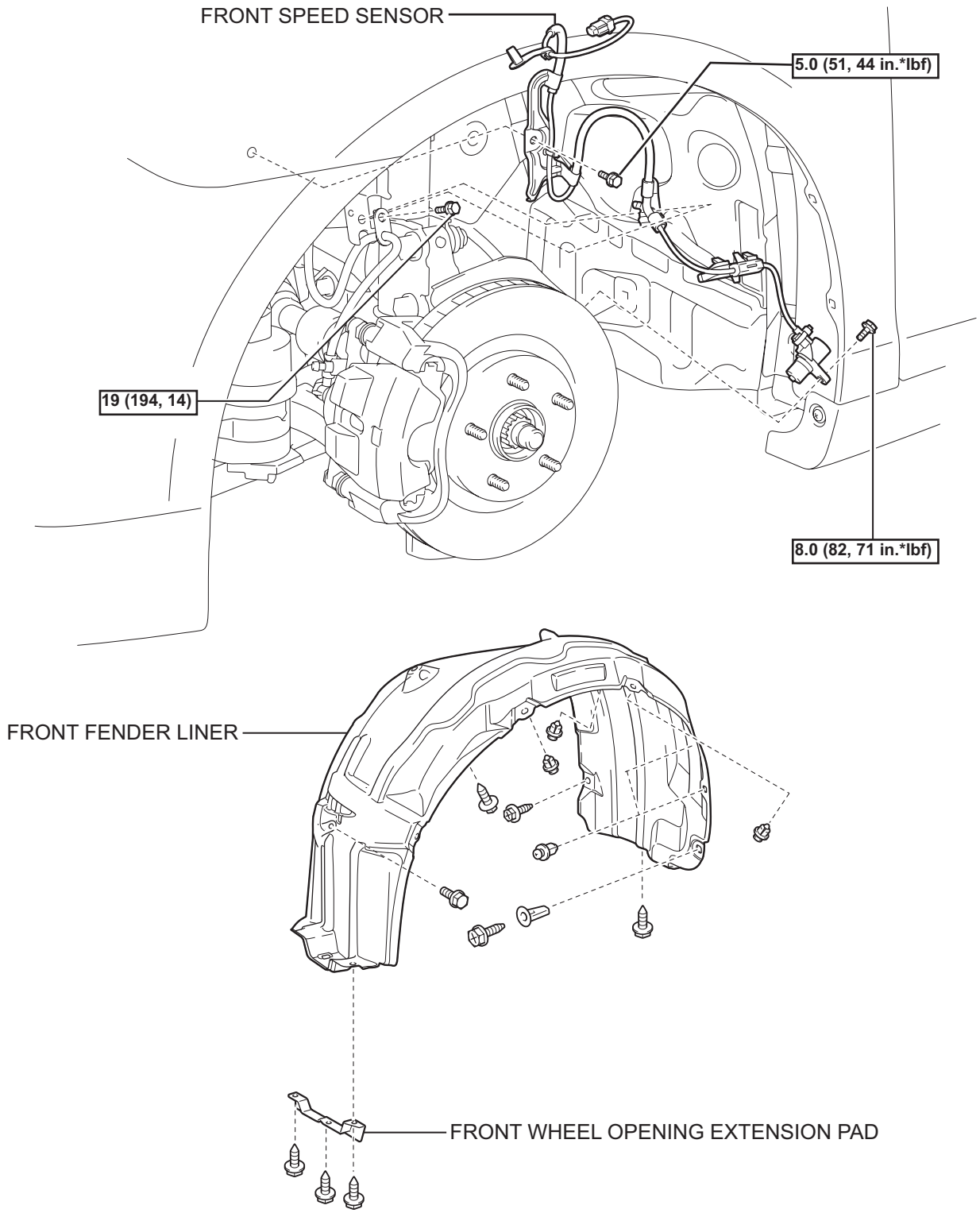
13. INSPECT DTC AND CLEAR

HINT:

- without VSC (See page BC-21)
- with VSC (See page BC-302)

FRONT SPEED SENSOR

COMPONENTS

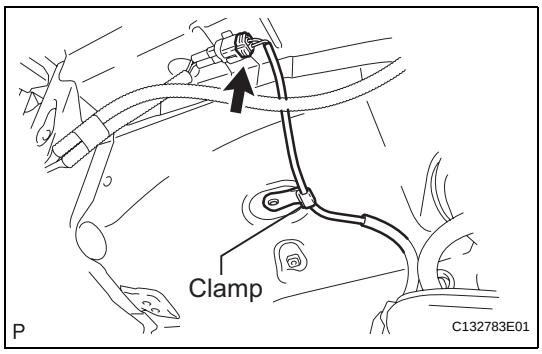


N*m (kgf*cm, ft.*lbf): Specified torque

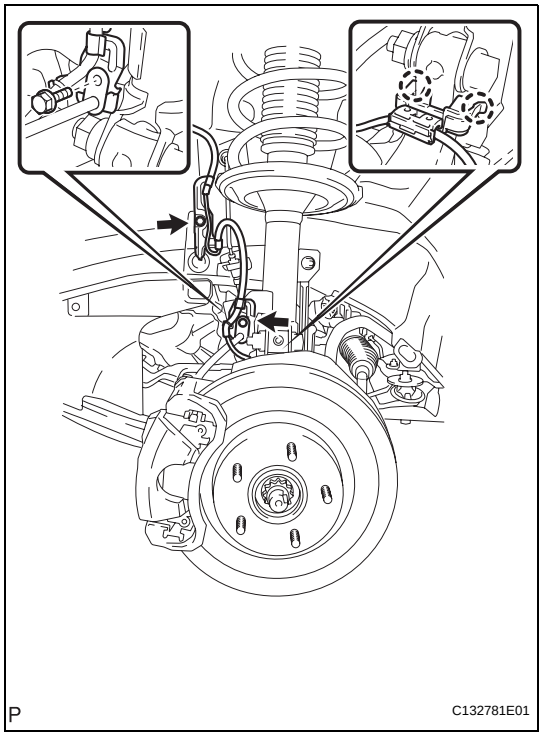
C132784E01

REMOVAL

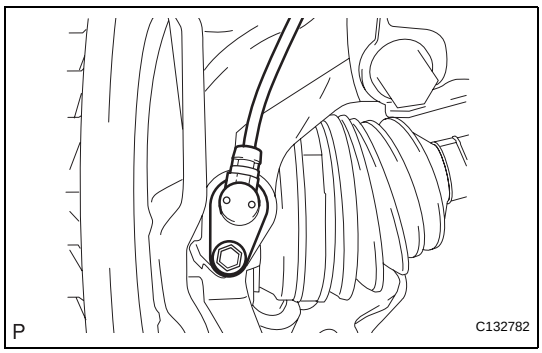
1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH (See page ED-6)**
3. **REMOVE FRONT FENDER LINER (See page ED-6)**
4. **REMOVE FRONT SPEED SENSOR**
   (a) Disconnect the front speed sensor connector and clamp.



BC



   (b) Remove the 2 bolts from the body and the shock absorber assembly.
   (c) Disengage the 2 claws from the steering knuckle and body.

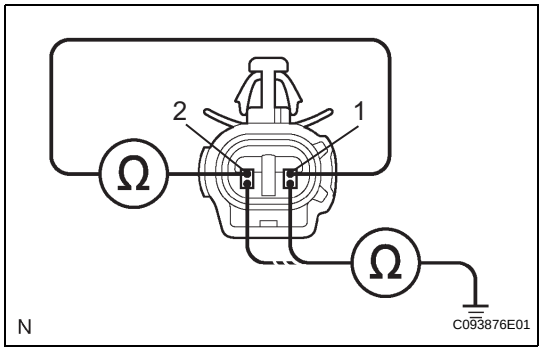


   (d) Remove the bolt and the front speed sensor.
   NOTICE:
   - **Prevent foreign matter from attaching to the sensor tip.**
   - **Clean the installation hole and the surface for the speed sensor every time the speed sensor is removed.**

INSPECTION

1. INSPECT FRONT SPEED SENSOR (for BOSCH Made)

(a) Inspect the front speed sensor. If any of the following occurs, replace the front speed sensor with a new one:
- The surface of the front speed sensor is cracked, dented, or chipped off.
- The connector or wire harness is scratched, cracked, or damaged.
- The front speed sensor has been dropped.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (FL+) - 2 (FL-)	0.92 to 1.22 kΩ at 20 °C (68°F)
1 (FL+) - Body ground	10 kΩ or higher
2 (FL-) - Body ground	10 kΩ or higher

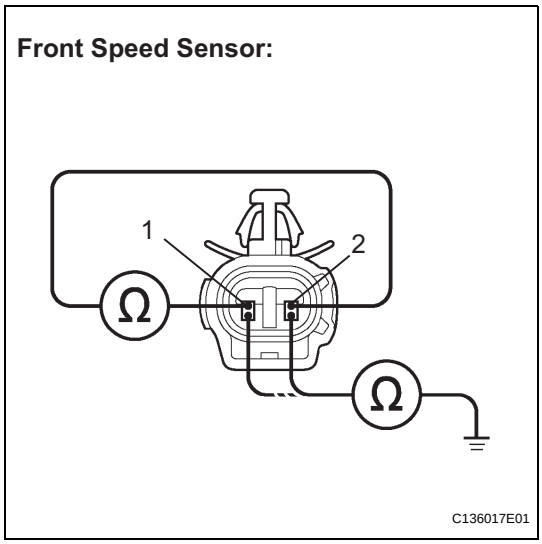
RH

Tester Connection	Specified Condition
1 (FR+) - 2 (FR-)	0.92 to 1.22 kΩ at 20 °C(68°F)
1 (FR+) - Body ground	10 kΩ or higher
2 (FR-) - Body ground	10 kΩ or higher

If the value is not as specified, replace the front speed sensor.

2. INSPECT FRONT SPEED SENSOR (for ADVICS Made)

(a) Inspect the front speed sensor. If any of the following occurs, replace the front speed sensor with a new one:
- The surface of the front speed sensor is cracked, dented, or chipped off.
- The connector or wire harness is scratched, cracked, or damaged.
- The front speed sensor has been dropped.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

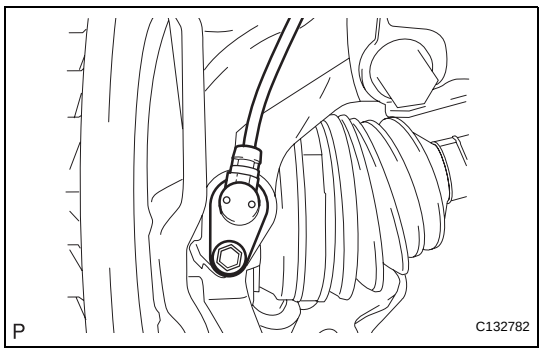
Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher

If the value is not as specified, replace the front speed sensor.

BC



INSTALLATION

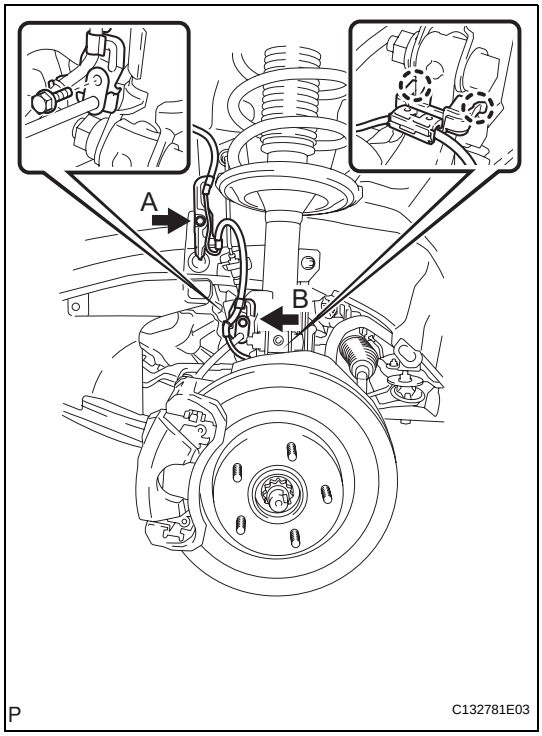
1. INSTALL FRONT SPEED SENSOR

(a) Install the front speed sensor with the bolt.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

NOTICE:

Prevent foreign matter from attaching to the sensor tip.



(b) Install the front speed sensor with the 2 bolts and engage the 2 claws.

Torque: Bolt A

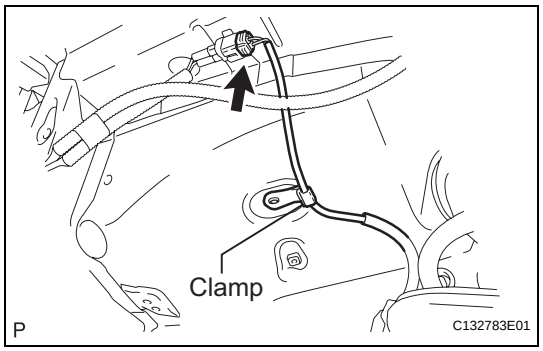
5.0 N*m (51 kgf*cm, 44 in.*lbf)

Bolt B

19 N*m (194 kgf*cm, 14 ft.*lbf)

NOTICE:

Do not twist the wire harness for the front speed sensor when installing the speed sensor.



(c) Connect the front speed sensor connector and clamp.

2. **INSTALL FRONT FENDER LINER (See page ED-10)**

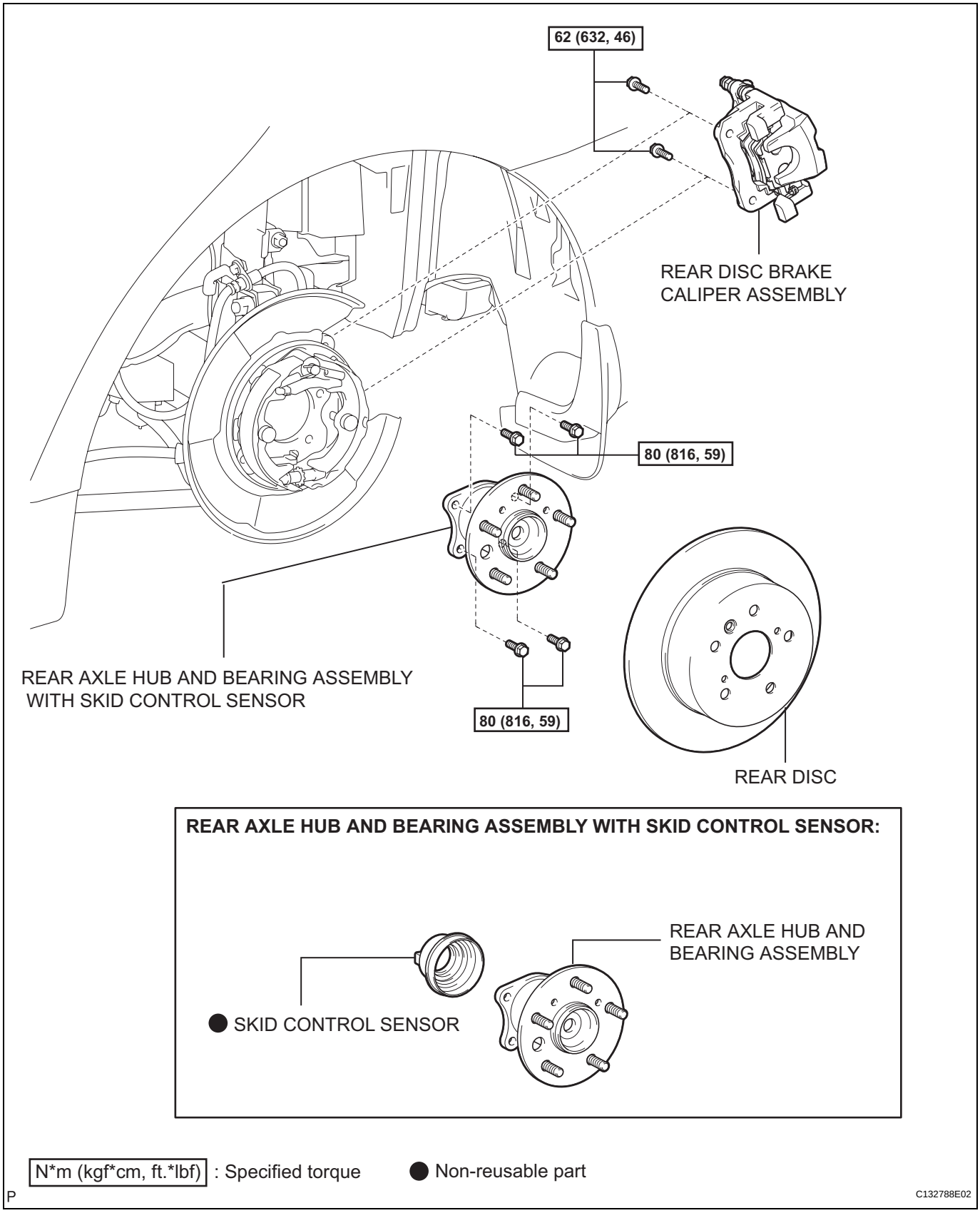
3. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH (See page ED-10)**

4. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

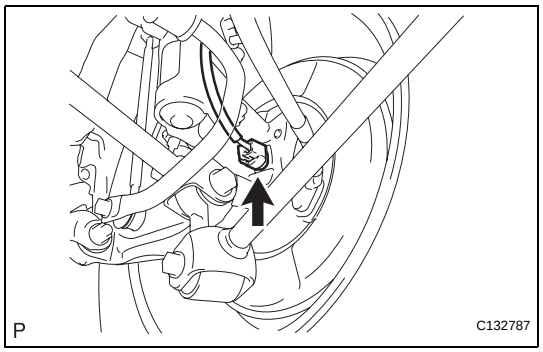
5. **CHECK SPEED SENSOR SIGNAL**
HINT:
- for BOSCH without VSC (See page BC-11)
- for BOSCH with VSC (See page BC-290)
- for ADVICS (See page BC-123)

SKID CONTROL SENSOR

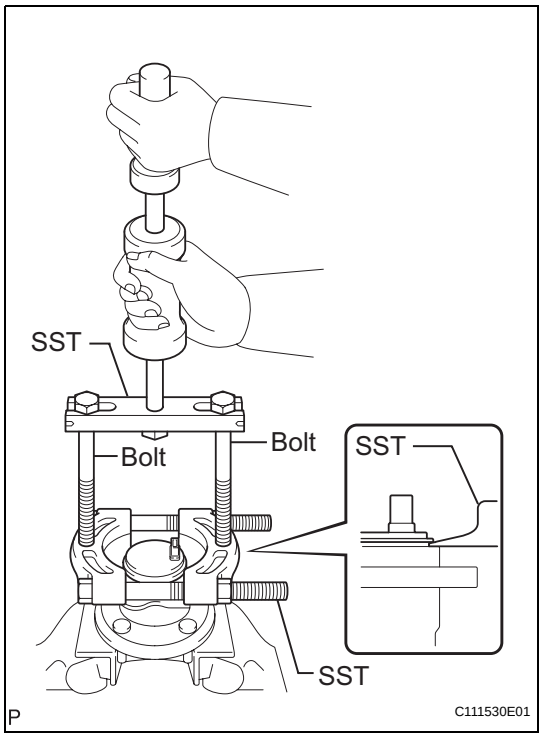
COMPONENTS



REMOVAL



1. **REMOVE REAR WHEEL**
2. **DISCONNECT SKID CONTROL SENSOR WIRE**
   (a) Disconnect the connector from the skid control sensor.
   NOTICE:
   Be careful not to damage the speed sensor.
3. **REMOVE REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-18)**
4. **REMOVE REAR DISC (See page BR-62)**
5. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY WITH SKID CONTROL SENSOR (See page AH-15)**



6. **REMOVE SKID CONTROL SENSOR**
   (a) Mount the rear axle hub in a vise using aluminum plates.
   NOTICE:
   Replace the hub and bearing assembly if it is dropped or receives a strong shock.
   (b) Using a pin punch and hammer, drive out the 2 pins and remove the 2 attachments from SST.
   SST 09520-00031 (09521-00010, 09520-00040), 09521-00020
   (c) Using SST and 2 bolts (Diameter: 12 mm, pitch: 1.5 mm), remove the skid control sensor from the hub and bearing assembly.
   SST 09520-00031 (09521-00010, 09520-00040), 09521-00020, 09950-00020
   NOTICE:
   - **Keep the sensor away from magnets.**
   - **Pull the skid control sensor off straight, taking care not to make contact with the skid control sensor rotor.**
   - **If the speed sensor rotor is damaged or deformed, replace the hub and bearing assembly.**
   - **Do not scratch the contact surface between the axle hub and the skid control sensor.**
   - **Do not attach foreign matter to the speed sensor rotor and tip.**

INSPECTION

1. INSPECT SKID CONTROL SENSOR (for BOSCH Made)

(a) Inspect the skid control sensor. If any of the following occurs, replace the skid control sensor with a new one:
- The surface of the skid control sensor is cracked, dented, or chipped off.
- The connector is scratched, cracked, or damaged.
- The skid control sensor has been dropped.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (RR+) - 2 (RR-)	Below 2.2 kΩ
1 (RR+) - Body ground	10 kΩ or higher
2 (RR-) - Body ground	10 kΩ or higher

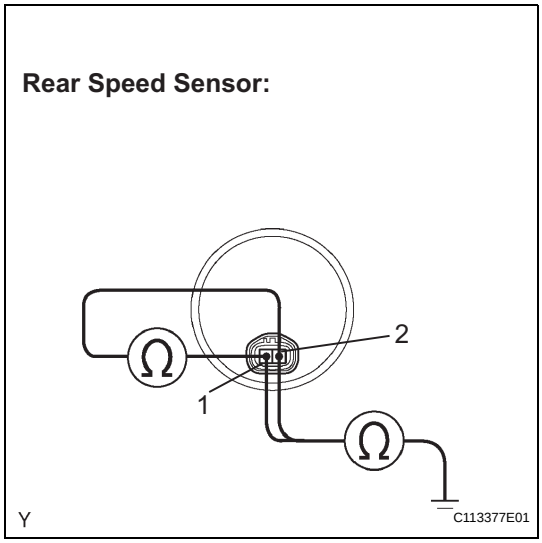
RH

Tester Connection	Specified Condition
1 (RL+) - 2 (RL-)	Below 2.2 kΩ
1 (RL+) - Body ground	10 kΩ or higher
2 (RL-) - Body ground	10 kΩ or higher

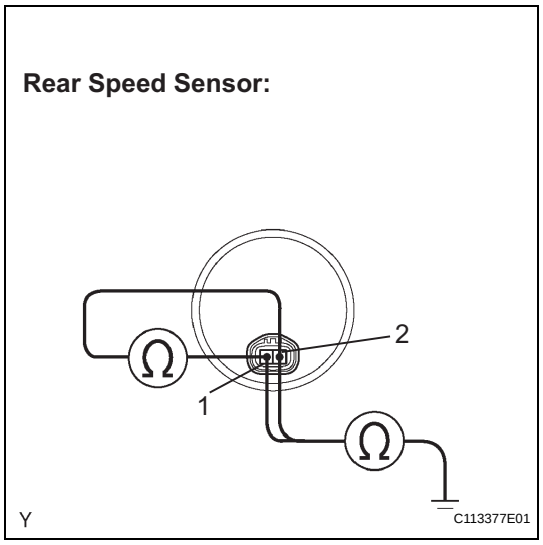
If the value is not as specified, replace the skid control sensor.

2. INSPECT SKID CONTROL SENSOR (for ADVICS Made)

(a) Inspect the skid control sensor. If any of the following occurs, replace the skid control sensor with a new one:
- The surface of the skid control sensor is cracked, dented, or chipped off.
- The connector is scratched, cracked, or damaged.
- The skid control sensor has been dropped.



BC



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

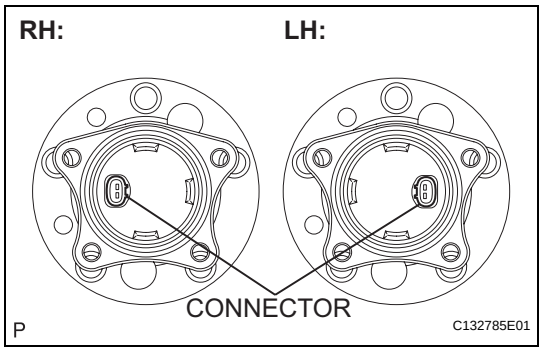
RH

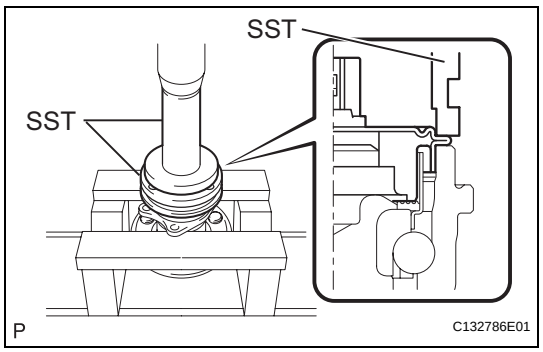
Tester Connection	Condition	Specified Condition
2 (RR+) - 1 (RR-)	Always	0.9 to 2.1 kΩ
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
2 (RL+) - 1 (RL-)	Always	0.9 to 2.1 kΩ
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

If the value is not as specified, replace the skid control sensor.





INSTALLATION

1. **INSTALL SKID CONTROL SENSOR**

(a) Clean the contact surface between the axle hub and a new skid control sensor.

NOTICE:

Prevent foreign matter from attaching to the sensor rotor.

(b) Place the skid control sensor on the axle hub so that the connector is positioned as shown in the illustration.

(c) Using SST, a press, 2 V-blocks, and 2 steel plates, install the skid control sensor to the axle hub.

SST 09309-36010, 09213-58013

NOTICE:

- **Keep the sensor away from magnets.**
- **Do not use a hammer on the skid control sensor.**
- **Check that there is no foreign matter such as iron chips on the detecting portion of the skid control sensor.**
- **Slowly press the skid control sensor straight.**

2. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY WITH SKID CONTROL SENSOR (See page AH-16)**

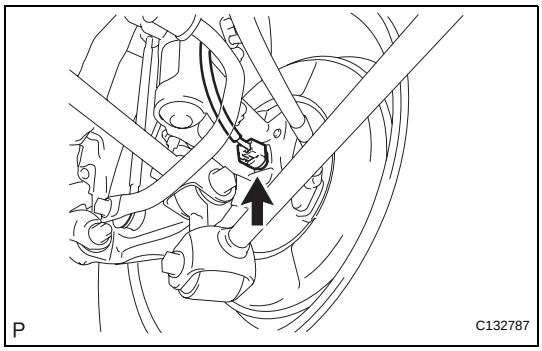
3. **INSPECT REAR AXLE HUB BEARING LOOSENESS (See page AH-15)**

4. **INSPECT REAR AXLE HUB RUNOUT (See page AH-15)**

5. **INSTALL REAR DISC (See page BR-63)**

6. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-20)**

BC



7. **CONNECT SKID CONTROL SENSOR WIRE**
   (a) Connect the connector to the skid control sensor.

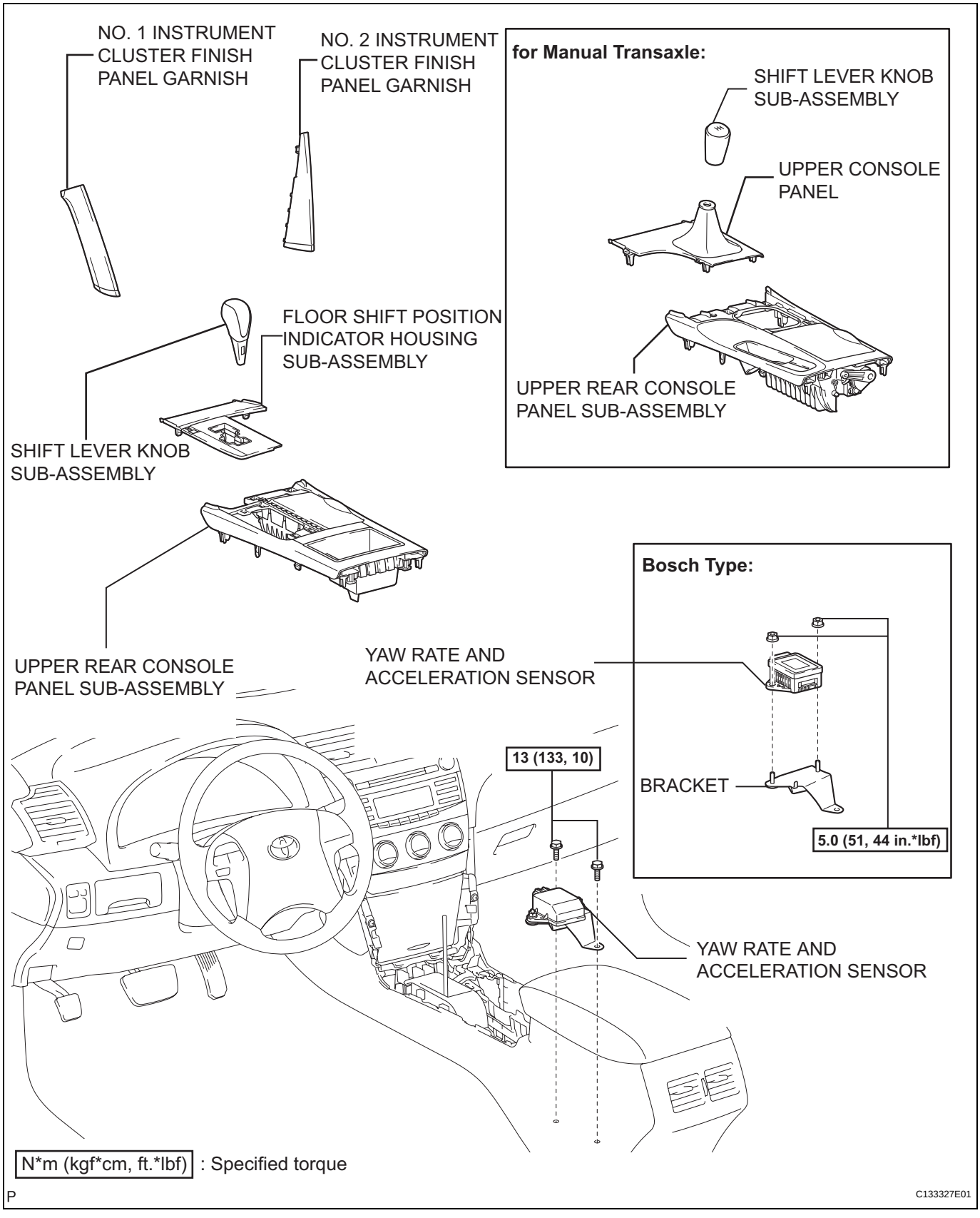
8. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

9. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**
   HINT:
   (See page SP-13)

10. **CHECK SPEED SENSOR SIGNAL**
    HINT:
    - for BOSCH without VSC (See page BC-11)
    - for BOSCH with VSC (See page BC-290)
    - for ADVICS (See page BC-123)

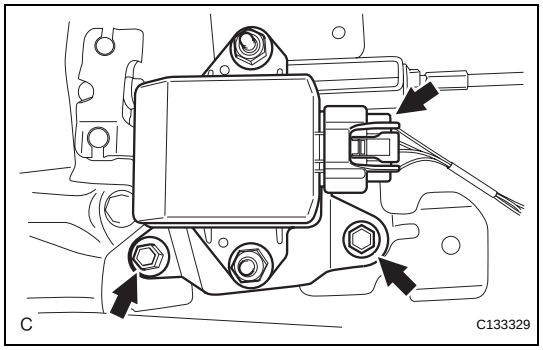
YAW RATE AND ACCELERATION SENSOR (w/ VSC)

COMPONENTS

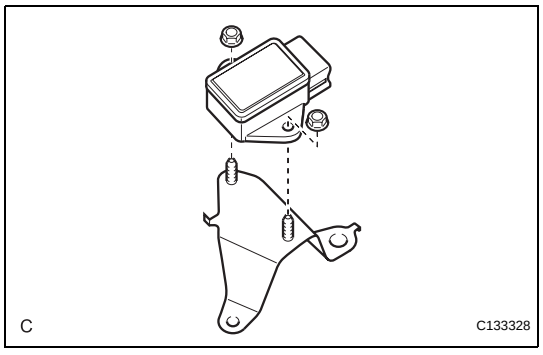


REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
4. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
5. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
6. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
7. **REMOVE UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
8. **REMOVE UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
9. **REMOVE YAW RATE AND ACCELERATION SENSOR**
   (a) Disconnect the yaw rate sensor connector.
   (b) Remove the 2 bolts and yaw rate sensor.
   NOTICE:
   Do not remove the sensor from the bracket.



10. **REMOVE YAW RATE AND ACCELERATION SENSOR (for BOSCH Made)**
    (a) Remove the 2 nuts and yaw rate sensor from the bracket.

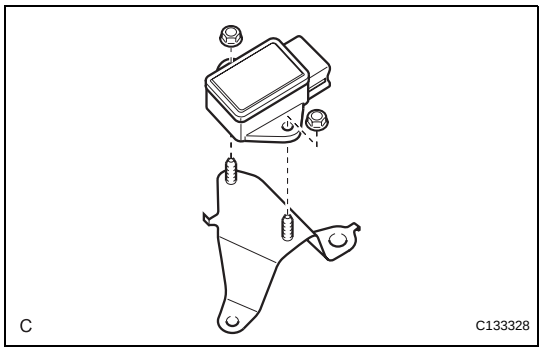


BC

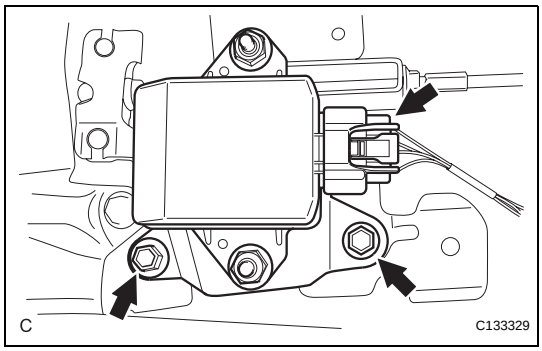
INSPECTION

1. **INSPECT YAW RATE AND ACCELERATION SENSOR**
   (a) Inspect the yaw rate sensor. If any of the following occurs, replace the yaw rate sensor with a new one:
   - The surface of the yaw rate sensor is cracked, dented, or chipped off.
   - The connector is scratched, cracked, or damaged.
   - The yaw rate sensor has been dropped.

INSTALLATION



1. **INSTALL YAW RATE AND ACCELERATION SENSOR (for BOSCH Made)**
   (a) Install the yaw rate and acceleration sensor to the bracket with the 2 nuts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



2. **INSTALL YAW RATE AND ACCELERATION SENSOR**
   (a) Install the yaw rate sensor and acceleration with the 2 bolts.
   NOTICE:
   - **Do not damage the yaw rate and acceleration sensor.**
   - **Make sure that the yaw rate and acceleration sensor is installed securely.**

   Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
   (b) Connect the yaw rate and acceleration sensor connector.

3. **INSTALL UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
4. **INSTALL UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
5. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
6. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
7. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
8. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
9. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**
10. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**

BC

11. PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION

HINT:

- for BOSCH (See page BC-278)
- for ADVICS (See page BC-119)

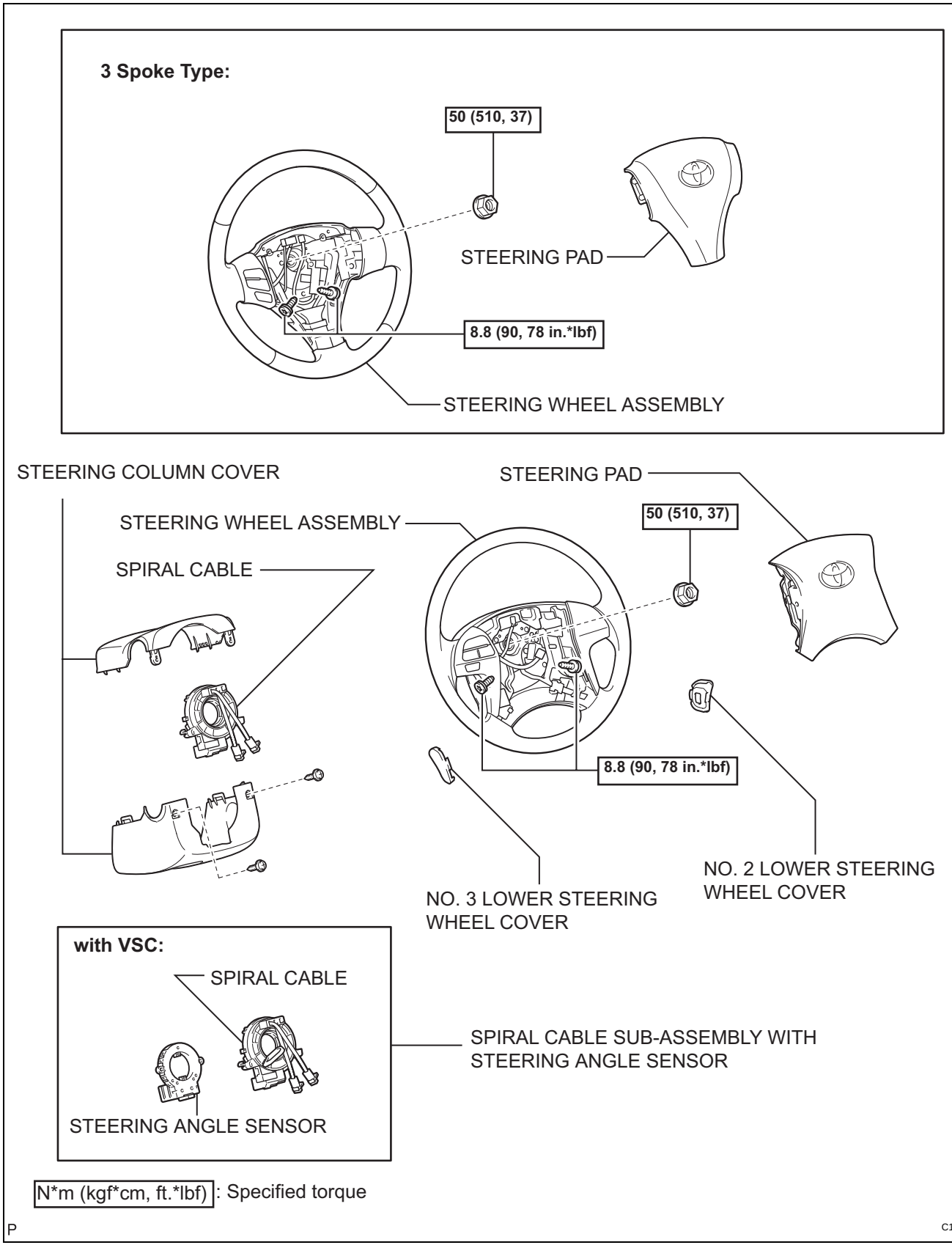
12. INSPECT SENSOR SIGNAL

HINT:

- for BOSCH (See page BC-290)
- for ADVICS (See page BC-123)

STEERING ANGLE SENSOR (w/ VSC)

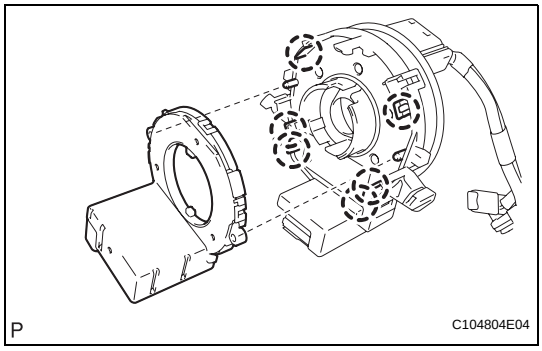
COMPONENTS



BC

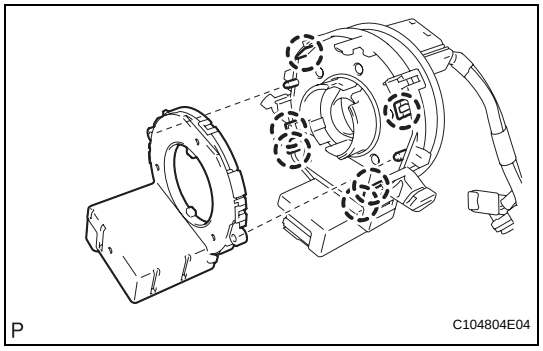
REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
   NOTICE:
   When reconnecting the cable to the negative battery terminal after installing the steering sensor, check that the front tires and steering wheel are kept aligned straight ahead before and after connecting the cable to the negative battery terminal.
4. **REMOVE NO. 2 STEERING WHEEL COVER LOWER (See page RS-349)**
5. **REMOVE NO. 3 STEERING WHEEL COVER LOWER (See page RS-349)**
6. **REMOVE STEERING PAD (See page RS-350)**
7. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
8. **REMOVE STEERING COLUMN COVER (See page SR-39)**
9. **REMOVE SPIRAL CABLE SUB-ASSEMBLY WITH STEERING ANGLE SENSOR (See page RS-364)**
10. **REMOVE STEERING ANGLE SENSOR**
    (a) Disengage the claws and remove the steering angle sensor from the spiral cable.



INSPECTION

1. **INSPECT STEERING ANGLE SENSOR**
   (a) Inspect the steering angle sensor. If any of the following occurs, replace the steering angle sensor with a new one:
   - The surface of the steering angle sensor is cracked, dented, or chipped off.
   - The connector is scratched, cracked, or damaged.
   - The steering angle sensor has been dropped.



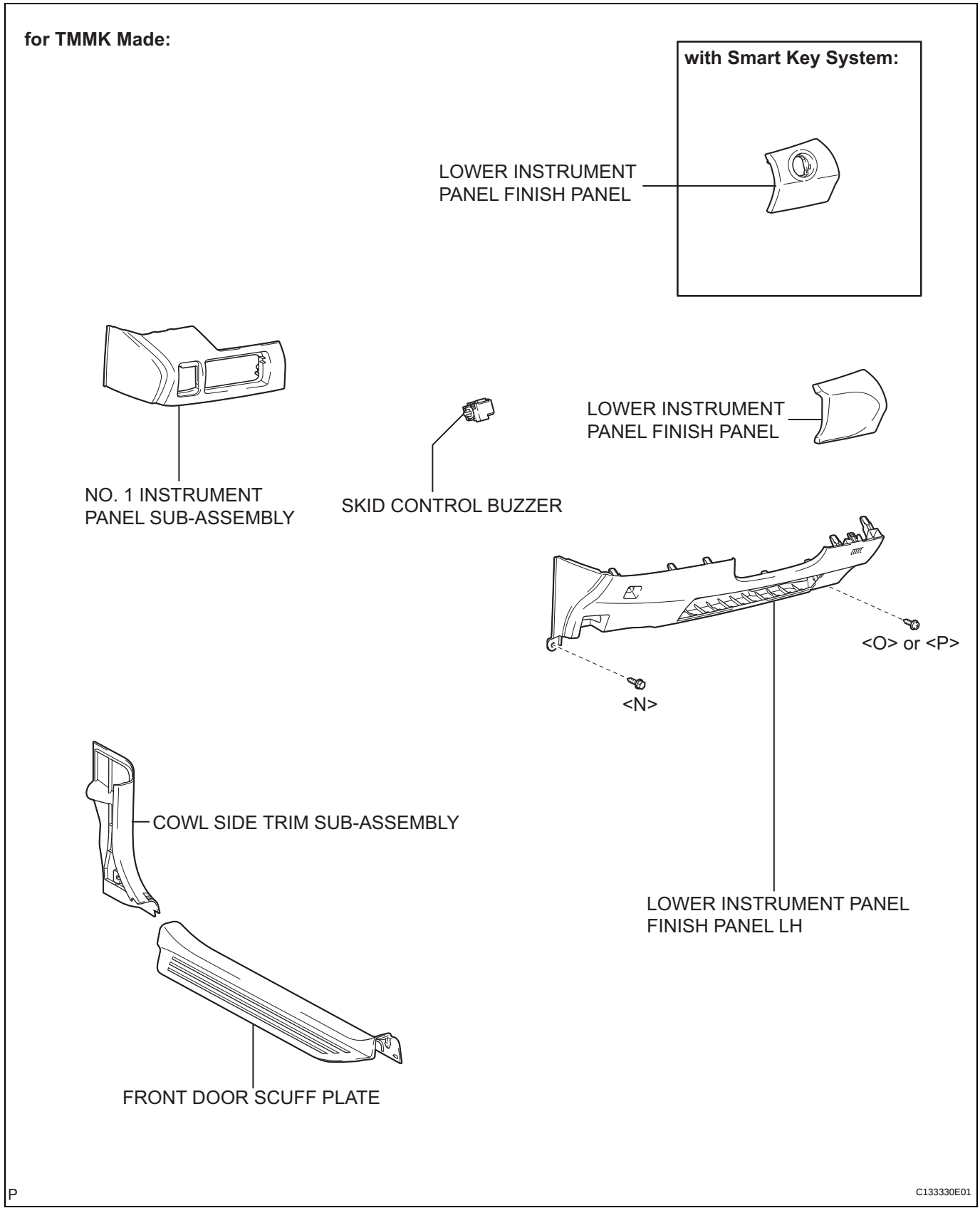
INSTALLATION

1. **INSTALL STEERING ANGLE SENSOR**
   (a) Align the locating pins, engage the claws, and install the steering angle sensor to the spiral cable sub-assembly.
2. **INSTALL SPIRAL CABLE SUB-ASSEMBLY WITH STEERING ANGLE SENSOR (See page RS-366)**
3. **INSTALL STEERING COLUMN COVER (See page SR-50)**
4. **ADJUST SPIRAL CABLE (See page RS-367)**
5. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)**
6. **INSPECT STEERING WHEEL CENTER POINT (See page SR-47)**
7. **INSTALL STEERING PAD (See page RS-350)**
8. **INSTALL NO. 2 STEERING WHEEL COVER LOWER (See page RS-352)**
9. **INSTALL NO. 3 STEERING WHEEL COVER LOWER (See page RS-351)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **INSPECT STEERING PAD (See page RS-347)**
12. **INSPECT SRS WARNING LIGHT**
    HINT:
    (See page RS-32)

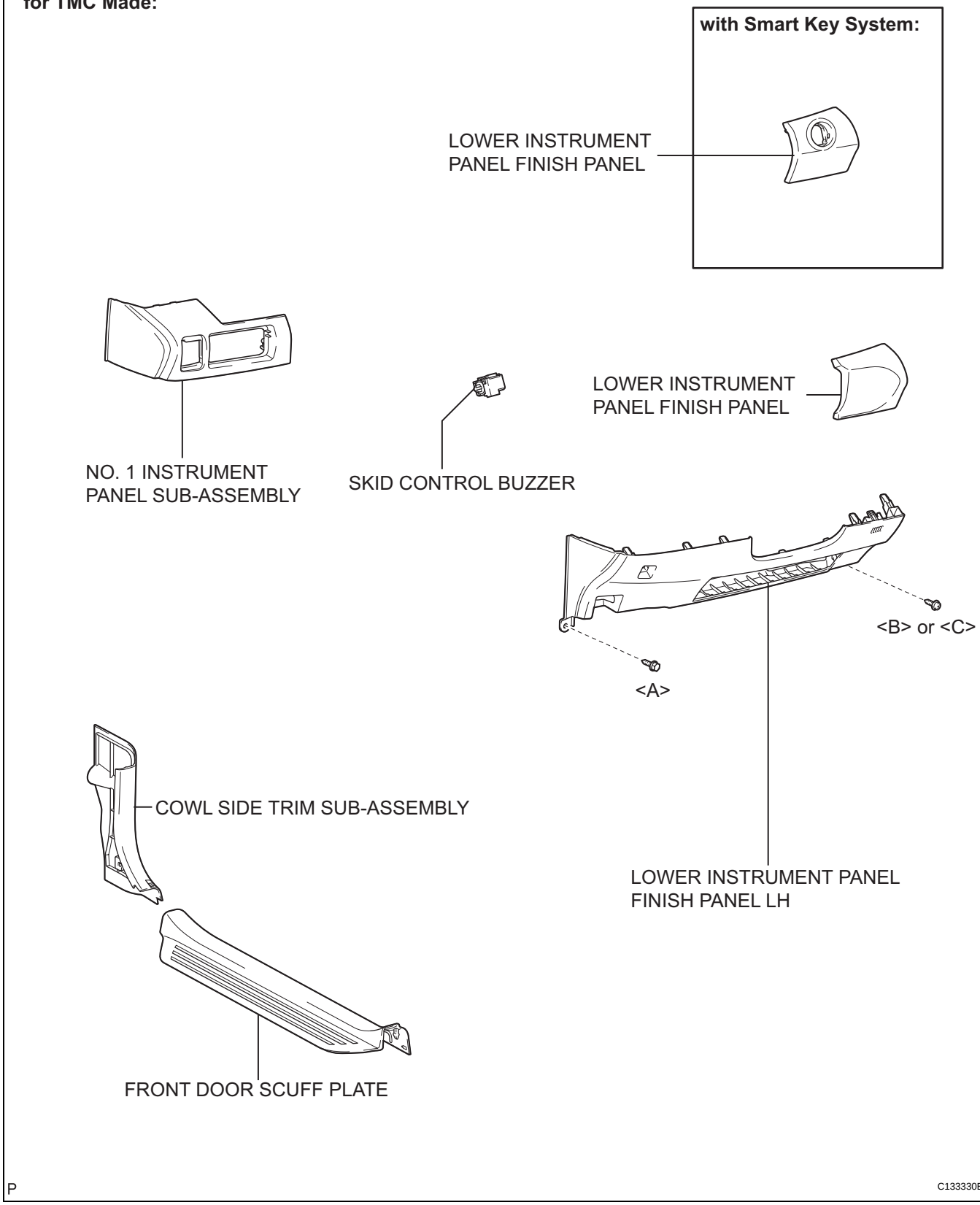
BC

SKID CONTROL BUZZER (w/ VSC)

COMPONENTS



for TMC Made:



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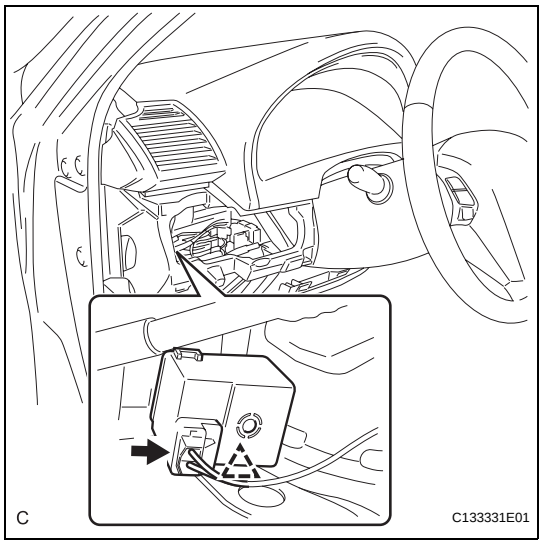
BC

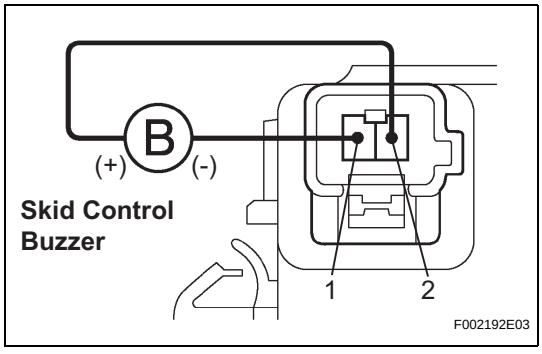
REMOVAL

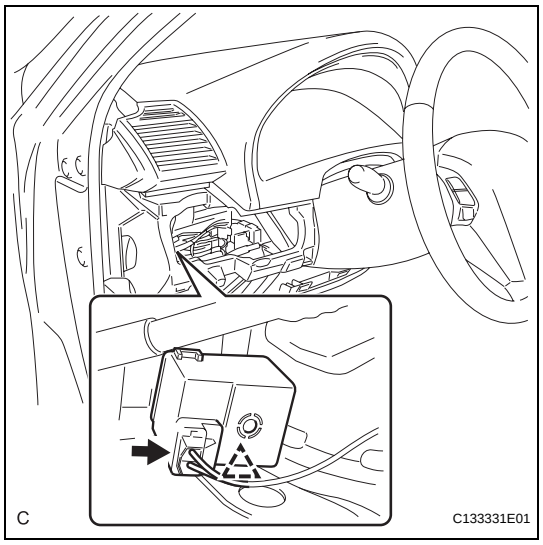
1. **PRECAUTION (See page IP-20)**
2. **REMOVE FRONT DOOR SCUFF PLATE (See page IR-24)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY (See page IR-25)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
6. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
9. **REMOVE SKID CONTROL BUZZER**
   (a) Disconnect the skid control buzzer connector.
   (b) Remove the clip and skid control buzzer assembly.



INSPECTION

1. **INSPECT SKID CONTROL BUZZER**
   (a) Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.
   OK:
   The skid control buzzer sounds.
   If the skid control buzzer does not sound, replace the skid control buzzer.





INSTALLATION

1. **INSTALL SKID CONTROL BUZZER**
   (a) Attach the claw and install the skid control buzzer.
   (b) Connect the skid control buzzer assembly connector.
2. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
3. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
4. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
5. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
6. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
7. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY (See page IR-54)**
8. **INSTALL FRONT DOOR SCUFF PLATE (See page IR-54)**

ABS MOTOR RELAY (w/ VSC)

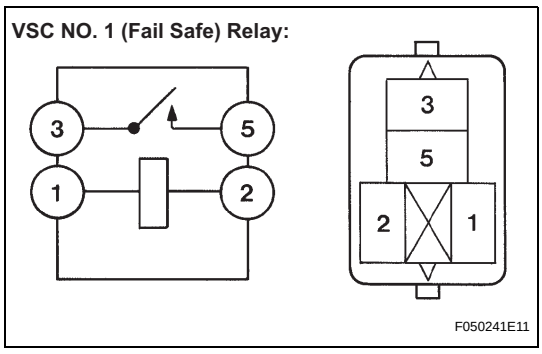
ON-VEHICLE INSPECTION

1. INSPECT VSC NO. 1 (FAIL SAFE) RELAY

(a) Remove the VSC NO. 1 (fail safe) relay.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance



Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

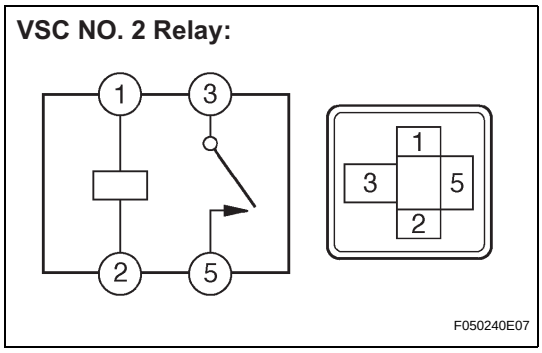
If the value is not as specified, replace the VSC NO. 1 (fail safe) relay.

2. INSPECT VSC NO. 2 RELAY

(a) Remove the VSC NO. 2 relay.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance



Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

If the value is not as specified, replace the VSC NO. 2 relay.

BC

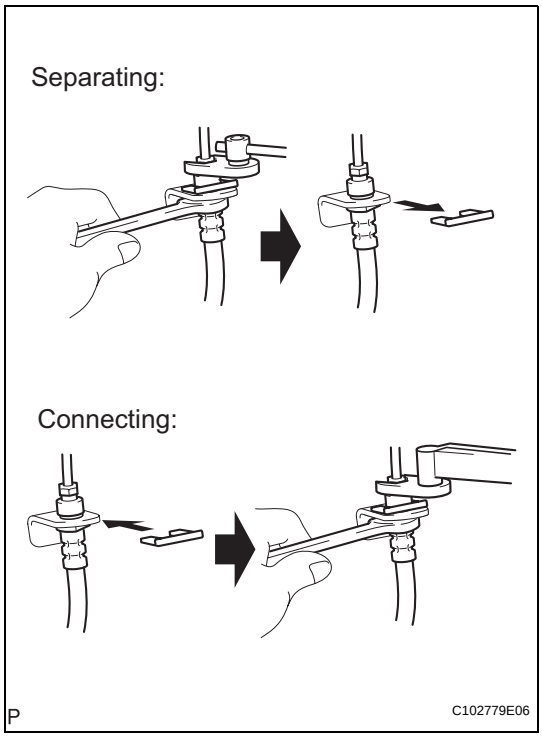
BRAKE SYSTEM

PRECAUTION

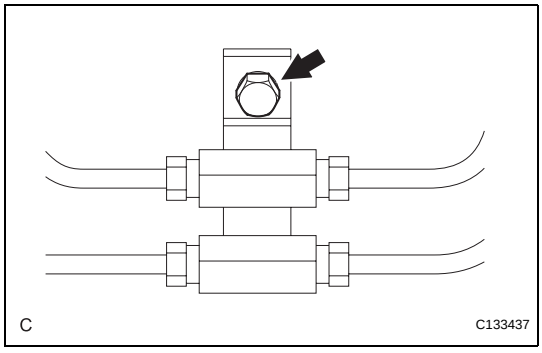
1. TROUBLESHOOTING PRECAUTION

NOTICE:

- **Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with those having the same part number or equivalent.**
- **It is very important to keep parts and the area clean when repairing the brake system.**
- **If the vehicle is equipped with a mobile communication system, refer to the precaution in the INTRODUCTION section.**
- **Care must be taken when using magnets as it could affect the performance of the speed sensors.**
- **Since the brake line is classified as one of the critical safety related parts, be sure to disassemble the components if a brake fluid leak is found. If any abnormality is found, replace the component with a new one.**
- **When removing brake components, cover the brake tube connections to prevent foreign matter such as dust or dirt from entering the tubes.**
- **Do not damage or deform the brake tubes when removing or installing them.**
- **When installing a grommet to the body, ensure that the brake tube passes through the center of the grommet.**
- **When installing a brake tube or flexible hose, ensure that they are free from twisting or bending.**
- **If the cap of the flexible hose does not match the groove on the bracket, twist the hose slightly to insert it.**
- **Flexible hoses must be free from absorber oil, grease, etc.**
- **When installing a brake tube to a plastic clamp, ensure that the brake tube is not loose or being pinched.**
- **Do not reuse a clip or plastic clamp removed from a flexible hose.**
- **After installing a brake tube and flexible hose, ensure that they do not interfere with any other components.**
- **Do not allow brake fluid to adhere to any painted surface such as the vehicle body. If brake fluid leaks onto any painted surface, immediately wash it off.**



- **Disconnect and connect the flexible hose and brake tube:**
  (a) Hold the flexible hose with a wrench and disconnect the brake tube with a union nut wrench without deforming the tube.
  (b) Remove the clip.
  (c) Install a new clip.
  (d) Connect the brake tube with a union nut wrench without deforming the tube.



- **Connect the brake tube and way:**
  (a) Support the way to prevent deformation of the brake tube and connect the brake tube to the way with a union nut wrench.
  (b) Support the way to prevent deformation of the brake tube and install the bolt to fix the way to the body.

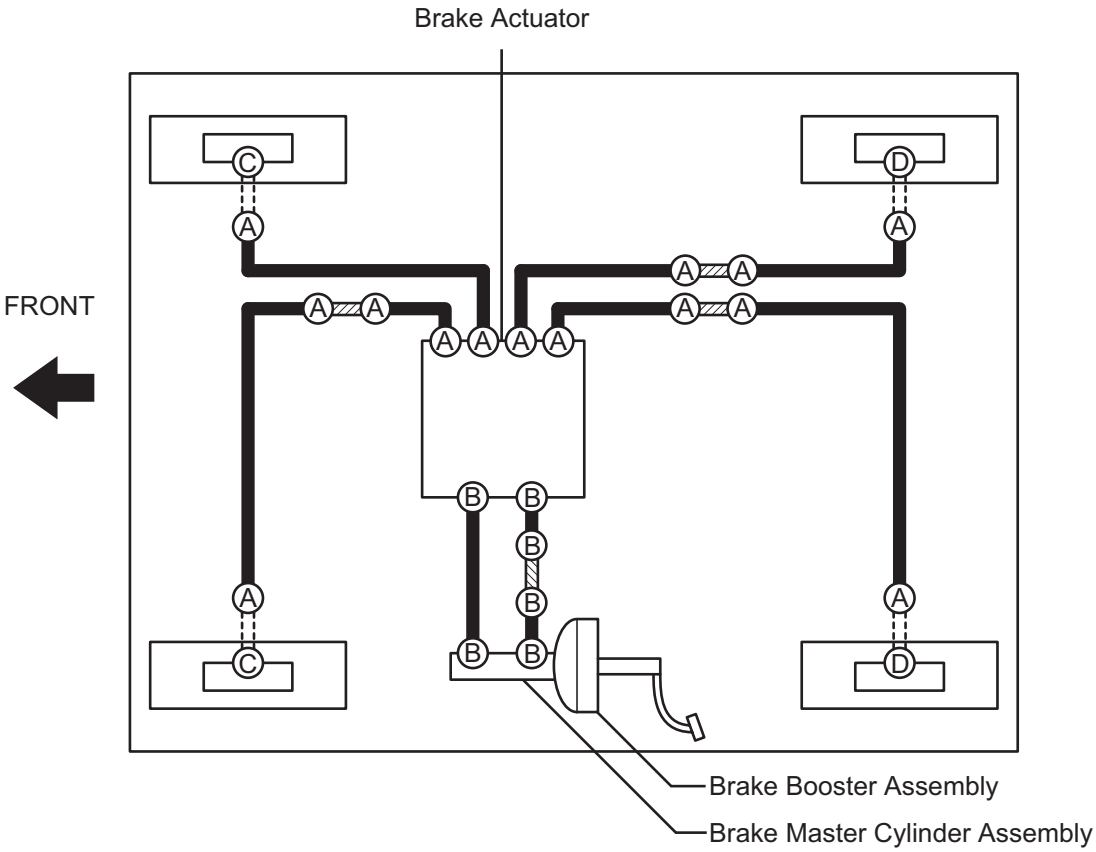
2. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition Switch off	LOCK	Off
	Ignition Switch on (IG)	ON	On (IG)
	Ignition Switch on (ACC)	ACC	On (ACC)
	Engine Start	START	Start

SYSTEM DIAGRAM

HINT:
See the layout drawing to confirm the locations and tightening torque of flexible hoses and brake tubes.



: Brake Tube

: Flexible Hose

: Brake Tube Way

Ⓐ : Union Nut

Torque : 15 N*m (155 kgf*cm, 11 ft.*lbf)

: 14 N*m (143 kgf*cm, 10 ft.*lbf)*

Ⓑ : Union Nut

Torque : 15 N*m (155 kgf*cm, 11 ft.*lbf)

: 14 N*m (143 kgf*cm, 10 ft.*lbf)*

: 19 N*m (194 kgf*cm, 14 ft.*lbf) (for TMMK made with VSC)

: 17 N*m (173 kgf*cm, 13 ft.*lbf) (for TMMK made with VSC)*

Ⓒ : Union Bolt

Torque : 30 N*m (306 kgf*cm, 22 ft.*lbf)

Ⓓ : Union Bolt

Torque : 33 N*m (337 kgf*cm, 24 ft.*lbf)

* For use with SST

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BR

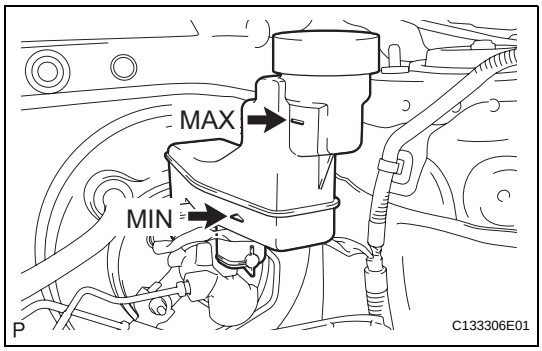
PROBLEM SYMPTOMS TABLE

Use the table below to help determine the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

BRAKE SYSTEM

Symptom	Suspected area	See page
Low pedal or spongy pedal	1. Fluid leaks in brake system	BR-6
	2. Air in brake system	BR-6
	3. Piston seals (Worn or damaged) (FRONT)	BR-47
	4. Piston seals (Worn or damaged) (REAR)	BR-59
	5. Master cylinder (Faulty)	BR-28
	6. Booster push rod (Out of adjustment)	BR-31
Brake drag	1. Brake pedal free play (Insufficient)	BR-19
	2. Parking brake lever travel (Out of adjustment)	PB-2
	3. Parking brake pedal travel (Out of adjustment)	PB-1
	4. Parking brake cable (Sticking)	PB-48
	5. Parking brake shoe clearance (Out of adjustment)	PB-1
	6. Pad (Cracked or distorted) (FRONT)	BR-47
	7. Pad (Cracked or distorted) (REAR)	BR-59
	8. Piston (Stuck) (FRONT)	BR-47
	9. Piston (Stuck) (REAR)	BR-59
	10. Piston (Seized) (FRONT)	BR-47
	11. Piston (Seized) (REAR)	BR-59
	12. Booster push rod (Out of adjustment)	BR-31
	13. Vacuum leaks in booster systems	BR-42
	14. Master cylinder (Faulty)	BR-28
Brake pull	1. Piston (Stuck) (FRONT)	BR-47
	2. Piston (Stuck) (REAR)	BR-59
	3. Pad (Oily) (FRONT)	BR-47
	4. Pad (Oily) (REAR)	BR-59
	5. Piston (Seized) (FRONT)	BR-47
	6. Piston (Seized) (REAR)	BR-59
	7. Disc (Scored) (FRONT)	BR-50
	8. Disc (Scored) (REAR)	BR-62
	9. Pad (Cracked or distorted) (FRONT)	BR-50
	10. Pad (Cracked or distorted) (REAR)	BR-62

Symptom	Suspected area	See page
Hard pedal but brake inefficient	1. Fluid leaks in brake systems	BR-6
	2. Air in brake system	BR-6
	3. Pad (Worn) (FRONT)	BR-50
	4. Pad (Worn) (REAR)	BR-62
	5. Pad (Cracked or distorted) (FRONT)	BR-50
	6. Pad (Cracked or distorted) (REAR)	BR-62
	7. Pad (Oily) (FRONT)	BR-50
	8. Pad (Oily) (REAR)	BR-62
	9. Pad (Glazed) (FRONT)	BR-50
	10. Pad (Glazed) (REAR)	BR-62
	11. Disc (Scored) (FRONT)	BR-50
	12. Disc (Scored) (REAR)	BR-62
	13. Booster push rod (Out of adjustment)	BR-31
	14. Vacuum leaks in booster system	BR-42
Noise from brakes	1. Pad (Cracked or distorted) (FRONT)	BR-50
	2. Pad (Cracked or distorted) (REAR)	BR-62
	3. Cylinder mounting bolt (Loose) (FRONT)	BR-47
	4. Caliper support bolt (Loose) (REAR)	PB-58
	5. Disc (Scored) (FRONT)	BR-50
	6. Disc (Scored) (REAR)	BR-62
	7. Pad support plate (Loose) (FRONT)	BR-50
	8. Pad support plate (Loose) (REAR)	BR-62
	9. Sliding pin (Worn) (FRONT)	BR-47
	10. Sliding pin (Worn) (REAR)	BR-59
	11. Pad (Dirty) (FRONT)	BR-47
	12. Pad (Dirty) (REAR)	BR-59
	13. Pad (Glazed) (FRONT)	BR-47
	14. Pad (Glazed) (REAR)	BR-59
	15. Anti-squeal shim (Damaged) (FRONT)	BR-47
	16. Anti-squeal shim (Damaged) (REAR)	BR-59



BRAKE FLUID

ON-VEHICLE INSPECTION

1. INSPECT FLUID LEVEL IN RESERVOIR

(a) Inspect the fluid level.

If brake fluid level is lowered, check for leakage and inspect the disc brake pad. If necessary, refill the reservoir with brake fluid after repair and replacement.

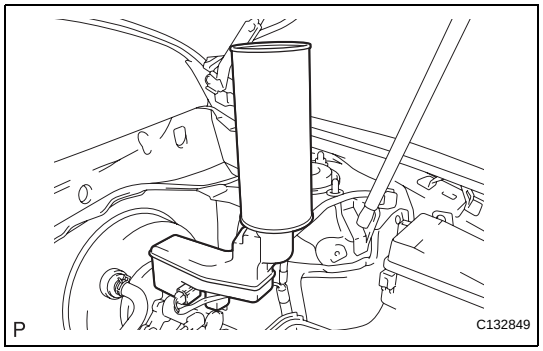
Fluid:

SAE J1703 or FMVSS No. 116 DOT 3

BLEEDING

HINT:
If any work is performed on the brake system or if air in the brake lines is suspected, bleed the air from the brake system.
NOTICE:

- **Move the shift lever to the P position and apply the parking brake before bleeding the brakes.**
- **Add brake fluid to keep the level between MIN and MAX lines of the reservoir while bleeding the brakes.**
- **If brake fluid leaks onto any painted surface, wash or remove it completely.**



1. FILL RESERVOIR WITH BRAKE FLUID

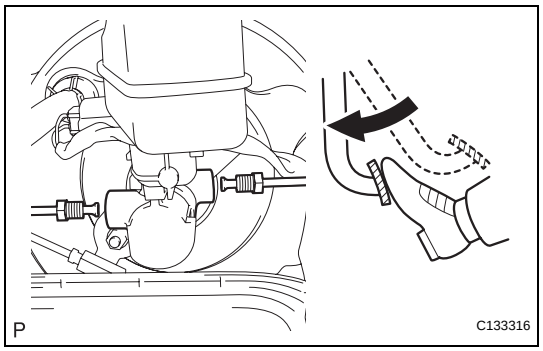
(a) Fill the reservoir with brake fluid.
Fluid:
SAE J1703 or FMVSS No. 116 DOT3

2. BLEED MASTER CYLINDER

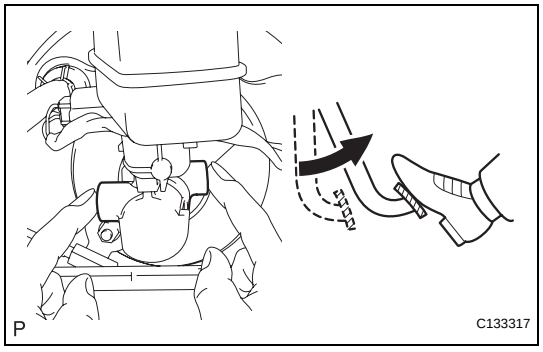
HINT:

- If the master cylinder is reinstalled or if the reservoir becomes empty, bleed the air from the master cylinder.
- To avoid brake fluid from adhering, cover the painted surface with a shop rag or piece of cloth.

(a) Disconnect the 2 brake lines from the master cylinder.

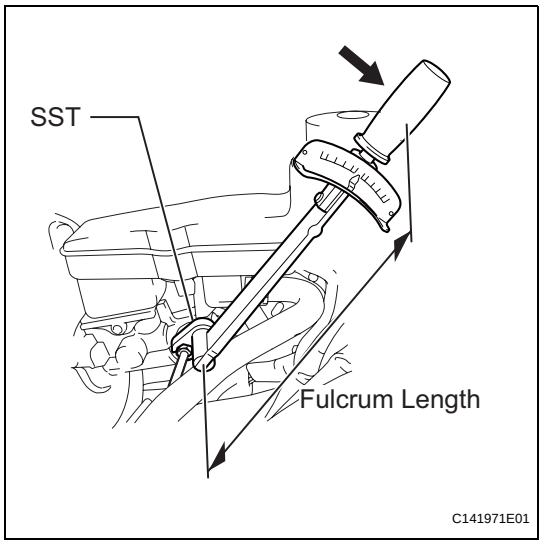


(b) Slowly depress the brake pedal and hold it (*1).



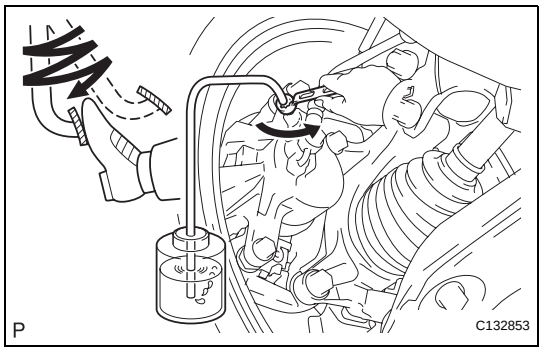
(c) Cover the 2 outer holes with fingers, and release the brake pedal (*2).
(d) Repeat (*1) and (*2) 3 or 4 times.

BR

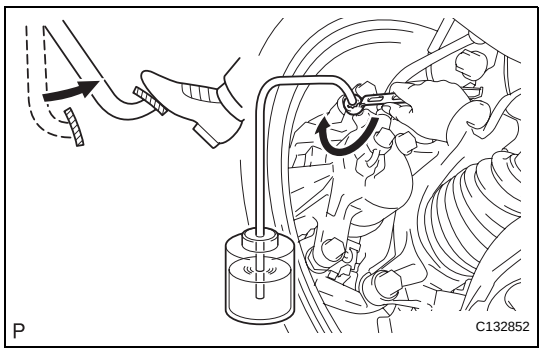


(e) Using SST, connect the brake lines to the master cylinder.
SST 09023-00101, 09023-38200
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
for TMMK made with VSC without SST
19 N*m (194 kgf*cm, 14 ft.*lbf)
for TMMK made with VSC with SST
17 N*m (173 kgf*cm, 13 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**

3. BLEED BRAKE LINE
NOTICE:
Bleed the air from the brake line of the wheel furthest from the master cylinder.

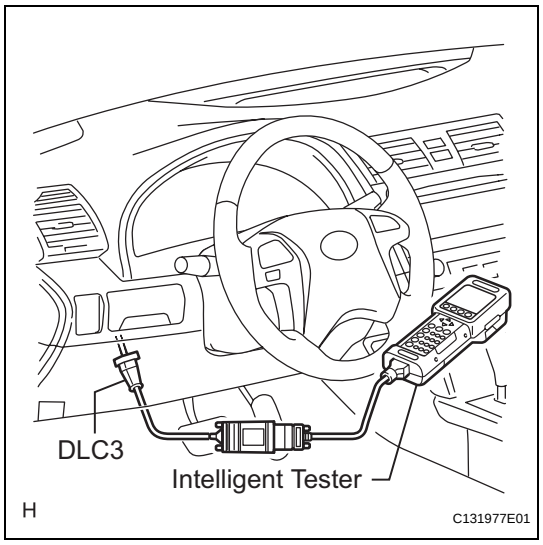


(a) Connect a vinyl tube to the bleeder plug.
(b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal depressed (*3).



(c) When fluid stops coming out, tighten the bleeder plug, then release the brake pedal (*4).
(d) Repeat (*3) and (*4) until all the air in the fluid is completely bled out.
(e) Tighten the bleeder plug completely.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
(f) Repeat the above procedures for each wheel to bleed the air from the brake line.

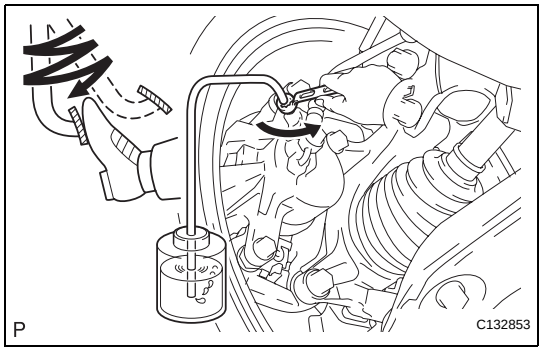
4. BLEED BRAKE ACTUATOR ASSEMBLY (w/ VSC)
NOTICE:
After bleeding the air from the brake system, if the height or feel of the brake pedal cannot be obtained, bleed the air from the brake actuator assembly with the intelligent tester by following the procedures below.
(a) Depress the brake pedal more than 20 times with the ignition switch off.



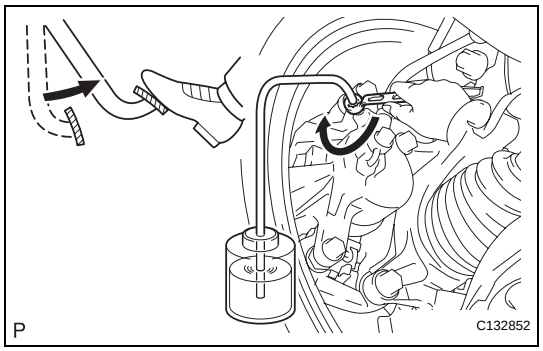
(b) Connect the intelligent tester to the DLC3, then turn the ignition switch on (IG).
NOTICE:
Do not start the engine.

(c) Turn the intelligent tester power on and select "AIR BLEEDING" on the screen.
NOTICE:
- **Refer to the intelligent tester operator's manual for further details.**
- **Bleed the air by following the steps displayed on the intelligent tester.**

(d) Bleed the air according to "Step 1: Increase" on the intelligent tester display.
NOTICE:
Make sure that the master cylinder reservoir tank does not become empty of brake fluid.

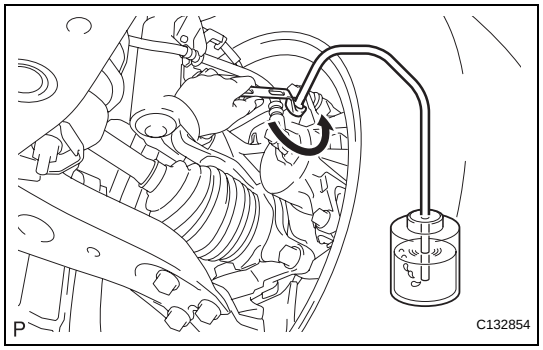


(1) Connect a vinyl tube to either one of the bleeder plugs.
(2) Depress the brake pedal several times, then loosen the bleeder plug connected to the vinyl tube with the pedal depressed (*5).



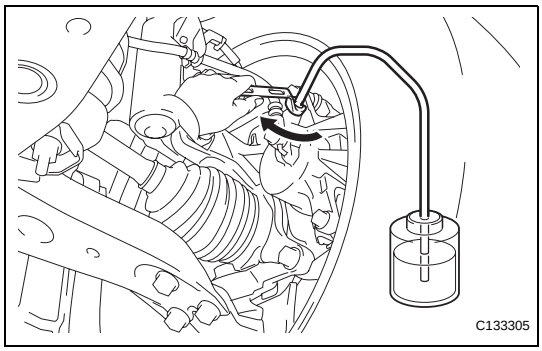
(3) When fluid stops coming out, tighten the bleeder plug, then release the brake pedal (*6).
(4) Repeat (*5) and (*6) until all the air in the fluid is completely bled out.
(5) Tighten the bleeder plug completely.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
(6) Repeat the above procedures for the rest of the wheels to bleed the air from the brake line.

(e) Bleed the air from the suction line according to "Step 2: Inhalation" on the intelligent tester display.
NOTICE:
- **Bleed the suction line by following the steps displayed on the intelligent tester.**
- **Make sure that the master cylinder reservoir tank does not become empty of brake fluid.**



(1) Connect a vinyl tube to the bleeder plug at the right front wheel or the right rear wheel and loosen the bleeder plug.
(2) Operate the brake actuator assembly to bleed the air using the intelligent tester (*7).
NOTICE:
- **The operation stops automatically in 4 seconds.**
- **At this time, be sure to release the brake pedal.**

BR

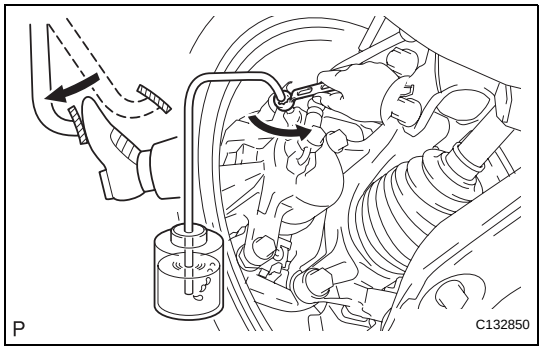


(3) Check that the operation has stopped by referring to the intelligent tester display and tighten the bleeder plug (*8).
(4) Repeat (*7) and (*8) until all the air in the fluid is completely bled out.
(5) Tighten the bleeder plug completely.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
(6) For the rest of the wheels, bleed the air in the same way as stated in the above procedures.

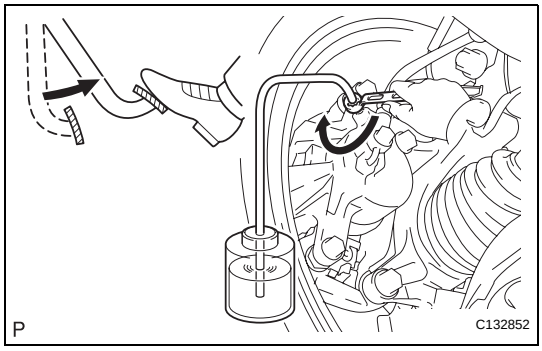
(f) Bleed the air from the pressure reduction line according to "Step 3: Decrease" on the intelligent tester display.

NOTICE:

- **Bleed the pressure reduction line by following the steps displayed on the intelligent tester.**
- **Make sure that the master cylinder reservoir tank does not become empty of brake fluid.**



(1) Connect a vinyl tube to either one of the bleeder plugs.
(2) Loosen the bleeder plug (*9).
(3) Using the intelligent tester, operate the brake actuator assembly, completely depress the brake pedal, and hold it.
NOTICE:
- **The operation stops automatically in 4 seconds. When performing this procedure continuously, an interval of at least 20 seconds is required.**
- **When the operation is completed, the brake pedal slightly goes down. This is a normal phenomenon when the solenoid opens.**
- **During this procedure, the pedal seems heavy, but completely depress it so that the brake fluid comes out from the bleeder plug.**
- **Be sure to keep the brake pedal depressed. Never depress and release the pedal repeatedly.**

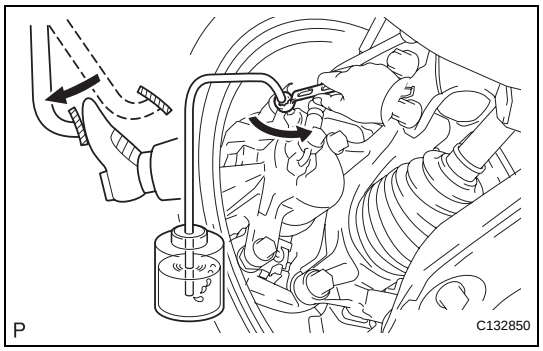


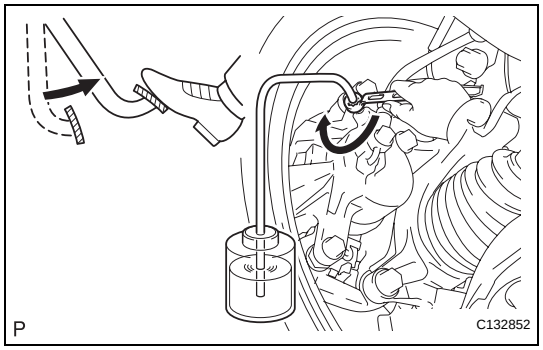
(4) Tighten the bleeder plug, then release the brake pedal (*10).
(5) Repeat steps (*9) to (*10) until all the air in the fluid is completely bled out.
(6) Tighten the bleeder plug completely.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
(7) Repeat the above procedures for the rest of the brakes to bleed the air from the brake line.

(g) Bleed the air from the brake line again according to "Step 4: Increase" on the intelligent tester display.

NOTICE:

- **Bleed the air by following the steps displayed on the intelligent tester.**





- **Make sure that the master cylinder reservoir tank does not become empty of brake fluid.**

(1) Connect a vinyl tube to either one of the bleeder plugs.
(2) Depress the brake pedal several times, then loosen the bleeder plug connected to the vinyl tube with the pedal depressed (*11).
(3) When fluid stops coming out, tighten the bleeder plug, then release the brake pedal (*12).
(4) Repeat (*11) and (*12) until all the air in the fluid is completely bled out.
(5) Tighten the bleeder plug completely.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
(6) Repeat the above procedures for each brake to bleed the air from the brake line.

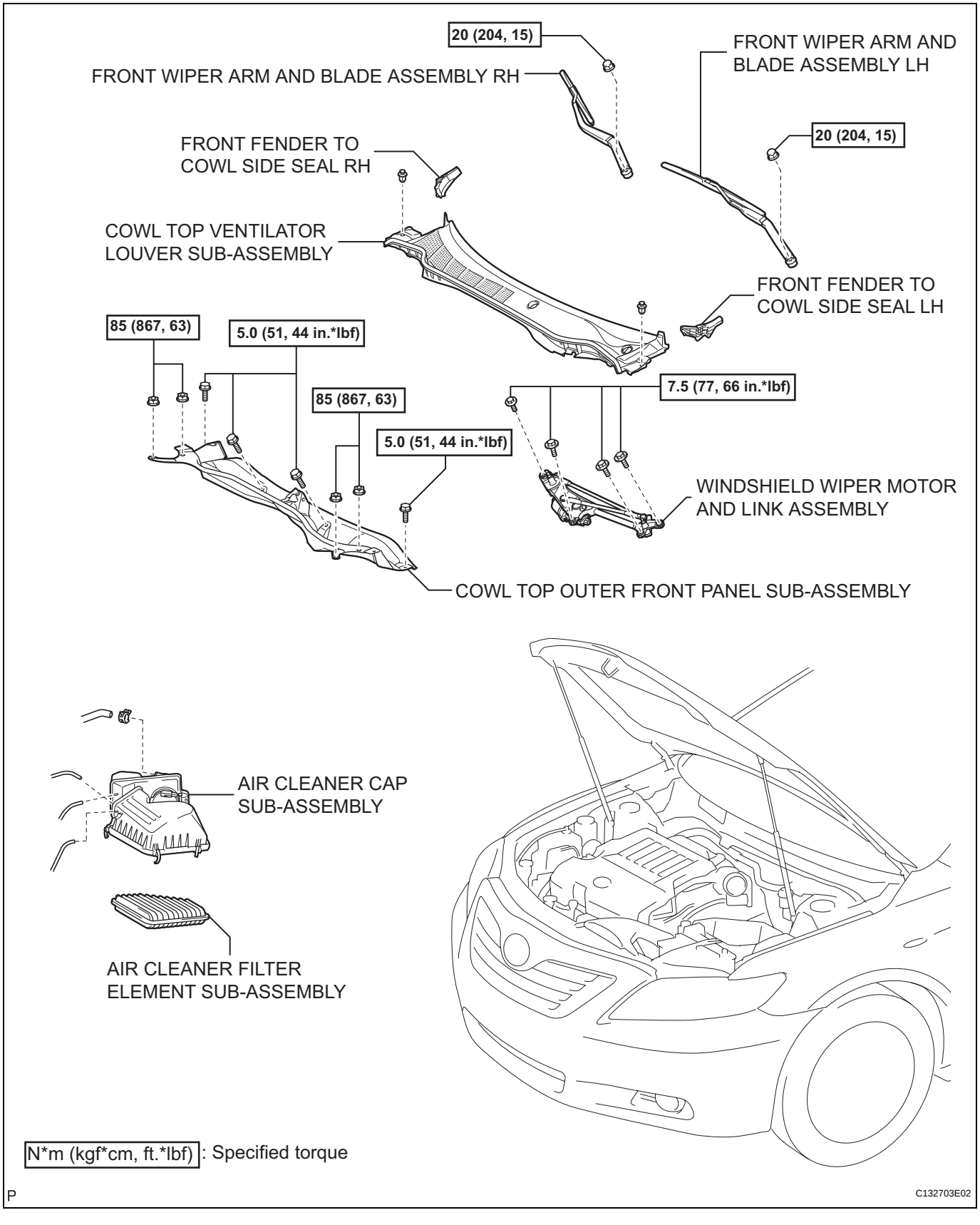
(h) Finish "AIR BLEEDING" on the intelligent tester and turn off the power.
(i) Disconnect the intelligent tester from the DLC3.
(j) Turn the ignition switch off.

5. INSPECT FLUID LEVEL IN RESERVOIR

(a) Check the fluid level and add fluid if necessary.
Fluid:
SAE J1703 or FMVSS No. 116 DOT3
If fluid leaks, tighten or replace the leaking part.

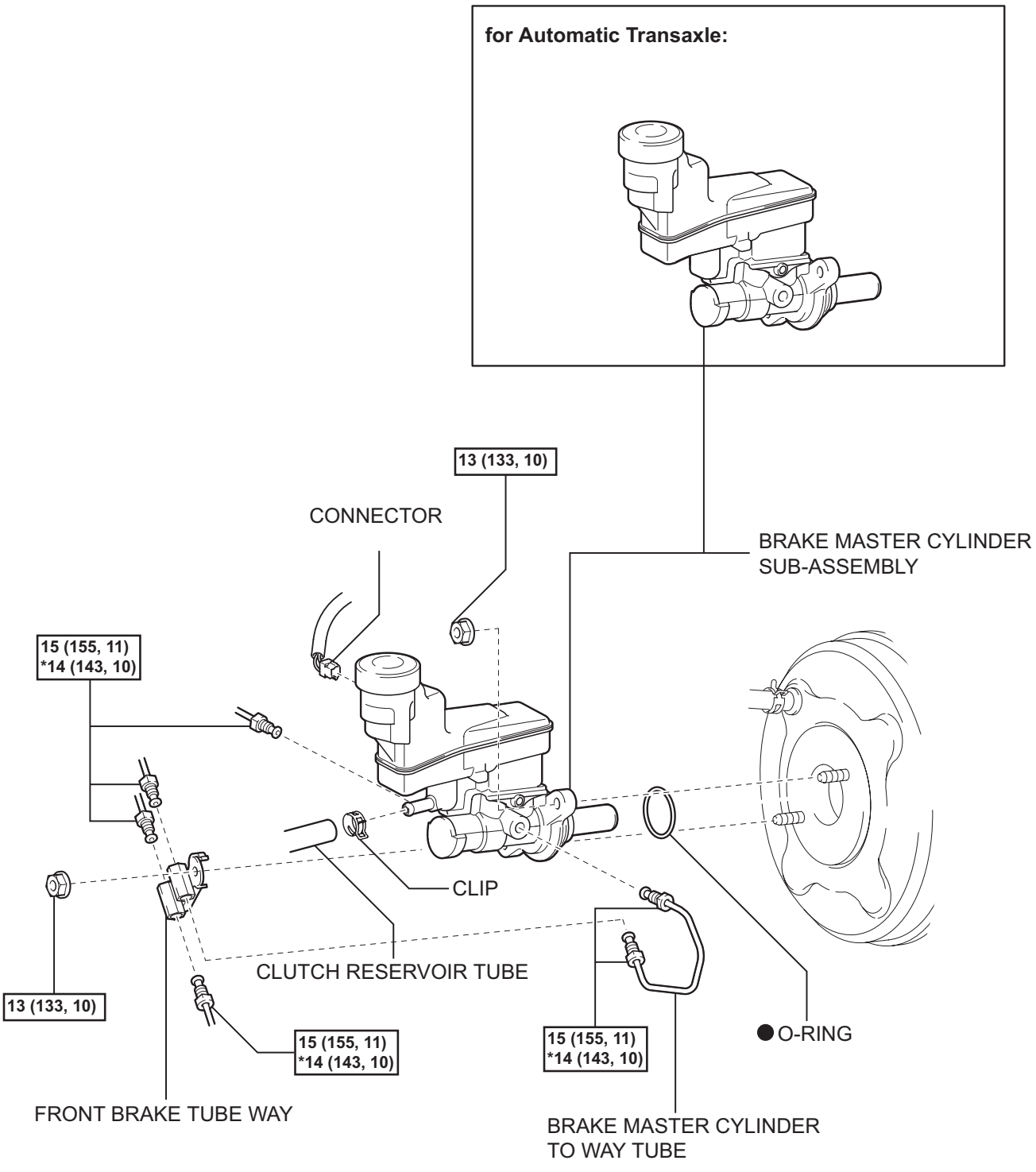
BRAKE PEDAL

COMPONENTS



BR

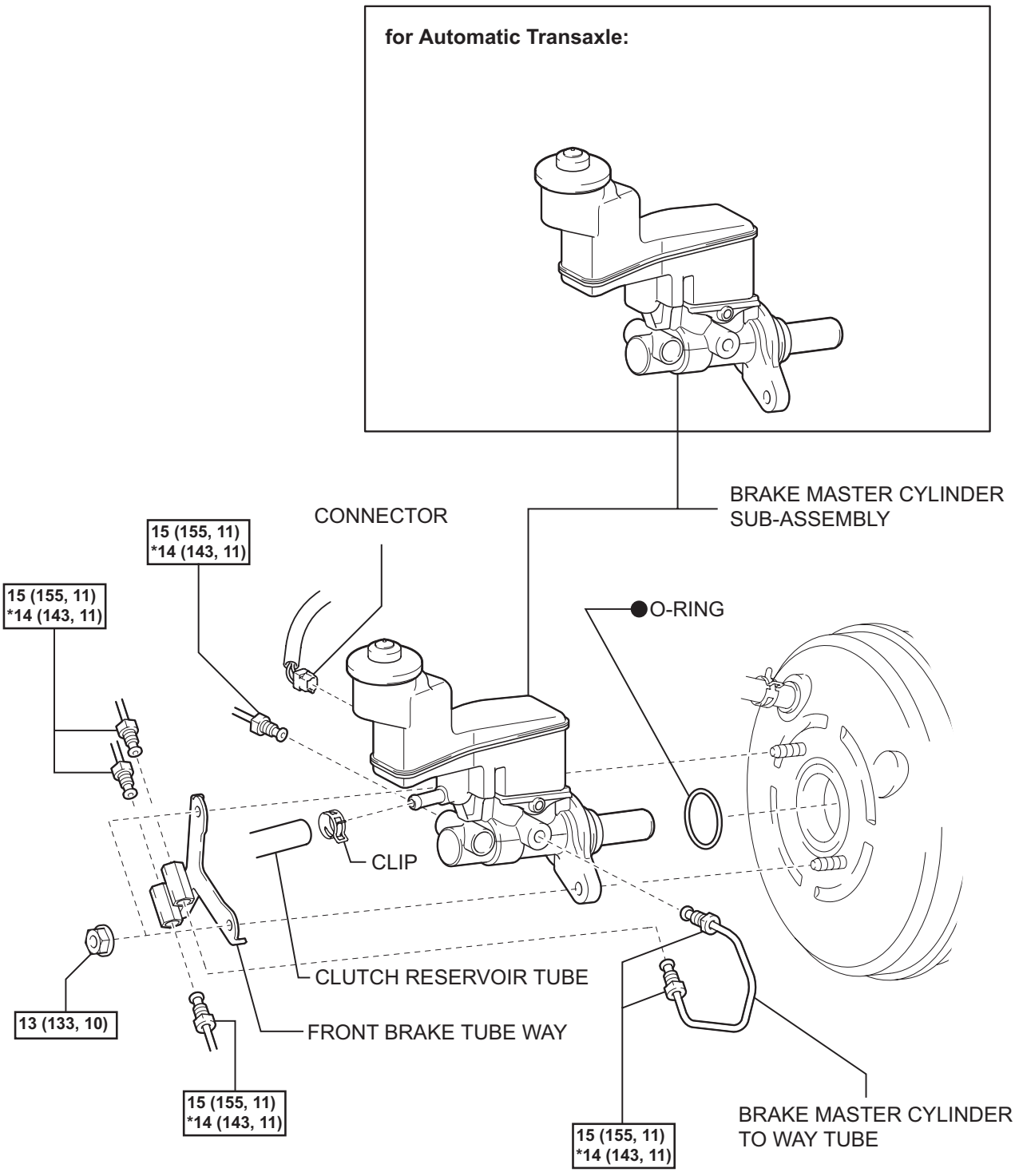
for TMC made:



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

C133461E01

for TMMK made without VSC:



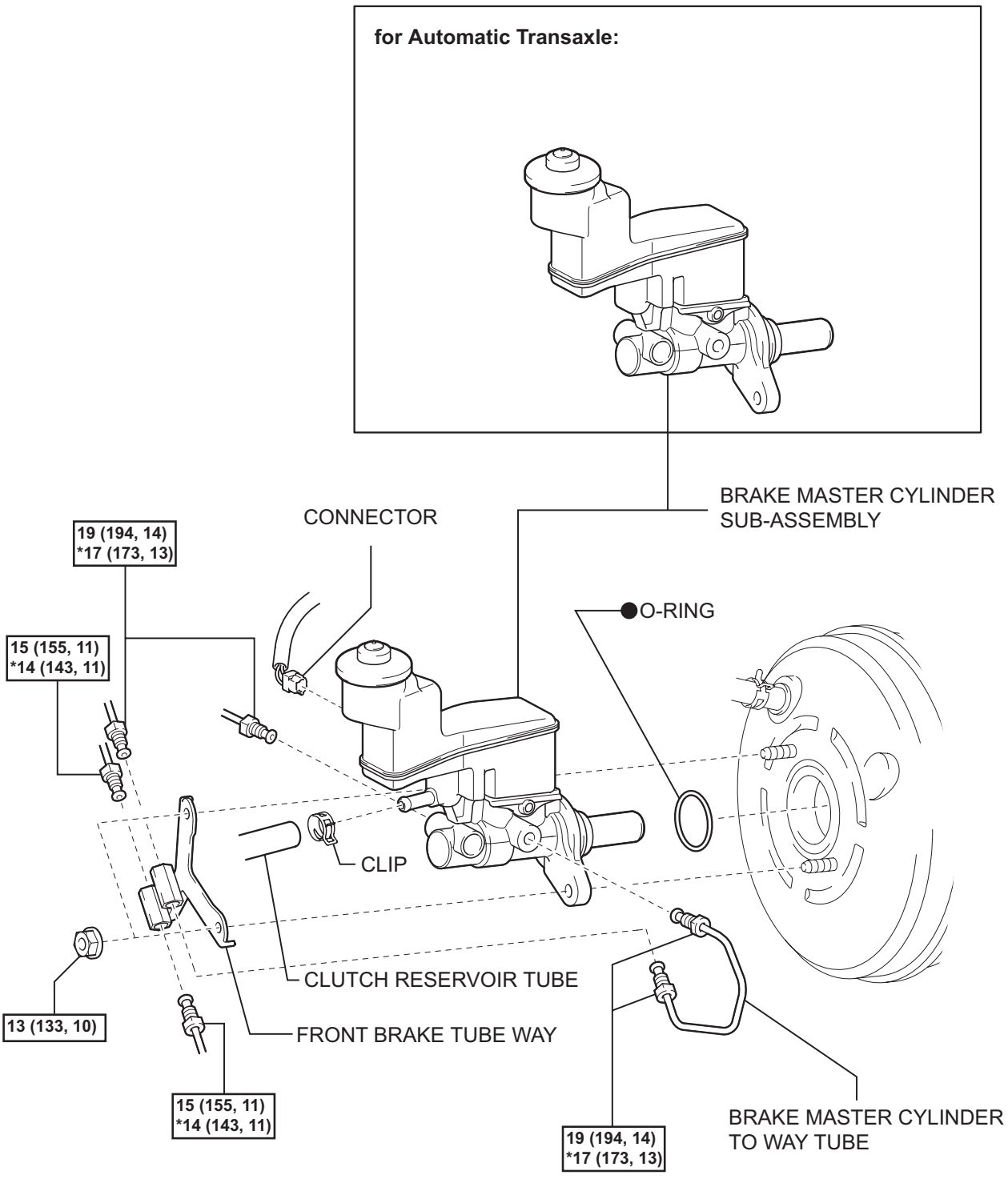
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

P

C132705E02

BR

for TMMK made with VSC:

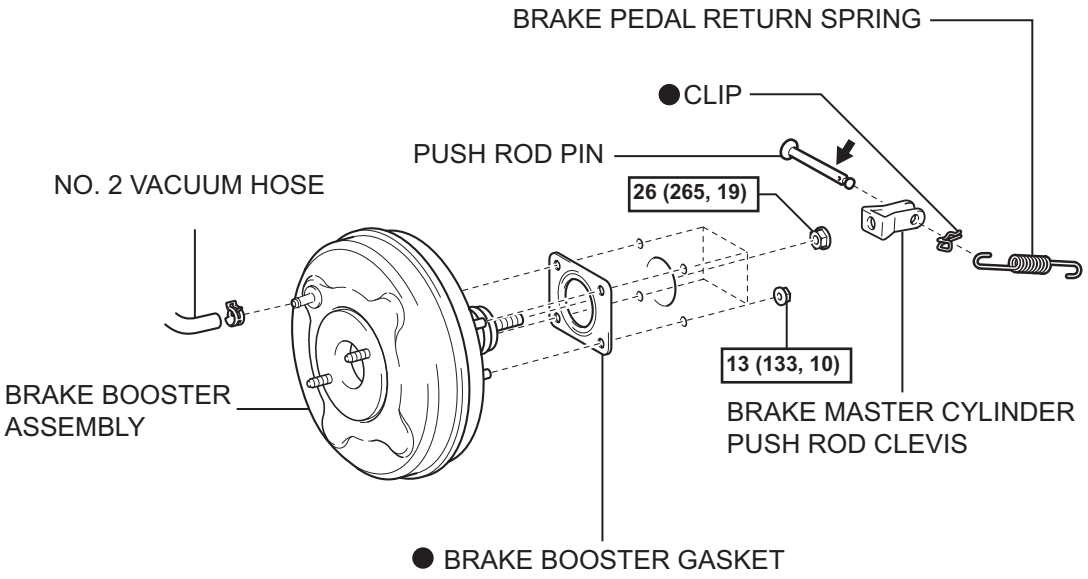


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

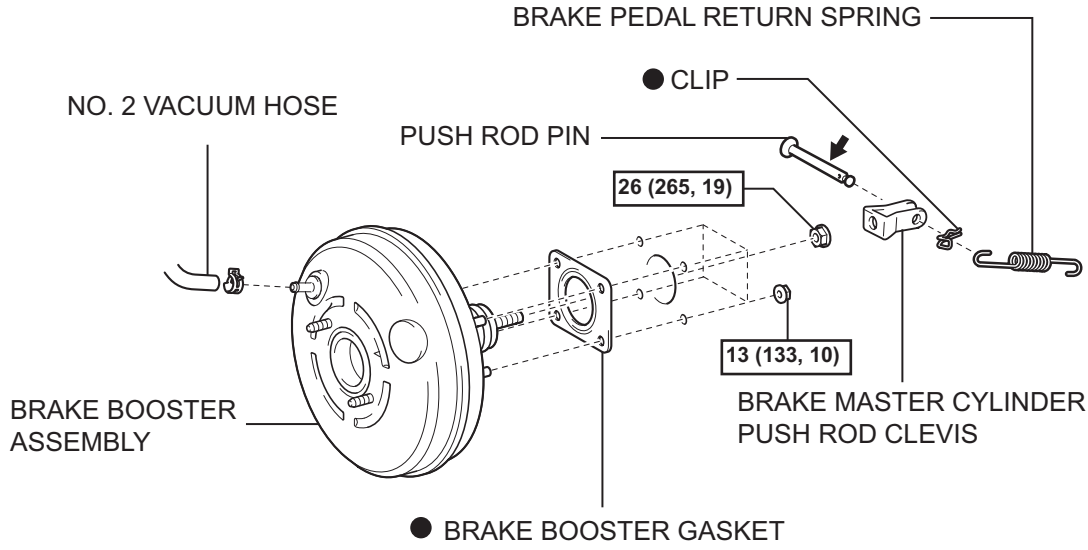
P

C132705E03

for TMC made:



for TMMK made:

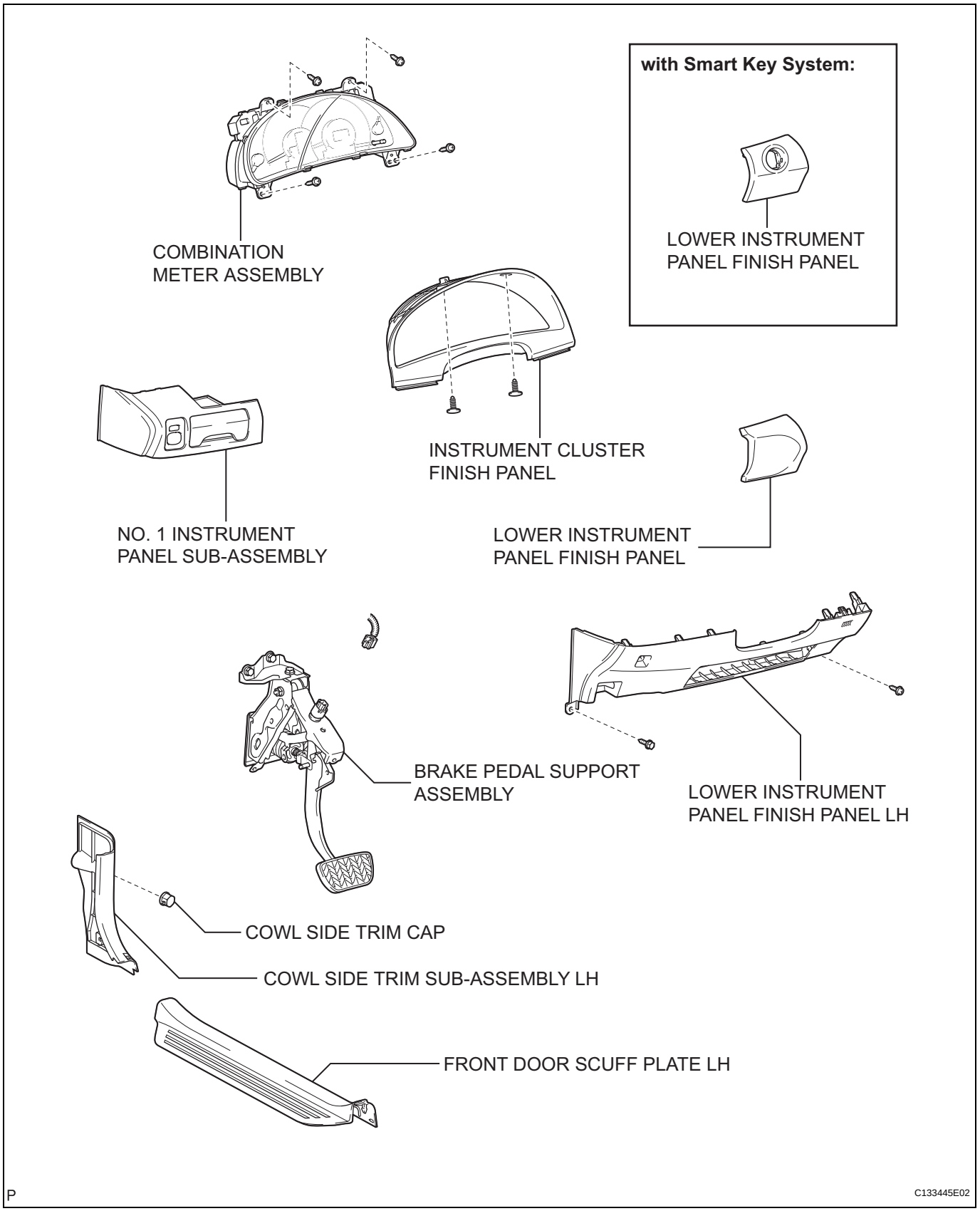


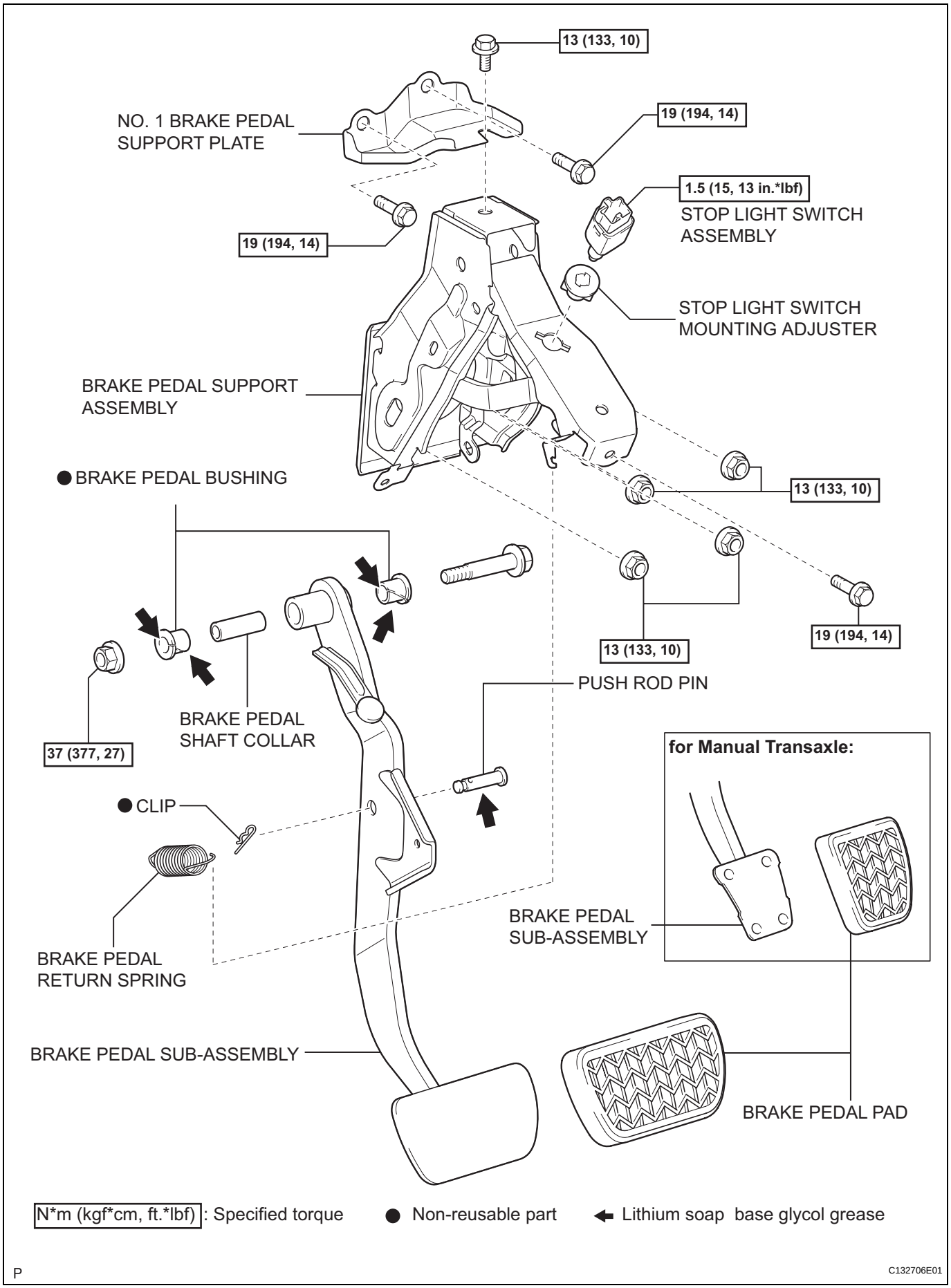
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ⬅ Apply lithium soap base glycol grease

P

C132704E03

BR

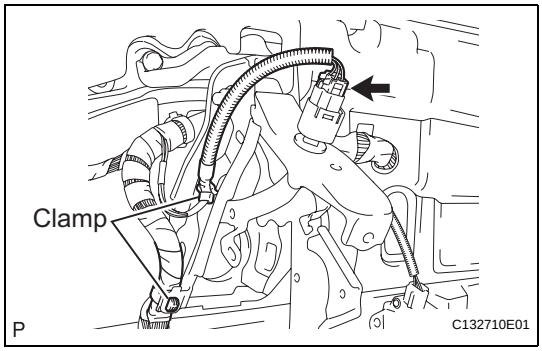

with Smart Key System:
LOWER INSTRUMENT PANEL FINISH PANEL
COMBINATION METER ASSEMBLY
INSTRUMENT CLUSTER FINISH PANEL
NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY
LOWER INSTRUMENT PANEL FINISH PANEL
BRAKE PEDAL SUPPORT ASSEMBLY
LOWER INSTRUMENT PANEL FINISH PANEL LH
COWL SIDE TRIM CAP
COWL SIDE TRIM SUB-ASSEMBLY LH
FRONT DOOR SCUFF PLATE LH
P
C133445E02


13 (133, 10)
NO. 1 BRAKE PEDAL SUPPORT PLATE
19 (194, 14)
1.5 (15, 13 in.*lbf)
STOP LIGHT SWITCH ASSEMBLY
19 (194, 14)
STOP LIGHT SWITCH MOUNTING ADJUSTER
BRAKE PEDAL SUPPORT ASSEMBLY
● BRAKE PEDAL BUSHING
13 (133, 10)
19 (194, 14)
13 (133, 10)
PUSH ROD PIN
BRAKE PEDAL SHAFT COLLAR
37 (377, 27)
● CLIP
for Manual Transaxle:
BRAKE PEDAL SUB-ASSEMBLY
BRAKE PEDAL RETURN SPRING
BRAKE PEDAL SUB-ASSEMBLY
BRAKE PEDAL PAD
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Lithium soap base glycol grease
P
C132706E01

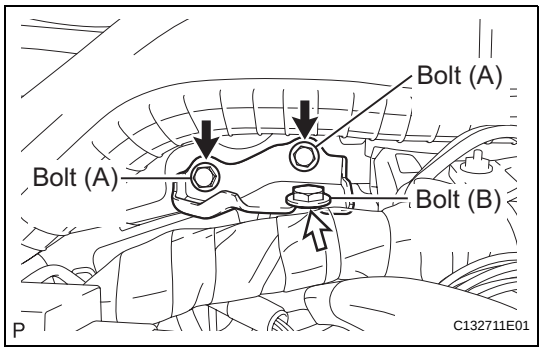
BR

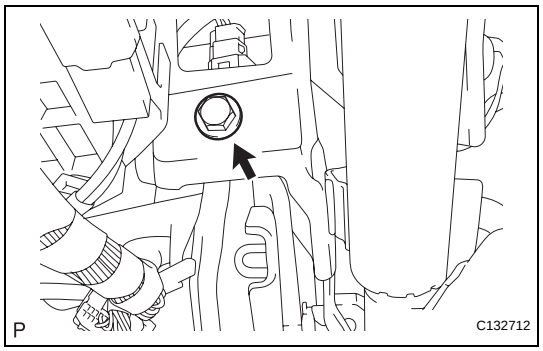
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page ME-63)**
5. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
8. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page ME-65)**
9. **REMOVE COMBINATION METER ASSEMBLY (See page ME-65)**
10. **REMOVE BRAKE BOOSTER ASSEMBLY**
    HINT:
    Refer to the procedures up to "REMOVE BRAKE BOOSTER". (See page BR-42)
11. **REMOVE BRAKE PEDAL SUPPORT ASSEMBLY**
    (a) Disconnect the stop light switch connector and disengage the 2 clamps.

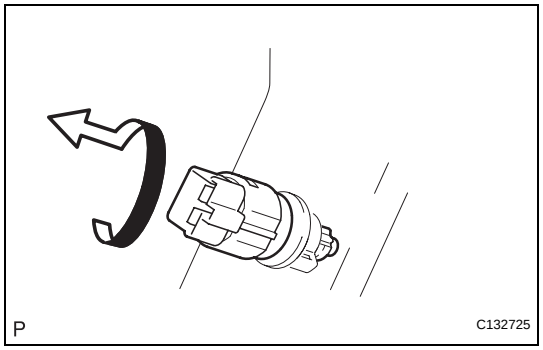


(b) Remove 2 bolts (A), bolt (B) and the No. 1 brake pedal support plate.





(c) Remove the bolt and the brake pedal support assembly.



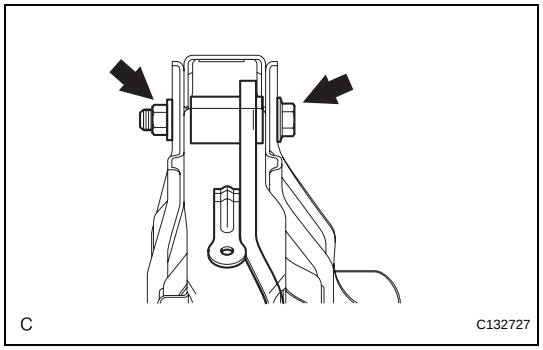
DISASSEMBLY

1. REMOVE STOP LIGHT SWITCH ASSEMBLY

(a) Turn the stop light switch assembly and remove it as shown in the illustration.

2. REMOVE STOP LIGHT SWITCH MOUNTING ADJUSTER

(a) Remove the stop light switch mounting adjuster.



3. REMOVE BRAKE PEDAL SUB-ASSEMBLY

(a) Remove the bolt and the nut.

(b) Remove the 2 brake pedal bushings, the brake pedal shaft collar, and the brake pedal sub-assembly.

4. REMOVE BRAKE PEDAL PAD

(a) Remove the brake pedal pad.

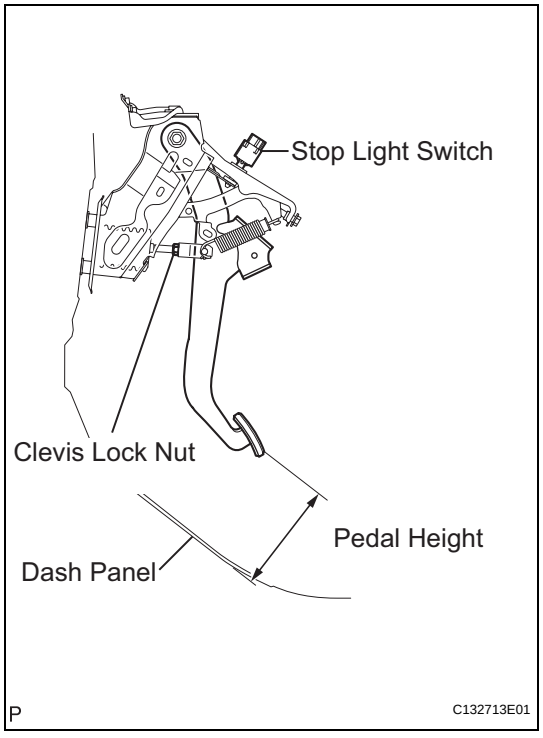
ADJUSTMENT

1. INSPECT AND ADJUST BRAKE PEDAL HEIGHT

(a) Inspect the brake pedal height.

Pedal height from dash panel

Transaxle	Specified condition
Automatic	129.9 to 139.9 mm (5.114 to 5.508 in.)
Manual	131.9 to 141.9 mm (5.193 to 5.587 in.)



(b) Adjust the brake pedal height.

(1) Disconnect the connector from the stop light switch assembly.

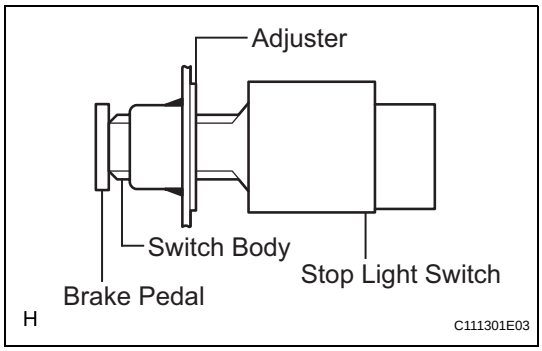
(2) Remove the stop light switch.

(3) Loosen the push rod clevis lock nut.

(4) Adjust the pedal height by turning the push rod.

(5) Tighten the clevis lock nut.

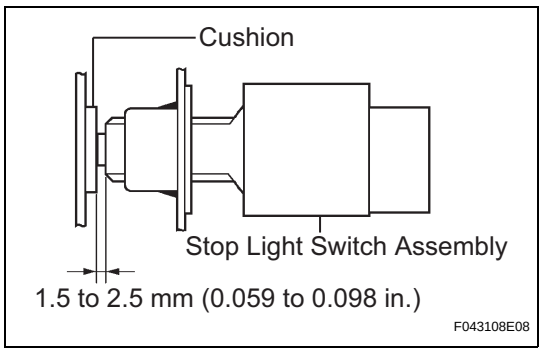
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)



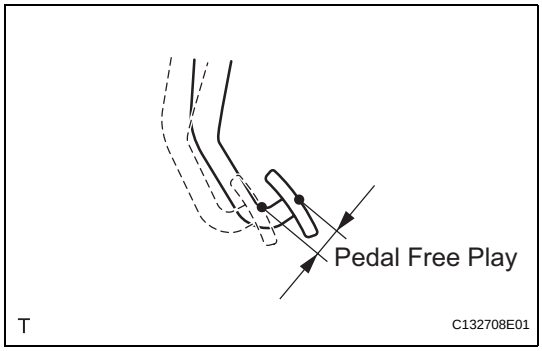
(6) Insert the switch into the adjuster until the switch body touches the pedal.
NOTICE:
Do not depress the pedal.

(7) Rotate the switch a quarter turn clockwise.
Torque: 1.5 N*m (15 kgf*cm, 13 in.*lbf) or less
NOTICE:
Do not depress the pedal.

(8) Connect the connector.



(9) Check the switch clearance.
Standard stop light switch clearance:
1.5 to 2.5 mm (0.059 to 0.098 in.)

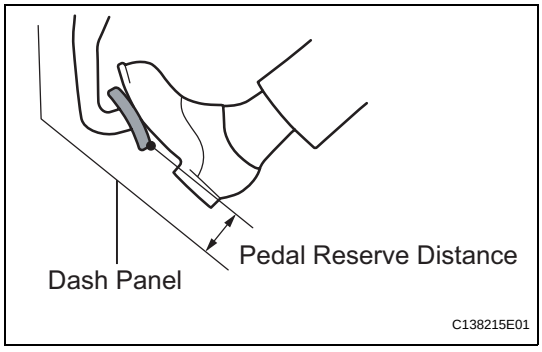


2. INSPECT PEDAL FREE PLAY

(a) Stop the engine. Press the pedal several times until no vacuum is left in the booster. Then release the pedal.

(b) Depress the pedal until a slight resistance is felt. Measure the distance as shown in the illustration.
Pedal free play:
1.0 to 6.0 mm (0.039 to 0.236 in.)
If the pedal free play is not as specified, check the switch clearance in the next step. If the pedal free play is as specified, proceed to the "CHECK PEDAL RESERVE DISTANCE" procedure.

(c) Check the switch clearance.
Standard stop light clearance:
1.5 to 2.5 mm (0.059 to 0.098 in.)
If the clearance is not as specified, reinstall the switch and recheck the pedal free play. If the clearance is as specified, troubleshoot the brake system and proceed to the "CHECK PEDAL RESERVE DISTANCE" procedure.



3. INSPECT PEDAL RESERVE DISTANCE

(a) Release the parking brake pedal or parking brake lever.

(b) With the engine running, depress the brake pedal and measure the pedal reserve distance as shown in the illustration.
Pedal reserve distance from the dash panel at 500 N (51 kgf, 112 lbf)

Transaxle	Specified condition
Automatic	61 mm (2.402 in.)
Manual	63 mm (2.480 in.)

If the distance is not as specified, troubleshoot the brake system.

REASSEMBLY

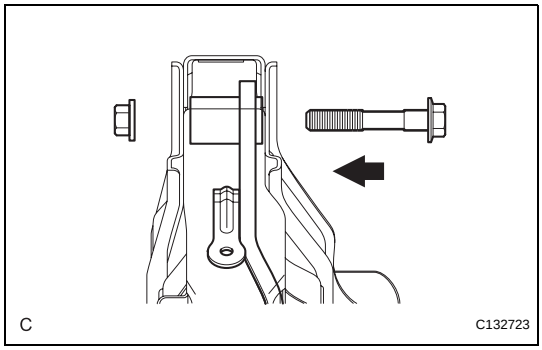
1. INSTALL BRAKE PEDAL PAD

(a) Install the brake pedal pad.

2. INSTALL BRAKE PEDAL SUB-ASSEMBLY

(a) Apply lithium soap base glycol grease to 2 new brake pedal bushings.

(b) Install the brake pedal sub-assembly, the 2 brake pedal bushings, and the brake pedal shaft collar to the brake pedal support assembly with the bolt and the nut as shown in the illustration.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

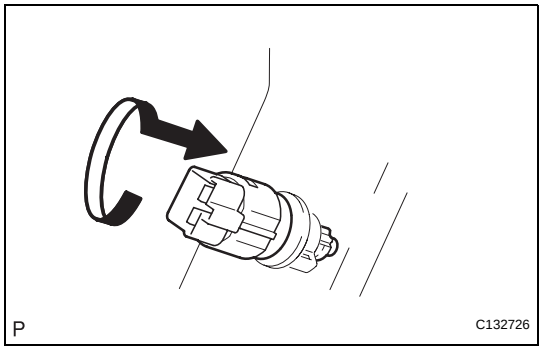


3. INSTALL STOP LIGHT SWITCH MOUNTING ADJUSTER

(a) Install the stop light switch mounting adjuster.

4. TEMPORARILY TIGHTEN STOP LIGHT SWITCH ASSEMBLY

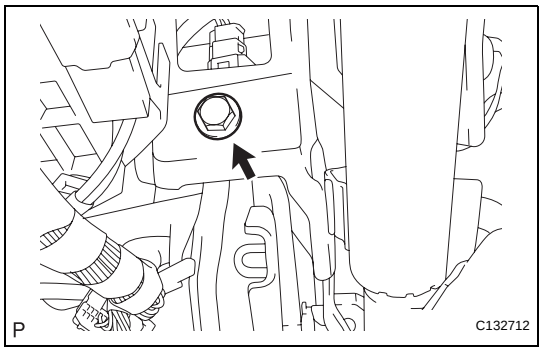
(a) Temporarily tighten the stop light switch assembly as shown in the illustration.
Torque: 1.5 N*m (15 kgf*cm, 13 in.*lbf) or less
HINT:
Completely install the stop light switch assembly after adjusting the brake pedal height.



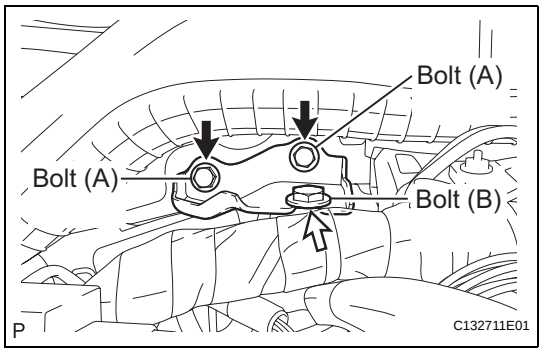
INSTALLATION

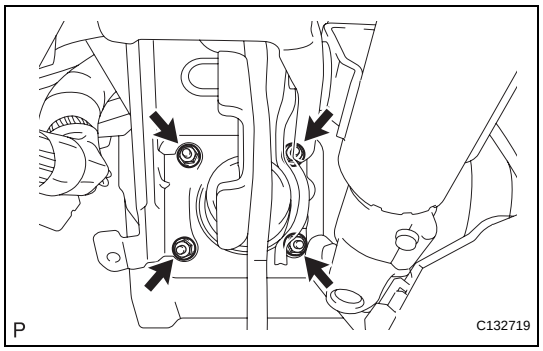
1. INSTALL BRAKE PEDAL SUPPORT ASSEMBLY

(a) Temporarily install the brake pedal support assembly with the bolt.
NOTICE:
Fully tighten the bolt after installing the brake booster assembly.

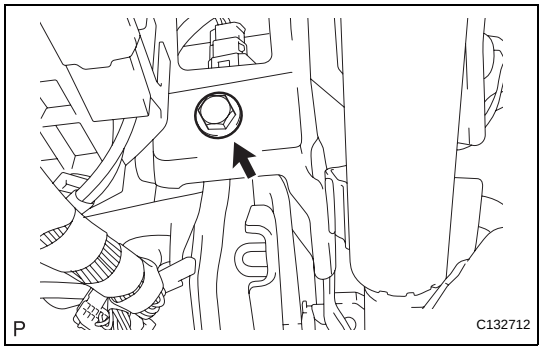


(b) Temporarily install the No. 1 brake pedal support plate with 2 bolts (A) and bolt (B).
NOTICE:
Fully tighten 2 bolts (A) and bolt (B) after installing the brake booster assembly.

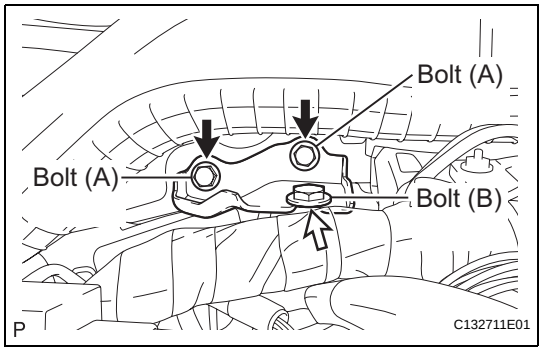




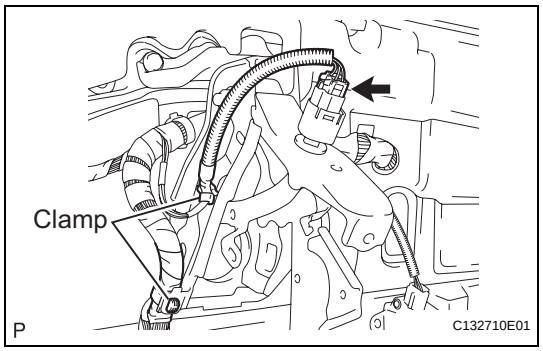
(c) Temporarily install the brake booster assembly and the gasket with the 4 nuts.



(d) Fully tighten the bolt.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



(e) Fully tighten 2 bolts (A) and bolt (B).
Torque: Bolt (A)
19 N*m (194 kgf*cm, 14 ft.*lbf)
Bolt (B)
13 N*m (133 kgf*cm, 10 ft.*lbf)



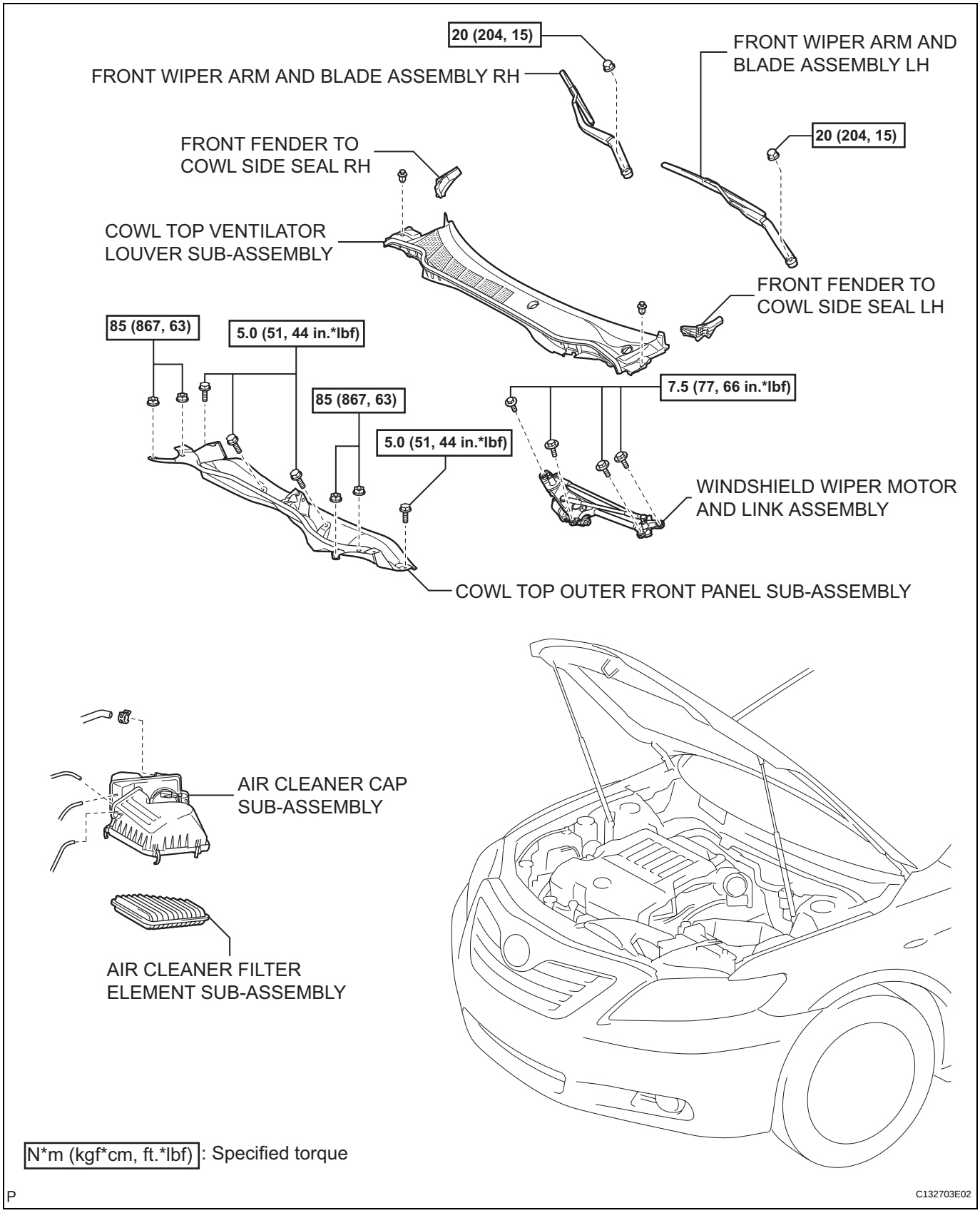
(f) Engage the 2 clamps and connect the stop light switch connector.

2. **INSTALL BRAKE BOOSTER ASSEMBLY**
HINT:
Refer to the procedures up to "INSTALL BRAKE BOOSTER ASSEMBLY". (See page BR-43)
3. **INSTALL COMBINATION METER ASSEMBLY (See page ME-67)**
4. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page ME-68)**
5. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
6. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
7. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
8. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page ME-68)**

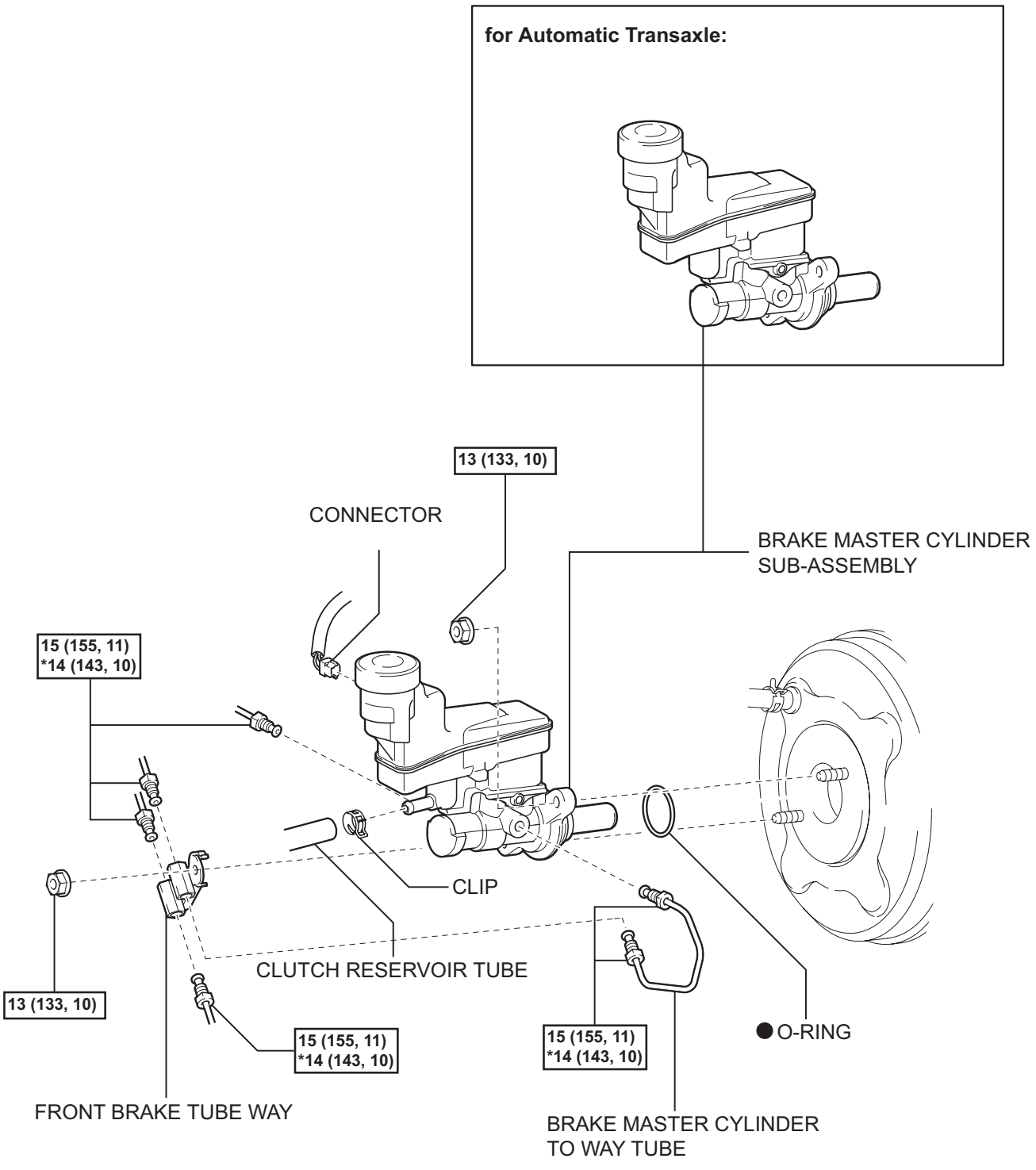
9. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
10. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
11. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

BRAKE MASTER CYLINDER

COMPONENTS



for TMC made:

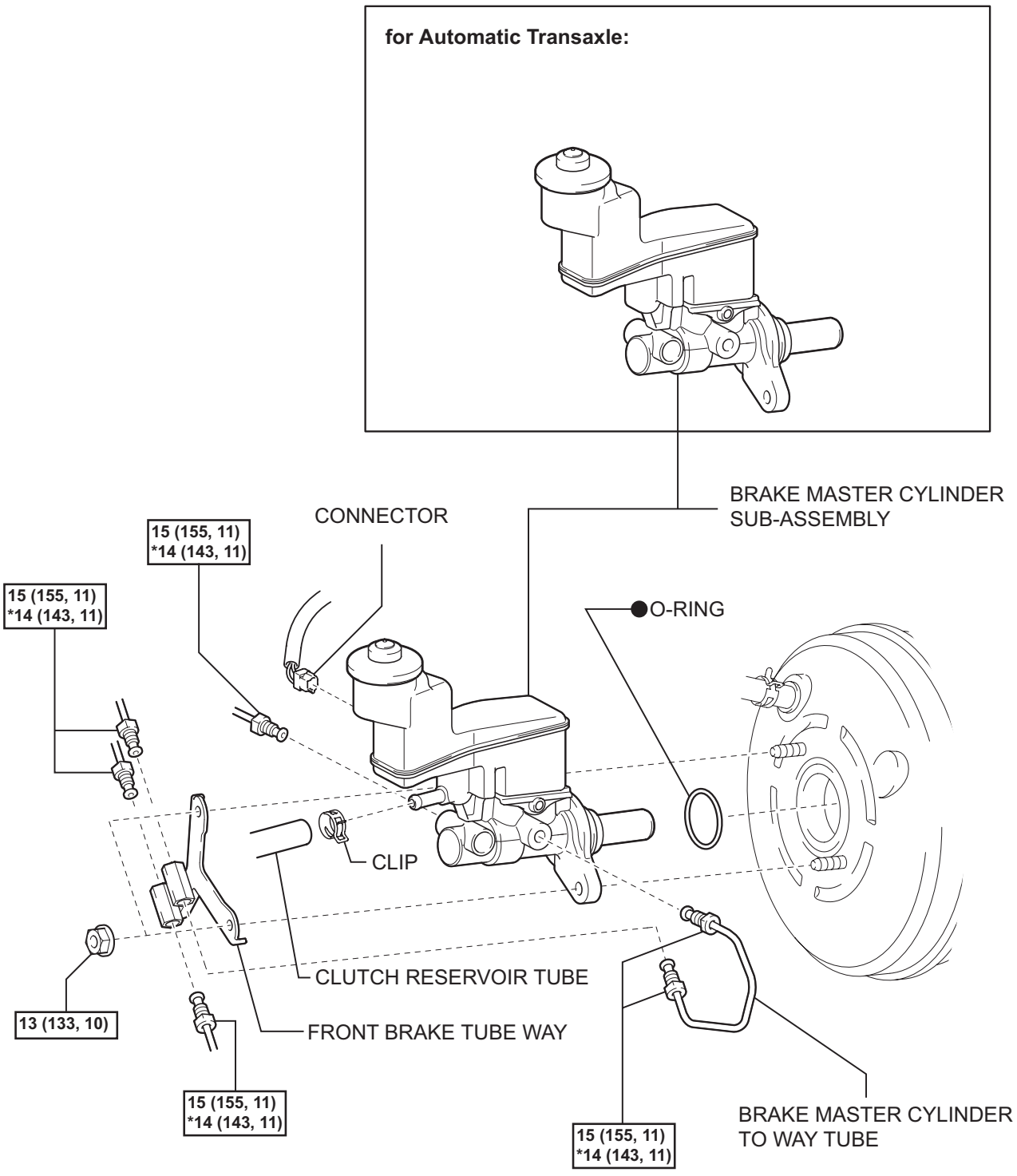


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

C133461E01

BR

for TMMK made without VSC:

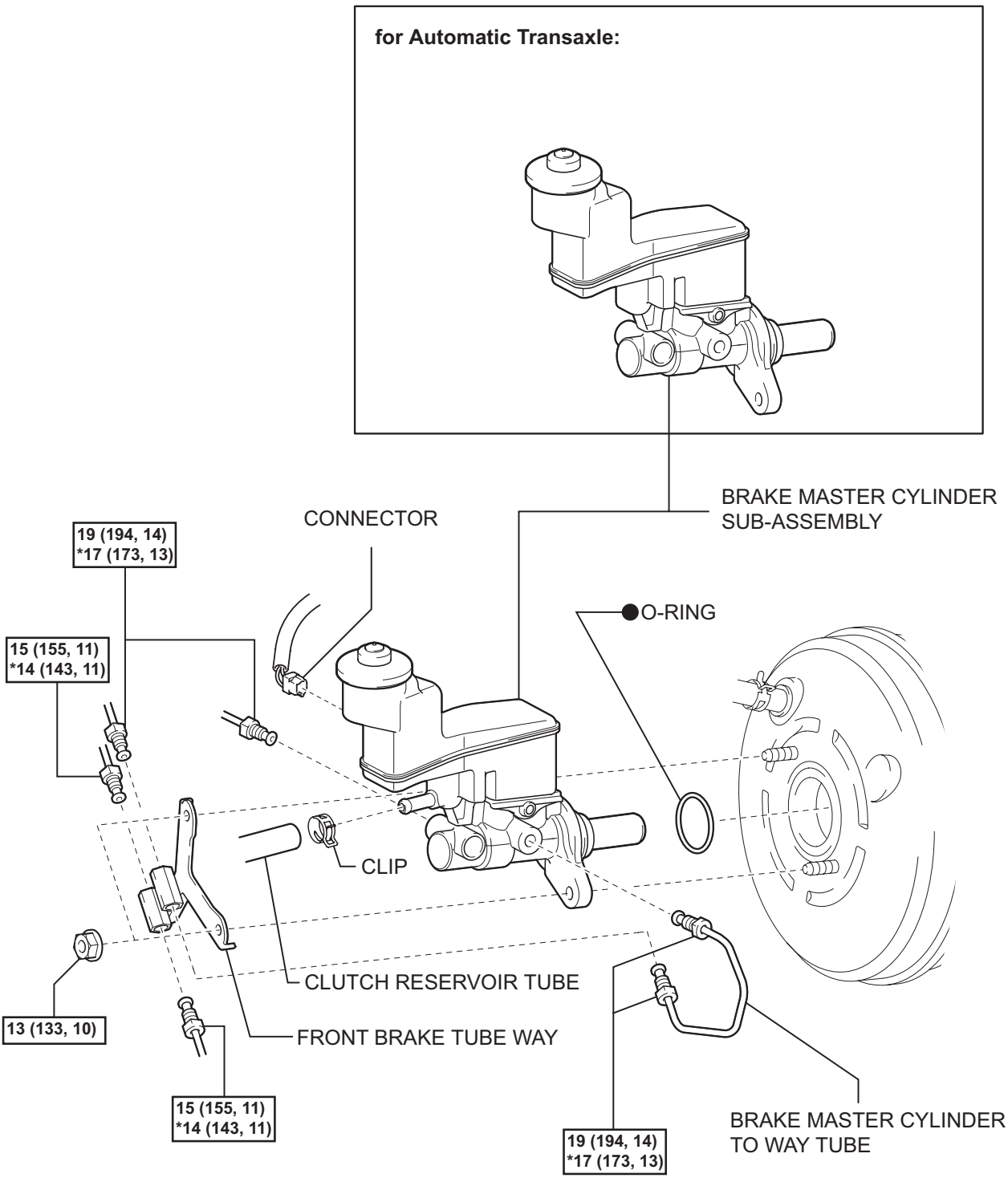


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

P

C132705E02

for TMMK made with VSC:



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

P C132705E03

BR

REMOVAL

NOTICE:

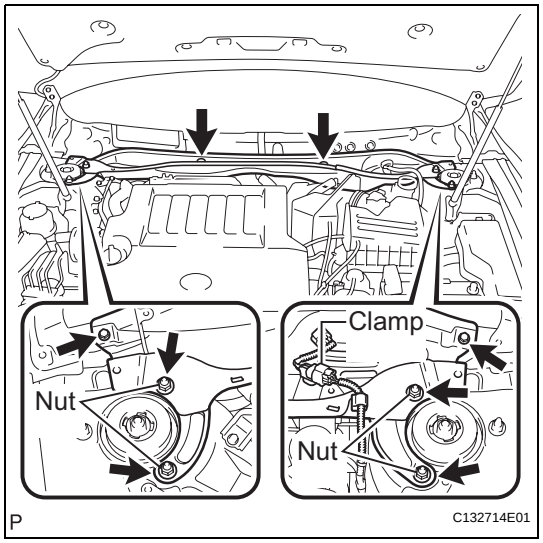
- **The structure of the master cylinder allows the piston to pop out, so observe the following:**
  - **(a) for TMC made:**
    - **(1) The master cylinder requires careful handling. Do not allow the master cylinder to receive any impact, such as from being dropped. Do not reuse a master cylinder that has been dropped.**
    - **(2) Do not scratch or damage the circumference of the piston. For the seal to function correctly, all sliding surfaces must not have any damage.**
    - **(3) Do not pull out the master cylinder piston.**
    - **(4) Make sure to release the vacuum from the brake booster (by removing a vacuum hose, etc.) before removing the master cylinder from the brake booster.**
    - **(5) When installing the master cylinder, remove the protectors for the piston and the discharge port.**
    - **(6) Apply the supplied grease to the outer diameter of the piston and the inner diameter of the brake booster.**
  - **(b) for TMMK made:**
    - **(1) Do not hold the master cylinder by the piston. (Hold the master cylinder by its body or its reservoir while transporting it.)**
    - **(2) Do not pull out the master cylinder piston.**
    - **(3) Do not strike or pinch the master cylinder piston, and do not cause any damage to the master cylinder piston by any other means.**
    - **(4) Make sure to release the vacuum from the brake booster before removing the master cylinder from the brake booster.**
    - **(5) When installing the master cylinder to the brake booster, or when removing the master cylinder from the brake booster, make sure that the master cylinder is kept horizontal or its tip faces downward (the piston faces upward) to prevent the master cylinder piston from falling off.**
    - **(6) Do not allow any foreign objects to contaminate the master cylinder piston. If a foreign object gets on the piston, remove it by using a shop rag or a piece of cloth and then apply an even layer of lithium soap based glycol grease around the circumference (sliding part) of the piston**
    - **(7) Do not use any other type of grease.**

1. DRAIN BRAKE FLUID

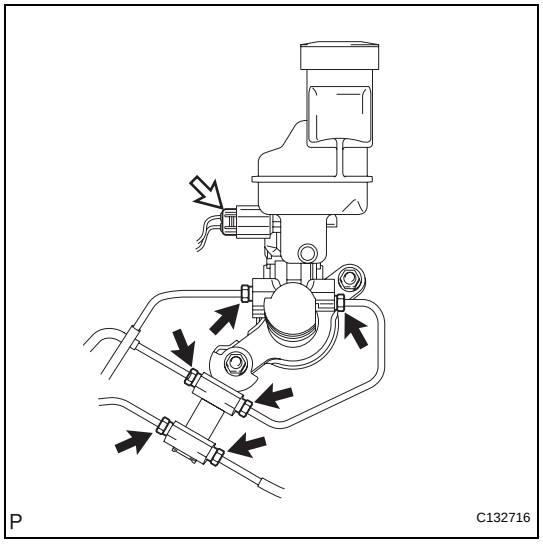
NOTICE:

- **Stop the engine and depress the brake pedal several times until no vacuum is left in the brake booster.**
- **If the brake fluid leaks onto any painted surface, wash off or remove the brake fluid completely.**

2. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
3. **REMOVE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**
4. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
5. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
6. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
7. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
8. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
9. **REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-10)**
10. **REMOVE COWL TOP OUTER FRONT PANEL SUB-ASSEMBLY**
    (a) Disengage the clamp.
    (b) Remove the 4 nuts, the 4 bolts and the cowl top outer front panel sub-assembly.

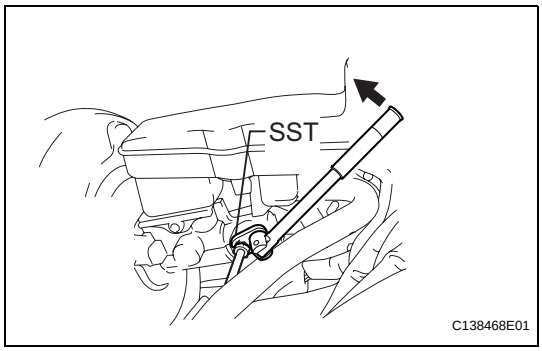


11. **DISCONNECT CLUTCH RESERVOIR TUBE (for Manual Transaxle)**
    (a) Move the clip and disconnect the clutch reservoir tube from the brake master cylinder sub-assembly.

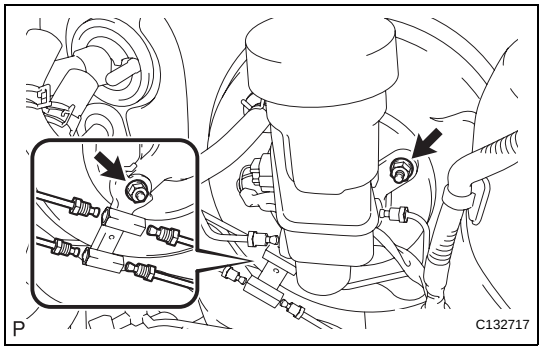


12. **REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY (for TMC Made)**
    (a) Disconnect the connector.

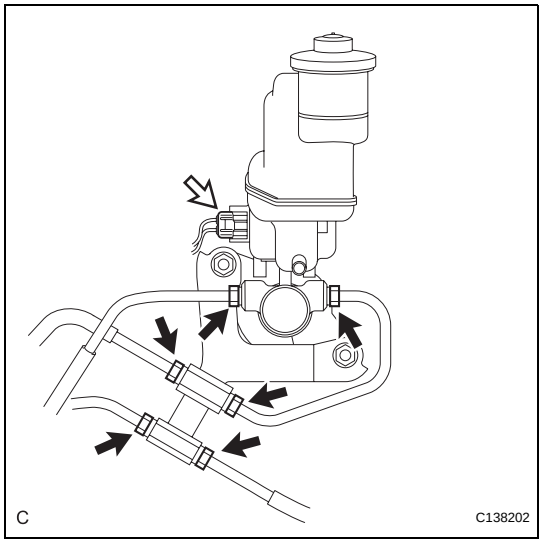
BR



(b) Using SST, disconnect the 6 brake lines and remove the brake master cylinder to way tube.
SST 09023-00101

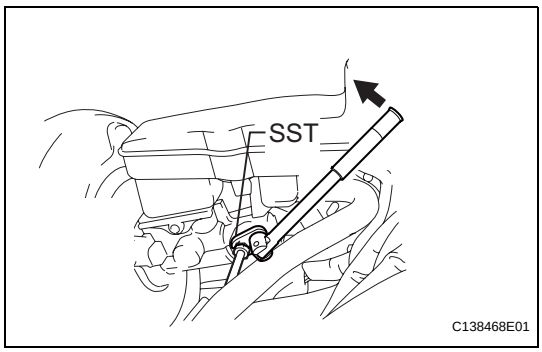


(c) Remove the 2 nuts, the front brake tube way, the O-ring and the brake master cylinder sub-assembly.

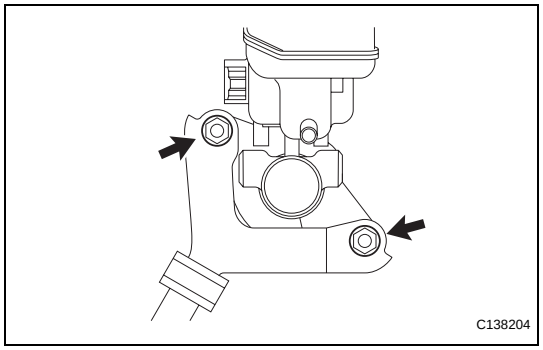


13. REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY (for TMMK Made without VSC)

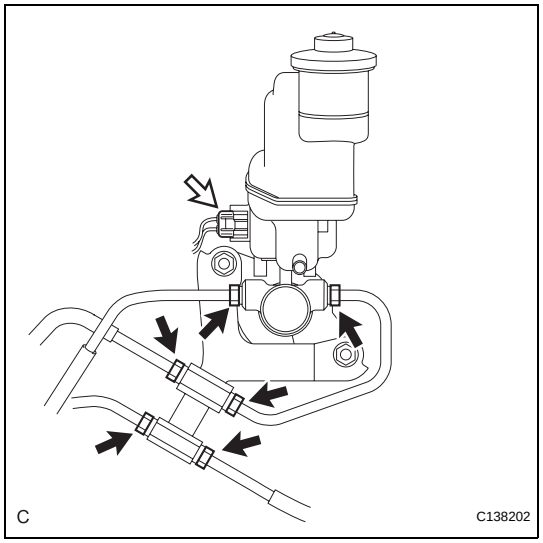
(a) Disconnect the connector.



(b) Using SST, disconnect the 6 brake lines and remove the brake master cylinder to way tube.
SST 09023-00101

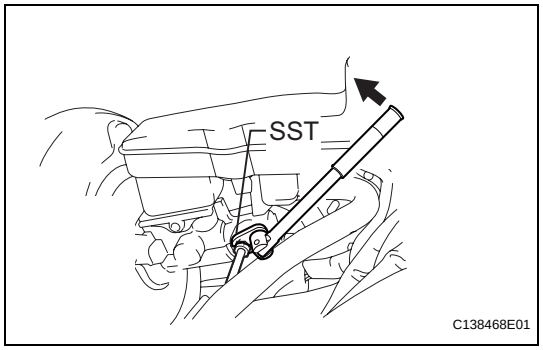


(c) Remove the 2 nuts, the front brake tube way, the O-ring and the brake master cylinder sub-assembly.

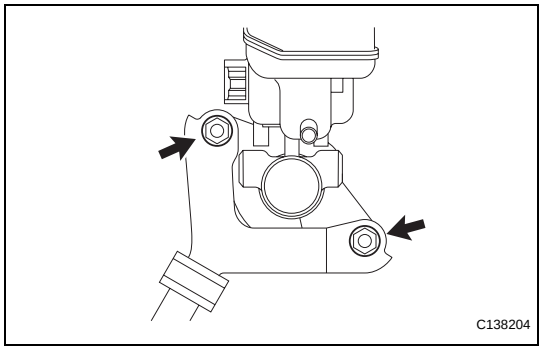


14. REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY (for TMMK Made with VSC)

(a) Disconnect the connector.



(b) Using SST, disconnect the 6 brake lines and remove the brake master cylinder to way tube.
SST 09023-38200, 09023-00101



(c) Remove the 2 nuts, the front brake tube way, the O-ring and the brake master cylinder sub-assembly.

INSPECTION

1. INSPECT AND ADJUST BRAKE BOOSTER PUSH ROD (for TMMK Made)

NOTICE:

- **Make an adjustment with no vacuum in the brake booster assembly. (Depress the brake pedal several times with the engine stopped.)**
- **The brake booster made by TMC does not need adjustment.**

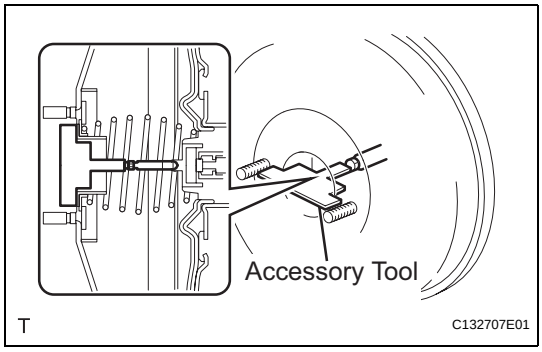
HINT:

- Adjustment of the brake booster push rod is required when the brake master cylinder sub-assembly is replaced with a new one.
- Adjustment is not necessary when the removed brake master cylinder sub-assembly is reused and the brake booster assembly is replaced with a new one.

(a) Apply chalk to the tip of the accessory tool.

HINT:

An accessory tool is enclosed with a new brake master cylinder sub-assembly.



(b) Place the accessory tool on the brake booster assembly.

(c) Measure the clearance between the brake booster push rod and accessory tool.

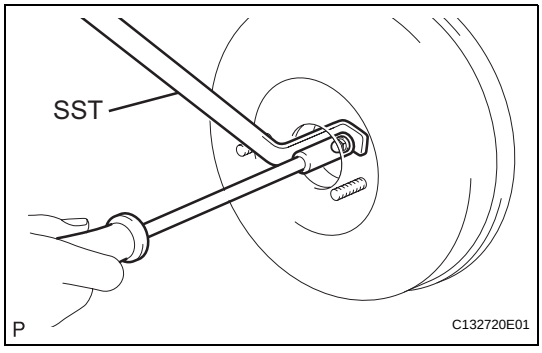
Standard clearance:

0 mm (0 in.)

HINT:

Adjust the clearance in the following cases:

- If there is a clearance between the accessory tool and the shell of the brake booster (floating accessory tool), the push rod is protruding too far.
- If the chalk does not stick on the tip of the brake booster push rod, the push rod protrusion is insufficient.

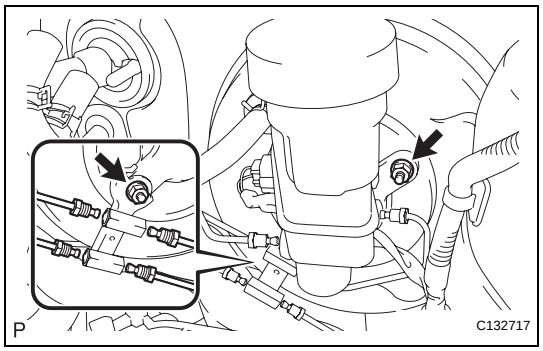


(d) If the clearance is not as specified, adjust the push rod length by holding the rod using SST and turning the tip of the rod using a socket driver (7 mm, 0.28 in.).

SST 09737-00020

HINT:

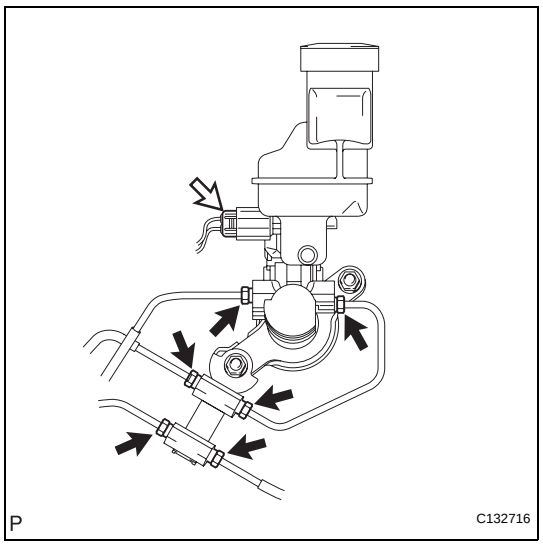
Check the push rod clearance again after adjustment.



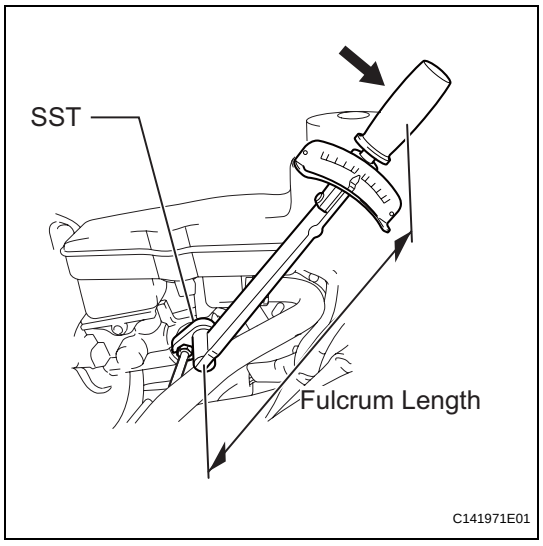
INSTALLATION

1. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY (for TMC Made)

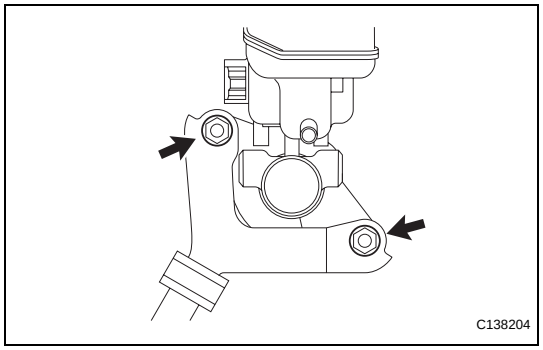
(a) Install the O-ring, the brake master cylinder sub-assembly and the front brake tube way with the 2 nuts .
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)



(b) Connect the connector.
(c) Install the brake master cylinder to way tube and temporarily tighten the 6 brake lines.



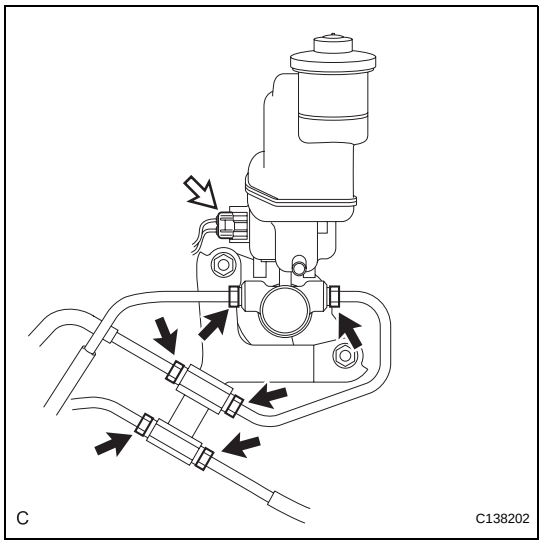
(d) Using the SST, fully tighten the 6 brake lines.
SST 09023-00101
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



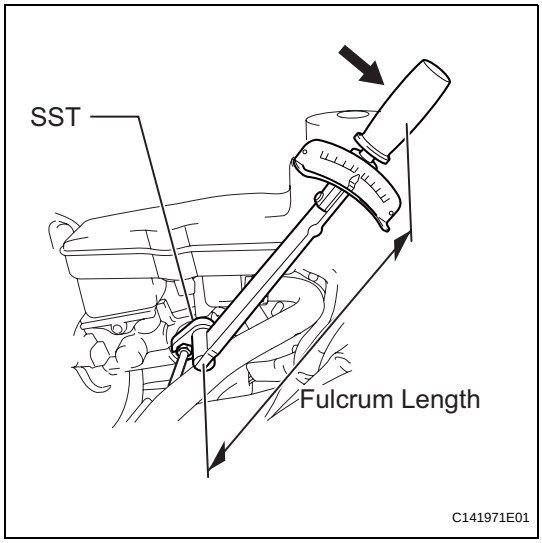
2. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY (for TMMK Made without VSC)

(a) Install the O-ring, the brake master cylinder sub-assembly and the front brake tube way with the 2 nuts .
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

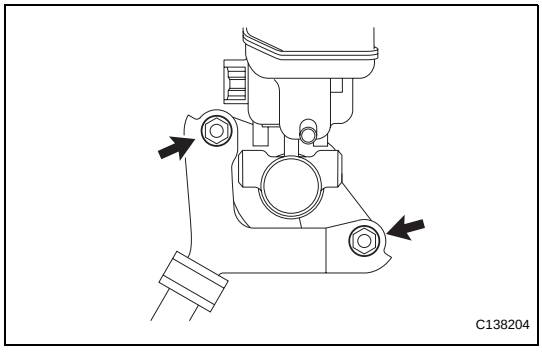
BR



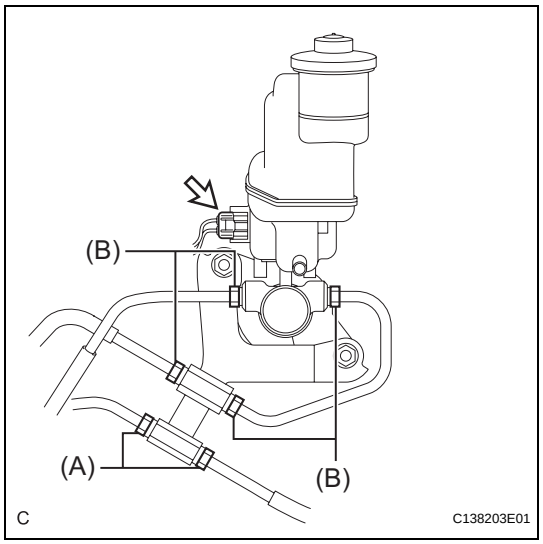
(b) Connect the connector.
(c) Install the brake master cylinder to way tube and temporarily tighten the 6 brake lines.



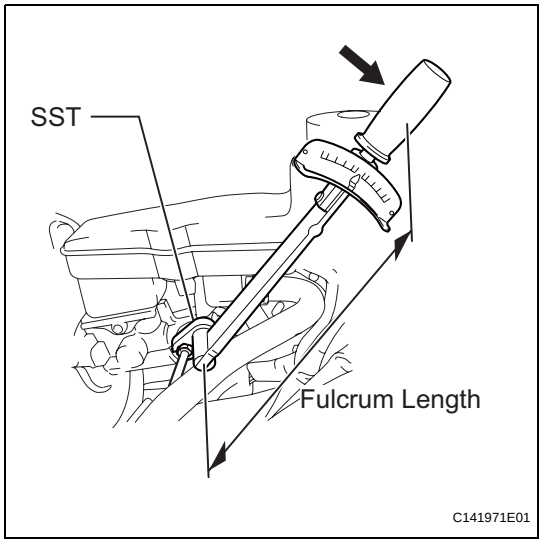
(d) Using the SST, fully tighten the 6 brake lines.
SST 09023-00101
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



3. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY (for TMMK Made with VSC)
(a) Install the O-ring, the brake master cylinder sub-assembly and the front brake tube way with the 2 nuts .
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)



(b) Connect the connector.
(c) Install the brake master cylinder to way tube and temporarily tighten the 6 brake lines.



(d) Using the SST, fully tighten the 6 brake lines.
SST 09023-00101, 09023-38200
Torque: (A) without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
(A) with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
(B) without SST
19 N*m (194 kgf*cm, 14 ft.*lbf)
(B) with SST
17 N*m (173 kgf*cm, 13 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**

4. CONNECT CLUTCH RESERVOIR TUBE (for Manual Transaxle)
(a) Connect the clutch reservoir tube to the brake master cylinder sub-assembly and move the clip.

5. FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)

6. BLEED CLUTCH PIPE LINE (for Manual Transaxle) (See page CL-19)

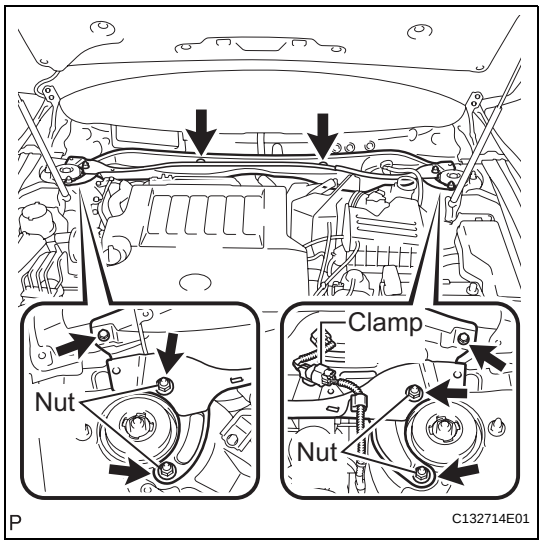
7. BLEED MASTER CYLINDER (See page BR-6)

8. BLEED BRAKE LINE (See page BR-7)

9. BLEED BRAKE ACTUATOR ASSEMBLY (w/ VSC) (See page BR-8)

10. INSPECT FLUID LEVEL IN RESERVOIR (See page BR-10)

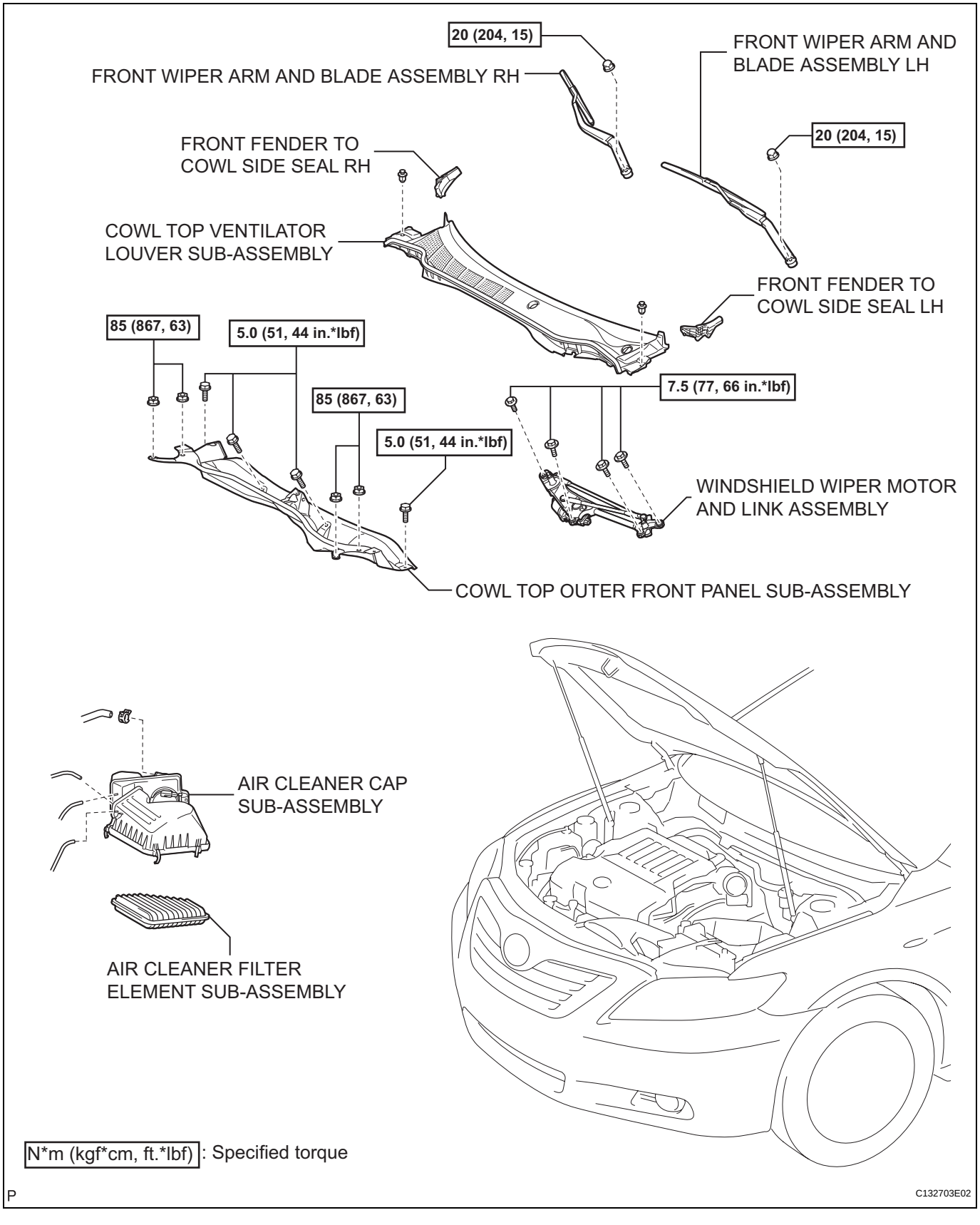
11. INSPECT FOR BRAKE FLUID LEAKAGE



12. **INSTALL COWL TOP OUTER FRONT PANEL SUB-ASSEMBLY**
    (a) Install the cowl top outer front panel sub-assembly with the 4 nuts, the 4 bolts and the clamp.
    Torque: Nut
    85 N*m (867 kgf*cm, 63 ft.*lbf)
    Bolt
    5.0 N*m (51 kgf*cm, 44 in.*lbf)
13. **INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY (See page WW-14)**
14. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)**
15. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
16. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
17. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**
18. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**
19. **INSTALL AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**
20. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**

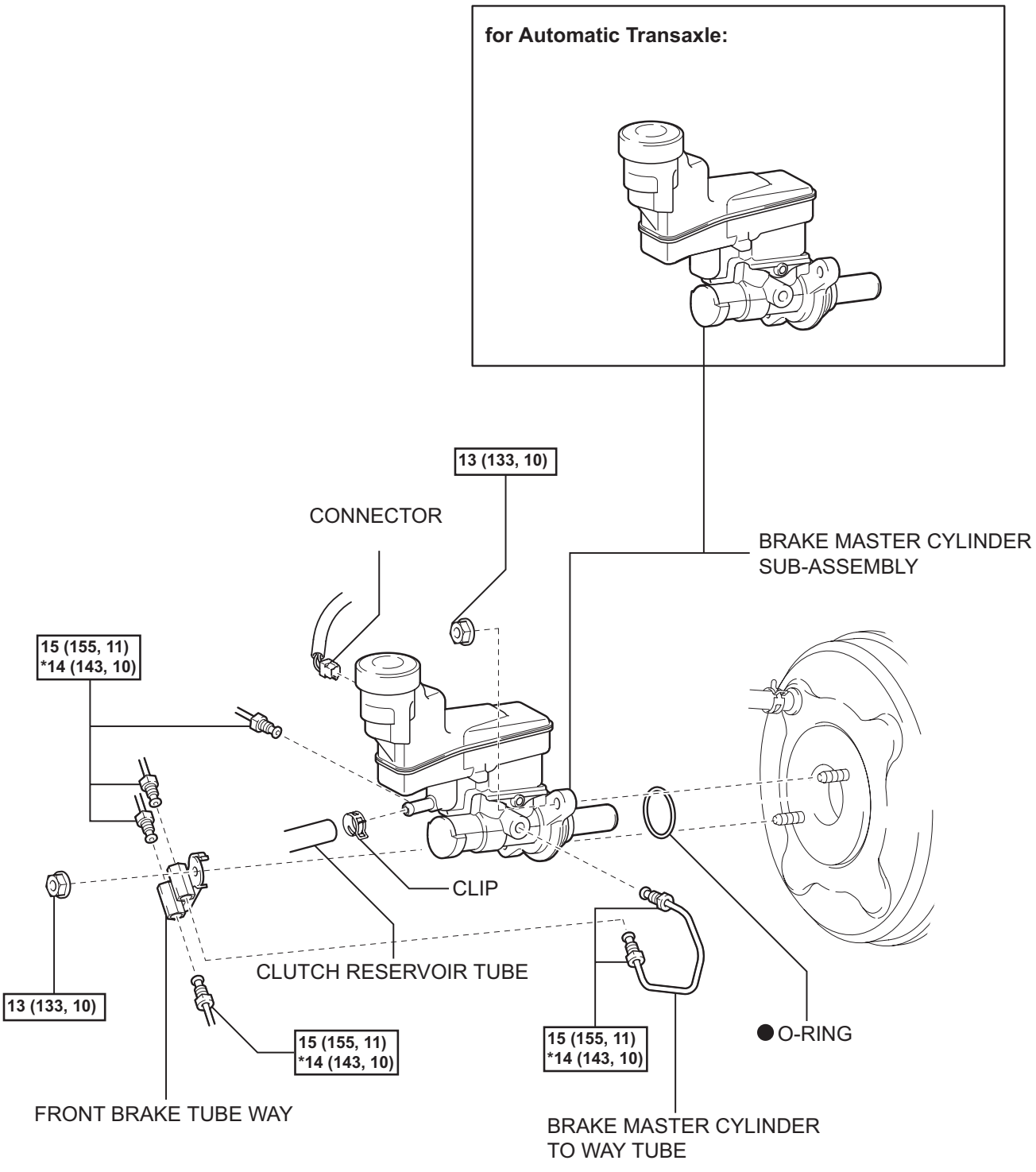
BRAKE BOOSTER

COMPONENTS



BR

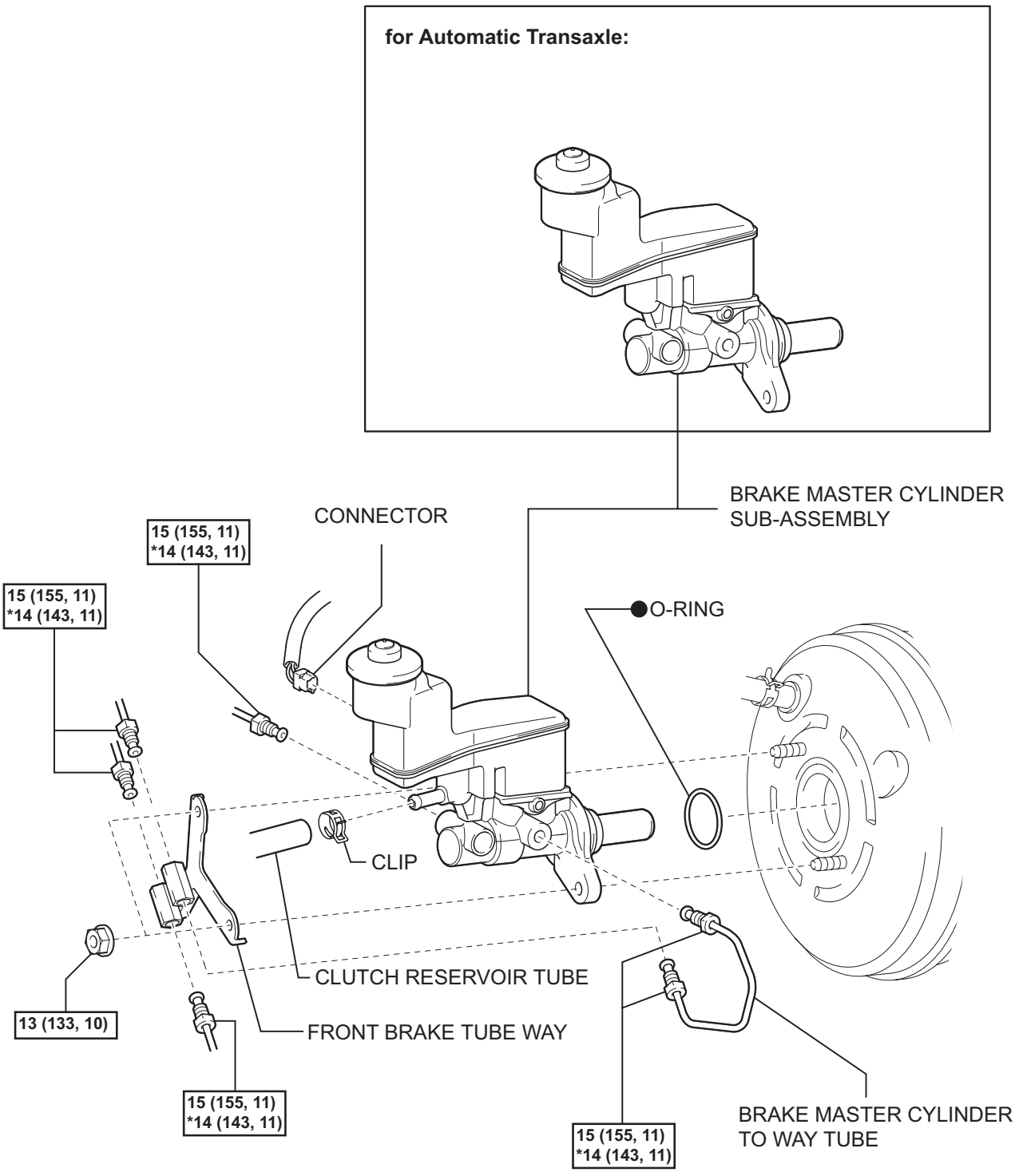
for TMC made:



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

C133461E01

for TMMK made without VSC:



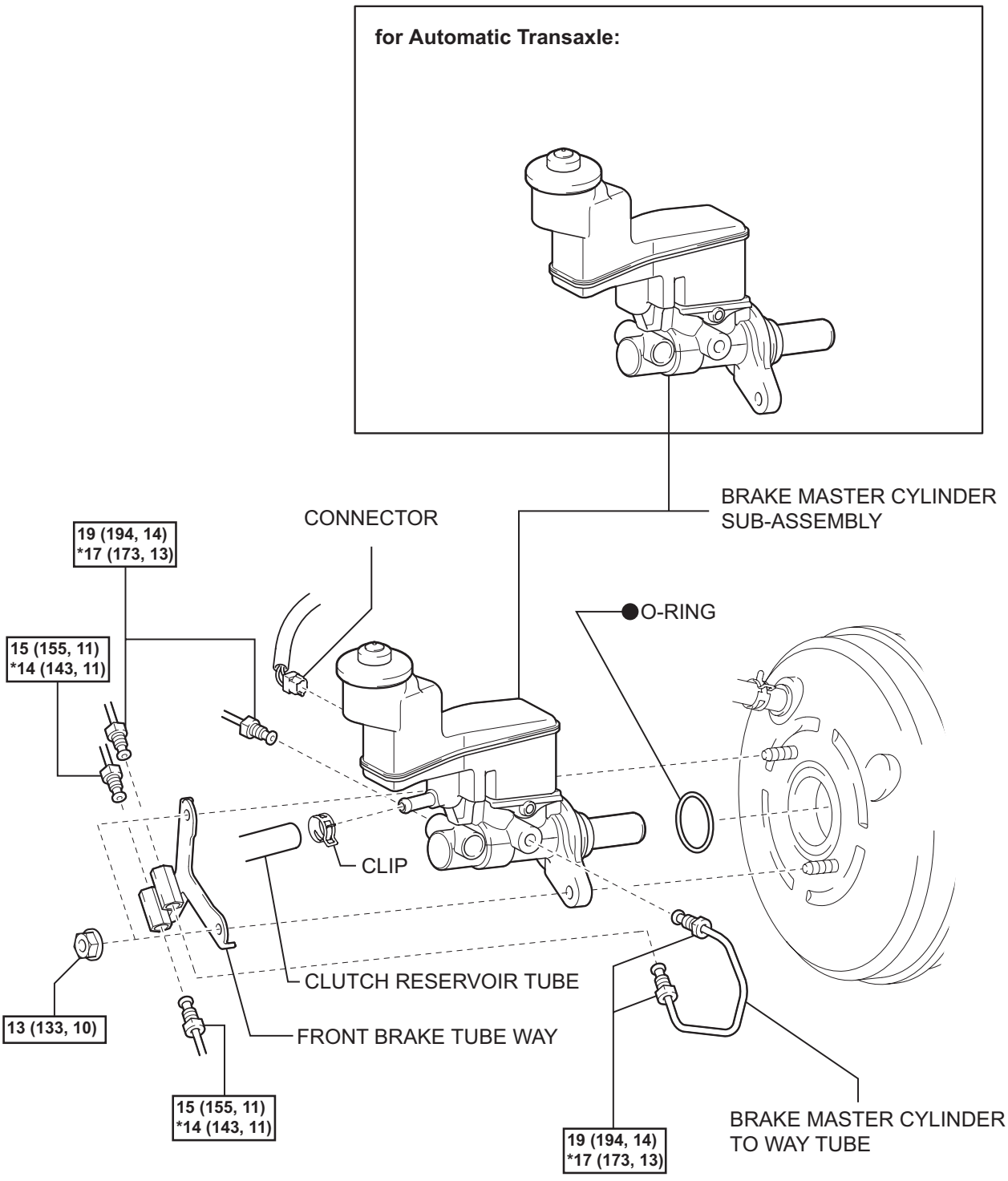
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

P

C132705E02

BR

for TMMK made with VSC:

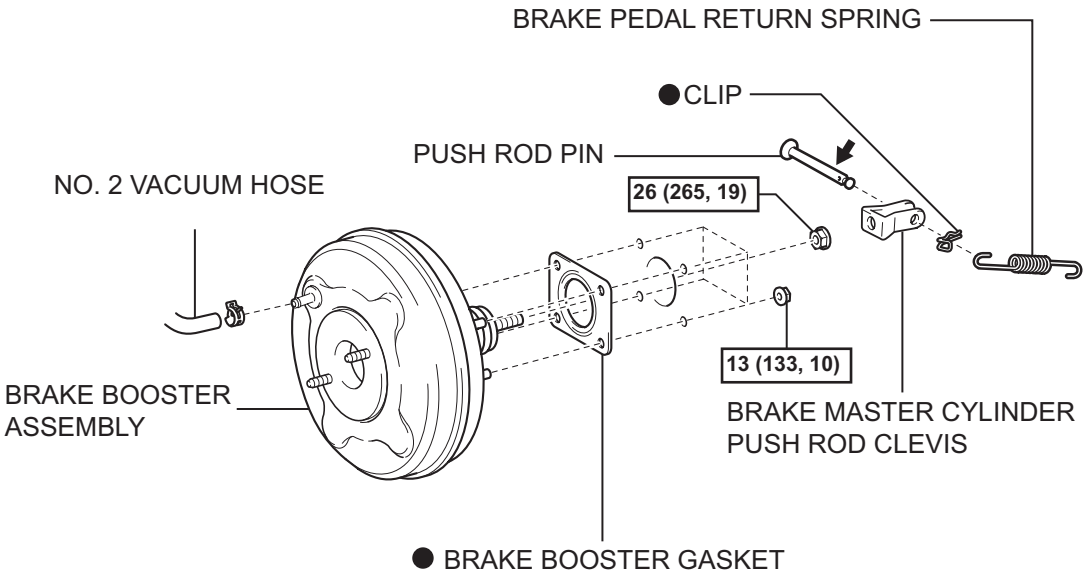


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part * For use with SST

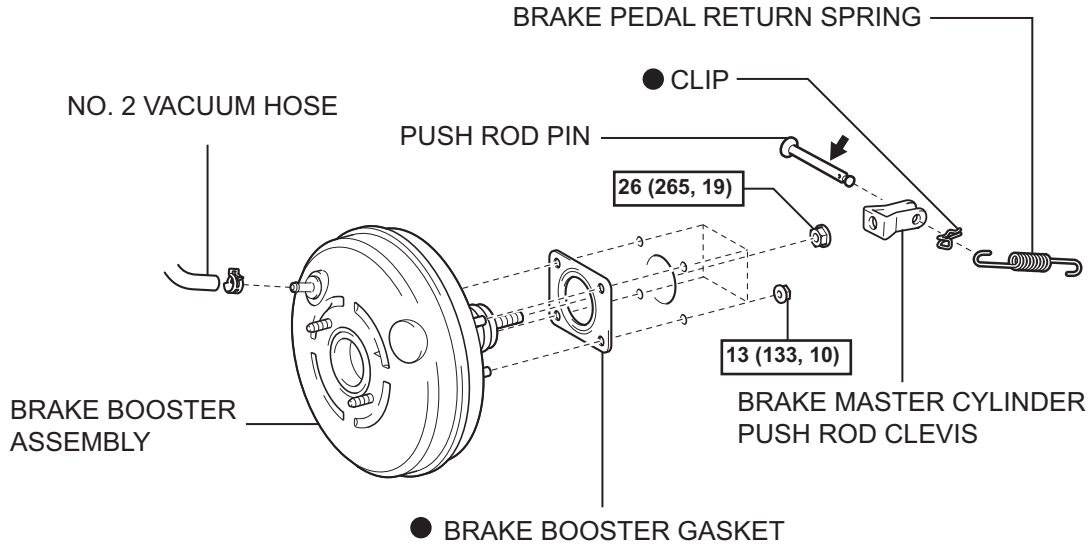
P

C132705E03

for TMC made:



for TMMK made:

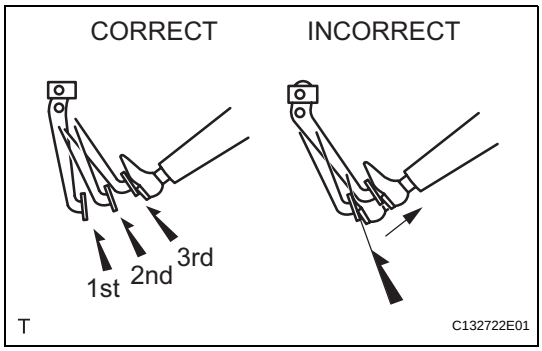


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ← Apply lithium soap base glycol grease

P

C132704E03

BR



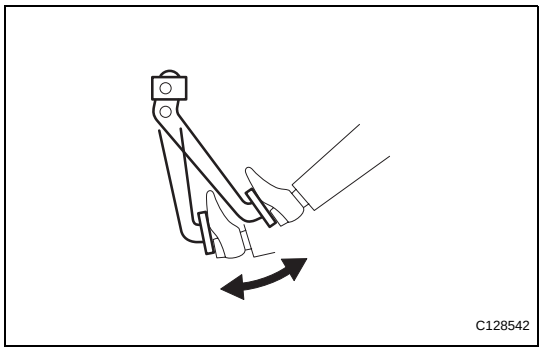
ON-VEHICLE INSPECTION

1. INSPECT BRAKE BOOSTER ASSEMBLY

(a) Airtightness check.

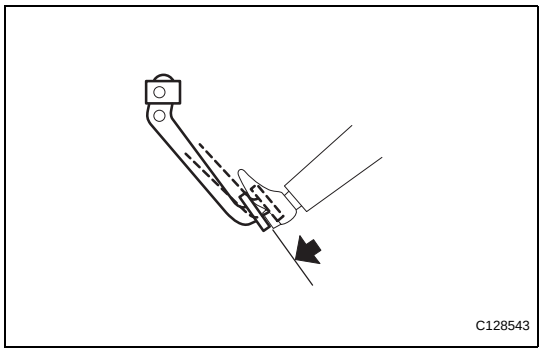
(1) Start the engine and stop it after 1 or 2 minutes. Slowly depress the brake pedal several times.
HINT:
If the pedal can be depressed to the floor the first time, but on the 2nd and 3rd time cannot be depressed as far, the booster is airtight.

(2) Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed.
HINT:
If there is no change in the pedal reserve distance while holding the pedal for 30 seconds, the booster is airtight.



(b) Operation check.

(1) Depress the brake pedal several times with the ignition switch off and check that there is no change in the pedal reserve distance when the pedal is depressed.



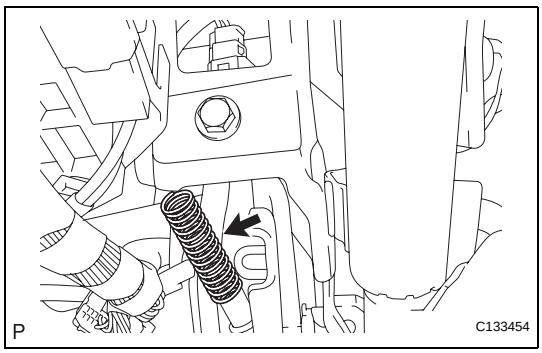
(2) Depress and hold down the pedal, and start the engine.
HINT:
If the pedal goes down slightly, operation is normal.

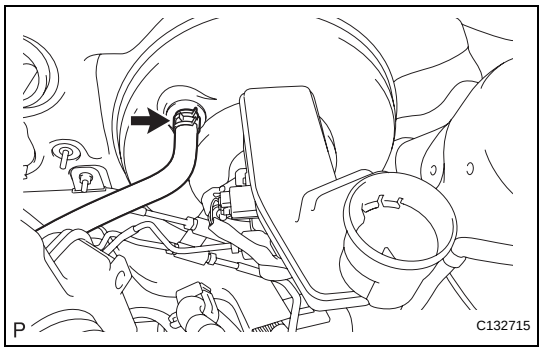
REMOVAL

1. REMOVE BRAKE PEDAL RETURN SPRING

(a) Remove the brake pedal return spring.

2. SEPARATE BRAKE MASTER CYLINDER PUSH ROD CLEVIS





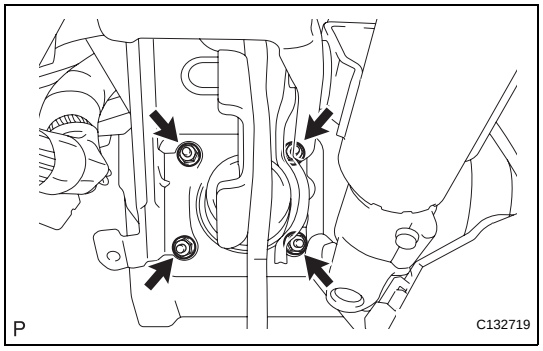
3. DISCONNECT NO. 2 VACUUM HOSE

(a) Move the clip and disconnect the No. 2 vacuum hose.

4. REMOVE BRAKE MASTER CYLINDER SUB-ASSEMBLY

HINT:

Refer to the procedures up to "REMOVE MASTER CYLINDER". (See page BR-28)

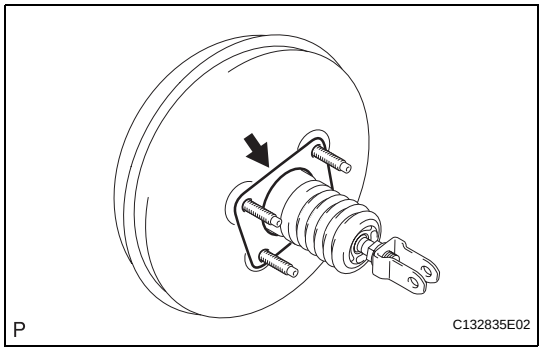


5. REMOVE BRAKE BOOSTER ASSEMBLY

(a) Remove the 4 nuts and the brake booster assembly.

NOTICE:

Do not damage the brake lines.



6. REMOVE BRAKE BOOSTER GASKET

(a) Remove the brake booster gasket.

7. REMOVE BRAKE MASTER CYLINDER PUSH ROD CLEVIS

(a) Loosen the lock nut and remove the brake master cylinder push rod clevis.

BR

INSPECTION

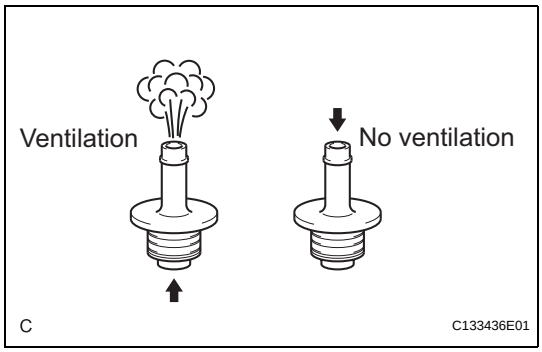
1. INSPECT VACUUM CHECK VALVE

(a) Inspect the vacuum check valve.

(1) Slide the clip and disconnect the vacuum hose.

(2) Remove the vacuum check valve.

(3) Check that there is ventilation from the booster to the engine, and no ventilation from the engine to the booster. If the results are not as specified, replace the brake booster assembly.



INSTALLATION

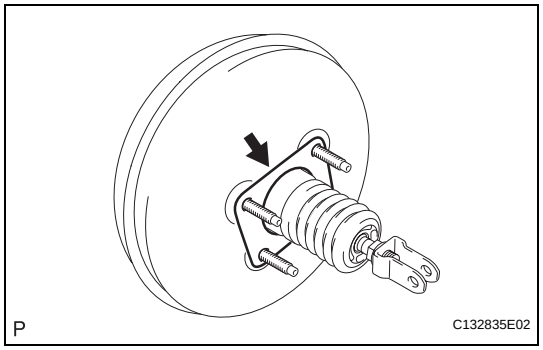
1. INSTALL BRAKE MASTER CYLINDER PUSH ROD CLEVIS

(a) Temporarily install the lock nut and the brake master cylinder push rod clevis to the brake booster assembly.

NOTICE:
Fully tighten the lock nut after adjusting the pedal height.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

2. INSTALL BRAKE BOOSTER GASKET

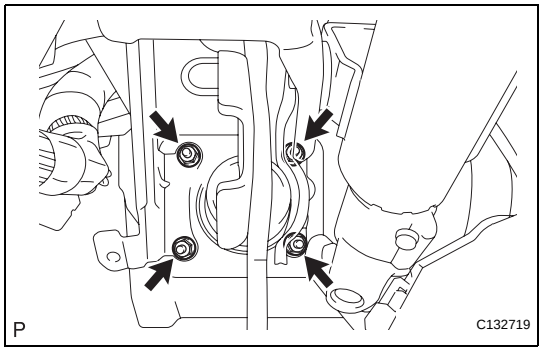
(a) Install a new brake booster gasket.



3. INSTALL BRAKE BOOSTER ASSEMBLY

(a) Install the brake booster assembly and the gasket with the 4 nuts.

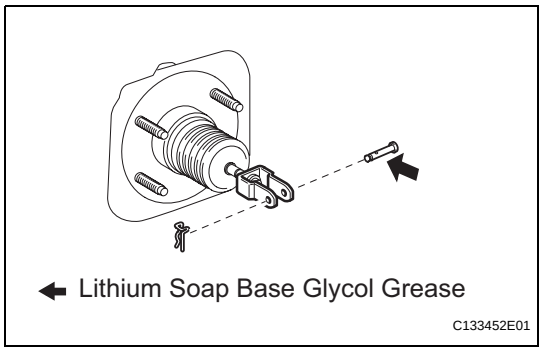
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
NOTICE:
Do not damage the brake lines.



4. CONNECT BRAKE MASTER CYLINDER PUSH ROD CLEVIS

(a) Apply lithium soap base glycol grease to the push rod pin.

(b) Connect the brake master cylinder push rod clevis to the brake pedal with the push rod pin and a new clip as shown in the illustration.



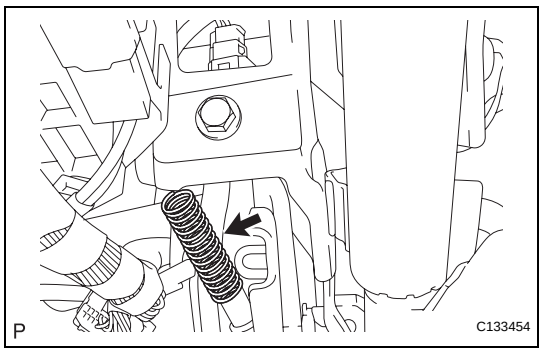
5. INSTALL BRAKE PEDAL RETURN SPRING

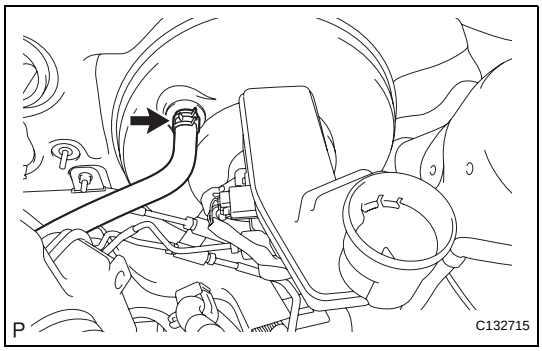
(a) Install the brake pedal return spring.

6. INSPECT AND ADJUST BRAKE PEDAL HEIGHT (See page BR-19)

7. INSTALL BRAKE MASTER CYLINDER SUB-ASSEMBLY

HINT:
Refer to the procedures up to "INSTALL BRAKE MASTER CYLINDER". (See page BR-32)



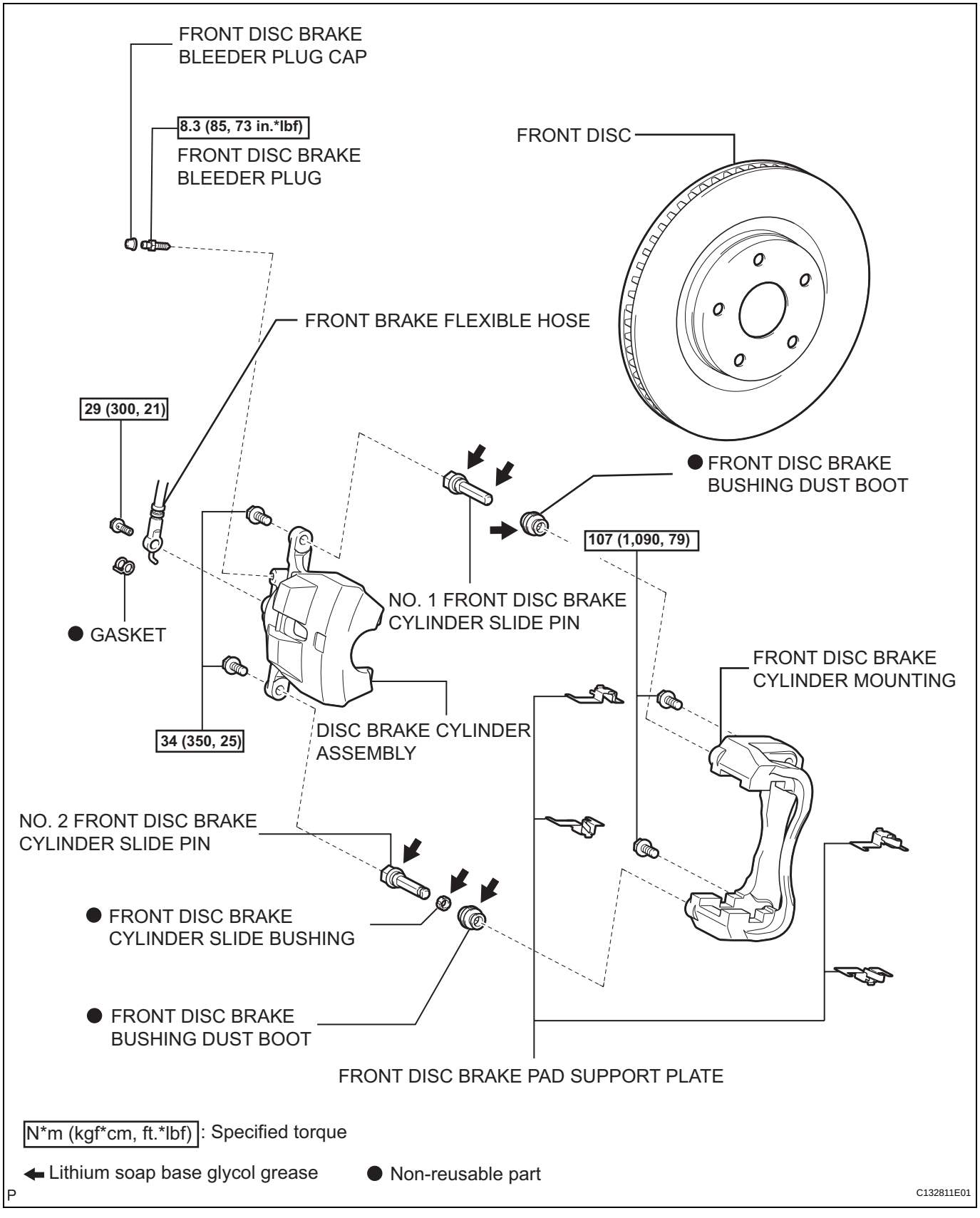


8. CONNECT NO. 2 VACUUM HOSE

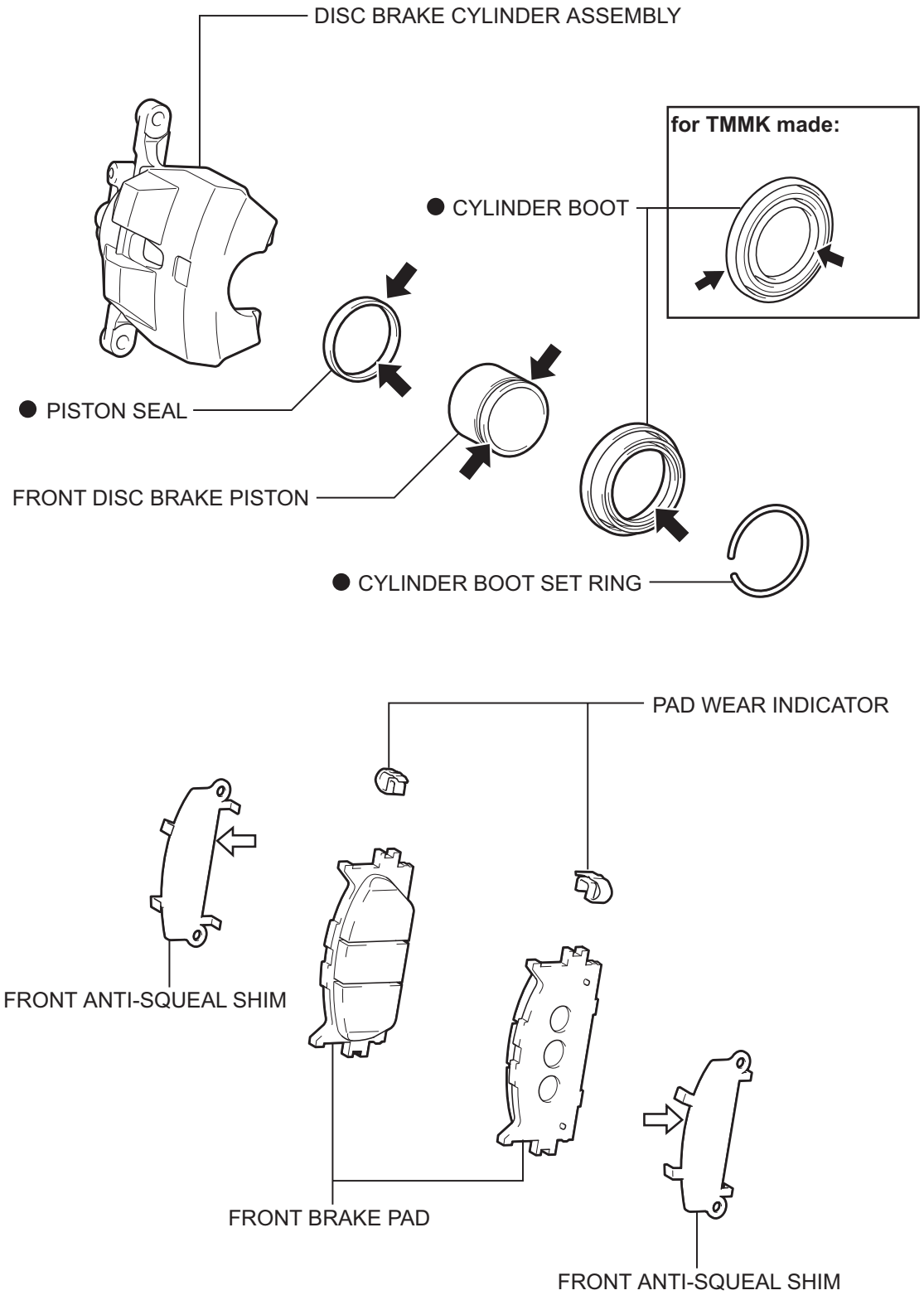
(a) Connect the No. 2 vacuum hose and move the clip.

FRONT BRAKE

COMPONENTS

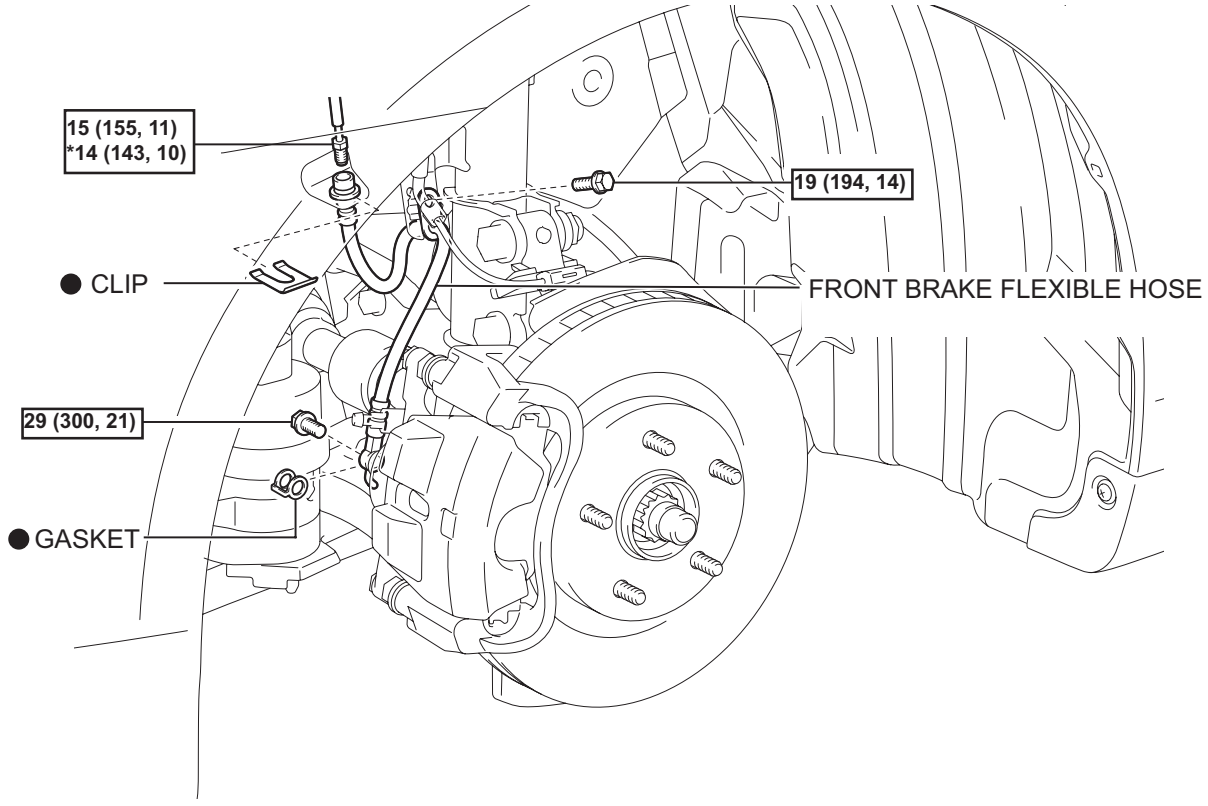


BR


DISC BRAKE CYLINDER ASSEMBLY
for TMMK made:
● CYLINDER BOOT
● PISTON SEAL
FRONT DISC BRAKE PISTON
● CYLINDER BOOT SET RING
PAD WEAR INDICATOR
FRONT ANTI-SQUEAL SHIM
FRONT BRAKE PAD
FRONT ANTI-SQUEAL SHIM
Lithium soap base glycol grease
● Non-reusable part
Disc brake grease
P
C132812E01

FRONT BRAKE FLEXIBLE HOSE

COMPONENTS



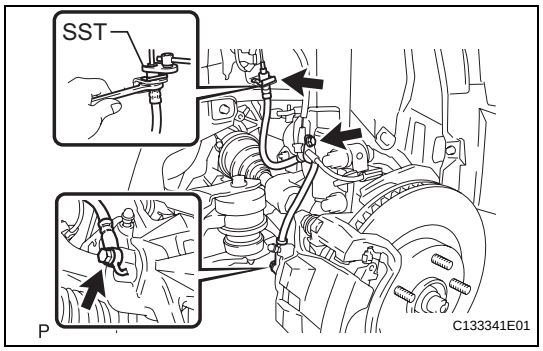
N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part * For use with SST

C132792E01

REMOVAL

1. REMOVE FRONT WHEEL

2. DRAIN BRAKE FLUID



3. REMOVE FRONT BRAKE FLEXIBLE HOSE

(a) Remove the clip.

(b) Remove the brake tube with SST while holding the front brake flexible hose with a wrench.

SST 09023-00101

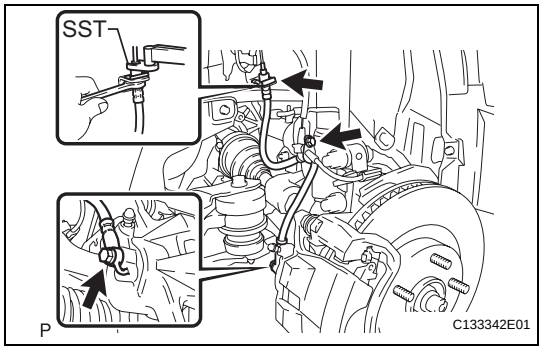
NOTICE:

- **Do not bend or damage the brake tube.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake tube from the connecting points.**

(c) Remove the bolt, and separate the front brake flexible hose and the speed sensor from the shock absorber.

(d) Remove the union bolt, the front brake flexible hose and gasket.

INSTALLATION



1. INSTALL FRONT BRAKE FLEXIBLE HOSE

(a) Connect the front brake flexible hose with the union bolt and a new gasket.

Torque: 29 N*m (300 kgf*cm, 21 ft.*lbf)

(b) Connect the front flexible hose and the speed sensor to the shock absorber with the bolt.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

NOTICE:

When installing the front flexible hose and the speed sensor, the bracket must face toward the exterior of the vehicle.

(c) Connect the brake tube to the front brake flexible hose with SST while holding the flexible hose with a wrench.

SST 09023-00101

Torque: Without SST

15 N*m (155 kgf*cm, 11 ft.*lbf)

With SST

14 N*m (143 kgf*cm, 10 ft.*lbf)

NOTICE:

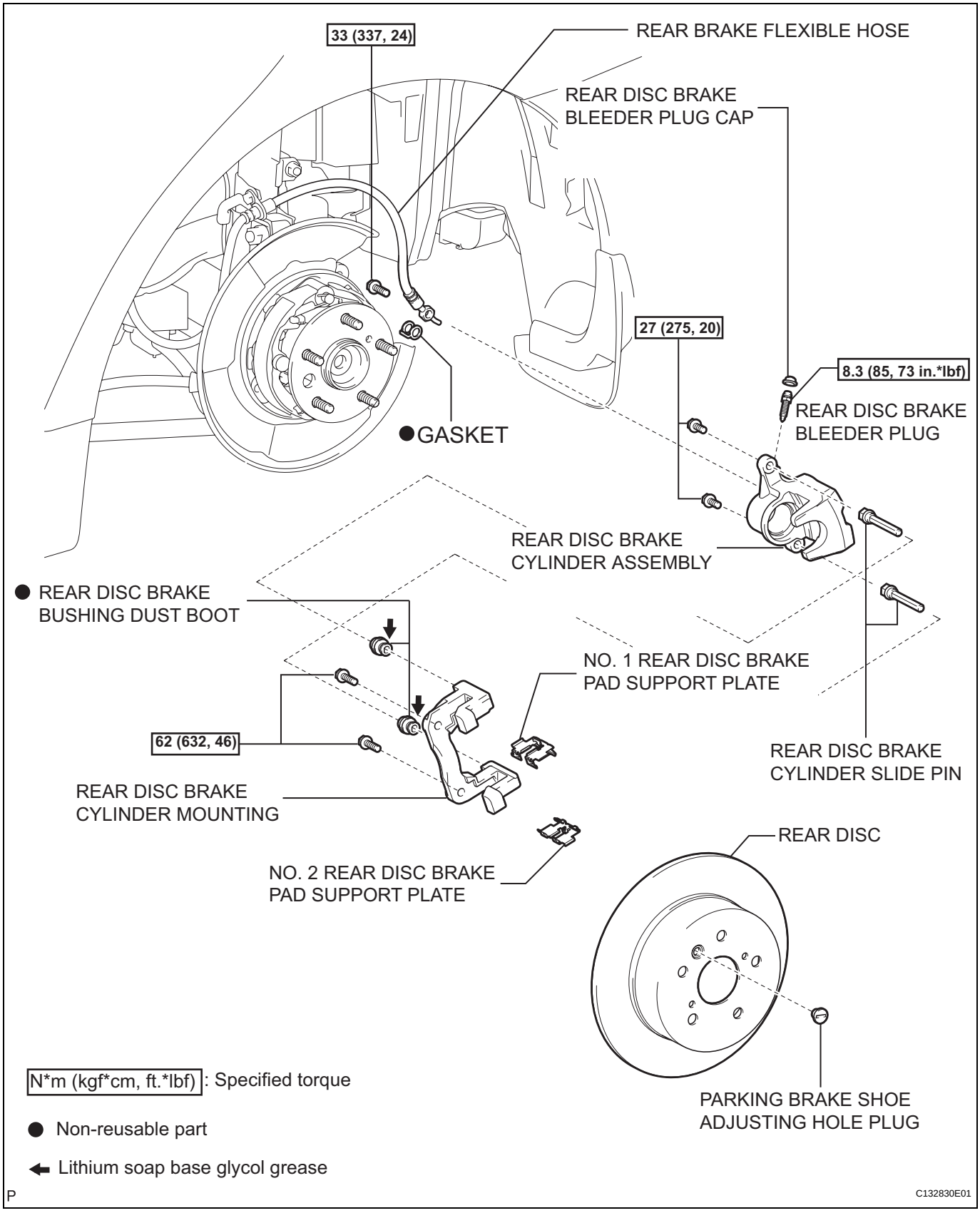
- **Do not bend or damage the brake tube.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake tube from the connecting points.**
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**

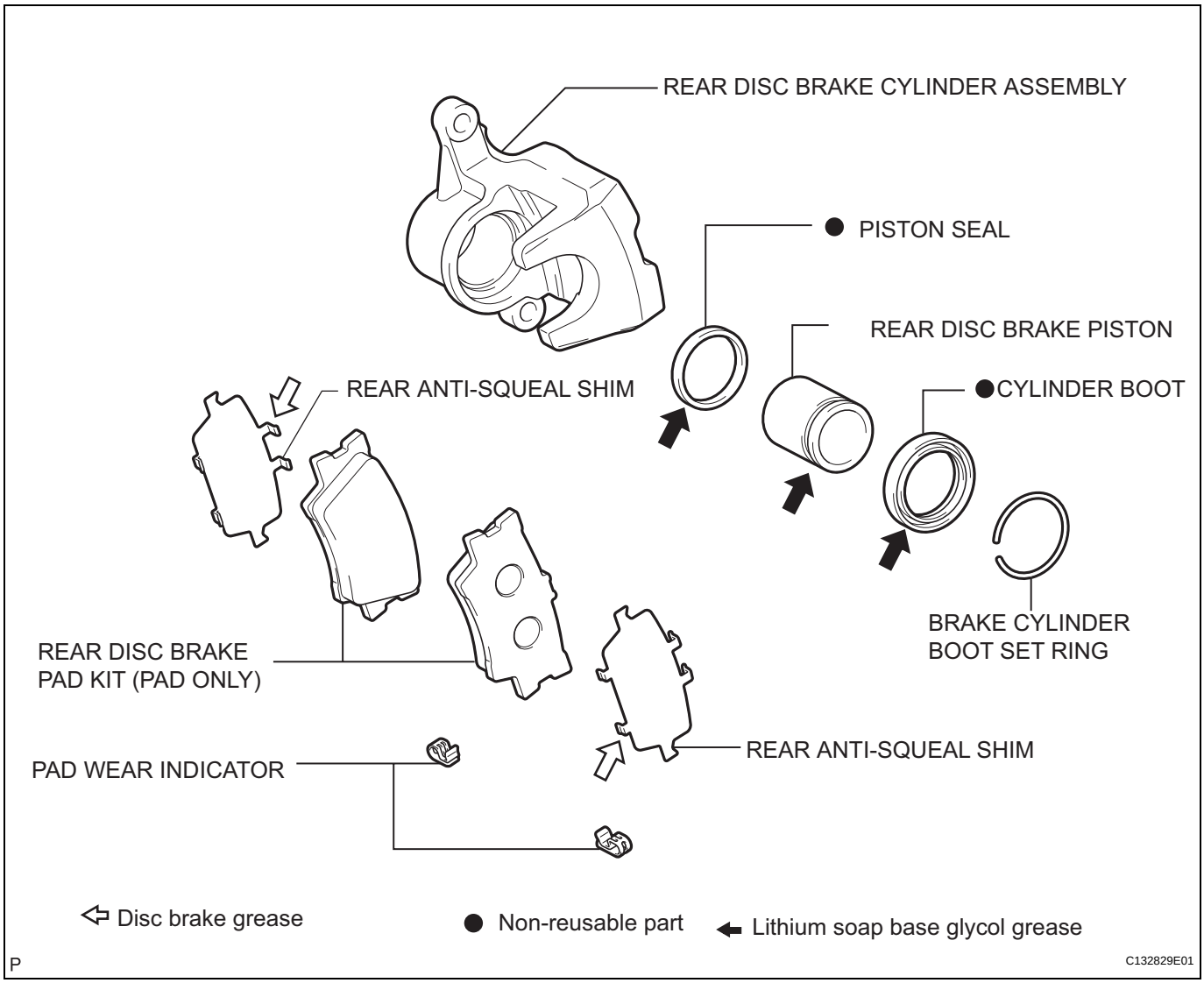
(d) Install the front brake flexible hose with a new clip.
NOTICE:
- **When installing the front brake flexible hose, face the identification mark toward the exterior of the vehicle and minimize twisting of the hose.**
- **Install the clip as far as it will go.**

2. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)**
3. **BLEED MASTER CYLINDER (See page BR-6)**
4. **BLEED BRAKE LINE (See page BR-7)**
5. **BLEED BRAKE ACTUATOR ASSEMBLY (w/ VSC) (See page BR-8)**
6. **INSPECT BRAKE FLUID LEVEL IN RESERVOIR (See page BR-10)**
7. **INSPECT FOR BRAKE FLUID LEAKAGE**
8. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REAR BRAKE

COMPONENTS




REAR DISC BRAKE CYLINDER ASSEMBLY
● PISTON SEAL
REAR DISC BRAKE PISTON
REAR ANTI-SQUEAL SHIM
●CYLINDER BOOT
BRAKE CYLINDER
BOOT SET RING
REAR DISC BRAKE
PAD KIT (PAD ONLY)
PAD WEAR INDICATOR
REAR ANTI-SQUEAL SHIM
⇦ Disc brake grease
● Non-reusable part
⬅ Lithium soap base glycol grease
P
C132829E01

BR

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. REMOVE FRONT WHEEL

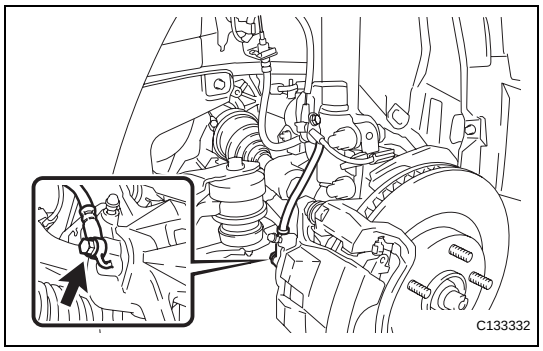
2. DRAIN BRAKE FLUID

NOTICE:

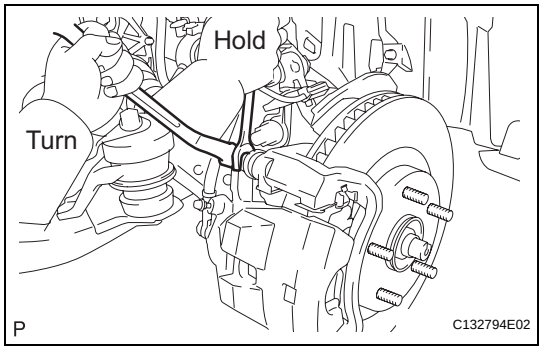
If brake fluid leaks onto any painted surface of the vehicle, wash or remove it completely.

3. REMOVE DISC BRAKE CYLINDER ASSEMBLY

(a) Remove the union bolt and gasket from the disc brake cylinder assembly, then disconnect the flexible hose.



(b) Hold the front disc brake cylinder slide pin and remove the 2 bolts and disc brake cylinder assembly.



BR

DISASSEMBLY

1. REMOVE FRONT BRAKE PAD

(a) Remove the 2 brake pads from the front disc brake cylinder mounting.

2. REMOVE FRONT ANTI-SQUEAL SHIM

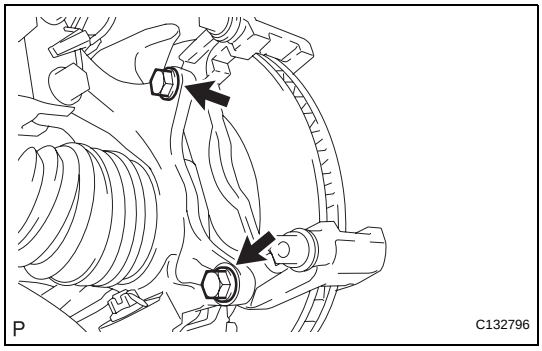
(a) Remove the 2 anti-squeal shims and the 2 pad wear indicator plates from each pad.

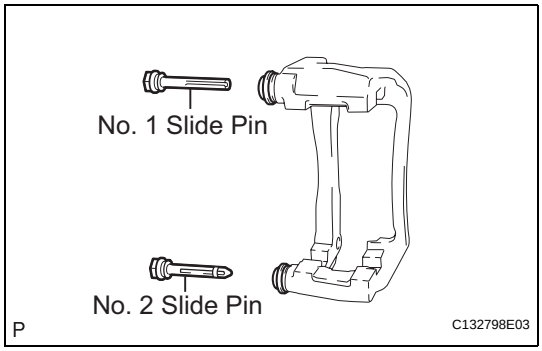
3. REMOVE FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Remove the 4 front disc brake pad support plates.

4. REMOVE FRONT DISC BRAKE CYLINDER MOUNTING

(a) Remove the 2 bolts and front disc brake cylinder mounting.



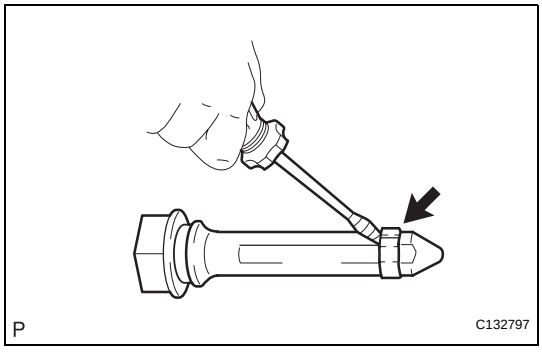


5. REMOVE NO. 1 FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Remove the No. 1 front disc brake cylinder slide pin from the front disc brake cylinder mounting.

6. REMOVE NO. 2 FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Remove the No. 2 front disc brake cylinder slide pin from the front disc brake cylinder mounting.



7. REMOVE FRONT DISC BRAKE CYLINDER SLIDE BUSHING

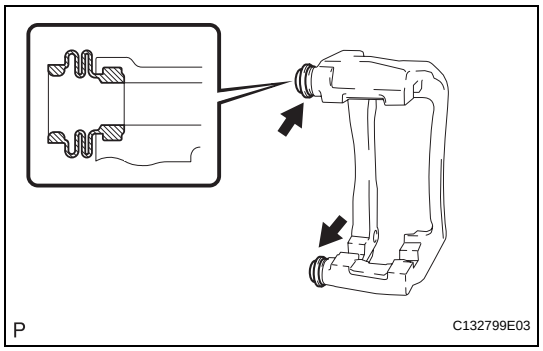
(a) Using a screwdriver, remove the cylinder slide bushing from the No. 2 front disc brake cylinder slide pin.

NOTICE:

Do not damage the No. 2 front disc brake cylinder slide pin.

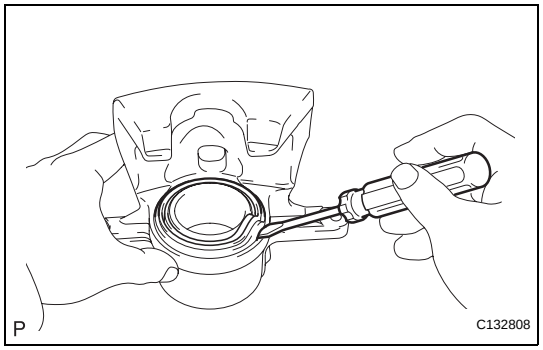
HINT:

Tape the screwdriver tip before use.



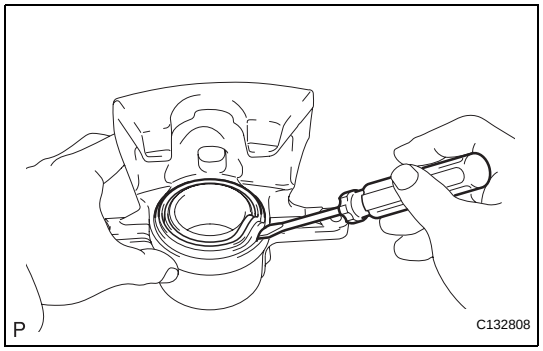
8. REMOVE FRONT DISC BRAKE BUSHING DUST BOOT

(a) Remove the 2 bushing dust boots from the front disc brake cylinder mounting.



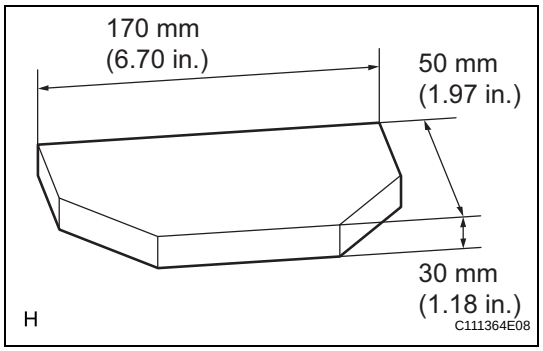
9. REMOVE CYLINDER BOOT (for TMC Made)

(a) Using a screwdriver, remove the cylinder boot set ring and the cylinder boot.
NOTICE:
Be careful not to damage the brake piston and cylinder.



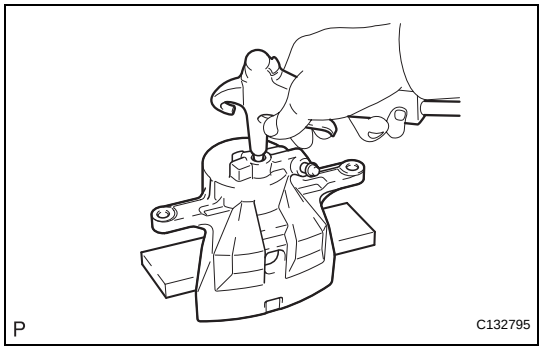
10. REMOVE CYLINDER BOOT (for TMMK Made)

(a) Using a screwdriver, remove the cylinder boot.
NOTICE:
Be careful not to damage the brake piston and cylinder.

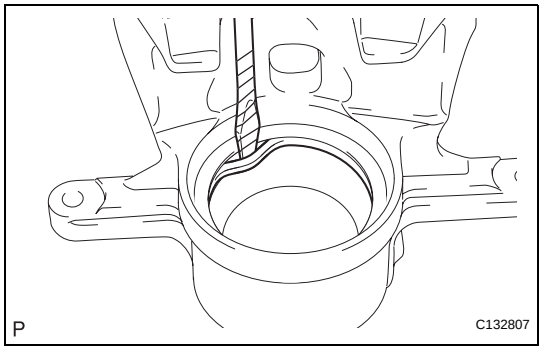


11. REMOVE FRONT DISC BRAKE PISTON

(a) Prepare a wooden plate to hold the pistons.
(b) Place the wooden plate between the piston and the disc brake cylinder assembly.



(c) Use compressed air to remove the piston from the disc brake cylinder assembly.
CAUTION:
Do not place your fingers in front of the piston when using compressed air.
NOTICE:
Do not spatter the brake fluid.



12. REMOVE PISTON SEAL

(a) Using a screwdriver, remove the piston seal from the disc brake cylinder assembly.
NOTICE:
Do do not damage the inner cylinder or cylinder groove.
HINT:
Tape the screwdriver tip before use.

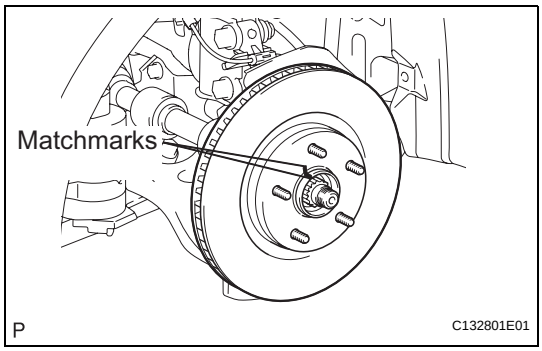
13. REMOVE FRONT DISC BRAKE BLEEDER PLUG CAP

(a) Remove the front disc brake bleeder plug cap.

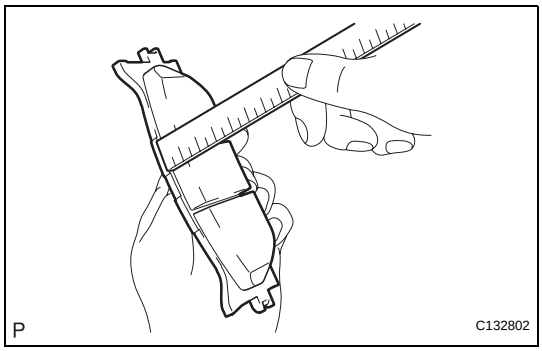
14. REMOVE FRONT DISC BRAKE BLEEDER PLUG

15. REMOVE FRONT DISC

(a) Remove the front disc.
HINT:
Put matchmarks on the disc and the axle hub.



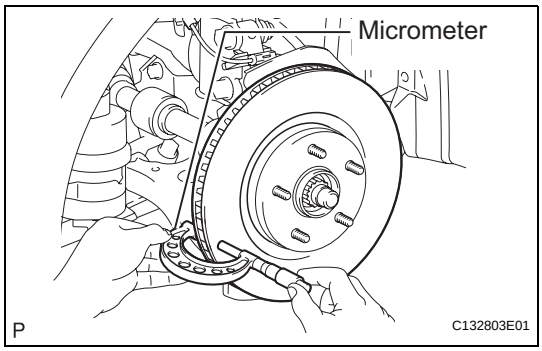
BR



INSPECTION

1. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.
Standard thickness:
12.0 mm (0.472 in.)
Minimum thickness:
1.0 mm (0.039 in.)
If the pad lining thickness is less than the minimum, replace the brake pads.
HINT:
Be sure to check wear of the front disc after replacing the brake pad with a new one.



2. INSPECT DISC THICKNESS

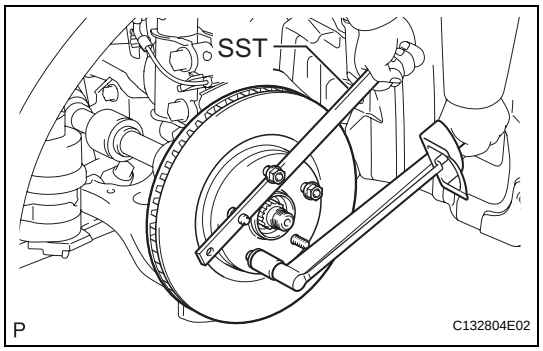
(a) Using a micrometer, measure the disc thickness.
Standard thickness:
28.0 mm (1.102 in.)
Minimum thickness :
25.0 mm (0.983 in.)
If the disc thickness is less than the minimum, replace the front disc.

3. INSPECT BRAKE CYLINDER AND PISTON

(a) Check the cylinder bore and piston for rust or scoring. If necessary, replace the disc brake cylinder assembly.

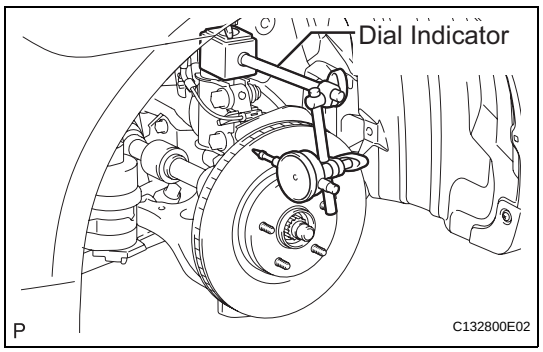
4. INSPECT FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Make sure that the pad support plate has sufficient rebound, has no deformation, cracks or wear, and that all rust and dirt are cleaned off. If necessary, replace the brake pad support plate.



5. INSPECT DISC RUNOUT

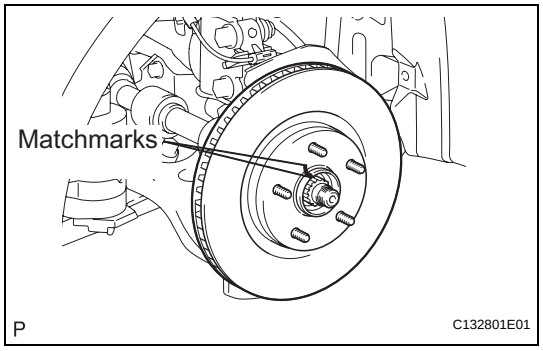
(a) Using SST to hold the disc, tighten the disc with the 3 hub nuts.
SST 09330-00021
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
HINT:
Use the SST to hold the disc while torquing the nuts.



(b) Using a dial indicator, measure the disc runout 10 mm (0.39 in.) away from the outer edge of the disc.
Maximum disc runout:
0.05 mm (0.0020 in)
NOTICE:
- **Keep the magnet of the dial indicator away from the axle hub and speed sensor.**
- **Install the dial indicator to the shock absorber.**

(c) If the runout exceeds the maximum value, change the installation positions of the disc and axle so that the runout will become minimal. If the runout exceeds the maximum even after the installation positions are changed, check the bearing play in the axial direction and the axle hub runout (See page AH-16). If the bearing play and the axle hub runout are normal and if the disc thickness is not within the specified range, grind the disc. If the disc thickness is less than the minimum, replace the disc.

(d) Remove the front disc.



REASSEMBLY

1. INSTALL FRONT DISC

(a) Align the matchmarks and install the front disc.
NOTICE:
When replacing the disc with a new one, select the installation position where the front disc has the minimum runout.

2. TEMPORARILY TIGHTEN FRONT DISC BRAKE BLEEDER PLUG

(a) Temporarily tighten the front disc brake bleeder plug to the disc brake cylinder sub-assembly.

3. INSTALL FRONT DISC BRAKE BLEEDER PLUG CAP

(a) Install the bleeder plug cap to the front disc brake bleeder plug.

4. INSTALL PISTON SEAL

(a) Apply lithium soap base glycol grease to a new piston seal.

(b) Install the piston seal to the disc brake cylinder assembly.

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5. INSTALL FRONT DISC BRAKE PISTON (for TMC Made)

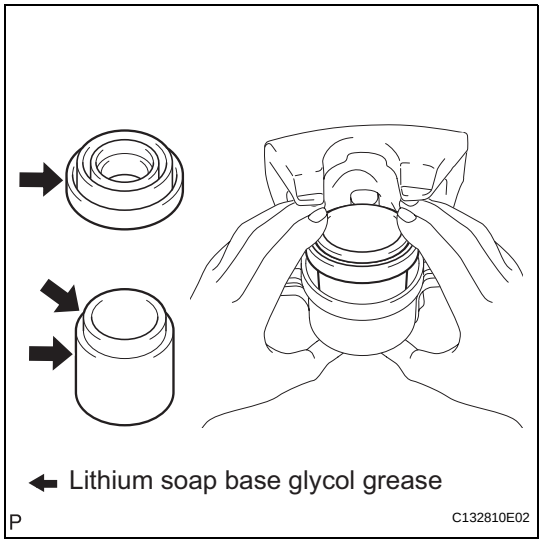
(a) Apply lithium soap base glycol grease to the piston and a new cylinder boot.

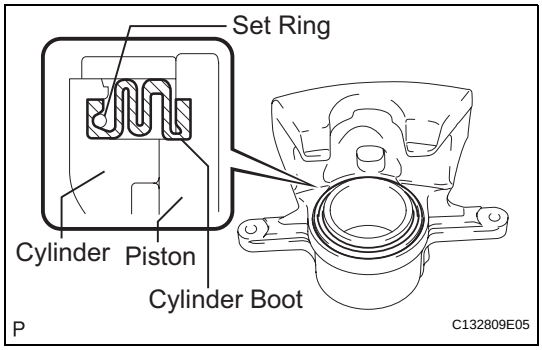
(b) Install the cylinder boot to the piston.

(c) Install the piston to the disc brake cylinder assembly.

NOTICE:

Do not install the piston forcibly in the cylinder assembly.





6. INSTALL CYLINDER BOOT (for TMC Made)

(a) Install the cylinder boot to the disc brake cylinder assembly.

NOTICE:

Install the boot securely to the grooves of the cylinder and piston.

(b) Using a screwdriver, install a new set ring.

NOTICE:

- **Install the set ring securely to the grooves of the cylinder boot.**
- **Do not damage the cylinder boot.**

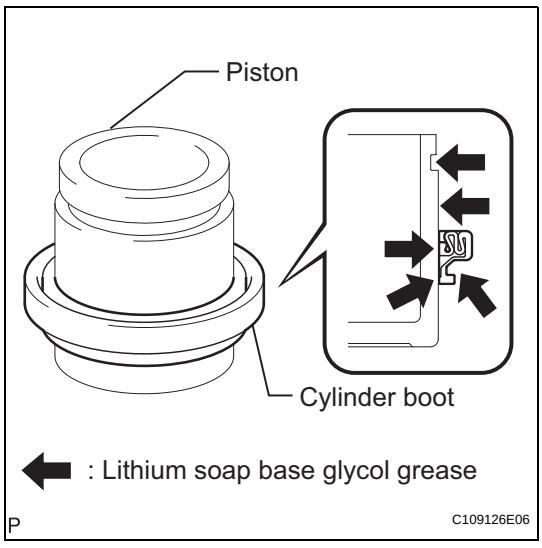
HINT:

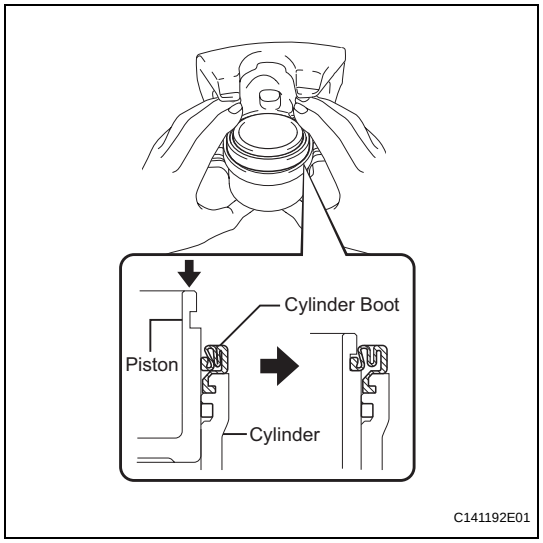
Tape the screwdriver tip before use.

7. INSTALL CYLINDER BOOT (for TMMK Made)

(a) Apply lithium soap base glycol grease to the piston and a new cylinder boot.

(b) Install the cylinder boot to the piston as shown in the illustration.

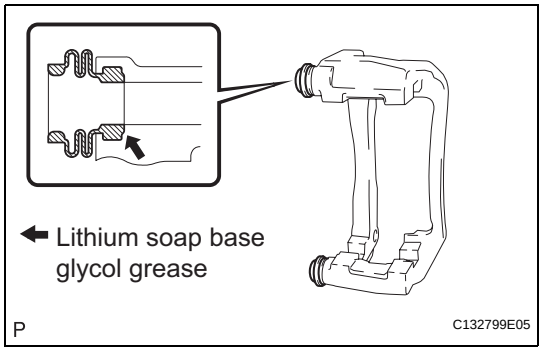




8. INSTALL FRONT DISC BRAKE PISTON (for TMMK Made)

(a) Install the cylinder boot to the cylinder assembly.
NOTICE:
Install the boot securely to the grooves of the cylinder.

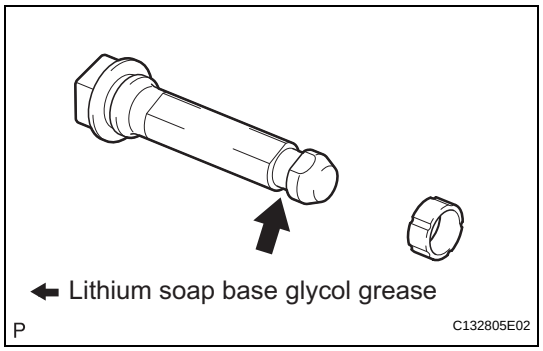
(b) Push in the piston by hand and install the boot seal onto the grooves of the piston.
NOTICE:
Install the boot securely to the grooves of the piston.



9. INSTALL FRONT DISC BRAKE BUSHING DUST BOOT

(a) Apply lithium soap base glycol grease to the seal surface of 2 new bushing dust boots.

(b) Install the 2 bushing dust boots to the front disc brake cylinder mounting.



10. INSTALL FRONT DISC BRAKE CYLINDER SLIDE BUSHING

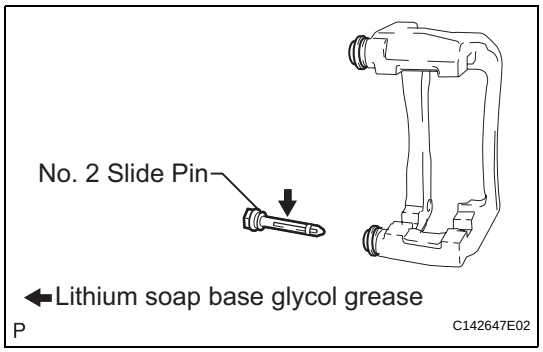
(a) Apply lithium soap base glycol grease to a new front disc brake cylinder slide bushing.

(b) Install the front disc brake cylinder slide bushing to the No. 2 front disc brake cylinder slide pin.

11. INSTALL NO. 2 FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the sliding part and the seal surface of the No. 2 front disc brake cylinder slide pin.

(b) Install the No. 2 front disc brake cylinder slide pin to the bottom side of the cylinder mounting.



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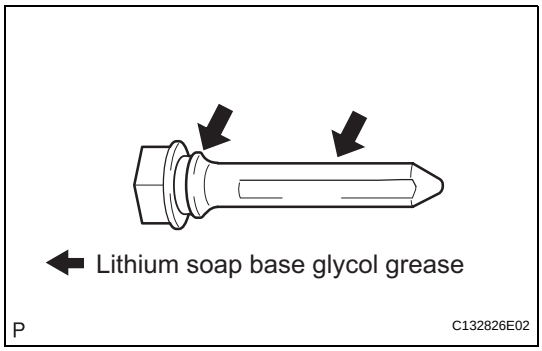
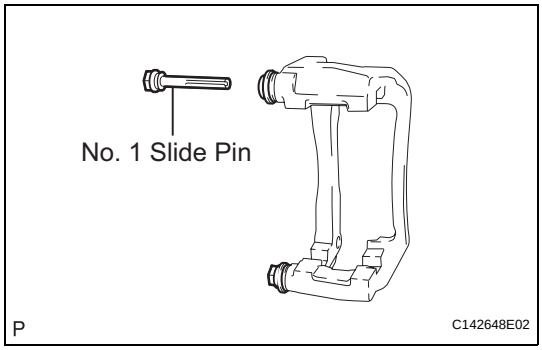
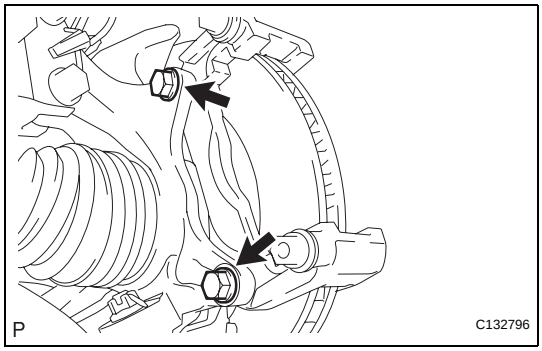


12. INSTALL NO. 1 FRONT DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the sliding part and the seal surface of the No. 1 front disc brake cylinder slide pin.



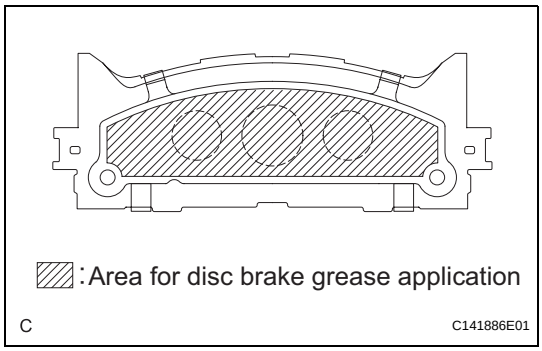
(b) Install the No. 1 front disc brake cylinder slide pin.



13. INSTALL FRONT DISC BRAKE CYLINDER MOUNTING

(a) Install the cylinder mounting with the 2 bolts.
Torque: 107 N*m (1,090 kgf*cm, 79 ft.*lbf)

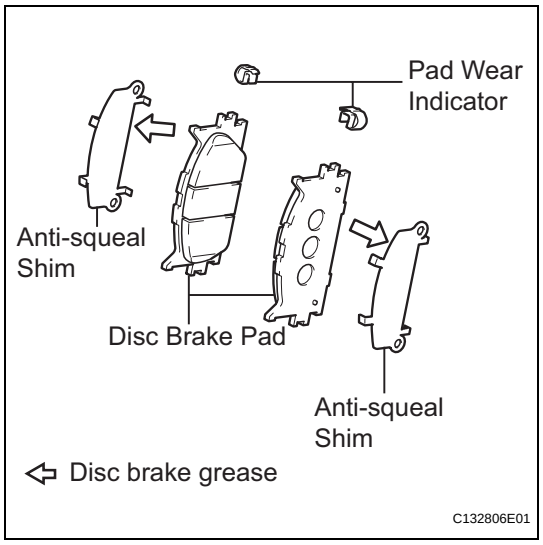
14. INSTALL FRONT DISC BRAKE PAD SUPPORT PLATE



15. INSTALL FRONT ANTI-SQUEAL SHIM

(a) Apply disc brake grease to the anti-squeal shims.
NOTICE:

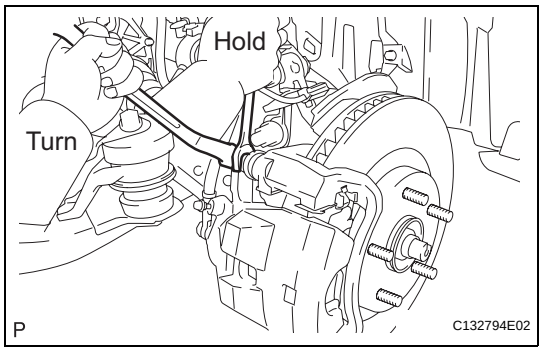
- **When replacing worn pads, the anti-squeal shims must be replaced together with the pads.**
- **Install the shims in the correct positions and directions.**
- **Apply disc brake grease to the area that contacts the anti-squeal shim.**
- **Disc brake grease can come out slightly from the area where the anti-squeal shim is installed.**
- **Make sure that disc brake grease is not applied onto the lining surface.**



(b) Install the 2 anti-squeal shims and the 2 pad wear indicators to each pad.
NOTICE:
Install the pad wear indicators in the correct positions and directions.

16. INSTALL FRONT BRAKE PAD

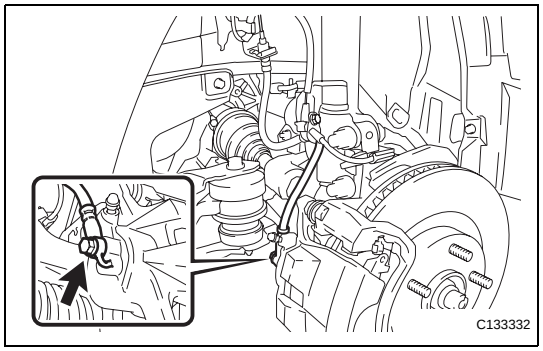
(a) Install the 2 brake pads with anti-squeal shims to the disc brake cylinder mounting.



INSTALLATION

1. INSTALL DISC BRAKE CYLINDER ASSEMBLY

(a) Install the disc brake cylinder assembly with the 2 bolts.
Torque: 34 N*m (350 kgf*cm, 25 ft.*lbf)



(b) Connect the flexible hose with the union bolt and the new gasket.
NOTICE:
Install the flexible hose lock securely in the lock hole in the disc brake cylinder.
Torque: 29 N*m (300 kgf*cm, 21 ft.*lbf)

2. FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)

3. BLEED MASTER CYLINDER (See page BR-6)

4. BLEED BRAKE LINE (See page BR-7)

5. BLEED BRAKE ACTUATOR ASSEMBLY (w/ VSC) (See page BR-8)

6. INSPECT BRAKE FLUID LEVEL IN RESERVOIR (See page BR-10)

7. INSPECT FOR BRAKE FLUID LEAKAGE

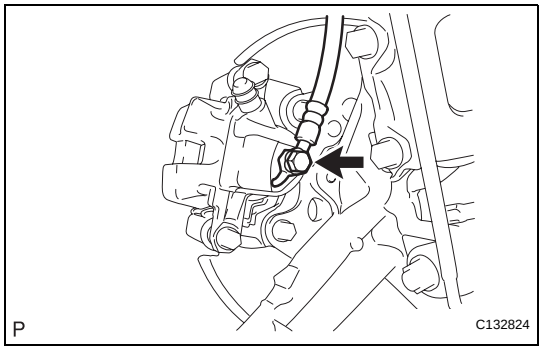
8. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REMOVAL

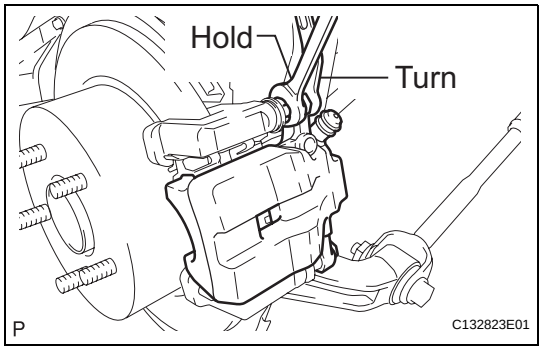
1. **REMOVE REAR WHEEL**

2. **DRAIN BRAKE FLUID**
   NOTICE:
   If brake fluid leaks onto any painted surface, wash or remove it completely.

3. **DISCONNECT REAR BRAKE FLEXIBLE HOSE**
   (a) Remove the union bolt and the gasket from the rear disc brake cylinder assembly, then disconnect the flexible hose.



4. **REMOVE REAR DISC BRAKE CYLINDER ASSEMBLY**
   (a) Hold the 2 front disc brake cylinder slide pins and remove the 2 bolts and rear disc brake cylinder assembly.



BR

DISASSEMBLY

1. REMOVE REAR DISC BRAKE PAD KIT (PAD ONLY)

(a) Remove the 2 brake pads with the anti-squeal shims.

2. REMOVE REAR ANTI-SQUEAL SHIM KIT

(a) Remove the 2 anti-squeal shims and the 2 pad wear indicator plates from each pad.

3. REMOVE NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

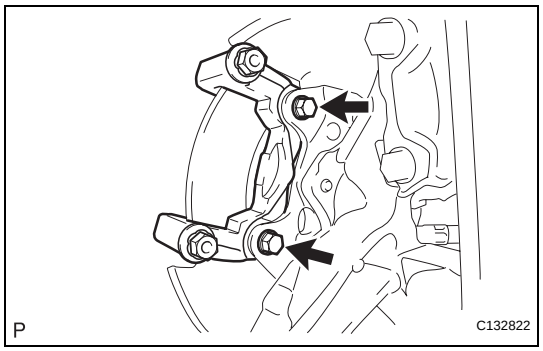
(a) Remove the No. 1 rear disc brake pad support plate from the rear disc brake cylinder mounting.

4. REMOVE NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

(a) Remove the No. 2 rear disc brake pad support plate from the rear disc brake cylinder mounting.

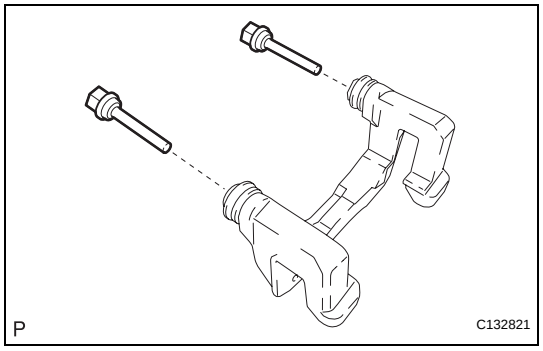
5. REMOVE REAR DISC BRAKE CYLINDER MOUNTING

(a) Remove the 2 bolts and the rear disc brake cylinder mounting.



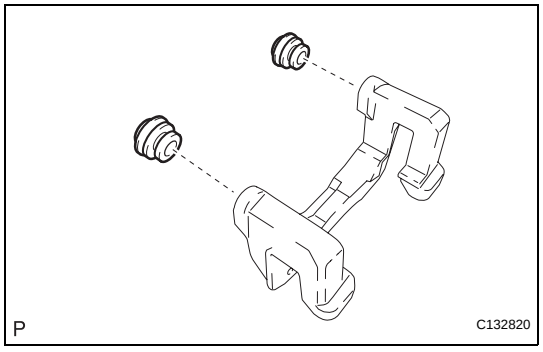
6. REMOVE REAR DISC BRAKE CYLINDER SLIDE PIN

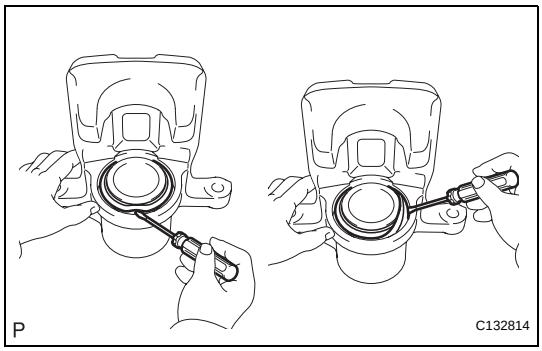
(a) Remove the 2 pins (upper and lower) from the rear brake cylinder mounting.



7. REMOVE REAR DISC BRAKE BUSHING DUST BOOT

(a) Remove the 2 rear disc brake bushing dust boots from the rear disc brake cylinder mounting.





8. REMOVE CYLINDER BOOT

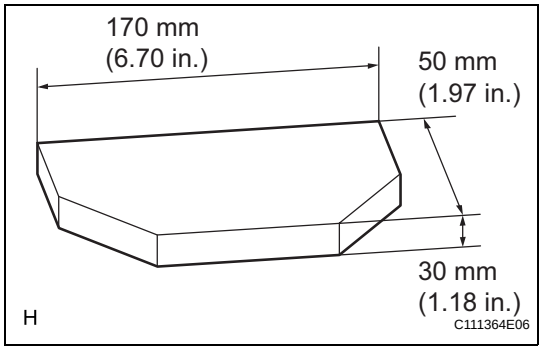
(a) Using a screwdriver, pry out the set ring and cylinder boot.

NOTICE:

Be careful not to damage the brake piston and cylinder.

HINT:

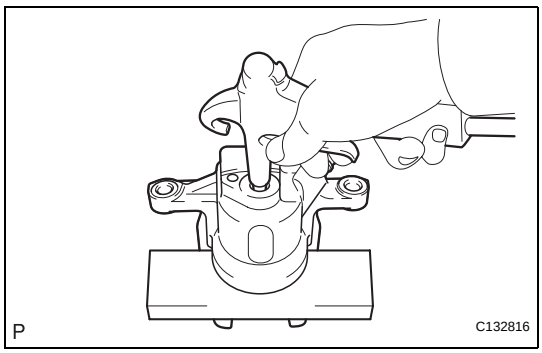
Tape the screwdriver tip before use.



9. REMOVE REAR DISC BRAKE PISTON

(a) Prepare a wooden plate to hold the brake pistons.

(b) Place the wooden plate between the brake piston and the rear disc brake cylinder sub-assembly.



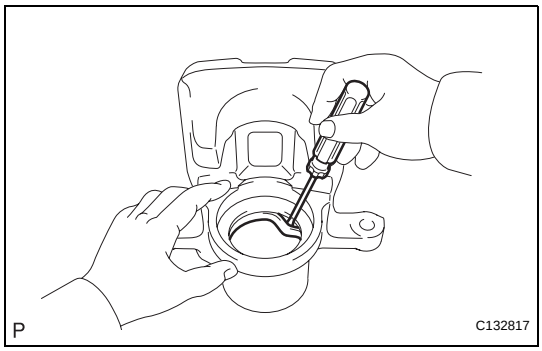
(c) Use compressed air to remove the piston from the disc brake cylinder assembly.

CAUTION:

Do not place your fingers in front of the brake piston when using compressed air.

NOTICE:

Be careful not to spatter the brake fluid.



10. REMOVE PISTON SEAL

(a) Using a screwdriver, remove the piston seal from the rear disc brake cylinder sub-assembly.

NOTICE:

Be careful not to damage the inner cylinder and cylinder groove.

HINT:

Tape the screwdriver tip before use.

11. REMOVE REAR DISC BRAKE BLEEDER PLUG CAP

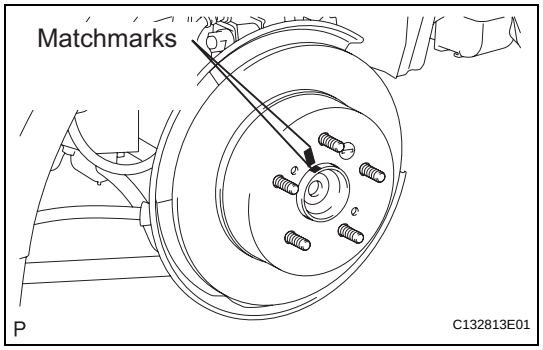
(a) Remove the bleeder plug cap from the rear disc brake bleeder plug.

12. REMOVE REAR DISC BRAKE BLEEDER PLUG

(a) Remove the rear disc brake bleeder plug from the rear disc brake cylinder sub-assembly.

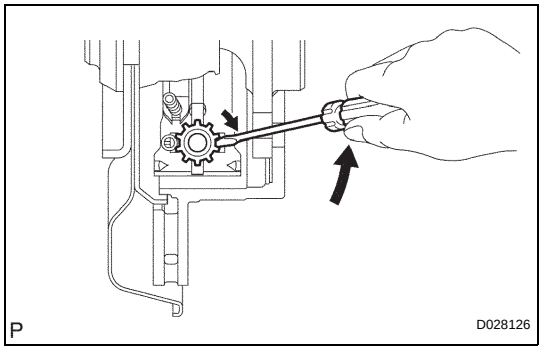
13. REMOVE PARKING BRAKE SHOE ADJUSTING HOLE PLUG

(a) Remove the parking brake shoe adjusting hole plug.



14. REMOVE REAR DISC

(a) Put matchmarks on the rear disc and the axle hub.

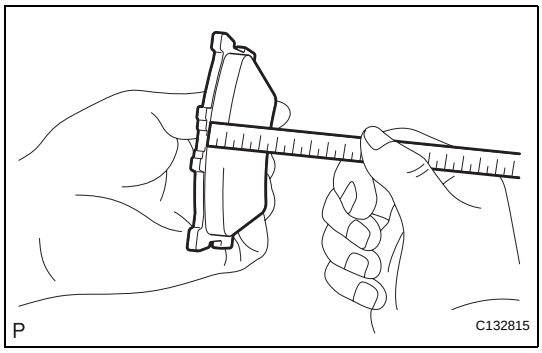


(b) Release the parking brake and remove the rear disc.
HINT:
If the disc cannot be removed easily, turn and press firmly the shoe adjuster until the wheel comes free.

INSPECTION

1. INSPECT BRAKE CYLINDER AND PISTON

(a) Inspect the cylinder bore and the piston for rust or scoring. If necessary, replace the rear disc brake cylinder assembly and piston.



2. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.

Standard thickness:
11.0 mm (0.433 in.)
Minimum thickness:
1.0 mm (0.039 in.)

If the pad lining thickness is less than the minimum, replace the brake pads.

HINT:

Be sure to check wear of the front disc after replacing the brake pad with a new one.

3. INSPECT NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

(a) Inspect the No. 1 rear disc brake pad support plate.

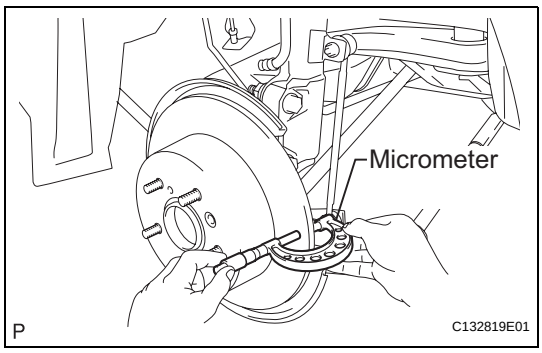
HINT:

Make sure that they have sufficient rebound, and have no deformation, cracks or wear, and all rust and dirt are cleaned off.

4. INSPECT NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

HINT:

Inspect the No. 2 rear disc brake pad support plate using the same procedure with the No. 1 rear disc brake pad support plate.



5. INSPECT DISC THICKNESS

(a) Using a micrometer, measure the disc thickness.

Standard thickness:
10.0 mm (0.390 in.)
Minimum thickness:
8.5 mm (0.334 in.)

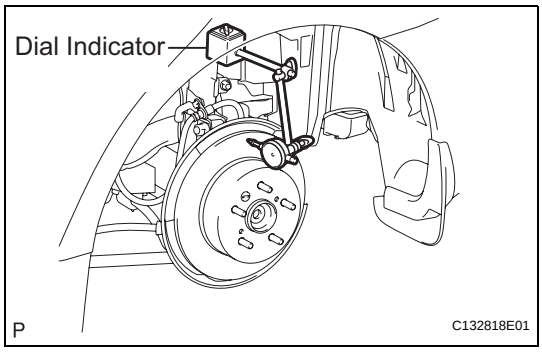
If the disc thickness is less than the minimum, replace the rear disc.

6. INSPECT DISC RUNOUT

(a) Install the rear disc.

(b) Temporarily fasten the rear disc with the 3 hub nuts.

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

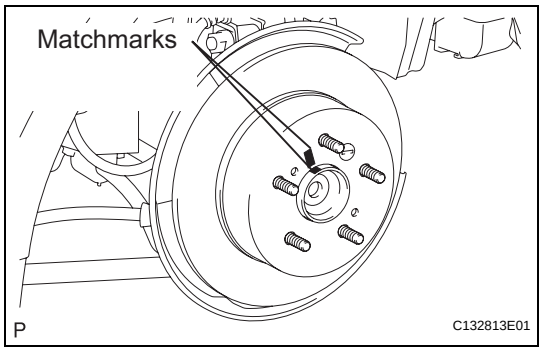


(c) Using a dial indicator, measure the disc runout 10 mm (0.39 in.) away from the outer edge of the rear disc.

Maximum disc runout:
0.15 mm (0.0059 in.)

BR

(d) If the runout exceeds the maximum value, change the installation positions of the disc and axle so that the runout will become minimal. If the runout exceeds the maximum even after the installation positions are changed, check the bearing play in the axial direction and the axle hub runout (See page AH-16). If the bearing play and the axle hub runout are normal and if the disc thickness is not within the specified range, grind the disc. If the disc thickness is less than the minimum, replace the disc.
(e) Remove the 3 hub nuts.
(f) Remove the rear disc.



REASSEMBLY

1. INSTALL REAR DISC

(a) Aligning the matchmarks, install the rear disc.
HINT:
When replacing the rear disc with a new one, select the installation position where the rear disc has the minimum runout.

2. ADJUST PARKING BRAKE SHOE CLEARANCE

(See page PB-63)
HINT:
Hold the rear disc with hub nuts by applying parking brake before adjusting the parking brake shoe clearance.

3. INSTALL PARKING BRAKE SHOE ADJUSTING HOLE PLUG

(a) Install the parking brake shoe adjusting hole plug.

4. TEMPORARILY TIGHTEN REAR DISC BRAKE BLEEDER PLUG

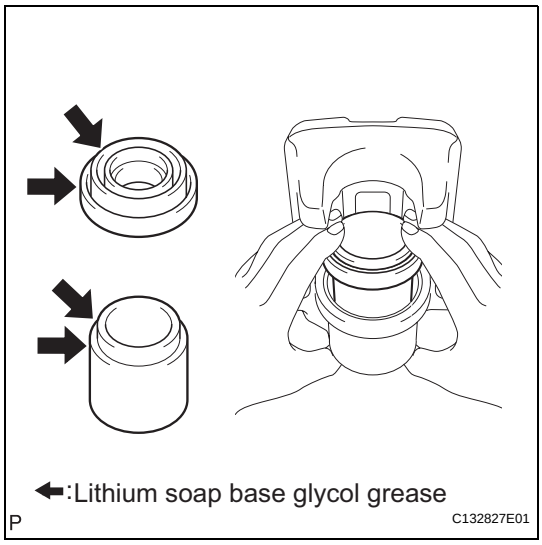
(a) Temporarily install the rear disc brake bleeder plug to the rear disc brake cylinder sub-assembly.

5. INSTALL REAR DISC BRAKE BLEEDER PLUG CAP

(a) Install the rear disc brake bleeder plug cap to the rear disc brake bleeder plug.

6. INSTALL PISTON SEAL

(a) Apply lithium soap base glycol grease to a new piston seal.
(b) Install the piston seal to the rear disc brake cylinder sub-assembly.



7. INSTALL REAR DISC BRAKE PISTON

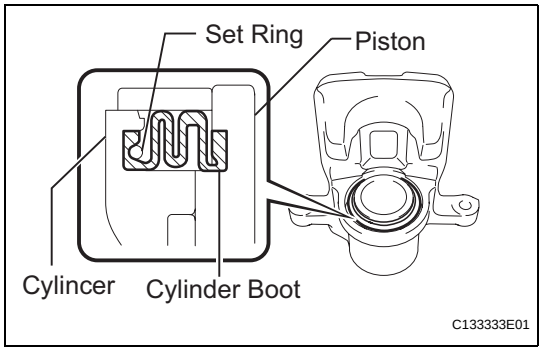
(a) Apply lithium soap base glycol grease to the rear disc brake piston and a new cylinder boot.

(b) Install the cylinder boot to the rear disc brake piston.

(c) Install the piston to the rear disc brake cylinder sub-assembly.

NOTICE:

Do not install the piston forcibly in the disc brake cylinder.



8. INSTALL CYLINDER BOOT

(a) Install the cylinder boot to the rear disc brake cylinder sub-assembly.

NOTICE:

- **Install the boot securely onto the grooves of the cylinder and the piston.**
- **Do not damage the cylinder boot.**

(b) Using a screwdriver, install the set ring.

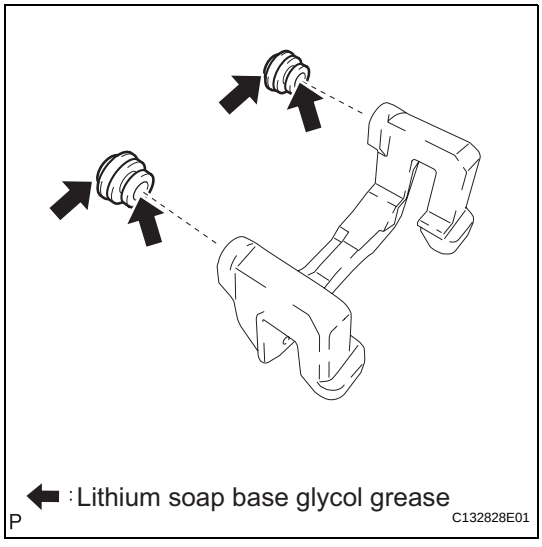
CAUTION:

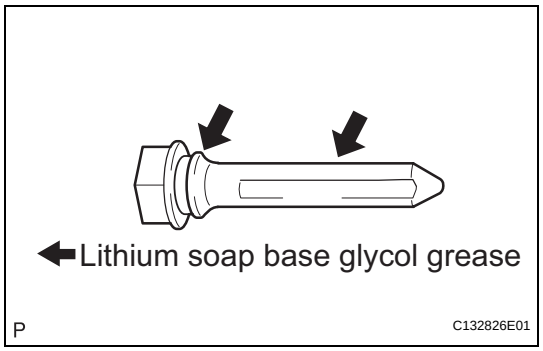
Be careful not to damage the boot.

9. INSTALL REAR DISC BRAKE BUSHING DUST BOOT

(a) Apply lithium soap base glycol grease to the seal surface of 2 new rear disc brake bushing dust boots.

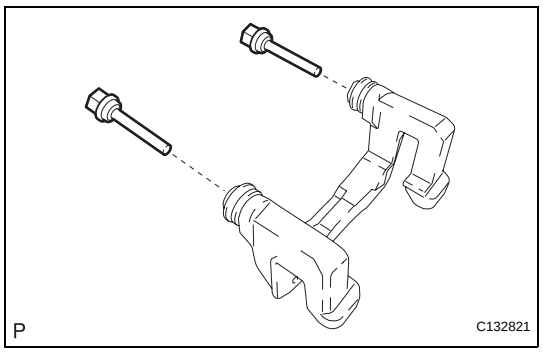
(b) Install the 2 rear disc brake bushing dust boots to the rear disc brake cylinder mounting.



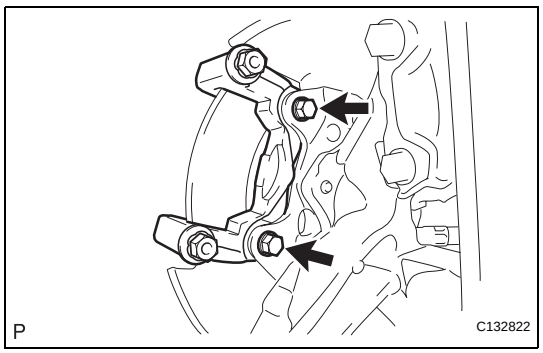


10. INSTALL REAR DISC BRAKE CYLINDER SLIDE PIN

(a) Apply lithium soap base glycol grease to the pins.



(b) Install the 2 pins (upper and lower) to the rear brake cylinder mounting.



11. INSTALL REAR DISC BRAKE CYLINDER MOUNTING

(a) Install the rear disc brake cylinder mounting with the 2 bolts.

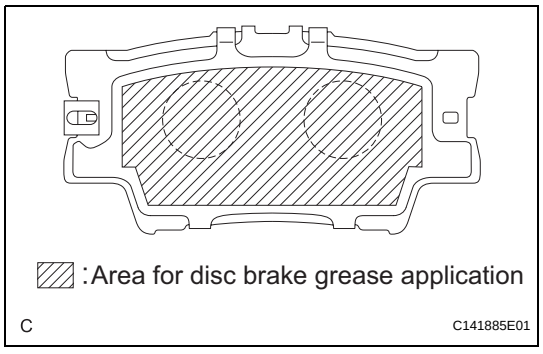
Torque: 62 N*m (632 kgf*cm, 46 ft.*lbf)

12. INSTALL NO. 1 REAR DISC BRAKE PAD SUPPORT PLATE

(a) Install the No. 1 rear disc brake pad support plate to the rear disc brake cylinder mounting.

13. INSTALL NO. 2 REAR DISC BRAKE PAD SUPPORT PLATE

(a) Install the No. 2 rear disc brake pad support plate to the rear disc brake cylinder mounting.

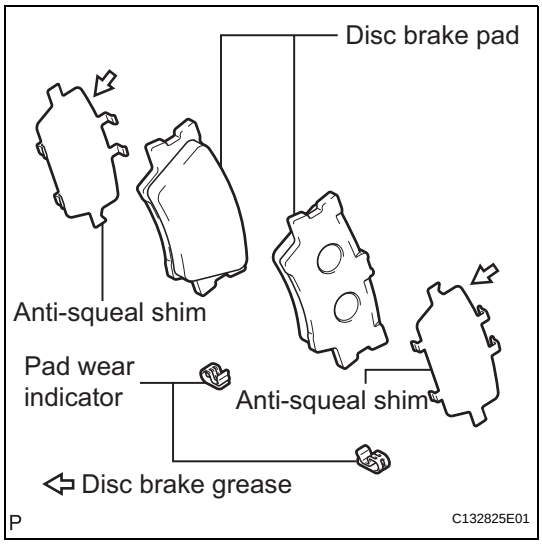


14. INSTALL REAR ANTI-SQUEAL SHIM KIT

(a) Apply disc brake grease to the inside of the anti-squeal shims.

NOTICE:

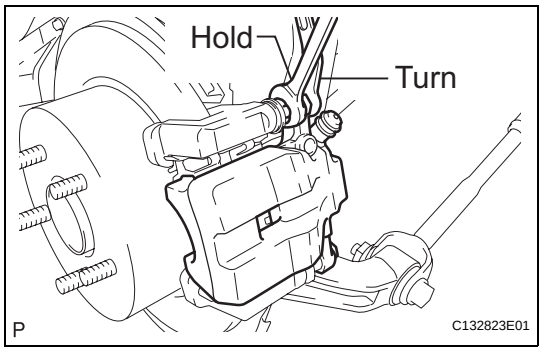
- **When replacing worn pads, the anti-squeal shims must be replaced together with the pads.**
- **Apply disc brake grease to the area that contacts the anti-squeal shim.**
- **Disc brake grease can come out slightly from the area where the anti-squeal shim is installed.**
- **Make sure that disc brake grease is not applied onto the lining surface.**

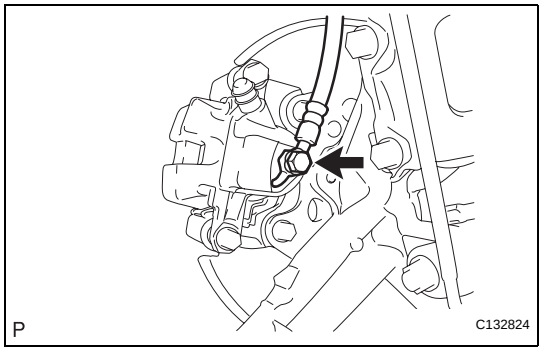


(b) Install the 2 anti-squeal shims and the pad wear indicators to each of the 2 brake pads.
NOTICE:
Install the pad wear indicator and anti-squeal shims in the correct positions and directions.

15. INSTALL REAR DISC BRAKE PAD KIT (PAD ONLY)

(a) Install the 2 brake pads with anti-squeal shims to the rear disc brake cylinder mounting.





INSTALLATION

1. INSTALL REAR DISC BRAKE CYLINDER ASSEMBLY

(a) Install the disc brake cylinder assembly with the 2 bolts.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)
NOTICE:
Install the rear disc brake bushing dust boot onto the groove of the rear disc brake cylinder.

2. CONNECT REAR BRAKE FLEXIBLE HOSE

(a) Connect the flexible hose with the union bolt and a new gasket.
Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)

3. FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)

4. BLEED MASTER CYLINDER (See page BR-6)

5. BLEED BRAKE LINE (See page BR-7)

6. BLEED BRAKE ACTUATOR ASSEMBLY (w/ VSC) (See page BR-8)

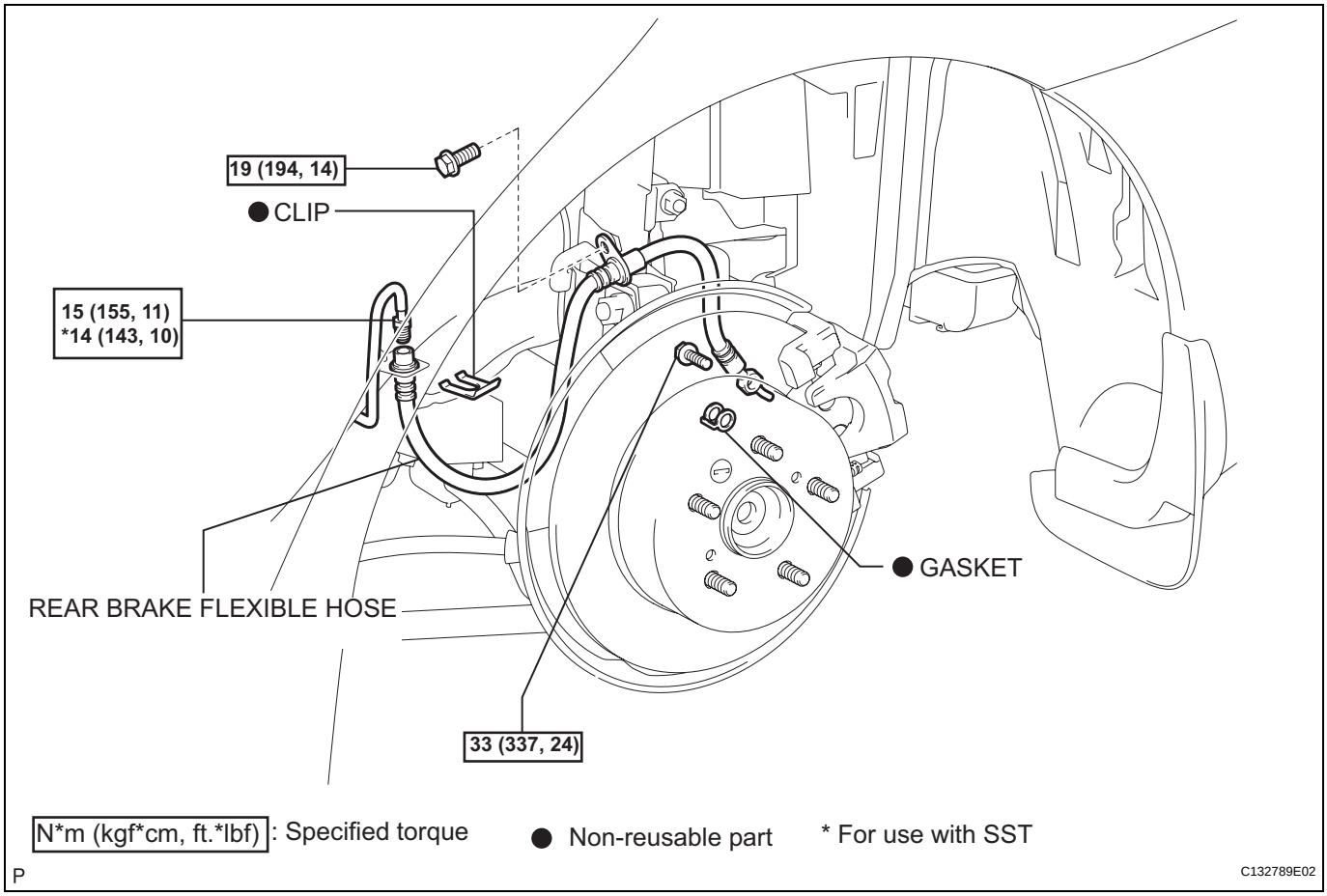
7. INSPECT FLUID LEVEL IN RESERVOIR (See page BR-10)

8. CHECK FOR BRAKE FLUID LEAKAGE

9. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REAR BRAKE FLEXIBLE HOSE

COMPONENTS



BR

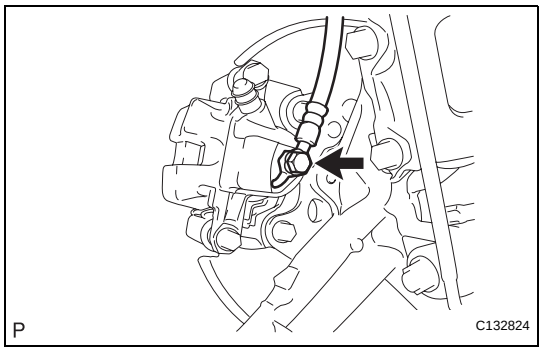
REMOVAL

1. DRAIN BRAKE FLUID

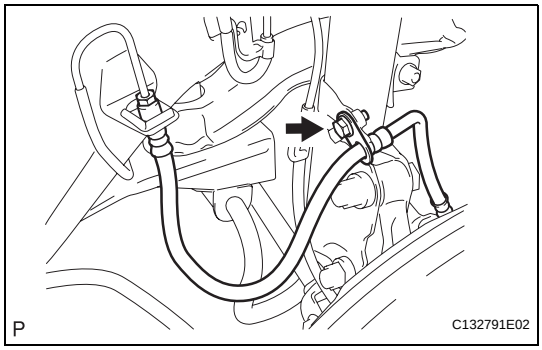
2. REMOVE REAR WHEEL

3. REMOVE REAR BRAKE FLEXIBLE HOSE

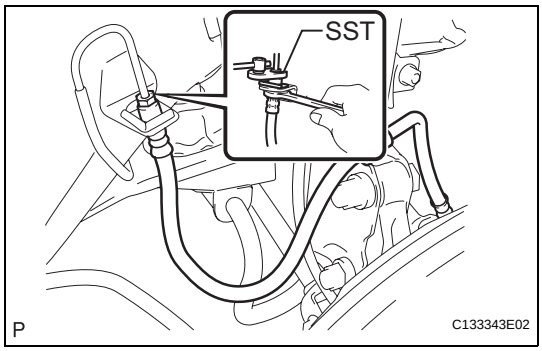
(a) Remove the union bolt, the rear brake flexible hose and gasket.



(b) Remove the bolt and separate the rear brake flexible hose.



(c) Using SST, remove the brake line while holding the rear brake flexible hose with a wrench.
SST 09023-00101
NOTICE:
- **Do not bend or damage the brake line.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake tube from the connecting points.**



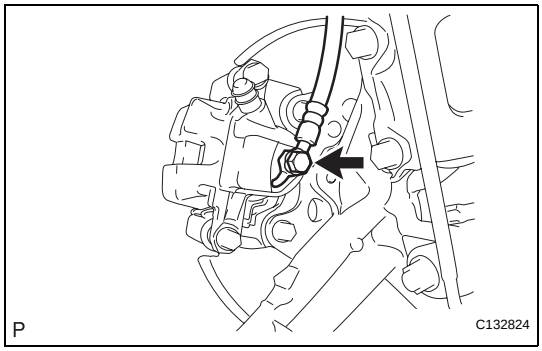
(d) Remove the clip.

INSTALLATION

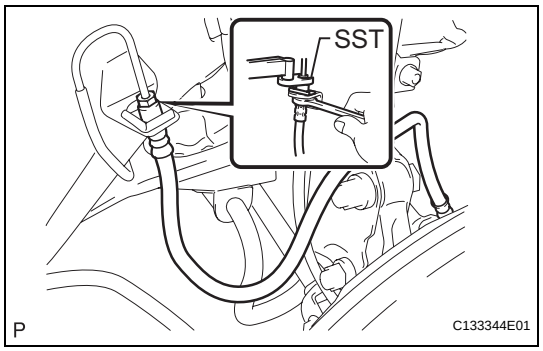
1. INSTALL REAR BRAKE FLEXIBLE HOSE

(a) Connect the rear brake flexible hose with the union bolt and a new gasket.
Torque: 33 N*m (337 kgf*cm, 24 ft.*lbf)

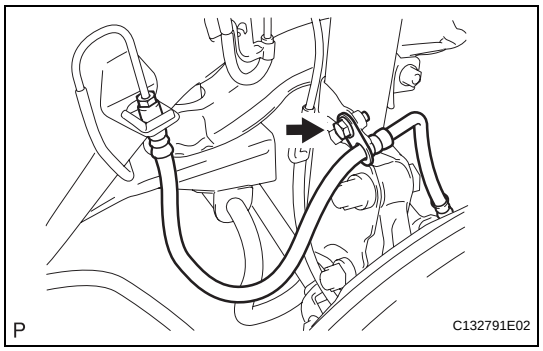
(b) Install the rear brake flexible hose with a new clip.
NOTICE:
- **When installing the rear brake flexible hose, face the identification mark toward the exterior of the vehicle and minimize twisting of the hose.**
- **Install the clip as far as it will go.**



BR



(c) Using SST, connect the brake line to the rear brake flexible hose while holding the flexible hose with a wrench.
SST 09023-00101
Torque: Without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
With SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Do not bend or damage the brake tube.**
- **Do not allow any foreign matter such as dirt and dust to enter the brake tube from the connecting points.**
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**

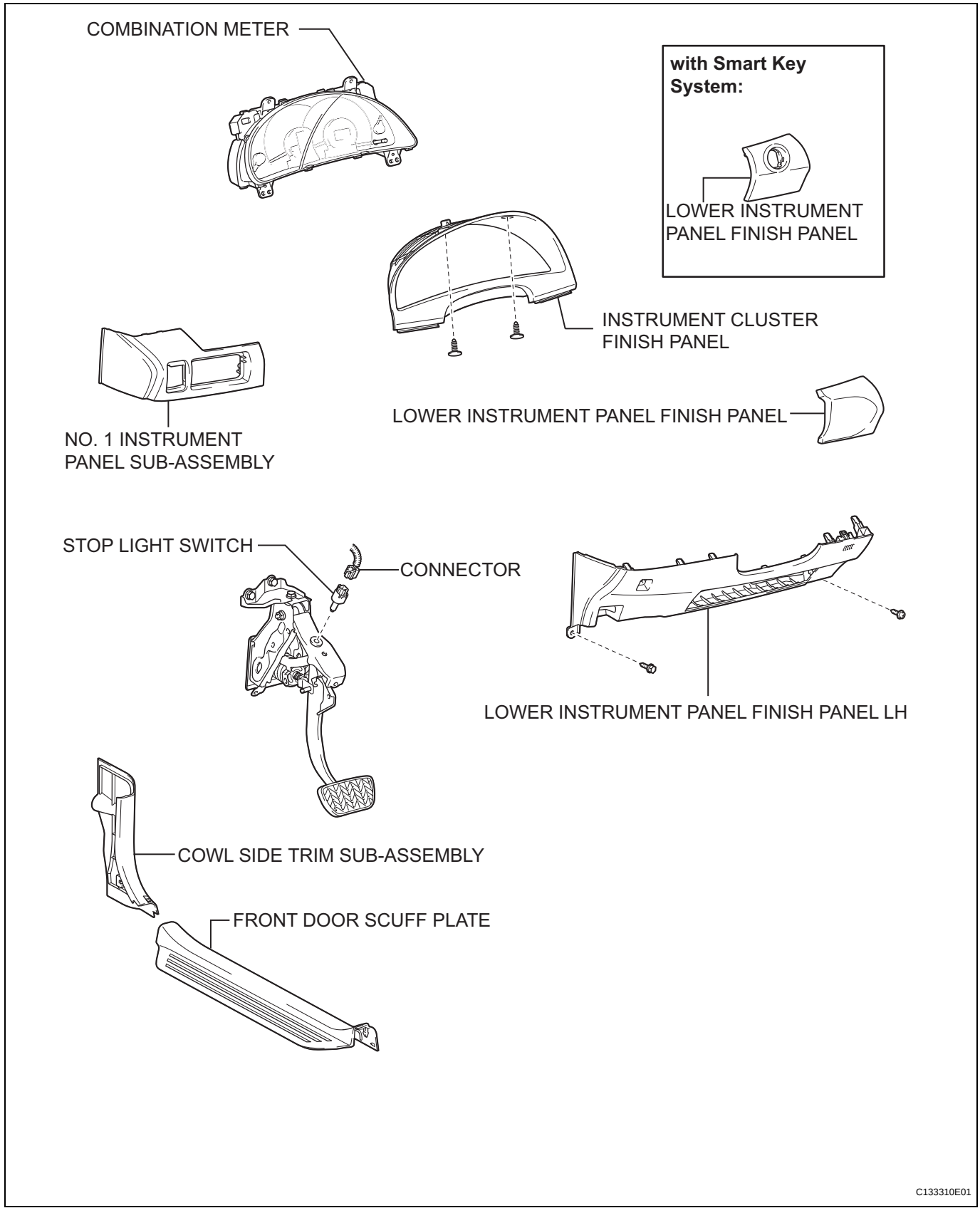


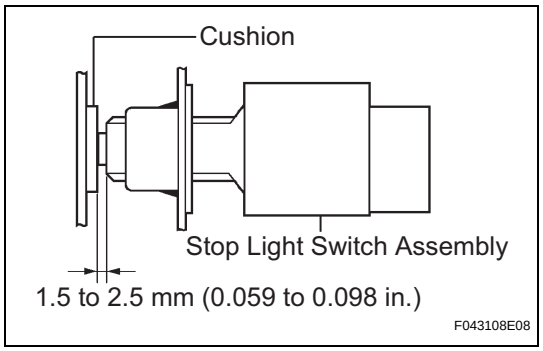
(d) Connect the rear flexible hose and the speed sensor to the shock absorber with the bolt.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
NOTICE:
When installing the rear flexible hose and the speed sensor, the bracket must face toward the exterior of the vehicle.

2. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)**
3. **BLEED BRAKE LINE (See page BR-7)**
4. **BRAKE ACTUATOR ASSEMBLY (w/ VSC) (See page BR-8)**
5. **INSPECT BRAKE FLUID LEVEL IN RESERVOIR (See page BR-10)**
6. **CHECK FOR BRAKE FLUID LEAKAGE**
7. **INSTALL REAR WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

STOP LIGHT SWITCH

COMPONENTS





ON-VEHICLE INSPECTION

1. INSPECT STOP LIGHT SWITCH

(a) Check the protrusion of the rod.

Protrusion of the rod:

1.5 to 2.5 mm (0.059 to 0.098 in.)

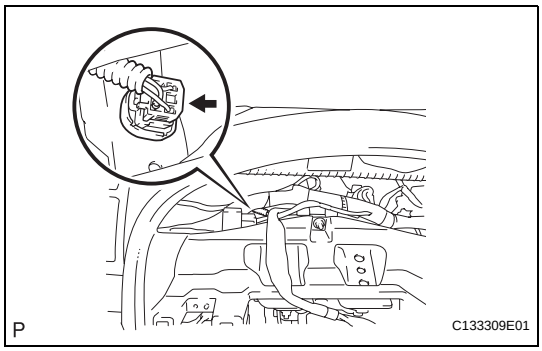
If the protrusion is not within the specified range, adjust it.

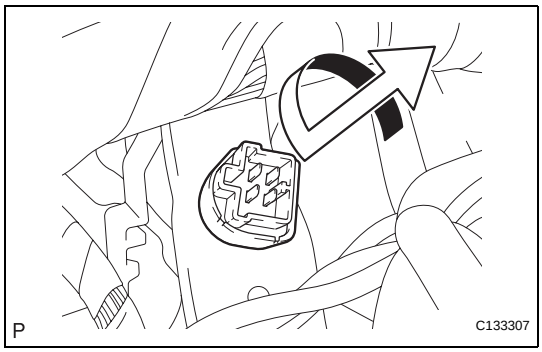
CAUTION:

Do not depress the brake pedal.

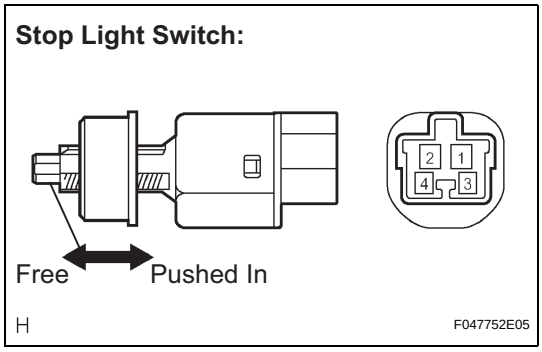
REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE (See page IR-24)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY (See page IR-25)**
3. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-20)**
4. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
7. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)**
8. **REMOVE COMBINATION METER (See page IP-32)**
9. **REMOVE STOP LIGHT SWITCH**
   (a) Disconnect the stop light switch assembly connector from the stop light switch assembly.





   (b) Turn the stop light switch assembly counterclockwise and remove the stop light switch assembly.

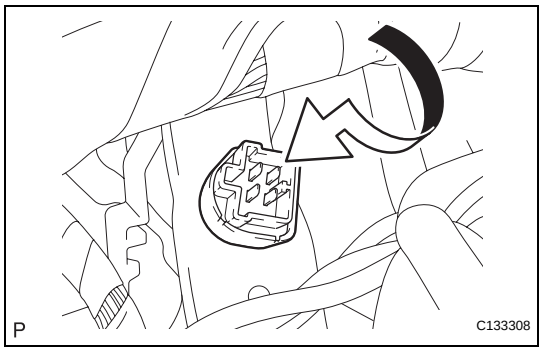


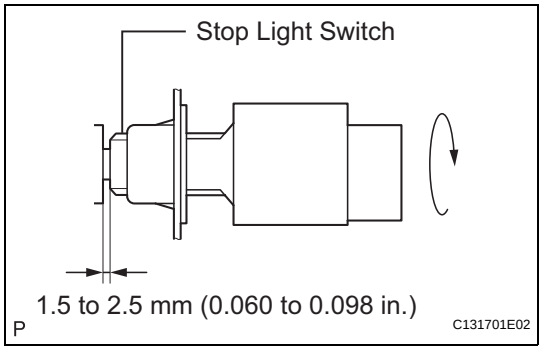
INSPECTION

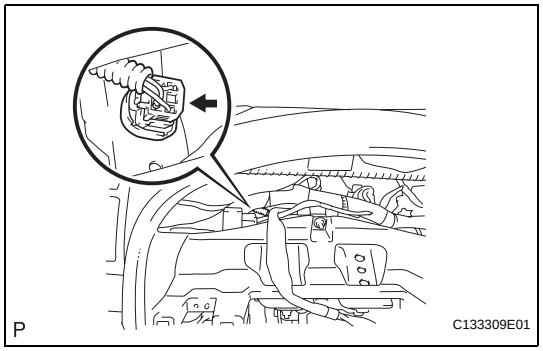
1. **INSPECT STOP LIGHT SWITCH**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	10 kΩ or higher

   If the measurement result is not normal, replace the stop light switch assembly.







INSTALLATION

1. **INSTALL STOP LIGHT SWITCH**
   (a) Insert the stop light switch assembly until the body hits the cushion.
   NOTICE:
   When inserting the stop light switch assembly, support the pedal from behind so that the pedal is not pushed in.

   (b) Make a quarter turn clockwise to install the stop light switch assembly.
   Torque: 1.5 N*m (15 kgf*cm, 13 in.*lbf) or less
   NOTICE:
   When inserting the stop light switch assembly, support the pedal from behind so that the pedal is not pushed in.

   (c) Connect the stop light switch connector to the stop light switch assembly.
   (d) Check the protrusion of the rod (See page BR-71).
2. **INSTALL COMBINATION METER (See page IP-56)**
3. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)**
4. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
5. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
6. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
7. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-58)**
8. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY (See page IR-54)**
9. **INSTALL FRONT DOOR SCUFF PLATE (See page IR-54)**

PARKING BRAKE SYSTEM

PROBLEM SYMPTOMS TABLE

Use the table below to help determine the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

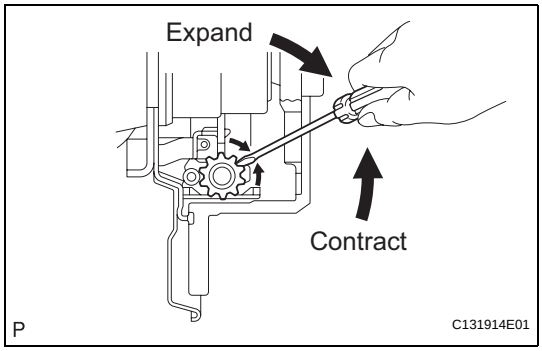
Symptom	Suspected area	See page
Brake drag	1. Parking brake lever travel (Out of adjustment)	PB-1
	2. Parking brake pedal travel (Out of adjustment)	PB-1
	3. Parking brake wire (Sticking) [No. 1 cable]	PB-48
	4. Parking brake wire (Sticking) [No. 2/No. 3 cable]	PB-48
	5. Parking brake shoe clearance (Out of adjustment)	PB-1
	6. Parking brake shoe lining (Cracked or distorted)	PB-60
	7. Tension or return spring (Damaged)	PB-58

ADJUSTMENT

1. REMOVE REAR WHEEL

2. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Temporarily install the hub nuts.
(b) Remove the shoe adjusting hole plug.

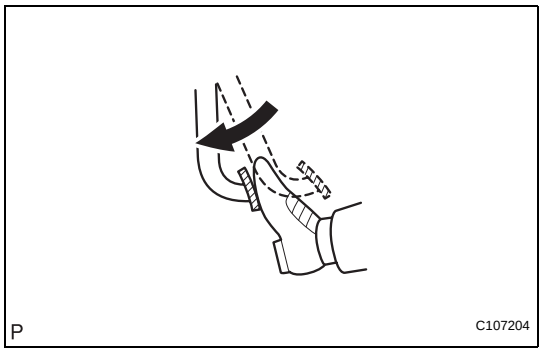


(c) Turn the shoe adjuster and expand the shoe until the disc locks.
(d) Turn and contract the shoe adjuster until the disc can rotate smoothly.
Standard:
Return 8 notches
(e) Check that there is no brake drag against the shoe.
(f) Install the shoe adjusting hole plug.
(g) Remove the hub nuts.

3. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

4. INSPECT PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle)

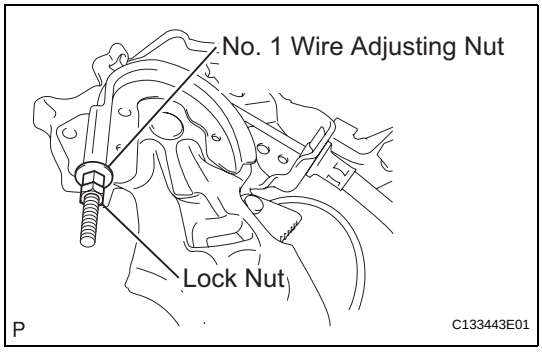
(a) Fully depress the parking brake pedal and release it to engage the parking brake.
(b) Depress the pedal to the floor again, and release it to disengage the parking brake.



(c) Slowly depress the parking brake pedal to the floor, and count the number of clicks.
Parking brake pedal travel:
7 to 10 notches at 300 N (31 kgf, 67 lbf)

5. ADJUST PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle)

(a) Depress the parking brake pedal. Hold the No. 1 wire adjusting nut using a wrench and loosen the lock nut.
(b) Release the parking brake pedal.

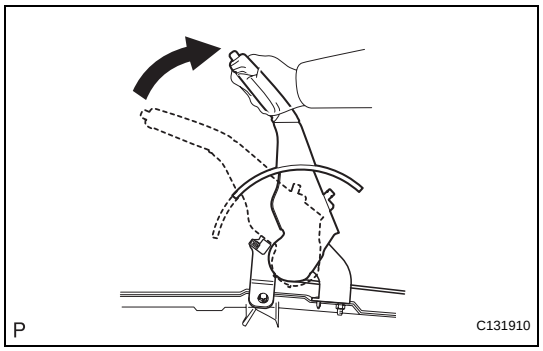


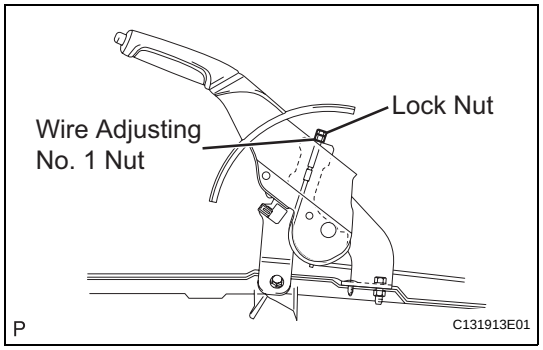
(c) Turn the No. 1 wire adjusting nut until the parking brake pedal travel meets the above specification.
(d) Hold the No. 1 wire adjusting nut using a wrench or an equivalent tool and tighten the lock nut.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
(e) Count the number of clicks after depressing and releasing the parking brake pedal 3 or 4 times.
(f) Check whether the parking brake drags.
(g) When operating the parking brake pedal, check that the parking brake indicator light comes on.

6. INSPECT PARKING BRAKE LEVER TRAVEL (for Manual Transaxle)

(a) Pull the parking brake lever firmly.
(b) Release the parking brake lock, and return the parking brake lever to its off position.

PB





(c) Slowly pull the parking brake lever all the way up, and count the number of clicks.
Parking brake lever travel:
7 to 9 notches at 200 N (20 kgf, 45 lbf)

7. ADJUST PARKING BRAKE LEVER TRAVEL (for Manual Transaxle)

(a) Pull up the parking brake lever. Hold the No. 1 wire adjusting nut using a wrench and loosen the lock nut.

(b) Release the parking brake lever.

(c) Turn the No. 1 wire adjusting nut until the parking brake lever travel meets the above specification.

(d) Hold the No. 1 wire adjusting nut using a wrench or an equivalent tool and tighten the lock nut.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

(e) Count the number of clicks after depressing and releasing the parking brake lever 3 or 4 times.

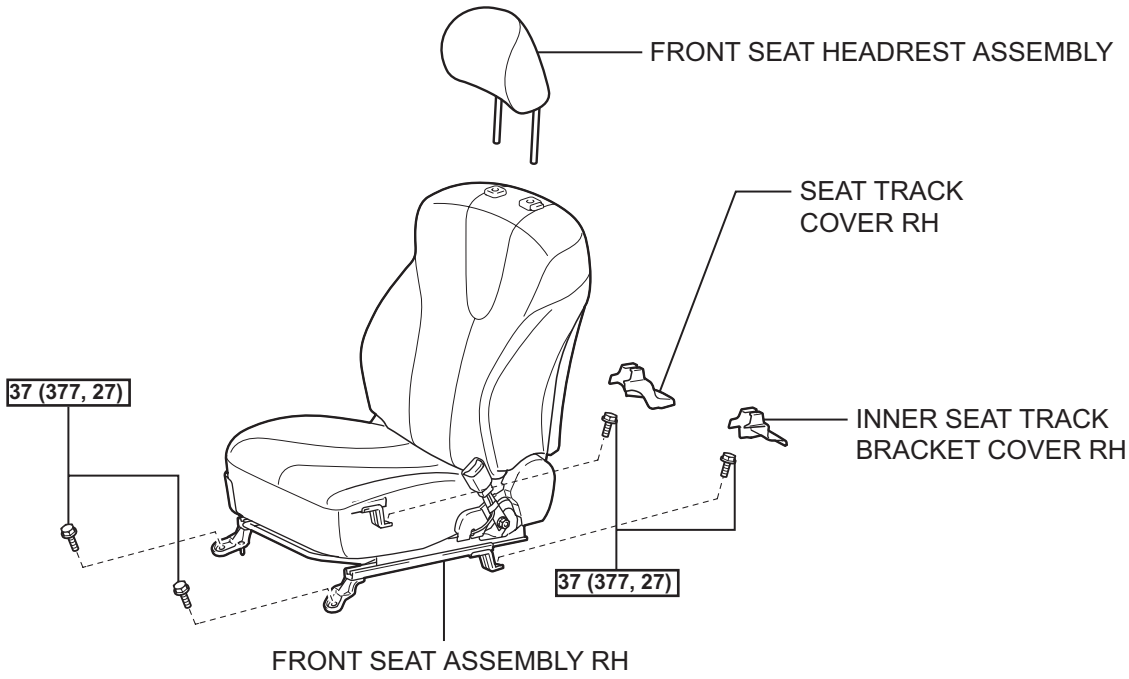
(f) Check whether the parking brake drags.

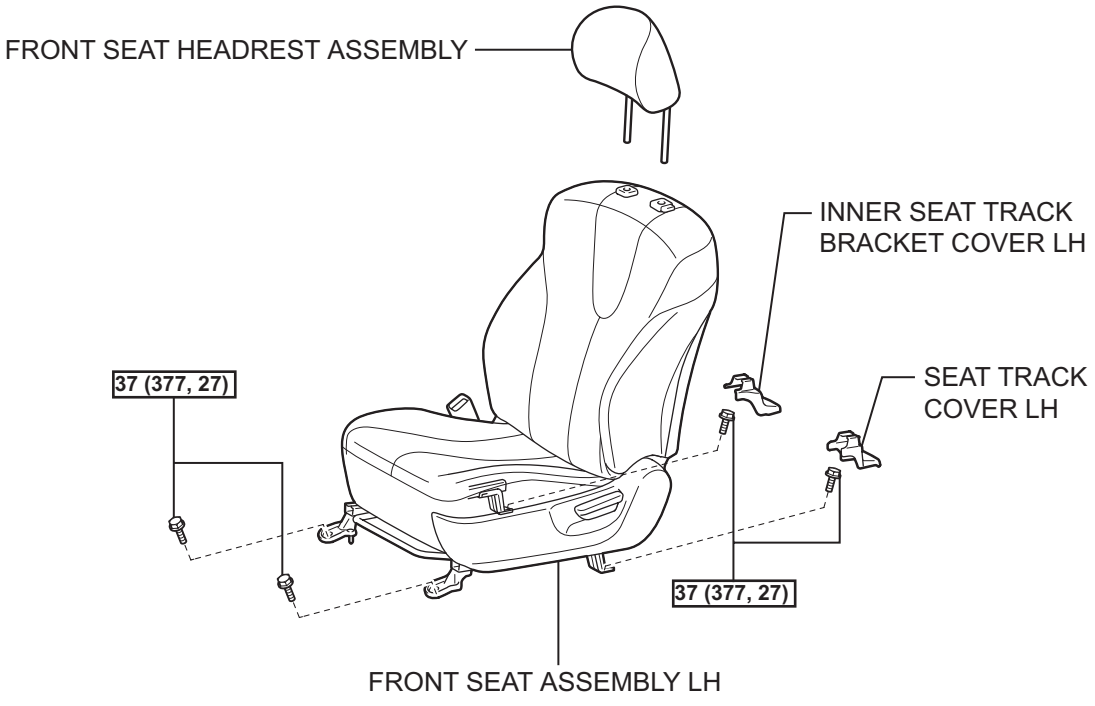
(g) When operating the parking brake lever, check that the parking brake indicator light comes on.

PARKING BRAKE LEVER

COMPONENTS

for Manual Seat:





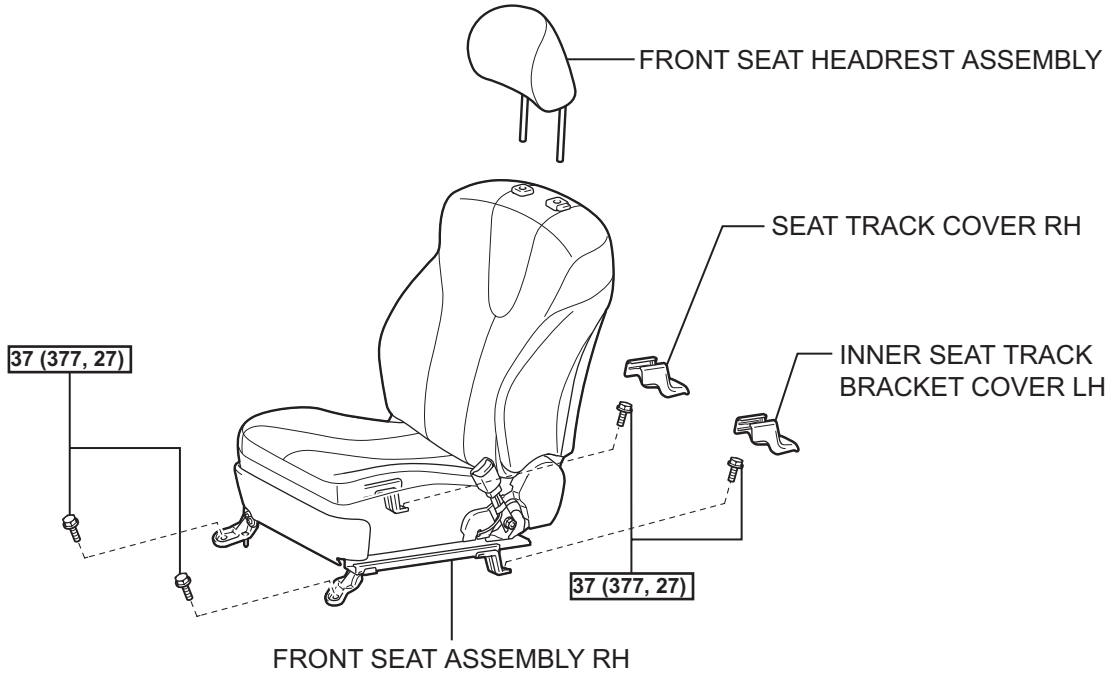
N*m (kgf*cm, ft.*lbf) : Specified torque

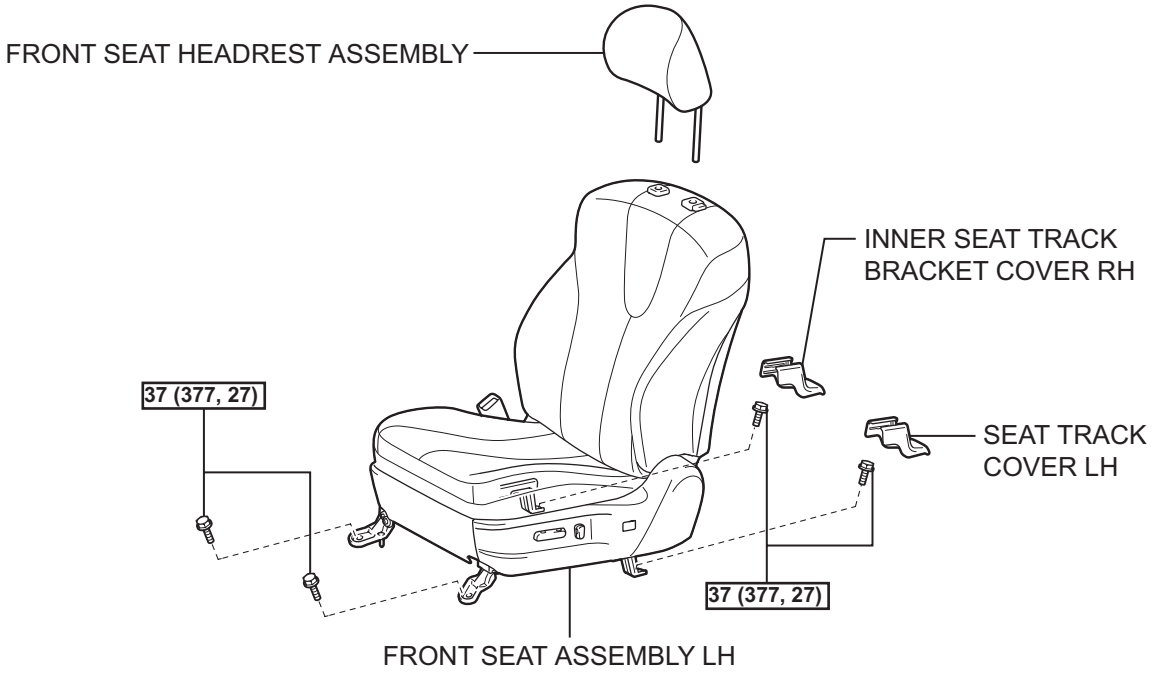
P

B132048E01

PB

for Power Seat:



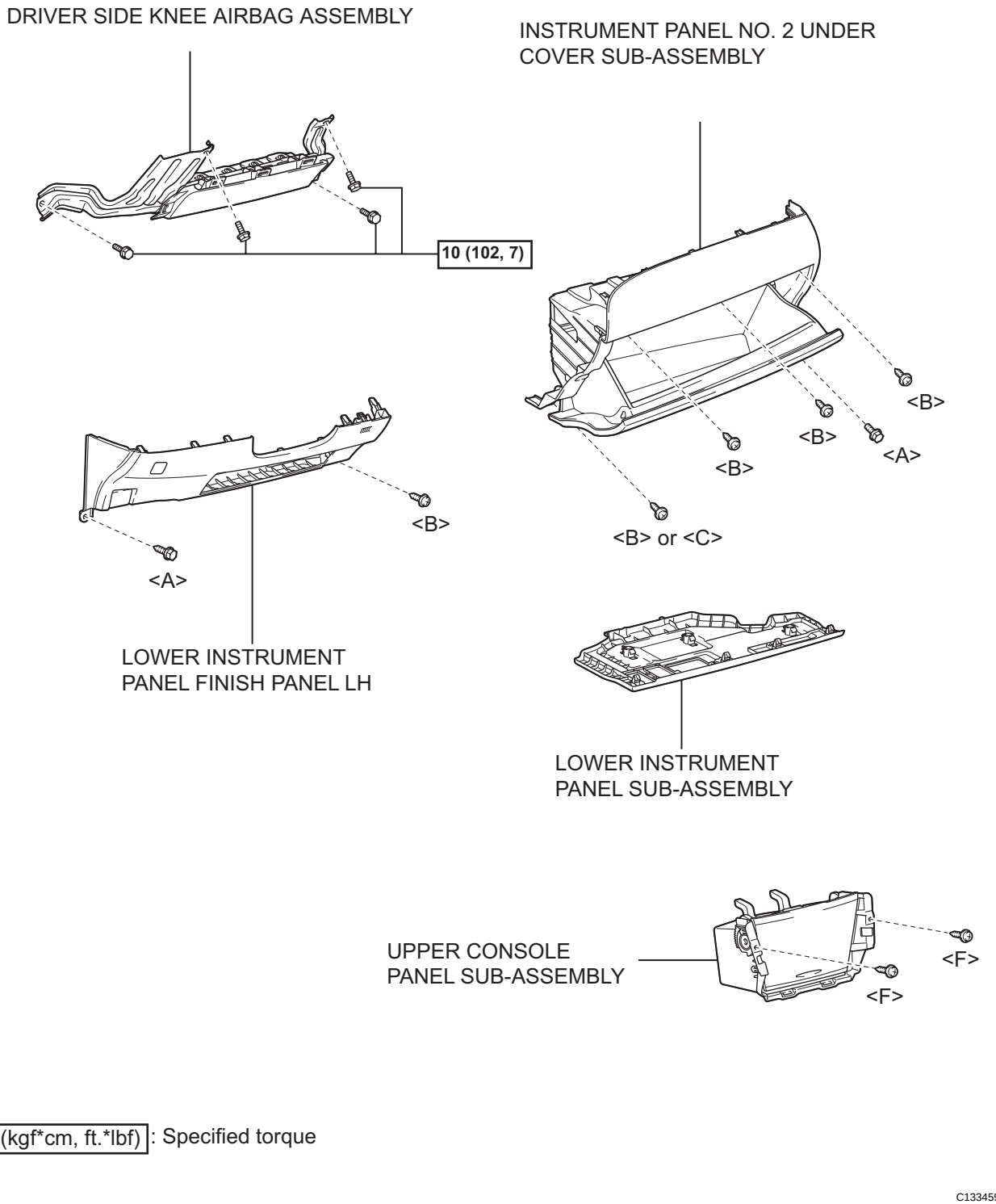


N*m (kgf*cm, ft.*lbf): Specified torque

P

B132047E01

for TMC made:

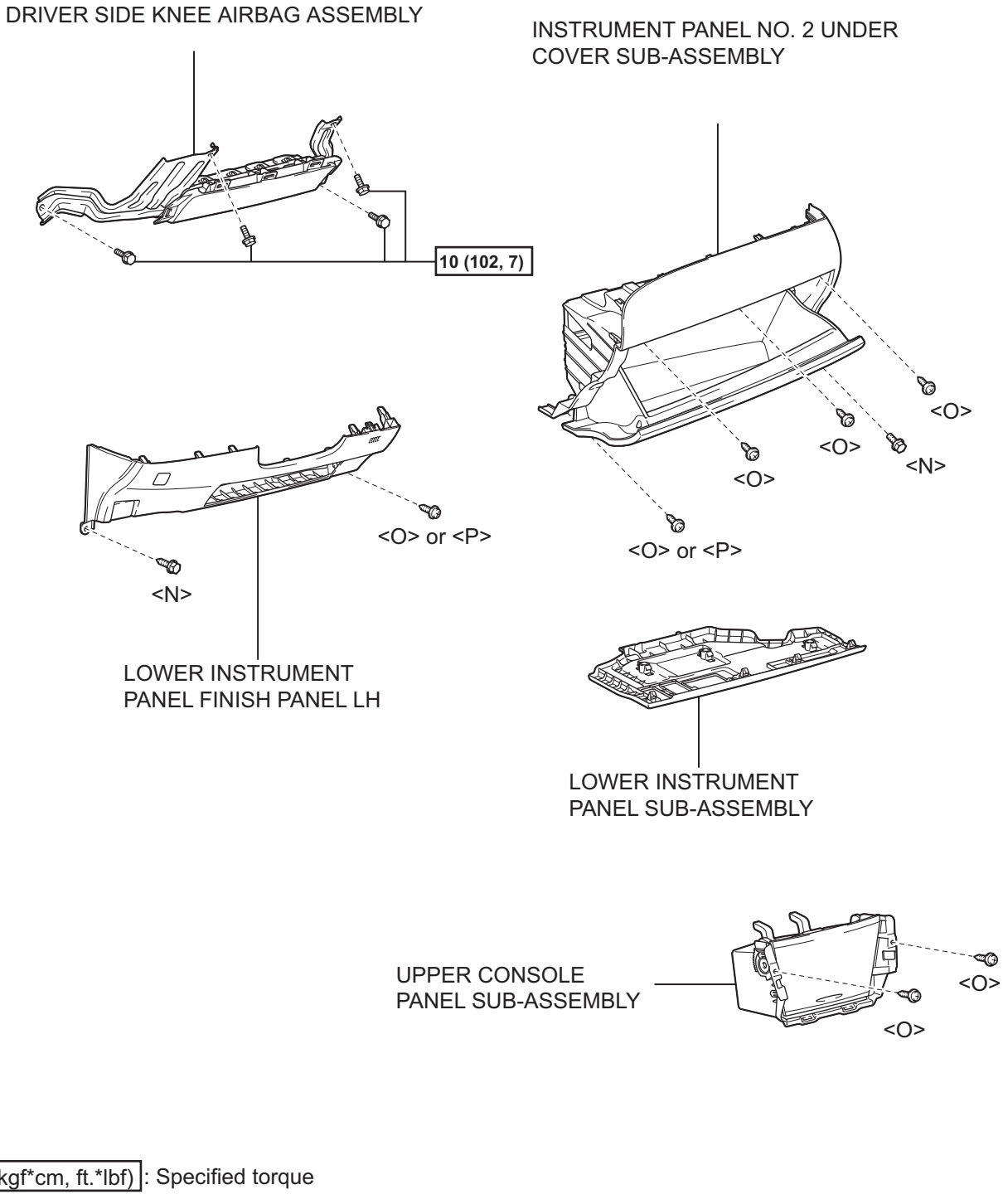


N*m (kgf*cm, ft.*lbf) : Specified torque

C133459E01

PB

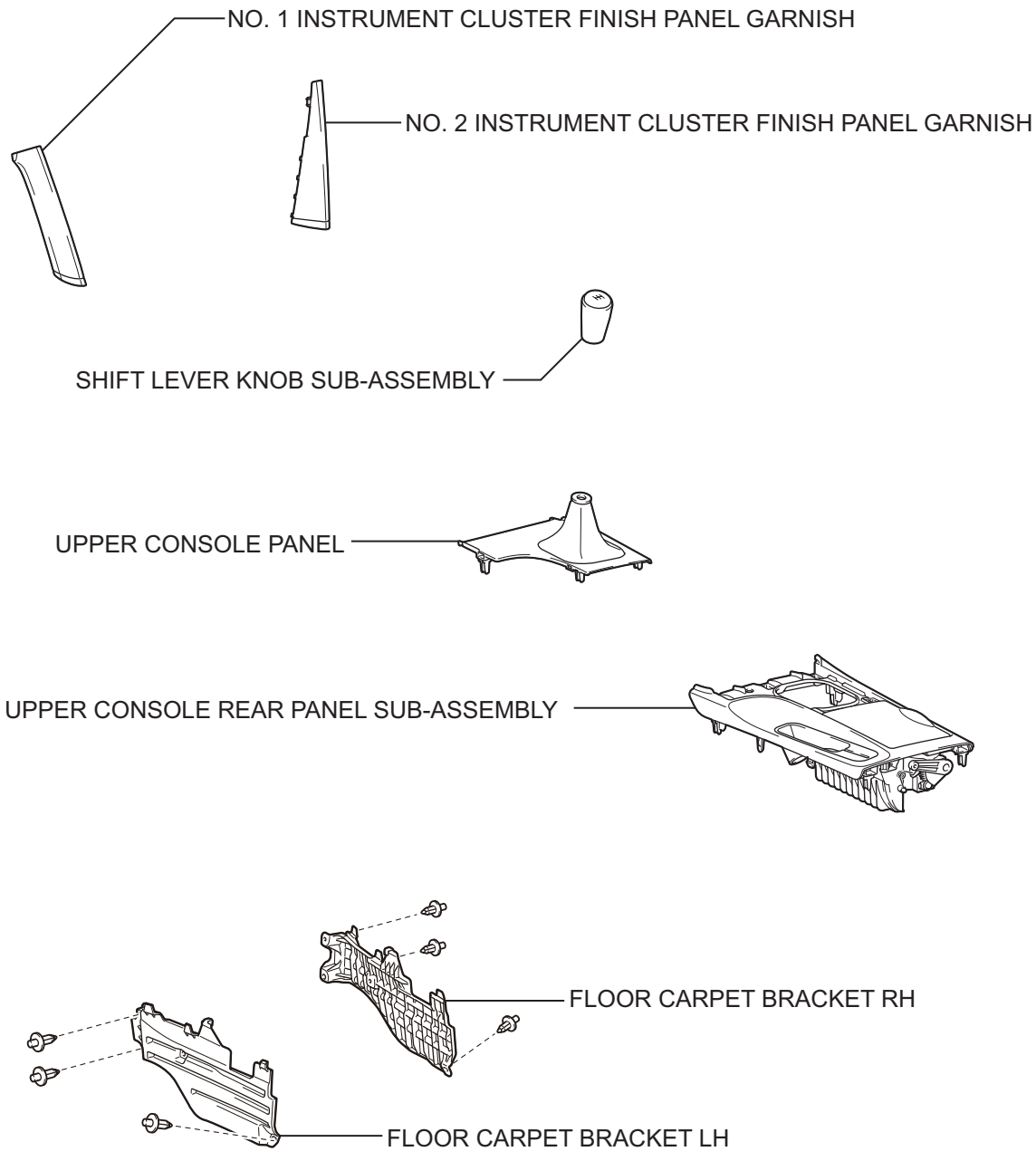
for TMMK made:



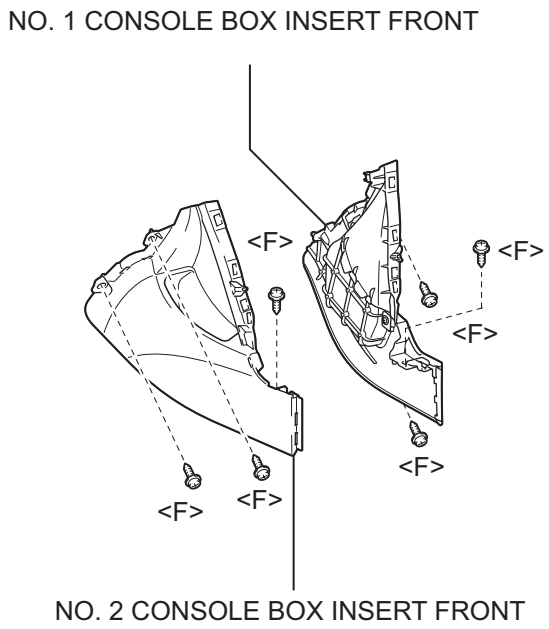
N*m (kgf*cm, ft.*lbf): Specified torque

C133459E02

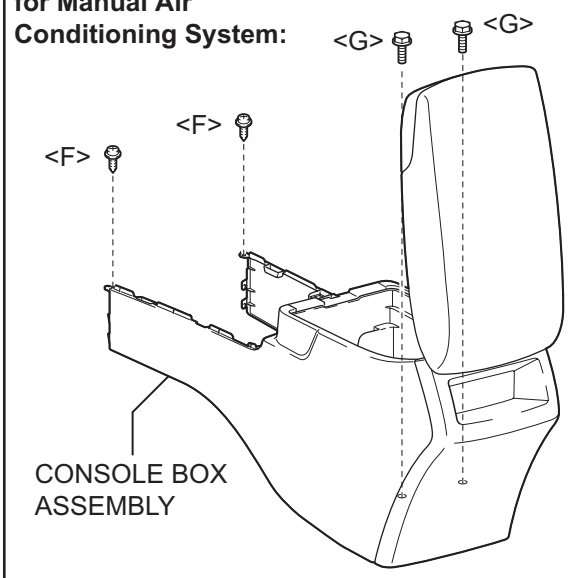
PB


NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
SHIFT LEVER KNOB SUB-ASSEMBLY
UPPER CONSOLE PANEL
UPPER CONSOLE REAR PANEL SUB-ASSEMBLY
FLOOR CARPET BRACKET RH
FLOOR CARPET BRACKET LH
C133456E01

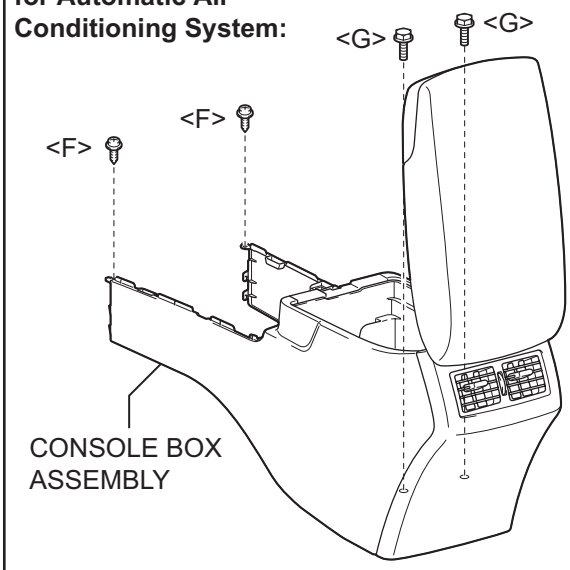
for TMC made:



for Manual Air Conditioning System:



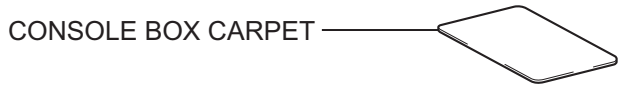
for Automatic Air Conditioning System:

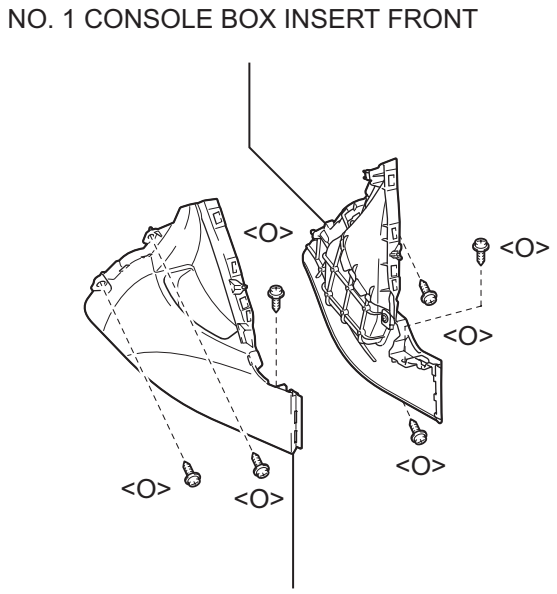


C141955E01

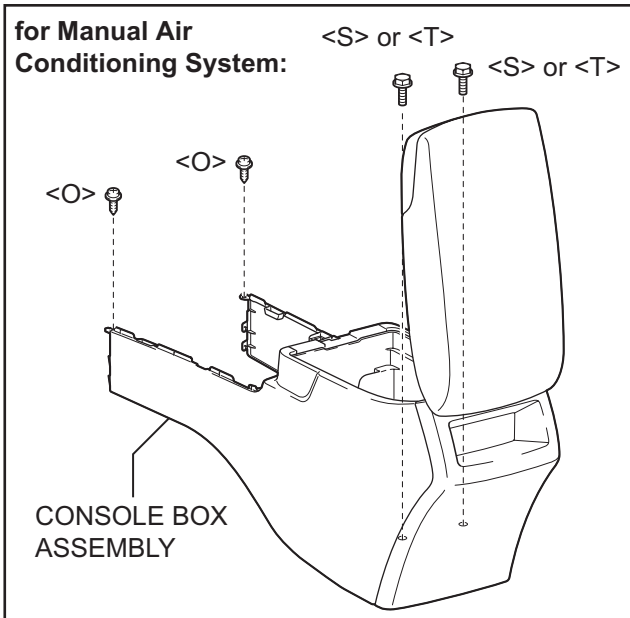
PB

for TMMK made:

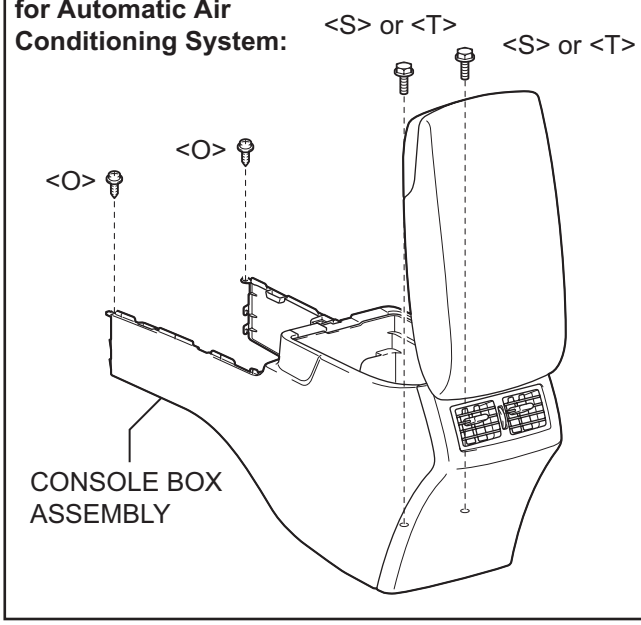




for Manual Air Conditioning System:

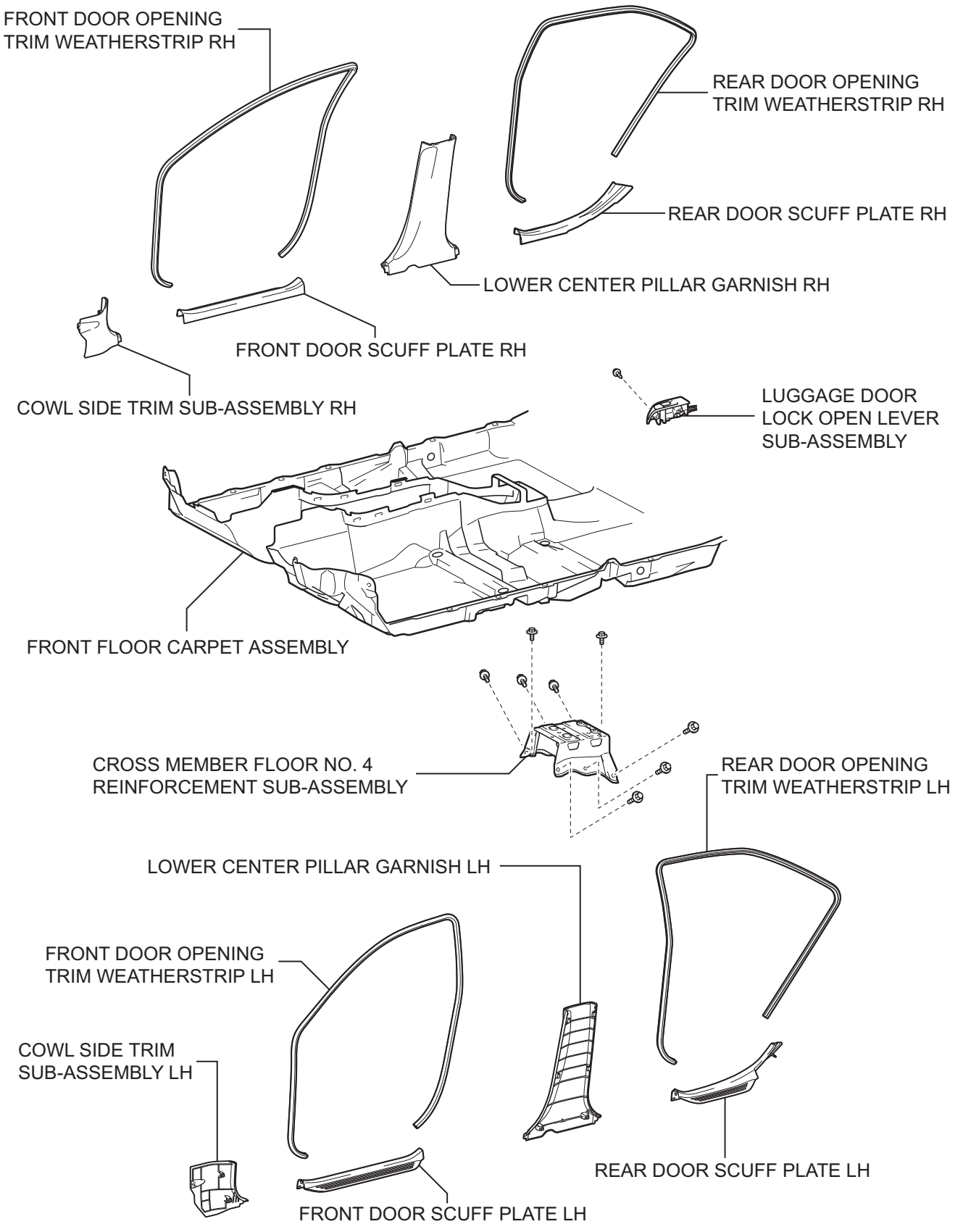


for Automatic Air Conditioning System:



C141955E02

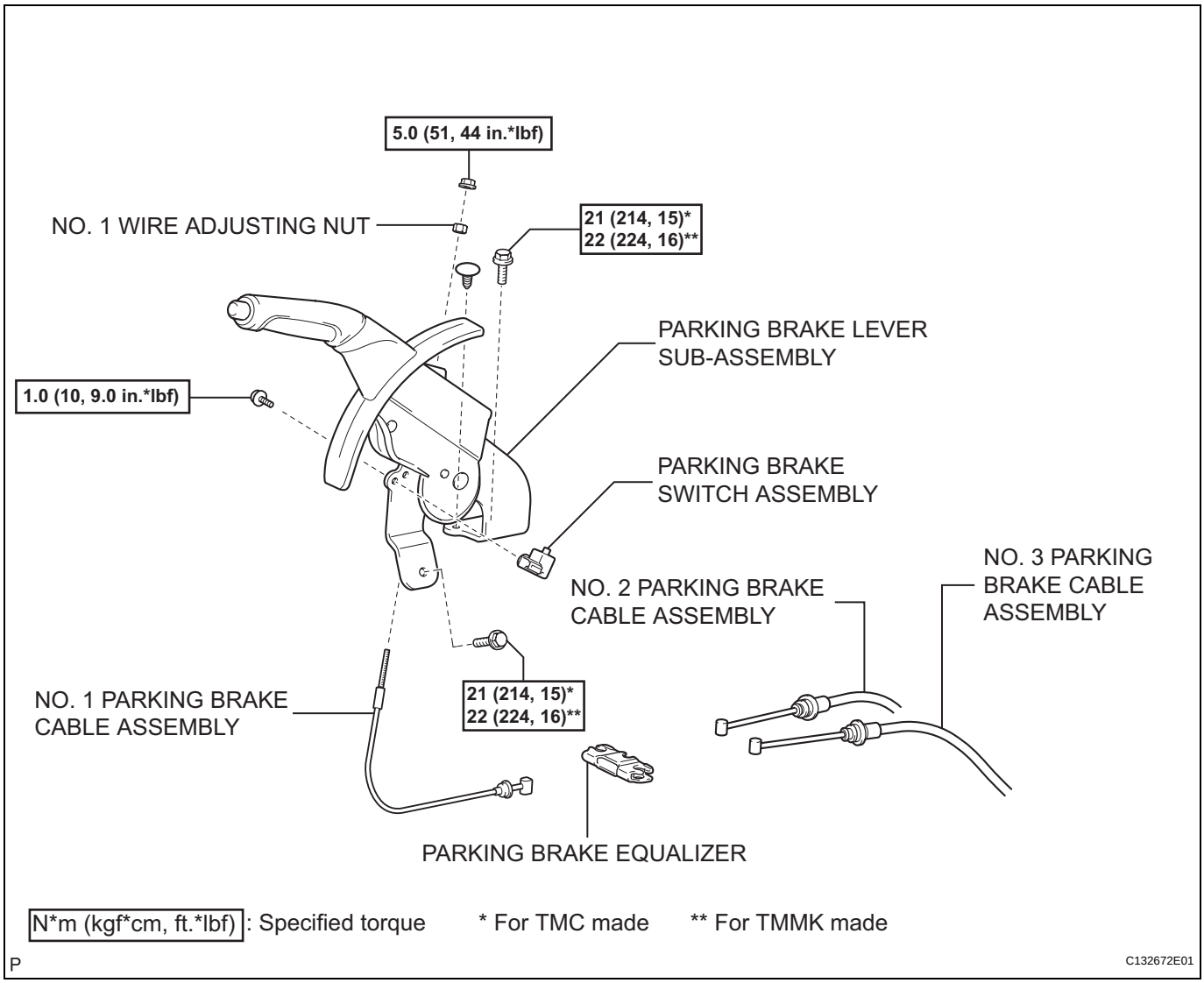
PB



PB

P

C132673E01



N*m (kgf*cm, ft.*lbf): Specified torque * For TMC made ** For TMMK made

P

C132672E01

PB

REMOVAL

1. **PRECAUTION**
(See page IP-1)

2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent the airbag working. (See page RS-1)

3. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat)**
HINT:
Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-16)

4. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

5. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat)**
HINT:
Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-30)

6. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

7. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**

8. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**

9. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**

10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**

11. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**

12. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**

13. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**

14. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**

15. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-24)**

16. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
17. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
18. REMOVE UPPER CONSOLE PANEL (See page IP-25)
19. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)
20. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)
21. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)
22. REMOVE CONSOLE BOX POCKET (See page IP-28)
23. REMOVE CONSOLE BOX CARPET (See page IP-28)
24. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
25. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)
26. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)
27. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
28. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)
29. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
30. REMOVE FLOOR CARPET BRACKET LH (See page AC-155)
31. REMOVE FLOOR CARPET BRACKET RH (See page AC-155)
32. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)
33. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH
34. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)
35. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH
36. REMOVE LOWER CENTER PILLAR GARNISH LH (See page IR-25)
37. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)
38. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH

39. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)

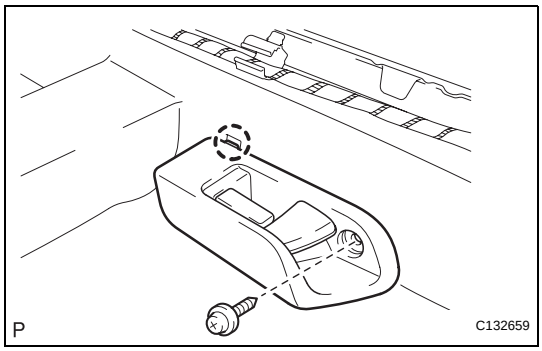
40. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH

41. REMOVE LOWER CENTER PILLAR GARNISH RH (See page IR-26)

42. REMOVE LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY

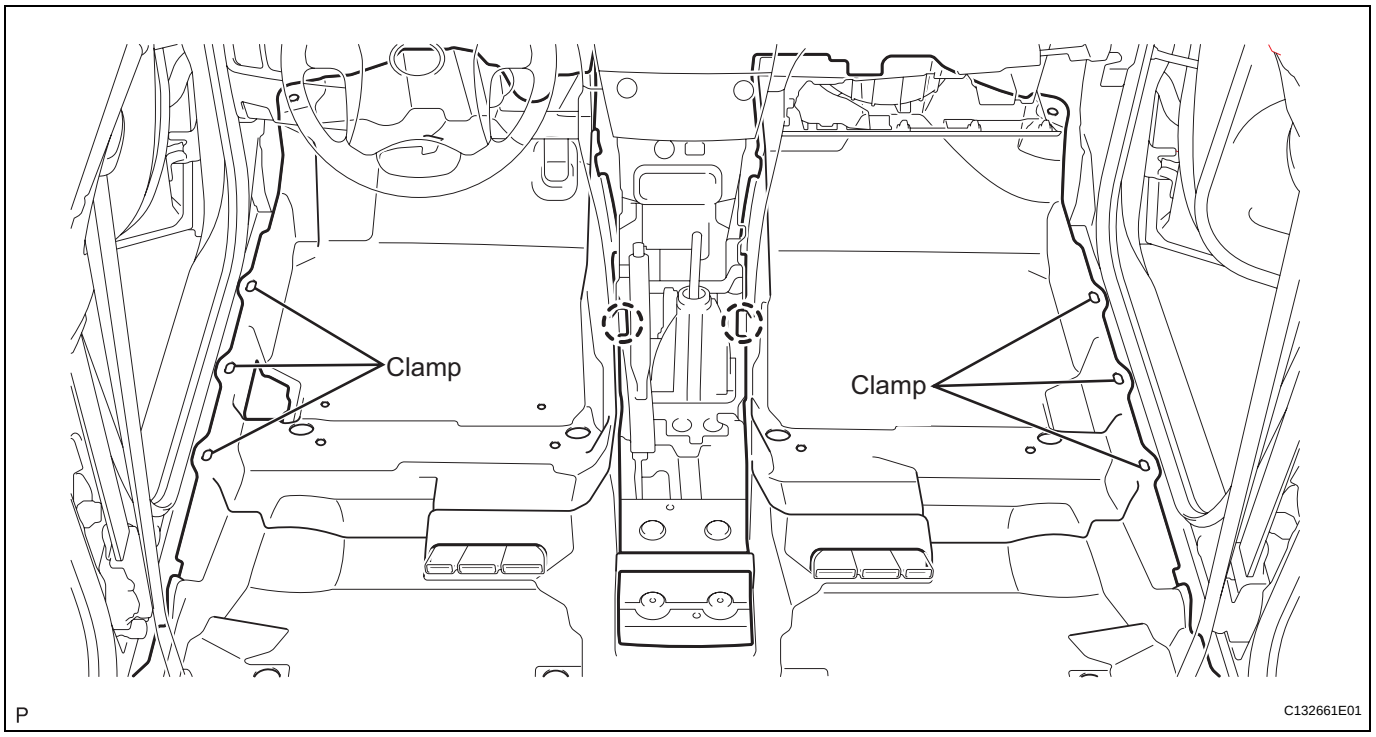
(a) Remove the screw.

(b) Disengage the claw and remove the luggage door open lever sub-assembly.



43. REMOVE FRONT FLOOR CARPET ASSEMBLY

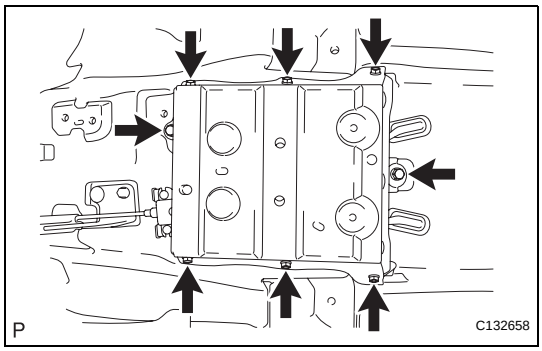
(a) Disengage the 6 clamps and the 2 claws.

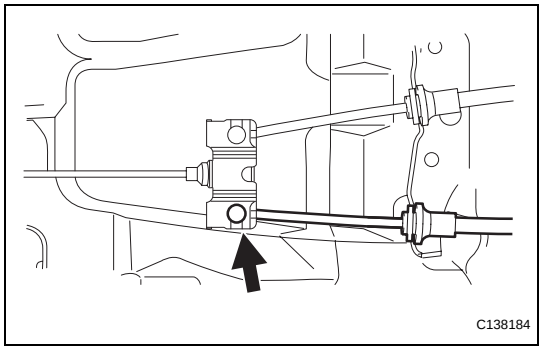


(b) Turn back the front floor carpet assembly until the bolts of the cross member floor No. 4 reinforcement sub-assembly can be seen.

44. REMOVE CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY

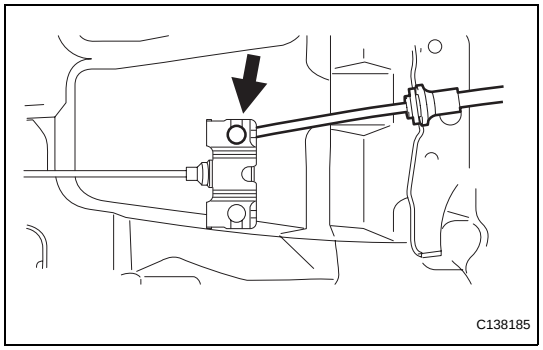
(a) Remove the 8 bolts and the cross member floor No. 4 reinforcement sub-assembly.





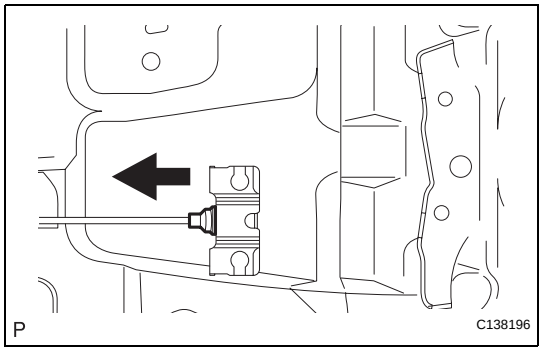
45. SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Separate the No. 3 parking brake cable assembly from the parking brake equalizer.



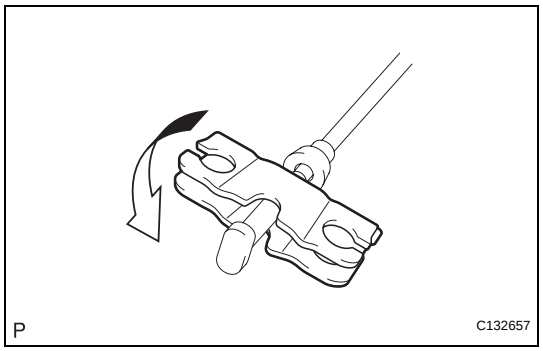
46. SEPARATE NO. 2 PARKING BRAKE CABLE ASSEMBLY

Separate the No. 2 parking brake cable assembly from the parking brake equalizer.

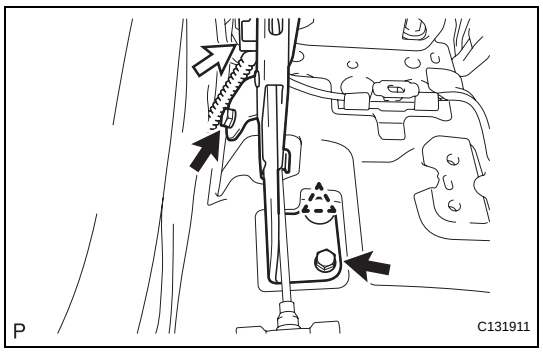


47. REMOVE PARKING BRAKE EQUALIZER

(a) Slide the rubber boot as shown in the illustration.



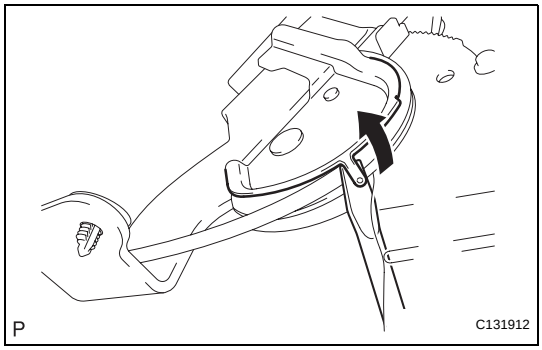
(b) Remove the parking brake equalizer from the No. 1 parking brake cable assembly.



48. REMOVE PARKING BRAKE LEVER SUB-ASSEMBLY

(a) Disconnect the parking brake switch connector.

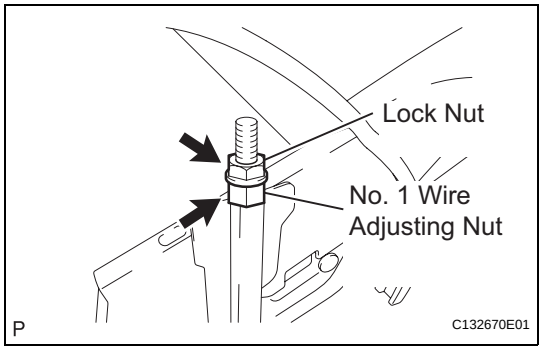
(b) Remove the 2 bolts, the clip, and the parking brake lever.



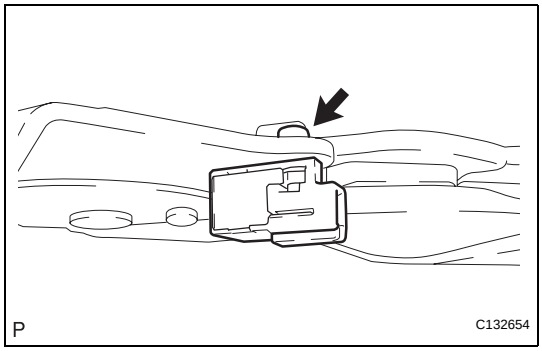
DISASSEMBLY

1. REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY

(a) Using a screwdriver, pull up the parking brake lever claw.



(b) Remove the lock nut, the No. 1 wire adjusting nut, and the No. 1 parking brake cable assembly from the parking brake lever sub-assembly.



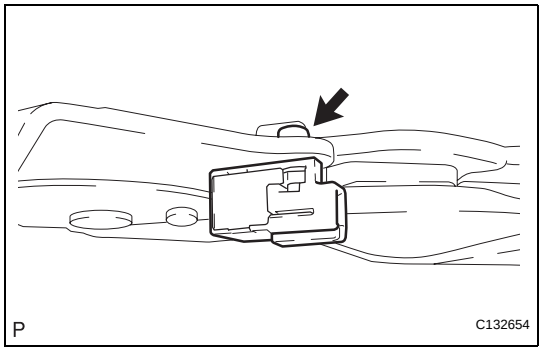
2. REMOVE PARKING BRAKE SWITCH ASSEMBLY

(a) Remove the screw and the parking brake switch assembly.

REASSEMBLY

1. INSTALL PARKING BRAKE SWITCH ASSEMBLY

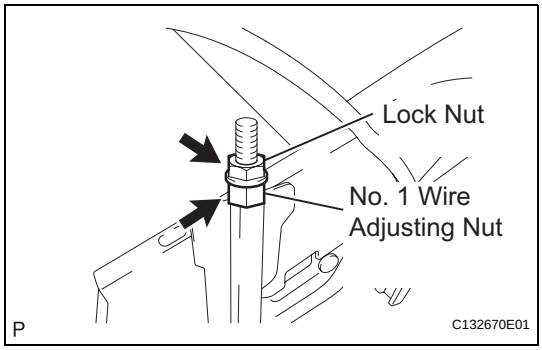
(a) Install the parking brake switch assembly with the screw.
Torque: 1.0 N*m (10 kgf*cm, 9.0 in.*lbf)

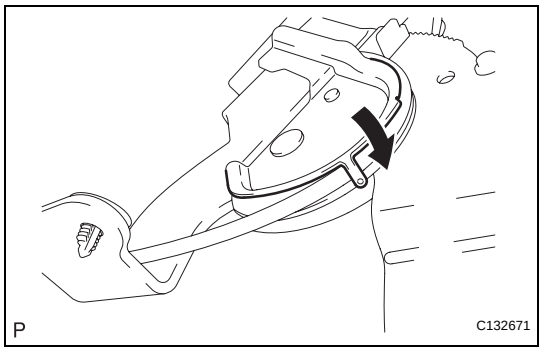


2. INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY

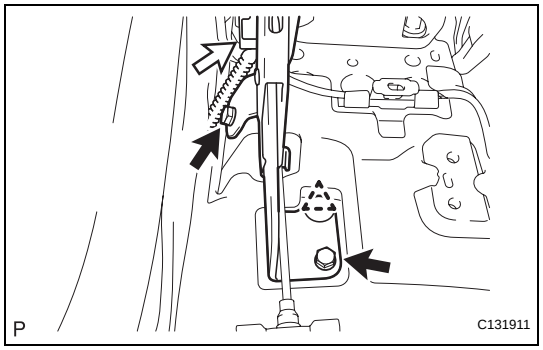
(a) Pass the No. 1 parking brake cable assembly through the parking brake lever sub-assembly.

(b) Temporarily tighten the lock nut and the No. 1 wire adjusting nut.
NOTICE:
Fully tighten the lock nut when adjusting the parking brake lever travel.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)





(c) Bend the parking brake lever claw.



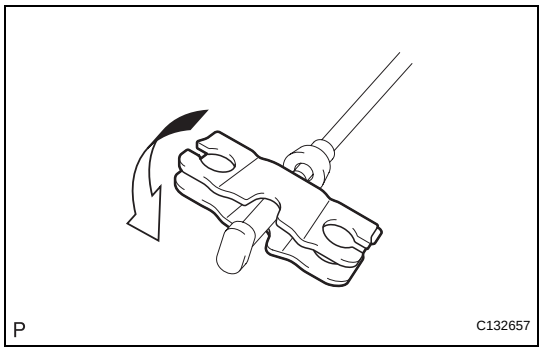
INSTALLATION

1. INSTALL PARKING BRAKE LEVER SUB-ASSEMBLY

(a) Install the parking brake lever sub-assembly with the 2 bolts and the clip.

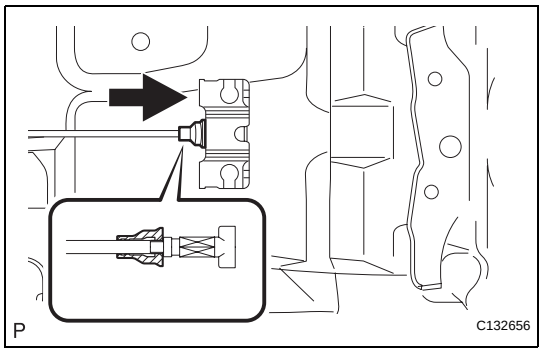
Torque: for TMC made
21 N*m (214 kgf*cm, 15 ft.*lbf)
for TMMK made
22 N*m (224 kgf*cm, 16 ft.*lbf)

(b) Connect the parking brake switch connector.

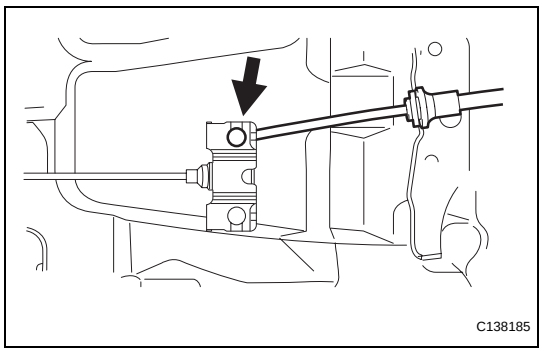


2. INSTALL PARKING BRAKE EQUALIZER

(a) Install the parking brake equalizer to the No. 1 parking brake cable assembly.



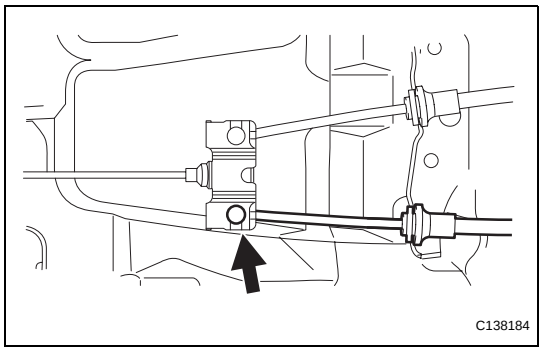
(b) Slide the rubber boot back as shown in the illustration.



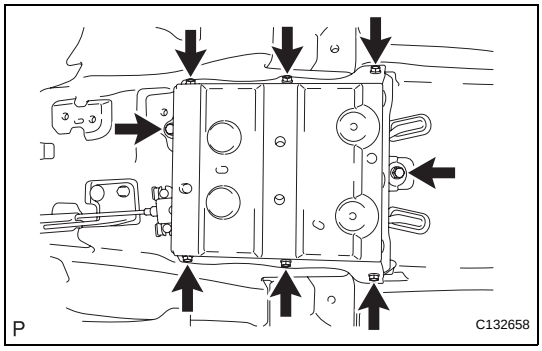
3. INSTALL NO. 2 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the No. 2 parking brake cable assembly to the parking brake equalizer.

PB



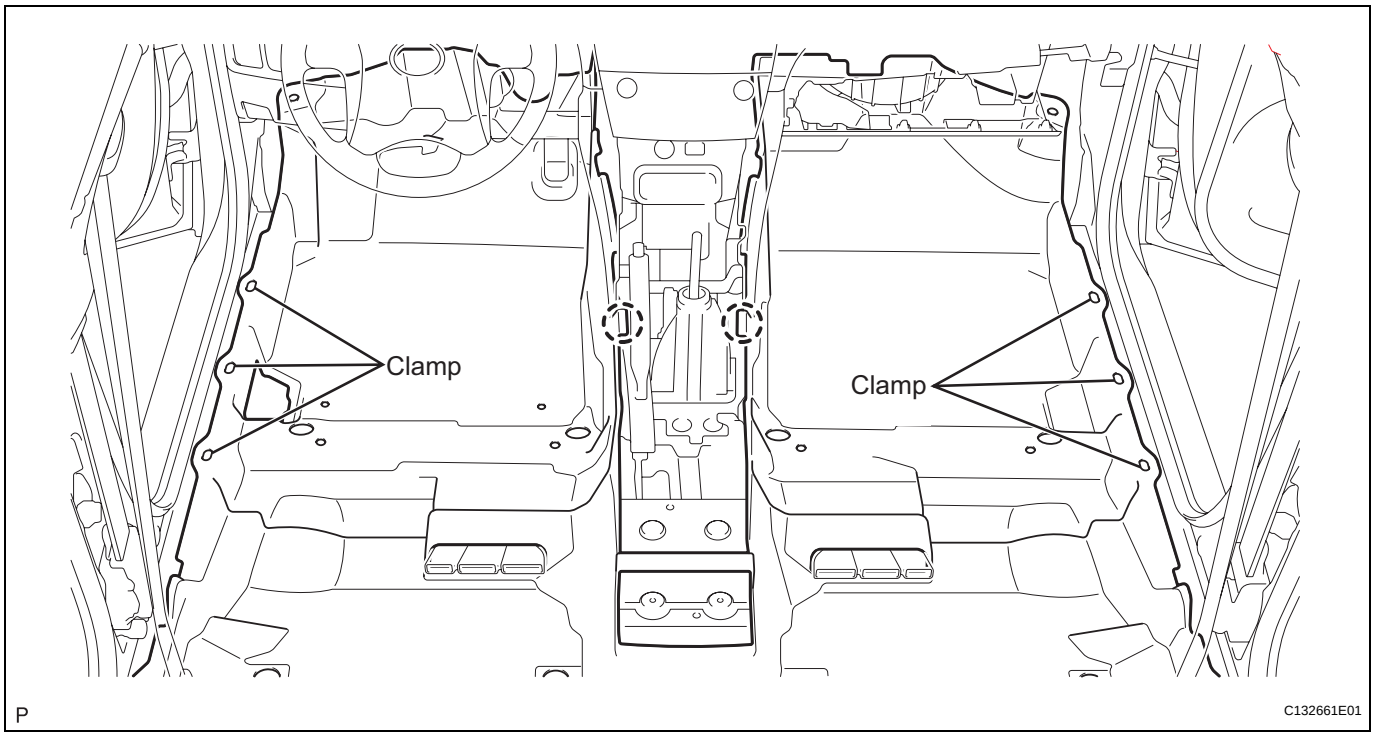
4. **INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY**
   (a) Connect the No. 3 parking brake cable assembly to the parking brake equalizer.

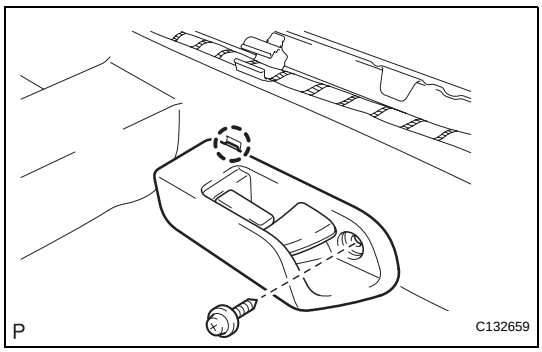


5. **INSTALL CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY**
   (a) Install the cross member floor No. 4 reinforcement sub-assembly with the 8 bolts.

6. **INSTALL FRONT FLOOR CARPET ASSEMBLY**
   (a) Engage the 6 clamps and the 2 claws and install the front floor carpet assembly.

PB





7. **INSTALL LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY**
   (a) Engage the claw and install the luggage door open lever sub-assembly with the screw.

8. **INSTALL LOWER CENTER PILLAR GARNISH LH (See page IR-53)**

9. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**

10. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**

11. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-54)
12. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
13. INSTALL LOWER CENTER PILLAR GARNISH RH (See page IR-54)
14. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)
15. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)
16. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-55)
17. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)
18. INSTALL FLOOR CARPET BRACKET LH
19. INSTALL FLOOR CARPET BRACKET RH
20. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)
21. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)
22. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)
23. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)
24. INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)
25. INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)
26. INSTALL CONSOLE BOX CARPET (See page IP-51)
27. INSTALL CONSOLE BOX POCKET (See page IP-51)
28. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)
29. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)
30. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)
31. INSTALL UPPER CONSOLE PANEL (See page IP-54)
32. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)
33. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)
34. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-55)

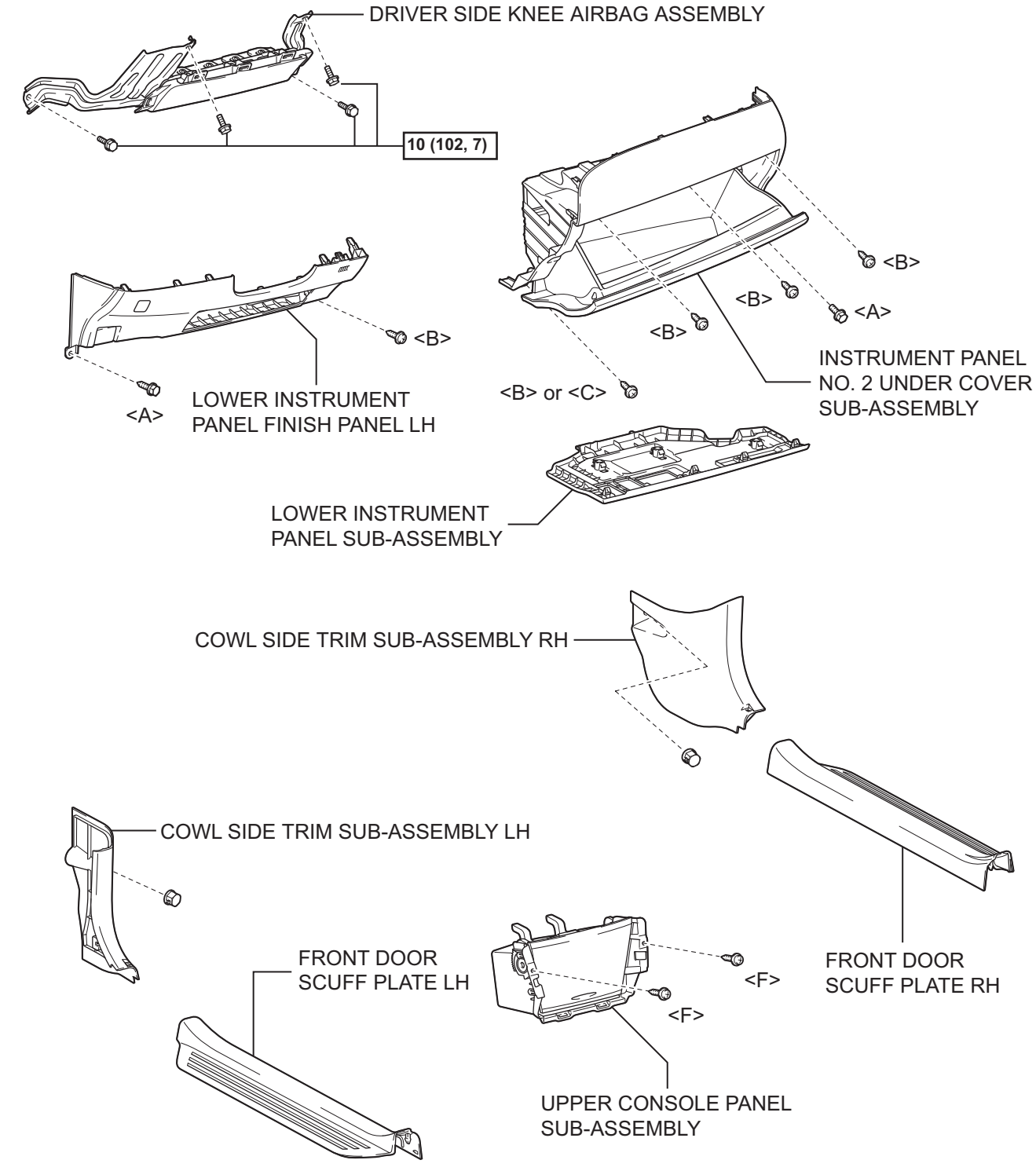
35. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
36. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
37. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
38. **INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**
39. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
40. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
41. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
42. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
43. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-24)
44. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
45. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-41)
46. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
47. **INSPECT PARKING BRAKE LEVER TRAVEL (See page PB-2)**
48. **ADJUST PARKING BRAKE LEVER TRAVEL (See page PB-2)**
49. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
50. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
    (See page RS-242)
51. **INSPECT SRS WARNING LIGHT**
52. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

53. INSPECT FRONT SEAT ASSEMBLY (for Power Seat)
(See page SE-42)

PARKING BRAKE PEDAL

COMPONENTS

for TMC made:

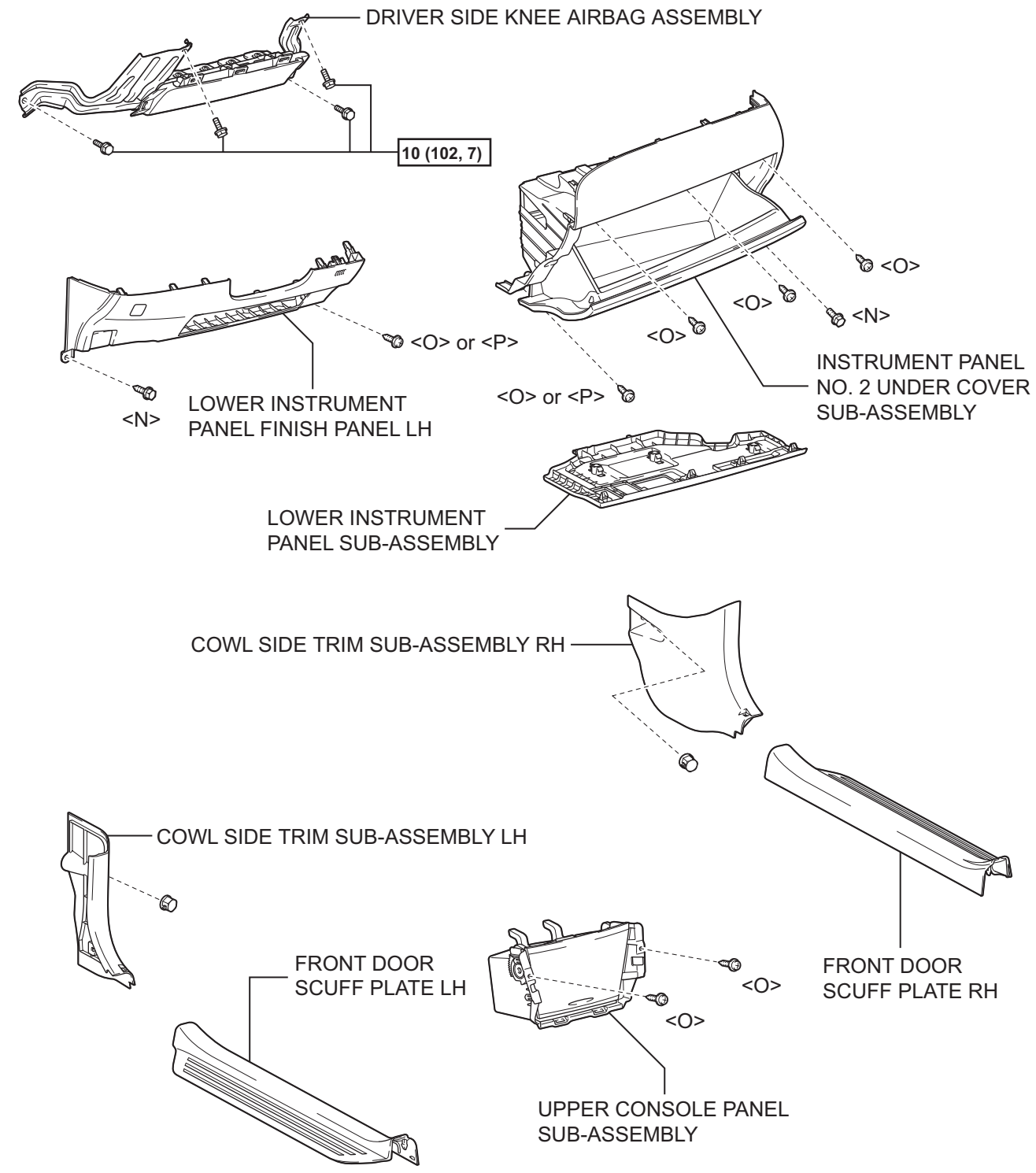


N*m (kgf*cm, ft.*lbf) : Specified torque

C133466E01

PB

for TMMK made:

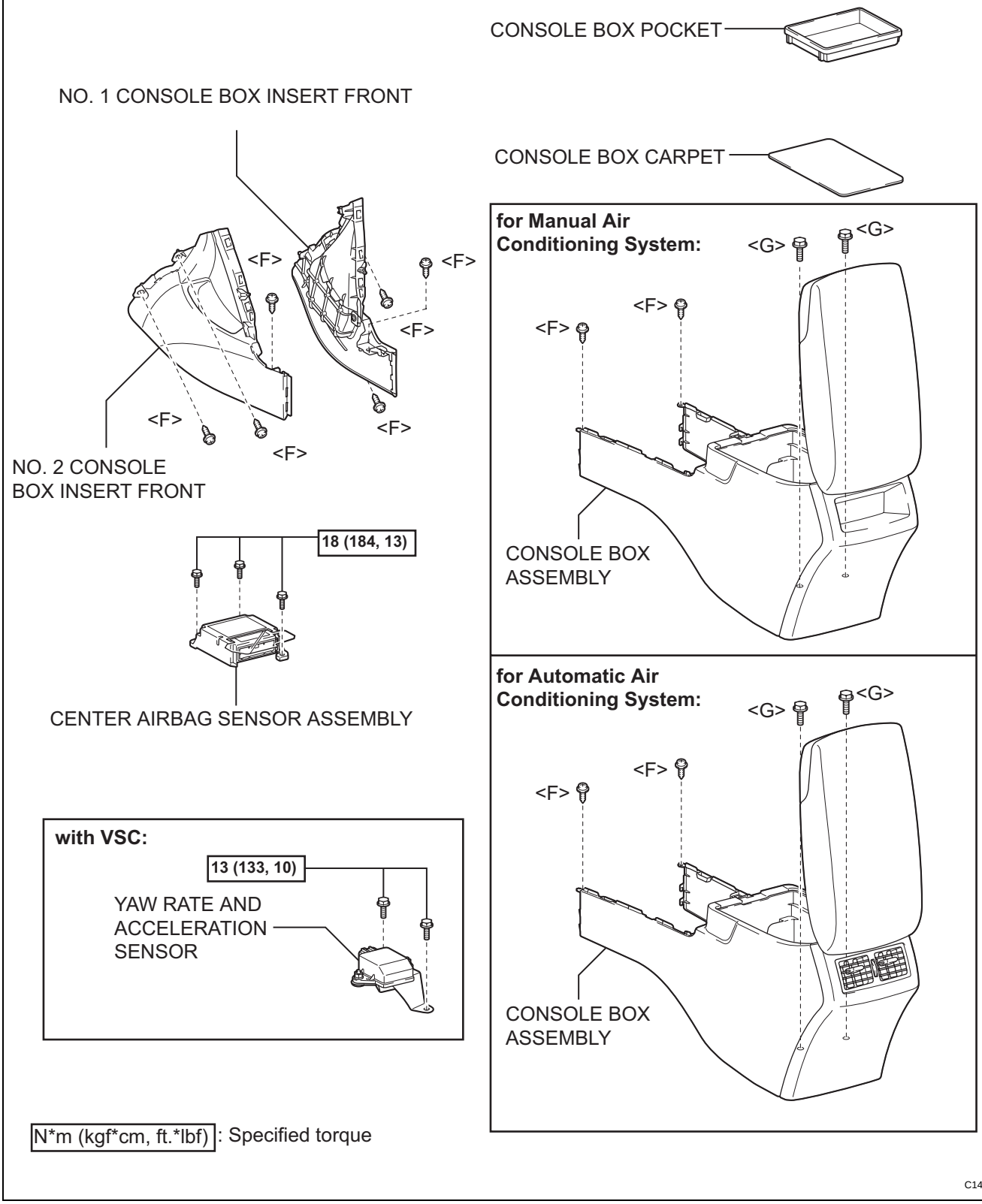


N*m (kgf*cm, ft.*lbf) : Specified torque

C133466E02

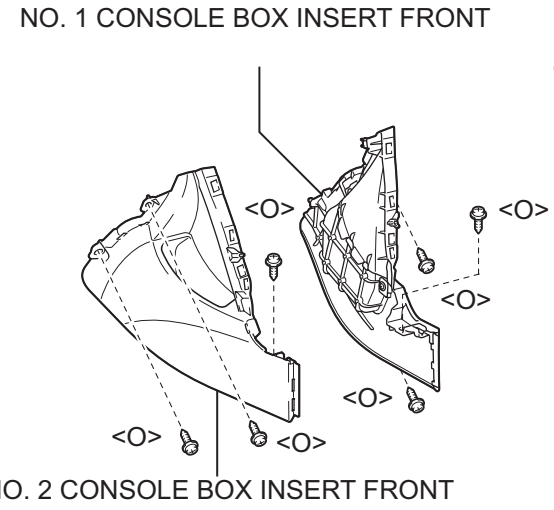
PB

for TMC made:

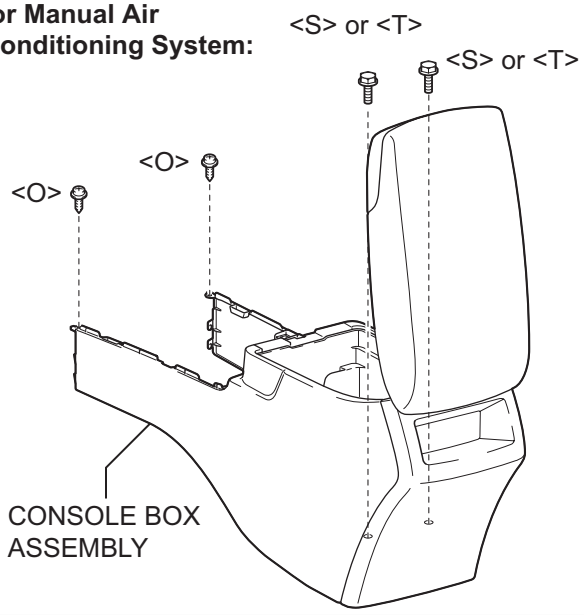


PB

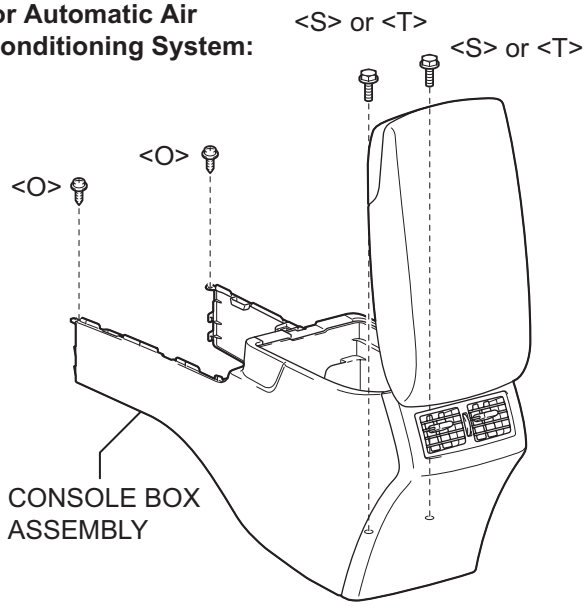
for TMMK made:

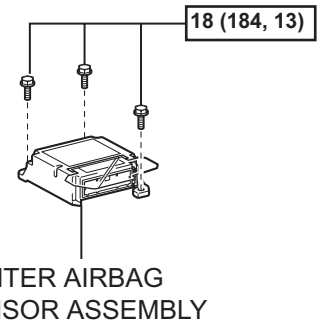


for Manual Air Conditioning System:

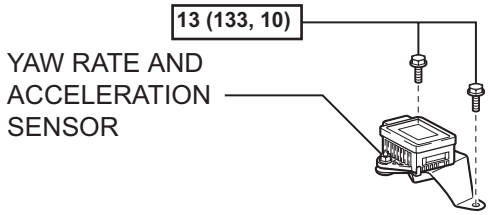


for Automatic Air Conditioning System:





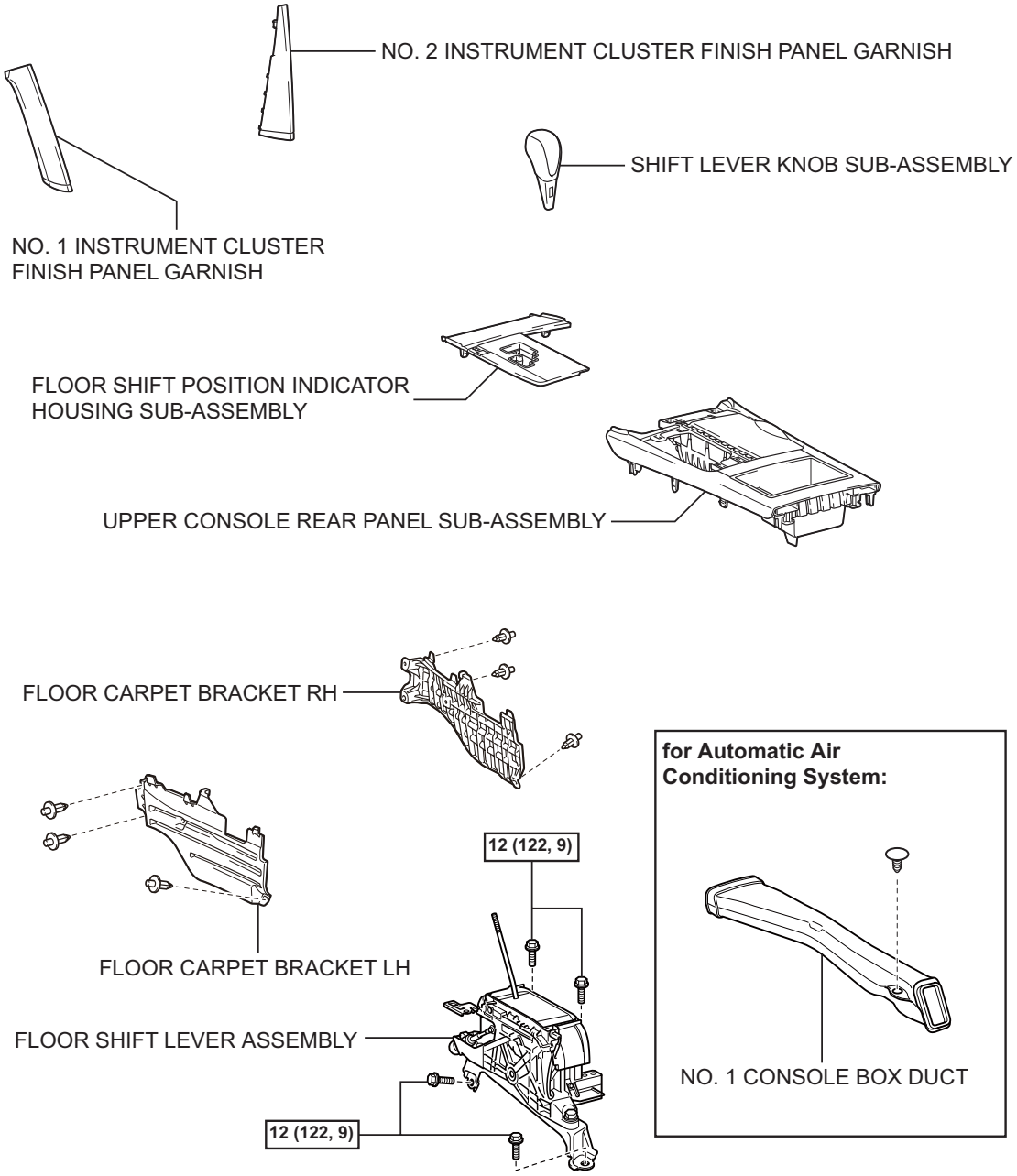
with VSC:



N*m (kgf*cm, ft.*lbf): Specified torque

C141957E01

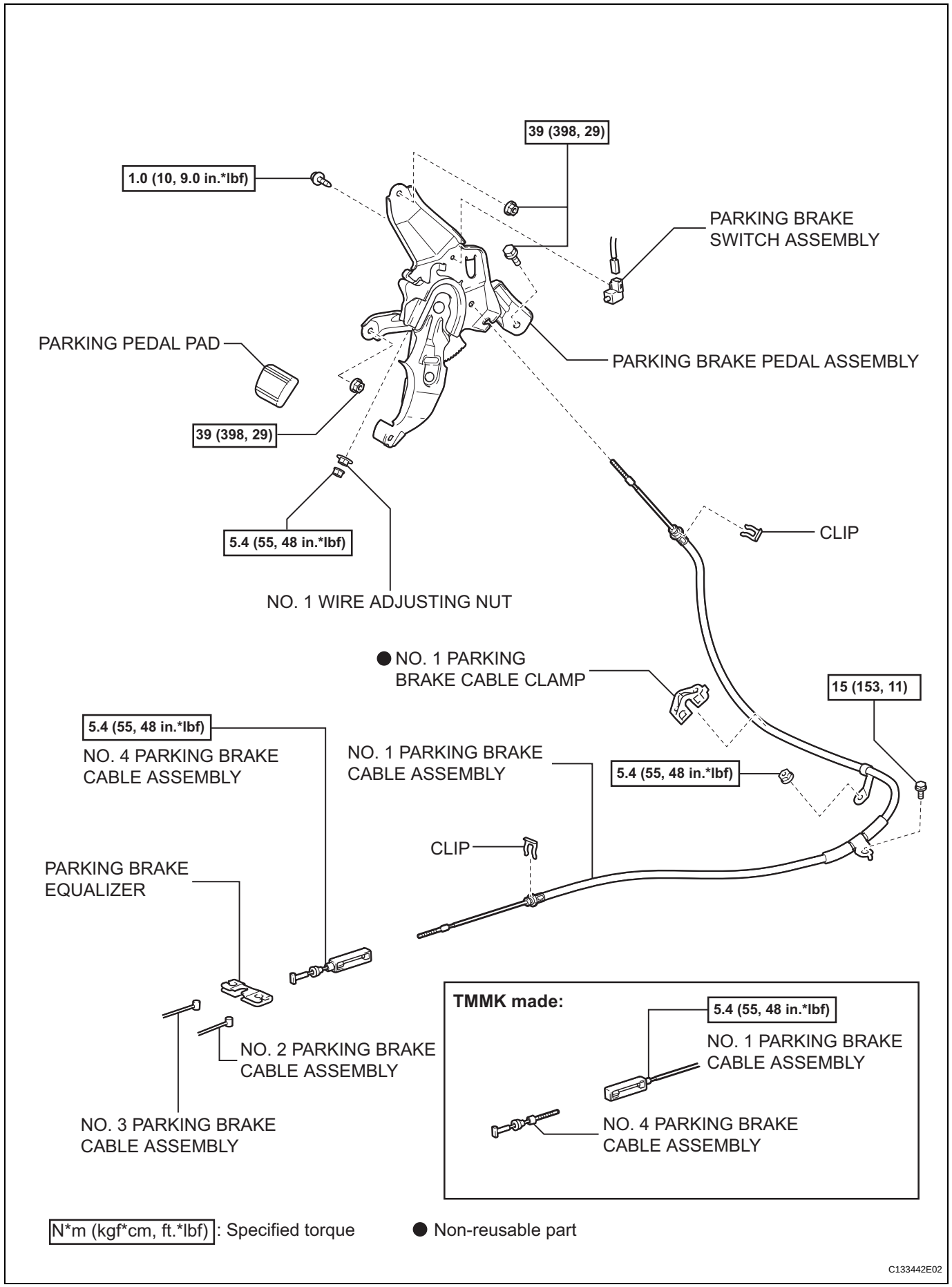
PB



PB

N*m (kgf*cm, ft.*lbf): Specified torque

C133457E02



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C133442E02

REMOVAL

1. **PRECAUTION**
(See page IP-1)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent the airbag working. (See page RS-1)
3. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
4. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
5. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
6. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
9. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**
10. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**
11. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**
12. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**
13. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-24)**
14. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
15. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
16. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-25)**
17. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)**
18. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)**
19. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)**
20. **REMOVE CONSOLE BOX POCKET (See page IP-28)**
21. **REMOVE CONSOLE BOX CARPET (See page IP-28)**

22. **REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)**

23. **REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)**

24. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)**

25. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

26. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)**

27. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

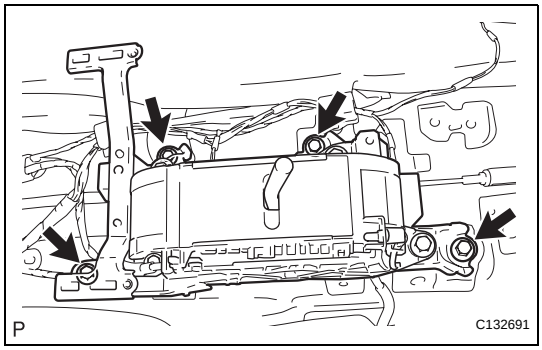
28. **REMOVE NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-154)**

29. **REMOVE FLOOR CARPET BRACKET LH (See page AC-155)**

30. **REMOVE FLOOR CARPET BRACKET RH (See page AC-155)**

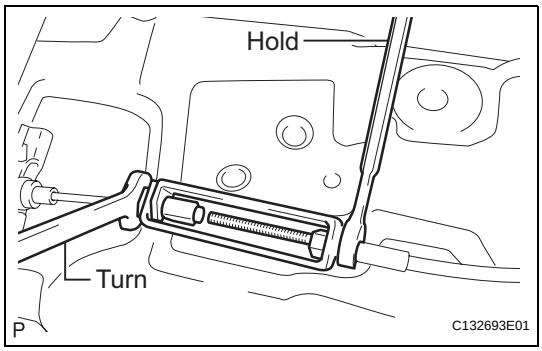
31. **REMOVE YAW RATE AND ACCELERATION SENSOR (w/ VSC) (See page BC-447)**

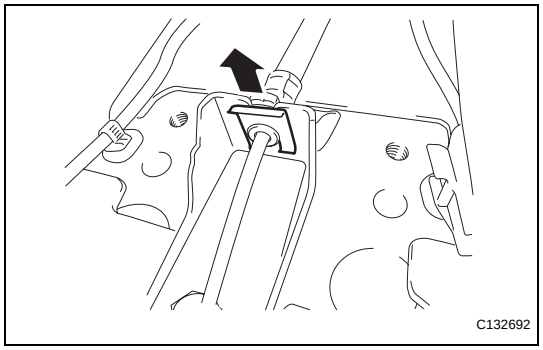
32. **REMOVE FLOOR SHIFT LEVER ASSEMBLY**
    (a) Remove the 4 bolts and the floor shift lever assembly.



33. **REMOVE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**

34. **DISCONNECT NO. 4 PARKING BRAKE CABLE ASSEMBLY**
    (a) Using a wrench, hold the lock nut and loosen the turnbuckle.
    (b) Disconnect the No. 4 parking brake cable assembly from the No. 1 parking brake cable assembly.

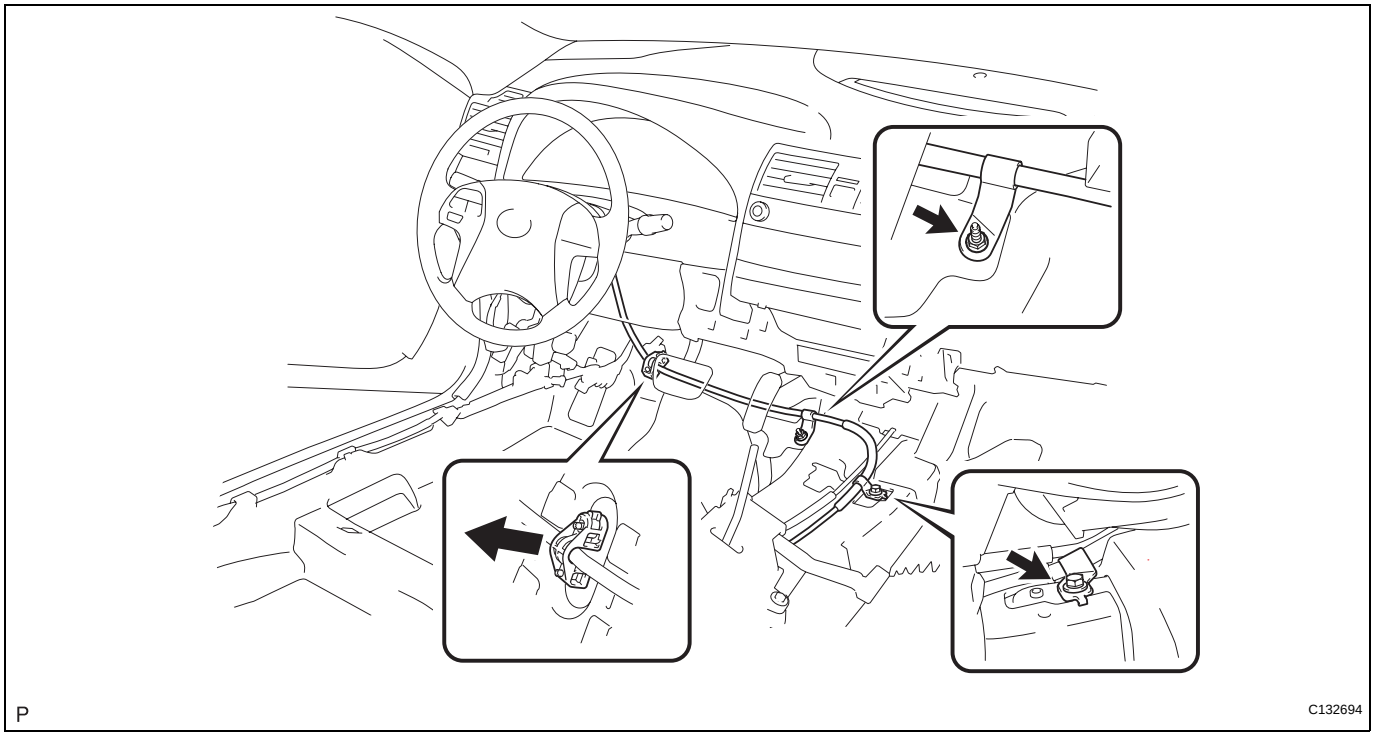




35. REMOVE PARKING BRAKE PEDAL ASSEMBLY

(a) Using needle-nose pliers, remove the clip from the No. 1 parking brake cable assembly.

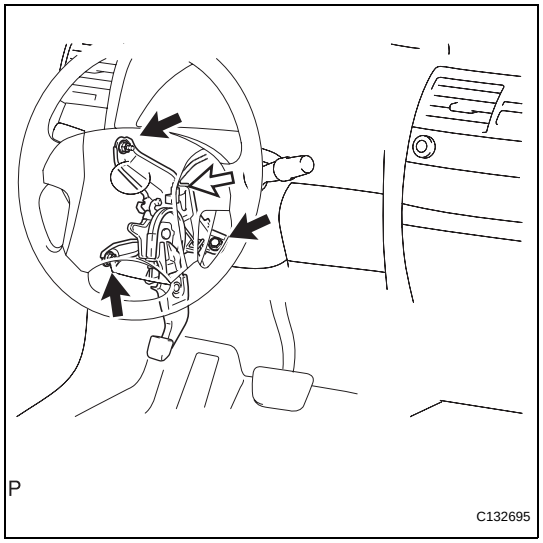
(b) Remove the bolt, nut, and the No. 1 parking brake cable clamp.



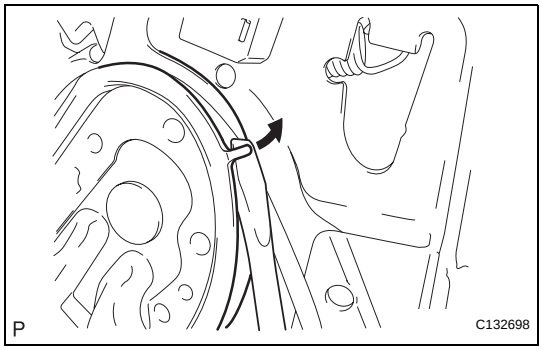
(c) Separate the No. 1 parking brake cable assembly from the body.

(d) Disconnect the parking brake switch connector.

(e) Remove the bolt, 2 nuts, and the parking brake pedal assembly with the No. 1 parking brake cable assembly from the body.



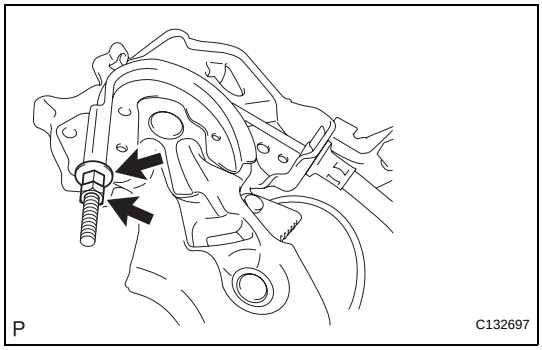
PB



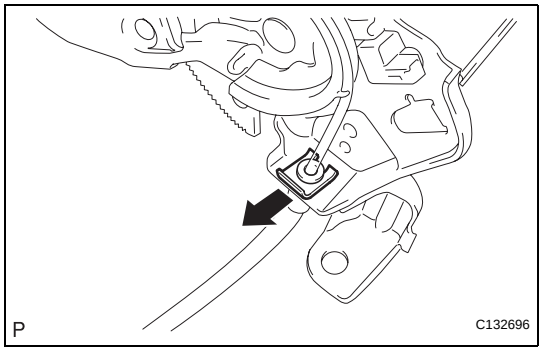
DISASSEMBLY

1. REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY

(a) Using a screwdriver, pull up the parking brake pedal claw.

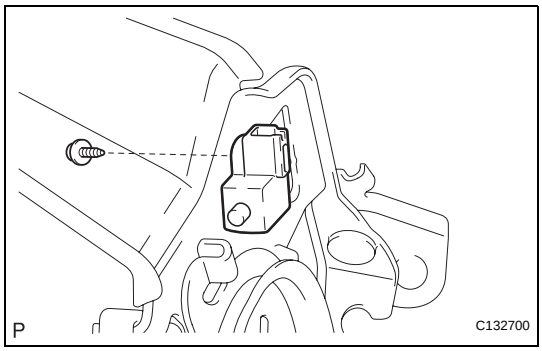


(b) Remove the lock nut and the No. 1 wire adjusting nut.



(c) Using needle nose pliers, remove the clip and the No. 1 parking brake cable from the parking brake pedal assembly.

2. REMOVE PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the screw and the parking brake switch assembly.

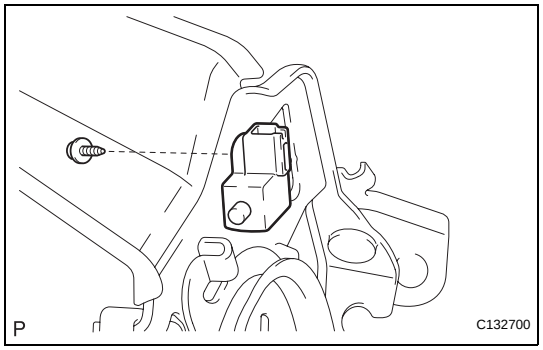
3. REMOVE PARKING PEDAL PAD

(a) Remove the parking pedal pad.

REASSEMBLY

1. INSTALL PARKING PEDAL PAD

(a) Install the parking pedal pad to the parking brake pedal assembly.

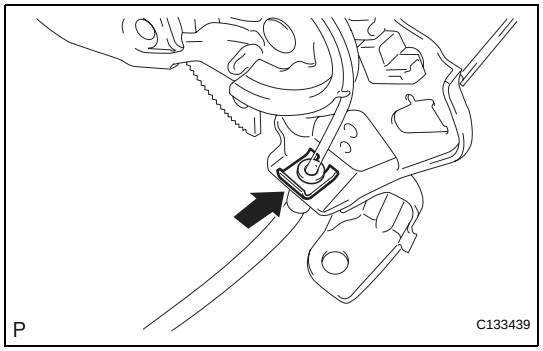


2. INSTALL PARKING BRAKE SWITCH ASSEMBLY

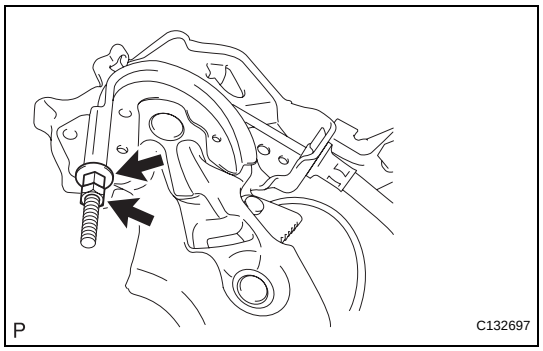
(a) Install the parking brake switch assembly with the screw.
Torque: 1.0 N*m (10 kgf*cm, 9.0 in.*lbf)

3. INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY

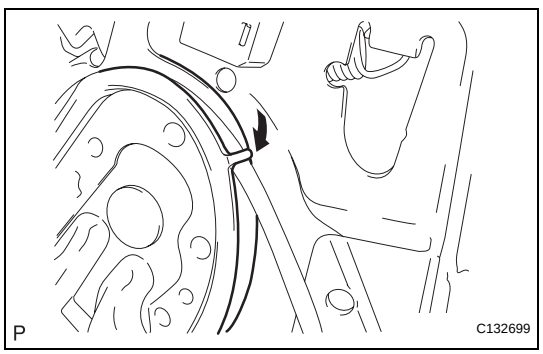
(a) Pass the No. 1 parking brake cable assembly through the pedal guide.



(b) Using a brass bar and a hammer, install the clip to the No. 1 parking brake cable assembly.

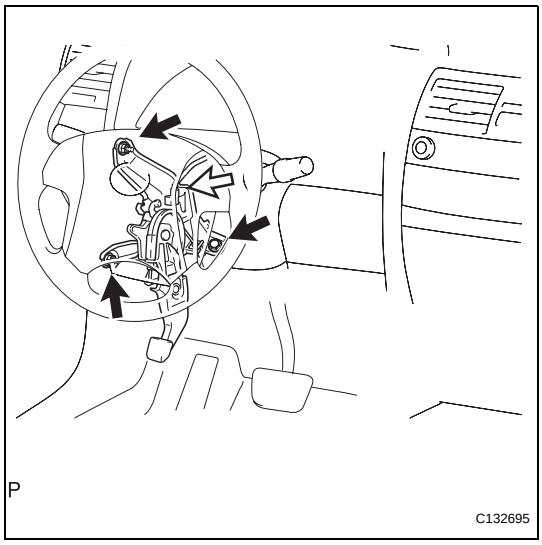


(c) Temporarily tighten the the lock nut and No. 1 wire adjusting nut.
NOTICE:
Fully tighten the lock nut and the No. 1 wire adjusting nut when adjusting the parking brake pedal travel.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



(d) Bend the parking brake pedal claw.

PB



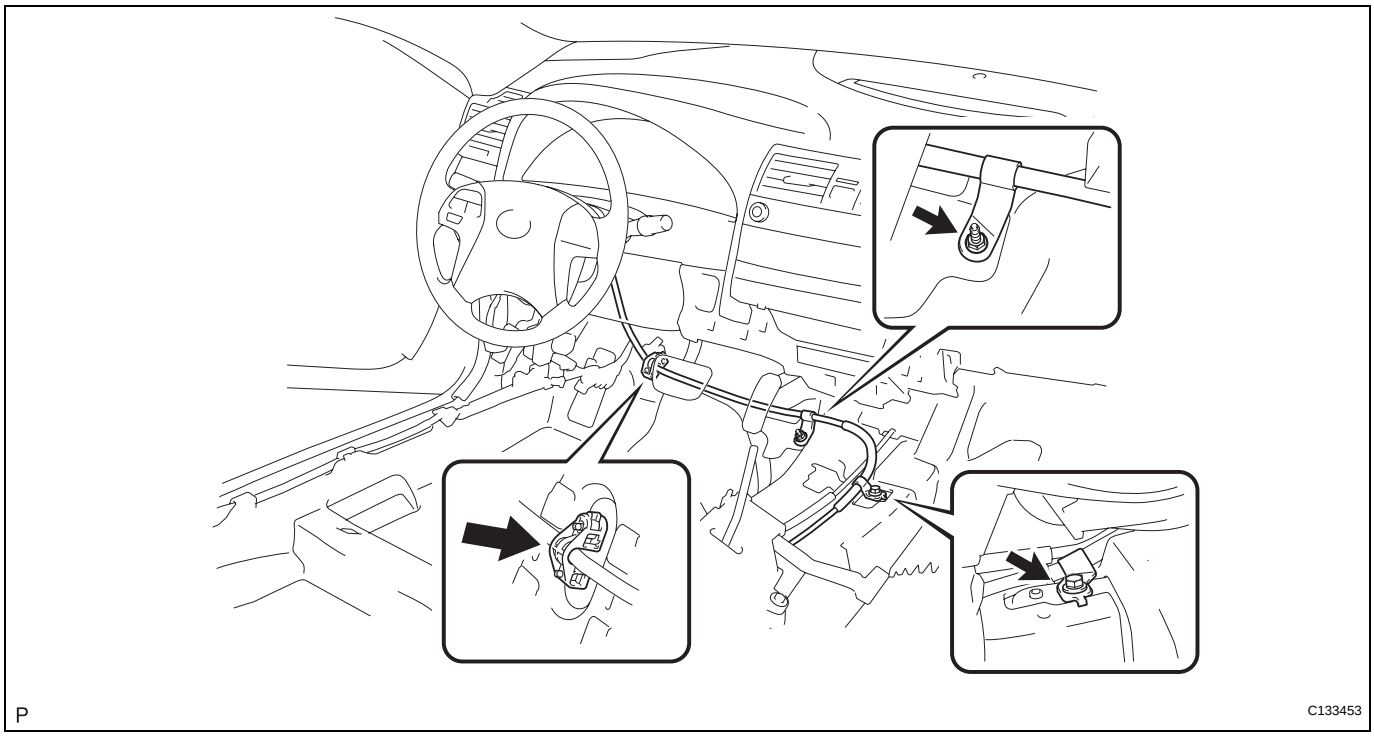
INSTALLATION

1. INSTALL PARKING BRAKE PEDAL ASSEMBLY

(a) Install the parking brake pedal assembly with the bolt and 2 nuts.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)

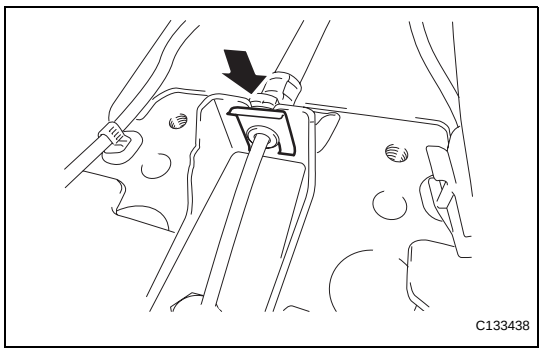
(b) Connect the parking brake switch connector.

(c) Install the No. 1 parking brake cable assembly to the body with the bolt, the nut, and a new No. 1 parking brake cable clamp.



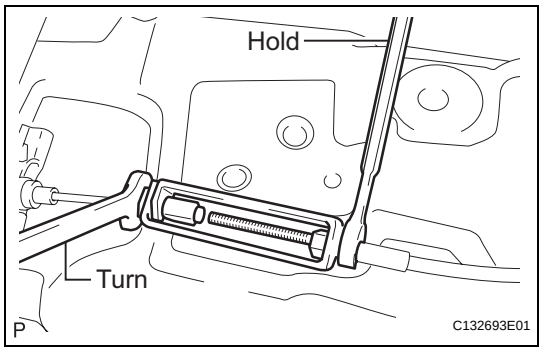
Torque: Bolt
15 N*m (153 kgf*cm, 11 ft.*lbf)
Nut
5.4 N*m (55 kgf*cm, 48 in.*lbf)

(d) Using a brass bar and a hammer, install the clip to the No. 1 parking brake cable assembly.



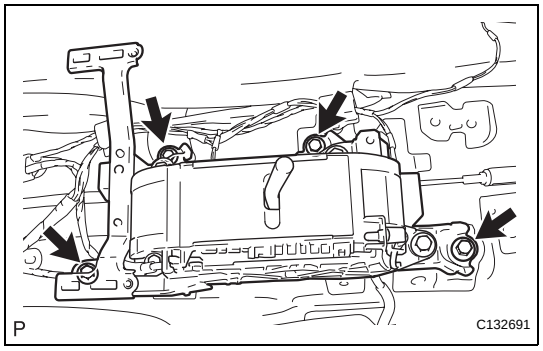
2. CONNECT NO. 4 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the No. 4 parking brake cable assembly to the No. 1 parking brake cable assembly.



(b) Using a wrench, hold the lock nut and tighten the turnbuckle.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

3. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**



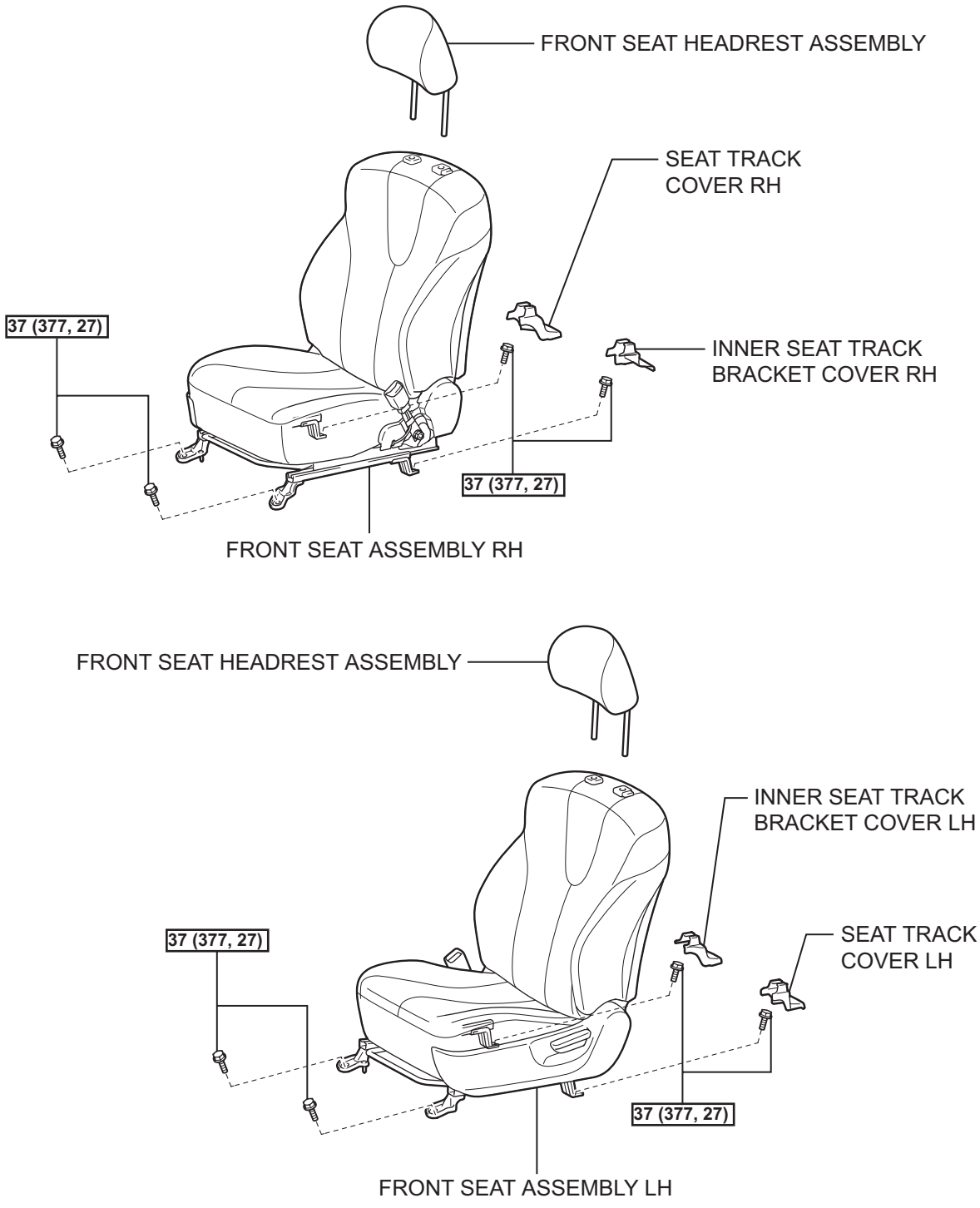
4. **INSTALL FLOOR SHIFT LEVER ASSEMBLY**
(a) Install the floor shift lever assembly with the 4 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)
5. **INSTALL YAW RATE AND ACCELERATION SENSOR (w/ VSC) (See page BC-448)**
6. **INSTALL FLOOR CARPET BRACKET LH**
7. **INSTALL FLOOR CARPET BRACKET RH**
8. **INSTALL NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-177)**
9. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
10. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
11. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)**
12. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
13. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**
14. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
15. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
16. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
17. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)**
18. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
19. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
20. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
21. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
22. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**

23. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-55)
24. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)
25. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)
26. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)
27. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)
28. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)
29. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)
30. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
31. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
32. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)
33. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)
34. INSPECT PARKING BRAKE PEDAL TRAVEL (See page PB-1)
35. ADJUST PARKING BRAKE PEDAL TRAVEL (See page PB-1)
36. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
37. INSPECT SENSOR SIGNAL (See page BC-448)

PARKING BRAKE CABLE

COMPONENTS

for Manual Seat:



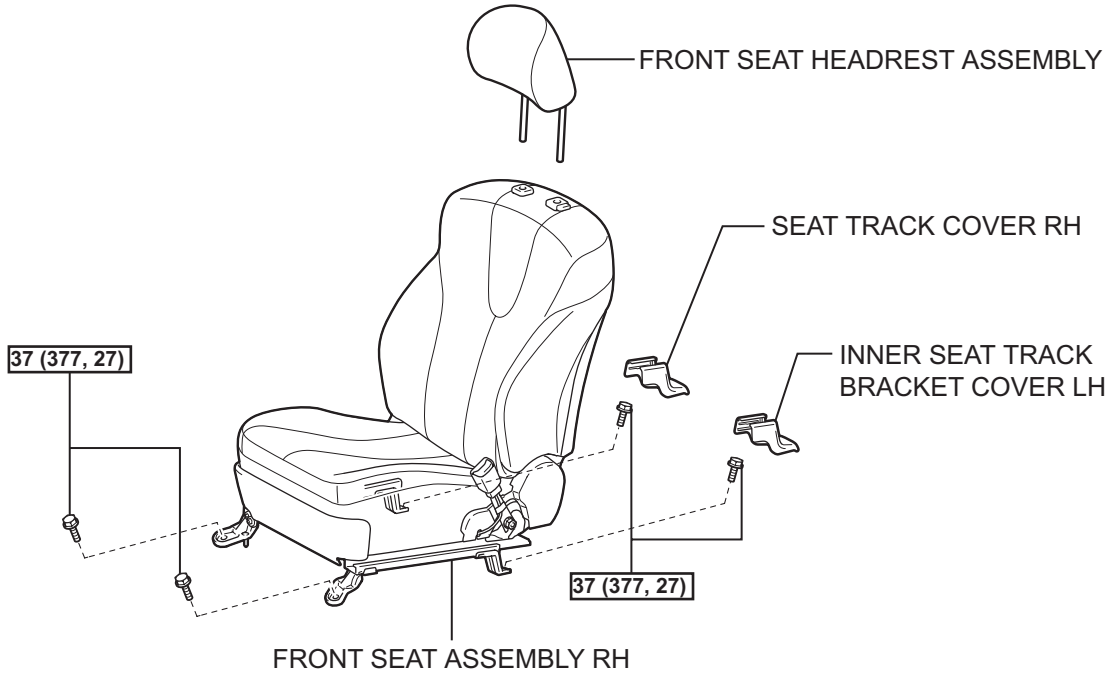
N*m (kgf*cm, ft.*lbf) : Specified torque

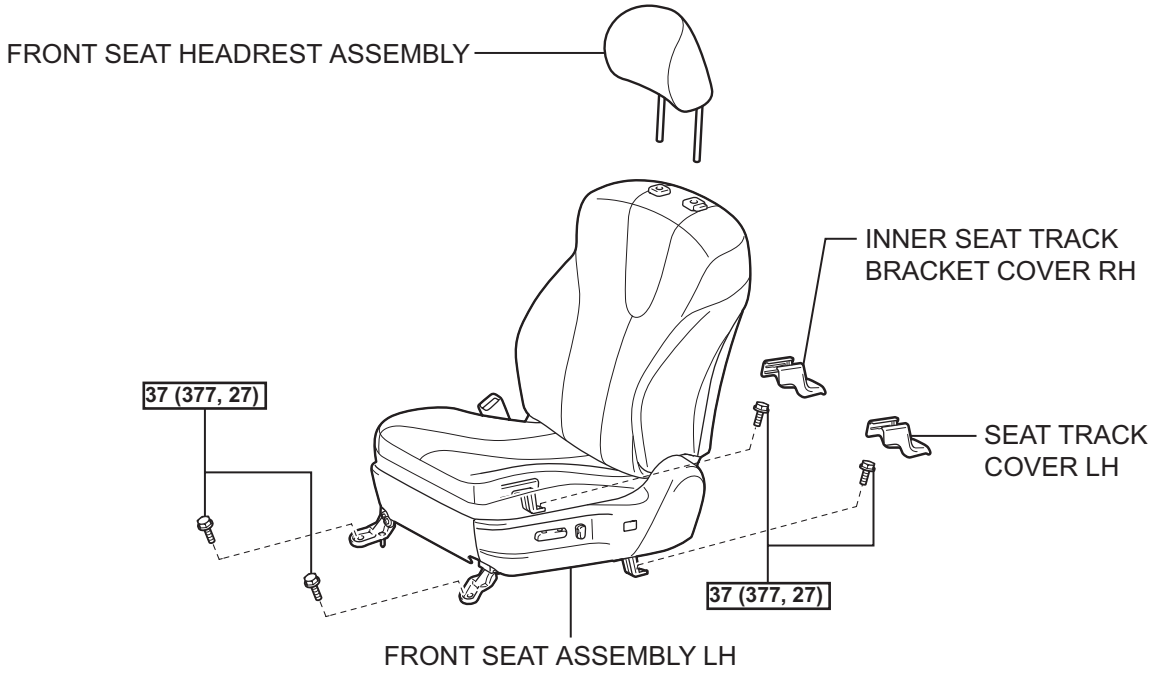
P

B132048E01

PB

for Power Seat:



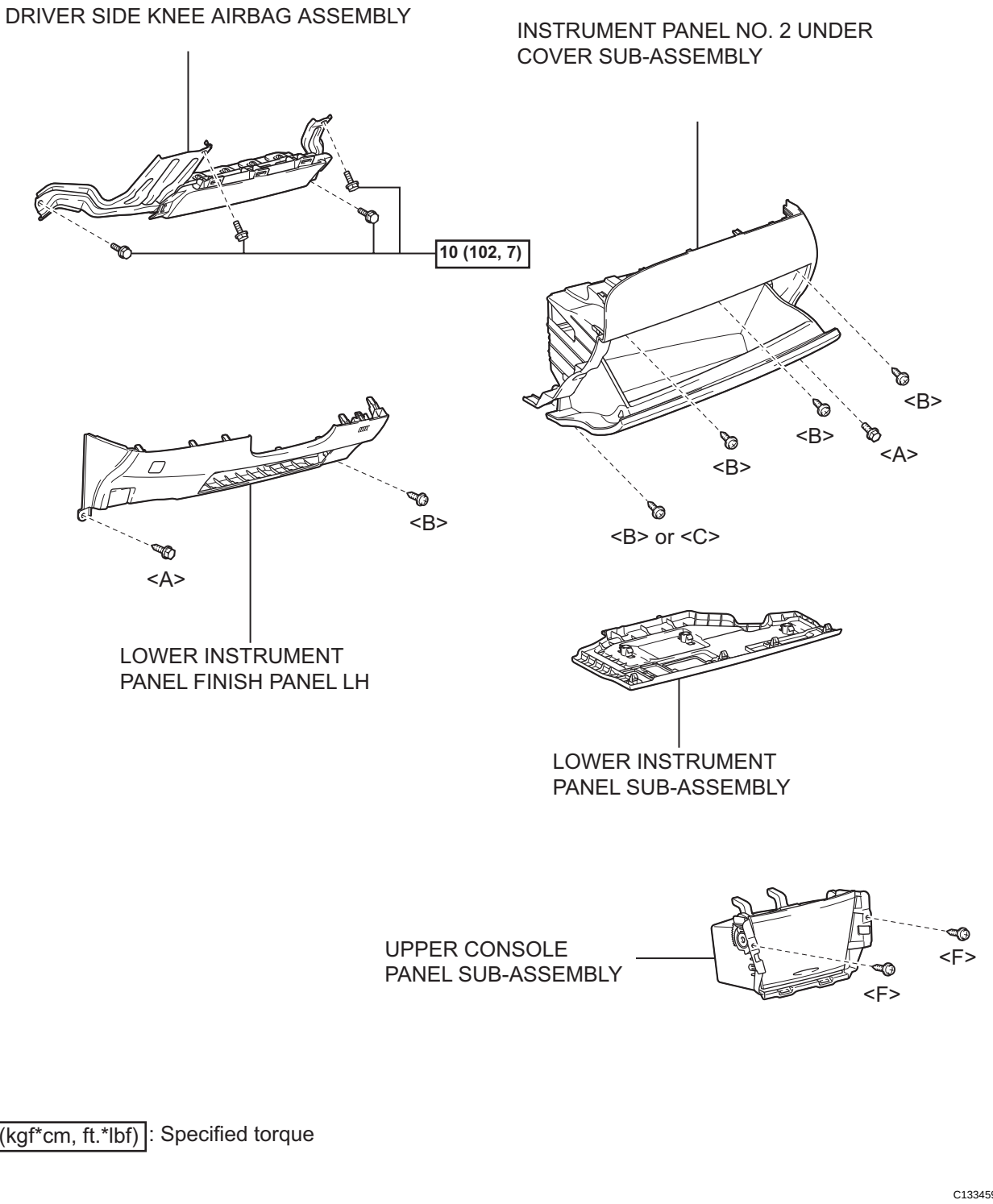


N*m (kgf*cm, ft.*lbf): Specified torque

P

B132047E01

for TMC made:

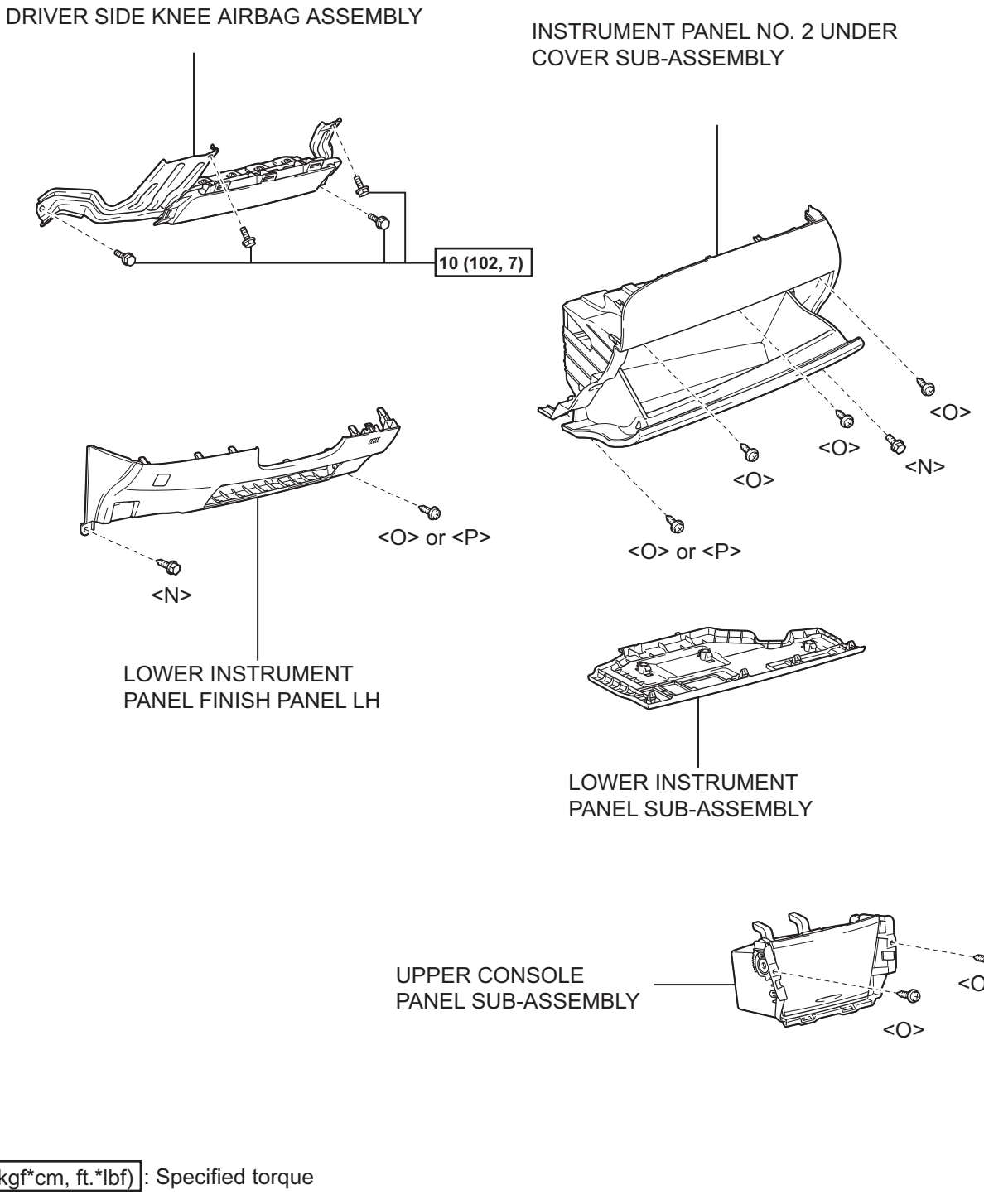


N*m (kgf*cm, ft.*lbf) : Specified torque

C133459E01

PB

for TMMK made:

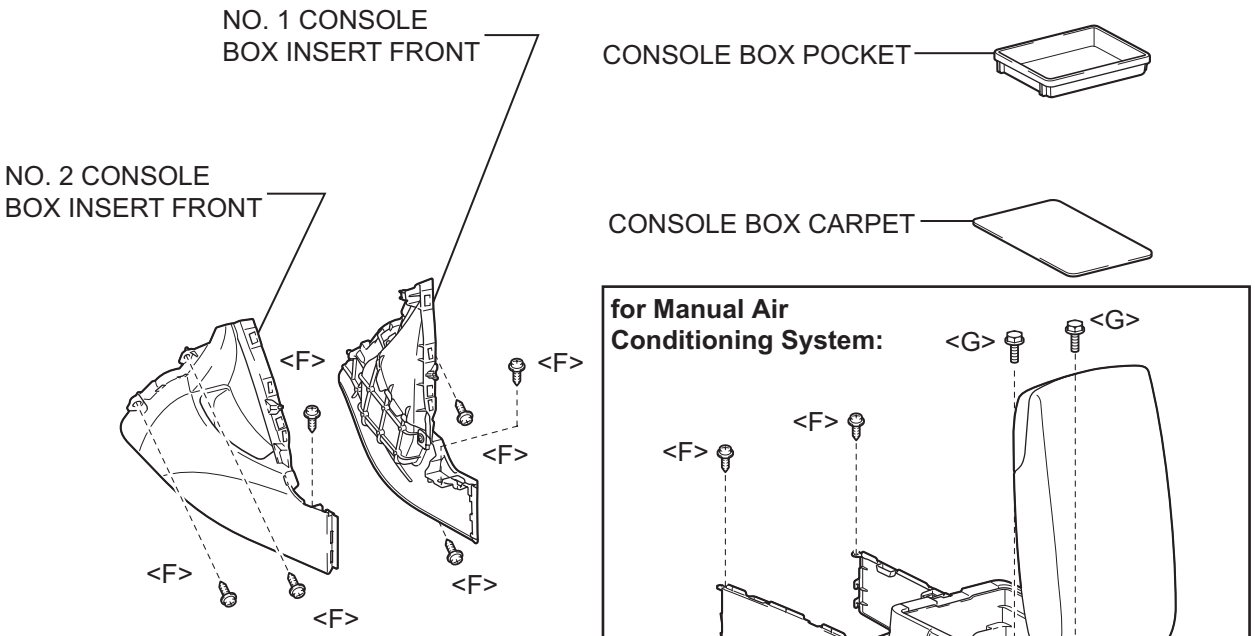


N*m (kgf*cm, ft.*lbf): Specified torque

C133459E02

PB

for TMC made:

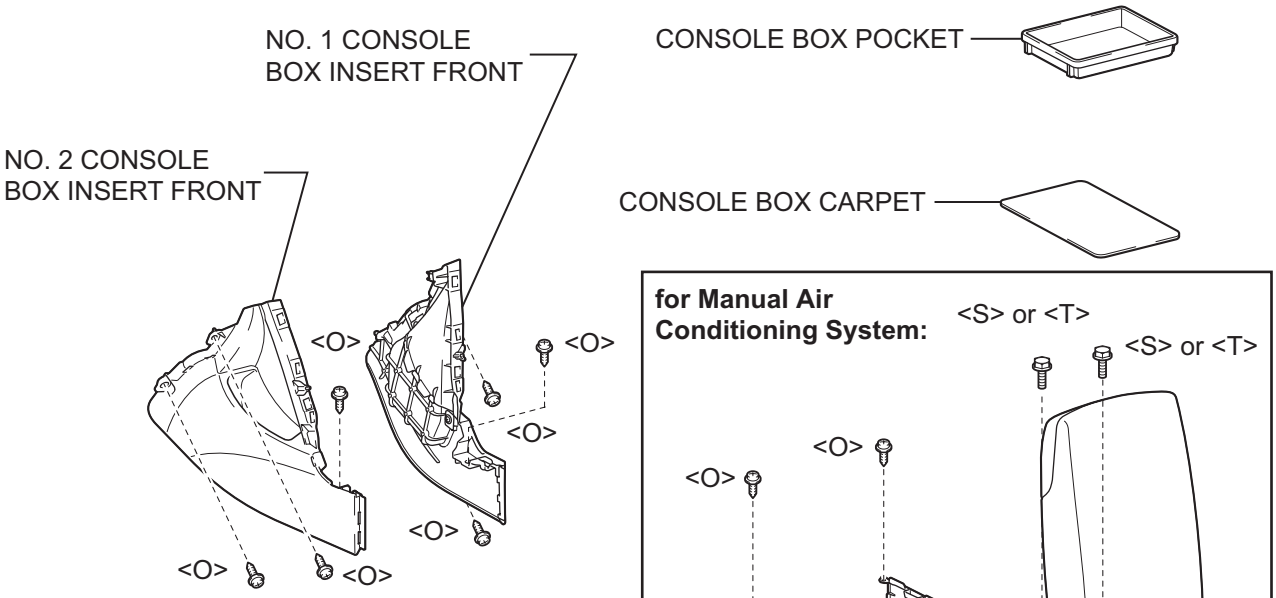


N*m (kgf*cm, ft.*lbf): Specified torque

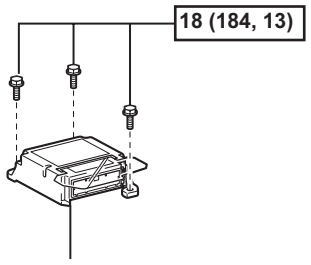
C141956E02

PB

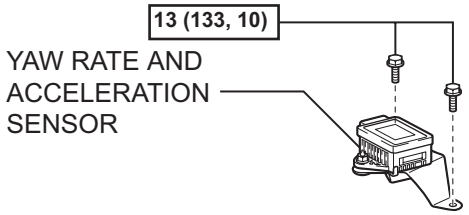
for TMMK made:



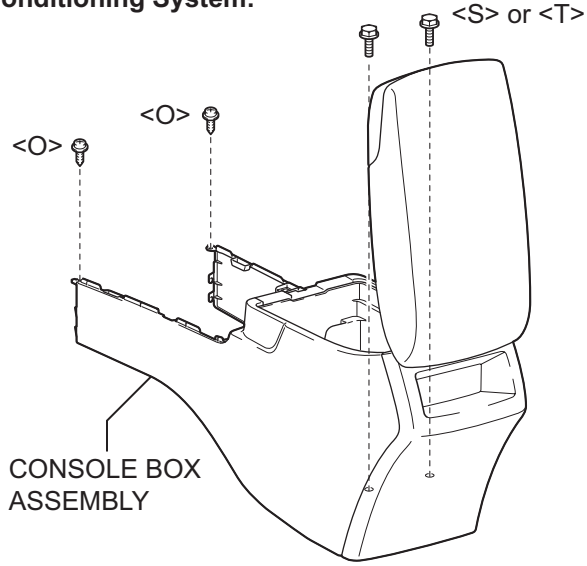
for Automatic Transaxle:



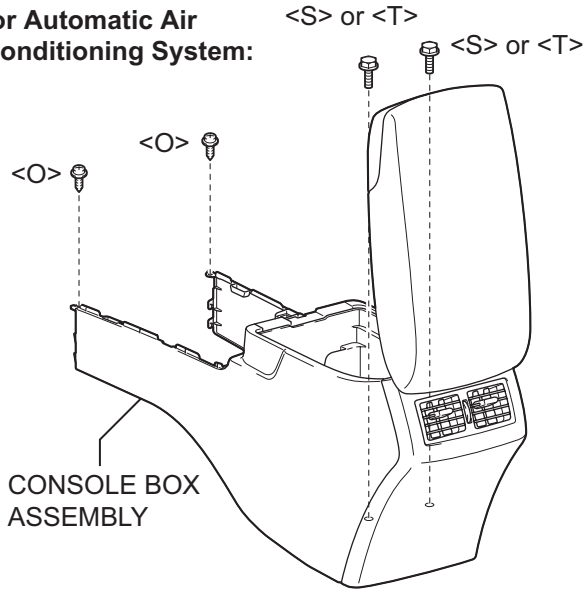
for Automatic Transaxle with VSC:



for Manual Air Conditioning System:



for Automatic Air Conditioning System:

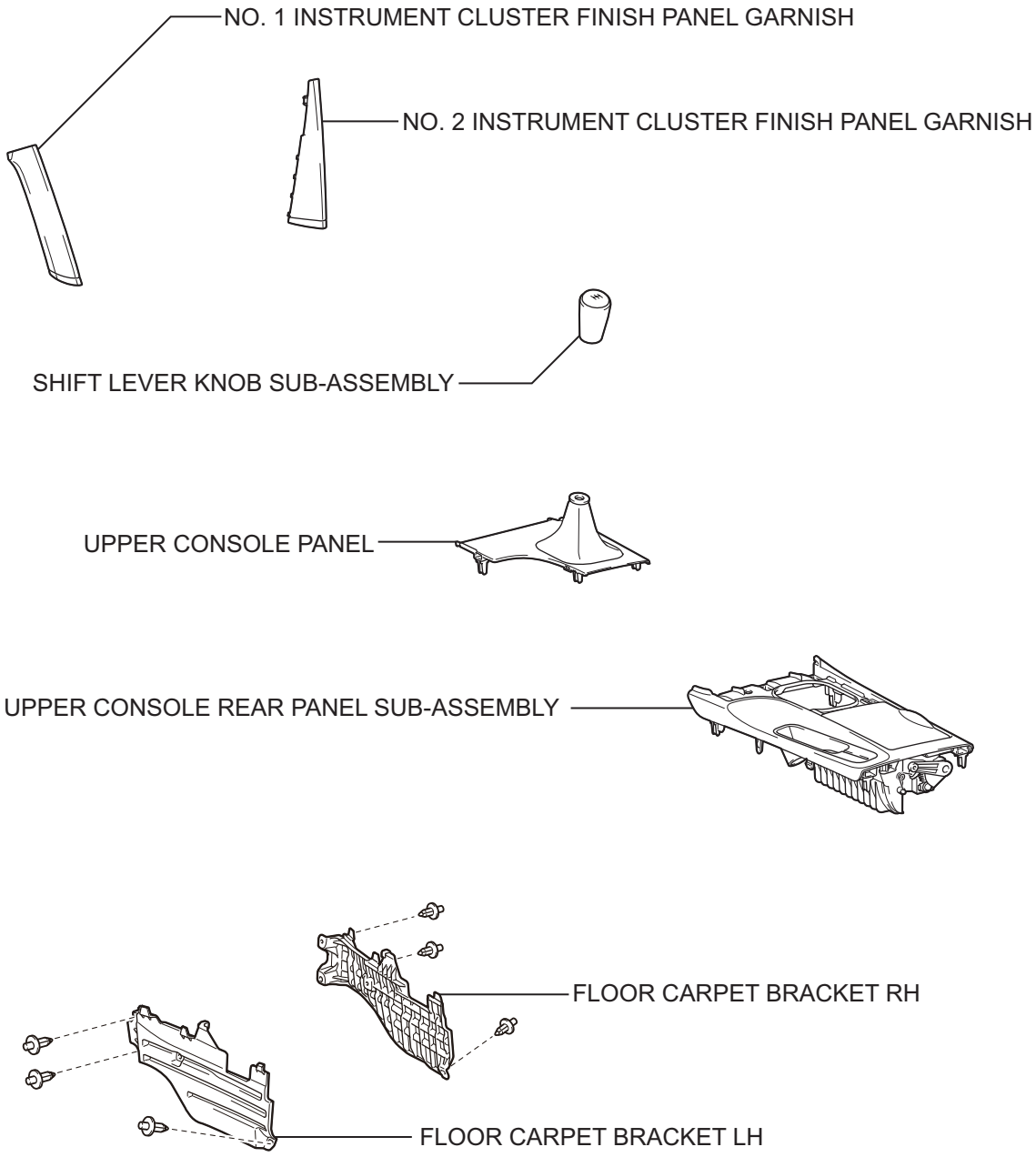


N*m (kgf*cm, ft.*lbf): Specified torque

C141957E02

PB

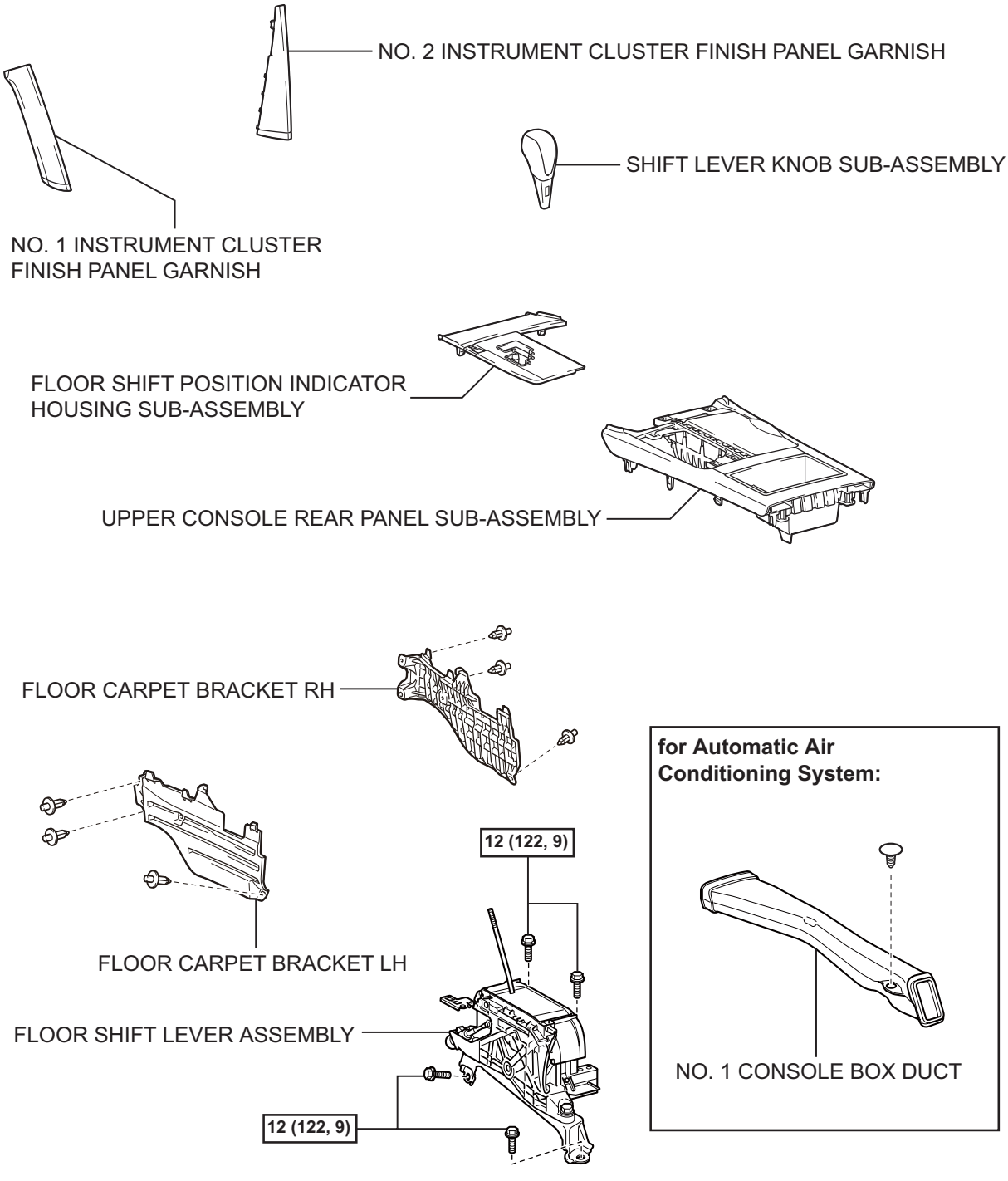
for Manual Transaxle:



C133456E02

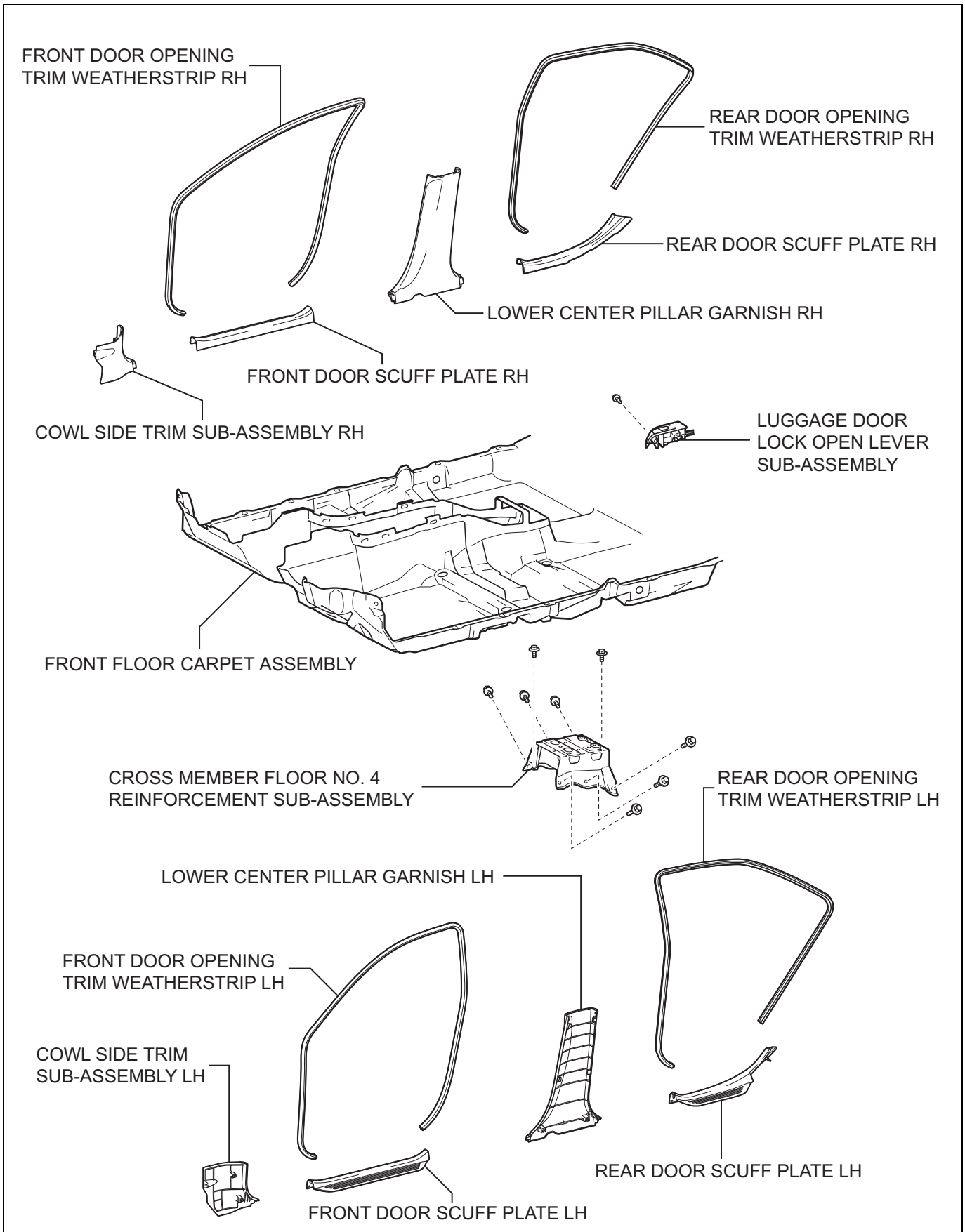
PB

for Automatic Transaxle:



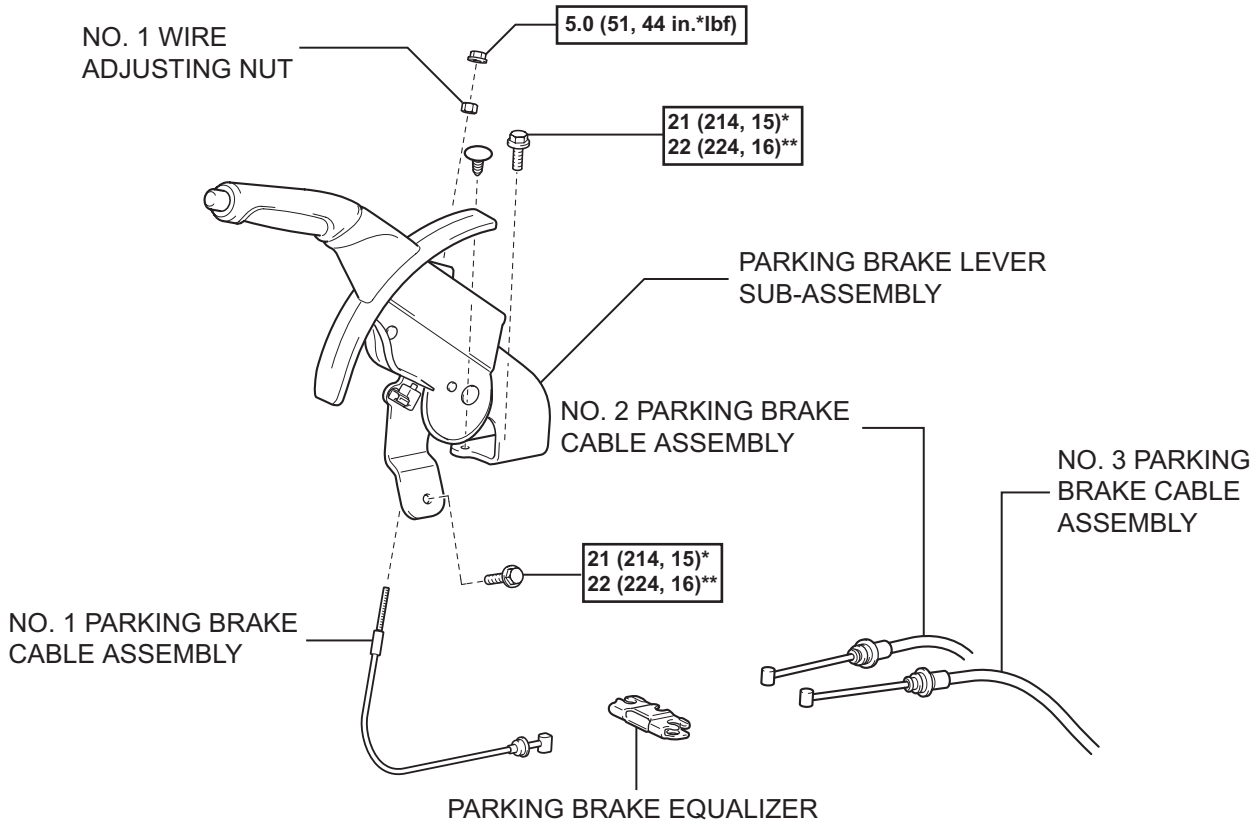
N*m (kgf*cm, ft.*lbf): Specified torque

C133457E03


FRONT DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR SCUFF PLATE RH
LOWER CENTER PILLAR GARNISH RH
FRONT DOOR SCUFF PLATE RH
COWL SIDE TRIM SUB-ASSEMBLY RH
LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY
FRONT FLOOR CARPET ASSEMBLY
CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY
REAR DOOR OPENING TRIM WEATHERSTRIP LH
LOWER CENTER PILLAR GARNISH LH
FRONT DOOR OPENING TRIM WEATHERSTRIP LH
COWL SIDE TRIM SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
FRONT DOOR SCUFF PLATE LH
P
C132673E01

PB

for Manual Transaxle:



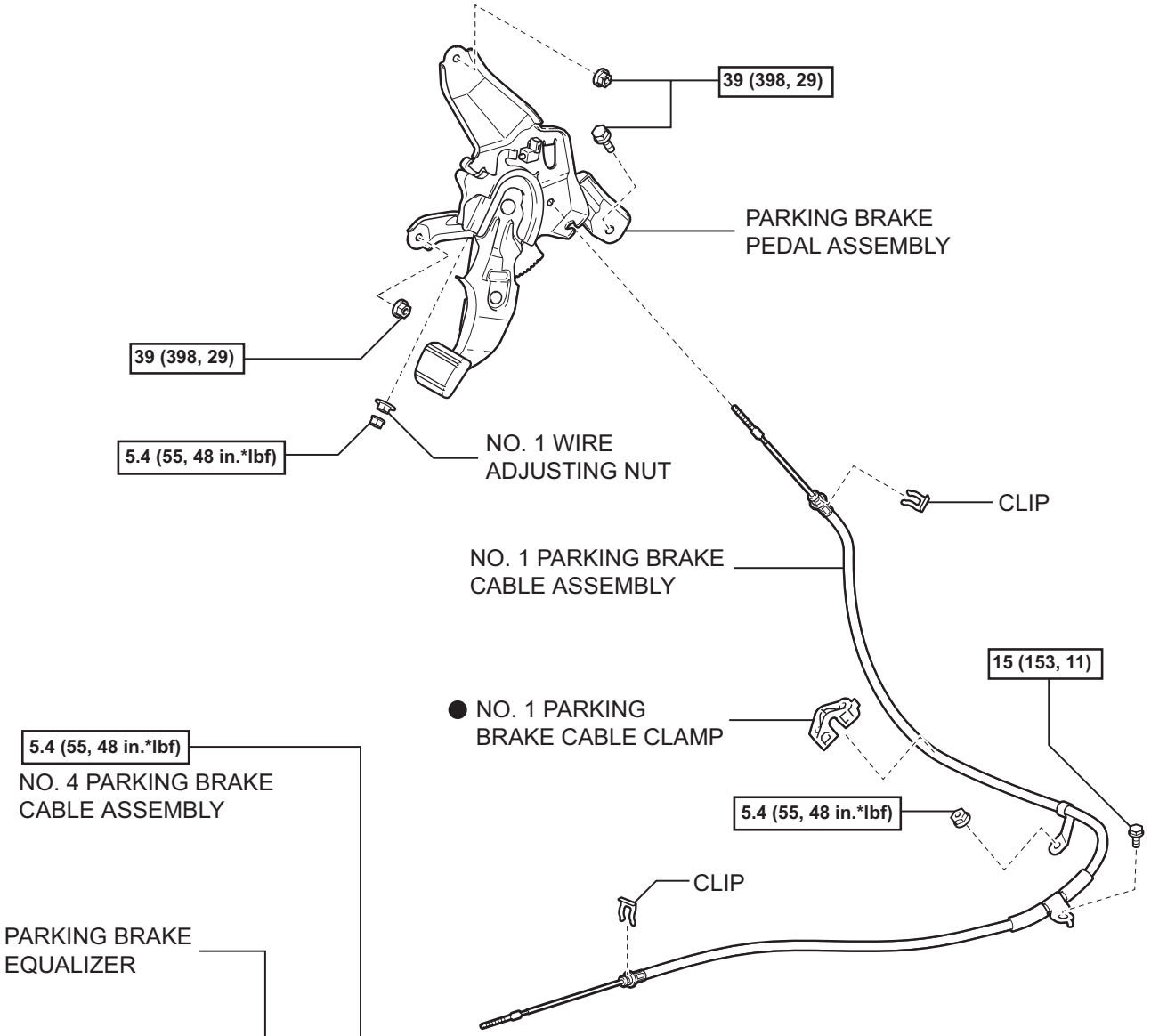
N*m (kgf*cm, ft.*lbf): Specified torque * For TMC made ** For TMMK made

P

C138181E01

PB

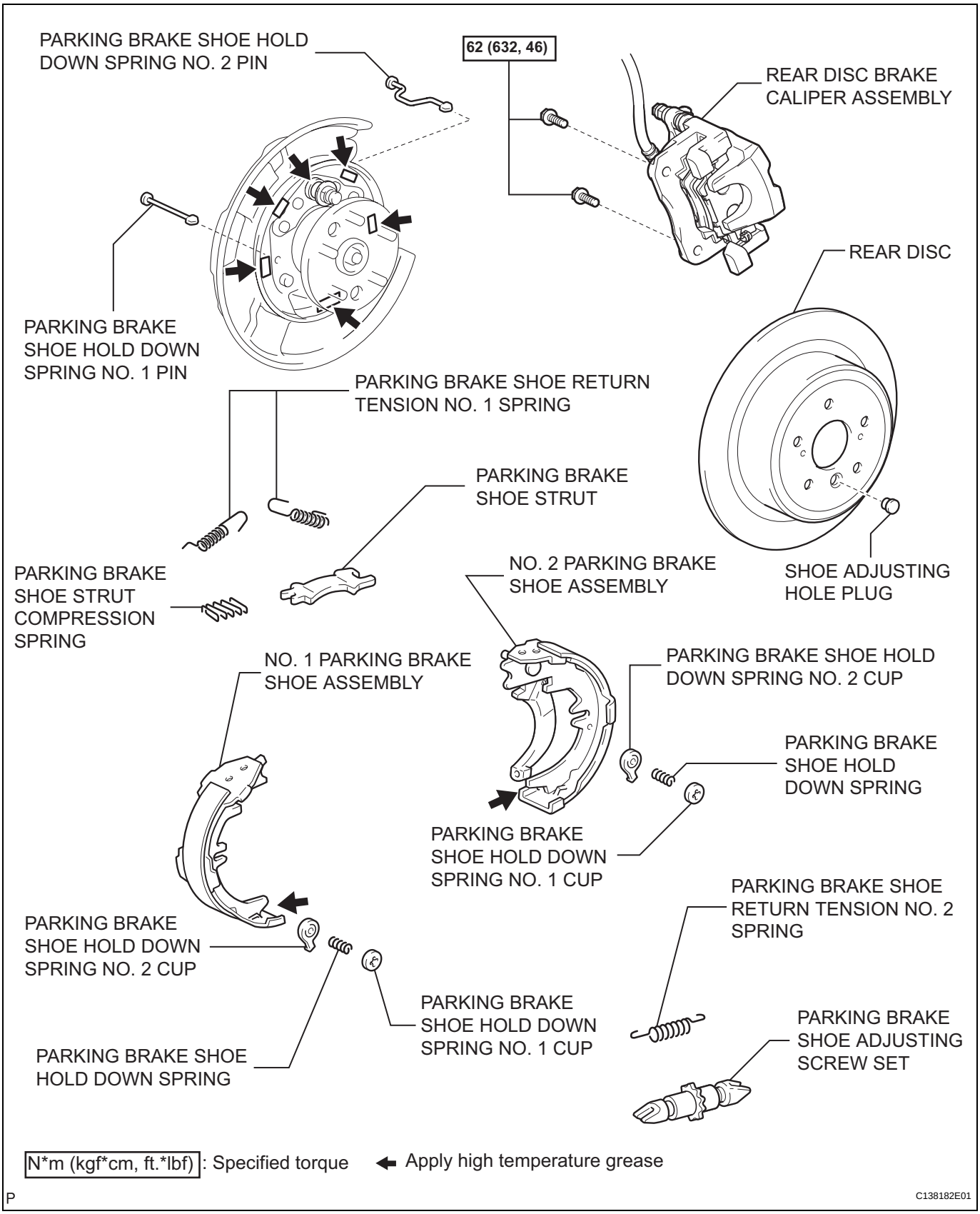
for Automatic Transaxle:



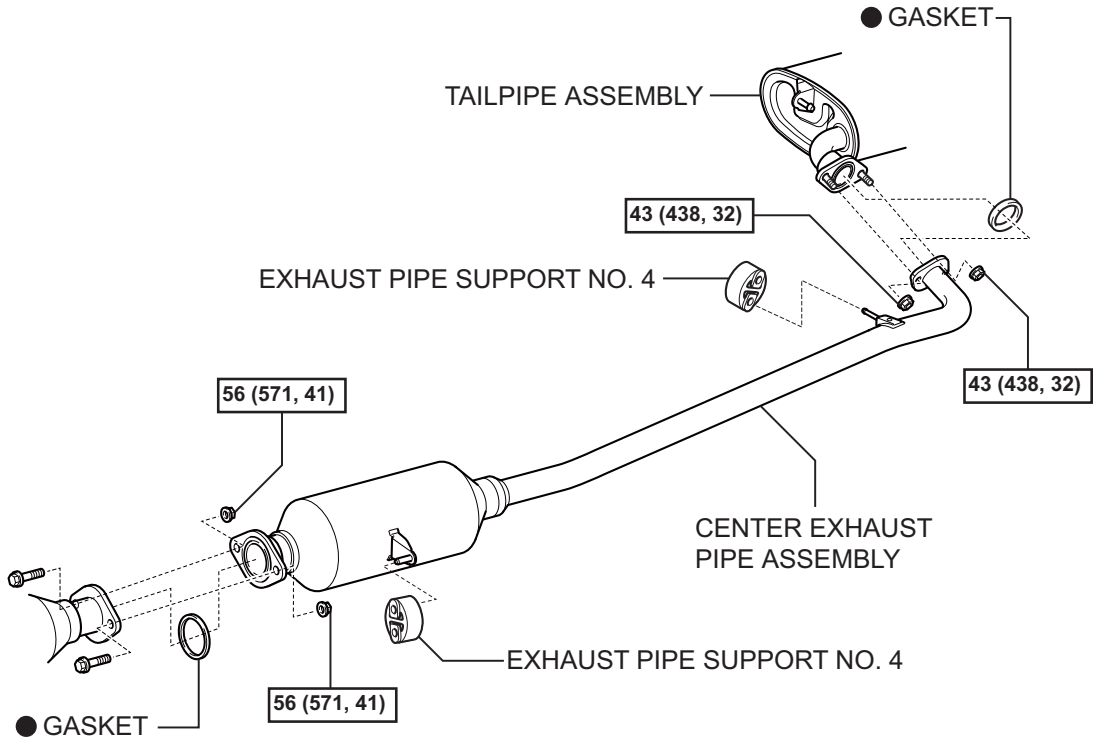
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C138178E01

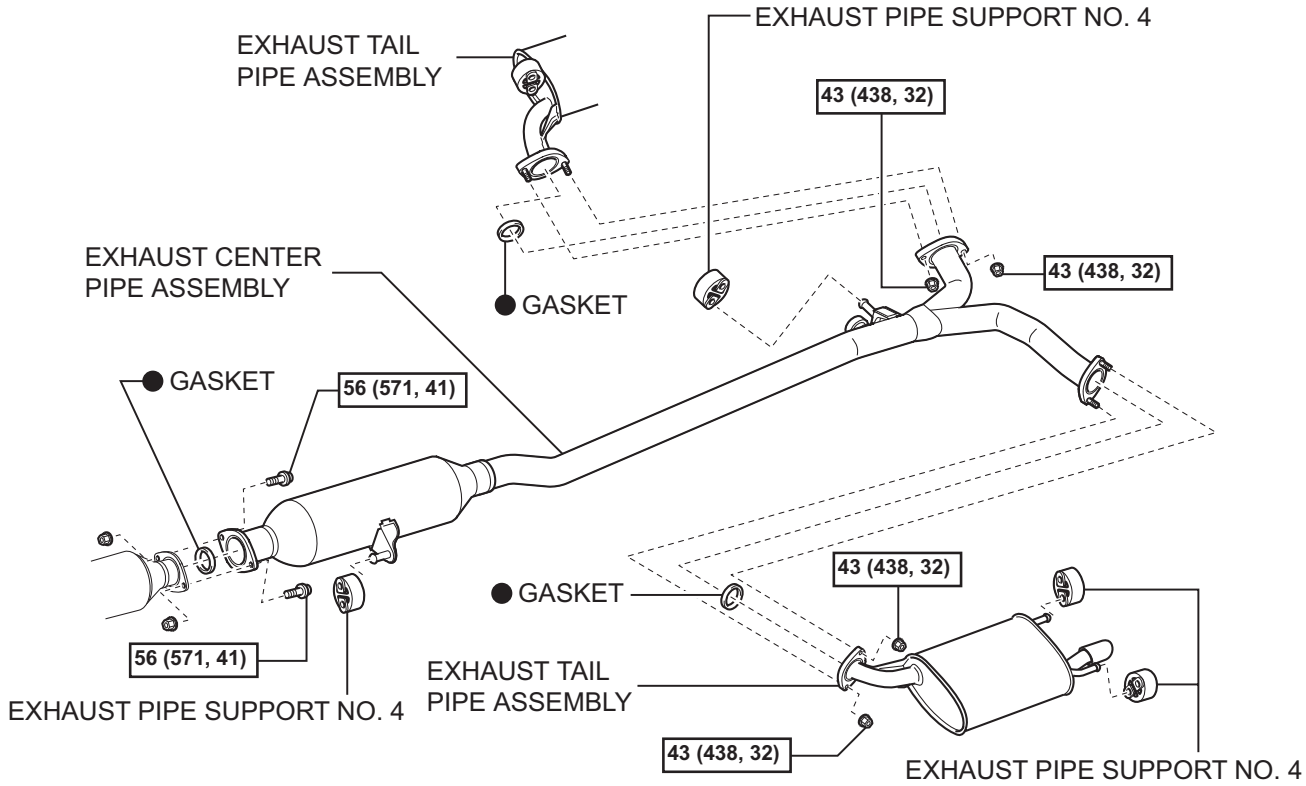
PB


PARKING BRAKE SHOE HOLD DOWN SPRING NO. 2 PIN
62 (632, 46)
REAR DISC BRAKE CALIPER ASSEMBLY
REAR DISC
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 1 PIN
PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING
PARKING BRAKE SHOE STRUT
PARKING BRAKE SHOE STRUT COMPRESSION SPRING
NO. 2 PARKING BRAKE SHOE ASSEMBLY
SHOE ADJUSTING HOLE PLUG
NO. 1 PARKING BRAKE SHOE ASSEMBLY
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 2 CUP
PARKING BRAKE SHOE HOLD DOWN SPRING
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 1 CUP
PARKING BRAKE SHOE RETURN TENSION NO. 2 SPRING
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 2 CUP
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 1 CUP
PARKING BRAKE SHOE HOLD DOWN SPRING
PARKING BRAKE SHOE ADJUSTING SCREW SET
N*m (kgf*cm, ft.*lbf): Specified torque
Apply high temperature grease
P
C138182E01

for 2AZ-FE:



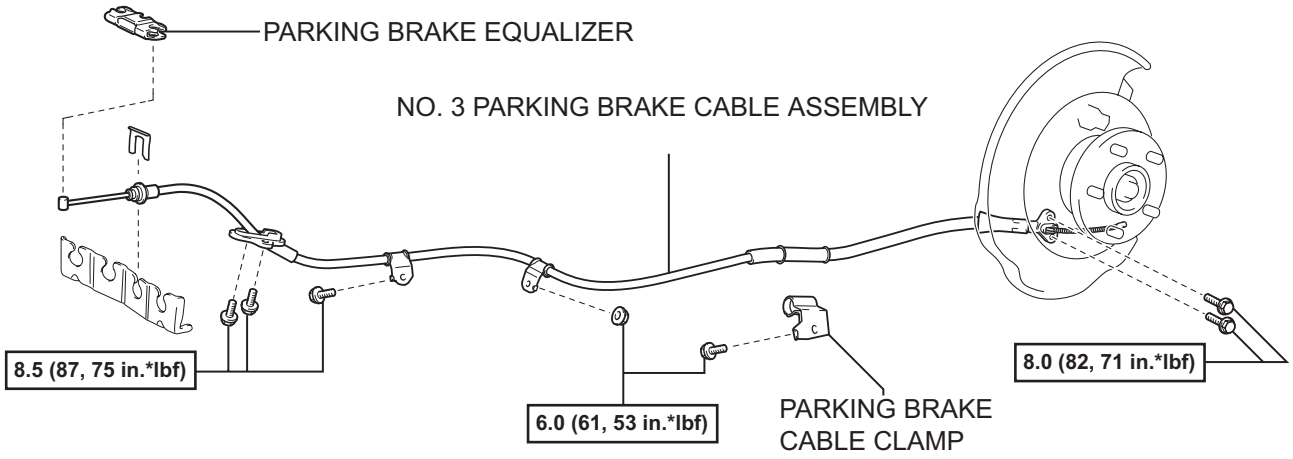
for 2GR-FE:



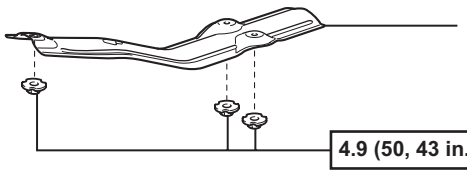
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C138183E01

PB



for 2AZ-FE:



N*m (kgf*cm, ft.*lbf) : Specified torque

P

C131895E01

PB

REMOVAL

HINT:

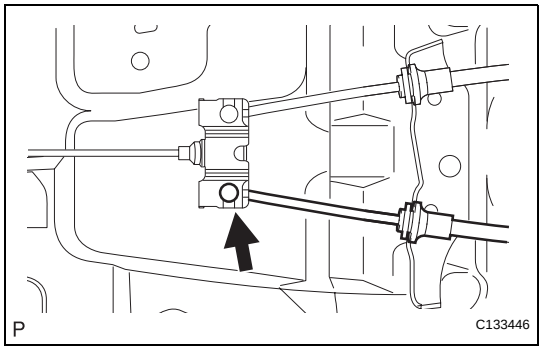
- Use the same procedures for the No. 2 parking brake cable assembly and No. 3 parking brake cable assembly.
- The procedures listed below are for the No. 3 parking brake cable assembly.

1. **PRECAUTION**
   (See page IP-20)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent the airbag working. (See page RS-1)
3. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat)**
   HINT:
   Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-16)
4. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side.
5. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat)**
   HINT:
   Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-30)
6. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side.
7. **REMOVE PARKING BRAKE LEVER SUB-ASSEMBLY (for Manual Transaxle)**
   HINT:
   Refer to the procedures up to "REMOVE PARKING BRAKE LEVER". (See page PB-11)
8. **REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Manual Transaxle) (See page PB-15)**
9. **REMOVE PARKING BRAKE PEDAL ASSEMBLY (for Automatic Transaxle)**
   HINT:
   Refer to the procedures up to "REMOVE PARKING BRAKE PEDAL". (See page PB-27)
10. **REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle) (See page PB-30)**

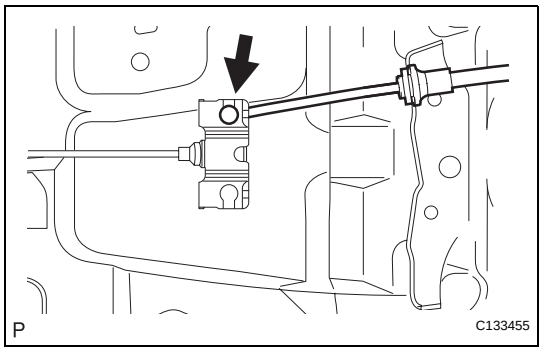
11. **REMOVE LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-13)**

12. **REMOVE FRONT FLOOR CARPET ASSEMBLY (for Automatic Transaxle) (See page PB-14)**

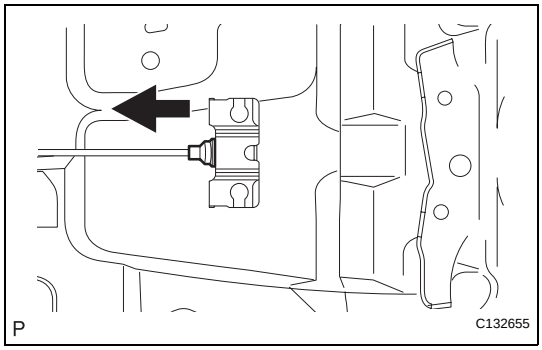
13. **REMOVE CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-14)**



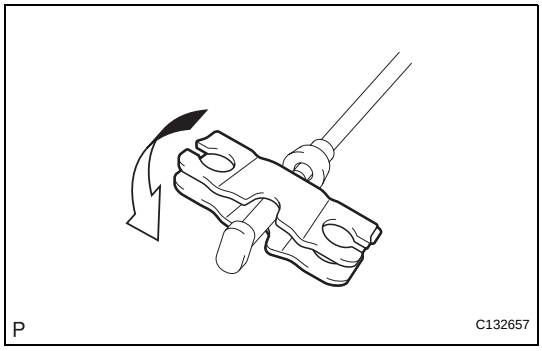
14. **SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Separate the No. 3 parking brake cable assembly from the parking brake equalizer.



15. **SEPARATE NO. 2 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Separate the No. 2 parking brake cable assembly from the parking brake equalizer.



16. **REMOVE NO. 4 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Slide the rubber boot as shown in the illustration.

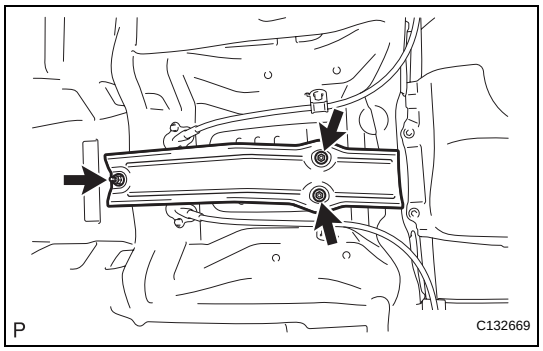


    (b) Remove the No. 4 parking brake cable assembly from the parking brake equalizer as shown in the illustration.

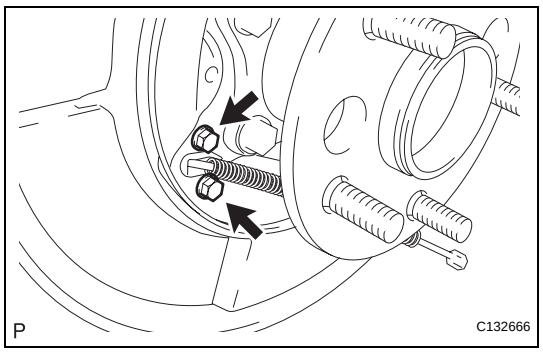
17. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-2)**

18. **REMOVE EXHAUST TAIL PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**

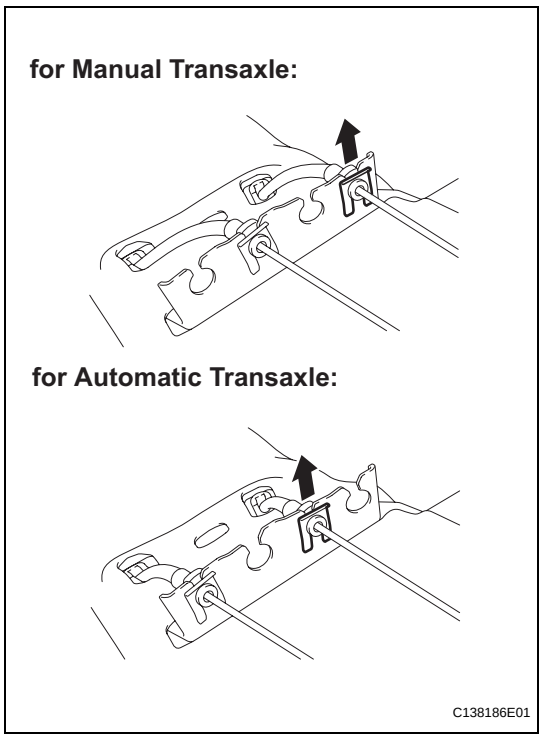
19. **REMOVE EXHAUST CENTER PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**



20. **REMOVE NO. 2 FRONT FLOOR HEAT LOWER INSULATOR (for 2AZ-FE)**
    (a) Remove the 3 nuts and the No. 2 front floor heat lower insulator.
21. **REMOVE REAR WHEEL**
22. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (See page PB-58)**
23. **REMOVE REAR DISC (See page PB-58)**
24. **REMOVE PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING (See page PB-58)**
25. **REMOVE PARKING BRAKE SHOE STRUT (See page PB-58)**
26. **REMOVE NO. 1 PARKING BRAKE SHOE ASSEMBLY (See page PB-58)**
27. **REMOVE PARKING BRAKE SHOE ADJUSTING SCREW SET (See page PB-59)**
28. **REMOVE NO. 2 PARKING BRAKE SHOE ASSEMBLY (See page PB-59)**
29. **REMOVE NO. 3 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the 2 bolts and separate the No. 3 parking brake cable assembly from the backing plate.

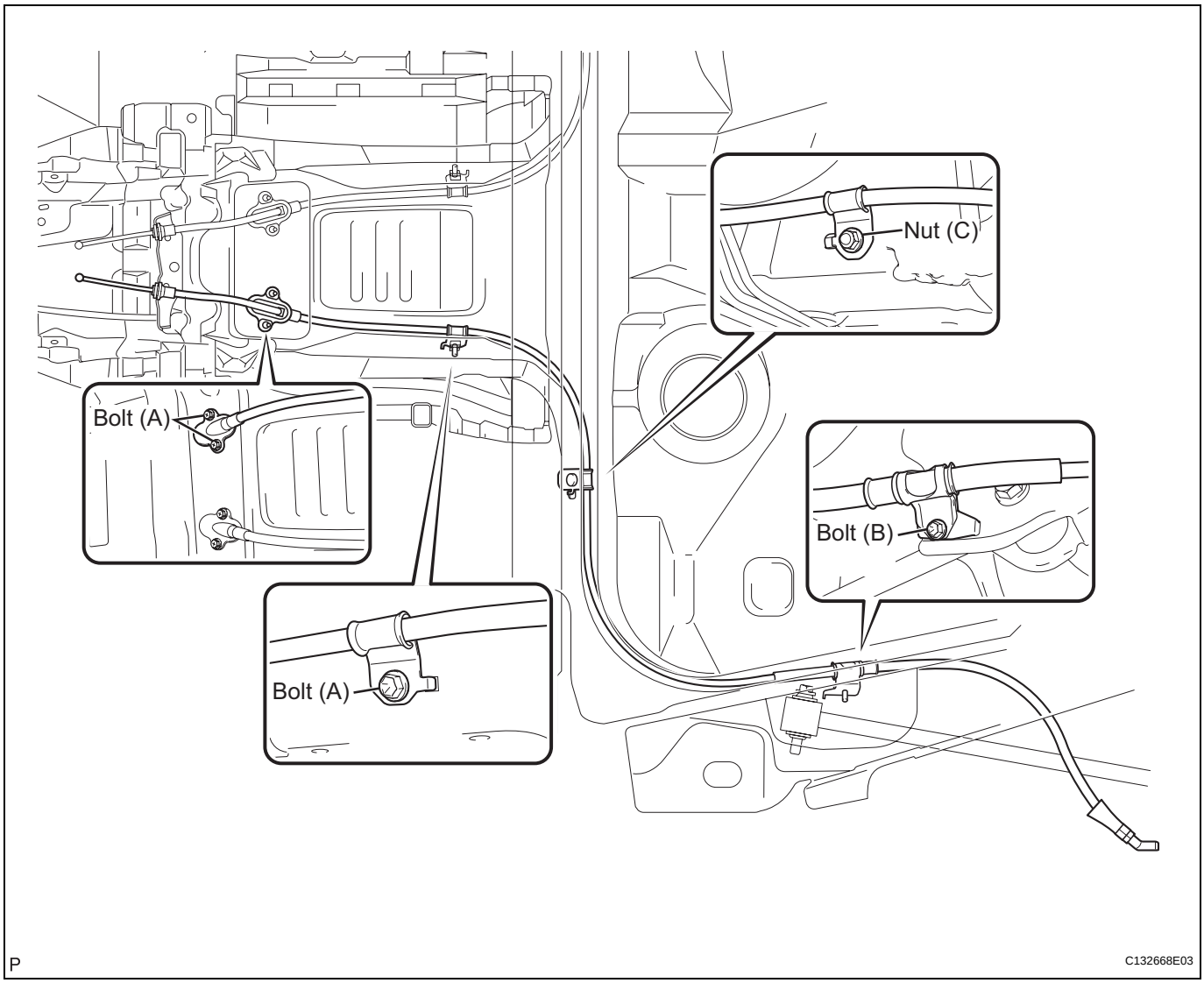


(b) Using needle-nose pliers, remove the clip from the No. 3 parking brake cable assembly.



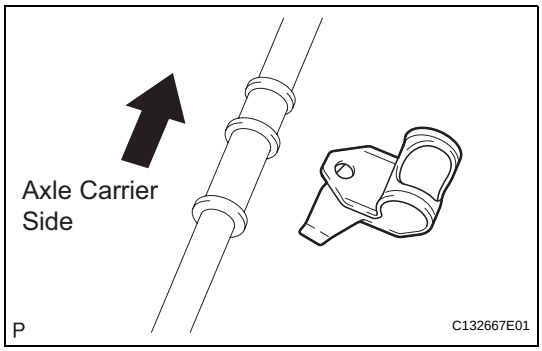
PB

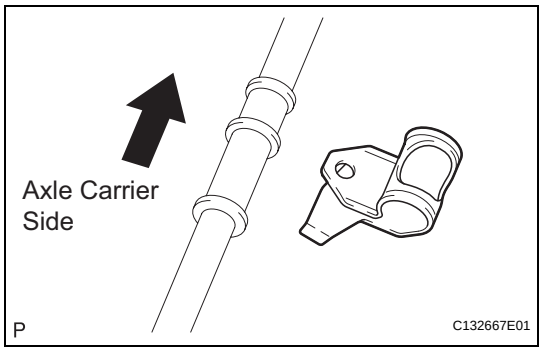
(c) Remove the 3 bolts (A), the bolt (B), and the nut (C), and disengage each claw.



(d) Remove the No. 3 parking brake cable assembly from the body.

(e) Remove the parking brake cable clamp.





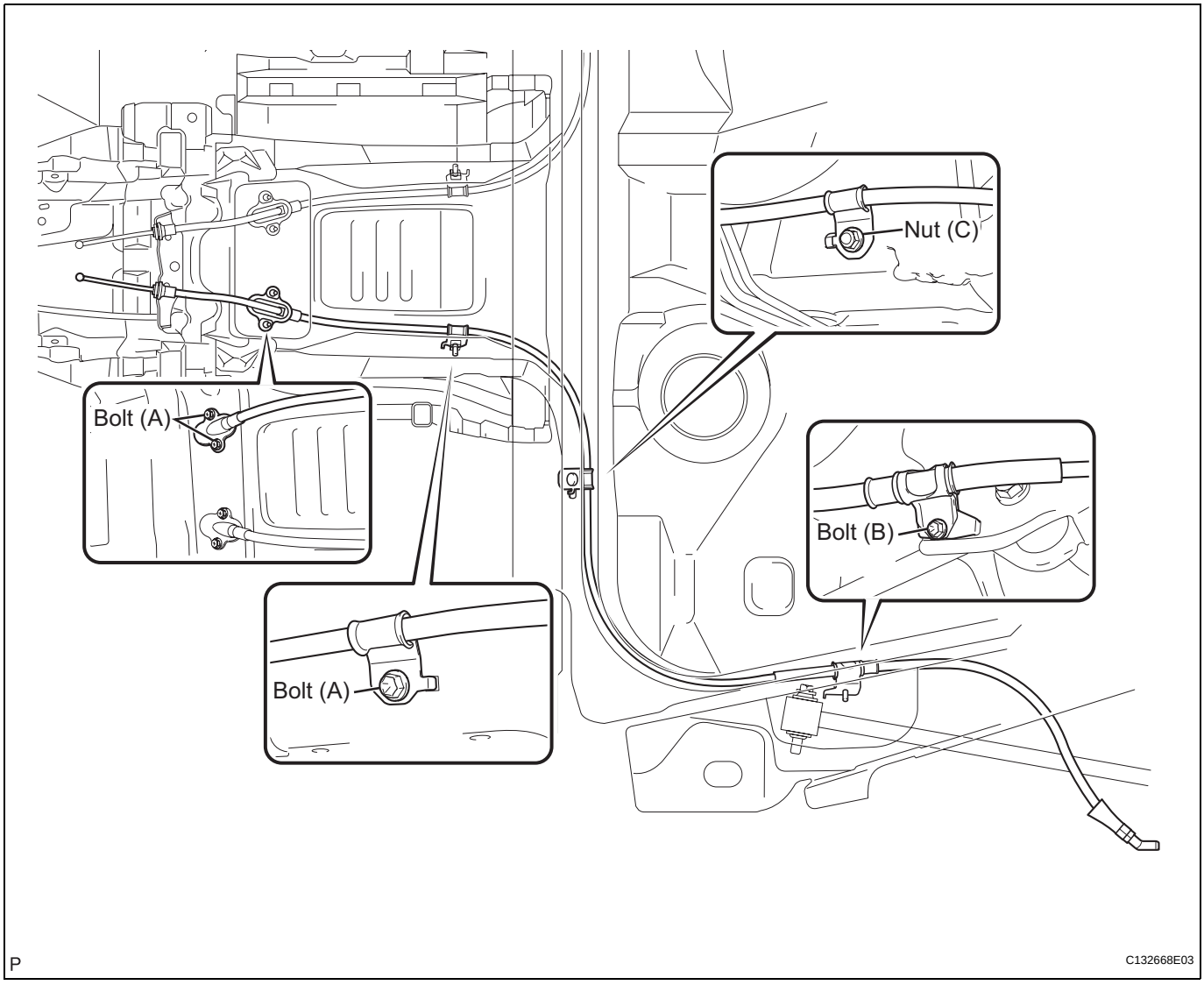
INSTALLATION

1. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

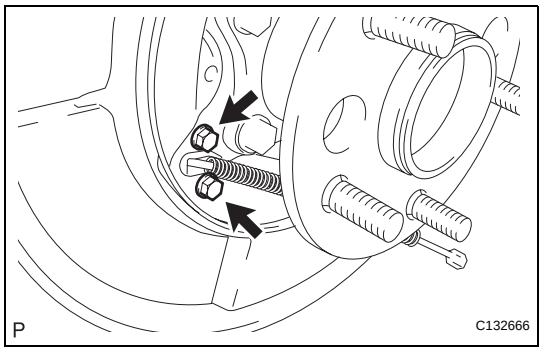
(a) Install the parking brake cable clamp to the No. 3 parking brake cable assembly.

(b) Install the No. 3 parking brake cable assembly with the 3 bolts (A), the bolt (B) and the nut (C), and engage each claw.

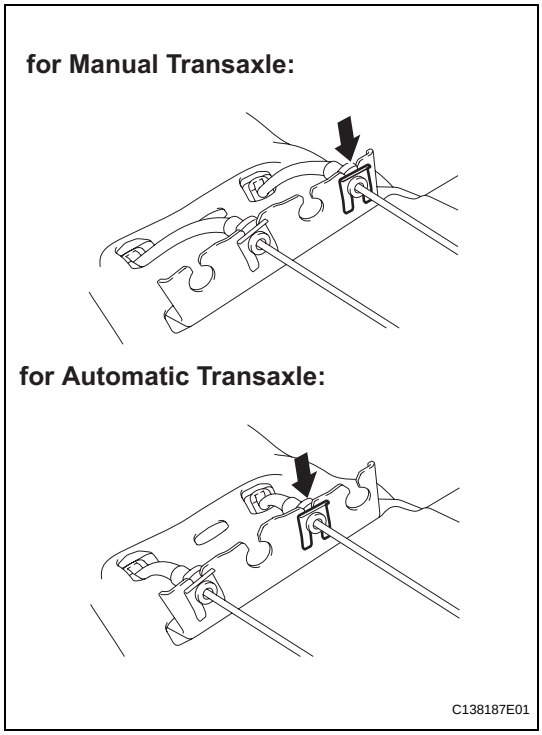
Torque: Bolt (A)
8.5 N*m (87 kgf*cm, 75 in.*lbf)
Bolt (B) and Nut (C)
6.0 N*m (61 kgf*cm, 53 in.*lbf)



PB

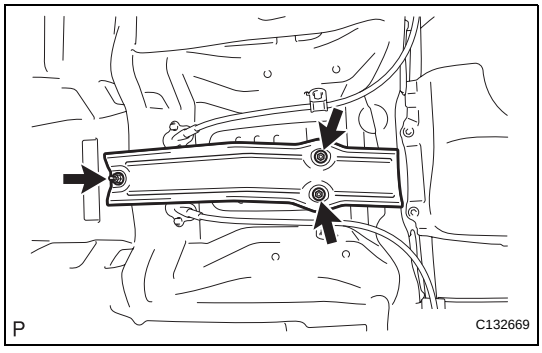


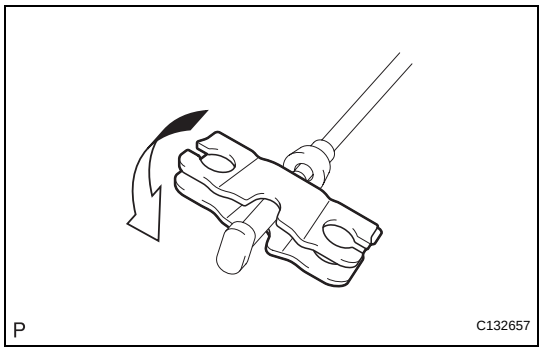
(c) Install the No. 3 parking brake cable assembly to the backing plate with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



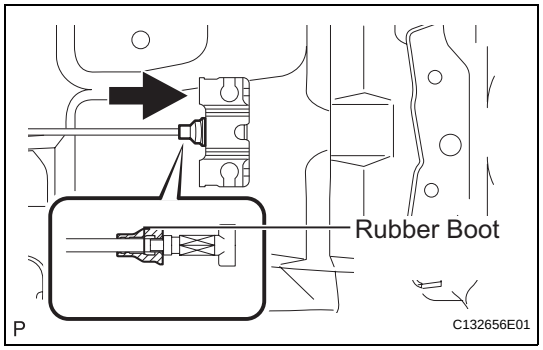
(d) Using a brass bar and a hammer, install the clip to the No. 3 parking brake cable assembly.

2. **INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY (See page PB-61)**
3. **INSTALL PARKING BRAKE SHOE ADJUSTING SCREW SET (See page PB-62)**
4. **INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY (See page PB-62)**
5. **INSTALL PARKING BRAKE SHOE STRUT (See page PB-62)**
6. **INSTALL PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING (See page PB-62)**
7. **CHECK PARKING BRAKE INSTALLATION (See page PB-63)**
8. **INSTALL REAR DISC (See page PB-63)**
9. **ADJUST PARKING BRAKE SHOE CLEARANCE (See page PB-63)**
10. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page PB-63)**
11. **INSTALL REAR WHEEL**
12. **INSTALL NO. 2 FRONT FLOOR HEAT LOWER INSULATOR (for 2AZ-FE)**
    (a) Install the No. 2 front floor heat lower insulator with the 3 nuts.
    Torque: 4.9 N*m (50 kgf*cm, 43 in.*lbf)
13. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-4)**
14. **INSTALL EXHAUST CENTER PIPE ASSEMBLY (for 2GR-FE) (See page EX-4)**
15. **INSTALL EXHAUST TAIL PIPE ASSEMBLY (for 2GR-FE) (See page EX-5)**

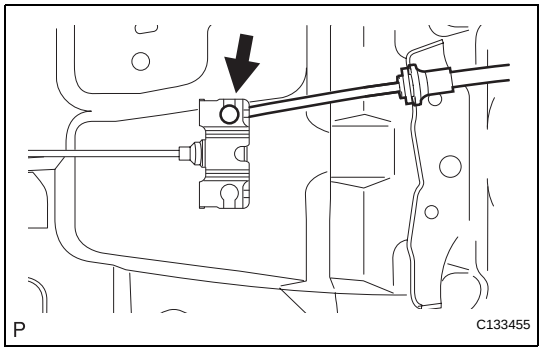




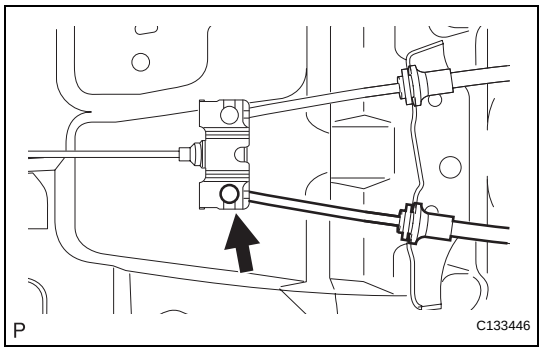
16. **INSTALL NO. 4 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Install the No. 4 parking brake cable assembly to the parking brake equalizer.



    (b) Slide the rubber boot back as shown in the illustration.



17. **CONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Connect the No. 2 parking brake cable assembly to the parking brake equalizer.



18. **CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Connect the No. 3 parking brake cable assembly to the parking brake equalizer.

19. **INSTALL CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-18)**

20. **INSTALL FRONT FLOOR CARPET ASSEMBLY (for Automatic Transaxle) (See page PB-18)**

21. **INSTALL LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-18)**

22. **INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Manual Transaxle) (See page PB-16)**

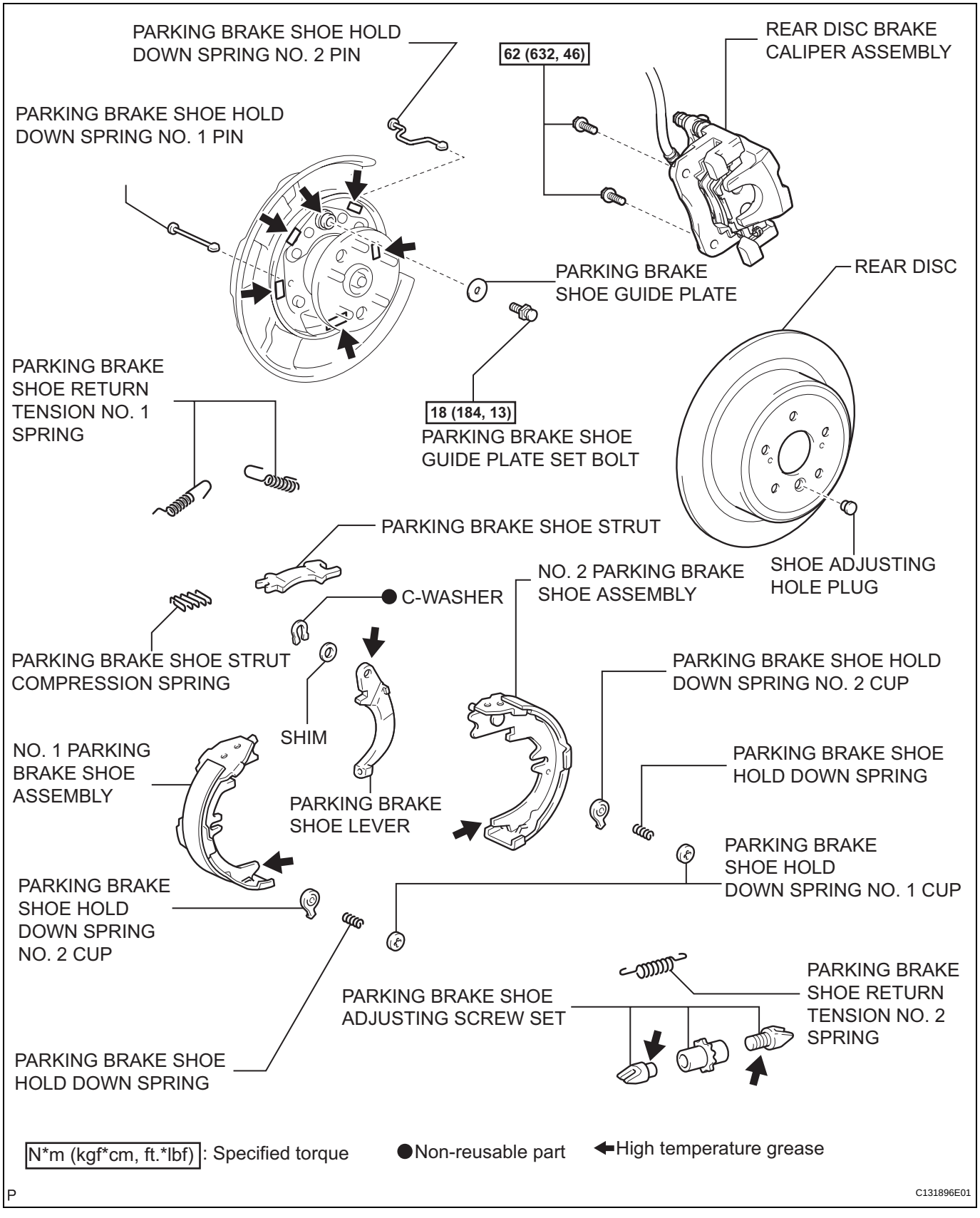
23. **INSTALL PARKING BRAKE LEVER SUB-ASSEMBLY (for Manual Transaxle)**
    HINT:
    Refer to the procedures up to "INSTALL PARKING BRAKE LEVER". (See page PB-17)

PB

24. **INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle) (See page PB-31)**
25. **INSTALL PARKING BRAKE PEDAL ASSEMBLY (for Automatic Transaxle)**
    HINT:
    Refer to the procedures up to "INSTALL PARKING BRAKE PEDAL". (See page PB-32)
26. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-24)
27. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
28. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-41)
29. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
30. **INSPECT PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)**
31. **INSPECT PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)**
32. **ADJUST PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)**
33. **ADJUST PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)**
34. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
35. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
    HINT:
    (See page RS-242)
36. **INSPECT SRS WARNING LIGHT**
37. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**
38. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-42)**
39. **CHECK FOR EXHAUST GAS LEAKS (See page EX-5)**

PARKING BRAKE ASSEMBLY

COMPONENTS



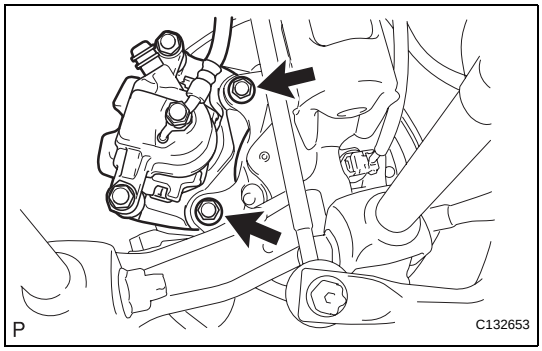
PB

DISASSEMBLY

HINT:

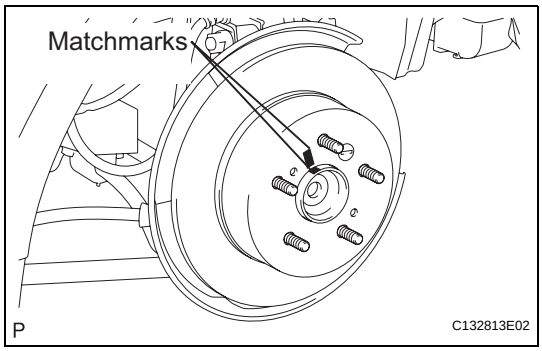
- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.

1. REMOVE REAR WHEEL



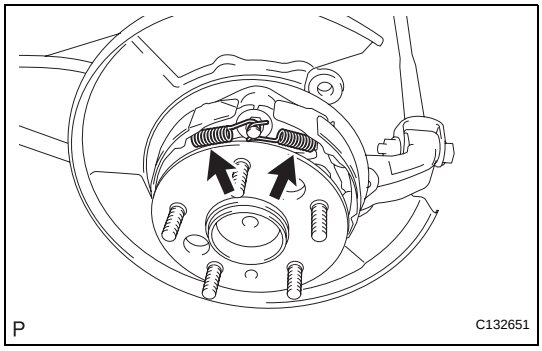
2. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY

(a) Remove the 2 bolts and separate the rear disc brake caliper assembly.
HINT:
Do not disconnect the flexible hose from the disc brake caliper assembly.



3. REMOVE REAR DISC

(a) Release the parking brake and place the matchmarks on the rear disc and the axle hub.
(b) Remove the rear disc.
HINT:
If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.

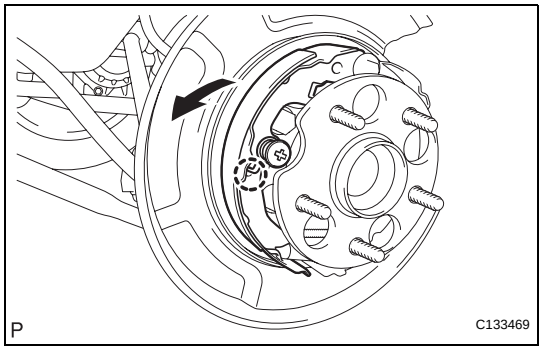


4. REMOVE PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING

(a) Using needle-nose pliers, remove the 2 parking brake shoe return tension No. 1 springs.

5. REMOVE PARKING BRAKE SHOE STRUT

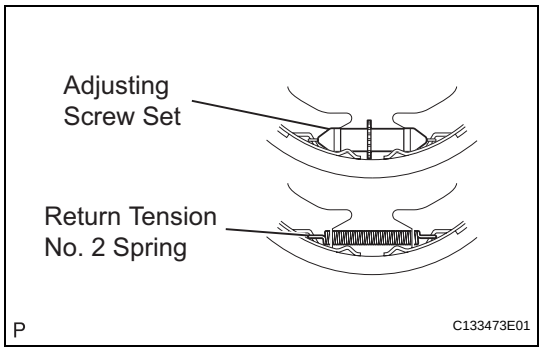
(a) Remove the parking brake shoe strut and the parking brake shoe strut compression spring.



6. REMOVE NO. 1 PARKING BRAKE SHOE ASSEMBLY

(a) Release the claw of the parking brake shoe hold down spring No. 1 cup.
(b) Remove the No. 1 parking brake shoe assembly as shown in the illustration.
(c) Remove the parking brake shoe hold down spring No. 1 cup, the parking brake shoe hold down spring, the parking brake shoe hold down spring No. 2 cup, and the parking brake shoe hold down spring No. 1 pin.

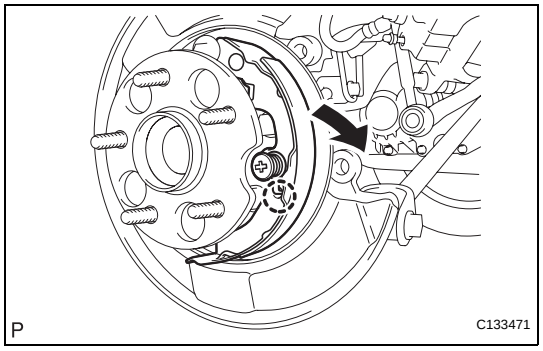
PB



7. REMOVE PARKING BRAKE SHOE ADJUSTING SCREW SET

(a) Remove the parking brake shoe adjusting screw set.

(b) Remove the parking brake shoe return tension No. 2 spring.

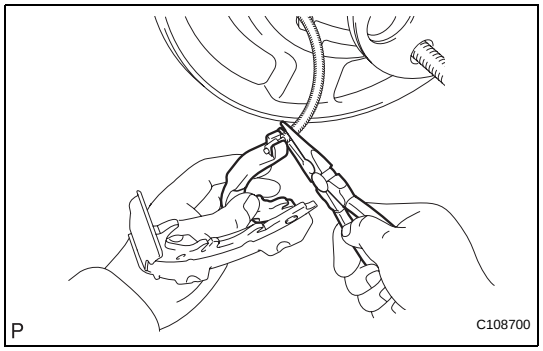


8. REMOVE NO. 2 PARKING BRAKE SHOE ASSEMBLY

(a) Release the claw of the the parking brake shoe hold down spring No. 1 cup.

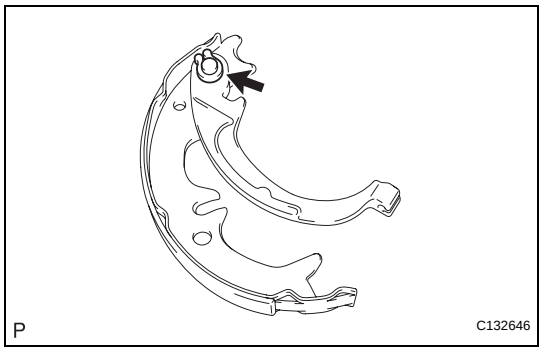
(b) Remove the No. 2 parking brake shoe assembly as shown in the illustration.

(c) Remove the parking brake shoe hold down spring No. 1 cup, the parking brake shoe hold down spring, the parking brake shoe hold down spring No. 2 cup, and the parking brake shoe hold down spring No. 2 pin.



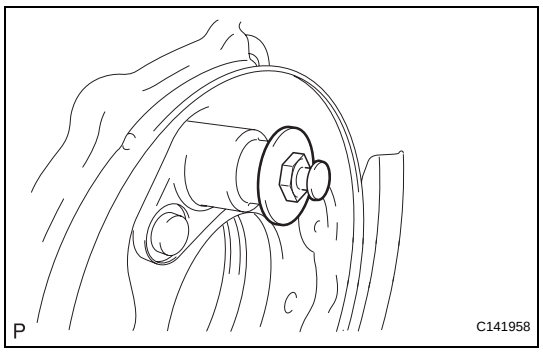
(d) Using needle-nose pliers, disconnect the No. 3 parking brake cable assembly from the parking brake shoe lever.

NOTICE:
Be careful not to damage the No. 3 parking brake cable assembly.



9. REMOVE PARKING BRAKE SHOE LEVER

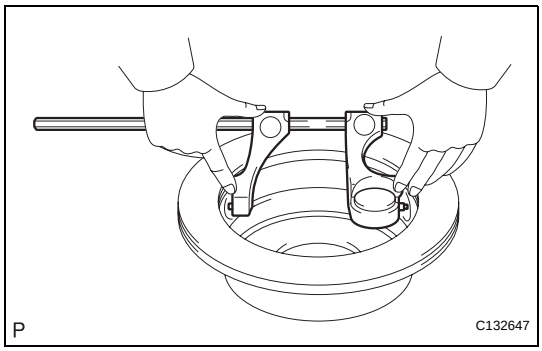
(a) Using a screwdriver, remove the C-washer, shim and the parking brake shoe lever.



10. REMOVE PARKING BRAKE SHOE GUIDE PLATE

(a) Remove the parking brake shoe guide plate set bolt and the parking brake shoe guide plate.

PB



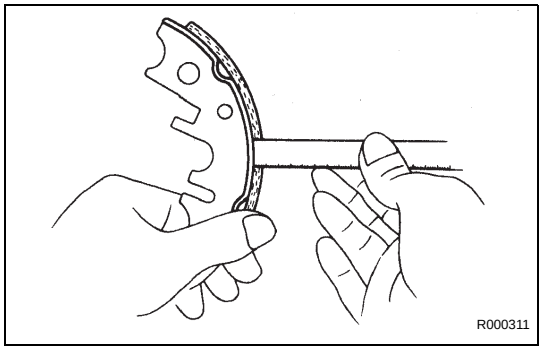
INSPECTION

1. INSPECT BRAKE DISC INSIDE DIAMETER

(a) Using a brake drum gauge or an equivalent tool, measure the inside diameter of the disc.

Standard inside diameter:
170 mm (6.69 in.)
Maximum inside diameter:
171 mm (6.73 in.)

If the inside diameter is more than the maximum, replace the disc.



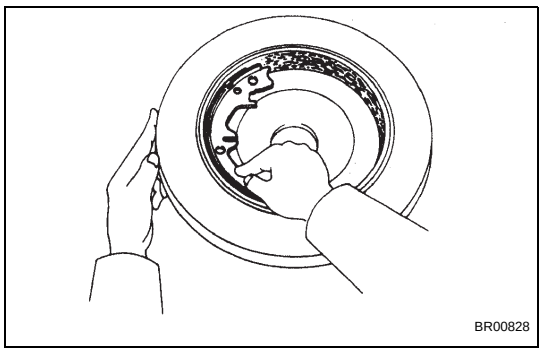
2. INSPECT PARKING BRAKE SHOE LINING THICKNESS

(a) Using a ruler, measure the thickness of the shoe lining.

Standard thickness:
2.0 mm (0.079 in.)
Minimum thickness:
1.0 mm (0.039 in.)

If the lining thickness is less than the minimum, or if there is severe or uneven wear, replace the brake shoe.

NOTICE:
Always replace both the right and left parking brake shoes together.



3. INSPECT BRAKE DISC AND PARKING BRAKE SHOE LINING FOR PROPER CONTACT

(a) Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit the disc.
If the contact between the disc and the brake shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe.

PB

REASSEMBLY

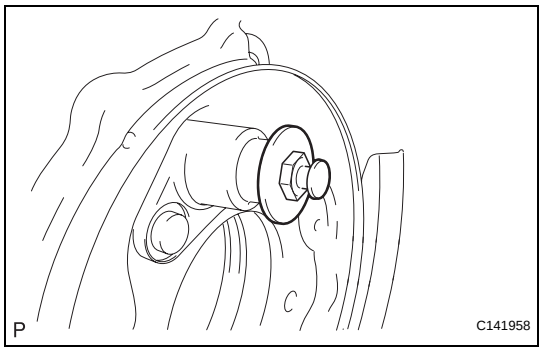
1. APPLY HIGH TEMPERATURE GREASE

(a) Apply high temperature grease to the backing plate which makes contact with the shoe.

2. INSTALL PARKING BRAKE SHOE GUIDE PLATE

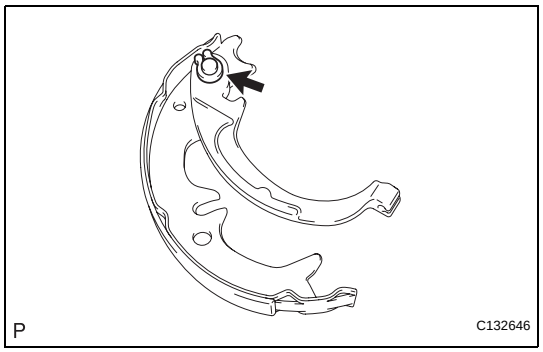
(a) Apply adhesive to the threads of the parking brake shoe guide plate set bolt.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

(b) Install the parking brake shoe guide plate with the parking brake shoe guide plate set bolt.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

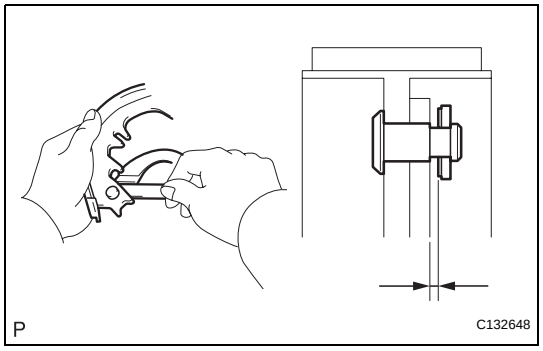


3. INSTALL PARKING BRAKE SHOE LEVER

(a) Install the parking brake shoe lever and shim to the No. 2 parking brake shoe assembly with a new C-washer.



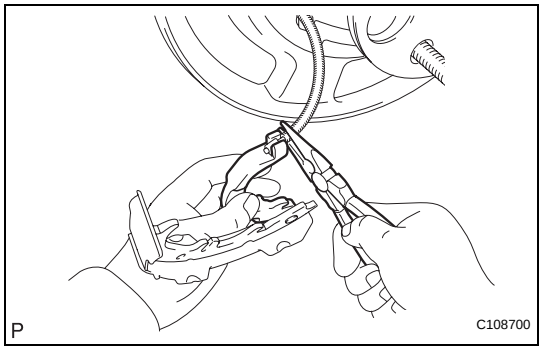
(b) Using a feeler gauge, measure the clearance between the No. 2 parking brake shoe assembly and parking brake shoe lever.
Standard clearance:
Less than 0.35 mm (0.014 in.)
If the clearance is not as specified, replace the shim with one of the correct size.

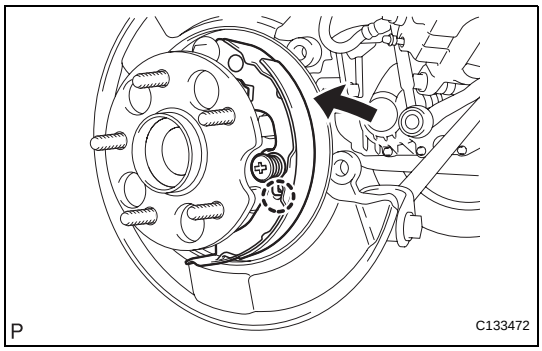


Shim Thickness	Shim Thickness
0.3 mm (0.012 in.)	0.9 mm (0.035 in.)
0.6 mm (0.024 in.)	-

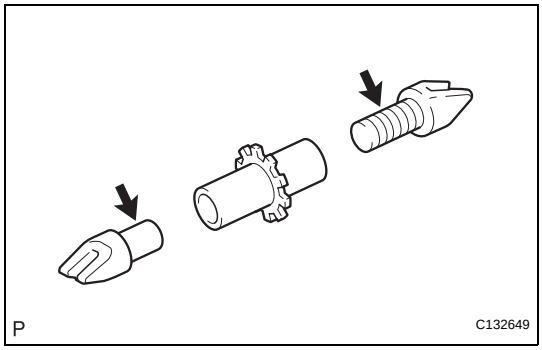
4. INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY

(a) Using needle-nose pliers, connect the No. 3 parking brake cable assembly to the parking brake shoe lever.





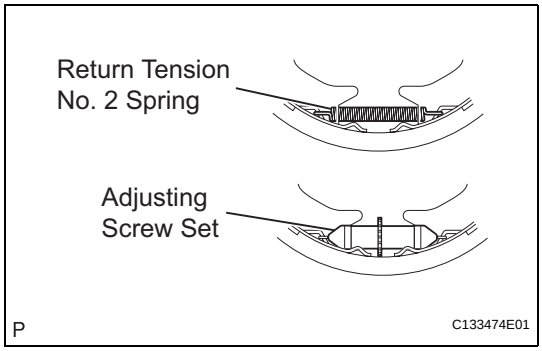
(b) Install the No. 2 parking brake shoe assembly with the parking brake shoe hold down spring No. 2 pin, the parking brake shoe hold down spring No. 2 cup, the parking brake shoe hold down spring and the parking brake shoe hold down spring No. 1 cup.
(c) Engage the claw of the parking brake shoe hold down spring No. 1 cup to the No. 2 parking brake shoe assembly.



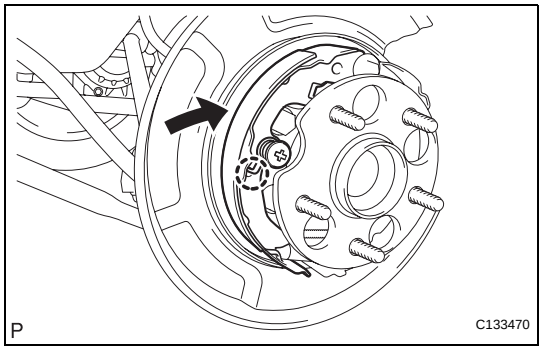
5. INSTALL PARKING BRAKE SHOE ADJUSTING SCREW SET

(a) Apply high temperature grease to the parking brake adjusting screw as shown in the illustration.

PB



(b) Install the parking brake shoe return tension No. 2 spring to the No. 1 parking brake shoe assembly and the No. 2 parking brake shoe assembly.
(c) Install the parking brake shoe adjusting screw set to the No. 1 parking brake shoe assembly and the No. 2 parking brake shoe assembly.

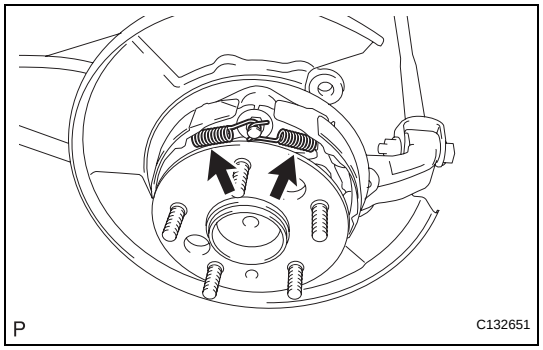


6. INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY

(a) Install the No. 1 parking brake shoe assembly with the parking brake shoe hold down spring No. 1 pin, parking brake shoe hold down spring No. 2 cup, parking brake shoe hold down spring and parking brake shoe hold down spring No. 1 cup.

7. INSTALL PARKING BRAKE SHOE STRUT

(a) Attach the parking brake shoe strut and the parking brake shoe strut compression spring to the No. 1 parking brake shoe assembly and No. 2 parking brake shoe assembly.

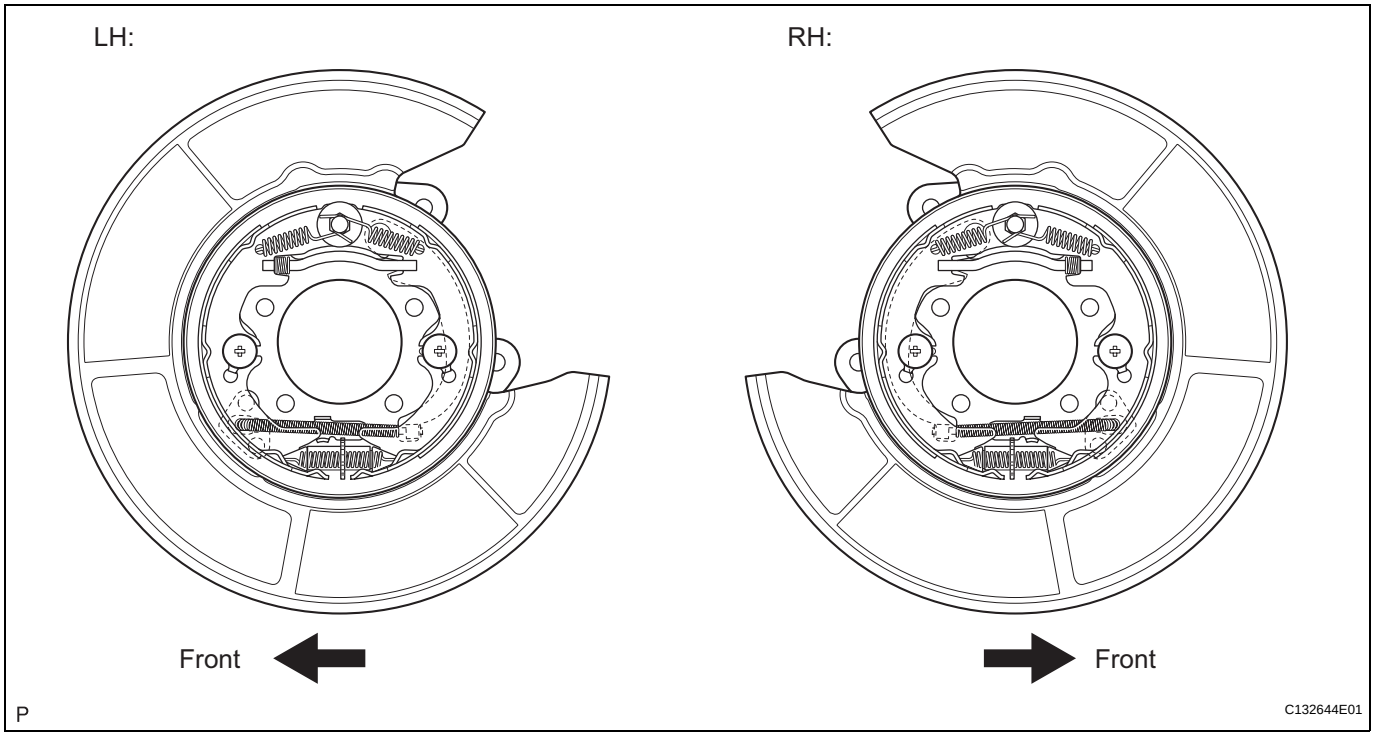


8. INSTALL PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING

(a) Using needle-nose pliers, install the 2 parking brake shoe return tension No. 1 springs.
HINT:
First install the front side spring and then the rear side spring.

9. CHECK PARKING BRAKE INSTALLATION

(a) Check that each part is installed properly.



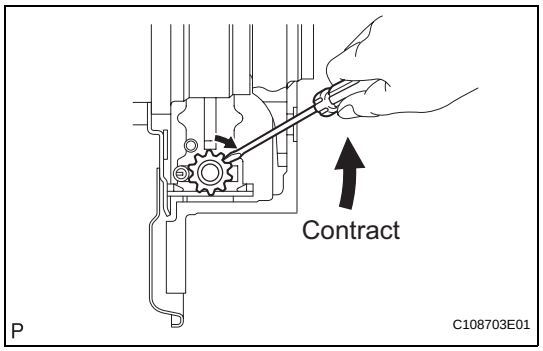
NOTICE:
There should be no oil or grease on the friction surface of the shoe lining and disc.

10. INSTALL REAR DISC

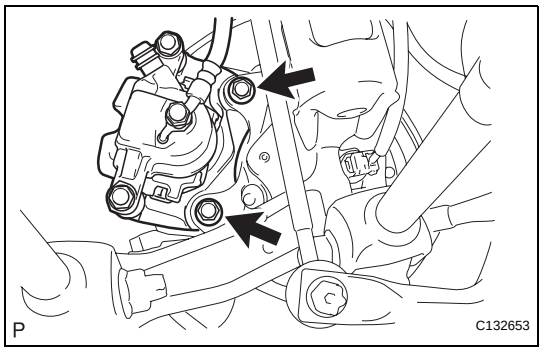
(a) Align the matchmarks and install the rear disc.

11. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Temporarily install the hub nuts.
(b) Remove the shoe adjusting hole plug.
(c) Turn the adjuster and expand the shoes until the disc locks.
(d) Contract the shoe adjuster until the disc rotates smoothly.
Standard:
Return 8 notches
(e) Check that the shoe has no brake drag.
(f) Install the shoe adjusting hole plug.



PB



12. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY

(a) Install the rear disc brake caliper assembly with the 2 bolts.
Torque: 62 N*m (632 kgf*cm, 46 ft.*lbf)

13. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

14. INSPECT PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)

15. INSPECT PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)

16. ADJUST PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)

17. ADJUST PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)

ANTI-LOCK BRAKE SYSTEM

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	off
Ignition switch on (IG)	ON	on (IG)
Ignition switch on (ACC)	ACC	on (ACC)
Engine start	START	start

2. TROUBLESHOOTING PRECAUTION

HINT:
The anti-lock brake system includes the ABS and EBD.

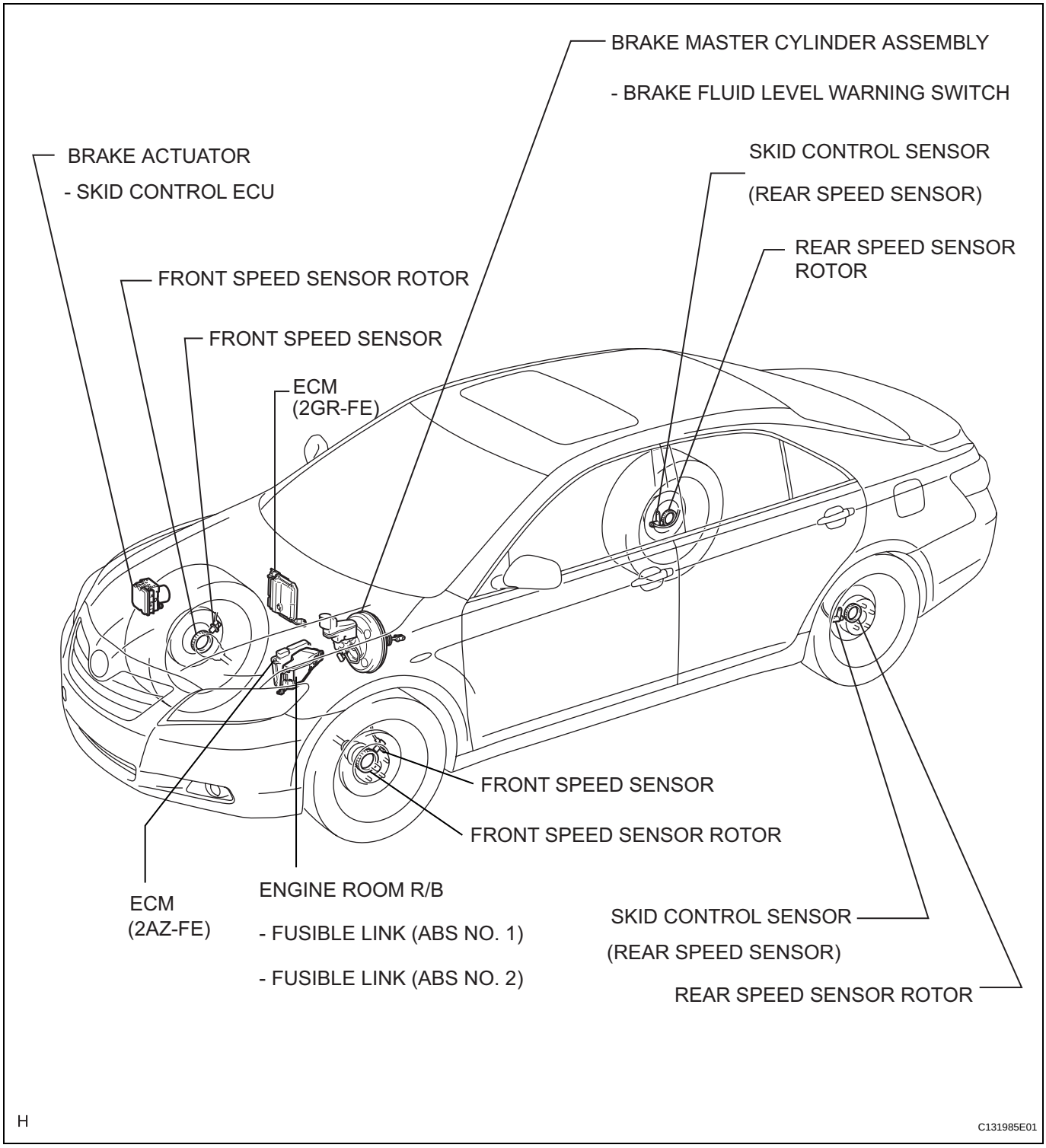
(a) When there is a malfunction in the terminal contact points or installation problems with parts, removing and installing the suspected problem parts may return the system to normal, either completely or temporarily.
(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by the DTC output and the freeze frame data output, and record it before disconnecting each connector or removing and installing parts.
(c) Be sure to remove and install the brake actuator and each individual sensor with the ignition switch off unless otherwise specified in the inspection procedure.
(d) If the brake actuator or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using the intelligent tester, also check that system functions and signals received by the ECU are normal using test mode.

3. CAN COMMUNICATION SYSTEM PRECAUTION

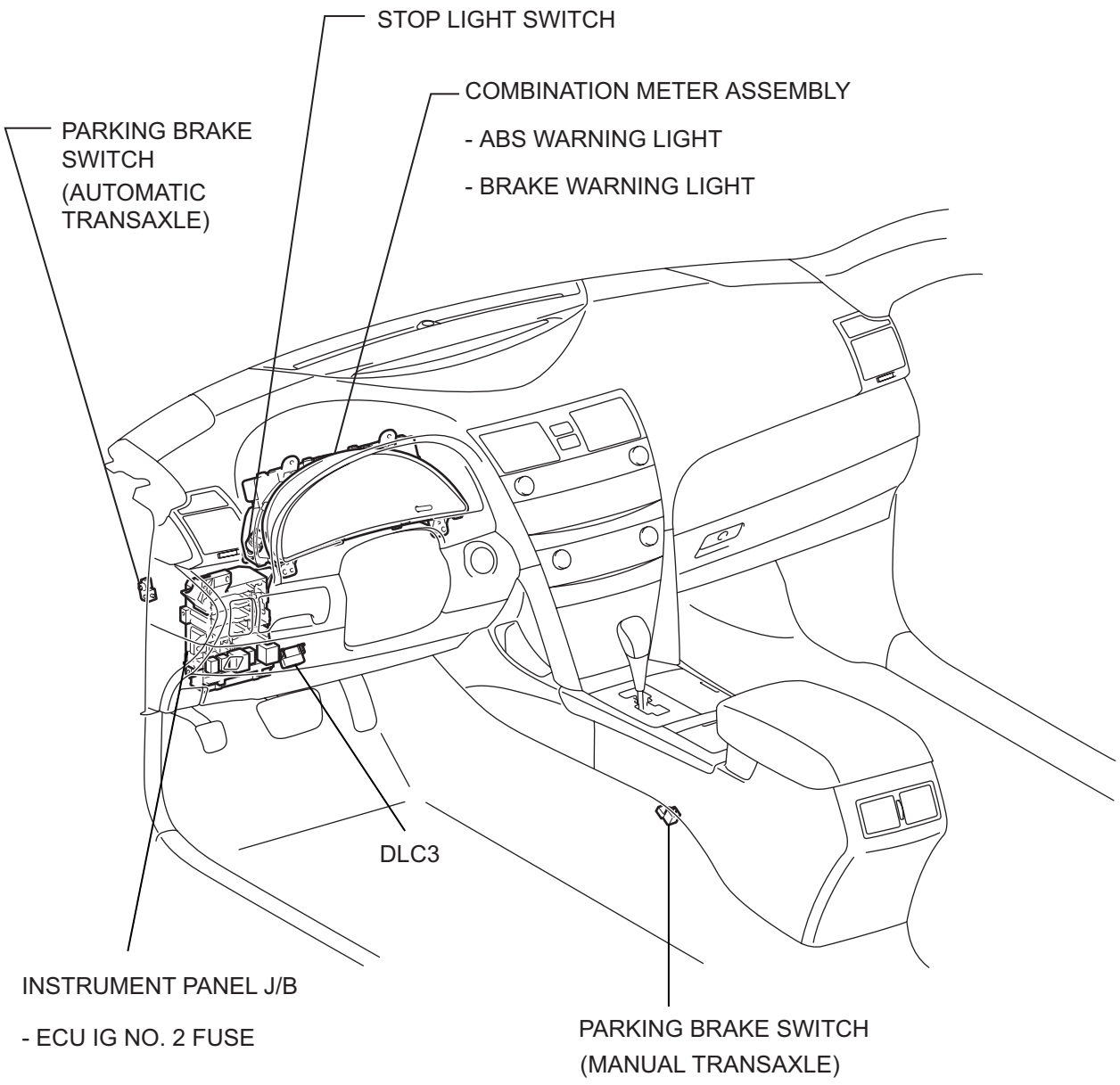
(a) The CAN communication system is used for data communication between each of the ECUs and sensors. If there is trouble in the CAN communication line, a DTC of the communication line is output.
(b) If a DTC of the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the anti-lock brake system.

(c) In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires that have an equal length. A bypass wire should not be used, because the data being transmitted will be corrupted.

PARTS LOCATION

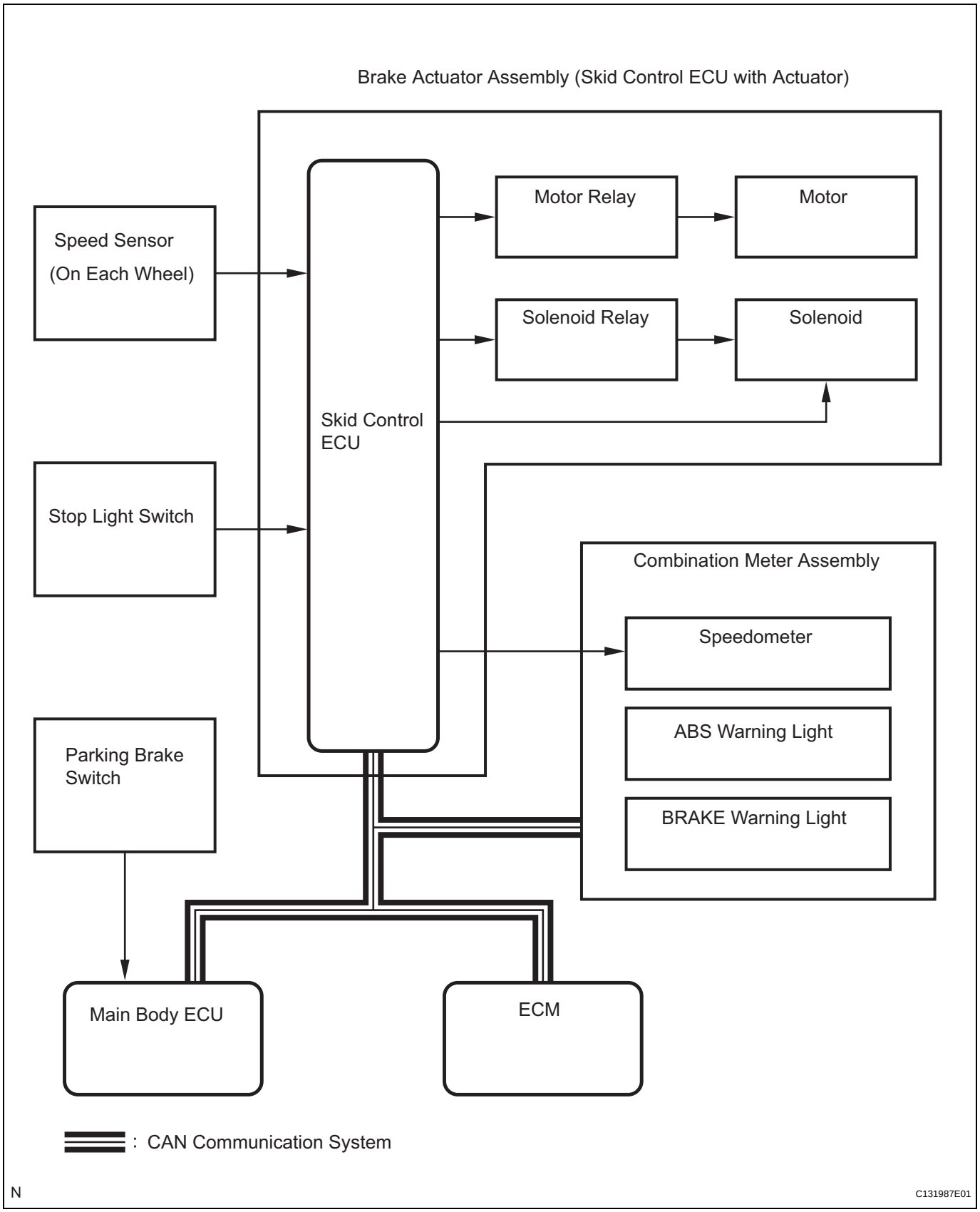


BC


STOP LIGHT SWITCH
COMBINATION METER ASSEMBLY
- ABS WARNING LIGHT
- BRAKE WARNING LIGHT
PARKING BRAKE SWITCH (AUTOMATIC TRANSAXLE)
DLC3
INSTRUMENT PANEL J/B
- ECU IG NO. 2 FUSE
PARKING BRAKE SWITCH (MANUAL TRANSAXLE)
H
C131984E01

BC

SYSTEM DIAGRAM



Transmitting ECU	Receiving ECU	Signals	Communication method
Skid control ECU	Combination meter	• ABS warning light signal • BRAKE warning light signal	CAN communication system

BC

Transmitting ECU	Receiving ECU	Signals	Communication method
ECM	Skid control ECU	Shift position signal	CAN communication system

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

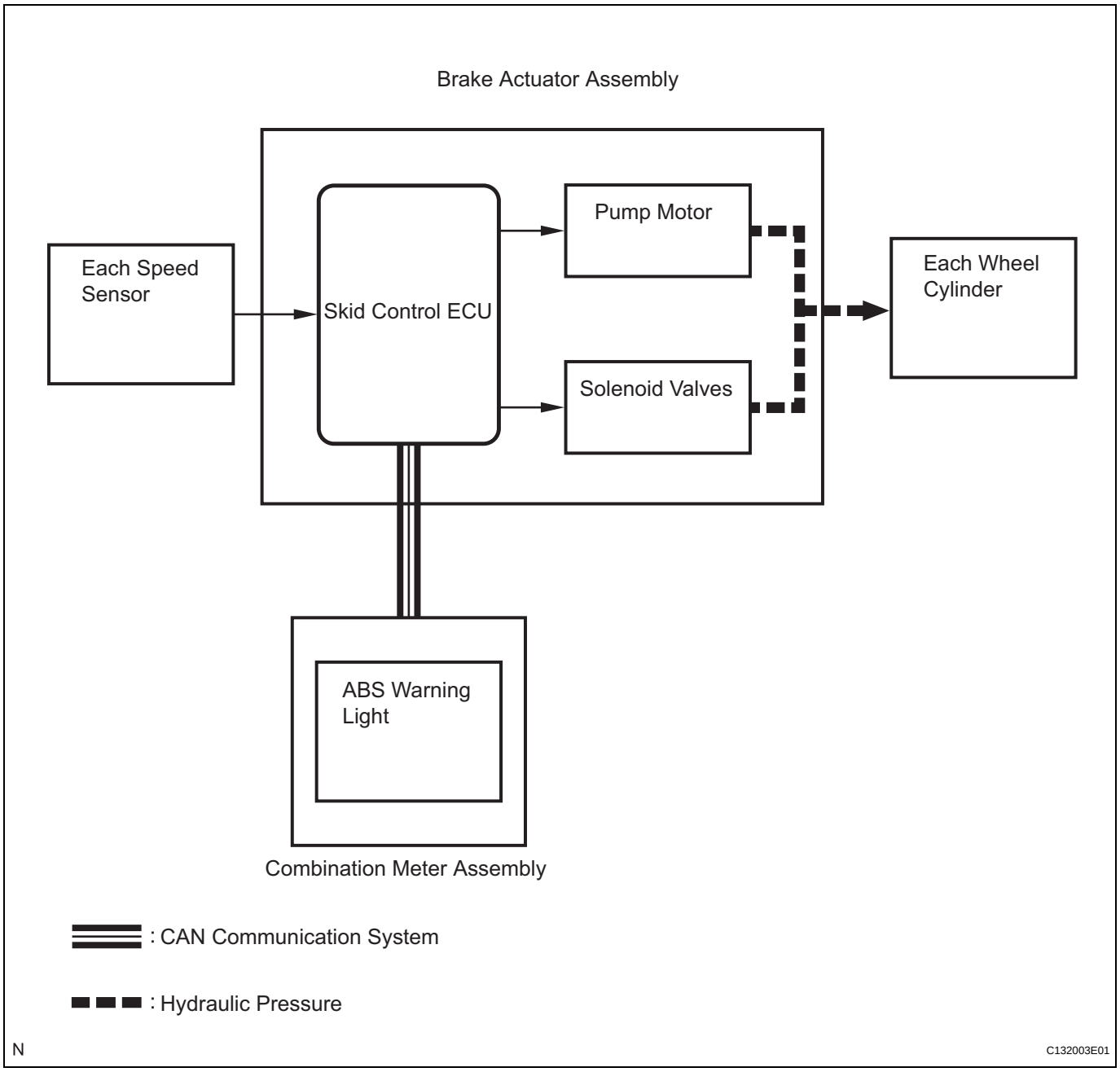
HINT:

The skid control ECU is located within the brake actuator assembly.

(a) ABS

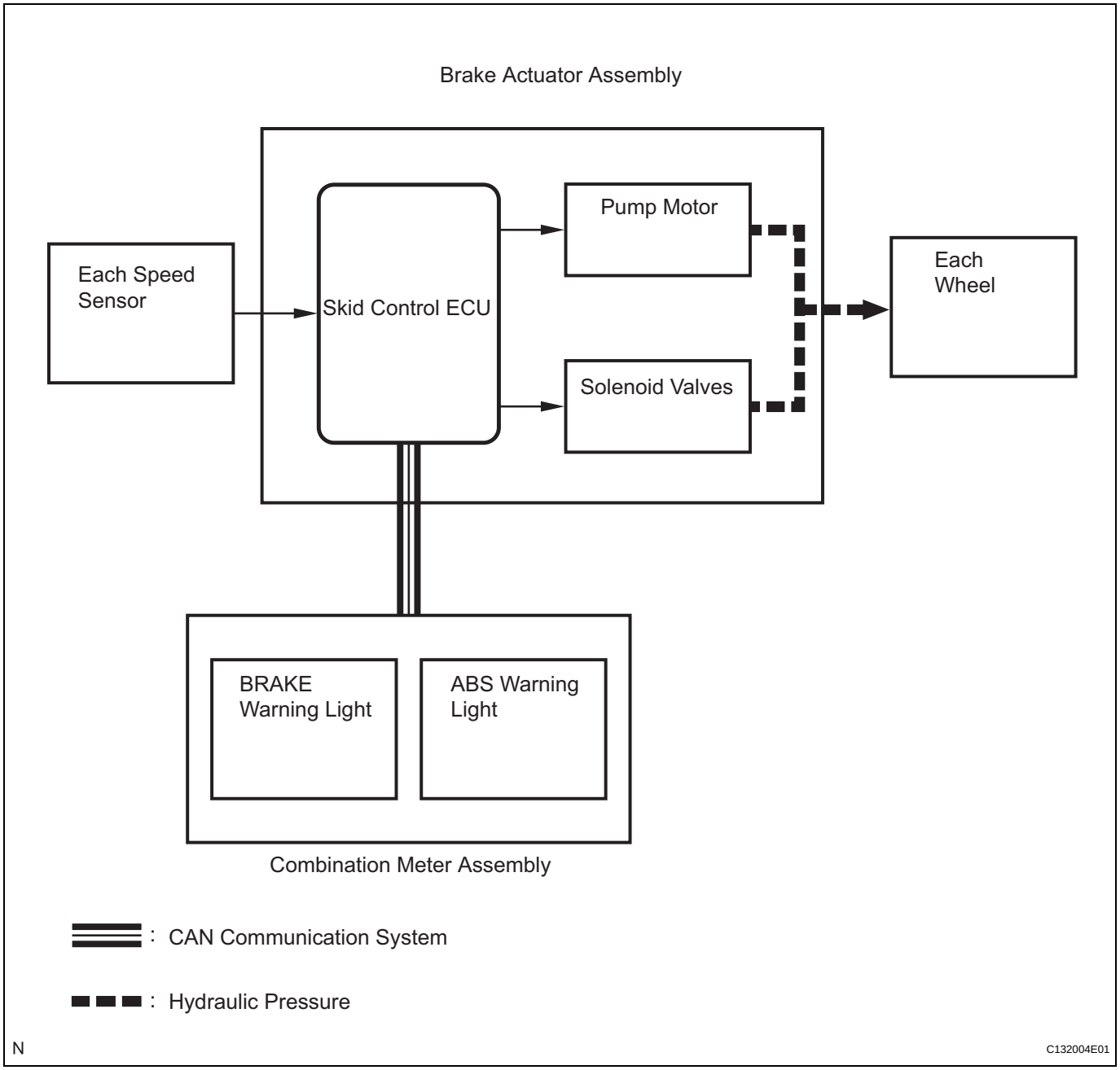
(Anti-lock Brake System)

The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.



Operation description
The skid control ECU detects wheel lock based on speed signals it receives from the wheel speed sensors. Based on this information, the skid control ECU controls the pump motor and solenoid valves. The pump motor and solenoid valves are used to prevent wheel lock by controlling the hydraulic pressure applied to the brakes at each wheel. The ABS warning light will come on when the system is malfunctioning.

(b) EBD
(Electronic Brake force Distribution)
The EBD control utilizes ABS, realizing proper brake force distribution between the front and rear wheels in accordance with driving conditions.
In addition, when braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.



Operation description
The skid control ECU receives a speed signal from each wheel speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves. The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The ABS and BRAKE warning lights come on if there is a malfunction in the EBD system.

2. ABS with EBD OPERATION

(a) Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates the deceleration and speed of each wheel, while monitoring for wheel lock. If wheel lock is occurring, the ECU controls the solenoid valves in the brake actuator in order to adjust the hydraulic pressure applied to the brakes at each wheel.

3. FAIL SAFE FUNCTION

(a) When a failure occurs in the anti-lock brake system, the ABS warning light comes on and operation is prohibited. In addition, when a failure which disables EBD operation occurs, the brake warning light also comes on and operation is prohibited (See page BC-24).

4. INITIAL CHECK

(a) When the vehicle speed first becomes approximately 4 mph (6 km/h) or more after the ignition switch is turned on (IG), each solenoid valve and motor of the brake actuator is sequentially activated to perform an electrical check. During the initial check, the operating sound of solenoid valve and motor can be heard from the engine compartment, but this is not a malfunction.

5. FUNCTION OF COMPONENTS

Components	Function
Brake actuator assembly	• Composed of the holding solenoid valve, pressure reduction solenoid valve, pump motor, reservoir, etc., and adjusts the hydraulic pressure applied to each wheel cylinder. • Houses the skid control ECU.
Skid control ECU	Processes the signals sent from each sensor to control ABS and EBD.
Speed sensor	Detects speed of each wheel and inputs the data into the skid control ECU.
Master cylinder	Generates pressure according to pedal effort.
Stop light switch	Illuminates the stop light when the brake pedal is depressed. (Sends a brake on signal to the skid control ECU)
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
Motor relay	• Supplies power to the pump motor. • Housed in the skid control ECU.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS and EBD has occurred. • Blinks to output DTC.

Components	Function
BRAKE warning light	• Comes on to inform the driver that the parking brake is on when the system is normal or the brake fluid level has decreased. • Comes on to inform the driver that a malfunction in the EBD has occurred.

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble.

NEXT

3	CHECK CAN COMMUNICATION SYSTEM

BC

(a) Check for DTCs (See page BC-21).
HINT:
The skid control ECU is connected to the CAN communication system.
Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → CHECK CAN COMMUNICATION CIRCUIT

A

4	CHECK DTC AND FREEZE FRAME DATA

(a) Check for DTCs and Freeze Frame Data (See page BC-21 for DTC Check / Clear, BC-23 for Freeze Frame Data).
(1) Record the DTCs and Freeze Frame Data.
(b) Clear the DTCs.
(c) Recheck for DTCs.
(1) Reproduce the malfunction and check if the DTCs are output again.

Result

Result	Proceed to
DTC is output	A
DTC is not output (Problem symptom does not occur)	B
DTC is not output (Problem symptom occurs)	C

B → GO TO STEP 9

C → GO TO STEP 10

A

5	DIAGNOSTIC TROUBLE CODE CHART

(a) Go to "DIAGNOSTIC TROUBLE CODE CHART" (See page BC-27).

NEXT

6	CIRCUIT INSPECTION

NEXT

7	REPAIR OR REPLACE

NEXT

8	CONFIRMATION TEST

NEXT

END

9	SYMPTOM SIMULATION

NEXT

10	PROBLEM SYMPTOMS TABLE

(a) Go to "PROBLEM SYMPTOMS TABLE" (See page BC-16).

NEXT

11	CIRCUIT INSPECTION

NEXT

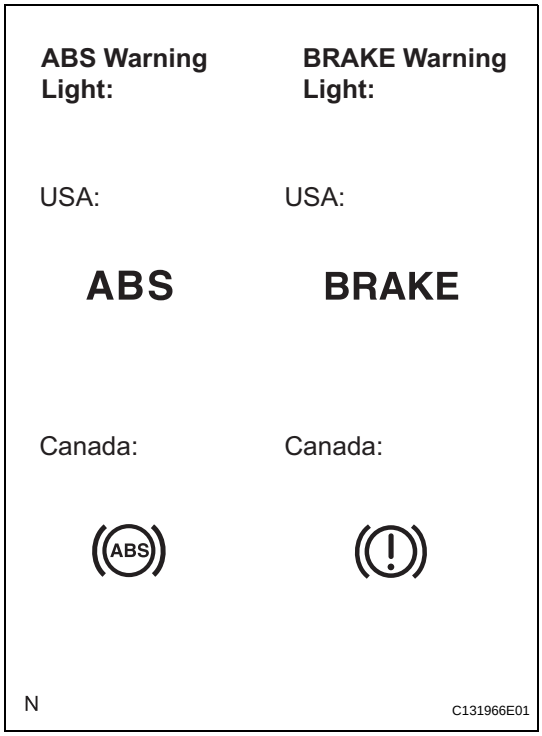
12	REPAIR OR REPLACE

NEXT

13	CONFIRMATION TEST

NEXT

END



TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

Before releasing the parking brake, move the shift lever to the P position for safety (AT model) or set the chocks to hold the vehicle for safety (MT model).

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS warning light comes on for approximately 3 seconds.

HINT:

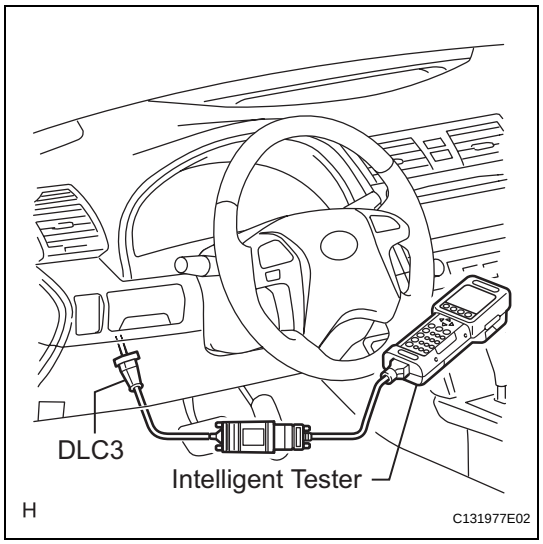
- If the skid control ECU stores any DTCs, the ABS and BRAKE warning lights come on.
- If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

Trouble Area	See procedure
ABS warning light (Remains on)	BC-74
ABS warning light circuit (Does not come on)	BC-78
BRAKE warning light (Remains on)	BC-81
BRAKE warning light (Does not come on)	BC-91

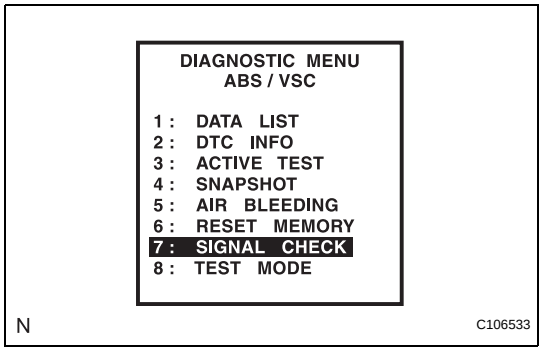
2. SENSOR SIGNAL CHECK USING TEST MODE (SIGNAL CHECK) (INTELLIGENT TESTER)

HINT:

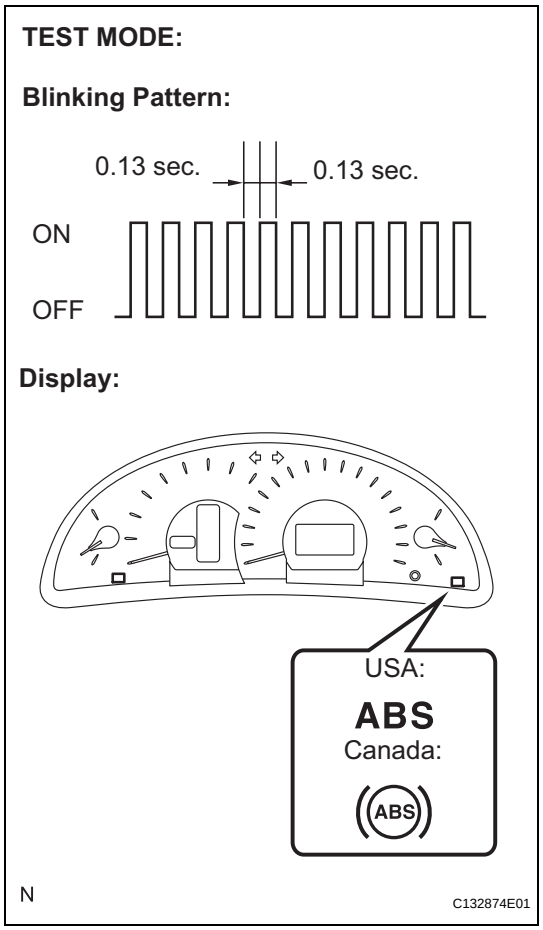
If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check function will be erased.



(a) Procedure to enter Test Mode.
(1) Turn the ignition switch off.
(2) Connect the intelligent tester to the DLC3.
(3) Check that the steering wheel is centered and move the shift lever to the P position (for Automatic Transaxle) or apply the parking brake (Manual Transaxle).
(4) Turn the ignition switch on (IG).



(5) Set the intelligent tester to Test Mode (select "SIGNAL CHECK").
HINT:
Refer to the intelligent tester operator's manual for further details.



(6) Check that the ABS warning light comes on for several seconds and then blinks in test mode.
HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit.

Trouble Area	See procedure
ABS warning light (Does not come on)	BC-78

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheel spin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

BC

(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**

(d) Read the DTC(s) by following the tester screen.
NOTICE:
- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

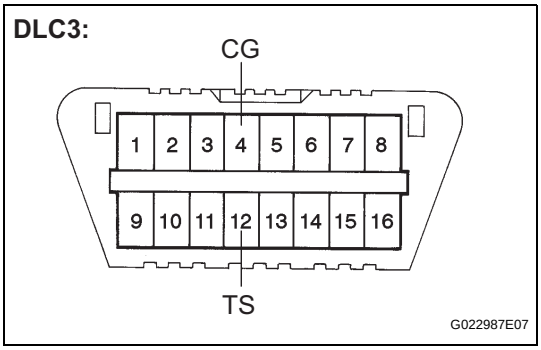
HINT:
See the list of DTCs (See procedure "A").

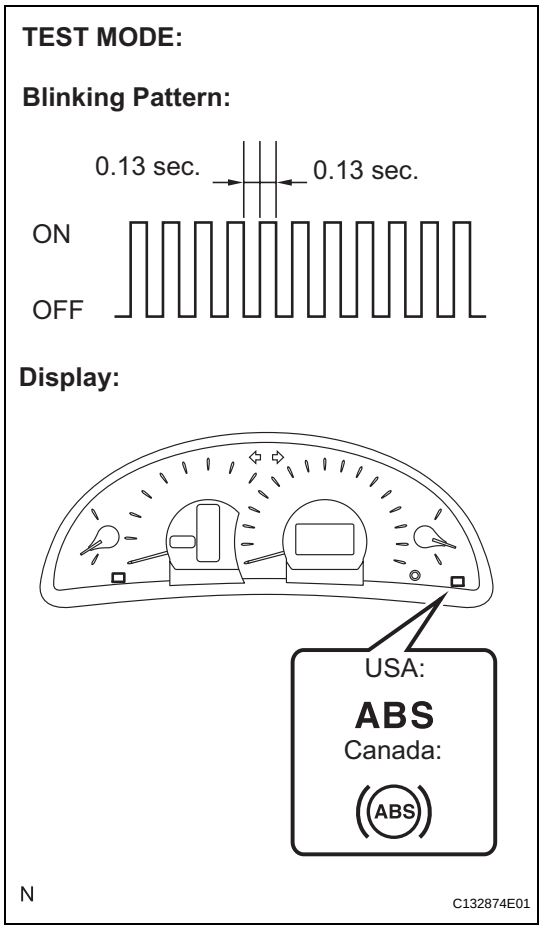
3. SENSOR SIGNAL CHECK BY TEST MODE (SIGNAL CHECK) (SST CHECK WIRE)

HINT:
If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check will be erased.

(a) Procedure for Test Mode.
(1) Turn the ignition switch off.
(2) Check that the steering wheel is centered and move the shift lever to the P position (Automatic Transaxle) or apply the parking brake (Manual Transaxle).
(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040
(4) Turn the ignition switch on (IG).

DLC3:





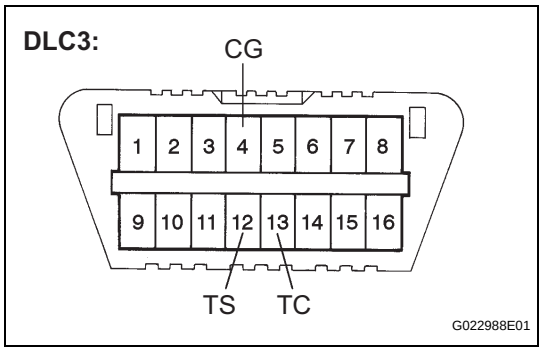
(5) Check that the ABS warning light comes on for several seconds and then blinks in Test Mode.
HINT:
If the ABS warning light does not blink, inspect the TS and CG terminal circuit, and ABS warning light circuit.

Trouble Area	See procedure
TS and CG terminal circuit	BC-97
ABS warning light circuit (Does not come on)	BC-78

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheel spin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**

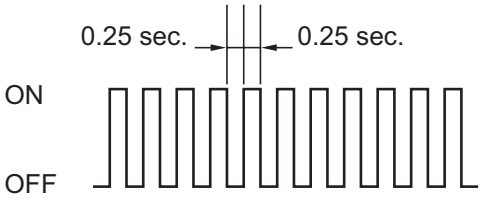
(d) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040



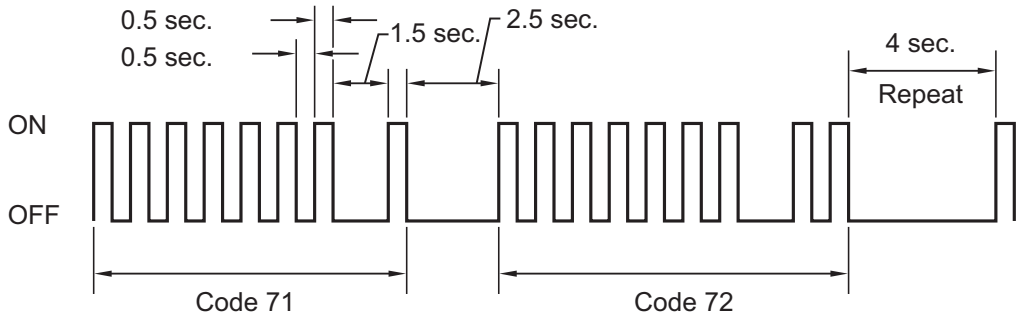
BC

(e) Count the number of blinks of the ABS warning light.

Blinking Pattern of Normal System Code:



Blinking Pattern of Trouble Code (Example Codes 71 and 72):



N

C132876E01

NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTCs (See procedure "A").

(f) After performing the check, disconnect the SST from terminals TS and CG, and TC and CG of the DLC3, and turn the ignition switch off.

(g) Turn the ignition switch on (IG) to cancel the test mode.

HINT:

- If the ignition switch is not turned on (IG) after the SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned on (IG) with terminals TS and CG shorted, the previous Test Mode will continue.

4. DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")

DTC of Test Mode (Signal Check):

Code No.	Diagnosis	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	• Front speed sensor RH • Front speed sensor circuit RH • Sensor installation
C1276/76	Abnormal change in output signal of front speed sensor LH	• Front speed sensor LH • Front speed sensor circuit LH • Sensor installation
C1277/77	Abnormal change in output signal of rear speed sensor RH	• Rear speed sensor RH • Rear speed sensor circuit RH • Sensor installation
C1278/78	Abnormal change in output signal of rear speed sensor LH	• Rear speed sensor LH • Rear speed sensor circuit LH • Sensor installation

HINT:
The codes in this table are output only in Test Mode (signal check).

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the skid control ECU, sensor, etc., turn the ignition switch off.

HINT:

- Inspect the fuses and relays before investigating the suspected areas as shown in the table below.
- Inspect each malfunction circuit in numerical order for the corresponding symptoms.

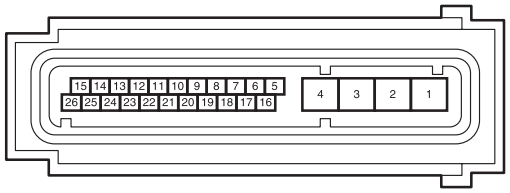
ANTI-LOCK BRAKE SYSTEM:

Symptom	Suspected area	See page
ABS does not operate	1. Check the DTC reconfirming that the normal system code is output	BC-21
	2. IG power source circuit	BC-63
	3. Front speed sensor circuit	BC-30
	4. Rear speed sensor circuit	BC-38
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function) If abnormal, check the hydraulic circuit for leakage	BR-42
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU)	BC-432
ABS does not operate efficiently	1. Check the DTC reconfirming that the normal system code is output.	BC-21
	2. Front speed sensor circuit	BC-30
	3. Rear speed sensor circuit	BC-38
	4. Stop light switch circuit	BC-67
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function)	BR-42
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU)	BC-432
ABS warning light malfunction (Remains on)	1. ABS warning light circuit	BC-74
	2. Brake actuator assembly (skid control ECU)	BC-432
ABS warning light malfunction (Does not come on)	1. ABS warning light circuit	BC-78
Brake warning light malfunction (Remains on)	1. Brake warning light circuit	BC-81
	2. Brake actuator assembly (skid control ECU)	BC-432
Brake warning light malfunction (Does not come on)	1. Brake warning light circuit	BC-91
	2. Brake actuator assembly (skid control ECU)	BC-432
ABS sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output	BC-21
	2. TS and CG terminal circuit	BC-97
	3. TC and CG terminal circuit	BC-94
	4. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU)	BC-432

TERMINALS OF ECU

1. TERMINALS OF ECU

Skid Control ECU (Brake Actuator Assembly):



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C131974E01

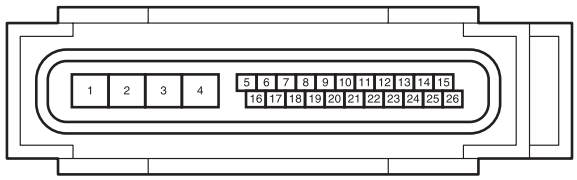
Symbols (Terminal No.)	Terminal Description
GND2 (1)	Actuator pump motor ground
+BM (2)	Motor relay power supply
+BS (3)	Solenoid valves power supply
GND1 (4)	Skid control ground
FL+ (5)	Front LH (+) wheel speed signal input
FL- (6)	Front LH (-) wheel speed signal input
RL+ (7)	Rear LH (+) wheel speed signal input
RR- (8)	Rear RH (-) wheel speed signal input
FR- (9)	Front RH (-) wheel speed signal input
FR+ (10)	Front RH (+) wheel speed signal input
D/G (11)	Diagnosis tester communication line
CANL (15)	CAN communication line L
RL- (17)	Rear LH (-) wheel speed signal input
IG1 (18)	ECU power supply
RR+ (19)	Rear RH (+) wheel speed signal input
STP (20)	Stop light switch input
SP1 (23)	Speed signal output for speedometer
TS (25)	Sensor check input
CANH (26)	CAN communication line H

BC

2. TERMINAL INSPECTION

(a) Disconnect the connector and measure the voltage or resistance on the wire harness side.
HINT:
Voltage cannot be measured with the connector connected to the skid control ECU as the connector is watertight.

Skid Control ECU (Harness Side Connector Front View):



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C131969E01

BC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (1) - Body ground	W-B - Body ground	Actuator pump motor ground	Always	Below 1 Ω
+BM (2) - Body ground	B - Body ground	Motor relay power supply	Always	10 to 14 V
+BS (3) - Body ground	L - Body ground	Solenoid valves power supply	Always	10 to 14 V
GND1 (4) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 Ω
IG1 (18) - Body ground	P - Body ground	ECU power supply	Ignition switch on (IG)	10 to 14 V
STP (20) - Body ground	P - Body ground	Stop light switch input	Stop light switch ON (Brake pedal depressed)	8 to 14 V
STP (20) - Body ground	P - Body ground	Stop light switch input	Stop light switch OFF (Brake pedal released)	Below 3 V

DIAGNOSIS SYSTEM

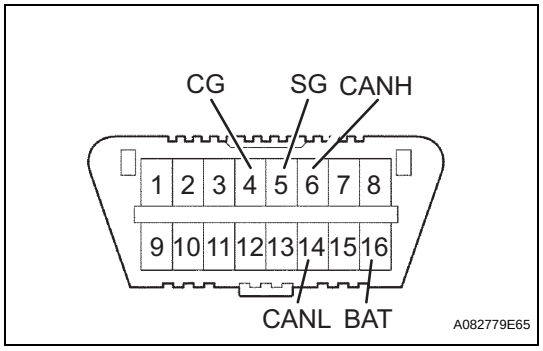
1. DIAGNOSIS SYSTEM

(a) Inspect the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.



(b) The vehicle's ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists on either the vehicle side or the tester side.

If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.

If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

BC

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher

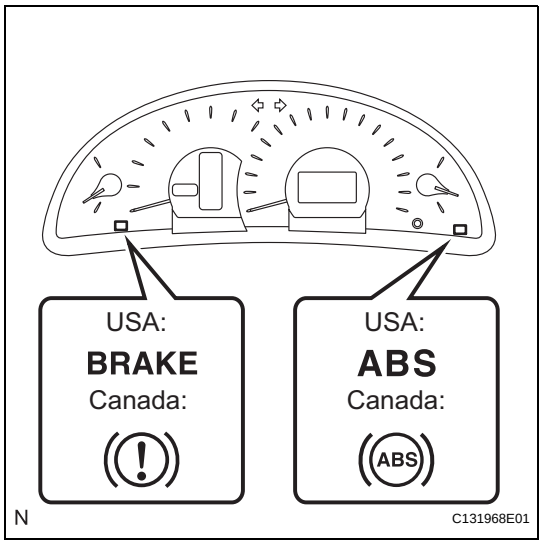
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

2. DIAGNOSIS

NOTICE:

When releasing the parking brake, set chocks to hold the vehicle for safety.



(a) Release the parking brake.
(b) Turn the ignition switch on (IG).
(c) If the skid control ECU detects a malfunction, the ABS warning light and brake warning light will come on to warn the driver. The table below indicates which light will come on when there is a malfunction in a particular function.

Item/Trouble Area	ABS System	EBD System	Skid Control ECU
ABS Warning light	○	○	○
Brake Warning light	-	○	○

○: Light ON
-: Light OFF

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST (09843-18043) between the TC and CG terminals of the DLC3 and observing the blinking pattern of the ABS warning light, or by connecting an intelligent tester (See page BC-21).
- This system has a sensor signal check function (See page BC-11).

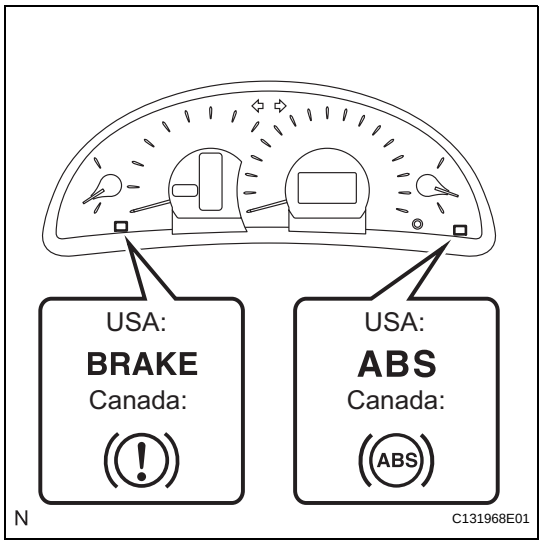
3. WARNING LIGHT INITIAL CHECK

NOTICE:

When releasing the parking brake, set chocks to hold the vehicle for safety.

HINT:

When the parking brake is applied or the level of the brake fluid is low, the brake warning light comes on.



(a) Release the parking brake.
(b) Check that the ABS warning light and brake warning light come on when the ignition switch is turned on (IG) and go off in approximately 3 seconds.
(c) If the warning lights do not come on or remain on, inspect the ABS warning light circuit and/or brake warning light circuit.

Trouble Area	See procedure
ABS warning light circuit (Remains on)	BC-74
ABS warning light circuit (Does not come on)	BC-78
Brake warning light circuit (Remains on)	BC-81
Brake warning light circuit (Does not come on)	BC-91

4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.

(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is turned on (IG)).

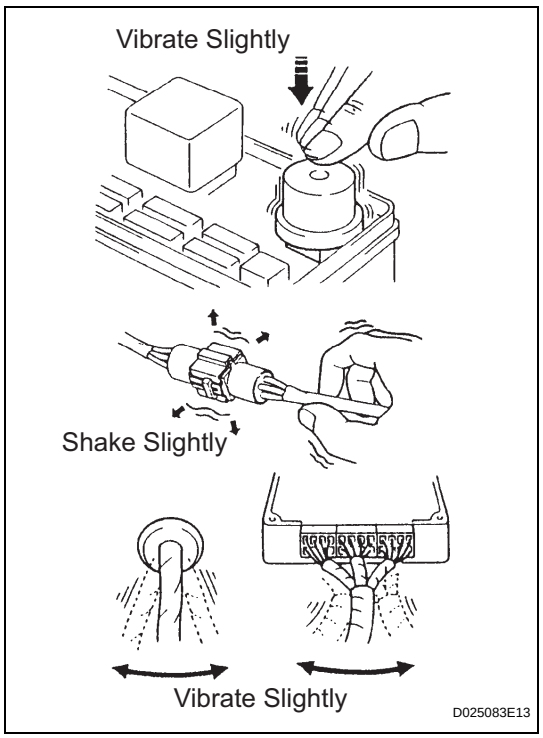
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

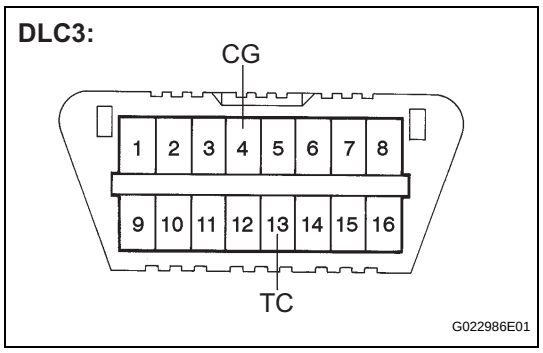
(2) Slightly shake the connector vertically and horizontally.

HINT:

Shaking the relays too strongly may result in open relays.

(3) Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.





DTC CHECK / CLEAR

1. DTC CHECK / CLEAR (SST CHECK WIRE)

(a) DTC check

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the ignition switch on (IG).

(3) Read the DTCs from the ABS warning light on the combination meter.

HINT:

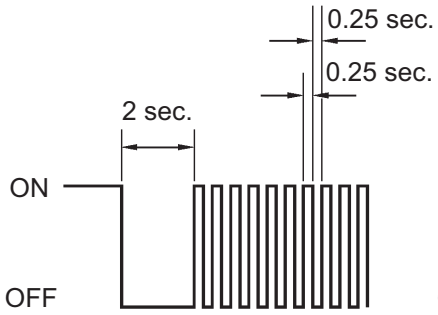
If no code appears, inspect the TC and CG terminal circuit and the ABS warning light circuit.

Trouble Area	See procedure
TC and CG terminal circuit	BC-94
ABS warning light circuit (Remains on)	BC-74
ABS warning light circuit (Does not come on)	BC-78

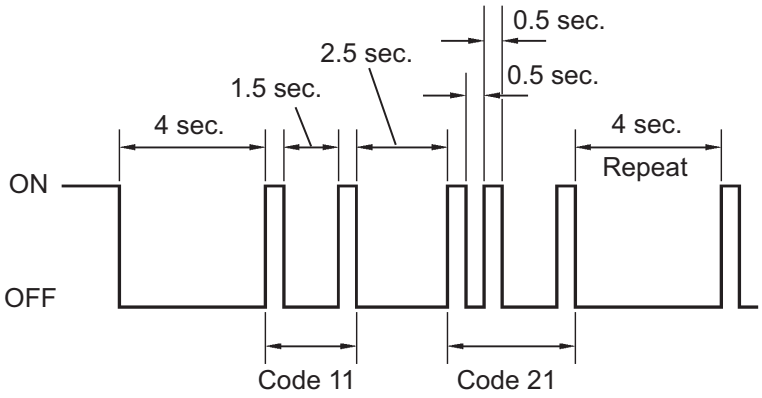
BC

(4) As an example, refer to the chart below for the blinking patterns of the normal system code and trouble codes 11 and 21.

Normal System Code:



Trouble Code (Example Codes 11 and 21):



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BC

(5) The codes are explained in the code table (See page BC-27).

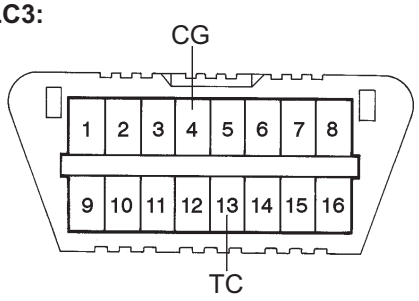
(6) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

(b) DTC clear

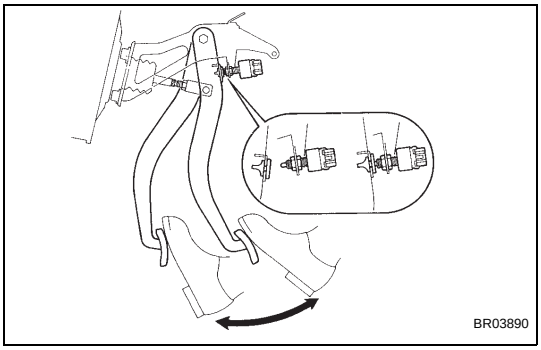
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the ignition switch on (IG).

DLC3:



G022986E01

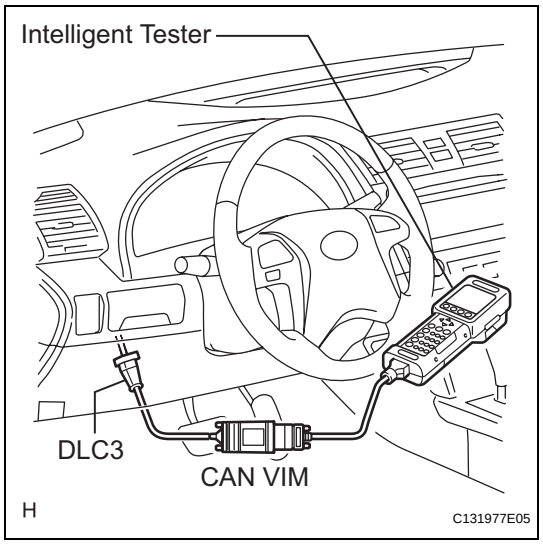


BR03890

(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.

(4) Check that the warning light indicates the normal system code.

(5) Remove the SST from the terminals of the DLC3.
HINT:
Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG fuse.



2. DTC CHECK/CLEAR (WHEN USING INTELLIGENT TESTER:)

(a) DTC check
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch on (IG).
  (3) Read the DTCs by following the prompts on the tester screen.

(b) DTC clear
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch on (IG).
  (3) Operate the intelligent tester to clear the codes.
  HINT:
  Refer to the intelligent tester operator's manual for further details.

3. END OF DTC CHECK/CLEAR

(a) Turn the ignition switch on (IG).

(b) Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

(a) Whenever a DTC is detected or the ABS operates, the skid control ECU stores the current vehicle (sensor) status as Freeze Frame Data.

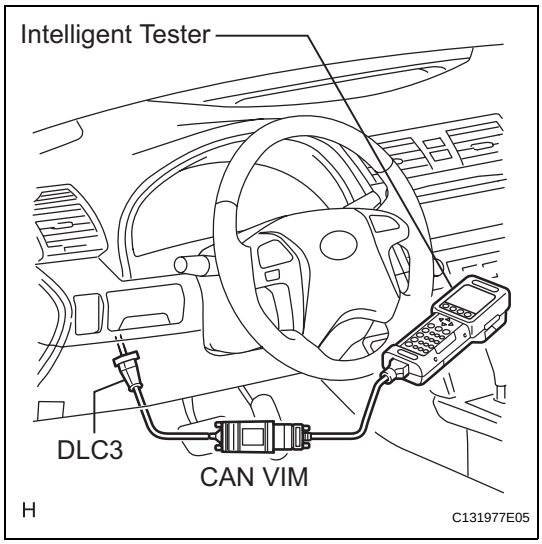
(b) The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to on (IG) since the last time the ABS was activated.
HINT:
- Freeze frame data at the time the ABS operates: The skid control ECU stores and updates data whenever the ABS system operates.
  When the skid control ECU stores data at the time a DTC is detected, the data stored during ABS operation is erased.
- Freeze frame data at the time a DTC is detected: When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(c) Connect the intelligent tester to the DLC3.

(d) Turn the ignition switch on (IG).

(e) Select "DTC INFO" on the tester display.

(f) On the DTC data display screen, select the DTC data display with "*".



Intelligent Tester Display	Measurement Item	Reference Value
TROUBLE CODE	Freeze DTC	min.: 0, max.: 65535
#DTC	Number of trouble codes	min.: 0, max.: 255
FREEZE TIME	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
#IG ON	Number of operations of ignition switch on (IG) after storing freeze frame data	0 to 31
STOP LAMP SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
PARKING BRAKE SW	Parking brake condition	ON: Parking brake on OFF: Parking brake off
OPERATED SYSTEM	Operated system	ABS operated: ABS
FR WHEEL SPD	Front right wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)
FL WHEEL SPD	Front left wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)
RR WHEEL SPD	Rear right wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)

Intelligent Tester Display	Measurement Item	Reference Value
RL WHEEL SPD	Rear left wheel speed	Min.: 0 MPH (0 km/h), Max.: 202 MPH (326 km/h)
VEHICLE SPD	Vehicle speed reading	Speed indication on the meter
SPD GRADE	Vehicle speed grade	Min.: -1.869 G, Max.: 1.869 G

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

If there is a problem with sensor signals or brake actuator systems, the skid control ECU will prohibit power supply to the brake actuator and terminate ABS control.

ABS control will be prohibited, but EBD control continues as much as possible. If EBD control is impossible, the brake warning light will come on to warn the driver (See page BC-19).

Malfunction Area	Control Method
ABS system	Prohibits the ABS control
EBD system	Prohibits the ABS and EBD control

HINT:

If the ABS system has a malfunction, the brake system will operate normally without ABS control.

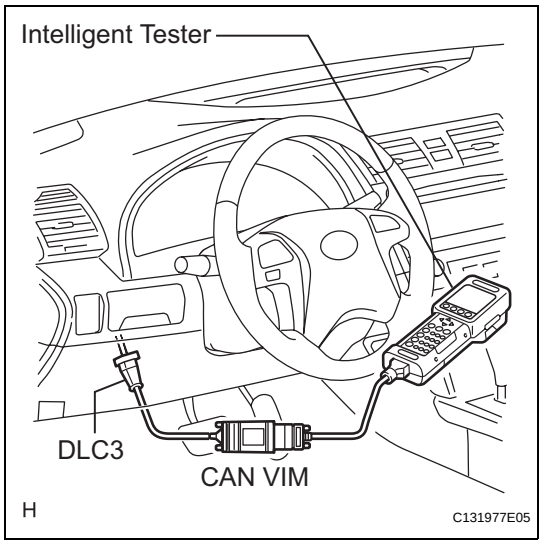
DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the intelligent tester, the value of the switch, sensor, actuator and other items can be read without removing any parts. Reading the DATA LIST as a first step in troubleshooting is one of the methods to save labor time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) According to the display on the tester, read the "DATA LIST".



DATA LIST:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MOT RELAY	ABS motor relay / ON or OFF	ON: During pump motor operation OFF: No pump motor operation	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
VEHICLE SPD	Vehicle speed reading / min.: 0 km/h (0 MPH), max.: 326 km/h (202 MPH)	Actual wheel speed	Speed indicated on speedometer
IG VOLTAGE	ECU power supply voltage / NORMAL or TOO LOW	NORMAL: 9.5 V or over TOO LOW: Below 9.5 V	-
SFRR	ABS solenoid (SFRR) ON / OFF	ON: Operates	-
SFRH	ABS solenoid (SFRH) ON / OFF	ON: Operates	-
SFLR	ABS solenoid (SFLR) ON / OFF	ON: Operates	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SFLH	ABS solenoid (SFLH) ON / OFF	ON: Operates	-
SRRR	ABS solenoid (SRRR (SRR)) ON / OFF	ON: Operates	-
SRRH	ABS solenoid (SRRH (SRH)) ON / OFF	ON: Operates	-
SRLR	ABS solenoid (SRLR) ON / OFF	ON: Operates	-
SRLH	ABS solenoid (SRLH) ON / OFF	ON: Operates	-
TEST MODE	Test mode / NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of DTCs recorded / min.: 0, max.: 255	Min.: 0, max.: 19	-
ABS WARN LAMP	ABS warning light ON /OFF	ON: ABS warning light ON OFF: ABS warning light off	-
BRAKE WARN LAMP	Brake warning light ON / OFF	ON: Brake warning light ON OFF: Brake warning light off	-
FR WHEEL ACCEL	Front right wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
FL WHEEL ACCEL	Front left wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
RR WHEEL ACCEL	Rear right wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
RL WHEEL ACCEL	Rear left wheel acceleration / Min.: -200.84 m/s, Max.: 199.27 m/s	0 m/s	-
FR ABS STATUS	Front right ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
FL ABS STATUS	Front left ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
RR ABS STATUS	Rear right ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
RL ABS STATUS	Rear left ABS control status / ON or OFF	ON: During ABS control OFF: Not ABS control	-
FR EBD STATUS	Front right EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-
FL EBD STATUS	Front left EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-
RR EBD STATUS	Rear right EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-
RL EBD STATUS	Rear left EBD control status / ON or OFF	ON: During EBD control OFF: Not EBD control	-

BC

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay, actuator and other items to operate without removing any parts. Performing the ACTIVE TEST as a first step in troubleshooting is one of the methods to save labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) According to the display on the tester, perform the "ACTIVE TEST".

ACTIVE TEST:

Item	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
MOT RELAY	Turns ABS motor relay ON / OFF	Operating sound of motor can be heard
ABS WRN LIGHT	Turns ABS warning light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Turns Brake warning light ON / OFF	Observe combination meter

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

Turn the ignition switch off before removing parts.

HINT:

- If no abnormality is found when inspecting parts, inspect the skid control ECU and ground points for poor contact.
- If a malfunction code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the "See page" for respective "DTC No." in the DTC chart.
- When 2 or more DTCs are detected, perform circuit inspection one by one until the problem is identified.

ANTI-LOCK BRAKE SYSTEM:

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor RH 2. Front speed sensor RH circuit 3. Front speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-30
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor LH 2. Front speed sensor LH circuit 3. Front speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-30
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor RH 2. Rear speed sensor RH circuit 3. Rear speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-38
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor LH 2. Rear speed sensor LH circuit 3. Rear speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-38
C0226/21	SFR Solenoid Circuit	1. SFRR or SFRH circuit 2. Brake actuator assembly	BC-47
C0236/22	SFL Solenoid Circuit	1. SFLR or SFLH circuit 2. Brake actuator assembly	BC-47
C0246/23	SRR Solenoid Circuit	1. SRRR or SRRH circuit 2. Brake actuator assembly	BC-47
C0256/24	SRL Solenoid Circuit	1. SRLR or SRLH circuit 2. Brake actuator assembly	BC-47
C0273/13	Open or Short Circuit in ABS Motor Relay Circuit	1. Brake actuator assembly (motor relay) 2. ABS No. 1 fuse (Fusible link) 3. Wire harness (+BM circuit)	BC-49
C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit	1. Brake actuator assembly (solenoid relay) 2. ABS No. 2 fuse (Fusible link) 3. Wire harness (+BS circuit)	BC-53

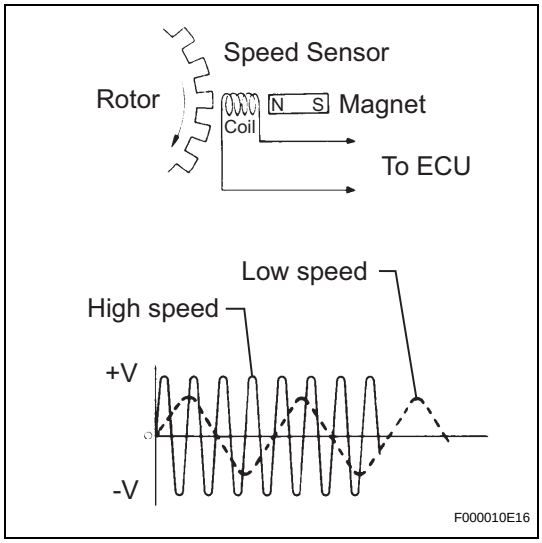
DTC No.	Detection Item	Trouble Area	See page
C1237/37	Speed Sensor Rotor Faulty	1. Brake actuator assembly (skid control ECU) 2. Speed sensor rotor (Front) 3. Rear axle hub and bearing assembly 4. Speed sensor 5. Speed sensor circuit 6. Tire and wheel size 7. Tire deformation	BC-56
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	1. Battery 2. Charging system 3. Power source circuit 4. Brake actuator assembly (Skid control ECU)	BC-63
C1249/49	Open in Stop Light Switch Circuit	1. Stop light switch 2. Stop light switch circuit 3. Brake actuator assembly (Skid control ECU)	BC-67
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Skid control rotor	BC-30
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Skid control rotor	BC-30
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Skid control rotor	BC-38
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Skid control rotor	BC-38
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Front speed sensor circuit RH 3. Sensor installation	BC-30
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Front speed sensor circuit LH 3. Sensor installation	BC-30
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Sensor rotor	BC-38
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Sensor rotor	BC-38
C1300/62	Skid Control ECU Malfunction	Brake actuator assembly (skid control ECU)	BC-72
C1330/35	Right Front Speed Sensor Circuit	1. Front speed sensor RH 2. Front speed sensor RH circuit 3. Sensor installation	BC-30
C1331/36	Left Front Speed Sensor Circuit	1. Front speed sensor LH 2. Front speed sensor LH circuit 3. Sensor installation	BC-30
C1332/38	Right Rear Speed Sensor Circuit	1. Rear speed sensor RH 2. Rear speed sensor RH circuit 3. Sensor installation	BC-38
C1333/39	Left Rear Speed Sensor Circuit	1. Rear speed sensor LH 2. Rear speed sensor LH circuit 3. Sensor installation	BC-38
U0073/94	Control Module Communication Bus OFF	1. Wire harness (CANL, CANH circuit) 2. Brake actuator assembly (skid control ECU)	BC-73

DTC	**C0200/31**	**Right Front Wheel Speed Sensor Signal Malfunction**
DTC	**C0205/32**	**Left Front Wheel Speed Sensor Signal Malfunction**
DTC	**C1271/71**	**Low Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1272/72**	**Low Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1275/75**	**Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1276/76**	**Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1330/35**	**Right Front Speed Sensor Circuit**
DTC	**C1331/36**	**Left Front Speed Sensor Circuit**

BC

DESCRIPTION

The speed sensors detect wheel speed and transmit the signals to the skid control ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71 to C1276/76 can be deleted when the speed sensor sends a wheel speed signal or the test mode ends. DTCs C1271/71 to C1276/76 are output only in the test mode.

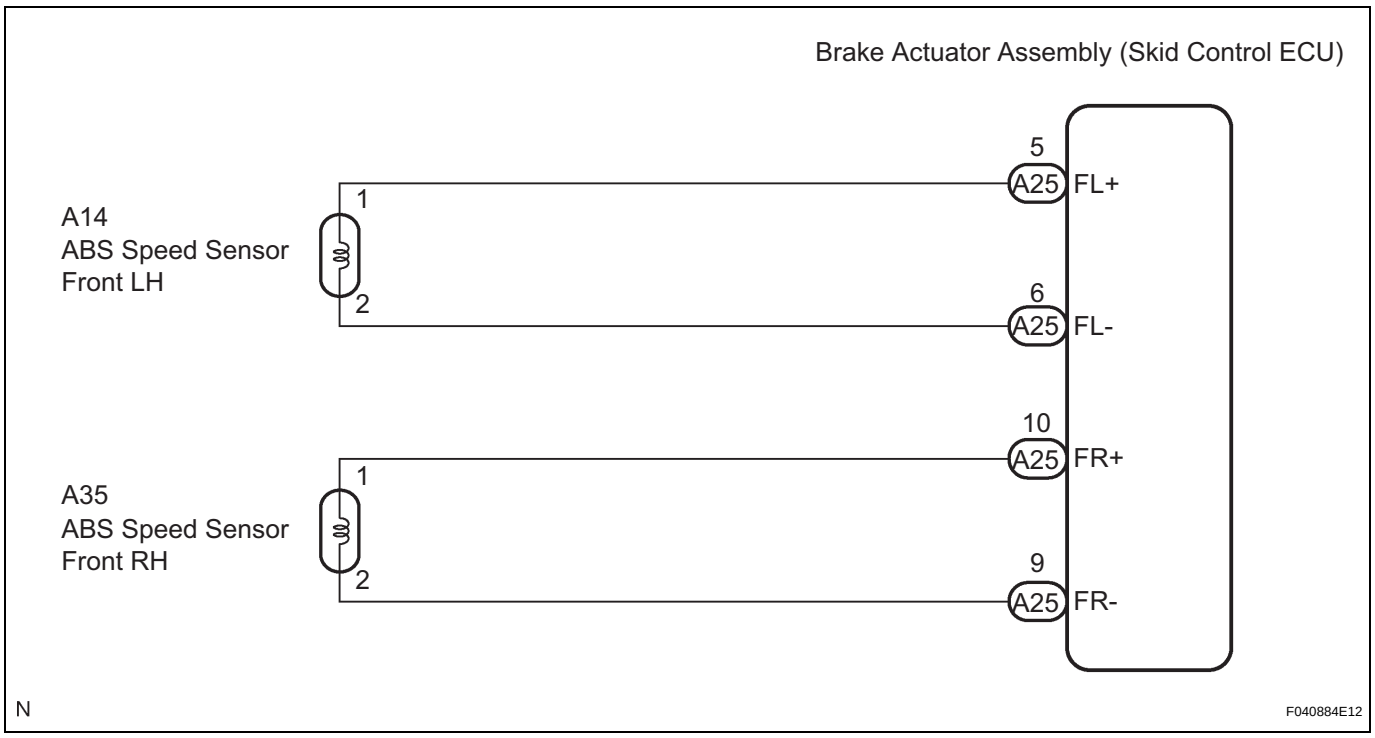


DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h), and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h) after the initial start or restart, a wheel speed of 0 mph (0 km/h) is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Front speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1330/35 C1331/36	Abnormality in the resistance value of each speed sensor is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Sensor installation
C1271/71 C1272/72	Detected only during test mode.	• Front speed sensor • Sensor installation • Sensor rotor
C1275/75 C1276/76	Detected only during test mode.	• Front speed sensor • Front speed sensor circuit • Sensor installation

HINT:
DTC No. C0200/31 and C1330/35 are for the front speed sensor RH.
DTC No. C0205/32 and C1331/36 are for the front speed sensor LH.

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

BC

OK

2 PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-11).

Result

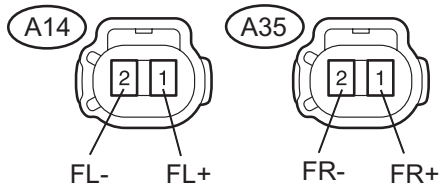
Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

B → **Go to step 5**

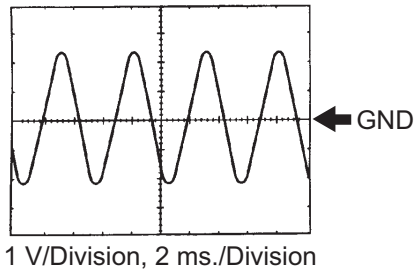
A

3 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Front Speed Sensor (Wire Harness Side) Connector Front View:



Normal Signal Waveform:



C132005E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.
  OK:
  The same waveform is output from front wheels and there is no noise or interference in the waveform.
  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
(c) Connect the connector.

NG → **Go to step 11**

OK

4 RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-21).
  HINT:
  Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output (When troubleshooting in accordance with the DTC CHART)	C

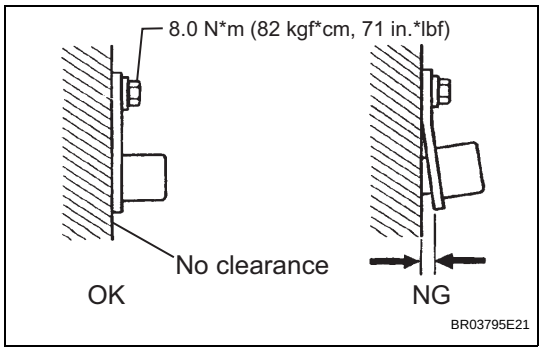
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

C → **END**

BC

A

5 INSPECT FRONT SPEED SENSOR INSTALLATION



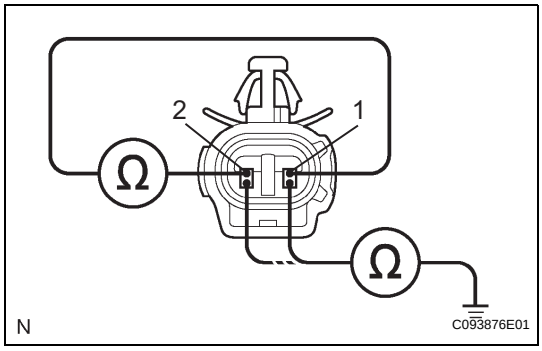
(a) Check the front speed sensor installation.
OK:
The installation bolt is tightened properly.
There is no clearance between the sensor and front steering knuckle.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE FRONT SPEED SENSOR (See page BC-438)**

BC

OK

6 INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.
(b) Disconnect the front speed sensor connectors.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
LH

Tester Connection	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	0.92 to 1.22 kΩ at 20 °C (68°F)
A14-1 (FL+) - Body ground	10 kΩ or higher
A14-2 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A35-1 (FR+) - A35-2 (FR-)	0.92 to 1.22 kΩ at 20 °C(68°F)
A35-1 (FR+) - Body ground	10 kΩ or higher
A35-2 (FR-) - Body ground	10 kΩ or higher

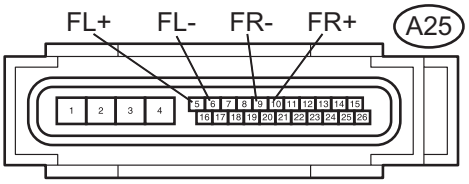
NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE FRONT SPEED SENSOR (See page BC-438)**

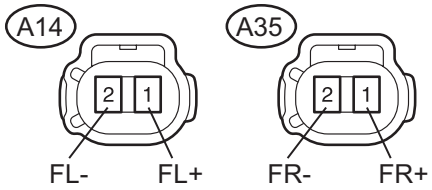
OK

7 CHECK HARNESS AND CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)

Skid Control ECU (Wire Harness Side) Connector Front View:



Front Speed Sensor (Wire Harness Side) Connector Front View:



N

C132908E02

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A25-5 (FL+) - A14-1 (FL+)	Below 1 Ω
A25-6 (FL-) - A14-2 (FL-)	Below 1 Ω
A14-1 (FL+) - Body ground	10 kΩ or higher
A14-2 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A25-10 (FR+) - A35-1 (FR+)	Below 1 Ω
A25-9 (FR-) - A35-2 (FR-)	Below 1 Ω
A35-1 (FR+) - Body ground	10 kΩ or higher
A35-2 (FR-) - Body ground	10 kΩ or higher

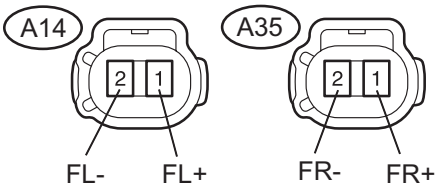
(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)**

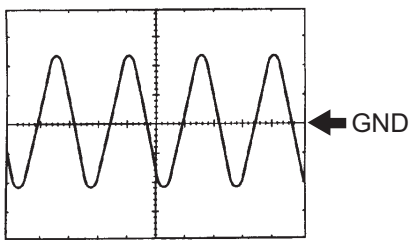
OK

8 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Front Speed Sensor (Wire Harness Side) Connector Front View:



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C132005E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.

  OK:

  The same waveforms is output from front wheels and there is no noise or interference in the waveform.

  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

  (4) Connect the connector.

NG → **Go to step 11**

BC

OK

9	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.
HINT:
If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step before replacing the part (See page BC-16).

BC

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

10	RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output	B

B → **END**

A

11	INSPECT SPEED SENSOR TIP

(a) Remove the front speed sensor (See page BC-438).
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-11).
(c) Install the speed sensor.

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

CLEAN OR REPLACE SPEED SENSOR ROTOR

DTC	**C0210/33**	**Right Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C0215/34**	**Left Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C1273/73**	**Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1274/74**	**Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1277/77**	**Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1278/78**	**Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1332/38**	**Right Rear Speed Sensor Circuit**
DTC	**C1333/39**	**Left Rear Speed Sensor Circuit**

BC

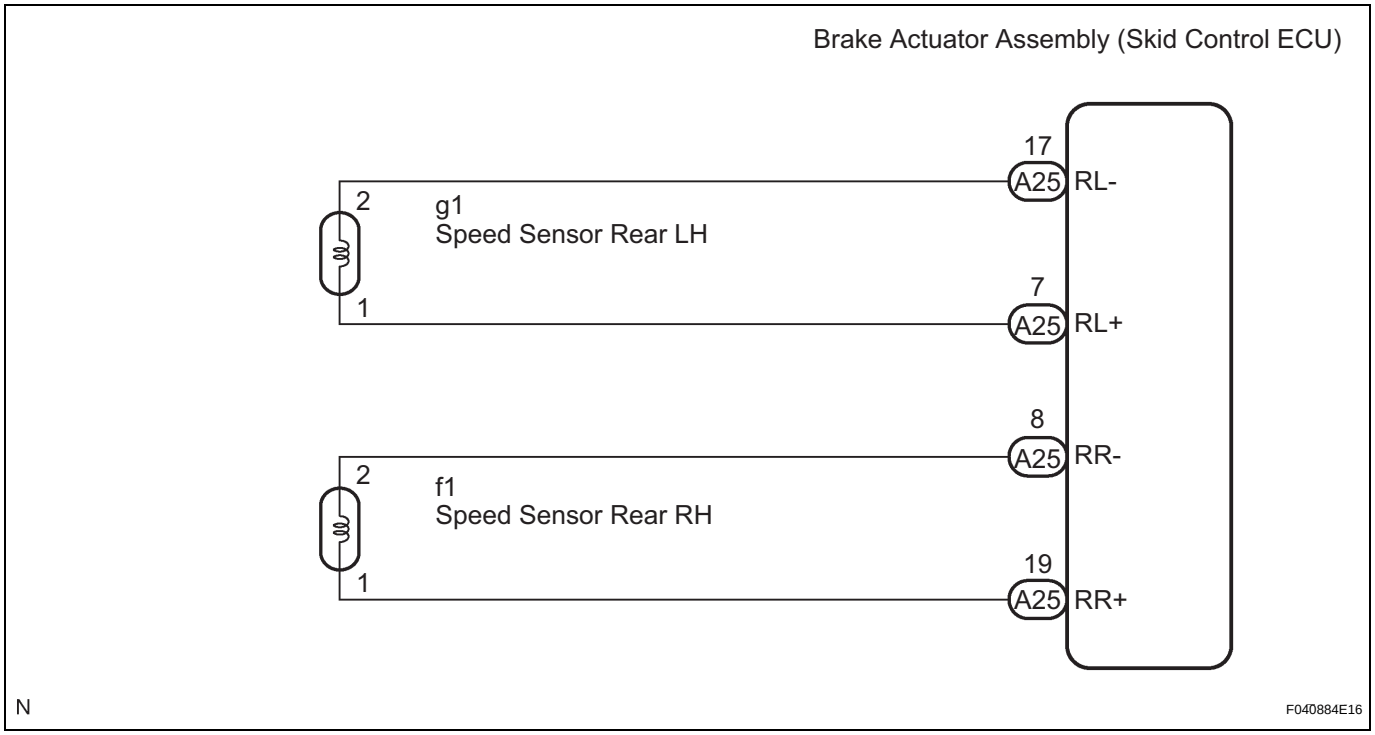
DESCRIPTION

Refer to DTCs C0200/31, C0205/32, C1330/35, and C1331/36 (See page BC-30).
DTCs from C1273/73 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs from C1273/73 to C1278/78 are output only in the test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h), and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h), after the initial start or restart a wheel speed of 0 mph (0 km/h) is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Rear speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1332/38 C1333/39	Abnormality in the resistance value of each speed sensor is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Sensor installation
C1273/73 C1274/74	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor
C1277/77 C1278/78	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor

HINT:
DTC No. C0210/33 and C1332/38 are for the rear speed sensor RH.
DTC No. C0215/34 and C1333/39 are for the rear speed sensor LH.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

OK

2	PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-11).

Result

Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

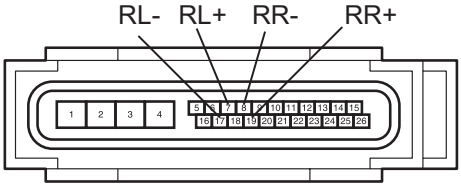
B → **Go to step 5**

A

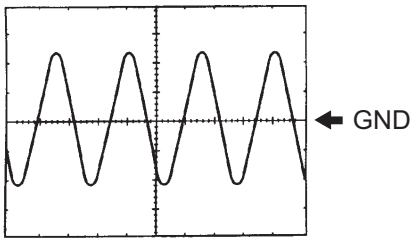
3	INSPECT SPEED SENSOR SIGNAL WAVEFORM

BC

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



C132907E02

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the skid control ECU connector.
  (2) Connect the oscilloscope to terminals of the skid control ECU.
  (3) Check that a waveform is output when the tires are rotated.
    OK:
    The same waveform is output from rear wheels and there is no noise or interference in the waveform.
    HINT:
    - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
    - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connector.

NG → **CLEAN OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

4	RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.

(c) Check if the same DTCs are recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	A
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output (When troubleshooting in accordance with the DTC CHART)	C

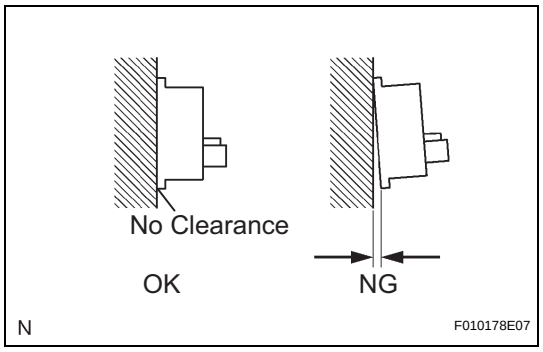
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

C → **END**

BC

A

5 INSPECT SPEED SENSOR INSTALLATION

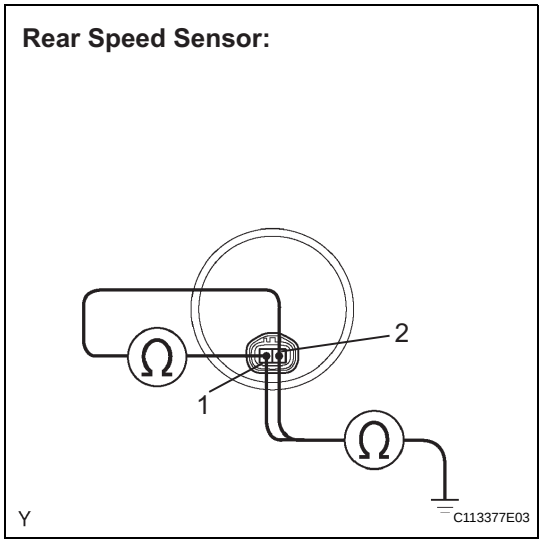


(a) Check the rear speed sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.
NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE REAR SPEED SENSOR (See page BC-443)**

OK

6	INSPECT REAR SPEED SENSOR



(a) Disconnect the rear speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 (RL+) - g1-2 (RL-)	Below 2.2 kΩ
g1-1 (RL+) - Body ground	10 kΩ or higher
g1-2 (RL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 (RR+) - f1-2 (RR-)	Below 2.2 kΩ
f1-1 (RR+) - Body ground	10 kΩ or higher
f1-2 (RR-) - Body ground	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-11).

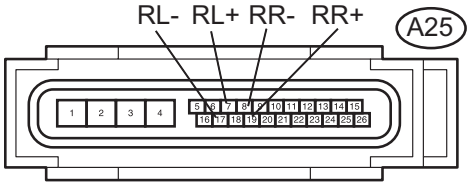
NG → **REPLACE REAR SPEED SENSOR (See page BC-443)**

OK

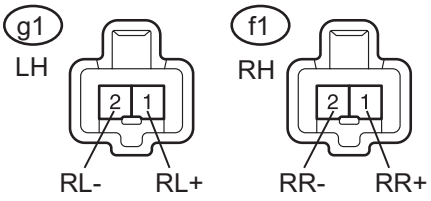
BC

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE TO SKID CONTROL ECU)

Skid Control ECU (Wire Harness Side) Connector Front View:



Front Speed Sensor (Wire Harness Side) Connector Front View:



N

C132909E03

(a) Check harness and connector.
(1) Disconnect the skid control ECU connector.
(2) Disconnect the skid control sensor wire.
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A25-7 (RL+) - g1-1 (RL+)	Below 1 Ω
A25-17 (RL-) - g1-2 (RL-)	Below 1 Ω
g1-1 (RL+) - Body ground	10 kΩ or higher
g1-2 (RL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A25-19 (RR+) - f1-1 (RR+)	Below 1 Ω
A25-8 (RR-) - f1-2 (RR-)	Below 1 Ω
f1-1 (RR+) - Body ground	10 kΩ or higher
f1-2 (RR-) - Body ground	10 kΩ or higher

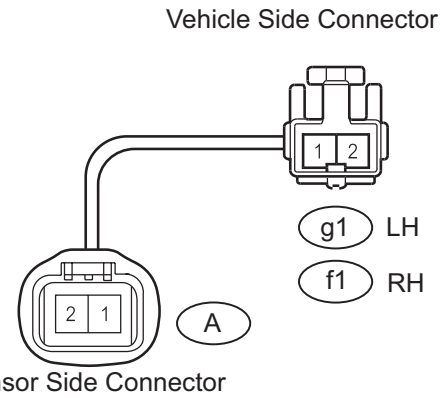
BC

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO SKID CONTROL SENSOR WIRE)**

OK

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE TO REAR SPEED SENSOR)

Skid Control Sensor Wire:



C113396E04

(a) Check harness and connector (skid control sensor wire).
(1) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 - A-1	Below 1 Ω
g1-1 - A-2	10 kΩ or higher
g1-1 - Body ground	10 kΩ or higher
g1-2 - A-2	Below 1 Ω
g1-2 - A-1	10 kΩ or higher
g1-2 - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 - A-1	Below 1 Ω

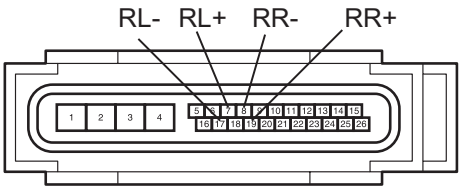
Tester Connection	Specified Condition
f1-1 - A-2	10 kΩ or higher
f1-1 - Body ground	10 kΩ or higher
f1-2 - A-2	Below 1 Ω
f1-2 - A-1	10 kΩ or higher
f1-2 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE SKID CONTROL SENSOR WIRE**

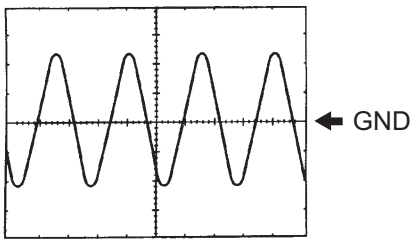
OK

9 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C132907E02

(a) Lift up the vehicle.
(b) Perform the inspection using the oscilloscope.
  (1) Disconnect the skid control ECU connector.
  (2) Connect the oscilloscope to terminals of the skid control ECU.
  (3) Check that a waveform is output when the tires are rotated.
    OK:
    The same waveforms is output from rear wheels and there is no noise or interference in the waveform.
    HINT:
    - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
    - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connectors.

NG → **CLEAN OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

10 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-25).

DATA LIST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

HINT:

- It is suspected that the DTCs were output due to a bad connection of the connector terminal.
- If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step (See page BC-16).

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

11 RECONFIRM DTC

(a) Clear the DTCs (See page BC-21).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-21).

HINT:

Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	A
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output	B

B → **END**

A

12 INSPECT SPEED SENSOR ROTOR

(a) Turn the ignition switch off.
(b) Remove the rear axle (See page AH-15).

(c) Check the rotor.
OK:
No scratches, cracks, oil, or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-11).

(d) Install the rear axle (See page AH-16).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

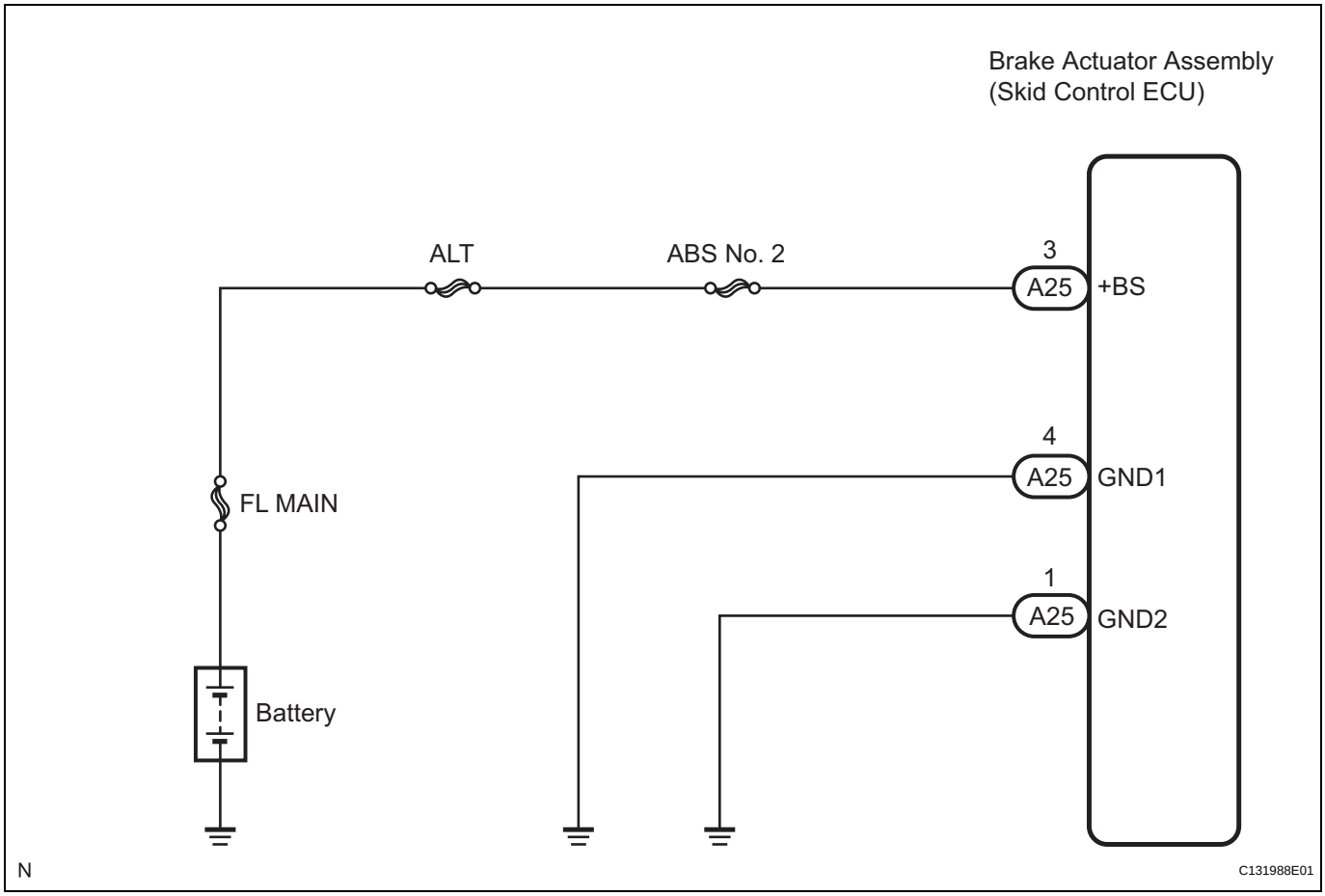
DESCRIPTION

These solenoids turn on when signals are received from the ECU and they control the pressure acting on the wheel cylinders thus controlling braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Solenoid valve signal does not match the check result.	• Each solenoid circuit • Brake actuator assembly

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are detected when a problem is identified in the brake actuator assembly.
The solenoid circuit is in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:

- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPAIR BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

DTC	C0273/13	Open or Short Circuit in ABS Motor Relay Circuit

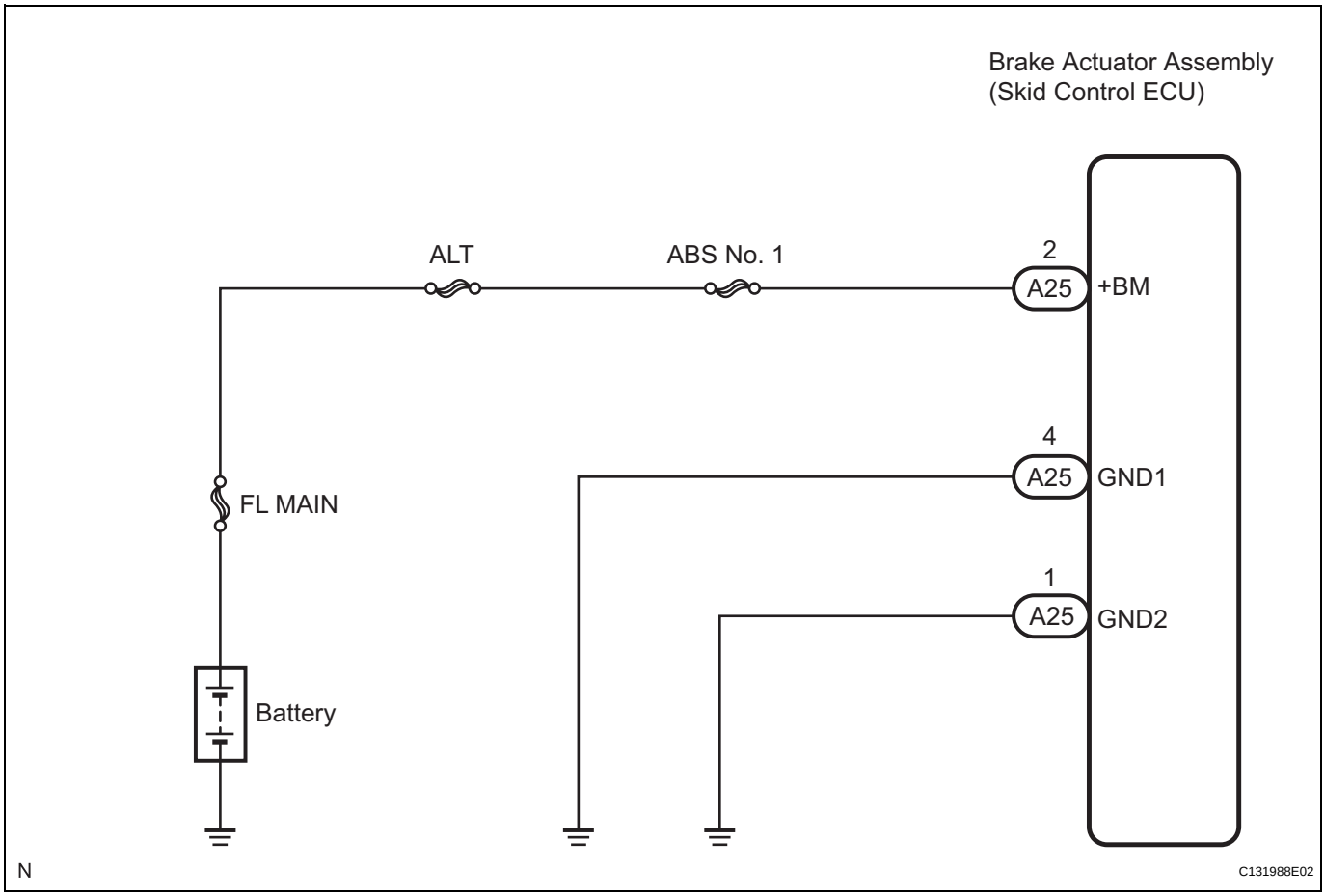
DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU turns the motor relay on and operates the ABS pump motor.
If the voltage supplied to the motor relay (+BM) is below the DTCs detection threshold due to low voltage from the battery or alternator, the DTC may be stored.

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	When any of the following is detected: • When the motor relay is actuated, voltage is not supplied to the pump motor within 0.1 second. • When the motor relay is changed from ON to OFF, the remaining high voltage is more than 2 V for 1 second. • For 30 to 125 msec. after the motor relay is turned from ON to OFF, the remaining high voltage is out of range. The voltage is still out of range when the motor relay is turned from ON to OFF 3 times.	• ABS No. 1 fuse (Fusible link) • Wire harness (+BM circuit) • Brake actuator assembly (motor relay)

BC

WIRING DIAGRAM



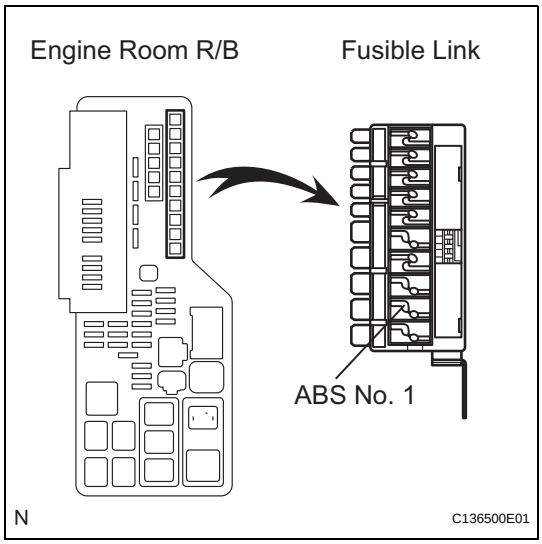
INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0273/13, inspect and repair the trouble areas indicated by C1241/41 (See page BC-63).

- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	INSPECT FUSIBLE LINK (ABS NO. 1 FUSE)



(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is melted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "ACTIVE TEST" on the intelligent tester (See page BC-25).

ACTIVE TEST: ABS

Item	Measurement Item / Range (Display)	Normal Condition
ABS MTR RELAY	Turns ABS motor relay ON / OFF	Operating sound of motor is heard

(d) Check the operating sound of the ABS motor relay when operating it with the intelligent tester.
OK:
The operating sound of the ABS motor relay should be heard.

Result

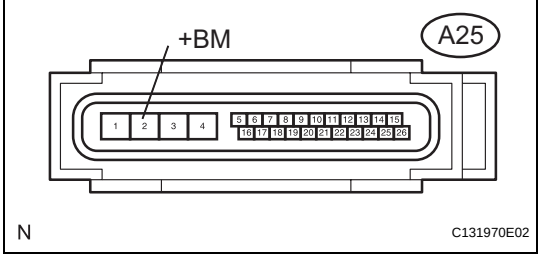
Result	Proceed to
The operating sound is not heard	A
The operating sound is heard	B

B → **Go to step 5**

A

3 INSPECT SKID CONTROL ECU CONNECTOR (+BM TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

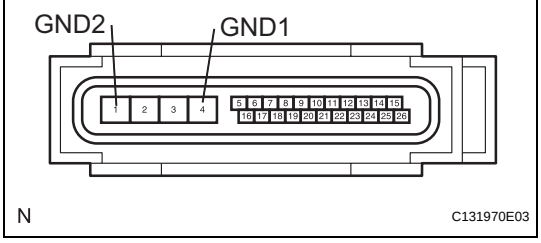
Tester Connection	Condition	Specified Condition
A25-2 (+BM) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BM CIRCUIT)**

OK

4 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

5 RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The ABS motor relay is in the brake actuator assembly. Therefore, ABS motor relay inspection and motor relay unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A

Condition	Proceed to
DTC is output	B

HINT:

- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

BC

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

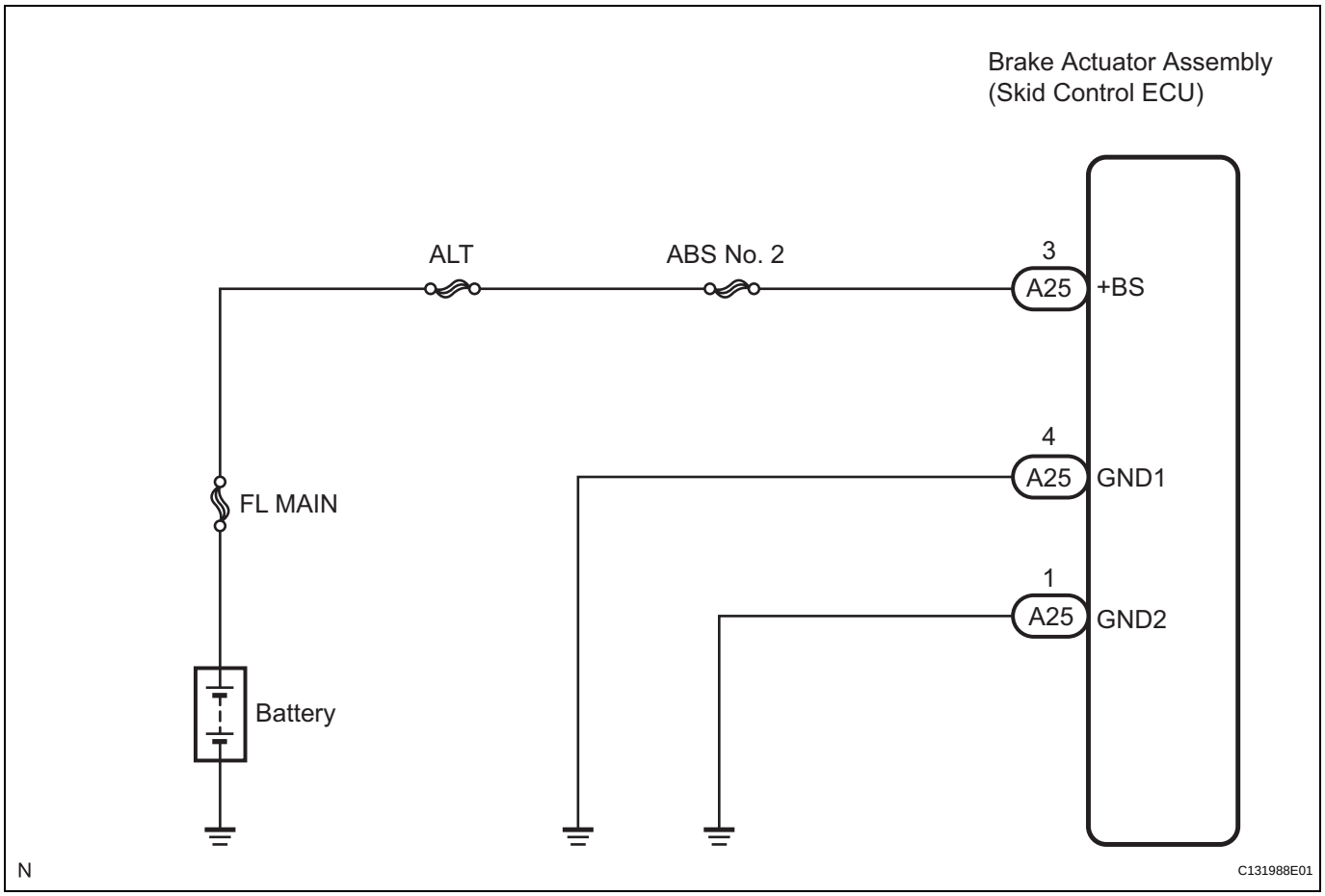
DTC	C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit

DESCRIPTION

This relay supplies power to each ABS solenoid. If the ABS initial check is OK after the ignition switch is turned on (IG), the skid control ECU will turn the ABS solenoid relay on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	When any of the following is detected: • 3 or more solenoid valves are found faulty and simultaneously valve supply voltage is detected to be abnormal. • Solenoid valve relay is not switched off. • Valve relay is stuck open even through the valve relay supply voltage is high.	• Wire harness (+BS circuit) • ABS No. 2 fuse (Fusible link) • Brake actuator assembly (Solenoid relay)

WIRING DIAGRAM

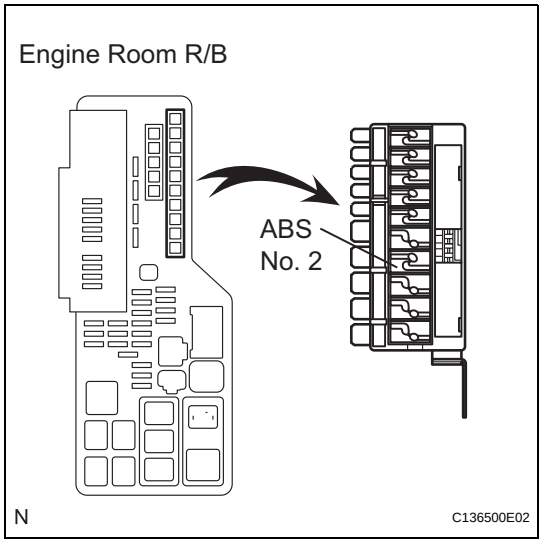


INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0278/11, inspect and repair the trouble areas indicated by C1241/41 (See page BC-63).
- Check the condition of each related circuit before troubleshooting (See page IN-40).

1 INSPECT FUSIBLE LINK (ABS NO. 2 FUSE)



(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is melted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

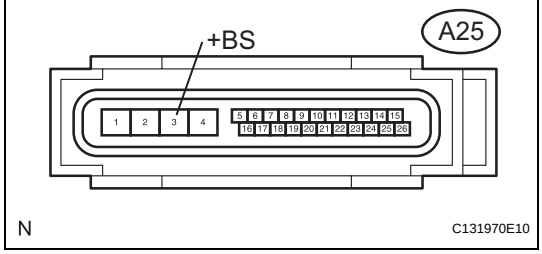
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2 INSPECT SKID CONTROL ECU CONNECTOR (+BS CIRCUIT)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

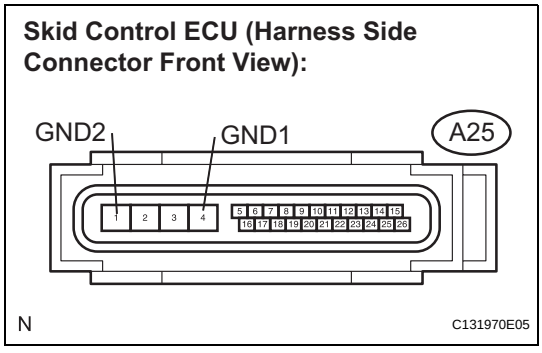
Tester Connection	Condition	Specified Condition
A25-3 (+BS) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4	RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The solenoid circuit is in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

BC

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

DTC	C1237/37	Speed Sensor Rotor Faulty

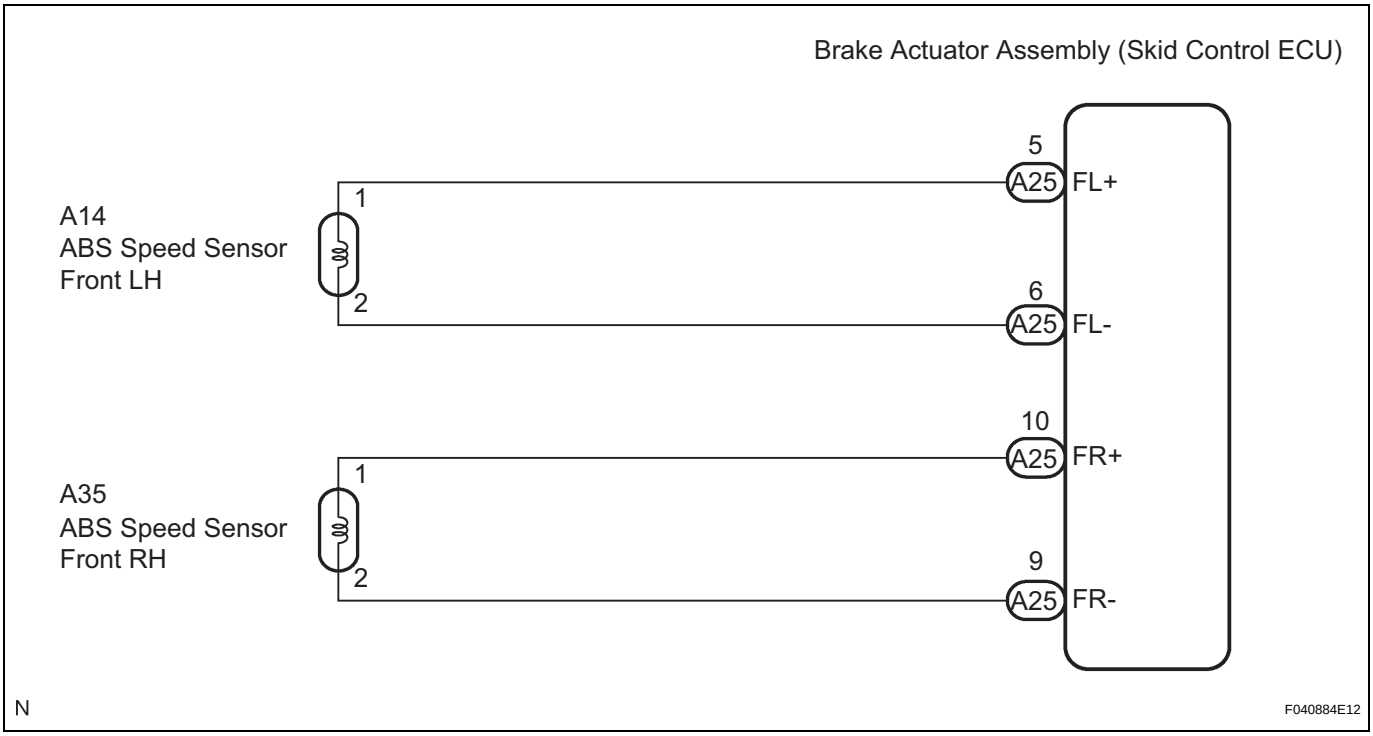
DESCRIPTION

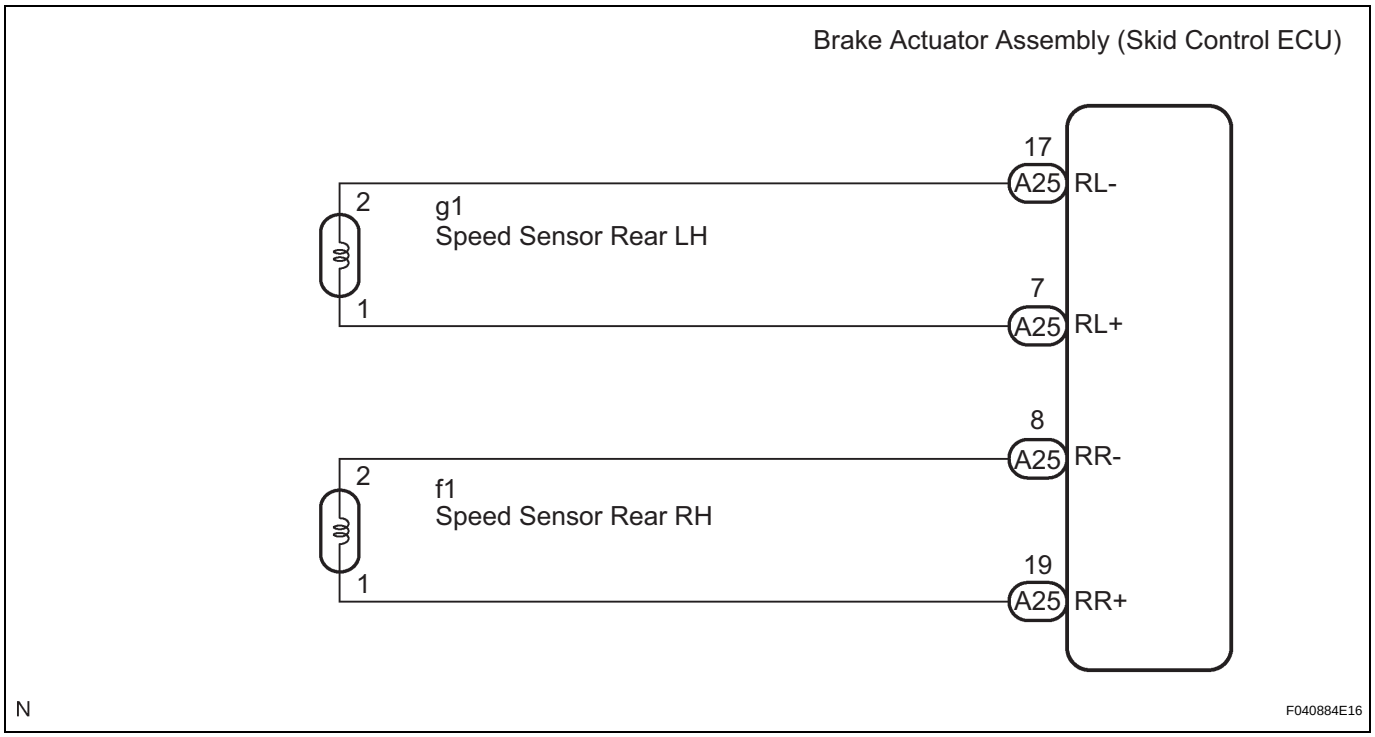
The skid control ECU measures the speed of each wheel by receiving signals from the speed sensor. These signals are used for recognizing that all 4 wheels are operating properly.
Therefore, all wheel signals must be equal.

DTC No.	DTC Detecting Condition	Trouble Area
C1237/37	When any of the following is detected: • Wheel speed difference between the wheels. • Wheel sensor signal failure. • ABS control continues for 60 sec. or more.	• Brake actuator assembly (skid control ECU) • Speed sensor rotor (Front) • Rear axle hub and bearing assembly • Speed sensor • Speed sensor circuit • Tire and wheel size • Tire deformation

WIRING DIAGRAM

BC





BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK TIRES

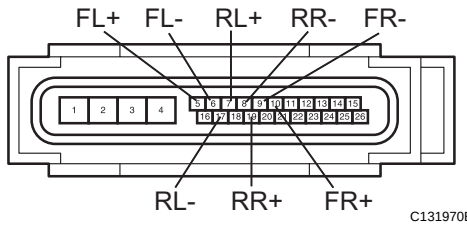
(a) Check the size and condition of all 4 tires (See page TW-3).
HINT:
This DTC is output when tire deformation or a difference in tire size is detected.
OK:
The diameters of all 4 tires and air pressure are the same.

NG → **REPLACE TIRES SO THAT ALL 4 TIRES ARE THE SAME SIZE**

OK

2 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS

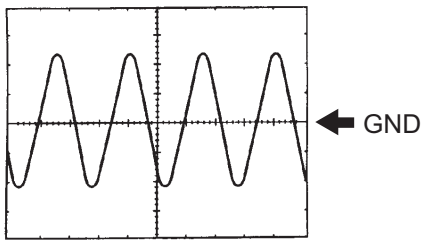
Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Connect the oscilloscope to each speed sensor terminal of the skid control ECU connector.
Terminals

Connector	Circuit
A25-5 (FL+) - A25-6 (FL-)	Front left speed sensor
A25-10 (FR+) - A25-9 (FR-)	Front right speed sensor
A25-7 (RL+) - A25-17 (RL-)	Rear left speed sensor
A25-19 (RR+) - A25-8 (RR-)	Rear right speed sensor

Normal Signal Waveform:



1 V / Division, 2 ms. / Division

(c) Check that a waveform is output when the tires are rotated (by the sensor circuit).
OK:
A waveform as shown in the figure should be output.
HINT:
- Each sensor circuit outputs the same waveform without noise.
- As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

(d) Make sure that the waveform does not change while jiggling a connector or a wire harness.
OK:
The waveform does not change.
HINT:
If the waveform changes while jiggling a connector or a wire harness, there may be a malfunction in the connector or the wire harness.
(e) Connect the connector.

NG → **Go to step 4**

OK

3 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Start the engine.
(c) Drive the vehicle at a speed of 20 mph (32 km/h) or more for 60 seconds or more.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

4 CHECK SPEED SENSOR ROTOR

(a) Check the speed sensor rotor.
Front Speed Sensor Rotor: (See page DS-25)
Rear Speed Sensor Rotor: (See page AH-15)
OK:
No scratches or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-11).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

5 CHECK SPEED SENSOR TIP

(a) Remove each speed sensor.
(b) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-11).
(c) Install speed sensor.

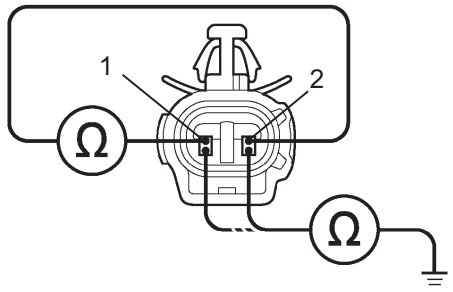
NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

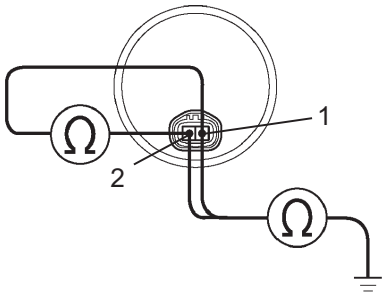
BC

6	INSPECT EACH SPEED SENSOR

Front Speed Sensor:



Rear Speed Sensor:



C136027E01

(a) Disconnect each speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68°F)
A14-1 (FL+) - Body ground	Always	10 kΩ or higher
A14-2 (FL-) - Body ground	Always	10 kΩ or higher
A35-1 (FR+) - A35-2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68°F)
A35-1 (FR+) - Body ground	Always	10 kΩ or higher
A35-2 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
g1-1 (RL+) - g1-2 (RL-)	Always	Below 2.2 kΩ
g1-1 (RL+) - Body ground	Always	10 kΩ or higher
g1-2 (RL-) - Body ground	Always	10 kΩ or higher
f1-1 (RR+) - f1-2 (RR-)	Always	Below 2.2 kΩ
f1-1 (RR+) - Body ground	Always	10 kΩ or higher
f1-2 (RR-) - Body ground	Always	10 kΩ or higher

(c) Connect the connector.

NOTICE:

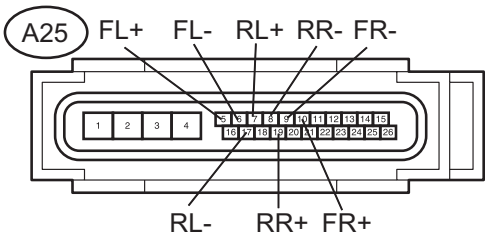
Check the speed sensor signal after replacement (See page BC-11).

NG → **REPLACE EACH SPEED SENSOR**

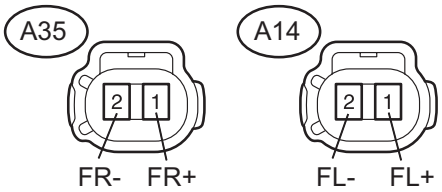
OK

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)

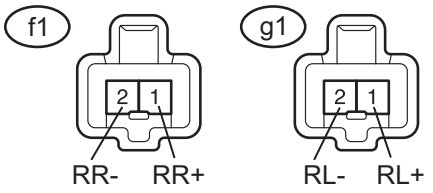
Skid Control ECU Harness Side Connector Front View:



Front Speed Sensor Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



C136491E02

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A25-5 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A25-6 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A25-10 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A25-9 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A25-5 (FL+) - Body ground	Always	10 kΩ or higher
A25-6 (FL-) - Body ground	Always	10 kΩ or higher
A25-10 (FR+) - Body ground	Always	10 kΩ or higher
A25-9 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
A25-7 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A25-17 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A25-19 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A25-8 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A25-7 (RL+) - Body ground	Always	10 kΩ or higher
A25-17 (RL-) - Body ground	Always	10 kΩ or higher
A25-19 (RR+) - Body ground	Always	10 kΩ or higher
A25-8 (RR-) - Body ground	Always	10 kΩ or higher

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)**

OK

8 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Start the engine.

BC

(c) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1237/37) is not output	A
DTC (C1237/37) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)**

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

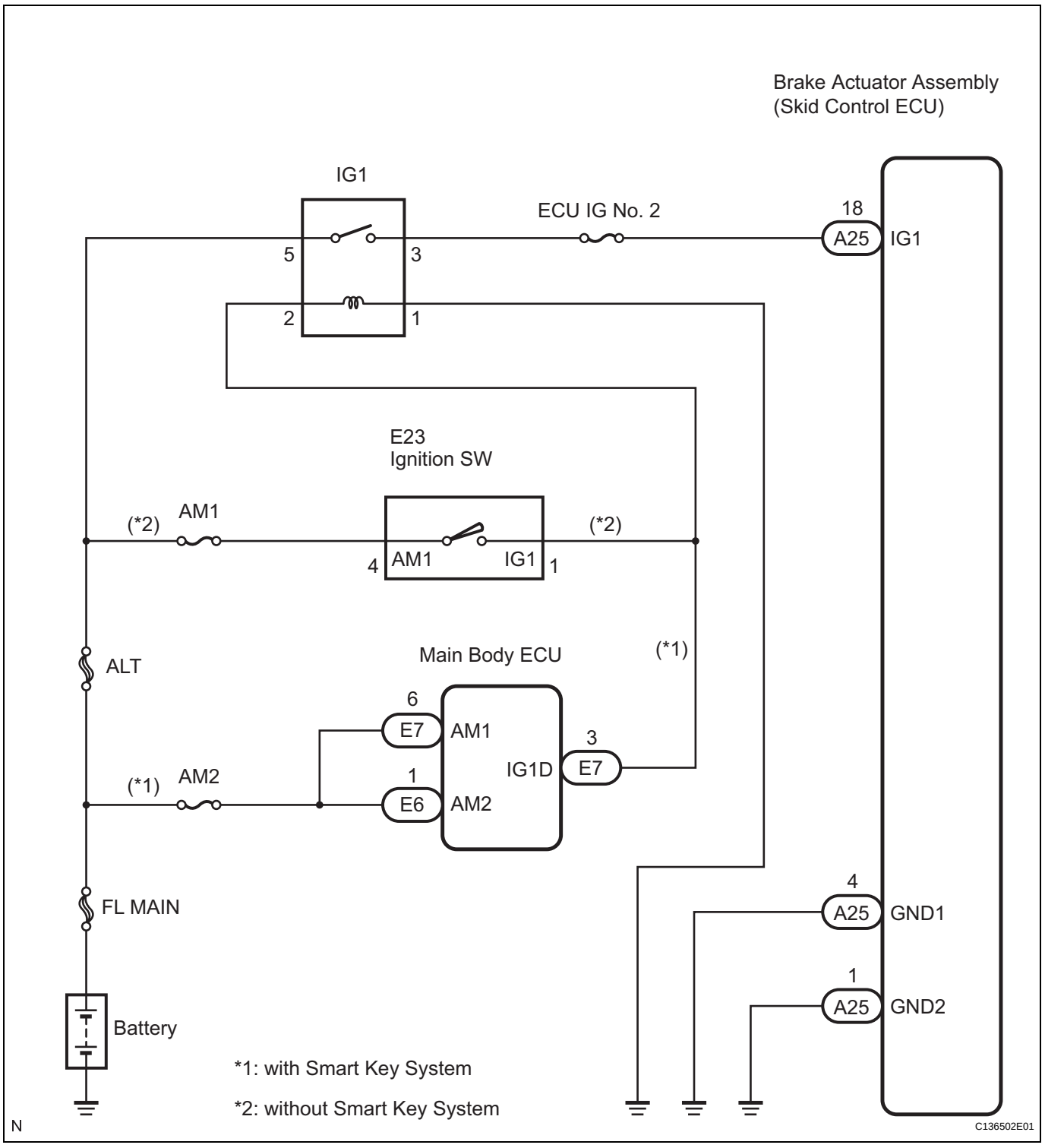
If a malfunction is detected in the power supply circuit of the brake actuator assembly (skid control ECU), the skid control ECU (housed in the actuator assembly) stores this DTC and the fail-safe function prohibits ABS operation (See page BC-24).

This DTC is output when the IG1 terminal voltage deviates from the normal condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit, etc.

This DTC is cancelled when the IG1 terminal voltage returns to normal (only when the voltage returns to normal from a voltage lower than the specified value).

DTC No.	DTC Detecting Condition	Trouble Area
C1241/41	With vehicle speed more than 4 mph (6 km/h), when any of the following is detected: • Battery voltage is 16.9 V or more. • Battery voltage is 9.4 V or less when ABS does not operate. • Battery voltage is 9.2 V or less when ABS operates.	• Battery • Charging system • Power source circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

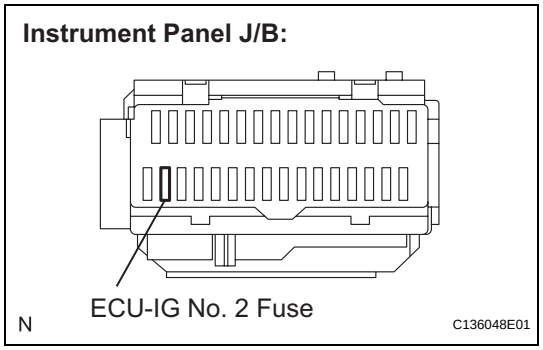


INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 INSPECT FUSE (ECU-IG NO. 2 FUSE)



(a) Remove the ECU-IG No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
ECU-IG No. 2 fuse	Below 1 Ω (Continuity)

(c) Install the fuse.

NG → **REPLACE FUSE**

OK

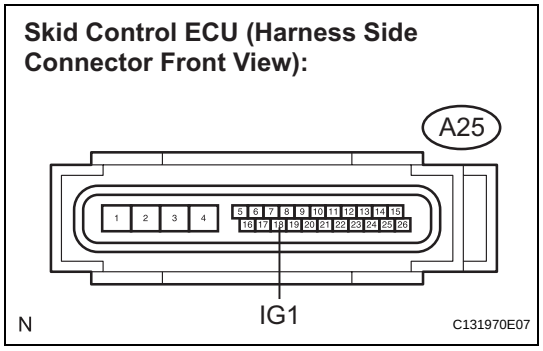
2 INSPECT BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

3 INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

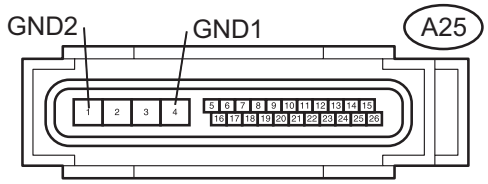
Tester Connection	Condition	Specified Condition
A25-18 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

4 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

5 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1241/41) is output	A
DTC (C1241/41) is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTC (C1241/41) is not output (When troubleshooting in accordance with the DTC CHART)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

C → **END**

A

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

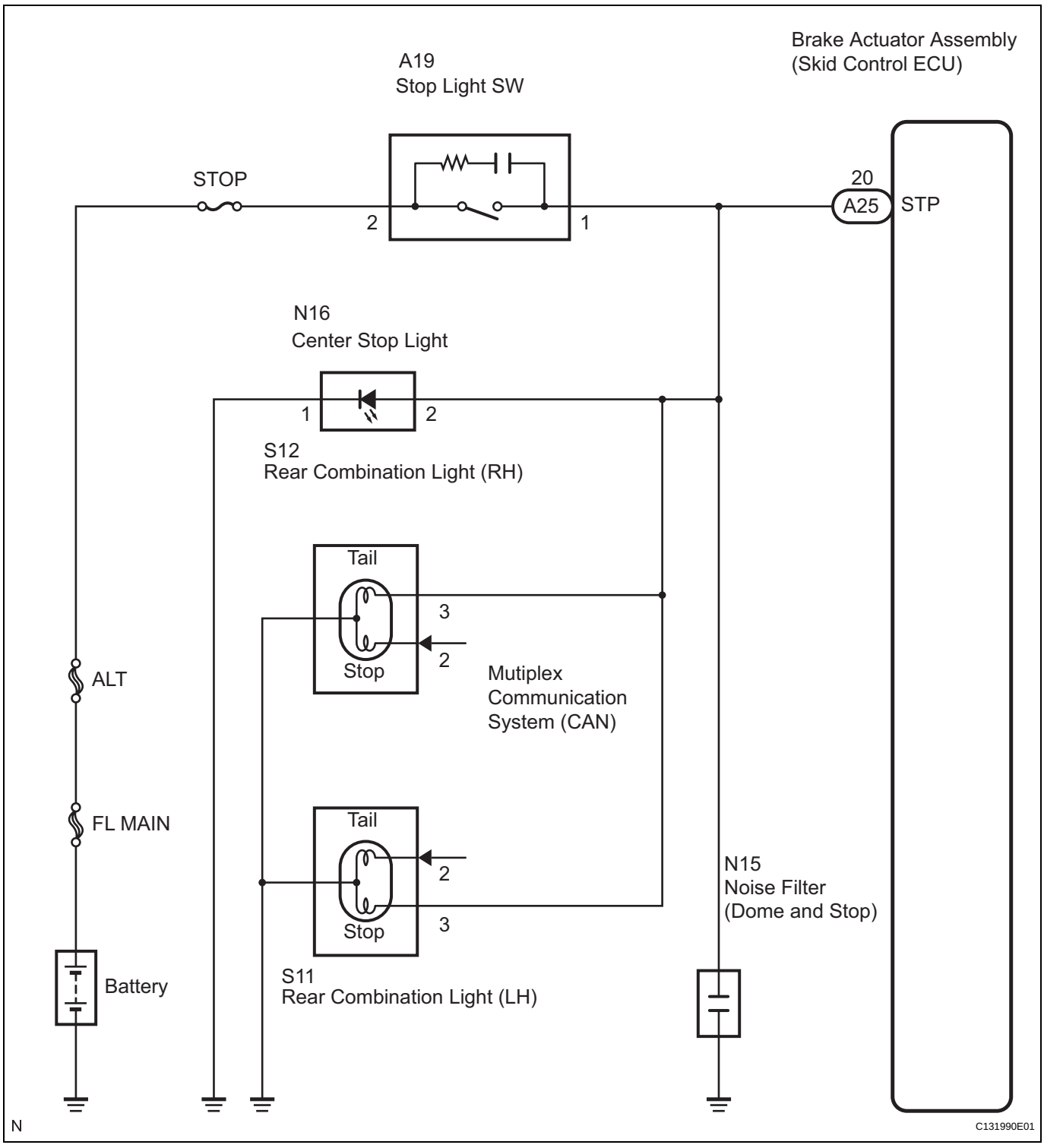
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.
The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light signal input line (STP terminal) or the ground line of the stop light circuit with the stop light switch off (brake pedal not depressed).

DTC No.	DTC Detecting Condition	Trouble Area
C1249/49	Stop light switch circuit is open, and stop light switch voltage is 40% or more and less than 67% of the battery voltage.	• Stop light switch • Stop light switch circuit • Brake actuator assembly (Skid Control ECU)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 CHECK STOP LIGHT SWITCH OPERATION (STOP LIGHT SWITCH CIRCUIT)

(a) Check that the stop lights come on when the brake pedal is depressed and goes off when the brake pedal is released.

OK

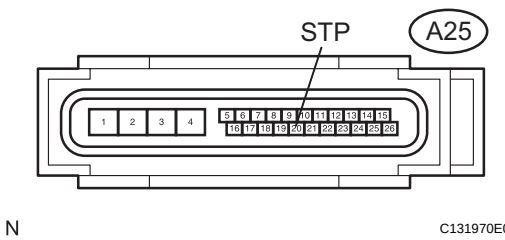
Pedal Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG → **Go to step 5**

OK

2 INSPECT SKID CONTROL ECU CONNECTOR (STP TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

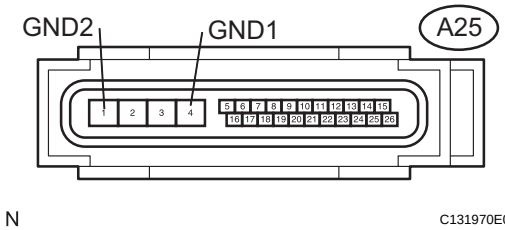
Tester Connection	Switch Condition	Specified Condition
A25-20 (STP) - Body ground	Brake pedal depressed	8 to 14 V
A25-20 (STP) - Body ground	Brake pedal released	Below 4.0 V

NG → **Go to step 7**

OK

3 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

(a) Clear the DTC (See page BC-21).
(b) Start the engine.

(c) Depress the brake pedal several times to test the stop light circuit.
(d) Check if the same DTC is recorded (See page BC-21).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output (When troubleshooting in accordance with the DTC CHART)	B
DTC is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	C

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

C → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

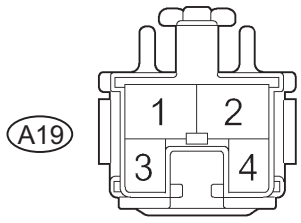
BC

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-19)

5 INSPECT STOP LIGHT SWITCH ASSEMBLY (POWER SOURCE TERMINAL VOLTAGE)

Stop Light Switch (Wire Harness Side) Connector Front View:



I042363E17

(a) Disconnect the stop light switch connector.
(b) Measure the voltage according to the value(s) in the table below.

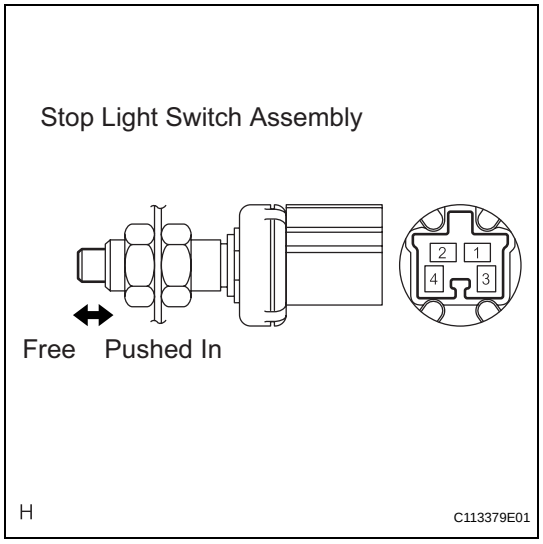
Standard voltage

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

6 INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

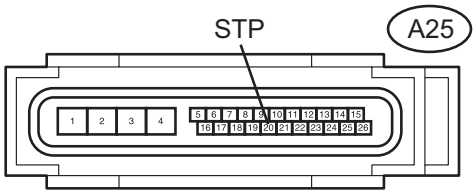
Tester Connection	Condition	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY (See page BR-71)**

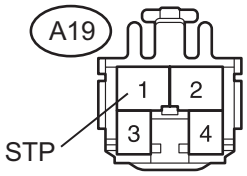
OK

7 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)

Skid Control ECU (Wire Harness Side) Connector Front View:



Stop Light Switch (Wire Harness Side) Connector Front View:



(a) Disconnect the stop light switch connector and skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-20 (STP) - A19-1 (STP)	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CIRCUIT)

BC

DTC	C1300/62	Skid Control ECU Malfunction

DESCRIPTION

The skid control ECU outputs this DTC, if malfunctions are found in the circuit inside the computer by self diagnosis.

DTC No.	DTC Detecting Condition	Trouble Area
C1300/62	Internal failure of the skid control ECU control unit	Brake actuator assembly (skid control ECU)

INSPECTION PROCEDURE

1	REPLACE BRAKE ACTUATOR ASSEMBLY

(a) Replace the brake actuator assembly (skid control ECU) (See page BC-432).
HINT:
This DTC is output when the skid control ECU detects a malfunction in the internal circuit.
(b) Clear the DTC (See page BC-21).

NEXT

END

DTC	U0073/94	Control Module Communication Bus OFF

DESCRIPTION

- The skid control ECU receives the signal sent from the ECM via the CAN communication system.
- When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system before repairing each corresponding sensor.

DTC No.	DTC Detecting Condition	Trouble Area
U0073/94	When any of the following is detected: 1. The skid control ECU cannot send a signal (30 cycles). 2. The condition that bus OFF state occurs for 300 msec.	• Wire harness (CANL, CANH circuit) • Brake actuator assembly (Skid control ECU)

INSPECTION PROCEDURE

Proceed to CAN communication system troubleshooting (See page CA-8).
HINT:
When DTCs indicating a CAN communication system malfunction are output, repair the CAN communication system before repairing each corresponding sensor.

ABS Warning Light Remains ON

DESCRIPTION

The skid control ECU sends the indicator signals to the combination meter assembly via the CAN communication system.

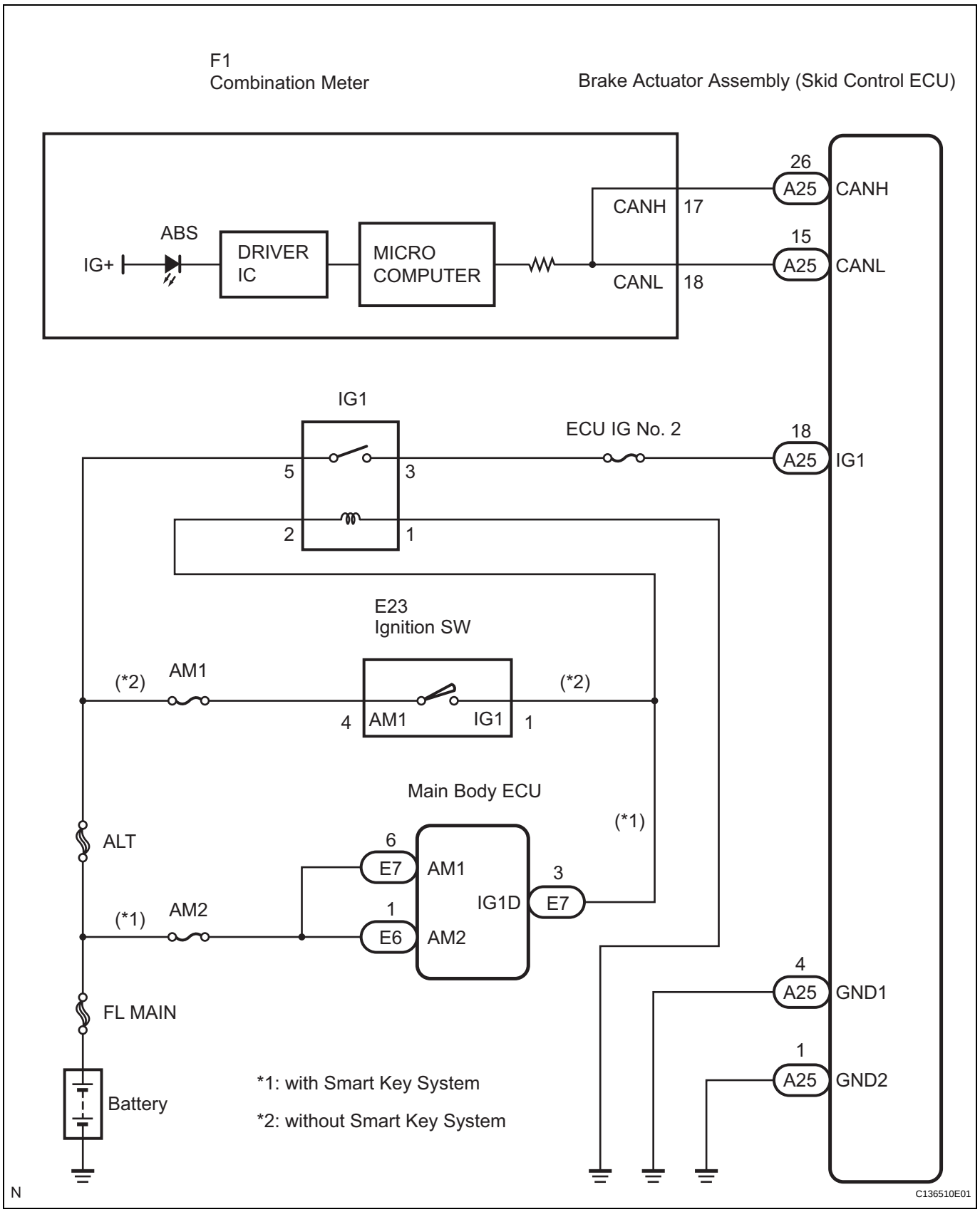
If any of the following is detected, the ABS warning light remains on.

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the wire harness between the combination meter and the skid control ECU.
- The ABS and/or EBD is defective.

HINT:

The intelligent tester may not be used when the skid control ECU is abnormal.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit before troubleshooting (See page IN-40).

1	INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK SKID CONTROL ECU CONNECTOR SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

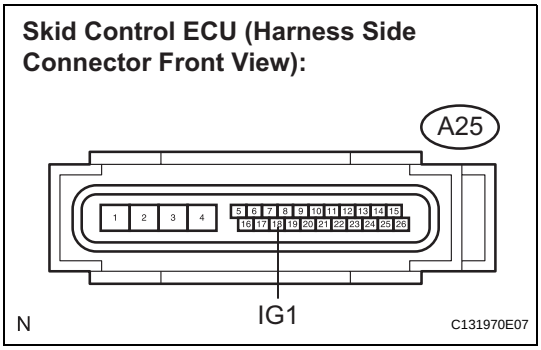
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

4	INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

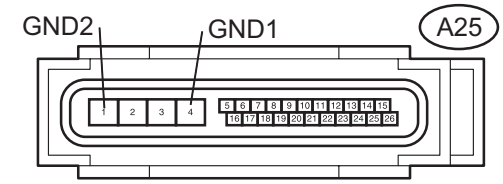
Tester Connection	Condition	Specified Condition
A25-18 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: ABS

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WRN LIGHT	Turn ABS warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

Result

Condition	Proceed to
OK	A
OK (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
NG	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)**

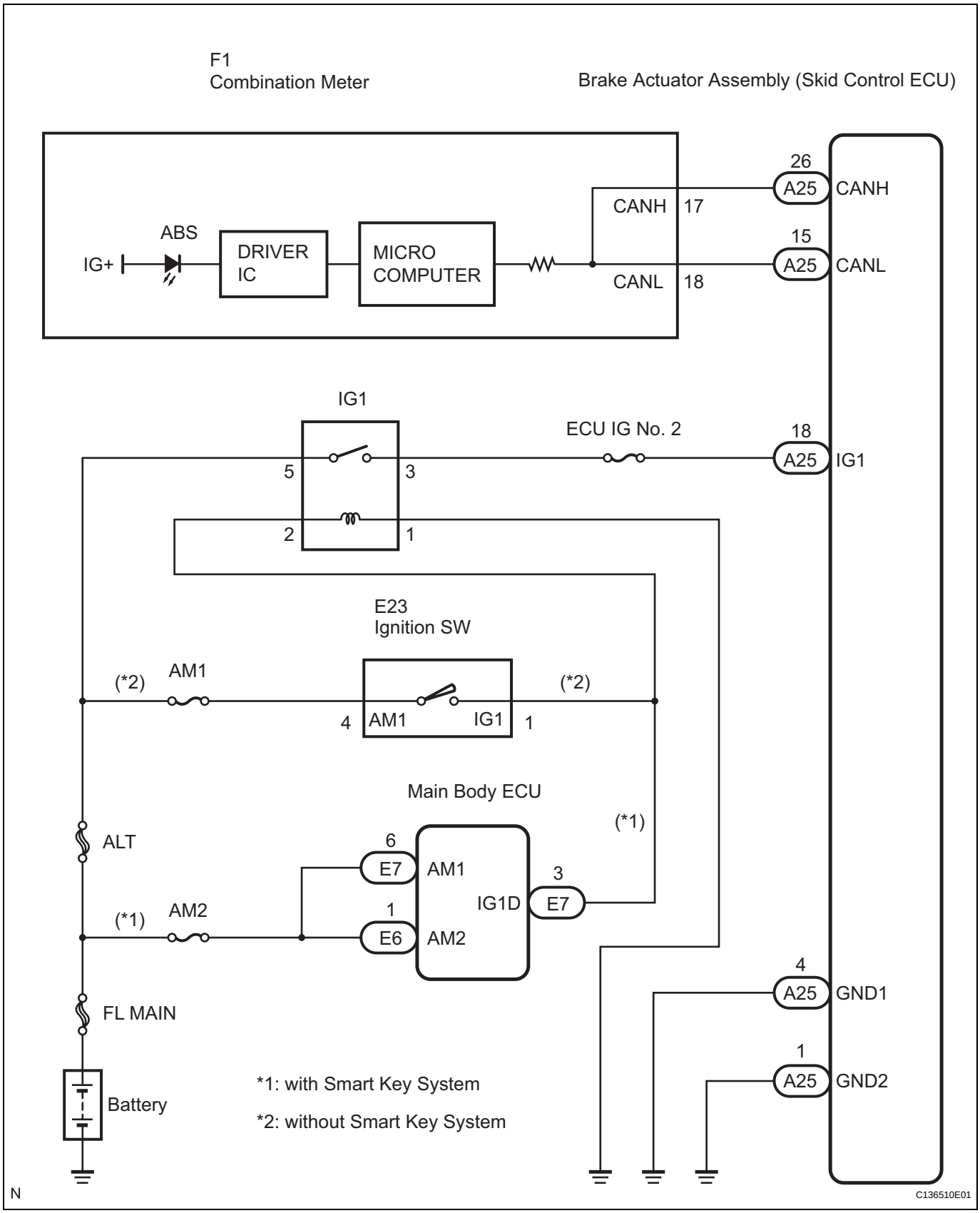
C → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

A

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

ABS Warning Light does not Come ON

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 INSPECT ABS WARNING LIGHT

HINT:
When disconnecting the skid control ECU connector, the ABS warning light comes on.

(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Turn the ignition switch on (IG).
(d) Check that the ABS warning light comes on.
OK:
The ABS warning light comes on.
(e) Connect the connector.

NG → **Go to step 3**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

3 INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: METER

Item	Vehicle Condition / Test Details	Diagnostic Note
ABS WRN LIGHT	Turn ABS warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.
OK:
The ABS warning light turns on or off in accordance with the intelligent tester.

NG → REPLACE COMBINATION METER ASSEMBLY (See page ME-63)

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Brake Warning Light Remains ON

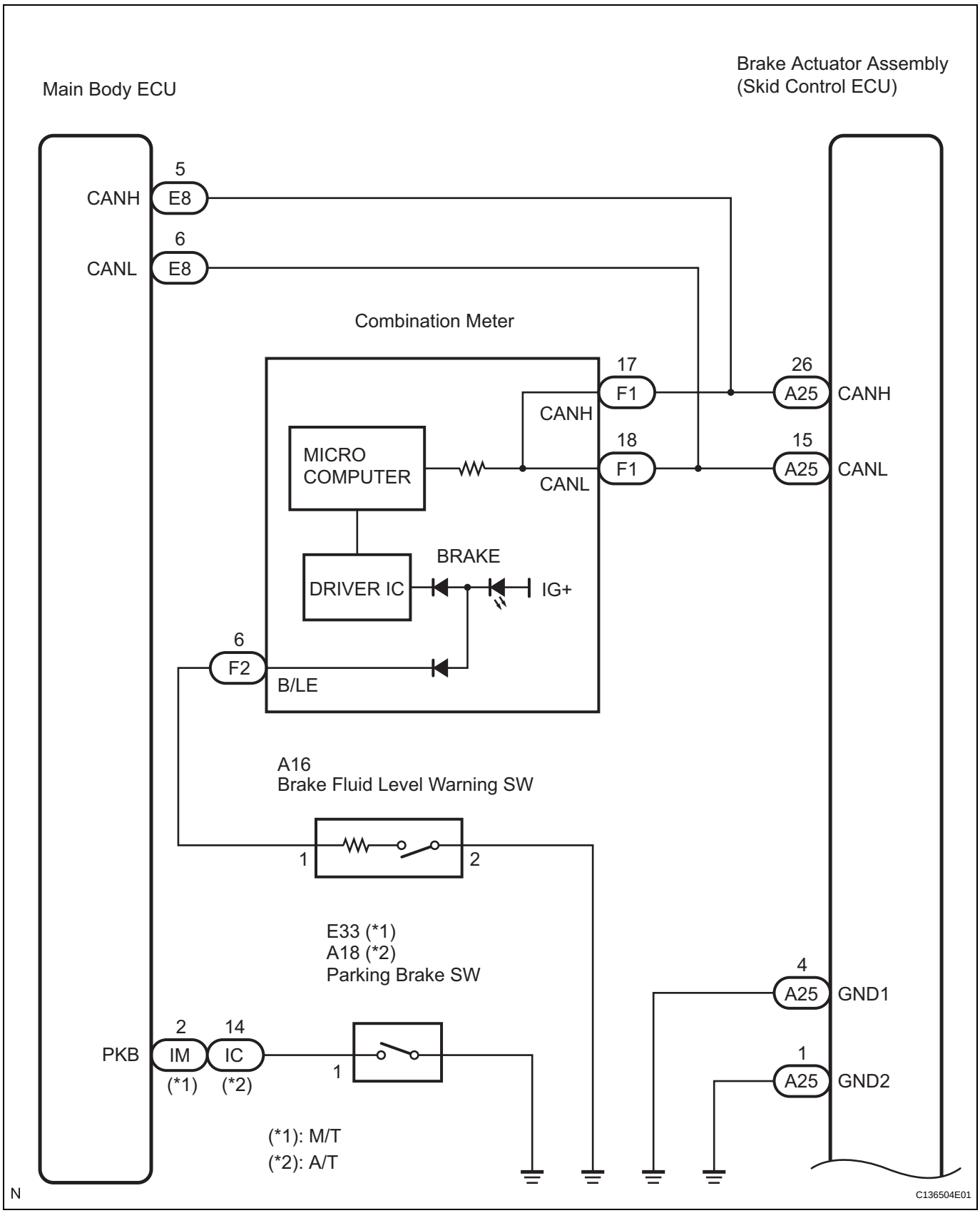
DESCRIPTION

The skid control ECU sends the indicator signals to the combination meter assembly via the CAN communication system.

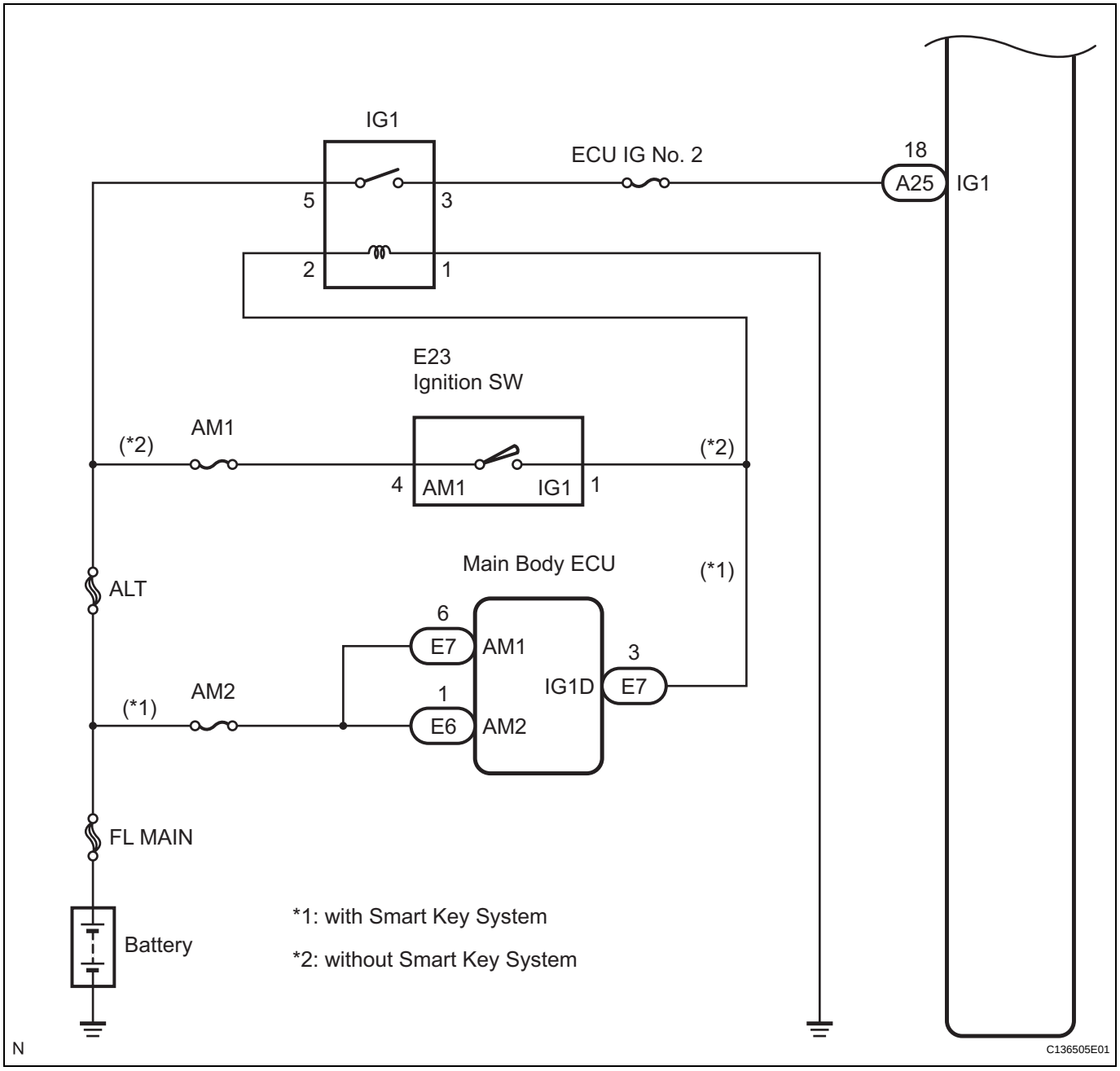
If any of the following is detected, the brake warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM



BC



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK DTC

(a) Check if an ABS DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

BC

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (See page BC-27)**

A

2	INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM (See page CA-8)**

BC

A

3	CHECK IF SKID CONTROL ECU CONNECTOR SECURELY CONNECTED

(a) Check if the skid control ECU connector is connected securely.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

4	CHECK BATTERY

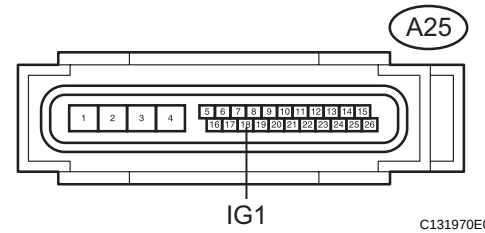
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

5 INSPECT SKID CONTROL ECU CONNECTOR (IG1 TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A25-18 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

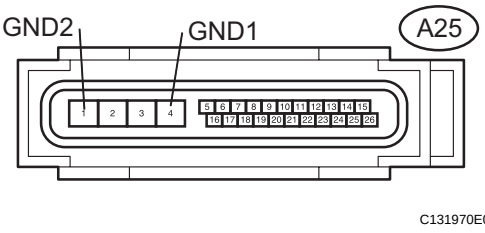
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

6 INSPECT SKID CONTROL ECU CONNECTOR (GND TERMINAL CONTINUITY)

BC

Skid Control ECU (Harness Side Connector Front View):



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A25-4 (GND1) - Body ground	Below 1 Ω
A25-1 (GND2) - Body ground	Below 1 Ω

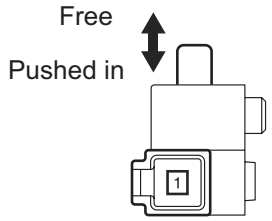
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

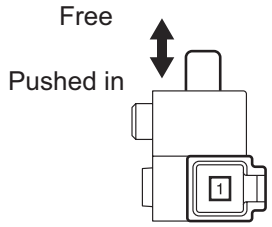
7	**INSPECT PARKING BRAKE SWITCH**

Parking Brake Switch:

Automatic Transaxle:



Manual Transaxle:



N C109430E03

(a) Remove the parking brake switch.
(b) Disconnect the parking brake switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Automatic Transaxle

Tester Connection	Condition	Specified Condition
(A18-1) - Ground part	Free	Below 1 Ω
(A18-1) - Ground part	Pushed in	10 kΩ or higher

Manual Transaxle

Tester Connection	Condition	Specified Condition
(E33-1) - Ground part	Free	Below 1 Ω
(E33-1) - Ground part	Pushed in	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH**

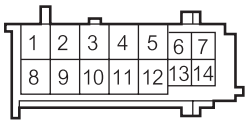
OK

BC

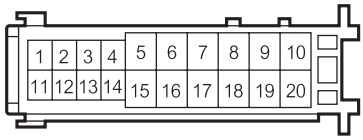
8	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)

Main Body ECU
Wire Harness View:

IC : Automatic Transaxle



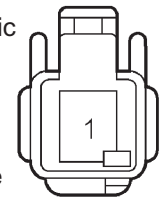
IM : Manual Transaxle



Parking Brake Switch Harness Side Connector Front View:

A18 : Automatic Transaxle

E33 : Manual Transaxle



C136418E03

OK

(a) Disconnect the main body ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Automatic Transaxle

Tester Connection	Specified Condition
IC-14 - A18-1 (PKB)	Below 1 Ω
A18-1 (PKB) - Body ground	10 kΩ or higher

Manual Transaxle

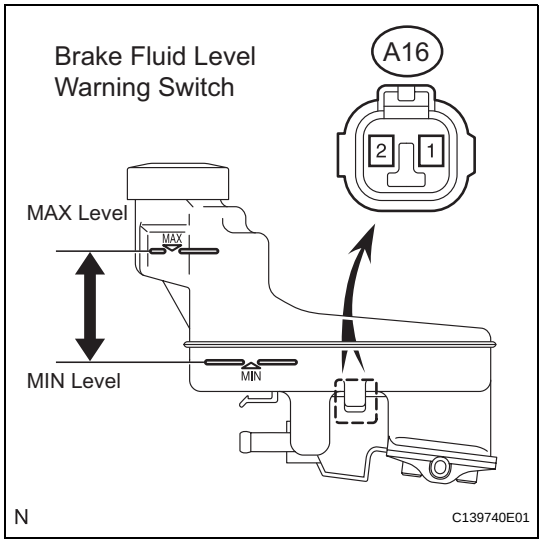
Tester Connection	Specified Condition
IM-2 (PKB) - E33-1 (PKB)	Below 1 Ω
E33-1 (PKB) - Body ground	10 kΩ or higher

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)**

BC

9	**INSPECT BRAKE FLUID LEVEL WARNING SWITCH ASSEMBLY**



(a) Remove the reservoir tank cap.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.
HINT:
A float is located inside the reservoir.
Its position can be changed by increasing or decreasing the level of brake fluid.
Standard resistance

Tester Connection	Condition	Specified Condition
(A16-1) - (A16-2)	Float UP	10 kΩ or higher (No Continuity)
(A16-1) - (A16-2)	Float DOWN	Below 1 Ω (Continuity)

HINT:
If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

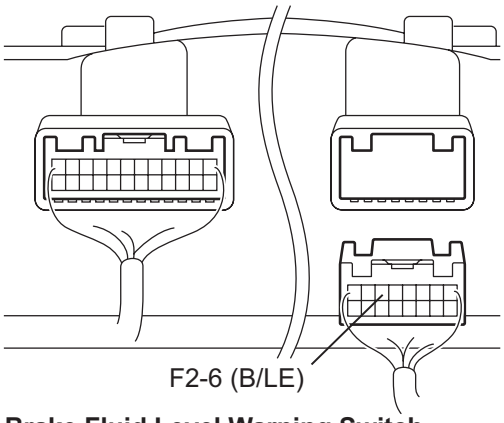
NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)**

OK

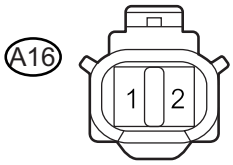
BC

10	CHECK HARNESS AND CONNECTOR (BRAKE FLUID LEVEL WARNING SWITCH TO COMBINATION METER)

Combination Meter Wire Harness View:



Brake Fluid Level Warning Switch Harness Side Connector Front View:



C136033E01

(a) Disconnect the combination meter assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A16-1 - F2-6 (B/LE)	Below 1 Ω
F2-6 (B/LE) - Body ground	10 kΩ or higher
A16-2 - Body ground	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (BRAKE FLUID LEVEL WARNING SWITCH TO COMBINATION METER)**

OK

11	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: ABS

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WARN LIGHT	Turn brake warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

Result

Condition	Proceed to
OK	A
OK (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
NG	C

BC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-16)

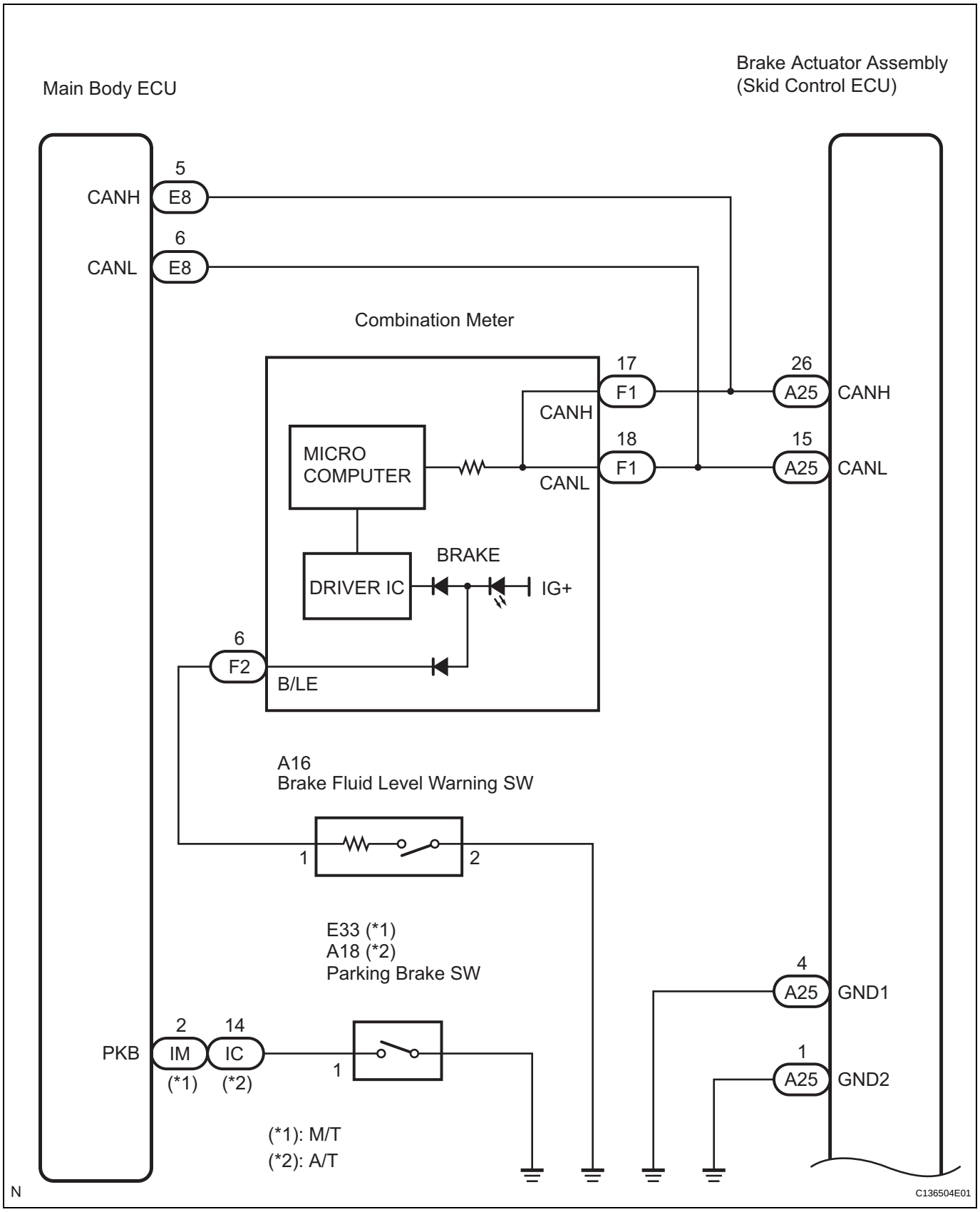
C → REPLACE COMBINATION METER ASSEMBLY (See page ME-63)

A

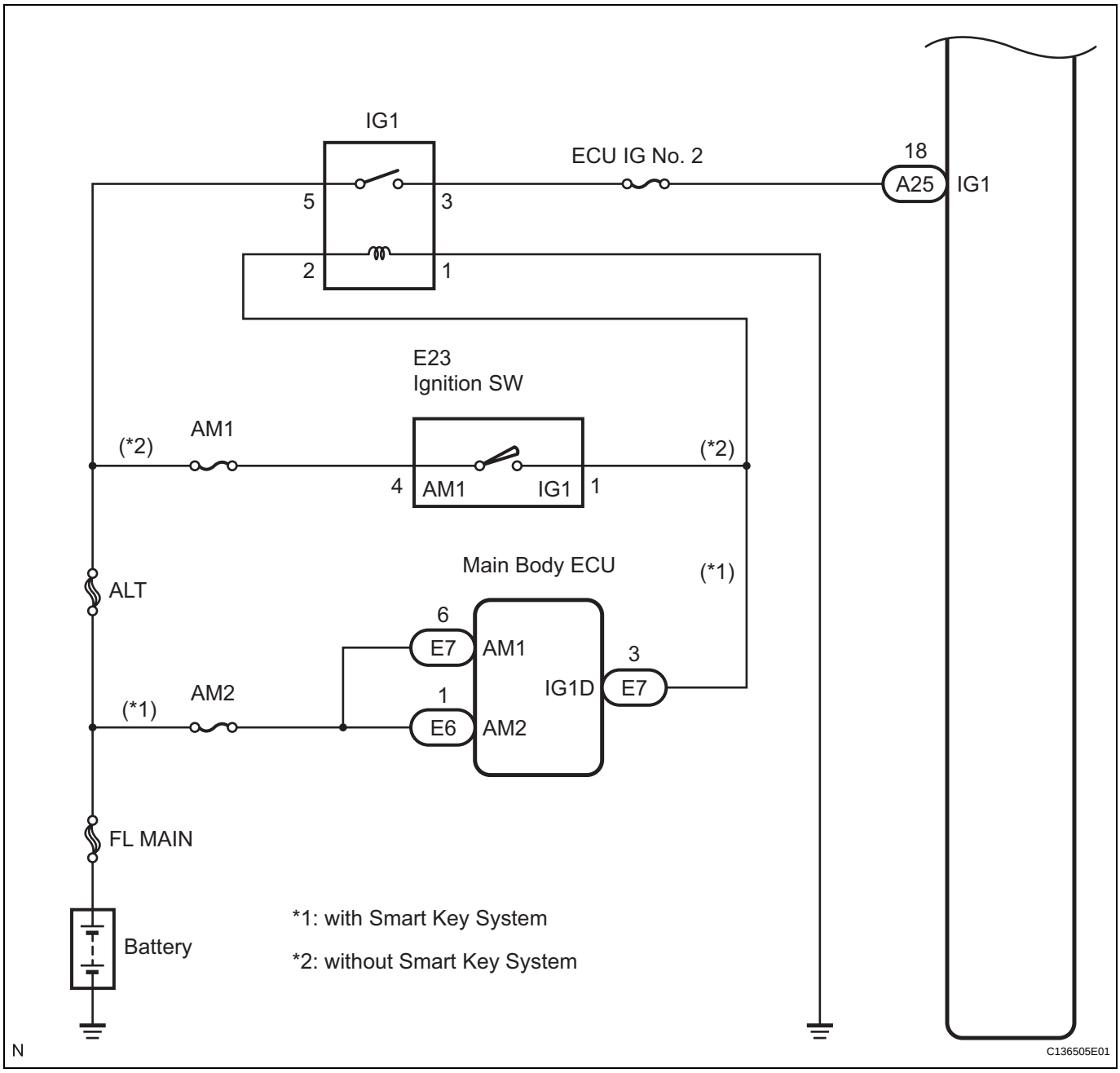
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Brake Warning Light does not Come ON

WIRING DIAGRAM



BC



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	INSPECT CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-21).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **REPAIR CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	INSPECT BRAKE WARNING LIGHT

HINT:
When disconnecting the skid control ECU connector, the brake warning light comes on.

(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Turn the ignition switch on (IG).
(d) Check that the brake warning light comes on.
OK:
The brake warning light comes on.

NG → **Go to step 3**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

3	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-25).

ACTIVE TEST: METER

Item	Vehicle Condition / Test Details	Diagnostic Note
BRAKE WARN LIGHT	Turn brake warning light ON / OFF	Observe combination meter

(c) Check the ABS warning light operation.
OK:
The BRAKE warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

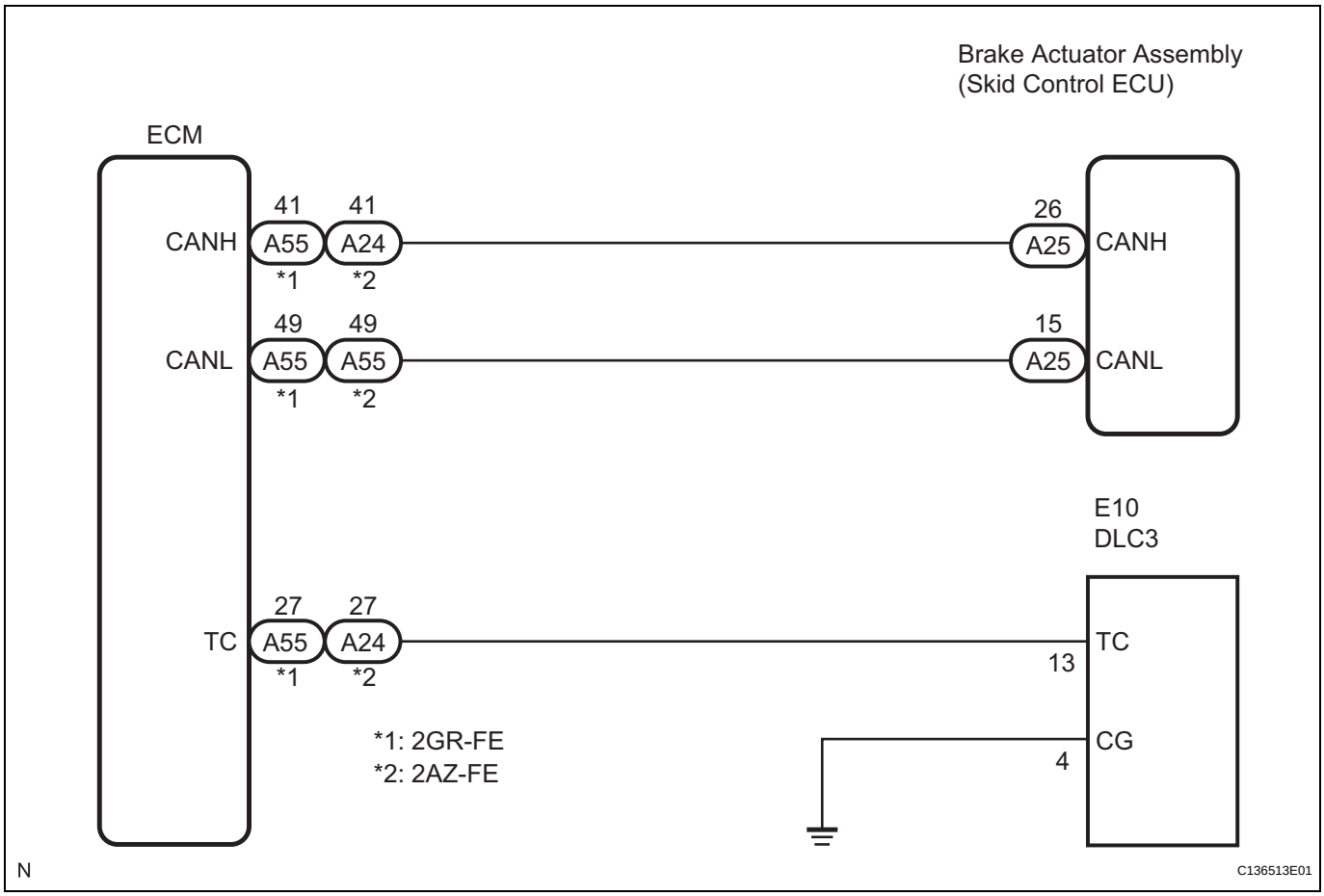
BC

TC and CG Terminal Circuit

DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
DTCs are indicated by the blinking pattern of the ABS warning light.

WIRING DIAGRAM



HINT:
When warning lights continue to blink, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in one or more ECUs is suspected.

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication DTC is output (See page BC-21).

Result

Result	Proceed to
CAN communication system DTC is output	A
CAN communication system DTC is not output	B

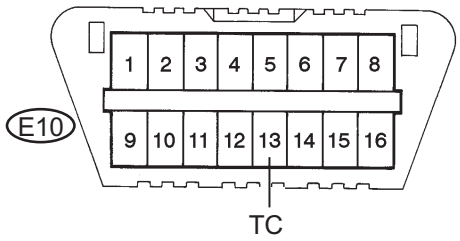
B → Go to step 2

A

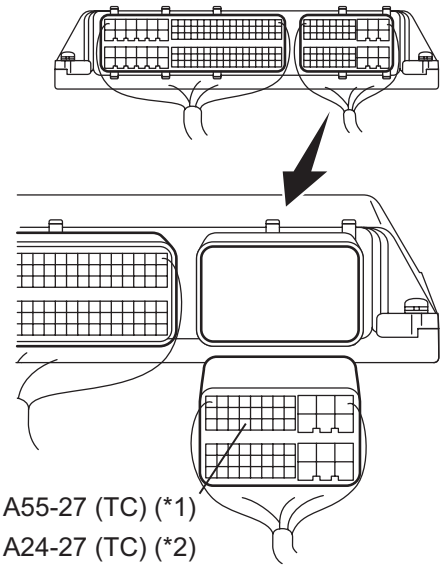
GO TO CAN COMMUNICATION SYSTEM (See page CA-8)

2 CHECK HARNESS AND CONNECTOR (ECM TO DLC3)

DLC3:



ECM Wire Harness View:



(*1): 2GR-FE (*2): 2AZ-FE

C136035E02

(a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

2GR-FE

Tester Connection	Specified Condition
A55-27 (TC) - E10-13 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

2AZ-FE

Tester Connection	Specified Condition
A24-27 (TC) - E10-13 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

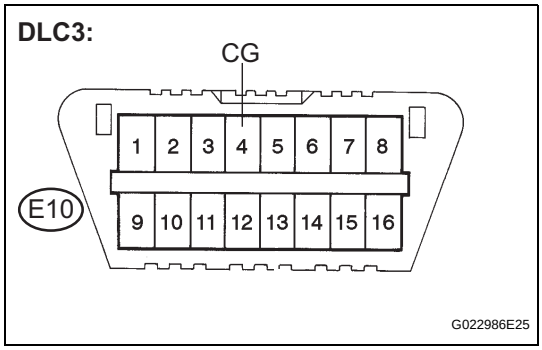
(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)**

OK

BC

3	CHECK HARNESS AND CONNECTOR (DLC3 CG CIRCUIT)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

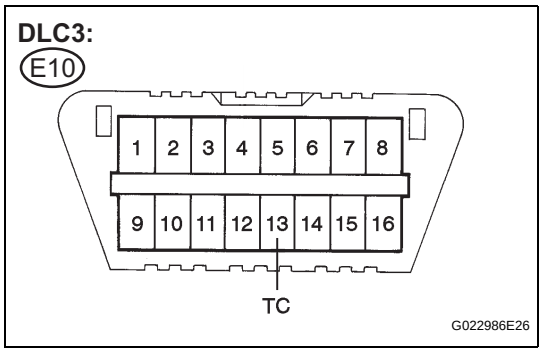
Tester Connection	Specified Condition
E10-4 (CG) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (CG TERMINAL CIRCUIT)**

OK

4	REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)

BC



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E10-13 (TC) - Body ground	10 kΩ or higher

NG → **CHECK HARNESS AND CONNECTOR (TC TERMINAL CIRCUIT)**

OK

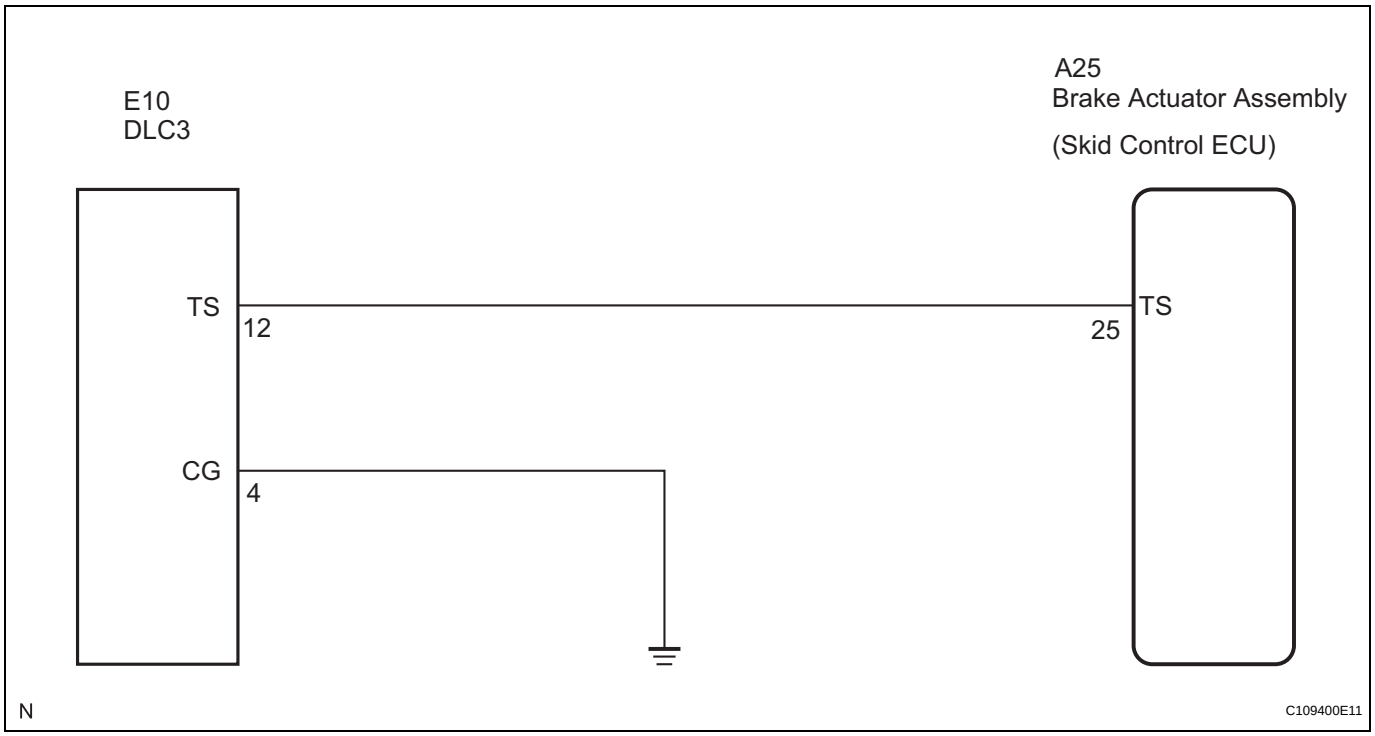
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

TS and CG Terminal Circuit

DESCRIPTION

In the Test Mode (signal check), a malfunction of the speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to on (IG).

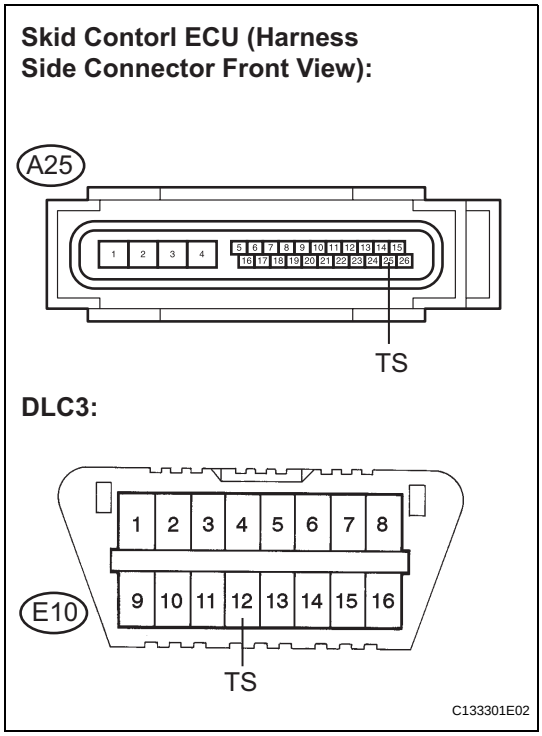
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO DLC3)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

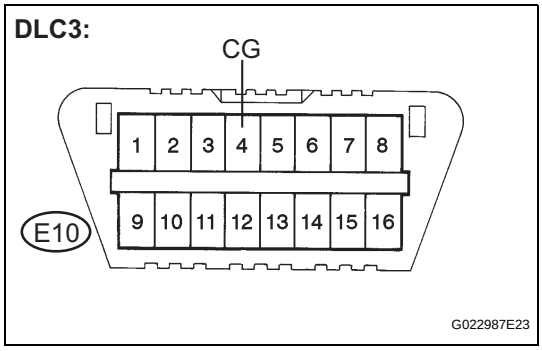
Tester Connection	Condition	Specified Condition
A25-25 (TS) - E10-12 (TS)	Always	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO DLC3)**

OK

2 CHECK HARNESS AND CONNECTOR (DLC3 TO BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

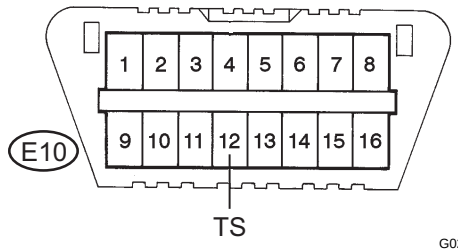
Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 TO BODY GROUND)**

OK

3	CHECK HARNESS AND CONNECTOR (DLC3 TO BODY GROUND)

DLC3:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-12 (TS) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 TO BODY GROUND)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

VEHICLE STABILITY CONTROL SYSTEM (for ADVICS Made)

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	off
Ignition switch on (IG)	ON	on (IG)
Ignition switch on (ACC)	ACC	on (ACC)
Engine start	START	start

BC

2. TROUBLESHOOTING PRECAUTIONS

(a) When there is a malfunction with terminal contact points or part installation problems, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as DTC output and the Freeze Frame Data, and record it before disconnecting each connector or removing and installing parts.
(c) Since the system may be influenced by malfunctions in systems other than the brake control system, be sure to check for DTCs in other systems.

3. HANDLING PRECAUTIONS

(a) Do not remove or install VSC parts such as the steering angle sensor or yaw rate sensor (acceleration sensor included) except when required, as they cannot be adjusted correctly after removal or installation.
(b) Be sure to perform preparation before work and confirmation after work is completed by following the direction in the repair manual when working on the VSC system.
(c) Be sure to remove and install the ECU, actuator, each sensor, etc. with the ignition switch off unless it is not specified in the inspection procedure.
(d) If the ECU, brake actuator, or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using the intelligent tester, also check that system functions and signals received by the ECU are normal using Test Mode.

4. DTC PRECAUTION

(a) Warnings for some DTCs cannot be cleared only by repairing the malfunctioning parts. If the warning is displayed after repair work, the DTC should be cleared after turning the ignition switch off.
NOTICE:
If a DTC for a malfunctioning part reappears after it was cleared, then it has been stored again.

5. CHASSIS DYNAMOMETER PRECAUTION

(a) Enter Test Mode to disable TRAC and VSC control when using a chassis dynamometer.
HINT:
The vehicle may move unexpectedly out of the dynamometer because of TRAC and VSC operations.
NOTICE:
- **Make sure that the VSC warning light is blinking (for vehicles without the multi information display) or "CHECK VSC SYSTEM" is displayed on the multi information display (for vehicles with the multi information display) (Test Mode is achieved).**
- **Secure the vehicle with the lock chain for safety.**

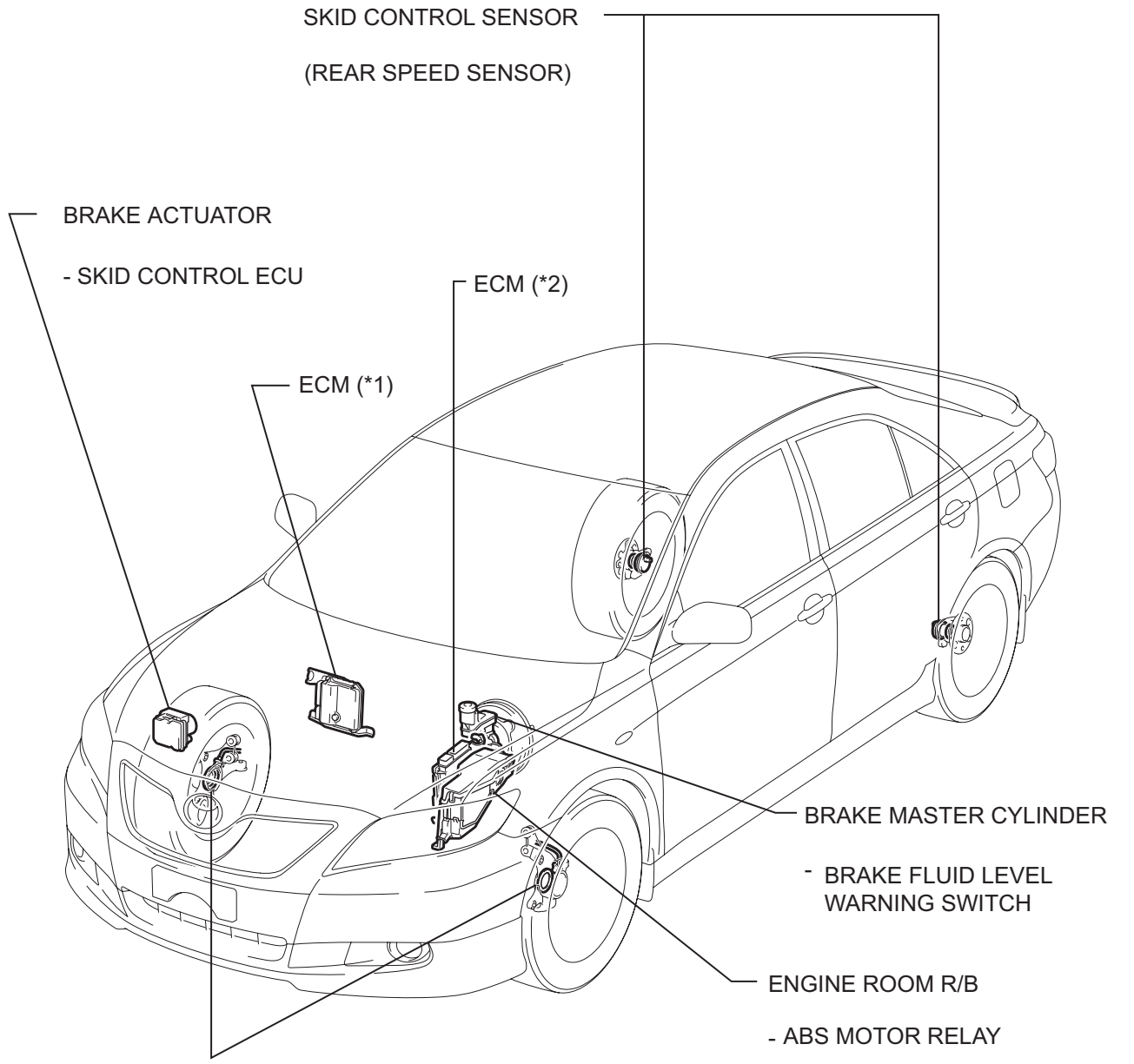
6. CAN COMMUNICATION SYSTEM PRECAUTIONS

(a) The CAN communication system is used for the data communication between the skid control ECU, the steering angle sensor, the yaw rate sensor (acceleration sensor included) and other ECUs. If there is trouble in the CAN communication line, corresponding DTCs in the communication line are output.

(b) If the DTC in the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the VSC system while data communication is normal.

(c) In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires that have an equal length. A bypass wire should not be used, because the data being transmitted will be corrupted.

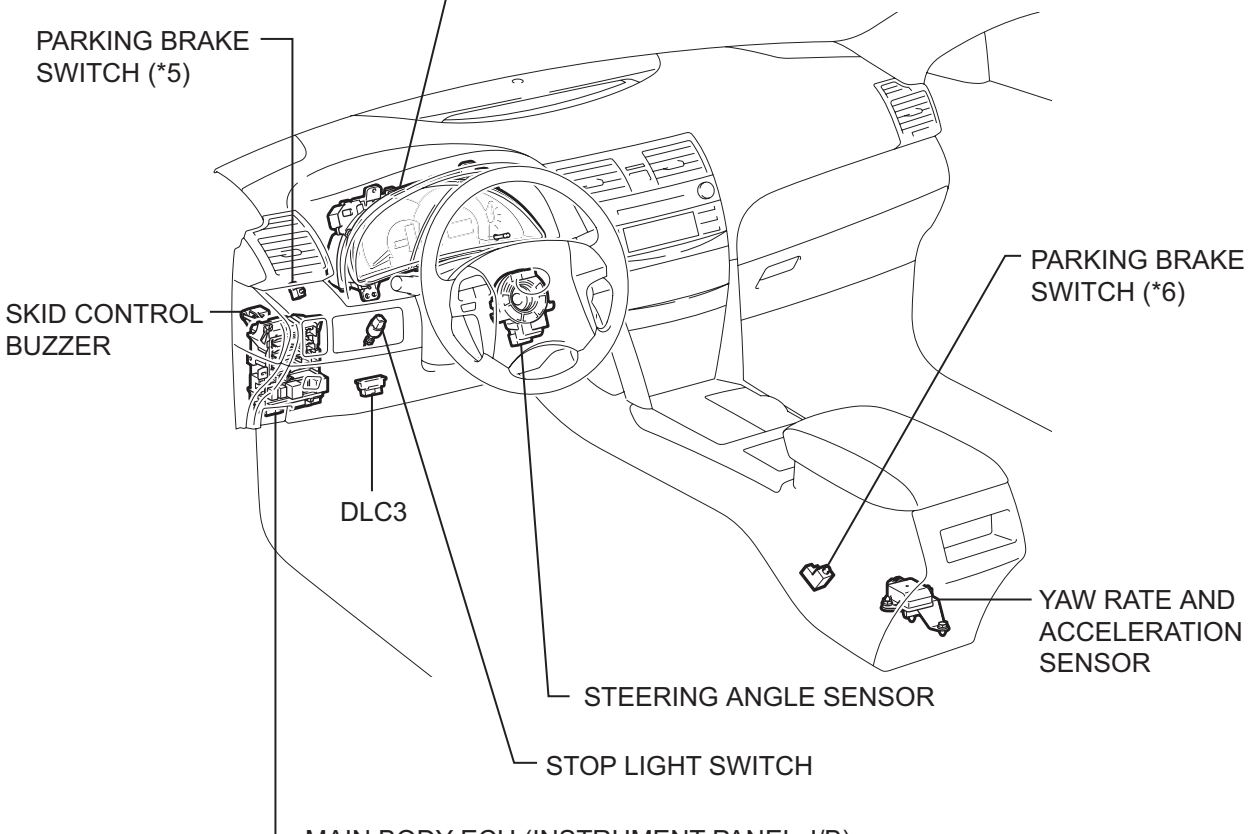
PARTS LOCATION



(*1): 2GR-FE (*2): 2AZ-FE

P

C135800E01



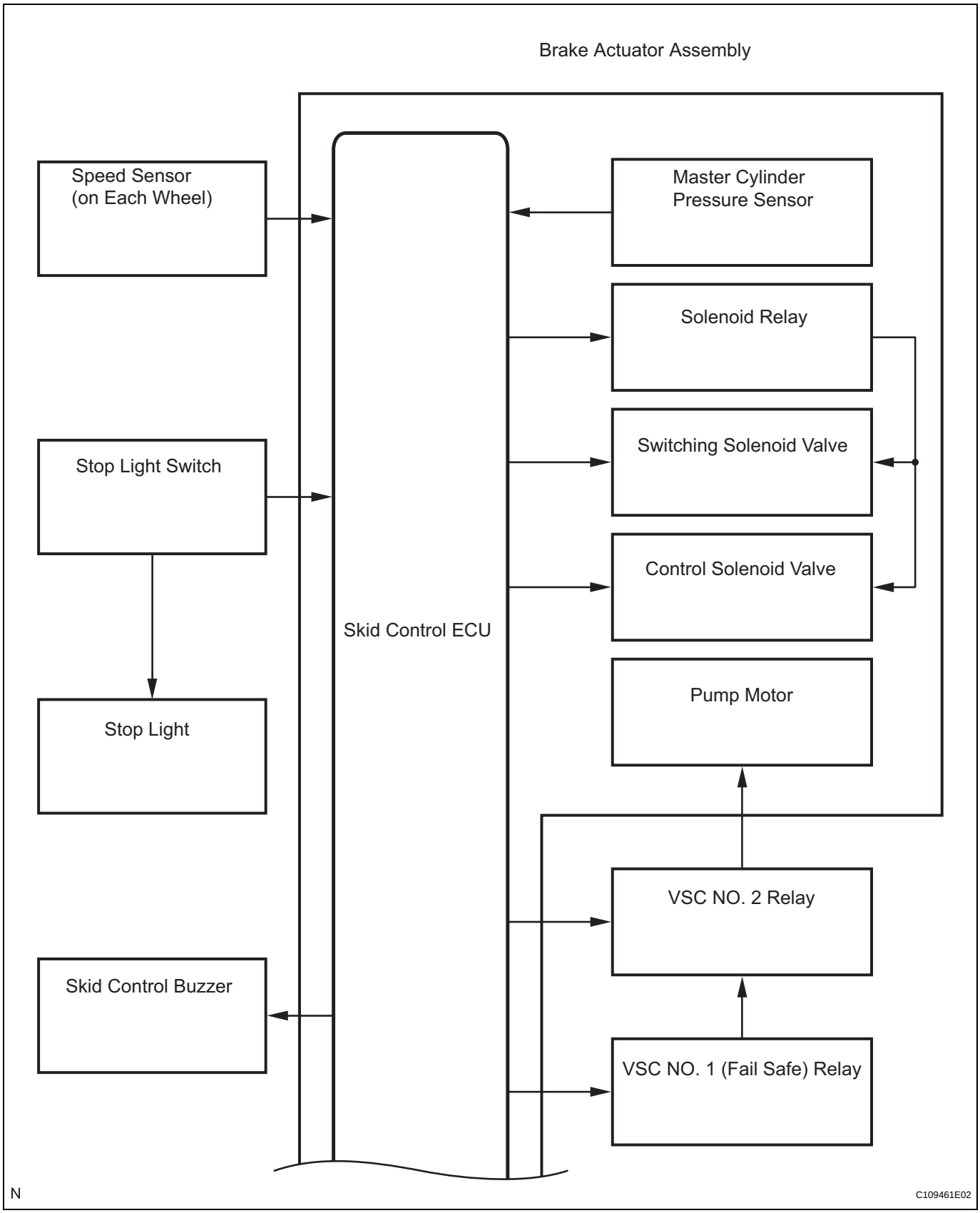
(*3): Models without Multi Information Display (*5): A/T

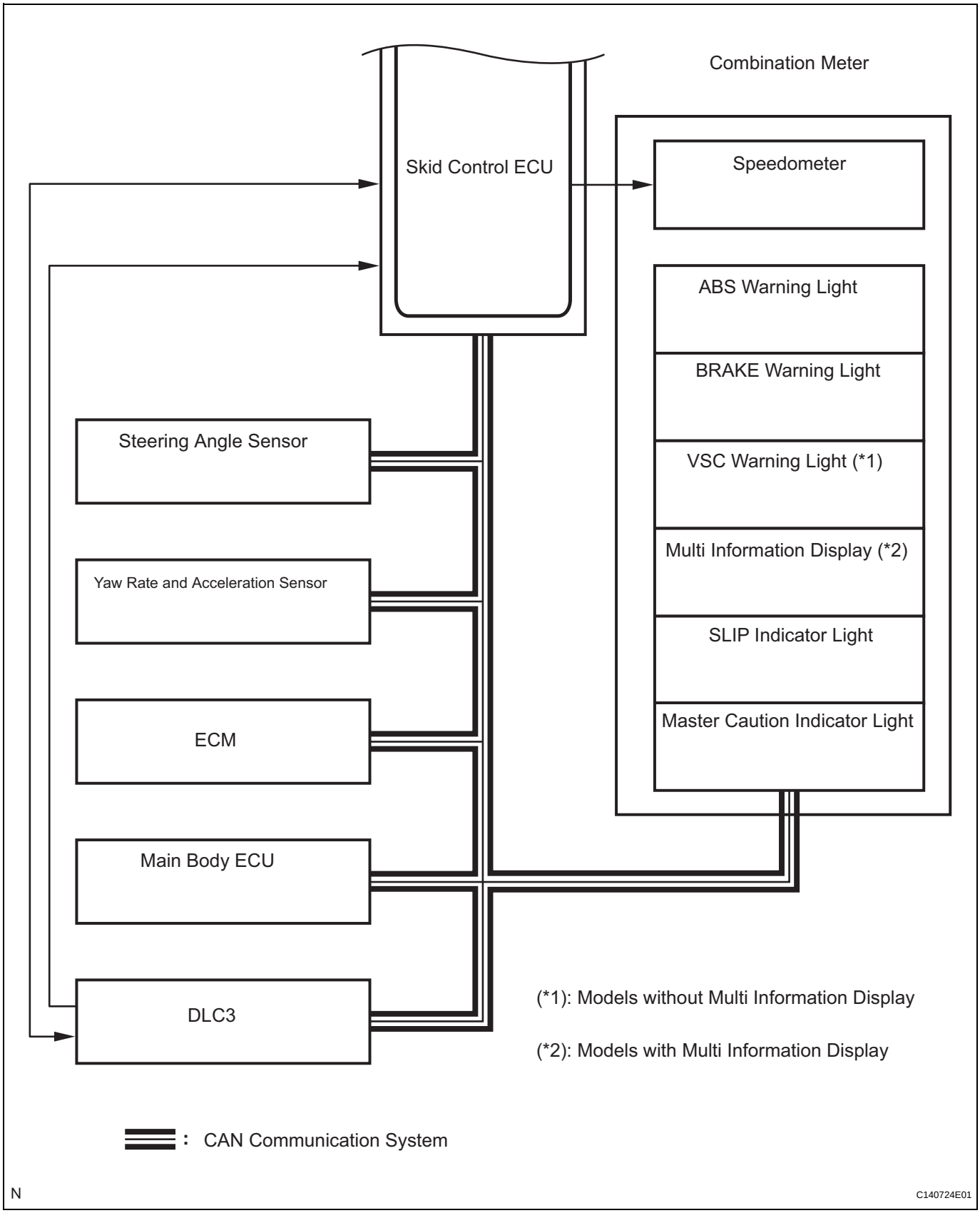
(*4): Models with Multi Information Display (*6): M/T

P C135801E04

BC

SYSTEM DIAGRAM




Combination Meter
Skid Control ECU
Speedometer
ABS Warning Light
BRAKE Warning Light
VSC Warning Light (*1)
Multi Information Display (*2)
SLIP Indicator Light
Master Caution Indicator Light
Steering Angle Sensor
Yaw Rate and Acceleration Sensor
ECM
Main Body ECU
DLC3
(*1): Models without Multi Information Display
(*2): Models with Multi Information Display
: CAN Communication System
N
C140724E01

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
ECM	Skid control ECU	• Shift position signal • Throttle position signal • Engine revolution signal • Intake air temperature signal • Engine torque request signal • Accelerator pedal position signal	CAN communication system
Skid control ECU	Yaw rate and acceleration sensor	Yaw rate and acceleration request signal	CAN communication system
Skid control ECU	Steering angle sensor	Steering angle sensor request signal	CAN communication system
Skid control ECU	ECM	• Wheel speed signal • VSC data signal	CAN communication system
Skid control ECU	Combination meter	• ABS warning light ON signal • BRAKE warning light ON signal • VSC warning light ON signal (*1) • Multi information display ON signal (*2) • SLIP indicator light ON signal • Master caution indicator light ON signal • Wheel speed signal	CAN communication system
Main body ECU	Skid control ECU	Parking brake switch signal	CAN communication system

(*1): Models without multi information display
(*2): Models with multi information display

BC

SYSTEM DESCRIPTION

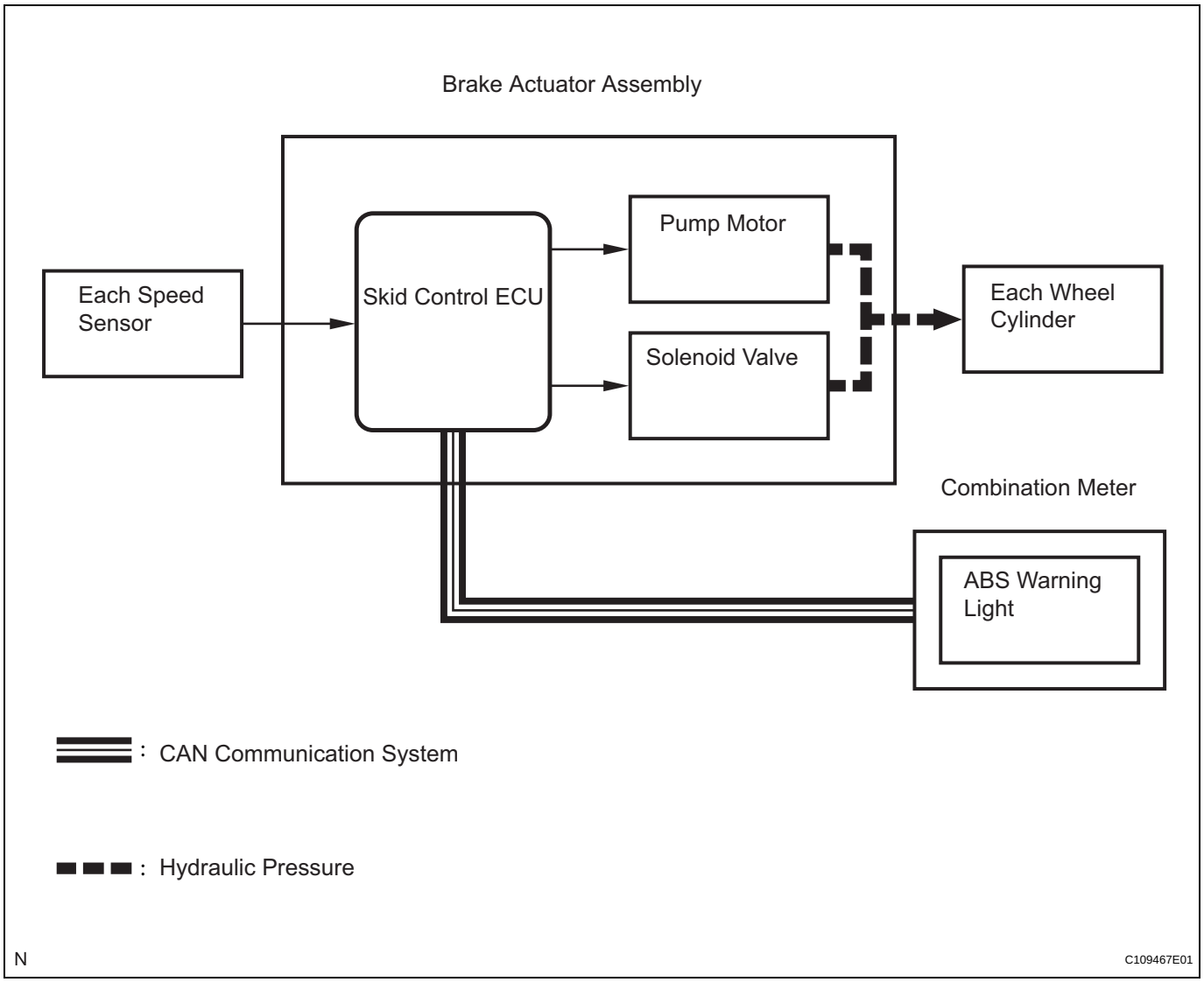
1. FUNCTION DESCRIPTION

HINT:

- The skid control ECU is located within the brake actuator assembly.
- The yaw rate sensor and acceleration sensor are combined in a single unit. This unit communicates with the skid control ECU through CAN communication.

(a) ABS (Anti-lock Brake System)

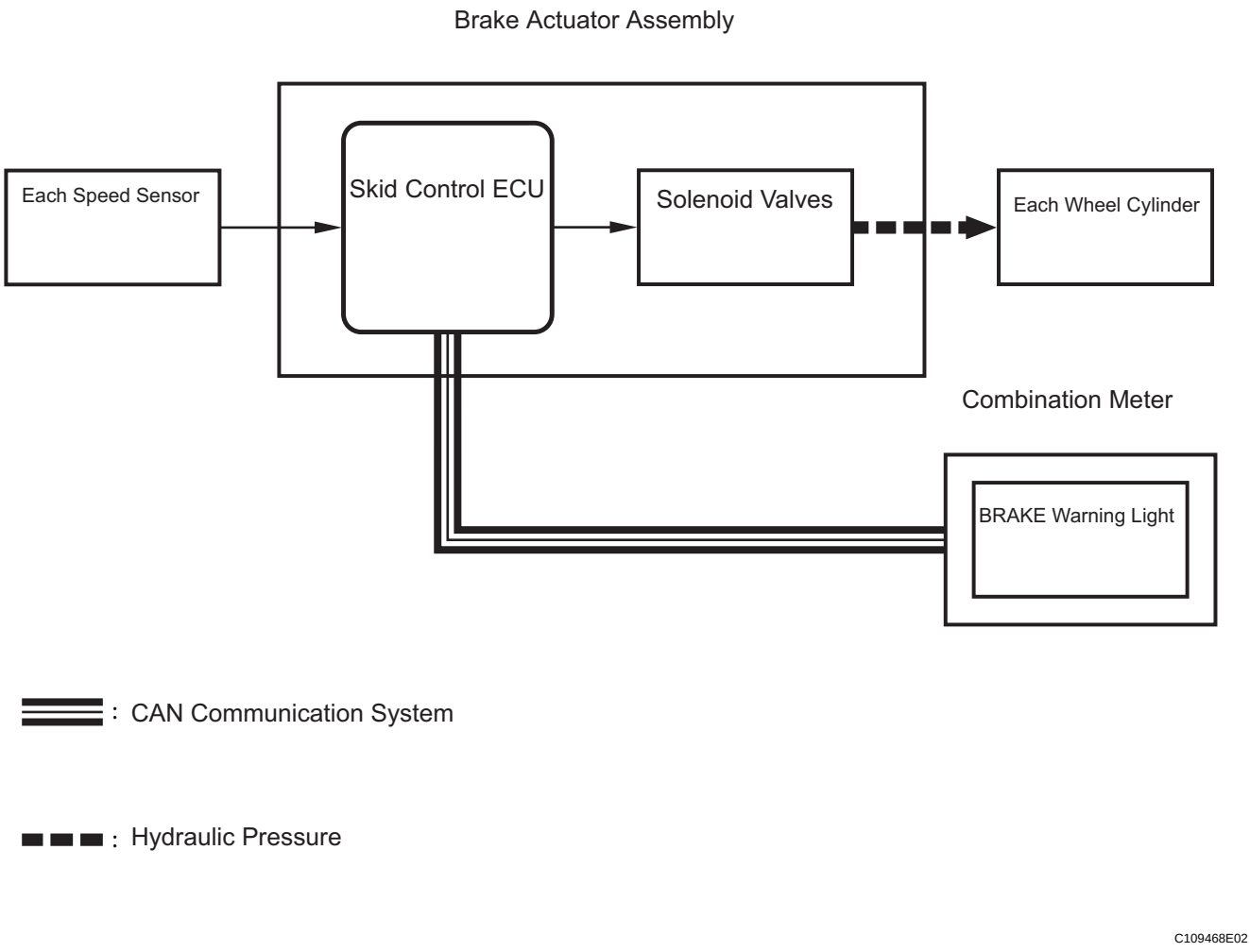
The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.



(1) Operation description
The skid control ECU detects wheel lock based on speed signals it receives from the wheel speed sensors. Based on this information, the skid control ECU controls the pump motor and solenoid valves. The pump motor and solenoid valves are used to prevent wheel lock by controlling the hydraulic pressure applied to the brakes at each wheel. The ABS warning light will come on when the system is malfunctioning.

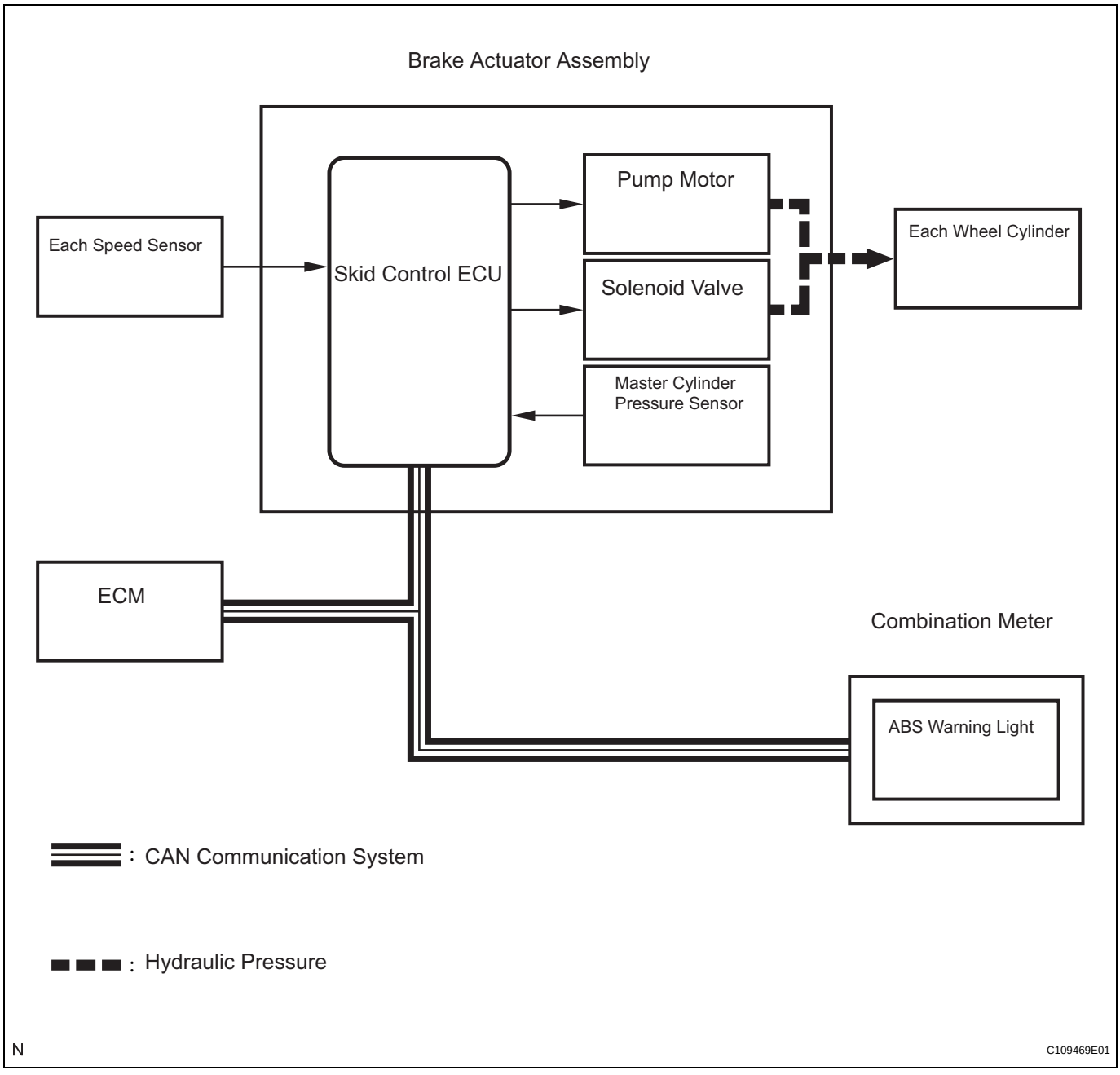
(b) EBD (Electronic Brake force Distribution)
The EBD control utilizes ABS, and performs proper brake force distribution between the front and rear wheels in accordance with driving conditions. When braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.

BC



(1) Operation description
The skid control ECU receives a speed signal from each wheel speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves.
The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The BRAKE warning light will come on if there is a malfunction in the EBD system.

(c) BA (Brake Assist)
The primary purpose of the brake assist system is to provide auxiliary brake force to assist the driver who cannot generate a large enough brake force during emergency braking, thus helping to maximize the brake performance of the vehicle.

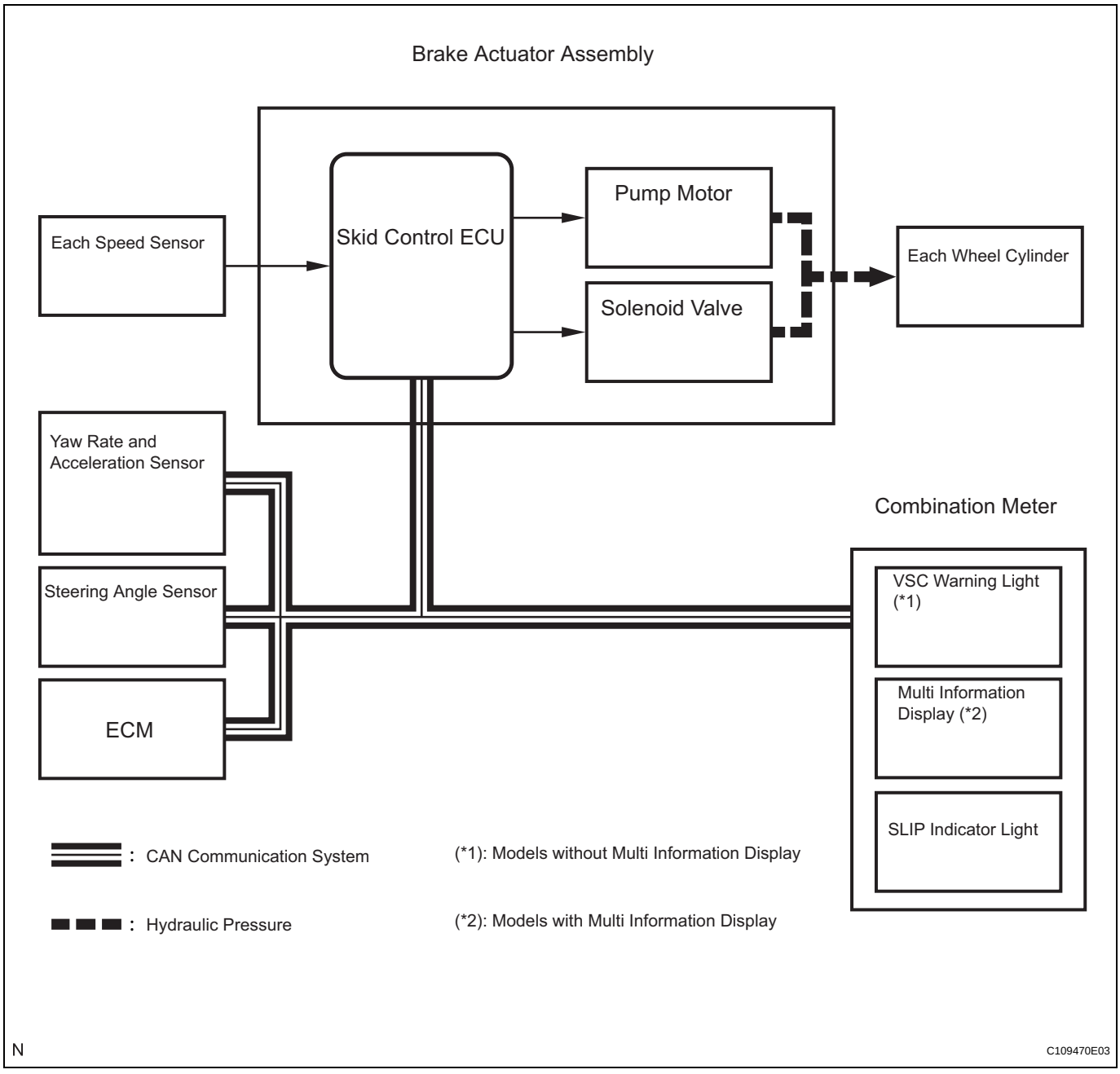


(1) Operation description

The skid control ECU receives the speed signal from each speed sensor and the fluid pressure signal from the master cylinder pressure sensor to determine whether brake assist is necessary. If brake assist is necessary, the skid control ECU sends control signals to the pump motor and solenoid. The pump and the solenoid valve then control the pressure applied to each wheel cylinder.

The ABS warning light comes on to indicate a malfunction in the BA system.

(d) TRAC (Traction Control)
The TRAC system helps prevent the drive wheels from slipping when the driver depresses the accelerator pedal excessively when starting off or accelerating on a slippery surface.



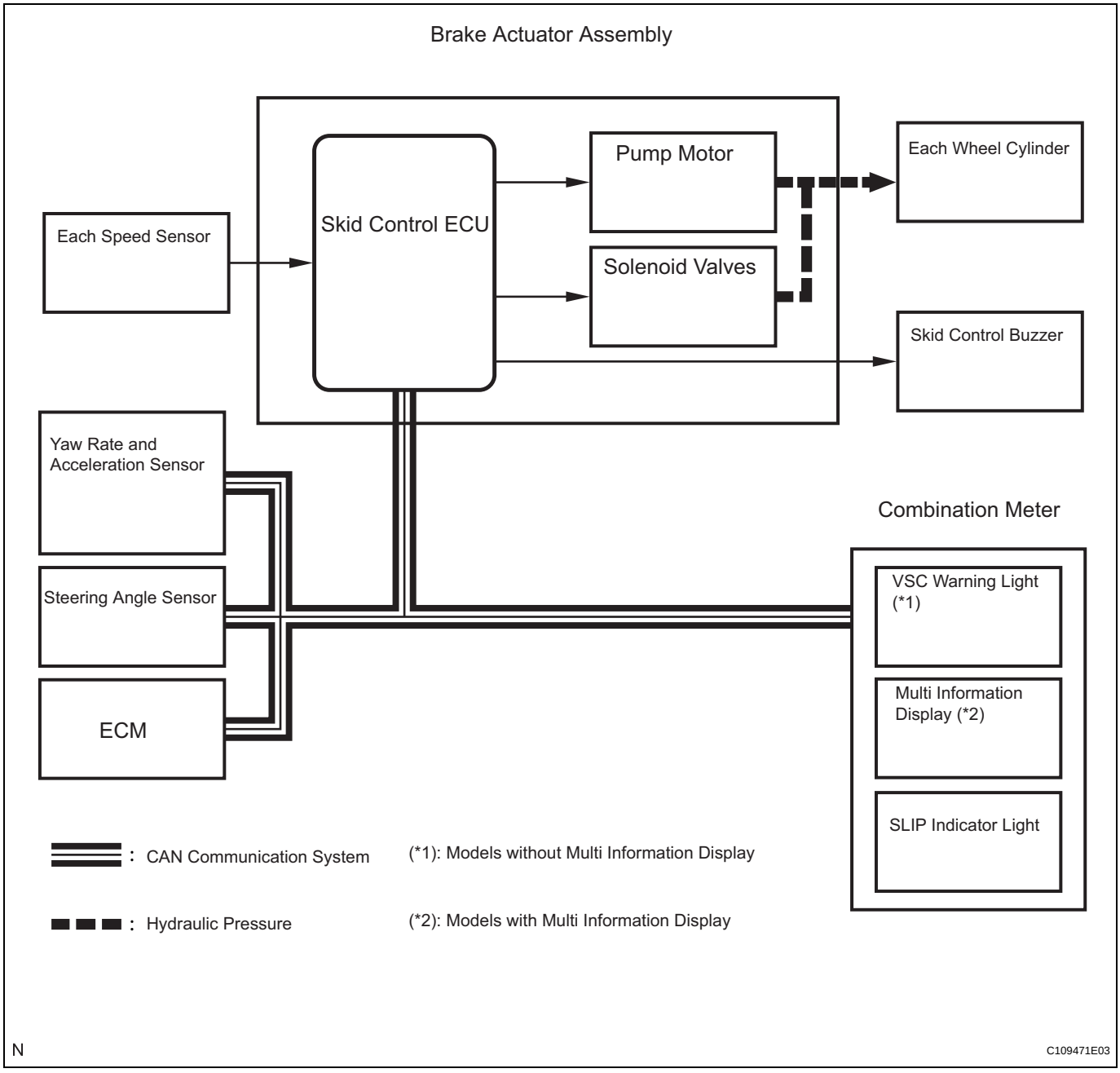
BC

(1) Operation description

The skid control ECU detects wheelspin by receiving signals from each speed sensor and the ECM via CAN communication. The skid control ECU controls engine torque with the ECM via CAN communication and brake hydraulic pressure through the pump and solenoid valve.

The SLIP indicator light blinks when the system is operating. When there is a malfunction in the TRAC system, both VSC warning light (models without multi information display) and SLIP indicator light will come on and the DTC will be displayed on the multi information display (models with multi information display).

(e) VSC (Vehicle Stability Control)
The VSC system helps prevent the vehicle from slipping sideways as a result of strong front or rear wheel skid during cornering.



(1) Operation description

The skid control ECU determines the vehicle operating conditions based on signals received from the wheel speed sensors, yaw rate and acceleration sensor, and steering angle sensor. The skid control ECU sends signals via CAN communication to the ECM in order to control engine torque. The skid control ECU controls brake hydraulic pressure using the pump and solenoid valves.

The SLIP indicator light will blink, and the skid control buzzer will sound when the system is operating. If a malfunction occurs in the VSC system, both the VSC warning light (models without multi information display) and the SLIP indicator light will come on. In addition, the DTC will appear on the multi information display (models with multi information display).

2. ABS with EBD, BA, TRAC and VSC OPERATION

(a) The skid control ECU calculates vehicle stability tendency based on the signals from the speed sensor, yaw rate and acceleration sensor, and steering angle sensor. In addition, it evaluates the results of the calculations to determine whether any control actions (control of the engine output torque by electronic throttle control and of the wheel brake pressure by the brake actuator assembly) should be implemented.

(b) The SLIP indicator blinks and the skid control buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when traction control is operating, and the operation being performed is displayed.

3. FAIL SAFE

(a) When a failure occurs in the ABS with BA, TRAC and VSC systems, the ABS warning, VSC warning (models without multi information display), and SLIP indicator lights come on or the DTC will be displayed on the multi information display (models with multi information display) and ABS with BA, TRAC and VSC operations are prohibited. In addition, when there is a failure that disables the EBD operation, the BRAKE warning light also comes on and the EBD operation is prohibited.

(b) If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.

4. INITIAL CHECK

(a) When the vehicle speed first becomes approximately 4 mph (6 km/h) or more after the ignition switch is turned on (IG), each solenoid valve and motor of the brake actuator is sequentially activated to perform an electrical check. During the initial check, the operating sound of solenoid valve and motor can be heard from the engine compartment, but this is not a malfunction.

5. INSPECTION MODE

(a) VSC operation can be disabled by operating the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.

6. FUNCTION OF COMPONENTS

Components	Function
Speed sensor	Detects the wheel speed and sends the signal to the skid control ECU.
Skid control ECU (housed in brake actuator assembly)	• Processes the signals sent from each sensor to control the ABS, BA, TRAC, and VSC. • Sends and receives the control signals to or from the ECM, yaw rate and acceleration sensor, and steering angle sensor, etc. via CAN communication.
Brake actuator assembly	• Consists of the master cylinder cut solenoid valve, retention solenoid valve, pressure reduction solenoid valve, pump motor, and reservoir, and adjusts the brake fluid pressure applied to each wheel cylinder. • Houses the skid control ECU.
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
Motor relay (VSC NO. 2 relay)	Supplies power to the pump motor.
Fail safe relay (VSC NO. 1 relay)	Cuts off power to the motor when the pump motor circuit malfunctions.
Steering angle sensor	• Installed in the combination switch. • Detects the steering amount and direction and sends the signals to the skid control ECU via CAN communication. • Has the magnetic resistance element which detects the rotation of the magnet housed in the detection gear in order to detect the changes of magnetic resistance and the steering amount and direction.
Yaw rate and acceleration sensor	• Acceleration sensor measures the capacity of the condenser that changes the distance between the electrodes depending on G force, which occurs when the vehicle is accelerated, and converts the measured value into electrical signals. • Yaw rate sensor detects the vehicle's angular velocity (yaw rate) in the vertical direction based on the amount and direction of the piezoelectric ceramics deflection. • Sends signals to the skid control ECU via CAN communication.
Master cylinder pressure sensor	• Detects the fluid pressure in the master cylinder. • Housed in the brake actuator assembly.
Stop light switch	Detects the brake operating conditions and inputs the results to the skid control ECU.
ECM	Controls the engine output when TRAC and VSC are operating with the skid control ECU via CAN communication.
Skid control buzzer	Intermittently sounds to inform the driver that the VSC is operating.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS or BA has occurred. • Blinks to output DTC.
BRAKE warning light	• Comes on to inform the driver that the parking brake is ON when the system is normal, or the brake fluid has decreased. • Comes on to inform the driver that a malfunction in the EBD has occurred.

Components	Function
VSC warning light (*1)	• Comes on to inform the driver that a malfunction in the VSC system has occurred. • Blinks to output DTC.
Multi information display (*2)	• Displays to inform the driver that a malfunction in the VSC system has occurred. • Displays to output DTC.
SLIP indicator light	Blinks to inform the driver that TRAC and VSC are operating.
Master caution indicator light	Comes on to inform the driver that a malfunction.

(*1): Models without multi information display
(*2): Models with multi information display

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The intelligent tester can be used at steps 3, 7, and 10.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer and confirm the trouble (See page IN-45).

NEXT

BC

3	CHECK DTC AND FREEZE FRAME DATA

(a) Check and record a DTC and Freeze Frame Data.
(b) Clear the DTC and Freeze Frame Data (See page BC-141).
(c) Reconfirm the DTC.
  (1) Reconfirm the DTC based on the recorded DTC and Freeze Frame Data (See page BC-141 for DTC Check/Clear, and BC-144 for Freeze Frame Data).
  HINT:
  If any of the DTCs U0100/65, U0123/62, U0124/95, and U0126/63 is output together with a CAN communication DTC, first check the appropriate sensor for a momentary open circuit (See page BC-118).

Result

Condition	Proceed to
DTC is output	A
DTC is not output (Problem symptom does not occur)	B
DTC is not output (Problem symptom occurs)	C

B → GO TO STEP 5

C → GO TO STEP 6

A

4	DIAGNOSTIC TROUBLE CODE CHART

(a) Proceed to Diagnostic Trouble Code Chart (See page BC-151).

NEXT

GO TO STEP 7

5	**SYMPTOM SIMULATION**

(a) Proceed to Diagnosis System (See page BC-138).

NEXT

6	**PROBLEM SYMPTOMS TABLE**

(a) Proceed to Problem Symptoms Table (See page BC-134).

NEXT

7	**CIRCUIT INSPECTION**

NEXT

8	**IDENTIFICATION OF PROBLEM**

NEXT

9	**REPAIR OR REPLACEMENT**

NEXT

10	**CONFIRMATION TEST**

NEXT

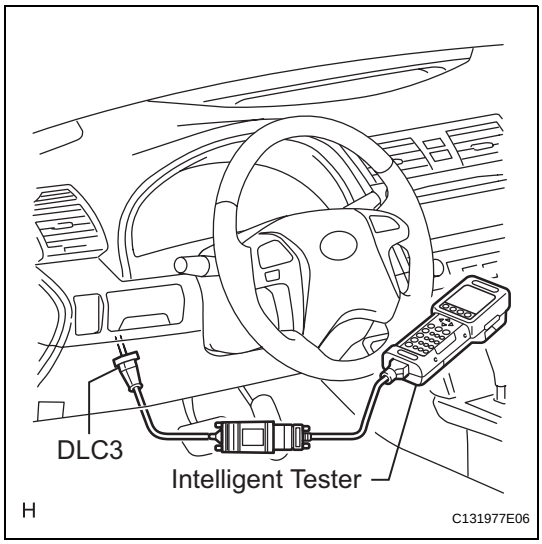
END

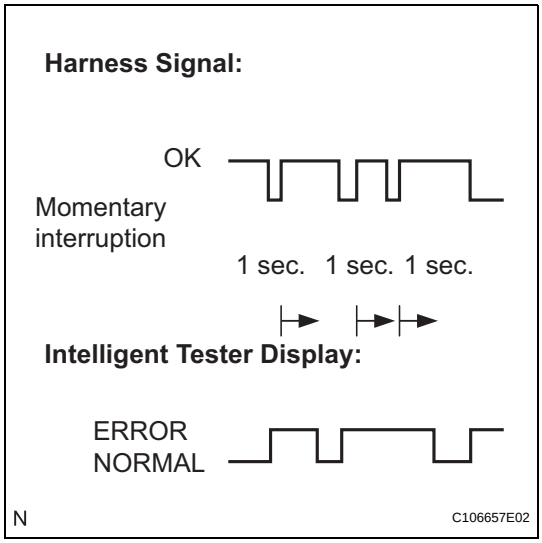
CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

HINT:
A momentary interruption (open circuit) in the connectors and/or wire harness between the sensors and ECUs can be detected using the ECU Data List function of the intelligent tester.

(a) Turn the ignition switch off and connect the intelligent tester to the DLC3.

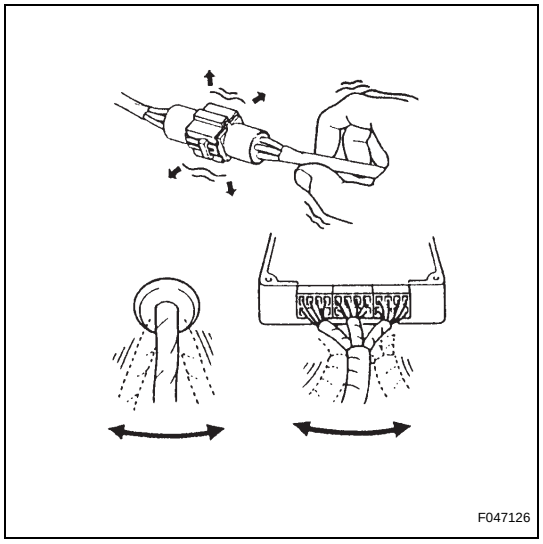




(b) Turn the ignition switch on (IG). Follow the directions on the intelligent tester to display the Data List and select areas where momentary interruption should be monitored.
HINT:
- A momentary interruption (open circuit) cannot be detected for 3 seconds after the ignition switch is turned on (IG) (initial check).
- If the status remains on (ERROR displayed), check the continuity between the ECU and the sensors, or between ECUs.
- The ERROR display on the intelligent tester remains on for 1 second after the harness signal changes from momentary interruption (open circuit) to normal condition.

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C OPN	Master cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-



(c) While observing the screen, gently jiggle the connector or wire harness between the ECU and sensors, or between ECUs.

Result:

ERROR display does not change.

HINT:

The connector and/or wire harness will be in momentary interruption (open circuit) if the display changes. Repair or replace the connector and/or wire harness as one of them is faulty.

BC

PROBLEM SYMPTOMS TABLE

If there are no DTCs output and the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

- Inspect the fuse and relay before investigating the suspected areas as shown in the table below.
- Inspect each malfunction circuit in numerical order for the corresponding symptom.

Vehicle Stability Control System:

Symptom	Suspected Area	See page
ABS, BA and/or EBD does not operate	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. IG power source circuit	BC-207
	3. Front speed sensor circuit	BC-156
	4. Rear speed sensor circuit	BC-164
	5. Check the brake actuator assembly with the intelligent tester. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leakage.	BC-425
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
ABS, BA and/or EBD does not operate efficiently	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. Front speed sensor circuit	BC-156
	3. Rear speed sensor circuit	BC-164
	4. Stop light switch circuit	BC-213
	5. Check the brake actuator assembly with the intelligent tester. (Check brake actuator assembly operation using the Active Test function.) If abnormal, check the hydraulic circuit for leakage.	BC-425
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
ABS sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. TC and CG terminal circuit	BC-266
	3. If the symptoms still occur even after the above circuit in suspected areas has been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
ABS warning light abnormal (Remains on)	1. ABS warning light circuit	BC-229
	2. Brake actuator assembly (Skid control ECU)	BC-426
ABS warning light abnormal (Does not come on)	1. ABS warning light circuit	BC-233
	2. Brake actuator assembly (Skid control ECU)	BC-426
BRAKE warning light abnormal (Remains on)	1. BRAKE warning light circuit	BC-244
	2. Brake actuator assembly (Skid control ECU)	BC-426
BRAKE warning light abnormal (Does not come on)	1. BRAKE warning light circuit	BC-252
	2. Brake actuator assembly (Skid control ECU)	BC-426

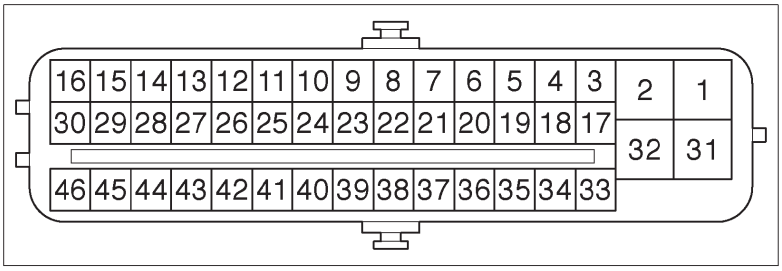
Symptom	Suspected Area	See page
VSC and/or TRAC does not operate	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. IG power source circuit	BC-207
	3. Check the hydraulic circuit for leakage	-
	4. Front speed sensor circuit	BC-156
	5. Rear speed sensor circuit	BC-164
	6. Yaw rate and acceleration sensor circuit	BC-193
	7. Steering angle sensor circuit	BC-190
	8. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
VSC sensor DTC check cannot be done	1. Check the DTC again and make sure that the normal system code is output.	BC-141
	2. TC and CG terminal circuit	BC-266
	3. If the symptoms still occur even after the above circuit in suspected areas has been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-426
VSC warning light abnormal (Remains on) (*1)	1. VSC warning light circuit	BC-236
	2. Brake actuator assembly (Skid control ECU)	BC-426
VSC warning light abnormal (Does not come on) (*1)	1. VSC warning light circuit	BC-240
	2. Brake actuator assembly (Skid control ECU)	BC-426
Multi information display abnormal (Remains on) (*2)	1. VSC warning light circuit	BC-236
	2. Brake actuator assembly (Skid control ECU)	BC-426
Multi information display abnormal (Does not come on) (*2)	1. VSC warning light circuit	BC-240
	2. Brake actuator assembly (Skid control ECU)	BC-426
SLIP indicator light abnormal (Remains on)	1. SLIP indicator light circuit	BC-255
	2. Brake actuator assembly (Skid control ECU)	BC-426
SLIP indicator light abnormal (Does not come on)	1. SLIP indicator light circuit	BC-259
	2. Brake actuator assembly (Skid control ECU)	BC-426
Sensor check cannot be done	1. TS and CG terminal circuit	BC-269
	2. Brake actuator assembly (Skid control ECU)	BC-426
Skid control buzzer abnormal	1. Skid control buzzer circuit	BC-263
	2. Brake actuator assembly (Skid control ECU)	BC-426

(*1): Models without multi information display
(*2): Models with multi information display

TERMINALS OF ECU

1. Terminal of ECU

Skid Control ECU:



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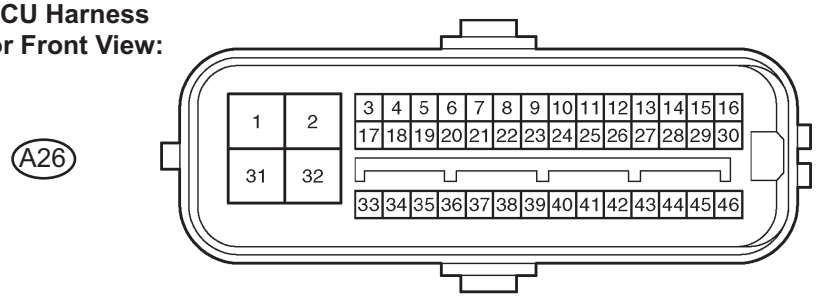
Symbols (Terminal No.)	Terminal Description
GND2 (1)	Pump motor ground
BM (2)	Motor relay input
FR+ (3)	Front wheel speed RH signal power supply output
FL- (4)	Front wheel speed LH signal input
RR+ (5)	Rear wheel speed RH signal power supply output
RL- (6)	Rear wheel speed LH signal input
CANH (11)	CAN communication line H
SP1 (12)	Speed signal output for combination meter
D/G (13)	Diagnosis tester communication line
MRF (14)	Fail safe motor relay output
MR (15)	Motor relay output
FR- (17)	Front wheel speed RH signal input
FL+ (18)	Front wheel speed LH signal power supply output
RR- (19)	Rear wheel speed RH signal input
RL+ (20)	Rear wheel speed LH signal power supply output
TS (24)	Test mode (signal check) input
CANL (25)	CAN communication line L
STP (27)	Stop light switch input
BZ (30)	Skid control buzzer output
+BS (31)	Solenoid relay power supply
GND1 (32)	Skid control ECU ground
WFSE (42)	WFSE input
R+ (45)	Power supply for motor relay
IG1 (46)	IG1 power supply

2. Terminal Inspection

(a) Disconnect the connector and measure the voltage or resistance on the wire harness side.

Skid Control ECU Harness Side Connector Front View:



HINT:
Voltage cannot be measured with the connector connected to the skid control ECU because the connector is watertight.

Standard

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (A26-1) - Body ground	W-B - Body ground	Pump motor ground	Ignition switch off	Below 1 Ω
STP (A26-27) - Body ground	P - Body ground	Stop light switch input	Stop light switch ON → OFF (Brake pedal depressed → released)	8 to 14 V → Below 1.5 V
BZ (A26-30) - Body ground	R - Body ground	Buzzer output	Ignition switch on (IG), when buzzer not sounding	6 to 10 V
+BS (A26-31) - Body ground	L - Body ground	Solenoid relay power supply	Always	10 to 14 V
GND1 (A26-32) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 Ω
IG1 (A26-46) - Body ground	P - Body ground	IG1 power supply	Ignition switch on (IG)	10 to 14 V

CALIBRATION

1. DESCRIPTION

- After replacing the VSC relevant components or performing "Front wheel alignment adjustment", clear and read the sensor calibration data.
- Follow the chart to perform calibration.

Replacing Parts / Operation	Necessary Operation
Skid control ECU	Yaw rate and acceleration sensor zero point calibration.
Yaw rate and acceleration sensor	1. Clearing zero point calibration data. 2. Yaw rate and acceleration sensor zero point calibration.
Front wheel alignment adjustment	1. Clearing zero point calibration data. 2. Yaw rate and acceleration sensor zero point calibration.

2. OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (INTELLIGENT TESTER)

NOTICE:

- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not start the engine.)**
- **Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).**

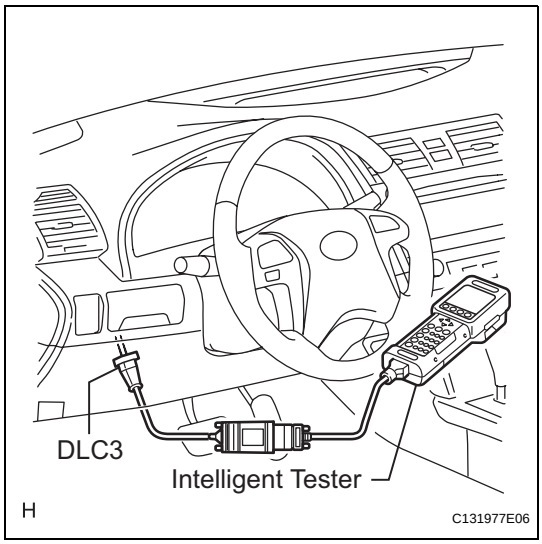
(a) Clear the zero point calibration data.

(1) Turn the ignition switch off.

(2) Connect the intelligent tester to the DLC3.

(3) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).

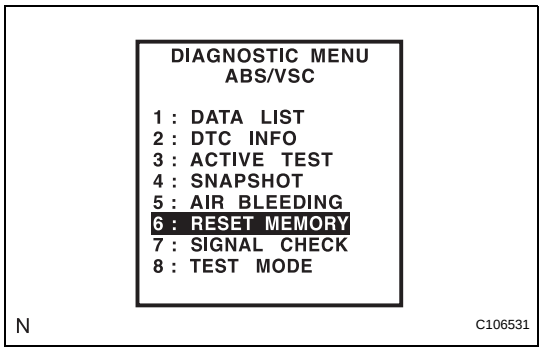
(4) Turn the ignition switch on (IG).



(5) Operate the intelligent tester to erase the codes (select "RESET MEMORY").

HINT:

Refer to the intelligent tester operator's manual for further details.



(6) Turn the ignition switch off.

NOTICE:

If the ignition switch is turned on (IG) for more than 15 seconds with the shift lever in the P position (A/T) or the parking brake applied (M/T) after zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the indicator lights (models without multi information display) or multi information display (models with multi information display).

(b) Perform zero point calibration of the yaw rate and acceleration sensor.

(1) Turn the ignition switch off.

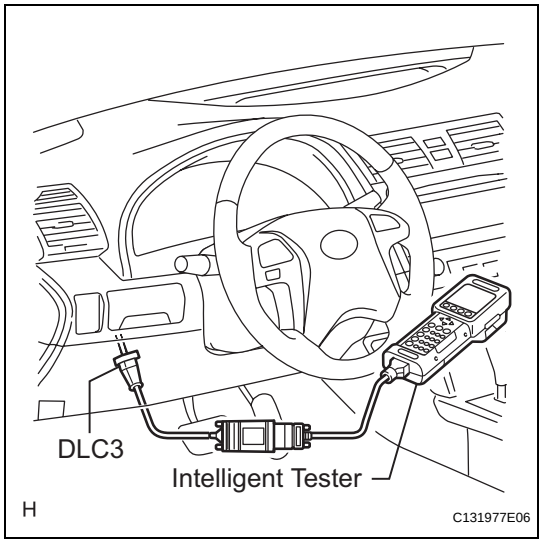
(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).

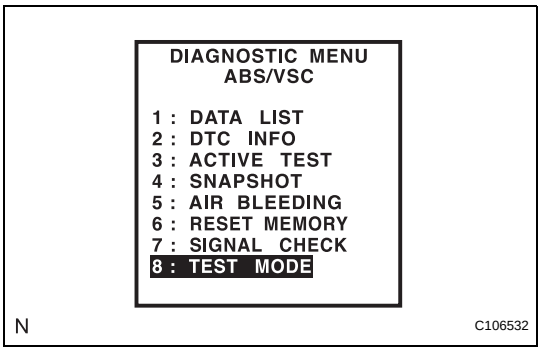
NOTICE:

DTCs C1210/36 and C1336/39 will be recorded if the shift lever is not in the P position (A/T) or the parking brake is not applied (M/T) (See page BC-188).

(3) Connect the intelligent tester to the DLC3.

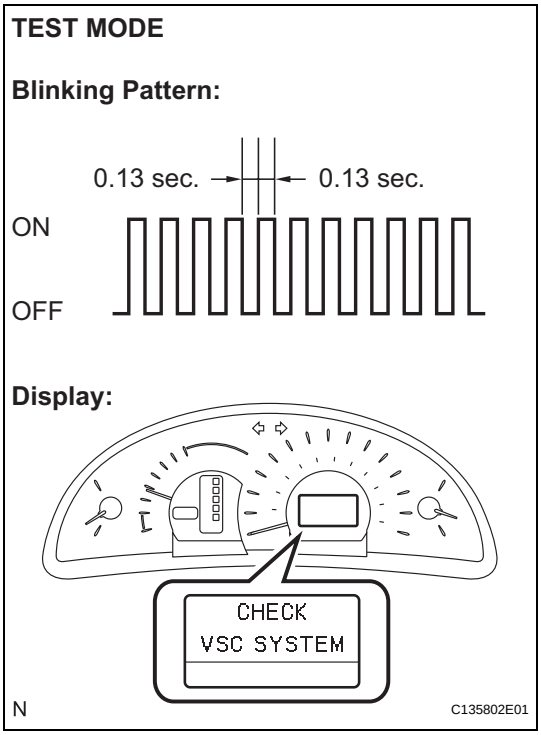
(4) Turn the ignition switch on (IG).





(5) Set the intelligent tester to Test Mode (select "TEST MODE").
HINT:
Refer to the intelligent tester operator's manual for further details.

(6) After the Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.

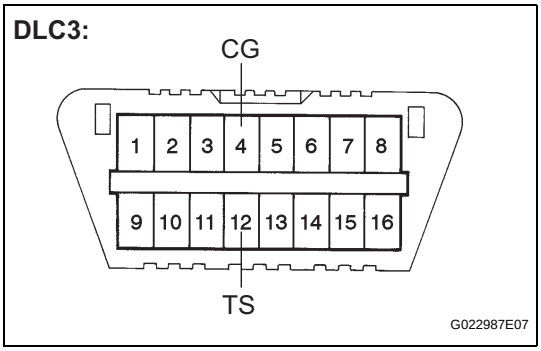


(7) Check that the VSC warning light blinks (models without multi information display) or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the VSC warning light does not blink (models without multi information display) or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), perform zero point calibration again.
- The zero point calibration is performed only once after the system enters the Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(8) Turn the ignition switch off and disconnect the intelligent tester.

3. OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (SST CHECK WIRE)

NOTICE:
- **While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it. (Do not start the engine.)**
- **Be sure to perform the procedure on a level surface (with an inclination of less than 1 degree).**

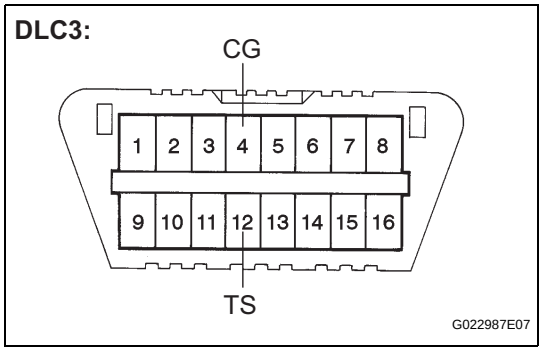


(a) Clear the zero point calibration data.
(1) Turn the ignition switch off.
(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).
(3) Turn the ignition switch on (IG).
(4) The warning light and indicator light come on for 3 seconds to indicate that the initial check is completed.
(5) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.
SST 09843-18040

NOTICE:
If the ignition switch is turned on (IG) for more than 15 seconds with the shift lever in the P position (A/T) or the parking brake applied (M/T) after zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the indicator lights (models without multi information display) or multi information display (models with multi information display).

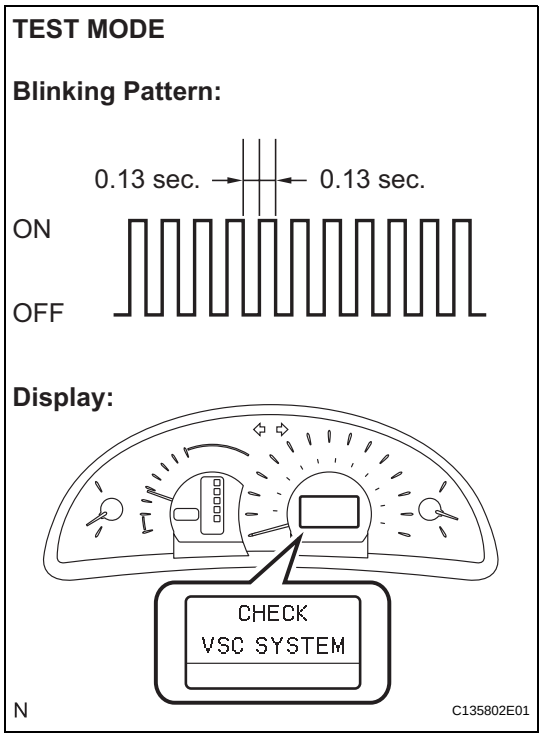
(b) Perform zero point calibration of the yaw rate and acceleration sensor.
(1) Turn the ignition switch off.
(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).
NOTICE:
DTCs C1210/36 and C1336/39 will be recorded if the shift lever is not in the P position (A/T) or the parking brake is not applied (M/T) (See page BC-188).

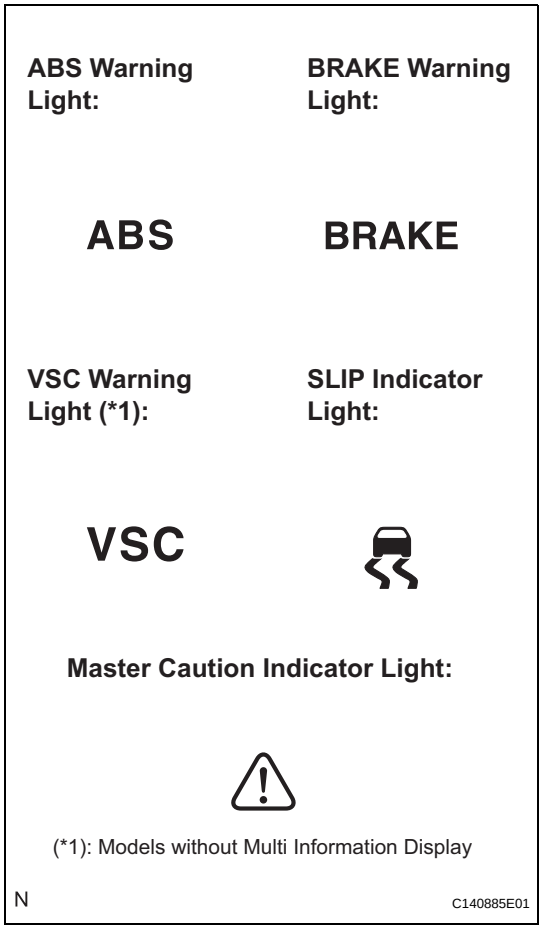
DLC3:



(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040
(4) Turn the ignition switch on (IG).
(5) Keep the vehicle stationary on a level surface for 2 seconds or more.

BC





(6) Check that the VSC warning light blinks (models without multi information display) or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the VSC warning light does not blink (models without multi information display) or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), perform zero point calibration again.
- The zero point calibration is performed only once after the system enters the Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(7) Turn the ignition switch off and disconnect the SST from the DLC3.

TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.
NOTICE:
Before releasing the parking brake, move the shift lever to the P position for safety (A/T) or set the chocks to hold the vehicle for safety (M/T).
HINT:
When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS warning, BRAKE warning, SLIP indicator, and master caution indicator lights come on for approximately 3 seconds. Vehicles equipped with VSC, which are not equipped with a multi information display, the VSC warning light will illuminate instead of the master caution indicator light.
HINT:
If the ECU stores a DTC, the ABS warning, BRAKE warning, VSC warning and SLIP indicator lights will come on.

If the vehicle is equipped with a multi information display, and the vehicle stores a DTC, the master caution indicator light will illuminate, and the multi information display will indicate the malfunction instead of the VSC warning light. In this case, the ABS warning, BRAKE warning, and SLIP indicator lights will also come on.
If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

Trouble Area	See procedure
ABS warning light circuit	BC-229 or BC-233
BRAKE warning light circuit	BC-244 or BC-252
VSC warning light circuit	BC-236 or BC-240
SLIP indicator light circuit	BC-255 or BC-259

2. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (INTELLIGENT TESTER)

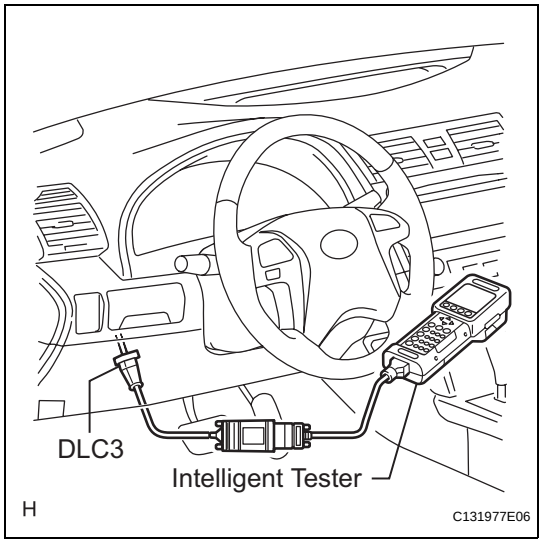
NOTICE:

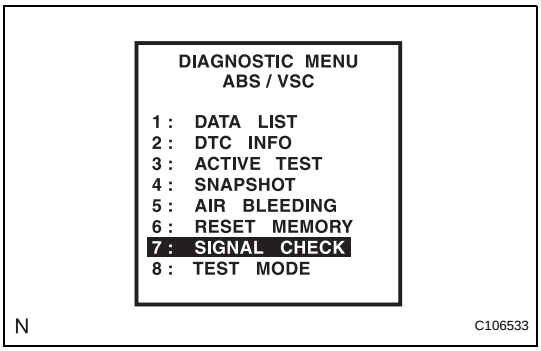
After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.

HINT:

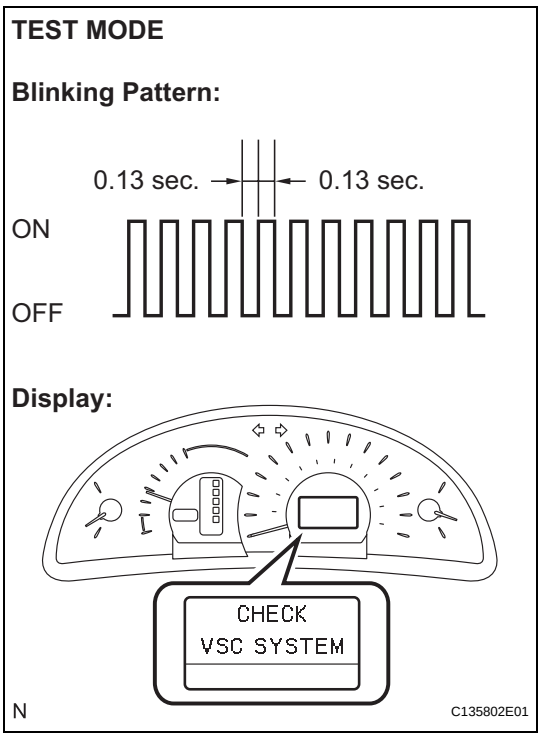
- If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs of the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

(a) Procedure to enter Test Mode.
  (1) Turn the ignition switch off.
  (2) Connect the intelligent tester to the DLC3.
  (3) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).
  (4) Turn the ignition switch on (IG).



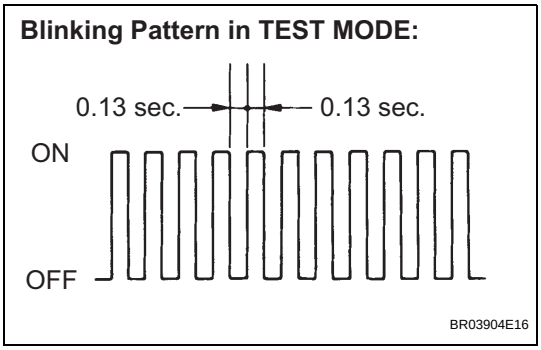


(5) Set the intelligent tester to Test Mode (select "SIGNAL CHECK").
HINT:
Refer to the intelligent tester operator's manual for further details.



(6) Check that the ABS and VSC (models without multi information display) warning lights blink or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the ABS and VSC (models without multi information display) warning lights do not blink or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), inspect the TS and CG terminal circuit, and ABS and VSC warning light circuits.

Trouble Area	See procedure
TS and CG terminal circuit	BC-269
ABS warning light circuit	BC-233
VSC warning light circuit	BC-240



(7) Check the ABS sensor.
HINT:
Check that the ABS warning light is blinking in Test Mode and perform the check.

3. ACCELERATION SENSOR CHECK (INTELLIGENT TESTER)

(a) Keep the vehicle stationary on a level surface for 1 second or more.
HINT:
Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

4. MASTER CYLINDER PRESSURE SENSOR CHECK (INTELLIGENT TESTER)

(a) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.

(b) Check that the ABS warning light stays on for 3 seconds.
HINT:
- Ensure that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time brake pedal operation above is performed.
- If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to be completed.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
- If the brake pedal is strongly depressed when the negative pressure is insufficient, the BRAKE warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

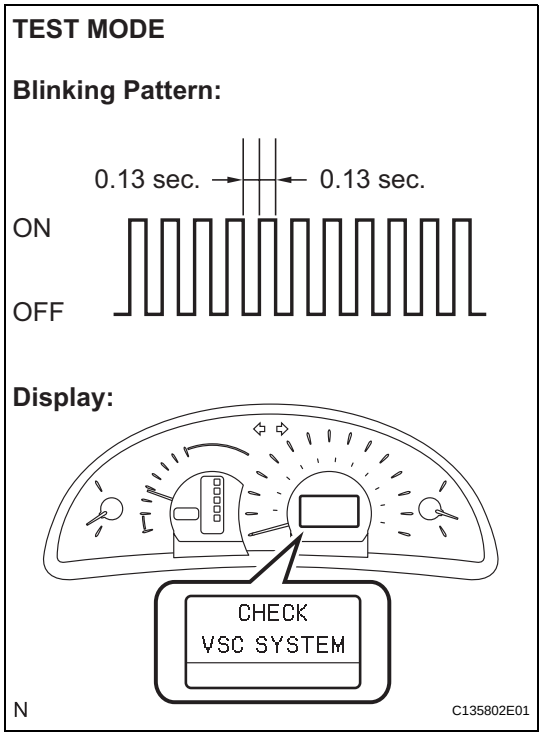
5. SPEED SENSOR CHECK (INTELLIGENT TESTER)

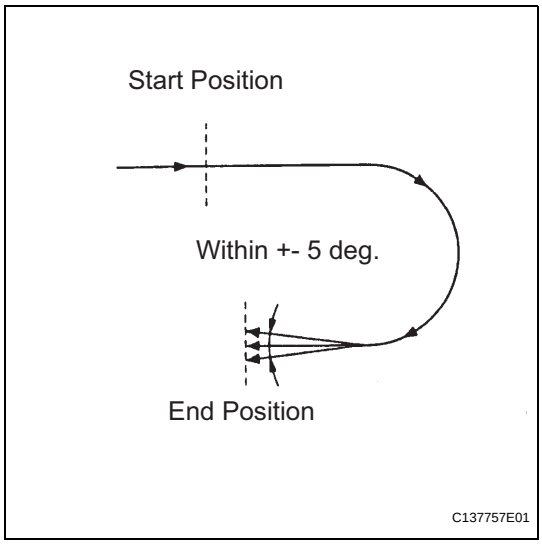
(a) Check the speed sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off.
HINT:
The sensor check may not be completed if wheelspin occurs.

(b) Stop the vehicle.
NOTICE:
- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off and if the vehicle speed exceeds 50 mph (80 km/h), a signal check code will be stored again. Accelerate or stop the vehicle before the speed reaches 50 mph (80 km/h).**
- **If the signal check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:
When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

(c) Check the VSC sensor.
Check that the VSC warning light (models without multi information display) blinks or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display), and perform the check.



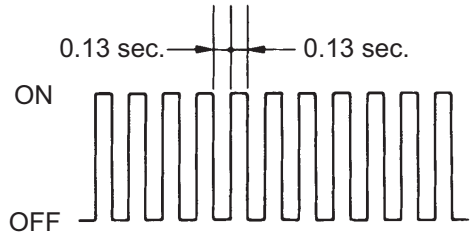


6. YAW RATE SENSOR CHECK (INTELLIGENT TESTER)

(a) Check the output of the yaw rate sensor.
(1) Keep the vehicle in a stationary condition on a level surface for 1 second or more.
(2) Move the shift lever from P to the D position (A/T) or release the parking brake (M/T) and drive the vehicle at a speed of approximately 3 mph (5 km/h), and turn the steering wheel either to the left or right 90° or more until the vehicle makes a 180° turn.
(3) Stop the vehicle and move the shift lever to the P position (A/T) or apply the parking brake (M/T). Check that the skid control buzzer sounds for 3 seconds.
HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-263), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +- 5° of its start position.

- Do not spin the wheels.
- Do not turn the ignition switch off while turning.
- Do not move the shift lever to the P position (A/T) or do not apply the parking brake (M/T) while turning, but changing in the vehicle speed, stopping, or driving in reverse is possible.
- Complete the turn within 20 seconds.

Blinking Pattern in TEST MODE:



7. END OF SENSOR CHECK (INTELLIGENT TESTER)

(a) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTICE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

8. READ DTC OF SIGNAL CHECK FUNCTION (INTELLIGENT TESTER)

(a) Read the DTC(s) by following the tester screen.

NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

See the list of DTC (See procedure "A").

9. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (SST CHECK WIRE)

NOTICE:

After replacement of the brake actuator assembly and/or yaw rate and acceleration sensor, perform zero point calibration of the yaw rate and acceleration sensor.

HINT:

- If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs of the signal check function will be erased.
- During Test Mode (signal check), the skid control ECU records all DTCs of the signal check function. By performing the Test Mode (signal check), the codes are erased if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

(a) Procedure to enter Test Mode.

(1) Turn the ignition switch off.

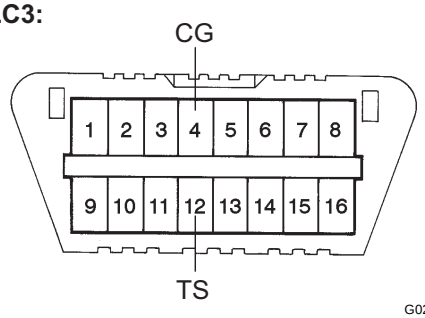
BC

(2) Check that the steering wheel is centered and move the shift lever to the P position (A/T) or apply the parking brake (M/T).

(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(4) Turn the ignition switch on (IG).

DLC3:



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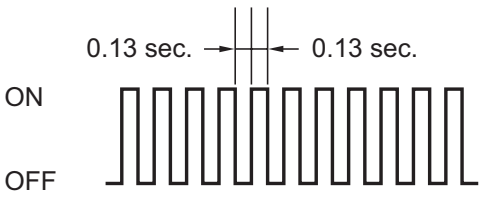
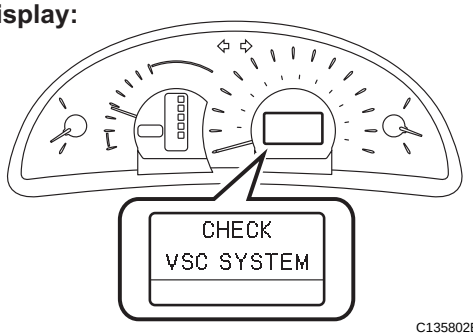
TEST MODE

Blinking Pattern:



Display:



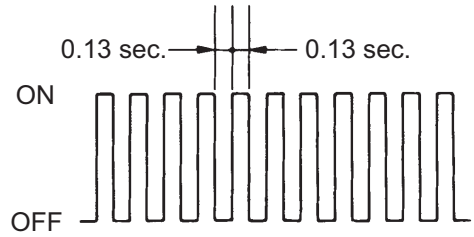
N

C135802E01

(5) Check that the ABS and VSC (models without multi information display) warning lights blink or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display) (Test Mode).
HINT:
- The SLIP indicator light remains on during Test Mode because TRAC is prohibited.
- If the ABS and VSC (models without multi information display) warning lights do not blink or "CHECK VSC SYSTEM" is not displayed on the multi information display (models with multi information display), inspect the TS and CG terminal circuit, and ABS and VSC warning light circuits.

Trouble Area	See procedure
TS and CG terminal circuit	BC-269
ABS warning light circuit	BC-233
VSC warning light circuit	BC-240

Blinking Pattern in TEST MODE:



BR03904E16

(6) Check the ABS sensor.
HINT:
Check that the ABS warning light is blinking in Test Mode and perform the check.

10. ACCELERATION SENSOR CHECK (SST CHECK WIRE)

(a) Keep the vehicle stationary on a level surface for 1 second or more.
HINT:
Acceleration sensor check can be performed with the master cylinder pressure sensor check below.

11. MASTER CYLINDER PRESSURE SENSOR CHECK (SST CHECK WIRE)

(a) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 second.

(b) Check that the ABS warning light stays on for 3 seconds.
HINT:
- Ensure that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time the brake pedal operation above is performed.
- If the check of the master cylinder pressure sensor is not completed, depressing the brake pedal causes further decrease in the negative pressure, making the sensor check difficult to be completed.
- If the negative pressure is insufficient, the master cylinder pressure sensor check may not be completed. In this case, run the engine at idle to obtain sufficient negative pressure.
- If the brake pedal is strongly depressed when the negative pressure is insufficient, the BRAKE warning light may come on in accordance with the booster pressure control. In this case, run the engine at idle to obtain sufficient negative pressure.

12. SPEED SENSOR CHECK (SST CHECK WIRE)

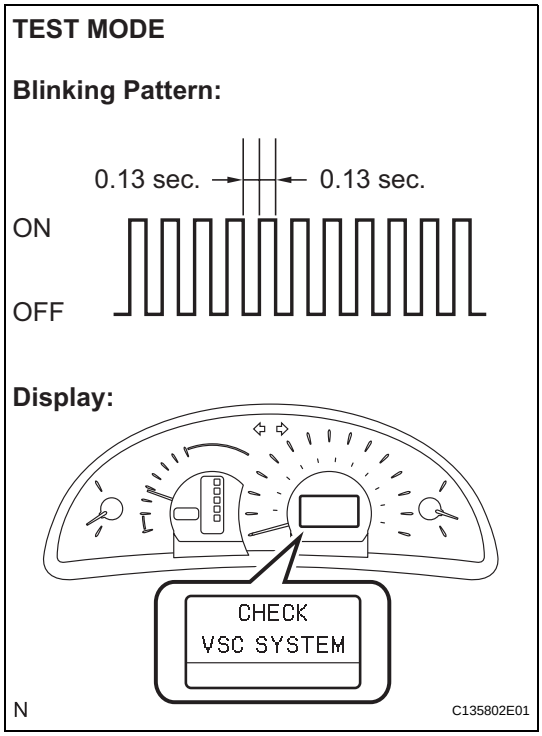
(a) Check the speed sensor signal.

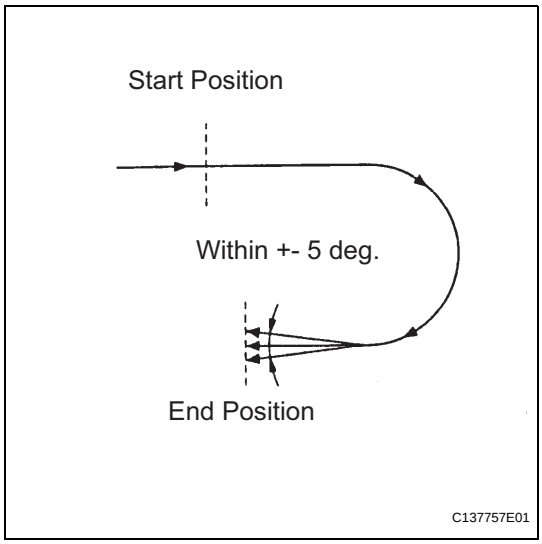
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off.
HINT:
The sensor check may not be completed if wheelspin occurs.

(b) Stop the vehicle.
NOTICE:
- **Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.**
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **After the ABS warning light goes off, if vehicle speed exceeds 50 mph (80 km/h), a signal check code will be stored again. Accelerate or stop the vehicle before the speed reaches 50 mph (80 km/h).**
- **If the signal check has not been completed, the ABS warning light blinks while driving and the ABS system does not operate.**

HINT:
When the sensor check has been completed, the ABS warning light goes off while driving and blinks in the Test Mode pattern while stationary.

(c) Check the VSC sensor.
Check that the VSC warning light (models without multi information display) blinks or "CHECK VSC SYSTEM" is displayed on the multi information display (models with multi information display), and perform the check.



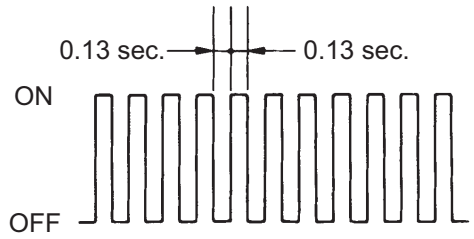


13. YAW RATE SENSOR CHECK (SST CHECK WIRE)

(a) Check the output of the yaw rate sensor.
(1) Keep the vehicle stationary on a level surface for 1 second or more.
(2) Move the shift lever from P to the D position (A/T) or release the parking brake (M/T) and drive the vehicle at a vehicle speed of approximately 3 mph (5 km/h) and turn the steering wheel either to the left or right 90° or more and until the vehicle makes a 180° turn.
(3) Stop the vehicle and move the shift lever to the P position (A/T) or apply the parking brake (M/T). Check that the skid control buzzer sounds for 3 seconds.
HINT:
- If the skid control buzzer sounds, the sensor check is completed normally.
- If the skid control buzzer does not sound, check the skid control buzzer circuit (See page BC-263), then perform the sensor check again.
- If the skid control buzzer still does not sound, there is a malfunction in the yaw rate sensor, so check the DTC.
- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +- 5° of its start position.
- Do not spin the wheels.

- Do not turn the ignition switch off while turning.
- Do not move the shift lever to the P position (A/T) or do not apply the parking brake (M/T) while turning, but changing in the vehicle speed, stopping, or driving in reverse is possible.
- Complete the turn within 20 seconds.

Blinking Pattern in TEST MODE:



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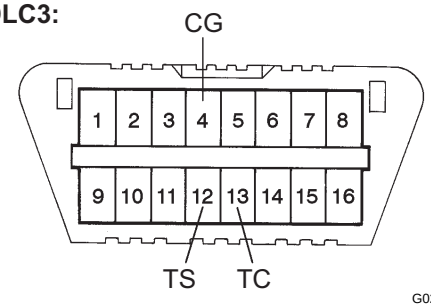
14. END OF SENSOR CHECK (SST CHECK WIRE)

(a) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle stops and the ABS warning light is off while the vehicle is driving.

NOTICE:

- **When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.**
- **If the sensor check is not completed, the ABS warning light blinks even while the vehicle is driving and the ABS does not operate.**

DLC3:



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15. READ DTC OF SIGNAL CHECK FUNCTION (SST CHECK WIRE)

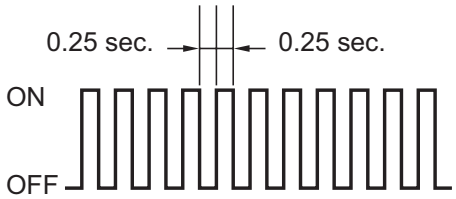
(a) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

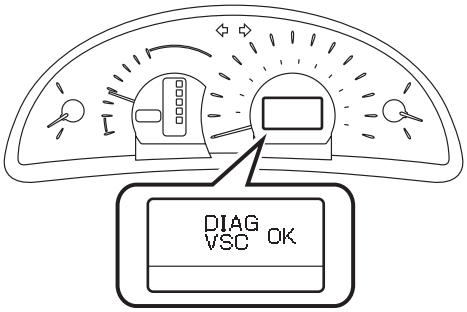
BC

(b) Count the number of blinks of the ABS and VSC (models without multi information display) warning lights or read "DIAG VSC" on the multi information display (models with multi information display).

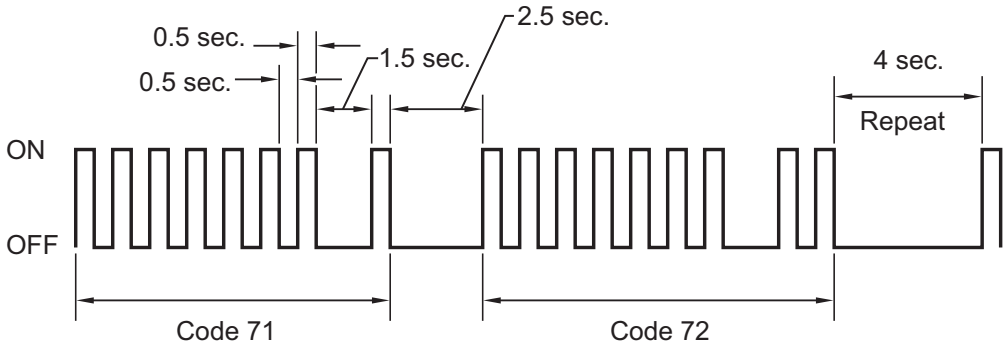
Blinking Pattern in Normal System Code:



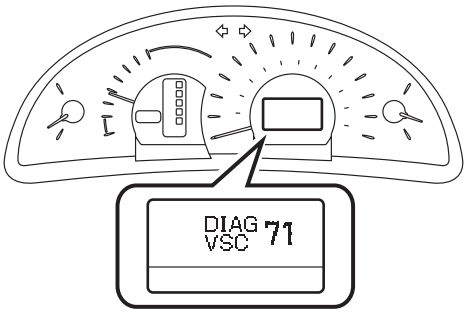
Display of Normal System Code:



Blinking Pattern in Trouble Code (Example Codes 71 and 72):



Display of Trouble Code (Example Code 71):



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NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTC (See procedure "A").

(c) After performing the check, disconnect the SST from terminals TS and CG, and TC and CG of the DLC3 and turn the ignition switch off.

(d) Turn the ignition switch on (IG).
HINT:
- If the ignition switch is not turned on (IG) after the SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned on (IG) with terminals TS and CG shorted, the previous Test Mode will continue.

16. DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")

ABS sensor:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	Speed sensor rotor
C1276/76	Abnormal change in output signal of front speed sensor LH	Speed sensor rotor
C1277/77	Abnormal change in output signal of rear speed sensor RH	Speed sensor rotor
C1278/78	Abnormal change in output signal of rear speed sensor LH	Speed sensor rotor
C1279/79	Acceleration sensor output voltage malfunction	• Yaw rate and acceleration sensor • Sensor installation
C1281/81	Master cylinder pressure sensor output malfunction	• Stop light switch • Master cylinder pressure sensor

VSC sensor:

Code No.	Diagnosis	Trouble Area
C0371/71	Yaw rate sensor	Yaw rate and acceleration sensor

HINT:
The codes in this table are output only in Test Mode (signal check).

BC

DIAGNOSIS SYSTEM

1. DESCRIPTION

When troubleshooting a vehicle with the diagnosis system, the only difference from the usual troubleshooting procedure is connecting the intelligent tester to the vehicle and reading various data output from the vehicle's skid control ECU.

The skid control ECU records DTCs when the computer detects a malfunction in the computer itself or in its circuits.

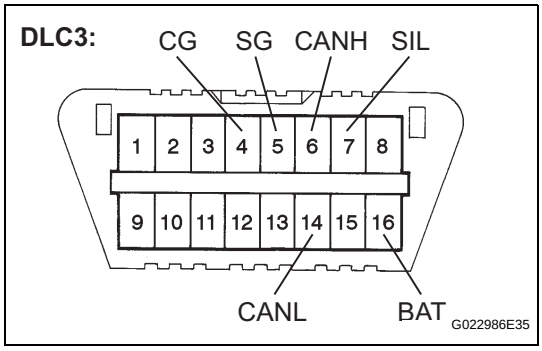
To check the DTCs, connect the intelligent tester to the DLC3 on the vehicle. The intelligent tester enables you to erase the DTCs, activate the various actuators, and check the Freeze Frame Data and Data List.

(a) Check the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.



(b) Check the DLC3.

The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

Verify the conditions listed in the table below.

Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	*Ignition switch off	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	*Ignition switch off	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	*Ignition switch off	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	*Ignition switch off	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	*Ignition switch off	6 kΩ or higher

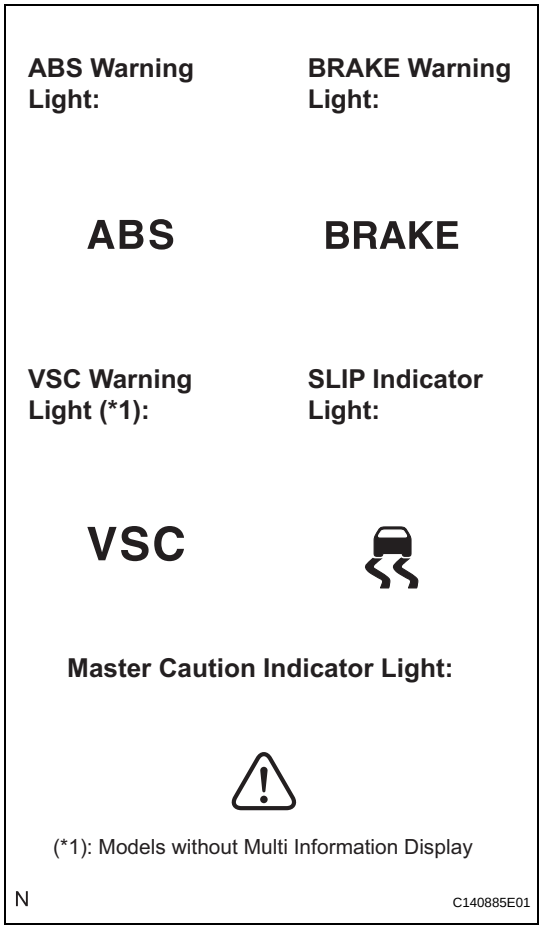
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's operator's manual.

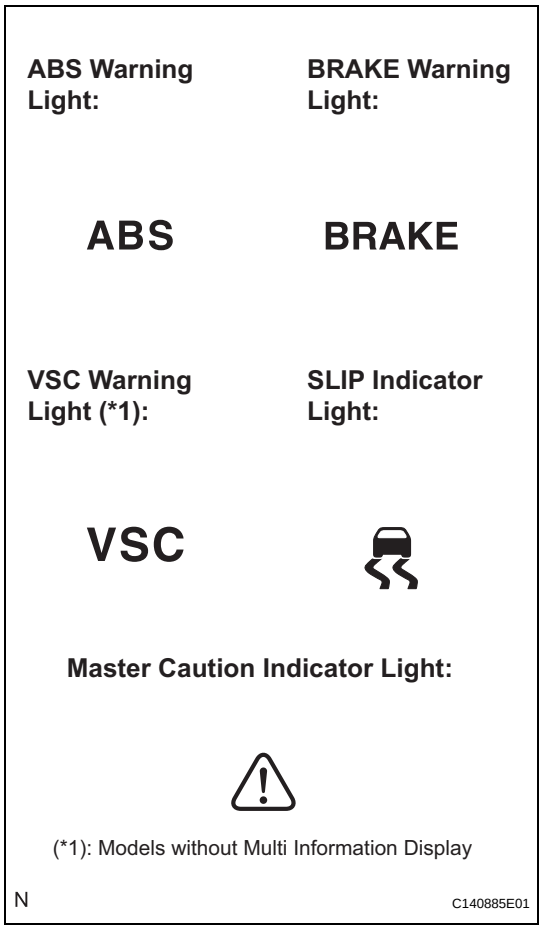


2. DIAGNOSIS

(a) If the skid control ECU detects a malfunction, the ABS, BRAKE, and VSC (models without multi information display) warning lights, and SLIP indicator light will come on and the multi information display (models with multi information display) shows warning messages in order to warn the driver.
The table below indicates which lights will come on when there is a malfunction in a particular function.

BC

Item / Trouble Area	ABS	EBD	BA	TRAC	VSC
ABS warning light	○	○	○	-	-
BRAKE warning light	-	○	-	-	-
VSC warning light (*1)	○	○	○	○	○
Multi information display (*2)	○	○	○	○	○
SLIP indicator light	○	○	○	○	○



○: Light ON
-: Light OFF
(*1): Models without multi information display
(*2): Models with multi information display

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS and VSC (models without multi information display) warning lights, by reading the multi information display (models with multi information display), or by connecting the intelligent tester.
- This system has a Test Mode (signal check) function (See page BC-123).
  The DTC can be read by connecting the intelligent tester and observing the blinking pattern of the ABS and VSC (models without multi information display) warning lights or by reading the multi information display (models with multi information display).

3. WARNING LIGHT AND INDICATOR LIGHT CHECK

(a) Release the parking brake.
NOTICE:
When releasing the parking brake, move the shift lever to the P position for safety (A/T) or set the chocks to hold the vehicle for safety (M/T).
HINT:
When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

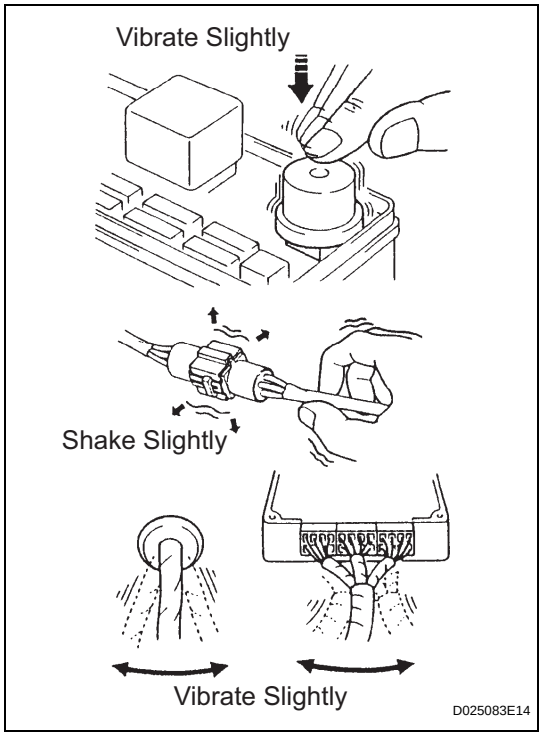
(b) When the ignition switch is turned on (IG), check that the ABS, BRAKE and VSC (models without multi information display) warning lights, and SLIP, and master caution indicator lights come on for approximately 3 seconds.
HINT:
If the warning light and indicator light check result is not normal, proceed to troubleshooting for the ABS, BRAKE and VSC warning light circuits and SLIP indicator light circuit.
If the indicator remains on, proceed to troubleshooting for the light circuit below.

Trouble Area	See procedure
ABS warning light circuit	BC-229
BRAKE warning light circuit	BC-244
VSC warning light circuit	BC-236
SLIP indicator light circuit	BC-255

4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.

HINT:

Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is on (IG)).

(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

(2) Slightly shake the connector vertically and horizontally.

HINT:

Shaking the relays too strongly may result in open relays.

(3) Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

BC

DTC CHECK / CLEAR

1. DTC CHECK/CLEAR (INTELLIGENT TESTER)

(a) Check the DTC.

(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch on (IG).

(3) Read the DTCs following the prompts on the tester screen.

(b) Clear the DTC.

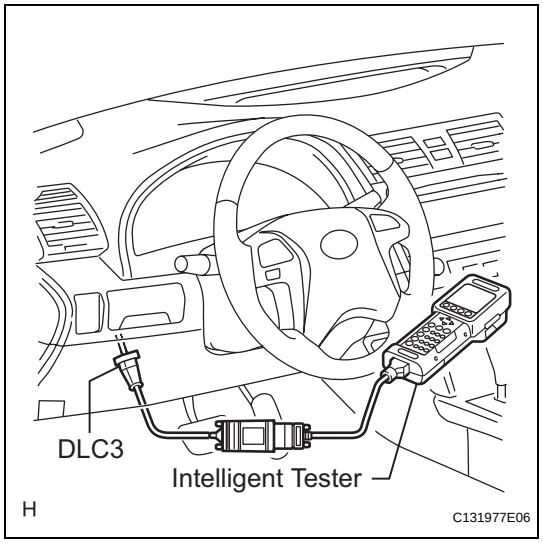
(1) Connect the intelligent tester to the DLC3.

(2) Turn the ignition switch on (IG).

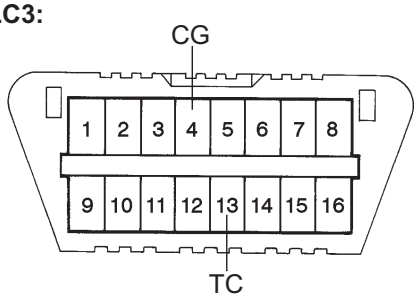
(3) Operate the intelligent tester to clear the codes.

HINT:

Refer to the intelligent tester operator's manual for further details.



DLC3:



2. DTC CHECK/CLEAR (SST CHECK WIRE)

(a) Check the DTC.

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

(2) Turn the ignition switch on (IG).

(3) Observe the blinking pattern of the ABS and VSC (models without multi information display) warning lights or read the multi information display (models with multi information display) in order to identify the DTC.

HINT:

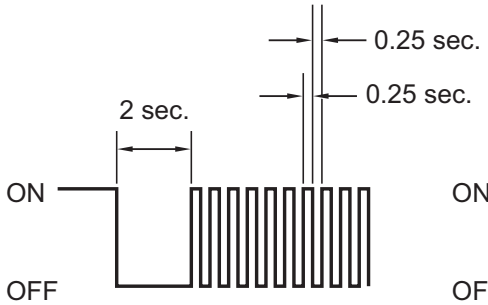
If no code appears, inspect the TC and CG terminal circuit, and ABS and VSC warning light circuits.

Trouble Area	See procedure
TC and CG terminal circuit	BC-266
ABS warning light circuit	BC-229 or BC-233
VSC warning light circuit	BC-236 or BC-240

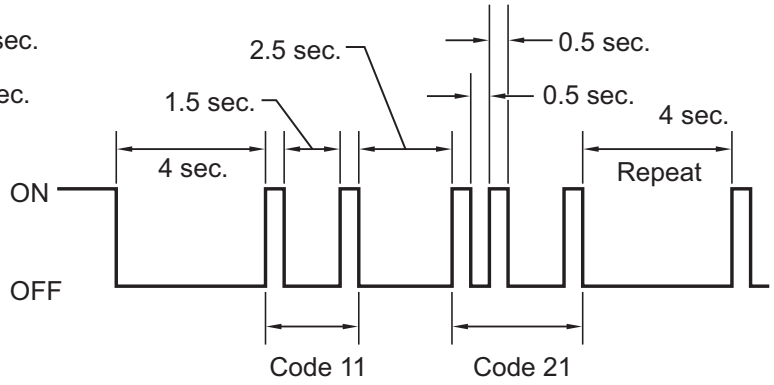
BC

(4) As an example, the illustration below shows the blinking patterns of the normal system code and trouble codes 11 and 21 for ABS and VSC (models without multi information display) warning lights or display of the normal system code and trouble code 43 for the VSC on the multi information display (models with multi information display).

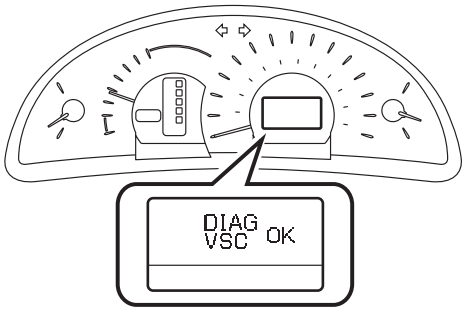
Blinking Pattern in Normal System Code:



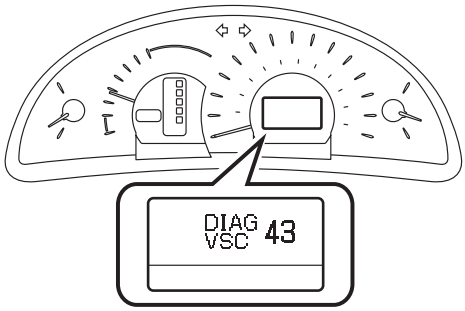
Blinking Pattern in Trouble Code (Example Codes 11 and 21):



Display of Normal System Code:



Display of Trouble Code (Example Code 43):



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(5) The codes are explained in the code table (See page BC-151).

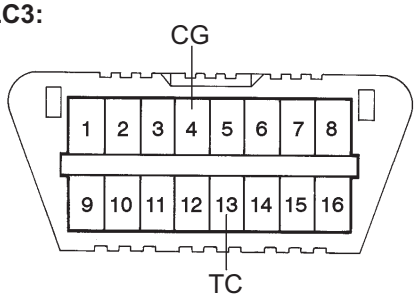
(6) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

(b) Clear the DTC.

(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the ignition switch on (IG).

DLC3:



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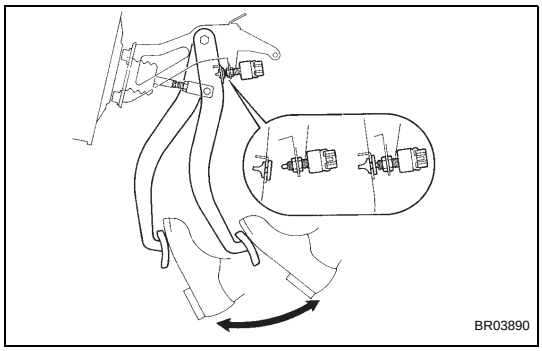


(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(4) Check that the warning light or multi information display indicates the normal system code.
(5) Remove the SST from the terminals of the DLC3.
HINT:
Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG NO. 2 fuse.

3. END OF DTC CHECK/CLEAR

(a) Turn the ignition switch on (IG).
(b) Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

(a) Whenever an ABS DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.
The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to on (IG) since the last time the ABS was activated.
HINT:
- However, if the vehicle is stopped or at a low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will stop counting the number.
- Freeze Frame Data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored during ABS operation is erased.
- Freeze Frame Data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) On the tester display, select the Freeze Frame Data.

Item (Display)	Measurement Item	Reference Value
VEHICLE SPD	Vehicle speed reading	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
STOP LAMP SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
#IG ON	Number of operations of ignition switch on (IG) after storing Freeze Frame Data	0 to 31
MAS CYL PRESS 1	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.5 V
M/C PRESS GRADE	Master cylinder pressure sensor change	Min.: -30 MPa/s, Max.: 225 MPa/s
YAW RATE	Yaw rate sensor reading	Min.: -128 deg/s, Max.: 127 deg/s
STEERING SEN	Steering angle sensor reading	Left turn: Increase Right turn: Decrease
FORWARD & REA G	Forward and backward G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
SPD GRADE	Vehicle speed grade	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
BUZZER	Skid control buzzer signal	Skid control buzzer ON: ON, OFF: OFF
ACCELERATOR %	Accelerator opening angle %	Min.: 0 %, Max.: 128 %
PARKING BRAKE SW	Parking brake switch signal	Parking brake switch ON: ON, OFF: OFF
ENGINE TORQUE	Real engine torque	Min.: -1,024 Nm, Max.: 1,023 Nm
FR WHEEL SPD	FR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
FL WHEEL SPD	FL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
RR WHEEL SPD	RR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)

Item (Display)	Measurement Item	Reference Value
RL WHEEL SPD	RL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
LATERAL G	Lateral G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
GEAR POSITION	Gear position information	FAIL 1st 2nd 3rd 4th 5th 6th P, N R NOT R
LEVER POSITION	Shift lever position information	FAIL 1st 2nd 3rd 4th 5th 6th/B D/M P, N R
OPERATED SYSTEM	Operated system status	ABS activated: ABS VSC activated: VSC TRAC activated: TRAC BA activated: BA Fail safe mode activated: FAIL No system activated: NON System prohibited: SYS
FREEZE TIME	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
TROUBLE CODE	Freeze frame DTC	Displays to output DTC
INSPECTION MODE	Inspection mode	OTHER: Normal, INSPECT: Service

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

- If there is a problem with sensor signals or actuator systems, the skid control ECU prohibits power supply to the brake actuator assembly and informs the ECM of VSC system failure.
  The brake actuator assembly turns off each solenoid and the ECM shuts off VSC control (traction control signal) from the skid control ECU accordingly, which turns out to be as if the ABS, TRAC and VSC systems were not installed.
  The ABS control will be prohibited, but EBD control continues as much as possible. If EBD control is impossible, the BRAKE warning light comes on to warn the driver (See page BC-138).
- If system components have any malfunction before starting control, immediately stop the operation. If system components have any malfunction during control, gradually stop the control so as not to trigger a sudden change in vehicle conditions.
  If it is impossible to control the systems, the warning light comes on to inform the driver of termination of the systems (See page BC-138).

HINT:
If the hydraulic brake booster encounters a malfunction, brake performance is gradually lost and ABS, BA, TRAC and VSC systems are prohibited.

BC

ABS, EBD and BA system:

Malfunction Area	Control Method
ABS system	ABS, BA, TRAC and VSC control prohibited
BA system	ABS, BA, TRAC and VSC control prohibited
EBD system	ABS, EBD, BA, TRAC and VSC control prohibited

HINT:
A malfunction in either the ABS or BA system will result in an identical operation, with ABS, BA, TRAC and VSC system control prohibited.

TRAC and VSC system:

Malfunction Area	Control Method
Engine control system (TRAC and VSC systems)	Before control: Disables control During control: Uses only the brakes to effect control
Brake control system (VSC system)	Before control: Disables control During control: Uses only the engine to effect control
Brake control system (TRAC system)	Before control: Disables control During control: Disables control (by gradually ending control)

HINT:
As for the TRAC and VSC systems, different systems prohibit different controls depending on a malfunctioning part.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

With the intelligent tester connected to the DLC3 and the ignition switch on (IG), the ABS, TRAC and VSC Data List can be displayed. Follow the prompts on the tester screen to access the Data List.

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
ABS MTR RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
FAIL MTR RELAY	Fail safe motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
IDLE SW	Main idle switch / ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
ENG REVOLUTIONS	Engine revolutions / min.: 0 r/min, max.: 65535 r/min	-	-
GEAR POSITION	Gear position information / P/N, R, 1st-6th, FAIL, NOT R	-	-
LEVER POSITION	Shift lever position information / P/N, R, D/M, 1st-6th/B, FAIL	-	-
SHIFT INFO	Shift information / ON or OFF	ON: During gear change	-
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
FL WHEEL SPD	FL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
DECELERAT SEN	Acceleration sensor 1 reading / min.: -1.889 G, max.: 1.875 G	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
DECELERAT SEN 2	Acceleration sensor 2 reading / min.: -1.889 G, max.: 1.875 G	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates	-
SRRR	ABS solenoid (SRRR) / ON or OFF	ON: Operates	-
SRRH	ABS solenoid (SRRH) / ON or OFF	ON: Operates	-

BC

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SRLR	ABS solenoid (SRLR) / ON or OFF	ON: Operates	-
SRLH	ABS solenoid (SRLH) / ON or OFF	ON: Operates	-
SM1	Master cut solenoid (SM1) / ON or OFF	ON: Operates	-
SM2	Master cut solenoid (SM2) / ON or OFF	ON: Operates	-
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual vehicle speed	Speed indicated on speedometer
YAW RATE SENS 1	Yaw rate sensor 1 / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
ZERO YAW RATE	Memorized zero value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING SEN	Steering angle sensor / min.: -3,276.8 deg, max.: 3,276.7 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V	Reading increases when brake pedal is depressed
ACCELERATOR %	The difference of a present accelerator / min.: 0%, max.: 128%	-	-
ENGINE TORQUE	Real engine torque / min.: -1,024 N*m, max.: 1,023 N*m	-	-
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
M/C OPN	Master cylinder pressure sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
#DTC	Number of DTC / min.: 0, max.: 255	-	-
ABS WARN LAMP	ABS warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
BRAKE WARN LAMP	BRAKE warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
SLIP INDI LAMP	SLIP indicator light / ON or OFF	ON: Indicator light ON OFF: Indicator light OFF	-
BUZZER	Skid control buzzer / ON or OFF	ON: Buzzer ON OFF: Buzzer OFF	-
VSC WARN LAMP	VSC warning light (*1) or multi information display (*2) / ON or OFF	ON: Indicator ON OFF: Indicator OFF	-
ZERO M/C SEN	Memorized zero value / min.: -12.5 MPa, max.: 12.4 MPa	Min.: -12.5 MPa Max.: 12.4 MPa	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
FR WHEEL ACCEL	FR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
FL WHEEL ACCEL	FL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RR WHEEL ACCEL	RR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RL WHEEL ACCEL	RL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
ZERO DECELERAT	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO DECELERAT 2	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO STEERING	Memorized zero value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
LATERAL G	Lateral G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
FORWARD&REA G	Forward and rearward G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
YAW RATE VALUE	Yaw rate value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING ANGLE	Steering angle value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
TRAC STATUS	TRAC control status / ON or OFF	ON: During the control	-
TRAC ENG STATUS	TRAC engine control status / ON or OFF	ON: During the control	-
TRAC BRK STATUS	TRAC brake control status / ON or OFF	ON: During the control	-
FR VSC STATUS	FR wheel VSC control status / ON or OFF	ON: During the control	-
FL VSC STATUS	FL wheel VSC control status / ON or OFF	ON: During the control	-
RR VSC STATUS	RR wheel VSC control status / ON or OFF	ON: During the control	-
RL VSC STATUS	RL wheel VSC control status / ON or OFF	ON: During the control	-
FR ABS STATUS	FR wheel ABS control status / ON or OFF	ON: During the control	-
FL ABS STATUS	FL wheel ABS control status / ON or OFF	ON: During the control	-
RR ABS STATUS	RR wheel ABS control status / ON or OFF	ON: During the control	-
RL ABS STATUS	RL wheel ABS control status / ON or OFF	ON: During the control	-
RR EBD STATUS	RR wheel EBD control status / ON or OFF	ON: During the control	-
RL EBD STATUS	RL wheel EBD control status / ON or OFF	ON: During the control	-
BA STATUS	BA control status / ON or OFF	ON: During the control	-
PBA STATUS	PBA control status / ON or OFF	ON: During the control	-
INSPECTION MODE	Inspection mode / OTHER or INSPECT	-	-
#IG ON2	Number of ignition switch on (IG) after entering the inspection mode / min.: 0, max.: 255	-	-

BC

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
TROUBLE CODE	Freeze frame DTC / min.:0, max.: 65,535	-	-

(*1): Models without multi information display
(*2): Models with multi information display

2. ACTIVE TEST

HINT:
Performing the Active Test using the intelligent tester allows the relay, actuator, and other items to operate without removing any parts. Performing the Active Test as the first step in troubleshooting is one of the methods to save labor time.
It is possible to display the Data List during the Active Test.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) On the tester display, select the Active Test.
HINT:
The ignition switch must be turned on (IG) to proceed to the Active Test using the intelligent tester.

BC

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SMF	Turns master cut solenoid (SM1) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SMR	Turns master cut solenoid (SM2) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SOL RELAY	Turns ABS solenoid relay ON / OFF	-
MOTOR RELAY	Turns ABS motor relay ON / OFF	Operating sound of relay (clicking sound) and motor can be heard
ABS WARN LAMP	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LAMP	Turns VSC warning light (*1) or multi information display (*2) ON / OFF	Observe combination meter
SLIP INDI LAMP	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WARN LAMP	Turns BRAKE warning light ON / OFF	Observe combination meter
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

(*1): Models without multi information display
(*2): Models with multi information display

DIAGNOSTIC TROUBLE CODE CHART

- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the page for the respective "DTC No." in the DTC chart.
- Inspect the fuse and relay before investigating the trouble areas as shown in the table below.

DTC chart of ABS:

DTC No.	Detection Item	Trouble Area	See page
C0200/31 (*1)	Front Speed Sensor RH Circuit	1. Front speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-156
C0205/32 (*1)	Front Speed Sensor LH Circuit	1. Front speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-156
C0210/33 (*1)	Rear Speed Sensor RH Circuit	1. Rear speed sensor RH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-164
C0215/34 (*1)	Rear Speed Sensor LH Circuit	1. Rear speed sensor LH 2. Speed sensor circuit 3. Speed sensor rotor 4. Sensor installation 5. Brake actuator assembly (Skid control ECU)	BC-164
C0226/21	SFR Solenoid Circuit	1. Brake actuator assembly 2. SFRH or SFRR circuit	BC-172
C0236/22	SFL Solenoid Circuit	1. Brake actuator assembly 2. SFLH or SFLR circuit	BC-172
C0246/23	SRR Solenoid Circuit	1. Brake actuator assembly 2. SRRH or SRRR circuit	BC-172
C0256/24	SRL Solenoid Circuit	1. Brake actuator assembly 2. SRLH or SRLR circuit	BC-172
C0273/13 (*1)	Open in ABS Motor Relay Circuit	1. ABS NO. 1 fuse 2. VSC NO. 2 relay 3. VSC NO. 2 relay circuit 4. Brake actuator assembly	BC-175
C0274/14	Short to B+ in ABS Motor Relay Circuit	1. ABS NO. 1 fuse 2. VSC NO. 2 relay 3. VSC NO. 2 relay circuit 4. Brake actuator assembly	BC-175
C0278/11	Open in ABS Solenoid Relay Circuit	1. ABS NO. 2 fuse 2. ABS solenoid relay 3. ABS solenoid relay circuit 4. Brake actuator assembly	BC-181
C0279/12	Short to B+ in ABS Solenoid Relay Circuit	Brake actuator assembly	BC-181
C1225/25	SM Solenoid Circuit	1. Brake actuator assembly 2. SM1 or SM2 circuit	BC-172
C1235/35	Foreign Object is Attached on Tip of Front Speed Sensor RH	1. Front speed sensor RH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197

DTC No.	Detection Item	Trouble Area	See page
C1236/36	Foreign Object is Attached on Tip of Front Speed Sensor LH	1. Front speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197
C1238/38	Foreign Object is Attached on Tip of Rear Speed Sensor RH	1. Rear speed sensor RH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197
C1239/39	Foreign Object is Attached on Tip of Rear Speed Sensor LH	1. Rear speed sensor LH 2. Speed sensor rotor 3. Sensor installation 4. Brake actuator assembly (Skid control ECU)	BC-197
C1241/41	Low Battery Positive Voltage	1. ECU-IG NO. 2 fuse 2. Battery 3. Charging system 4. Power source circuit 5. Internal power supply circuit of the skid control ECU	BC-207
C1243/43 (*1)	Acceleration Sensor Stuck Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1244/44	Open or Short in Acceleration Sensor Circuit	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1245/45 (*1)	Acceleration Sensor Output Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1246/46 (*2)	Master Cylinder Pressure Sensor Malfunction	1. Master cylinder pressure sensor 2. Master cylinder pressure sensor circuit 3. Stop light switch circuit 4. Brake actuator assembly	BC-210
C1249/49	Open in Stop Light Switch Circuit	1. STOP fuse 2. Stop light switch 3. Stop light switch circuit 4. Brake actuator assembly (Skid control ECU)	BC-213
C1251/51 (*1)	Open in Pump Motor Circuit	1. Brake actuator assembly (GND circuit) 2. Brake actuator assembly (Motor circuit)	BC-219
C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit	1. ABS NO. 1 fuse 2. VSC NO. 1 (fail safe) relay 3. VSC NO. 1 (fail safe) relay circuit 4. Brake actuator assembly	BC-175
C1381/97	Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor power source circuit	BC-193
U0073/94	Control Module Communication Bus OFF	CAN communication system	BC-224
U0124/95	Lost Communication with Lateral Acceleration Sensor Module	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)	BC-224

(*1, *2):

BC

Even after the trouble areas are repaired, the ABS warning light will not go off unless the following operations are performed:

- (*1):
  (a) Drive the vehicle at 12 mph (20 km/h) for 30 seconds or more and check that the ABS warning light goes off.
  (b) Clear the DTC.
- (*2):
  (a) Keep the vehicle stationary for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (b) Drive the vehicle at the vehicle speed of 31 mph (50 km/h) and keep depressing the brake pedal strongly for approximately 3 seconds.
  (c) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (d) Clear the DTC.

HINT:
In some cases, the intelligent tester cannot be used when the ABS warning light remains on.

BC

DTC chart of VSC:

DTC No.	Detection Item	Trouble Area	See page
43	ABS Control System Malfunction	ABS control system	BC-155
C1201/51	Engine Control System Malfunction	Engine control system	BC-186
C1203/53	ECM Communication Circuit Malfunction	ECM	BC-187
C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone	1. Brake actuator assembly (Skid control ECU) 2. Yaw rate and acceleration sensor 3. Zero point calibration undone	BC-188
C1231/31	Steering Angle Sensor Circuit Malfunction	1. Steering angle sensor 2. Steering angle sensor circuit 3. Steering angle sensor power supply 4. Brake actuator assembly (Skid control ECU)	BC-190
C1232/32	Stuck in Acceleration Sensor	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1234/34	Yaw Rate Sensor Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-193
C1290/66	Steering Angle Sensor Zero Point Malfunction	1. Yaw rate and acceleration sensor zero point calibration incomplete 2. Poor adjustment of the centered position of the steering wheel 3. Poor adjustment of front wheel alignment	BC-222
C1336/39	Zero Point Calibration of Acceleration Sensor Undone	1. Brake actuator assembly (Skid control ECU) 2. Yaw rate and acceleration sensor 3. Zero point calibration undone	BC-188
U0100/65	Lost Communication with ECM / PCM	CAN communication system (Skid control ECU to ECM)	BC-224

DTC No.	Detection Item	Trouble Area	See page
U0123/62	Lost Communication with Yaw Rate Sensor Module	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)	BC-224
U0126/63	Lost Communication with Steering Angle Sensor Module	CAN communication system (Skid control ECU to steering angle sensor)	BC-224

HINT:
In some cases, the intelligent tester cannot be used when the VSC warning light (models without multi information display) or multi information display (models with multi information display) remains on.

Test Mode DTC of ABS:

DTC No.	Detection Item	Trouble Area	See page
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-156
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-156
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-164
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-164
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	Speed sensor rotor	BC-197
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	Speed sensor rotor	BC-197
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	Speed sensor rotor	BC-197
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	Speed sensor rotor	BC-197
C1279/79	Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)	1. Yaw rate and acceleration sensor 2. Sensor installation	BC-193
C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)	1. Stop light switch 2. Master cylinder pressure sensor	BC-210

Test Mode DTC of VSC:

DTC No.	Detection Item	Trouble Area	See page
C0371/71	Yaw Rate Sensor (Test Mode DTC)	Yaw rate and acceleration sensor	BC-193

DTC	43	ABS Control System Malfunction

DESCRIPTION

This DTC is output when the VSC system detects a malfunction in the ABS control system.

DTC No.	DTC Detection Condition	Trouble Area
43	Malfunction in the ABS control system.	ABS control system

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK ABS CONTROL SYSTEM

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-141).

BC

Result

Condition	Proceed to
DTC (ABS control system DTC) is not output	A
DTC (ABS control system DTC) is output	B

B → REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)

A

2	RECONFIRM DTC

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (43) is not output	A
DTC (43) is output	B

B → REPLACE BRAKE ACTUATOR ASSEMBLY

A

USE SIMULATION METHOD TO CHECK

DTC	C0200/31	Front Speed Sensor RH Circuit

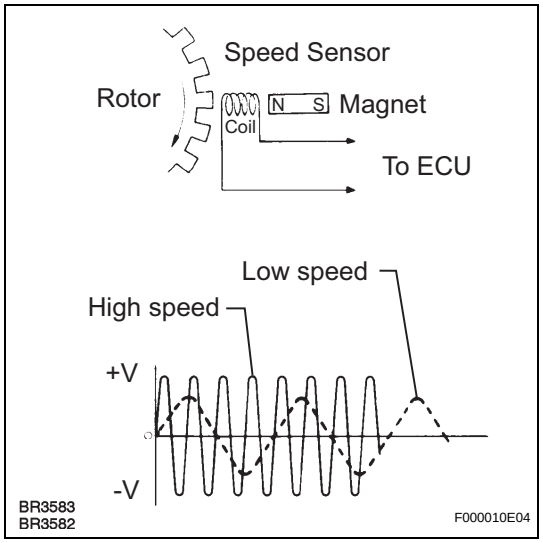
DTC	C0205/32	Front Speed Sensor LH Circuit

DTC	C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)

DTC	C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)

DESCRIPTION

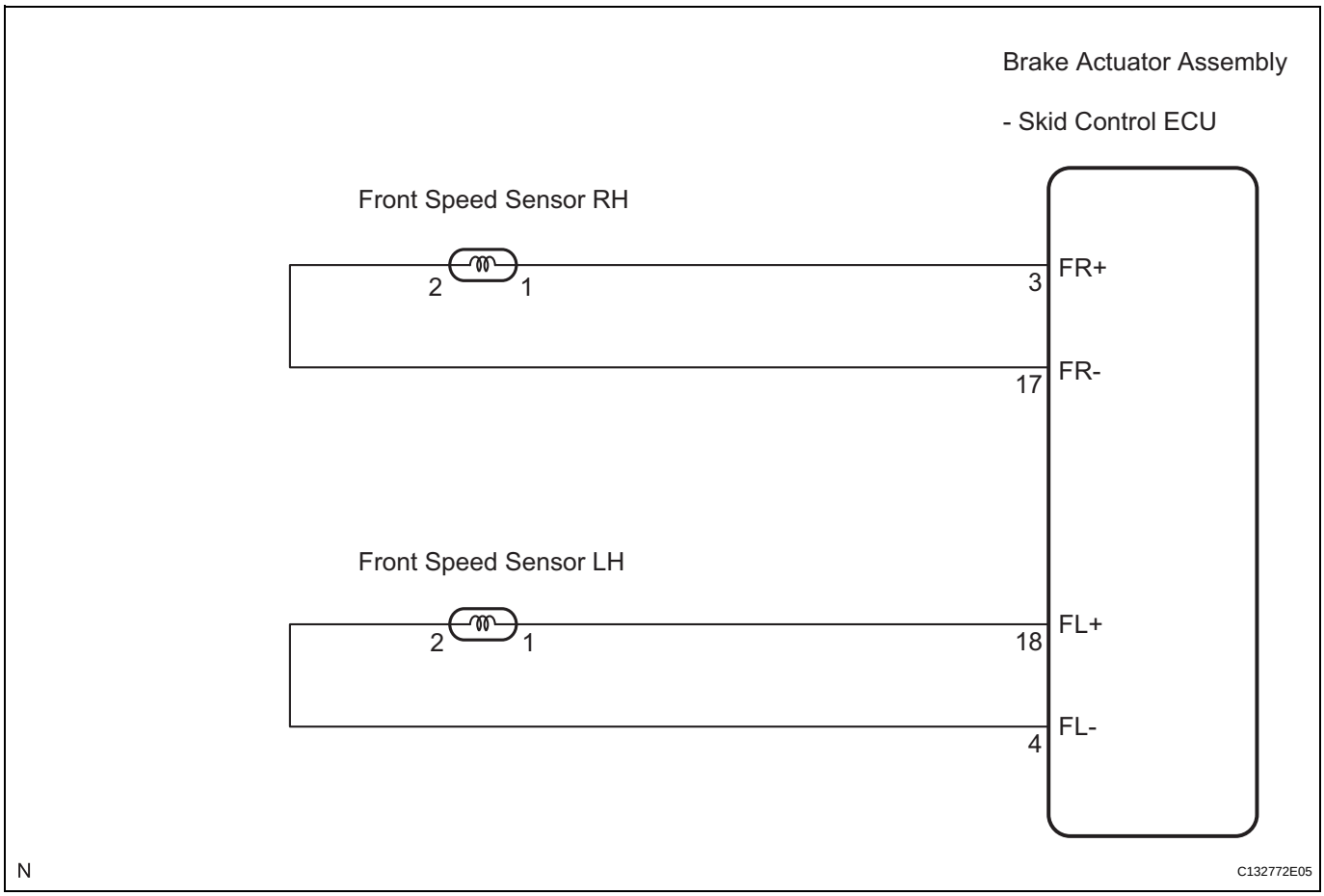
The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1271/71 and C1272/72 can be deleted when the speed sensor sends a wheel speed signal or the Test Mode ends. DTCs C1271/71 and C1272/72 are output only in the Test Mode.



DTC No.	DTC Detection Condition	Trouble Area
C0200/31 C0205/32	When any of the following is detected: 1. At a vehicle speed of 6 mph (10 km/h) or more, an open or short in the sensor signal circuit continues for 1 second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 7 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more.	• Front speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)

HINT:
- DTC C0200/31 is for the front speed sensor RH.
- DTC C0205/32 is for the front speed sensor LH.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-118).

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There are no momentary interruptions	**A**
There are momentary interruptions	**B**
There is a constant open circuit	**C**

HINT:

Perform the above inspection before removing the sensor and connector.

B → Go to step 11

C → Go to step 5

A

2 READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Turn the ignition switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Start the engine.
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed
FL WHEEL SPD	FL wheel speed sensor reading /min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed

BC

(e) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → Go to step 5

OK

3 PERFORM TEST MODE (SIGNAL CHECK)

(a) Perform sensor check in the Test Mode procedure (See page BC-123).
OK:
All Test Mode DTCs are erased.

NG → Go to step 5

OK

4 RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are not output	A
DTCs (C0200/31 and/or C0205/32) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

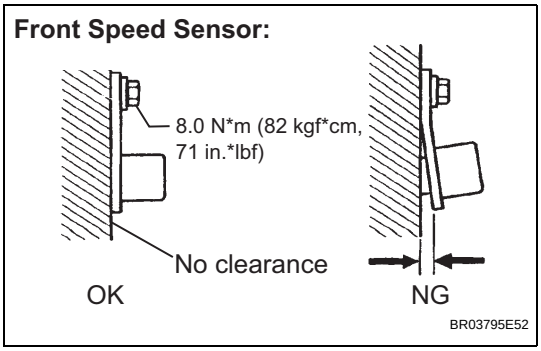
B → **Go to step 7**

A

USE SIMULATION METHOD TO CHECK

BC

5 CHECK FRONT SPEED SENSOR INSTALLATION



(a) Turn the ignition switch off.
(b) Check the speed sensor installation.
OK:
There is no clearance between the sensor and the front steering knuckle.
The installation bolt is tightened properly.
Torque:
8.0 N*m (82 kgf*cm, 71 in.*lbf)

NG → **INSTALL FRONT SPEED SENSOR CORRECTLY**

OK

6 CHECK FRONT SPEED SENSOR TIP

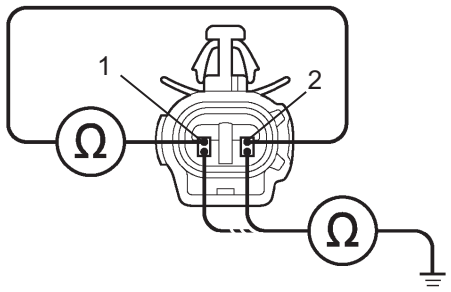
(a) Remove the front speed sensor (See page BC-438).
(b) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-123).

NG → **CLEAN OR REPLACE FRONT SPEED SENSOR**

OK

7	INSPECT FRONT SPEED SENSOR

Front Speed Sensor:



C136017E01

(a) Turn the ignition switch off.
(b) Install the front speed sensor.
(c) Disconnect the front speed sensor connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

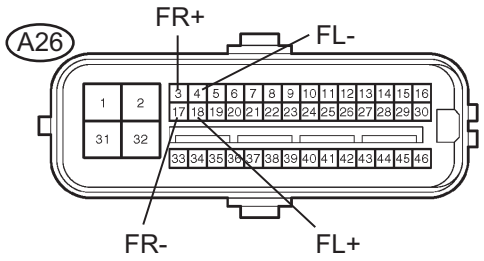
NG → **REPLACE FRONT SPEED SENSOR**

OK

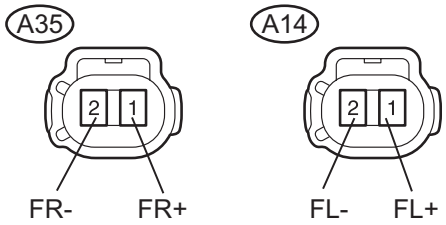
BC

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)

Skid Control ECU Harness Side Connector Front View:



Front Speed Sensor Harness Side Connector Front View:



C136018E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A26-3 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A26-3 (FR+) - Body ground	Always	10 kΩ or higher
A26-17 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A26-17 (FR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
A26-18 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A26-18 (FL+) - Body ground	Always	10 kΩ or higher
A26-4 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A26-4 (FL-) - Body ground	Always	10 kΩ or higher

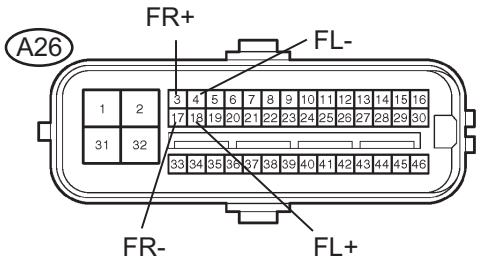
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

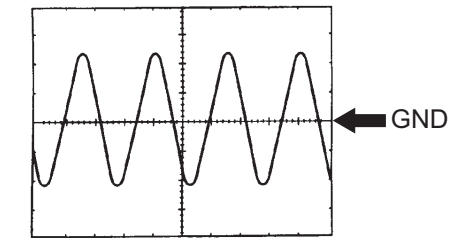
BC

9 CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Harness Side Connector Front View:



Normal Signal Waveform:



1 V/Division, 2 ms/Division

C136019E04

(a) Reconnect the front speed sensor connector.
(b) Connect the oscilloscope to the front speed sensor terminal of the skid control ECU.
(c) Check that a waveform is output when the tires are rotated.

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

10 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are output	A
DTCs (C0200/31 and/or C0205/32) are not output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **USE SIMULATION METHOD TO CHECK**

BC

A

REPLACE BRAKE ACTUATOR ASSEMBLY

11	**REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR)**

(a) Turn the ignition switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and front speed sensor (See page BC-118).
(d) Check that there is no momentary interruption.

NEXT

BC

12	**RECONFIRM DTC**

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0200/31 and/or C0205/32) are not output	A
DTCs (C0200/31 and/or C0205/32) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **Go to step 2**

A

END

DTC	C0210/33	Rear Speed Sensor RH Circuit

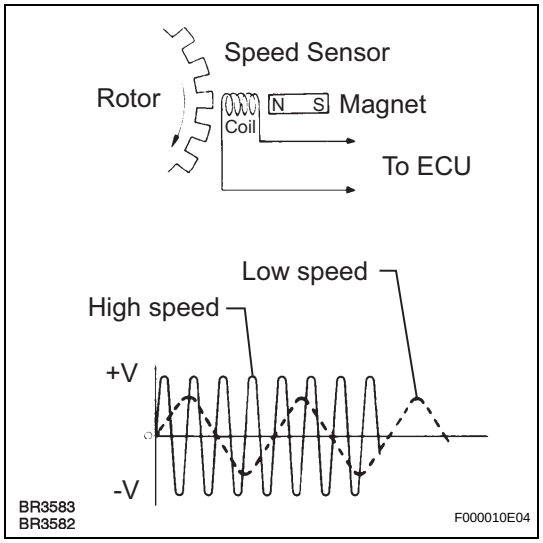
DTC	C0215/34	Rear Speed Sensor LH Circuit

DTC	C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)

DTC	C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)

DESCRIPTION

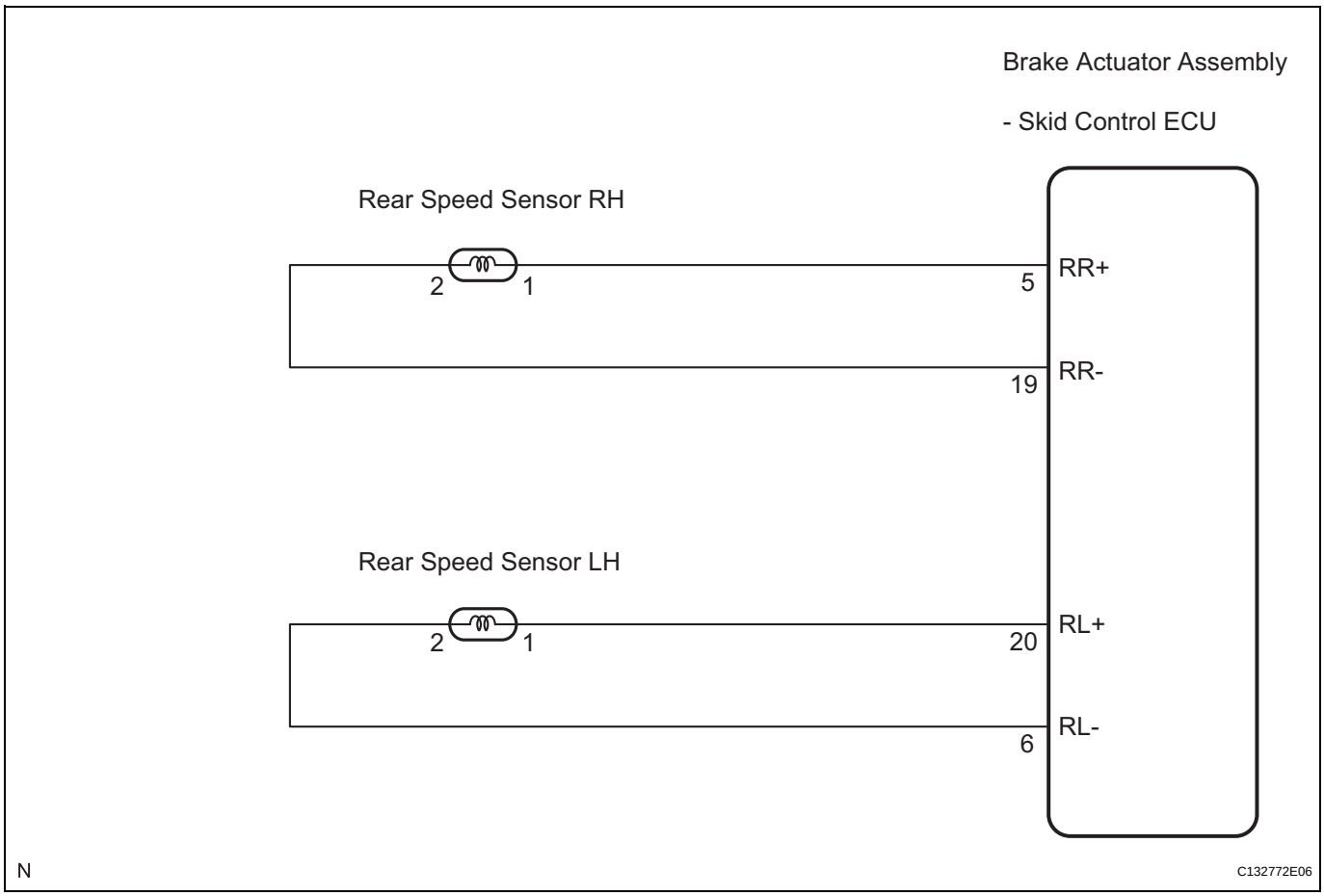
The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1273/73 and C1274/74 can be deleted when the speed sensor sends a wheel speed signal or the Test Mode ends. DTCs C1273/73 and C1274/74 are output only in the Test Mode.



DTC No.	DTC Detection Condition	Trouble Area
C0210/33 C0215/34	When any of the following is detected: 1. At a vehicle speed of 6 mph (10 km/h) or more, an open or short in the sensor signal circuit continues for 1 second or more. 2. Momentary interruption of the sensor signal from the abnormal wheel occurs 7 times or more. 3. An open in the speed sensor signal circuit continues for 0.5 seconds or more.	• Rear speed sensor RH/LH • Speed sensor circuit • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)

HINT:
- DTC C0210/33 is for the rear speed sensor RH.
- DTC C0215/34 is for the rear speed sensor LH.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-118).

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There are no momentary interruptions	**A**
There are momentary interruptions	**B**
There is a constant open circuit	**C**

HINT:

Perform the above inspection before removing the sensor and connector.

B → Go to step 11

C → Go to step 5

A

2 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Turn the ignition switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Start the engine.
(d) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed

BC

(e) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → Go to step 5

OK

3 PERFORM TEST MODE (SIGNAL CHECK)

(a) Perform sensor check in the Test Mode procedure (See page BC-123).

OK:

All Test Mode DTCs are erased.

NG → Go to step 5

OK

4 RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are not output	A
DTCs (C0210/33 and/or C0215/34) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

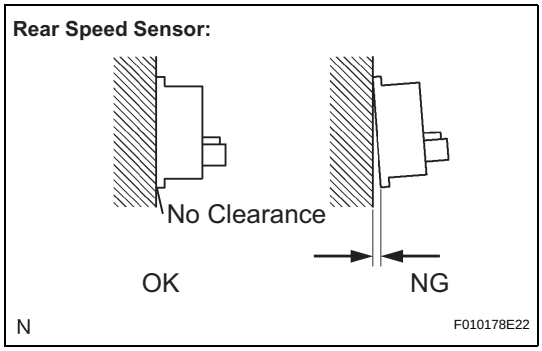
B → **Go to step 6**

A

USE SIMULATION METHOD TO CHECK

BC

5 CHECK REAR SPEED SENSOR INSTALLATION

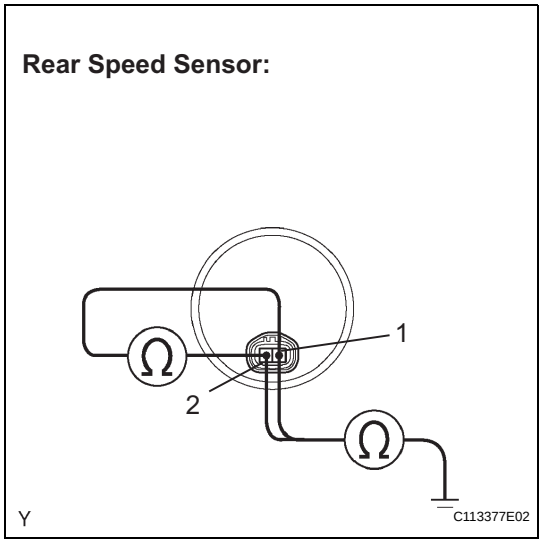


(a) Turn the ignition switch off.
(b) Check the speed sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.

NG → **INSTALL REAR SPEED SENSOR CORRECTLY**

OK

6 INSPECT REAR SPEED SENSOR



(a) Turn the ignition switch off.
(b) Disconnect the rear speed sensor connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
RH

Tester Connection	Condition	Specified Condition
2 (RR+) - 1 (RR-)	Always	0.9 to 2.1 kΩ
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
2 (RL+) - 1 (RL-)	Always	0.9 to 2.1 kΩ
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

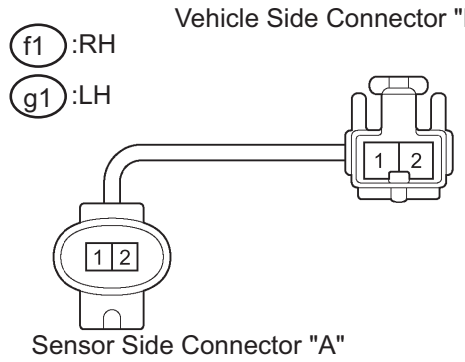
NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

NG → **REPLACE REAR SPEED SENSOR**

OK

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)

Skid Control Sensor Wire:



(a) Disconnect the skid control sensor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
f1 ("A"-1) - f1 ("B"-2)	Always	Below 1 Ω
f1 ("A"-1) - f1 ("B"-1)	Always	10 kΩ or higher
f1 ("A"-1) - Body ground	Always	10 kΩ or higher
f1 ("A"-2) - f1 ("B"-1)	Always	Below 1 Ω
f1 ("A"-2) - f1 ("B"-2)	Always	10 kΩ or higher
f1 ("A"-2) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
g1 ("A"-1) - g1 ("B"-2)	Always	Below 1 Ω
g1 ("A"-1) - g1 ("B"-1)	Always	10 kΩ or higher
g1 ("A"-1) - Body ground	Always	10 kΩ or higher
g1 ("A"-2) - g1 ("B"-1)	Always	Below 1 Ω
g1 ("A"-2) - g1 ("B"-2)	Always	10 kΩ or higher
g1 ("A"-2) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

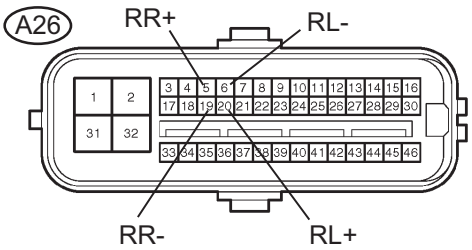
NG → **REPLACE SKID CONTROL SENSOR WIRE**

OK

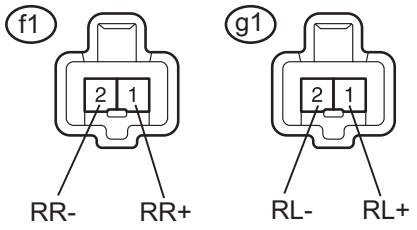
BC

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)

Skid Control ECU Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



N

C136020E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A26-5 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A26-5 (RR+) - Body ground	Always	10 kΩ or higher
A26-19 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A26-19 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
A26-20 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A26-20 (RL+) - Body ground	Always	10 kΩ or higher
A26-6 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A26-6 (RL-) - Body ground	Always	10 kΩ or higher

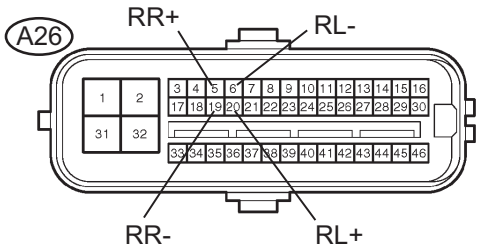
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

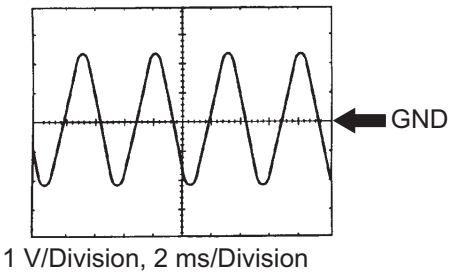
BC

9 CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Harness Side Connector Front View:



Normal Signal Waveform:



C136019E02

(a) Reconnect the skid control sensor wire.
(b) Reconnect the rear speed sensor connector.
(c) Connect the oscilloscope to the rear speed sensor terminal of the skid control ECU.
(d) Check that a waveform is output when the tires are rotated.

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

10 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are output	A
DTCs (C0210/33 and/or C0215/34) are not output	B

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **USE SIMULATION METHOD TO CHECK**

BC

A

REPLACE BRAKE ACTUATOR ASSEMBLY

11 **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR)**

(a) Turn the ignition switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and rear speed sensor (See page BC-118).
(d) Check that there is no momentary interruption.

NEXT

BC

12 **RECONFIRM DTC**

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 20 mph (32 km/h) or more for at least 60 seconds.
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0210/33 and/or C0215/34) are not output	A
DTCs (C0210/33 and/or C0215/34) are output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **Go to step 2**

A

END

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

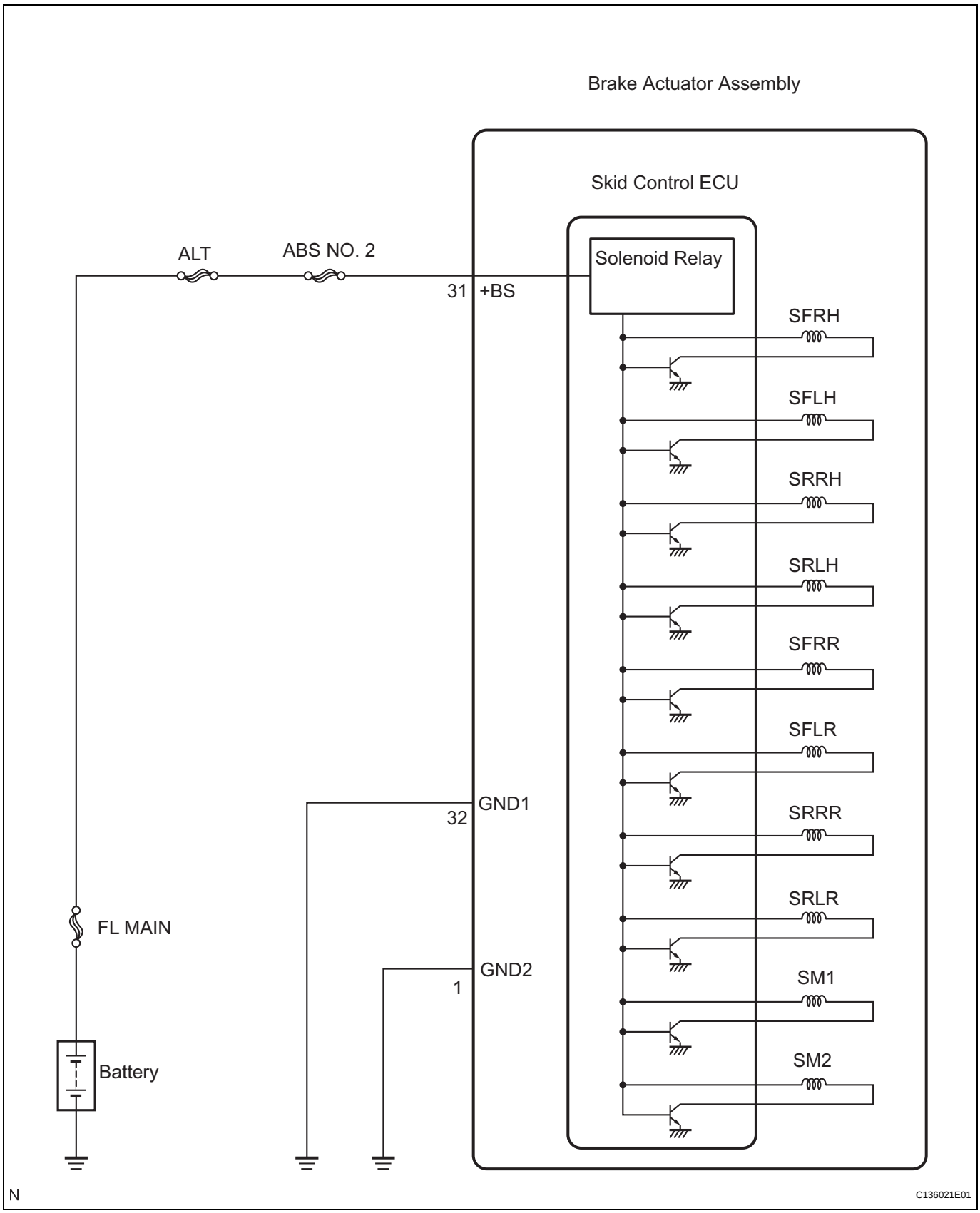
DTC	C1225/25	SM Solenoid Circuit

DESCRIPTION

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Open or short in the solenoid circuit continues for 0.05 seconds or more.	• Brake actuator assembly • Solenoid circuit
C1225/25	When any of the following is detected: • While outputting switching solenoid (SM1 or SM2) ON, overcurrent continues for 0.05 seconds or more. • While outputting switching solenoid (SM1 or SM2) OFF, an open circuit continues for 0.05 seconds or more. • While outputting switching solenoid (SM1 or SM2) ON, an open circuit continues for 0.1 second or more. • While outputting switching solenoid (SM1 or SM2) OFF, current continues to be applied for 0.1 second or more. • Short to GND in the switching solenoid (SM1 or SM2) continues for 0.1 second or more. • Switching solenoids SM1 and SM2 are shorted for 0.1 second or more.	• Brake actuator assembly • SM1 or SM2 circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	**RECONFIRM DTC**

HINT:
These codes are detected when a problem is determined in the brake actuator assembly.
The solenoid circuits are in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if any DTC code is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 4 mph (6 km/h) or more.
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0226/21, C0236/22, C0246/23, C0256/24 and/or C1225/25) are not output	A
DTCs (C0226/21, C0236/22, C0246/23, C0256/24 and/or C1225/25) are output	B

BC

HINT:

- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

DTC	C0273/13	Open in ABS Motor Relay Circuit

DTC	C0274/14	Short to B+ in ABS Motor Relay Circuit

DTC	C1361/91	Short Circuit in ABS Motor Fail Safe Relay Circuit

DESCRIPTION

If a DTC of the motor line is stored, the VSC NO. 1 (fail safe) relay cuts off the power supply to the VSC NO. 2 relay and performs fail safe.

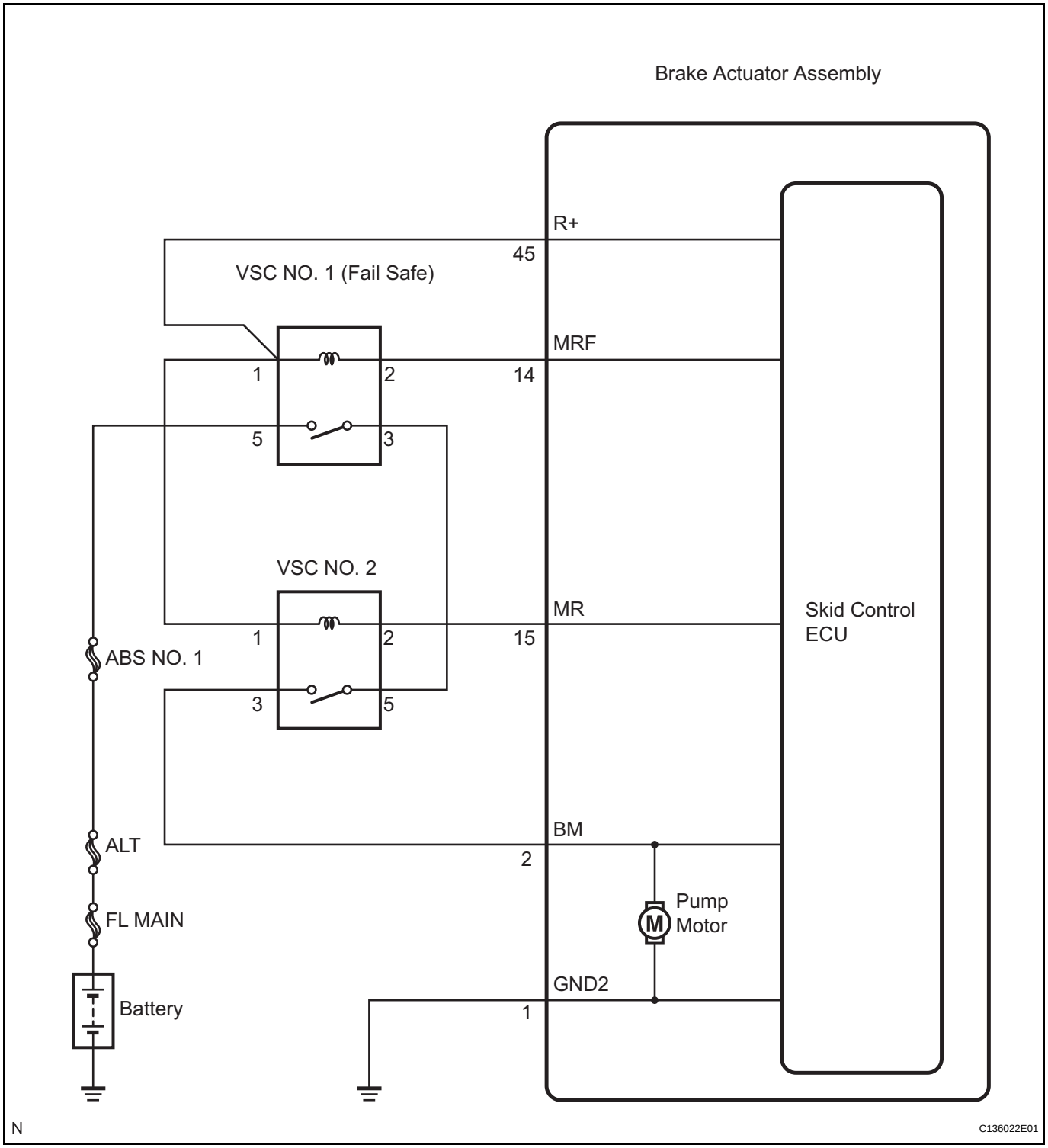
While any of the ABS, TRAC, VSC, or BA is operating, the skid control ECU (housed in the actuator assembly) turns the VSC NO. 2 relay on and activates the pump motor in the brake actuator.

This code may be stored if the motor relay (BM) voltage becomes lower than the DTC detecting condition due to insufficient output from the battery or alternator.

BC

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	When any of the following (1 or 2) is detected: 1. All of the following conditions continue for 0.12 seconds or more. • The IG1 terminal voltage is between 9.5 and 17.2 V. • During initial check and ABS, BA, TRAC, or VSC are operating. • Relay contact is open when the relay is ON. 2. All of the following conditions continue for 0.12 seconds. • The IG1 terminal voltage is 9.5 V or less. • Relay contact remains open when the relay is ON.	• ABS NO. 1 fuse • VSC NO. 2 relay • VSC NO. 2 relay circuit • Brake actuator assembly
C0274/14	When the motor relay is OFF, the VSC NO. 2 relay remains closed for 4 seconds or more.	• ABS NO. 1 fuse • VSC NO. 2 relay • VSC NO. 2 relay circuit • Brake actuator assembly
C1361/91	Immediately after the ignition switch is turned on (IG), the relay contact is closed for 4 seconds when the VSC NO. 1 (fail safe) relay is OFF.	• ABS NO. 1 fuse • VSC NO. 1 (fail safe) relay • VSC NO. 1 (fail safe) relay circuit • Brake actuator assembly

WIRING DIAGRAM

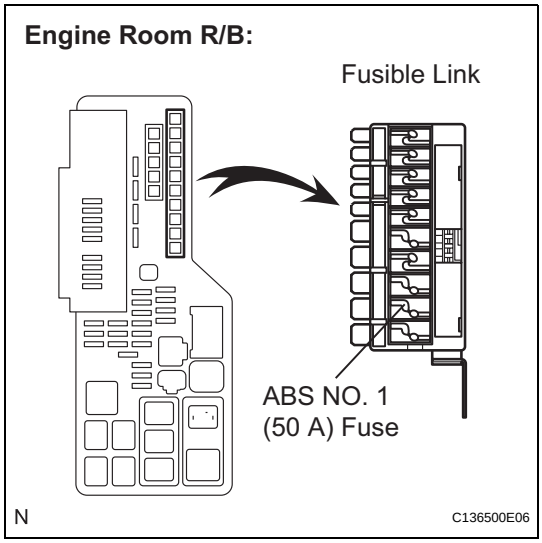


INSPECTION PROCEDURE

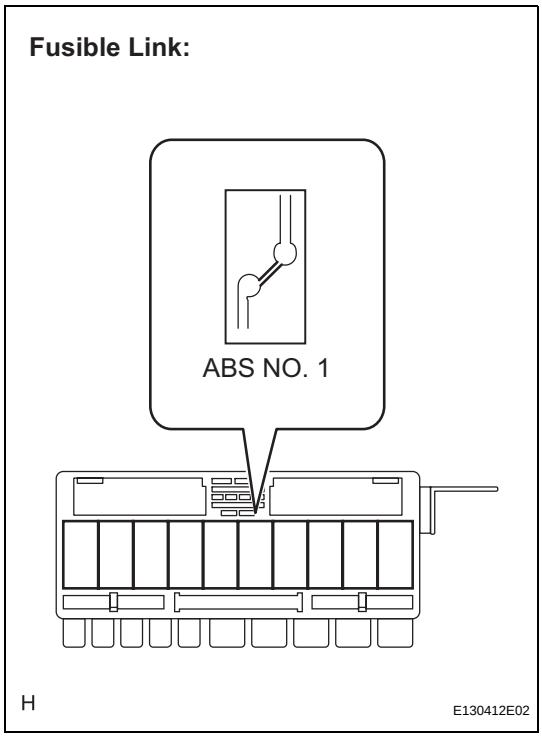
NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	**INSPECT ABS NO. 1 FUSE**



(a) Remove the fusible link from the engine room R/B.



(b) Check if the fusible link is melted.
OK:
The fusible link is melted.

(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

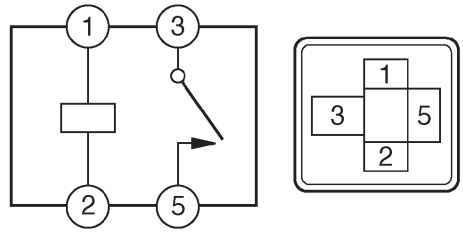
NG → **REPLACE FUSIBLE LINK (ABS NO. 1 FUSE)**

OK

BC

2 INSPECT VSC NO. 2 RELAY

VSC NO. 2 Relay:



F050240E07

(a) Remove the VSC NO. 2 relay.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

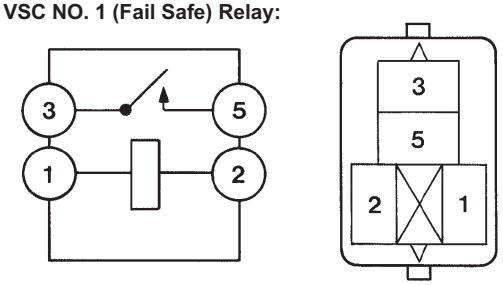
Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

NG → **REPLACE VSC NO. 2 RELAY**

OK

3 INSPECT VSC NO. 1 (FAIL SAFE) RELAY

VSC NO. 1 (Fail Safe) Relay:



F050241E11

(a) Remove the VSC NO. 1 (fail safe) relay.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

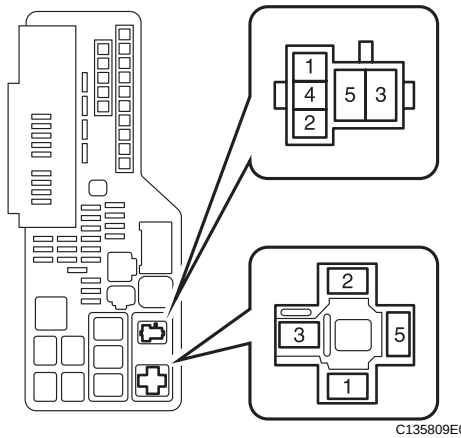
NG → **REPLACE VSC NO. 1 (FAIL SAFE) RELAY**

OK

4 INSPECT ENGINE ROOM RELAY BLOCK (POWER SOURCE TERMINAL)

Engine Room R/B:

VSC NO. 1 (Fail Safe) Relay



C135809E01

(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
VSC NO. 1 (fail safe) relay terminal 5 - Body ground	Always	10 to 14 V

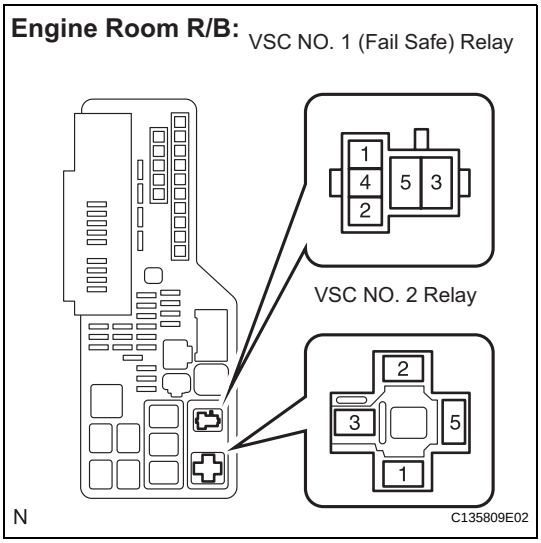
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

BC

5 INSPECT ENGINE ROOM RELAY BLOCK

Engine Room R/B: VSC NO. 1 (Fail Safe) Relay



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

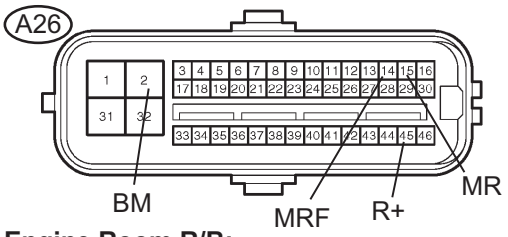
Tester Connection	Condition	Specified Condition
VSC NO. 1 (fail safe) relay terminal 3 - VSC NO. 2 relay terminal 5	Always	Below 1 Ω
VSC NO. 1 (fail safe) relay terminal 3 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE ENGINE ROOM RELAY BLOCK**

OK

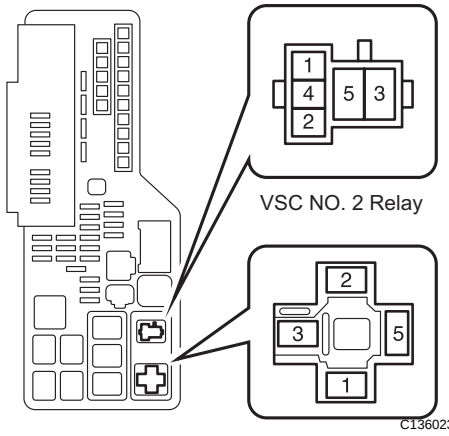
6 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - ENGINE ROOM RELAY BLOCK)

Skid Control ECU Harness Side Connector Front View:



Engine Room R/B:

VSC NO. 1 (Fail Safe) Relay



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-2 (BM) - VSC NO. 2 relay terminal 3	Always	Below 1 Ω
A26-2 (BM) - Body ground	Always	10 kΩ or higher
A26-14 (MRF) - VSC NO. 1 (fail safe) relay terminal 2	Always	Below 1 Ω
A26-14 (MRF) - Body ground	Always	10 kΩ or higher
A26-15 (MR) - VSC NO. 2 relay terminal 2	Always	Below 1 Ω
A26-15 (MR) - Body ground	Always	10 kΩ or higher
A26-45 (R+) - VSC NO. 1 (fail safe) relay terminal 1	Always	Below 1 Ω
A26-45 (R+) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

BC

OK

7	RECONFIRM DTC

(a) Clear the DTC (See page BC-141).
(b) Start the engine.
(c) Drive the vehicle at the speed of 4 mph (6 km/h) or more.
(d) Check if the same DTC is recorded (See page BC-141).
HINT:
Reinstall the relays, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0273/13, C0274/14 and/or C1361/91) are not output	A
DTCs (C0273/13, C0274/14 and/or C1361/91) are output	B

HINT:
- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → REPLACE BRAKE ACTUATOR ASSEMBLY

A

USE SIMULATION METHOD TO CHECK

BC

DTC	C0278/11	Open in ABS Solenoid Relay Circuit

DTC	C0279/12	Short to B+ in ABS Solenoid Relay Circuit

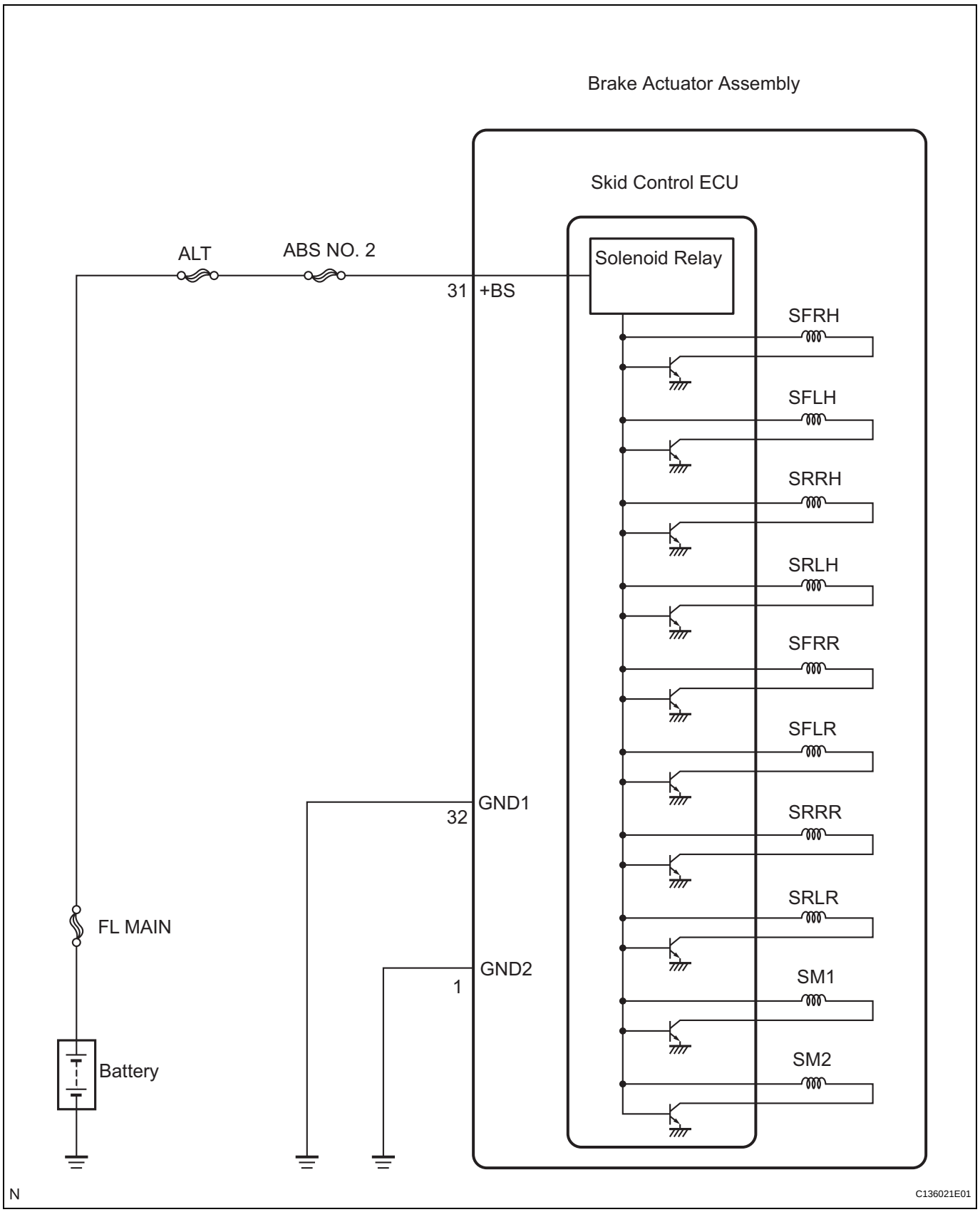
DESCRIPTION

The ABS solenoid relay supplies power to the ABS solenoid and TRAC solenoid.
The solenoid relay is turned on 1.5 seconds after the ignition switch is turned on (IG), and is turned off if an open or short in the solenoid is detected by self diagnosis performed when the vehicle starts running.
The ABS solenoid relay is housed in the skid control ECU in the actuator assembly.
HINT:
If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When any of the following (1 or 2) is detected: 1. Both of the following conditions continue for 0.2 seconds or more. • The IG1 terminal voltage is between 9.5 and 17.2 V. • The solenoid relay contact is open when the relay is ON. 2. Both of the following conditions continue for 0.2 seconds or more. • IG1 terminal voltage becomes lower than 9.5 V or less when the relay is turned on. • The relay contact remains open.	• ABS NO. 2 fuse • ABS solenoid relay • ABS solenoid relay circuit • Brake actuator assembly
C0279/12	Immediately after the ignition switch is turned on (IG), the solenoid relay contact is closed for 0.2 seconds when the relay is turned off.	Brake actuator assembly

BC

WIRING DIAGRAM

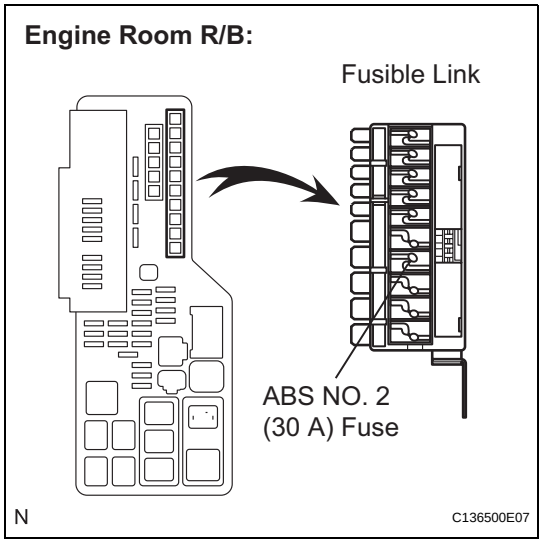


INSPECTION PROCEDURE

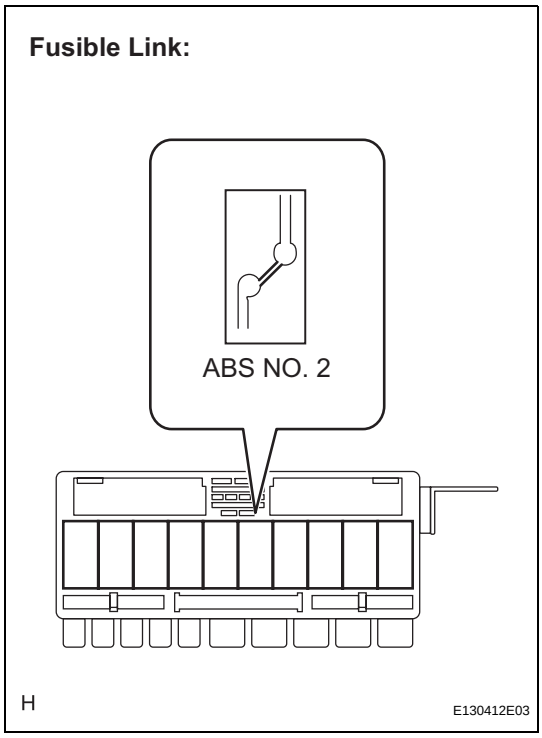
NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	**INSPECT ABS NO. 2 FUSE**



(a) Remove the fusible link from the engine room R/B.



(b) Check if the fusible link is melted.
OK:
The fusible link is melted.

(c) Install the fusible link to the engine room R/B with the nut.

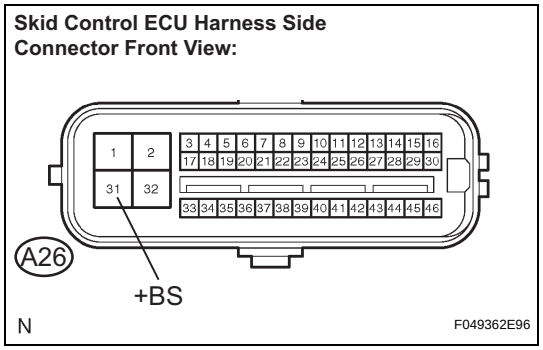
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK (ABS NO. 2 FUSE)**

OK

BC

2 INSPECT SKID CONTROL ECU (+BS TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

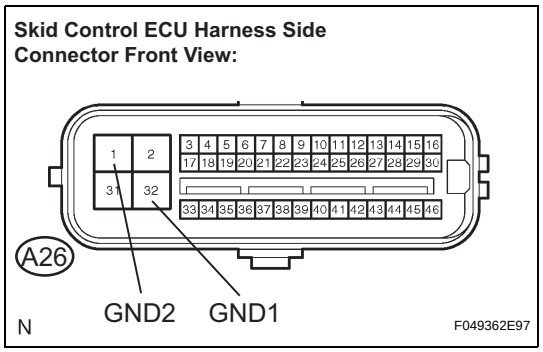
Standard voltage

Tester Connection	Condition	Specified Condition
A26-31 (+BS) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 4 mph (6 km/h) or more.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C0278/11 and/or C0279/12) are not output	A
DTCs (C0278/11 and/or C0279/12) are output	B

HINT:

- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.

BC

- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

DTC	C1201/51	Engine Control System Malfunction

DESCRIPTION

If a malfunction in the engine control system is detected, the operations of VSC and TRAC are prohibited by the fail safe function. When the signals from the engine are input normally, the fail safe is cancelled and the DTC is not stored.

DTC No.	DTC Detection Condition	Trouble Area
C1201/51	Engine control system malfunction signal continues for 5 seconds.	Engine control system

INSPECTION PROCEDURE

1	CHECK ENGINE CONTROL SYSTEM

(a) Check if the engine control system DTC is output (See page ES-45 for 2GR-FE, or ES-38 for 2AZ-FE).

BC

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT ENGINE CONTROL SYSTEM

A

REPLACE ECM

DTC	C1203/53	ECM Communication Circuit Malfunction

DESCRIPTION

The circuit is used to send TRAC and VSC control information from the skid control ECU to the ECM, and engine control information from the ECM to the skid control ECU.

DTC No.	DTC Detection Condition	Trouble Area
C1203/53	Engine, drive source and destination variations that are sent from the ECM do not match the ones of the skid control ECU.	ECM

INSPECTION PROCEDURE

1	CHECK PART NUMBER (ECM AND BRAKE ACTUATOR ASSEMBLY)

(a) Check that the proper ECM and brake actuator assembly (skid control ECU) are installed.
OK:
Proper ECUs are installed.

NG → **REPLACE ECUS WITH PROPER ONES**

OK

REPLACE ECM

BC

DTC	C1210/36	Zero Point Calibration of Yaw Rate Sensor Undone

DTC	C1336/39	Zero Point Calibration of Acceleration Sensor Undone

DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.
The yaw rate sensor has the built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2). If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, the DTCs U0123/62 (yaw rate sensor communication trouble) and U0124/95 (acceleration sensor communication trouble) are output.
The DTCs are also output when the calibration has not been completed.

DTC No.	DTC Detection Condition	Trouble Area
C1210/36	Zero point calibration of yaw rate sensor undone.	• Brake actuator assembly (Skid control ECU) • Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal)
C1336/39	When either of the following is detected: 1. The vehicle runs in the normal mode with zero point calibration undone. 2. After the zero point has been obtained, the zero point voltage of the sensor is not between 2.38 and 2.62 V.	• Brake actuator assembly (Skid control ECU) • Yaw rate and acceleration sensor • Zero point calibration undone (Perform zero point calibration and check DTC. If DTC is not output again, the sensor is normal)

BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

HINT:

When U0123/62, U0124/95 or U0126/63 is output along with C1210/36 or C1336/39, inspect and repair trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.

1	PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR

(a) Perform zero point calibration of the yaw rate and acceleration sensor (See page BC-119).

NEXT

2	RECONFIRM DTC

(a) Clear the DTC (See page BC-141).
(b) Check if the same DTCs are recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1210/36 and/or C1336/39) are output	A
DTCs (C1210/36 and/or C1336/39) are not output	B

HINT:
- The DTCs are recorded because zero point calibration has not been completed.
- End the procedure as the same DTCs are not recorded after completion of zero point calibration.

B → **END**

A

3	CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION

(a) Turn the ignition switch off.
(b) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-448).
OK:
The sensor should be tightened to the specified torque.
The sensor should not be tilted.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

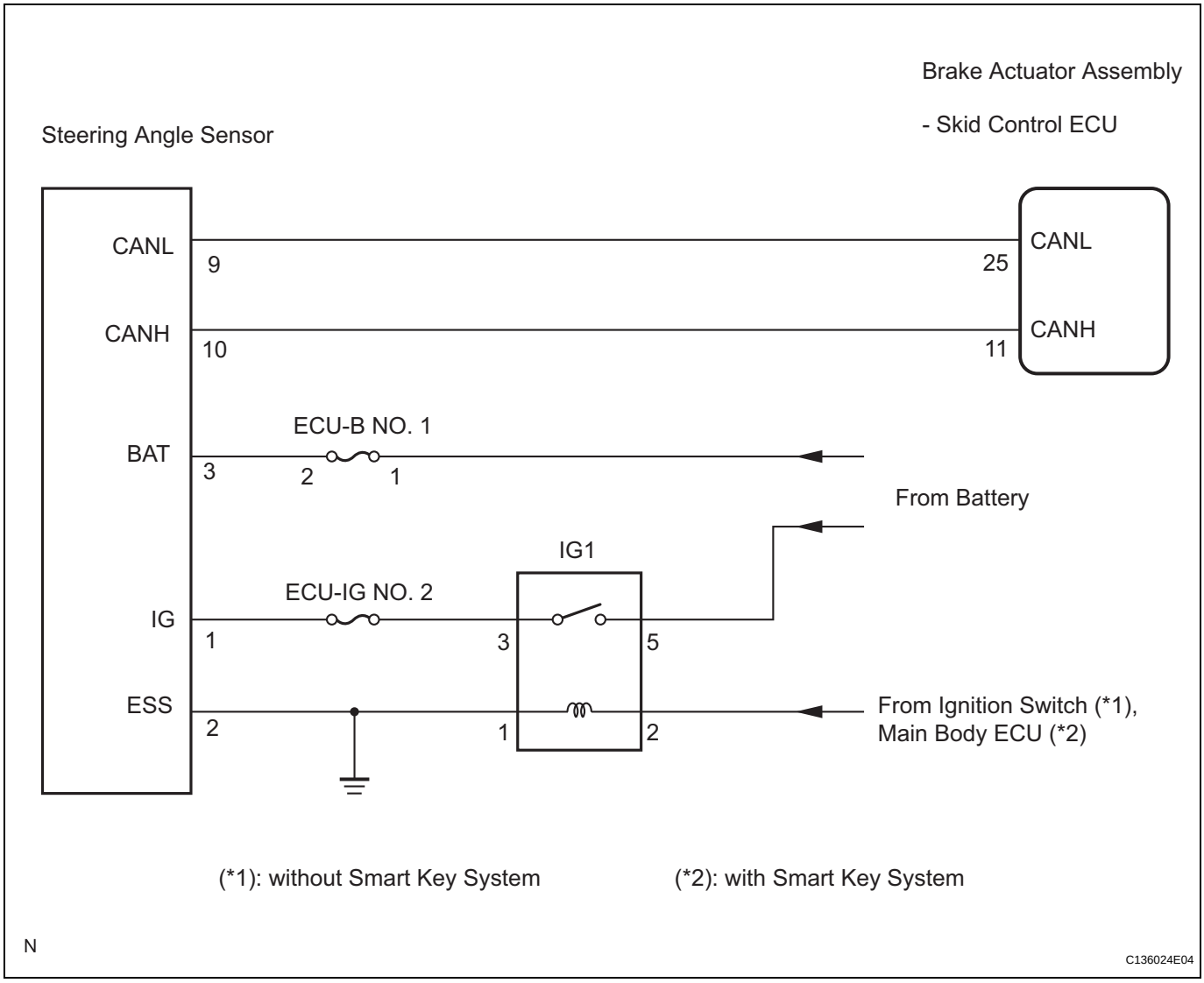
DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU via the CAN communication system. When there is a malfunction in the CAN communication system, it will be detected by the steering angle sensor zero point malfunction diagnostic function.

DTC No.	DTC Detection Condition	Trouble Area
C1231/31	When ECU IG1 terminal voltage is 9.5 V or more, the steering angle sensor malfunction signal is received.	• Steering angle sensor • Steering angle sensor circuit • Steering angle sensor power supply • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- When U0073/94, U0123/62, U0124/95 or U0126/63 is output together with C1231/31, inspect and repair the trouble areas indicated by U0073/94, U0123/62, U0124/95 or U0126/63 first.

- When the speed sensor or the yaw rate sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate sensor first, and then inspect and repair the steering angle sensor.

1 CHECK DTC

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch off.
(c) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output.
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 22 mph (35 km/h) and check that no speed sensor and yaw rate sensor DTCs are output.

Result

Condition	Proceed to
No CAN communication system DTC and the speed sensor or yaw rate sensor DTC are output	A
CAN communication system DTC is output	B
Speed sensor or yaw rate sensor DTC is output	C

BC

HINT:
- If there is a malfunction in the speed sensor or the yaw rate sensor, an abnormal value may be output although the steering angle sensor is normal.
- If the speed sensor and the yaw rate sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor.

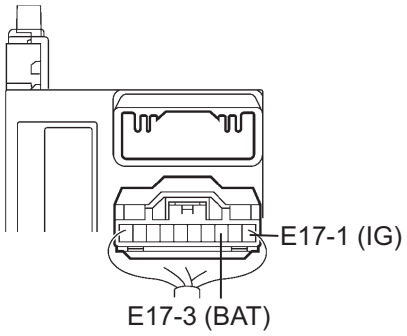
B → **INSPECT CAN COMMUNICATION SYSTEM**

C → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**

A

2 INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL)

Steering Angle Sensor Wire Harness View:



(a) Turn the ignition switch off.
(b) Remove the steering wheel and the column cover lower.
(c) Disconnect the steering angle sensor connector.
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

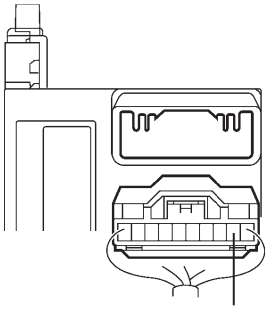
Tester Connection	Condition	Specified Condition
E17-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V
E17-3 (BAT) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3	INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)

Steering Angle Sensor Wire Harness View:



G030156E16

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E17-2 (ESS) - Body ground	Always	Below 1 Ω

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)**

OK

REPLACE STEERING ANGLE SENSOR

BC

DTC	**C1232/32**	**Stuck in Acceleration Sensor**
DTC	**C0371/71**	**Yaw Rate Sensor (Test Mode DTC)**
DTC	**C1234/34**	**Yaw Rate Sensor Malfunction**
DTC	**C1243/43**	**Acceleration Sensor Stuck Malfunction**
DTC	**C1244/44**	**Open or Short in Acceleration Sensor Circuit**
DTC	**C1245/45**	**Acceleration Sensor Output Malfunction**
DTC	**C1279/79**	**Acceleration Sensor Output Voltage Malfunction (Test Mode DTC)**
DTC	**C1381/97**	**Yaw Rate and / or Acceleration Sensor Power Supply Voltage Malfunction**

BC

DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.

The yaw rate sensor has a built in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2).

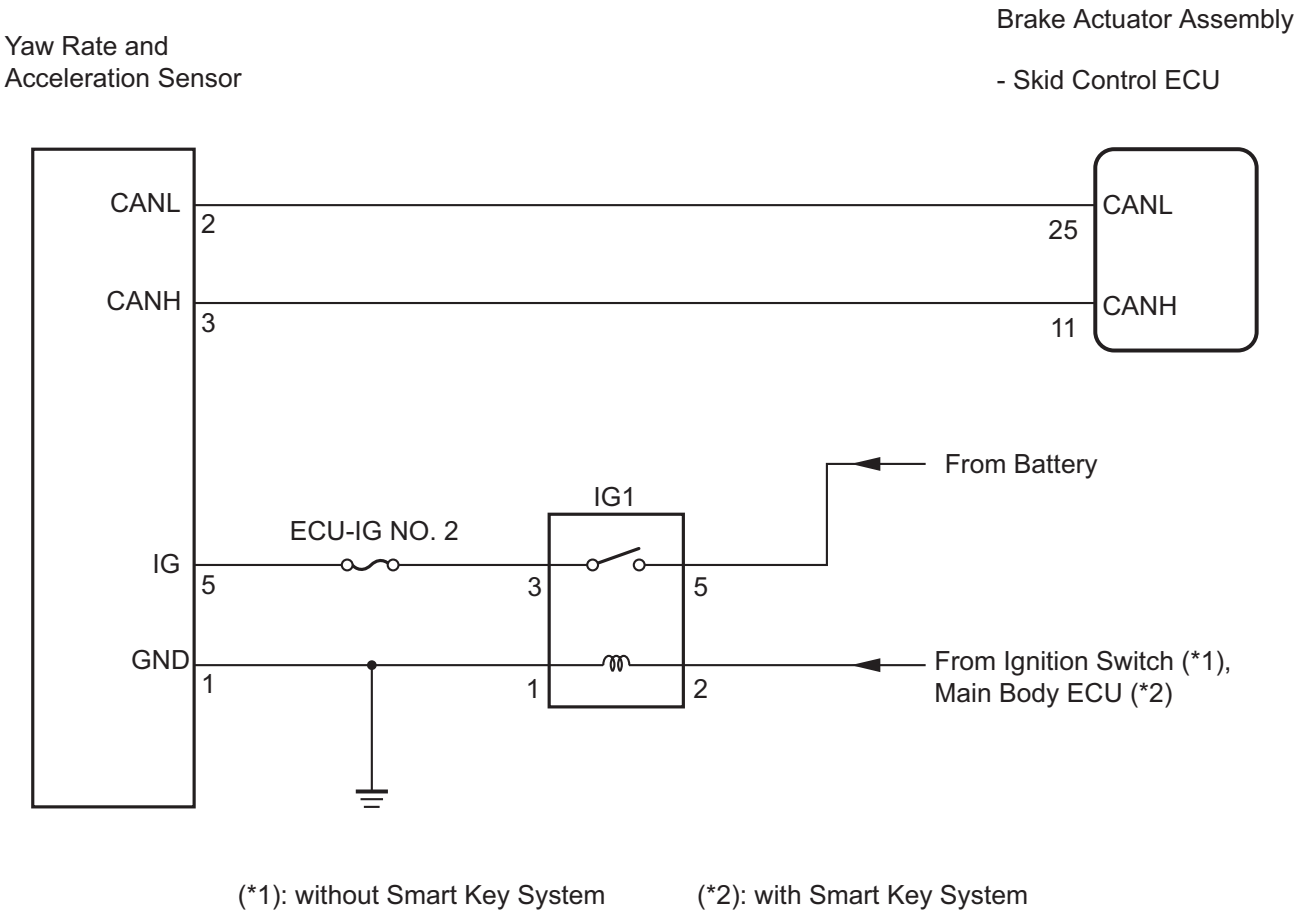
If there is trouble in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, the DTC U0123/62 (malfunction in CAN communication with the yaw rate sensor) and U0124/95 (malfunction in CAN communication with the acceleration sensor) are output.

These DTCs are also output when calibration has not been completed.

DTCs C0371/71 and C1279/79 can be deleted when the yaw rate and acceleration sensor sends a yaw rate and/or acceleration signal or the Test Mode ends. DTCs C0371/71 and C1279/79 are output only in the Test Mode.

DTC No.	DTC Detection Condition	Trouble Area
C1232/32	At a vehicle speed of 6 mph (10 km/h) or more, either GL1 or GL2 (input signal) does not change for 30 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1234/34	Sensor malfunction signal is received from the yaw rate sensor.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1243/43	While the vehicle speed changes from 19 mph (30 km/h) to 0 mph (0 km/h), the condition that the values of GL1 and GL2 do not change occurs 16 times or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1244/44	When either of the following is detected: 1. A data malfunction signal is received from the acceleration sensor. 2. After the difference between GL1 and GL2 becomes 0.6 G or more with the vehicle stationary, the difference remains 0.4 G or more for 60 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1245/45	At a vehicle speed of 19 mph (30 km/h) or more, the difference between the forward and backward G calculated from the acceleration sensor value and that calculated from the vehicle speed sensor exceeds 0.35 G for 60 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit
C1381/97	At a vehicle speed of more than 2 mph (3 km/h), the acceleration sensor power source malfunction signal is received for 10 seconds or more.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor power source circuit

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the yaw rate and acceleration sensor, perform zero point calibration (See page BC-119).

HINT:

When U0123/62, U0124/95 or U0126/63 is output together with C1232/32, C1234/34, C1243/43, C1244/44, C1245/45, or C1381/97, inspect and repair the trouble areas indicated by U0123/62, U0124/95 or U0126/63 first.

1	CHECK DTC

(a) Clear the DTC (See page BC-141).
(b) Turn the ignition switch off.
(c) At a speed of 19 mph (30 km/h) or more, drive the vehicle, turn the steering wheel, and decelerate the vehicle (depress the brake pedal).

(d) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output.
(e) Check if DTCs for zero point calibration of the yaw rate sensor undone (C1210/36) or for zero point calibration of the acceleration sensor undone (C1336/39) are output.

Result

Condition	Proceed to
DTCs (C1210/36, C1336/39 and/or CAN communication system DTC) are not output	A
CAN communication system DTC is output	B
DTCs (C1210/36 and/or C1336/39) are output	C

B → **INSPECT CAN COMMUNICATION SYSTEM**

C → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**

A

BC

2 CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION

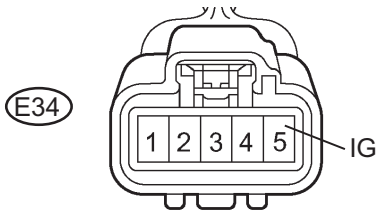
(a) Turn the ignition switch off.
(b) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-448).
OK:
The sensor is tightened to the specified torque.
The sensor is not tilted.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

3 INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)

Yaw Rate and Acceleration Sensor Harness Side Connector Front View:



(a) Disconnect the yaw rate and acceleration sensor connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

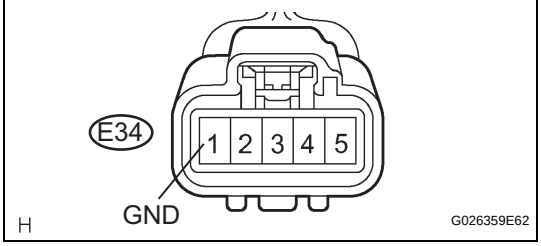
Tester Connection	Condition	Specified Condition
E34-5 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)**

OK

4 INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)

Yaw Rate and Acceleration Sensor Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E34-1 (GND) - Body ground	Always	Below 1 Ω

NOTICE:
Check the yaw rate and acceleration sensor signal after replacement (See page BC-123).
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

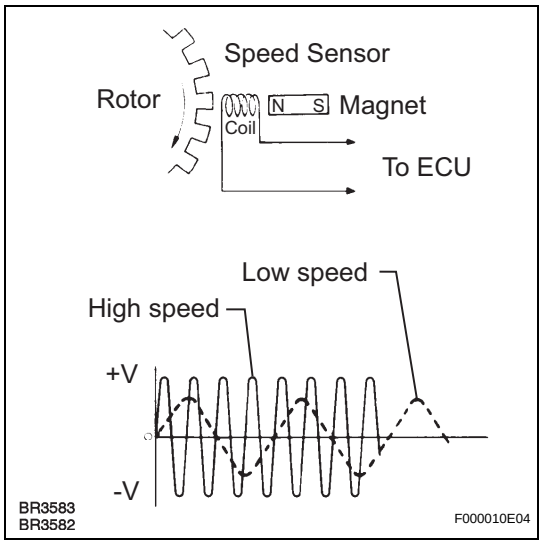
REPLACE YAW RATE AND ACCELERATION SENSOR

BC

DTC	**C1235/35**	**Foreign Object is Attached on Tip of Front Speed Sensor RH**
DTC	**C1236/36**	**Foreign Object is Attached on Tip of Front Speed Sensor LH**
DTC	**C1238/38**	**Foreign Object is Attached on Tip of Rear Speed Sensor RH**
DTC	**C1239/39**	**Foreign Object is Attached on Tip of Rear Speed Sensor LH**
DTC	**C1275/75**	**Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1276/76**	**Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1277/77**	**Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1278/78**	**Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)**

DESCRIPTION

The speed sensors detect wheel speed and transmit the signals to the ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces an AC voltage.
Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.
DTCs C1275/75 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the Test Mode ends. DTCs from C1275/75 to C1278/78 are output only in the Test Mode.



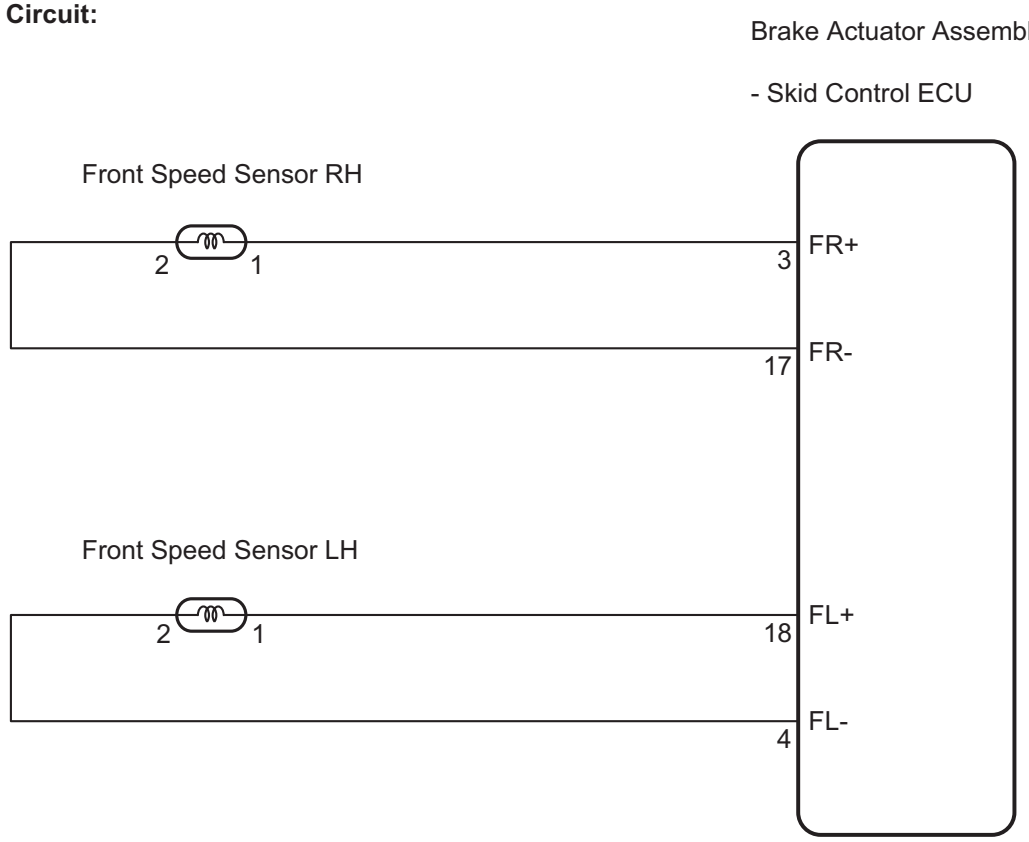
DTC No.	DTC Detection Condition	Trouble Area
C1235/35 C1236/36 C1238/38 C1239/39	At a vehicle speed of 12 mph (20 km/h) or more, noise occurs in the sensor signal from the abnormal wheel for 5 seconds or more.	• Speed sensor • Speed sensor rotor • Sensor installation • Brake actuator assembly (Skid control ECU)

BC

HINT:
- DTC C1235/35 is for the front speed sensor RH.
- DTC C1236/36 is for the front speed sensor LH.
- DTC C1238/38 is for the rear speed sensor RH.
- DTC C1239/39 is for the rear speed sensor LH.

WIRING DIAGRAM

Front Speed Sensor Circuit:

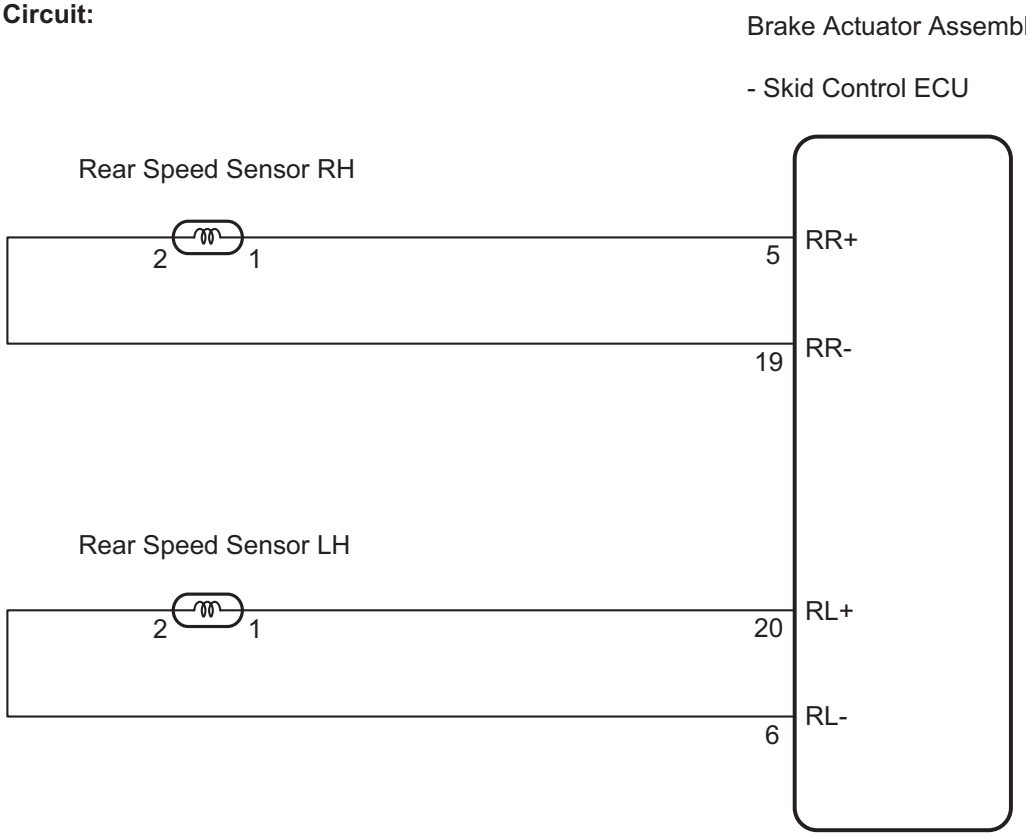


N

C132772E07

BC

Rear Speed Sensor Circuit:



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

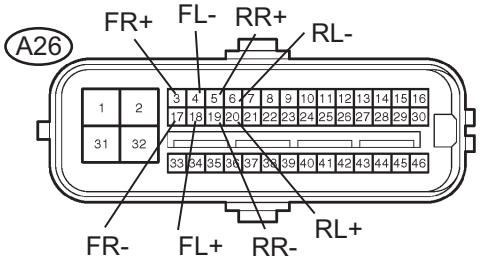
HINT:

When C0200/31, C0205/32, C0210/33, or C0215/34 is output together with C1235/35, C1236/36, C1238/38, or C1239/39, inspect and repair the trouble areas indicated by C0200/31, C0205/32, C0210/33, or C0215/34 first.

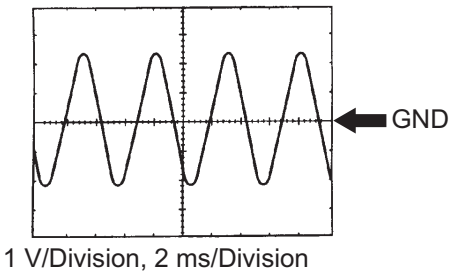
BC

1 CHECK SPEED SENSOR AND SPEED SENSOR ROTOR SERRATIONS

Skid Control ECU Harness Side Connector Front View:



Normal Signal Waveform:



C136019E05

(a) Disconnect the skid control ECU connector.
(b) Connect the oscilloscope to each speed sensor terminal of the skid control ECU.
(c) Check that a waveform is output when the tires are rotated (by the sensor circuit).

OK:

The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

(d) Check that the waveform does not change while jiggling a connector or a wire harness.

OK:

The waveform does not change.

HINT:

- As the vehicle speed (wheel revolution speed) increases, a cycle of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to speed sensor rotor's scratches, looseness or foreign matter attached to it.

NG → **Go to step 3**

OK

2 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 12 mph (20 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output	B

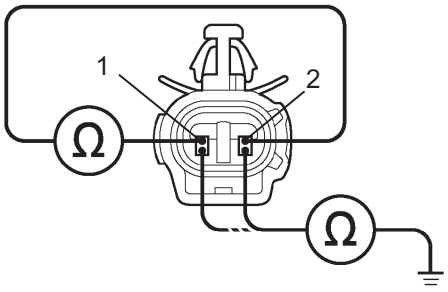
B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

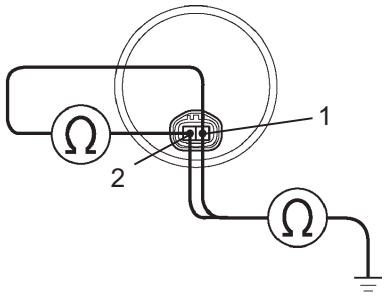
USE SIMULATION METHOD TO CHECK

3 INSPECT EACH SPEED SENSOR

Front Speed Sensor:



Rear Speed Sensor:



C136027E01

(a) Disconnect each speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher
2 (RR+) - 1 (RR-)	Always	0.9 to 2.1 kΩ
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher
2 (RL+) - 1 (RL-)	Always	0.9 to 2.1 kΩ
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

BC

Result

Result	Proceed to
OK (for rear)	A
OK (for front)	B
NG	C

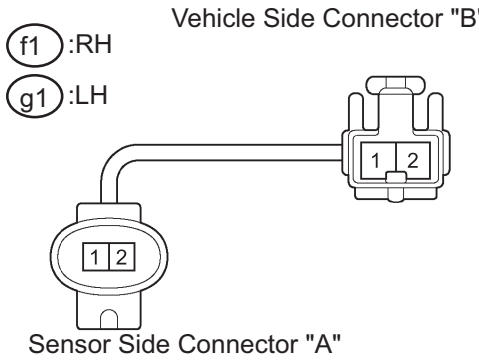
B → Go to step 5

C → REPLACE EACH SPEED SENSOR

A

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)

Skid Control Sensor Wire:



C136026E01

(a) Disconnect the skid control sensor wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
f1 ("A"-1) - f1 ("B"-2)	Always	Below 1 Ω
f1 ("A"-1) - f1 ("B"-1)	Always	10 kΩ or higher
f1 ("A"-1) - Body ground	Always	10 kΩ or higher
f1 ("A"-2) - f1 ("B"-1)	Always	Below 1 Ω
f1 ("A"-2) - f1 ("B"-2)	Always	10 kΩ or higher
f1 ("A"-2) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
g1 ("A"-1) - g1 ("B"-2)	Always	Below 1 Ω
g1 ("A"-1) - g1 ("B"-1)	Always	10 kΩ or higher
g1 ("A"-1) - Body ground	Always	10 kΩ or higher
g1 ("A"-2) - g1 ("B"-1)	Always	Below 1 Ω
g1 ("A"-2) - g1 ("B"-2)	Always	10 kΩ or higher
g1 ("A"-2) - Body ground	Always	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-123).

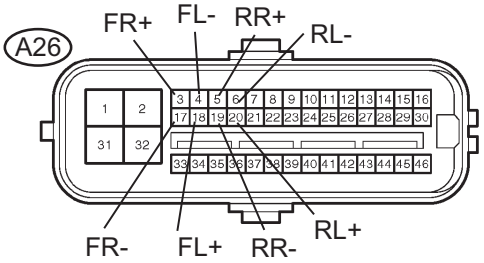
NG → **REPLACE SKID CONTROL SENSOR WIRE**

OK

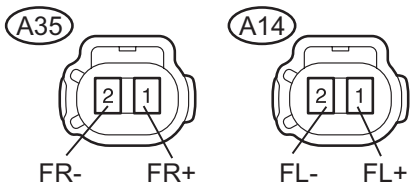
BC

5 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - EACH SPEED SENSOR)

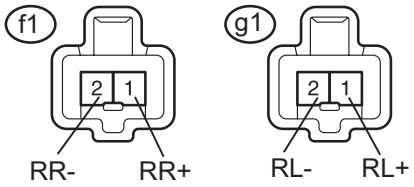
Skid Control ECU Harness Side Connector Front View:



Front Speed Sensor Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



C136025E01

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

Tester Connection	Condition	Specified Condition
A26-3 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A26-3 (FR+) - Body ground	Always	10 kΩ or higher
A26-17 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A26-17 (FR-) - Body ground	Always	10 kΩ or higher
A26-5 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A26-5 (RR+) - Body ground	Always	10 kΩ or higher
A26-19 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A26-19 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
A26-18 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A26-18 (FL+) - Body ground	Always	10 kΩ or higher
A26-4 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A26-4 (FL-) - Body ground	Always	10 kΩ or higher
A26-20 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A26-20 (RL+) - Body ground	Always	10 kΩ or higher
A26-6 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A26-6 (RL-) - Body ground	Always	10 kΩ or higher

BC

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 RECONFIRM DTC

(a) Reconnect the skid control sensor wire.
(b) Reconnect the skid control ECU connector and the speed sensor connector.
(c) Clear the DTC (See page BC-141).
(d) Start the engine.
(e) Drive the vehicle at the speed of 12 mph (20 km/h) or more for at least 60 seconds.
(f) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output (for front)	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output (for rear)	B

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	C

B → Go to step 8

C → USE SIMULATION METHOD TO CHECK

A

7 CHECK FRONT SPEED SENSOR TIP

(a) Turn the ignition switch off.
(b) Remove the front speed sensor (See page BC-438).
(c) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-123).

NG → CLEAN OR REPLACE FRONT SPEED SENSOR

OK

8 CHECK EACH SPEED SENSOR ROTOR

(a) Turn the ignition switch off.
(b) Remove each speed sensor rotor.
(c) Check the speed sensor rotor.
OK:
No scratches, missing teeth, or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-123).

NG → CLEAN OR REPLACE EACH SPEED SENSOR ROTOR

OK

9 RECONFIRM DTC

(a) Install the front speed sensor and the speed sensor rotor.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 12 mph (20 km/h) or more for at least 60 seconds.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are output	A
DTCs (C1235/35, C1236/36, C1238/38 and/or C1239/39) are not output	B

B → **USE SIMULATION METHOD TO CHECK**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

DTC	C1241/41	Low Battery Positive Voltage

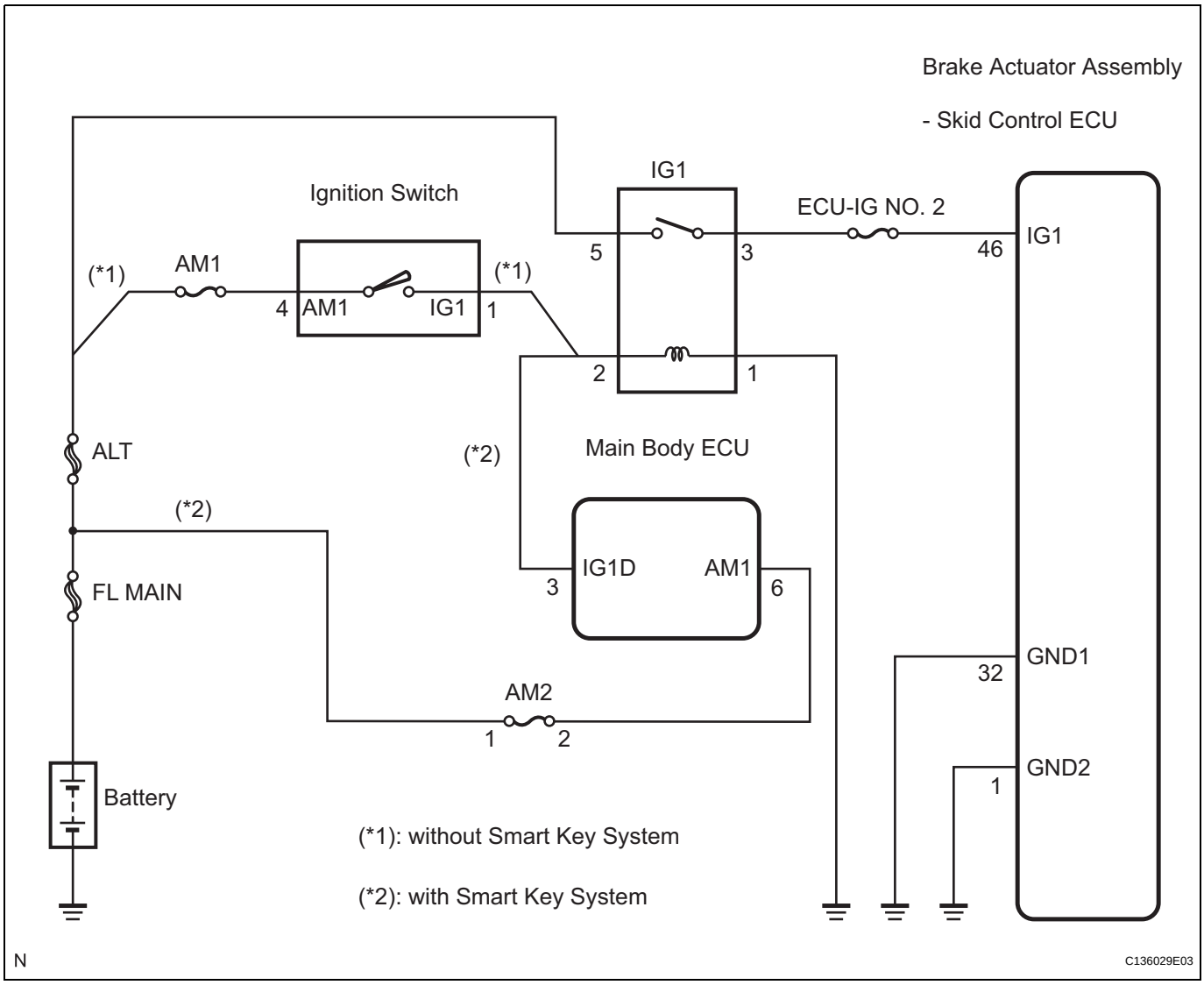
DESCRIPTION

If a malfunction is detected in the power supply circuit, the skid control ECU (housed in the actuator assembly) stores this DTC and the fail safe function prohibits ABS operation.
This DTC is stored when the IG1 terminal voltage deviates from the DTC detection condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit, etc.
The DTC is cancelled when the IG1 terminal voltage returns to normal.

DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When any of the following is detected: 1. At a vehicle speed of 2 mph (3 km/h) or more, the IG1 terminal voltage is 9.5 V or less for 10 seconds or more. 2. When the solenoid relay remains ON and the IG1 terminal voltage is 9.5 V or less, the relay contact is open for 0.2 seconds or more. 3. While the VSC NO. 1 (fail safe) relay is ON after VSC NO. 2 relay ON, the IG1 terminal voltage is 9.5 V or less and the actuator pump drive motor is OFF for 0.1 second or more.	• ECU-IG NO. 2 fuse • Battery • Charging system • Power source circuit • Internal power supply circuit of the skid control ECU

BC

WIRING DIAGRAM



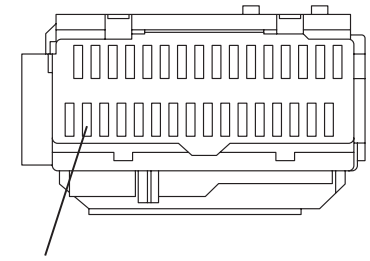
INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1 INSPECT ECU-IG NO. 2 FUSE

Main Body ECU:



N C135806E01

(a) Remove the ECU-IG NO. 2 fuse from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
ECU-IG NO. 2 (7.5 A) fuse	Always	Below 1 Ω

NG → **REPLACE ECU-IG NO. 2 FUSE**

OK

2 CHECK BATTERY

(a) Install the ECU-IG NO. 2 fuse.
(b) Check the battery voltage.

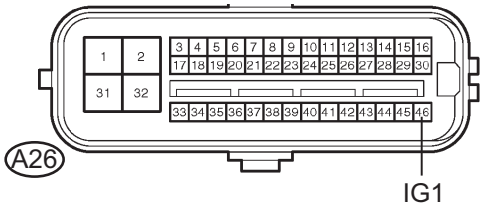
Standard voltage:
10 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

3 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU Harness Side Connector Front View:



N F049362E98

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

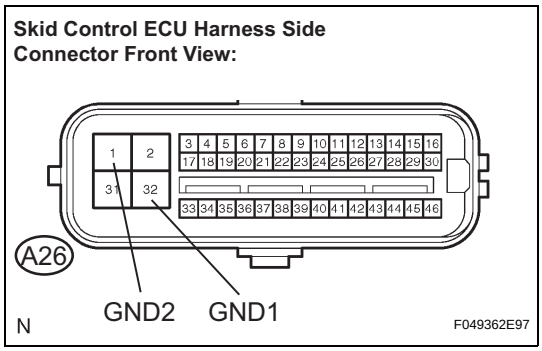
Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

BC

OK

4 INSPECT SKID CONTROL ECU (GND TERMINAL)



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

5 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Turn the ignition switch on (IG).
(d) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1241/41) is not output	A
DTC (C1241/41) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

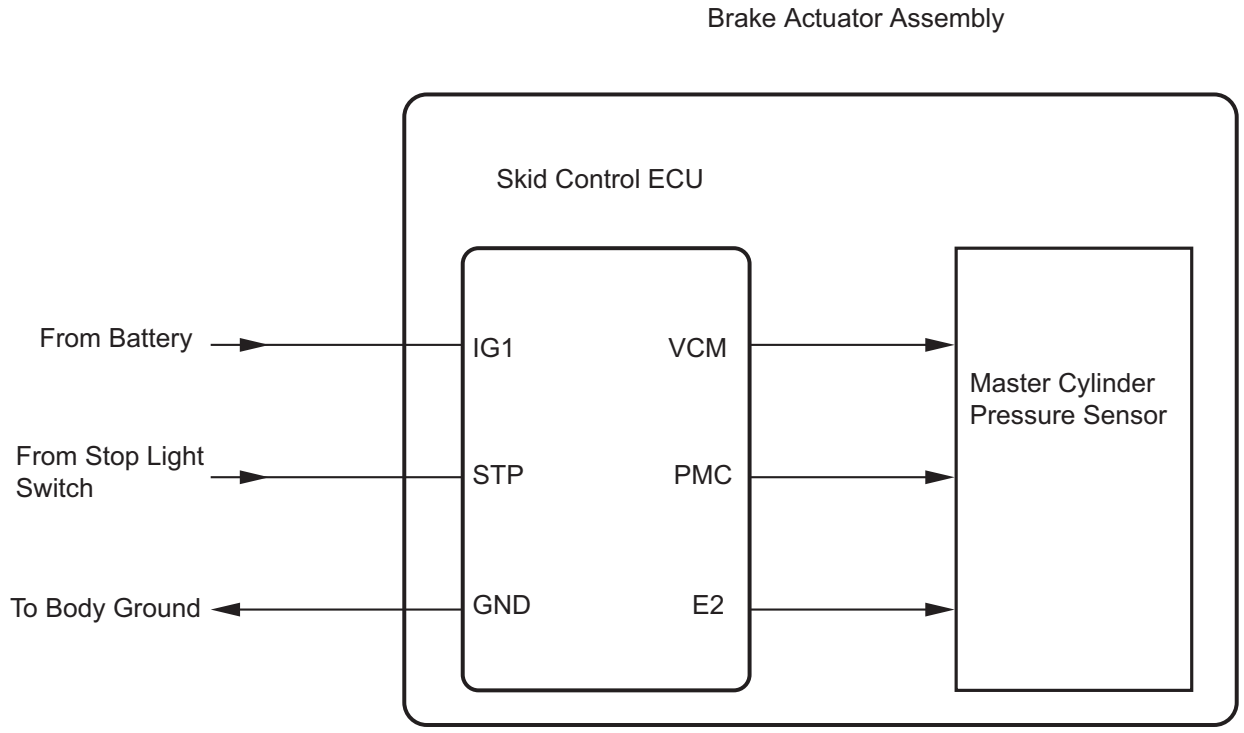
USE SIMULATION METHOD TO CHECK

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DTC	C1281/81	Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC)

DESCRIPTION

Master cylinder pressure sensor is connected to the skid control ECU in the brake actuator assembly. DTC C1281/81 can be deleted when the master cylinder pressure sensor sends a master cylinder pressure signal or the Test Mode ends. DTC C1281/81 is output only in the Test Mode.



VCM: Power Supply for Master Cylinder Pressure Sensor

PMC: Master Cylinder Pressure Sensor Input

E2: Master Cylinder Pressure Sensor Ground

N

C106656E05

BC

DTC No.	DTC Detection Condition	Trouble Area
C1246/46	When any of the following is detected: • At a vehicle speed of 4.3 mph (7 km/h) or more, when the PMC terminal voltage is over 0.86 V, it does not change by 0.005 V or more for 30 seconds. • Noise occurs in the PMC terminal 7 times or more within 5 seconds. • When the stop light switch is OFF, the PMC terminal voltage is more than 0.86 V or less than 0.3 V for 5 seconds or more. • With the IG1 terminal voltage between 9.5 and 17.2 V, the VCM terminal voltage is not between 4.4 and 5.6 V for 1.2 seconds or more. • When the VCM terminal voltage between 4.4 and 5.6 V, the PCM terminal voltage is not between 0.14 and 4.85 V for 1.2 seconds or more.	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit • Stop light switch circuit • Brake actuator assembly

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

BC

1 CHECK STOP LIGHT OPERATION

(a) Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK

Condition	Illumination Condition
Brake pedal depressed	**ON**
Brake pedal released	**OFF**

NG → **INSPECT STOP LIGHT CIRCUIT**

OK

2 READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V

(d) Check that the brake fluid pressure value of the master cylinder pressure sensor observed on the intelligent tester changes when the brake pedal is depressed.

OK:

When the pedal is depressed, voltage displayed on the intelligent tester increases.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

3	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Select the Data List mode on the intelligent tester.

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released

(b) Check that the stop light condition observed on the intelligent tester changes when the brake pedal is depressed.

OK:

When the brake pedal is depressed, the intelligent tester displays "ON".

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY**

OK

BC

4	RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) At a speed of 18 mph (30 km/h) or more, drive the vehicle and perform braking test (decelerate the vehicle by depressing the brake pedal).
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1246/46) is not output	A
DTC (C1246/46) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

DTC	C1249/49	Open in Stop Light Switch Circuit

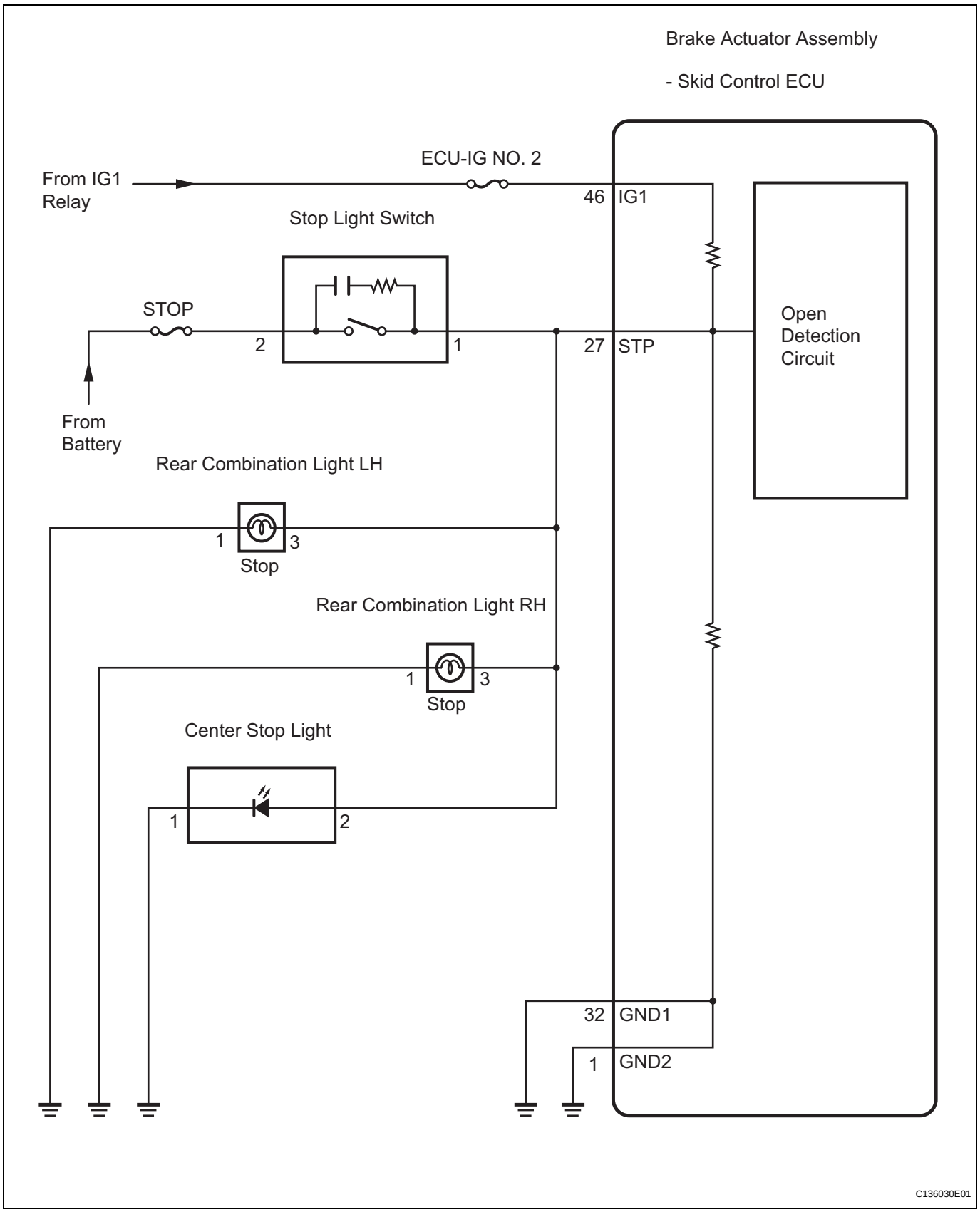
DESCRIPTION

The skid control ECU (housed in the actuator assembly) inputs the stop light switch signal and the condition of brake operation.

The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light input line while the stop light switch is OFF.

DTC No.	DTC Detection Condition	Trouble Area
C1249/49	When IG1 terminal voltage is 9.5 to 17.2 V, an open circuit of the stop light switch continues for 0.3 seconds or more.	• STOP fuse • Stop light switch • Stop light switch circuit • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM



BC

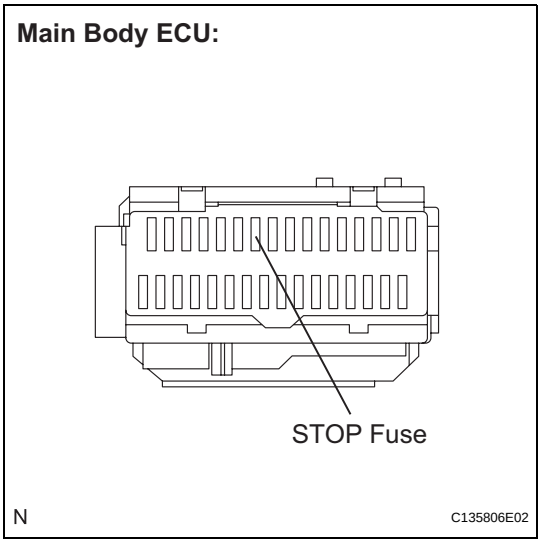
INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1 INSPECT STOP FUSE

Main Body ECU:



(a) Remove the STOP fuse from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
STOP (10 A) fuse	Always	Below 1 Ω

NG → **REPLACE STOP FUSE**

OK

2 CHECK STOP LIGHT OPERATION

(a) Install the STOP fuse.
(b) Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK

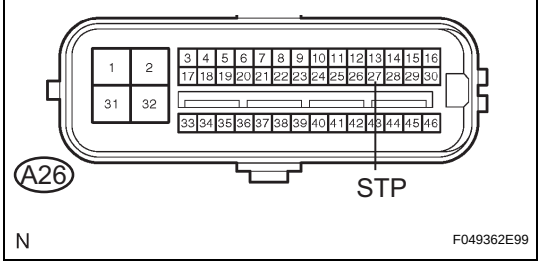
Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG → **Go to step 7**

OK

3 INSPECT SKID CONTROL ECU (STP TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

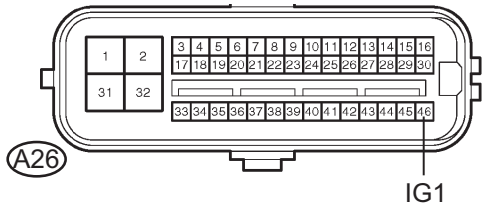
Tester Connection	Condition	Specified Condition
A26-27 (STP) - Body ground	Stop light switch ON (Brake pedal depressed)	8 to 14 V
A26-27 (STP) - Body ground	Stop light switch OFF (Brake pedal released)	Below 1.5 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STP CIRCUIT)**

OK

4 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Turn the ignition switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

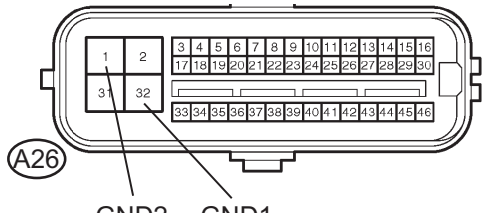
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

BC

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Depress the brake pedal several times to test the stop light circuit.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1249/49) is not output	A
DTC (C1249/49) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

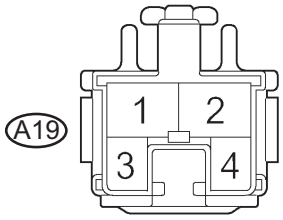
B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

USE SIMULATION METHOD TO CHECK

7 INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL)

Stop Light Switch Harness Side Connector Front View:



I042363E16

(a) Disconnect the stop light switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V

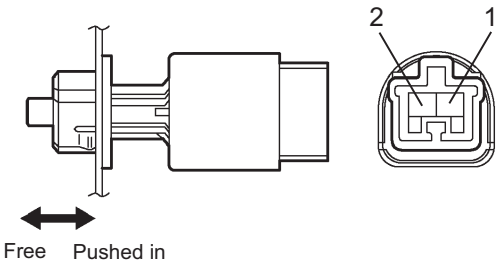
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

BC

OK

8 INSPECT STOP LIGHT SWITCH

Stop Light Switch:



C124796E03

(a) Measure the resistance according to the value(s) in the table below.

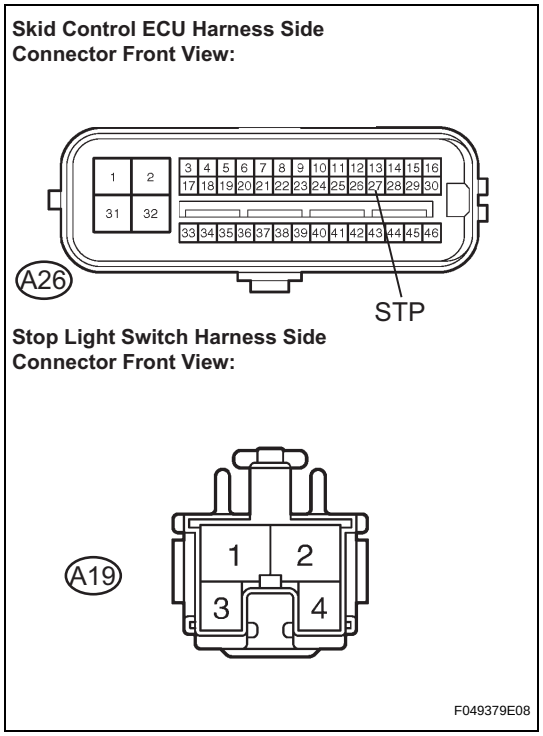
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	10 kΩ or higher

NG → **REPLACE STOP LIGHT SWITCH**

OK

9 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH)



(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-27 (STP) - A19-1	Always	Below 1 Ω
A26-27 (STP) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10 RECONFIRM DTC

(a) Reconnect the skid control ECU connector and the stop light switch connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Depress the brake pedal several times to test the stop light circuit.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1249/49) is not output	A
DTC (C1249/49) is output	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

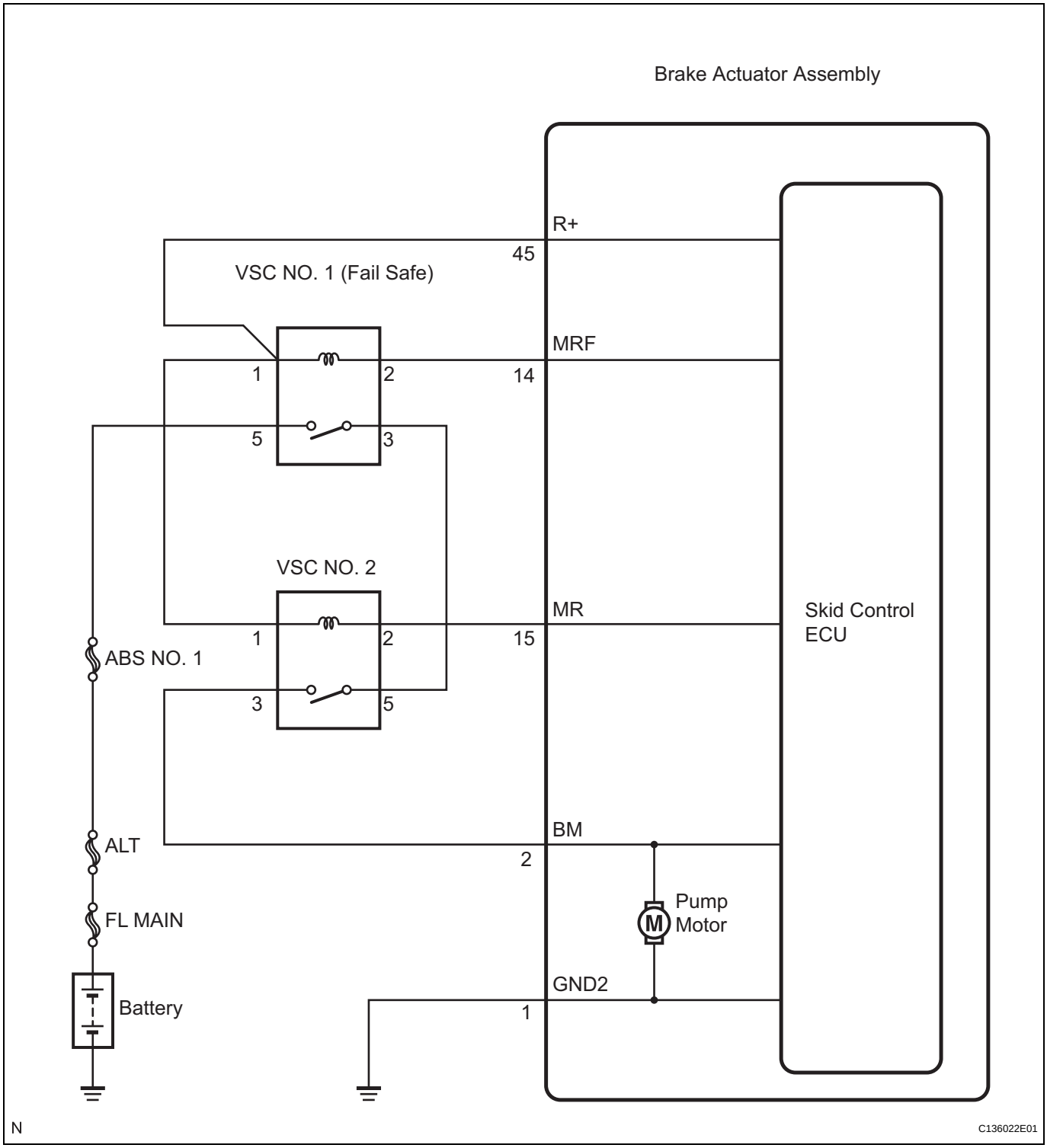
INSPECT LIGHTING SYSTEM (STOP LIGHT CIRCUIT)

DTC C1251/51 Open in Pump Motor Circuit

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1251/51	• Actuator pump motor does not operate properly. • Open in actuator pump motor circuit continues for at least 2 seconds.	• Brake actuator assembly (GND circuit) • Brake actuator assembly (Motor circuit)

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the Active Test mode on the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
MOTOR RELAY	Turns ABS motor relay ON / OFF	Operating sound of relay (clicking sound) and motor can be heard

(d) Check the operating sound of the ABS motor relay and motor when operating it with the intelligent tester.

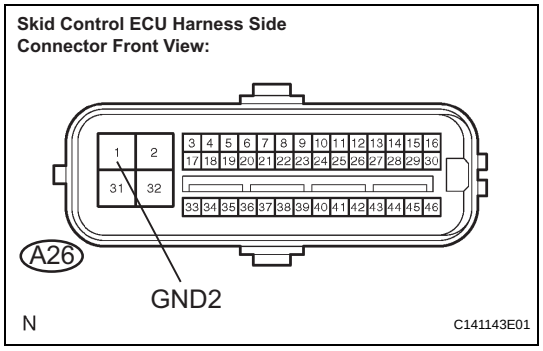
OK:

The operating sound of the ABS motor relay and motor can be heard.

OK → **Go to step 3**

NG

2 INSPECT SKID CONTROL ECU (GND2 TERMINAL)



(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND2 CIRCUIT)**

OK

3 RECONFIRM DTC

(a) Reconnect the skid control ECU connector.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle at the speed of 4.3 mph (7 km/h) or more.
(e) Check if the same DTC is recorded (See page BC-141).

Result

Condition	Proceed to
DTC (C1251/51) is not output	A
DTC (C1251/51) is output	B

HINT:

- If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the ECU performs self diagnosis of the motor and solenoid circuits.
- If a normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A

BC

USE SIMULATION METHOD TO CHECK

DTC	C1290/66	Steering Angle Sensor Zero Point Malfunction

DESCRIPTION

The skid control ECU acquires steering angle sensor zero point every time the ignition switch is turned on (IG) and the vehicle is driven at 22 mph (35 km/h) or more for approximately 5 seconds. The ECU also stores the previous zero point.
If front wheel alignment or steering wheel position is adjusted without disconnecting the negative battery terminal, or if yaw rate and acceleration sensor zero point is not acquired after the adjustments have been completed, the skid control ECU detects the difference between the previous zero point and newly acquired zero point and outputs this DTC to indicate a poor adjustment.
Warning of the steering angle sensor zero point malfunction will be cancelled by turning the ignition switch off.

DTC No.	DTC Detection Condition	Trouble Area
C1290/66	The steering angle sensor zero point calibration position vastly differs from the recorded value	• Yaw rate and acceleration sensor zero point calibration incomplete • Poor adjustment of the centered position of the steering wheel • Poor adjustment of front wheel alignment

BC

INSPECTION PROCEDURE

NOTICE:
When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR

(a) Perform zero point calibration of the yaw rate and acceleration sensor (See page BC-119).
HINT:
- When the stored zero point of the yaw rate and acceleration sensor is erased, steering angle sensor zero point will also be erased.
- If the zero point and output value of the yaw rate and acceleration sensor and the output value of the speed sensors are not normal, steering angle sensor zero point cannot be acquired normally even if the vehicle is driven straight ahead at 22 mph (35 km/h) or more.

NEXT

2	CHECK STEERING ANGLE SENSOR ZERO POINT CALIBRATION

(a) Drive the vehicle straight ahead at 22 mph (35 km/h) or more for at least 5 seconds.
(b) Check that the centered position of the steering wheel is correctly set while driving straight ahead.
HINT:
If front wheel alignment and steering position are adjusted as a result of abnormal centered position of the steering wheel, acquire yaw rate and acceleration sensor zero point again after the adjustments are completed.

OK:
The centered position of the steering wheel is correctly set.

NG → **ADJUST FRONT WHEEL ALIGNMENT OR STEERING POSITION**

OK ↓

3	RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 22 mph (35 km/h) or more.
(e) Check if the same DTC is recorded (See page BC-141).

Result

BC

Condition	Proceed to
DTC (C1290/66) is not output	A
DTC (C1290/66) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY**

A ↓

END

DTC	U0073/94	Control Module Communication Bus OFF

DTC	U0100/65	Lost Communication with ECM / PCM

DTC	U0123/62	Lost Communication with Yaw Rate Sensor Module

DTC	U0124/95	Lost Communication with Lateral Acceleration Sensor Module

DTC	U0126/63	Lost Communication with Steering Angle Sensor Module

DESCRIPTION

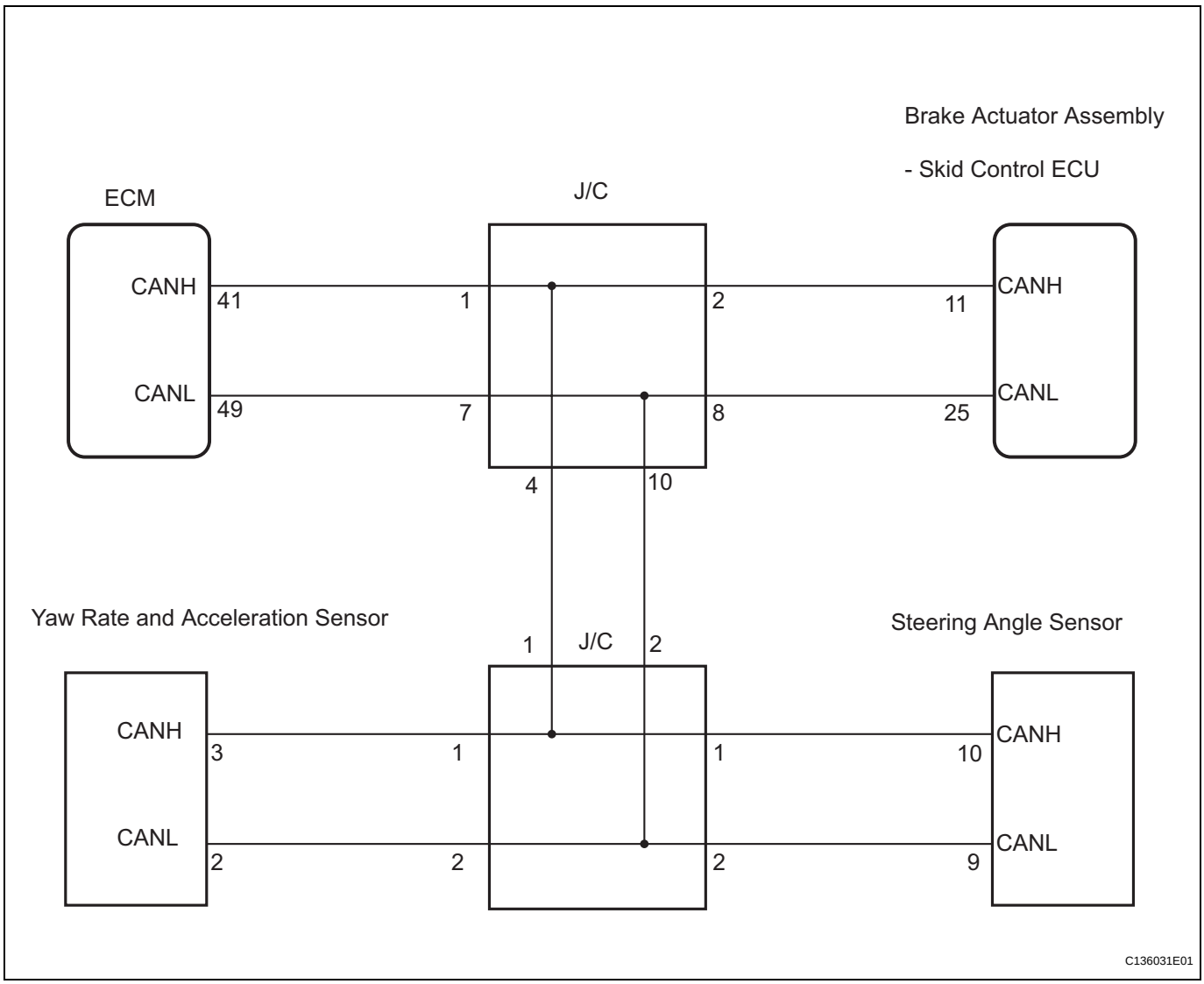
The skid control ECU receives the signals from the ECM, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

BC

DTC No.	DTC Detection Condition	Trouble Area
U0073/94	When any of the following is detected: 1. With the IG1 terminal voltage 10 V or more, after the output of data from the skid control ECU is completed, the sending continues for 5 seconds or more. 2. With the IG1 terminal voltage 10 V or more, the condition that bus OFF state occurs once or more within 100 ms occurs 10 times in succession. (Sent signals cannot be received.) 3. With the IG1 terminal voltage 10 V or more, a delay in receiving data from the yaw rate and acceleration sensor and steering angle sensor continues for 1 second or more. 4. With the IG1 terminal voltage 10 V or more, the condition that a delay in receiving data from the yaw rate and acceleration sensor and steering angle sensor occurs more than once within 5 seconds occurs 10 times in succession within 60 seconds.	CAN communication system
U0100/65	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more and the vehicle speed 9 mph (15 km/h) or more, data cannot be sent to the ECM for 2 seconds or more. 2. The IG1 terminal voltage 10 V or more and the vehicle speed 9 mph (15 km/h) or more for 2 seconds or more.	CAN communication system (Skid control ECU to ECM)
U0123/62	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the yaw rate sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession within 60 seconds. • The condition that data from the yaw rate sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)
U0124/95	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the acceleration sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession within 60 seconds. • The condition that data from the acceleration sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)

DTC No.	DTC Detection Condition	Trouble Area
U0126/63	When either of the following is detected: 1. With the IG1 terminal voltage 10 V or more, data from the steering angle sensor cannot be received for 1 second or more. 2. With the IG1 terminal voltage 10 V or more, the following occurs 10 times in succession within 60 seconds. • The condition that data from the steering angle sensor cannot be received occurs once or more within 5 seconds.	CAN communication system (Skid control ECU to steering angle sensor)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION)

(a) Using the intelligent tester, check for any momentary interruption in the wire harness and connector corresponding to a DTC (See page BC-118).

ABS / VSC:

Item (Display)	Measurement Item / Range (Display)	Normal Condition
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
STEERING OPN	Steering sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal

Result

Condition	Proceed to
There is a constant open circuit	**A**
There are no momentary interruptions	**B**
There are momentary interruptions	**C**

HINT:
Perform the above inspection before removing the sensor and connector.

B → **Go to step 3**

C → **Go to step 4**

A

2	CHECK IF EACH SENSOR AND ECM CONNECTOR IS SECURELY CONNECTED

(a) Turn the ignition switch off.
(b) Check if each sensor or ECM connector is securely connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO EACH SENSOR OR ECM CORRECTLY**

OK

3	RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Record the output DTCs (for ABS, VSC, and CAN communication) (See page BC-141).

HINT:
If the CAN communication system DTC and the relevant sensor DTCs are output simultaneously, troubleshoot the relevant sensor DTCs (for ABS and VSC) after the CAN communication system returns to normal.

Result

Condition	Proceed to
DTC (CAN communication system DTC) is output	A
DTC (ABS and/or VSC DTC) is output	B
DTC is not output	C

B → **REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**

C → **USE SIMULATION METHOD TO CHECK**

A

BC

INSPECT CAN COMMUNICATION SYSTEM

4 REPAIR OR REPLACE HARNESS OR CONNECTOR

(a) Turn the ignition switch off.
(b) Repair or replace the harness or connector.
(c) Check for any momentary interruption between the skid control ECU and each sensor or ECM (See page BC-118).
(d) Check that there is no momentary interruption.

NEXT

5 RECONFIRM DTC

(a) Turn the ignition switch off.
(b) Clear the DTC (See page BC-141).
(c) Start the engine.
(d) Drive the vehicle and turn the steering wheel to the right and left at a speed of 9 mph (15 km/h) or more.
(e) Check that no CAN communication system DTC is output.
(f) If ABS and VSC DTCs are output, record them.

Result

Condition	Proceed to
DTC output for the CAN communication system	A
No DTC is output (ABS and/or VSC DTC is output)	B
No DTC is output (No ABS and/or VSC DTC is output)	C

HINT:
The CAN communication system must be normal when repairing each sensor DTC (for ABS and VSC).

B	**REPAIR CIRCUIT INDICATED BY OUTPUT DTC (See page BC-151)**
C	**END**

A

INSPECT CAN COMMUNICATION SYSTEM

ABS Warning Light Remains ON

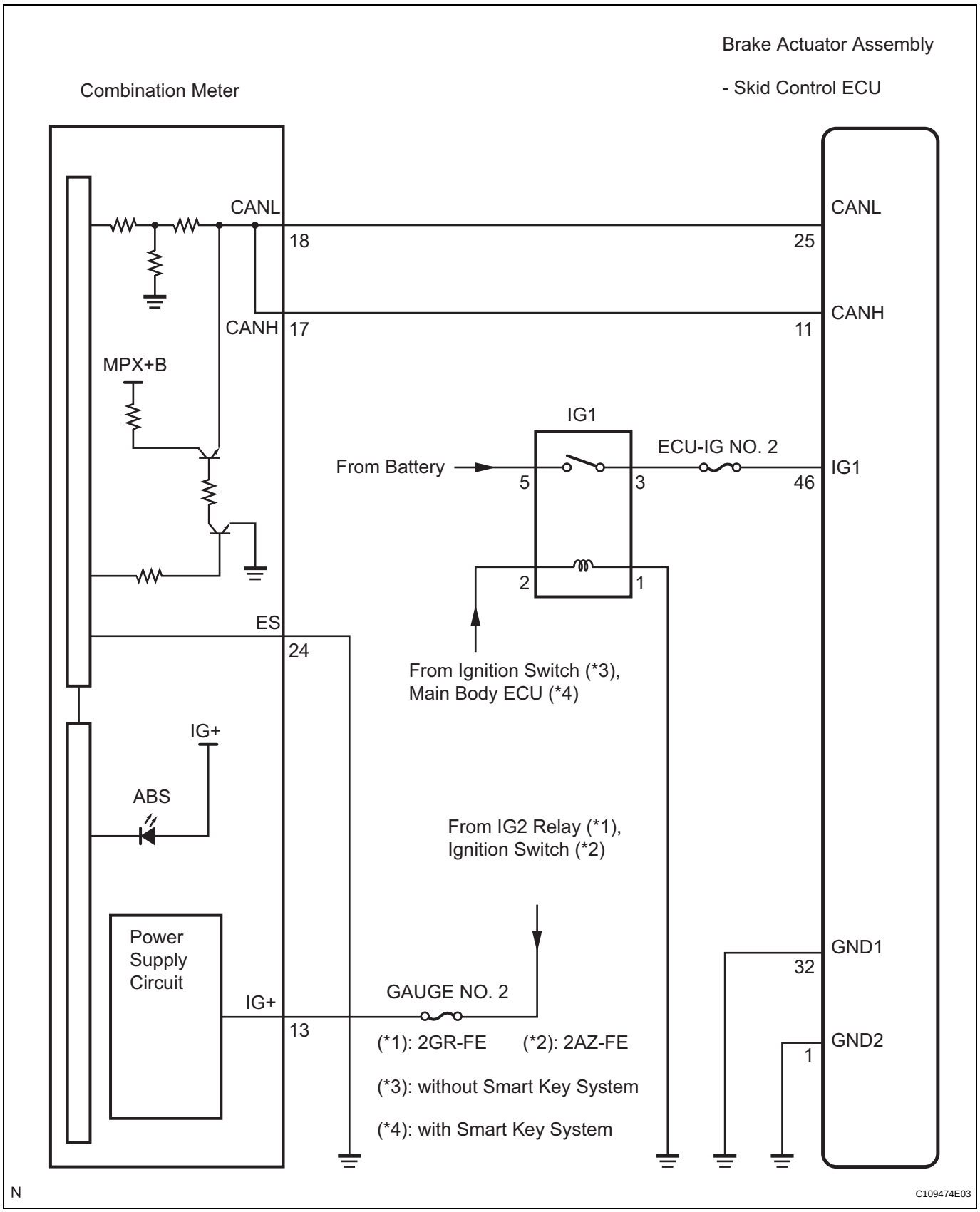
DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If any of the following is detected, the ABS warning light remains on.

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the harness between the combination meter and the skid control ECU.

HINT:
In some cases, the intelligent tester cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

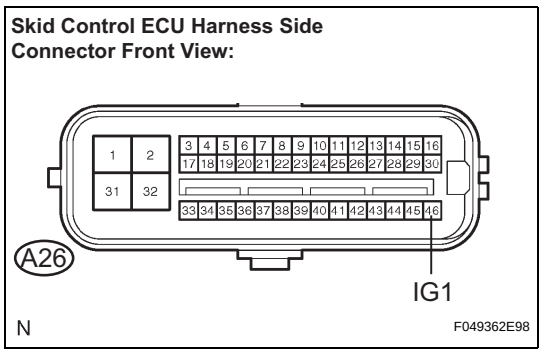
3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT SKID CONTROL ECU (IG1 TERMINAL)



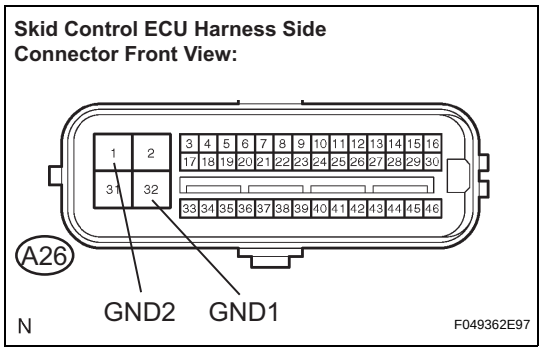
(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

6 INSPECT COMBINATION METER ASSEMBLY

(a) Reconnect the skid control ECU connector.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

HINT:

If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

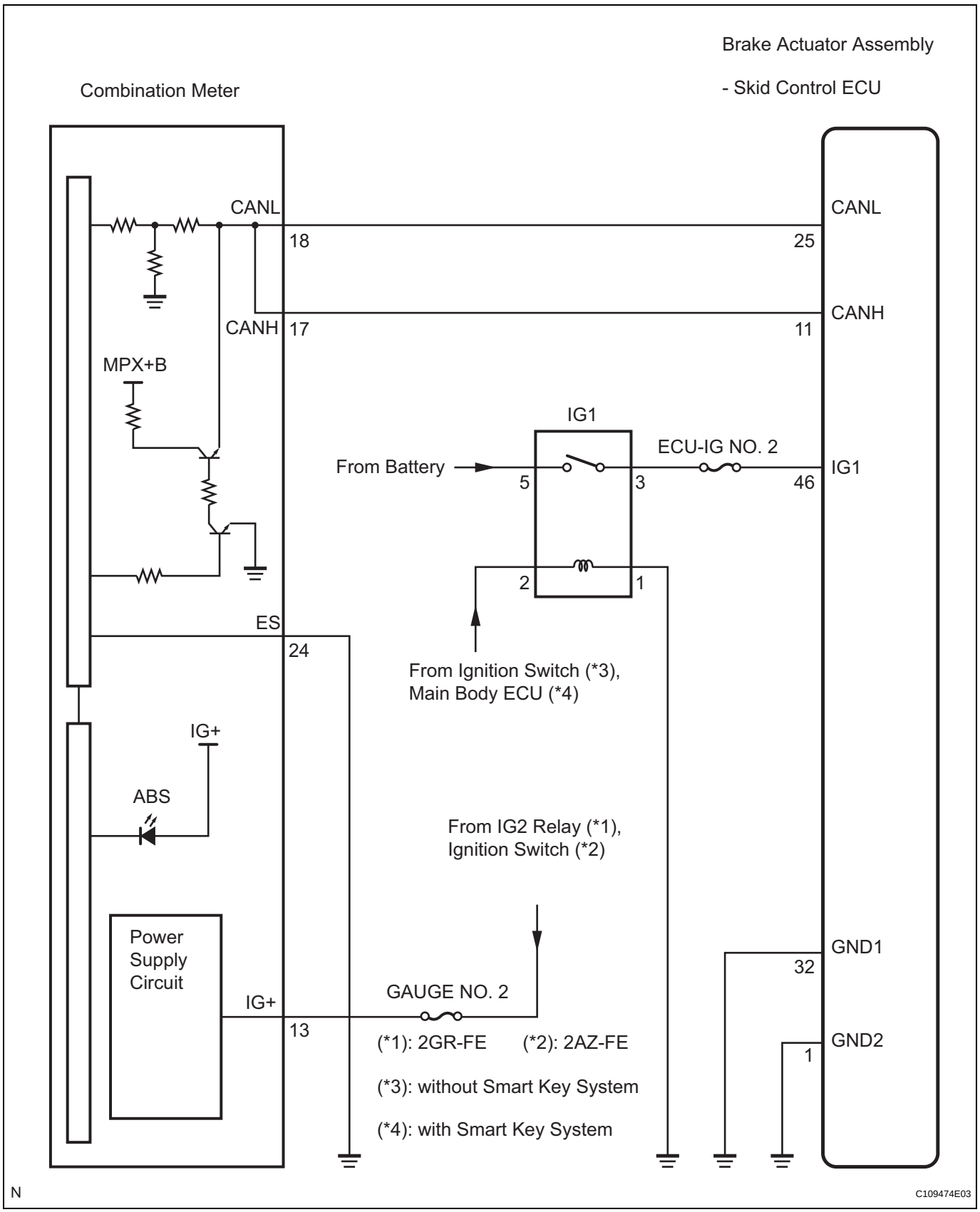
REPLACE BRAKE ACTUATOR ASSEMBLY

ABS Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK ABS WARNING LIGHT

BC

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the ABS warning light comes on.
OK:
The ABS warning light comes on.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.
(b) Reconnect the skid control ECU connector.
(c) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The ABS warning light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → REPLACE COMBINATION METER ASSEMBLY

OK

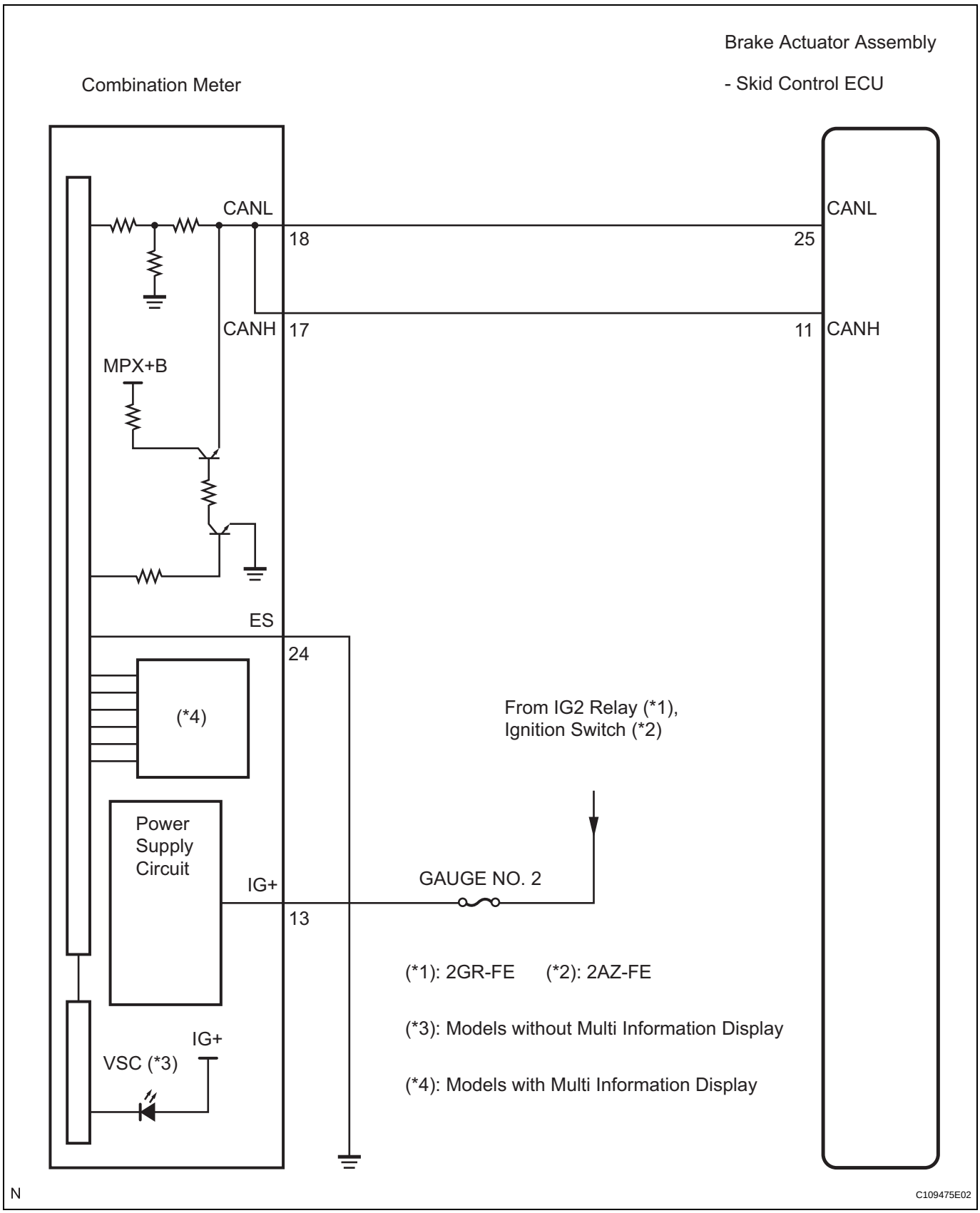
REPLACE BRAKE ACTUATOR ASSEMBLY

VSC Warning Light Remains ON

DESCRIPTION

The skid control ECU communicates with the combination meter via CAN communication. If the ECU stores a DTC, the DTC will be displayed on the multi information display in the combination meter (models with multi information display). On models without a multi information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → CHECK AND REPLACE CHARGING SYSTEM OR BATTERY

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The VSC warning light (models without multi information display) or multi information display (models with multi information display) turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

BC

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

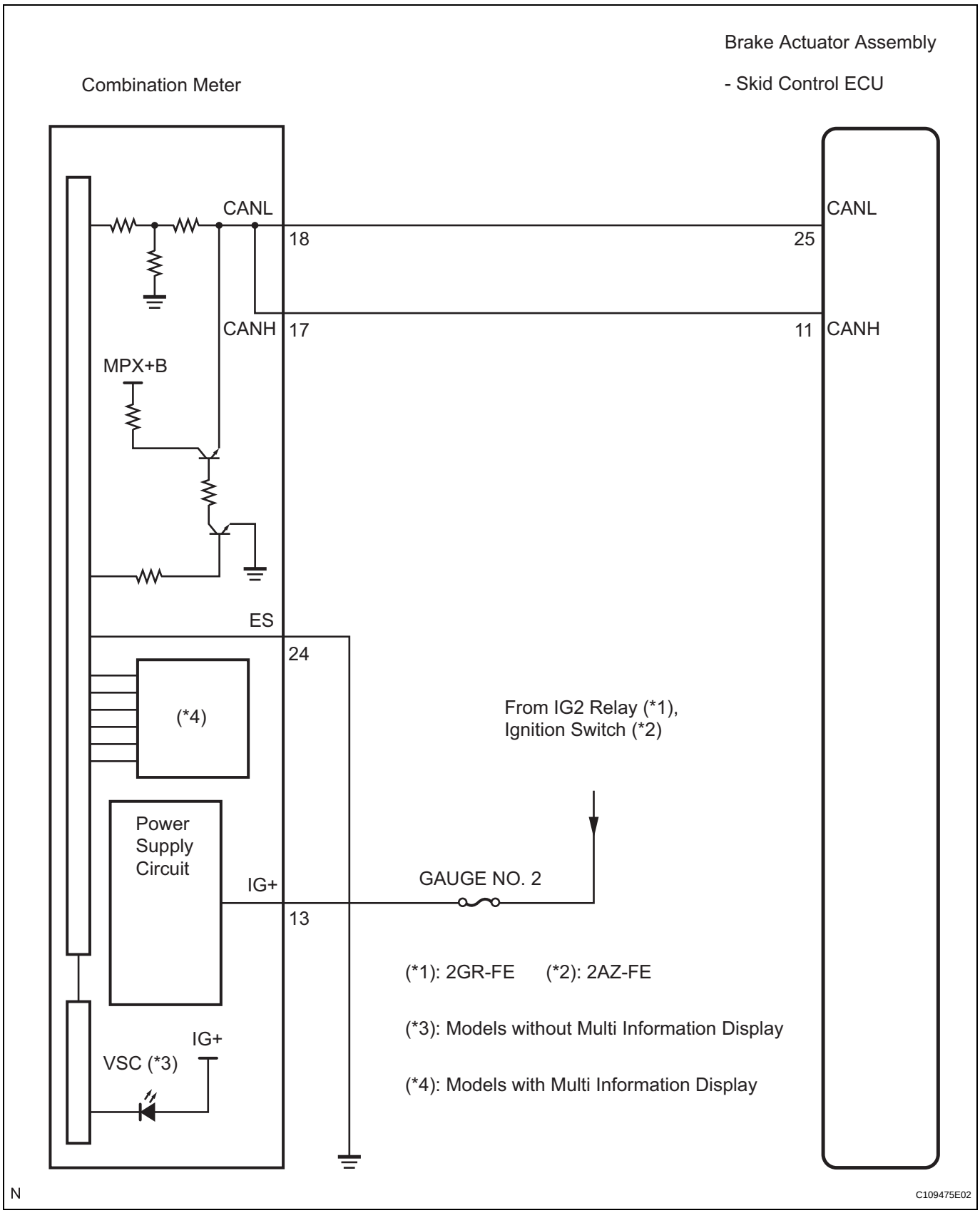
REPLACE BRAKE ACTUATOR ASSEMBLY

VSC Warning Light does not Come ON

DESCRIPTION

The skid control ECU communicates with the combination meter via CAN communication. If the ECU stores a DTC, the DTC will be displayed on the multi information display in the combination meter (models with multi information display). On models without a multi information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK VSC WARNING LIGHT

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "VSC WARN LAMP" in the Active Test and operate the VSC warning light (models without multi information display) or multi information display (models with multi information display) using the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
VSC WARN LAMP	Turn VSC warning light (*1) or multi information display (*2) ON / OFF	Observe combination meter

(*1): Models without multi information display
(*2): Models with multi information display

(d) Check that "ON" and "OFF" of the VSC warning light (models without multi information display) or multi information display (models with multi information display) are indicated on the combination meter when using the intelligent tester.

OK:

The VSC warning light (models without multi information display) or multi information display (models with multi information display) turns on or off in accordance with the intelligent tester.

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.

(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The VSC warning light (models without multi information display) or multi information display (models with multi information display) turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

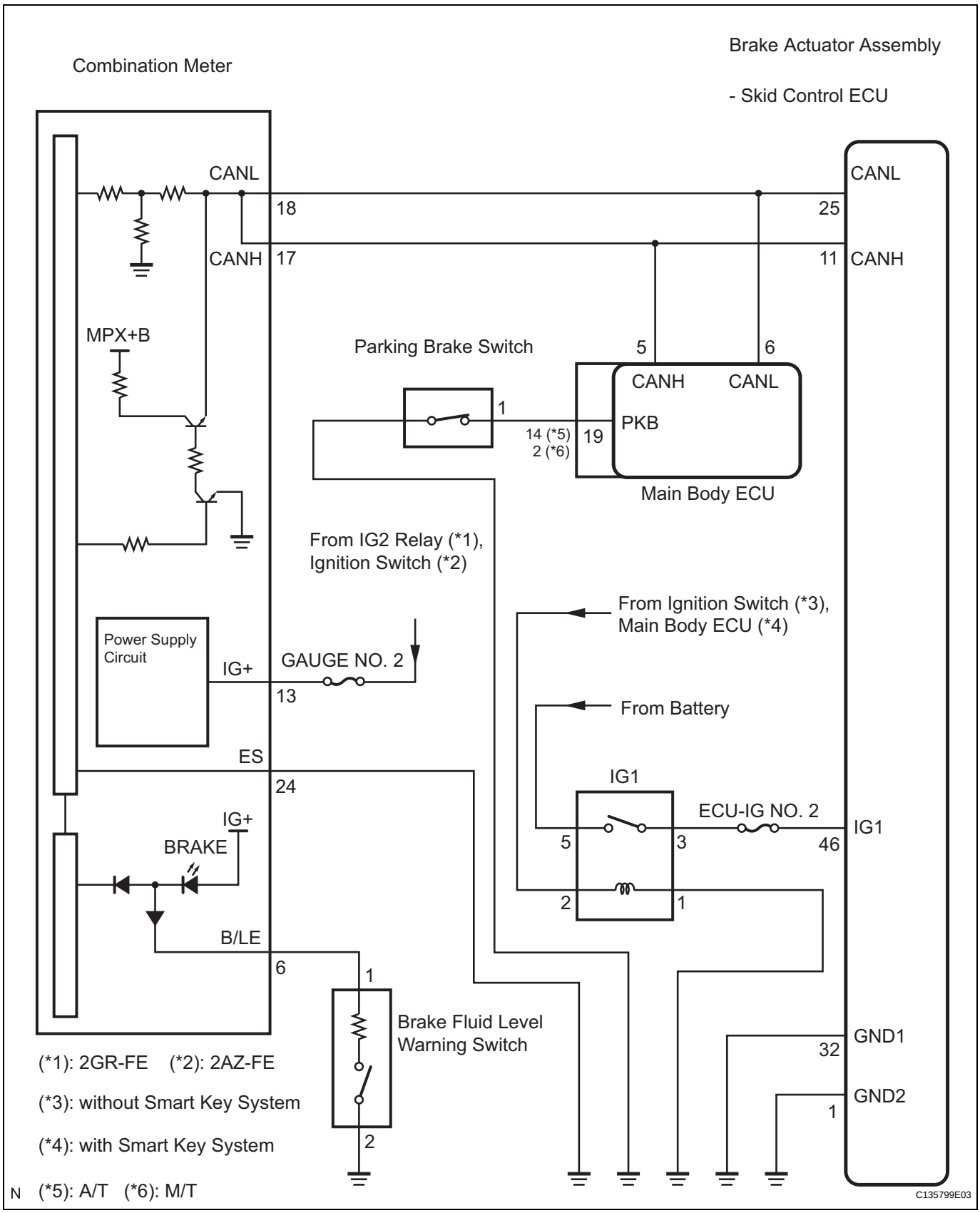
Brake Warning Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
If any of the following is detected, the BRAKE warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

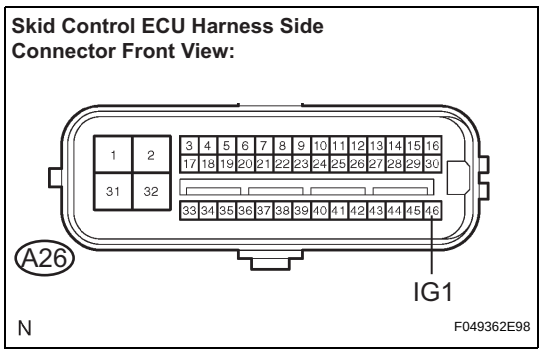
3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → CHECK AND REPLACE CHARGING SYSTEM OR BATTERY

OK

4	INSPECT SKID CONTROL ECU (IG1 TERMINAL)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

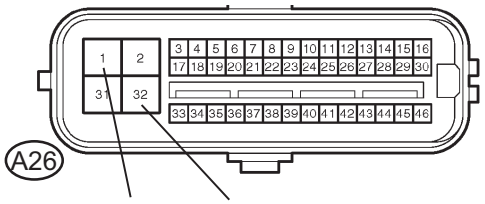
Tester Connection	Condition	Specified Condition
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

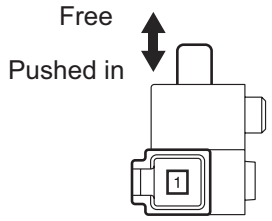
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

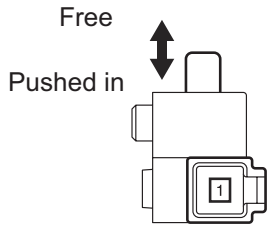
6 INSPECT PARKING BRAKE SWITCH

Parking Brake Switch

A/T:



M/T:



N C109430E02

(a) Disconnect the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Body ground	Parking brake switch ON (Switch pin free)	Below 1 Ω
1 - Body ground	Parking brake switch OFF (Switch pin pushed in)	10 kΩ or higher

NG → **REPLACE PARKING BRAKE SWITCH**

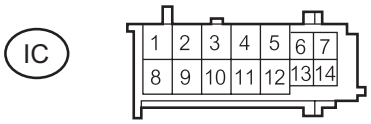
OK

BC

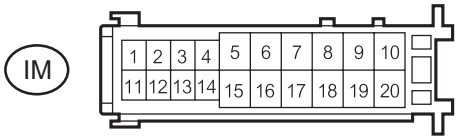
7	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - PARKING BRAKE SWITCH)

Main Body ECU Harness Side Connector Front View

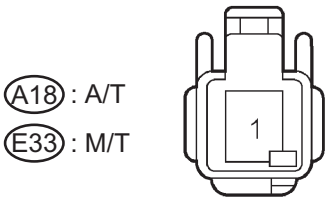
A/T:



M/T:



Parking Brake Switch Harness Side Connector Front View:



C136418E01

(a) Disconnect the main body ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

A/T

Tester Connection	Condition	Specified Condition
IC-14 (PKB) - A18-1	Always	Below 1 Ω
IC-14 (PKB) - Body ground	Always	10 kΩ or higher

M/T

Tester Connection	Condition	Specified Condition
IM-2 (PKB) - E33-1	Always	Below 1 Ω
IM-2 (PKB) - Body ground	Always	10 kΩ or higher

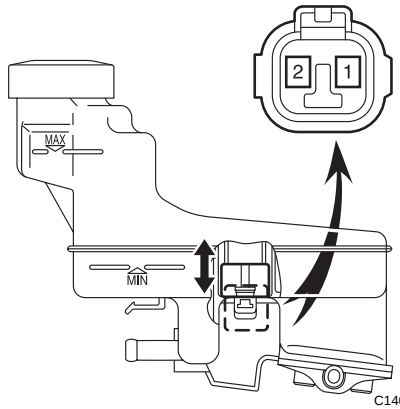
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

8	**INSPECT BRAKE FLUID LEVEL WARNING SWITCH**

Brake Fluid Level Warning Switch:



C140953E01

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.

HINT:
A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Float up (Switch OFF)	1.9 to 2.1 kΩ
1 - 2	Float down (Switch ON)	Below 1 Ω

HINT:
If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

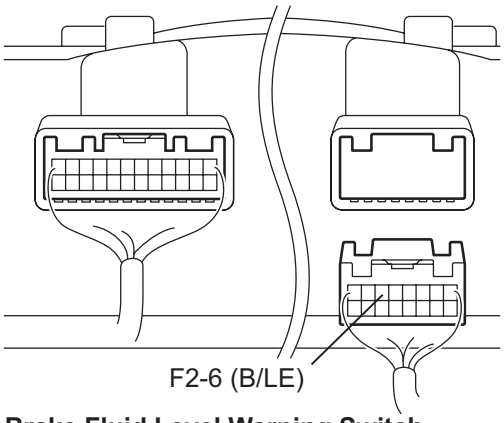
NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)**

OK

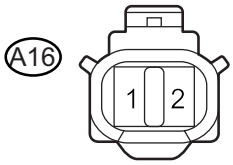
BC

9	CHECK HARNESS AND CONNECTOR (COMBINATION METER - BRAKE FLUID LEVEL WARNING SWITCH)

Combination Meter Wire Harness View:



Brake Fluid Level Warning Switch Harness Side Connector Front View:



C136033E01

(a) Disconnect the combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F2-6 (B/LE) - A16-1	Always	Below 1 Ω
F2-6 (B/LE) - Body ground	Always	10 kΩ or higher
A16-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

10	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

HINT:

- Reinstall the connectors and restore the vehicle to its prior condition before checking the combination meter.
- If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

BC

OK

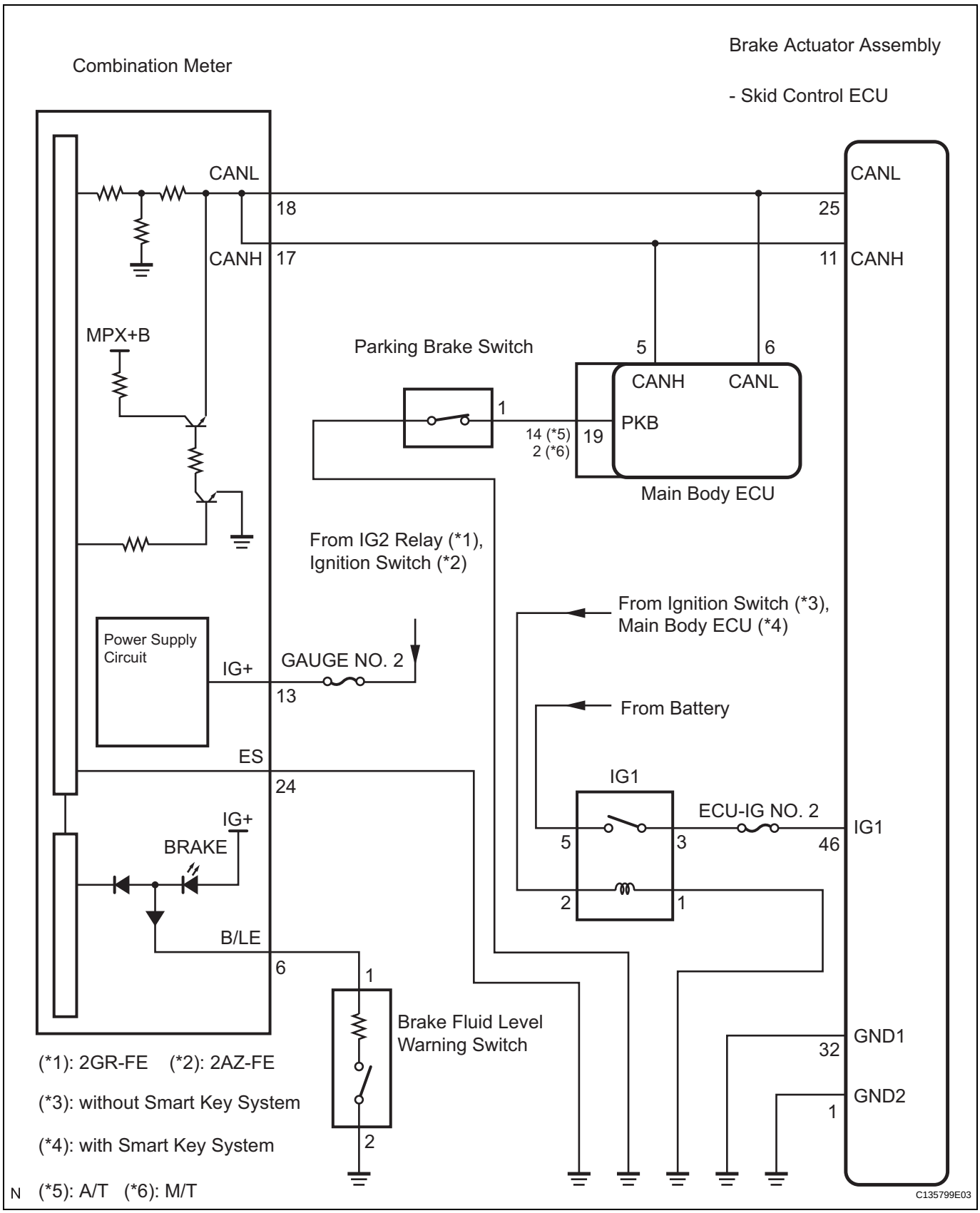
REPLACE BRAKE ACTUATOR ASSEMBLY

Brake Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK BRAKE WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the BRAKE warning light comes on.
OK:
The BRAKE warning light comes on.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.
(b) Reconnect the skid control ECU connector.
(c) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The BRAKE warning light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → REPLACE COMBINATION METER ASSEMBLY

OK

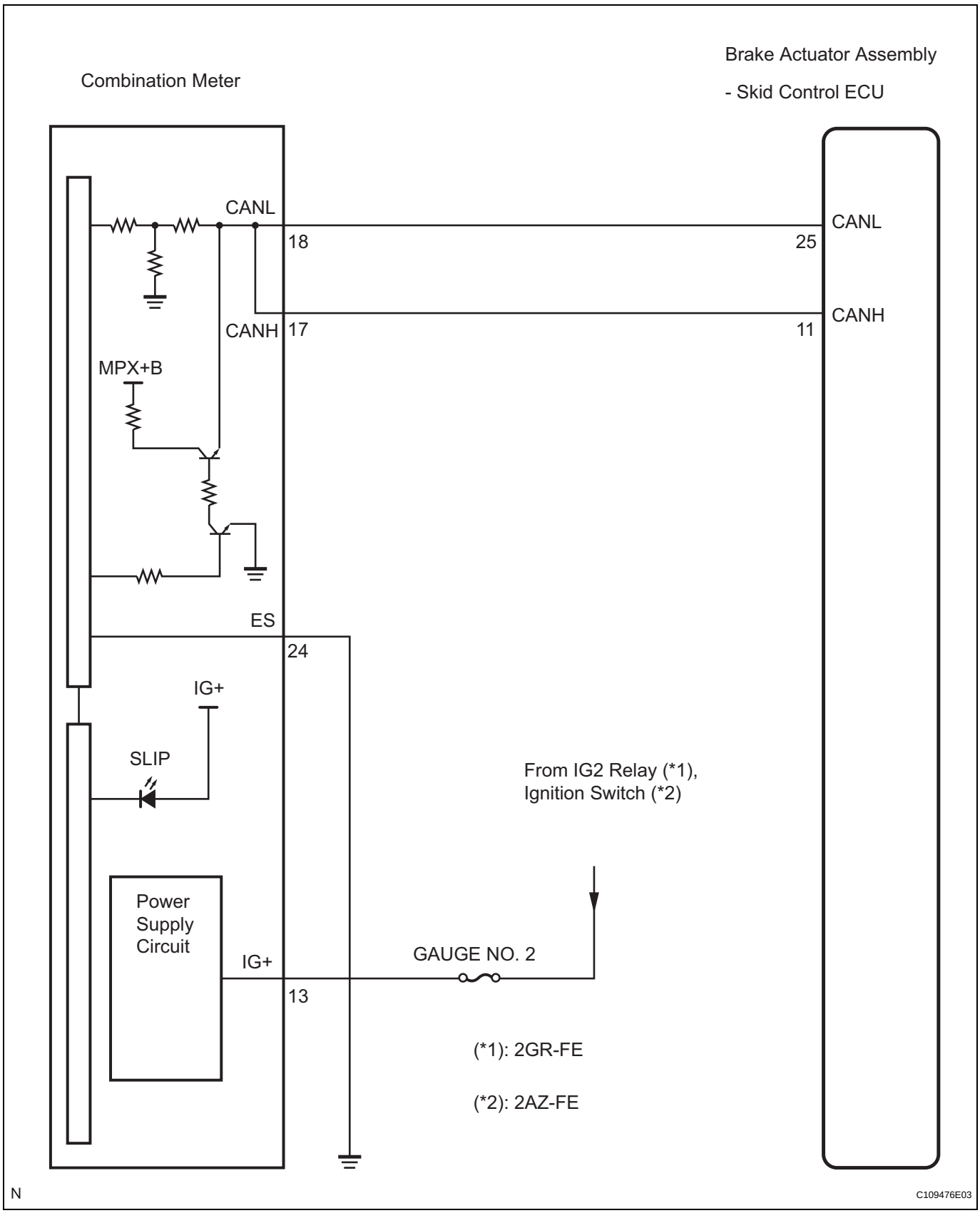
REPLACE BRAKE ACTUATOR ASSEMBLY

Slip Indicator Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-138).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector should be securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

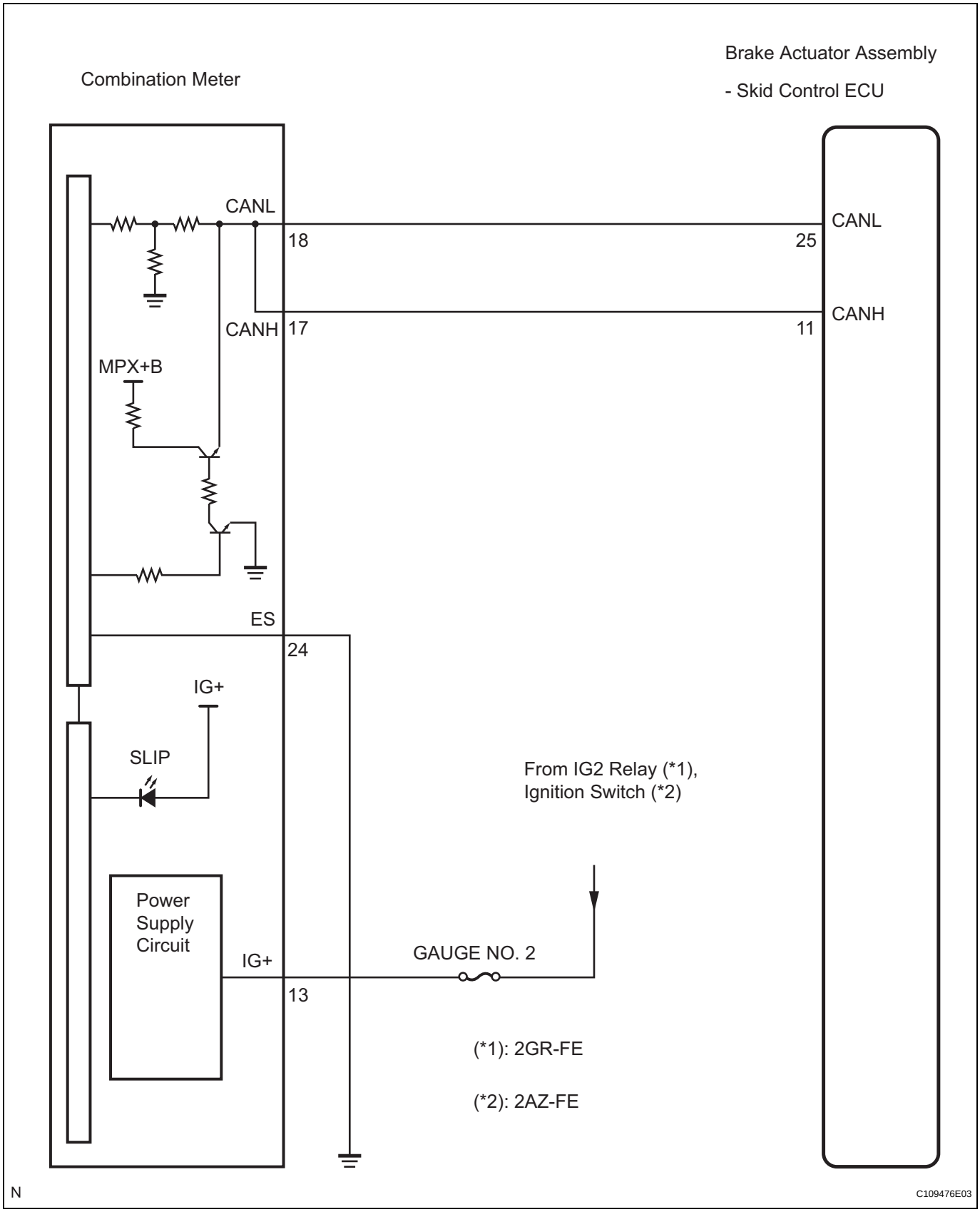
REPLACE BRAKE ACTUATOR ASSEMBLY

Slip Indicator Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-138).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	CHECK SLIP INDICATOR LIGHT

BC

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "SLIP INDI LAMP" in the Active Test and operate the SLIP indicator light using the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
SLIP INDI LAMP	Turn SLIP indicator light ON / OFF	Observe combination meter

(d) Check that "ON" and "OFF" of the SLIP indicator light are indicated on the combination meter when using the intelligent tester.
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

OK → REPLACE BRAKE ACTUATOR ASSEMBLY

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Turn the ignition switch off.
(b) Perform Active Test of the combination meter (meter CPU) using the intelligent tester (See page ME-32).
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

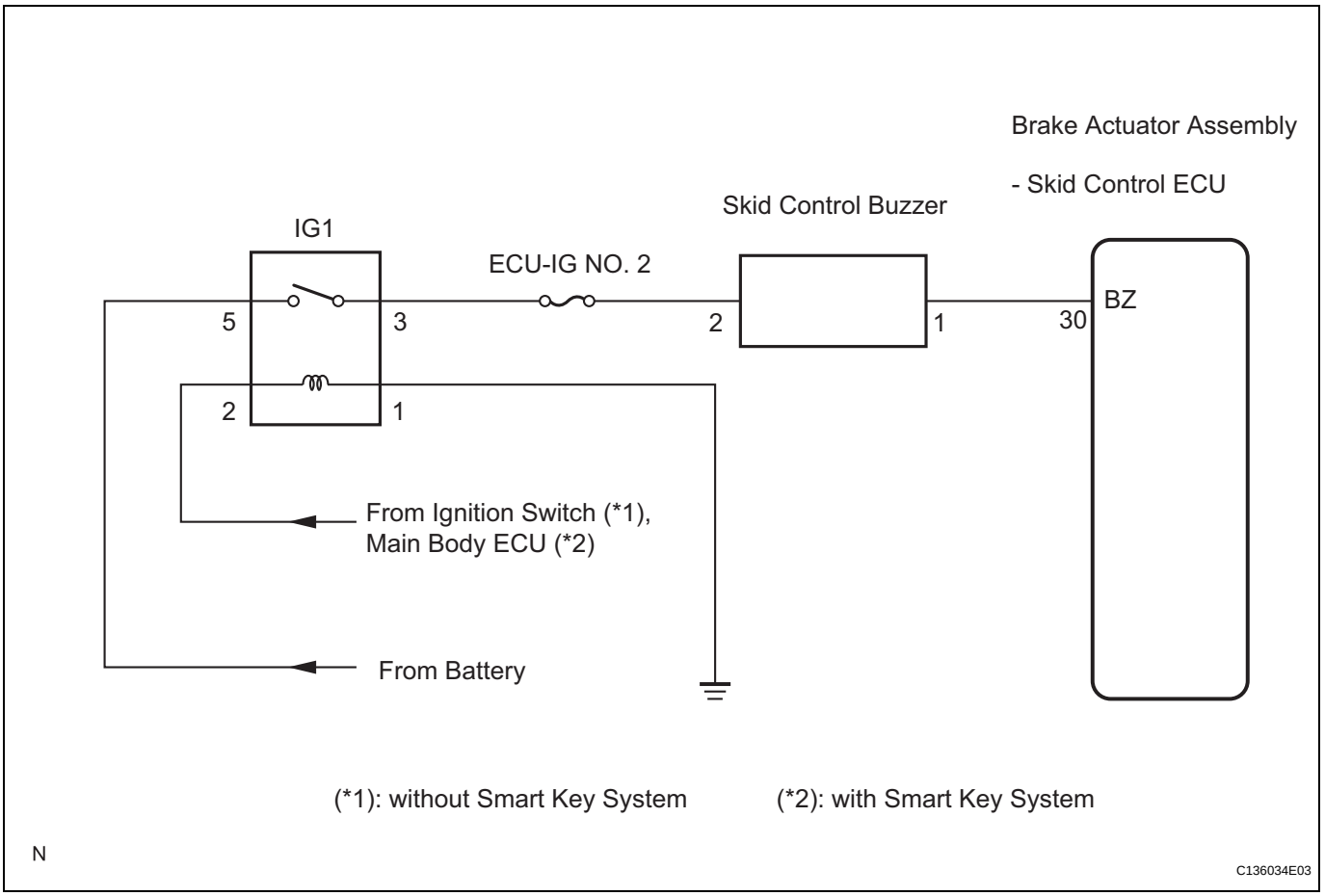
REPLACE BRAKE ACTUATOR ASSEMBLY

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds while the accumulator pressure is abnormally low or when an abnormality causing low fluid pressure occurs, and then the VSC is activated.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the Active Test mode on the intelligent tester.

ABS / VSC:

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

(d) Check that the buzzer sounds/stops when turning the skid control buzzer on/off by using the intelligent tester.

Result

Condition	Proceed to
Buzzer does not sound or sounds constantly	A
Buzzer sounds/stops	B

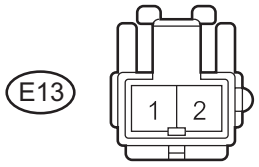
HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step (See page BC-134).

B → **END**

A

2 INSPECT SKID CONTROL BUZZER (POWER SOURCE TERMINAL)

Skid Control Buzzer Harness Side Connector Front View:



(a) Turn the ignition switch off.
(b) Disconnect the skid control buzzer connector.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

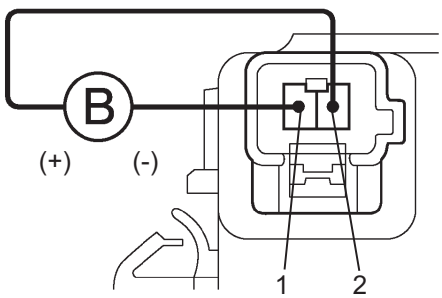
Tester Connection	Condition	Specified Condition
E13-2 - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3 INSPECT SKID CONTROL BUZZER

Skid Control Buzzer:



(a) Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.

OK:

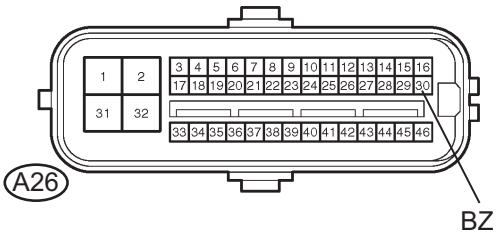
The skid control buzzer sounds.

NG → **REPLACE SKID CONTROL BUZZER**

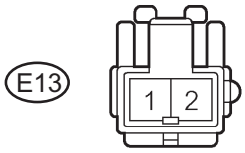
OK

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - SKID CONTROL BUZZER)

Skid Control ECU Harness Side Connector Front View:



Skid Control Buzzer Harness Side Connector Front View:



H

I045407E11

(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A26-30 (BZ) - E13-1	Always	Below 1 Ω
A26-30 (BZ) - Body ground	Always	10 kΩ or higher

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

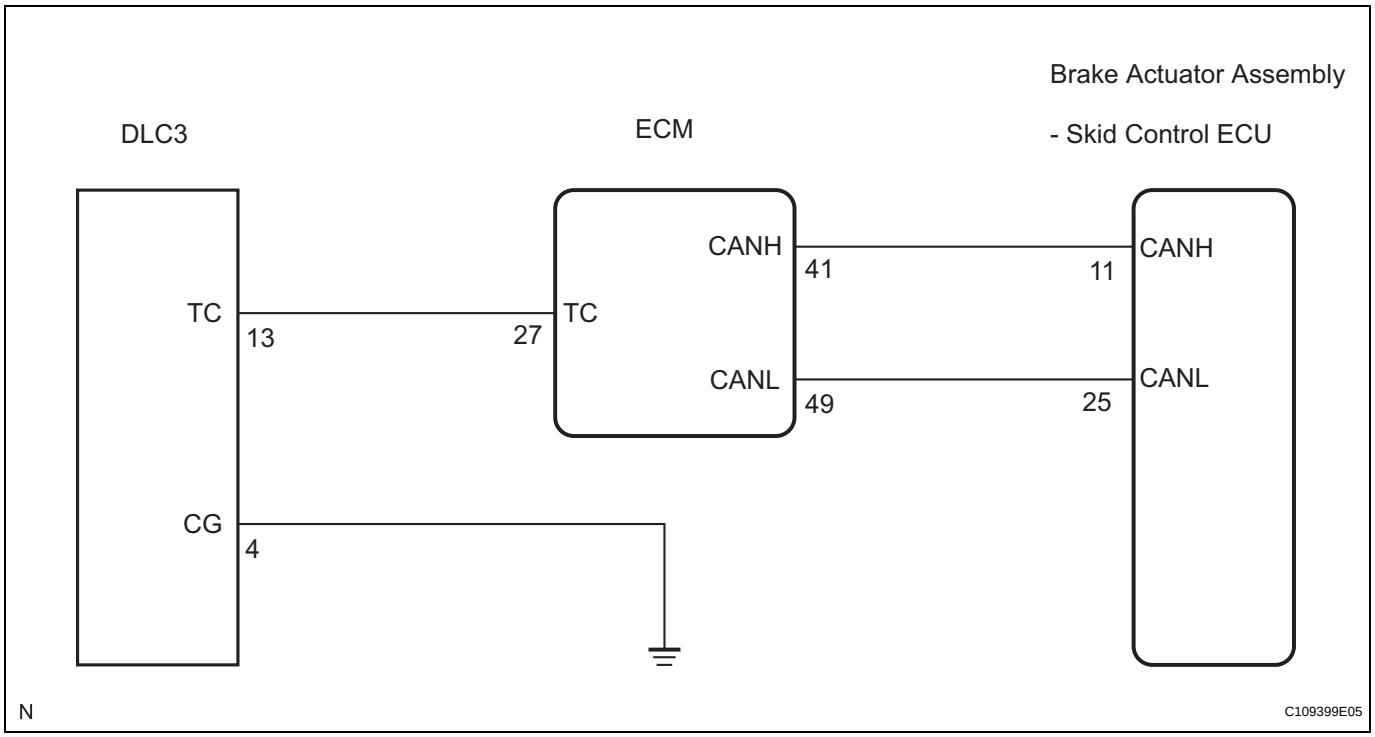
REPLACE BRAKE ACTUATOR ASSEMBLY

TC and CG Terminal Circuit

DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by blinking the ABS warning light.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

NOTICE:

When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if the CAN communication system DTC is output (See page CA-25).

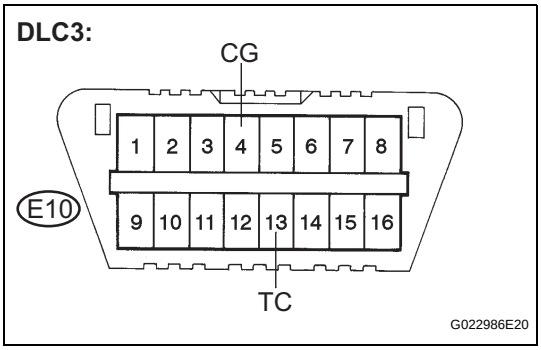
Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → INSPECT CAN COMMUNICATION SYSTEM

A

2	INSPECT DLC3



(a) Turn the ignition switch on (IG).
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

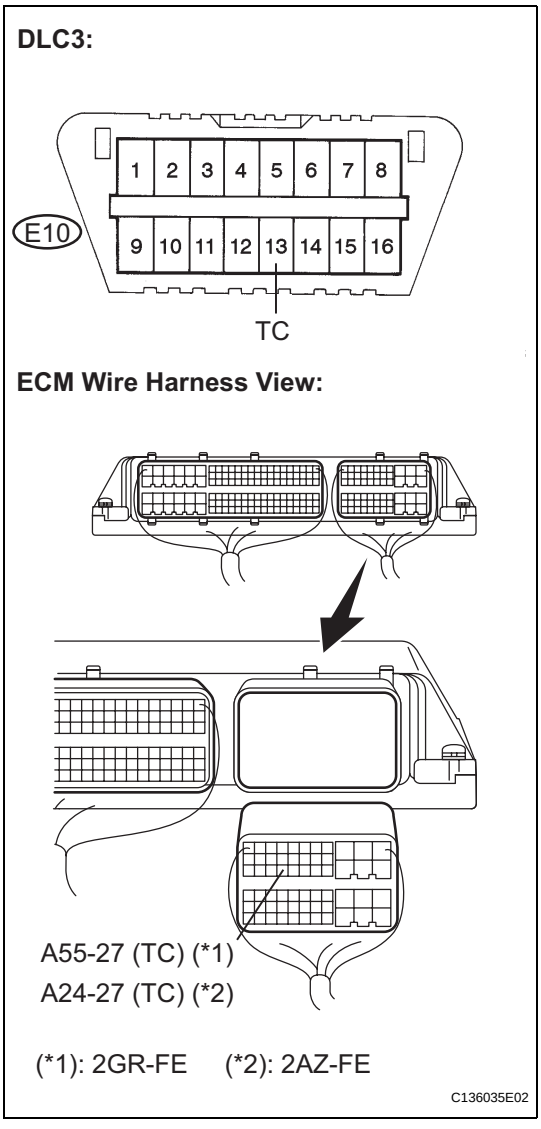
Tester Connection	Condition	Specified Condition
E10-13 (TC) - E10-4 (CG)	Ignition switch on (IG)	10 to 14 V

OK → **Go to step 5**

NG

3	CHECK HARNESS AND CONNECTOR (TC of DLC3 - ECM)

BC



(a) Turn the ignition switch off.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

2GR-FE

Tester Connection	Condition	Specified Condition
E10-13 (TC) - A55-27 (TC)	Always	Below 1 Ω
E10-13 (TC) - Body ground	Always	10 kΩ or higher

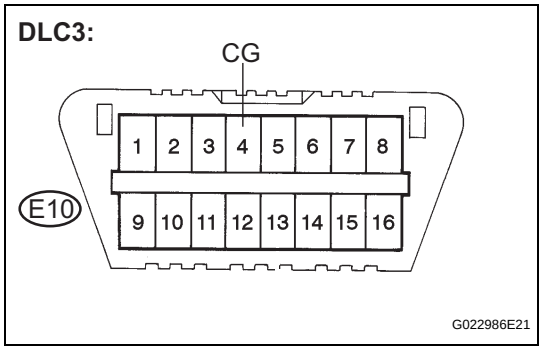
2AZ-FE

Tester Connection	Condition	Specified Condition
E10-13 (TC) - A24-27 (TC)	Always	Below 1 Ω
E10-13 (TC) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

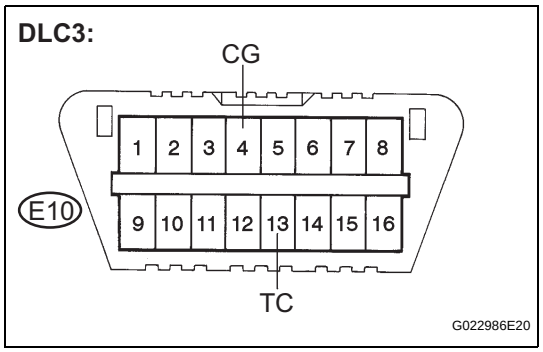
Standard resistance

Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK ECM (TC of DLC3 INPUT)



(a) Turn the ignition switch off.
(b) Reconnect the ECM connector.
(c) Using SST, connect terminals TC and CG of the DLC3.
(d) Turn the ignition switch on (IG).
(e) Check that the check engine warning light is blinking.

Result

Condition	Proceed to
Check engine warning light is blinking	A
Check engine warning light is not blinking	B

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

B → **REPAIR OR REPLACE WIRE HARNESS OR ECM (TC of ECM CIRCUIT)**

A

REPLACE BRAKE ACTUATOR ASSEMBLY

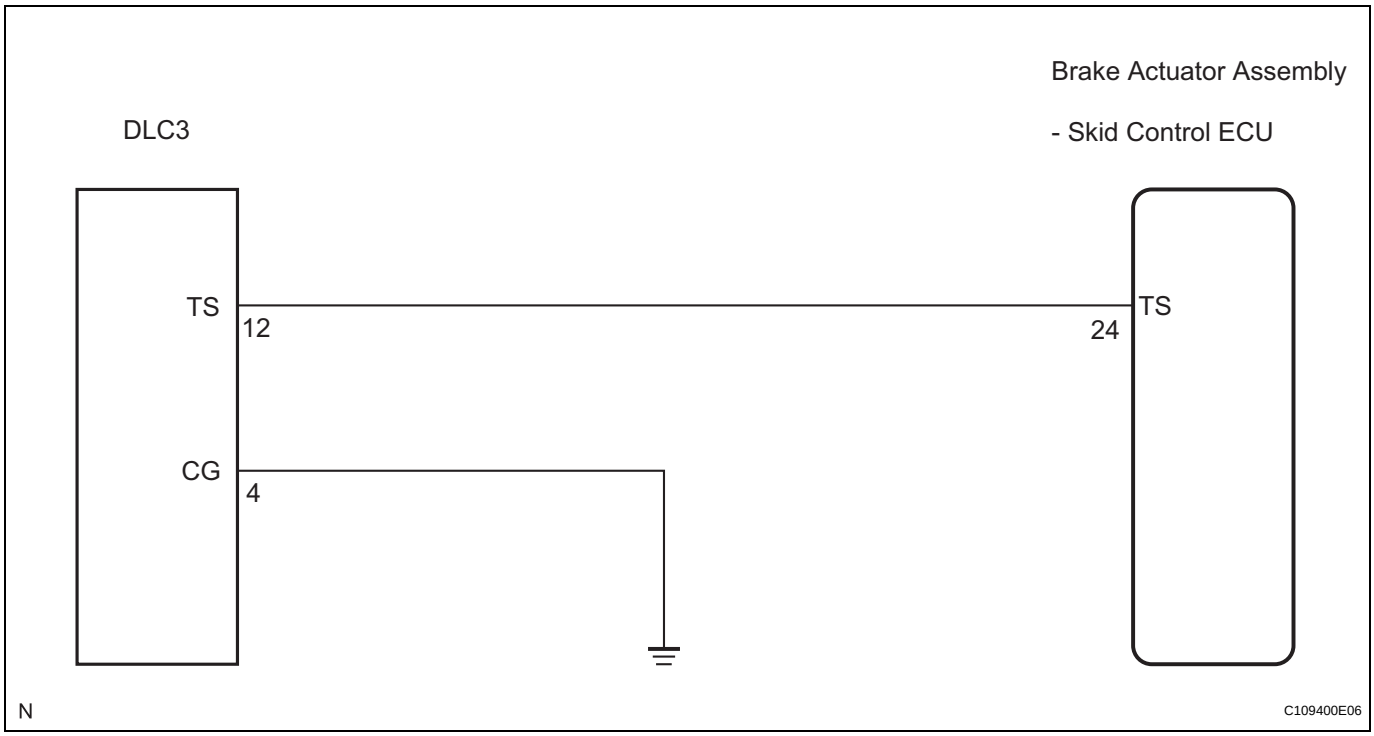
BC

TS and CG Terminal Circuit

DESCRIPTION

In the Test Mode (signal check), a malfunction of the speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to on (IG).

WIRING DIAGRAM

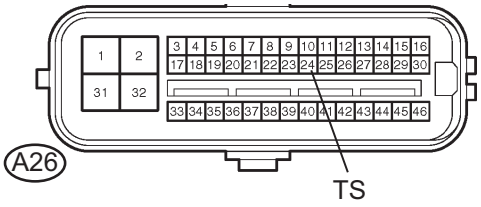


INSPECTION PROCEDURE

NOTICE:
When replacing the brake actuator assembly, perform zero point calibration (See page BC-119).

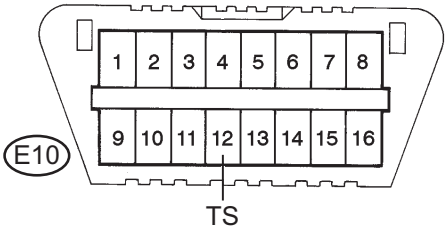
1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - TS of DLC3)

Skid Control ECU Harness Side Connector Front View:



N

DLC3:



C128347E08

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

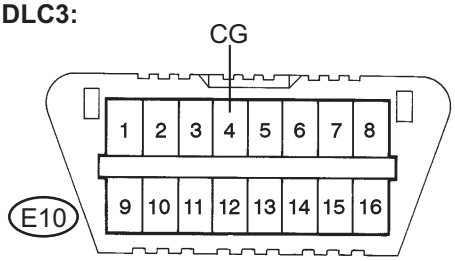
Tester Connection	Condition	Specified Condition
A26-24 (TS) - E10-12 (TS)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND)

DLC3:



G022987E21

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

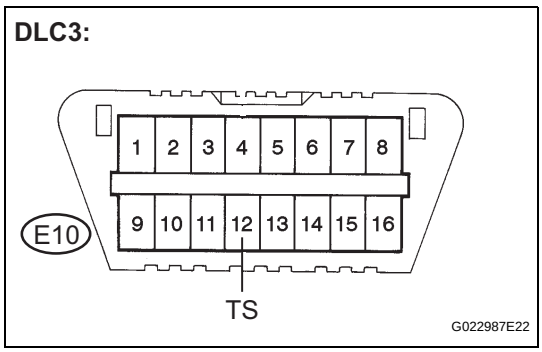
Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

BC

3	CHECK HARNESS AND CONNECTOR (TS of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-12 (TS) - Body ground	Always	10 kΩ or higher

HINT:
If troubleshooting has been carried out according to the Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part (See page BC-134).

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

BC

OK

REPLACE BRAKE ACTUATOR ASSEMBLY

VEHICLE STABILITY CONTROL SYSTEM (for BOSCH Made)

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	off
Ignition switch on (IG)	ON	on (IG)
Ignition switch on (ACC)	ACC	on (ACC)
Engine start	START	start

BC

2. TROUBLESHOOTING PRECAUTION

(a) When there is a malfunction in the contact point of the terminals or installation problems with parts, the removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.
(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as by DTC output and freeze frame data output, and record it before disconnecting each connector or removing and installing parts.
(c) Since the vehicle stability control system may be influenced by a malfunction in the other systems, be sure to check for DTCs in the other systems.
(d) Be sure to remove and install the brake actuator assembly and each sensor with the ignition switch off unless specified in the inspection procedure.
(e) If the brake actuator or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using the intelligent tester, also check that system functions and signals received by the ECU are normal using test mode.

3. CAN COMMUNICATION SYSTEM PRECAUTION

(a) The CAN communication system is used for data communication between the skid control ECU, the steering angle sensor, and the yaw rate and acceleration sensor. If there is trouble in the CAN communication line, a DTC of the communication line is output.
(b) If a DTC of the CAN communication line is output, repair the malfunction in the communication line and troubleshoot the vehicle stability control system under the condition that data communication is normal.

(c) In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires that have an equal length. A bypass wire should not be used, because the data being transmitted will be corrupted.

4. DTC PRECAUTION

(a) Warnings for some DTCs cannot be cleared by only repairing the malfunctioning parts. If the warning is displayed after repair work, the DTC should be cleared after turning the ignition switch off.

NOTICE:

If a DTC for a malfunctioning part reappears after it was cleared, then it has been stored again.

5. CHASSIS DYNAMOMETER PRECAUTION

(a) Enter Test Mode to disable TRAC and VSC control when using a chassis dynamometer.

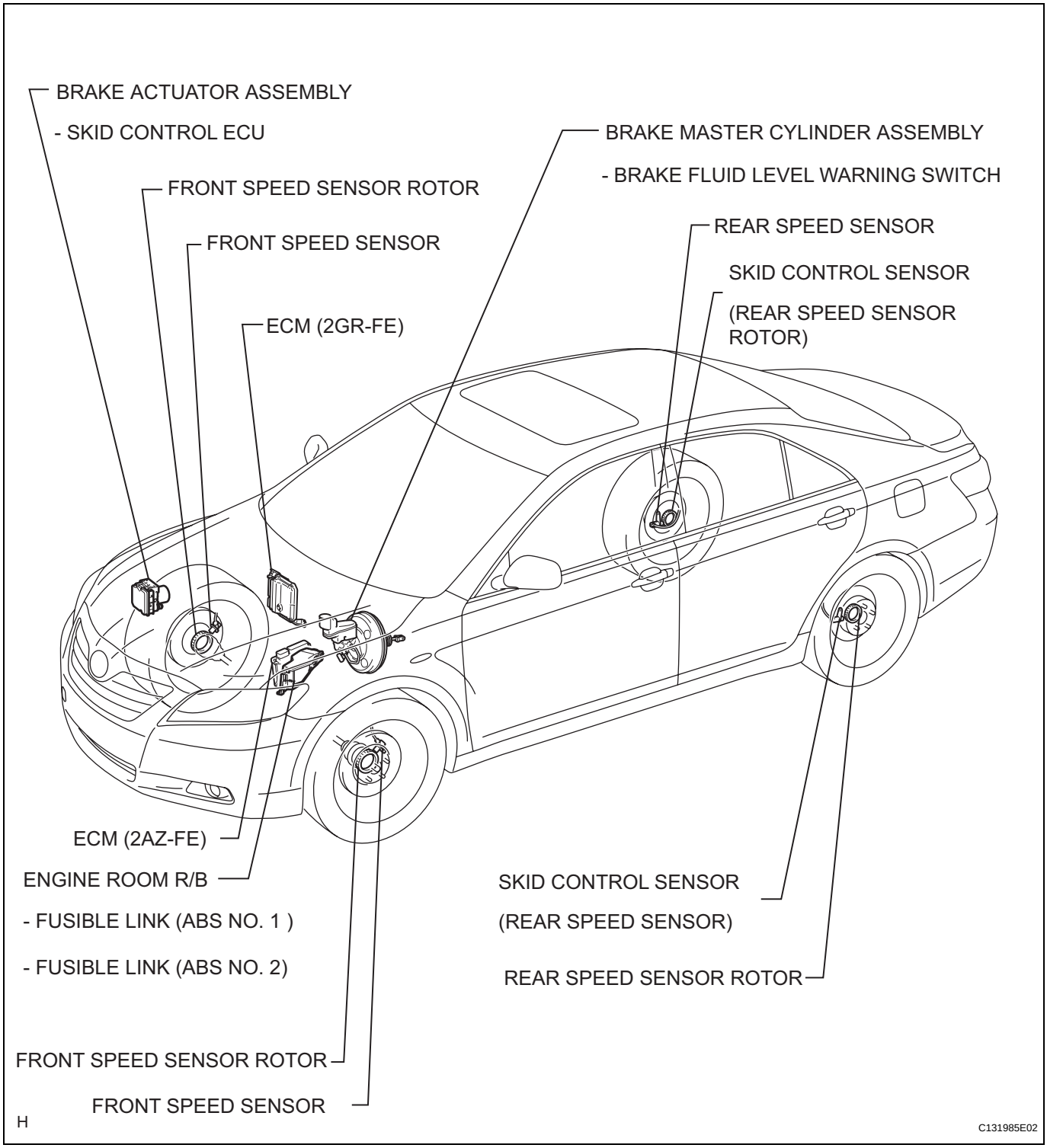
HINT:

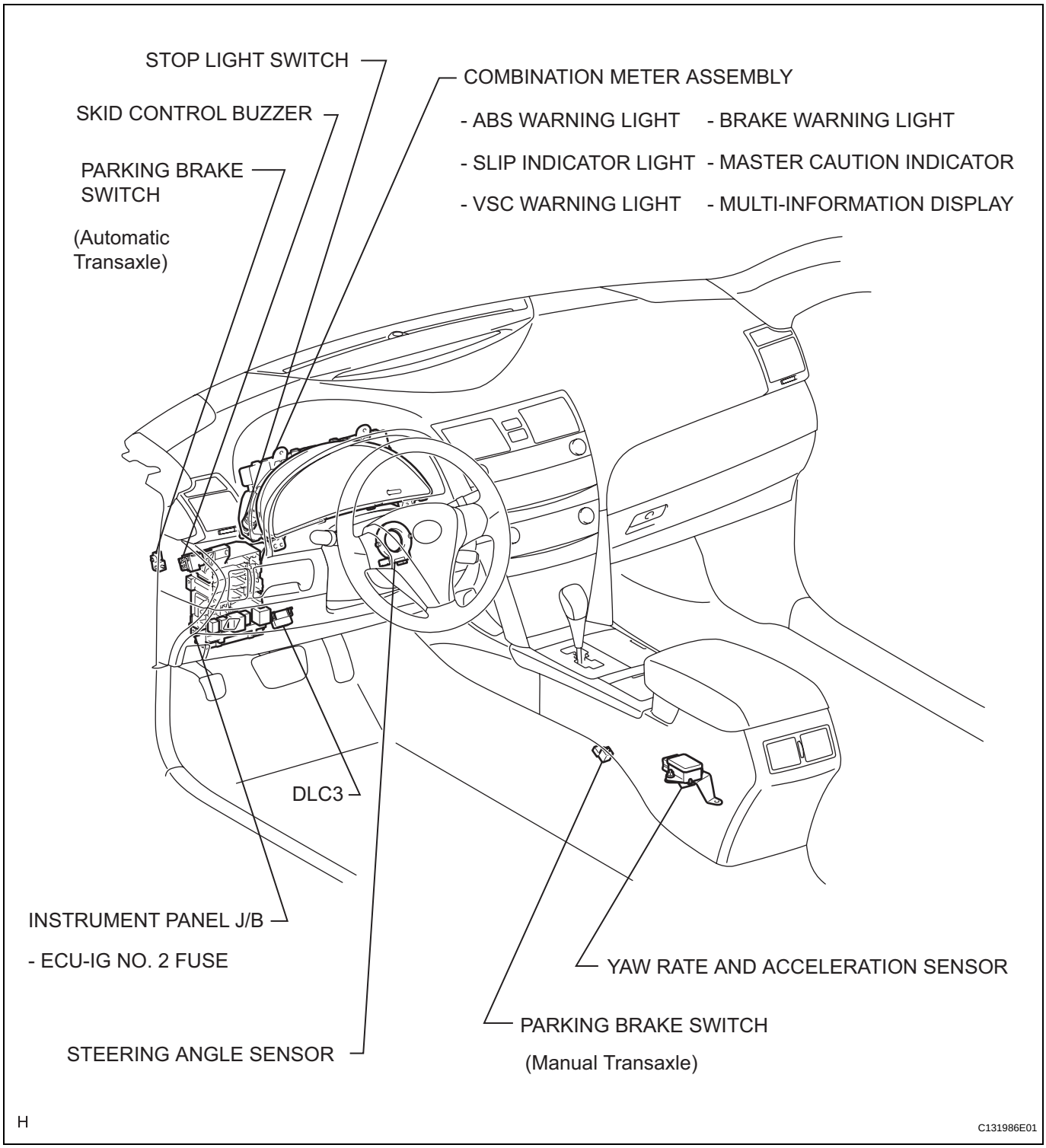
The vehicle may move unexpectedly out of the dynamometer because of TRAC and VSC operations.

NOTICE:

- **Make sure that the VSC warning (multi information display and master caution indicator light) light is blinking (TEST Mode is achieved).**
- **Secure the vehicle with the lock chain for safety.**

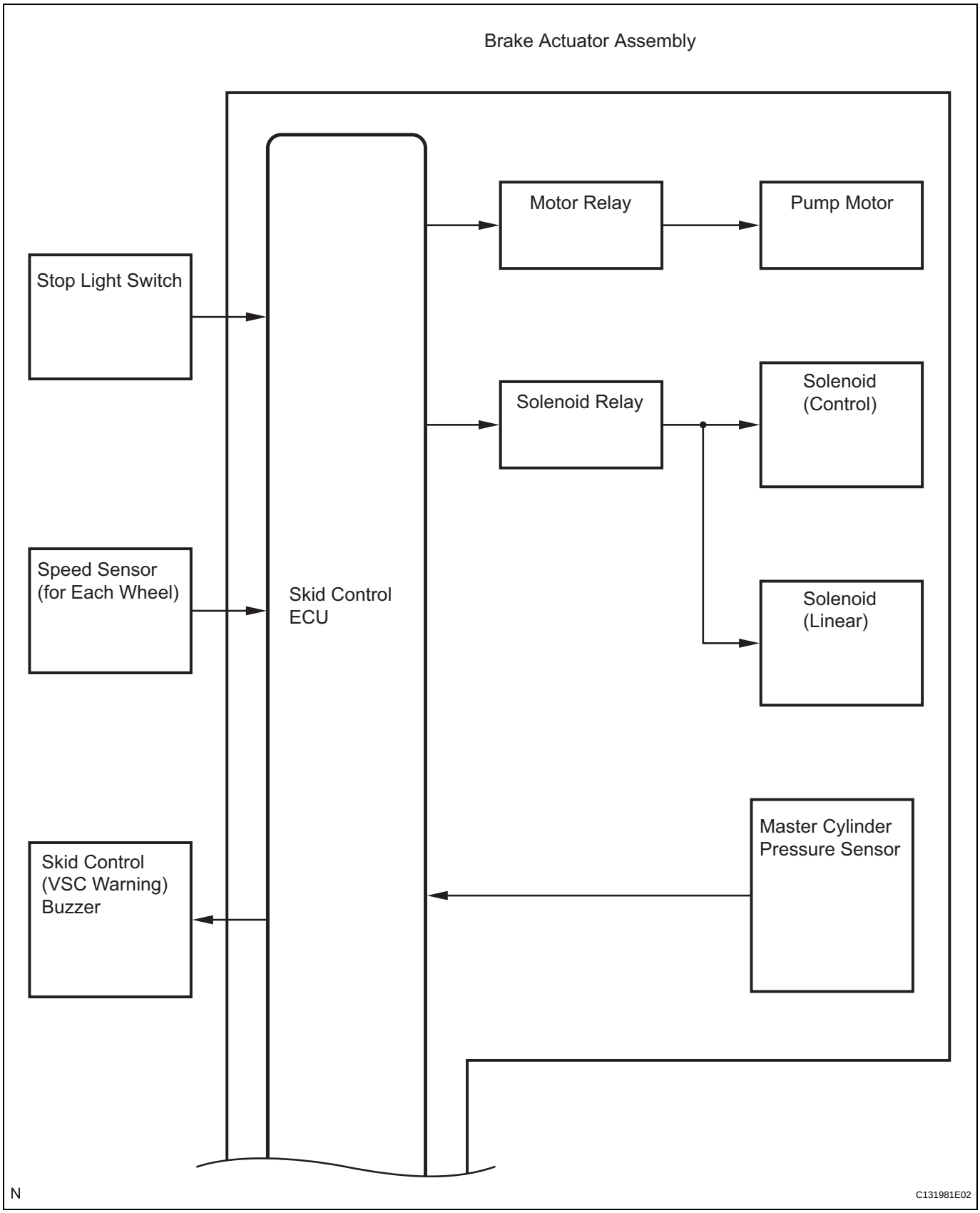
PARTS LOCATION



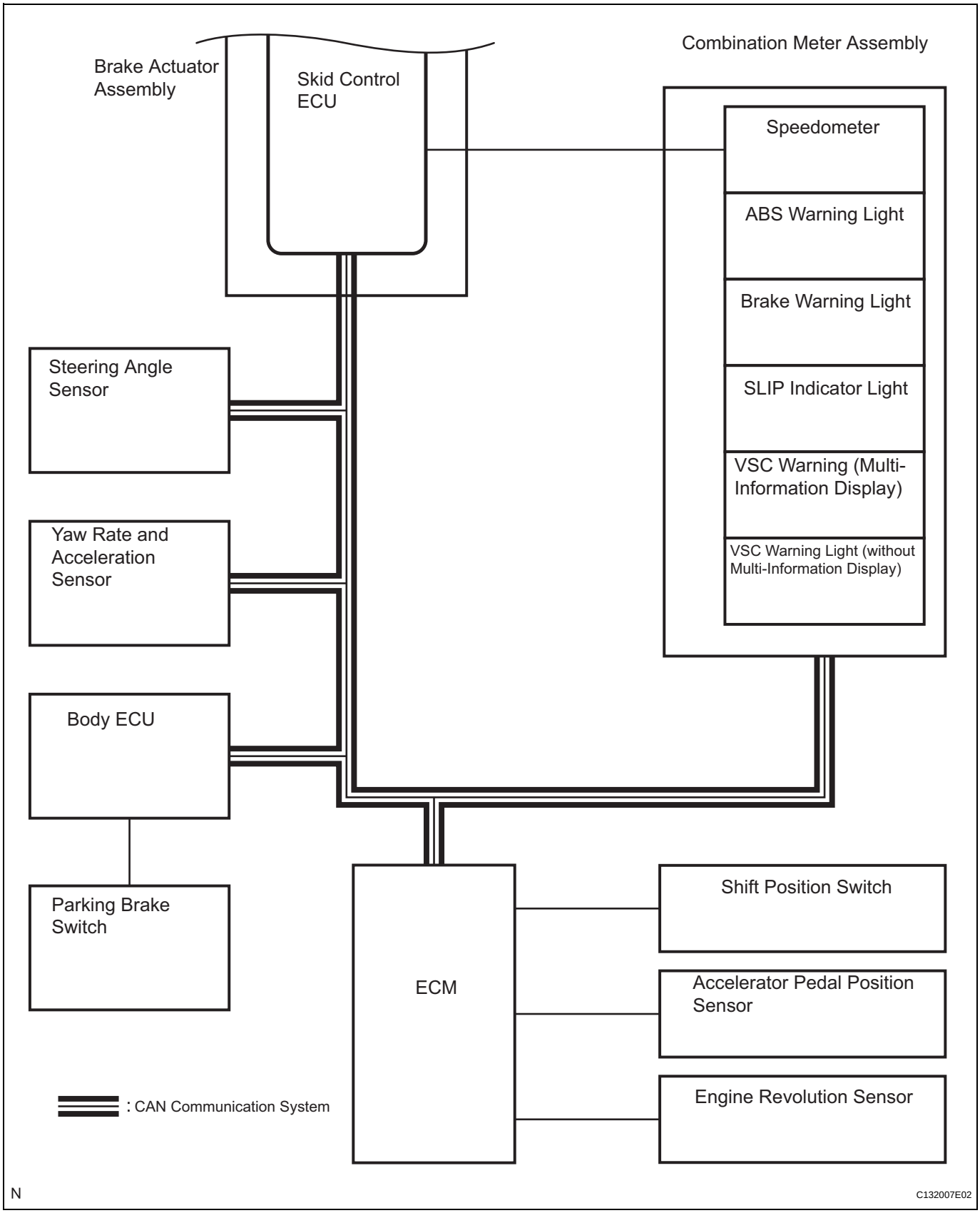

STOP LIGHT SWITCH
SKID CONTROL BUZZER
PARKING BRAKE SWITCH
(Automatic Transaxle)
COMBINATION METER ASSEMBLY
- ABS WARNING LIGHT
- BRAKE WARNING LIGHT
- SLIP INDICATOR LIGHT
- MASTER CAUTION INDICATOR
- VSC WARNING LIGHT
- MULTI-INFORMATION DISPLAY
DLC3
INSTRUMENT PANEL J/B
- ECU-IG NO. 2 FUSE
YAW RATE AND ACCELERATION SENSOR
PARKING BRAKE SWITCH
(Manual Transaxle)
STEERING ANGLE SENSOR
H
C131986E01

BC

SYSTEM DIAGRAM



BC


Brake Actuator Assembly
Skid Control ECU
Combination Meter Assembly
Speedometer
ABS Warning Light
Brake Warning Light
SLIP Indicator Light
VSC Warning (Multi-Information Display)
VSC Warning Light (without Multi-Information Display)
Steering Angle Sensor
Yaw Rate and Acceleration Sensor
Body ECU
Parking Brake Switch
ECM
Shift Position Switch
Accelerator Pedal Position Sensor
Engine Revolution Sensor
: CAN Communication System
N
C132007E02

BC

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication method
ECM	Skid control ECU	• Shift position signal • Throttle position signal • Engine revolution signal • Intake air temperature signal • Engine torque request signal • Accelerator pedal position signal	CAN communication system
Skid control ECU	Yaw rate and acceleration sensor	Yaw rate and acceleration request signal	CAN communication system
Skid control ECU	Steering angle sensor	Steering angle sensor request signal	CAN communication system
Skid control ECU	ECM	• Wheel speed signal • VSC data signal	CAN communication system
Skid control ECU	Combination meter	• Wheel speed signal • ABS warning light ON signal • BRAKE warning light ON signal • VSC warning light ON signal (*1) • Multi information display ON signal (*2) • SLIP indicator light ON signal • Master caution indicator light ON signal	CAN communication system
Main body ECU	Skid control ECU	Parking brake switch signal	CAN communication system

(*1): without multi-information display (Combination meter)
(*2): with multi-information display (Combination meter)

BC

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

HINT:

- The skid control ECU is located within the brake actuator assembly.
- The yaw rate sensor and acceleration sensor are combined in a single unit. This unit communicates with the skid control ECU through the CAN communication system.

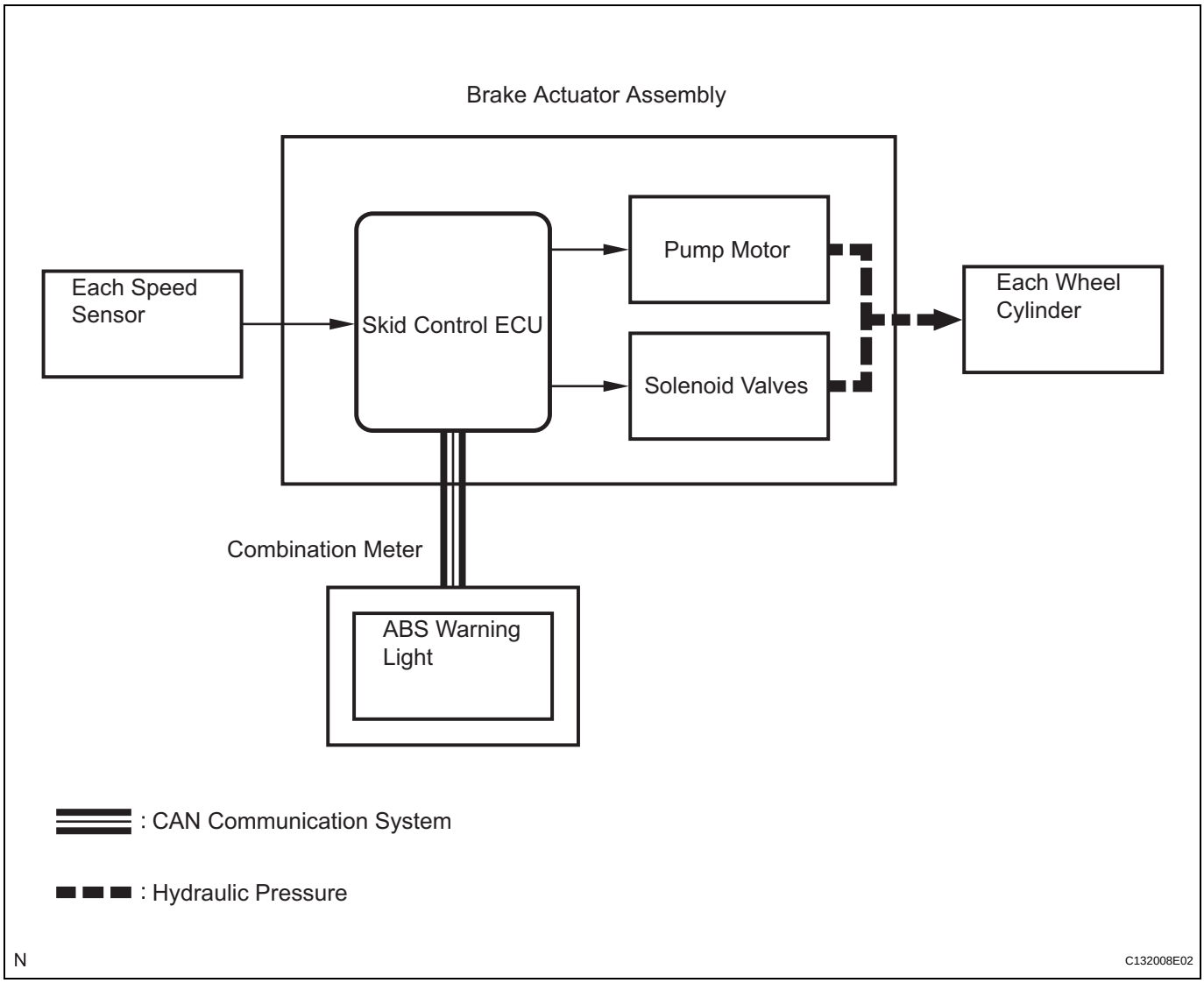
(a) ABS operation

(1) Based on the signals received from the 4 wheel speed sensors, the skid control ECU calculates the deceleration and speed of each wheel, while monitoring for wheel lock. If wheel lock is occurring, the ECU controls the solenoid valves in the brake actuator in order to adjust the hydraulic pressure applied to the brakes at each wheel.

2. FUNCTION DESCRIPTION

(a) ABS (Anti-lock Brake System)

The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

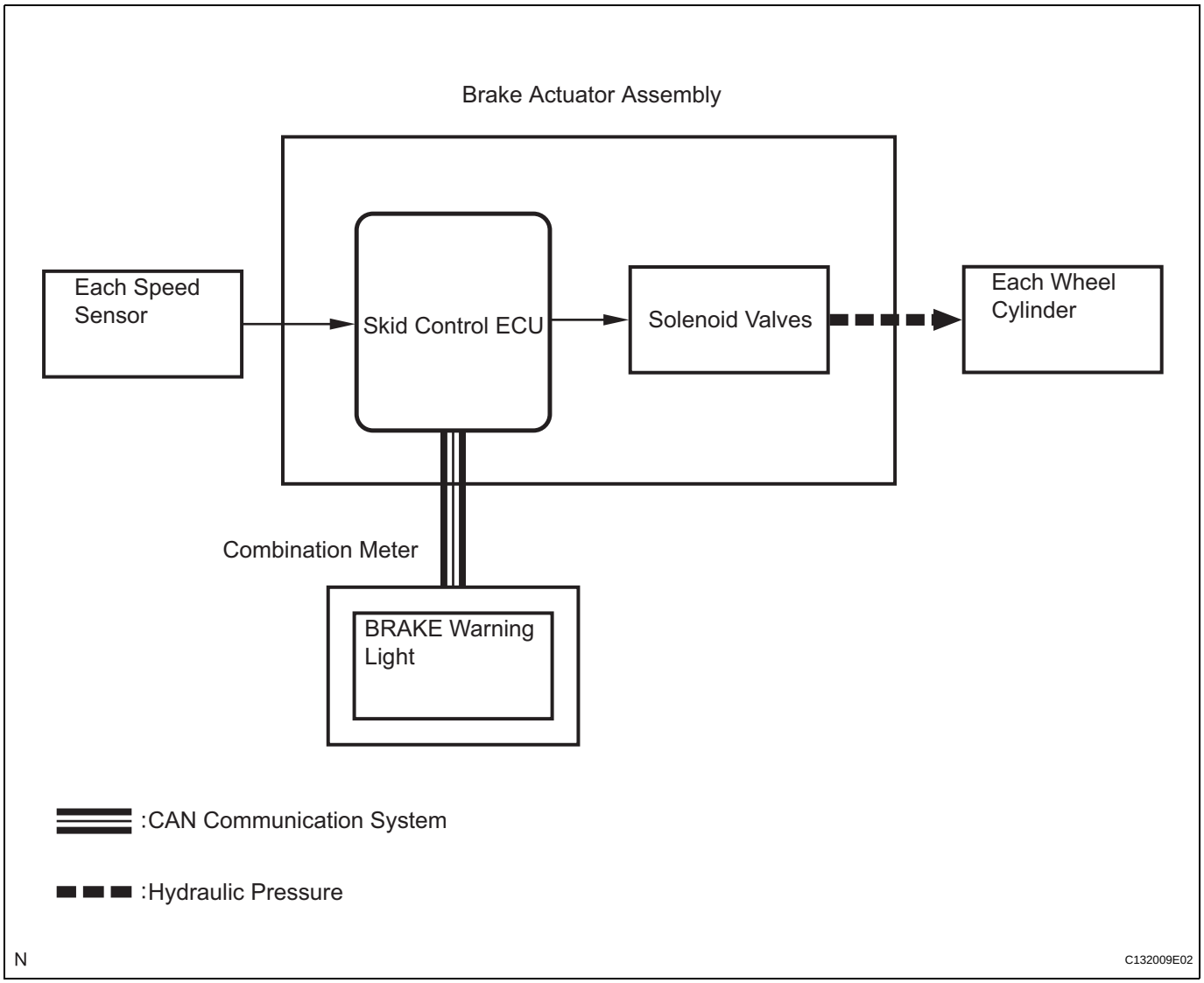


(1) Operation description

The skid control ECU detects wheel lock condition by receiving vehicle speed signals from each speed sensor, and sends control signals to the pump motor and solenoid valves. The pump motor and solenoid valves avoid wheel lock by controlling the hydraulic pressure of each wheel cylinder.

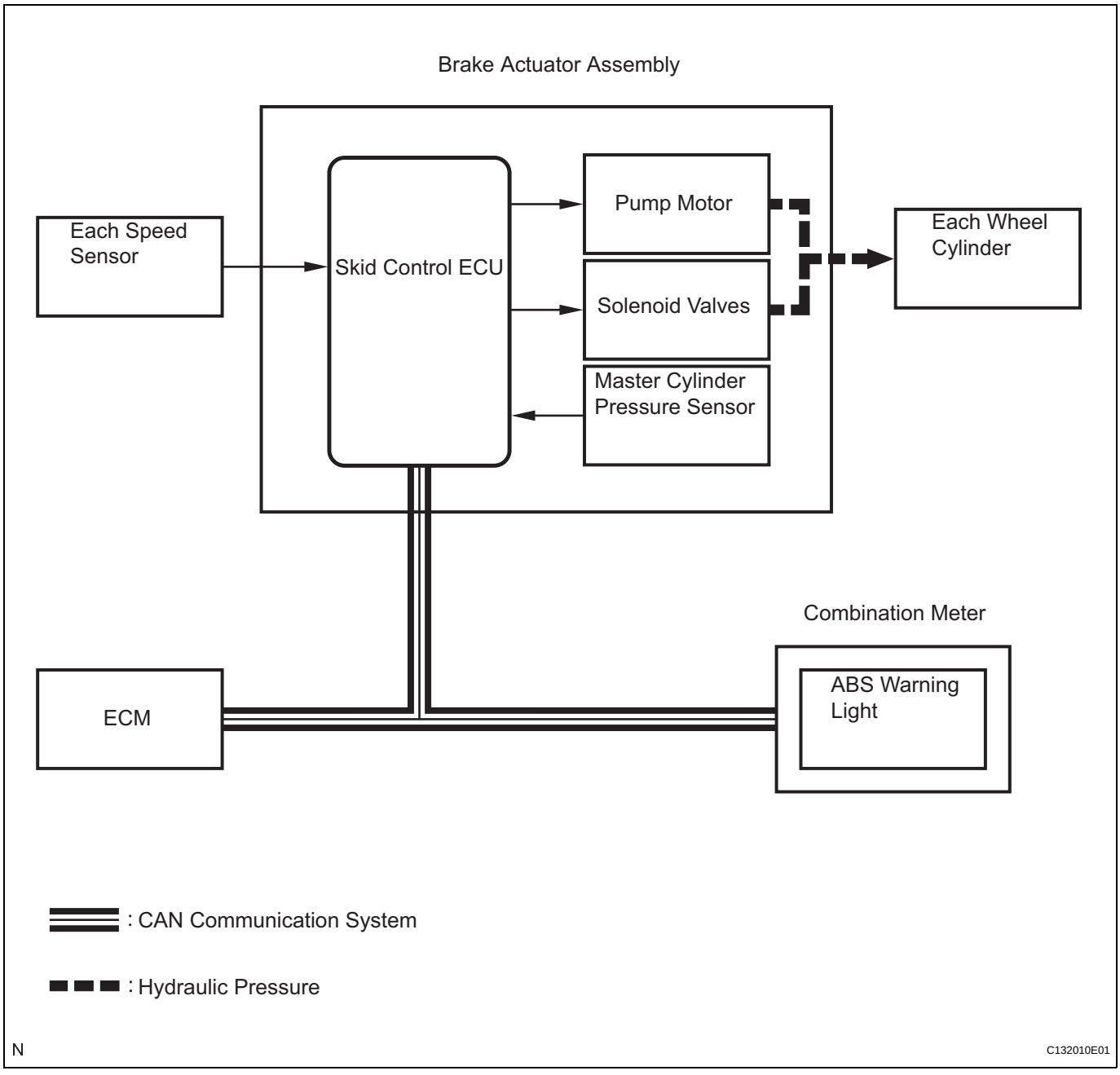
The ABS warning light comes on when the ABS system is malfunctioning.

(b) EBD (Electronic Brake force Distribution)
The EBD control utilizes ABS, which ensures proper brake force distribution between the front and rear wheels in accordance with driving conditions. In addition, when braking while cornering, it also controls the brake forces of the right and left wheels, helping to maintain vehicle behavior.



(1) Operation description
The skid control ECU receives a speed signal from each speed sensor, and uses these signals to detect locking of the wheels. The ECU uses this information in order to determine appropriate control of the solenoid valves.
The solenoid valves control the hydraulic pressure applied to the brake cylinder at each wheel. In this way, the solenoid valves are used to control the brake power split between the front and rear, and left and right wheels. The BRAKE warning light comes on if there is a malfunction in the EBD system.

(c) BA (Brake Assist)
The primary purpose of the brake assist system is to provide auxiliary brake force to assist a driver who cannot generate a large enough brake force during emergency braking. This system helps to maximize the brake performance of the vehicle.



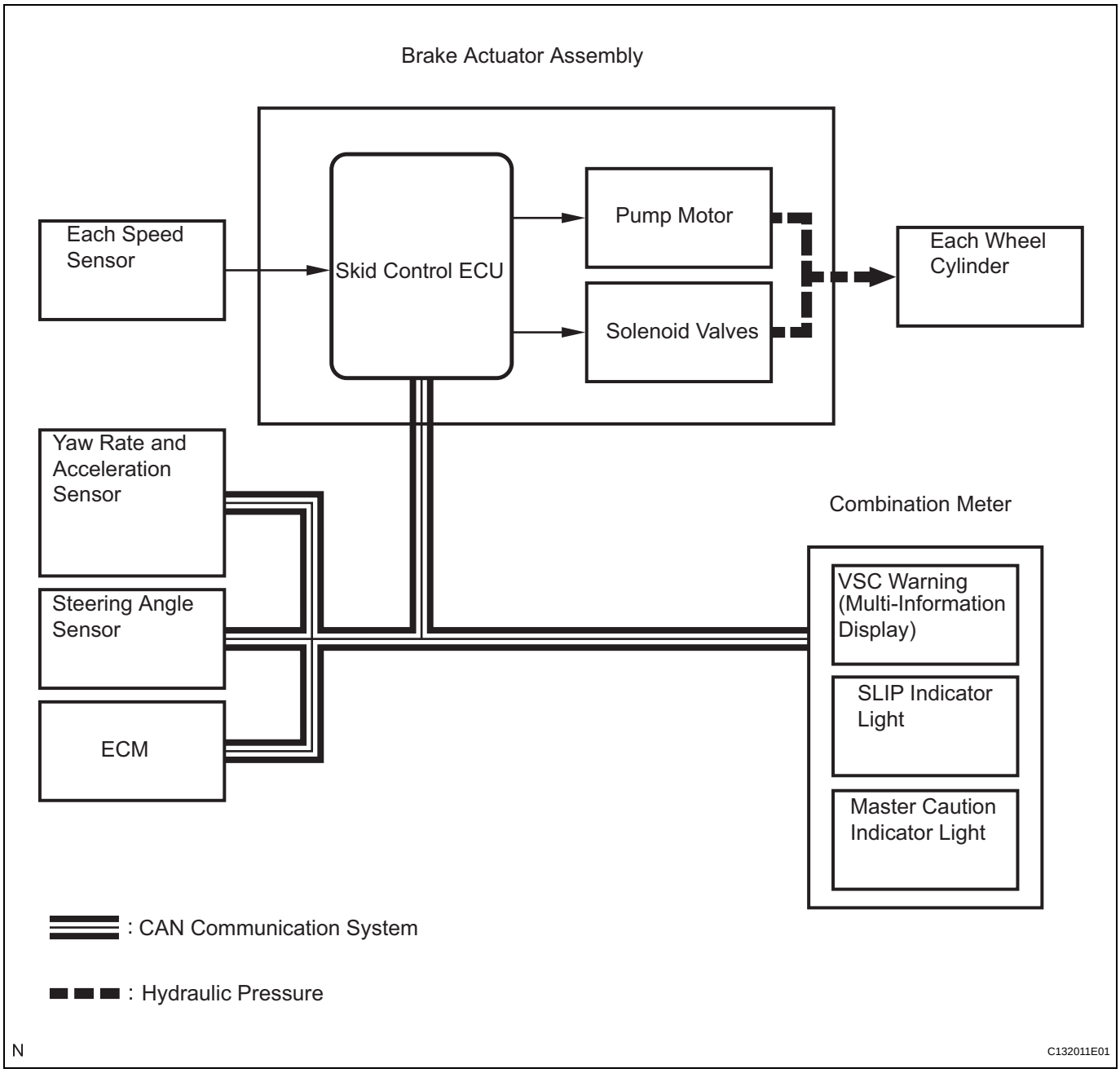
(1) Operation description

The skid control ECU receives the speed signal from each speed sensor and the hydraulic pressure signal from the master cylinder pressure sensor to determine whether brake assist is necessary. If brake assist is considered to be necessary, the skid control ECU sends control signals to the pump motor and solenoid valve.

The pump and solenoid valve then control the pressure applied to each wheel cylinder.

The ABS warning light comes on to indicate a malfunction in the BA (brake assist) system.

(d) TRAC (Traction Control)
The TRAC system helps prevent the drive wheel from slipping if the driver depresses the accelerator pedal excessively when starting off or accelerating on a slippery surface.

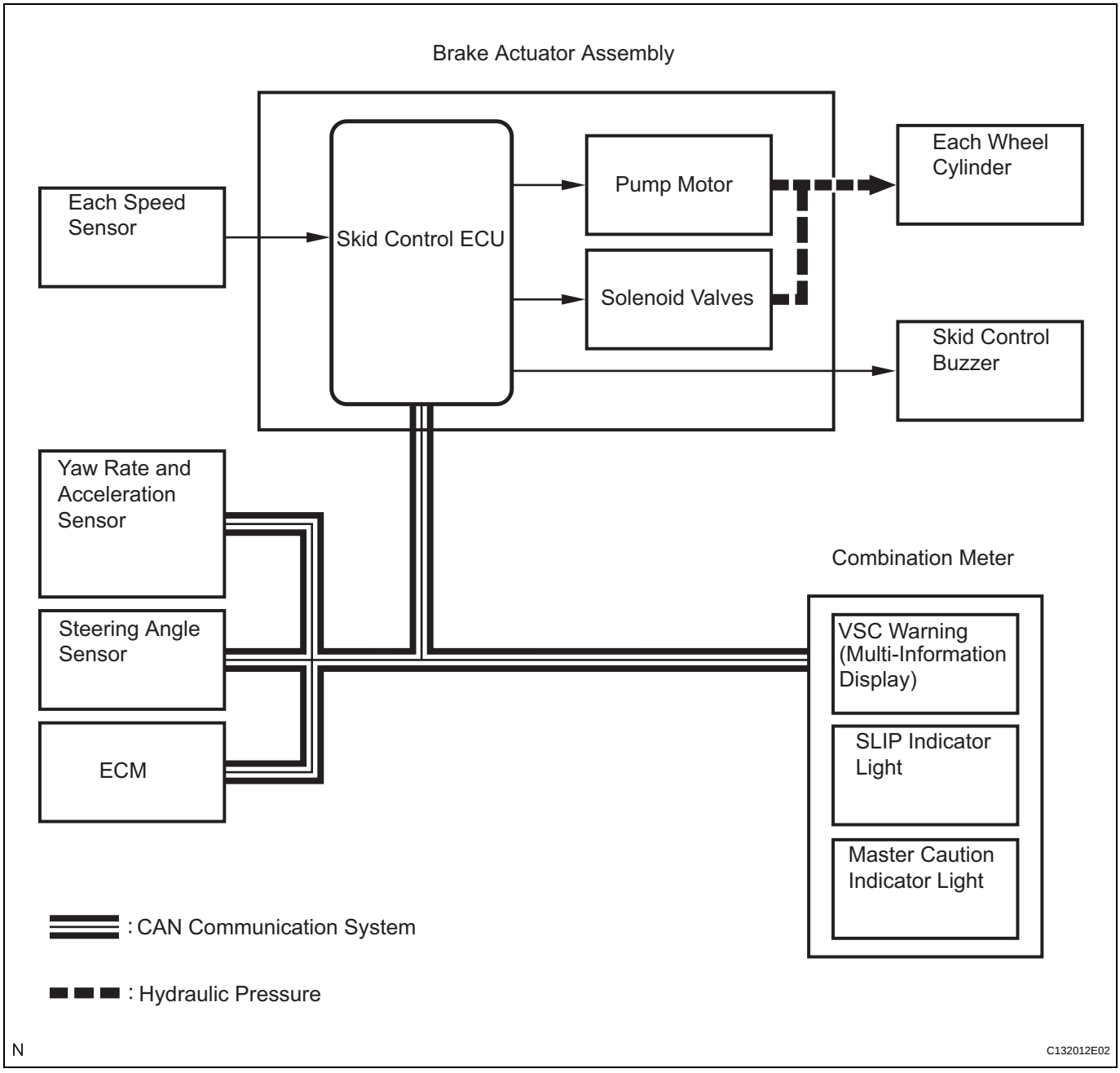


(1) Operation description

The skid control ECU detects wheelspin condition by receiving signals from each speed sensor and the ECM via CAN communication. The skid control ECU controls engine torque with the ECM via CAN communication and brake hydraulic pressure through the pump and solenoid valve.

The SLIP indicator light blinks when the system is operating. If a malfunction occurs in the TRAC system, both master caution and SLIP indicator lights will come on and the DTC will be displayed on the multi-information display.

(e) VSC (Vehicle Stability Control)
The VSC system helps prevent the vehicle from slipping sideways as a result of a strong front or rear wheel skid during cornering.



(1) Operation description

The skid control ECU determines the vehicle operating conditions based on signals received from the wheel speed sensors, yaw rate and acceleration sensor, and steering angle sensor. The skid control ECU sends signals via CAN communication to the ECM in order to control engine torque. The skid control ECU controls brake hydraulic pressure using the pump and solenoid valves.

The SLIP indicator light will blink, and the skid control system buzzer will sound when the system is operating. If a malfunction occurs in the VSC system, both the master caution indicator light and the SLIP indicator light will come on. In addition to this, the DTC will appear on the multi-information display. Vehicles without a multi-information display will illuminate the VSC warning light and SLIP indicator light if a malfunction occurs.

3. ABS with EBD, BA, TRAC and VSC OPERATION

(a) The skid control ECU calculates vehicle stability tendency based on the signals from the speed sensor, yaw rate and acceleration sensor, and steering angle sensor. In addition, it evaluates the results of the calculations to determine whether any control actions (control of the engine output torque by electronic throttle control and of the wheel brake pressure by the brake actuator assembly) should be implemented.

(b) The SLIP indicator blinks and the skid control buzzer sounds to inform the driver that the VSC system is operating. The SLIP indicator also blinks when traction control is operating, and the operation being performed is displayed.

4. FAIL SAFE

(a) When a failure occurs in the ABS with BA, TRAC and VSC systems, the ABS and VSC warning (with multi-information display) lights, and SLIP indicator light come on and ABS with BA, TRAC and VSC operations are prohibited. In addition, when there is a failure that disables the EBD operation, the BRAKE warning light also comes on and the EBD operation is prohibited.

(b) If control is prohibited due to a malfunction during operation, control will be disabled gradually. This is to avoid sudden vehicle instability.

5. INITIAL CHECK

(a) When the vehicle speed first becomes approximately 4 mph (6 km/h) or more after the ignition switch is turned on (IG), each solenoid valve and motor of the brake actuator assembly is sequentially activated to perform an electrical check. During the initial check, the operating sound of solenoid valve and motor can be heard from the engine compartment, but this is not a malfunction.

6. FUNCTION OF COMPONENTS

Components	Function
Brake actuator assembly	• Changes the fluid path based on the signals from the skid control ECU during the operation of the ABS with EBD & Brake Assist & TRAC & VSC system, in order to control the fluid pressure that is applied to the wheel cylinders. • Houses the skid control ECU.
Skid control ECU (housed in brake actuator assembly)	• Judges the vehicle driving condition based on the signals from each sensor, and controls the brake actuator assembly. • Sends and receives the control signals to or from the ECM, yaw rate and acceleration sensor, and steering angle sensor via CAN communication.
Master cylinder pressure sensor	• Detects the fluid pressure in the master cylinder. • Housed in the brake actuator assembly.
Speed sensor	Detects speed of each wheel and inputs the data into the skid control ECU.
Stop light switch	Illuminates the brake light when the brake pedal is depressed. (Sends a brake on signal to the skid control ECU)
Motor relay	• Supplies power to the pump motor. • Housed in the skid control ECU.
Solenoid relay	• Supplies power to each solenoid. • Housed in the skid control ECU.
ECM	• Controls the engine output based on the signals received from the skid control ECU. • Sends the accelerator pedal position signal and the engine speed signal to the skid control ECU.
ABS warning light	• Comes on to inform the driver that a malfunction in the ABS, EBD or BA (Brake Assist) has occurred. • Blinks to output DTC.
BRAKE warning light	• Comes on to inform the driver that the parking brake is ON when the system is normal. • Comes on to inform the driver that a malfunction in the EBD has occurred.
VSC warning light	Comes on to inform the driver that a malfunction in the VSC system has occurred.
SLIP indicator light	Blinks to inform the driver that TRC and VSC are operating.
Brake fluid level warning switch	Detects the brake fluid level.
Skid control buzzer	Intermittently sounds to inform the driver that the VSC is operating.
Yaw rate and acceleration sensor	• Acceleration sensor measures the capacity of the condenser that changes the distance between the electrodes depending on G force, which occurs when the vehicle is accelerated, and converts the measured value into electrical signals. • Yaw rate sensor detects the vehicle's angular velocity (yaw rate) in the vertical direction based on the amount and direction of the piezoelectric ceramics deflection. • Sends signals to the skid control ECU via CAN communication.
Steering angle sensor	• Installed in the steering column. • Detects the steering amount and direction and sends the signals to the skid control ECU via CAN communication. • Has the magnetic resistance element, which detects the rotation of the magnet housed in the detection gear in order to detect the changes in magnetic resistance and the steering amount and direction.

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble.

NEXT

3	CHECK CAN COMMUNICATION SYSTEM

(a) Check for DTCs (See page BC-302).
HINT:
The skid control ECU is connected to the CAN communication system.
Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → CHECK CAN COMMUNICATION CIRCUIT

A

4	CHECK DTC AND FREEZE FRAME DATA

(a) Check for DTCs and Freeze Frame Data (See page BC-302 for DTC Check / Clear, BC-305 for Freeze Frame Data).
(1) Record the DTCs and Freeze Frame Data.
(b) Clear the DTCs.
(c) Recheck for DTCs.
(1) Reproduce the malfunction and check if the DTCs are output again.

Result

Result	Proceed to
DTC is output	A
DTC is not output (Problem symptom does not occur)	B
DTC is not output (Problem symptom occurs)	C

B → GO TO STEP 9

C → **GO TO STEP 10**

A

5	**DIAGNOSTIC TROUBLE CODE CHART**

(a) Go to "DIAGNOSTIC TROUBLE CODE CHART" (See page BC-311).

NEXT

6	**CIRCUIT INSPECTION**

NEXT

BC

7	**REPAIR OR REPLACE**

NEXT

8	**CONFIRMATION TEST**

NEXT

END

9	**SYMPTOM SIMULATION**

NEXT

10	**PROBLEM SYMPTOMS TABLE**

(a) Go to "PROBLEM SYMPTOMS TABLE" (See page BC-295).

NEXT

11	**CIRCUIT INSPECTION**

NEXT

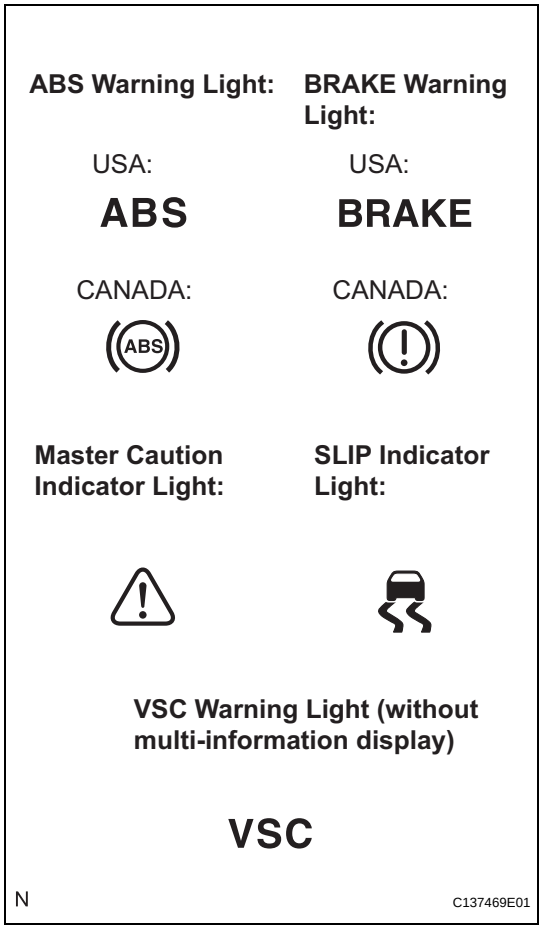
12	REPAIR OR REPLACE

NEXT

13	CONFIRMATION TEST

NEXT

END



TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

Before releasing the parking brake, move the shift lever to the P position for safety (Automatic Transaxle model) or set the chocks to hold the vehicle for safety (Manual Transaxle model).

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS, VSC (without multi-information display), BRAKE warning lights, and master caution, SLIP indicator lights come on for approximately 3 seconds.

HINT:

If the ECU stores any DTCs, the ABS, BRAKE, VSC warning (without multi-information display and master caution indicator light) lights, and SLIP indicator light come on.

If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

Trouble Area	See procedure
ABS warning light (Remains on)	BC-380
ABS warning light (Does not come on)	BC-385
BRAKE warning light (Remains on)	BC-395
BRAKE warning light (Does not come on)	BC-404
VSC warning light (Remains on)	BC-388
VSC warning light (Does not come on)	BC-392
SLIP indicator light (Remains on)	BC-408
SLIP indicator light (Does not come on)	BC-412

2. SENSOR SIGNAL CHECK BY TEST MODE (SIGNAL CHECK) (INTELLIGENT TESTER)

HINT:

If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check function will be erased.

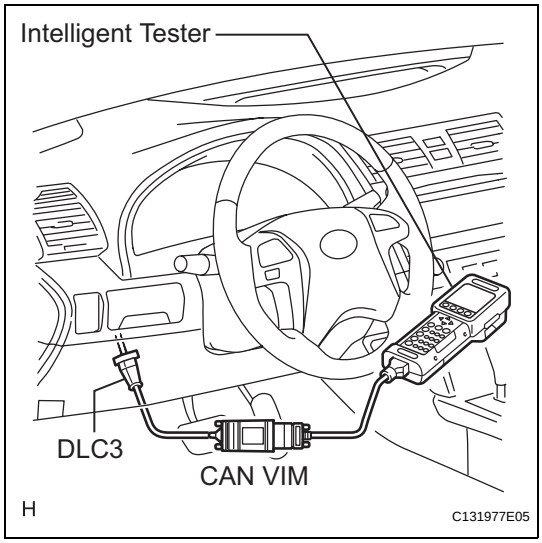
(a) Procedure to enter Test Mode.

(1) Turn the ignition switch off.

(2) Connect the intelligent tester to the DLC3.

(3) Check that the steering wheel is centered and move the shift lever to the P position (Automatic Transaxle) or apply the parking brake (Manual Transaxle).

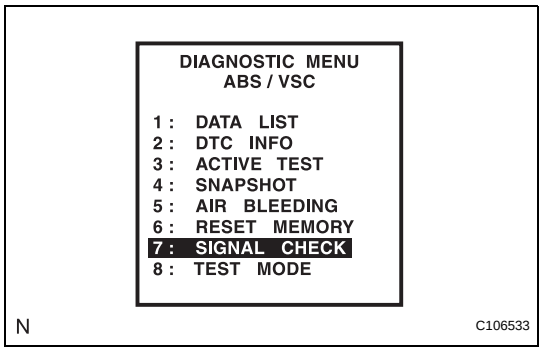
(4) Turn the ignition switch on (IG).

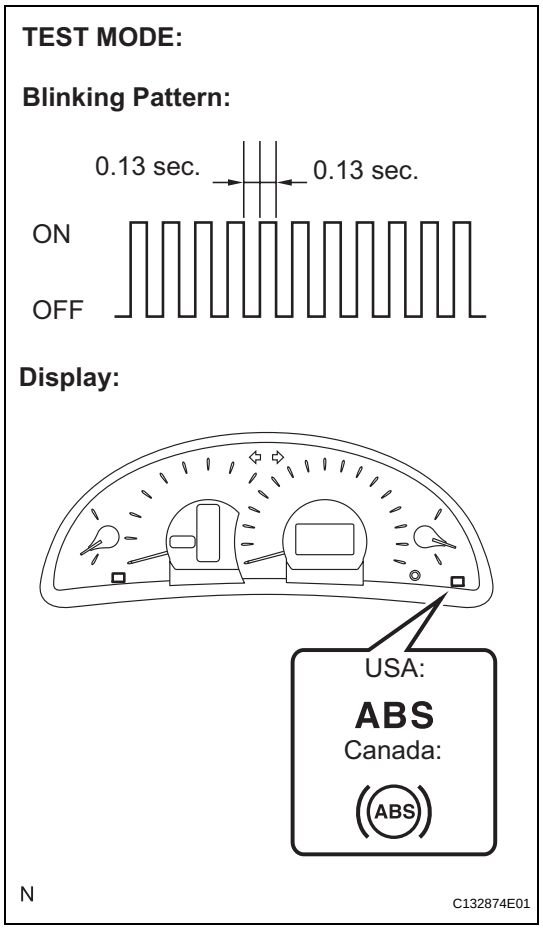


(5) Set the intelligent tester to Test Mode (select "SIGNAL CHECK").

HINT:

Refer to the intelligent tester operator's manual for further details.





(6) Check that the ABS warning light comes on for several seconds and then blinks in Test Mode.
HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit.

Trouble Area	See procedure
ABS warning light (Does not come on)	BC-404

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheelspin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**

(d) Read the DTC(s) by following the tester screen.
NOTICE:
- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:
See the list of DTCs (See procedure "A").

3. SENSOR SIGNAL CHECK BY TEST MODE (SIGNAL CHECK) (SST CHECK WIRE)

HINT:
If the ignition switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the signal check will be erased.

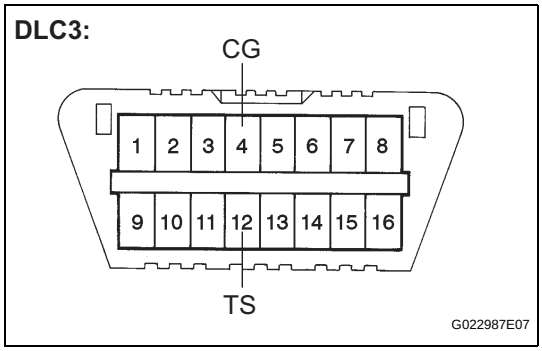
(a) Procedure to enter Test Mode.
(1) Turn the ignition switch off.

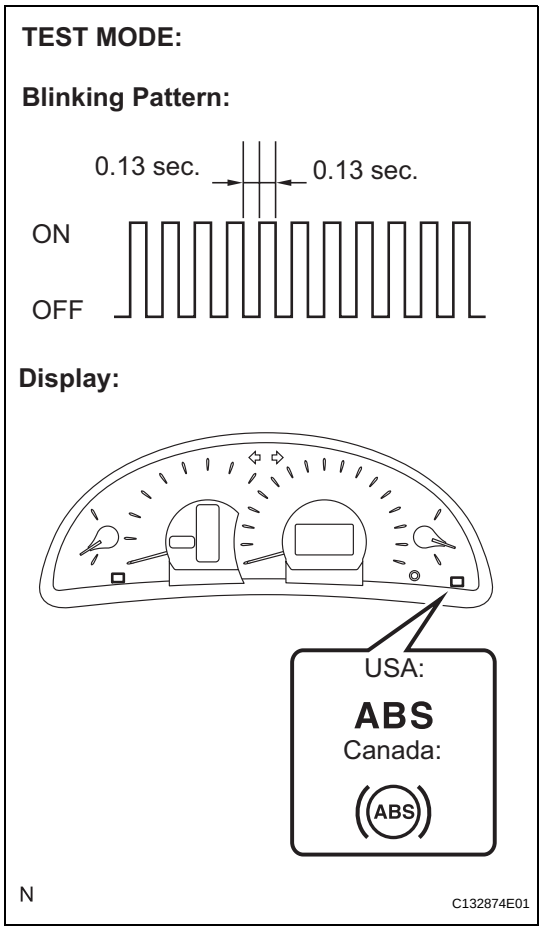
BC

(2) Check that the steering wheel is centered and move the shift lever to the P position (Automatic Transaxle) or apply the parking brake (Manual Transaxle).

(3) Using SST, connect terminals TS and CG of the DLC3.
SST 09843-18040

(4) Turn the ignition switch on (IG).



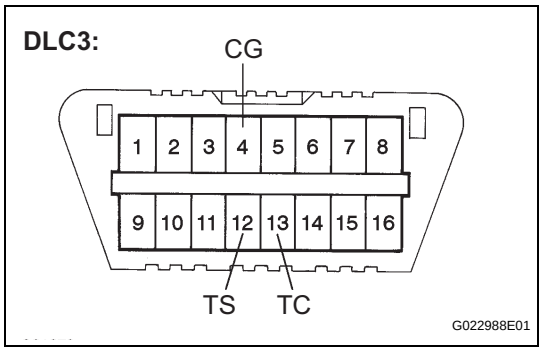


(5) Check that the ABS warning light comes on for several seconds and then blinks in Test Mode.
HINT:
If the ABS warning light does not blink, inspect the TS and CG terminal circuit, and ABS warning light circuit.

Trouble Area	See procedure
TS and CG terminal circuit	BC-421
ABS warning light circuit (Does not come on)	BC-385

(b) Check the sensor signal.
(1) Drive the vehicle straight ahead.
Accelerate the vehicle to a speed of 28 mph (45 km/h) or more for several seconds and check that the ABS warning light goes off when the brake pedal is depressed.
HINT:
- The sensor check may not be completed if wheelspin occurs, or if the steering wheel is turned during this check.
- The ABS warning light goes off when the sensor signal check has been completed and the brake pedal is depressed.
- The ABS warning light comes on immediately after a malfunction has been detected during the speed sensor signal check.

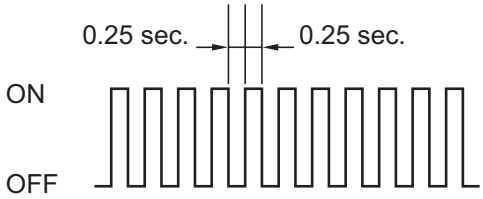
(c) Stop the vehicle.
NOTICE:
- **The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.**
- **If the signal check has not been completed, the ABS warning light will blink while driving and the ABS system will not operate.**



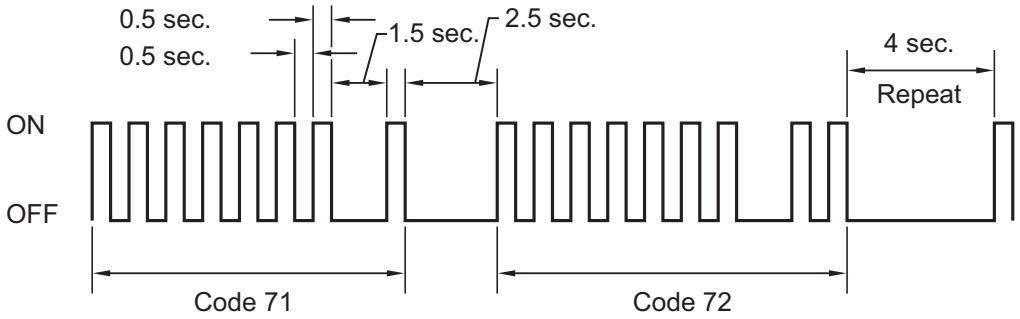
(d) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(e) Count the number of blinks of the ABS warning light.

Blinking Pattern of Normal System Code:



Blinking Pattern of Trouble Code (Example Codes 71 and 72):



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NOTICE:

- **If only the DTCs are displayed, repair the malfunction area and clear the DTCs.**
- **If the DTCs or Test Mode codes (DTC of signal check function) are displayed, repair the malfunction area, clear the DTCs and perform the Test Mode inspection.**

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See the list of DTCs (See procedure "A").

(f) After performing the check, disconnect the SST from terminals TS and CG, and TC and CG of the DLC3, and turn the ignition switch off.

BC

(g) Turn the engine switch on (IG) to cancel the Test Mode.
HINT:
- If the ignition switch is not turned on (IG) after the SST is removed from the DLC3, the previous Test Mode will continue.
- If the ignition switch is turned on (IG) with terminals TS and CG shorted, the previous Test Mode will continue.

4. DTC OF TEST MODE (SIGNAL CHECK) FUNCTION (Procedure "A")

DTC of Test Mode (Signal Check):

Code No.	Diagnosis	Trouble Area
C1271/71	Low output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Speed sensor rotor
C1272/72	Low output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Speed sensor rotor
C1273/73	Low output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Speed sensor rotor
C1274/74	Low output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Speed sensor rotor
C1275/75	Abnormal change in output signal of front speed sensor RH	• Front speed sensor RH • Sensor installation • Sensor rotor
C1276/76	Abnormal change in output signal of front speed sensor LH	• Front speed sensor LH • Sensor installation • Sensor rotor
C1277/77	Abnormal change in output signal of rear speed sensor RH	• Rear speed sensor RH • Sensor installation • Sensor rotor
C1278/78	Abnormal change in output signal of rear speed sensor LH	• Rear speed sensor LH • Sensor installation • Sensor rotor

HINT:
The codes in this table are output only in Test Mode (signal check).

5. ENGINE VARIANT LEARNING
- Engine variant learning is automatically performed immediately after the Test Mode is entered.
- The ABS, VSC, BRAKE, and SLIP indicators come on for 3 seconds after learning.

PROBLEM SYMPTOMS TABLE

If there are no DTCs output but the problem still occurs, check the circuits for each problem symptom in the order given in the table below, and proceed to the relevant troubleshooting page.

NOTICE:

Before replacing the brake actuator assembly, sensor, or other related parts, turn the ignition switch off.

Vehicle stability control system:

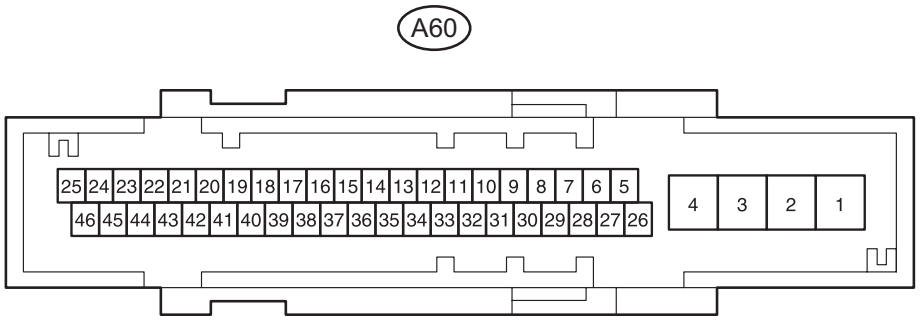
Symptom	Suspected area	See page
ABS, BA and/or EBD does not operate	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. IG power source circuit	BC-361
	3. Front speed sensor circuit	BC-316
	4. Rear speed sensor circuit	BC-324
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function). If abnormal, check the hydraulic circuit for leakage.	BC-431
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
ABS, BA and/or EBD does not operate efficiently	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. Front speed sensor circuit	BC-316
	3. Rear speed sensor circuit	BC-324
	4. Stop light switch circuit	BC-368
	5. Check the brake actuator assembly with the intelligent tester (Check brake actuator assembly operation using the active test function). If abnormal, check the hydraulic circuit for leakage.	BC-431
	6. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
VSC and/or TRACTION does not operate	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. IG power source circuit	BC-361
	3. Check the hydraulic circuit for leakage.	-
	4. Front speed sensor circuit	BC-316
	5. Rear speed sensor circuit	BC-324
	6. Yaw rate and deceleration sensor circuit	BC-343
	7. Steering angle sensor circuit	BC-350
	8. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
ABS sensor DTC check cannot be done	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. TC and CG terminal circuit	BC-418
	3. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432

Symptom	Suspected area	See page
VSC sensor DTC check cannot be done	1. Check for the DTC again and make sure that the normal system code is output.	BC-302
	2. TC and CG terminal circuit	BC-418
	3. If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake actuator assembly (skid control ECU).	BC-432
Sensor signal check cannot be done	1. TS and CG terminal circuit	BC-421
	2. Brake actuator assembly (skid control ECU)	BC-432
ABS warning light abnormal (Remains on)	ABS warning light circuit	BC-380
ABS warning light abnormal (Does not come on)	ABS warning light circuit	BC-385
VSC warning light abnormal (Remains on)	VSC warning light circuit	BC-388
VSC warning light abnormal (Does not come on)	VSC warning light circuit	BC-392
Brake warning light abnormal (Remains on)	Brake warning light circuit	BC-395
Brake warning light abnormal (Does not come on)	Brake warning light circuit	BC-404
SLIP indicator light abnormal (Remains on)	SLIP indicator light circuit	BC-408
SLIP indicator light abnormal (Does not come on)	SLIP indicator light circuit	BC-412
Skid control buzzer abnormal	Skid control buzzer circuit	BC-415

TERMINALS OF ECU

1. TERMINALS OF ECU

Skid Control ECU:



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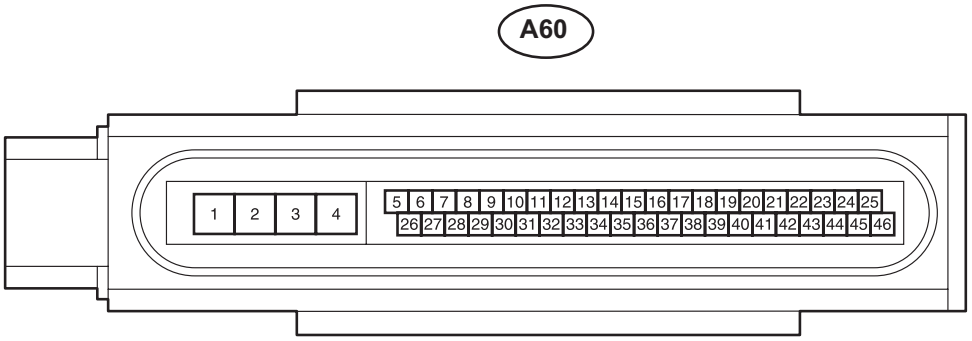
Symbols (Terminal No.)	Terminal Description
GND2 (1)	Skid control ECU ground
+BM (2)	Power supply for motor
+BS (3)	Power supply for solenoid
GND1 (4)	Skid control ECU ground
FL+ (5)	Front left wheel speed sensor input
FL- (6)	Front left wheel speed sensor ground
RL+ (7)	Rear left wheel speed sensor input
RR- (8)	Rear right wheel speed sensor ground
FR- (9)	Front right wheel speed sensor ground
FR+ (10)	Front right wheel speed sensor input
D/G (11)	Diagnosis tester communication line
CANL (14)	CAN communication line L
BZ (23)	Buzzer output
RL- (27)	Rear left wheel speed sensor ground
IG1 (28)	ECU power supply
RR+ (29)	Rear right wheel speed sensor input
STP1 (30)	Stop light switch input
SP1 (33)	Speed signal output
CANH (35)	CAN communication line H
TS (39)	Sensor check switch input

2. TERMINAL INSPECTION

(a) Disconnect the connector and measure the voltage and resistance according to the value(s) in the table below.

Skid Control ECU (Harness Side Connector Front View):



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HINT:
Voltage cannot be measured with the connector connected to the skid control ECU, as the connector is watertight.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND2 (A60-1) - Body ground	W-B - Body ground	Actuator pump motor ground	Always	Below 1 Ω
+BM (A60-2) - Body ground	B - Body ground	Power supply for motor	Always	10 to 14 V
+BS (A60-3) - Body ground	L - Body ground	Power supply for solenoid	Always	10 to 14 V
GND1 (A60-4) - Body ground	W-B - Body ground	Skid control ECU ground	Always	Below 1 Ω
BZ (A60-23) - Body ground	R - Body ground	Buzzer warning light output	Ignition switch on (IG), Buzzer does not sound	6 to 10 V
IG1 (A60-28) - Body ground	P - Body ground	IG1 power supply	Ignition switch on (IG)	10 to 14 V
STP1 (A60-30) - Body ground	P - Body ground	Stop light switch input	Stop light switch ON →OFF (Brake pedal depressed → released)	5 to 14 V → Below 3 V

DIAGNOSIS SYSTEM

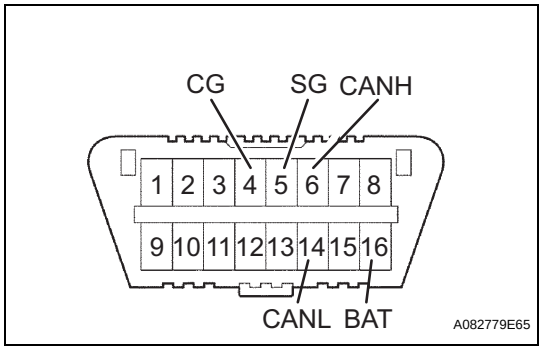
1. DIAGNOSIS SYSTEM

(a) Inspect the battery voltage.

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.



(b) The vehicle's ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists on either the vehicle side or the tester side.

If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.

If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

BC

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	9 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher

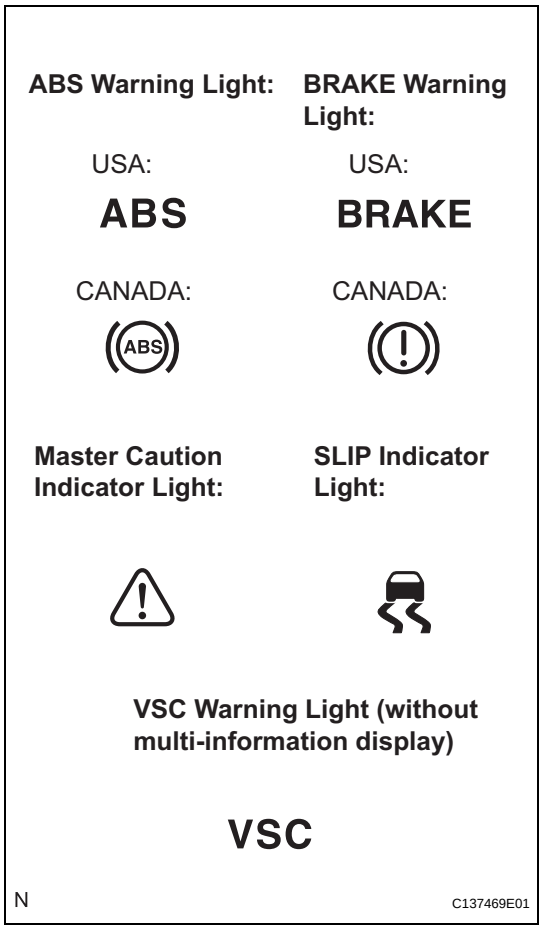
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

2. DESCRIPTION

NOTICE:

When releasing the parking brake, set chocks to hold the vehicle for safety.

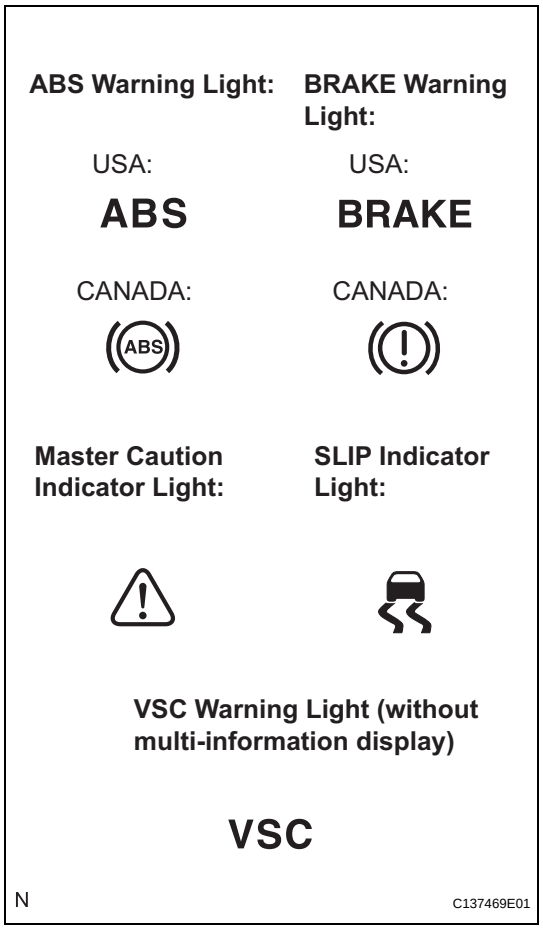


(a) If the skid control ECU detects a malfunction, the ABS, VSC (without multi-information display), and BRAKE warning lights, and master caution and SLIP indicator lights will come on and the multi-information display shows a warning message in order to warn the driver.
The table below indicates which lights will come on when there is a malfunction in a particular function.

Item/Trouble Area	ABS	EBD	BA	TRAC	VSC
ABS Warning Light	O	O	O	-	-
BRAKE Warning Light	-	O	-	-	-
VSC Warning Light (without multi-information display)	O	O	O	O	O
SLIP Indicator Light	O	O	O	O	O

O: Light ON
-: Light OFF

- The DTCs are simultaneously stored in the memory. The DTCs can be read by connecting the SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS warning light by connecting the intelligent tester (See page BC-302).
- This system has a signal check function (TEST MODE) (See page BC-290).
  The DTC can be read by connecting the intelligent tester and observing the blinking pattern of the ABS warning.



3. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

Before releasing the parking brake, move the shift lever to the P position for safety (Automatic Transaxle model) or set the chocks to hold the vehicle for safety (Manual Transaxle model).

HINT:

When the parking brake is applied or the level of the brake fluid is low, the BRAKE warning light comes on.

(b) When the ignition switch is turned on (IG), check that the ABS, VSC (without multi-information display), and BRAKE warning lights, and master caution and SLIP indicator lights come on for approximately 3 seconds.

HINT:

If the ECU stores any DTCs, the ABS, BRAKE, and VSC warning (multi-information display and master caution indicator light) lights, and SLIP indicator light come on.

If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

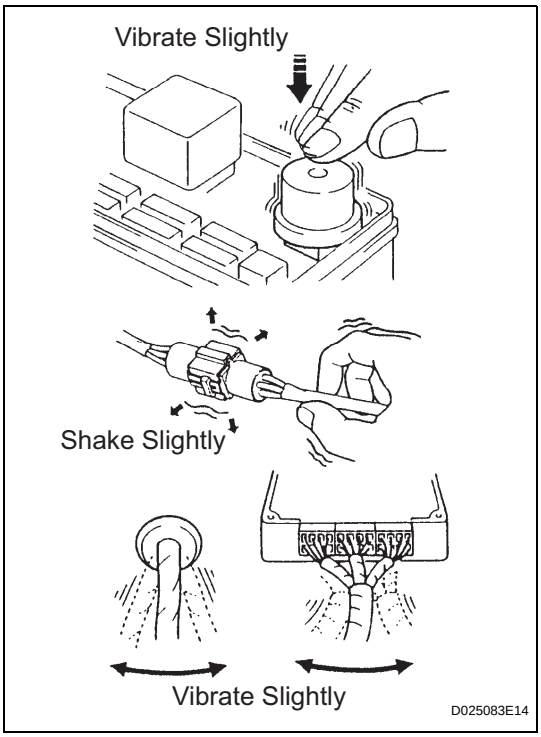
BC

Trouble Area	See procedure
ABS warning light (Remains on)	BC-380
ABS warning light (Does not come on)	BC-385
BRAKE warning light (Remains on)	BC-395
BRAKE warning light (Does not come on)	BC-404
VSC warning light (Remains on)	BC-388
VSC warning light (Does not come on)	BC-392
SLIP indicator light (Remains on)	BC-408
SLIP indicator light (Does not come on)	BC-412

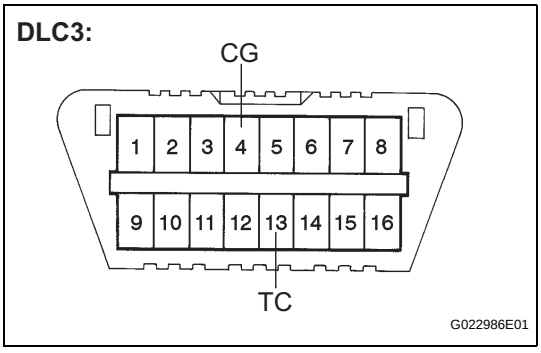
4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation. This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.
HINT:
Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is turned on (IG)).
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.
(2) Slightly shake the connector vertically and horizontally.
HINT:
Shaking the relays too strongly may result in open relays.
(3) Slightly shake the wire harness vertically and horizontally. The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

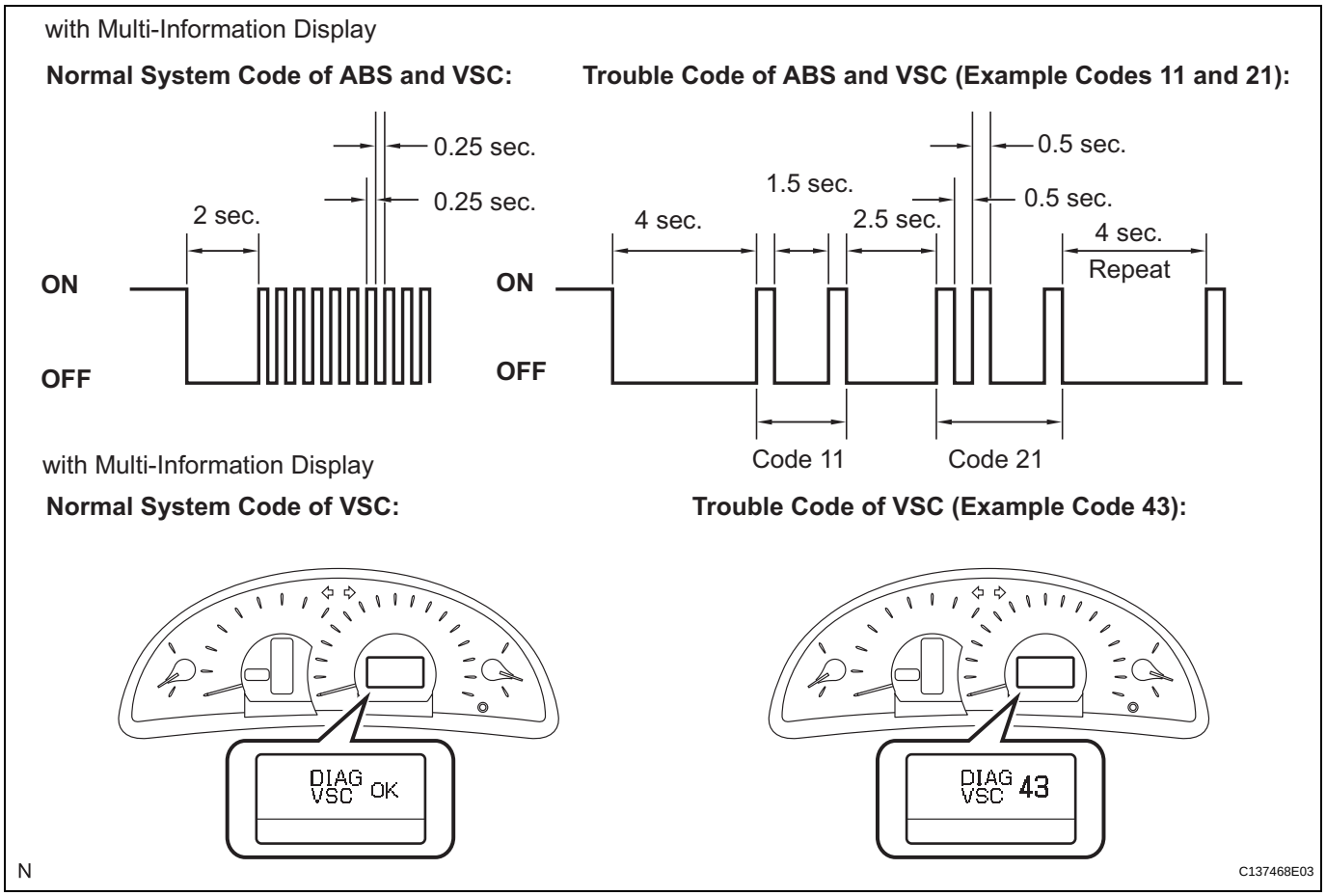


DTC CHECK / CLEAR

1. DTC CHECK/CLEAR (WHEN USING SST CHECK WIRE:)

(a) DTC check
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch on (IG).

(3) Observe the blinking pattern of the ABS and VSC (without multi-information display) warning lights or read the multi information display (with multi-information display) in order to identify the DTC.



HINT:
If no code appears, inspect the TC and CG terminal circuit, the ABS warning light circuit, and the VSC warning light circuit.

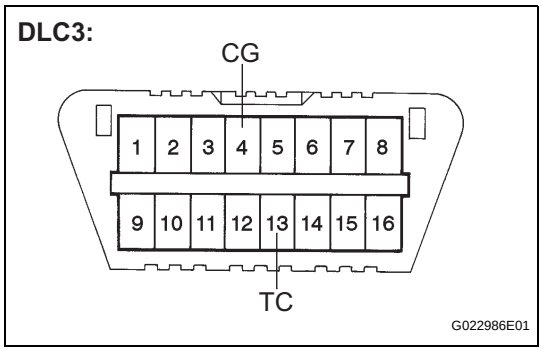
Trouble Area	See procedure
ABS warning light (Remains on)	BC-380
ABS warning light (Does not come on)	BC-385
VSC warning light (Remains on)	BC-388
VSC warning light (Does not come on)	BC-392
TC and CG Terminal Circuit	BC-418

- As an example, the blinking patterns for a normal system code and trouble codes 11 and 21 are shown in the illustration.

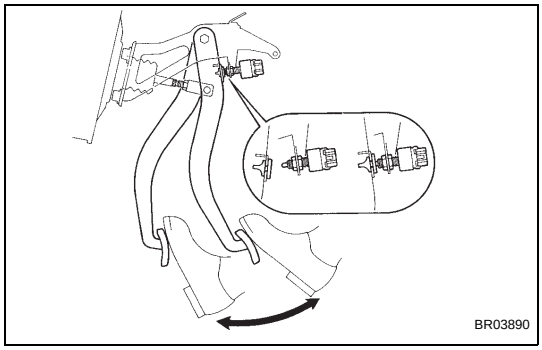
(4) Codes are explained in the code table (See page BC-311).

(5) After completing the check, disconnect terminals TC and CG of the DLC3, and turn off the display. If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

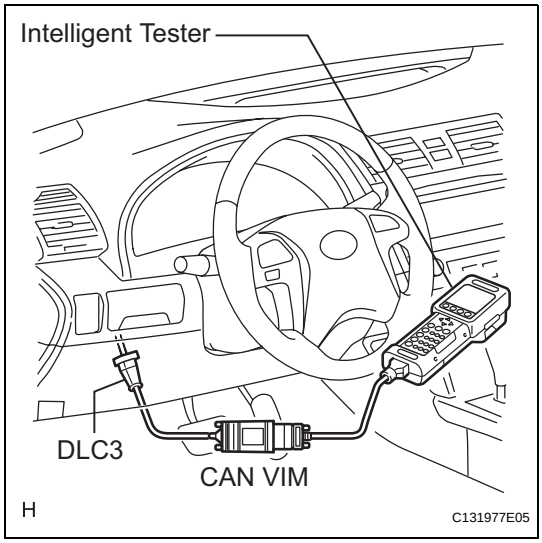
BC



(b) DTC clear
(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch on (IG).



(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.
(4) Check that the warning light indicates a normal system code.
(5) Remove the SST.
HINT:
Clearing the DTCs cannot be performed by disconnecting the battery terminal or the ECU-IG fuse.



2. DTC CHECK/CLEAR (WHEN USING INTELLIGENT TESTER:)
(a) DTC check
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Read the DTCs by following the prompts on the tester screen.
(b) DTC clear
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Operate the intelligent tester to clear the codes.
HINT:
Refer to the intelligent tester operator's manual for further details.

3. END OF DTC CHECK/CLEAR
(a) Turn the ignition switch on (IG).
(b) Check that the ABS warning light goes off within approximately 3 seconds.

FREEZE FRAME DATA

1. FREEZE FRAME DATA

(a) Whenever an ABS DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.
The skid control ECU stores the number of times (maximum: 31) the ignition switch has been turned from off to on (IG) since the last time the ABS was activated.
HINT:
- However, if the vehicle is stopped or at a low speed (4.3 mph (7 km/h) or less), or if a DTC is detected, the skid control ECU will stop counting the number.
- Freeze Frame Data at the time the ABS operates:
  The skid control ECU stores and updates data whenever the ABS system operates.
  When the ECU stores data at the time a DTC is detected, the data stored during ABS operation is erased.
- Freeze Frame Data at the time a DTC is detected:
  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Select the "DTC INFO" on the tester display.
(e) On the DTC data display screen, select the DTC data display with "*".

Item (Display)	Measurement Item	Reference Value
VEHICLE SPD	Vehicle speed reading	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
STOP LAMP SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
#IG ON	Number of operations of engine switch on (IG) after storing freeze frame data	0 to 31
MAS CYL PRESS 1	Master cylinder pressure sensor reading	Brake pedal released: 0.3 to 0.5 V
M/C PRESS GRADE	Master cylinder pressure sensor change	Min.: -30 MPa/s, Max.: 225 MPa/s
YAW RATE	Yaw rate sensor reading	Min.: -128 deg/s, Max.: 127 deg/s
STEERING SEN	Steering angle sensor reading	Left turn: Increase Right turn: Decrease
SPD GRADE	Vehicle speed grade	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
BUZZER	Skid control buzzer signal	Skid control buzzer ON: ON, OFF: OFF
PARKING BRAKE SW	Parking brake switch signal	Parking brake switch ON: ON, OFF: OFF
ENGINE TORQUE	Real engine torque	Min.: -1024 Nm, Max.: 1023 Nm
FR WHEEL SPD	FR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
FL WHEEL SPD	FL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
RR WHEEL SPD	RR wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)
RL WHEEL SPD	RL wheel speed	Min.: 0 mph (0 km/h), Max.: 202 mph (326.4 km/h)

Item (Display)	Measurement Item	Reference Value
LATERAL G	Lateral G	Min.: -25.11 m/s^2, Max.: 24.91 m/s^2
GEAR POSITION *	Gear position information	FAIL 1st 2nd 3rd 4th 5th 6th P, N R NOT R
LEVER POSITION *	Shift lever position information	FAIL 1st 2nd 3rd 4th 5th 6th/B D/M P, N R
OPERATED SYSTEM	Operated system status	ABS activated: ABS VSC activated: VSC TRAC activated: TRAC BA activated: BA PB activated: PB Fail safe mode activated: FAIL No system activated: NON System prohibited: SYS
FREEZE TIME	Elapsed time after freeze trigger	Min.: 0 ms, Max.: 500 ms
TROUBLE CODE	Freeze frame DTC	Displays to output DTC
INSPECTION MODE	Inspection mode	OTHER: Normal, INSPECT: Service

*: Automatic Transaxle

FAIL-SAFE CHART

1. FAIL SAFE OPERATION

(a) If there is a problem with sensor signals or actuator systems, the skid control ECU prohibits power supply to the brake actuator assembly and informs the ECM of the VSC system failure.

(b) The brake actuator assembly turns off each solenoid and the ECM shuts off the VSC control (traction control signal) from the skid control ECU accordingly, which turns out to be as if the vehicle stability control system was not installed.

(c) ABS, VSC, and TRAC control will be prohibited, but EBD control continues as much as possible. If EBD control is impossible, the brake warning light comes on to warn the driver (See page BC-298).

Malfunction	Symptom
ABS system	Prohibits the ABS, BA, TRAC, and VSC control
BA system	Prohibits the ABS, BA, TRAC, and VSC control
EBD system	Prohibits the ABS, EBD, BA, TRAC, and VSC control
TRAC system	Prohibits the TRAC and VSC control
VSC system	Prohibits the TRAC and VSC control

HINT:

- A malfunction in either the ABS or BA system results in an identical operation, with ABS, BA, TRAC, and VSC system control prohibited.
- If control is prohibited due to a malfunction during operation, control will be disabled gradually to prevent the vehicle from becoming unstable suddenly.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

With the intelligent tester connected to the DLC3 and the ignition switch on (IG), the ABS, TRAC and VSC Data List can be displayed. Follow the prompts on the tester screen to access the Data List.

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
MTR RELAY	ABS motor relay / ON or OFF	ON: Motor relay ON OFF: Motor relay OFF	-
SOL RELAY	Solenoid relay / ON or OFF	ON: Solenoid relay ON OFF: Solenoid relay OFF	-
IDLE SW	Main idle switch / ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
PARKING BRAKE SW	Parking brake switch / ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
ENG REVOLUTIONS	Engine revolutions / min.: 0 r/min, max.: 65,535 r/min	-	-
GEAR POSITION *	Gear position information / P/N, R, 1st-6th, FAIL, NOT R	-	-
LEVER POSITION *	Shift lever position information / P/N, R, D/M, 1st-6th/B, FAIL	-	-
SHIFT INFO	Shift information / ON or OFF	ON: During gear change	-
FR WHEEL SPD	FR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
FL WHEEL SPD	FL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RR WHEEL SPD	RR wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
RL WHEEL SPD	RL wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual wheel speed	Similar speed as indicated on speedometer
DECELERAT SEN	Acceleration sensor 1 reading / min.: -18.52 m/s^2, max.: 18.39 m/s^2	Approximately 0+-0.13 G while stationary	Reading changes when vehicle is bounced
SFRR	ABS solenoid (SFRR) / ON or OFF	ON: Operates	-
SFRH	ABS solenoid (SFRH) / ON or OFF	ON: Operates	-
SFLR	ABS solenoid (SFLR) / ON or OFF	ON: Operates	-
SFLH	ABS solenoid (SFLH) / ON or OFF	ON: Operates	-
SRRR	ABS solenoid (SRRR) / ON or OFF	ON: Operates	-
SRRH	ABS solenoid (SRRH) / ON or OFF	ON: Operates	-
SRLR	ABS solenoid (SRLR) / ON or OFF	ON: Operates	-
SRLH	ABS solenoid (SRLH) / ON or OFF	ON: Operates	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SRM2	Master cut solenoid (SRM2) / ON or OFF	ON: Operates	-
SRM1	Master cut solenoid (SRM1) / ON or OFF	ON: Operated	-
SRC2	Master cut solenoid (SMC2) / ON or OFF	ON: Operates	-
SRC1	Master cut solenoid (SRC1) / ON or OFF	ON: Operates	-
VEHICLE SPD	Maximum wheel speed sensor reading / min.: 0 mph (0 km/h), max.: 202 mph (326 km/h)	Actual vehicle speed	Speed indicated on speedometer
YAW RATE SENS 1	Yaw rate sensor 1 / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
ZERO YAW RATE	Memorized zero value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING SEN	Steering angle sensor / min.: -3,276.8 deg, max.: 3,276.7 deg	Left turn: Increase Right turn: Decrease	-
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V	Reading increases when brake pedal is depressed
ENGINE TORQUE	Real engine torque / min.: -1024 N*m, max.: 1023 N*m	-	-
FR SPD OPN	FR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
FL SPD OPN	FL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RR SPD OPN	RR speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
RL SPD OPN	RL speed sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
YAW RATE OPN	Yaw rate sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
DECELERAT OPN	Acceleration sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
STEERING OPN	Steering angle sensor open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
EFI COM OPN	EFI communication open detection / ERROR or NORMAL	ERROR: Momentary interruption NORMAL: Normal	-
#DTC	Number of DTC / min.: 0, max.: 255	-	-
ABS WARN LAMP	ABS warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
BRAKE WARN LAMP	BRAKE warning light / ON or OFF	ON: Warning light ON OFF: Warning light OFF	-
SLIP INDI LAMP	SLIP indicator light / ON or OFF	ON: Indicator light ON OFF: Indicator light OFF	-
BUZZER	Skid control buzzer / ON or OFF	ON: Buzzer ON OFF: Buzzer OFF	-
VSC WARN LAMP	VSC warning (multi-information display and master caution indicator light) light / ON or OFF	ON: Indicator ON OFF: Indicator OFF	-
FR WHEEL ACCEL	FR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
FL WHEEL ACCEL	FL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
RR WHEEL ACCEL	RR wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-

Item (Display)	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
RL WHEEL ACCEL	RL wheel acceleration / min.: -200.84 m/s^2, max.: 199.27 m/s^2	Min.: -200.84 m/s^2 Max.: 199.27 m/s^2	-
ZERO DECELERAT	Memorized zero value / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
ZERO STEERING	Memorized zero value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
LATERAL G	Lateral G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
FORWARD&REA G	Forward and rearward G / min.: -25.11 m/s^2, max.: 24.91 m/s^2	Min.: -25.11 m/s^2 Max.: 24.91 m/s^2	-
YAW RATE VALUE	Yaw rate value / min.: -128 deg/s, max.: 127 deg/s	Min.: -128 deg/s Max.: 127 deg/s	-
STEERING ANGLE	Steering angle value / min.: -3,276.8 deg, max.: 3,276.7 deg	Min.: -3,276.8 deg Max.: 3,276.7 deg	-
TRAC STATUS	TRAC control status / ON or OFF	ON: During the control	-
TRAC ENG STATUS	TRAC engine control status / ON or OFF	ON: During the control	-
TRAC BRK STATUS	TRAC brake control status / ON or OFF	ON: During the control	-
FR VSC STATUS	FR wheel VSC control status / ON or OFF	ON: During the control	-
FL VSC STATUS	FL wheel VSC control status / ON or OFF	ON: During the control	-
RR VSC STATUS	RR wheel VSC control status / ON or OFF	ON: During the control	-
RL VSC STATUS	RL wheel VSC control status / ON or OFF	ON: During the control	-
FR ABS STATUS	FR wheel ABS control status / ON or OFF	ON: During the control	-
FL ABS STATUS	FL wheel ABS control status / ON or OFF	ON: During the control	-
RR ABS STATUS	RR wheel ABS control status / ON or OFF	ON: During the control	-
RL ABS STATUS	RL wheel ABS control status / ON or OFF	ON: During the control	-
FR EBD STATUS	FR wheel EBD control status / ON or OFF	ON: During the control	-
FL EBD STATUS	FL wheel EBD control status / ON or OFF	ON: During the control	-
RR EBD STATUS	RR wheel EBD control status / ON or OFF	ON: During the control	-
RL EBD STATUS	RL wheel EBD control status / ON or OFF	ON: During the control	-
BA STATUS	BA control status / ON or OFF	ON: During the control	-
INSPECTION MODE	Inspection mode / OTHER or INSPECT	-	-
#IG ON2	Number of ignition switch on (IG) after entering the inspection mode / min.: 0, max.: 255	-	-
TROUBLE CODE	Freeze frame DTC / min.: 0, max.: 65,535	-	-

*: Automatic Transaxle

2. ACTIVE TEST

HINT:

Performing the Active Test using the intelligent tester allows the relay, actuator, and other items to operate without removing any parts. Performing the Active Test as the first step in troubleshooting is one of the methods to save labor time.

It is possible to display the Data List during the Active Test.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) From the display on the tester, select the Active Test.

HINT:

The ignition switch must be turned on (IG) to proceed to the Active Test using the intelligent tester.

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
SFRR	Turns ABS solenoid (SFRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFRH	Turns ABS solenoid (SFRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLR	Turns ABS solenoid (SFLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SFLH	Turns ABS solenoid (SFLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRR	Turns ABS solenoid (SRRR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRRH	Turns ABS solenoid (SRRH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLR	Turns ABS solenoid (SRLR) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRLH	Turns ABS solenoid (SRLH) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRM2	Turns master cut solenoid (SRM2) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRM1	Turns master cut solenoid (SRM1) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRC2	Turns master cut solenoid (SRC2) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
SRC1	Turns master cut solenoid (SRC1) ON / OFF	Operating sound of solenoid (clicking sound) can be heard
MOTOR RELAY	Turns ABS motor relay ON / OFF	Operating sound of relay (clicking sound) and motor can be heard
ABS WARN LAMP	Turns ABS warning light ON / OFF	Observe combination meter
VSC WARN LAMP	Turns VSC warning (master caution indicator) light ON / OFF	Observe combination meter
SLIP INDI LAMP	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WARN LAMP	Turns BRAKE warning light ON / OFF	Observe combination meter
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

DIAGNOSTIC TROUBLE CODE CHART

- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the page for the respective "DTC No." in the DTC chart.
- Inspect the fuse and relay before investigating the trouble areas as shown in the table below.

DTC chart of ABS:

DTC No.	Detection Item	Trouble Area	See page
C0200/31	Right Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor RH 2. Front speed sensor circuit RH 3. Front speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-316
C0205/32	Left Front Wheel Speed Sensor Signal Malfunction	1. Front speed sensor LH 2. Front speed sensor circuit LH 3. Front speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-316
C0210/33	Right Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor RH 2. Rear speed sensor circuit RH 3. Rear speed sensor rotor RH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-324
C0215/34	Left Rear Wheel Speed Sensor Signal Malfunction	1. Rear speed sensor LH 2. Rear speed sensor circuit LH 3. Rear speed sensor rotor LH 4. Sensor installation 5. Brake actuator assembly (skid control ECU)	BC-324
C0226/21	SFR Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0236/22	SFL Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0246/23	SRR Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0256/24	SRL Solenoid Circuit	1. Each solenoid circuit 2. Brake actuator assembly	BC-333
C0273/13	Open or Short Circuit in ABS Motor Relay Circuit	1. ABS No. 1 fuse (Fusible link) 2. Brake actuator assembly (skid control ECU) 3. Motor relay circuit	BC-335
C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit	1. ABS No. 2 fuse (Fusible link) 2. Brake actuator assembly (skid control ECU) 3. Solenoid relay circuit	BC-339
C1225/25	SMC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SMC1 solenoid circuit	BC-348
C1226/26	SMC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SMC2 circuit	BC-348
C1227/27	SRC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SRC1 circuit	BC-348
C1228/28	SRC Solenoid Circuit	1. Brake actuator assembly (skid control ECU) 2. SRC2 circuit	BC-348

DTC No.	Detection Item	Trouble Area	See page
C1237/37	Tires of Different Size	1. Brake actuator assembly (skid control ECU) 2. Speed sensor 3. Speed sensor rotor (front) 4. Rear axle hub and bearing assembly 5. Speed sensor circuit 6. Tire and wheel circuit 7. Tire deformation	BC-354
C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage	1. Battery 2. ECU-IG No. 2 fuse 3. Charging system 4. Power source circuit 5. Brake actuator assembly (internal power source circuit)	BC-361
C1246/46	Master Cylinder Pressure Sensor Malfunction	1. Master cylinder pressure sensor 2. Master cylinder pressure sensor circuit 3. Stop light switch circuit 4. Brake actuator assembly (skid control ECU)	BC-365
C1249/49	Open in Stop Light Switch Circuit	1. Stop light switch 2. Stop light switch circuit 3. Brake actuator assembly (skid control ECU)	BC-368
C1271/71	Low Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-316
C1272/72	Low Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-316
C1273/73	Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensor RH 2. Sensor installation 3. Speed sensor rotor	BC-324
C1274/74	Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensor LH 2. Sensor installation 3. Speed sensor rotor	BC-324
C1275/75	Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)	1. Front speed sensosr RH 2. Sensor installation 3. Sensor rotor	BC-316
C1276/76	Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)	1. Front speed sensosr LH 2. Sensor installation 3. Sensor rotor	BC-316
C1277/77	Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)	1. Rear speed sensosr RH 2. Sensor installation 3. Sensor rotor	BC-324
C1278/78	Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)	1. Rear speed sensosr LH 2. Sensor installation 3. Sensor rotor	BC-324
C1288/88	ECU Version Miss Match	ECM	BC-374
C1300/62	Skid Control ECU Malfunction	Brake actuator assembly (skid control ECU)	BC-375
C1330/35	Right Front Speed Sensor Circuit	1. Front speed sensor RH 2. Front speed sensor circuit RH 3. Sensor installation	BC-316
C1331/36	Left Front Speed Sensor Circuit	1. Front speed sensor LH 2. Front speed sensor circuit LH 3. Sensor installation	BC-316
C1332/38	Right Rear Speed Sensor Circuit	1. Rear speed sensor RH 2. Rear speed sensor circuit RH 3. Sensor installation	BC-324

DTC No.	Detection Item	Trouble Area	See page
C1333/39	Left Rear Speed Sensor Circuit	1. Rear speed sensor LH 2. Rear speed sensor circuit LH 3. Sensor installation	BC-324
U0073/94	Control Module Communication Bus OFF	CAN communication system	BC-377

(*1, *2):
Even after the trouble areas are repaired, the ABS warning light will not go off unless the following operations are performed:

- (*1):
  (a) Drive the vehicle at 12 mph (20 km/h) for 30 seconds or more and check that the ABS warning light goes off.
  (b) Clear the DTC.
- (*2):
  (a) Keep the vehicle stationary for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (b) Drive the vehicle at the vehicle speed of 31 mph (50 km/h) and keep depressing the brake pedal strongly for approximately 3 seconds.
  (c) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (d) Clear the DTC.

HINT:
In some cases, the intelligent tester cannot be used when the ABS warning light remains on.

DTC chart of VSC:

DTC No.	Detection Item	Trouble Area	See page
43	ABS Control System Malfunction	ABS control system	BC-315
C0365/28	Malfunction in Deceleration Sensor	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit 3. Sensor installation 4. Brake actuator assembly (skid control ECU)	BC-343
C1201/51	Engine Control System Malfunction	Engine control system	BC-347
C1231/31	Steering Angle Sensor Circuit Malfunction	1. Steering angle sensor 2. Steering angle sensor circuit 3. Steering angle sensor power supply	BC-350
C1234/34	Yaw Rate Sensor Malfunction	1. Yaw rate and acceleration sensor 2. Yaw rate and acceleration sensor circuit	BC-343
U0100/65	Lost Communication with ECM / PCM	CAN communication system (skid control ECU to ECM)	BC-377
U0123/62	Lost Communication with Yaw Rate Sensor Module	CAN communication system (skid control ECU to yaw rate and acceleration sensor)	BC-377
U0126/63	Lost Communication with Steering Angle Sensor Module	CAN communication system (skid control ECU to steering angle sensor)	BC-377

DTC	43	ABS Control System Malfunction

DESCRIPTION

This DTC is output when the VSC system detects a malfunction in the ABS control system.

DTC No.	DTC Detection Condition	Trouble Area
43	Malfunction in the ABS control system	ABS control system

INSPECTION PROCEDURE

1	CHECK ABS CONTROL SYSTEM

(a) Clear the DTC (See page BC-302).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC (ABS control system DTC) is not output	A
DTC (ABS control system DTC) is output	B

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (BRAKE CONTROL SYSTEM) (See page BC-311)**

A

2	CONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Turn the ignition switch on (IG).
(c) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC (43) is not output	A
DTC (43) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

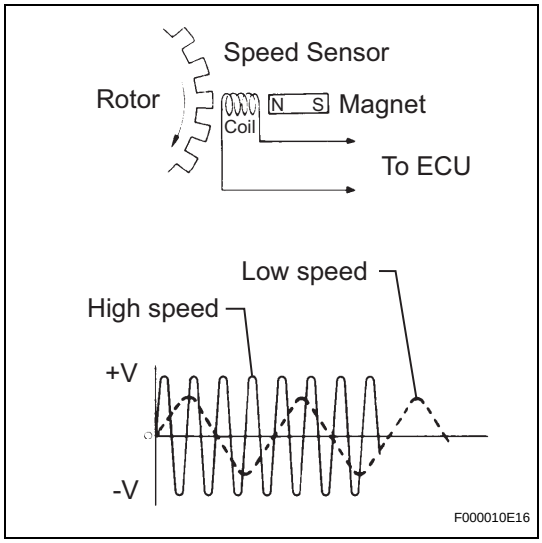
DTC	**C0200/31**	**Right Front Wheel Speed Sensor Signal Malfunction**
DTC	**C0205/32**	**Left Front Wheel Speed Sensor Signal Malfunction**
DTC	**C1271/71**	**Low Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1272/72**	**Low Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1275/75**	**Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC)**
DTC	**C1276/76**	**Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC)**
DTC	**C1330/35**	**Right Front Speed Sensor Circuit**
DTC	**C1331/36**	**Left Front Speed Sensor Circuit**

BC

DESCRIPTION

The speed sensors detects wheel speed and transmit the signals to the skid control ECU. These signals are used for control of the ABS control system. Each of the front and rear rotors has 48 serrations. When the rotors rotate, the magnetic field generated by the permanent magnet in the speed sensor induces AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to detect the speed of each wheel.

DTCs C1271/71 to C1276/76 can be deleted when the speed sensor sends a wheel speed signal or the test mode ends. DTCs C1271/71 to C1276/76 are output only in the test mode.

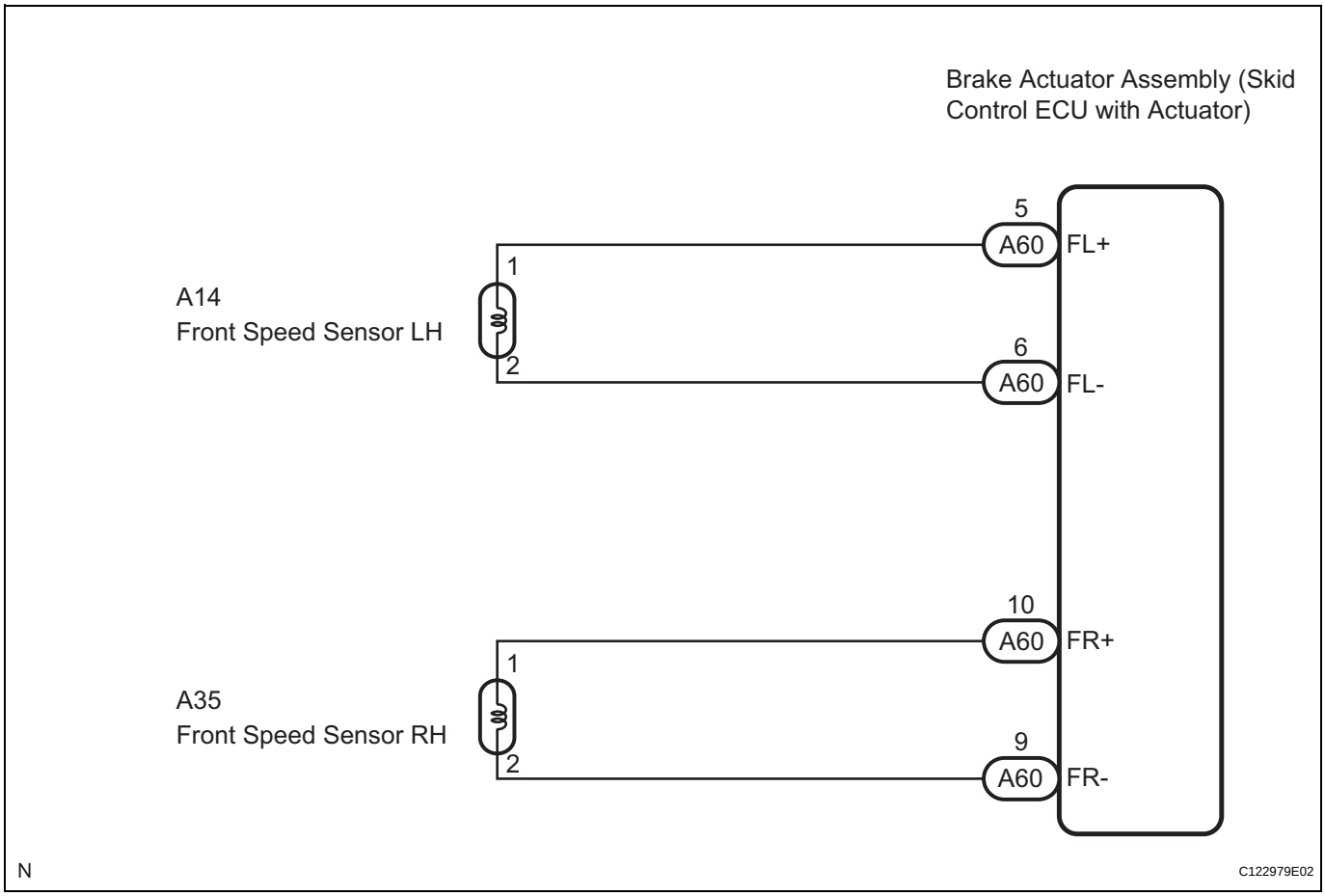


DTC No.	DTC Detecting Condition	Trouble Area
C0200/31 C0205/32	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h), and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h) after the initial start or restart, a wheel speed of 0 mph (0 km/h) is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Front speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1330/35 C1331/36	Abnormality in the resistance value of each speed sensor is detected.	• Front speed sensor RH and/or LH • Front speed sensor circuit RH and/or LH • Sensor installation
C1271/71 C1272/72	Detected only during test mode.	• Front speed sensor • Sensor installation • Sensor rotor
C1275/75 C1276/76	Detected only during test mode.	• Front speed sensor • Sensor installation • Sensor rotor

HINT:
DTC No. C0200/31 and C1330/35 are for the front speed sensor RH.
DTC No. C0205/32 and C1331/36 are for the front speed sensor LH.

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

OK

2	PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-290).

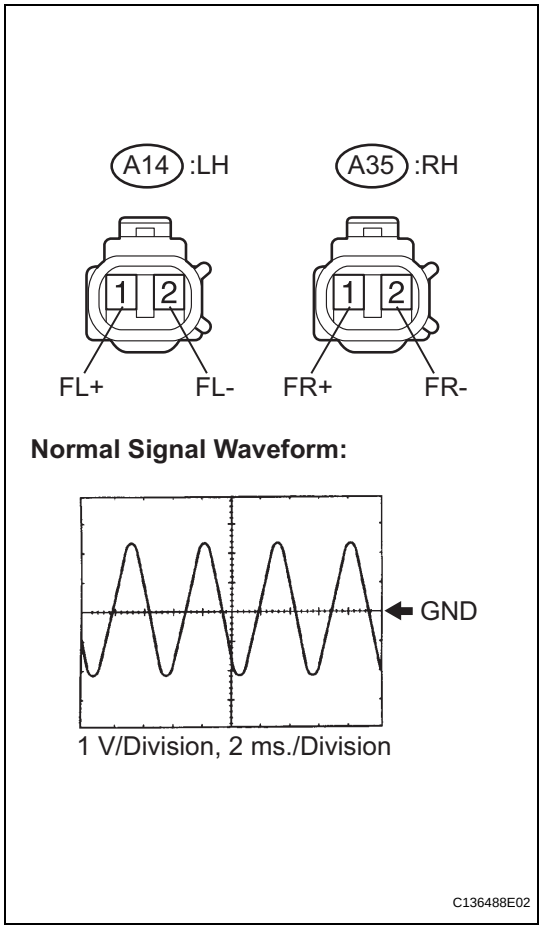
Result

Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

B → **Go to step 5**

A

3 INSPECT SPEED SENSOR SIGNAL WAVEFORM



(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.
  OK:
  The same waveform is output from front wheels and there is no noise or interference in the waveform.
  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connector.

NG	Go to step 11

OK

4 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output (When troubleshooting in accordance with the DTC CHART)	C

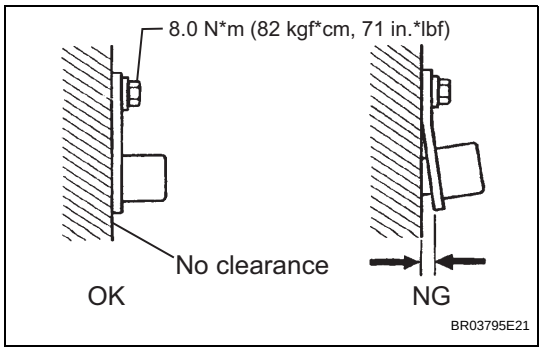
BC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)

C → END

A

5 INSPECT FRONT SPEED SENSOR INSTALLATION



(a) Check the front speed sensor installation.

OK:

The installation bolt is tightened properly.
There is no clearance between the sensor and front steering knuckle.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

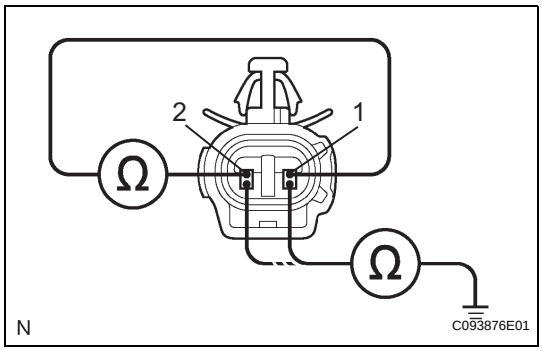
NOTICE:

Check the speed sensor signal after replacement (See page BC-290).

NG → **INSTALL FRONT SPEED SENSOR CORRECTLY (See page BC-440)**

OK

6 INSPECT FRONT SPEED SENSOR



(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(b) Disconnect the front speed sensor connectors.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	0.92 to 1.22 kΩ at 20°C
A14-1 (FL+) - Body ground	10 kΩ or higher
A14-2 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A35-1 (FR+) - A35-2 (FR-)	0.92 to 1.22 kΩ at 20°C
A35-1 (FR+) - Body ground	10 kΩ or higher
A35-2 (FR-) - Body ground	10 kΩ or higher

NOTICE:

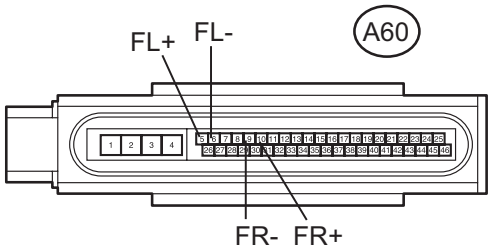
Check the speed sensor signal after replacement (See page BC-290).

NG → **REPLACE FRONT SPEED SENSOR (See page BC-438)**

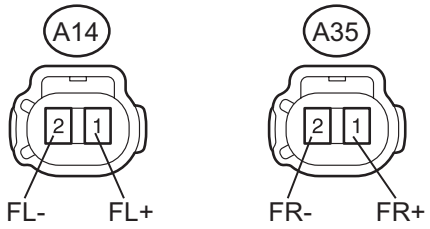
OK

7	CHECK HARNESS AND CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)

Skid Control ECU (Harness Side Connector Front View):



Front Speed Sensor (Harness Side Connecotor Front View):



N

C139143E01

(a) Disconnect the skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A60-5 (FL+) - A14-1 (FL+)	Below 1 Ω
A60-6 (FL-) - A14-2 (FL-)	Below 1 Ω
A60-5 (FL+) - Body ground	10 kΩ or higher
A60-6 (FL-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
A60-10 (FR+) - A35-1 (FR+)	Below 1 Ω
A60-9 (FR-) - A35-2 (FR-)	Below 1 Ω
A60-10 (FR+) - Body ground	10 kΩ or higher
A60-9 (FR-) - Body ground	10 kΩ or higher

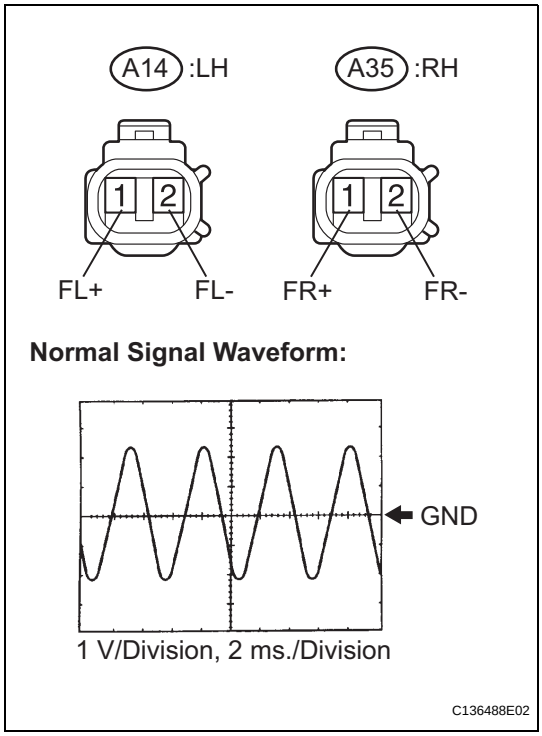
(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (FRONT SPEED SENSOR TO SKID CONTROL ECU)**

OK

BC

8	INSPECT SPEED SENSOR SIGNAL WAVEFORM



(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the front speed sensor connector.
  (2) Connect the oscilloscope to terminals 1 and 2 of the front speed sensor.
  (3) Check that a waveform is output when the tires are rotated.
    OK:
    The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.
    HINT:
    - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
    - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.
  (4) Connect the connector.

NG → **Go to step 11**

OK

9	READ VALUE OF INTELLIGENT TESTER (FRONT SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
FR WHEEL SPD	Wheel speed sensor (FR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
FL WHEEL SPD	Wheel speed sensor (FL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.
OK:
The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.
HINT:
If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step before replacing the part (See page BC-295).

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

10 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output	A
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0200/31, C0205/32, C1330/35 and C1331/36) are not output (When troubleshooting in accordance with the DTC CHART)	C

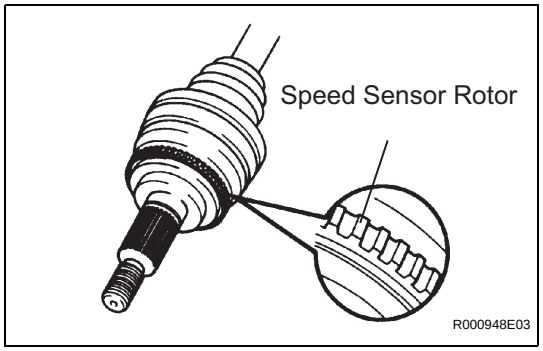
BC

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **END**

A

11 INSPECT SPEED SENSOR TIP



(a) Remove the front speed sensor.
(b) Check the sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-290).
(c) Install the speed sensor.

NG → **CLEAN OR REPLACE SPEED SENSOR**

OK

CLEAN OR REPLACE SPEED SENSOR ROTOR

DTC	**C0210/33**	**Right Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C0215/34**	**Left Rear Wheel Speed Sensor Signal Malfunction**
DTC	**C1273/73**	**Low Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1274/74**	**Low Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1277/77**	**Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC)**
DTC	**C1278/78**	**Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC)**
DTC	**C1332/38**	**Right Rear Speed Sensor Circuit**
DTC	**C1333/39**	**Left Rear Speed Sensor Circuit**

BC

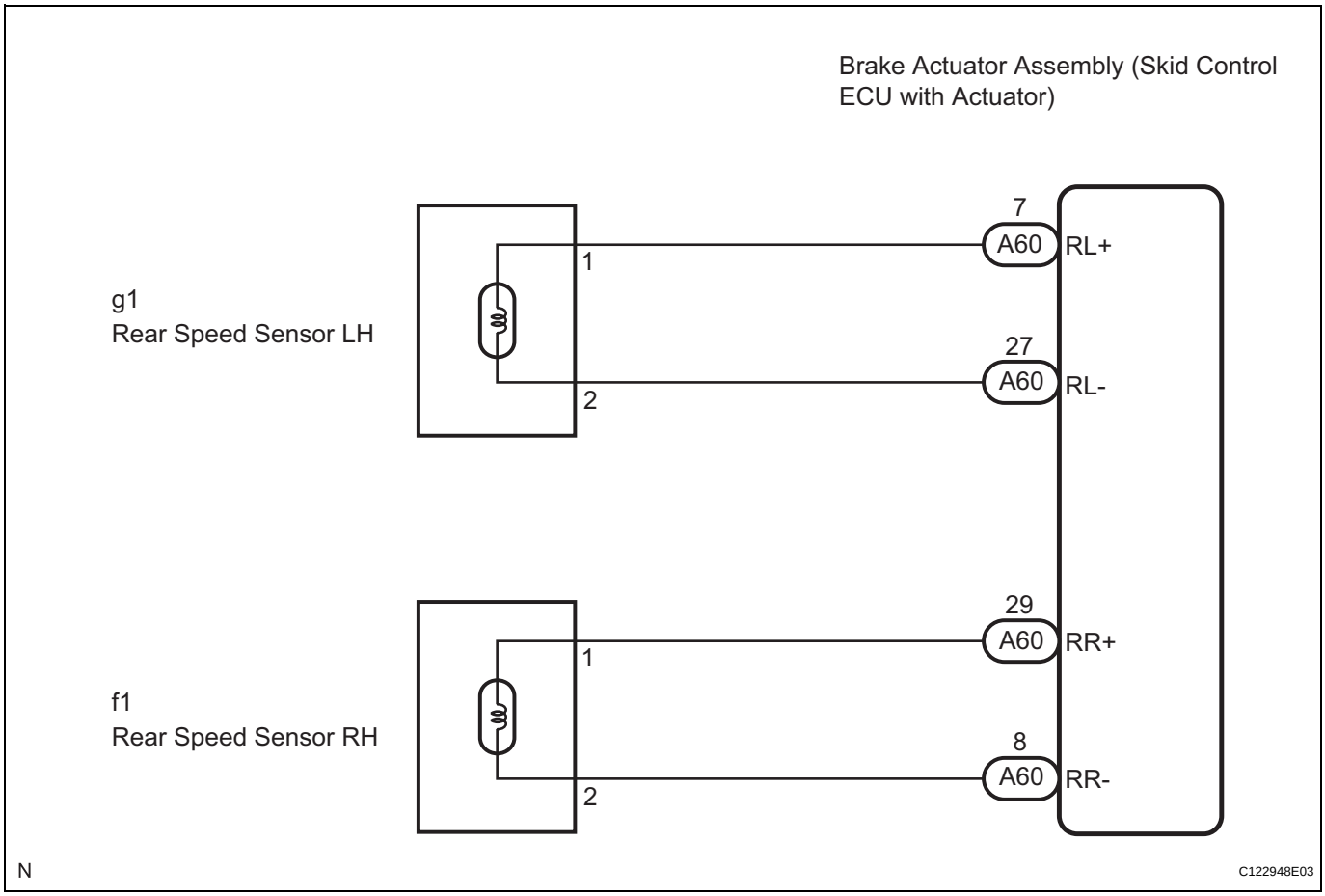
DESCRIPTION

Refer to DTCs C0200/31, C0205/32, C1330/35, and C1331/36 (See page BC-316).
DTCs from C1273/73 to C1278/78 can be deleted when the speed sensor sends a vehicle speed signal or the test mode ends. DTCs from C1273/73 to C1278/78 are output only in the test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C0210/33 C0215/34	When either of the following is detected: • Vehicle speed is more than 25 mph (40 km/h) and pulses are not input for 0.03 sec. • When the vehicle speed has reached 8 mph (12 km/h), after the initial start or restart, a wheel speed of 0 mph (0 km/h) is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Rear speed sensor rotor RH and/or LH • Sensor installation • Brake actuator assembly (skid control ECU)
C1332/38 C1333/39	Abnormality in the resistance value of each speed sensor is detected.	• Rear speed sensor RH and/or LH • Rear speed sensor circuit RH and/or LH • Sensor installation
C1273/73 C1274/74	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor
C1277/77 C1278/78	Detected only during test mode.	• Rear speed sensor • Sensor installation • Sensor rotor

HINT:
DTC No. C0210/33 and C1332/38 are for the rear speed sensor RH.
DTC No. C0215/34 and C1333/39 are for the rear speed sensor LH.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

NG → **Go to step 5**

OK

2 PERFORM TEST MODE INSPECTION (SIGNAL CHECK)

(a) Check if test mode (signal check) DTCs are detected (See page BC-290).

Result

Condition	Proceed to
Test mode (signal check) DTC is not output	A
Test mode (signal check) DTC is output	B

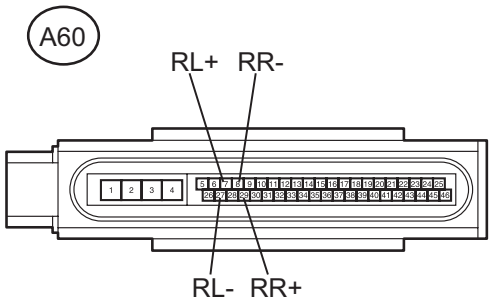
BC

B → **Go to step 5**

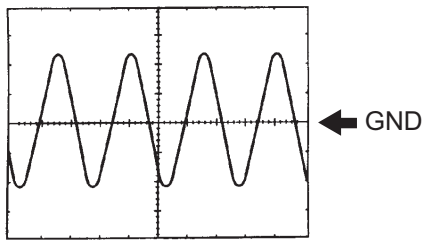
A

3 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C139144E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
  (1) Disconnect the skid control ECU connector.
  (2) Connect the oscilloscope to the rear speed sensor terminals of the skid control ECU.
  (3) Check that a waveform is output when the tires are rotated.

  OK:

  The same waveform is output from all the 4 wheels and there is no noise or interference in the waveform.

  HINT:
  - As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
  - When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

  (4) Connect the connector.

NG → **REPAIR OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

4 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.
(c) Check if the same DTCs are recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	A
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output (When troubleshooting in accordance with the DTC CHART)	C

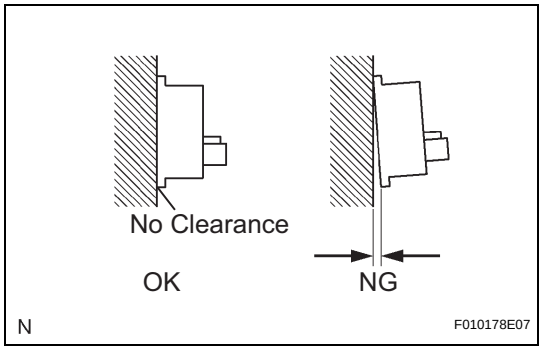
BC

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **END**

A

5 INSPECT SPEED SENSOR INSTALLATION

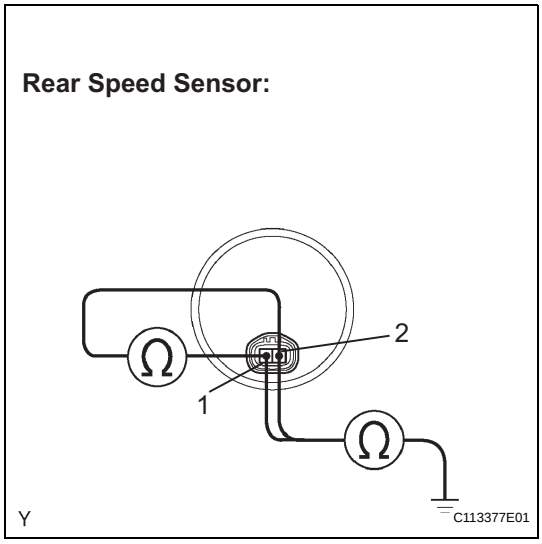


(a) Check the rear speed sensor installation.
OK:
There is no clearance between the sensor and rear axle carrier.
NOTICE:
Check the speed sensor signal after replacement (See page BC-290).

NG → **INSTALL REAR SPEED SENSOR CORRECTLY**

OK

6	INSPECT REAR SPEED SENSOR



(a) Disconnect the rear speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 (RR+) - g1-2 (RR-)	Below 2.2 kΩ
g1-1 (RR+) - Body ground	10 kΩ or higher
g1-2 (RR-) - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 (RL+) - f1-2 (RL-)	Below 2.2 kΩ
f1-1 (RL+) - Body ground	10 kΩ or higher
f1-2 (RL-) - Body ground	10 kΩ or higher

NOTICE:
Check the speed sensor signal after replacement (See page BC-290).

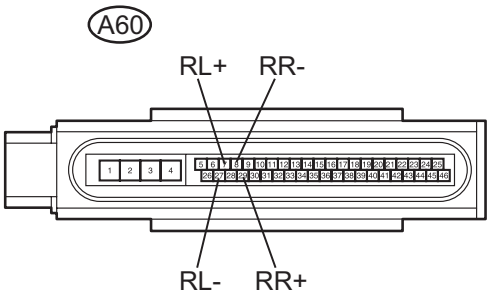
NG → **REPLACE REAR SPEED SENSOR (See page BC-443)**

OK

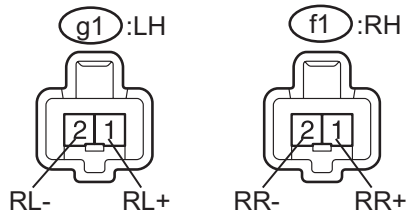
BC

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO SKID CONTROL SENSOR WIRE)

Skid Control ECU (Harness Side Connector Front View):



Rear Speed Sensor (Harness Side Connector Front View):



N

C139145E02

(a) Check the harness and connector.
(1) Disconnect the skid control ECU connector and the rear speed sensor connector.
(2) Disconnect the skid control sensor wire.
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
A60-7 (RL+) - g1-1 (RL+)	Below 1 Ω
A60-27 (RL-) - g1-2 (RL-)	Below 1 Ω
A60-7 (RL+) - Body ground	10 kΩ or higher
A60-27 (RL-) - Body ground	10 kΩ or higher

RH

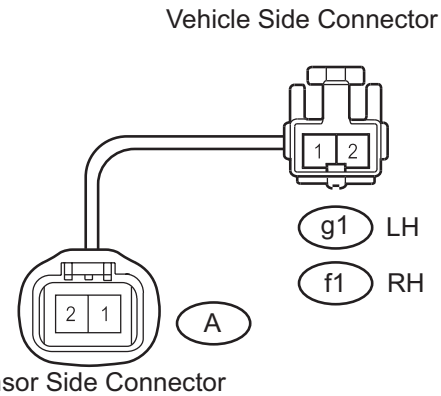
Tester Connection	Specified Condition
A60-29 (RR+) - f1-1 (RR+)	Below 1 Ω
A60-8 (RR-) - f1-2 (RR-)	Below 1 Ω
A60-29 (RR+) - Body ground	10 kΩ or higher
A60-8 (RR-) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO SKID CONTROL SENSOR WIRE)**

OK

8 CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE TO REAR SPEED SENSOR)

Skid Control Sensor Wire:



C113396E05

(a) Check harness and connector (skid control sensor wire).
(1) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
g1-1 - A-1	Below 1 Ω
g1-1 - A-2	10 kΩ or higher
g1-1 - Body ground	10 kΩ or higher
g1-2 - A-2	Below 1 Ω
g1-2 - A-1	10 kΩ or higher
g1-2 - Body ground	10 kΩ or higher

RH

Tester Connection	Specified Condition
f1-1 - A-1	Below 1 Ω

BC

Tester Connection	Specified Condition
f1-1 - A-2	10 kΩ or higher
f1-1 - Body ground	10 kΩ or higher
f1-2 - A-2	Below 1 Ω
f1-2 - A-1	10 kΩ or higher
f1-2 - Body ground	10 kΩ or higher

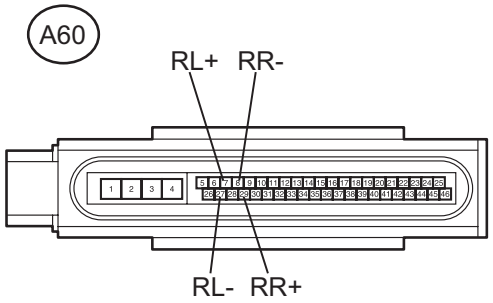
(2) Connect the connector.

NG → **REPAIR OR REPLACE SKID CONTROL SENSOR WIRE**

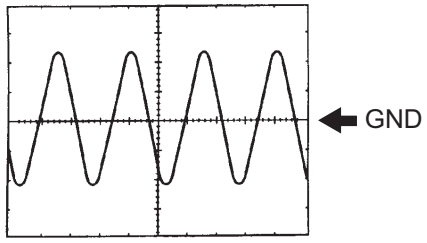
OK

9 INSPECT SPEED SENSOR SIGNAL WAVEFORM

Skid Control ECU (Harness Side Connector Front View):



Normal Signal Waveform:



1 V/Division, 2 ms./Division

C139144E01

(a) Lift up the vehicle.
(b) Perform the inspection using an oscilloscope.
(1) Disconnect the skid control ECU connector.
(2) Connect the oscilloscope to the rear speed sensor terminals of the skid control ECU.
(3) Check that a waveform is output when the tires are rotated.
OK:
The same waveforms is output from rear wheels and there is no noise or interference in the waveform.
HINT:
- As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

(4) Connect the connector.

NG → **CLEAN OR REPLACE SPEED SENSOR AND SENSOR ROTOR**

OK

10 READ VALUE OF INTELLIGENT TESTER (REAR SPEED SENSOR)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.

(c) Select "DATA LIST" and read the value displayed on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item	Measurement Item / Range (Display)	Normal Condition
RR WHEEL SPD	Wheel speed sensor (RR) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed
RL WHEEL SPD	Wheel speed sensor (RL) reading / min.: 0 MPH (0 km/h), max.: 202 MPH (326 km/h)	Actual wheel speed

(d) Check that there is no difference between the speed value output from the speed sensor displayed on the intelligent tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

The speed value output from the speed sensor displayed on the intelligent tester is the same as the actual vehicle speed.

HINT:

- It is suspected that the DTCs were output due to a bad connection of the connector terminal.
- If troubleshooting has been carried out according to the "PROBLEM SYMPTOMS TABLE", refer back to the table and proceed to the next step (See page BC-295).

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

11 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).

(b) Drive the vehicle at a speed of approximately 25 mph (40 km/h) or more for 60 seconds or more.

(c) Check if the same DTCs are recorded (See page BC-302).

HINT:

Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output	**A**
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	**B**
DTCs (C0210/33, C0215/34, C1332/38 and C1333/39) are not output (When troubleshooting in accordance with the DTC CHART)	**C**

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **END**

A

12	INSPECT SPEED SENSOR ROTOR

(a) Turn the ignition switch off.
(b) Remove the rear axle.
(c) Check the rotor.
OK:
No scratches, cracks, oil, or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after cleaning or replacement (See page BC-290).
(d) Install the rear axle.

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

BC

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

DTC	C0226/21	SFR Solenoid Circuit

DTC	C0236/22	SFL Solenoid Circuit

DTC	C0246/23	SRR Solenoid Circuit

DTC	C0256/24	SRL Solenoid Circuit

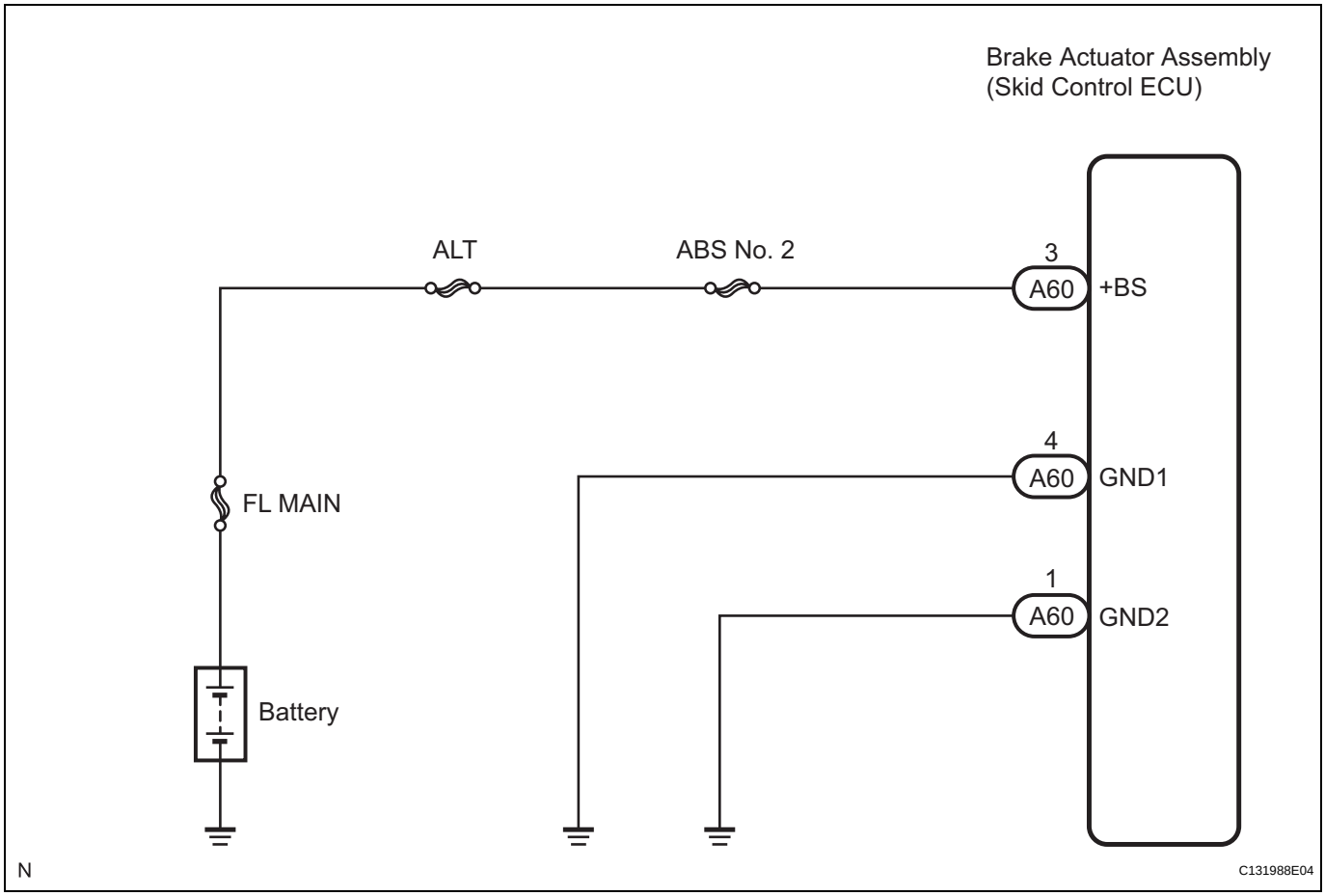
DESCRIPTION

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detection Condition	Trouble Area
C0226/21 C0236/22 C0246/23 C0256/24	Solenoid valve signal does not match the check result.	• Each solenoid circuit • Brake actuator assembly

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are detected when a problem is identified in the brake actuator assembly.
The solenoid circuits are located in the brake actuator assembly.
Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).

BC

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly (skid control ECU). Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

DTC	C0273/13	Open or Short Circuit in ABS Motor Relay Circuit

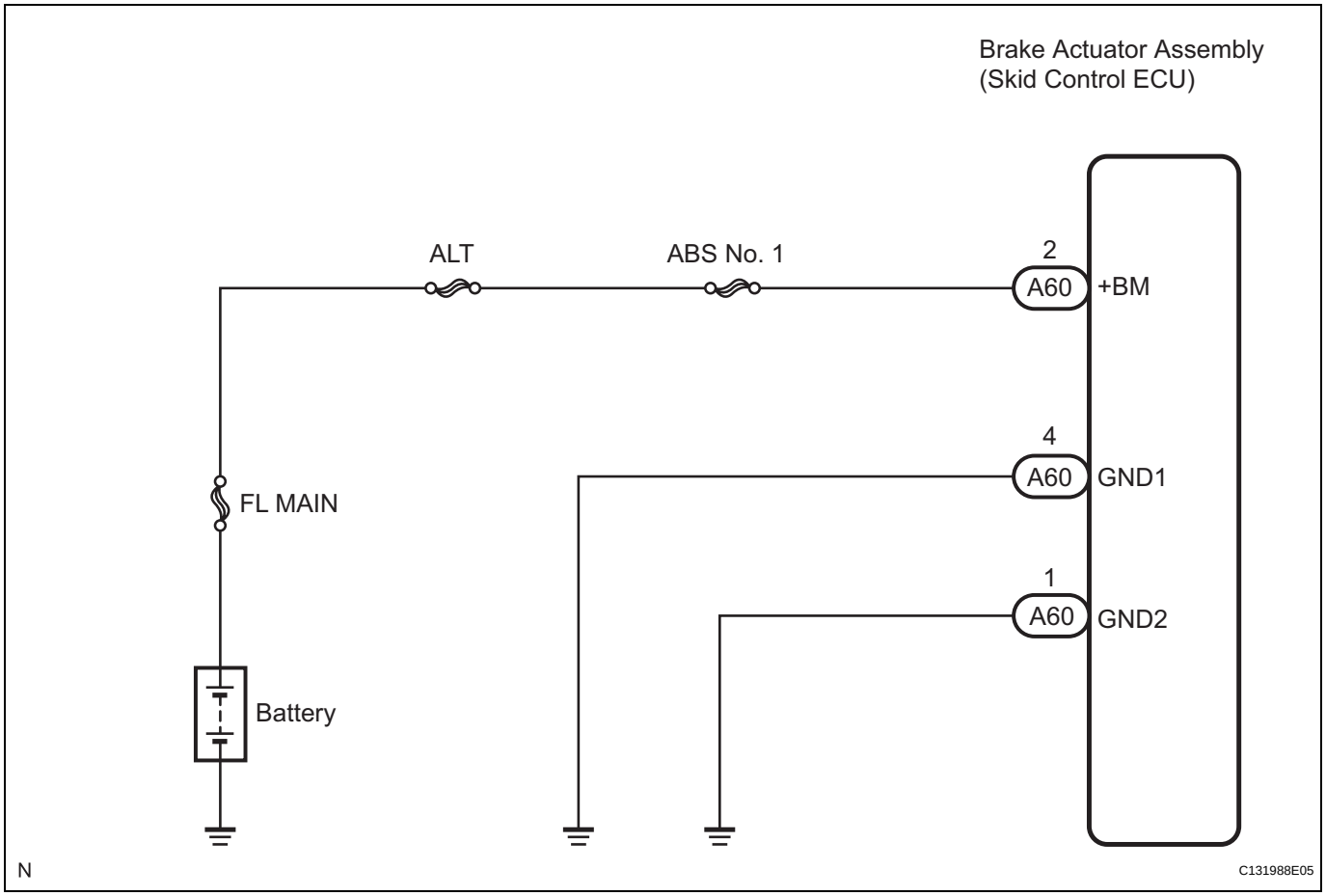
DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS is activated, the ECU switches the motor relay on and operates the ABS pump motor.
If the voltage supplied to the motor relay (+BM) is below the DTCs detection threshold due to low voltage from the battery or alternator, the DTC may be stored.

DTC No.	DTC Detection Condition	Trouble Area
C0273/13	When any of the following is detected: • When the motor relay is actuated, voltage is not supplied to the pump motor within 0.1 seconds. • For 30 to 125 ms after the motor relay is turned from ON to OFF, the remaining high voltage is out of range. The motor relay is turned from ON to OFF 3 times. If the voltage is still out of range in the 3rd operation, this failure is detected. • When the motor relay is changed from ON to OFF, the remaining high voltage is more than 2 V for 1 second.	• ABS No. 1 fuse (Fusible link) • Brake actuator assembly (skid control ECU) • Motor relay circuit

BC

WIRING DIAGRAM



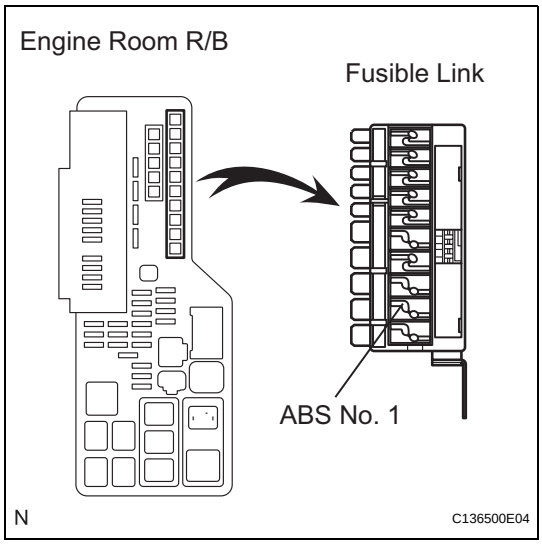
INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0273/13, inspect and repair the trouble areas indicated by C1241/41 (See page BC-361).

- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	INSPECT FUSIBLE LINK (ABS NO. 1 FUSE)



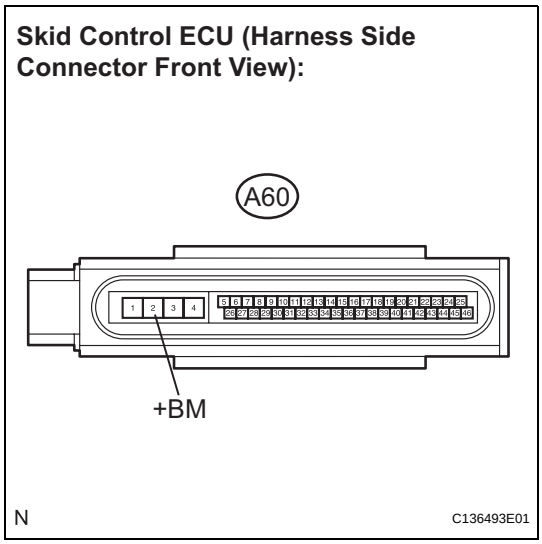
(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is malted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2	INSPECT SKID CONTROL ECU (+BM TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

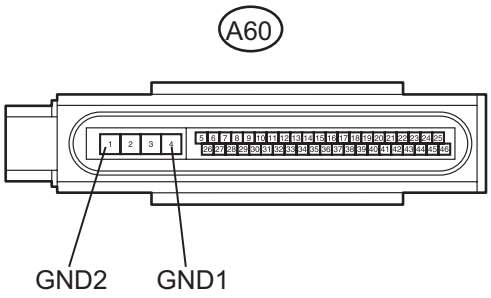
Tester Connection	Condition	Specified Condition
A60-2 (+BM) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BM CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (ABS MOTOR RELAY)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Select "ACTIVE TEST" on the intelligent tester (See page BC-307).

ACTIVE TEST: ABS/TRAC/VSC

Item	Measurement Item/Range (Display)	Normal Condition
ABS MTR RELAY	Turns ABS motor relay ON/OFF	Operating sound of motor is heard.

(d) Check the operating sound of the ABS motor relay when operating it with the intelligent tester.

OK:

The operating sound of the ABS motor relay is heard.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

5 RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The ABS motor relay is located in the brake actuator assembly.
Therefore, ABS motor relay inspection and motor relay unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).

BC

(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly (skid control ECU). Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator assembly (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A →

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

DTC	C0278/11	Open or Short Circuit in ABS Solenoid Relay Circuit

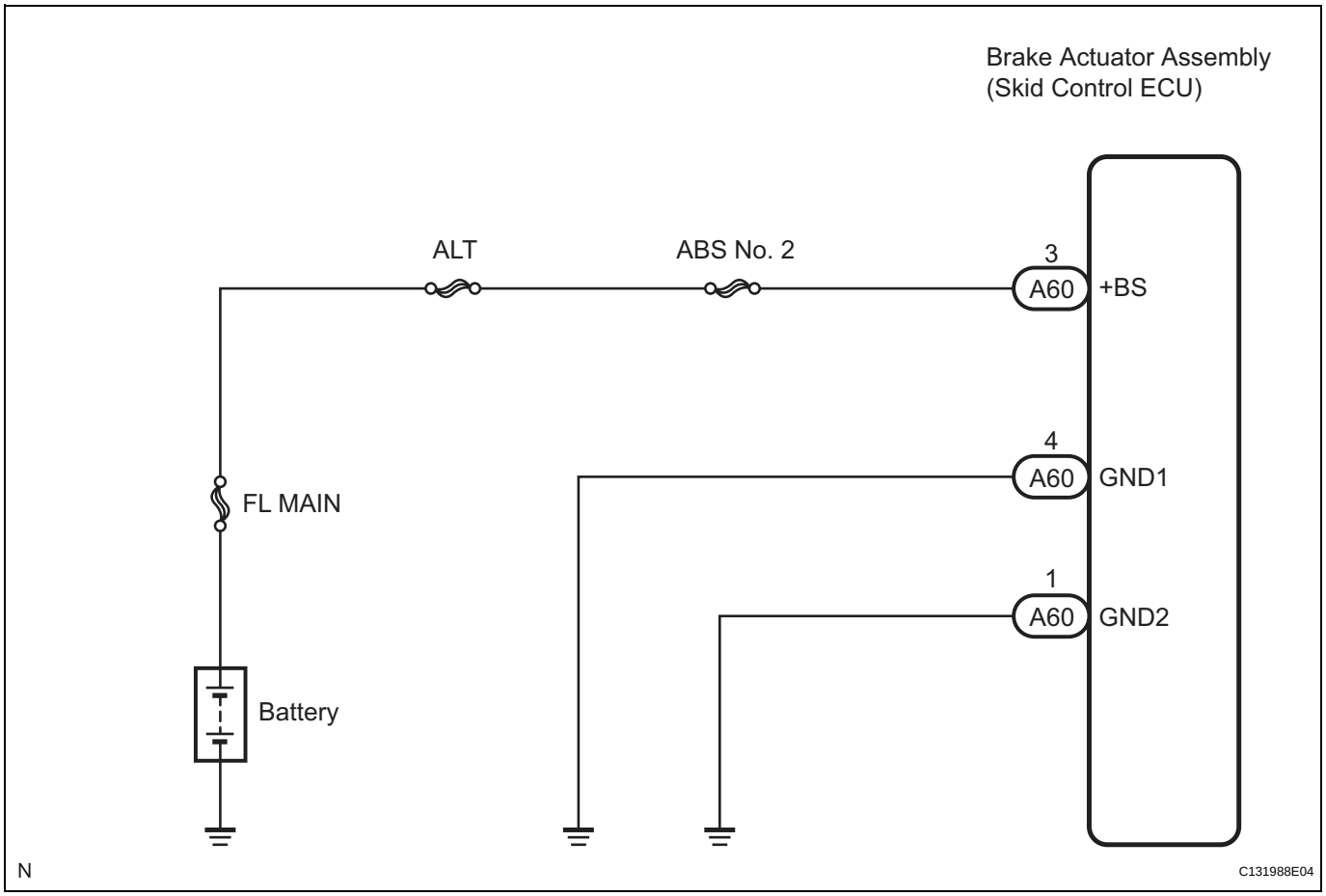
DESCRIPTION

The ABS solenoid relay supplies power to the ABS solenoid.
The solenoid relay is turned on 1.5 seconds after the ignition switch is turned on (IG), and is turned off if an open or short in the solenoid is detected by self diagnosis performed when the vehicle starts running.
The ABS solenoid relay is housed in the skid control ECU in the brake actuator assembly.
HINT:
If a speed signal of 4 mph (6 km/h) or more is input to the skid control ECU, with the ignition switch on (IG) and the stop light switch off, the skid control ECU performs self diagnosis of the motor and solenoid circuits.

DTC No.	DTC Detection Condition	Trouble Area
C0278/11	When any of the following is detected: • When the relay is ON, the voltage is less than IG terminal voltage x 0.8 V for 0.5 seconds. • When the relay is OFF, the voltage is out of range (IG terminal voltage x 0.1 to IG terminal voltage x 0.8).	• ABS No. 2 fuse (Fusible link) • Brake actuator assembly (skid control ECU) • Solenoid relay circuit

BC

WIRING DIAGRAM

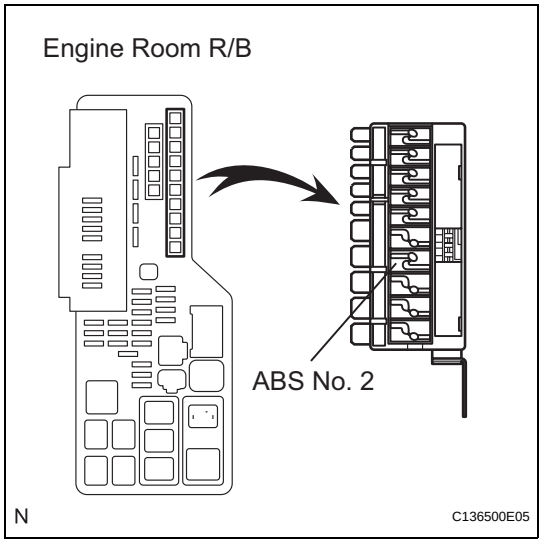


INSPECTION PROCEDURE

HINT:

- When C1241/41 is output together with C0278/11, inspect and repair the trouble areas indicated by C1241/41 (See page BC-361).
- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 INSPECT FUSIBLE LINK (ABS NO. 2 FUSE)



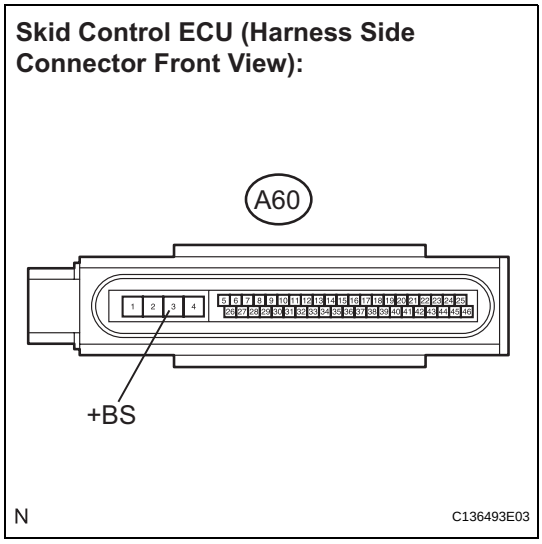
(a) Remove the fusible link from the engine room R/B.
(b) Check if the fusible link is melted.
OK:
The fusible link is not melted.
(c) Install the fusible link to the engine room R/B with the nut.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NG → **REPLACE FUSIBLE LINK**

OK

2 INSPECT SKID CONTROL ECU (+BS TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

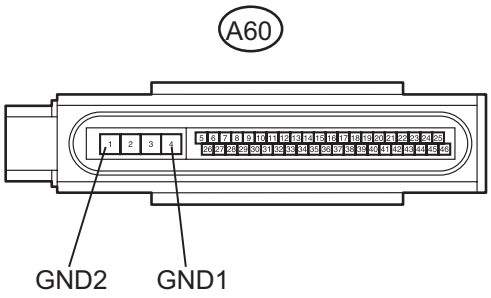
Tester Connection	Condition	Specified Condition
A60-3 (+BS) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (+BS CIRCUIT)**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

HINT:
This code is detected when a problem is identified in the brake actuator assembly.
The solenoid circuit is located in the brake actuator assembly. Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC code is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harnesses, and fuses of the brake actuator assembly. Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

BC

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

DTC	C0365/28	Malfunction in Deceleration Sensor

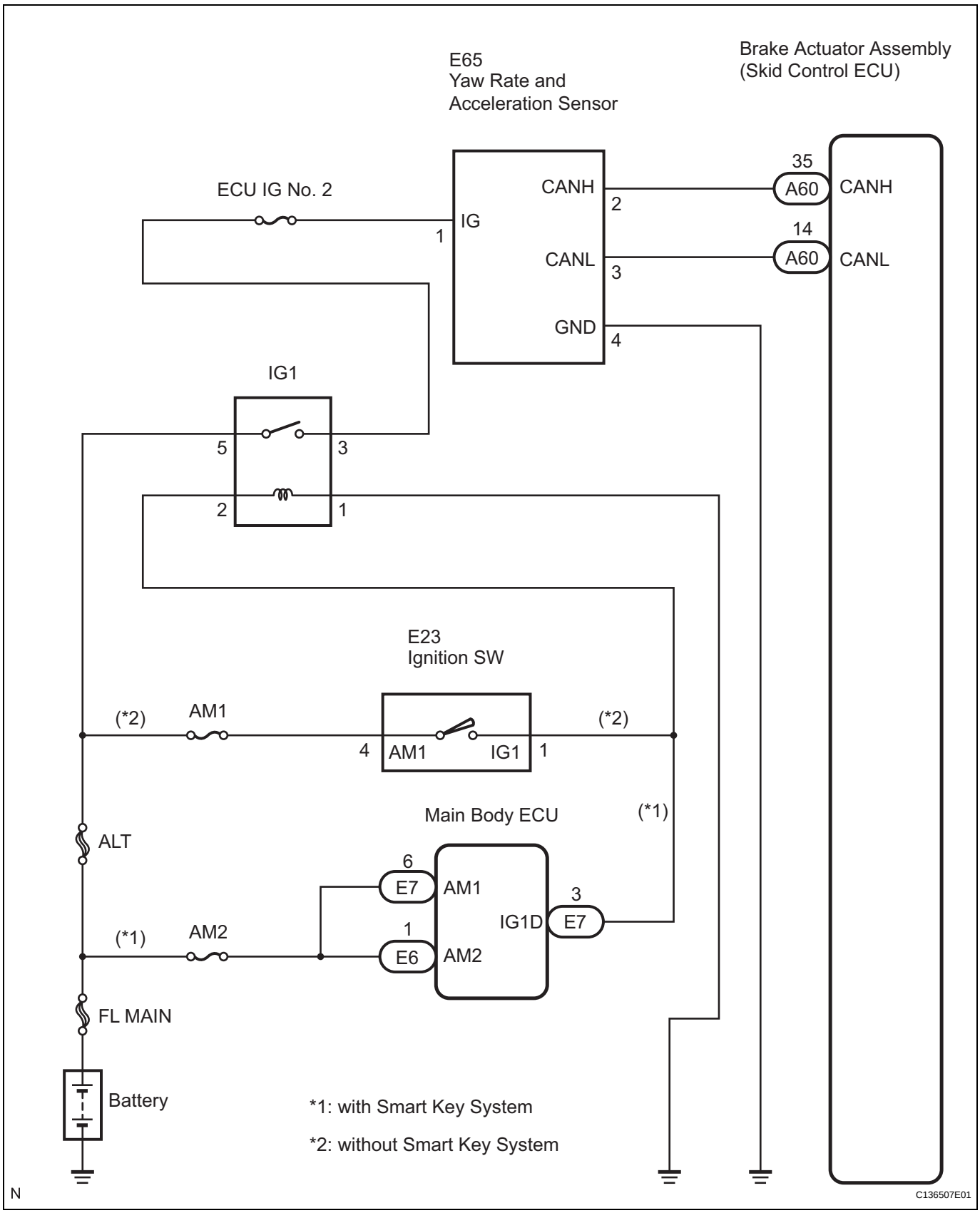
DTC	C1234/34	Yaw Rate Sensor Malfunction

DESCRIPTION

The deceleration sensor is combined with the yaw rate and acceleration sensor.
The brake actuator receives signals from the yaw rate and acceleration sensor via the CAN communication system.
If there is trouble in the CAN communication system, DTCs U0073/94 and U0123/62 are output.

DTC No.	DTC Detection Condition	Trouble Area
C0365/28	When any of the following is detected: • Lateral acceleration difference between sensor signal and reference value is large. • Offset value of sensor signal is higher than the standard value. • Sensor signal is out of range (2.25 m/s^2).	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit • Sensor installation • Brake actuator assembly (skid control ECU)
C1234/34	Sensor malfunction signal is received from the yaw rate sensor.	• Yaw rate and acceleration sensor • Yaw rate and acceleration sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

- When U0073/94, U0100/65, U0123/62 and/or U0126/63 is output together with C0365/28, inspect and repair the trouble areas indicated by U0073/94, U0100/65, U0123/62 and/or U0126/63 first.

1 CHECK DTC

(a) Clear the DTCs (See page BC-302).
(b) Start the engine.
(c) At a speed of 18 mph (30 km/h) or more, drive the vehicle, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.
(d) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

BC

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 INSPECT YAW RATE AND ACCELERATION SENSOR INSTALLATION

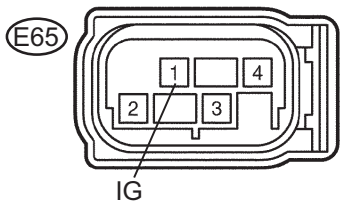
(a) Check that the yaw rate and acceleration sensor has been installed properly (See page BC-448).
OK:
The sensor should be tightened to the specified torque.
The sensor should not be titled.

NG → **INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY**

OK

3 INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL)

Yaw Rate and Acceleration Sensor (Harness Side Connector Front View):



F048983E13

(a) Disconnect the yaw rate and acceleration sensor connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

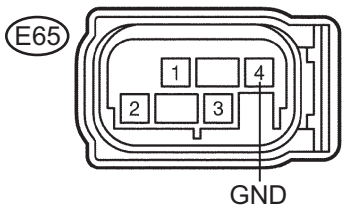
Tester Connection	Condition	Specified Condition
E65-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)**

OK

4 INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL)

Yaw Rate and Acceleration Sensor (Harness Side Connector Front View):



(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E65-4 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

BC

5 RECONFIRM DTC

(a) Clear the DTCs (See page BC-302).
(b) Start the engine.
(c) At a speed of 18 mph (30 km/h) or more, drive the vehicle, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.
(d) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is output	A
DTC is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTC is not output (When troubleshooting in accordance with the DTC CHART)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)**

A

REPLACE YAW RATE AND ACCELERATION SENSOR (See page BC-447)

DTC	C1201/51	Engine Control System Malfunction

DESCRIPTION

If a malfunction in the engine control system is detected, the operations of VSC and TRAC are prohibited by the fail safe function (See page BC-306).
When the signals from the engine are input normally, the fail safe is cancelled and the DTC is not stored.

DTC No.	DTC Detecting Condition	Trouble Area
C1201/51	A trouble signal in the engine control system is input.	Engine control system

INSPECTION PROCEDURE

1	CHECK DTC (ENGINE CONTROL SYSTEM)

(a) Clear the DTC (engine control system) (See page ES-38 for 2AZ-FE, ES-45 for 2GR-FE).
(b) Perform a road test.
(c) Check for the DTC (engine control system).

BC

Result

Display (DTC Output)	Proceed to
DTC (engine control system) is not output	A
DTC (engine control system) is output	B

B → REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (ENGINE CONTROL SYSTEM)

A → REPLACE ECM

DTC	C1225/25	SMC Solenoid Circuit

DTC	C1226/26	SMC Solenoid Circuit

DTC	C1227/27	SRC Solenoid Circuit

DTC	C1228/28	SRC Solenoid Circuit

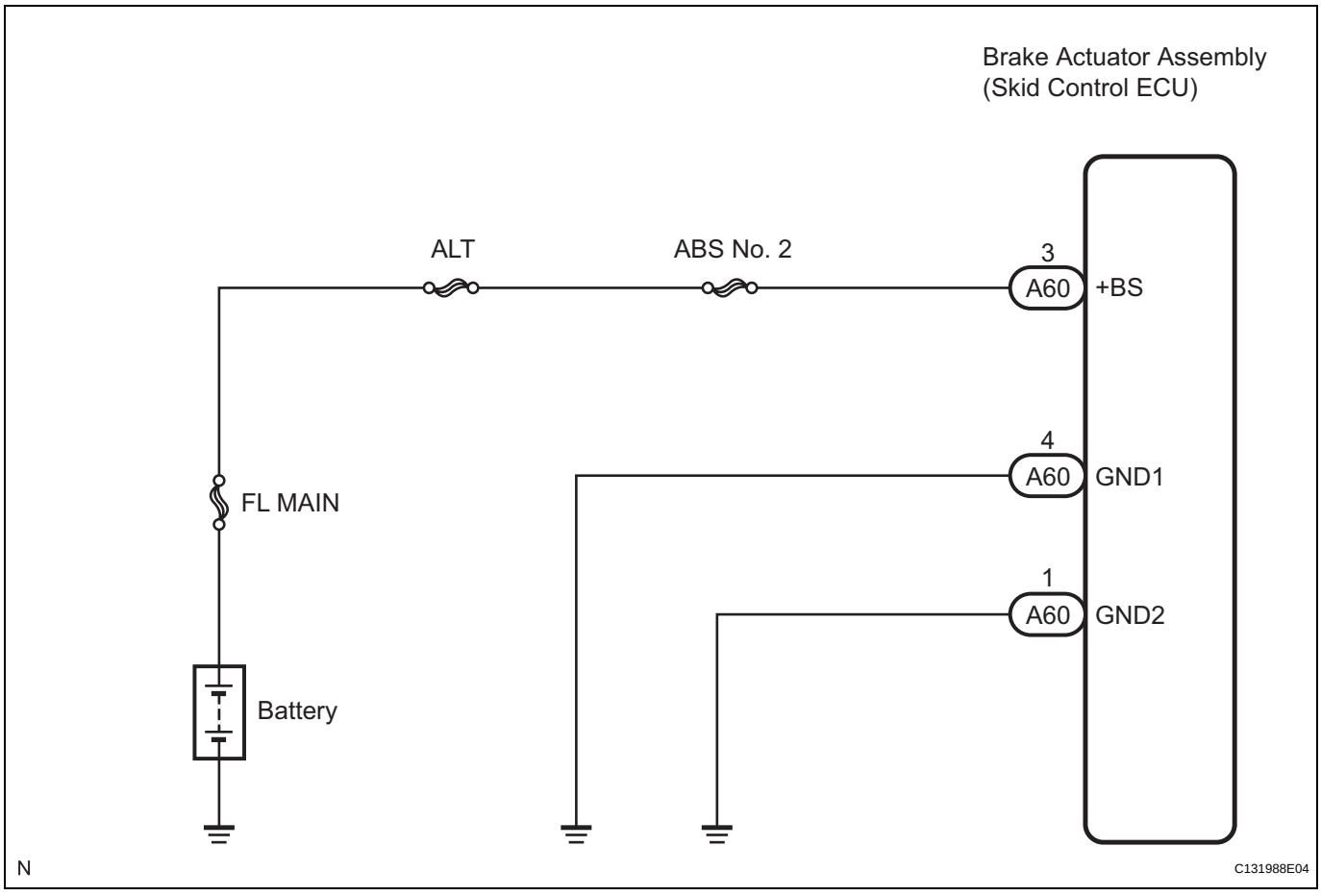
DESCRIPTION

These solenoids turn on when signals are received from the skid control ECU and they control the pressure acting on the wheel cylinders to control the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C1225/25	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SMC1 circuit
C1226/26	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SMC2 circuit
C1227/27	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SRC1 circuit
C1228/28	Solenoid valve signal does not match the check result	• Brake actuator assembly (skid control ECU) • SRC2 circuit

BC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	RECONFIRM DTC

HINT:
These codes are detected when a problem is identified in the brake actuator assembly.
The solenoid circuits are located in the brake actuator assembly.
Therefore, solenoid circuit inspection and solenoid unit inspection cannot be performed. Be sure to check if the DTC is output before replacing the brake actuator assembly.

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 12 mph (20 km/h) or more for 30 seconds or more.
(d) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
- If the normal system code is output (the trouble code is not output), slightly jiggle the connectors, wire harness, and fuses of the brake actuator assembly (skid control ECU). Make sure that no DTCs are output.
- If any DTCs are output while jiggling a connector or wire harness of the brake actuator (skid control ECU), inspect and repair the connector or wire harness.
- It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

END

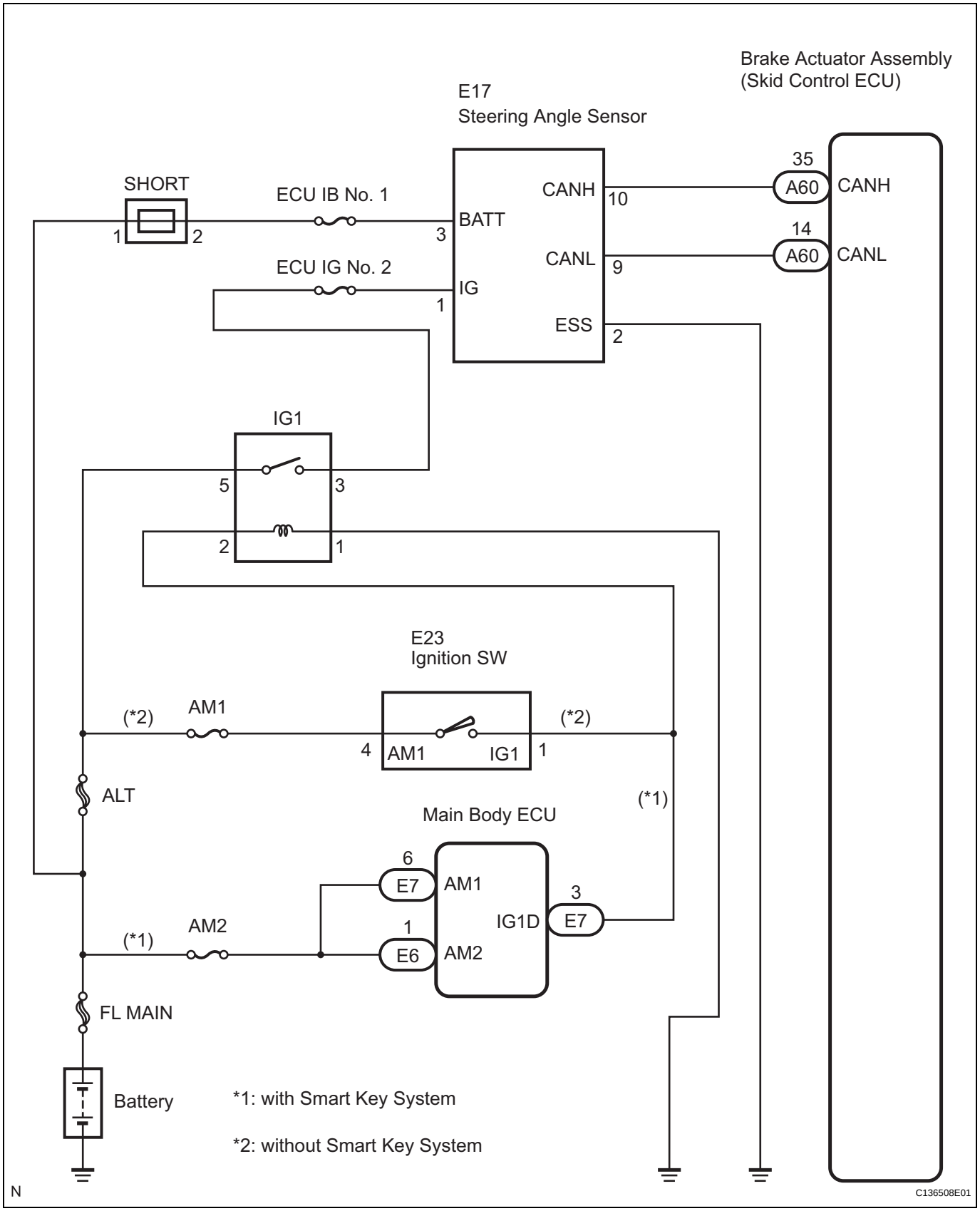
DTC	C1231/31	Steering Angle Sensor Circuit Malfunction

DESCRIPTION

The steering angle sensor signal is sent to the skid control ECU via the CAN communication system. When there is a malfunction in the CAN communication system, it will be detected by the steering angle sensor zero point malfunction diagnostic function.

DTC No.	DTC Detection Condition	Trouble Area
C1231/31	When any of the following is detected: • With ECU terminal IG1 voltage 9.8 V or more, the condition that the ECU does not receive data from the steering angle sensor continues. • Internal sensor failure • The offset value is out of range. • Sensor signal changes too rapidly. • Steering angle value difference between measured and reference is out of range. • Steering angle sensor signal is out of range.	• Steering angle sensor • Steering angle sensor circuit • Steering angle sensor power supply

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

- When U0073/94, U0100/63, U0123/62 and/or U0126/63 is output together with C1231/31, inspect and repair the trouble areas indicated by U0073/94, U0100/65, U0123/62 and/or U0126/63 first.
- When the speed sensor or the yaw rate and acceleration sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate and acceleration sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate and acceleration sensor first, and then inspect and repair the steering angle sensor.
- Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK DTC

(a) Clear the DTC (See page BC-302).
(b) Turn the ignition switch off.
(c) Turn the ignition switch on (IG) again and check that no CAN communication system DTC is output.
(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 22 mph (35 km/h) and check that no speed sensor and yaw rate and acceleration sensor DTCs are output (See page BC-302).

BC

Result

Condition	Proceed to
No CAN communication system DTC and the speed sensor or yaw rate and acceleration sensor DTC are output	A
CAN communication system DTC is output	B
Speed sensor or yaw rate and acceleration sensor DTC is output	C

HINT:

- If there is a malfunction in the speed sensor or the yaw rate and acceleration sensor, an abnormal value may be output although the steering angle sensor is normal.
- If the speed sensor and the yaw rate and acceleration sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor.

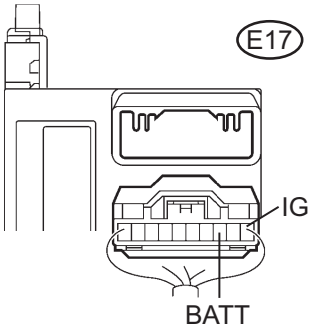
B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

C → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (See page BC-311)**

A

2 INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL)

Steering Angle Sensor Wire Harness View:



G030156E17

(a) Remove the column cover lower.
(b) Disconnect the steering angle sensor connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

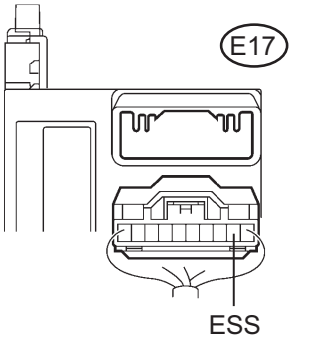
Tester Connection	Condition	Specified Condition
E17-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V
E17-3 (BAT) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3 INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL)

Steering Angle Sensor Wire Harness View:



G030156E18

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E17-2 (ESS) - Body ground	Always	Below 1 Ω

(b) Connect the connector.
(c) Install the column cover lower.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)**

OK

REPLACE STEERING ANGLE SENSOR (See page BC-450)

BC

DTC	C1237/37	Tires of Different Size

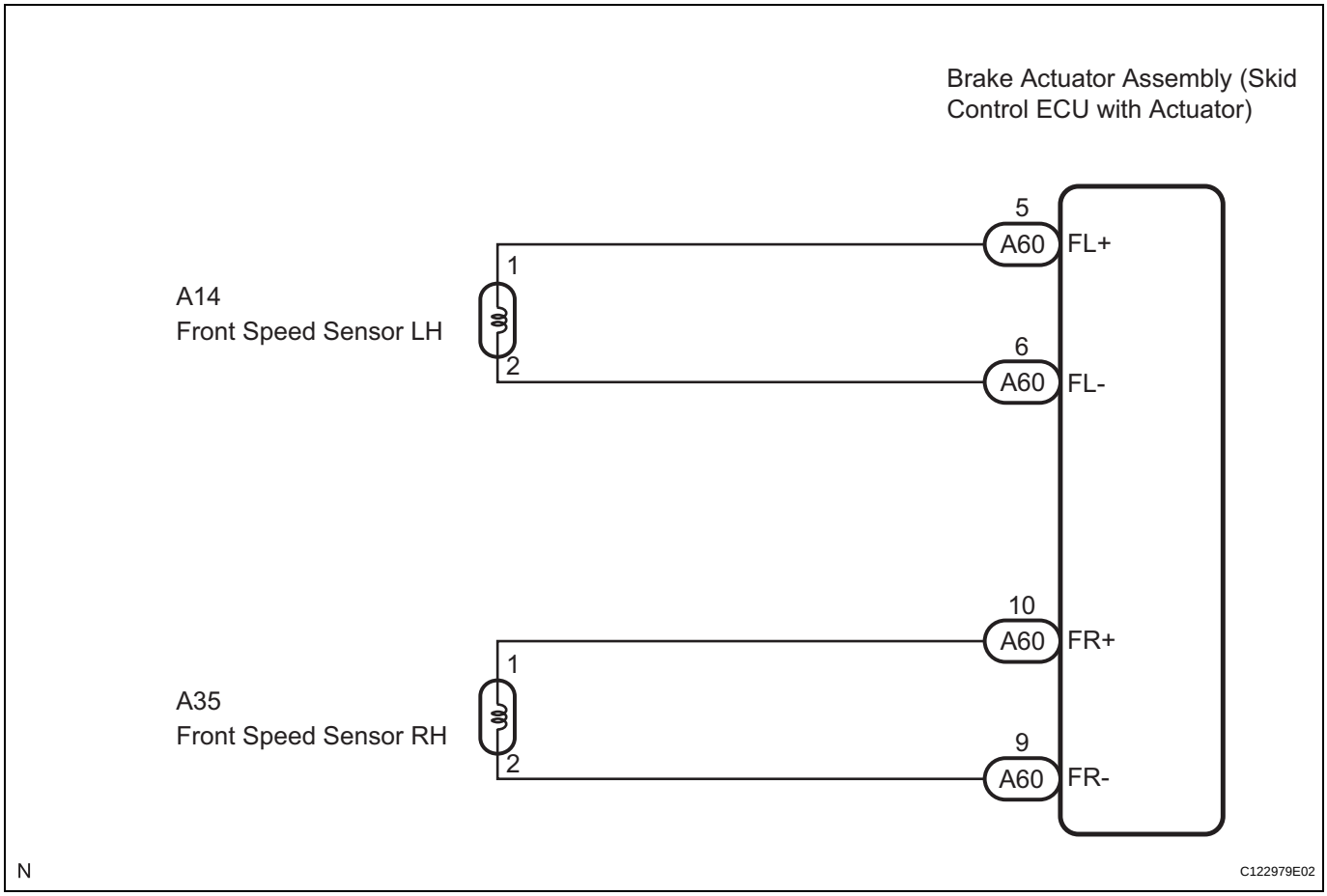
DESCRIPTION

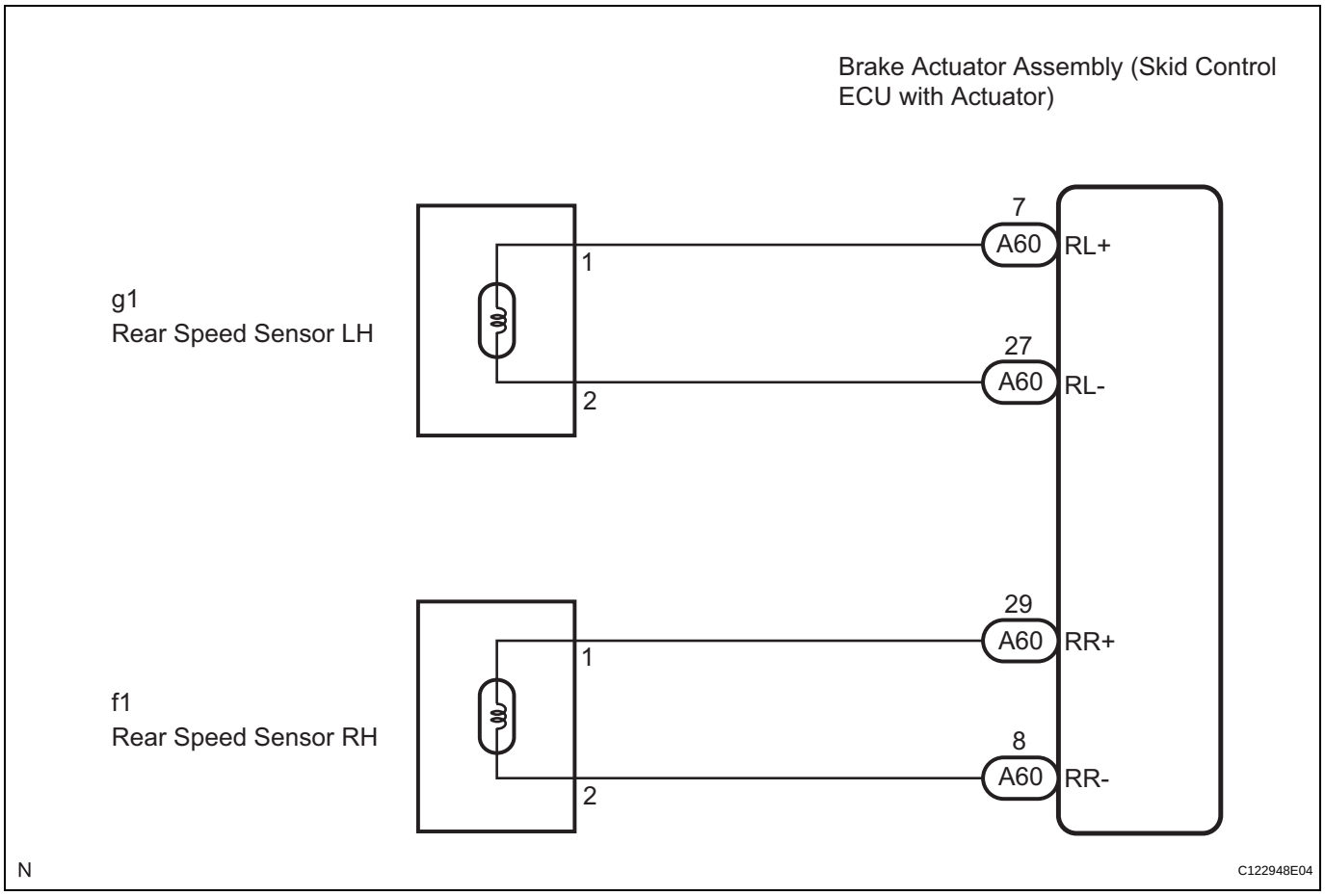
The skid control ECU measures the speed of each wheel by receiving signals from the speed sensor. These signals are used for recognizing that all 4 wheels are operating properly.
Therefore, all wheel signals must be equal.

DTC No.	DTC Detecting Condition	Trouble Area
C1237/37	When any of the following is detected: • Wheel speed difference between the wheels. • Wheel sensor signal failure. • ABS control continues for 60 sec. or more.	• Brake actuator assembly (skid control ECU) • Speed sensor rotor (Front) • Rear axle hub and bearing assembly • Speed sensor • Speed sensor circuit • Tire and wheel size • Tire deformation

WIRING DIAGRAM

BC





BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK TIRES

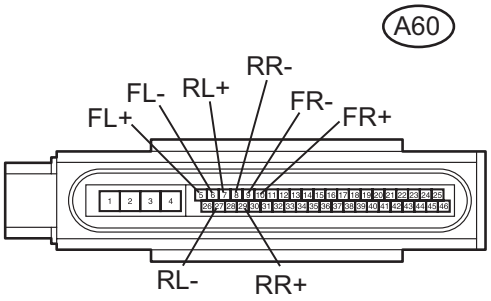
(a) Check the size and condition of all 4 wheels (See page TW-3).
HINT:
The DTC is output when tire deformation or a difference in tire size is detected.
OK:
The diameter of all 4 tires and air pressure are the same.

NG → **REPLACE TIRES SO THAT ALL 4 TIRES ARE THE SAME SIZE**

OK

2 INSPECT SPEED SENSOR AND SENSOR ROTOR SERRATIONS

Skid Control ECU (Harness Side Connector Front View):



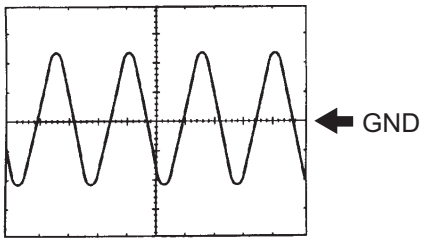
N C136493E04

(a) Lift up the vehicle.
(b) Disconnect the skid control ECU connector.
(c) Connect the oscilloscope to each speed sensor terminal of the skid control ECU connector.

Terminals

Connector	Circuit
A60-5 (FL+) - A60-6 (FL-)	Front left speed sensor
A60-10 (FR+) - A60-9 (FR-)	Front right speed sensor
A60-7 (RL+) - A60-27 (RL-)	Rear left speed sensor
A60-29 (RR+) - A60-8 (RR-)	Rear right speed sensor

Normal Signal Waveform:



1 V/Division, 2 ms./Division

C140980E03

(d) Check that a waveform is output when the tires are rotated (by the sensor circuit).

OK:

A waveform as shown in the figure is output.

HINT:

- Each sensor circuit outputs the same waveform without noise.
- As vehicle speed (wheel rotation speed) increases, the width of the waveform narrows and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, the erratic signals are generated due to rotor scratches, looseness or foreign matter attached to the speed sensor.

(e) Make sure that the waveform does not change while jiggling a connector or a wire harness.

OK:

The waveform does not change.

HINT:

If the waveform changes while jiggling a connector or a wire harness, there may be a malfunction in the connector or the wire harness.

(f) Connect the connector.

NG → **Go to step 4**

OK

3 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Drive the vehicle at a speed of 20 mph (32 km/h) or more for 60 seconds or more.

(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

BC

4 CHECK SPEED SENSOR ROTOR

(a) Check the speed sensor rotor.
Front Speed Sensor Rotor (Front drive outboard joint shaft assembly): (See page DS-23)
Rear Speed Sensor Rotor (Rear axle hub and bearing assembly): (See page AH-14)
OK:
No scratches or foreign matter on the rotors.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-290).

NG → **CLEAN OR REPLACE SPEED SENSOR ROTOR**

OK

5 CHECK SPEED SENSOR TIP

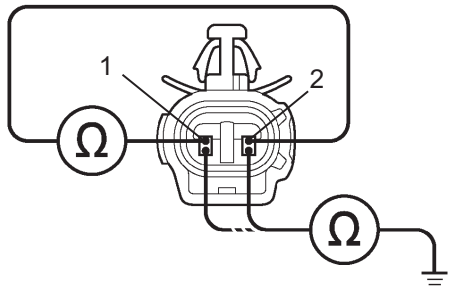
(a) Remove each speed sensor (See page BC-438 for front, BC-443 for rear).
(b) Check the speed sensor tip.
OK:
No scratches or foreign matter on the sensor tip.
NOTICE:
Check the speed sensor signal after the cleaning/ replacement (See page BC-290).
(c) Install the speed sensor.

NG → **CLEAN OR REPLACE SPEED SENSOR**

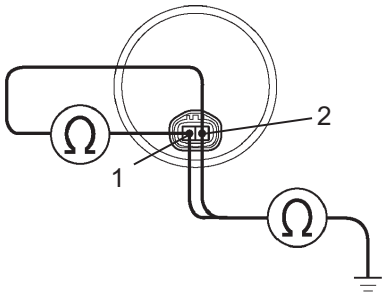
OK

6	INSPECT SPEED SENSOR

Front Speed Sensor:



Rear Speed Sensor:



C136027E02

(a) Disconnect each speed sensor connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A14-1 (FL+) - A14-2 (FL-)	Always	0.92 to 1.22 kΩ at 20°C
A14-1 (FL+) - Body ground	Always	10 kΩ or higher
A14-2 (FL-) - Body ground	Always	10 kΩ or higher
A35-1 (FR+) - A35-2 (FR-)	Always	0.92 to 1.22 kΩ at 20°C
A35-1 (FR+) - Body ground	Always	10 kΩ or higher
A35-2 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
g1-1 (RL+) - g1-2 (RL-)	Always	Below 2.2 kΩ
g1-1 (RL+) - Body ground	Always	10 kΩ or higher
g1-2 (RL-) - Body ground	Always	10 kΩ or higher
f1-1 (RR+) - f1-2 (RR-)	Always	Below 2.2 kΩ
f1-1 (RR+) - Body ground	Always	10 kΩ or higher
f1-2 (RR-) - Body ground	Always	10 kΩ or higher

NOTICE:

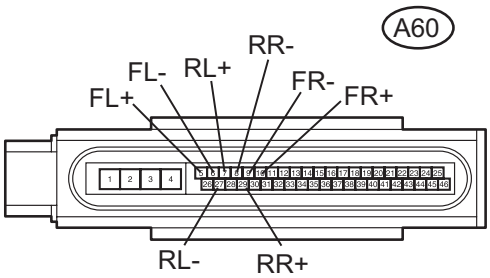
Check the speed sensor signal after replacement (See page BC-290).

NG → **REPLACE EACH SPEED SENSOR**

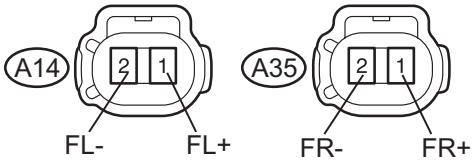
OK

7 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)

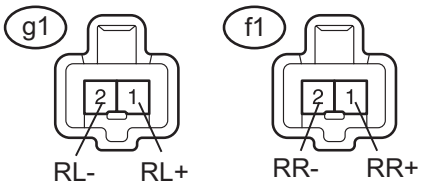
Skid Control ECU (Harness Side Connector Front View):



Front Speed Sensor Harness Side Connector Front View:



Rear Speed Sensor Harness Side Connector Front View:



C139146E02

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

FRONT

Tester Connection	Condition	Specified Condition
A60-5 (FL+) - A14-1 (FL+)	Always	Below 1 Ω
A60-5 (FL+) - Body ground	Always	10 kΩ or higher
A60-6 (FL-) - A14-2 (FL-)	Always	Below 1 Ω
A60-6 (FL-) - Body ground	Always	10 kΩ or higher
A60-10 (FR+) - A35-1 (FR+)	Always	Below 1 Ω
A60-10 (FR+) - Body ground	Always	10 kΩ or higher
A60-9 (FR-) - A35-2 (FR-)	Always	Below 1 Ω
A60-9 (FR-) - Body ground	Always	10 kΩ or higher

REAR

Tester Connection	Condition	Specified Condition
A60-7 (RL+) - g1-1 (RL+)	Always	Below 1 Ω
A60-7 (RL+) - Body ground	Always	10 kΩ or higher
A60-27 (RL-) - g1-2 (RL-)	Always	Below 1 Ω
A60-27 (RL-) - Body ground	Always	10 kΩ or higher
A60-29 (RR+) - f1-1 (RR+)	Always	Below 1 Ω
A60-29 (RR+) - Body ground	Always	10 kΩ or higher
A60-8 (RR-) - f1-2 (RR-)	Always	Below 1 Ω
A60-8 (RR-) - Body ground	Always	10 kΩ or higher

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO EACH SPEED SENSOR)**

OK

8 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.

BC

(c) Drive the vehicle at a speed of 20 mph (32 km/h) or more for at least 60 seconds.

(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1237/37) is not output	A
DTC (C1237/37) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)**

DTC	C1241/41	Low Battery Positive Voltage or Abnormally High Battery Positive Voltage

DESCRIPTION

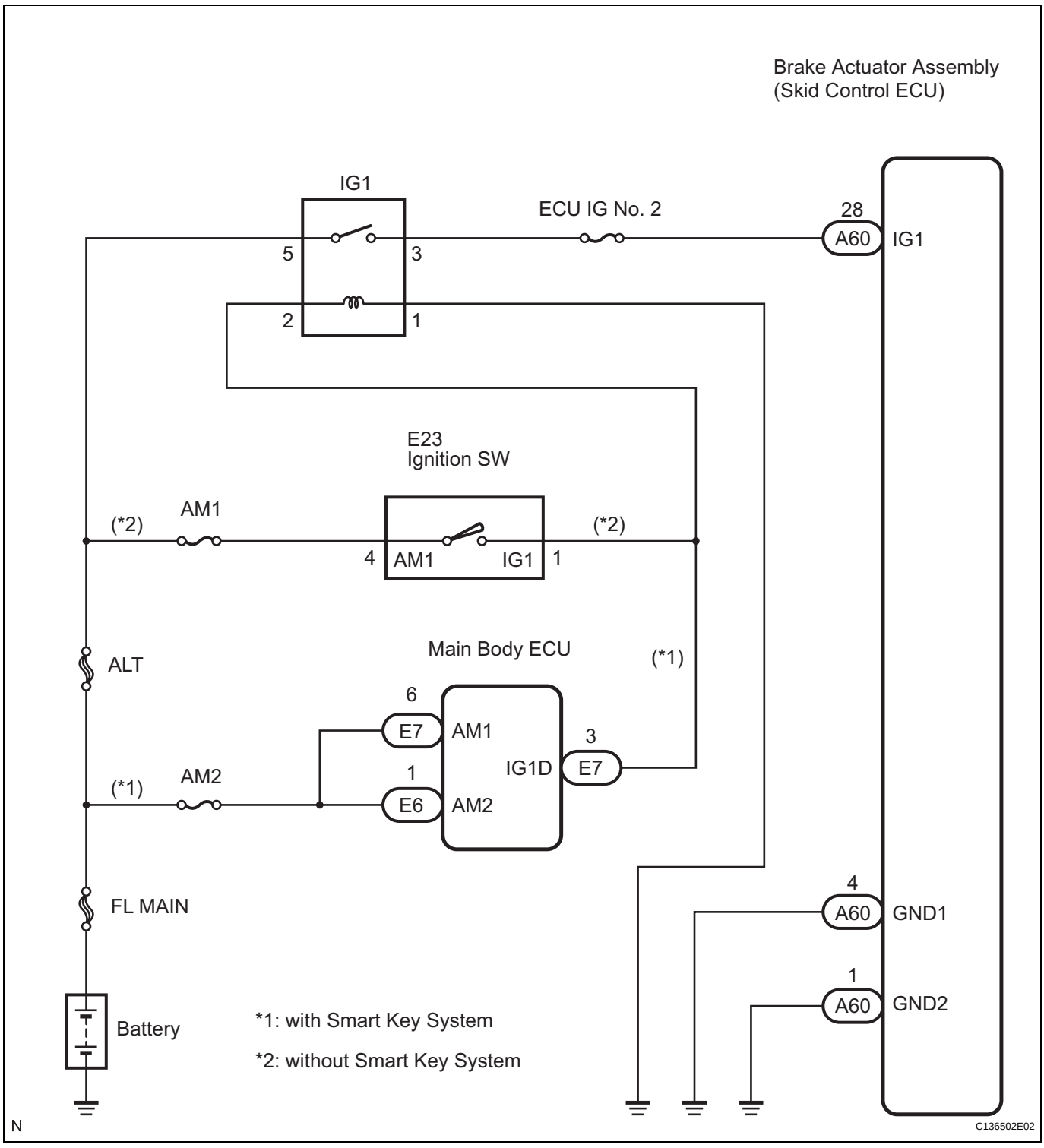
If a malfunction is detected in the power supply circuit of the brake actuator assembly (skid control ECU), the skid control ECU (housed in the actuator assembly) stores this DTC and the fail-safe function prohibits ABS operation.

This DTC is output when the IG1 terminal voltage deviates from the normal condition due to a malfunction in the power supply or charging circuit such as the battery or alternator circuit.

This DTC is cancelled when the IG1 terminal voltage returns to normal (only when the voltage returns to normal from a voltage lower than the specified value).

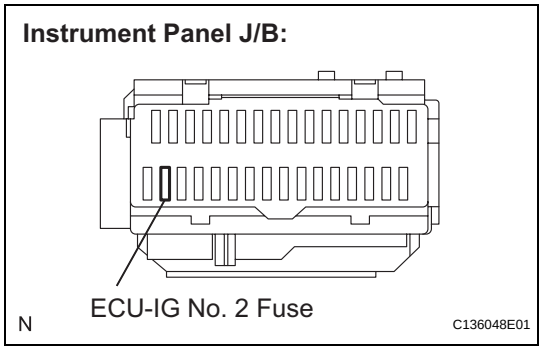
DTC No.	DTC Detection Condition	Trouble Area
C1241/41	When either of the following is detected: • Battery voltage is 16.8 V or more. • Battery voltage is 9.2 V or less.	• Battery • ECU-IG No. 2 fuse • Charging system • Power source circuit • Brake actuator assembly (internal power source circuit)

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT FUSE (ECU-IG NO. 2 FUSE)



(a) Remove the ECU-IG No. 2 fuse from the instrument panel J/B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
ECU-IG No. 2 fuse	Below 1 Ω (Continuity)

(c) Install the fuse.

NG → **REPLACE FUSE**

OK

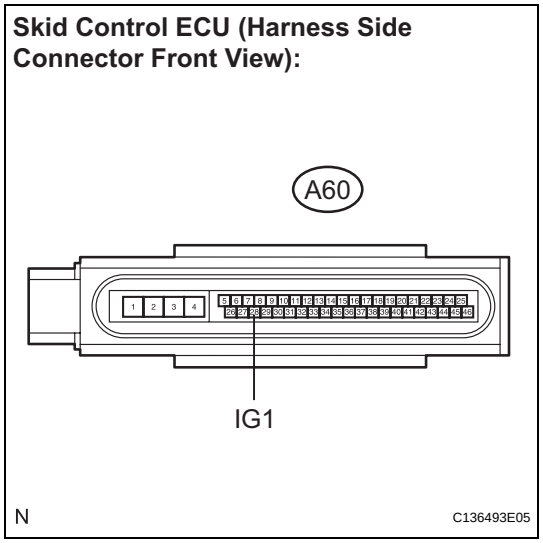
2 INSPECT BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **INSPECT CHARGING SYSTEM**

OK

3 INSPECT SKID CONTROL ECU (IG1 TERMINAL VOLTAGE)



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

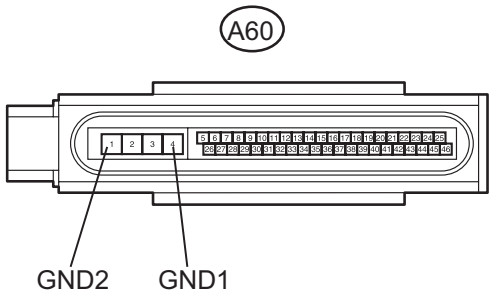
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

BC

4 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

BC

OK

5 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	B
DTC is output (When troubleshooting in accordance with the DTC CHART)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE (See page BC-295)**

C → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

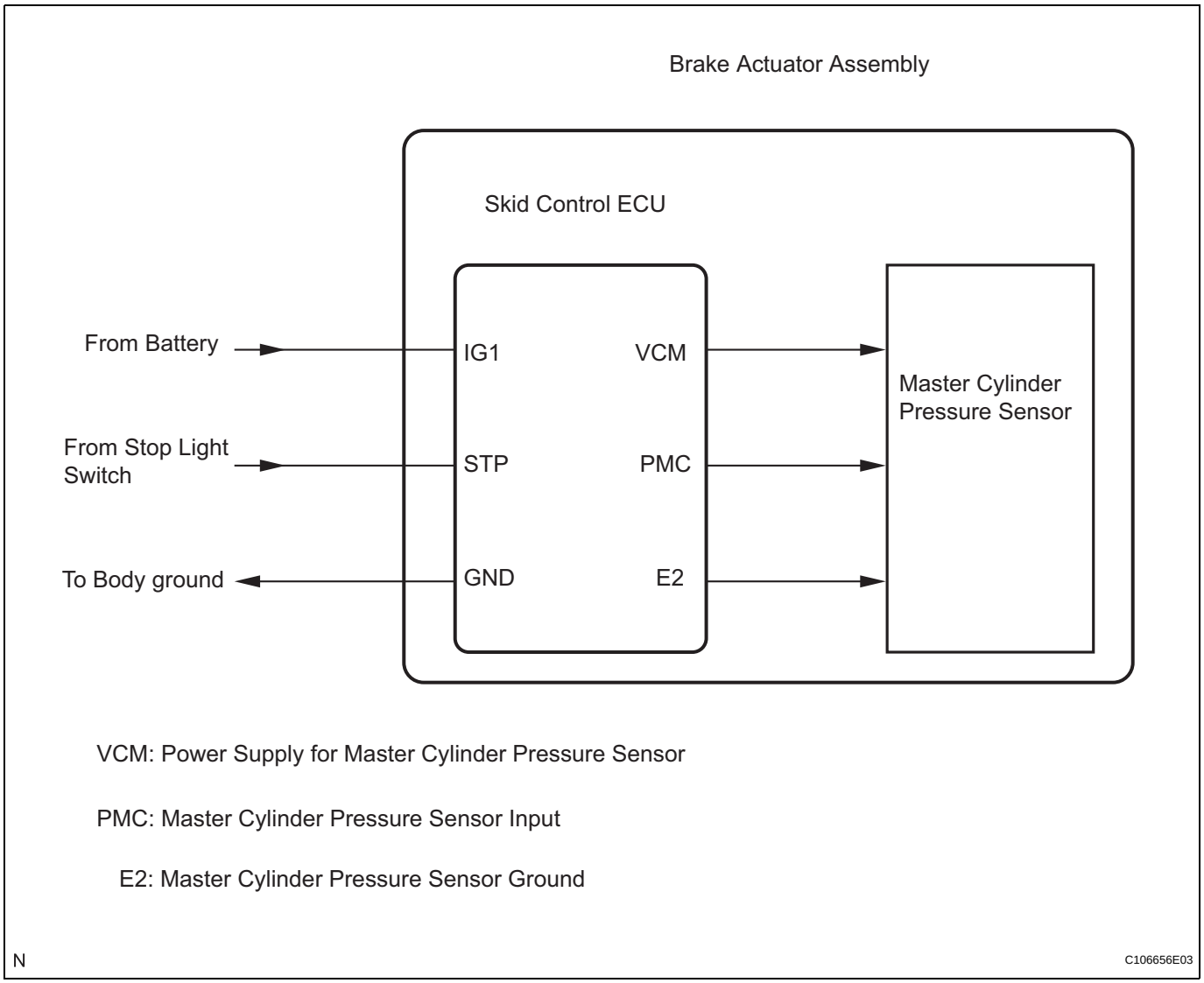
A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

DTC	C1246/46	Master Cylinder Pressure Sensor Malfunction

DESCRIPTION

The master cylinder pressure sensor is connected to the skid control ECU in the brake actuator assembly.



DTC No.	DTC Detection Condition	Trouble Area
C1246/46	When any of the following is detected: • The voltage of the sensor signal is out of range (less than 0.3 V, more than 4.86 V). • The sensor supply voltage is out of range (above 5.3 V, below 4.7 V). • The sensor signal offset value is out of range. • The sum of signal 1 and signal 2 is out of range (above 5.5 V, below 4.5 V).	• Master cylinder pressure sensor • Master cylinder pressure sensor circuit • Stop light switch circuit • Brake actuator assembly (skid control ECU)

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK STOP LIGHT OPERATION

(a) Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

OK

Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

NG → **INSPECT STOP LIGHT CIRCUIT**

OK ↓

2	READ VALUE OF INTELLIGENT TESTER (MASTER CYLINDER PRESSURE SENSOR)

BC

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine.
(c) Select the "DATA LIST" mode on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item (Display)	Measurement Item / Range (Display)	Normal Condition
MAS CYL PRESS 1	Master cylinder pressure sensor 1 reading / min.: 0 V, max.: 5 V	When brake pedal is released: 0.3 to 0.5 V

(d) Check that the hydraulic pressure value of the master cylinder pressure sensor observed on the intelligent tester changes when the brake pedal is depressed.
OK:
When the pedal is depressed, voltage displayed on the intelligent tester increases.

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK ↓

3	READ VALUE OF INTELLIGENT TESTER (STOP LIGHT SWITCH)

(a) Select the "DATA LIST" mode on the intelligent tester (See page BC-307).

DATA LIST: ABS/TRAC/VSC

Item (Display)	Measurement Item / Range (Display)	Normal Condition
STOP LAMP SW	Stop light switch / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released

(b) Check that the stop light condition observed on the intelligent tester changes when the brake pedal is depressed.
OK:
When the brake pedal is depressed, the intelligent tester displays "ON".

NG → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

OK

4	RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) At a speed of 18 mph (30 km/h) or more, drive the vehicle and perform braking test (decelerate the vehicle by depressing the brake pedal).
(d) Check if the same DTC is recorded (See page BC-302).
HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC (C1246/46) is not output	A
DTC (C1246/46) is output	B

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

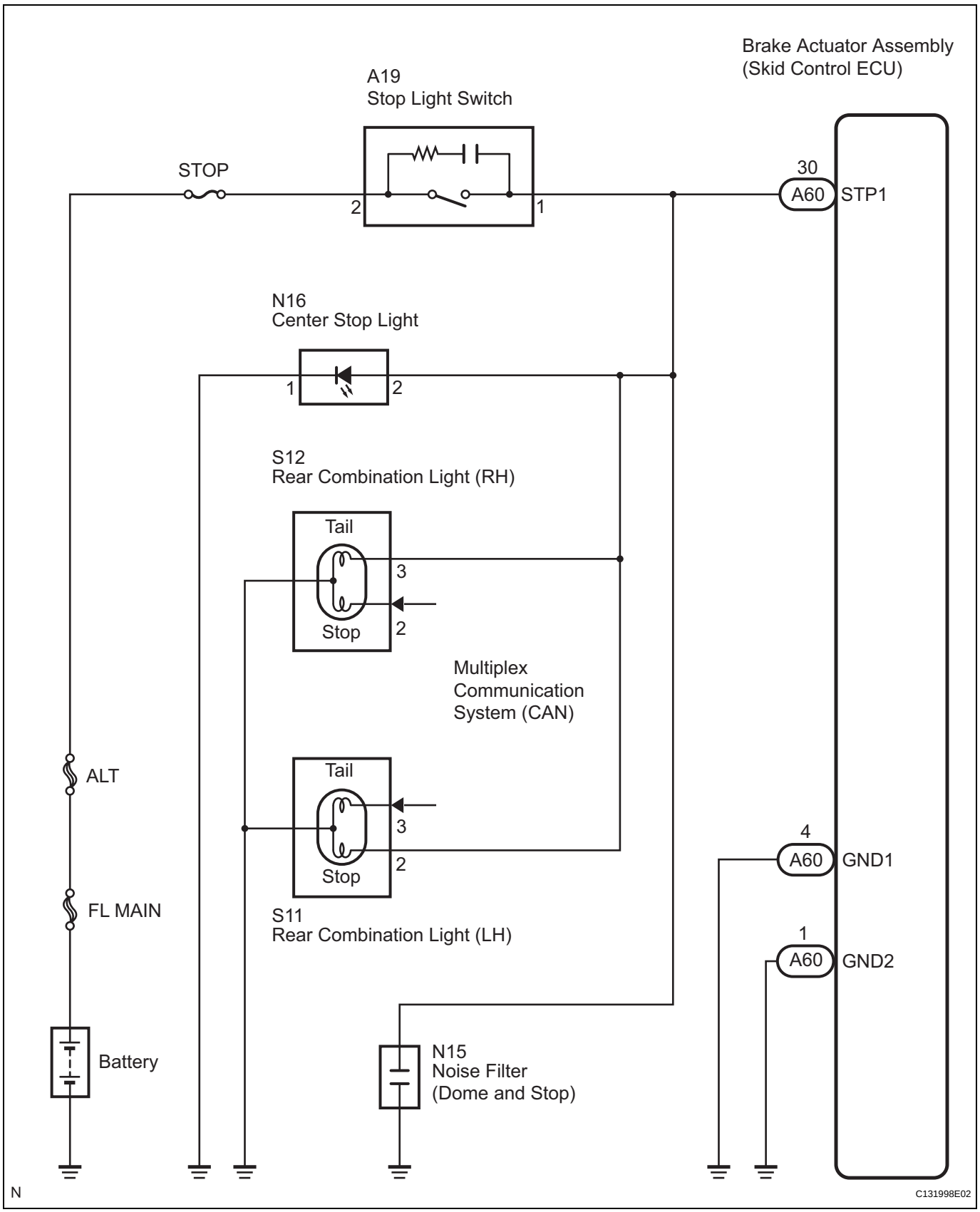
DTC	C1249/49	Open in Stop Light Switch Circuit

DESCRIPTION

This circuit recognizes brake operation by sending a stop light signal to the skid control ECU.
The skid control ECU has an open detection circuit, which outputs this DTC when detecting an open in the stop light signal input line (STP terminal) or the ground line of the stop light circuit with the stop light switch off (brake pedal not depressed).

DTC No.	DTC Detection Condition	Trouble Area
C1249/49	When either of the following is detected: • After the ignition switch is turned on (IG), the STP terminal voltage of the ECU is 40% to 67% of its supplied voltage for 0.5 seconds. • When STP signal is OFF (release the brake pedal), the pressure sensor value exceeds 725 bar for 1 second.	• Stop light switch • Stop light switch circuit • Brake actuator assembly (skid control ECU)

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK STOP LIGHT SWITCH OPERATION (STOP LIGHT SWITCH CIRCUIT)

(a) Check that the stop lights come on when the brake pedal is depressed and go off when the brake pedal is released.

OK

Pedal Condition	Illumination Condition
Brake pedal depressed	ON
Brake pedal released	OFF

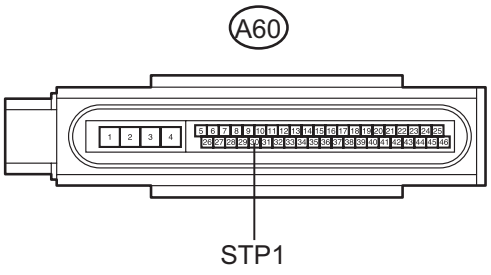
NG → **Go to step 5**

OK

2	INSPECT SKID CONTROL ECU (STP TERMINAL)

BC

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

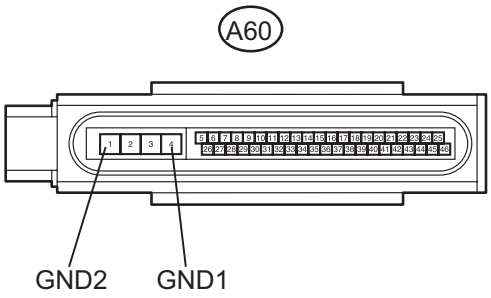
Tester Connection	Switch Condition	Specified Condition
A60-30 (STP1) - Body ground	Brake pedal depressed	8 to 14 V
A60-30 (STP1) - Body ground	Brake pedal released	Below 4.0 V

NG → **Go to step 7**

OK

3 INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

4 RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Depress the brake pedal several times to test the stop light circuit.
(d) Check if the same DTC is recorded (See page BC-302).

HINT:
Reinstall the sensors, connectors, etc. and restore the vehicle to its prior condition before rechecking for DTCs.

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

HINT:
It is suspected that the DTCs were output due to a bad connection of the connector terminal.

B → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

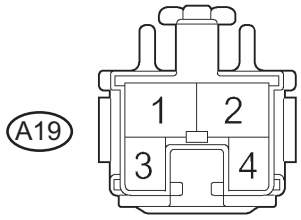
A

CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)

BC

5	CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH POWER SOURCE TERMINAL VOLTAGE)

Stop Light Switch (Harness Side Connector Front View):



I042363E18

(a) Disconnect the stop light switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V

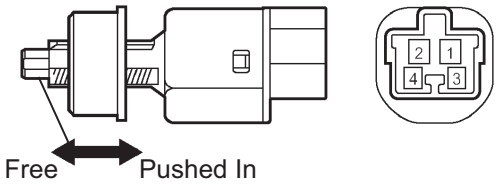
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH POWER SOURCE CIRCUIT)**

OK

BC

6	INSPECT STOP LIGHT SWITCH ASSEMBLY

Stop Light Switch Assembly:



H

F047752E04

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	10 kΩ or higher

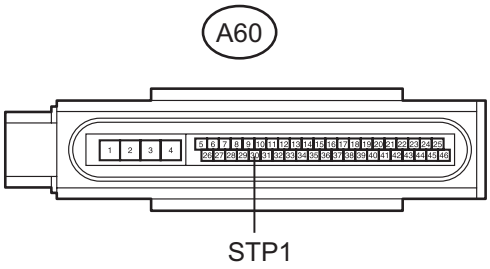
(b) Connect the connector.

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

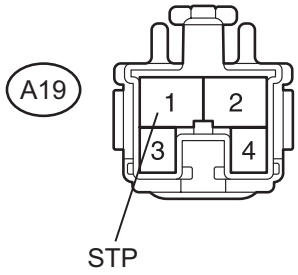
OK

7	CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)

Skid Control ECU (Harness Side Connector Front View):



Stop Lignt Switch (Harness Side Connector Front View):



N C139147E01

(a) Disconnect the stop light switch connector and skid control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-30 (STP1) - A19-1 (STP1)	Below 1 Ω

(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH TO SKID CONTROL ECU)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CIRCUIT)

BC

DTC	C1288/88	ECU Version Miss Match

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
C1288/88	ECM does not match	ECM

INSPECTION PROCEDURE

1 CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

BC

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 PERFORM ENGINE VARIANT LEARNING

(a) Perform engine variant learning (See page BC-290).

NEXT

3 CONFIRM RECONFIRM DTC

(a) Clear the DTC (See page BC-302).
(b) Start the engine.
(c) Check if the same DTC is recorded (See page BC-302).

Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPLACE ECM**

A

END

DTC	C1300/62	Skid Control ECU Malfunction

DESCRIPTION

The skid control ECU is housed in the brake actuator assembly.
The skid control ECU judges the vehicle driving condition based on the signals from each sensor, and controls the brake actuator assembly.

DTC No.	DTC Detection Condition	Trouble Area
C1300/62	Internal failure of the skid control ECU control unit	Brake actuator assembly (skid control ECU)

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK DTC

(a) Check the DTC (See page BC-302).

BC

Result

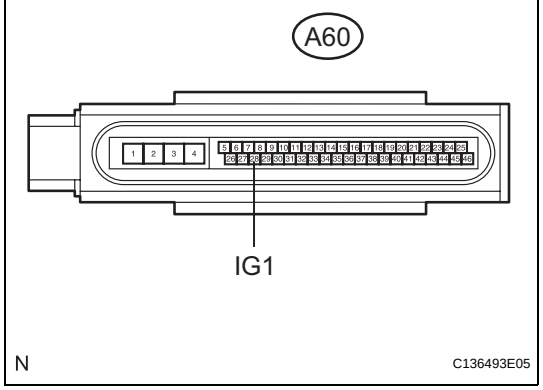
Condition	Proceed to
DTC C1300/62 is output (only C1300/62)	A
Other DTCs are output	B

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS (See page BC-302)**

A

2	INSPECT SKID CONTROL ECU (IG1 TERMINAL VOLTAGE)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

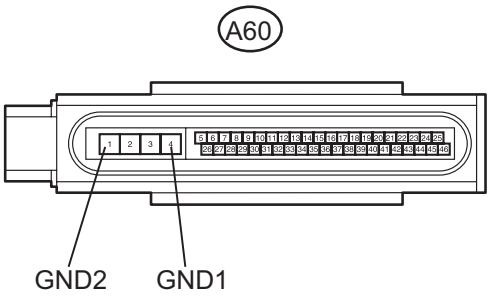
Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

3	INSPECT SKID CONTROL ECU (GND TERMINAL CONTINUITY)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A60-4 (GND1) - Body ground	Below 1 Ω
A60-1 (GND2) - Body ground	Below 1 Ω

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

BC

DTC	U0073/94	Control Module Communication Bus OFF

DTC	U0100/65	Lost Communication with ECM / PCM

DTC	U0123/62	Lost Communication with Yaw Rate Sensor Module

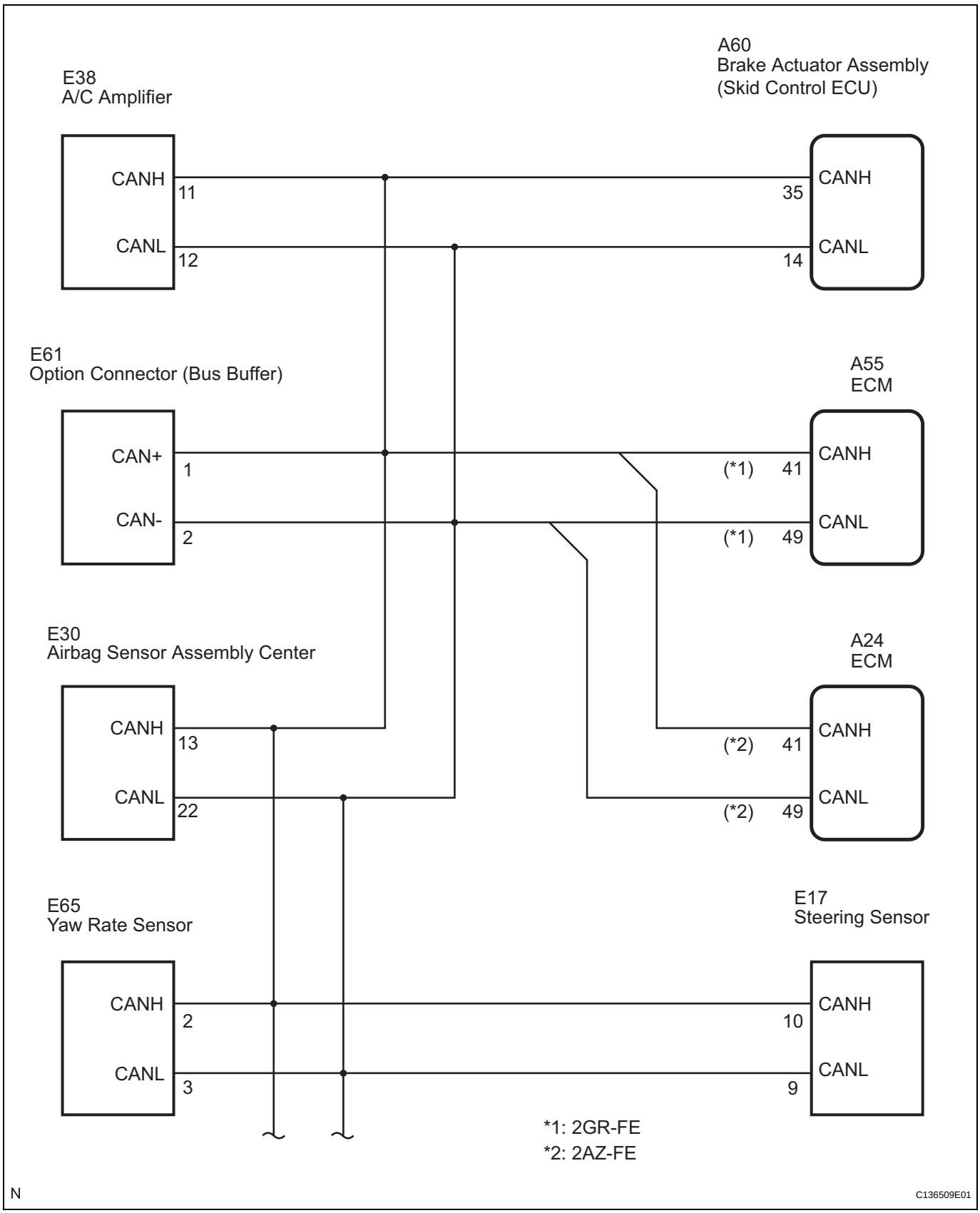
DTC	U0126/63	Lost Communication with Steering Angle Sensor Module

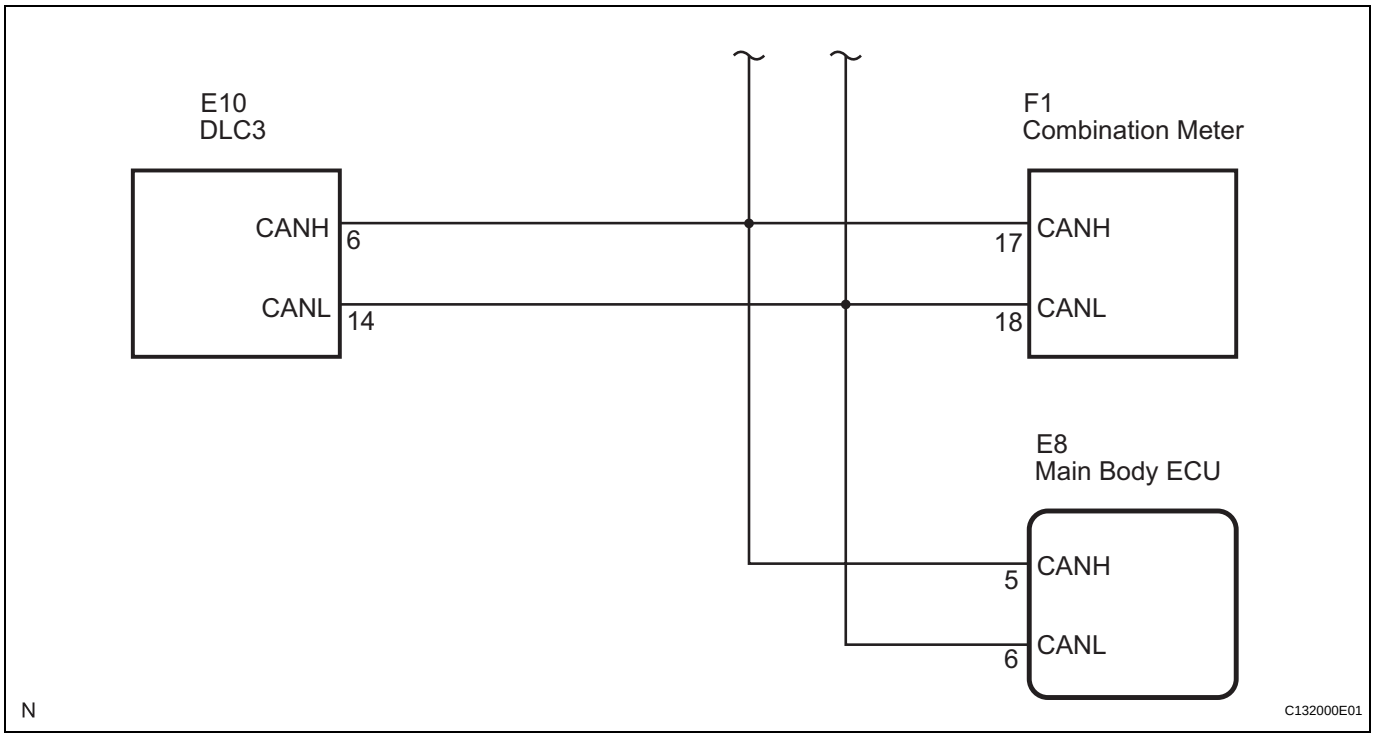
DESCRIPTION

The skid control ECU receives the signals from the ECM, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

DTC No.	DTC Detection Condition	Trouble Area
U0073/94	When either of the following is detected: 1. Bus OFF state continues for 300 msec. 2. The ECU detects that it cannot send a signal.	CAN communication system
U0100/65	When either of the following is detected: 1. At a vehicle speed of 4 mph (6 km/h) or more, the skid control ECU receives data that is out of range from the engine. 2. At a vehicle speed of 4 mph (6 km/h) or more, the skid control ECU receives abnormal data from the engine (5 cycles).	CAN communication system (Skid control ECU to ECM)
U0123/62	When any r of the following is detected: 1. The skid control ECU receives an abnormal signal from the yaw rate sensor (5 cycles). 2. The skid control ECU receives a signal that has a shorter message than normal. 3. The skid control ECU cannot receive a signal from the yaw rate sensor.	CAN communication system (Skid control ECU to yaw rate and acceleration sensor)
U0126/63	When any of the following is detected: 1. The skid control ECU receives an abnormal signal from the steering angle sensor (5 cycles). 2. The skid control ECU receives a signal that has a shorter message than normal. 3. The skid control ECU cannot receive a signal from the steering angle sensor.	CAN communication system (Skid control ECU to steering angle sensor)

WIRING DIAGRAM





BC

INSPECTION PROCEDURE

Proceed to CAN communication system troubleshooting (See page CA-8).

HINT:

When a DTC indicating a CAN communication system malfunction is output, repair the CAN communication system before repairing each corresponding sensor.

ABS Warning Light Remains ON

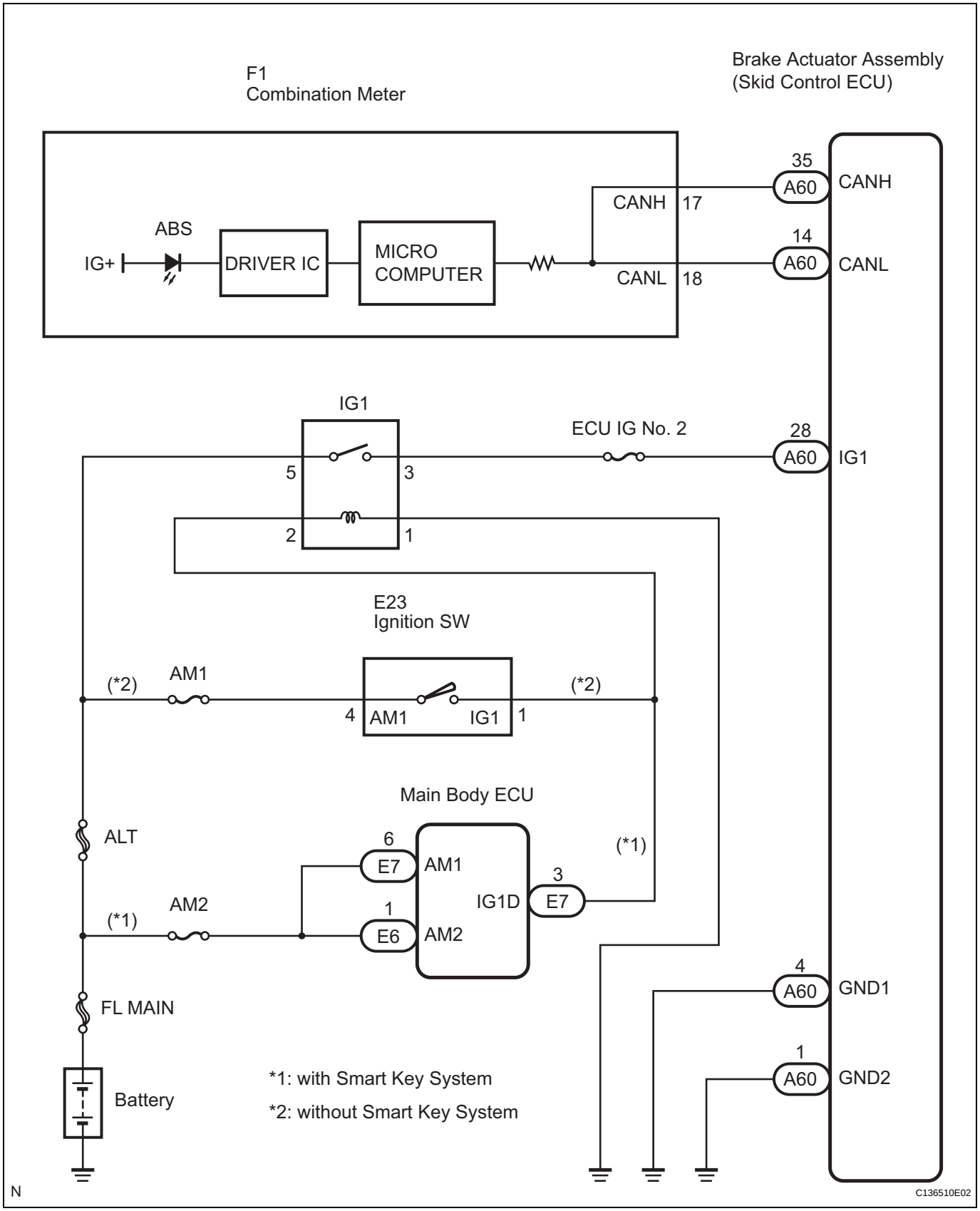
DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
If any of the following is detected, the ABS warning light remains on.

- The skid control ECU connectors are disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the wire harness between the combination meter assembly and the skid control ECU.

HINT:
In some cases, the intelligent tester cannot be used when the skid control ECU is abnormal.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

BC

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

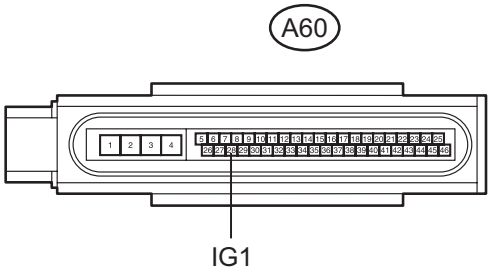
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



N C136493E05

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

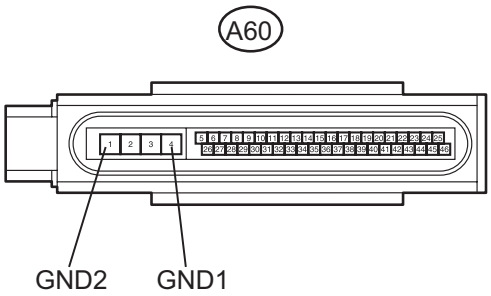
Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A60-4 (GND1) - Body ground	Always	Below 1 Ω
A60-1 (GND2) - Body ground	Always	Below 1 Ω

(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

6 INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check the ABS warning light operation.

OK:

The ABS warning light turns on or off in accordance with the intelligent tester.

BC

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

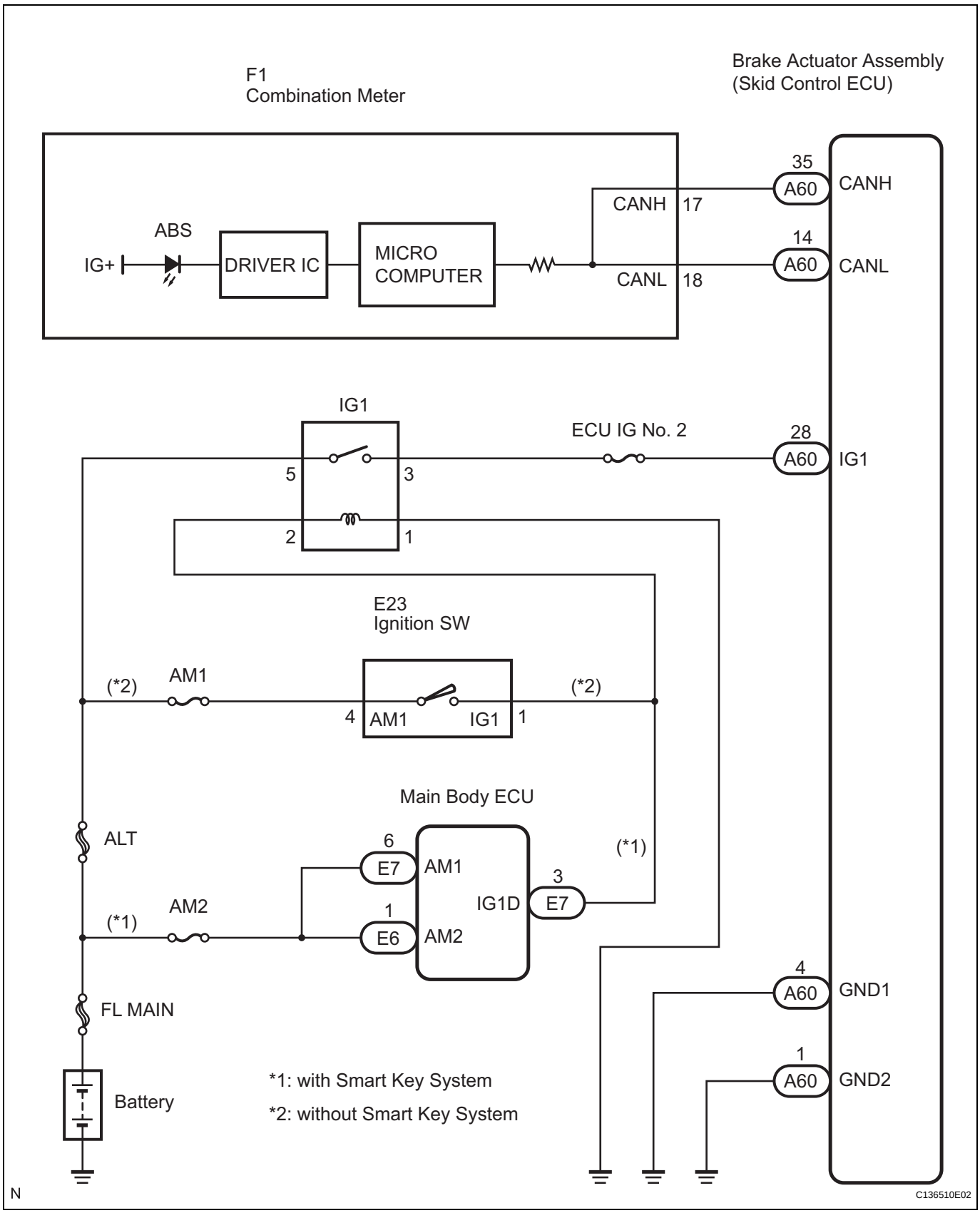
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

ABS Warning Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK ABS WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the ABS warning light comes on.
OK:
The ABS warning light comes on.
(d) Connect the connector.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

NG

3	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check ABS warning light operation.
OK:
The ABS warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

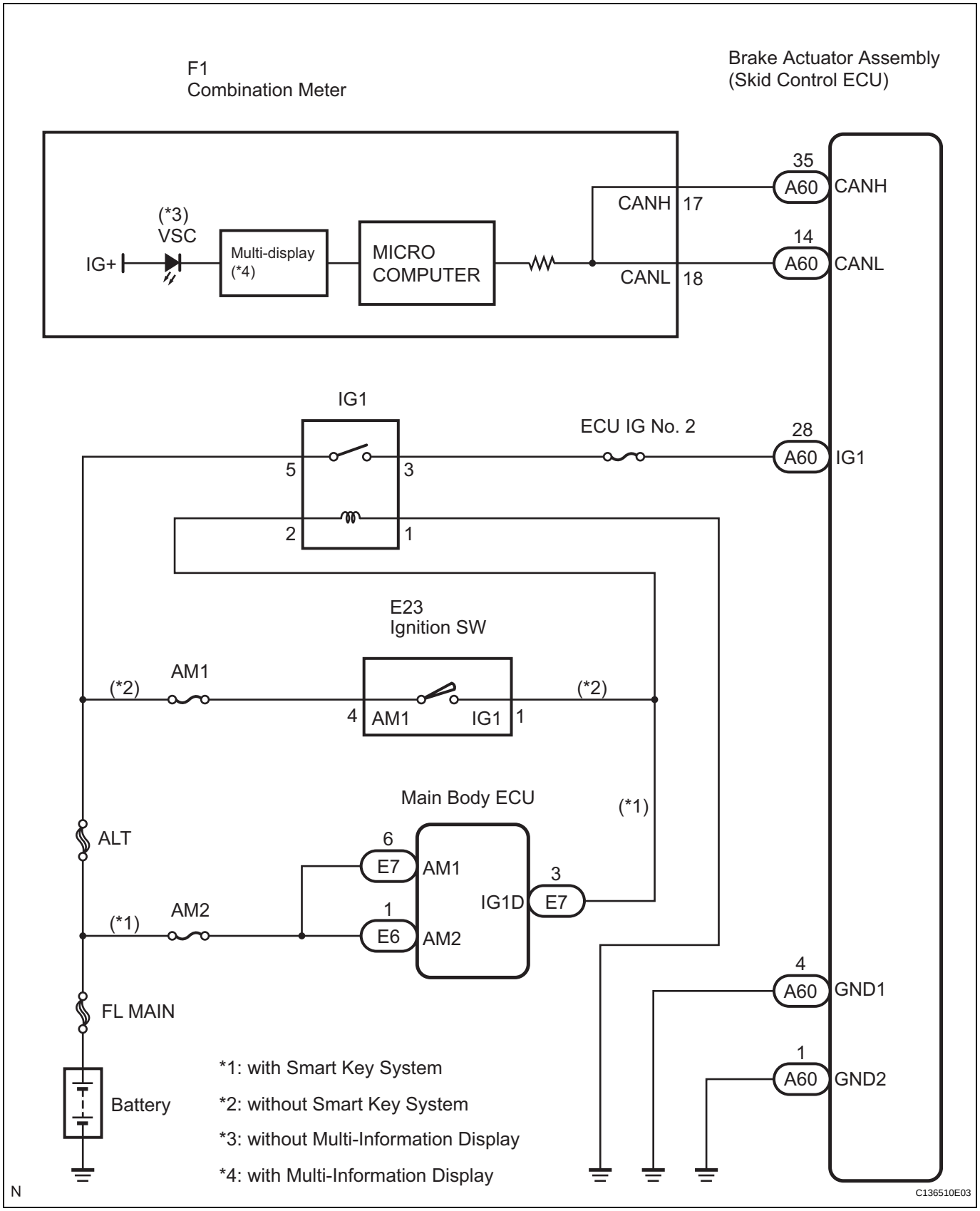
BC

VSC Warning Light Remains ON

DESCRIPTION

The skid control ECU communicates with the combination meter assembly via CAN communication. If the ECU stores a DTC, the master caution indicator light will illuminate, and the DTC will be displayed on the multi-information display in the combination meter (models with multi-information display). On models without a multi-information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check VSC warning (multi-information display)/VSC warning light (without multi-information display) operation.
OK:
The VSC warning (multi-information display) or VSC warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

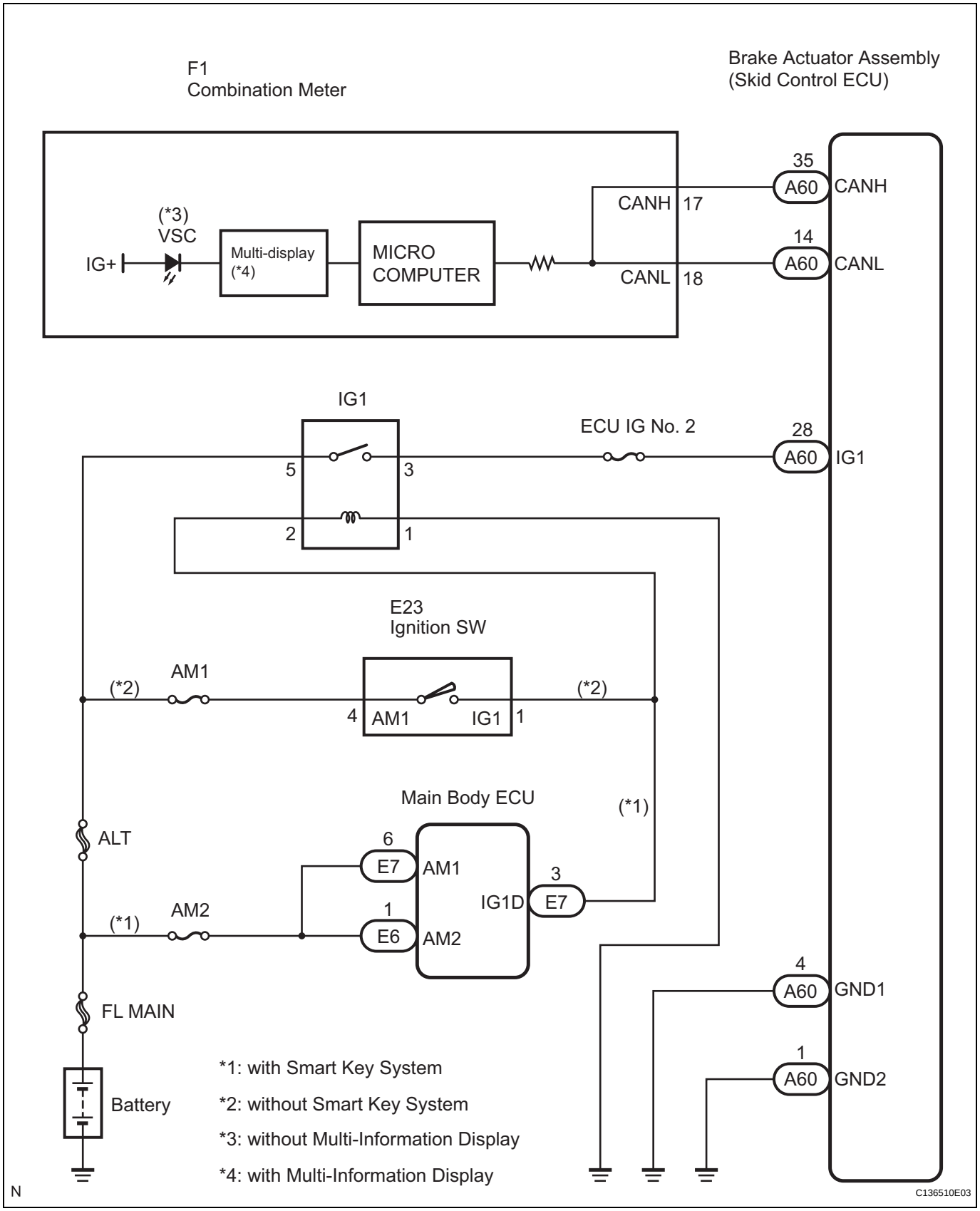
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

VSC Warning Light does not Come ON

DESCRIPTION

The skid control ECU communicates with the combination meter assembly via CAN communication. If the ECU stores a DTC, the master caution indicator light will illuminate, and the DTC will be displayed on the multi-information display in the combination meter (models with multi-information display). On models without a multi-information display, the VSC warning light will come on when the skid control ECU stores a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check that "ON" and "OFF" of the VSC warning (multi-information display) or VSC warning light are indicated on the combination meter assembly when using the intelligent tester.

OK:

The VSC warning (multi-information display) turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

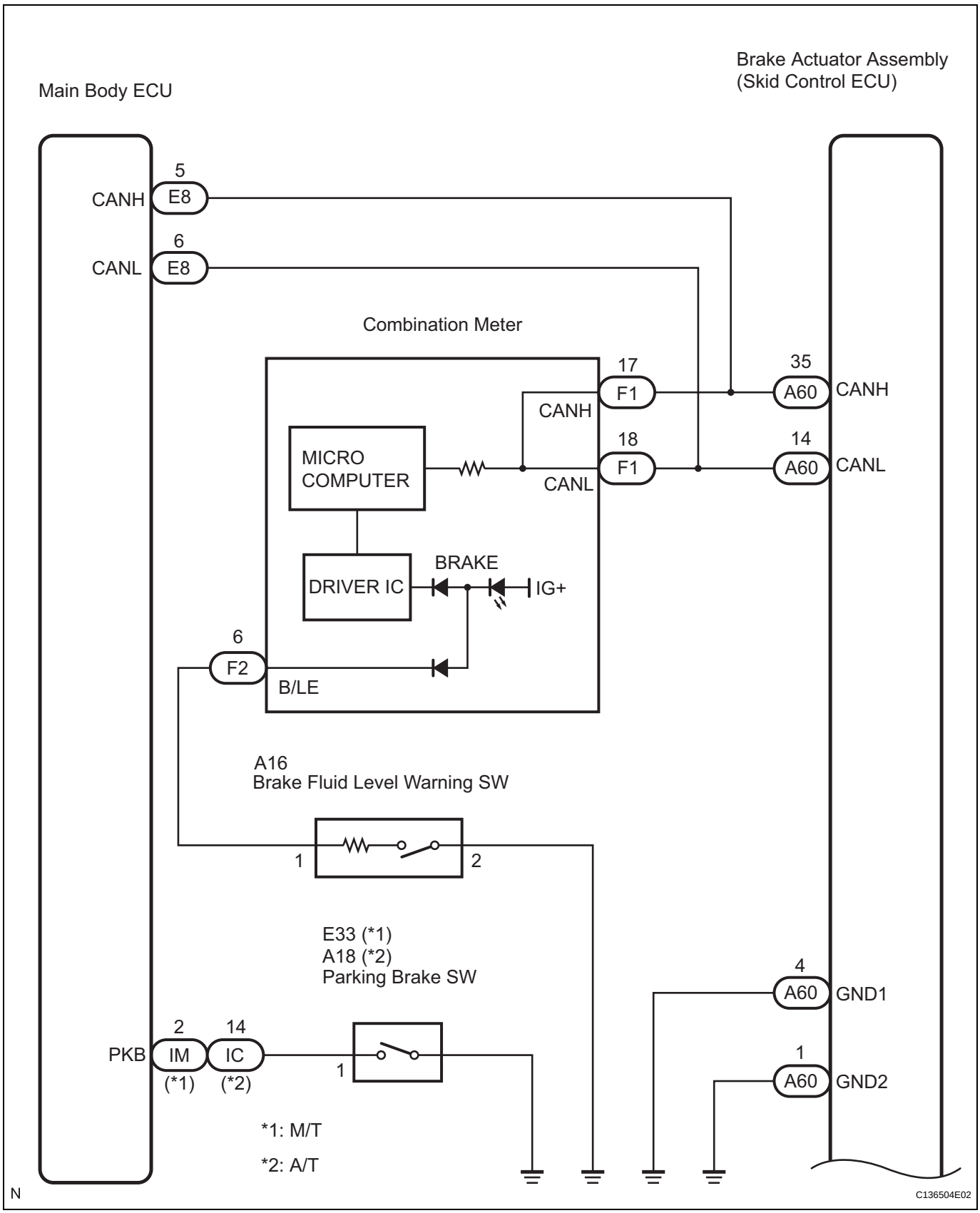
Brake Warning Light Remains ON

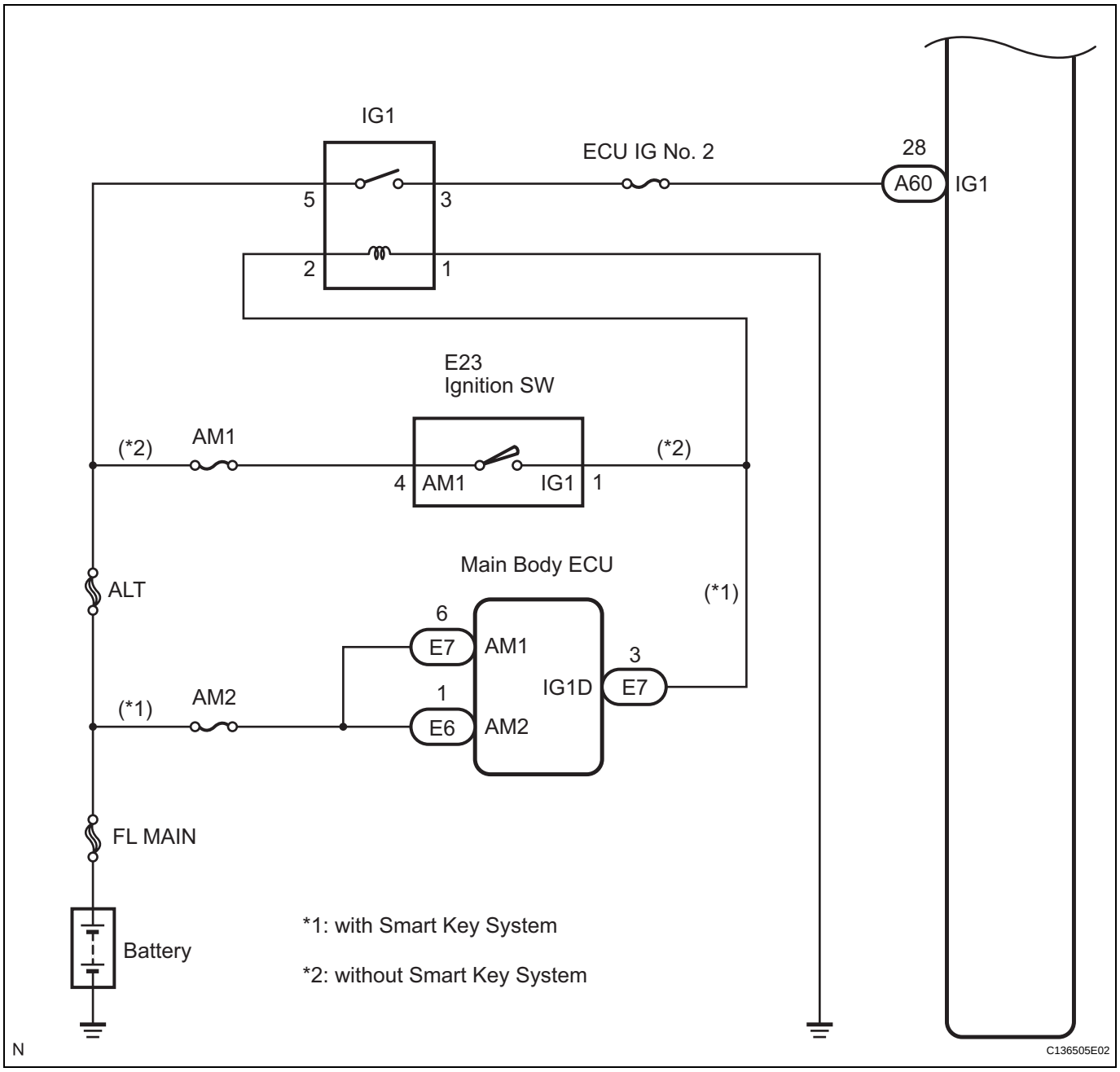
DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
If any of the following is detected, the BRAKE warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation is not possible.

WIRING DIAGRAM





BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2 CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

BC

3 CHECK BATTERY

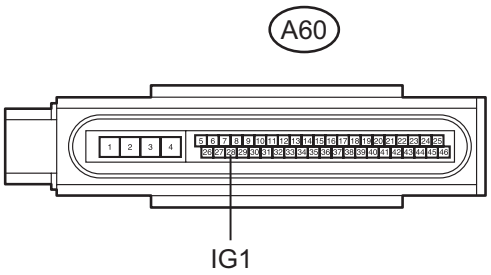
(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4 INSPECT SKID CONTROL ECU (IG1 TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

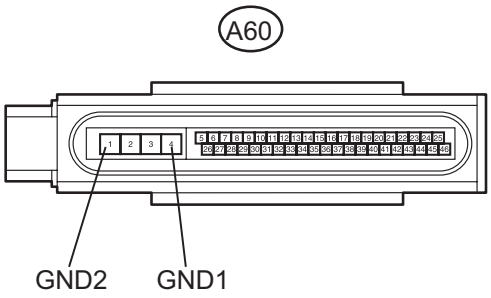
Tester Connection	Condition	Specified Condition
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)**

OK

5 INSPECT SKID CONTROL ECU (GND TERMINAL)

Skid Control ECU (Harness Side Connector Front View):



N C136493E02

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A60-4 (GND1) - Body ground	Always	Below 1 Ω
A60-1 (GND2) - Body ground	Always	Below 1 Ω

(c) Connect the connector.

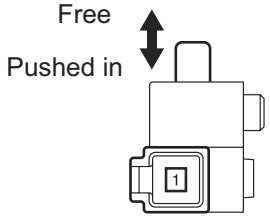
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)**

OK

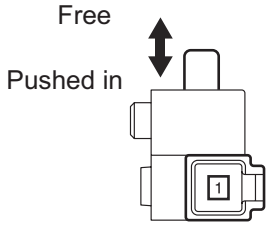
6 INSPECT PARKING BRAKE SWITCH

Parking Brake Switch:

Automatic Transaxle:



Manual Transaxle:



N C109430E03

(a) Disconnect the parking brake switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Body ground	Parking brake switch ON (Switch pin free)	Below 1 Ω
1 - Body ground	Parking brake switch OFF (Switch pin pushed in)	10 kΩ or higher

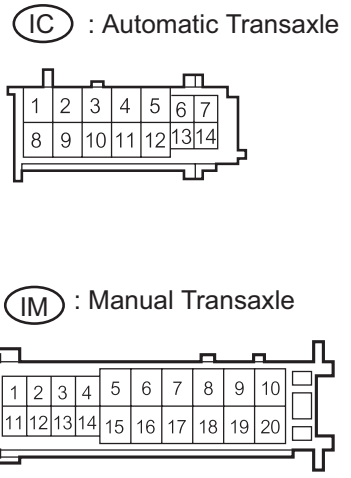
NG → **REPLACE PARKING BRAKE SWITCH**

OK

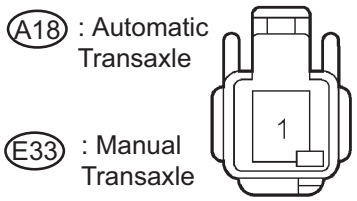
BC

7	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)

Main Body ECU
Wire Harness View:



Parking Brake Switch Harness Side Connector Front View:



C136418E03

OK

(a) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Automatic Transaxle

Tester Connection	Condition	Specified Condition
IC-14 (PKB) - A18-1	Always	Below 1 Ω
IC-14 (PKB) - Body ground	Always	10 kΩ or higher

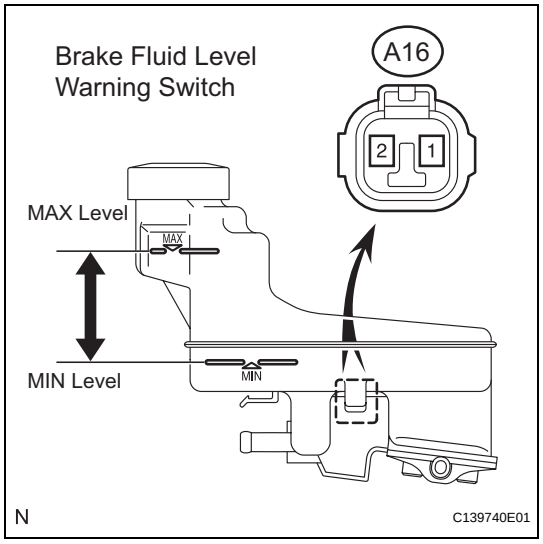
Manual Transaxle

Tester Connection	Condition	Specified Condition
IM-2 (PKB) - E33-1	Always	Below 1 Ω
IM-2 (PKB) - Body ground	Always	10 kΩ or higher

(b) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU TO PARKING BRAKE SWITCH)**

8	INSPECT BRAKE FLUID LEVEL WARNING SWITCH



(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the brake fluid level warning switch connector.
(c) Measure the resistance according to the value(s) in the table below.
HINT:
A float is located inside the reservoir. Its position can be changed by increasing or decreasing the level of brake fluid.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Float up (Switch OFF)	1.9 to 2.1 kΩ
1 - 2	Float down (Switch ON)	Below 1 Ω

HINT:
If there is no problem after finishing the above check, adjust the brake fluid level to the MAX level.

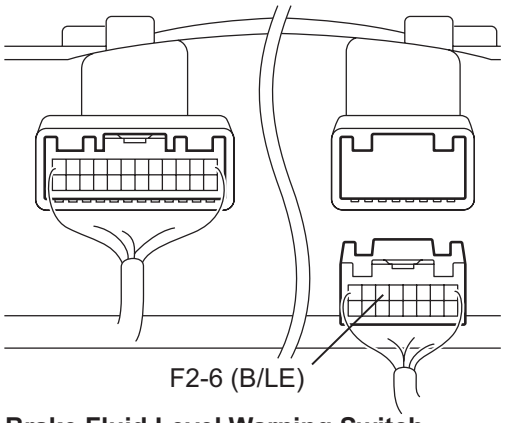
NG → **REPLACE BRAKE MASTER CYLINDER RESERVOIR SUB-ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)**

OK

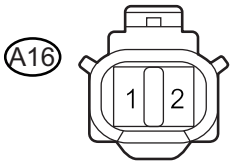
BC

9	CHECK HARNESS AND CONNECTOR (COMBINATION METER TO BRAKE FLUID LEVEL WARNING SWITCH)

Combination Meter Wire Harness View:



Brake Fluid Level Warning Switch Harness Side Connector Front View:



C136033E01

(a) Disconnect the combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F2-6 (B/LE) - A16-1	Always	Below 1 Ω
F2-6 (B/LE) - Body ground	Always	10 kΩ or higher
A16-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (COMBINATION METER TO BRAKE FLUID LEVEL WARNING SWITCH)**

OK

10	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the tester (See page BC-307).

ACTIVE TEST: ABS/TRAC/VSC

Item	Vehicle Condition/Test Details	Diagnostic Note
BRAKE WRN LIGHT	Turns brake warning light on / off	Observe combination meter

(c) Check BRAKE warning light operation.

OK:

The BRAKE warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

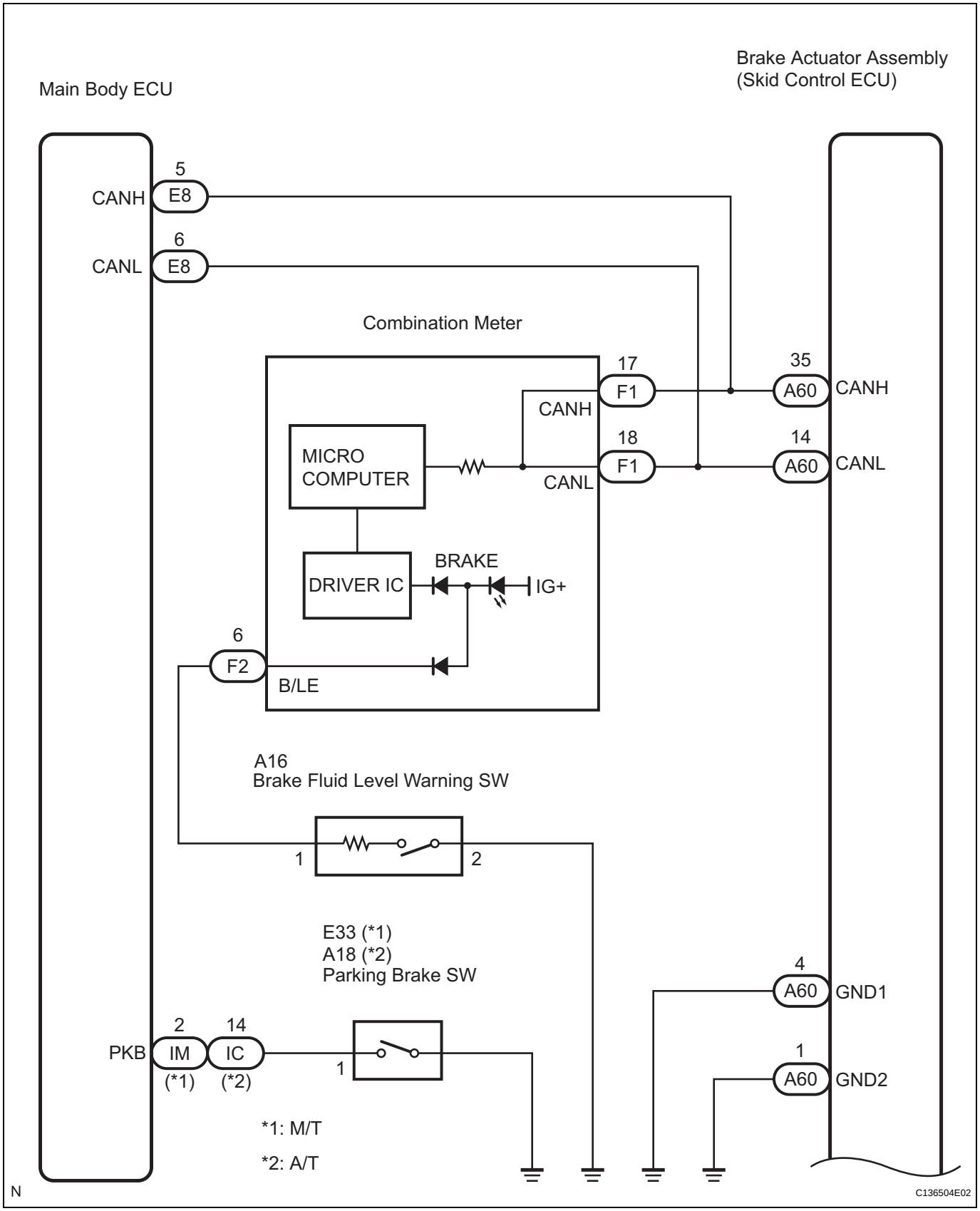
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Brake Warning Light does not Come ON

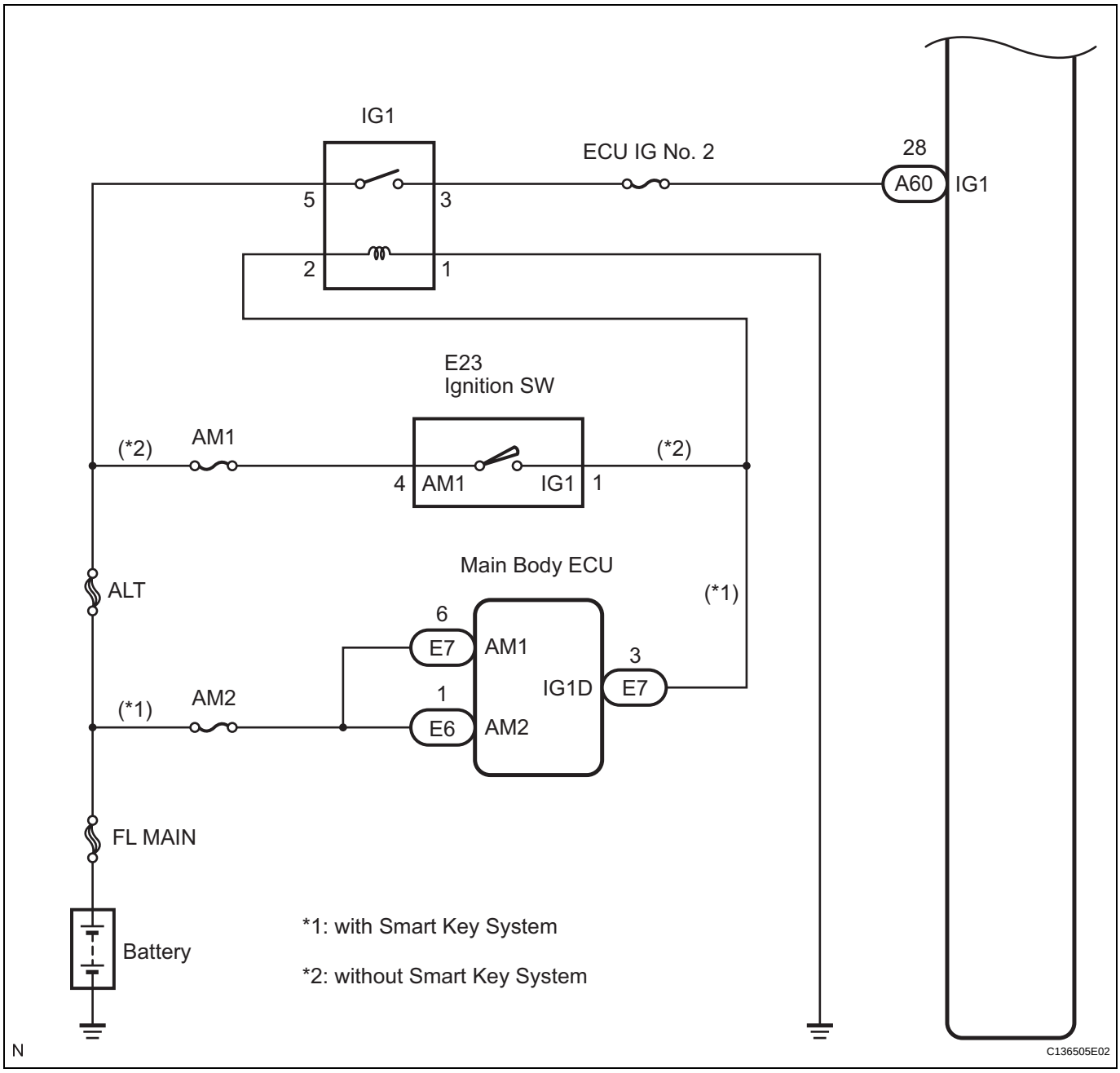
DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.

WIRING DIAGRAM



BC



BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK BRAKE WARNING LIGHT

(a) Disconnect the skid control ECU connector.
(b) Turn the ignition switch on (IG).
(c) Check that the BRAKE warning light comes on.
OK:
The BRAKE warning light comes on.
(d) Connect the connector.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)**

NG

BC

3	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check BRAKE warning light operation.
OK:
The BRAKE warning light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

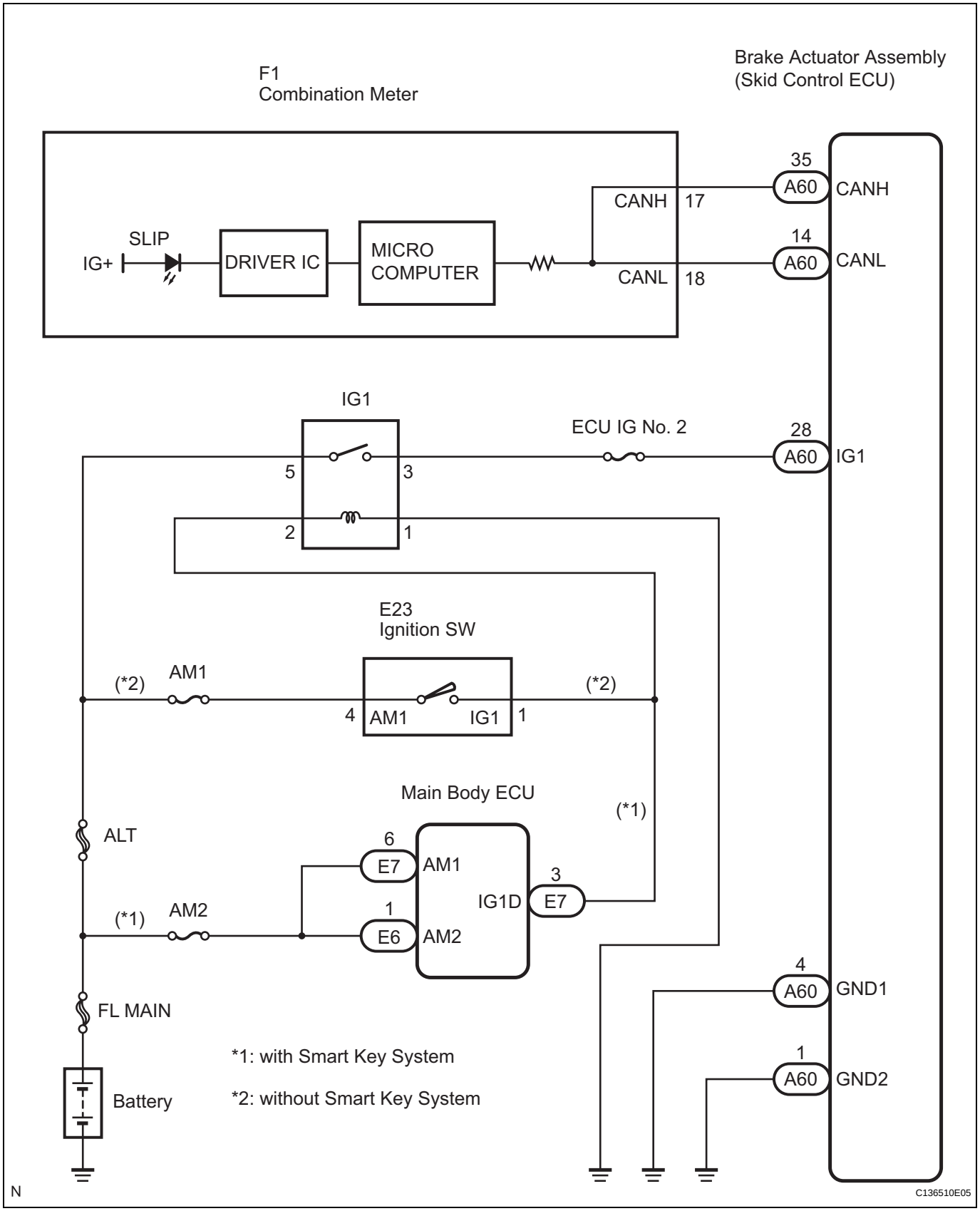
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Slip Indicator Light Remains ON

DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-278).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED

(a) Check if the skid control ECU connector is securely connected.
OK:
The connector is securely connected.

NG → **CONNECT CONNECTOR TO ECU CORRECTLY**

OK

3	CHECK BATTERY

(a) Check the battery voltage.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE CHARGING SYSTEM OR BATTERY**

OK

4	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check SLIP indicator light operation.
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

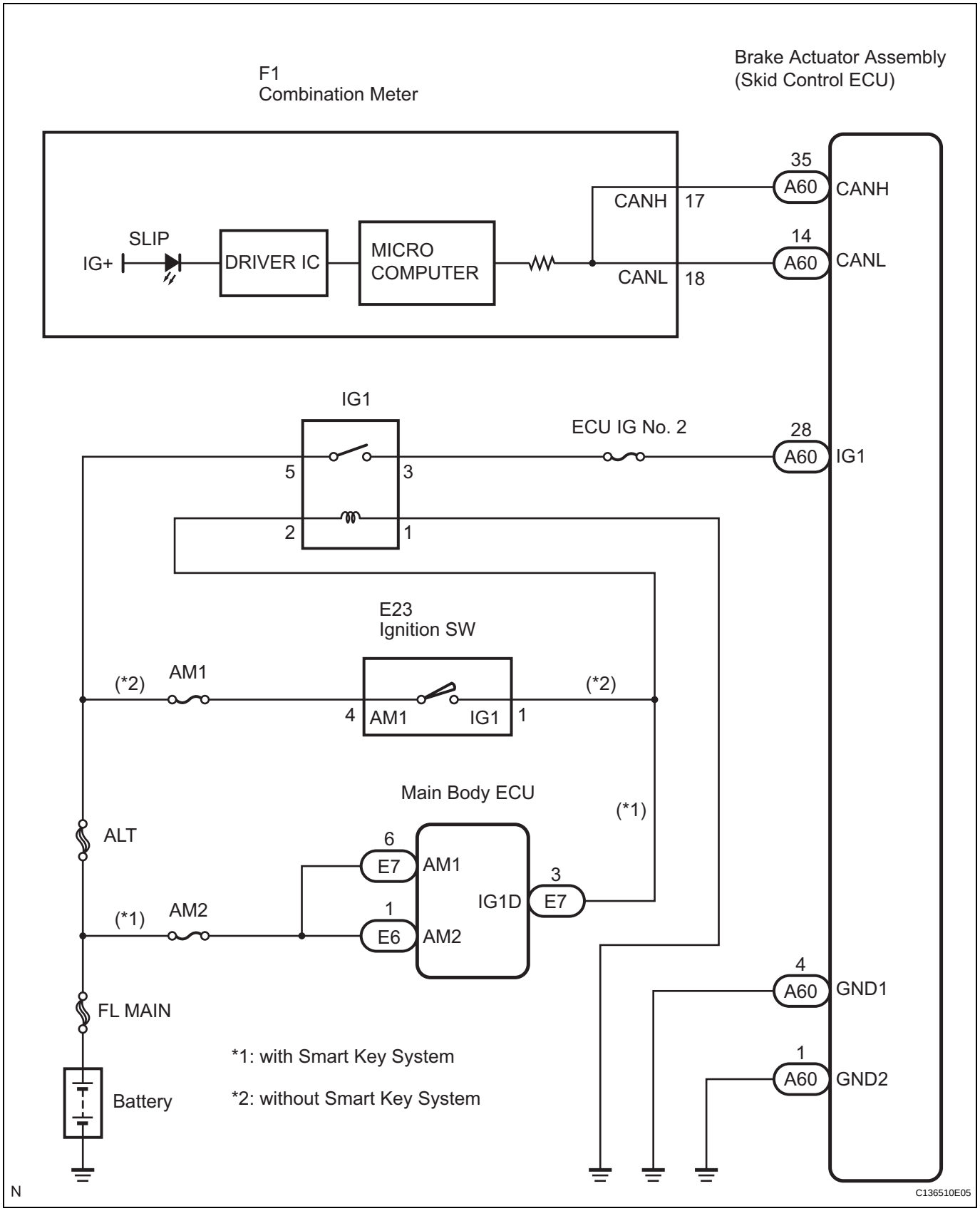
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Slip Indicator Light does not Come ON

DESCRIPTION

The skid control ECU is connected to the combination meter assembly via CAN communication.
The SLIP indicator light blinks during VSC and/or TRAC operation.
When the system fails, the SLIP indicator light comes on to warn the driver (See page BC-278).

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:

Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page BC-302).

Result

Condition	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → **INSPECT CAN COMMUNICATION SYSTEM (See page CA-8)**

A

2	INSPECT COMBINATION METER ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Perform "ACTIVE TEST" of the combination meter assembly using the intelligent tester (See page ME-32).
(c) Check the SLIP indicator light operation.
OK:
The SLIP indicator light turns on or off in accordance with the intelligent tester.

NG → **REPLACE COMBINATION METER ASSEMBLY (See page ME-63)**

OK

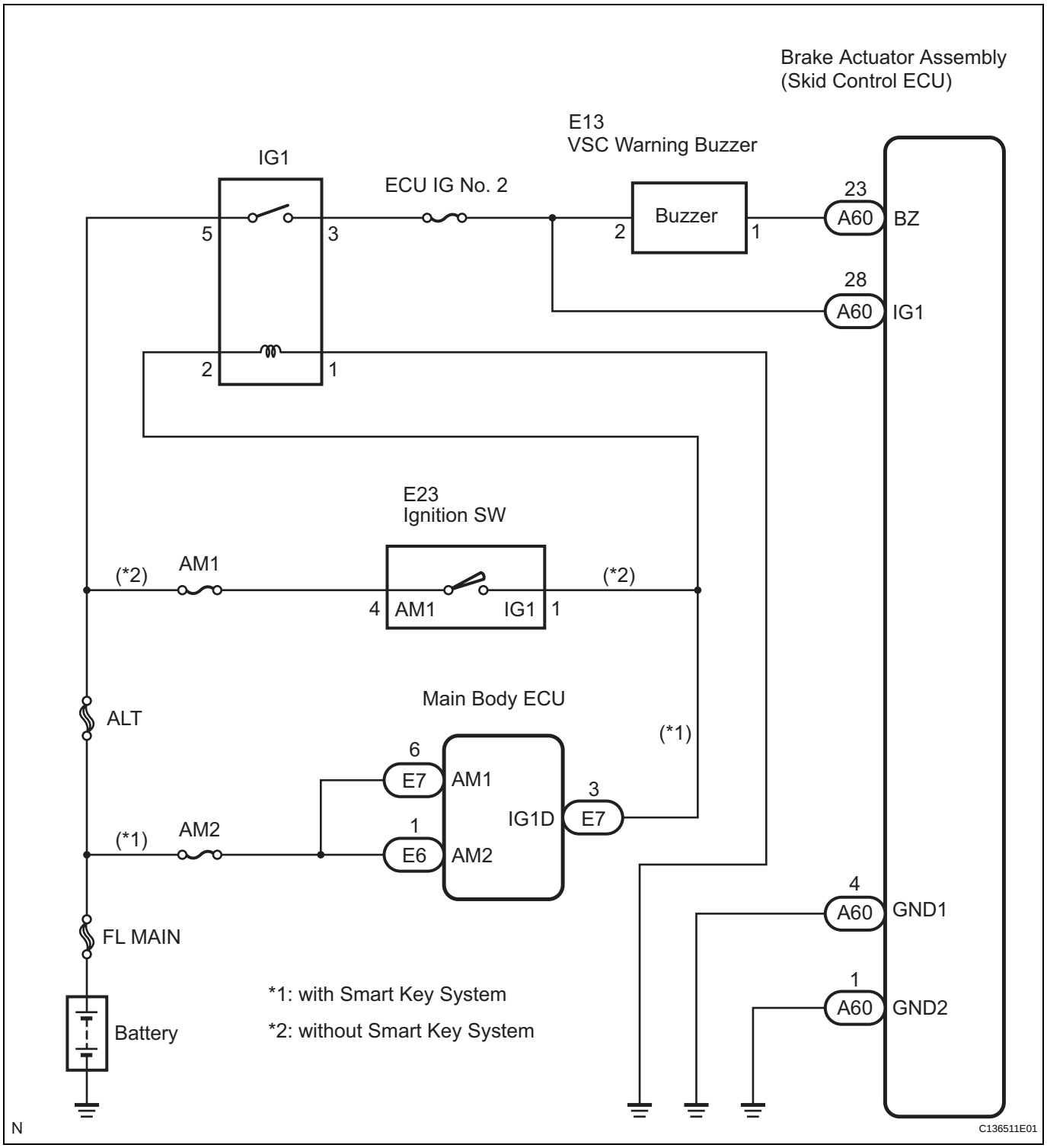
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

Skid Control Buzzer Circuit

DESCRIPTION

The skid control buzzer sounds and the SLIP indicator light blinks during VSC operation.

WIRING DIAGRAM



BC

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SKID CONTROL BUZZER)

(a) Connect the intelligent tester to the DLC3.
(b) Select the "ACTIVE TEST" on the intelligent tester (See page BC-307).

ACTIVE TEST: ABS/TRAC/VSC

Item (Display)	Vehicle Condition / Test Details	Diagnostic Note
BUZZER	Turns skid control buzzer ON / OFF	Buzzer can be heard

(c) Check that the buzzer sounds/stops when turning the skid control buzzer on/off by using the intelligent tester.

Result

Condition	Proceed to
Buzzer does not sound or sounds constantly	A
Buzzer sounds/stops	B

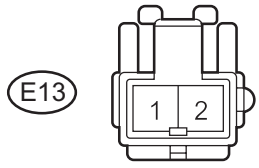
BC

B → **CHECK FOR INTERMITTENT PROBLEMS (SYMPTOM SIMULATION) (See page BC-298)**

A

2 INSPECT SKID CONTROL BUZZER (POWER SOURCE TERMINAL)

Skid Control Buzzer (Harness Side Connector Front View):



(a) Disconnect the skid control buzzer connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

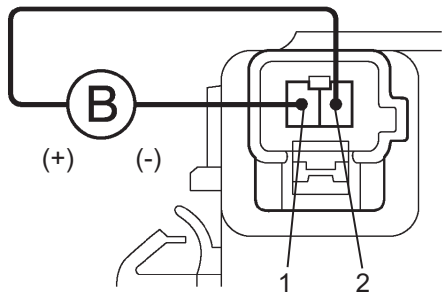
Tester Connection	Condition	Specified Condition
E13-2 - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)**

OK

3	INSPECT SKID CONTROL BUZZER

Skid Control Buzzer:



C125130E01

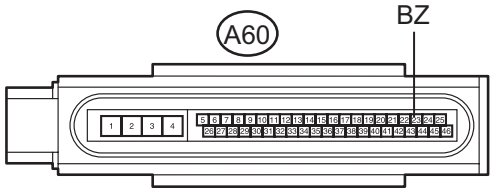
(a) Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.
OK:
The skid control buzzer sounds.

NG → **REPLACE SKID CONTROL BUZZER (See page BC-453)**

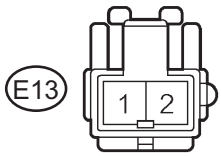
OK

4	CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO SKID CONTROL BUZZER)

Skid Control ECU (Harness Side Connector Front View):



Skid Control Buzzer (Harness Side Connector Front View):



C139149E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
A60-23 (BZ) - E13-1	Always	Below 1 Ω
A60-23 (BZ) - Body ground	Always	10 kΩ or higher

(c) Connect the connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO SKID CONTROL BUZZER)**

OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

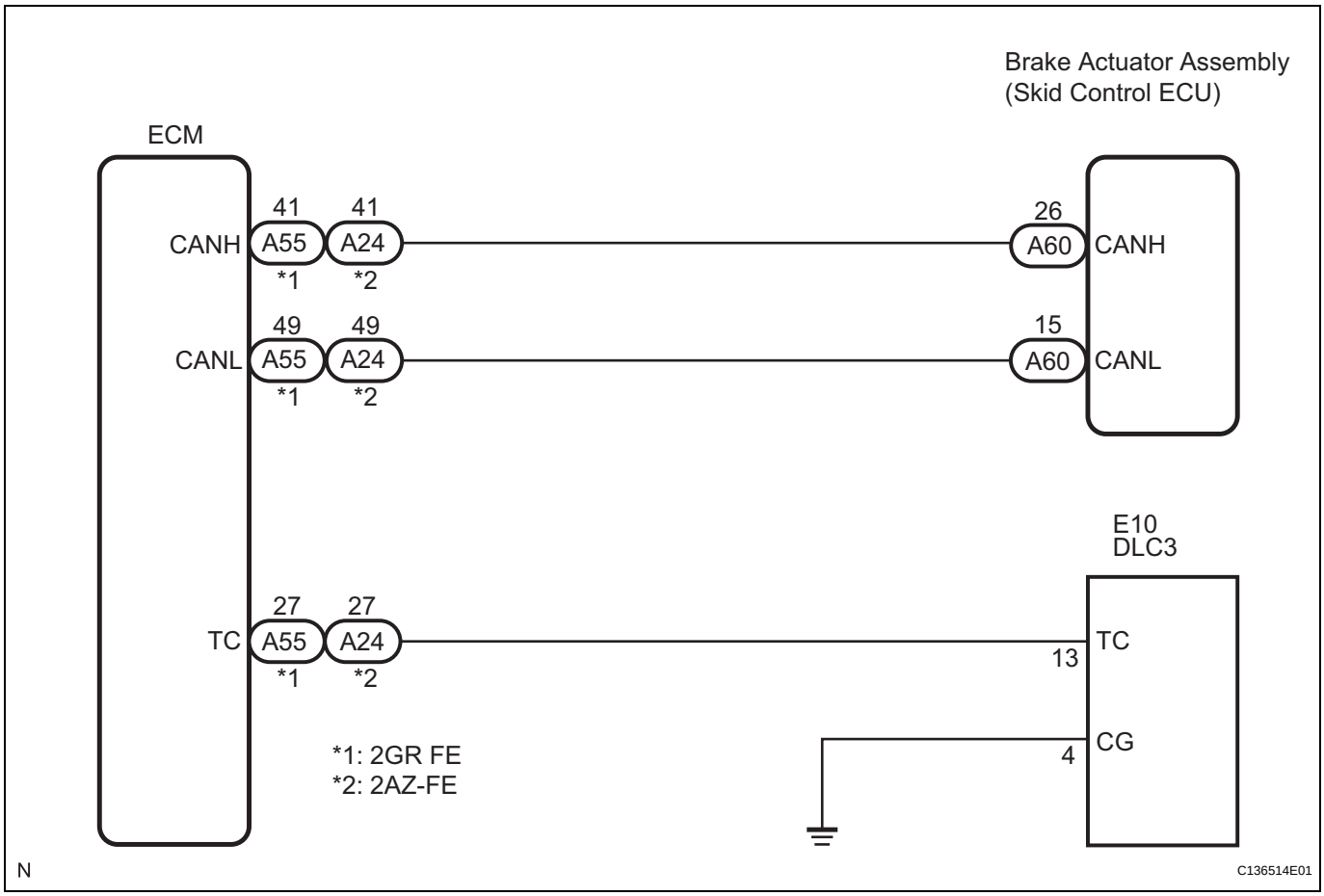
BC

TC and CG Terminal Circuit

DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
DTCs are indicated by the blinking pattern of the ABS warning light.

WIRING DIAGRAM



HINT:
When warning lights continue to blink, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in one or more ECUs is suspected.

INSPECTION PROCEDURE

HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication DTC is output (See page BC-302).

Result

Result	Proceed to
CAN communication system DTC is output	A
CAN communication system DTC is not output	B

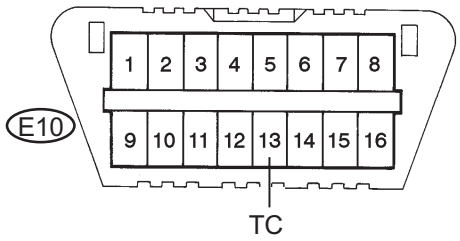
B → Go to step 2

A

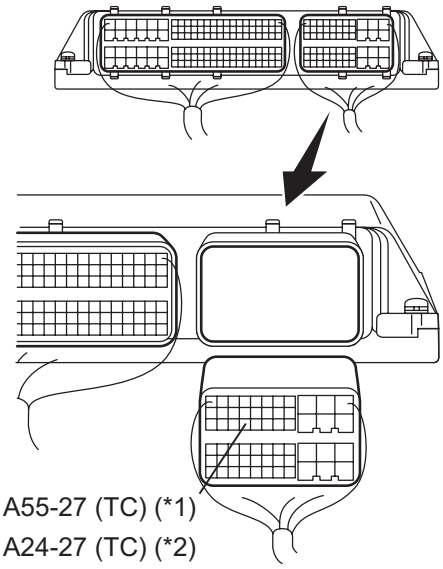
GO TO CAN COMMUNICATION SYSTEM (See page CA-8)

2 CHECK HARNESS AND CONNECTOR (ECM TO DLC3)

DLC3:



ECM Wire Harness View:



(*1): 2GR-FE (*2): 2AZ-FE

C136035E02

(a) Disconnect the ECM connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

2GR-FE

Tester Connection	Specified Condition
E10-13 (TC) - A55-27 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

2AZ-FE

Tester Connection	Specified Condition
E10-13 (TC) - A24-27 (TC)	Below 1 Ω
E10-13 (TC) - Body ground	10 kΩ or higher

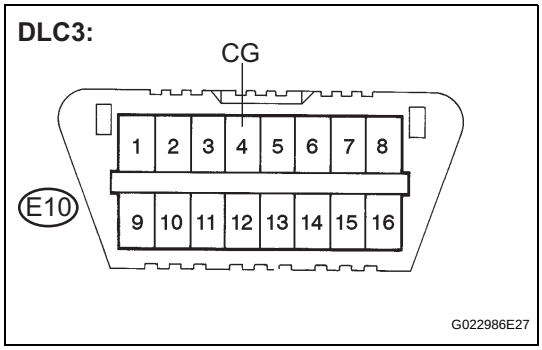
(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)**

OK

BC

3	CHECK HARNESS AND CONNECTOR (DLC3 TO CG CIRCUIT)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

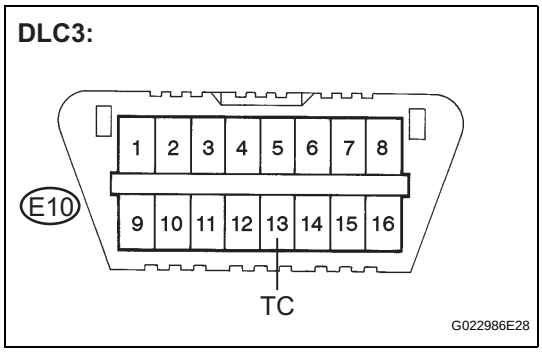
Tester Connection	Specified Condition
E10-4 (CG) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (CG TERMINAL CIRCUIT)**

OK

4	CHECK HARNESS AND CONNECTOR (TC TERMINAL CIRCUIT)

BC



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E10-13 (TC) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TC TERMINAL CIRCUIT)**

OK

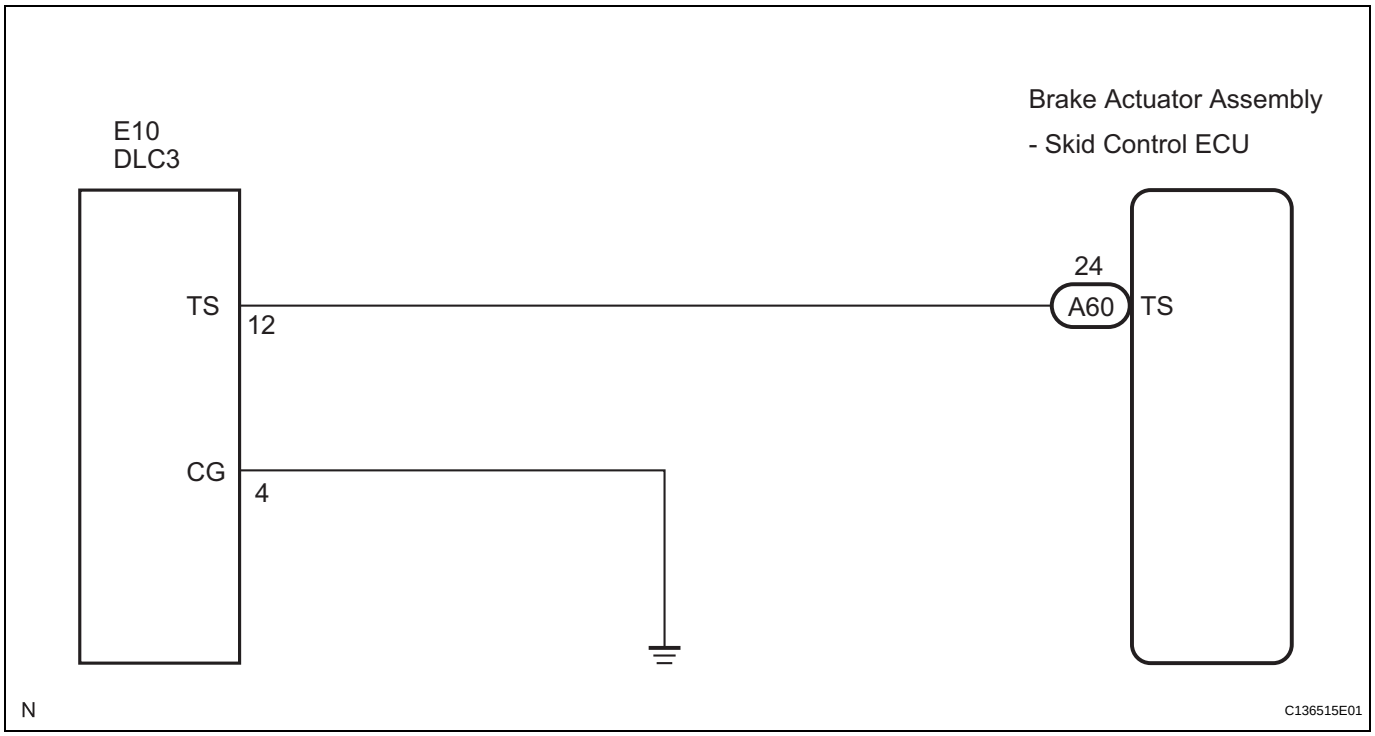
REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

TS and CG Terminal Circuit

DESCRIPTION

In the Test Mode (signal check), a malfunction of the speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.
Transition to the sensor check mode can be performed by connecting terminals TS and CG of the DLC3 and turning the ignition switch from off to on (IG).

WIRING DIAGRAM

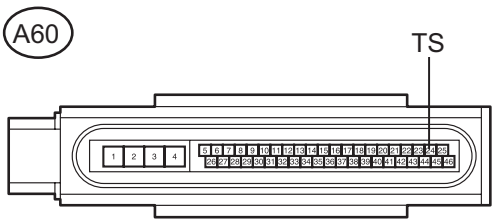


INSPECTION PROCEDURE

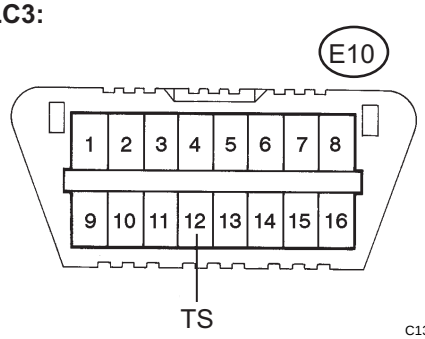
HINT:
Check the condition of each related circuit connector before troubleshooting (See page IN-40).

1 CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU TO DLC3)

Skid Control ECU (Harness Side Connector Front View):



DLC3:



C139177E01

(a) Disconnect the skid control ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
A60-24 (TS) - E10-12 (TS)	Always	Below 1 Ω

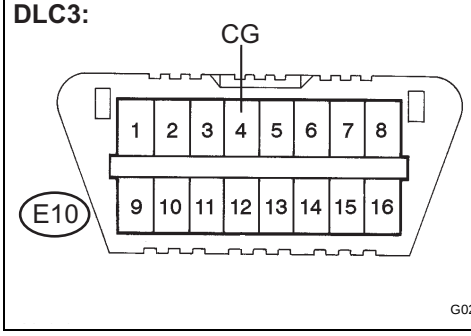
(c) Connect the connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SKID CONTROL ECU TO DLC3)**

OK

2 CHECK HARNESS AND CONNECTOR (DLC3 TO BODY GROUND)

DLC3:



G022987E25

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

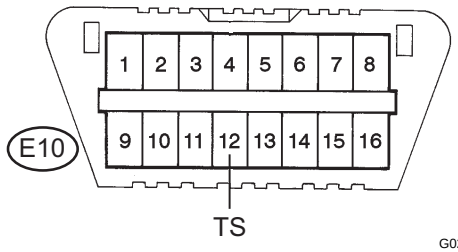
Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 TO BODY GROUND)**

OK

3	CHECK HARNESS AND CONNECTOR (TS TERMINAL CIRCUIT)

DLC3:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-12 (TS) - Body ground	Always	10 kΩ or higher

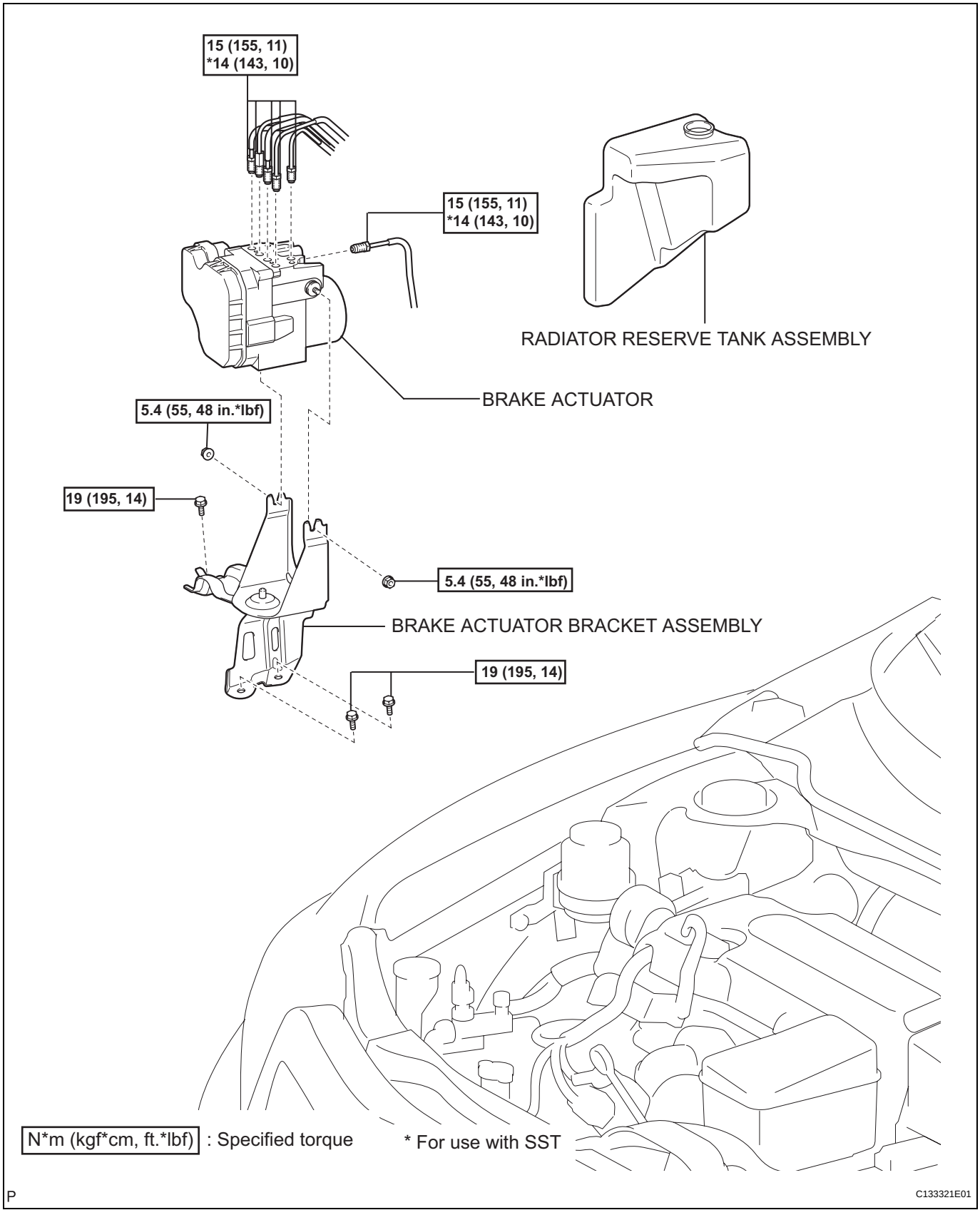
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TS TERMINAL CIRCUIT)**

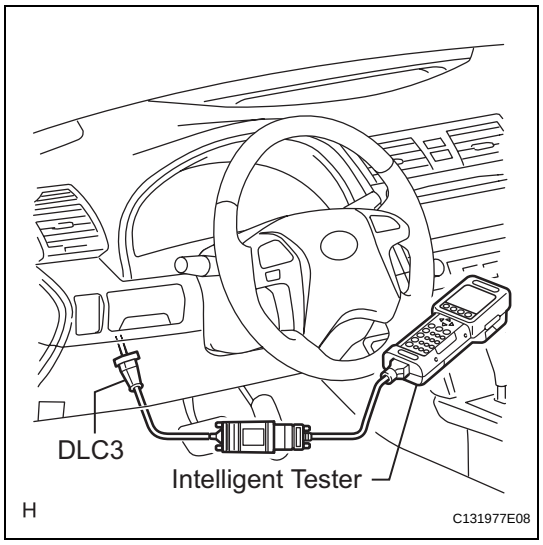
OK

REPLACE BRAKE ACTUATOR ASSEMBLY (See page BC-432)

BRAKE ACTUATOR (for ADVICS Made)

COMPONENTS





ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and run it at idle .
(c) Select the Active Test mode on the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. INSPECT ACTUATOR MOTOR OPERATION

NOTICE:
Do not keep a motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.

(a) With the motor relay on, check the actuator motor operation sounds.
(b) Turn the motor relay off.
(c) Depress the brake pedal and hold it for approximately 15 seconds. Check that the brake pedal cannot be depressed farther.
(d) With the motor relay on, check that the pedal does not pulsate.
(e) Turn the motor relay off and release the brake pedal.

3. INSPECT RIGHT FRONT WHEEL OPERATION

NOTICE:
Do not turn on a solenoid in a manner different than described below.

(a) Depress the brake pedal and hold it.
(b) Turn the SFRH and SFRR solenoids on simultaneously, and check that the pedal cannot be depressed.
(c) Turn the SFRH and SFRR solenoids off simultaneously, and check that the pedal can be depressed.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating them continuously, set an interval of more than 20 seconds.
(d) Turn the motor relay on and check that the pedal returns.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

4. INSPECT OTHER WHEEL OPERATION

(a) Using the same procedure, check the solenoids of the other wheels.
HINT:
- Left front wheel: SFLH, SFLR
- Right rear wheel: SRRH, SRRR
- Left rear wheel: SRLH, SRLR

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE RADIATOR RESERVE TANK ASSEMBLY

(a) Separate the radiator reserve tank hose.

(b) Remove the radiator reserve tank assembly.

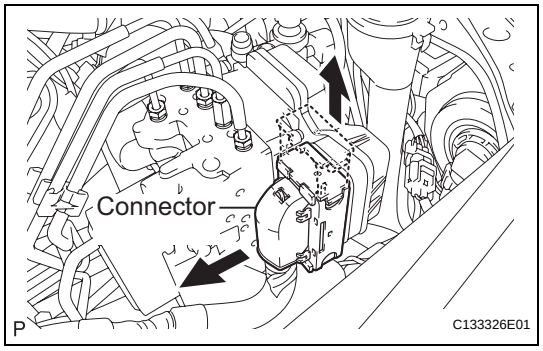
3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately clean it off completely.

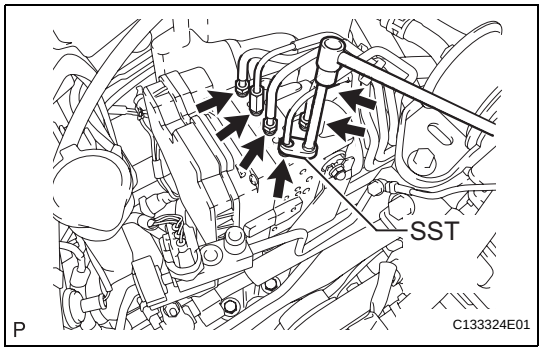
4. REMOVE BRAKE ACTUATOR

(a) Release the lock lever and disconnect the actuator connector.



(b) Using SST, disconnect the 6 brake lines from the actuator assembly with bracket.

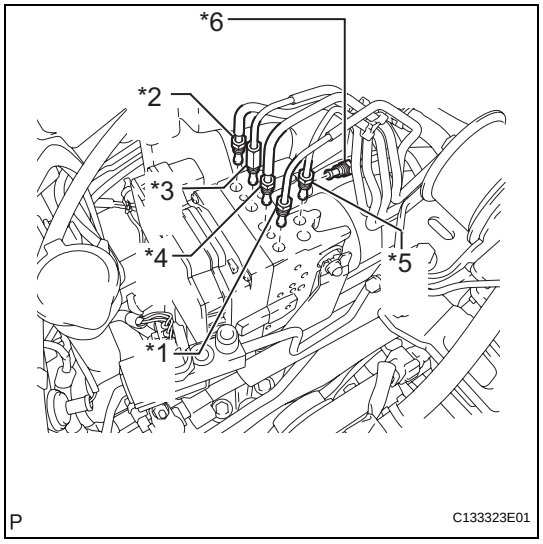
SST 09023-00101

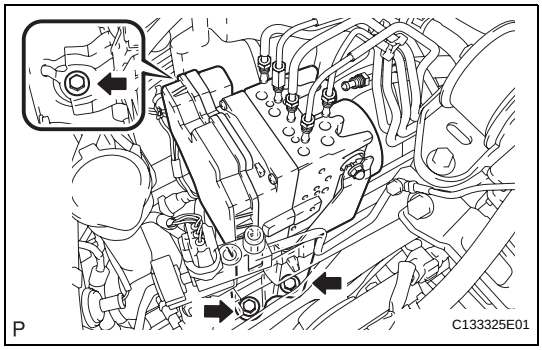


(c) Use tags or make a memo to identify the places to reconnect.

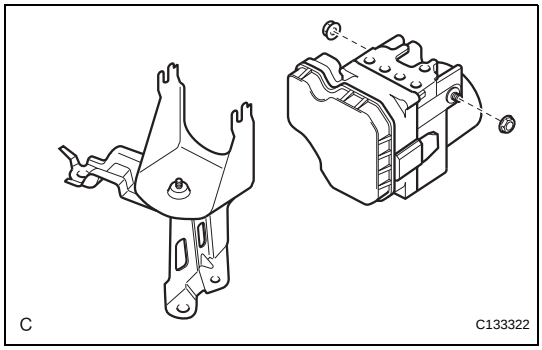
HINT:

- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 1st Master Cylinder
- *6: From 2nd Master Cylinder





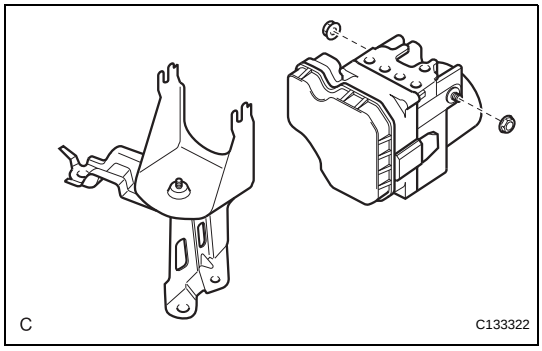
(d) Remove the 3 bolts and brake actuator assembly with bracket from the body.
NOTICE:
Do not damage the brake tubes and wire harness.



DISASSEMBLY

1. REMOVE BRAKE ACTUATOR BRACKET ASSEMBLY

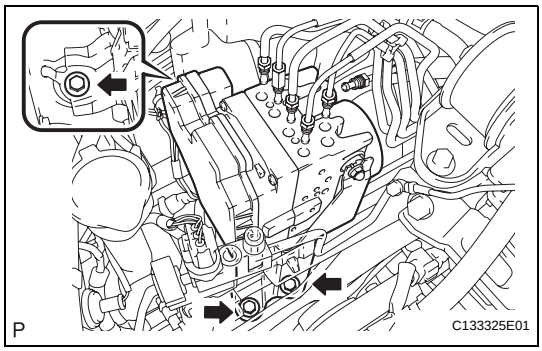
(a) Remove the 2 nuts and the brake actuator assembly from the actuator bracket assembly.



REASSEMBLY

1. INSTALL BRAKE ACTUATOR BRACKET ASSEMBLY

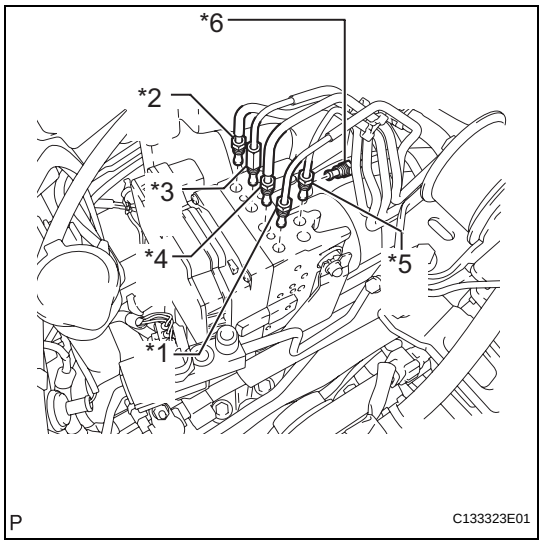
(a) Install the actuator assembly to the brake actuator bracket assembly with the 2 nuts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
NOTICE:
Do not remove the hole plug before installing a new brake actuator because the brake actuator assembly is filled with brake fluid.



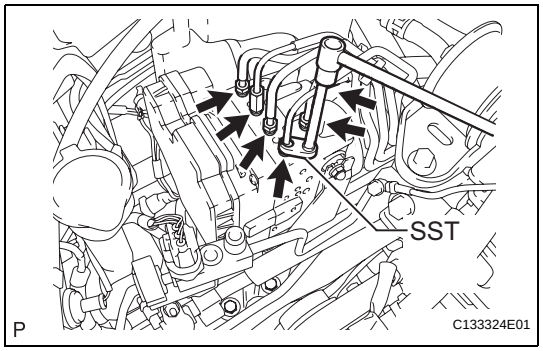
INSTALLATION

1. INSTALL BRAKE ACTUATOR

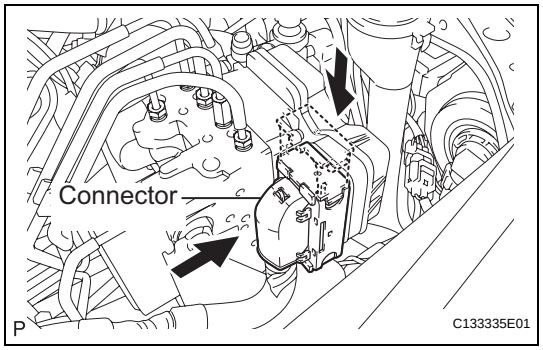
(a) Install the brake actuator assembly with bracket to the body with the 3 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not damage the brake tubes and wire harness.



(b) Temporarily tighten each brake tube to the correct positions of the brake actuator assembly with bracket as shown in the illustration.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 1st Master Cylinder
- *6: From 2nd Master Cylinder



(c) Using SST, fully tighten each brake tube.
SST 09023-00101
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



(d) Connect the actuator connector.
NOTICE:
Make sure that the connector is locked securely.

2. INSTALL RADIATOR RESERVE TANK ASSEMBLY
(a) Install the radiator reserve tank assembly.
(b) Connect the radiator reservoir tank hose.

3. FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)

4. BLEED BRAKE LINE (See page BR-7)

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. BLEED BRAKE ACTUATOR (See page BR-8)

7. INSPECT BRAKE FLUID LEVEL (See page BR-10)

8. INSPECT FOR BRAKE FLUID LEAKAGE

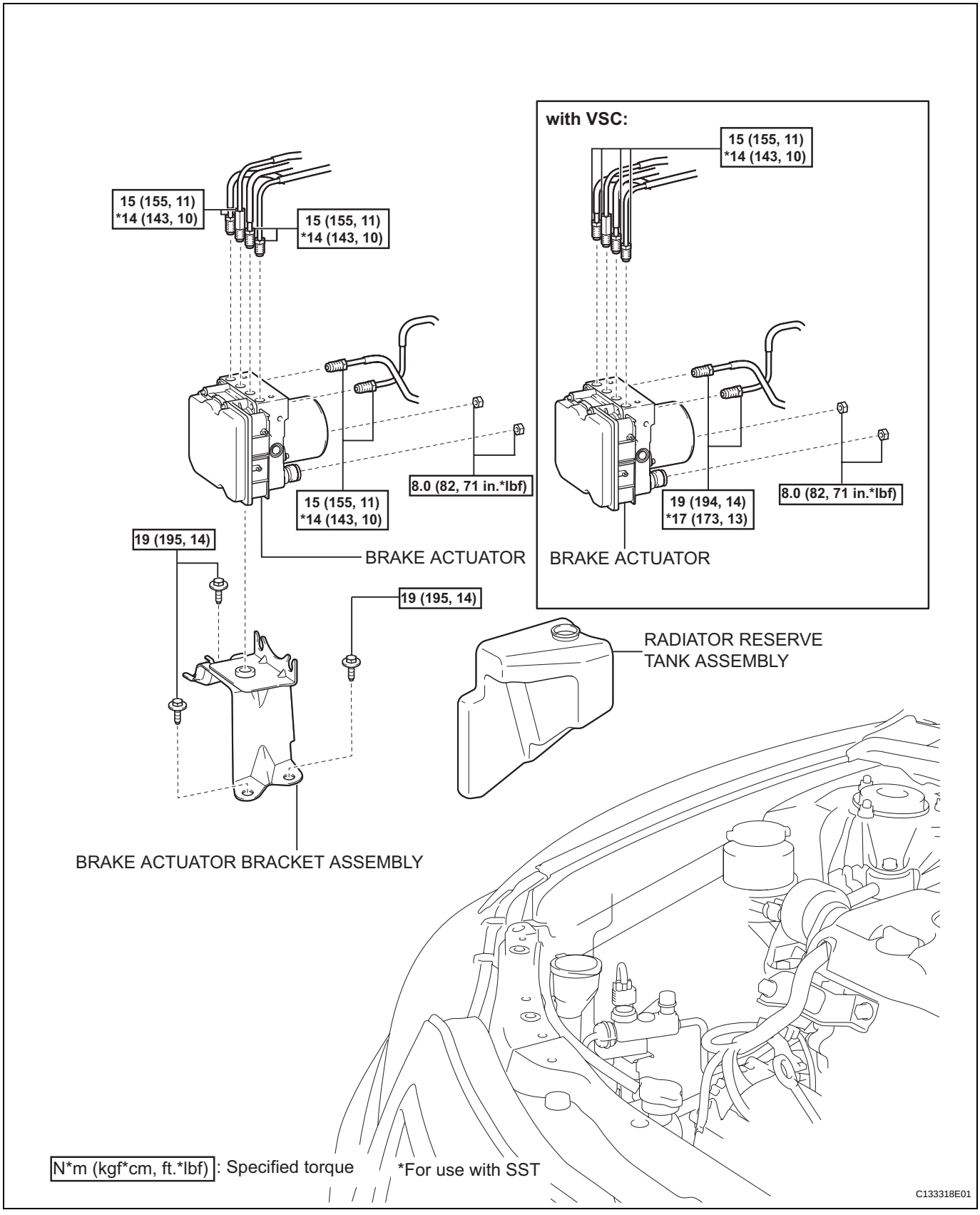
9. PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION
HINT:
(See page BC-119)

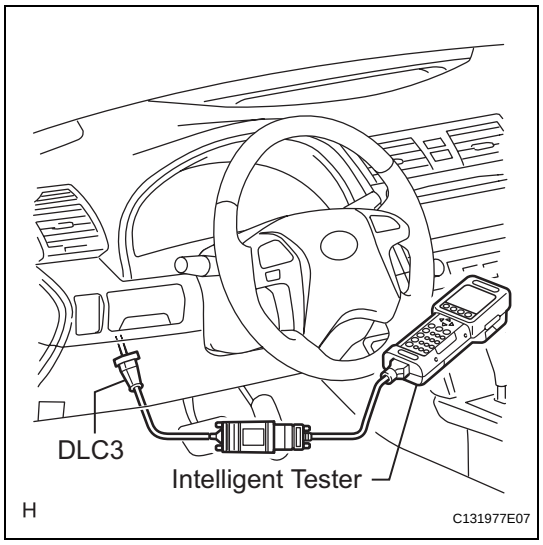
10. INSPECT ACTUATOR WITH INTELLIGENT TESTER
HINT:
(See page BC-425)

BC

BRAKE ACTUATOR (for BOSCH Made)

COMPONENTS





ON-VEHICLE INSPECTION

1. CONNECT INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and run it at idle.
(c) Select the Active Test mode on the intelligent tester.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. INSPECT ACTUATOR MOTOR OPERATION

NOTICE:
Do not keep a motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.

(a) With the motor relay on, check the actuator motor operation sounds.
(b) Turn the motor relay off.
(c) Depress the brake pedal and hold it for approximately 15 seconds. Check that the brake pedal cannot be depressed farther.
(d) With the motor relay on, check that the pedal does not pulsate.
(e) Turn the motor relay off and release the brake pedal.

3. INSPECT RIGHT FRONT WHEEL OPERATION

NOTICE:
Do not turn on a solenoid in a manner different than described below.

(a) Depress the brake pedal and hold it.
(b) Turn the SFRH and SFRR solenoids on simultaneously, and check that the pedal cannot be depressed.
(c) Turn the SFRH and SFRR solenoids off simultaneously, and check that the pedal can be depressed.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating them continuously, set an interval of more than 20 seconds.
(d) Turn the motor relay on and check that the pedal returns.
NOTICE:
Do not keep the motor relay on continuously for more than 5 seconds. When operating it continuously, set an interval of more than 20 seconds.
(e) Turn the motor relay off and release the brake pedal.

4. INSPECT OTHER WHEEL OPERATION

(a) Using the same procedure, check the solenoids of the other wheels.

HINT:

- Left front wheel: SFLH, SFLR
- Right rear wheel: SRRH, SRRR
- Left rear wheel: SRLH, SRLR

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE RADIATOR RESERVE TANK ASSEMBLY

(a) Separate the radiator reserve tank hose.

(b) Remove the radiator reserve tank assembly.

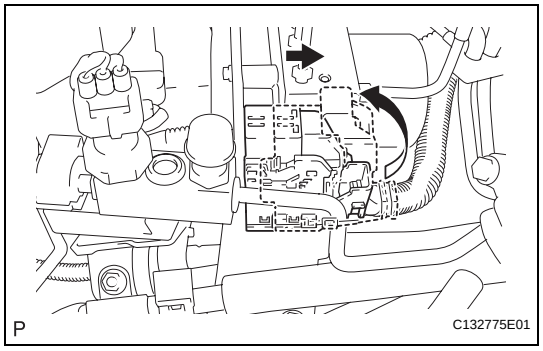
3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately clean it off completely.

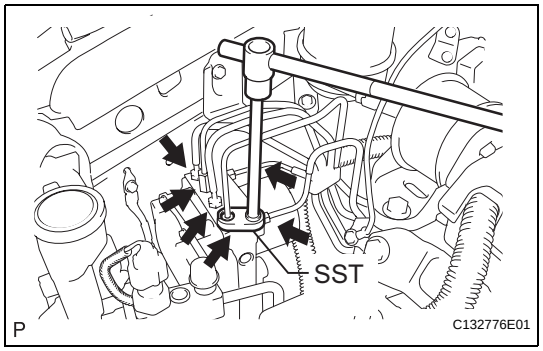
4. REMOVE BRAKE ACTUATOR

(a) Release the lock lever and disconnect the actuator connector.



(b) Using SST, disconnect the 6 brake lines from the actuator assembly with bracket.

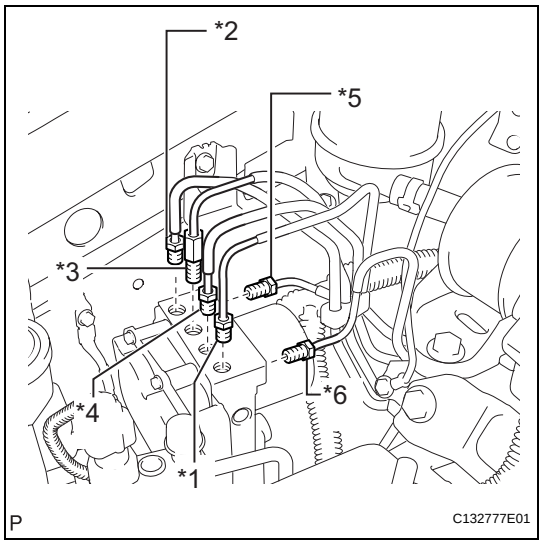
SST 09023-00101

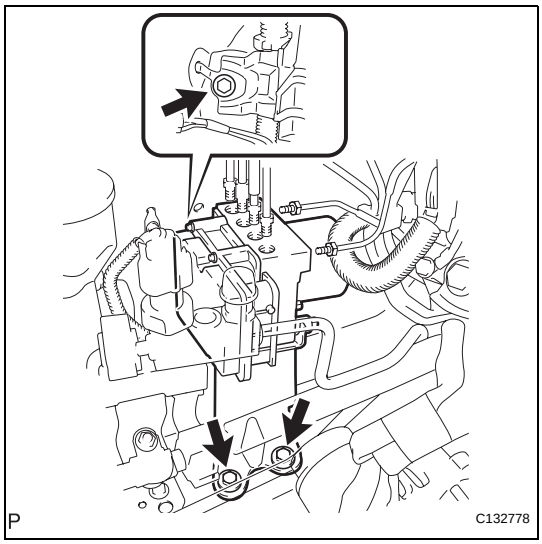


(c) Use tags or make a memo to identify the places to reconnect.

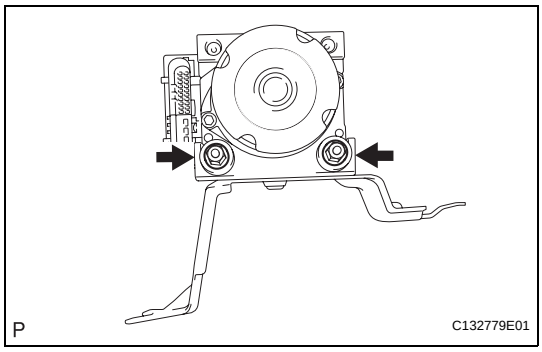
HINT:

- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 2nd Master Cylinder
- *6: From 1st Master Cylinder





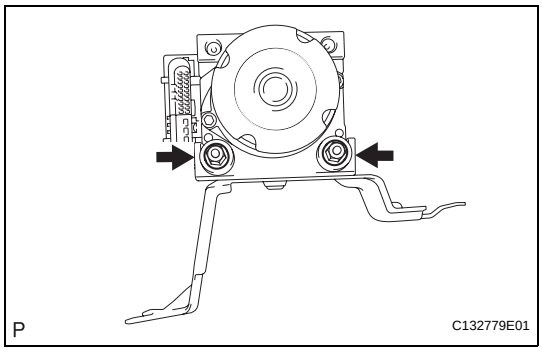
(d) Remove the 3 bolts and actuator assembly from the body with bracket.
NOTICE:
Do not damage the brake tubes and wire harness.



DISASSEMBLY

1. REMOVE BRAKE ACTUATOR BRACKET ASSEMBLY

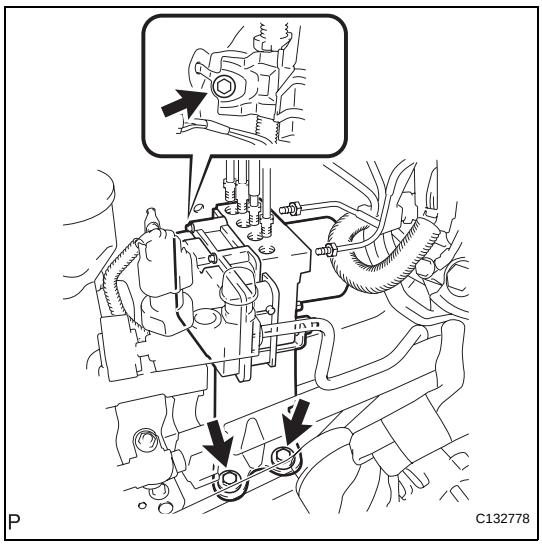
(a) Remove the 2 nuts and the brake actuator assembly from the actuator bracket assembly.



REASSEMBLY

1. INSTALL BRAKE ACTUATOR BRACKET ASSEMBLY

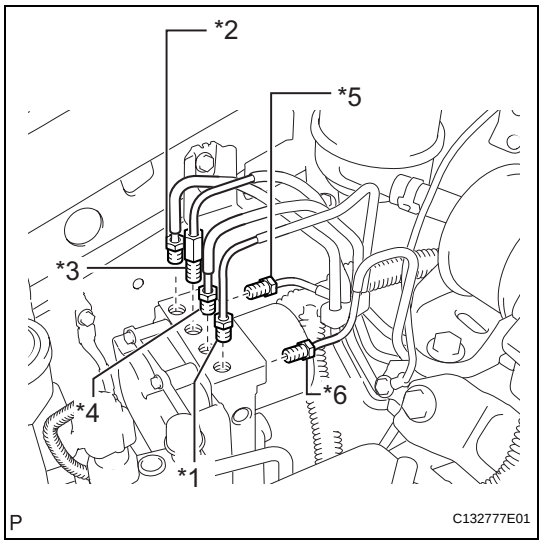
(a) Install the actuator assembly to the actuator bracket assembly with the 2 nuts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
NOTICE:
Do not remove the hole plug before installing a new brake actuator because the brake actuator assembly is filled with brake fluid.



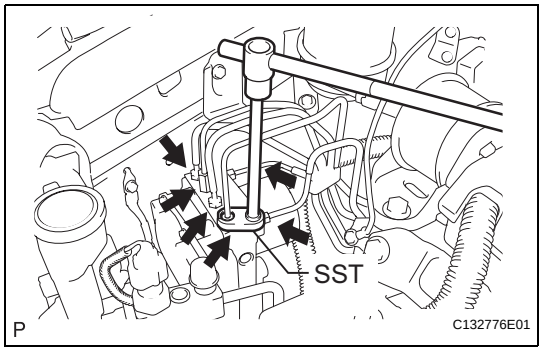
INSTALLATION

1. INSTALL BRAKE ACTUATOR (w/o VSC)

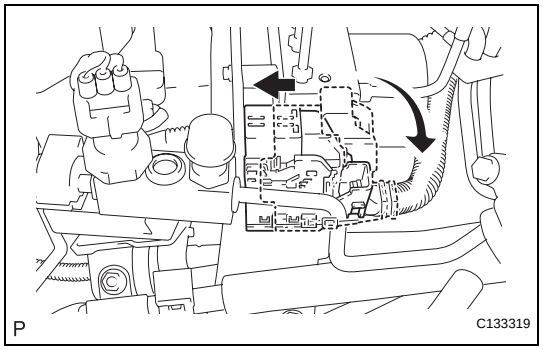
(a) Install the actuator assembly with bracket to the body with the 3 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not damage the brake tubes and wire harness.



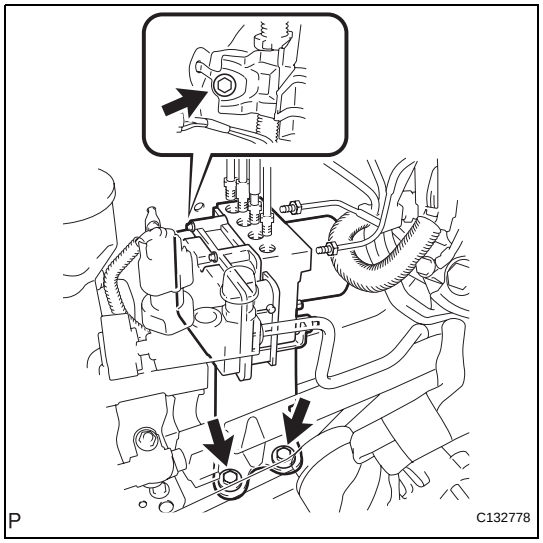
(b) Temporarily tighten each brake tube to the correct positions of the actuator assembly with bracket as shown in the illustration.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 2nd Master Cylinder
- *6: From 1st Master Cylinder



(c) Using SST, fully tighten each brake tube.
SST 09023-00101
Torque: without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



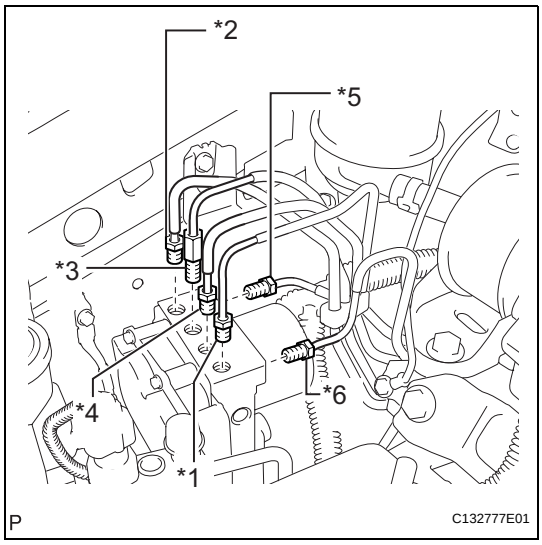
(d) Connect the actuator connector.
NOTICE:
Make sure that the connector is locked securely.



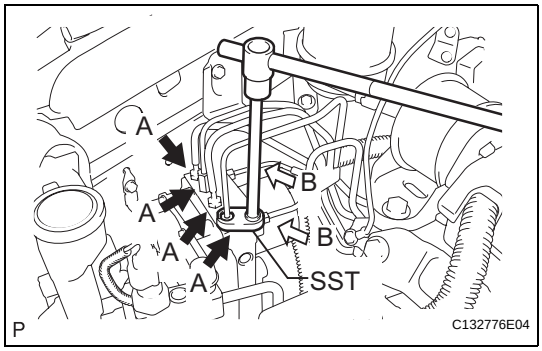
2. INSTALL BRAKE ACTUATOR (w/ VSC)

(a) Install the actuator assembly with bracket to the body with the 3 bolts.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not damage the brake tubes.

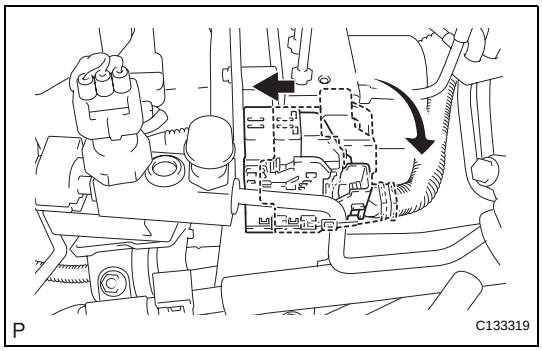
BC



(b) Temporarily tighten each brake tube to the correct positions of the actuator assembly with bracket as shown in the illustration.
HINT:
- *1: To Front Wheel Cylinder RH
- *2: To Front Wheel Cylinder LH
- *3: To Rear Wheel Cylinder RH
- *4: To Rear Wheel Cylinder LH
- *5: From 2nd Master Cylinder
- *6: From 1st Master Cylinder



(c) Using SST, fully tighten each brake tube.
SST 09023-00101, 09023-38200
Torque: bolt A M10 without SST
15 N*m (155 kgf*cm, 11 ft.*lbf)
bolt A M10 with SST
14 N*m (143 kgf*cm, 10 ft.*lbf)
bolt B M12 without SST
19 N*m (194 kgf*cm, 14 ft.*lbf)
bolt B M12 with SST
17 N*m (173 kgf*cm, 13 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**



(d) Connect the actuator connector.
NOTICE:
Make sure that the connector is locked securely.

3. **INSTALL RADIATOR RESERVE TANK ASSEMBLY**
(a) Install the radiator reserve tank assembly.
(b) Connect the radiator reservoir tank hose.

4. **FILL RESERVOIR WITH BRAKE FLUID (See page BR-6)**

5. **BLEED BRAKE LINE (See page BR-7)**

6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

7. **BLEED BRAKE ACTUATOR ASSEMBLY (w/ VSC) (See page BR-8)**

8. **INSPECT BRAKE FLUID LEVEL (See page BR-10)**

9. **INSPECT FOR BRAKE FLUID LEAKAGE**

10. **INSPECT ACTUATOR WITH INTELLIGENT TESTER**
HINT:
(See page BC-431)

11. PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION (w/ VSC)

HINT:

(See page BC-278)

12. INSPECT SENSOR SIGNAL

HINT:

- without VSC (see page BC-11)
- with VSC (see page BC-290)

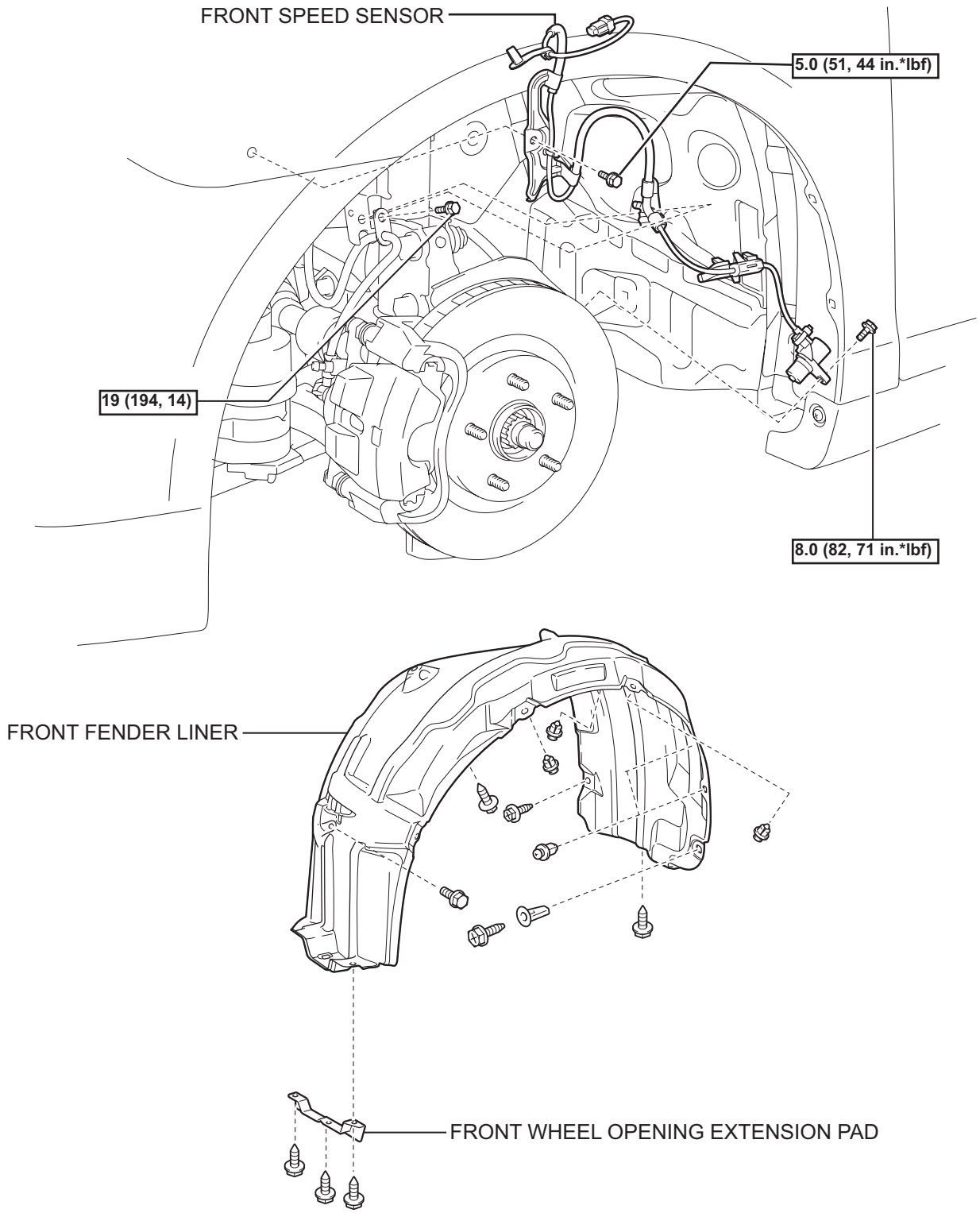
13. INSPECT DTC AND CLEAR

HINT:

- without VSC (See page BC-21)
- with VSC (See page BC-302)

FRONT SPEED SENSOR

COMPONENTS

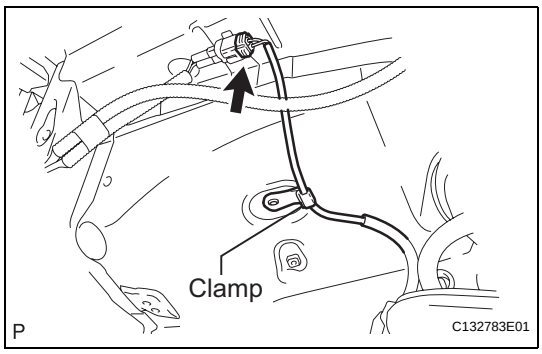


N*m (kgf*cm, ft.*lbf): Specified torque

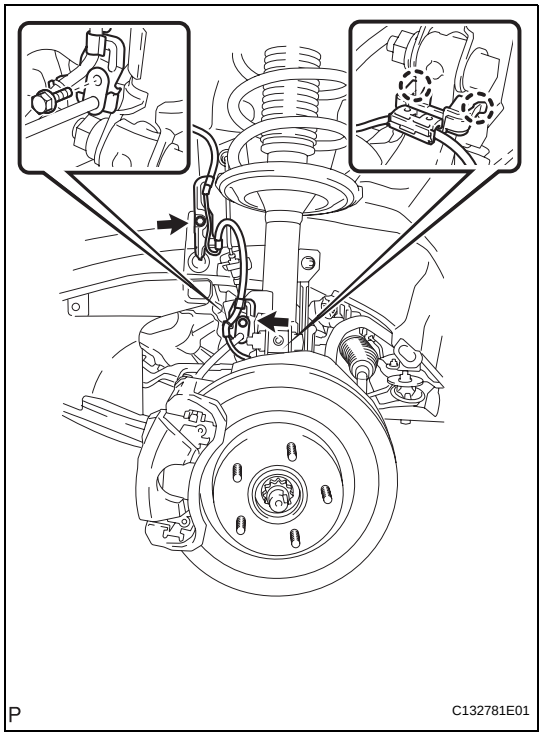
C132784E01

REMOVAL

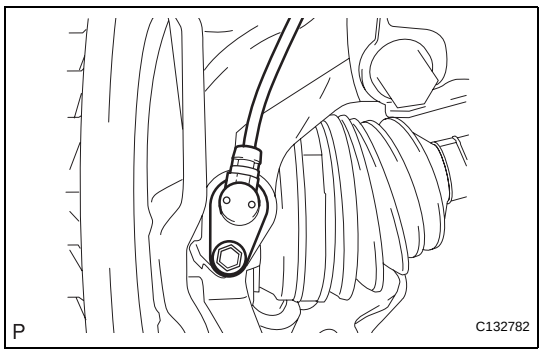
1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD LH (See page ED-6)**
3. **REMOVE FRONT FENDER LINER (See page ED-6)**
4. **REMOVE FRONT SPEED SENSOR**
   (a) Disconnect the front speed sensor connector and clamp.



BC



   (b) Remove the 2 bolts from the body and the shock absorber assembly.
   (c) Disengage the 2 claws from the steering knuckle and body.

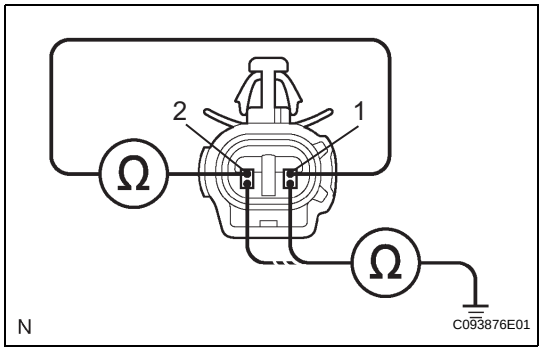


   (d) Remove the bolt and the front speed sensor.
   NOTICE:
   - **Prevent foreign matter from attaching to the sensor tip.**
   - **Clean the installation hole and the surface for the speed sensor every time the speed sensor is removed.**

INSPECTION

1. INSPECT FRONT SPEED SENSOR (for BOSCH Made)

(a) Inspect the front speed sensor. If any of the following occurs, replace the front speed sensor with a new one:
- The surface of the front speed sensor is cracked, dented, or chipped off.
- The connector or wire harness is scratched, cracked, or damaged.
- The front speed sensor has been dropped.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (FL+) - 2 (FL-)	0.92 to 1.22 kΩ at 20 °C (68°F)
1 (FL+) - Body ground	10 kΩ or higher
2 (FL-) - Body ground	10 kΩ or higher

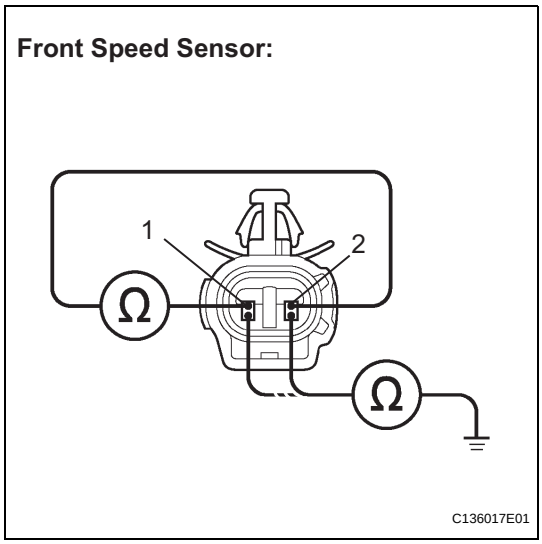
RH

Tester Connection	Specified Condition
1 (FR+) - 2 (FR-)	0.92 to 1.22 kΩ at 20 °C(68°F)
1 (FR+) - Body ground	10 kΩ or higher
2 (FR-) - Body ground	10 kΩ or higher

If the value is not as specified, replace the front speed sensor.

2. INSPECT FRONT SPEED SENSOR (for ADVICS Made)

(a) Inspect the front speed sensor. If any of the following occurs, replace the front speed sensor with a new one:
- The surface of the front speed sensor is cracked, dented, or chipped off.
- The connector or wire harness is scratched, cracked, or damaged.
- The front speed sensor has been dropped.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

RH

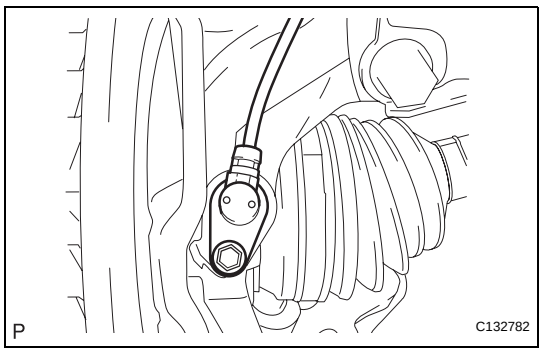
Tester Connection	Condition	Specified Condition
1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FR+) - Body ground	Always	10 kΩ or higher
2 (FR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
1 (FL+) - Body ground	Always	10 kΩ or higher
2 (FL-) - Body ground	Always	10 kΩ or higher

If the value is not as specified, replace the front speed sensor.

BC



INSTALLATION

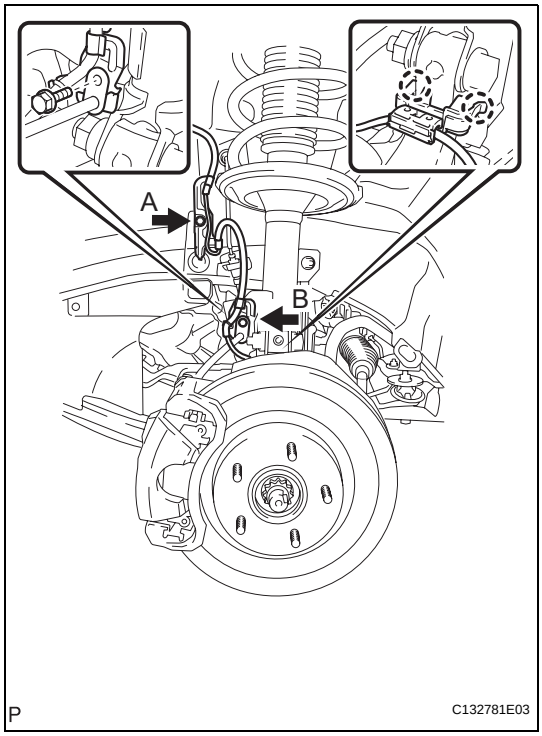
1. INSTALL FRONT SPEED SENSOR

(a) Install the front speed sensor with the bolt.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

NOTICE:

Prevent foreign matter from attaching to the sensor tip.



(b) Install the front speed sensor with the 2 bolts and engage the 2 claws.

Torque: Bolt A

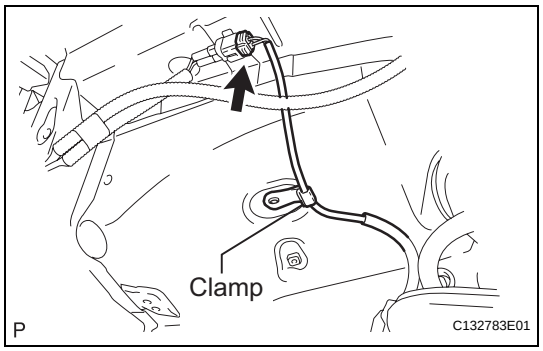
5.0 N*m (51 kgf*cm, 44 in.*lbf)

Bolt B

19 N*m (194 kgf*cm, 14 ft.*lbf)

NOTICE:

Do not twist the wire harness for the front speed sensor when installing the speed sensor.



(c) Connect the front speed sensor connector and clamp.

2. **INSTALL FRONT FENDER LINER (See page ED-10)**

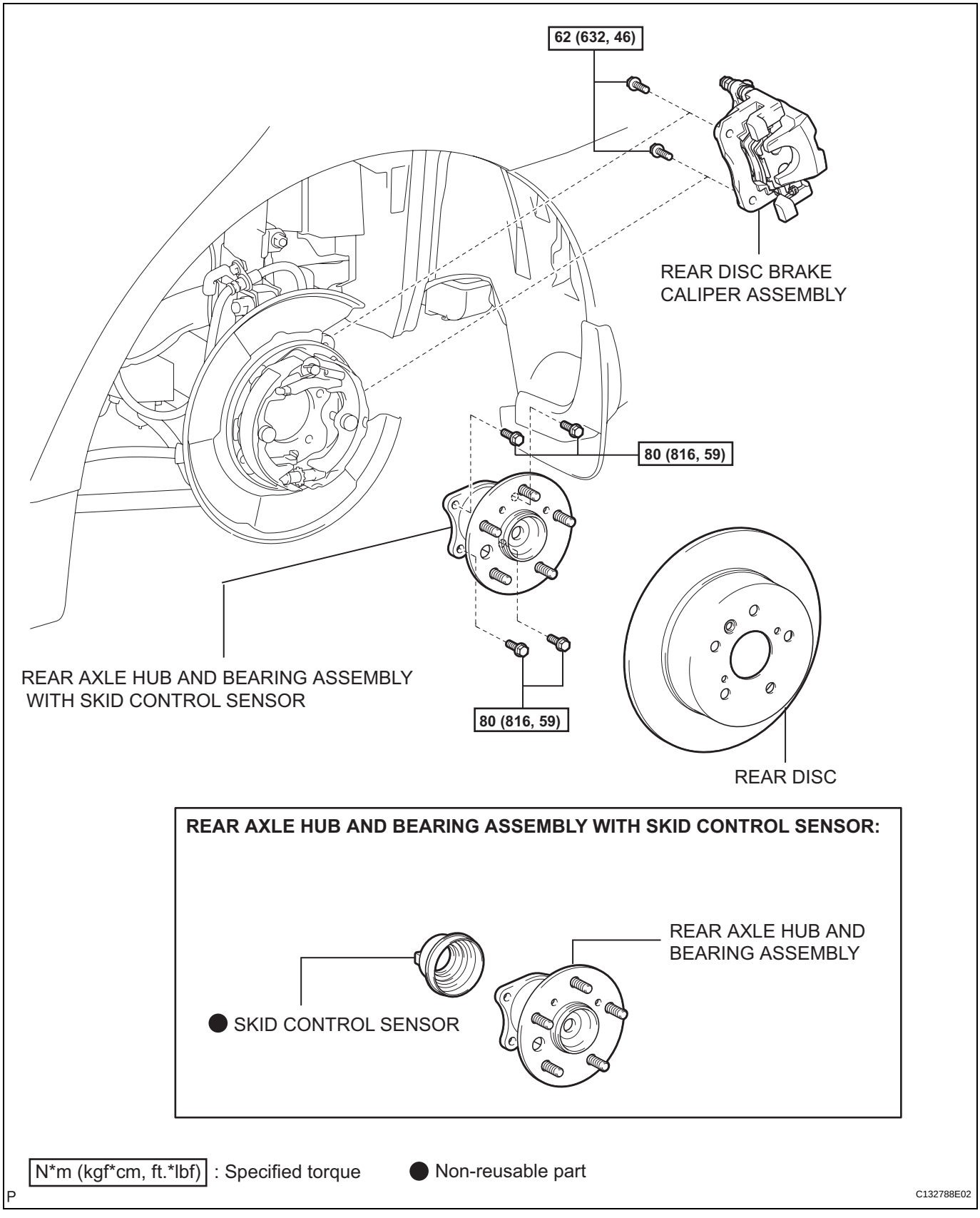
3. **INSTALL FRONT WHEEL OPENING EXTENSION PAD LH (See page ED-10)**

4. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

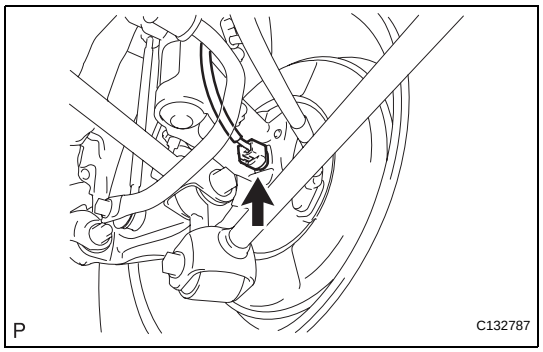
5. **CHECK SPEED SENSOR SIGNAL**
HINT:
- for BOSCH without VSC (See page BC-11)
- for BOSCH with VSC (See page BC-290)
- for ADVICS (See page BC-123)

SKID CONTROL SENSOR

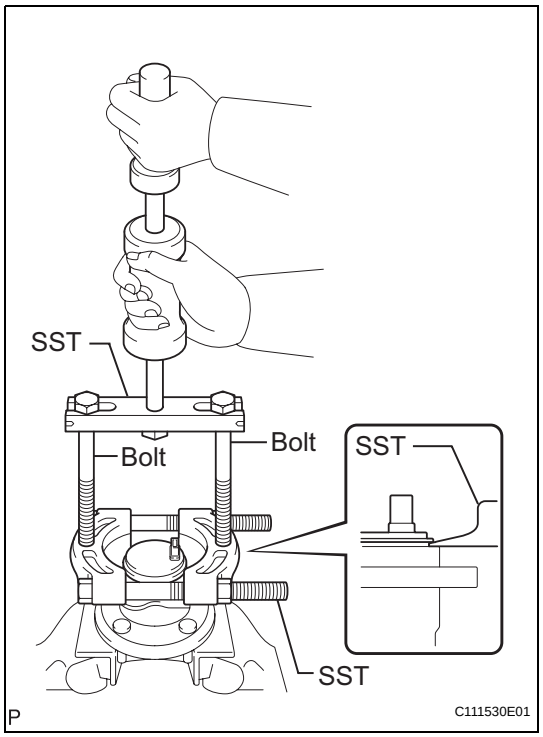
COMPONENTS



REMOVAL



1. **REMOVE REAR WHEEL**
2. **DISCONNECT SKID CONTROL SENSOR WIRE**
   (a) Disconnect the connector from the skid control sensor.
   NOTICE:
   Be careful not to damage the speed sensor.
3. **REMOVE REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-18)**
4. **REMOVE REAR DISC (See page BR-62)**
5. **REMOVE REAR AXLE HUB AND BEARING ASSEMBLY WITH SKID CONTROL SENSOR (See page AH-15)**



6. **REMOVE SKID CONTROL SENSOR**
   (a) Mount the rear axle hub in a vise using aluminum plates.
   NOTICE:
   Replace the hub and bearing assembly if it is dropped or receives a strong shock.
   (b) Using a pin punch and hammer, drive out the 2 pins and remove the 2 attachments from SST.
   SST 09520-00031 (09521-00010, 09520-00040), 09521-00020
   (c) Using SST and 2 bolts (Diameter: 12 mm, pitch: 1.5 mm), remove the skid control sensor from the hub and bearing assembly.
   SST 09520-00031 (09521-00010, 09520-00040), 09521-00020, 09950-00020
   NOTICE:
   - **Keep the sensor away from magnets.**
   - **Pull the skid control sensor off straight, taking care not to make contact with the skid control sensor rotor.**
   - **If the speed sensor rotor is damaged or deformed, replace the hub and bearing assembly.**
   - **Do not scratch the contact surface between the axle hub and the skid control sensor.**
   - **Do not attach foreign matter to the speed sensor rotor and tip.**

INSPECTION

1. INSPECT SKID CONTROL SENSOR (for BOSCH Made)

(a) Inspect the skid control sensor. If any of the following occurs, replace the skid control sensor with a new one:
- The surface of the skid control sensor is cracked, dented, or chipped off.
- The connector is scratched, cracked, or damaged.
- The skid control sensor has been dropped.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

LH

Tester Connection	Specified Condition
1 (RR+) - 2 (RR-)	Below 2.2 kΩ
1 (RR+) - Body ground	10 kΩ or higher
2 (RR-) - Body ground	10 kΩ or higher

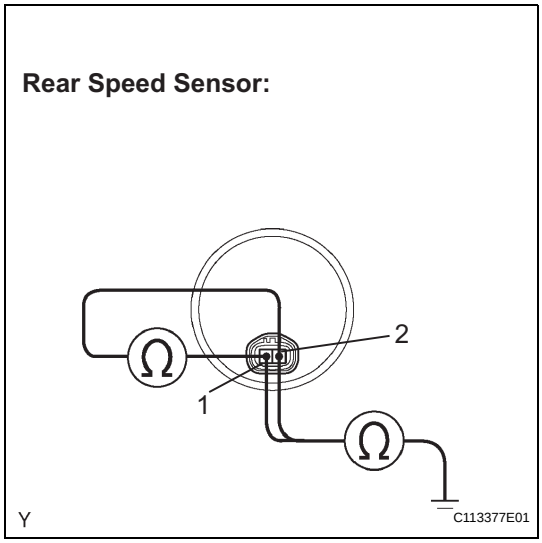
RH

Tester Connection	Specified Condition
1 (RL+) - 2 (RL-)	Below 2.2 kΩ
1 (RL+) - Body ground	10 kΩ or higher
2 (RL-) - Body ground	10 kΩ or higher

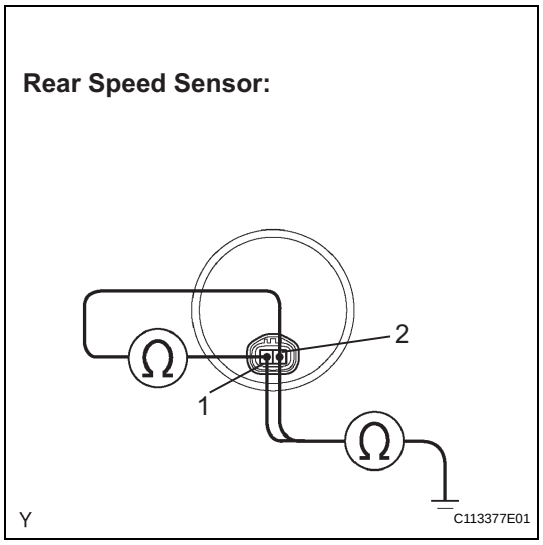
If the value is not as specified, replace the skid control sensor.

2. INSPECT SKID CONTROL SENSOR (for ADVICS Made)

(a) Inspect the skid control sensor. If any of the following occurs, replace the skid control sensor with a new one:
- The surface of the skid control sensor is cracked, dented, or chipped off.
- The connector is scratched, cracked, or damaged.
- The skid control sensor has been dropped.



BC



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

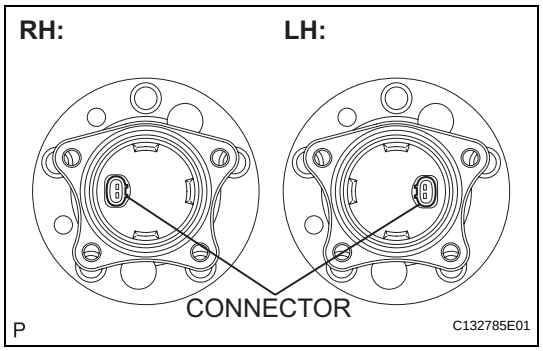
RH

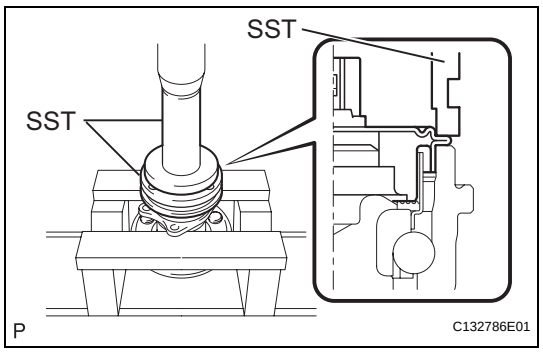
Tester Connection	Condition	Specified Condition
2 (RR+) - 1 (RR-)	Always	0.9 to 2.1 kΩ
2 (RR+) - Body ground	Always	10 kΩ or higher
1 (RR-) - Body ground	Always	10 kΩ or higher

LH

Tester Connection	Condition	Specified Condition
2 (RL+) - 1 (RL-)	Always	0.9 to 2.1 kΩ
2 (RL+) - Body ground	Always	10 kΩ or higher
1 (RL-) - Body ground	Always	10 kΩ or higher

If the value is not as specified, replace the skid control sensor.





INSTALLATION

1. **INSTALL SKID CONTROL SENSOR**

(a) Clean the contact surface between the axle hub and a new skid control sensor.

NOTICE:

Prevent foreign matter from attaching to the sensor rotor.

(b) Place the skid control sensor on the axle hub so that the connector is positioned as shown in the illustration.

(c) Using SST, a press, 2 V-blocks, and 2 steel plates, install the skid control sensor to the axle hub.

SST 09309-36010, 09213-58013

NOTICE:

- **Keep the sensor away from magnets.**
- **Do not use a hammer on the skid control sensor.**
- **Check that there is no foreign matter such as iron chips on the detecting portion of the skid control sensor.**
- **Slowly press the skid control sensor straight.**

2. **INSTALL REAR AXLE HUB AND BEARING ASSEMBLY WITH SKID CONTROL SENSOR (See page AH-16)**

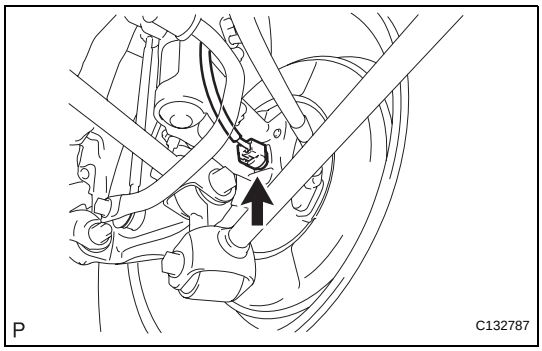
3. **INSPECT REAR AXLE HUB BEARING LOOSENESS (See page AH-15)**

4. **INSPECT REAR AXLE HUB RUNOUT (See page AH-15)**

5. **INSTALL REAR DISC (See page BR-63)**

6. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page AH-20)**

BC



7. **CONNECT SKID CONTROL SENSOR WIRE**
   (a) Connect the connector to the skid control sensor.

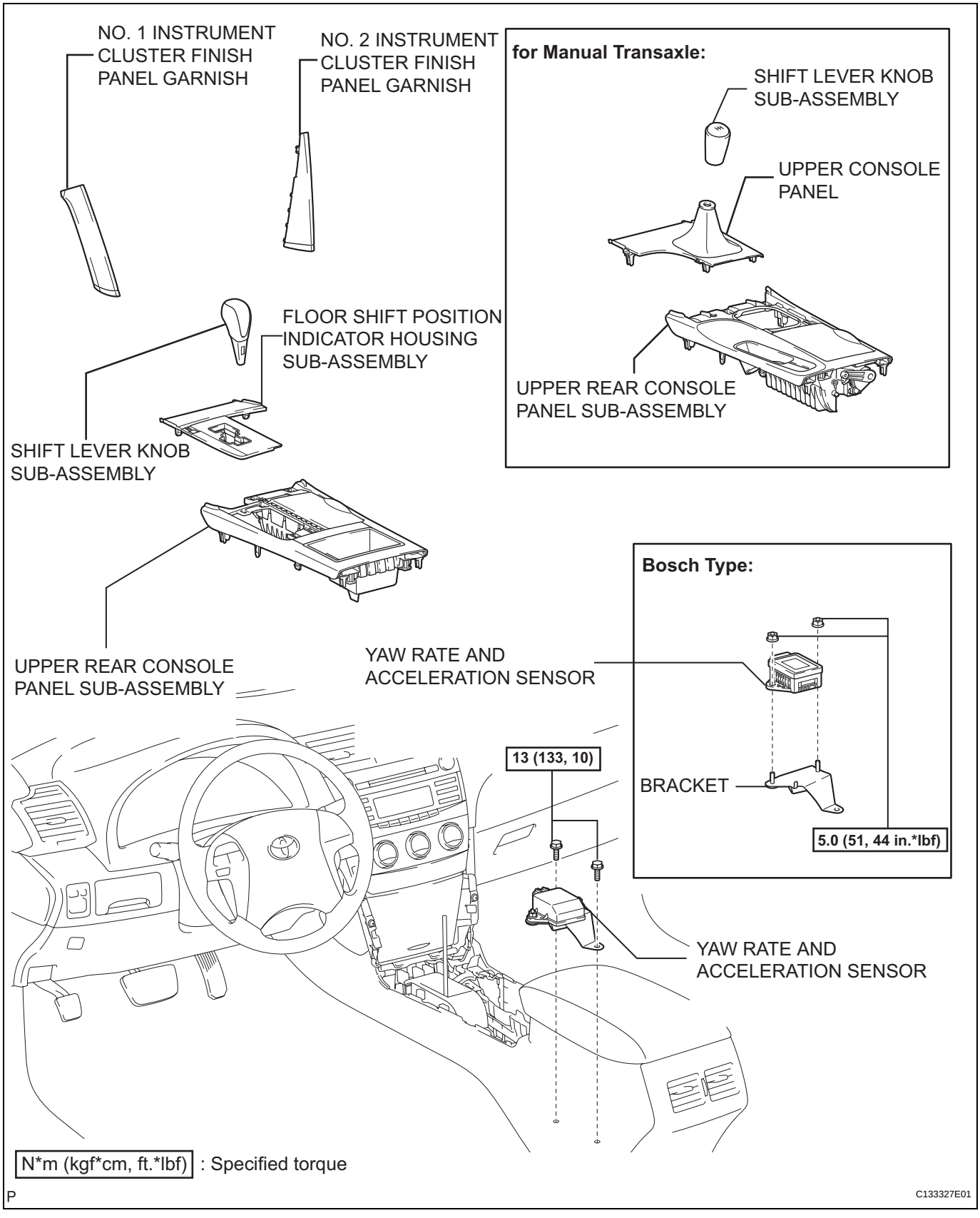
8. **INSTALL REAR WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

9. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**
   HINT:
   (See page SP-13)

10. **CHECK SPEED SENSOR SIGNAL**
    HINT:
    - for BOSCH without VSC (See page BC-11)
    - for BOSCH with VSC (See page BC-290)
    - for ADVICS (See page BC-123)

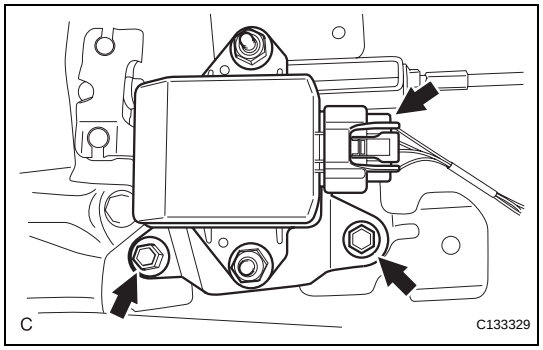
YAW RATE AND ACCELERATION SENSOR (w/ VSC)

COMPONENTS

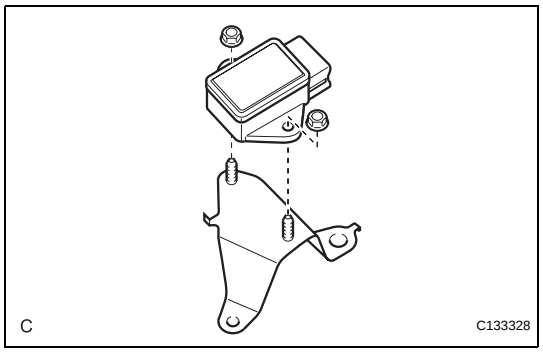


REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
4. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
5. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
6. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
7. **REMOVE UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
8. **REMOVE UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
9. **REMOVE YAW RATE AND ACCELERATION SENSOR**
   (a) Disconnect the yaw rate sensor connector.
   (b) Remove the 2 bolts and yaw rate sensor.
   NOTICE:
   Do not remove the sensor from the bracket.



10. **REMOVE YAW RATE AND ACCELERATION SENSOR (for BOSCH Made)**
    (a) Remove the 2 nuts and yaw rate sensor from the bracket.

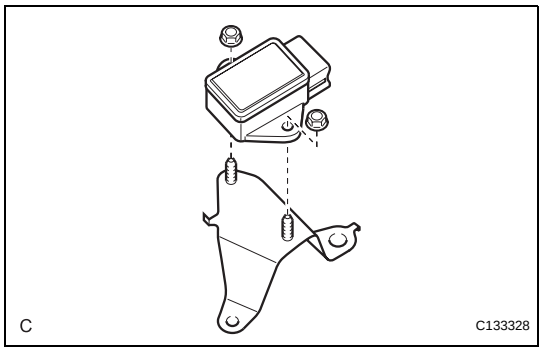


BC

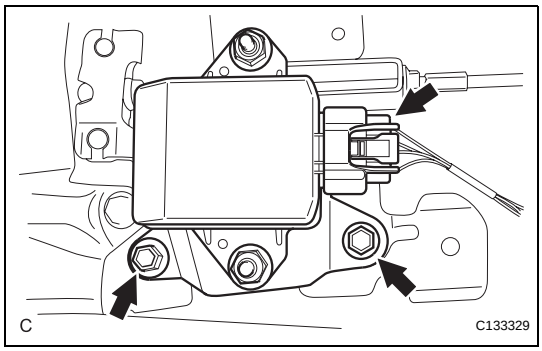
INSPECTION

1. **INSPECT YAW RATE AND ACCELERATION SENSOR**
   (a) Inspect the yaw rate sensor. If any of the following occurs, replace the yaw rate sensor with a new one:
   - The surface of the yaw rate sensor is cracked, dented, or chipped off.
   - The connector is scratched, cracked, or damaged.
   - The yaw rate sensor has been dropped.

INSTALLATION



1. **INSTALL YAW RATE AND ACCELERATION SENSOR (for BOSCH Made)**
   (a) Install the yaw rate and acceleration sensor to the bracket with the 2 nuts.
   Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



2. **INSTALL YAW RATE AND ACCELERATION SENSOR**
   (a) Install the yaw rate sensor and acceleration with the 2 bolts.
   NOTICE:
   - **Do not damage the yaw rate and acceleration sensor.**
   - **Make sure that the yaw rate and acceleration sensor is installed securely.**

   Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
   (b) Connect the yaw rate and acceleration sensor connector.

3. **INSTALL UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
4. **INSTALL UPPER REAR CONSOLE PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
5. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
6. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
7. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
8. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
9. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**
10. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**

BC

11. PERFORM YAW RATE SENSOR ZERO POINT CALIBRATION

HINT:

- for BOSCH (See page BC-278)
- for ADVICS (See page BC-119)

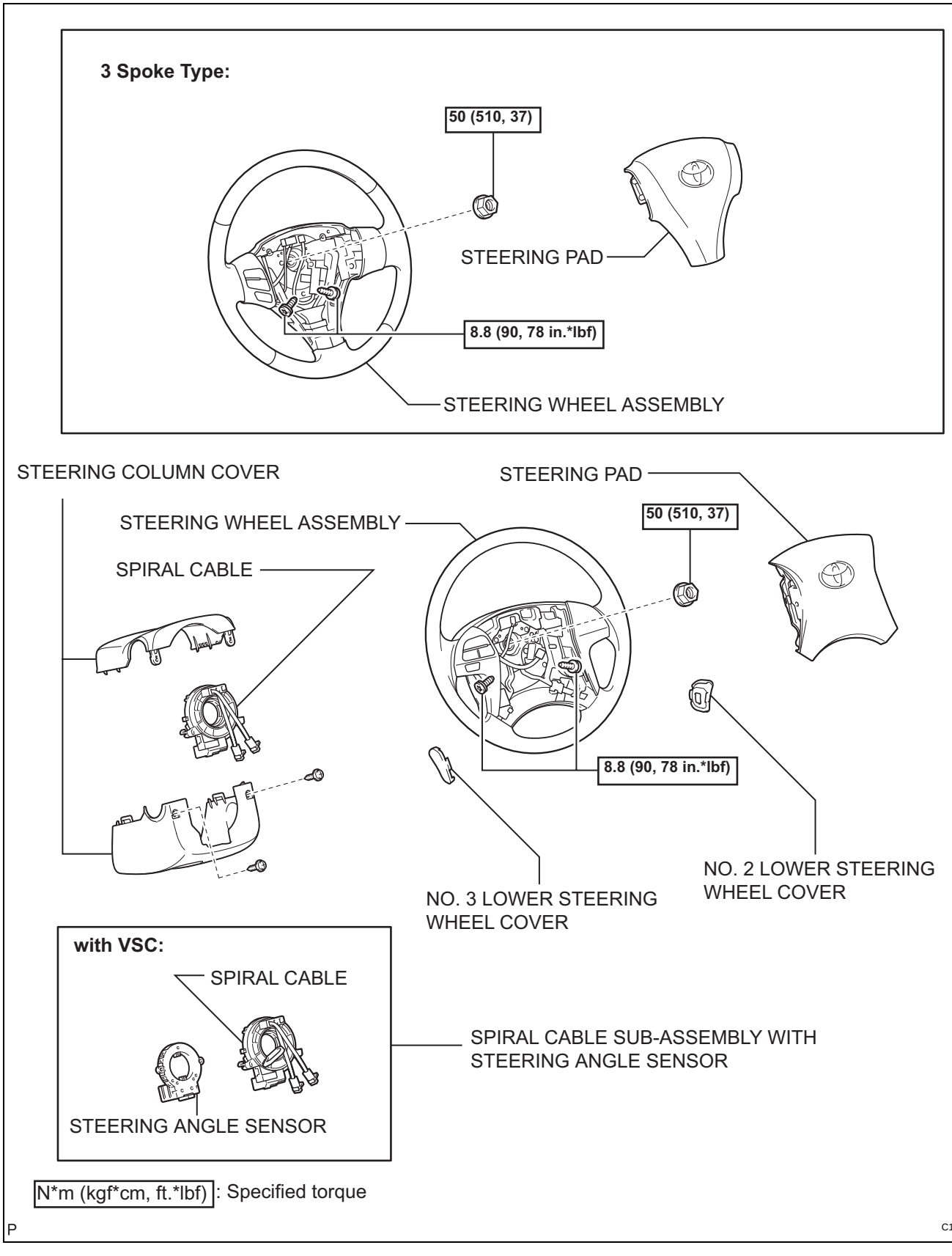
12. INSPECT SENSOR SIGNAL

HINT:

- for BOSCH (See page BC-290)
- for ADVICS (See page BC-123)

STEERING ANGLE SENSOR (w/ VSC)

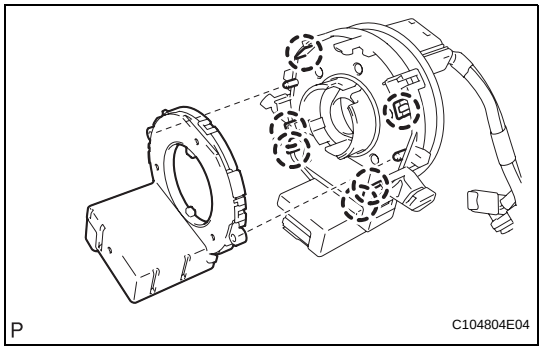
COMPONENTS



BC

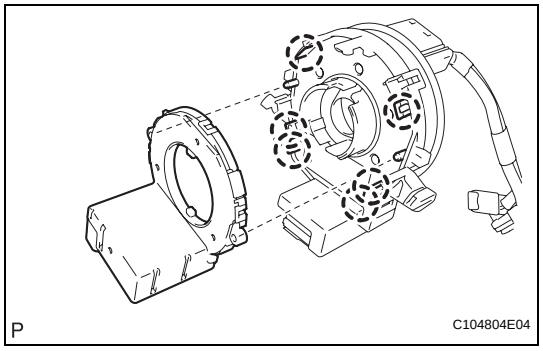
REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
   NOTICE:
   When reconnecting the cable to the negative battery terminal after installing the steering sensor, check that the front tires and steering wheel are kept aligned straight ahead before and after connecting the cable to the negative battery terminal.
4. **REMOVE NO. 2 STEERING WHEEL COVER LOWER (See page RS-349)**
5. **REMOVE NO. 3 STEERING WHEEL COVER LOWER (See page RS-349)**
6. **REMOVE STEERING PAD (See page RS-350)**
7. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
8. **REMOVE STEERING COLUMN COVER (See page SR-39)**
9. **REMOVE SPIRAL CABLE SUB-ASSEMBLY WITH STEERING ANGLE SENSOR (See page RS-364)**
10. **REMOVE STEERING ANGLE SENSOR**
    (a) Disengage the claws and remove the steering angle sensor from the spiral cable.



INSPECTION

1. **INSPECT STEERING ANGLE SENSOR**
   (a) Inspect the steering angle sensor. If any of the following occurs, replace the steering angle sensor with a new one:
   - The surface of the steering angle sensor is cracked, dented, or chipped off.
   - The connector is scratched, cracked, or damaged.
   - The steering angle sensor has been dropped.



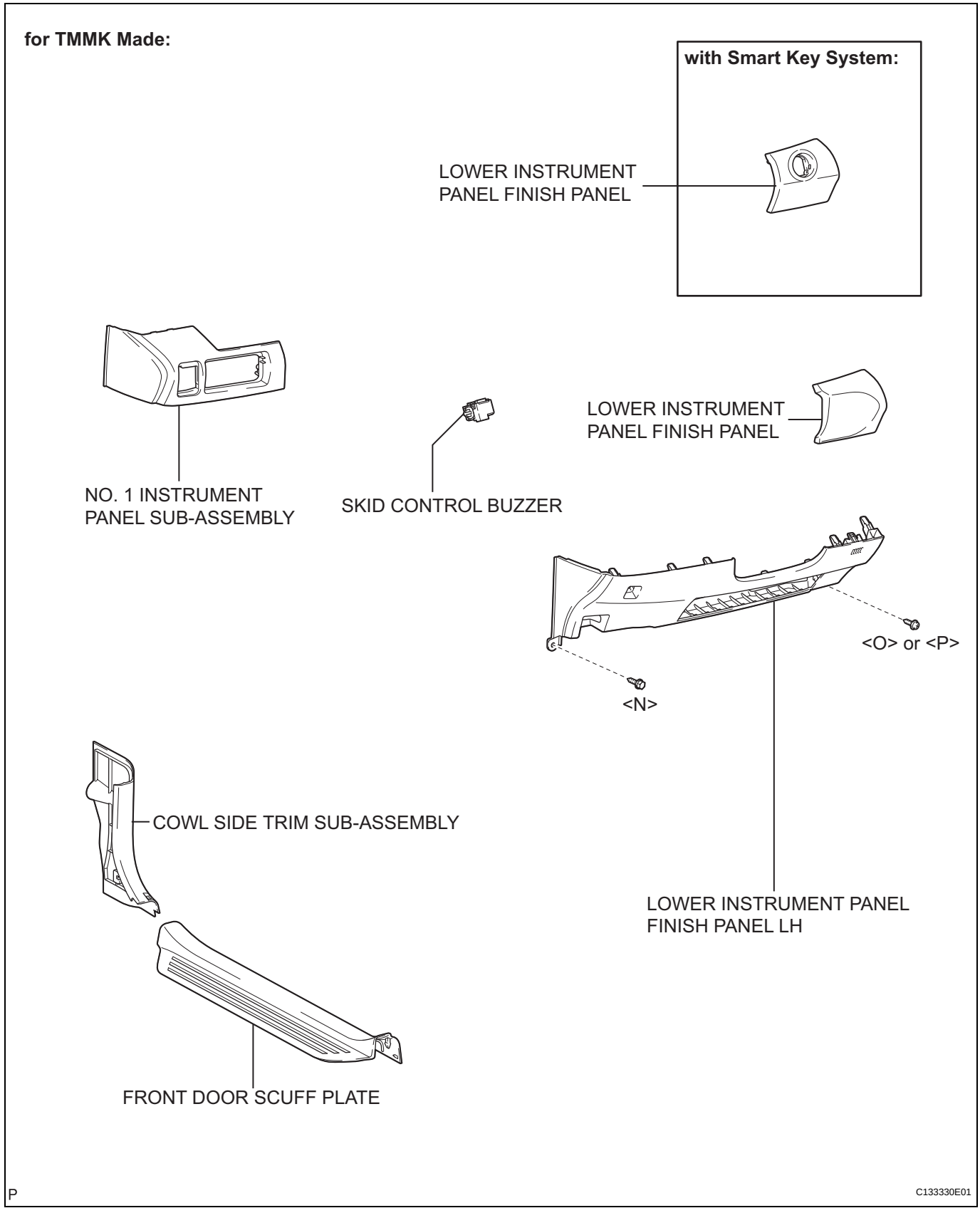
INSTALLATION

1. **INSTALL STEERING ANGLE SENSOR**
   (a) Align the locating pins, engage the claws, and install the steering angle sensor to the spiral cable sub-assembly.
2. **INSTALL SPIRAL CABLE SUB-ASSEMBLY WITH STEERING ANGLE SENSOR (See page RS-366)**
3. **INSTALL STEERING COLUMN COVER (See page SR-50)**
4. **ADJUST SPIRAL CABLE (See page RS-367)**
5. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)**
6. **INSPECT STEERING WHEEL CENTER POINT (See page SR-47)**
7. **INSTALL STEERING PAD (See page RS-350)**
8. **INSTALL NO. 2 STEERING WHEEL COVER LOWER (See page RS-352)**
9. **INSTALL NO. 3 STEERING WHEEL COVER LOWER (See page RS-351)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **INSPECT STEERING PAD (See page RS-347)**
12. **INSPECT SRS WARNING LIGHT**
    HINT:
    (See page RS-32)

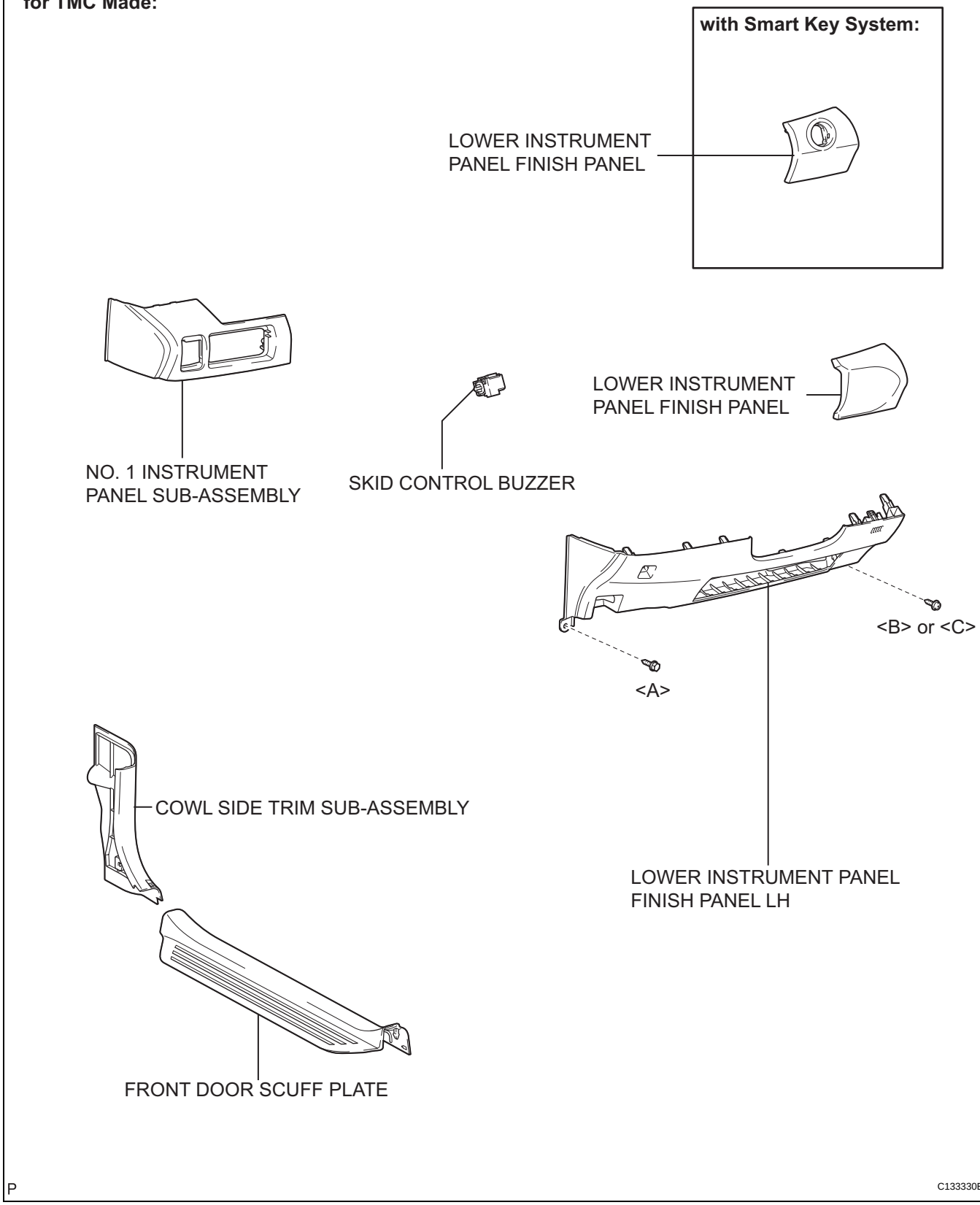
BC

SKID CONTROL BUZZER (w/ VSC)

COMPONENTS



for TMC Made:



P

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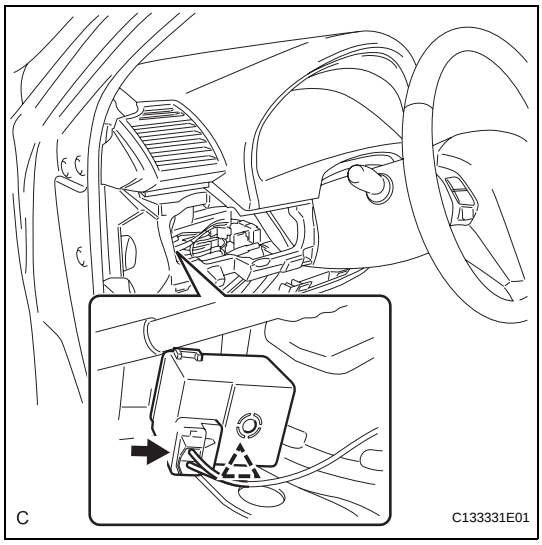
BC

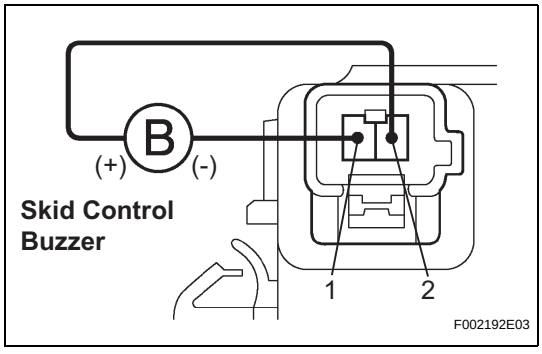
REMOVAL

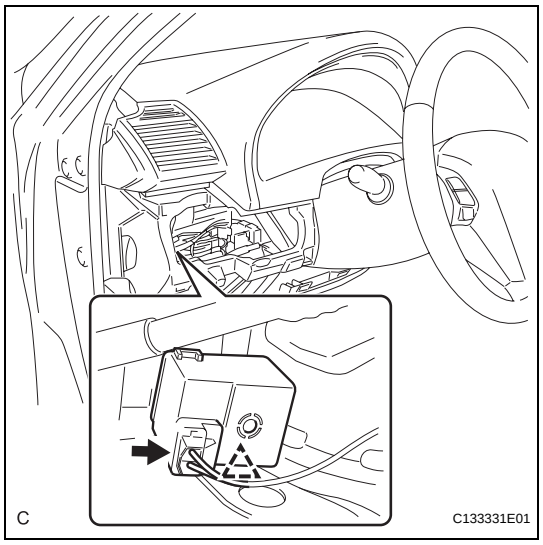
1. **PRECAUTION (See page IP-20)**
2. **REMOVE FRONT DOOR SCUFF PLATE (See page IR-24)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY (See page IR-25)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
6. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
9. **REMOVE SKID CONTROL BUZZER**
   (a) Disconnect the skid control buzzer connector.
   (b) Remove the clip and skid control buzzer assembly.



INSPECTION

1. **INSPECT SKID CONTROL BUZZER**
   (a) Apply battery negative voltage to terminal 1, and battery positive voltage to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.
   OK:
   The skid control buzzer sounds.
   If the skid control buzzer does not sound, replace the skid control buzzer.





INSTALLATION

1. **INSTALL SKID CONTROL BUZZER**
   (a) Attach the claw and install the skid control buzzer.
   (b) Connect the skid control buzzer assembly connector.
2. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
3. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
4. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
5. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
6. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
7. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY (See page IR-54)**
8. **INSTALL FRONT DOOR SCUFF PLATE (See page IR-54)**

ABS MOTOR RELAY (w/ VSC)

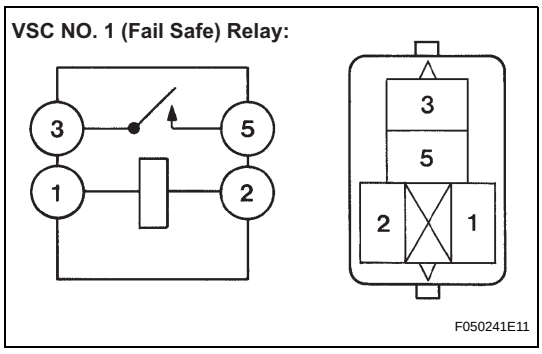
ON-VEHICLE INSPECTION

1. INSPECT VSC NO. 1 (FAIL SAFE) RELAY

(a) Remove the VSC NO. 1 (fail safe) relay.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance



Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

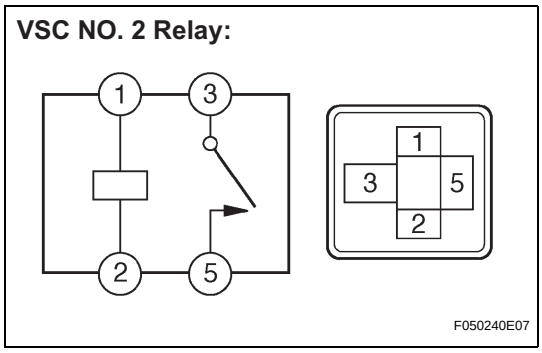
If the value is not as specified, replace the VSC NO. 1 (fail safe) relay.

2. INSPECT VSC NO. 2 RELAY

(a) Remove the VSC NO. 2 relay.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance



Tester Connection	Condition	Specified Condition
3 - 5	Always	10 kΩ or higher
3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

If the value is not as specified, replace the VSC NO. 2 relay.

BC

CAN COMMUNICATION SYSTEM

PRECAUTION

1. STEERING SYSTEM HANDLING PRECAUTIONS

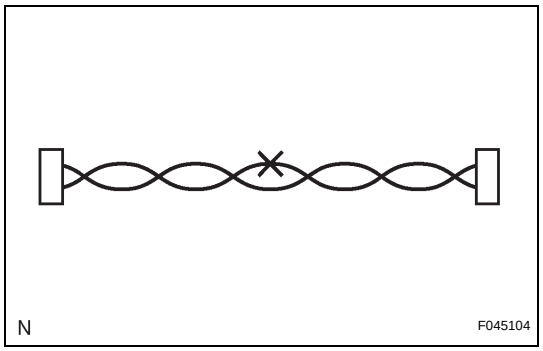
(a) Care must be taken when replacing parts. Incorrect replacement could affect the performance of the steering system and result in hazardous driving.

2. SRS AIRBAG SYSTEM HANDLING PRECAUTIONS

(a) This vehicle is equipped with an SRS (Supplemental Restraint System) which includes parts such as the driver airbag and front passenger airbag. Failure to carry out service operations in the correct sequence could cause unexpected SRS deployment during servicing and may lead to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notice for the Supplemental Restraint System (See page RS-1).

CA

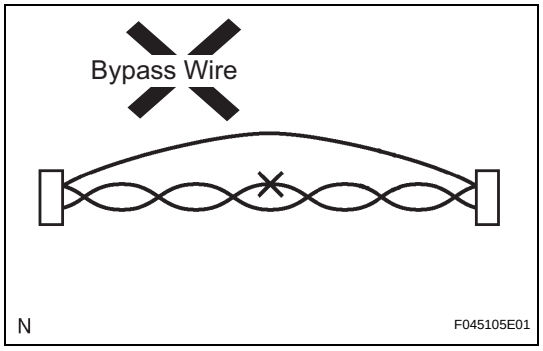
3. BUS WIRE REPAIR



(a) After repairing a bus wire with solder, wrap the repaired part with vinyl tape.

NOTICE:

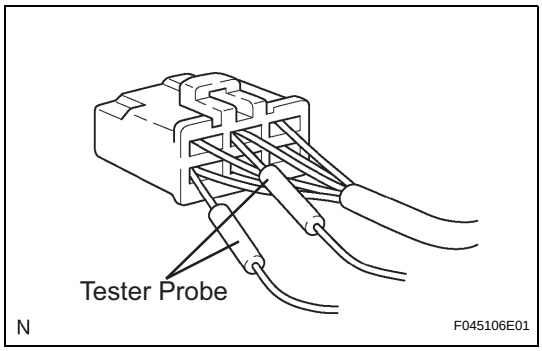
- **The CANL bus wire and CANH bus wire must be installed together at all times.**
- **When installing, make sure that they are twisted.**
- **CAN bus wires are likely to be influenced by noise if the bus wires are not twisted.**
- **The difference in length between the CANL bus wire and CANH bus wire should be within 100 mm (3.937 in.).**
- **Leave approximately 80 mm (3.150 in.) loose in the twisted wires around the connector.**



(b) Do not use bypass wiring between the connectors.

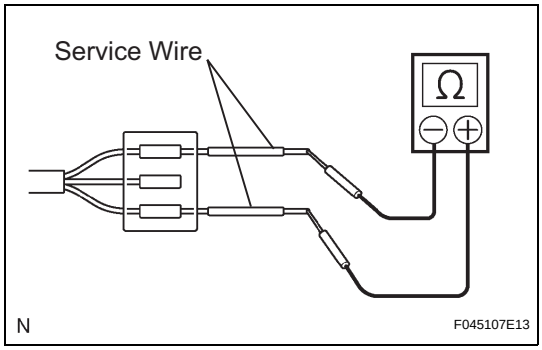
NOTICE:

The protective effect of the twisted wire harness will be lost if you use bypass wiring.



4. CONNECTOR HANDLING

(a) When checking resistance with a tester, insert the tester probes from the backside (harness side) of the connector.



(b) Use a service wire to check the connector if it is impossible to check continuity from the rear of the connector.

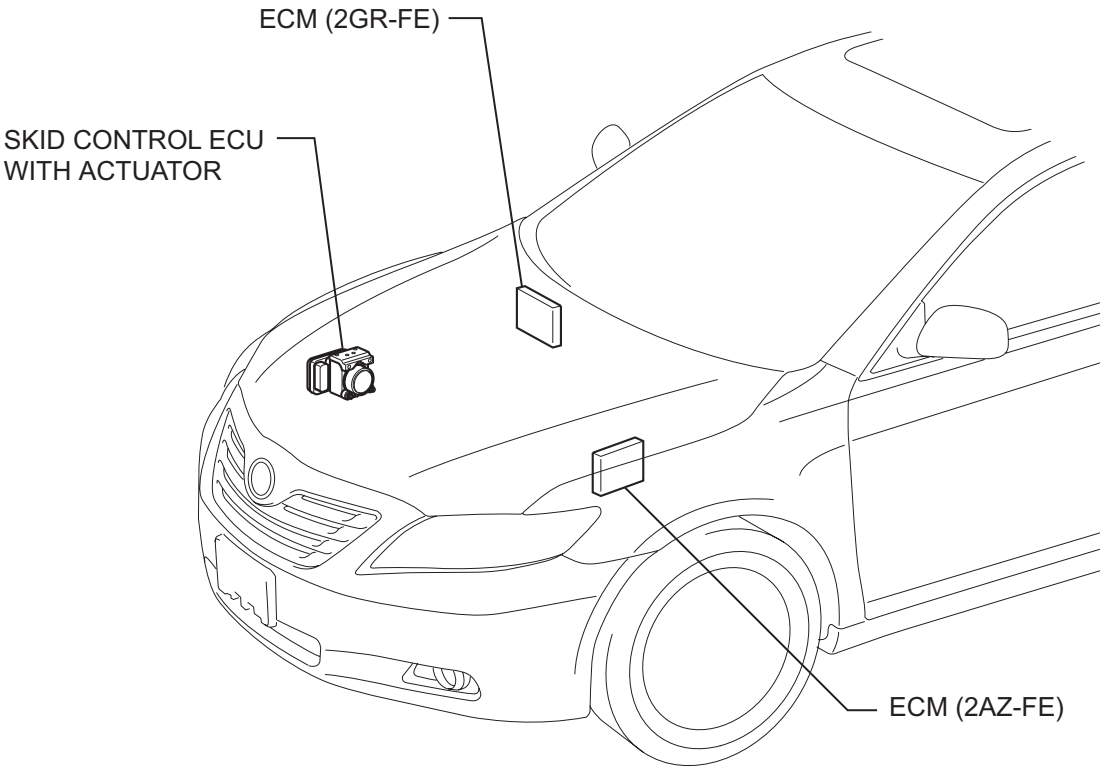
5. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

CA

Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	Off
Ignition switch on (IG)	ON	On (IG)
Ignition switch on (ACC)	ACC	ON (ACC)
Engine start	START	Start

PARTS LOCATION



C

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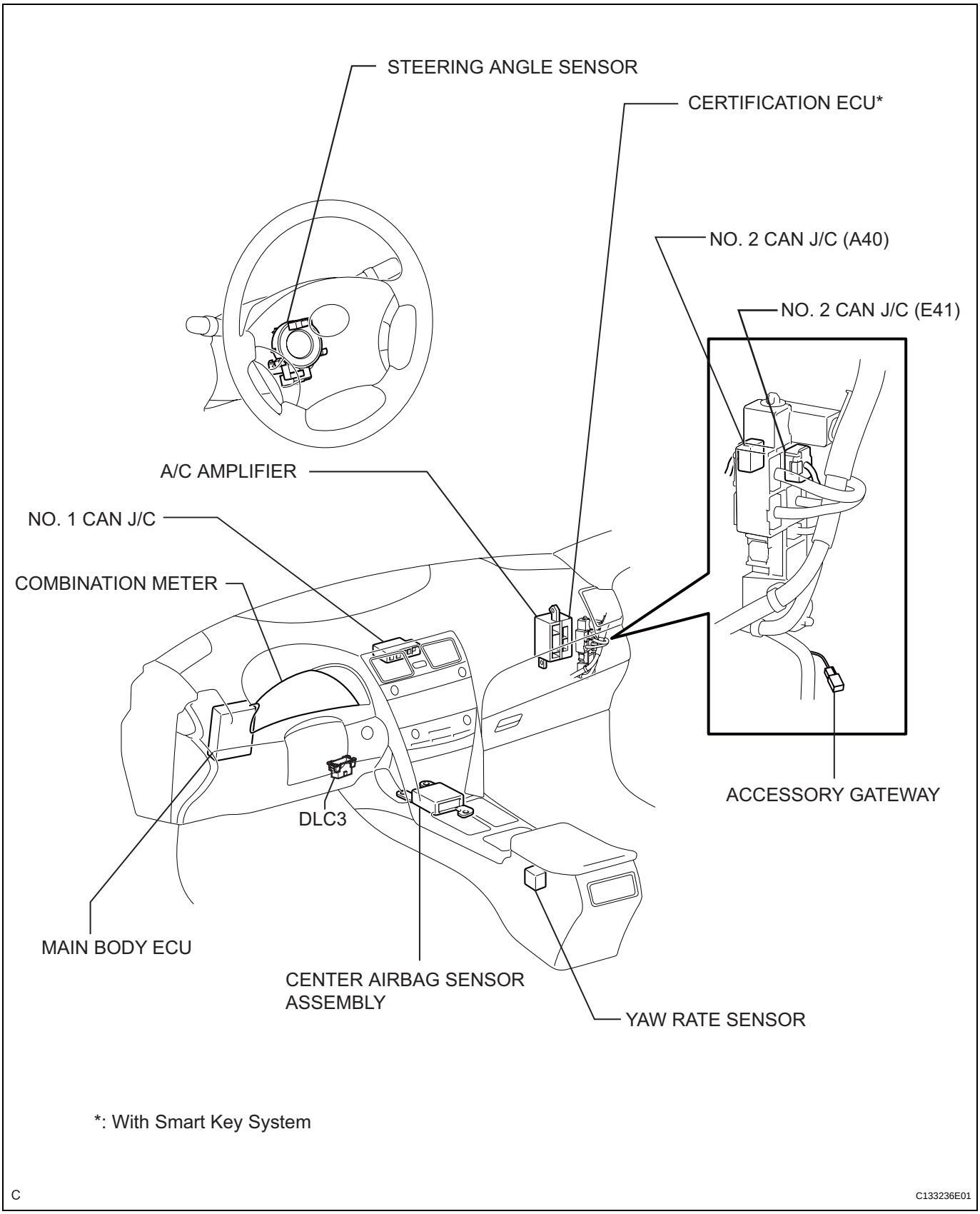
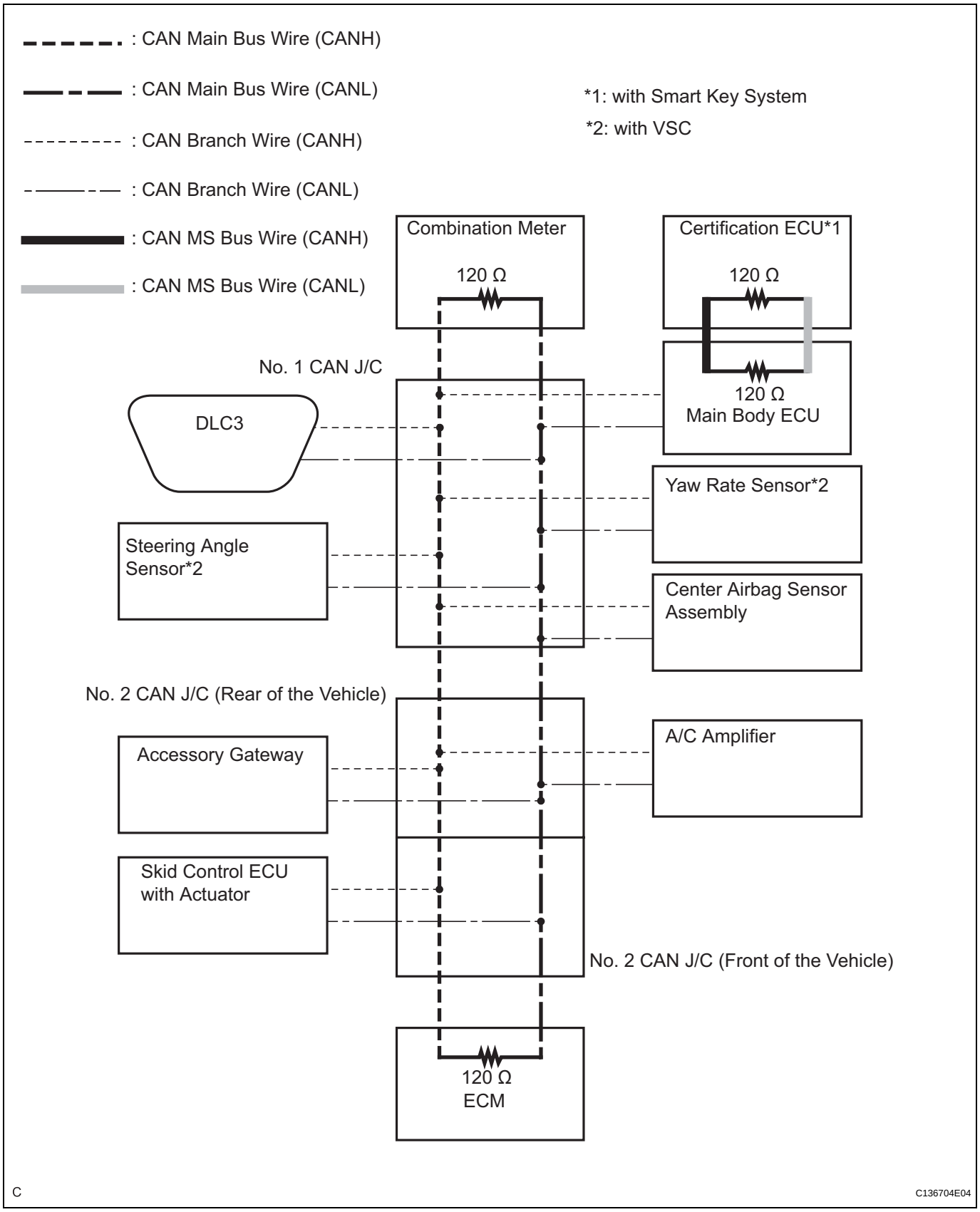

STEERING ANGLE SENSOR
CERTIFICATION ECU*
NO. 2 CAN J/C (A40)
NO. 2 CAN J/C (E41)
A/C AMPLIFIER
NO. 1 CAN J/C
COMBINATION METER
DLC3
ACCESSORY GATEWAY
MAIN BODY ECU
CENTER AIRBAG SENSOR ASSEMBLY
YAW RATE SENSOR
*: With Smart Key System
C
C133236E01

SYSTEM DIAGRAM



CA

HINT:

- The skid control ECU detects and stores steering angle sensor and yaw rate sensor DTCs and allows DTC communication by receiving information from the steering angle sensor and yaw rate sensor.

SYSTEM DESCRIPTION

1. BRIEF DESCRIPTION

(a) Two different CAN busses are used. The CAN busses are classified into two types based on typical communication speed.
The HS-CAN bus is a high-speed communication bus that is used for powertrain, chassis, and some body electrical communication. The HS-CAN bus is referred to as the "CAN bus" and it operates at speeds of approximately 500 kbps. Terminating resistors for the HS-CAN bus are located in the ECM and combination meter.
The MS-CAN bus is a medium-speed communication bus that is used for body electrical communication. The MS-CAN bus is referred to as the "MS bus" and it operates at speeds of approximately 250 kbps. Terminating resistors for the MS-CAN bus are located in the main body ECU and the certification ECU. The resistance of the MS-CAN bus cannot be measured from the DLC3 connector.
Communication between these two networks is handled via the main body ECU, which acts as a gateway ECU.

(b) By pairing the CANH and CANL bus wires, the CAN performs communication based on differential voltage.

(c) Many ECUs (sensors) installed on the vehicle operate by sharing information and communicating with each other.

(d) The CAN has two resistors of 120 Ω which are necessary to enable communication on the main bus wire.

2. DEFINITION OF TERMS

(a) Main bus wire

(1) The main bus wire is a wire harness between the two terminus circuits on the bus (communication line).

(b) Branch wire

(1) The branch wire is a wire harness which diverges from the main bus wire to an ECU or sensor.

(c) Terminating resistors
(1) Two resistors of 120 Ω resistance are installed in parallel across the ends of the CAN main bus wires. They are called terminating resistors. These resistors allow the changes of the voltage differential between the CAN bus wires to be accurately judged. To allow proper function of CAN communication, it is necessary to have both terminating resistors installed. Since the two resistors are installed in parallel, a measurement of resistance between the two CAN bus wires should produce a reading of approximately 60 Ω.

3. ECUS OR SENSORS WHICH COMMUNICATE THROUGH CAN COMMUNICATION SYSTEM

(a) Skid control ECU with actuator
(b) Air conditioning amplifier
(c) Main body ECU
(d) Combination meter ECU
(e) Yaw rate sensor
(f) Steering angle sensor
(g) Center airbag sensor
(h) ECM
(i) Certification ECU (with smart key system)
(j) TCM
(k) Accessory gateway

4. DIAGNOSTIC CODE FOR CAN COMMUNICATION SYSTEM

(a) DTCs for the CAN communication system are as follows: U0101, U0073, U0100, U0123, U0124, U0126, U0129, B1207, B1499, and B2326.

5. TROUBLESHOOTING REMARKS

(a) DTCs for the CAN communication system can be checked using the intelligent tester via the CAN VIM. The DLC3 is connected to the CAN communication system, but no DTCs exist regarding problems in the DLC3 or the DLC3 branch wires. If there is trouble in the DLC3 or the DLC3 branch wires, ECUs on the CAN network cannot output codes to the intelligent tester via the CAN VIM.
(b) Trouble in the CAN buses (communication lines) can be checked by measuring the resistance between terminals of the DLC3. However, an open circuit in a branch wire other than the DLC3 branch wires cannot be checked from the DLC3.
NOTICE:
Do not insert the tester probes directly into the DLC3. Be sure to use a service wires.

6. HOW TO DISTINGUISH THE CAN J/C CONNECTOR

(a) In the CAN communication system, the shape of all connectors connected to the CAN J/C No. 1 is the same. The connectors connected to the CAN J/C No. 1 can be connecting side of the junction connector.
HINT:
See "TERMINALS OF ECU" (See page CA-10) for bus wire color or the type of connecting surface.

HOW TO PROCEED WITH TROUBLESHOOTING

NOTICE:

- **DTCs for the CAN communication system are as follows: U0101, U0073, U0100, U0123, U0124, U0126, B1207, B1499, and B2326.**
- **Refer to troubleshooting of each system if DTCs regarding the CAN communication system are not output.**

1	CHECK AND CLEAR DTCS

NEXT

2	CHECK FOR INSTALLED SYSTEMS (ECUS & SENSORS) THAT ADOPT CAN COMMUNICATION)

CA

(a) Check which of the following is adopted: SFI system, automatic transaxle system, brake control system, supplemental restraint system, smart key system, air conditioning system and meter / gauge system (See page CA-25).

NEXT

3	CHECK CAN BUS LINE

(a) Check the CAN bus wires (See page CA-65).

NEXT

4	CHECK INTELLIGENT TESTER

(a) Select "Communication Bus Check" (See page CA-25).

Result

Symptom	Proceed	See procedure
All the ECUs and sensors connected to the CAN communication system are displayed on the screen.	A	Go to step 5
An ECU or sensor not connected to the CAN communication system is displayed on the screen.	B	CA-10
More than one of the ECUs and sensors not connected to the CAN communication system are displayed on the screen. (If the displayed ECUs and sensors are only those relating to the "Engine" and "ECT", proceed to B.)	C	CA-119

NOTICE:

- **The systems (ECUs, sensors) that adopt CAN communication vary depending on the vehicle and option settings. Check which systems (ECUs, sensors) are installed on the vehicle (See page CA-25).**

- **Non-installed ECUs or sensors are not displayed. Do not mistake ECUs that are not installed as being in communication stop mode.**
- **If 2 or more ECUs or sensors are not displayed on the intelligent tester, perform troubleshooting for communication stop mode for each undisplayed ECU or sensor. (Open in one side of the CAN branch wires.)**

B	**GO TO "COMMUNICATION STOP MODE TABLE"**
C	**GO TO "OPEN IN ONE SIDE OF CAN BRANCH LINE"**

A

5	**DTC COMBINATION TABLE**

(a) Confirm trouble according to the combination of output DTCs regarding the CAN communication system (See page CA-25).
HINT:
Previous CAN communication system DTCs may be the cause if CAN communication system DTCs are output and all ECUs and sensors connected to the CAN communication system are displayed on the intelligent tester "Communication Bus Check" screen.

NEXT

6	**CIRCUIT INSPECTION**

NEXT

7	**IDENTIFICATION OF PROBLEM**

NEXT

8	**REPAIR OR REPLACE**

NEXT

9	**CONFIRMATION TEST**

NEXT

END

CA

PROBLEM SYMPTOMS TABLE

RESULT LIST OF HOW TO PROCEED WITH TROUBLESHOOTING:

Symptom	Suspected area	See page
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Open in CAN Main Bus Line"	Open in CAN Main Bus Wire	CA-69
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Short in CAN Bus Line"	Short in CAN Bus Wires	CA-74
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Short to +B in CAN Bus Line"	Short to B+ in CAN Bus Wire	CA-89
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Short to GND in CAN Bus Line"	Short to GND in CAN Bus Wire	CA-104
The result of "HOW TO PROCEED WITH TROUBLESHOOTING" is "Open in One Side of CAN Sub Bus Line"	Open in One Side of CAN Branch Wire	CA-119

COMMUNICATION STOP MODE TABLE:

Symptom	Suspected area	See page
"ABS/VSC/TRAC" is not displayed on the intelligent tester (with VSC)	Skid Control ECU Communication Stop Mode	CA-42
"A/C " is not displayed on the intelligent tester	Air Conditioning Amplifier Communication Stop Mode	CA-46
"Body/Gateway" is not displayed on the intelligent tester	Main Body ECU Communication Stop Mode	CA-57
"Steering Angle Sensor" is not displayed on the intelligent tester	Steering Angle Sensor Communication Stop Mode	CA-49
"Yaw Rate/Deceleration Sensor" is not displayed on the intelligent tester	Yaw Rate Sensor Communication Stop Mode	CA-51
"Engine" are not displayed on the intelligent tester	ECM Communication Stop Mode	CA-54
"Meter " is not displayed on the intelligent tester	Combination Meter Communication Stop Mode	CA-61
"SRS Airbag" is not displayed on the intelligent tester	Center Airbag Sensor Communication Stop Mode	CA-63

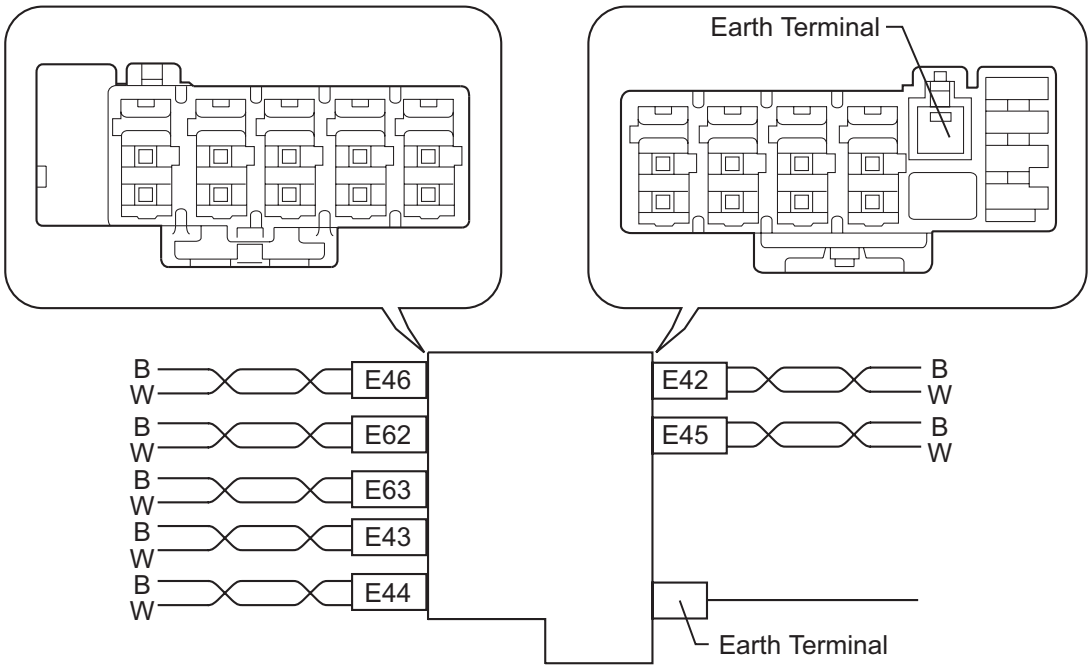
TERMINALS OF ECU

NOTICE:
This section describes the standard CAN values for all CAN related components.

1. JUNCTION CONNECTOR (NO. 1 CAN J/C, NO. 2 CAN J/C)

(a) No. 1 CAN J/C

No. 1 CAN J/C "B" side (without Earth Terminal): **No. 1 CAN J/C "A" side (with Earth Terminal):**



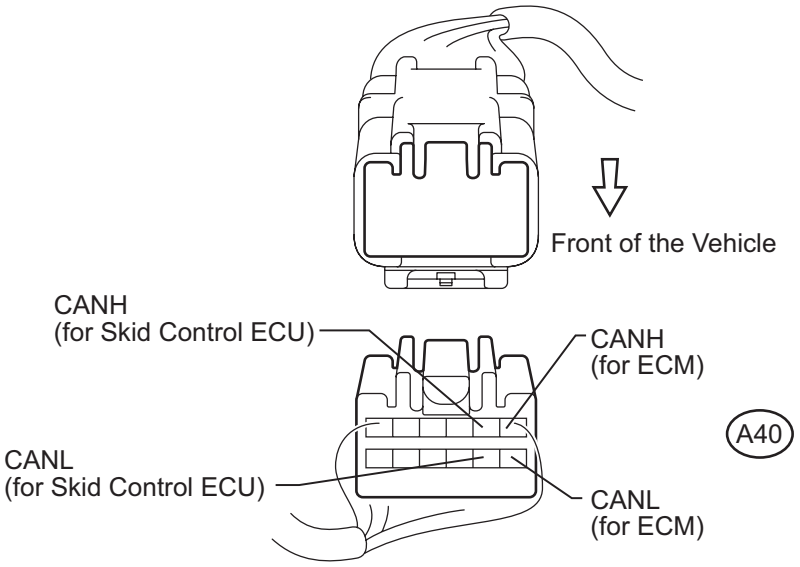
No. 1 CAN J/C connectors ("A" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
CAN Main Bus Wire (E42)	White	B	W
Airbag Sensor Assembly Center (E45)	Black	B	W

No. 1 CAN J/C connectors ("B" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Yaw Rate Sensor* (E46)	Blue	B	W
DLC3 (E62)	Gray	B	W
Steering Angle Sensor* (E63)	Brown	B	W
Combination Meter (E43)	White	B	W
Main Body ECU (E44)	Black	B	W

*: with VSC

(b) No. 2 CAN J/C (FRONT OF THE VEHICLE)

No. 2 CAN J/C (Front of the Vehicle) Wire Harness View:



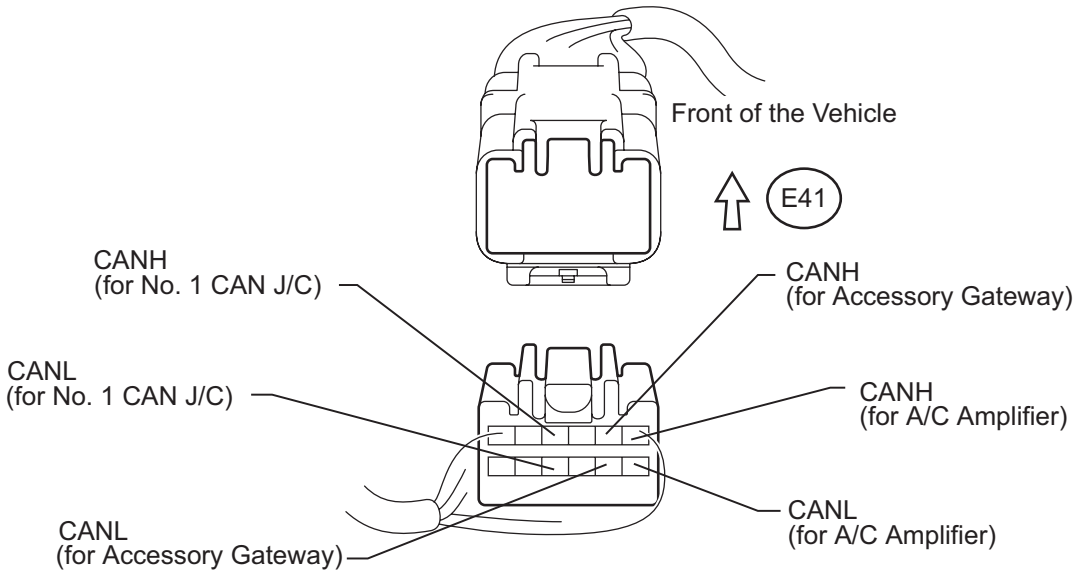
H

C137762E02

Terminals	Wiring Color	Connects to
A40-1 (CANH)	B	ECM (CANH)
A40-7 (CANL)	W	ECM (CANL)
A40-2 (CANH)	B	Skid Control ECU (CANH)
A40-8 (CANL)	W	Skid Control ECU (CANL)

(c) No. 2 CAN J/C (REAR OF THE VEHICLE)

No. 2 CAN J/C (Rear of the Vehicle) Wire Harness View:



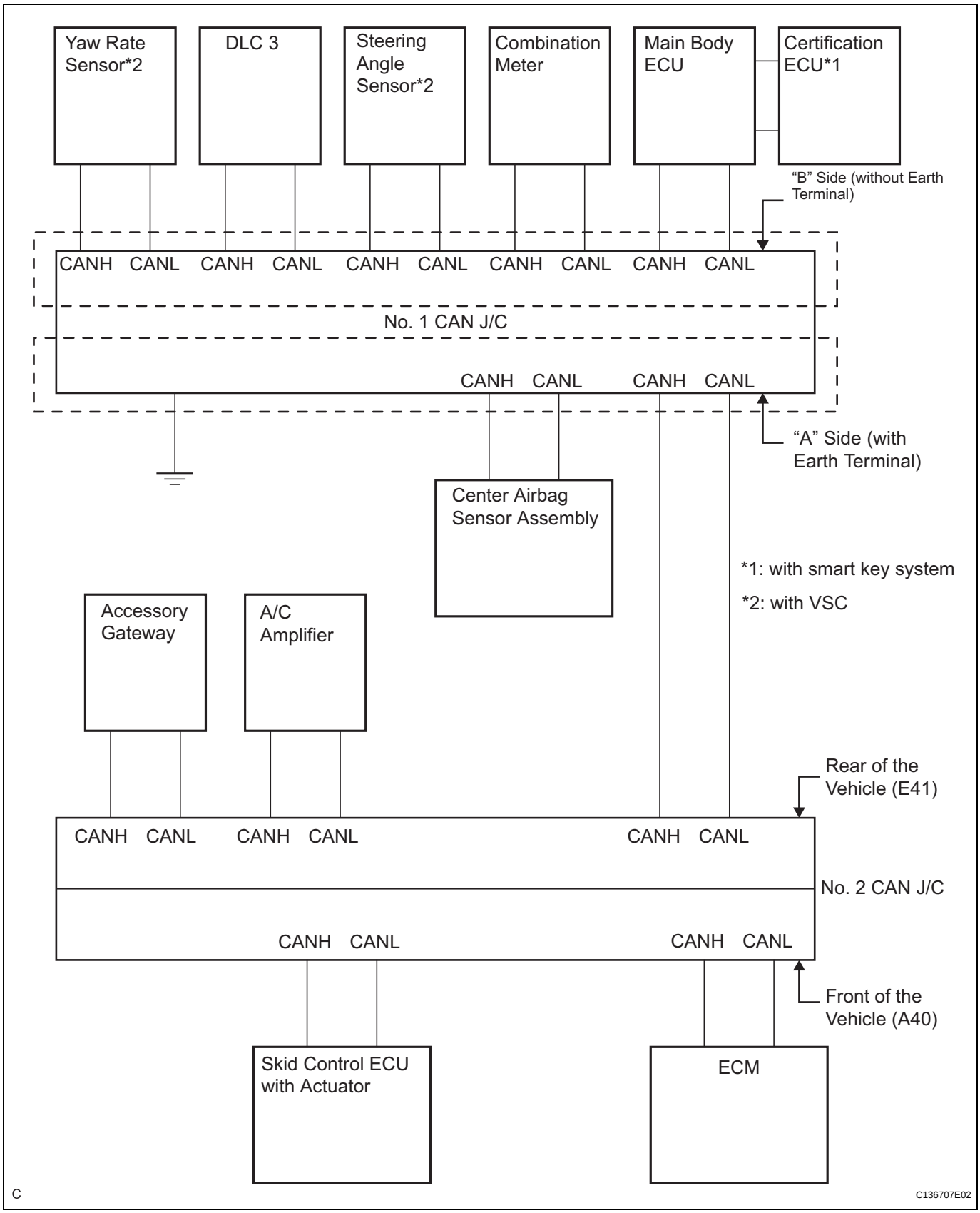
H

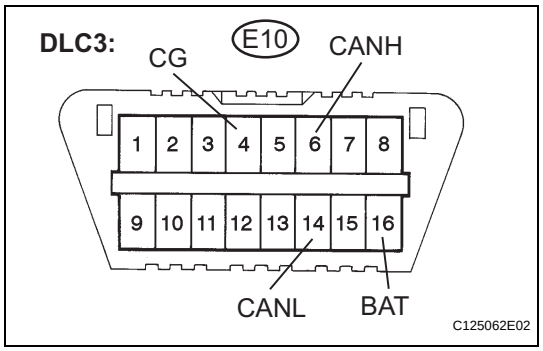
C137763E02

Terminals	Wiring Color	Connects to
E41-1 (CANH)	B	Accessory Gateway (CANH)

Terminals	Wiring Color	Connects to
E41-7 (CANL)	W	Accessory Gateway (CANL)
E41-2 (CANH)	B	A/C Amplifier (CANH)
E41-8 (CANL)	W	A/C Amplifier (CANL)
E41-4 (CANH)	B	No. 1 CAN J/C (CANH)
E41-10 (CANL)	W	No. 1 CAN J/C (CANL)

(d) The connection diagram of the components which are connected to the CAN J/C





2. DLC3

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

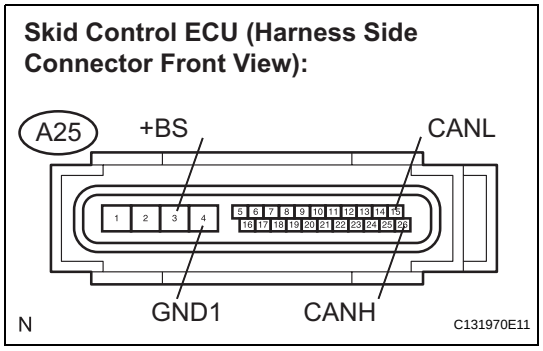
Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E10-6 (CANH) - E10-14 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
E10-6 (CANH) - E10-4 (CG)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E10-14 (CANL) - E10-4 (CG)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E10-6 (CANH) - E10-16 (BAT)	B - L	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	1 MΩ or higher
E10-14 (CANL) - E10-16 (BAT)	W - L	LOW-level CAN bus wire - Battery positive	Ignition Switch off	1 MΩ or higher

CA

3. SKID CONTROL ECU (w/o VSC)

(a) Disconnect the A25 connector from the skid control ECU.

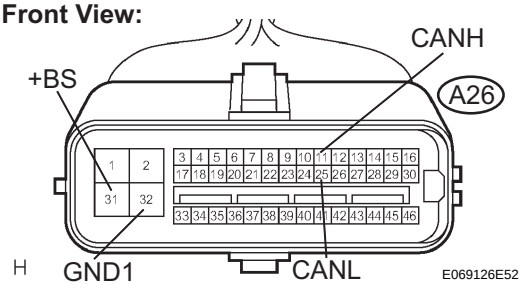
(b) Measure the resistance according to the value(s) in the table below.



Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
A25-26 (CANH) - A25-15 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
A25-26 (CANH) - A25-4 (GND1)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A25-15 (CANL) - A25-4 (GND1)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A25-26 (CANH) - A25-3 (+BS)	B - L	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
A25-15 (CANL) - A25-3 (+BS)	W - L	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

Skid Control ECU Connector Front View:



4. SKID CONTROL ECU WITH ACTUATOR (w/ VSC)

(a) TMC made

(1) Disconnect A26 connector from the skid control ECU.

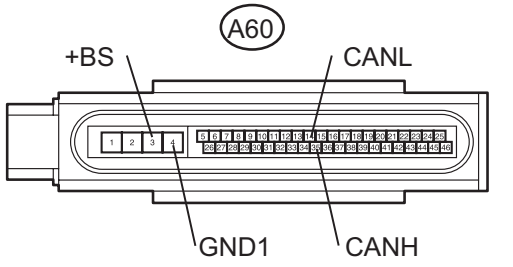
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
A26-11 (CANH) - A26-25 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
A26-11 (CANH) - A26-32 (GND1)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A26-25 (CANL) - A26-32 (GND1)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A26-11 (CANH) - A26-31 (+BS)	B - L	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
A26-25 (CANL)- A26-31 (+BS)	W - L	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

CA

Skid Control ECU (Harness Side Connector Front View):



(b) TMMK made

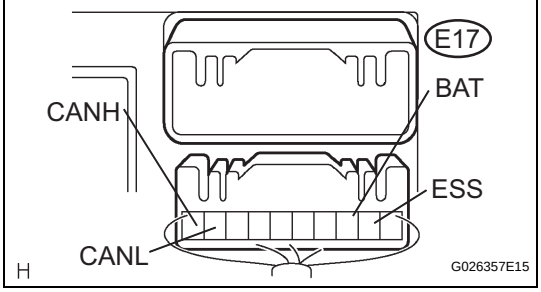
(1) Disconnect the A60 connector from the skid control ECU.

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
A60-35 (CANH) - A60-14 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
A60-35 (CANH) - A60-4 (GND1)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A60-14 (CANL) - A60-4 (GND1)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A60-35 (CANH) - A60-3 (+BS)	B - L	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
A60-14 (CANL)- A60-3 (+BS)	W - L	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

Steering Angle Sensor Wire Harness View:



5. STEERING ANGLE SENSOR (W/ VSC)

(a) Disconnect the E17 connector from the steering angle sensor.

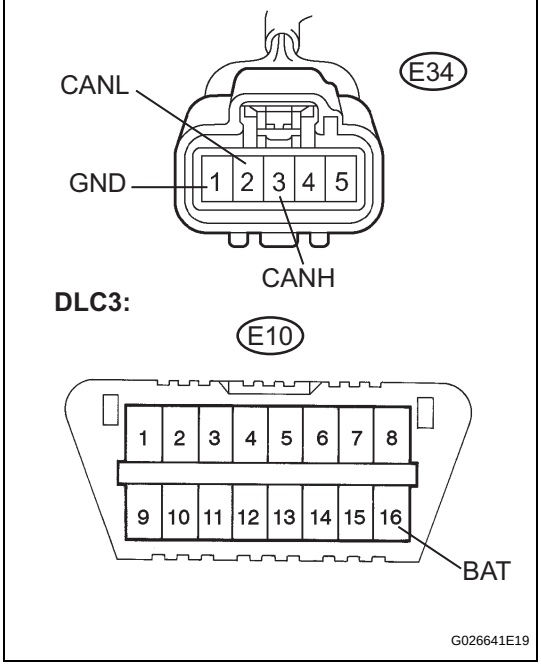
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E17-10 (CANH) - E17-9 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
E17-10 (CANH) - E17-2 (ESS)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E17-9 (CANL) - E17-2 (ESS)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E17-10 (CANH) - E17-3 (BAT)	B - W	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
E17-9 (CANL) - E17-3 (BAT)	W - W	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

CA

Yaw Rate Sensor Connector Front View:



6. YAW RATE SENSOR (W/ VSC)

(a) TMC made

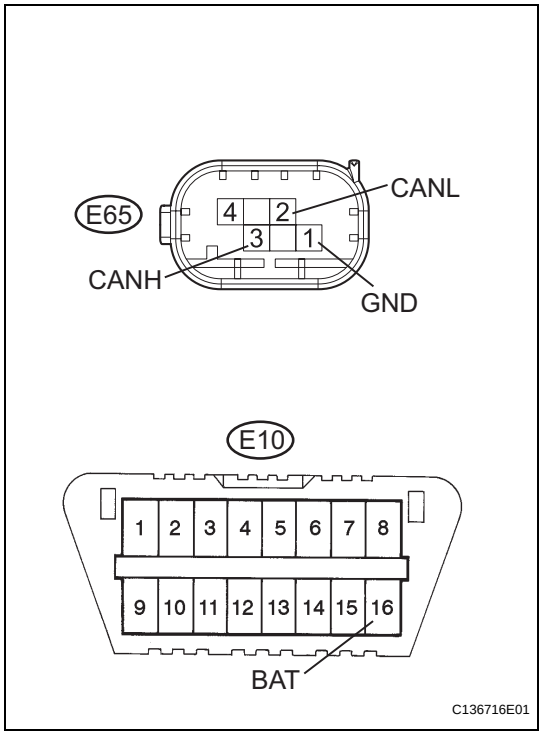
(1) Disconnect the E34 connector from the yaw rate sensor.

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E34-3 (CANH) - E34-2 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
E34-3 (CANH) - E34-1 (GND)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E34-2 (CANL) - E34-1 (GND)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E34-3 (CANH) - E10-16 (BAT)	B - O	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E34-2 (CANL) - E10-16 (BAT)	W - O	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher



(b) TMMK made
(1) Disconnect the E34 connector from the yaw rate sensor.
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

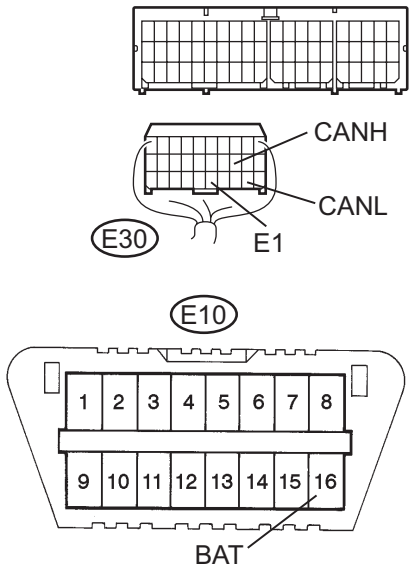
Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E65-3 (CANH) - E65-2 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
E65-3 (CANH) - E65-1 (GND)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E65-2 (CANL) - E65-1 (GND)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E65-3 (CANH) - E10-16 (BAT)	B - O	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
E65-2 (CANL) - E10-16 (BAT)	W - O	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

7. CENTER AIRBAG SENSOR ASSEMBLY

(a) Disconnect the E30 connector from the center airbag sensor assembly.

CA

Center Airbag Sensor Wire Harness View :



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

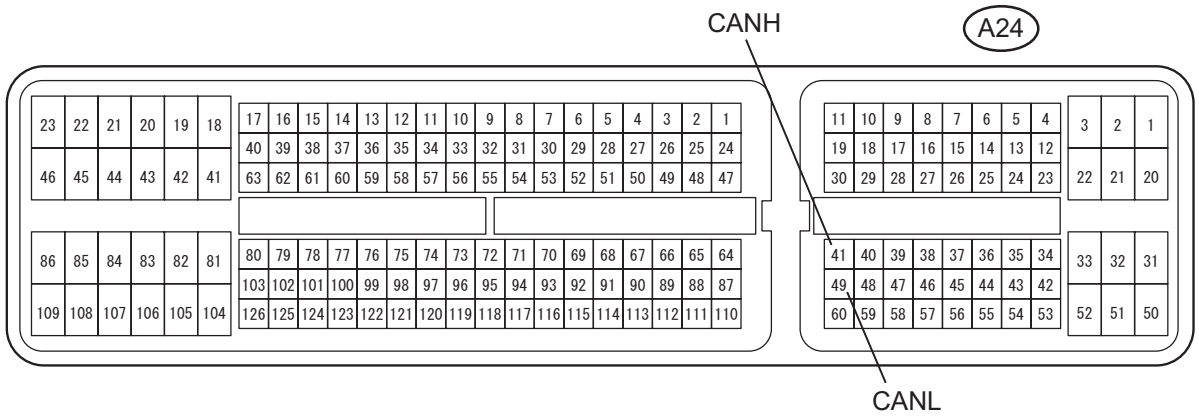
Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E30-13 (CANH) - E30-22 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
E30-13 (CANH) - E30-25 (E1)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E30-22 (CANL) - E30-25 (E1)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E30-13 (CANH) - E10-16 (BAT)	B - L	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
E30-22 (CANL) - E10-16 (BAT)	W - L	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

CA

8. ECM

(a) 2AZ-FE

ECM:

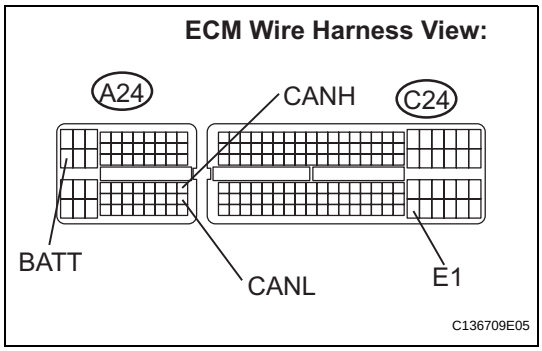


(1) Disconnect the A24 connector from the ECM.

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Condition	Specified Condition
A24-41 (CANH) - A29-49 (CANL)	Ignition Switch off	108 to 132 Ω



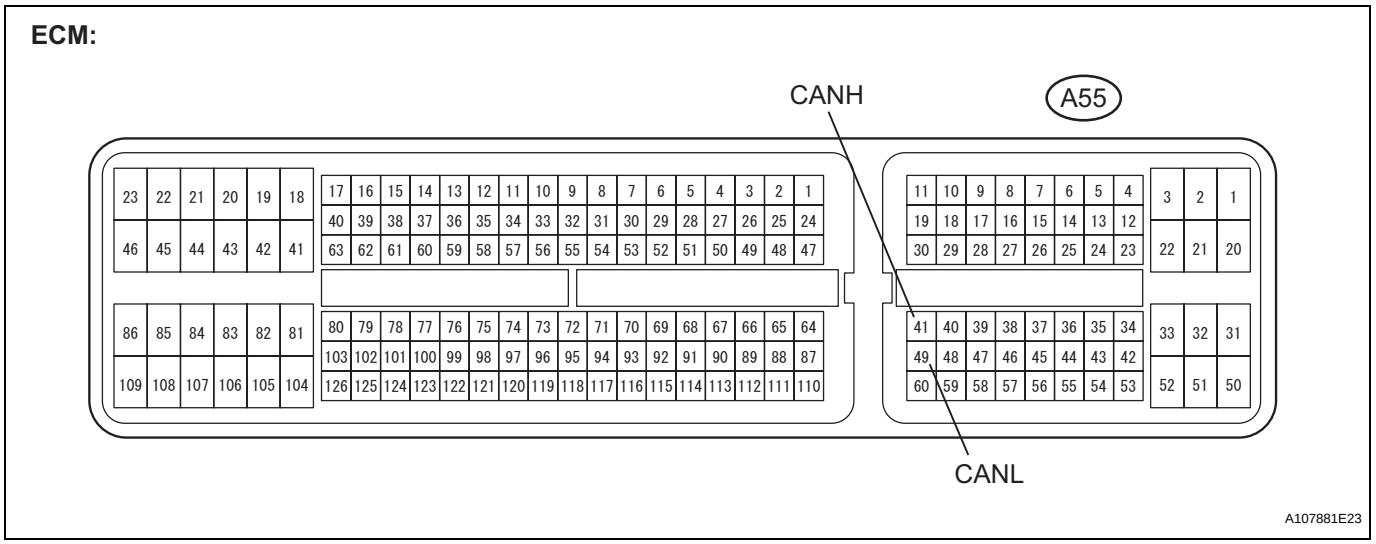
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
A24-41 (CANH) - A24-49 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	108 to 132 Ω
A24-41 (CANH) - C24-104 (E1)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A24-49 (CANL) - C24-104 (E1)	B - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A24-41 (CANH) - A24-20 (BATT)	B - Y	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
A24-49 (CANL) - A24-20 (BATT)	W - Y	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

CA

(b) 2GR-FE

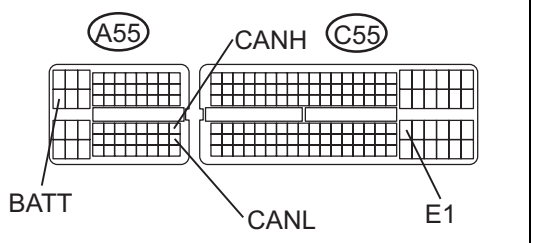


(1) Disconnect the A55 connector from the ECM.
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Condition	Specified Condition
A55-41 (CANH) - A55-49 (CANL)	Ignition Switch off	108 to 132 Ω

ECM Wire Harness View:



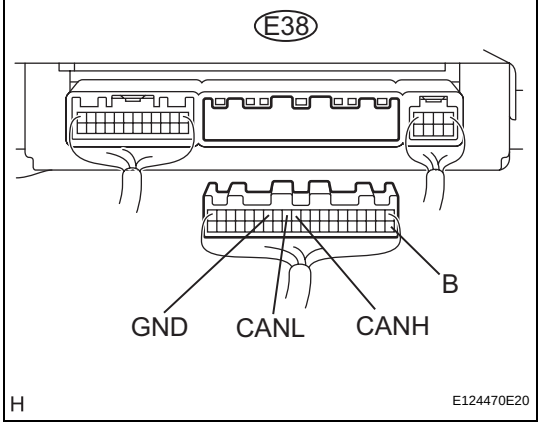
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
A55-41 (CANH) - A55-49 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	108 to 132 Ω
A55-41 (CANH) - C55-81 (EC)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A55-49 (CANL) - C55-81 (EC)	B - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
A55-41 (CANH) - A55-20 (BATT)	B - Y	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
A55-49 (CANL) - A55-20 (BATT)	W - Y	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

CA

Air Conditioning Amplifier (Wire Harness Side):



9. AIR CONDITIONING AMPLIFIER

(a) Check the harness side connector (E38) of the air conditioning amplifier.

(1) Disconnect the connector (E38) from the air conditioning amplifier.

(2) Measure the resistance according to the value(s) in the table below.

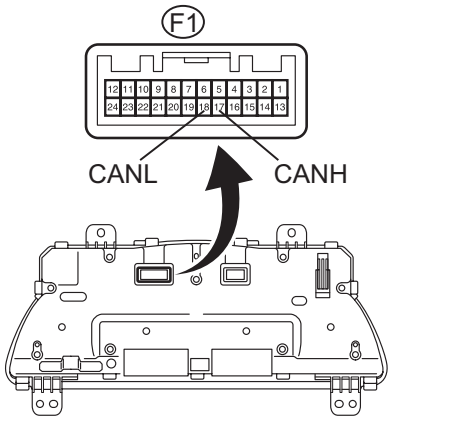
Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E38-11 (CANH) - E38-12 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
E38-11 (CANH) - E38-14 (GND)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E38-12 (CANL) - E38-14 (GND)	W - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E38-11 (CANH) - E38-21 (B)	B - GR	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
E38-12 (CANL) - E38-21 (B)	W - GR	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

10. COMBINATION METER ECU

(a) Disconnect the F1 connector from the combination meter.

Combination Meter (Component Side):



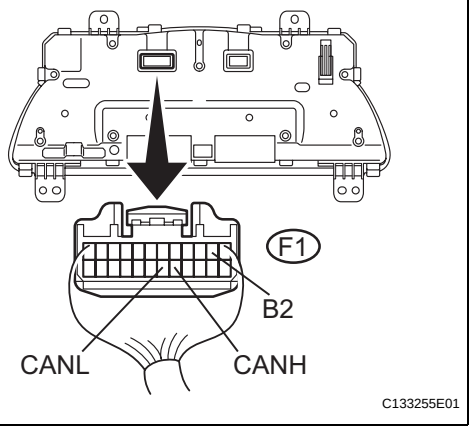
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Condition	Specified Condition
F1-17 (CANH) - F1-18 (CANL)	Ignition Switch off	108 to 132 Ω

CA

Combination Meter (Wire Harness Side):



(c) Measure the resistance according to the value(s) in the table below.

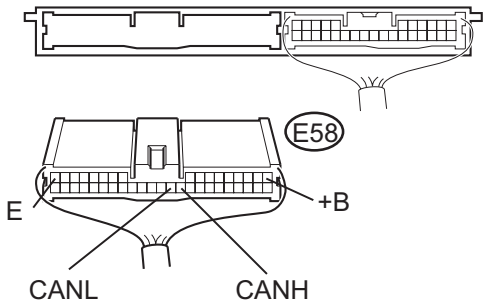
Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
F1-17 (CANH) - F1-18 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	108 to 132 Ω
F1-17 (CANH) - F1-12 (E2)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
F1-18 (CANL) - F1-12 (E2)	B - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
F1-17 (CANH) - F1-2 (B2)	B - R	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
F1-18 (CANL) - F1-2 (B2)	B - R	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

11. CERTIFICATION ECU (W/ SMART KEY SYSTEM)

(a) Disconnect the E58 connector from the certification ECU.

Certification ECU (Wire Harness Side):



(b) Measure the resistance according to the value(s) in the table below.

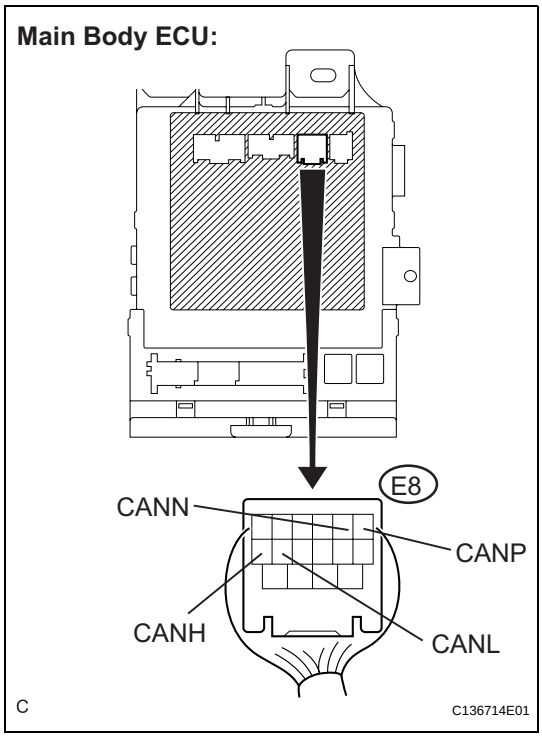
Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	108 to 132 Ω
E58-27 (CANH) - E58-17 (E)	B - W-B	HIGH-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E58-28 (CANL) - E58-17 (E)	B - W-B	LOW-level CAN bus wire - Ground	Ignition Switch off	200 Ω or higher
E58-27 (CANH) - E58-1 (+B)	B - W	HIGH-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher
E58-28 (CANL) - E58-1 (+B)	W - W	LOW-level CAN bus wire - Battery positive	Ignition Switch off	6 kΩ or higher

CA

12. MAIN BODY ECU (INSTRUMENT PANEL J/B)

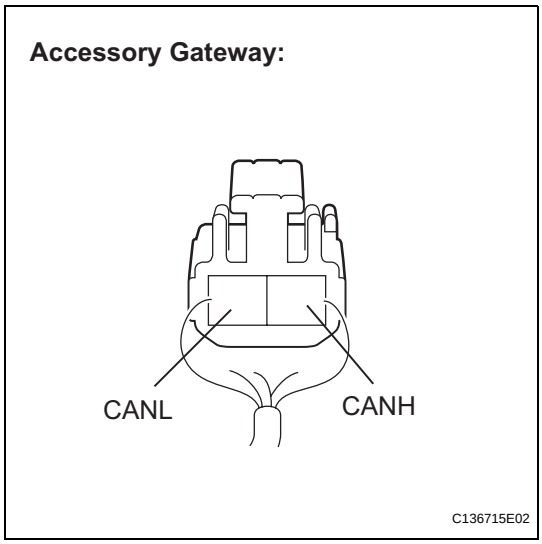
(a) Disconnect the E8 connector from the main body ECU.



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminals	Wiring Color	Terminal Description	Condition	Specified Condition
E8-5 (CANH) - E8-6 (CANL)	B - W	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω
E8-16 (CANP) - E8-15 (CANN)	W - L	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	108 to 132 Ω

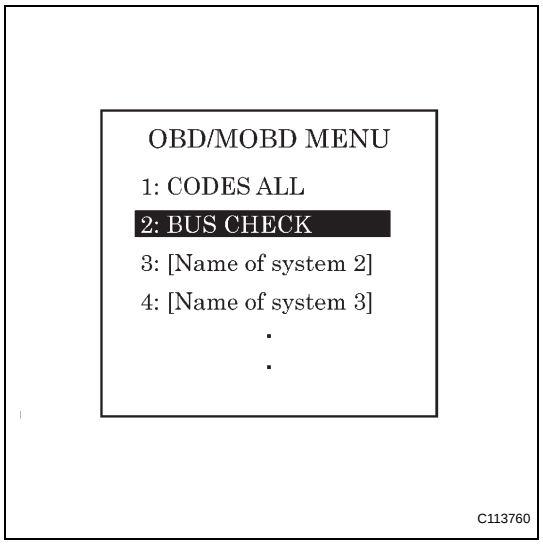


13. ACCESSORY GATEWAY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

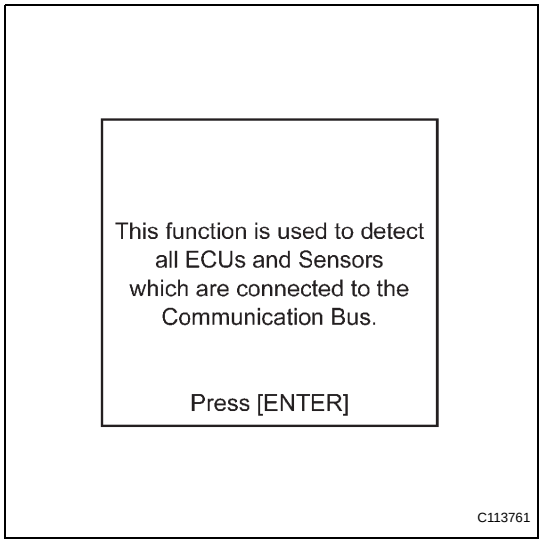
Terminals	Terminal Description	Condition	Specified Condition
E61-6 (CANH) - E61-14 (CANL)	HIGH-level CAN bus wire - LOW-level CAN bus wire	Ignition Switch off	54 to 69 Ω



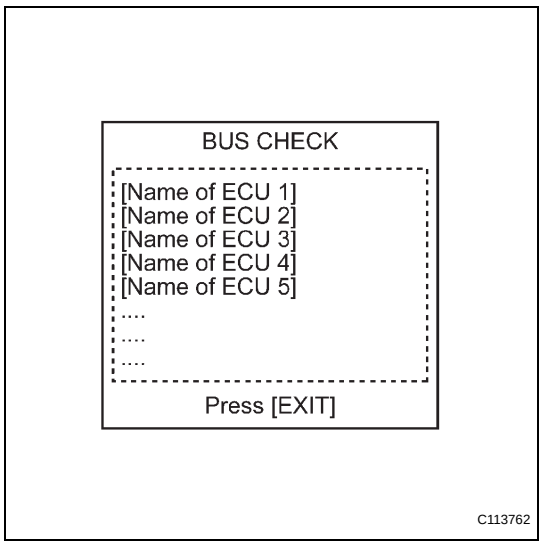
DIAGNOSIS SYSTEM

1. BUS CHECK

(a) Select "BUS CHECK" from the "OBD/MOBD MENU" screen.
HINT:
The ECUs and sensors that are properly connected to the CAN communication system can be displayed using the intelligent tester via the CAN VIM.



(b) Press "ENTER" on the intelligent tester.



(c) The screen displays the ECUs and sensors that are properly connected to the CAN communication system.
HINT:
Properly connected ECUs or sensors that are not displayed on the screen indicate that a communication stop is occuring in the system, sensor, or ECU which is not displayed.

2. CHECK FOR INSTALLED SYSTEMS (ECUS AND SENSORS) THAT USE CAN COMMUNICATION

(a) Systems (ECUs, sensors) that use CAN communication vary depending on the vehicle's optional equipment. Check which systems (ECUs, sensors) are installed on the vehicle.

ECU/Sensor name	Check method
ABS/VSC/TRC	Installed on all vehicles
STEERING SENSOR	With VSC system
YAW / DECELERAT	With VSC system
ENGINE	Installed on all vehicles

ECU/Sensor name	Check method
ECT	With automatic transaxle
SRS AIRBAG	Installed on all vehicles
A/C	Installed on all vehicles
METER	Installed on all vehicles
MAIN BODY	Installed on all vehicles
ACCESSORY G/W	With dealer option
SMART ACCESS/KEY	With smart key system

3. DTC TABLE BY ECU

HINT:

- For the CAN communication system, CAN communication system DTCs stored in certain ECUs can be displayed using the intelligent tester.
- If CAN communication system DTCs are output, trouble cannot be determined only by the DTCs. Perform troubleshooting according to "HOW TO PROCEED WITH TROUBLESHOOTING" (See page CA-8).

(a) ECM (2AZ-FE)

DTC No.	Detection Item
U0101*	High speed CAN Communication Bus

HINT:

- DTC communication is via the CAN communication system.
- *: The ECM is malfunctioning if only U0101 is output. Replace the ECM.

(b) ECM (2GR-FE)

DTC No.	Detection Item
U0101*	High speed CAN Communication Bus

HINT:

- DTC communication is via the CAN communication system.
- *: The ECM is malfunctioning if only U0101 is output. Refer to SFI system (See page ES-389).

(c) ECT (2AZ-FE)

DTC No.	Detection Item
U0100*	High speed CAN Communication Bus

HINT:

- DTC communication is via the CAN communication system.
- *: The ECM is malfunctioning if only U0100 is output. Replace the ECM.

(d) ECT (2GR-FE)

DTC No.	Detection Item
U0100*	High speed CAN Communication Bus

HINT:

- DTC communication is via the CAN communication system.

- *: The ECM is malfunctioning if only U0100 is output. Refer to Automatic Transaxle system (See page AX-151).

(e) SKID CONTROL ECU (with VSC)

DTC No.	Detection Item
U0073	Control Module Communication Bus Off
U0100	Lost Communication With ECM/PCM "A"
U0123	Lost Communication With Yaw Rate Sensor Module
U0124*	Lost Communication With Lateral Acceleration Sensor Module
U0126	Lost Communication With Steering Angle Sensor Module

HINT:

- DTC communication is via the CAN communication system.
- *: TMC made only

(f) SKID CONTROL ECU (without VSC)

DTC No.	Detection Item
U0073	Control Module Communication Bus Off

HINT:
DTC communication is via the CAN communication system.

(g) COMBINATION METER ECU

DTC No.	Detection Item
U0100	Lost Communication With ECM/PCM "A"
U0129	Lost Communication with Brake System Control Mode

HINT:
DTC communication is via the CAN communication system.

(h) AIR CONDITIONER AMPLIFIER

DTC No.	Detection Item
B1499	Multiplex Communication Circuit

HINT:
DTC communication is via the CAN communication system.

(i) MAIN BODY ECU (with smart key system)

DTC No.	Detection Item
B1207*	Certification ECU Communication Malfunction
B2326*	CAN MS Bus Line Communication Malfunction

HINT:

- DTC communication is via the CAN communication system.
- *: The main body ECU is malfunctioning if B1207 and/or B2326 are output alone. Refer to DTC chart (See page AX-46).

(j) MAIN BODY ECU (without smart key system)

HINT:
Although the center airbag sensor is connected to the CAN communication system, CAN communication DTCs are not output.

(k) CENTER AIRBAG SENSOR
HINT:
Although the center airbag sensor is connected to the CAN communication system, CAN communication DTCs are not output.

(l) CERTIFICATION ECU
HINT:
Although the Main Body ECU is connected to the CAN communication system, CAN communication DTCs are not output.

4. DTC COMBINATION TABLE

(a) with VSC SYSTEM

DTC		Trouble Mode			
Output from	**Output DTC**	**ECM Communication Stop Mode**	**Skid Control ECU Communication Stop Mode**	**Steering Angle Sensor Communication Stop Mode**	**Yaw Rate Sensor Communication Stop Mode**
Skid Control ECU	U0073	X	X	X	X
	U0100	▲ During driving	▲ During driving	X	X
	U0123	X	○	X	○
	U0124*	X	○	X	○
	U0126	X	○	○	X
Combination Meter ECU	U0100	○	X	X	X
	U0129	X	○	X	X
Air Conditioner Amplifier ECU	B1499	X	X	X	X
No DTC		X	X	X	X

*: TMC made only.
HINT:
- ○: Set
- X: Not set or may be set according to the malfunctioning part when one side of the CAN bus wire opens
- ▲: Set under the condition shown in the table above

DTC		Trouble Mode			
Output from	**Output DTC**	**Air Conditioner Amplifier ECU Communication Stop Mode**	**Center Airbag Sensor Communication Stop Mode**	**Main Body ECU Communication Stop Mode**	**Combination Meter ECU Communication Stop Mode**
Skid Control ECU	U0073	X	X	X	X
	U0100	X	X	X	X
	U0123	X	X	X	X
	U0124*	X	X	X	X
	U0126	X	X	X	X
Combination Meter ECU	U0100	X	X	X	X
	U0129	X	X	X	X
Air Conditioner Amplifier ECU	B1499	X	X	▲	▲
No DTC		○	○	X	X

*: TMC made only.
HINT:
- ○: Set

- X: Not set or may be set according to the malfunctioning part when one side of the CAN bus wire opens
- ▲: Set under the condition shown in the table above

(b) without VSC SYSTEM

DTC		Trouble Mode					
Output from	**Output DTC**	**ECM Communication Stop Mode**	**Skid Control ECU Communication Stop Mode**	**Combination Meter ECU Communication Stop Mode**	**Air Conditioner Amplifier ECU Communication Stop Mode**	**Center Airbag Sensor Communication Stop Mode**	**Main Body ECU Communication Stop Mode**
Skid Control ECU	U0073	X	X	X	X	X	X
Combination Meter ECU	U0100	○	X	X	X	X	X
	U0129	X	○	X	X	X	X
Air Conditioner Amplifier ECU	B1499	X	X	▲	X	X	▲
No DTC		X	X	X	○	○	X

HINT:

- ○: Set
- X: Not set or may be set according to the malfunctioning part when one side of the CAN bus wire becomes open.

(c) Perform troubleshooting depending on the combination of DTCs output.

HINT:

- ECM Communication Stop Mode (See Page CA-54)
- Skid Control ECU Communication Stop Mode (See page CA-42)
- Steering Angle Sensor Communication Stop Mode (See page CA-49)
- Yaw Rate Sensor Communication Stop Mode (See page CA-51)
- Combination Meter ECU Communication Stop Mode (See page CA-61)
- Center Airbag Sensor Communication Stop Mode (See page CA-63)
- Air Conditioner Amplifier ECU Communication Stop Mode (See page CA-46)
- Main Body ECU Communication Stop Mode (See page CA-57)

CA

FAIL-SAFE CHART

1. FAIL-SAFE FUNCTION

(a) When communication fails in any of the CAN bus wire (communication lines) due to a short circuit or other causes, a fail-safe functions, will operate. The fail-safe function that is specified for each system operates to prevent those systems from malfunctioning.

(b) The following chart shows the relationships between components and system functions and effects of communication failure on these functions. (For further details, see the pages for each system.)

Function	ECM	Skid Control ECU (Without VSC)	Skid Control ECU (With VSC)	Steering Sensor	Yaw Rate Sensor	Condition when communication impossible	DTC detection (Driver detectable)
VSC control (Controls driving force while VSC in operation)	○	-	●	○	○	Control inoperative (gradually stops controlling during VSC control)	Detectable (Light comes on)
TRC control (Controls driving force and engine power when wheel slip detected during acceleration)	○	-	●	-	-	Control inoperative (gradually stops controlling during TRC control)	Detectable (Light comes on)
ABS control (Controls driving force while ABS in operation)	○	●	●	-	○ *1	Control is inoperative (gradually stops controlling during ABS control)	Detectable (Light comes on)
Security function	-	-	-	-	-	Theft deterrent system cannot be set	Detectable (Indicator light does not comes on)
Air conditioning control	○	-	-	-	-	Air conditioning function stops	None (Air conditioning inoperative)
Meter Display (Displays operation condition and DTCs)	○	○	○ *2	-	-	Light does not come on, illuminates abnormally, or blinks abnormally	Detectable (Abnormal display)
Buzzer control	○	○	○ *2	-	-	Buzzer function stops	Detectable (Buzzer does not sound)
Illumination control	○	-	-	-	-	Light illumination rheostat inoperative	None (Rheostat inoperative)
Smart entry / Power door lock control *3	-	-	-	-	-	Unlock permitted	None (Wireless door lock operation)

HINT:

- ●: Control master
- ○: System related
- *1: TMC made

- *2: TMMK made
- *3: with smart key system

Function	Center Airbag Sensor Assembly	Air Conditioning Amplifier	Combination Meter ECU	Main Body ECU	Certification ECU*3	Condition when communication on impossible	DTC detection (Driver detectable)
VSC control (Controls driving force while VSC in operation)	-	-	-	-	-	Control inoperative (gradually stops controlling during VSC control)	Detectable (Light comes on)
TRC control (Controls driving force and engine power when wheel slip detected during acceleration)	-	-	-	-	-	Control inoperative (gradually stops controlling during TRC control)	Detectable (Light comes on)
ABS control (Controls driving force while ABS in operation)	-	-	-	-	-	Control is inoperative (gradually stops controlling during ABS control)	Detectable (Light comes on)
Security function	-	-	-	○	●	Theft deterrent system cannot beset	Detectable (Indicator light does not comes on)
Air conditioning control	-	●	○	○	-	Air conditioning function stops	None (Air conditioning inoperative)
Meter Display (Displays operation condition and DTCs)	○	-	●	○	○	Light does not come on, illuminates abnormally, or blinks abnormally	Detectable (Abnormal display)
Buzzer control	○	-	●	-	-	Buzzer function stops	Detectable (Buzzer does not sound)
Illumination control	-	-	○	●	-	Light illumination rheostat inoperative	None (Rheostat inoperative)
Smart entry / Power door lock control*3	-	-	○	○	●	Unlock permitted	None (Wireless door lock operation)

HINT:
- ●: Control master
- ○: System related
- *3: with smart key system

CA

DIAGNOSTIC TROUBLE CODE CHART

CAN COMMUNICATION SYSTEM

DTC No.	Detection Item	Trouble Area	See page
B1207	Certification ECU Communication Malfunction	1. CAN MS bus wire or connector 2.Certification ECU power source circuit 3. Certification ECU 4. Main Body ECU	CA-32
B2326	CAN MS Bus Line Communication Malfunction	1. CAN MS bus wire or connector 2.Certification ECU power source circuit 3. Certification ECU 4. Main Body ECU	CA-32

DTC	B1207	Certification ECU Communication Malfunction

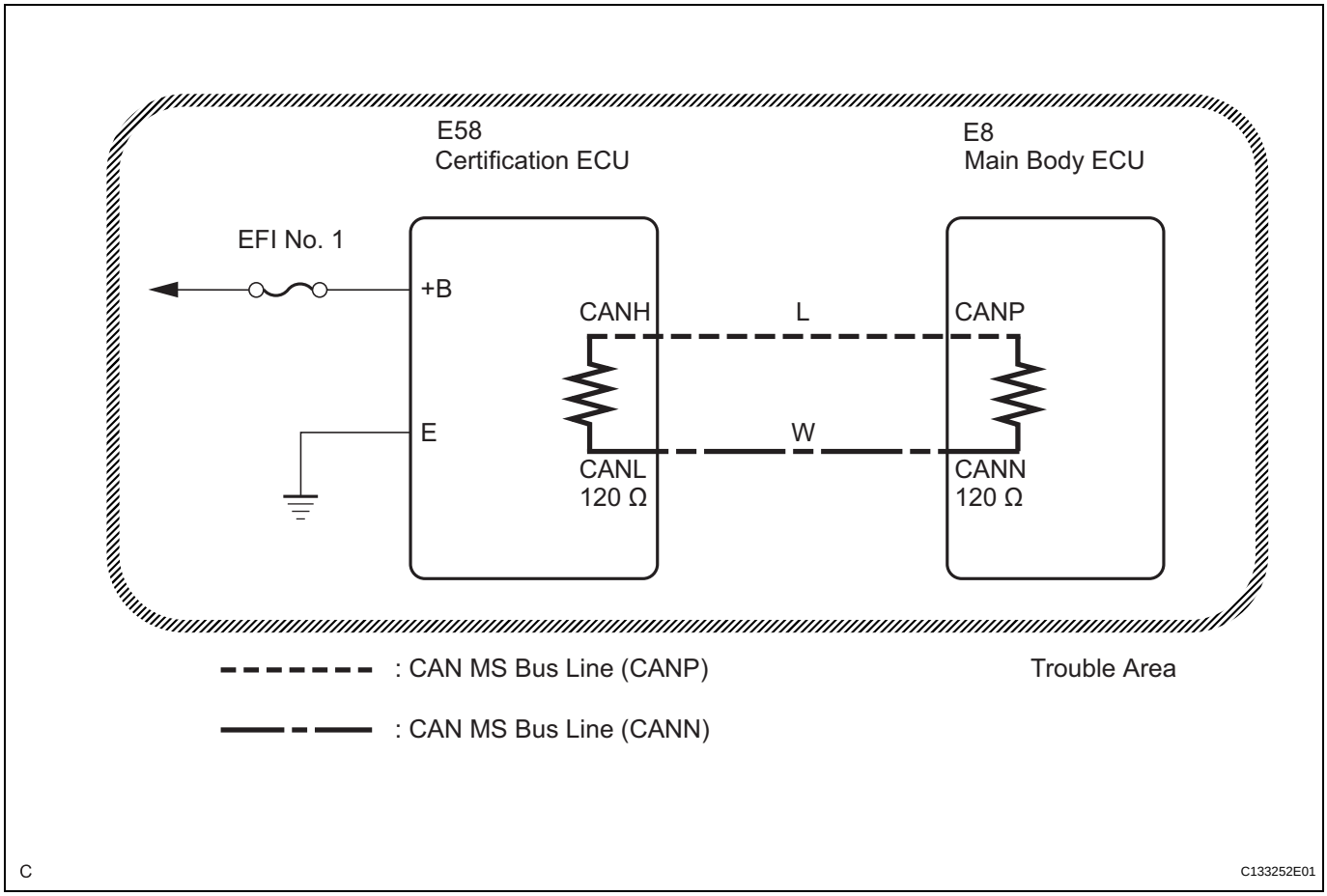
DTC	B2326	CAN MS Bus Line Communication Malfunction

DESCRIPTION

The Main Body ECU and Certification ECU perform 2-way communication with each other via the Controller Area Network (CAN). If the Certification ECU cannot communicate with the Main Body ECU, the Main Body ECU will conclude that there is a malfunction in the CAN system, and set a DTC.

DTC No.	DTC Detection Condition	Trouble Area
B1207 B2326	No communication from certification ECU continues	• CAN MS bus wire or connector • Certification ECU power source circuit • Certification ECU • Main body ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

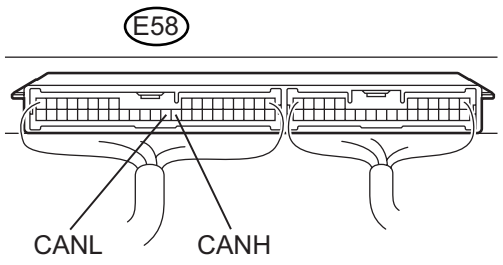
NOTICE:

- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1 CHECK CAN MS BUS WIRE

Certification ECU Connector:



H B139430E05

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition	Proceed to
E58-27 (CANH) - E58-28 (CANL)	Ignition switch off	54 to 69 Ω	A
E58-27 (CANH) - E58-28 (CANL)	Ignition switch off	69 Ω or more	B
E58-27 (CANH) - E58-28 (CANL)	Ignition switch off	54 Ω or less	C

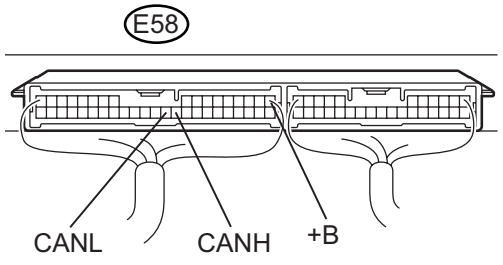
B → **Go to step 9**

C → **Go to step 11**

A

2 CHECK SHORT TO +B IN CAN MS BUS WIRE

Certification ECU Connector:



H B139430E06

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

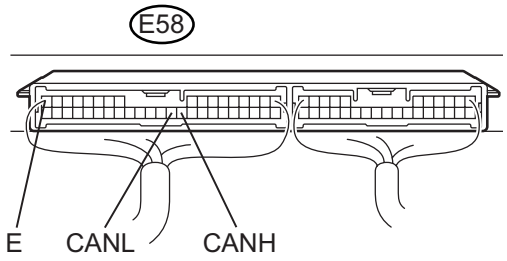
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-1 (+B)	Ignition switch off	6 kΩ or higher
E58-2 (CANL) - E58-1 (+B)	Ignition switch off	6 kΩ or higher

NG → **Go to step 5**

OK

3 CHECK SHORT TO GND IN CAN MS BUS WIRE

Certification ECU Connector:



H B139430E07

(a) Turn the ignition switch off.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

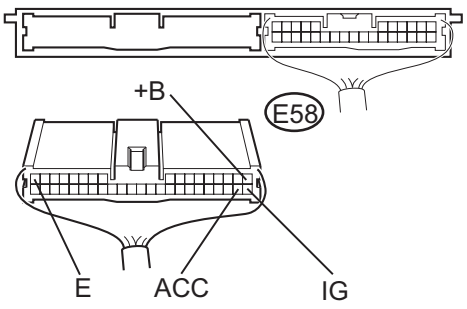
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-17 (E)	Ignition switch off	200 Ω or higher
E58-28 (CANL) - E58-17 (E)	Ignition switch off	200 Ω or higher

NG → **Go to step 7**

OK

4 CHECK CERTIFICATION ECU (POWER SOURCE CIRCUIT)

Certification ECU Connector



C C136713E06

(a) Turn the ignition switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E58-17 (E) - Body ground	Always	Below 1 Ω

(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E58-1 (B) - Body ground	Always	10 to 14 V
E58-18 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V
E58-19 (ACC) - Body ground	Ignition switch on (ACC)	10 to 14 V

OK → **REPLACE CERTIFICATION ECU**

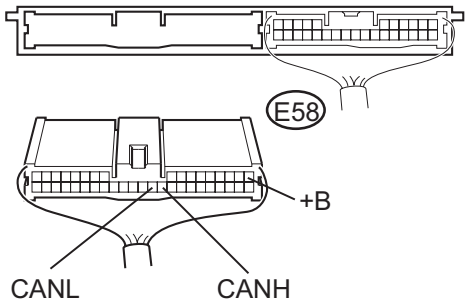
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (FUSES - ECU, ECU - BODY GROUND)

CA

5	CHECK SHORT TO +B IN CAN MS BUS WIRE (CERTIFICATION ECU)

Certification ECU Connector (Wire Harness Side):



C C136713E02

(a) Turn the ignition switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

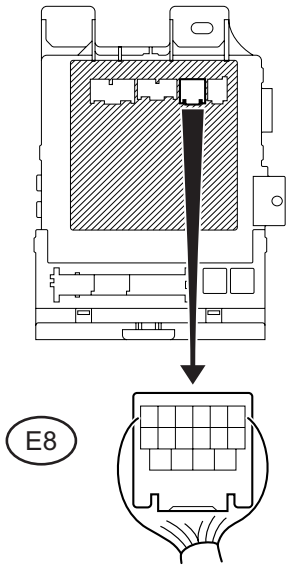
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-1 (+B)	Ignition switch off	6 kΩ or higher
E58-28 (CANL) - E58-1 (+B)	Ignition switch off	6 kΩ or higher

OK → REPLACE CERTIFICATION ECU

NG

6	CHECK SHORT TO +B IN CAN MS BUS WIRE (CERTIFICATION ECU - MAIN BODY ECU)

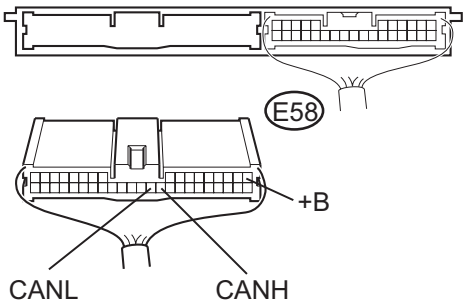
Main Body ECU:



C C140857E01

(a) Turn the ignition switch off.
(b) Disconnect the E8 main body ECU connector.

Certification ECU Connector (Wire Harness Side):



C C136713E02

(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-1 (+B)	Ignition switch off	6 kΩ or higher
E58-28 (CANL) - E58-1 (+B)	Ignition switch off	6 kΩ or higher

OK → **REPLACE MAIN BODY ECU**

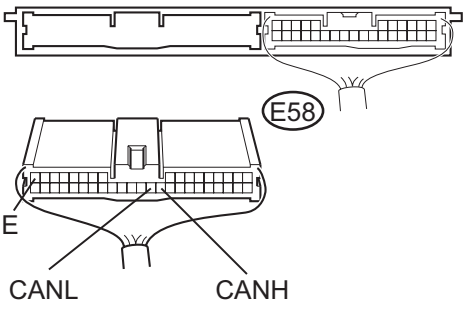
NG

REPAIR OR REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

CA

7 **CHECK SHORT TO GND IN CAN MS BUS WIRE (CERTIFICATION ECU)**

Certification ECU Connector (Wire Harness Side):



C C136713E03

(a) Turn the ignition switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

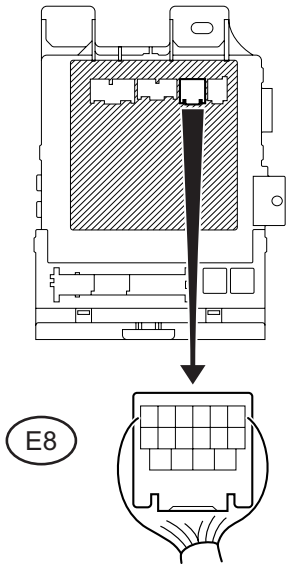
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-17 (E)	Ignition switch off	6 kΩ or higher
E58-28 (CANL) - E58-17 (E)	Ignition switch off	6 kΩ or higher

OK → **REPLACE CERTIFICATION ECU**

NG

8	CHECK SHORT TO GND IN CAN MS BUS WIRE

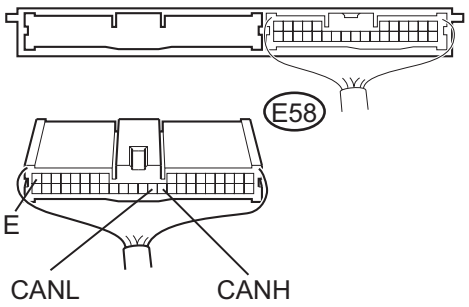
Main Body ECU:



C C140857E01

(a) Turn the ignition switch off.
(b) Disconnect the E8 main body ECU connector.

Certification ECU Connector (Wire Harness Side):



C C136713E03

(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-17 (E)	Ignition switch off	6 kΩ or higher
E58-28 (CANL) - E58-17 (E)	Ignition switch off	6 kΩ or higher

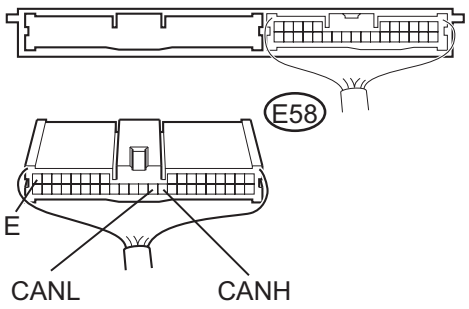
OK → **REPLACE MAIN BODY ECU**

NG

REPAIR OR REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

9	CHECK CAN MS BUS MAIN WIRE OR CONNECTOR (CERTIFICATION ECU)

Certification ECU Connector (Wire Harness Side):



C C136713E03

(a) Turn the ignition switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	Ignition switch off	108 to 132 Ω or higher

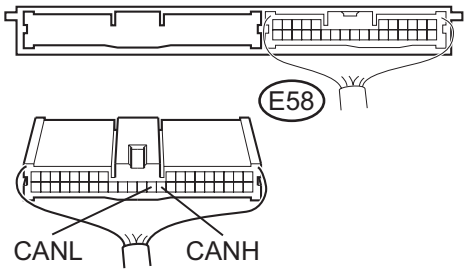
OK → **REPLACE CERTIFICATION ECU**

NG

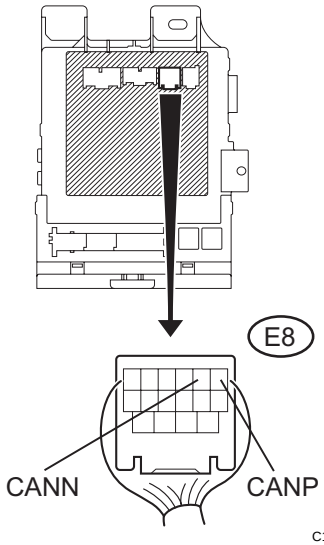
CA

10	**CHECK CAN MS BUS MAIN WIRE OR CONNECTOR (CERTIFICATION ECU - MAIN BODY ECU)**

Certification ECU Connector (Wire Harness Side):



Main Body ECU Connector (Wire Harness Side):



C

C133244E01

(a) Turn the ignition switch off.
(b) Disconnect the E8 main body ECU connector.
(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E8-16 (CANP)	Always	Below 1 Ω
E58-28 (CANL) - E8-15 (CANN)	Always	Below 1 Ω

OK → **REPLACE MAIN BODY ECU**

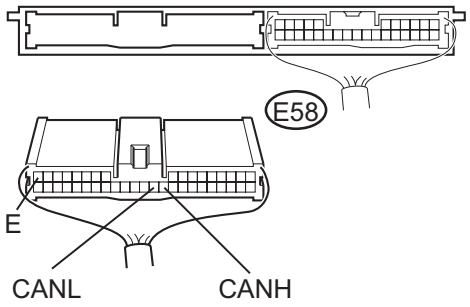
NG

REPAIR OR REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

CA

11 CHECK SHORT IN CAN MS BUS WIRES (CERTIFICATION ECU)

Certification ECU Connector (Wire Harness Side):



C C136713E03

(a) Turn the ignition switch off.
(b) Disconnect the E58 certification ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

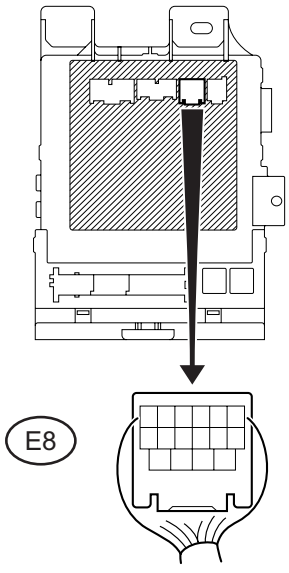
Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	Ignition switch off	108 to 132 Ω or higher

OK → **REPLACE CERTIFICATION ECU**

NG

12 CHECK SHORT IN CAN MS BUS WIRES

Main Body ECU:

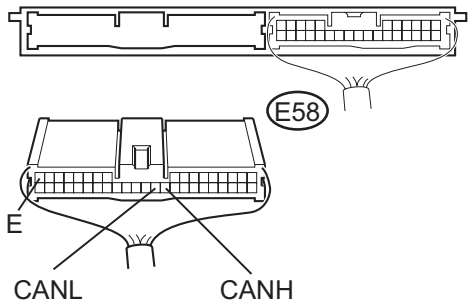


C C140857E01

(a) Turn the ignition switch off.
(b) Disconnect the E8 main body ECU connector.

CA

Certification ECU Connector (Wire Harness Side):



(c) Measure the resistance according to the value(s) in the table below.
HINT:
The resistance must be measured after the E58 certification ECU connector is disconnected.
Standard resistance

Tester Connection	Condition	Specified Condition
E58-27 (CANH) - E58-28 (CANL)	Ignition switch off	1 MΩ or higher

OK → **REPLACE MAIN BODY ECU**

NG

REPAIR OR REPLACE CAN MS BUS MAIN WIRE OR CONNECTOR

CA

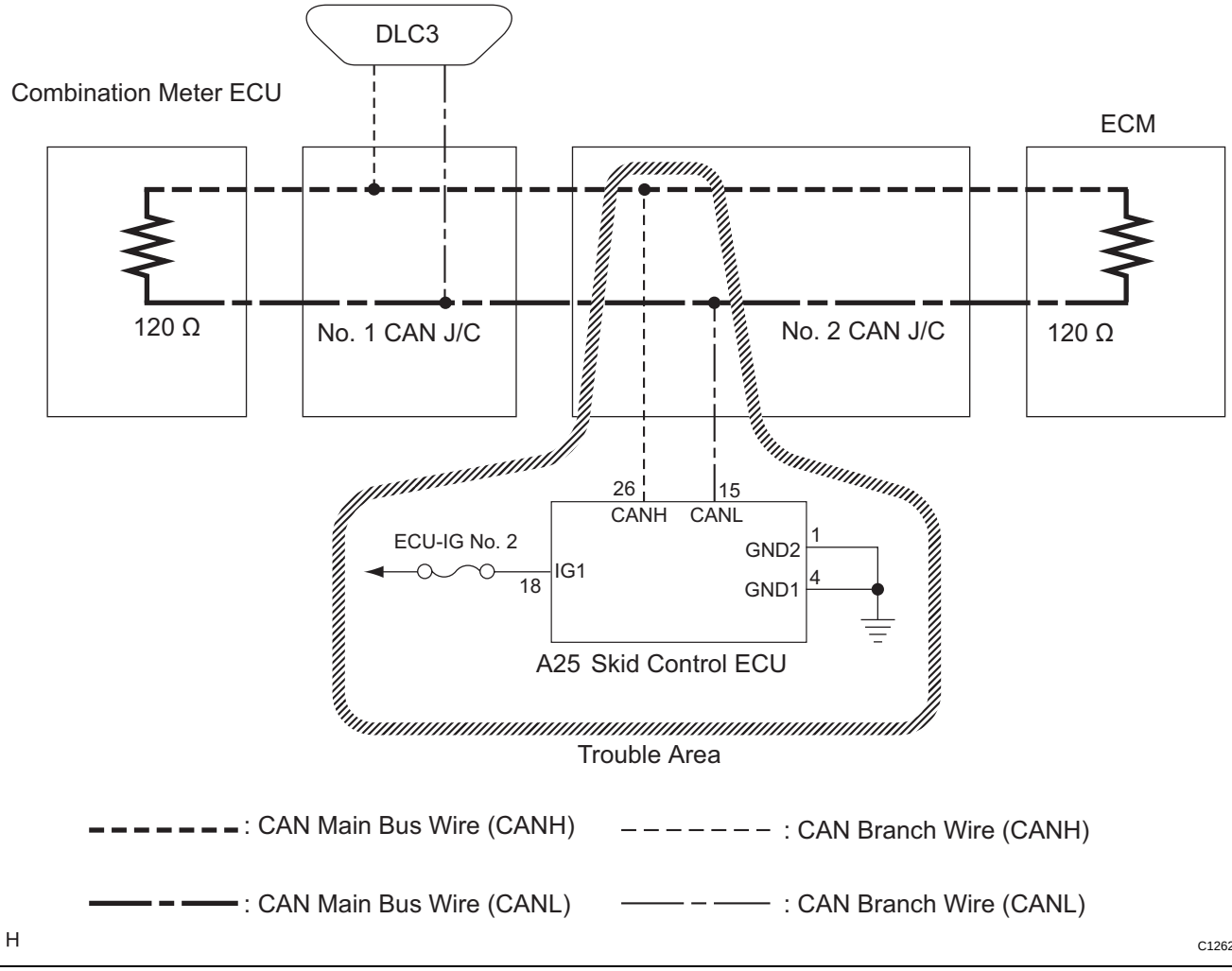
Skid Control ECU Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Skid Control ECU Communication Stop Mode	• "ABS/VSC/TRC" is not displayed on the "Communication Bus Check" screen of the intelligent tester • Applies to "Skid Control ECU Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of skid control ECU • Skid control ECU branch wire or connector • Brake actuator assembly (Skid control ECU)

WIRING DIAGRAM

without VSC:

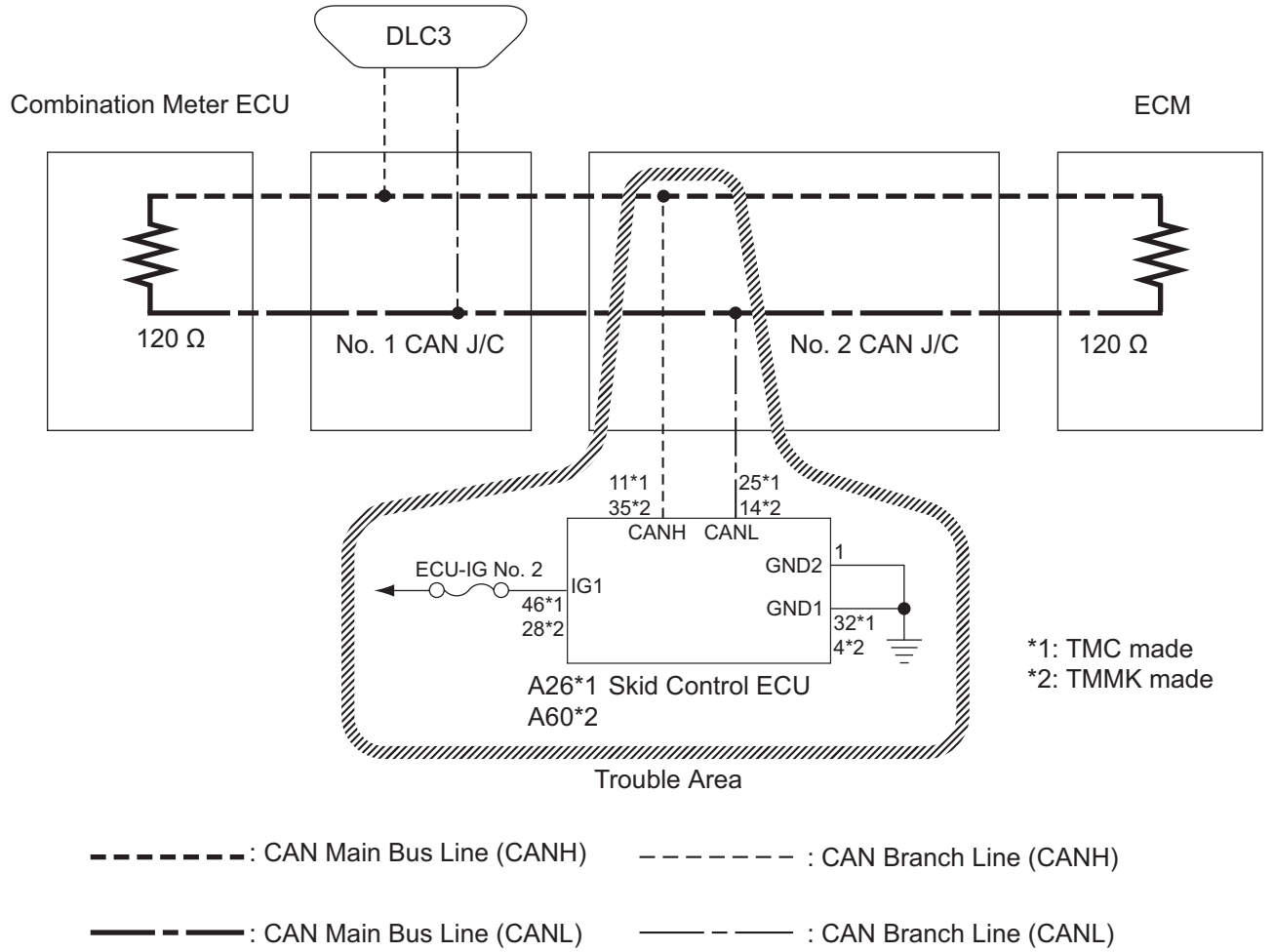


H

C126207E07

CA

with VSC:



INSPECTION PROCEDURE

NOTICE:

- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:

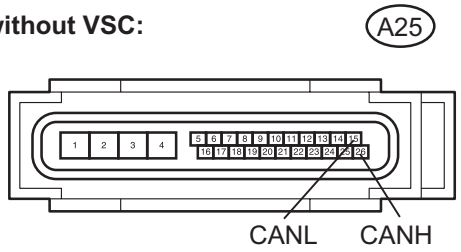
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1	**CHECK OPEN IN CAN BUS WIRE (SKID CONTROL ECU BRANCH WIRE)**

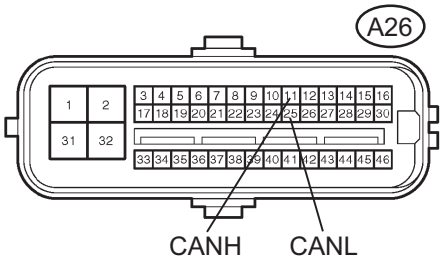
(a) Turn the ignition switch off.
(b) Disconnect the skid control ECU connector.

Skid Control ECU Connector (Front View):

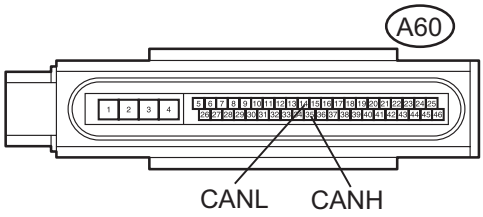
without VSC:



with VSC (TMC Made):



with VSC (TMMK Made):



C133241E01

OK

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

without VSC

Tester Connection	Condition	Specified Value
A25-26 (CANH) - A25-15 (CANL)	Ignition switch off	54 to 69 Ω

with VSC (TMC made)

Tester Connection	Condition	Specified Value
A26-11 (CANH) - A26-25 (CANL)	Ignition switch off	54 to 69 Ω

with VSC (TMMK made)

Tester Connection	Condition	Specified Value
A60-35 (CANH) - A60-14 (CANL)	Ignition switch off	54 to 69 Ω

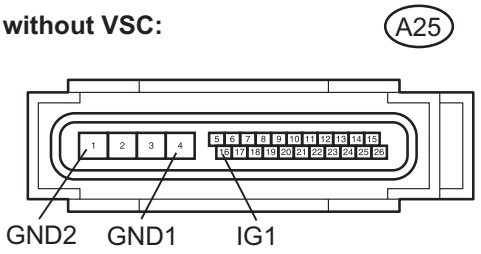
NG → **REPAIR OR REPLACE SKID CONTROL ECU BRANCH WIRE OR CONNECTOR (CAN-H, CAN-L)**

CA

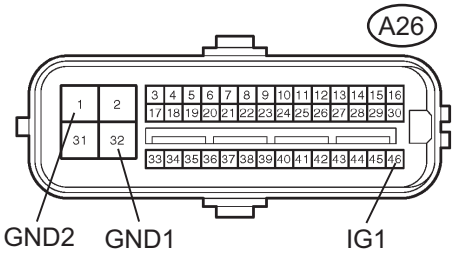
2	CHECK WIRE HARNESS (IG1, GND1, GND2)

Skid Control ECU Connector (Front View):

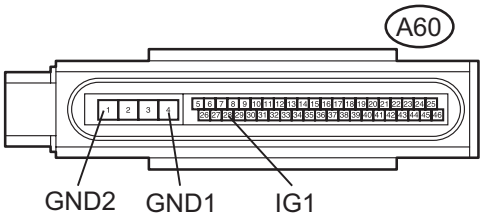
without VSC:



with VSC (TMC Made):



with VSC (TMMK Made):



C133241E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

without VSC

Tester Connection	Condition	Specified Value
A25-4 (GND1) - Body ground	Always	Below 1 Ω
A25-1 (GND2) - Body ground	Always	Below 1 Ω

with VSC (TMC made)

Tester Connection	Condition	Specified Value
A26-32 (GND1) - Body ground	Always	Below 1 Ω
A26-1 (GND2) - Body ground	Always	Below 1 Ω

with VSC (TMMK made)

Tester Connection	Condition	Specified Value
A60-4 (GND1) - Body ground	Always	Below 1 Ω
A60-1 (GND2) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage:

without VSC

Tester Connection	Condition	Specified Value
A25-18 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

with VSC (TMC made)

Tester Connection	Condition	Specified Value
A26-46 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

with VSC (TMMK made)

Tester Connection	Condition	Specified Value
A60-28 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

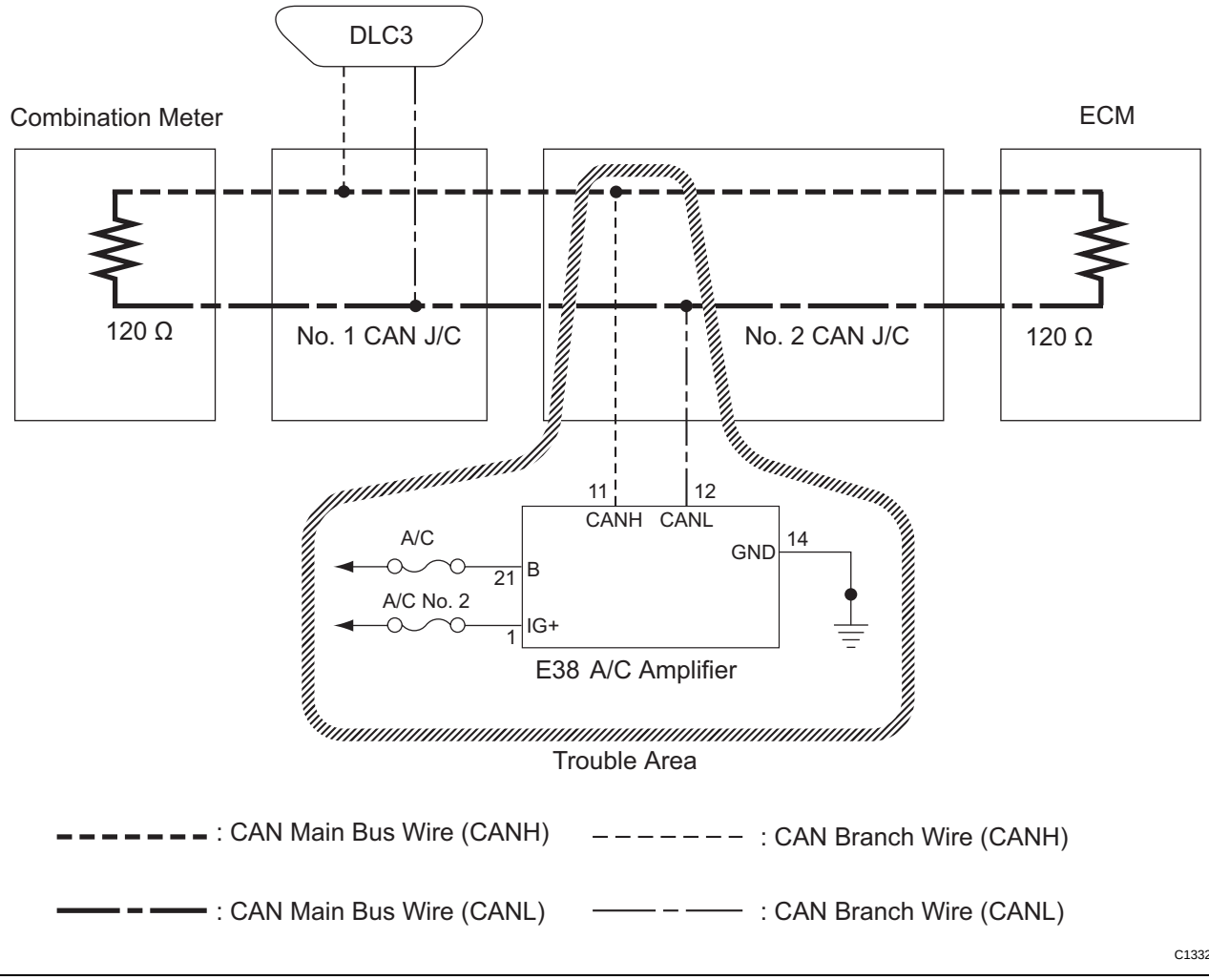
REPLACE BRAKE ACTUATOR ASSEMBLY

Air Conditioning Amplifier Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Air Conditioning Amplifier Communication Stop Mode	• "Air Conditioner" not displayed on "Communication Bus Check" screen of intelligent tester • Applies to "Air Conditioning Amplifier Communication Stop Mode" in "DTC combination table"	• Power source circuit of the air conditioning amplifier • Air conditioning amplifier branch wire or connector • Air conditioning amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

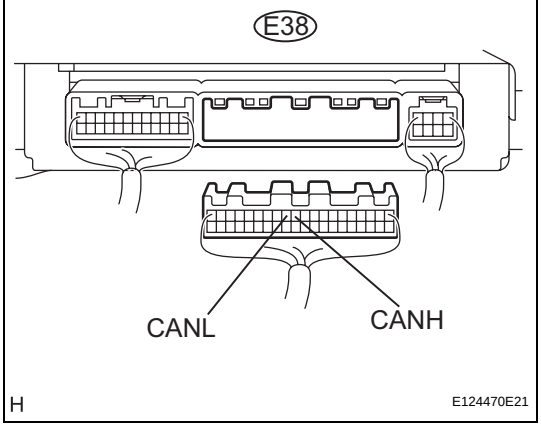
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**

- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1	CHECK CAN BUS LINE FOR DISCONNECTION (AIR CONDITIONING AMPLIFIER BRANCH WIRE)

Air Conditioning Amplifier (Wire Harness Side):



(a) Turn the ignition switch off.
(b) Disconnect the air conditioning amplifier connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

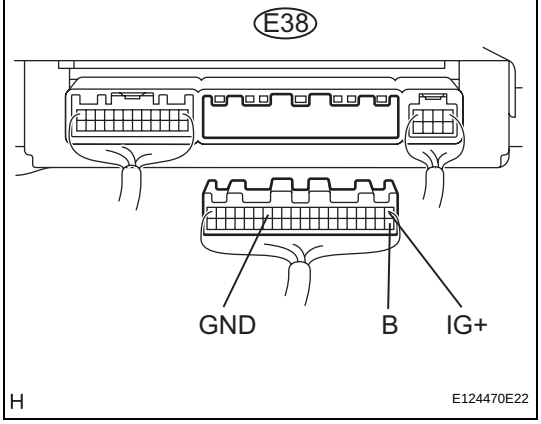
Tester Connection	Condition	Specified Condition
E38-11 (CANH) - E38-12 (CANL)	Ignition Switch off	54 to 69 Ω

NG → **REPAIR OR REPLACE CAN BRANCH WIRE CONNECTED TO AIR CONDITIONING AMPLIFIER (CAN-H, CAN-L)**

OK

2	CHECK HARNESS AND CONNECTOR (IG+, B, GND)

Air Conditioning Amplifier (Wire Harness Side):



(a) Disconnect the air conditioning amplifier connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E38-14 (GND) - Body Ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E38-1 (IG+) - Body Ground	Ignition Switch on (IG)	10 to 14 V
E38-21 (B)- Body Ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

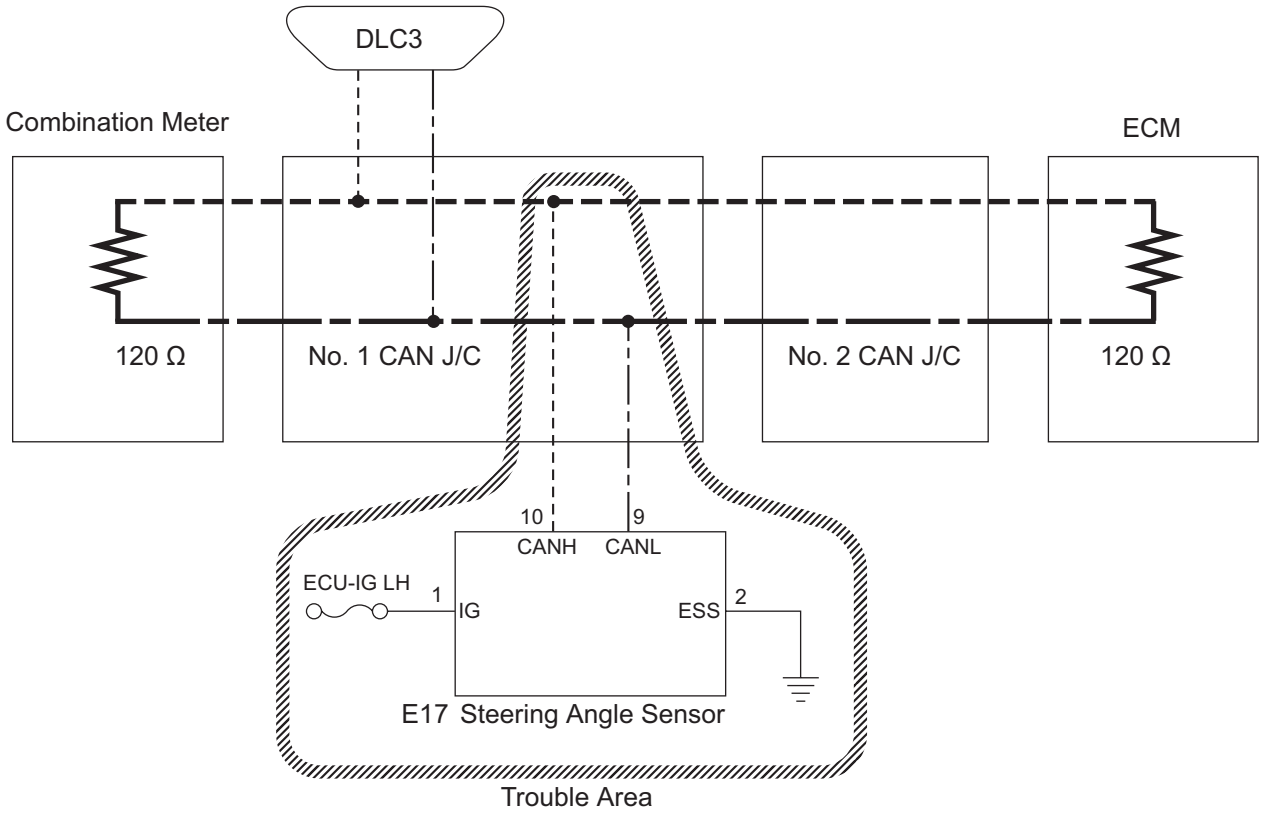
REPLACE AIR CONDITIONING AMPLIFIER

Steering Angle Sensor Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Steering Angle Sensor Communication Stop Mode	• "Steering Angle Sensor" is not displayed on the "Communication Bus Check" screen of the intelligent tester • Applies to "Steering Angle Sensor Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the steering angle sensor • Steering angle sensor branch wire or connector • Steering angle sensor

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

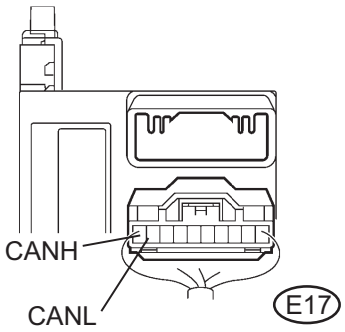
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**

- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1 CHECK OPEN IN CAN BUS WIRE (STEERING ANGLE SENSOR BRANCH LINE)

Steering Angle Sensor Connector (Wire Harness View):



G030155E40

(a) Turn the ignition switch off.
(b) Disconnect the steering angle sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

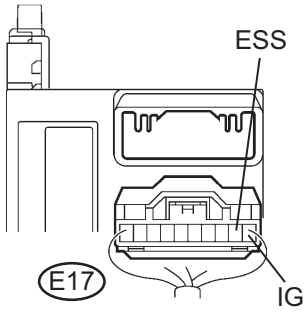
Tester Connection	Condition	Specified Value
E17-10 (CANH) - E17-9 (CANL)	Ignition switch off	54 to 69 Ω

NG → **REPAIR OR REPLACE STEERING ANGLE SENSOR BRANCH WIRE OR CONNECTOR (CANH, CANL)**

OK

2 CHECK WIRE HARNESS (IG, ESS)

Steering Angle Sensor Connector (Wire Harness View):



G030155E41

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E17-2 (ESS) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Value
E17-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE STEERING ANGLE SENSOR

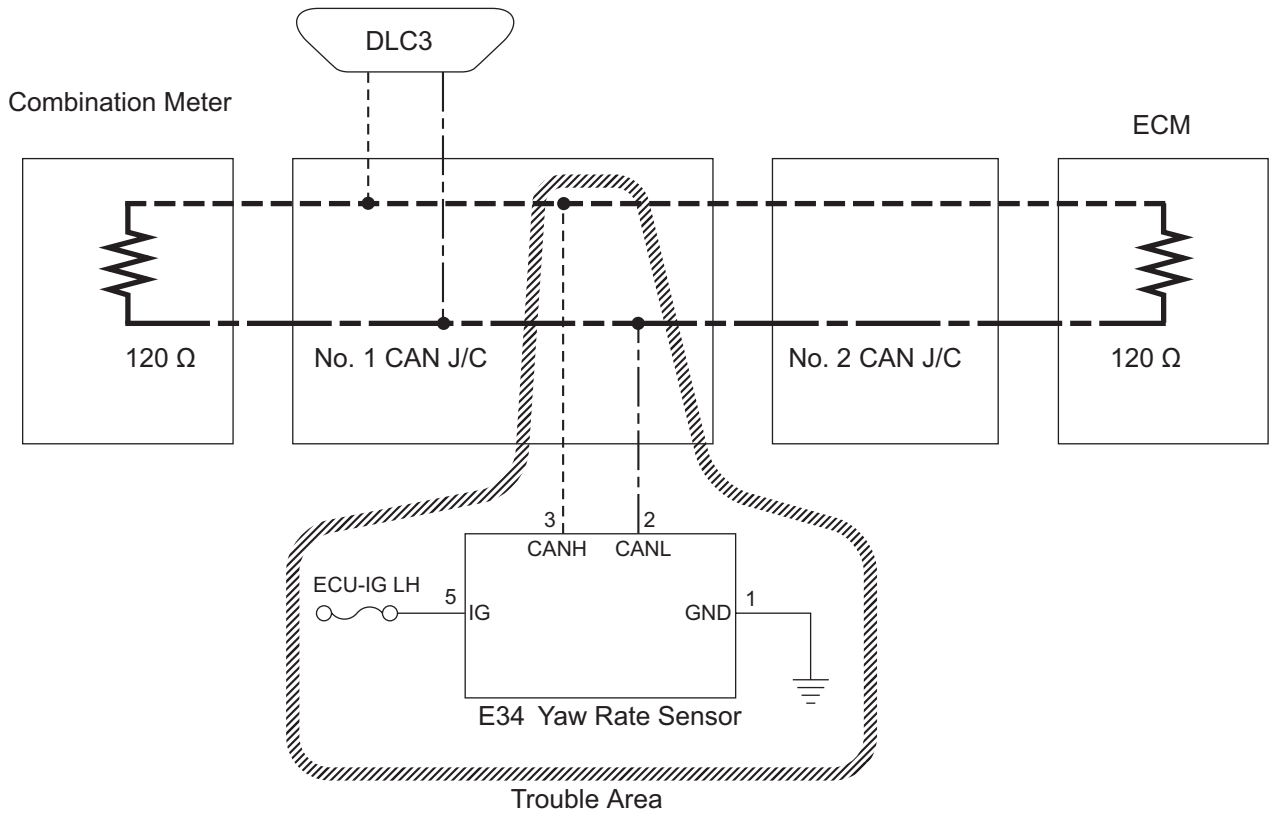
CA

Yaw Rate Sensor Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Yaw Rate Sensor Communication Stop Mode	• "Yaw Rate/Decelerate Sensor" is not displayed on the "Communication Bus Check" screen of the intelligent tester • Applies to "Yaw Rate Sensor Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the yaw rate sensor • Yaw rate sensor branch wire or connector • Yaw rate sensor

WIRING DIAGRAM



H

C126215E04

INSPECTION PROCEDURE

NOTICE:

- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**

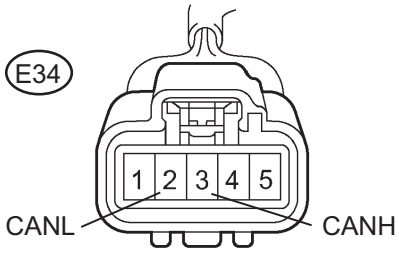
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

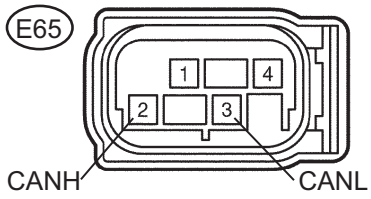
1	CHECK OPEN IN CAN BUS WIRE (YAW RATE SENSOR BRANCH LINE)

Yaw Rate Sensor Connector (Front View):

TMC Made:



TMMK Made:



C133237E01

(a) Turn the ignition switch off.
(b) Disconnect the yaw rate sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

TMC made

Tester Connection	Condition	Specified Value
E34-3 (CANH) - E34-2 (CANL)	Ignition switch off	54 to 69 Ω

TMMK made

Tester Connection	Condition	Specified Value
E65-3 (CANL) - E65-2 (CANH)	Ignition switch off	54 to 69 Ω

NG → **REPAIR OR REPLACE YAW RATE SENSOR BRANCH WIRE OR CONNECTOR (CANH, CANL)**

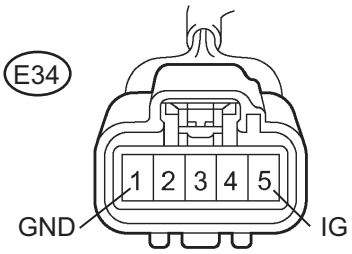
OK

CA

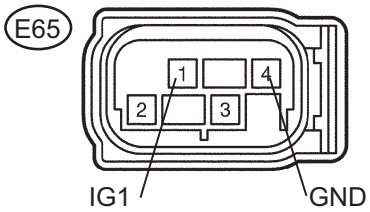
2	CHECK WIRE HARNESS (IG, GND)

Yaw Rate Sensor Connector (Front View):

TMC Made:



TMMK Made:



C133237E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

TMC made

Tester Connection	Condition	Specified Value
E34-1 (GND) - Body ground	Always	Below 1 Ω

TMMK made

Tester Connection	Condition	Specified Value
E65-4 (GND) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage:

TMC made

Tester Connection	Condition	Specified Value
E34-5 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

TMMK made

Tester Connection	Condition	Specified Value
E65-1 (IG1) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE YAW RATE AND ACCELERATION SENSOR

CA

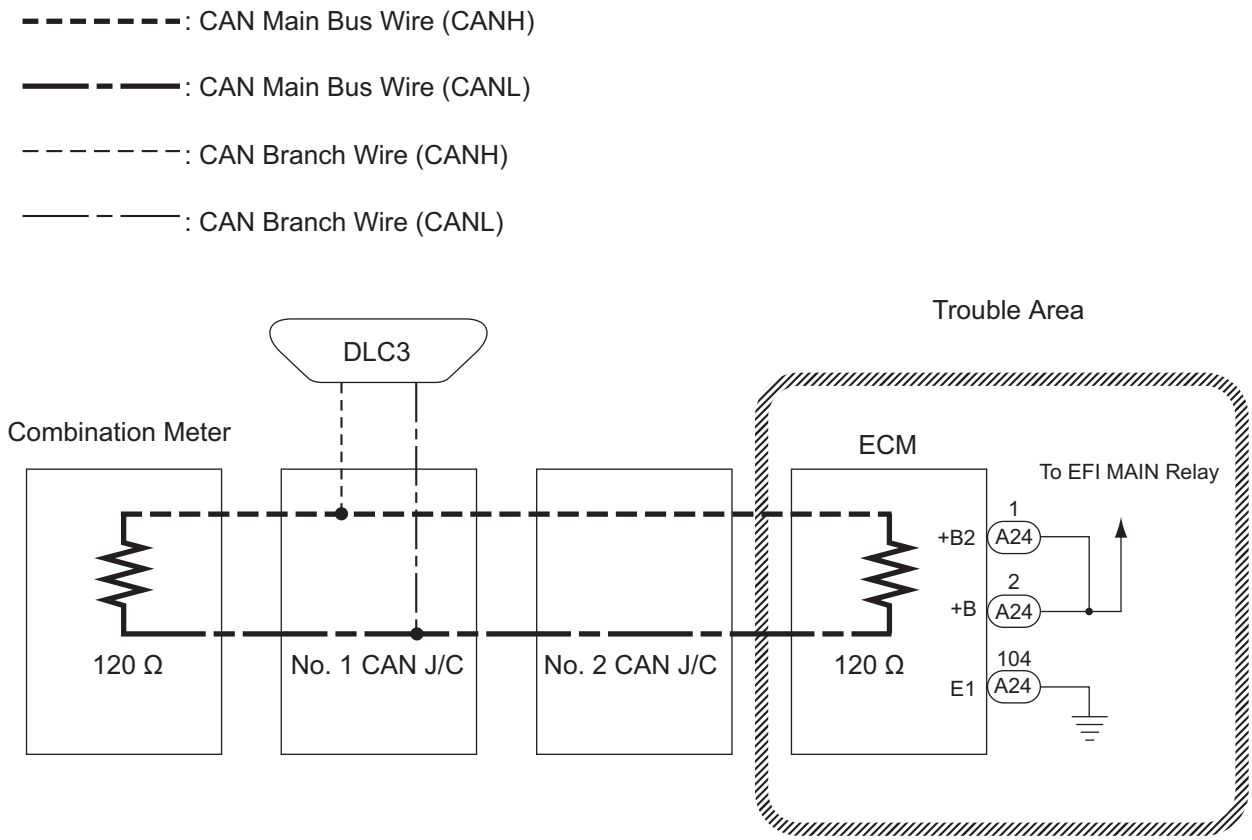
ECM Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
ECM Communication Stop Mode	• "Engine" and "ECT" are not displayed on the "Communication Bus Check" screen of the intelligent tester • Applies to "ECM Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the ECM • ECM main bus wire or connector • ECM

WIRING DIAGRAM

2AZ-FE:

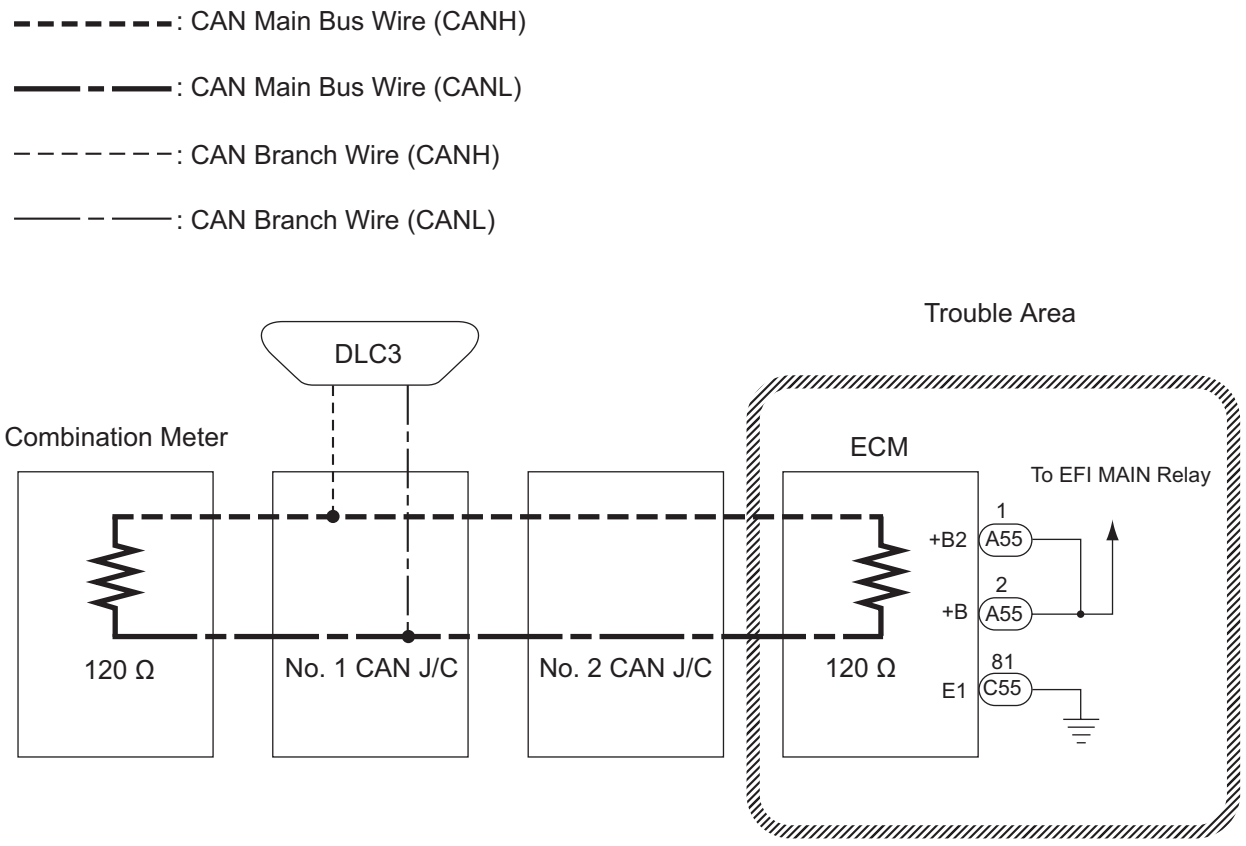


H

C126217E08

CA

2GR-FE:



INSPECTION PROCEDURE

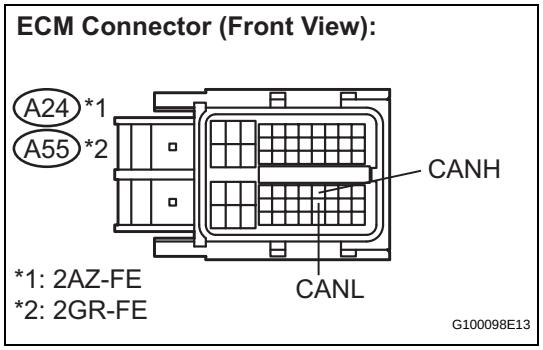
NOTICE:

- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:

Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1	CHECK CAN BUS LINE FOR DISCONNECTION (ECU MAIN BUS LINE)



(a) Reconnect the CAN main bus line connector (A40) to the No. 2 CAN J/C (front side of the vehicle).
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

2AZ-FE

Tester Connection	Condition	Specified Value
A24-38 (CANH) - A24-46 (CANL)	Ignition switch off	108 to 132 Ω

2GR-FE

Tester Connection	Condition	Specified Value
A55-38 (CANH) - A55-46 (CANL)	Ignition switch off	108 to 132 Ω

NG → **REPAIR OR REPLACE CAN MAIN WIRE OR CONNECTOR**

OK

2	CHECK ECM POWER SOURCE CIRCUIT

(a) Check the ECM power source circuit (2AZ-FE: See page ES-380 or 2GR-FE: See page ES-432)

NG → **REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT**

OK

REPLACE ECM

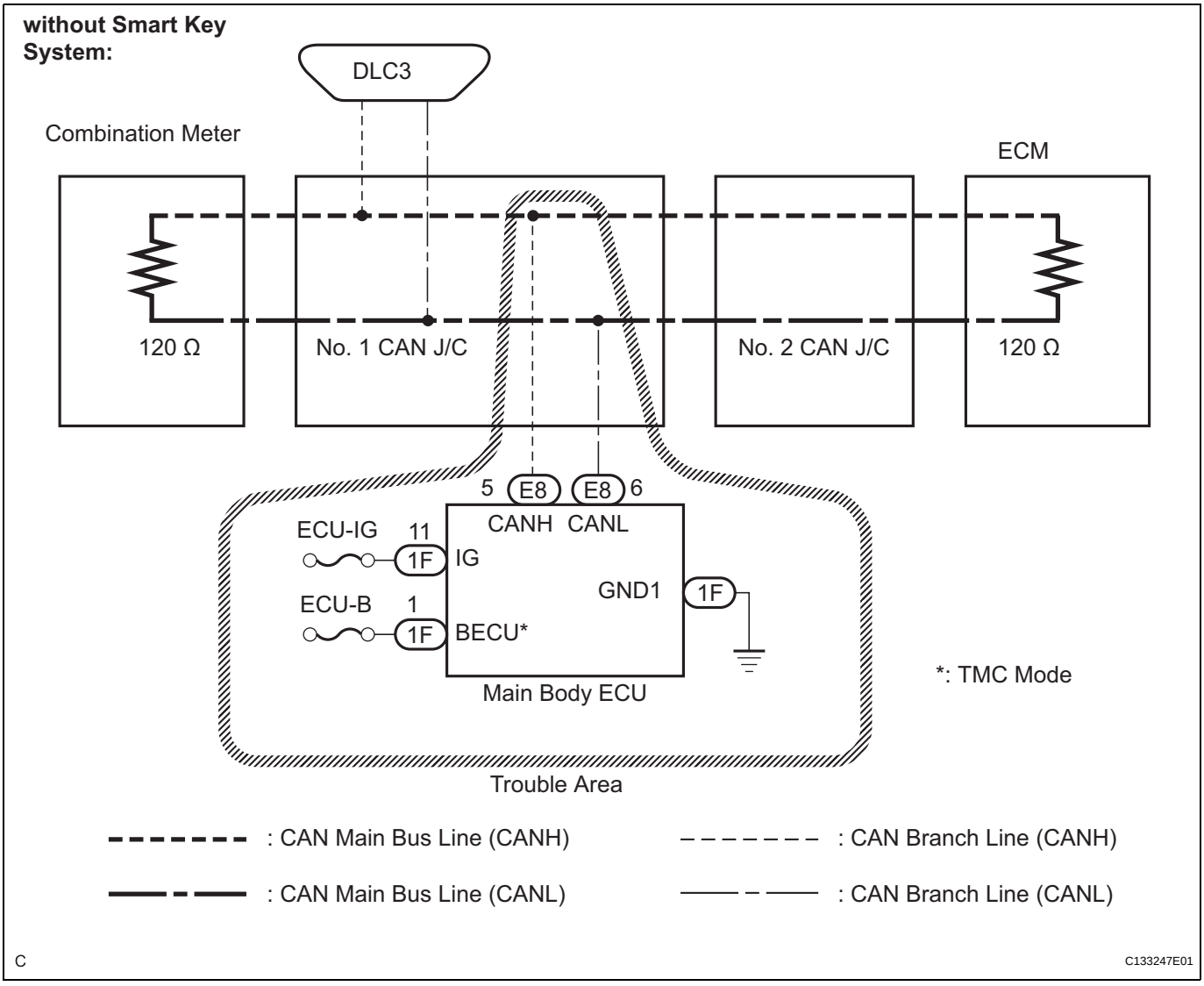
CA

Main Body ECU Communication Stop Mode

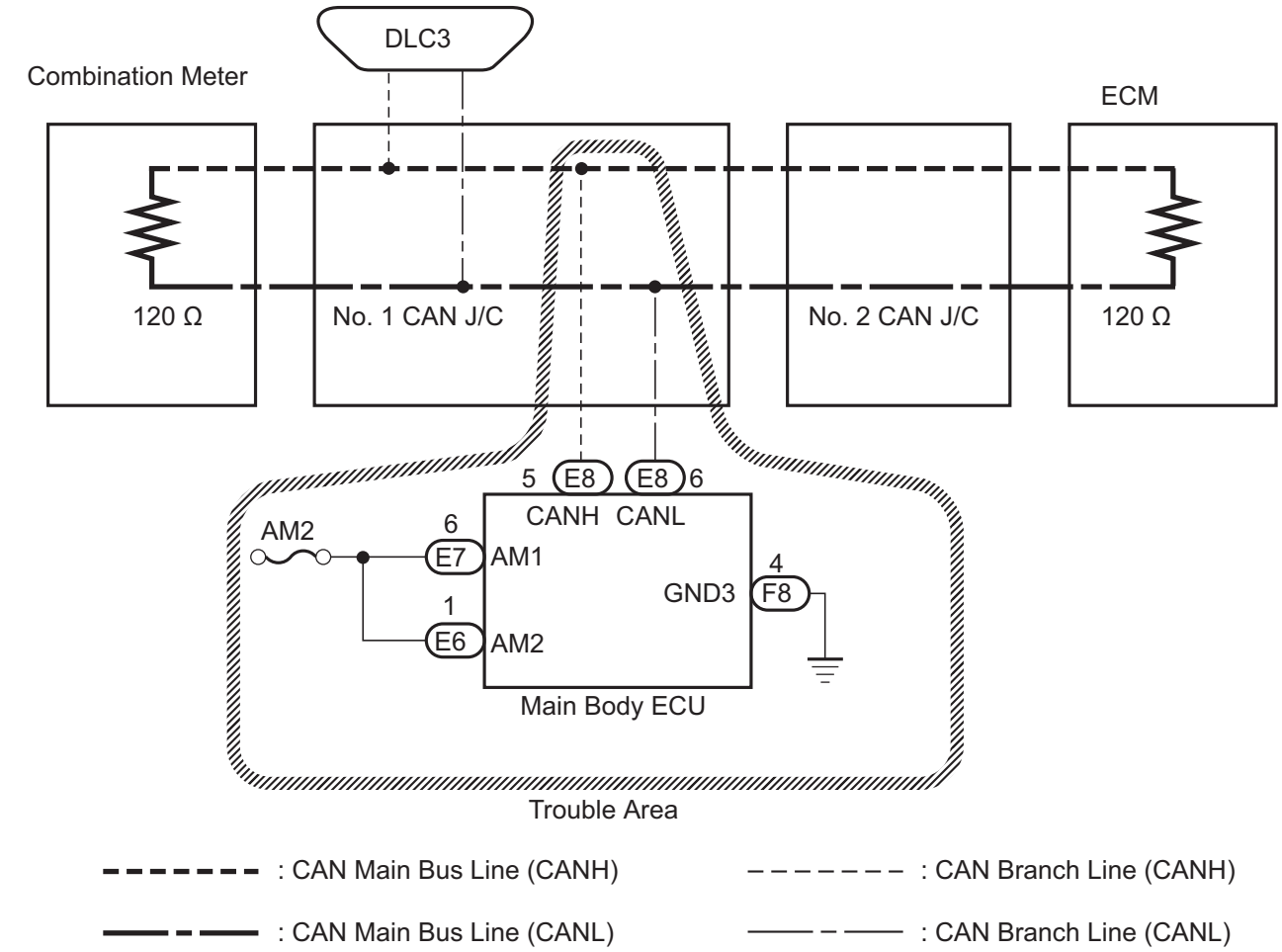
DESCRIPTION

Detection Item	Symptom	Trouble Area
Main Body ECU Communication Stop Mode	• "Integrated J/B" not displayed on "Communication Bus Check" screen of the intelligent tester • Applies to "Main Body ECU Communication Stop Mode" in "DTC combination table"	• Power source circuit of the main body ECU • Main body ECU branch wire or connector • Main body ECU

WIRING DIAGRAM



with Smart Key System:



C

C133291E01

INSPECTION PROCEDURE

NOTICE:

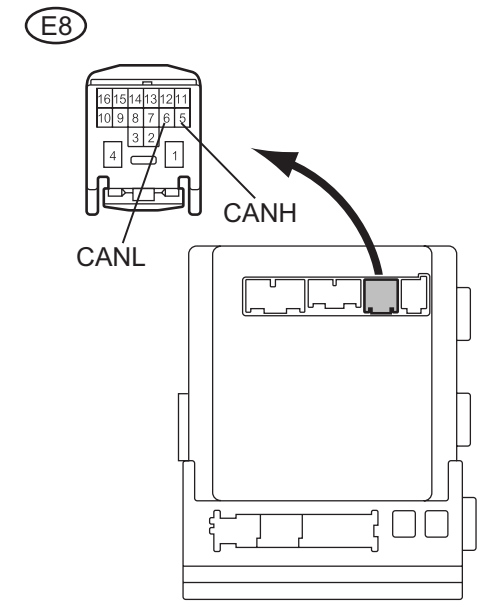
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:

Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1 CHECK CAN BUS LINE FOR DISCONNECTION (MAIN BODY ECU BRANCH WIRE)

Main Body ECU Connector (Front View):



(a) Turn the ignition switch off.
(b) Disconnect the main body ecu connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

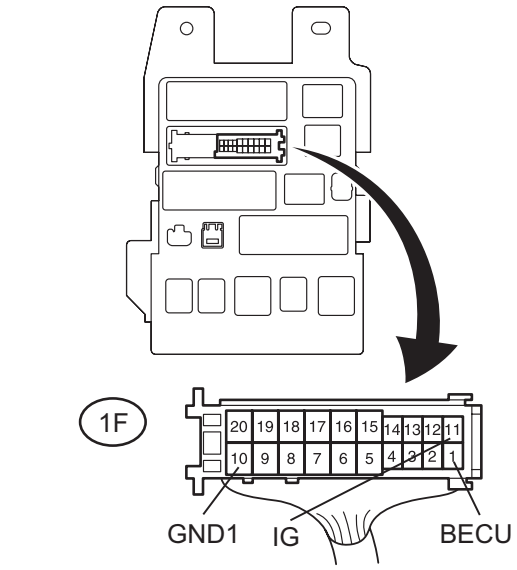
Tester Connection	Condition	Specified Condition
E8-5 (CANH) - E8-6 (CANL)	Ignition switch off	54 to 69 Ω

NG → **REPAIR OR REPLACE CAN BRANCH WIRE CONNECTED TO MAIN BODY ECU (CAN-H, CAN-L)**

OK

2 CHECK HARNESS AND CONNECTOR (BECU, IG, GND1)

Wire Harness Side:



(a) without Smart Key System
  (1) Disconnect the 1F J/B connector.
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1F-10 (GND1) - Body ground	Always	Below 1 Ω

  (3) Measure the voltage according to the value(s) in the table below.

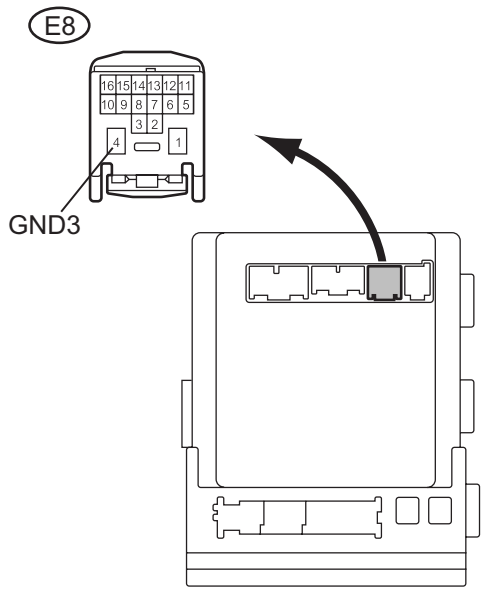
Standard voltage

Tester Connection	Condition	Specified Condition
1F-1 (BECU)* - Body ground	Always	10 to 14 V
1F-11 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

*: TMC Made only

  (4) Reconnect the J/B connector.

Main Body ECU Connector (Front View):



(b) with Smart Key System

(1) Disconnect the E8 main body ECU connector.

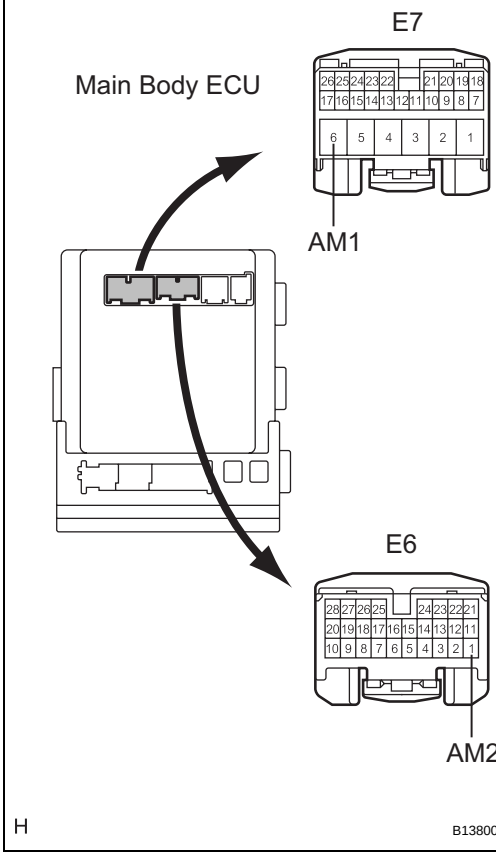
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E8-4 (GND3) - Body ground	Always	Below 1 Ω

CA

Wire Harness Side:



(3) Disconnect the E6 and E7 main body ECU connectors.

(4) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V
E6-1 (AM2) - Body ground	Always	10 to 14 V

*: TMC Made only

(5) Reconnect the main body ECU connectors.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

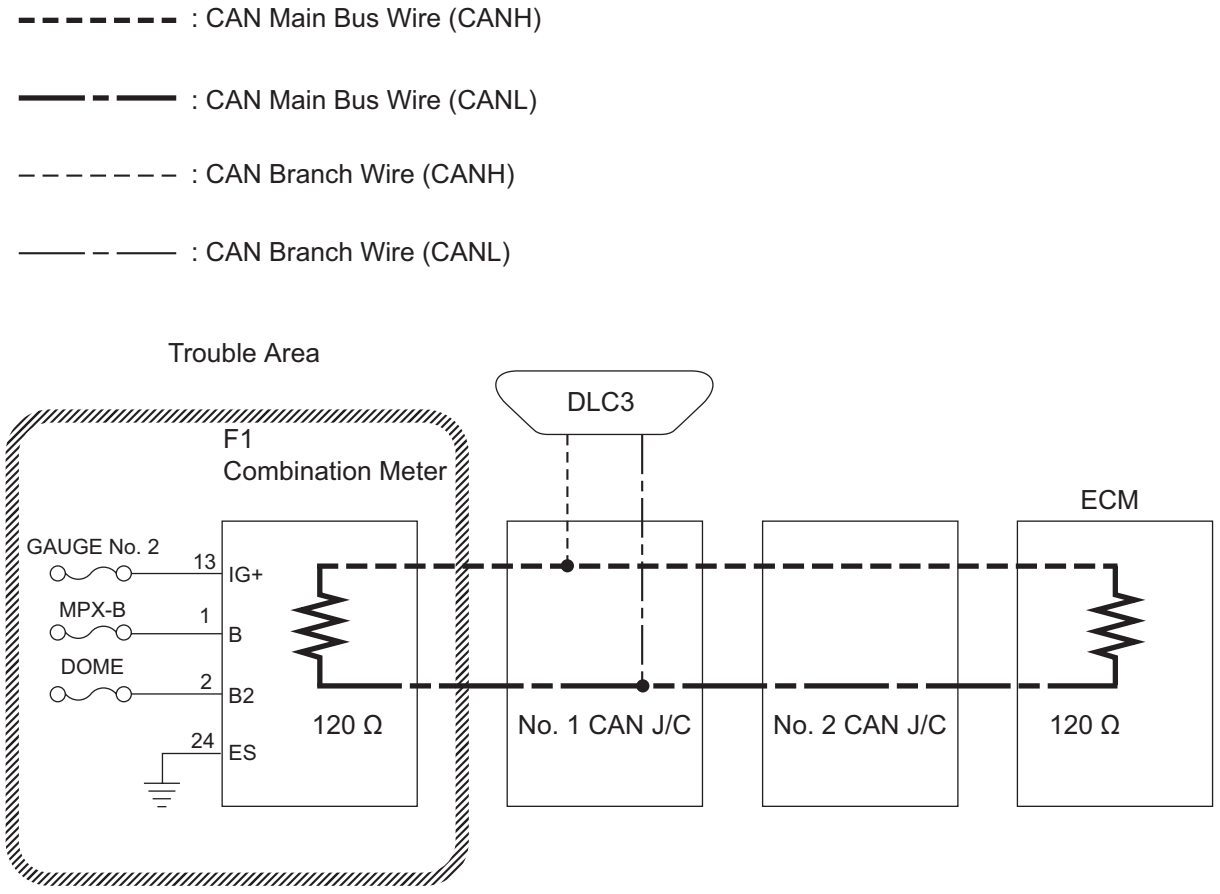
REPLACE MAIN BODY ECU

Combination Meter ECU Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Combination Meter ECU Communication Stop Mode	• "Combination Meter" not displayed on "Communication Bus Check" screen of intelligent tester • Applies to "Combination Meter ECU Communication Stop Mode" in "DTC combination table"	• Power source circuit of the combination meter • Combination meter main bus wire or connector • Combination meter

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

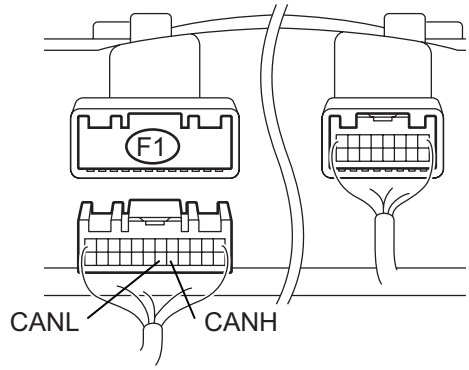
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**

- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1 CHECK CAN BUS LINE FOR DISCONNECTION (COMBINATION METER MAIN BUS WIRE)

Combination Meter Connector (Wire Harness Side View):



(a) Turn the ignition switch off.
(b) Disconnect the combination meter connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

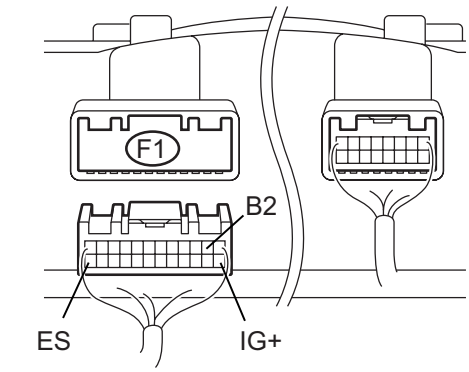
Tester Connection	Condition	Specified Condition
F1-17 (CANH) - F1-18 (CANL)	Ignition switch off	108 to 132 Ω

NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (COMBINATION METER MAIN BUS LINE)**

OK

2 CHECK HARNESS AND CONNECTOR (ES, IG+, B2)

Combination Meter Connector (Wire Harness Side View):



(a) Disconnect the combination meter connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-24 (ES) - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F1-13 (IG+) - Body ground	Ignition switch on (IG)	10 to 14 V
F1-2 (B2) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE COMBINATION METER ECU

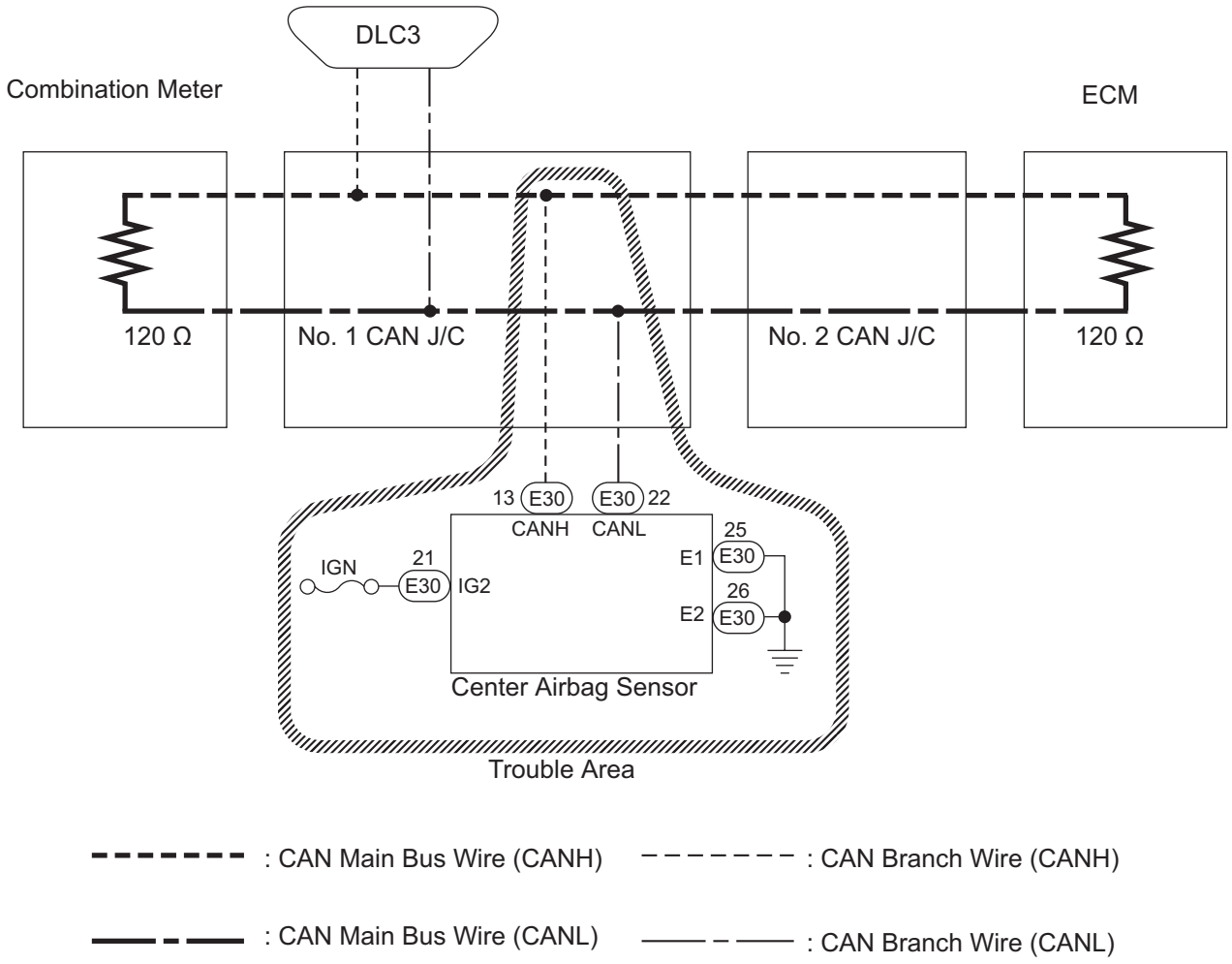
CA

Center Airbag Sensor Communication Stop Mode

DESCRIPTION

Detection Item	Symptom	Trouble Area
Center Airbag Sensor Communication Stop Mode	• "SRS Airbag" is not displayed on the "Communication Bus Check" screen of the intelligent tester • Applies to "Center Airbag Sensor Communication Stop Mode" in the "DTC COMBINATION TABLE"	• Power source circuit of the center airbag sensor • Center airbag sensor branch wire or connector • Center airbag sensor

WIRING DIAGRAM



H

C126212E03

INSPECTION PROCEDURE

NOTICE:

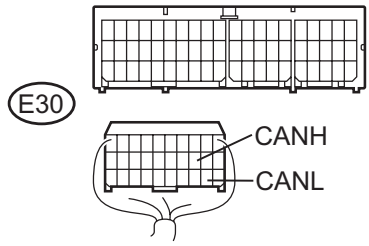
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**

- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1 CHECK OPEN IN CAN BUS WIRE (CENTER AIRBAG SENSOR BRANCH LINE)

Center Airbag Sensor Wire Harness View:



(a) Turn the ignition switch off.
(b) Disconnect the center airbag sensor connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

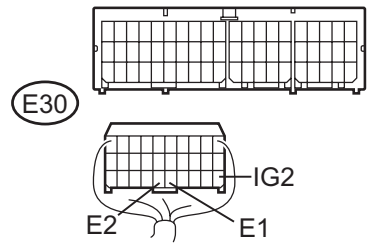
Tester Connection	Condition	Specified Value
E30-13 (CANH) - E30-22 (CANL)	Ignition switch off	54 to 69 Ω

NG → **REPAIR OR REPLACE CENTER AIRBAG SENSOR BRANCH WIRE OR CONNECTOR**

OK

2 CHECK WIRE HARNESS (IG2, E1, E2)

Center Airbag Sensor Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E30-25 (E1) - Body ground	Always	Below 1 Ω
E30-26 (E2) - Body ground	Always	Below 1 Ω

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Value
E30-21 (IG2) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE CENTER AIRBAG SENSOR

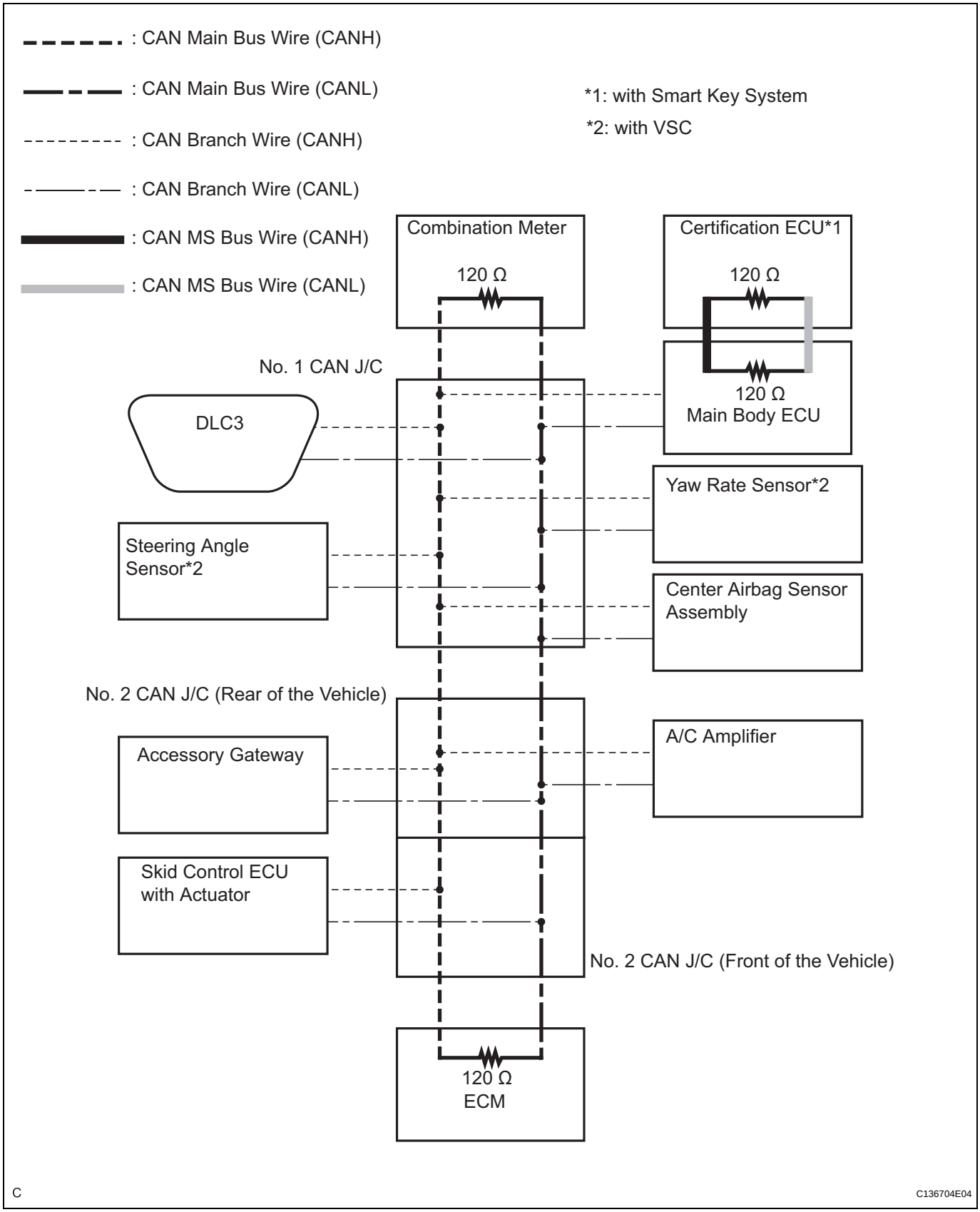
CA

CAN Bus Line

DESCRIPTION

When any DTC of the CAN communication system is output, first measure the resistance between the terminals of the DLC3 to confirm the trouble area.

WIRING DIAGRAM



CA

INSPECTION PROCEDURE

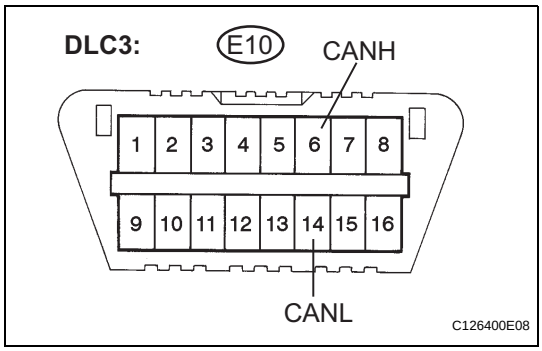
NOTICE:

- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:

Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1 CHECK CAN BUS WIRE (MAIN BUS WIRE FOR DISCONNECTION, BUS WIRES FOR SHORT CIRCUIT)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value	Result
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	54 to 69 Ω	OK

Result

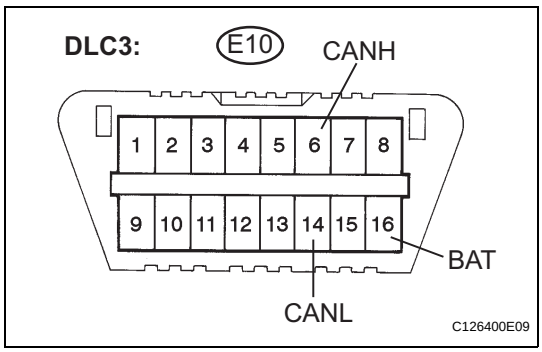
Result	Proceed to
OK	A
69 Ω or higher	B
Below 54 Ω	C

B → **OPEN IN CAN BUS MAIN WIRE (See page CA-69)**

C → **SHORT IN CAN BUS WIRES (See page CA-74)**

A

2 CHECK CAN BUS WIRE (SHORT TO B+ IN CAN BUS WIRE)



(a) Measure the resistance according to the value(s) in the table below.

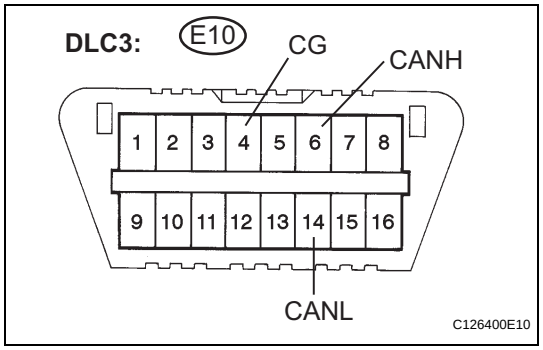
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E10-14 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

NG → **SHORT TO B+ IN CAN BUS WIRE (See page CA-89)**

OK

3	CHECK CAN BUS WIRE (SHORT TO GND IN CAN BUS WIRE)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E10-4 (CG) - E10-6 (CANH)	Ignition switch off	200 Ω or higher
E10-4 (CG) - E10-14 (CANL)	Ignition switch off	200 Ω or higher

NG → **SHORT TO GND IN CAN BUS WIRE (See page CA-104)**

OK

GO TO "HOW TO PROCEED WITH TROUBLESHOOTING" (See page CA-8)

CA

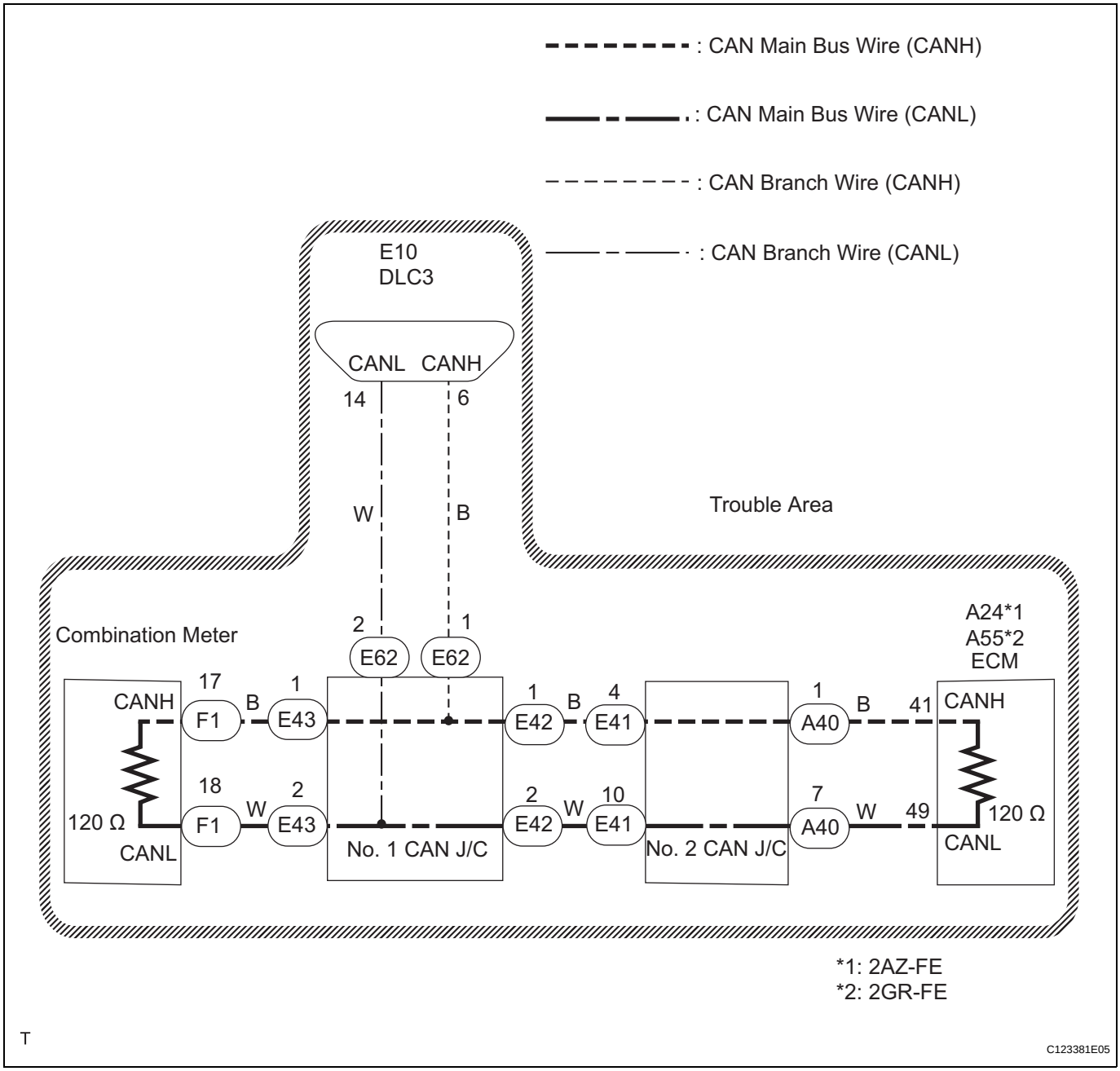
Open in CAN Main Bus Line

DESCRIPTION

There may be an open circuit in the CAN main bus wire and/or the DLC3 branch wire when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 69 Ω or more.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 69 Ω or more.	• CAN main bus wire or connector • No. 1 CAN J/C • No. 2 CAN J/C • DLC3 branch wire or connector • Combination meter • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

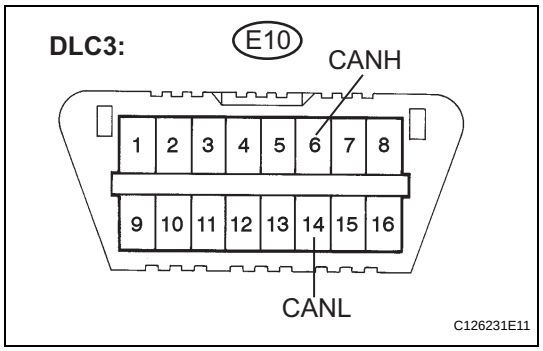
NOTICE:

- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**
- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:

Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

1	CHECK DLC3



(a) Turn the ignition switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value	Result
E10-6 (CANH) - E101-14 (CANL)	Ignition switch off	108 to 132 Ω	A
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	132 Ω or higher	B

NOTICE:

When the measured value is 132 Ω or more and a CAN communication system diagnostic trouble code is output, there may be a fault besides disconnection of the DLC3 branch wire. For that reason, troubleshooting should be performed again from "HOW TO PROCEED WITH TROUBLESHOOTING" (See page CA-8) after repairing the trouble area.

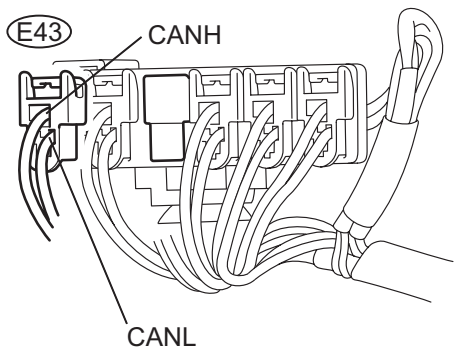
B → **REPAIR OR REPLACE DLC3 BRANCH WIRE OR CONNECTOR (CANH, CANL)**

A

CA

2	CHECK FOR OPEN IN CAN BUS MAIN WIRE (COMBINATION METER MAIN BUS LINE)

No. 1 CAN "B" J/C Side (without Earth Terminal) Wire Harness Side



N C133231E01

(a) Disconnect the CAN main bus wire white connector (E43) from the No. 1 CAN J/C "B" side (without earth terminal).
NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Value
E43-1 (CANH) - E43-2 (CANL)	Ignition switch off	108 to 132 Ω

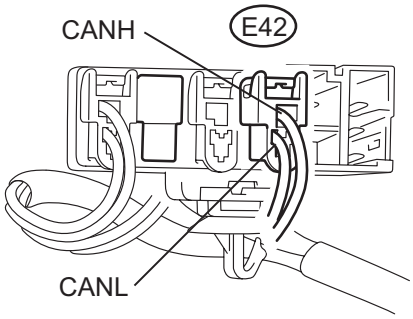
NG → **Go to step 7**

CA

OK

3	CHECK FOR OPEN IN CAN BUS MAIN WIRE (NO. 1 CAN J/C)

No. 1 CAN J/C "A" Side (with Earth Terminal) :



N C133228E02

(a) Reconnect the CAN main bus wire connector (E43) to the No. 1 CAN J/C "B" side (without earth terminal).
(b) Disconnect the CAN main bus wire white connector (E42) from the No. 1 CAN J/C "A" side (with earth terminal).
NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

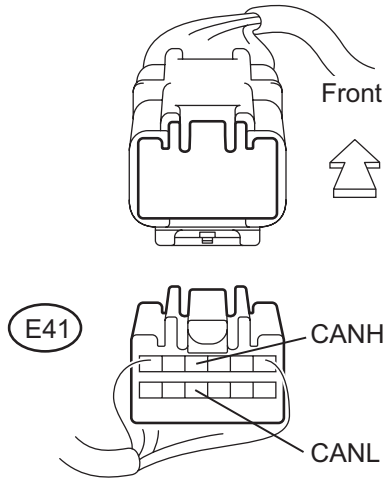
Tester Connection	Condition	Specified Value
E41-1 (CANH) - E41-2 (CANL)	Ignition switch off	108 to 132 Ω

OK → **REPLACE NO. 1 CAN J/C**

NG

4 CHECK FOR OPEN IN CAN BUS MAIN WIRE (NO. 1 CAN J/C - NO. 2 CAN J/C)

No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E01

(a) Reconnect the CAN main bus wire connector (E42) to the No. 1 CAN J/C "A" side (with earth terminal).
(b) Disconnect the CAN main bus wire connector (E41) from the No. 2 CAN J/C (rear of the vehicle).
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

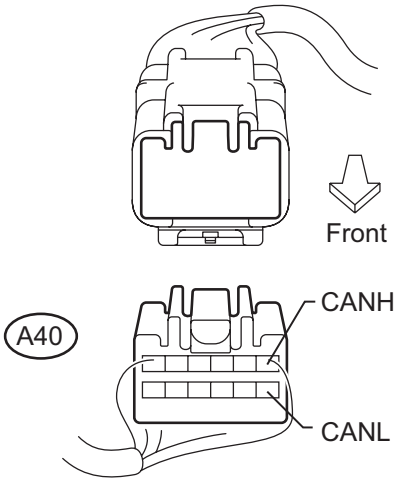
Tester Connection	Condition	Specified Value
E42-4 (CANH) - E42-10 (CANL)	Ignition switch off	108 to 132 Ω

NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (NO. 1 CAN J/C - NO. 2 CAN J/C)**

OK

5 CHECK FOR OPEN IN CAN BUS MAIN WIRE (NO. 2 CAN J/C)

No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E04

(a) Reconnect the CAN main bus wire connector (E41) to the No. 2 CAN J/C (rear of the vehicle).
(b) Disconnect the CAN main bus wire connector (A40) from the No. 2 CAN J/C (front of the vehicle).
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

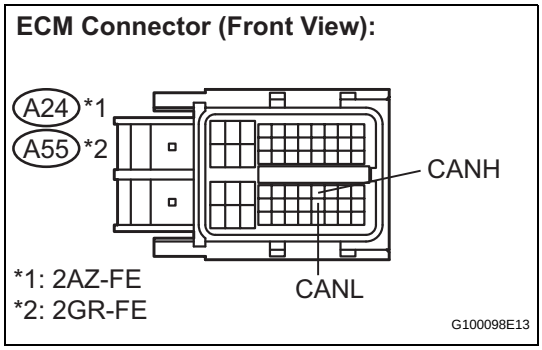
Tester Connection	Condition	Specified Value
A40-1 (CANH) - A40-7 (CANL)	Ignition switch off	108 to 132 Ω

OK → **REPLACE NO. 2 CAN J/C**

NG

CA

6	CHECK FOR OPEN IN CAN BUS MAIN WIRE (ECM CAN MAIN BUS WIRE)



(a) Reconnect the CAN main bus wire connector (A40) to the No. 2 CAN J/C (front of the vehicle).
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

2AZ-FE

Tester Connection	Condition	Specified Value
A24-38 (CANH) - A24-46 (CANL)	Ignition switch off	108 to 132 Ω

2GR-FE

Tester Connection	Condition	Specified Value
A55-38 (CANH) - A55-46 (CANL)	Ignition switch off	108 to 132 Ω

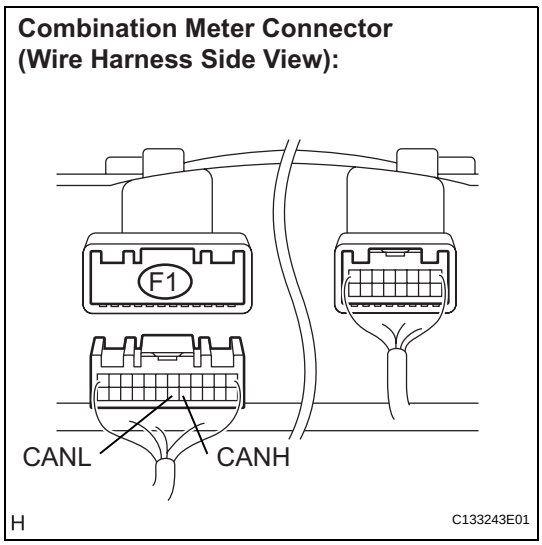
CA

OK → REPLACE ECM

NG

REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (NO. 2 CAN J/C - ECM)

7	CHECK FOR OPEN IN CAN BUS MAIN WIRE (COMBINATION METER - NO. 1 CAN J/C)



(a) Reconnect the CAN main bus wire connector (E43) to the No. 1 CAN J/C "B" side (without earth terminal).
(b) Disconnect the combination meter connector (F1).
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
F1-17 (CANH) - F1-18 (CANL)	Ignition switch off	108 to 132 Ω

OK → REPLACE COMBINATION METER

NG

REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (NO. 1 CAN J/C - COMBINATION METER)

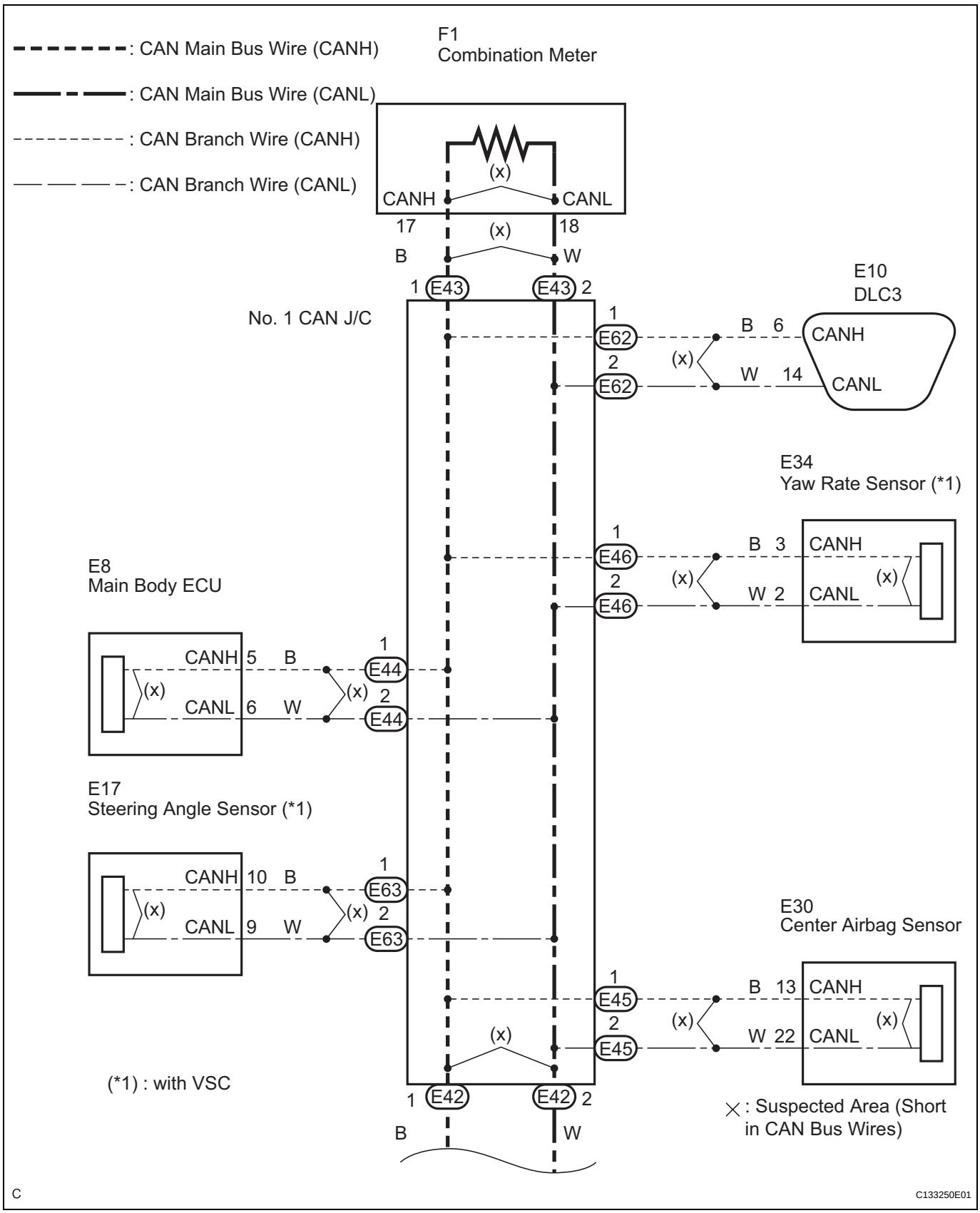
Short in CAN Bus Lines

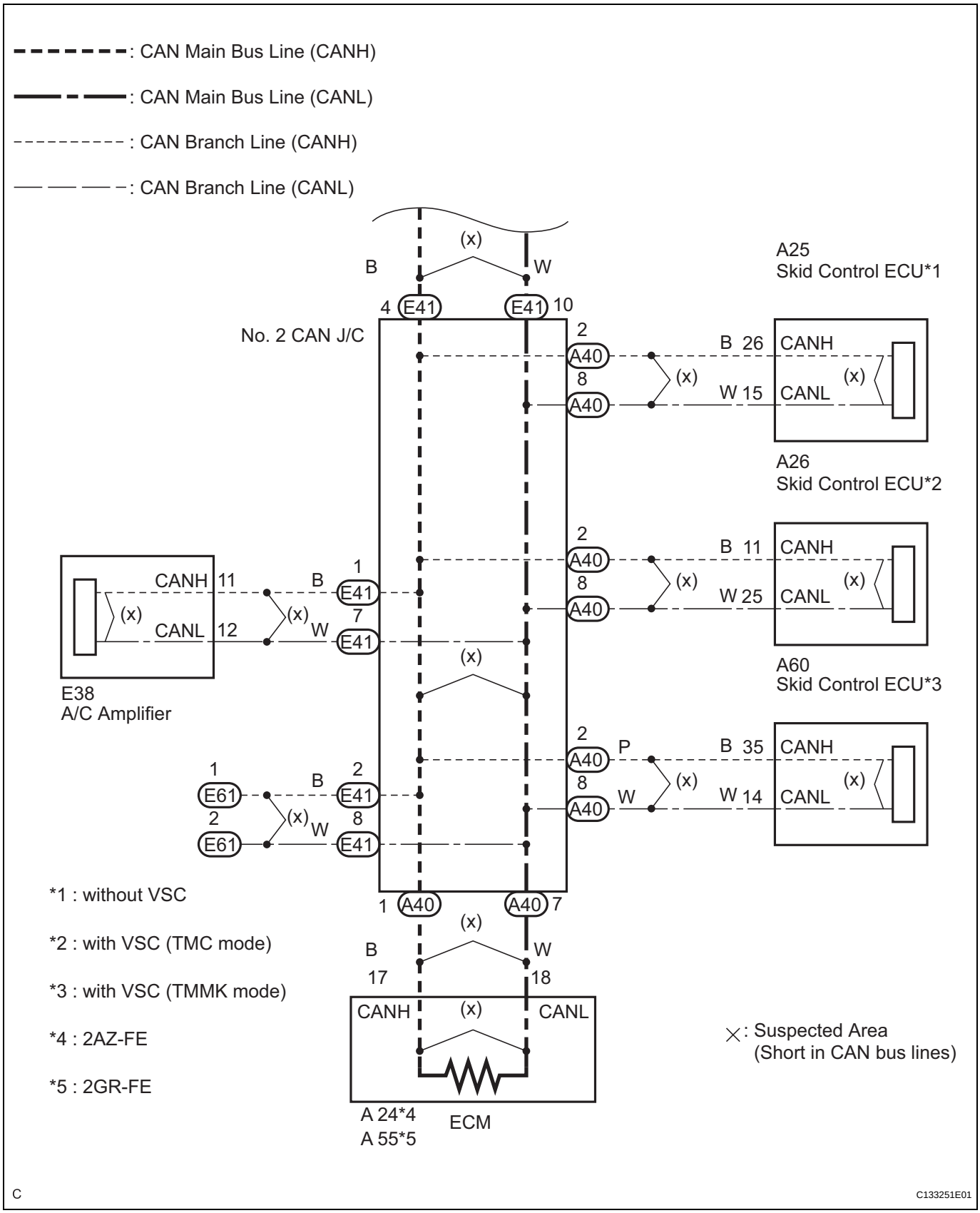
DESCRIPTION

The CAN bus wires are considered to be shorted when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

Symptom	Trouble Area
Resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.	• Short in CAN bus wires • Brake actuator assembly (Skid control ECU) • Steering angle sensor • Yaw rate sensor • ECM • Combination meter • Main body ECU • A/C amplifier • Center airbag sensor • No. 1 CAN J/C • No. 2 CAN J/C

WIRING DIAGRAM





INSPECTION PROCEDURE

NOTICE:

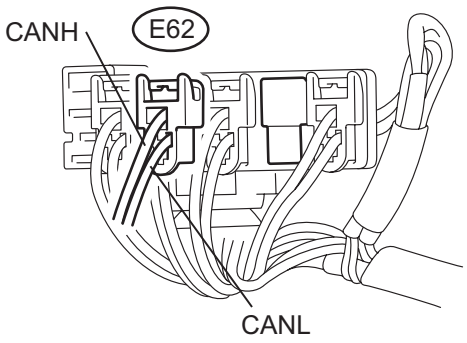
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**

- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

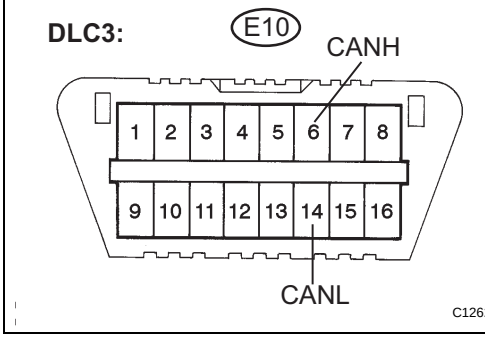
1	CHECK FOR SHORT IN CAN BUS WIRES (DLC3 BRANCH WIRE)

No. 1 CAN J/C "B" Side (without Earth Terminal) Wire Harness Side:



(a) Turn the ignition switch off.
(b) Disconnect the DLC3 branch wire gray connector (E62) from the No. 1 CAN J/C "B" side (without earth terminal).
NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	1 MΩ or higher

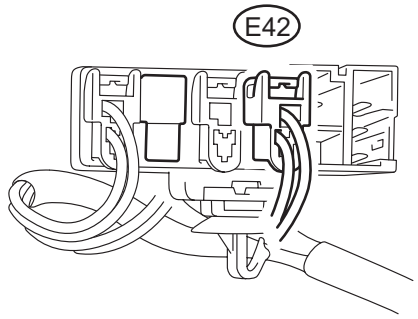
(d) Reconnect the DLC3 branch wire connector (E62) to the No. 1 CAN J/C "B" side (without earth terminal).

NG → **REPAIR OR REPLACE DLC3 BRANCH WIRE OR CONNECTOR**

OK

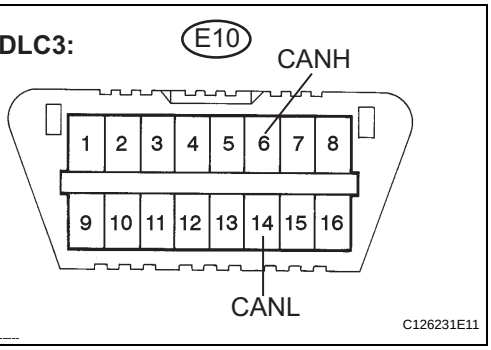
2 CHECK FOR SHORT IN CAN BUS WIRES (NO. 1 CAN J/C SIDE)

No. 1 CAN J/C "A" Side (with Earth Terminal):



N C133228E01

(a) Disconnect the CAN main bus wire white connector (E42) from the No. 1 CAN J/C "A" side (with earth terminal).



C126231E11

(b) Connect the probes of an ohmmeter to terminals 6 (CANH) and 14 (CANL) of the DLC3.
(c) Measure the resistance according to the value(s) in the table below.

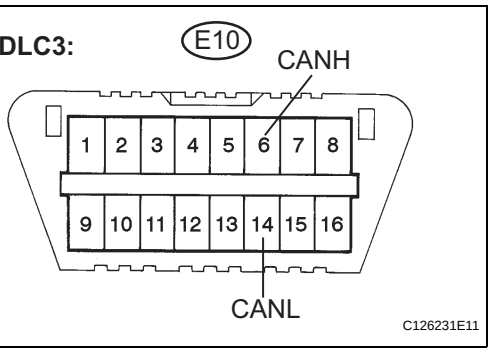
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	108 to 132 Ω

OK → **Go to step 7**

NG

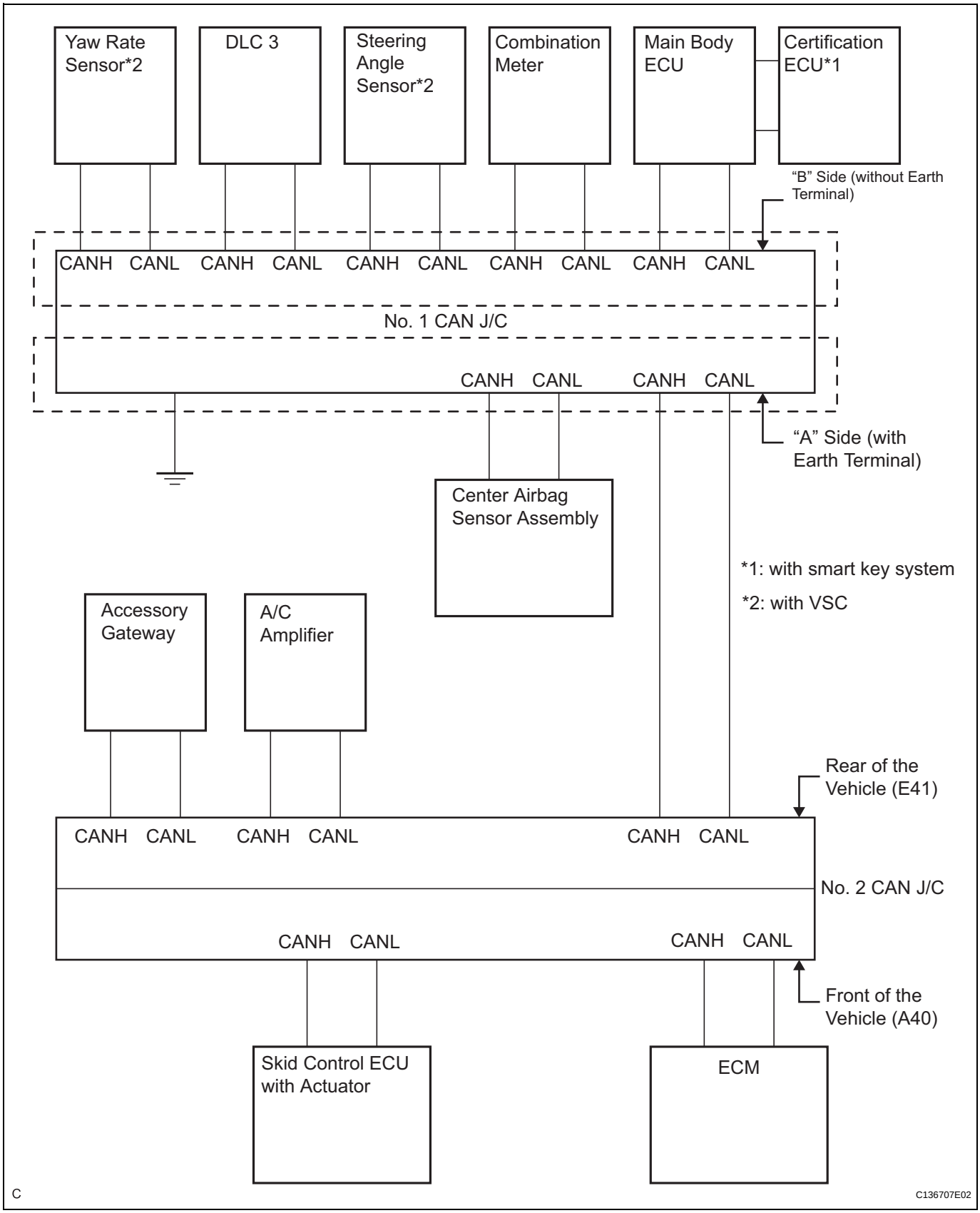
3 CHECK FOR SHORT IN CAN BUS WIRES (NO. 1 CAN J/C BRANCH WIRE)



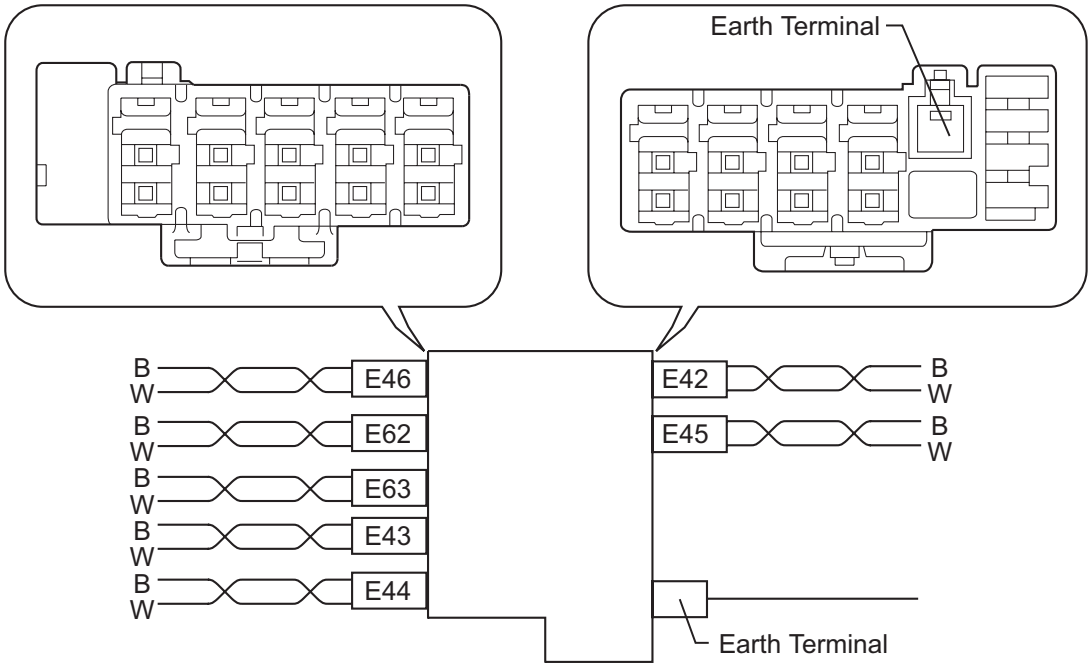
C126231E11

(a) Reconnect the CAN main bus wire connector (E42) to the No. 1 CAN J/C "A" side (with earth terminal).
(b) Connect the probes of an ohmmeter to terminals 6 (CANH) and 14 (CANL) of the DLC3.
(c) While observing the resistance value shown on the tester, disconnect connectors E44, E45, E46 and E63 from the No. 1 CAN J/C one by one until the resistance becomes normal (between 54 and 69 Ω).
HINT:
Disconnect the branch wire connectors other than those of the DLC3.

CA


Yaw Rate Sensor*2
DLC 3
Steering Angle Sensor*2
Combination Meter
Main Body ECU
Certification ECU*1
"B" Side (without Earth Terminal)
CANH CANL CANH CANL CANH CANL CANH CANL CANH CANL
No. 1 CAN J/C
CANH CANL CANH CANL
"A" Side (with Earth Terminal)
Center Airbag Sensor Assembly
*1: with smart key system
*2: with VSC
Accessory Gateway
A/C Amplifier
Rear of the Vehicle (E41)
CANH CANL CANH CANL CANH CANL
No. 2 CAN J/C
CANH CANL CANH CANL
Front of the Vehicle (A40)
Skid Control ECU with Actuator
ECM
C
C136707E02

No. 1 CAN J/C "B" side (without Earth Terminal): **No. 1 CAN J/C "A" side (with Earth Terminal):**



CAN J/C connectors ("A" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Airbag Sensor Assembly Center (E45)	Black	B	W

CAN J/C connectors ("B" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Yaw Rate Sensor* (E46)	Blue	B	W
Steering Angle Sensor* (E63)	Brown	B	W
Main Body ECU (E44)	Black	B	W

*: with VSC

NOTICE:

Do not reconnect the disconnected connectors until this inspection is complete because there may be a short in 2 or more branch wires.

Result

Symptom	Proceed to
The resistance is still below 54 Ω when all the specified connectors are disconnected. (There are no shorts in the branch wires.)	**A**
The resistance becomes normal (between 54 and 69 Ω) when a connector is disconnected. (There is a short in one or more of the branch wires.)	**B**

(d) When there is a short in one or more of the branch wires:

(1) Reconnect all of the connectors to the No. 1 CAN J/C, except for the one that was disconnected last (the short-circuited bus wire). Check that the resistance shown on the tester is normal (between 54 and 69 Ω) to confirm that there is a short in one branch wire only.

CA

HINT:
- The connectors connected to the No. 1 CAN J/C can be distinguished according to the color of the communication bus wires and the shape of the connectors.
- Reconnecting the connectors to non-specified positions on the No. 1 CAN J/C does not affect system operation. However, it is preferred to reconnect the connectors to their specified positions to avoid negative effects on the wiring such as tension on the wiring harnesses, and to make future maintenance easier.

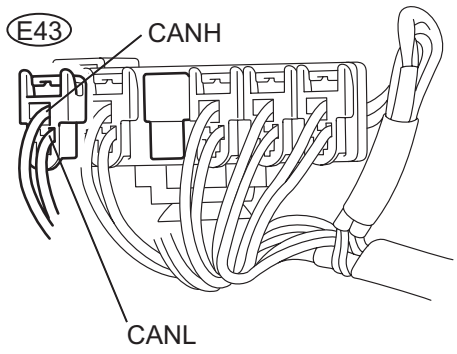
B → **Go to step 15**

A

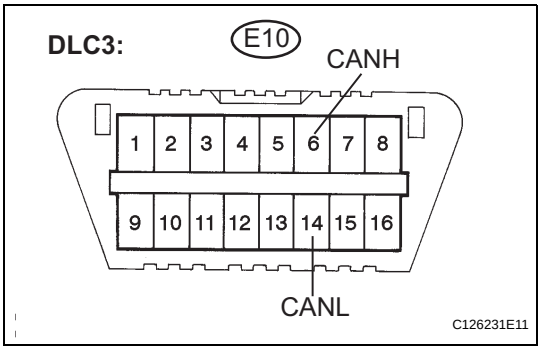
4 CHECK FOR SHORT IN CAN BUS WIRES (COMBINATION METER MAIN BUS WIRE)

CA

No. 1 CAN "B" J/C Side (without Earth Terminal) Wire Harness Side



(a) Disconnect the combination meter main bus wire white connector (E43) from the No. 1 CAN J/C "B" side (without earth terminal).
NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**



(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	108 to 132 Ω

NG → **REPLACE NO. 1 CAN J/C**

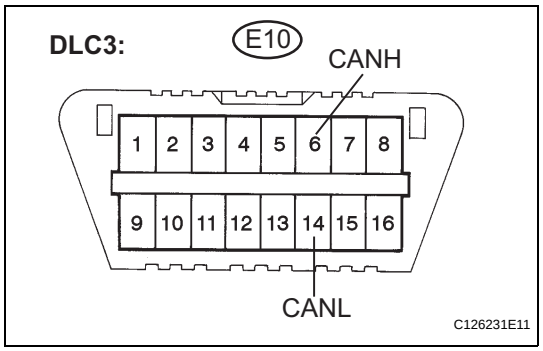
OK

5 RECONNECT CONNECTOR

(a) Reconnect the combination meter main bus wire connector (E43) to the No. 1 CAN J/C "B" side (without earth terminal).

NEXT

6 CHECK FOR SHORT IN CAN BUS WIRES (COMBINATION METER)



(a) Disconnect the combination meter connector (F1).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	108 to 132 Ω

HINT:
If the resistance changes to 108 to 132 Ω when the connector is disconnected, there may be a short in the Combination meter.

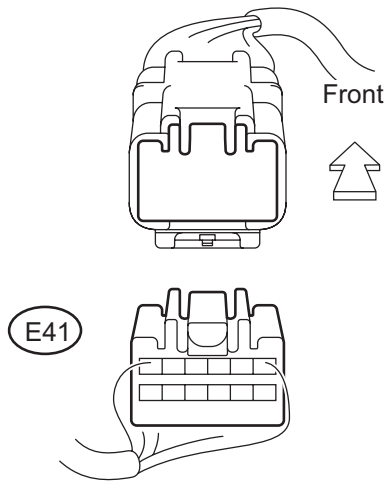
NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE (COMBINATION METER MAIN BUS WIRE)**

OK

REPLACE COMBINATION METER

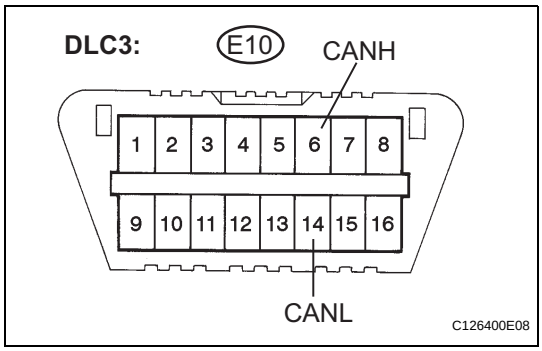
7 CHECK FOR SHORT IN CAN BUS WIRES (NO. 2 CAN - NO. 1 CAN J/C)

No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



(a) Reconnect the No. 1 CAN J/C connector (E42).
(b) Disconnect the No. 2 CAN J/C connector (E41).

CA



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

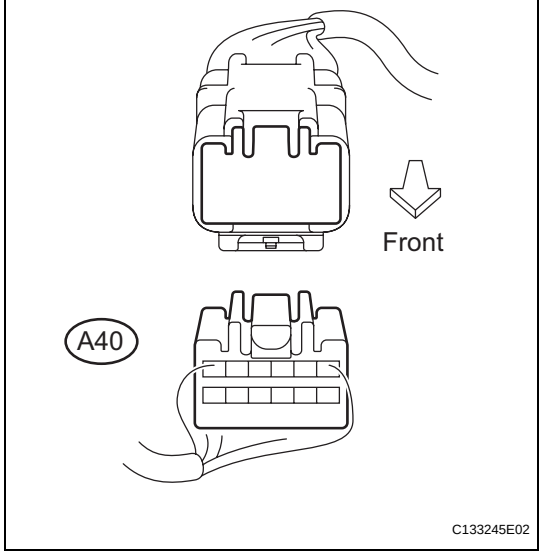
Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	108 to 132 Ω

NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (NO. 1 CAN J/C - NO. 2 CAN J/C)**

OK

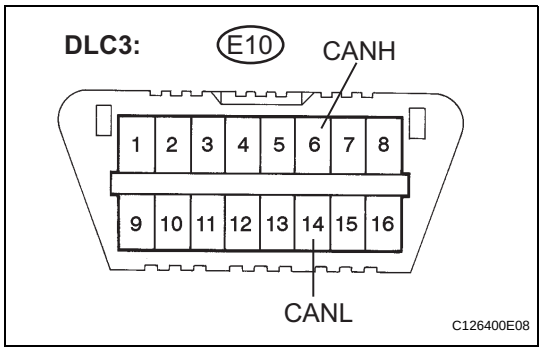
8 CHECK FOR SHORT IN CAN BUS WIRES (NO. 1 CAN J/C - NO. 2 CAN J/C)

No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



(a) Reconnect the No. 2 CAN J/C connector (E41) (rear of the vehicle).

(b) Disconnect the No. 2 CAN J/C connector (A40) (front of the vehicle).



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

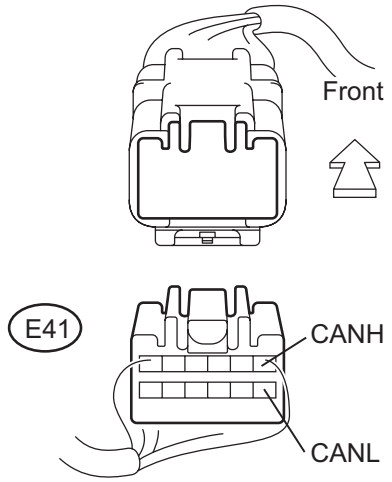
Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	108 to 132 Ω

OK → **Go to step 12**

NG

9 CHECK FOR SHORT IN CAN BUS WIRES (A/C AMPLIFIER BRANCH WIRE)

No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E05

(a) Reconnect the No. 2 CAN J/C connector (A40) (front of the vehicle).
(b) Disconnect the No. 2 CAN J/C connector (E41) (rear of the vehicle).
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

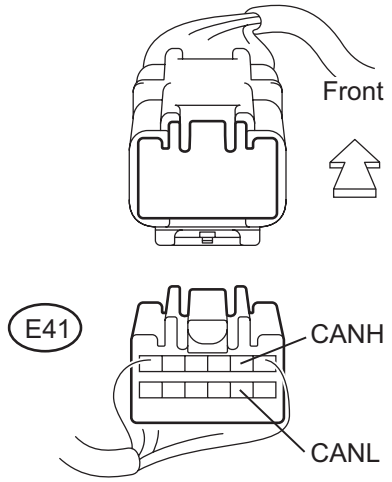
Tester Connection	Condition	Specified Value
E41-1 (CANH) - E41-7 (CANL)	Ignition switch off	1 MΩ or higher

NG → **Go to step 11**

OK

10 CHECK FOR SHORT IN CAN BUS WIRES (ACCESSORY GATEWAY BRANCH WIRE)

No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E03

(a) Disconnect the No. 2 CAN J/C connector (E41) (rear of the vehicle).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E41-2 (CANH) - E41-8 (CANL)	Ignition switch off	1 MΩ or higher

NG → **REPAIR OR REPLACE ACCESSORY GATEWAY BRANCH WIRE OR CONNECTOR**

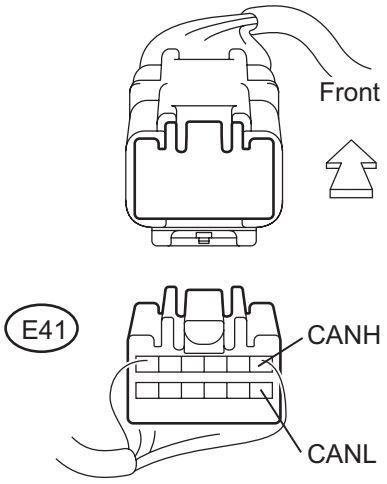
CA

OK

REPLACE NO. 2 CAN J/C

11	CHECK FOR SHORT IN CAN BUS WIRES (A/C AMPLIFIER - NO. 2 CAN J/C)

No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E05

(a) Disconnect the A/C amplifier connector (E38).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E41-1 (CANH) - E41-7 (CANL)	Ignition switch off	1 MΩ or higher

NG → **REPAIR OR REPLACE A/C AMPLIFIER BRANCH WIRE OR CONNECTOR**

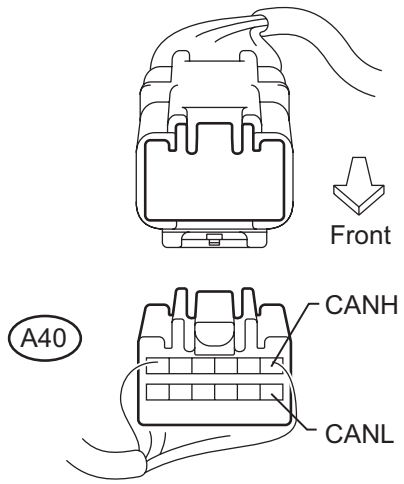
OK

REPLACE A/C AMPLIFIER

CA

12 CHECK FOR SHORT IN CAN BUS WIRES (ECM MAIN BUS WIRE)

No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E04

(a) Disconnect the No. 2 CAN J/C connector (A40).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

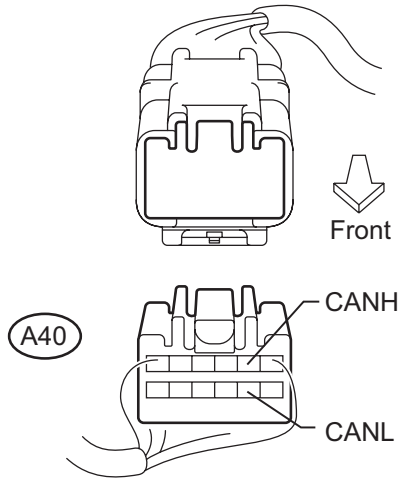
Tester Connection	Condition	Specified Value
A40-1 (CANH) - A40-7 (CANL)	Ignition switch off	108 to 132 Ω

NG → **Go to step 14**

OK

13 CHECK FOR SHORT IN CAN BUS WIRES (SKID CONTROL ECU - NO. 2 CAN J/C)

No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E05

(a) Disconnect the skid control ECU connector (A25, A26 or A60).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A40-2 (CANH) - A40-8 (CANL)	Ignition switch off	1 MΩ or higher

HINT:
Measure the resistance with the No. 2 CAN J/C connector (A40) disconnected.

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

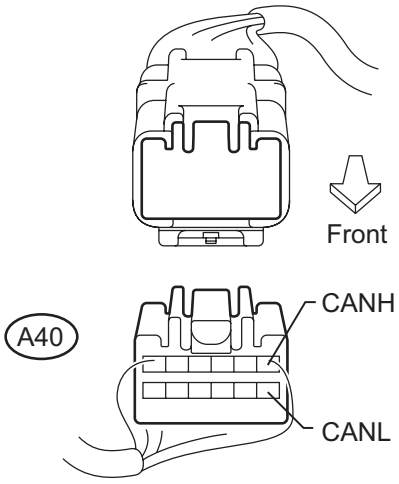
CA

NG

REPAIR OR REPLACE SKID CONTROL ECU BRANCH WIRE OR CONNECTOR

14 CHECK FOR SHORT IN CAN BUS WIRES (ECM MAIN BUS WIRE)

No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E04

(a) Disconnect the ECM connector (A24 or A55).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A40-1 (CANH) - A40-7 (CANL)	Ignition switch off	1 MΩ or higher

HINT:
Measure the resistance with the No. 2 CAN J/C connector (A40) disconnected.

NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (ECM - NO. 2 CAN J/C)**

OK

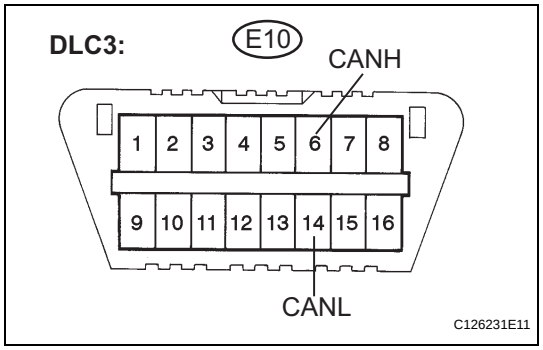
REPLACE ECM

15 RECONNECT CONNECTOR

(a) Reconnect the connector for the short-circuited branch wire to the No. 1 CAN J/C (the connector that caused the bus wire resistance to become normal (between 54 and 69 Ω) when it was disconnected).

NEXT

16	CHECK FOR SHORT IN CAN BUS WIRES



(a) Disconnect the connector that includes terminals CANH and CANL from the ECU (or sensor) to which the short-circuited branch wire is connected. (See page CA-10)

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-14 (CANL)	Ignition switch off	54 to 69 Ω

HINT:
If the resistance becomes normal (between 54 and 69 Ω) when the connector is disconnected from the ECU (or sensor), there may be a short in the ECU (or sensor).

NG → **REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR BRANCH WIRE OR CONNECTOR**

OK

REPLACE CORRESPONDING ECU OR SENSOR

CA

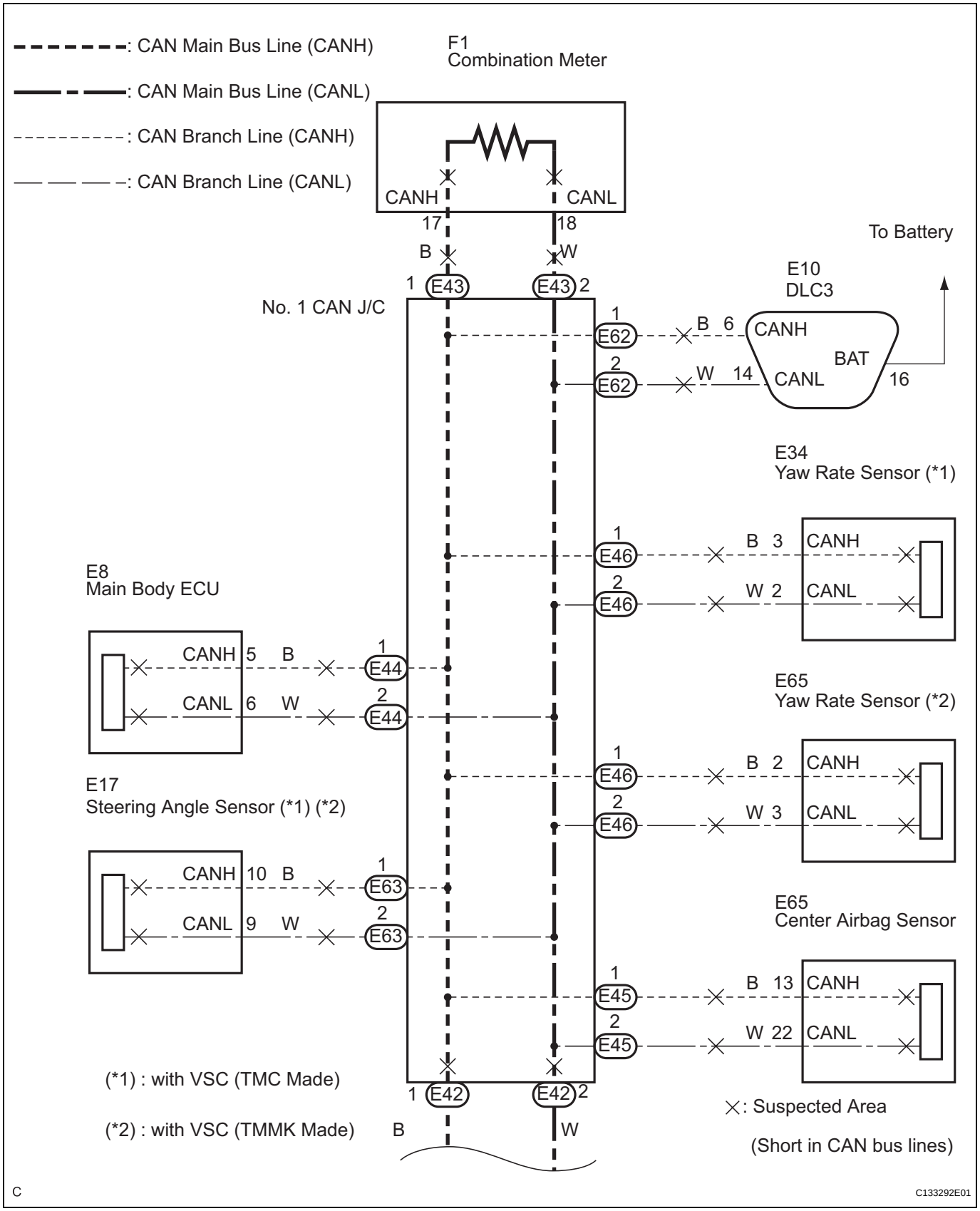
Short to B+ in CAN Bus Line

DESCRIPTION

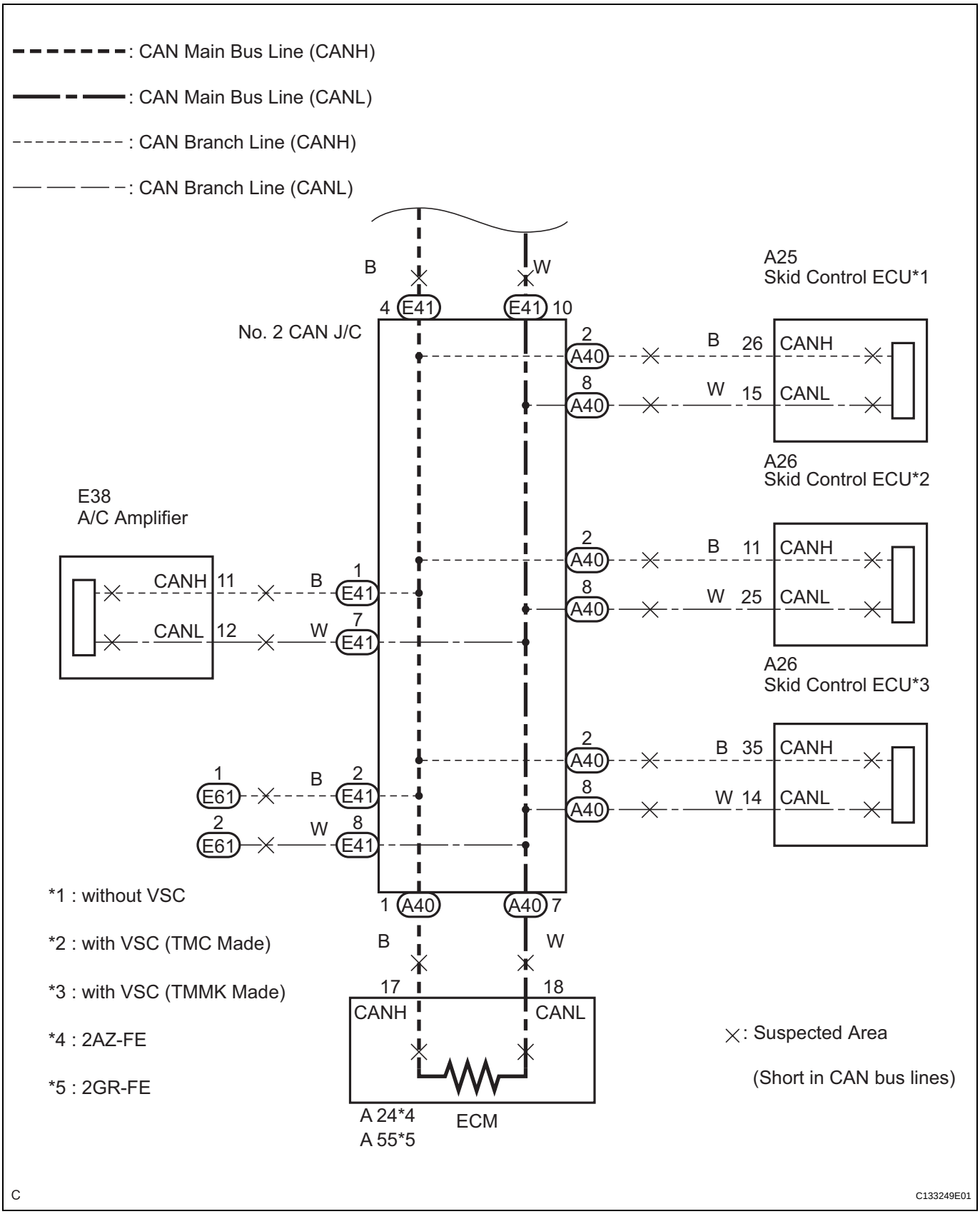
A short to B+ is suspected in the CAN bus wire when the resistance between terminals 6 (CANH) and 16 (BAT), or terminals 14 (CANL) and 16 (BAT) of the DLC3 is below 6 kΩ.

Symptom	Trouble Area
The resistance between terminals 6 (CANH) and 16 (BAT), or terminals 14 (CANL) and 16 (BAT) of the DLC3 is below 6 kΩ.	• Short to B+ in CAN bus wire • Brake actuator assembly (Skid control ECU) • Steering angle sensor • Yaw rate sensor • ECM • Combination meter • Main body ECU • A/C amplifier • Center airbag sensor • No. 1 CAN J/C

WIRING DIAGRAM



CA



INSPECTION PROCEDURE

NOTICE:

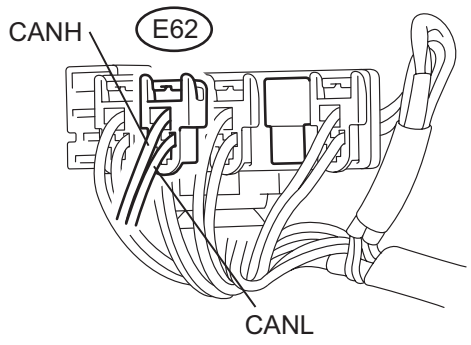
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**

- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

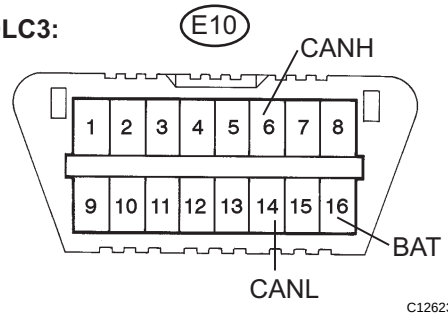
1	CHECK FOR SHORT TO B+ IN CAN BUS WIRE (DLC3 BRANCH WIRE)

No. 1 CAN J/C "B" Side (without Earth Terminal) Wire Harness Side:



(a) Turn the ignition switch off.
(b) Disconnect the DLC3 branch wire gray connector (E62) from the No. 1 CAN J/C "B" side (without earth terminal).
NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E10-14 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

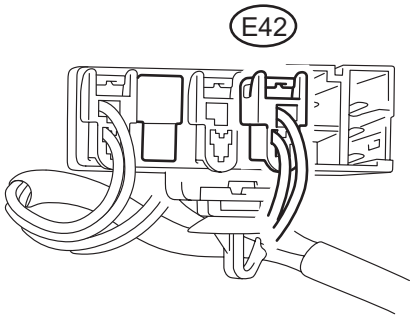
(d) Reconnect the DLC3 branch wire connector (E62) to the No. 1 CAN J/C "B" side (without earth terminal).

NG → **REPAIR OR REPLACE DLC3 BRANCH WIRE OR CONNECTOR**

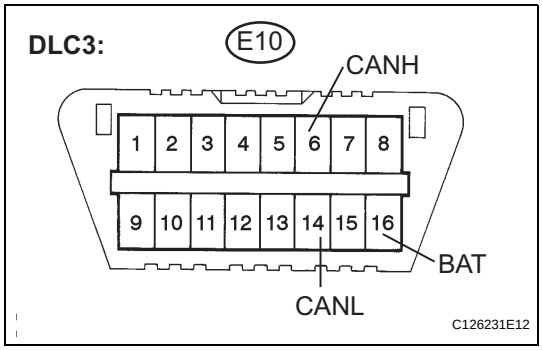
OK

2 CHECK FOR SHORT TO B+ IN CAN BUS WIRE (NO. 1 CAN J/C SIDE)

No. 1 CAN J/C "A" Side (with Earth Terminal):



(a) Disconnect the CAN main bus wire white connector (E42) from the No. 1 CAN J/C "A" side (with earth terminal).



(b) Measure the resistance between terminals 6 (CANH) and 16 (BAT), and between terminals 14 (CANL) and 16 (BAT) of the DLC3 each time a connector is disconnected.

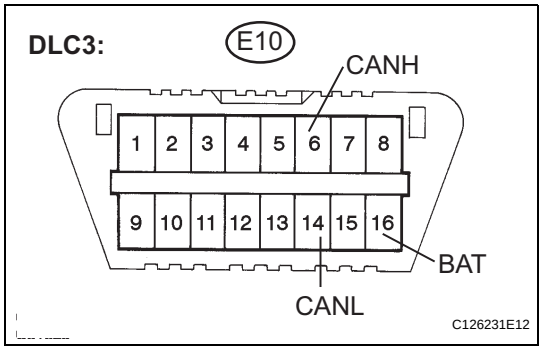
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E10-14 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

OK → **Go to step 6**

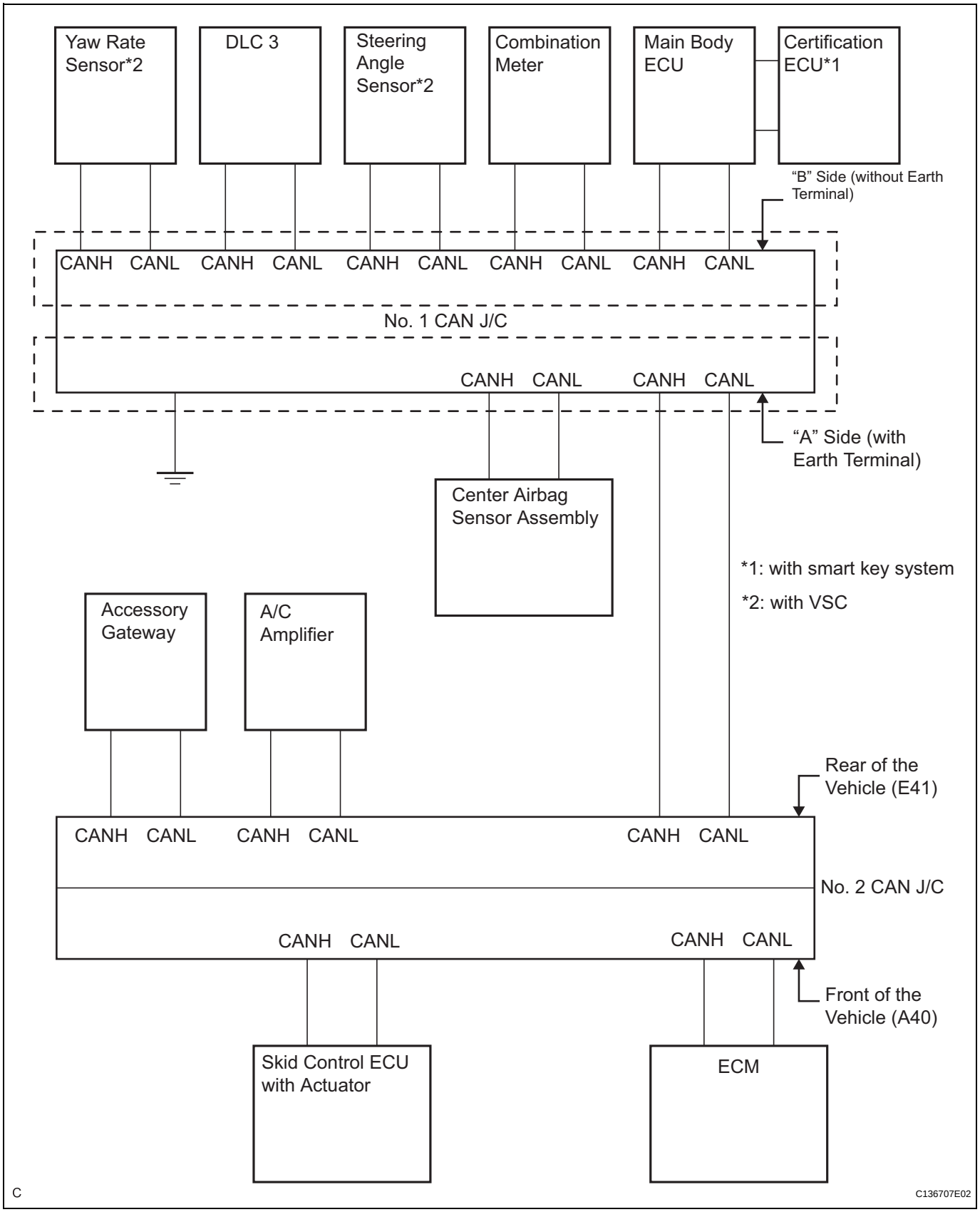
NG

3 CHECK FOR SHORT TO B+ IN CAN BUS WIRE



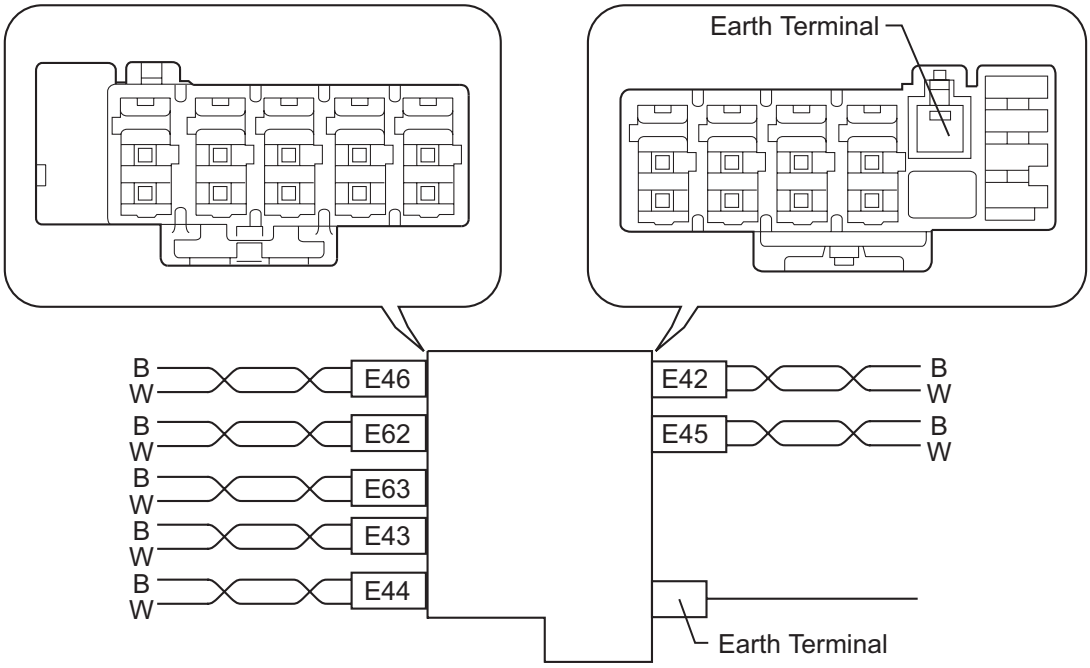
(a) Disconnect connectors from the No. 1 CAN J/C one at a time.
HINT:
Disconnect the ECU and sensor connectors other than the DLC3 branch wires and CAN main bus wires between the No. 1 CAN J/C.

(b) Measure the resistance between terminals 6 (CANH) and 16 (BAT), and between terminals 14 (CANL) and 16 (BAT) of the DLC3 each time a connector is disconnected.


Yaw Rate Sensor*2
DLC 3
Steering Angle Sensor*2
Combination Meter
Main Body ECU
Certification ECU*1
"B" Side (without Earth Terminal)
CANH CANL CANH CANL CANH CANL CANH CANL CANH CANL
No. 1 CAN J/C
CANH CANL CANH CANL
"A" Side (with Earth Terminal)
Center Airbag Sensor Assembly
*1: with smart key system
*2: with VSC
Accessory Gateway
A/C Amplifier
Rear of the Vehicle (E41)
CANH CANL CANH CANL CANH CANL
No. 2 CAN J/C
CANH CANL CANH CANL
Front of the Vehicle (A40)
Skid Control ECU with Actuator
ECM
C
C136707E02

CA

No. 1 CAN J/C "B" side (without Earth Terminal): **No. 1 CAN J/C "A" side (with Earth Terminal):**



No. 1 CAN J/C connectors ("A" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Airbag Sensor Assembly Center (E45)	Black	B	W

No. 1 CAN J/C connectors ("A" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Yaw Rate Sensor* (E46)	Blue	B	W
Steering Angle Sensor* (E63)	Brown	B	W
Combination Meter (E43)	White	B	W
Main Body ECU (E44)	Black	B	W

*: with VSC

NOTICE:

Do not reconnect the disconnected connectors until this inspection is complete because there may be a short to B+ in 2 or more CAN bus wires.

Result

Symptom	Proceed to
The resistance between terminals 6 (CANH) and 16 (BAT), or the resistance between 14 (CANL) and 16 (BAT) is still below 6 kΩ when all the specified connectors are disconnected from the No. 1 CAN J/C. (There is a short to B+ in the CAN main bus wires between the No. 1 CAN J/C and No. 2 CAN J/C.)	**OK**
The resistance between terminals 6 (CANH) and 16 (BAT), or the resistance between 14 (CANL) and 16 (BAT) becomes normal (6 kΩ or more) when a connector is disconnected from the No. 1 CAN J/C. (There is a short to B+ in one of the areas that relate to one or more of the disconnected bus wires.)	**NG**

(c) When there is a short to B+ in one or more of the bus wires that connect to an ECU (or sensor):

(1) Reconnect all of the connectors to the No. 1 CAN J/C, except for the one that was disconnected last (the bus wire that is shorted to B+). Check that the resistance shown on the tester is normal (6 kΩ or more) to confirm that there is a short to B+ in one bus wire only.
HINT:
- The connectors connected to the No. 1 CAN J/C can be distinguished according to the color of the communication bus wires and the shape of the connectors.
- Reconnecting the connectors to non-specified positions on the No. 1 CAN J/C does not affect system operation. However, it is preferred to reconnect the connectors to their specified positions to avoid negative effects on the wiring such as tension on the wiring harnesses, and to make future maintenance easier.

OK → **REPLACE NO. 1 CAN J/C**

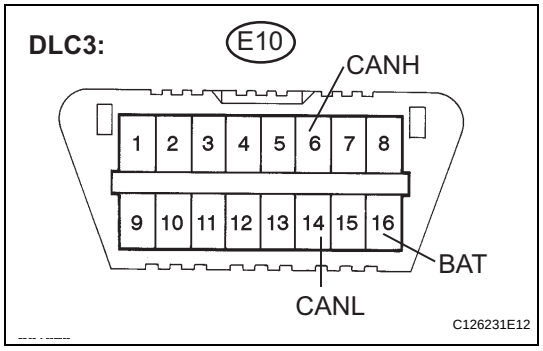
NG

4	RECONNECT CONNECTOR

(a) Reconnect the connector of the bus wire that is shorted to B+ to the No. 1 CAN J/C (the connector that caused the bus wire resistance to change to 6 kΩ or more when it was disconnected).

NEXT

5	CHECK FOR SHORT TO B+ IN CAN BUS WIRE



(a) Disconnect the connector that includes terminals CANH and CANL from the ECU (or sensor) to which the bus wire shorted to B+ is connected. (See page CA-10)
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E10-14 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

HINT:
If the resistance changes to 6 kΩ or higher when the connector is disconnected from the ECU (or sensor), there may be a short in the ECU (or sensor).

NG → **REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR BUS LINE OR CONNECTOR**

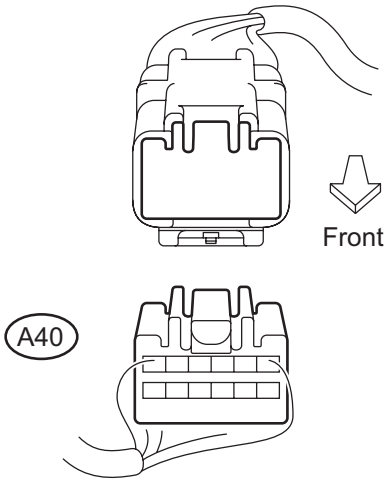
CA

OK

REPLACE CORRESPONDING ECU OR SENSOR

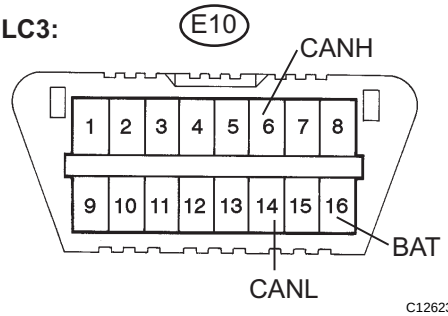
6	CHECK FOR SHORT TO B+ IN CAN BUS WIRE

No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



(a) Reconnect the CAN main bus wire connector (E42) to the No. 1 CAN J/C "A" side (with earth terminal).
(b) Disconnect the No. 2 CAN J/C connector (A40) (front of the vehicle).

DLC3:



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

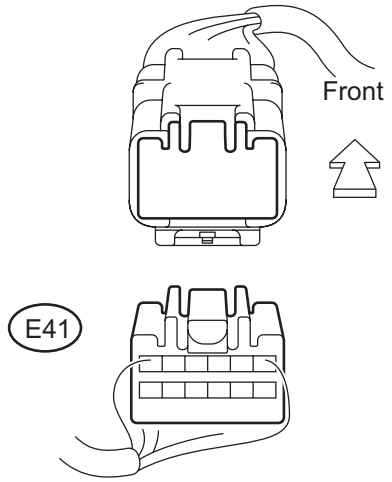
Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E10-14 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

OK → **Go to step 11**

NG

7	CHECK FOR SHORT TO B+ IN CAN BUS WIRE (NO. 1 CAN J/C - NO. 2 CAN J/C)

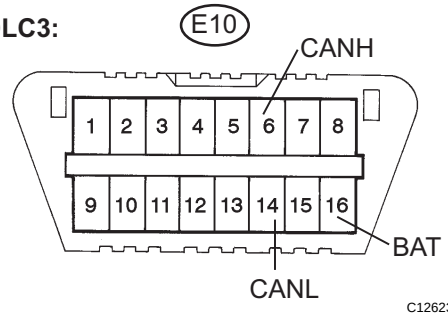
No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E06

(a) Disconnect the No. 2 CAN J/C connector (E41) (rear of the vehicle).

DLC3:



C126231E12

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E10-14 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

HINT:
Measure the resistance with the No. 2 CAN J/C connector (A40) disconnected.

NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE (NO. 1 CAN J/C - NO. 2 CAN J/C)**

OK

8	RECONNECT CONNECTOR

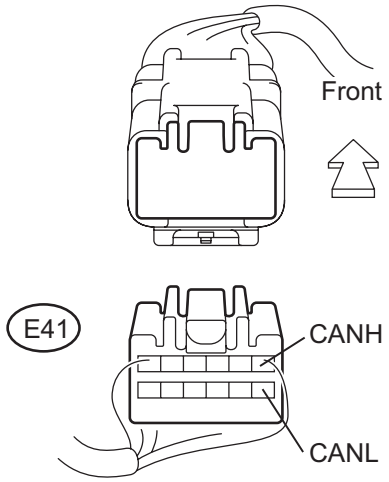
(a) Reconnect the No. 2 CAN J/C connector (A40) (front of the vehicle).

NEXT

CA

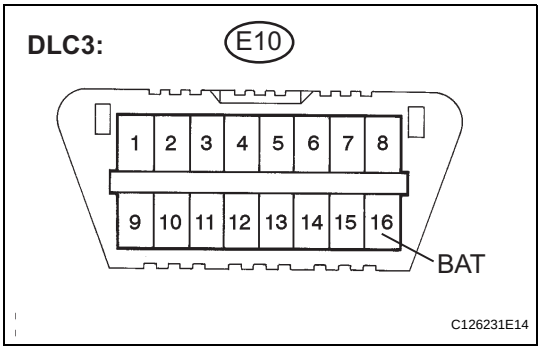
9	CHECK FOR SHORT TO B+ IN CAN BUS WIRE (A/C AMPLIFIER BRANCH WIRE)

No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



(a) Disconnect the No. 2 CAN J/C connector (E41) (rear of the vehicle).

DLC3:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

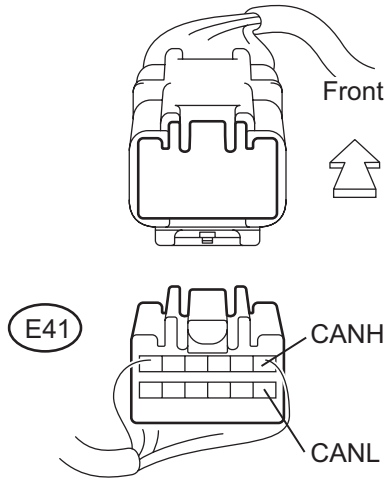
Tester Connection	Condition	Specified Value
E41-1 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E41-7 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

OK → **REPAIR OR REPLACE ACCESSORY GATEWAY BRANCH WIRE OR CONNECTOR**

NG

10	CHECK FOR SHORT TO B+ IN CAN BUS WIRE (A/C AMPLIFIER)

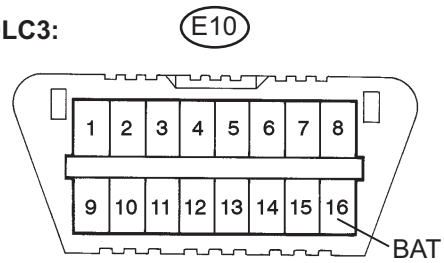
No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E05

(a) Disconnect the A/C amplifier connector (E38).

DLC3:



C126231E14

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E41-1 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
E41-7 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

HINT:
Measure the resistance with the No. 2 CAN J/C connector (E41) disconnected.

NG → **REPAIR OR REPLACE A/C AMPLIFIER BRANCH WIRE OR CONNECTOR**

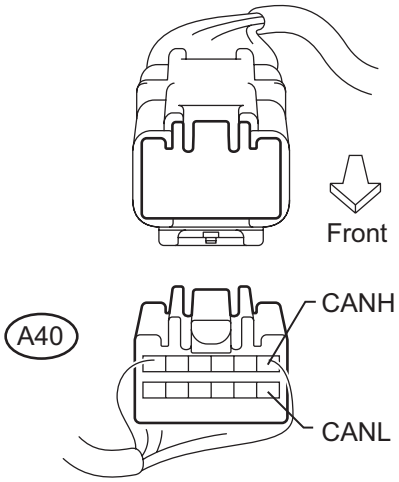
OK

REPLACE A/C AMPLIFIER

CA

11	CHECK FOR SHORT TO B+ IN CAN BUS WIRE (ECM MAIN BUS WIRE)

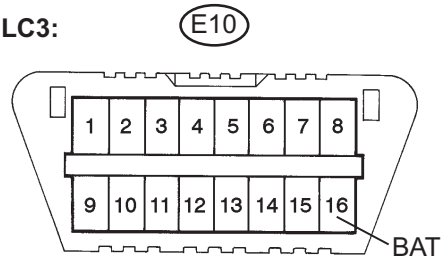
No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E04

(a) Disconnect the No. 2 CAN J/C connector (E40) (front of the vehicle).

DLC3:



C126231E14

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

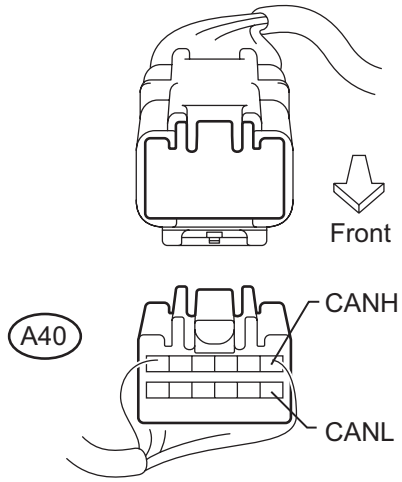
Tester Connection	Condition	Specified Value
A40-1 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
A40-7 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

OK → **Go to step 13**

NG

12	CHECK FOR SHORT TO B+ IN CAN BUS WIRE (ECM)

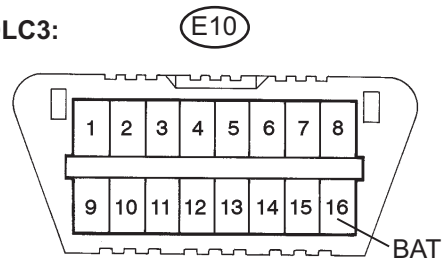
No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E04

(a) Disconnect the ECM connector (A24 or A55).

DLC3:



C126231E14

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A40-1 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
A40-7 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

HINT:
Measure the resistance with the No. 2 CAN J/C connector (A40) disconnected.

NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (ECM - NO. 2 CAN J/C)**

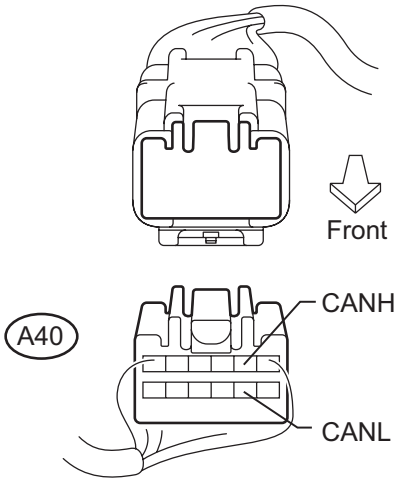
OK

REPLACE ECM

CA

13	CHECK FOR SHORT TO B+ IN CAN BUS WIRE (SKID CONTROL ECU)

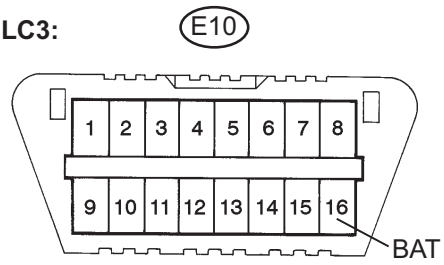
No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E05

(a) Disconnect the skid control ECU connector (A25, A26 or A60).

DLC3:



C126231E14

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A40-2 (CANH) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher
A40-8 (CANL) - E10-16 (BAT)	Ignition switch off	6 kΩ or higher

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

REPAIR OR REPLACE SKID CONTROL ECU BRANCH WIRE OR CONNECTOR

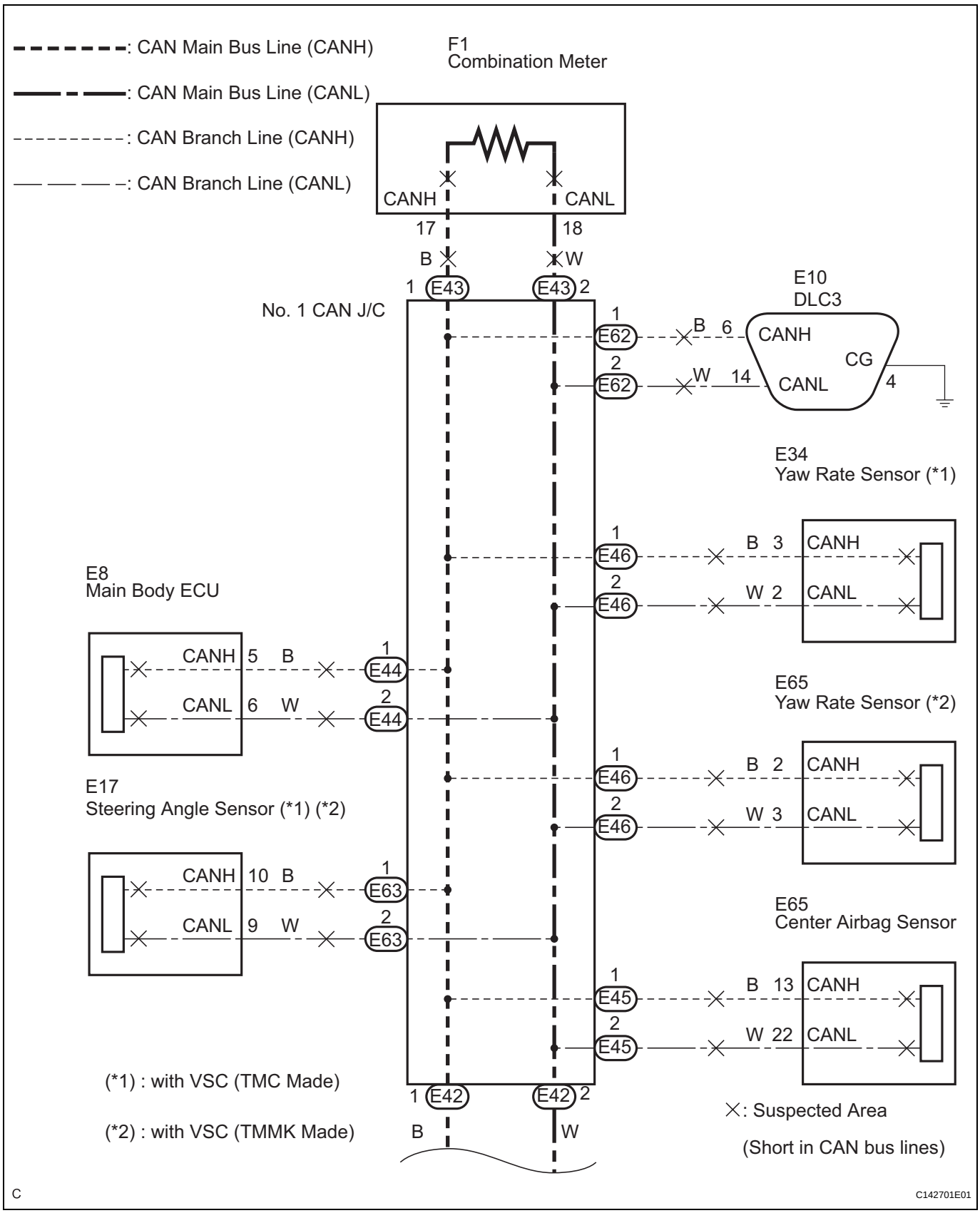
Short to GND in CAN Bus Line

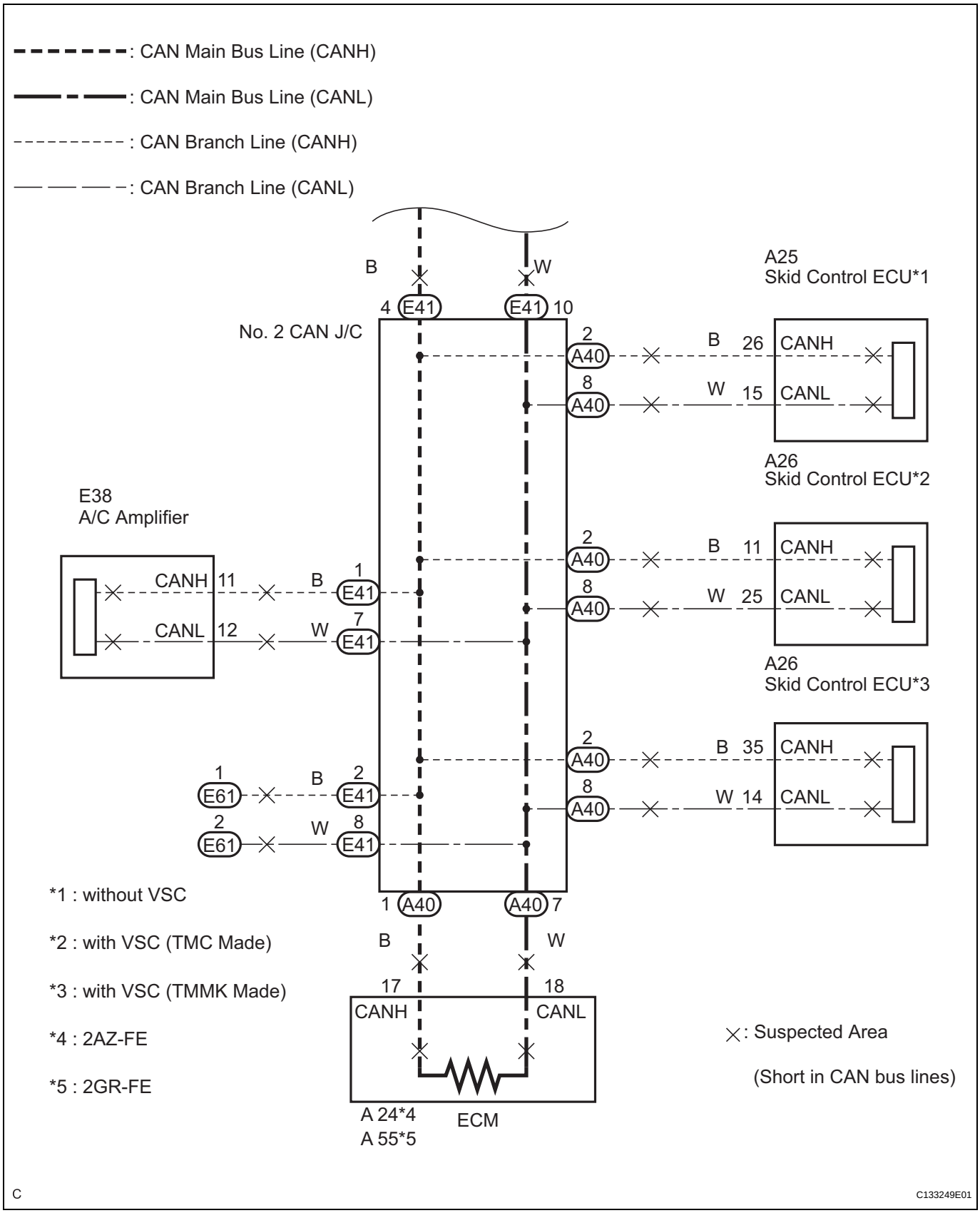
DESCRIPTION

A short to GND is suspected in the CAN bus wire when the resistance between terminals 4 (CG) and 6 (CANH), or terminals 4 (CG) and 14 (CANL) of the DLC3 is below 200 Ω.

Symptoms	Trouble Area
The resistance between terminals 6 (CANH) and 4 (CG), or terminals 14 (CANL) and 4 (CG) of the DLC3 is below 200 Ω.	• Short to GND in CAN bus wire • ECM • Brake actuator assembly (Skid control ECU) • Steering angle sensor • Yaw rate sensor • Main Body ECU • A/C amplifier • Combination meter • Center airbag sensor • No. 1 CAN J/C

WIRING DIAGRAM





INSPECTION PROCEDURE

NOTICE:

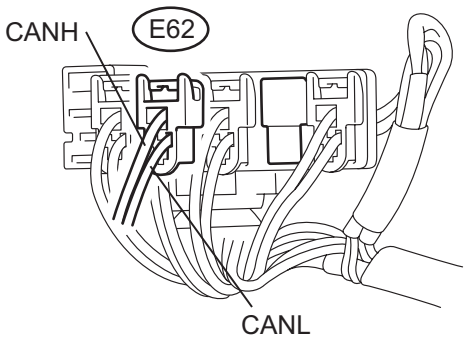
- **Turn the ignition switch off before measuring the resistance of the CAN main wire and CAN branch wires.**

- **After the ignition switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.**
- **Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors. If doors need to be opened in order to check connectors, open the doors and leave them open.**

HINT:
Operating the ignition switch, any other switches or any triggers related ECU and sensor communication on the CAN, which would cause resistance reading variations.

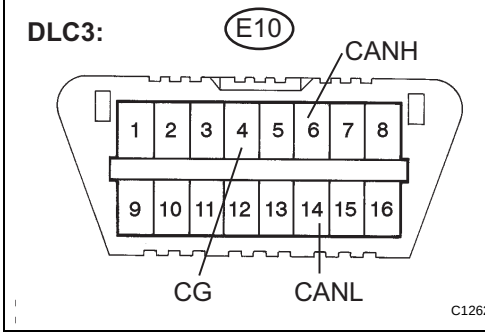
1	CHECK FOR SHORT TO GND IN CAN BUS WIRE (DLC3 BRANCH WIRE)

No. 1 CAN J/C "B" Side (without Earth Terminal) Wire Harness Side:



(a) Turn the ignition switch off.
(b) Disconnect the DLC3 branch wire gray connector (E62) from the No. 1 CAN J/C "B" side (without earth terminal).
NOTICE:
- **Before disconnecting the connector, make a note of where it is connected.**
- **Reconnect the connector to its original position.**

DLC3:



(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
E10-14 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

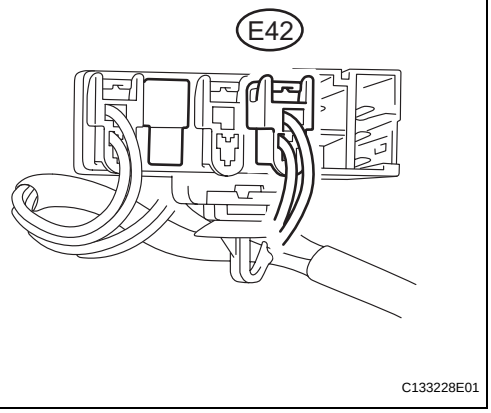
(d) Reconnect the DLC3 branch wire connector (E62) to the No. 1 CAN J/C "B" side (without earth terminal).

NG → **REPAIR OR REPLACE DLC3 BRANCH WIRE OR CONNECTOR**

OK

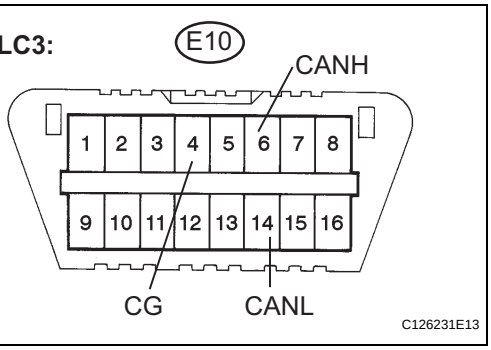
2 CHECK FOR SHORT TO GND IN CAN BUS WIRE (NO. 1 CAN J/C SIDE)

No. 1 CAN J/C "A" Side (with Earth Terminal):



(a) Disconnect the CAN main bus wire white connector (E42) from the No. 1 CAN J/C "A" side (with earth terminal).

DLC3:



(b) Measure the resistance between terminals 6 (CANH) and 4 (CG), and between terminals 14 (CANL) and 4 (CG) of the DLC3 each time a connector is disconnected.

Standard resistance

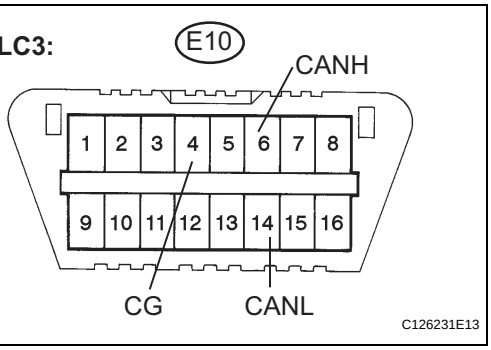
Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
E10-14 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

OK → **Go to step 6**

NG

3 CHECK FOR SHORT TO GND IN CAN BUS WIRE

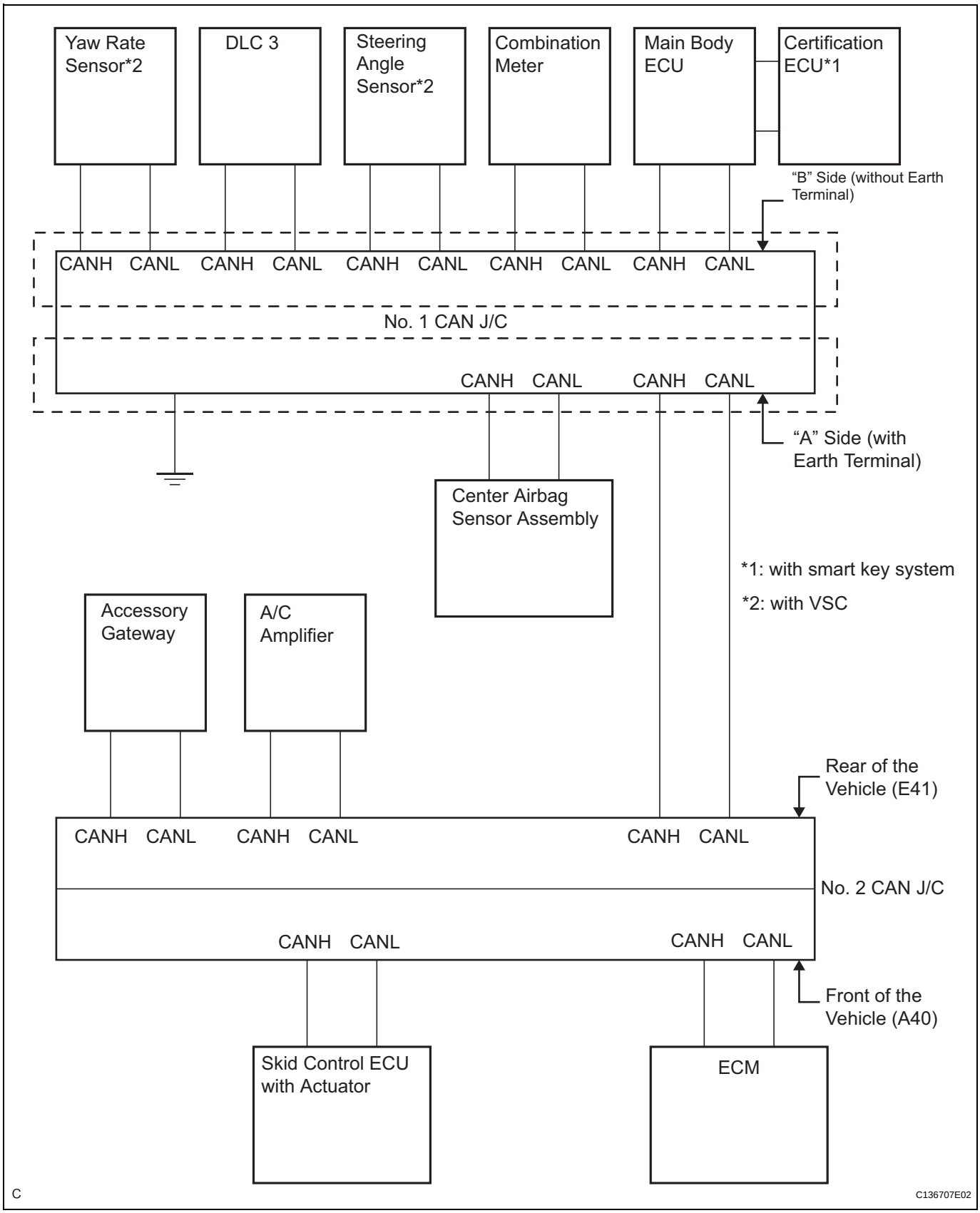
DLC3:



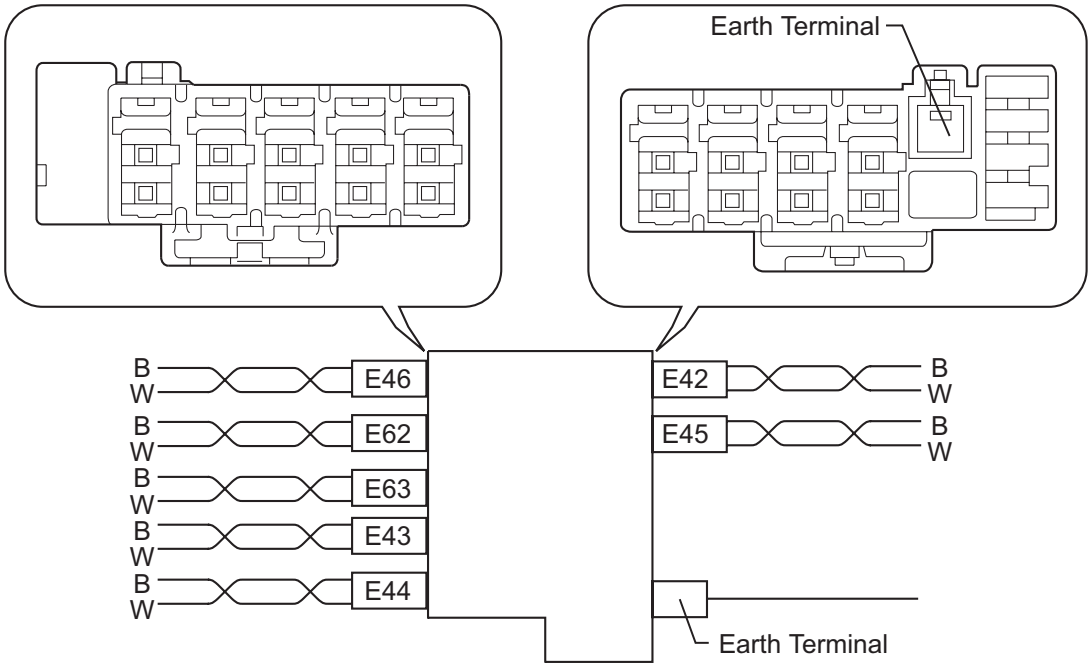
(a) Disconnect connectors from the No. 1 CAN J/C one at a time.
HINT:
Disconnect the ECU and sensor connectors other than the DLC3 branch wires and CAN main bus lines between the No. 1 CAN J/C.

(b) Measure the resistance between terminals 6 (CANH) and 4 (CG), and between terminals 14 (CANL) and 4 (CG) of the DLC3 each time a connector is disconnected.

CA


Yaw Rate Sensor*2
DLC 3
Steering Angle Sensor*2
Combination Meter
Main Body ECU
Certification ECU*1
"B" Side (without Earth Terminal)
CANH CANL CANH CANL CANH CANL CANH CANL CANH CANL
No. 1 CAN J/C
CANH CANL CANH CANL
"A" Side (with Earth Terminal)
Center Airbag Sensor Assembly
*1: with smart key system
*2: with VSC
Accessory Gateway
A/C Amplifier
Rear of the Vehicle (E41)
CANH CANL CANH CANL CANH CANL
No. 2 CAN J/C
CANH CANL CANH CANL
Front of the Vehicle (A40)
Skid Control ECU with Actuator
ECM
C
C136707E02

No. 1 CAN J/C "B" side (without Earth Terminal): **No. 1 CAN J/C "A" side (with Earth Terminal):**



No. 1 CAN J/C connectors ("A" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Airbag Sensor Assembly Center (E45)	Black	B	W

No. 1 CAN J/C connectors ("A" side, with earth terminal)	Connector Color	Wire Color (CAN-H)	Wire Color (CAN-L)
Yaw Rate Sensor* (E46)	Blue	B	W
Steering Angle Sensor* (E63)	Brown	B	W
Combination Meter (E43)	White	B	W
Main Body ECU (E44)	Black	B	W

*: with VSC

NOTICE:

Do not reconnect the disconnected connectors until this inspection is complete because there may be a short to GND in 2 or more CAN bus wires.

Result

Symptom	Proceed to
The resistance between terminals 6 (CANH) and 4 (CG), or the resistance between 14 (CANL) and 4 (CG) is still below 200 Ω when all the specified connectors are disconnected from the No. 1 CAN J/C. (There is a short to GND in the CAN main bus wires between the No. 1 CAN J/C and No. 2 CAN J/C.)	**A**
The resistance between terminals 6 (CANH) and 4 (CG), or the resistance between 14 (CANL) and 4 (CG) becomes normal (200 Ω or more) when a connector is disconnected from the CAN J/C. (There is a short to GND in one of the areas that relate to the disconnected bus wires.)	**B**

(c) When there is a short to GND in one or more of the bus wires that connect to an ECU (or sensor):

(1) Reconnect all of the connectors to the No. 1 CAN J/C, except for the one that was disconnected last (the bus wire that is shorted to GND). Check that the resistance shown on the tester is normal (200 Ω or more) to confirm that there is a short to GND in one branch wire only.
HINT:
- The connectors connected to the No. 1 CAN J/C can be distinguished according to the color of the communication bus wires and the shape of the connectors.
- Reconnecting the connectors to non-specified positions on the No. 1 CAN J/C does not affect system operation. However, it is preferred to reconnect the connectors to their specified positions to avoid negative effects on the wiring such as tension on the wiring harnesses, and to make future maintenance easier.

A → **REPLACE NO. 1 CAN J/C**

CA

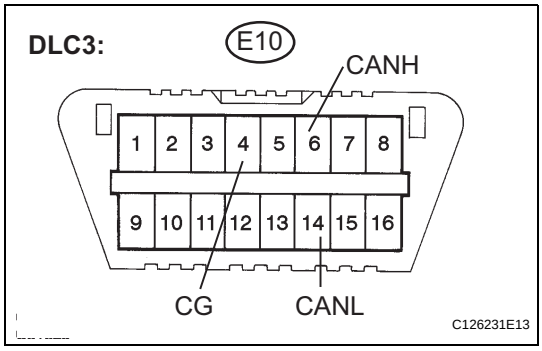
B

4	RECONNECT CONNECTOR

(a) Reconnect the connector of the bus wire that is shorted to GND to the No. 1 CAN J/C (the connector that caused the bus wire resistance to change to 200 Ω or more when it was disconnected).

NEXT

5	CHECK FOR SHORT TO GND IN CAN BUS WIRE



(a) Disconnect the connector that includes terminals CANH and CANL from the ECU (or sensor) to which the bus wire shorted to GND is connected (See page CA-10).
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
E10-14 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

HINT:
If the resistance changes to 200 Ω or higher when the connector is disconnected from the ECU (or sensor), there may be a short in the ECU (or sensor).

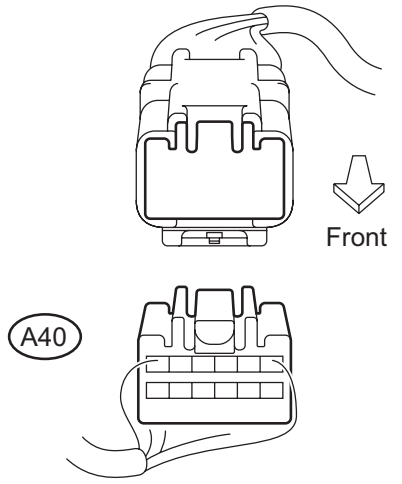
NG → **REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR BUS LINE OR CONNECTOR**

OK

REPLACE CORRESPONDING ECU OR SENSOR

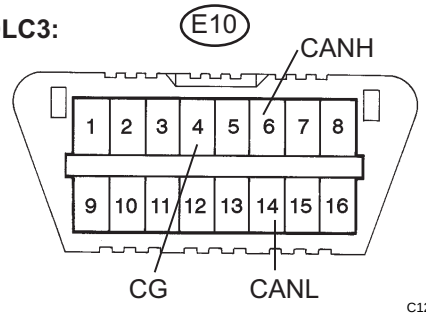
6 CHECK FOR SHORT TO GND IN CAN BUS WIRE

No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



(a) Reconnect the CAN main bus line connector (E42) to the No. 1 CAN J/C "A" side (with earth terminal).
(b) Disconnect the No. 2 CAN J/C connector (A40) (front of the vehicle).

DLC3:



(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E10-6 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
E10-14 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

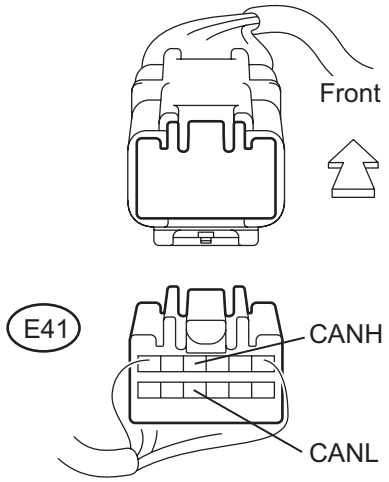
OK → **Go to step 11**

NG

CA

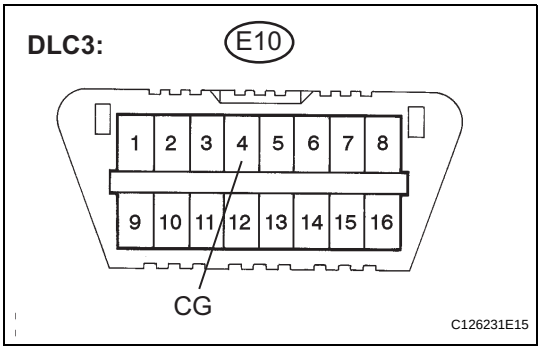
7	CHECK FOR SHORT TO GND IN CAN BUS WIRE (NO. 1 CAN J/C - NO. 2 CAN J/C)

No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



(a) Disconnect the No. 2 CAN J/C connector (E41) (rear of the vehicle).

DLC3:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E41-4 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
E41-10 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (NO. 1 CAN J/C - NO. 2 CAN J/C)**

OK

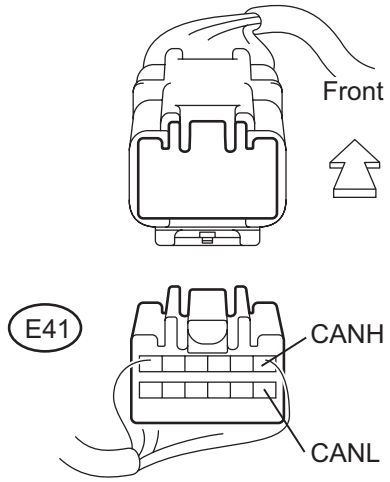
8	RECONNECT CONNECTOR

(a) Reconnect the No. 2 CAN J/C connector (A40) (front of the vehicle).

NEXT

9	CHECK FOR SHORT TO GND IN CAN BUS WIRE (A/C AMPLIFIER BRANCH WIRE)

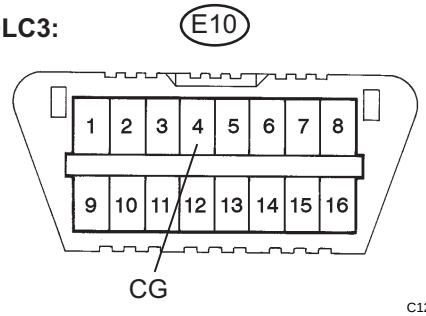
No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E05

(a) Disconnect the No. 2 CAN J/C connector (E41) (rear of the vehicle).

DLC3:



C126231E15

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E41-1 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
E41-7 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

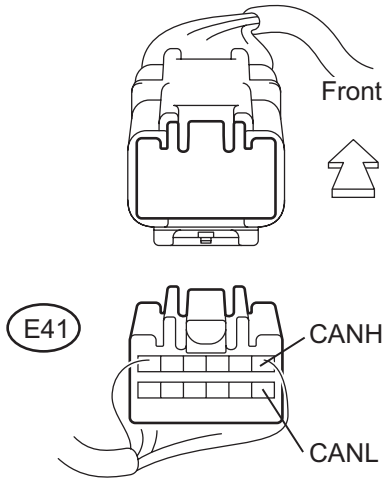
NG

OK → **REPAIR OR REPLACE ACCESSORY GATEWAY BRANCH WIRE OR CONNECTOR**

CA

10	CHECK FOR SHORT TO GND IN CAN BUS WIRE (A/C AMPLIFIER)

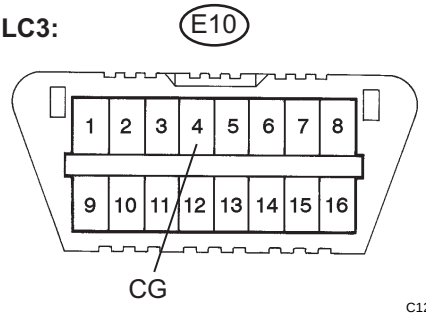
No. 2 CAN J/C Connector (Rear of the Vehicle) Wire Harness Side View:



C133246E05

(a) Disconnect the A/C amplifier connector (E38).

DLC3:



C126231E15

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
E41-1 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
E41-7 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

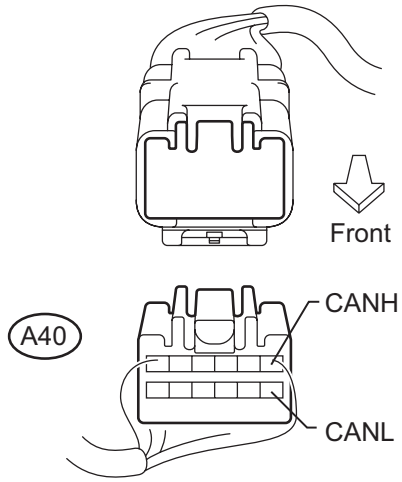
NG → **REPAIR OR REPLACE A/C AMPLIFIER BRANCH WIRE OR CONNECTOR**

OK

REPLACE A/C AMPLIFIER

11	CHECK FOR SHORT TO GND IN CAN BUS WIRE (ECM MAIN BUS WIRE)

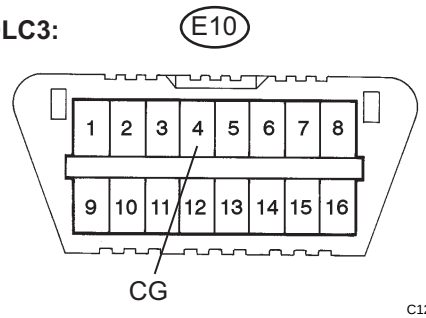
No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E04

(a) Disconnect the No. 2 CAN J/C connector (A40) (front of the vehicle).

DLC3:



C126231E15

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A40-1 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
A40-7 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

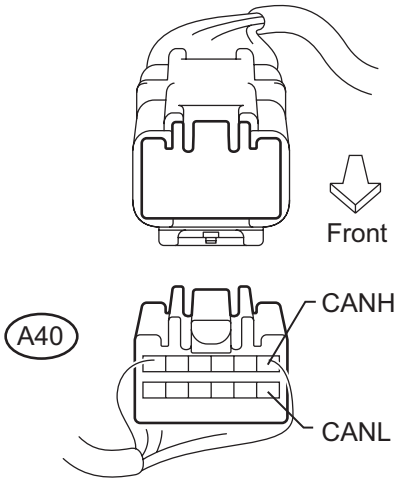
OK → **Go to step 13**

NG

CA

12	CHECK FOR SHORT TO GND IN CAN BUS WIRE (ECM)

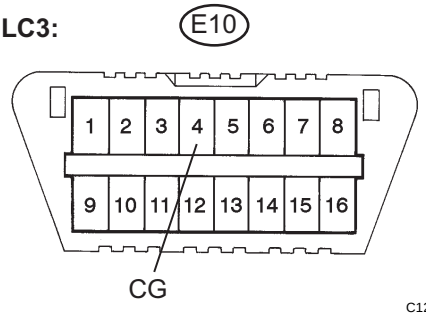
No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E04

(a) Disconnect the ECM connector (A24 or A55).

DLC3:



C126231E15

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A40-1 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
A40-7 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

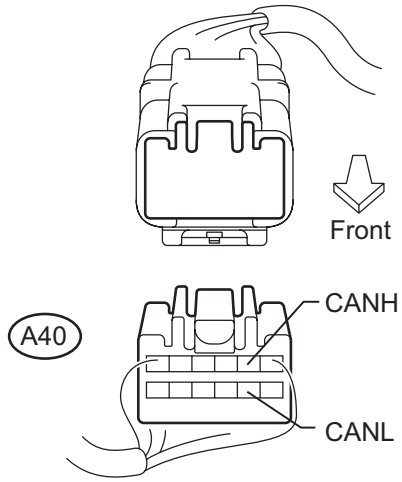
NG → **REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (ECM - NO. 2 CAN J/C)**

OK

REPLACE ECM

13	CHECK FOR SHORT TO GND IN CAN BUS WIRE (SKID CONTROL ECU)

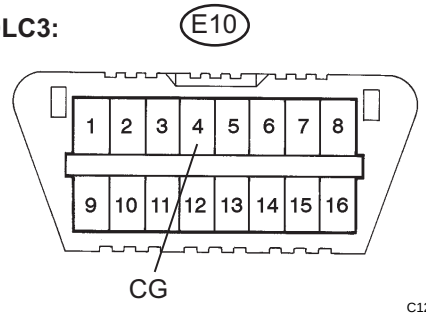
No. 2 CAN J/C Connector (Front of the Vehicle) Wire Harness Side View:



C133245E05

(a) Disconnect the skid control ECU connector (A25, A26 or A60).

DLC3:



C126231E15

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Value
A40-2 (CANH) - E10-4 (CG)	Ignition switch off	200 Ω or higher
A40-8 (CANL) - E10-4 (CG)	Ignition switch off	200 Ω or higher

OK → **REPLACE BRAKE ACTUATOR ASSEMBLY**

NG

REPAIR OR REPLACE SKID CONTROL ECU BRANCH WIRE OR CONNECTOR

CA

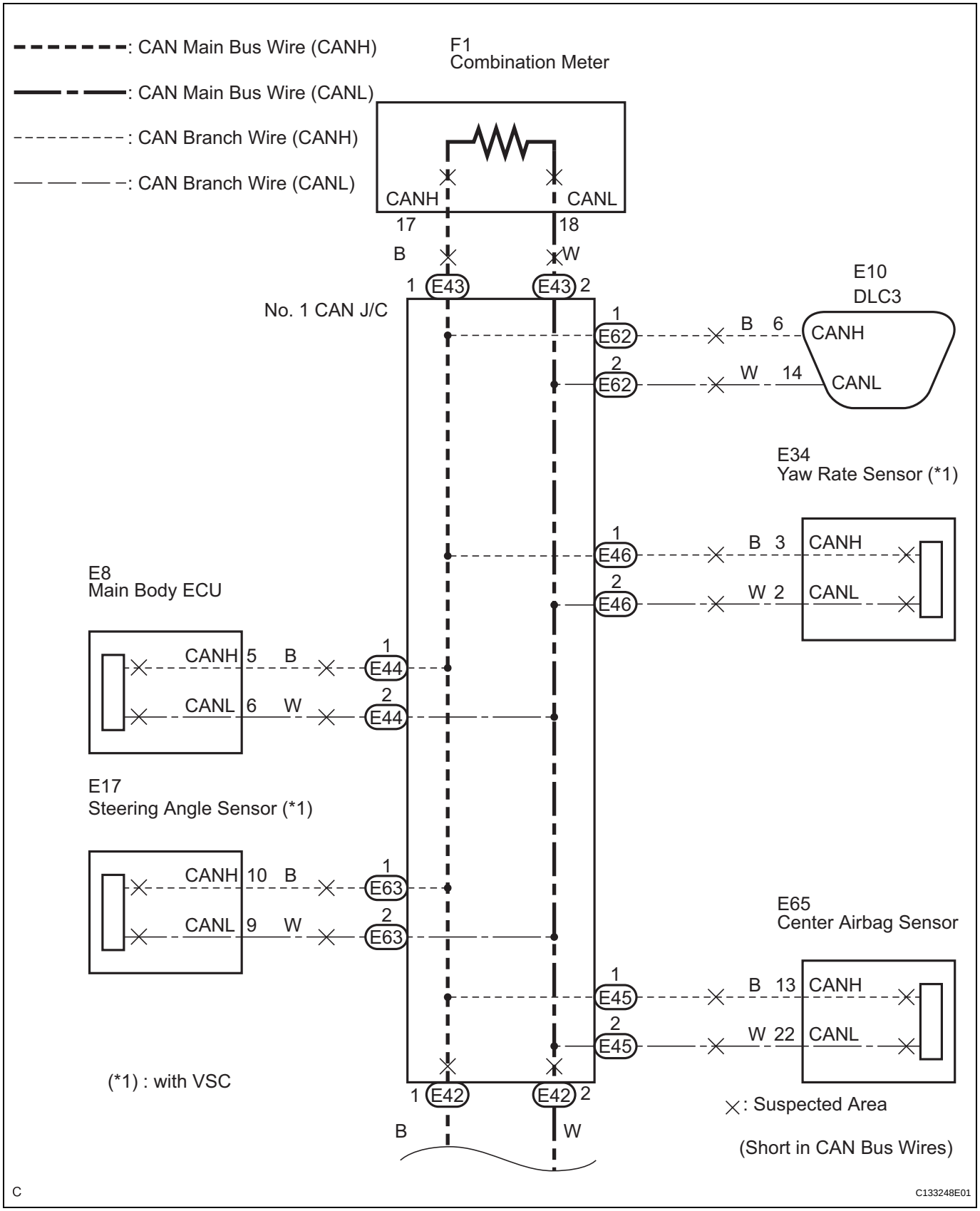
Open in One Side of CAN Branch Line

DESCRIPTION

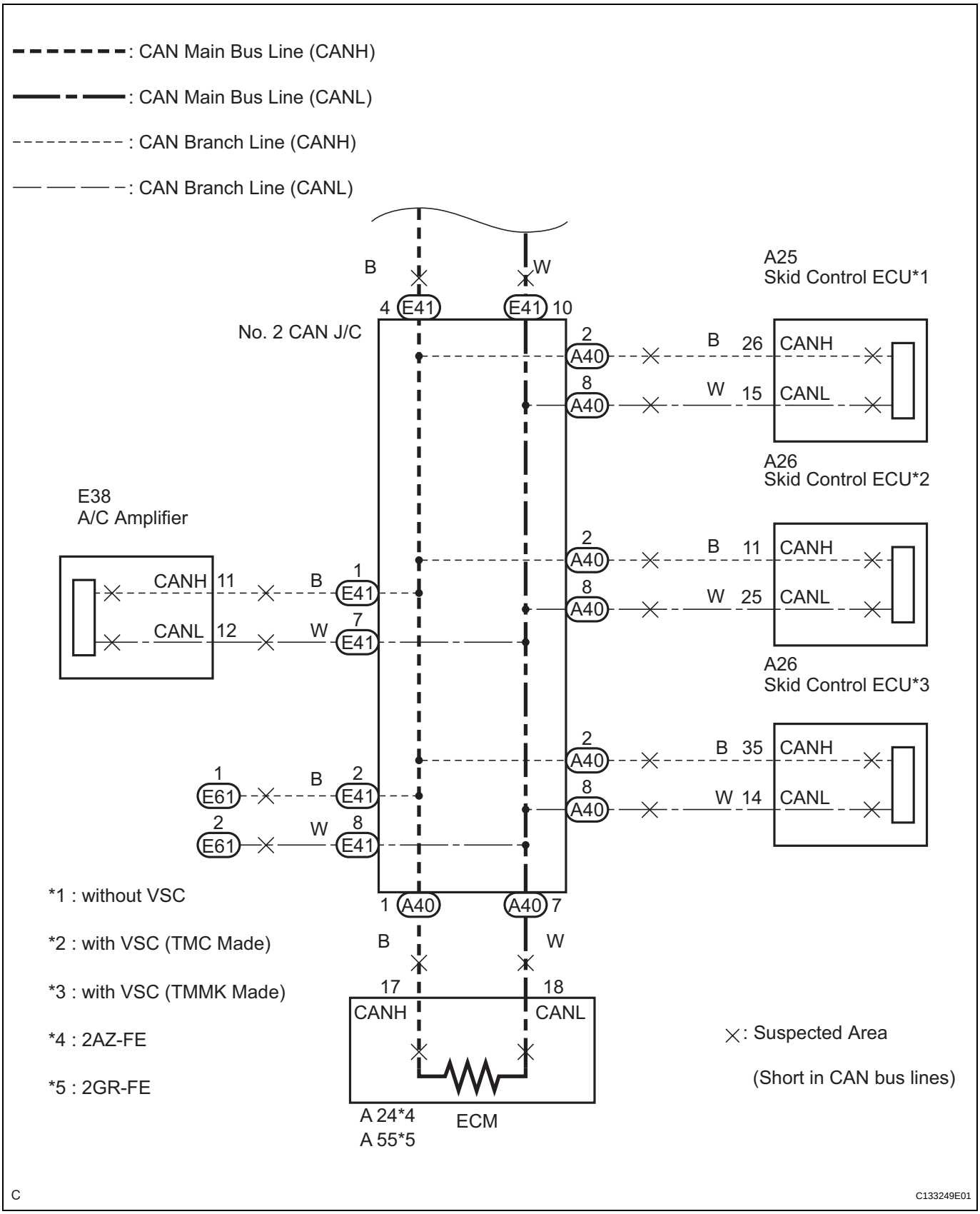
If 2 or more ECUs and/or sensors do not appear on the intelligent tester "Communication Bus Check" screen, one side of the CAN branch line may be open. (One side of the CAN-H [branch line] / CAN-L [branch line] of the ECU and/or sensor is open.)

Symptom	Trouble Area
2 or more ECUs and/or sensors do not appear on the intelligent tester "Communication Bus Check" screen.	• One side of the CAN branch line is open • Steering angle sensor • Skid control ECU • ECM • Yaw rate sensor • Main body ECU • A/C amplifier • Center airbag sensor • Combination meter

WIRING DIAGRAM



CA


: CAN Main Bus Line (CANH)
: CAN Main Bus Line (CANL)
: CAN Branch Line (CANH)
: CAN Branch Line (CANL)
B
W
4 E41
E41 10
No. 2 CAN J/C
2 A40
8 A40
A25
Skid Control ECU*1
B 26 CANH
W 15 CANL
A26
Skid Control ECU*2
E38
A/C Amplifier
CANH 11
CANL 12
B
W
1 E41
7 E41
2 A40
8 A40
B 11 CANH
W 25 CANL
A26
Skid Control ECU*3
1 E61
2 E61
2 E41
8 E41
B 35 CANH
W 14 CANL
1 A40
A40 7
17
18
CANH
CANL
A 24*4
A 55*5
ECM
*1 : without VSC
*2 : with VSC (TMC Made)
*3 : with VSC (TMMK Made)
*4 : 2AZ-FE
*5 : 2GR-FE
: Suspected Area
(Short in CAN bus lines)
C
C133249E01

INSPECTION PROCEDURE

HINT:
Perform the following inspection for the ECUs (sensors) which are not displayed on the intelligent tester. If the malfunction cannot be identified, then perform the following inspections for the ECUs (sensors) connected to CAN communication.

1	CHECK FOR OPEN IN ONE SIDE OF CAN BRANCH WIRE

(a) Confirm the systems (ECUs and sensors), which use CAN communication, equipped on the vehicle. (See page CA-25)
(b) Using the intelligent tester, select and perform "Communication Bus Check". (See page CA-25) [*1]
(c) Disconnect the connectors from the ECUs or sensors that are not displayed on the screen. [*2]
(d) Check that only the ECUs and sensors from which the connectors were disconnected in the previous step are not displayed on the "Communication Bus Check" screen. [*3]
HINT:
If any ECUs or sensors, other than those from which the connectors were disconnected in the previous step, are not displayed on the "Communication Bus Check" screen, reconnect the disconnected connectors and repeat the procedures [*1], [*2], and [*3].
(e) Perform the communication stop mode check for the ECUs and sensors which correspond to the disconnected connectors. (See page CA-10)

NEXT

GO TO CORRESPONDING COMMUNICATION STOP MODE

CA

CLUTCH SYSTEM

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the ranked order of probability of each of the possible causes. Check each part in order. Replace parts as necessary.

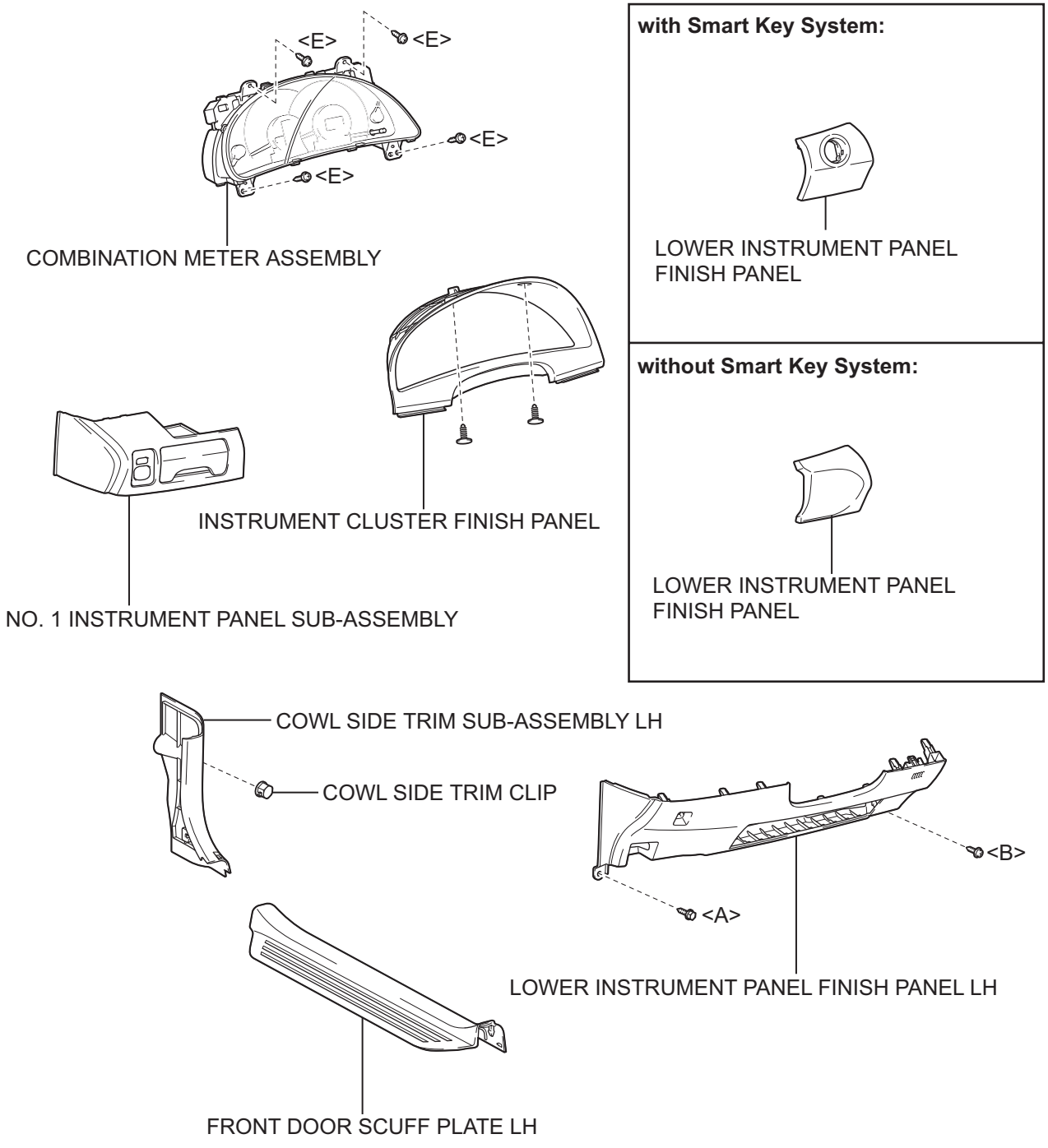
CLUTCH SYSTEM

Symptom	Suspected area	See page
Clutch grabs/chatters	1. Engine mounting (Loosen)	-
	2. Clutch disc (Runout is excessive)	CL-32
	3. Clutch disc (Oily)	CL-32
	4. Clutch disc (Worn out)	CL-32
	5. Clutch disc torsion rubber (Damaged)	CL-32
	6. Clutch disc (Glazed)	CL-32
	7. Diaphragm spring (Out of tip alignment)	CL-32
Clutch pedal is spongy	1. Clutch Line (Air in line)	CL-25
	2. Master cylinder cup (Damaged)	CL-15
	3. Release cylinder rubber (Damaged)	CL-24
Clutch is noisy	1. Release bearing (Worn, dirty, or damaged)	CL-33
Clutch slips	1. Clutch pedal (Free play is out of adjustment)	CL-4
	2. Clutch disc (Oily)	CL-32
	3. Clutch disc (Worn out)	CL-32
	4. Diaphragm spring (Damaged)	CL-33
	5. Pressure plate (Distortion)	CL-32
	6. Flywheel (Distortion)	CL-33
Clutch does not disengage	1. Clutch pedal (Free play is out of adjustment)	CL-4
	2. Clutch line (Air in line)	CL-25
	3. Master cylinder cup (Damaged)	CL-15
	4. Release cylinder cup (Damaged)	CL-24
	5. Clutch disc (Out of true)	CL-32
	6. Clutch disc (Runout is excessive)	CL-32
	7. Clutch disc (Lining broken)	CL-32
	8. Clutch disc (Dirty or burned)	CL-32
	9. Clutch disc (Oily)	CL-32
	10. Clutch disc (Lack of spline grease)	CL-32

CLUTCH PEDAL

COMPONENTS

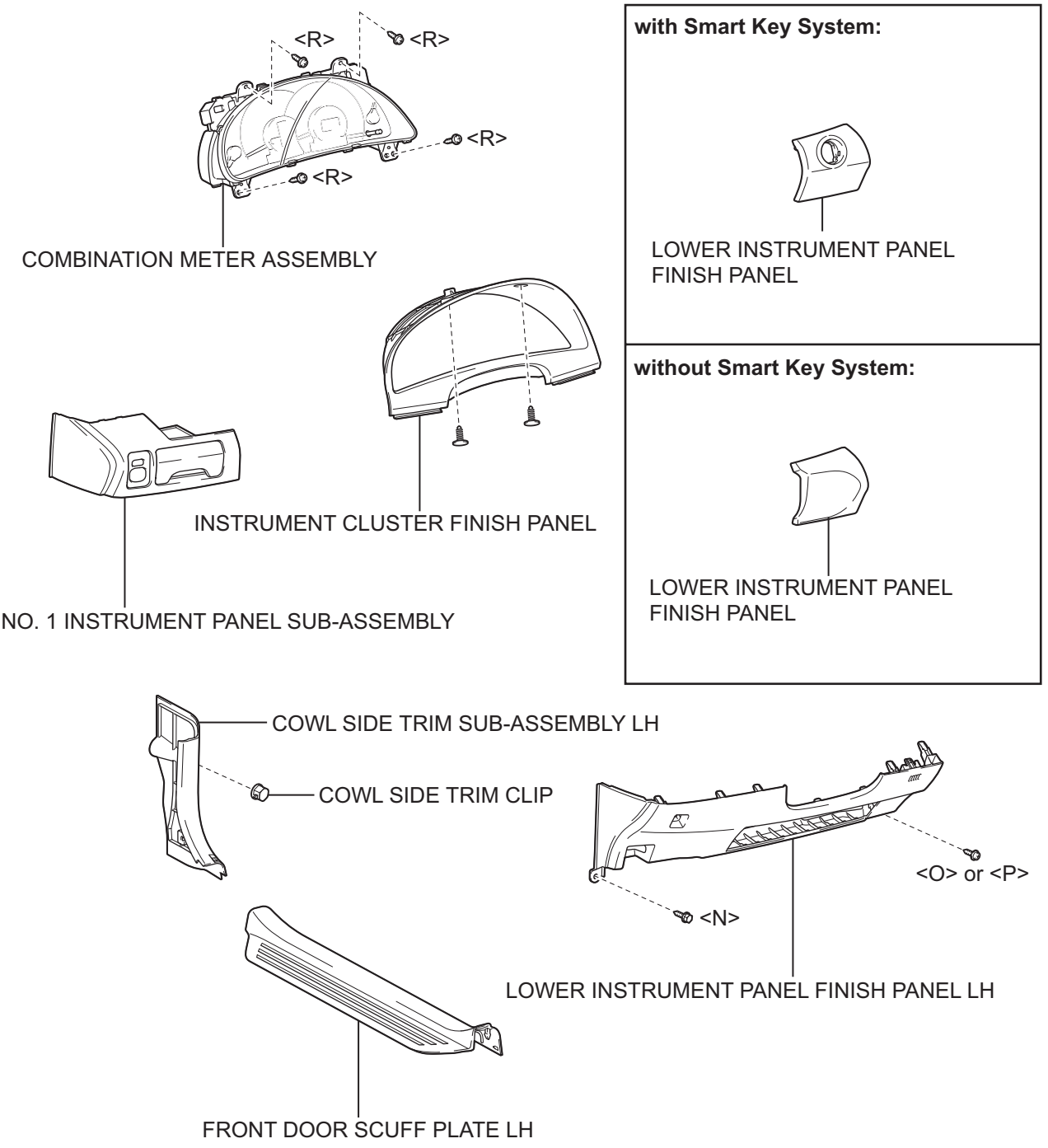
for TMC Made:



P

C138372E01

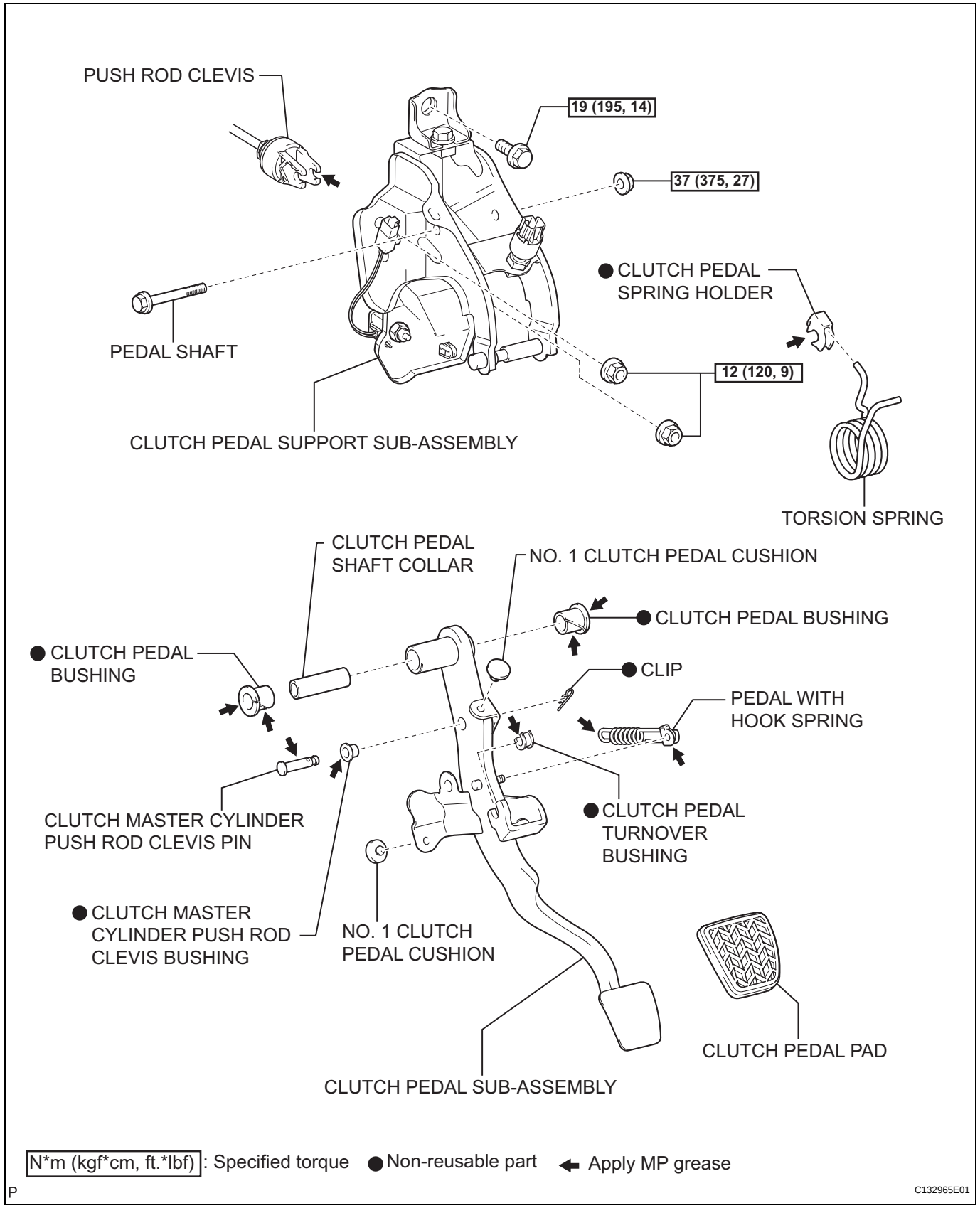
for TMMK Made:



P

C138372E02

CL



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ← Apply MP grease

P

C132965E01

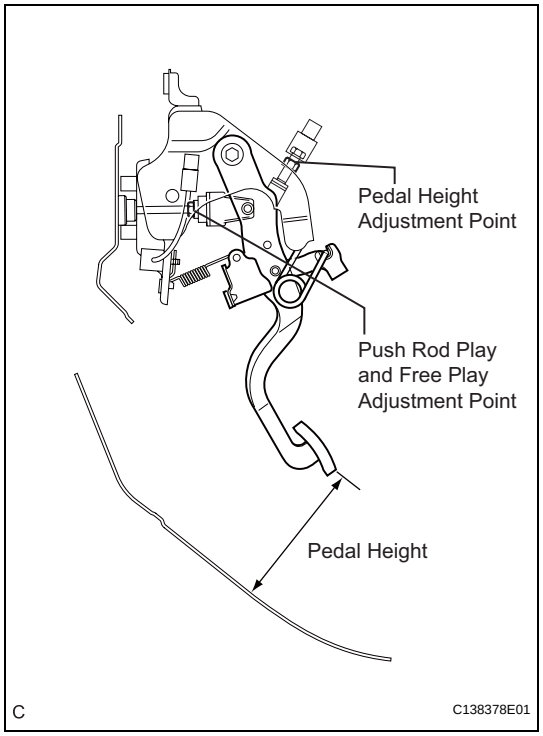
ON-VEHICLE INSPECTION

1. INSPECT AND ADJUST CLUTCH PEDAL HEIGHT

(a) Turn back the floor carpet.

(b) Check the pedal height.
Pedal height from asphalt sheet:
148.0 to 158.0 mm (5.8268 to 6.2205 in.)
If necessary, adjust the pedal height.

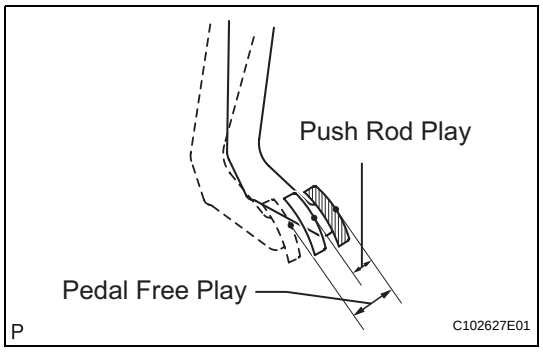
(c) Adjust the pedal height.
(1) Loosen the lock nut and turn the clutch switch until the height is correct. Tighten the lock nut.
Torque: 16 N*m (160 kgf*cm, 12 ft.*lbf)



2. INSPECT CLUTCH PEDAL FREE PLAY AND PUSH ROD PLAY

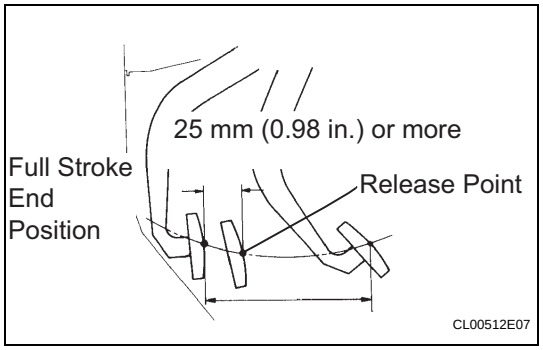
(a) Check that the pedal free play and push rod play are correct.
(1) Depress the pedal until clutch resistance is felt.
Pedal free play:
5.0 to 15.0 mm (0.197 to 0.591 in.)
(2) Gently depress the pedal until the resistance begins to increase a little.
Push rod play at pedal top:
1.0 to 5.0 mm (0.039 to 0.197 in.)

(b) Adjust the pedal free play and push rod play.
(1) Loosen the lock nut and turn the push rod until the free play and push rod play are correct.
(2) Tighten the lock nut.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)
(3) After adjusting the pedal free play, check the pedal height.



3. INSPECT CLUTCH RELEASE POINT

(a) Check the clutch release point.
(1) Pull the parking brake lever and install the wheel stopper.
(2) Start and idle the engine.
(3) Without depressing the clutch pedal, slowly move the shift lever to the reverse position until the gears are engaged.



(4) Gradually depress the clutch pedal and measure the stroke distance from the point that the gear noise stops (release point) to the full stroke end position.

Standard distance:

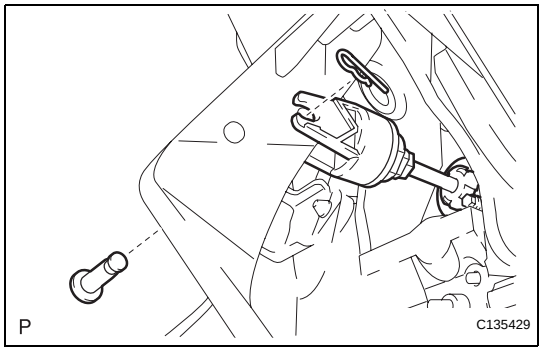
25 mm (0.98 in.) or more (From pedal stroke end position to release point)

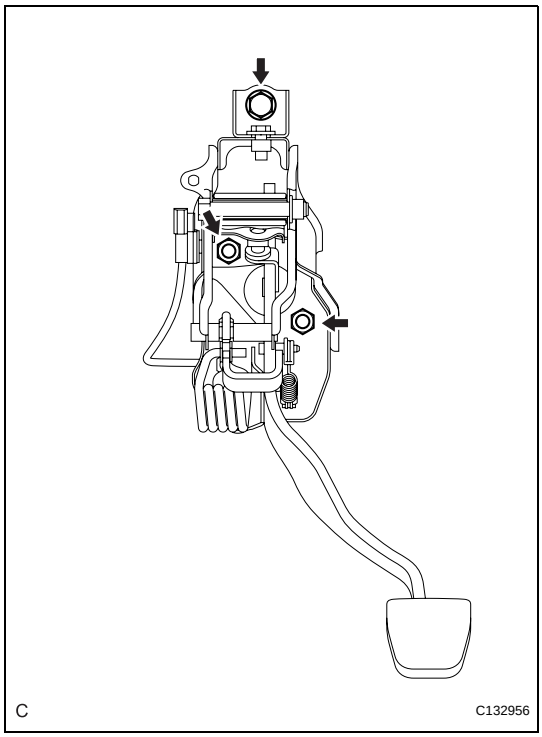
If the distance is not as specified, perform the following operations:

- Check the pedal height.
- Check push rod play and pedal free play.
- Bleed the clutch line.
- Check the clutch cover assembly and disc assembly.

REMOVAL

1. **PRECAUTION**
   See page IP-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
4. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
7. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
9. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
10. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)**
11. **REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)**
12. **REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)**
13. **DISCONNECT CONNECTORS**
    (a) Disconnect the clutch start switch connector.
    (b) Disconnect the clutch switch connector (with cruise control).
14. **REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS PIN**
    (a) Remove the clip and pin.





15. REMOVE CLUTCH PEDAL SUPPORT SUB-ASSEMBLY

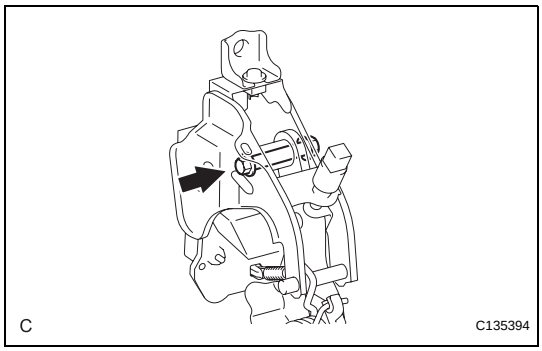
(a) Remove the bolt, 2 nuts and clutch pedal support assembly.

16. REMOVE TORSION SPRING

(a) While the clutch pedal is fully depressed, remove the torsion spring.

17. REMOVE PEDAL WITH HOOK SPRING

(a) Remove the pedal with hook spring.



18. REMOVE CLUTCH PEDAL SUB-ASSEMBLY

(a) Remove the pedal shaft and nut.

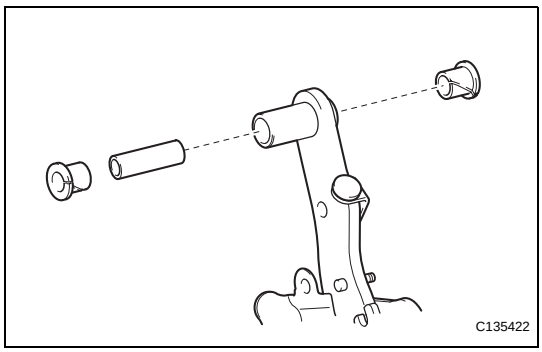
(b) Remove the clutch pedal from the clutch pedal support.

19. REMOVE CLUTCH PEDAL SPRING HOLDER

(a) Remove the clutch pedal spring holder from the clutch pedal support.

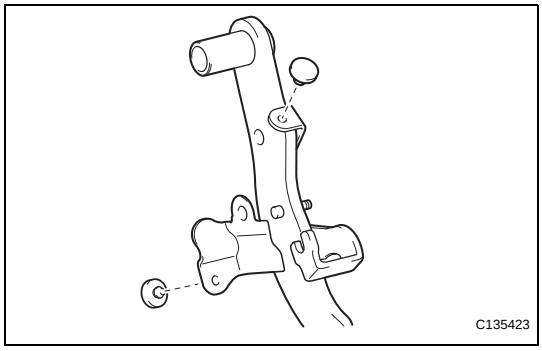
20. REMOVE CLUTCH PEDAL PAD

(a) Remove the clutch pedal pad from the clutch pedal.



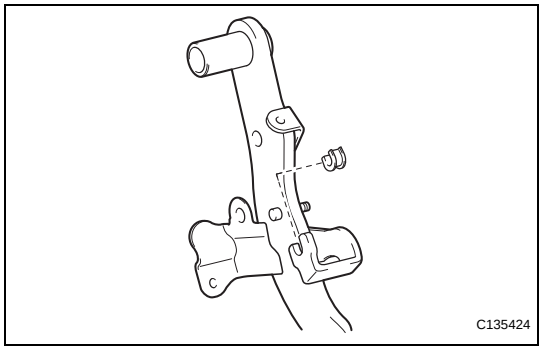
21. REMOVE CLUTCH PEDAL BUSHING

(a) Remove the 2 pedal bushings and pedal shaft collar from the clutch pedal.



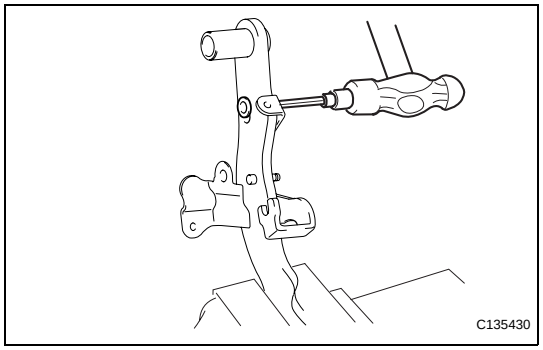
22. REMOVE NO. 1 CLUTCH PEDAL CUSHION

(a) Using needle-nose pliers, remove the 2 No. 1 clutch pedal cushions from the clutch pedal.



23. REMOVE CLUTCH PEDAL TURNOVER BUSHING

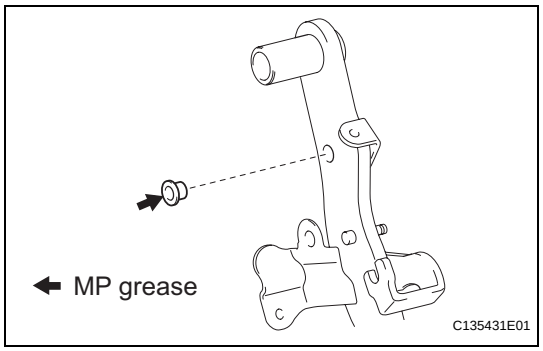
(a) Remove the turnover bushing from the clutch pedal.



24. REMOVE CLUTCH MASTER CYLINDER PUSH ROD CLEVIS BUSHING

(a) Using an 8 mm hexagon wrench and a hammer, remove the clevis bushing from the clutch pedal.

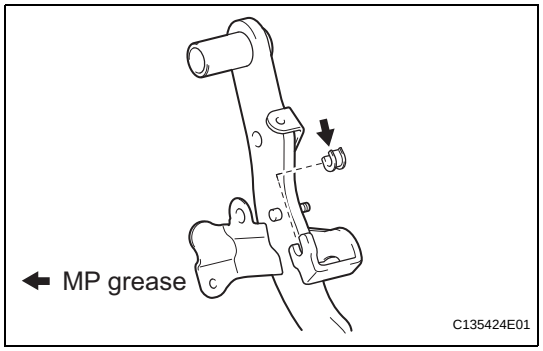
INSTALLATION



1. INSTALL CLUTCH MASTER CYLINDER PUSH ROD CLEVIS BUSHING

(a) Apply MP grease to the inside of a new clevis bushing.

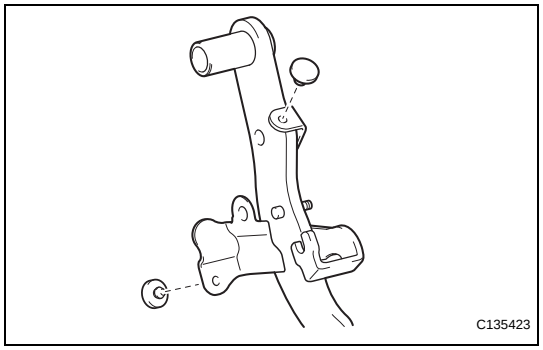
(b) Install the clevis bushing to the clutch pedal.
HINT:
Install the clevis bushing from the left side of the vehicle.



2. INSTALL CLUTCH PEDAL TURNOVER BUSHING

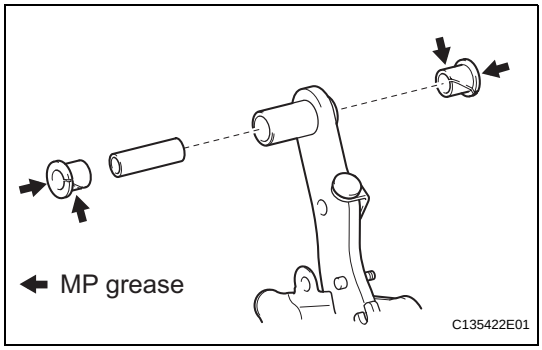
(a) Apply MP grease to the inside of the turnover bushing.

(b) Install the turnover bushing to the clutch pedal.



3. INSTALL NO. 1 CLUTCH PEDAL CUSHION

(a) Using needle-nose pliers, install the 2 No. 1 clutch pedal cushions to the clutch pedal.



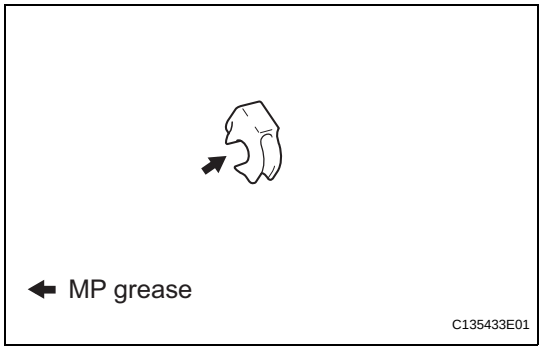
4. INSTALL CLUTCH PEDAL BUSHING

(a) Apply MP grease to the inner, outer and end surfaces of 2 new pedal bushings.

(b) Install the clutch pedal shaft collar and 2 pedal bushings to the clutch pedal.

5. INSTALL CLUTCH PEDAL PAD

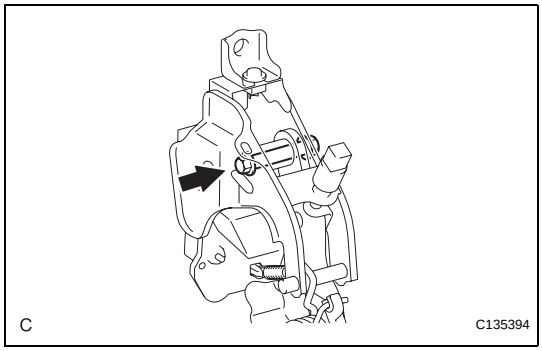
(a) Install the clutch pedal pad to the clutch pedal.



6. INSTALL CLUTCH PEDAL SPRING HOLDER

(a) Apply MP grease to the inside of a new clutch pedal spring holder.

(b) Install the clutch pedal spring holder.



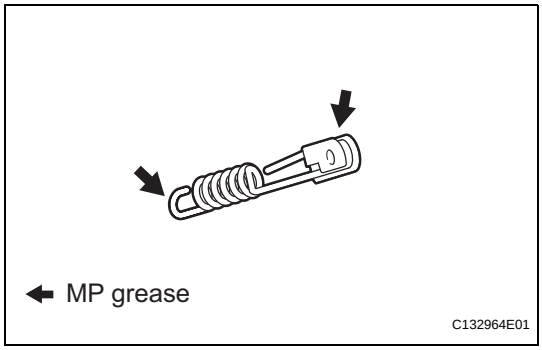
7. INSTALL CLUTCH PEDAL SUB-ASSEMBLY

(a) Install the clutch pedal to the clutch pedal support with the bolt and nut.

Torque: 37 N*m (375 kgf*cm, 27 ft.*lbf)

HINT:

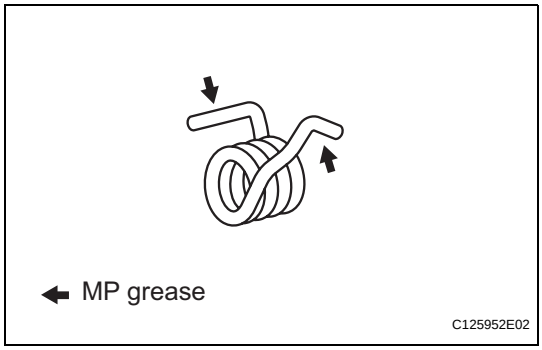
Install the bolt from the right side of the vehicle.



8. INSTALL PEDAL WITH HOOK SPRING

(a) Apply MP grease to the sliding portion of the spring.

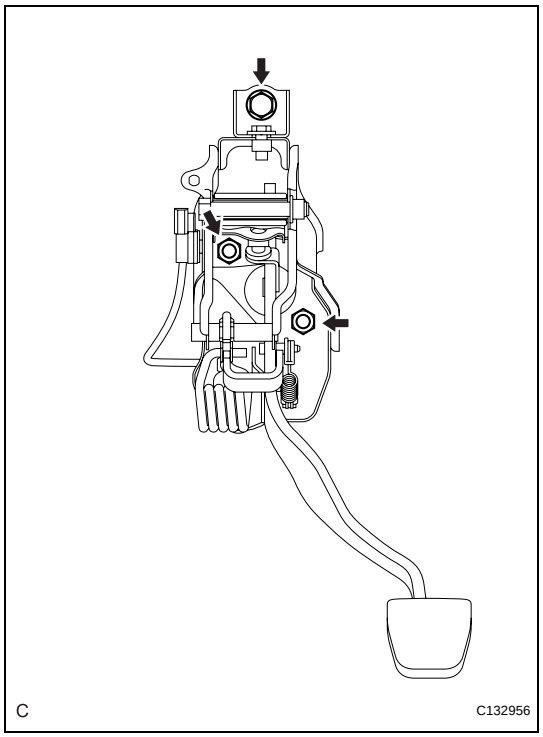
(b) Install the hook spring.



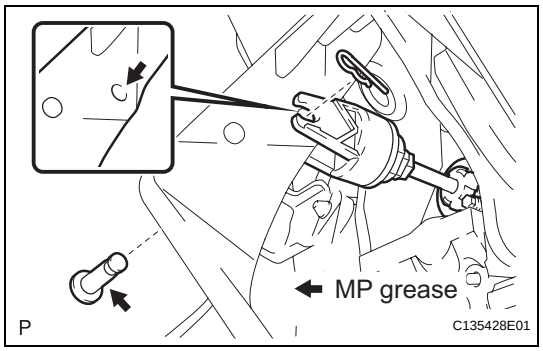
9. INSTALL TORSION SPRING

(a) Apply MP grease to the sliding portion of the spring.

(b) Install the torsion spring.



10. **INSTALL CLUTCH PEDAL SUPPORT SUB-ASSEMBLY**
    (a) Install the clutch pedal support to the vehicle with the 2 nuts and bolt.
    Torque: Bolt
    19 N*m (195 kgf*cm, 14 ft.*lbf)
    Nut
    12 N*m (120 kgf*cm, 9 ft.*lbf)



11. **INSTALL CLUTCH MASTER CYLINDER PUSH ROD CLEVIS PIN**
    (a) Apply MP grease to the contact surface of the pin and clevis bushing.
    (b) Connect the clevis to the clutch pedal with the pin and a new clip.
    HINT:
    Install the pin from the left side of the vehicle.

12. **CONNECT CONNECTORS**
    (a) Connect the clutch start switch connector.
    (b) Connect the clutch switch connector (with cruise control).

13. **INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)**

14. **INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)**

15. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)**

16. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**

17. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**

18. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**

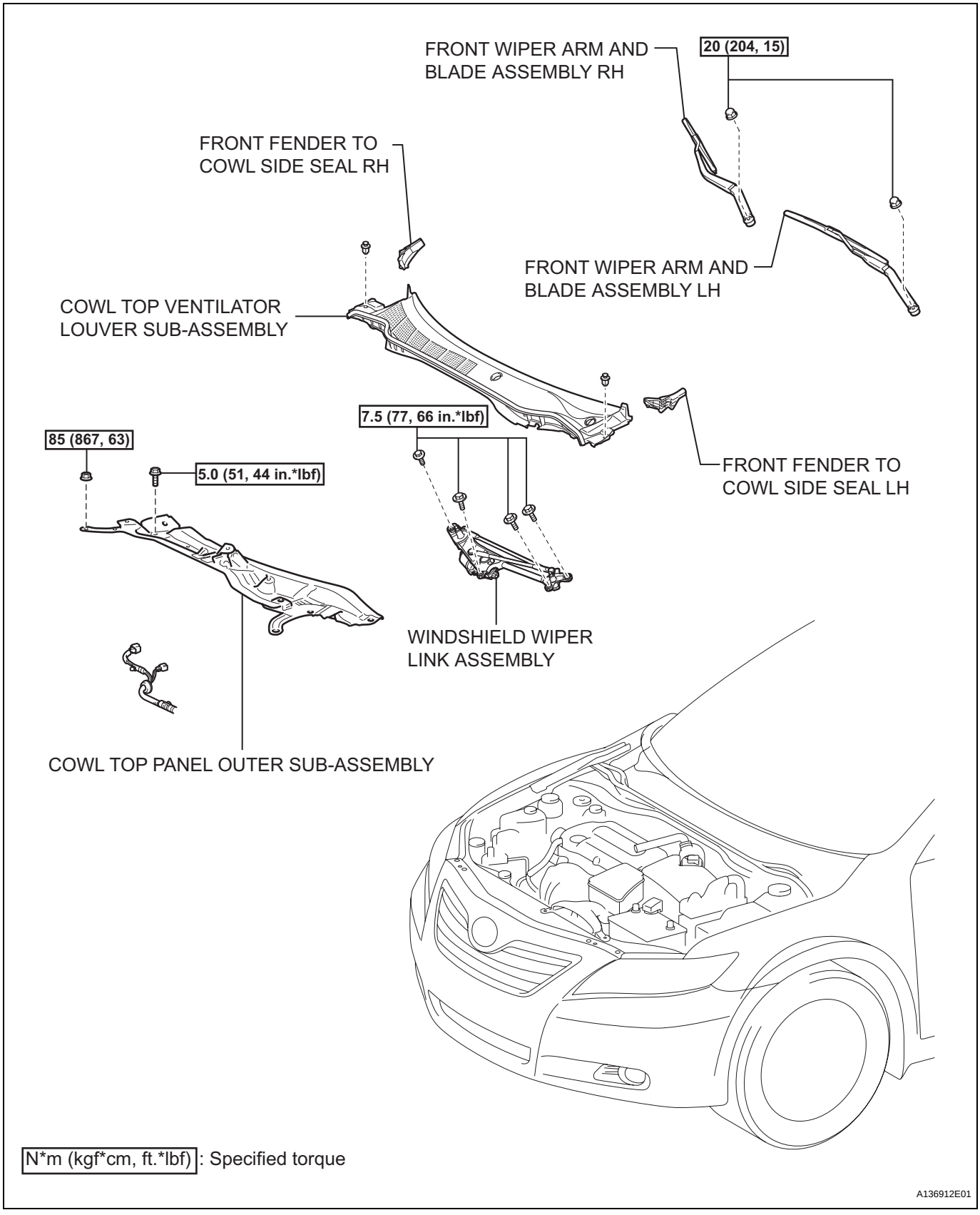
19. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**

20. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**

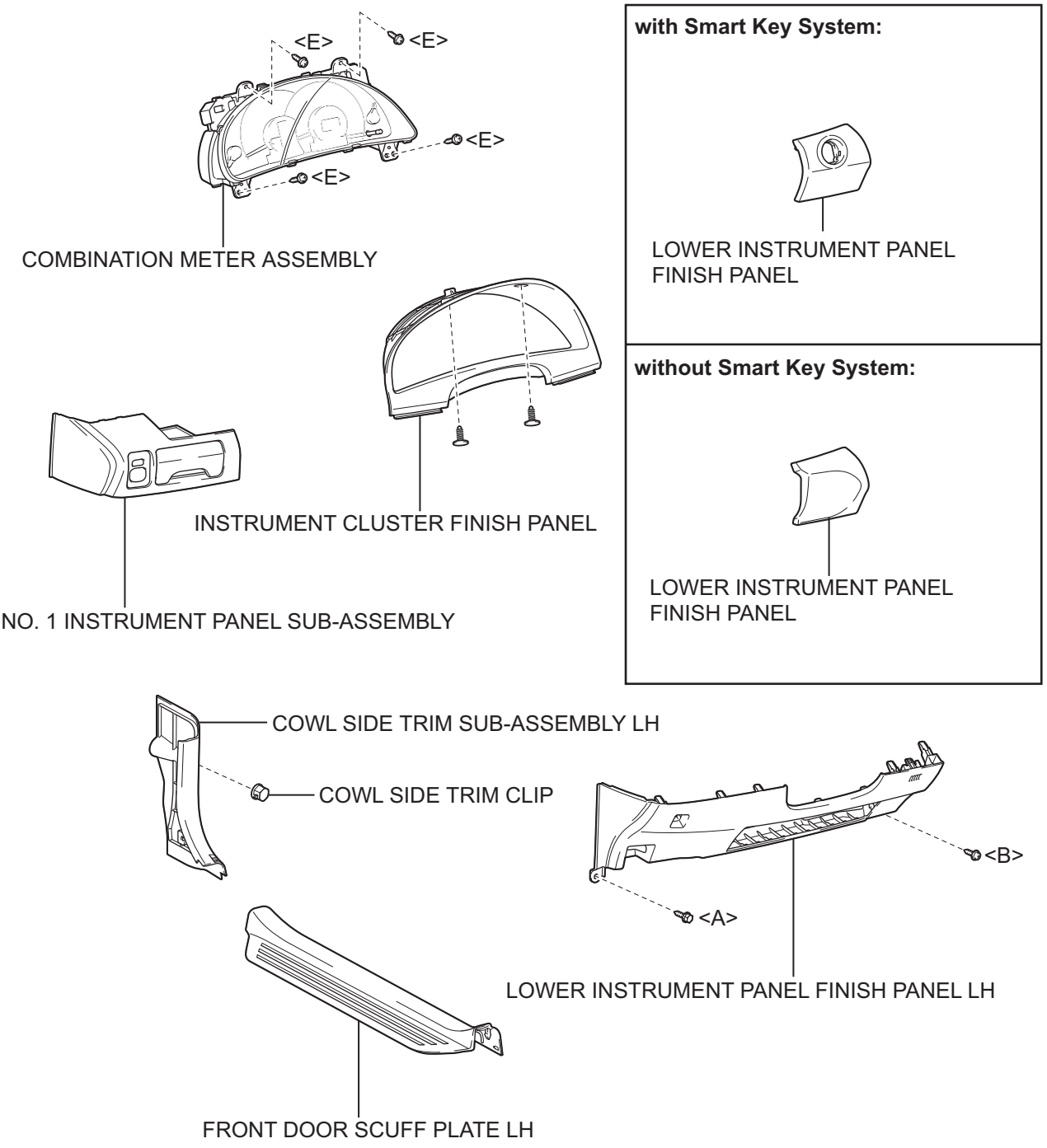
21. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
22. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
23. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
24. **INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSEMBLY**
    See page CL-4.

CLUTCH MASTER CYLINDER

COMPONENTS



for TMC Made:



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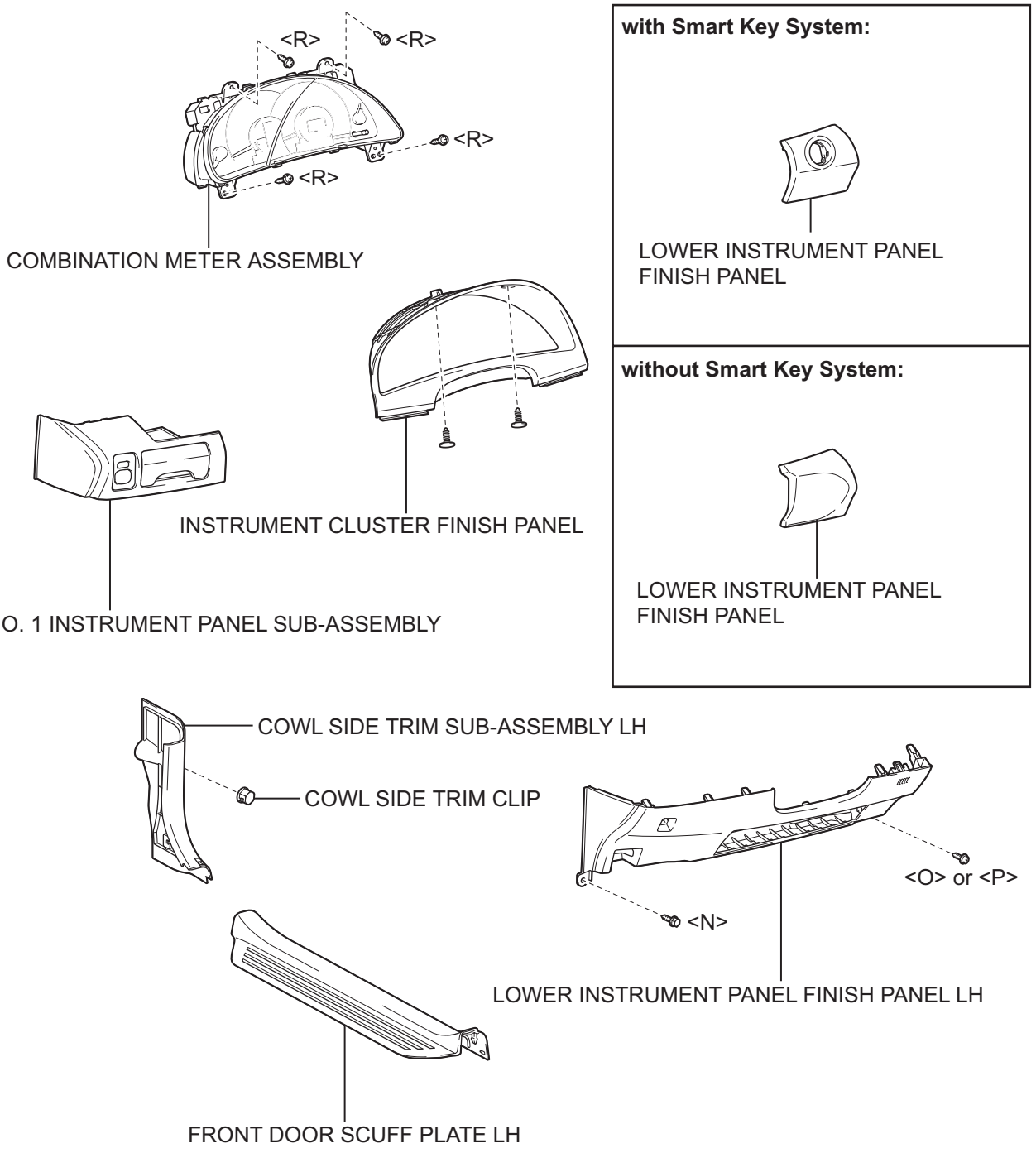
for TMMK Made:



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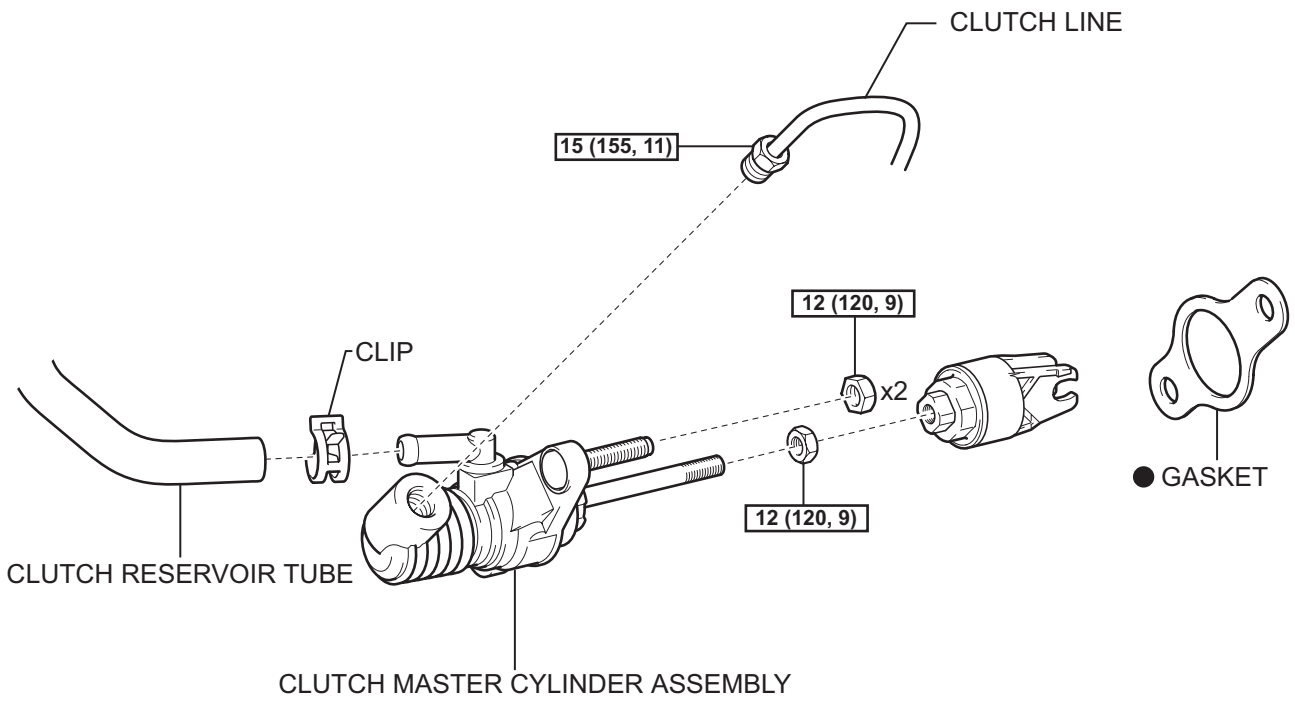

N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

P

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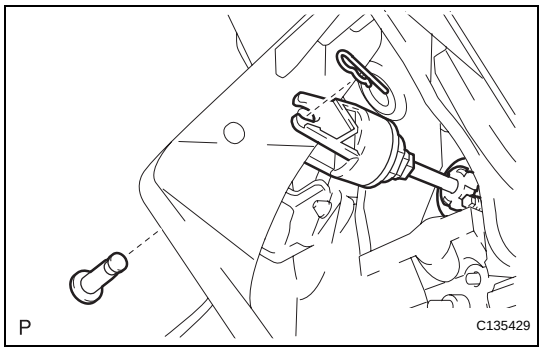
CL

REMOVAL

1. **PRECAUTION**
   See page IP-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **DRAIN BRAKE FLUID (See page BR-28)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
6. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
7. **REMOVE WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
8. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
9. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
10. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
11. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY (See page WW-10)**
12. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-424)**
13. **REMOVE BRAKE BOOSTER ASSEMBLY**
    See page BR-42.
14. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
15. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
16. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
17. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
18. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
19. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
20. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
21. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)**
22. **REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)**

23. REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)



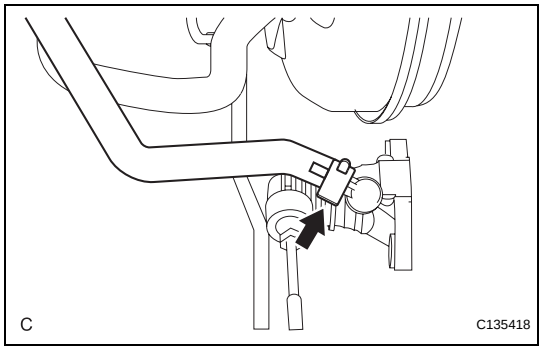
24. DISCONNECT CLUTCH MASTER CYLINDER PUSH ROD CLEVIS

(a) Remove the clip and pin, and disconnect the push rod clevis from the clutch pedal.

25. DRAIN BRAKE FLUID

NOTICE:

Wash brake fluid off immediately if it is spilled on any painted surface.

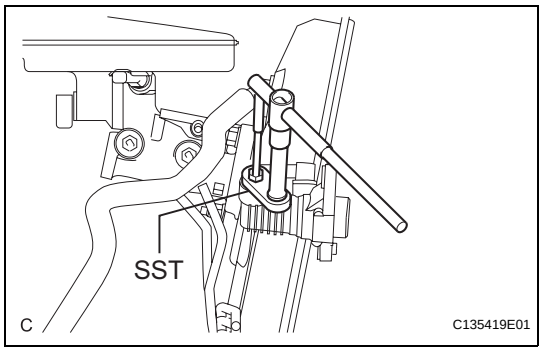


26. DISCONNECT CLUTCH RESERVOIR TUBE

(a) Using pliers, grip the claws of the clip and slide the clip to disconnect the tube from the clutch master cylinder.

HINT:

Use a container to catch the fluid.



27. DISCONNECT CLUTCH LINE

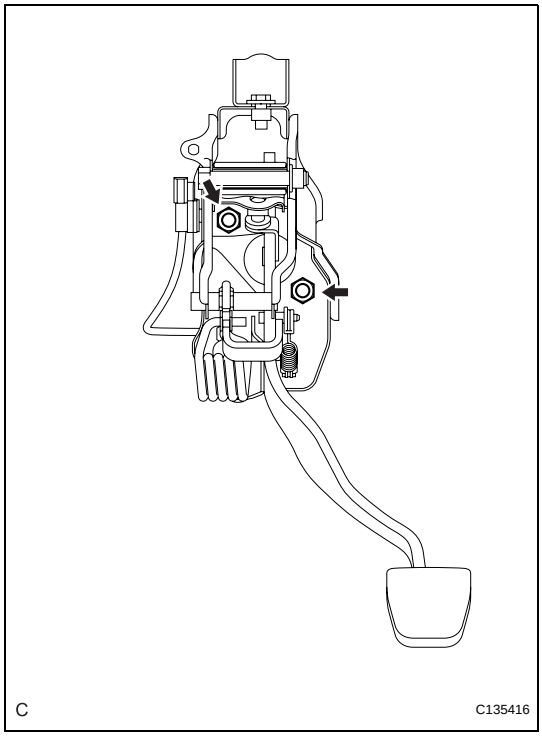
(a) Using SST, disconnect the clutch line.

SST 09023-00101

HINT:

Use a container to catch the fluid.

CL

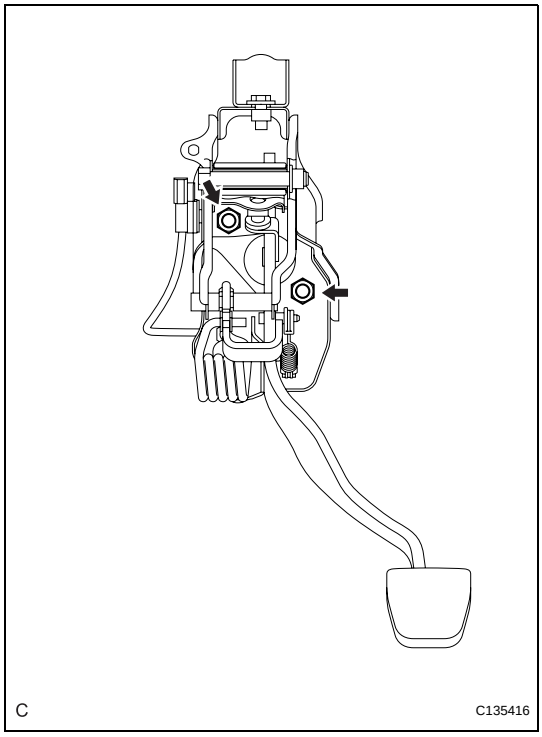


28. REMOVE CLUTCH MASTER CYLINDER ASSEMBLY

(a) Remove the 2 nuts and clutch master cylinder.

(b) Remove the gasket from the clutch master cylinder assembly.

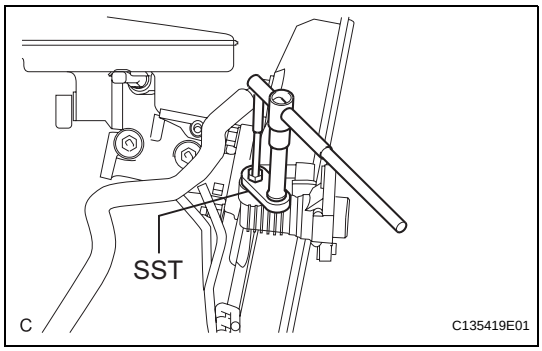
INSTALLATION



1. INSTALL CLUTCH MASTER CYLINDER ASSEMBLY

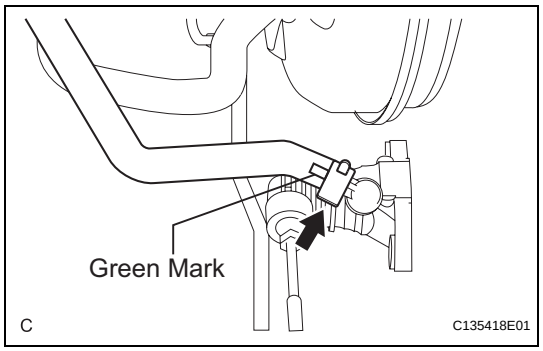
(a) Install a new gasket to the clutch master cylinder assembly.

(b) Install the clutch master cylinder with the 2 nuts.
Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



2. CONNECT CLUTCH LINE

(a) Using SST, connect the clutch line.
SST 09023-00101
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)

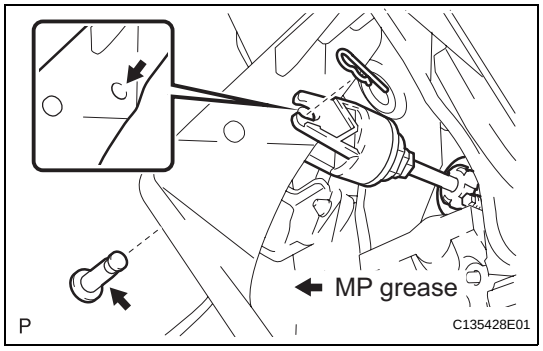


3. CONNECT CLUTCH RESERVOIR TUBE

(a) Connect the clutch reservoir tube to the clutch master cylinder with the clip.

NOTICE:

- **Connect the clutch reservoir tube so that it will not be twisted.**
- **Make sure that the green mark is positioned as shown in the illustration.**



4. CONNECT CLUTCH MASTER CYLINDER PUSH ROD CLEVIS

(a) Apply MP grease to the contact surface of the pin and clevis bushing.

(b) Connect the clevis to the clutch pedal with the pin and a new clip.

HINT:

Install the pin from the left side of the vehicle.

5. INSTALL BRAKE BOOSTER ASSEMBLY

See page BR-43.

6. INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)

7. INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)

8. INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)

9. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)

10. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)

11. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)

12. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)

13. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)

14. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)

15. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)

16. INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-426)

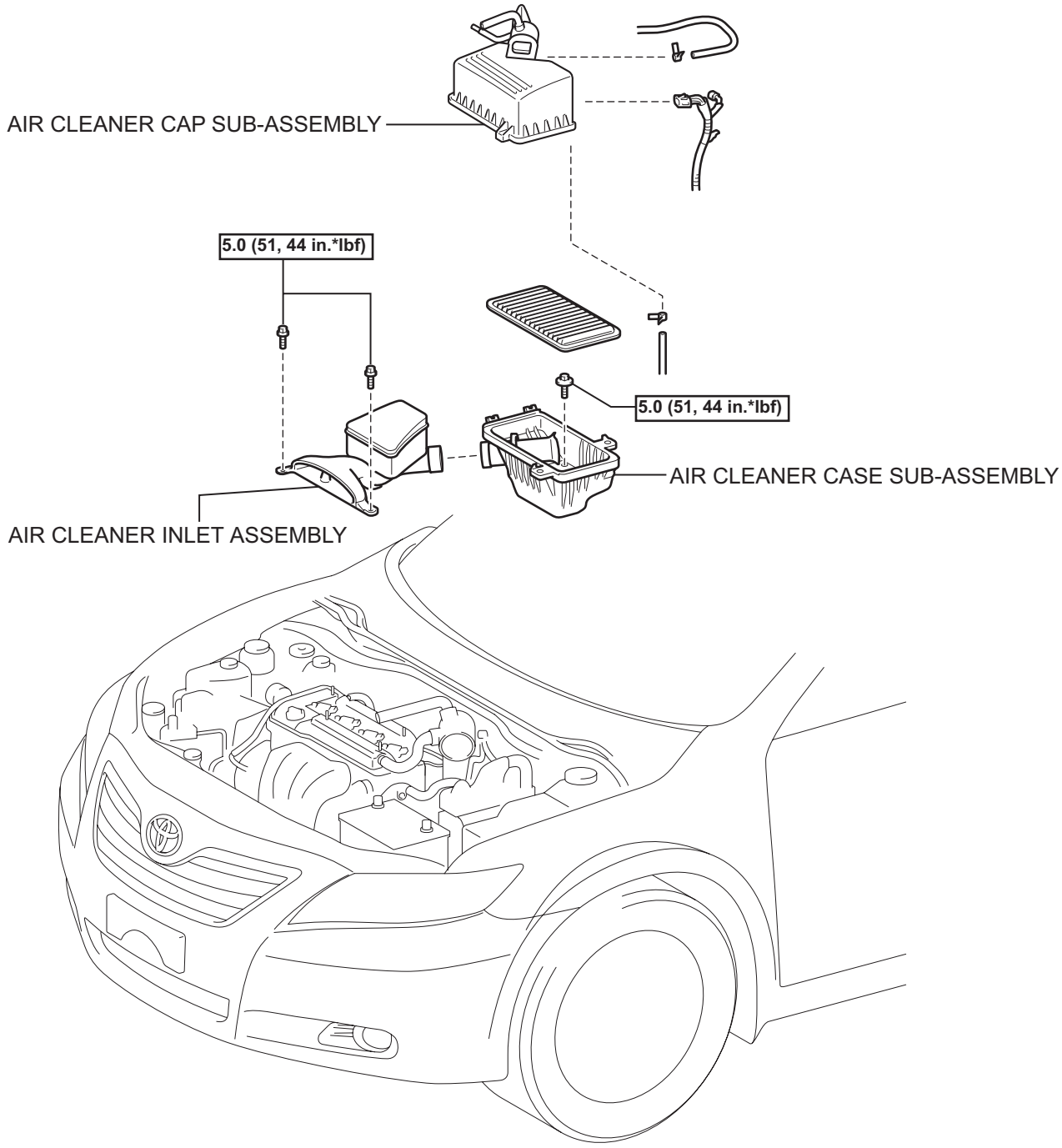
17. INSTALL WINDSHIELD WIPER LINK ASSEMBLY (See page WW-14)

18. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)

19. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
20. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
21. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**
22. **INSTALL WINDSHIELD WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**
23. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
24. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
25. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
26. **BLEED CLUTCH PIPE LINE**
    (a) Fill the brake reservoir with brake fluid and bleed the clutch system.
    Torque: 8.3 N*m (85 kgf*cm, 74 in.*lbf)
27. **CHECK BRAKE FLUID**
    (a) Check the brake fluid (See page BR-6).
    HINT:
    - Check for leakage in the brake system.
    - Check for leakage in the clutch system.
28. **CHECK FLUID LEVEL IN RESERVOIR (See page BR-6)**
29. **INSPECT AND ADJUST CLUTCH PEDAL SUB-ASSEMBLY**
    See page CL-4.

CLUTCH RELEASE CYLINDER

COMPONENTS



T

N*m (kgf*cm, ft.*lbf): Specified torque

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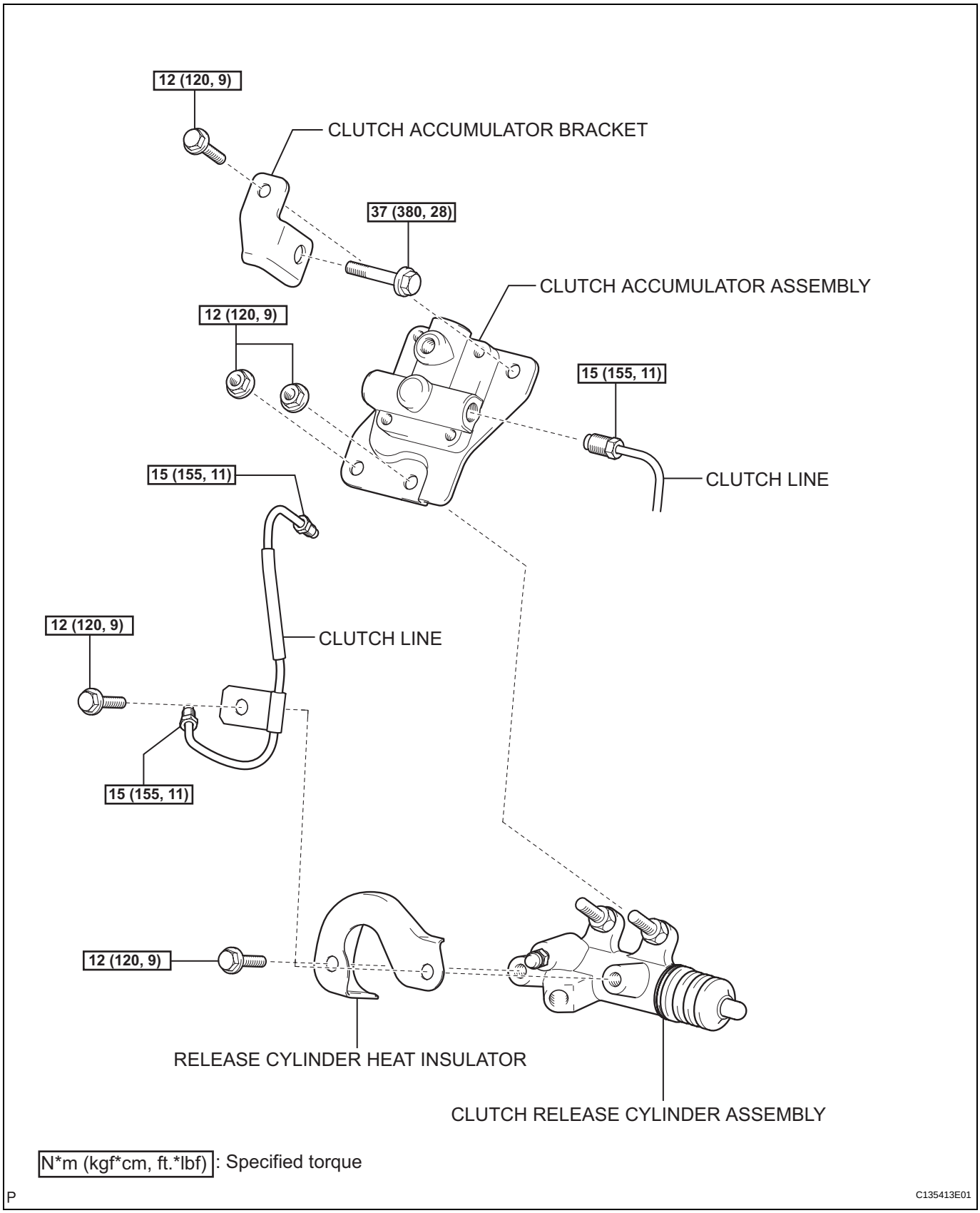
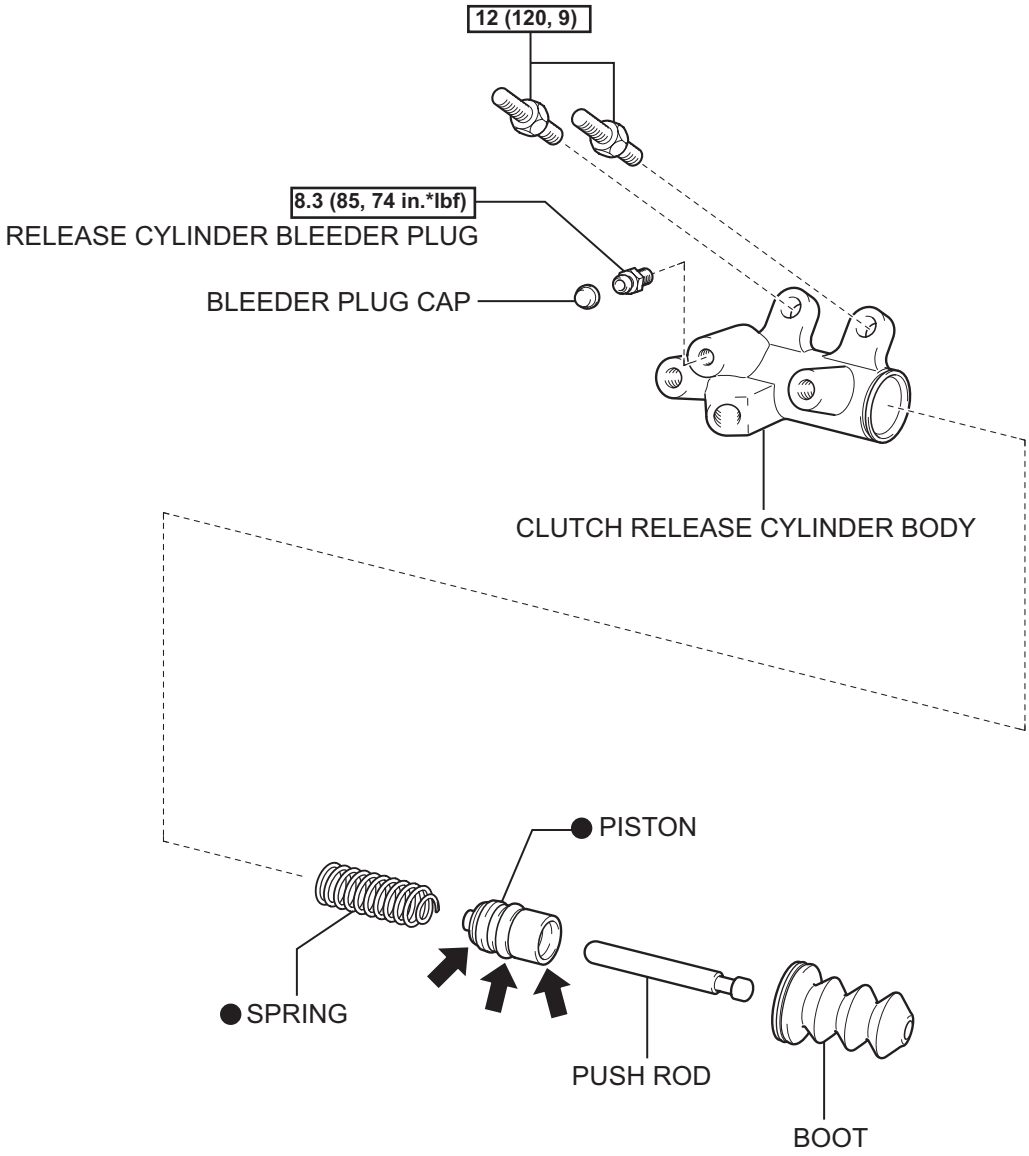
CL



N*m (kgf*cm, ft.*lbf) : Specified torque

P

C135413E01



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ⬅ Lithium soap base glycol grease

P

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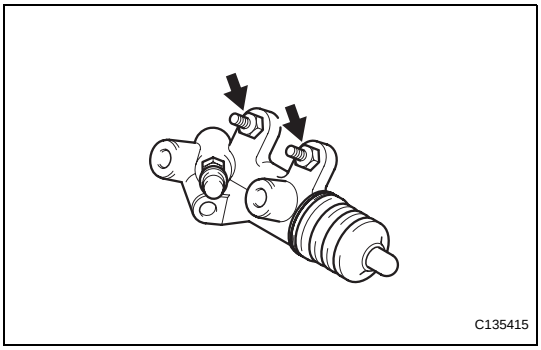
CL

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
3. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
4. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
5. **REMOVE CLUTCH ACCUMULATOR BRACKET (See page CL-28)**
6. **REMOVE RELEASE CYLINDER HEAT INSULATOR (See page CL-28)**
7. **DISCONNECT CLUTCH LINE (See page CL-28)**
8. **REMOVE CLUTCH ACCUMULATOR ASSEMBLY (See page CL-28)**
9. **REMOVE CLUTCH RELEASE CYLINDER ASSEMBLY**
   (a) Remove the 2 bolts and clutch release cylinder assembly.



DISASSEMBLY

1. REMOVE CLUTCH RELEASE CYLINDER KIT

(a) Remove the boot from the cylinder body.
(b) Remove the push rod from the cylinder body.
(c) Remove the piston from the cylinder body.
NOTICE:
Be careful not to damage the inside of the cylinder body.
(d) Remove the spring from the cylinder body.
(e) Remove the bleeder plug cap from the bleeder plug.

2. REMOVE RELEASE CYLINDER BLEEDER PLUG

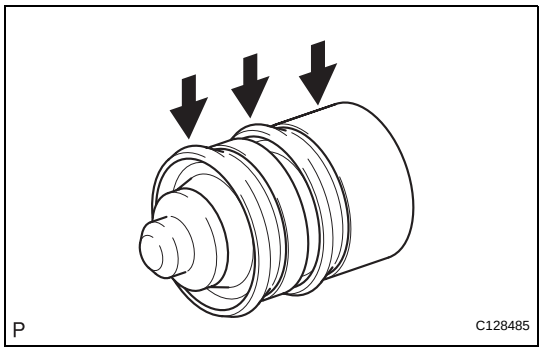
(a) Remove the bleeder plug from the cylinder body.

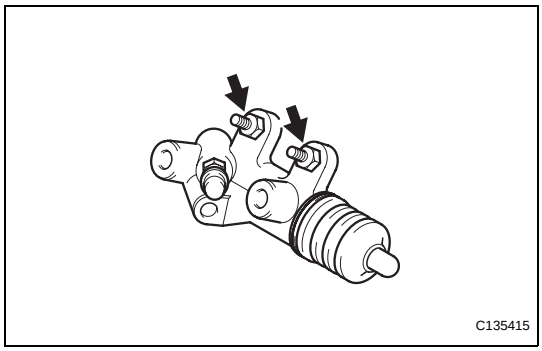
CL

REASSEMBLY

1. **INSTALL RELEASE CYLINDER BLEEDER PLUG**
   (a) Install the bleeder plug to the cylinder body.
   Torque: 8.3 N*m (85 kgf*cm, 73 in.*lbf)

2. **INSTALL CLUTCH RELEASE CYLINDER KIT**
   (a) Install the bleeder plug cap to the bleeder plug.
   (b) Install a new spring to the cylinder body.
   (c) Coat the piston with lithium soap base glycol grease as shown in the illustration.
   (d) Install the piston to the cylinder body.
   NOTICE:
   Be careful not to damage the inside of the cylinder body.
   (e) Install the push rod to the cylinder body.
   (f) Install the boot to the cylinder body.





INSTALLATION

1. **INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY**
   (a) Install the clutch release cylinder and clutch line bracket with the 2 bolts.
   Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)

2. **INSTALL CLUTCH ACCUMULATOR ASSEMBLY (See page CL-29)**

3. **CONNECT CLUTCH LINE (See page CL-29)**

4. **INSTALL RELEASE CYLINDER HEAT INSULATOR (See page CL-29)**

5. **INSTALL CLUTCH ACCUMULATOR BRACKET (See page CL-29)**

6. **BLEED CLUTCH LINE**
   (a) Fill the brake reservoir with brake fluid and bleed the clutch system.
   Torque: 8.3 N*m (85 kgf*cm, 74 in.*lbf)

7. **CHECK FOR BRAKE FLUID LEAKAGE**
   HINT:
   Check for leakage in the clutch system.

8. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**

9. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**

10. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**

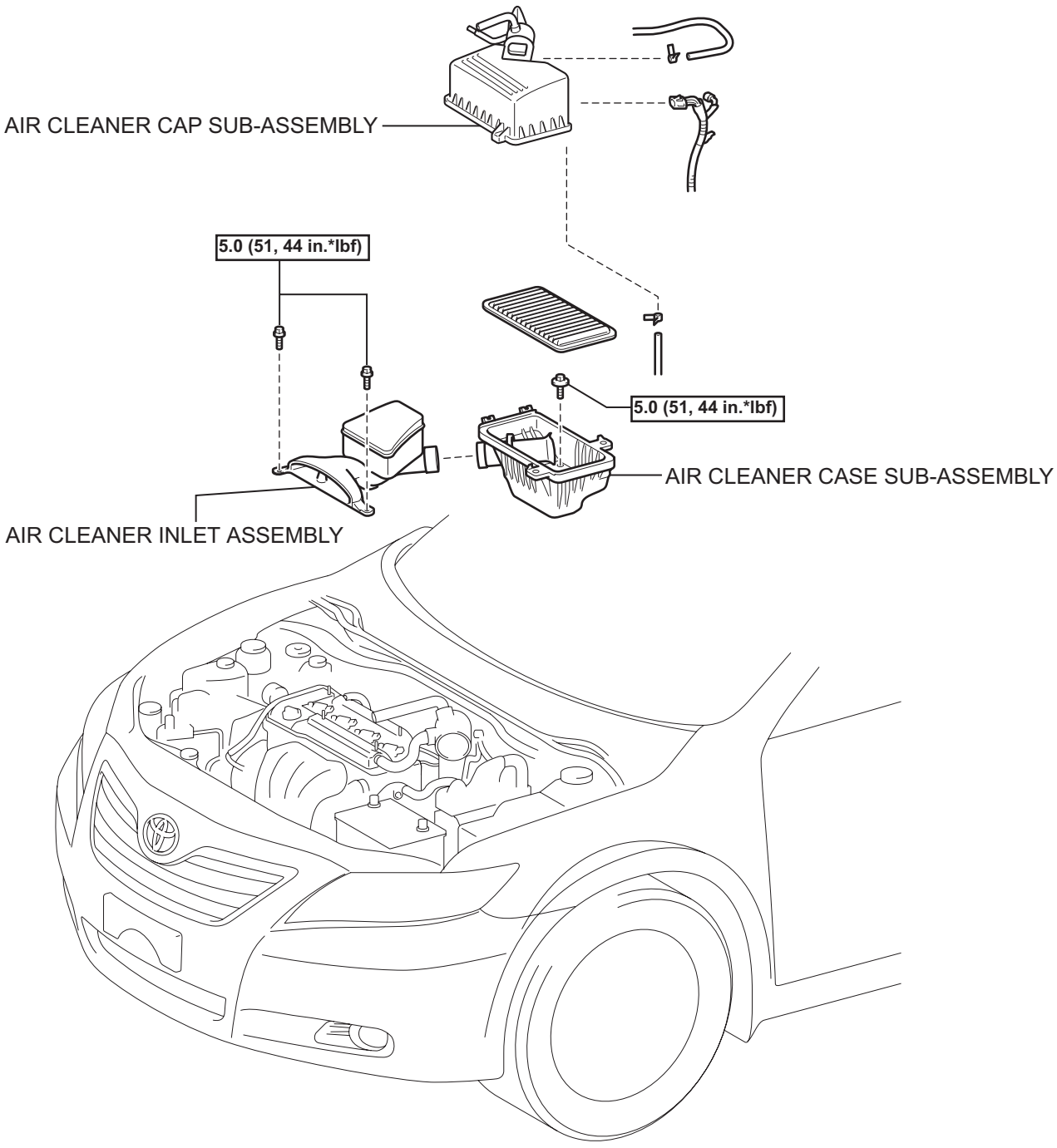
11. **CHECK FLUID LEVEL IN RESERVOIR**

12. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

CLUTCH ACCUMULATOR

COMPONENTS

CL



T

N*m (kgf*cm, ft.*lbf) : Specified torque

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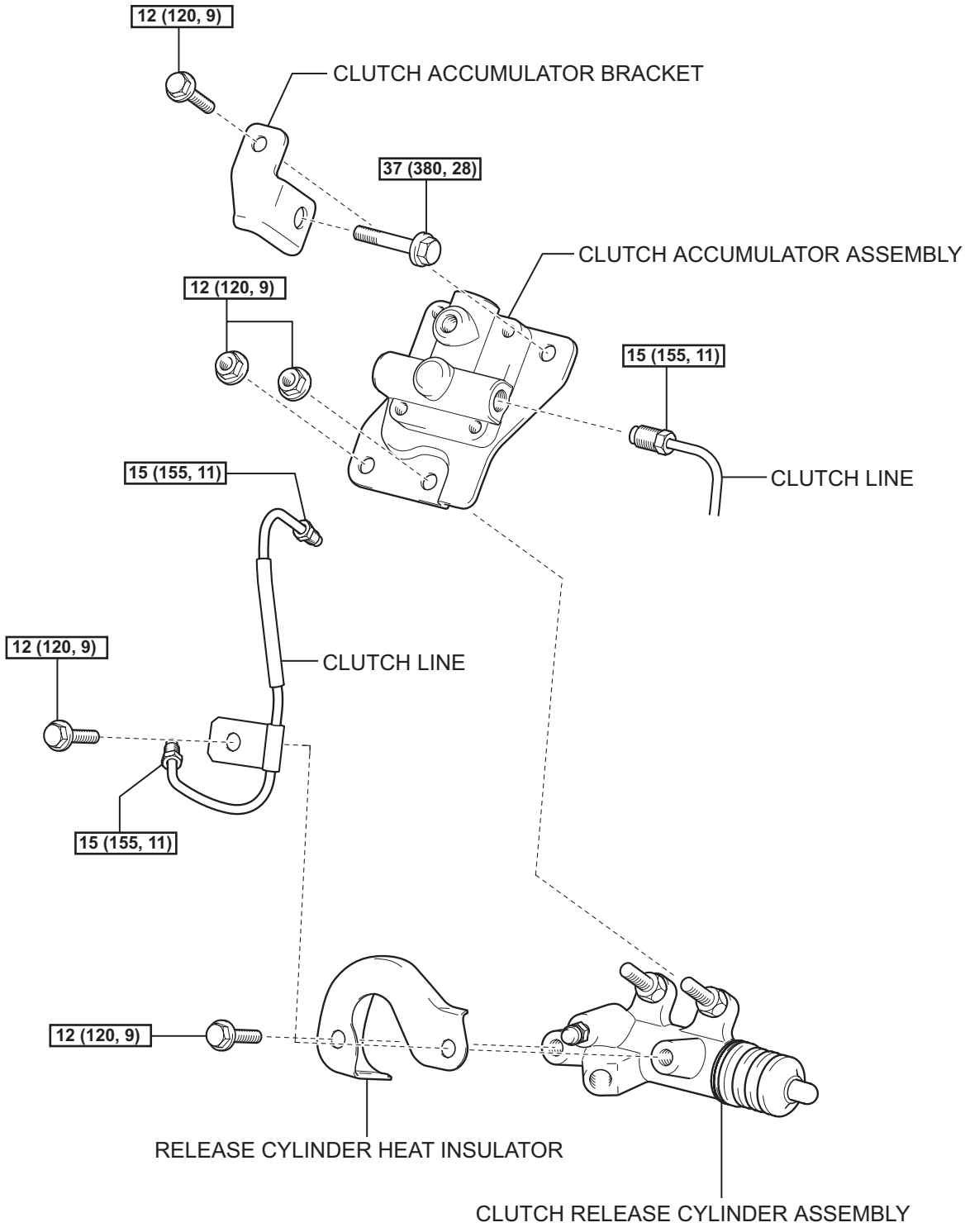

N*m (kgf*cm, ft.*lbf): Specified torque

P

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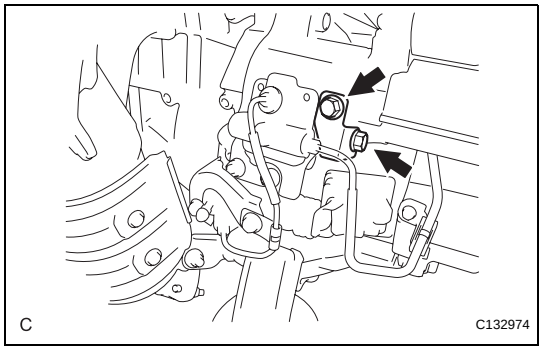
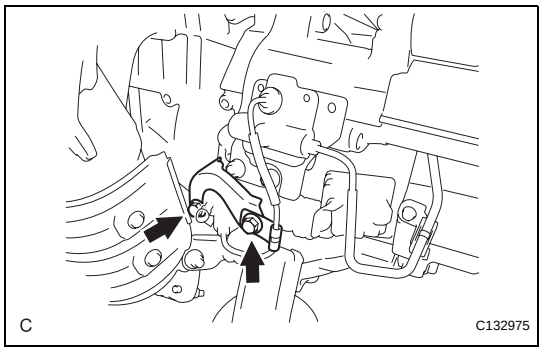
CL

REMOVAL

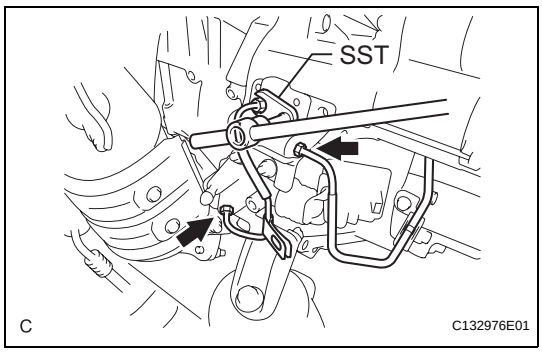
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
3. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
4. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
5. **REMOVE CLUTCH ACCUMULATOR BRACKET**
   (a) Remove the 2 bolts and clutch accumulator bracket.



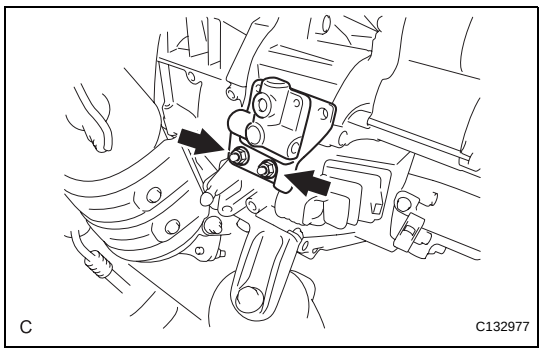
6. **REMOVE RELEASE CYLINDER HEAT INSULATOR**
   (a) Remove the 2 bolts and release cylinder heat insulator.

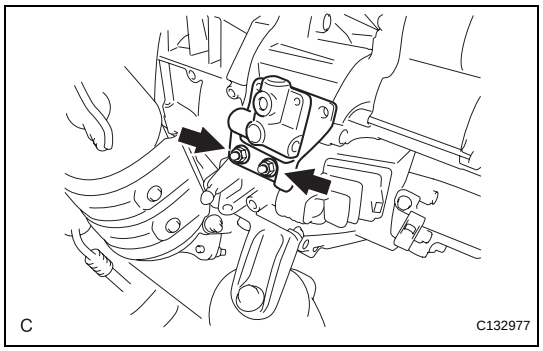


7. **DISCONNECT CLUTCH LINE**
   (a) Using SST, disconnect the clutch lines.
   SST 09023-00101
   HINT:
   Use a container to catch the fluid.



8. **REMOVE CLUTCH ACCUMULATOR ASSEMBLY**
   (a) Remove the 2 nuts and clutch accumulator assembly.



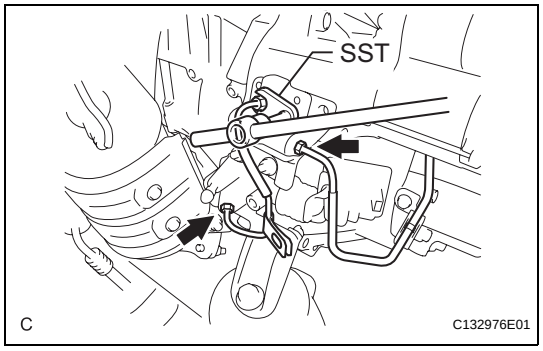


INSTALLATION

1. INSTALL CLUTCH ACCUMULATOR ASSEMBLY

(a) Install the clutch accumulator assembly with the 2 nuts.

Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)

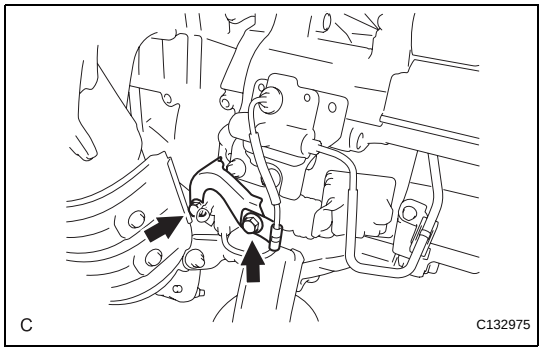


2. CONNECT CLUTCH LINE

(a) Using SST, connect the clutch lines to the clutch accumulator assembly.

SST 09023-00101

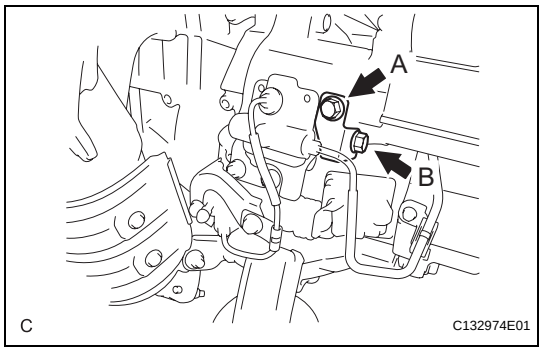
Torque: 15 N*m (155 kgf*cm, 11 ft.*lbf)



3. INSTALL RELEASE CYLINDER HEAT INSULATOR

(a) Install the release cylinder heat insulator with the 2 bolts.

Torque: 12 N*m (120 kgf*cm, 9 ft.*lbf)



4. INSTALL CLUTCH ACCUMULATOR BRACKET

(a) Install the clutch accumulator bracket with the 2 bolts.

Torque: Bolt A
12 N*m (120 kgf*cm, 9 ft.*lbf)
Bolt B
37 N*m (380 kgf*cm, 28 ft.*lbf)

5. BLEED CLUTCH PIPE LINE

(a) Fill the brake reservoir with brake fluid and bleed the clutch system.

Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

6. CHECK FOR BRAKE FLUID LEAKAGE

HINT:
Check for leakage in the clutch system.

7. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)

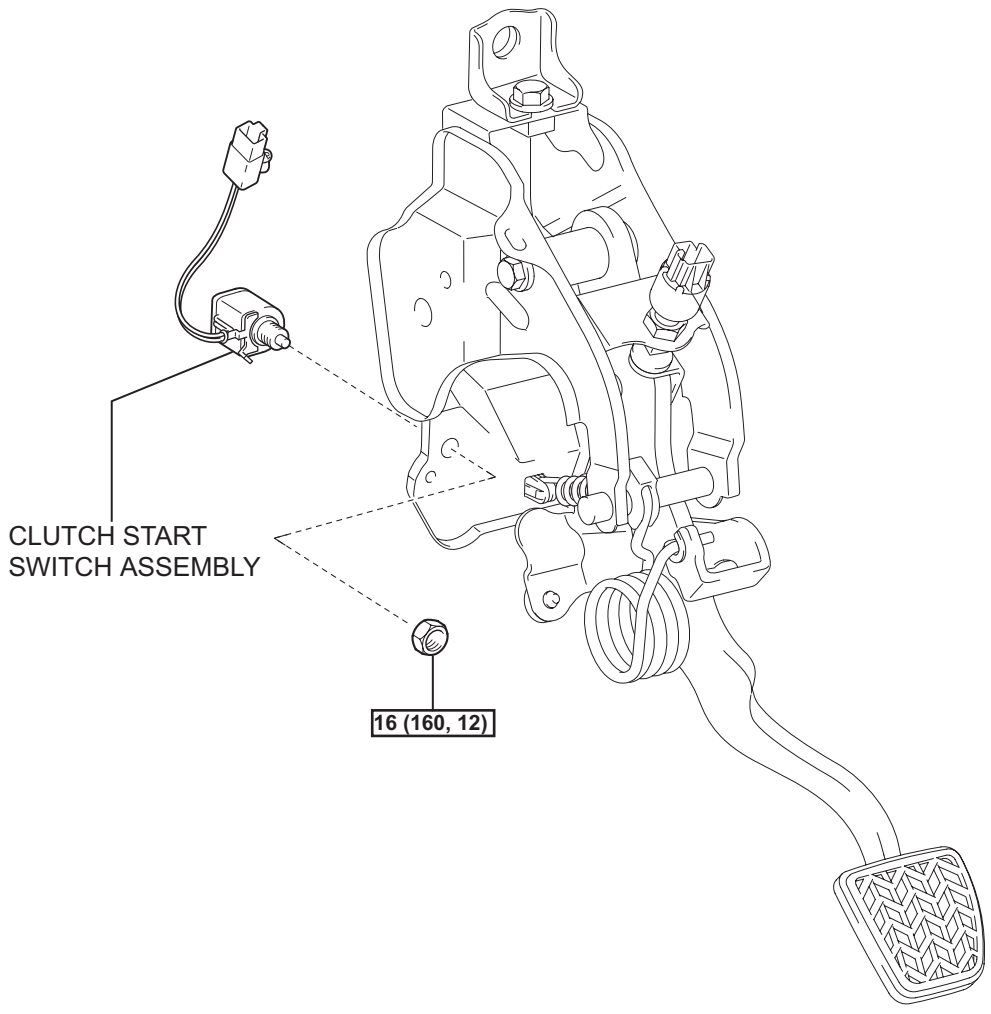
8. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)

9. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
10. **CHECK BRAKE FLUID LEVEL IN RESERVOIR**
11. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

CLUTCH START SWITCH

COMPONENTS

CL



N*m (kgf*cm, ft.*lbf): Specified torque

P

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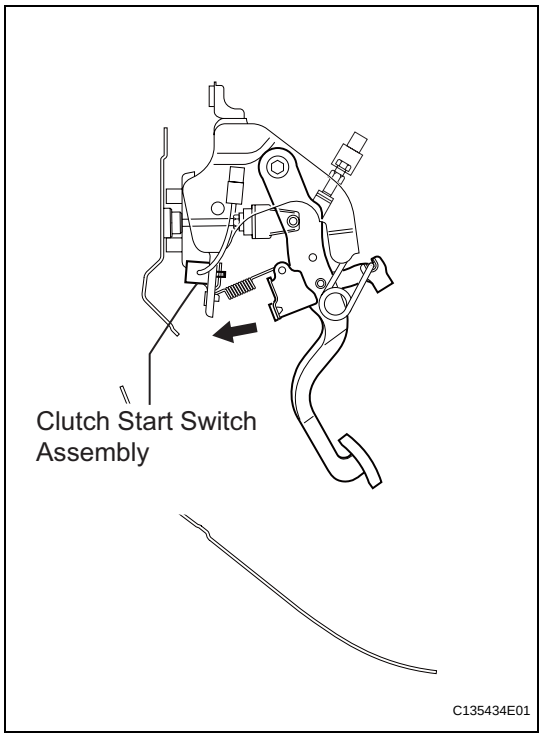


ON-VEHICLE INSPECTION

1. INSPECT CLUTCH START SWITCH ASSEMBLY

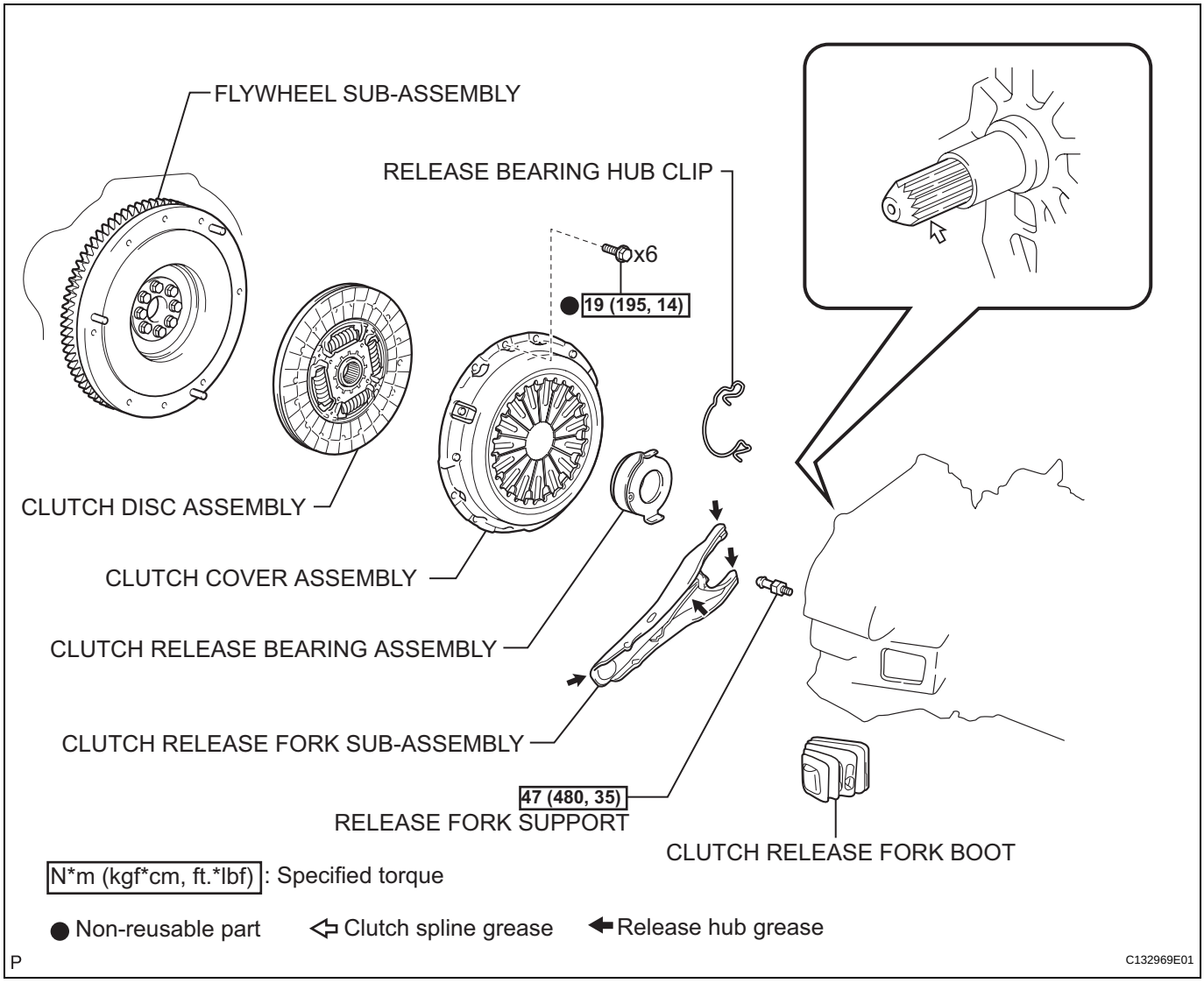
(a) Check that the engine does not start when the clutch pedal is released.

(b) Check that the engine starts when the clutch pedal is fully depressed.

If necessary, replace the clutch start switch assembly.

CLUTCH UNIT

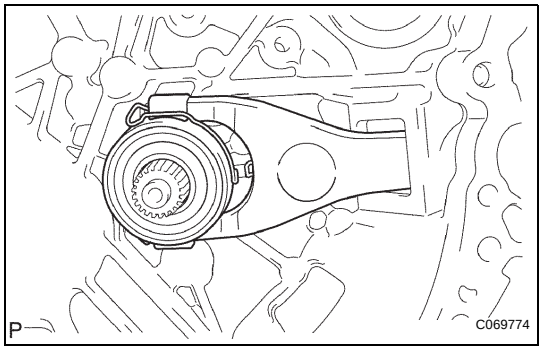
COMPONENTS



CL

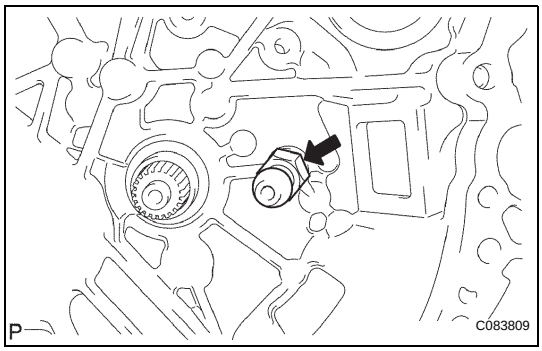
DISASSEMBLY

1. **REMOVE MANUAL TRANSAXLE ASSEMBLY**
   See page MX-24.



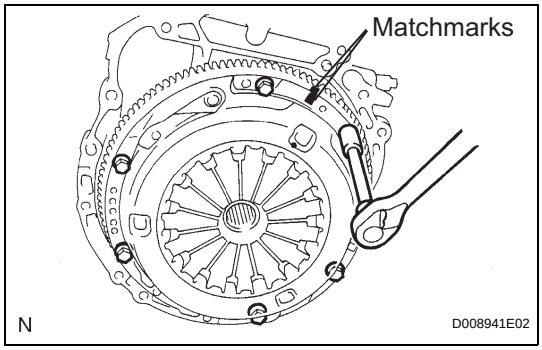
2. **REMOVE CLUTCH RELEASE FORK SUB-ASSEMBLY**
   (a) Remove the clutch release fork with the clutch release bearing from the transaxle assembly.

3. **REMOVE CLUTCH RELEASE BEARING ASSEMBLY**
   (a) Remove the release bearing hub clip and clutch release bearing assembly from the clutch release fork.



4. **REMOVE RELEASE FORK SUPPORT**
   (a) Remove the release fork support from the manual transaxle assembly.

5. **REMOVE CLUTCH RELEASE FORK BOOT**

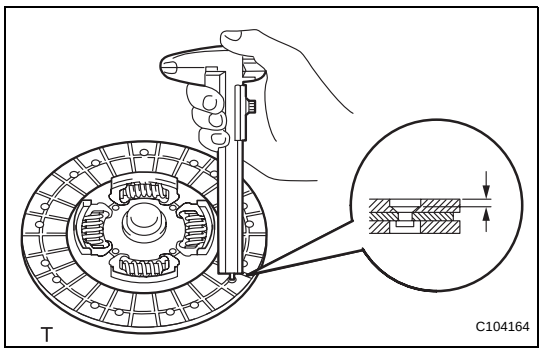


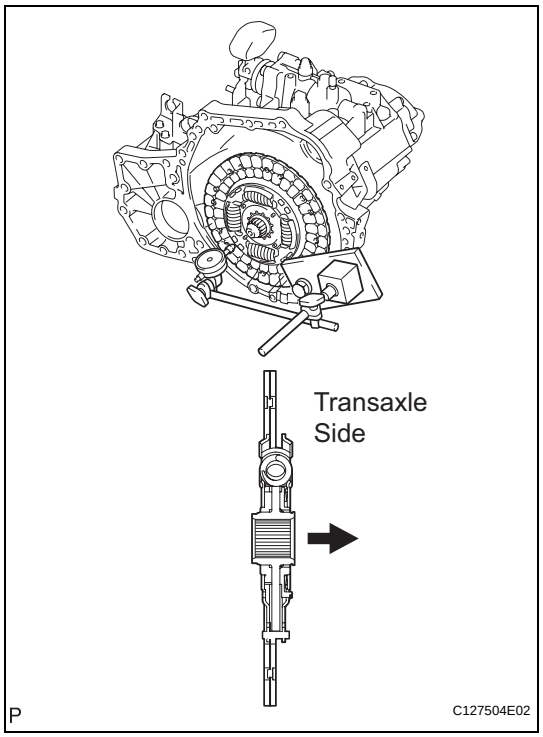
6. **REMOVE CLUTCH COVER ASSEMBLY**
   (a) Put matchmarks on the clutch cover assembly and flywheel sub-assembly.
   (b) Loosen the 6 bolts one turn at a time until spring tension is released.
   (c) Remove the 6 bolts and pull off the clutch cover assembly.
   NOTICE:
   Do not drop the clutch disc assembly.

7. **REMOVE CLUTCH DISC ASSEMBLY**
   NOTICE:
   Keep the lining part of the clutch disc assembly, the pressure plate and surface of the flywheel sub-assembly away from oil and foreign matter.

INSPECTION

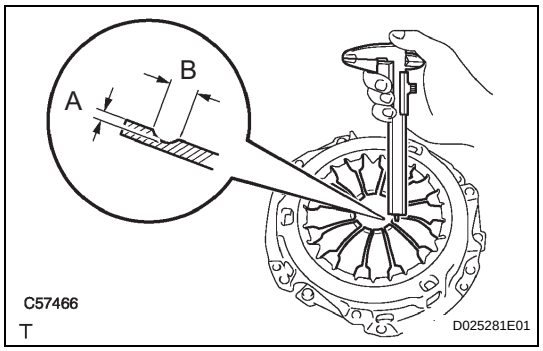
1. **INSPECT CLUTCH DISC ASSEMBLY**
   (a) Using vernier calipers, measure the rivet head depth.
   Minimum rivet depth:
   0.3 mm (0.012 in.)
   If necessary, replace the clutch disc assembly.





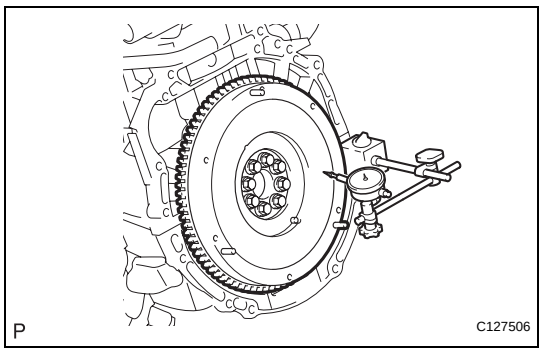
(b) Install the clutch disc assembly to the transaxle assembly.
NOTICE:
Take care not to insert the clutch disc assembly in the wrong direction.

(c) Using a dial indicator with a roller instrument, measure the clutch disc assembly runout.
Maximum runout:
0.8 mm (0.031 in.)
If necessary, replace the clutch disc assembly.



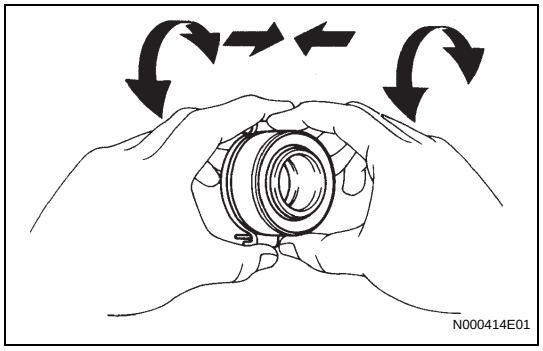
2. INSPECT CLUTCH COVER ASSEMBLY

(a) Using vernier calipers, inspect the diaphragm spring for depth and width of wear.
Maximum:
A (Depth):
0.5 mm (0.020 in.)
B (Width):
6.0 mm (0.236 in.)
If necessary, replace the clutch cover assembly.



3. INSPECT FLYWHEEL SUB-ASSEMBLY

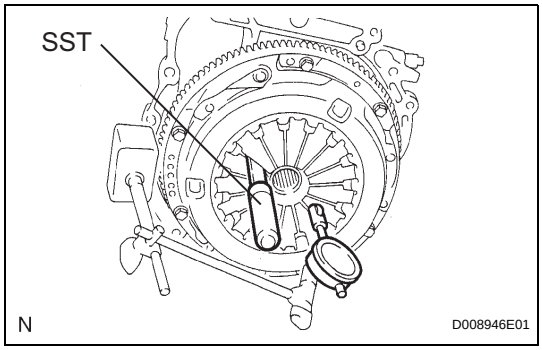
(a) Using a dial indicator, measure the flywheel runout.
Maximum runout:
0.1 mm (0.004 in.)
If necessary, replace the flywheel sub-assembly.



4. INSPECT CLUTCH RELEASE BEARING ASSEMBLY

(a) Check that the bearing moves smoothly without abnormal resistance by turning the sliding parts of the bearing (contact surfaces with the clutch cover) while applying force in the axial direction.

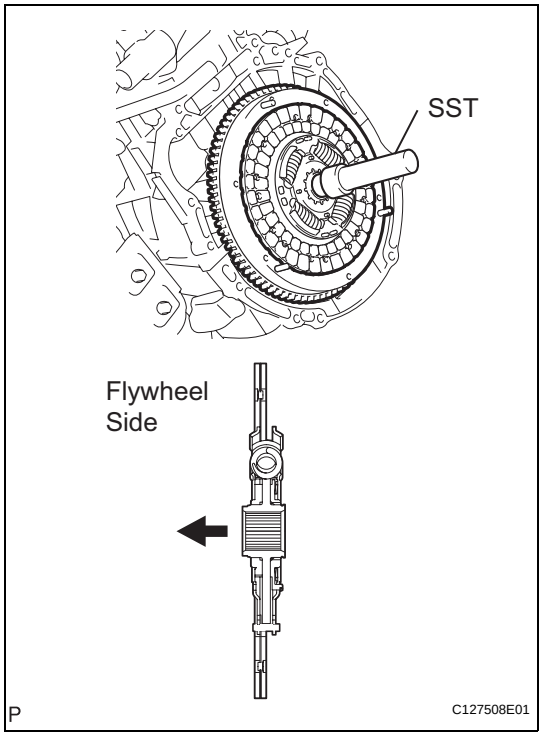
(b) Inspect the bearing for damage or wear. If necessary, replace the release bearing assembly.



5. INSPECT AND ADJUST CLUTCH COVER ASSEMBLY

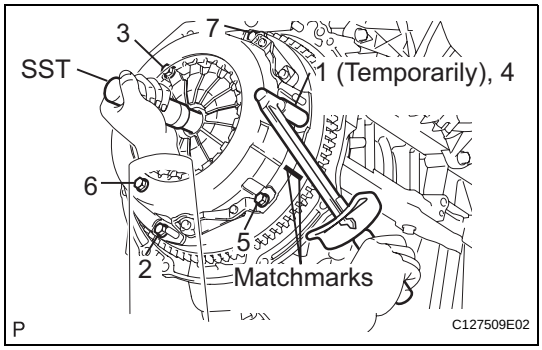
(a) Using a dial indicator with a roller instrument, check the diaphragm spring tip alignment.
Maximum variation:
0.5 mm (0.020 in.)
If alignment is not as specified, adjust the diaphragm spring tip alignment with SST.
SST 09333-00013

REASSEMBLY



1. INSTALL CLUTCH DISC ASSEMBLY

(a) Insert SST into the clutch disc assembly, then insert them into the flywheel sub-assembly.
SST 09301-00220
NOTICE:
Take care not to insert the clutch disc assembly in the wrong direction.

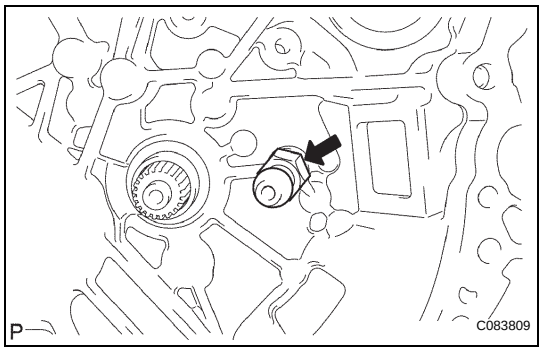


2. REMOVE AND INSTALL CLUTCH COVER ASSEMBLY

(a) Align the matchmarks on the clutch cover assembly with the one on the flywheel sub-assembly.

(b) Following the procedures shown in the illustration, tighten the 6 bolts in order, starting with the bolt located near the knock pin on the top.
Torque: 19 N*m (195 kgf*cm, 14 ft.*lbf)
HINT:
- Following the order in the illustration, evenly tighten the bolts one turn at a time.
- Lightly move SST up and down, and right and left after checking that the disc is in the center to tighten the bolts.

SST 09301-00210

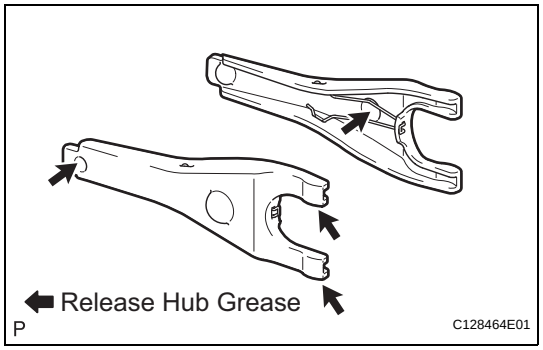


3. INSTALL RELEASE FORK SUPPORT

(a) Install the release fork support to the manual transaxle assembly.
Torque: 47 N*m (480 kgf*cm, 35 ft.*lbf)

4. INSTALL RELEASE BEARING HUB CLIP

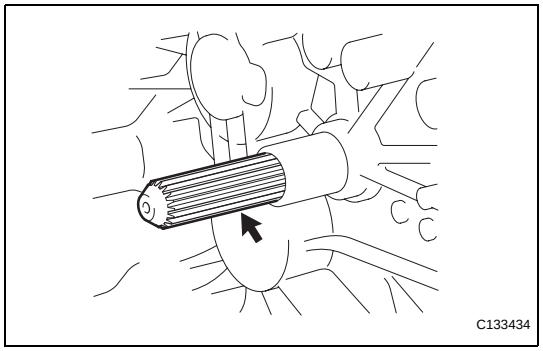
(a) Install the release bearing hub clip to the release bearing assembly.



5. INSTALL CLUTCH RELEASE FORK SUB-ASSEMBLY

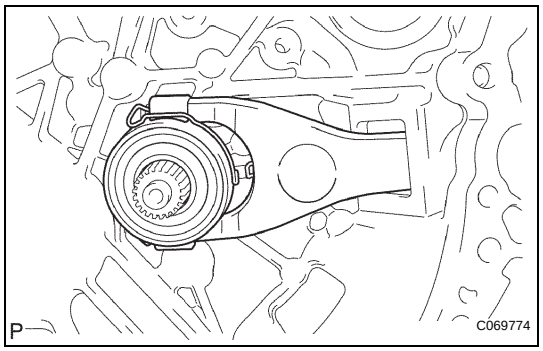
(a) Apply release hub grease to the contact surfaces between the release fork and release bearing, fork and push rod, and fork and fork support.
Sealant:
Part No. 08887-01806, RELEASE HUB GREASE or equivalent

(b) Install the release fork to the release bearing assembly.



6. INSTALL CLUTCH RELEASE BEARING ASSEMBLY

(a) Apply clutch spline grease to the input shaft spline as shown in the illustration.
Sealant:
Part No. 08887-01706, CLUTCH SPLINE GREASE or equivalent

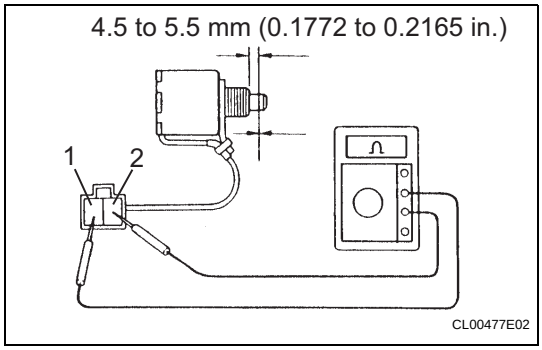


(b) Install the release fork with the release bearing assembly to the manual transaxle assembly.
NOTICE:
After installation, move the fork back and forth to check that the release bearing slides smoothly.

7. INSTALL CLUTCH RELEASE FORK BOOT

8. INSTALL MANUAL TRANSAXLE ASSEMBLY
See page MX-27.

CL



REMOVAL

1. REMOVE CLUTCH START SWITCH ASSEMBLY

(a) Disconnect the clutch start switch assembly connector.

(b) Remove the nut and clutch start switch assembly from the clutch pedal support.

INSPECTION

1. INSPECT CLUTCH START SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Terminal connection	Switch position	Condition
1 - 2	ON (pushed)	Below 1 Ω
1 - 2	OFF (free)	10 kΩ or higher

INSTALLATION

1. **INSTALL CLUTCH START SWITCH ASSEMBLY**
   (a) Install the clutch start switch assembly with the nut.
   Torque: 16 N*m (160 kgf*cm, 12 ft.*lbf)
   (b) Connect the clutch start switch assembly connector.

2. **INSPECT CLUTCH START SWITCH ASSEMBLY**
   See page CL-37.

CRUISE CONTROL SYSTEM

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specifications of the vehicle.

Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start

2. HANDLING PRECAUTION FOR CRUISE CONTROL SYSTEM

(a) Turn the cruise control main switch off when not using the cruise control system.

(b) Be careful as the vehicle speed increases when driving downhill with the cruise control system on.

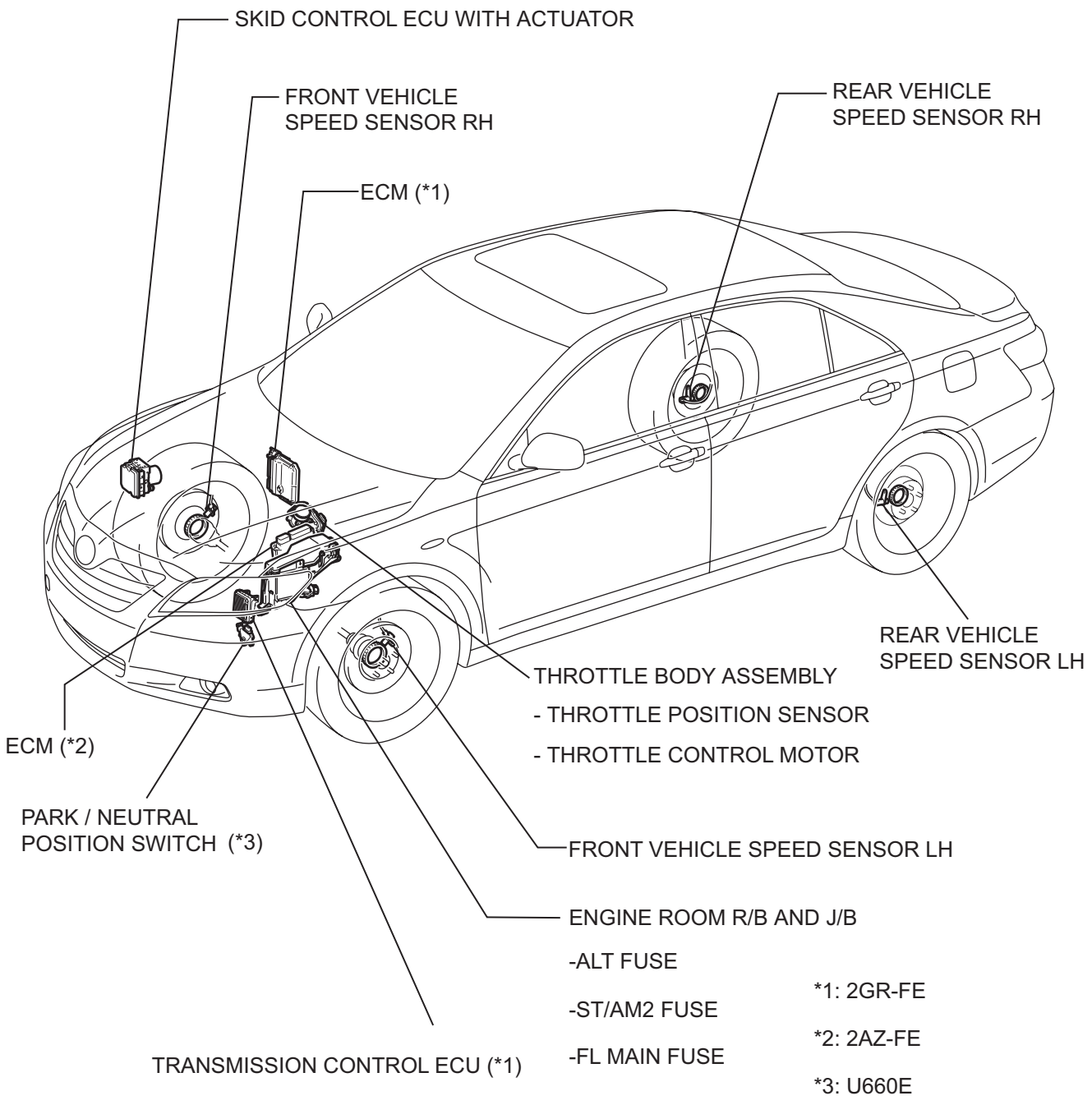
(c) The + (ACCEL)/RES (RESUME) operation changes according to the cruise control system status. When the cruise control system is operating, the + (ACCEL) function operates. When the cruise control system is not operating, the RES (RESUME) function operates.

(d) If the CRUISE main indicator light blinks while the cruise control system is operating, turn the cruise control main switch off to reset the cruise control system. After the reset, if the cruise control main switch cannot be turned on, or the cruise control system is canceled immediately after turning the cruise control main switch on, the system may have a malfunction.

(e) Do not use the cruise control system where the road conditions are as follows:

- Heavy traffic
- Steep decline
- Roads with sharp turns
- Icy or snowy roads
- Slippery roads

PARTS LOCATION



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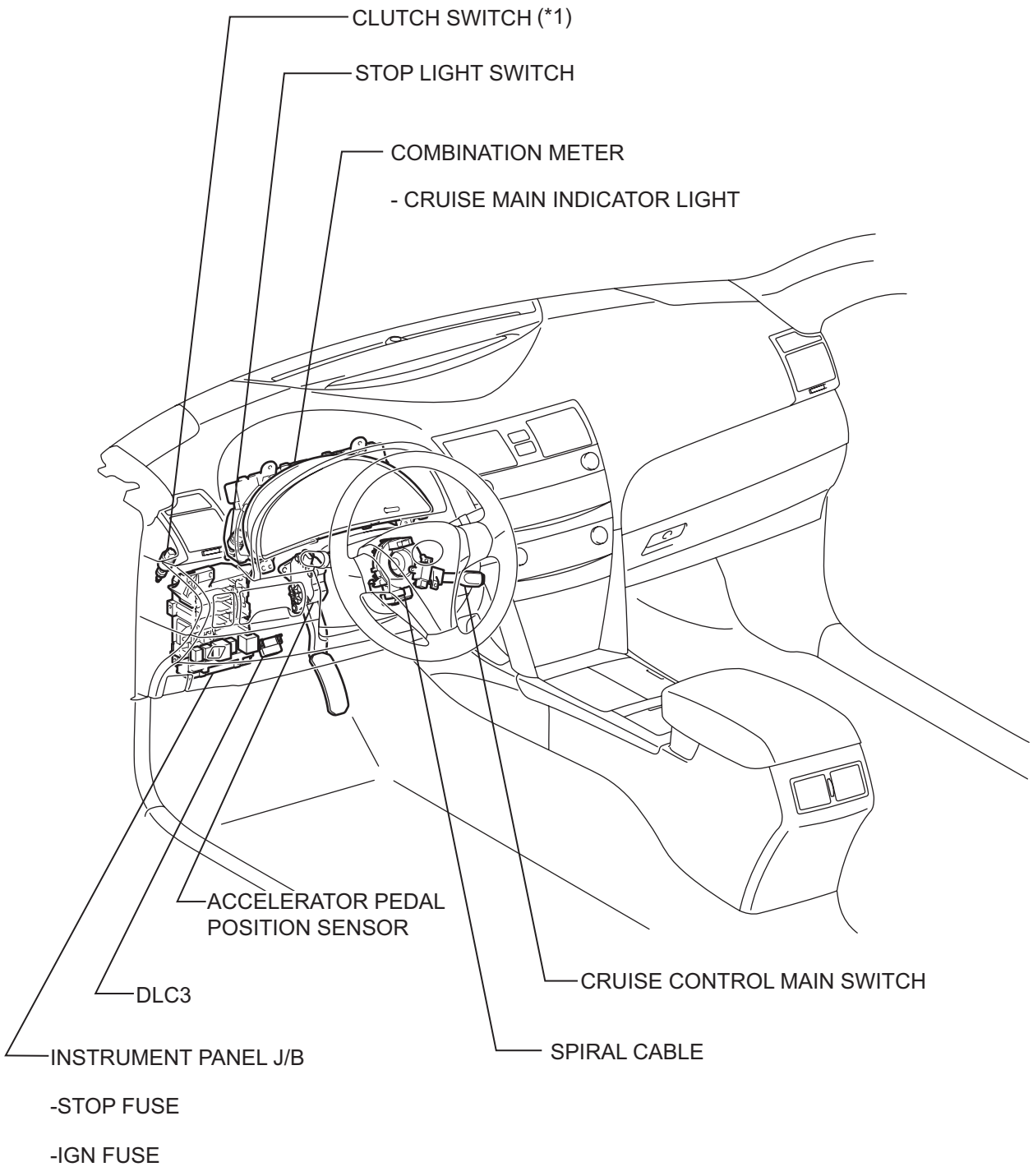


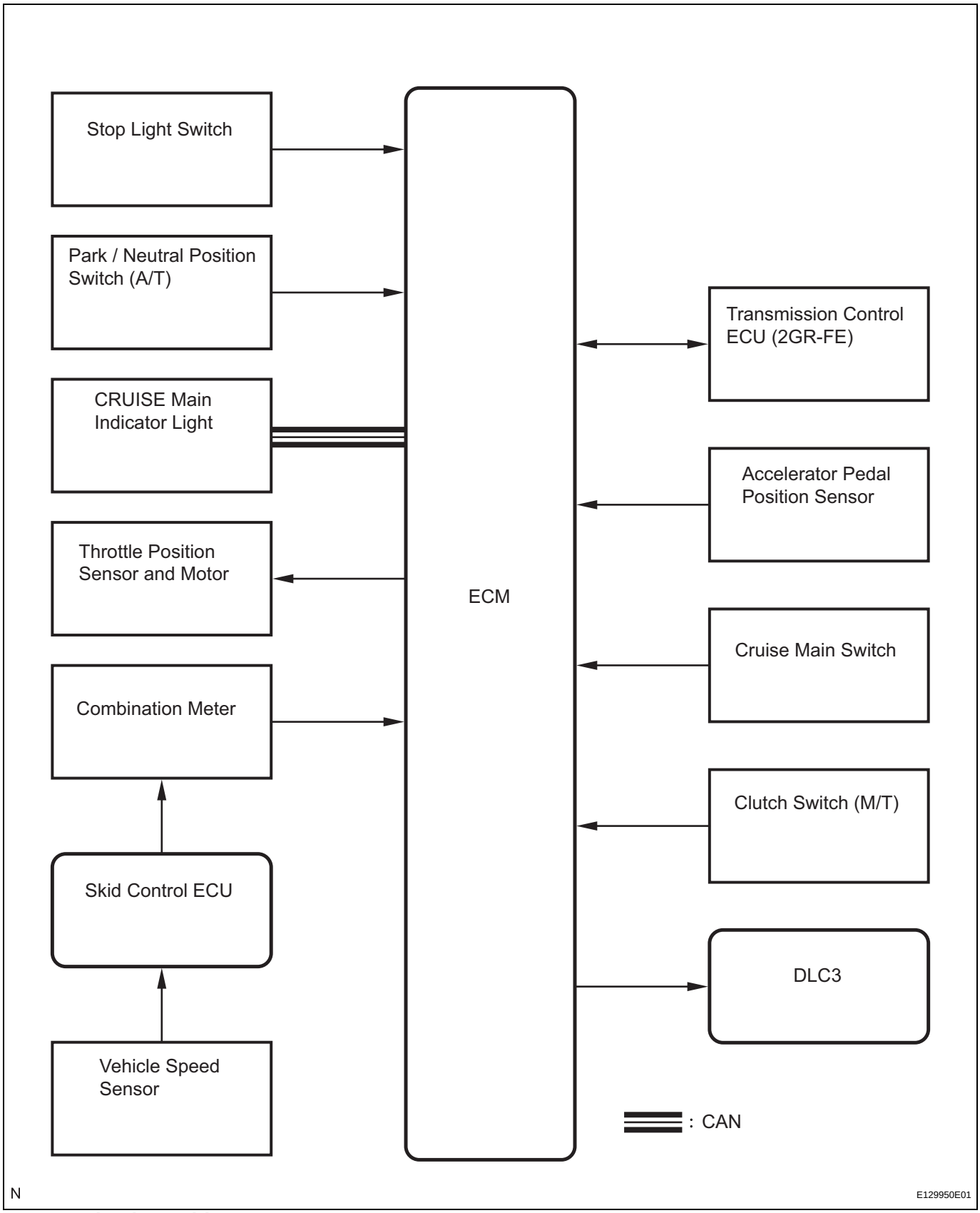
*1: M/T

H

E129947E01

CC

SYSTEM DIAGRAM



Communication Table:

Sender	Receiver	Signal	Line
ECM	Combination Meter ECU	CRUISE main indicator operation signal	CAN

SYSTEM DESCRIPTION

1. CRUISE CONTROL SYSTEM

This system is controlled by the ECM, and is activated by the throttle position sensor and motor. The ECM controls the following functions: ON-OFF, - (COAST)/SET, + (ACCEL)/RES (RESUME), CANCEL, vehicle speed operation, motor output control, and overdrive control.

- The ECM compares the driving vehicle speed from the speed sensor with the stored vehicle speed set through the cruise control main switch. The ECM instructs the throttle valve motor of the throttle body assembly to close the valve when the driving speed is greater than the stored speed, and instructs it to open the valve when the driving speed is less than the stored speed.
- The ECM receives signals such as ON-OFF, - (COAST)/SET, + (ACCEL)/RES (RESUME), and CANCEL from the cruise control main switch and executes the command.
- The ECM illuminates the combination meter's CRUISE main indicator light when it receives a cruise control main switch ON signal.
- The ECM cancels the cruise control system when the brake pedal is depressed and the ECM receives a stop light switch signal.
- The ECM cancels the cruise control system when the shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position, and the ECM receives a park/neutral position switch signal.
- The ECM cancels the cruise control system when the clutch pedal is depressed and the ECM receives a clutch switch signal.

2. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is set at approximately 40 km/h (25 mph). The cruise control system cannot be set when the driving vehicle speed is below the low speed limit. Cruise control operation will be automatically canceled but the stored vehicle speed will be retained when the vehicle speed drops below the low speed limit 40 km/h (25 mph) while the cruise control is in operation.

(b) High speed limit

The highest possible limit of the speed setting range is set at approximately 200 km/h (125 mph). The cruise control system cannot be set when the driving vehicle speed is over the high speed limit. Also, + (ACCEL)/RES (RESUME) cannot be used to increase speed beyond the high speed limit.

3. OPERATION OF CRUISE CONTROL

The cruise control main switch operates 7 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, and CANCEL. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP, and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in the direction of each arrow and turns off after releasing it.

(a) SET CONTROL

The vehicle speed is stored and constant speed control is maintained when pushing the cruise control main switch to - (COAST)/SET while driving with the main switch on (the CRUISE main indicator light is on), and the vehicle speed is within the set speed range (between the low and high speed limits).

(b) - (COAST) CONTROL

When the cruise control main switch is set to - (COAST)/SET and held in that position while the cruise control system is operating, the ECM sends a "throttle valve opening angle 0°" demand signal to the cruise control system. Then the vehicle speed, when the cruise control main switch is released, is stored and maintained.

HINT:

An actual throttle valve opening angle of 0° is not possible due to the idle speed control, etc.

(c) TAP-DOWN CONTROL

When tapping down the cruise control main switch to - (COAST)/SET (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1.0 mph). When the cruise control main switch is released from - (COAST)/SET and the difference between the driving and stored vehicle speed is more than 5 km/h (3 mph), the driving vehicle speed is stored and constant speed control is maintained.

(d) ACCELERATION CONTROL

The throttle valve motor of the throttle body assembly is instructed by the ECM to open the throttle valve when + (ACCEL)/RES (RESUME) on the cruise control main switch is pressed and held while the cruise control system is in operation. When the cruise control main switch is released from + (ACCEL)/RES (RESUME), the vehicle speed is stored and the vehicle is controlled at a constant speed.

(e) TAP-UP CONTROL
When tapping up the cruise control main switch to + (ACCEL)/RES (RESUME) (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed increases each time by approximately 1.6 km/h (1.0 mph). However, when the difference between the driving and the stored vehicle speed is more than 5 km/h (approximately 3.1 mph), the stored vehicle speed will not be changed.

(f) RESUME CONTROL
If cruise control operation was canceled with the stop light switch or the CANCEL switch, and if driving speed is within the limit range, pushing the cruise control main switch to + (ACCEL)/RES (RESUME) restores vehicle speed memorized at the time of cancellation, and maintains constant speed control.

(g) MANUAL CANCEL CONTROL
Performing any of the following cancels the cruise control system while in operation (the stored vehicle speed in the ECM is maintained).
- Depressing the brake pedal
- Depressing the clutch pedal
- The shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position.
- Pulling the cruise control main switch to CANCEL
- Turning the cruise control main switch off (the stored vehicle speed in the ECM is not maintained).

4. AUTO CANCEL (FAIL-SAFE)
This system has an automatic cancellation function (fail-safe) (See page CC-16).

CC

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the cruise control system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	PROBLEM SYMPTOM CONFIRMATION

NEXT

3	CHECK CAN COMMUNICATION SYSTEM*

Refer to PRECAUTION (See page CA-1).

(a) Check for output DTCs.

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

HINT:

The ECM of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

B → PROCEED TO "CAN COMMUNICATION SYSTEM"

CC

A

4	DTC CHECK AND CLEAR*

Refer to DTC CHECK / CLEAR (See page CC-16).

NEXT

5	DTC CHECK (OTHER THAN CAN SYSTEM DTC)*

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

A → GO TO STEP 7

B

6	DTC CHART

Refer to DIAGNOSTIC TROUBLE CODE CHART (See page CC-18).

NEXT

GO TO STEP 10

7	PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom occurs	A
Symptom does not occur	B

A → GO TO STEP 9

B

8	SYMPTOM SIMULATION

Refer to ELECTRONIC CIRCUIT INSPECTION PROCEDURE (See page IN-40).

NEXT

Go to step 7

9	PROBLEM SYMPTOMS TABLE

Refer to the PROBLEM SYMPTOMS TABLE (See page CC-11).

NEXT

10	CIRCUIT INSPECTION

NEXT

11	TERMINALS OF ECM

Refer to TERMINALS OF ECM (See page CC-13).

NEXT

12	IDENTIFICATION OF PROBLEM

NEXT

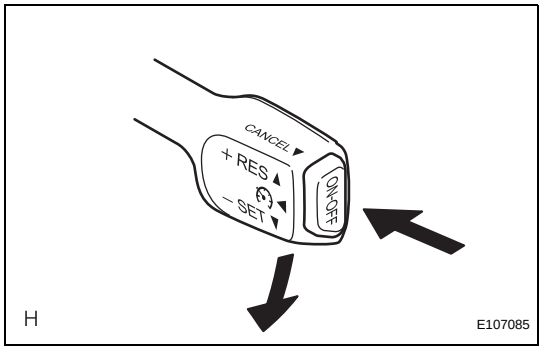
13	REPAIR OR REPLACE

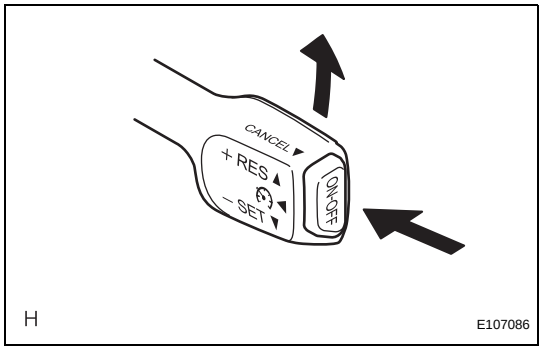
NEXT

14	CONFIRMATION TEST

NEXT

END





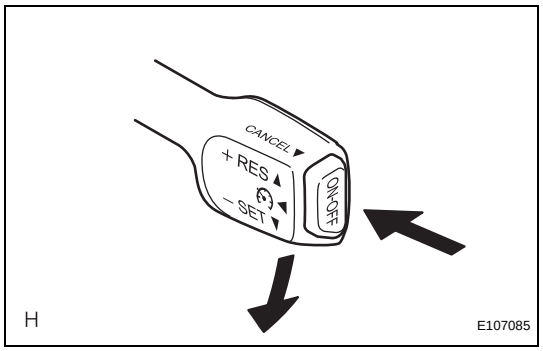
ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

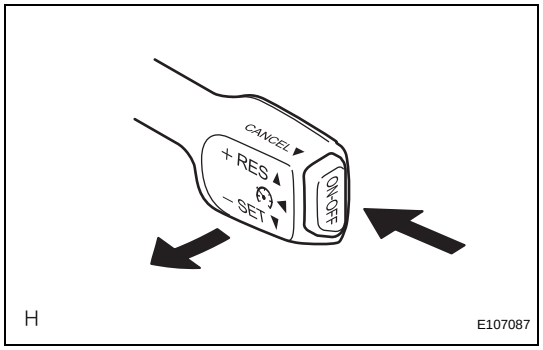
(a) Inspect the SET function.
- (1) Turn the cruise control main switch on.
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to - (COAST)/SET.
- (4) After releasing the switch, check that the vehicle cruises at the set speed.

(b) Inspect the ACCELERATION function.
- (1) Turn the cruise control main switch on.
- (2) Drive at the required speed (40 km/h (25 mph) or higher).
- (3) Push the cruise control main switch to - (COAST)/SET.
- (4) Check that vehicle speed increases while the cruise control main switch is pushed to + (ACCEL)/RES (RESUME), and that the vehicle cruises at the newly set speed when the switch is released.
- (5) Push the cruise control main switch to + (ACCEL)/RES (RESUME) and then release it immediately. Check that vehicle speed increases by approximately 1.6 km/h (1.0 mph) (tap-up control).

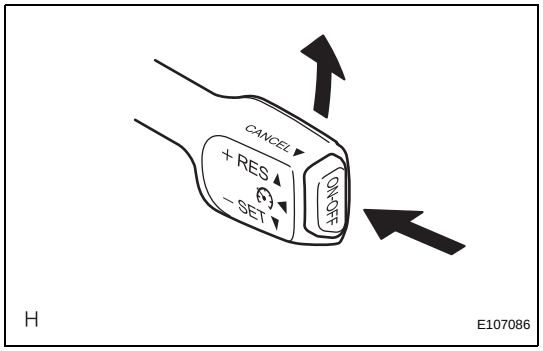
CC



(c) Inspect the - (COAST) function.
(1) Turn the cruise control main switch on.
(2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
(3) Push the cruise control main switch to - (COAST)/SET.
(4) Check that vehicle speed decreases while the cruise control main switch is pushed to - (COAST)/SET, and the vehicle cruises at the newly set speed when the switch is released.
(5) Push the cruise control main switch to - (COAST)/SET, and then release it immediately. Check that vehicle speed decreases by approximately 1.6 km/h (1.0 mph) (tap-down control).



(d) Inspect the CANCEL function.
(1) Turn the cruise control main switch on.
(2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
(3) Push the cruise control main switch to - (COAST)/SET.
(4) When performing any one of the following, check that the cruise control system is canceled and that the normal driving mode is reset.
- Depressing the brake pedal
- Depressing the clutch pedal
- The shift lever is moved from the D to the N position or the transmission is shifted to the 3rd, 2nd, or 1st gear with the shift lever in the S position
- Turning the cruise control main switch off
- Pulling the cruise control main switch to CANCEL



(e) Inspect the RES (RESUME) function.
(1) Turn the cruise control main switch on.
(2) Drive at the required speed between 40 km/h (25 mph) and 200 km/h (125 mph).
(3) Push the cruise control main switch to - (COAST)/SET.
(4) Cancel the cruise control system by performing any of the above operations (other than turning the main switch off).
(5) After pushing the cruise control main switch to + (ACCEL)/RES (RESUME) at a driving speed of more than 40 km/h (25 mph), check that the vehicle resumes the speed set prior to the cancellation.

PROBLEM SYMPTOMS TABLE

HINT:
Be sure to perform the SYMPTOM SIMULATION procedure before replacing the ECM. If these symptoms do not persist, the cause of the problem may be poor intermittent electrical contact (open or short) of a wire harness or connector.

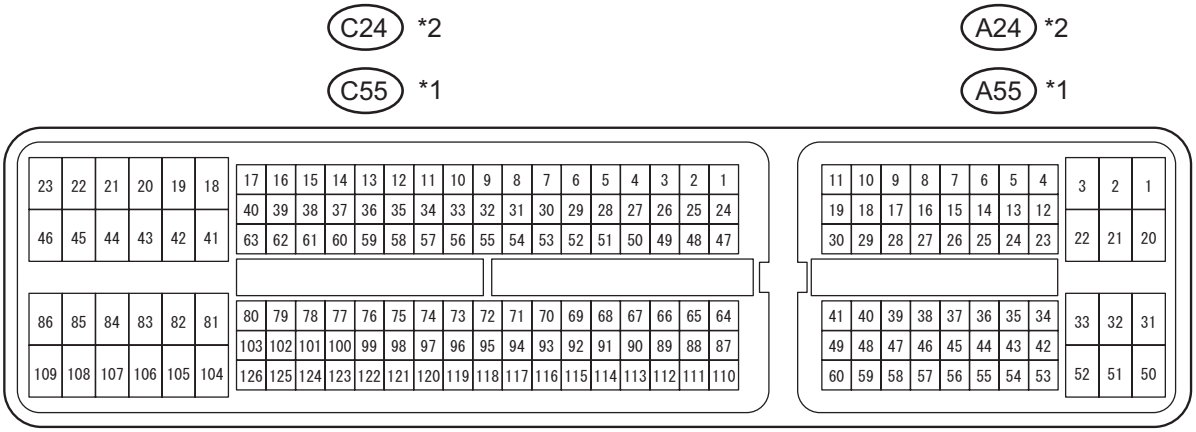
Cruise control system:

Symptom	Suspected area	See page
Vehicle speed cannot be set. (The CRUISE main indicator light comes on.)	1. Cruise control switch circuit	CC-28
	2. Combination meter	ME-15
	3. Vehicle speed sensor circuit	CC-19
	4. Stop light switch	CC-20
	5. Transmission range sensor circuit (U250E)	AX-39
	5. Park / Neutral position sensor circuit (U660E)	AX-158
	6. Clutch switch circuit	CC-25
	7. If the symptoms still occur after the above ares have been inspected and have proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	7. If the symptoms still occur after the above ares have been inspected and have proven to be normal, replace the ECM. (2GR-FE)	ES-518
Pushing the ON-OFF button does not turn the cruise control system on. (Vehicle speed cannot be set.)	1. Stop light switch circuit	CC-20
	2. Clutch switch circuit (M/T)	CC-25
	3. Vehicle speed sensor circuit	CC-19
	4. Cruise control switch circuit	CC-28
	5. Transmission range sensor circuit (U250E)	AX-39
	5. Park / Neutral position sensor circuit (U660E)	AX-158
	6. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the ECM. (2AZ- FE)	ES-432
	6. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the ECM. (2GR-FE)	ES-518
The cruise control is canceled while it is operating.	1. Stop light switch circuit	CC-20
	2. Clutch switch circuit (M/T)	CC-25
	3. Transmission range sensor circuit (U250E)	AX-39
	3. Park / Neutral position sensor circuit (U660E)	AX-158
	4. Cruise control switch circuit	CC-28
	5. Vehicle speed sensor circuit	CC-19
	6. Combination meter	ME-15
	7. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	7. If the symptoms still occur after the above areas have been inspected and have proven to be normal, replace the ECM. (2GR-FE)	ES-518
Pulling back on the control main switch does not cancel the cruise control. (The CRUISE main indicator light remains on.)	1. Cruise control switch circuit	CC-28
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2GR-FE)	ES-518
Pulling back on the control main switch does not cancel the cruise control. (The CRUISE main indicator light goes off.)	Replace ECM (2AZ-FE)	ES-432
	Replace ECM (2GR-FE)	ES-518

Symptom	Suspected area	See page
The cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main indicator light remains on.)	1. Vehicle speed sensor circuit	CC-19
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2GR-FE)	ES-518
The cruise control is not canceled when vehicle speed drops below the low speed limit. (The CRUISE main indicator light goes off.)	Replace ECM (2AZ-FE)	CC-13
	Replace ECM (2GR-FE)	ES-518
Depressing the brake pedal does not cancel the cruise control. (The CRUISE main indicator light remains on.)	1. Stop light switch circuit	CC-20
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2GR-FE)	ES-518
Depressing the brake pedal does not cancel the cruise control. (The CRUISE main indicator light goes off.)	Replace ECM (2AZ-FE)	ES-432
	Replace ECM (2GR-FE)	ES-518
Depressing the clutch pedal does not cancel the cruise control. (The CRUISE main indicator light remains on.)	1. Clutch switch circuit	CC-25
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2GR-FE)	ES-518
Depressing the clutch pedal does not cancel the cruise control. (The CRUISE main indicator light goes off.)	Replace ECM (2AZ-FE)	ES-432
	Replace ECM (2GR-FE)	ES-518
Moving the shift liver does not cancel the cruise control.	1. Transmission range sensor circuit (U250E)	AX-39
	1. Park / Neutral position sensor circuit (U660E)	AX-158
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM. (2GR-FE)	ES-518
Hunting (Speed is not constant.)	1. Vehicle speed sensor circuit	CC-19
	2. Combination meter	ME-15
	3. If the symptoms still occur after the above ares have been inspected and have proven to be normal, replace the ECM. (2AZ-FE)	ES-432
	3. If the symptoms still occur after the above ares have been inspected and have proven to be normal replace the ECM. (2GR-FE)	ES-518
The CRUISE main indicator light remains blinking.	1. TC and CG terminal circuit	CC-35
	2. If the symptoms still occur after the above area has been inspected and has proven to be normal, replace the ECM.	CC-13

TERMINALS OF ECM

1. CHECK ECM



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
A55-27 (TC) - C55-81 (E1)*1 A24-27 (TC) - C24-104 (E1)*2	P - W-B	Ground	Ignition switch on (IG)	10 to 14 V
A55-27 (TC) - C55-81 (E1)*1 A24-27 (TC) - C24-104 (E1)*2	P - W-B	Ground	Connect terminals TC and CG of DLC3	Below 1 V
A55-36 (STP) - C55-81 (E1)*1 A24-36 (STP) - C24-104 (E1)*2	W - W-B	Stop light signal	Ignition switch on (IG), Depress brake pedal	10 to 14 V
A55-36 (STP) - C55-81 (E1)*1 A24-36 (STP) - C24-104 (E1)*2	W - W-B	Stop light signal	Ignition switch on (IG), Release brake pedal	Below 1 V
A55-40 (CCS) - C55-81 (E1)*1 A24-40 (CCS) - C24-104 (E1)*2	W - W-B	Cruise control main switch circuit	Ignition switch on (IG)	10 to 14 V
A55-40 (CCS) - C55-81 (E1)*1 A24-40 (CCS) - C24-104 (E1)*2	W - W-B	Cruise control main switch circuit	CANCEL switch ON	6.6 to 10.1 V
A55-40 (CCS) - C55-81 (E1)*1 A24-40 (CCS) - C24-104 (E1)*2	W - W-B	Cruise control main switch circuit	SET/COAST switch ON	4.5 to 7.1 V
A55-40 (CCS) - C55-81 (E1)*1 A24-40 (CCS) - C24-104 (E1)*2	W - W-B	Cruise control main switch circuit	RES/ACC switch ON	2.3 to 4.0 V
A55-40 (CCS) - C55-81 (E1)*1 A24-40 (CCS) - C24-104 (E1)*2	W - W-B	Cruise control main switch circuit	MAIN switch ON	Below 1 V
A55-35 (ST1-) - C55-81 (E1)*1 A24-35 (ST1-) - C24-104 (E1)*2	GR - W-B	Stop light signal	Ignition switch on (IG), Depress brake pedal	Below 1 V
A55-35 (ST1-) - C55-81 (E1)*1 A24-35 (ST1-) - C24-104 (E1)*2	GR - W-B	Stop light signal	Ignition switch on (IG), Release brake pedal	10 to 14 V
C24-56 (D) - C55-81 (E1)*1 C24-56 (D) - C24-104 (E1)*2	C - W-B	Clutch signal	Ignition switch on (IG), Depress clutch pedal	Below 1 V
C24-56 (D) - C55-81 (E1)*1 C24-56 (D) - C24-104 (E1)*2	C - W-B	Clutch signal	Ignition switch on (IG), Release brake pedal	10 to 14 V

HINT:
*1: 2GR-FE
*2: 2AZ-FE

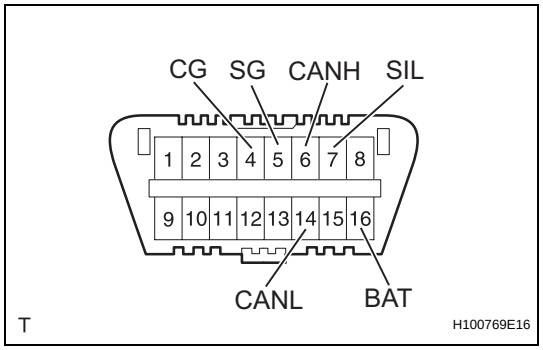
CC

DIAGNOSIS SYSTEM

1. DESCRIPTION

The ECU controls the cruise control system of the vehicle. The data and DTCs relating to the cruise control system can be read from the DLC3 of the vehicle. If either DTC or CRUISE OK is not displayed on the multi-information display on the combination meter when checking for DTCs, there may be a problem with either the combination meter or the CAN communication and multiplex communication systems. Use the intelligent tester to check and solve the problem.

2. CHECK DLC3



(a) The ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Terminal No. (Symbols)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch off*	6 kΩ or higher

NOTICE:

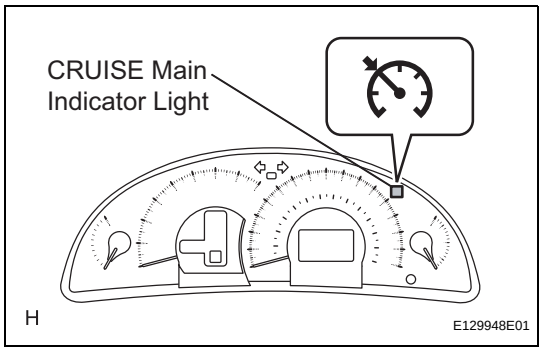
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

(b) Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG), and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem with either the vehicle or the tester.

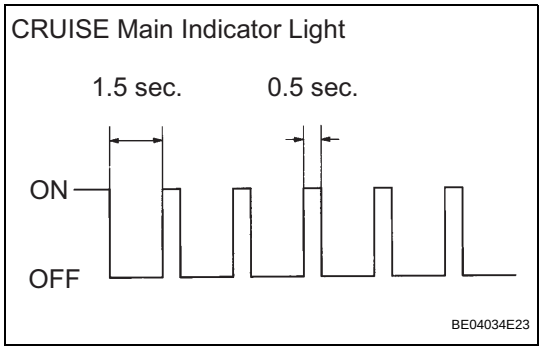
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.

- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. CHECK INDICATOR

(a) Turn the ignition switch on (IG).

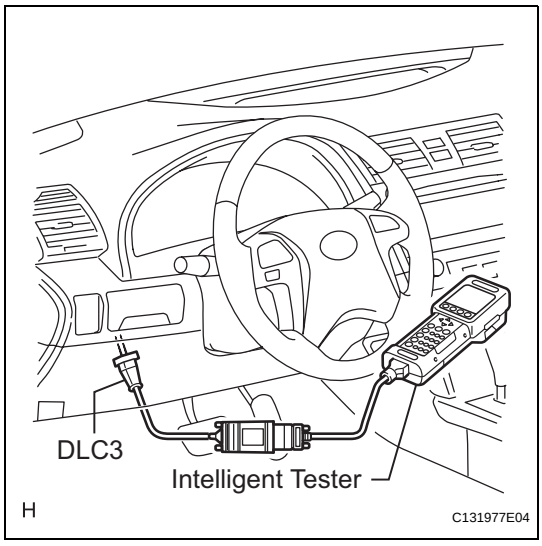


(b) Check that the CRUISE main indicator light illuminates when the cruise control main switch is turned on, and that the indicator light turns off when the main switch is turned off. If the results are not as specified, inspect the CRUISE main indicator light circuit (See page CC-34).

HINT:

While driving with cruise control, the ECM activates AUTO CANCEL of the cruise control system when a malfunction occurs in one of the following: vehicle speed sensors, stop light switch, or other related parts. When AUTO CANCEL is activated, the CRUISE main indicator light outputs the blinking pattern shown to the left. At the same time, data of the malfunction is stored as a DTC.

DTC CHECK / CLEAR



1. DTC CHECK

(a) Connect the intelligent tester to the DLC3.
  (1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(b) Turn the ignition switch on (IG).

(c) Read the DTCs by following the prompts on the tester screen.

HINT:

Refer to the intelligent tester operator's manual for further details.

2. DTC CLEAR

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Operate the intelligent tester to erase the codes.

HINT:

Refer to the intelligent tester operator's manual for further details.

CC

FAIL-SAFE CHART

HINT:
If the following conditions are detected while the cruise control is in operation, the system clears the stored vehicle speed in the ECM and cancels the cruise control operation.

Vehicle Condition	Auto Cancel Condition	Re-operation Condition
CRUISE main indicator light blinks	• There is open or short in stop light switch circuit • There is problem with vehicle speed signal • There is problem with throttle position sensor and motor	Turn cruise control main switch on again
CRUISE main indicator light blinks	• There is problem with input circuit of stop light switch circuit • There is problem with cancel circuit	• Turn cruise control main switch on again • Turn ignition switch off then on again
CRUISE main indicator light remains on (Cruise control is canceled)	• Vehicle speed is lower than low speed limit (approx. 40 km/h (25 mph)) while running with cruise control on	Push cruise control main switch to + (ACCEL)/RES (RESUME)
	• Vehicle speed is lower than stored speed by approx. 16 km/h (9.9 mph) or more	Push cruise control main switch to - (COAST)/ SET

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:
Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Read the DATA LIST according to the display on the tester.

ECM (Cruise control):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed / min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	-
MEMORY SPD	Cruise control memorized speed / min.: 36 km/h (22.5 mph), max.: 200 km/h (125 mph)	Actual stored vehicle speed	-
THROTTLE	Throttle opening angle / min.: 0°, max.: 125°	Actual demanded throttle angle	-
SHIFT D POS	Shift D position / ON or OFF	ON: Shift lever in D or 4 OFF: Shift lever is except D or 4 position	-
CRUISE CONTROL	Cruise control system active condition / ON or OFF	ON: Cruise control activated OFF: Cruise control deactivated	-
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON: "CRUISE" on OFF: "CRUISE" off	-
MAIN SW (MAIN)	Main switch signal (Main CPU) / ON or OFF	ON: Cruise control main switch on OFF: Cruise control main switch off	"1"
MAIN SW (SUB)	Main switch signal (Main CPU) / ON or OFF	ON: Cruise control main switch on OFF: Cruise control main switch off	-
SHIFT D POS	Clutch pedal / ON or OFF	ON: Clutch pedal released OFF: Clutch pedal depressed	-
CANCEL SW	CANCEL switch signal / ON or OFF	ON: CANCEL switch on OFF: CANCEL switch off	-
SET/COAST SW	SET / COAST switch signal / ON or OFF	ON: - (COAST) / SET switch on OFF: - (COAST) / SET switch off	-
RES/ACC SW	RES / ACC switch signal / ON or OFF	ON: + (ACCEL) / RES (RESUME) switch on OFF: + (ACCEL) / RES (RESUME) switch off	-
STP LIGHT SW M (STP)	Stop light switch signal (Main CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW S2 (STP)	Stop light switch signal (Sub CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW S1 (ST1-)	Stop light switch signal (Sub CPU)	ON: Brake pedal depressed OFF: Brake pedal released	-

HINT:

- "1" is OK but CRUISE main indicator light does not illuminate → CRUISE main indicator light, wire harness, or ECM failure

CC

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relays, VSVs, actuators, and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Perform the ACTIVE TEST according to the display on the tester.

HINT:

The ignition switch must be turned on (IG) to proceed to with the ACTIVE TEST using the intelligent tester.

Combination meter:

Item	Vehicle Condition / Test Details	Diagnostic Note
CRUISE INDIC	Turns CRUISE main indicator light ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the trouble areas listed for that code in the table below and proceed to the appropriate page.

Cruise control system:

DTC No.	Detection Item	Trouble Area	See page
P0500	Vehicle Speed Sensor Malfunction	1. Vehicle speed sensor 2. Vehicle speed sensor signal circuit 3. ECM	CC-19
P0503	Vehicle Speed Sensor "A" Intermittent / Erratic / High	1. Vehicle speed sensor 2. Vehicle speed sensor signal circuit 3. ECM	CC-19
P0571	Brake Switch "A" Circuit	1. Stop light switch 2. Stop light switch circuit 3. ECM	CC-20
P0607	Control Module Performance	ECM	CC-24

DTC	P0500	Vehicle Speed Sensor Malfunction

DTC	P0503	Vehicle Speed Sensor "A" Intermittent / Erratic / High

DESCRIPTION

Refer to DTC P0500 (See page ES-229).

DTC No.	DTC Detection Condition	Trouble Area
P0500	The vehicle speed signal from the vehicle speed sensor is cut for 0.14 sec. or more while cruise control is in operation.	• Vehicle speed sensor • Vehicle speed sensor signal circuit • ECM
P0503	Momentary interruption and noise are detected when a rapid change of vehicle speed occurs while cruise control is in operation.	• Vehicle speed sensor • Vehicle speed sensor signal circuit • ECM

WIRING DIAGRAM

Refer to DTC P0500 (See page ES-231).

INSPECTION PROCEDURE

Refer to DTC P0500 (See page ES-231).

DTC	P0571	Brake Switch "A" Circuit

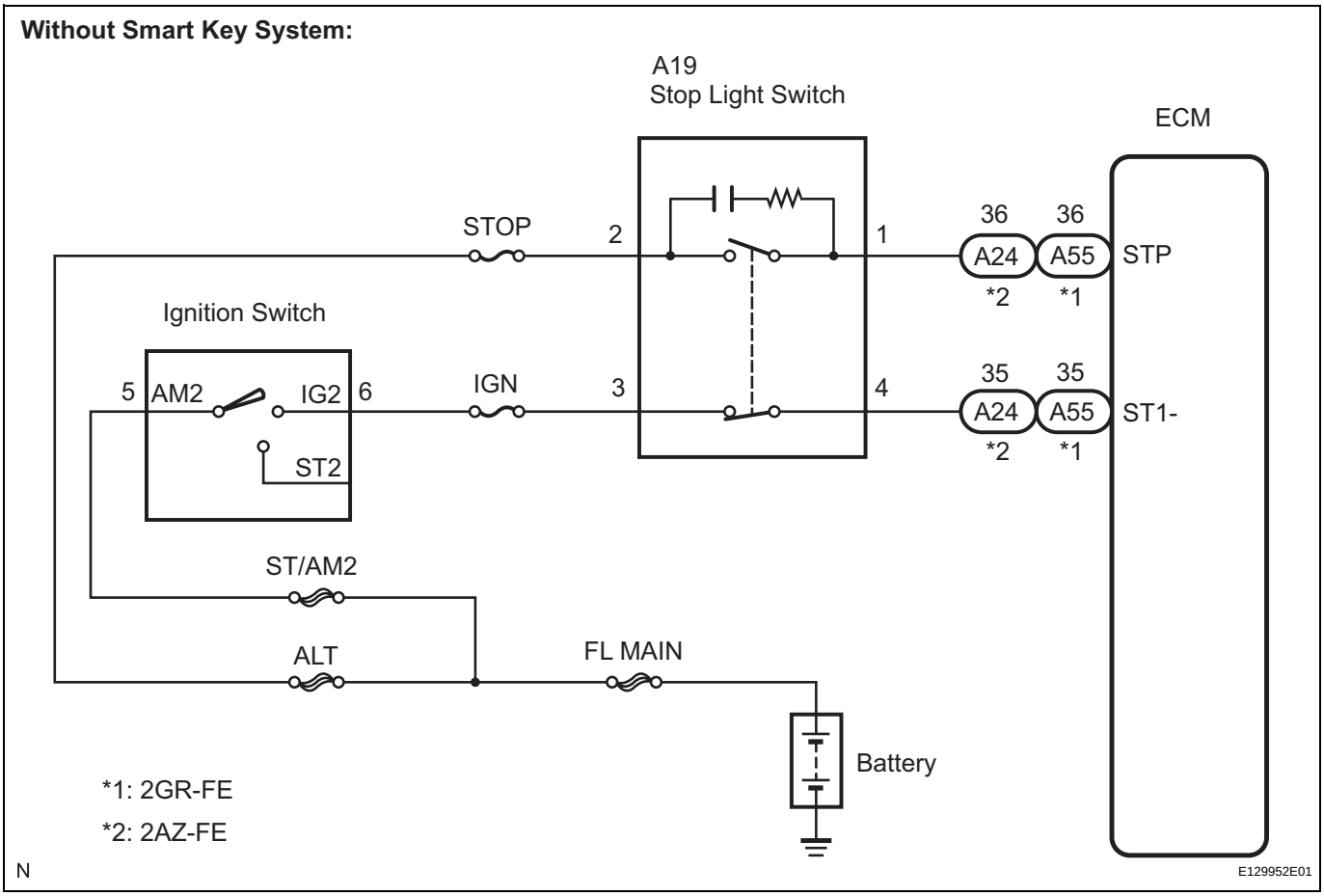
DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control. The fail-safe function operates to enable normal driving even if there is a malfunction in the stop light signal circuit. The cancellation condition occurs when voltage is applied to terminal STP. When the brake is applied, voltage is normally applied to terminal STP of the ECM through the STOP SW fuse and the stop light switch, and the ECM turns the cruise control off.

DTC No.	DTC Detection Condition	Trouble Area
P0571	When voltage of STP terminal and that of ST1- terminal of ECM are less than 1 V for 0.5 sec. or more	• Stop light switch • Stop light switch circuit • ECM

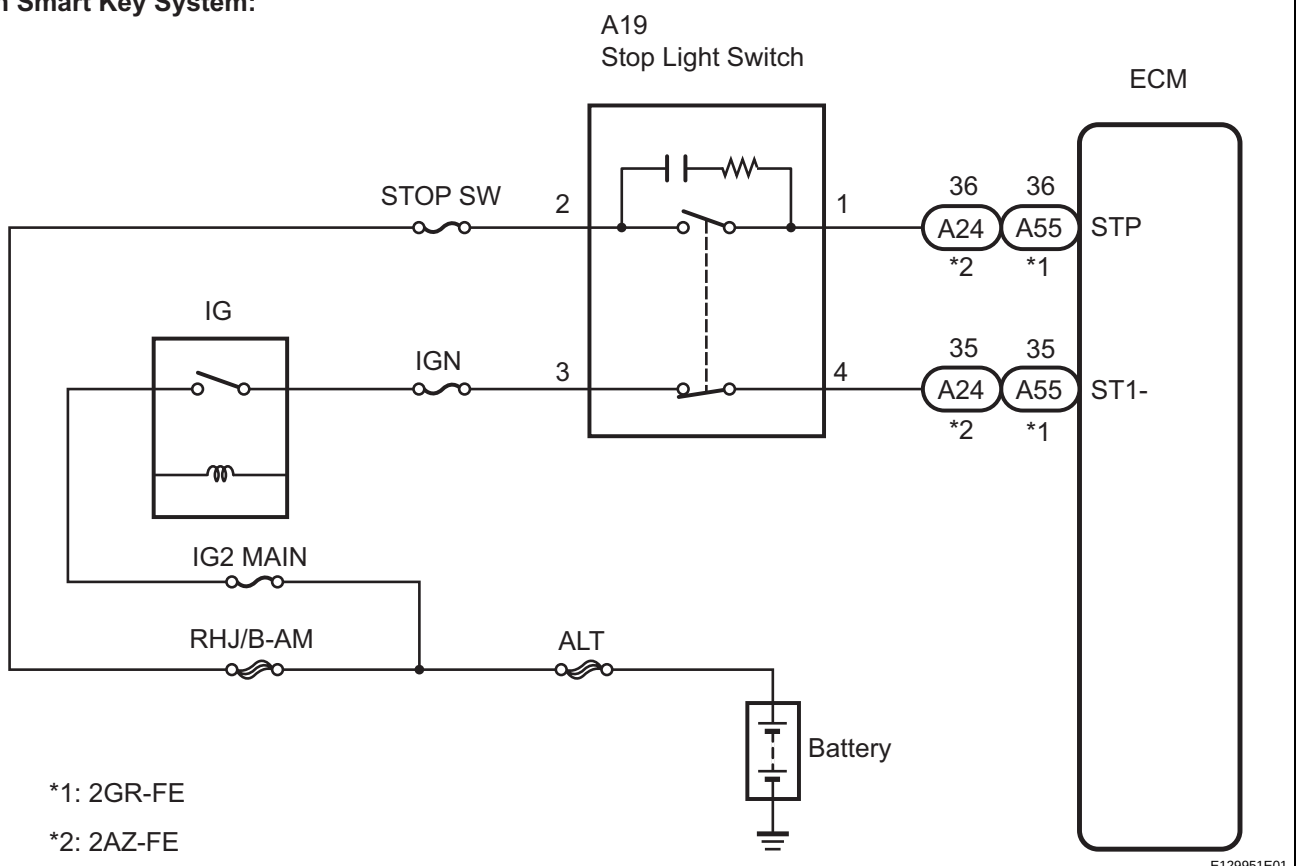
WIRING DIAGRAM

Without Smart Key System:



CC

With Smart Key System:



INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG), and turn the intelligent tester main switch on.
(c) Check the DATA LIST for proper functioning of the stop light switch.

ECM (Cruise control):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
STP LIGHT SW M (STP)	Stop light switch signal (Main CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW S2 (STP)	Stop light switch signal (Sub CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW S1 (ST1-)	Stop light switch signal (Sub CPU) / ON or OFF	ON: Brake pedal depressed OFF: Brake pedal released	-

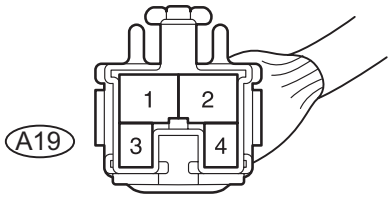
OK:
When the brake pedal is operated, the display changes as shown above.

OK → **REPLACE ECM**

NG

2 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH - BATTERY)

Stop Light Switch Wire Harness Side Connector Front View:



N E114084E08

(a) Disconnect the A19 connector from the stop light switch.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

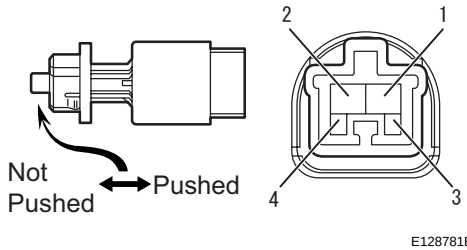
Tester Connection	Condition	Specified Condition
A19-2 - Body ground	Always	10 to 14 V
A19-3 - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT STOP LIGHT SWITCH

Stop Light Switch:



H E128781E02

(a) Remove the stop light switch. (See page CC-42)
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 - 2	Switch pin not pushed	Below 1 Ω
3 - 4	Switch pin not pushed	10 kΩ or higher
1 - 2	Switch pin pushed	10 kΩ or higher
3 - 4	Switch pin pushed	Below 1 Ω

(c) Install the stop light switch.

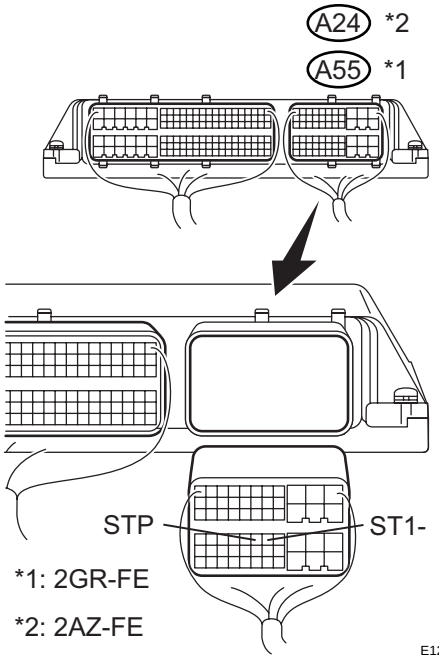
NG → **REPLACE STOP LIGHT SWITCH**

OK

CC

4	CHECK ECM

ECM Wire Harness View:



(a) Reconnect the stop light switch connector.
(b) Disconnect the A55 connector from the ECM. (2GR-FE)
(c) Disconnect the A24 connector from the ECM. (2AZ-FE)
(d) Turn the ignition switch on (IG).
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Brake Pedal Condition	Specified Condition
A55-36 (STP) - Body ground*1 A24-36 (STP) - Body ground*2	Depressed	10 to 14 V
A55-36 (STP) - Body ground*1 A24-36 (STP) - Body ground*2	Released	Below 1 V
A55-35 (ST1-) - Body ground*1 A24-35 (ST1-) - Body ground*2	Depressed	Below 1 V
A55-35 (ST1-) - Body ground*1 A24-35 (ST1-) - Body ground*2	Released	10 to 14 V

HINT:
*1: 2GR-FE
*2: 2AZ-FE

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH - ECM)**

OK

REPLACE ECM

CC

DTC	P0607	Control Module Performance

DESCRIPTION

This DTC indicates the internal abnormalities of the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0607	When both of the following conditions are met: • STP signals input to the ECM supervisory CPU and control ECU are different for 0.15 sec. or more • 0.4 sec. have passed after cruise cancel input signal (STP input) is input to the ECM	ECM

HINT:
The ECM receives signals from each sensor to control all functions of the cruise control system. When a trouble code is detected, the fail-safe function remains on until the ignition switch is turned off.

INSPECTION PROCEDURE

1	REPLACE ECM

NEXT

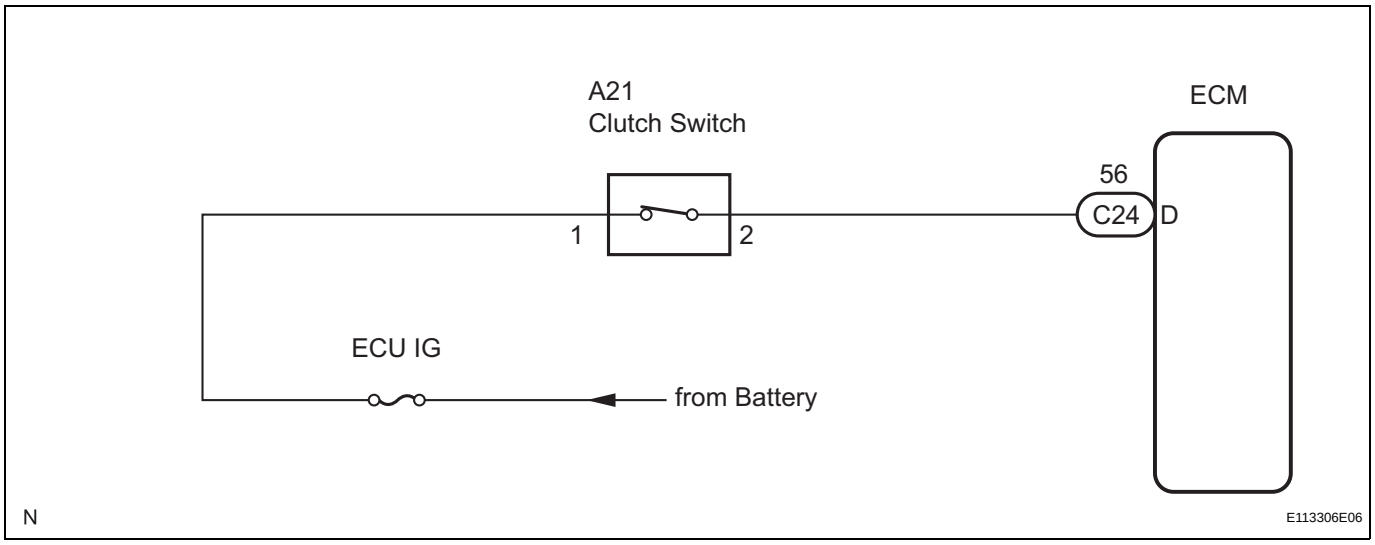
END

Clutch Switch Circuit

DESCRIPTION

Clutch switch circuit inspection is necessary for M/T vehicles.
When the clutch pedal is released, the ECM receives positive (+) battery voltage through the ECU IG fuse. While depressing the clutch pedal, the clutch switch sends a signal to terminal D of the ECM. The ECM cancels cruise control drive when terminal D receives the signal.

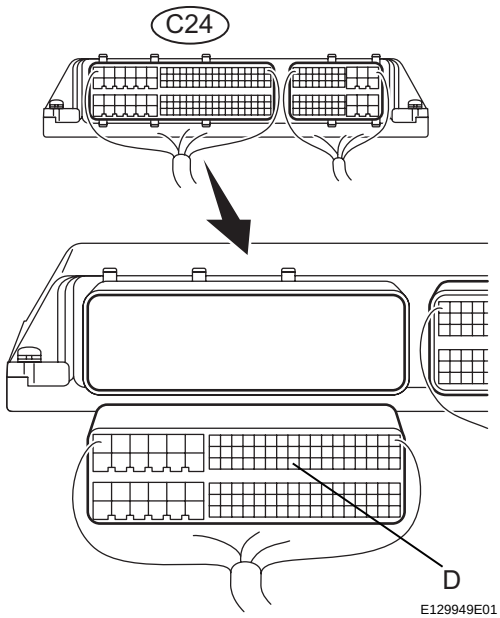
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ECM

ECM Wire Harness View:



(a) Disconnect the C24 connector from the ECM.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
C24-56 (D) - Body ground	Clutch pedal depressed	Below 1 V
	Clutch pedal released	10 to 14 V

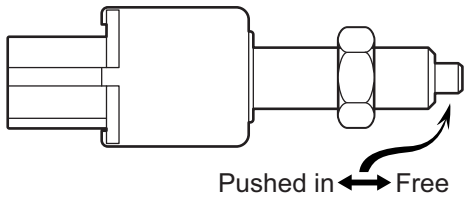
OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

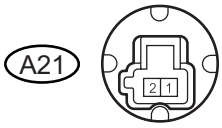
CC

NG

2	INSPECT CLUTCH SWITCH

Clutch Switch:





H

E133093E01

(a) Turn the ignition switch off.
(b) Disconnect the A21 connector from the clutch switch.
(c) Remove the clutch switch. (See page CC-42)
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free (Clutch pedal depressed)	10 kΩ or higher
	Switch pin pushed in (Clutch pedal released)	Below 1Ω

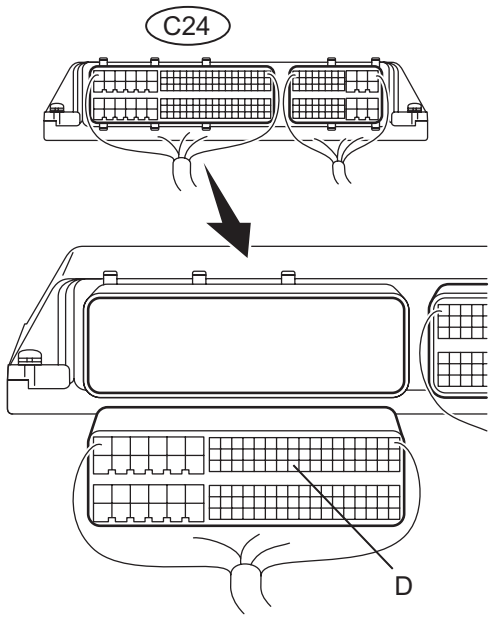
NG → REPLACE CLUTCH SWITCH

OK

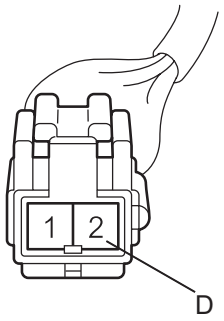
CC

3	CHECK HARNESS AND CONNECTOR

ECM Wire Harness View:



Clutch Switch (Wire Harness Side) Connector Front View:



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E129955E01

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
C24-56 (D) - A21-2	Always	Below 1 Ω
C24-56 (D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - CLUTCH SWITCH)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (BATTERY - CLUTCH SWITCH)

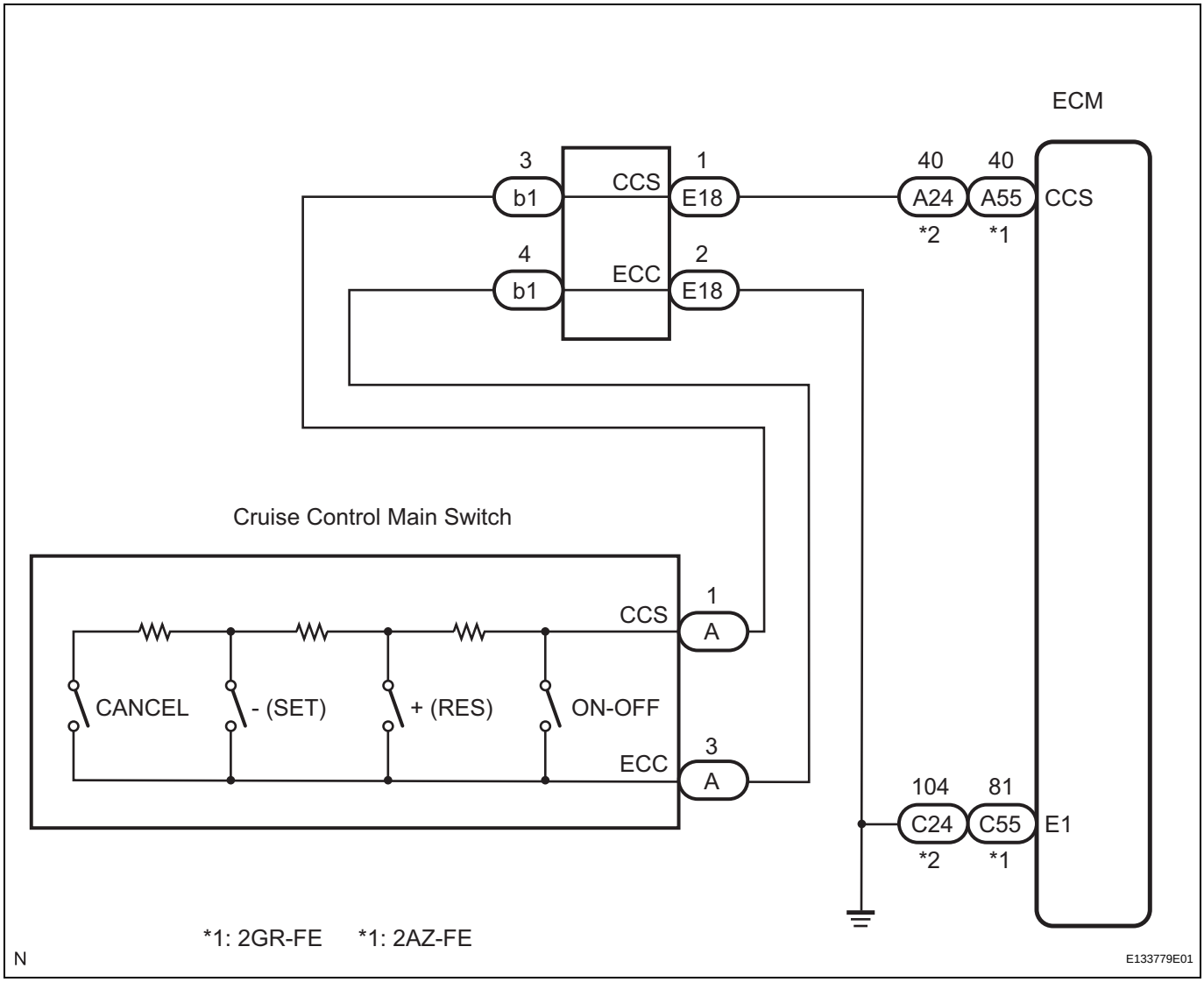
CC

Cruise Control Switch Circuit

DESCRIPTION

The cruise control main switch operates 7 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, and CANCEL. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP, and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in the direction of each arrow and turns off after releasing it. The internal contact point of the cruise control main switch is turned on with the switch operation. Then the ECM reads the voltage value that has been changed by the switch operation to control SET, - (COAST), RES (RESUME), + (ACCEL), and CANCEL.

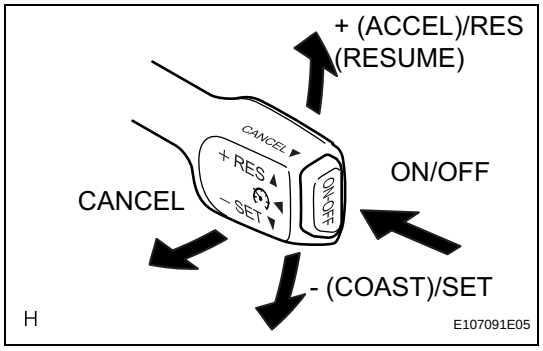
WIRING DIAGRAM



CC

INSPECTION PROCEDURE

1	READ VALUE ON INTELLIGENT TESTER



(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Check the DATA LIST for proper functioning of the cruise control main switch.

ECM (Cruise control):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
MAIN SW (MAIN)	Main switch signal (Main CPU)/ ON or OFF	ON: Cruise control main switch on OFF: Cruise control main switch off	-
CANCEL SW	CANCEL switch signal/ON or OFF	ON: CANCEL switch on OFF: CANCEL switch off	-
SET / COAST SW	SET / COAST switch signal/ON or OFF	ON: - (COAST)/SET switch on OFF: - (COAST)/SET switch off	-
RES / ACC SW	RES / ACC switch signal/ON or OFF	ON: + (ACCEL)/RES (RESUME) switch on OFF: + (ACCEL)/RES (RESUME) switch off	-
MAIN SW (SUB)	Main switch signal (Sub CPU) / ON or OFF	ON: Cruise control main switch ON OFF: Cruise control main switch OFF	-

OK:
When the cruise control main switch is operated, the display changes as shown above.

Result

Result	Proceed to
OK	A
NG (All items are defective)	B
NG (1 to 4 items are defective)	C

A → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE CRUISE CONTROL MAIN SWITCH**

B

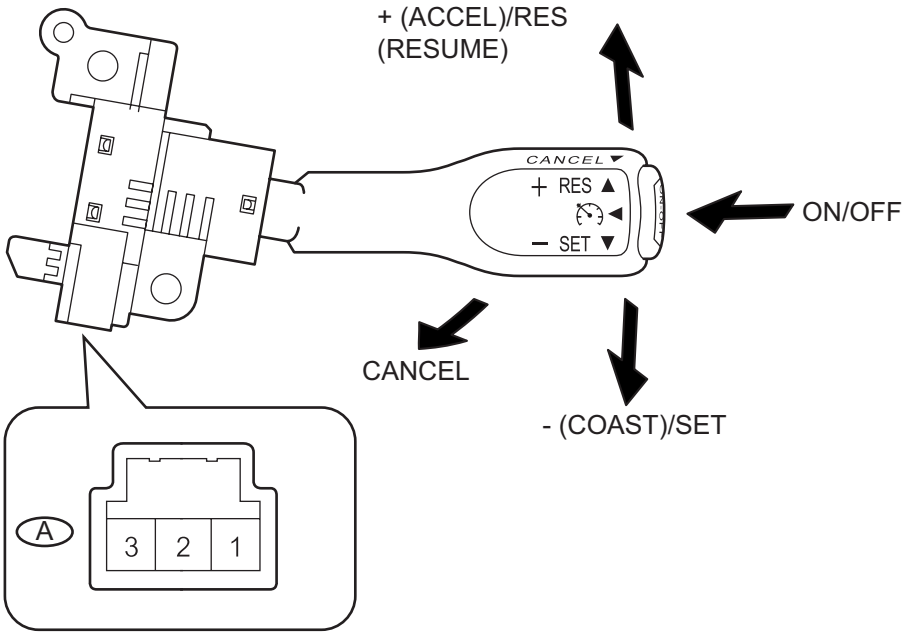
2	INSPECT CRUISE CONTROL MAIN SWITCH

(a) Remove the cruise control main switch (See page CC-38).

CC

(b) Measure the resistance according to the value(s) in the table below.

Cruise Control Main Switch:



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Standard resistance

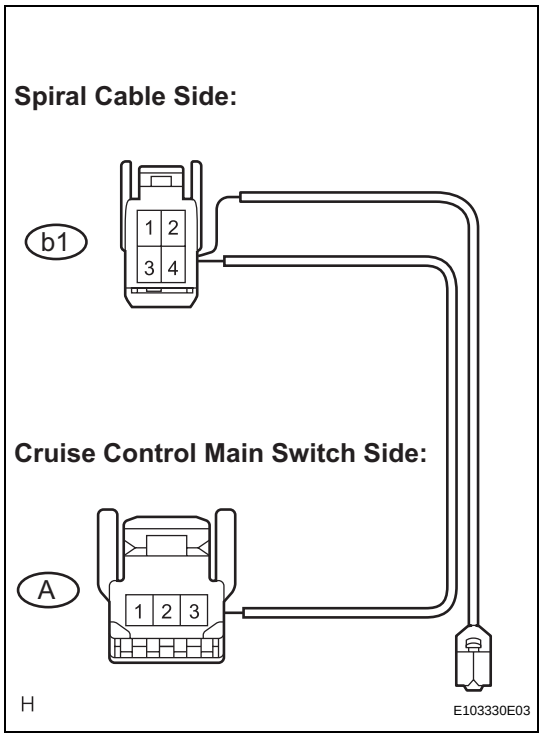
Tester Connection	Switch Condition	Specified Condition
A-1 (CCS) - A-3 (ECC)	Neutral	10 kΩ or higher
A-1 (CCS) - A-3 (ECC)	+ (ACCEL)/RES (RESUME)	216 to 264 Ω
A-1 (CCS) - A-3 (ECC)	- (COAST)/SET	567 to 693 Ω
A-1 (CCS) - A-3 (ECC)	CANCEL	1,386 to 1,694 Ω
A-1 (CCS) - A-3 (ECC)	Main Switch off	10 kΩ or higher
A-1 (CCS) - A-3 (ECC)	Main Switch on	Below 1 Ω

NG → **REPLACE CRUISE CONTROL MAIN SWITCH**

CC

OK

3	CHECK HARNESS AND CONNECTOR (CRUISE CONTROL MAIN SWITCH - SPIRAL CABLE)



(a) Disconnect the b1 connector from the spiral cable.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

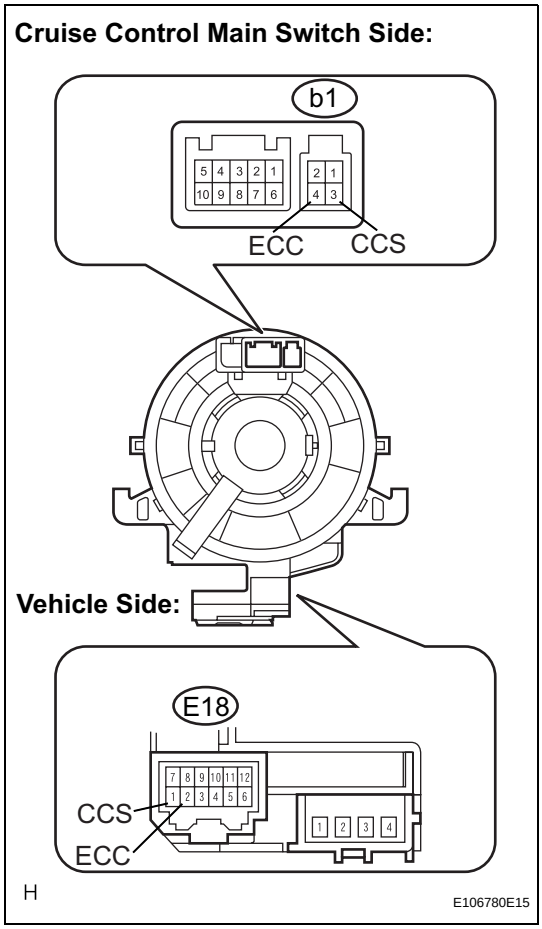
Tester connection	Specified condition
A-1 - b1-3	Below 1 Ω
A-3 - b1-4	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

CC

4	CHECK SPIRAL CABLE



NOTICE:
The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may prevent the airbag from deploying. Be sure to read the page shown in the brackets.
HINT:
- Removal (See page RS-363)
- Installation (See page RS-366)

(a) Remove the spiral cable.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Spiral Cable Position	Specified Condition
b1-3 - E18-1 (CCS)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
b1-4 - E18-2 (ECC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

HINT:
The spiral cable makes a maximum of approximately 5 rotations.

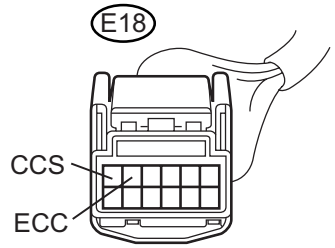
NG → REPLACE SPIRAL CABLE

OK

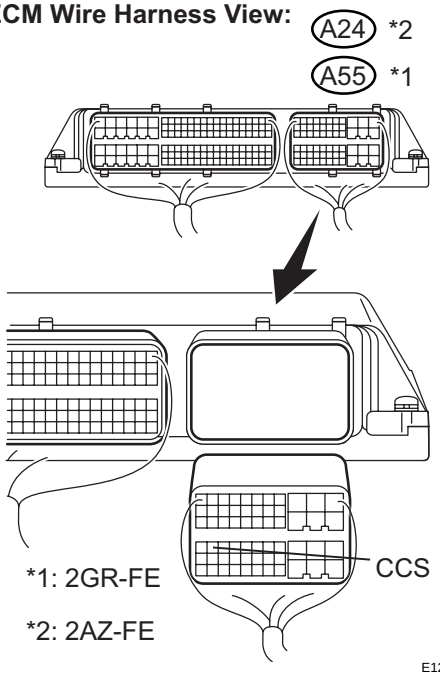
CC

5	CHECK WIRE HARNESS (SPIRAL CABLE - ECM AND BODY GROUND)

Vehicle Side Connector Front View:



ECM Wire Harness View:



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(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E18-1 - A55-40 (CCS)*1 E18-1 - A24-40 (CCS)*2	Always	Below 1 Ω
A55-40 (CCS) - Body ground*1 A24-40 (CCS) - Body ground*2	Always	10 kΩ or higher
E18-2 (ECC) - Body ground	Always	Below 1 Ω

HINT:
*1: 2GR-FE
*2: 2AZ-FE

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

CC

Cruise Main Indicator Light Circuit

DESCRIPTION

- The ECM detects a cruise control switch signal and sends it to the combination meter through CAN. Then the CRUISE main indicator light comes on.
- The CRUISE main indicator light circuit uses CAN for communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

INSPECTION PROCEDURE

1 **PERFORM ACTIVE TEST USING INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Check the CRUISE main indicator light by performing the ACTIVE TEST.

Combination meter:

Item	Test Details	Diagnostic Note
CRUISE INDIC	Turns CRUISE main indicator light ON / OFF	-

OK:
Indicator light comes on / goes off.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

2 **READ VALUE ON INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Check the DATA LIST for proper functioning of the CRUISE main indicator light.

CC

ECM (Cruise control):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
CCS INDICATOR M	Cruise indicator signal (Main CPU) / ON or OFF	ON: "CRUISE" on OFF: "CRUISE" off	-

OK:
When the cruise control main switch is operated, the display changes as shown above.

NG → **REPLACE ECM**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

TC and CG Terminal Circuit

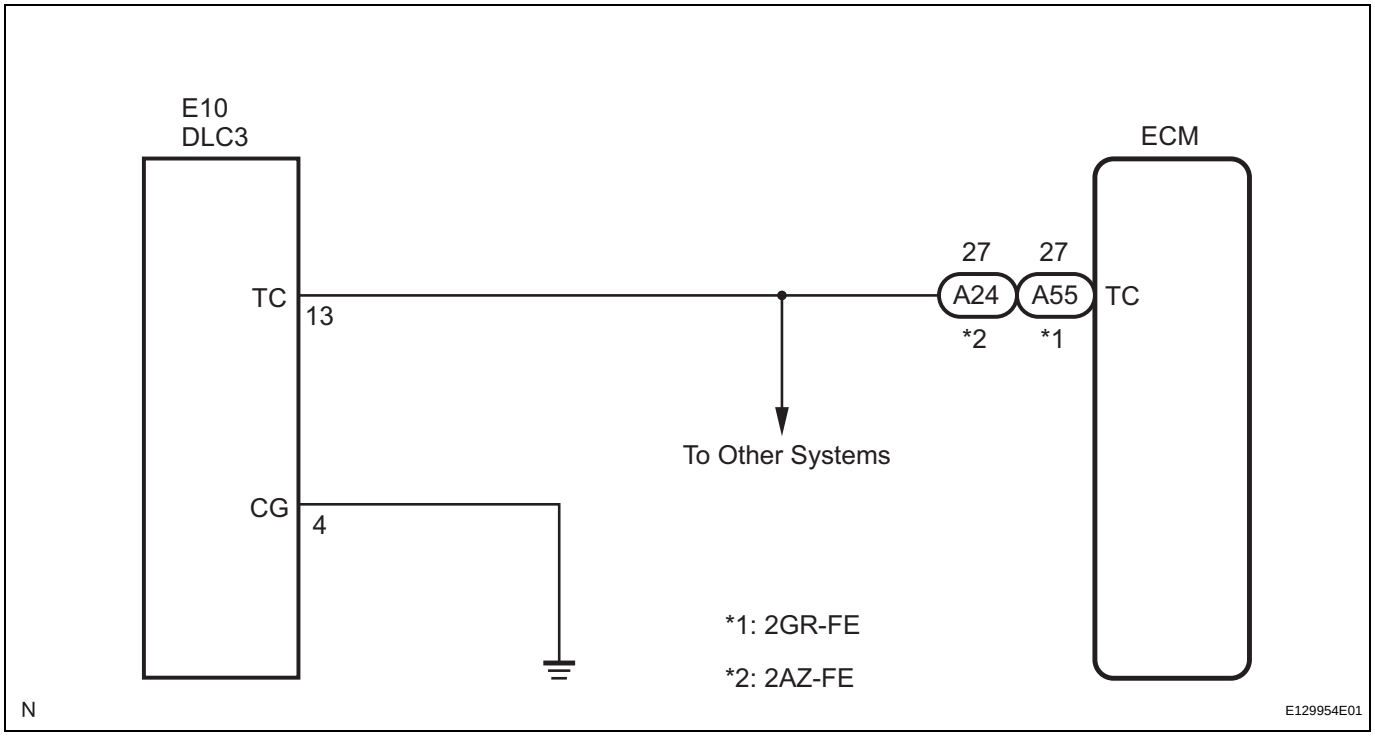
DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the system to enter self-diagnostic mode. If a malfunction is present, DTCs will be output.

HINT:

When a particular warning light remains blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is suspected.

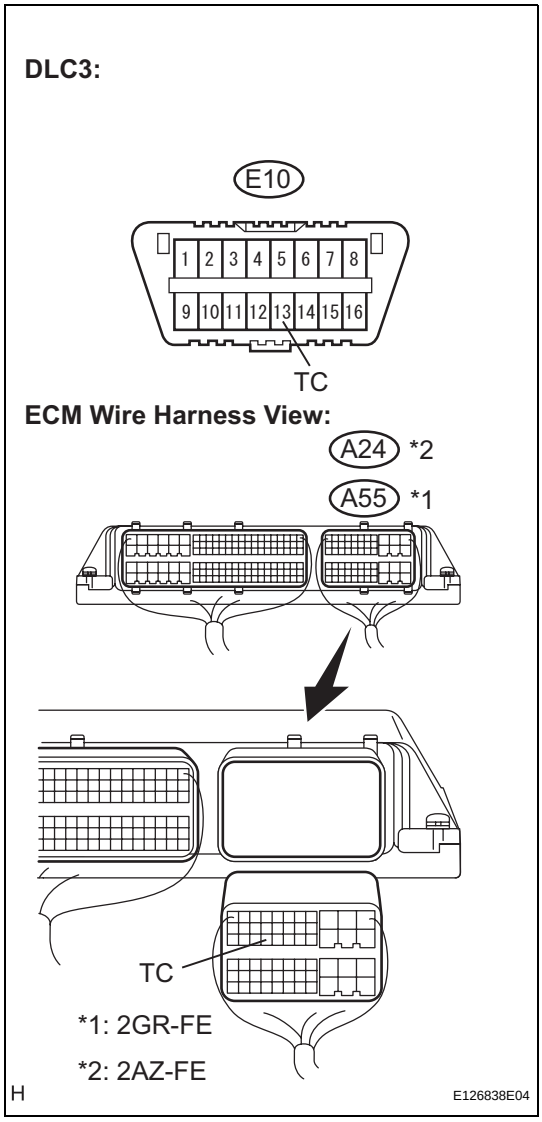
WIRING DIAGRAM



CC

INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (TERMINAL TC of DLC3 - ECM)



(a) Disconnect the A55 connector from the ECM. (2GR-FE)
(b) Disconnect the A24 connector from the ECM. (2AZ-FE)
(c) Measure the resistance according to the value(s) in the table below.

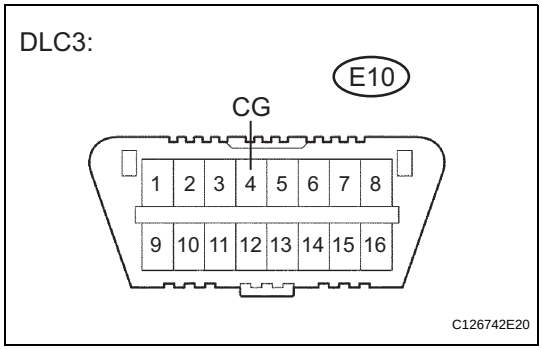
Standard resistance

Tester Connection	Condition	Specified Condition
A55-27 (TC) - E10-13 (TC)*1 A24-27 (TC) - E10-13 (TC)*2	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - ECM)**

OK

2 CHECK WIRE HARNESS (TERMINAL CG of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

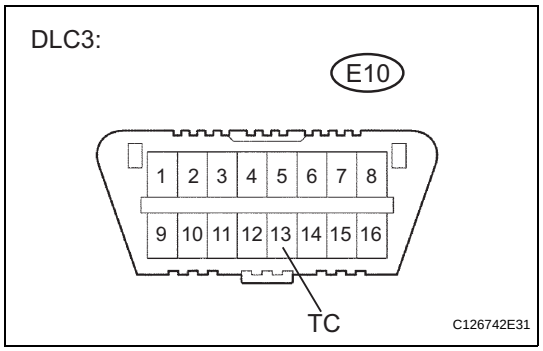
Tester connection	Condition	Specified condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - BODY GROUND)**

CC

OK

3	CHECK WIRE HARNESS (TERMINAL TC of DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-13 (TC) - Body ground	Always	10 kΩ or higher

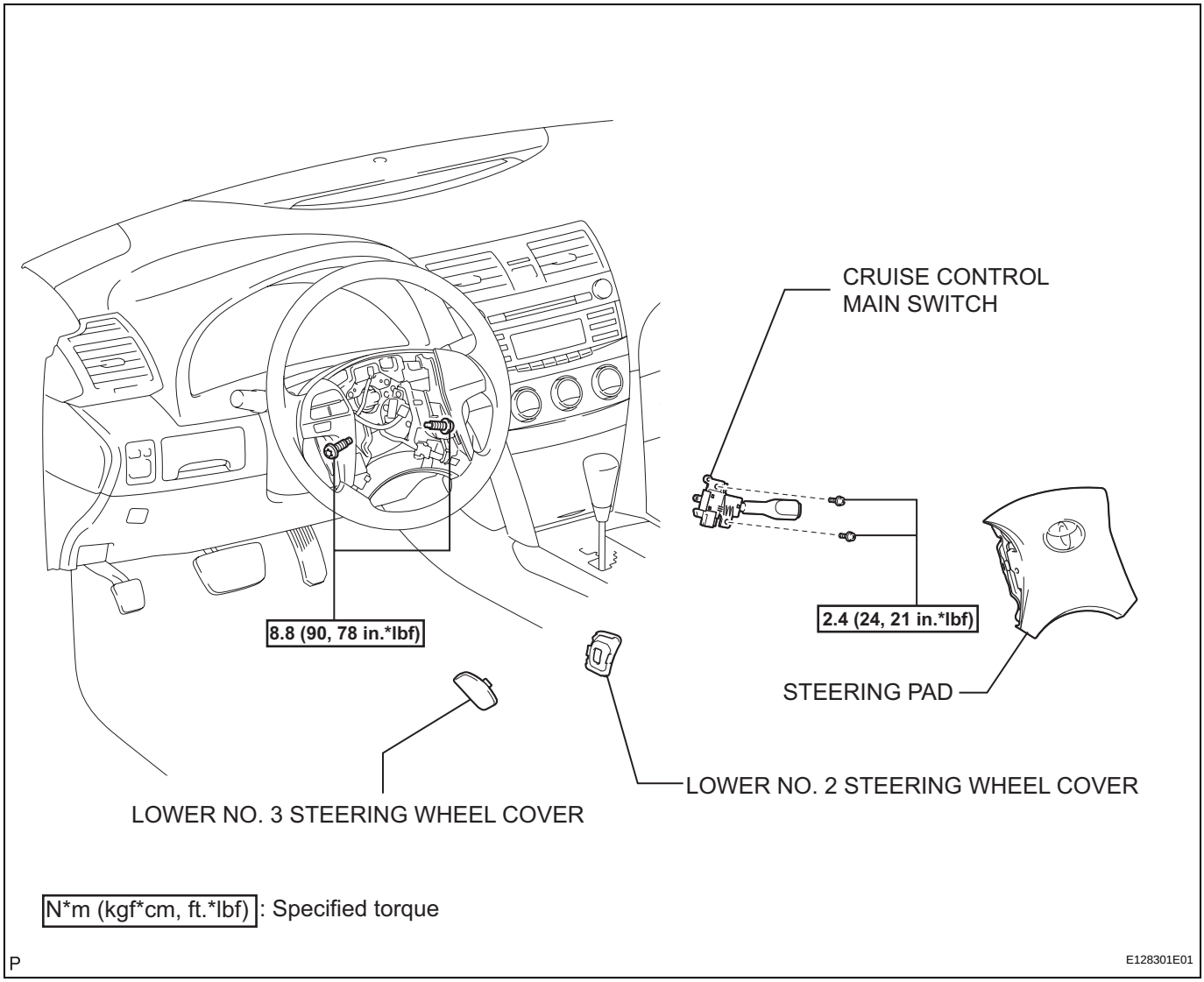
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR OR EACH ECU**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

CRUISE CONTROL MAIN SWITCH

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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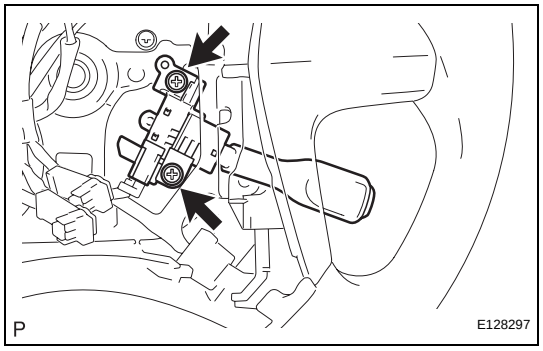
REMOVAL

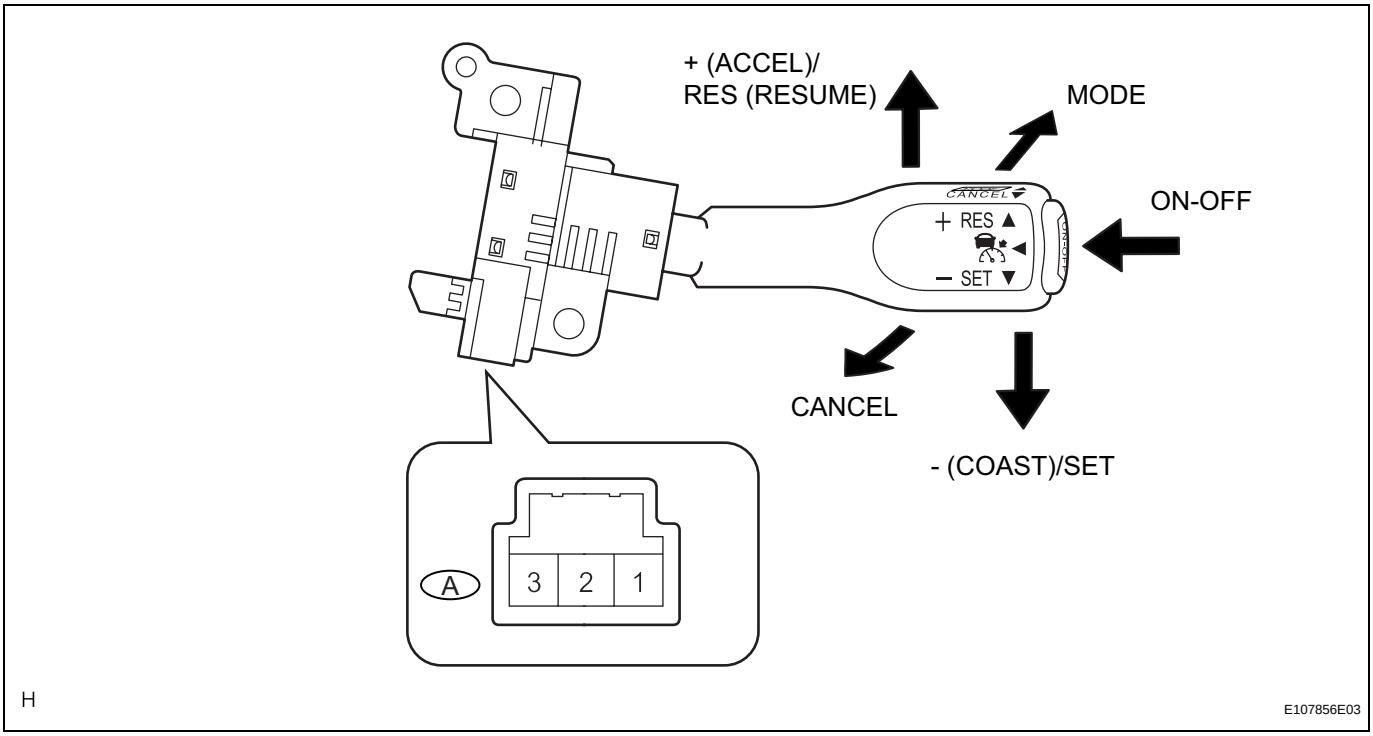
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation (See page RS-1).
2. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)**
3. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)**
4. **REMOVE STEERING PAD (See page RS-350)**
5. **REMOVE CRUISE CONTROL MAIN SWITCH**
   (a) Disconnect the connector.
   (b) Remove the 2 screws and the cruise control main switch.



INSPECTION

1. INSPECT CRUISE CONTROL MAIN SWITCH

(a) Remove the cruise control main switch



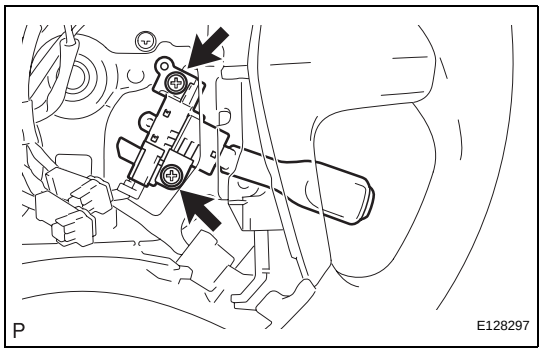
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
A-1(ECC) - A-2(R/N), A-1(ECC) - A-3(CCS)	Neutral	10 kΩ or higher
A-1(ECC) - A-3(CCS)	+ (ACCEL)/RES (RESUME)	216 to 264Ω
A-1(ECC) - A-3(CCS)	- (COAST)/SET	567 to 693Ω
A-1(ECC) - A-3(CCS)	CANCEL	1,386 to 1,694Ω
A-1(ECC) - A-3(CCS)	Main Switch off	10kΩ or higher
A-1(ECC) - A-3(CCS)	Main Switch on	Below 1Ω
A-1(ECC) - A-2(R/N)	Main Switch on and Mode Switch on	Below 1Ω

CC

If the result is not as specified, replace the cruise control main switch



INSTALLATION

1. INSTALL CRUISE CONTROL MAIN SWITCH

(a) Install the cruise control main switch with the 2 screws.

Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)

(b) Connect the connector.

2. INSTALL STEERING PAD (See page RS-350)

3. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)

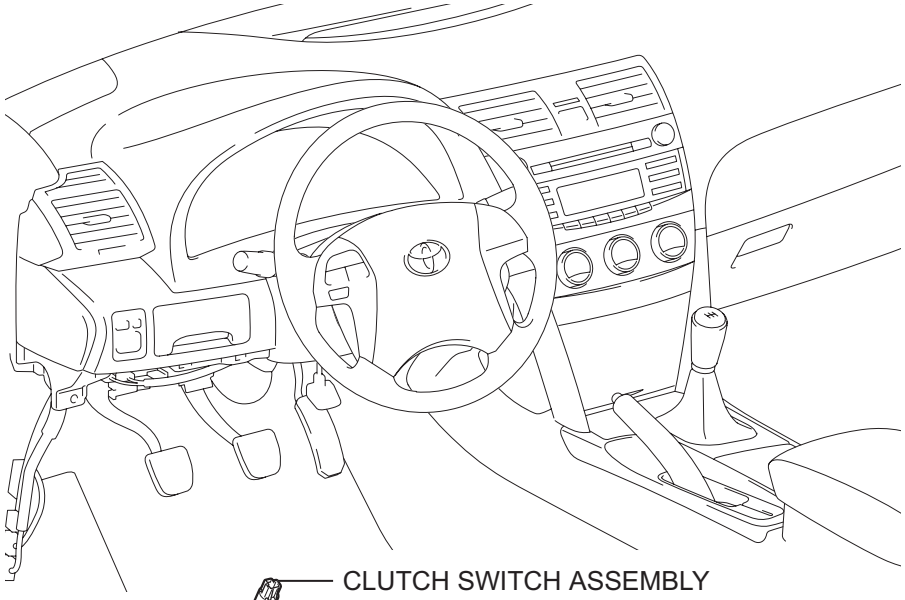
4. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)

5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

6. **INSPECT SRS WARNING LIGHT**
(See page RS-32)

CLUTCH SWITCH

COMPONENTS



CLUTCH SWITCH ASSEMBLY

15.7 (160, 12)

MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)

8.0 (82, 71 in.*lbf)

COWL SIDE TRIM SUB-ASSEMBLY LH

COWL SIDE TRIM CLIP

FRONT DOOR SCUFF PLATE LH

INSTRUMENT PANEL FINISH LOWER PANEL LH

N*m (kgf*cm, ft.*lbf) : Specified torque

P

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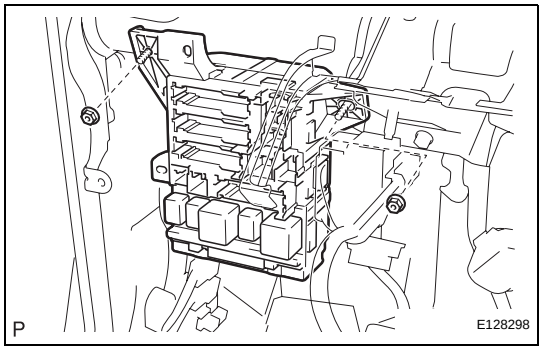
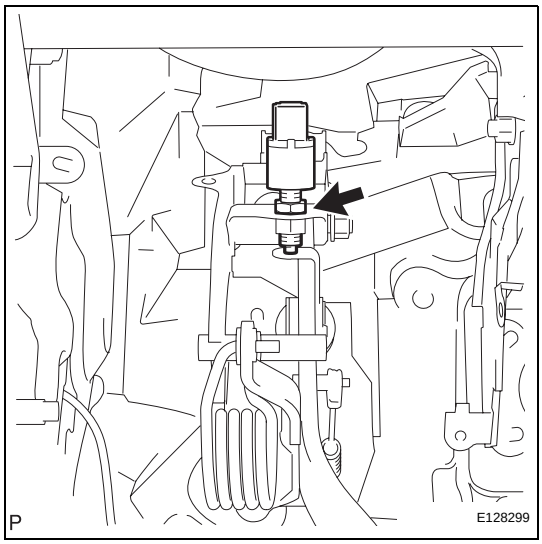
CC

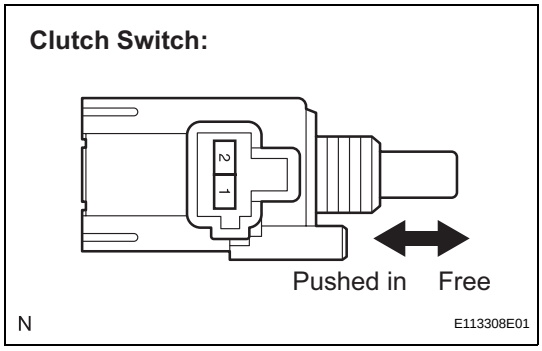
REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
3. **REMOVE INSTRUMENT PANEL FINISH LOWER PANEL LH (for TMC Made) (See page IP-20)**
4. **REMOVE INSTRUMENT PANEL FINISH LOWER PANEL LH (for TMMK Made) (See page IP-21)**
5. **REMOVE MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)**
   (a) Disconnect all connectors.
   (b) Remove the 2 nuts and the main body ECU (cowl side junction block LH).
6. **REMOVE CLUTCH SWITCH ASSEMBLY**
   (a) Disconnect the connector.





   (b) Loosen the nut and remove the clutch switch assembly.



INSPECTION

1. **INSPECT CLUTCH SWITCH**
   (a) Remove the clutch switch.
   (b) Measure the resistance according to the value(s) in the table below.

Standard resistance

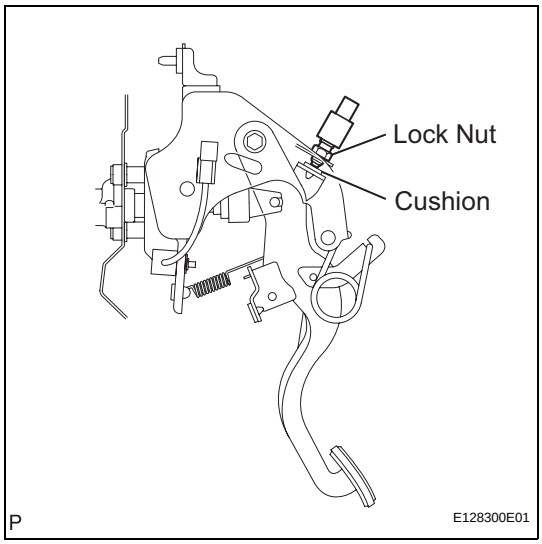
Tester Connection	Condition	Specified Condition
1 - 2	Switch pin free (Clutch pedal depressed)	10 kΩ or higher
	Switch pin pushed in (Clutch pedal released)	Below 1Ω

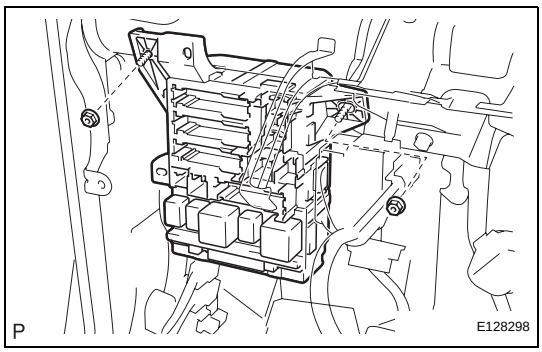
CC

If the result is not as specified, replace the clutch switch.

INSTALLATION

1. **INSTALL CLUTCH SWITCH ASSEMBLY**
   (a) Completely loosen the lock nut of the clutch switch assembly.
   (b) Adjust the clutch switch until the threaded portion makes gentle contact with the cushion. Tighten the lock nut and verify the contact of the switch threaded portion with the cushion.
   Torque: 15.7 N*m (160 kgf*cm, 12 ft.*lbf)
   (c) Connect the connector.





2. **INSTALL MAIN BODY ECU (COWL SIDE JUNCTION BLOCK LH)**
   (a) Install the main body ECU (cowl side junction block LH) with the 2 nuts.
   Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
   (b) Connect all connectors.
3. **INSTALL INSTRUMENT PANEL FINISH LOWER PANEL LH (for TMC Made) (See page IP-58)**
4. **INSTALL INSTRUMENT PANEL FINISH LOWER PANEL LH (for TMMK Made) (See page IP-59)**
5. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
6. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**

CC

POWER DOOR LOCK CONTROL SYSTEM

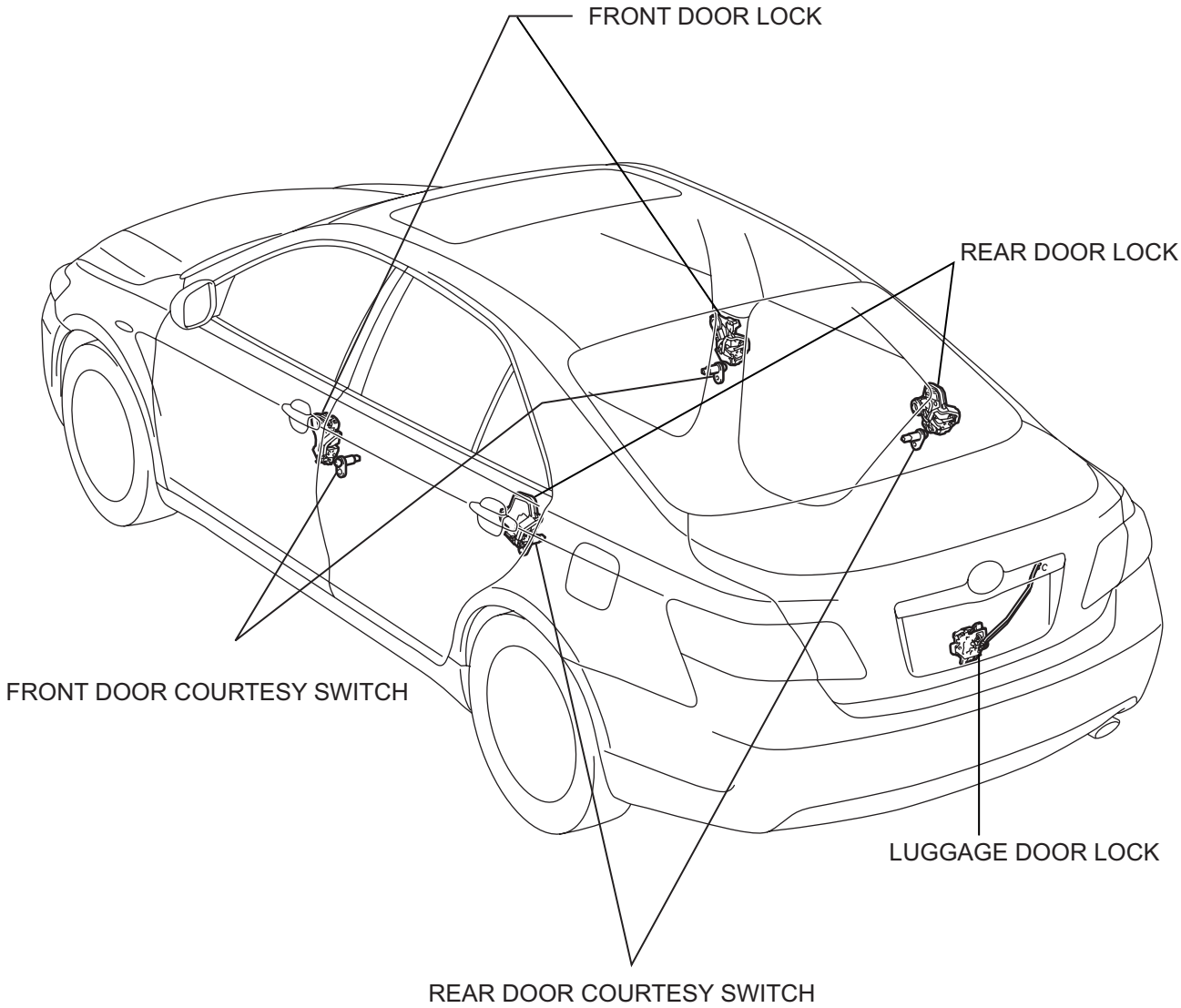
PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start

PARTS LOCATION



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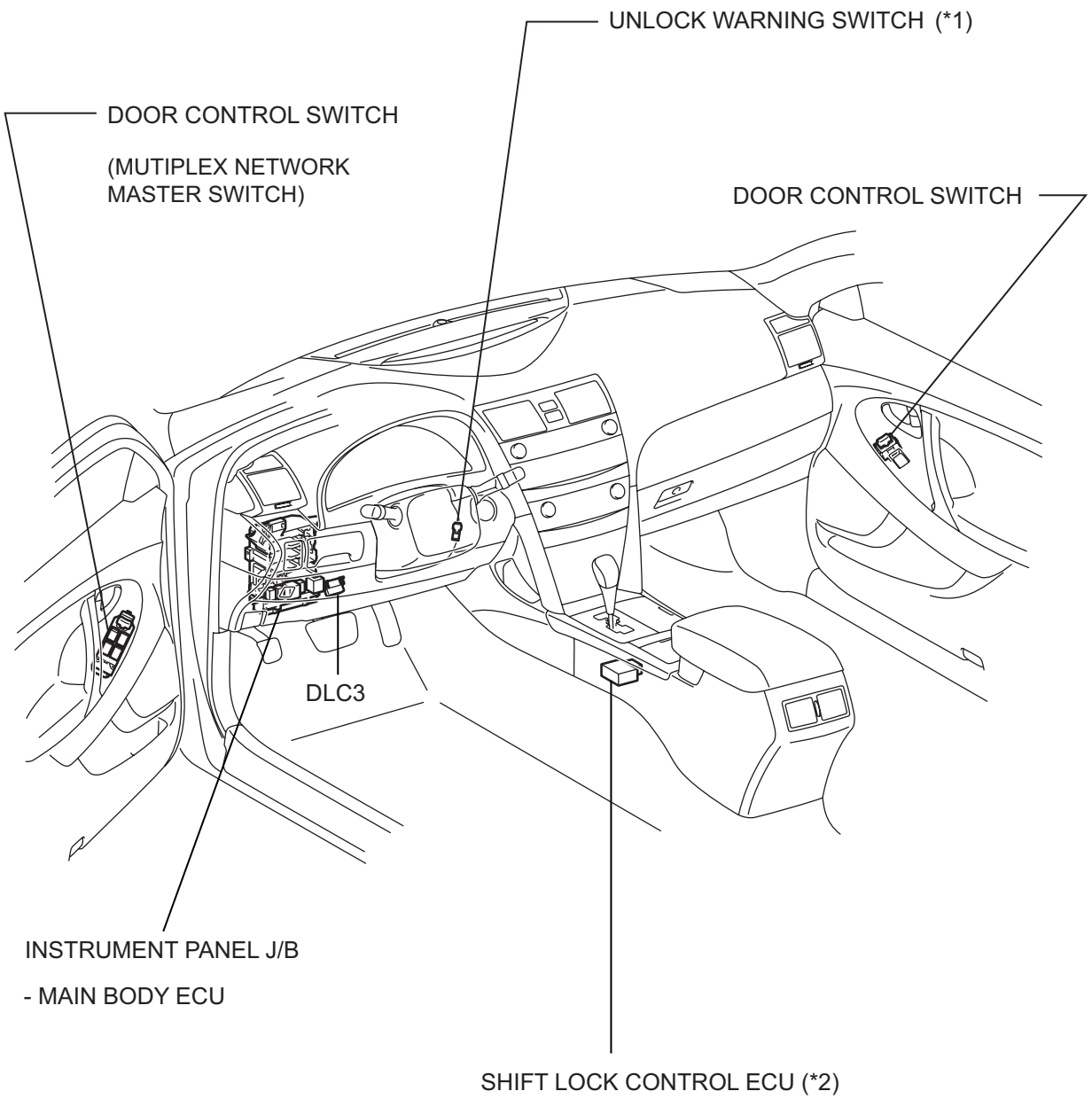

*1: W/O SMART KEY SYSTEM

*2: W/ SMART KEY SYSTEM

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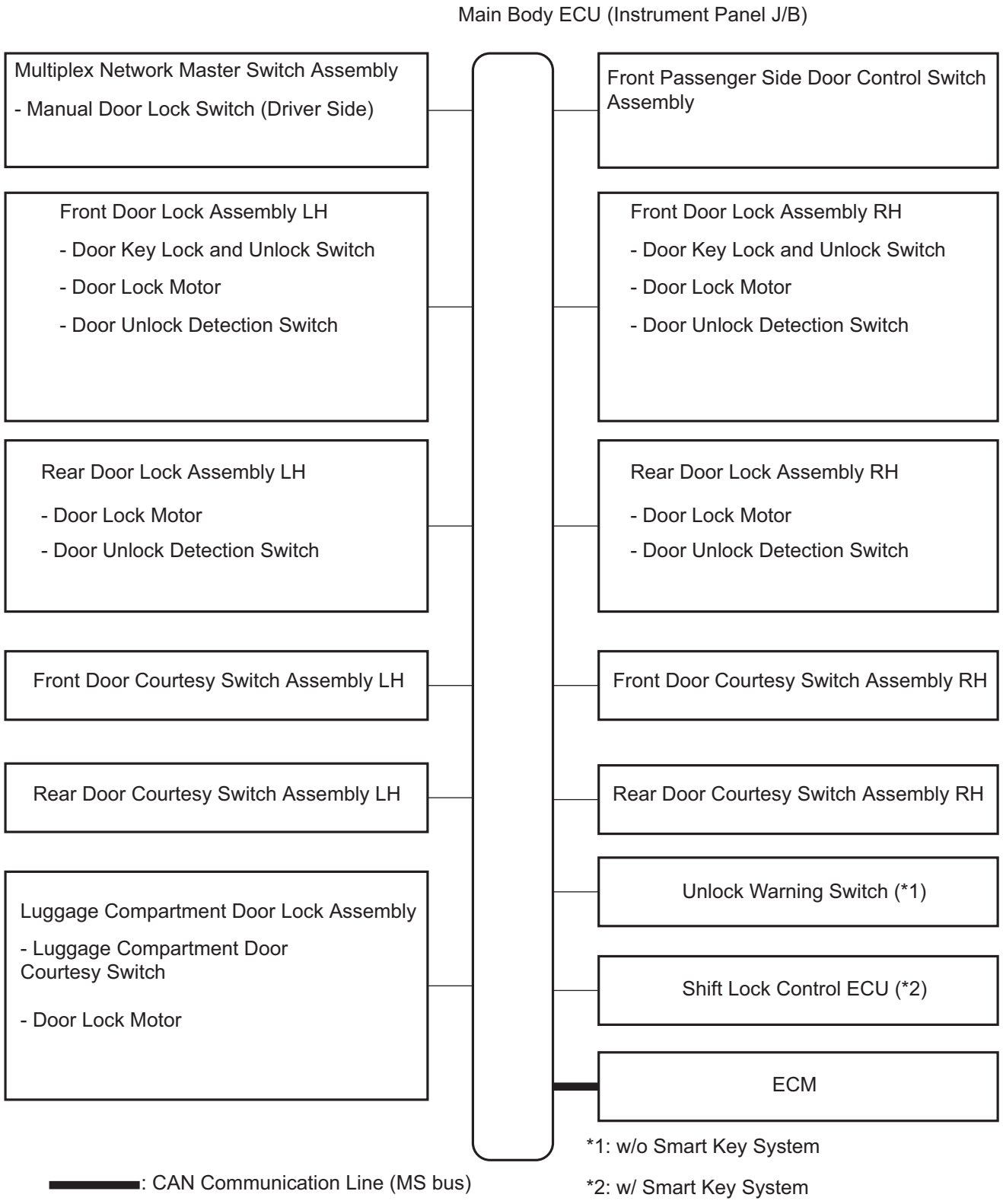
DL

SYSTEM DIAGRAM

Door Lock Control System:



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Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signals	Communication method
ECM	Main Body ECU	Park / Neutral Position Switch Signal	CAN (MS bus)

SYSTEM DESCRIPTION

1. POWER DOOR LOCK CONTROL SYSTEM DESCRIPTION

(a) The power door lock system locks/unlocks all the doors.

The master switch and the door control switch on the passenger door send "lock/unlock" request signals to the main body ECU. Then, the main body ECU sends these request signals to the lock motors in each door to lock/unlock all the doors at once in response to the inputs.

Operating the driver's door lock using a mechanical key sends request signals to lock/unlock the doors to the main body ECU via the master switch. "2-step unlock function" is optional for unlocking procedures of the key-linked lock for the driver side door.

2. FUNCTION OF MAIN COMPONENT

Components	Function
Multiplex network master switch assembly (Manual door lock switch)	Door control switch on master switch assembly locks/unlocks all doors.
Door control switch	Door control switch on passenger side door locks/unlocks all doors.
Door courtesy switch	Placed on each door. Detects door status (open or closed) and outputs data to main body ECU. Turns on when door is open and turns off when door is closed.
Driver side door lock	• Built-in motor locks/unlocks door. • Built-in door control switch (key-linked) detects door key operation's door status (locked or unlocked) and outputs data to main body ECU. • Built-in position switch detects door status (locked or unlocked) and outputs data to main body ECU. This switch turns off when door is locked and turns on when door is unlocked.
Front passenger side door lock, luggage compartment door lock, rear LH and RH door locks	• Built-in motor locks/unlocks door. • Built-in position switch detects door status (locked or unlocked) and outputs data to main body ECU. This switch turns off when door is locked and turns on when door is unlocked.

3. SYSTEM FUNCTION

HINT:

The following functions' default settings are ON. Some of these functions can be customized (See page DL-10).

(a) This system is controlled by the main body ECU. The main body ECU outputs signals to each door lock motor. The door lock control system of the CAMRY has the following functions:

DL

Function	Outline
Manual lock and unlock function	This function can lock or unlock all doors by the door lock control switch operation.
Key-linked lock and unlock function	This function, which is linked with the key cylinder, can lock or unlock all the doors when a lock or unlock operation is effected.
Manual unlock prohibition function	Performing the door lock operation with an electrical key (*1) or a mechanical key (transmitter) will prohibit the unlock operation by the door lock control switch.
Key lock-in prevention function (Electrical key)	If a each door lock (*1) or driver's door lock (*2) operation is performed when the electrical key (*1) or mechanical key is in the cabin (*1) or ignition key cylinder (*2), all the doors will be unlocked.

Function	Outline
Shift-linked automatic door lock function (A/T)	When the conditions listed below are met consecutively, this function causes all the doors to be automatically locked. • The ignition switch is on (IG). • All doors are closed. • The shift lever is moved out of the P position. • Any of the doors are unlocked.
Shift-linked automatic door unlock function (A/T)	When the ignition switch is on (IG), if moving the shift lever to the P position from any other position, all the doors will be automatically unlocked.
One-motion open	When the door is locked, this function enables the door to be unlocked by pulling the inside handle of the driver's or front passenger's door.
2-step unlock function	This function is provided to unlock the driver's door by turning the key cylinder once and to unlock the remaining doors by turning it the second time.

*1: w/ Smart Key System
*2: w/o Smart Key System

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the power door lock control system.
- The intelligent tester should be used in step 5 and 7.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS CHECK

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

NEXT

3	INSPECT BATTERY VOLTAGE

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

DL

NEXT

4	PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	**A**
Fault is listed in problem symptoms table	**B**

B → After repair, go to step 7

A

5	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU
(See page DL-13)
(b) DATA LIST/ACTIVE TEST
(See page DL-17)

NEXT

6	REPAIR OR REPLACE

NEXT

7	CONFIRMATION TEST

NEXT

END

OPERATION CHECK

1. CHECK ELECTRICAL DOOR LOCK OPERATION

NOTICE:

The initial condition that the customizing function using the intelligent tester is not chosen is shown.

(a) Check the basic function.

(1) Check that all doors lock when the door control switch (for manual operation) is turned to LOCK and all doors unlock when turned to UNLOCK.

(2) Check that all doors lock when the driver side door lock key cylinder is turned to LOCK using the mechanical key.

(b) Check the electrical key lock-in prevention function (w/ Smart Key System).

NOTICE:

In order to prevent the electrical key from being actually locked-in, the following inspection should be performed with the driver side door window open.

(1) Place the electrical key in the cabin.

(2) With the driver side door open, check that all doors unlock immediately after the door lock knob for the driver side door is turned to LOCK.

(3) With the driver side door open, check that all doors unlock immediately after the door control switch (for manual operation) is turned to LOCK.

(4) With the driver side door open, turn the driver side door lock knob to LOCK, and then close the driver side door. Then check that all doors unlock.

(c) Check the key lock-in prevention function (w/o Smart Key System).

NOTICE:

In order to prevent the key from being actually locked-in, the inspection should be performed with the driver side door window open.

(1) Have the key inserted into the ignition key cylinder.

(2) With the driver side door open, check that all doors unlock immediately after the door lock knob for the driver side door is turned to LOCK.

(3) With the driver side door open, check that all doors unlock immediately after the door control switch (for manual operation) is turned to LOCK.

(4) With the driver side door open, turn the driver side door lock knob to LOCK, and then close the driver side door. Then check that all doors unlock.

(d) Check the security function.

*1: w/ Smart Key System

(1) Close all doors with the driver side door window open so that the door control switch can be operated from outside the vehicle.

(2) Pull out the electrical key (*1) or mechanical key (transmitter), open the driver side door and then close and lock the door using the electrical key (*1) or mechanical key (transmitter). Under this condition, check that all doors do not unlock when the door control switch (for manual operation) is turned to UNLOCK from outside the vehicle.

(3) Pull out the electrical key (*1) or the mechanical key, and close and lock the driver side door by mechanical key operation. Under this condition, check that all doors do not unlock when the door control switch (for manual operation) is turned to UNLOCK from outside the vehicle.

(4) Pull out the electrical key (*1) or mechanical key (transmitter), close the driver side door, and lock the door by wireless door lock operation. Under this condition, check that all doors do not unlock when the door control switch (for manual operation) is turned to UNLOCK from outside the vehicle.

HINT:

Check that the security function is canceled under the following conditions:

- The ignition switch is turned on (IG).
- The driver side door is unlocked using the mechanical key (transmitter) or the electrical key.
- The door control switch (for manual operation) is turned to UNLOCK after the door control knob is turned to UNLOCK manually.

(e) Check the illumination function.

(1) Set the room light switch to the DOOR position.

(2) With all doors locked, check that driver's door unlock when the driver side door lock cylinder is turned to UNLOCK using the key. At the same time, the room light comes on.

(3) Check that the room light goes off in approximately 15 seconds if the doors have not been opened.

(f) Check the AUTO lock function (w/ Smart Key System).

(1) Lock all doors.

(2) Unlock driver's door using the electrical key.

(3) Allow 30 seconds to elapse while all doors remain closed and the electrical key switch and the entry unlock switch remain untouched. Then, check that all doors will lock automatically.

(g) Check the automatic locking function interlocked with the shift lever.
*1: w/o Smart Key System and w/o Theft Deterrent System
*2: Except *1
(1) When any door (*1), driver's door or passenger's door (*2) is unlocked with all doors closed and the engine started, check that all doors automatically lock when the shift lever is moved into any position from the P position (A/T).
(2) When any door is unlocked after all doors automatically lock, check that all doors attempt to automatically lock once again (retry function). The retry function is canceled when any of the following conditions is fulfilled:
- All doors are locked.
- Any door is opened.
- The shift lever is moved into the P position.
- The doors are locked or unlocked by the user.
- The ignition switch is turned off.
- The engine is stopped.

CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:

The following items can be customized.

NOTICE:

- **Before attempting to customize vehicle settings, confirm whether it is possible to make the change that the customer has requested.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting, make sure that the item in question has not been disabled using the customizing function.**

DOOR LOCK:

Display (Item)	Default	Contents	Setting
UNLOCK/PARK (Unlock w/ engine switch on (IG), shift P, speed 0 km/h (0 mph))	A/T: ON M/T: OFF (Cannot be changed)	Function that unlocks doors when the shift lever is moved to the P position from any other position while the ignition switch is on (IG)	ON/OFF
ALL UNLK/OPN-CL (All unlock w/ D door open-close)	A/T: OFF M/T: ON	Function that unlocks all other doors when opening driver side door within 10 seconds after turning the ignition switch off from on (IG)	ON/OFF
UNLK/KEY TWICE (Unlock w/ 2 times D key operation)	ON	• Function that unlocks only the driver side door when the driver side door key cylinder is turned to unlock once and unlocks all the doors when it is turned to unlock twice • In the OFF setting, turning it once unlocks all doors	ON/OFF
AUTO LOCK/SHIFT (Auto lock/shift not P)	A/T: ON M/T: OFF (Cannot be changed)	Function that locks doors when the shift lever is moved from the P position to any other position	ON/OFF
AUTO LOCK	OFF	Function that locks doors when vehicle reaches a vehicle speed 20 km/h (13 mph)	ON/OFF

WIRELESS D LOCK:

Display (Item)	Default	Contents	Setting
AUTO LOCK DELAY	60s	Function that selects AUTO LOCK time (30 sec. or 60 sec.)	30s/60s

PROBLEM SYMPTOMS TABLE

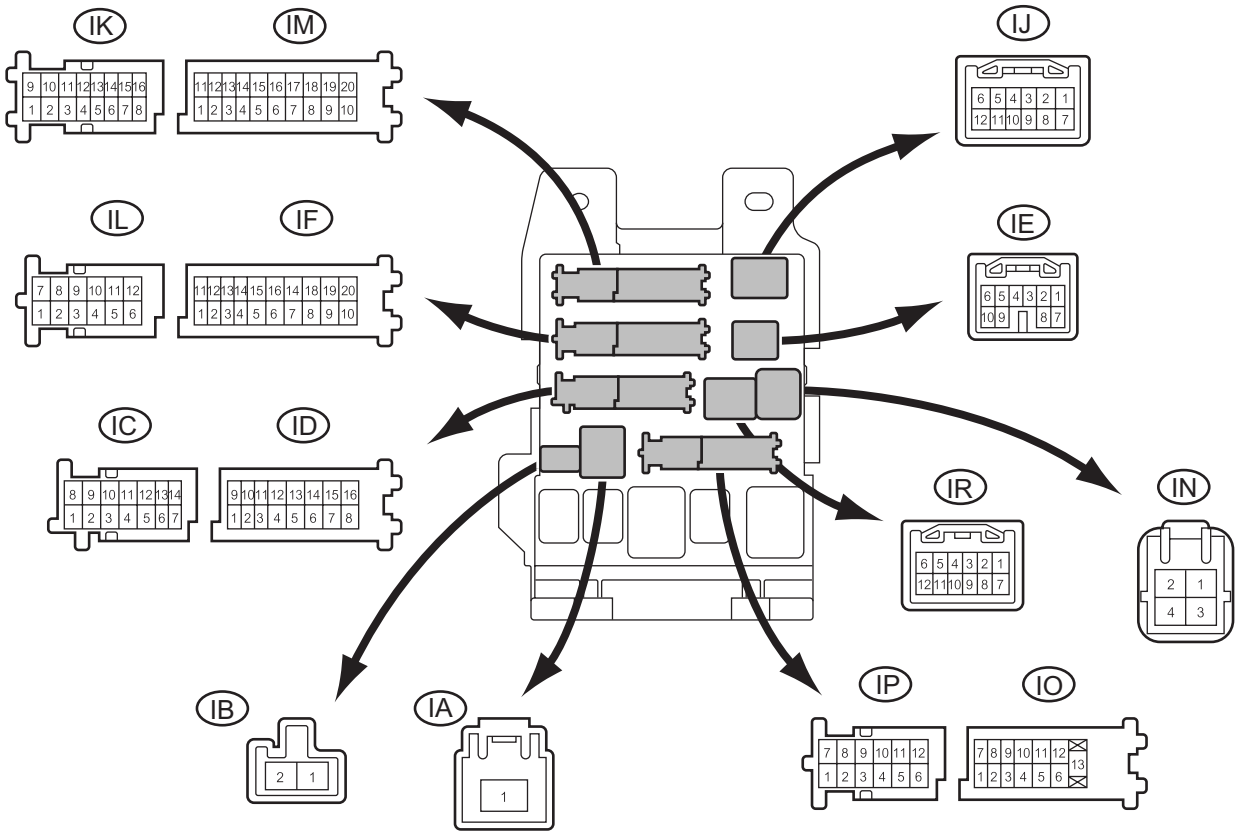
POWER DOOR LOCK CONTROL SYSTEM:

Symptom	Suspected area	See page
All doors cannot be locked/unlocked simultaneously by neither door control switch nor door key cylinder	Power source circuit (Main body ECU)	DL-13
	Replace main body ECU (Instrument panel J/B)	-
All doors cannot be locked/unlocked simultaneously by driver side door control switch	Door control switch circuit (Driver side)	DL-60
	Replace main body ECU (Instrument panel J/B)	-
All doors cannot be locked/unlocked simultaneously by front passenger side door control switch	Door control switch circuit (Front passenger side door)	DL-60
	Replace main body ECU (Instrument panel J/B)	-
All doors cannot be locked/unlocked simultaneously by door key cylinder	Driver side door key lock and unlock switch circuit	DL-56
	Multiplex network master switch assembly	DL-13
	Replace main body ECU (Instrument panel J/B)	-
Driver side door lock does not operate	Driver side door lock motor circuit	DL-32
	Replace main body ECU (Instrument panel J/B)	-
Passenger side door lock does not operate	Front passenger side door lock motor circuit	DL-35
	Replace main body ECU (Instrument panel J/B)	-
Rear LH side door lock does not operate	Rear door lock motor LH circuit	DL-38
	Replace main body ECU (Instrument panel J/B)	-
Rear RH side door lock does not operate	Rear door lock motor RH circuit	DL-41
	Replace main body ECU (Instrument panel J/B)	-
Luggage compartment door lock does not operate	Luggage compartment door lock circuit	DL-47
	Replace main body ECU (Instrument panel J/B)	-
Key lock-in prevention function does not work properly (manual operation and key-linked lock are active) w/ Smart Key System	Door courtesy switch circuit (Driver side)	LI-52
	Smart key system	DL-147
	Replace main body ECU (Instrument panel J/B)	-
Key lock-in prevention function does not work properly (manual operation and key-linked lock are active) w/o Smart Key System	Door courtesy switch circuit (Driver side)	LI-52
	Unlock warning switch circuit	DL-205
	Replace main body ECU (Instrument panel J/B)	-
Shift-linked automatic door lock does not operate (A/T)	CAN communication system	CA-8
	Replace main body ECU (Instrument panel J/B)	-
One or more doors cannot be locked/unlocked simultaneously (Wireless key operation)	Wireless door lock system (w/ smart key system)	DL-74
	Wireless door lock system (w/o smart key system)	DL-104
	Driver side door unlock detection switch circuit	DL-19
	Front passenger door unlock detection switch circuit	DL-22
	Rear door unlock detection switch LH circuit	DL-25
	Rear door unlock detection switch RH circuit	DL-28
	Replace main body ECU (Instrument panel J/B)	-
One or more doors cannot be locked/unlocked simultaneously (Theft deterrent operation)	Theft deterrent system (w/ smart key system)	TD-15
	Theft deterrent system (w/o smart key system)	TD-53
	Driver side door unlock detection switch circuit	DL-19
	Front passenger door unlock detection switch circuit	DL-22
	Rear door unlock detection switch LH circuit	DL-25
	Rear door unlock detection switch RH circuit	DL-28
	Replace main body ECU (Instrument panel J/B)	-

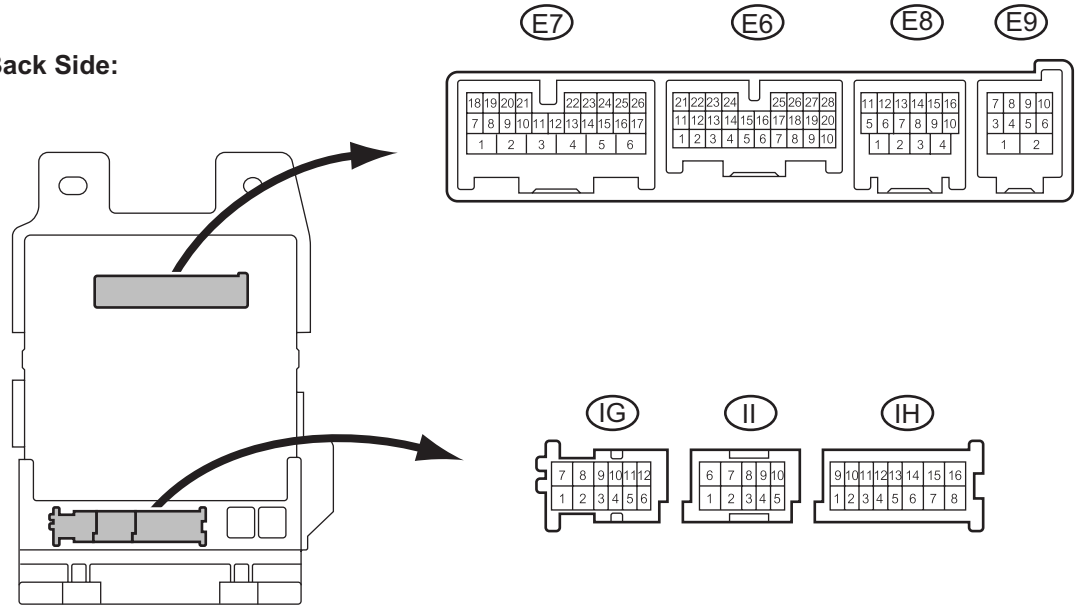
TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

Front Side:



Back Side:



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(a) Disconnect the E6, E7, IO, IK, IM, ID, IA, IF, IJ, and E9 J/B and ECU connectors.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
DCTY (E7-24) - Body ground	L - Body ground	Driver door courtesy switch	Driver door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
RCTY (E6-5 (*1), 7 (*2)) - Body ground	GR - Body ground	Rear right door courtesy switch input	Rear right door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
PCTY (E6-21) - Body ground	Y - Body ground	Passenger door courtesy switch input	Passenger door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
LCTY (IO-7) - Body ground	LG - Body ground	Rear left door courtesy switch input	Rear left door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
IG (IA-1) - Body ground	B - Body ground	Engine power supply	Ignition switch on (IG) → off	10 to 14 V → Below 1 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
ACC (IA-1) - Body ground	B - Body ground	ACC power supply	Always	10 to 14 V
L1 (IJ-3) - Body ground	L - Body ground	Passenger door control switch LOCK input	Passenger door control switch OFF → LOCK	10 kΩ or higher → Below 1 Ω
UL1 (IJ-4) - Body ground	G - Body ground	Passenger door control switch UNLOCK input	Passenger door control switch OFF → UNLOCK	10 kΩ or higher → Below 1 Ω
L1 (IK-15) - Body ground	V - Body ground	Driver door control switch LOCK input	Driver door control switch OFF → LOCK	10 kΩ or higher → Below 1 Ω
UL1 (IK-12) - Body ground	G - Body ground	Driver door control switch UNLOCK input	Driver door control switch OFF → UNLOCK	10 kΩ or higher → Below 1 Ω
KSW (*1) (E9-5) - Body ground	L - Body ground	Unlock warning switch signal input	No key is in ignition key cylinder → Key is in ignition key cylinder	10 kΩ or higher → Below 1 Ω
LGCY (E6-25) - Body ground	W - Body ground	Luggage compartment door courtesy switch input	Luggage compartment door CLOSED → OPEN	10 kΩ or higher → Below 1 Ω
TSW (E6-2) - Body ground	R - Body ground	Luggage compartment door key-linked door unlock input	Using mechanical key, operate luggage compartment door lock cylinder to LOCK → OPEN → UNLOCK	10 kΩ or higher → Below 1 Ω → 10 kΩ or higher →
BECU (*1) (ID-10) - Body ground	O - Body ground	+B (BECU) power supply	Always	10 to 14 V

*1: w/o Smart Key System
*2: w/ Smart Key System
If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the J/B and ECU connectors.
(d) Measure the voltage according to the value(s) in the table below.

DL

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
LSWL (*2), LSR (*1) (IP-5) - Body ground	GR - Body ground	Rear left door lock position switch input	Rear left door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
LSWL (*1) (IL-5) - Body ground	GR - Body ground	Rear right door lock position switch input	Rear right door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
LSWD (E7-9) - Body ground	L - Body ground	Driver door lock position switch input	Driver door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
UL3 (E7-8) - Body ground	GR - Body ground	Driver door key-linked door unlock input	Using mechanical key, operate driver door lock cylinder to LOCK → UNLOCK	Below 1 V → 10 to 14 V (or pulse generation)
L2 (IK-16) - Body ground	BR - Body ground	Driver door key-linked door lock input	Using mechanical key, operate driver door lock cylinder to UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
UL2 (IK-7) - Body ground	GR - Body ground	Front passenger door key-linked door unlock input	Using mechanical key, operate passenger door lock cylinder to LOCK → UNLOCK	Below 1 V → 10 to 14 V (or pulse generation)
L2 (IJ-5) - Body ground	W - Body ground	Front passenger door key-linked door lock input	Using mechanical key, operate passenger door lock cylinder to UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
ACT+ (IJ-1) - Body ground	L - Body ground	Door lock motor LOCK drive output (Front passenger door)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT+ (IP-11) - Body ground	W - Body ground	Door lock motor LOCK drive output (Rear door LH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT+ (IF-5) - Body ground	L - Body ground	Door lock motor LOCK drive output (Rear door RH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT- (IP-6) - Body ground	G - Body ground	Door lock motor UNLOCK drive output (Rear door LH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT- (IF-18) - Body ground	B - Body ground	Door lock motor UNLOCK drive output (Rear door RH)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
TR+ (E7-1) - Body ground	B - Body ground	Door lock motor UNLOCK drive output (Luggage compartment door)	Luggage compartment open switch (Transmitter) or luggage compartment door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACTD (E7-5) - Body ground	GR - Body ground	Door lock motor UNLOCK drive output (Driver door)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
ACT+ (IK-2) - Body ground	W - Body ground	Door lock motor LOCK drive output (Driver door)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → LOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ACT- (IJ-2) - Body ground	LG - Body ground	Door lock motor UNLOCK drive output (Front passenger)	Door control switch (Master switch or passenger side switch) or driver side door key cylinder OFF → UNLOCK → OFF	Below 1 V → 10 to 14 V → Below 1 V
LSWR (*2) (E6-5) - Body ground	V - Body ground	Rear right door lock position switch input	Rear right door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)
LSWP (E6-27) - Body ground	LG - Body ground	Passenger door lock position switch input	Passenger door UNLOCK → LOCK	Below 1 V → 10 to 14 V (or pulse generation)

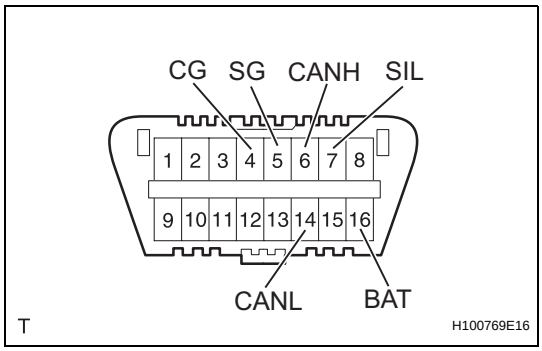
*1: w/o Smart Key System
*2: w/ Smart Key System
If the result is not as specified, the main body ECU (instrument panel J/B) may have a malfunction.

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Power door lock control system data and Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



HINT:

The vehicle uses the ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition Switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition Switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition Switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition Switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition Switch OFF*	6 kΩ or more

NOTICE:

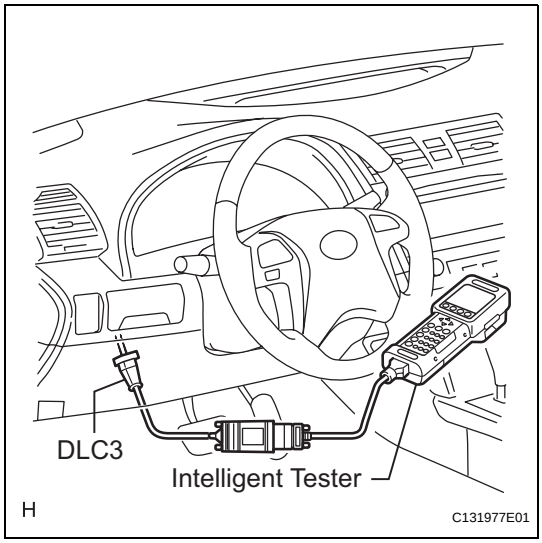
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. INSPECT BATTERY VOLTAGE

Standard Voltage:

11 to 14 V

DL

If the voltage is below 11 V, recharge or replace the battery before proceeding.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator, and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(d) Read the DATA LIST according to the display on the tester.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D DOR CTY SW	Driver side door courtesy light switch signal/ON or OFF	ON: Driver side door is CLOSED OFF: Driver side door is OPEN	-
P DOR CTY SW	Passenger side door courtesy light switch signal/ON or OFF	ON: Passenger side door is CLOSED OFF: Passenger side door is OPEN	-
RR DOR CTY SW	Rear right door courtesy light switch signal/ON or OFF	ON: Rear right door is CLOSED OFF: Rear right door is OPEN	-
RL DOR CTY SW	Rear left door courtesy light switch signal/ON or OFF	ON: Rear left door is CLOSED OFF: Rear left door is OPEN	-
D LOCK POS SW	Driver side door lock position switch signal/ON or OFF	ON: Driver side door is unlocked ON: Driver side door is locked	-
P LOCK POS SW	Front passenger side door lock position switch signal/ON or OFF	ON: Front passenger side door is unlocked ON: Front passenger side door is locked	-
RR LOCK POS SW (*1)	Rear right door lock position switch signal/ON or OFF	ON: Rear right door is unlocked OFF: Rear right door is locked	-
RL LOCK POS SW (*1)	Rear left door lock position switch signal/ON or OFF	ON: Rear left door is unlocked OFF: Rear left door is locked	-
LUGG COURTSY SW	Luggage compartment door courtesy light switch signal/ON or OFF	ON: Luggage compartment door is OPEN OFF: Luggage compartment door is CLOSED	-
D/L SW-LOCK	Door control switch lock signal/ ON or OFF	ON: Door control switch is pushed to lock position OFF: Door control switch is not pushed to lock position	-
D/L SW-UNLOCK	Door control switch unlock signal/ ON or OFF	ON: Door control switch is pushed to unlock position OFF: Door control switch is not pushed to unlock position	-
DOR KEY SW-LOCK	Driver door lock/unlock switch lock signal (key-linked lock switch)/ON or OFF	ON: Driver side door key cylinder is turned to lock position OFF: Driver side door key cylinder is turned to unlock position	-
DOR KEY SW-ULCK	Driver door lock/unlock switch unlock signal (key-linked unlock switch)/ON or OFF	ON: Driver side door key cylinder is turned to unlock position OFF: Driver side door key cylinder is turned to lock position	-

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D DOR KEY SW-UL	Driver door lock/unlock switch unlock signal (2 times key-linked unlock switch)/ON or OFF	ON: Driver side door key cylinder is turned to unlock position OFF: Driver side door key cylinder is turned to lock position	-
TRUNK KEY UNLK	Luggage compartment door key cylinder switch/ON or OFF	ON: Ignition key is inserted and turned to lock position OFF: Ignition key is inserted and turned to unlock position	-

*1: w/ Smart Key System, w/o Smart Key System with Theft Deterrent System

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relays, VSVs, actuators, and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY:

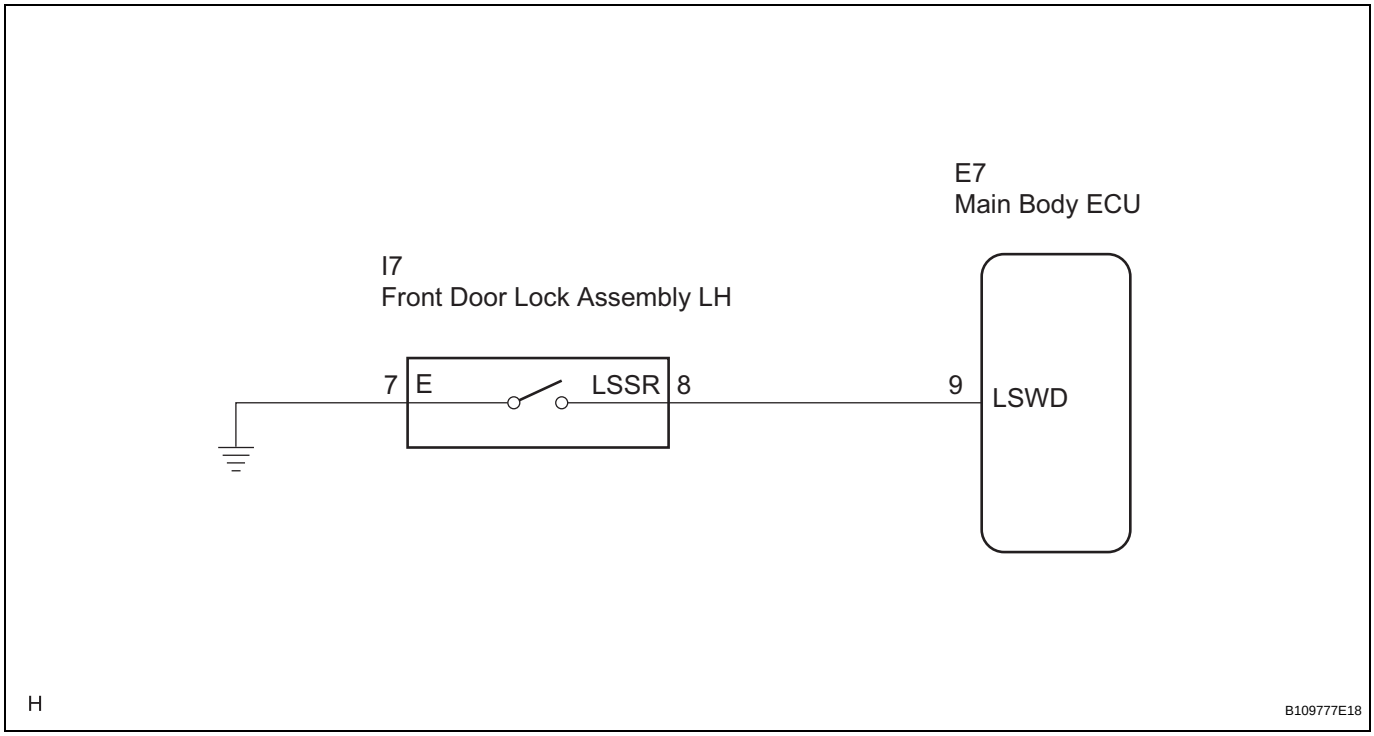
Item	Test Details	Diagnostic Note
DOOR LOCK	Operate door lock motor LOCK/UNLOCK	-
D DOOR UNLOCK	Operate driver door lock motor LOCK	-
TRUNK/BDOR OPEN	Operate luggage compartment door lock motor LOCK	-

Driver Side Door UNLOCK Detection Switch Circuit

DESCRIPTION

The driver's door unlock detection switch is built into the driver's door lock assembly. The switch turns on when the driver's door is locked and turns off when the door is unlocked.
The main body ECU is connected to the driver's door lock assembly via terminal LSWD and driver's door lock/unlock state signals are input to the main body ECU.
The main body ECU applies voltage to the door unlock detection switch via terminal LSWD. When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the main body ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (DOOR UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
D LOCK POS SW	Driver side door unlock detection switch signal /ON or OFF	ON: Driver side door is unlocked OFF: Driver side door is locked	-

OK:

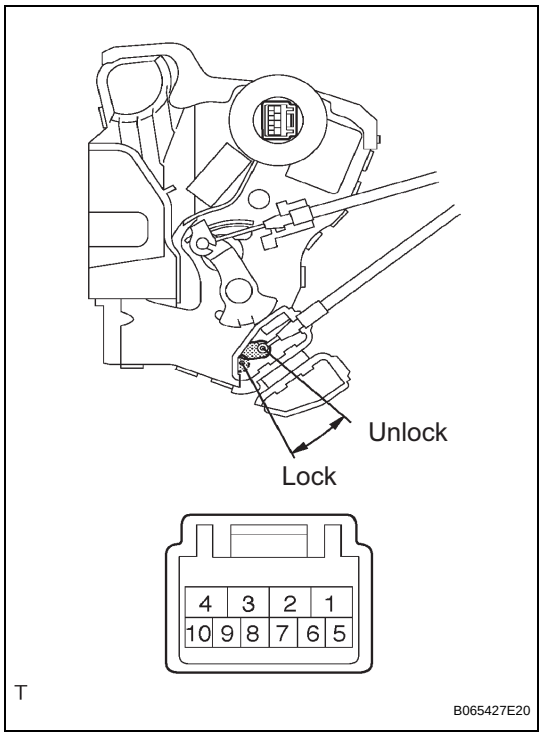
The display is as specified in the normal condition column.

NG	Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR UNLOCK DETECTION SWITCH)



(a) Remove the front door lock assembly LH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
7 - 8	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
7 - 8	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

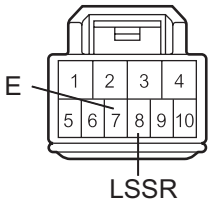
OK

DL

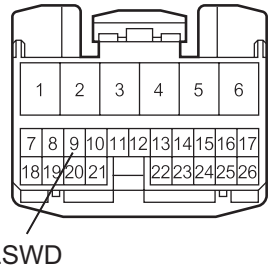
3	CHECK WIRE HARNESS (FRONT DOOR LOCK ASSEMBLY - MAIN BODY ECU)

Wire Harness Side:

I7
Front Door Lock Assembly LH



E7
Main Body ECU



H

B112606E01

(a) Disconnect the front door lock assembly LH connector.
(b) Disconnect the main body ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
I7-8 (LSSR) - E7-9 (LSWD)	Always	Below 1 Ω
I7-8 (LSSR) - Body ground	Always	10 kΩ or higher
I7-7 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

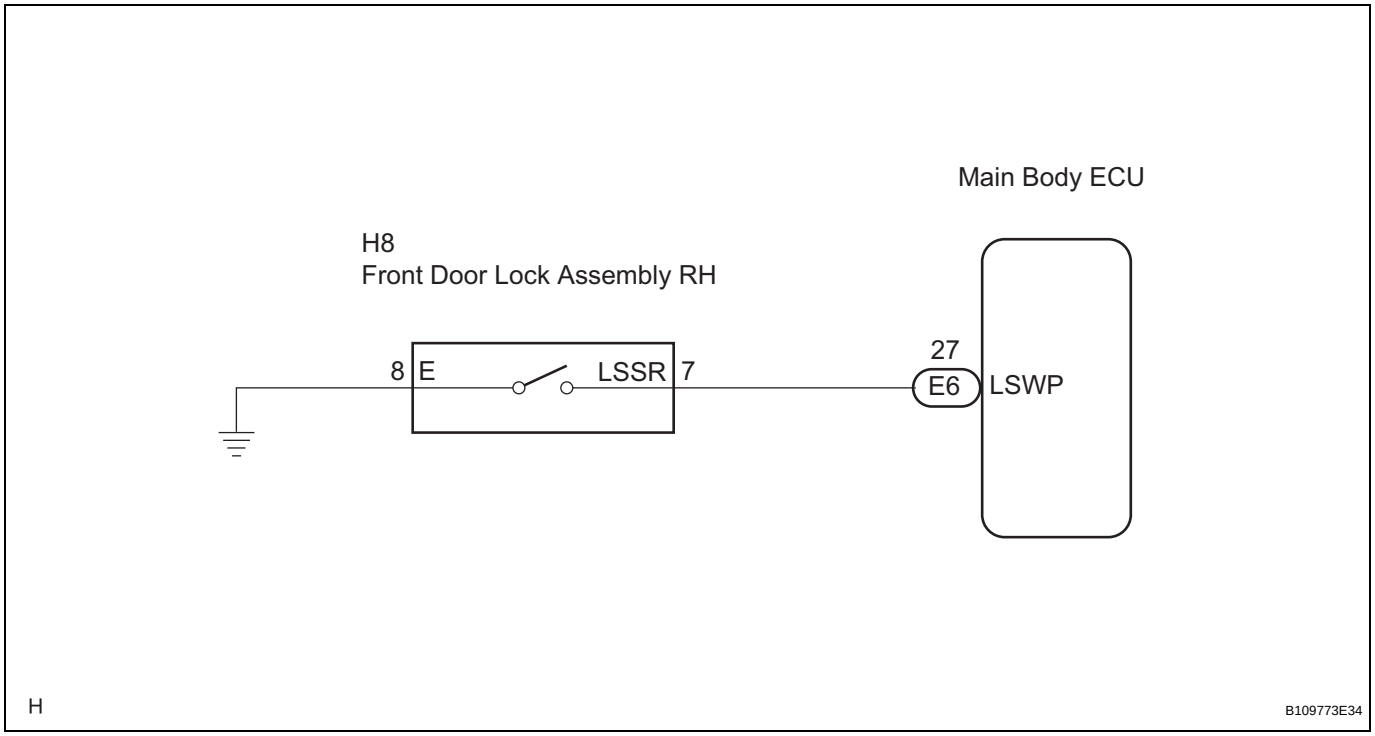
REPLACE MAIN BODY ECU

Front Passenger Side Door UNLOCK Detection Switch Circuit

DESCRIPTION

The front passenger door unlock detection switch is built into the front passenger door lock assembly. The switch turns on when the front passenger door is locked and turns off when the door is unlocked.
The main body ECU is connected to the front passenger door lock assembly via terminal LSWP and front passenger door lock/unlock state signals are input to the ECU.
The main body ECU applies voltage to the door unlock detection switch via terminal LSWP. When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (DOOR UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
P LOCK POS SW	Passenger side door lock position switch signal /ON or OFF	ON: Passenger side door lock is in UNLOCK position OFF: Passenger side door lock is in LOCK position	-

OK:

The display is as specified in the normal condition column.

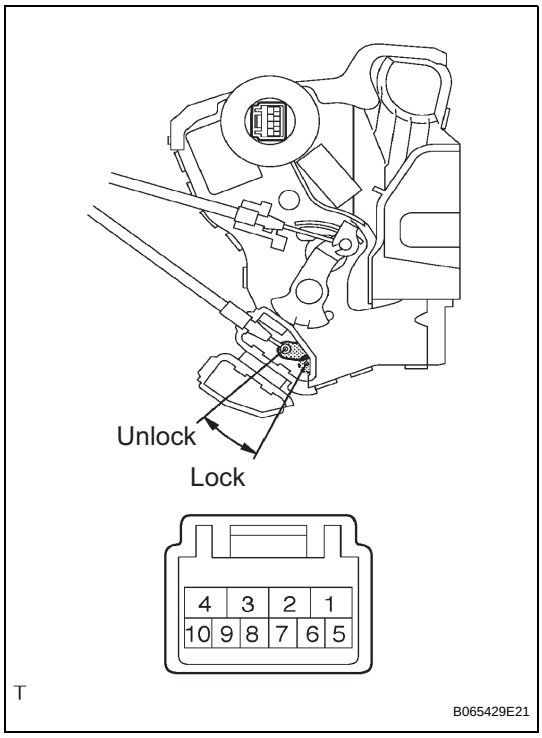
DL

NG → Go to step 2

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR UNLOCK DETECTION SWITCH)



(a) Remove the front door lock assembly RH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
7 - 8	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	LOCK	10 kΩ or higher
7 - 8	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	UNLOCK	Below 1 Ω

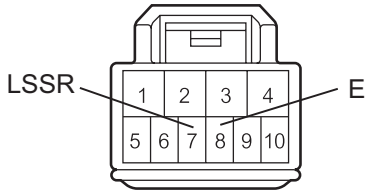
NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

OK

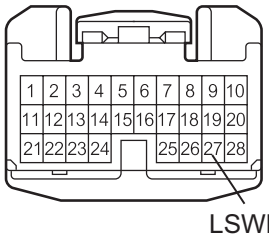
3	CHECK WIRE HARNESS (FRONT DOOR LOCK ASSEMBLY - MAIN BODY ECU)

Wire Harness Side:

H8
Front Door Lock Assembly RH



E6
Main Body ECU



H

B111708E12

(a) Disconnect the front door lock assembly RH connector.
(b) Disconnect the ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
H8-7 (LSSR) - E6-27 (LSWP)	Always	Below 1 Ω
H8-7 (LSSR) - Body ground	Always	10 kΩ or higher
H8-8 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

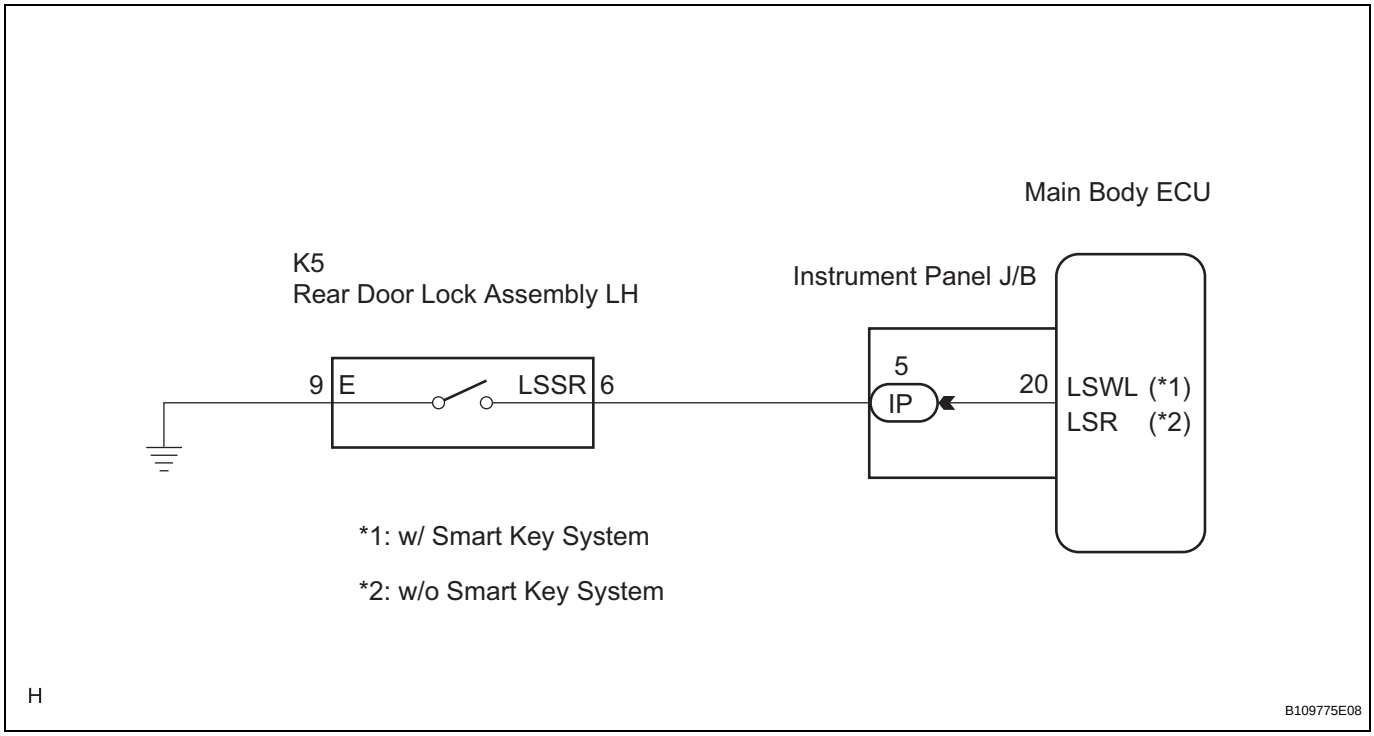
DL

Rear Door UNLOCK Detection Switch LH Circuit

DESCRIPTION

The rear left door unlock detection switch is built into the rear left door lock assembly. The switch turns on when the rear left door is locked and turns off when the door is unlocked.
The main body ECU is connected to the rear left door lock assembly via terminal LSWL (w/ Smart key system) or LSR (w/o Smart key system) and rear left door lock/unlock state signals are input to the ECU. The main body ECU applies voltage to the door unlock detection switch via terminal LSWL (w/ Smart key system) or LSR (w/o Smart key system). When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 when w/ smart key system or w/o smart key system and w/ theft deterrent system, and start from step 2 when w/o smart key system and w/o theft deterrent system.

DL

1	READ VALUE OF DATA LIST (UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
RL LOCK POS SW	Rear left door lock position switch signal / ON or OFF	ON: Rear left door lock is in UNLOCK position OFF: Rear left door lock is in LOCK position	-

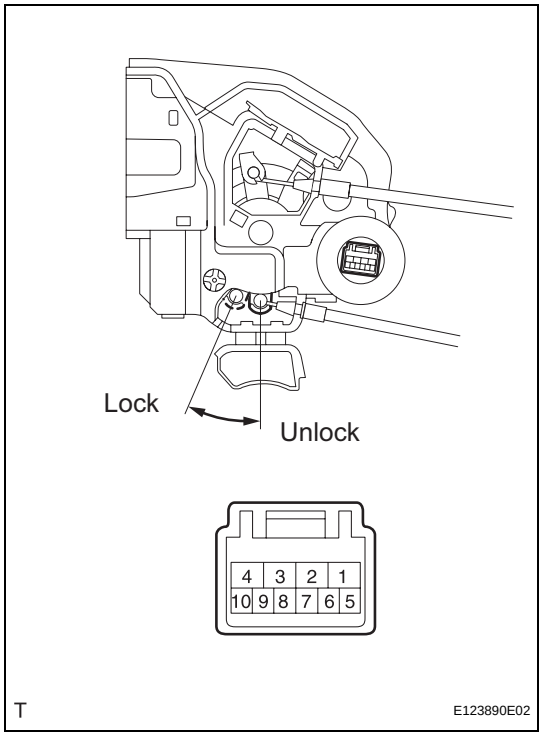
OK:
The display is as specified in the normal condition column.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT REAR DOOR LOCK ASSEMBLY (UNLOCK DETECTION SWITCH)



(a) Remove the rear door lock assembly LH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
6 - 9	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
6 - 9	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

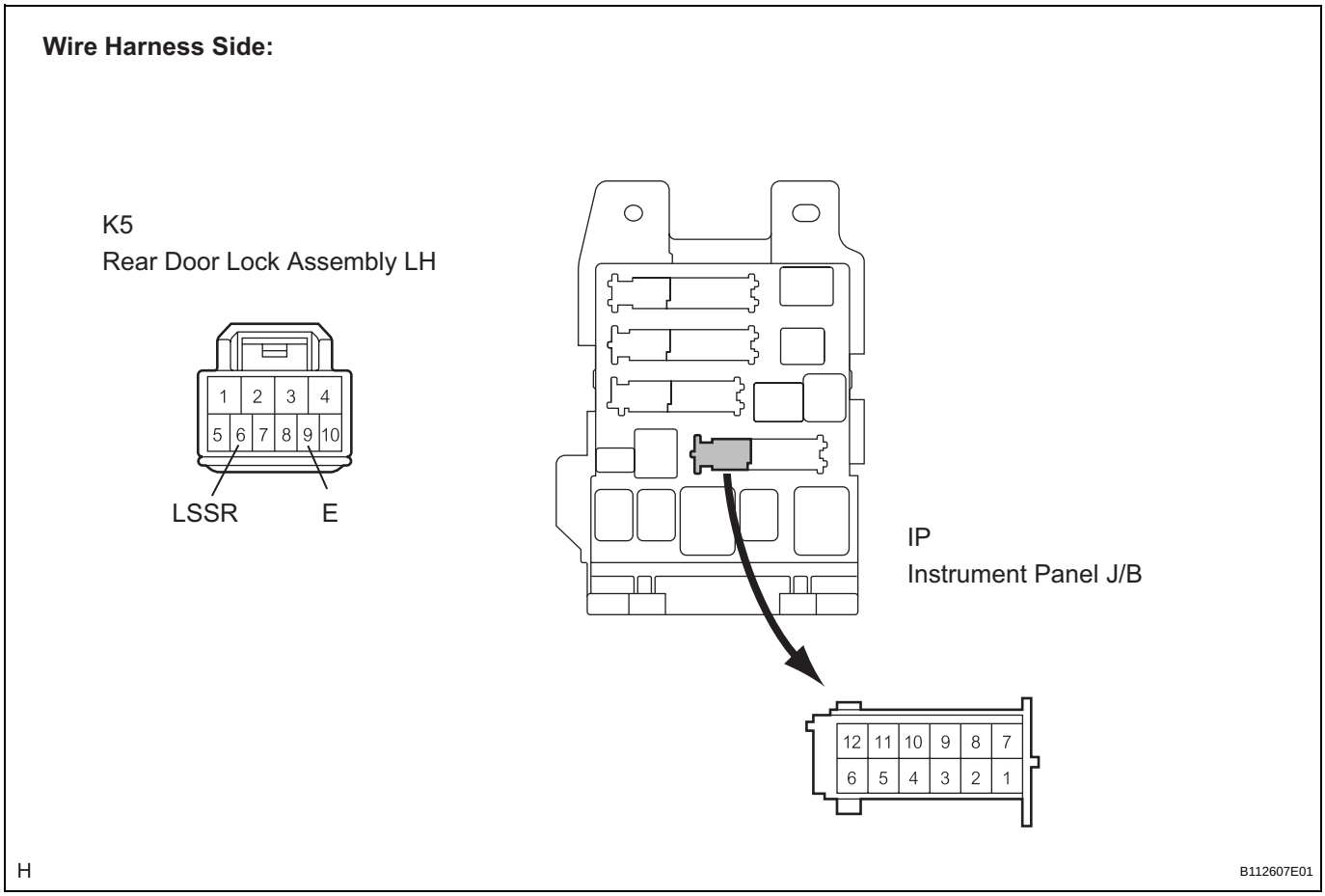
NG → **REPLACE REAR DOOR LOCK ASSEMBLY**

OK

3 CHECK WIRE HARNESS (REAR DOOR LOCK ASSEMBLY - MAIN BODY ECU)

(a) Disconnect the rear door lock assembly LH connector.

DL



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
K5-6 (LSSR) - IP-5	Always	Below 1 Ω
K5-6 (LSSR) - Body ground	Always	10 kΩ or higher
K5-9 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

DL

OK

REPLACE MAIN BODY ECU (INSTRUMENT PANEL J/B)

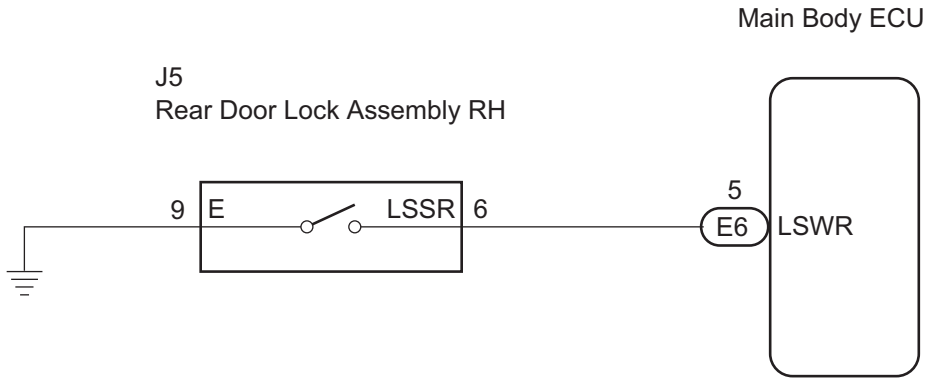
Rear Door UNLOCK Detection Switch RH Circuit

DESCRIPTION

The rear right door unlock detection switch is built into the rear right door lock assembly. The switch turns on when the rear right door is locked and turns off when the door is unlocked.
The main body ECU is connected to the rear right door lock assembly via terminal LSWR (w/ smart key system), LSWL (w/o smart key system), and rear right door lock/unlock state signals are input to the ECU. The main body ECU applies voltage to the door unlock detection switch via terminal LSWR (w/ smart key system), LSWL (w/o smart key system). When the door unlock detection switch is on (there is continuity between the switch terminals), a lock state signal is input to the ECU. When the switch is off (there is no continuity between the switch terminals), an unlock state signal is input.

WIRING DIAGRAM

w/ SMART KEY SYSTEM:



H

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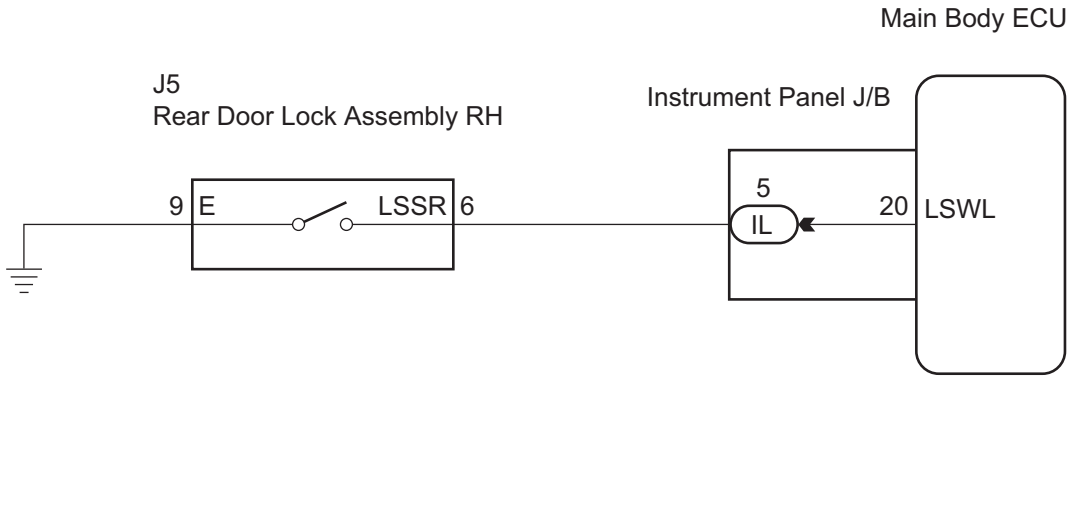
w/o SMART KEY SYSTEM:



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 when w/ smart key system or w/o smart key system and w/ theft deterrent system, and start from step 2 when w/o smart key system and w/o theft deterrent system.

1	READ VALUE OF DATA LIST (UNLOCK DETECTION SWITCH)

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
RR LOCK POS SW	Rear right door lock position switch signal / ON or OFF	ON: Rear right door lock is in UNLOCK position OFF: Rear right door lock is in LOCK position	-

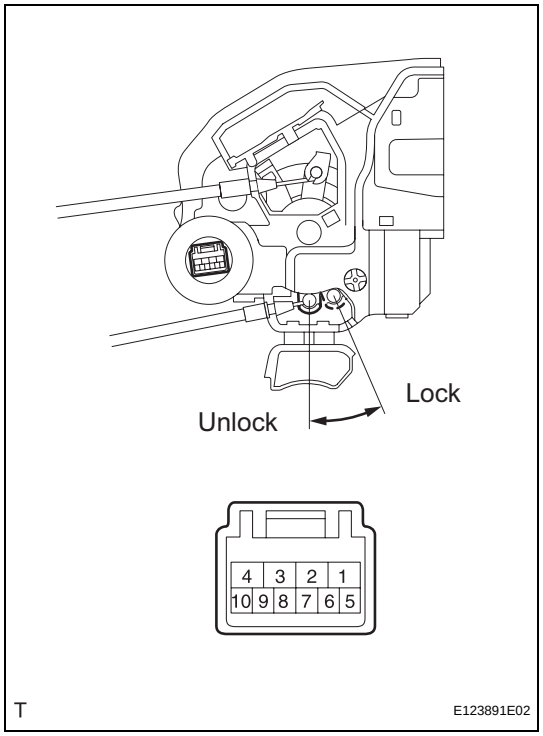
OK:
The display is as specified in the normal condition column.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	INSPECT REAR DOOR LOCK ASSEMBLY (UNLOCK DETECTION SWITCH)



(a) Remove the rear door lock assembly RH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
6 - 9	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
6 - 9	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

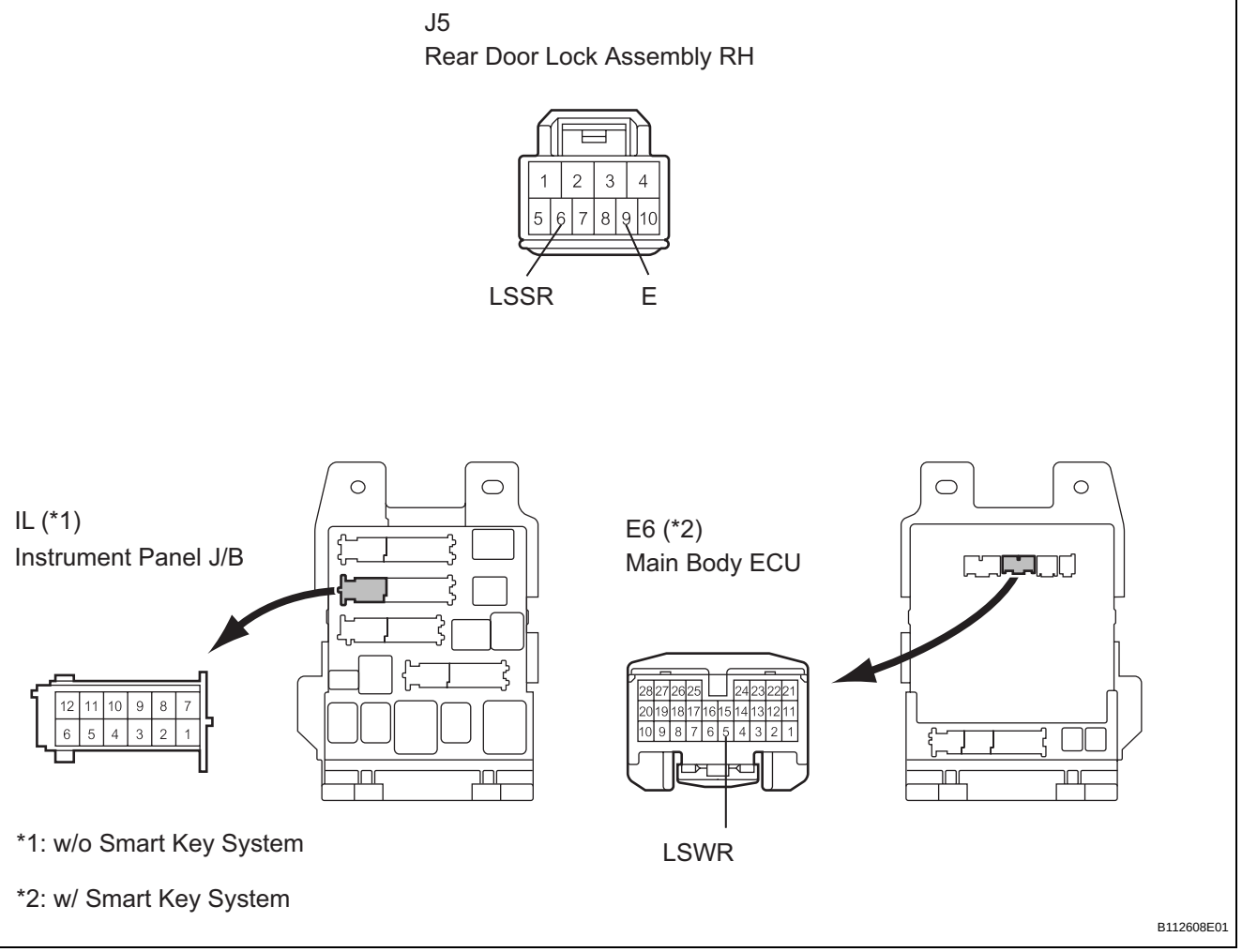
NG → **REPLACE REAR DOOR LOCK ASSEMBLY**

OK

3	CHECK WIRE HARNESS (REAR DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

(a) Disconnect the rear door lock assembly RH connector.

Wire Harness Side:



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
J5-6 (LSSR) - IL-5 (*1)	Always	Below 1 Ω
J5-6 (LSSR) - E6-5 (LSWR) (*2)	Always	Below 1 Ω
J5-6 (LSSR) - Body ground	Always	10 kΩ or higher
J5-9 (E) - Body ground	Always	Below 1 Ω

*1: w/o SMART KEY SYSTEM
*2: w/ SMART KEY SYSTEM

DL

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

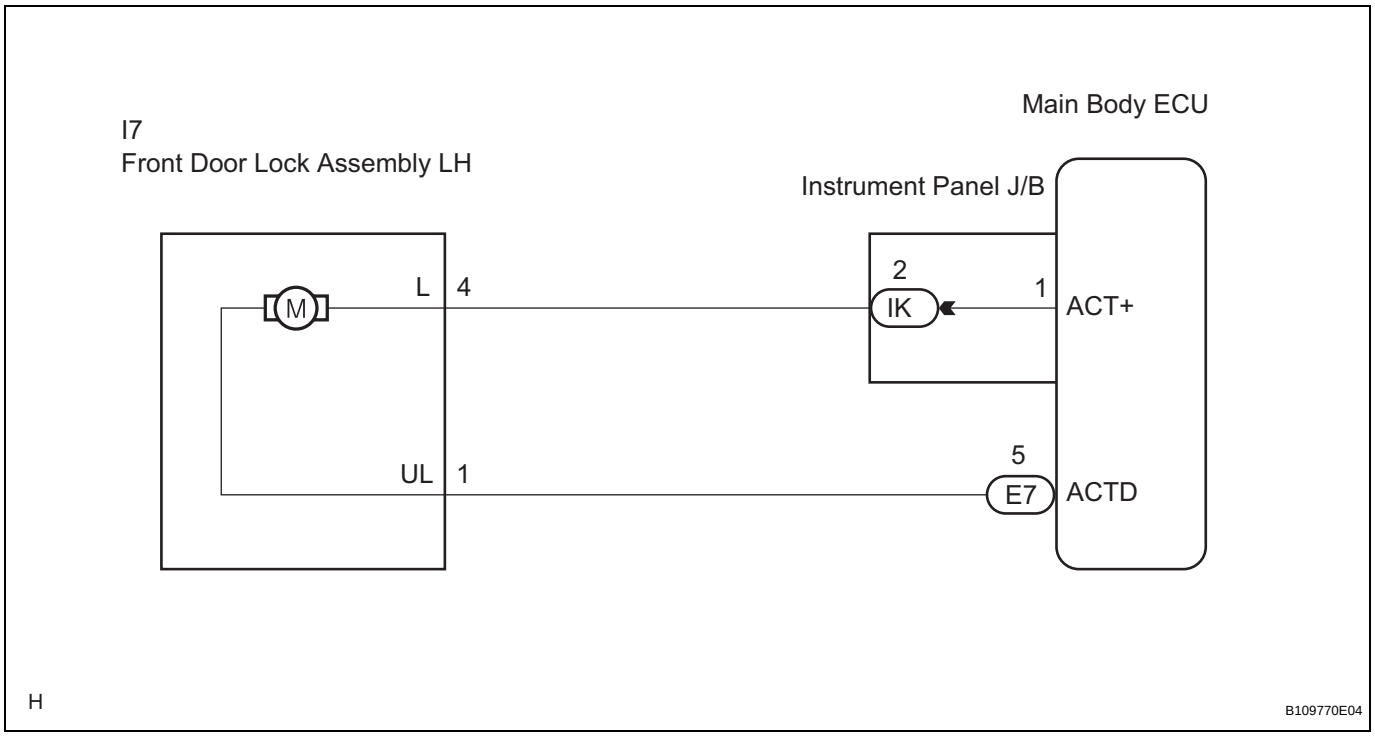
REPLACE MAIN BODY ECU (INSTRUMENT PANEL J/B)

Driver Side Door Lock Motor Circuit

DESCRIPTION

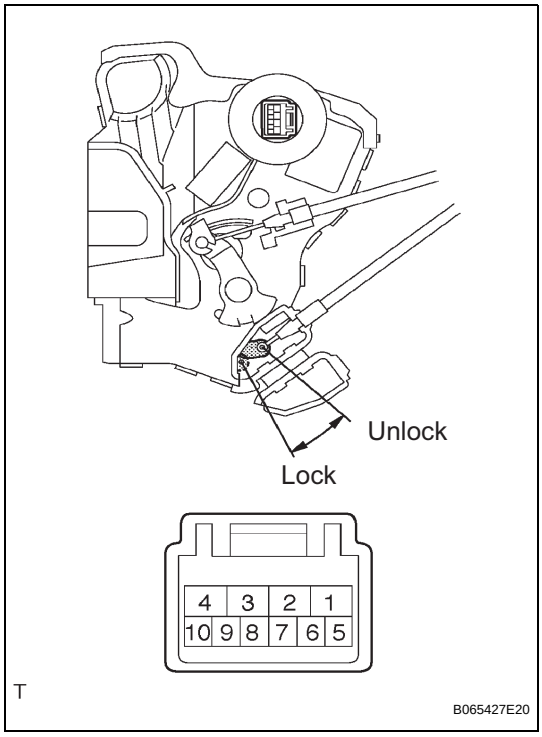
The driver's door lock motor is built into the driver's door lock assembly.
The main body ECU controls the driver's door lock motor to lock/unlock the driver's door. This ECU applies current from terminal ACT+ to terminal ACTD to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR LOCK MOTOR)



(a) Remove the front door lock assembly LH.
(b) Apply battery voltage and check operation of the door lock motor.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

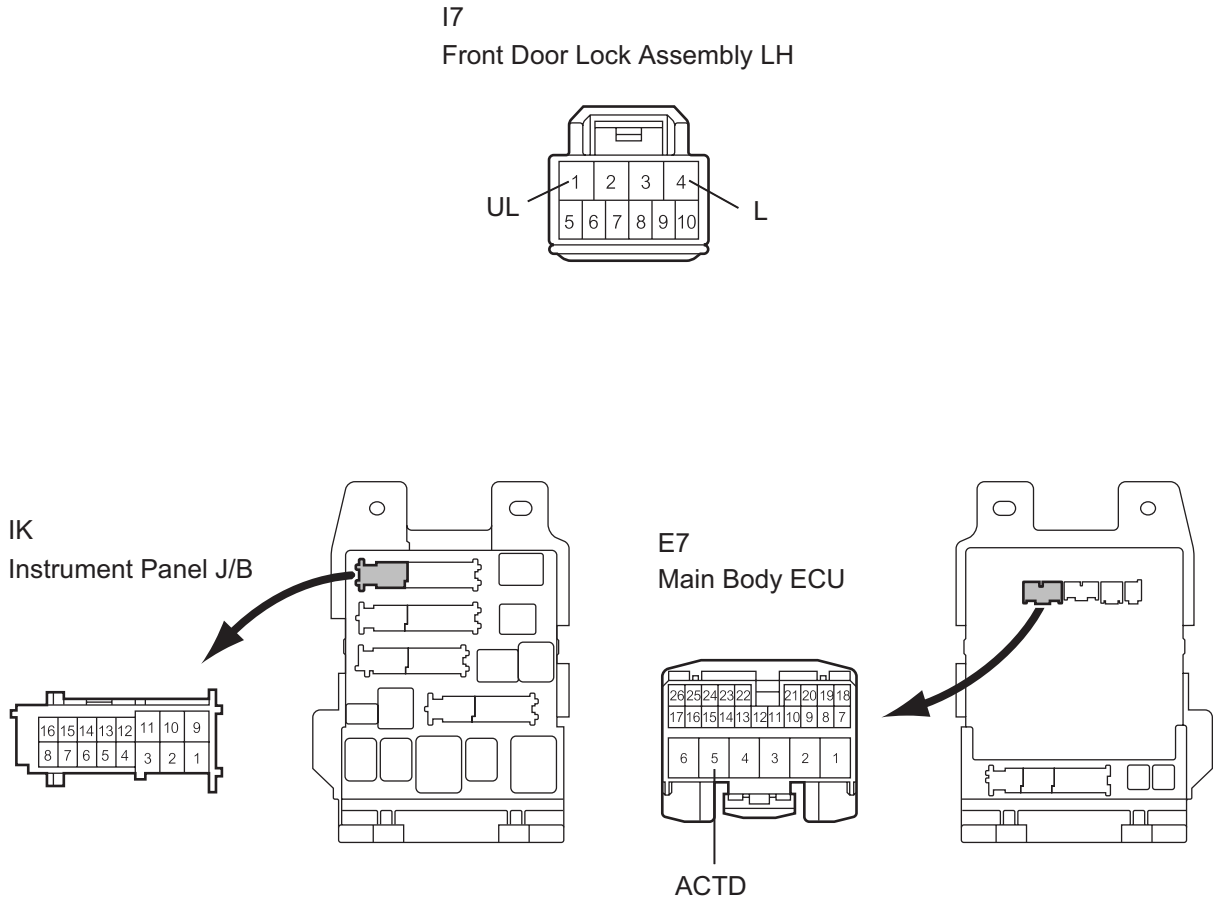
NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

OK

2	CHECK WIRE HARNESS (FRONT DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

(a) Disconnect the front door lock assembly LH connector.

Wire Harness Side:



(b) Disconnect the ECU (instrument panel J/B) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
I7-4 (L) - IK-2	Always	Below 1 Ω
I7-1 (UL) - E7-5 (ACTD)	Always	Below 1 Ω
IK-2 - Body ground	Always	10 kΩ or higher
E7-5 (ACTD) - Body ground	Always	10 kΩ or higher

DL

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

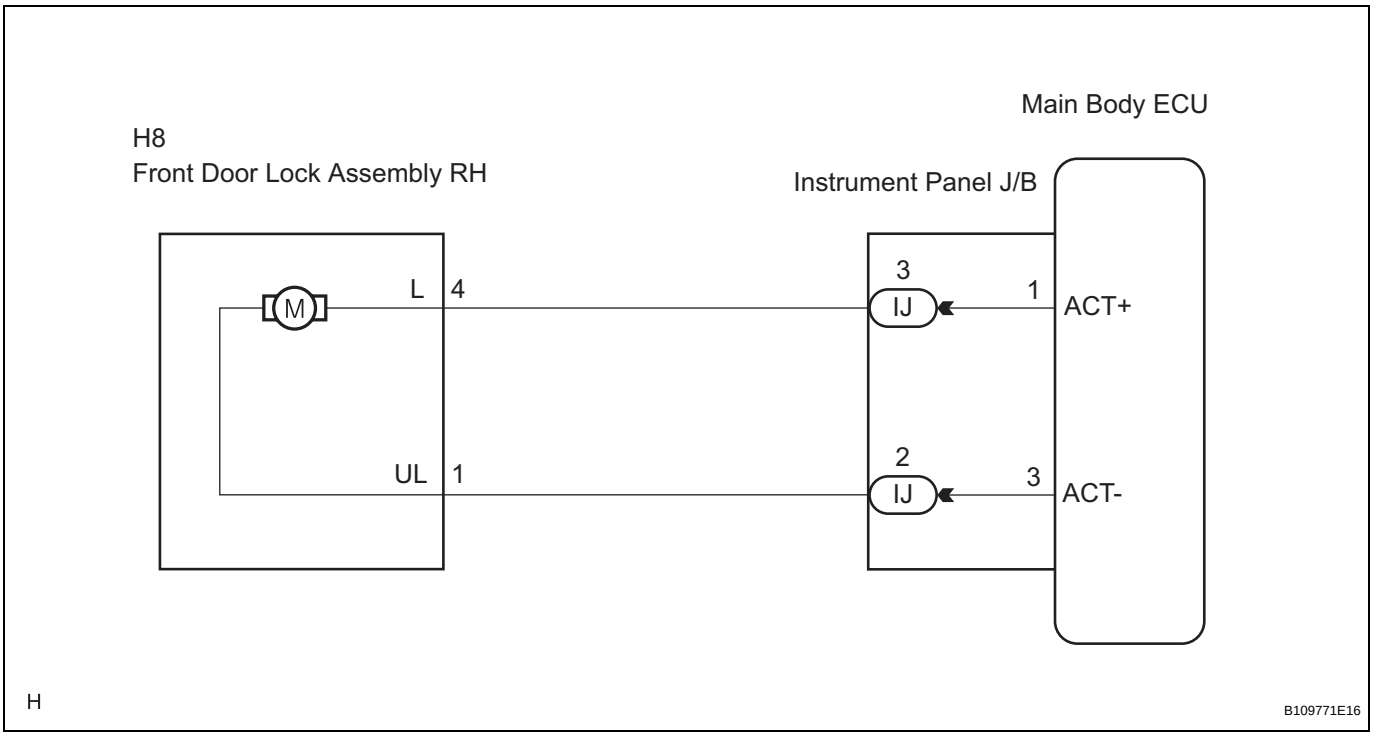
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Front Passenger Side Door Lock Motor Circuit

DESCRIPTION

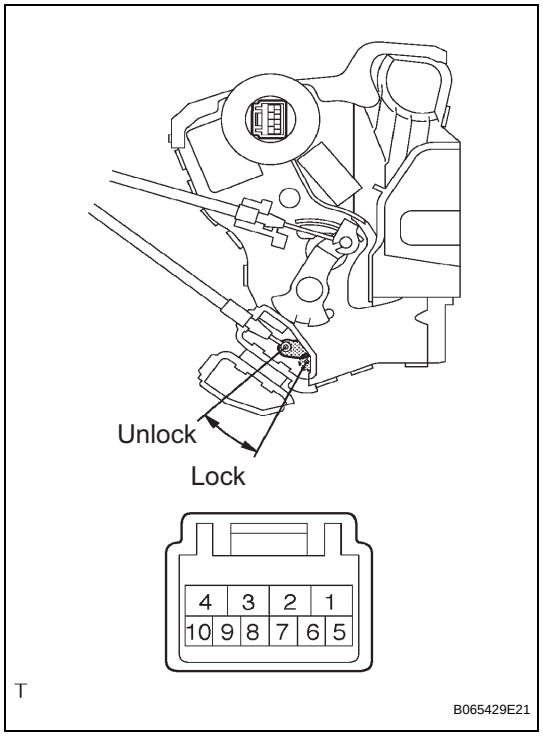
The front passenger door lock motor is built into the front passenger door lock assembly.
The main body ECU controls the front passenger door lock motor to lock/unlock the front passenger door. This ECU applies current from terminal ACT+ to terminal ACT- to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR LOCK MOTOR)



(a) Remove the front door lock assembly RH.
(b) Apply battery voltage and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

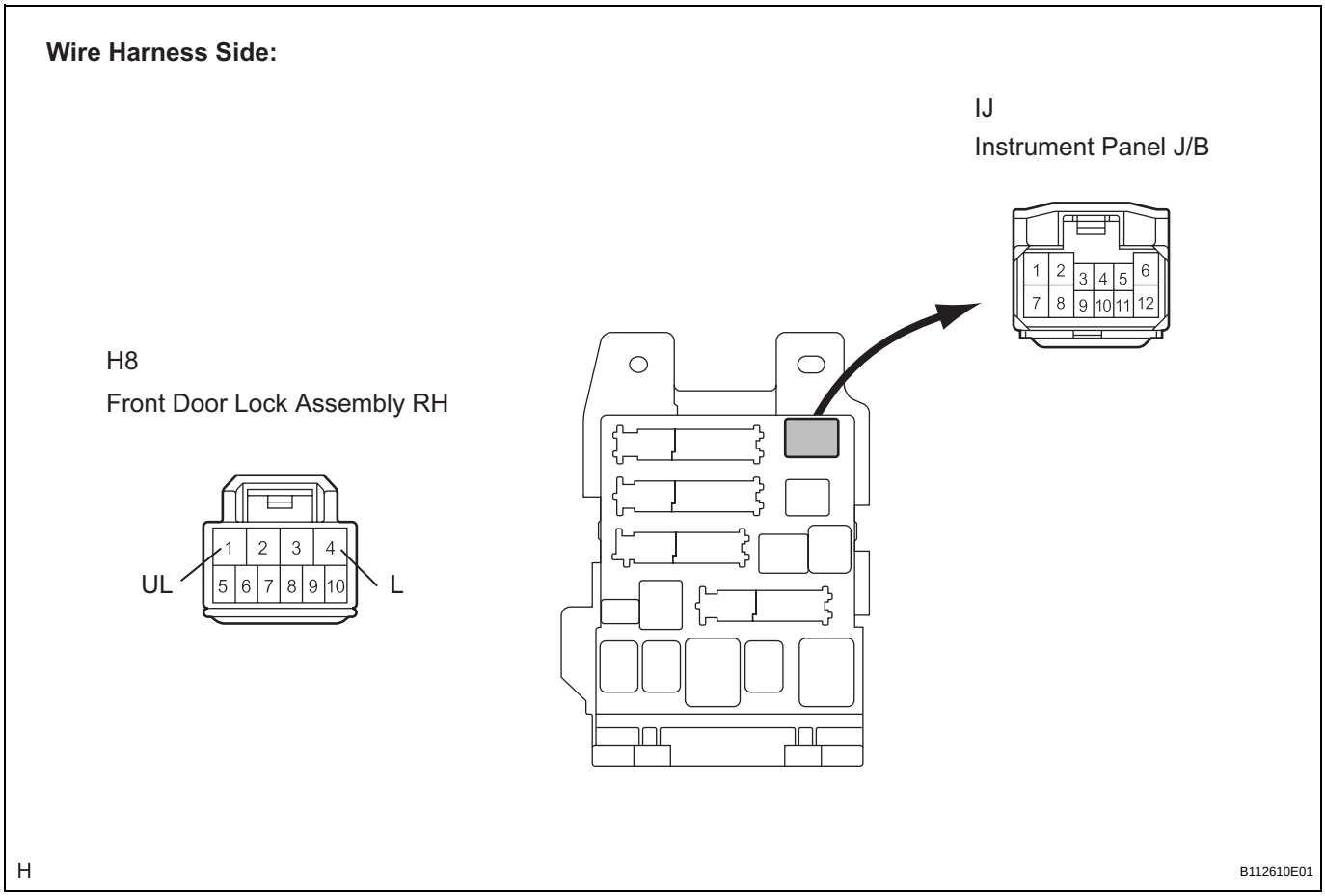
NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

OK

2	CHECK WIRE HARNESS (FRONT DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

(a) Disconnect the front door lock assembly RH connector.

DL



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
H8-4 (L) - IJ-1	Always	Below 1 Ω
H8-1 (UL) - IJ-2	Always	Below 1 Ω
IJ-1 - Body ground	Always	10 kΩ or higher
IJ-2 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

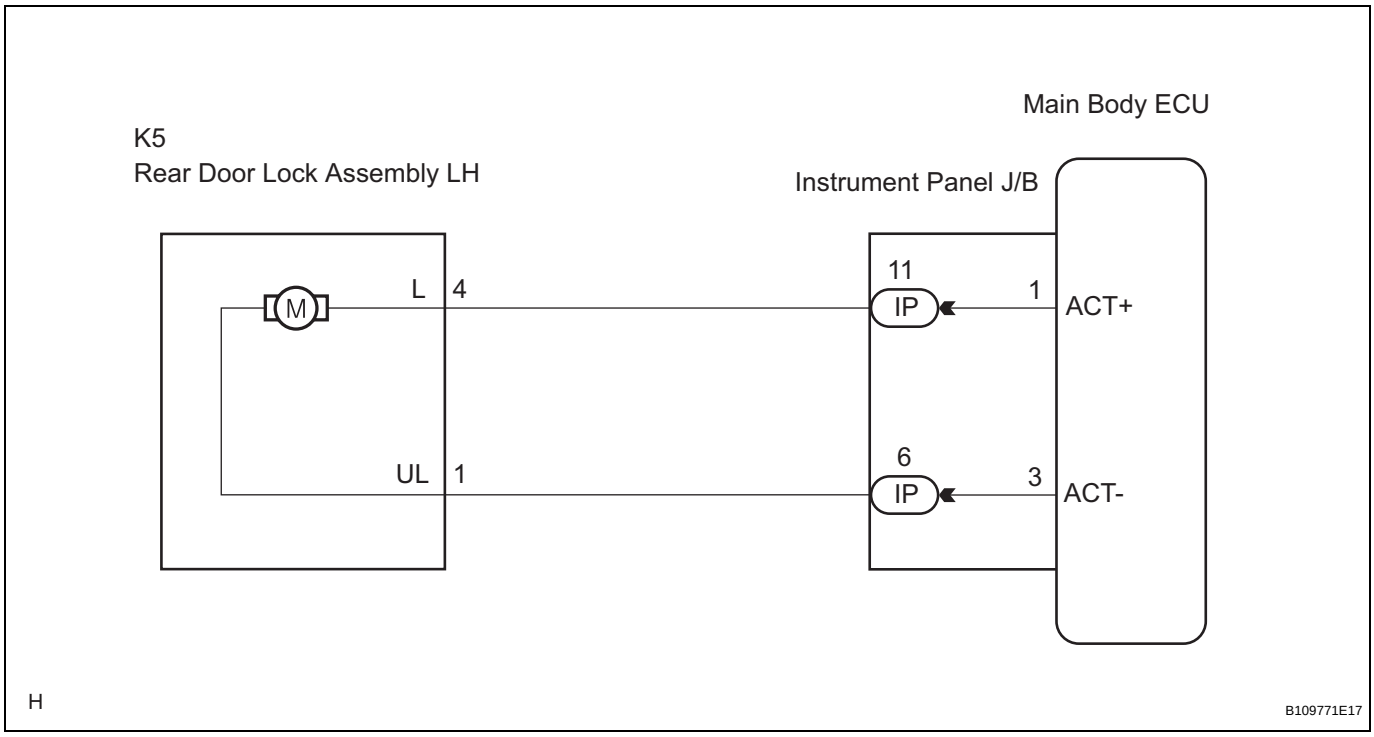
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Door Lock Motor LH Circuit

DESCRIPTION

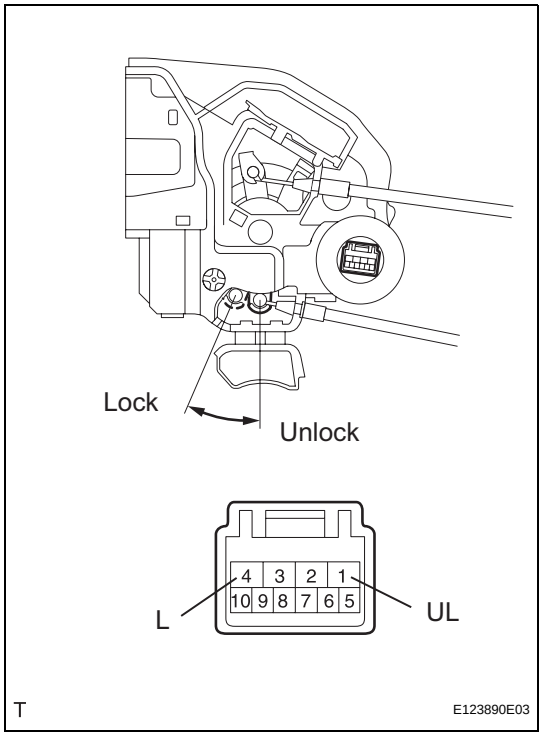
The rear left door lock motor is built into the rear left door lock assembly.
The main body ECU controls the rear left door lock motor to lock/unlock the rear left door. This ECU applies current from terminal ACT+ to terminal ACT- to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT REAR DOOR LOCK ASSEMBLY



(a) Remove the rear door lock assembly LH.
(b) Apply battery voltage and check operation of the door lock motor.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

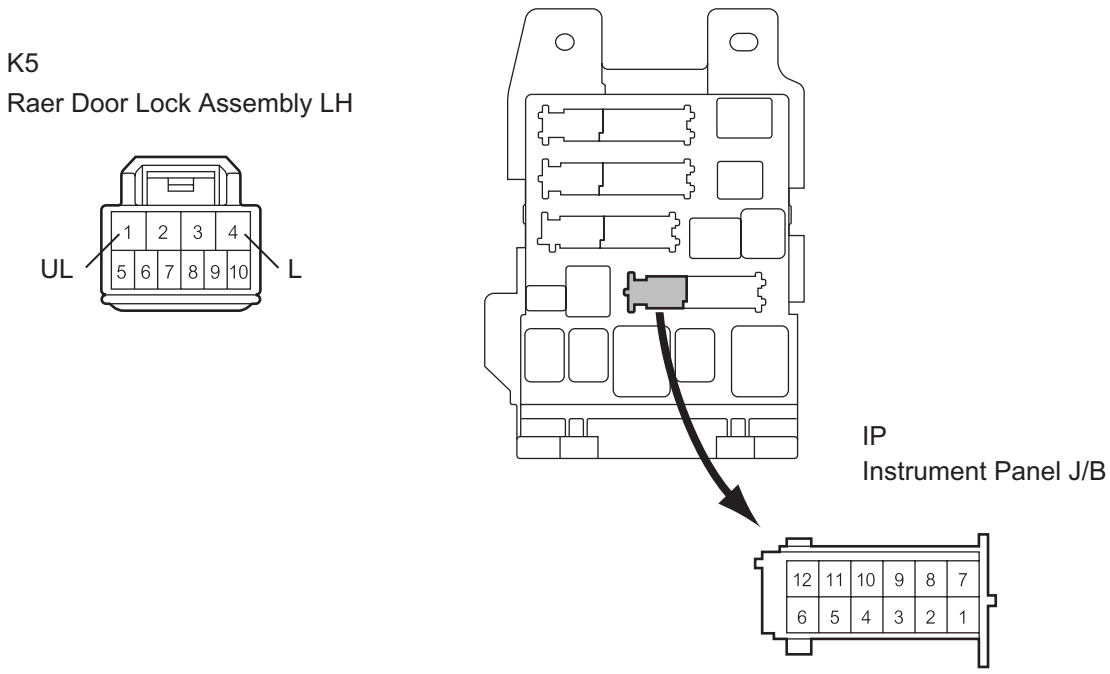
NG → **REPLACE REAR DOOR LOCK ASSEMBLY**

OK

2	CHECK WIRE HARNESS (REAR DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

(a) Disconnect the rear door lock assembly LH connector.

Wire Harness Side:



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
K5-4 (L) - IP-11	Always	Below 1 Ω
K5-1 (UL) - IP-6	Always	Below 1 Ω
IP-11 - Body ground	Always	10 kΩ or higher
IP-6 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

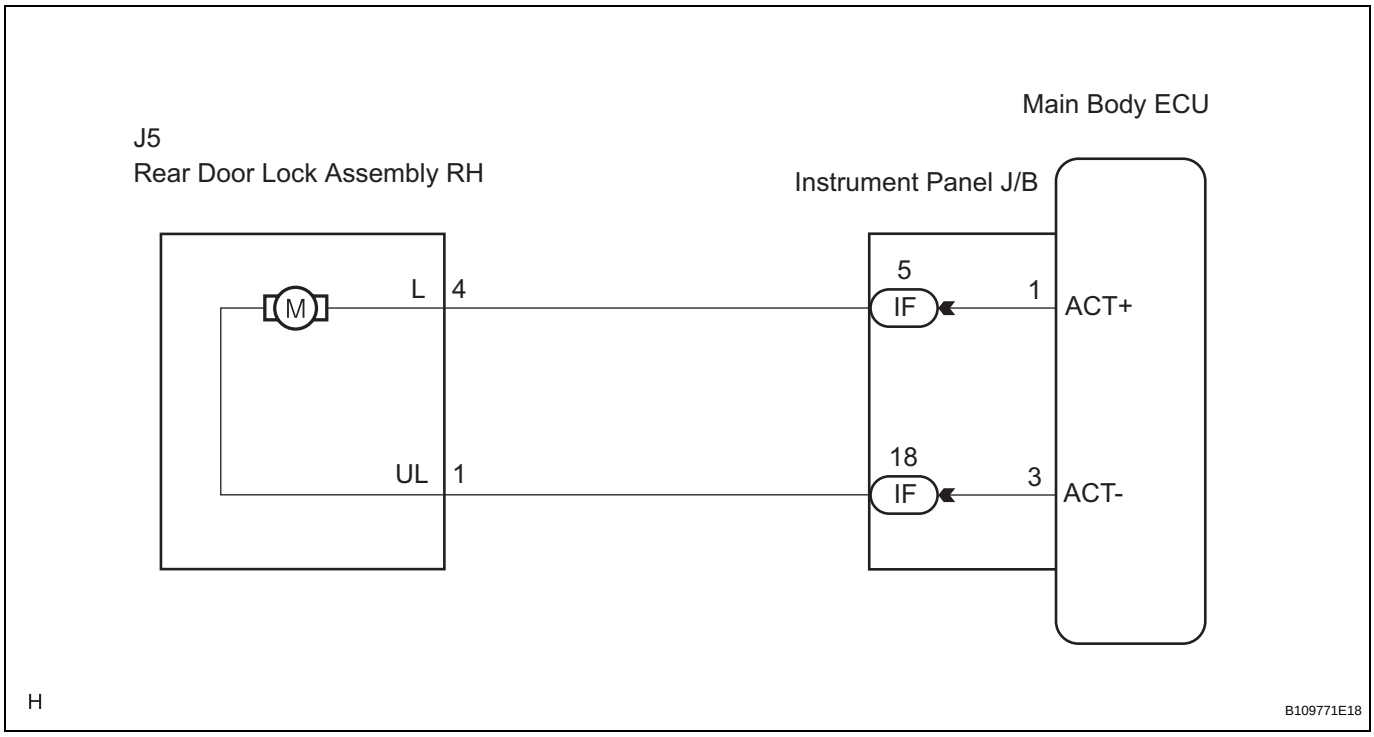
DL

Rear Door Lock Motor RH Circuit

DESCRIPTION

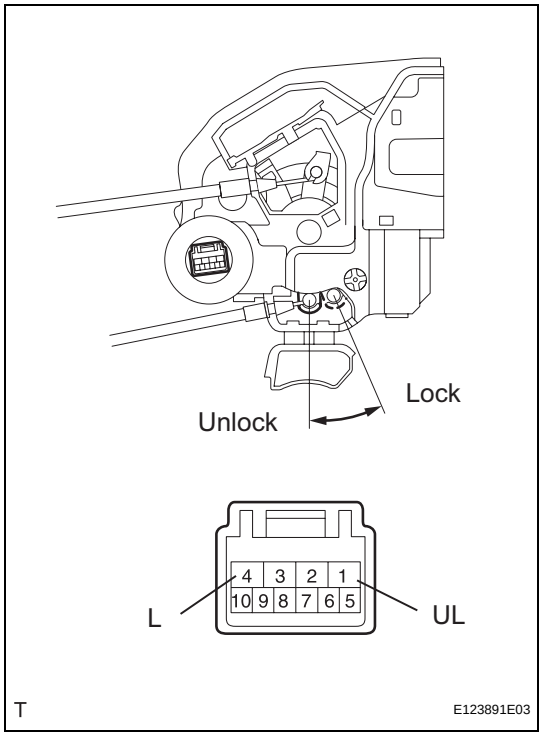
The rear right door lock motor is built into the rear right door lock assembly.
The main body ECU controls the rear right door lock motor to lock/unlock the rear right door. This ECU applies current from terminal ACT+ to terminal ACT- to operate the motor to lock the door. It reverses the direction of the current flow to operate the motor to unlock the door.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT REAR DOOR LOCK ASSEMBLY



(a) Remove the rear door lock assembly RH.
(b) Apply battery voltage and check operation of the door lock motor.
OK

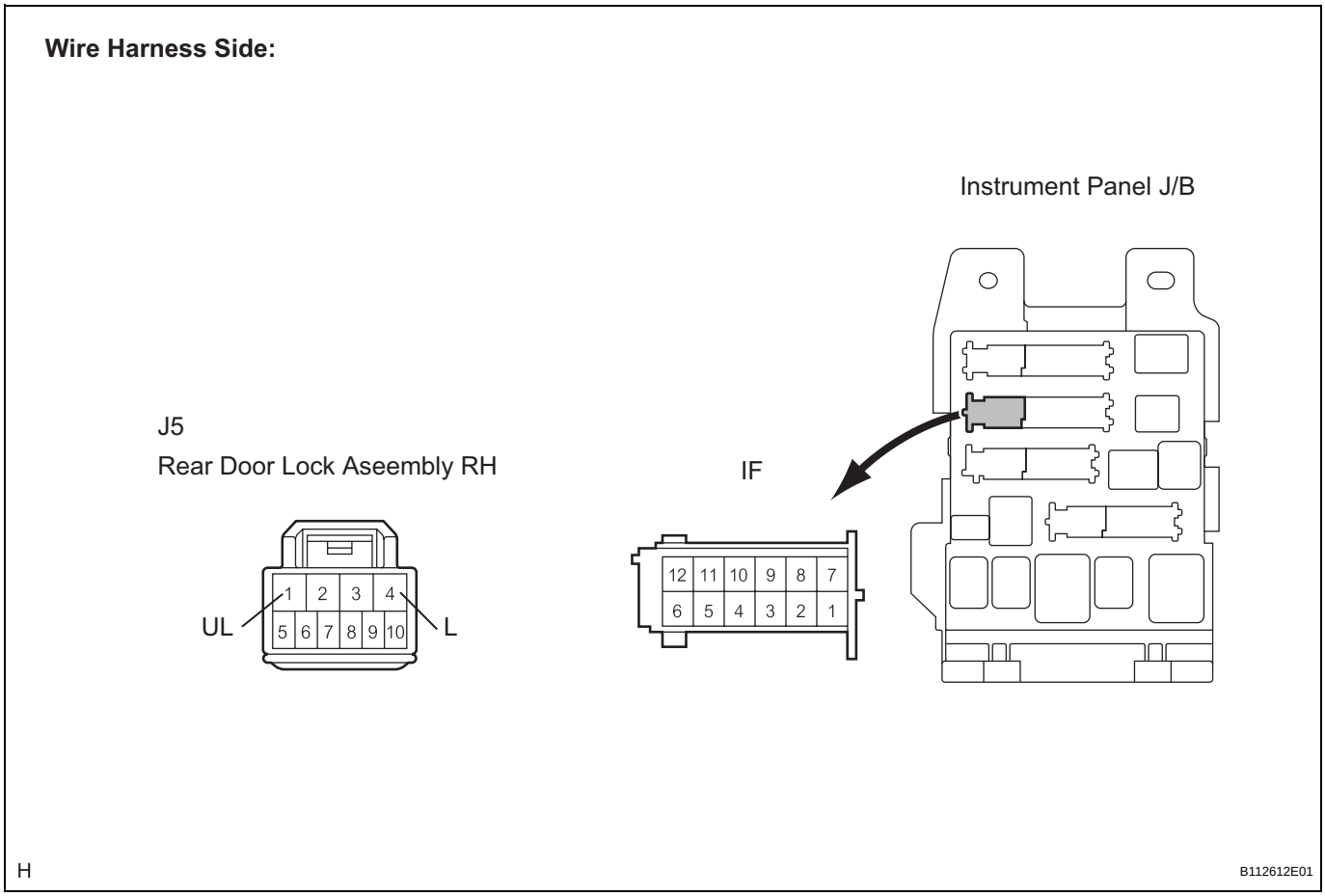
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

NG → **REPLACE REAR DOOR LOCK ASSEMBLY**

OK

2	CHECK WIRE HARNESS (REAR DOOR LOCK - MAIN BODY ECU (INSTRUMENT PANEL J/B))

(a) Disconnect the rear door lock assembly RH connector.



(b) Disconnect the ECU (instrument panel J/B) connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
J5-4 (L) - IF-5	Always	Below 1 Ω
J5-1 (UL) - IF-18	Always	Below 1 Ω
IF-5 - Body ground	Always	10 kΩ or higher
IF-18 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

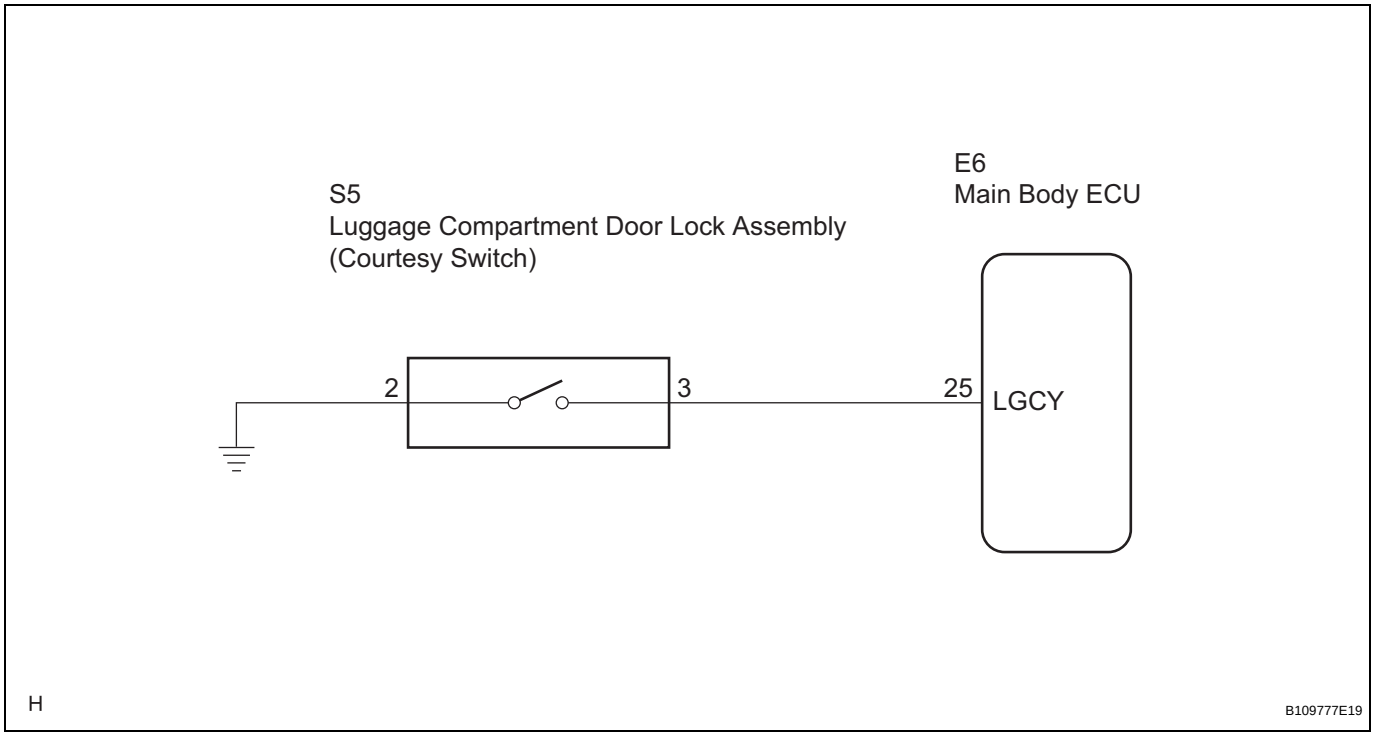
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Luggage Compartment Door Courtesy Switch Circuit

DESCRIPTION

The door courtesy switch turns on when the door is open and turns off when the door is closed.
The main body ECU detects the condition of the door courtesy switch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (DOOR COURTESY SWITCH)

(a) Check the DATA LIST for proper functioning of the door courtesy switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
LUGG COURTSY SW	Luggage compartment door courtesy light switch signal / ON or OFF	ON: Luggage compartment door is OPEN OFF: Luggage compartment door is CLOSED	-

OK:
"ON" (door is open) and "OFF" (door is closed) appear on the screen.

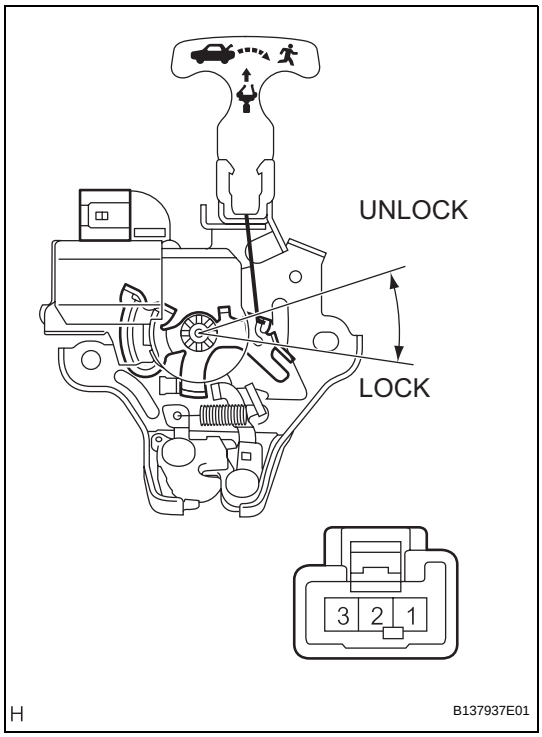
NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

DL

2	**INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (DOOR COURTESY SWITCH)**



(a) Remove the luggage compartment door lock.
(b) Measure the resistance between the specified terminals of the switch.

Standard resistance

Tester Connection	Condition	Specified Condition
2 - 3	UNLOCK	Below 1 Ω
2 - 3	LOCK	10 kΩ or higher

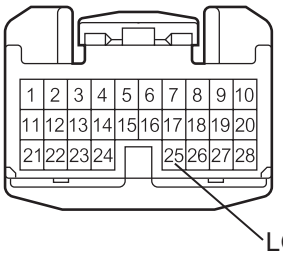
NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY**

OK

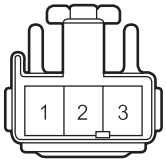
3	CHECK WIRE HARNESS (LUGGAGE COMPARTMENT DOOR LOCK - MAIN BODY ECU)

Wire Harness Side:

E6 Main Body ECU



S5 Luggage Compartment Door Lock Assembly (Door Courtesy Switch)



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(a) Disconnect the ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
S5-3 - E6-25 (LGCY)	Always	Below 1 Ω
S5-3 - Body ground	Always	10 kΩ or higher
S5-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

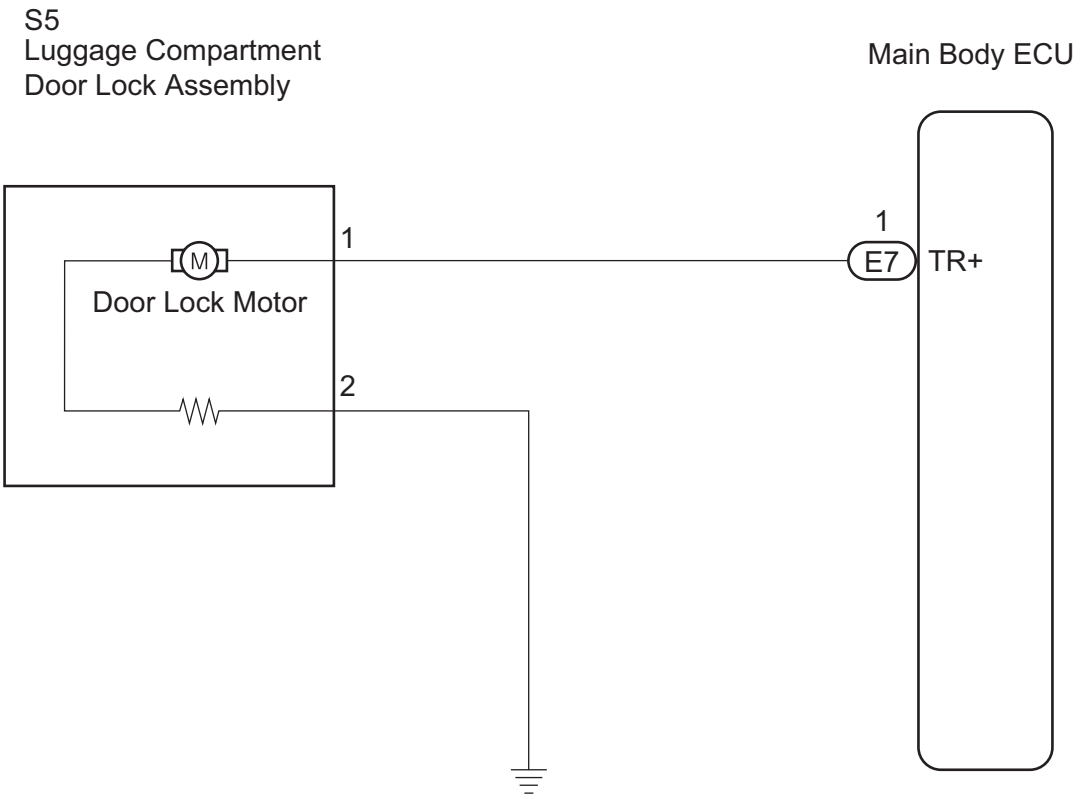
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Luggage Compartment Door Lock Circuit

DESCRIPTION

The luggage compartment door lock motor is built into the luggage compartment door lock assembly. The main body ECU receives a luggage compartment door unlock signal from the luggage compartment door lock cylinder or electrical key switch (w/ smart key system) and operates the door lock motor.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST (LUGGAGE COMPARTMENT DOOR)

(a) Select the ACTIVE TEST, use the intelligent tester to generate a control command, and then check that the door lock operates.

MAIN BODY:

Item	Test Details	Diagnostic Note
TRUNK/BDOR OPEN	Operate luggage compartment door lock motor LOCK/UNLOCK	-

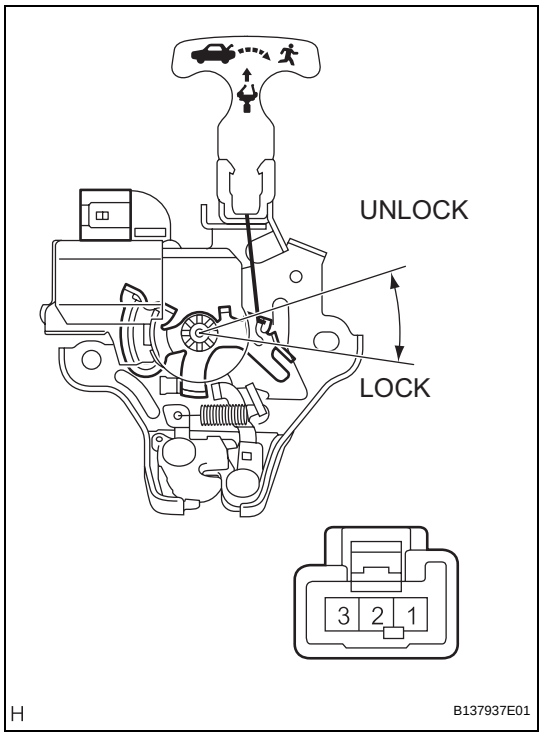
OK:
Door lock is locked/unlocked.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (DOOR LOCK MOTOR)



(a) Remove the luggage compartment door lock assembly.
(b) Apply battery voltage and check operation of the door lock motor.

Standard voltage

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Unlock

NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY**

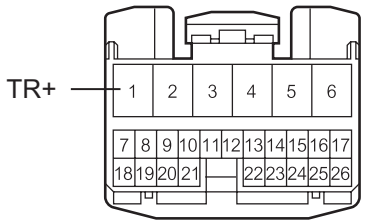
OK

DL

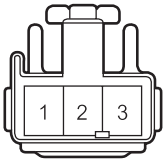
3	CHECK WIRE HARNESS (LUGGAGE COMPARTMENT DOOR LOCK - MAIN BODY ECU)

Wire Harness Side:

E7 Main Body ECU



S5 Luggage Compartment Door Lock Assembly



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(a) Disconnect the ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E7-1 (TR+) - S5-1	Always	Below 1 Ω
S5-1 - Body ground	Always	10 kΩ or higher
S5-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

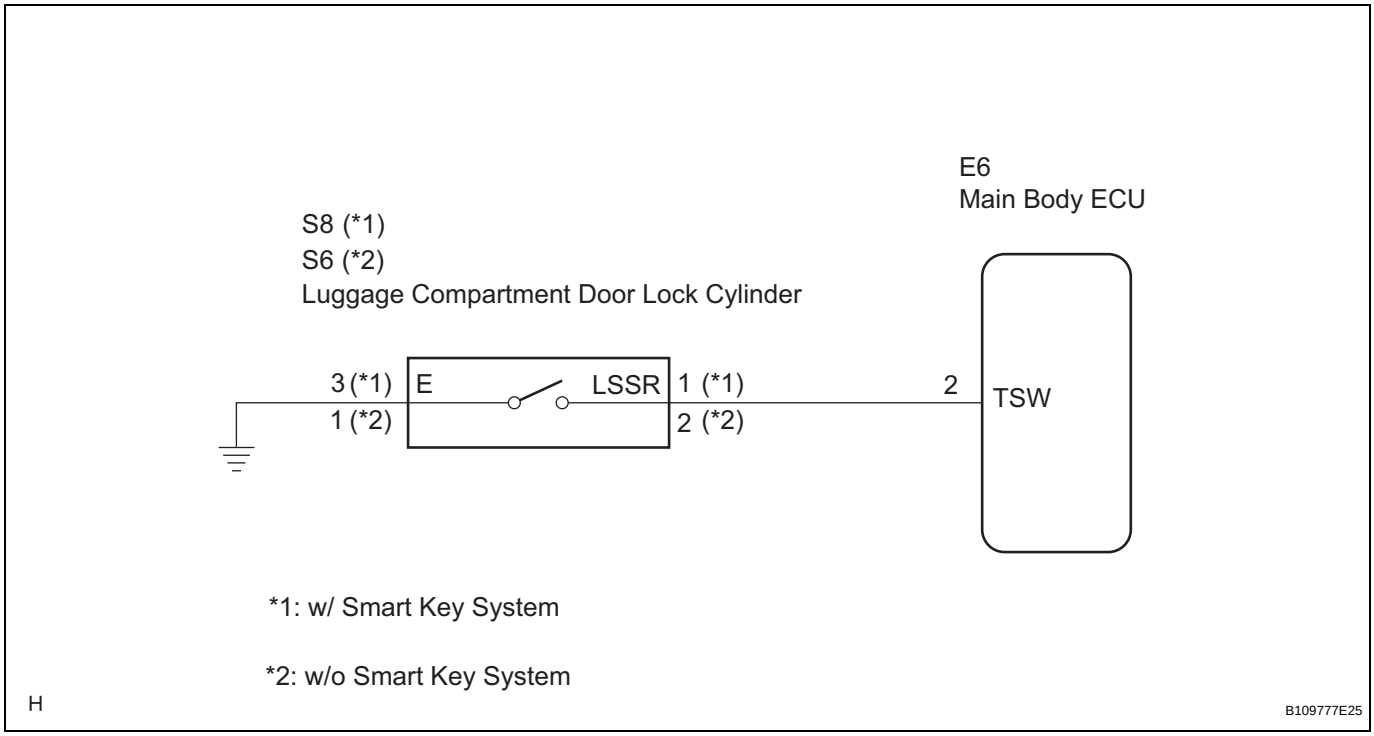
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Luggage Compartment Door Key Cylinder Switch Circuit

DESCRIPTION

When the luggage compartment door lock cylinder is turned to unlock the door by key, there is continuity between terminal TSW of the main body ECU and body ground.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the "DATA LIST" and read the display on the intelligent tester.

MAIN BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
TRUNK KEY UNLK	Luggage compartment door key cylinder switch/ON or OFF	ON: Ignition key inserted and turned to lock position OFF: Ignition key inserted and turned to unlock position	-

OK:

When the ignition switch is operated, the display changes as shown above.

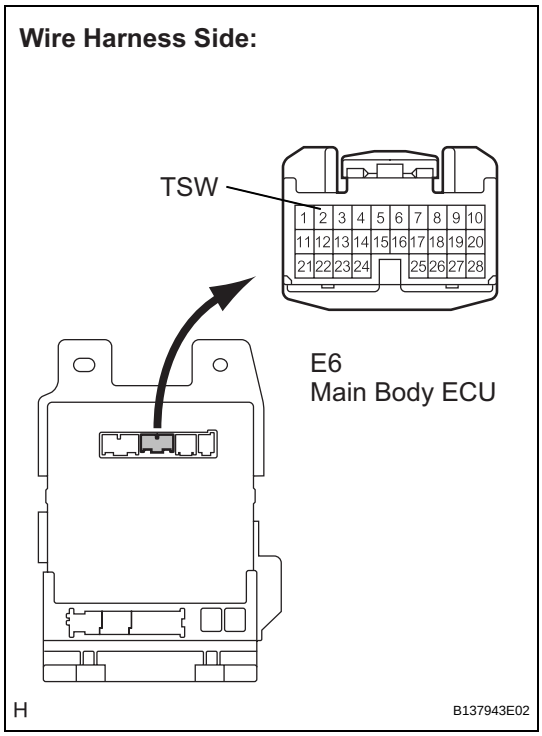
NG	Go to step 2

DL

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT MAIN BODY ECU (TSW TERMINAL)



(a) Turn the ignition switch off.
(b) Disconnect the ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

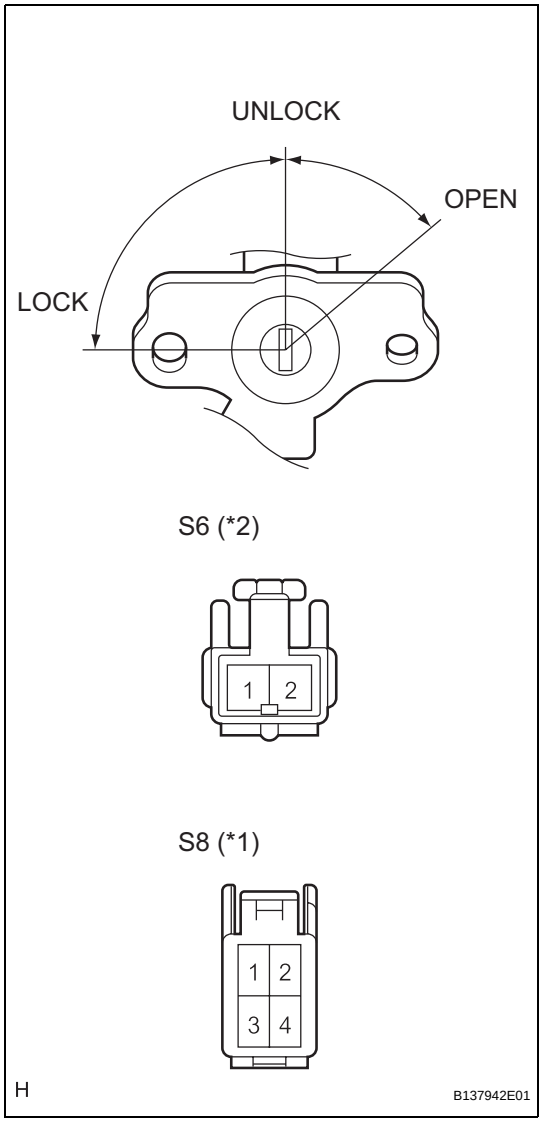
Tester Connection (Symbols)	Condition	Specified Condition
E6-2 (TSW) - Body ground	Luggage compartment door lock cylinder LOCK	10 kΩ or higher
E6-2 (TSW) - Body ground	Luggage compartment door lock cylinder OPEN	Below 1 Ω
E6-2 (TSW) - Body ground	Luggage compartment door lock cylinder UNLOCK	10 kΩ or higher

NG → **Go to step 3**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

3	INSPECT LUGGAGE COMPARTMENT DOOR LOCK CYLINDER



(a) Disconnect the luggage compartment door lock cylinder connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
*1 S8-1 - S8-3	Luggage compartment door lock cylinder LOCK	10 kΩ or higher
*1 S8-1 - S8-3	Luggage compartment door lock cylinder OPEN	Below 1 Ω
*1 S8-1 - S8-3	Luggage compartment door lock cylinder UNLOCK	10 kΩ or higher
*2 S6-2 - S6-1	Luggage compartment door lock cylinder LOCK	10 kΩ or higher
*2 S6-2 - S6-1	Luggage compartment door lock cylinder OPEN	Below 1 Ω
*2 S6-2 - S6-1	Luggage compartment door lock cylinder UNLOCK	10 kΩ or higher

*1: w/ SMART KEY SYSTEM
*2: w/o SMART KEY SYSTEM

NG → **REPLACE LUGGAGE COMPARTMENT DOOR LOCK CYLINDER**

OK

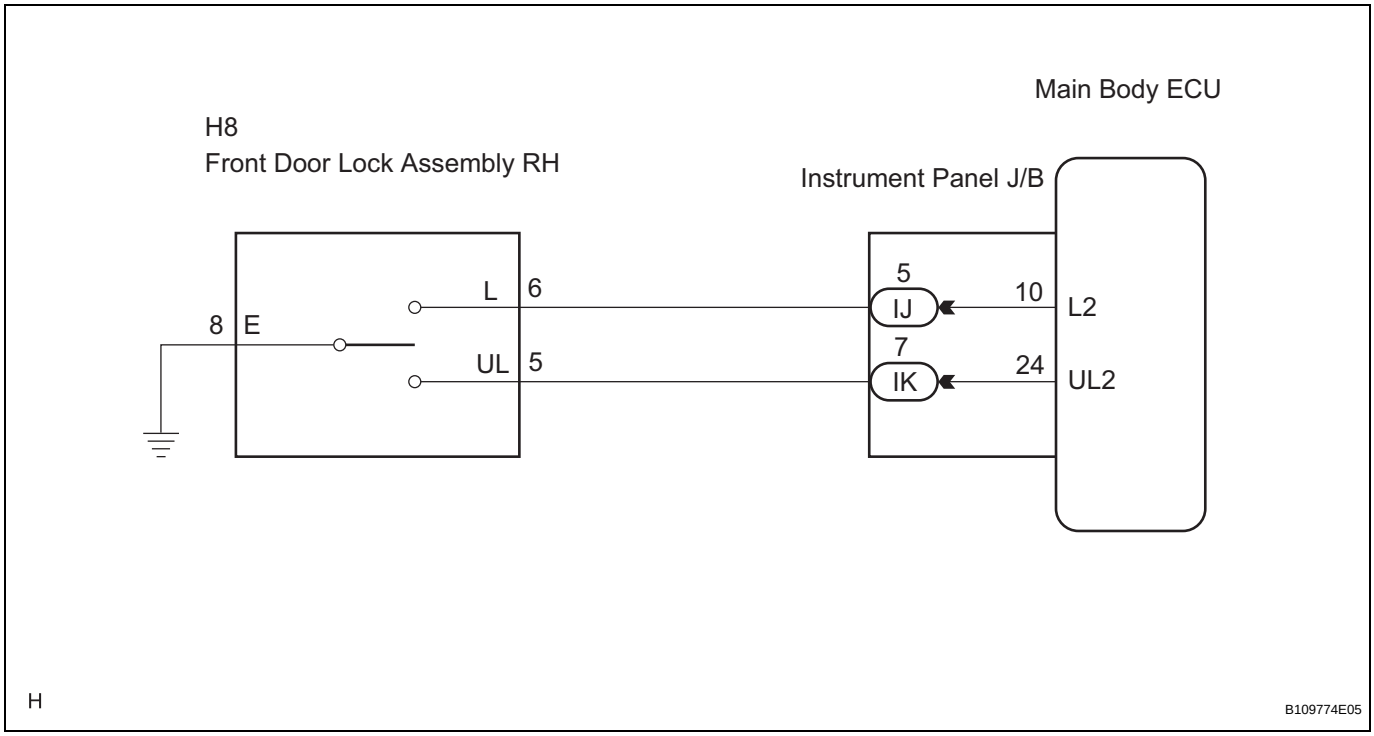
REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU, BODY GROUND - DOOR LOCK CYLINDER)

Door Key Lock / Unlock Switch Circuit

DESCRIPTION

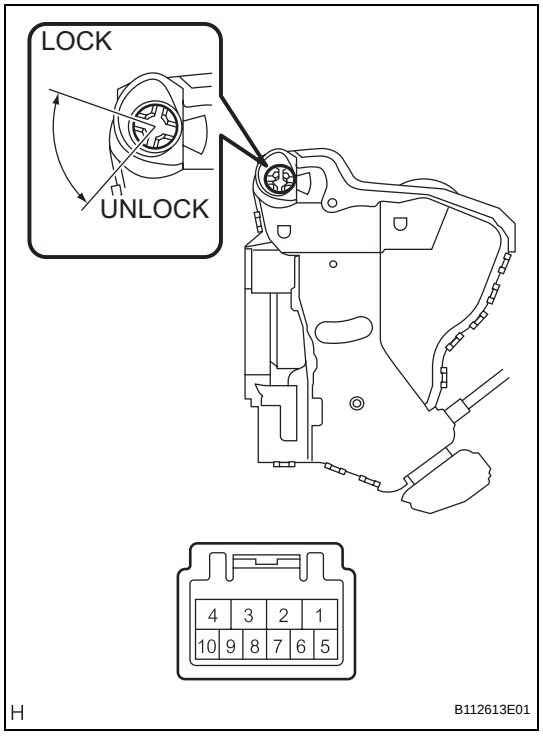
The door lock and unlock switch is built into the door lock assembly.
This switch is ON when the door key is in the unlock position and OFF when the door key is in the lock position. It is used as one of the operating conditions for the key confinement prevention function.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT FRONT DOOR LOCK ASSEMBLY RH (DOOR KEY LOCK AND UNLOCK SWITCH)**



(a) Remove the front door lock assembly RH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
5 - 8	ON (Door lock set to UNLOCK)	Below 1 Ω
5 - 8 6 - 8	OFF (Free)	10 kΩ or higher
6 - 8	ON (Door lock set to LOCK)	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY LH**

OK

2	**CHECK WIRE HARNESS (FRONT DOOR LOCK RH - MAIN BODY ECU (INSTRUMENT PANEL J/B))**

(a) Disconnect the IJ J/B connector.

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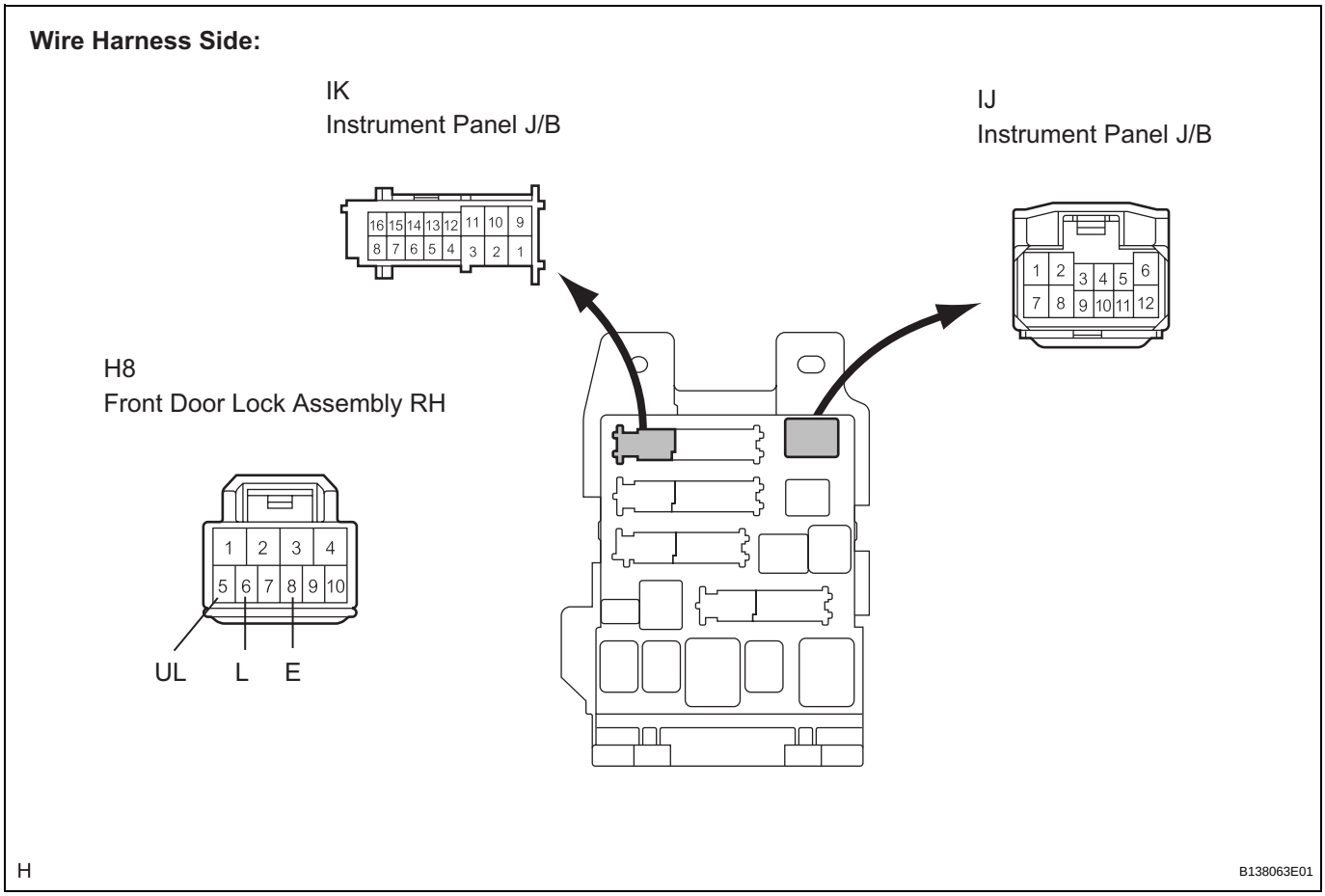


(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
H8-6 (L) - IJ-5	Always	Below 1 Ω
H8-5 (UL) - IK-7	Always	Below 1 Ω
H8-8 (E) - Body ground	Always	Below 1 Ω
H8-6 (L) - Body ground	Always	10 kΩ or higher
H8-5 (UL) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

DL

OK

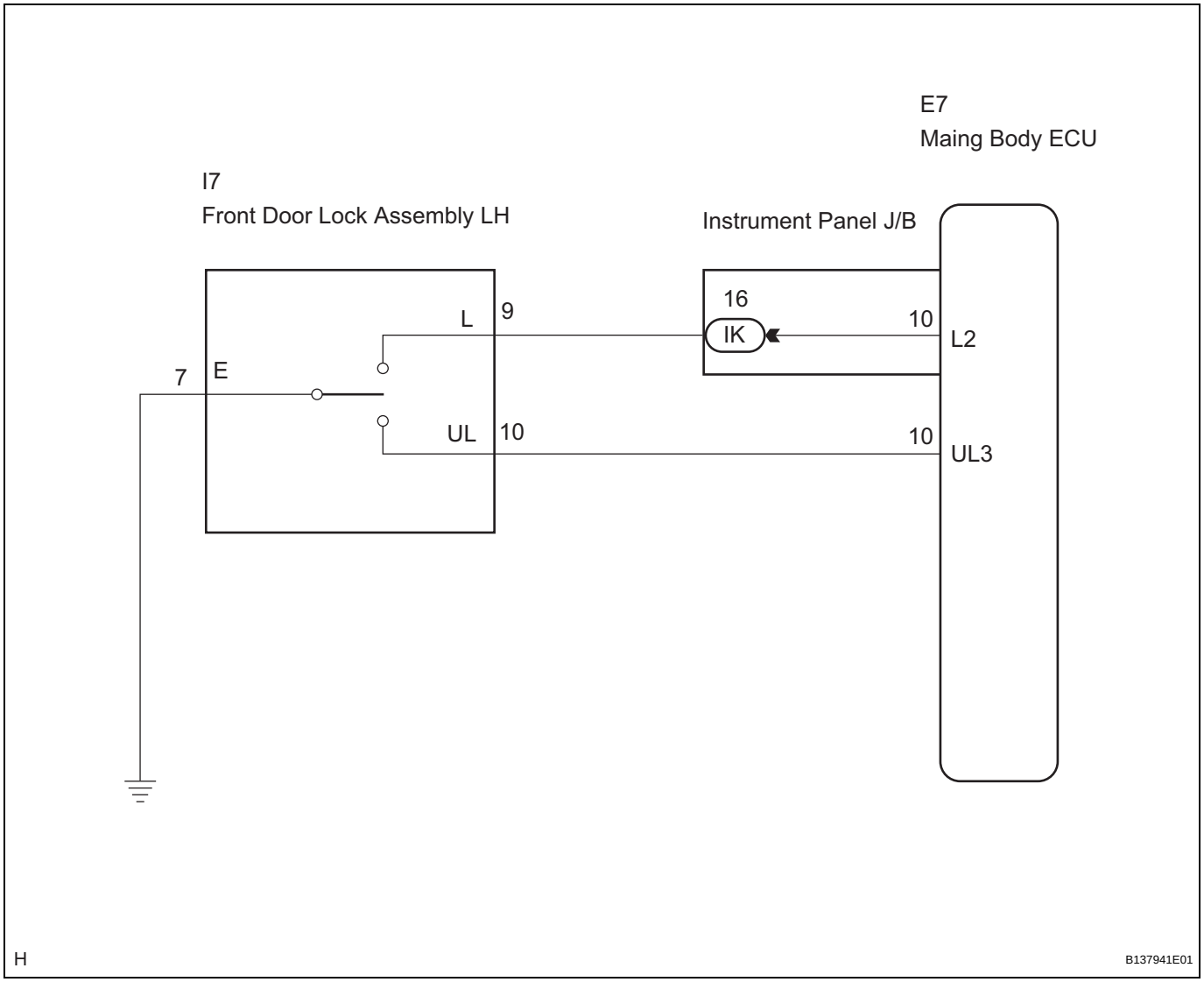
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Driver Side Door Key Lock and Unlock Switch Circuit

DESCRIPTION

The driver's door key lock and unlock switch is built into the driver's door lock assembly.
When the driver's door key cylinder is turned to lock all the doors by key, there is continuity between terminals L and E of the key lock and unlock switch. When the cylinder is turned to unlock the door(s), there is continuity between terminals UL and E.
Terminals L2 and UL3 of the main body ECU are connected to the door lock assembly, and door lock/unlock request signals (by key) are input to the main body ECU.
The main body ECU constantly applies voltage to terminal L of the driver's door lock assembly via terminal L2. When the driver's door key cylinder is turned to lock all the doors by key, current flows from terminal L2 to terminal L.
The main body ECU also applies constant voltage to terminal UL of the door lock assembly via terminal UL3. When the door key cylinder is turned in the direction to unlock the door(s) by key, current flows from terminal UL3 to terminal UL.

WIRING DIAGRAM



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INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST

(a) Check the DATA LIST to ensure proper function of the door unlock detection switch.

MAIN BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
DOR KEY SW-LOCK	Driver door lock/unlock switch lock signal (key-linked lock switch) /ON or OFF	ON: Driver side door key cylinder is turned to LOCK OFF: Driver side door key cylinder is not turned to LOCK	-
DOR KEY SW-ULCK	Driver door lock/unlock switch unlock signal (key-linked unlock switch) /ON or OFF	ON: Driver side door key cylinder is turned to UNLOCK OFF: Driver side door key cylinder is not turned to UNLOCK	-

OK:

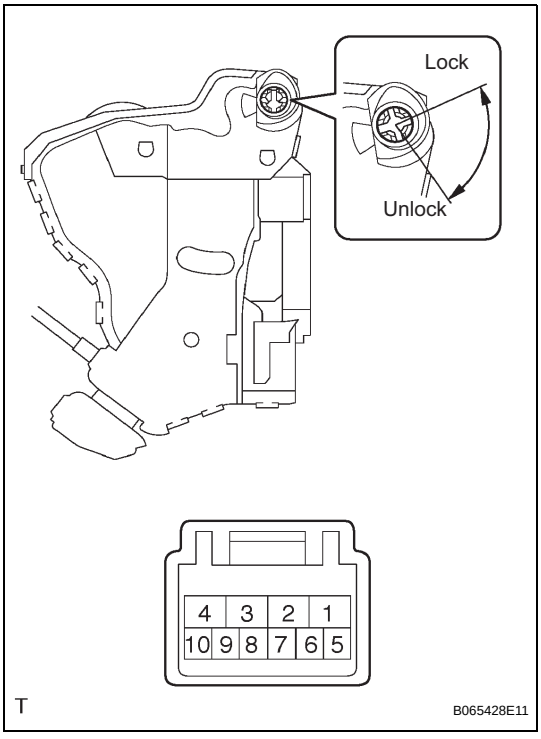
The display is as specified in the normal condition column.

NG → **Go to step 2**

OK ↓

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	INSPECT FRONT DOOR LOCK ASSEMBLY (DOOR KEY LOCK AND UNLOCK SWITCH)



(a) Remove the front door lock assembly LH.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
7 - 9	ON (Door lock set to LOCK)	Below 1 Ω
7 - 9 7 - 10	OFF (Free)	10 kΩ or higher
7 - 10	ON (Door lock set to UNLOCK)	Below 1 Ω

NG → **REPLACE FRONT DOOR LOCK ASSEMBLY**

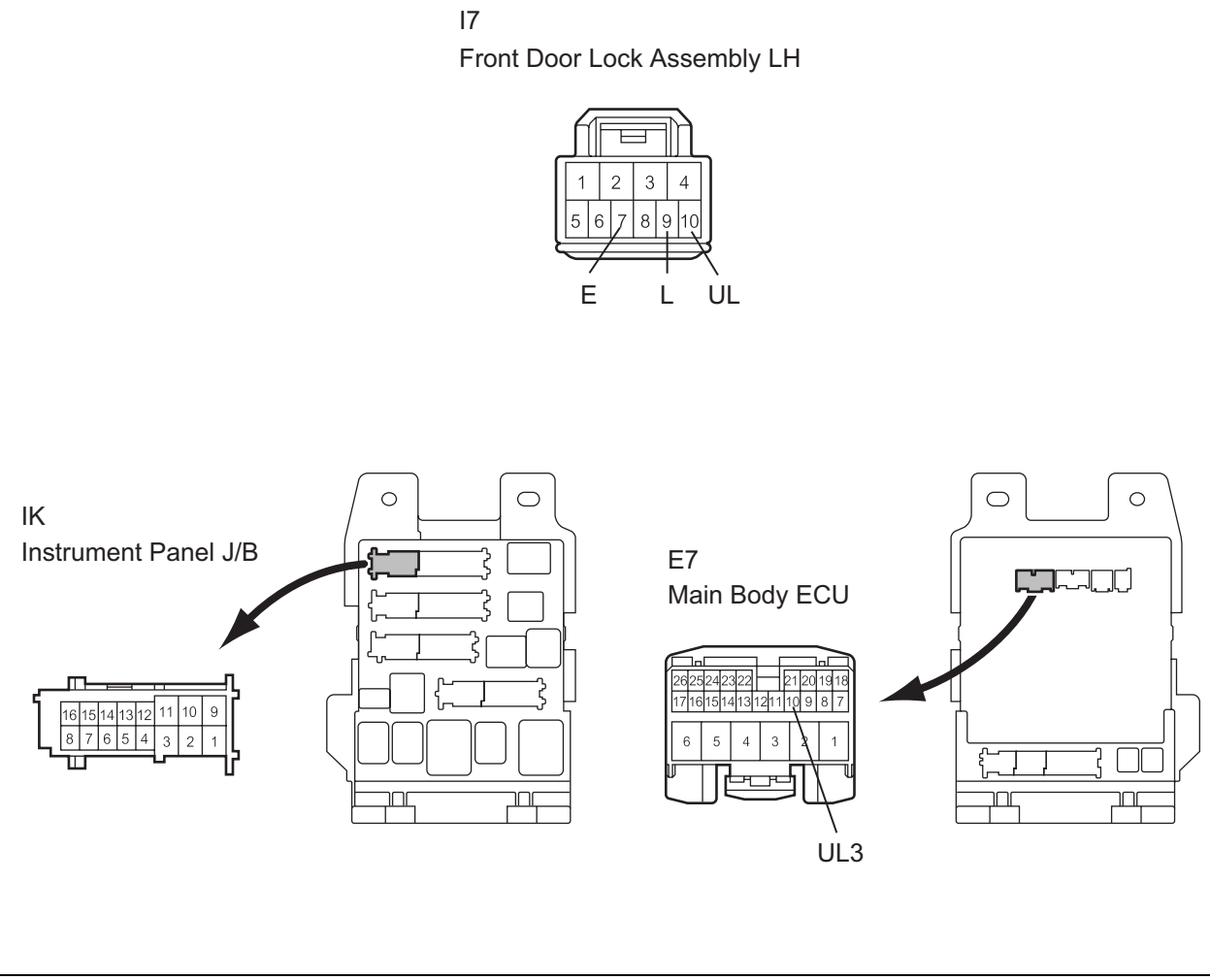
OK ↓

DL

3	CHECK WIRE HARNESS (FRONT DOOR LOCK ASSEMBLY - MAIN BODY ECU)

(a) Disconnect the front door lock assembly LH connector.

Wire Harness Side:



(b) Disconnect the main body ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
I7-9 (L) - IK-16	Always	Below 1 Ω
I7-10 (UL) - E7-10 (UL3)	Always	Below 1 Ω
I7-7 (E) - Body ground	Always	Below 1 Ω
I7-9 (L) - Body ground	Always	10 kΩ or higher
I7-10 (UL) - Body ground	Always	10 kΩ or higher

NG	REPAIR OR REPLACE HARNESS OR CONNECTOR

DL

OK

REPLACE MAIN BODY ECU

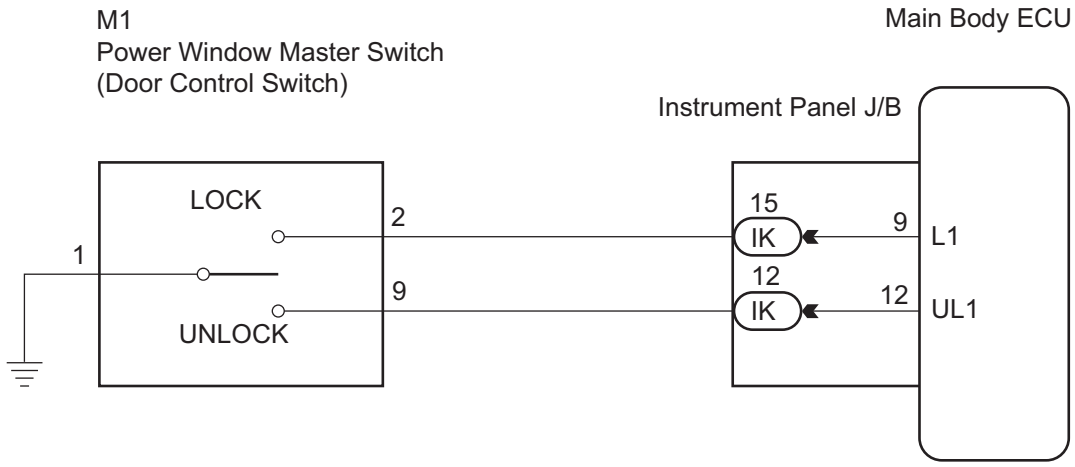
Door Control Switch Circuit

DESCRIPTION

When the lock side of the door control switch is pressed, continuity is established between terminal 2 (driver side) or 4 (passenger side) and terminal 1 (driver side) or 3 (passenger side) of the switch. When the unlock side of the switch is pressed, continuity is established between terminal 9 (driver side) or 2 (passenger side) and terminal 1 (driver side) or 3 (passenger side).
Terminals L1 and UL1 of the main body ECU are connected to the door control switch and door lock/unlock request signals (by door control switch operation) are input to the ECU.
The main body ECU constantly applies voltage to terminal 2 (driver side) or 4 (passenger side) of the door control switch via terminal L1. When the door control switch is operated to lock all doors, current flows from terminal L1 to terminal 2 (driver side) or 4 (passenger side). The main body ECU determines that this is door lock request signal input.
The main body ECU also applies constant voltage to terminal 9 (driver side) or 2 (passenger side) of the door control switch via terminal UL1. When the door control switch is operated to unlock the doors, current flows from terminal UL1 to terminal 9 (driver side) or 2 (passenger side). The main body ECU determines that this is door unlock request signal input.

WIRING DIAGRAM

DRIVER SIDE:



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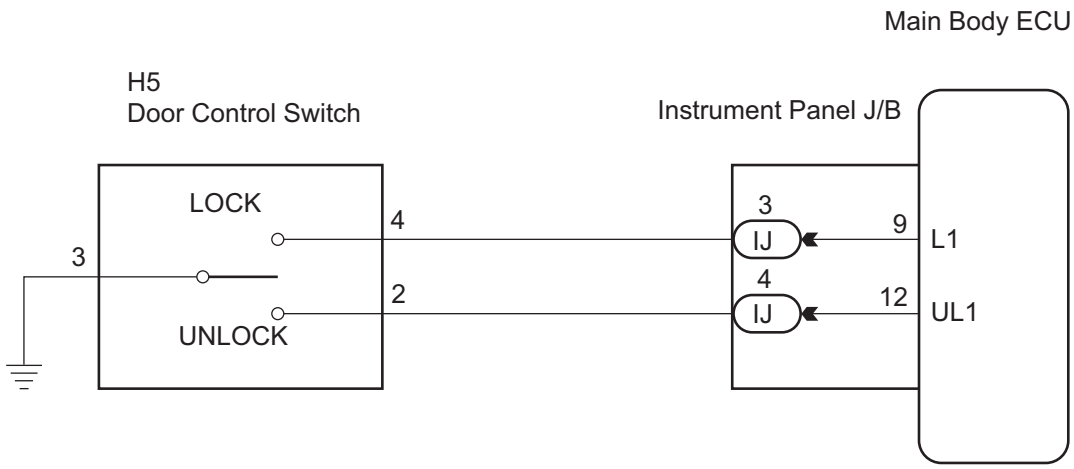
PASSENGER SIDE:



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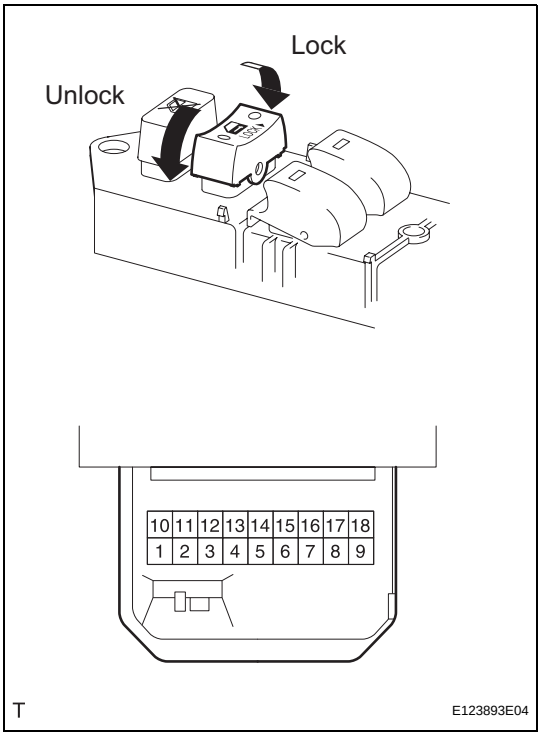
INSPECTION PROCEDURE

1	INSPECT DOOR CONTROL SWITCH ASSEMBLY



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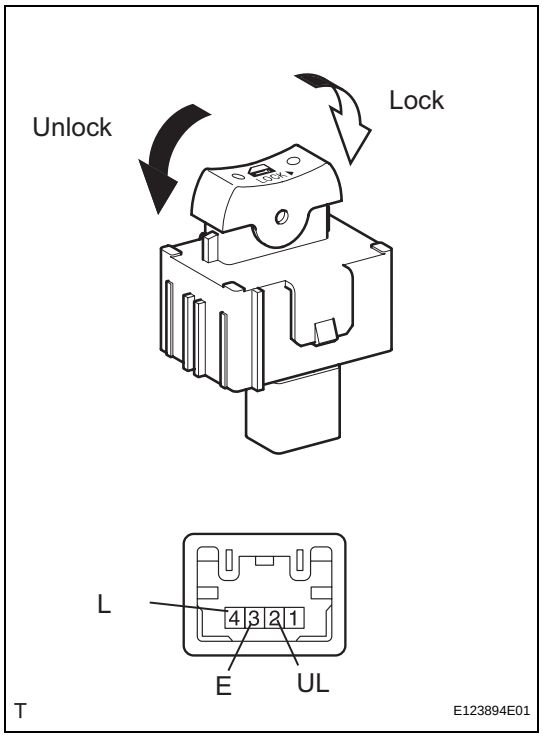
(a) Inspect driver side.
  (1) Remove the master switch.
  (2) Measure the resistance of the door control switch.
  Standard resistance

Tester Connection	Switch Condition	Specified Condition
2 - 1	Lock	Below 1 Ω
2 - 1	OFF (Free)	10 kΩ or higher
9 - 1	Unlock	Below 1 Ω
9 - 1	OFF (Free)	10 kΩ or higher

DL



(b) Inspect passenger side.
(1) Remove the door control switch assembly.
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
4 - 3	Lock	Below 1 Ω
4 - 3 2 - 3	OFF (Free)	10 kΩ or higher
2 - 3	Unlock	Below 1 Ω

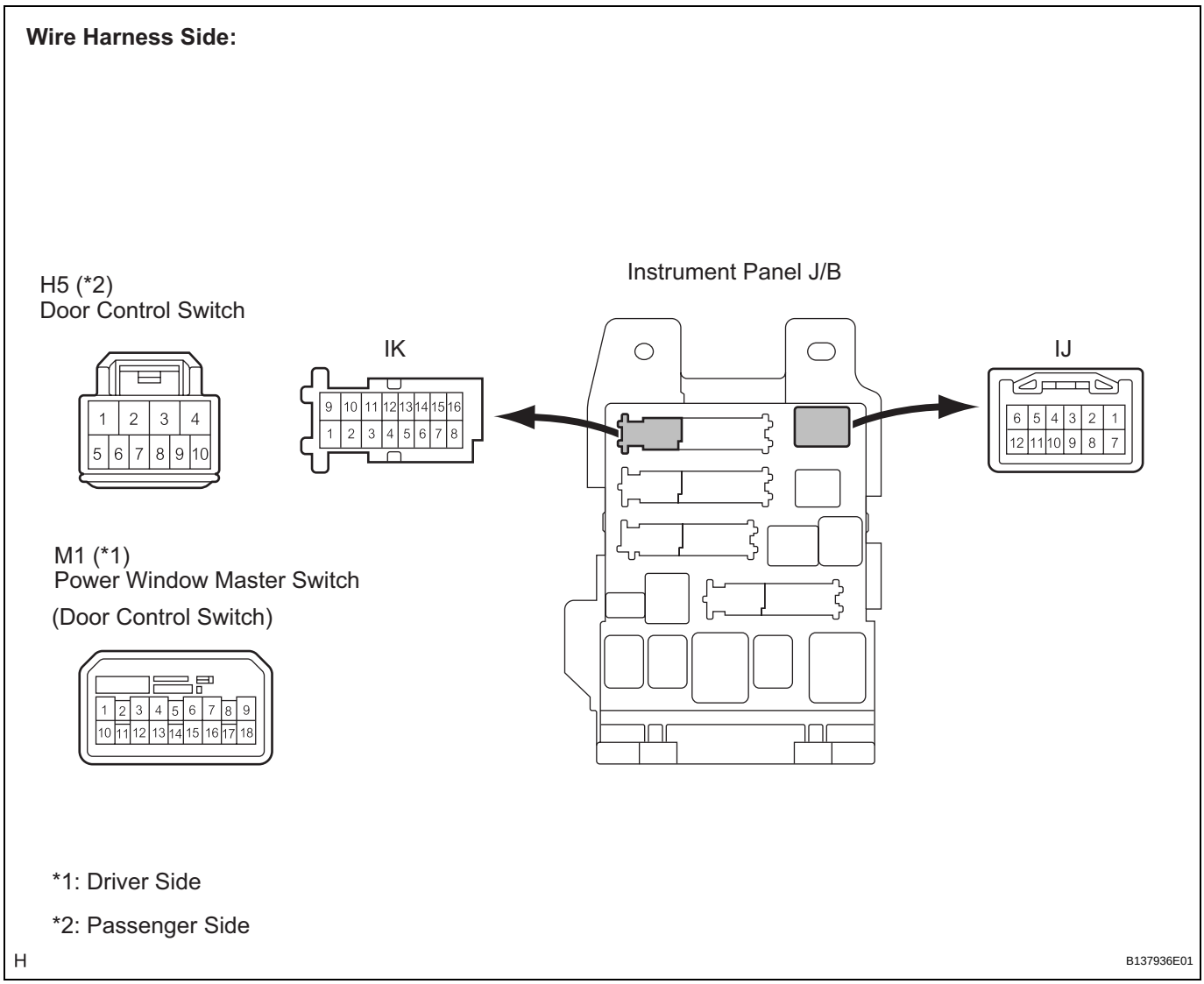
NG → **REPLACE DOOR CONTROL SWITCH OR MASTER SWITCH**

OK

2	**CHECK WIRE HARNESS (DOOR CONTROL SWITCH - MAIN BODY ECU (INSTRUMENT PANEL J/B))**

(a) Disconnect the door control switch connector.

DL



(b) Disconnect the ECU (instrument panel J/B) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
*1 M1-2 - IK-15	Always	Below 1 Ω
*1 M1-9 - IK-12	Always	Below 1 Ω
*1 M1-1 - Body ground	Always	Below 1 Ω
*1 IK-15 - Body ground	Always	10 kΩ or higher
*1 IK-12 - Body ground	Always	10 kΩ or higher
*2 H5-4 - IJ-3	Always	Below 1 Ω
*2 H5-2 - IJ-4	Always	Below 1 Ω
*2 H5-3 - Body ground	Always	Below 1 Ω
*2 IJ-3 - Body ground	Always	10 kΩ or higher
*2 IJ-4 - Body ground	Always	10 kΩ or higher

*1: Driver Side
*2: Passenger Side

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

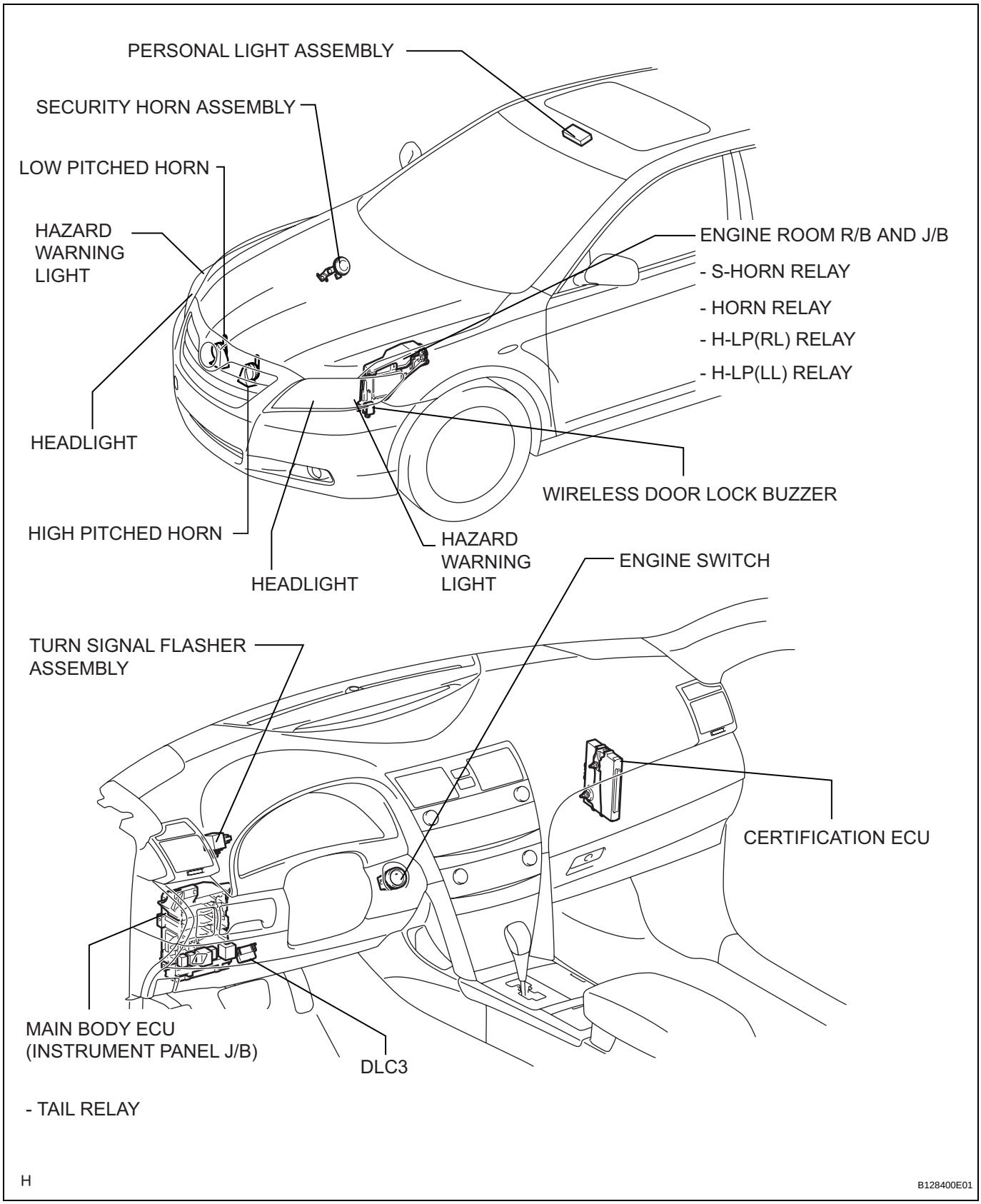
DL

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

WIRELESS DOOR LOCK CONTROL SYSTEM (w/ Smart Key System)

PARTS LOCATION



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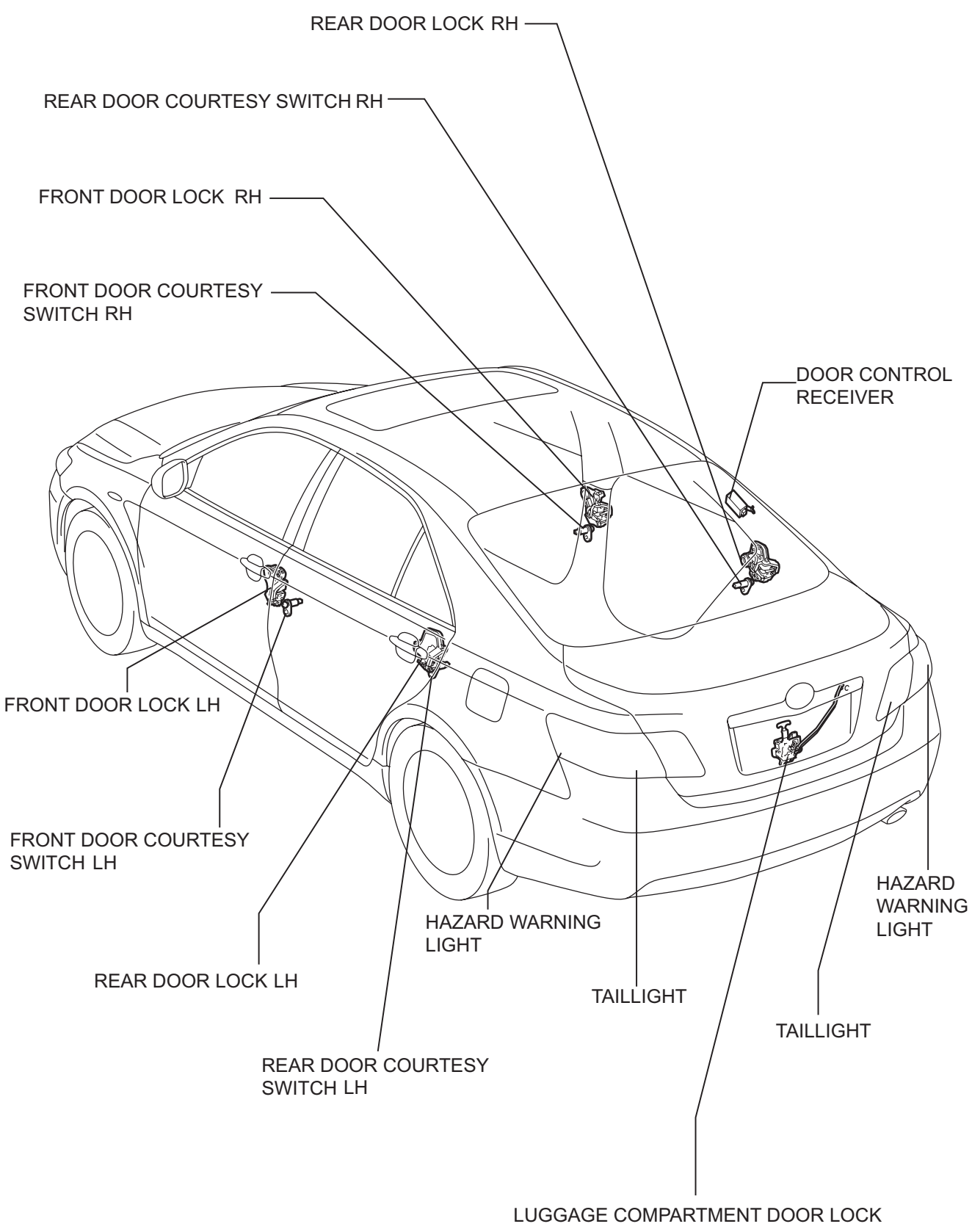

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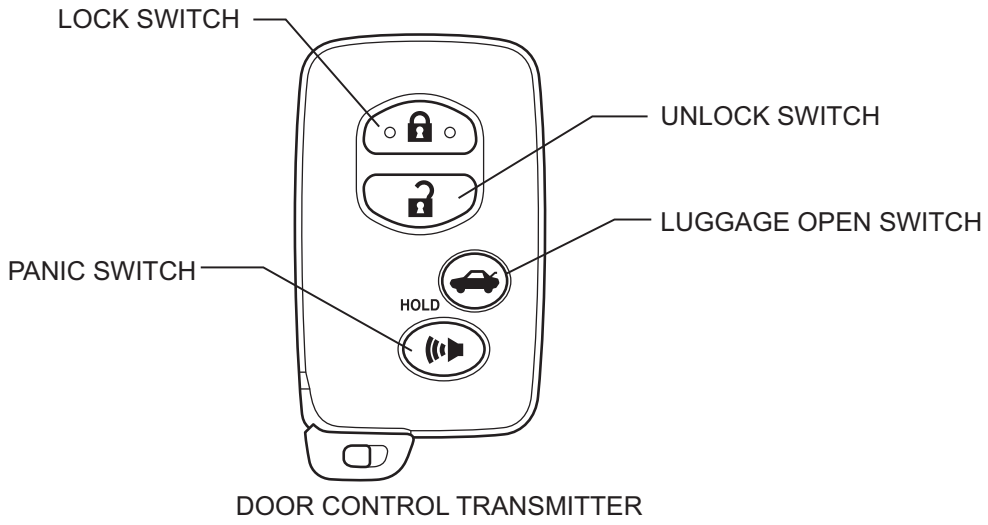

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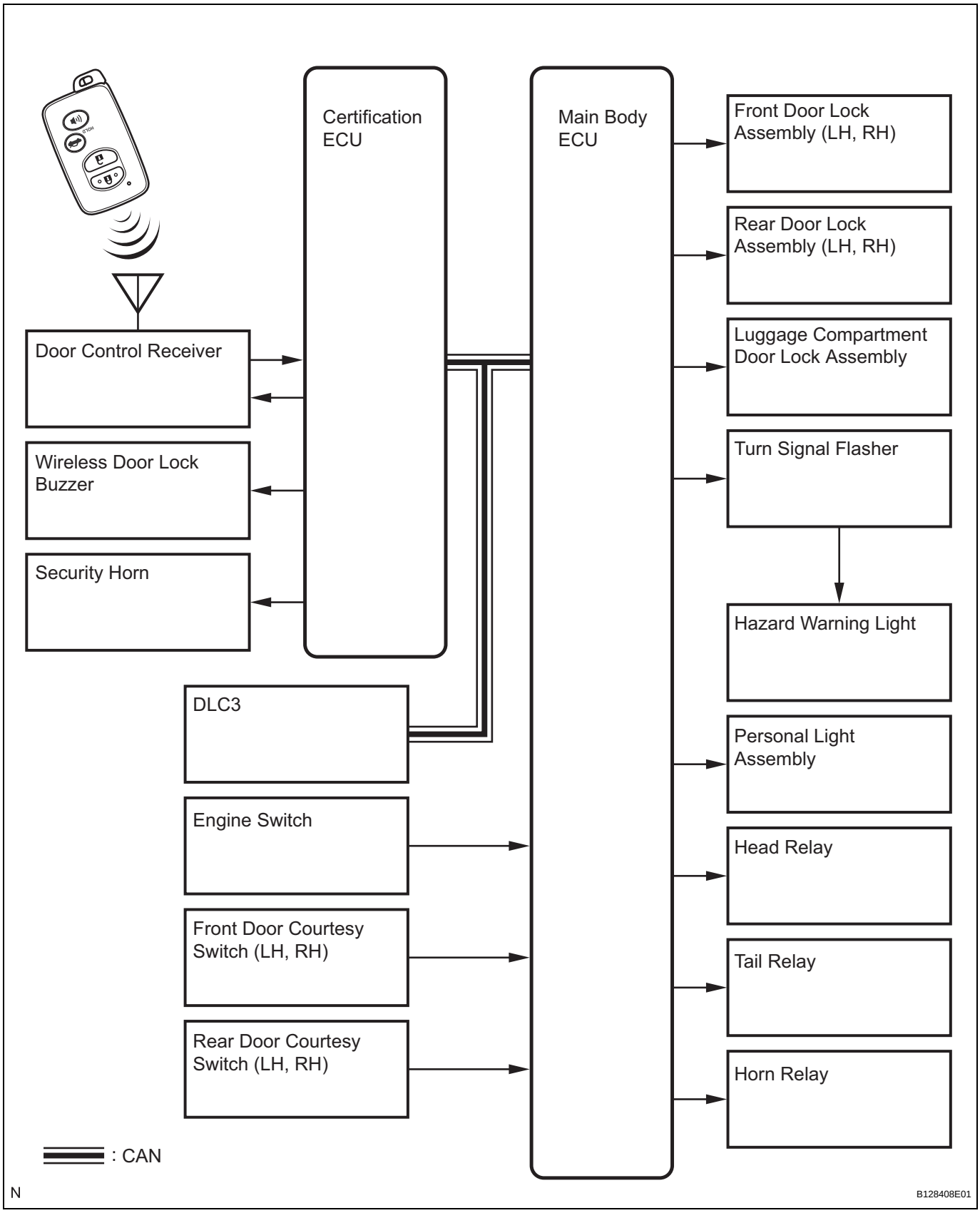
SYSTEM DIAGRAM



Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signal	Line
Certification ECU	Main body ECU	Wireless door lock signal	CAN

DL

SYSTEM DESCRIPTION

1. WIRELESS DOOR LOCK CONTROL SYSTEM

The wireless door lock control system functions to lock and unlock all the doors from a distance. The system is controlled by a hand-held transmitter which sends radio waves to the door control receiver. The certification ECU performs an ID code identification process and engages the door lock control.

2. FUNCTION OF MAIN COMPONENTS

Component	Function
Door control transmitter	• Has LOCK, UNLOCK, LUGGAGE OPEN, and PANIC switches. • Transmits weak radio waves (recognition codes and function codes) to the door control receiver.
Door control receiver	Receives weak radio waves from the door control transmitter and sends them to the certification ECU.
• Front door courtesy light switch • Rear door courtesy light switch • Luggage compartment door courtesy light switch	Turns on when a door is opened and turns off when it is closed. Outputs door status codes (open or closed) to the main body ECU.
Door lock position switch	Transmits the door lock positions of each door to the main body ECU.
Wireless door lock buzzer	Emits beep (answer back) when doors are locked or unlocked, or luggage compartment door is opened by wireless operation.
Certification ECU	Sends wireless door lock control signals in response to the code data from the door control receiver and signals from each ECU.

3. SYSTEM FUNCTION

The door control transmitter has the LOCK, UNLOCK, LUGGAGE OPEN, and PANIC switches. Operating these switches activates each function.

The wireless door lock control system has the following functions:

HINT:

The default settings of the following functions are ON. Part of these functions can be customized (See page DL-73).

Function	Operation
All door lock	Pressing the LOCK switch locks all doors.
All door unlock (2-step unlock)	Pressing the UNLOCK switch twice within 3 seconds unlocks all the doors after the driver's door is unlocked.
Automatic lock	If none of the doors is opened within 60 seconds after they are unlocked by the wireless door lock control, all the doors will lock again automatically.
Luggage compartment door open	Pressing the LUGGAGE OPEN switch of the transmitter opens the luggage compartment door.
Answer back	• When the doors are locked by wireless operation, the hazard warning lights flash once and the wireless door lock buzzer sounds once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice and the wireless door lock buzzer sounds twice. • When the luggage compartment door is opened by wireless operation, the wireless door lock buzzer sounds.
Panic alarm	Pressing the PANIC switch of the transmitter for longer than about 0.8 seconds causes the following alarms to activate: • Sounds the horn and security horn. • Flashes the hazard lights, headlights, and taillights. • Illuminates the front interior light (when the switch is in the DOOR position). While the panic alarm is operating, pressing any switch of the transmitter cancels the alarm operation.

Function	Operation
Door ajar warning	The buzzer sounds when LOCK is pressed when any of the doors are ajar. When all the doors are closed or when UNLOCK is pressed, the buzzer will stop after it sounds for 10 seconds continuously.
Illuminated Entry	When all the doors are locked, pressing the UNLOCK switch causes the interior light to come on simultaneously with the unlock operation.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The wireless door lock control system troubleshooting procedures are based on the premise that the power door lock control system is operating normally. Check the power door lock control system first before troubleshooting the wireless door lock control system.
Use this procedure to troubleshoot the wireless door lock control system.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble (See page IN-45).

NEXT

3	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) If no code is output, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) If any code is output, proceed to B.

B → Go To CAN COMMUNICATION SECTION

A

4	DTC CHECK

(a) Check for a DTC and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original symptom that the DTC suggests.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC reoccurs, proceed to B.

B → Go To DTC chart

A

5	**SYMPTOM SIMULATION**

NEXT

6	**PROBLEM SYMPTOMS TABLE**

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → **Go to step 7**

A

7	**PERFORM TROUBLESHOOTING ACCORDING TO MALFUNCTION SYMPTOM**

(a) Terminals of ECU (See page DL-106)
(b) DATA LIST/ACTIVE TEST (See page DL-81)

NEXT

8	**ADJUST, REPAIR OR REPLACE**

NEXT

9	**CONFIRMATION TEST**

NEXT

END

OPERATION CHECK

1. FUNCTIONS AND OPERATING CONDITIONS

(a) The wireless door LOCK/UNLOCK function:
This wireless door lock control function operates only when the following 4 conditions are met:
(1) There is no wireless transmitter in the cabin.
(2) All the doors are closed.
(3) The power door lock system is functioning normally.
(4) The function is not disabled by customization.
HINT:
The UNLOCK function operates even when any of the doors are open.

(b) The wireless transmitter operational range differs depending on the situation.
(1) The operational range differs depending on the user, the way the transmitter is held, and the location.
(2) In certain areas, the operational range will be reduced due to the vehicle body shape and the influence of the surrounding environment.
(3) Since the transmitter uses weak radio waves, the operational range may be reduced or the transmitter may not function if interference or stronger radio waves occur in the area where the transmitter is used.
(4) When the battery is low, the operational range is reduced and/or the transmitter may not function.
HINT:
If the transmitter has been left in a place that is exposed to direct sunlight, such as on the instrument panel, the battery may be weakened or other problems may occur.

2. CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS

HINT:
- The switches built into the door control transmitter send radio waves to the door lock control receiver.
- The operational range must be taken into account during checks.

(a) Establish conditions that allow the wireless control function to be operated successfully.
(b) Check these basic functions.
(1) Check that all the doors lock when the LOCK switch is pressed.
(2) Check that the driver's door unlocks when the UNLOCK switch is pressed once, and all doors unlock when pressed twice within 3 seconds.
(c) Check the automatic lock function.
(1) Check that if the driver's door or all doors are unlocked with the UNLOCK switch and none of the doors are opened or locked within approximately 60 seconds, the doors automatically re-lock.

(2) Check that if the driver's door or all doors are unlocked with the UNLOCK switch and a door is opened or locked within approximately 60 seconds, the automatic lock function does not operate.

(d) Check the interior light ON function.
HINT:
Turn the interior light switch to the DOOR position before the check.
(1) Check that the interior light comes on simultaneously with the unlocking operation when the UNLOCK switch has been pressed.
(2) Check that the interior light goes off in approximately 15 seconds if none of the doors is opened after the unlocking operation.

(e) Check the answer back function.
(1) When the doors are locked by wireless operation, the hazard warning lights flash once and the wireless door lock buzzer sounds once.
(2) When the doors are unlocked by wireless operation, the hazard warning lights flash twice and the wireless door lock buzzer sounds twice.
(3) When the luggage compartment door is opened by wireless operation, the wireless door lock buzzer sounds.

(f) Check the switch operation fail-safe function.
(1) Check that the doors cannot be locked by operating a switch while the wireless transmitter is in the cabin.
(2) Check that the doors cannot be locked or unlocked by operating a switch on the unregistered transmitter, and that the doors are locked and unlocked by operating a switch on the registered transmitter.

(g) Check the chattering prevention function.
(1) Check that the corresponding operation occurs only once, and does not repeat itself while the switch is kept pressed. Check that the corresponding operation is carried out when the switch is operated repeatedly at 1-second intervals.

(h) Check the luggage compartment door opener function.
(1) Check that the luggage compartment door opens when the LUGGAGE OPEN switch is held down for 0.6 seconds or more.

(i) Check the door ajar warning function.
(1) Check that the wireless door lock buzzer sounds for approximately 10 seconds when the LOCK switch is pressed with any of the doors ajar or open.

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.
NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

WIRELESS DOOR LOCK CONTROL SYSTEM

Display (item)	Default	Function	Setting
WIRELESS OPER (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF	ON/OFF
HAZARD ANS BACK (Hazard answer-back for wireless door lock control)	ON	• When the doors are locked by wireless operation, the hazard warning lights flash once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice.	ON/OFF
OPEN DOOR WARN (Door ajar warning)	ON	The buzzer sounds when LOCK is pressed when any of the doors are ajar.	ON/OFF
AUTO LOCK DELAY (Auto lock time)	60 s	This function regulates the interval between unlocking and automatic relocking of doors.	30 s/60 s
UNLOCK /2OPER (Wireless unlock operated twice)	ON	This function unlocks the driver's door when the UNLOCK switch is pressed once, and unlocks all doors when pressed twice within 3 seconds. If set to OFF, pressing UNLOCK once unlocks all doors.	ON/OFF
ALARM FUNCTION (Panic function)	ON	This function operates the theft deterrent system when PANIC is pressed and held for 0.8 seconds.	ON/OFF
WIRLS BUZZ RESP (Wireless buzzer answer-back)	ON	Wireless door lock buzzer response/ON or OFF	ON/OFF
TRUNK LID OPER (Wireless trunk opener function setting)	0.6 s PR ON	This function changes operation method of transmitter to open luggage compartment door. 1 TIME: Push 1 time 2 TIMES: Push 2 times 0.6 s PR: Push 0.6 seconds OFF: Does not operate	1 TIME/2 TIMES/0.6 s PR/ OFF

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check, but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

- The following is the troubleshooting procedure for the wireless door lock control of a vehicle without the smart key system.
- For the troubleshooting procedure for the wireless door lock control of a vehicle with the smart key system, refer to the wireless door lock control system (without Smart Key System).
- Inspect the fuse and relay before investigating the suspected areas shown in the table below.
- Inspect each malfunction circuit in numerical order for its corresponding symptom.

WIRELESS DOOR LOCK CONTROL SYSTEM:

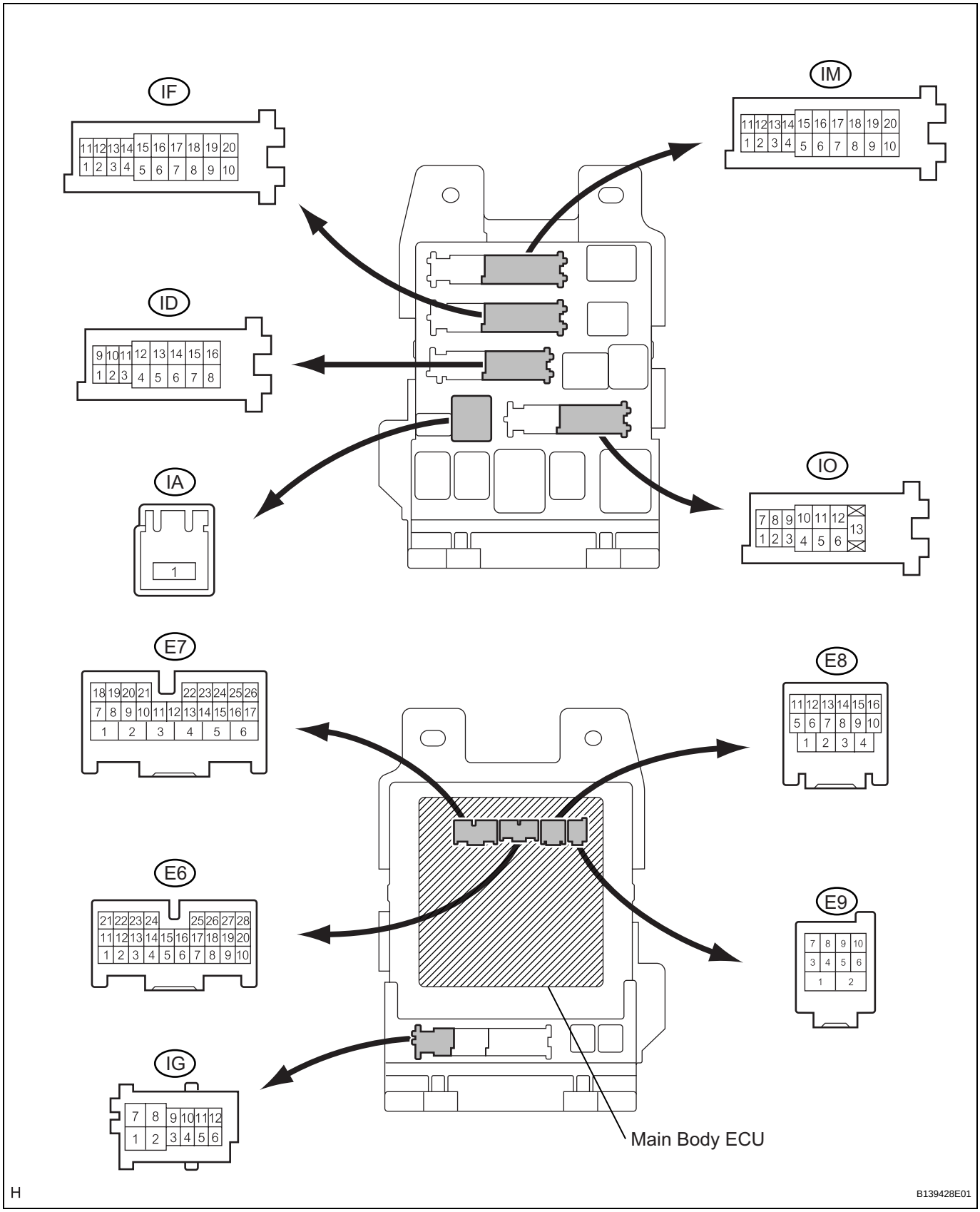
Symptom	Suspected area	See page
The wireless door lock control system does not operate.	1. Perform the operation check	DL-71
	2. Check if the CAN communication DTC is output	CA-31
	3. Door control transmitter	DL-210
	4. Door courtesy light switch circuit	LI-52
	5. Luggage compartment door courtesy light switch	DL-44
	6. Power source circuit	DL-89
	7. Replace door control receiver	-
	8. Replace certification ECU	-
	9. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The automatic lock function does not operate normally.	1. Perform the operation check	DL-71
	2. Door courtesy light switch circuit	LI-52
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The illuminated entry function only does not operate.	1. Perform the operation check	DL-71
	2. Lighting system	LI-12
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The answer back function does not operate (Wireless door lock buzzer).	1. Perform the operation check	DL-71
	2. Wireless door lock buzzer circuit	DL-86
	3. Replace certification ECU	-
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The answer back function does not operate (Hazard warning light).	1. Perform the operation check	DL-71
	2. Wire harness	-
	3. Turn signal flasher	LI-138
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

Symptom	Suspected area	See page
The door ajar warning function only does not operate.	1. Perform the operation check	DL-71
	2. Door courtesy switch circuit	LI-52
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function only does not operate.	1. Perform the operation check	DL-71
	2. Door control transmitter	DL-210
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function does not operate (Vehicle horn).	1. Perform the operation check	DL-71
	2. Horn circuit	TD-25
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function does not operate (Security horn).	1. Perform the operation check	DL-71
	2. Security horn circuit	TD-27
	3. Replace certification ECU	-
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function does not operate (Hazard warning light).	1. Perform the operation check	DL-71
	2. Wire harness	-
	3. Turn signal flasher	LI-138
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
The panic alarm function does not operate (Headlight or taillight).	1. Perform the operation check	DL-71
	2. Lighting system	LI-12
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the main body ECU (instrument panel J/B) connectors.



DL

(b) Measure the resistance and voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RCTY (E6-7) - Body ground	GR - Body ground	Rear courtesy light switch RH input	Rear door RH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
PCTY (E6-21) - Body ground	Y - Body ground	Passenger side courtesy light switch input	Passenger side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
LGCY (E6-25) - Body ground	W - Body ground	Luggage compartment door courtesy light switch input	Luggage compartment door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
DCTY (E7-24) - Body ground	L - Body ground	Driver side door courtesy light switch input	Driver side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
ACC (IA-1) - Body ground	B - Body ground	Ignition power supply (ACC signal)	Engine switch on (ACC) → off	10 to 14 V → Below 1 V
IG (IA-1) - Body ground	B - Body ground	Ignition power supply (IG signal)	Engine switch on (IG) → off	10 to 14 V → Below 1 V
BATB (IA-1) - Body ground	B - Body ground	+B (power battery system) power supply	Always	10 to 14 V
ALTB (ID-16) - Body ground	W - Body ground	+B (power system alternator system) power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LCTY (IO-7) - Body ground	LG - Body ground	Rear courtesy light switch LH input	Rear door LH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the main body (instrument panel J/B) connectors.

(d) Measure the voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TR+ (E7-1) - Body ground	B - Body ground	Luggage compartment door opener motor input	Luggage compartment door CLOSED (LOCKED) → OPEN (UNLOCKED)	Below 1 V → 10 to 14 V*1
HAZ (E8-4) - Body ground	W - Body ground	Turn signal flasher relay signal	Any transmitter switch is pressed → not pressed	Below 1 V → 10 to 14 V*2

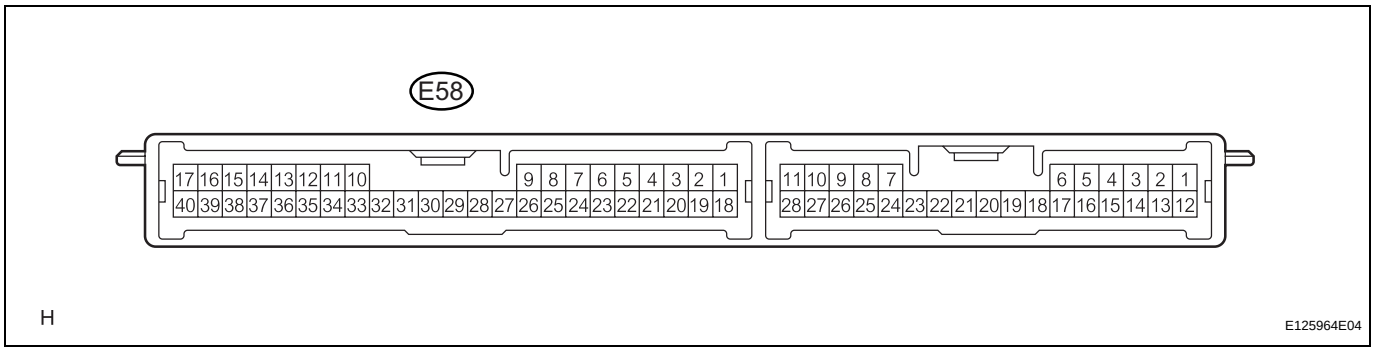
HINT:

- *1: When operating the motor.
- *2: When operating the answer back function.

DL

2. CHECK CERTIFICATION ECU ASSEMBLY

(a) Disconnect the E58 ECU connector.



(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - E (E58-17)	W - W-B	Battery power supply	Always	10 to 14 V
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
IG (E58-18) - E (E58-17)	LG - W-B	IG power supply	Engine switch on (IG)	10 to 14 V
IG (E58-18) - E (E58-17)	LG - W-B	IG power supply	Engine switch off	Below 1 V

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the E58 ECU connector.

(d) Measure the voltage of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BZR (E58-21) - Body ground	O - Body ground	Wireless door lock buzzer	Wireless door lock buzzer OFF → ON	0 V → Pulse generation
RC0 (E58-29) - E (E58-17)	G - W-B	Door control receiver power supply	Engine switch off, all doors closed and transmitter switch not pressed	Below 1 V
RC0 (E58-29) - E (E58-17)	G - W-B	Door control receiver power supply	Engine switch off, all doors closed and transmitter switch pressed	4.6 to 5.4 V
RDA (E58-38) - E (E58-17)	Y - W-B	Door control receiver output signal	Engine switch off, all doors closed and transmitter switch not pressed	10 to 14 V
RDA (E58-38) - E (E58-17)	Y - W-B	Door control receiver output signal	Engine switch off, all doors closed and transmitter switch pressed	Pulse generation

If the result is not as specified, the ECU may have a malfunction.

DIAGNOSIS SYSTEM

1. DESCRIPTION

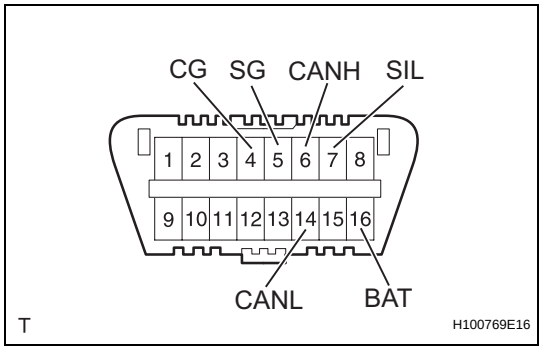
The main body ECU stores trouble codes when trouble occurs on the vehicle.

The diagnostic system allows for reading of the trouble codes from the DLC3.

Use the intelligent tester to check and solve the problem.

2. CHECK DLC3

(a) The main body ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

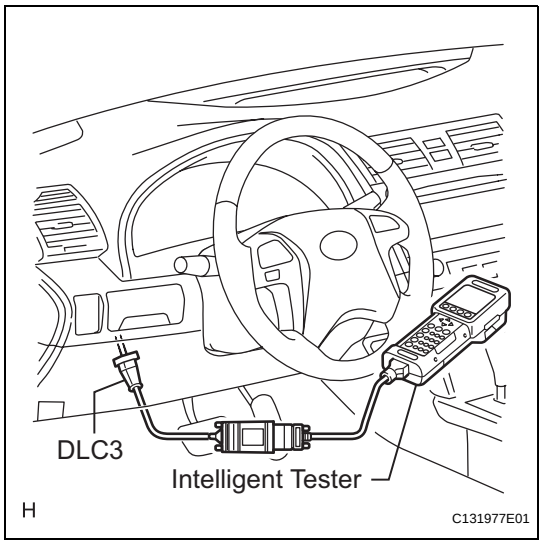


Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine switch off*	54 to 67 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine switch off*	6 kΩ or higher

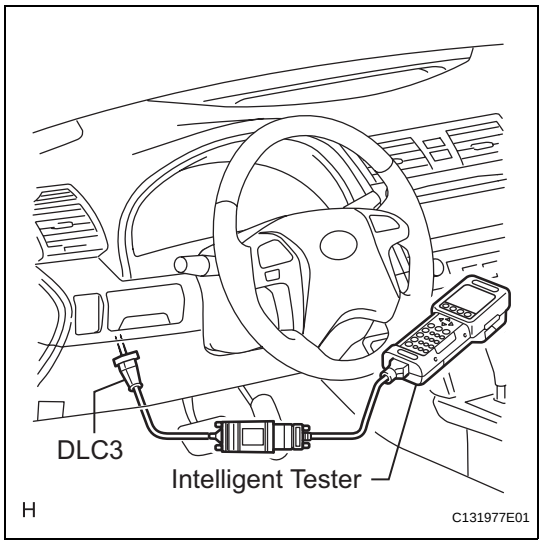
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the engine switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle or in the tester.
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
(d) Erase the DTC by following the directions on the tester screen.

HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / BODY or SMART / DATA LIST.
(d) Read the DATA LIST according to the display on the tester.

MAIN BODY (Main body ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
WIRELESS OPER	Wireless door lock control function / ON or OFF	ON: Operating OFF: Not operating	-
HAZARD ANS BACK	Hazard answer-back of wireless / ON or OFF	ON: Operating OFF: Not operating	-
OPEN DOOR WARN	Open door warning / ON or OFF	ON: Operating OFF: Not operating	-
AUTO LOCK DELAY	Automatic lock time / 60 s or 30 s	60 s: 60 seconds 30 s: 30 seconds	-
UNLOCK /2OPER	2 times operation of wireless unlock / ON or OFF	ON: All doors unlock when UNLOCK is pressed twice OFF: All doors unlock when UNLOCK is pressed once	-
WIRLS BUZZ RESP	Wireless door lock buzzer response / ON or OFF	ON: Operating OFF: Not operating	-
TRUNK LID OPER	Luggage compartment door open function type / 1 TIME/2 TIME/ 0.6 s PR/ OFF	1 TIME: Luggage compartment door opens when LUGGAGE OPEN switch is pressed once 2 TIME: Luggage compartment door opens when LUGGAGE OPEN switch is pressed twice 0.6 s PR: Luggage compartment door opens when LUGGAGE OPEN switch is pressed and held down for 0.6 seconds. OFF: Not operating	-

SMART (Certification ECU):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
ALARM FUNCTION	Panic function / ON or OFF	ON: Operating OFF: Not operating	-

2. ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten the labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / BODY or SMART / ACTIVE TEST.

(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY (Main body ECU):

Item	Tester Detail	Diagnostic Note
HAZARD	Turns the turn signal flasher relay ON / OFF	Observe headlight and rear combination light for correct operation
VEHICLE HORN	Vehicle horn ON / OFF	-
TRUNK/BDOR OPEN	Turns luggage compartment door opener motor ON / OFF	Observe luggage compartment door

SMART (Certification ECU):

Item	Tester Detail	Diagnostic Note
WIRELESS BUZZER	Wireless door lock buzzer ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a trouble code is indicated during the DTC check, check the circuit listed for that code in the table below. Then proceed to the appropriate page.

WIRELESS DOOR LOCK CONTROL SYSTEM:

DTC No.	Detection Item	Trouble Area	See page
B1242	Wireless Door Lock Tuner Circuit Malfunction	1. Door control receiver 2. Wire harness 3. Certification ECU	DL-83

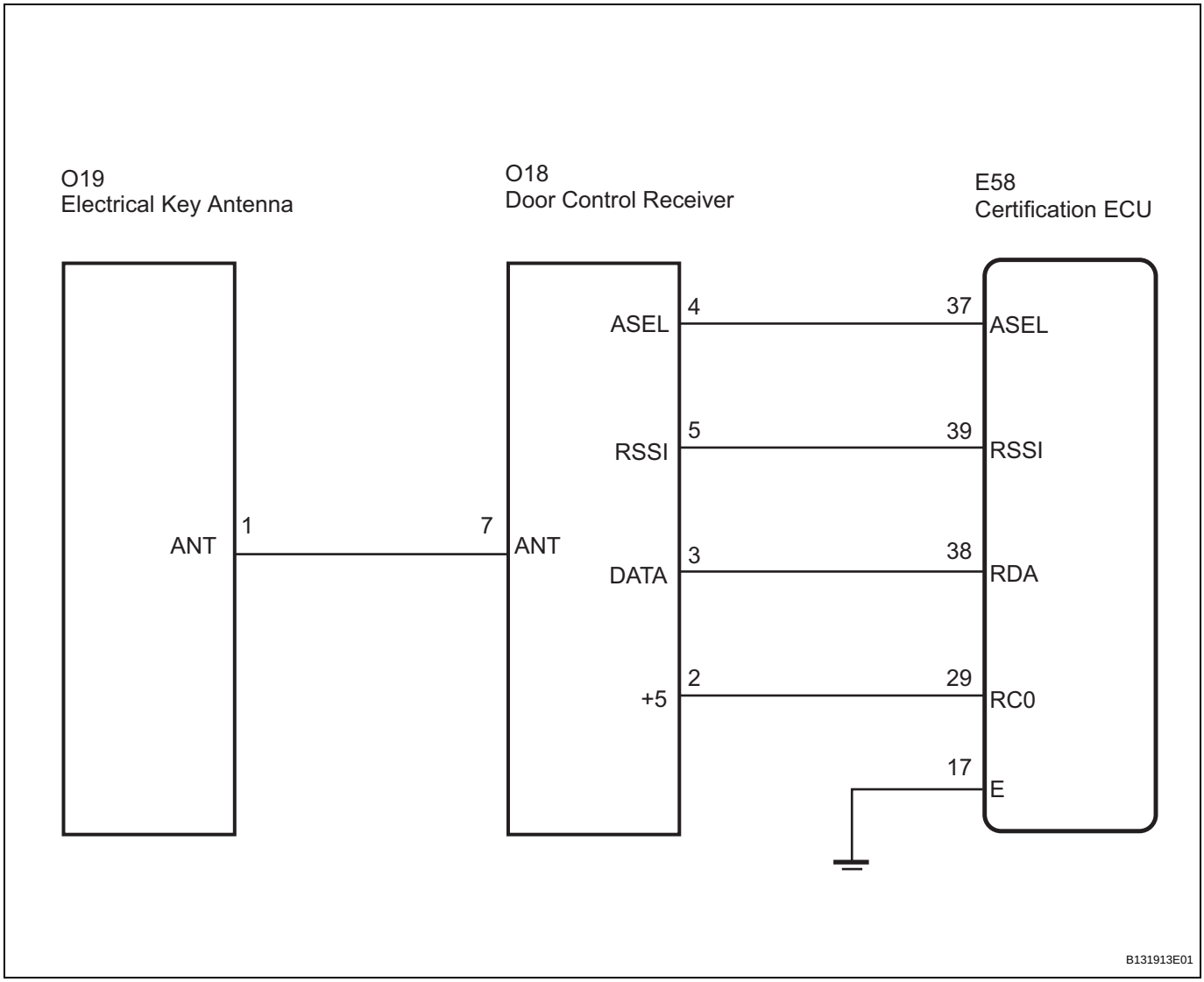
DTC	B1242	Wireless Door Lock Tuner Circuit Malfunction

DESCRIPTION

- The electrical key antenna is used to receive electric waves relating to the entry functions of the smart access system with push-button start. The certification ECU decodes the requested smart access system with push-button start operation by identifying a key code based on electric waves received via the electrical key antenna and the door control receiver.
- The door control receiver receives a signal from the wireless door control transmitter and sends signals to the main body ECU through the certification ECU.
- The certification ECU then sends a command, according to the requested operation, to each ECU. (e.g. If door lock operation is requested, the ECU sends a door lock command to the main body ECU.)

DTC No.	DTC Detection Condition	Trouble Area
B1242	The certification ECU detects that there is a short in the circuit between terminals RSSI, or between terminals DATA and RDA.	• Door Control Receiver • Wire harness • Certification ECU

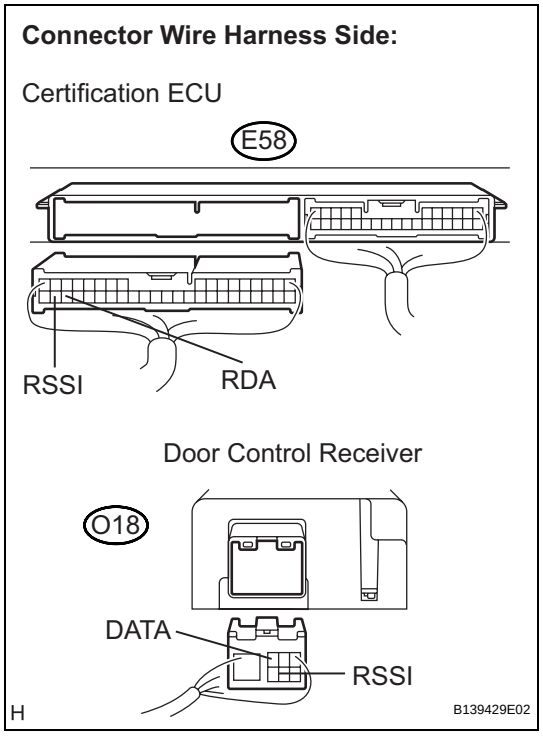
WIRING DIAGRAM



DL

INSPECTION PROCEDURE

1 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - DOOR CONTROL RECEIVER)



(a) Disconnect the E58 certification ECU connector and O18 door control receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

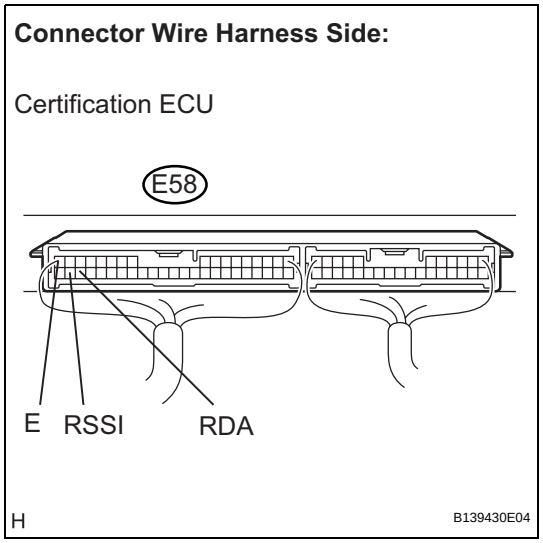
Standard resistance

Symbol (Tester Connection)	Condition	Specified Condition
RSSI (E58-39) - RSSI (O18-5)	Always	Below 1 Ω
RDA (E58-38) - DATA (O18-3)	Always	Below 1 Ω
RSSI (E58-39) - RDA (E58-38)	Always	10 kΩ or higher
RSSI (E58-39) - Body ground	Always	10 kΩ or higher
RDA (E58-38) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2 INSPECT CERTIFICATION ECU



(a) Reconnect the E58 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbol (Tester Connection)	Condition	Specified Condition
RSSI (E58-39) - E (E58-17)	Engine switch OFF, all doors closed, the electrical key is not in the actuation area	Below 1 V
	Engine switch OFF, all doors closed, the electrical key is in the actuation area	4.6 to 5.4 V
RDA (E58-38) - E (E58-17)	Engine switch OFF, all doors closed and transmitter switch not pressed	Below 1 V
	Engine switch OFF, all doors closed and transmitter switch pressed	4.6 to 5.4 V

NG → REPLACE CERTIFICATION ECU

DL

OK

3	**REPLACE DOOR CONTROL RECEIVER**

(a) Replace the door control receiver with a normal one.
(b) Perform the registration procedure.
OK:
The system returns to normal operation.

NG → **REPLACE CERTIFICATION ECU**

OK

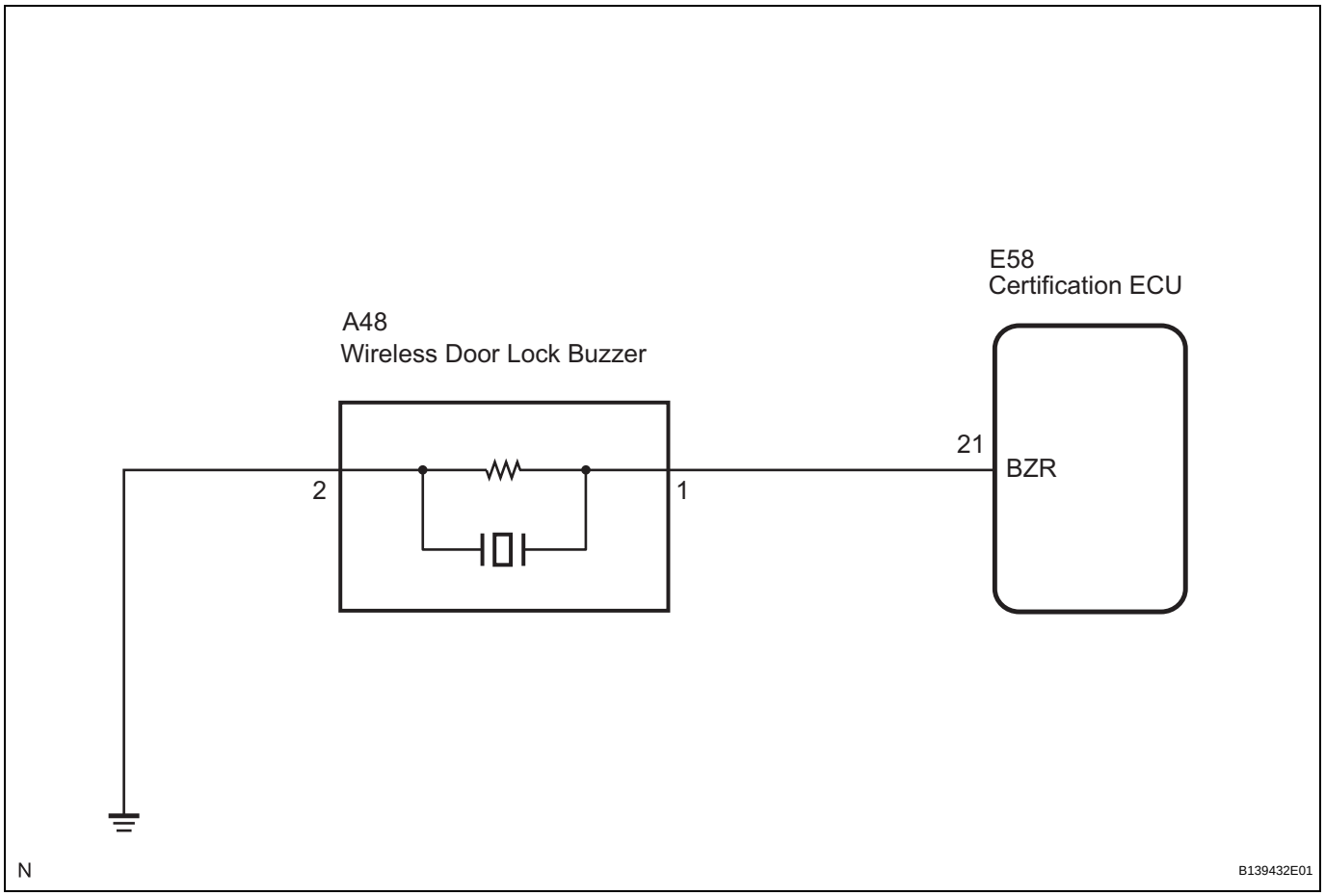
END

Wireless Door Lock Buzzer Circuit

DESCRIPTION

The certification ECU activates the wireless door lock buzzer when detecting a lock/unlock signal from the door control transmitter.

WIRING DIAGRAM

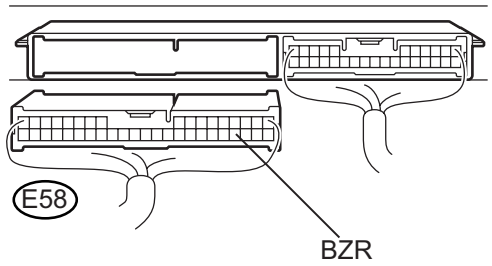


DL

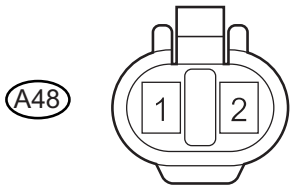
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - WIRELESS DOOR LOCK BUZZER - BODY GROUND)

Connector Wire Harness View:



Wire Harness Side Connector Front View:



H B139431E01

(a) Disconnect the E58 certification ECU connector and A48 wireless door lock buzzer connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

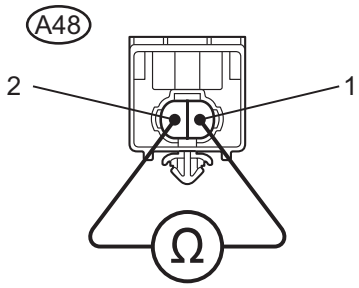
Symbol (Tester Connection)	Condition	Specified Condition
BZR (E58-21) - A48-1	Always	Below 1 Ω
BZR (E58-21) - Body ground	Always	10 kΩ or higher
A48-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT WIRELESS DOOR LOCK BUZZER

Wireless Door Lock Buzzer:



N B144393E01

(a) Measure the resistance according to the value(s) in the table below.
HINT:
The buzzer activation circuit is built into the ECU, not into the buzzer itself. When battery voltage is applied directly to the buzzer, the buzzer will not sound.

Standard resistance

Tester Connection	Condition	Specified Condition
A48-1 - A48-2	Always	Approx. 1 kΩ

NG → **REPLACE WIRELESS DOOR LOCK BUZZER**

DL

OK

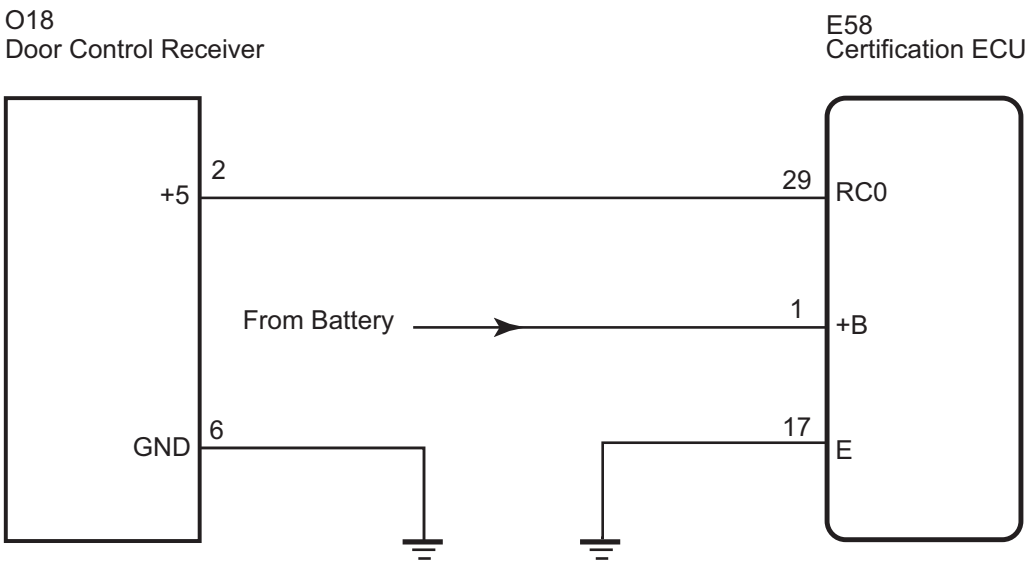
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Power Source Circuit

DESCRIPTION

The certification ECU provides power for the door control receiver operation.

WIRING DIAGRAM

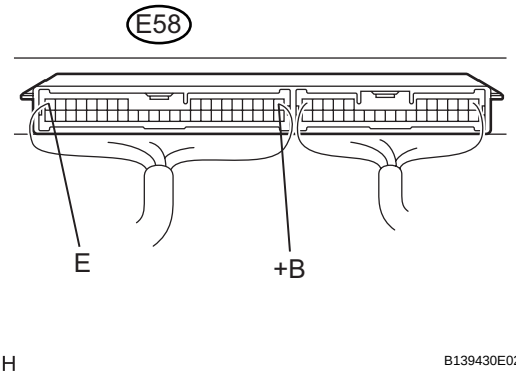


INSPECTION PROCEDURE

1	INSPECT CERTIFICATION ECU (+B TERMINAL)

Connector Wire Harness View:

Certification ECU



(a) Measure the voltage according to value(s) in the table below.

Standard voltage

Symbol (Tester Connection)	Condition	Specified Condition
+B (E58-1) - E (E58-17)	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

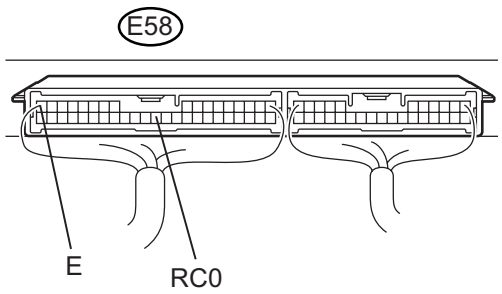
OK

DL

2 INSPECT CERTIFICATION ECU (RC0 TERMINAL)

Connector Wire Harness View:

Certification ECU



H B139430E03

(a) Measure the voltage according to value(s) in the table below.

Standard voltage

Symbol (Tester Connection)	Condition	Specified Condition
RC0 (E58-29) - E (E58-17)	Engine switch off, all doors closed and transmitter switch not pressed	Below 1 V
	Engine switch off, all doors closed and transmitter switch pressed	4.6 to 5.4 V

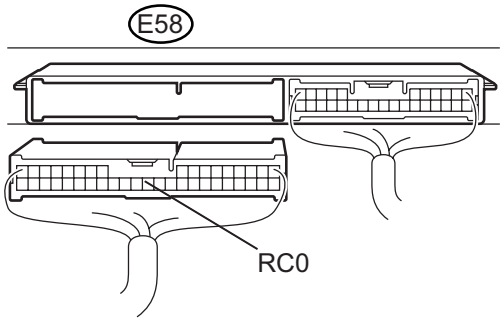
OK → **Go to step 4**

NG

3 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BATTERY - BODY GROUND)

Connector Wire Harness Side:

Certification ECU



H E125974E10

(a) Disconnect the E58 certification ECU connector.
(b) Measure the voltage and resistance according to value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Condition	Specified Condition
RC0 (E58-29) - Body ground	Always	Below 1 V
	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

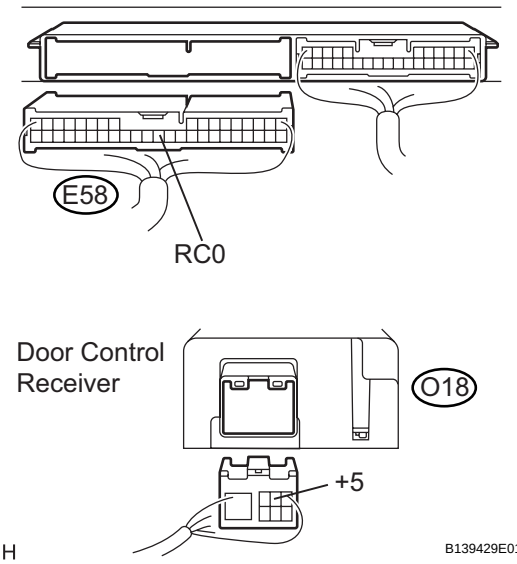
OK

REPLACE CERTIFICATION ECU

DL

4	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - DOOR CONTROL RECEIVER)

Connector Wire Harness View:



(a) Disconnect the O18 door control receiver connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

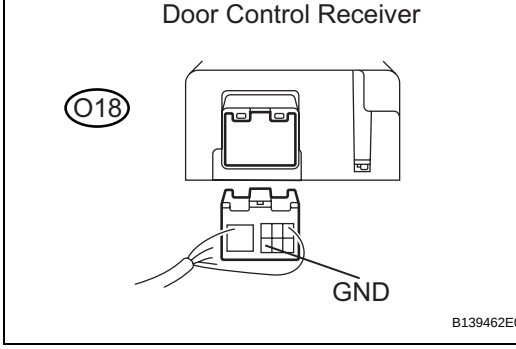
Symbol (Tester Connection)	Condition	Specified Condition
RC0 (E58-29) - +5 (O18-2)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	CHECK HARNESS AND CONNECTOR (BODY GROUND)

Connector Wire Harness View:



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Condition	Specified Condition
GND (O18-6) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

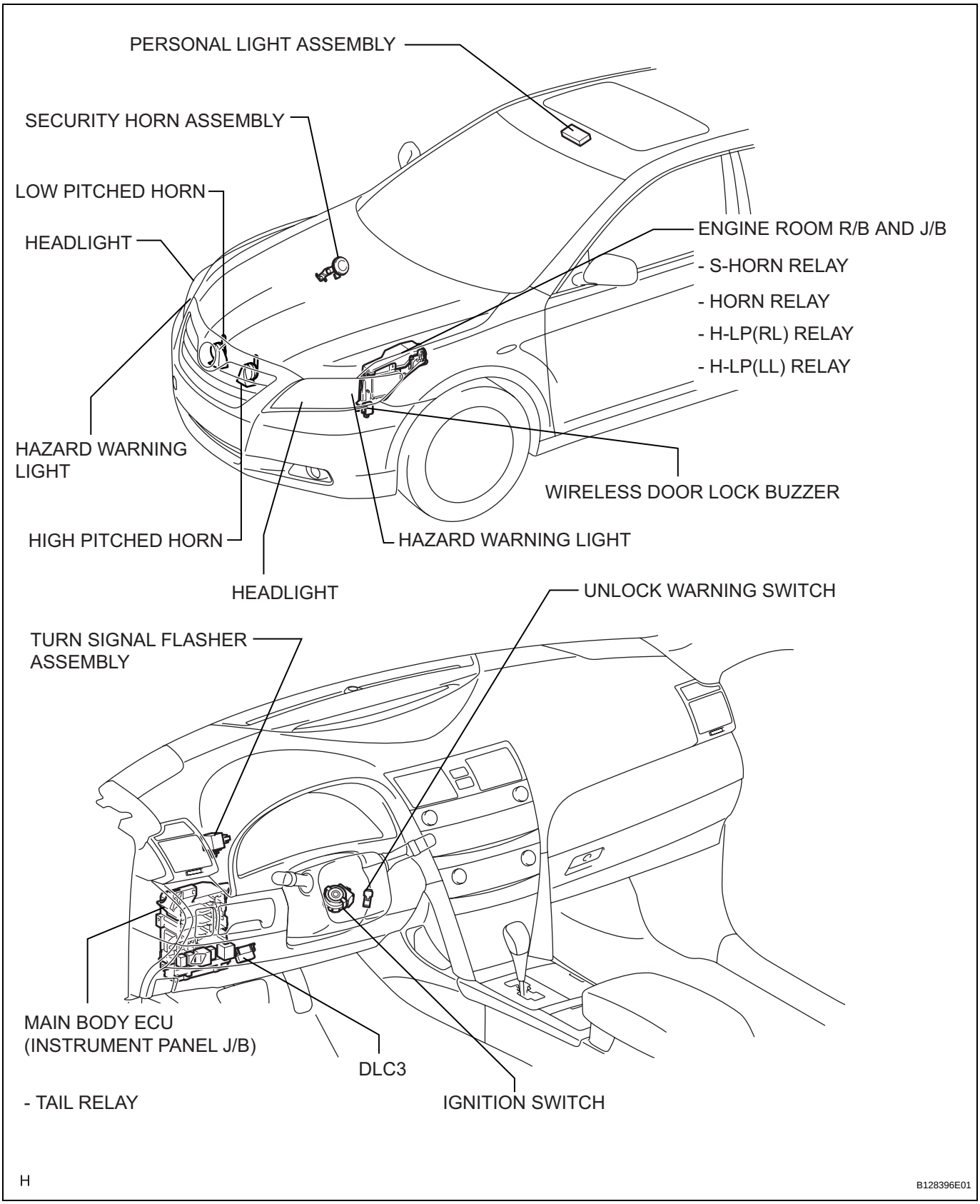
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

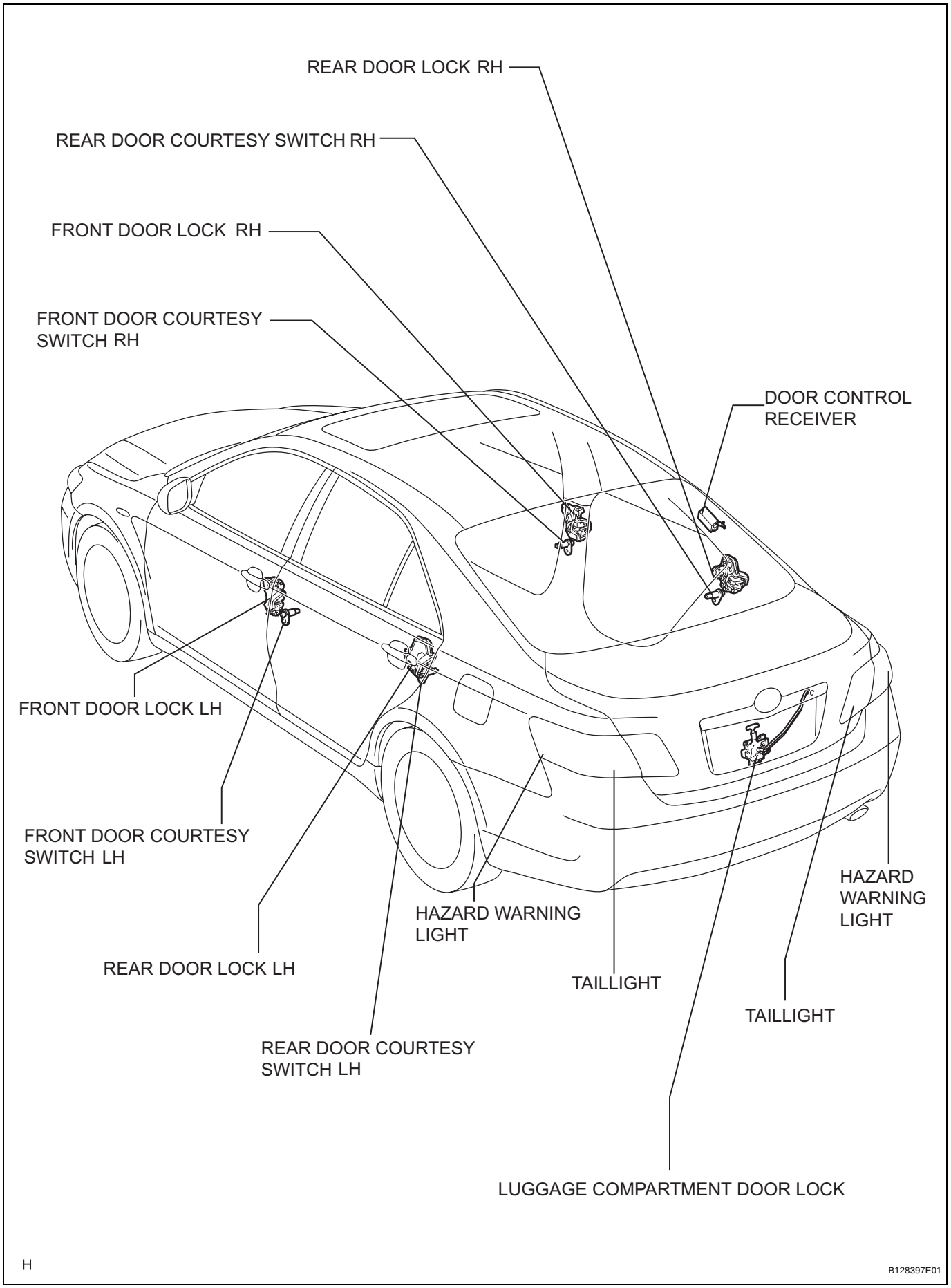
DL

WIRELESS DOOR LOCK CONTROL SYSTEM (w/o Smart Key System)

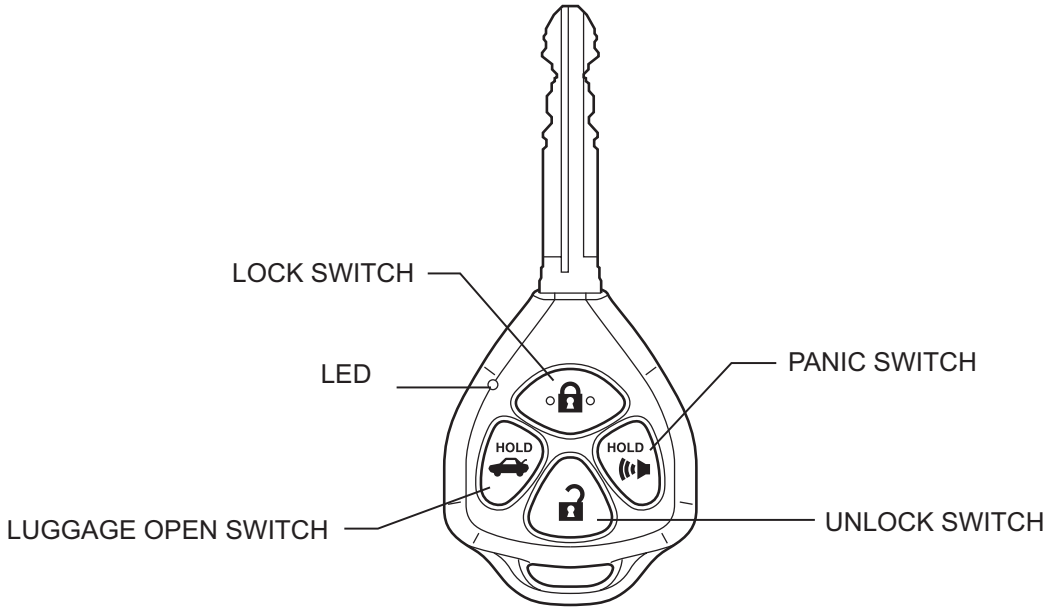
PARTS LOCATION



DL


REAR DOOR LOCK RH
REAR DOOR COURTESY SWITCH RH
FRONT DOOR LOCK RH
FRONT DOOR COURTESY SWITCH RH
DOOR CONTROL RECEIVER
FRONT DOOR LOCK LH
FRONT DOOR COURTESY SWITCH LH
HAZARD WARNING LIGHT
HAZARD WARNING LIGHT
REAR DOOR LOCK LH
TAILLIGHT
TAILLIGHT
REAR DOOR COURTESY SWITCH LH
LUGGAGE COMPARTMENT DOOR LOCK
H
B128397E01

DL

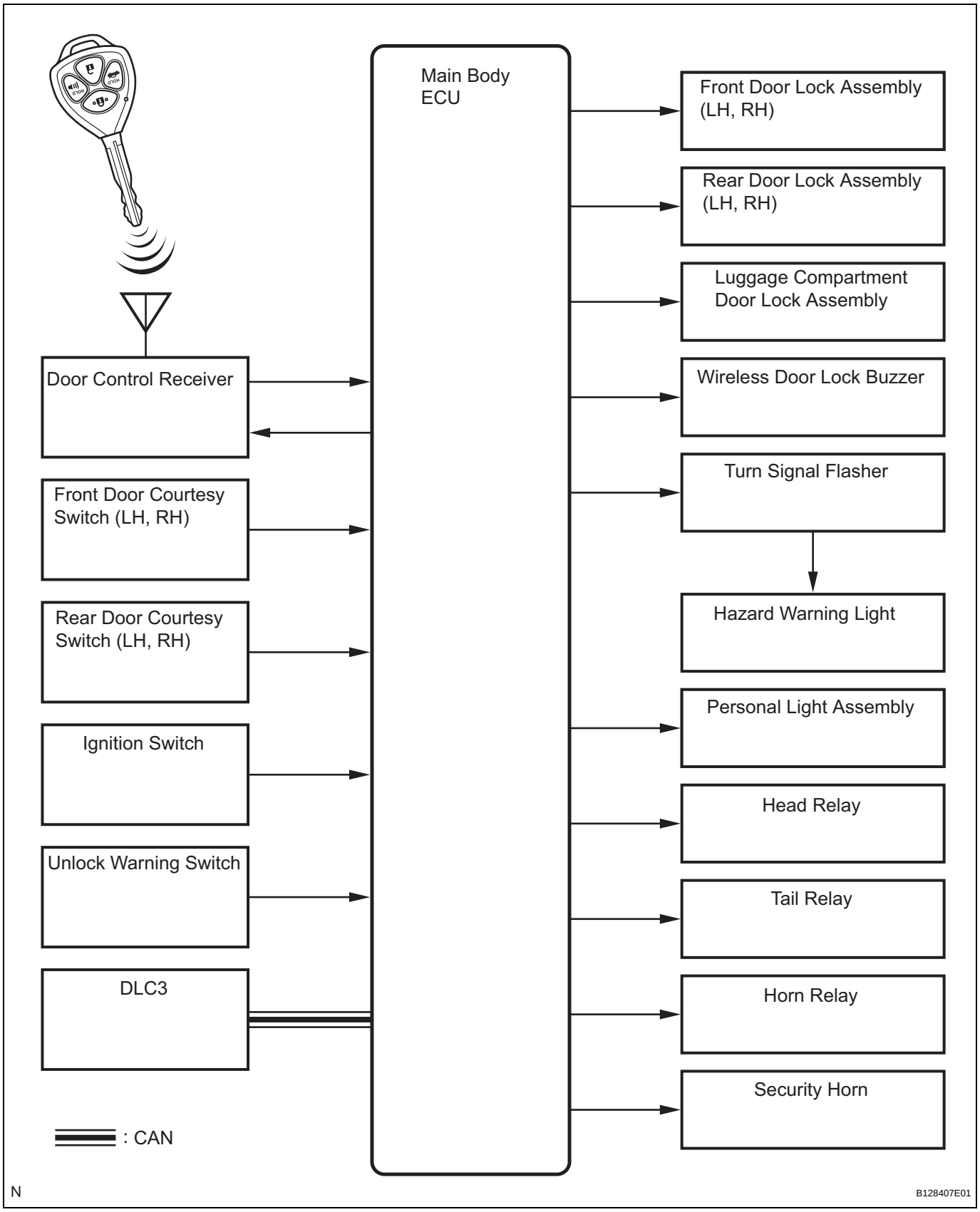


DOOR CONTROL TRANSMITTER

H

B128398E01

SYSTEM DIAGRAM



DL

SYSTEM DESCRIPTION

1. WIRELESS DOOR LOCK CONTROL SYSTEM

The wireless door lock control system functions to lock and unlock all the doors from a distance. The system is controlled by a hand-held transmitter which sends radio waves to the door control receiver. The main body ECU performs an ID code identification process and engages the door lock control.

2. FUNCTION OF MAIN COMPONENTS

Component	Function
Door control transmitter	• Has LOCK, UNLOCK, LUGGAGE OPEN, and PANIC switches. • Transmits weak radio waves (recognition codes and function codes) to the door control receiver. • Illuminates the indicator light (LED) during transmission.
Door control receiver	Receives weak radio waves (recognition codes and function codes) and outputs them as code data to the main body ECU.
• Front door courtesy light switch • Rear door courtesy light switch • Luggage compartment door courtesy light switch	Turns on when a door is opened and turns off when it is closed. Outputs door status codes (open or closed) to the main body ECU.
Unlock warning switch	Detects if the key is inserted in the ignition key cylinder or not.
Door lock position switch	Transmits the door lock positions of each door to the main body ECU.
Wireless door lock buzzer	Emits beep (answer back) when doors are locked or unlocked, or luggage compartment door is opened by wireless operation.
Main body ECU	Sends wireless door lock control signals in response to the code data from the door control receiver and signals from each switch.

3. SYSTEM FUNCTION

The door control transmitter has the LOCK, UNLOCK, LUGGAGE OPEN, and PANIC switches. Operating these switches activates each function.

The wireless door lock control system has the following functions:

HINT:

The default settings of the following functions are ON. Part of these functions can be customized (See page DL-103).

Function	Operation
All door lock	Pressing the LOCK switch locks all doors.
All door unlock (2-step unlock)	Pressing the UNLOCK switch twice within 3 seconds unlocks all the doors after the driver's door is unlocked.
Automatic lock	If none of the doors is opened within 60 seconds after they are unlocked by the wireless door lock control, all the doors will lock again automatically.
Panic alarm	Pressing the PANIC switch of the transmitter for longer than about 0.8 seconds causes the following alarms to activate: • Sounds the horn and security horn. • Flashes the hazard lights, headlights, and taillights. • Illuminates the front interior light (when the switch is in the DOOR position). While the panic alarm is operating, pressing any switch of the transmitter cancels the alarm operation.
Luggage compartment door opener	Pressing the LUGGAGE OPEN switch of the transmitter opens the luggage compartment door.
Answer back	• When the doors are locked by wireless operation, the wireless door lock buzzer sounds once and the hazard warning lights flash once. • When the doors are unlocked by wireless operation, the wireless door lock buzzer sounds twice and the hazard warning lights flash twice. • When the luggage compartment door is opened by wireless operation, the wireless door lock buzzer sounds once.

Function	Operation
Door ajar warning	The buzzer sounds when LOCK is pressed when any of the doors are ajar. When all the doors are closed or when UNLOCK is pressed, the buzzer will stop after it sounds for 10 seconds continuously.
Illuminated entry	When all the doors are locked, pressing UNLOCK causes the interior lights to come on simultaneously with the unlock operation.
Self-diagnostic mode	The following are ways to enter the self-diagnostic mode: • If the door control receiver receives normal radio waves from the door control transmitter when the system is in diagnostic mode, it sounds the wireless door lock buzzer and flashes the interior light in a normal pattern that corresponds to the function of each switch. • Read DTCs with the intelligent tester.
Transmitter recognition code registration	Enables the registration (writing and storing) of 6 types of transmitter recognition codes in the EEPROM that is contained in the door control receiver.

4. TRANSMITTER RECOGNITION CODE REGISTRATION FUNCTION

The table below shows the 6 ID registration function modes by which up to 6 different codes can be registered. The codes are electronically registered (written and stored) in the EEPROM that is contained in the door control receiver.

Mode	Function
Add mode	Adds a newly received code while preserving any previously registered codes. This mode is used when adding a new transmitter. If the number of registered codes exceeds 6, the oldest registered code is erased first.
Rewrite mode	Erases all previously registered codes and registers only newly input codes.
Confirmation mode	Confirms how many codes are currently registered. When adding a new code, this mode is used to check how many codes already exist.
Prohibition mode	Deletes all the registered codes and disables the wireless door lock function. This mode is used when the transmitter is lost.

5. CONDITIONS THAT WIRELESS FUNCTIONS DO NOT OPERATE

(a) Lock operation is not available when:
- Any of the doors is open.
- The key is inserted in the ignition key cylinder.

(b) Unlock operation is not available when:
- The key is inserted in the ignition key cylinder.

(c) Luggage compartment door opener is not available when:
- The key is inserted in the ignition key cylinder.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
The wireless door lock control system troubleshooting procedures are based on the premise that the power door lock control system is operating normally. Check the power door lock control system first before troubleshooting the wireless door lock control system.
Use this procedure to troubleshoot the wireless door lock control system.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble (See page IN-45).

NEXT

3	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) If no code is output, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) If any code is output, proceed to B.

B → Go To CAN COMMUNICATION SECTION

A

4	DTC CHECK

DL

(a) Check for a DTC and note any codes that are output.
(b) Delete the DTC.
(c) Recheck for DTCs. Try to prompt the DTC by simulating the original symptom that the DTC suggests.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC reoccurs, proceed to B.

B → Go To DTC chart

A

5	SYMPTOM SIMULATION

NEXT

6	PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → Go to step 7

A

7	PERFORM TROUBLESHOOTING ACCORDING TO MALFUNCTION SYMPTOM

(a) Terminals of ECU (See page DL-106)
(b) DATA LIST/ACTIVE TEST (See page DL-111)

NEXT

8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END

OPERATION CHECK

1. FUNCTIONS AND OPERATING CONDITIONS

(a) The wireless door LOCK/UNLOCK function:
This wireless door lock control function operates only when the following 4 conditions are met:
(1) There is no key in the ignition key cylinder.
(2) All the doors are closed.
(3) The power door lock system is functioning normally.
(4) The function is not disabled by customization.
HINT:
The UNLOCK function operates even when any of the doors are open.

(b) The wireless transmitter operational range differs depending on the situation.
(1) The operational range differs depending on the user, the way the transmitter is held and the location.
(2) In certain areas, the operational range will be reduced due to the vehicle body shape and the influence of the surrounding environment.
(3) Since the transmitter uses weak radio waves, the operational range may be reduced or the transmitter may not function if interference or stronger radio waves occur in the area where the transmitter is used.
(4) When the battery is low, the operational range is reduced and/or the transmitter may not function.
HINT:
If the transmitter has been left in a place that is exposed to direct sunlight, such as on the instrument panel, the battery may be weakened or other problems may occur.

2. CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS

HINT:
- The switches built into the door control transmitter send radio waves to the door lock control receiver.
- The operational range must be taken into account during checks.

(a) Establish conditions that allow the wireless control function to be operated successfully.
(b) Check the following basic functions.
(1) Check that the transmitter's LED lights up 3 times when each switch is pressed 3 times and that the LED blinks when each switch is pressed and held down.
HINT:
If the LED does not illuminate when the switch has been pressed 3 times or more, the battery may be depleted.
(2) Check that all the doors lock when the LOCK switch is pressed.

(3) Check that the driver's door unlocks when the UNLOCK switch is pressed once, and all the doors unlock when pressed twice within 3 seconds.

(c) Check the automatic lock function.
(1) Check that if the driver's door or all doors are unlocked with the UNLOCK switch and none of the doors are opened or locked within approximately 60 seconds, the doors automatically re-lock.
(2) Check that if the driver's door or all doors are unlocked with the UNLOCK switch and a door is opened or locked within approximately 60 seconds, the automatic lock function does not operate.

(d) Check the interior light ON function.
HINT:
Turn the interior light switch to the DOOR position before the check.
(1) Check that the interior light comes on simultaneously with the unlocking operation when the UNLOCK switch is pressed.
(2) Check that the interior light goes off in approximately 15 seconds if none of the doors is opened after the unlocking operation.

(e) Check the answer back function.
(1) When the doors are locked by wireless operation, the wireless door lock buzzer sounds once and the hazard warning lights flash once.
(2) When the doors are unlocked by wireless operation, the wireless door lock buzzer sounds twice and the hazard warning lights flash twice.
(3) When the luggage compartment door is opened by wireless operation, the wireless door lock buzzer sounds once.

(f) Check the switch operation fail-safe function.
(1) Check that the doors cannot be locked by operating a switch while the key is in the ignition key cylinder.
HINT:
This check cannot be made when the system is in recognition code registration mode.

(g) Check the chattering prevention function.
(1) Check that the corresponding operation occurs only once, and does not repeat itself while the switch is kept pressed. Check that the corresponding operation is carried out when the switch is operated repeatedly at 1-second intervals.

(h) Check the luggage compartment door opener function.
(1) Check that the luggage compartment door opens when the LUGGAGE OPEN switch is held down for 0.6 seconds or more.

(i) Check the door ajar warning function.
  (1) Check that the buzzer sounds when the LOCK switch is pressed when any of the doors are ajar. When all the doors are closed or when the UNLOCK switch is pressed, the buzzer will stop after it sounds for 10 seconds continuously.

(j) Check the panic alarm function.
  (1) Check that the following alarms operate when the PANIC switch is pressed longer than about 0.8 seconds:
    - The vehicle horns and the security horn sound.
    - The hazard warning lights, headlights and taillights flash.
    - The front interior light illuminates (when the switch is in the DOOR position).
  (2) Check that during the panic alarm is operating, pressing any switch of transmitter cancels the alarm operation.

REGISTRATION

HINT:

- Register the recognition code when replacing the door control transmitter or the door control receiver.
- Add mode is used to register new recognition codes while still retaining codes already registered. This mode is used when a new transmitter is added. If the number of registered codes exceeds 6, the previously registered codes will be erased in order, starting from the first registered code.
- Rewrite mode is used to erase all the previously registered recognition codes in order to register all-new recognition codes. This mode is used when the transmitter or the door control receiver is replaced with a new one.
- Confirmation mode is used to confirm how many recognition codes have already been registered before another recognition code is registered.
- Prohibition mode is used to erase all the registered codes and disable the wireless door lock function.
  This mode is used when the transmitter is lost.
- All the following registration procedures must be performed in order.

1. REGISTRATION OF RECOGNITION CODE (USING INTELLIGENT TESTER)

(a) Turn the ignition switch ON.

(b) Select the add or rewrite mode according to the intelligent tester display.

(c) The number of registered codes is indicated.

(d) Registration of the door control transmitter.

(1) If the add mode or rewrite mode has been selected, press the LOCK and UNLOCK switches on the transmitter simultaneously.

(2) Within 3 seconds of releasing the LOCK and UNLOCK switches, press either of the switches on the door control transmitter.

NOTICE:

- **Do not press the LOCK and UNLOCK switches simultaneously for more than 1.5 seconds.**
- **Do the operation within 1 meter of the driver's seat to register the transmitter.**
- **Do not push other transmitter switches during the transmitter registration process.**

(3) The main body ECU automatically performs the power door LOCK-UNLOCK operation once and sounds the wireless door lock buzzer twice, in order to indicate whether registration has been completed correctly or not.

(4) If registration is continued, the next recognition code must be registered in the door control transmitter within 30 seconds.
HINT:
Up to 6 recognition codes can be registered.

(e) Completing the registration mode.
(1) The registration mode will cease when any of the following occurs:
- 30 seconds or more have elapsed after a code is registered.
- The intelligent tester is used to complete.
- The intelligent tester is disconnected.
- The ignition switch is turned off.

(f) Perform the following after registration is completed.
(1) Perform the wireless door lock control operation check (See page DL-99).
HINT:
If the wireless door lock control does not operate, perform the registration procedure again.

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.
NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

WIRELESS DOOR LOCK CONTROL SYSTEM:

Display (item)	Default	Function	Setting
WIRELESS OPER (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF	ON/OFF
HAZARD ANS BACK (Hazard answer-back for wireless door lock control)	ON	• When the doors are locked by wireless operation, the hazard warning lights flash once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice.	ON/OFF
OPEN DOOR WARN (Door ajar warning)	ON	The buzzer sounds when LOCK is pressed when any of the doors are ajar.	ON/OFF
AUTO LOCK DELAY (Auto lock time)	60 s	This function regulates the interval between unlocking and automatic relocking of doors.	30 s/60 s
UNLOCK /2OPER (Wireless unlock operated twice)	ON	This function unlocks the driver's door when the UNLOCK switch is pressed once, and unlocks all doors when pressed twice within 3 seconds. If set to OFF, pressing UNLOCK once unlocks all doors.	ON/OFF
ALARM FUNCTION (Panic function)	ON	This function operates the theft deterrent system when PANIC is pressed and held for 0.8 seconds.	ON/OFF
WIRLS BUZZ RESP (Wireless buzzer answer-back)	ON	Wireless door lock buzzer response/ON or OFF	ON/OFF
TRUNK LID OPER (Wireless trunk opener function setting)	0.6 s ON	This function changes operation method of transmitter to open luggage compartment door. 1 TIME: Push 1 time 2 TIMES: Push 2 times 0.6 s PR: Push 0.6 seconds OFF: Does not operate	1 TIME/2 TIMES/0.6 s PR/ OFF

PROBLEM SYMPTOMS TABLE

If a normal system code is displayed during the DTC check, but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

HINT:

- The following is the troubleshooting procedure for the wireless door lock control of a vehicle without the smart key system.
- For the troubleshooting procedure for the wireless door lock control of a vehicle with the smart key system, refer to the wireless door lock control system (with Smart Key System).
- Inspect the fuse and relay before investigating the suspected areas shown in the table below.
- Inspect each malfunction circuit in numerical order for its corresponding symptom.

WIRELESS DOOR LOCK CONTROL SYSTEM

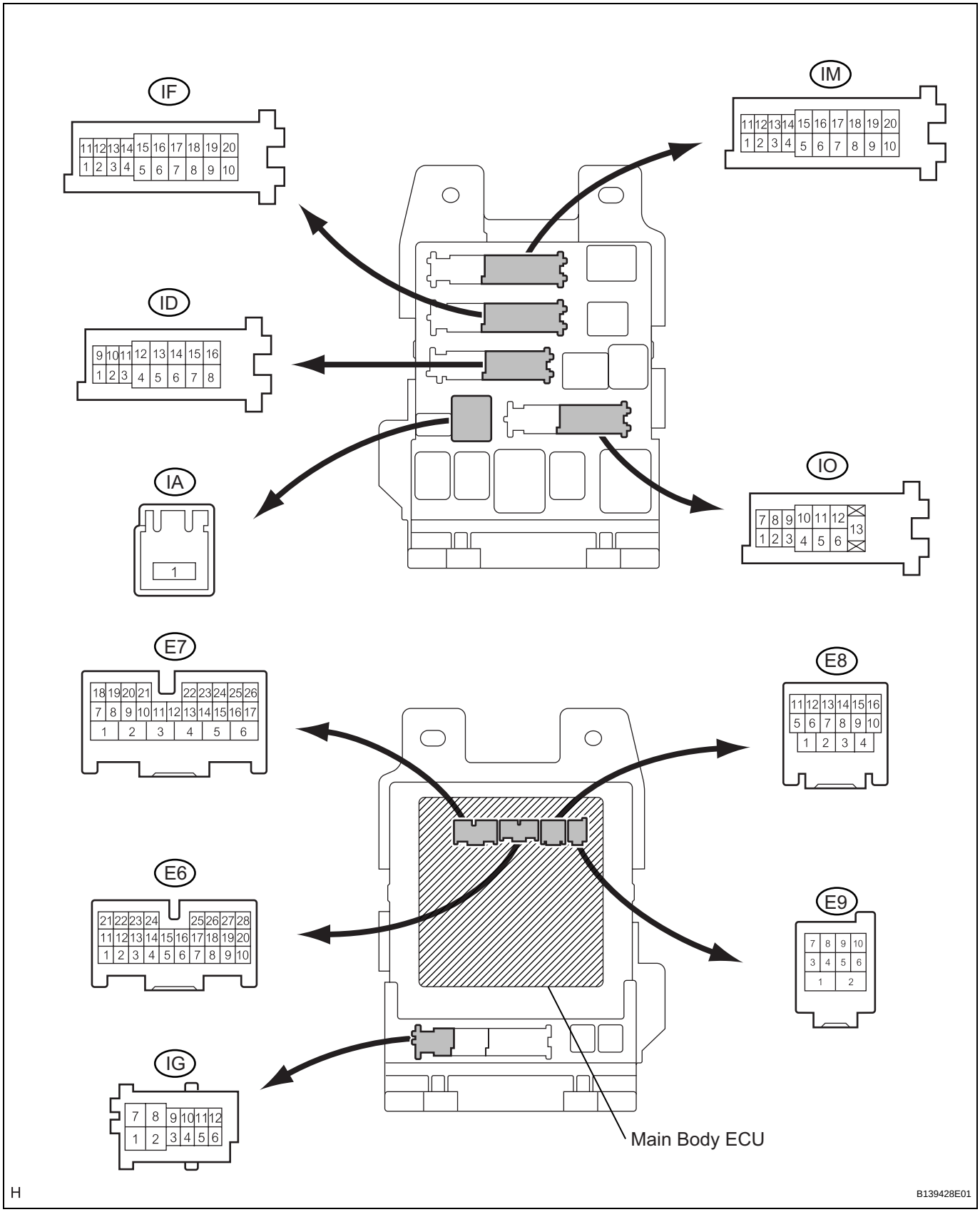
Symptom	Suspected area	See page
The wireless door lock control system does not operate.	1. Perform the operation check	DL-99
	2. Door control transmitter	DL-216
	3. Enter the self-diagnostic mode	DL-109
	4. If the recognition code does not match the key code, check that the key code can be registered in the rewrite or add mode of the recognition code registration	-
	5. Unlock warning switch circuit	DL-205
	6. Door courtesy switch circuit	LI-52
	7. Luggage compartment door courtesy switch circuit	DL-44
	8. If the symptoms still occur after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The automatic lock function does not operate normally.	1. Perform the operation check	DL-99
	2. Unlock warning switch circuit	DL-205
	3. Door courtesy switch circuit	LI-52
	4. If the symptoms still occur after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The illuminated entry function only does not operate.	1. Perform the operation check	DL-99
	2. Lighting system	LI-12
	3. If the symptoms still occur after the above area has been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The answer back function does not operate (Wireless door lock buzzer).	1. Perform the operation check	DL-99
	2. Wireless door lock buzzer circuit	DL-116
	3. If the symptoms still occur after the above area has been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The answer back function does not operate (Hazard warning light).	1. Perform the operation check	DL-99
	2. Wire harness	-
	3. Turn signal flasher	LI-138
	4. If the symptoms still occur after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-

Symptom	Suspected area	See page
The wireless trunk opener function only does not operate.	1. Perform the operation check	DL-99
	2. Unlock warning switch circuit	DL-205
	3. Luggage compartment door courtesy switch circuit	DL-44
	4. If the symptoms still occur after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The door ajar warning function only does not operate.	1. Perform the operation check	DL-99
	2. Door courtesy circuit	LI-52
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The panic alarm function only does not operate.	1. Perform the operation check	DL-99
	2. Door control transmitter	DL-216
	3. If the symptoms still occur after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The panic alarm function does not operate (Vehicle horn).	1. Perform the operation check	DL-99
	2. Horn circuit	TD-62
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The panic alarm function does not operate (Security horn).	1. Perform the operation check	DL-99
	2. Security horn circuit	TD-64
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The panic alarm function does not operate (Hazard warning light).	1. Perform the operation check	DL-99
	2. Wire harness	-
	3. Turn signal flasher	LI-138
	4. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-
The panic alarm function does not operate (Headlight, taillight or interior light).	1. Perform the operation check	DL-99
	2. Lighting system	LI-12
	3. If the symptom still occurs after the above areas have been inspected and proved to be normal, replace the main body ECU (Instrument Panel J/B)	-

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the main body ECU (instrument panel J/B) connectors.



DL

(b) Measure the resistance and voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RCTY (E6-5) - Body ground	GR - Body ground	Rear courtesy light switch RH input	Rear door RH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
PCTY (E6-21) - Body ground	Y - Body ground	Passenger side courtesy light switch input	Passenger side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
LGCY (E6-25) - Body ground	W - Body ground	Luggage compartment door courtesy light switch input	Luggage compartment door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
DCTY (E7-24) - Body ground	L - Body ground	Driver side door courtesy light switch input	Driver side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
KSW (E9-5) - Body ground	L - Body ground	Unlock warning switch input	No key in ignition key cylinder (OFF) → Key inserted (ON)	10 kΩ or higher → Below 1 Ω
ACC (IA-1) - Body ground	B - Body ground	Ignition power supply (ACC signal)	Ignition switch ACC → OFF	10 to 14 V → Below 1 V
IG (IA-1) - Body ground	B - Body ground	Ignition power supply (IG signal)	Ignition switch ON → OFF	10 to 14 V → Below 1 V
ALTB (ID-16) - Body ground	W - Body ground	+B (power system alternator system) power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
BECU (ID-10) - Body ground	O - Body ground	+B power supply	Always	10 to 14 V
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LCTY (IO-7) - Body ground	LG - Body ground	Rear courtesy light switch LH input	Rear door LH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the main body ECU (instrument panel J/B) connectors.

(d) Measure the voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TR+ (E7-1) - Body ground	B - Body ground	Luggage compartment door opener motor input	Luggage compartment door CLOSED (LOCKED) → OPEN (UNLOCKED)	Below 1 V → 10 to 14 V*1
HAZ (E8-4) - Body ground	W - Body ground	Turn signal flasher relay signal	Any transmitter switch is pressed → not pressed	Below 1 V → 10 to 14 V*2
BZR (E9-7) - Body ground	O - Body ground	Wireless door lock buzzer	Wireless door lock buzzer OFF → ON	0 V → Pulse generation

HINT:

- *1: When operating the motor.
- *2: When operating the answer back function.

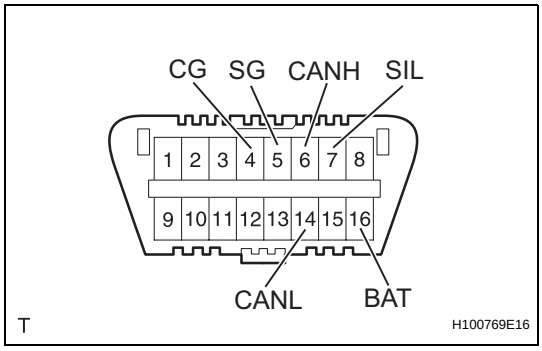
DIAGNOSIS SYSTEM

1. DESCRIPTION

The main body ECU stores trouble codes when trouble occurs on the vehicle.
The diagnostic system allows for reading of the trouble codes from the DLC3.
Use the intelligent tester to check and solve the problem.

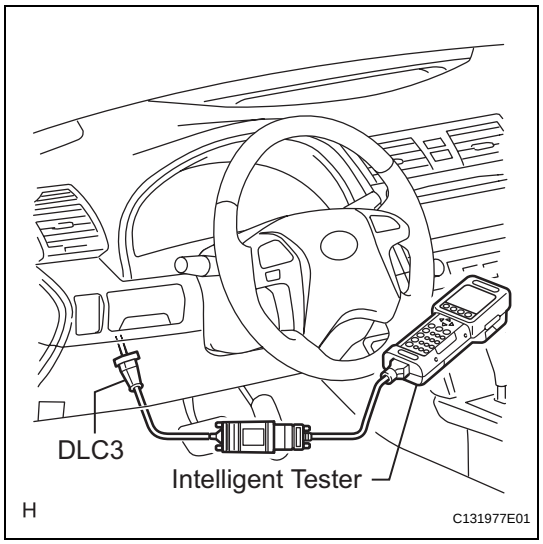
2. CHECK DLC3

(a) The main body ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

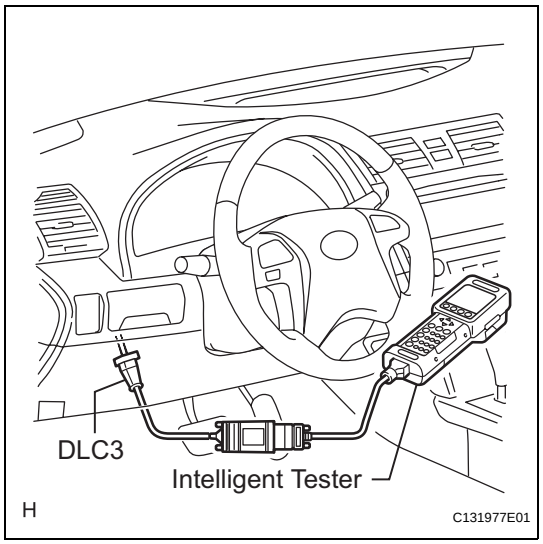


Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 67 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch ON and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle or in the tester.
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



DTC CHECK / CLEAR

1. DTC CHECK/CLEAR (USING INTELLIGENT TESTER)

(a) DTC check
- (1) Connect the intelligent tester to the DLC3.
- (2) Turn the ignition switch ON.
- (3) Read DTCs on the tester screen.

(b) DTC clear
- (1) Connect the intelligent tester to the DLC3.
- (2) Turn the ignition switch ON.
- (3) Clear the DTCs following the prompts on the tester screen.
  HINT:
  The intelligent tester has a SNAPSHOT function which records the monitored data.
  Refer to the intelligent tester operator's manual for further details.

2. SELF-DIAGNOSTIC MODE (OPERATING IGNITION KEY CYLINDER)

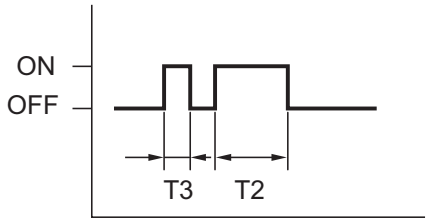
(a) Switch to self-diagnostic mode.
- (1) Establish the vehicle's initial conditions (See page DL-99).
- (2) Insert the key into the ignition key cylinder and remove it.
- (3) Within 5 seconds after the key is removed, insert it into the ignition key cylinder and then turn the ignition switch ON then OFF 1 time (End in OFF).
- (4) Within 30 seconds of turning the ignition switch OFF, perform the following 9 times: Turn the ignition switch ON then OFF (End in OFF).
  HINT:
  - Turning the ignition switch ON after the procedure above has been completed will end the self-diagnostic mode.
  - Do not lock or unlock doors while performing the self-diagnostic mode.

NOTICE:
If the system fails to enter the self-diagnostic mode, the system will return to normal mode.

(b) Check that the system has switched to self-diagnostic mode by checking the sound of the wireless door lock buzzer.
(c) Check the diagnostic outputs when the door control transmitter switch is held down. The diagnostic outputs can be checked by the sound of the wireless door lock buzzer.

Timing Chart

Buzzer Output:



T1: 0.25 seconds

T2: 0.5 seconds

T3: 0.13 seconds

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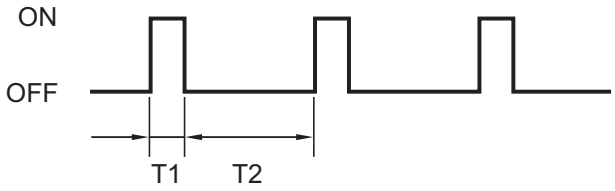
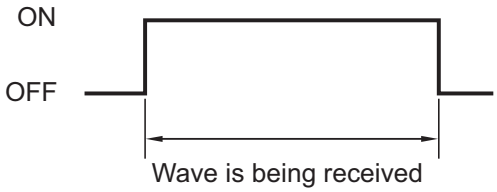
Buzzer Output:

Normal Wave

(LOCK/UNLOCK or LUGGAGE OPEN Switch):



Unmatching Recognition Code:



No Diagnosis Output:

T1: 0.13 seconds

T2: 0.5 seconds

N

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3. SELF-DIAGNOSTIC MODE (USING INTELLIGENT TESTER)

(a) Switch to self-diagnostic mode.
(1) Connect the intelligent tester to the DLC3.

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(2) Turn the ignition switch ON and turn the intelligent tester main switch on.
HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / BODY / DATA LIST.
(d) Read the DATA LIST according to the display on the tester.

BODY (Main body ECU RH):

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
WIRELESS OPER	Wireless door lock control function / ON or OFF	ON: Operating OFF: Not operating	-
HAZARD ANS BACK	Hazard answer-back of wireless / ON or OFF	ON: Operating OFF: Not operating	-
OPEN DOOR WARN	Open door warning / ON or OFF	ON: Operating OFF: Not operating	-
AUTO LOCK DELAY	Automatic lock time / 60 s or 30 s	60 s: 60 seconds 30 s: 30 seconds	-
UNLOCK /2OPER	2 times operation of wireless unlock / ON or OFF	ON: All doors unlock when UNLOCK is pressed twice OFF: All doors unlock when UNLOCK is pressed once	-
ALARM FUNCTION	Panic function / ON or OFF	ON: Operating OFF: Not operating	-
WIRLS BUZZ RESP	Wireless door lock buzzer response / ON or OFF	ON: Operating OFF: Not operating	-
TRUNK LID OPER	Luggage compartment door open function type / 1 TIME/2 TIME/ 0.6 s PR/ OFF	1 TIME: Luggage compartment door opens when LUGGAGE OPEN switch is pressed once 2 TIME: Luggage compartment door opens when LUGGAGE OPEN switch is pressed twice 0.6 s PR: Luggage compartment door opens when LUGGAGE OPEN switch is pressed and held down for 0.6 seconds. OFF: Not operating	-

2. ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten the labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / BODY / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

BODY (Main body ECU RH):

Item	Tester Detail	Diagnostic Note
BUZZ RESP SOUND	Wireless door lock buzzer ON / OFF	-

Item	Tester Detail	Diagnostic Note
HAZARD	Turns the turn signal flasher relay ON / OFF	Observe headlight and rear combination light for correct operation
VEHICLE HORN	Vehicle horn ON / OFF	-
TRUNK/BDOR OPEN	Turns luggage compartment door opener motor ON / OFF	Observe luggage compartment door

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a trouble code is displayed during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to "See Page" in the DTC chart.

- The following is the troubleshooting procedure for the wireless door lock control of a vehicle without the smart key system.
  For the troubleshooting procedure for the wireless door lock control of a vehicle with the entry and start system, refer to the wireless door lock control system (with Smart Key System).
- Inspect the fuse and relay before investigating the trouble areas shown in the table below.

WIRELESS DOOR LOCK CONTROL SYSTEM:

DTC No.	Detection Item	Trouble Area	See page
B1242	Wireless Door Lock Tuner Circuit Malfunction	1. Wire harness 2. Door control receiver 3. Main body ECU	DL-113

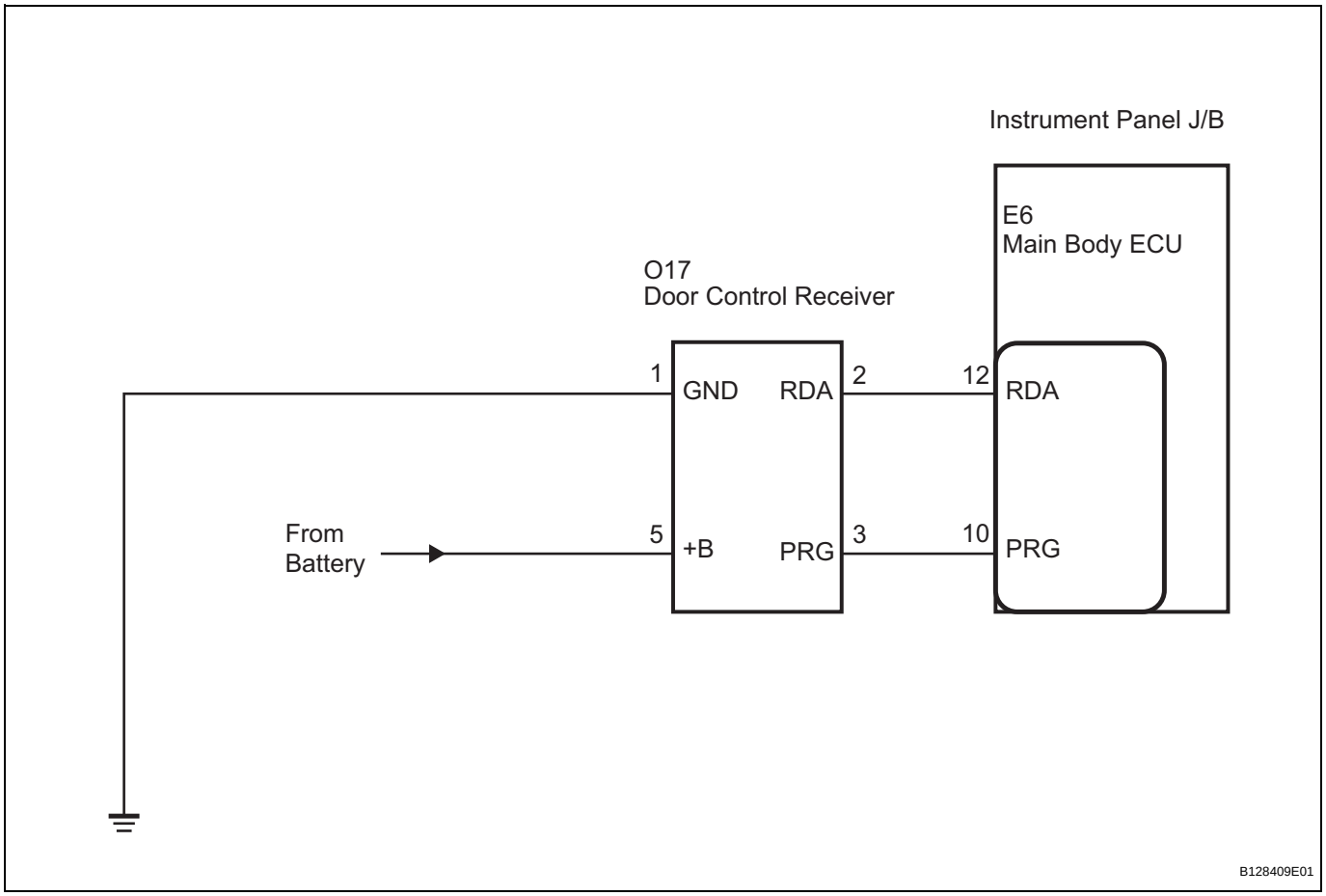
DTC	B1242	Wireless Door Lock Tuner Circuit Malfunction

DESCRIPTION

The door control receiver receives signals from the transmitter and sends these signals to the main body ECU.

DTC No.	DTC Detection Condition	Trouble Area
B1242	In diagnostic mode, an applicable RDA signal cannot be received within 1 second after an PRG signal has been output from the main body ECU.	• Wire harness • Door control receiver • Main body ECU (Instrument panel J/B)

WIRING DIAGRAM



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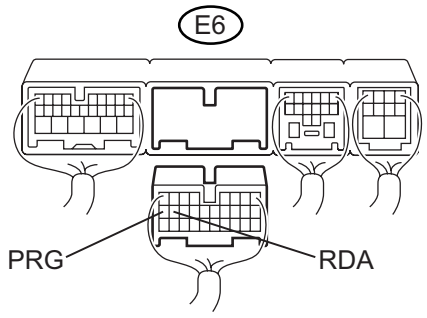
INSPECTION PROCEDURE

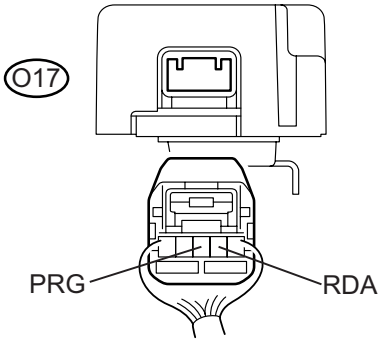
1 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - DOOR CONTROL RECEIVER)

Connector Wire Harness Side:

Main Body ECU



Door Control Receiver



B139427E01

(a) Disconnect the E6 main body ECU connector and the O17 door control receiver connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Condition	Specified Condition
RDA (E6-12) - RDA (O17-2)	Always	Below 1 Ω
RDA (E6-12) - Body ground	Always	10 kΩ or higher
PRG (E6-10) - PRG (O17-3)	Always	Below 1 Ω
PRG (E6-10) - Body ground	Always	10 kΩ or higher

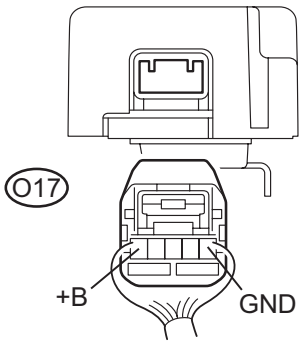
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR (BATTERY, BODY GROUND)

Connector Wire Harness View:

Door Control Receiver



N

B113637E02

(a) Measure the voltage and resistance according to the value(s) in the table below.

Standard

Symbol (Tester Connection)	Condition	Specified Condition
GND (O17-1) - Body ground	Always	Below 1 Ω
+B (O17-5) - Body ground	Always	10 - 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

DL

OK

3	REPLACE DOOR CONTROL RECEIVER

(a) Reconnect the E6 main body ECU connector.
(b) Replace the door control receiver with a normal one.
(c) Perform the registration procedures (See page DL-101).
HINT:
If a normally functioning door control receiver is available, connect it and check if the wireless door lock function is normal or DTCs are output. If the alternative receiver functions normally, replace the original door control receiver.

NEXT

4	CONFIRM DTC

(a) Clear the DTCs (See page DL-109).
(b) Check if the same DTC is detected.
HINT:
Reinstall the sensors, connectors, etc. and restore the previous vehicle conditions before rechecking for DTCs.

Result

Result	Proceed To
DTC is output	A
DTC is not output (When troubleshooting in accordance with the DTC CHART)	B
DTC is not output (When troubleshooting in accordance with the PROBLEM SYMPTOMS TABLE)	C

B → END

C → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

A

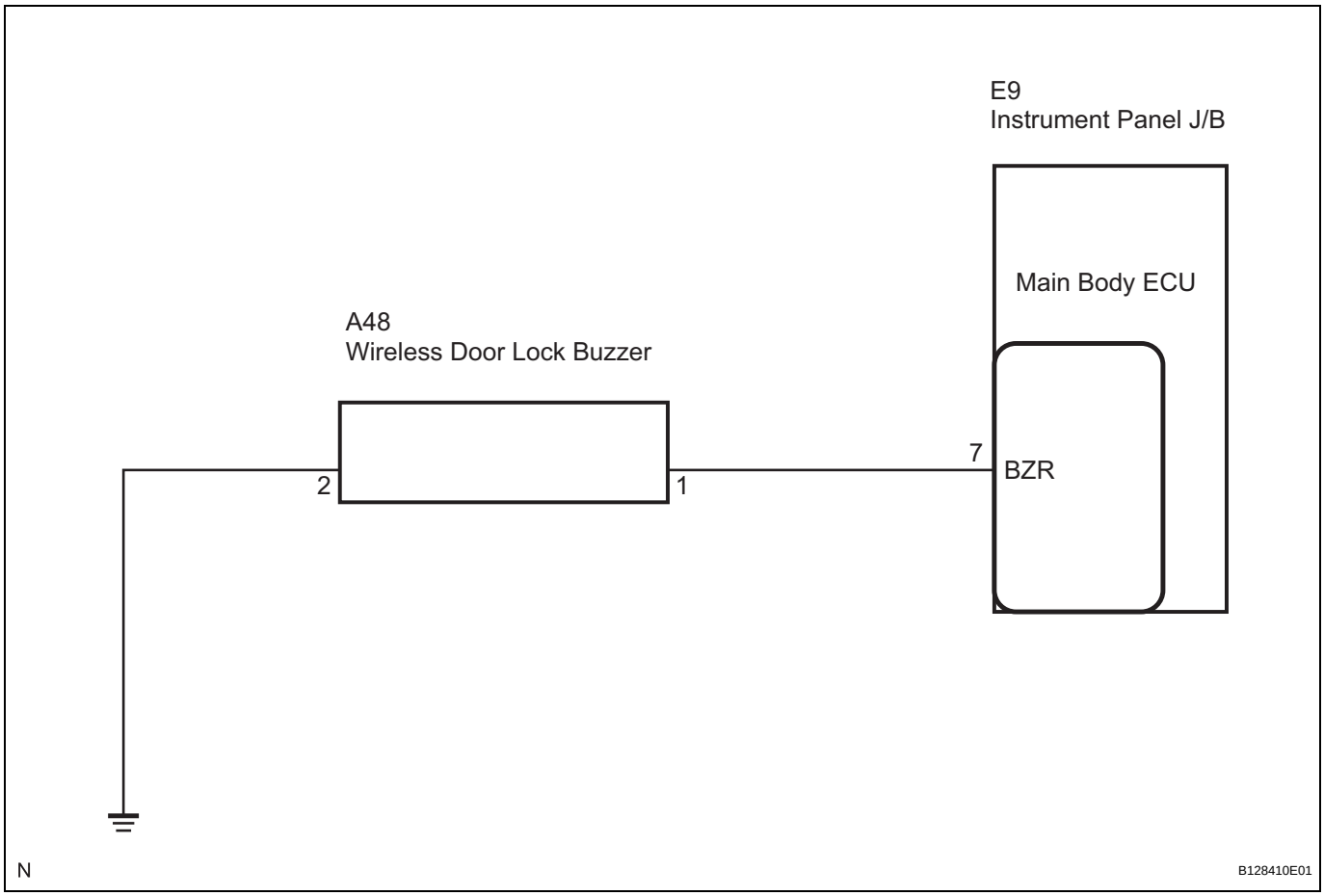
REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

Wireless Door Lock Buzzer Circuit

DESCRIPTION

The main body ECU RH activates the wireless door lock buzzer when detecting a lock/unlock signal from the door control transmitter.

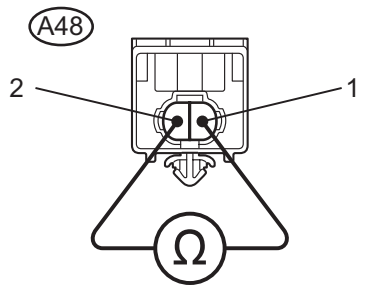
WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT WIRELESS DOOR LOCK BUZZER

Wireless Door Lock Buzzer:



N B144393E01

(a) Disconnect the A48 wireless door lock buzzer connector.
(b) Measure the resistance according to the value(s) in the table below.
HINT:
The buzzer activation circuit is built into the ECU, not into the buzzer itself. When battery voltage is applied directly to the buzzer, the buzzer will not sound.
Standard resistance

Tester Connection	Condition	Specified Condition
A48-1 - A48-2	Always	Approx. 1 kΩ

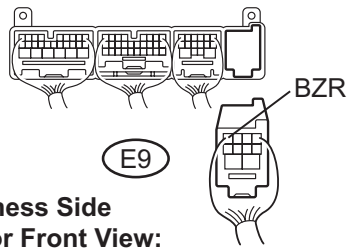
NG → **REPLACE WIRELESS DOOR LOCK BUZZER**

OK

2 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - WIRELESS DOOR LOCK BUZZER - BODY GROUND)

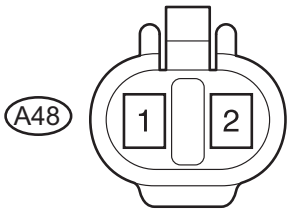
Connector Wire Harness View:

Main Body ECU



Wire Harness Side Connector Front View:

Wireless Door Lock Buzzer



N B113633E03

(a) Disconnect the E9 main body ECU connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Symbol (Tester Connection)	Condition	Specified Condition
BZR (E9-7) - A48-1	Always	Below 1 Ω
BZR (E9-7) - Body ground	Always	10 kΩ or higher
A48-1 - Body ground	Always	10 kΩ or higher
A48-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

DL

SMART KEY SYSTEM

PRECAUTION

1. PRECAUTIONS WHEN USING INTELLIGENT TESTER

(a) When troubleshooting the smart key system using the intelligent tester with the engine switch off, connect the intelligent tester to the vehicle and repeat turning any of the courtesy light switches on and off until communication between the tester and the vehicle begins (the interval between ON and OFF should be less than 1.5 seconds).

(b) After DTCs are all cleared, check if the trouble occurs again 6 seconds after the engine switch is turned on (IG).

2. PRECAUTIONS FOR EACH FUNCTION

(a) Precautions for the electrical key:
The electrical key is a precision instrument. Be sure to observe the following:
(1) Do not drop or strike the electrical key.
(2) Do not keep the electrical key in a high temperature area for a long time.
(3) Do not use an ultrasonic washing machine to clean the electrical key.
(4) Keep the electrical key away from magnets or magnetized items during use.
(5) Do not attach any stickers to the electrical key.
(6) If an electrical key is lost, delete all registered electrical key ID codes and then reregister the remaining electrical keys.

(b) Precautions for the entry unlock function:
(1) As the sensor is built into the backside of the outside door handle, the user must touch the backside of the handle when performing the unlock function.
(2) If touched with gloved hands, the response of the door may be delayed.
(3) During the entry unlock operation, if the door handle is pulled before the door unlocks, the unlock function cannot be completed. Confirm that the door has been unlocked before pulling the door handle to open the door.

(4) Make sure that the doors are unlocked when touching the touch sensor on the outside door handle while the electrical key is being carried.
If the doors cannot be unlocked, the certification ECU orders the main body ECU to perform the door unlock operation 4 times at intervals of 0.75 seconds.
At this time, the door may not be unlocked because the handle is being pulled due to some mechanical reasons.
Be sure to return the door handle to its original position.
If the door cannot be opened by pulling the handle, perform the entry unlock operation again.

(5) If the electrical key is too close to the oscillator on the outside of the vehicle, the door may not be unlocked because the electrical key cannot react to the strong wave output from the transmitter.

(6) If the electrical key is within the vehicle exterior detection area, the door can be unlocked even when a person other than the person carrying the electrical key holds the door handle.
However, the doors other than the door that the codes match will not be unlocked.
(If the electrical key is within the driver side door's detection area outside the vehicle, the doors will be unlocked when the person carrying the electrical key holds the driver side door handle. However, if any door handle other than that of the driver side door is held, the doors will not be unlocked).

(7) If a door is not opened after the door unlock operation, the doors automatically lock after approximately 30 seconds.

(8) If a large amount of water is applied to the door handle due to a car wash or heavy rain, the electrical key being within the vehicle exterior detection area may cause the doors to be unlocked.
However, the doors will be locked again after approximately 30 seconds if a door is not opened.

(9) If the electrical key of the smart key system is used while it is being carried with the electrical key of another smart key system, the time before the entry unlock operation will become longer than usual. This is not a malfunction.

(c) Precautions for the entry lock function:

(1) When performing the entry lock operation, firmly press the lock switch on the outside door handle. If pressed too quickly or lightly, the entry lock may not operate.

(2) It is possible that signals output from the indoor electrical key antenna may leak through the window. Also, if the electrical key is too close to a door oscillator, the oscillator output signals are too strong and the electrical key cannot respond. As a result, when the electrical key is near the vehicle interior (window, door handle), the entry lock function may not operate. Also, the electrical key reminder warning buzzer may sound and the entry unlock operation may stop functioning. In this situation, move the electrical key away from the vehicle interior (window, door handle), perform the entry lock operation and perform the entry unlock operation.

(3) Do not touch the lock switch while opening or closing the door.
If the lock switch is pressed when opening or closing the door while the electrical key is being carried, the door ajar warning buzzer sounds (beeps outside the vehicle for 10 seconds).

(4) If the electrical key is on the instrument panel, rear package tray, floor, or in the glove box, the electrical key reminder function may not operate and the electrical key may be locked in the vehicle. Always carry the electrical key.

(5) If the electrical key is outside the vehicle but is very close to a window or door handle (the ECU determines that the electrical key is inside the vehicle) and the transmitter or mechanical key is used to lock the doors (entry lock is not used), entry unlock will not operate. To unlock the doors, perform a wireless door unlock operation. The entry lock function operates in this way to prevent the user from unintentionally unlocking the doors from outside the vehicle. For example, when a user operates the wireless door lock operation from inside the vehicle, radio waves from a door oscillator may leak into the vehicle interior and the doors may unlock.

(6) To allow the user enough time to check if the doors are locked after performing a door lock operation (entry lock function or wireless door lock operation), the entry unlock function will not be permitted for 3 seconds after the door lock operation.

(d) Precautions for the entry ignition function:

(1) To start the engine, first depress the brake pedal firmly until the engine switch indicator illuminates green.

(2) When operating the engine switch, firmly press the switch. If the switch is pressed too quickly, power source control and engine starting may not operate.

(3) While driving the vehicle, continuously pressing the engine switch for 3 seconds or more will turn off the engine. Do not touch the engine switch while driving, except in an emergency.
(4) Do not touch the engine switch with oily hands.
(5) If the vehicle has been in a high temperature location for an extended period of time, be careful when touching the engine switch. It may be very hot and lead to burns.
(6) Take care to avoid spilling beverages on the engine switch. Keep all liquids away from the engine switch.
(7) Do not use the engine switch if it seems to be sticking or feels abnormal.
(8) The vehicle continually records the power source mode (off, on (ACC), on (IG), start). When the battery cable is disconnected and reconnected, the power source mode will return to the mode that was selected before disconnecting the battery cable. Always turn the power off before disconnecting the battery cable. When the vehicle battery is fully depleted, power will be cut. As a result, the power source mode before the power was cut cannot be recognized, so be extremely careful.
(9) Do not connect any electronic products to the ACC, IG1 or IG2 coil side wiring, as the vehicle power supply may be unable to be turned on, or other problems may occur.
(10) After the battery cable has been disconnected and reconnected, the engine will not start on the first attempt. The engine will start normally on the second attempt.
(11) When starting the engine immediately after reconnecting the battery cable, connect the cable and wait at least 10 seconds before attempting to start the engine. The engine may not start when attempting an engine start immediately after disconnecting and reconnecting the battery cable.
(12) If the electrical key is held over the engine switch to start the engine because the electrical key battery is depleted, the following warnings will sound:
- Driver's door open → closed:
  – An exit warning if the shift lever is in a position other than P and the power source is in a mode other than off.
  – An exit warning if the shift lever is in the P position and the power source is in a mode other than off.
- Doors other than the driver door open → closed:

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Warning to inform that the electrical key has been taken out of the vehicle.

These warnings will sound because whether the electrical key is in the cabin or not cannot be determined. They do not indicate system malfunctions.

(e) Precautions for luggage compartment door entry function:

Even if the electrical key is within the electrical key oscillator (outside luggage compartment) detection area, the luggage compartment door cannot be opened if the electrical key is in the following areas:

- Near the center of the bumper
- Too close to the ground or in a high place

(f) Precautions for the function to prevent electrical key confinement in the luggage compartment:

(1) Do not place the electrical key in the luggage compartment.

If the luggage compartment is closed with the electrical key in it when all the doors are locked, the alarm to indicate electrical key confinement will operate (beeping sound for 2 seconds outside of the vehicle). However, the alarm may not operate for some reason relating to the electrical key location (near the spare tire or the side of the luggage compartment), the electrical key condition (covered with metal or near metal), or ambient radio waves.

(2) If the luggage compartment is closed with the electrical key in it when any of the doors is unlocked or open, the electrical key confinement prevention function will not operate. In this case, use the luggage compartment opener in the cabin to open the luggage compartment and take out the electrical key.

(3) The alarm may erroneously operate in the following conditions. If you can confirm that you are carrying the electrical key or that the electrical key is in the cabin, there is no problem. The entry luggage compartment open function may not operate if the alarm erroneously operates. In this case, use the luggage compartment opener in the cabin or perform a wireless operation to open the luggage compartment.

- The electrical key is brought into the cabin after the luggage compartment is opened, and then the luggage compartment is closed.
- The luggage compartment is closed by the person who is carrying the electrical key.

(4) If the alarm operates when the luggage compartment is closed with all the doors locked, the electrical key is in the cabin or luggage compartment. Check the cabin and luggage compartment to find the electrical key.
(5) If the luggage compartment is closed with the electrical key in it when all the doors are locked, the alarm will sound and the luggage compartment can be opened. This may increase the risk of the vehicle being stolen.
(6) Do not open or close the luggage compartment after all the doors are locked if you want to keep the spare electrical keys in the cabin. As a result, the alarm may sound and the luggage compartment can be opened. This may increase the risk of the vehicle being stolen.

(g) Precautions for the battery built into the electrical key and the vehicle battery:
(1) The electrical key is constantly checking for signals from the vehicle, which requires power from the electrical key's built-in battery. The life of the battery is approximately 1 to 2 years depending on the usage conditions. Be sure to replace the battery when its power is low. When replacing the battery, do not touch the inner circuit board or other inner parts.
(2) The electrical key is constantly checking for signals from the vehicle using battery power to determine whether the electrical key is being used or not. Even if the user is carrying 2 electrical keys and only 1 electrical key is used, both electrical keys will consume battery power.
(3) The electrical key receives radio waves at approximately 314 MHz. If the electrical key continuously receives strong, identical frequency waves, this may drain the electrical key's battery. Store the electrical key at least 1 m (3.3 ft) from TVs, personal computers, or other electrical products.
(4) When a door is being locked, the vehicle battery is used to transmit radio waves. The battery may be dead if the vehicle remains stopped for a long time. If the vehicle is not used for a long time, remove the battery from the vehicle or cancel the smart key system.
(5) When a door is being locked with the electrical key in the detection area of a door oscillator, the battery is used for regular communication between the electrical key and vehicle. If the vehicle is not used, keep the electrical key away from the vehicle (more than 2 m (6.6 ft)).

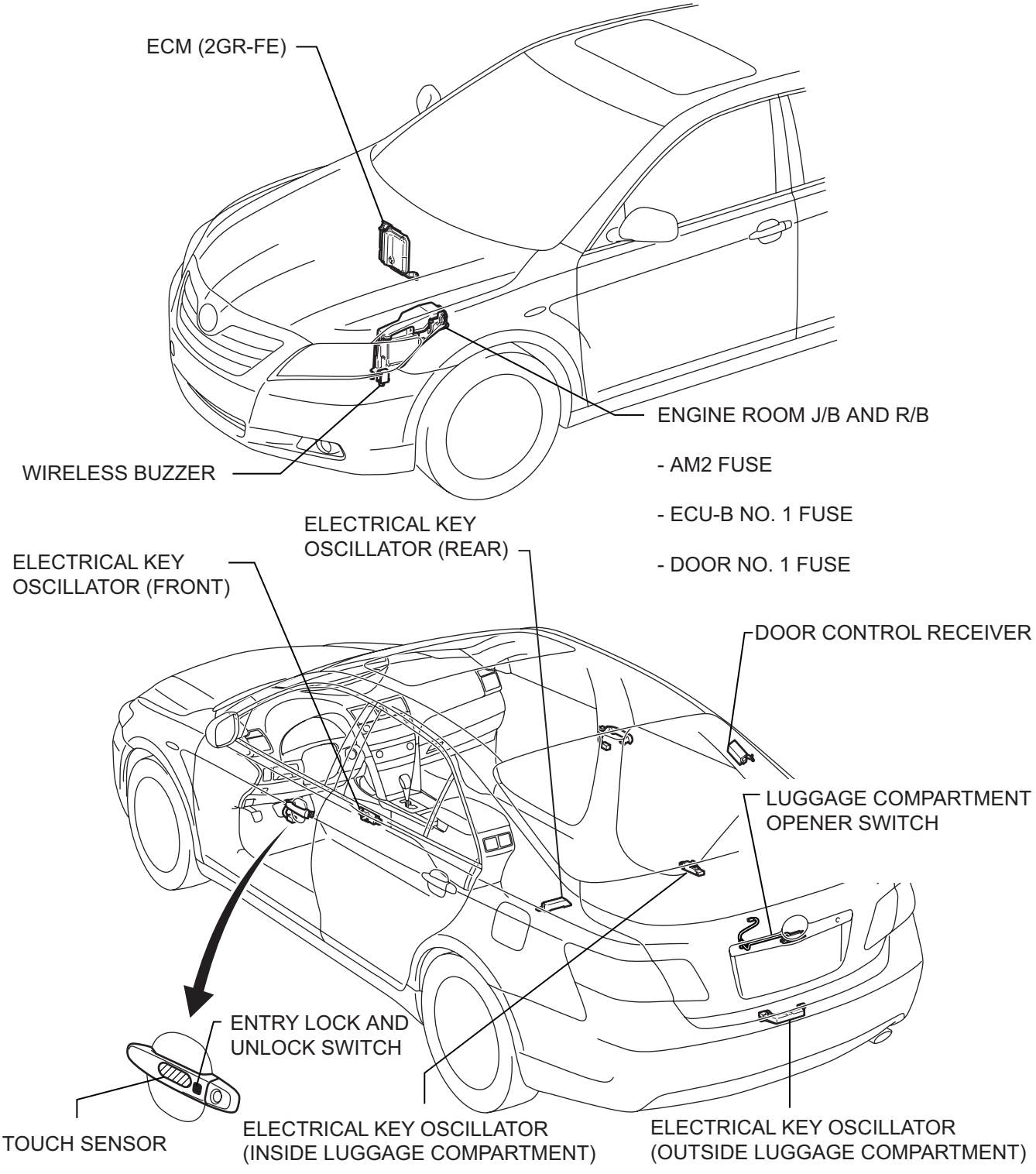
(6) After disconnecting and reconnecting the battery cable, the entry unlock function may not operate. If this occurs, perform a wireless door unlock and lock operation.

(h) Precautions for the entry unlock mode switching function:

(1) Perform the entry unlock mode switching function within a 1 m (3.3 ft) area around the vehicle.

(2) The entry unlock mode switching function cannot be performed within 5 seconds of the previous mode change. Wait 5 seconds or more before performing a mode change.

PARTS LOCATION



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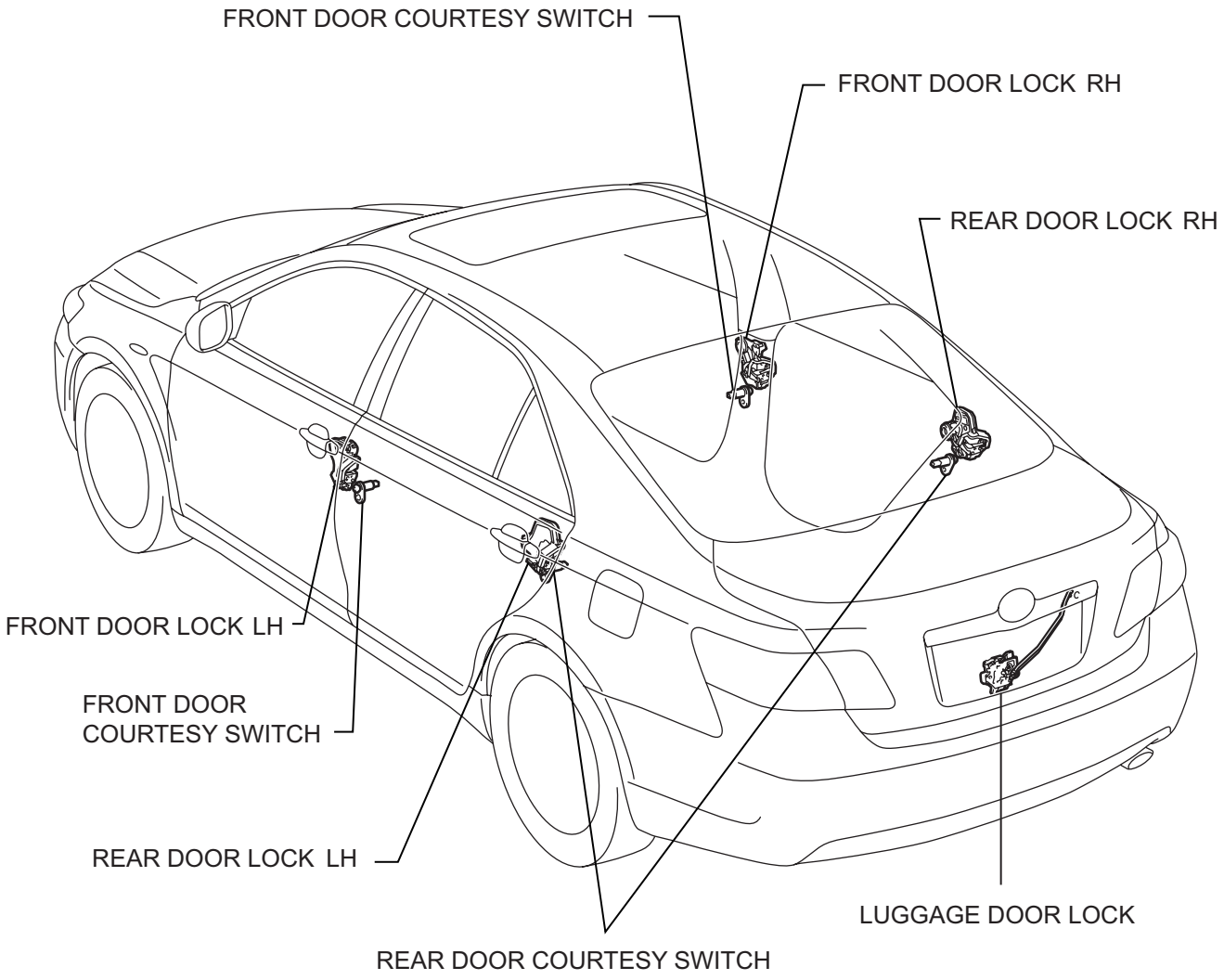

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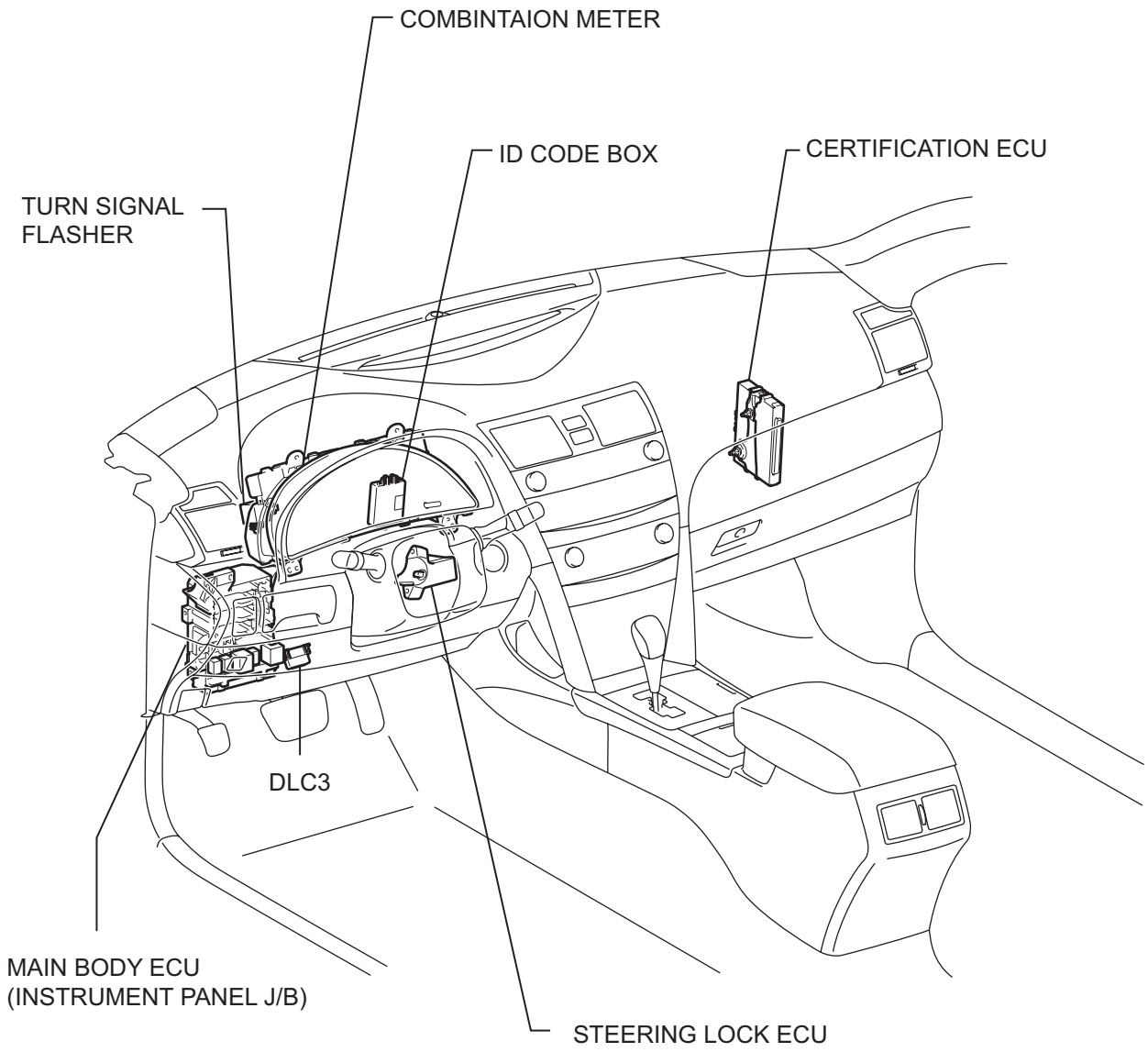

- DOOR NO. 2 FUSE
- ECU-ACC FUSE
- ECU IG NO. 1 FUSE

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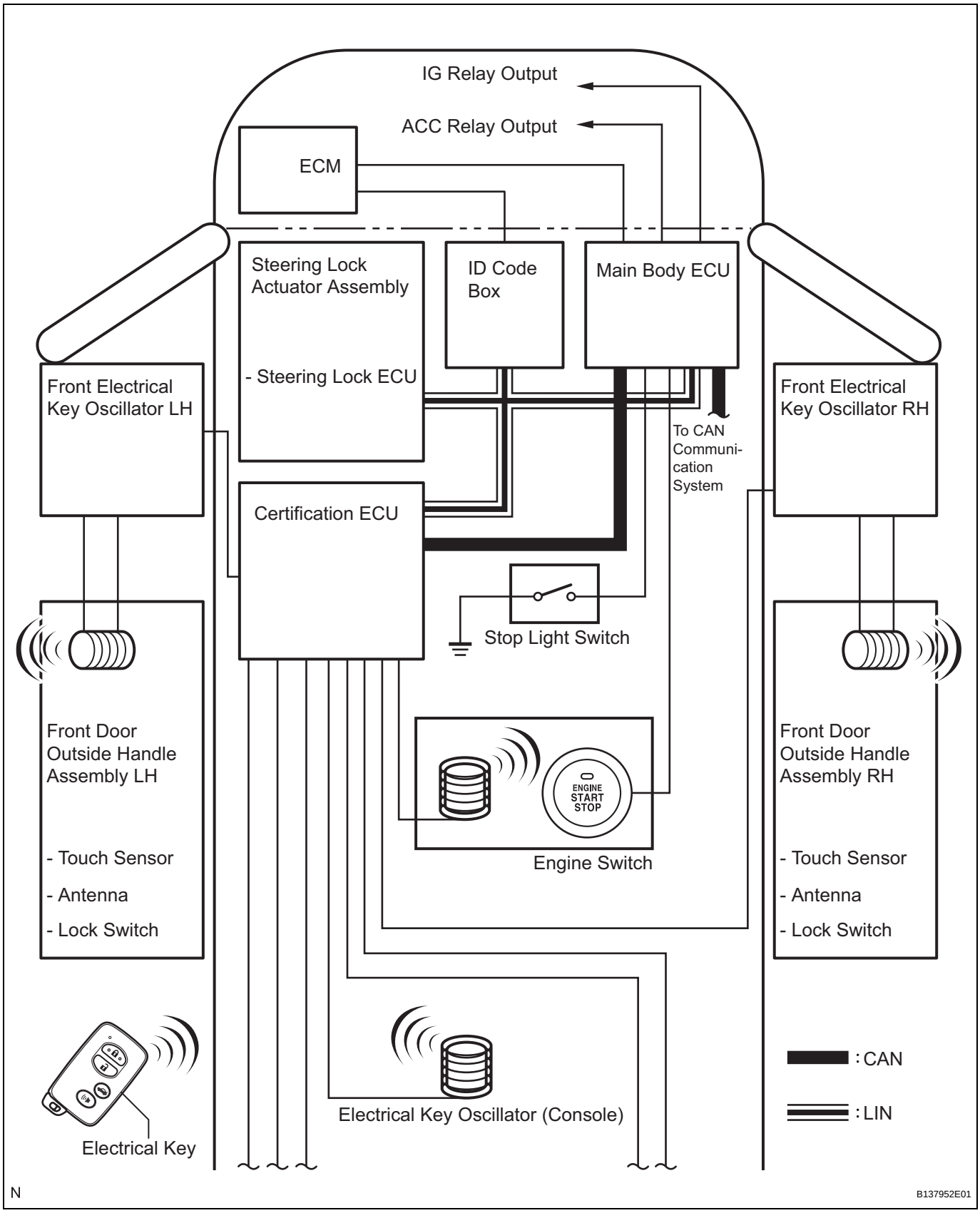
SYSTEM DIAGRAM



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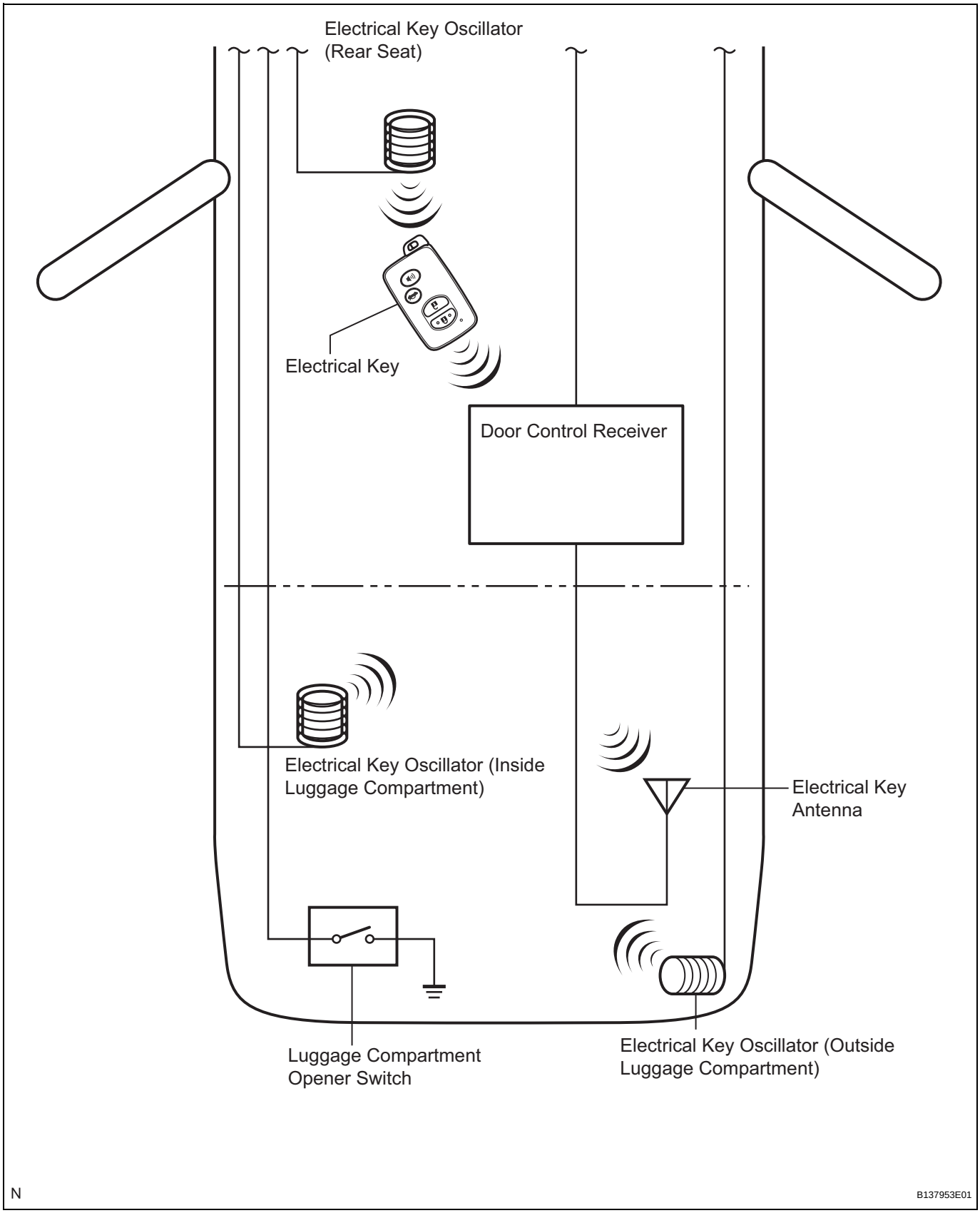
Electrical Key Oscillator
(Rear Seat)
Electrical Key
Door Control Receiver
Electrical Key Oscillator (Inside
Luggage Compartment)
Electrical Key
Antenna
Luggage Compartment
Opener Switch
Electrical Key Oscillator (Outside
Luggage Compartment)
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Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication method
Main body ECU	Certification ECU	Engine switch position signal	CAN
		Courtesy light switch signal	
		Door lock output signal	
		Luggage compartment door output signal	
		Wireless door lock buzzer request signal	
		Door lock position switch signal	
		D/P door key operated switch signal	
		Luggage compartment door key operated switch signal	
Main body ECU	Combination meter	Wireless door lock buzzer request signal	CAN
Certification ECU	Main body ECU	Illumination light request signal	CAN
		Light answer back signal	
Certification ECU	Driver seat ECU	Memory call replay request signal	CAN
Certification ECU	Combination meter	Meter buzzer single-shot request signal	CAN
		Meter buzzer intermittence request signal	
		Meter buzzer continuation request signal	
		Door open display signal	
		Key loss warning signal	
		Low key battery warning signal	
		Shift position warning signal	
		Steering lock abnormal warning	
		Steering lock unlock warning	
Combination meter	Certification ECU/Main body ECU	Vehicle speed signal	CAN
ID code box	Certification ECU	• Matching request random number signal • EEP ROM access malfunction • Model code matching signal • Model code mismatching signal • ECM code receiving status • Engine start permission request signal • Engine start permission response signal • S code matching result signal • S code registration status signal • S code registration mode signal • L code matching result signal • ECM communication signal • Registered key number response signal • Diagnosis mode switching signal • Registered key number signal	LIN
Certification ECU	ID code box	• 3 bit code request signal • ID code matching result signal • Registered key number signal • Vehicle type handle signal	LIN
Certification ECU	• ID code box • Steering lock ECU	• L code registration mode signal • Diagnosis mode request signal • DTC clear request signal • L code registration status signal	LIN
Steering lock ECU	• Certification ECU • ID code box	• Steering lock request signal • Steering unlock signal • Steering lock confirmation signal • Steering unlock confirmation signal • Diagnosis response signal • Steering unlock drive relay signal • Steering lock drive relay signal • Steering lock motor operation signal	LIN

Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication method
Main body ECU	Certification ECU	• Shift position P signal • Power ON operation status signal • Engine starting status signal • ACC relay operating status signal • IG relay operating status signal	LIN
Main body ECU	Steering lock ECU	Steering lock relay power supply status signal	LIN
Steering lock ECU	• Certification ECU • Main body ECU	• Steering lock catching malfunction signal • Push button start malfunction signal • Engine operation signal	LIN

SYSTEM DESCRIPTION

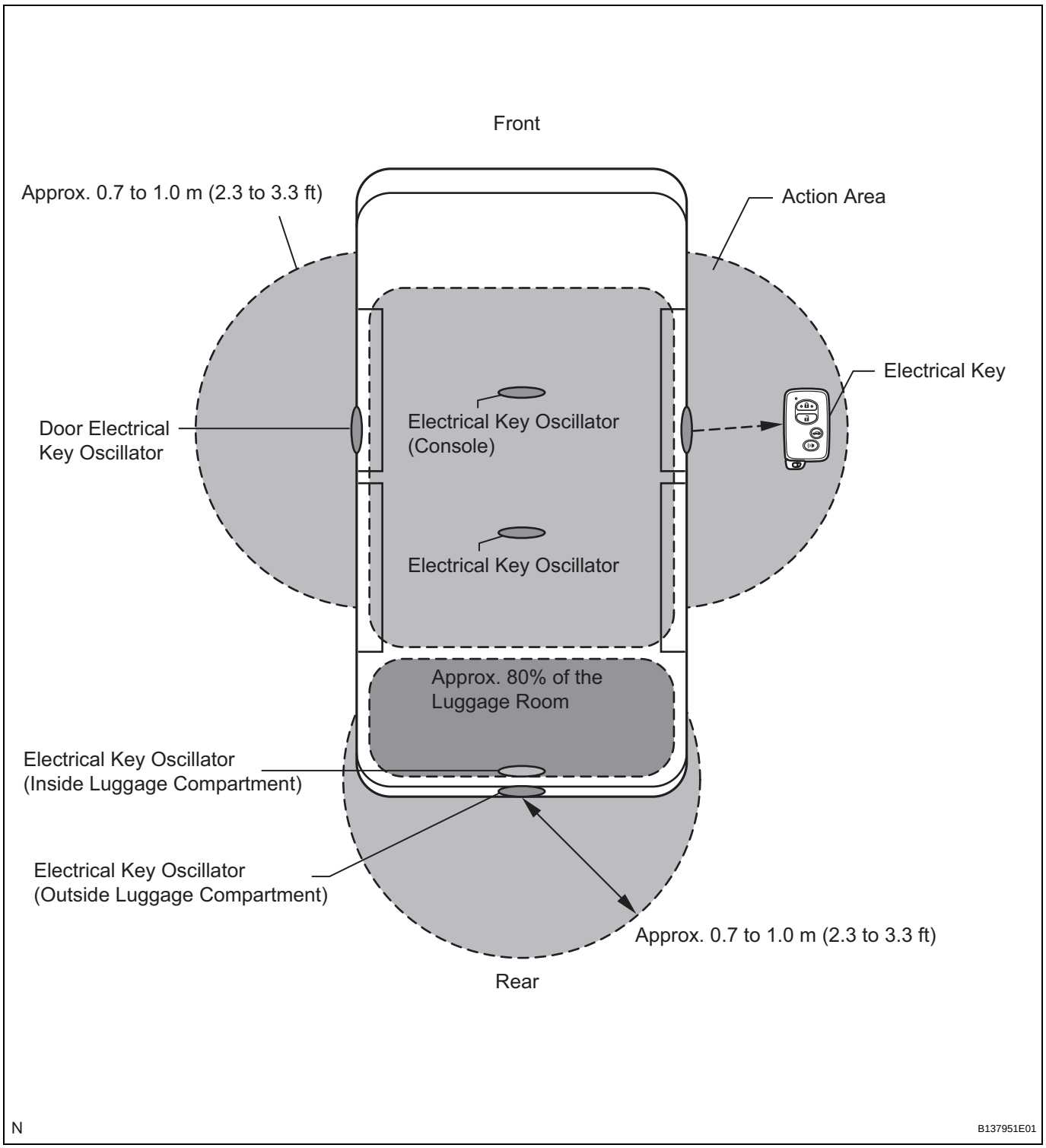
CAUTION:
If using a pacemaker, be sure to read the manual of the pacemaker before using the electrical key because the radio waves of the electrical key may affect the pacemaker.

1. SMART KEY SYSTEM DESCRIPTION

(a) In addition to conventional mechanical key and wireless door lock control functions, the smart key system enables door locking/unlocking, steering lock releasing, engine starting, and luggage compartment door opening without operating the electrical key. The only requirement is that the electrical key is in the user's possession.

- This system is controlled by the certification ECU. When the certification ECU detects the presence of an electrical key in one of the detection areas, it identifies and checks the ID code, and outputs operation signals to the related ECU in accordance with their functions.
- The detection areas are formed by 6 oscillators (2 door oscillators, 2 luggage compartment oscillators, and 2 cabin oscillators).

2. DETECTION AREA



(a) Precautions for the entire system:
- Be sure to carry the electrical key during inspection of the smart key system.
- As weak radio waves are used to detect the electrical key, the electrical key detection area may decrease, or the electrical key may not be detected correctly in the following situations:
  (a) The electrical key battery is depleted.

(b) Any facilities that generate strong radio waves, such as a TV tower, power plant, broadcast station, or gas station, are located near the inspection site.
(c) A wireless device, such as a cellular phone, is carried with the electrical key.
(d) The electrical key is in contact with or covered with metal.
(e) Another wireless door lock control function is operated near the vehicle.
(f) The electrical key is located near a device that generates high voltage or noise.

- The electrical key may be difficult to operate for a reason relating to the vehicle body shape.
- The electrical key may not be detected correctly if it is around the vehicle's windows, the door handle, or the center of the bumper even when it is in the detection area outside the vehicle.
- The electrical key may not be detected correctly if it is on the instrument panel, auxiliary box of the driver's side instrument panel, rear package tray, floor, or in the glove box even when it is in the detection area inside the vehicle.
- The engine cannot be started even when the electrical key is in the detection area inside the luggage compartment.
- The electrical key may not operate if the electrical key is not held properly.
- The smart key system does not operate in the following conditions:
  (a) The smart key system is canceled.
  (b) The electrical key battery is completely depleted (the indicator does not blink when pushing any of the buttons on the electrical key).

3. FUNCTION OF MAIN COMPONENTS

Component	Function
Electrical Key	Consists of mechanical key, transmitter for wireless door lock control, and transceiver for smart key system
Certification ECU	Controls smart key system in accordance with signals from each oscillator, various switches, ECUs, and electrical key • Judges and certifies ID code from entry door control receiver • Transmits engine immobiliser unset signal to ID code box • Transmits steering unlock signals to steering lock ECU
Main Body ECU (Instrument Panel J/B)	Controls push button start function in accordance with signals from various switches, ECUs, and combination meter • Transmits electrical key verification request signal to certification ECU in accordance with engine switch signal, and turns relays ON and OFF • Receives request signal from certification ECU and actuates door lock motor to unlock or lock door • Transmits each door condition signal to certification ECU
ID Code ECU	Receives steering unlock or engine immobiliser unset signals from certification ECU, certifies them, and transmits unset signals to steering lock ECU or ECM
Outside Door Handle (driver and passenger doors) (antenna)	Transmits request signals
Outside Door Handle (driver and passenger doors) (touch sensor)	Detects that person touches inside of outside handle

Component	Function
Outside Door Handle (driver and passenger doors) (lock switch)	Transmits door lock request signals to certification ECU
Door Electrical Key Oscillator (driver and passenger doors)	Receives request signal from certification ECU, and forms detection area around front door
Indoor Electrical Key Oscillator (console and rear seat)	Receives request signal from certification ECU, and forms detection area in vehicle interior
Luggage Compartment Electrical Key Oscillator (inner)	Receives request signal from certification ECU, and forms detection area in luggage compartment
Luggage Compartment Electrical Key Oscillator (outer)	Receives request signal from certification ECU, and forms detection area around luggage compartment door
Door Control Receiver	• Receives ID code from electrical key in detection area and transmits it to certification ECU • Receives ID code from electrical key in luggage compartment and transmits it to certification ECU
Electrical Key Antenna	Receives ID code from electrical key and transmits it to entry door control receiver
Luggage Compartment Opener Switch	Transmits luggage compartment door open request signal to certification ECU
Stop Light Switch	Outputs state of brake pedal to main body ECU
Wireless Door Lock Buzzer • Combination Meter – Multi-information Display – Buzzer	When certification ECU detects human errors such as those below, it warns driver by sounding wireless door lock buzzer, displaying information and sounding a buzzer in combination meter in accordance with request signal from ECU Example: • Electrical key is taken out of vehicle • Driver leaves vehicle while engine is still running • Driver leaves vehicle while shift lever is in any position other than P

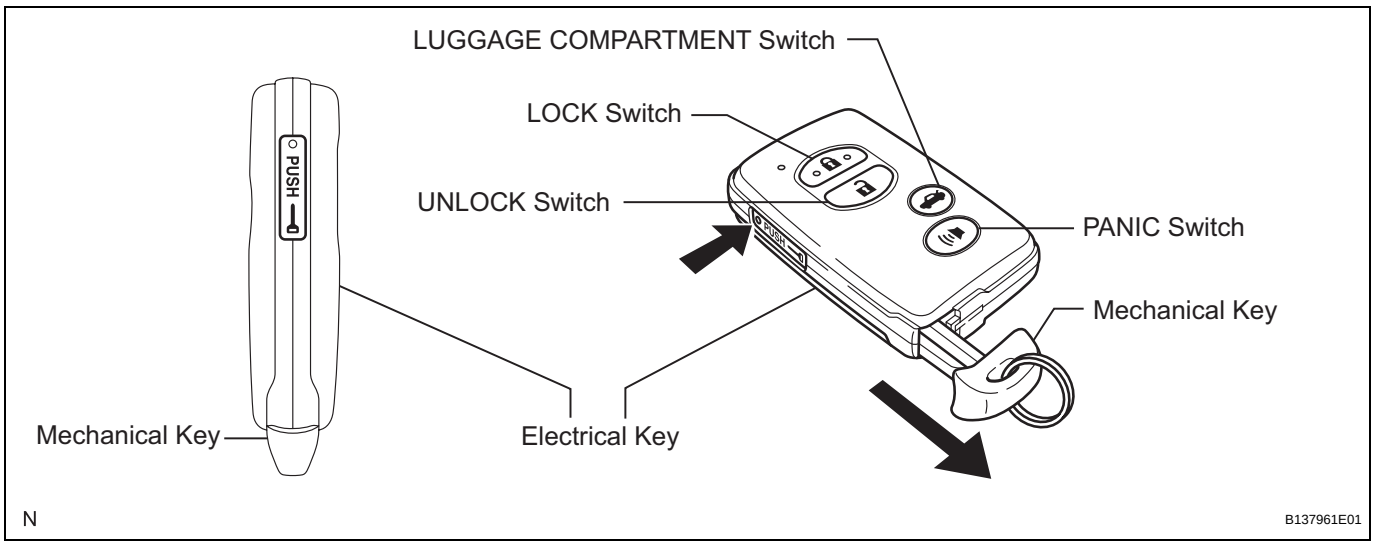
4. CONSTRUCTION AND OPERATION

(a) Electrical Key

The electrical key consists of a mechanical key, a transmitter for the wireless door lock control, and a transceiver for the smart key system.

- The transceiver for the smart key system receives signals from the oscillators and sends the ID code to the tuner.
- The transmitter for the wireless door lock control has a LOCK switch, UNLOCK switch, LUGGAGE COMPARTMENT switch, and PANIC switch.
- This mechanical key works for the driver door, luggage compartment door, and glove box, but cannot start the engine.

A total of 7 electrical keys can be registered.



(b) Oscillator (front door oscillator, front and rear indoor oscillator, luggage compartment inner oscillator, luggage compartment outer oscillator)
Each oscillator transmits the request signal received from the certification ECU, and forms an electrical key detection area to detect the presence of an electrical key. The detection area formed by front door oscillator and luggage compartment outer oscillator is approximately 0.7 to 1.0 m (2.3 to 3.3 ft) from the outside handle of front door or the center of the rear bumper.

- The detection area of front door oscillator is formed by transmitting a request signal every 0.25 seconds while the engine switch is off and each door is locked. In this way, it detects the proximity of an electrical key. During entry lock, the detection area is formed with the lock switch on.
- The detection area of the luggage compartment outer oscillator is formed when the power luggage door open switch is on.
- The detection area of the indoor oscillator (front and rear) is formed when the driver door is opened or closed, entry luggage compartment open, electrical key lock-in prevention during start ignition, when a warning is activated, or when the lock switch is on.
- The detection area of the luggage compartment inner oscillator is formed when the luggage compartment door is closed, entry luggage compartment open, electrical key lock-in prevention, the luggage compartment open switch or lock switch is pressed.

5. ENTRY FUNCTION OPERATION

(a) The smart key system has the following functions:

Function	Outline
Mechanical Key	Operation is same as conventional mechanical key.
Wireless Door Lock Control	This function remotely locks and unlocks all doors or luggage compartment. Operation is same as wireless door lock control system. However, receiver in certification ECU uses entry door control receiver to control locking and unlocking.
Entry Illumination	When person carrying electrical key enters detection area, door will enter unlock standby mode and front map light will illuminate.
Entry Unlock	When electrical key is located in detection area of door oscillator, door will unlock by touching inside of outside door handle.
Entry Unlock Mode Switching (See page DL-145)	Changes doors that can be unlocked with entry unlock function between 2 modes. • Driver door mode • All door mode
Entry Lock	When electrical key is located in detection area of door oscillator and engine switch is off, door can be locked by pressing lock switch on outside door handle.
Entry Luggage Compartment Open	When electrical key is in detection area of luggage compartment outer oscillator, luggage compartment opens by pressing luggage compartment open switch.
Memory Call	This function operates driving position memory system in accordance with electrical key ID code.
Electrical Key Lock-in Prevention	• Prevents confinement of electrical key if door is locked using outside door handle while electrical key is still inside vehicle. • If all doors are locked and luggage compartment door is closed while electrical key is still in luggage compartment, warning buzzer sounds. If luggage compartment open switch is operated, luggage compartment door can be opened.
Warning	When any of situations below occur, smart key system causes certification ECU to sound buzzer in combination meter and wireless door lock buzzer, and display information in order to alert driver. • Exit warning if shift lever position is not P and power source mode is not off. • Exit warning if shift lever position is P and power source mode is not off. • Warning if occupant leaves with electrical key. • Warning if engine switch is operated while electrical key is outside actuation area. • Warning if entry lock is operated while electrical key is inside vehicle. • Warning if electrical key battery is weak.
Battery Saving	If electrical key is constantly located within actuation area of door oscillator, system maintains periodic communication with electrical key. Therefore, if vehicle remains parked in that state for a long time, electrical key battery and vehicle battery could be drained.
Key Cancel (See page DL-145)	Following electrical key functions can be cancelled by performing certain operations: • Entry Unlock/Lock • Memory Call • Entry Luggage Compartment Open • Electrical key Lock-in Prevention • Warning
Electrical Key Code Registration	The total number of electrical keys that can be registered is seven. Enables the registration (writing and storing) of transmitter recognition codes in the EEPROM that is contained in the certification ECU.

6. WIRELESS DOOR LOCK AND UNLOCK AND LUGGAGE COMPARTMENT OPEN FUNCTION

Push the LOCK/UNLOCK/PANIC/LUGGAGE COMPARTMENT switch on the electrical key to operate each function. For details, (See page DL-69).

7. ENTRY UNLOCK FUNCTION

(a) The detection area is formed by communication between a door oscillator and door control receiver when the door is locked in order to detect access of the person carrying the electrical key.

(b) When the person carrying the electrical key enters the detection area around the vehicle, the matching of the ID codes for a door oscillator and electrical key will automatically be performed. After the matching is completed, the door will enter unlock standby mode.

(c) In unlock standby mode, the antenna built into the outside handle starts sensing. If the outside handle is held (the back side of the handle is touched), the door unlock operation will be performed. At this time, the hazard warning light blinks twice and the wireless door lock buzzer sounds twice.

(d) If any of the doors are not opened after a door unlock operation, all doors will automatically lock after 60 seconds.

8. ENTRY LOCK FUNCTION

(a) After leaving the vehicle carrying the electrical key, push the lock switch on the outside handle when all the doors are closed.

(b) The certification ECU determines whether the electrical key is located inside or outside of the cabin based on the information from a door oscillator and room oscillator. Then matching of the ID codes is performed.

(c) When the matching result shows that the ID codes of the electrical key and indoor antenna do not match and the ID codes of the electrical key and door oscillator match, the door lock function will operate. At this time, the hazard warning lights blink once and the wireless door lock buzzer sounds once.

(d) If the electrical key is located inside of the cabin, the door lock function will not operate and the alarm buzzer (beep sound) will sound for 2 seconds.

9. ENTRY LUGGAGE COMPARTMENT OPEN FUNCTION

Stand in front of the luggage compartment with the electrical key and push the power luggage compartment opener switch to start the matching of the ID codes for the electrical key oscillator (outside luggage compartment). If the ID codes match, luggage compartment door open operation will be performed.

10. PREVENTION OF ELECTRICAL KEY CONFINEMENT FUNCTION

(a) If you attempt to lock the door through keyless operation (move the lock knob to the lock position and then close the door) with the electrical key in the cabin, the system determines that the electrical key is located in the cabin and unlocks the door.

(b) If the luggage compartment is closed with the electrical key in it, the alarm will sound and the luggage compartment can be opened only when all the doors are locked in order to prevent electrical key confinement in the vehicle.

11. ENTRY ILLUMINATION FUNCTION

When a person carrying the electrical key enters the detection area, the door will enter unlock standby mode and the front map light will illuminate.

HINT:

The entry illumination function operates when the electrical key enters the vehicle exterior detection area from out of the detection area. If the electrical key remains in the detection area for 3 seconds or more, the illumination function does not operate.

12. MEMORY CALL FUNCTION

When the engine switch is off and the driver side door is closed, opening the door will operate the memory call function (the door will move to a previously recorded driving position). Using the electrical key, memory call, electrical key registration and electrical key cancellation can be performed.

13. WARNING FUNCTION

(a) General

When any of the situations below occur, the smart key system causes the certification ECU to sound the buzzer in the combination meter and the wireless door lock buzzer, and illuminate the combination meter's multi-information display in order to alert the driver.

Warning Function Operation Condition	Situation
Exit warning if shift lever position is not P and power source mode is not off.	A
Exit warning if shift lever position is P and power source mode is not off.	B
Warning if occupant leaves with electrical key.	C
Warning if engine switch is operated while electrical key is outside detection area.	D
Warning if entry lock is operated while electrical key is inside cabin.	E
Warning if electrical key battery is weak.	F

(b) Situation A

There are 2 patterns for situation A.

Pattern 1: In situation A, the door is opened and the user tries to leave the vehicle.

Pattern 2: Then the user holds the electrical key and tries to move away from the vehicle.

In these situations, the following control is performed:

- Pattern 1

Possible Effects without Warning	Sudden vehicle start, vehicle theft, vehicle roll-away
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is not P • Engine switch is not off • Driver side door is opened • Vehicle speed is 5 km/h (3.1 mph)

DL

Possible Effects without Warning	Sudden vehicle start, vehicle theft, vehicle roll-away
Combination Meter • Buzzer	Warning: Continuous sound Warning is stopped when one of following conditions is met: • Engine switch is off • Shift lever position is P • Driver side door is opened • Vehicle speed is above 5 km/h (3.1 mph)
Combination Meter • Multi-information Display	Warning: Continuous sound Warning is stopped when one of following conditions is met: • Engine switch is off • Shift lever position is P • Driver side door is opened • Vehicle speed is above 5 km/h (3.1 mph)
Wireless Door Lock Buzzer	-

• Pattern 2

Possible Effects without Warning	Sudden vehicle start, vehicle theft, vehicle roll-away
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is not P • Engine switch is not off • Driver side door is opened and closed • Vehicle speed is 0 km/h (0 mph) • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	Warning: Continuous sound Warning is stopped when one of following conditions is met: • Engine switch is off • Shift lever position is P • Electrical key is in cabin or luggage compartment • Vehicle speed is above 0 km/h (0 mph)
Combination Meter • Multi-information Display	Warning: Information below is displayed alternately on combination meter: • "Shift to P Range" • "Key is not Detected" "Shift to P Range" warning is stopped when one of following conditions is met: • Engine switch is off • Vehicle speed is above 0 km/h (0 mph) • Shift lever position is P "Key is not Detected" warning is stopped when either of following conditions is met: • Engine switch is off • Electrical key is in cabin
Wireless Door Lock Buzzer	Warning: Continuous sound Warning is stopped when one of following conditions is met: • Engine switch is off • Shift lever position is P • Electrical key is in cabin or luggage compartment • Vehicle speed is above 0 km/h (0 mph)

(c) Situation B

There are 2 patterns for situation B.

Pattern 1: In situation B, the door is opened and the user tries to leave the vehicle.

Then the user holds the electrical key and tries to move away from the vehicle.

Pattern 2: Then the user tries to use the entry lock and presses the lock switch.

In these situations, the following control is performed:

- Pattern 1

Possible Effects without Warning	Vehicle theft, engine cannot be restarted
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is P • Engine switch is not off • Driver side door is opened and closed • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	Warning: Sounds once
Combination Meter • Multi-information Display	Warning: Information below is displayed on combination meter: • "Key is not Detected" Warning is stopped when either of following conditions is met: • Engine switch is off • Electrical key is in cabin or luggage compartment
Wireless Door Lock Buzzer	Warning: Sounds 3 times Warning is stopped when either of following conditions is met: • Engine switch is off • Electrical key is in cabin or luggage compartment

- Pattern 2

Possible Effects without Warning	Vehicle theft
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Shift lever position is P • Engine switch is not off • All doors are closed • Lock switch is "ON" • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	-
Wireless Door Lock Buzzer	Warning: Sounds for 2 seconds

(d) Situation C

In this situation, the following control is performed:

Possible Effects without Warning	Engine cannot be restarted
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Engine switch is not off • Door other than driver side door is opened and closed • Vehicle speed is 0 km/h (0 mph) • Electrical key is not in cabin or luggage compartment
Combination Meter • Buzzer	Warning: Sounds once

Possible Effects without Warning	Engine cannot be restarted
Combination Meter • Multi-information Display	Warning: Information below is displayed on combination meter: • "Key is not Detected" Warning is stopped when one of following conditions is met: • Engine switch is off • Vehicle speed is above 0 km/h (0 mph) • Electrical key is in cabin or luggage compartment
Wireless Door Lock Buzzer	Warning: Sounds 3 times Warning is stopped when one of following conditions is met: • Engine switch is off • Vehicle speed is above 0 km/h (0 mph) • Electrical key is in cabin or luggage compartment

(e) Situation D

In this situation, the following control is performed:

Possible Effects without Warning	Confuses the user
Warning Condition	Certification ECU gives warning when both following conditions are satisfied: • Engine switch is not off • Electrical key is not in cabin
Combination Meter • Buzzer	Warning: Sounds once
Combination Meter • Multi-information Display	Warning: Information below is displayed on combination meter for 8 seconds (disappears after 8 seconds): • "Key is not Detected"
Wireless Door Lock Buzzer	-

(f) Situation E

In this situation, the following control is performed:

Possible Effects without Warning	Vehicle theft
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Engine switch is off • All doors are closed • Lock switch is "ON" • Electrical key is in cabin or luggage compartment
Combination Meter • Buzzer	-
Combination Meter • Multi-information Display	-
Wireless Door Lock Buzzer	Warning: Sounds for 2 seconds

(g) Situation F

In this situation, the following control is performed:

Possible Effects without Warning	Smart key system does not function
Warning Condition	Certification ECU gives warning when all following conditions are satisfied: • Engine switch is turned off after being left on (IG) for over 20 minutes • Electrical key battery voltage is low • Electrical key is in cabin
Combination Meter • Buzzer	Warning: Sounds once
Combination Meter • Multi-information Display	Information below is displayed on combination meter: • "Low Key Battery"
Wireless Door Lock Buzzer	-

14. BATTERY SAVING

(a) Vehicle Battery Saving Function

In the smart key system, signals are emitted outside of the vehicle at a prescribed interval (0.25 seconds) when the doors are locked. Therefore, the vehicle battery could be drained if the vehicle remains parked for a long time. For this reason, the controls listed below are carried out:

Condition	Control
Both conditions below are met for 5 days: • Electrical key is not in detection area • Touch sensor or lock switch operation is not performed	Signal transmission interval is extended from 0.25 to 0.75 seconds
Both conditions below are met for 14 days: • Electrical key is not in detection area • Touch sensor or lock switch operation is not performed	Automatically deactivates the smart key system

Reinstatement Conditions

- A wireless door lock control signal (lock, unlock) is input and the ID code matches.
- A user carries the electrical key and pushes a lock switch on an outside door handle.
- A door is locked or unlocked by the mechanical key.

(b) Electrical Key Battery and Vehicle Battery Saving Function

In the smart key system, if the electrical key is constantly located within the vehicle exterior detection area of the doors, the system maintains periodic communication with the electrical key. Therefore, if the vehicle remains parked in that state for a long time, the electrical key battery and the vehicle battery could be drained. For this reason, if this state continues longer than 10 minutes, the smart key system automatically becomes deactivated.

Reinstatement Conditions

- A wireless door lock control signal (lock, unlock) is input and the ID code matches.
- A user carries the electrical key and pushes a lock switch on an outside door handle.
- A door is locked or unlocked by the mechanical key.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the smart key system.
- The intelligent tester can be used in steps 4, 5 and 7.
- When troubleshooting the smart key system using the intelligent tester with the engine switch off, connect the intelligent tester to the vehicle and repeat turning any of the courtesy light switches on and off until communication between the tester and the vehicle begins (the interval between ON and OFF should be less than 1.5 sec.).

1	**VEHICLE BROUGHT TO WORKSHOP**

NEXT

2	**CUSTOMER PROBLEM ANALYSIS CHECK**

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

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NEXT

3	**INSPECT BATTERY VOLTAGE**

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

4 INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check if the CAN Communication System is functioning normally (See page CA-8).

Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → **GO TO CAN COMMUNICATION SYSTEM**

A

5 CHECK FOR DTC

(a) Check for DTCs and note any codes that are output (See page DL-156).
(b) Delete the DTCs.
(c) Recheck for DTCs.

Result

Result	Proceed to
DTC does not reoccur	A
DTC reoccurs	B

B → **GO TO DIAGNOSTIC TROUBLE CODE CHART**

A

6 PROBLEM SYMPTOMS TABLE

NEXT

7 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) On-vehicle inspection (See page DL-160)
(b) DATA LIST/ACTIVE TEST (See page DL-156)
(c) Terminals of ECU (See page DL-150)

NEXT

8 REPAIR OR REPLACEMENT

NEXT

9	**CONFIRMATION TEST**

NEXT

END

CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:

The items in the table below can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

HINT:

The following functions' default settings are ON. Part of these functions can be customized.

SMART:

Display (Item)	Default	Contents	Setting
PARK WAIT TIME (Wait time to permit opening door after locking)	2.5s	Function that sets waiting time to permit opening door after door is locked with entry lock function.	0.5s / 1.5s / 2.5s / 5.0s
SMART UNLOCK	D_DOOR	Function that switches the entry unlock detection area.	ALL / D_DOOR
SMART IGNITION (SMART ignition available area)	ALL	Function to choose the available area for electrical key to start E/G and cancel the steering lock.	FRONT / ALL
SMART TRUNK (Luggage compartment opening operation)	ON	Function to open a luggage compartment when the driver has the electrical key and presses the luggage open button.	ON / OFF

WIRELESS DOOR LOCK:

Display (Item)	Default	Contents	Setting
ALARM FUNCTION (Panic function)	ON	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 2.5 seconds. If there is a panic button, press the panic button instead of the lock button.	ON / OFF

WARNING:

Display (Item)	Default	Contents	Setting
KEY LOW-BATT WRN	ON	Function to set a warning function for the time when a key battery becomes weak.	ON / OFF

2. Entry Unlock Mode Switching Function

(a) To change the vehicle to entry unlock mode switching function, make sure the vehicle power is off and simultaneously press and hold the electrical key's LOCK switch and another electrical key switch for 4.5 seconds.

When the switches are pressed and held for 4.5seconds, the entry door unlock mode changes in the following order: driver door mode, all door mode.

NOTICE:

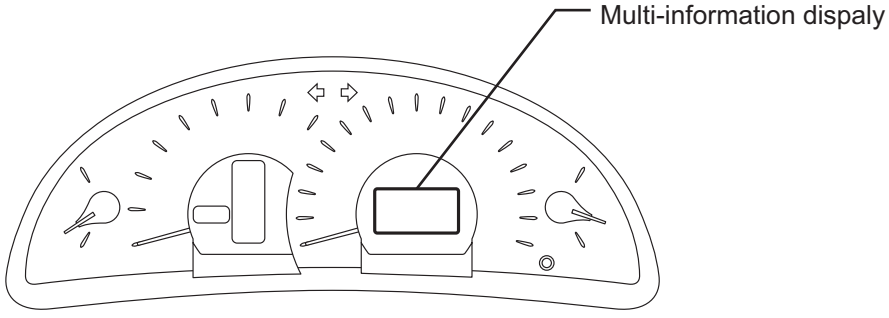
After pressing and holding the switches for 4.5 seconds, wait 5 seconds before performing the same procedure again.

- Driver door unlock mode:
  When the driver door's touch sensor is touched, only the driver door unlocks. When another touch sensor is touched, all doors unlock.
- All door unlock mode:
  When the touch sensor is touched, all doors unlock.

(b) The certification ECU receives this signal from the entry door control receiver and changes the smart key system to the entry unlock mode.

(c) The certification ECU sounds the buzzers of the wireless door lock buzzer and combination meter to inform the user that the mode has been switched.

Mode	Wireless Door Lock Buzzer	Combination Meter		
		Multi-information Display		Buzzer
Driver Door (Default)	ON OFF Sounds 3 times	Displayed for 5 sec.	Passenger, rear LH and RH door “open” indication	Sounds once
All Doors (Customized)	ON OFF Sounds 2 times	Displayed for 5 sec.	All door “open” indication	Sounds once



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HINT:
The function only changes the entry unlock mode of the smart key system. It does not switch the unlocking of the wireless door lock control.

3. Electrical Key Cancel

The electrical key cancel operation disables the following functions:

- Entry Ignition
- Entry Unlock/Lock
- Entry Luggage Compartment Open
- Electrical Key Lock-in Prevention
- Warning
- Memory Call

(a) The operation procedures are as follows:
Precondition:
Engine switch off, driver side door closed and unlocked.
(1) Unlock the driver side door once with the UNLOCK switch of the electrical key.
(2) Open the driver door within 5 seconds.
(3) Unlock the driver side door twice with the UNLOCK switch of the electrical key within 5 seconds.
(4) Repeat open → close twice for the driver door within 30 seconds, and open again.
(Driver door: Open → Close → Open → Close → Open)
(5) Unlock the driver side door twice with the UNLOCK switch of the electrical key within 5 seconds.
(6) Repeat open → close once for the driver door within 30 seconds, and open again.
(Driver door: Open → Close → Open)
(7) Close the driver door within 5 seconds.
When electrical key cancel is activated, the wireless door lock buzzer sounds twice.
To return to the original condition, perform the procedures again. When the original condition is returned, the wireless door lock buzzer sounds once.

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptoms. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

SMART KEY SYSTEM:

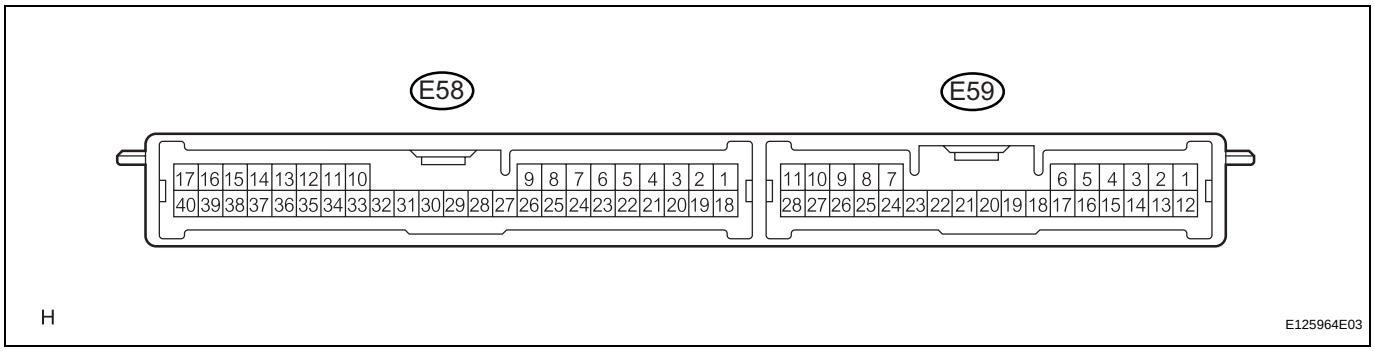
Symptom	Suspected area	See page
Entry lock/unlock does not operate.	1. Check for DTCs in the smart key system (Starting function).	ST-26
	2. Refer to PROBLEM SYMPTOMS TABLE of the power door lock control system ("All doors cannot be locked/unlocked simultaneously by neither door control switch nor door key cylinder").	DL-11
	3. Courtesy light switch circuit	LI-52
	4. Lock position switch circuit	-
	- Driver door	DL-19
	- Front passenger door	DL-22
	- Rear passenger door LH	DL-25
	- Rear passenger door RH	DL-28
	5. Entry lock switch cirucit	DL-173
	6. Touch sensor circuit	DL-177
	7. Antenna circuit	DL-180
	8. Refer to "ID code matching inside the cabin cannot be performed".	-
	9. Door oscillator circuit	DL-168
	10. Replace the main body ECU.	-
	11. Replace the certification ECU.	-
Luggage compartment does not open (when the electrical key is outside the vehicle).	1. Check for DTCs in the smart key system (Starting function).	ST-26
	2. Check if any function is cancelled due to customization.	DL-145
	3. Refer to PROBLEM SYMPTOM TABLE of the power door lock control system ("Luggage compartment door opener does not operate").	DL-11
	4. Operate the luggage compartment opener switch on the electrical key to check the wireless function.	DL-71
	5. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-74
	6. Check operation of the cabin oscillator in active test.	DL-156
	7. Luggage oscillator circuit	DL-182
	8. Luggage compartment opener switch circuit	DL-188
	9. Replace the main body ECU.	-
	10. Replace the certification ECU.	-
All entry function does not operate.	1. Registration of the key.	EI-8
	2. Certification ECU power source circuit	DL-190
	3. Replace certification ECU.	-

Symptom	Suspected area	See page
Function to prevent electrical key confinement in the luggage compartment does not operate. (The luggage compartment does not open.)	1. Check for DTCs in the smart key system (Starting function).	ST-26
	2. Power door lock control system	DL-11
	3. Courtesy light switch circuit	LI-52
	4. Lock position switch circuit	-
	- Driver door	DL-19
	- Front passenger door	DL-22
	- Rear passenger door LH	DL-38
	- Rear passenger door RH	DL-28
	5. Check if any function is not cancelled due to customization.	DL-145
	6. Operate the LOCK/UNLOCK SW on the key to check the wireless function.	DL-71
	7. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-74
	8. Check operation of the cabin oscillator in active test.	DL-156
	9. Luggage oscillator circuit	DL-182
	10. Replace the main body ECU.	-
	11. Replace the certification ECU.	-
Function to prevent electrical key confinement in the luggage compartment does not operate. (The alarm does not sound.)	1. Check if the function to prevent electrical key confinement in the luggage compartment operates.	DL-160
	2. Check if answer back is performed when the wireless door lock is operated.	DL-74
	3. Replace the certification ECU.	-
The outside alarm of the answer back and entry systems does not sound.	1. Check if the function to prevent electrical key confinement in the luggage compartment operates.	DL-160
	2. Check that "WIRLS BUZZ RESP" and "HAZARD ANS BACK" in the DATA LIST of the main body ECU are YES. (If it is NO, go to power door lock system.)	DL-81
	3. Wireless door lock tuner circuit (DTC B1242)	DL-164
	4. Replace the certification ECU.	-
The inside alarm of the entry system does not sound.	1. Operate the LOCK/UNLOCK SW on the electrical key to check the wireless function.	DL-71
	2. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("Wireless door lock function").	DL-74
	3. Check if the electrical key reminder buzzer sounds.	DL-160
	4. Replace the certification ECU.	-
ID code matching inside the cabin cannot be performed.	1. Check if any function is cancelled due to customization.	DL-145
	2. Operate the LOCK/UNLOCK SW on the key to check the wireless function.	DL-71
	3. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-74
	4. Check the cabin oscillator operation in the active test.	DL-156
	5. Room oscillator circuit	DL-185
	6. Luggage oscillator circuit	DL-182
	7. Replace the certification ECU.	-
ID code matching outside the cabin cannot be performed.	1. Check if any function is cancelled due to customization.	DL-145
	2. Operate the LOCK/UNLOCK SW on the electrical key to check the wireless function.	DL-71
	3. Refer to PROBLEM SYMPTOMS TABLE of the wireless door lock control system ("The wireless door lock control system does not operate").	DL-74
	4. Check operation of each door oscillator in active test.	DL-156
	5. Door oscillator circuit	DL-168

Symptom	Suspected area	See page
Key reminder buzzer does not sound.	1. Perform ACTIVE TEST for the combination meter.	ME-32
	2. Check "COURTESY SW" in the DATA LIST of the power door lock control system.	DL-17
	3. Check the key reminder buzzer when the engine switch is on (ACC) and the driver's door is opened.	-
	4. Check if the steering wheel is locked when all power supplies are OFF and the driver's door is opened.	-
	5. Refer to PROBLEM SYMPTOMS TABLE of the steering lock system ("Steering wheel cannot be locked").	SR-10
	6. Check that the "LCK BAR STUCK" item in the DATA LIST of the certification ECU displays OK.	SR-14
	7. Replace the steering lock ECU.	-
	8. Replace the certification ECU.	-

TERMINALS OF ECU

1. CHECK CERTIFICATION ECU



(a) Disconnect the E58 ECU connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - Body ground	W - Body ground	+B power supply	Always	10 to 14 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Engine switch off	Below 1 V
IG (E58-18) - Body ground	LG - Body ground	Ignition power supply	Engine switch on (IG)	10 to 14 V
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
ACC (E58-19) - Body ground	L - Body ground	ACC power supply	Engine switch off	Below 1 V
ACC (E58-19) - Body ground	L - Body ground	ACC power supply	Engine switch on (ACC)	10 to 14 V
TSW1 (E58-3) - Body ground	GR - Body ground	Entry lock switch signal	Front lock switch LH not pushed	10 kΩ or higher
TSW1 (E58-3) - Body ground	GR - Body ground	Entry lock switch signal	Front lock switch LH pushed	Below 1 Ω
TSW2 (E58-4) - Body ground	L - Body ground	Entry lock switch signal	Front lock switch RH not pushed	10 kΩ or higher
TSW2 (E58-4) - Body ground	L - Body ground	Entry lock switch signal	Front lock switch RH pushed	Below 1 Ω
LIN (E58-10) - Body ground	O - Body ground	LIN line	Always	10 kΩ or higher
CANH (E58-27) - Body ground	L - Body ground	CAN line	Always	10 kΩ or higher
CANL (E58-28) - Body ground	W - Body ground	CAN line	Always	10 kΩ or higher
AGND (E58-40) - Body ground	G - Body ground	Ground	Always	Below 1 Ω
TSW5 (E58-7) - Body ground	G - Body ground	Luggage compartment opener switch signal	Opener switch OFF	10 kΩ or higher
TSW5 (E58-7) - Body ground	G - Body ground	Luggage compartment opener switch signal	Opener switch ON	Below 1 Ω

If the result is not as specified, the wire harness side may have a malfunction.

(c) Reconnect the E58 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CLG1 (E58-33) - CG1B (E58-34)	LG - L	Door electrical key oscillator (front LH) sensor signal	All doors closed, all doors locked and engine switch off	Alternating between 5 V and below 1 V
CLG1 (E58-33) - CG1B (E58-34)	LG - L	Door electrical key oscillator (front LH) sensor signal	Door unlocked or door open	Below 1 V
SEN1 (E58-22) - E (E58-17)	B - W-B	Touch sensor detection signal	Outside door handle touched	Below 1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SEN1 (E58-22) - E (E58-17)	B - W-B	Touch sensor detection signal	Outside door handle not touched (Have the electrical key outside the cabin)	10 to 14 V
SEL1 (E58-5) - E (E58-17)	V - W-B	Touch sensor activation control signal	Move the key more than 5 m (16.4 ft) away from the front door LH	10 to 14 V
SEL1 (E58-5) - E (E58-17)	V - W-B	Touch sensor activation control signal	Bring it to the outside handle	Below 1 V
CLG2 (E58-35) - CG2B (E58-36)	GR - BR	Door electrical key oscillator (front RH) sensor signal	All doors closed, all doors locked and engine switch off	Alternating between 5 V and below 1 V
CLG2 (E58-35) - CG2B (E58-36)	GR - BR	Door electrical key oscillator (front RH) sensor signal	Door unlocked or door open	Below 1 V
SEN2 (E58-23) - E (E58-17)	O - W-B	Touch sensor detection signal	Outside door handle touched	Below 1 V
SEN2 (E58-23) - E (E58-17)	O - W-B	Touch sensor detection signal	Outside door handle not touched (Have the electrical key outside the cabin)	10 to 14 V
SEL2 (E58-6) - E (E58-17)	P - W-B	Touch sensor activation control signal	Move the key more than 5 m (16.4 ft) away from the front door RH	10 to 14 V
SEL2 (E58-6) - E (E58-17)	P - W-B	Touch sensor activation control signal	Bring it to the outside handle	Below 1 V
CLG5 (E58-11) - CG5B (E58-12)	R - W	Indoor electrical key oscillator (front) sensor signal	Within 30 seconds driver side door opened and closed, engine switch off	Alternating between 5 V and below 1 V
CLG5 (E58-11) - CG5B (E58-12)	R - W	Indoor electrical key oscillator (front) sensor signal	Engine switch on (IG)	Below 1 V
CLG6 (E58-13) - CG6B (E58-14)	Y - B	Indoor electrical key oscillator (rear) sensor signal	Within 30 seconds after driver side door opened and closed, engine switch off	Alternating between 5 V and below 1 V
CLG6 (E58-13) - CG6B (E58-14)	Y - B	Indoor electrical key oscillator (rear) sensor signal	Engine switch on (IG)	Below 1 V
CLG7 (E58-15) - CG7B (E58-16)	R - W	Luggage electrical key oscillator (inner) sensor signal	Luggage compartment door opening switch ON	Alternating between 5 V and below 1 V
CLG7 (E58-15) - CG7B (E58-16)	R - W	Luggage electrical key oscillator (inner) sensor signal	Luggage compartment door opening switch OFF	Below 1 V
CLG8 (E58-31) - CG8B (E58-32)	V - P	Luggage electrical key oscillator (outer) sensor signal	Luggage compartment door opening switch ON	Alternating between 5 V and below 1 V
CLG8 (E58-31) - CG8B (E58-32)	V - P	Luggage electrical key oscillator (outer) sensor signal	Luggage compartment door opening switch OFF	Below 1 V
RC0 (E58-29) - E (E58-17)	G - W-B	Entry door control receiver power source	Engine switch off, all doors closed and electrical key switch on	4.5 to 5.5 V
RC0 (E58-29) - E (E58-17)	G - W-B	Entry door control receiver power source	Engine switch off, all doors closed and electrical key switch off	Below 1 V
RSSI (E58-39) - E (E58-17)	R - W-B	Entry door control receiver electric wave existence signal	Engine switch off, all doors closed, the electrical key is not in the action area	10 to 14 V

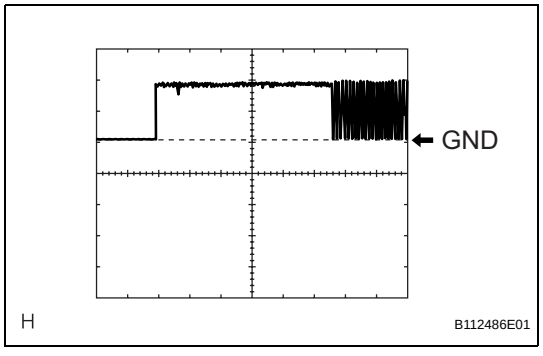
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RSSI (E58-39) - E (E58-17)	R - W-B	Entry door control receiver electric wave existence signal	Engine switch off, all doors closed, the electrical key is in the action area	Below 1 V
RDA (E58-38) - E (E58-17)	Y - W-B	Entry door control receiver data input signal	Engine switch off, all doors closed and electrical key switch off	10 to 14 V (Pulse generation)
RDA (E58-38) - E (E58-17)	Y - W-B	Entry door control receiver data input signal	Engine switch off, all doors closed and electrical key switch on	Pulse generation
RDA (E58-38) - Body ground	Y - Body ground	Tuner input signal	Engine switch off, all doors closed, the electrical key is not in the action area	10 to 14 V (Pulse generation)
RDA (E58-38) - Body ground	Y - Body ground	Tuner input signal	The electrical key is in the action area.	Pulse generation
ASEL (E58-37) - Body ground	V - Body ground	Cabin / luggage receiver select signal	Engine switch off, luggage compartment door closed and the electrical key is in the luggage action area	4.6 to 6.0 V
ASEL (E58-37) - Body ground	V - Body ground	Cabin / luggage receiver select signal	Engine switch off, luggage compartment door open	Below 1 V
VC5 (E58-30) - Body ground	R - Body ground	Transponder key amplifier power supply	Electrical key is not in the cabin.	Below 1 V
VC5 (E58-30) - Body ground	R - Body ground	Transponder key amplifier power supply	Have the electrical key outside the cabin and open the driver's door.	4.5 to 5.5 V
TXCT (E58-8) - Body ground	GR - Body ground	Transponder key amplifier output signal	Electrical key is not in the cabin.	Below 1 V
TXCT (E58-8) - Body ground	GR - Body ground	Transponder key amplifier output signal	Have the electrical key outside the cabin and open the driver's door.	Pulse generation (see waveform 1)
CODE (E58-9) - Body ground	W - Body ground	Transponder key amplifier communication signal	Electrical key is not in the cabin.	Below 1 V
CODE (E58-9) - Body ground	W - Body ground	Transponder key amplifier communication signal	Have the electrical key outside the cabin and open the driver's door. Hold the electrical key close to the engine switch with the brake pedal depressed.	Pulse generation (see waveform 2)
BZR (E58-21) - Body ground	O - Body ground	Wireless door lock buzzer signal	Wireless door lock buzzer OFF	Below 1 V
BZR (E58-21) - Body ground	O - Body ground	Wireless door lock buzzer signal	Wireless door lock buzzer ON	Pulse generation

If the result is not as specified, the ECU may have a malfunction.

(e) Inspect using an oscilloscope.

Waveform 1 (Reference):

Terminal	TXCT - Body ground
Tool Setting	2 V/DIV, 10 ms./DIV
Condition	Have the electrical key outside the cabin and open the driver's door.



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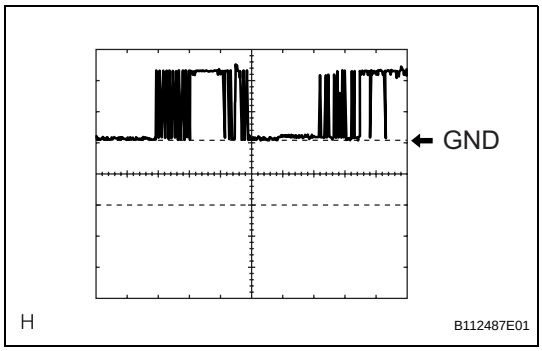


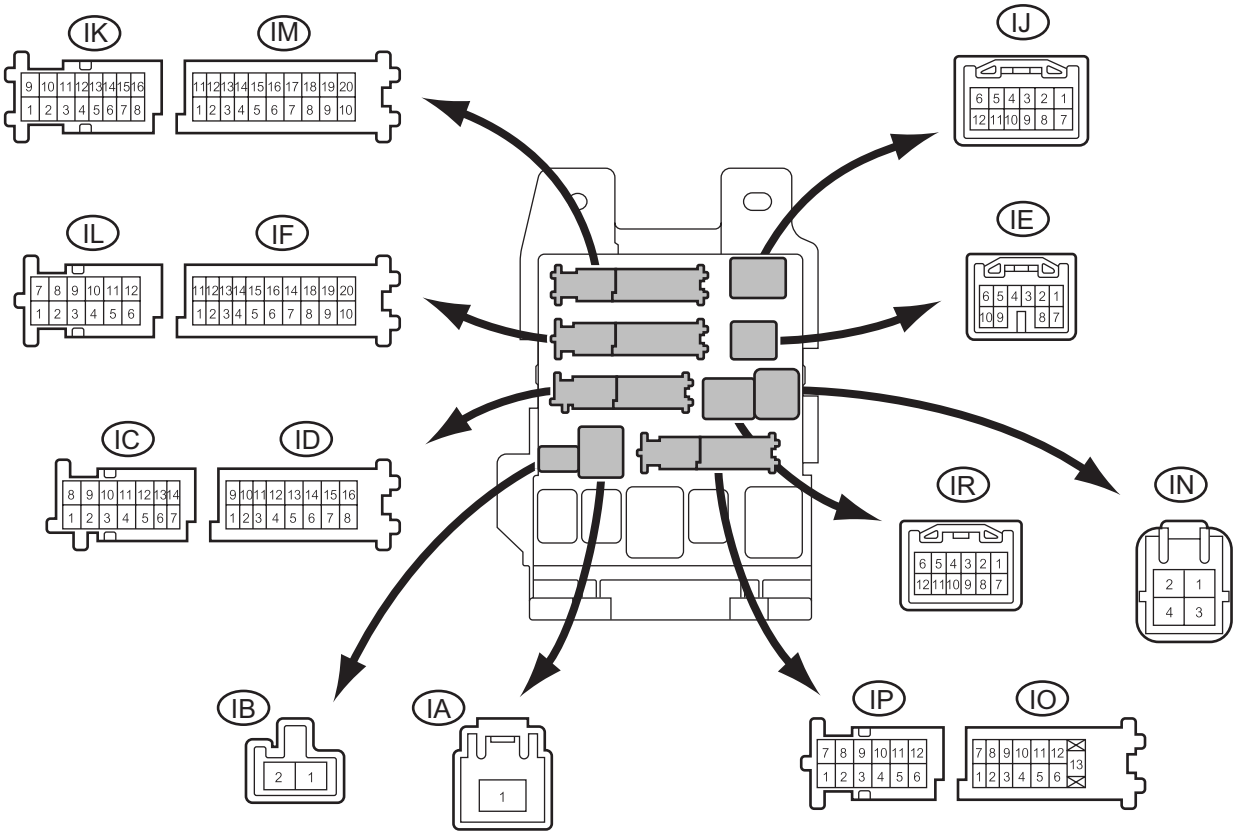
(f) Inspect using an oscilloscope.
Waveform 2 (Reference):

Terminal	CODE - Body ground
Tool Setting	2 V/DIV, 20 ms./DIV
Condition	Have the electrical key outside the cabin and open the driver's door. Hold the electrical key close to the engine switch with the brake pedal depressed.

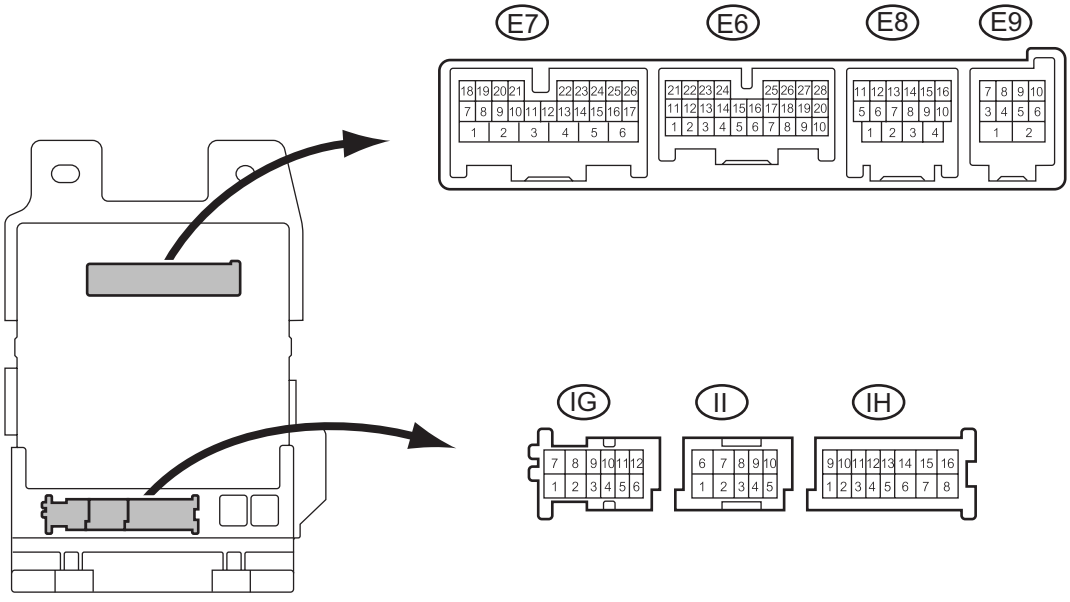
2. MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

(a) Measure the voltage and resistance according to the value(s) in the table below.

Front Side:



Back Side:



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Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CANN (E8-15) - Body ground	W - Body ground	CAN Line	Always	10 kΩ or higher
CANP (E8-16) - Body ground	L - Body ground	CAN Line	Always	10 kΩ or higher
STP (IL-7) - Body ground	L - Body ground	Stop light switch signal	Brake pedal depressed	10 to 14 V
STP (IL-7) - Body ground	L - Body ground	Stop light switch signal	Brake pedal depressed	Below 1 V

If the result is not as specified, the junction block may have a malfunction.

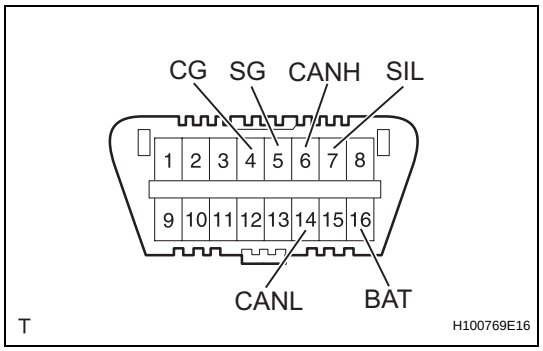
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Smart key system data and the Diagnostic Trouble Codes (DTCs) can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3

The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine switch OFF*	54 to 69 Ω
CANH (6) - Battery positive (+)	HIGH-level CAN bus line	Engine switch OFF*	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch OFF*	200 Ω or higher
CANL (14) - Battery positive (+)	LOW-level CAN bus line	Engine switch OFF*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch OFF*	200 Ω or higher

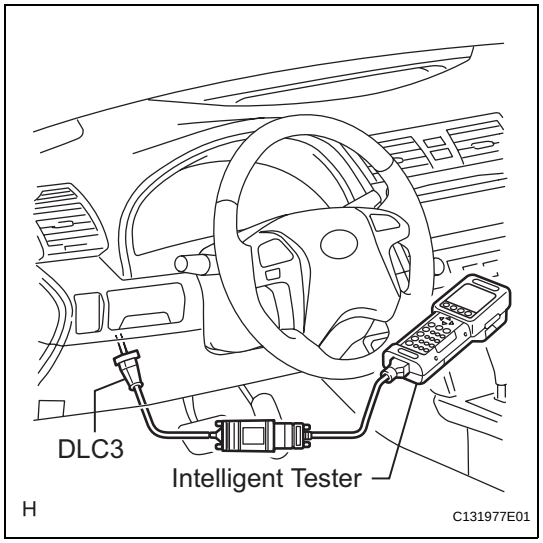
*: Before measuring the resistance, leave the vehicle for at least 1 minute and do not operate the engine switch, any switches or doors.

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the engine switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



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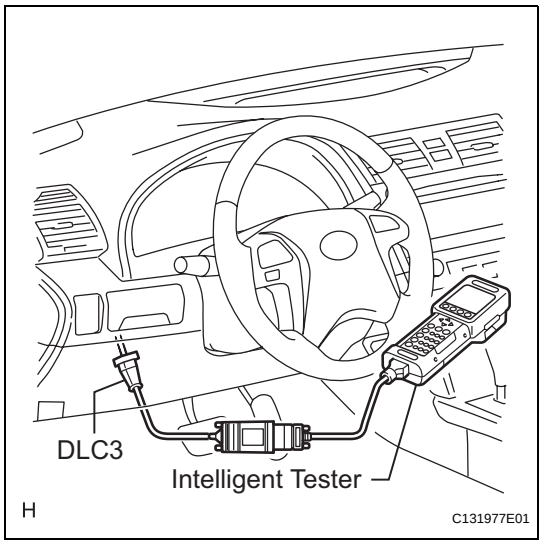


DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
(d) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menu items: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES.
(d) Erase the DTC by following the directions on the tester screen.

HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST relay in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the engine switch on (IG). When the intelligent tester cannot be turned on due to a malfunction or other problem, refer to "precautions when using the intelligent tester" (See page DL-118).

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.

(d) Read the DATA LIST according to the display on the tester.

SMART ACCESS (Certification ECU):

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
D TOUCH SENSOR	Driver side door touch sensor / ON or OFF	ON: Sensor is touched OFF: Sensor is not touched	-
P TOUCH SENSOR	Front passenger side door touch sensor / ON or OFF	ON: Sensor is touched OFF: Sensor is not touched	-
D TRIGGER SW	Driver side door lock switch / ON or OFF	ON: Switch is touched OFF: Switch is not touched	-
P TRIGGER SW	Front passenger side door lock switch / ON or OFF	ON: Switch is touched OFF: Switch is not touched	-
TR/B-DOOR UNLK	Luggage compartment door unlock switch / ON or OFF	ON: Switch is pushed OFF: Switch is not pushed	-
IG SW	Engine switch / ON or OFF	ON: Engine switch is on (IG) OFF: Engine switch is off	-
ACC SW	Engine switch / ON or OFF	ON: Engine switch is on (ACC) OFF: Engine switch is off	-
P/S 10-MIN	Power save counter - 10 minutes / Min: 0; Max: 255	Power save counter after door LOCK/UNLOCK-10 minutes	-
P/S 5-DAY	Power save counter - 5 days / Min: 0; Max: 255	Power save counter after door LOCK/UNLOCK-5 days	-
P/S 14-DAY	Power save counter - 14 days / Min: 0; Max: 255	Power save counter after door LOCK/UNLOCK-14 days	-
UNMATCH V-ID	Unmatched vehicle-ID / YES or NO	YES: Key ID matches vehicle NO: Key ID does not match vehicle	-
NO RESPONSE	No response / YES or NO	YES: Response from key NO: No response from key	-
UNMATCH FORMAT	Unmatched response code and format / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-
LOW BATTERY	Key low battery / YES or NO	YES: Key battery voltage drops NO: Key battery voltage is normal	-
WRONG CODE	ID code difference / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-
WRONG C CODE	Challenge code difference (Response) / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-
WRONG ID CODE	ID code difference / YES or NO	YES: Key ID code matches NO: Key ID code does not match	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
WRONG ROL CODE	Rolling code difference / YES or NO	YES: Key rolling code matches NO: Key rolling code does not match	-
DOOR UNLOCK MOD	Door unlock mode / ALL, D_DOOR	Mode status is displayed	-
FUNCTION CANCEL	Entry door lock function cancel / ON or OFF	Mode status is displayed	-
MASTER KEY	Master key / MATCH or NO MATCH	MATCH: Key code is sent NO MATCH: Unmatched key code	-
SUB KEY	Sub key / MATCH or NO MATCH	MATCH: Key code is sent NO MATCH: Unmatched key code	-
BCC	Transponder chip data / OK or NG	OK: Correct data sensing NG: Incorrect data sensing	-
STATUS	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
ENCRYPT CODE	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
SERIAL NUMBER	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
FRAME	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
RESPONSE	Transponder chip data / OK or NG	OK: With no response NG: Those with a response	-
#CODE	Diagnostic trouble code / Min.: 0, Max.: 255	-	-
IGNITION AREA	Ignition available area / FRONT or ALL	Customization status is displayed	-
PARK WAIT TIME	Parking wait time / 0.5s, 1.5s, 2.5s, 5s	Customization status is displayed	-
TRUNK OPEN MODE	Luggage compartment door open mode with vehicle locked / ON or OFF	Customization status is displayed	-
KEY LO-BATT WRN	Key low battery warning / ON or OFF	Customization status is displayed	-

MAIN BODY:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
LUGG COURTESY SW	Luggage compartment door courtesy light switch signal / ON or OFF	ON: Luggage compartment door open OFF: Luggage compartment door closed	-
D DOR CTY SW	Driver side door courtesy light switch signal / ON or OFF	ON: Driver side door open OFF: Driver side door closed	-
P DOR CTY SW	Front passenger side door courtesy light switch signal / ON or OFF	ON: Front passenger side door open OFF: Front passenger side door closed	-
RL DOR CTY SW	Rear door courtesy light switch LH signal / ON or OFF	ON: Rear door open OFF: Rear door closed	-
RR DOR CTY SW	Rear door courtesy light switch RH signal / ON or OFF	ON: Rear door open OFF: Rear door closed	-
TRUNK KEY UNLOCK	Luggage compartment door lock/ unlock switch / ON or OFF	ON: Luggage compartment door lock switch is pushed OFF: Luggage compartment door lock switch is not pushed	-

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
IG SW	Engine switch / ON or OFF	ON: Engine switch is on (IG) OFF: Engine switch is off	-

METER (Combination Meter):

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
KEY REMND VOLUM	Key reminder buzzer volume condition / LARGE, MEDIUM, SMALL	LARGE: Volume is large MEDIUM: Volume is medium SMALL: Volume is small	-
KEY REMND SOUND	Key reminder buzzer sound condition / FAST, NORMAL, SLOW	FAST: Buzz pattern is fast NORMAL: Buzz pattern is normal SLOW: Buzz pattern is slow	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

SMART ACCESS (Certification ECU):

Item	Test Details	Diagnostic Note
OVERHEAD TUNER	Entry door control receiver ON / OFF	-
IN LUG TUNER	Luggage receiver ON / OFF	-
D TRANSMITTER	Driver side electrical key oscillator ON / OFF	-
P TRANSMITTER	Front passenger side electrical key oscillator ON / OFF	-
FR TRANSMITTER	Indoor electrical key oscillator (console) ON / OFF	-
RR TRANSMITTER	Indoor electrical key oscillator (rear seat) ON / OFF	-
IN_BDR TRNSMTTR	Luggage compartment door inner oscillator ON / OFF	-
BDOOR TRNSMTTR	Luggage compartment door outer oscillator ON / OFF	-
D SELECT SIG	Driver side select ON / OFF	-
P SELECT SIG	Front passenger side select ON / OFF	-
WIRELESS BUZZER	Wireless buzzer ON / OFF	-

MAIN BODY:

Item	Test Details	Diagnostic Note
TRNK/BDOR OPEN	Luggage compartment open switch signal ON / OFF	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:
If a trouble code is indicated during the DTC check, check the circuit listed for that code in the table below. Then proceed to the appropriate page.

Power door lock control system:

DTC No.	Detection Item	Trouble Area	See page
B1242	Wireless Door Lock Tuner Circuit Malfunction	1. Electrical key antenna 2. Door control receiver 3. Wire harness 4. Certification ECU	DL-164

ON-VEHICLE INSPECTION

1. SMART KEY SYSTEM OPERATION INSPECTION

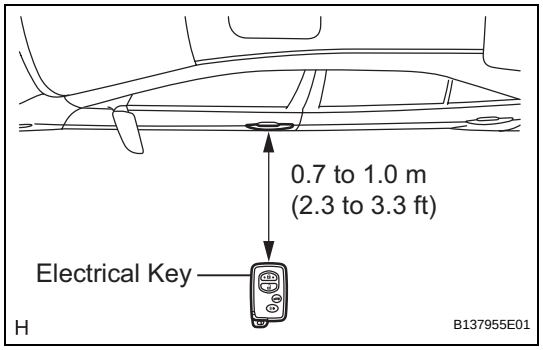
HINT:

Refer to PROBLEM SYMPTOMS TABLE if the results of the following checks are not normal (See page DL-147).

(a) Check the entry unlock function.

(1) Use the wireless lock operation to lock the doors. With the electrical key in your possession, touch a door's outside handle (touch sensor) and check that the door unlocks.

(b) Check the entry unlock operation's detection area.



(1) Step 1: Hold the electrical key at the same height as the door's outside handle (approximately 0.8 m (2.6 ft)). Pay attention to the direction of the electrical key in the illustration.

(2) Step 2: When the electrical key is brought within 0.7 to 1.0 m (2.3 to 3.3 ft) of the vehicle, check that the system enters unlock standby mode.

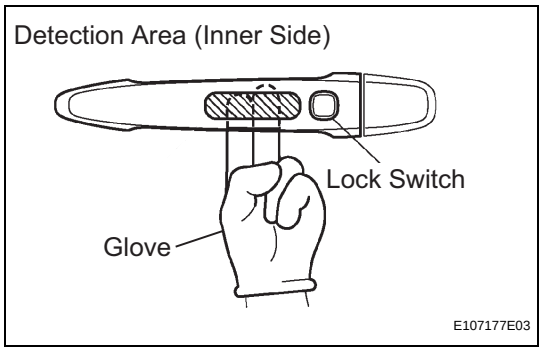
HINT:

Unlock standby mode is signified by the electrical key's red LED illuminating.

(3) Step 3: After the system enters unlock standby mode, touch the outside handle's sensor within 3 seconds. Check that the door unlocks.

NOTICE:

The electrical key cannot communicate with the system within a 0.2 m (0.6 ft) radius of each outside handle.



(4) Step 4: Repeat steps 2 and 3 for the remaining doors.

(5) Step 5: Inspect the door electrical key oscillator's response sensitivity. Wear protective gloves, set the system to unlock standby mode, and check that touching the inner side of the outside handle (the highlighted area in the illustration) with your finger causes the door to unlock.

NOTICE:

When touching the highlighted area, tapping too quickly or having extended contact may not trigger the sensor. In such a case, the door will not unlock.

(6) Step 6: Repeat step 5 for the remaining doors.

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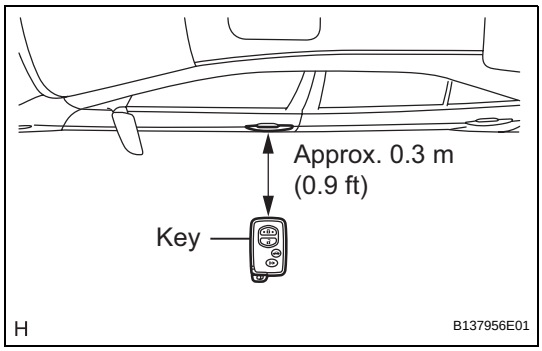
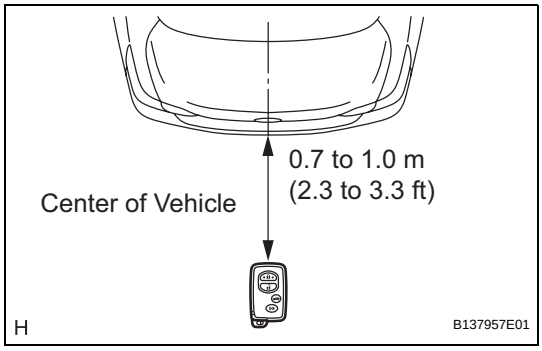
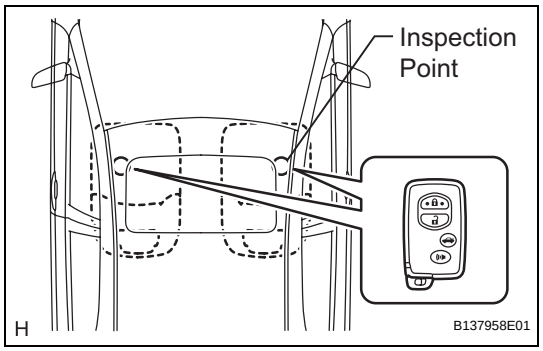


(c) Check the entry lock function.
  (1) Step 1: Close all of the vehicle's doors. With the electrical key in your possession outside the vehicle, check that pressing the lock switch locks the doors.
  (2) Step 2: Inspect the entry lock operation's detection area and the indoor electrical key antenna for wave leaks. Hold the electrical key at a height of 1 m (3.3 ft) (0.1 m (0.3 ft) above the lower edge of the window frame). Pay attention to the direction and position of the electrical key in the illustration. When the electrical key is approximately 0.3 m (0.9 ft) from the vehicle and the lock switch is pressed, check that the all doors lock and the warning buzzer (for when the electrical key is forgotten) does not sound. If the warning buzzer sounds, the indoor electrical key antenna may have a wave leak.
  HINT:
  Do not press the lock switch with the same hand that is holding the electrical key because the electrical key cannot communicate with the system within a 0.2 m (0.6 ft) radius of the outside handle. The doors will not lock.
  (3) Step 3: Repeat steps 1 and 2 for the remaining doors.



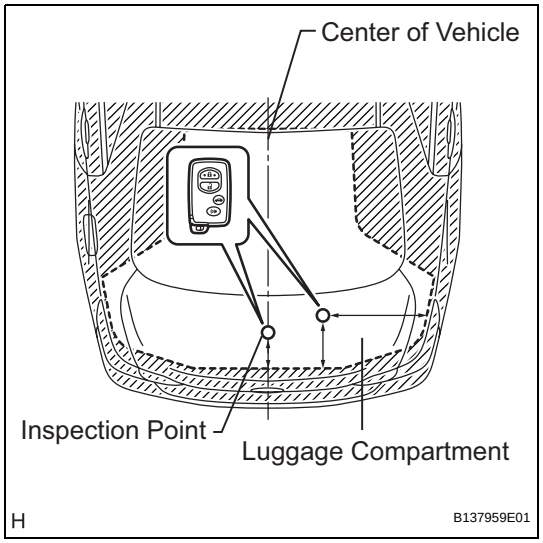
(d) Check the entry luggage compartment door open function.
  (1) Close the luggage compartment door. With the electrical key in your possession, check that pressing the power luggage door open switch opens the luggage compartment door.
  (2) Inspect the entry luggage compartment door open operation's detection area. Hold the electrical key at the same height as the power luggage door open switch (approximately 0.8 m (2.6 ft)) and align the key with the center of the rear of the vehicle. Pay attention to the direction of the electrical key shown in the illustration. When the electrical key is brought within 0.7 to 1.0 m (2.3 to 3.3 ft) of the vehicle, check that pressing the power luggage door open switch opens the luggage compartment door.

(e) Check the entry ignition function.
  (1) When the engine is off:
  With the electrical key in your possession and the brake pedal depressed, check that pressing the engine switch releases the steering wheel lock and starts the engine.
  HINT:
  The engine can be started only when the engine switch indicator illuminates in green.



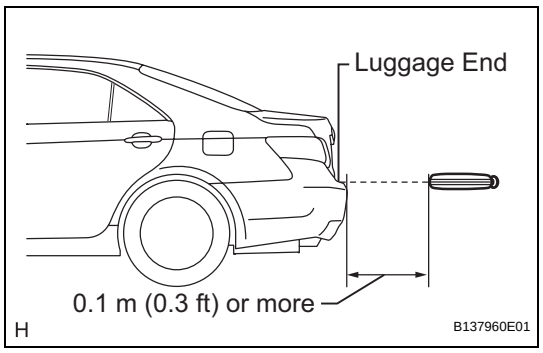
(2) When the engine is running:
With the electrical key in your possession, check that pressing the engine switch stops the engine.
HINT:
The shift position must be P to stop the engine.

(3) Inspect the entry ignition operation's detection area. Pay attention to the direction of the electrical key in the illustration. When the electrical key is in either of the 2 inspection points in the illustration, check that the engine can start.
NOTICE:
The engine cannot be started when the electrical key is on the instrument panel, rear package tray, or in the glove box.



(f) Check the electrical key lock-in prevention function.

(1) Place the electrical key in the luggage compartment with all doors locked. Check that: 1) closing the luggage compartment door triggers the electrical key's wireless buzzer (which lasts approximately 2 seconds), and 2) pressing the power luggage door open switch opens the luggage compartment door.



(2) Inspect the electrical key lock-in prevention's detection area. Pay attention to the direction of the electrical key shown in the illustration. When the electrical key is in either of the 2 inspection points in the illustration, check that: 1) closing the luggage compartment door sounds the electrical key's wireless buzzer, and 2) pressing the power luggage door open switch opens the luggage compartment door.
NOTICE:
If the electrical key is inside a metal storage item, such as a metal briefcase or metal box, the electrical key will not be detected by the system.

(3) Inspect the electrical key lock-in prevention's detection area and the entry door control receiver for wave leaks. Hold the electrical key at the same height as the lower edge of the luggage compartment door and align the key with the center of the rear of the vehicle. Pay attention to the direction and position of the electrical key shown in the illustration. When the electrical key is over 0.1 m (0.3 ft) from the vehicle's rear bumper, check that the electrical key's wireless buzzer does not sound.
If the warning buzzer sounds, the entry door control receiver may have a wave leak.

(g) Check the electrical key cancel function.
(1) While the engine switch is on (IG), check that the power luggage door open switch, entry ignition, electrical key lock-in prevention and warning are the only switch in the smart key system that can be operated.
(2) While the electrical key cancel function (smart key system cancel function) is ON, check that all functions in the smart key system cannot be operated.

(h) Check the answer-back function (hazard warning light flashing and buzzer sounding).

Entry Operation	Hazard Warning Light	Buzzer
Entry Door Lock	Flashes once	Sounds once
Entry Door Unlock	Flashes twice	Sounds twice
Entry Luggage Compartment Door Open	Does not flash	Does not sound

(i) Check that the electrical key reminder warning buzzer sounds.
(1) Carry the electrical key in the vehicle and close the driver side door. Then turn the engine switch off or on (ACC). The steering lock is unlocked.
(2) Open the driver side door and check that the buzzer sounds intermittently.

(j) Check that the electrical key reminder warning buzzer stops.
(1) When the buzzer is sounding, check that the buzzer stops sounding if either of the following is performed:
- Close the driver side door (front door courtesy light switch is off).
- Turn the engine switch on (IG, ACC) and lock the steering lock.

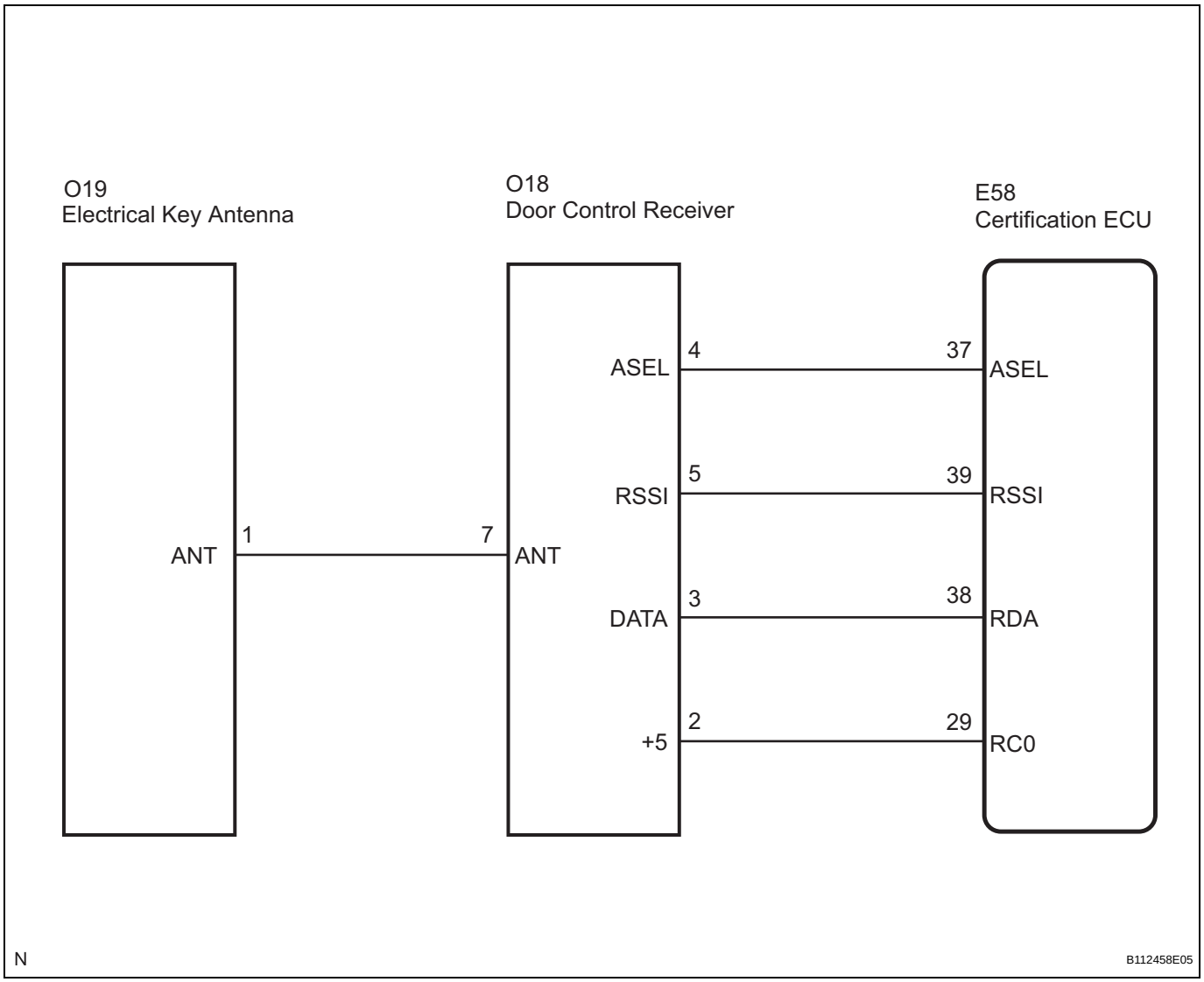
DTC	B1242	Wireless Door Lock Tuner Circuit Malfunction

DESCRIPTION

- The electrical key antenna and the door control receiver are used as antennas for the entry and wireless door lock functions of the smart key system.
- The certification ECU decodes the requested smart key system operation by identifying a key code based on electric waves received via the electrical key antenna and the door control receiver. The ECU then sends a command, according to the requested operation, to each ECU. (e.g. If door lock operation is requested, the ECU sends a door lock command to the main body ECU.)

DTC No.	DTC Detection Condition	Trouble Area
B1242	If the certification ECU detects that terminal RDA or RSSI is short-circuited, this DTC is stored.	• Electrical key antenna • Door control receiver • Wire harness • Certification ECU

WIRING DIAGRAM

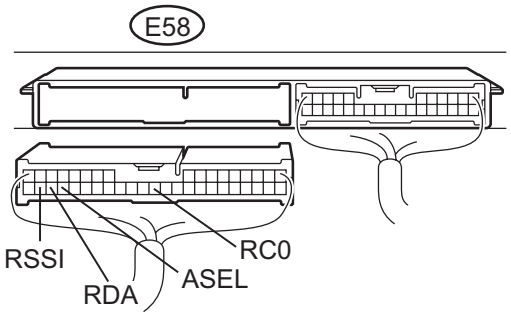


DL

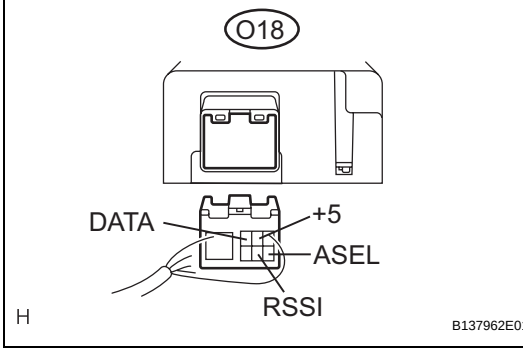
INSPECTION PROCEDURE

1	**CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - DOOR CONTROL RECEIVER)**

Certification ECU:



Door Control Receiver:



(a) Disconnect the E58 ECU connector.
(b) Disconnect the O18 receiver connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

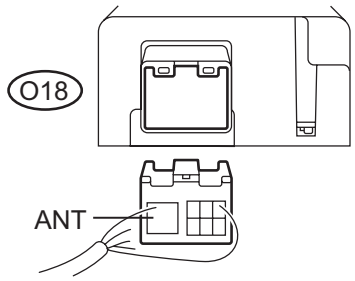
Tester Connection (Symbols)	Condition	Specified Condition
E58-37 (ASEL) - O18-4 (ASEL)	Always	Below 1 Ω
E58-39 (RSSI) - O18-5 (RSSI)	Always	Below 1 Ω
E58-38 (RDA) - O18-3 (DATA)	Always	Below 1 Ω
E58-29 (RC0) - O18-2 (+5)	Always	Below 1 Ω
E58-37 (ASEL) - Body ground	Always	10 kΩ or higher
E58-39 (RSSI) - Body ground	Always	10 kΩ or higher
E58-38 (RDA) - Body ground	Always	10 kΩ or higher
E58-29 (RC0) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

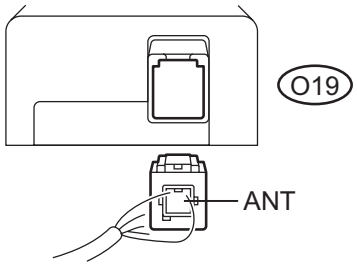
OK

2	CHECK HARNESS AND CONNECTOR (DOOR CONTROL RECEIVER - ELECTRICAL KEY ANTENNA)

Door Control Receiver:



Electrical Key Antenna:



H

B112462E03

(a) Disconnect the O19 antenna connector.
(b) Measure the resistance according to the value(s) in the table below.
HINT:
Perform the measurement with the O18 receiver connector disconnected.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
O18-7 (ANT) - O19-1 (ANT)	Always	Below 1 Ω
O18-7 (ANT) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK AND REPLACE DOOR CONTROL RECEIVER (RECONFIRM DTC)

(a) Replace the receiver.
(b) Clear the DTCs and repeat the procedure to recheck for DTCs (See page DL-156).

OK:

DTC is not output.

OK → **END (RECEIVER IS DEFECTIVE)**

NG

DL

4	CHECK AND REPLACE ELECTRICAL KEY ANTENNA (RECONFIRM DTC)

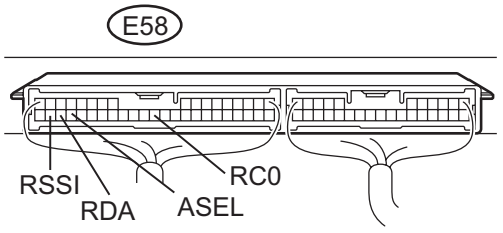
(a) Replace the antenna.
(b) Clear the DTCs and repeat the procedure to recheck for DTCs (See page DL-156).
OK:
DTC is not output.

OK → **END (ANTENNA IS DEFECTIVE)**

NG

5	INSPECT CERTIFICATION ECU

Certification ECU:



H

B137963E01

(a) Reconnect the E58 ECU connector.
(b) Reconnect the O19 antenna connector.
(c) Reconnect the O18 receiver connector.
(d) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E58-37 (ASEL) - Body ground	Engine switch OFF, luggage compartment door OPEN	Below 1 V
	Engine switch OFF, luggage compartment door CLOSED	4.5 to 5.5 V
E58-39 (RSSI) - Body ground	Engine switch OFF, all doors closed, the electrical key is not in the action area	10 to 14 V
	Engine switch OFF, all doors closed, the electrical key in the action area	Below 1 V
E58-38 (RDA) -Body ground	Engine switch OFF, all doors closed and electrical key switch OFF	10 to 14 V (Pulse generation)
	Engine switch OFF, all doors closed and electrical key switch ON	Pulse generation
E58-29 (RC0) - Body ground	Engine switch OFF, all doors closed and electrical key switch OFF	Below 1 V
	Engine switch OFF, all doors closed and electrical key switch ON	4.5 to 5.5 V

NG → **REPLACE CERTIFICATION ECU**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

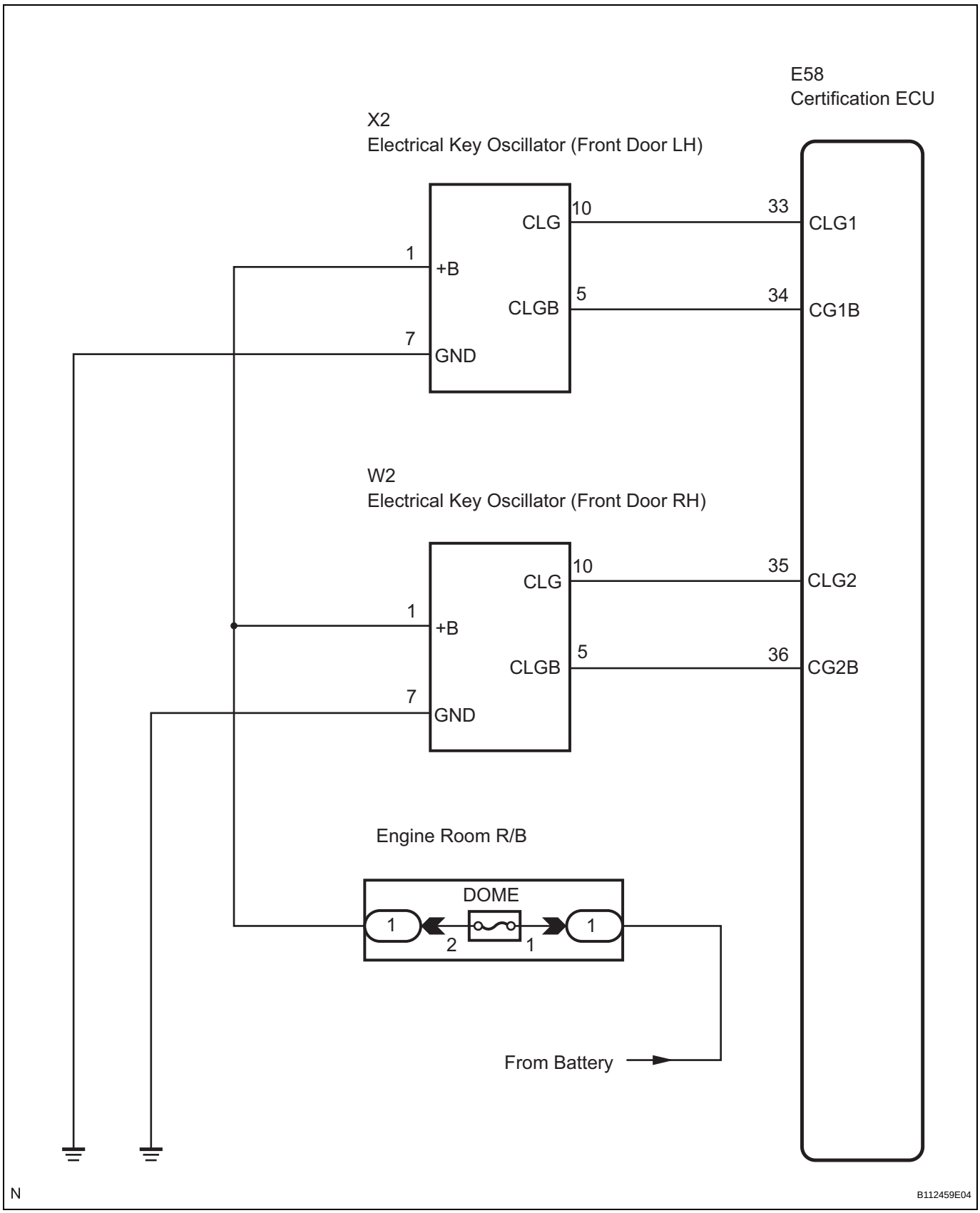
DL

Door Oscillator Circuit

DESCRIPTION

Door oscillators are built into each door. Each of them forms its own action area around its door and detects the presence of the electrical key.

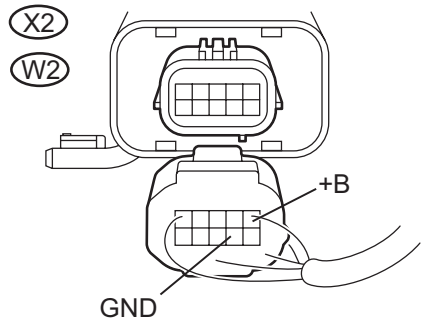
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ELECTRICAL KEY OSCILLATOR

Door Oscillator:



H B112463E04

(a) Disconnect the oscillator connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage:

Front LH side

Tester Connection (Symbols)	Condition	Specified Condition
X2-1 (+B) - X2-7 (GND)	Always	10 to 14 V

Front RH side

Tester Connection (Symbols)	Condition	Specified Condition
W2-1 (+B) - W2-7 (GND)	Always	10 to 14 V

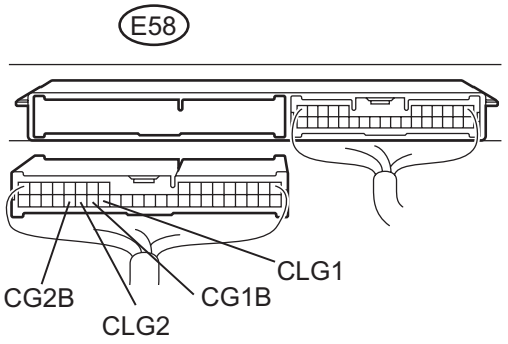
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

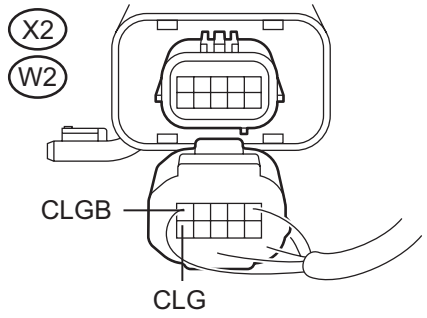
DL

2	CHECK HARNESS AND CONNECTOR (ELECTRICAL KEY OSCILLATOR - CERTIFICATION ECU)

Certification ECU:



Door Oscillator:



H

B137964E01

(a) Disconnect the E58 ECU connector.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-33 (CLG1) - X2-10 (CLG)	Always	Below 1 Ω
E58-34 (CG1B) - X2-5 (CLGB)	Always	Below 1 Ω
E58-35 (CLG2) - W2-10 (CLG)	Always	Below 1 Ω
E58-36 (CG2B) - W2-5 (CLGB)	Always	Below 1 Ω
E58-33 (CLG1) - Body ground	Always	10 kΩ or higher
E58-34 (CG1B) - Body ground	Always	10 kΩ or higher
E58-35 (CLG2) - Body ground	Always	10 kΩ or higher
E58-36 (CG2B) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

DL

3	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR (CHECK OPERATION OF OSCILLATOR)

(a) Replace the door oscillator.
(b) Check that the entry LOCK/UNLOCK function operates normally.

OK:

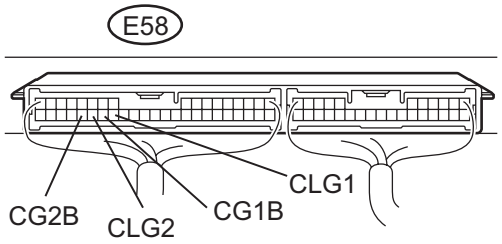
Entry LOCK/UNLOCK function operates normally.

OK → **END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)**

NG

4	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (CERTIFICATION ECU OUTPUT SIGNAL)

Certification ECU:



H

B137963E02

(a) Reconnect the ECU and the oscillator connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the engine switch on (IG).
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(e) Following the display on the tester, select the "ACTIVE TEST".

SMART ACCESS (Certification ECU):

Item	Vehicle Condition/Test Details
D TRANSMITTER	Door Oscillator ON/OFF
P TRANSMITTER	Door Oscillator ON/OFF

(f) Measure the frequency according to the value(s) in the table below.

Standard

Tester Connection (Symbols)	Condition	Specified Condition
E58-33 (CLG1) - E58-34 (CG1B)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)
E58-35 (CLG2) - E58-36 (CG2B)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)

NG → **REPLACE CERTIFICATION ECU**

OK

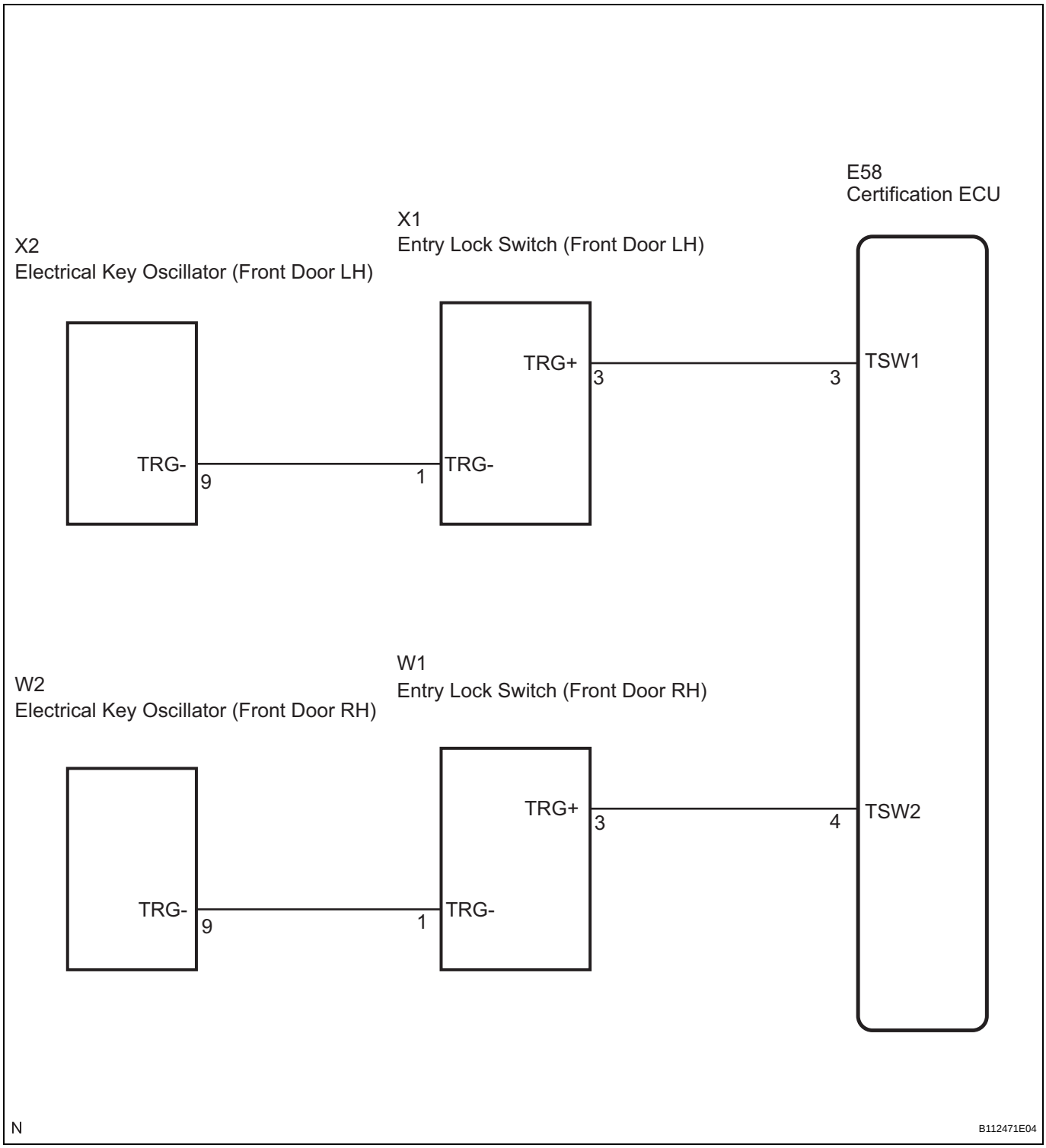
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Entry Lock Switch Circuit

DESCRIPTION

The entry lock switches (trigger switch) are built into the outside handles of the LH/RH door. The certification ECU detects the conditions of the each lock switch.

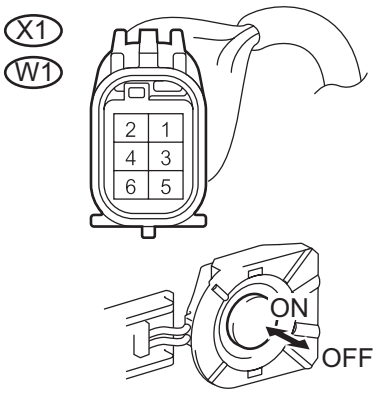
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ENTRY LOCK SWITCH

Lock Switch:



H B112465E07

(a) Remove the outside handle.
(b) Disconnect the connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
X1-1 (TRG-) - X1-3 (TRG+)	Lock switch not pushed	10 kΩ or higher
	Lock switch pushed	Below 1 Ω
W1-1 (TRG-) - W1-3 (TRG+)	Lock switch not pushed	10 kΩ or higher
	Lock switch pushed	Below 1 Ω

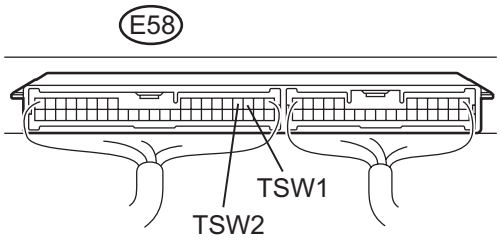
NG → **REPLACE OUTSIDE HANDLE ASSEMBLY**

OK

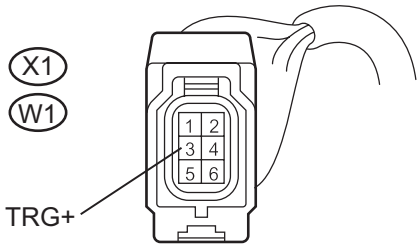
DL

2	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ENTRY LOCK SWITCH)

Certification ECU:



Lock Switch Wire Harness:



H

B137967E01

(a) Disconnect the E58 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

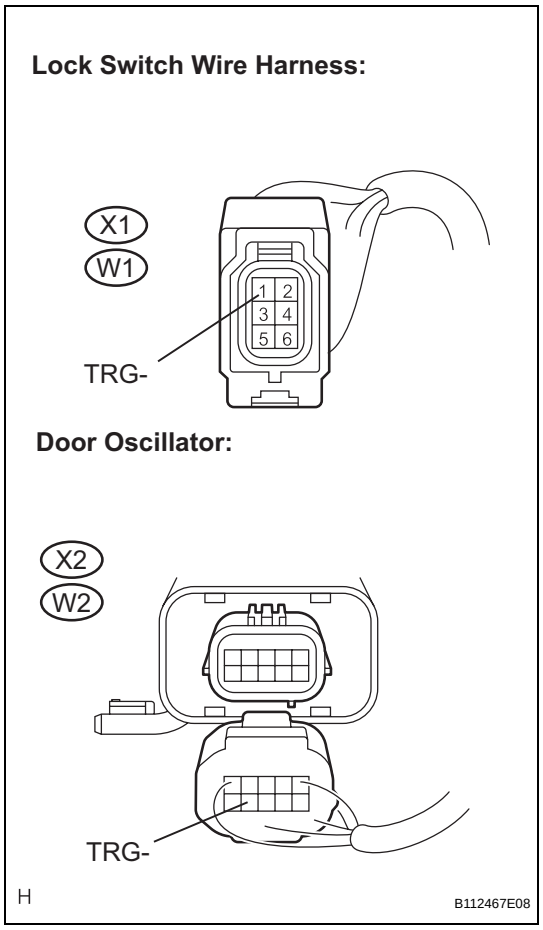
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-3 (TSW1) - X1-3 (TRG+)	Always	Below 1 Ω
E58-4 (TSW2) - W1-3 (TRG+)	Always	Below 1 Ω
E58-3 (TSW1) - Body ground	Always	10 kΩ or higher
E58-4 (TSW2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR (ELECTRICAL KEY OSCILLATOR - ENTRY LOCK SWITCH)



(a) Disconnect the door oscillator connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
X2-9 (TRG-) - X1-1 (TRG-)	Always	Below 1 Ω
W2-9 (TRG-) - W1-1 (TRG-)	Always	Below 1 Ω
X2-9 (TRG-) - Body ground	Always	10 kΩ or higher
W2-9 (TRG-) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR

(a) Replace the electrical key oscillator.
(b) Check that the entry LOCK/UNLOCK function operates normally.

OK:

Entry LOCK/UNLOCK function operates normally.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)

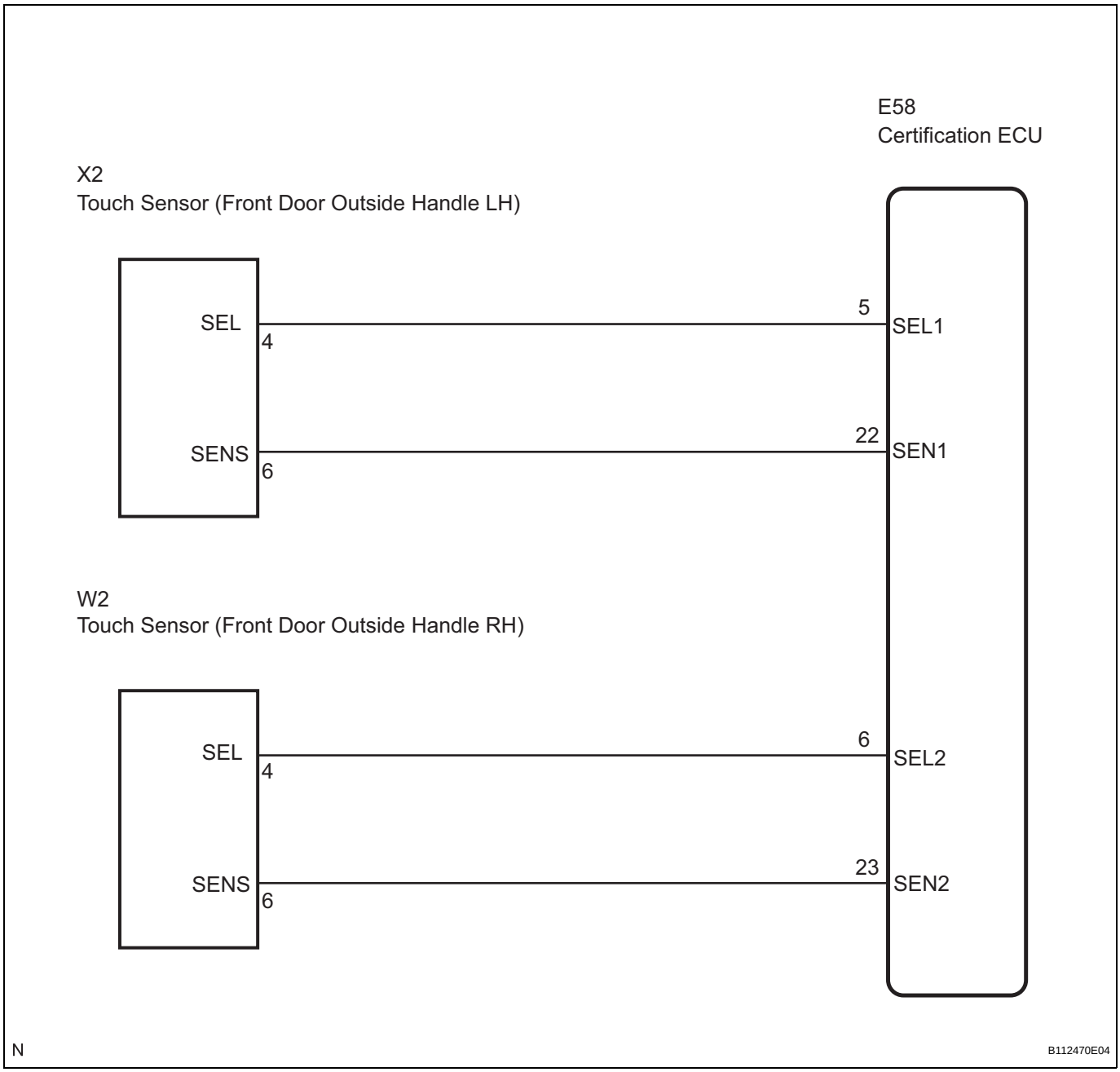
DL

Touch Sensor Circuit

DESCRIPTION

This circuit receives a signal indicating whether a touch sensor signal is detected.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG).

(c) Following the display on the tester, select "DATA LIST".

SMART ACCESS (Certification ECU):

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
D TOUCH SENSOR	Status of touch sensor front LH/ ON or OFF	ON: Touch sensor is touched OFF: Touch sensor is not touched	-
P TOUCH SENSOR	Status of touch sensor front RH/ ON or OFF	ON: Touch sensor is touched OFF: Touch sensor is not touched	-

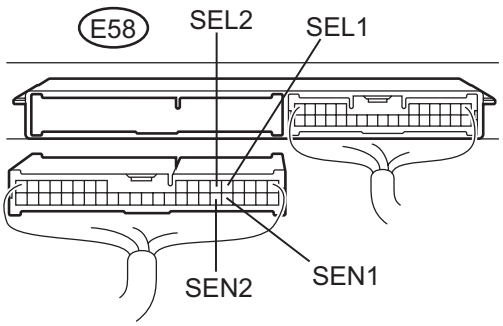
OK:
"ON" (screen is touched) or "OFF" (screen is not touched) appears on the tester screen.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

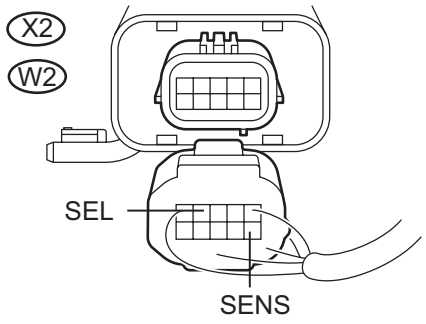
NG

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ELECTRICAL KEY OSCILLATOR)

Certification ECU:



Door Oscillator:



H

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(a) Disconnect the E58 ECU connector.
(b) Disconnect the oscillator connectors.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-5 (SEL1) - X2-4 (SEL)	Always	Below 1 Ω
E58-22 (SEN1) - X2-6 (SENS)	Always	Below 1 Ω
E58-6 (SEL2) - W2-4 (SEL)	Always	Below 1 Ω
E58-23 (SEN2) - W2-6 (SENS)	Always	Below 1 Ω
E58-5 (SEL1) - Body ground	Always	10 kΩ or higher
E58-22 (SEN1) - Body ground	Always	10 kΩ or higher
E58-6 (SEL2) - Body ground	Always	10 kΩ or higher
E58-23 (SEN2) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

DL

OK

3	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR (CHECK OPERATION OF OSCILLATOR)

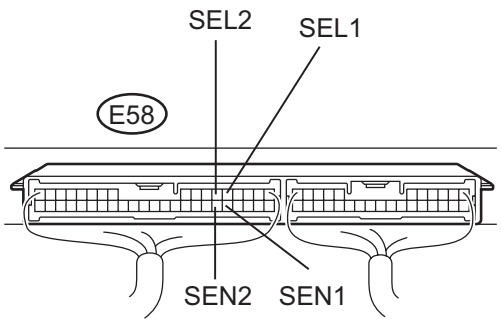
(a) Replace the door oscillator.
(b) Check that the entry UNLOCK function operates normally.
OK:
Entry UNLOCK function operates normally.

NG → **END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)**

OK

4	INSPECT CERTIFICATION ECU

Certification ECU:



H B137963E03

(a) Reconnect the ECU and the oscillator connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the engine switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E58-5 (SEL1) - Body ground	Move the key more than 5 m (16.4 ft) away from the front door LH	10 to 14 V
E58-5 (SEL1) - Body ground	Bring it to the outside handle	Below 1 V
E58-6 (SEL2) - Body ground	Move the key more than 5 m (16.4 ft) away from the front door RH	10 to 14 V
E58-6 (SEL2) - Body ground	Bring it to the outside handle	Below 1 V
E58-22 (SEN1) - Body ground	Front door LH outside handle is not held (Bring the electrical key to the outside handle)	10 to 14 V
E58-22 (SEN1) - Body ground	Front door LH outside handle is held	Below 1 V
E58-23 (SEN2) - Body ground	Front door RH outside handle is not held (Bring the electrical key to the outside handle)	10 to 14 V
E58-23 (SEN2) - Body ground	Front door RH outside handle is held	Below 1 V

NG → **REPLACE CERTIFICATION ECU**

OK

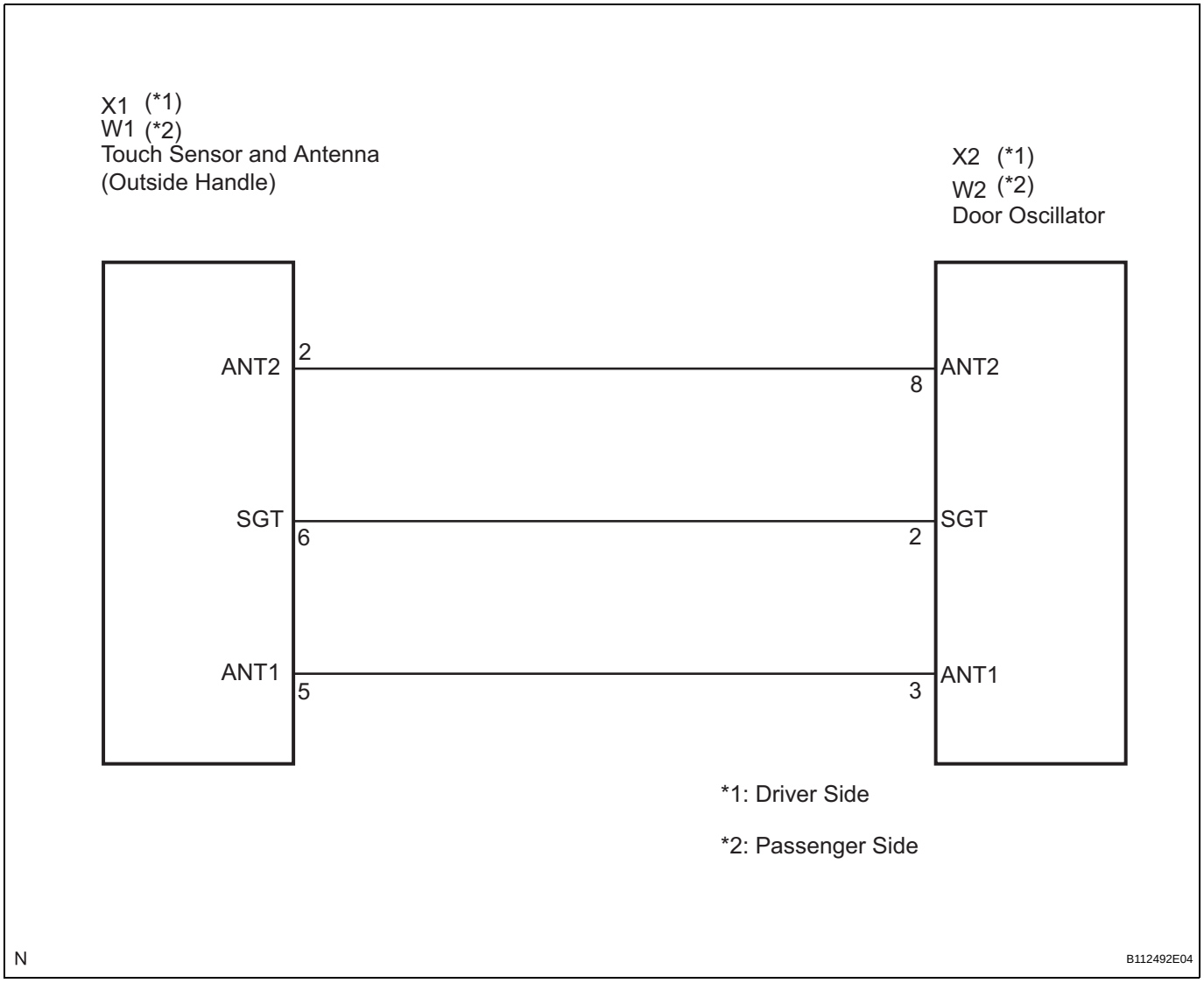
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Antenna Circuit

DESCRIPTION

Terminals ANT1 and ANT2 of the antenna (door outside handle) detect if the electrical key is within the action area around the door outside handle.

WIRING DIAGRAM

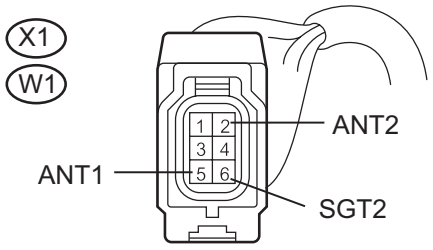


DL

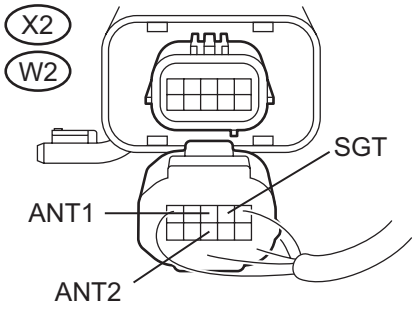
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (ELECTRICAL KEY OSCILLATOR - ANTENNA)

Antenna Wire Harness:



Door Oscillator:



H

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(a) Remove the outside handle.
(b) Disconnect the antenna and door oscillator connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
X1-2 (ANT2) - X2-8 (ANT2) (*1)	Always	Below 1 Ω
X1-6 (SGT) - X2-2 (SGT) (*1)	Always	Below 1 Ω
X1-5 (ANT1) - X2-3 (ANT1) (*1)	Always	Below 1 Ω
X1-2 (ANT2) - Body ground (*1)	Always	10 kΩ or higher
X1-6 (SGT) - Body ground (*1)	Always	10 kΩ or higher
X1-5 (ANT1) - Body ground (*1)	Always	10 kΩ or higher
W1-2 (ANT2) - W2-8 (ANT2) (*2)	Always	Below 1 Ω
W1-6 (SGT) - W2-2 (SGT) (*2)	Always	Below 1 Ω
W1-5 (ANT1) - W2-3 (ANT1) (*2)	Always	Below 1 Ω
W1-2 (ANT2) - Body ground (*2)	Always	10 kΩ or higher
W1-6 (SGT) - Body ground (*2)	Always	10 kΩ or higher
W1-5 (ANT1) - Body ground (*2)	Always	10 kΩ or higher

*1: Driver side
*2: Passenger side

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK AND REPLACE DOOR OUTSIDE HANDLE

(a) Replace the door outside handle.
(b) Check that the entry LOCK/UNLOCK function operates normally.

OK:

Entry LOCK/UNLOCK function operates normally.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

END (DOOR OUTSIDE HANDLE IS DEFECTIVE)

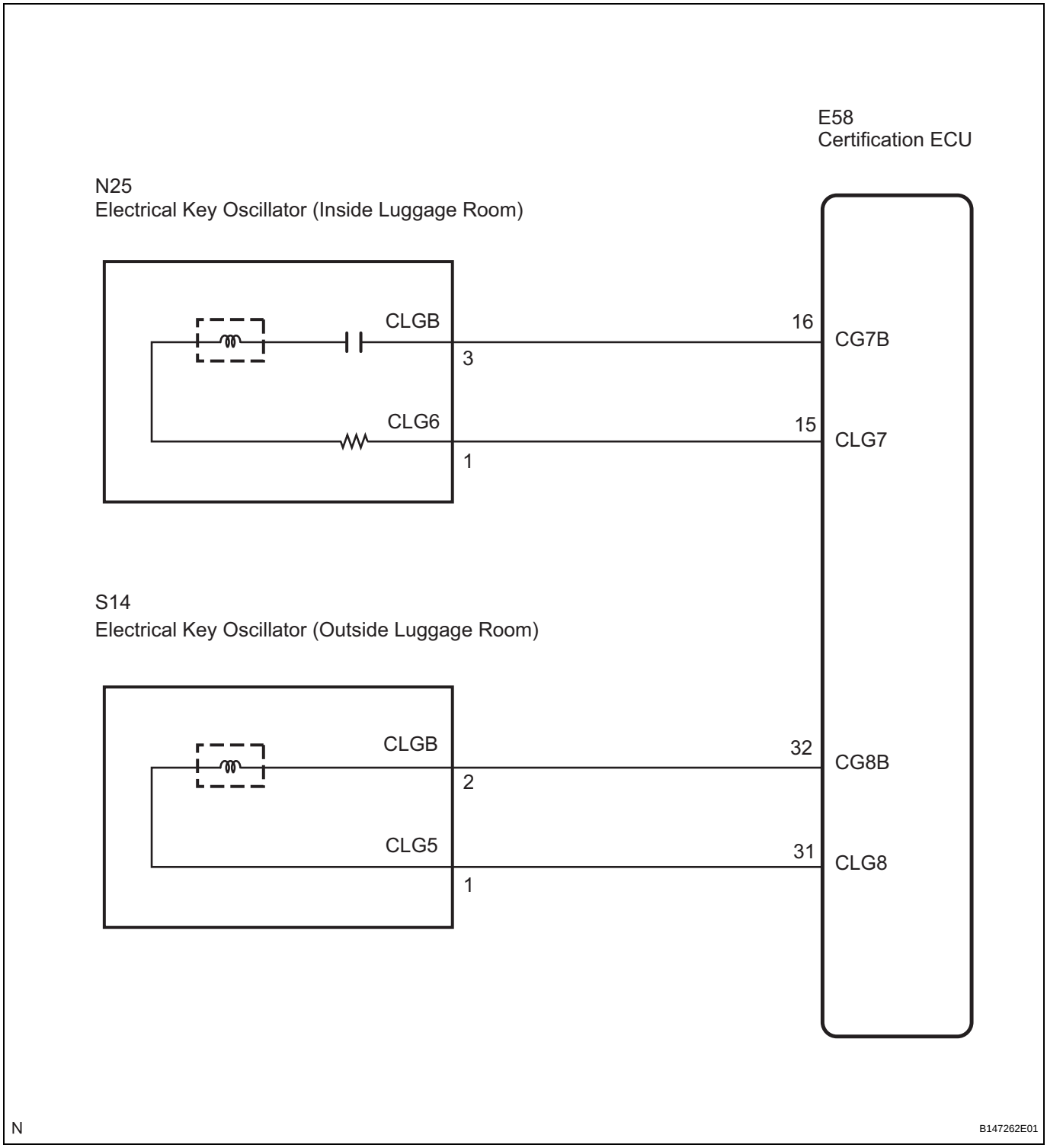
DL

Luggage Oscillator Circuit

DESCRIPTION

The certification ECU activates the inner and outer luggage compartment oscillators. The power is supplied from the certification ECU to both the inner and outer luggage compartment oscillators. The inner and outer luggage compartment oscillator circuits have the same wiring. If the entry luggage compartment function has a problem, check both the inner and outer luggage compartment oscillator circuits.

WIRING DIAGRAM

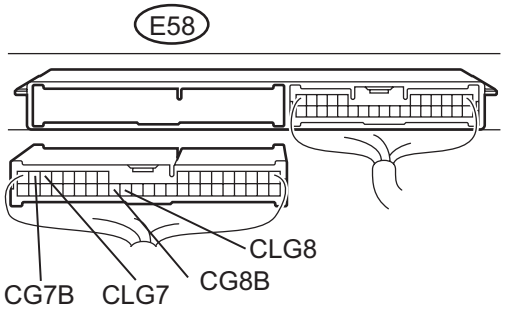


DL

INSPECTION PROCEDURE

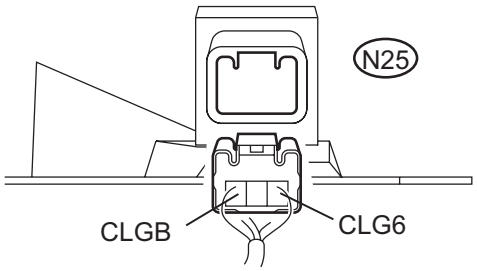
1	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ELECTRICAL KEY OSCILLATOR)

Certification ECU:



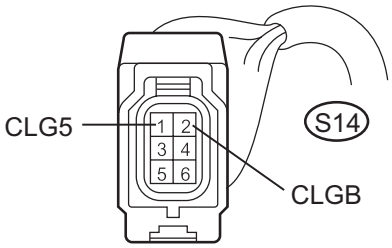
Electrical Key Oscillator

(Inside Luggage Compartment):



Electrical Key Oscillator

(Outside Luggage Compartment):



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(a) Disconnect the E58 ECU connector.
(b) Disconnect the oscillator connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-16 (CG7B) - N25-3 (CLGB)	Always	Below 1 Ω
E58-15 (CLG7) - N25-1 (CLG6)	Always	Below 1 Ω
E58-32 (CG8B) - S14-2 (CLGB)	Always	Below 1 Ω
E58-31 (CLG8) - S14-1 (CLG5)	Always	Below 1 Ω
E58-16 (CG7B) - Body ground	Always	10 kΩ or higher
E58-15 (CLG7) - Body ground	Always	10 kΩ or higher
E58-32 (CG8B) - Body ground	Always	10 kΩ or higher
E58-31 (CLG8) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

DL

2	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR

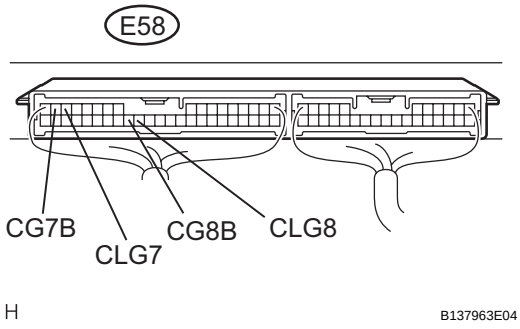
(a) Replace the electrical key oscillator.
(b) Check that the luggage compartment door entry LOCK/UNLOCK function operates normally.
OK:
Luggage compartment door entry LOCK/UNLOCK function operates normally.

OK → **END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)**

NG

3	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

Certification ECU:



(a) Reconnect the oscillator and the ECU connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the engine switch on (IG).
(d) Following the display on the tester, select the "ACTIVE TEST".
SMART ACCESS (Certification ECU):

Item	Vehicle Condition/Test Details
IN-BDR TRNSMTTR	Electrical key oscillator (Luggage compartment inner) ON/OFF
BDOOR TRNSMTTR	Electrical key oscillator (Luggage compartment outer) ON/OFF

(e) Measure the frequency according to the value(s) in the table below.
Standard

Tester Connection (Symbols)	Condition	Specified Condition
E58-16 (CG7B) - E58-15 (CLG7)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)
E58-32 (CG8B) - E58-31 (CLG8)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)

NG → **REPLACE CERTIFICATION ECU**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

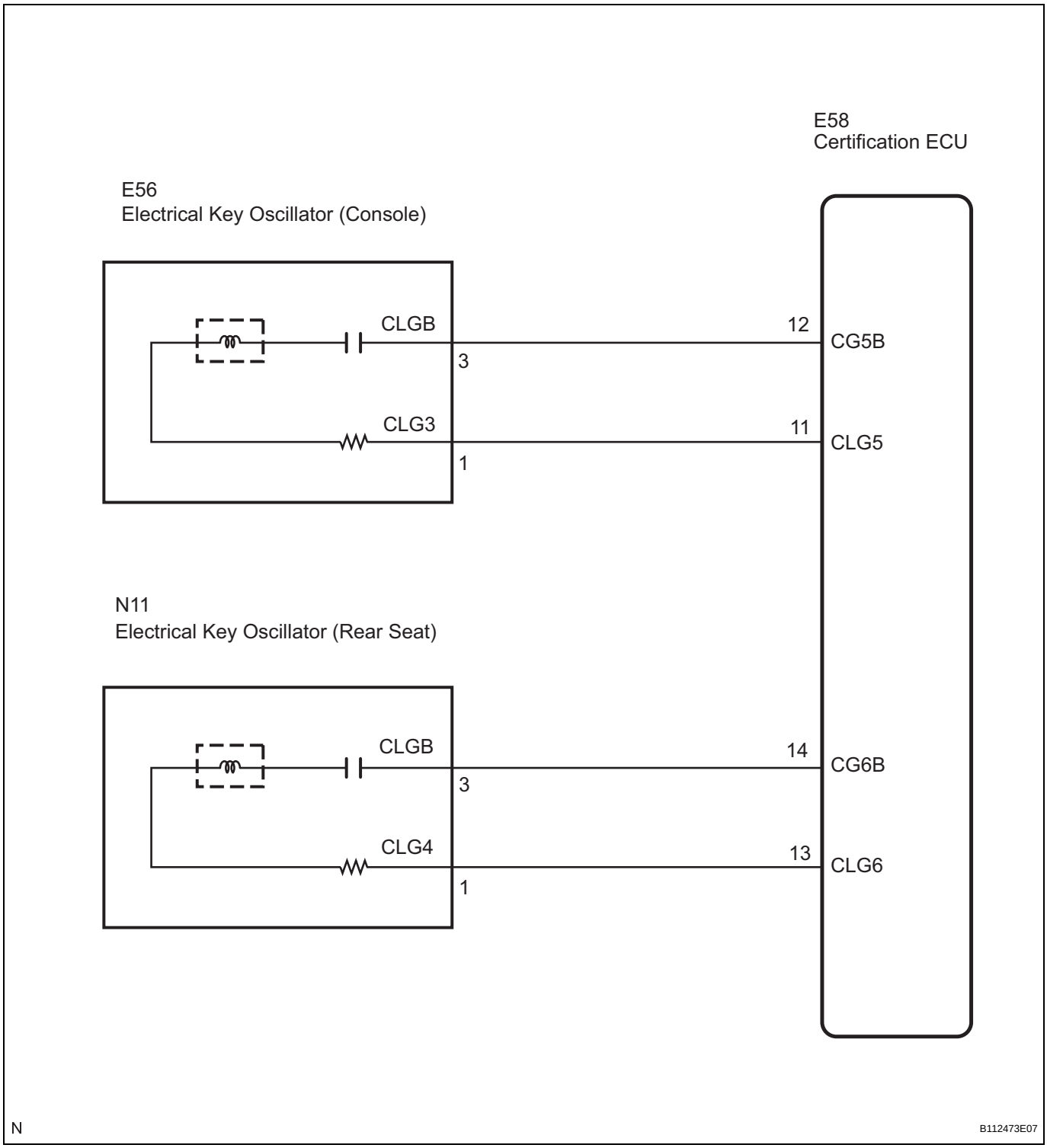
DL

Room Oscillator Circuit

DESCRIPTION

The certification ECU activates the front and rear cabin oscillators. The power is supplied from the certification ECU to both the front and rear cabin oscillators. The front and rear cabin oscillator circuits have the same wiring. If the smart key system does not operate properly inside the vehicle, check both the front and rear cabin oscillator circuits.

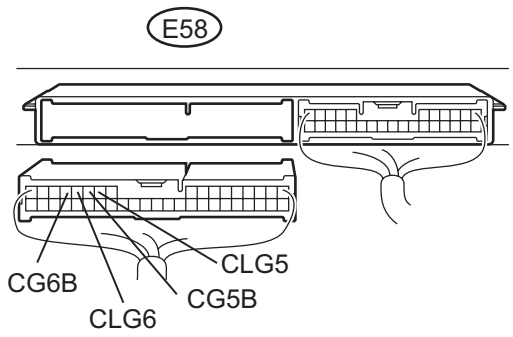
WIRING DIAGRAM



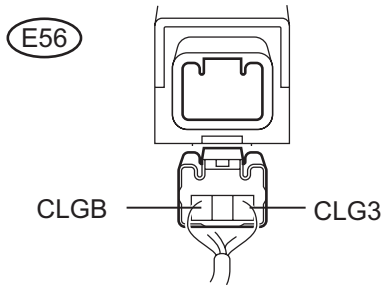
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ELECTRICAL KEY OSCILLATOR)

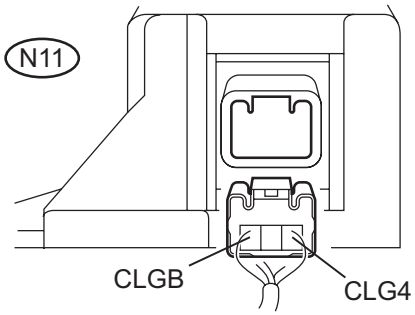
Certification ECU:



Electrical Key Oscillator (Console):



Electrical Key Oscillator (Rear Seat):



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(a) Disconnect the E58 ECU connector.
(b) Disconnect the oscillator connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-12 (CG5B) - E56-3 (CLGB)	Always	Below 1 Ω
E58-11 (CLG5) - E56-1 (CLG3)	Always	Below 1 Ω
E58-14 (CG6B) - N11-3 (CLGB)	Always	Below 1 Ω
E58-13 (CLG6) - N11-1 (CLG4)	Always	Below 1 Ω
E58-12 (CG5B) - Body ground	Always	10 kΩ or higher
E58-11 (CLG5) - Body ground	Always	10 kΩ or higher
E58-14 (CG6B) - Body ground	Always	10 kΩ or higher
E58-13 (CLG6) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

DL

2	CHECK AND REPLACE ELECTRICAL KEY OSCILLATOR

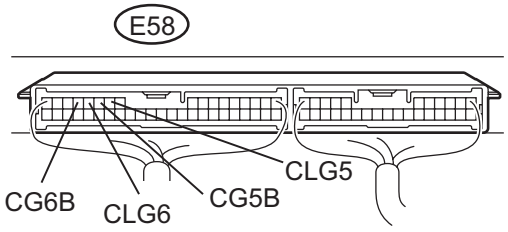
(a) Replace the electrical key oscillator.
(b) Check that the entry LOCK/UNLOCK function operates normally.
OK:
Entry LOCK/UNLOCK function operates normally.

OK → **END (ELECTRICAL KEY OSCILLATOR IS DEFECTIVE)**

NG

3	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (CERTIFICATION ECU OUTPUT SIGNAL)

Certification ECU:



(a) Reconnect the oscillator and the ECU connectors.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the engine switch on (IG).
(d) Following the display on the tester, select the "ACTIVE TEST".
SMART ACCESS (Certification ECU):

Item	Vehicle Condition/Test Details
Fr TRANSMITTER	Electrical key oscillator (console) ON/OFF
Rr TRANSMITTER	Electrical key oscillator (rear seat) ON/OFF

(e) Measure the frequency according to the value(s) in the table below.
Standard

Tester Connection (Symbols)	Condition	Specified Condition
E58-12 (CG5B) - E58-11 (CLG5)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)
E58-14 (CG6B) - E58-13 (CLG6)	During ACTIVE TEST	Frequency is generated (higher than 0 Hz)

NG → **REPLACE CERTIFICATION ECU**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

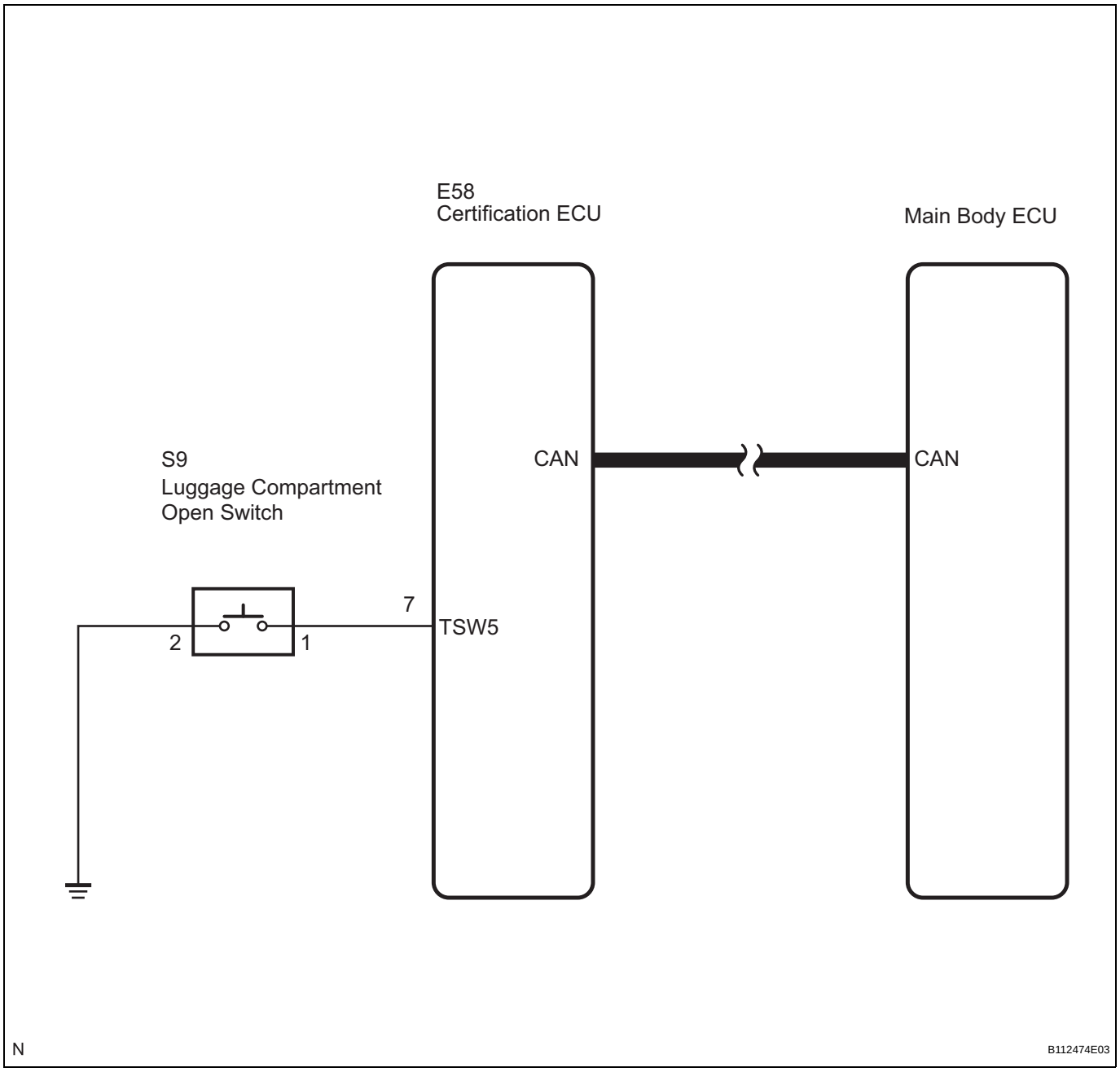
DL

Luggage Compartment Door Open Switch Circuit

DESCRIPTION

If the certification ECU detects that the luggage compartment open switch is pressed when the driver is carrying the electrical key or when the electrical key is locked in the luggage compartment door, the certification ECU sends a luggage compartment door open motor drive request signal to the main body ECU.

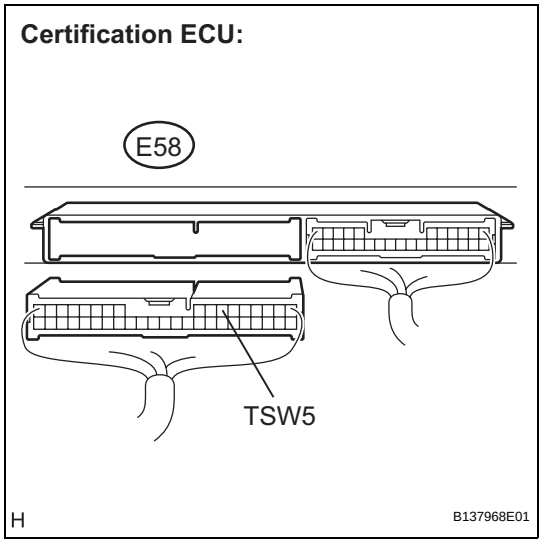
WIRING DIAGRAM



DL

INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - LUGGAGE COMPARTMENT OPEN SWITCH)



(a) Disconnect the E58 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

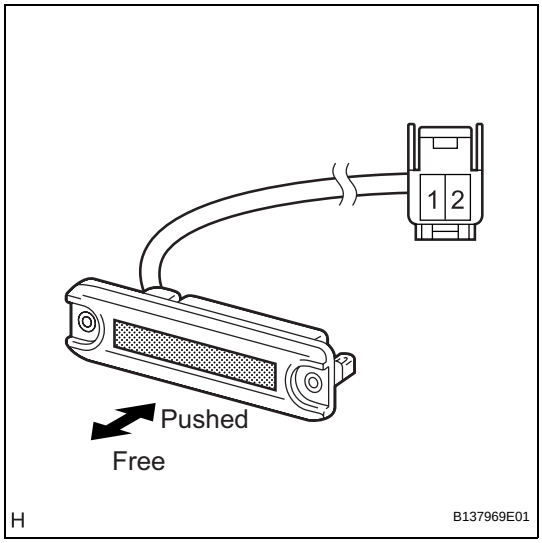
Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-7 (TSW5) - Body ground	Luggage compartment open switch not pushed	10 kΩ or higher
	Luggage compartment open switch pushed	Below 1 Ω

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	INSPECT LUGGAGE COMPARTMENT OPEN SWITCH



(a) Disconnect the switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
S9-1 - S9-2	Luggage compartment open switch not pushed (OFF)	10 kΩ or higher
	Luggage compartment open switch pushed (ON)	Below 1 Ω

NG → **REPLACE LUGGAGE COMPARTMENT OPEN SWITCH**

OK

REPLACE CERTIFICATION ECU

DL

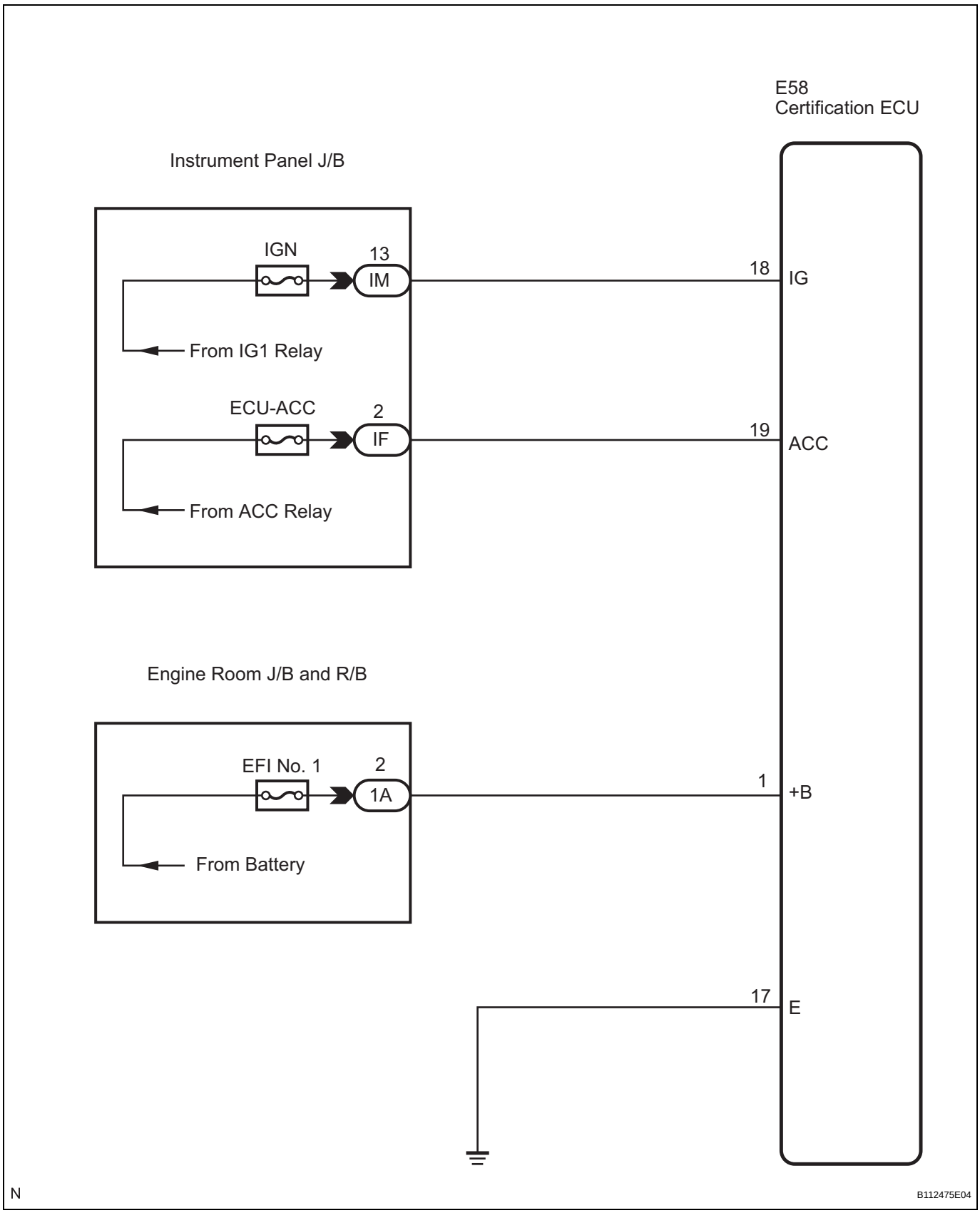
Certification ECU Power Source Circuit

DESCRIPTION

This is the power source circuit of the certification ECU.
The certification ECU controls the following:

- Electrical key verification confirmation
- Cabin and door oscillator control
- Entry door LOCK/UNLOCK request to the main body ECU
- Steering LOCK/UNLOCK request
- Immobilizer SET/UNSET request to the ID code box

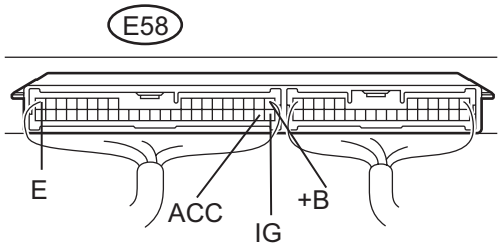
WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT)

Certification ECU:



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(a) Disconnect the E58 certification ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection (Symbols)	Condition	Specified Condition
E58-1 (+B) - Body ground	Always	10 to 14 V
E58-18 (IG) - Body ground	Engine switch OFF	Below 1 V
	Engine switch ON (IG)	10 to 14 V
E58-19 (ACC) - Body ground	Engine switch OFF	Below 1 V
	Engine switch ON (ACC)	10 to 14 V

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection (Symbols)	Condition	Specified Condition
E58-17 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

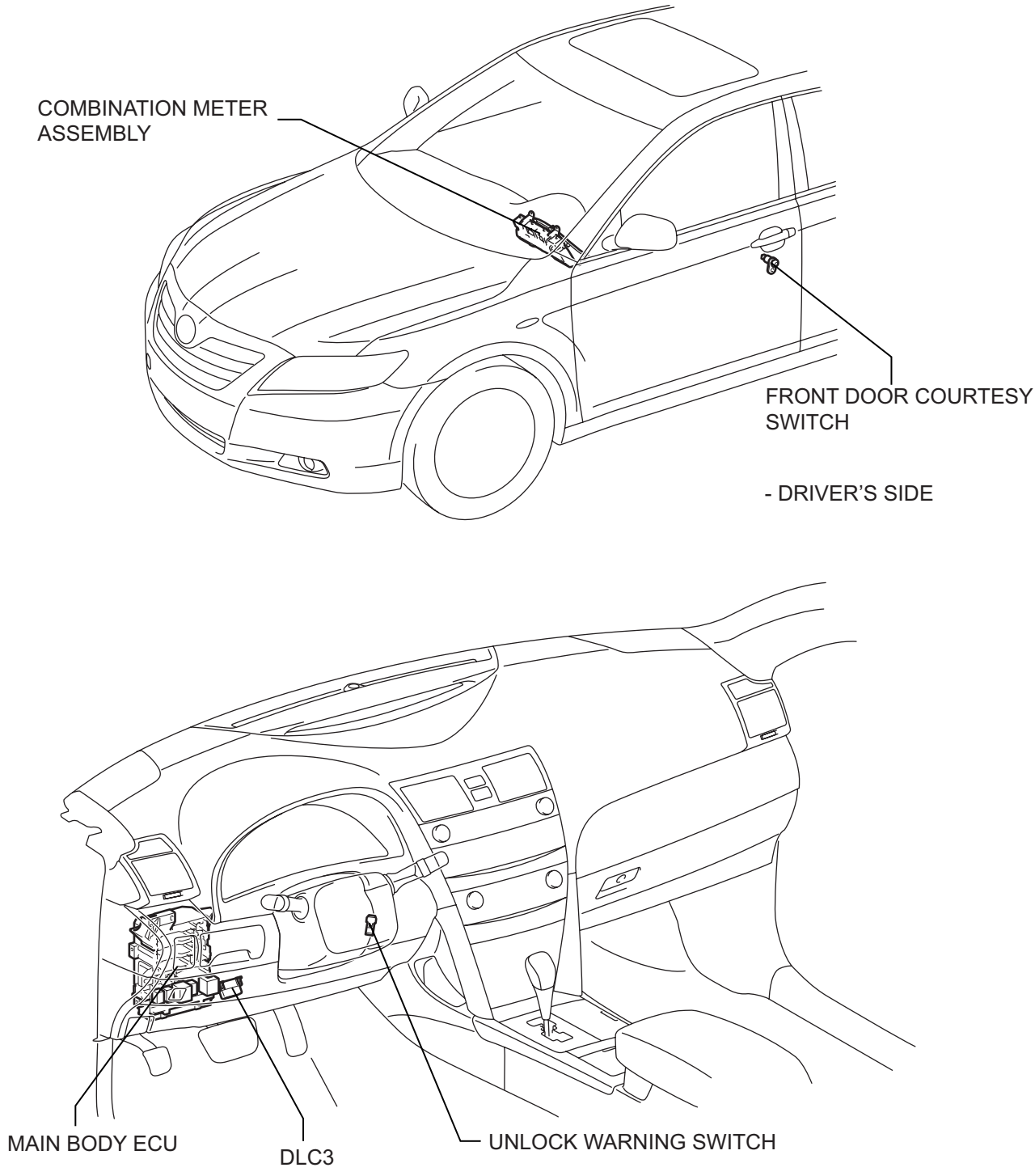
KEY REMINDER WARNING SYSTEM

PRECAUTION

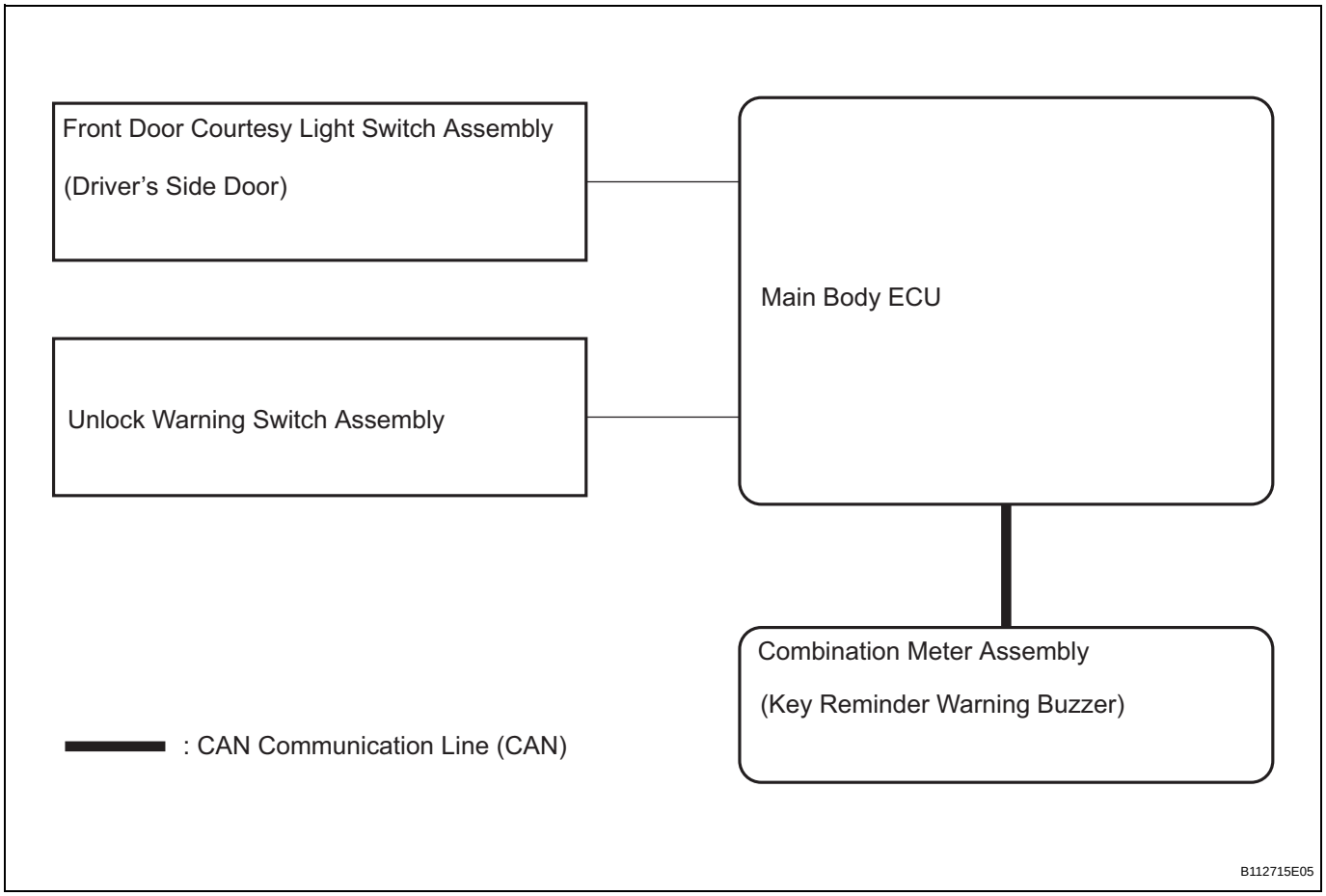
1. PRECAUTION FOR KEY REMINDER WARNING SYSTEM

(a) For the inspection procedure of the key reminder warning system for models equipped with the entry and start system, refer to SMART KEY SYSTEM (See page DL-142).

PARTS LOCATION



SYSTEM DIAGRAM



BODY ECU:

Transmitting ECU	Receiving ECU	Signals	Communication method
Main Body ECU	Combination Meter Assembly	Driver's side door courtesy light switch signal	CAN
Main Body ECU	Combination Meter Assembly	Unlock warning switch signal	CAN

SYSTEM DESCRIPTION

1. KEY REMINDER WARNING SYSTEM DESCRIPTION

(a) When the driver's side door is opened with the ignition key in the ACC or LOCK position, this system causes a buzzer to sound in order to warn the driver that the ignition key has not been removed.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the key reminder warning system.
- The intelligent tester should be used in steps 3 and 5.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage.
Standard voltage:
10 to 14 V
If the voltage is below 10 V, recharge or replace the battery before proceeding to the next step.

NEXT

3 INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM (CAN)

(a) Use the intelligent tester to check if the CAN communication system (CAN) is functioning normally.
(1) (ECU connected, communication line malfunctioning) If no code is output, proceed to A.
(2) (ECU connected, communication line malfunctioning) If any code is output, proceed to B.

B → **GO TO CAN COMMUNICATION SYSTEM**

A

4 PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → **Go to step 6**

A

5 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Inspection with the intelligent tester (DATA LIST)
(b) TERMINALS OF ECU (See page DL-198)

DL

NEXT

6	**REPAIR OR REPLACE**

NEXT

7	**CONFIRMATION TEST**

NEXT

END

OPERATION CHECK

1. CHECK FUNCTION

(a) Check that the key reminder warning buzzer sounds.

(1) With the driver's side door closed, insert the key into the ignition key cylinder and then turn the key to the LOCK or ACC position.

(2) Check that the buzzer sounds intermittently if the driver's side door is opened.

(b) Check that the key reminder warning buzzer stops.

(1) Check that the buzzer stops sounding if any of the following operations is performed while the buzzer is sounding:

- Close the driver's side door (front door courtesy light switch is off).
- Turn the ignition switch to the ON position.
- Pull out the key from the ignition key cylinder.

CUSTOMIZE PARAMETERS

1. PARAMETERS (USING INTELLIGENT TESTER)

HINT:

The following items can be customized.

NOTICE:

- **Be sure to record current values before customizing.**
- **When performing troubleshooting, be aware that the functions may be set to OFF by customizing. (Example: In case of the symptom in which "The wireless operation does not function", check that the wireless operation is not set to OFF by customizing, then perform the troubleshooting.)**

METER:

Display (Item)	Default	Contents	Setting
KEY REMND VOLUM	LARGE	Function to change volume of the key reminder warning buzzer.	LARGE/MEDIUM/SMALL
KEY REMND SOUND	NORMAL	Function to change cycle of the key reminder warning buzzer.	FAST/NORMAL/SLOW

PROBLEM SYMPTOMS TABLE

KEY REMINDER WARNING SYSTEM:

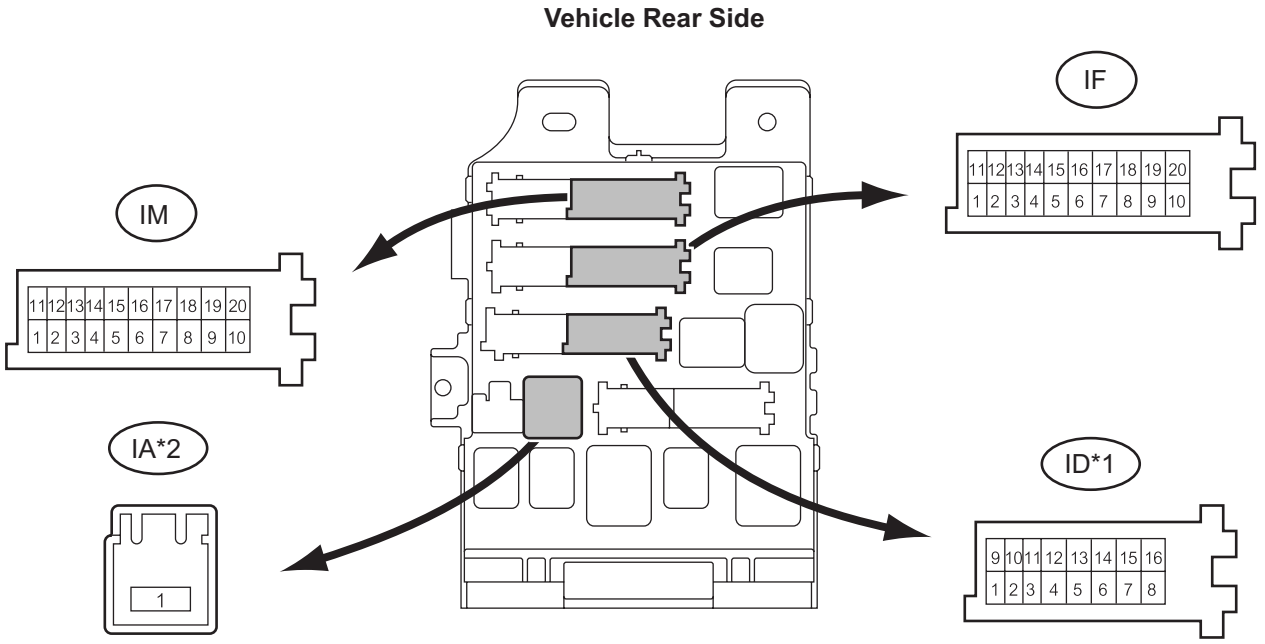
Symptom	Suspected area	See page
Key reminder buzzer does not sound.	1. Unlock warning switch circuit	DL-205
	2. Door courtesy switch circuit	DL-202
	3. Combination meter assembly (Key reminder buzzer)	ME-15
	4. Main body ECU (Instrument panel J/B)	-

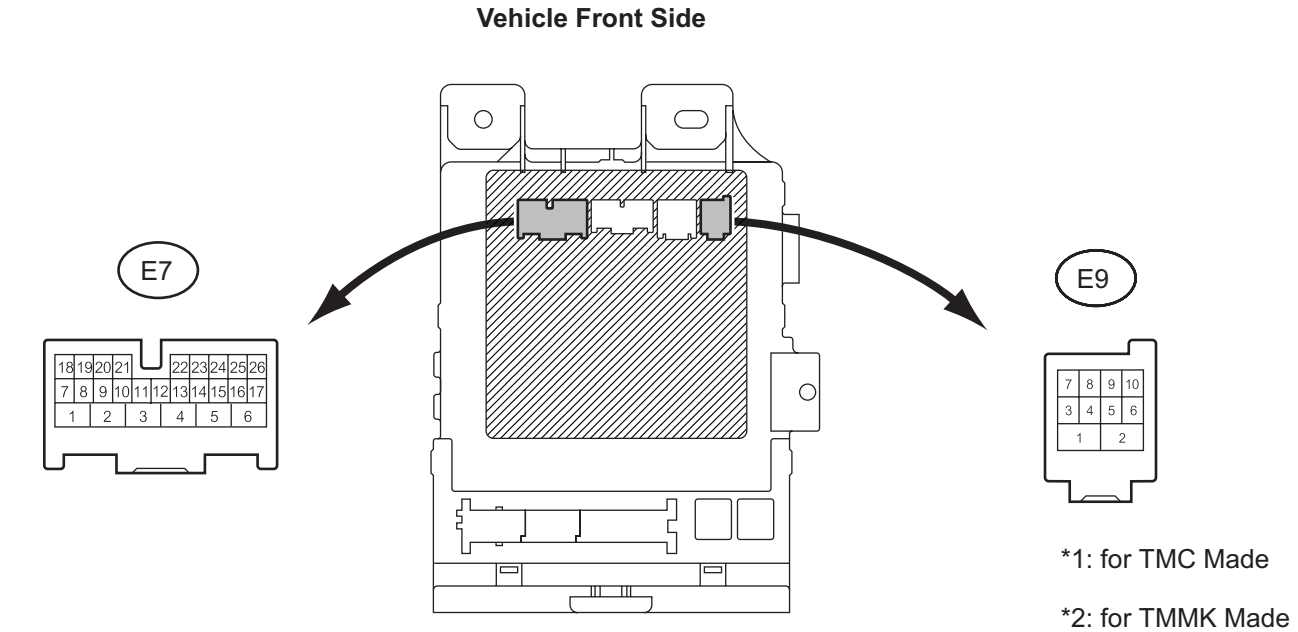
TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the IF and IM, ID*1 or IA*2 junction block connectors.
*1: for TMC Made
*2: for TMMK Made

(b) Disconnect the E7 and E9 main body ECU connectors.





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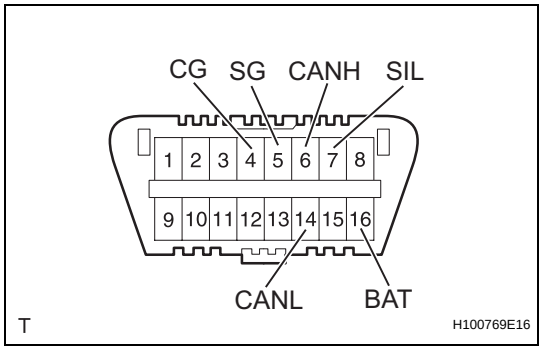
DL

(c) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground				
BECU*1 (ID-10) - Body ground	O*1 - Body ground	Power source	Always	10 to 14 V
BATB*2 (IA-1) - Body ground	B*2 - Body ground			
DCTY (E7-24) - Body ground	L - Body ground	Driver door courtesy light switch signal	Switch pushed (Door closed)	Below 1 Ω
			Switch free (Door opened)	10 kΩ or higher
KSW (E9-5) - Body ground	L - Body ground	Key unlock warning switch signal	No key is in ignition key cylinder	10 kΩ or higher
			Key is in ignition key cylinder	Below 1 Ω

*1: for TMC Made
*2: for TMMK Made
HINT:
If the result is not as specified, there may be a malfunction on the wire harness side.



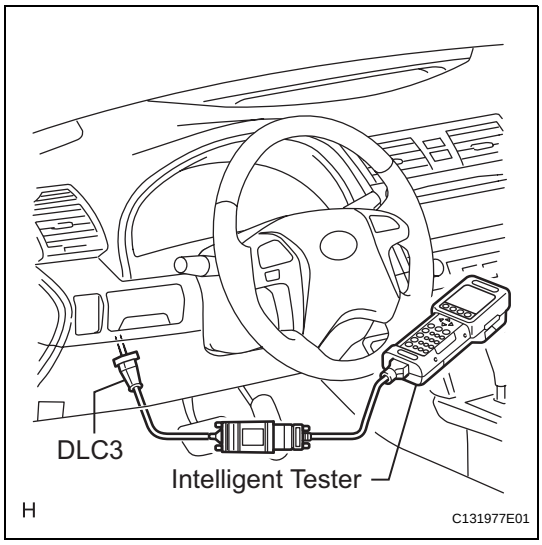
DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



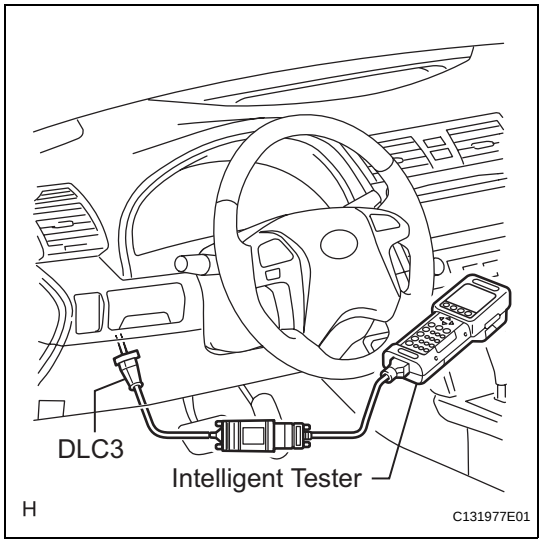
(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch to the ON position and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or tester side.
HINT:
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester to read the DATA LIST allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non intrusive inspection can be very useful as intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the DATA LIST information early in troubleshooting is one way to save diagnostic time.



(a) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Read the DATA LIST.

MAIN BODY:

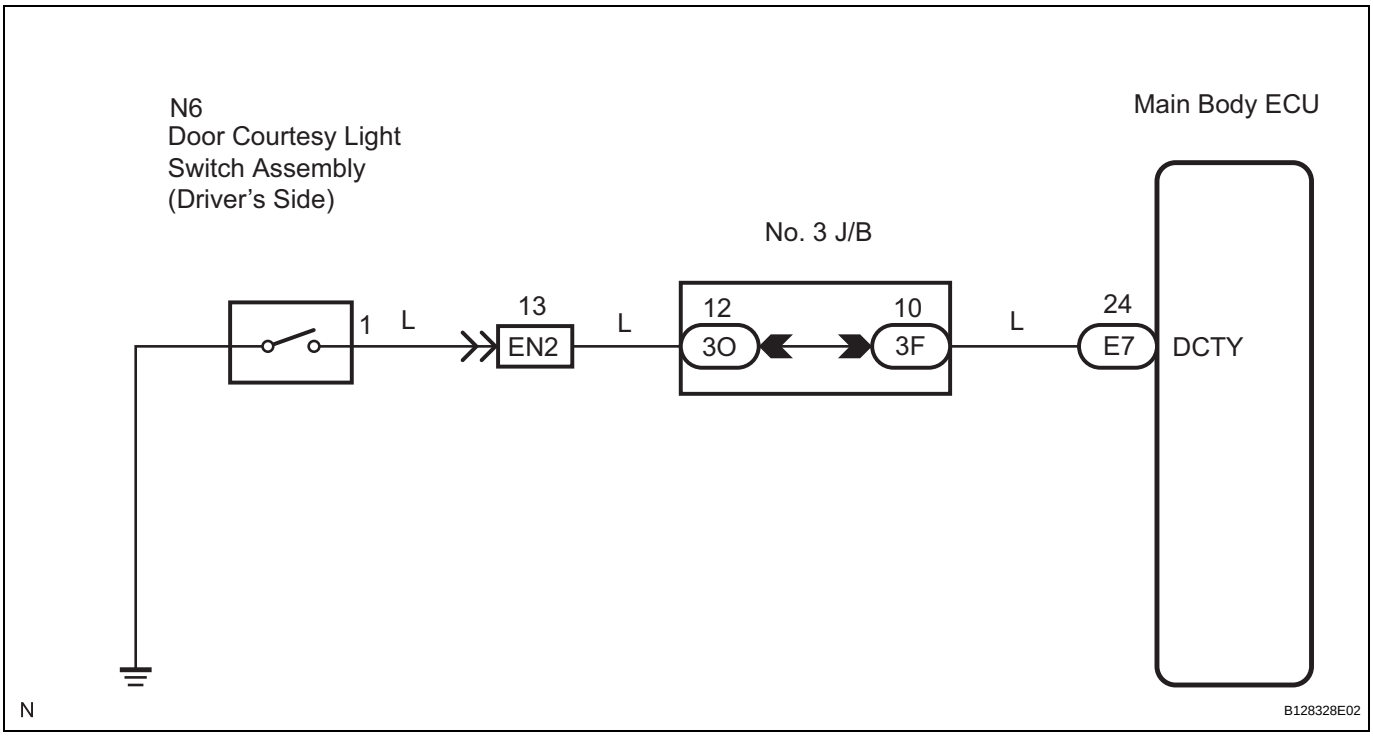
Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
KEY UNLK WRN SW	Unlock warning switch signal /ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-
D DOR CTY SW	Driver's side door courtesy switch signal /ON or OFF	ON: Driver's side door is open OFF: Driver's side door is closed	-

Door Courtesy Switch Circuit

DESCRIPTION

The main body ECU detects the condition of the front door courtesy light switch assembly (driver's side).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester main switch on.
(c) Select D DOR CTY SW in the DATA LIST and read the value displayed on the tester.

DL

BODY:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
D DOR CTY SW	Driver's side door courtesy switch signal/ON or OFF	ON: Driver's side door is open OFF: Driver's side door is closed	-

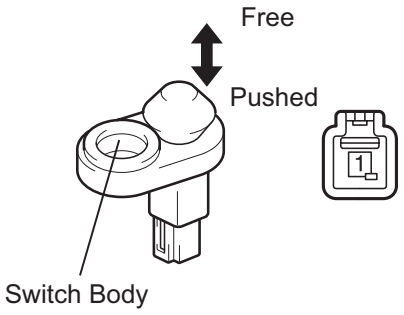
OK:
ON (Driver's door is open) appears on the screen.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY

Front Door Courtesy Light Switch Side Connector Front View:



(a) Remove the driver's side front door courtesy light switch (See page LI-128).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Switch body	Courtesy switch pushed (Door closed)	10 kΩ or higher
	Courtesy switch free (Door open)	Below 1 Ω

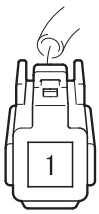
NG → **REPLACE FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**

OK

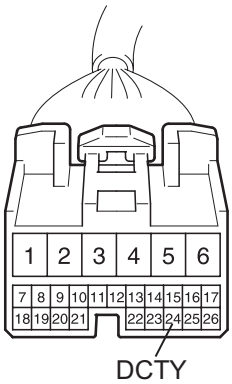
3 CHECK HARNESS AND CONNECTOR (FRONT DOOR COURTESY LIGHT SWITCH - MAIN BODY ECU)

Wire Harness Side Connector Front View:

N6
Front Door Courtesy Light Switch Assembly



E7
Main Body ECU



(a) Disconnect the E7 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
N6-1 - E7-24 (DCTY)	Always	Below 1 Ω
N6-1 - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

DL

OK

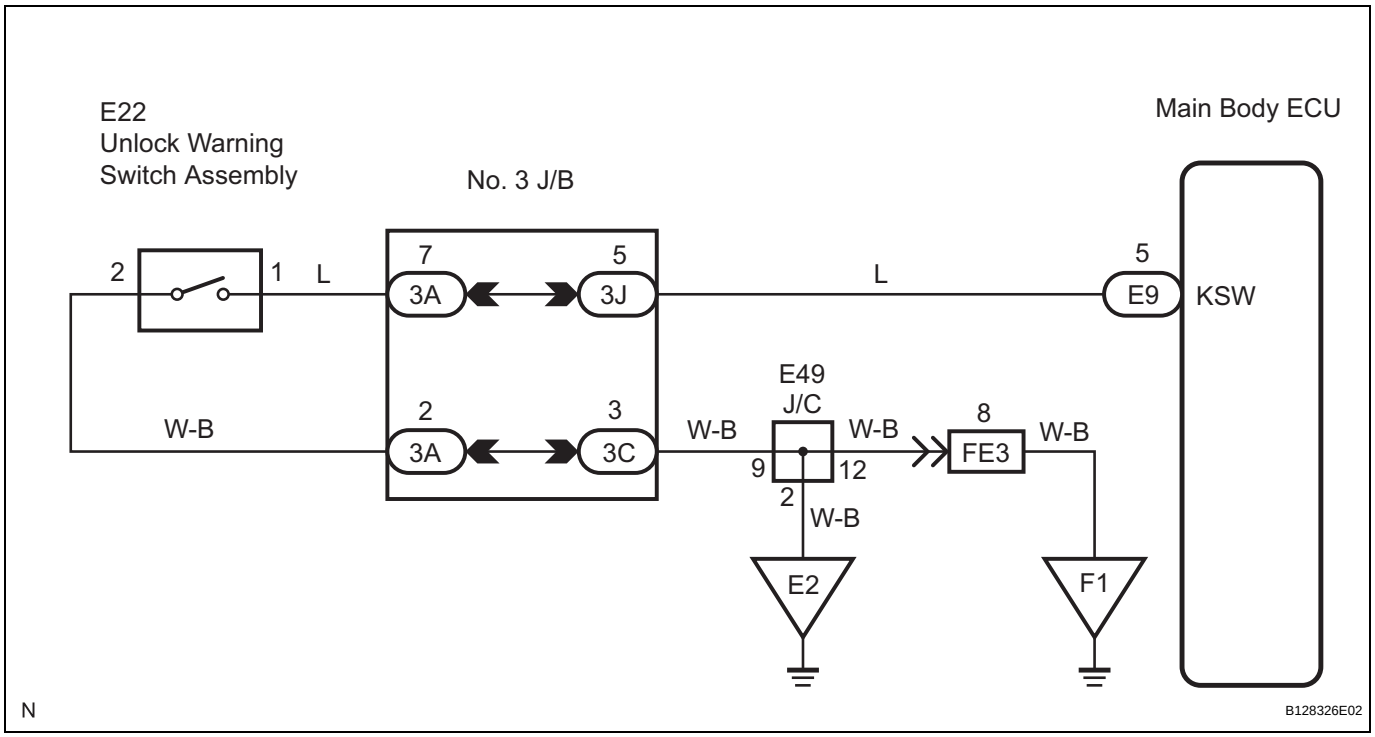
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Unlock Warning Switch Circuit

DESCRIPTION

The unlock warning switch detects if the key is in the ignition key cylinder.
The unlock warning switch turns on when the key is inserted into the ignition key cylinder and turns off when the key is removed from the cylinder.
The main body ECU is connected to the unlock warning switch via terminal KSW and key detection status signals are input to the main body ECU.
The main body ECU applies voltage to the unlock warning switch via terminal KSW. When the unlock warning switch is on (there is continuity between the switch terminals), a signal indicating that the key is in the ignition key cylinder is input to the main body ECU. When the switch is off (there is no continuity between the switch terminals), a signal indicating that the key is not in the cylinder is input.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

DL

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester main switch on.
(c) Select KEY UNLK WRN SW in the DATA LIST and read the value displayed on the tester.

BODY:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
KEY UNLK WRN SW	Unlock warning switch signal /ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-

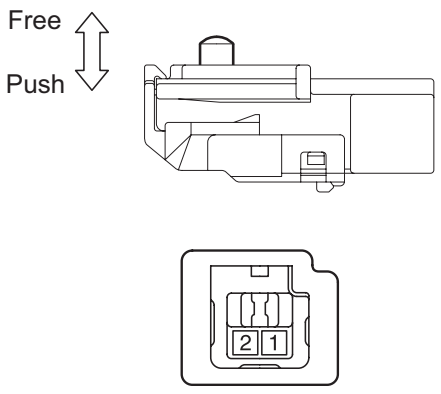
OK:
ON (Key is in ignition key cylinder) appears on the screen.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT UNLOCK WARNING SWITCH ASSEMBLY

Unlock Warning Switch Assembly:



(a) Remove the unlock warning switch assembly (See page DL-225).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch free (Key removed)	10 kΩ or higher
1 - 2	Switch pushed (Key set)	Below 1 Ω

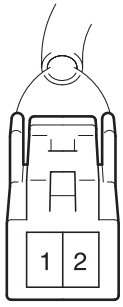
NG → **REPLACE UNLOCK WARNING SWITCH ASSEMBLY**

OK

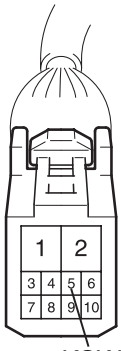
3 CHECK HARNESS AND CONNECTOR (UNLOCK WARNING SWITCH - MAIN BODY ECU)

Wire Harness Side Connector Front View:

E22
Unlock Warning Switch Assembly



E9
Main Body ECU



P B139168E01

(a) Disconnect the E22 switch and E9 ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E22-1 - E9-5 (KSW)	Always	Below 1 Ω
E22-1 - Body ground		10 kΩ or higher

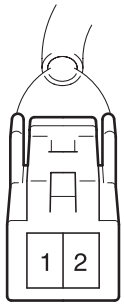
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR (UNLOCK WARNING SWITCH - BODY GROUND)

Wire Harness Side Connector Front View:

E22
Unlock Warning Switch Assembly



P B139172E01

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E22-2 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

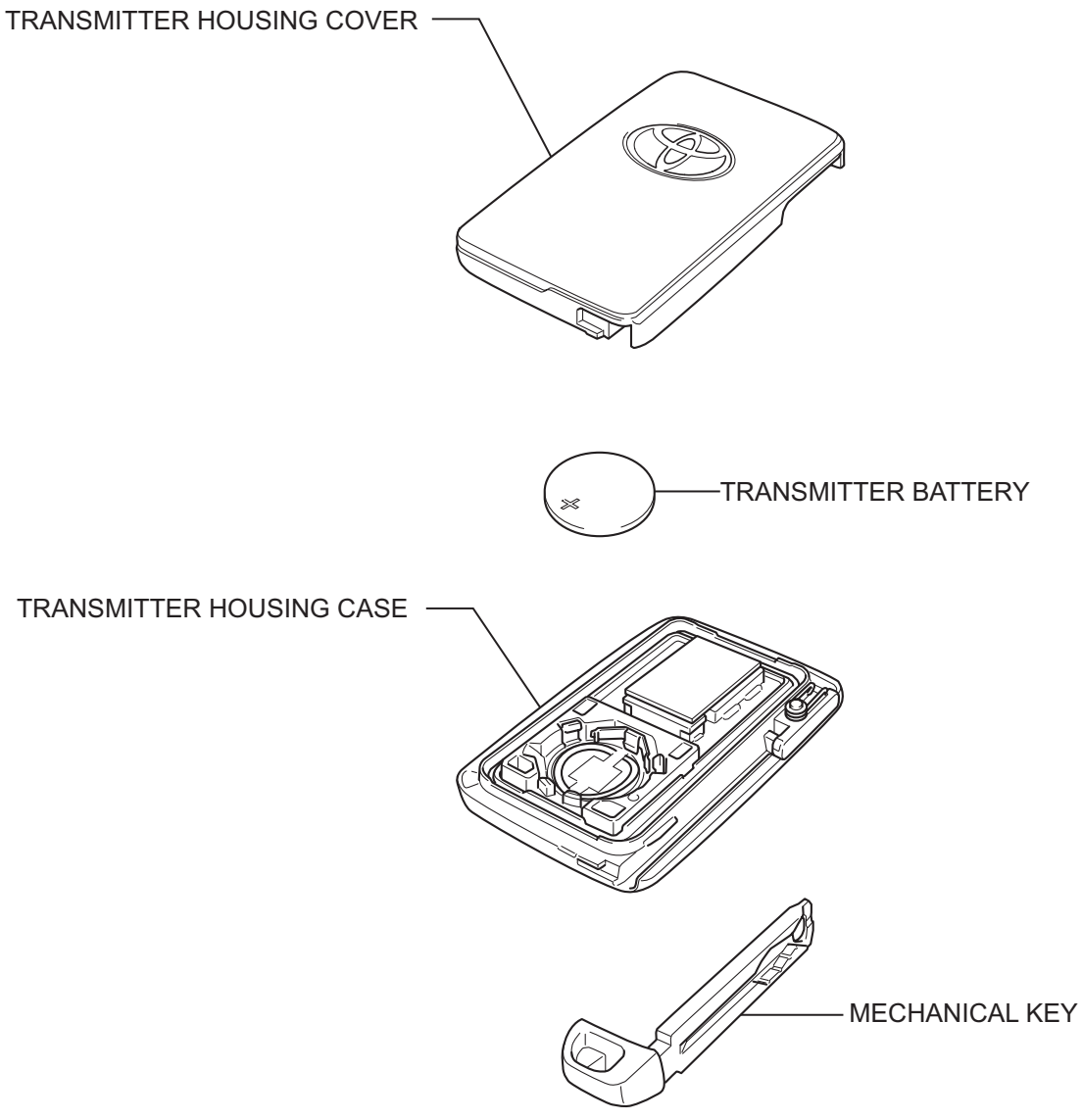
DL

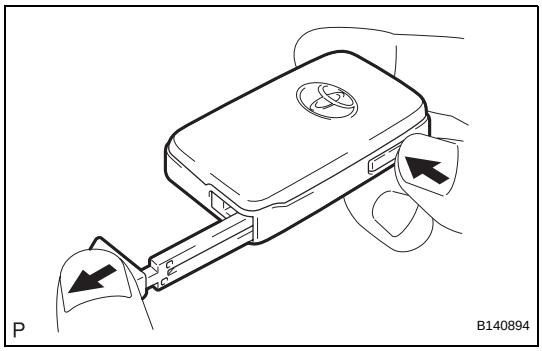
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

DOOR CONTROL TRANSMITTER (w/ Smart Key System)

COMPONENTS

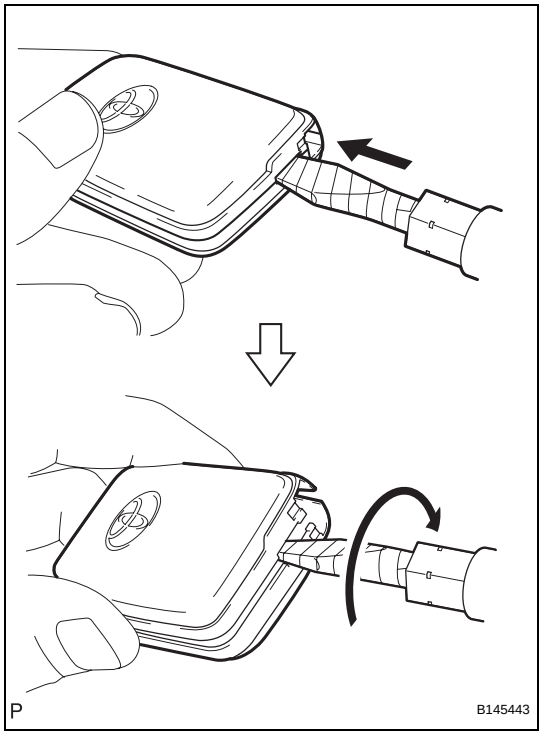




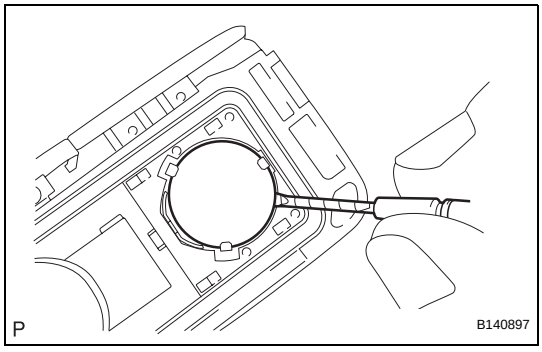
REMOVAL

1. REMOVE TRANSMITTER BATTERY

(a) Remove the mechanical key.



(b) Insert a screwdriver into the gap, and turn the screwdriver to detach the cover.
HINT:
Tape the screwdriver tip before use.



(c) Insert a screwdriver into the gap and gently remove the battery (lithium battery).
NOTICE:

- **Do not push the terminals with your finger.**
- **Do not forcibly pry up the battery (lithium battery) because doing so will deform the terminals.**
- **Do not touch the battery with wet hands. Water may result in corrosion.**
- **Do not touch or move any components inside the transmitter because handling the components may interfere with proper operation of the transmitter.**

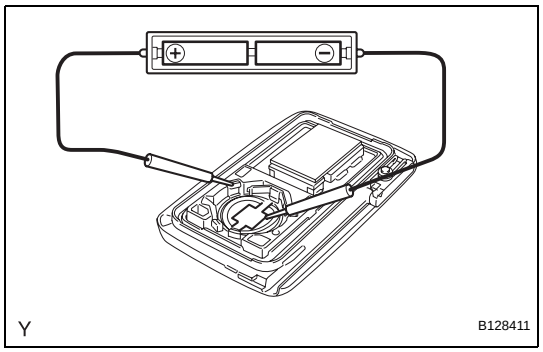
INSPECTION

1. INSPECT DOOR CONTROL TRANSMITTER

(a) Inspect operation of the transmitter.

(1) Remove the battery (lithium battery) from the transmitter (See page DL-210).

(2) Install a new or normal battery (lithium battery).
HINT:
If a new or normal battery is not available, first connect 2 new 1.5 V batteries in series. Then connect leads to the batteries and apply 3 V to the transmitter, as shown in the illustration.



(3) From outside the vehicle, approximately 1 m (3.28 ft.) away from the driver side outside door handle, test the transmitter by pointing its key plate at the vehicle and pressing a transmitter switch.
OK:
The door lock can be operated via the transmitter.
The LED comes on more than once.

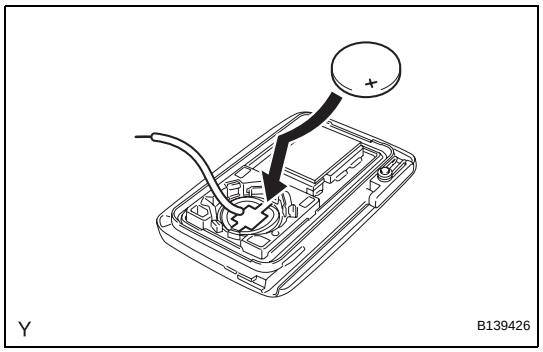
- The operational area differs depending on the user, the way the transmitter is held, and the location.
- The transmitter's faint electric waves may be affected if the area has strong electric waves or noise. The transmitter's operation area may be shortened or the transmitter may not function.

(b) Inspect the battery capacity.
HINT:

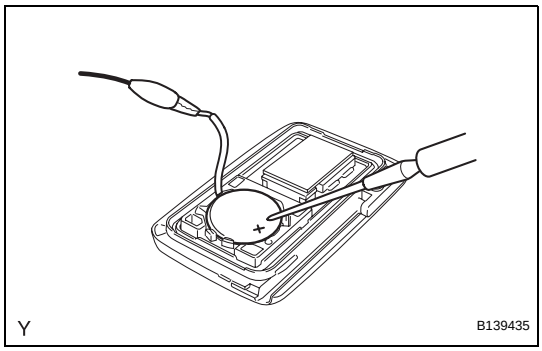
- When checking the amount of energy left in the battery (lithium battery), the battery must be checked while it is installed in the transmitter (a resistance of 1.2 kΩ is applied to the battery). When the battery energy is checked by itself (removed from the vehicle), the voltage reading will be more than 2.5 V until the energy is depleted.
- If the transmitter is malfunctioning, the voltage reading of the energy left in the battery will be inaccurate.

(1) Remove the battery (lithium battery) from the transmitter (See page DL-210).

(2) Connect a wire to the negative (-) terminal of the transmitter and install the battery.



DL

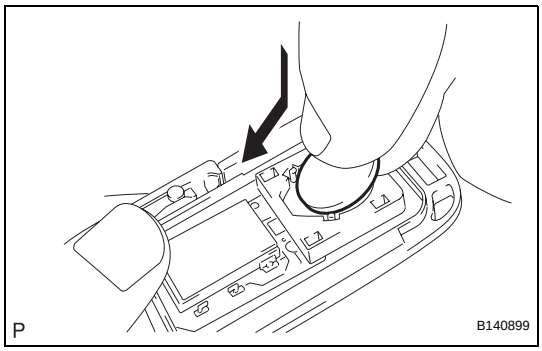


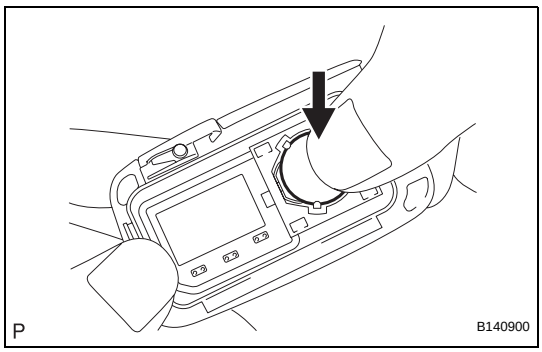
(3) Connect the tester positive (+) lead to the positive (+) battery (lithium battery), and the tester negative (-) lead to the wire connected in the previous step.
(4) Press one of the transmitter switches on the transmitter for approximately 1 second.
(5) Press the transmitter switch on the transmitter again to check the voltage.
Voltage:
2.2 V or higher
HINT:
- If the temperature of the battery is low, the inspection cannot be performed correctly. If the result of the test is less than 2.2 V, perform the test again after leaving the battery in a place at a temperature of 18°C (64°F) for 30 minutes or more.
- Read the voltage immediately after the switch is pressed. When 0.8 seconds have passed after the switch is pressed, the automatic power-off function starts and the resistance applied to the battery will cease. The voltage of the battery will be 2.5 V or more.
- Press the switch at least 3 times before reading the voltage. If the battery has just been returned to 18°C (64°F), the voltage may be unusually high for the first or second voltage reading.

INSTALLATION

1. INSTALL TRANSMITTER BATTERY

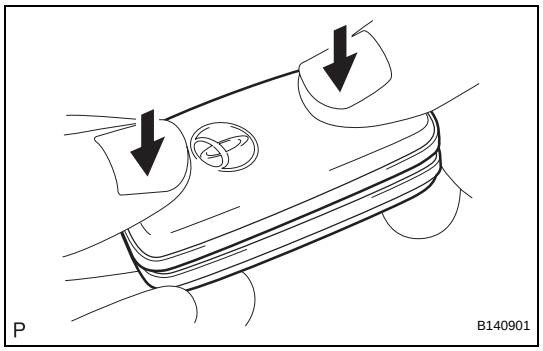
(a) Install a new battery (lithium battery) with the positive (+) side up as shown in the illustration.



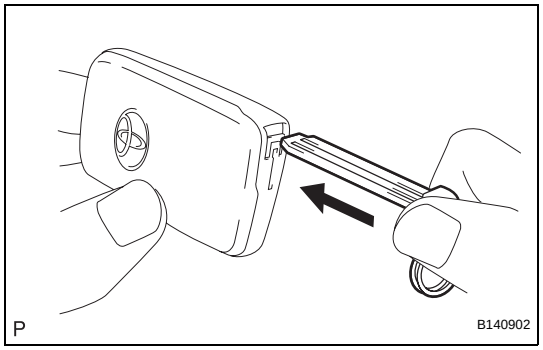


(b) Press down gently on the battery to set it in place.
NOTICE:
- **Be sure that the positive and negative sides of the transmitter battery are positioned correctly.**
- **Be careful not to bend the terminals of the transmitter battery during installation.**
- **Keep the interior of the transmitter case free of dust, water, and oil.**

DL



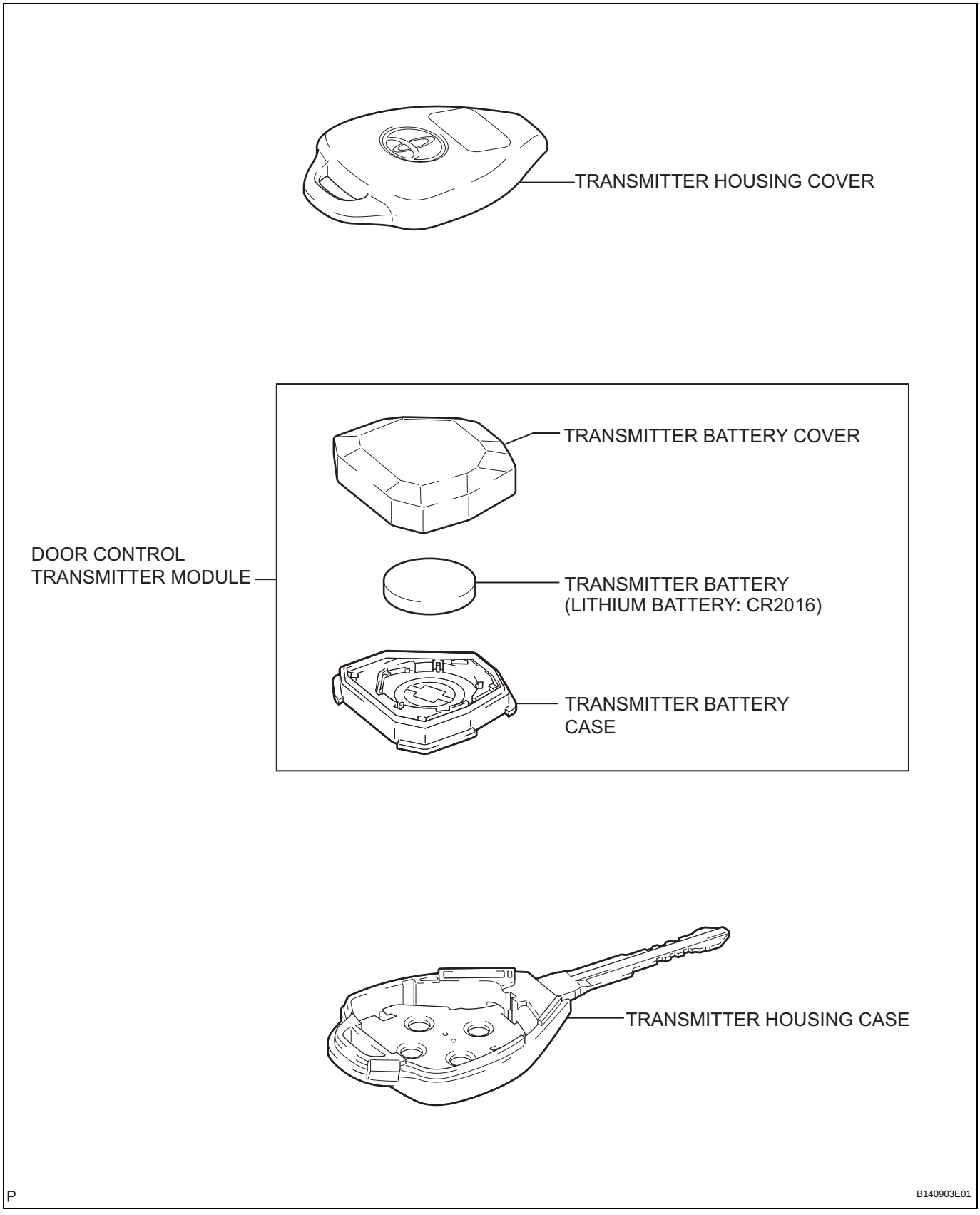
(c) Install the cover by pressing down on it as shown in the illustration.



(d) Install the mechanical key.
HINT:
After the installation, press one of the transmitter switches and check that the LED illuminates.

DOOR CONTROL TRANSMITTER (w/o Smart Key System)

COMPONENTS



DL

REMOVAL

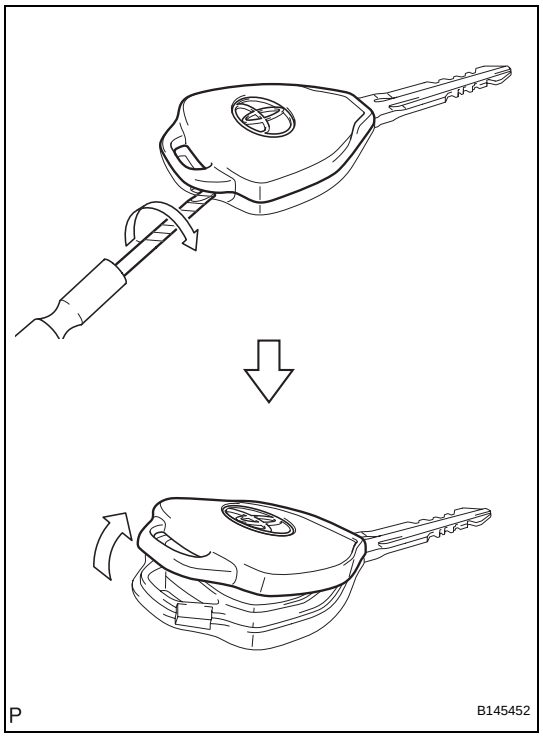
1. REMOVE TRANSMITTER BATTERY

(a) Remove the transmitter battery.

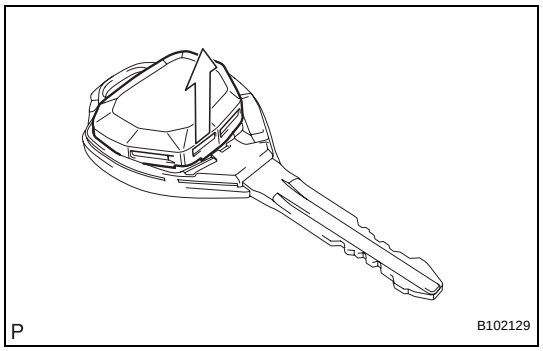
(1) Using a screwdriver with its tip wrapped in protective tape, pry open the transmitter housing cover.

NOTICE:

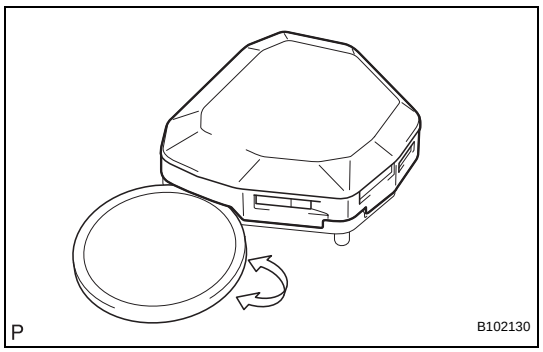
Do not use excessive force when prying open the housing cover.



(b) Remove the door control transmitter module from the transmitter housing case.



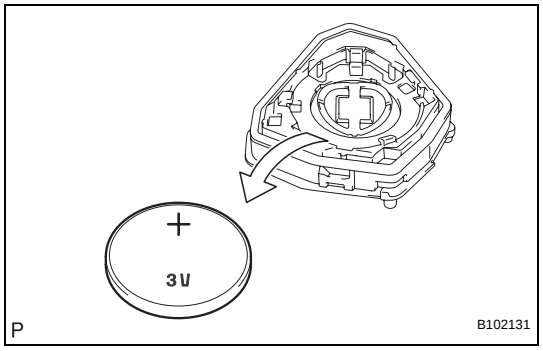
(c) Using a coin, or other flat object, pry open the transmitter cover.



(d) Remove the transmitter battery (lithium battery).

NOTICE:

- **Do not push the terminals with your finger.**
- **Do not forcibly pry up the battery (lithium battery) because doing so will deform the terminals.**
- **Do not touch the battery with wet hands. Water may result in corrosion.**



DL

- **Do not touch or move any components inside the transmitter because handling the components may interfere with proper operation of the transmitter.**

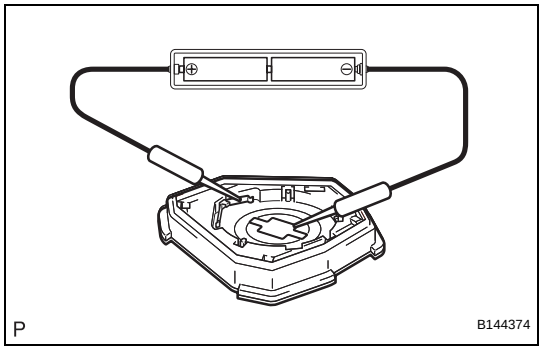
INSPECTION

1. INSPECT DOOR CONTROL TRANSMITTER

(a) Inspect operation of the transmitter.

(1) Remove the battery (lithium battery) from the transmitter (See page DL-215).

(2) Install a new or normal battery (lithium battery).



(3) If a new or normal battery is not available, connect 2 new 1.5 V batteries in a series. Connect the positive (+) battery electrode to the battery receptacle side terminal, and the negative (-) battery electrode to the bottom terminal, and apply a voltage of 3 V to the transmitter.

(4) In a location that is approximately 1 m (3.28 ft) away from the driver side outside door handle, point the key plate of the transmitter at the vehicle and check operation of the transmitter by pressing the transmission switches on the transmitter body.

Standard:

The door lock/unlock can be operated via remote control.

The LED lights up when each switch is pressed.

HINT:

- The minimum operational distance differs depending on the way the transmitter is held and the location.
- Since the transmitter uses faint electric waves, the operational distance might be shortened if noise or a strong electric wave occurs in the area where the frequency is used.

(5) Install the battery (lithium battery).

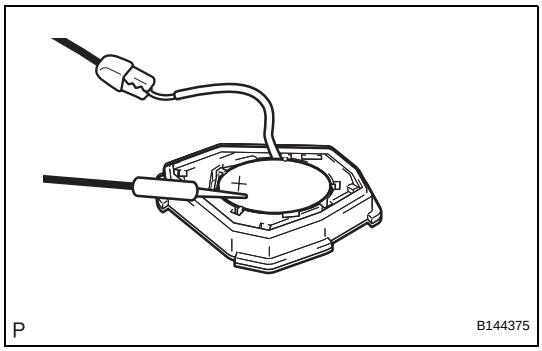
(b) Inspect the battery capacity.

HINT:

- The capacity of the battery can be determined only when the battery is installed in the transmitter. For a lithium battery used in the transmitter, a voltage of more than 2.5 V is shown on the tester until the energy is completely consumed without the battery installed in the transmitter. Therefore, it is necessary to measure the voltage with the battery installed in the transmitter (a resistance of 1.2 kΩ is applied to the battery) to check the amount of energy left in the battery.
- If the transmitter is faulty, the amount of energy left in the battery might not be checked correctly.

(1) Remove the battery (lithium battery) from the transmitter (See page DL-215).

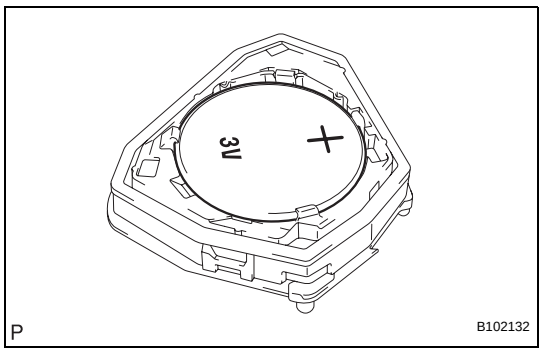
(2) Connect the lead to the negative (-) terminal of the transmitter and install the battery.



(3) Connect the positive (+) tester probe to the positive (+) side of the battery (lithium battery), and the negative (-) tester probe to the lead respectively.
(4) Press one of the transmission switches on the transmitter for approximately 1 second.
(5) Press the same or another transmission switch again and check the voltage.
Voltage:
2.2 V or higher
HINT:
- If the temperature of the battery is low, the inspection cannot be done correctly.
If the outcome of the test is less than 2.2 V, conduct the test again after leaving the battery in a place with a temperature of 18°C (64°F) for more than 30 minutes.
- The automatic power-off function causes the battery voltage to be 2.5 V or more (with no resistance applied to the battery) when 0.8 seconds have passed after the switch is pressed. Therefore, make sure to read the voltage immediately after the switch is pressed.

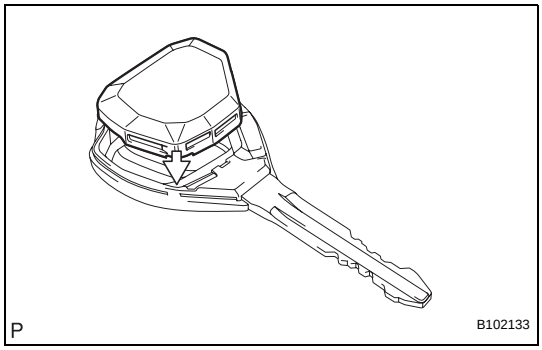
(6) Remove the lead.
(7) Set the battery (lithium battery) in the transmitter.

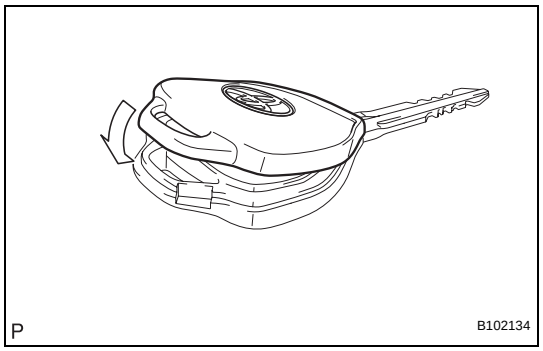
INSTALLATION



1. INSTALL TRANSMITTER BATTERY
(a) Install the transmitter battery.
(1) Install a battery (lithium battery: CR2016) with the positive (+) side up, as shown in the illustration.
NOTICE:
- **Be sure that the positive and negative sides of the transmitter battery are positioned correctly.**
- **Be careful not to bend the terminals of the transmitter battery during installation.**
- **Keep the interior of the transmitter case free of dust, water, and oil.**

(b) Install the door control transmitter module into the transmitter housing case.

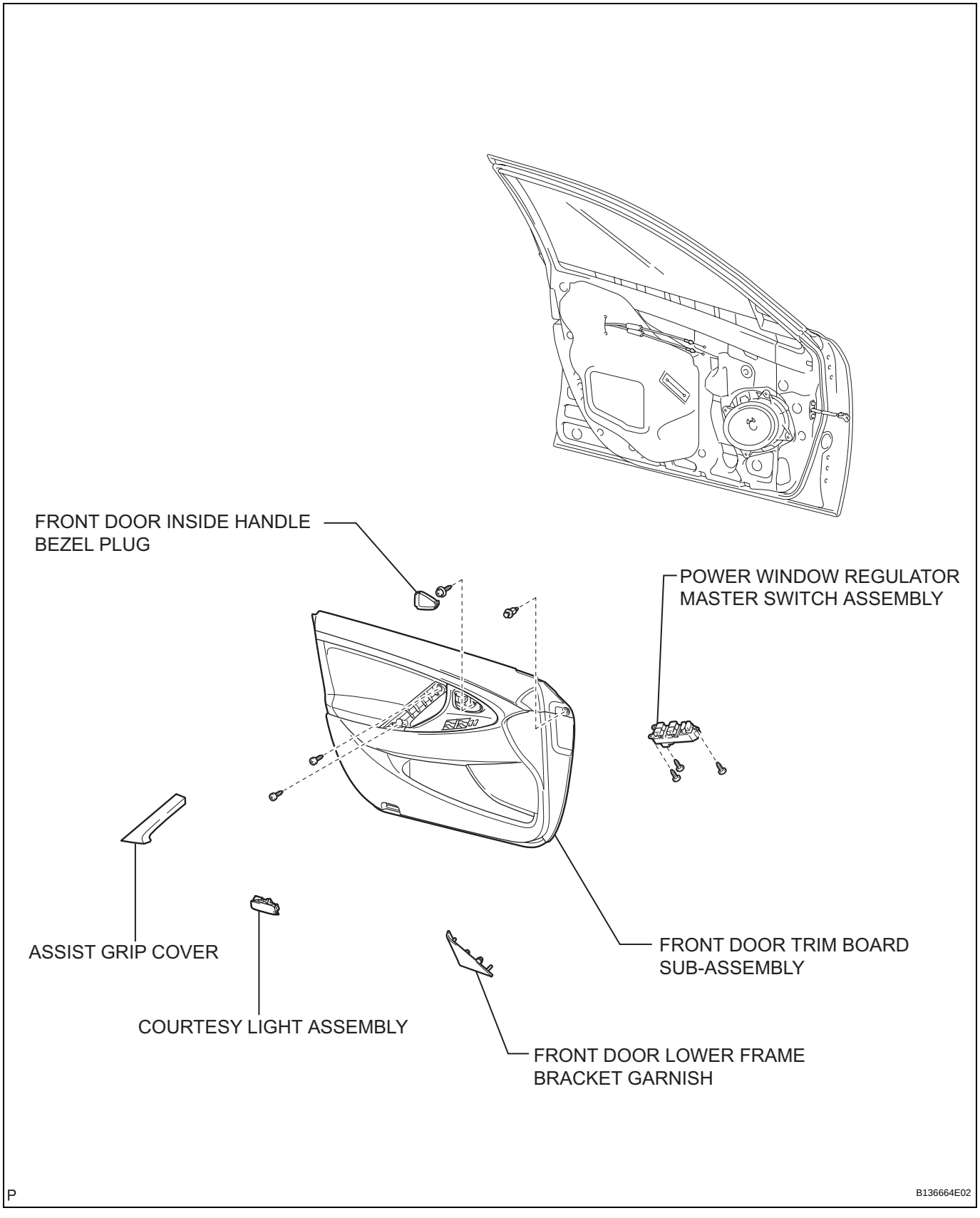




(c) Install the transmitter housing cover securely onto the transmitter housing case.
HINT:
After the installation, press one of the transmitter switches and check that the LED illuminates.

DOOR CONTROL SWITCH

COMPONENTS



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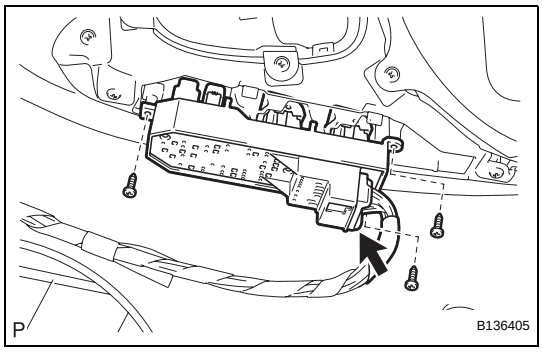
REMOVAL

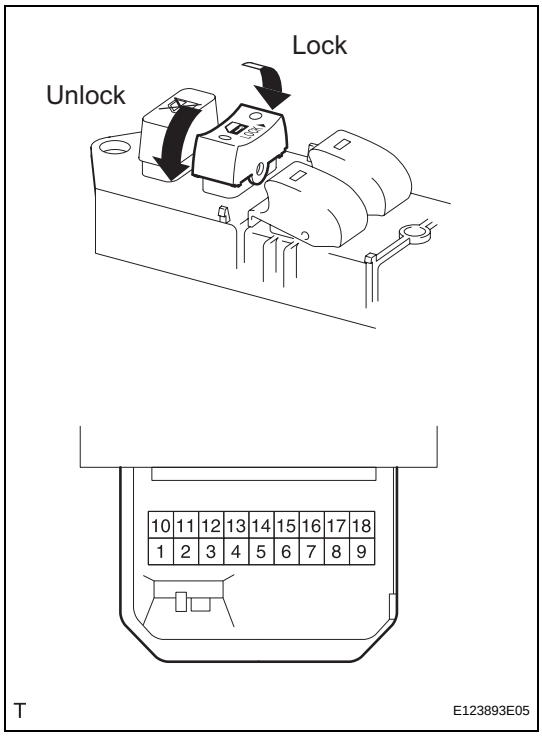
1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)**
3. **REMOVE ASSIST GRIP COVER (See page ED-15)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)**
6. **REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 3 screws and the power window regulator master switch assembly.



INSPECTION

1. **INSPECT DOOR CONTROL SWITCH (for Driver Side)**
   (a) Measure the resistance of the door control switch.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
2 - 1	Lock	Below 1 Ω
2 - 1	OFF (Free)	10 kΩ or higher
9 - 1	Unlock	Below 1 Ω
9 - 1	OFF (Free)	10 kΩ or higher



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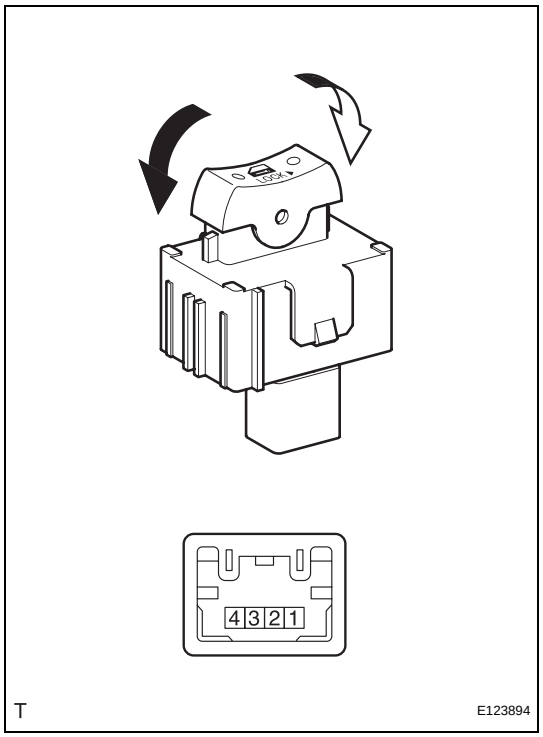
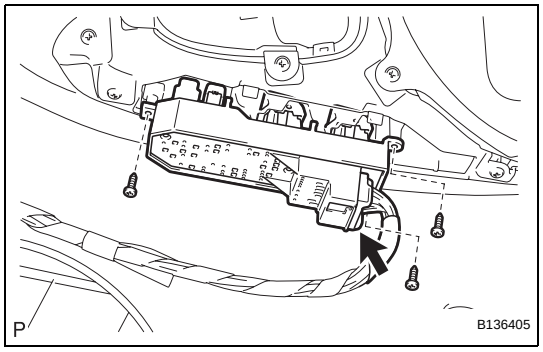


2. **INSPECT DOOR CONTROL SWITCH (for Front Passenger Side)**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
4 - 3	Lock	Below 1 Ω
4 - 3 2 - 3	OFF (Free)	10 kΩ or higher
2 - 3	Unlock	Below 1 Ω

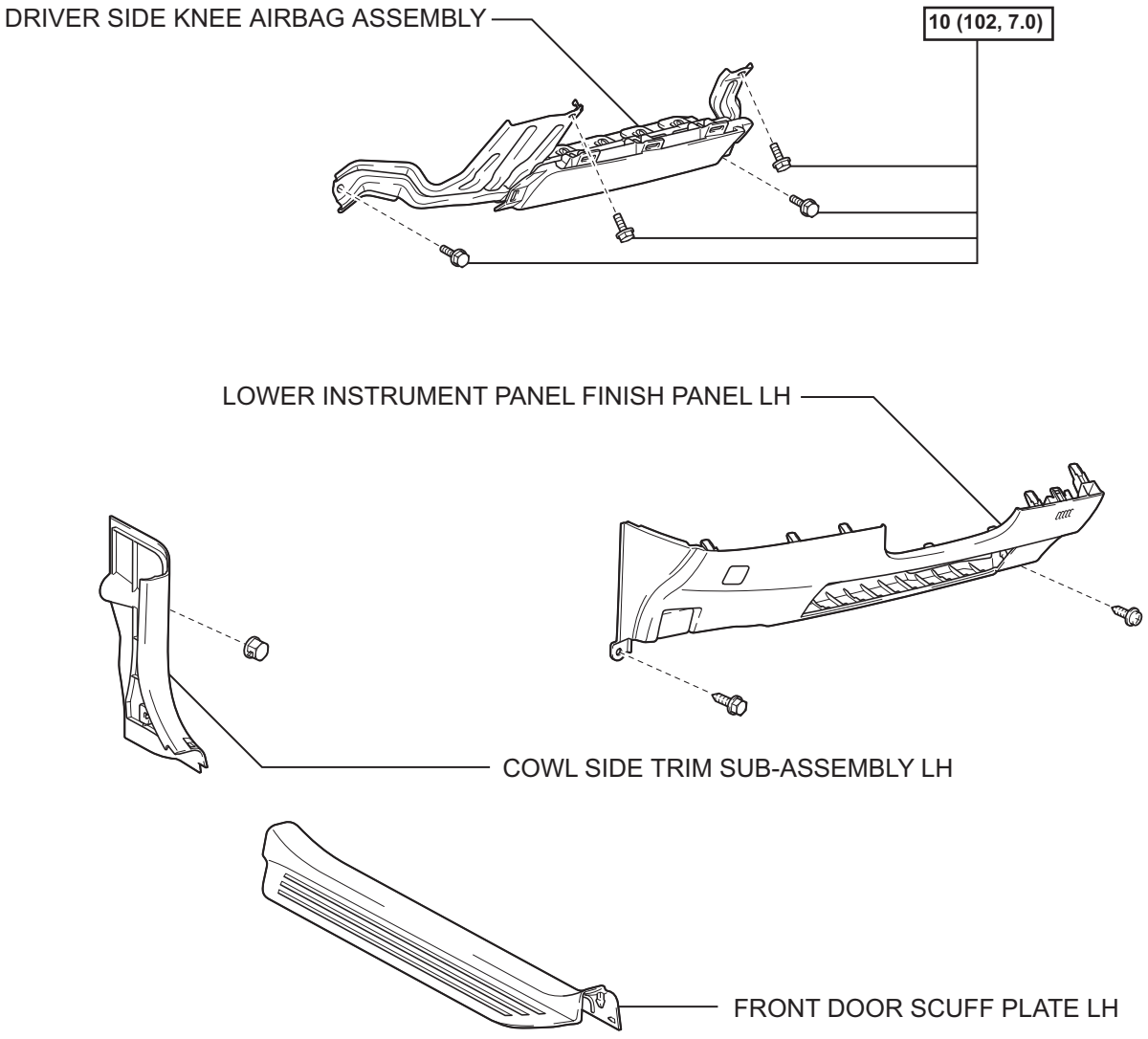


INSTALLATION

1. **INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**
   (a) Install the power window regulator master switch assembly with the 3 screws.
   (b) Connect the connector.
2. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**
3. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-34)**
4. **REMOVE ASSIST GRIP COVER (See page ED-34)**
5. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**
6. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

UNLOCK WARNING SWITCH

COMPONENTS

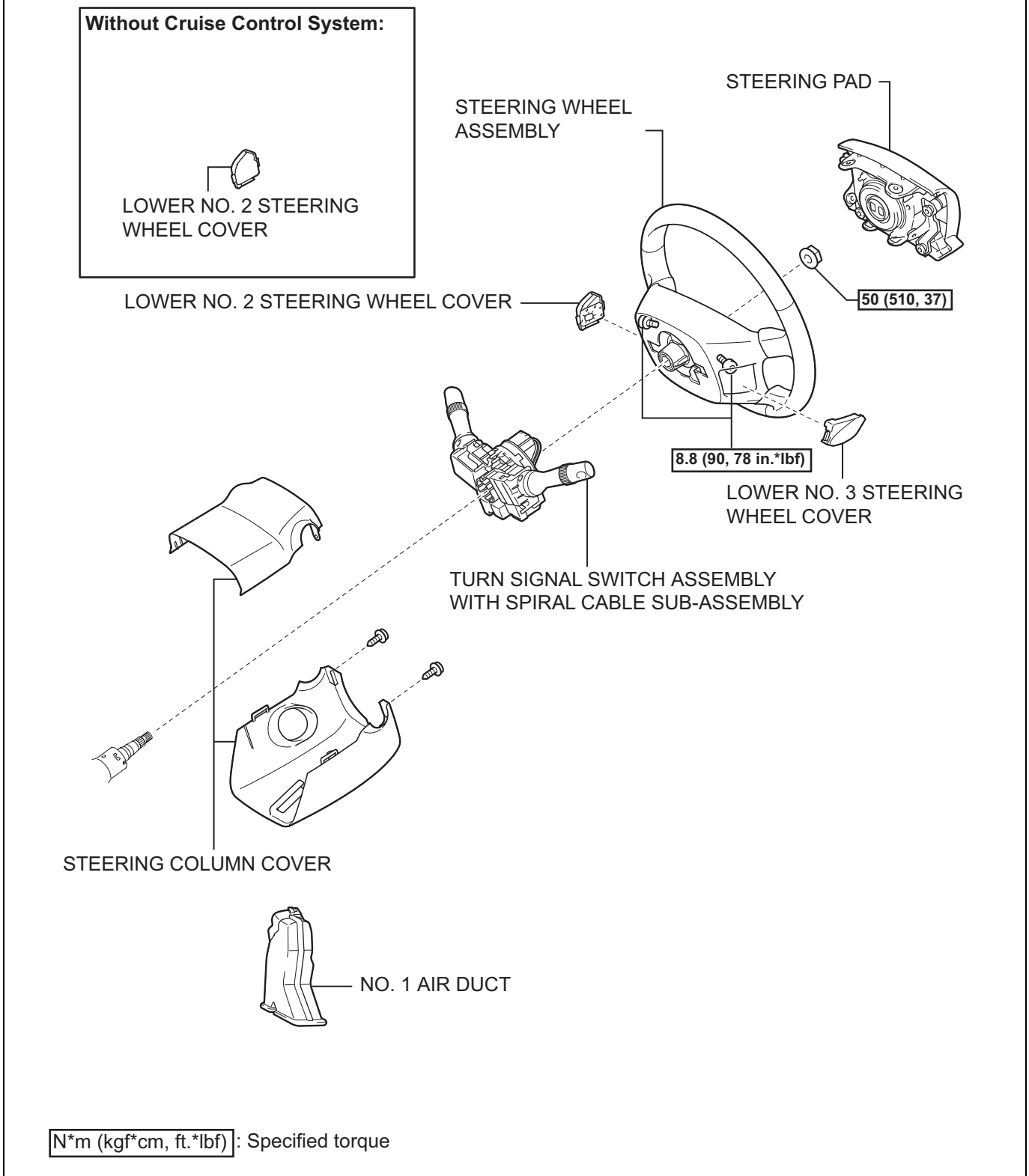


N*m (kgf*cm, ft.*lbf) : Specified torque

P

C133871E04

DL

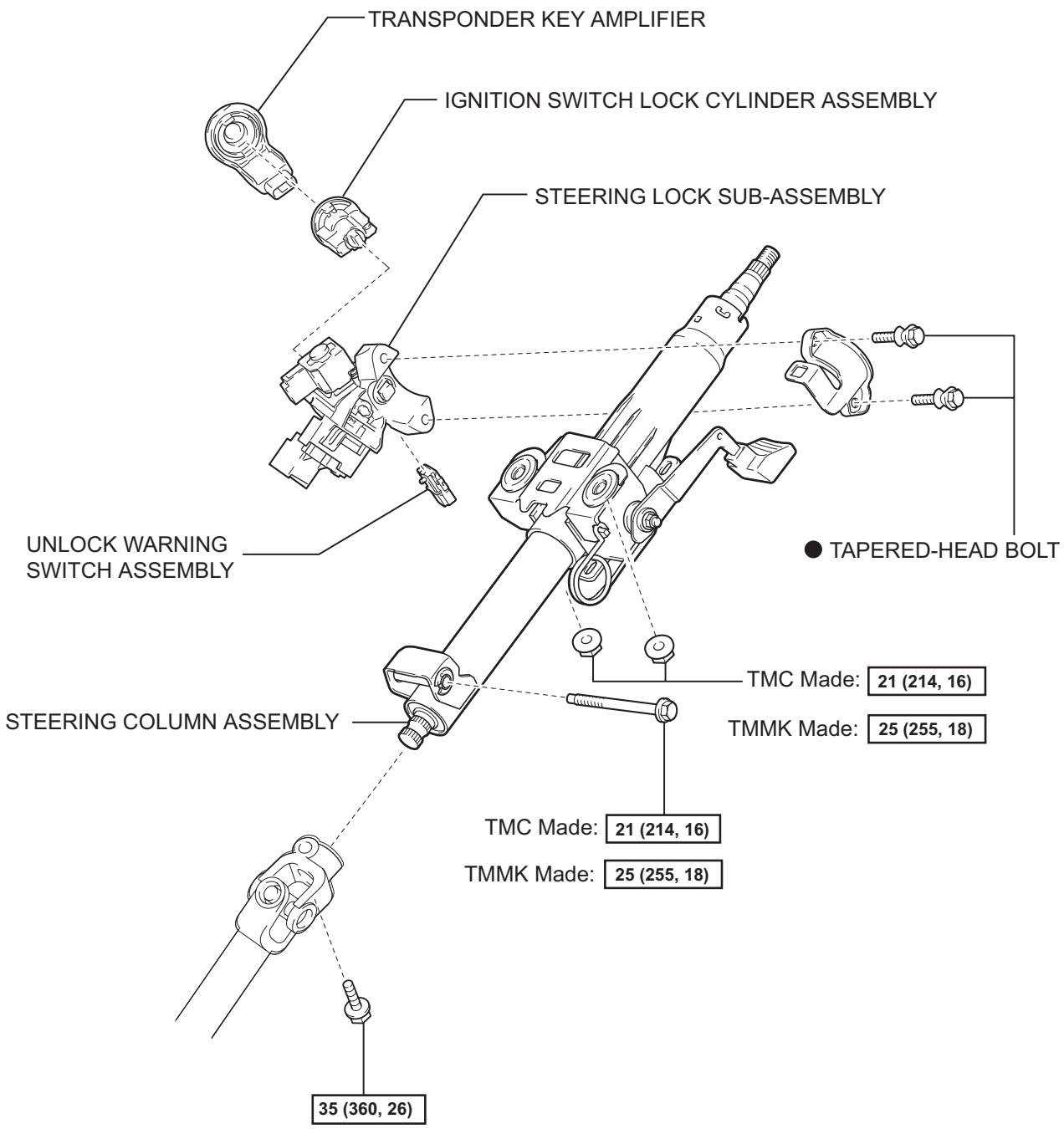


N*m (kgf*cm, ft.*lbf): Specified torque

P

C115592E06

DL



● Non-reusable part

N*m (kgf*cm, ft.*lbf): Specified torque

P

B139059E01

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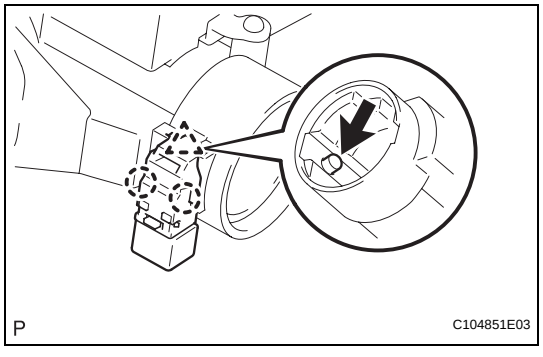
REMOVAL

1. **PRECAUTION**
   (See page RS-1)
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   (See page RS-1)
4. **REMOVE FRONT WHEEL LH**
5. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
6. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-20)**
8. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**
9. **REMOVE LOWER NO. 2 STEERING WHEEL COVER**
10. **REMOVE LOWER NO. 3 STEERING WHEEL COVER**
11. **REMOVE STEERING PAD (See page RS-350)**
12. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
13. **REMOVE STEERING COLUMN COVER (See page SR-39)**
14. **REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)**
15. **REMOVE NO. 1 AIR DUCT (See page SR-39)**
16. **REMOVE STEERING COLUMN ASSEMBLY (See page SR-39)**
17. **REMOVE TRANSPONDER KEY AMPLIFIER (See page SR-42)**
18. **REMOVE STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY (See page SR-43)**
19. **REMOVE IGNITION SWITCH LOCK CYLINDER ASSEMBLY (See page SR-43)**
20. **REMOVE UNLOCK WARNING SWITCH ASSEMBLY**
    (a) Remove the unlock warning switch assembly by pushing up the center part and releasing the 2 claws.



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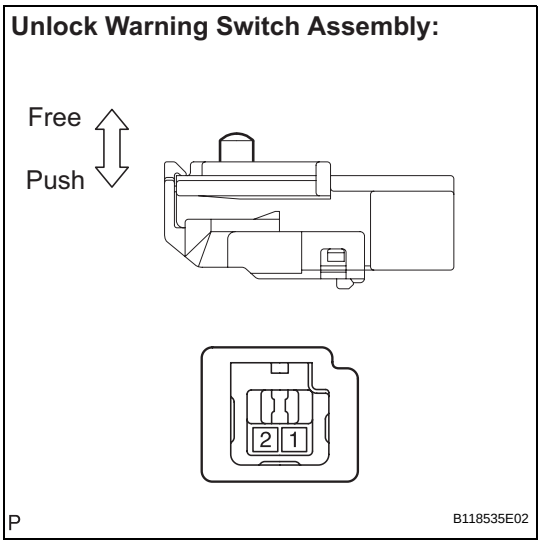
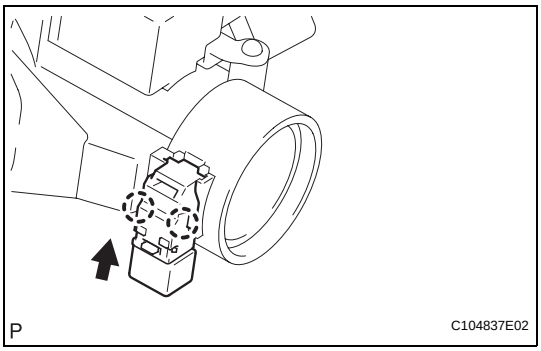




INSPECTION

1. **INSPECT UNLOCK WARNING SWITCH ASSEMBLY**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Switch free (Key removed)	10 kΩ or higher
1 - 2	Switch pushed (Key set)	Below 1 Ω

   If the result as specified, replace the unlock warning switch assembly.

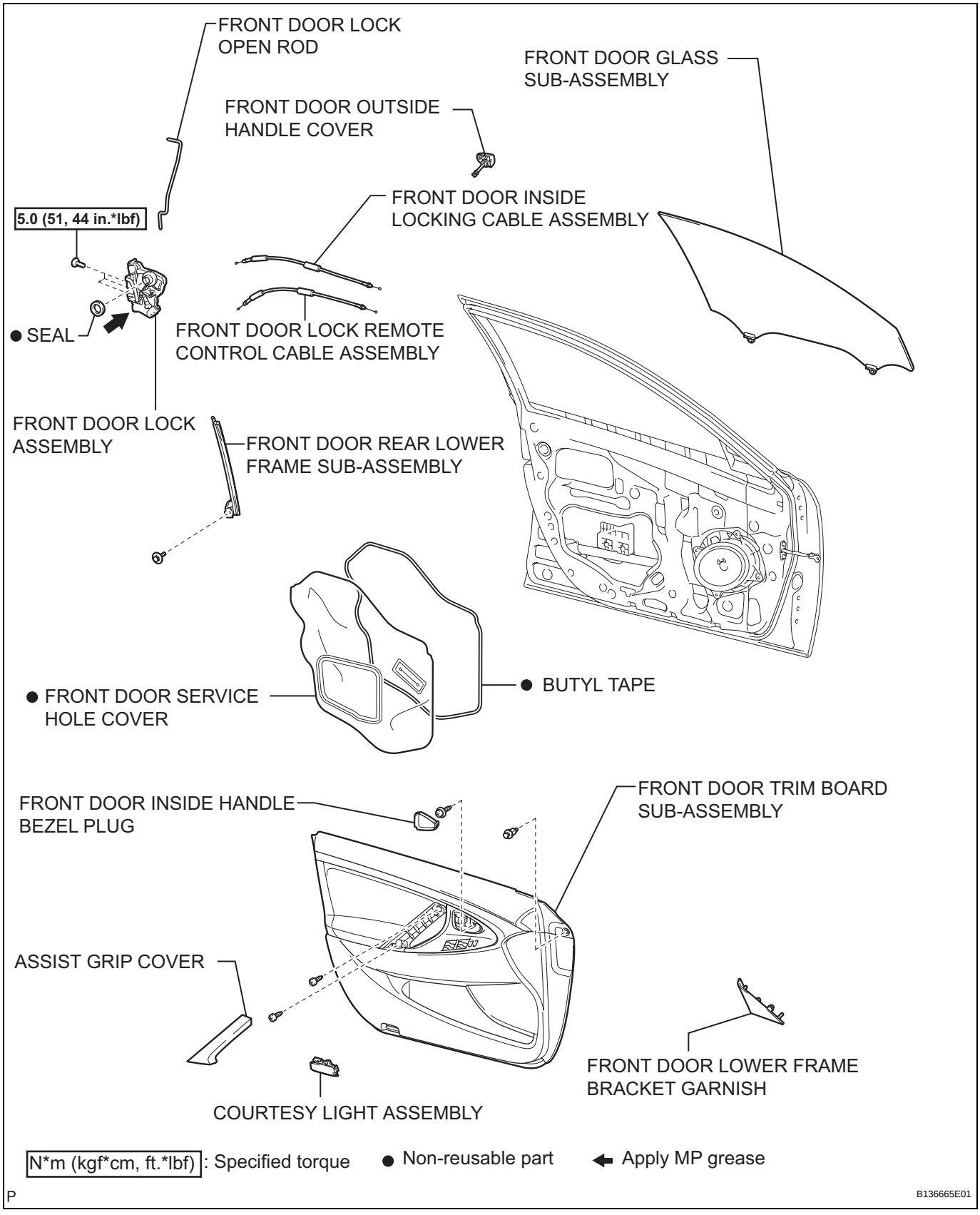
INSTALLATION

1. **INSTALL UNLOCK WARNING SWITCH ASSEMBLY**
   (a) Engage the 2 claws to install the unlock warning switch assembly to the steering lock sub-assembly.
2. **INSTALL IGNITION SWITCH LOCK CYLINDER ASSEMBLY (See page SR-46)**
3. **INSPECT STEERING LOCK OPERATION**
4. **INSTALL STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY (See page SR-46)**
5. **INSTALL TRANSPONDER KEY AMPLIFIER (See page SR-46)**
6. **INSTALL STEERING COLUMN ASSEMBLY (See page SR-47)**
7. **INSTALL NO. 1 AIR DUCT (See page SR-50)**
8. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
9. **INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-50)**
10. **INSTALL STEERING COLUMN COVER (See page SR-50)**
11. **ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)**
12. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)**
13. **INSPECT STEERING WHEEL CENTER POINT**
14. **INSPECT STEERING PAD (See page RS-352)**
15. **INSTALL STEERING PAD (See page RS-350)**
16. **INSTALL LOWER NO. 2 STEERING WHEEL COVER**
17. **INSTALL LOWER NO. 3 STEERING WHEEL COVER**
18. **INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**

19. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-55)**
20. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
21. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
22. **INSTALL FRONT WHEEL LH (See page SR-51)**
23. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
24. **INSPECT SRS WARNING LIGHT**
    (See page RS-32)

FRONT DOOR LOCK

COMPONENTS



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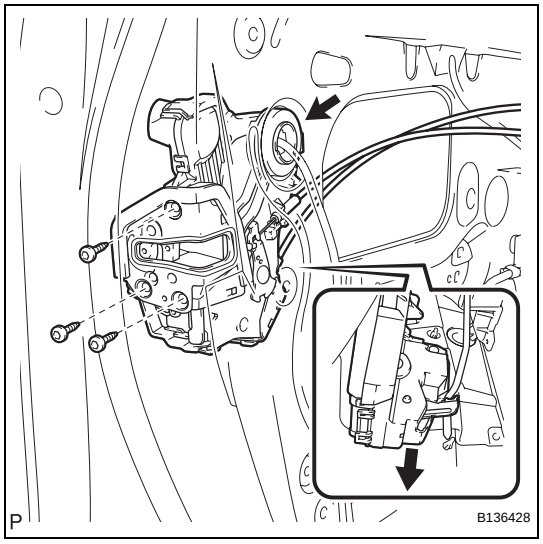
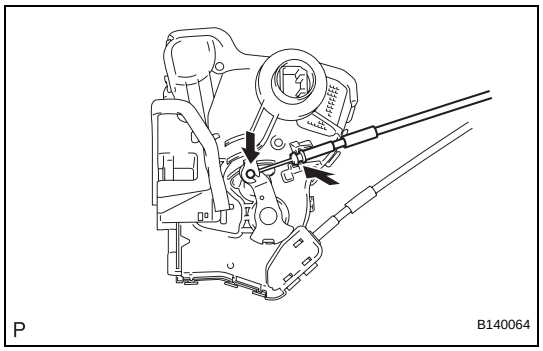
REMOVAL

1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)**
3. **REMOVE ASSIST GRIP COVER (See page ED-15)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)**
6. **REMOVE FRONT DOOR SERVICE HOLE COVER (See page ED-17)**
7. **REMOVE FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-17)**
8. **REMOVE FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY (See page ED-19)**
9. **REMOVE FRONT DOOR OUTSIDE HANDLE COVER (See page ED-19)**
10. **REMOVE FRONT DOOR LOCK ASSEMBLY**
    (a) Disconnect the connector.
    (b) Using a "torx" socket wrench (T30), remove the 3 screws.
    (c) Slide the front door lock assembly downward and pull out the front door lock open rod from the outside handle frame. Remove the front door lock assembly and cables as a unit.
    (d) Remove the front door lock open rod from the front door lock assembly.
    (e) Remove the door lock wiring harness seal from the front door lock assembly.





(f) Remove the front door lock remote control cable assembly.

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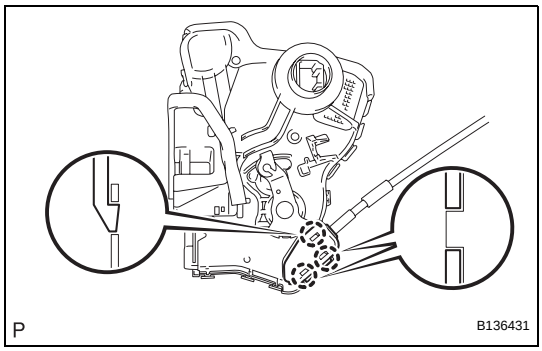
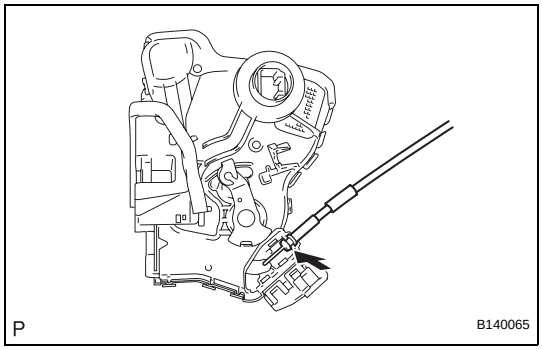


(g) Using a screwdriver, disengage the 3 claws.
HINT:
Tape the screwdriver tip before use.



(h) Remove the front door inside locking cable assembly.

INSPECTION

1. INSPECT FRONT DOOR LOCK LH ASSEMBLY

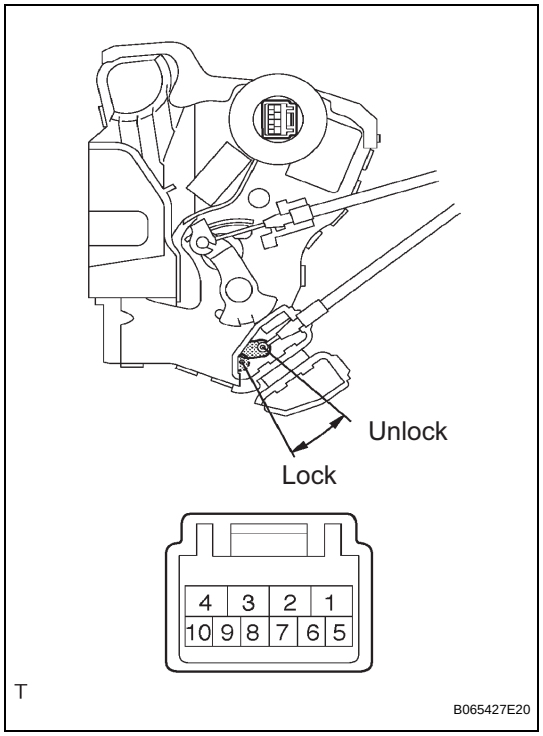
(a) Remove the front door lock assembly LH.

(b) Check operation of the door lock motor.

(1) Apply battery voltage and check operation of the door lock motor.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

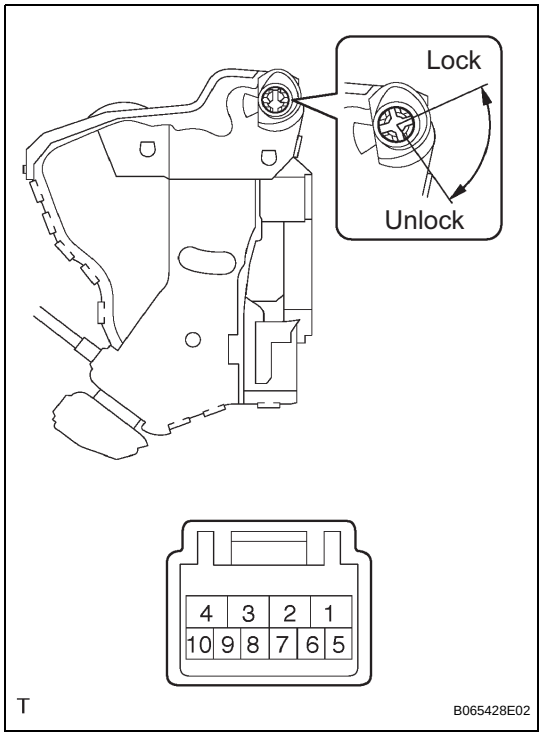


(c) Check operation of the door key lock and unlock switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
7 - 9	ON (Door lock set to LOCK)	Below 1 Ω
7 - 9 7 - 10	OFF (Free)	10 kΩ or higher
7 - 10	ON (Door lock set to UNLOCK)	Below 1 Ω



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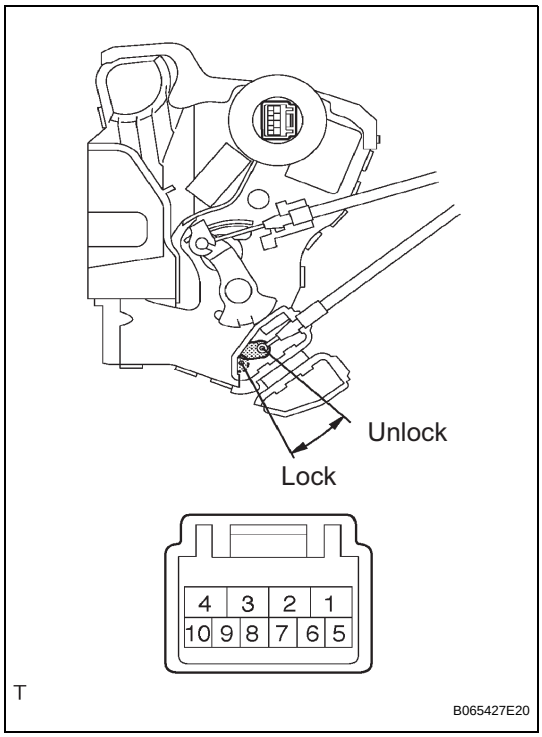
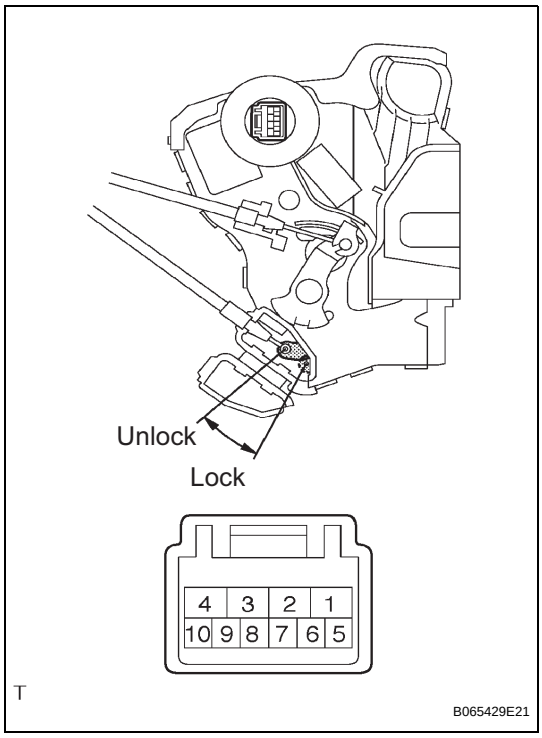


(d) Check operation of the door unlock detection switch.
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

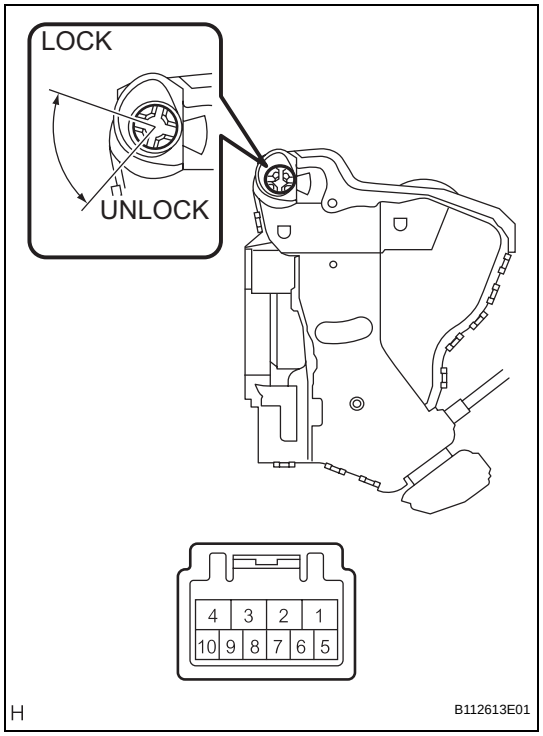
Tester Connection	Measurement Condition	Door Lock Condition	Specified Condition
7 - 8	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
7 - 8	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

2. INSPECT FRONT DOOR LOCK RH ASSEMBLY
(a) Remove the front door lock assembly RH.



(b) Check operation of the door lock motor.
(1) Apply battery voltage and check operation of the door lock motor.
OK

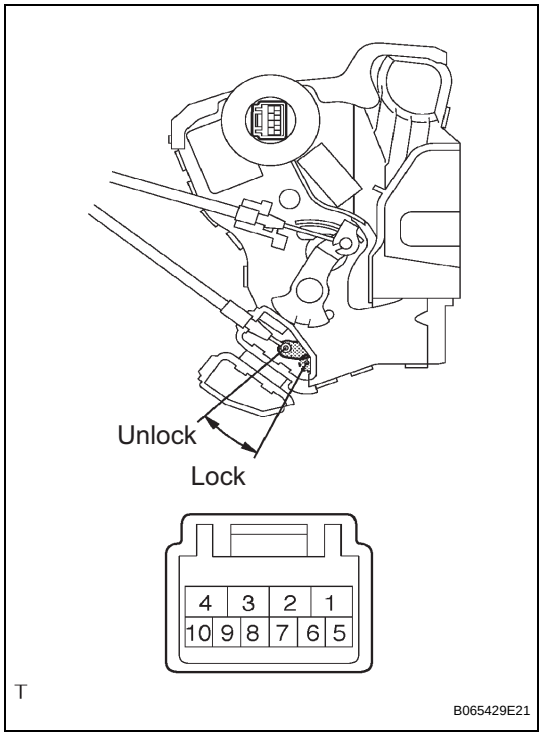
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock



(c) Check operation of the door key lock and unlock switch.
(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
5 - 8	ON (Door lock set to UNLOCK)	Below 1 Ω
5 - 8 6 - 8	OFF (Free)	10 kΩ or higher
6 - 8	ON (Door lock set to LOCK)	Below 1 Ω



(d) Check operation of the door unlock detection switch.
(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	(Specified Condition)
7 - 8	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	LOCK	10 kΩ or higher
7 - 8	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	UNLOCK	Below 1 Ω

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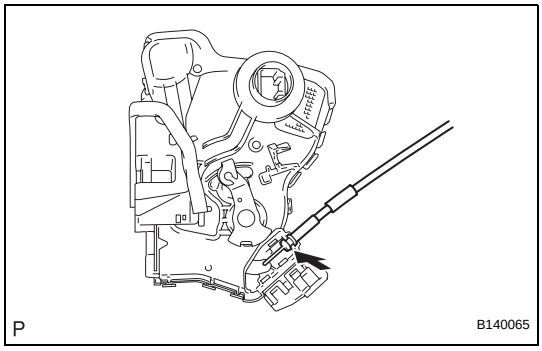
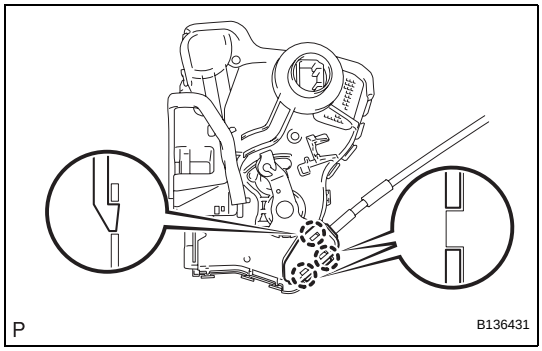
INSTALLATION

1. INSTALL FRONT DOOR LOCK ASSEMBLY
NOTICE:
- **When reusing the removed front door lock assembly, replace the door lock wiring harness seal on the door lock with a new one.**
- **Do not allow grease or dust to adhere to the surface of the door lock where the seal attaches.**
- **Reusing the door lock wiring harness seal or using a damaged door lock wiring harness seal may allow water intrusion to the connection, and result in a malfunction in the front door lock assembly.**

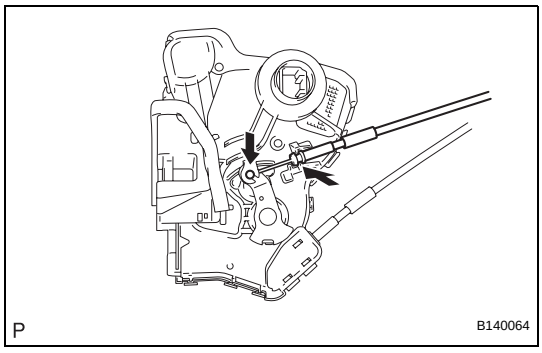
(a) Install the front door inside locking cable assembly.



(b) Engage the 3 claws.



(c) Install the front door lock remote control cable assembly.
(d) Apply MP grease to the sliding parts on the front door lock assembly.
(e) Install a new door lock wiring harness seal to the front door lock assembly.



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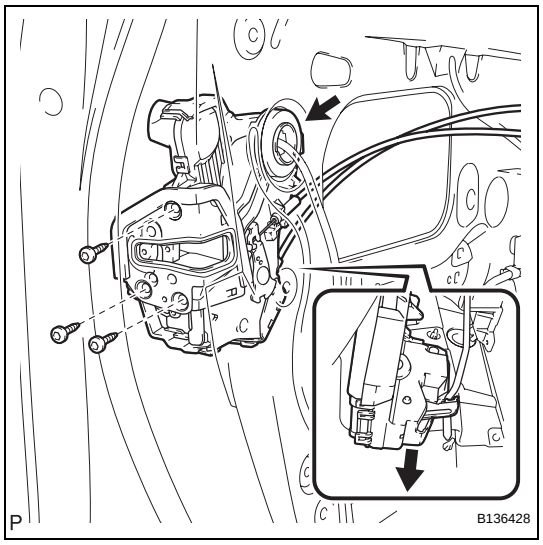


(f) Insert the front door lock open rod to the front door lock assembly, and set the assembly to the front door outside handle frame.
(g) Make sure that the front door lock open rod is securely connected to the front door lock assembly.
(h) Using a "torx" socket wrench (T30), install the front door lock assembly with the 3 screws.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(i) Connect the connector.

2. **INSTALL FRONT DOOR OUTSIDE HANDLE COVER (See page ED-29)**
3. **INSTALL FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY (See page ED-30)**
4. **INSTALL FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-31)**
5. **INSTALL FRONT DOOR SERVICE HOLE COVER (See page ED-32)**
6. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**
7. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-34)**
8. **INSTALL ASSIST GRIP COVER (See page ED-34)**
9. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**
10. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

INSPECTION

1. INSPECT REAR DOOR LOCK LH ASSEMBLY

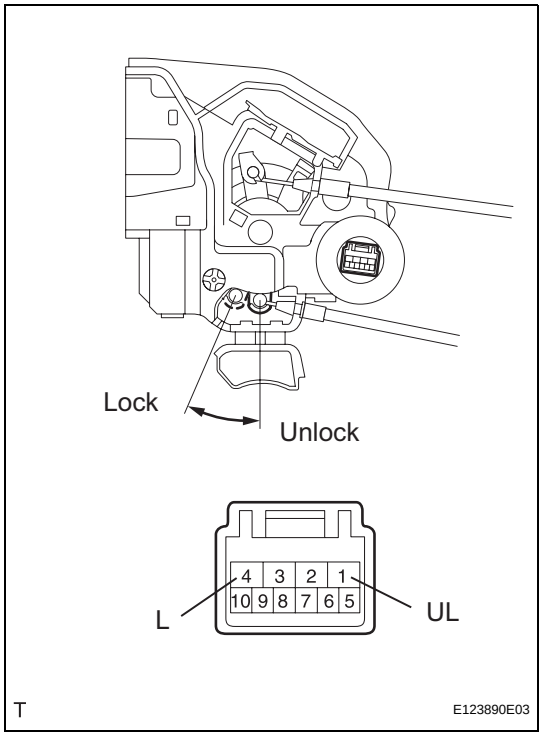
(a) Remove the rear door lock assembly LH.

(b) Check operation of the door lock motor.

(1) Apply battery voltage and check operation of the door lock motor.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock

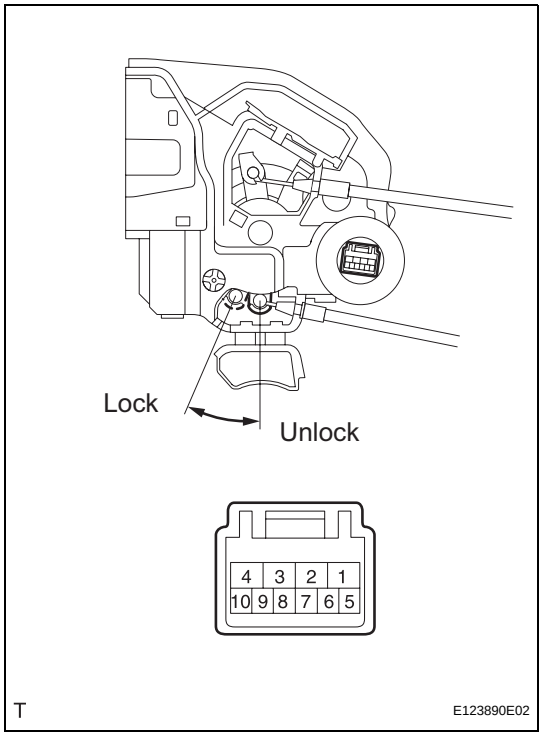


(c) Check operation of the unlock detection switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	(Specified Condition)
6 - 9	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
6 - 9	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω



2. INSPECT REAR DOOR LOCK RH ASSEMBLY

(a) Remove the rear door lock assembly RH.

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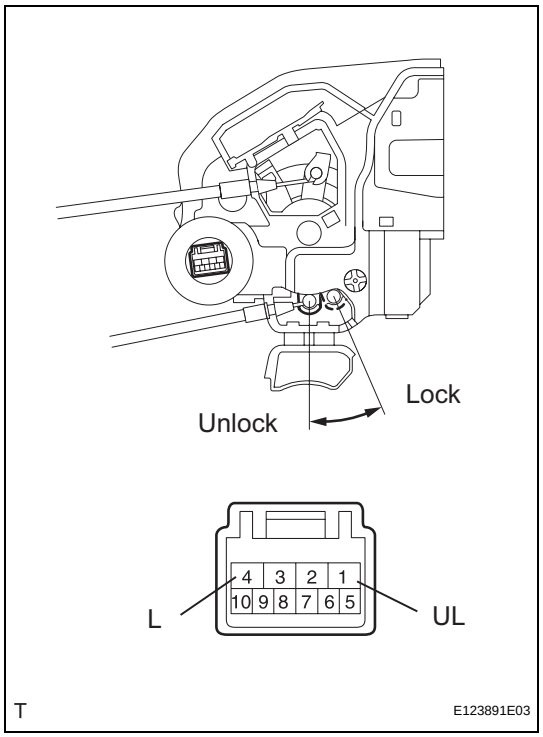
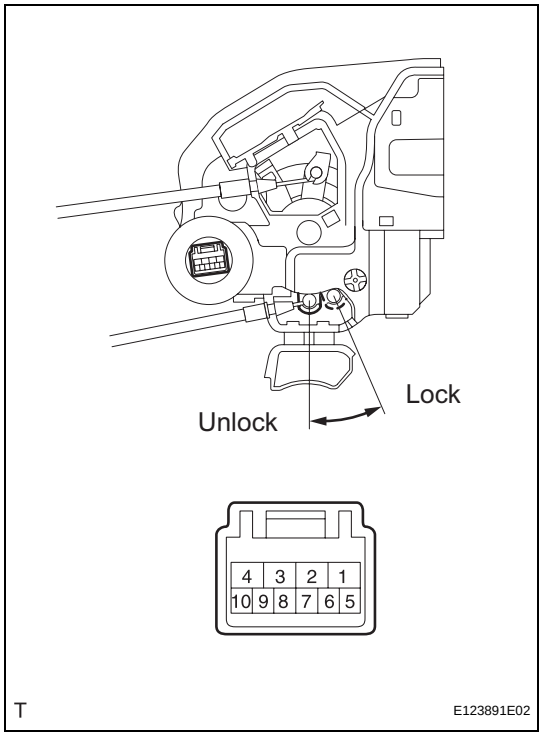


(b) Check operation of the door lock motor.
(1) Apply battery voltage and check operation of the door lock motor.
OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock



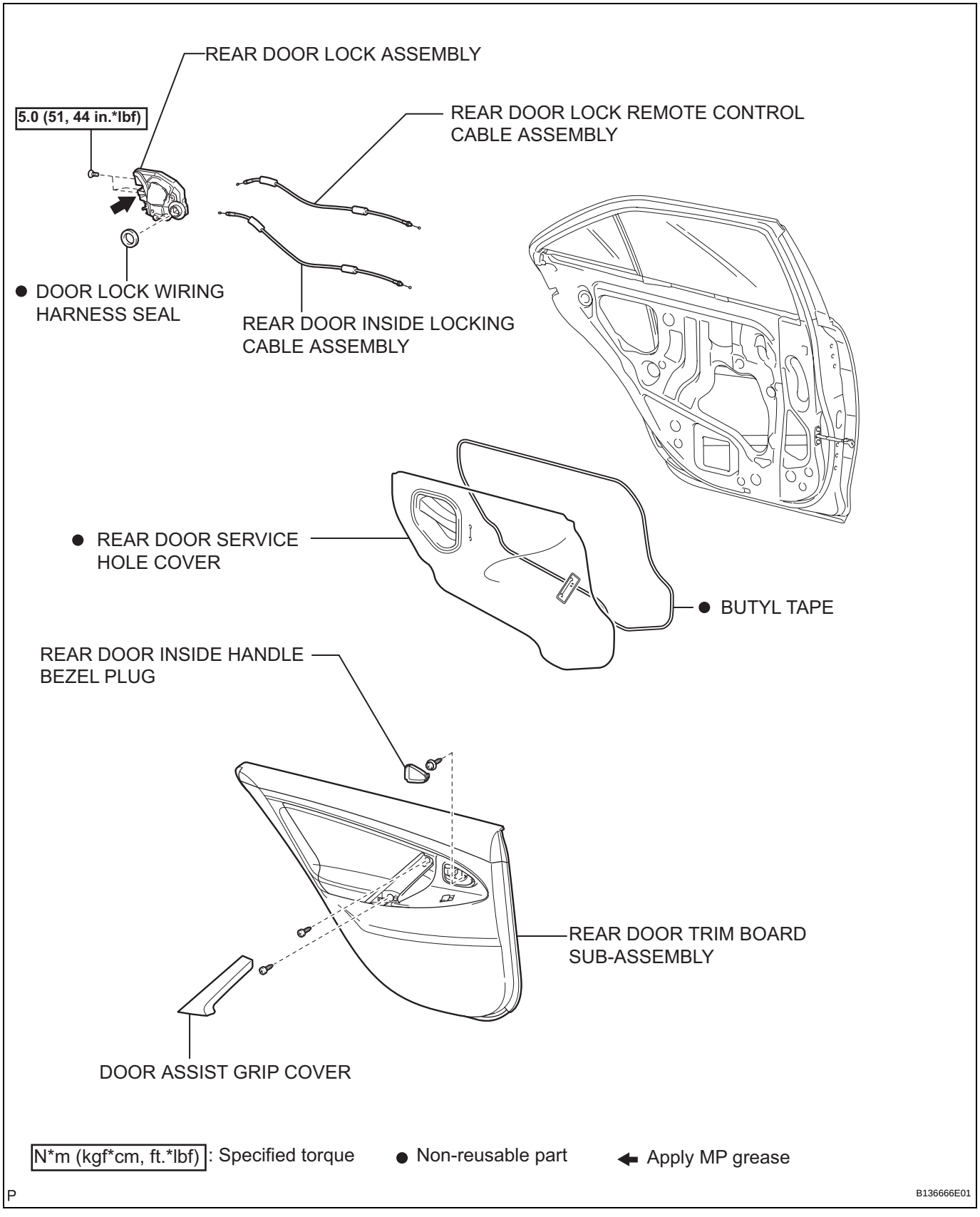
(c) Check operation of the unlock detection switch.
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Measurement Condition	Door Lock Condition	(Specified Condition)
6 - 9	Battery positive (+) → Terminal 4 Battery negative (-) → Terminal 1	Lock	10 kΩ or higher
6 - 9	Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 4	Unlock	Below 1 Ω

DL

REAR DOOR LOCK

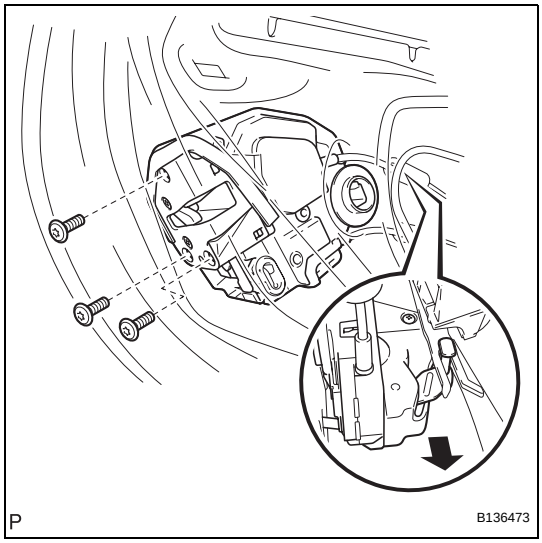
COMPONENTS

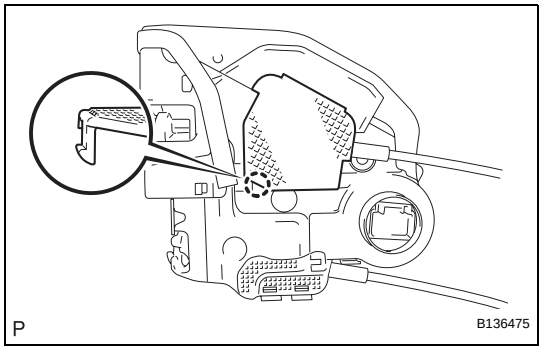


DL

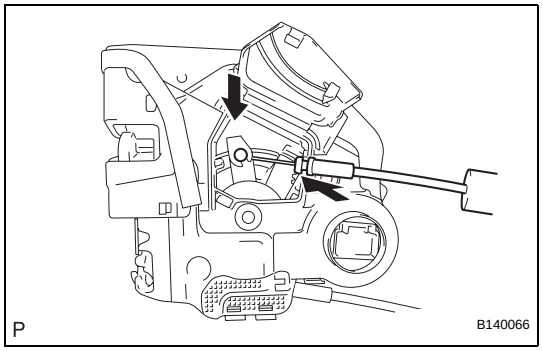
REMOVAL

1. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-38)**
2. **REMOVE DOOR ASSIST GRIP COVER (See page ED-38)**
3. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-39)**
4. **REMOVE REAR DOOR SERVICE HOLE COVER (See page ED-41)**
5. **REMOVE REAR DOOR LOCK ASSEMBLY**
   (a) Using a "torx" socket wrench (T30), remove the 3 screws.
   (b) Move the rear door lock assembly downward and pull the release plate out of the rear door outside handle frame.
   (c) Remove the door lock wiring harness seal from the rear door lock assembly.



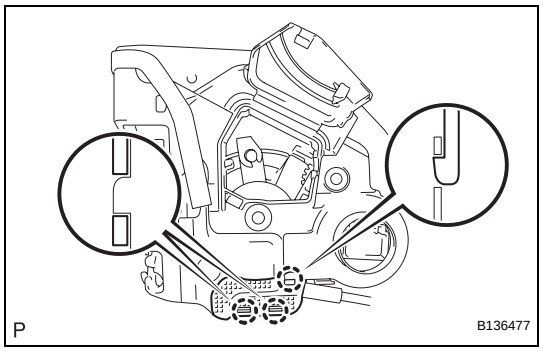


   (d) Using a screwdriver, disengage the claw.
   HINT:
   Tape the screwdriver tip before use.

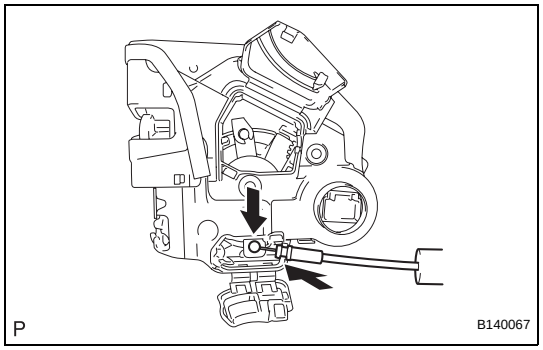


   (e) Remove the rear door inside locking cable assembly.

DL



(f) Using a screwdriver, disengage the 3 claws.
HINT:
Tape the screwdriver tip before use.



(g) Remove the rear door inside locking cable assembly.

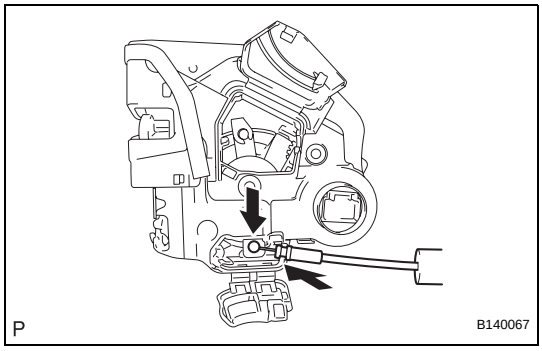
INSTALLATION

1. INSTALL REAR DOOR LOCK ASSEMBLY

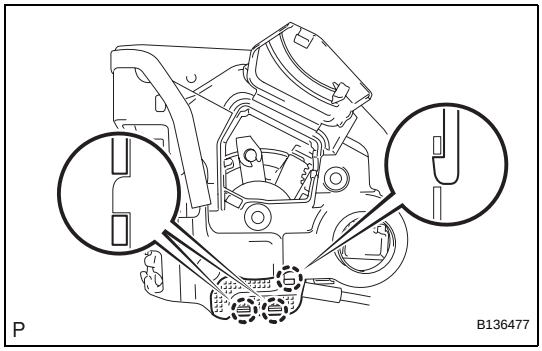
NOTICE:

- **When reusing the removed rear door lock assembly, replace the door lock wiring harness seal on the door lock with a new one.**
- **Do not allow grease or dust to adhere to the surface of the door lock where the seal attaches.**
- **Reusing the door lock wiring harness seal or using a damaged door lock wiring harness seal may allow water intrusion to the connection, and result in a malfunction in the rear door lock assembly.**

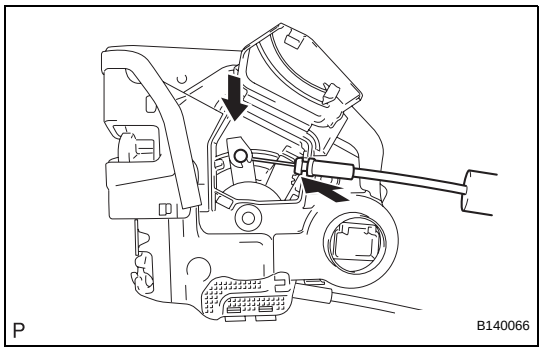
(a) Install the rear door inside locking cable assembly.

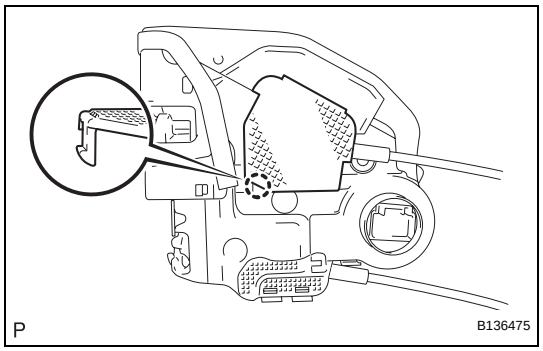


(b) Engage the 3 claws.

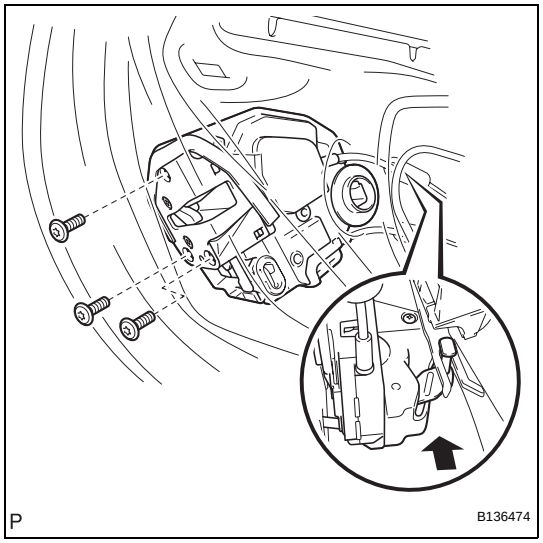


(c) Install the rear door lock remote control cable assembly.





(d) Engage the claw.
(e) Apply MP grease to the sliding parts on the rear door lock assembly.
(f) Install a new door lock wiring harness seal to the rear door lock assembly.

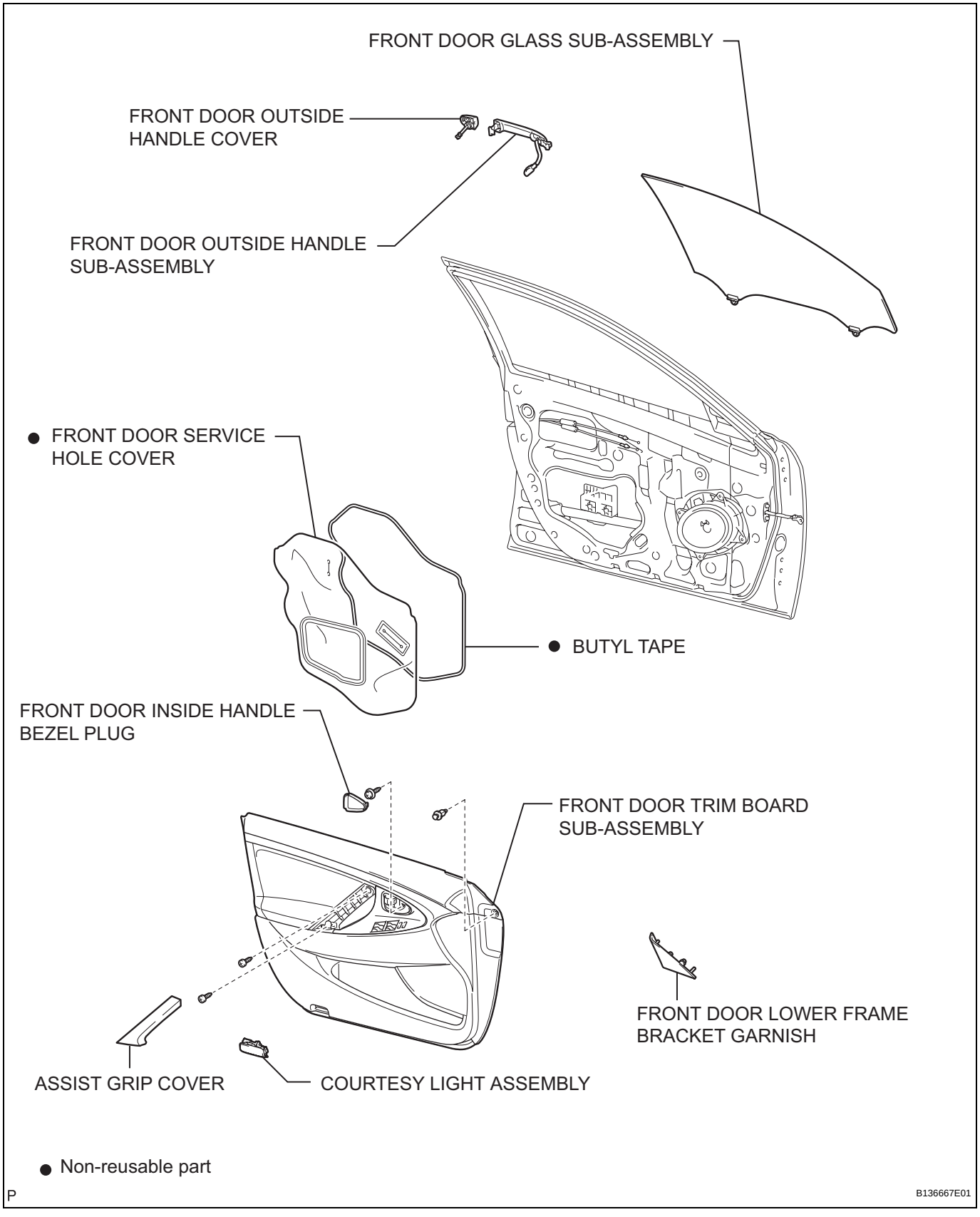


(g) Insert the rear door lock assembly to the rear door outside handle release plate, and set the assembly to the rear door panel.
(h) Make sure that the rear door outside handle frame release plate is securely connected to the rear door lock assembly.
(i) Using a "torx" socket wrench (T30), install the rear door lock assembly with the 3 screws.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(j) Connect the connector.

2. **INSTALL REAR DOOR SERVICE HOLE COVER (See page ED-53)**
3. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-55)**
4. **INSTALL DOOR ASSIST GRIP COVER (See page ED-56)**
5. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-56)**

ENTRY LOCK AND UNLOCK SWITCH

COMPONENTS

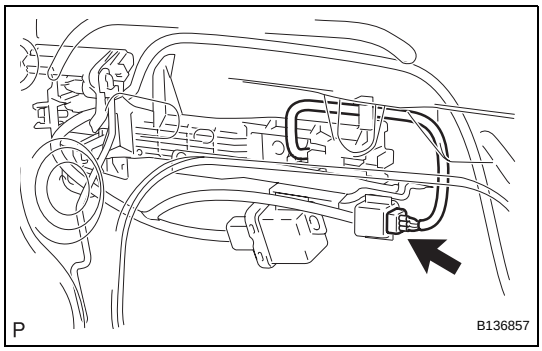


DL

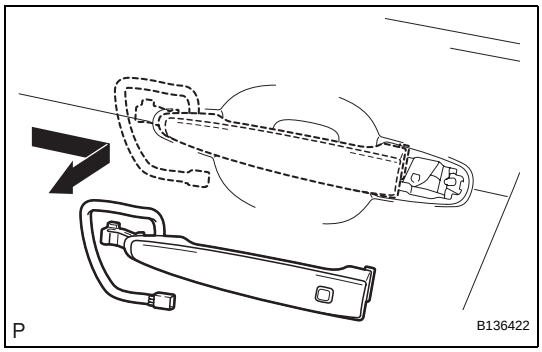
REMOVAL

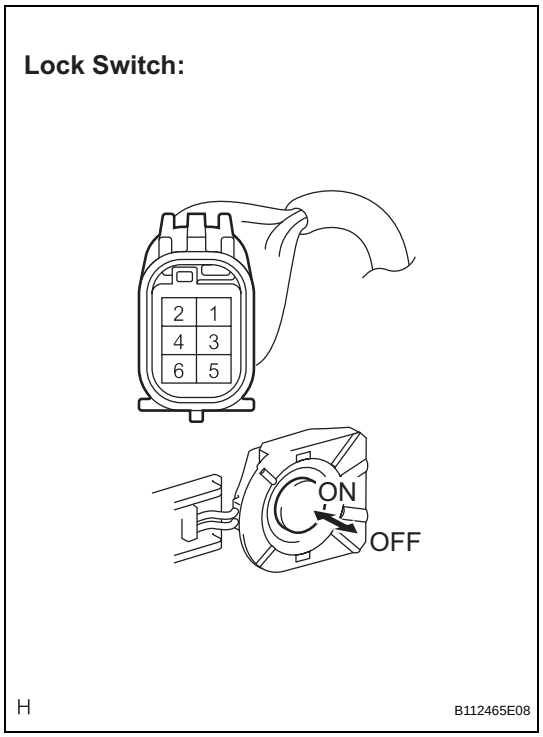
1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)**
3. **REMOVE ASSIST GRIP COVER (See page ED-15)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)**
6. **REMOVE FRONT DOOR SERVICE HOLE COVER (See page ED-17)**
7. **REMOVE FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-17)**
8. **REMOVE FRONT DOOR OUTSIDE HANDLE COVER (See page ED-19)**
9. **REMOVE FRONT DOOR OUTSIDE HANDLE SUB-ASSEMBLY**

(a) Disconnect the connector.



(b) Remove the front door outside handle assembly as shown in the illustration.

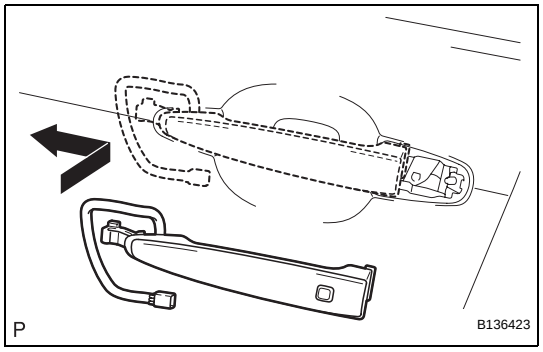


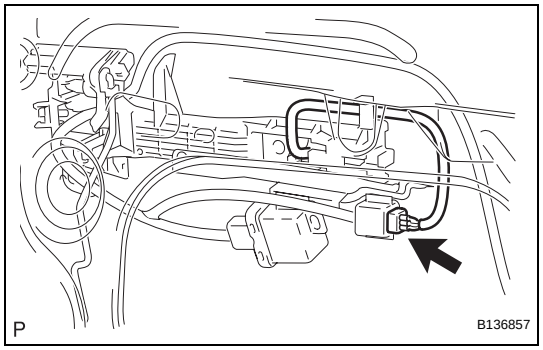


INSPECTION

1. **INSPECT ENTRY LOCK AND UNLOCK SWITCH**
   (a) Remove the outside handle.
   (b) Disconnect the connectors.
   (c) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Condition	Specified Condition
1 - 3	Lock switch not pushed (OFF)	10 kΩ or higher
	Lock switch pushed (ON)	Below 1 Ω





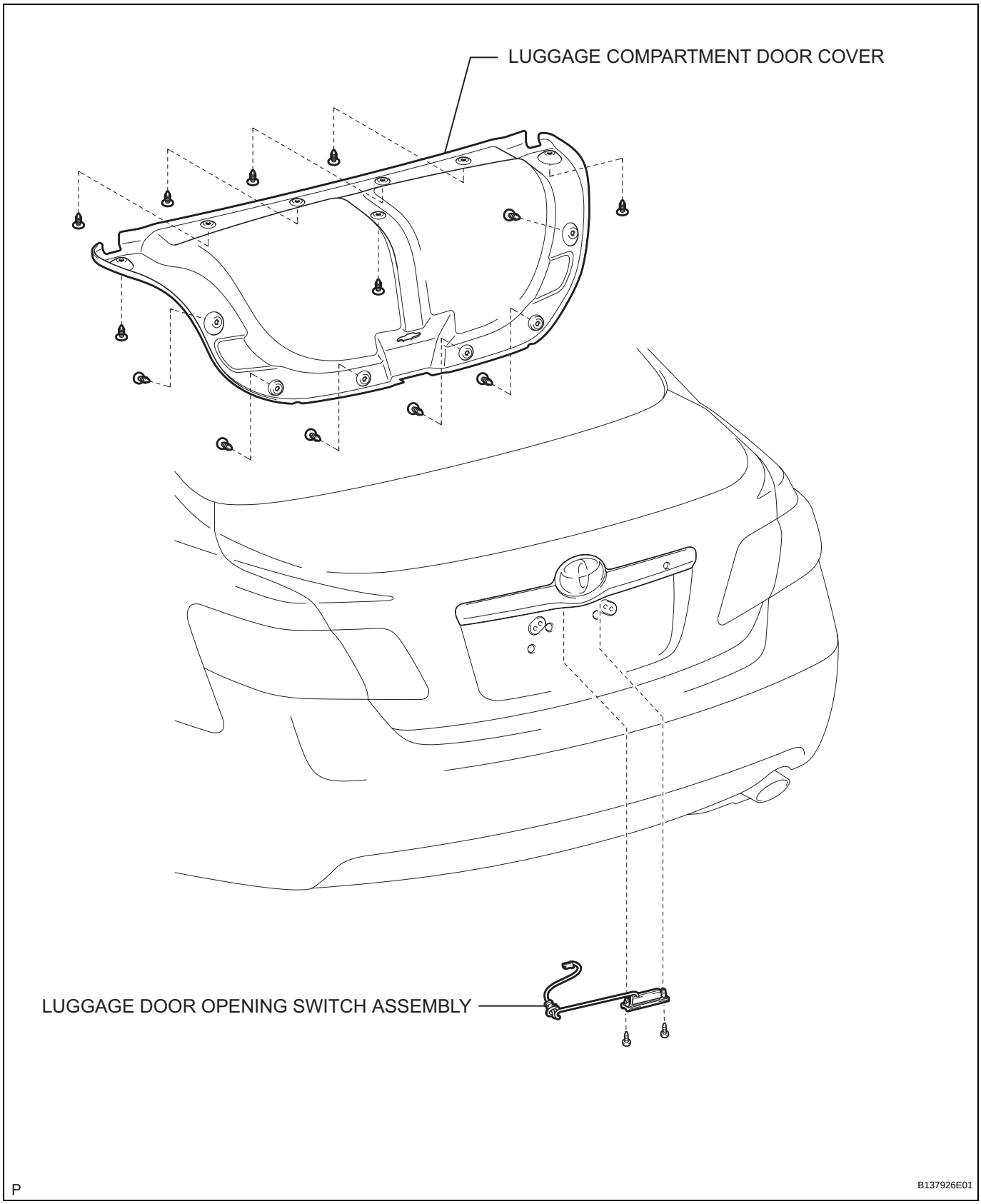
INSTALLATION

1. **INSTALL FRONT DOOR OUTSIDE HANDLE SUB-ASSEMBLY**
   (a) Insert the front end of the front door outside handle assembly into the front door outside handle frame.
   (b) Insert the rear end of the front door outside handle assembly into the front door outside handle frame. Slide the front door outside handle assembly to the front of the vehicle to install it.
   (c) Connect the connector.
2. **INSTALL FRONT DOOR OUTSIDE HANDLE COVER (See page ED-29)**
3. **INSTALL FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-31)**
4. **INSTALL FRONT DOOR SERVICE HOLE COVER (See page ED-32)**
5. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**
6. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-34)**
7. **INSTALL ASSIST GRIP COVER (See page ED-34)**
8. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**

9. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

LUGGAGE COMPARTMENT DOOR OPENER OUTER SWITCH

COMPONENTS

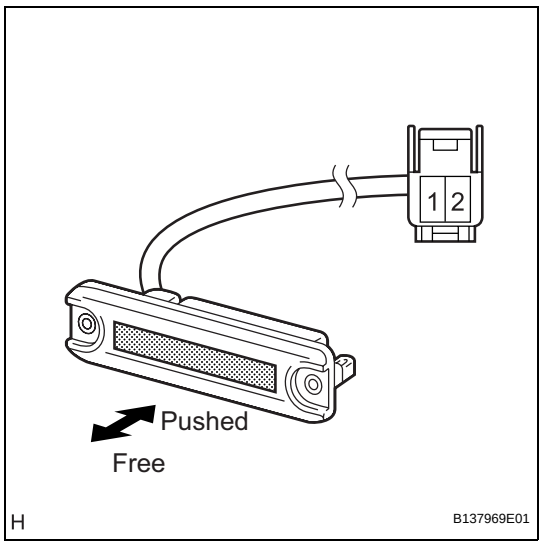


REMOVAL

1. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)**
2. **REMOVE LUGGAGE DOOR OPENING SWITCH ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 2 screws and the luggage door opening switch assembly.

INSPECTION

1. **INSPECT LUGGAGE KEY ELECTRICAL SWITCH**
   (a) Disconnect the switch connector.
   (b) Measure the resistance according to the value(s) in the table below.
   Standard resistance



Tester connection	Condition	Specified condition
1 - 2	Luggage compartment open switch not pushed (OFF)	10 kΩ or higher
	Luggage compartment open switch pushed (ON)	Below 1 Ω

INSTALLATION

1. **INSTALL LUGGAGE DOOR OPENING SWITCH ASSEMBLY**
   (a) Install the luggage door opening switch assembly with the 2 screws.
   (b) Connect the connector.
2. **INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)**

DRIVE SHAFT SYSTEM

PROBLEM SYMPTOMS TABLE

Use the table below to help find the cause of the problem. Check each part. If necessary, replace these parts.

For TMC made

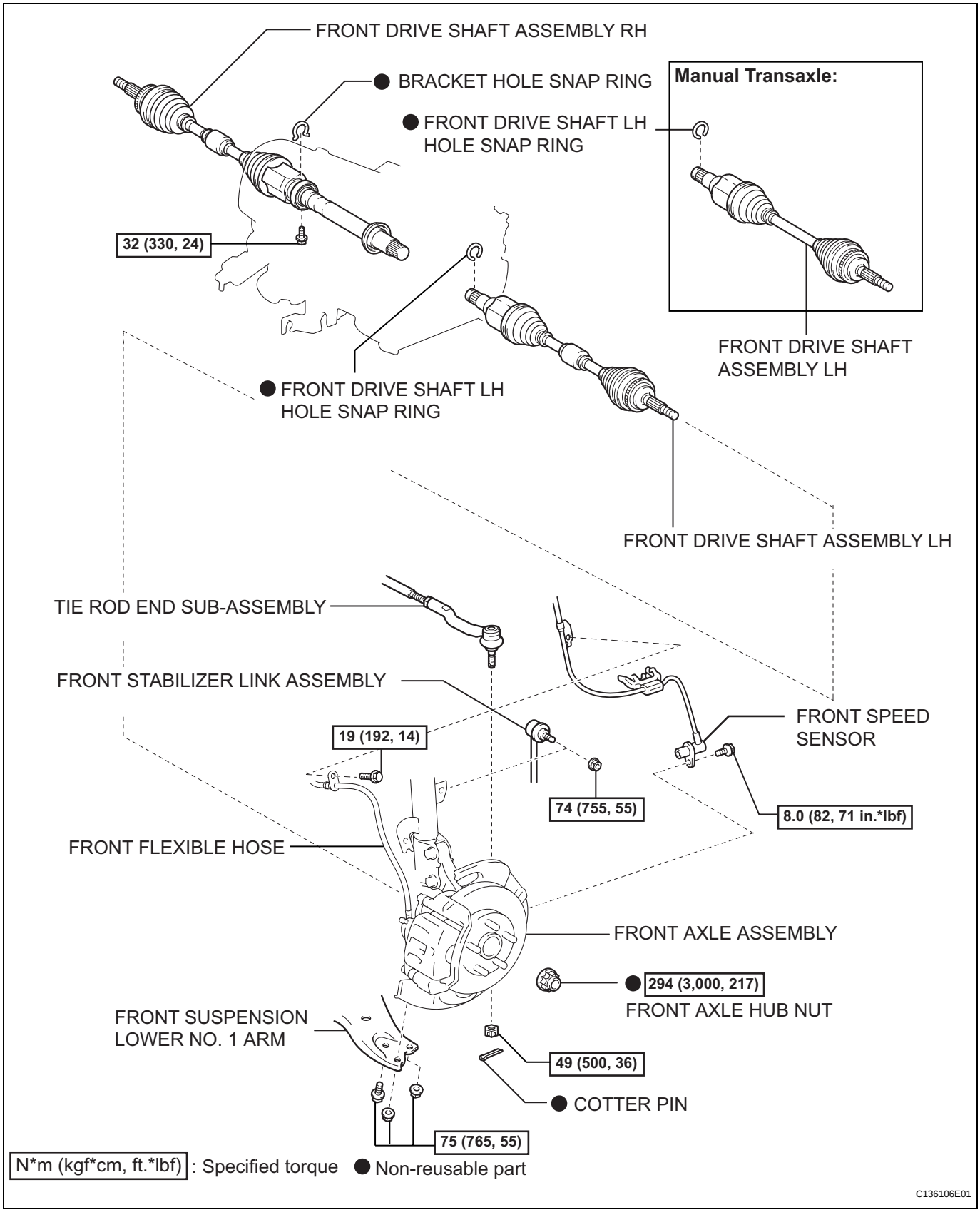
Symptom	Suspected area	See page
Noise (Front drive shaft)	Inboard or outboard joint (Worn)	DS-13

For TMMK made

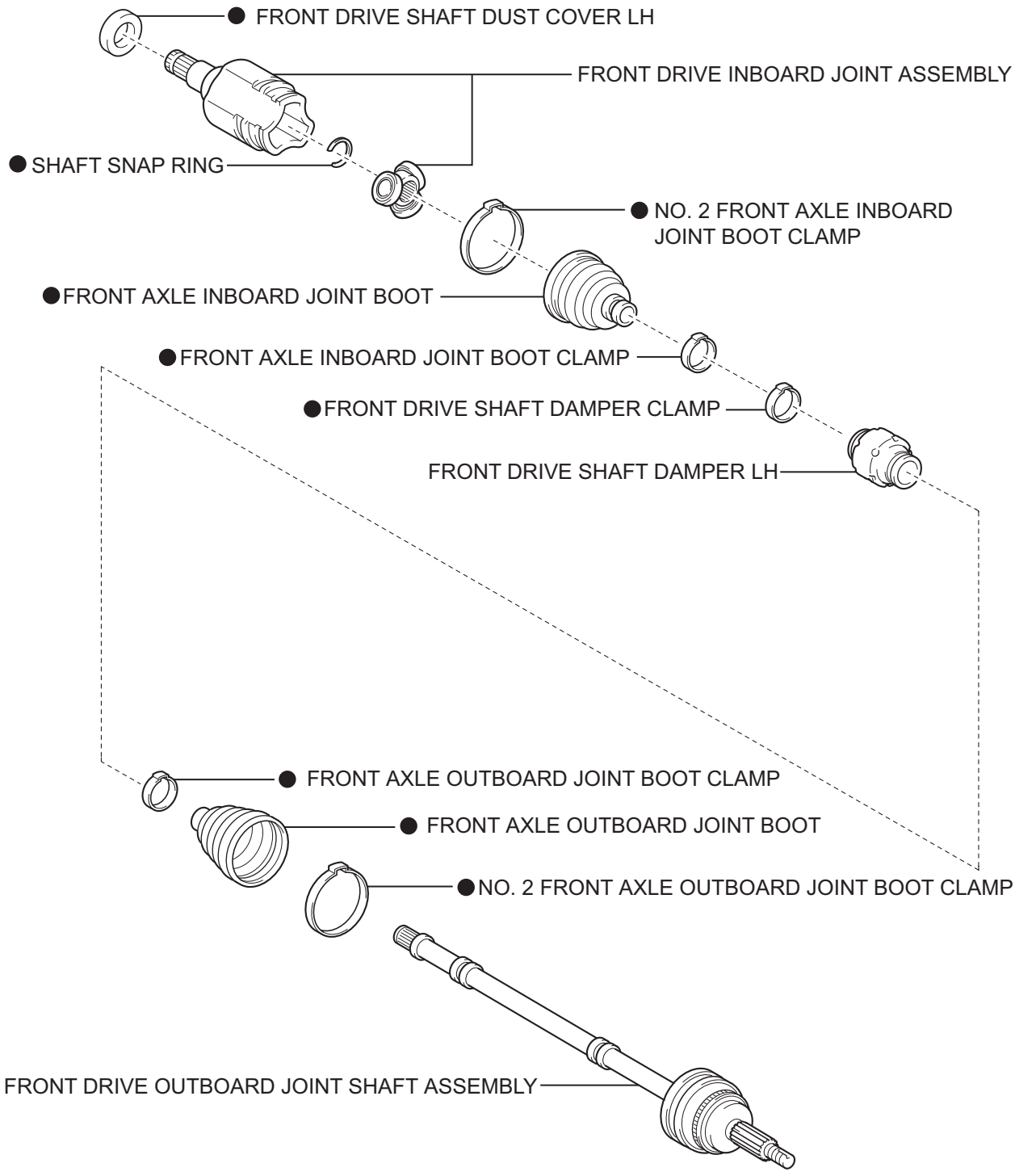
Symptom	Suspected area	See page
Noise (Front drive shaft)	Inboard or outboard joint (Worn)	DS-29

FRONT DRIVE SHAFT (for TMC Made)

COMPONENTS



2GR-FE LH SIDE:

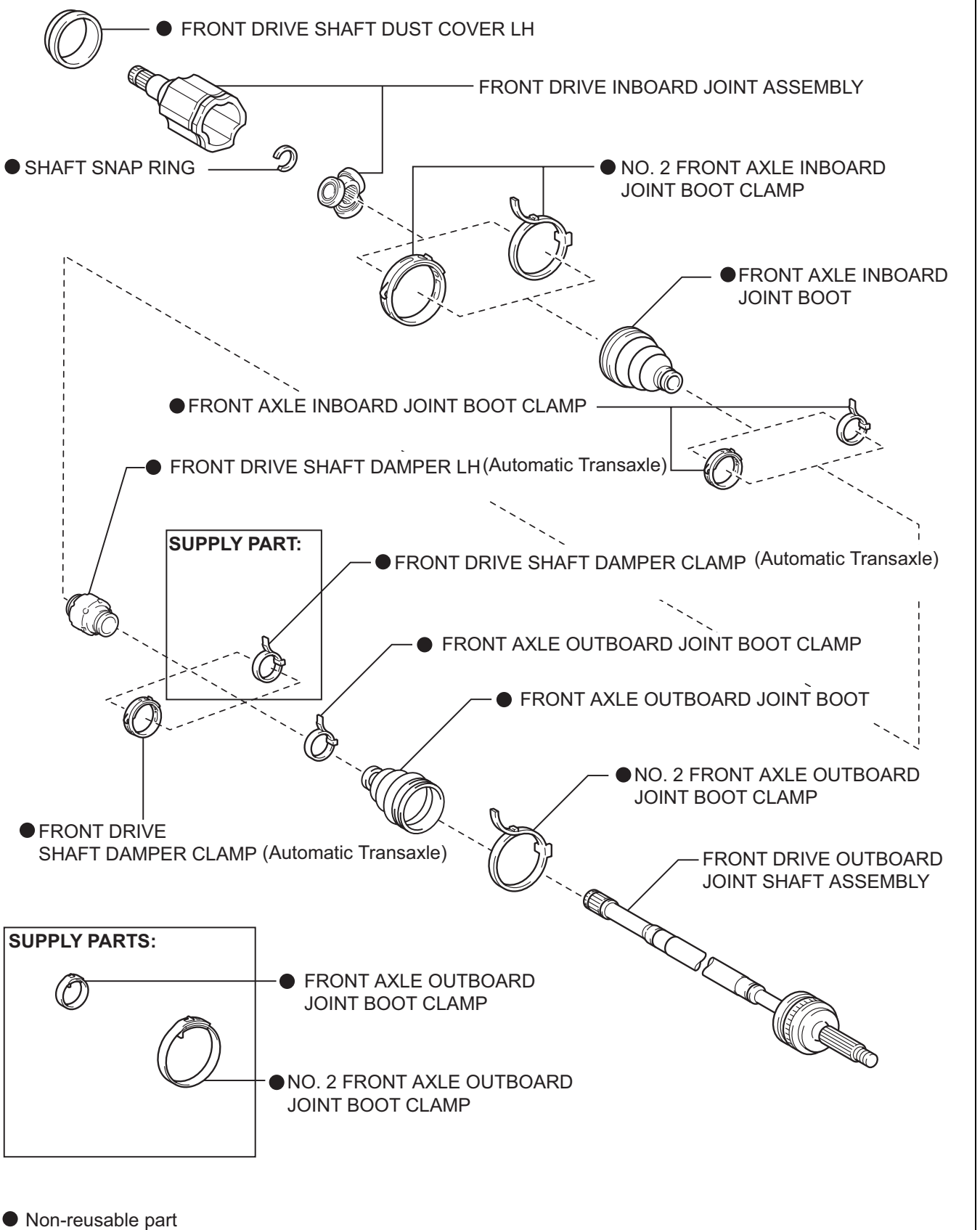


● Non-reusable part

C136538E01

DS

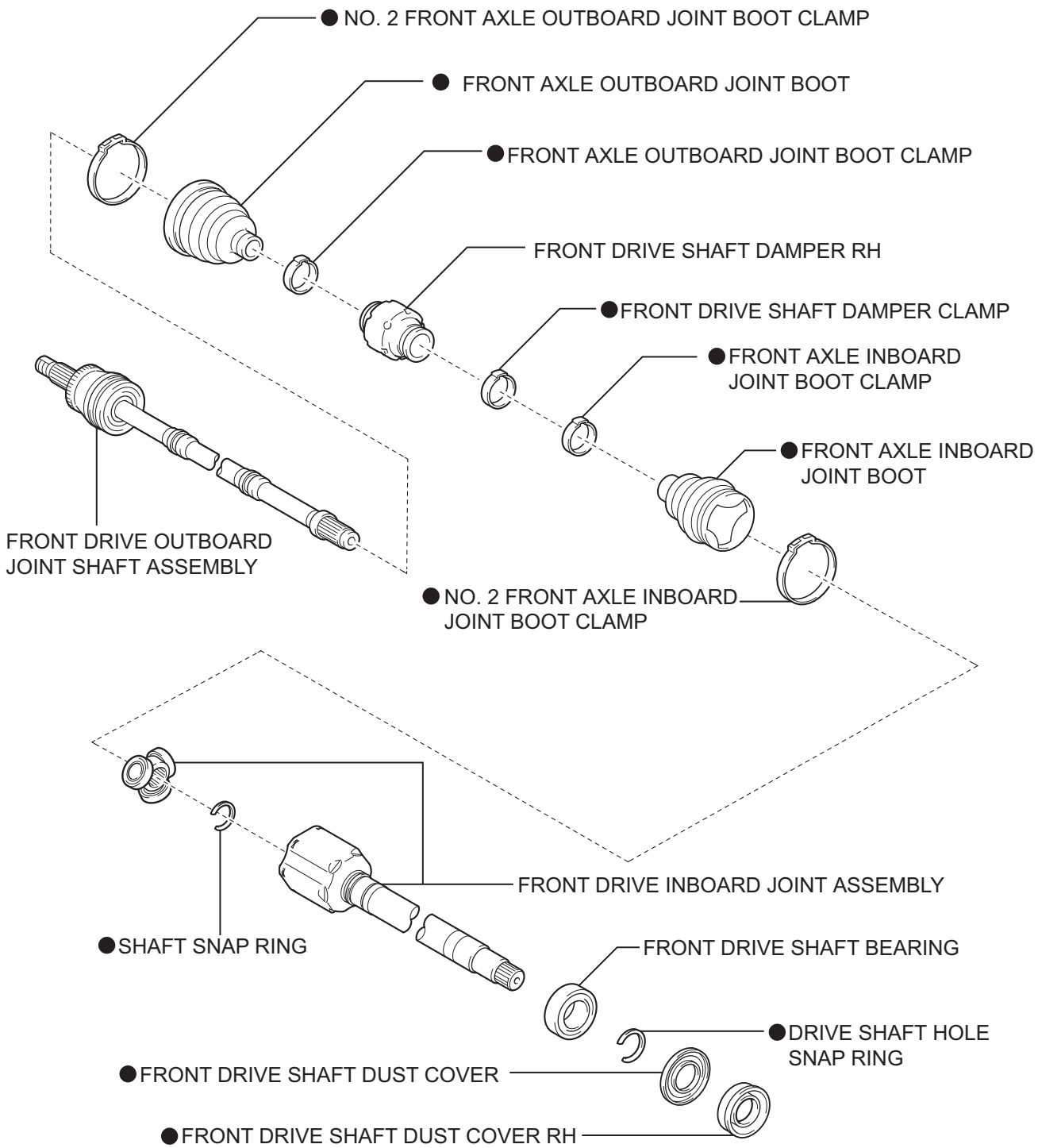
2AZ-FE LH SIDE:



● Non-reusable part

C141176E01

2GR-FE RH SIDE:



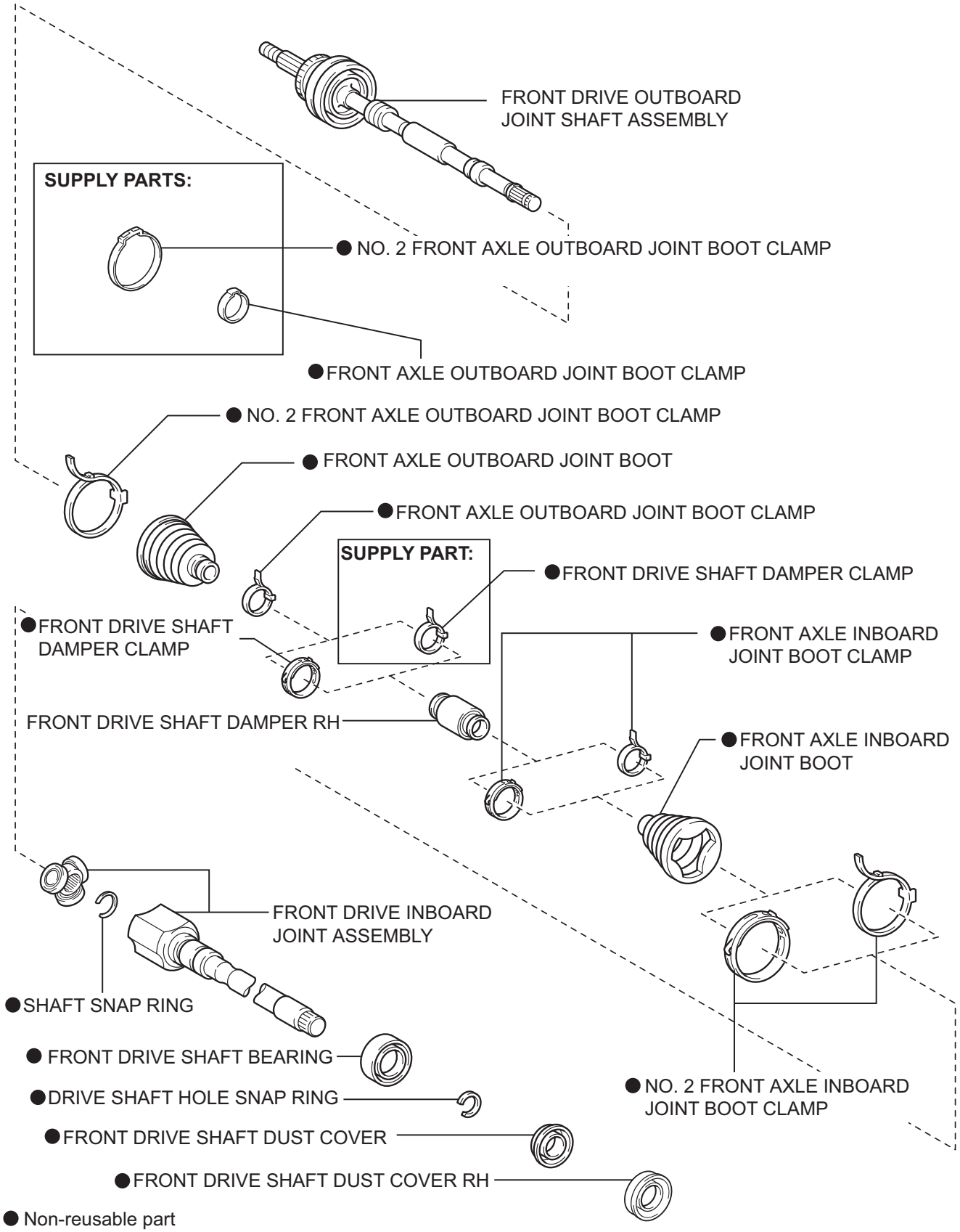
● Non-reusable part

C136540E01

DS

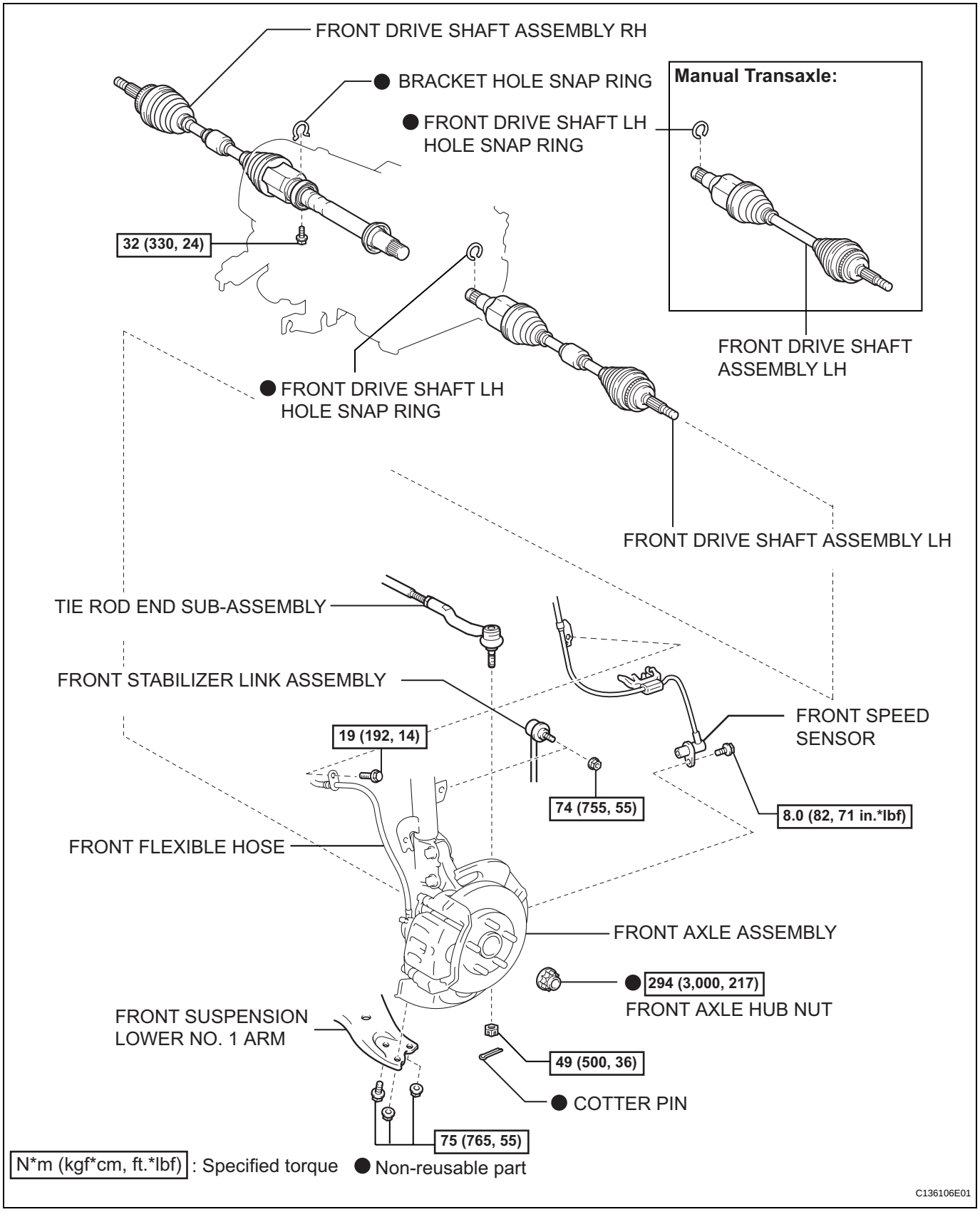
DS

2AZ-FE RH SIDE:

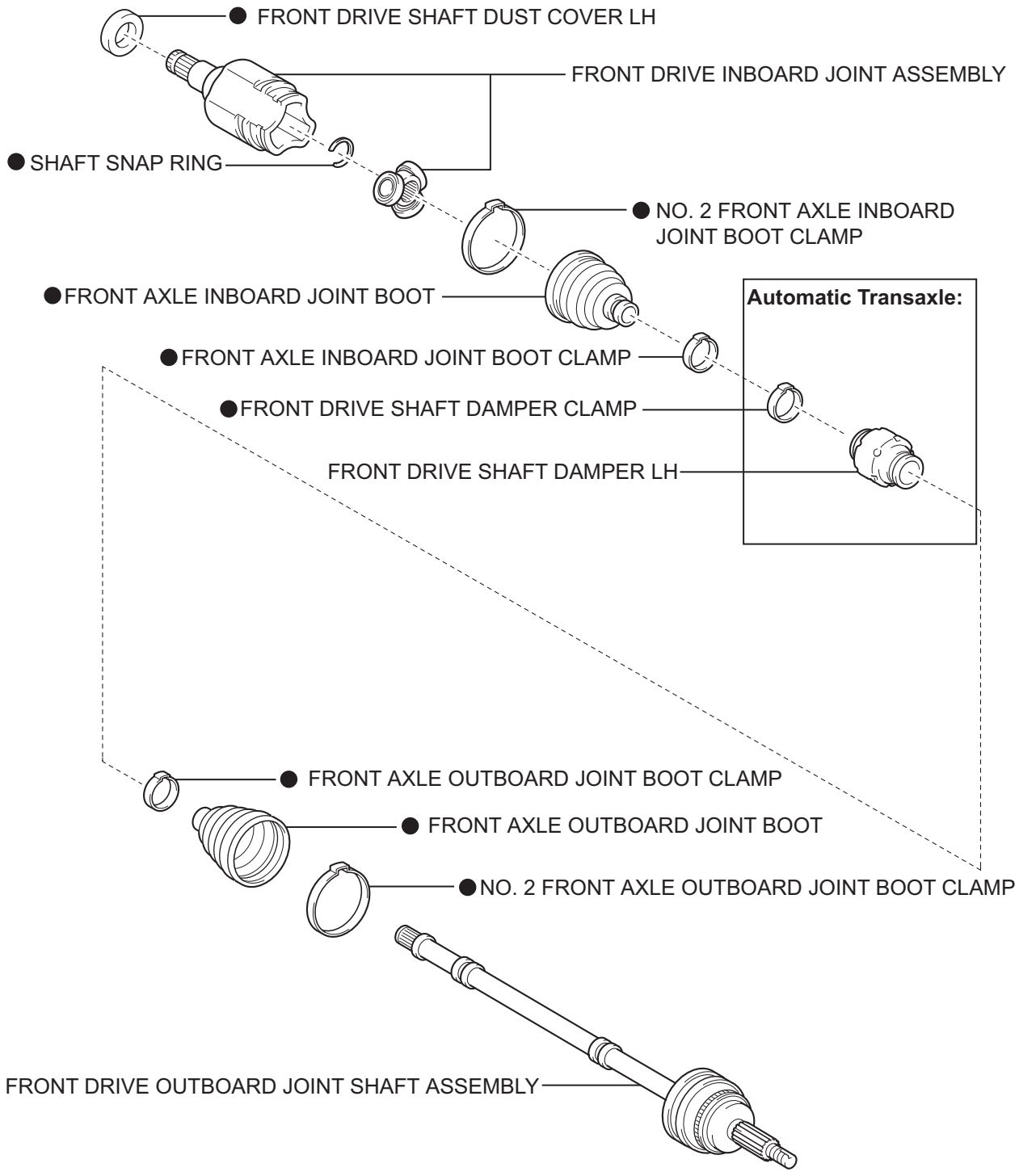


FRONT DRIVE SHAFT (for TMMK Made)

COMPONENTS



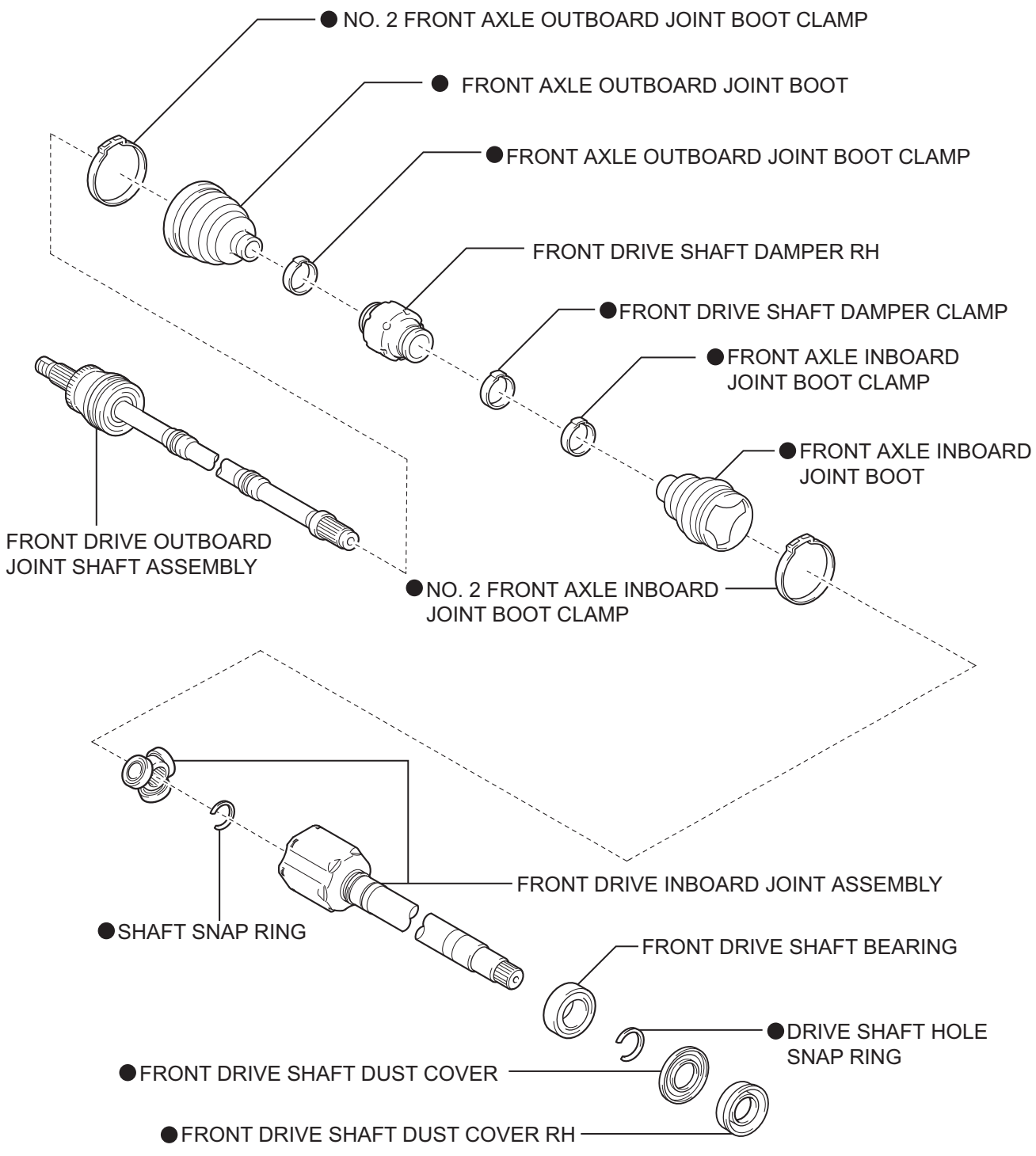
LH SIDE:



● Non-reusable part

C136538E02

RH SIDE:



● Non-reusable part

C136540E02

DS

REMOVAL

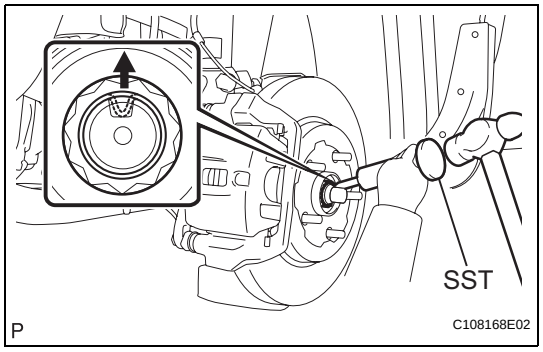
HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. DRAIN AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)
(a) for 2GR-FE: See page AX-207
(b) for 2AZ-FE: See page AX-162

2. DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-5)

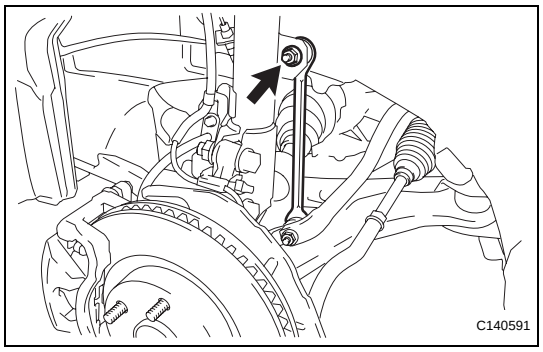
3. REMOVE FRONT WHEEL

4. REMOVE FRONT AXLE HUB NUT



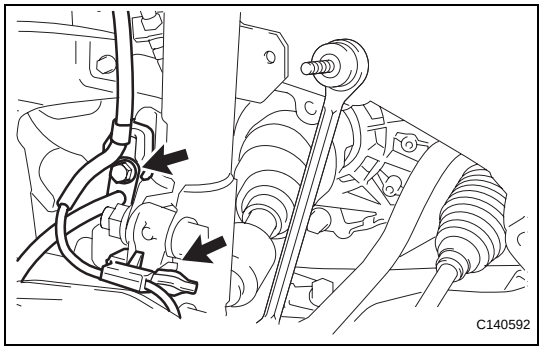
(a) Using SST and a hammer, release the staked part of the front axle hub nut.
SST 09930-00010
NOTICE:
Loosen the staked part of the nut completely, otherwise the thread of the drive shaft may be damaged.
(b) While applying the brakes, remove the front axle hub nut.

5. SEPARATE FRONT STABILIZER LINK ASSEMBLY

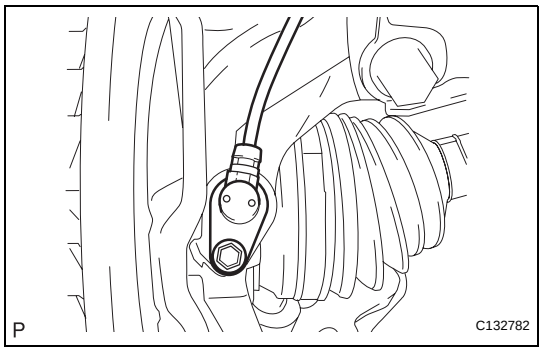


(a) Remove the nut and separate the front stabilizer link assembly.
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.

6. SEPARATE FRONT SPEED SENSOR

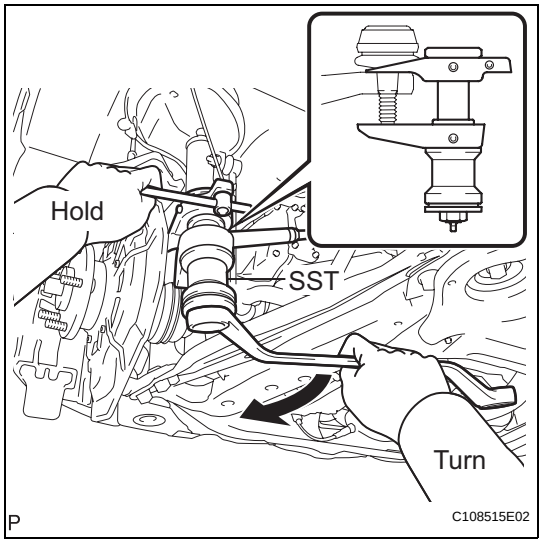


(a) Remove the bolt and clip, and separate the speed sensor wire and flexible hose from the shock absorber.

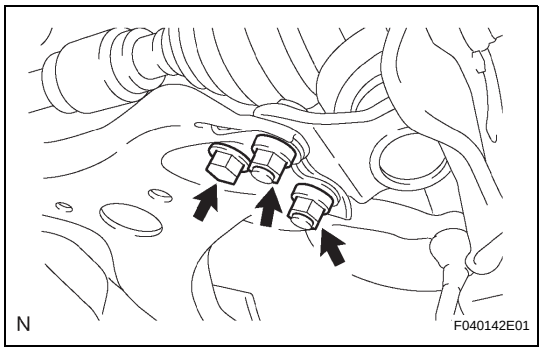


(b) Remove the bolt and separate the speed sensor from the steering knuckle.
NOTICE:
- **Prevent foreign matter from adhering to the speed sensor.**
- **Be careful not to damage the speed sensor.**

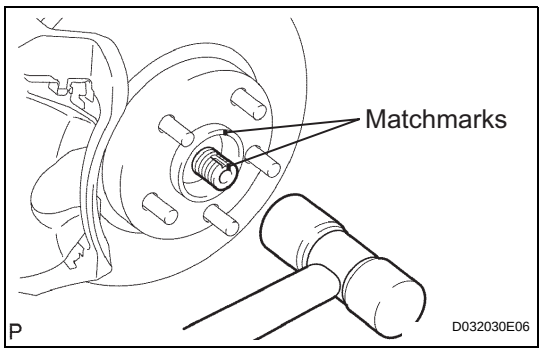
DS



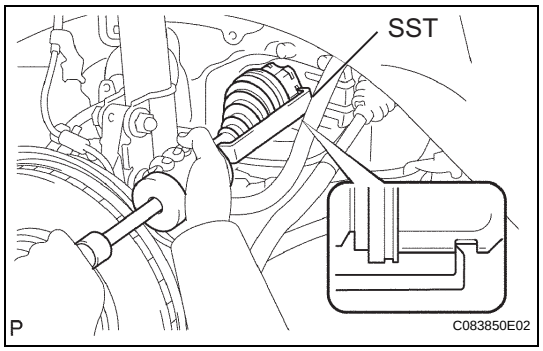
7. SEPARATE TIE ROD END SUB-ASSEMBLY
(a) Remove the cotter pin and nut.
(b) Using SST, separate the tie rod end sub-assembly from the steering knuckle.
SST 09628-00011
NOTICE:
- **Make sure that the string of the SST is securely tied to the vehicle.**
- **Be careful not to damage the ball joint dust cover.**
- **Be careful not to damage the steering knuckle.**
- **Be careful not to damage the front disc brake dust cover.**



8. SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM
(a) Remove the bolt and 2 nuts, and separate the front suspension lower No. 1 arm from the lower ball joint.



9. SEPARATE FRONT AXLE ASSEMBLY
(a) Put matchmarks on the front drive shaft assembly and the axle hub.
(b) Using a plastic hammer, separate the front drive shaft assembly from the front axle assembly.
NOTICE:
Be careful not to damage the drive shaft boot and speed sensor rotor.



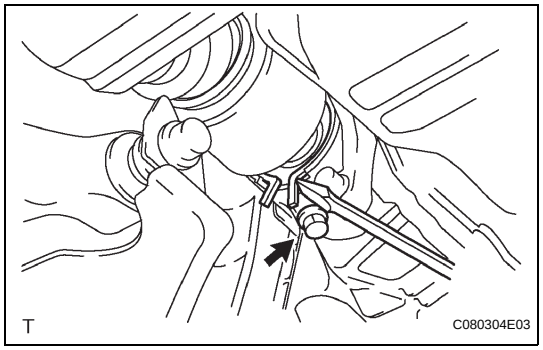
10. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH

(a) Using SST, remove the front drive shaft assembly LH.

SST 09520-01010, 09520-24010 (09520-32040)

NOTICE:

- **Be careful not to damage the drive shaft dust cover, boot, and oil seal.**
- **Be careful not to drop the drive shaft assembly.**



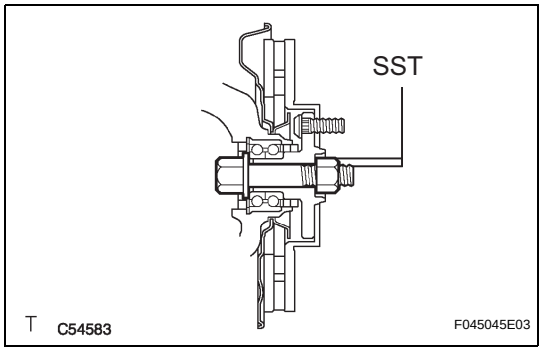
11. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

(a) Using a screwdriver, remove the bearing bracket hole snap ring.

(b) Remove the bolt and front drive shaft assembly RH from the drive shaft bearing bracket.

NOTICE:

Do not damage the boot and oil seal.



12. SECURE FRONT AXLE HUB SUB-ASSEMBLY

(a) Secure the front axle hub bearing.

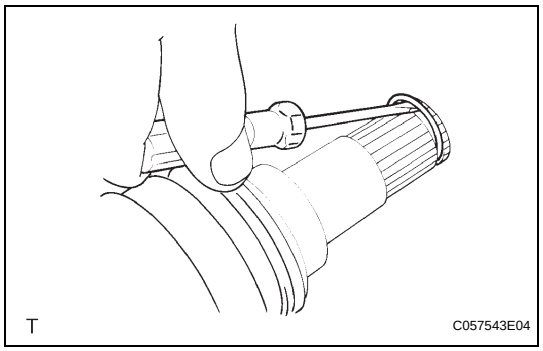
SST 09608-16042 (09608-02021, 09608-02041)

NOTICE:

The hub bearing may be damaged if it is subjected to the vehicle's full weight, such as moving the vehicle with the drive shaft removed. If it is necessary to place the vehicle's weight on the hub bearing, first support it with SST.

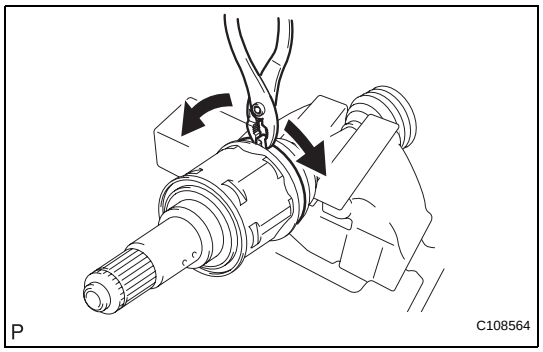
13. INSPECT FRONT DRIVE SHAFT ASSEMBLY (See page DS-13)

DISASSEMBLY



1. REMOVE FRONT DRIVE SHAFT LH HOLE SNAP RING

(a) Using a screwdriver, remove the front drive shaft LH hole snap ring.



2. REMOVE NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2GR-FE)

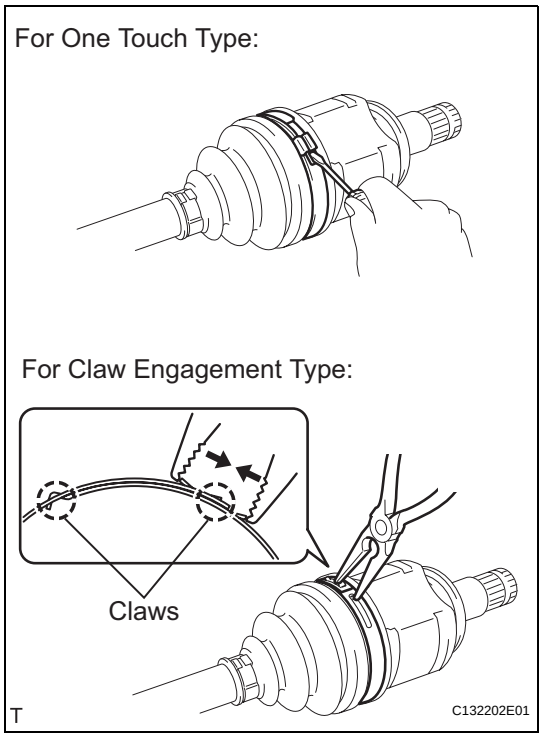
(a) Using pliers, remove the No. 2 front axle inboard joint boot clamp as shown in the illustration.

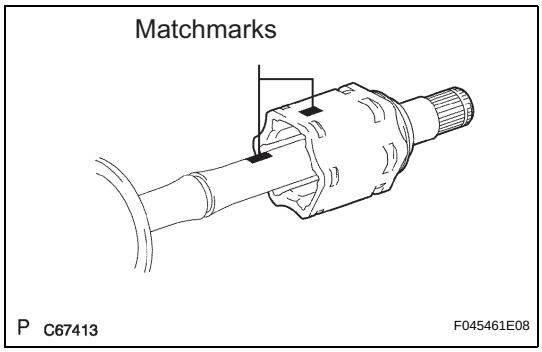
3. REMOVE FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2GR-FE)

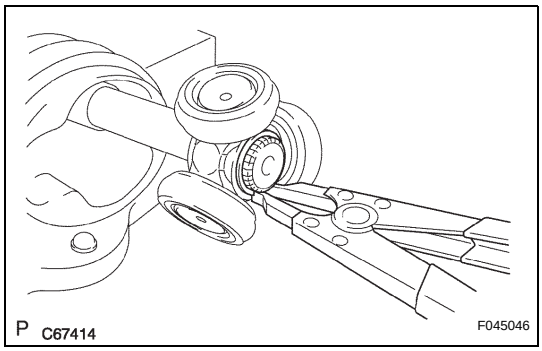
(a) Remove the front axle inboard joint boot clamp.

HINT:

Perform the same procedures as for the No. 2 front axle inboard joint boot clamp.







4. REMOVE NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2AZ-FE)

(a) For one touch type:
  (1) Using a screwdriver, remove the No. 2 front axle inboard joint boot clamp as shown in the illustration.

(b) For claw engagement type:
  (1) Using needle-nose pliers, remove the No. 2 front axle inboard joint boot clamp as shown in the illustration.

5. REMOVE FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2AZ-FE)

(a) Remove the front axle inboard joint boot clamp.
HINT:
Perform the same procedures as for the No. 2 front axle inboard joint boot clamp.

6. SEPARATE FRONT AXLE INBOARD JOINT BOOT

(a) Separate the front axle inboard joint boot from the inboard joint assembly.

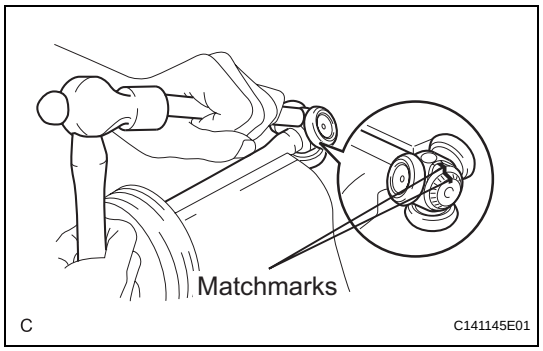
7. REMOVE FRONT DRIVE INBOARD JOINT ASSEMBLY

(a) Remove the grease from the inboard joint assembly.

(b) Put matchmarks on the inboard joint assembly and outboard joint shaft.
NOTICE:
Do not use a punch for the marks.

(c) Remove the inboard joint assembly from the outboard joint shaft.

(d) Using a snap ring expander, remove the shaft snap ring.

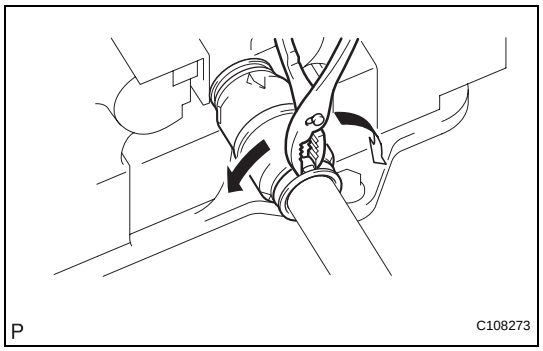


(e) Put matchmarks on the outboard joint shaft and tripod joint.
NOTICE:
Do not use a punch for the marks.

(f) Using a brass bar and a hammer, remove the tripod joint from the outboard joint shaft.
NOTICE:
Do not tap the roller.

8. REMOVE FRONT AXLE INBOARD JOINT BOOT

(a) Remove the inboard joint boot from the outboard joint shaft.



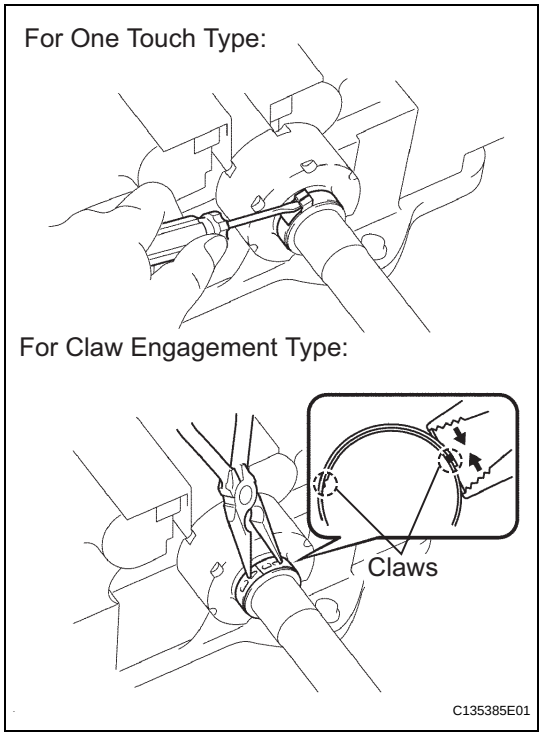
9. REMOVE FRONT DRIVE SHAFT DAMPER LH (for 2GR-FE)

(a) Using pliers, remove the drive shaft damper clamp as shown in the illustration.

(b) Remove the drive shaft damper.

10. REMOVE FRONT DRIVE SHAFT DAMPER RH (for 2GR-FE)

(a) Remove the front drive shaft damper RH.
HINT:
Perform the same procedures as for the front drive shaft damper LH.



11. REMOVE FRONT DRIVE SHAFT DAMPER LH (for 2AZ-FE Automatic Transaxle)

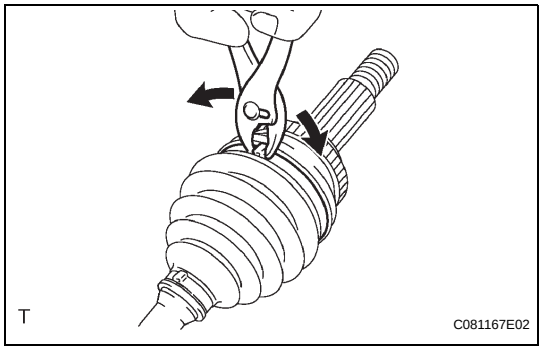
(a) For one touch type:
(1) Using a screwdriver, remove the drive shaft damper clamp as shown in the illustration.

(b) For claw engagement type:
(1) Using needle-nose pliers, remove the drive shaft damper clamp as shown in the illustration.

(c) Remove the drive shaft damper.

12. REMOVE FRONT DRIVE SHAFT DAMPER RH (for 2AZ-FE)

(a) Remove the front drive shaft damper RH.
HINT:
Perform the same procedures as for the front drive shaft damper LH.



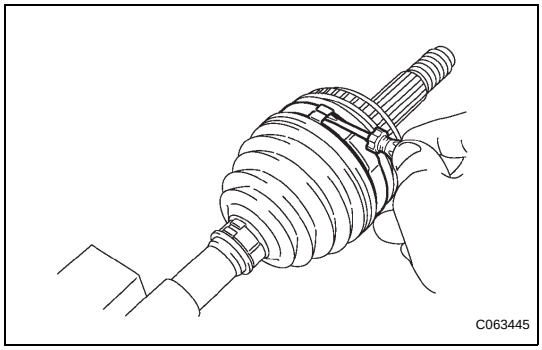
13. REMOVE NO. 2 FRONT AXLE OUTBOARD JOINT BOOT CLAMP (for 2GR-FE)

(a) Using pliers, remove the No. 2 front axle outboard joint boot clamp as shown in the illustration.

14. REMOVE FRONT AXLE OUTBOARD JOINT BOOT CLAMP (for 2GR-FE)

(a) Remove the front axle outboard joint boot clamp.
HINT:
Perform the same procedures as for the No. 2 front axle outboard joint boot clamp.

DS



15. REMOVE NO. 2 FRONT AXLE OUTBOARD JOINT BOOT CLAMP (for 2AZ-FE)

(a) Using a screwdriver, remove the No. 2 front axle outboard joint boot clamp as shown in the illustration.

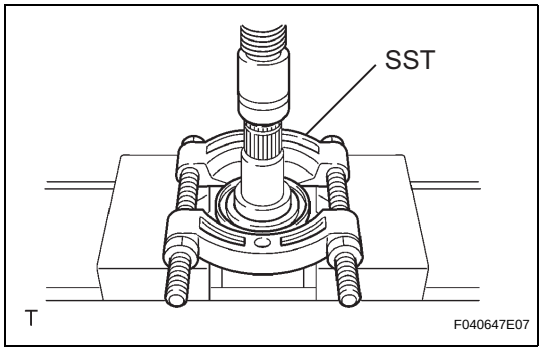
16. REMOVE FRONT AXLE OUTBOARD JOINT BOOT CLAMP (for 2AZ-FE)

(a) Remove the front axle outboard joint boot clamp.
HINT:
Perform the same procedures as for the No. 2 front axle outboard joint boot clamp.

17. REMOVE FRONT AXLE OUTBOARD JOINT BOOT

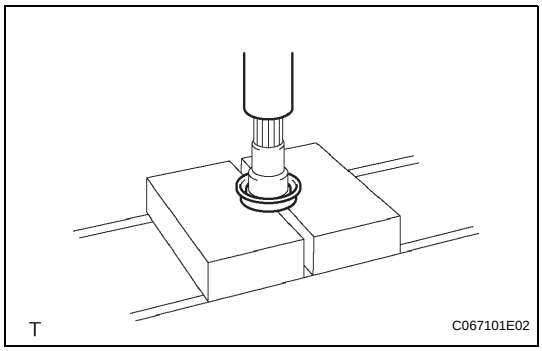
(a) Remove the outboard joint boot from the outboard joint shaft.

(b) Remove the grease from the outboard joint.



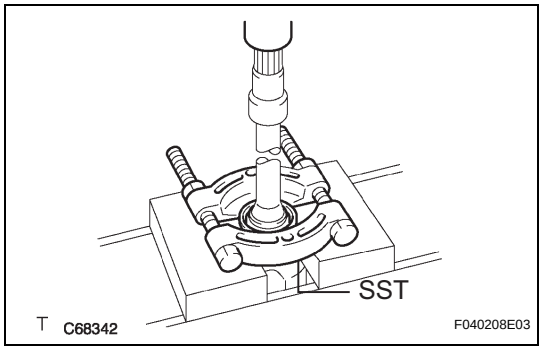
18. REMOVE FRONT DRIVE SHAFT DUST COVER LH

(a) Using SST and a press, remove the drive shaft dust cover LH.
SST 09950-00020
NOTICE:
Be careful not to drop the inboard joint assembly.



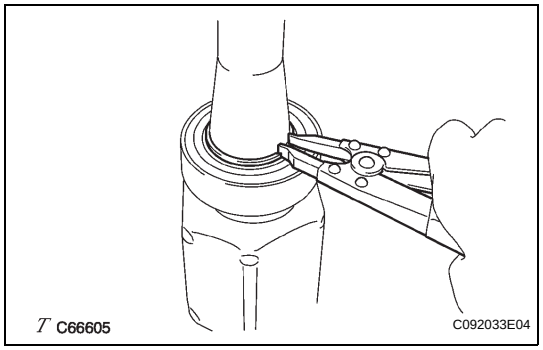
19. REMOVE FRONT DRIVE SHAFT DUST COVER RH

(a) Using a press, remove the drive shaft dust cover RH.



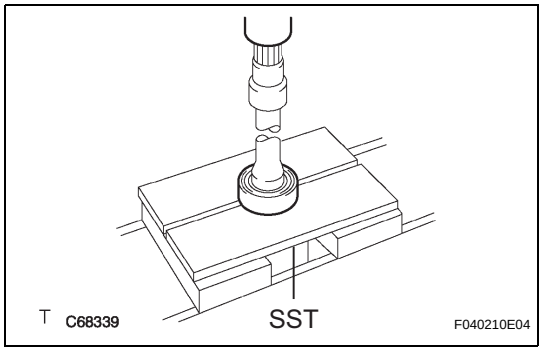
20. REMOVE FRONT DRIVE SHAFT DUST COVER

(a) Using SST and a press, remove the drive shaft dust cover.
SST 09950-00020



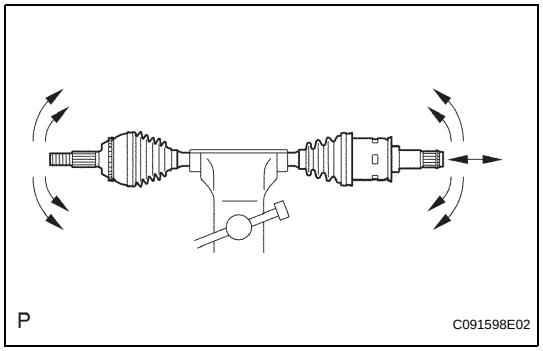
21. REMOVE FRONT DRIVE SHAFT BEARING

(a) Using a snap ring expander, remove the drive shaft hole snap ring.



(b) Using SST and a press, remove the bearing.
SST 09527-10011

(c) Remove the bearing bracket hole snap ring.
NOTICE:
Be careful not to drop the inboard joint assembly.



INSPECTION

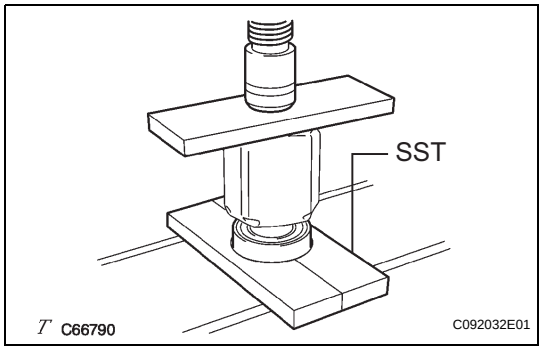
1. INSPECT FRONT DRIVE SHAFT ASSEMBLY

(a) Check that there is no excessive play in the outboard joint.

(b) Check that the inboard joint slides smoothly in the thrust direction.

(c) Check that there is no excessive play in the radial directions of the inboard joint.

(d) Check the boots for damage.

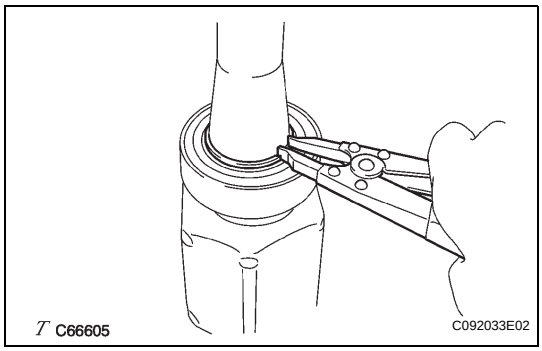


REASSEMBLY

1. INSTALL FRONT DRIVE SHAFT BEARING

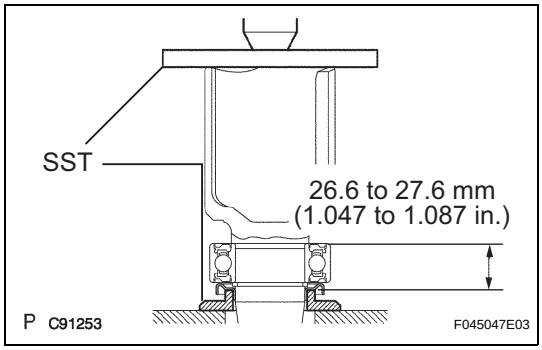
(a) Install a new bearing bracket hole snap ring to the front drive shaft assembly RH.

(b) Using SST and a steel plate, install a new front drive shaft bearing.
SST 09527-30010, 09527-10011
NOTICE:
Bearing should be completely installed.



(c) Using a snap ring expander, install a new drive shaft hole snap ring.

DS



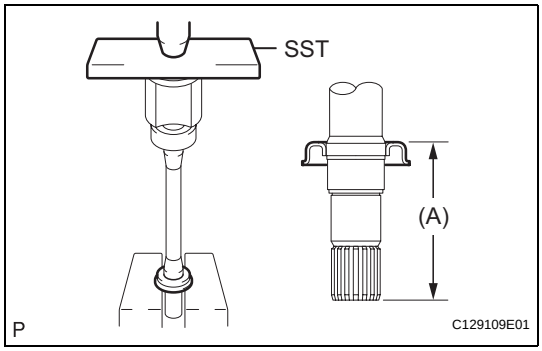
2. INSTALL FRONT DRIVE SHAFT DUST COVER

(a) Using SST and a press, install a new drive shaft dust cover.

SST 09726-40010, 09527-10011

NOTICE:

- **The dust cover should be completely installed.**
- **Be careful not to damage the dust deflector.**



3. INSTALL FRONT DRIVE SHAFT DUST COVER RH

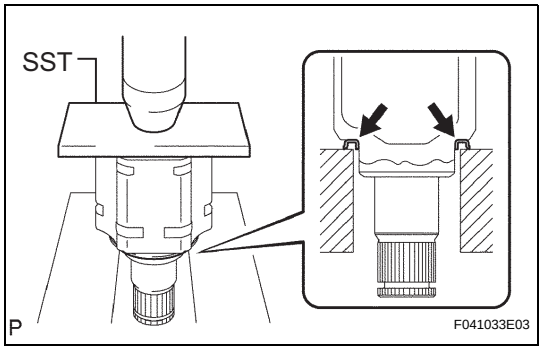
(a) Using SST and a press, install a new drive shaft dust cover RH until distance (A) from the tip of the center drive shaft to the drive shaft dust cover RH meets the specification.

SST 09527-10011

Engine type	Distance (A)
2GR-FE	110.0 to 111.0 mm (4.3307 to 4.3701 in.)
2AZ-FE	91.0 to 92.0 mm (3.5827 to 3.6220 in.)

NOTICE:

- **The dust cover should be completely installed.**
- **Be careful not to damage the dust deflector.**



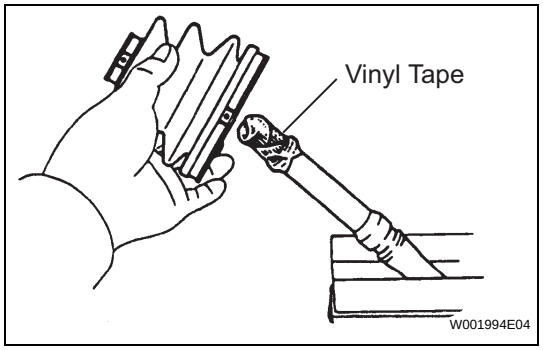
4. INSTALL FRONT DRIVE SHAFT DUST COVER LH

(a) Using SST and a press, install a new drive shaft dust cover LH.

SST 09527-10011

NOTICE:

- **The dust cover should be completely installed.**
- **Be careful not to damage the dust deflector.**



5. INSTALL FRONT AXLE OUTBOARD JOINT BOOT

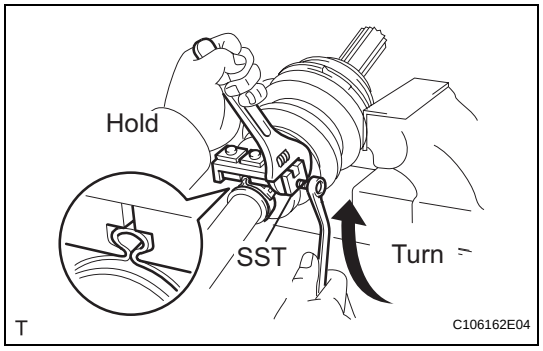
(a) Hold the drive shaft lightly in a vise between aluminium plates.
HINT:
Before installing the boots, wrap the spline of the drive shaft with vinyl tape to prevent the boots from being damaged.

(b) Temporarily install a new outboard joint boot to the drive shaft with the 2 clamps.

(c) Pack the outboard joint shaft and boot with grease.

Engine type	Grease capacity
2GR-FE	164 to 184 g (5.8 to 6.5 oz.)
2AZ-FE	190 to 200 g (6.7 to 7.1 oz.)

DS



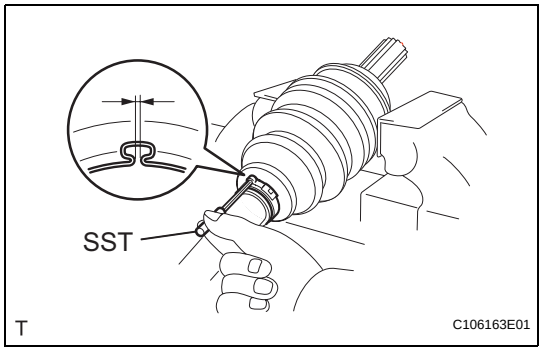
6. INSTALL FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Hold the drive shaft lightly in a vise between aluminum plates.
NOTICE:
Do not overtighten the vise.

(b) Install the 2 outboard joint boot clamps onto the boot.

(c) Place SST onto the outboard joint boot clamp.
SST 09521-24010

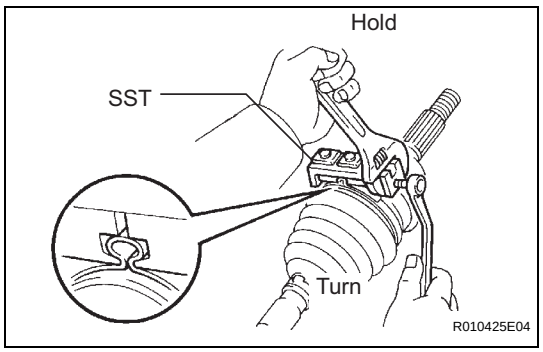
(d) Tighten the SST so that the outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.



(e) Using SST, measure the clearance of the outboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

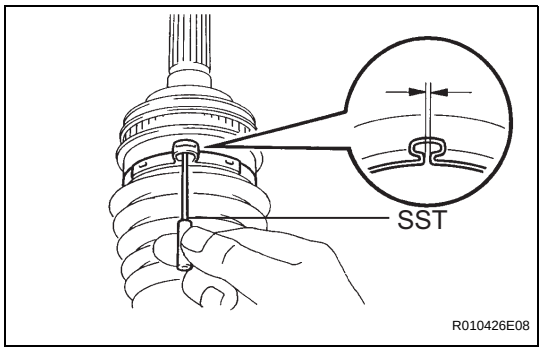
7. INSTALL NO. 2 FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Install the No. 2 outboard joint boot clamp onto the boot.



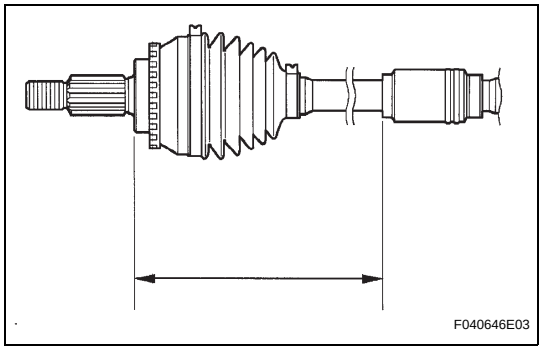
(b) Place SST onto the No. 2 outboard joint boot clamp.
SST 09521-24010

(c) Tighten the SST so that the No. 2 outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.

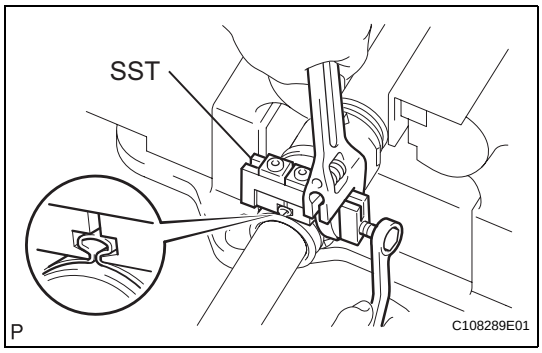


(d) Using SST, measure the clearance of the No. 2 outboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

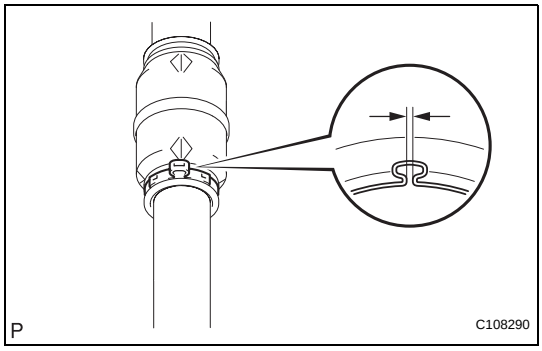
DS



8. INSTALL FRONT DRIVE SHAFT DAMPER LH (for 2GR-FE)
(a) Install the drive shaft damper to the drive shaft.
(b) Make sure that the damper is on the shaft groove.
(c) Set the distance as specified below.
Distance:
228.0 to 232.0 mm (8.976 to 9.134 in.)
(d) Install the drive shaft damper clamp onto the drive shaft damper.
NOTICE:
Be sure to install the clamp in the correct position.

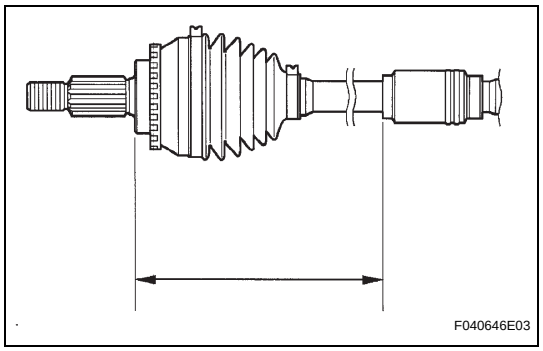


(e) Place SST onto the drive shaft damper clamp.
SST 09521-24010
(f) Tighten the SST so that the clamp is pinched.
NOTICE:
Do not overtighten the SST.



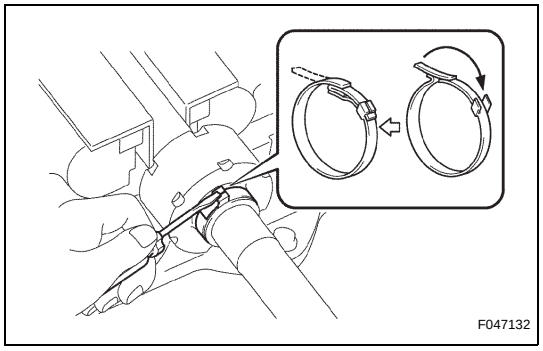
(g) Using SST, measure the clearance of the drive shaft damper clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

9. INSTALL FRONT DRIVE SHAFT DAMPER RH (for 2GR-FE)
(a) Install the front drive shaft damper RH.
HINT:
Perform the same procedures as for the front drive shaft damper LH.



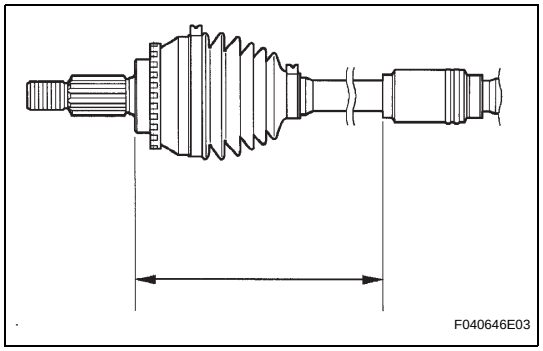
10. INSTALL FRONT DRIVE SHAFT DAMPER LH (for 2AZ-FE Automatic Transaxle)

(a) Install the drive shaft damper to the drive shaft.
(b) Make sure that the damper is on the shaft groove.
(c) Set the distance as specified below.
Distance:
222.0 to 226.0 mm (8.740 to 8.898 in.)



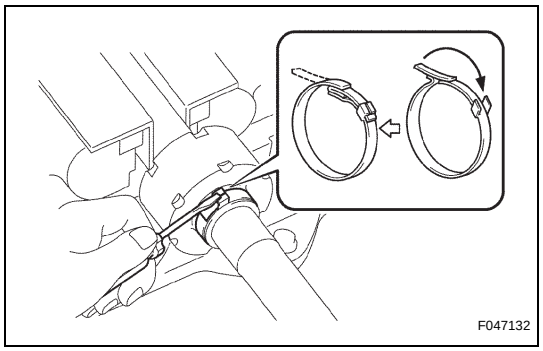
(d) Using a screwdriver, install a new drive shaft damper clamp as shown in the illustration.

DS

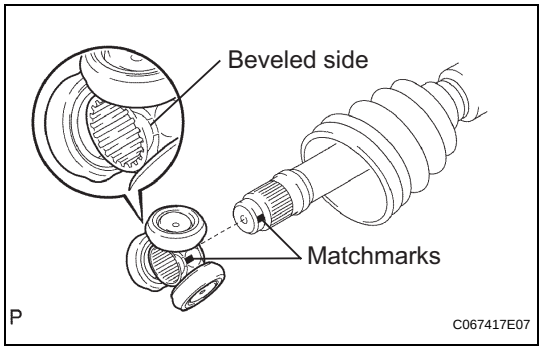


11. INSTALL FRONT DRIVE SHAFT DAMPER RH (for 2AZ-FE)

(a) Install the drive shaft damper to the drive shaft.
(b) Make sure that the damper is on the shaft groove.
(c) Set the distance as specified below.
Distance:
223.4 to 227.4 mm (8.795 to 8.953 in.)



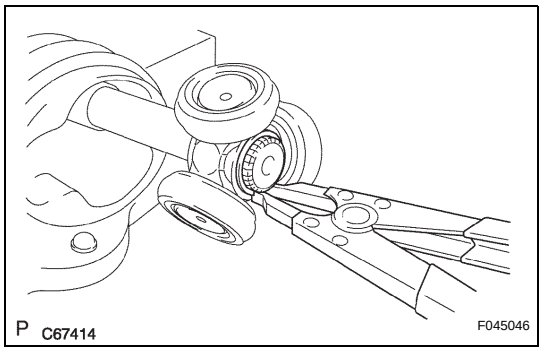
(d) Using a screwdriver, install a new drive shaft damper clamp as shown in the illustration.



12. INSTALL FRONT DRIVE INBOARD JOINT ASSEMBLY

(a) Temporarily install a new inboard joint boot to the drive shaft with the 2 clamps.
(b) Place the beveled side of the tripod joint axial spline toward the outboard joint shaft.
(c) Align the matchmarks.
(d) Using a brass bar and hammer, tap in the tripod joint to the outboard joint shaft.
NOTICE:
- **Do not tap the roller.**

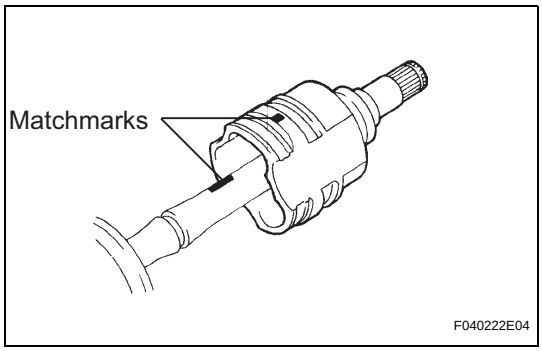
- **Be sure to install the tripod joint assembly in the correct direction.**



(e) Using a snap ring expander, install a new shaft snap ring.

(f) Coat the outboard joint shaft and boot with grease.

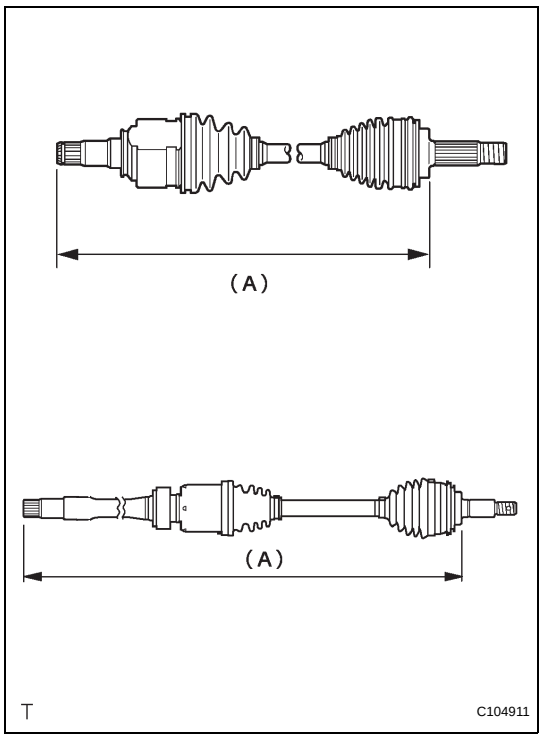
Engine type	Grease capacity
2GR-FE	155 to 175 g (5.5 to 6.2 oz.)
2AZ-FE	175 to 185 g (6.2 to 6.5 oz.)



(g) Align the matchmarks and install the inboard joint assembly to the outboard joint shaft assembly.

13. INSTALL FRONT AXLE INBOARD JOINT BOOT

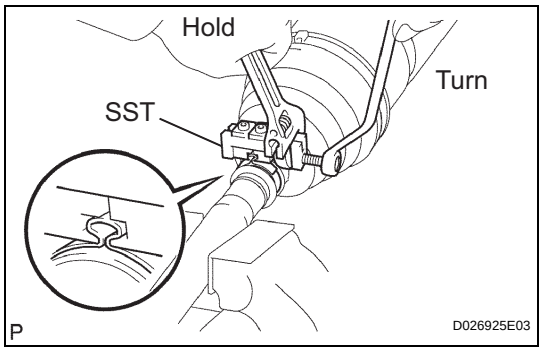
(a) Install the inboard joint boot to the inboard joint assembly.



(b) Check whether the drive shaft dimensions are within the following specifications.
HINT:
The following table shows dimension (A) of the drive shaft.
Dimension (A)

Engine Type	LH	RH
2GR-FE	**585.5 to 589.5 mm (23.05 to 23.21 in.)**	**904.4 to 908.4 mm (35.61 to 35.76 in.)**
2AZ-FE	**592.2 to 602.2 mm (23.32 to 23.71 in.)**	**891.0 to 901.0 mm (35.08 to 35.47 in.)**

DS



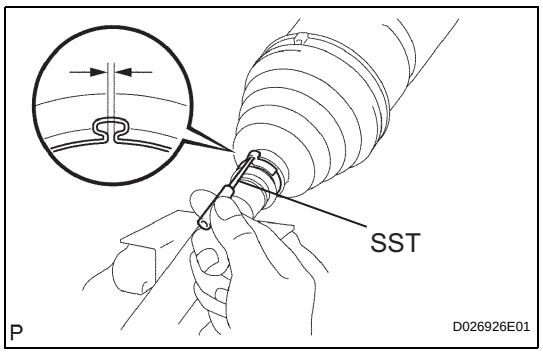
14. INSTALL FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2GR-FE)

(a) Hold the drive shaft lightly in a vise between aluminum plates.
NOTICE:
Do not overtighten the vise.

(b) Install the 2 inboard joint boot clamps onto the boot.

(c) Place SST onto the inboard joint boot clamp.
SST 09521-24010

(d) Tighten the SST so that the inboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.

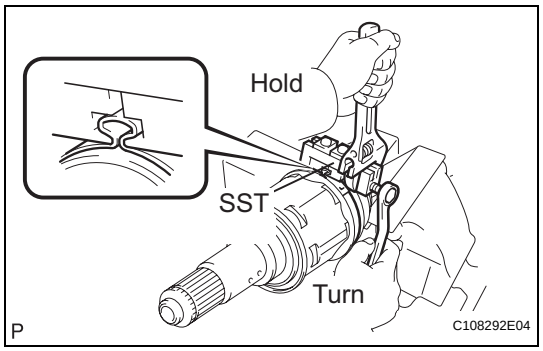


(e) Using SST, measure the clearance of the inboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

15. INSTALL NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2GR-FE)

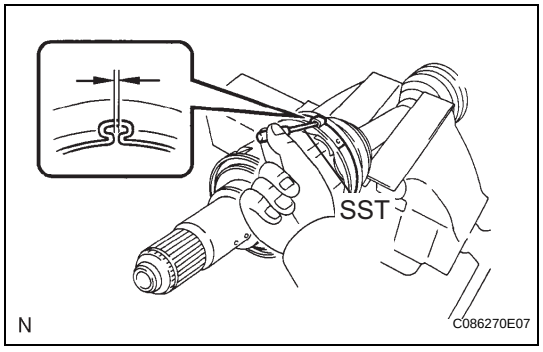
(a) Hold the inboard joint shaft assembly in a vise between aluminium plates.
NOTICE:
Do not overtighten the vise.

(b) Install the No. 2 front axle inboard joint boot clamp onto the boot.



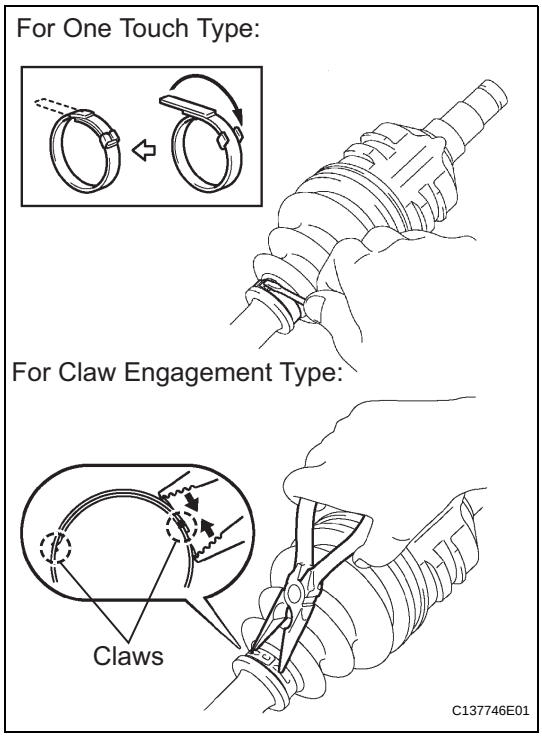
(c) Place SST onto the No. 2 front axle inboard joint boot clamp.
SST 09521-24010

(d) Tighten the SST so that the No. 2 front axle inboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.



(e) Using SST, measure the clearance of the No. 2 front axle inboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

DS



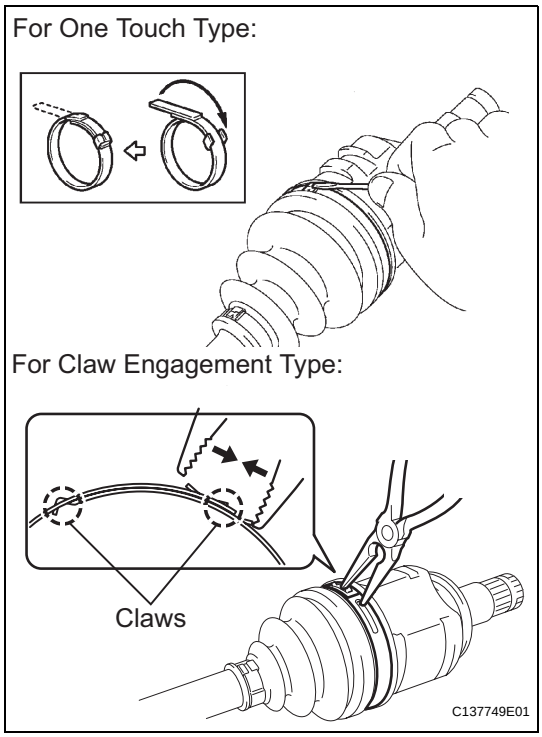
16. INSTALL FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2AZ-FE)

(a) For one touch type:

(1) Using a screwdriver, install the inboard joint boot clamp as shown in the illustration.

(b) For claw engagement type:

(1) Using needle nose pliers, install the inboard joint boot clamp as shown in the illustration.



17. INSTALL NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP (for 2AZ-FE)

(a) For one touch type:

(1) Using a screwdriver, install the No. 2 front axle inboard joint boot clamp as shown in the illustration.

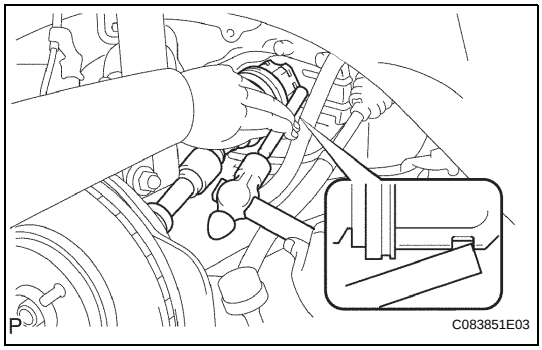
(b) For claw engagement type:

(1) Using needle nose pliers, install the No. 2 front axle inboard joint boot clamp as shown in the illustration.

18. INSTALL FRONT DRIVE SHAFT LH HOLE SNAP RING

(a) Install a new hole snap ring.

19. INSPECT FRONT DRIVE SHAFT ASSEMBLY (See page DS-13)



INSTALLATION

1. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

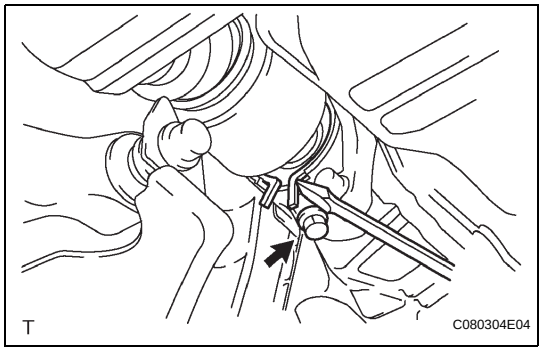
(a) Coat the spline of the inboard joint shaft assembly with ATF.

(b) Align the shaft splines and install the drive shaft assembly LH with a brass bar and hammer.

NOTICE:

- **Set the shaft snap ring with the opening side facing down.**

- **Be careful not to damage the drive shaft dust cover, boot, and oil seal.**
- **Move the drive shaft assembly while keeping it level.**



2. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

(a) Coat the spline of the inboard joint shaft assembly with ATF.

(b) Install the front drive shaft the assembly RH.

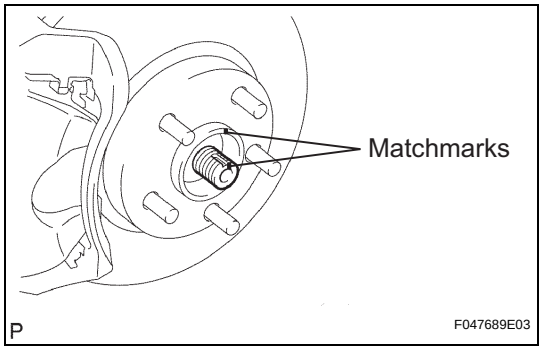
(c) Using a screwdriver, install a new bearing bracket hole snap ring.

NOTICE:

- **Do not damage the boot and oil seal.**
- **Move the drive shaft assembly while keeping it level.**

(d) Install a new bolt.

Torque: 32 N*m (330 kgf*cm, 24 ft.*lbf)

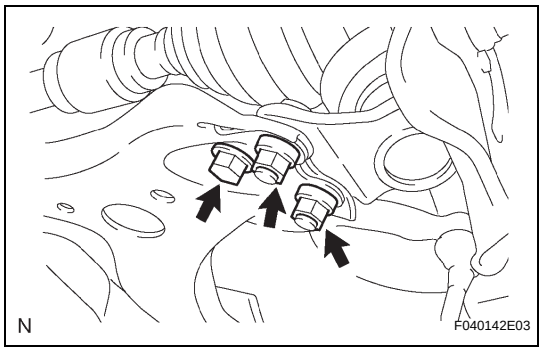


3. INSTALL FRONT AXLE ASSEMBLY

(a) Align the matchmarks and install the front drive shaft assembly to the front axle hub sub-assembly.

NOTICE:

Be careful not to damage the drive shaft boot and speed sensor rotor.



4. INSTALL FRONT SUSPENSION LOWER NO. 1 ARM

(a) Install the lower ball joint to the front suspension lower No. 1 arm with the bolt and 2 nuts.

Torque: 75 N*m (765 kgf*cm, 55 ft.*lbf)

5. INSTALL TIE ROD END SUB-ASSEMBLY

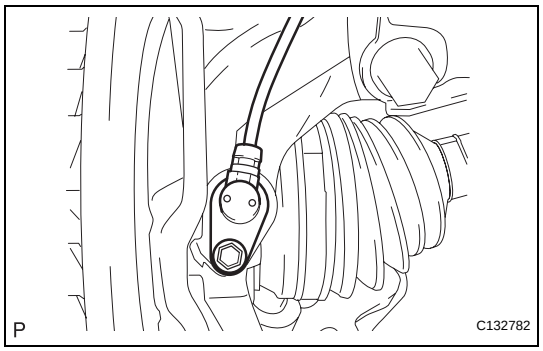
(a) Install the tie rod end sub-assembly to the steering knuckle with the nut.

Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

(b) Install a new cotter pin.

NOTICE:

If the holes for the cotter pin are not aligned, tighten the nut up to 60° further.



6. INSTALL FRONT SPEED SENSOR

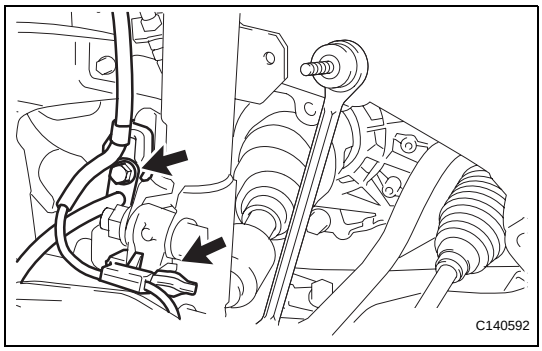
(a) Install the front speed sensor to the steering knuckle with the bolt.

Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

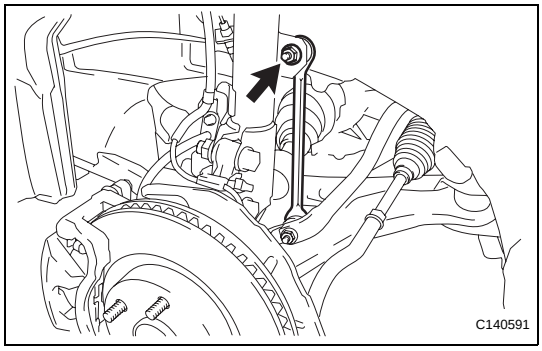
NOTICE:

- **Prevent foreign matter from adhering to the speed sensor.**
- **Be careful not to damage the speed sensor.**

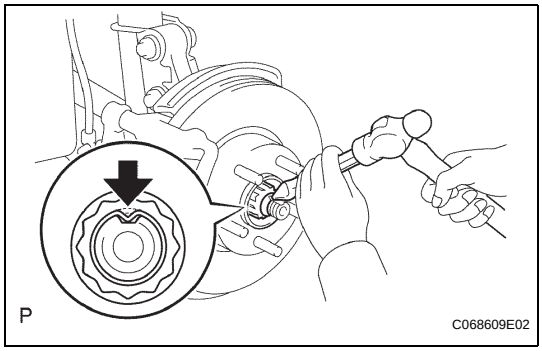
DS



(b) Install the flexible hose and the speed sensor to the shock absorber with the bolt and set the sensor clip on the knuckle.
Torque: 19 N*m (192 kgf*cm, 14 ft.*lbf)
NOTICE:
- **Be careful not to damage the speed sensor.**
- **Prevent foreign matter from adhering to the speed sensor.**
- **Do not twist the sensor wire when installing the speed sensor.**



7. INSTALL FRONT STABILIZER LINK ASSEMBLY
(a) Install the stabilizer link assembly with the nut.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.



8. INSTALL FRONT AXLE HUB NUT
(a) Using a socket wrench (30 mm), install a new axle hub nut.
Torque: 294 N*m (3,000 kgf*cm, 217 ft.*lbf)
(b) Using a chisel and hammer, stake the front axle hub nut.

9. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

10. ADD AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)
(a) for 2GR-FE: See page AX-164
(b) for 2AZ-FE: See page AX-175

11. ADD MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-6)

12. INSPECT AUTOMATIC TRANSAXLE FLUID (for 2AZ-FE Automatic Transaxle) (See page AX-123)

13. INSPECT MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-2)

14. ADJUST FRONT WHEEL ALIGNMENT
HINT:
See page SP-4

15. CHECK ABS SPEED SENSOR SIGNAL
(a) ABS: See page BC-11
(b) VSC (for BOSCH): See page BC-123
(c) VSC (for ADVICS): See page BC-290

DS

REMOVAL

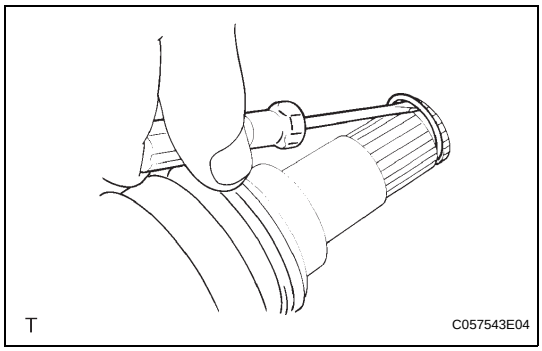
HINT:

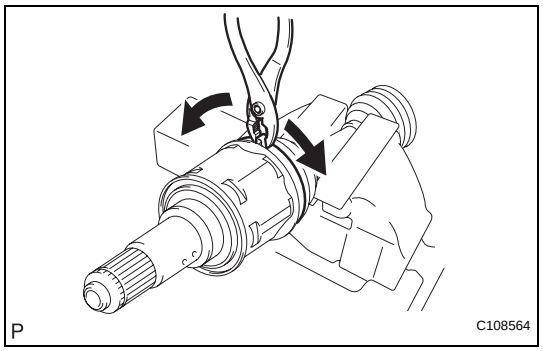
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **DRAIN AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)**
   (a) for 2GR-FE: See page AX-207
   (b) for 2AZ-FE: See page AX-162
2. **DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-5)**
3. **REMOVE FRONT WHEEL**
4. **REMOVE FRONT AXLE HUB NUT (See page DS-7)**
5. **SEPARATE FRONT STABILIZER LINK ASSEMBLY (See page DS-7)**
6. **SEPARATE FRONT SPEED SENSOR (See page DS-7)**
7. **SEPARATE TIE ROD END SUB-ASSEMBLY (See page DS-8)**
8. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-8)**
9. **SEPARATE FRONT AXLE ASSEMBLY (See page DS-8)**
10. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)**
11. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)**
12. **SECURE FRONT AXLE HUB SUB-ASSEMBLY (See page DS-9)**
13. **INSPECT FRONT DRIVE SHAFT ASSEMBLY (See page DS-29)**

DISASSEMBLY

1. **REMOVE FRONT DRIVE SHAFT LH HOLE SNAP RING**
   (a) Using a screwdriver, remove the front drive shaft LH hole snap ring.





2. REMOVE NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP

(a) Using pliers, remove the No. 2 front axle inboard joint boot clamp as shown in the illustration.

3. REMOVE FRONT AXLE INBOARD JOINT BOOT CLAMP

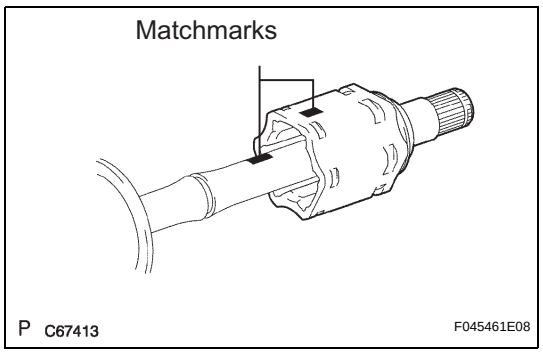
(a) Remove the front axle inboard joint boot clamp.
HINT:
Perform the same procedures as for the No. 2 front axle inboard joint boot clamp.

4. SEPARATE FRONT AXLE INBOARD JOINT BOOT

(a) Separate the front axle inboard joint boot from the inboard joint assembly.

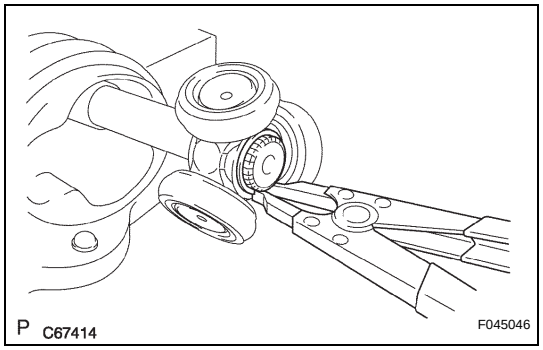
5. REMOVE FRONT DRIVE INBOARD JOINT ASSEMBLY

(a) Remove the grease from the inboard joint assembly.

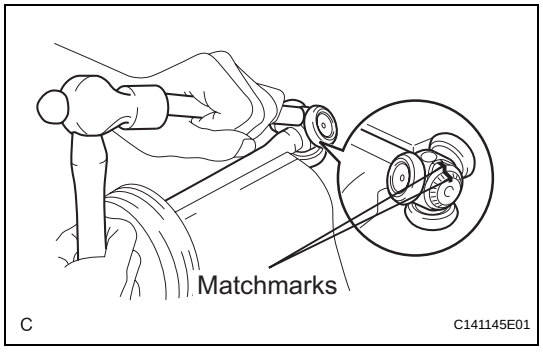


(b) Put matchmarks on the inboard joint assembly and outboard joint shaft.
NOTICE:
Do not use a punch for the marks.

(c) Remove the inboard joint assembly from the outboard joint shaft.



(d) Using a snap ring expander, remove the shaft snap ring.

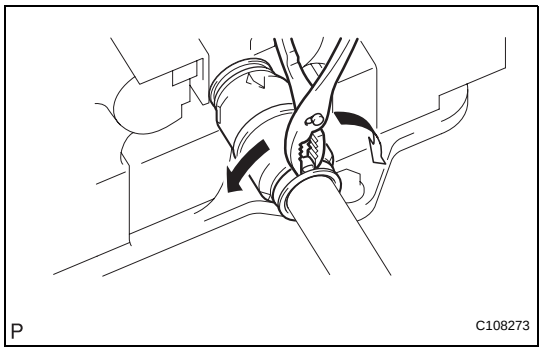


(e) Put matchmarks on the outboard joint shaft and tripod joint.
NOTICE:
Do not use a punch for the marks.

(f) Using a brass bar and a hammer, remove the tripod joint from the outboard joint shaft.
NOTICE:
Do not tap the roller.

6. REMOVE FRONT AXLE INBOARD JOINT BOOT

(a) Remove the inboard joint boot from the outboard joint shaft.



7. REMOVE FRONT DRIVE SHAFT DAMPER LH

(a) Using pliers, remove the drive shaft damper clamp as shown in the illustration.

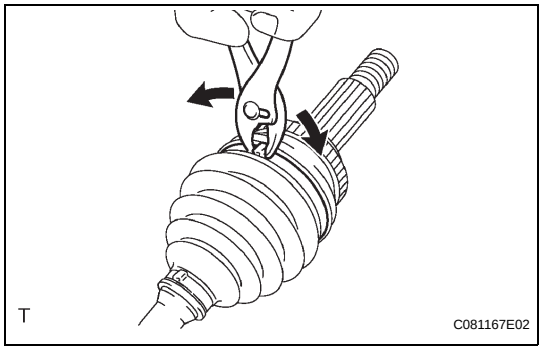
(b) Remove the drive shaft damper.

8. REMOVE FRONT DRIVE SHAFT DAMPER RH

(a) Remove the front drive shaft damper RH.

HINT:

Perform the same procedures as for the front drive shaft damper LH.



9. REMOVE NO. 2 FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Using pliers, remove the No. 2 front axle outboard joint boot clamp as shown in the illustration.

10. REMOVE FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Remove the front axle outboard joint boot clamp.

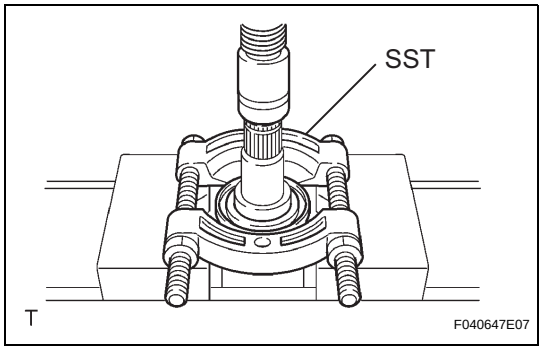
HINT:

Perform the same procedures as for the No. 2 front axle outboard joint boot clamp.

11. REMOVE FRONT AXLE OUTBOARD JOINT BOOT

(a) Remove the outboard joint boot from the outboard joint shaft.

(b) Remove the grease from the outboard joint.



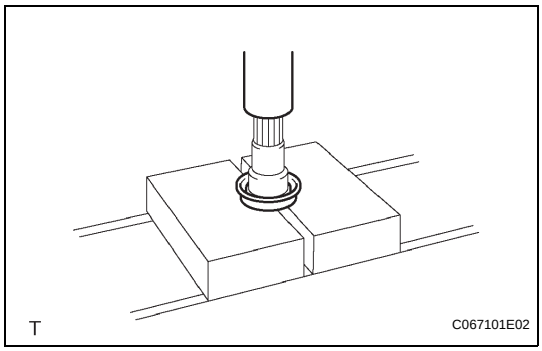
12. REMOVE FRONT DRIVE SHAFT DUST COVER LH

(a) Using SST and a press, remove the drive shaft dust cover LH.

SST 09950-00020

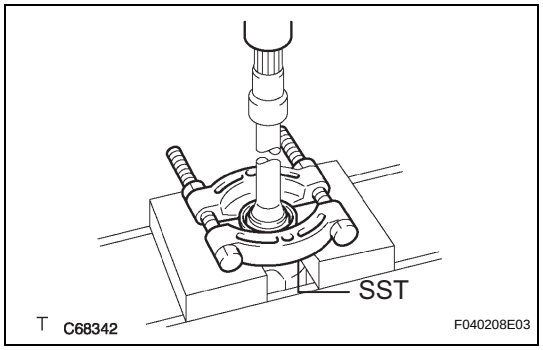
NOTICE:

Be careful not to drop the inboard joint assembly.



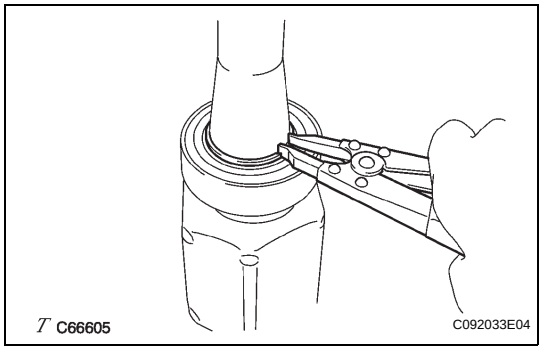
13. REMOVE FRONT DRIVE SHAFT DUST COVER RH

(a) Using a press, remove the drive shaft dust cover RH.



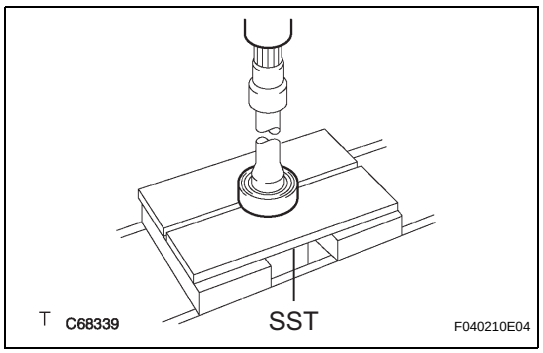
14. REMOVE FRONT DRIVE SHAFT DUST COVER

(a) Using SST and a press, remove the drive shaft dust cover.
SST 09950-00020



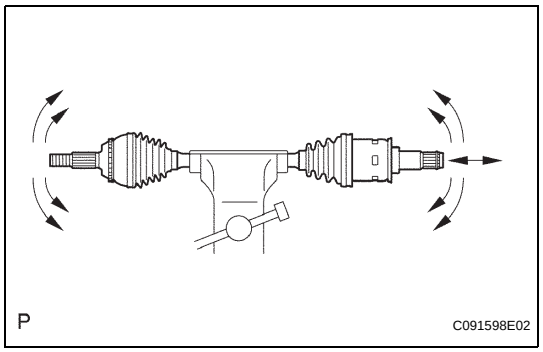
15. REMOVE FRONT DRIVE SHAFT BEARING

(a) Using a snap ring expander, remove the drive shaft hole snap ring.



(b) Using SST and a press, remove the bearing.
SST 09527-10011

(c) Remove the bearing bracket hole snap ring.
NOTICE:
Be careful not to drop the inboard joint assembly.



INSPECTION

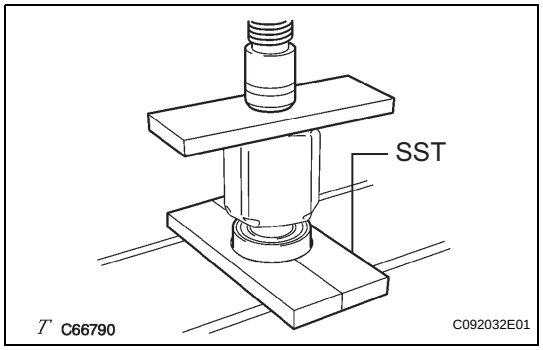
1. INSPECT FRONT DRIVE SHAFT ASSEMBLY

(a) Check that there is no excessive play in the outboard joint.

(b) Check that the inboard joint slides smoothly in the thrust direction.

(c) Check that there is no excessive play in the radial directions of the inboard joint.

(d) Check the boots for damage.

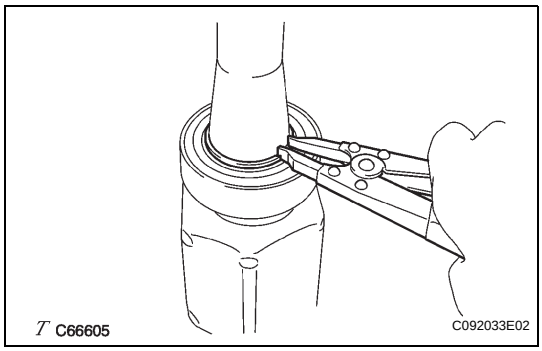


REASSEMBLY

1. INSTALL FRONT DRIVE SHAFT BEARING

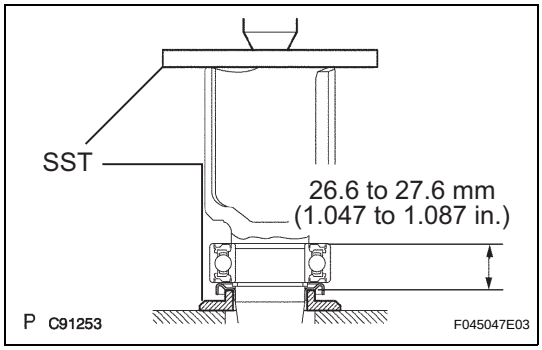
(a) Install a new bearing bracket hole snap ring to the front drive shaft assembly RH.

(b) Using SST and a steel plate, install a new front drive shaft bearing.
SST 09527-30010, 09527-10011
NOTICE:
Bearing should be completely installed.



(c) Using a snap ring expander, install a new drive shaft hole snap ring.

DS



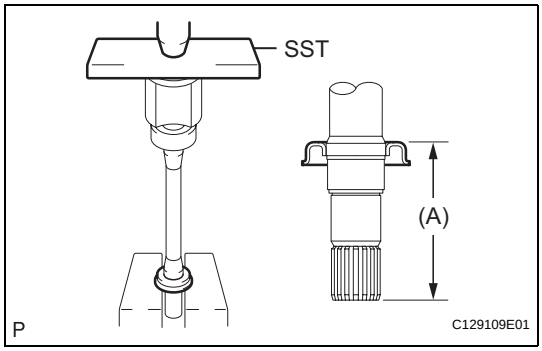
2. INSTALL FRONT DRIVE SHAFT DUST COVER

(a) Using SST and a press, install a new drive shaft dust cover.

SST 09726-40010, 09527-10011

NOTICE:

- **The dust cover should be completely installed.**
- **Be careful not to damage the dust cover.**



3. INSTALL FRONT DRIVE SHAFT DUST COVER RH

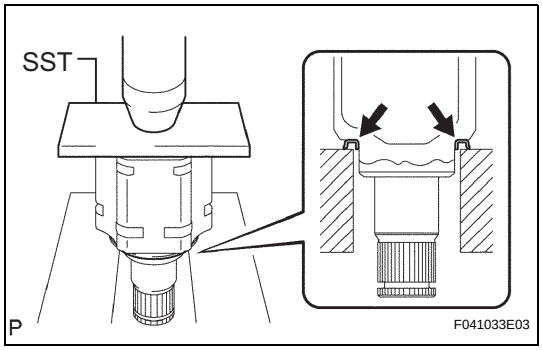
(a) Using SST and a press, install a new drive shaft dust cover RH until distance (A) from the tip of the center drive shaft to the drive shaft dust cover RH meets the specification.

SST 09527-10011

Engine type	Distance (A)
2GR-FE	110.0 to 111.0 mm (4.3307 to 4.3701 in.)
2AZ-FE	91.0 to 92.0 mm (3.5827 to 3.6220 in.)

NOTICE:

- **The dust cover should be completely installed.**
- **Be careful not to damage the dust cover.**



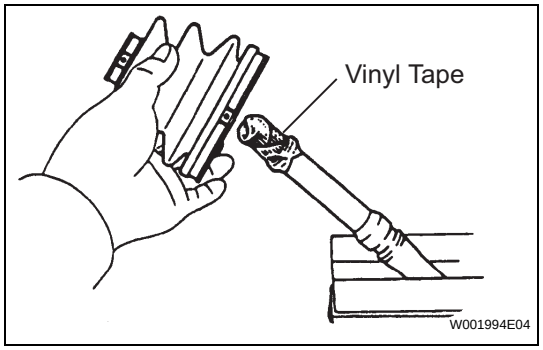
4. INSTALL FRONT DRIVE SHAFT DUST COVER LH

(a) Using SST and a press, install a new drive shaft dust cover LH.

SST 09527-10011

NOTICE:

- **The dust cover should be completely installed.**
- **Be careful not to damage the dust cover.**



5. INSTALL FRONT AXLE OUTBOARD JOINT BOOT

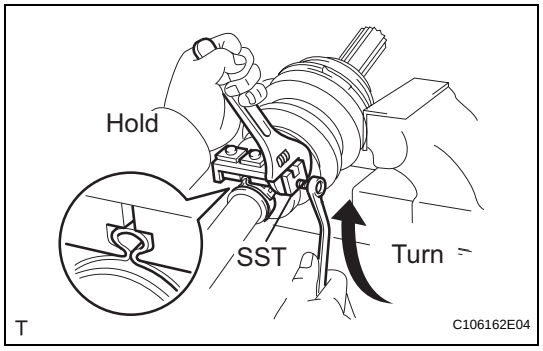
(a) Hold the drive shaft lightly in a vise between aluminium plates.
HINT:
Before installing the boots, wrap the spline of the drive shaft with vinyl tape to prevent the boots from being damaged.

(b) Temporarily install a new outboard joint boot to the drive shaft with the 2 clamps.

(c) Coat the outboard joint shaft and boot with grease.

Engine type	Grease capacity
2GR-FE	164 to 184 g (5.8 to 6.5 oz.)
2AZ-FE	100 to 120 g (3.5 to 4.2 oz.)

DS



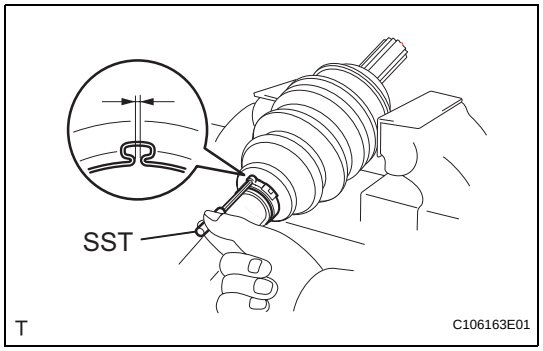
6. INSTALL FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Hold the drive shaft lightly in a vise between aluminum plates.
NOTICE:
Do not overtighten the vise.

(b) Install the 2 outboard joint boot clamps onto the boot.

(c) Place SST onto the outboard joint boot clamp.
SST 09521-24010

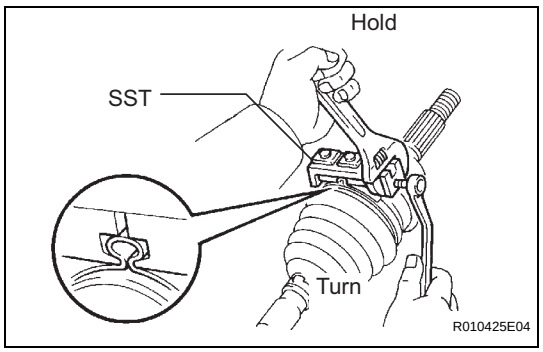
(d) Tighten the SST so that the outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.



(e) Using SST, measure the clearance of the outboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

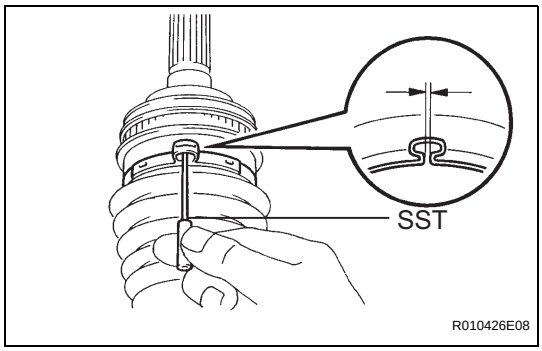
7. INSTALL NO. 2 FRONT AXLE OUTBOARD JOINT BOOT CLAMP

(a) Install the No. 2 outboard joint boot clamp onto the boot.



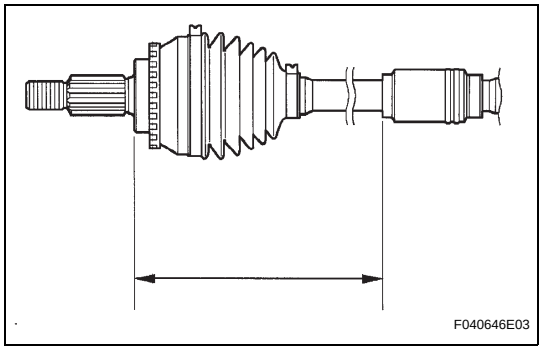
(b) Place SST onto the No. 2 outboard joint boot clamp.
SST 09521-24010

(c) Tighten the SST so that the No. 2 outboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.

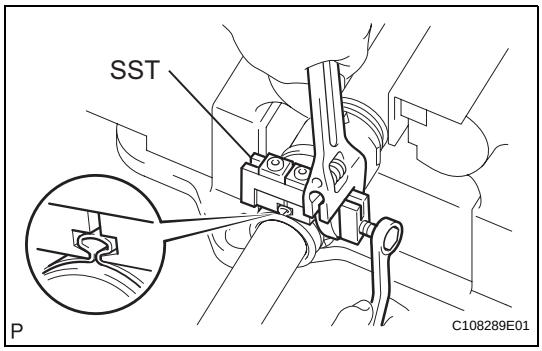


(d) Using SST, measure the clearance of the No. 2 outboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

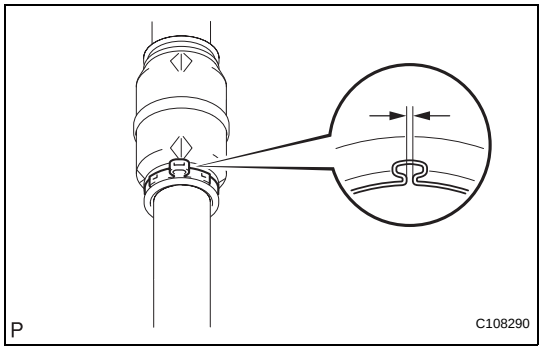
DS



8. INSTALL FRONT DRIVE SHAFT DAMPER LH
(a) Install the drive shaft damper to the drive shaft.
(b) Make sure that the damper is on the shaft groove.
(c) Set the distance as specified below.
Distance:
228.0 to 232.0 mm (8.976 to 9.134 in.)
(d) Install the drive shaft damper clamp onto the drive shaft damper.
NOTICE:
Be sure to install the clamp in the correct position.

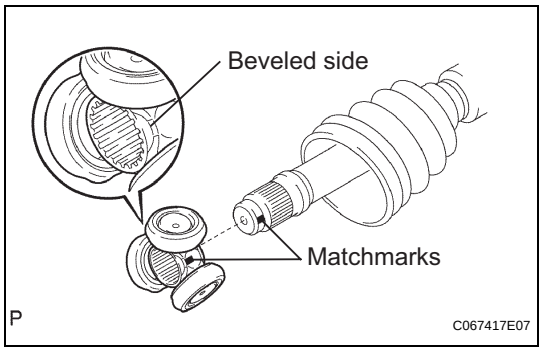


(e) Place SST onto the drive shaft damper clamp.
SST 09521-24010
(f) Tighten the SST so that the clamp is pinched.
NOTICE:
Do not overtighten the SST.



(g) Using SST, measure the clearance of the drive shaft damper clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

9. INSTALL FRONT DRIVE SHAFT DAMPER RH
(a) Install the front drive shaft damper RH.
HINT:
Perform the same procedures as for the front drive shaft damper LH.



10. INSTALL FRONT DRIVE INBOARD JOINT ASSEMBLY

(a) Temporarily install a new inboard joint boot to the drive shaft with the 2 clamps.

(b) Place the beveled side of the tripod joint axial spline toward the outboard joint shaft.

(c) Align the matchmarks.

(d) Using a brass bar and hammer, tap in the tripod joint to the outboard joint shaft.

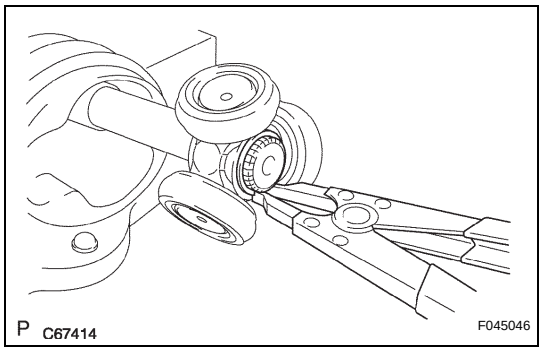
NOTICE:

- **Do not tap the roller.**
- **Be sure to install the tripod joint assembly in the correct direction.**

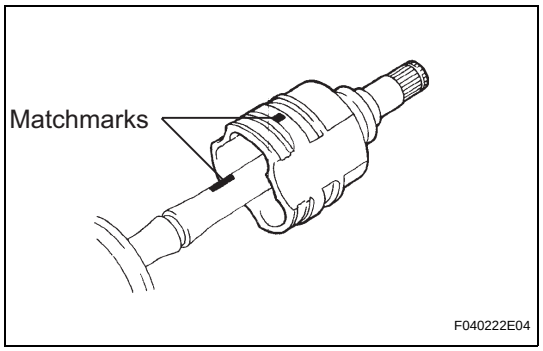
(e) Using a snap ring expander, install a new shaft snap ring.

(f) Coat the outboard joint shaft and boot with grease.

Engine type	Grease capacity
2GR-FE	155 to 175 g (5.5 to 6.2 oz.)
2AZ-FE	170 to 190 g (6.0 to 6.7 oz.)



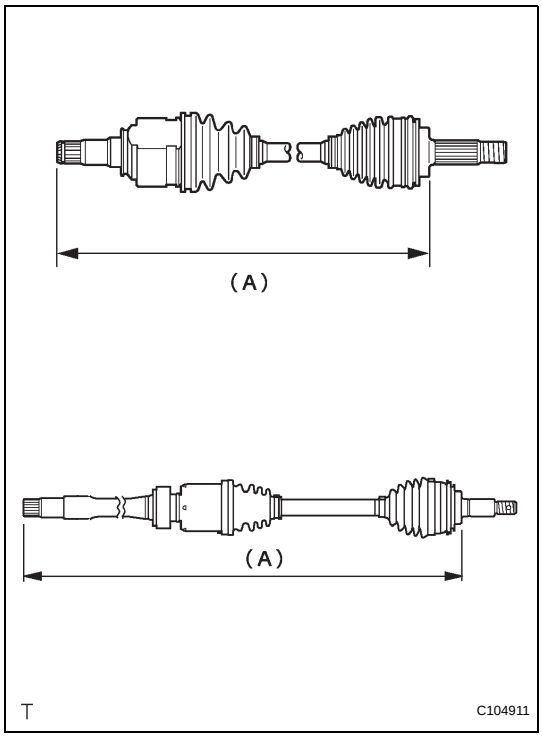
(g) Align the matchmarks and install the inboard joint assembly to the outboard joint shaft assembly.



11. INSTALL FRONT AXLE INBOARD JOINT BOOT

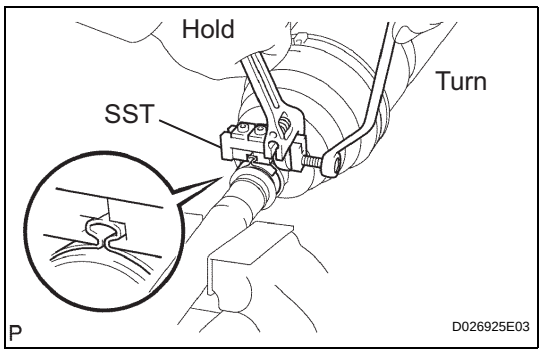
(a) Install the inboard joint boot to the inboard joint assembly.

DS



(b) Check whether the drive shaft dimensions are within the following specifications.
HINT:
The following table shows dimension (A) of the drive shaft.
Dimension (A)

Engine Type	LH	RH
2GR-FE	585.5 to 589.5 mm (23.05 to 23.21 in.)	904.4 to 908.4 mm (35.61 to 35.76 in.)
2AZ-FE	598.0 to 602.0 mm (23.54 to 23.70 in.)	897.0 to 901.0 mm (35.32 to 35.47 in.)



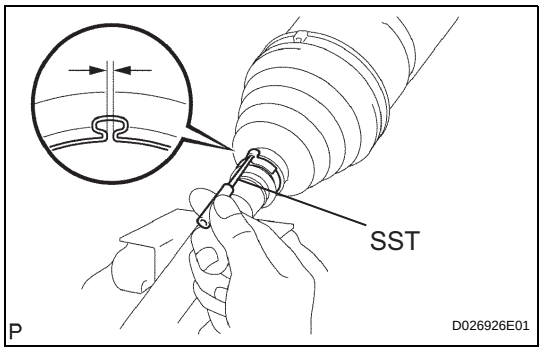
12. INSTALL FRONT AXLE INBOARD JOINT BOOT CLAMP

(a) Hold the drive shaft lightly in a vise between aluminum plates.
NOTICE:
Do not overtighten the vise.

(b) Install the 2 inboard joint boot clamps onto the boot.

(c) Place SST onto the inboard joint boot clamp.
SST 09521-24010

(d) Tighten the SST so that the inboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.

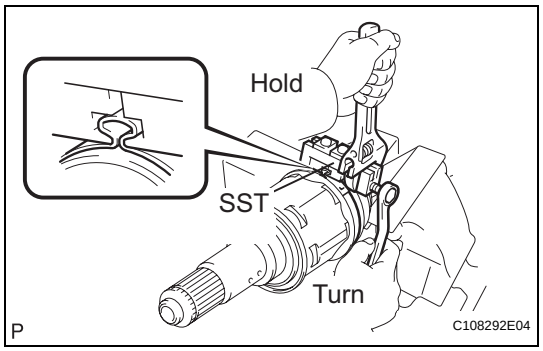


(e) Using SST, measure the clearance of the inboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

13. INSTALL NO. 2 FRONT AXLE INBOARD JOINT BOOT CLAMP

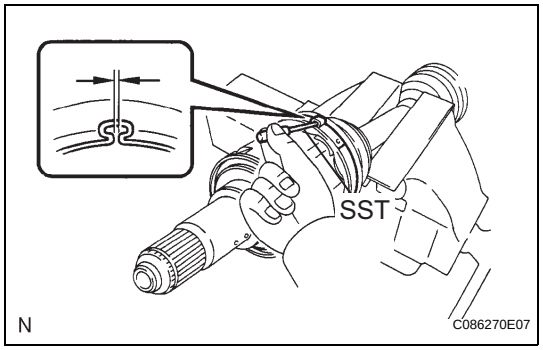
(a) Hold the inboard joint shaft assembly in a vise between aluminium plates.
NOTICE:
Do not overtighten the vise.

(b) Install the No. 2 front axle inboard joint boot clamp onto the boot.



(c) Place SST onto the No. 2 front axle inboard joint boot clamp.
SST 09521-24010

(d) Tighten the SST so that the No. 2 front axle inboard joint boot clamp is pinched.
NOTICE:
Do not overtighten the SST.



(e) Using SST, measure the clearance of the No. 2 front axle inboard joint boot clamp.
SST 09240-00020
Clearance:
0.5 to 1.5 mm (0.0197 to 0.0591 in.)
NOTICE:
If the measured value is greater than the specified value, retighten the clamp.

14. INSTALL FRONT DRIVE SHAFT LH HOLE SNAP RING

(a) Install a new hole snap ring.

15. INSPECT FRONT DRIVE SHAFT ASSEMBLY (See page DS-29)

DS

INSTALLATION

1. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)**
2. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)**
3. **INSTALL FRONT AXLE ASSEMBLY (See page DS-21)**
4. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-21)**
5. **INSTALL TIE ROD END SUB-ASSEMBLY (See page DS-21)**
6. **INSTALL FRONT SPEED SENSOR (See page DS-21)**
7. **INSTALL FRONT STABILIZER LINK ASSEMBLY (See page DS-22)**
8. **INSTALL FRONT AXLE HUB NUT (See page DS-22)**
9. **INSTALL FRONT WHEEL**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
10. **ADD AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)**
    (a) for 2GR-FE: See page AX-164
    (b) for 2AZ-FE: See page AX-175
11. **ADD MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-6)**
12. **INSPECT AUTOMATIC TRANSAXLE FLUID (for 2AZ-FE Automatic Transaxle) (See page AX-123)**
13. **INSPECT MANUAL TRANSAXLE OIL (for Manual Transaxle) (See page MX-2)**
14. **ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    See page SP-4
15. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) ABS: See page BC-11
    (b) VSC (for BOSCH): See page BC-290
    (c) VSC (for ADVICS): See page BC-123

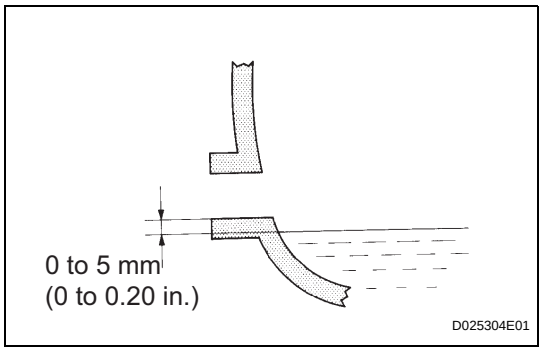
MANUAL TRANSAXLE SYSTEM

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the ranked order of probability of each of the possible causes. Check each part in order. Replace parts as necessary.

Manual transaxle system (MTM)

Symptom	Suspected area	See page
Noise	1. Oil (Level low)	MX-2
	2. Oil (Wrong)	MX-2
	3. Gear (Worn or damaged)	MX-54
	-	MX-79
	-	MX-89
	4. Bearing (Worn or damaged)	MX-40
	-	MX-79
	-	MX-89
Oil leakage	1. Oil (Level too high)	MX-2
	2. Gasket (Damaged)	MX-40
	3. Oil seal (Worn or damaged)	MX-5
	-	MX-99
	4. O-Ring (Worn or damaged)	MX-40
Hard to shift or will not shift	1. Control cable assembly	MX-13
	2. Synchronizer ring (Worn or damaged)	MX-54
	-	MX-79
	-	MX-89
	3. Shift key spring (Damaged)	MX-40
	-	MX-77
	-	MX-87
Jumps out of gear	1. Locking ball spring (Damaged)	MX-40
	2. Shift fork (Worn)	MX-54
	-	MX-79
	-	MX-89
	3. Gear (Worn or damaged)	MX-54
	-	MX-79
	-	MX-89
	4. Bearing (Worn or damaged)	MX-40
	-	MX-79
	-	MX-89



MX

MANUAL TRANSAXLE OIL

ON-VEHICLE INSPECTION

1. INSPECT MANUAL TRANSAXLE OIL

(a) Stop the vehicle on a level surface.

(b) Remove the transmission filler plug and gasket.

(c) Check that the oil surface is within 5 mm (0.20 in.) of the bottom of the transmission filler plug opening.

NOTICE:

- **Excessively large or small amounts of oil may cause trouble.**
- **After replacing the oil, drive the vehicle and check the oil level again.**

HINT:

Insert your finger into the filler plug hole. You should be able to just touch the surface of the oil if the oil is at the correct level.

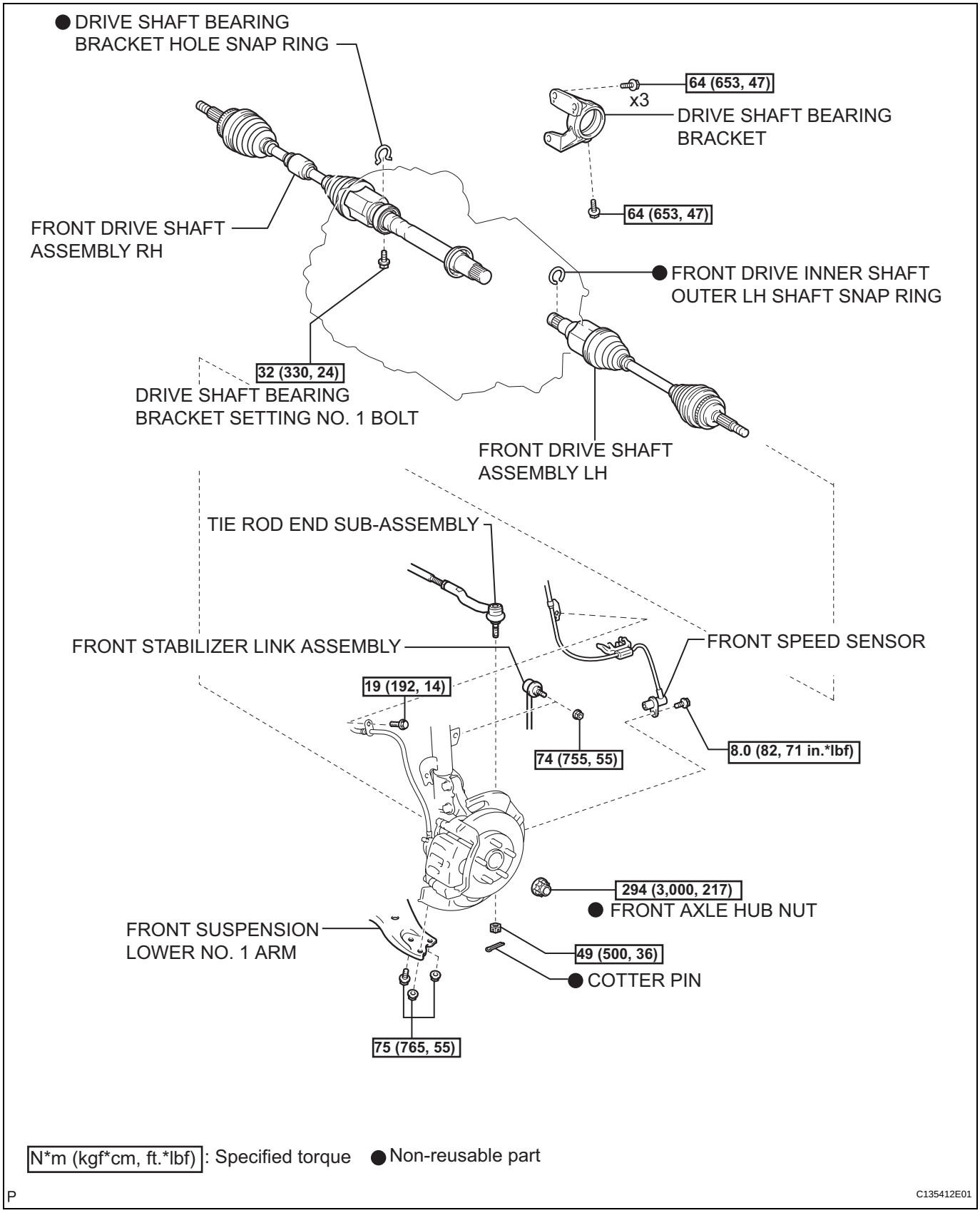
(d) Check for oil leakage if the oil level is low.

(e) Install the transmission filler plug and a new gasket.

Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

DIFFERENTIAL OIL SEAL

COMPONENTS



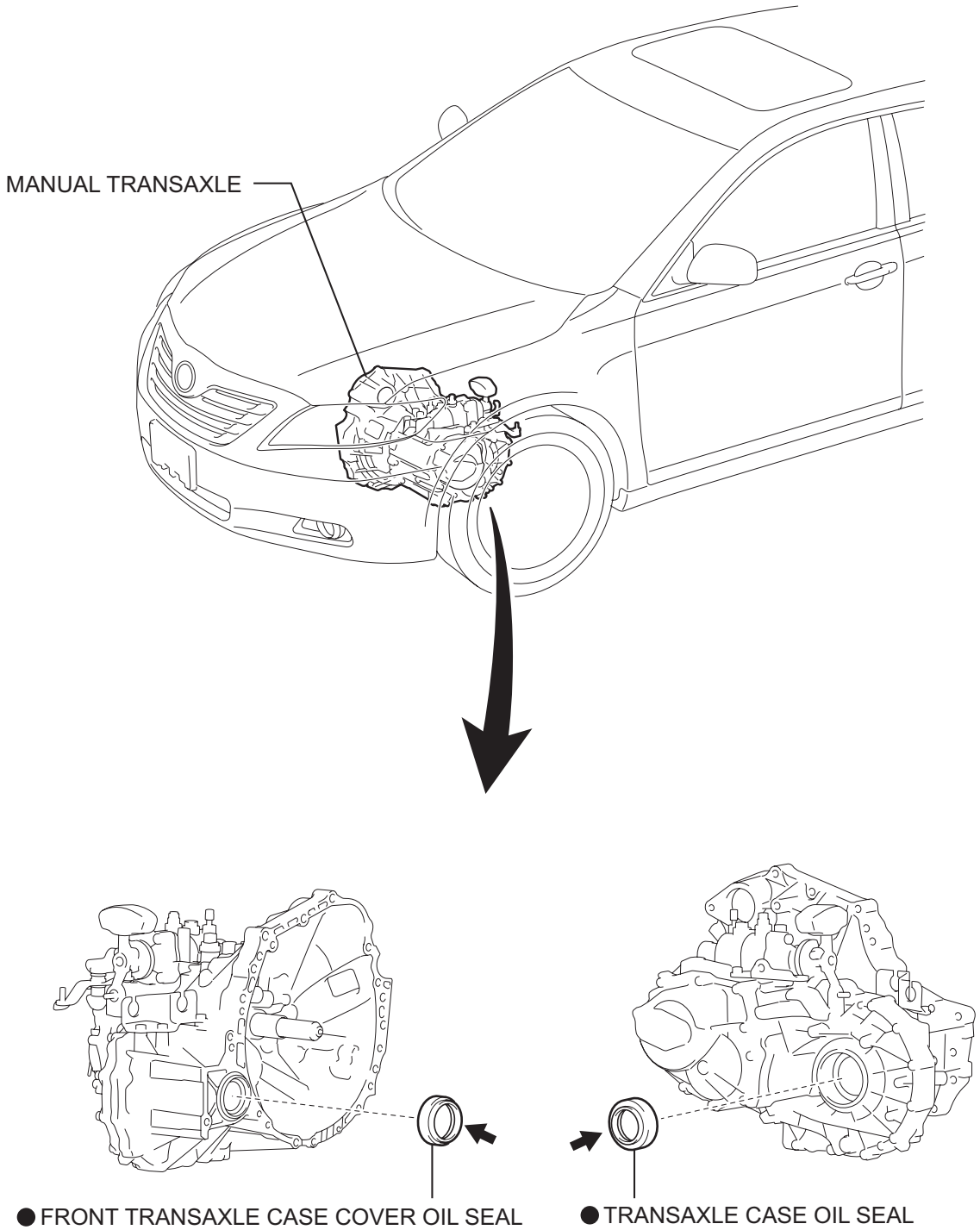
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

P

C135412E01

MX

MX



C135407E01

REMOVAL

HINT:

- Use the same procedures for the RH side (transaxle case oil seal) and LH side (transaxle case cover oil seal).
- The procedures listed below are for the LH side (transaxle case cover oil seal).

1. DRAIN MANUAL TRANSAXLE OIL

(a) Remove the filler plug and the gasket.

(b) Remove the drain plug and gasket, and drain the manual transaxle oil.

(c) Install a new gasket and the drain plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

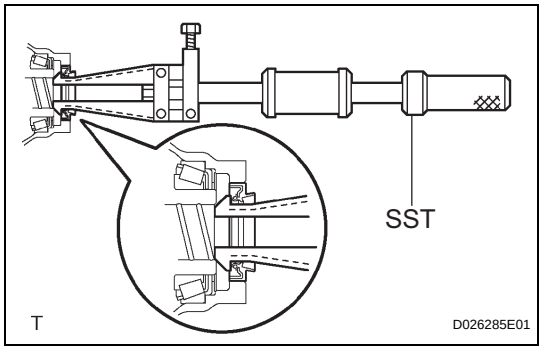
2. REMOVE FRONT WHEELS

3. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH
TMC made: (See page DS-7).
TMMK made: (See page DS-25).

4. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

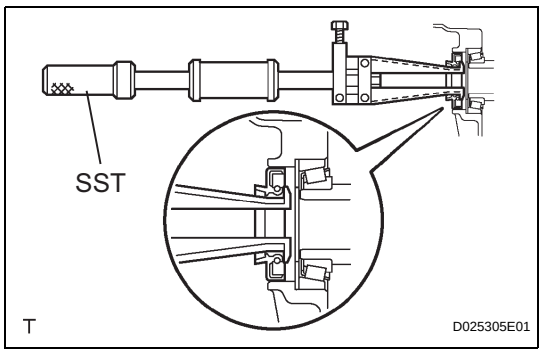
5. REMOVE FRONT TRANSAXLE CASE COVER OIL SEAL

(a) Using SST, remove the oil seal.
SST 09308-00010



6. REMOVE TRANSAXLE CASE OIL SEAL

(a) Using SST, remove the oil seal.
SST 09308-00010

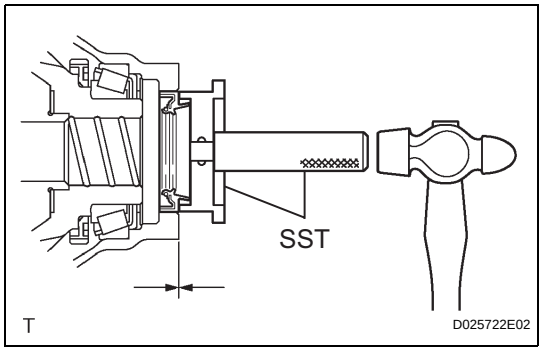


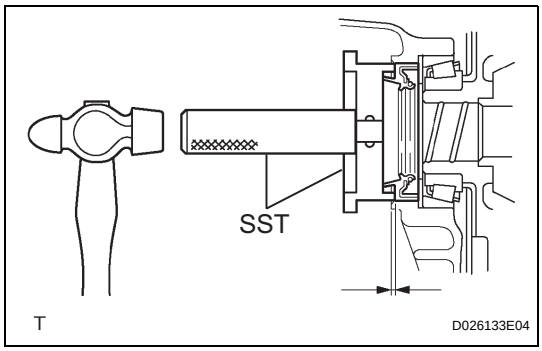
INSTALLATION

1. INSTALL FRONT TRANSAXLE CASE COVER OIL SEAL

(a) Coat a new oil seal lip with MP grease.

(b) Using SST and a hammer, install the oil seal.
SST 09608-10010, 09950-70010 (09951-07200)
Installation depth:
-0.5 to 0.5 mm (-0.020 to 0.020 in.)
NOTICE:
Be careful not to damage the oil seal lip.





2. INSTALL TRANSAXLE CASE OIL SEAL

(a) Coat a new oil seal lip with MP grease.

(b) Using SST and a hammer, install the oil seal.

SST 09608-32010, 09950-70010 (09951-07200)

Installation depth:

3.0 to 4.0 mm (0.1181 to 0.1575 in.)

NOTICE:

Be careful not to damage the oil seal lip.

3. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH

TMC made: (See page DS-20).

TMMK made: (See page DS-34).

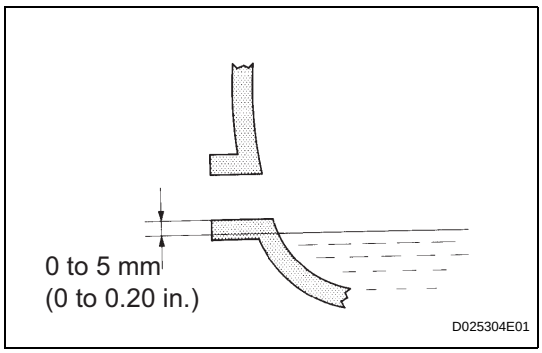
4. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

5. INSTALL FRONT WHEELS

Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



6. ADD MANUAL TRANSAXLE OIL

(a) Park the vehicle on a level place.

(b) Remove the filler plug and gasket.

(c) Check that the oil surface is within 5 mm (0.20 in.) below the lowest point of the filler plug opening.

Oil grade:

API GL-4 or GL-5

Viscosity:

SAE 75W-90

NOTICE:

- **Problems may occur if the oil level is too high or too low.**
- **After replacing the oil, drive the vehicle and check the oil level again.**

(d) Check for oil leakage if the oil level is low.

(e) Install the filler plug and a new gasket.

Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

7. INSPECT MANUAL TRANSAXLE OIL

8. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

See page SP-4.

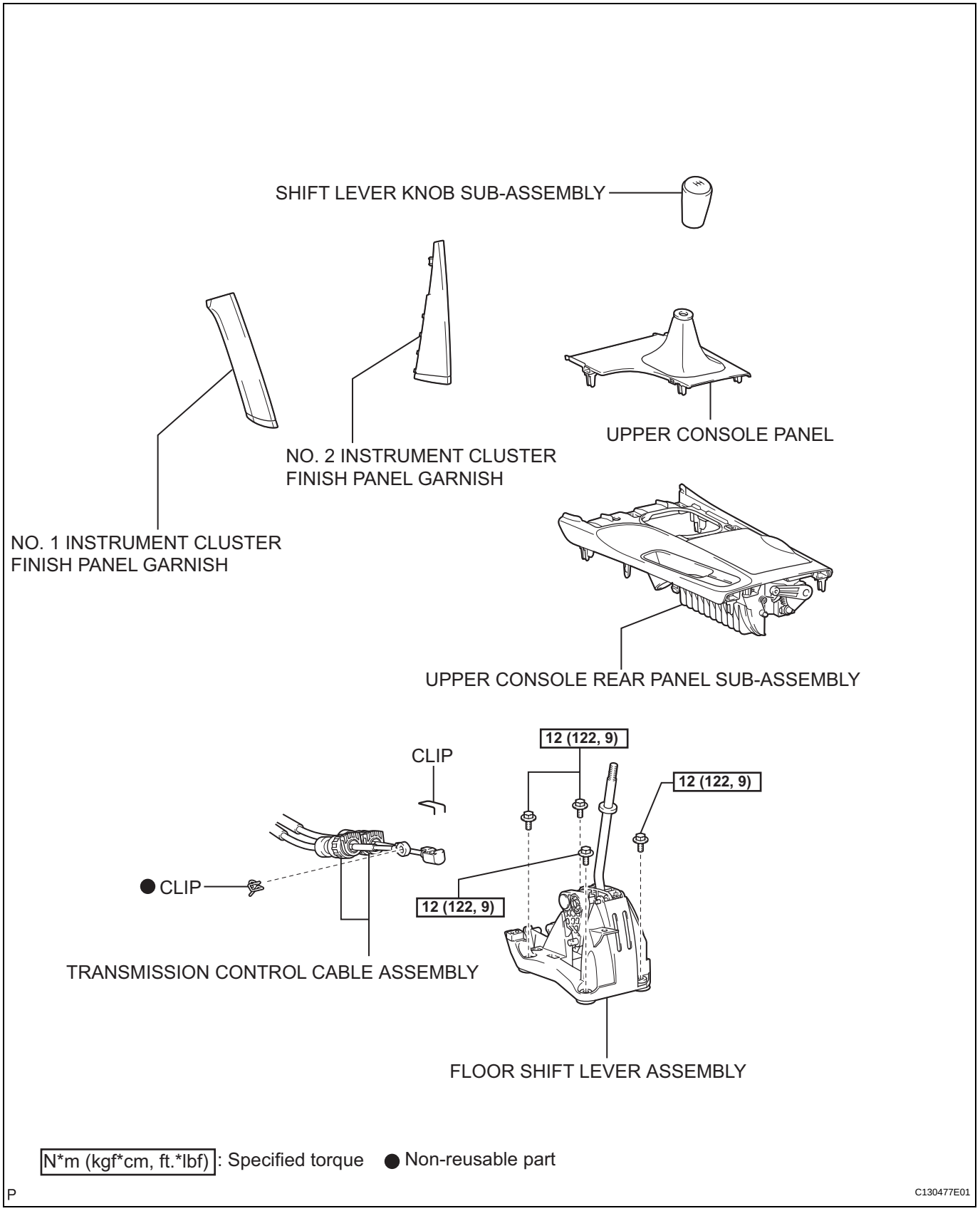
9. CHECK ABS SPEED SENSOR SIGNAL

See page BC-11.

MX

FLOOR SHIFT LEVER ASSEMBLY

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

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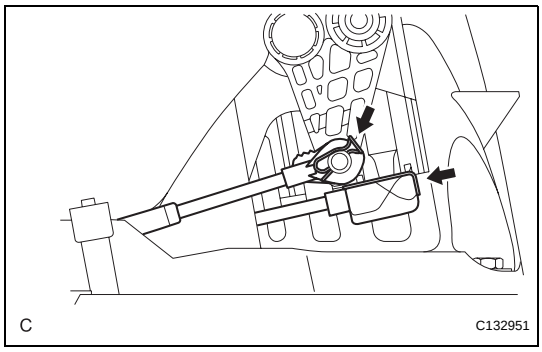
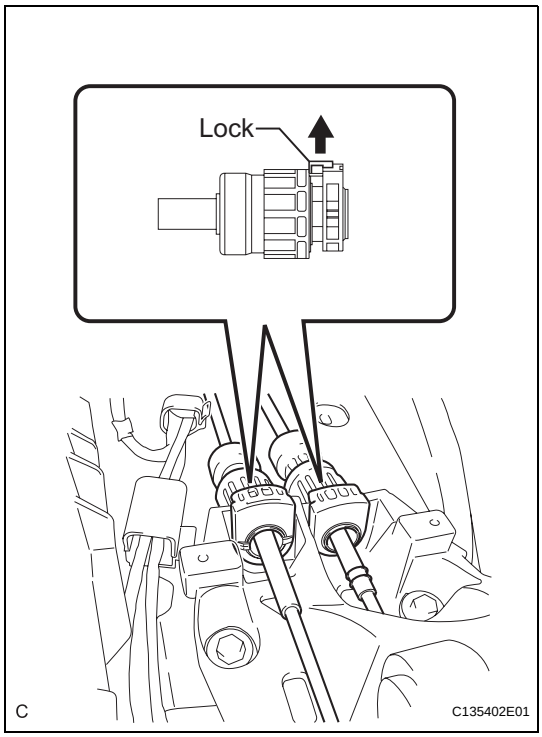
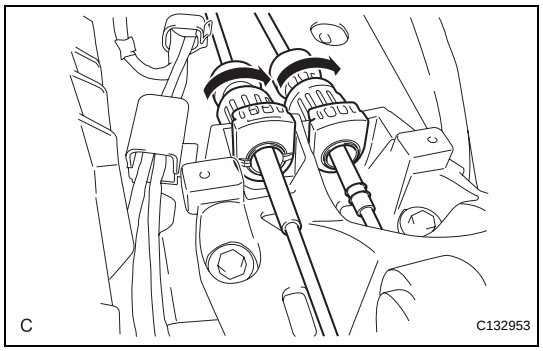
REMOVAL

1. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
2. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
3. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-24)**
4. **REMOVE UPPER CONSOLE PANEL (See page IP-25)**
5. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)**
6. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the 2 clips and disconnect the end of the transmission control cable.

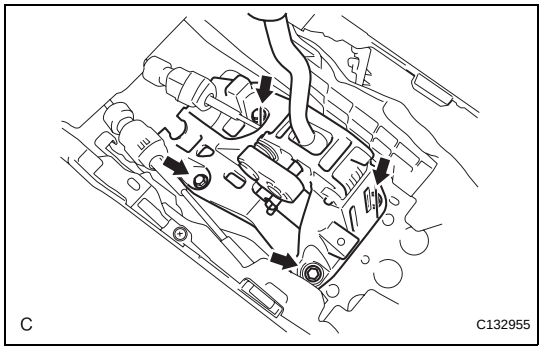


   (b) Pull out the control cable assembly locks.





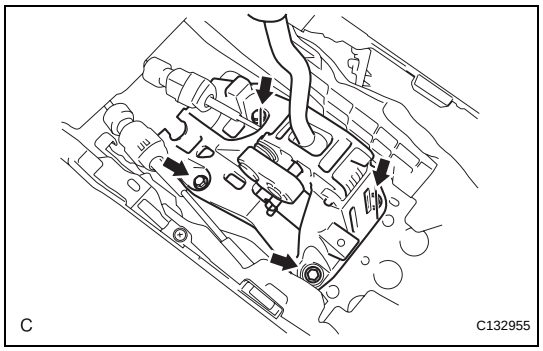
(c) Turn the adjust nut 180° clockwise. While holding the adjust nut, separate the control cable assembly.



7. REMOVE FLOOR SHIFT LEVER ASSEMBLY

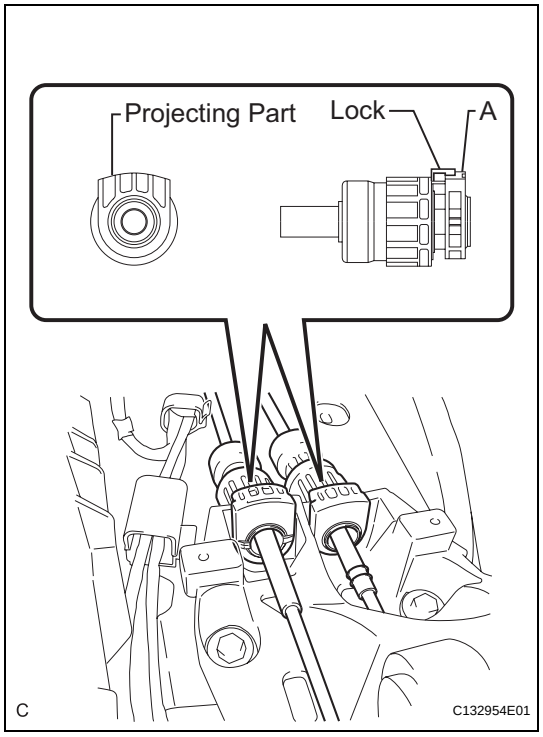
(a) Remove the 4 bolts and shift lever assembly.

INSTALLATION



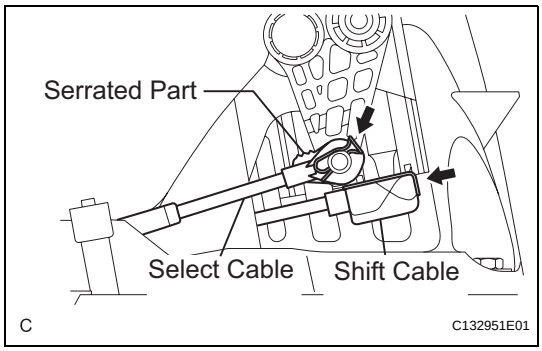
1. INSTALL FLOOR SHIFT LEVER ASSEMBLY

(a) Install the shift lever assembly with the 4 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Connect the control cable to the shift lever retainer.
NOTICE:
- **The projecting part of the cable outer should face upward when the shift cable is connected.**
- **After installation, make sure that the cable outer lock is projecting from A as shown in the illustration.**



(b) Connect the end of the shift cable to the shift lever assembly with the clip.

(c) Connect the end of the select cable to the shift lever assembly with a new clip.

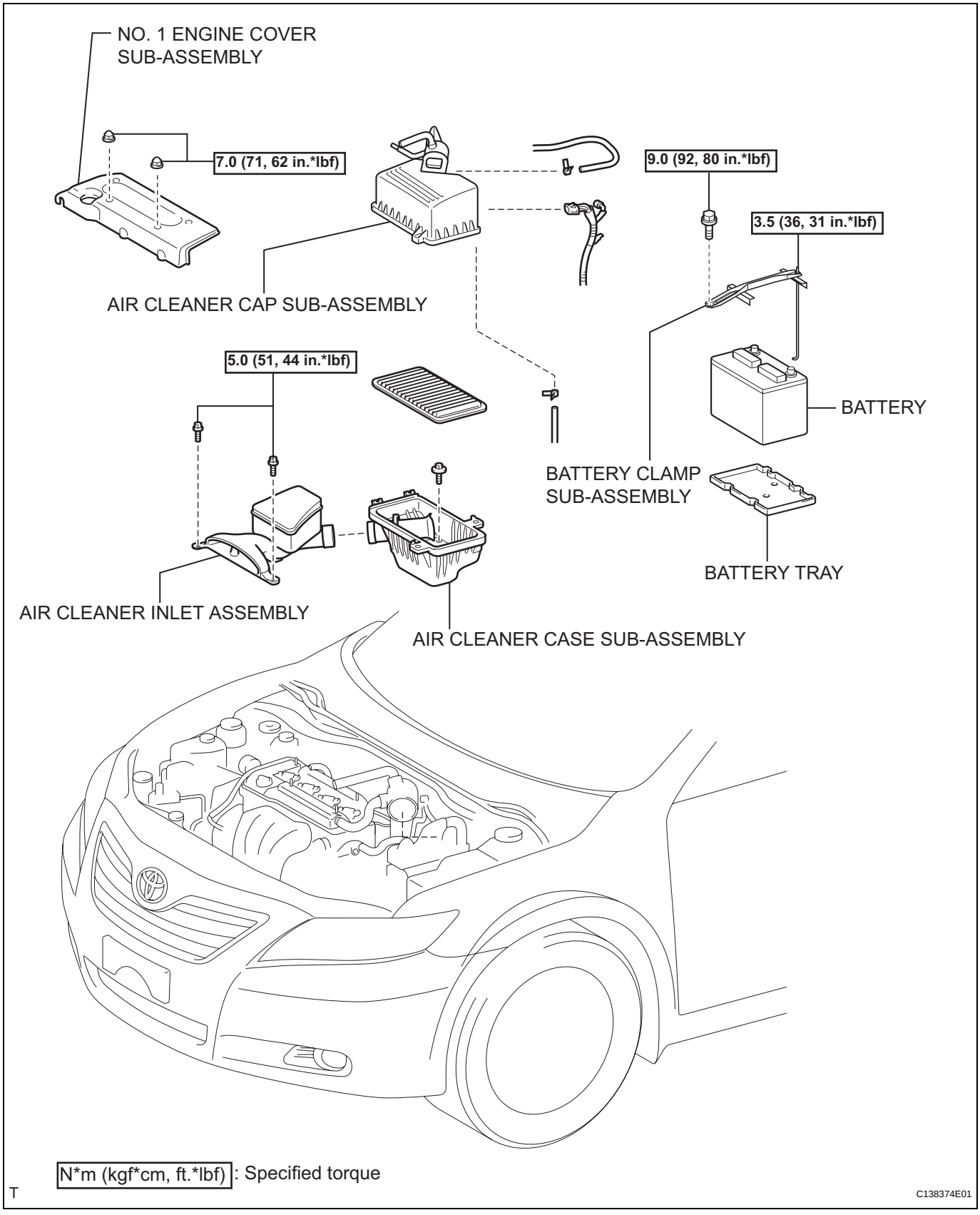
NOTICE:

- **The serrated part of the select cable point should face upward when the select cable point is connected.**
- **The clip should be installed in the direction as shown in the illustration.**

3. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
4. **INSTALL UPPER CONSOLE PANEL (See page IP-53)**
5. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
6. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
7. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-55)**

TRANSMISSION CONTROL CABLE

COMPONENTS



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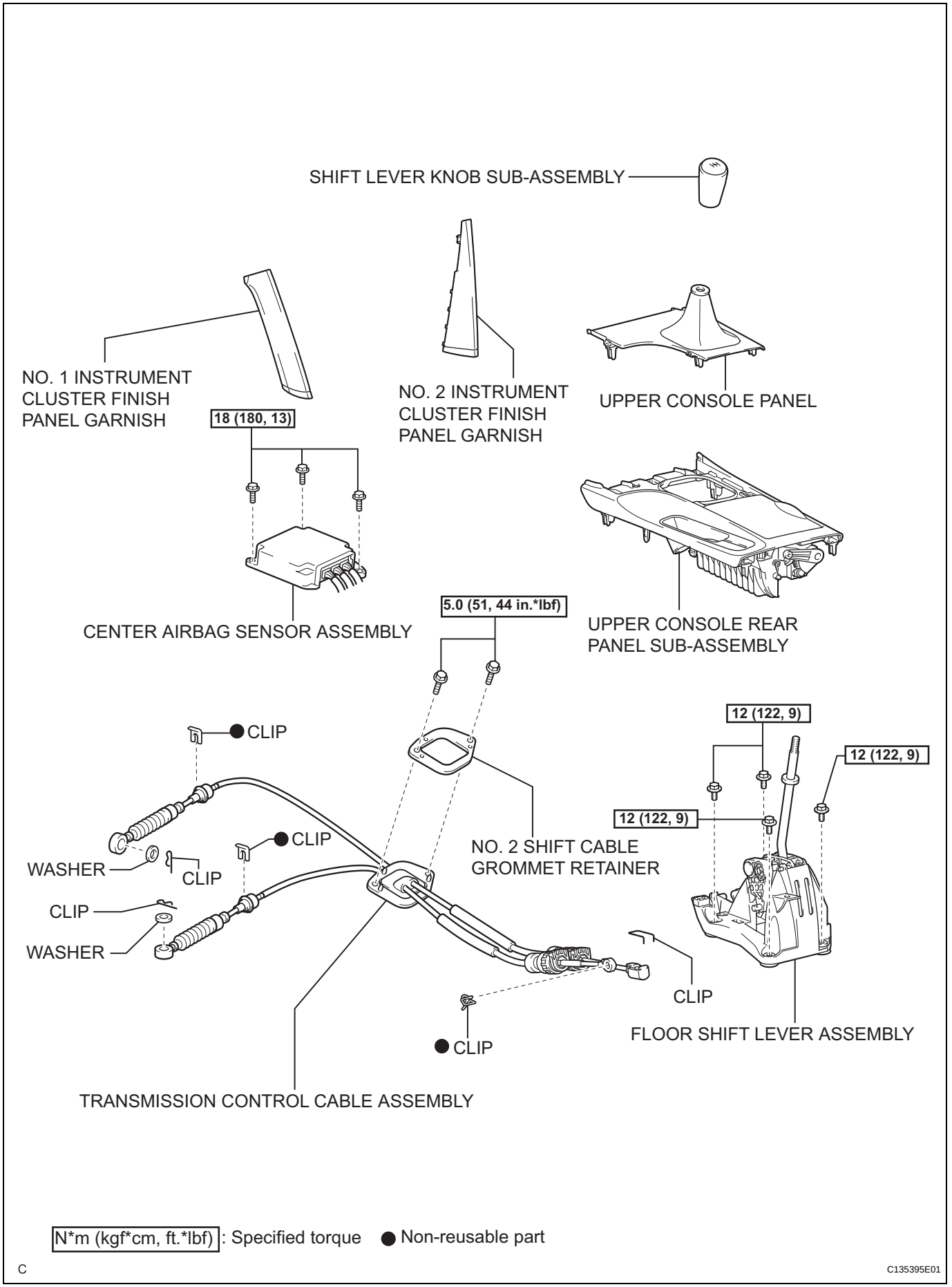

N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

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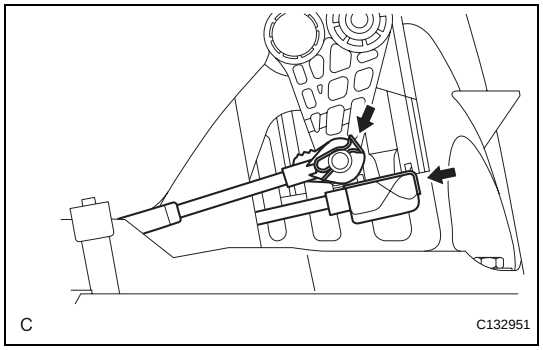
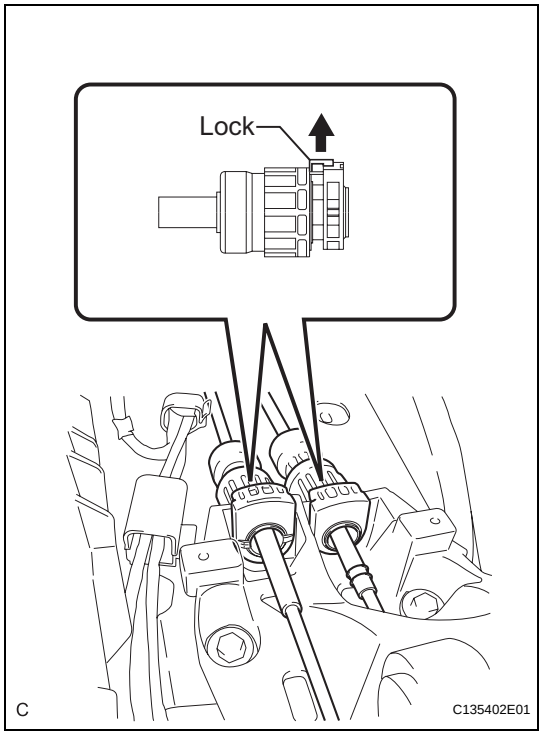
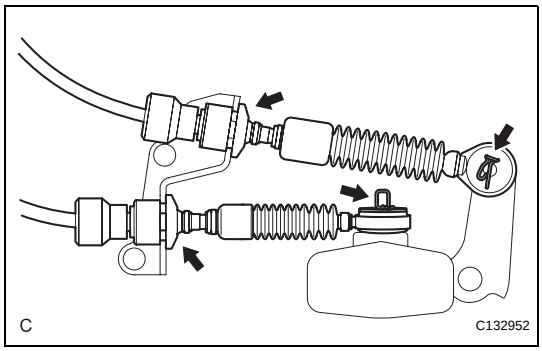
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
3. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
4. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-24)**
5. **REMOVE UPPER CONSOLE PANEL (See page IP-25)**
6. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
7. **SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the 2 clips and disconnect the end of the transmission control cable.





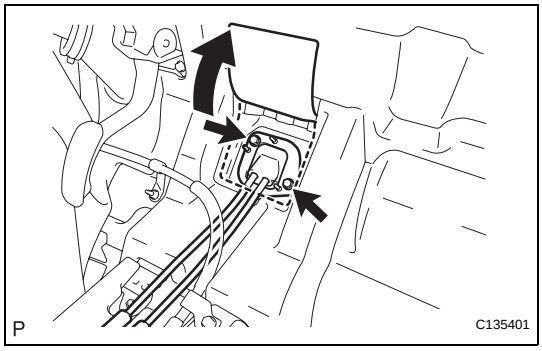
   (b) Pull out the control cable assembly locks.
   (c) Turn the adjust nut 180° clockwise. While holding the adjust nut, separate the control cable assembly.
8. **REMOVE INSTRUMENT PANEL SAFETY PAD SUB-ASSEMBLY**
   See page IP-20.
9. **REMOVE AIR CONDITIONER UNIT ASSEMBLY**
   See page AC-151.
10. **REMOVE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**
11. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
12. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
13. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
14. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
15. **REMOVE BATTERY (See page EM-95)**



16. REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Remove the 2 clips and 2 washers and disconnect the 2 cables from the transaxle.

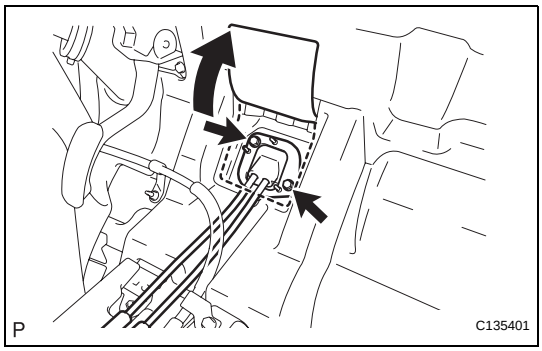
(b) Remove the 2 clips and disconnect the 2 cables from the control cable bracket.



(c) Remove the 2 bolts and control cable assembly.

(d) Remove the No. 2 shift cable grommet retainer from the control cable assembly.

INSTALLATION

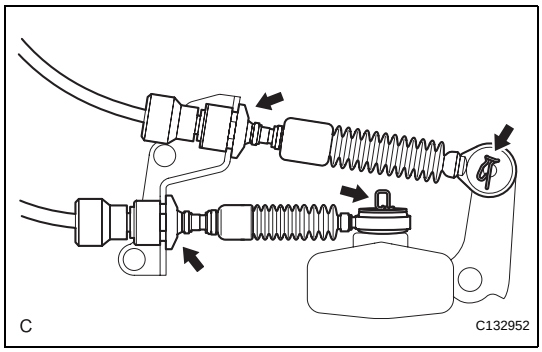


1. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Install the No. 2 shift cable grommet retainer to the transmission control cable assembly.

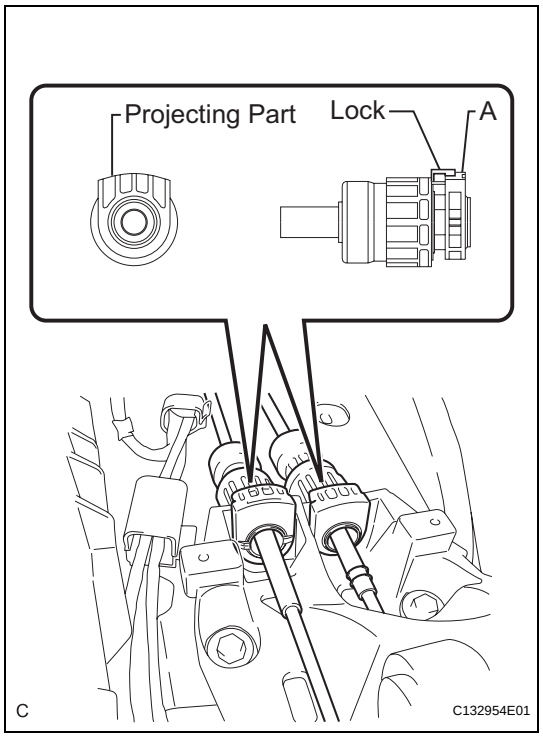
(b) Install the control cable assembly through the floor hole.

(c) Install the control cable assembly with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

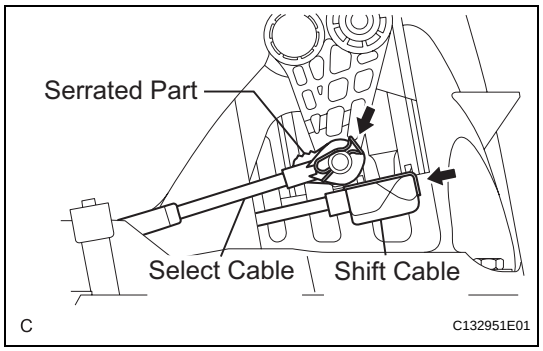


(d) Connect the ends of the 2 cables and install the 2 washers and 2 clips.

(e) Install 2 new clips to the control cable bracket.



2. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Connect the control cable to the shift lever retainer.
   NOTICE:
   - **The projecting part of the cable outer should face upward when the shift cable is connected.**
   - **After installation, make sure that the cable outer lock is projecting from A as shown in the illustration.**



   (b) Connect the end of the shift cable to the shift lever assembly with the clip.
   (c) Connect the end of the select cable to the shift lever assembly with a new clip.
   NOTICE:
   - **The serrated part of the select cable point should face upward when the select cable point is connected.**
   - **The clip should be installed in the direction as shown in the illustration.**

3. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**
4. **INSTALL AIR CONDITIONER UNIT ASSEMBLY**
   See page AC-173.
5. **INSTALL INSTRUMENT PANEL SAFETY PAD SUB-ASSEMBLY**
   See page IP-43.
6. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
7. **INSTALL UPPER CONSOLE PANEL (See page IP-54)**
8. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
9. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
10. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-55)**
11. **INSTALL BATTERY (See page EM-119)**

MX

12. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
13. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
14. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
15. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**
16. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **DRAIN ENGINE OIL (See page LU-4)**
9. **DRAIN ENGINE COOLANT (See page CO-5)**
10. **DRAIN MANUAL TRANSAXLE OIL (See page MX-5)**
11. **DRAIN BRAKE FLUID (See page BR-28)**
12. **REMOVE WINDSHIELD WIPER MOTOR ASSEMBLY**
    See page WW-9.
13. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-424)**
14. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
15. **REMOVE V-RIBBED BELT (See page EM-6)**
16. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
17. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
18. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
19. **REMOVE BATTERY (See page EM-95)**
20. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-95)**
21. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-95)**
22. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-96)**
23. **DISCONNECT NO. 1 VACUUM HOSE CONNECTOR (See page EM-96)**
24. **DISCONNECT RADIATOR HOSE INLET (See page EM-96)**
25. **DISCONNECT RADIATOR HOSE OUTLET (See page EM-96)**
26. **DISCONNECT HEATER INLET WATER HOSE (See page EM-97)**

27. **DISCONNECT HEATER OUTLET WATER HOSE (See page EM-97)**
28. **REMOVE ECM**
    See page ES-432.
29. **DISCONNECT ENGINE WIRE (See page EM-97)**
30. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page EM-98)**
31. **DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-98)**
32. **DISCONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-99)**
33. **REMOVE CLUTCH ACCUMULATOR ASSEMBLY**
    See page CL-15.
34. **REMOVE CLUTCH RELEASE CYLINDER ASSEMBLY**
    See page CL-23.
35. **DISCONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-99)**
36. **REMOVE GENERATOR ASSEMBLY (See page CH-11)**
37. **SEPARATE COMPRESSOR AND MAGNETIC CLUTCH (See page EM-99)**
38. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
    See page EX-2.
39. **REMOVE FRONT AXLE HUB NUT LH (See page DS-7)**
40. **REMOVE FRONT AXLE HUB NUT RH**
    HINT:
    Use the same procedures described for the LH side.
41. **REMOVE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)**
42. **REMOVE FRONT STABILIZER LINK ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
43. **REMOVE FRONT SPEED SENSOR LH (See page DS-7)**
44. **REMOVE FRONT SPEED SENSOR RH**
    HINT:
    Use the same procedures described for the LH side.
45. **DISCONNECT TIE ROD ASSEMBLY LH (See page DS-8)**
46. **DISCONNECT TIE ROD ASSEMBLY RH**
47. **DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)**

48. DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM RH

HINT:

Use the same procedures described for the LH side.

49. SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)

50. SEPARATE FRONT AXLE ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

51. SEPARATE STEERING SLIDING YOKE (See page PS-40)

52. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-100)

53. REMOVE VANE PUMP ASSEMBLY (See page EM-101)

54. REMOVE FRONT FRAME ASSEMBLY (See page EM-101)

55. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)

56. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)

57. REMOVE STARTER ASSEMBLY (See page ST-5)

58. DISCONNECT WIRE HARNESS

(a) Remove the bolt and separate the ground cable.

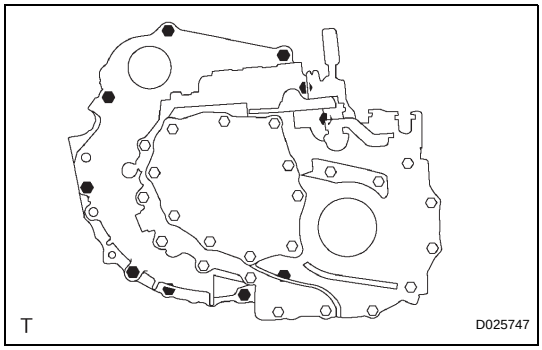
(b) Disconnect the back-up light switch connector.

(c) Disconnect the wire harness.

59. REMOVE MANUAL TRANSAXLE ASSEMBLY

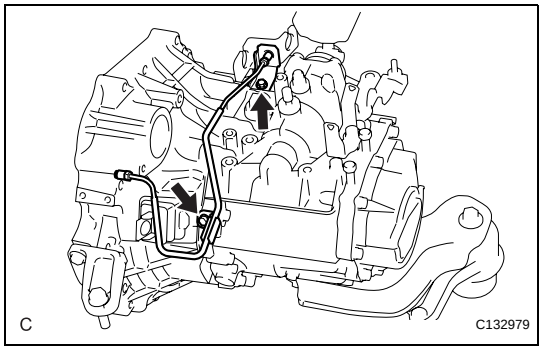
(a) Remove the 10 bolts.

(b) Separate and remove the transaxle from the engine.



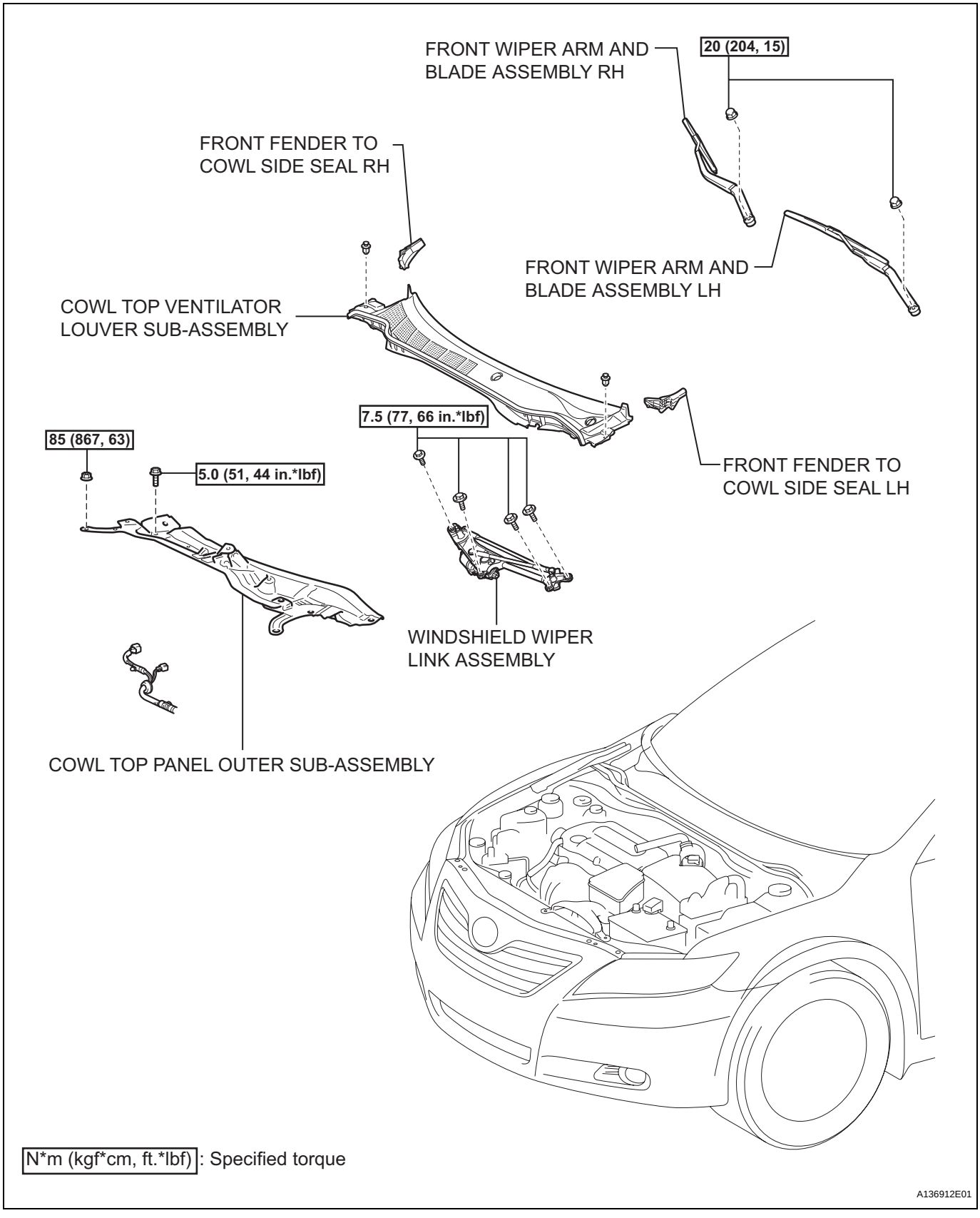
60. REMOVE CLUTCH LINE

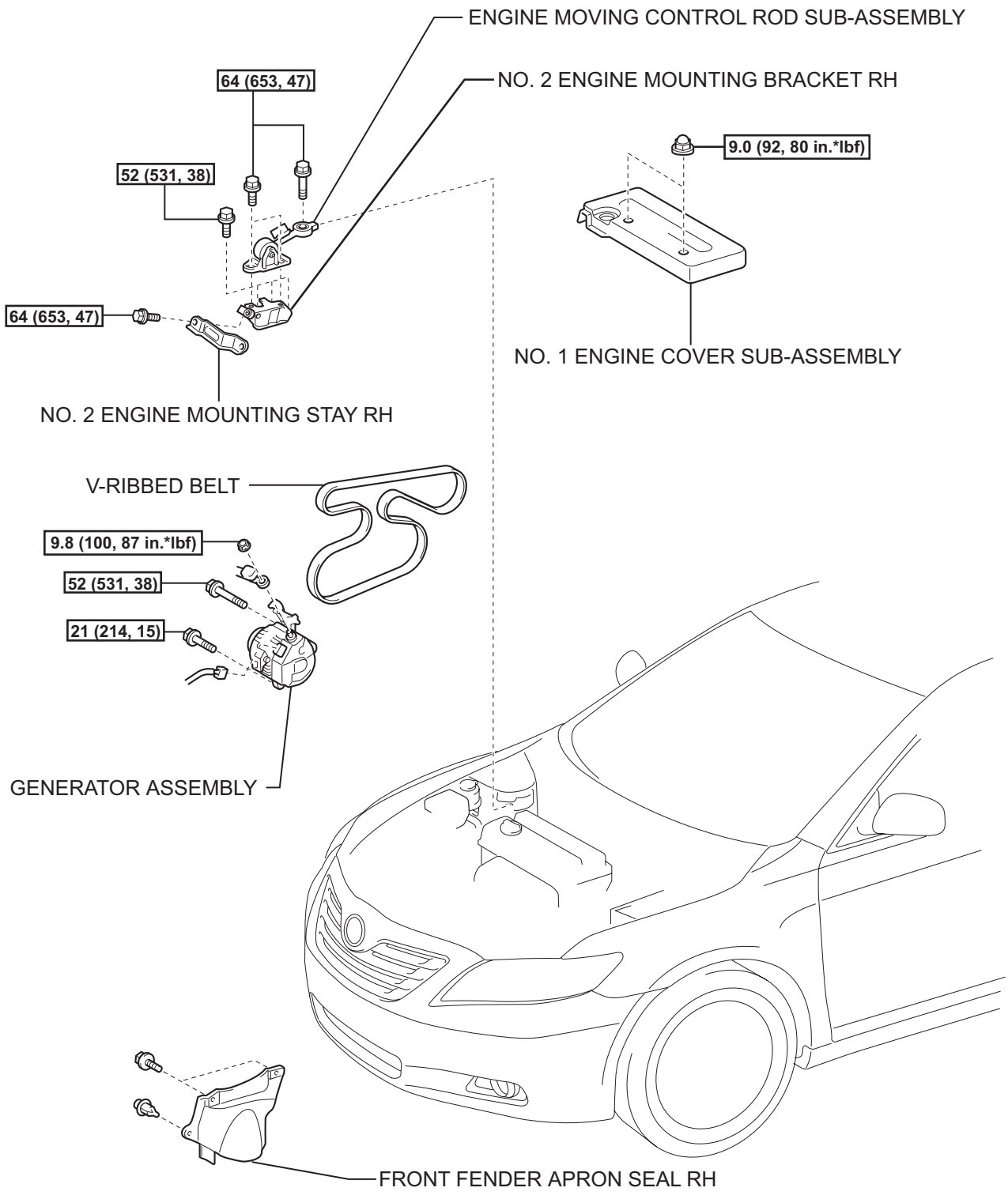
(a) Remove the 2 bolts, clutch line and bracket.



MANUAL TRANSAXLE ASSEMBLY

COMPONENTS





N*m (kgf*cm, ft.*lbf): Specified torque

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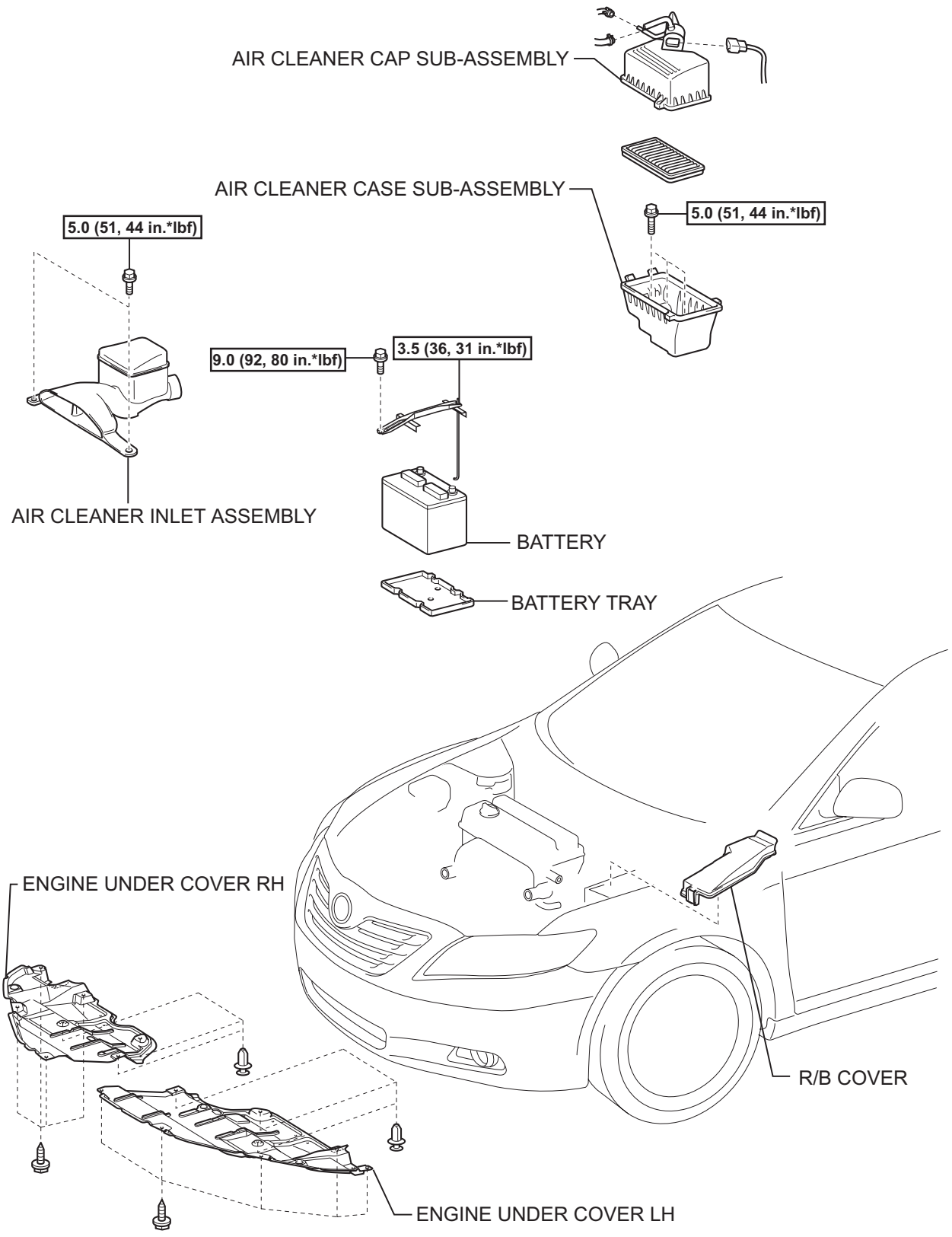

N*m (kgf*cm, ft.*lbf): Specified torque

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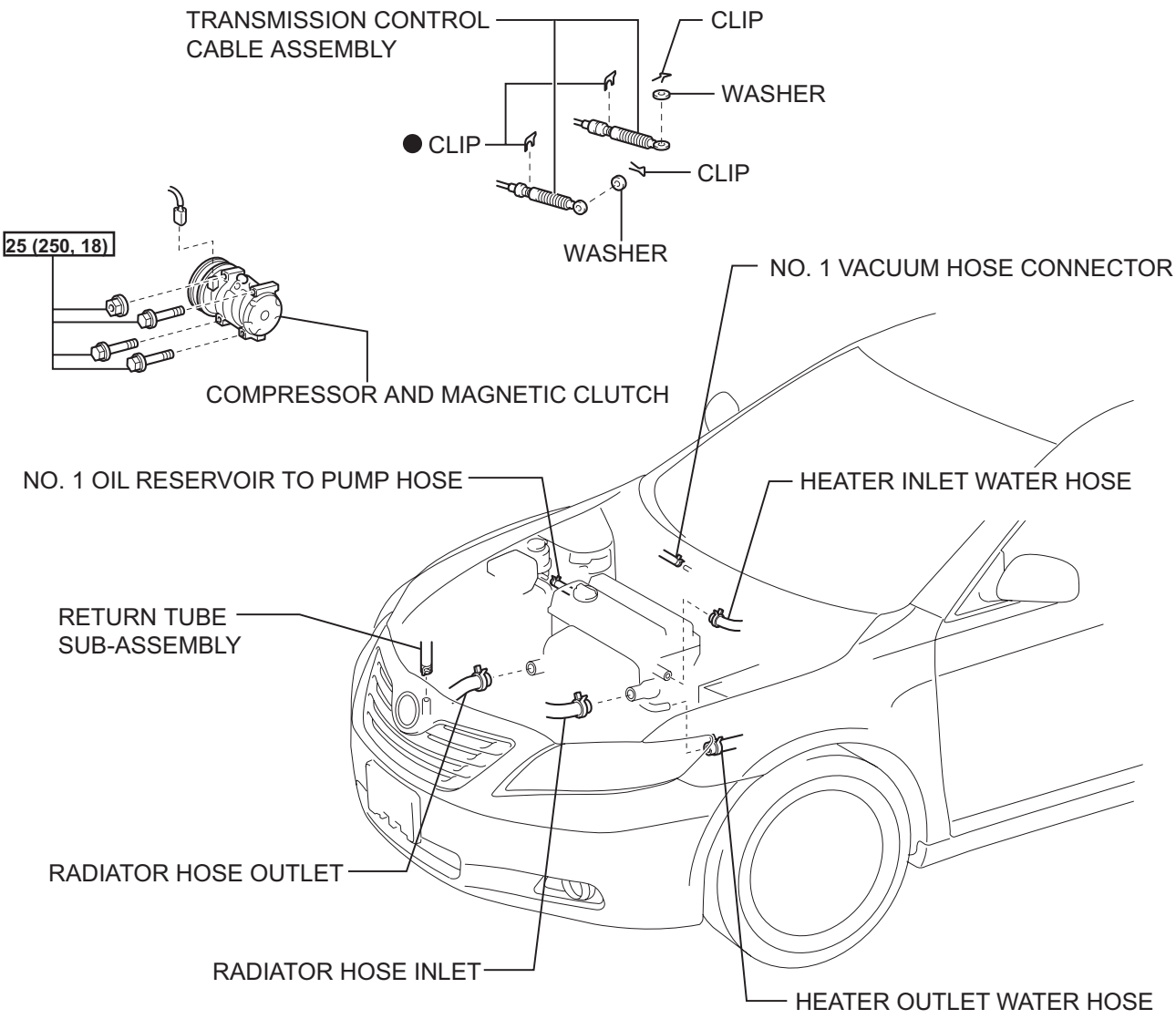
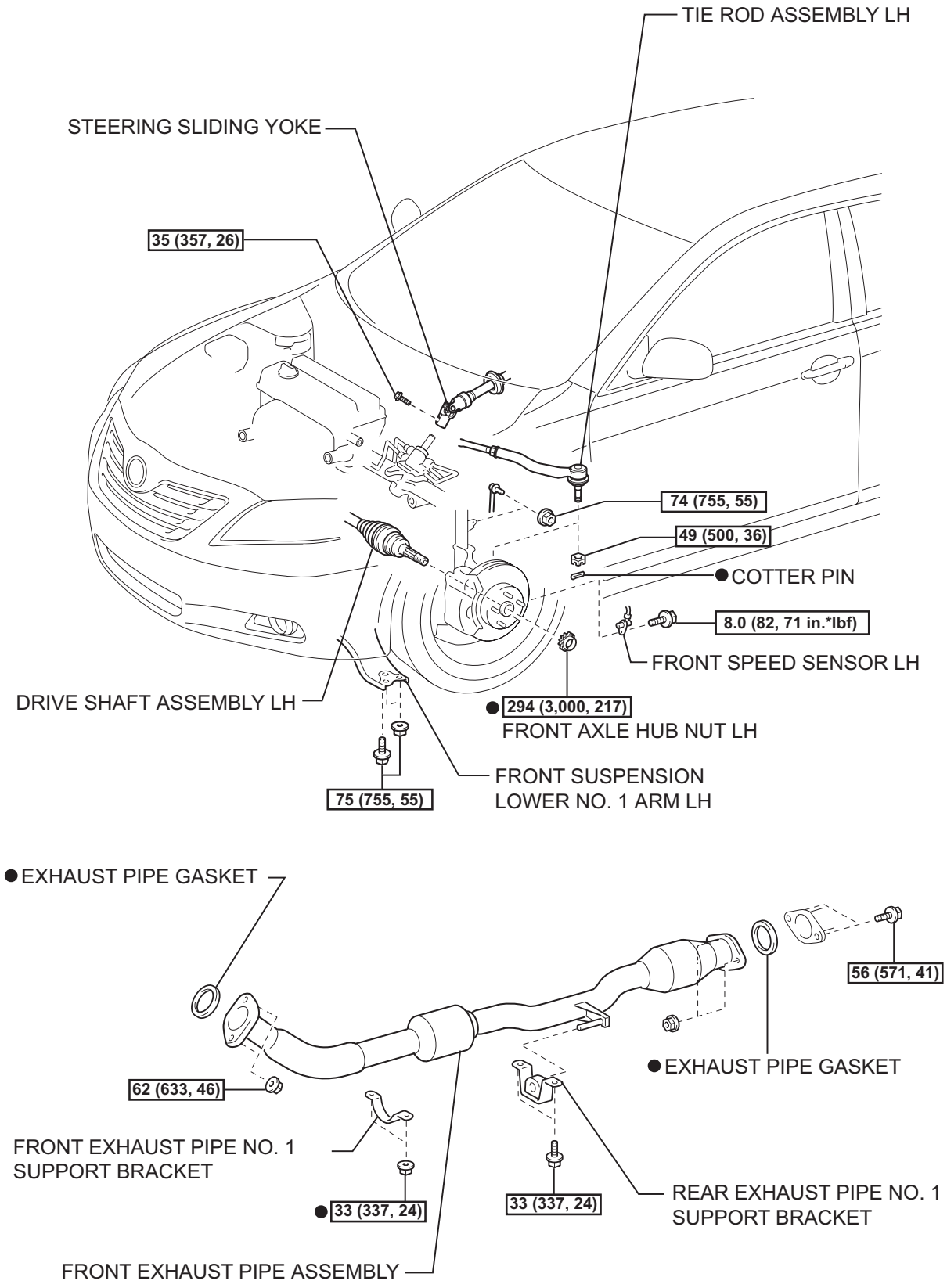
MX



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

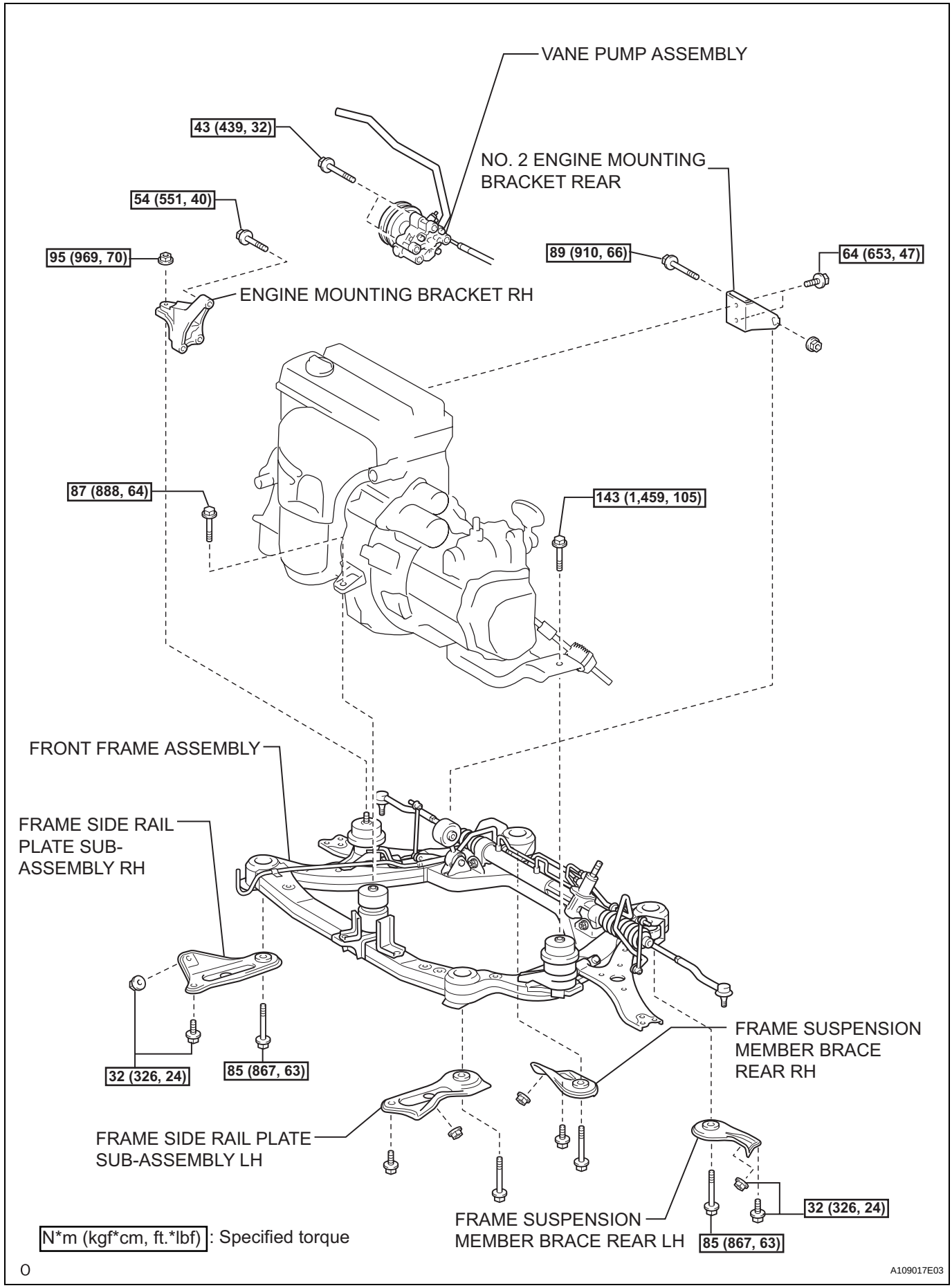
C138377E01

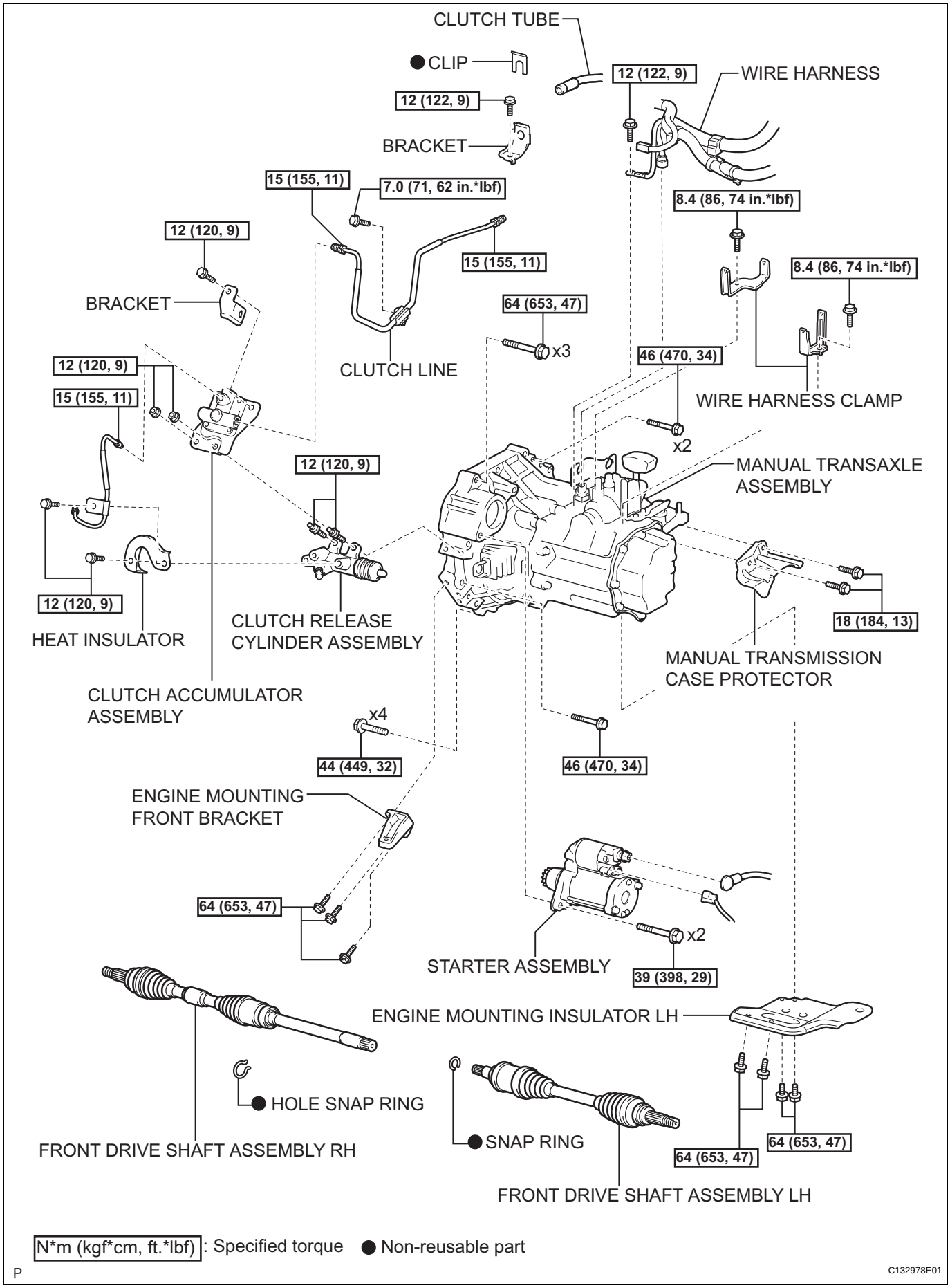


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

C143322E01

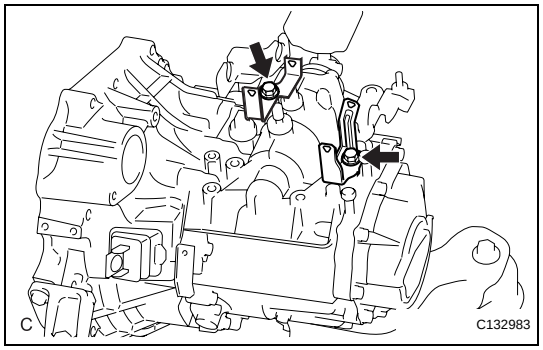

VANE PUMP ASSEMBLY
43 (439, 32)
NO. 2 ENGINE MOUNTING BRACKET REAR
54 (551, 40)
95 (969, 70)
89 (910, 66)
64 (653, 47)
ENGINE MOUNTING BRACKET RH
87 (888, 64)
143 (1,459, 105)
FRONT FRAME ASSEMBLY
FRAME SIDE RAIL PLATE SUB-ASSEMBLY RH
32 (326, 24)
85 (867, 63)
FRAME SUSPENSION MEMBER BRACE REAR RH
FRAME SIDE RAIL PLATE SUB-ASSEMBLY LH
FRAME SUSPENSION MEMBER BRACE REAR LH
32 (326, 24)
85 (867, 63)
N*m (kgf*cm, ft.*lbf): Specified torque
A109017E03



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

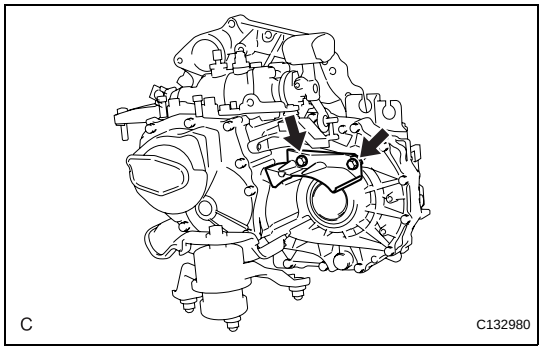
P

C132978E01



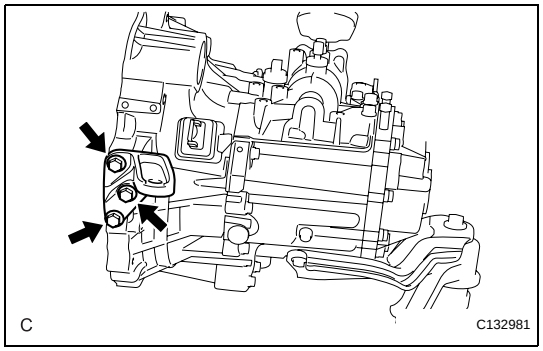
61. REMOVE WIRE HARNESS CLAMP

(a) Remove the 2 bolts and wire harness clamps.



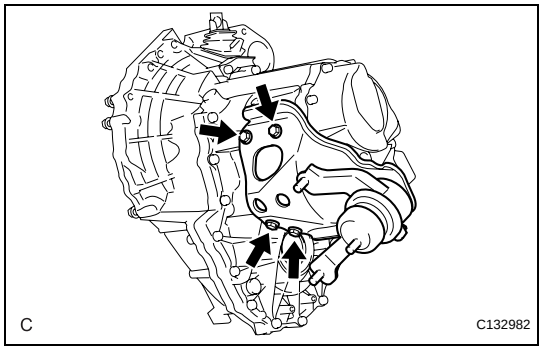
62. REMOVE MANUAL TRANSMISSION CASE PROTECTOR

(a) Remove the 2 bolts and manual transmission case protector.



63. REMOVE ENGINE MOUNTING FRONT BRACKET

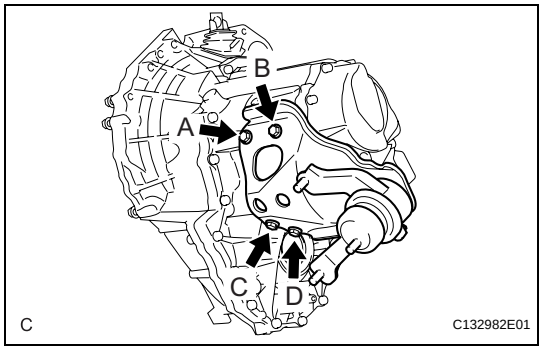
(a) Remove the 3 bolts and engine mounting front bracket.



64. REMOVE ENGINE MOUNTING INSULATOR LH

(a) Remove the 4 bolts and engine mounting insulator LH.

INSTALLATION



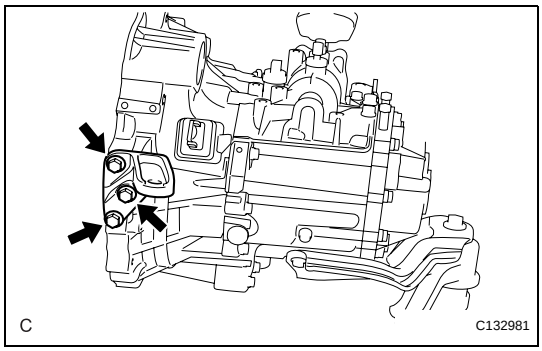
1. INSTALL ENGINE MOUNTING INSULATOR LH

(a) Install the engine mounting insulator LH with the 4 bolts.

Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

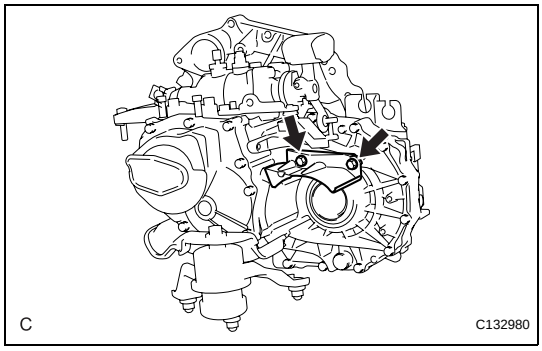
HINT:

Tighten the bolts in order: A, B, C and D.



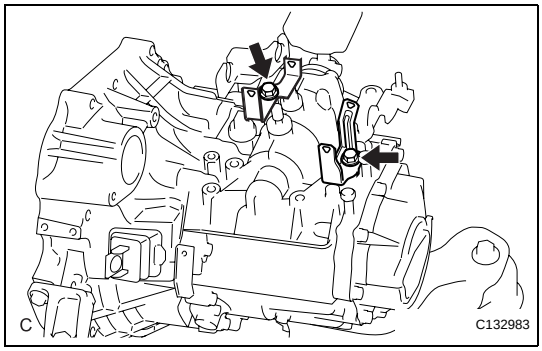
2. INSTALL ENGINE MOUNTING FRONT BRACKET

(a) Install the engine mounting front bracket with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



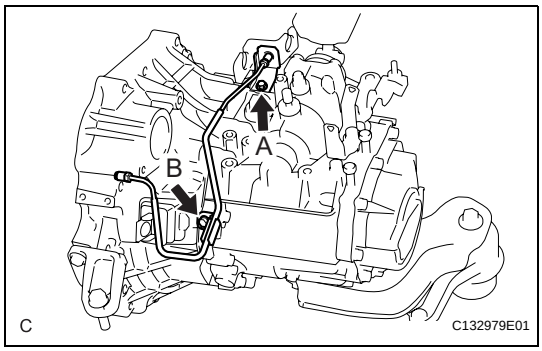
3. INSTALL MANUAL TRANSMISSION CASE PROTECTOR

(a) Install the manual transmission case protector with the 2 bolts.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



4. INSTALL WIRE HARNESS CLAMP

(a) Install the 2 wire harness clamps with the 2 bolts.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

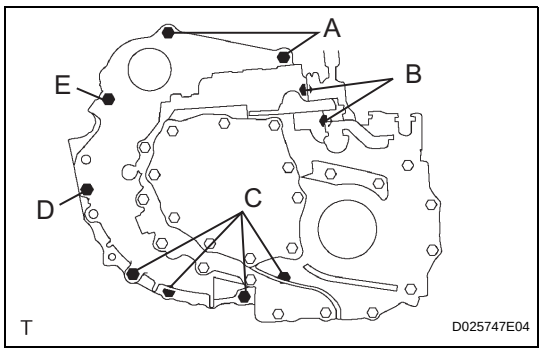


5. INSTALL CLUTCH LINE

(a) Install the clutch line and bracket with the 2 bolts.
Torque: Bolt A
12 N*m (122 kgf*cm, 9 ft.*lbf)
Bolt B
7.0 N*m (71 kgf*cm, 62 in.*lbf)

6. INSTALL MANUAL TRANSAXLE ASSEMBLY

(a) Align the input shaft with the clutch disc and install the transaxle to the engine.



(b) Install the 10 bolts.
Torque: Bolt A
64 N*m (653 kgf*cm, 47 ft.*lbf)
Bolt B
46 N*m (470 kgf*cm, 34 ft.*lbf)
Bolt C
44 N*m (449 kgf*cm, 32 ft.*lbf)
Bolt D
46 N*m (470 kgf*cm, 34 ft.*lbf)
Bolt E
64 N*m (653 kgf*cm, 47 ft.*lbf)

Bolt length:
Bolt A:
60 mm (2.3622 in.)
Bolt B:
60 mm (2.3622 in.)
Bolt C:
32 mm (1.2598 in.)
Bolt D:
65 mm (2.5591 in.)
Bolt E:
74.5 mm (2.9331 in.)

7. **CONNECT WIRE HARNESS**
   (a) Install the wire harness.
   (b) Connect the back-up light switch connector.
   (c) Install the ground cable with the bolt.
   Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)
8. **INSTALL STARTER ASSEMBLY (See page ST-13)**
9. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)**
10. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)**
11. **INSTALL FRONT FRAME ASSEMBLY (See page EM-112)**
12. **INSTALL VANE PUMP ASSEMBLY (See page EM-113)**
13. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-114)**
14. **INSTALL STEERING SLIDING YOKE (See page PS-65)**
15. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)**
16. **INSTALL FRONT AXLE ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
17. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)**
18. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH**
    HINT:
    Use the same procedures described for the LH side.
19. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**
20. **INSTALL TIE ROD ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
21. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**

22. **INSTALL FRONT SPEED SENSOR RH**
HINT:
Use the same procedures described for the LH side.

23. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**

24. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.

25. **INSTALL FRONT AXLE HUB NUT LH (See page DS-7)**

26. **INSTALL FRONT AXLE HUB NUT RH**
HINT:
Use the same procedures described for the LH side.

27. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
See page EX-3.

28. **INSTALL COMPRESSOR AND MAGNETIC CLUTCH (See page EM-115)**

29. **INSTALL GENERATOR ASSEMBLY (See page CH-19)**

30. **CONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-115)**

31. **INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY**
See page CL-25.

32. **INSTALL CLUTCH ACCUMULATOR ASSEMBLY**
See page CL-29.

33. **CONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-116)**

34. **CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-116)**

35. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (See page EM-116)**

36. **CONNECT ENGINE WIRE (See page EM-117)**

37. **INSTALL ECM**
See page ES-433.

38. **CONNECT HEATER INLET WATER HOSE (See page EM-117)**

39. **CONNECT HEATER OUTLET WATER HOSE (See page EM-118)**

40. **CONNECT OIL COOLER INLET HOSE (See page CO-30)**

41. **CONNECT OIL COOLER OUTLET HOSE (See page CO-30)**

42. **CONNECT RADIATOR HOSE INLET (See page EM-118)**

43. **CONNECT RADIATOR HOSE OUTLET (See page EM-118)**

44. **CONNECT NO. 1 VACUUM HOSE CONNECTOR (See page EM-118)**
45. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-118)**
46. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-119)**
47. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-119)**
48. **INSTALL BATTERY (See page EM-119)**
49. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
50. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
51. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
52. **INSTALL V-RIBBED BELT (See page EM-6)**
53. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-426)**
54. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY** See page WW-13.
55. **INSTALL FRONT WHEEL (See page EM-120)**
56. **ADD ENGINE OIL**
57. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**
58. **BLEED CLUTCH LINE (See page CL-25)**
59. **ADD ENGINE COOLANT (See page CO-5)**
60. **ADD MANUAL TRANSAXLE OIL (See page MX-6)**
61. **ADD POWER STEERING FLUID**
62. **BLEED POWER STEERING FLUID (See page PS-7)**
63. **CHECK FOR FUEL LEAKS (See page FU-9)**
64. **CHECK FOR ENGINE OIL LEAKS**
65. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
66. **CHECK FOR EXHAUST GAS LEAKS**
67. **ADJUST FRONT WHEEL ALIGNMENT** See page SP-4.
68. **CHECK IGNITION TIMING (See page EM-1)**
69. **CHECK ENGINE IDLE SPEED (See page EM-2)**
70. **INSPECT CO/HC (See page EM-3)**
71. **INSTALL FRONT FENDER APRON SEAL RH**
72. **INSTALL ENGINE UNDER COVER LH**

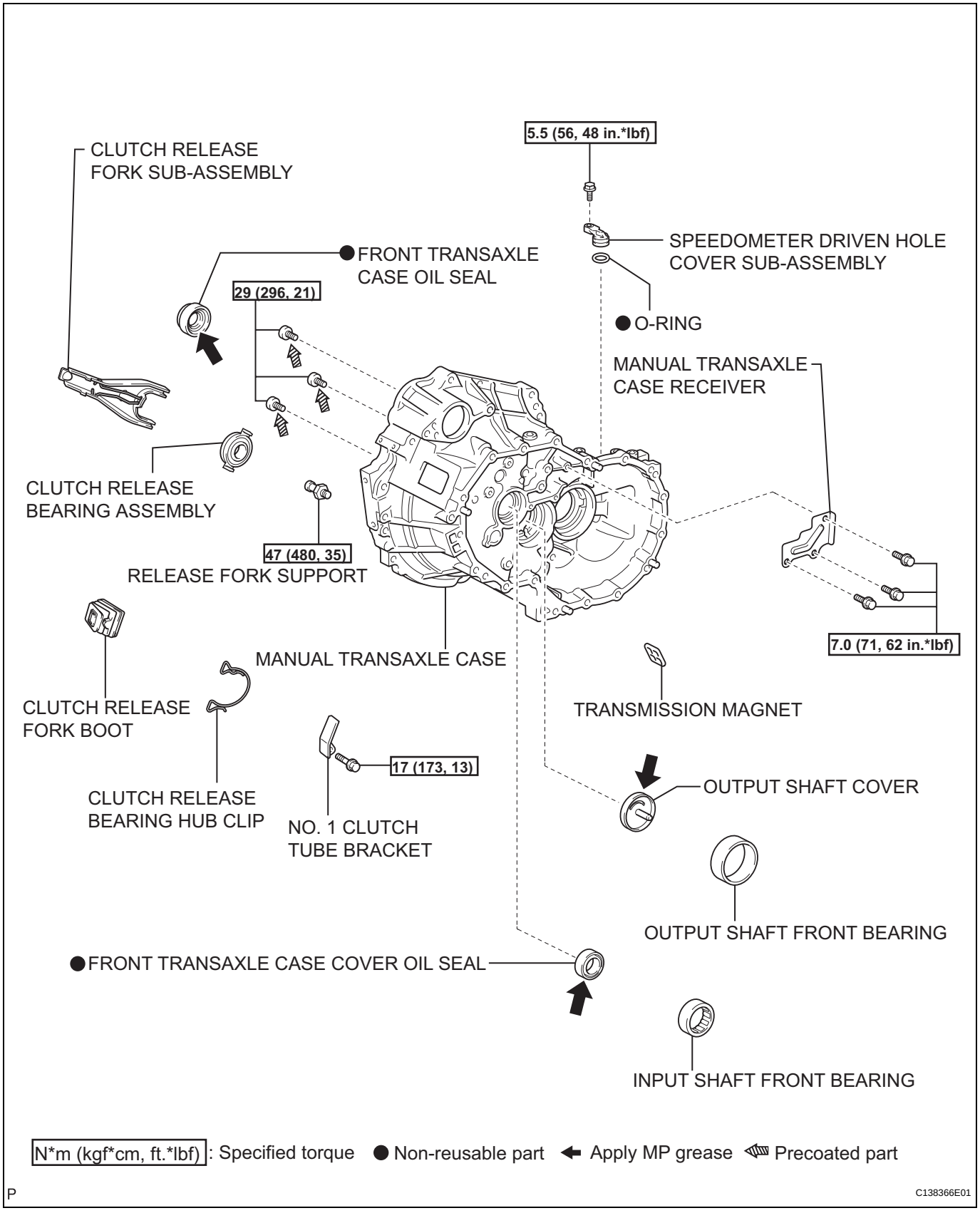
73. **INSTALL ENGINE UNDER COVER RH**

74. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY**
(See page EM-121)

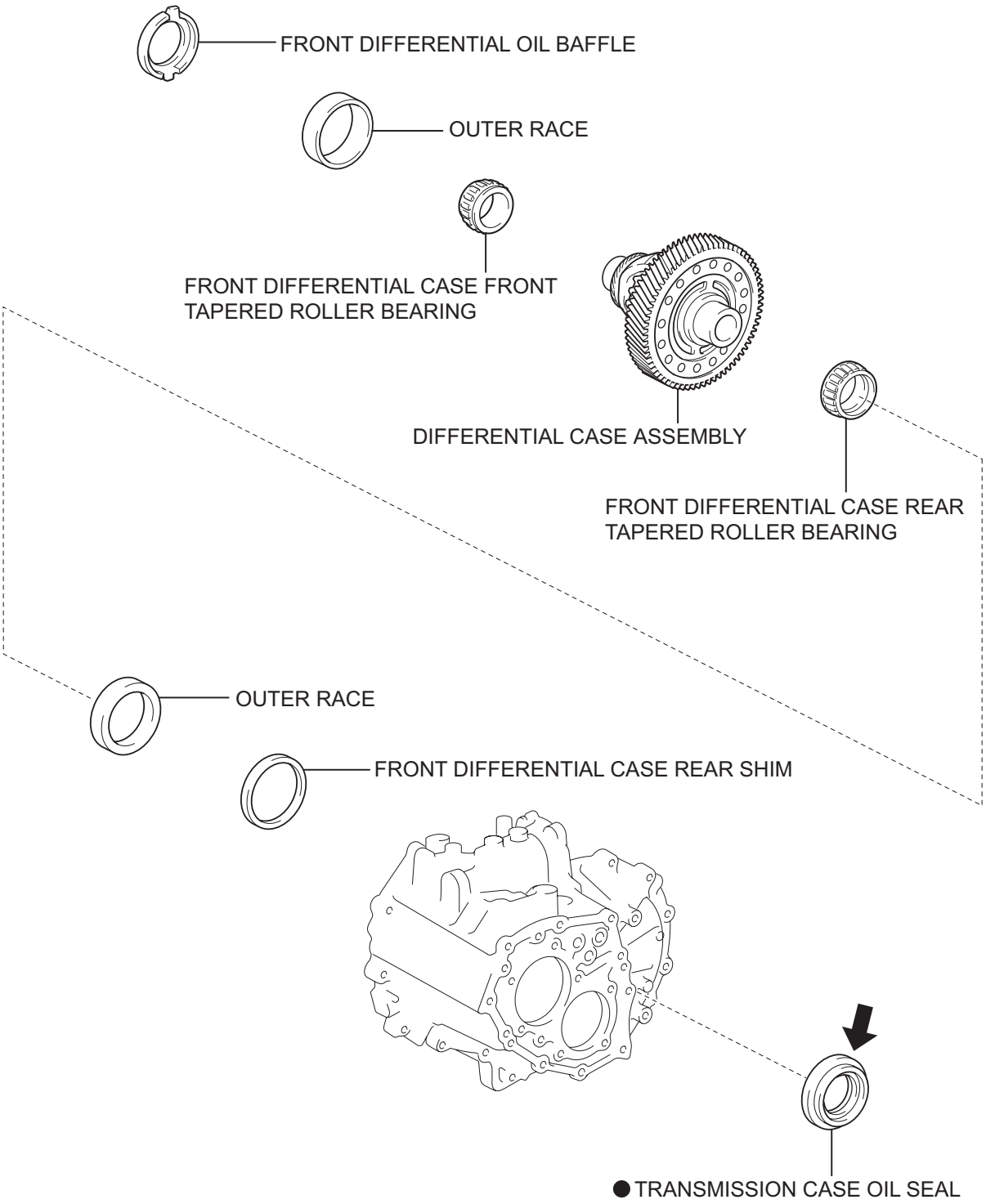
75. **CHECK ABS SPEED SENSOR SIGNAL**
See page BC-11.

MANUAL TRANSAXLE UNIT

COMPONENTS



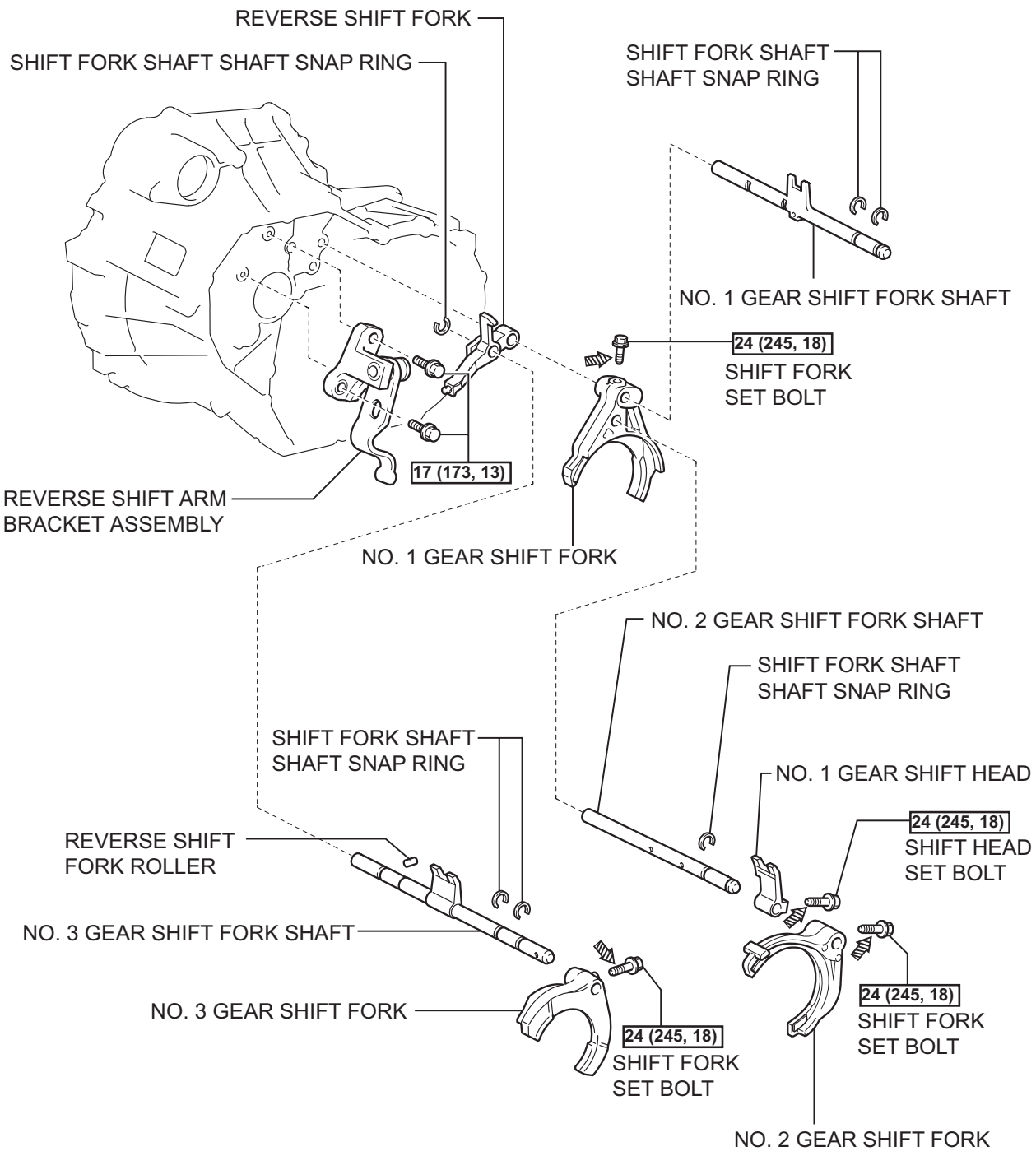
MX



● Non-reusable part ⬅ Apply MP grease

P

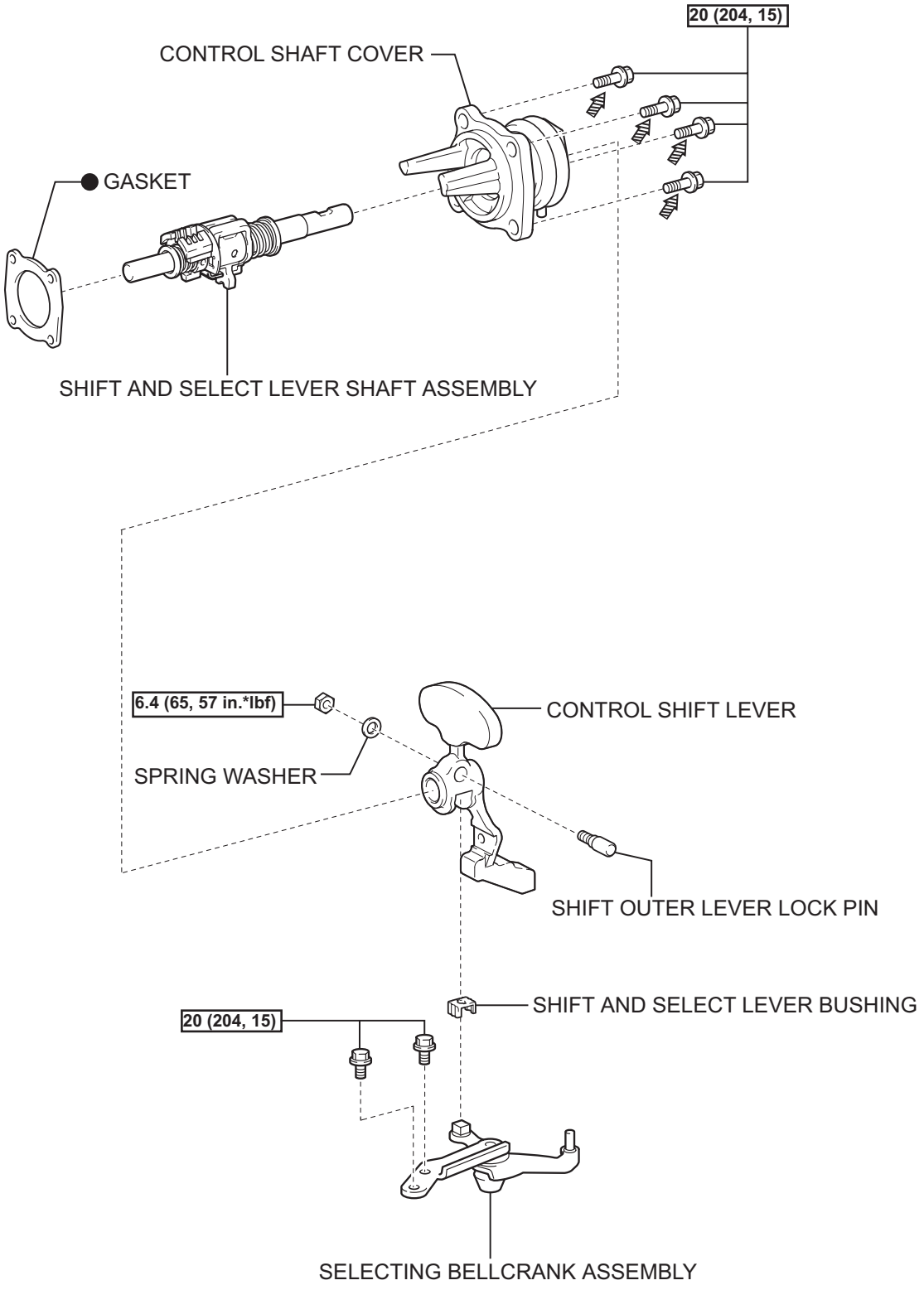
C138367E01



N*m (kgf*cm, ft.*lbf): Specified torque ⇦ Precoated part

P

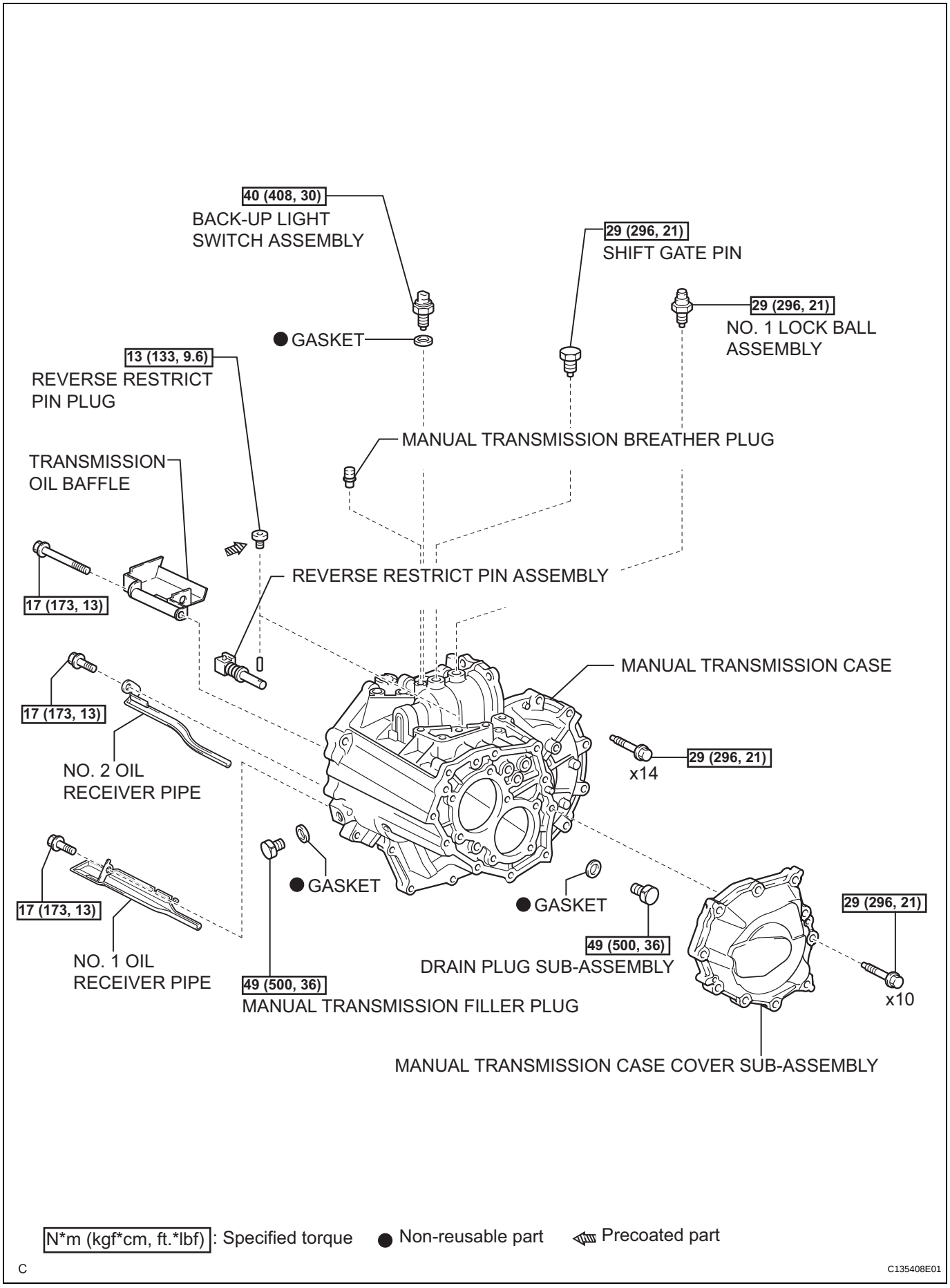
C138368E01



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part Precoated part

P

C135435E01

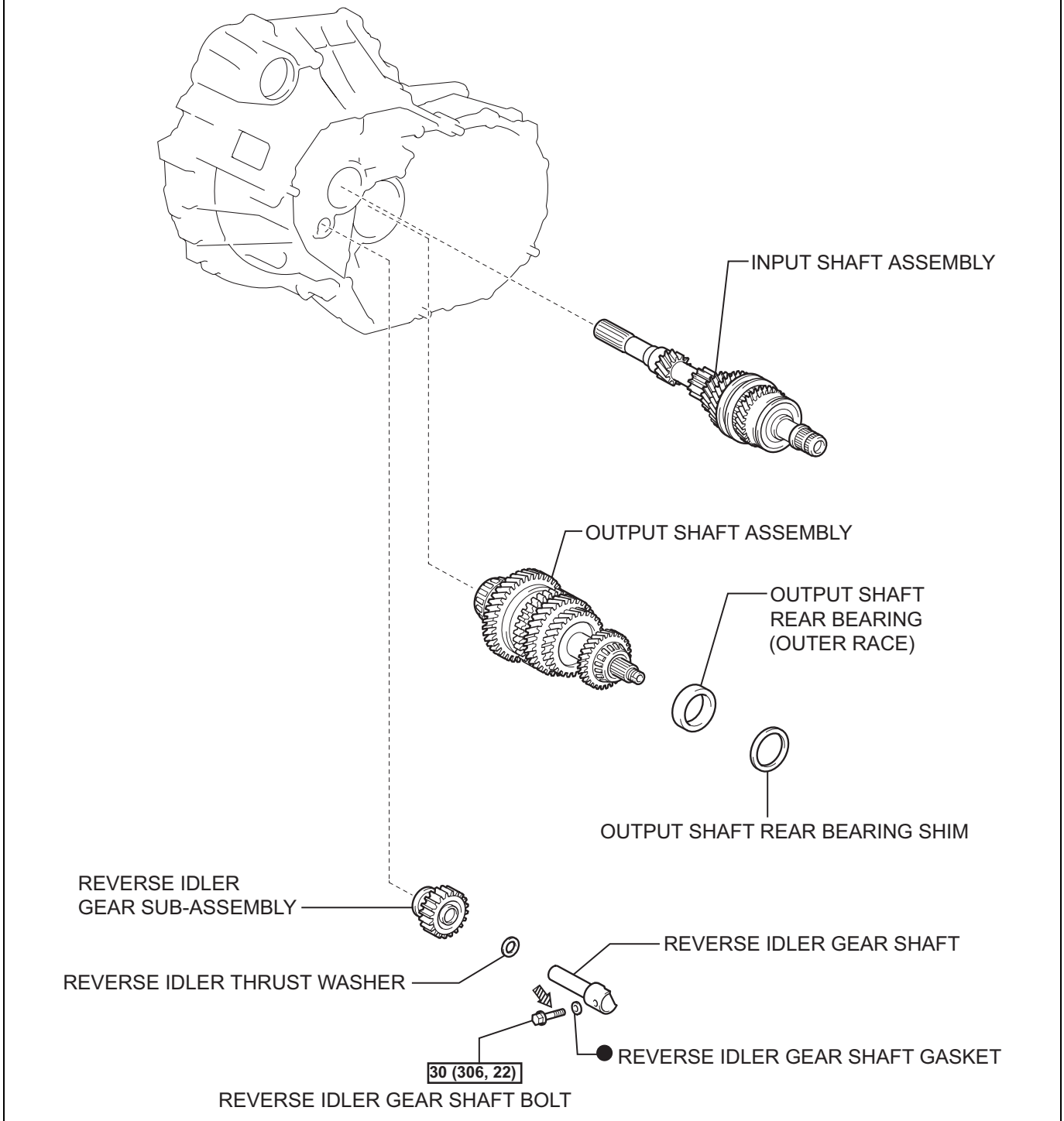


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part Precoated part

C

C135408E01

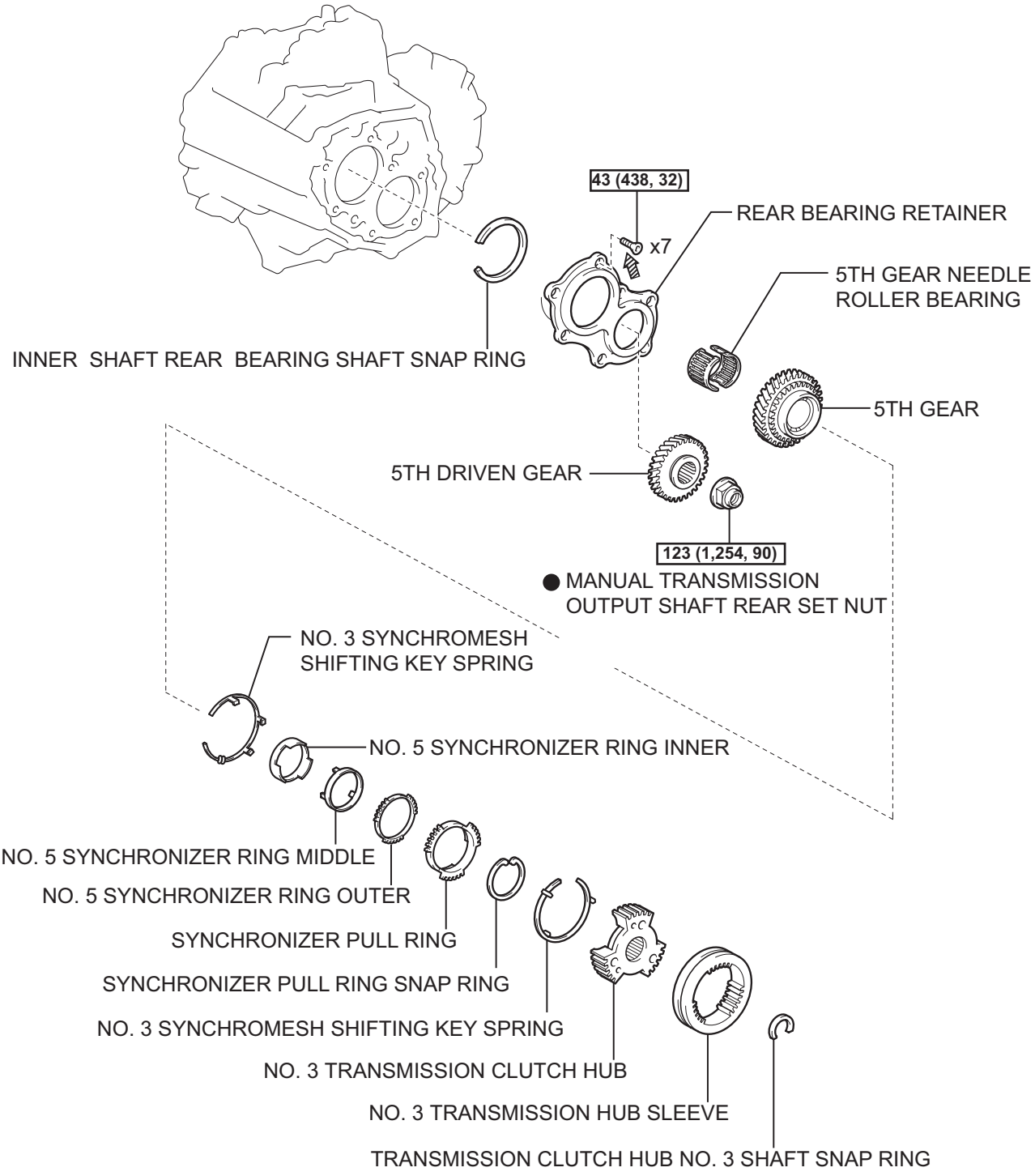
MX



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ⇦ Precoated part

P

C138369E01

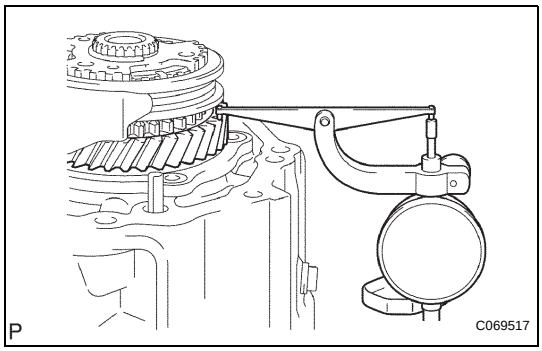


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part Precoated part

P

C138370E01

INSPECTION



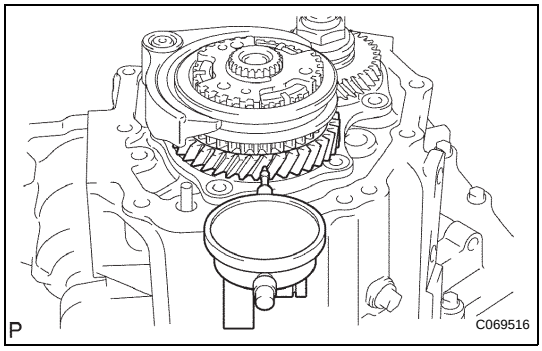
1. INSPECT 5TH GEAR THRUST CLEARANCE

(a) Using a dial indicator, inspect the 5th gear thrust clearance.

Standard clearance:

0.10 to 0.65 mm (0.0039 to 0.0256 in.)

If clearance is out of specification, replace the No. 3 transmission clutch hub, 5th gear, or input shaft rear radial ball bearing.



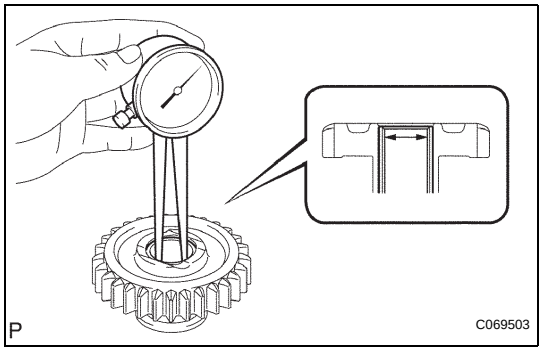
2. INSPECT 5TH GEAR RADIAL CLEARANCE

(a) Using a dial indicator, inspect the 5th gear radial clearance.

Standard clearance:

0.009 to 0.050 mm (0.0004 to 0.0020 in.)

If clearance is out of specification, replace the 5th gear, 5th gear needle roller bearing, or input shaft.



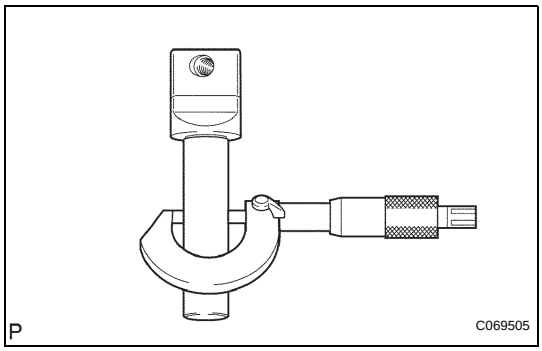
3. INSPECT REVERSE IDLER GEAR SUB-ASSEMBLY

(a) Using a caliper gauge, measure the inside diameter of the reverse idler gear.

Inside diameter: mm (in.)

Standard inside diameter	Maximum inside diameter
20.056 to 20.074 (0.7896 to 0.7903)	20.074 (0.7903)

If the inside diameter exceeds the maximum, replace the reverse idler gear.

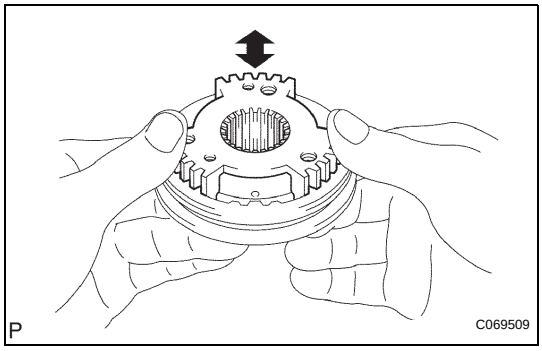


(b) Using a micrometer, measure the outside diameter of the reverse idler gear shaft.

Outside diameter: mm (in.)

Standard outside diameter	Minimum outside diameter
19.984 to 20.000 (0.7868 to 0.7874)	19.984 (0.7868)

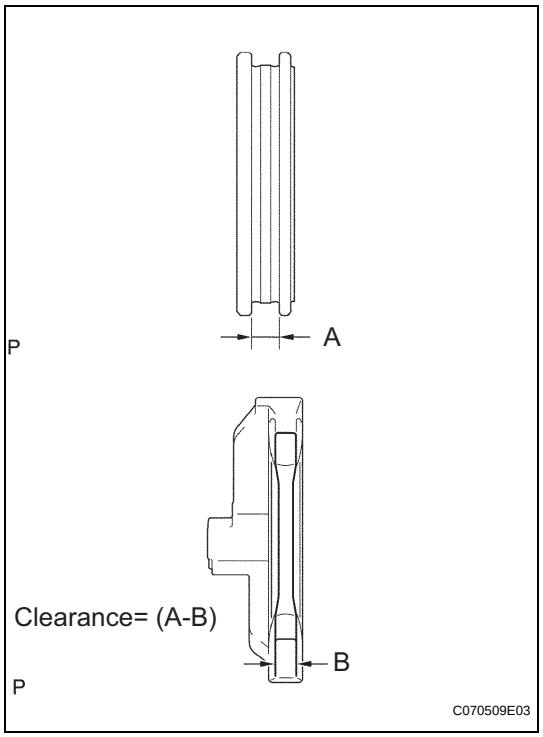
If the outside diameter is less than the minimum, replace the reverse idler gear shaft.



4. INSPECT NO. 3 TRANSMISSION CLUTCH HUB

(a) Inspect the sliding condition between the No. 3 transmission clutch hub and the No. 3 transmission hub sleeve.

(b) Inspect the tip of the spline gear on the No. 3 transmission hub sleeve for wear.



5. INSPECT NO. 3 TRANSMISSION HUB SLEEVE

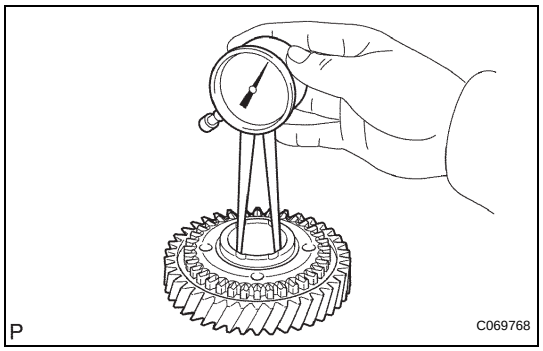
(a) Using vernier calipers, measure the width of the No. 3 transmission hub sleeve groove and the thickness of the claw part on the No. 3 gear shift fork, and calculate the clearance.

Standard clearance:

0.15 to 0.35 mm (0.0059 to 0.0138 in.) {A - B}

If clearance is out of specification, replace the No. 3 transmission hub sleeve and No. 3 gear shift fork with new ones.

MX



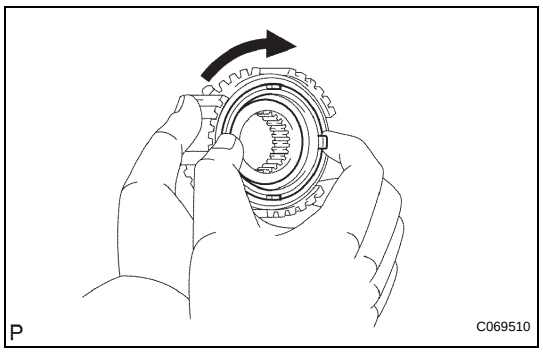
6. INSPECT 5TH GEAR

(a) Using a caliper gauge, measure the inside diameter of the 5th gear.

Inside diameter mm (in.)

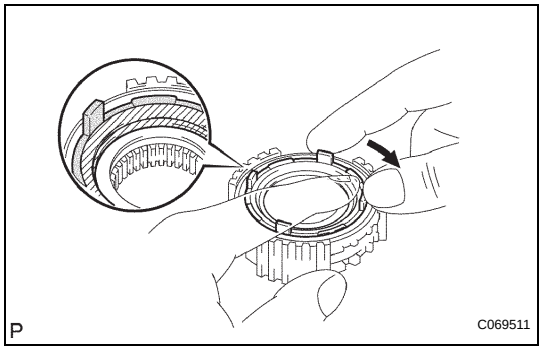
Standard inside diameter	Maximum inside diameter
34.981 to 34.997 (1.3772 to 1.3778)	34.997 (1.3778)

If the inside diameter exceeds the maximum, replace the 5th gear.



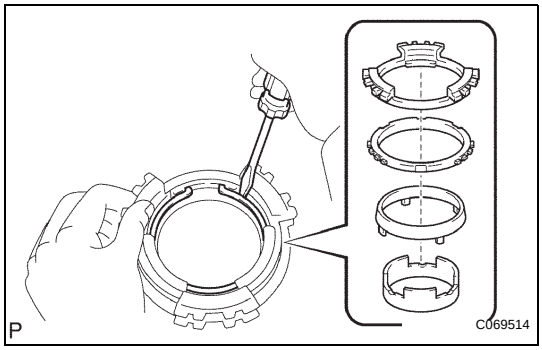
7. INSPECT NO. 5 SYNCHRONIZER RING MIDDLE

(a) Check that the No. 5 synchronizer ring middle rotates smoothly.



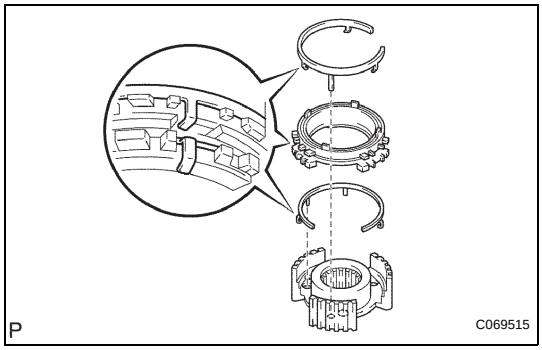
(b) Check that the No. 5 synchronizer ring middle does not rotate while being pushed against the No. 3 clutch hub.

REASSEMBLY



1. INSTALL SYNCHRONIZER PULL RING

(a) Install the No. 5 synchronizer middle ring, No. 5 synchronizer ring outer, and synchronizer pull ring to the No. 5 synchronizer ring inner. Using a screwdriver, fix them with the snap ring.



2. INSTALL NO. 3 SYNCHROMESH SHIFTING KEY SPRING

(a) Install the No. 3 synchromesh shifting key spring to the No. 3 transmission clutch hub.

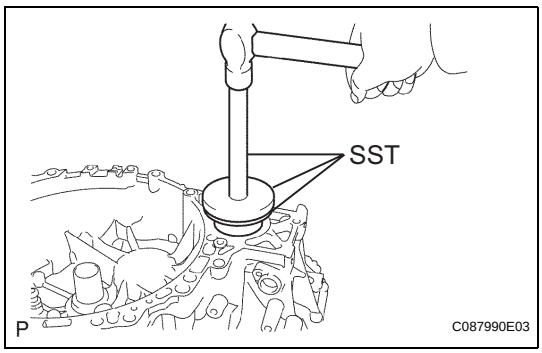
NOTICE:

Align the projection of the shifting key spring with the No. 3 hole of the clutch hub.

(b) Install the synchronizer ring set and No. 3 synchromesh shifting key spring to the No. 3 transmission clutch hub.

NOTICE:

- **Engage the shifting key spring claw to the center of the teeth of the synchronizer ring.**
- **Align the projection of the shifting key spring with the hole of the No. 3 clutch hub.**



3. INSTALL FRONT TRANSAXLE CASE COVER OIL SEAL

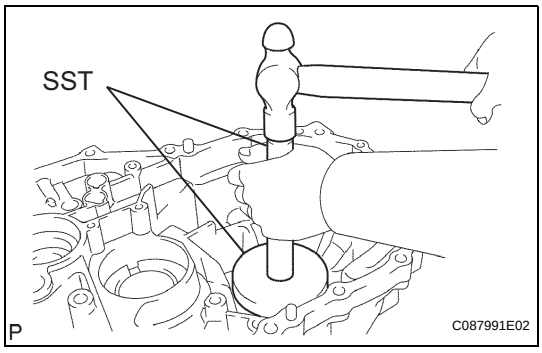
(a) Using SST and a hammer, install a new front transaxle case cover oil seal.

SST 09316-20011, 09950-60020 (09951-00910), 09950-70010 (09951-07150)

Oil seal installation depth:

- 0.5 to 0.5 mm (- 0.020 to 0.020 in.)

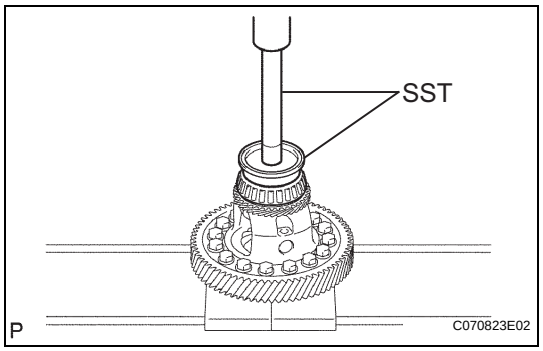
(b) Coat the front transaxle case cover oil seal lip with MP grease.



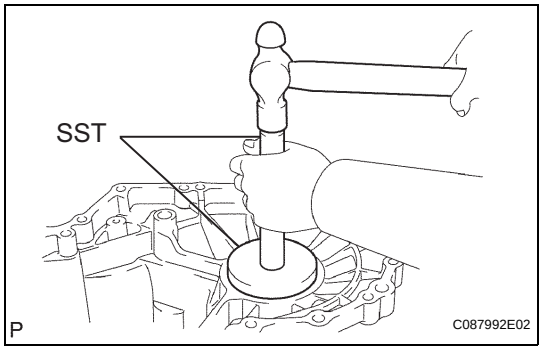
4. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST and a hammer, install the front differential case front tapered roller bearing (outer race) to the front transaxle case.

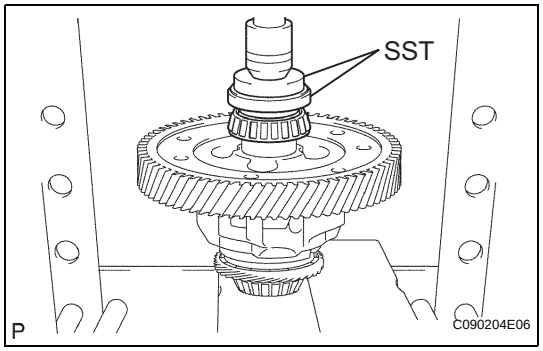
SST 09950-60020 (09951-00910), 09950-70010 (09951-07100)



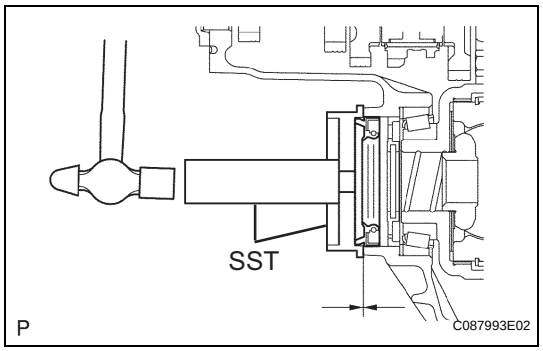
(b) Using SST and a press, install the front differential case front tapered roller bearing (inner race) to the front differential case.
SST 09950-70010 (09951-07100, 09951-07150), 09608-10010



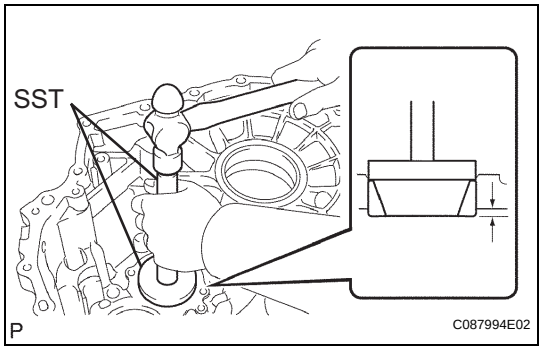
5. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING
(a) Install the front differential case shim rear.
(b) Using SST and a hammer, install the front differential case rear tapered roller bearing (outer race).
SST 09950-60020 (09951-00890), 09950-70010 (09951-07100)



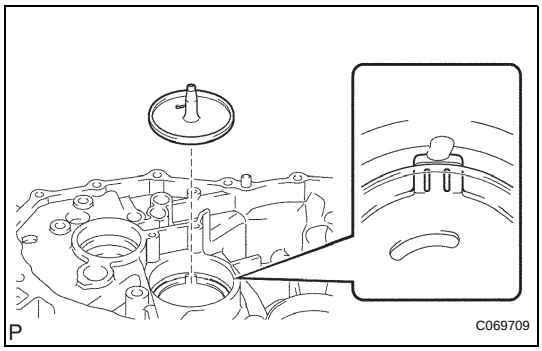
(c) Using SST and a press, install the front differential case rear tapered roller bearing (inner race).
SST 09631-12090, 09950-60010 (09951-00600), 09950-70010 (09951-07100)



6. INSTALL TRANSMISSION CASE OIL SEAL
(a) Using SST and a hammer, install a transmission case oil seal to the manual transmission case.
SST 09608-32010, 09950-70010 (09951-07150)
Oil seal installation depth:
3.0 to 4.0 mm (0.1181 to 0.1575 in.)
(b) Coat the transmission case oil seal lip with MP grease.

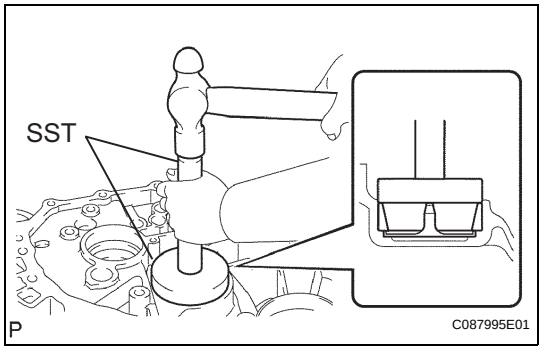


7. INSTALL OUTPUT SHAFT REAR BEARING
(a) Using SST and a hammer, install the output shaft rear bearing (outer race) to the manual transmission case.
SST 09950-60020 (09951-00680), 09950-70010 (09951-07100)
Clearance:
3.8 to 4.4 mm (0.150 to 0.173 in.)



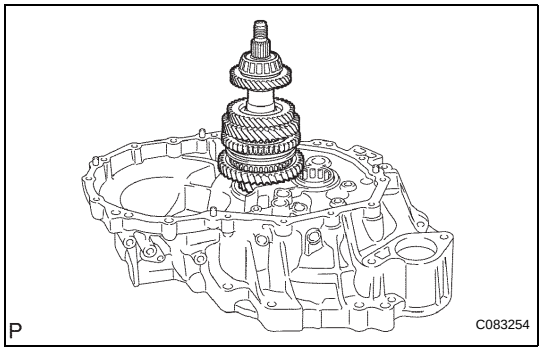
8. INSTALL OUTPUT SHAFT COVER

(a) Coat the output shaft cover with MP grease, and install it to the manual transaxle case.
NOTICE:
Align the projection of the output shaft with the transmission groove.



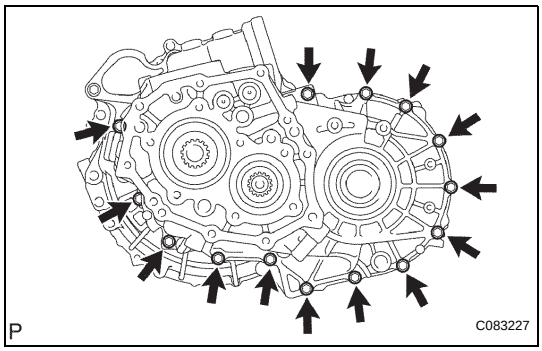
9. INSTALL OUTPUT SHAFT FRONT BEARING

(a) Using SST and a hammer, install the output shaft front bearing (outer race).
SST 09950-60020 (09951-00730), 09950-70010 (09951-07100)

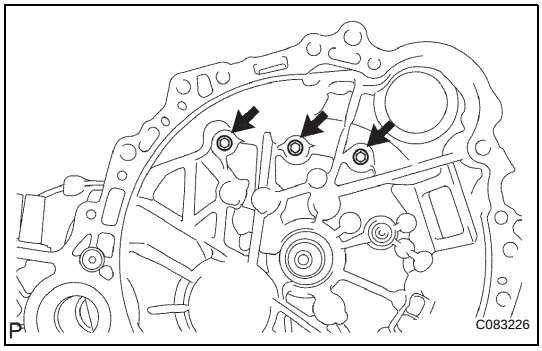


10. ADJUST OUTPUT SHAFT BEARING PRELOAD

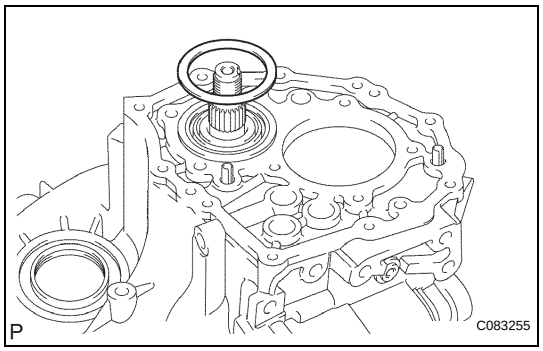
(a) Install the output shaft to the manual transaxle case.



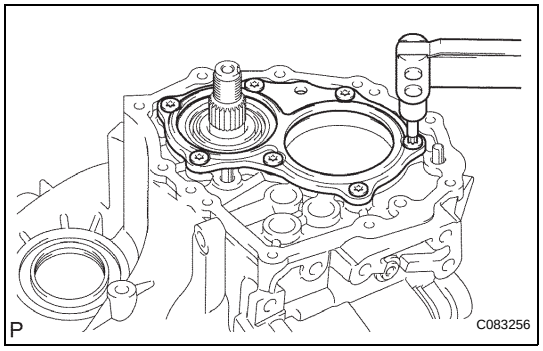
(b) Install the transmission case to the manual transaxle case with the 14 bolts.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



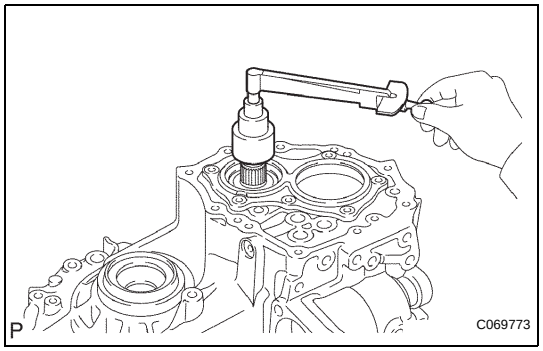
(c) Install the 3 bolts to the manual transaxle case.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



(d) Install the output shaft rear bearing case shim to the output shaft.



(e) Using a "TORX" socket wrench (T45), install the bearing retainer rear to the manual transmission case with the 7 screws.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



(f) Turn the output shaft in both directions to make sure that it starts to turn smoothly.

(g) Using a socket wrench and torque wrench, inspect the preload.
Preload: N*m (kgf*cm, in.*lbf)

Bearing	Preload
New	0.8 to 1.6 (8.16 to 16.32, 7.1 to 14.2)
Used	0.5 to 1.0 (5.10 to 10.20, 4.4 to 8.9)

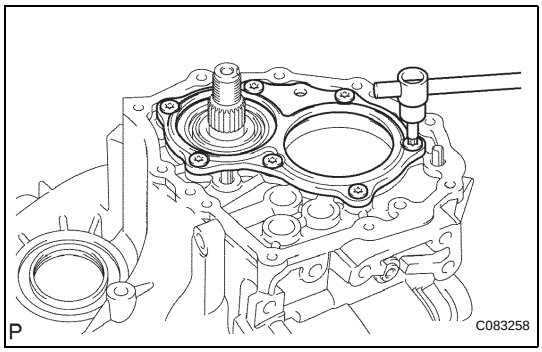
(h) If preload is out of specification, select a proper output shaft rear bearing shim and adjust it.
HINT:
The preload of all the output shaft rear bearing shim varies in torque from about 0.04 to 0.06 N*m (0.408 to 0.612 kgf*cm, 0.35 to 0.53 in.*lbf).
Shim

Part No.	Thickness: mm (in.)	Mark
90564-59001	1.30 (0.0512)	0
90564-59002	1.35 (0.0531)	1
90564-59003	1.40 (0.0551)	2
90564-59004	1.45 (0.0571)	3
90564-59005	1.50 (0.0591)	4
90564-59006	1.55 (0.0610)	5
90564-59007	1.60 (0.0630)	6
90564-59008	1.65 (0.0650)	7
90564-59009	1.70 (0.0669)	8
90564-59010	1.75 (0.0689)	9
90564-59011	1.80 (0.0709)	A
90564-59012	1.85 (0.0728)	B
90564-59013	1.90 (0.0748)	C
90564-59014	1.95 (0.0768)	D

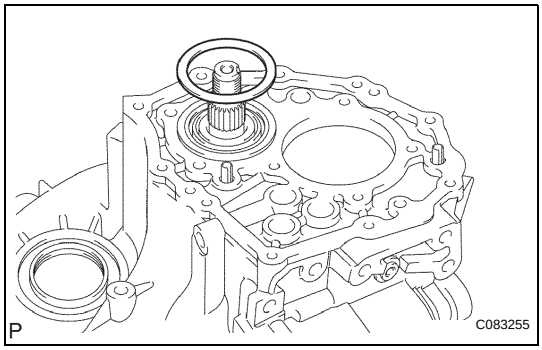
Part No.	Thickness: mm (in.)	Mark
90564-59015	2.00 (0.0787)	E
90564-59016	2.05 (0.0807)	F
90564-59017	2.10 (0.0827)	G
90564-59018	2.15 (0.0846)	H
90564-59019	2.20 (0.0866)	J
90564-59020	2.25 (0.0886)	K
90564-59021	2.30 (0.0906)	L
90564-59022	2.35 (0.0925)	M
90564-59023	2.40 (0.0945)	N
90564-59024	2.45 (0.0965)	P
90564-59025	2.50 (0.0984)	Q

(i) Remove the output shaft rear set nut from the output shaft.

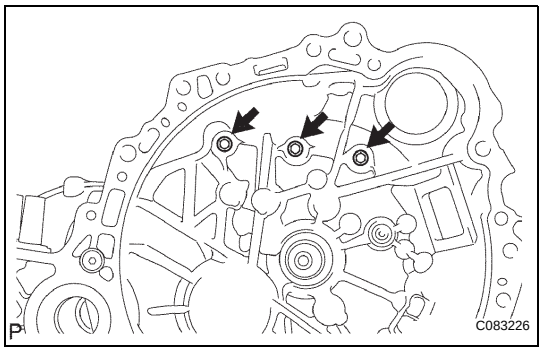
(j) Using a "TORX" socket wrench (T45), remove the 7 screws and bearing retainer rear from the manual transmission case.

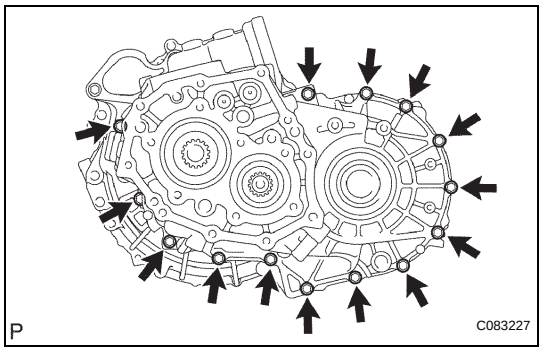


(k) Remove the output shaft rear bearing shim from the output shaft.

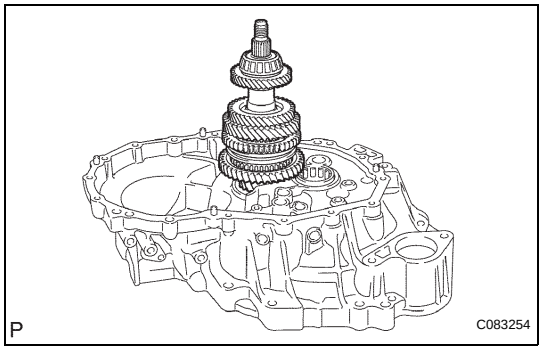


(l) Remove the 3 bolts.

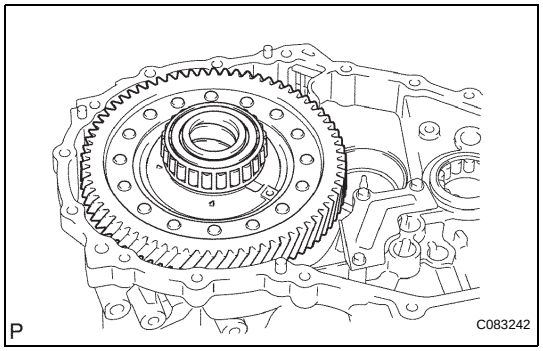




(m) Remove the 14 bolts and manual transmission case from the manual transaxle case.

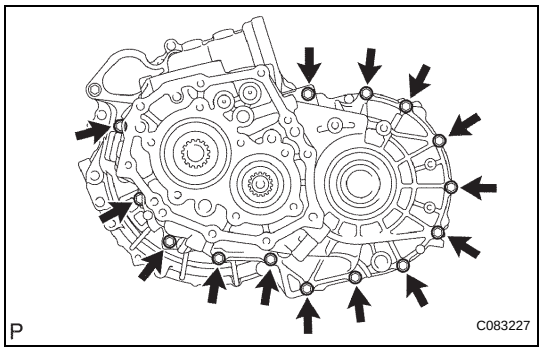


(n) Remove the output shaft assembly from the front manual transaxle case.

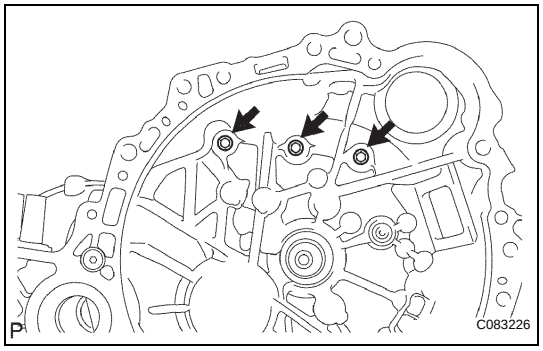


11. ADJUST TAPERED ROLLER BEARING PRELOAD

(a) Install the differential case assembly to the manual transaxle case.

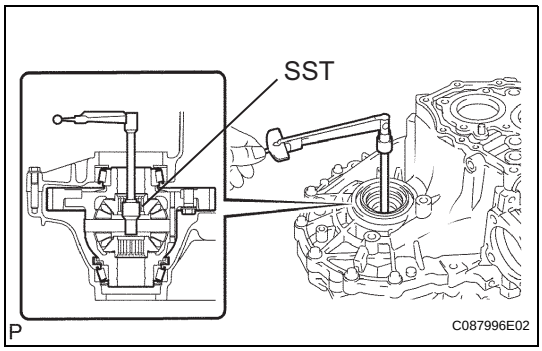


(b) Install the 14 bolts and manual transmission case to the manual transaxle case.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



(c) Install the 3 bolts to the front manual transaxle case.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)

(d) Turn the differential case in both directions to make sure that it starts to turn smoothly.

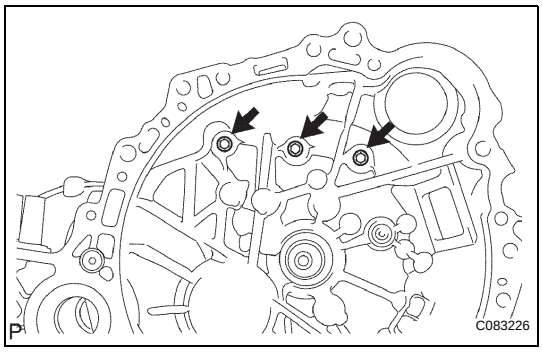


(e) Using SST and a torque wrench, inspect preload.
SST 09564-32011
Preload: N*m (kgf*cm, in.*lbf)

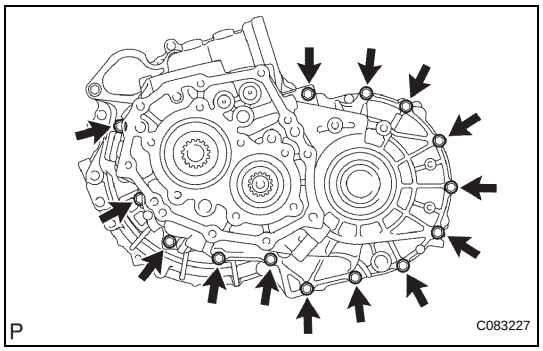
Bearing	Preload
New	0.8 to 1.6 (8.16 to 16.32, 7.1 to 14.2)
Used	0.5 to 1.0 (5.10 to 10.2, 4.4 to 8.9)

If preload is out of specification, select a proper front differential case rear shim and adjust it.
HINT:
The preload of all the front differential case rear shims varies in torque from about 0.04 to 0.06 N*m (0.408 to 0.612 kgf*cm, 0.35 to 0.53 in.*lbf).
Shim

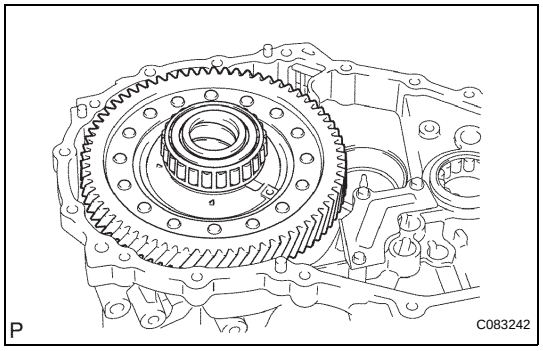
Part No.	Thickness: mm (in.)	Mark
90564-56055	2.00 (0.0787)	0
90564-56056	2.05 (0.0807)	1
90564-56057	2.10 (0.0827)	2
90564-56058	2.15 (0.0846)	3
90564-56059	2.20 (0.0866)	4
90564-56060	2.25 (0.0886)	5
90564-56061	2.30 (0.0906)	6
90564-56062	2.35 (0.0925)	7
90564-56063	2.40 (0.0945)	8
90564-56064	2.45 (0.0965)	9
90564-56065	2.50 (0.0984)	A
90564-56066	2.55 (0.1004)	B
90564-56067	2.60 (0.1024)	C
90564-56068	2.65 (0.1043)	D
90564-56069	2.70 (0.1063)	E
90564-56070	2.75 (0.1083)	F
90564-56071	2.80 (0.1102)	G
90564-56072	2.85 (0.1122)	H



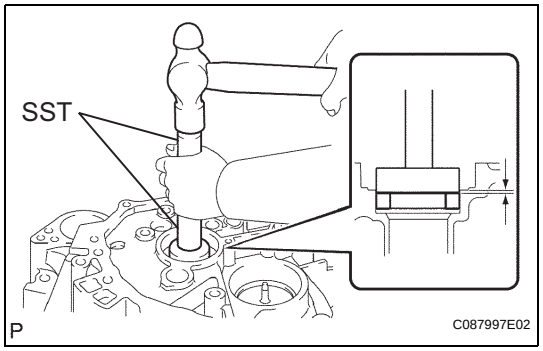
(f) Remove the 3 bolts.



(g) Remove the 14 bolts and manual transmission case from the manual transaxle case.



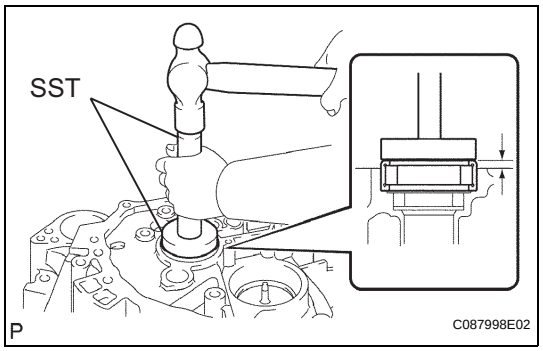
(h) Remove the differential case assembly from the manual transaxle case.



12. INSTALL FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, install a new front transaxle case oil seal to the manual transaxle case.
SST 09950-60010 (09951-00420), 09950-70010 (09951-07150)

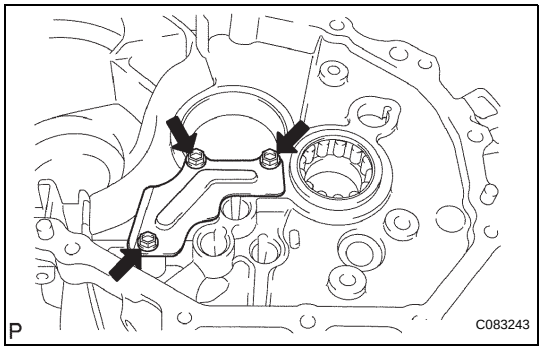
(b) Coat the lip of the front transaxle case oil seal with MP grease.
Clearance:
1.0 to 2.0 mm (0.0394 to 0.0787 in.)



13. INSTALL INPUT SHAFT FRONT BEARING

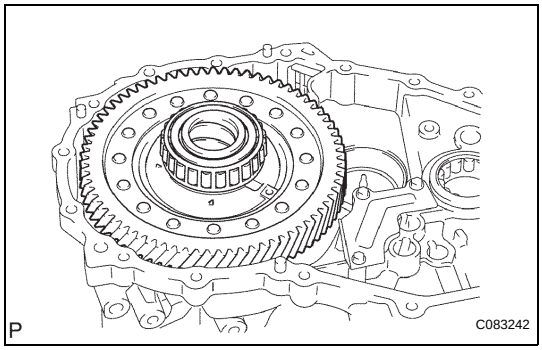
(a) Coat the input shaft front bearing with gear oil.

(b) Using SST and a hammer, install the oil seal to the manual transaxle case.
SST 09950-60010 (09951-00570), 09950-70010 (09951-07150)
Clearance:
4.28 to 4.60 mm (0.1685 to 0.1811 in.)



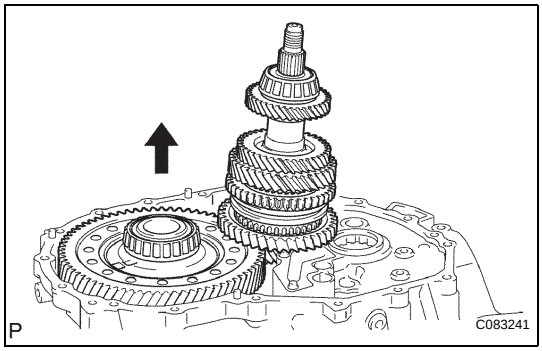
14. INSTALL MANUAL TRANSAXLE CASE RECEIVER

(a) Install the manual transaxle case receiver to the manual transaxle case with the 3 bolts.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)



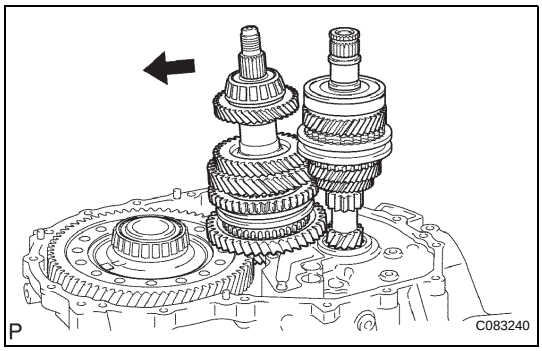
15. INSTALL DIFFERENTIAL CASE ASSEMBLY

(a) Coat the differential case tapered roller bearing with gear oil, and install the differential case assembly to the manual transaxle case.



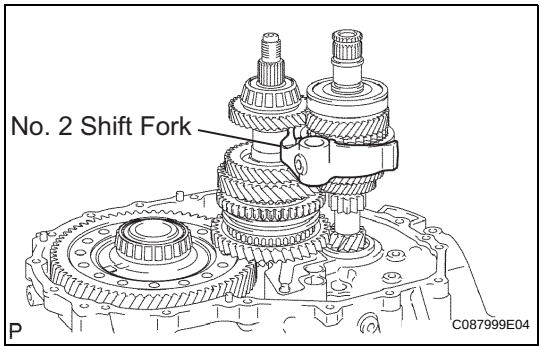
16. INSTALL OUTPUT SHAFT ASSEMBLY

(a) Apply gear oil to each sliding part of the output shaft assembly.
(b) Lift the differential case assembly with the output shaft assembly leaned, and install it to the manual transaxle case.



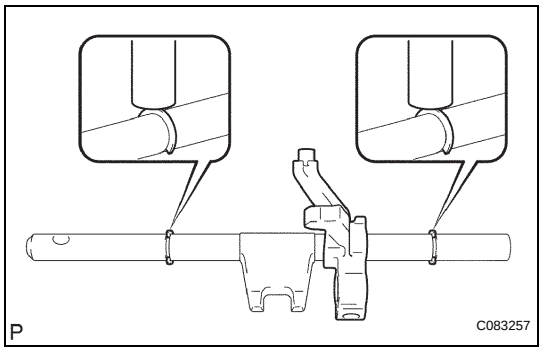
17. INSTALL INPUT SHAFT ASSEMBLY

(a) Apply gear oil to each sliding part of the input shaft assembly.
(b) Install the input shaft assembly to the manual transaxle case while tilting the output shaft assembly.



18. INSTALL NO. 2 GEAR SHIFT FORK

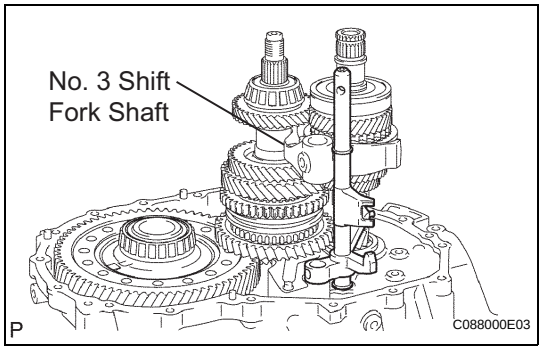
(a) Coat the No. 2 gear shift fork with gear oil, and install it to the input shaft assembly.



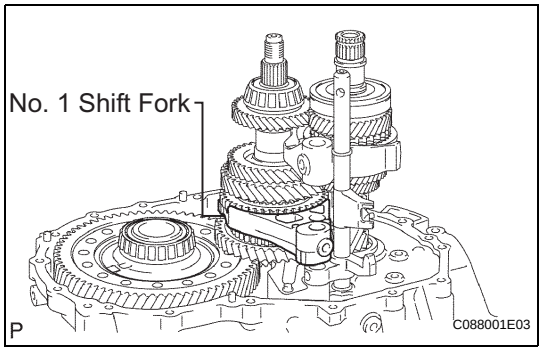
19. INSTALL NO. 3 GEAR SHIFT FORK

(a) Install the No. 3 gear shift fork to the No. 3 gear shift fork shaft.

(b) Using a brass bar and hammer, install the 2 shift fork shaft snap rings to the gear shift fork shaft.

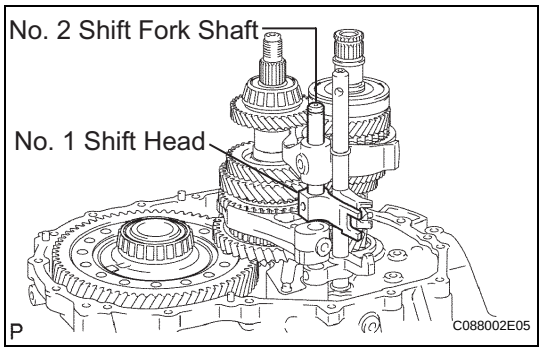


(c) Apply gear oil to each sliding part of the No. 3 gear shift fork shaft, and install it to the manual transaxle case.



20. INSTALL NO. 1 GEAR SHIFT FORK

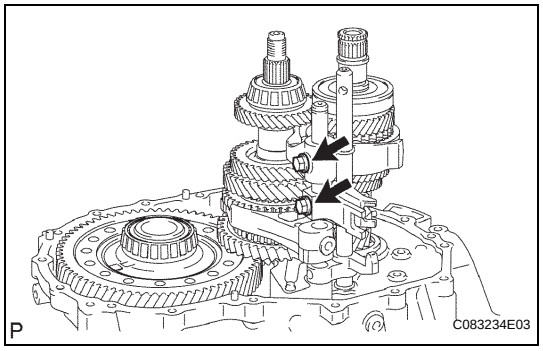
(a) Apply gear oil to each sliding part of the No. 1 gear shift fork, and install it to the output shaft assembly.



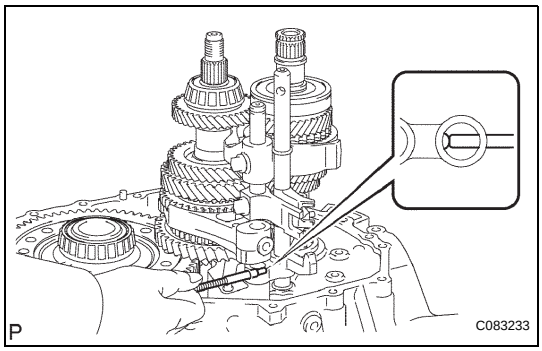
21. INSTALL NO. 2 GEAR SHIFT FORK SHAFT

(a) Install the No. 1 gear shift head to the No. 2 gear shift fork shaft.

(b) Apply gear oil to each sliding part of the No. 2 gear shift fork shaft, and install it to the manual transaxle case.

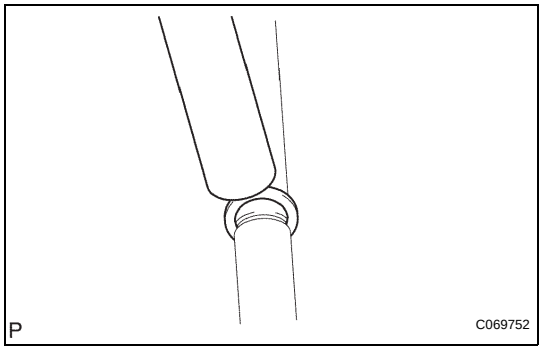


(c) Install the shift fork set bolt and shift head set bolt to the No. 1 gear shift head.
Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)



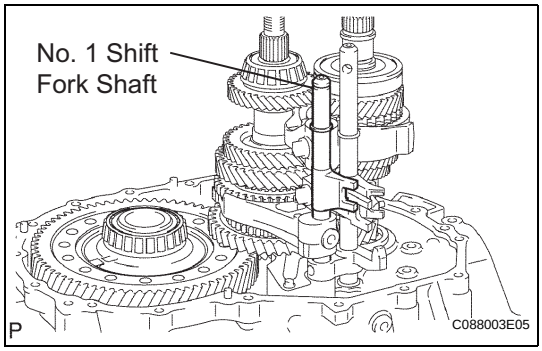
22. INSTALL REVERSE SHIFT FORK ROLLER

(a) Using a magnetic finger, install the reverse shift fork roller to the reverse shift fork.

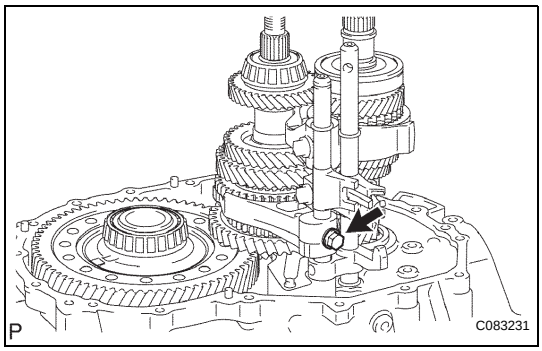


23. INSTALL NO. 1 GEAR SHIFT FORK SHAFT

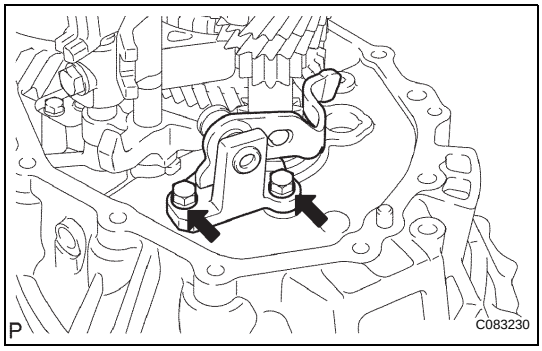
(a) Using a brass bar and hammer, install the shift fork shaft snap ring to the No. 1 shift fork shaft.



(b) Install the No. 1 gear shift fork shaft to the manual transaxle case.

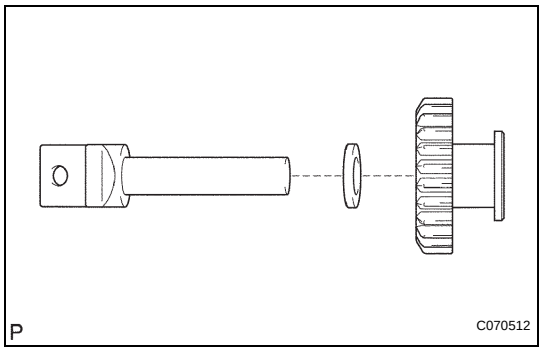


(c) Install the shift fork set bolt to the No. 1 gear shift fork.
Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)



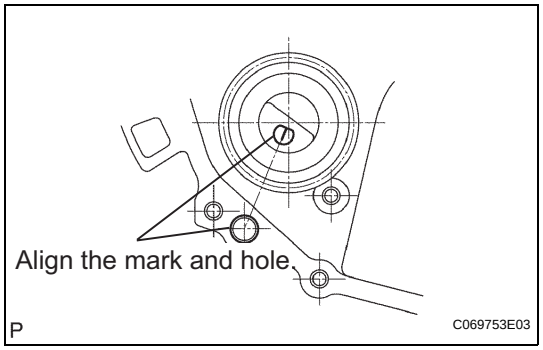
24. INSTALL REVERSE SHIFT ARM BRACKET ASSEMBLY

(a) Install the reverse shift arm bracket assembly to the manual transaxle case with the 2 bolts.
Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)

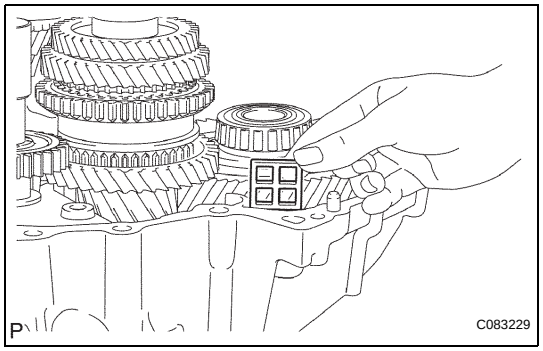


25. INSTALL REVERSE IDLER GEAR SUB-ASSEMBLY

(a) Coat the reverse idler gear and reverse idler thrust washer with MP grease, and install them to the reverse idler gear shaft.

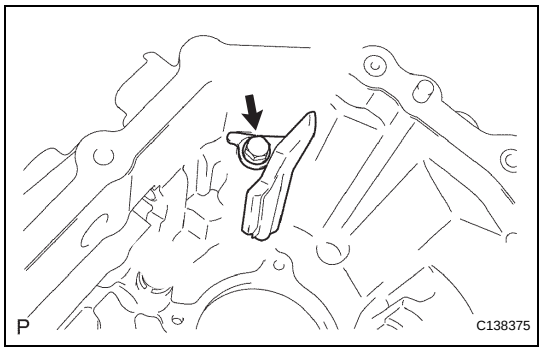


(b) Install the reverse idler gear to the manual transaxle case.
HINT:
Align the mark of the reverse idler gear shaft with the hole of the bolt.



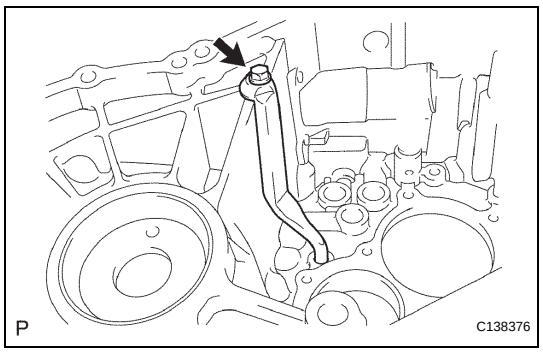
26. INSTALL TRANSMISSION MAGNET

(a) Clean the transmission magnet and install it to the manual transaxle case.



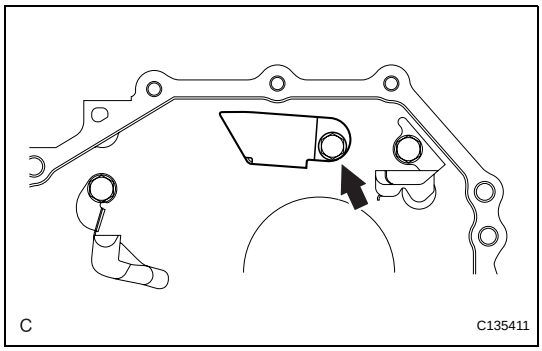
27. INSTALL NO. 1 OIL RECEIVER PIPE

(a) Install the No. 1 oil receiver pipe to the manual transmission case with the bolt.
Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)
NOTICE:
Do not damage the pipe.



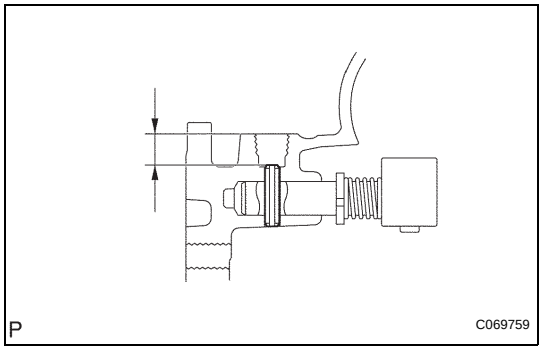
28. INSTALL NO. 2 OIL RECEIVER PIPE

(a) Install the No. 2 oil receiver pipe to the manual transmission case with the bolt.
Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)
NOTICE:
Do not damage the pipe.

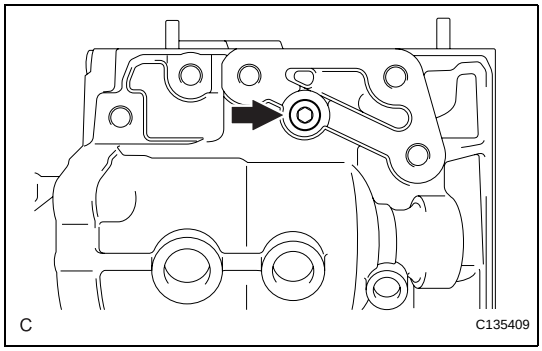


29. INSTALL REVERSE RESTRICT PIN ASSEMBLY

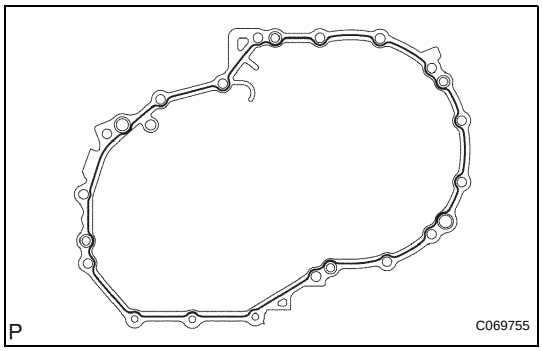
(a) Install the transmission oil baffle and reverse restrict pin with the bolt.
Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)



(b) Using a pin punch (ϕ 5 mm), install the slotted pin to the reverse restrict pin assembly.
Clearance:
12.5 to 13.5 mm (0.492 to 0.531 in.)

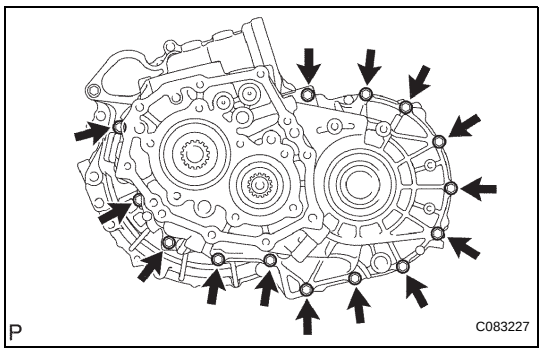


(c) Coat the reverse restrict pin plug with adhesive. Using a hexagon wrench (6 mm), install the manual transmission case.
Torque: 13 N*m (133 kgf*cm, 9.6 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

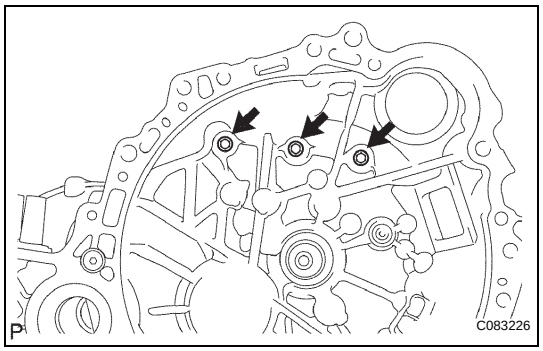


30. INSTALL MANUAL TRANSMISSION CASE

(a) Apply a bead of FIPG to the manual transmission case as shown in the illustration.
HINT:
Install the manual transmission case within 10 minutes after applying FIPG.



(b) Install the manual transmission case to the manual transaxle case with the 14 bolts.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)

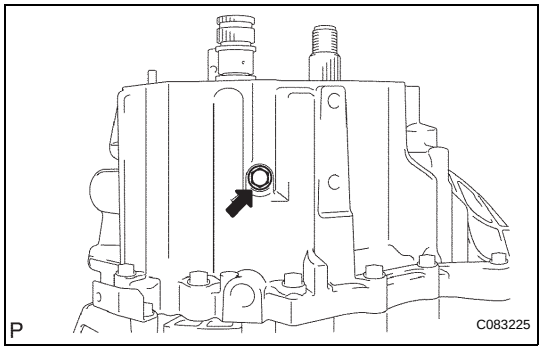


(c) Coat the 3 bolts with adhesive.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

(d) Install the 3 bolts to the manual transaxle case.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)

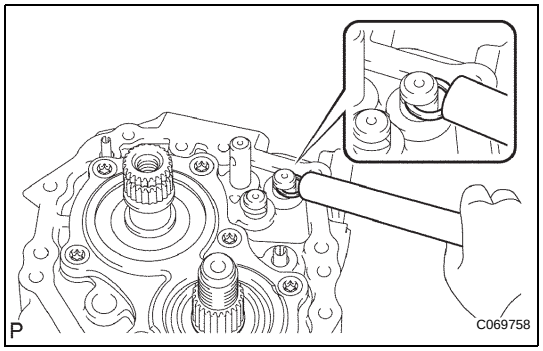
31. INSTALL NO. 1 CLUTCH TUBE BRACKET

(a) Install the clutch tube bracket with the bolt.
Torque: 17 N*m (173 kgf*cm, 13 ft.*lbf)



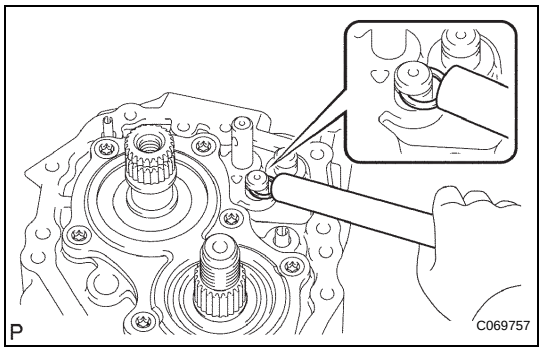
32. INSTALL REVERSE IDLER GEAR SHAFT BOLT

(a) Coat the bolt with adhesive. Install a new gasket to the manual transmission case with the bolt.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

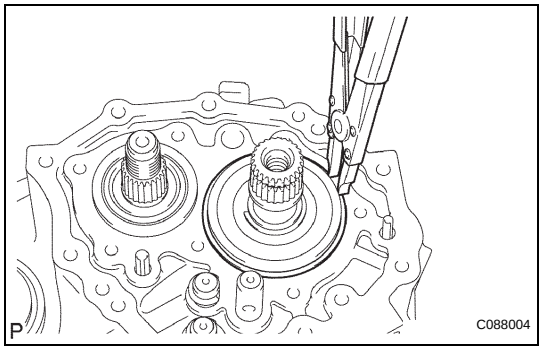


33. INSTALL SHIFT FORK SHAFT SHAFT SNAP RING

(a) Using a brass bar and hammer, install the shift fork shaft snap ring to the No. 1 gear shift fork shaft.

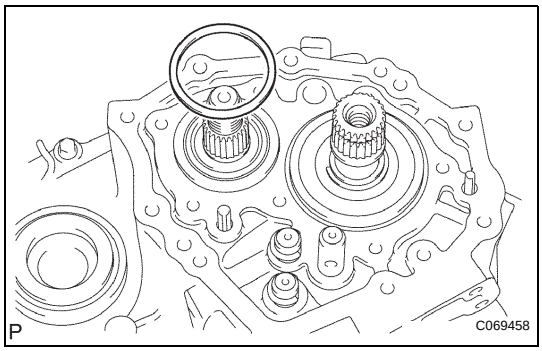


(b) Using a brass bar and hammer, install the shift fork shaft snap ring to the No. 2 gear shift fork shaft.



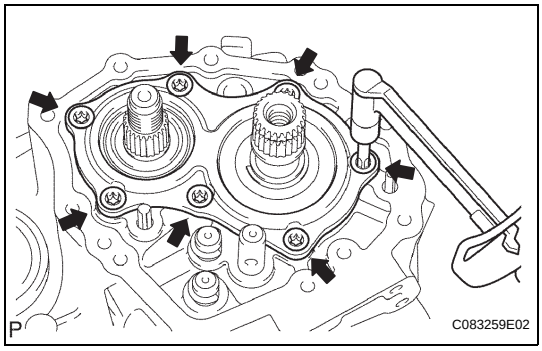
34. INSTALL INPUT SHAFT REAR BEARING SHAFT SNAP RING

(a) Using a snap ring expander, install the input shaft rear bearing shaft snap ring.



35. INSTALL OUTPUT SHAFT REAR BEARING SHIM

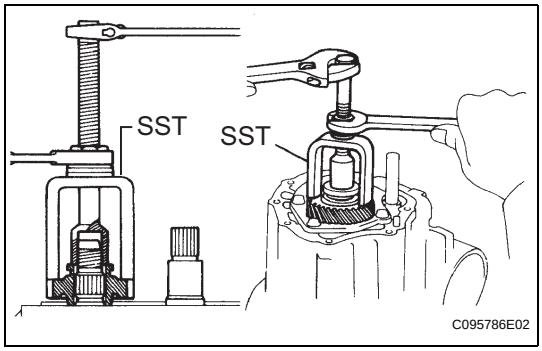
(a) Install the output shaft rear bearing shim to the output shaft.



36. INSTALL REAR BEARING RETAINER

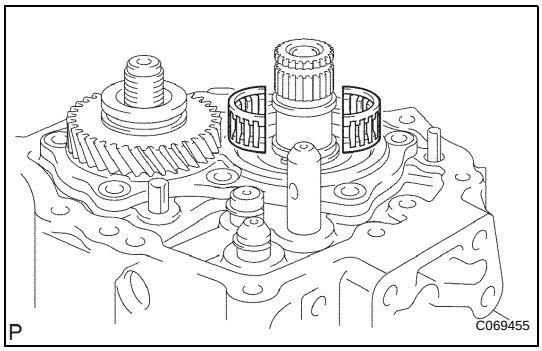
(a) Coat the rear bearing retainer with sealant and install it with a "TORX" wrench (T45).

(b) Install a new output rear set nut to the output shaft.
Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)



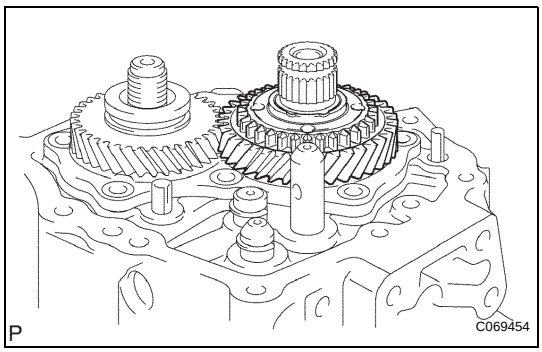
37. INSTALL 5TH DRIVEN GEAR

(a) Using SST, install the 5th driven gear to the output shaft.
SST 09309-12020



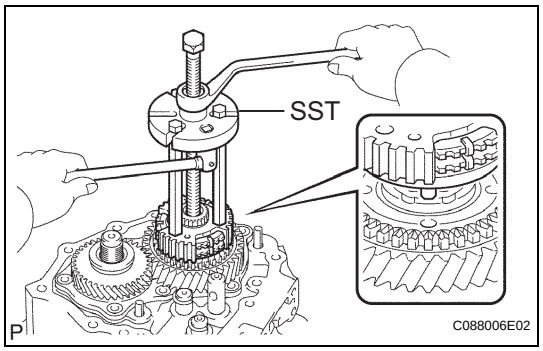
38. INSTALL 5TH GEAR NEEDLE ROLLER BEARING

(a) Coat the 5th gear needle roller bearing with gear oil and install it to the input shaft.



39. INSTALL 5TH GEAR

(a) Coat the 5th gear with gear oil and install it to the input shaft.



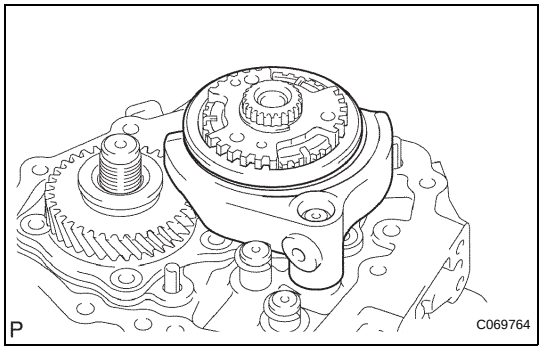
40. INSTALL NO. 3 TRANSMISSION CLUTCH HUB

(a) Using SST, install the No. 3 transmission clutch hub to the input shaft.

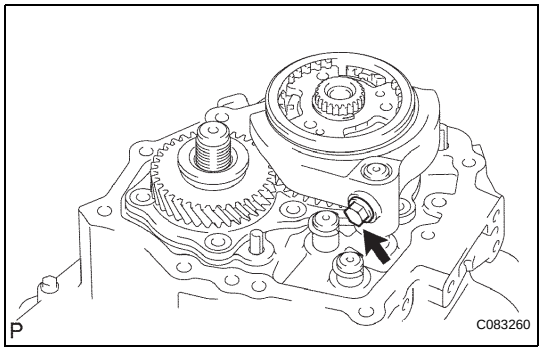
SST 09950-30012 (09951-03010, 09953-03010, 09954-03010)

NOTICE:

Align the projection of the synchronizer ring with the hole of the 5th gear.



(b) Install the No. 3 transmission hub sleeve and No. 3 gear shift fork to the No. 3 transmission clutch hub.

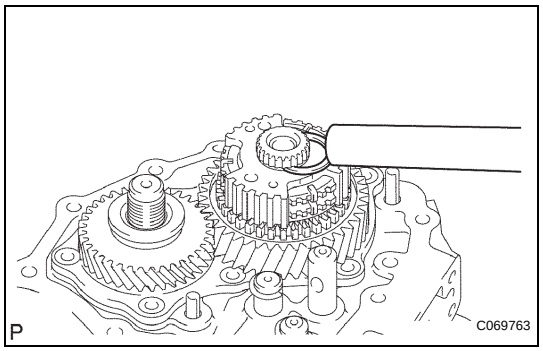


(c) Coat the shift fork set bolt with adhesive and install it to the No. 3 gear shift fork.

Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)

Adhesive:

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent



(d) Select a snap ring that will allow minimum axial play. Using a brass bar and a hammer, install the shaft snap ring.

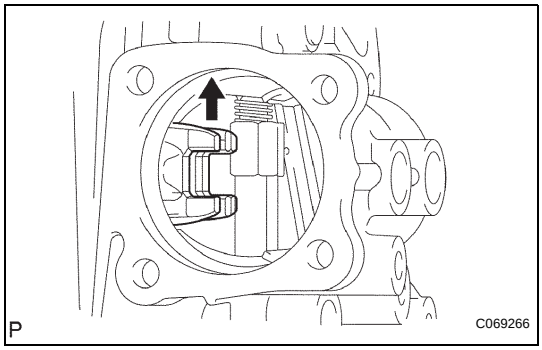
Clearance:

0.1 mm (0.004 in.) or less

Snap ring

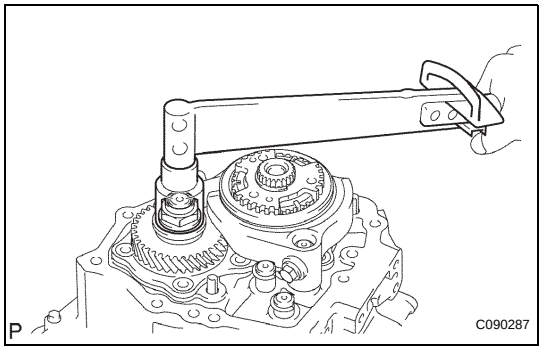
Part No.	Thickness: mm (in.)	Mark
90520-27061	1.75 to 1.80 (0.0689 to 0.0709)	a
90520-27062	1.80 to 1.85 (0.0709 to 0.0728)	b
90520-27063	1.85 to 1.90 (0.0728 to 0.0748)	c
90520-27064	1.90 to 1.95 (0.0748 to 0.0768)	d
90520-27065	1.95 to 2.00 (0.0768 to 0.0787)	e
90520-27066	2.00 to 2.05 (0.0787 to 0.0807)	f
90520-27067	2.05 to 2.10 (0.0807 to 0.0827)	g
90520-27068	2.10 to 2.15 (0.0827 to 0.0846)	h

Part No.	Thickness: mm (in.)	Mark
90520-27069	2.15 to 2.20 (0.0846 to 0.0866)	j

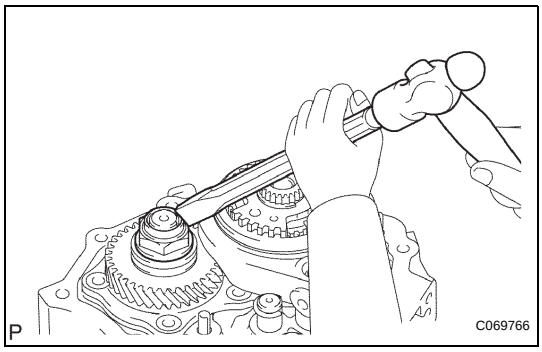


41. INSTALL MANUAL TRANSMISSION OUTPUT SHAFT REAR SET NUT

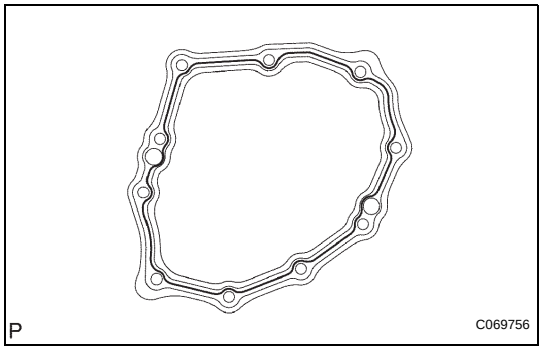
(a) Engage the 1st and 2nd gears simultaneously.



(b) Install a new manual transmission output shaft rear set nut.
Torque: 123 N*m (1,254 kgf*cm, 90 ft.*lbf)

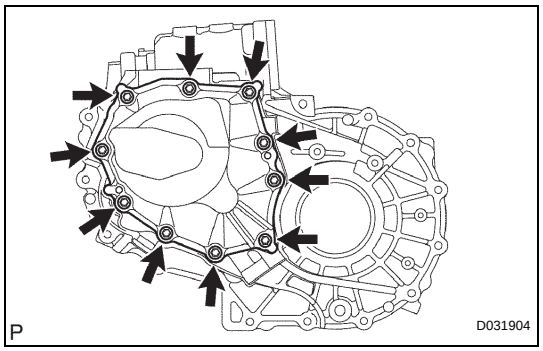


(c) Using a chisel and a hammer, stake the manual transmission output shaft rear set nut.
(d) Disengage the gears.

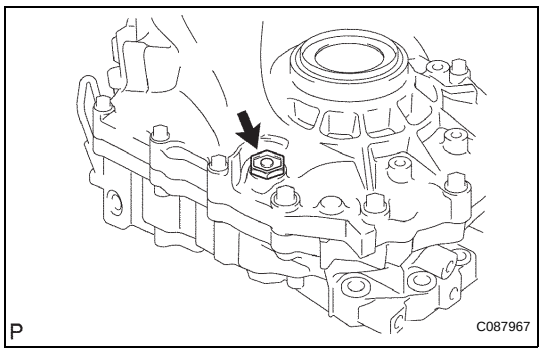


42. INSTALL MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY

(a) Apply FIPG to the transaxle case cover sub-assembly as shown in the installation.
FIPG:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent
NOTICE:
Install the part within 10 minutes after applying the packing material (FIPG).

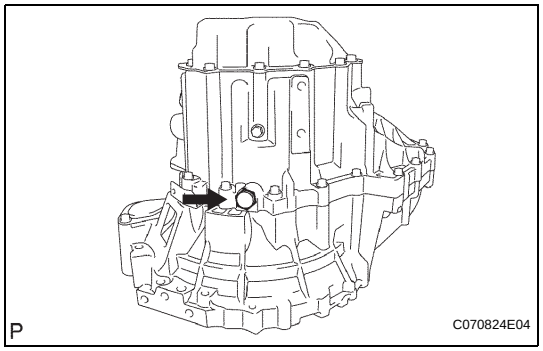


(b) Install the transmission case cover sub-assembly to the manual transaxle case with the 10 bolts.



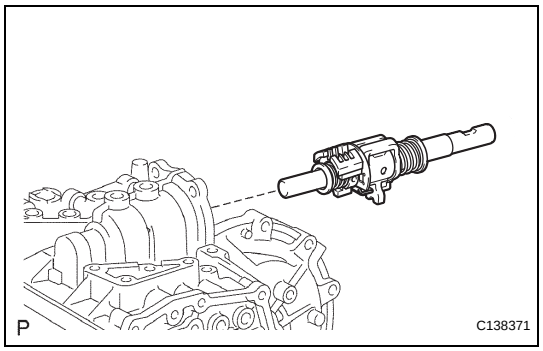
43. INSTALL DRAIN PLUG SUB-ASSEMBLY

(a) Install the drain plug sub-assembly to the manual transmission case with a new gasket.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



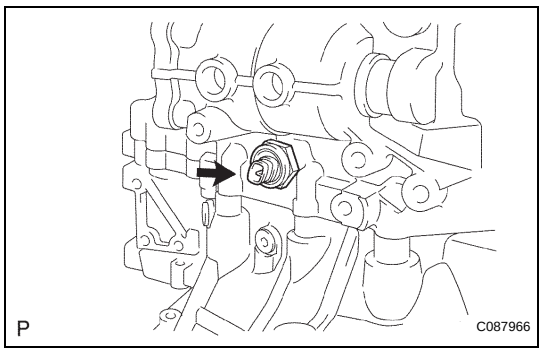
44. INSTALL MANUAL TRANSMISSION FILLER PLUG

(a) Install the manual transmission filler plug to the transaxle case with a new gasket.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



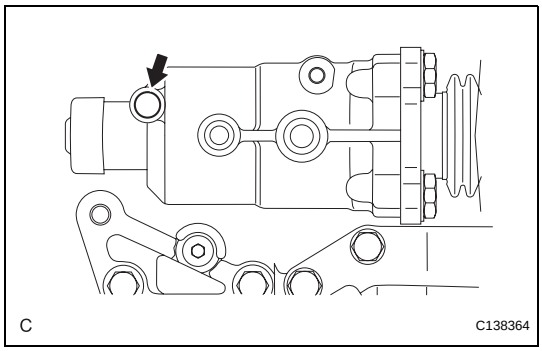
45. INSTALL SHIFT AND SELECT LEVER SHAFT ASSEMBLY

(a) Coat the shift and select lever shaft assembly with gear oil, and install it to the manual transmission case.



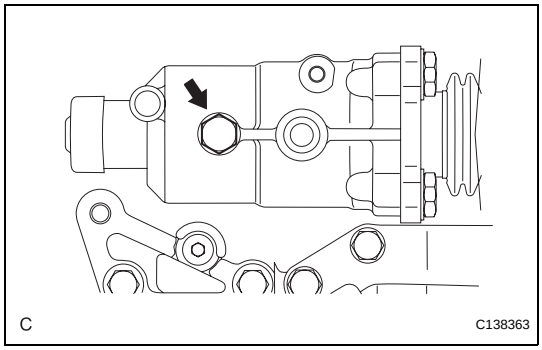
46. INSTALL BACK-UP LIGHT SWITCH ASSEMBLY

(a) Install the back-up light switch assembly to the manual transmission case with a new gasket.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)



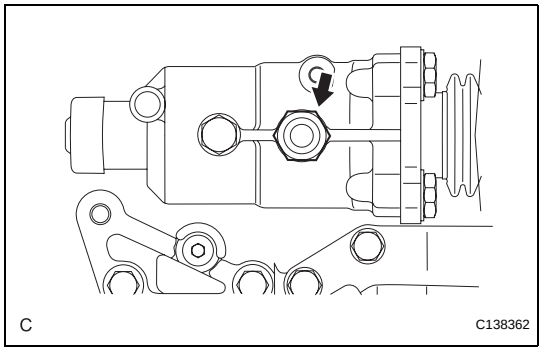
47. INSTALL MANUAL TRANSMISSION BREATHER PLUG

(a) Install the manual transmission breather plug to the manual transmission case.



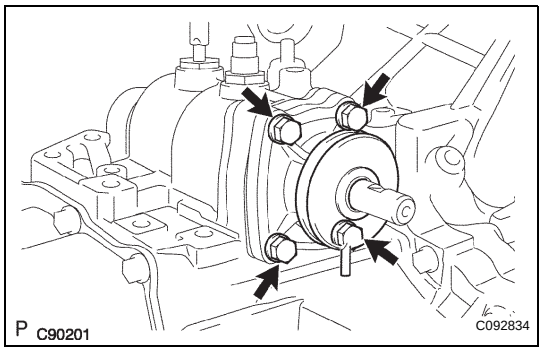
48. INSTALL SHIFT GATE PIN

(a) Install the shift gate pin to the manual transmission case.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



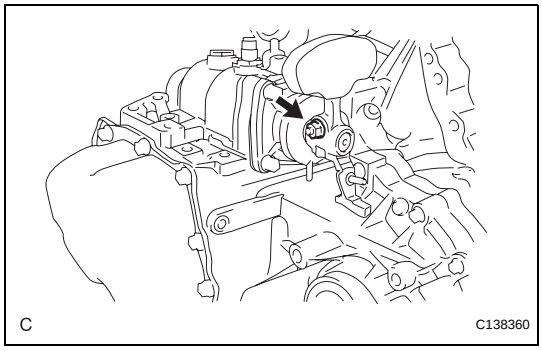
49. INSTALL NO. 1 LOCK BALL ASSEMBLY

(a) Install the lock ball assembly No. 1 to the manual transmission case.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



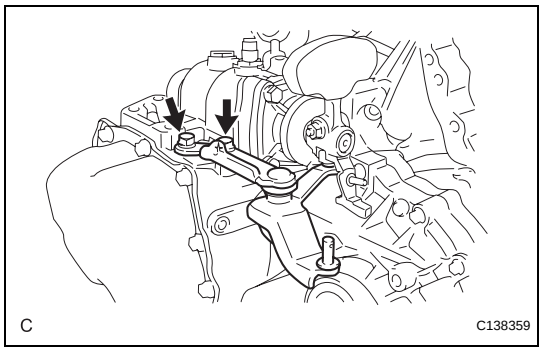
50. INSTALL CONTROL SHAFT COVER

(a) Coat the 4 bolts with adhesive. Install a new gasket and the control shaft cover with the bolts.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent



51. INSTALL CONTROL SHIFT LEVER

(a) Install the control shift lever with the shift outer lever lock pin to the shift and select lever shaft.
(b) Install the spring washer with the nut.
Torque: 6.4 N*m (65 kgf*cm, 57 in.*lbf)



52. INSTALL SELECTING BELLCRANK ASSEMBLY

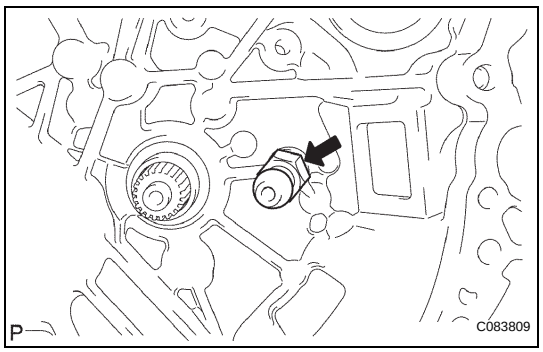
(a) Coat the 2 bolts with adhesive. Install the selecting bellcrank assembly to the manual transmission case with the bolts.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

53. INSTALL SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

(a) Install a new O-ring and the speedometer driven hole cover sub-assembly to the transmission case with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 48 in.*lbf)

54. INSTALL CLUTCH RELEASE FORK BOOT

(a) Install the clutch release fork boot to the manual transaxle case.



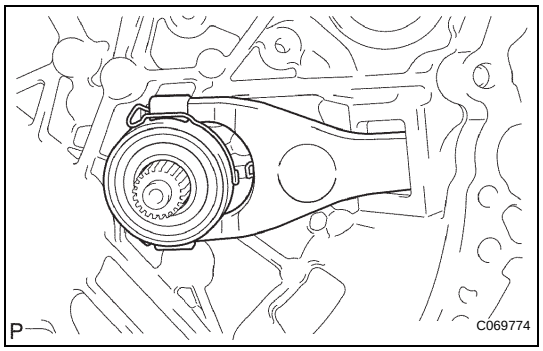
55. INSTALL RELEASE FORK SUPPORT

(a) Using a deep socket wrench, install the release fork support to the manual transaxle case.
Torque: 47 N*m (480 kgf*cm, 36 ft.*lbf)

56. INSTALL CLUTCH RELEASE BEARING ASSEMBLY

(a) Coat the clutch release bearing assembly with release hub grease, and install it to the clutch release fork sub-assembly.
Sealant:
Part No. 08887-01806, Release Hub Grease or equivalent

(b) Apply clutch spline grease to the input shaft spline.

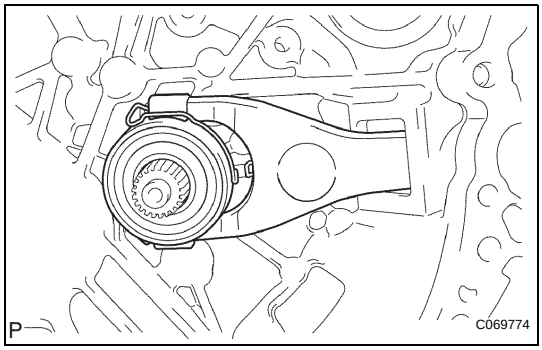


57. INSTALL CLUTCH RELEASE FORK SUB-ASSEMBLY

(a) Install the clutch release fork sub-assembly to the input shaft.

MX

DISASSEMBLY

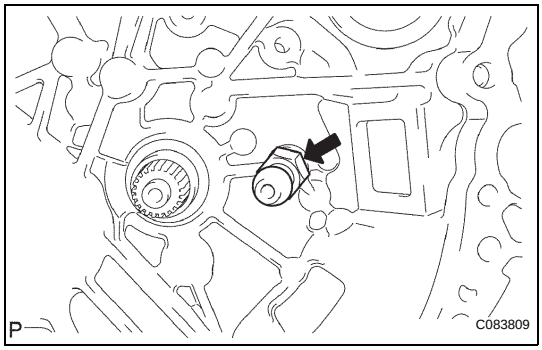


1. REMOVE CLUTCH RELEASE FORK SUB-ASSEMBLY

(a) Remove the clutch release fork sub-assembly together with the clutch release bearing assembly from the manual transaxle case.

2. REMOVE CLUTCH RELEASE BEARING ASSEMBLY

(a) Remove the clutch release bearing assembly and release bearing hub clip from the clutch release fork sub-assembly.



3. REMOVE RELEASE FORK SUPPORT

(a) Remove the release fork support from the manual transaxle case.

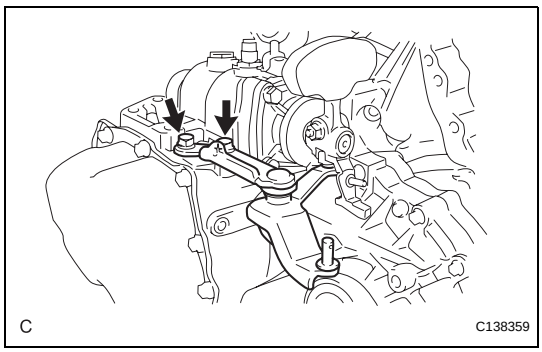
4. REMOVE CLUTCH RELEASE FORK BOOT

(a) Remove the clutch release fork boot from the manual transaxle case.

5. REMOVE SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

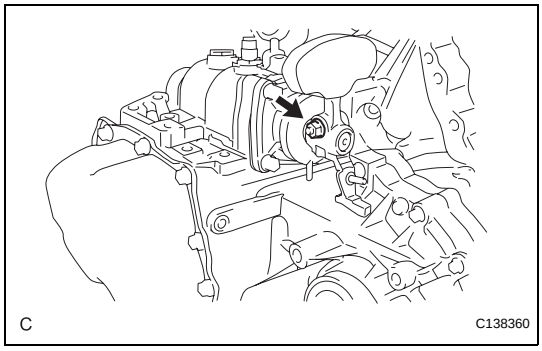
(a) Remove the bolt and speedometer driven hole cover sub-assembly.

(b) Remove the O-ring.



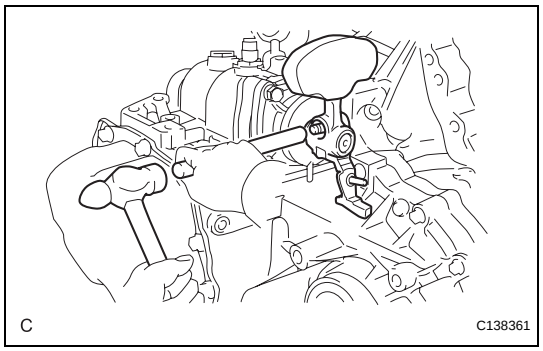
6. REMOVE SELECTING BELLCRANK ASSEMBLY

(a) Remove the 2 bolts and selecting bellcrank assembly from the manual transmission case.

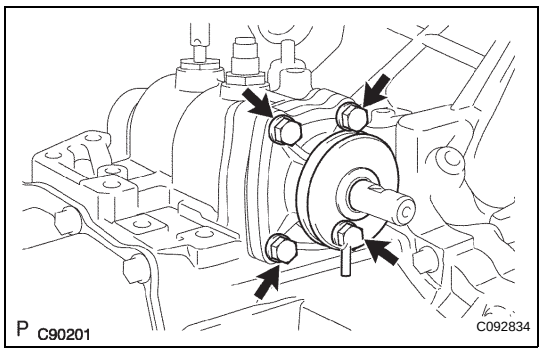


7. REMOVE CONTROL SHIFT LEVER

(a) Remove the nut and spring washer.

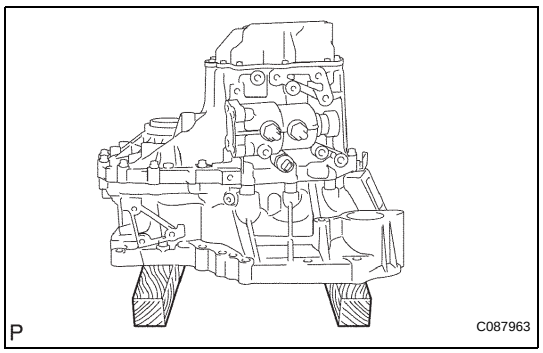


(b) Using a brass bar and hammer, remove the shift outer lever lock pin.
(c) Remove the control shift lever.



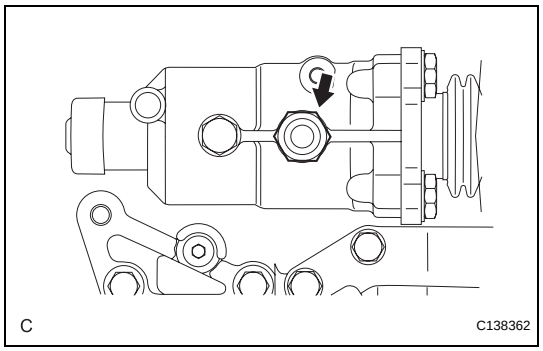
8. REMOVE CONTROL SHAFT COVER

(a) Remove the 4 bolts and control shaft cover from the manual transmission case.



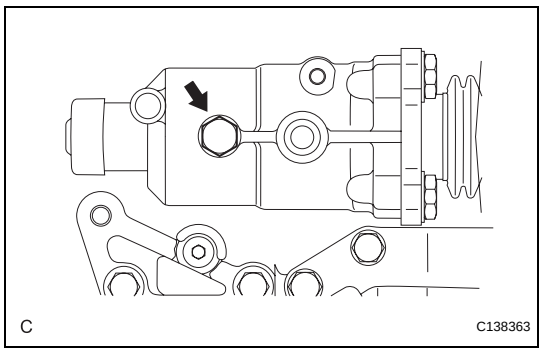
9. SECURE MANUAL TRANSAXLE ASSEMBLY

(a) Place the manual transaxle assembly on wooden blocks.



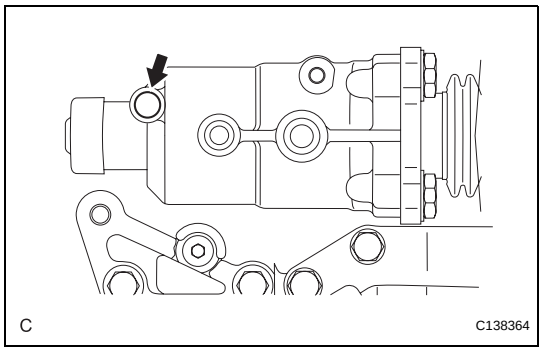
10. REMOVE NO. 1 LOCK BALL ASSEMBLY

(a) Remove the No. 1 lock ball assembly from the manual transmission case.



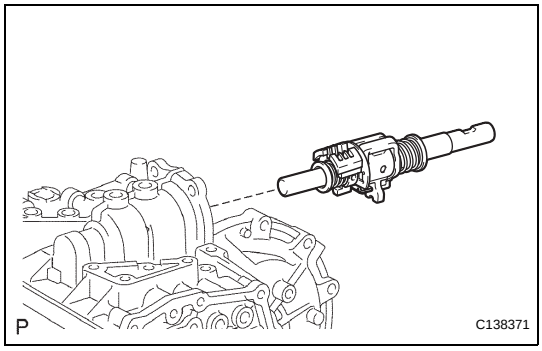
11. REMOVE SHIFT GATE PIN

(a) Remove the shift gate pin from the manual transmission case.



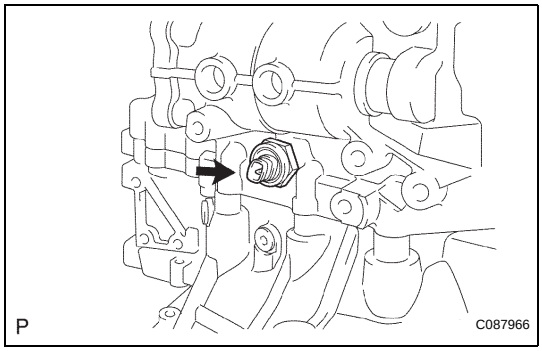
12. REMOVE MANUAL TRANSMISSION BREATHER PLUG

(a) Remove the manual transmission breather plug.



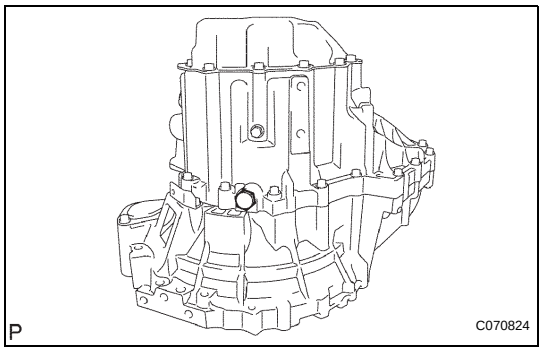
13. REMOVE SHIFT AND SELECT LEVER SHAFT ASSEMBLY

(a) Remove the shift and select lever shaft assembly from the manual transmission case.



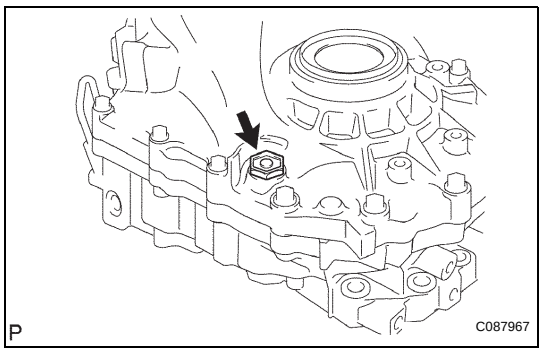
14. REMOVE BACK-UP LIGHT SWITCH ASSEMBLY

(a) Remove the back-up light switch assembly and gasket from the manual transmission case.



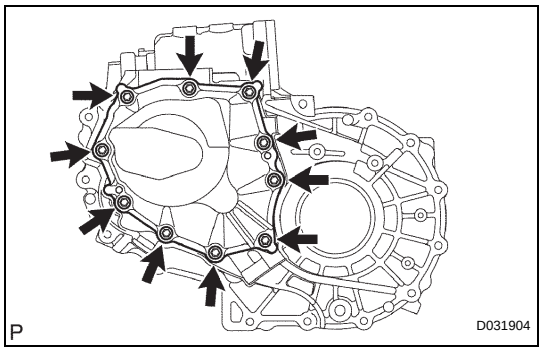
15. REMOVE MANUAL TRANSMISSION FILLER PLUG

(a) Remove the manual transmission filler plug and gasket from the manual transmission case.



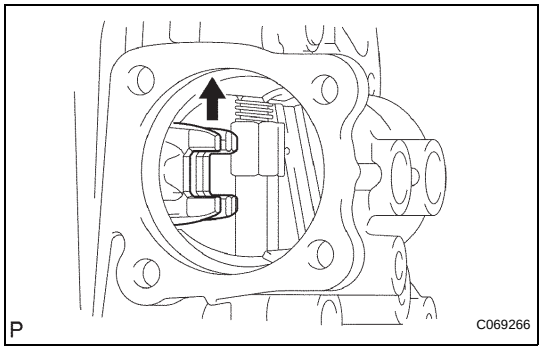
16. REMOVE DRAIN PLUG SUB-ASSEMBLY

(a) Remove the drain plug sub-assembly and gasket from the manual transmission case.



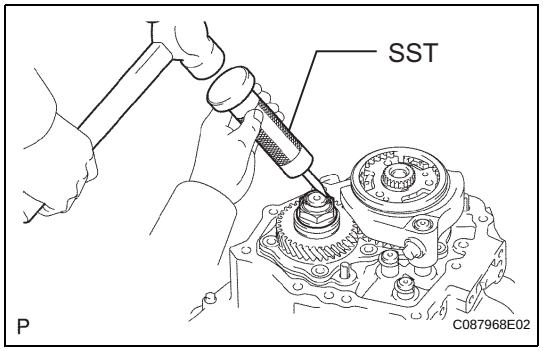
17. REMOVE MANUAL TRANSMISSION CASE COVER SUB-ASSEMBLY

(a) Remove the 10 bolts and manual transmission case cover from the manual transmission case.

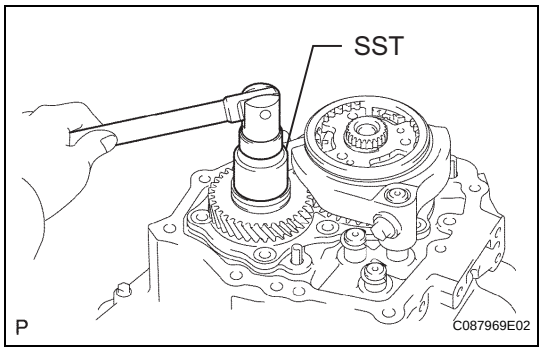


18. REMOVE MANUAL TRANSMISSION OUTPUT SHAFT REAR SET NUT

(a) Engage the 1st and 2nd gears simultaneously.

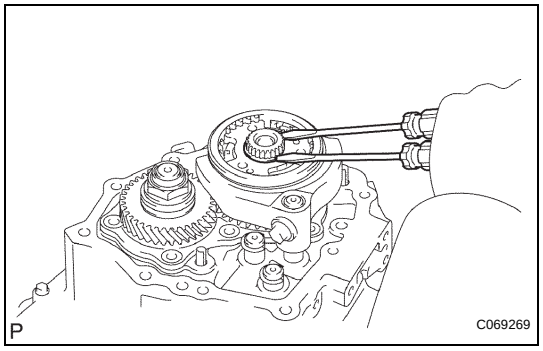


(b) Using SST and a hammer, unstake the manual transmission output shaft rear set nut.
SST 09930-00010



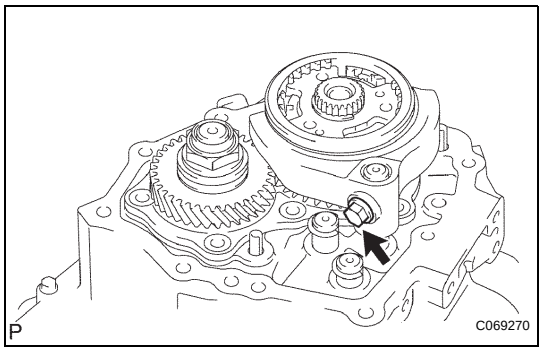
(c) Using SST, remove the manual transmission output shaft rear set nut from the output shaft.
SST 09229-55010

(d) Disengage the gears.

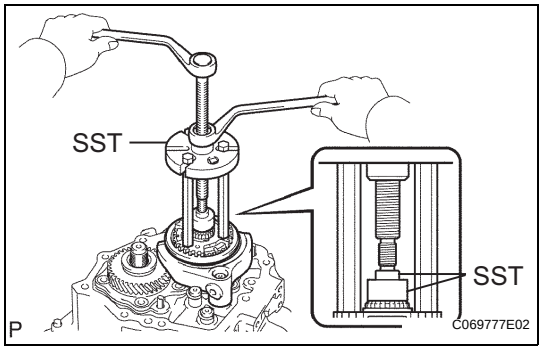


19. REMOVE NO. 3 TRANSMISSION CLUTCH HUB

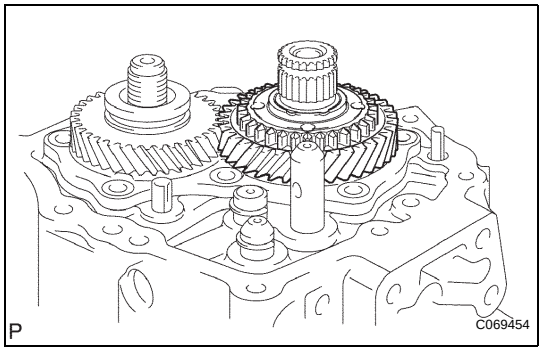
(a) Using 2 screwdrivers and a hammer, remove the transmission clutch hub No. 3 shaft snap ring from the input shaft.
HINT:
Use a shop rag or a piece of cloth to keep the snap ring from flying.



(b) Remove the shift fork set bolt from the No. 3 gear shift fork.

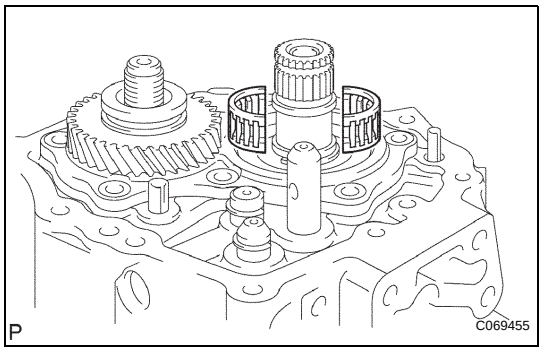


(c) Using SST, remove the No. 3 transmission clutch hub and No. 3 gear shift fork from the input shaft.
SST 09950-30012 (09951-03010, 09953-03010, 09954-03010), 09950-50013 (09957-04010), 09950-60010 (09951-00280)



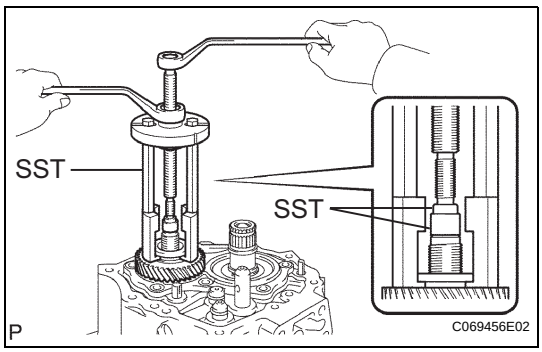
20. REMOVE 5TH GEAR

(a) Remove the 5th gear from the input shaft.



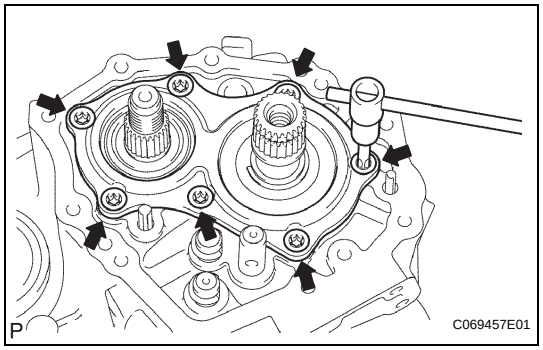
21. REMOVE 5TH GEAR NEEDLE ROLLER BEARING

(a) Remove the 5th gear needle roller bearing from the input shaft.



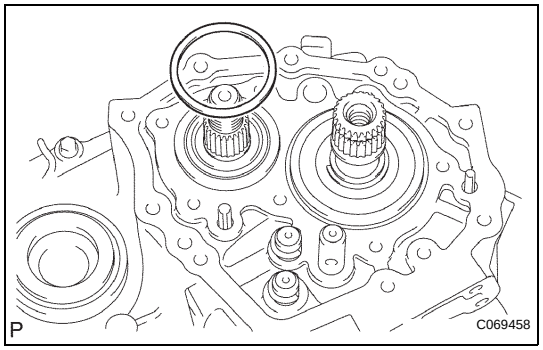
22. REMOVE 5TH DRIVEN GEAR

(a) Using SST, remove the 5th driven gear from the output shaft.
SST 09950-30012 (09951-03010, 09953-03010, 09954-03010, 09957-04010), 09950-60010 (09951-00180, 09955-03011), 09950-50013



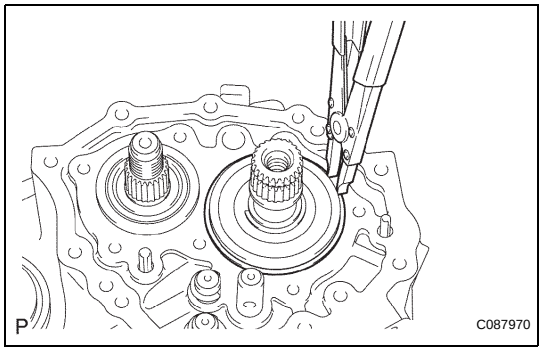
23. REMOVE REAR BEARING RETAINER

(a) Using a "TORX" socket wrench (T45), remove the 7 "TORX" screws and rear bearing retainer from the manual transmission case.



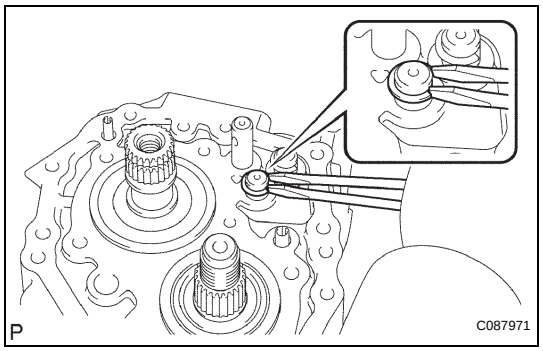
24. REMOVE OUTPUT SHAFT REAR BEARING SHIM

(a) Remove the output shaft rear bearing shim from the output shaft.



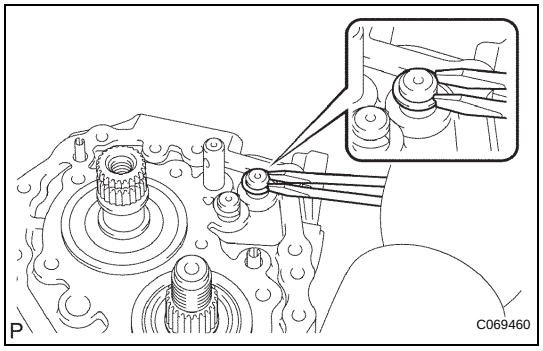
25. REMOVE INPUT SHAFT REAR BEARING SHAFT SNAP RING

(a) Using a snap ring expander, remove the input shaft rear bearing shaft snap ring from the input shaft.

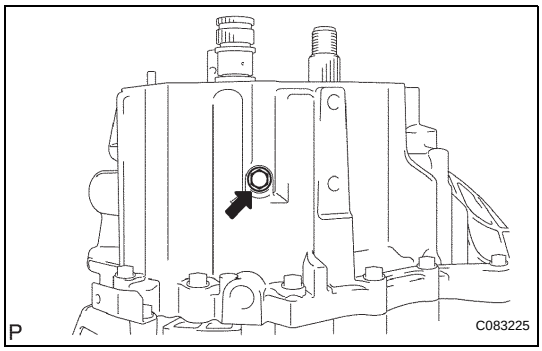


26. REMOVE SHIFT FORK SHAFT SHAFT SNAP RING

(a) Using 2 screwdrivers and a hammer, remove the shift fork shaft shaft snap ring from the No. 1 gear shift fork shaft.
HINT:
Use a shop rag or a piece of cloth to keep the snap ring from flying.



(b) Using 2 screwdrivers and a hammer, remove the shift fork shaft shaft snap ring from the No. 2 gear shift fork shaft.
HINT:
Use a shop rag or a piece of cloth to keep the snap ring from flying.

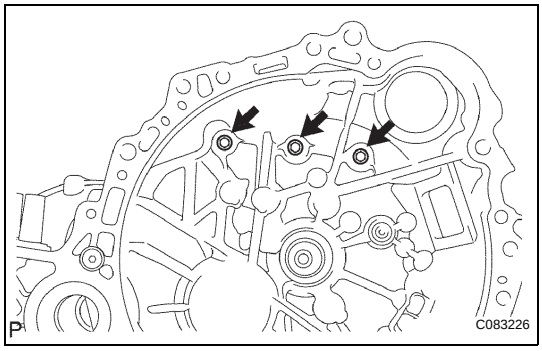


27. REMOVE REVERSE IDLER GEAR SHAFT BOLT

(a) Remove the reverse idler gear shaft bolt and gasket.

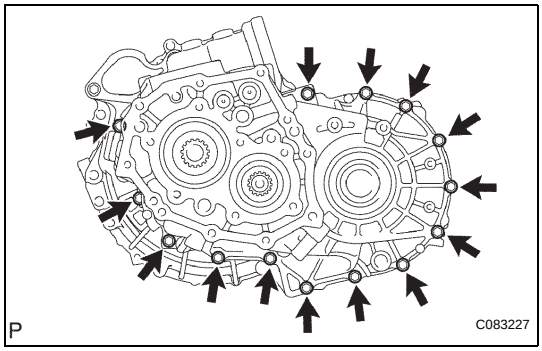
28. REMOVE NO. 1 CLUTCH TUBE BRACKET

(a) Remove the bolt and clutch tube bracket.



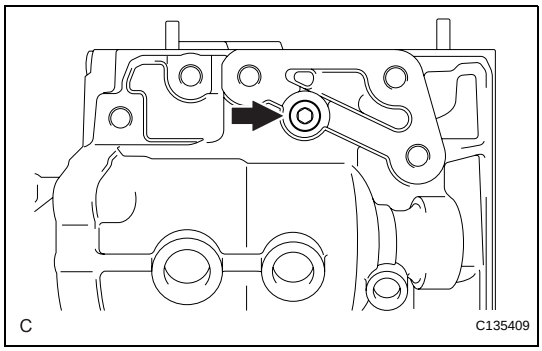
29. REMOVE MANUAL TRANSMISSION CASE

(a) Remove the 3 bolts from the manual transaxle case.



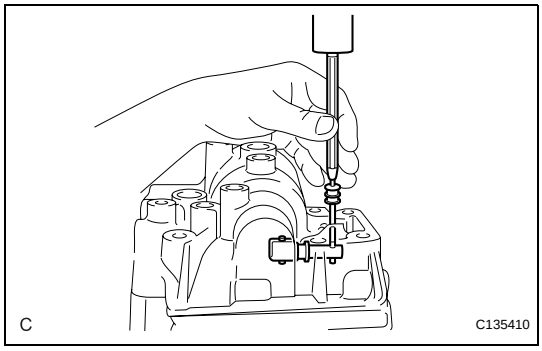
(b) Remove the 14 bolts from the manual transmission case.

(c) Tapping with a plastic hammer, remove the manual transmission case.

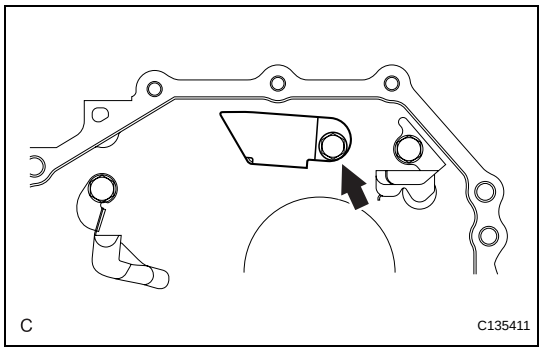


30. REMOVE REVERSE RESTRICT PIN ASSEMBLY

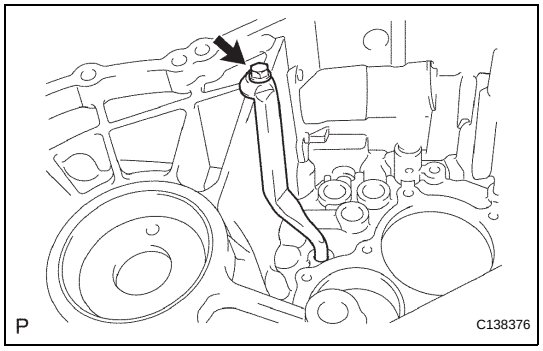
(a) Using a hexagon wrench (6 mm), remove the reverse restrict pin plug from the manual transmission case.



(b) Using a pin punch (ϕ 5 mm) and hammer, remove the slotted pin.

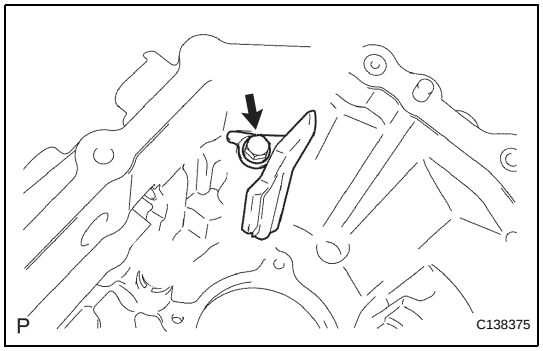


(c) Remove the bolt, transmission oil baffle and reverse restrict pin assembly.



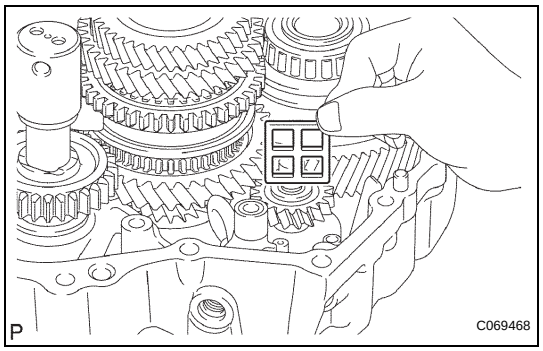
31. REMOVE NO. 2 OIL RECEIVER PIPE

(a) Remove the bolt and No. 2 oil receiver pipe from the manual transmission case.
NOTICE:
Do not damage the pipe.



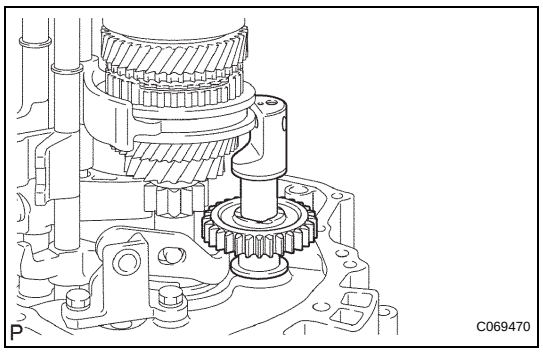
32. REMOVE NO. 1 OIL RECEIVER PIPE

(a) Remove the bolt and No. 1 oil receiver pipe from the manual transmission case.
NOTICE:
Do not damage the pipe.



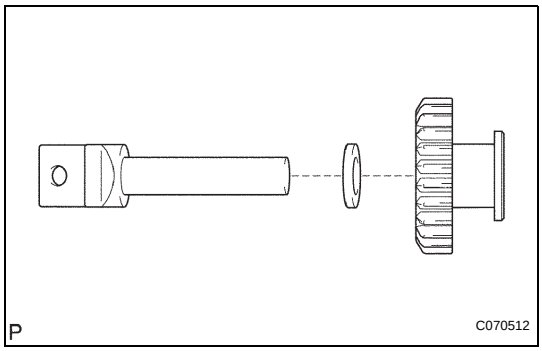
33. REMOVE TRANSMISSION MAGNET

(a) Remove the transmission magnet from the manual transaxle case.

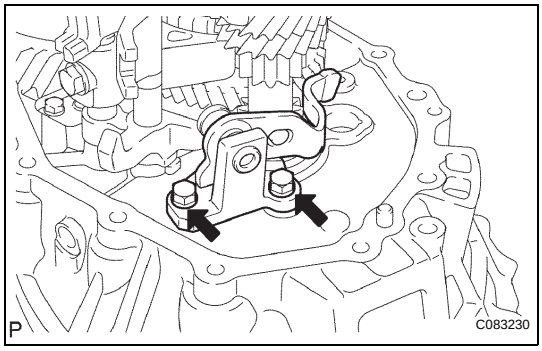


34. REMOVE REVERSE IDLER GEAR SUB-ASSEMBLY

(a) Remove the reverse idler gear sub-assembly from the manual transaxle case.

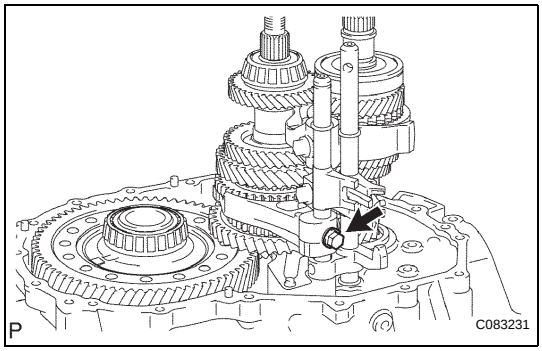


(b) Remove the reverse gear and reverse idler thrust washer from the reverse idler gear shaft.



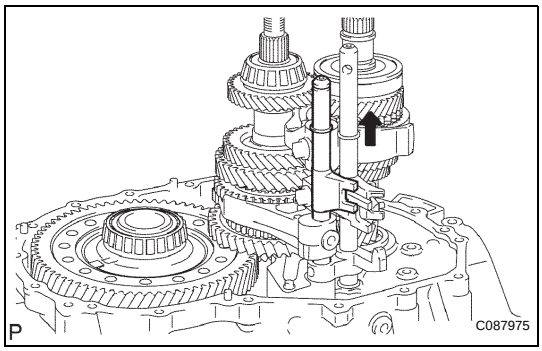
35. REMOVE REVERSE SHIFT ARM BRACKET ASSEMBLY

(a) Remove the 2 bolts and reverse shift arm bracket assembly from the manual transaxle case.

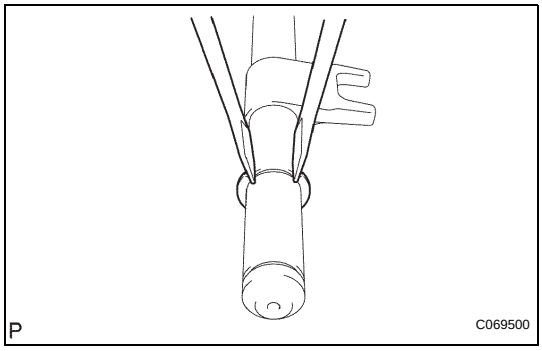


36. REMOVE NO. 1 GEAR SHIFT FORK SHAFT

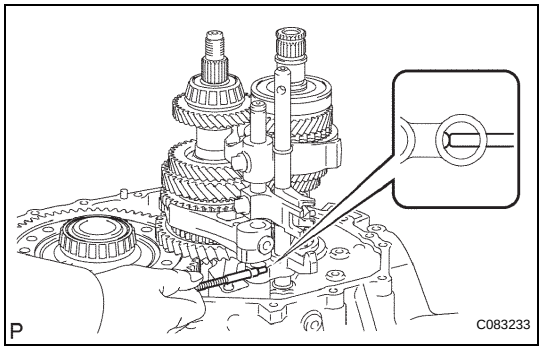
(a) Remove the shift fork set bolt from the No. 1 gear shift fork.



(b) Pull out the No. 1 gear shift fork shaft while the No. 3 gear shift fork shaft is pulled up.

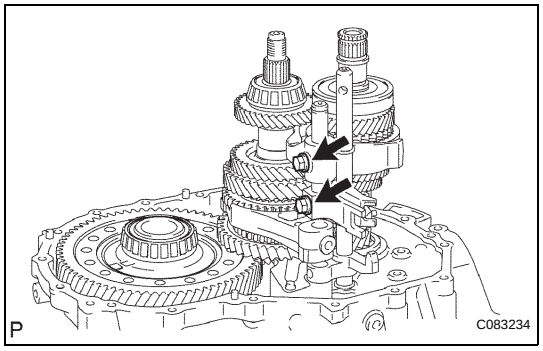


(c) Using 2 screwdrivers and a hammer, remove the shift fork shaft snap ring from the No. 1 gear shift fork shaft.
HINT:
Use a shop rag or a piece of cloth to keep the snap ring from flying.



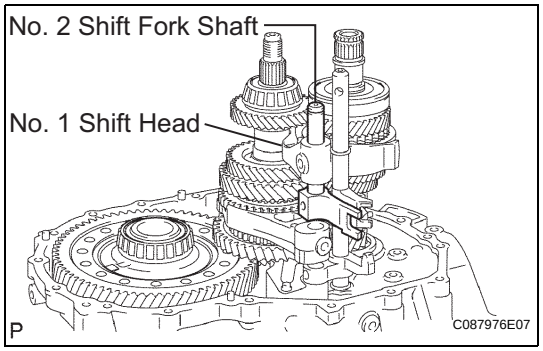
37. REMOVE REVERSE SHIFT FORK ROLLER

(a) Using a magnetic finger, remove the reverse shift fork roller from the reverse shift fork.

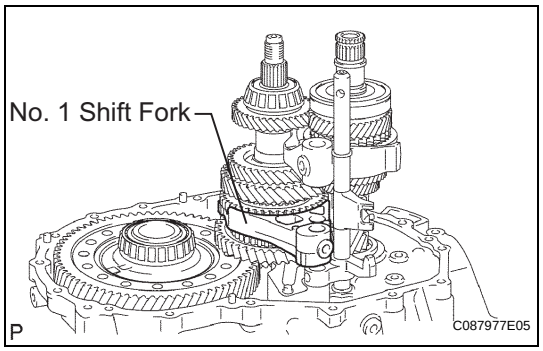


38. REMOVE NO. 2 GEAR SHIFT FORK SHAFT

(a) Remove the shift fork set bolt and shift head set bolt from the No. 2 gear shift fork and No. 1 gear shift head.

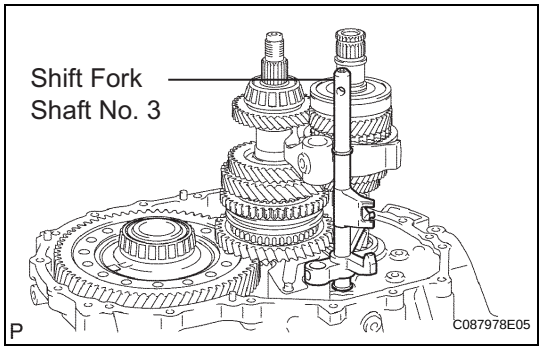


(b) Remove the No. 2 gear shift fork shaft and No. 1 gear shift head from the manual transaxle case.



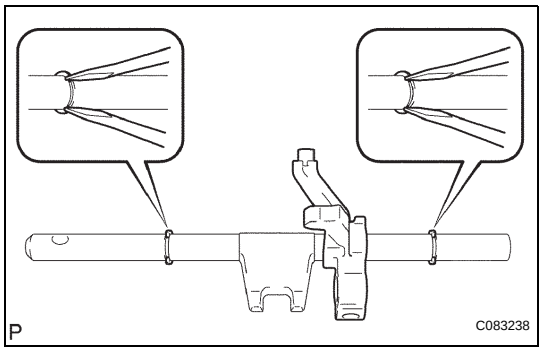
39. REMOVE NO. 1 GEAR SHIFT FORK

(a) Remove the No. 1 gear shift fork.

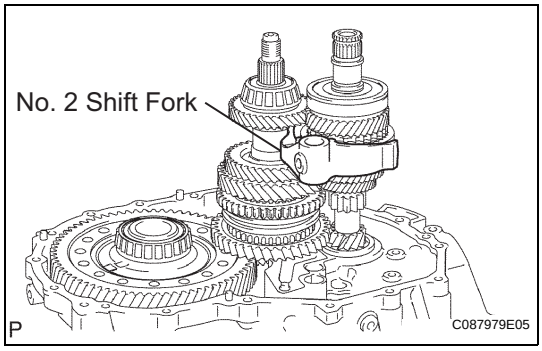


40. REMOVE NO. 3 GEAR SHIFT FORK SHAFT

(a) Remove the No. 3 gear shift fork shaft from the manual transaxle case.

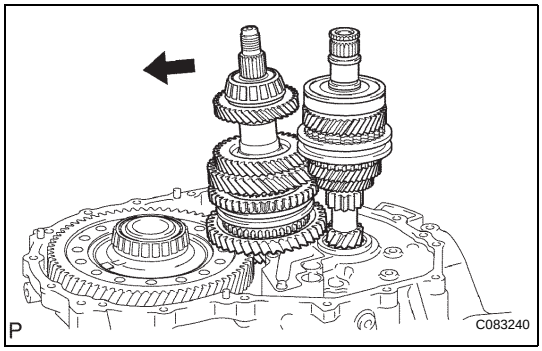


(b) Using 2 screwdrivers and a hammer, remove the 2 shift fork shaft snap rings from the No. 3 gear shift fork shaft.
(c) Remove the reverse shift fork from the No. 3 gear shift fork shaft.



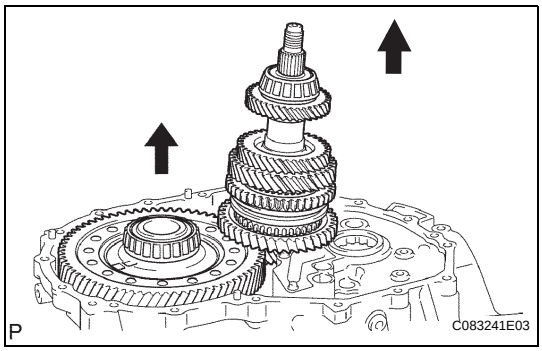
41. REMOVE NO. 2 GEAR SHIFT FORK

(a) Remove the No. 2 gear shift fork from the input shaft assembly.



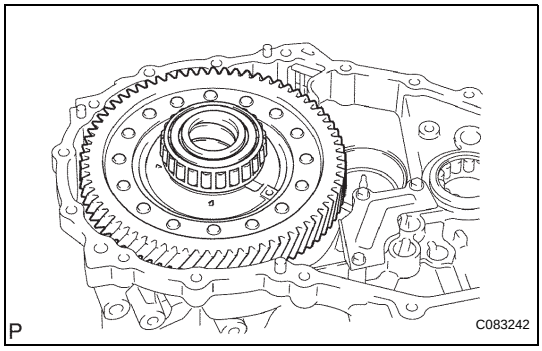
42. REMOVE INPUT SHAFT ASSEMBLY

(a) Tilt the output shaft, then remove the input shaft from the manual transaxle case.



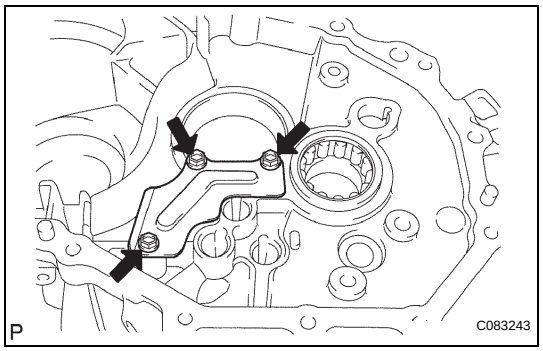
43. REMOVE OUTPUT SHAFT ASSEMBLY

(a) Lift the differential case assembly with the output shaft assembly leaned.
(b) Remove the output shaft assembly from the manual transaxle case.



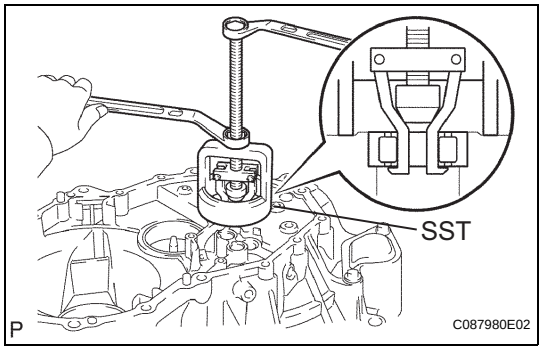
44. REMOVE DIFFERENTIAL CASE ASSEMBLY

(a) Remove the differential case assembly from the manual transaxle case.



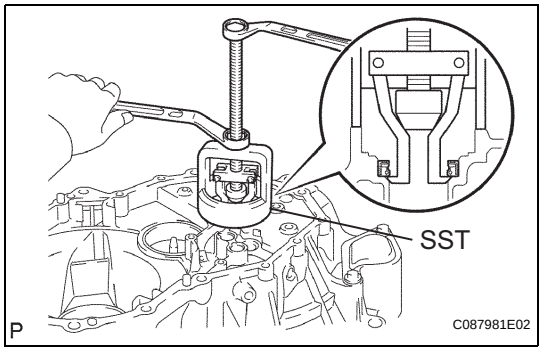
45. REMOVE MANUAL TRANSAXLE CASE RECEIVER

(a) Remove the 3 bolts and manual transaxle case receiver from the manual transaxle case.



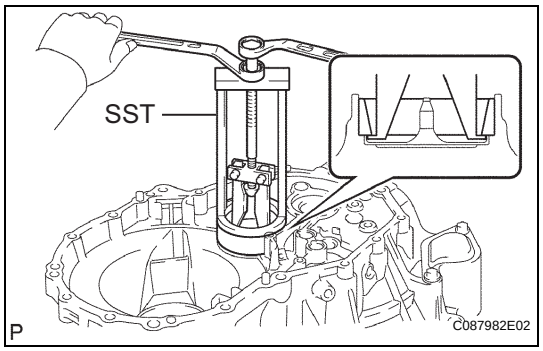
46. REMOVE INPUT SHAFT FRONT BEARING

(a) Using SST, remove the input shaft front bearing (outer race) from the manual transaxle case.
SST 09612-65014 (09612-01040, 09612-01050)



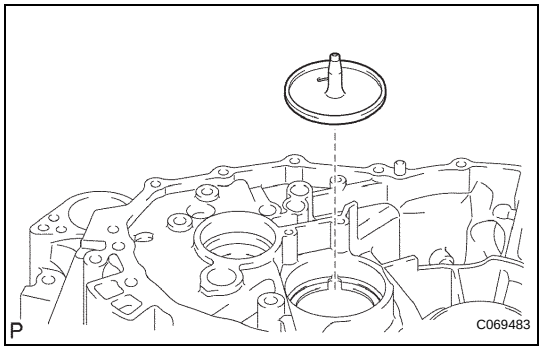
47. REMOVE FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST, remove the manual transaxle case oil seal from the manual transaxle case.
SST 09612-65014 (09612-01040, 09612-01050)



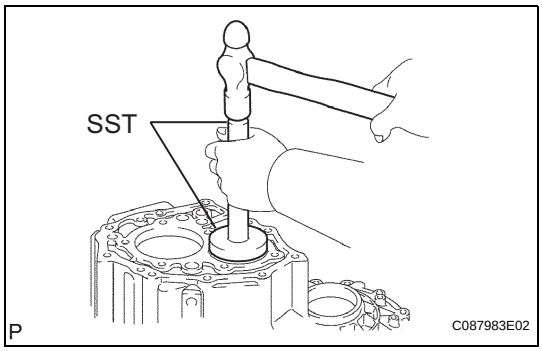
48. REMOVE OUTPUT SHAFT FRONT BEARING

(a) Using SST, remove the output shaft front bearing (outer race) from the manual transaxle case.
SST 09387-00041 (09387-02020, 09387-02010)



49. REMOVE OUTPUT SHAFT COVER

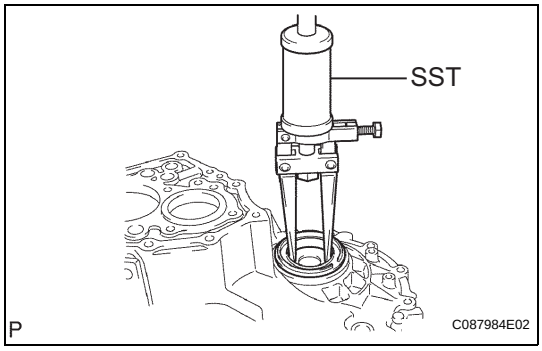
(a) Remove the output shaft cover from the manual transaxle case.



50. REMOVE OUTPUT SHAFT REAR BEARING

(a) Using SST and a hammer, remove the output shaft rear bearing from the manual transmission case (outer race).

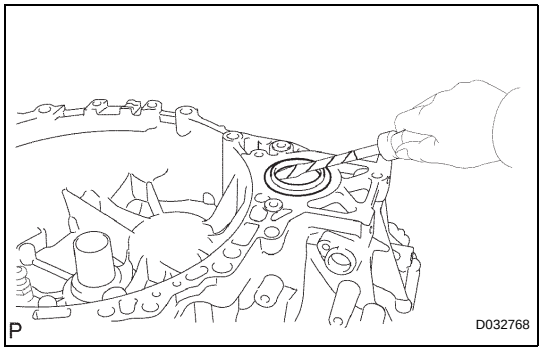
SST 09950-60010 (09951-00680), 09950-70010 (09951-07100)



51. REMOVE TRANSMISSION CASE OIL SEAL

(a) Using SST, remove the transmission case oil seal from the manual transmission case.

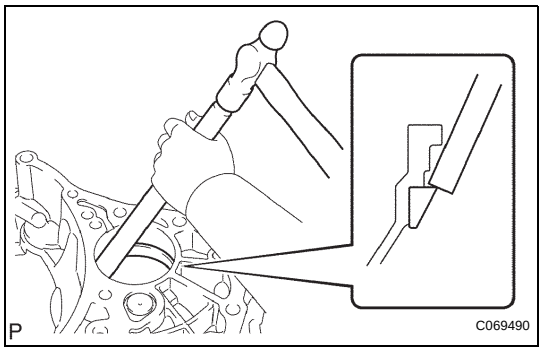
SST 09308-00010



52. REMOVE FRONT TRANSAXLE CASE COVER OIL SEAL

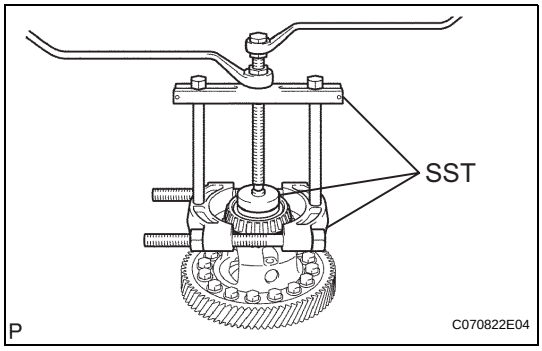
(a) Using a screwdriver, remove the front transaxle case cover oil seal.

HINT:
Tape the screwdriver tip before use to avoid damage.



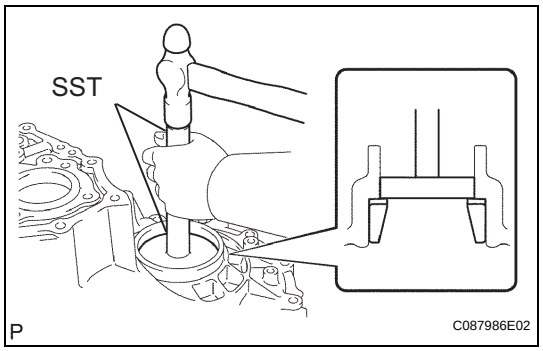
53. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using a brass bar and a hammer, remove the front differential case front tapered roller bearing (outer race) from the manual transaxle case.



(b) Using SST, remove the front differential case front tapered roller bearing from the front differential case.

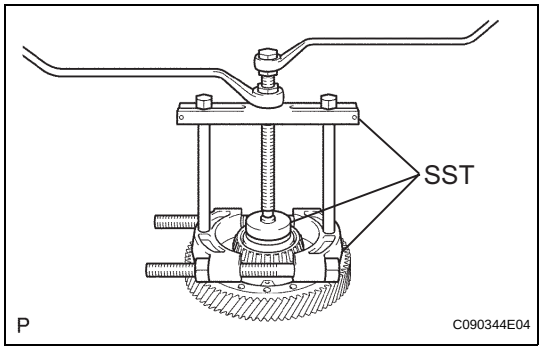
SST 09950-00020, 09950-00030, 09950-40011 (09957-04010), 09950-60010 (09951-00560)



54. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

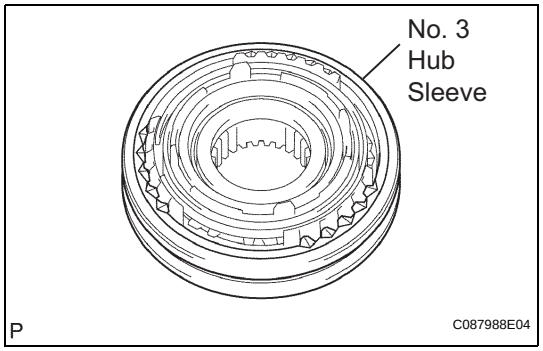
(a) Using SST and a hammer, remove the front differential case rear tapered roller bearing (outer race) and front differential case rear shim from the manual transmission case.

SST 09950-60020 (09951-00790), 09950-70010 (09951-07100)



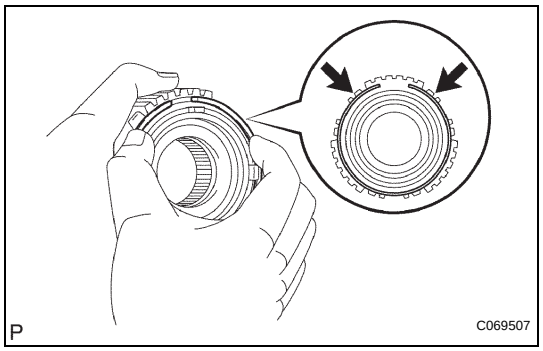
(b) Using SST, remove the front differential case rear tapered roller bearing (inner race) from the front differential case.

SST 09950-60020, 09950-00030, 09950-40011 (09957-04010), 09950-60010 (09951-00490)



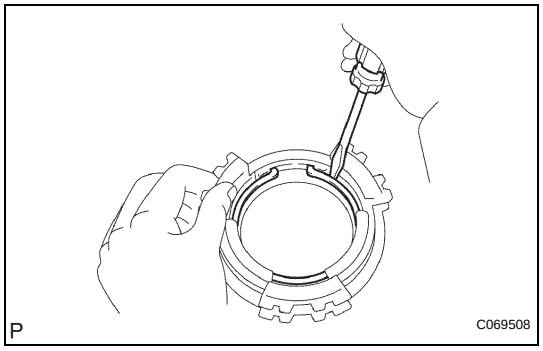
55. REMOVE NO. 3 TRANSMISSION HUB SLEEVE

(a) Remove the No. 3 transmission hub sleeve from the No. 3 transmission clutch hub.



56. REMOVE NO. 3 SYNCHROMESH SHIFTING KEY SPRING

(a) Remove the 2 No. 3 synchromesh shifting key springs from the No. 3 transmission clutch hub while pushing on the No. 3 synchromesh shifting key spring.



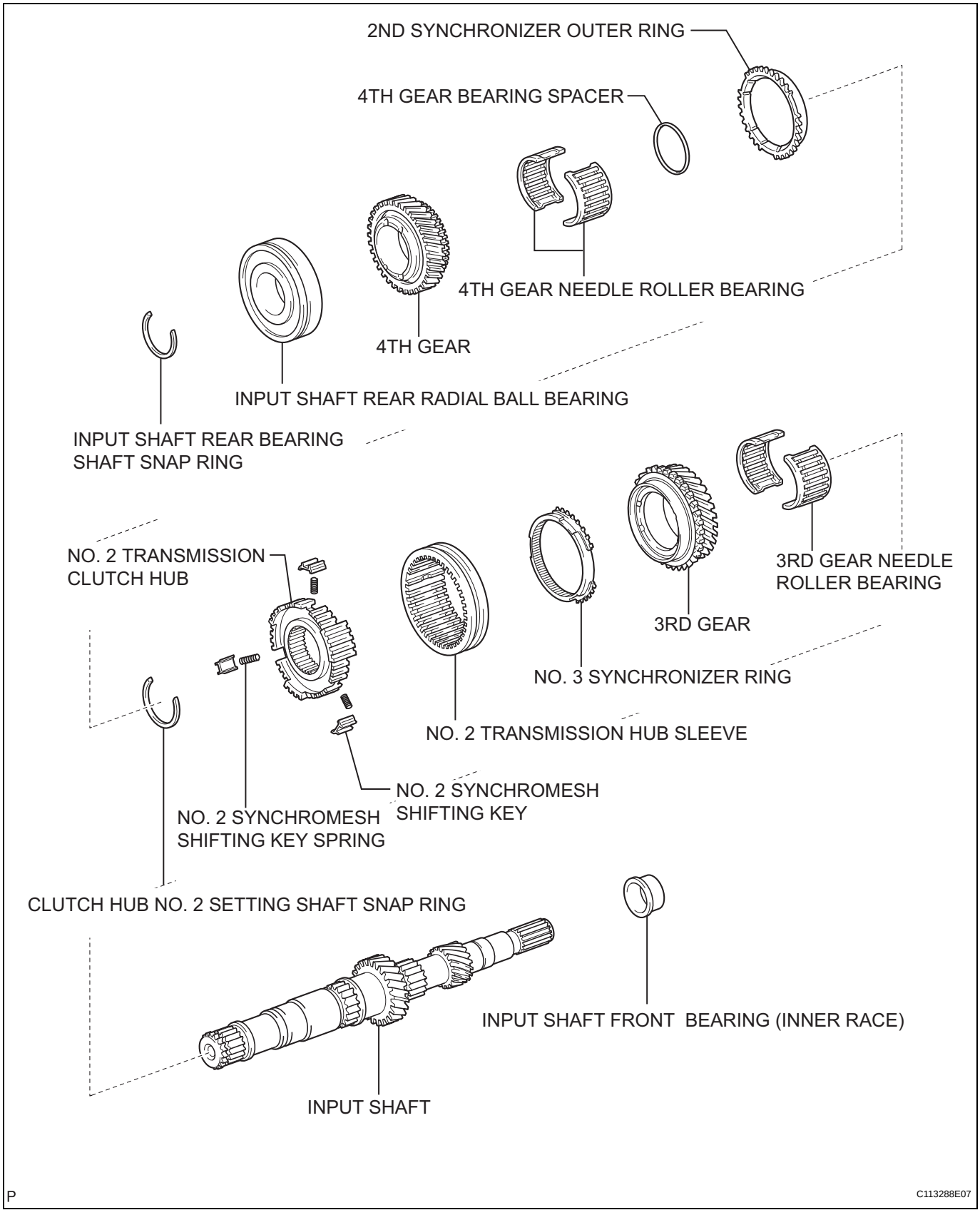
57. REMOVE SYNCHRONIZER PULL RING

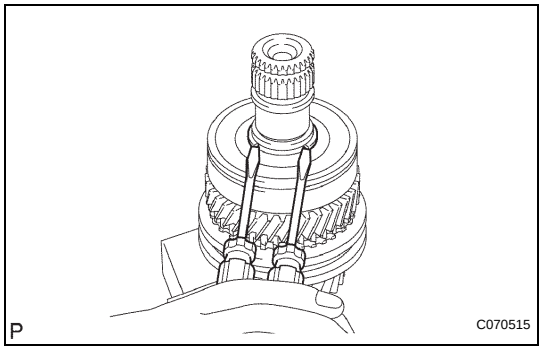
(a) Using a screwdriver, remove the synchronizer pull ring snap ring.

(b) Remove the synchronizer pull ring, No. 5 synchronizer outer ring, No. 5 synchronizer inner ring, and No. 5 synchronizer ring middle from the No. 5 synchronizer ring inner.

INPUT SHAFT

COMPONENTS



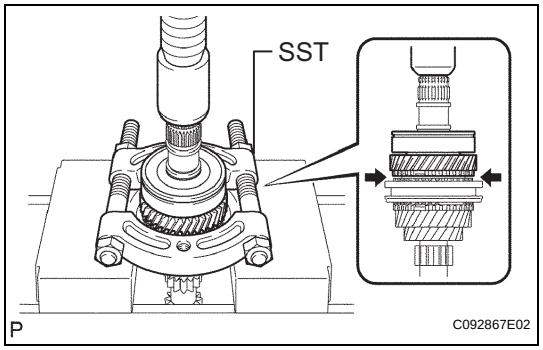


DISASSEMBLY

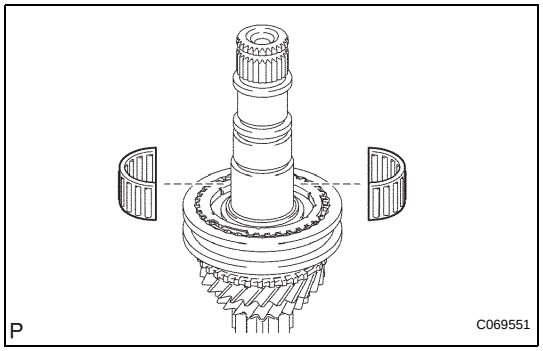
1. REMOVE 4TH GEAR

(a) Hold the input shaft assembly in a vise using aluminum plates.

(b) Using 2 screwdrivers and a hammer, remove the input shaft rear bearing shaft snap ring from the input shaft.
HINT:
Use a shop rag or a piece of cloth to keep the snap ring from flying.

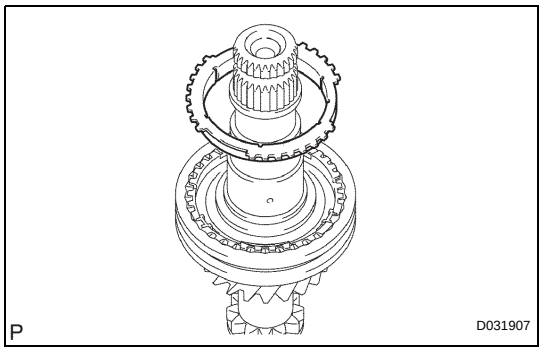


(c) Using SST and a press, remove the input shaft rear bearing and 4th gear.
SST 09950-00020
NOTICE:
Do not overtighten the SST.



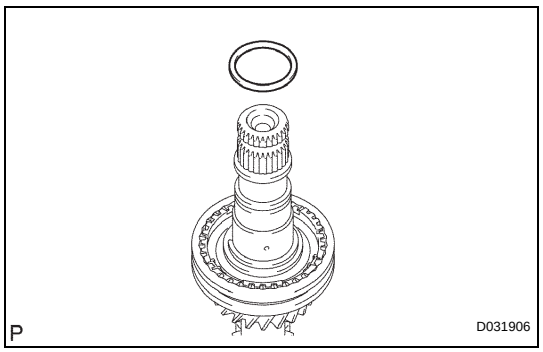
2. REMOVE 4TH GEAR NEEDLE ROLLER BEARING

(a) Remove the 4th gear needle roller bearing from the input shaft.



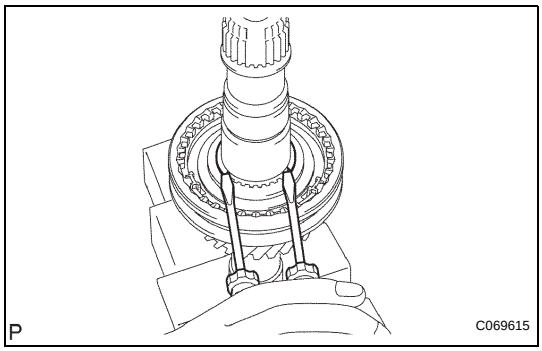
3. REMOVE 2ND SYNCHRONIZER OUTER RING

(a) Remove the 2nd synchronizer outer ring (No. 4 synchronizer ring) from the No. 2 transmission clutch hub.



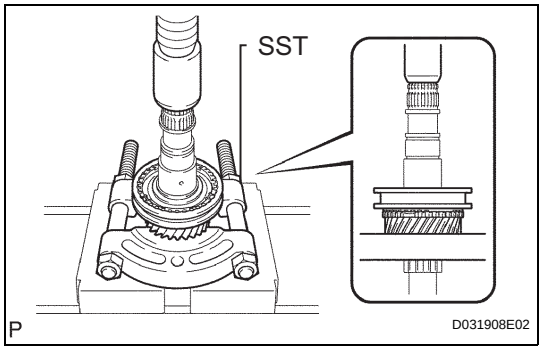
4. REMOVE 4TH GEAR BEARING SPACER

(a) Remove the 4th gear bearing spacer from the No. 2 transmission clutch hub.

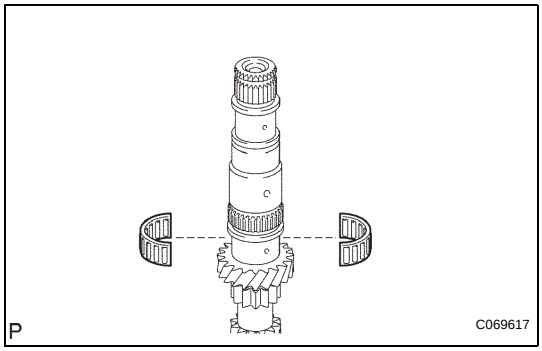


5. REMOVE 3RD GEAR

(a) Using 2 screwdrivers and a hammer, remove the No. 2 clutch hub setting shaft snap ring from the input shaft.
HINT:
Use a shop rag or a piece of cloth to keep the snap ring from flying.

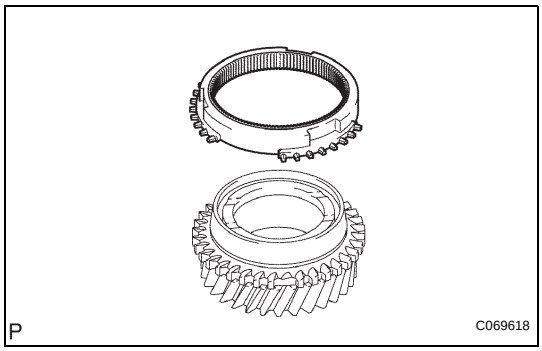


(b) Using SST and a press, remove the No. 2 transmission clutch hub and 3rd gear from the input shaft.
SST 09950-00020
NOTICE:
Do not overtighten the SST.



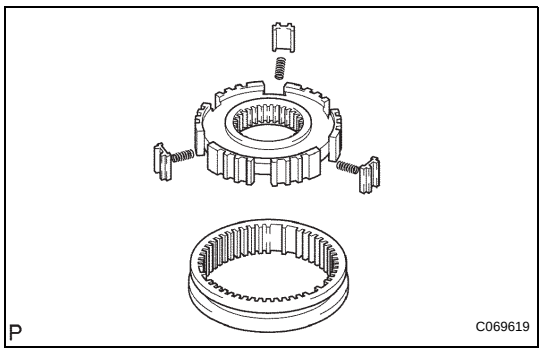
6. REMOVE 3RD GEAR NEEDLE ROLLER BEARING

(a) Remove the 3rd gear needle roller bearing from the input shaft.



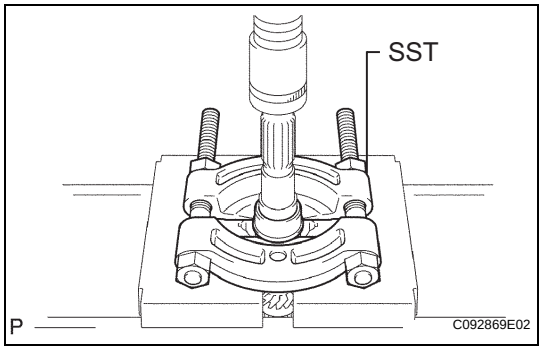
7. REMOVE NO. 3 SYNCHRONIZER RING

(a) Remove the No. 3 synchronizer ring from the 3rd gear.



8. REMOVE NO. 2 TRANSMISSION HUB SLEEVE

(a) Remove the No. 2 transmission hub sleeve, 3 No. 2 synchromesh shifting keys, and 3 No. 2 synchromesh shifting key springs from the No. 2 transmission clutch hub.
HINT:
Use a shop rag or a piece of cloth to keep the shifting keys and shifting key springs from flying.



9. REMOVE INPUT SHAFT FRONT BEARING

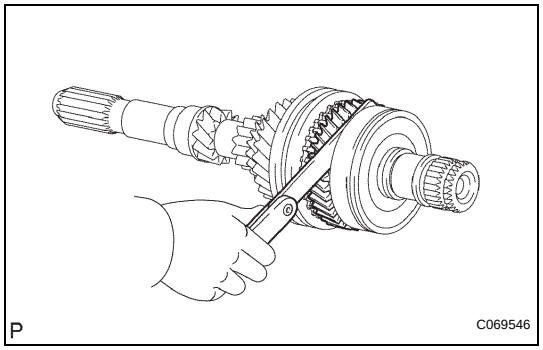
(a) Using SST and a press, remove the input shaft front bearing (inner race) from the input shaft.

SST 09950-00020

NOTICE:

Do not overtighten the SST.

INSPECTION



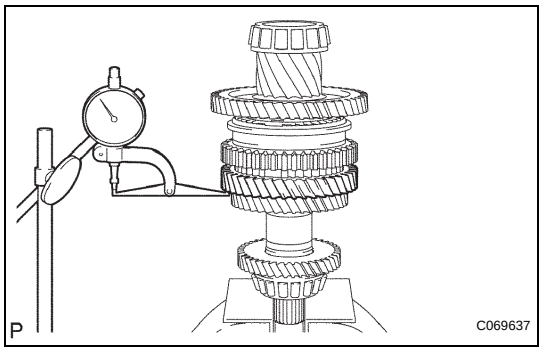
1. INSPECT 4TH GEAR THRUST CLEARANCE

(a) Using a feeler gauge, measure the 4th gear thrust clearance.

Standard clearance:

0.10 to 0.57 mm (0.0039 to 0.0224 in.)

If clearance is out of specification, replace the No. 2 transmission clutch hub, 4th gear, or input shaft rear radial ball bearing.



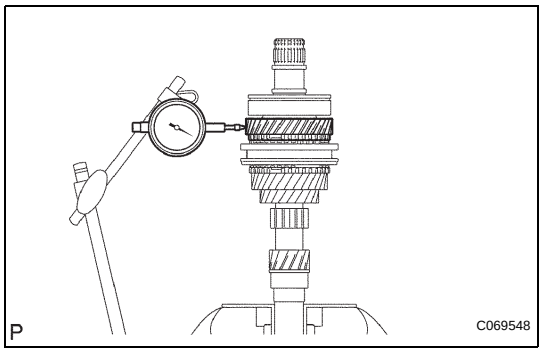
2. INSPECT 3RD GEAR THRUST CLEARANCE

(a) Using a dial indicator, measure the 3rd gear thrust clearance.

Standard clearance:

0.10 to 0.35 mm (0.0039 to 0.0138 in.)

If clearance is out of specification, replace the No. 2 transmission clutch hub, 3rd gear, or input shaft.



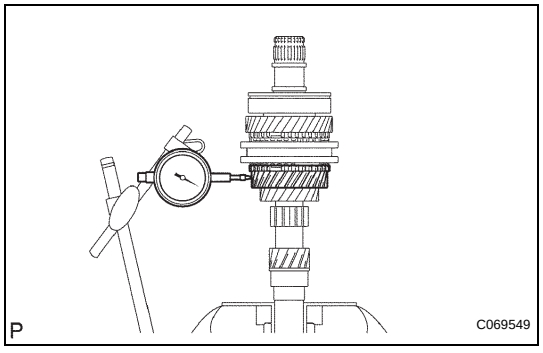
3. INSPECT 4TH GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 4th gear radial clearance.

Standard clearance mm (in.)

Bearing	Standard clearance
KOYO made	0.009 to 0.053 (0.0004 to 0.0021)
NSK made	0.009 to 0.051 (0.0004 to 0.0020)

If clearance is out of specification, replace the 4th gear, needle roller bearing, or input shaft.



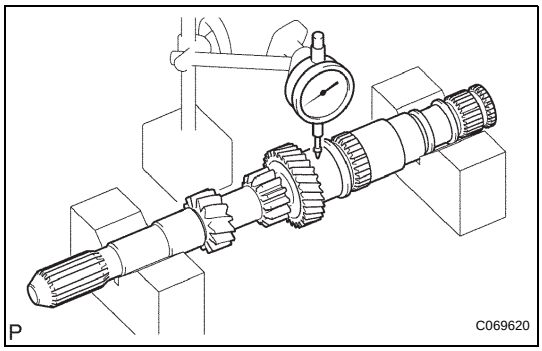
4. INSPECT 3RD GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 3rd gear radial clearance.

Standard clearance mm (in.)

Bearing	Standard clearance
KOYO made	0.009 to 0.053 (0.0004 to 0.0021)
NSK made	0.009 to 0.051 (0.0004 to 0.0020)

If clearance is out of specification, replace the 3rd gear, needle roller bearing, or input shaft.



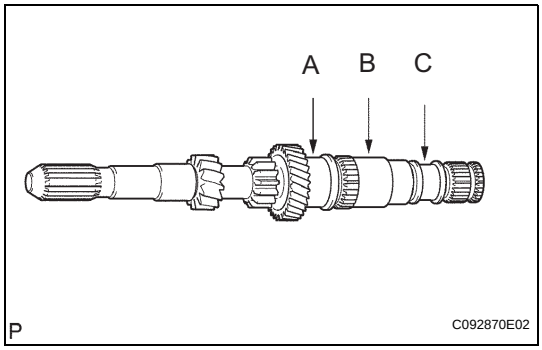
5. INSPECT INPUT SHAFT

(a) Using a V-block and dial indicator, inspect the shaft for runout.

Maximum runout:

0.03 mm (0.0012 in.)

If runout exceeds the maximum, replace the input shaft.

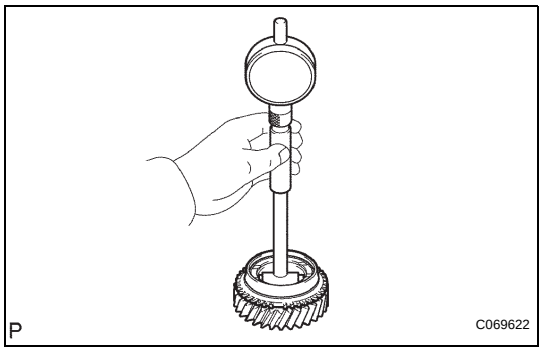


(b) Using a micrometer, measure the outside diameter of the input shaft journal surface.

Outside diameter mm (in.)

Part	Standard outside diameter	Minimum outside diameter
A	35.984 to 36.000 (1.4167 to 1.4173)	35.984 (1.4167)
B	35.984 to 36.000 (1.4167 to 1.4173)	35.984 (1.4167)
C	27.957 to 27.972 (1.1007 to 1.1013)	27.957 (1.1007)

If the outside diameter is less than the minimum, replace the input shaft.



6. INSPECT 4TH GEAR

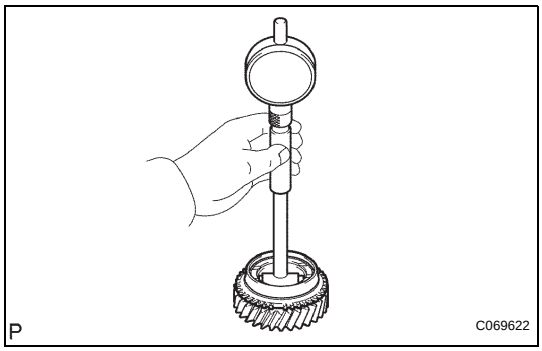
(a) Using a cylinder gauge, measure the inside diameter of the 4th gear.

Inside diameter:

mm (in.)

Standard inside diameter	Maximum inside diameter
42.009 to 42.025 (1.6539 to 1.6545)	42.025 (1.6545)

If the inside diameter exceeds the maximum, replace the 4th gear.



7. INSPECT 3RD GEAR

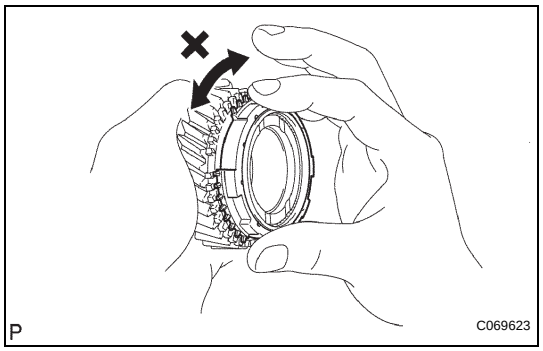
(a) Using a cylinder gauge, measure the inside diameter of the 3rd gear.

Inside diameter:

mm (in.)

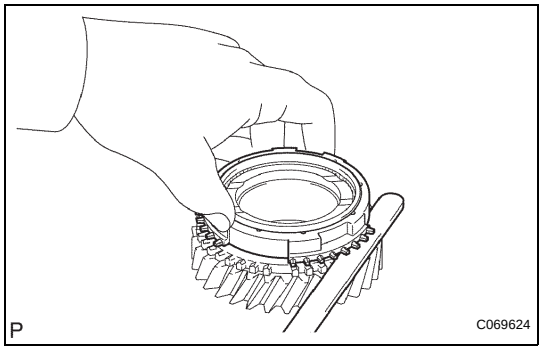
Standard inside diameter	Maximum inside diameter
43.009 to 43.025 (1.6933 to 1.6939)	43.025 (1.6939)

If the inside diameter exceeds the maximum, replace the 3rd gear.

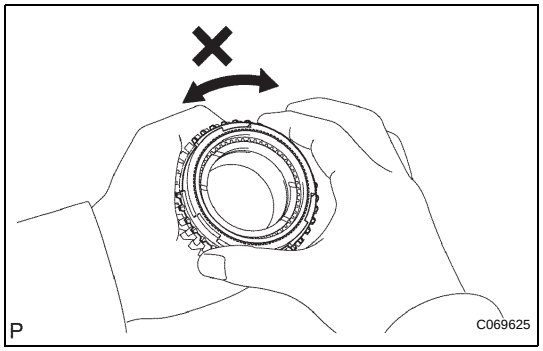


8. INSPECT 2ND SYNCHRONIZER OUTER RING

(a) Coat the 4th gear cone with gear oil. Turn the 2nd synchronizer outer ring (No. 4 synchronizer ring) in one direction while pushing it against the 4th gear cone. Check that the ring locks.
If the 2nd synchronizer outer ring does not lock, replace the ring or the 4th gear.

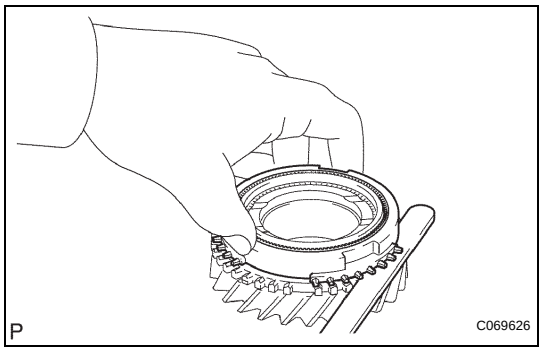


(b) Using a feeler gauge, measure the clearance between the synchronizer outer ring (No. 4 synchronizer ring) back and 4th gear spline end.
Standard clearance:
0.75 to 1.65 mm (0.0295 to 0.0650 in.)
If clearance is out of specification, replace the synchronizer ring.

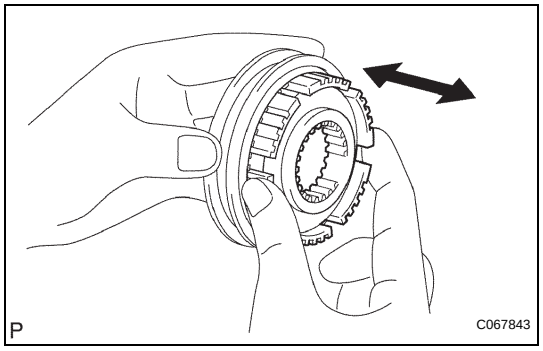


9. INSPECT NO. 3 SYNCHRONIZER RING

(a) Coat the 3rd gear cone with gear oil. Turn the synchronizer outer ring in one direction while pushing it against the 3rd gear cone. Check that the ring locks.
If the synchronizer outer ring does not lock, replace the ring or the 3rd gear.



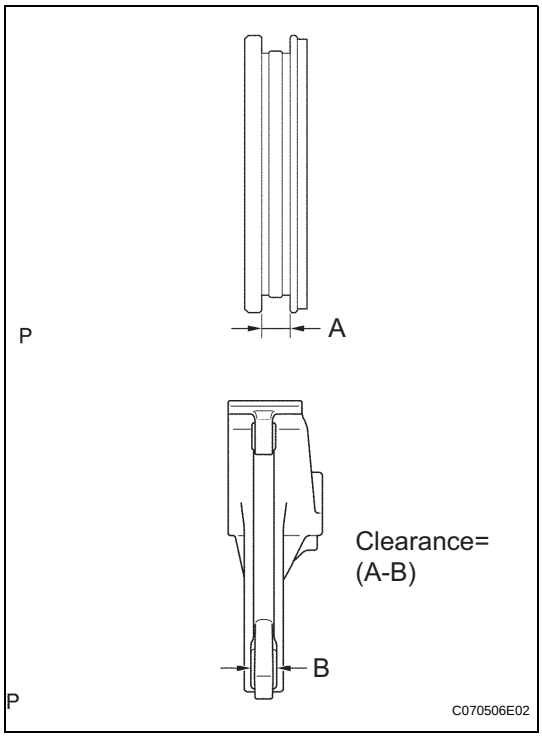
(b) Using a feeler gauge, measure the clearance between the No. 3 synchronizer ring back and 3rd gear spline end.
Standard clearance:
0.65 to 1.75 mm (0.0256 to 0.0689 in.)
If clearance is out of specification, replace the No. 3 synchronizer ring.



10. INSPECT NO. 2 TRANSMISSION HUB SLEEVE

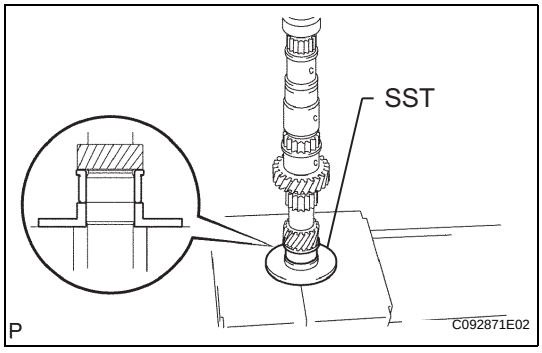
(a) Inspect the sliding condition between the No. 2 transmission hub sleeve and No. 2 transmission clutch hub.

(b) Inspect the tip of the spline gear on the No. 2 transmission hub sleeve for wear.
If any defects are found, replace the transmission hub sleeve or the transmission clutch hub.



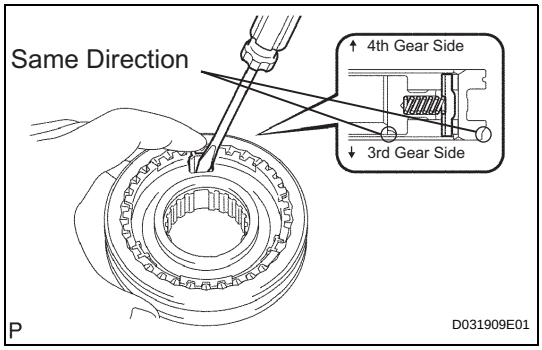
(c) Using vernier calipers, measure the width of the No. 3 transmission hub sleeve groove and the thickness of the claw part on the No. 1 gear shift fork, and calculate the clearance.
Standard clearance:
0.11 to 0.69 mm (0.0043 to 0.0272 in.) {A - B}
If clearance is out of specification, replace the No. 2 transmission hub sleeve and No. 2 gear shift fork with new ones.

REASSEMBLY



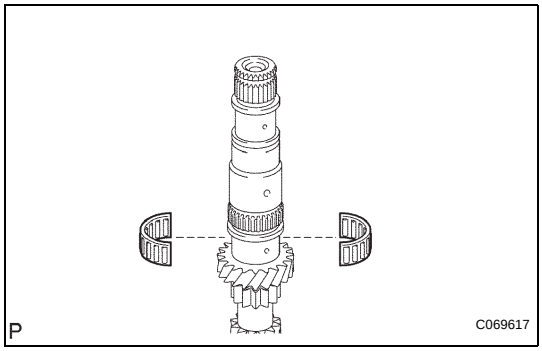
1. INSTALL INPUT SHAFT FRONT BEARING

(a) Using SST and a press, install the input shaft front bearing (inner race).
SST 09608-00071



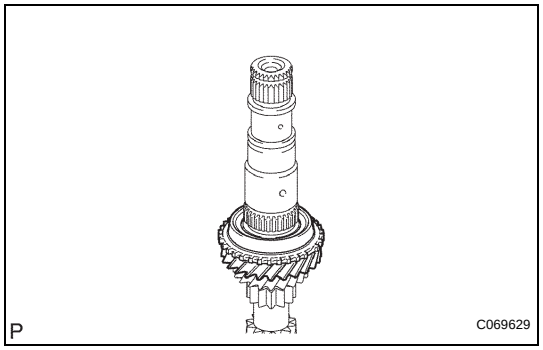
2. INSTALL NO. 2 TRANSMISSION HUB SLEEVE

(a) Coat the transmission No. 2 hub sleeve with gear oil.
(b) Install the 3 synchromesh key springs with the No. 2 transmission hub sleeve.
NOTICE:
Install the No. 2 transmission clutch hub sleeve and the No. 2 transmission clutch hub in the correct direction.
(c) Using a screwdriver, install the synchromesh shifting key to the input shaft.



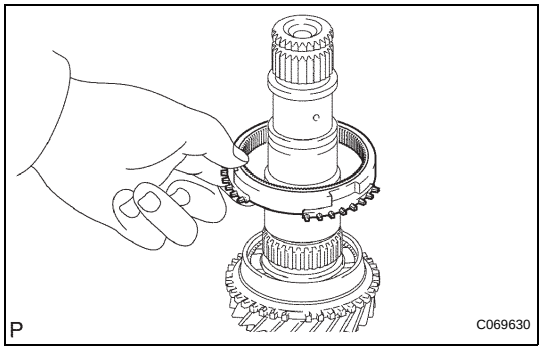
3. INSTALL 3RD GEAR NEEDLE ROLLER BEARING

(a) Coat the 3rd gear bearing with gear oil and install it to the input shaft.



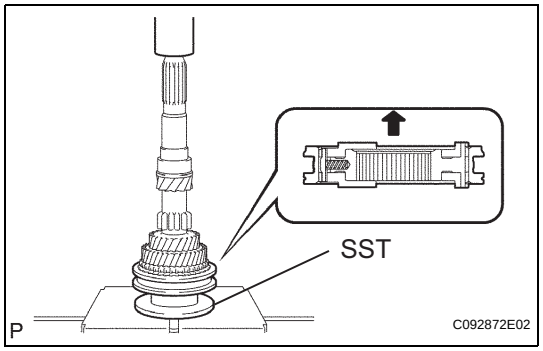
4. INSTALL 3RD GEAR

(a) Coat the 3rd gear with gear oil and install it to the input shaft.



5. INSTALL NO. 3 SYNCHRONIZER RING

(a) Coat the No. 3 synchronizer ring with gear oil and install it to the 3rd gear.



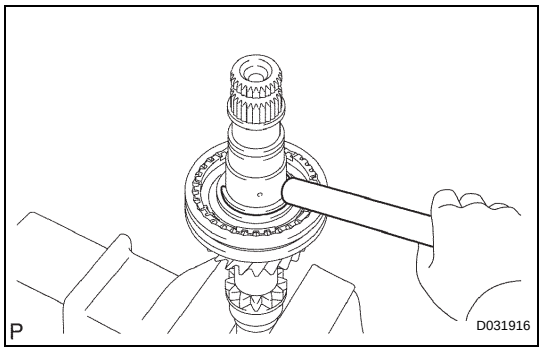
6. INSTALL NO. 2 TRANSMISSION CLUTCH HUB

(a) Using SST and a press, install the No. 2 transmission clutch hub to the input shaft.

SST 09316-60011 (09316-00041)

NOTICE:

- **Align the claw of the clutch hub No. 2 with the notch of the synchronizer ring No. 3.**
- **Make sure that the 3rd gear can rotate.**



(b) Select a snap ring so that clearance between the No. 2 transmission clutch hub and the No. 2 clutch hub shaft snap ring will be within the specified range. Using a brass bar and a hammer, install the snap ring.

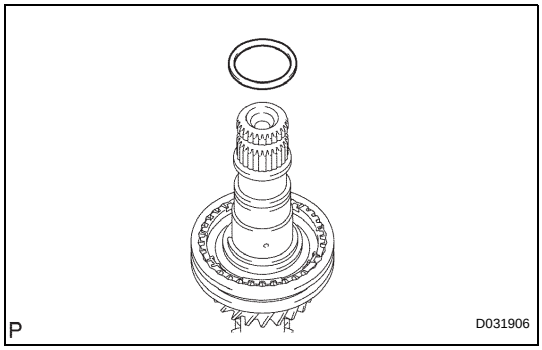
Standard clearance:

0.1 mm or less (0.0039 in.) or less

Snap ring thickness

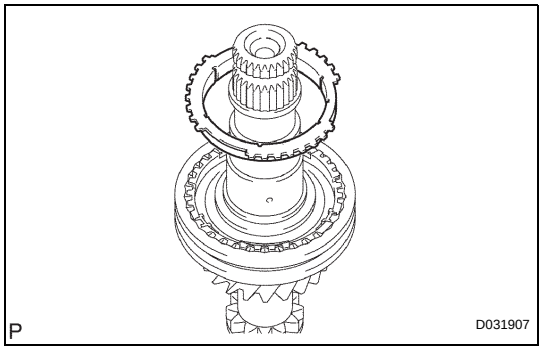
Part No.	Thickness: mm (in.)	Mark
90520-34003	2.30 to 2.35 (0.0906 to 0.0925)	H
90520-34004	2.35 to 2.40 (0.0925 to 0.0945)	J
90520-34005	2.40 to 2.45 (0.0945 to 0.0965)	K
90520-34006	2.45 to 2.50 (0.0965 to 0.0984)	L
90520-34007	2.50 to 2.55 (0.0984 to 0.1004)	M
90520-34008	2.55 to 2.60 (0.1004 to 0.1024)	N

Part No.	Thickness: mm (in.)	Mark
90520-34009	2.60 to 2.65 (0.1024 to 0.1043)	P



7. INSTALL 4TH GEAR BEARING SPACER

(a) Coat the 4th gear bearing spacer with gear oil and install it to the input shaft.

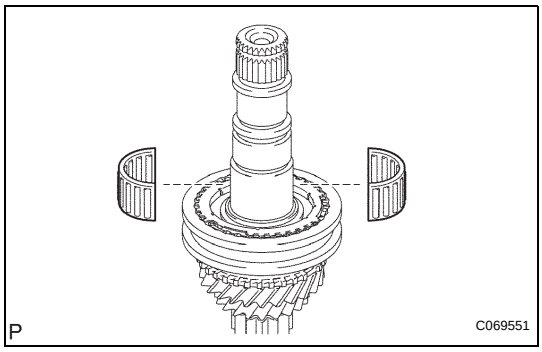


8. INSTALL 2ND SYNCHRONIZER OUTER RING

(a) Coat the 2nd synchronizer outer ring (No. 4 synchronizer ring) with gear oil and install it to the No. 2 transmission clutch hub.

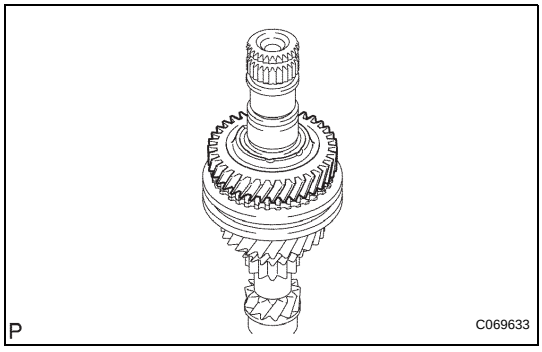
NOTICE:

Align the claw of the No. 2 clutch hub with the notch of the 2nd synchronizer outer ring (No. 4 synchronizer ring).



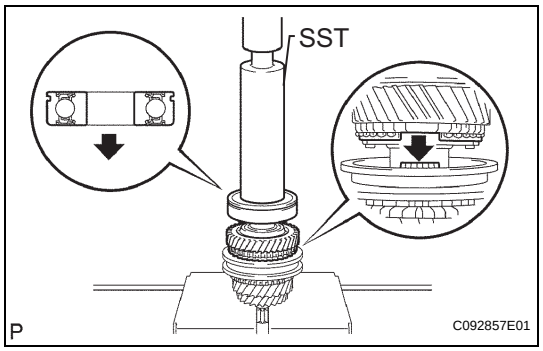
9. INSTALL 4TH GEAR NEEDLE ROLLER BEARING

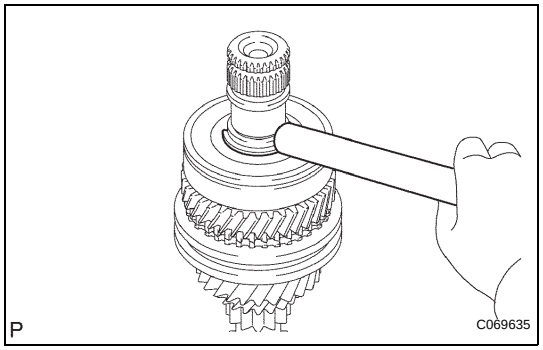
(a) Coat the 4th gear needle roller bearing with gear oil and install it to the input shaft.



10. INSTALL 4TH GEAR

(a) Coat the 4th gear with gear oil and install it to the input shaft.





11. INSTALL INPUT SHAFT REAR RADIAL BALL BEARING

(a) Using SST and a press, install the input shaft rear radial ball bearing to the input shaft.

SST 09608-06041

NOTICE:

- **Install the bearing with its groove facing rearward.**
- **Make sure that the 3rd gear rotates.**

(b) Select a snap ring so that the clearance between the input shaft radial ball rear bearing and the input shaft rear bearing snap ring will be within the specified range. Using a brass bar and a hammer, install the snap ring.

Standard clearance:

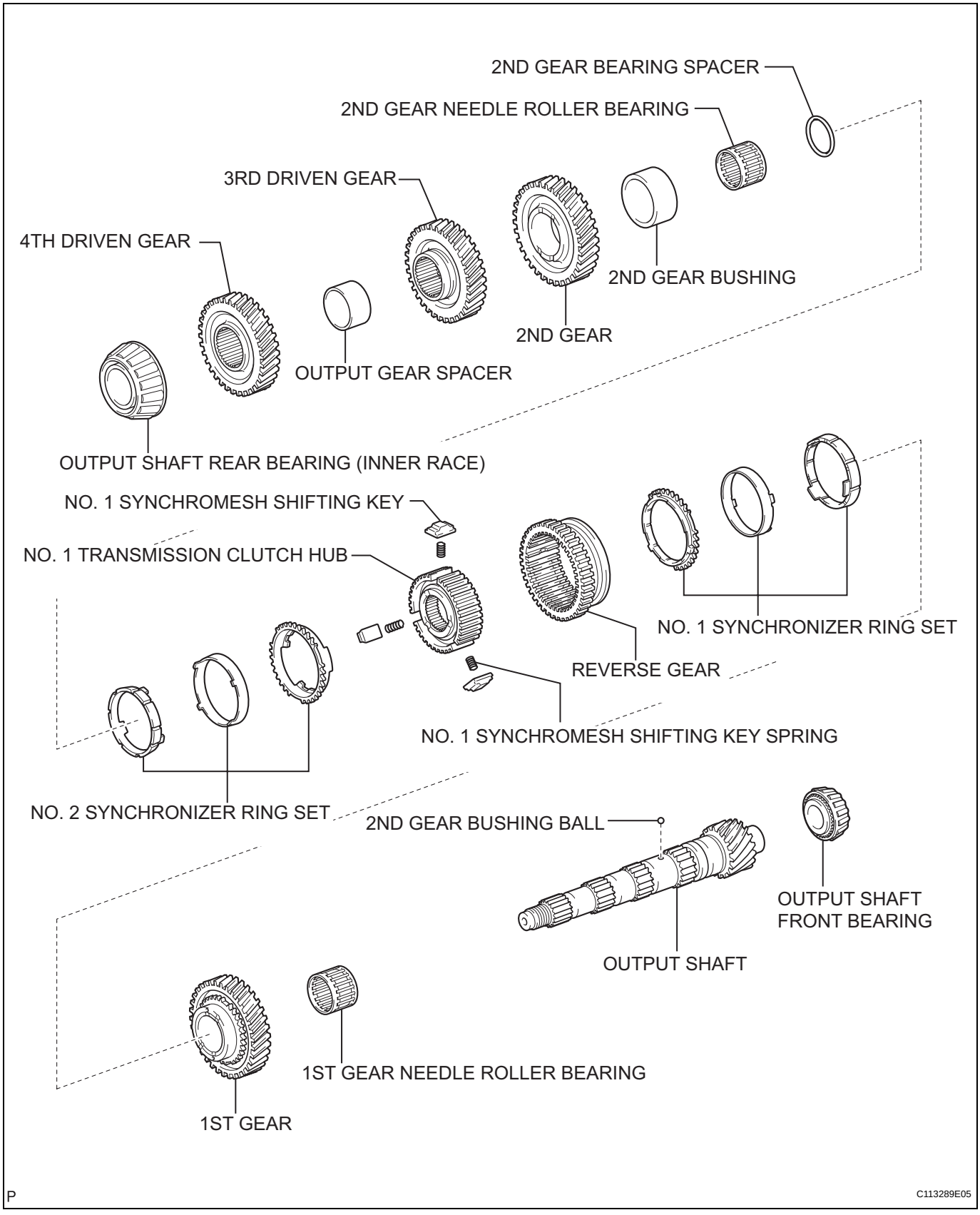
0.1 mm (0.004 in.) or less

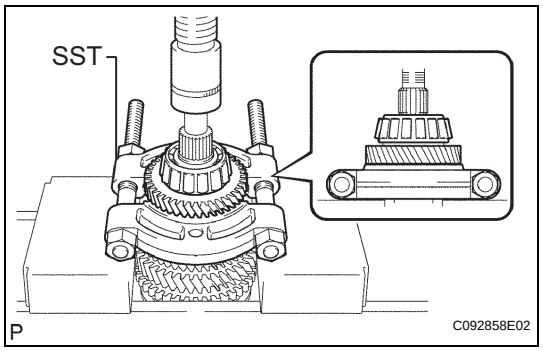
Snap ring

Part No.	Thickness: mm (in.)	Mark
90520-30008	2.35 to 2.40 (0.0925 to 0.0945)	1
90520-30009	2.40 to 2.45 (0.0945 to 0.0965)	2
90520-30010	2.45 to 2.50 (0.0965 to 0.0984)	3
90520-30011	2.50 to 2.55 (0.0984 to 0.1004)	4
90520-30012	2.55 to 2.60 (0.1004 to 0.1024)	5
90520-30013	2.60 to 2.65 (0.1024 to 0.1043)	6
90520-30021	2.65 to 2.70 (0.1043 to 0.1063)	7
90520-30022	2.70 to 2.75 (0.1063 to 0.1083)	8

OUTPUT SHAFT

COMPONENTS

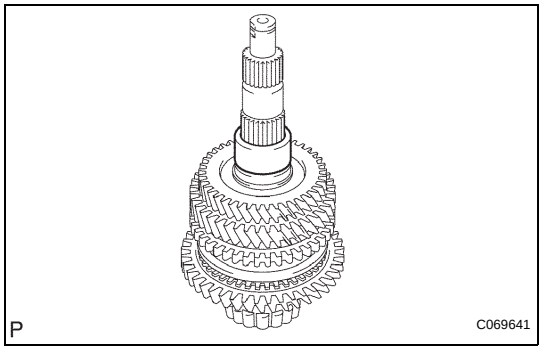




DISASSEMBLY

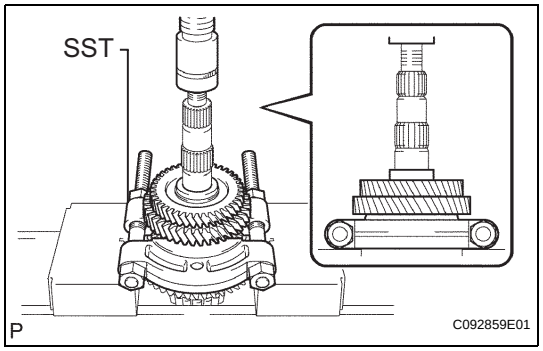
1. REMOVE 4TH DRIVEN GEAR

(a) Using SST and a press, remove the output shaft rear bearing (inner race) and 4th driven gear.
SST 09950-00020



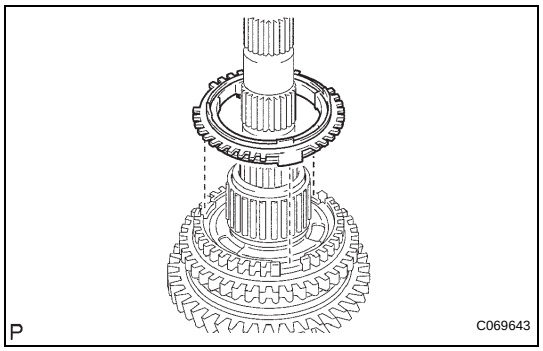
2. REMOVE OUTPUT GEAR SPACER

(a) Remove the output gear spacer from the output shaft.



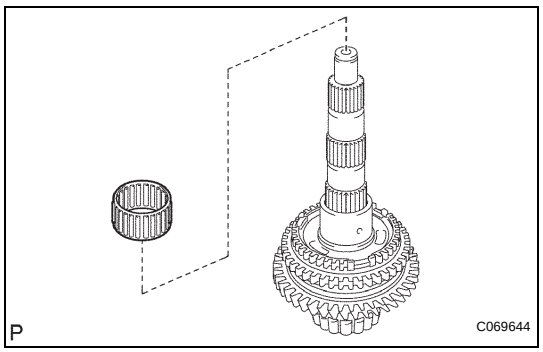
3. REMOVE 2ND GEAR

(a) Using SST and a press, remove the 3rd driven gear and 2nd gear from the output shaft.
SST 09950-00020



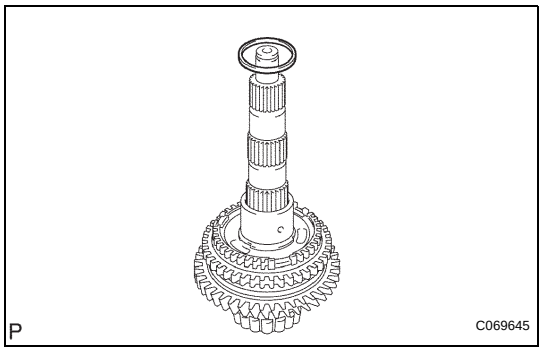
4. REMOVE NO. 2 SYNCHRONIZER RING SET

(a) Remove the No. 2 synchronizer ring set from the No. 1 transmission clutch hub.



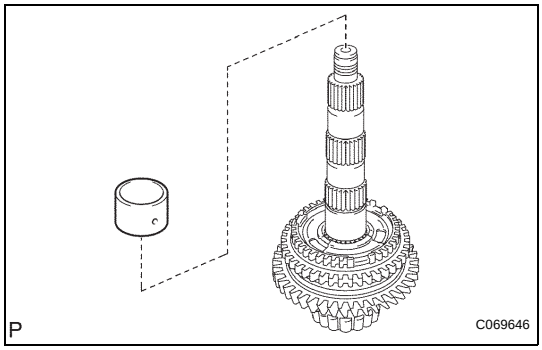
5. REMOVE 2ND GEAR NEEDLE ROLLER BEARING

(a) Remove the 2nd gear needle roller bearing from the output shaft.



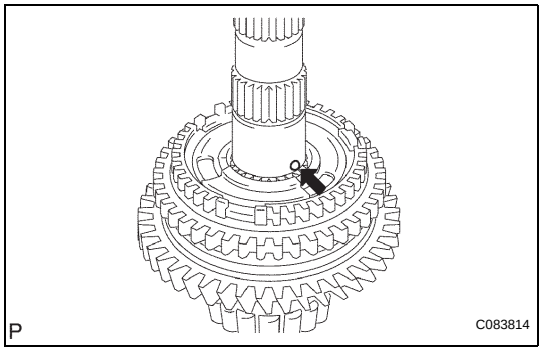
6. REMOVE 2ND GEAR BEARING SPACER

(a) Remove the 2nd gear bearing spacer from the output shaft.



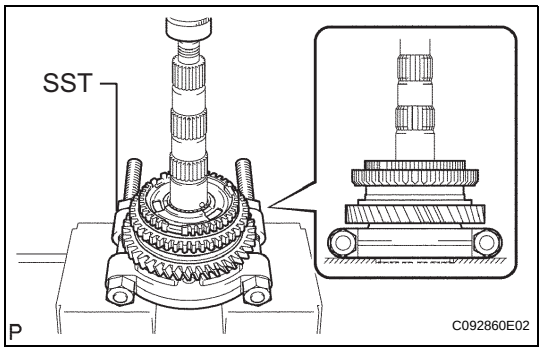
7. REMOVE 2ND GEAR BUSHING

(a) Remove the 2nd gear bushing from the output shaft.



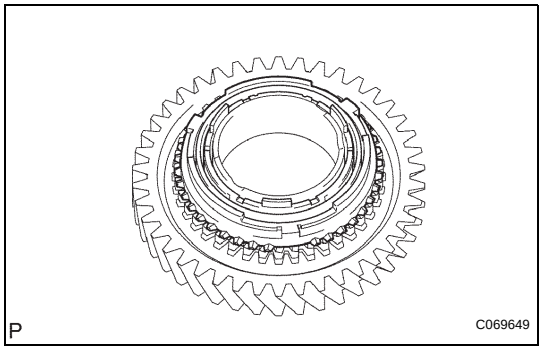
8. REMOVE 2ND GEAR BUSHING BALL

(a) Using a magnetic finger, remove the 2nd gear bush ball from the output shaft.



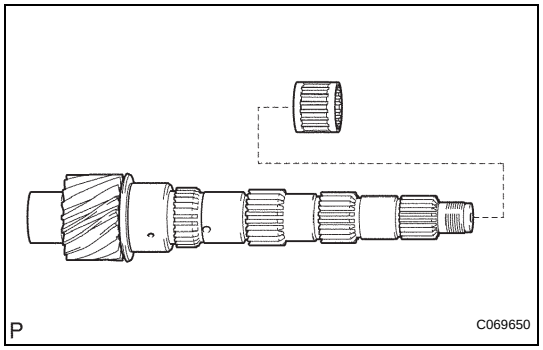
9. REMOVE 1ST GEAR

(a) Using SST and a press, remove the No. 1 transmission clutch hub and 1st gear from the output shaft.
SST 09950-00020



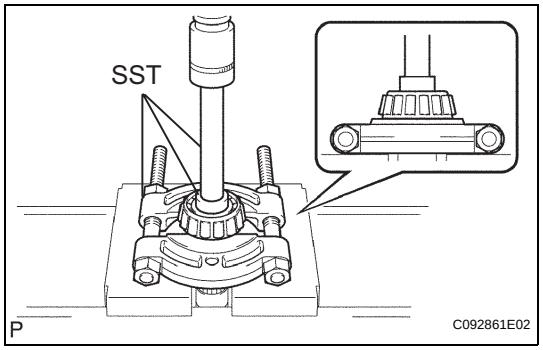
10. REMOVE NO. 1 SYNCHRONIZER RING SET

(a) Remove the No. 1 synchronizer ring set from the 1st gear.



11. REMOVE 1ST GEAR NEEDLE ROLLER BEARING

(a) Remove the 1st gear needle roller bearing from the output shaft.



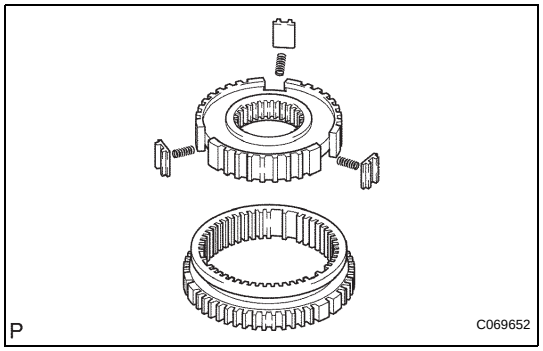
12. REMOVE OUTPUT SHAFT FRONT BEARING

(a) Using SST and a press, remove the output shaft front bearing (inner race) from the output shaft.

SST 09950-00020, 09950-60010 (09951-00320), 09950-70010 (09951-07150)

NOTICE:

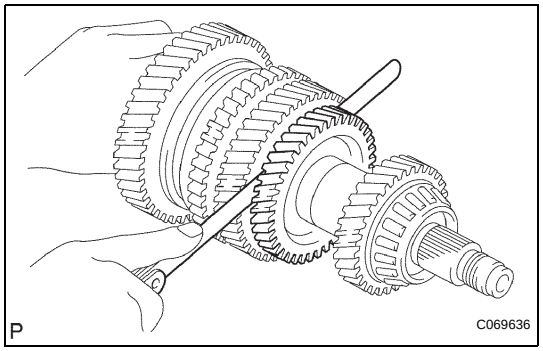
Do not overtighten the SST.



13. REMOVE REVERSE GEAR

(a) Remove the No. 1 transmission clutch hub, 3 No. 1 synchromesh shifting keys, and 3 No. 1 synchromesh shifting key springs from the reverse gear.

INSPECTION



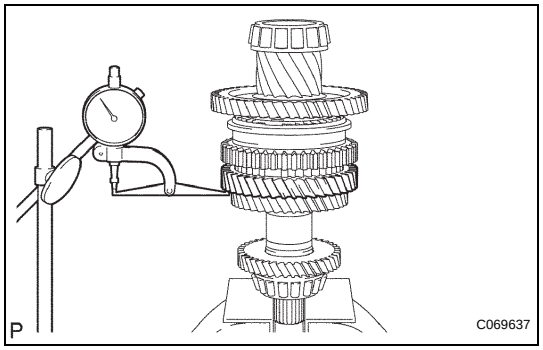
1. INSPECT 1ST GEAR THRUST CLEARANCE

(a) Using a feeler gauge, measure the 1st gear thrust clearance.

Standard clearance:

0.25 to 0.40 mm (0.0098 to 0.0157 in.)

If clearance is out of specification, replace the 1st gear, thrust washer, 1st gear, or No. 1 transmission clutch hub.



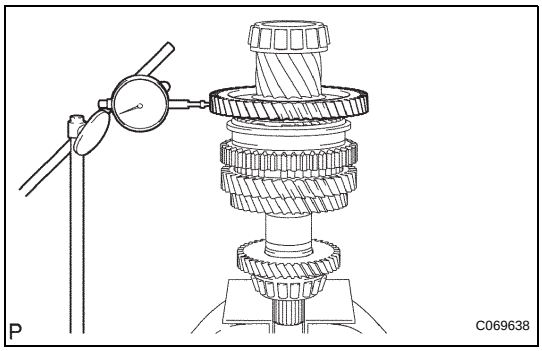
2. INSPECT 2ND GEAR THRUST CLEARANCE

(a) Using a dial indicator, measure the 2nd gear thrust clearance.

Standard clearance:

0.10 to 0.35 mm (0.0039 to 0.0138 in.)

If clearance is out of specification, replace the No. 1 transmission clutch hub, 2nd gear, or 3rd driven gear.



MX

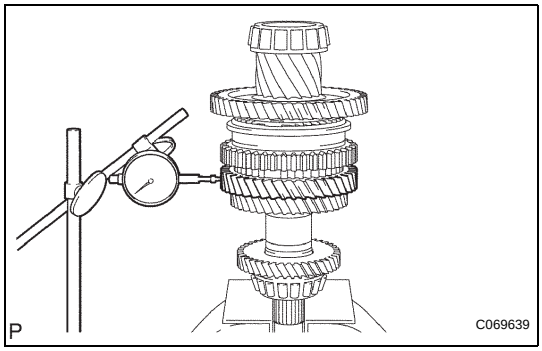
3. INSPECT 1ST GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 1st gear radial clearance.

Standard clearance mm (in.)

Bearing	Standard clearance
KOYO made	0.009 to 0.053 (0.0004 to 0.0021)
NSK made	0.009 to 0.051 (0.0004 to 0.0020)

If clearance is out of specification, replace the 1st gear and 1st gear needle roller bearing.



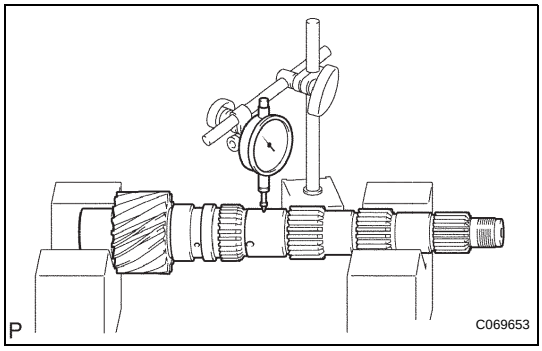
4. INSPECT 2ND GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 2nd gear radial clearance.

Standard clearance mm (in.)

Bearing	Standard clearance
KOYO made	0.009 to 0.053 (0.0004 to 0.0021)
NSK made	0.009 to 0.051 (0.0004 to 0.0020)

If clearance is out of specification, replace the 2nd gear and 2nd gear needle roller bearing.



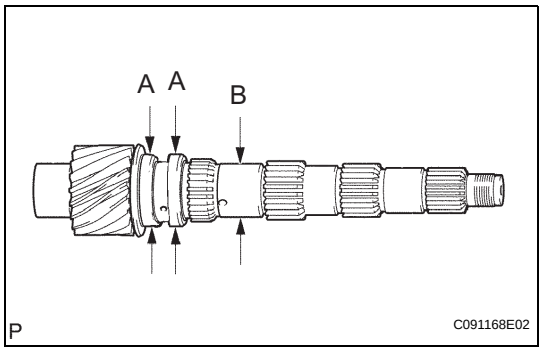
5. INSPECT OUTPUT SHAFT

(a) Using a V-block and a dial indicator, inspect the shaft for runout.

Maximum runout:

0.03 mm (0.0012 in.)

If runout exceeds the maximum, replace the input shaft.

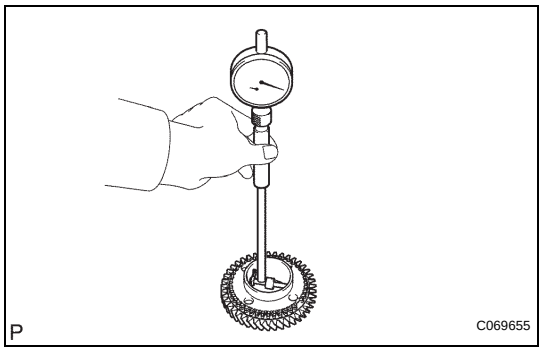


(b) Using a micrometer, measure the outside diameter of the output shaft journal surface.

Outside diameter mm (in.)

Part	Standard outside diameter	Minimum outside diameter
A	37.610 to 37.626 (1.4807 to 1.4813)	37.610 (1.4807)
B	34.502 to 34.512 (1.3583 to 1.3587)	34.502 (1.3583)

If the outside diameter is less than the minimum, replace the input shaft.

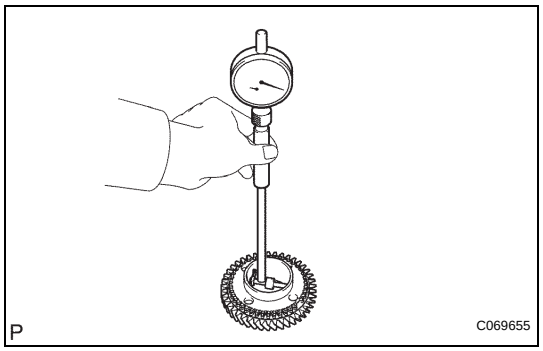


6. INSPECT 2ND GEAR

(a) Using a cylinder gauge, measure the inside diameter of the 2nd gear.
Inside diameter:
mm (in.)

Standard inside diameter	Maximum inside diameter
50.009 to 50.025 (1.9689 to 1.9695)	50.025 (1.9695)

If the inside diameter exceeds the maximum, replace the 2nd gear.

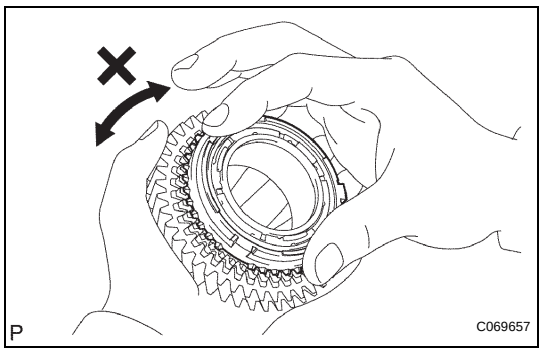


7. INSPECT 1ST GEAR

(a) Using a cylinder gauge, measure the inside diameter of the 1st gear.
Inside diameter mm (in.)

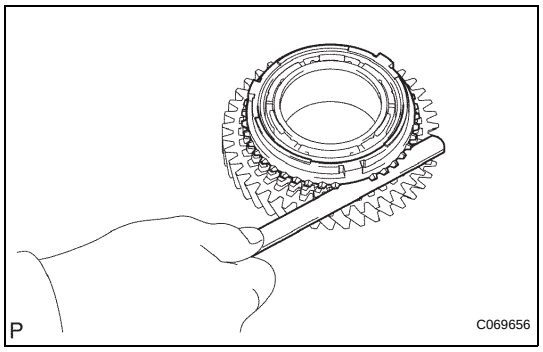
Standard inside diameter	Maximum inside diameter
51.009 to 51.025 (2.0082 to 2.0089)	51.025 (2.0089)

If the inside diameter exceeds the maximum, replace the 1st gear.

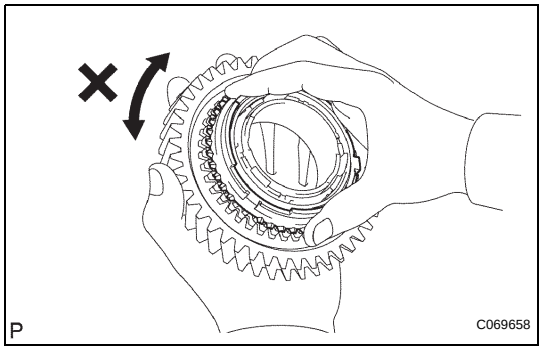


8. INSPECT NO. 2 SYNCHRONIZER RING SET

(a) Coat the 2nd gear cone with gear oil. Turn the No. 2 synchronizer ring set in one direction while pushing it against the No. 2 synchronizer ring. Check that the ring locks.
If the No. 2 synchronizer ring set does not lock, replace the ring or 2nd gear.



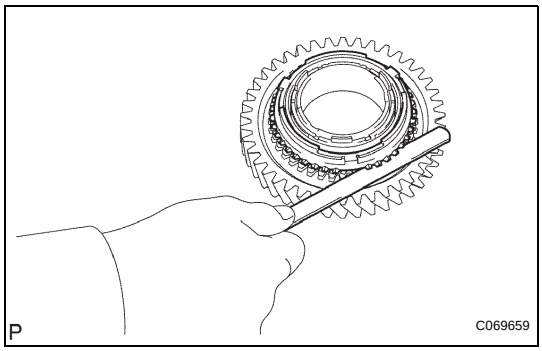
(b) Check the clearance between the No. 2 synchronizer ring and 2nd gear while pushing the 2nd gear against the No. 2 synchronizer ring.
Standard clearance:
0.70 to 1.45 mm (0.0276 to 0.0571 in.)
If clearance is out of specification, replace the No. 2 synchronizer ring set with a new one.



9. INSPECT NO. 1 SYNCHRONIZER RING SET

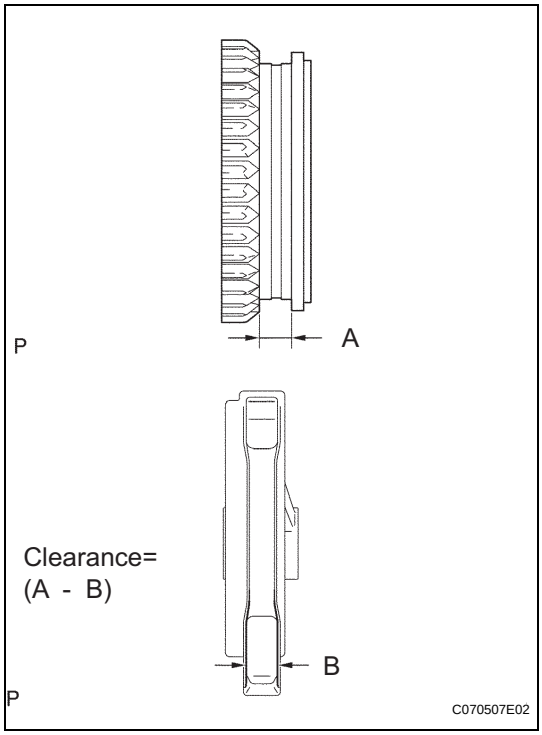
(a) Coat the 1st gear cone with gear oil. Turn the No. 1 synchronizer ring set in one direction while pushing it against the 1st gear cone. Check that the ring locks.
If the No. 1 synchronizer ring set does not lock, replace the No. 1 synchronizer ring set with a new one.

MX

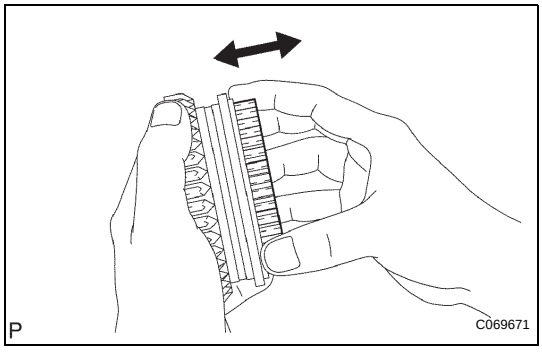


(b) Check the clearance between the No. 1 synchronizer ring set and 1st gear while pushing the 1st gear against the cone of the No. 1 synchronizer ring set.
Standard clearance:
0.70 to 1.45 mm (0.0276 to 0.0571 in.)
If clearance is out of specification, replace the No. 1 synchronizer ring set with a new one.

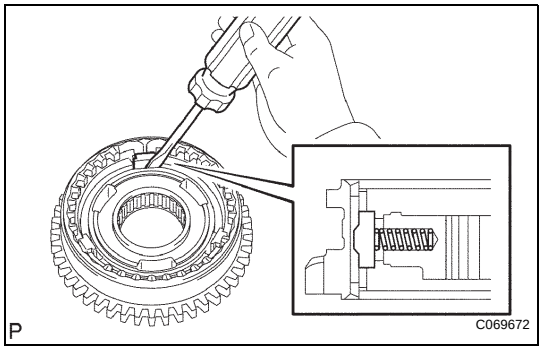
MX



10. INSPECT REVERSE GEAR
(a) Using vernier calipers, measure the width of the reverse gear groove and thickness of the claw part on the No. 1 gear shift fork, and calculate the clearance.
Standard clearance:
0.15 to 0.35 mm (0.0059 to 0.0138 in.) {A - B}
If clearance is out of specification, replace the reverse gear and No. 1 gear shift fork with new ones.



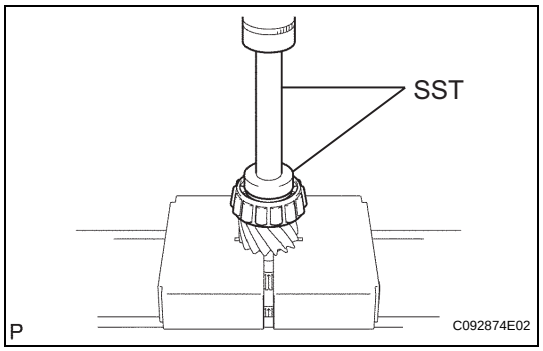
11. INSPECT NO. 1 TRANSMISSION CLUTCH HUB
(a) Check the sliding condition between the No. 1 transmission clutch hub and the reverse gear.
(b) Check the tip of the spline gear on the sleeve of the reverse gear for wear.
If any defects are found, replace the transmission hub sleeve or the transmission clutch hub.



REASSEMBLY

1. INSTALL REVERSE GEAR
(a) Coat the reverse gear with gear oil.
(b) Install the 3 No. 1 synchromesh shifting key springs and No. 1 transmission clutch hub to the reverse gear.
NOTICE:
Assemble the reverse gear and the No. 1 transmission clutch hub in the correct direction.

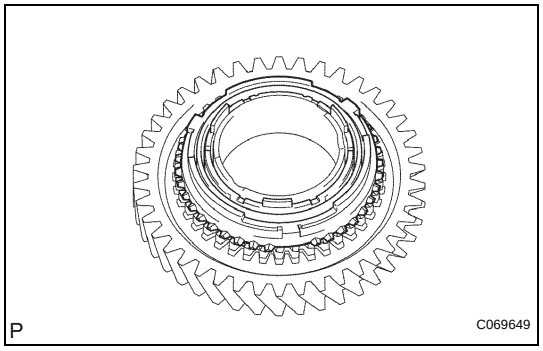
(c) Using a screwdriver, install the 3 No. 1 synchromesh shifting keys to the reverse gear.



2. INSTALL OUTPUT SHAFT FRONT BEARING

(a) Using SST and a press, install the output shaft front bearing (inner race) to the output shaft.

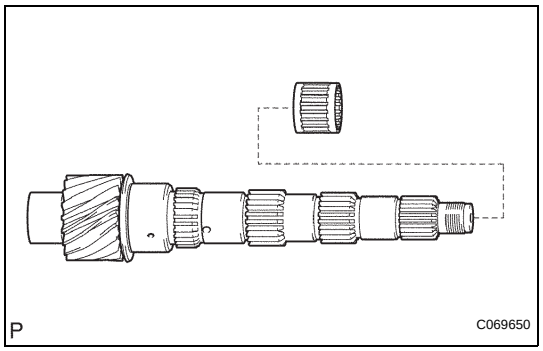
SST 09950-60010 (09951-00430), 09950-70010 (09951-07150)



3. INSTALL NO. 1 SYNCHRONIZER RING SET

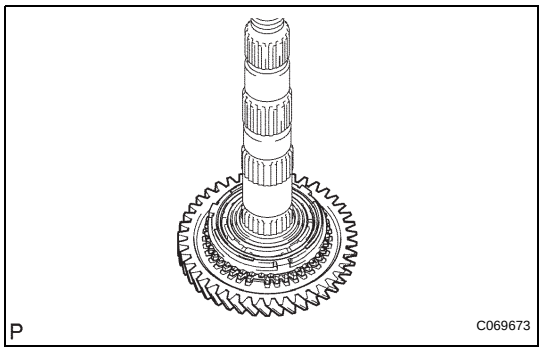
(a) Coat the No. 1 synchronizer ring set with gear oil and install it to the 1st gear.

NOTICE:
Align the No. 1 synchronizer ring set with the hole of the 1st gear.



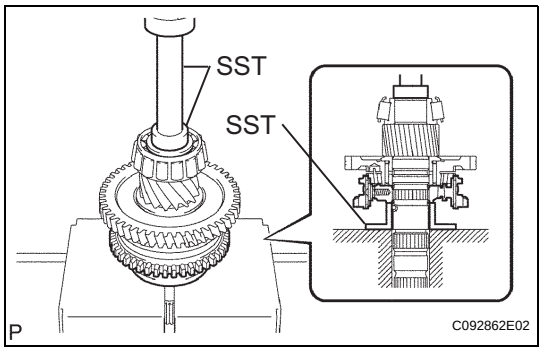
4. INSTALL 1ST GEAR NEEDLE ROLLER BEARING

(a) Coat the 1st gear needle roller bearing with gear oil and install it to the output shaft.



5. INSTALL 1ST GEAR

(a) Coat the 1st gear with gear oil and install it to the output shaft.



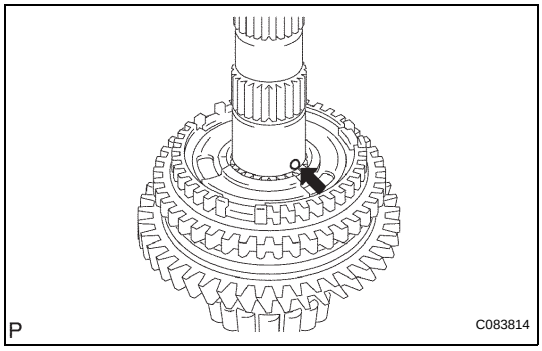
6. INSTALL NO. 1 TRANSMISSION CLUTCH HUB

(a) Using SST and a press, install the No. 1 transmission clutch hub to the output shaft.

SST 09316-60011 (09316-00031), 09950-60010 (09951-00320), 09950-70010 (09951-07100)

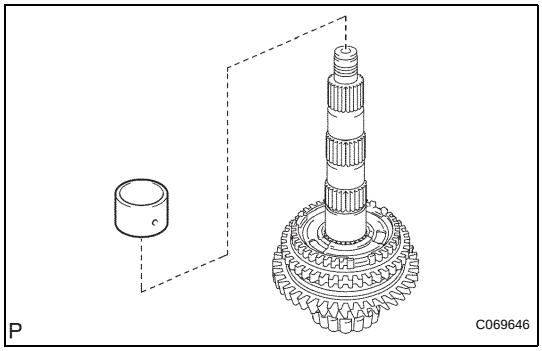
NOTICE:

- **Align the No. 1 synchronizer ring with the No. 1 synchromesh shifting key.**
- **Make sure that the 1st gear rotates.**



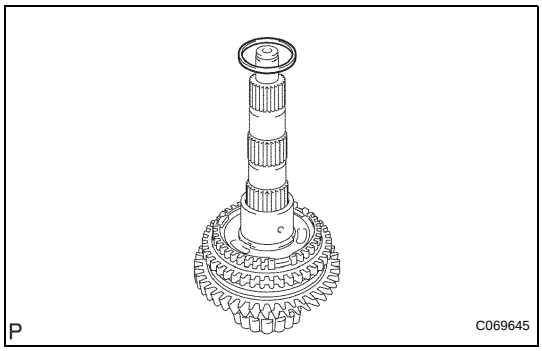
7. INSTALL 2ND GEAR BUSHING BALL

(a) Coat the gear bushing with MP grease, and install it to the output shaft.



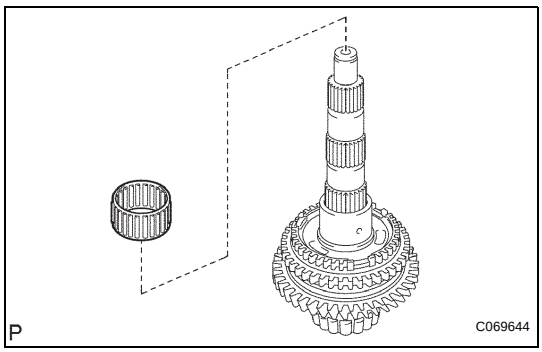
8. INSTALL 2ND GEAR BUSHING

(a) Coat the 2nd gear bushing with gear oil and install it to the output shaft.



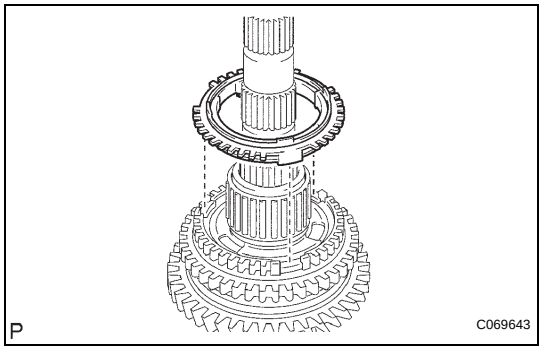
9. INSTALL 2ND GEAR BEARING SPACER

(a) Coat the 2nd gear bearing spacer with gear oil and install it to the output shaft.



10. INSTALL 2ND GEAR NEEDLE ROLLER BEARING

(a) Coat the 2nd gear needle roller bearing with gear oil and install it to the output shaft.

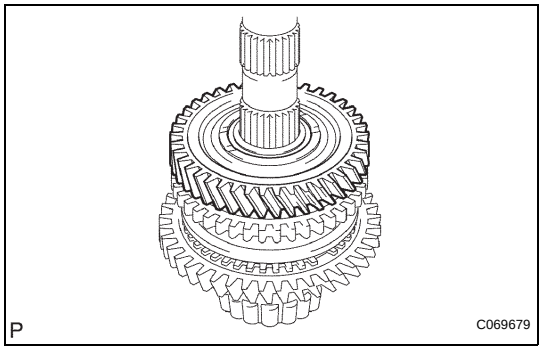


11. INSTALL NO. 2 SYNCHRONIZER RING SET

(a) Coat the No. 2 synchronizer ring set with gear oil and install it to the No. 1 transmission clutch hub.

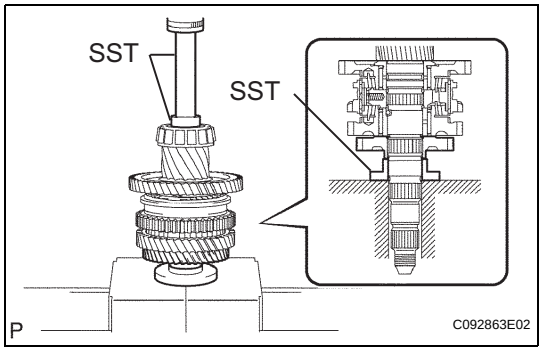
NOTICE:

Align the key groove on the No. 2 synchronizer ring set with the No. 1 synchromesh shifting key.



12. INSTALL 2ND GEAR

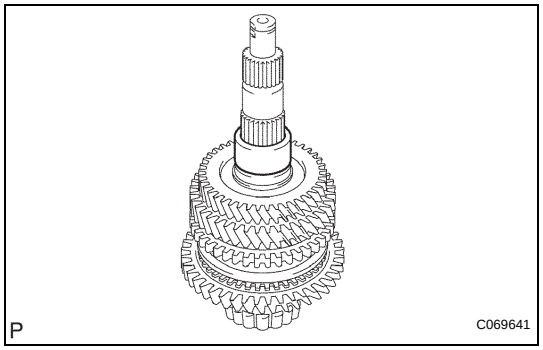
(a) Coat the 2nd gear with gear oil and install it to the output shaft.



13. INSTALL 3RD DRIVEN GEAR

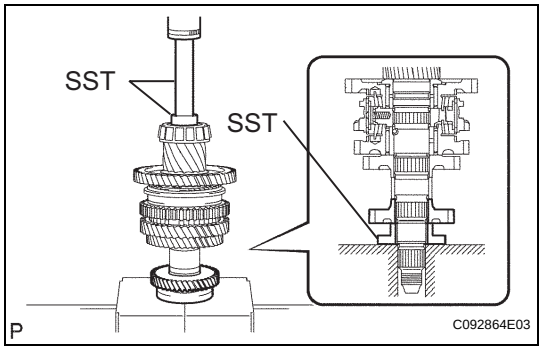
(a) Using SST and a press, install the 3rd driven gear to the output shaft.

SST 09608-00071, 09950-60010 (09951-00320), 09950-70010 (09951-07100)



14. INSTALL OUTPUT GEAR SPACER

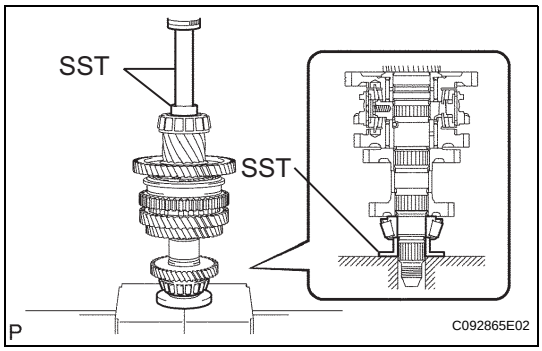
(a) Install the output gear spacer to the output shaft.



15. INSTALL 4TH DRIVEN GEAR

(a) Using SST and a press, install the 4th driven gear to the output shaft.

SST 09608-00071, 09950-60010 (09951-00320), 09950-70010 (09951-07100)



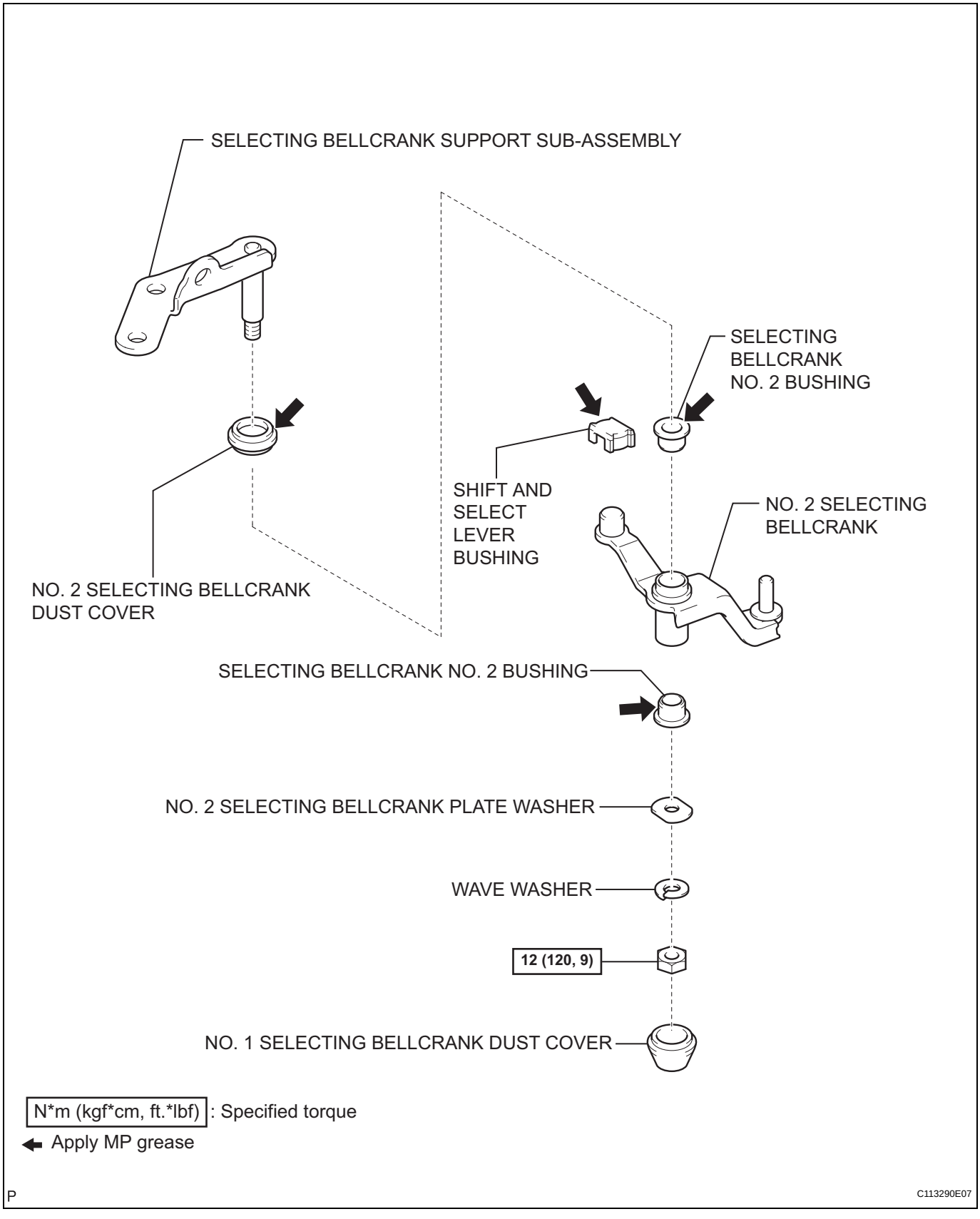
16. INSTALL OUTPUT SHAFT FRONT BEARING

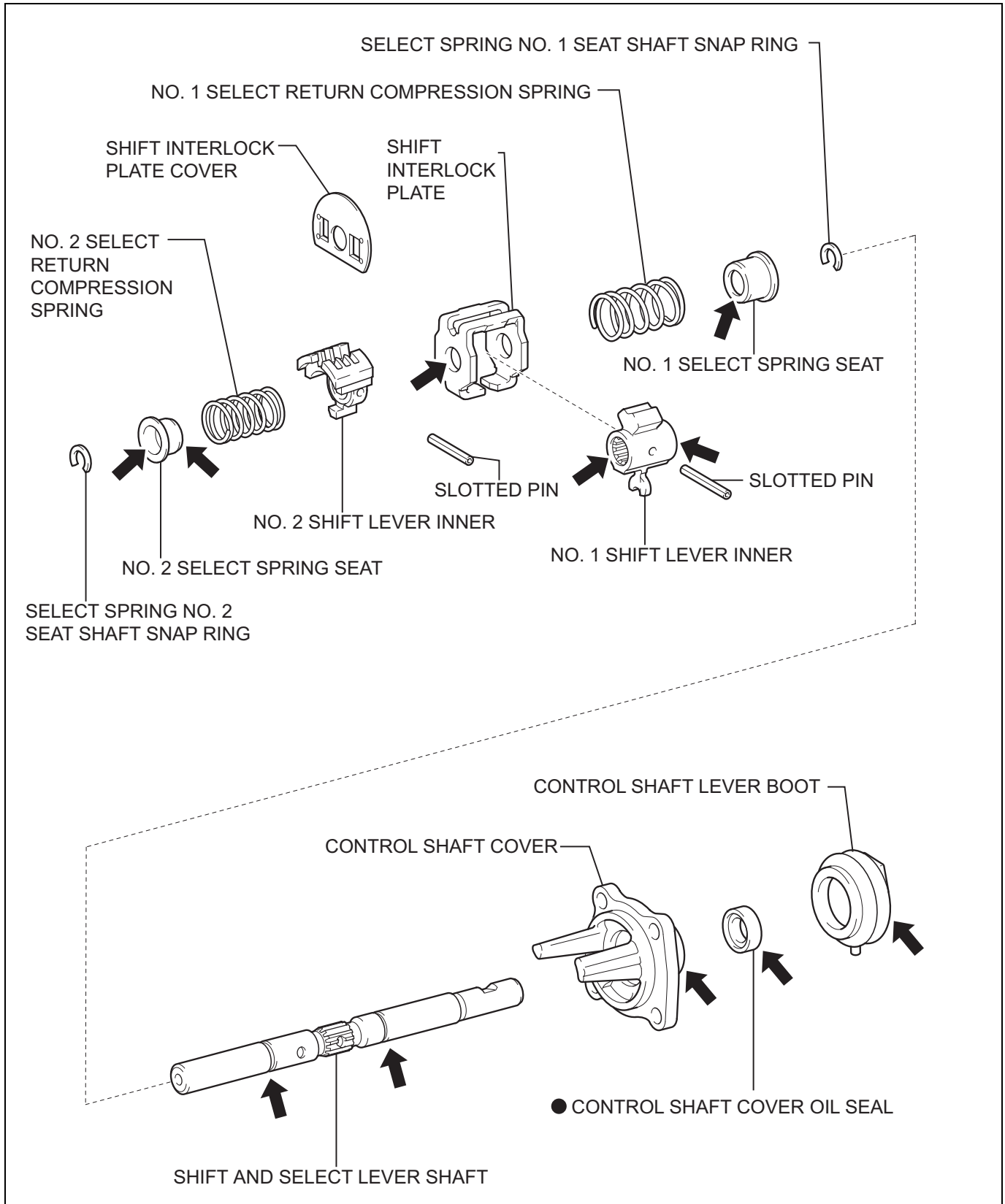
(a) Using SST and a press, install the output shaft front bearing (inner race) to the output shaft.

SST 09506-30012, 09950-60010 (09951-00320), 09950-70010 (09951-07100)

SHIFT AND SELECT LEVER SHAFT

COMPONENTS

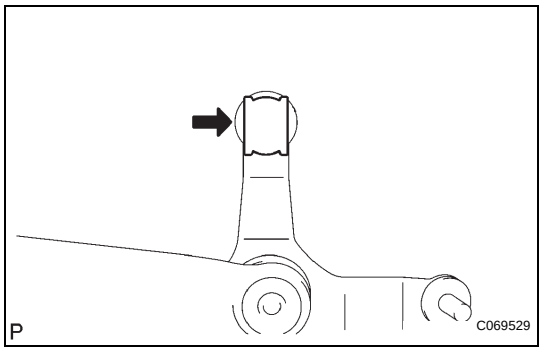




● Non-reusable part ⬅ Apply MP grease

P

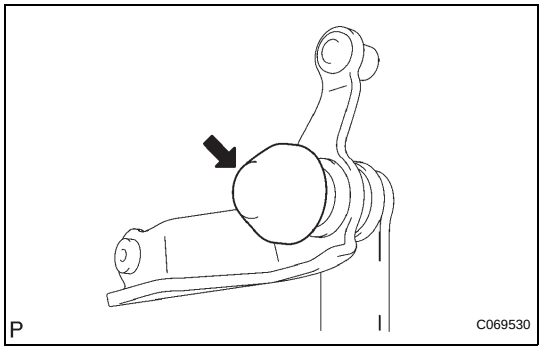
C135404E01



DISASSEMBLY

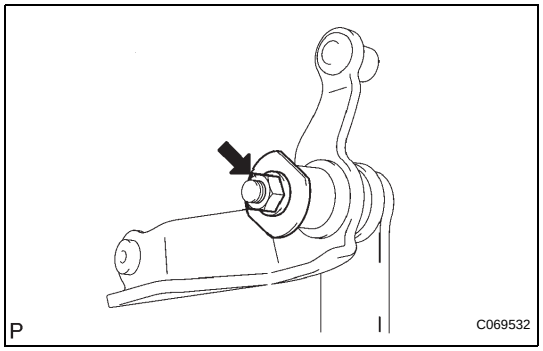
1. REMOVE CONTROL SHIFT LEVER BUSHING

(a) Remove the control shift lever bushing from the No. 2 selecting bellcrank.



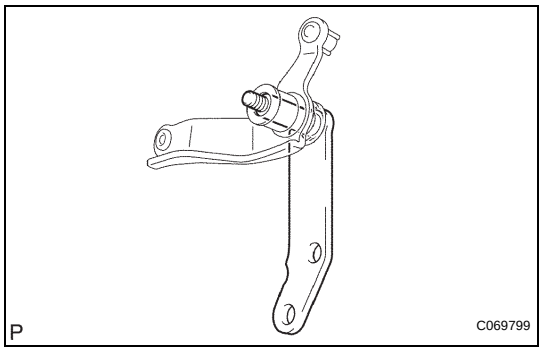
2. REMOVE NO. 1 SELECTING BELLCRANK DUST COVER

(a) Remove the No. 1 selecting bellcrank dust cover from the No. 2 selecting bellcrank.

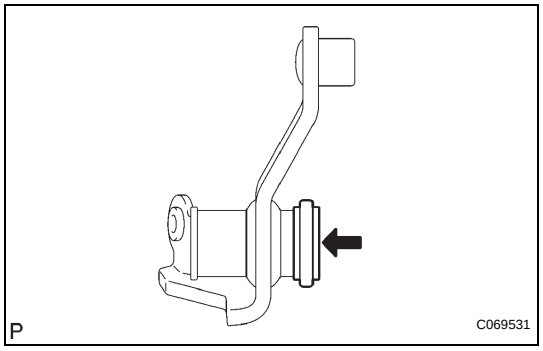


3. REMOVE SELECTING BELLCRANK SUPPORT SUB-ASSEMBLY

(a) Remove the nut, wave washer, and selecting bellcrank No. 2 plate washer from the No. 2 selecting bellcrank.

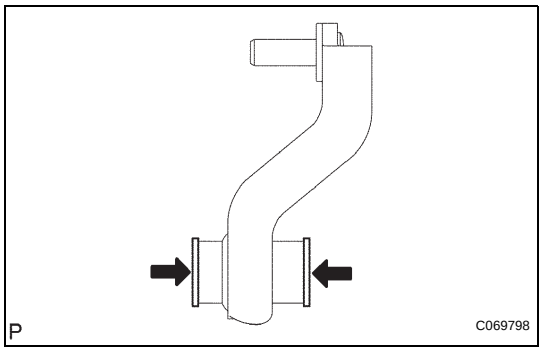


(b) Remove the selecting bellcrank support sub-assembly from the No. 2 selecting bellcrank.



4. REMOVE NO. 2 SELECTING BELLCRANK DUST COVER

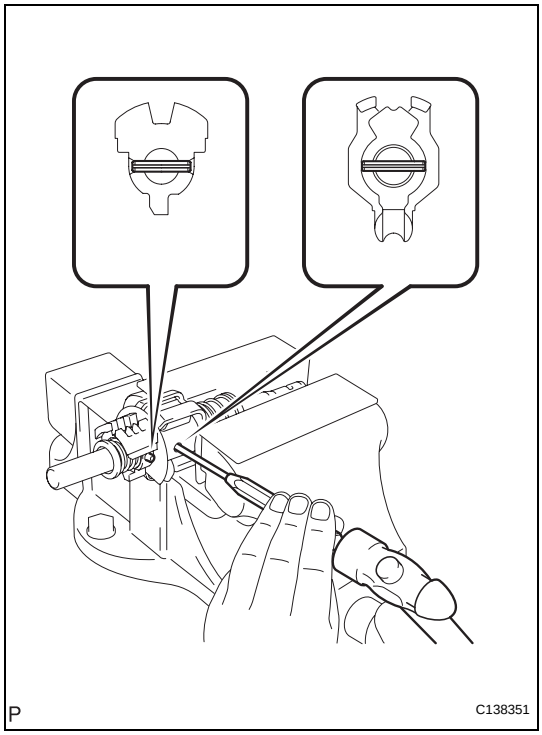
(a) Remove the No. 2 selecting bellcrank dust cover from the No. 2 selecting bellcrank.



5. REMOVE SELECTING BELLCRANK NO. 2 BUSHING

(a) Remove the selecting bellcrank bushing from the No. 2 selecting bellcrank.

MX

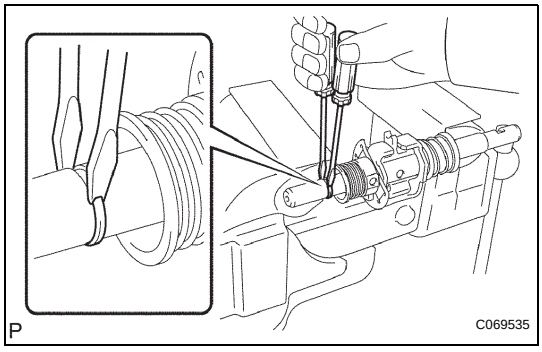


6. REMOVE NO. 2 SHIFT LEVER INNER

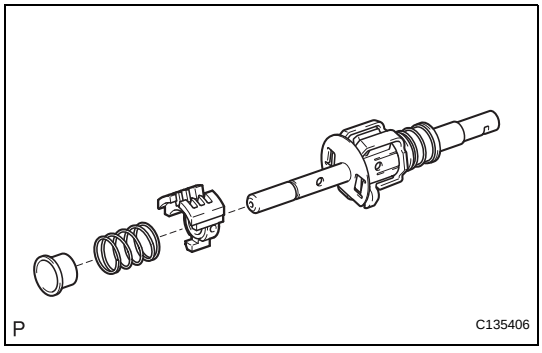
(a) Hold the shift and select lever in a vise using aluminum plates.
NOTICE:
Do not damage the shift and select lever shaft.

(b) Using a pin punch (ϕ 5 mm), remove the 2 shift inner lever slotted pins.
NOTICE:
Do not damage the shift and select lever shaft.

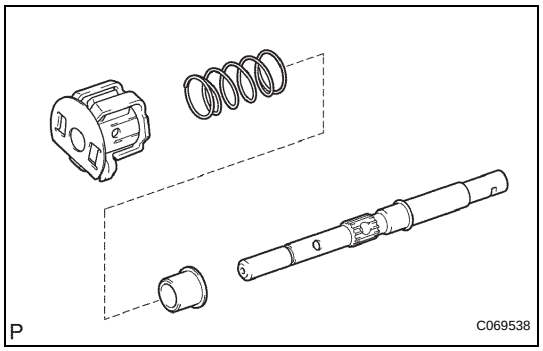
(c) Apply force to the No. 1 select return compression spring and No. 2 select return compression spring, then hold them in a vise using aluminum plates.



(d) Using 2 screwdrivers and a hammer, remove the select spring No. 2 seat snap ring from the shift and select lever shaft.
NOTICE:
Do not damage the shift and select lever shaft.

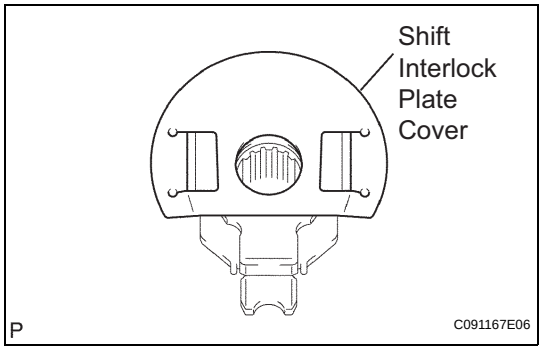


(e) Remove the No. 2 select spring seat, No. 2 select return compression spring, and No. 2 shift lever inner from the shift and select lever shaft.



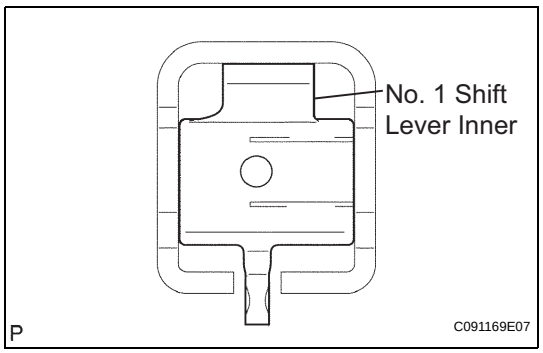
7. REMOVE NO. 1 SELECT SPRING SEAT

(a) Remove the shift inter lock plate, No. 1 select return compression spring and No. 1 select spring seat from the shift and select lever shaft.



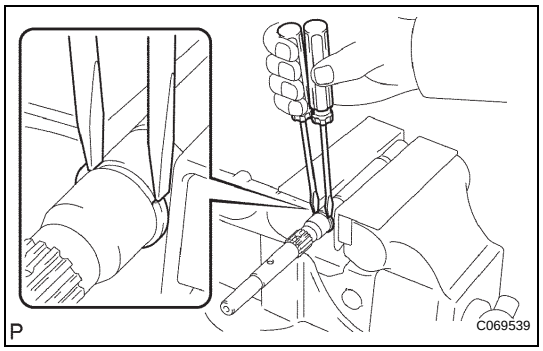
8. REMOVE SHIFT INTERLOCK PLATE COVER

(a) Remove the shift interlock plate cover from the shift interlock plate.



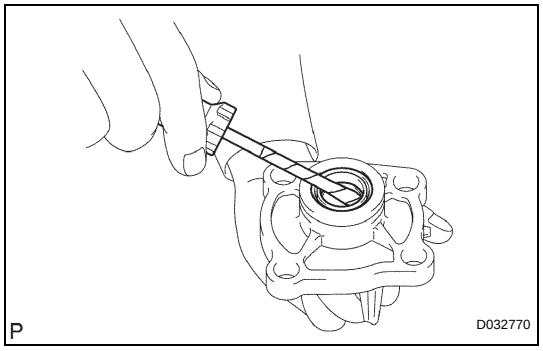
9. REMOVE NO. 1 SHIFT LEVER INNER

(a) Remove the No. 1 shift lever inner from the shift interlock plate.



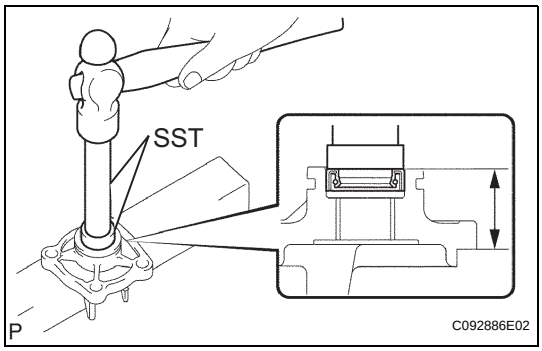
10. REMOVE SELECT SPRING NO. 1 SEAT SHAFT SNAP RING

(a) Using 2 screwdrivers and a hammer, remove the select spring No. 1 seat shaft snap ring.
NOTICE:
Do not damage the shaft.



11. REMOVE CONTROL SHAFT COVER OIL SEAL

(a) Using a screwdriver, remove the control shaft cover oil seal from the control shaft cover.
HINT:
Tape the screwdriver tip before use to avoid damage.



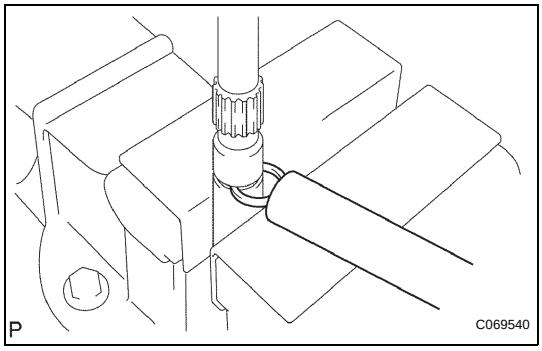
REASSEMBLY

1. INSTALL CONTROL SHAFT COVER OIL SEAL

(a) Using SST and a hammer, install a new control shaft cover oil seal to the control shaft cover.

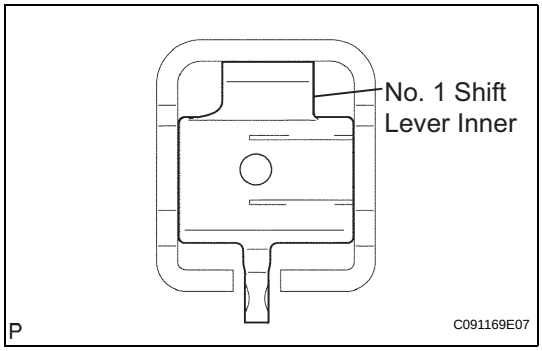
SST 09950-60010 (09951-00280), 09950-70010 (09951-07100)

Oil seal installation depth:
28.0 to 29.0 mm (1.1022 to 1.142 in.)



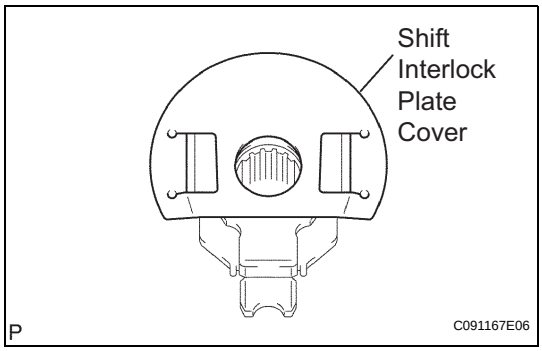
2. INSTALL SELECT SPRING NO. 1 SEAT SHAFT SNAP RING

(a) Using a brass bar and a hammer, install the select spring No. 1 seat shaft snap ring.



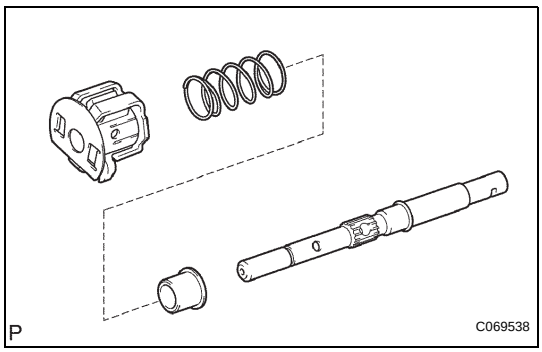
3. INSTALL NO. 1 SHIFT LEVER INNER

(a) Install the No. 1 shift lever inner to the shift interlock plate.



4. INSTALL SHIFT INTERLOCK PLATE COVER

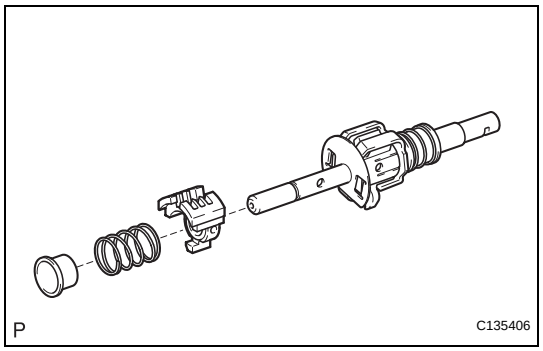
(a) Install the shift interlock plate cover to the shift interlock plate.



5. INSTALL NO. 1 SELECT SPRING SEAT

(a) Install the No. 1 select spring seat, No. 1 select return compression spring, and shift interlock plate to the shift and select lever shaft.

MX

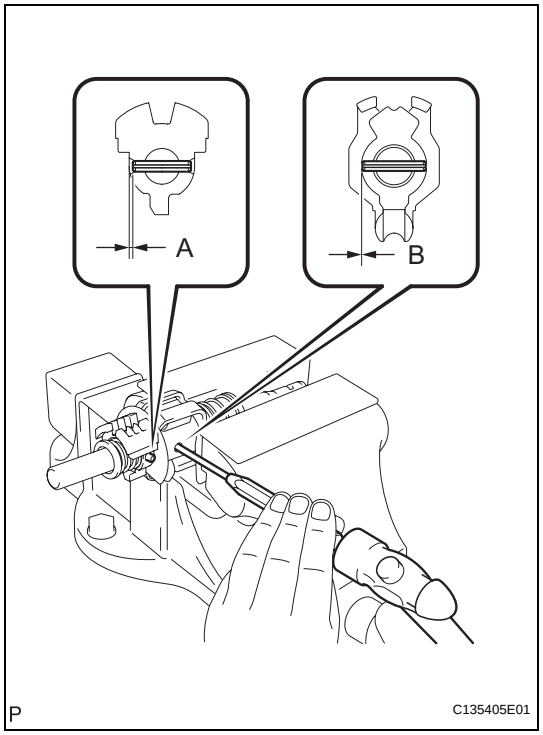


6. INSTALL NO. 2 SHIFT LEVER INNER

(a) Install the No. 2 shift lever inner, No. 2 select return compression spring and No. 2 select return spring seat to the shift and select lever shaft.

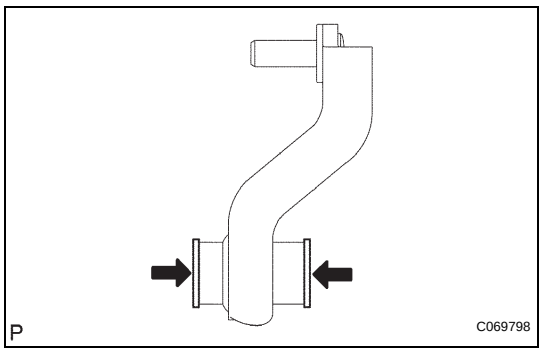
(b) Hold the shift and select lever in a vise using aluminum plates.

(c) Using a brass bar and a hammer, install the select seat snap ring to the shift and select lever shaft.



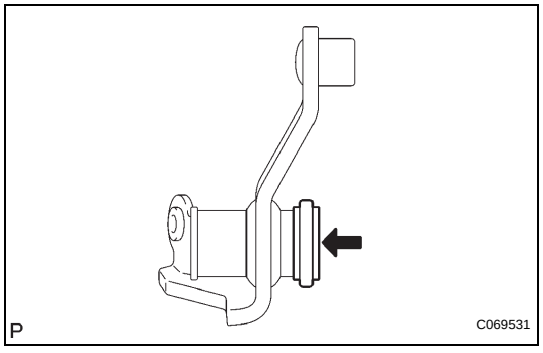
(d) Using a pin punch (ϕ 5 mm) and a hammer, install the 2 shift inner lever slotted pins to the shift and select lever shaft.

Clearance A:
0.7 to 1.7 mm (0.0276 to 0.0669 in.)
Clearance B:
-0.4 to 0.5 mm (-0.0157 to 0.0197 in.)



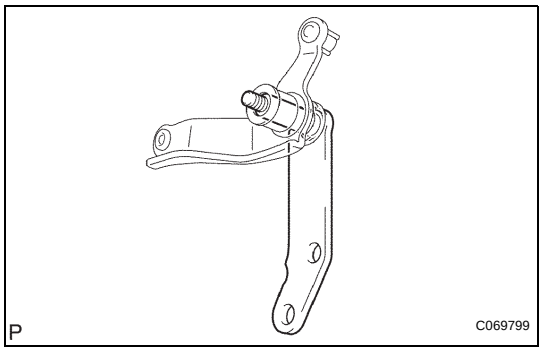
7. INSTALL SELECTING BELLCRANK NO. 2 BUSHING

(a) Coat the 2 selecting bellcrank No. 2 bushings with MP grease and install them to the No. 2 selecting bellcrank.



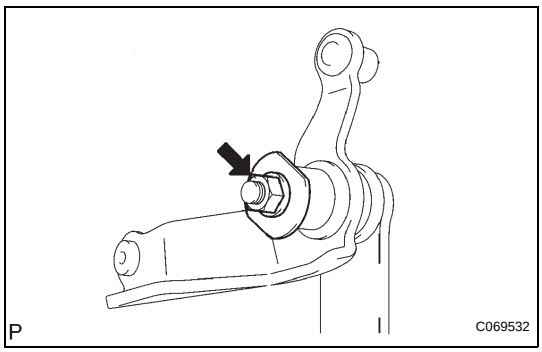
8. INSTALL NO. 2 SELECTING BELLCRANK DUST COVER

(a) Coat the No. 2 selecting bellcrank dust cover with MP grease and install it to the No. 2 selecting bellcrank.

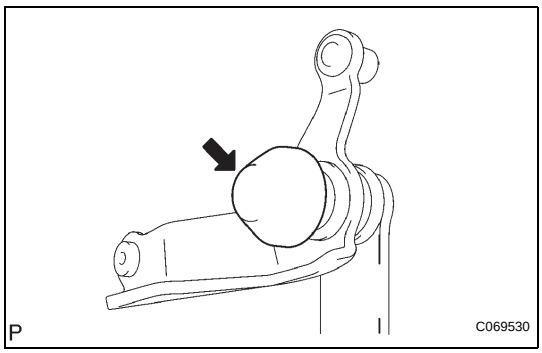


9. INSTALL SELECTING BELLCRANK SUPPORT SUB-ASSEMBLY

(a) Install the selecting bellcrank support sub-assembly to the No. 2 selecting bellcrank.

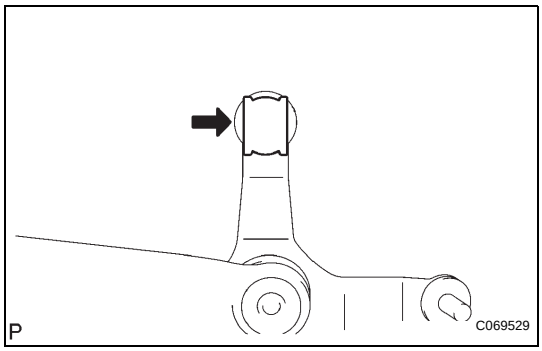


(b) Install the No. 2 selecting bellcrank plate washer, washer, and nut.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



10. INSTALL NO. 1 SELECTING BELLCRANK DUST COVER

(a) Install the No. 1 selecting bellcrank dust cover to the No. 2 selecting bellcrank.

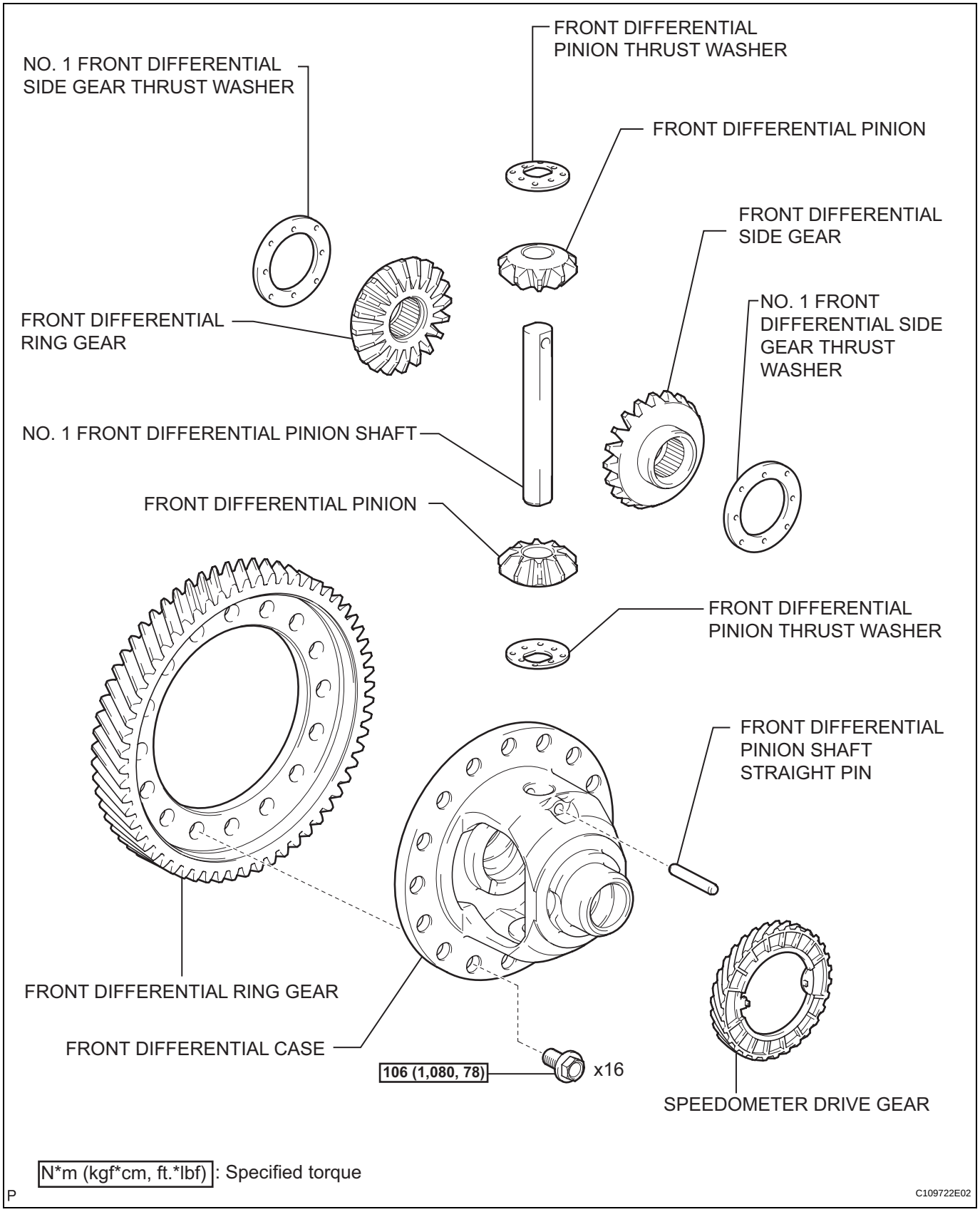


11. INSTALL CONTROL SHIFT LEVER BUSHING

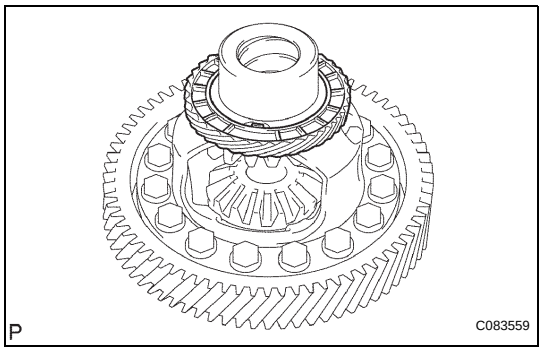
(a) Install the control shift lever bushing to the No. 2 selecting bellcrank.

DIFFERENTIAL CASE

COMPONENTS

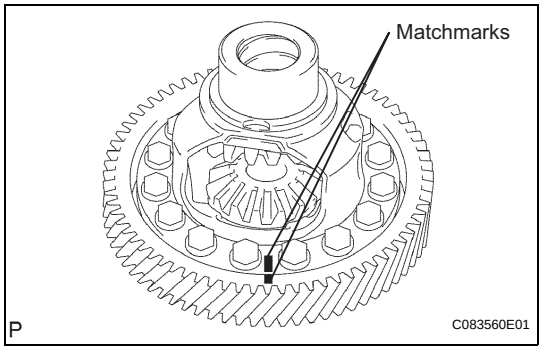


DISASSEMBLY



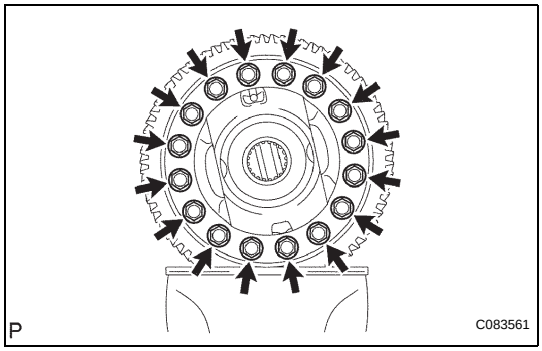
1. REMOVE SPEEDOMETER DRIVE GEAR

(a) Remove the speedometer drive gear from the front differential case assembly.



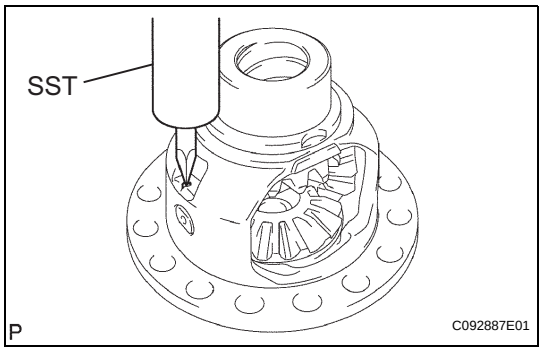
2. REMOVE FRONT DIFFERENTIAL RING GEAR

(a) Put matchmarks on the front differential ring gear and the front differential case.



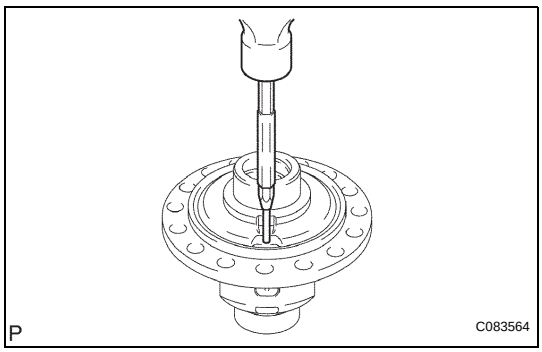
(b) Remove the 16 bolts.

(c) Using a plastic hammer, remove the front differential case.

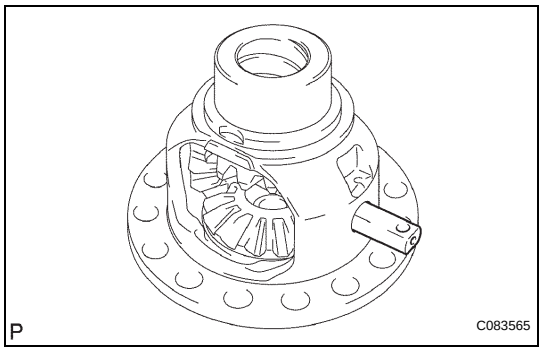


3. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using SST and a hammer, unstake the staked part of the front differential case.
SST 09930-00010

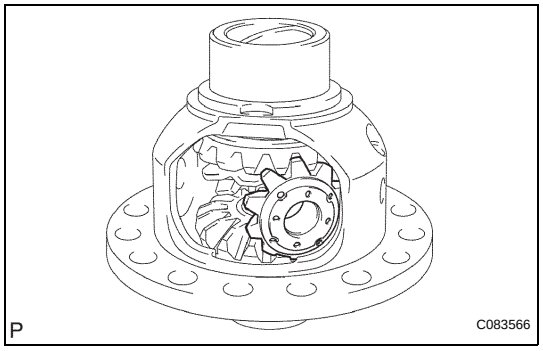


(b) Using a pin punch and a hammer, remove the front differential pinion shaft straight pin from the front differential case.



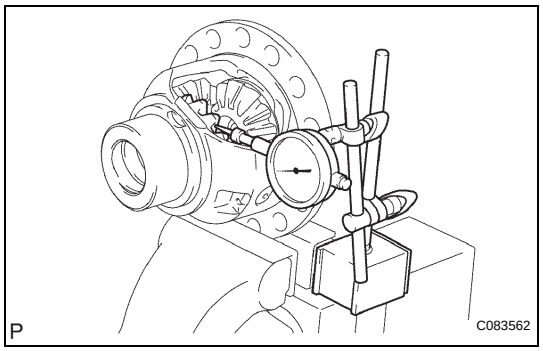
4. REMOVE NO. 1 FRONT DIFFERENTIAL PINION SHAFT

(a) Remove the No. 1 front differential pinion shaft from the front differential case.



5. REMOVE FRONT DIFFERENTIAL SIDE GEAR

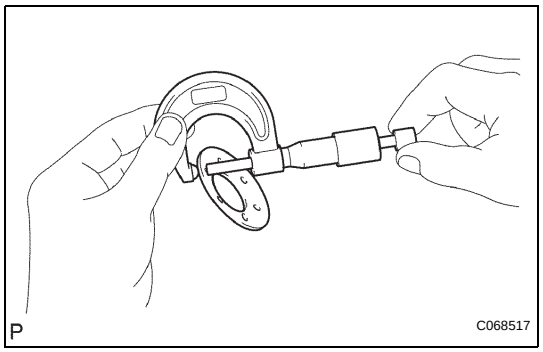
(a) Remove the 2 front differential pinions, 2 front differential pinion thrust washers, 2 front differential side gears, and 2 front differential side gear thrust washers from the front differential case.
HINT:
Remove the 2 pinion thrust washers and side gear thrust washers while turning the front differential pinion.



INSPECTION

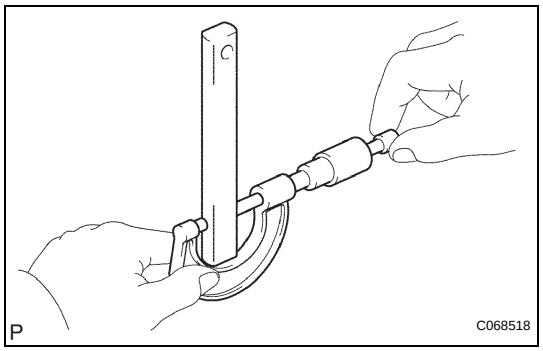
1. INSPECT FRONT DIFFERENTIAL SIDE GEAR BACKLASH

(a) Hold the front differential pinion to the front differential case side. Using a dial indicator, measure the front differential side gear backlash.
Standard backlash:
0.05 to 0.20 mm (0.002 to 0.0079 in.)
If backlash is out of specification, install proper side gear thrust washers.



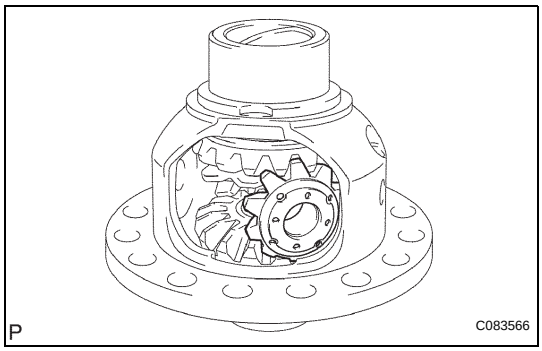
2. INSPECT FRONT DIFFERENTIAL PINION THRUST WASHER

(a) Using a micrometer, measure the thickness of the front differential pinion thrust washer.
Minimum thickness:
0.9 mm (0.035 in.)
If the thickness is less than the minimum, replace the front differential pinion thrust washer.



3. INSPECT NO. 1 FRONT DIFFERENTIAL PINION SHAFT

(a) Using a micrometer, measure the outside diameter of the No. 1 front differential pinion shaft.
Minimum diameter:
17.975 mm (0.70768 in.)
If the outer diameter is less than the minimum, replace the No. 1 front differential pinion shaft.



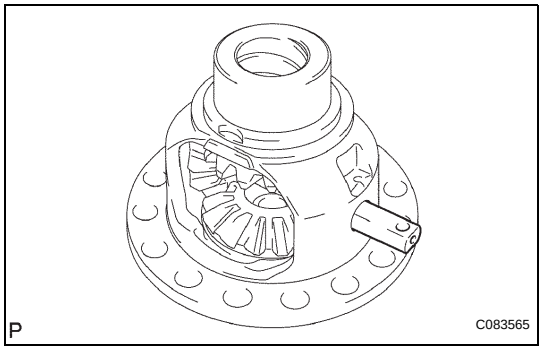
REASSEMBLY

1. INSTALL FRONT DIFFERENTIAL SIDE GEAR

(a) Coat the rotating surface of the front differential side gear with gear oil.

(b) Install the 2 front differential side gear thrust washers to the 2 front differential side gears.

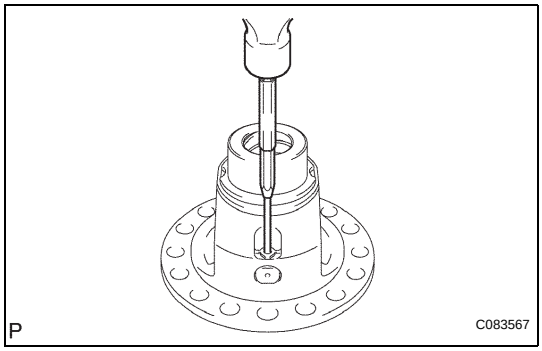
(c) Install the 2 front differential side gears, 2 front differential pinions, and 2 front differential side gear thrust washers to the front differential case.
HINT:
Install the 2 front differential pinions with the front differential washers while turning the front differential pinion.



2. REMOVE NO. 1 FRONT DIFFERENTIAL PINION SHAFT

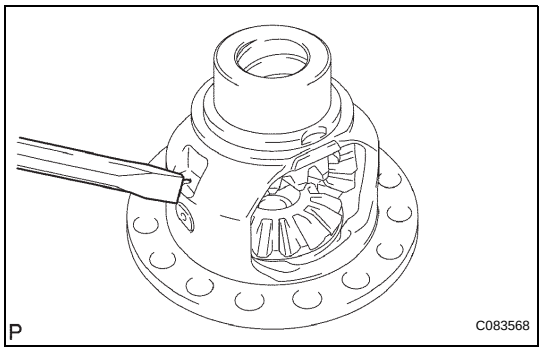
(a) Coat the rotating surface of the No. 1 front differential pinion shaft with gear oil.

(b) Install the No. 1 front differential pinion shaft to the front differential case so that the hole for the front differential pinion shaft straight pin is aligned with the hole in the front differential case.

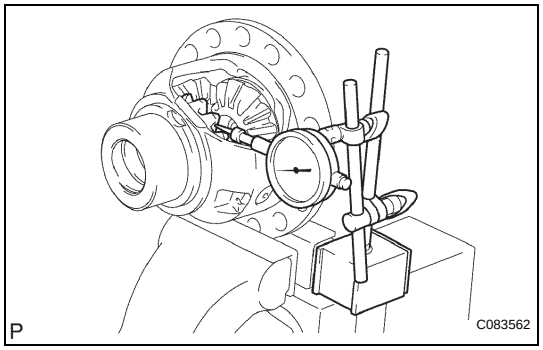


3. INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch and a hammer, install the front differential pinion shaft straight pin to the front differential case.



(b) Using a chisel and hammer, stake the front differential case hole.

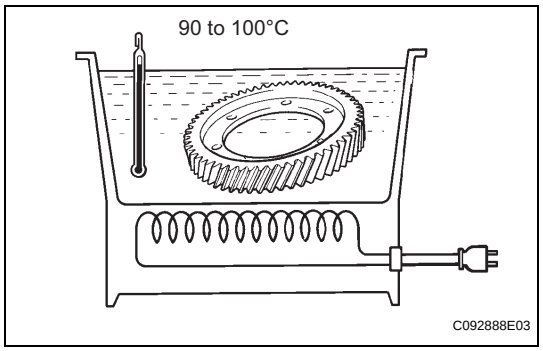


4. ADJUST FRONT DIFFERENTIAL SIDE GEAR BACKLASH

(a) Hold the front differential pinion to the front differential case side. Using a dial indicator, measure the front differential side gear backlash.
Standard backlash:
0.05 to 0.20 mm (0.002 to 0.0079 in.)

(b) If backlash is out of specification, select another front differential side gear thrust washer and adjust backlash.
Thrust washer

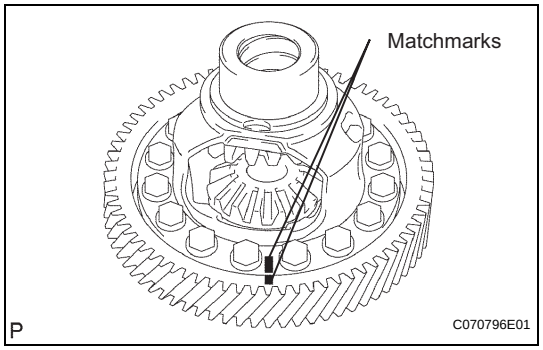
Part No.	Thickness: mm (in.)	Mark
41361-28230	1.00 (0.0394)	1
41361-28240	1.10 (0.0433)	2
41361-28250	1.20 (0.0472)	3
41361-28260	1.30 (0.0512)	4



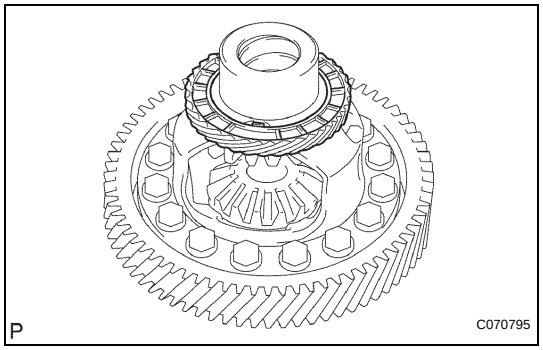
5. INSTALL FRONT DIFFERENTIAL RING GEAR

(a) Using a heater, heat the front differential ring gear to 90 to 100°C (194.0 to 212.0°F).

(b) Clean the surface that contacts the differential case.



(c) Aligning the matchmarks, quickly install the front differential ring gear to the front differential case.
Torque: 106 N*m (1,081 kgf*cm, 78 ft.*lbf)



6. INSTALL SPEEDOMETER DRIVE GEAR

(a) Install the speedometer drive gear to the front differential case.

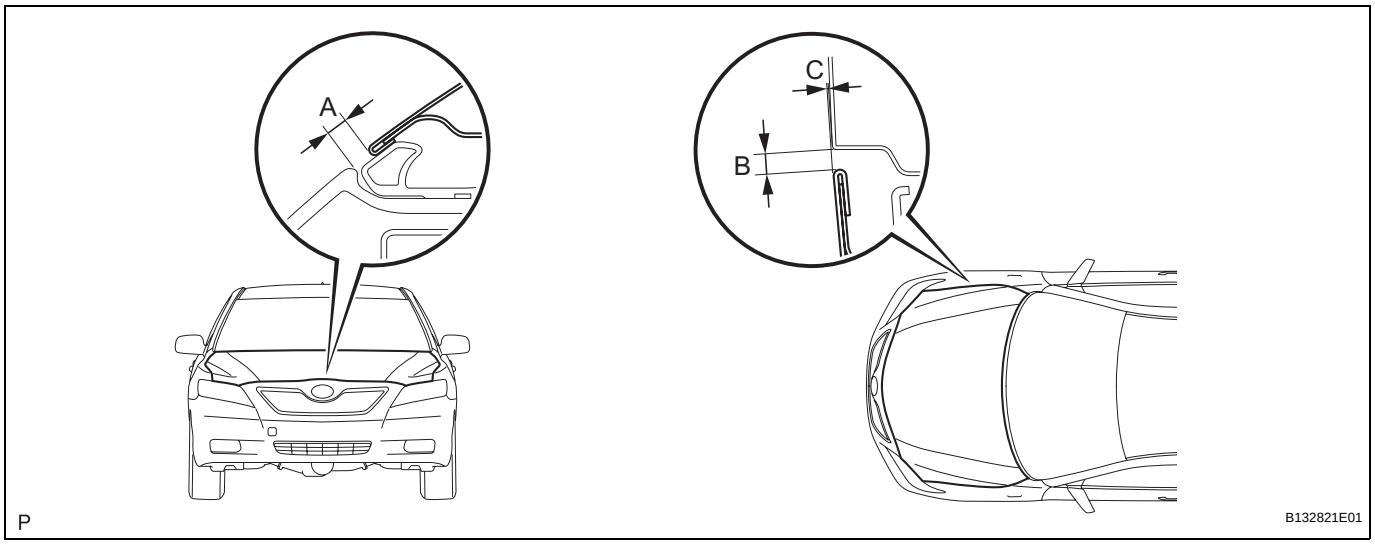
MX

HOOD

ON-VEHICLE INSPECTION

1. INSPECT HOOD SUB-ASSEMBLY

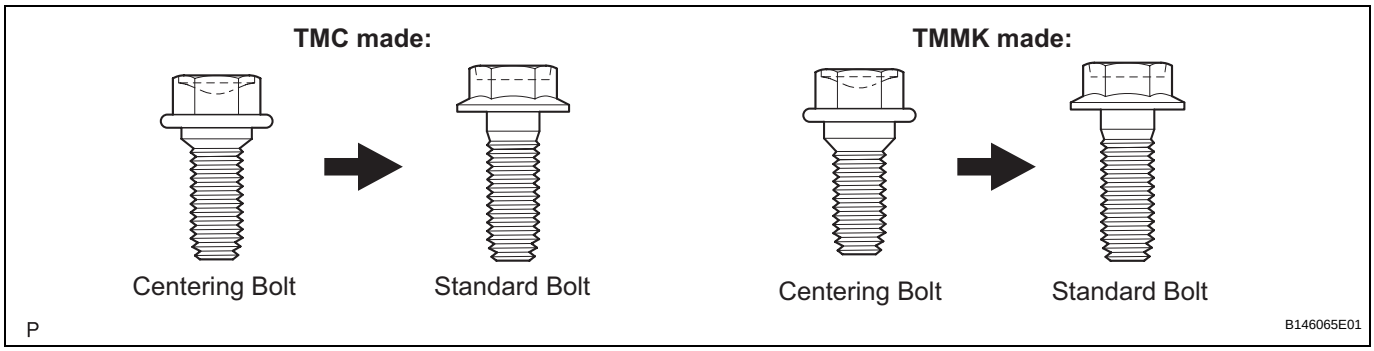
(a) Check that the clearance measurements of areas A to C are within each standard range.



Standard clearance

Area	Measurement
A	2.3 to 5.3 mm (0.091 to 0.209 in.)
B	2.0 to 5.0 mm (0.079 to 0.197 in.)
C	-1.4 to 1.6 mm (-0.055 to 0.063 in.)

ADJUSTMENT

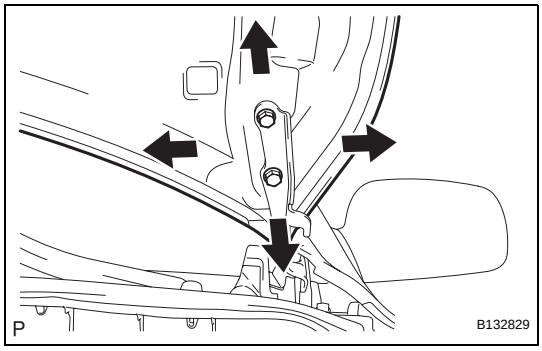


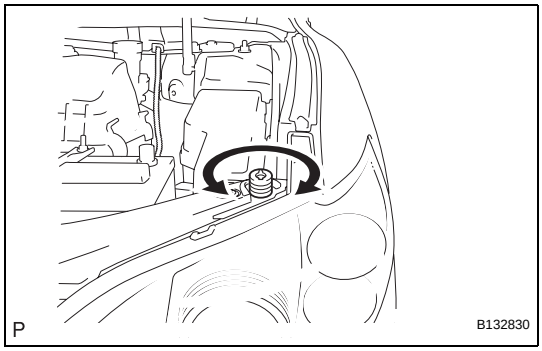
ED

HINT:

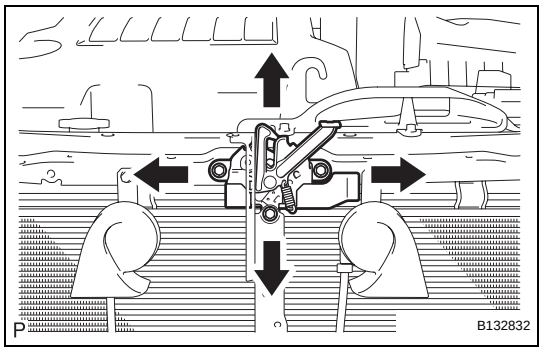
- Centering bolts are used to mount the hood hinge and hood lock. The hood and hood lock cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (with washers) when making adjustments.
- A bolt without a torque specification is shown in the standard bolt chart (See page SS-2).

1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**
3. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
4. **ADJUST HOOD SUB-ASSEMBLY**
   (a) Horizontally and vertically adjust the hood.
   (1) Loosen the hood's 4 hinge bolts.
   (2) Move the hood and adjust the clearance between the hood and front fender.
   (3) Tighten the hood's 4 hinge bolts after the adjustment.
   Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)





   (b) Adjust the height of the hood front end using the cushion rubber.
   (1) Adjust the cushion rubber so that the height of the hood and fender are aligned.
   HINT:
   Raise or lower the hood's front end by turning the cushion rubber.

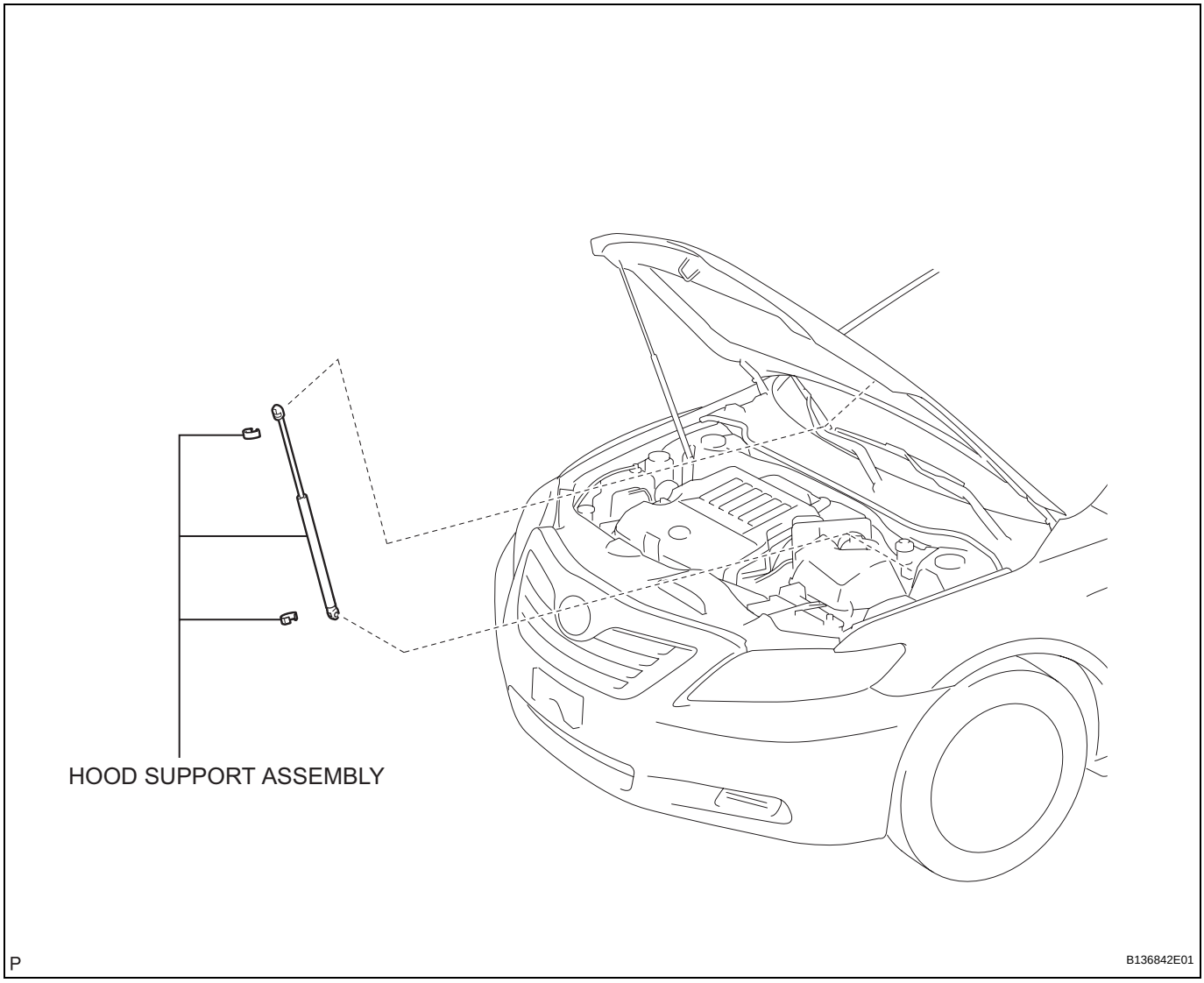


(c) Adjust the hood lock.
(1) Loosen the 3 bolts.
(2) Tighten the bolts after the adjustment.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
(3) Adjust the hood lock position so that the striker can enter it smoothly.

5. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
6. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
7. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**
8. **VEHICLE PREPARATION FOR FOG LIGHT AIM (w/ Fog Light) (See page LI-79)**
9. **PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-80)**
10. **FOG LIGHT AIMING INSPECTION (w/ Fog Light) (See page LI-81)**
11. **FOG LIGHT AIMING ADJUSTMENT (w/ Fog Light) (See page LI-82)**

HOOD SUPPORT ROD

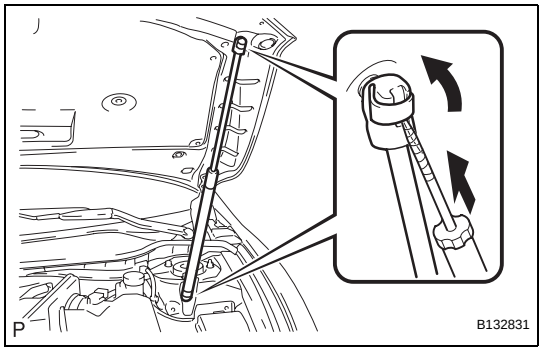
COMPONENTS



REMOVAL

NOTICE:

- **Avoid touching the stroke portions of the rod as much as possible to prevent foreign matter from attaching to it. Be sure to hold the cylinders while servicing.**
- **Do not wear cotton gloves or other similar materials when handling the rod. Fibers may attach to the rod and result in gas leaks.**
- **Do not apply any load to the cylinders in the horizontal direction in order to prevent the rod from being deformed.**



1. REMOVE HOOD SUPPORT ASSEMBLY

(a) Using a screwdriver, remove the hood support assembly while releasing the 2 clips.

NOTICE:

Remove the hood support assembly while supporting the hood with hand.

INSTALLATION

NOTICE:

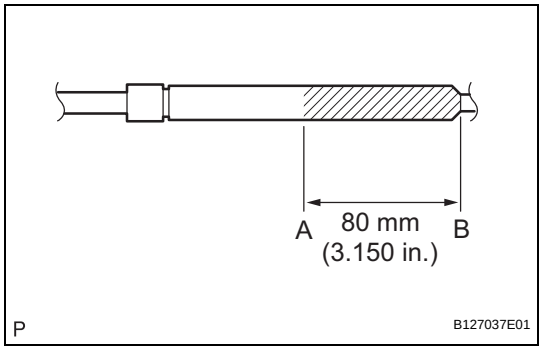
- **Avoid touching the stroke portions of the rod as much as possible to prevent foreign matter from attaching to it. Be sure to hold the cylinders while servicing.**
- **Do not wear cotton gloves or other similar materials when handling the rod. Fibers may attach to the rod and result in gas leaks.**
- **Do not apply any load to the cylinders in the horizontal direction in order to prevent the rod from being deformed.**

1. INSTALL HOOD SUPPORT ASSEMBLY

(a) Install the hood support assembly.

NOTICE:

- **Install the hood support assembly while supporting the hood with hand.**
- **Check that the hood support assembly is engaged in the ball joint and it cannot be pulled out.**



DISPOSAL

1. DISPOSE OF HOOD SUPPORT ASSEMBLY

(a) Horizontally fix the hood support in a vise with the piston-rod pulled out.

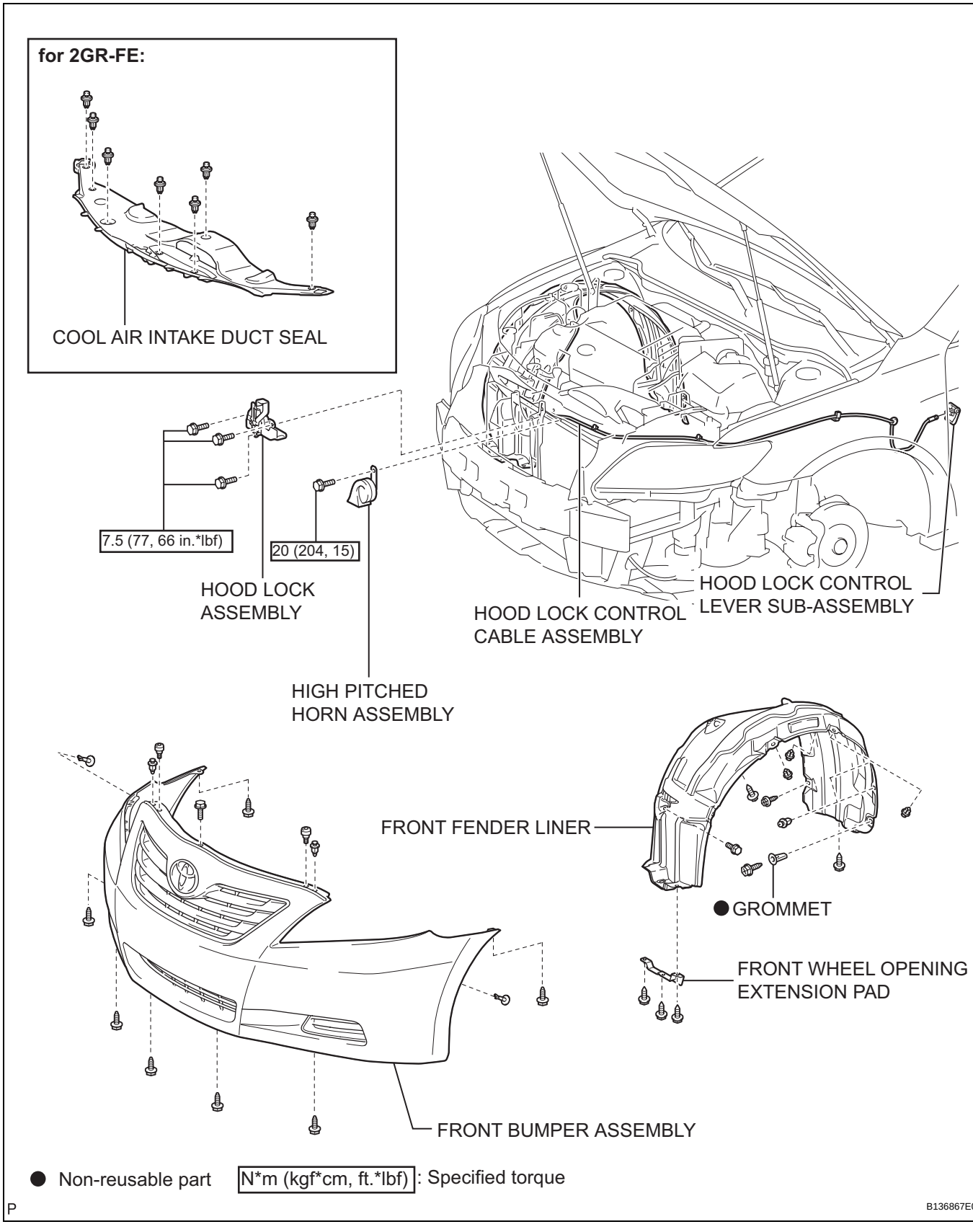
(b) Wear safety glasses. Gradually cut a part between A and B shown in the illustration using a metal saw and gradually release the gas.

NOTICE:

Although the gas inside the hood support is colorless, odorless and harmless, there is a possibility that metal debris could scatter. Therefore, cover it with a piece of cloth or other material.

HOOD LOCK CONTROL CABLE ASSEMBLY

COMPONENTS



● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

P

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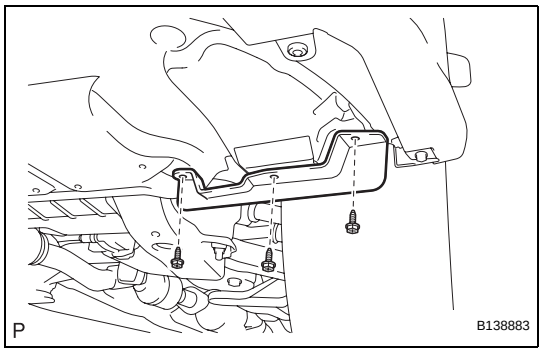
ED

REMOVAL

1. **REMOVE FRONT WHEEL**

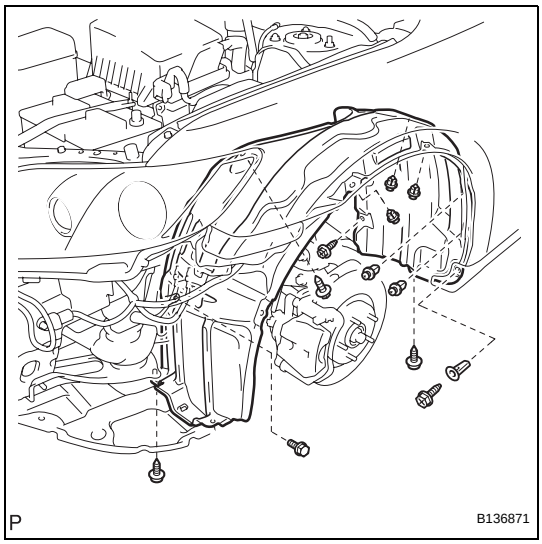


2. **REMOVE FRONT WHEEL OPENING EXTENSION PAD**
   (a) Remove the 3 screws and the front wheel opening extension pad.

3. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**

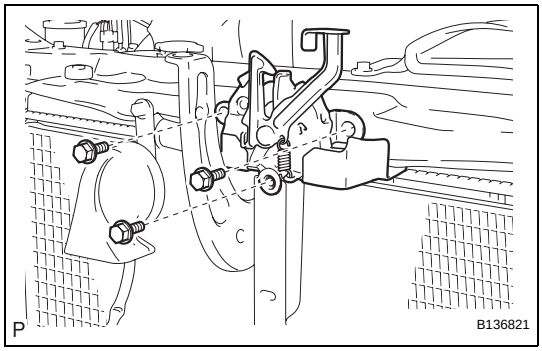
4. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**

5. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**

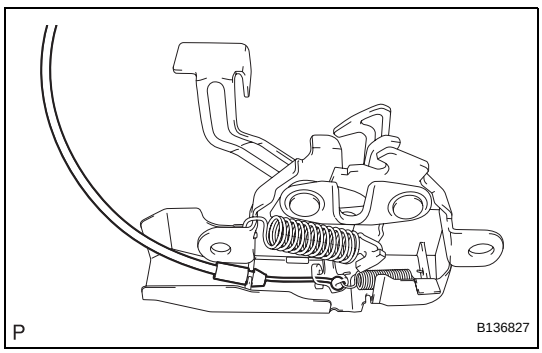


6. **REMOVE FRONT FENDER LINER**
   (a) Remove the 5 clips and bolt.
   (b) Remove the 4 screws, grommet and the front fender liner.

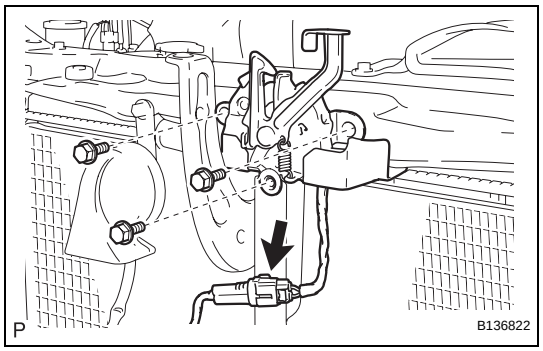
7. **REMOVE HIGH PITCHED HORN ASSEMBLY (See page HO-7)**



8. **REMOVE HOOD LOCK ASSEMBLY (w/o Engine Hood Courtesy Switch)**
   (a) Remove the 3 bolts.

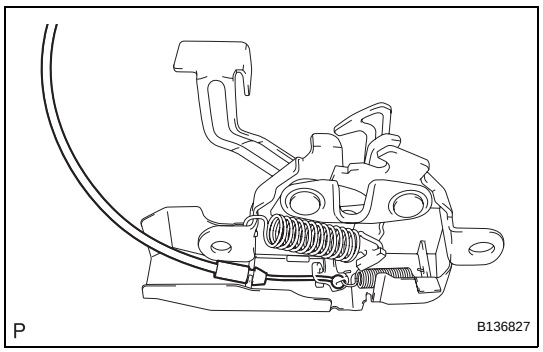


   (b) Disconnect the hood lock control cable.
   (c) Remove the hood lock assembly.

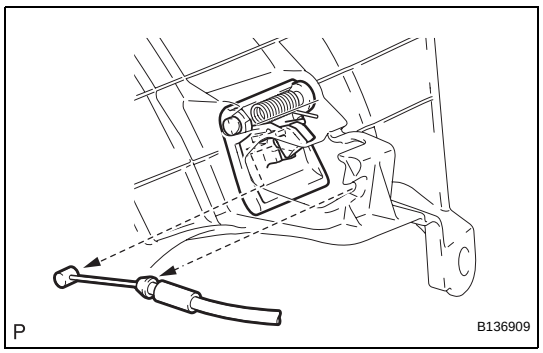


9. REMOVE HOOD LOCK ASSEMBLY (w/ Engine Hood Courtesy Switch)

(a) Disconnect the connector.
(b) Remove the 3 bolts.



(c) Disconnect the hood lock control cable.
(d) Remove the hood lock assembly.

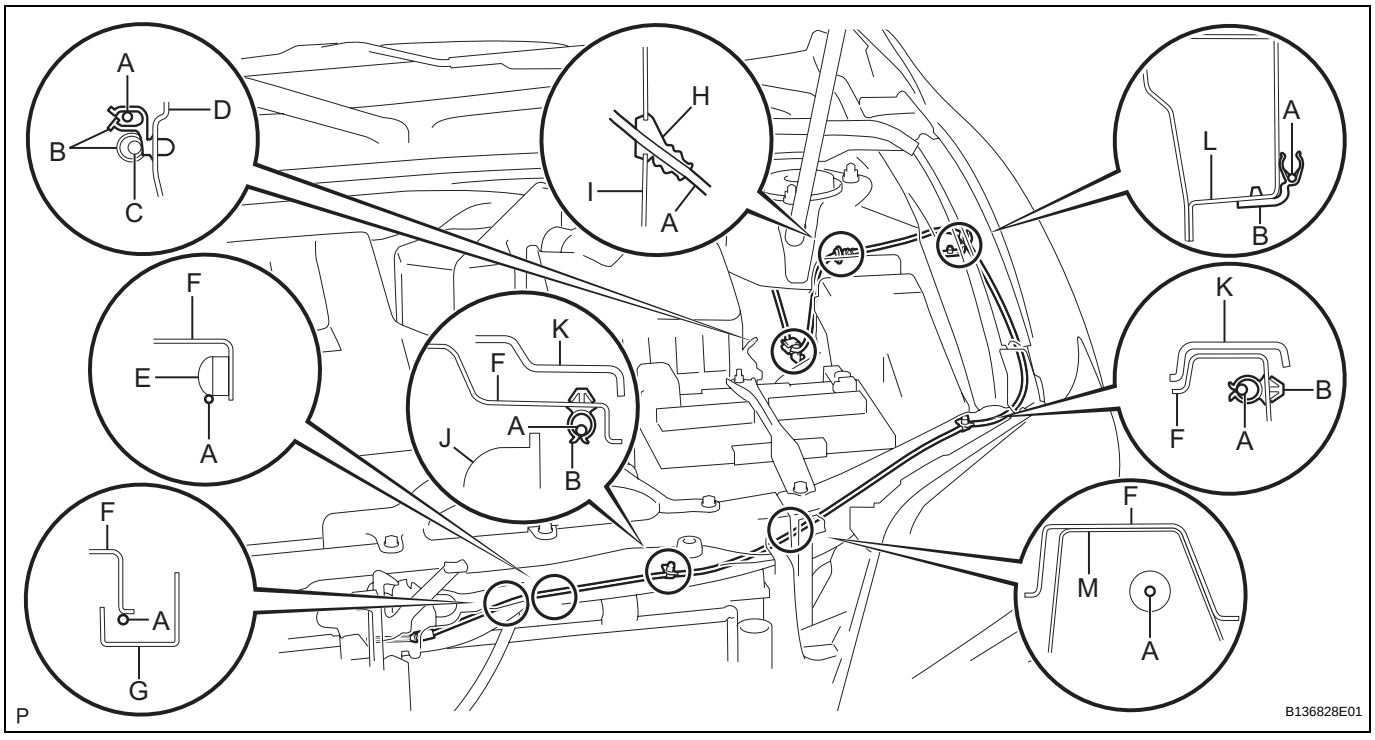


10. REMOVE HOOD LOCK CONTROL LEVER SUB-ASSEMBLY

(a) Disconnect the hood lock control cable and remove the hood lock control lever.

11. REMOVE HOOD LOCK CONTROL CABLE ASSEMBLY

(a) Using a screwdriver, disconnect the clamps shown in the illustration.



Area	Part Name	Area	Part Name
A	Hood lock control cable	H	Grommet
B	Clamp	I	Side member outer
C	Wire harness	J	Radiator
D	Pillar	K	Radiator support cover
E	Nut	L	Front fender apron
F	Radiator support upper	M	Brace
G	Hood lock protector	-	-

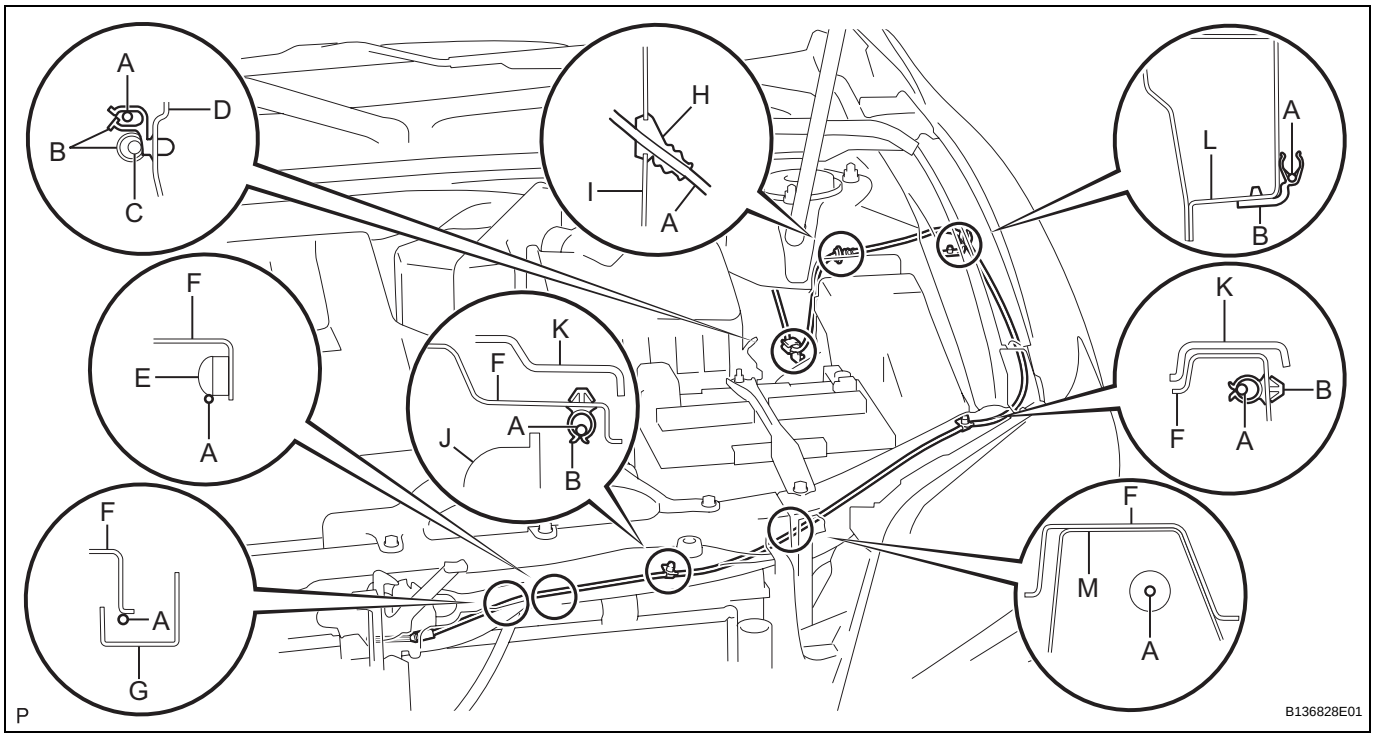
HINT:
Tape the screwdriver tip before use.

(b) Pull the cable from the engine compartment and remove it.

INSTALLATION

1. INSTALL HOOD LOCK CONTROL CABLE ASSEMBLY

(a) Pass the hood lock control cable assembly into the engine compartment.



Area	Part Name	Area	Part Name
A	Hood lock control cable	H	Grommet
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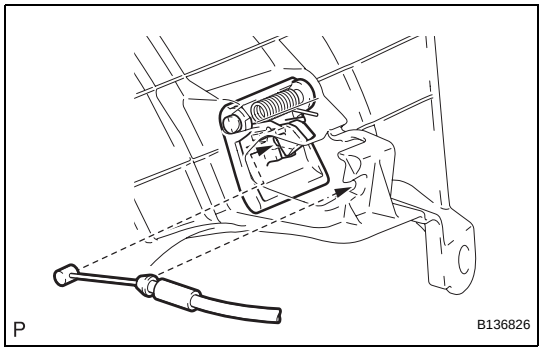
C	Wire harness	J	Radiator
D	Pillar	K	Radiator support cover
E	Nut	L	Front fender apron
F	Radiator support upper	M	Brace
G	Hood lock protector	-	-

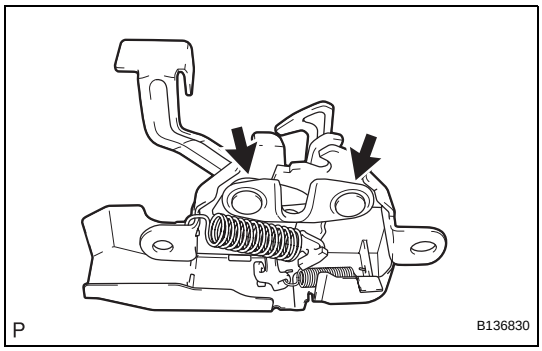
(b) Pass the cable front side through the upper radiator support.

(c) Connect the clamps as shown in the illustration.



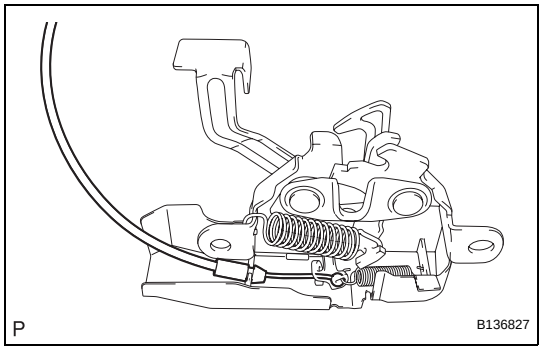
2. INSTALL HOOD LOCK CONTROL LEVER SUB-ASSEMBLY

(a) Install the hood lock control lever and connect the hood lock control cable.

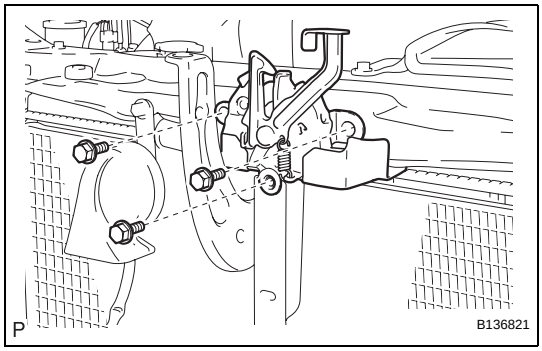


3. INSTALL HOOD LOCK ASSEMBLY (w/o Engine Hood Courtesy Switch)

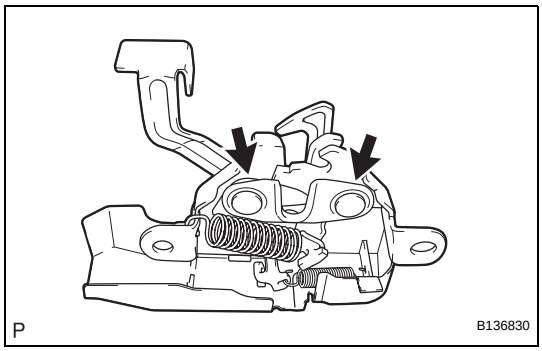
(a) Apply MP grease to the sliding areas of the lock.



(b) Connect the hood lock control cable.

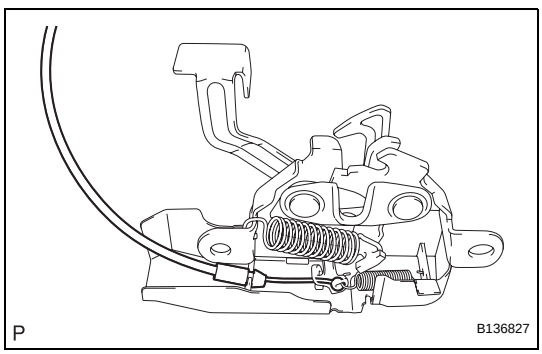


(c) Install the hood lock assembly with the 3 bolts.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)

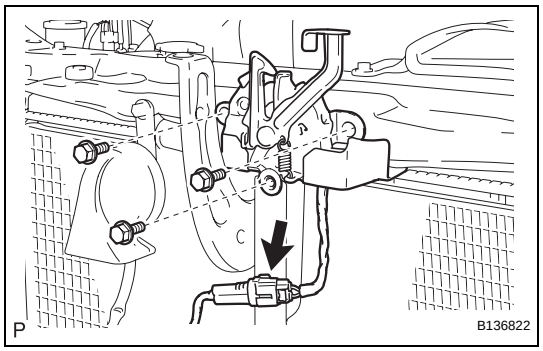


4. INSTALL HOOD LOCK ASSEMBLY (w/ Engine Hood Courtesy Switch)

(a) Apply MP grease to the sliding areas of the lock.

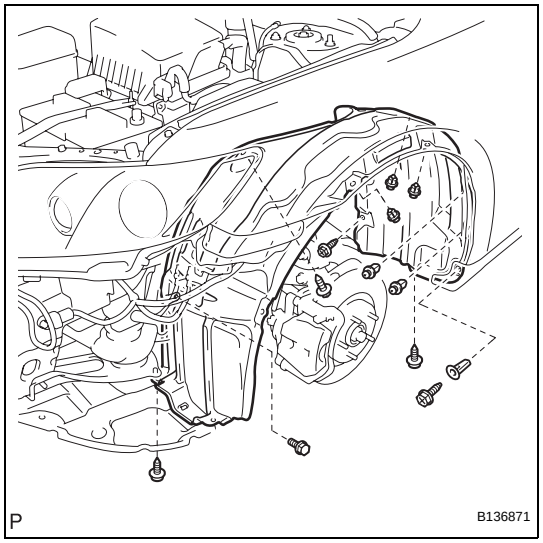


(b) Connect the hood lock control cable.

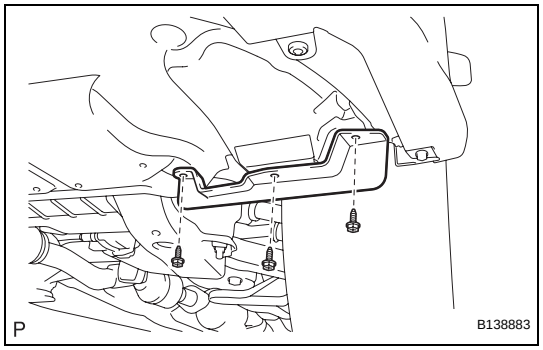


(c) Install the hood lock assembly with the 3 bolts.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
(d) Connect the connector.

5. **INSTALL HIGH PITCHED HORN ASSEMBLY (See page HO-7)**



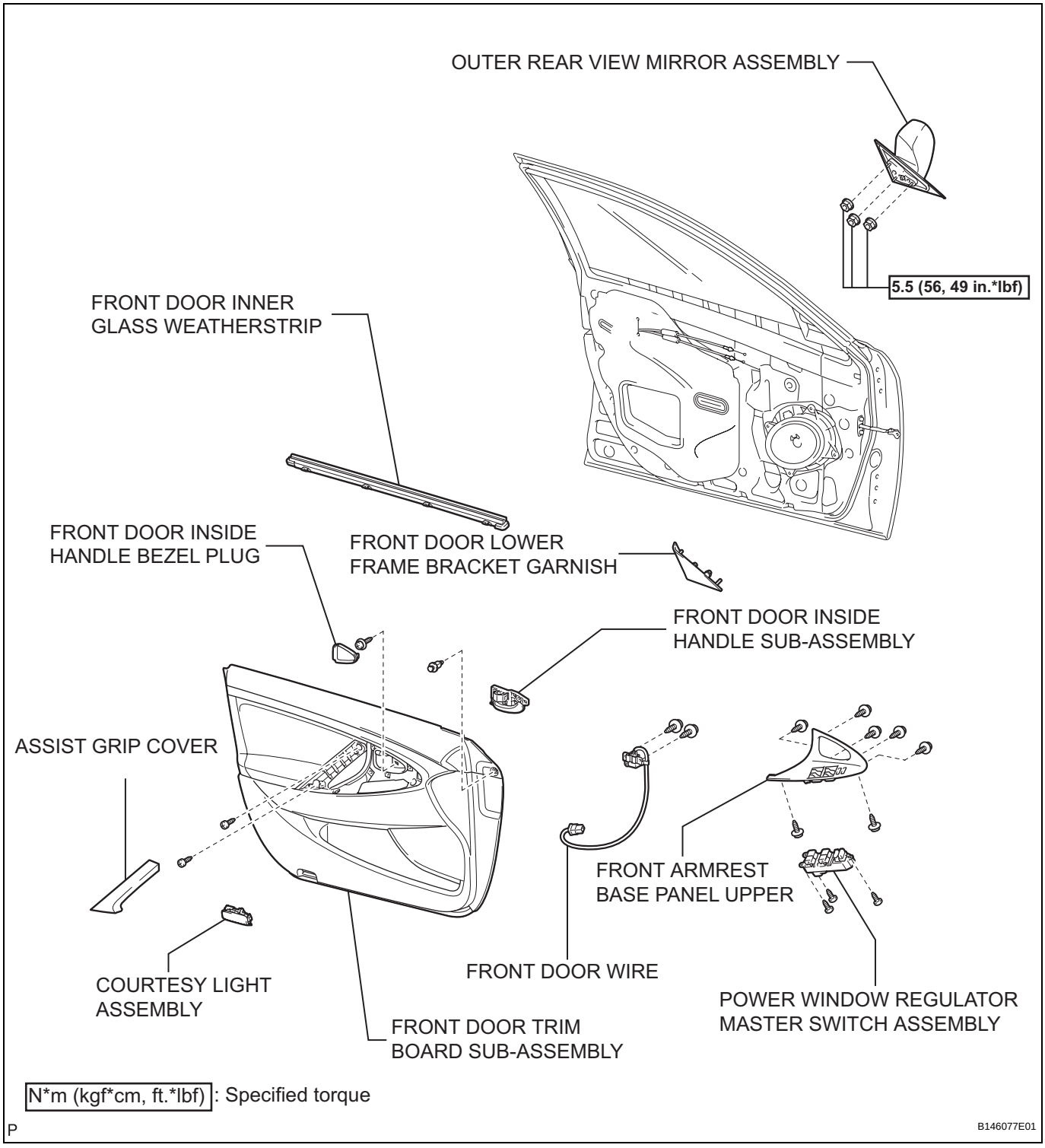
6. **INSTALL FRONT FENDER LINER**
(a) Install the front fender liner with the grommet and 4 screws.
(b) Install the bolt and 5 clips.
7. **INSPECT HOOD SUB-ASSEMBLY (See page ED-1)**
8. **ADJUST HOOD SUB-ASSEMBLY (See page ED-2)**
9. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
10. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
11. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**

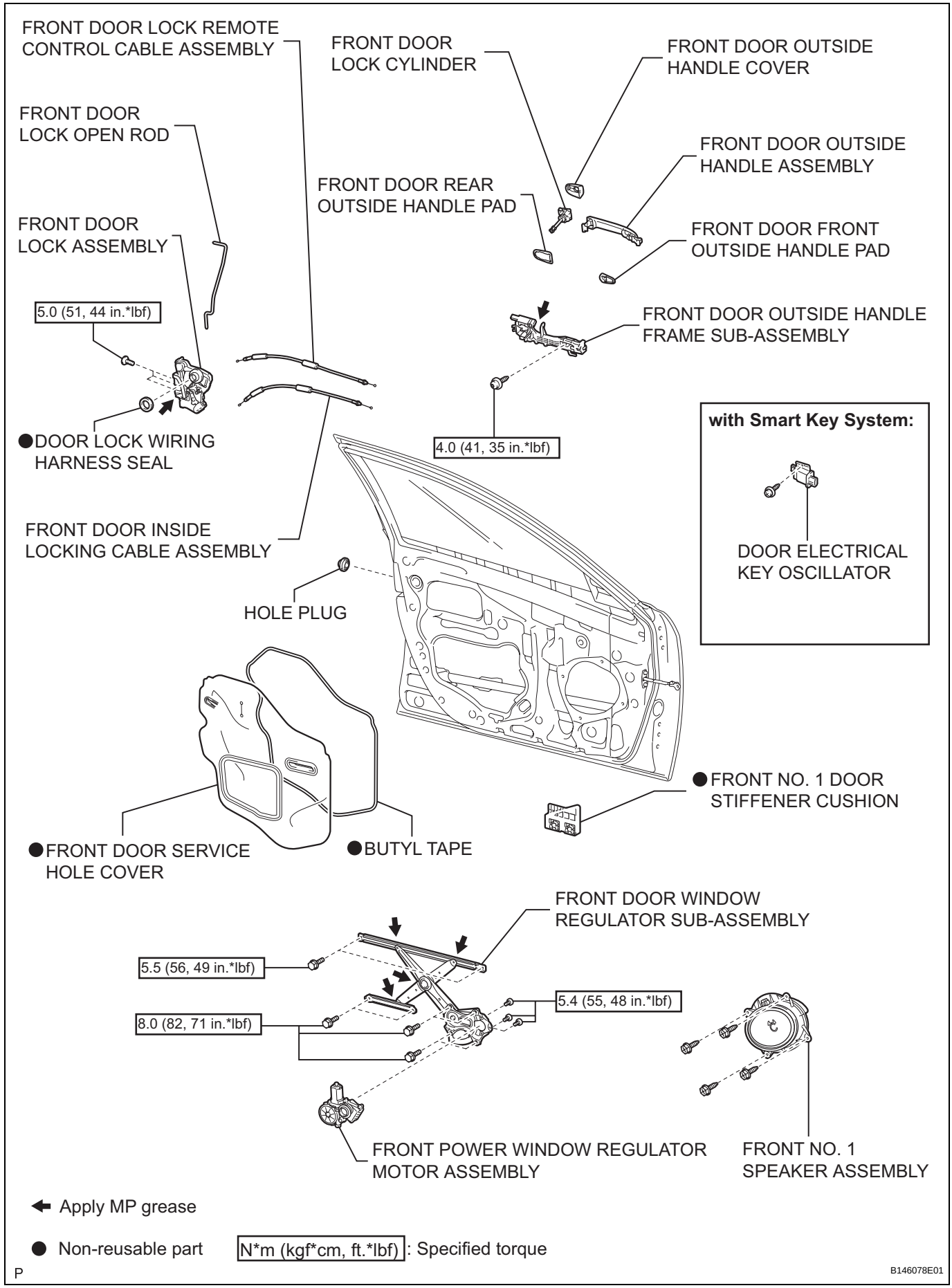


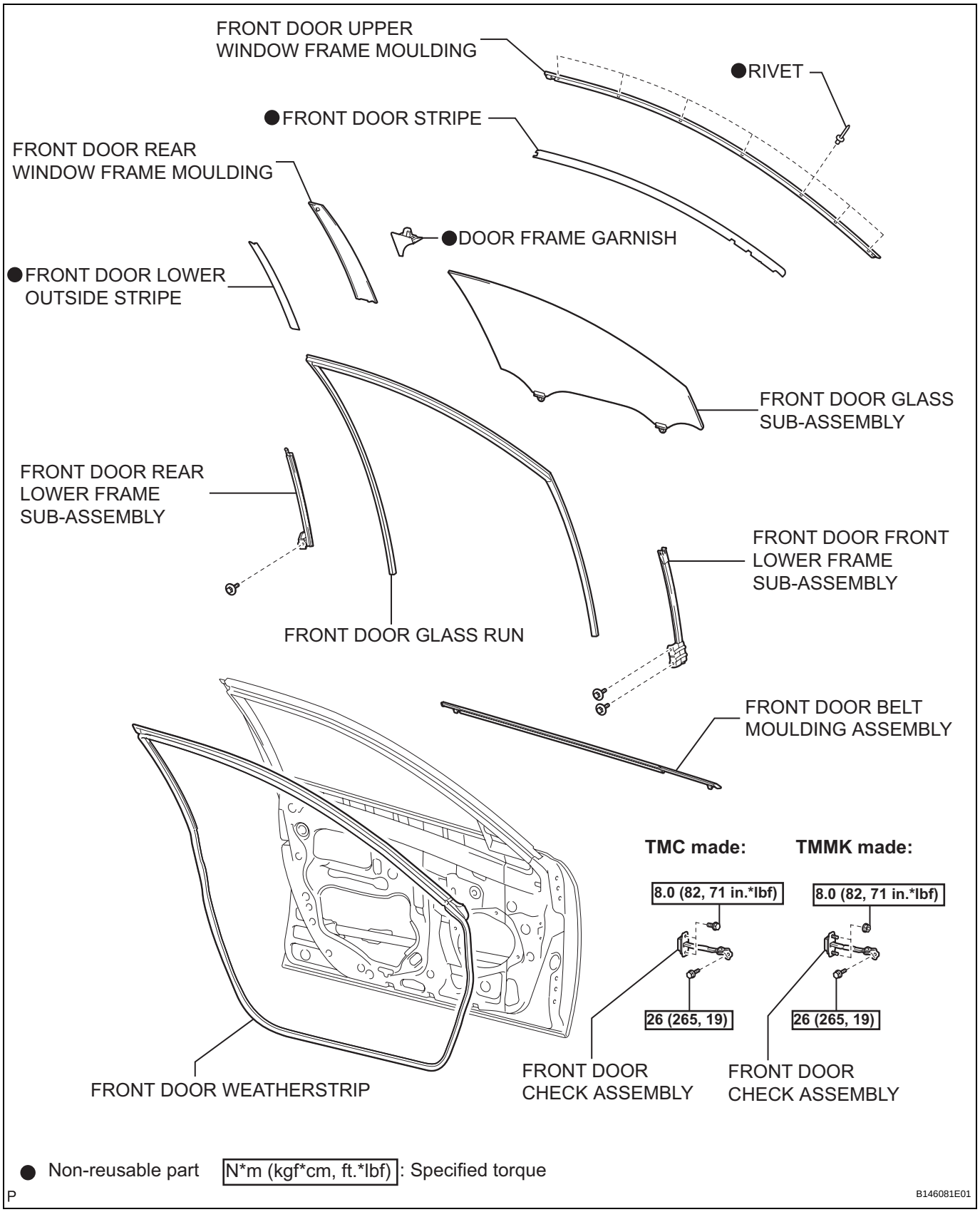
12. **INSTALL FRONT WHEEL OPENING EXTENSION PAD**
(a) Install the front wheel opening extension pad with the 3 screws.
13. **INSTALL FRONT WHEEL (See page SP-22)**
14. **VEHICLE PREPARATION FOR FOG LIGHT AIM (w/ Fog Light) (See page LI-79)**
15. **PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-80)**
16. **FOG LIGHT AIMING INSPECTION (w/ Fog Light) (See page LI-81)**
17. **FOG LIGHT AIMING ADJUSTMENT (w/ Fog Light) (See page LI-82)**

FRONT DOOR

COMPONENTS




FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY
FRONT DOOR LOCK CYLINDER
FRONT DOOR OUTSIDE HANDLE COVER
FRONT DOOR LOCK OPEN ROD
FRONT DOOR OUTSIDE HANDLE ASSEMBLY
FRONT DOOR REAR OUTSIDE HANDLE PAD
FRONT DOOR LOCK ASSEMBLY
FRONT DOOR FRONT OUTSIDE HANDLE PAD
5.0 (51, 44 in.*lbf)
FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY
●DOOR LOCK WIRING HARNESS SEAL
4.0 (41, 35 in.*lbf)
with Smart Key System:
DOOR ELECTRICAL KEY OSCILLATOR
FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY
HOLE PLUG
●FRONT NO. 1 DOOR STIFFENER CUSHION
●FRONT DOOR SERVICE HOLE COVER
●BUTYL TAPE
FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY
5.5 (56, 49 in.*lbf)
5.4 (55, 48 in.*lbf)
8.0 (82, 71 in.*lbf)
FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY
FRONT NO. 1 SPEAKER ASSEMBLY
Apply MP grease
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
P
B146078E01



● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

P

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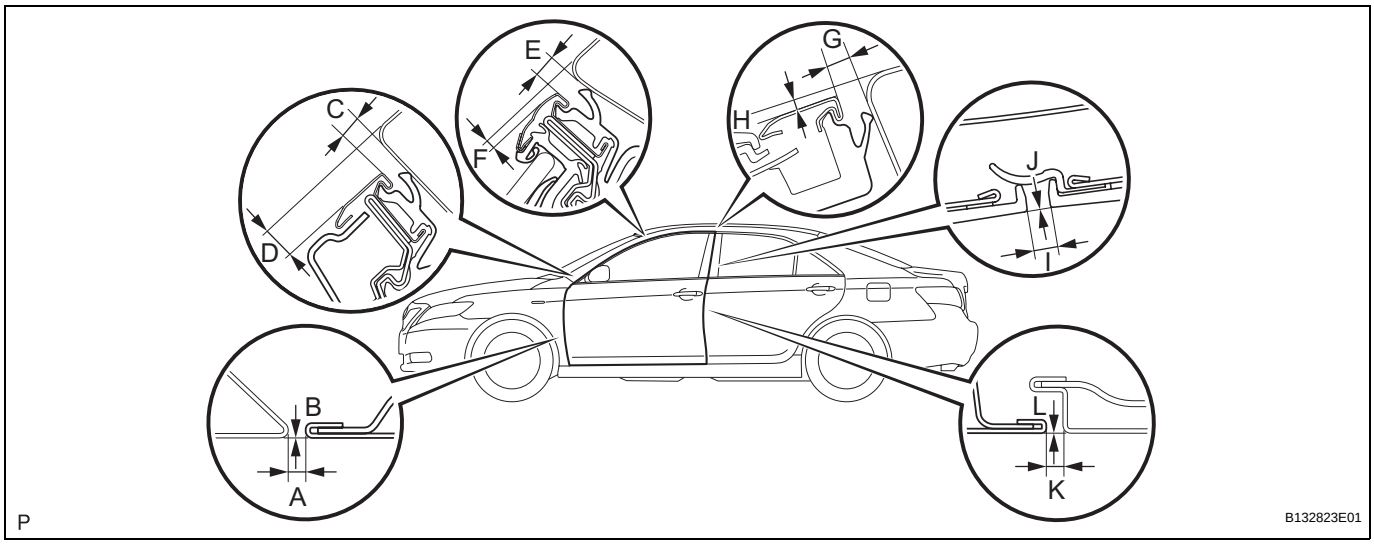
ED

ON-VEHICLE INSPECTION

1. INSPECT FRONT DOOR PANEL SUB-ASSEMBLY

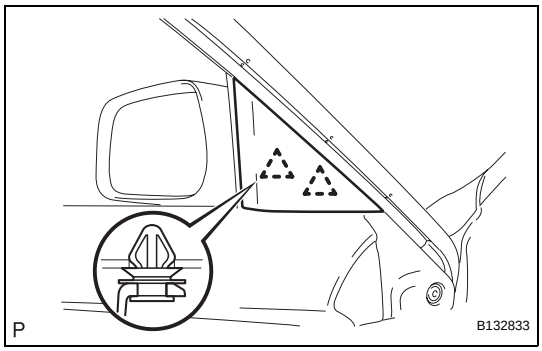
(a) Check that the clearance measurements of areas A to L are within each standard range.



Standard clearance

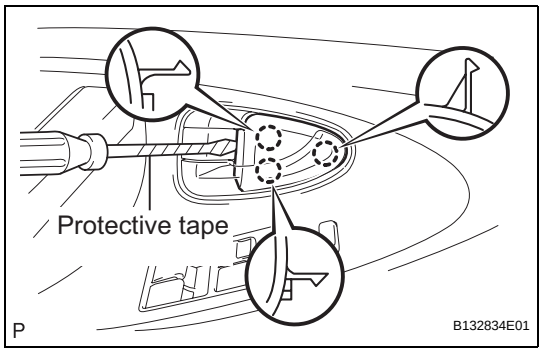
Area	Measurement	Area	Measurement
A	2.7 to 5.7 mm (0.106 to 0.224 in.)	G	3.3 to 6.3 mm (0.130 to 0.248 in.)
B	-1.5 to 1.5 mm (-0.059 to 0.059 in.)	H	-0.3 to 2.7 mm (-0.012 to 0.106 in.)
C	3.3 to 6.3 mm (0.130 to 0.248 in.)	I	2.3 to 6.3 mm (0.091 to 0.248 in.)
D	6.4 to 9.4 mm (0.252 to 0.370 in.)	J	-2.0 to 2.0 mm (-0.079 to 0.079 in.)
E	3.3 to 6.3 mm (0.130 to 0.248 in.)	K	2.7 to 5.7 mm (0.106 to 0.224 in.)
F	0.9 to 3.9 mm (0.035 to 0.154 in.)	L	-1.5 to 1.5 mm (-0.059 to 0.059 in.)

DISASSEMBLY



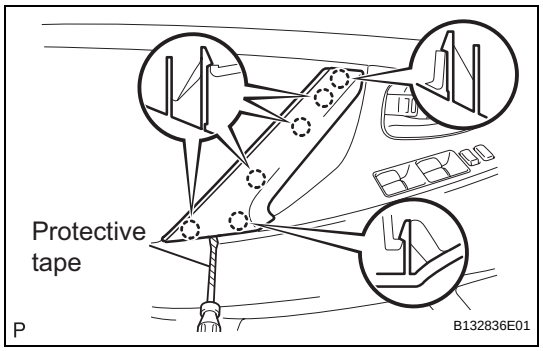
1. REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH

(a) Disengage the 2 clips and remove the front door lower frame bracket garnish.



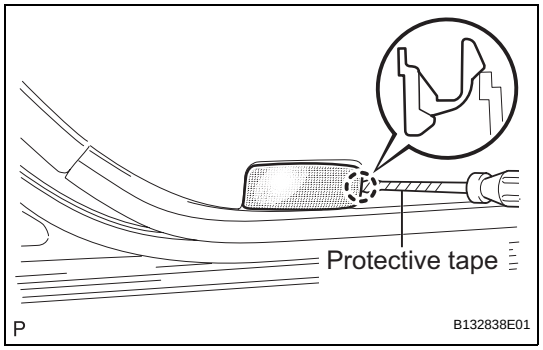
2. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG

(a) Using a screwdriver wrapped with protective tape, disengage the 3 claws, and remove the front door inside handle bezel plug.



3. REMOVE ASSIST GRIP COVER

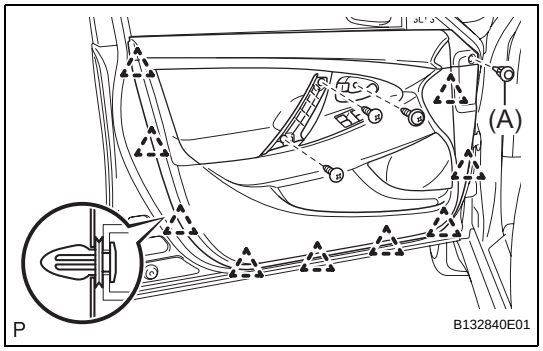
(a) Using a screwdriver wrapped with protective tape, disengage the 6 claws and remove the assist grip cover.



4. REMOVE COURTESY LIGHT ASSEMBLY

(a) Using a screwdriver wrapped with protective tape, disengage the claw and remove the courtesy light assembly.

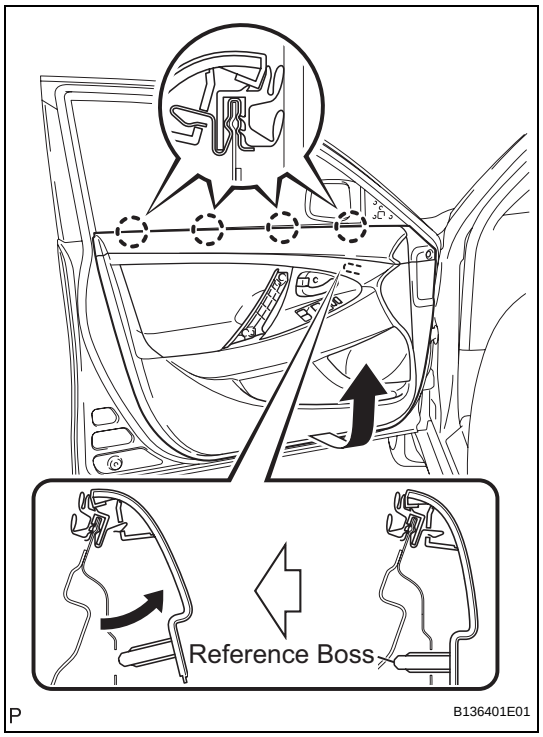
(b) Disconnect the connector.



5. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY

(a) Remove the 3 screws and clip (A).

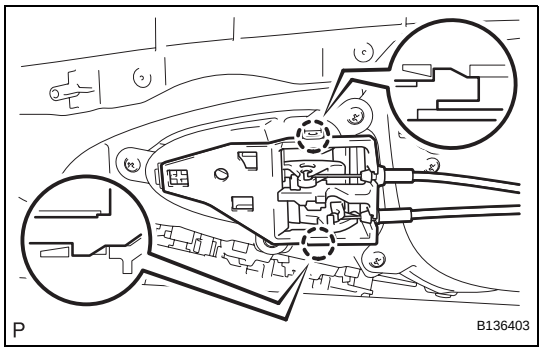
(b) Using the clip remover, disengage the 9 clips.



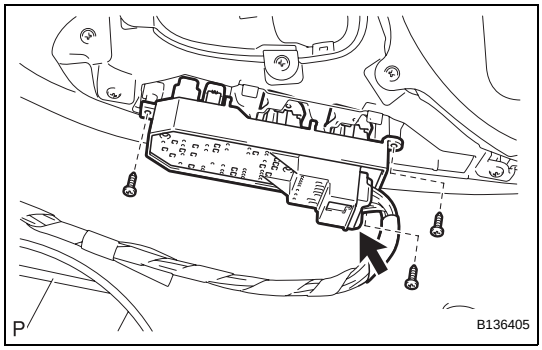
(c) Pull out the front door trim board in the direction indicated by the arrow.

(d) Remove the reference bosses from the front door panel.

(e) Raise the front door trim board to disengage the 4 claws and remove the front door trim board together with the front door inner glass weatherstrip.

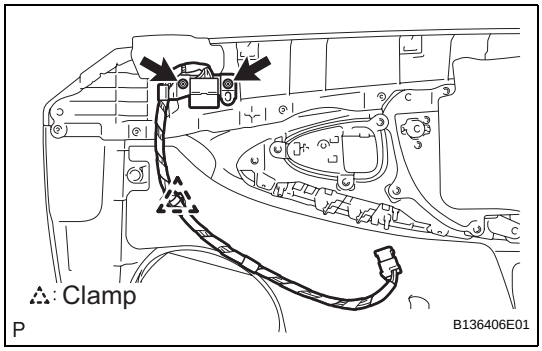


(f) Disengage the 2 claws and disconnect the front door inside handle sub-assembly.



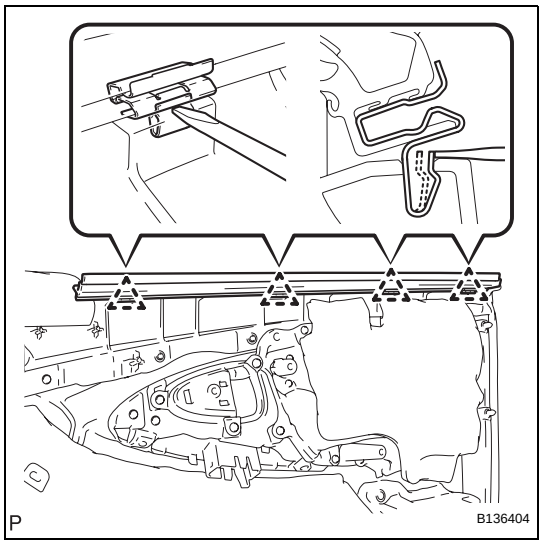
6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY

(a) Disconnect the connector.
(b) Remove the 3 screws and the power window regulator master switch assembly.



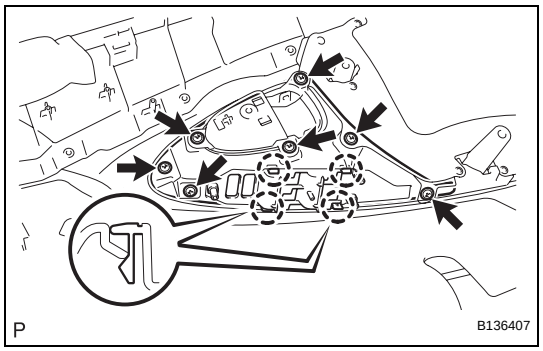
7. REMOVE FRONT DOOR WIRE (for Driver Side)

(a) Disengage the clamp and remove the 2 screws and front door wire.



8. REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP

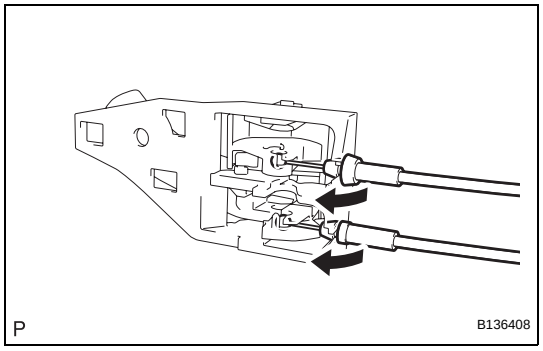
(a) Using a screwdriver, disengage the 4 clips as shown in the illustration and remove the front door inner glass weatherstrip from the front door trim board.



9. REMOVE FRONT ARMREST BASE PANEL UPPER

(a) Remove the 7 screws.

(b) Disengage the 4 claws and remove the front armrest base panel upper.

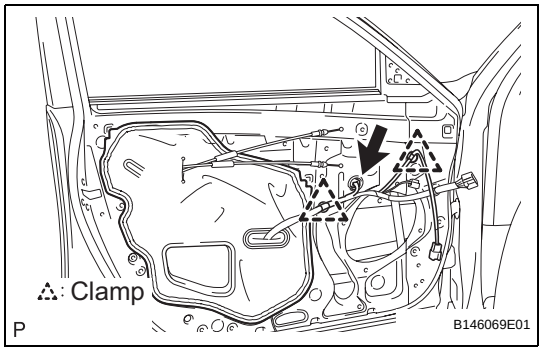


10. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY

(a) Disconnect the front door lock remote control cable and front door inside locking cable and remove the front door inside handle sub-assembly.

11. REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-155)

12. REMOVE OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-15)



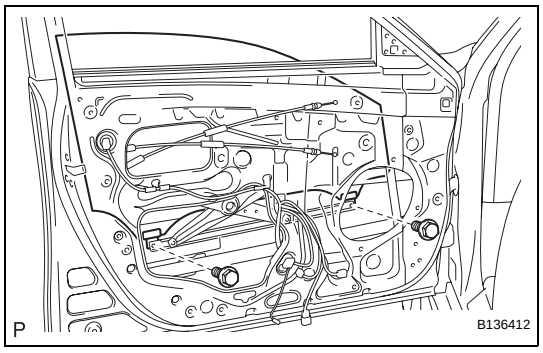
13. REMOVE FRONT DOOR SERVICE HOLE COVER

(a) Disconnect the connector and each clamp, and remove the front door service hole cover.
HINT:
Remove the remaining butyl tape on the door side.

14. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY

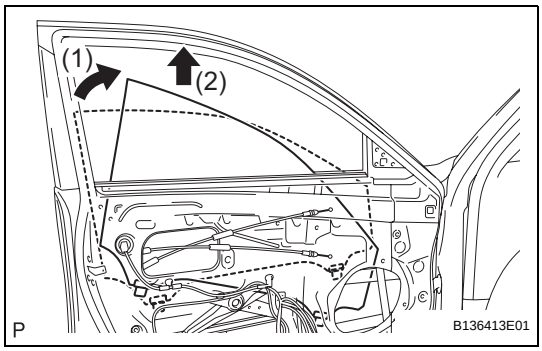
(a) Connect the front power window regulator motor assembly connector.

(b) Connect the power window regulator master switch assembly and move the front door glass sub-assembly so that the door glass bolts can be seen.

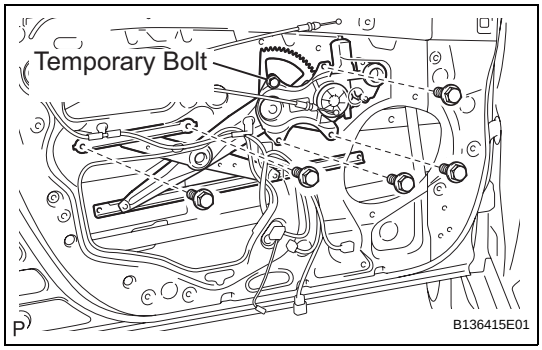


(c) Remove the 2 bolts.
NOTICE:
After the bolts are removed, the door glass may fall and become deformed.

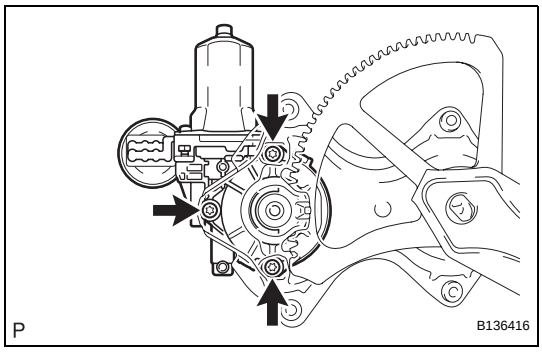
ED



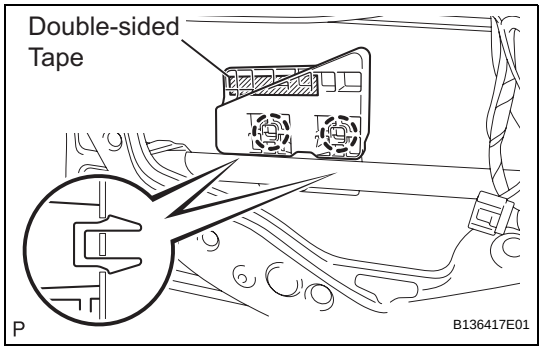
(d) Remove the front door glass sub-assembly as shown in the illustration.
NOTICE:
Do not damage the door glass.
(e) Disconnect the power window regulator master switch assembly and front power window regulator motor assembly connector.



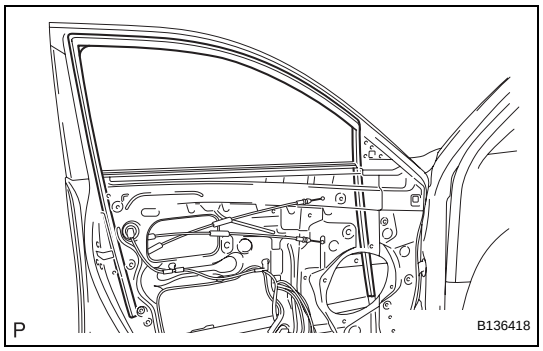
15. REMOVE FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY
(a) Loosen the temporary bolt.
NOTICE:
If the temporary bolt is removed, the front door window regulator may fall and become deformed.
(b) Remove the 5 bolts.
(c) Remove the front door window regulator sub-assembly and the power window regulator motor assembly front as a unit.
(d) Remove the temporary bolt from the front door window regulator sub-assembly.



16. REMOVE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY
(a) Using a "torx" driver (T25), remove the 3 screws and the front power window regulator motor assembly.

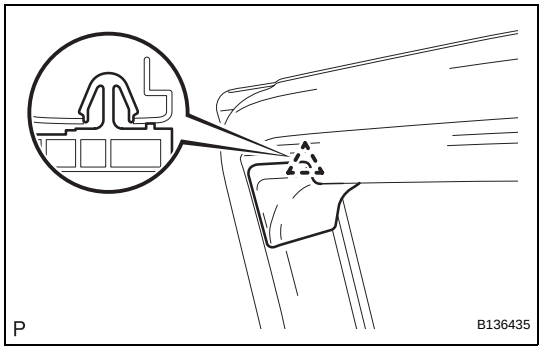


17. REMOVE FRONT NO. 1 DOOR STIFFENER CUSHION
(a) Disengage the 2 claws.
(b) Remove the double-sided tape and the front No. 1 door stiffener cushion.



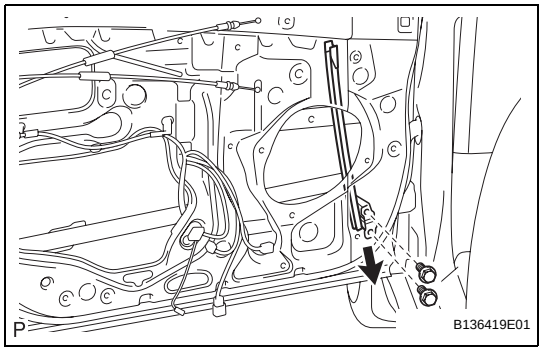
18. REMOVE FRONT DOOR GLASS RUN

(a) Remove the front door glass run.



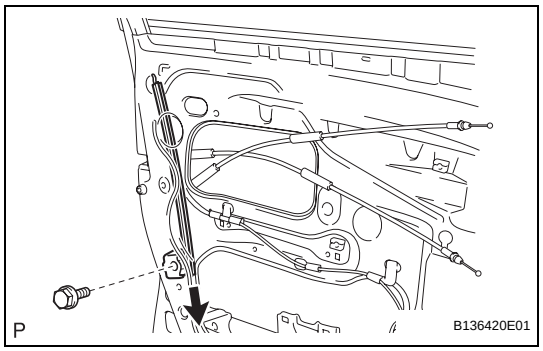
19. REMOVE DOOR FRAME GARNISH

(a) Disengage the clip and remove the door frame garnish.



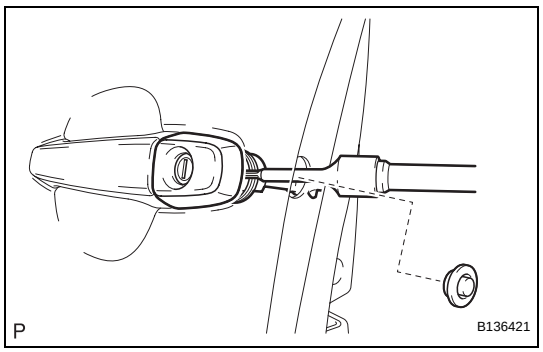
20. REMOVE FRONT DOOR FRONT LOWER FRAME SUB-ASSEMBLY

(a) Remove the 2 bolts and the front door front lower frame sub-assembly as shown in the illustration.



21. REMOVE FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY

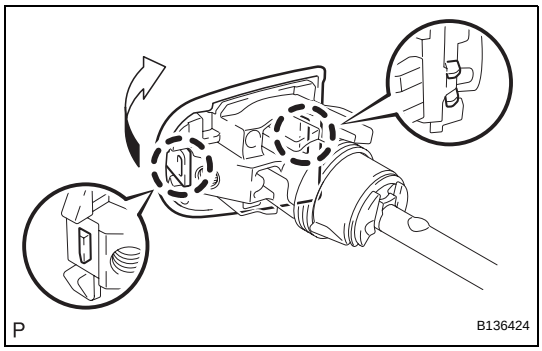
(a) Remove the bolt and the front door rear lower frame sub-assembly as shown in the illustration.



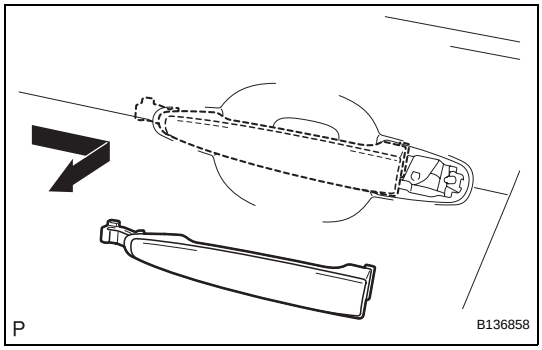
22. REMOVE FRONT DOOR OUTSIDE HANDLE COVER

(a) Remove the hole plug.

(b) Using a "torx" socket wrench (T30), loosen the screw and remove the front door outside handle cover and the door lock key cylinder as a unit.
HINT:
The screw cannot be removed because it is integrated into the front door outside handle frame sub-assembly.

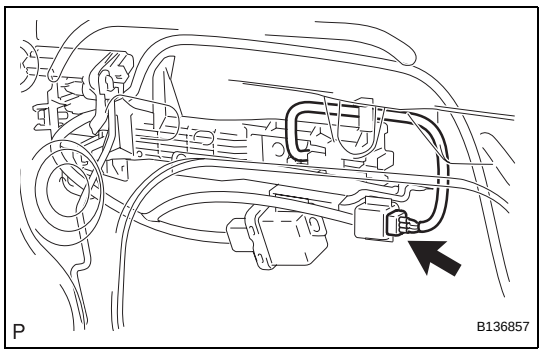


(c) Using a screwdriver, disengage the 2 claws and remove the front door outside handle cover.



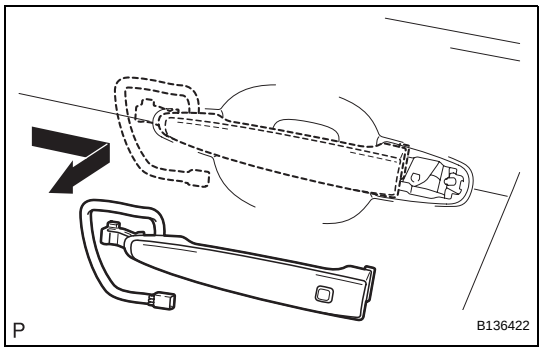
23. REMOVE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (w/o Smart Key System)

(a) Remove the front door outside handle assembly as shown in the illustration.

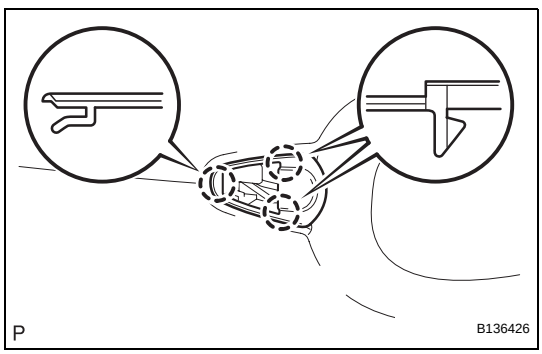


24. REMOVE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (w/ Smart Key System)

(a) Disconnect the connector.

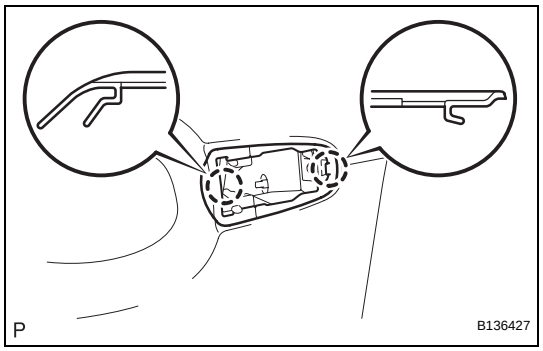


(b) Remove the front door outside handle assembly as shown in the illustration.



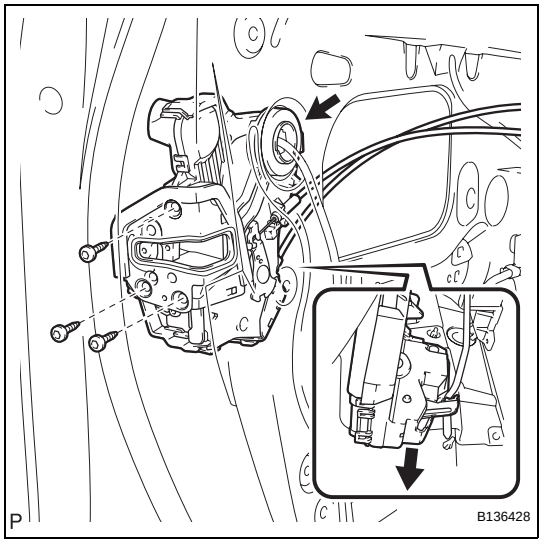
25. REMOVE FRONT DOOR FRONT OUTSIDE HANDLE PAD

(a) Disengage the 3 claws and remove the front door front outside handle pad.



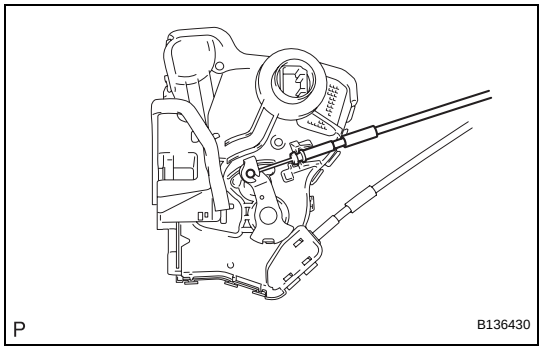
26. REMOVE FRONT DOOR REAR OUTSIDE HANDLE PAD

(a) Disengage the 2 claws and remove the front door rear outside handle pad.



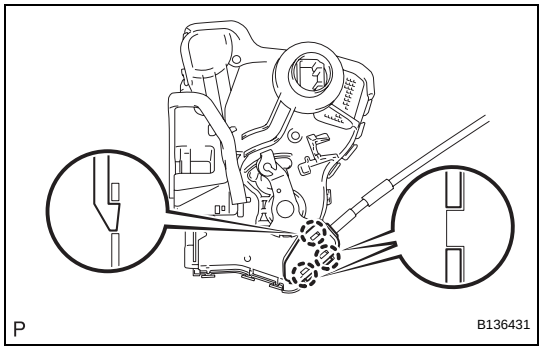
27. REMOVE FRONT DOOR LOCK ASSEMBLY

(a) Disconnect the connector.
(b) Using a "torx" socket wrench (T30), remove the 3 screws.
(c) Slide the front door lock assembly downward, pull out the front door lock open rod from the outside handle frame, and remove the front door lock assembly and cables as a unit.
(d) Remove the front door lock open rod from the front door lock assembly.
(e) Remove the door lock wiring harness sealing from the front door lock assembly.



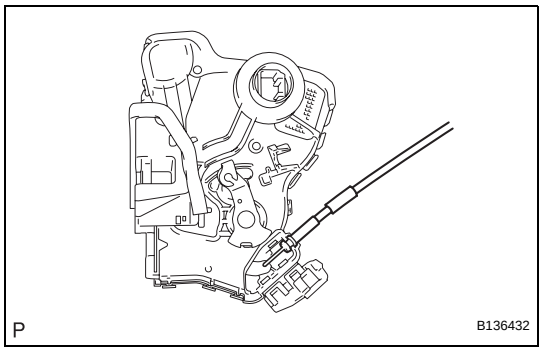
28. REMOVE FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY

(a) Remove the front door lock remote control cable assembly.

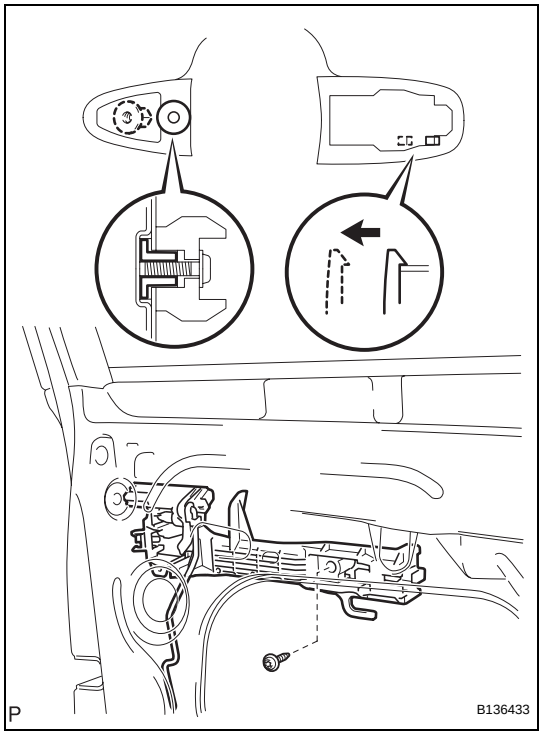


29. REMOVE FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY

(a) Using a screwdriver, disengage the 3 claws.
HINT:
Tape the screwdriver tip before use.

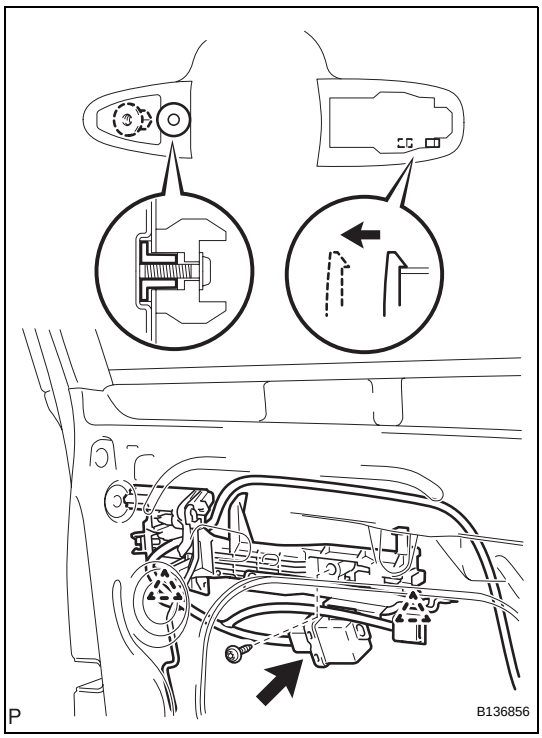


(b) Remove the front door inside locking cable assembly.



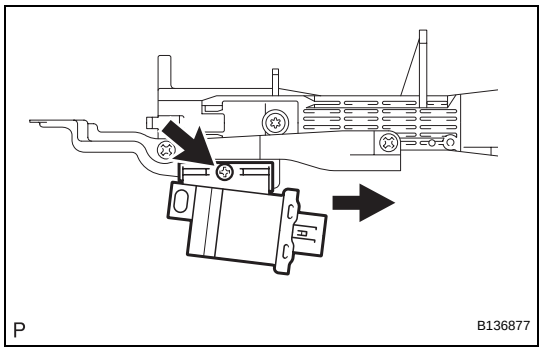
30. REMOVE FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY (w/o Smart Key System)

(a) Using a "torx" socket wrench (T30), remove the screw.
(b) Disengage the claws and remove the front door outside handle frame sub-assembly.



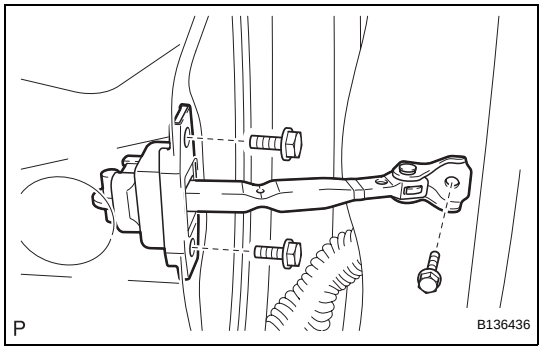
31. REMOVE FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY (w/ Smart Key System)

(a) Using a "torx" socket wrench (T30), remove the screw.
(b) Disconnect the connector.
(c) Disengage the 2 clamps.
(d) Disengage the claws and remove the front door outside handle frame sub-assembly.



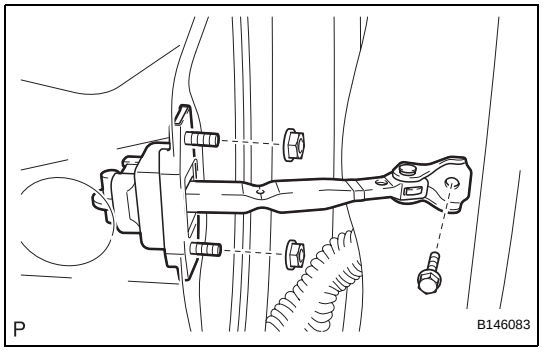
32. REMOVE DOOR ELECTRICAL KEY OSCILLATOR (w/ Smart Key System)

(a) Remove the screw and door electrical key oscillator.



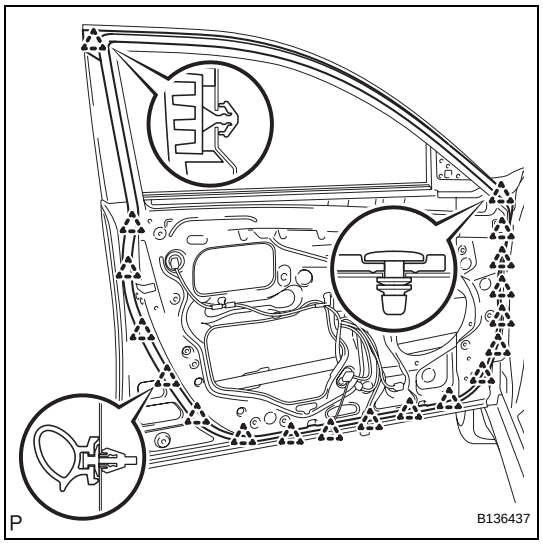
33. REMOVE FRONT DOOR CHECK ASSEMBLY (for TMC Made)

(a) Remove the 3 bolts and the front door check assembly.



34. REMOVE FRONT DOOR CHECK ASSEMBLY (for TMMK Made)

(a) Remove the bolt, 2 nuts, and the front door check assembly.



35. REMOVE FRONT DOOR WEATHERSTRIP

(a) Using the clip remover, disengage the 19 clips and remove the front door weatherstrip.

36. REMOVE FRONT DOOR BELT MOULDING ASSEMBLY (See page ET-34)

37. REMOVE FRONT DOOR REAR WINDOW FRAME MOULDING (See page ET-48)

38. REMOVE FRONT DOOR UPPER WINDOW FRAME MOULDING (See page ET-49)

39. REMOVE FRONT DOOR STRIPE (See page ET-67)

40. REMOVE FRONT DOOR LOWER OUTSIDE STRIPE (See page ET-67)

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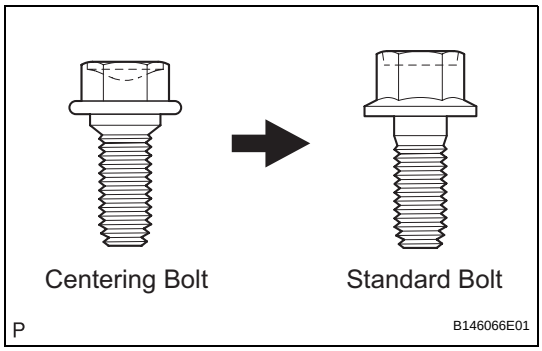


ADJUSTMENT

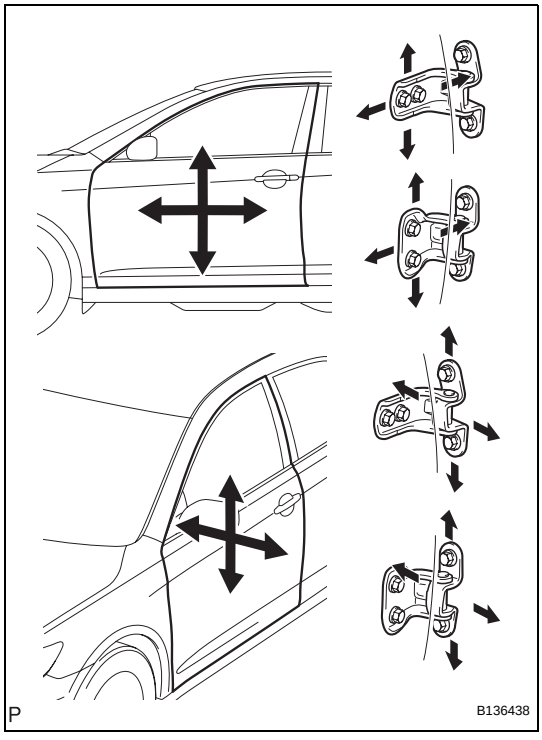
HINT:

- Before adjusting the door position for vehicles equipped with side airbags and curtain shield airbags, be sure to disconnect the battery. After adjustment, inspect the SRS warning light, the side airbag system, and the curtain shield airbag system for normal operation. Then initialize both airbag systems.
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (with washers) when making adjustment.
- A bolt without a torque specification is shown in the standard bolt chart (See page SS-2).

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page IR-22).



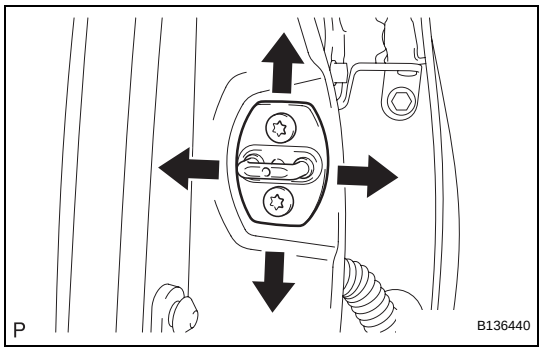
2. ADJUST FRONT DOOR

(a) Using SST, loosen the body's hinge bolts and adjust the door position.
SST 09812-00010

(b) Tighten the body's hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

(c) Loosen the door's hinge bolts and adjust the door position.

(d) Tighten the door's hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)



(e) Using a "torx" socket wrench (T40), adjust the striker position by slightly loosening the striker mounting screws and hitting the striker with a plastic hammer.
(f) Using a "torx" socket wrench (T40), tighten the striker mounting screws after the adjustment.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. INSPECT SRS WARNING LIGHT
(See page IR-58)

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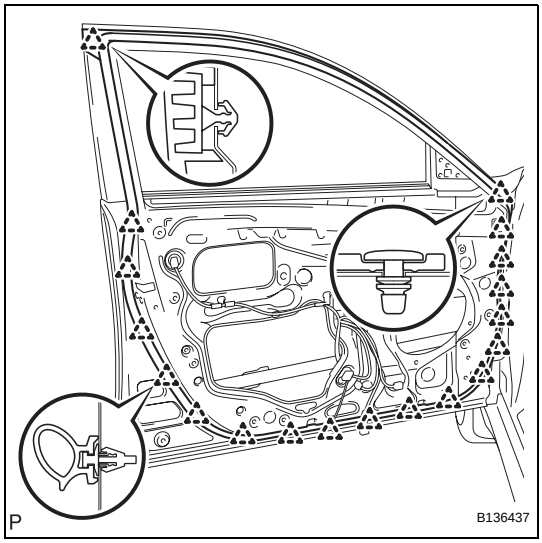
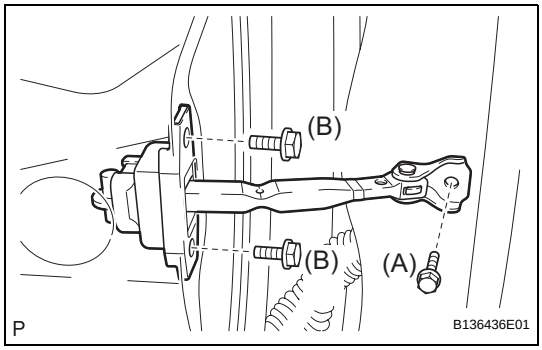
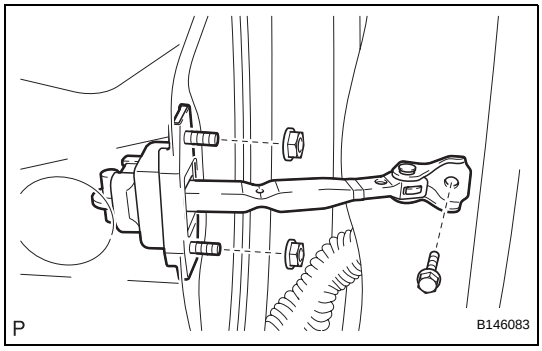
REASSEMBLY

1. **REPAIR INSTRUCTION (See page ET-68)**
2. **INSTALL FRONT DOOR LOWER OUTSIDE STRIPE (See page ET-71)**
3. **INSTALL FRONT DOOR STRIPE (See page ET-71)**
4. **INSTALL FRONT DOOR UPPER WINDOW FRAME MOULDING (See page ET-49)**
5. **INSTALL FRONT DOOR REAR WINDOW FRAME MOULDING (See page ET-50)**
6. **INSTALL FRONT DOOR BELT MOULDING ASSEMBLY (See page ET-34)**
7. **INSTALL FRONT DOOR WEATHERSTRIP**
   (a) Engage the 19 clips to install a new front door weatherstrip.

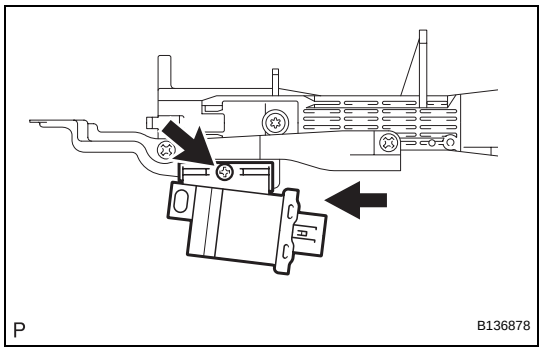




8. **INSTALL FRONT DOOR CHECK ASSEMBLY (for TMC Made)**
   (a) Install the front door check assembly with the 3 bolts.
   Torque: Bolt (A)
   26 N*m (265 kgf*cm, 19 ft.*lbf)
   Torque: Bolt (B)
   8.0 N*m (82 kgf*cm, 71 in.*lbf)



9. **INSTALL FRONT DOOR CHECK ASSEMBLY (for TMMK Made)**
   (a) Install the front door check assembly with the bolt and 2 nuts.
   Torque: Bolt
   26 N*m (265 kgf*cm, 19 ft.*lbf)
   Torque: Nut
   8.0 N*m (82 kgf*cm, 71 in.*lbf)

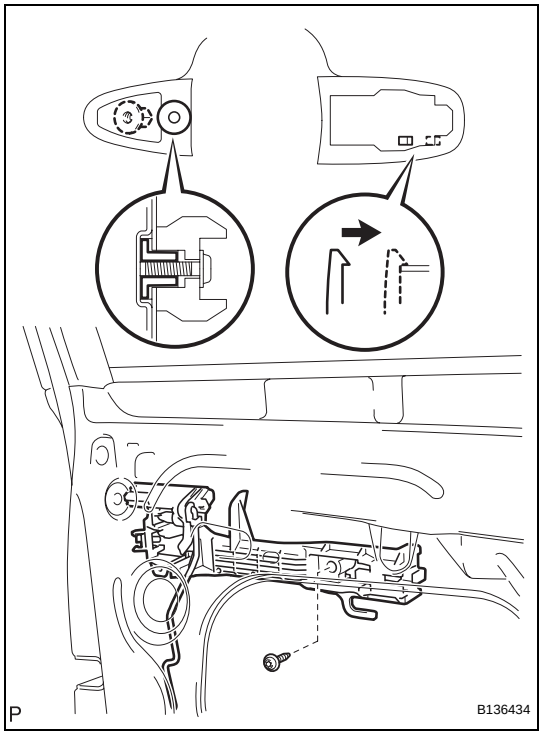


10. INSTALL DOOR ELECTRICAL KEY OSCILLATOR (w/ Smart Key System)

(a) Install the door electrical key oscillator with the screw.

11. INSTALL FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY (w/o Smart Key System)

(a) Apply MP grease to the sliding parts on the front door outside handle frame sub-assembly.



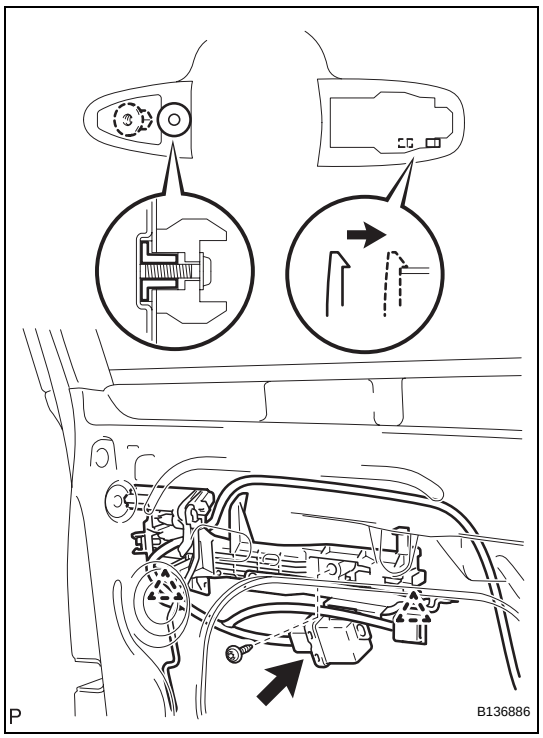
(b) Install the front door outside handle frame sub-assembly with the claw.

(c) Using a "torx" socket wrench (T30), install the front door outside handle frame sub-assembly with the screw.

Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

12. INSTALL FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY (w/ Smart Key System)

(a) Apply MP grease to the sliding parts on the front door outside handle frame sub-assembly.



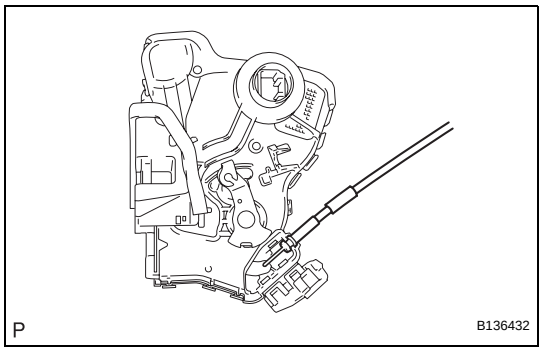
(b) Install the front door outside handle frame sub-assembly with the claw.

(c) Using a "torx" socket wrench (T30), install the front door outside handle frame sub-assembly with the screw.

Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

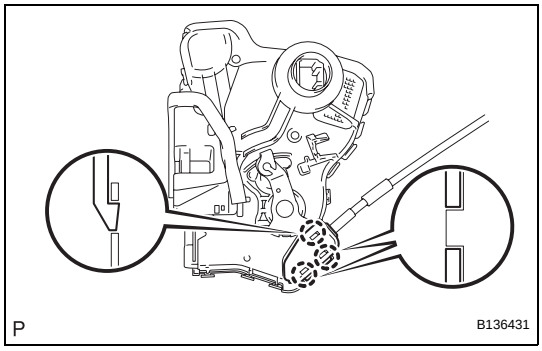
(d) Engage the 2 clamps.

(e) Connect the connector.

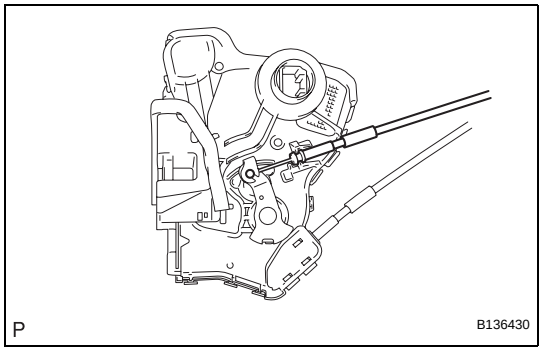


13. INSTALL FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY

(a) Install the front door inside locking cable assembly.



(b) Engage the 3 claws.



14. INSTALL FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY

(a) Install the front door lock remote control cable assembly.

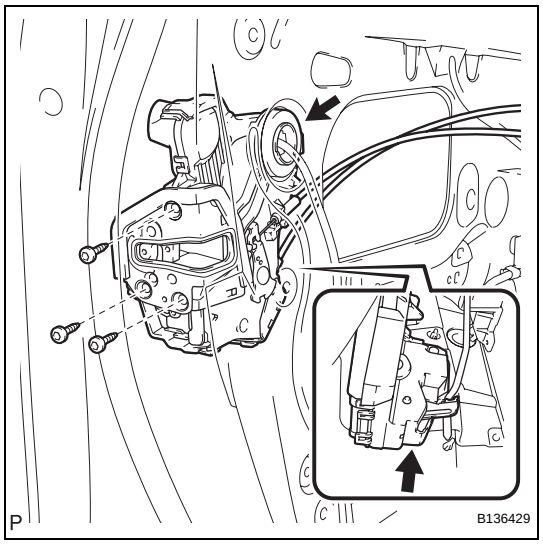
15. INSTALL FRONT DOOR LOCK ASSEMBLY

NOTICE:

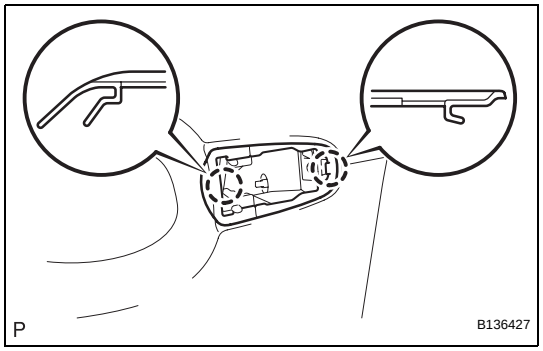
- **When reusing the removed front door lock assembly, replace the door lock wire harness sealing on the connector with a new one.**
- **Do not allow grease or dust to adhere on the door lock wiring harness sealing surface of the connector.**
- **Reusing the door lock wiring harness sealing and/or using damaged door lock wiring harness sealing may cause water intrusion to the connection. This may result in a malfunction in the front door lock assembly.**

(a) Apply MP grease to the sliding parts on the front door lock assembly.

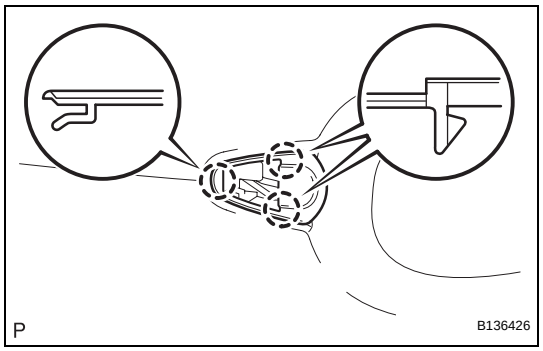
(b) Install a new door lock wiring harness sealing to front door lock assembly.



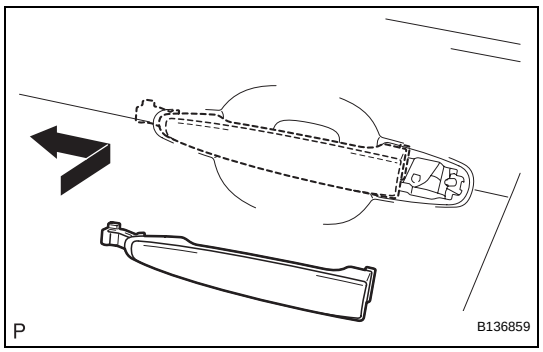
(c) Insert the front door lock open rod to the front door lock assembly, and set it to the front door outside handle frame.
(d) Make sure that the front door lock open rod is securely connected to the front door lock assembly.
(e) Using a "torx" socket wrench (T30), install the front door lock assembly with the 3 screws.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(f) Connect the connector.



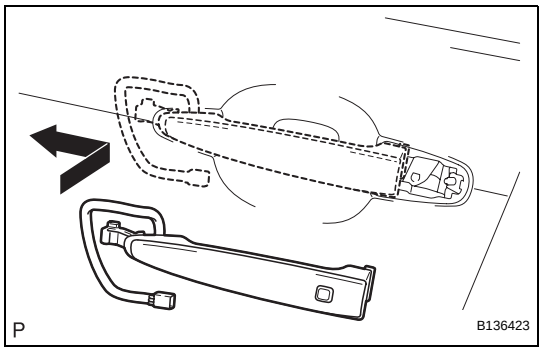
16. INSTALL FRONT DOOR REAR OUTSIDE HANDLE PAD
(a) Attach the 2 claws to install the front door rear outside handle pad.



17. INSTALL FRONT DOOR FRONT OUTSIDE HANDLE PAD
(a) Attach the 3 claws to install the front door front outside handle pad.



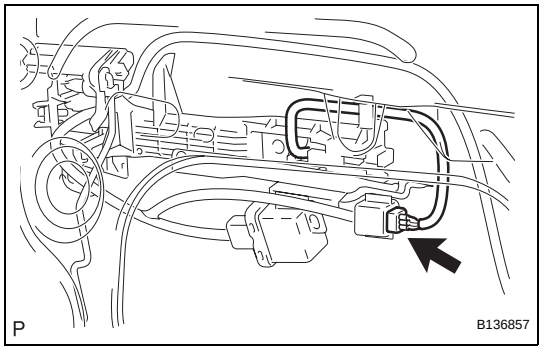
18. INSTALL FRONT DOOR OUTSIDE HANDLE ASSEMBLY (w/o Smart Key System)
(a) Insert the front end of the front door outside handle assembly into the front door outside handle frame.
(b) Insert the rear end of the front door outside handle assembly into the front door outside handle frame. Next slide the front door outside handle assembly to the front of the vehicle to install it.



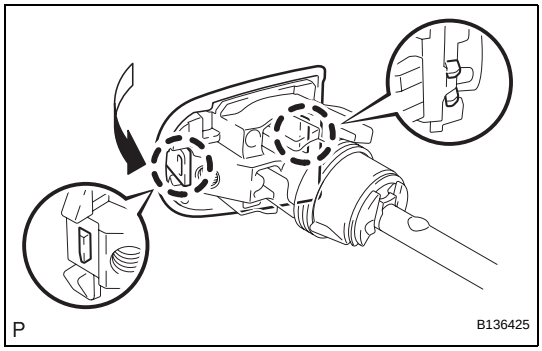
19. INSTALL FRONT DOOR OUTSIDE HANDLE ASSEMBLY (w/ Smart Key System)

(a) Insert the front end of the front door outside handle assembly into the front door outside handle frame.

(b) Insert the rear end of the front door outside handle assembly into the front door outside handle frame. Next slide the front door outside handle assembly to the front of the vehicle to install it.

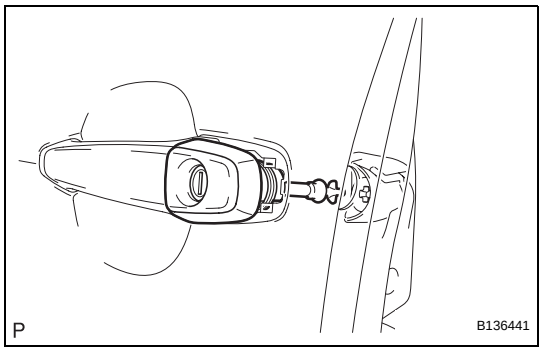


(c) Connect the connector.

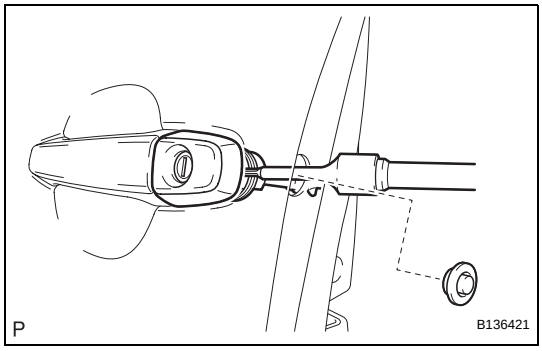


20. INSTALL FRONT DOOR OUTSIDE HANDLE COVER

(a) Engage the 2 claws of the front door outside handle cover to the front door lock cylinder to install the cover.

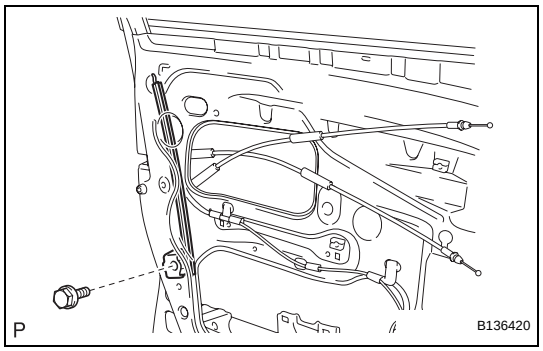


(b) Install the front door lock cylinder.
HINT:
Make sure that the front door lock cylinder rod is inserted into the front door lock assembly.



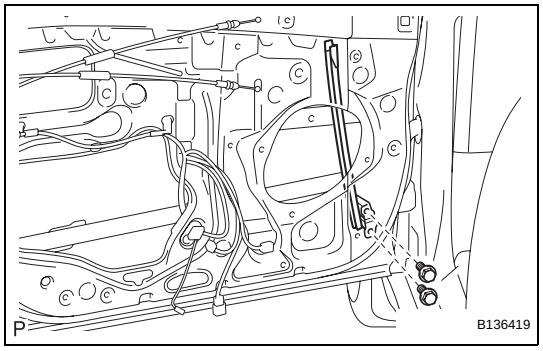
(c) Using a "torx" socket wrench (T30), install the front door lock cylinder with the screw.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

(d) Install the hole plug.



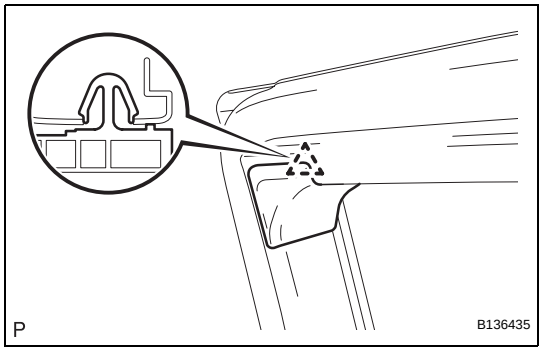
21. INSTALL FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY

(a) Install the front door rear lower frame sub-assembly with the bolt.



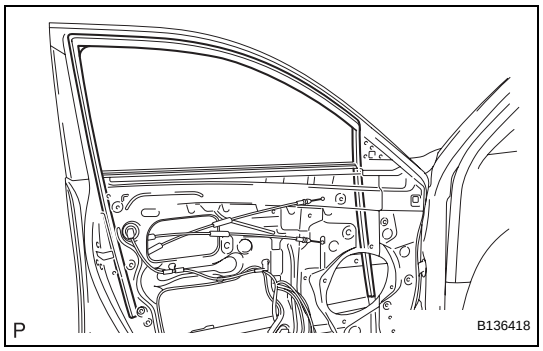
22. INSTALL FRONT DOOR FRONT LOWER FRAME SUB-ASSEMBLY

(a) Install the front door front lower frame sub-assembly with the 2 bolts.



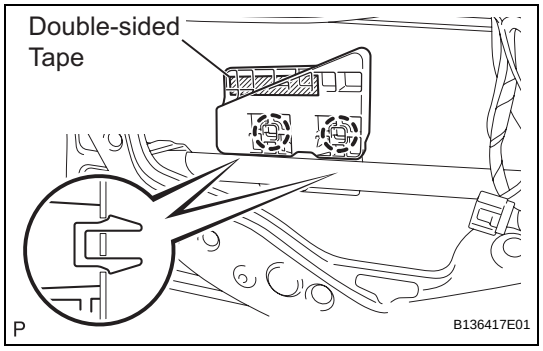
23. INSTALL DOOR FRAME GARNISH

(a) Engage the clip and install a new door frame garnish.



24. INSTALL FRONT DOOR GLASS RUN

(a) Install the front door glass run.



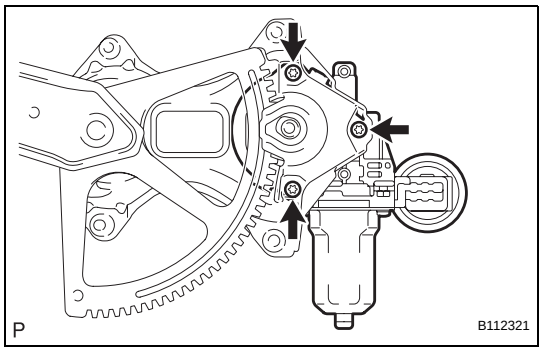
25. INSTALL FRONT NO. 1 DOOR STIFFENER CUSHION

(a) Engage the 2 claws and install a new front No. 1 door stiffener cushion with the double-sided tape.

26. INSTALL FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY

NOTICE:

The regulator arm must be below the intermediate position when installing the power window regulator motor.



(a) Using a "torx" driver (T25), install the front power window regulator motor sub-assembly with the 3 screws.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
HINT:
A new front window regulator adopts a self-tapping method. The installation position of the regulator will be threaded when the self-tapping screw is inserted.

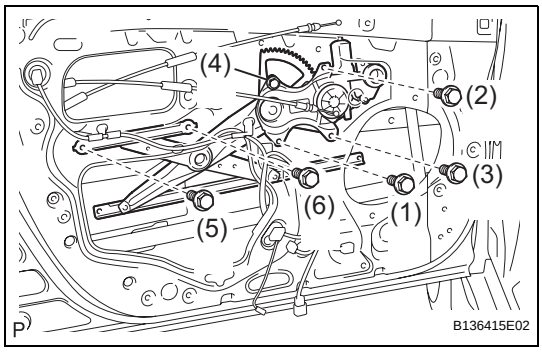
27. INSTALL FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY

(a) Apply MP grease to the sliding parts on the front door window regulator sub-assembly.

(b) Install the temporary bolt to the front door window regulator sub-assembly.

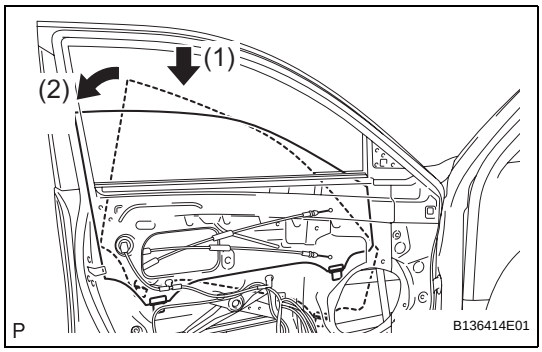
(c) Temporarily install the window regulator.

(d) Tighten the 6 bolts in the order shown in the illustration to install the front window regulator.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

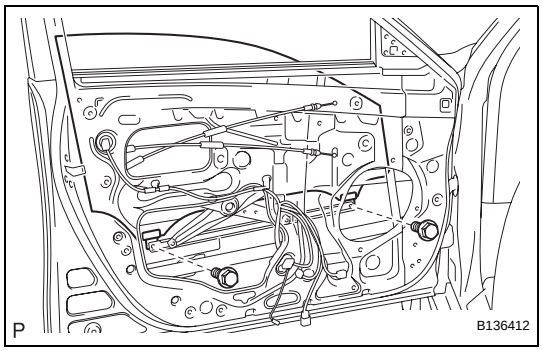


28. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY

(a) Insert the front door glass sub-assembly into the front door panel along the front door glass run as indicated by the arrows in the illustration.



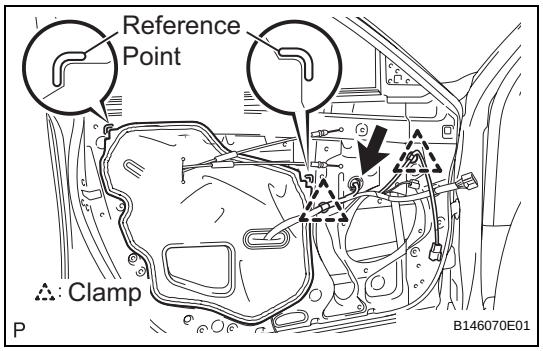
(b) Install the front door glass sub-assembly with the 2 bolts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)



29. INSTALL FRONT DOOR SERVICE HOLE COVER

(a) Apply butyl tape to the front door panel.

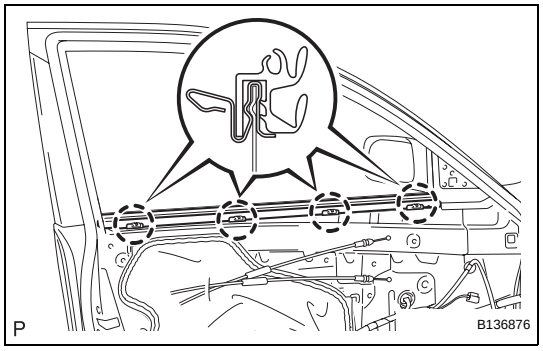
(b) Pass the front door lock remote control cable and rear door inside locking cable through a new front door service hole cover.



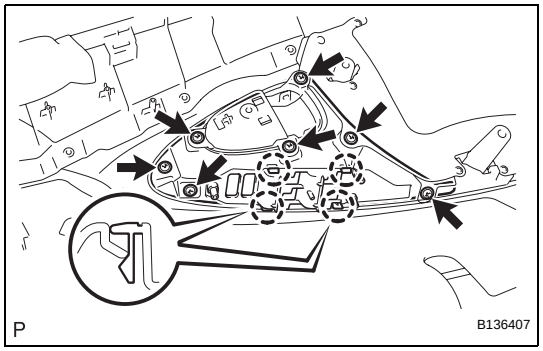
(c) Install a new service hole cover.
NOTICE:
Securely install the front door service hole cover avoiding wrinkles and air bubbles.
(d) Connect each connector and each clamp.

30. INSTALL OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-17)

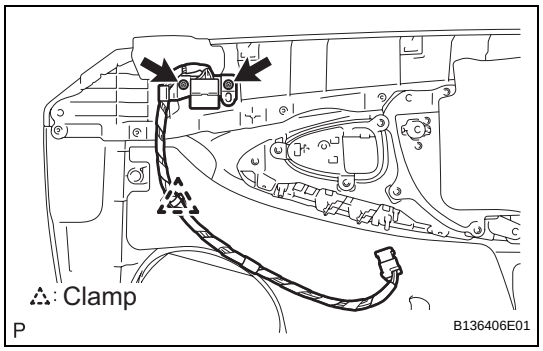
31. INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-157)



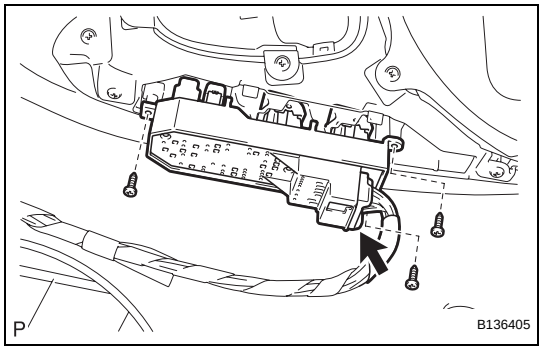
32. INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP
(a) Engage the 4 claws and install the front door inner glass weatherstrip.



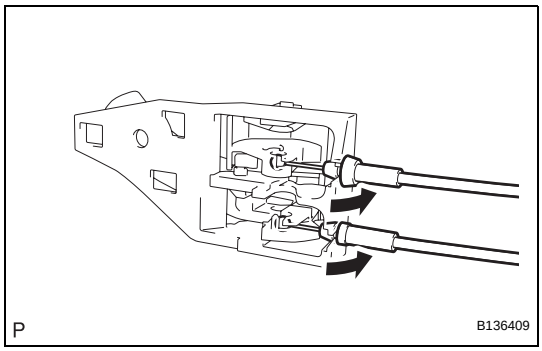
33. INSTALL FRONT ARMREST BASE PANEL UPPER
(a) Engage the 4 claws and install the front armrest base panel upper.
(b) Install the 7 screws.



34. INSTALL FRONT DOOR WIRE (for Driver Side)
(a) Install the front door wire with the 2 screws.
(b) Engage the clamp.

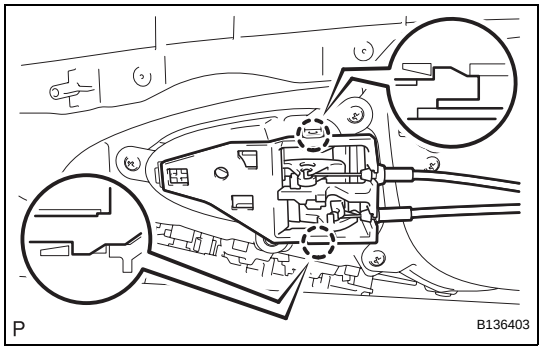


35. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY
(a) Connect the connector.
(b) Install the power window regulator master switch assembly with the 3 screws.



36. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY

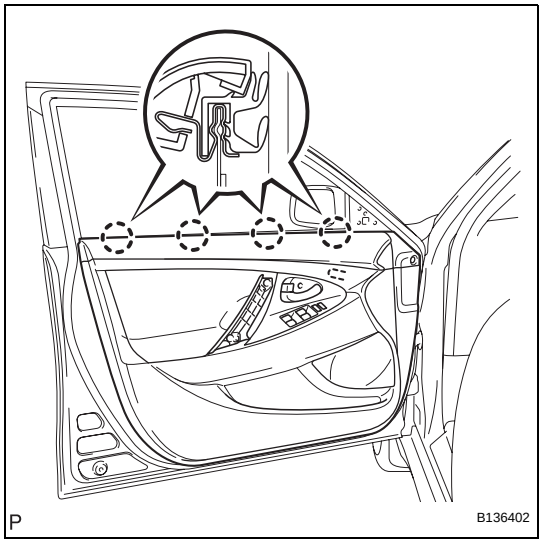
(a) Connect the front door lock remote control cable and front door inside locking cable to the front door inside handle sub-assembly.



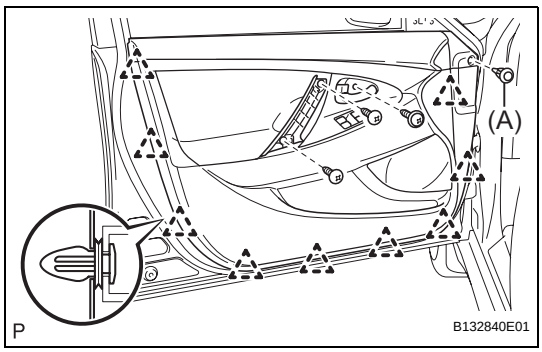
(b) Engage the 2 claws and install the front door inside handle sub-assembly.

37. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY

(a) Connect each connector.



(b) Engage the front door trim board with the 4 clips of the front door inner glass weatherstrip.

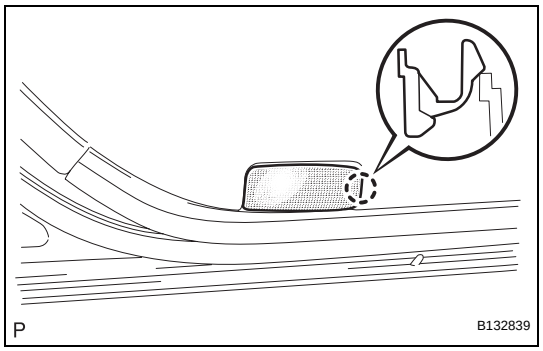


(c) Engage the 9 clips and install the front door trim board to the front door panel.

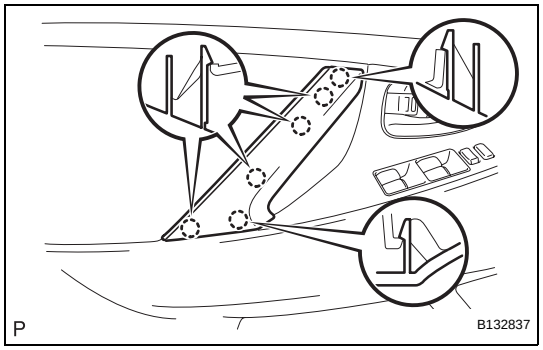
(d) Install the 3 screws and clip (A).

38. INSTALL COURTESY LIGHT ASSEMBLY

(a) Connect the connector.

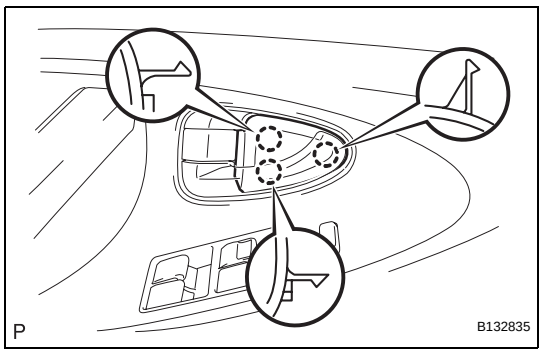


(b) Engage the claw and install the courtesy light assembly.



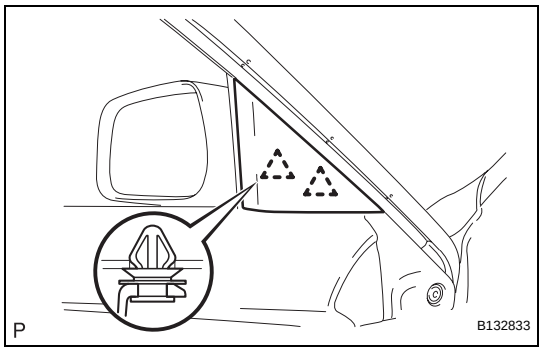
39. INSTALL ASSIST GRIP COVER

(a) Engage the 6 claws and install the assist grip cover.



40. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG

(a) Engage the 3 claws and install the front door inside handle bezel plug.



41. INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH

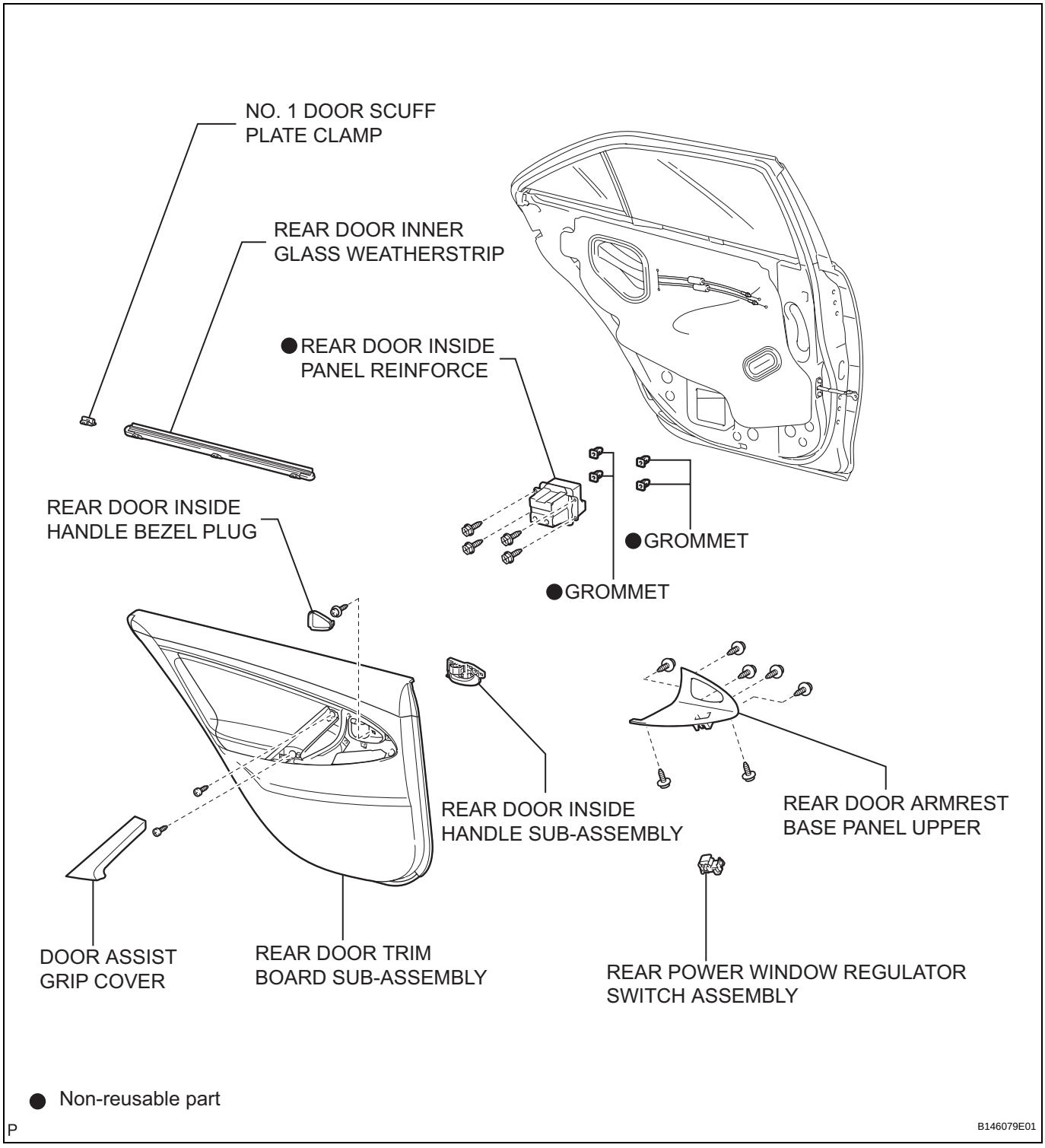
(a) Engage the 2 clips and install the front door lower frame bracket garnish.

42. INITIALIZE POWER WINDOW CONTROL SYSTEM

(See page WS-8)

REAR DOOR

COMPONENTS



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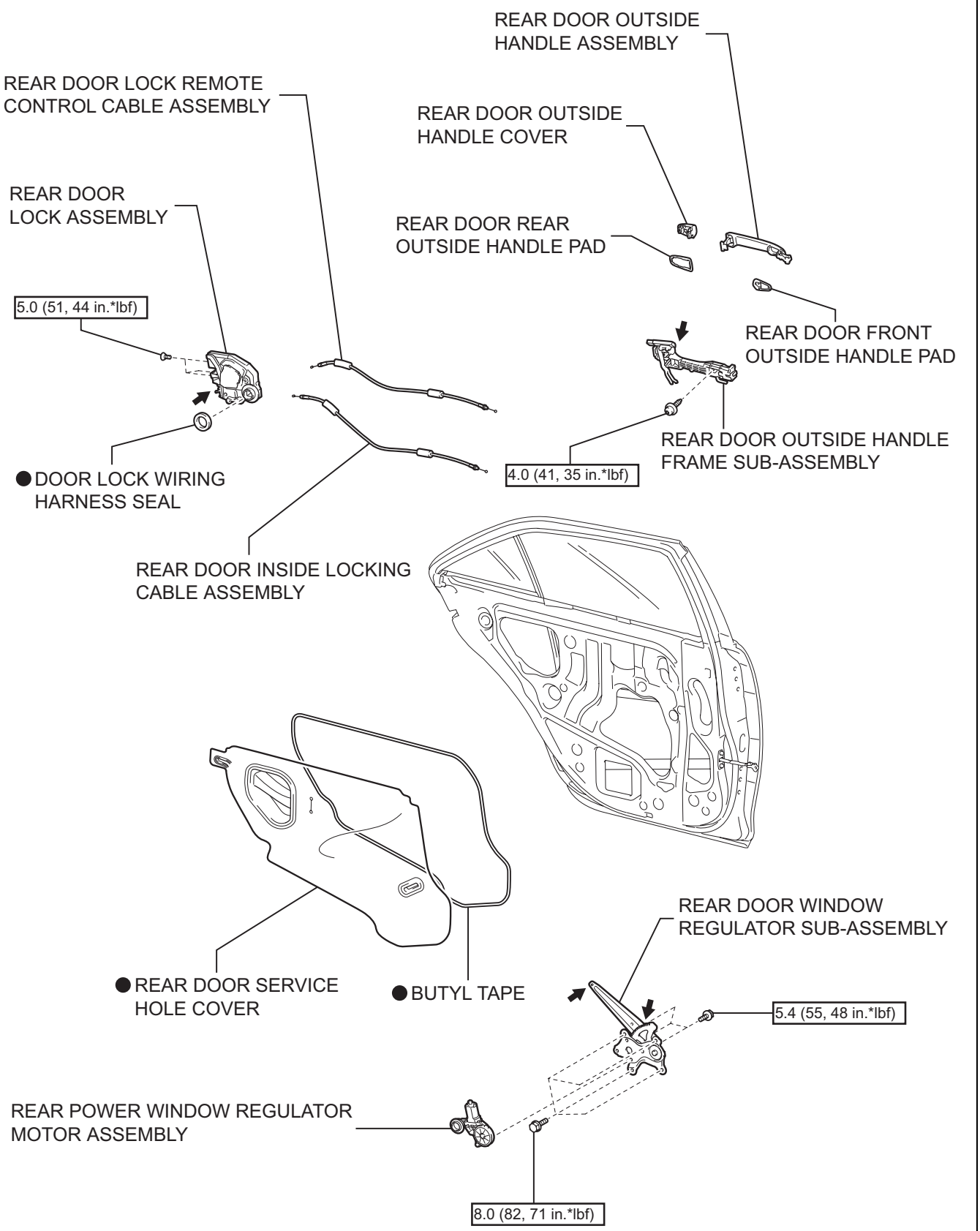
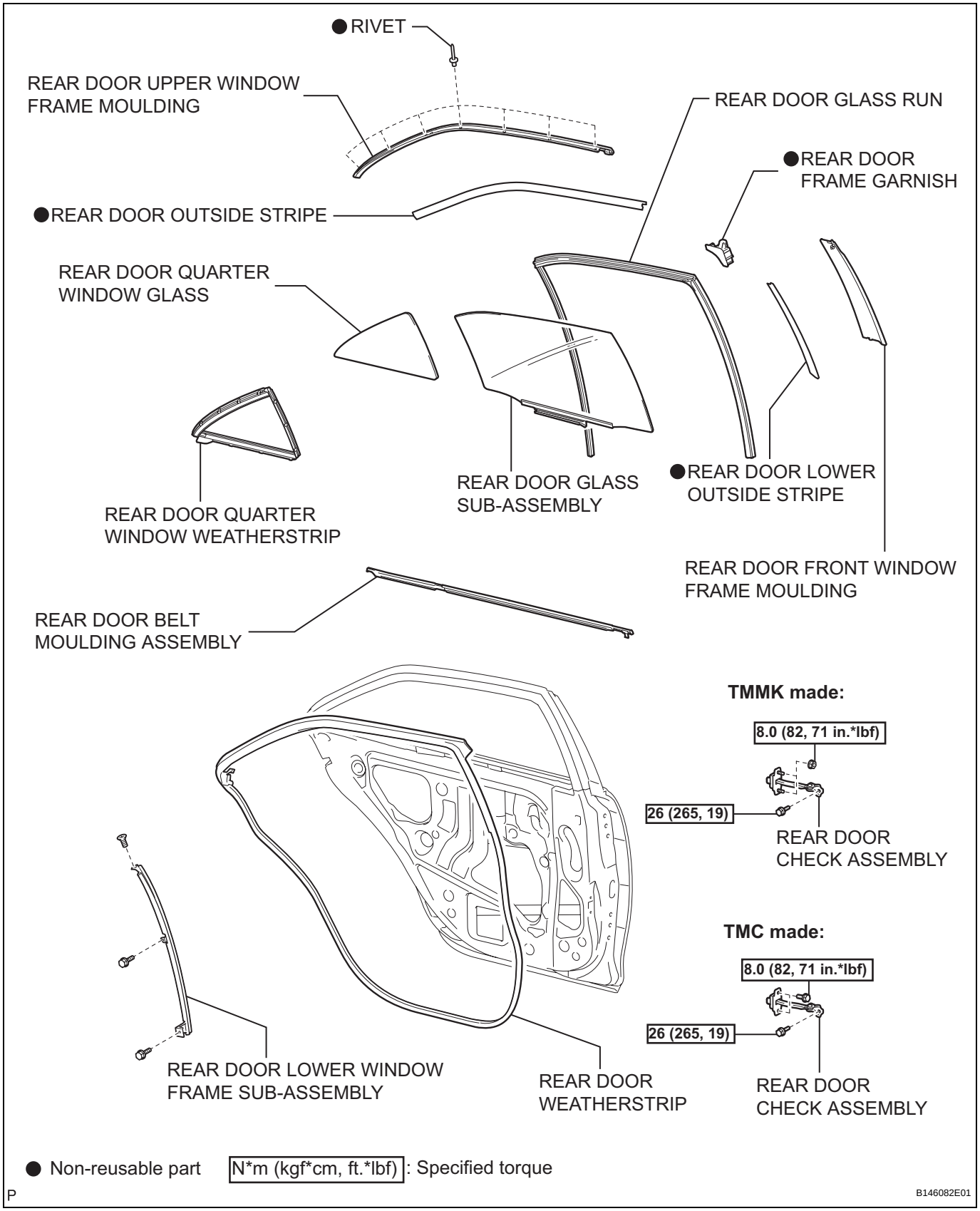
ED


REAR DOOR OUTSIDE HANDLE ASSEMBLY
REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY
REAR DOOR OUTSIDE HANDLE COVER
REAR DOOR LOCK ASSEMBLY
REAR DOOR REAR OUTSIDE HANDLE PAD
5.0 (51, 44 in.*lbf)
REAR DOOR FRONT OUTSIDE HANDLE PAD
REAR DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY
4.0 (41, 35 in.*lbf)
● DOOR LOCK WIRING HARNESS SEAL
REAR DOOR INSIDE LOCKING CABLE ASSEMBLY
REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY
● REAR DOOR SERVICE HOLE COVER
● BUTYL TAPE
5.4 (55, 48 in.*lbf)
REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY
8.0 (82, 71 in.*lbf)
⬅ Apply MP grease
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
P
B146068E01



● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

P

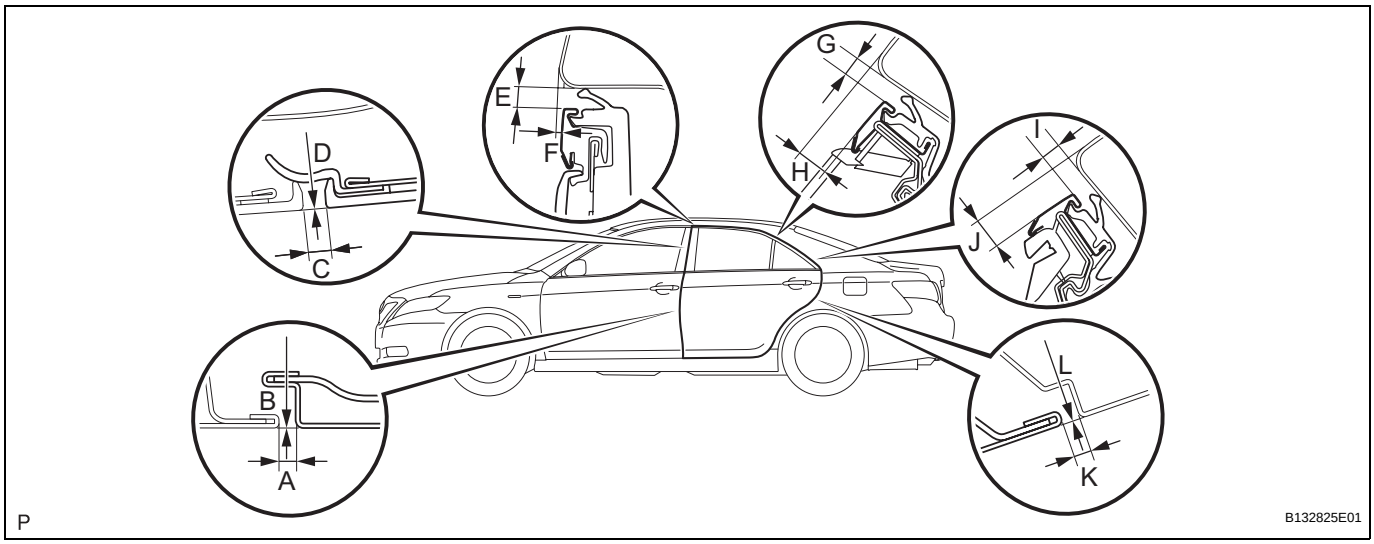
B146082E01

ED

ON-VEHICLE INSPECTION

1. INSPECT REAR DOOR PANEL SUB-ASSEMBLY

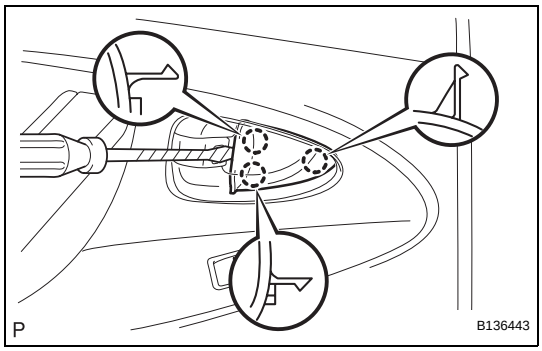
(a) Check that the clearance measurements of areas A to L are within each standard range.



Standard clearance

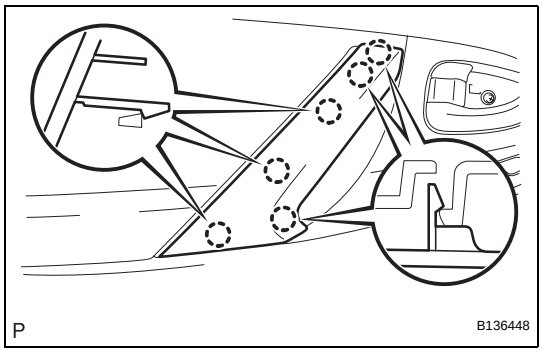
Area	Measurement	Area	Measurement
A	2.7 to 5.7 mm (0.106 to 0.224 in.)	G	3.3 to 6.3 mm (0.130 to 0.248 in.)
B	-1.5 to 1.5 mm (-0.059 to 0.059 in.)	H	0 to 3.0 mm (0 to 0.118 in.)
C	2.3 to 6.3 mm (0.091 to 0.248 in.)	I	3.3 to 6.3 mm (0.130 to 0.248 in.)
D	-2.0 to 2.0 mm (-0.079 to 0.079 in.)	J	5.7 to 8.7 mm (0.224 to 0.343 in.)
E	3.3 to 6.3 mm (0.130 to 0.248 in.)	K	2.7 to 5.7 mm (0.106 to 0.224 in.)
F	-0.3 to 2.7 mm (0.012 to 0.106 in.)	L	-1.5 to 1.5 mm (-0.059 to 0.059 in.)

DISASSEMBLY



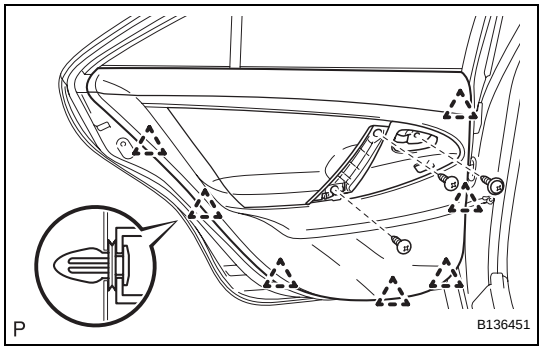
1. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG

(a) Using a screwdriver wrapped with protective tape, disengage the 3 claws and remove the rear door inside handle bezel plug.



2. REMOVE DOOR ASSIST GRIP COVER

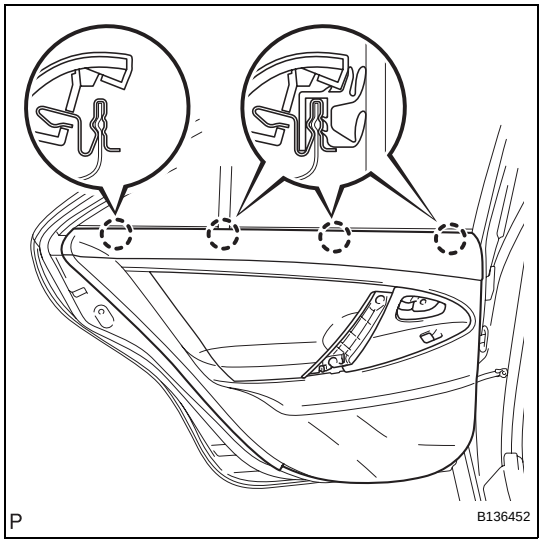
(a) Using a screwdriver wrapped with protective tape, disengage the 6 claws and remove the door assist grip cover.



3. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY

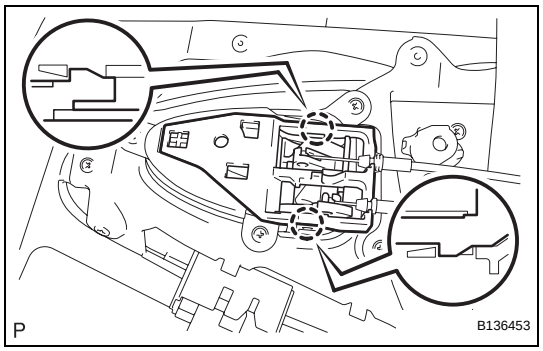
(a) Remove the 3 screws.

(b) Using the clip remover, disengage the 7 clips.

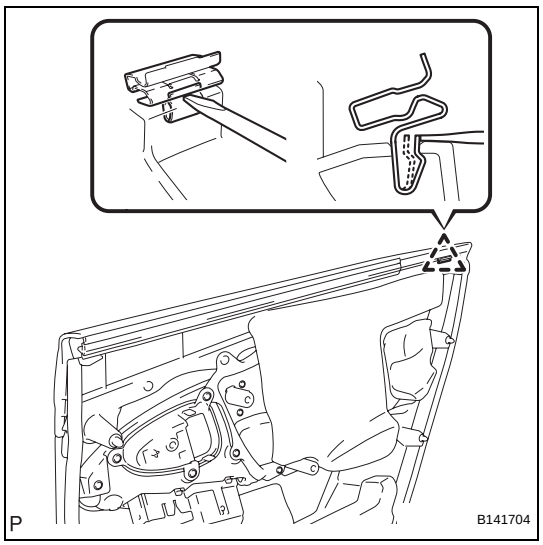


(c) Raise the rear door trim board to disengage the 4 claws and remove the rear door trim board together with the rear door inner glass weatherstrip.

(d) Disconnect the connector.



(e) Disengage the 2 claws and disconnect the rear door inside handle sub-assembly.

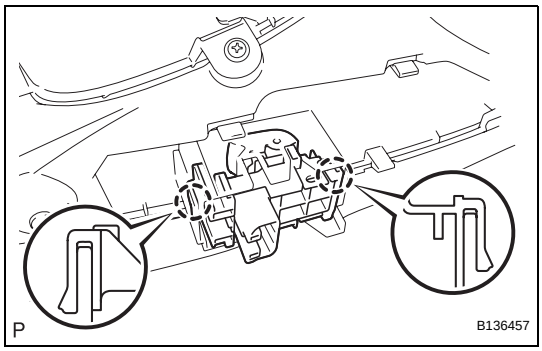


(f) Disengage the clip as shown in the illustration and remove the No. 1 door scuff plate clamp from the rear door trim board.

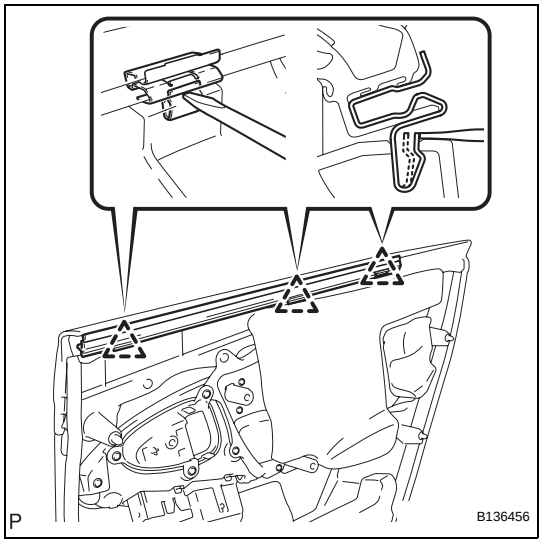
4. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY

(a) Disconnect the connector.

ED

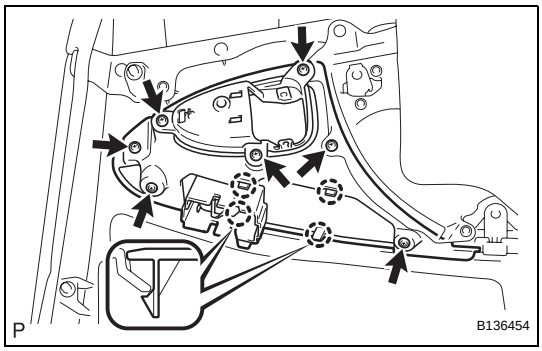


(b) Using a screwdriver wrapped with protective tape, disengage the 2 claws and remove the rear power window regulator switch assembly.



5. REMOVE REAR DOOR INNER GLASS WEATHERSTRIP

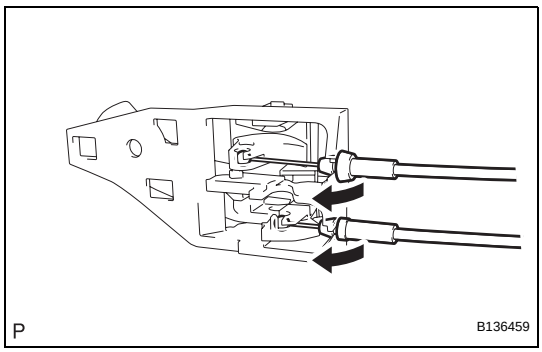
(a) Disengage the 3 clips as shown in the illustration and remove the rear door inner glass weatherstrip from the rear door trim board.



6. REMOVE REAR DOOR ARMREST BASE PANEL UPPER

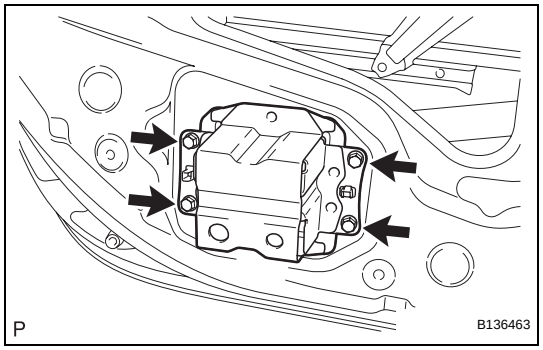
(a) Remove the 7 screws.

(b) Disengage the 4 claws and remove the rear door armrest base panel upper.



7. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY

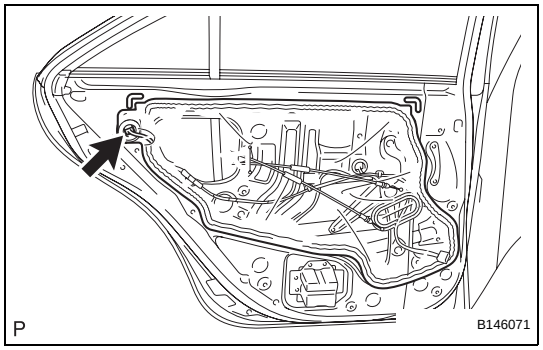
(a) Disconnect the cables and remove the rear door inside handle sub-assembly.



8. REMOVE REAR DOOR INSIDE PANEL REINFORCE

(a) Remove the 4 screws and the rear door inside panel reinforce.

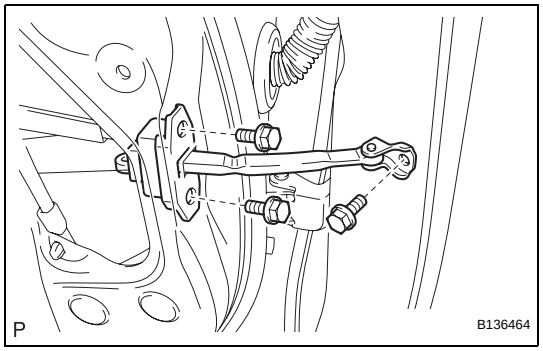
(b) Remove the 4 grommets.



9. REMOVE REAR DOOR SERVICE HOLE COVER

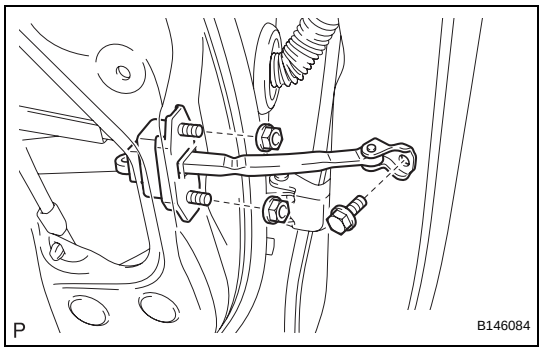
(a) Disconnect the connector.

(b) Remove the rear door service hole cover.
HINT:
Remove the remaining tape on the door side.



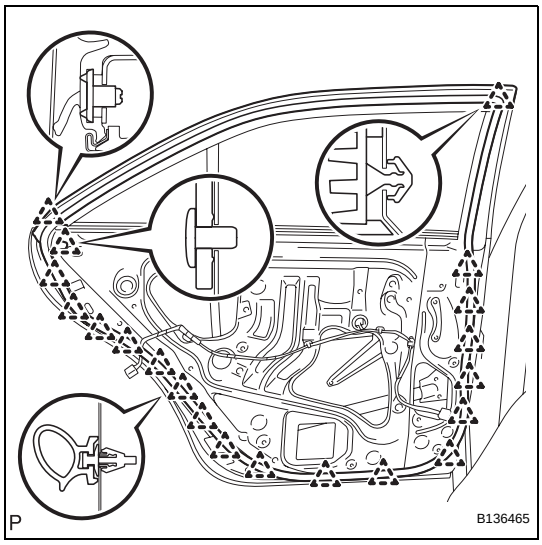
10. REMOVE REAR DOOR CHECK ASSEMBLY (for TMC Made)

(a) Remove the 3 bolts and the rear door check assembly.



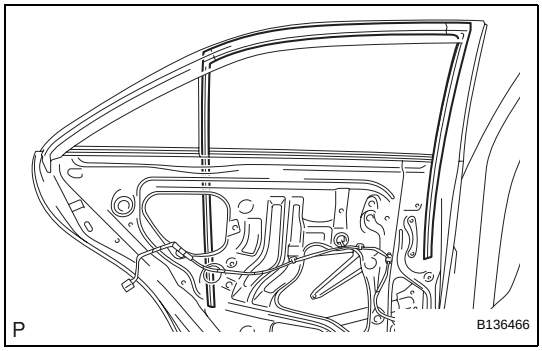
11. REMOVE REAR DOOR CHECK ASSEMBLY (for TMMK Made)

(a) Remove the bolt, 2 nuts, and the rear door check assembly.



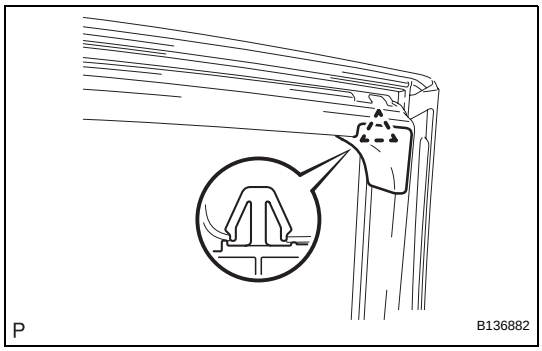
12. REMOVE REAR DOOR WEATHERSTRIP

(a) Using the clip remover, disengage the 20 clips and remove the rear door weatherstrip.



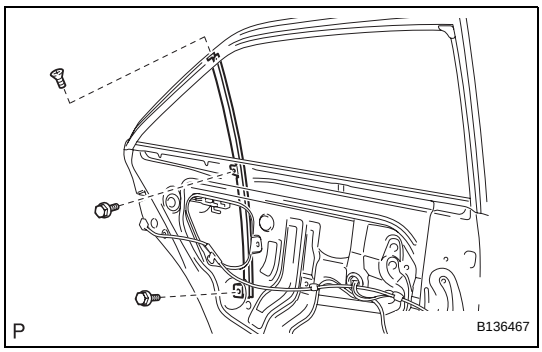
13. REMOVE REAR DOOR GLASS RUN

(a) Remove the rear door glass run.



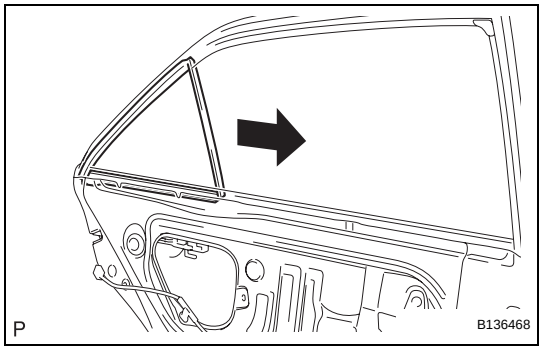
14. REMOVE REAR DOOR FRAME GARNISH

(a) Disengage the clip and remove the rear door frame garnish.



15. REMOVE REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY

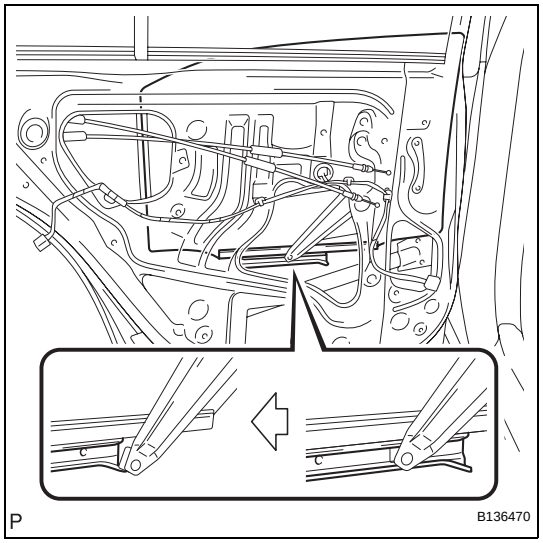
(a) Remove the 2 bolts, the screw, and the rear door lower window frame sub-assembly.



16. REMOVE REAR DOOR QUARTER WINDOW GLASS

(a) Remove the rear door quarter window glass and the rear door quarter window weatherstrip as a unit as shown in the illustration.

(b) Remove the rear door quarter window glass from the rear door quarter window weatherstrip.

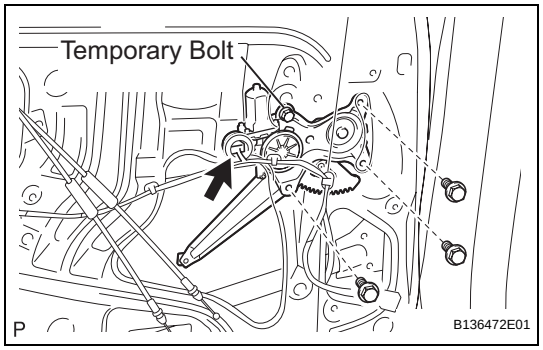


17. REMOVE REAR DOOR GLASS SUB-ASSEMBLY

(a) Remove the rear door glass sub-assembly from the rear door window regulator sub-assembly as shown in the illustration.

NOTICE:

Do not damage the door glass.



18. REMOVE REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY

(a) Disconnect the connector.

(b) Loosen the temporary bolt.

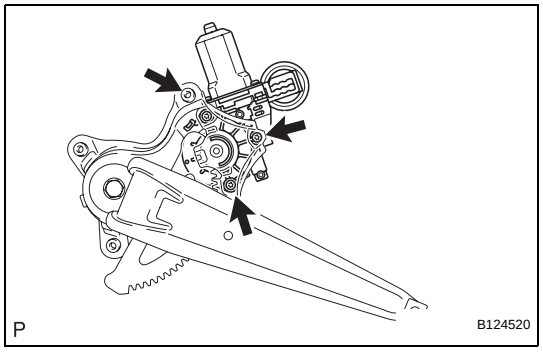
NOTICE:

If the temporary bolt is removed, the rear door window regulator may fall and become deformed.

(c) Remove the 3 bolts.

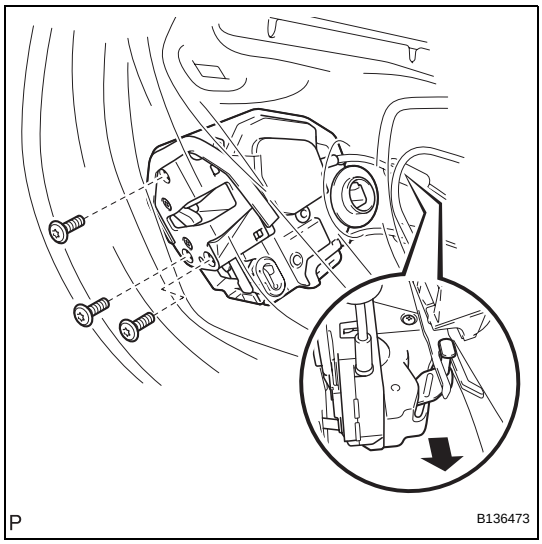
(d) Remove the rear door window regulator sub-assembly and the power window regulator motor assembly rear as a unit.

(e) Remove the temporary bolt from the rear door window regulator.



19. REMOVE REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY

(a) Using a "torx" driver (T25), remove the 3 screws and the rear power window regulator motor assembly.

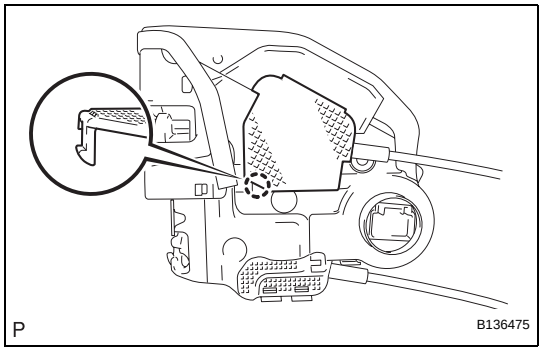


20. REMOVE REAR DOOR LOCK ASSEMBLY

(a) Using a "torx" socket wrench (T30), remove the 3 screws.

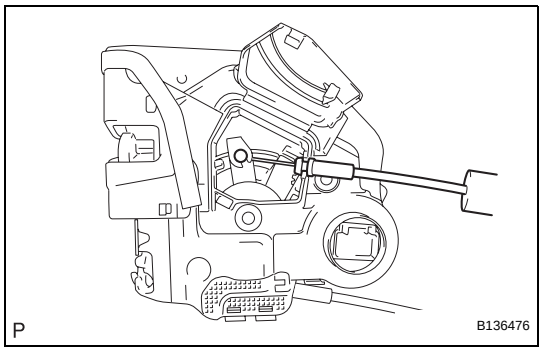
(b) Move the rear door lock assembly downward and pull the release plate out of the rear door outside handle frame.

(c) Remove the door lock wiring harness sealing from the rear door lock assembly.

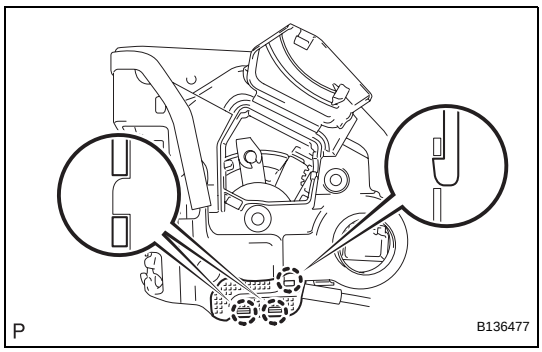


21. REMOVE REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY

(a) Using a screwdriver, disengage the claw.
HINT:
Tape the screwdriver tip before use.

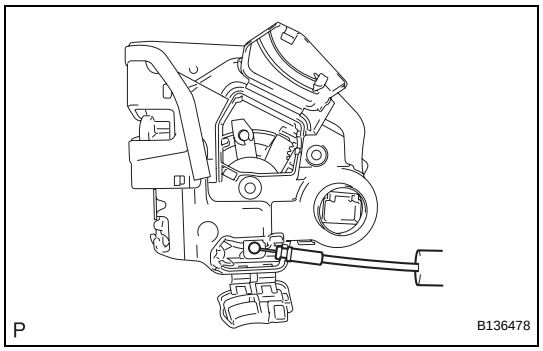


(b) Remove the rear door lock remote control cable assembly.

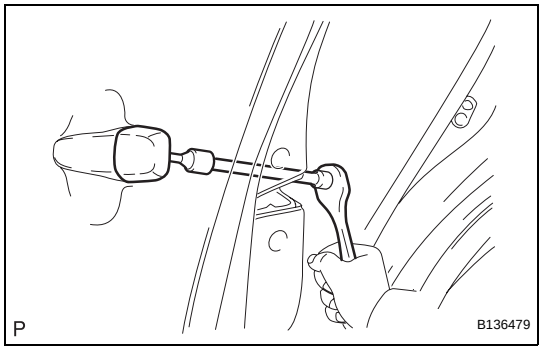


22. REMOVE REAR DOOR INSIDE LOCKING CABLE ASSEMBLY

(a) Using a screwdriver, disengage the 3 claws.
HINT:
Tape the screwdriver tip before use.

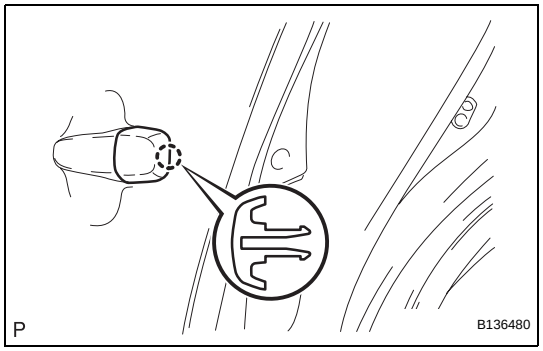


(b) Remove the rear door inside locking cable assembly.

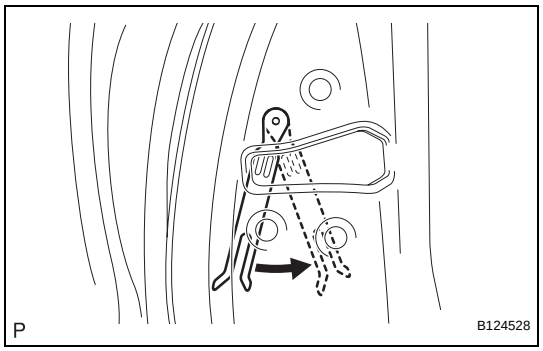


23. REMOVE REAR DOOR OUTSIDE HANDLE COVER

(a) Using a "torx" socket wrench (T30), loosen the screw.
HINT:
The screw cannot be removed because it is integrated into the rear door outside handle frame sub-assembly.

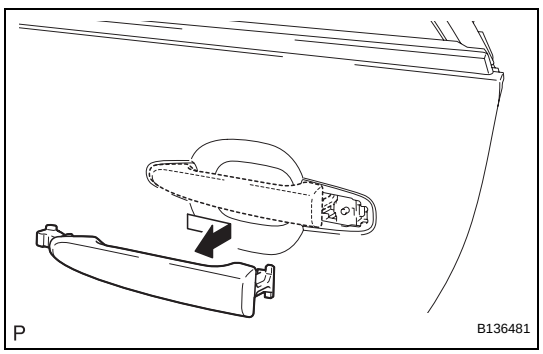


(b) Disengage the 2 claws and remove the rear door outside handle cover.



24. REMOVE REAR DOOR OUTSIDE HANDLE ASSEMBLY

(a) Pull and hold the release plate of the outside handle frame as shown in the illustration.
NOTICE:
The release plate may interfere with the outside handle and may be damaged when removing the handle, unless the release plate of the outside handle frame is pulled and held.



(b) Remove the rear door outside handle assembly as shown in the illustration.

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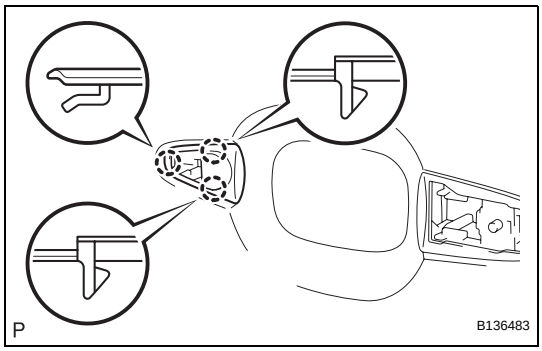
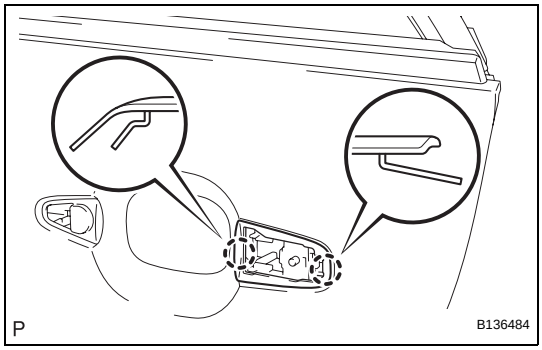


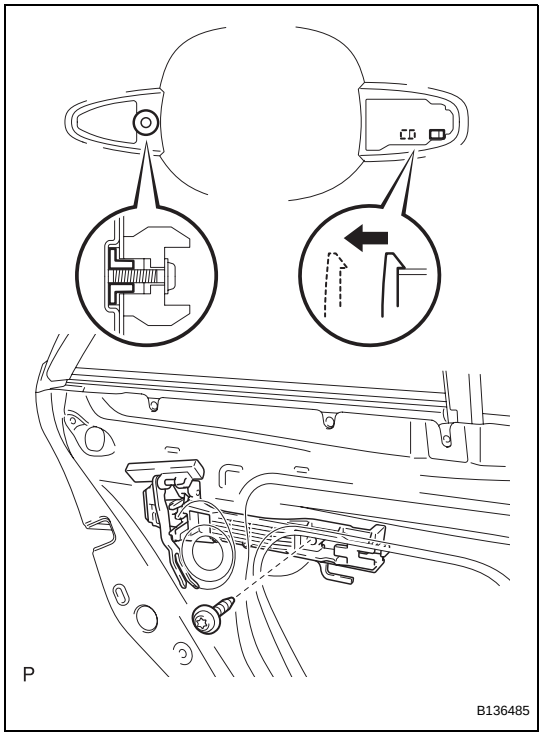
25. REMOVE REAR DOOR FRONT OUTSIDE HANDLE PAD

(a) Disengage the 3 claws and remove the rear door front outside handle pad.



26. REMOVE REAR DOOR REAR OUTSIDE HANDLE PAD

(a) Disengage the 2 claws and remove the rear door rear outside handle pad.



27. REMOVE REAR DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY

(a) Using a "torx" socket wrench (T30), remove the screw.

(b) Disengage the claws and remove the rear door outside handle frame sub-assembly.

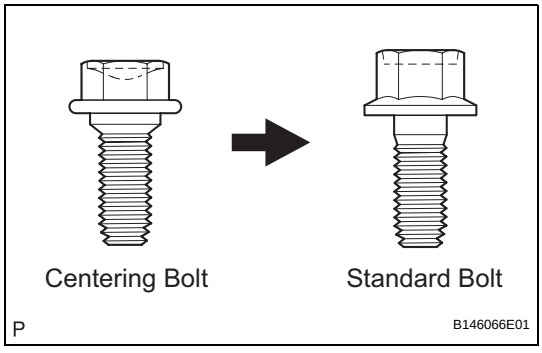
28. REMOVE REAR DOOR BELT MOULDING ASSEMBLY (See page ET-37)

29. REMOVE REAR DOOR FRONT WINDOW FRAME MOULDING (See page ET-55)

30. REMOVE REAR DOOR UPPER WINDOW FRAME MOULDING (See page ET-56)

31. REMOVE REAR DOOR OUTSIDE STRIPE (See page ET-76)

32. REMOVE REAR DOOR LOWER OUTSIDE STRIPE (See page ET-76)



ADJUSTMENT

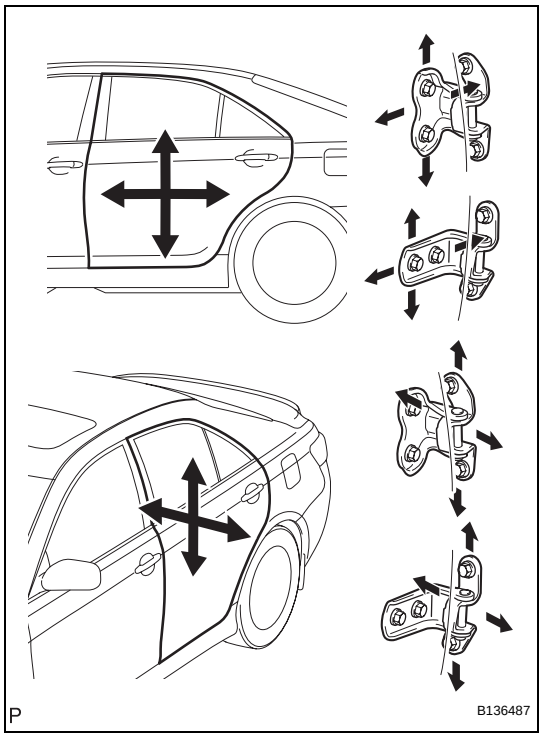
HINT:

- Before adjusting the door position for vehicles equipped with side airbags and curtain shield airbags, be sure to disconnect the battery. After adjustment, inspect the SRS warning light, the side airbag system, and the curtain shield airbag system for normal operation. Then initialize both airbag systems.
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (with washers) when making adjustments.
- A bolt without a torque specification is shown in the standard bolt chart (See page SS-2).

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-363).



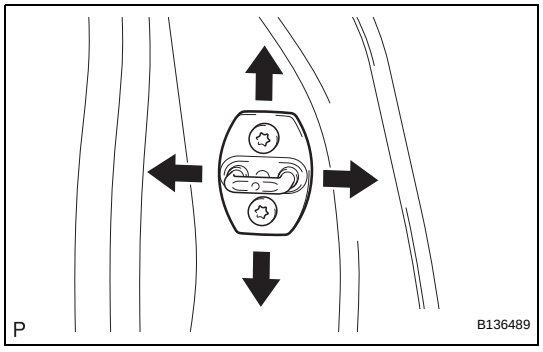
2. ADJUST REAR DOOR

(a) Loosen the body's hinge bolts and adjust the door position.
SST 09812-00010

(b) Tighten the body's hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

(c) Loosen the door's hinge bolts and adjust the door position.

(d) Tighten the door's hinge bolts after the adjustment.
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)



(e) Using a "torx" socket wrench (T40), adjust the striker position by slightly loosening the striker mounting screws and hitting the striker with a plastic hammer.

(f) Using a "torx" socket wrench (T40), tighten the striker mounting screws after the adjustment.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

4. INSPECT SRS WARNING LIGHT
(See page ED-25)

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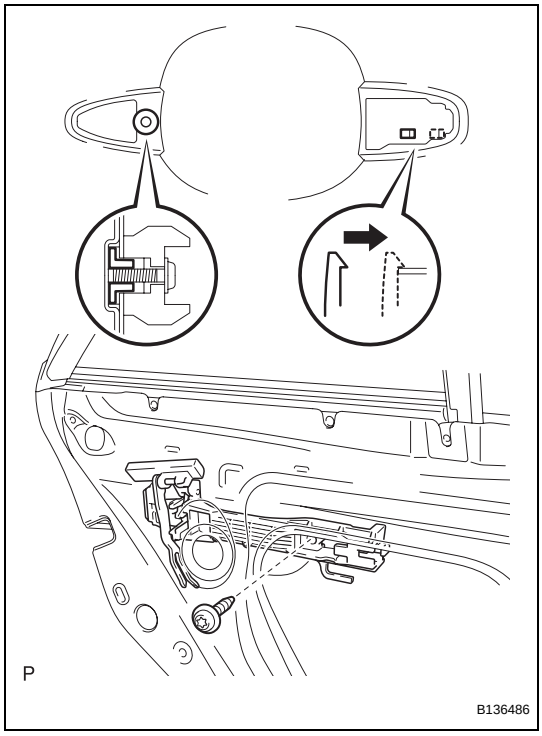
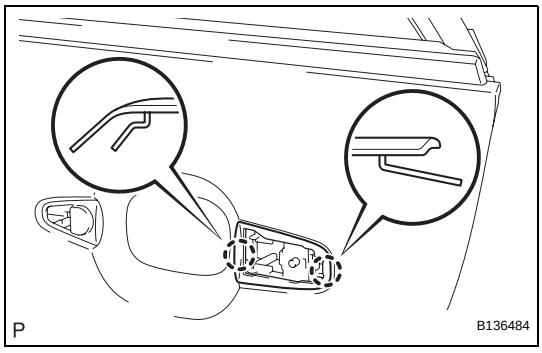
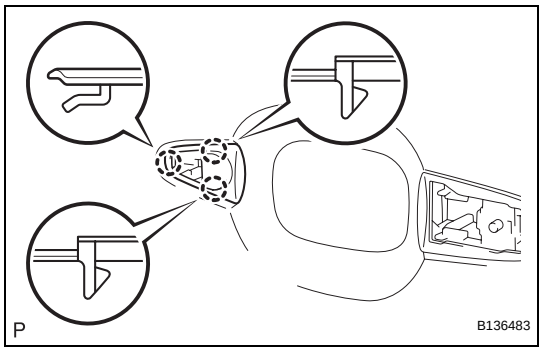
REASSEMBLY

1. **REPAIR INSTRUCTION (See page ET-77)**
2. **INSTALL REAR DOOR LOWER OUTSIDE STRIPE (See page ET-80)**
3. **INSTALL REAR DOOR OUTSIDE STRIPE (See page ET-80)**
4. **INSTALL REAR DOOR UPPER WINDOW FRAME MOULDING (See page ET-56)**
5. **INSTALL REAR DOOR FRONT WINDOW FRAME MOULDING (See page ET-57)**
6. **INSTALL REAR DOOR BELT MOULDING ASSEMBLY (See page ET-37)**
7. **INSTALL REAR DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY**
   (a) Apply MP grease to the sliding parts on the rear door outside handle frame sub-assembly.
   (b) Using a "torx" socket wrench (T30), install the rear door outside handle frame sub-assembly with the screw.



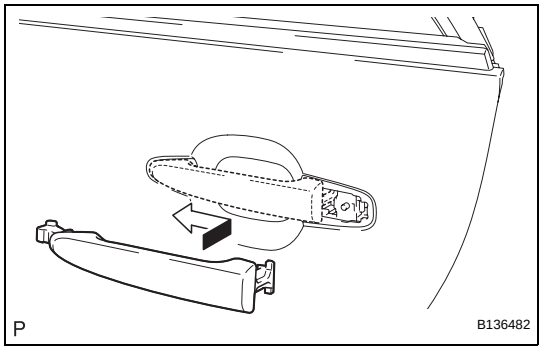
8. **INSTALL REAR DOOR REAR OUTSIDE HANDLE PAD**
   (a) Attach the 2 claws to install the rear door rear outside handle pad.





9. INSTALL REAR DOOR FRONT OUTSIDE HANDLE PAD

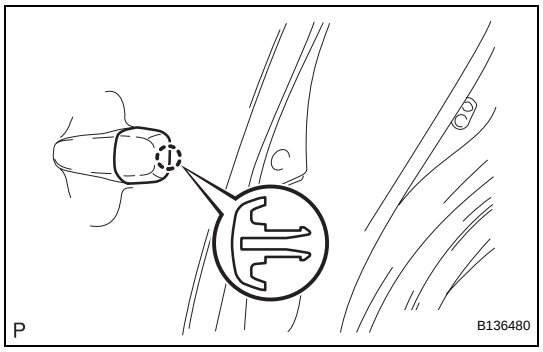
(a) Attach the 3 claws to install the rear door front outside handle pad.



10. INSTALL REAR DOOR OUTSIDE HANDLE ASSEMBLY

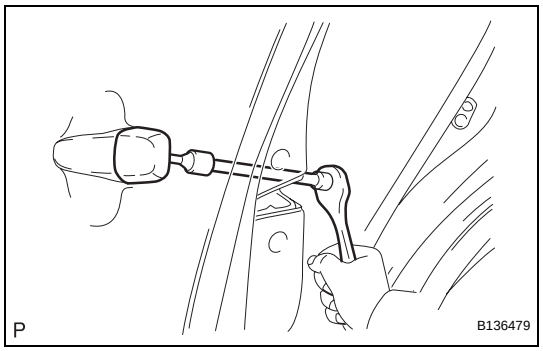
(a) Insert the front end of the rear door outside handle assembly into the rear door outside handle frame.
NOTICE:
If the bellcrank lever is not pulled and held when installing the outside handle, the bellcrank lever will interfere with the outside handle and it will damage the release plate.

(b) Insert the rear end of the rear door outside handle assembly into the rear door outside handle frame. Next slide the rear door outside handle assembly to the front of the vehicle to install it.

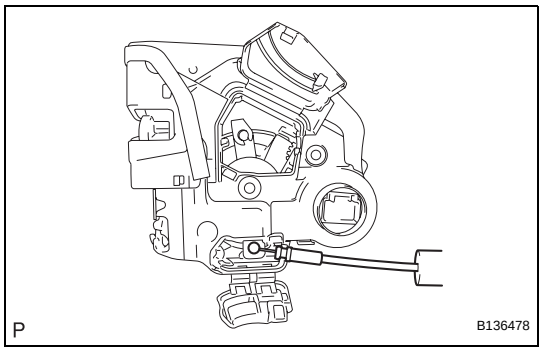


11. INSTALL REAR DOOR OUTSIDE HANDLE COVER

(a) Install the rear door outside handle cover with the claw.

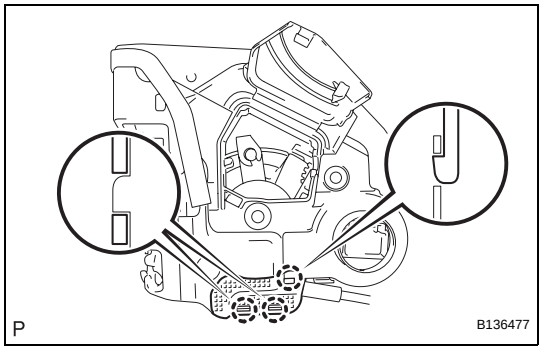


(b) Using a "torx" socket wrench (T30), install the rear door outside handle cover with the screw.

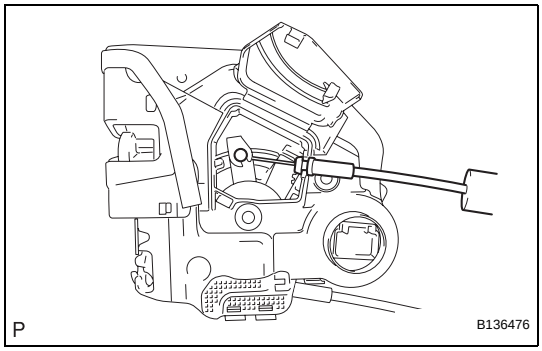


12. INSTALL REAR DOOR INSIDE LOCKING CABLE ASSEMBLY

(a) Install the rear door inside locking cable assembly.

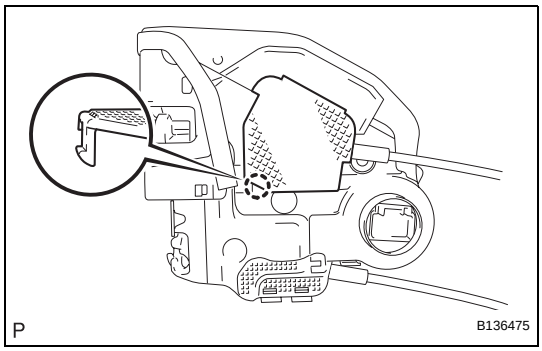


(b) Engage the 3 claws.



13. INSTALL REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY

(a) Install the rear door lock remote control cable assembly.



(b) Engage the claw.

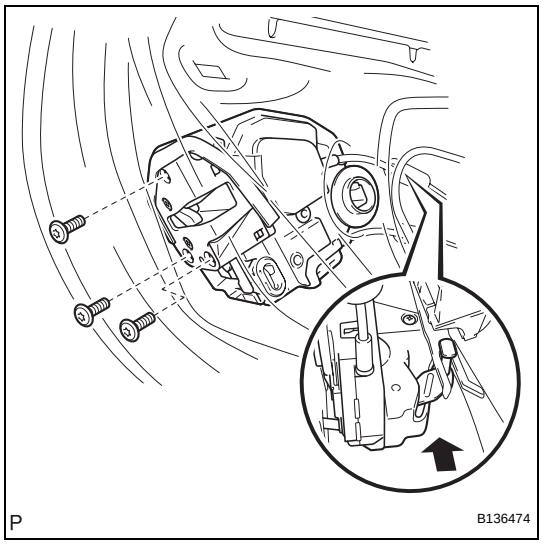
14. INSTALL REAR DOOR LOCK ASSEMBLY

NOTICE:

- **When reusing the removed rear door lock assembly, replace the door lock wire harness sealing on the connector with a new one.**
- **Do not allow grease or dust to adhere on the door lock wiring harness sealing surface of the connector.**
- **Reusing the door lock wiring harness sealing and/or using damaged door lock wiring harness sealing may cause water intrusion to the connection. This may result in a malfunction in the rear door lock assembly.**

(a) Apply MP grease to the sliding parts on the rear door lock assembly.

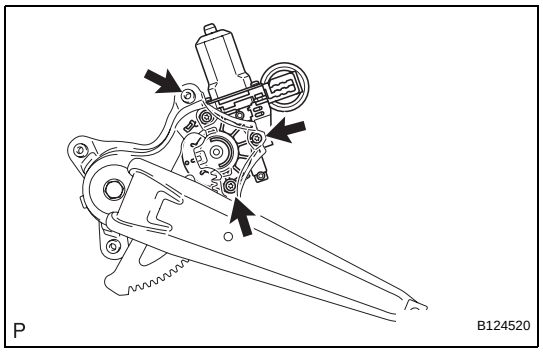
(b) Install a new door lock wiring harness sealing to the rear door lock assembly.



(c) Insert the rear door lock assembly to the rear door outside handle release plate, and set it to the rear door panel.
(d) Make sure that the rear door outside handle frame release plate is securely connected to the rear door lock assembly.
(e) Using a "torx" socket wrench (T30), install the rear door lock assembly with the 3 screws.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)
(f) Connect the connector.

15. INSTALL REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY

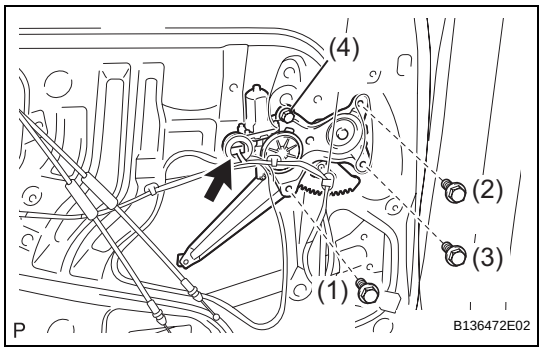
NOTICE:
The regulator arm must be below the intermediate position when installing the power window regulator motor.



(a) Using a "torx" driver (T25), install the power window regulator motor assembly with the 3 screws.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
HINT:
The new rear window regulator adopts a self-tapping method. The installation position of the regulator will be threaded when the self-tapping screw is inserted.

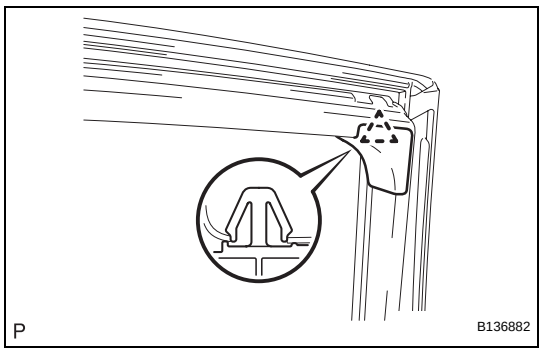
16. INSTALL REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY

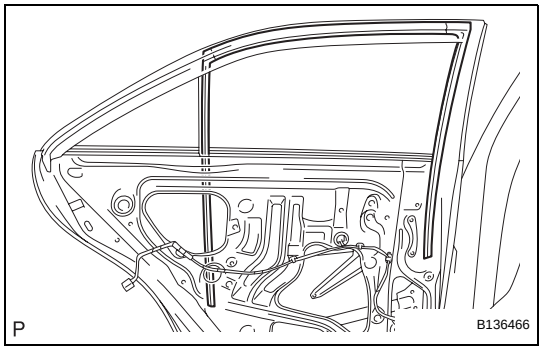
(a) Apply MP grease to the sliding parts on the rear door window regulator sub-assembly.
(b) Install the temporary bolt to the rear door window regulator sub-assembly.
(c) Temporarily install the window regulator.
(d) Tighten the 4 bolts in the order shown in the illustration to install the rear door window regulator.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)
(e) Connect the connector.



17. INSTALL REAR DOOR FRAME GARNISH

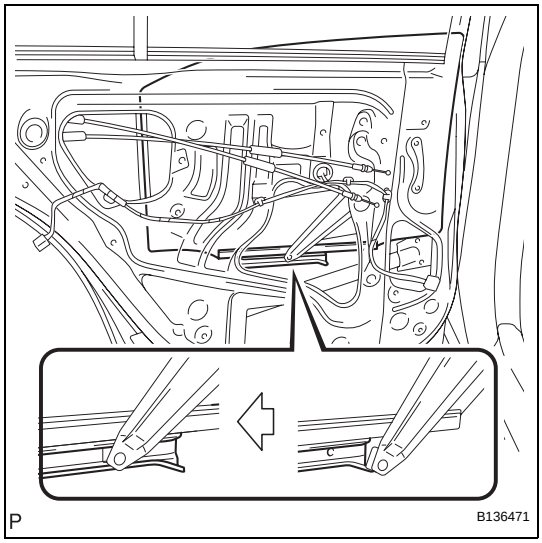
(a) Engage the clip and install a new rear door frame garnish.





18. INSTALL REAR DOOR GLASS RUN

(a) Install the rear door glass run.

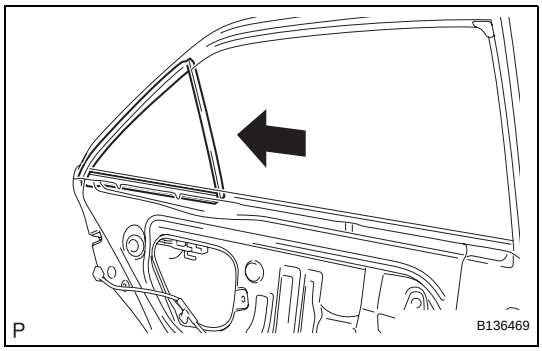


19. INSTALL REAR DOOR GLASS SUB-ASSEMBLY

(a) Slide the rear door glass sub-assembly to install it as shown in the illustration.

20. INSTALL REAR DOOR QUARTER WINDOW GLASS

(a) Install the rear door quarter window glass to the rear door quarter weatherstrip.

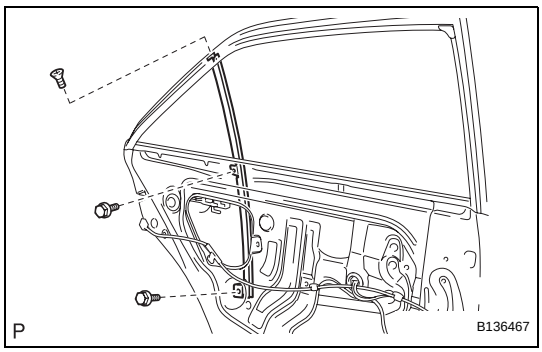


(b) Install the rear door quarter window glass together with the rear door quarter window glass weatherstrip in the direction indicated by the arrow in the illustration.

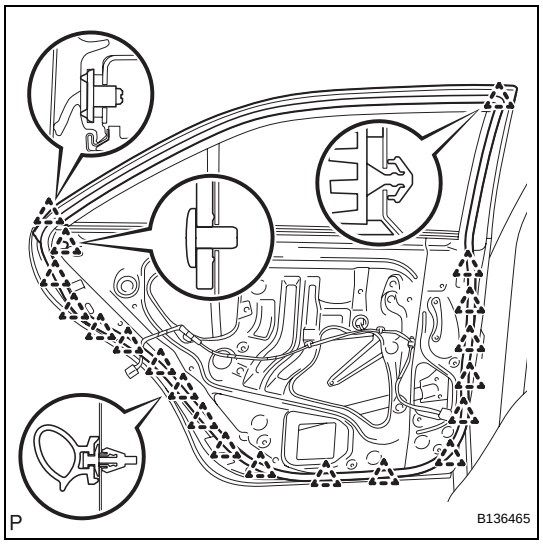
21. INSTALL REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY

(a) Insert the rear door lower window frame sub-assembly from up above.

(b) Install the rear door glass run to the rear door lower window frame sub-assembly.

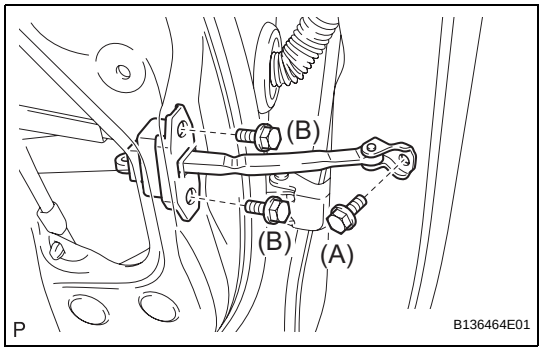


(c) Install the rear door lower window frame sub-assembly with the 2 bolts and screw.



22. INSTALL REAR DOOR WEATHERSTRIP

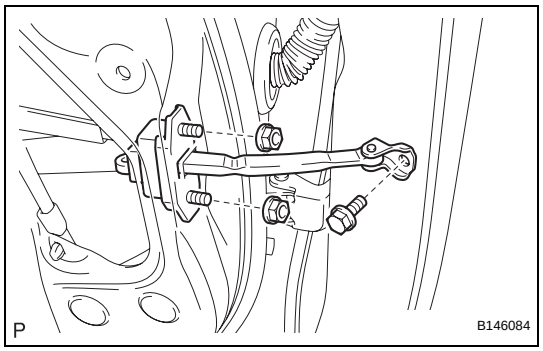
(a) Engage the 20 clips and install the rear door weatherstrip.



23. INSTALL REAR DOOR CHECK ASSEMBLY (for TMC Made)

(a) Install the rear door check assembly with the 3 bolts.

Torque: Bolt (A)
26 N*m (265 kgf*cm, 19 ft.*lbf)
Torque: Bolt (B)
8.0 N*m (82 kgf*cm, 71 in.*lbf)



24. INSTALL REAR DOOR CHECK ASSEMBLY (for TMMK Made)

(a) Install the rear door check assembly with the bolt and 2 nuts.

Torque: Bolt
26 N*m (265 kgf*cm, 19 ft.*lbf)
Torque: Nut
8.0 N*m (82 kgf*cm, 71 in.*lbf)

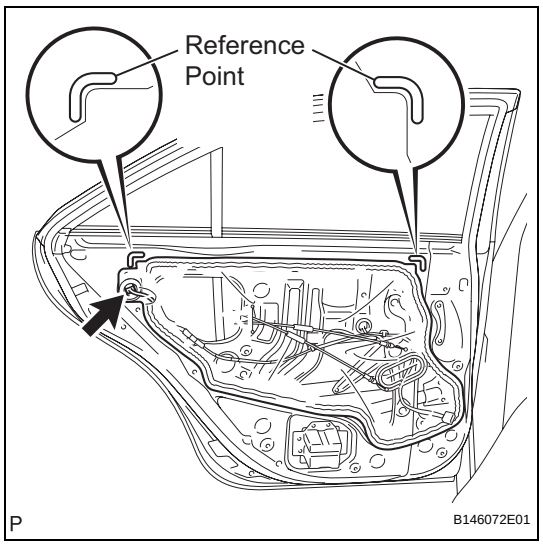
25. INSTALL REAR DOOR SERVICE HOLE COVER

(a) Apply butyl tape to the rear door panel.

(b) Pass the rear door lock remote control cable, rear door inside locking cable and each connector through a new rear door service hole cover.

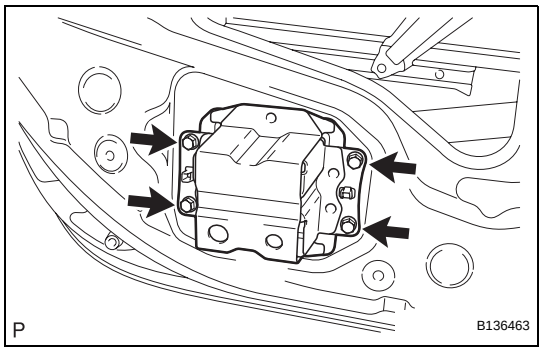
(c) Install a new rear door service hole cover.
NOTICE:
Securely install the rear door service hole cover avoiding wrinkles and air bubbles.

(d) Connect the connector and clamp.

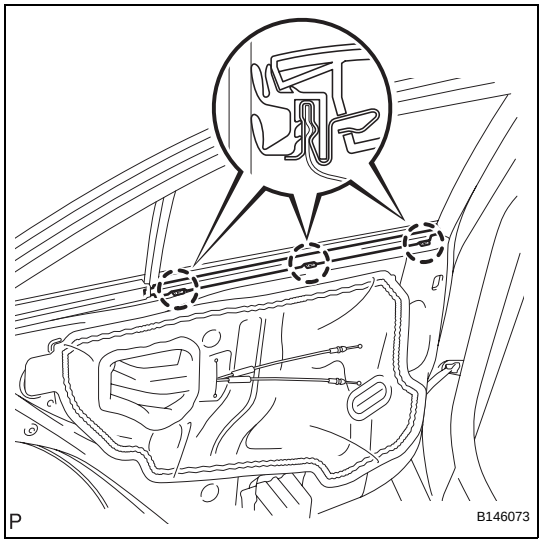


26. INSTALL REAR DOOR INSIDE PANEL REINFORCE

(a) Install 4 new grommets.

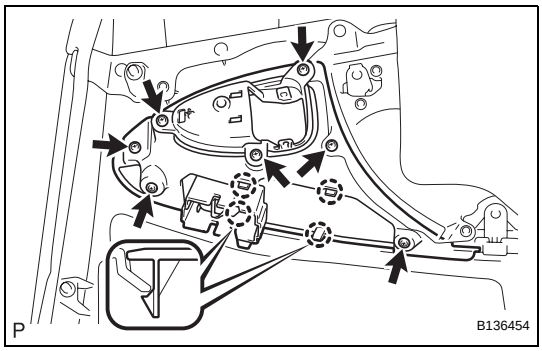


(b) Install a new rear door inside panel reinforce with the 4 screws.



27. INSTALL REAR DOOR INNER GLASS WEATHERSTRIP

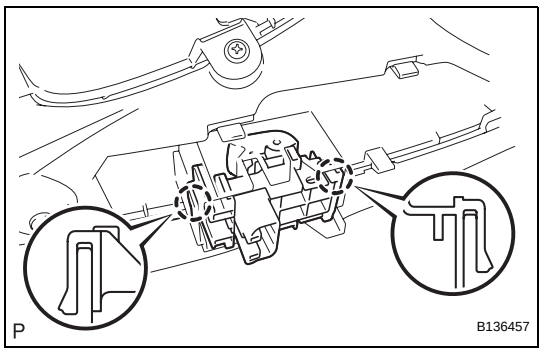
(a) Engage the 3 claws to install the rear door inner glass weatherstrip.



28. INSTALL REAR DOOR ARMREST BASE PANEL UPPER

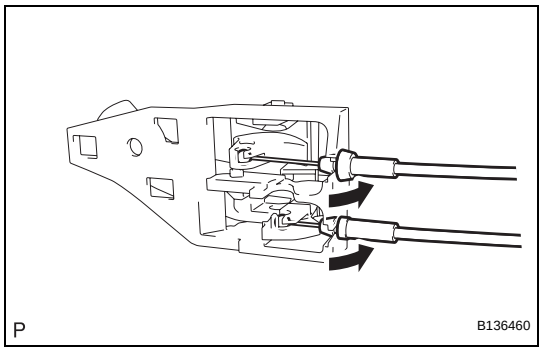
(a) Engage the 4 claws.

(b) Install the rear door armrest base panel upper with the 7 screws.



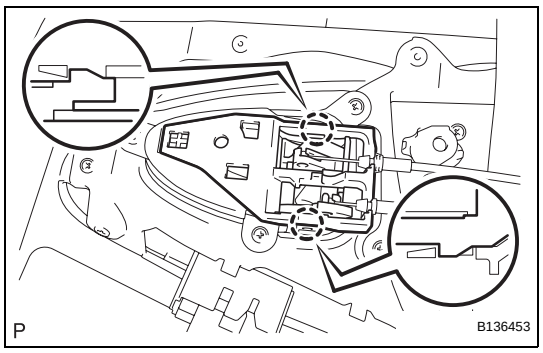
29. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY

(a) Engage the 2 claws and install the rear power window regulator switch assembly.

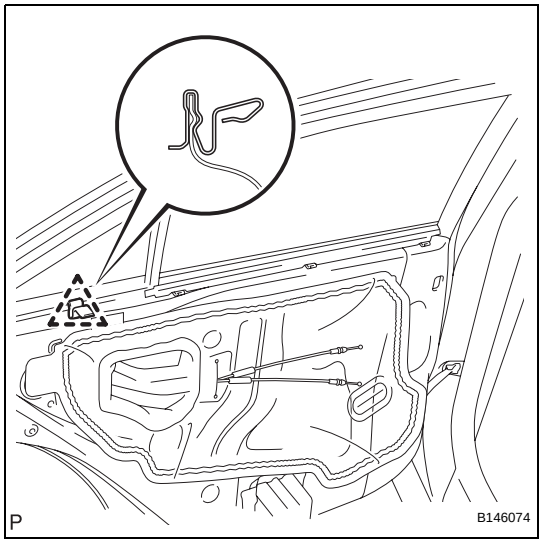


30. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY

(a) Connect the rear door lock remote control cable and rear door inside locking cable to the rear inside handle.



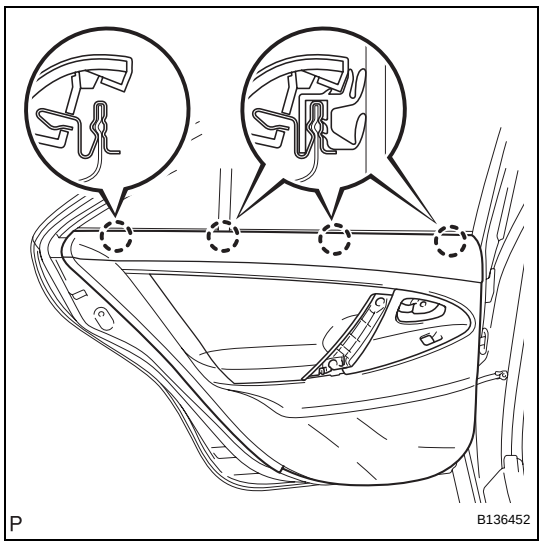
(b) Engage the 2 claws and install the rear door inside handle sub-assembly.



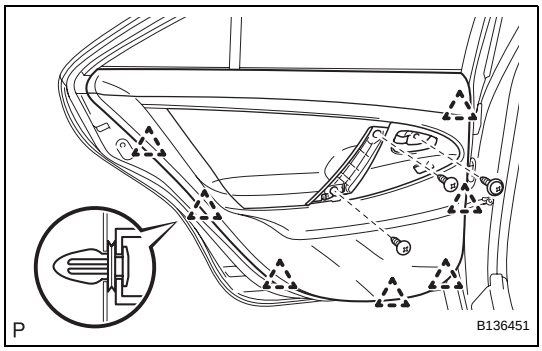
31. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY

(a) Engage the claw to install the No. 1 door scuff plate clamp.

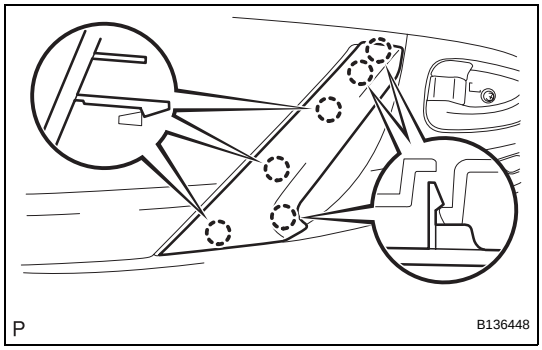
(b) Connect each connector.



(c) Engage the rear door trim board with the 4 clips of the rear door inner glass weatherstrip.

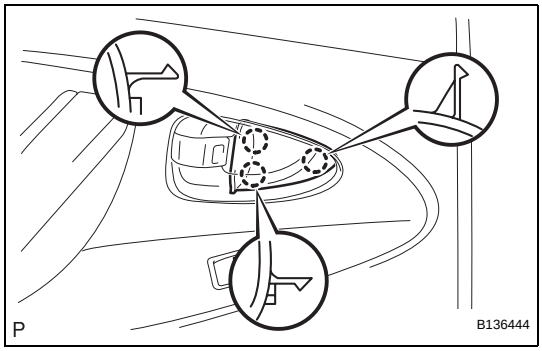


(d) Engage the 7 clips to install the rear door trim board to the rear door panel.
(e) Install the 3 screws.



32. INSTALL DOOR ASSIST GRIP COVER

(a) Engage the 6 claws and install the door assist grip cover.



33. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG

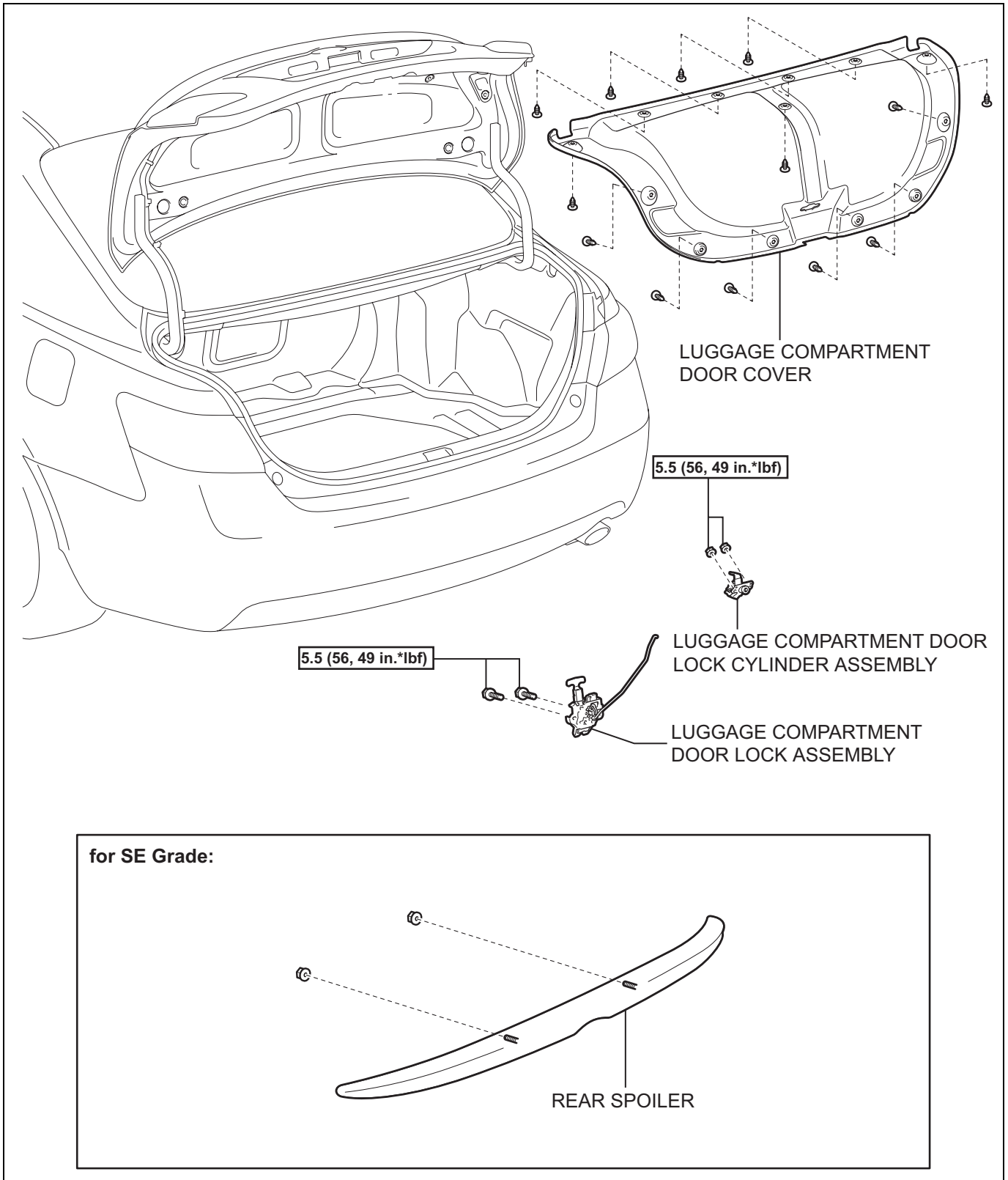
(a) Engage the 3 claws to install the rear door inside handle bezel plug.

34. INITIALIZATION POWER WINDOW CONTROL SYSTEM

(See page WS-8)

LUGGAGE COMPARTMENT DOOR

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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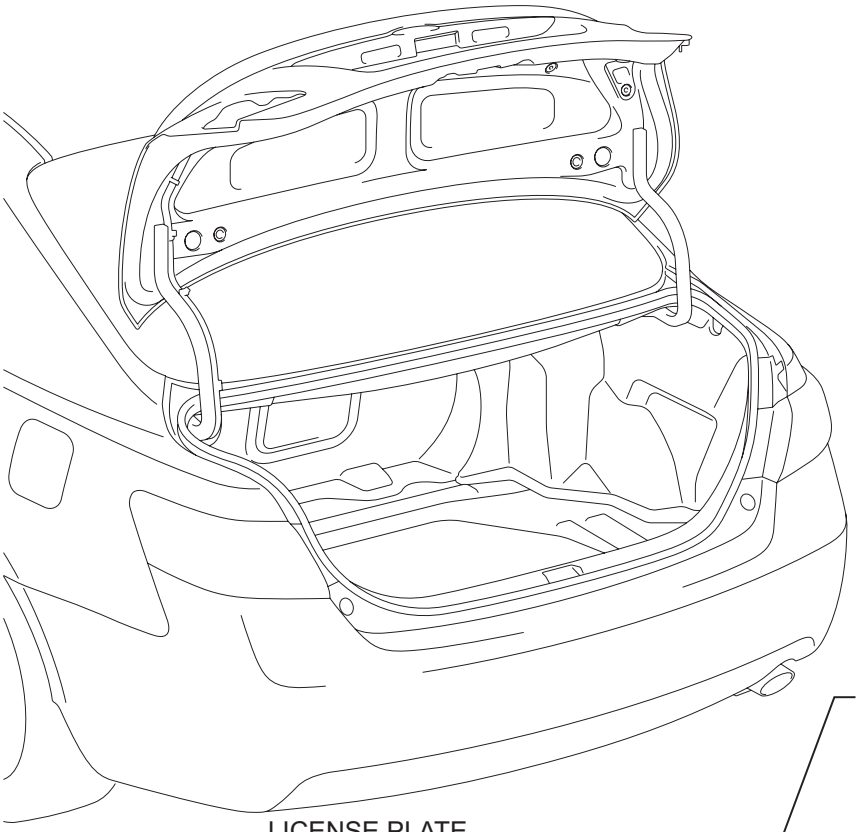
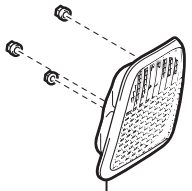
ED

ED

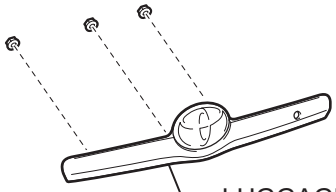


LICENSE PLATE
LIGHT ASSEMBLY RH

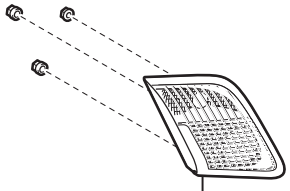
LICENSE PLATE
LIGHT ASSEMBLY LH



REAR LIGHT
ASSEMBLY RH

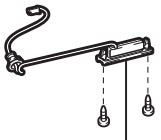


LUGGAGE COMPARTMENT OUTSIDE
DOOR GARNISH SUB-ASSEMBLY



REAR LIGHT
ASSEMBLY LH

with Smart Key System:



LUGGAGE DOOR OPENING SWITCH ASSEMBLY

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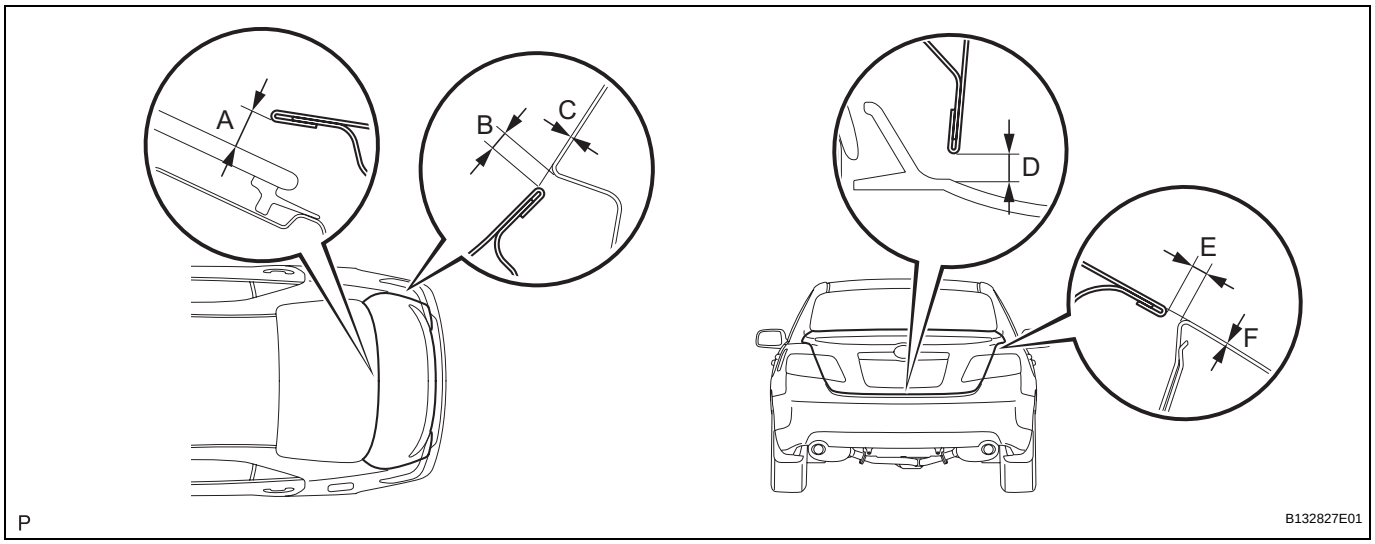
ON-VEHICLE INSPECTION

1. INSPECT LUGGAGE COMPARTMENT DOOR PANEL SUB-ASSEMBLY

(a) Check that the clearance measurements of areas A to F are within each standard range.



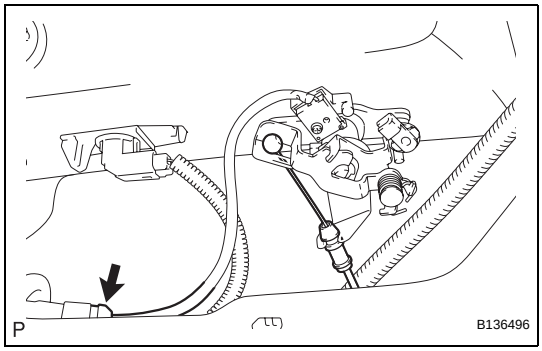
Standard clearance

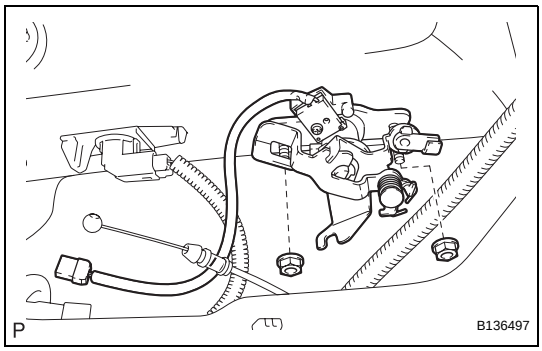
Area	Measurement	Area	Measurement
A	7.6 mm (0.299 in.)	D	3.8 to 7.8 mm (0.146 to 0.307 in.)
B	2.0 to 5.0 mm (0.079 to 0.197 in.)	E	2.0 to 5.0 mm (0.079 to 0.197 in.)
C	-1.5 to 1.5 mm (-0.059 to 0.059 in.)	F	-1.5 to 1.5 mm (-0.059 to 0.059 in.)

ED

DISASSEMBLY

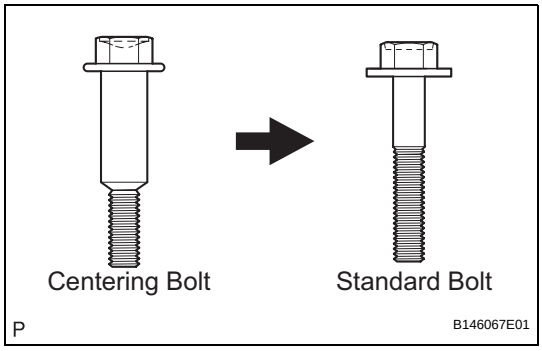
1. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)**
2. **REMOVE LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (See page ED-63)**
3. **REMOVE LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY**
   (a) Disconnect the cable and connector.





   (b) Remove the 2 nuts and the luggage compartment door lock cylinder assembly.
4. **REMOVE REAR SPOILER (for SE Grade) (See page ET-30)**
5. **REMOVE LUGGAGE DOOR OPENING SWITCH ASSEMBLY (w/ Smart Key System) (See page DL-246)**
6. **REMOVE LUGGAGE COMPARTMENT OUTSIDE DOOR GARNISH SUB-ASSEMBLY (See page ET-61)**
7. **REMOVE REAR LIGHT ASSEMBLY LH (See page LI-87)**
8. **REMOVE REAR LIGHT ASSEMBLY RH**
9. **REMOVE LICENSE PLATE LIGHT ASSEMBLY LH (See page LI-94)**
10. **REMOVE LICENSE PLATE LIGHT ASSEMBLY RH**

ADJUSTMENT



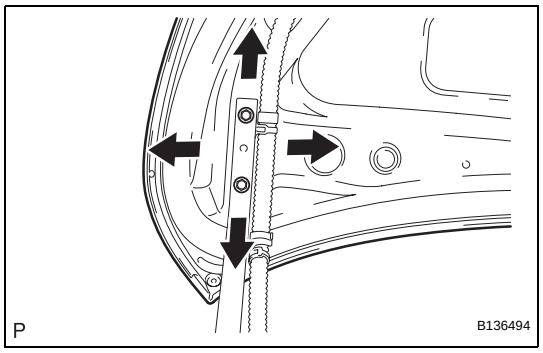
HINT:

- Centering bolts are used to mount the door hinge to the door. The door cannot be adjusted with the centering bolts on. Substitute the centering bolts with standard bolts (with washers) when making adjustments.
- A bolt without a torque specification is shown in the standard bolt chart (See page SS-2).

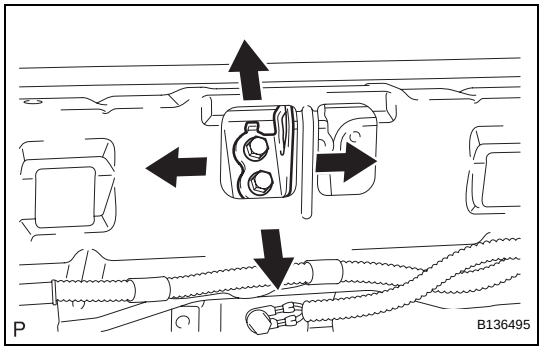
1. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)**
2. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
3. **REMOVE SPARE WHEEL COVER CLAMP**
4. **REMOVE SPARE WHEEL COVER ASSEMBLY**
5. **REMOVE LUGGAGE COMPARTMENT SIDE TRAY ASSEMBLY (See page ED-66)**

6. **REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-66)**

7. **REMOVE REAR FLOOR FINISH PLATE (See page ED-66)**



8. **ADJUST LUGGAGE COMPARTMENT DOOR**
   (a) Horizontally and vertically adjust the door by loosening the door side hinge bolts.
   Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)



   (b) Adjust the striker position by slightly loosening the striker mounting screws and hitting the striker with a plastic hammer.
   (c) Tighten the striker mounting screws after the adjustment.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

9. **INSTALL REAR FLOOR FINISH PLATE (See page ED-72)**

10. **INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-72)**

11. **INSTALL LUGGAGE COMPARTMENT SIDE TRAY ASSEMBLY (See page ED-72)**

12. **INSTALL SPARE WHEEL COVER ASSEMBLY**

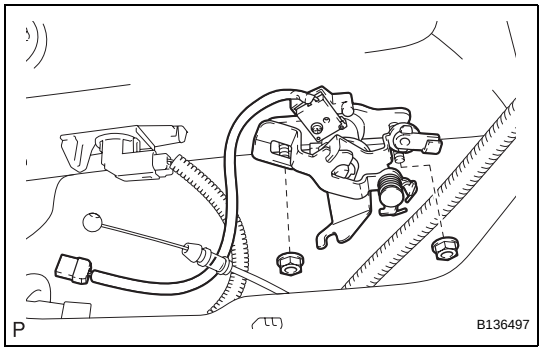
13. **INSTALL SPARE WHEEL COVER CLAMP**

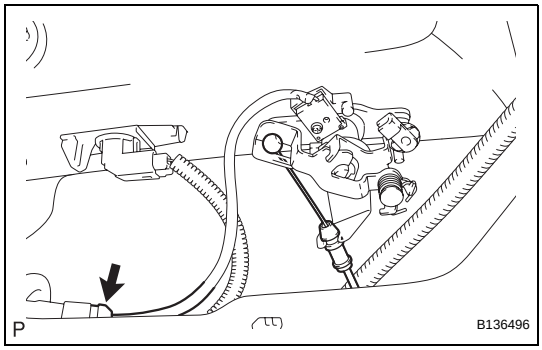
14. **INSTALL LUGGAGE COMPARTMENT FLOOR MAT**

15. **INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)**

REASSEMBLY

1. **INSTALL LICENSE PLATE LIGHT ASSEMBLY LH (See page LI-95)**
2. **INSTALL LICENSE PLATE LIGHT ASSEMBLY RH**
3. **INSTALL REAR LIGHT ASSEMBLY LH (See page LI-91)**
4. **INSTALL REAR LIGHT ASSEMBLY RH**
5. **INSTALL LUGGAGE COMPARTMENT OUTSIDE DOOR GARNISH SUB-ASSEMBLY (See page ET-63)**
6. **INSTALL LUGGAGE DOOR OPENING SWITCH ASSEMBLY (w/ Smart Key System) (See page DL-246)**
7. **INSTALL REAR SPOILER (for SE Grade) (See page ET-31)**
8. **INSTALL LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY**
   (a) Install the luggage compartment door lock cylinder with the 2 nuts.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

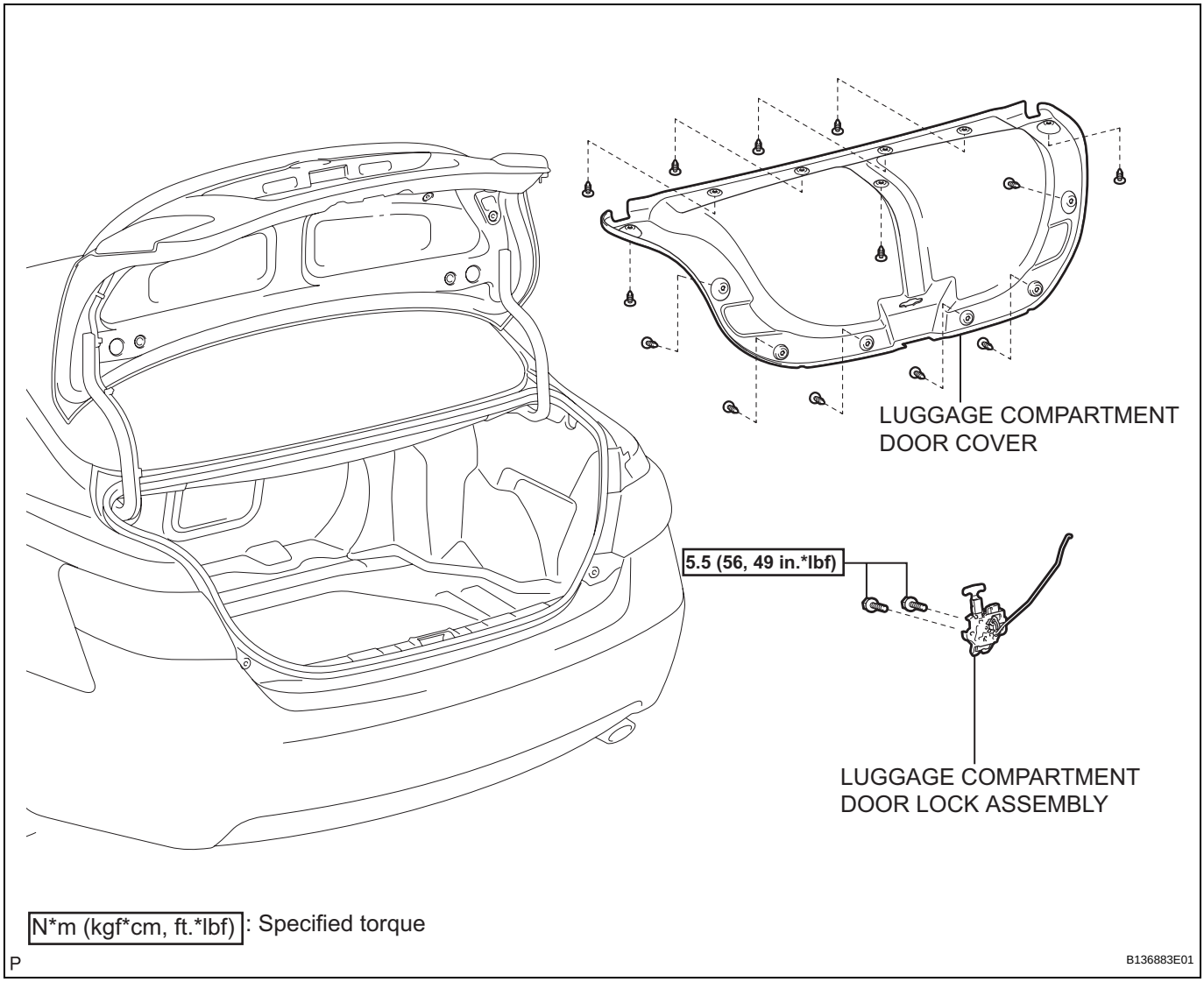




   (b) Connect the cable and connector.
9. **INSTALL LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (See page ED-64)**
10. **INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)**

LUGGAGE COMPARTMENT DOOR LOCK

COMPONENTS



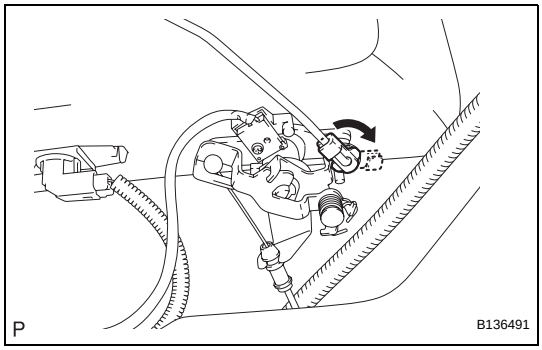
ED

REMOVAL

1. REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)

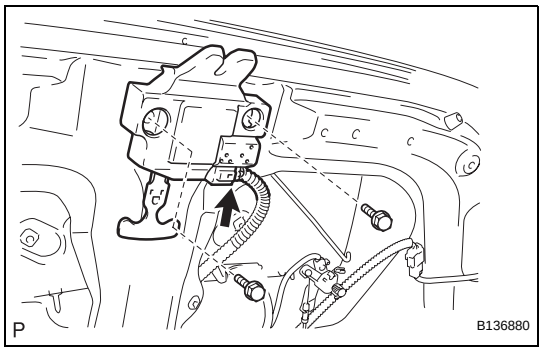
2. REMOVE LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY

(a) Disconnect the rod.



(b) Disconnect the connector.

(c) Remove the 2 bolts and luggage compartment door lock assembly.

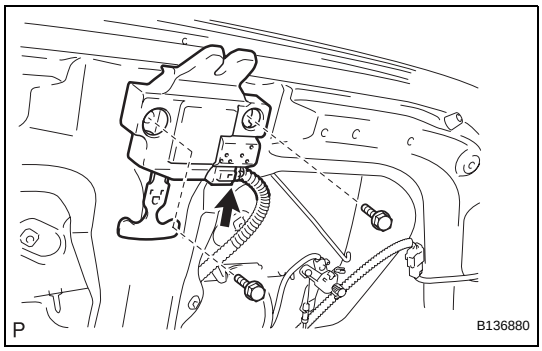


INSTALLATION

1. INSTALL LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY

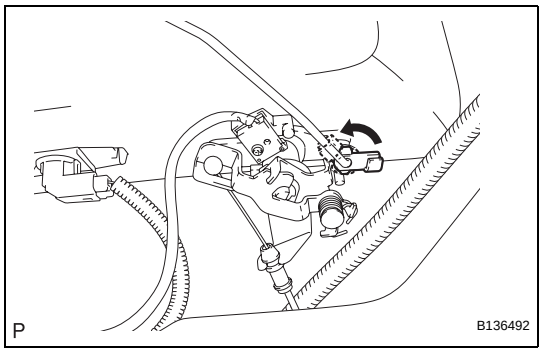
(a) Install the luggage compartment door lock assembly with the 2 bolts.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

(b) Connect the connector.



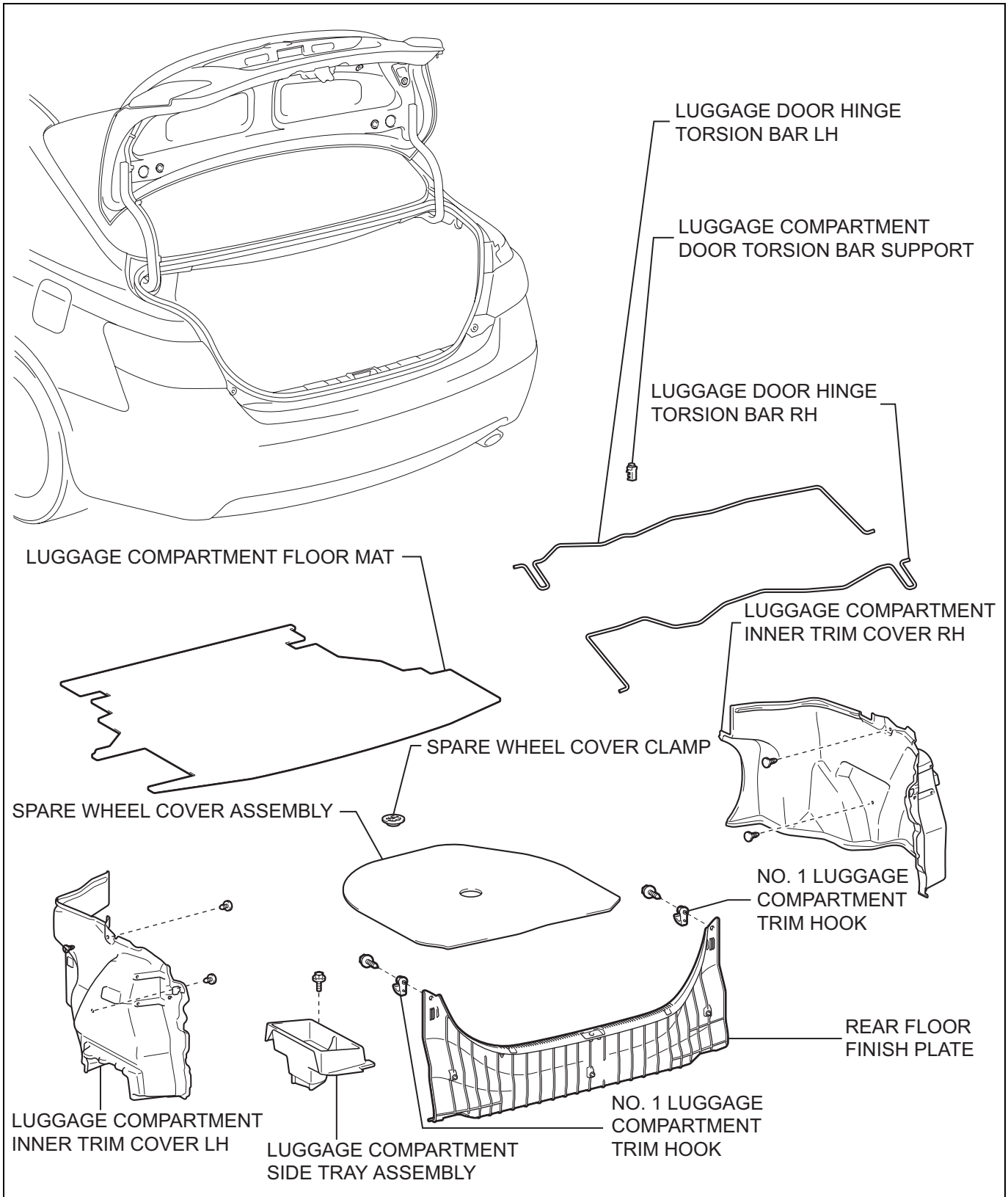
(c) Connect the rod.

2. INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)



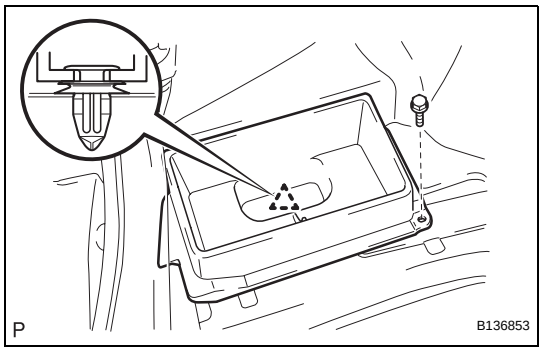
LUGGAGE DOOR HINGE TORSION BAR

COMPONENTS

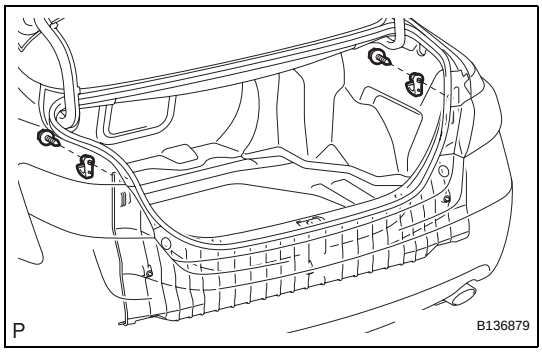


REMOVAL

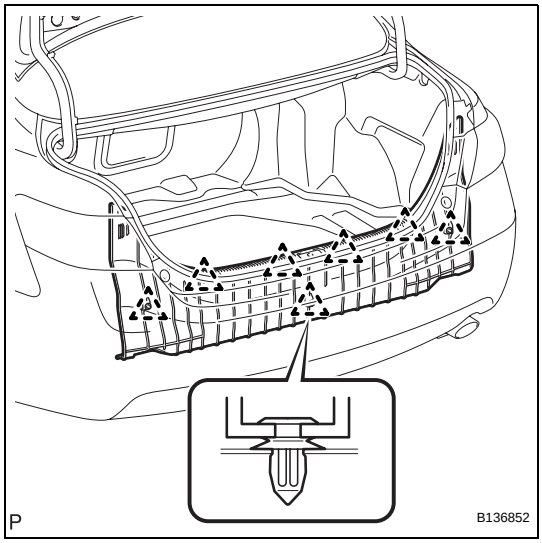
1. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
2. **REMOVE SPARE WHEEL COVER CLAMP**
3. **REMOVE SPARE WHEEL COVER ASSEMBLY**
4. **REMOVE LUGGAGE COMPARTMENT SIDE TRAY ASSEMBLY**
   (a) Remove the bolt.
   (b) Disengage the clip and remove the luggage compartment side tray assembly.



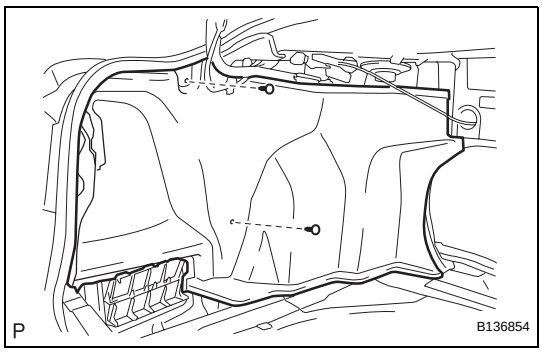
5. **REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK**
   (a) Remove the 2 screws and the 2 No. 1 luggage compartment trim hooks.

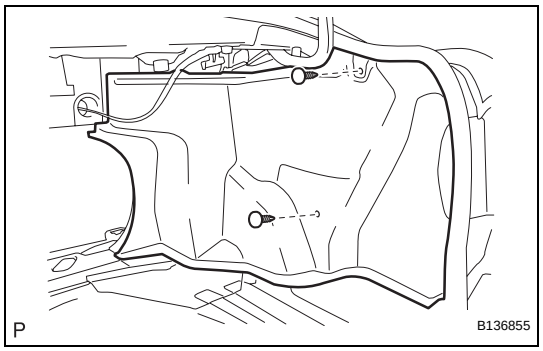


6. **REMOVE REAR FLOOR FINISH PLATE**
   (a) Disengage the 7 clips and remove the rear floor finish plate.



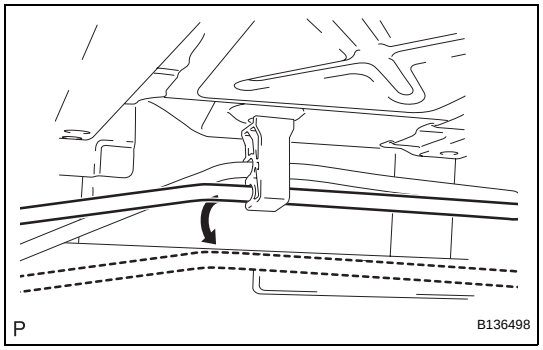
7. **REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER LH**
   (a) Remove the 2 clips and the luggage compartment inner trim cover LH.





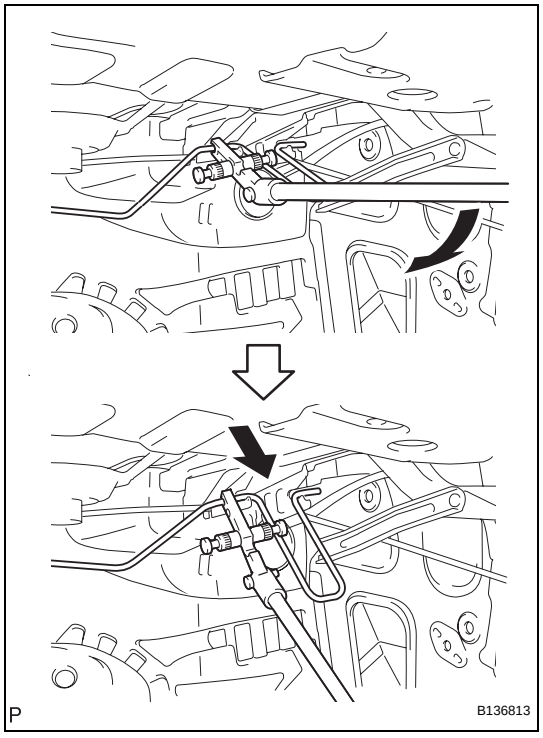
8. REMOVE LUGGAGE COMPARTMENT INNER TRIM COVER RH

(a) Remove the 2 clips and the luggage compartment inner trim cover RH.

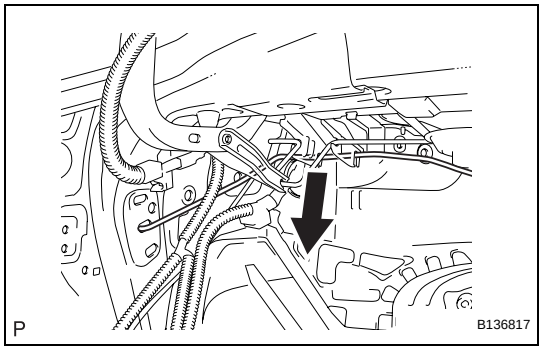


9. REMOVE LUGGAGE DOOR HINGE TORSION BAR RH

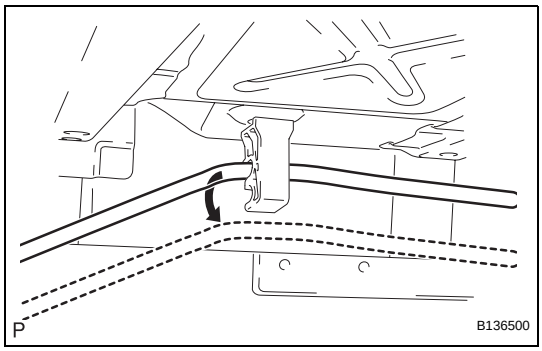
(a) Disconnect the luggage door hinge torsion bar RH from the luggage compartment door torsion bar support as shown in the illustration.



(b) Using SST, disconnect the luggage door hinge torsion bar RH from the luggage door hinge and body RH side as shown in the illustration.
SST 09804-24010

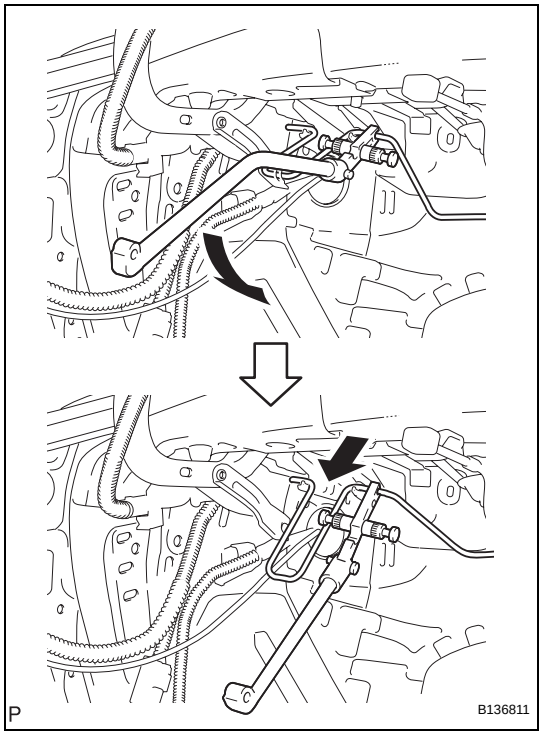


(c) Remove the luggage door hinge torsion bar RH from the body LH side as shown in the illustration.

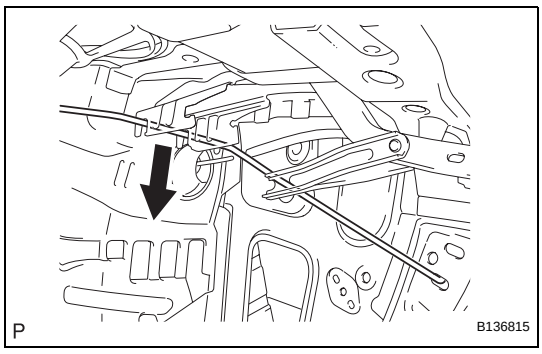


10. REMOVE LUGGAGE DOOR HINGE TORSION BAR LH

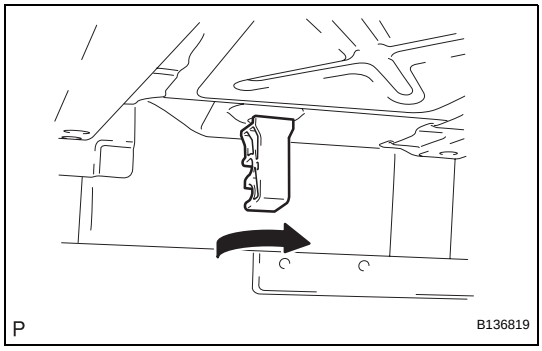
(a) Disconnect the luggage door hinge torsion bar LH from the luggage compartment door torsion bar support as shown in the illustration.



(b) Using SST, disconnect the luggage door hinge torsion bar LH from the luggage door hinge and body LH side as shown in the illustration.
SST 09804-24010



(c) Remove the luggage door hinge torsion bar LH from the body RH side as shown in the illustration.



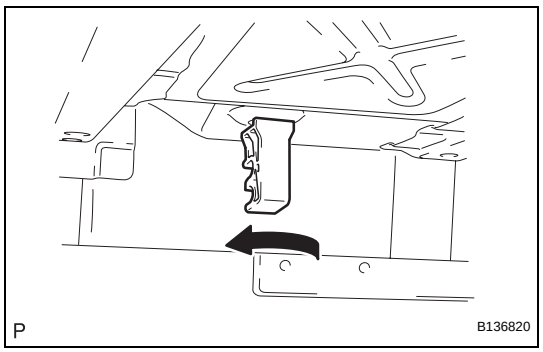
11. REMOVE LUGGAGE COMPARTMENT DOOR TORSION BAR SUPPORT

(a) Remove the luggage compartment door torsion bar support as shown in the illustration.

INSTALLATION

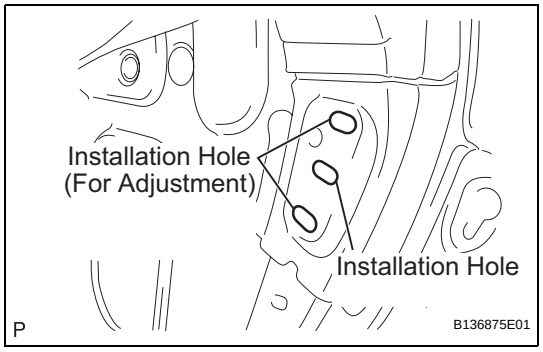
HINT:

- The installation should be performed in the order of LH to RH.
- After installing the torsion bar, use your hand to open and close the luggage door. Make sure the luggage door can open and close smoothly.



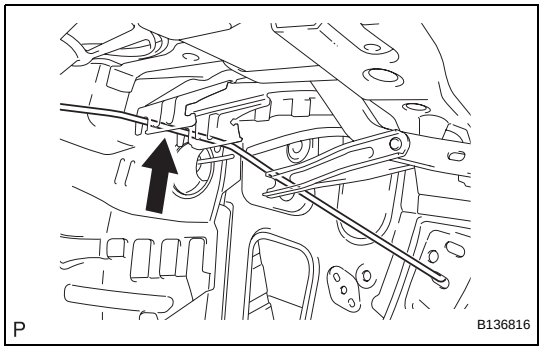
1. INSTALL LUGGAGE COMPARTMENT DOOR TORSION BAR SUPPORT

(a) Install the luggage compartment door torsion bar support as shown in the illustration.

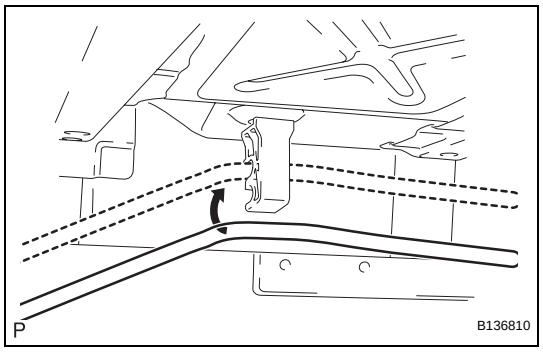


2. INSTALL LUGGAGE DOOR HINGE TORSION BAR LH

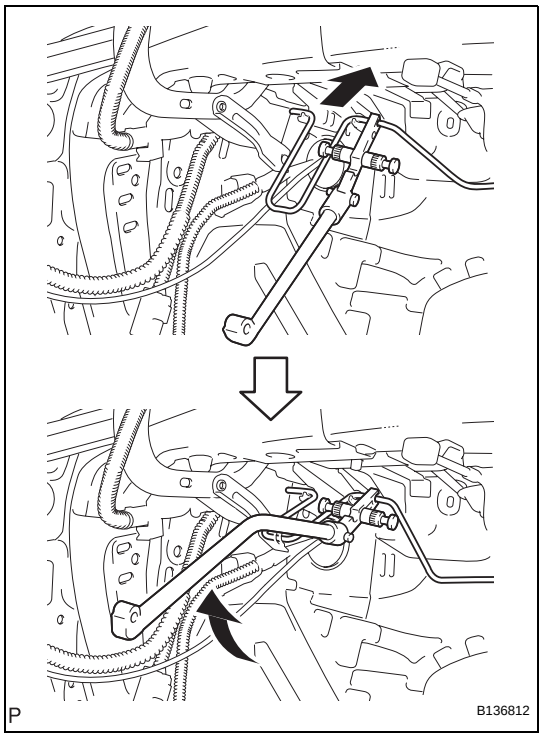
(a) Set the tip of the luggage door hinge torsion bar LH in the installation hole placed in the center part. Holes placed in the upper and lower parts are used for adjustment.



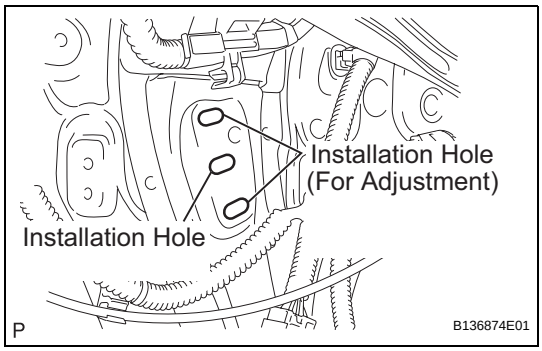
(b) Connect the luggage door hinge torsion bar LH to the body RH side as shown in the illustration.



(c) Connect the luggage door hinge torsion bar LH to the luggage compartment door torsion bar support as shown in the illustration.

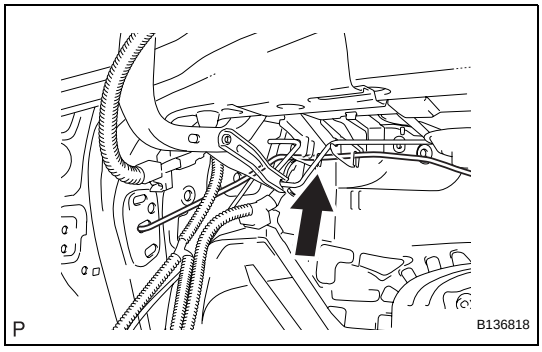


(d) Using SST, install the luggage door hinge torsion bar LH to the luggage door hinge and body LH side as shown in the illustration.
SST 09804-24010

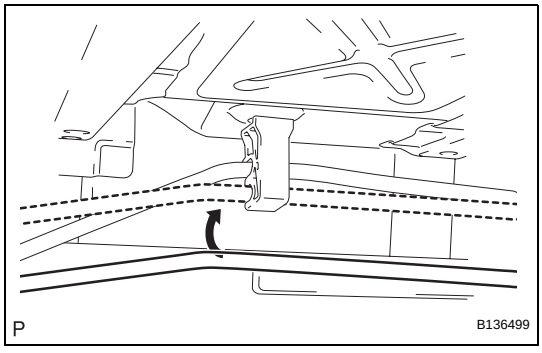


3. INSTALL LUGGAGE DOOR HINGE TORSION BAR RH

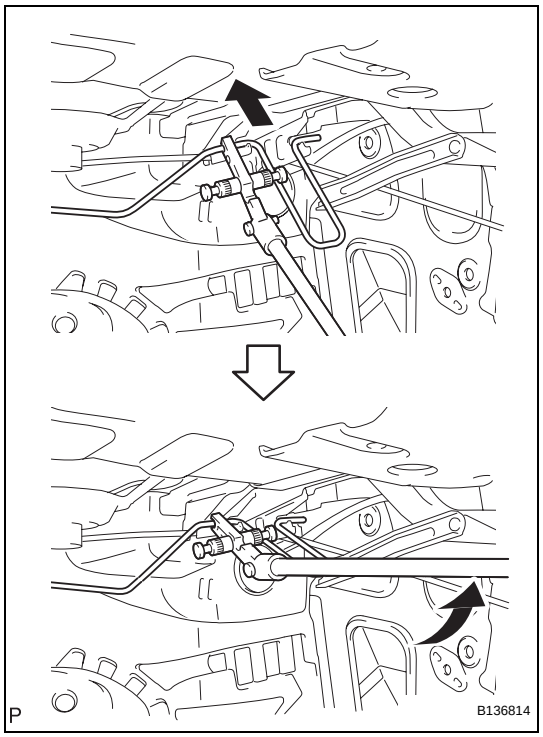
(a) Set the tip of the luggage door hinge torsion bar RH in the installation hole placed in the center part. Holes placed in the upper and lower parts are used for adjustment.



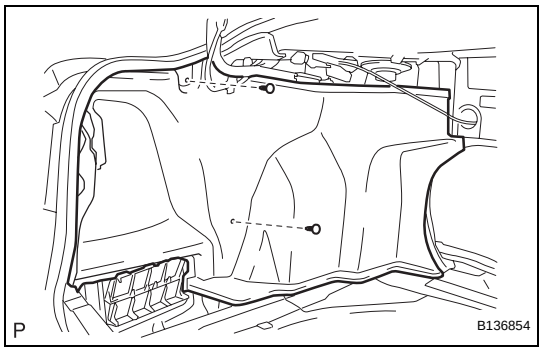
(b) Connect the luggage door hinge torsion bar RH to the body LH side as shown in the illustration.



(c) Connect the luggage door hinge torsion bar RH to the luggage compartment door torsion bar support as shown in the illustration.

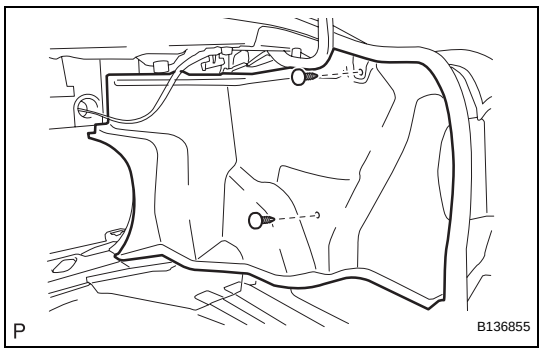


(d) Using SST, install the luggage door hinge torsion bar RH to the luggage door hinge and body LH side as shown in the illustration.
SST 09804-24010



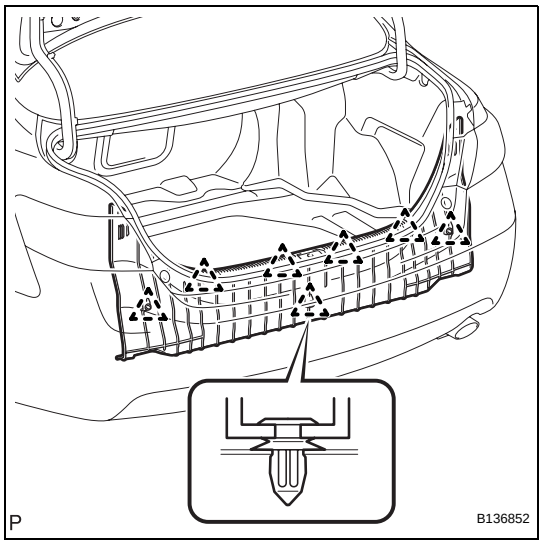
4. INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER LH

(a) Install the luggage compartment inner trim cover LH with the 2 clips.



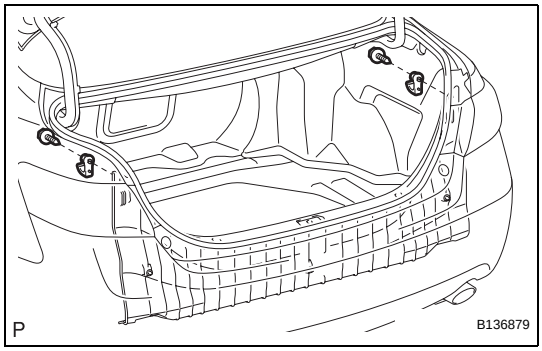
5. INSTALL LUGGAGE COMPARTMENT INNER TRIM COVER RH

(a) Install the luggage compartment inner trim cover RH with the 2 clips.



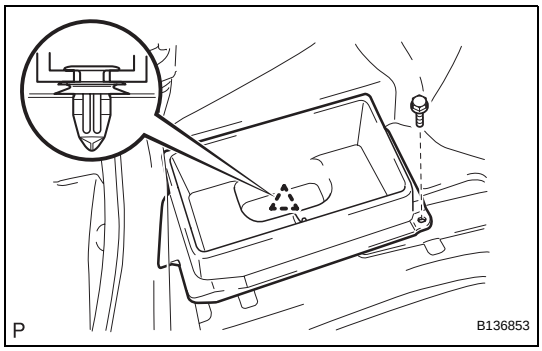
6. INSTALL REAR FLOOR FINISH PLATE

(a) Engage the 7 clips and install the rear floor finish plate.



7. INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK

(a) Install the 2 No. 1 luggage compartment trim hooks with the 2 screws.



8. INSTALL LUGGAGE COMPARTMENT SIDE TRAY ASSEMBLY

(a) Engage the clip and install the luggage compartment side tray assembly.

(b) Install the bolt.

9. INSTALL SPARE WHEEL COVER ASSEMBLY

10. INSTALL SPARE WHEEL COVER CLAMP

11. INSTALL LUGGAGE COMPARTMENT FLOOR MAT

ENGINE IMMOBILISER SYSTEM (w/ Smart Key System)

PRECAUTION

1. PRECAUTIONS WHEN USING INTELLIGENT TESTER

(a) When using the intelligent tester to troubleshoot the smart access system: Connect the intelligent tester to the DLC3 while the engine switch off, and turn a door courtesy light switch on and off at 1.5-second intervals until communication between the tester and vehicle begins.

2. PRECAUTIONS FOR EACH FUNCTION

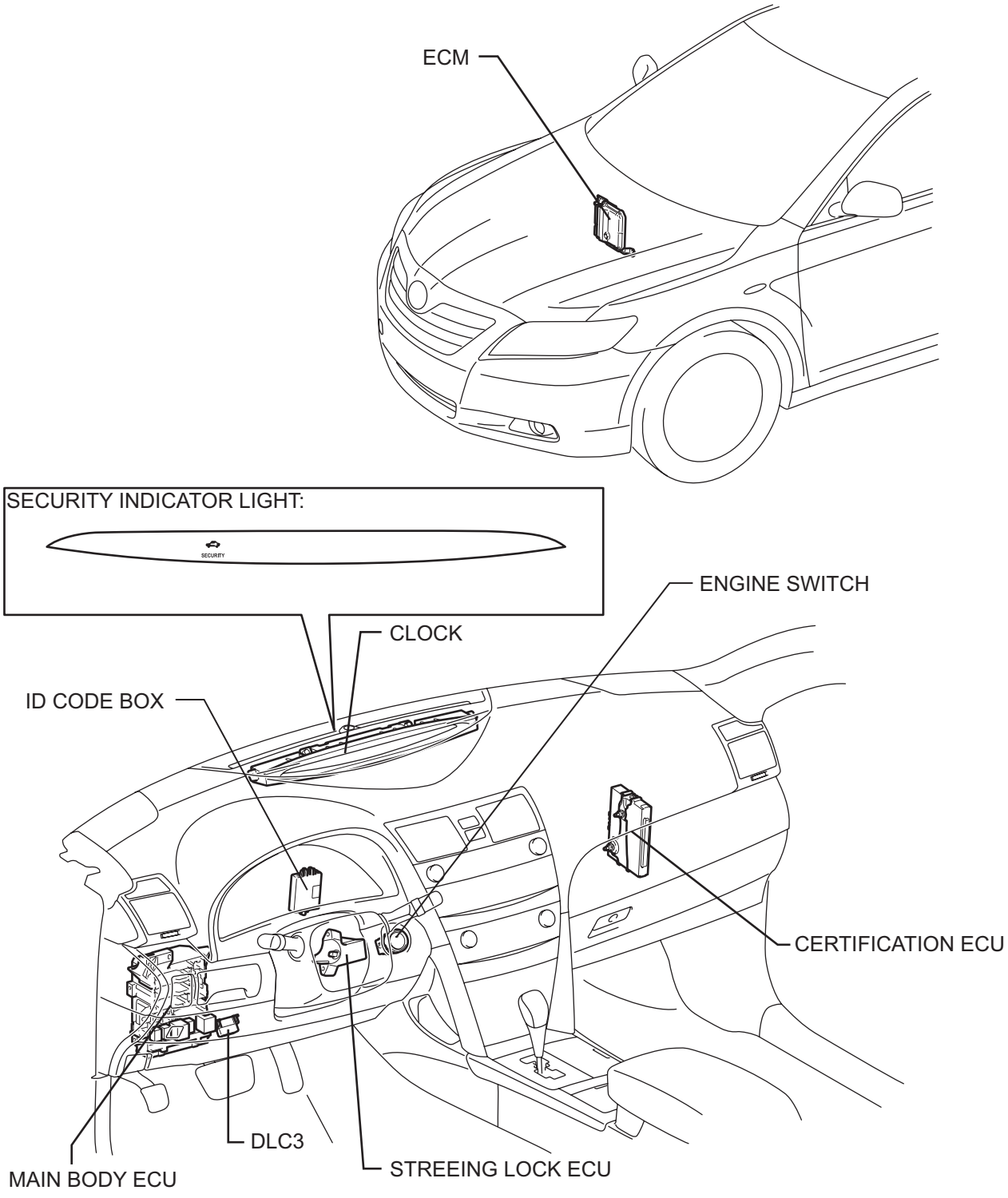
(a) Precautions for the electrical key:
The electrical key is a precision instrument. Be sure to observe the following:
(1) Do not drop or strike the electrical key.
(2) Do not allow the electrical key to be kept in a high temperature place for a long time.
(3) Do not use an ultrasonic washing machine to clean the electrical key.
(4) Keep the electrical key away from magnets or magnetized items during use.
(5) Do not attach any stickers to the electrical key.

(b) Precautions for the engine start function:
(1) Before starting the engine, firmly depress the brake pedal until the indicator of the engine switch illuminates in green.
(2) Be sure to turn the engine switch off before disconnecting the negative (-) battery terminal. When the battery terminal is disconnected, the power source mode (off, on (ACC), on (IG)) will remain in memory. When the vehicle's battery becomes discharged, be careful to remember the power source mode.
(3) After the battery is removed and reinstalled, be sure to wait 10 seconds or more before the next engine start. The engine may not start immediately after the battery is reinstalled.

(c) Precautions for the battery built into the electrical key and the vehicle battery:
(1) When the doors are locked (locked state), signals are emitted by the vehicle at a predetermined interval. If the vehicle were to remain parked for a long time, the vehicle battery could become discharged. To prevent this, periodically charge the vehicle battery, or disable the entry and start system.

(2) When the doors are locked (locked state), and the electrical key remains in the door oscillator detection area, the system will maintain periodic communication with the electrical key. If the vehicle remains parked in this state for a long time, the vehicle and key batteries could become discharged. If the vehicle is not being used, keep the electrical key at least 2 m (6.56 ft) from the vehicle.

PARTS LOCATION



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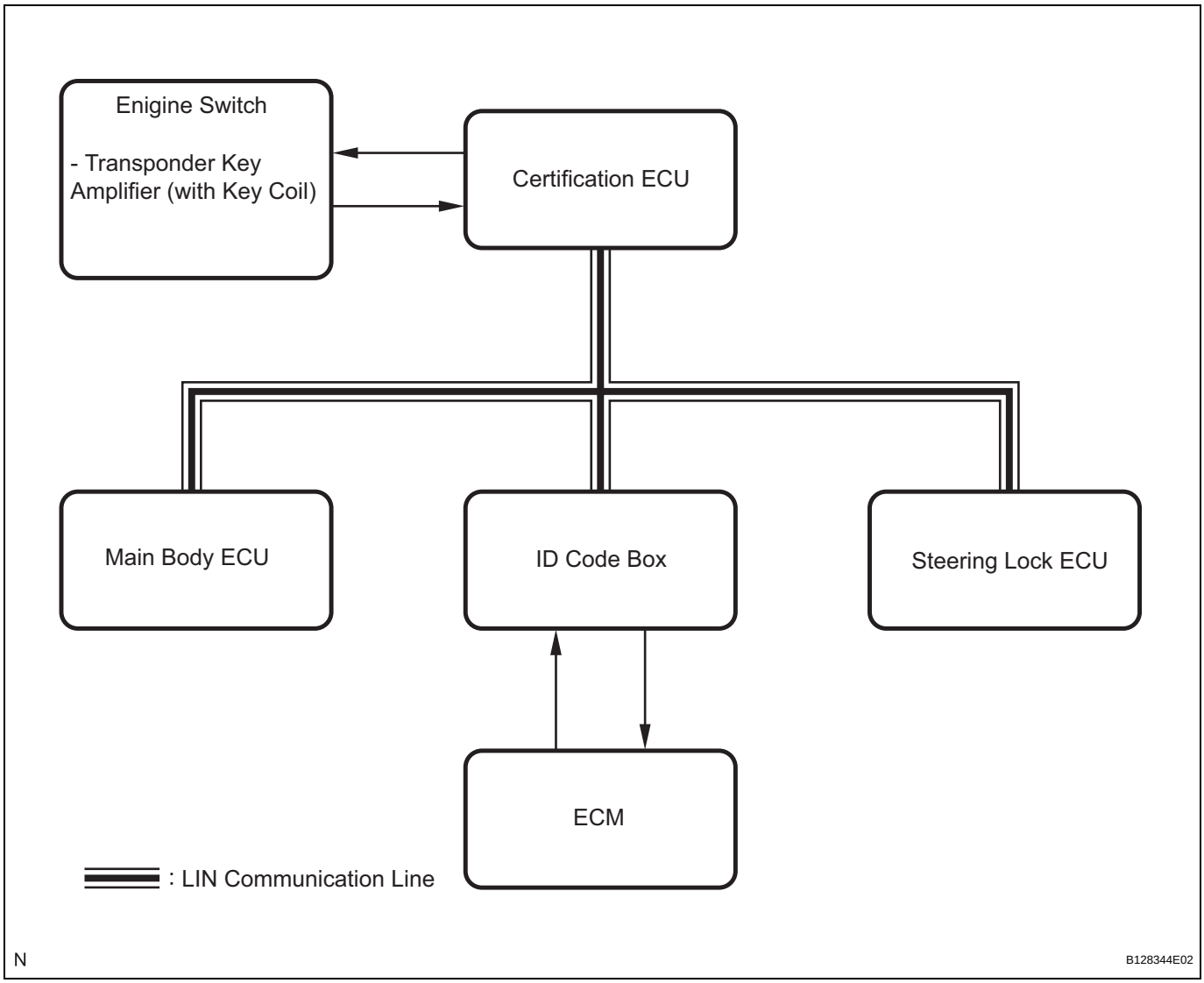
SYSTEM DIAGRAM



EI

Communication table:

Transmitting ECU (Transmitter)	Receiving ECU (Receiver)	Signals	Communication method
Main body ECU	Certification ECU	Key code recognition signal	LIN
ID code box	Certification ECU	DTC (B2791) signal	LIN
ID code box	Steering lock ECU	• Steering lock release signal • Matching request random number signal	LIN
ID code box	Certification ECU	Matching request random number signal	LIN

SYSTEM DESCRIPTION

1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

(a) The immobiliser system is a theft deterrent system that determines whether to disable starting of the SFI system based on a comparison of the key's ID codes and the vehicle's pre-registered code. The immobiliser system compares the vehicle certification ECU's pre-registered ID code with the ID of the key-embedded transponder chip. If the ID codes do not match, the immobiliser system activates and the SFI system cannot be started. The certification ECU manages communication with the ECM, main body ECU, steering lock ECU and ID code box. When the ID codes of the transponder chip and certification ECU match, the certification ECU authorizes the SFI system to start.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Transponder key coil/amplifier (built into engine switch)	Receives key ID code, amplifies ID code and outputs the code to the certification ECU.
Indoor electrical key oscillator	Transmits key detection signals within the detection area in the vehicle interior upon receiving a transmission request signal from the certification ECU. Certification ECU request signal is activated when the key is brought into the vehicle interior and the engine switch is pushed.
Door control receiver	Receives an ID code from the key in the actuation area and transmits it to the certification ECU.
Security indicator	Illuminates or starts flashing. Illumination is controlled by the certification ECU.

3. SYSTEM FUNCTION

(a) Using entry function

(1) When the driver (or passenger) is sitting in the vehicle while carrying the key, and the engine switch is pressed while the brake pedal is depressed, the main body ECU recognizes that the engine start operation has occurred and sends a certification request signal to the certification ECU. Upon receipt of the certification request signal, the certification ECU sends a request signal to the indoor electrical key oscillator. Upon receipt of the request signal, the indoor electrical key oscillator sends a request signal to detect if the key is inside the vehicle. When the key receives this request signal, it answers by sending an ID code containing a response code through the glass antenna to the door control receiver. Upon receipt of the ID code, the certification ECU analyzes the code. If the interior certification passes, then the main body ECU sends a certification pass response signal. When the main body ECU receives this signal, the ACC relay is switched on and the IG1 and IG2 relays are switched on in sequence. At this time, the

engine switch indicator illuminates in green. Then the certification ECU checks that the power source mode has been changed and sends a steering lock command signal to the main body ECU. After receiving this signal, the main body ECU supplies power to the steering lock actuator. Then (via the ID code box) the steering lock ECU confirms that the certification ECU is certified and drives the steering actuator motor until the steering lock is unlocked. After unlocking the steering lock, an unlock completed signal is sent to the certification ECU. Upon receipt of this signal, the certification ECU sends an unset command signal to the ID code box. Once this signal is received, the ID code box confirms that the certification ECU is certified, sends an immobiliser unset command signal to the ECM and sends a security indicator light off signal to the certification ECU.

(b) Not using the entry function (when key battery is depleted)

(1) When the driver is sitting in the vehicle while carrying the key and the brake pedal is depressed, the main body ECU recognizes that the stop light switch is on and sends a key confirmation request signal to the certification ECU. Upon receipt of this signal, the certification ECU drives the immobiliser amplifier built in the engine switch. At this time, the engine switch sends an RF wave communication signal to the immobiliser. If the driver holds the key up to the engine switch at this time, the engine switch receives the immobiliser RF wave signal and responds by sending a radio wave signal. When the engine switch receives the radio wave signal from the key, it duplicates the signal and sends an ID code to the certification ECU. Upon receipt of the ID code, the code is analyzed. If the certification passes, a key certification pass response signal is sent to the main body ECU while simultaneously sending a sound buzzer request signal to the meter ECU. When the main body ECU receives this signal, the ACC relay is switched on and the IG1 and IG2 relays are switched on in sequence. At this time, the engine switch indicator illuminates in green. Then the certification ECU checks that the power source mode has been changed and sends a steering lock command signal to the main body ECU. After receiving this signal, the main body ECU supplies power to the steering lock actuator. Then (via the ID code box) the steering lock ECU confirms that the certification ECU is certified and drives the steering actuator

motor until the steering lock is unlocked. After unlocking the steering lock, an unlock completed signal is sent to the certification ECU. Upon receipt of this signal, the certification ECU sends an unset command signal to the ID code box. Once this signal is received, the ID code box confirms that the certification ECU is certified, sends an immobiliser unset command signal to the ECM and sends a security indicator light off signal to the certification ECU.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the engine immobiliser system.
- The intelligent tester should be used in steps 3 and 5.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CRANK ENGINE FOR MORE THAN 10 SECONDS

NEXT

3 CHECK FOR DTCS

(a) Check for DTCs and note any codes that are output (see page EI-24).
(b) Delete the DTCs.
(c) Recheck for DTCs. Based on the DTCs output above, try to duplicate the SFI system DTC or engine immobiliser system DTC by simulating the symptoms indicated by the DTC.

Result

Result	Proceed to
DTC output does not reoccur	A
SFI system DTC output reoccurs	B
Engine immobiliser system DTC output reoccurs	C

B → GO TO SFI SYSTEM

C → GO TO DTC CHART

A

4 PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B → GO TO STEP 6

A

EI

5	**OVERALL ANALYSIS AND TROUBLESHOOTING**

(a) DATA LIST/ACTIVE TEST (See page EI-24)
(b) TERMINALS OF ECU (See page EI-15)

NEXT

6	**ADJUST, REPAIR OR REPLACE**

NEXT

7	**CONFIRMATION TEST**

NEXT

END

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

HINT:

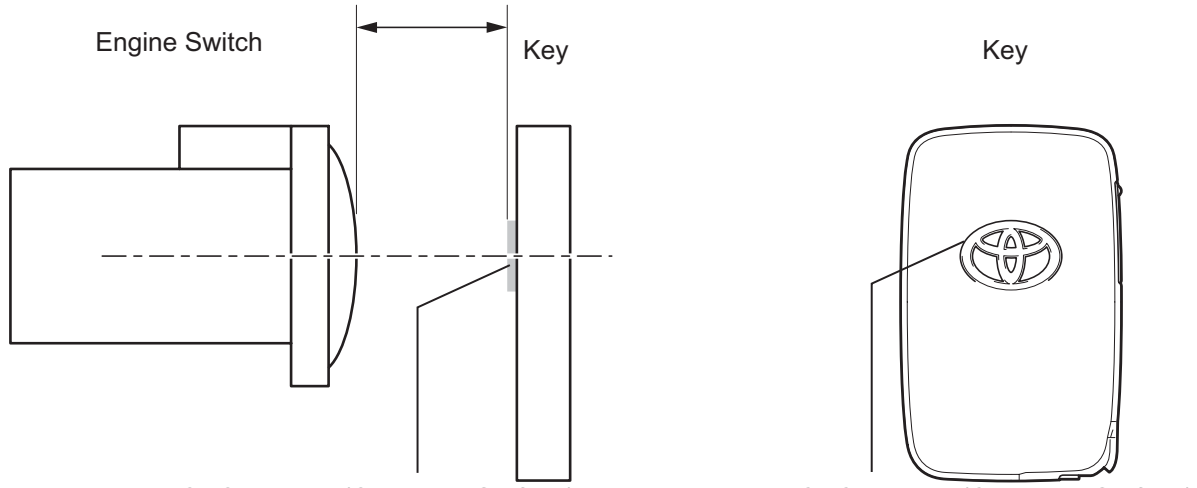
- ID codes are the same as recognition codes for the wireless transmitter and the engine immobiliser function. Registering an ID code enables the smart access system with push-button start, the wireless door lock control function and the engine immobiliser function to be operated.
- Code registration is needed when the certification ECU, ID code box, steering lock ECU or key is replaced with a new one.

(a) PROCEDURE "1"

The vehicle with the smart access system with push-button start system does not have a key slot. Therefore, hold the key close to the engine switch to register the key, as shown in the illustration below.

Hold the key with its ornament surface within a range of 10 mm (0.39 in.) or less from the engine switch.

Communication distance: 10 mm (0.39 in.) or less from the engine switch.



P

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EI

2. PART REPLACEMENT KEY REGISTRATION

(a) The following table shows ECU replacement and key registration procedures in case the malfunctioning ECU has been identified after troubleshooting the smart access system with push-button start.

HINT:

- The following procedures indicated in the table below require the use of the intelligent tester:
  - New key ID registration
  - Additional key ID registration
  - Key ID erasure
  - ECU code registration
- If all of the registered keys are not available, replacement of the ID code box is also required.
- A maximum of 7 keys can be registered.

Part to be replaced	Condition		Procedure	Reference
Certification ECU	Customer has brought all keys		1. Replace certification ECU	-
			2. Reregister all keys (new key ID registration)	PROCEDURE "B"
	Some keys are lost	Key ID codes can be registered and erased	1. Erase key codes (key ID erasure)	PROCEDURE "D"
			2. Perform additional key registration procedure (additional key ID registration)	PROCEDURE "C"
			3. Replace certification ECU	-
			4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "B"
		Key ID codes cannot be either registered or erased	1. Replace certification ECU	-
			2. Replace ID code box	-
			3. Reregister all keys (new key ID registration) HINT: If key codes cannot be erased or additional keys cannot be registered due to a malfunction in certification ECU, replace ID code box and certification ECU. If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"
ID code box	At least 1 key is available		1. Replace ID code box	-
			2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
			3. ECU communication ID registration	PROCEDURE "F"
	All keys are lost		1. Replace ID code box	-
			2. Replace certification ECU	-
			3. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "A"
			4. ECU communication ID registration	PROCEDURE "F"

EI

Part to be replaced	Condition	Procedure	Reference
Steering lock ECU	Customer has brought at least 1 key	1. Replace steering lock ECU	-
		2. Register recognition codes in ECUs (ECU code registration)	PROCEDURE "E"
	All keys are lost	1. Replace steering lock ECU	-
		2. Replace certification ECU	-
		3. Replace ID code box	-
		4. Reregister all keys (new key ID registration) HINT: If some keys are not registered during above steps, they will be disabled because they cannot be registered later	PROCEDURE "A"
		5. ECU communication ID registration	PROCEDURE "F"
Main body ECU	No condition required	Replace main body ECU	-
ECM	No condition required	1. Replace ECM	-
		2. ECU communication ID registration	PROCEDURE "F"
Key	Customer has brought at least 1 key	1. Using remaining key, erase lost key code (key ID erasure)	PROCEDURE "D"
		2. Register additional keys as necessary (additional key ID registration)	PROCEDURE "E"
	All keys are lost	1. Replace certification ECU	-
		2. Replace ID code box	-
		3. Register all keys (new key ID registration) HINT: If customer brings lost keys at later date, they can be registered using additional key ID registration function	PROCEDURE "A"
		4. ECU communication ID registration	PROCEDURE "F"

3. KEY REGISTRATION

(a) PROCEDURE "A"

New key ID registration (when replacing certification ECU and ID code box, or certification ECU, ID code box and steering lock ECU)

EI

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE REG" from tester menu HINT: The engine switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode
3. Verification of unregistered key *1	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat
	Confirm that wireless door lock buzzer sounds
4. Registration of ID code	Perform operation according to prompts on tester screen
5. End of registration	Finish new key ID code registration

*1: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(b) PROCEDURE "B"
New key ID registration (when replacing certification ECU)

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE REG" from tester menu HINT: The engine switch cannot be turned on (IG) more than 10 times. After connecting tester, turn tester on while turning driver's side door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure
2. Confirmation of ECU code	Perform operation according to prompts on tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode
3. Confirmation of all registered keys *1	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds
4. Confirmation of ECU code	Perform operation according to prompts on tester screen
5. Verification of unregistered key *2	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger side seat
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish new key ID code registration

*1: Repeat this process for each key registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from process 1 again. If performing the key confirmation procedure for a key, the security indicator comes on and remains on until all the keys are confirmed.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(c) PROCEDURE "C"
Additional key ID registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE REG" from tester menu
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen HINT: The mode is automatically selected by tester, new registration mode or add mode
	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Verification of unregistered key *2	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds. Place unregistered key on front passenger's side seat
	Confirm that wireless door lock buzzer sounds
5. Registration of ID code	Perform operation according to prompts on tester screen
6. End of registration	Finish key ID code registration

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform registration procedures from process 1 again.
*2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform registration procedures from 1 again. Make sure that only 1 key is in the cabin during registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(d) PROCEDURE "D"
Key ID erasure
HINT:
Erase all registered key codes except one.

Process	Procedure
1. Start of erasure	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / SMART CODE ERS" from tester menu
2. Confirmation of registered key *1	Perform operation according to prompts on intelligent tester screen
	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Confirmation of ECU code	Perform operation according to prompts on tester screen
4. Erasure of ID code	Perform operation according to prompts on tester screen
5. End of erasure	Finish key ID code erasure

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

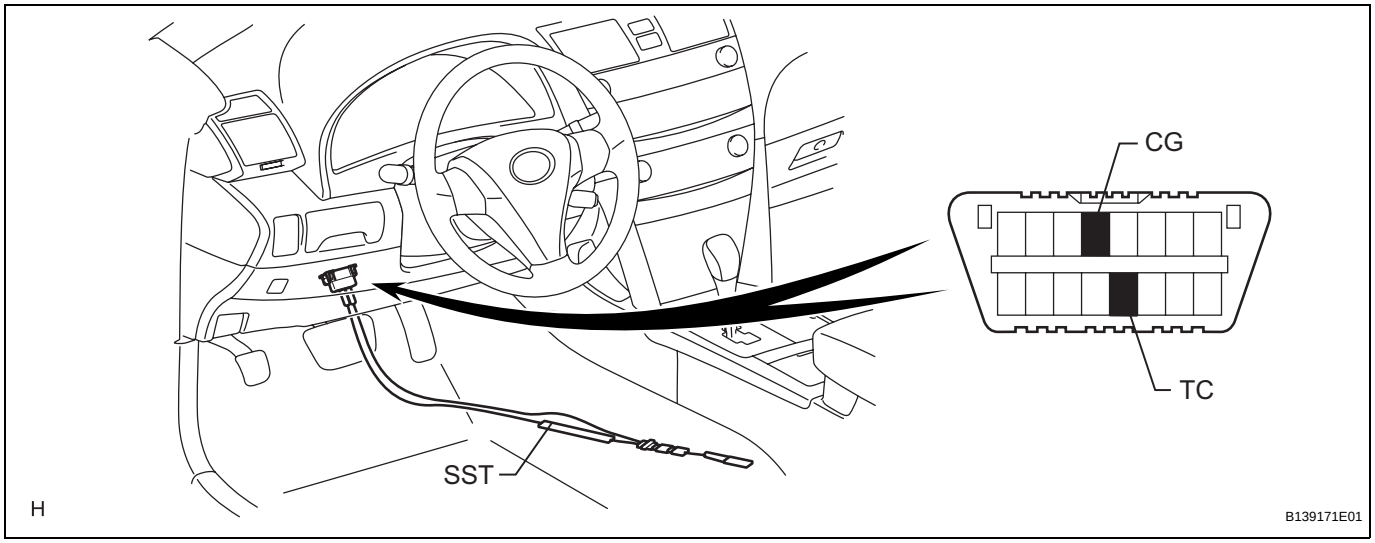
(e) PROCEDURE "E"
ECU code registration

Process	Procedure
1. Start of registration	1. Connect intelligent tester (with CAN VIM) to DLC3 2. Turn engine switch on (IG) 3. Select "SMART ACCESS / ID UTILITY / ECU COMM ID REG / ID Code Box and Steering Lock" from tester menu
2. Confirmation of registered key *1	Hold unregistered key close to engine switch (For details, refer to PROCEDURE "1")
	Confirm that wireless door lock buzzer sounds once
3. Registration of ECU code	Perform operation according to prompts on tester screen
4. End of registration	Finish ECU code registration

*1: Perform this process for one of the keys registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform erasure procedures from process 1 again.

(f) PROCEDURE "F"
ECU communication ID registration
NOTICE:
- **The ECU communication ID should be registered when the ID code box and/or the ECM is replaced in order to match these ECM communication ID.**
- **The engine cannot be started unless the ECM communication ID matches.**

Register the ECU communication ID.



(1) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040

(2) Turn the engine switch on (IG) and leave it for 30 minutes.
HINT:
Do not start the engine.
(3) Turn the engine switch off and disconnect terminals TC and CG.
(4) Check that the engine starts.

PROBLEM SYMPTOMS TABLE

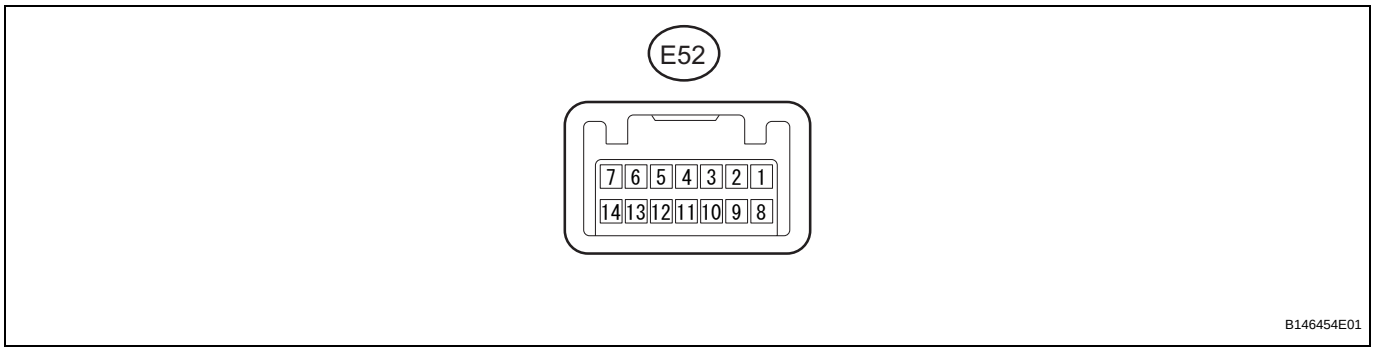
HINT:
Use the table below to help determine the cause of the problem symptom. The potential cases of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected area in the order they are listed. Replace parts as necessary.

Engine Immobiliser System:

Symptom	Suspected area	See page
Engine does not start	1. Key	EI-24
	2. ID code box power source circuit	EI-45
	3. Certification ECU power source circuit	EI-48
	4. Steering lock ECU power source circuit	SR-30
	5. Smart access system	DL-142
	6. SFI system	ES-15

TERMINALS OF ECU

1. CHECK ENGINE SWITCH



(a) Disconnect the E52 switch connector.
(b) Measure the resistance according to the value(s) in the table below.

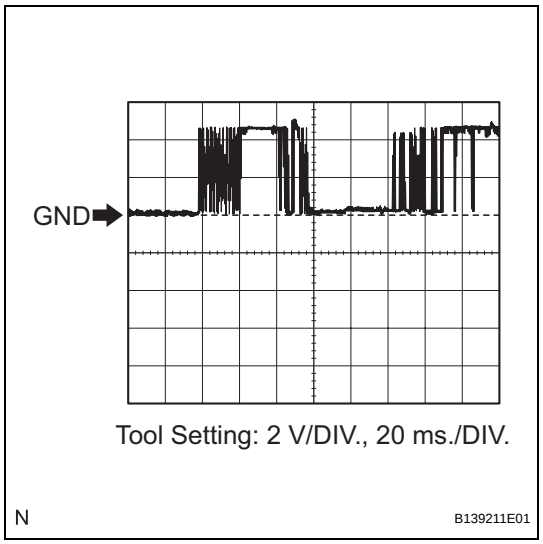
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E52-8) - Body ground	G - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E52 switch connector.
(d) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E52-8) - Body ground	G - Body ground	Ground	Always	Below 1 Ω
VC5 (E52-14) - AGND (E52-8)	R - G	Power supply	Key is not in cabin	Below 1 V
			Press engine switch	4.6 to 5.4 V
CODE (E52-10) - AGND (E52-8)	W - G	Demodulated signal of key code data	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 1)
TXCT (E52-9) - AGND (E52-8)	GR - G	Key code output signal	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 2)

HINT:
*: Remove the key battery before performing this inspection.
If the result is not as specified, the switch may have a malfunction.

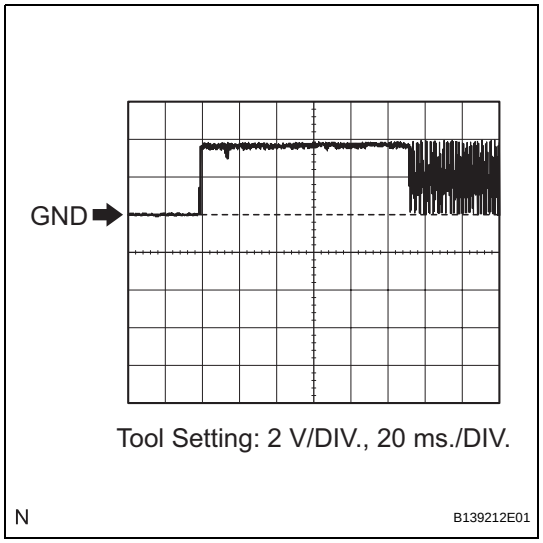
EI



(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	CODE (E52-10) - AGND (E52-8)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

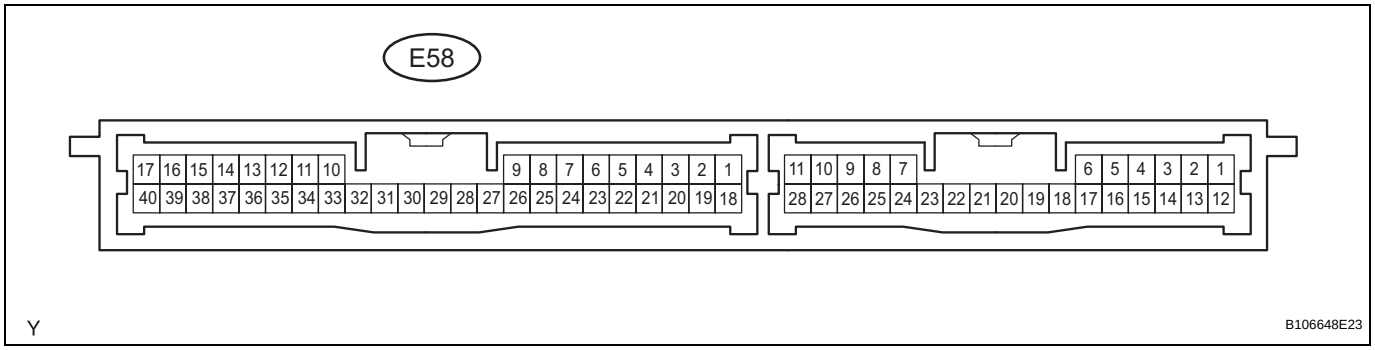


(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	TXCT (E52-9) - AGND (E52-8)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

2. CHECK CERTIFICATION ECU



(a) Disconnect the E58 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E58-1) - E (E58-17)	W - W-B	+B power supply	Always	10 to 14 V
IG (E58-18) - E (E58-17)	LG - W-B	Ignition power supply	Engine switch off	Below 1 V

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E58 ECU connector.

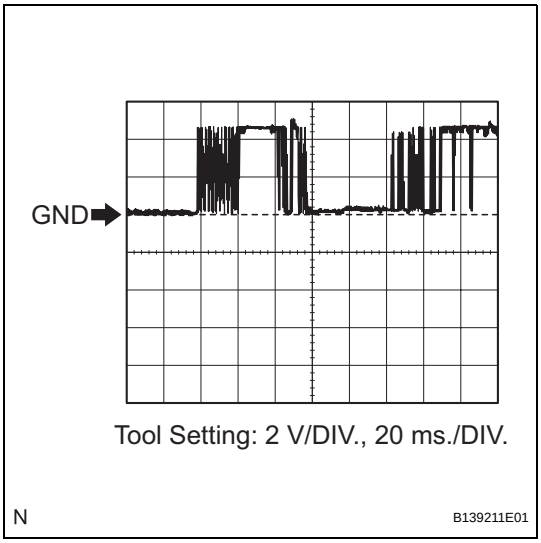
EI

(d) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E58-40) - Body ground	G - Body ground	Engine switch ground	Always	Below 1 Ω
VC5 (E58-30) - AGND (E58-40)	R - G	Engine switch power supply	Key is not in cabin	Below 1 V
			Press engine switch*	4.6 to 5.4 V
CODE (E58-9) - AGND (E58-40)	W - G	Engine switch CODE input	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 1)
TXCT (E58-8) - AGND (E58-40)	GR - G	Engine switch TXCT output	Key is not in cabin	Below 1 V
			Press engine switch and hold key close to engine switch*	Pulse generation (see waveform 2)

HINT:
*: Remove the key battery before performing this inspection.
If the result is not as specified, the ECU may have a malfunction.

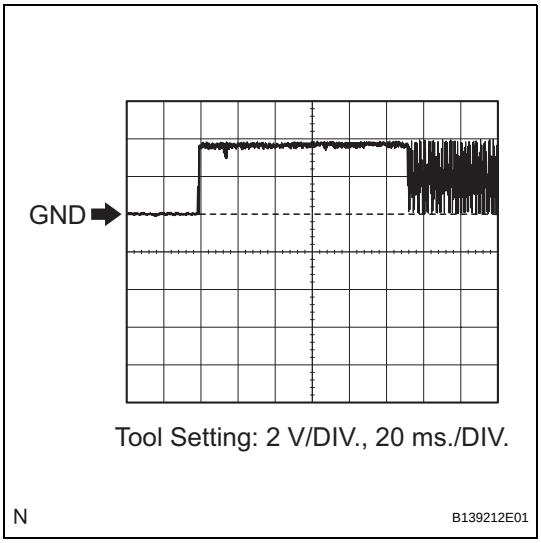
(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Item	Content
Symbols (Terminal No.)	CODE (E58-9) - AGND (E58-40)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

(2) Waveform 2 (Reference)

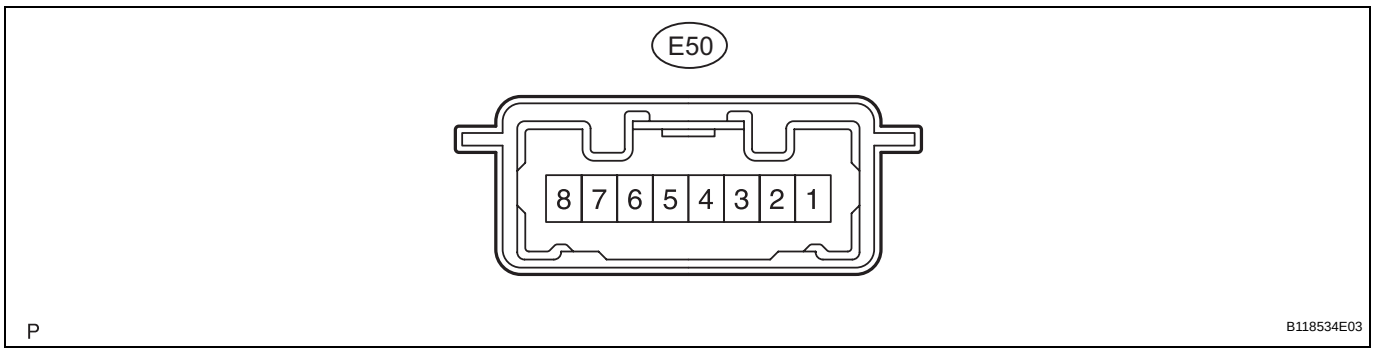


Item	Content
Symbols (Terminal No.)	TXCT (E58-8) - AGND (E58-40)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Press engine switch and hold key close to engine switch*

HINT:
*: Remove the key battery before performing this inspection.

EI

3. CHECK ID CODE BOX



(a) Disconnect the E50 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

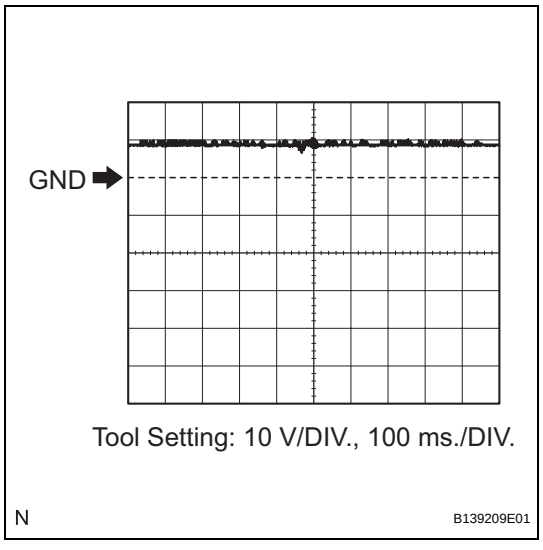
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (E50-8) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E50-1) - GND (E50-8)	W - W-B	+B power supply	Always	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the E50 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
EFII (E50-5) - GND (E50-8)	G - W-B	ECM input signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 1)
EFIO (E50-6) - GND (E50-8)	L - W-B	ECM output signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 2)

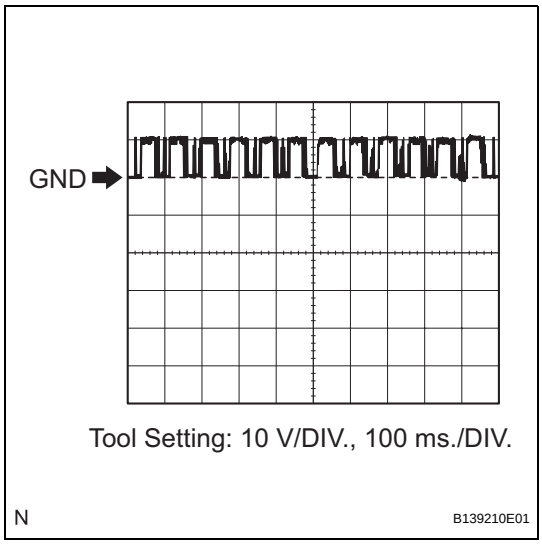
If the result is not as specified, the ECU may have a malfunction.

(e) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Item	Content
Symbols (Terminal No.)	EFII (E50-5) - GND (E50-8)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)

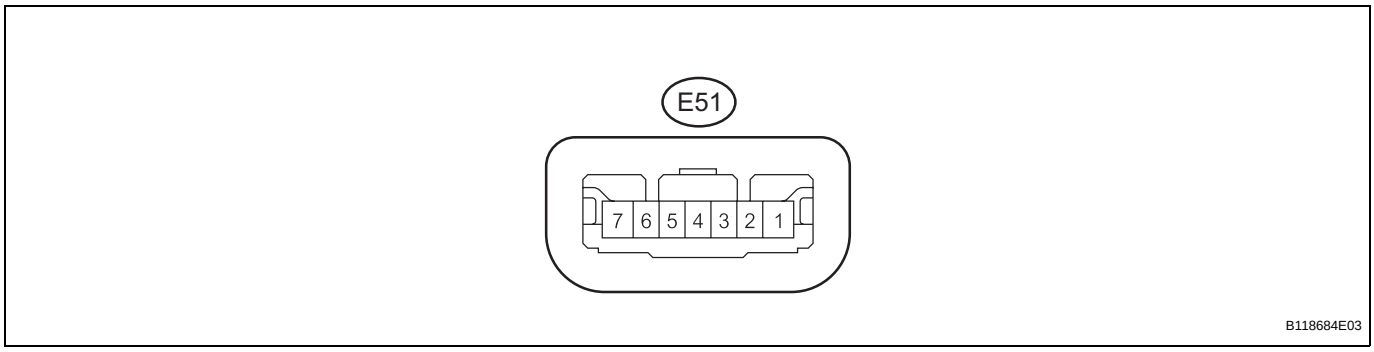
EI



(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	EFIO (E50-6) - GND (E50-8)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)

4. CHECK STEERING CONTROL ECU

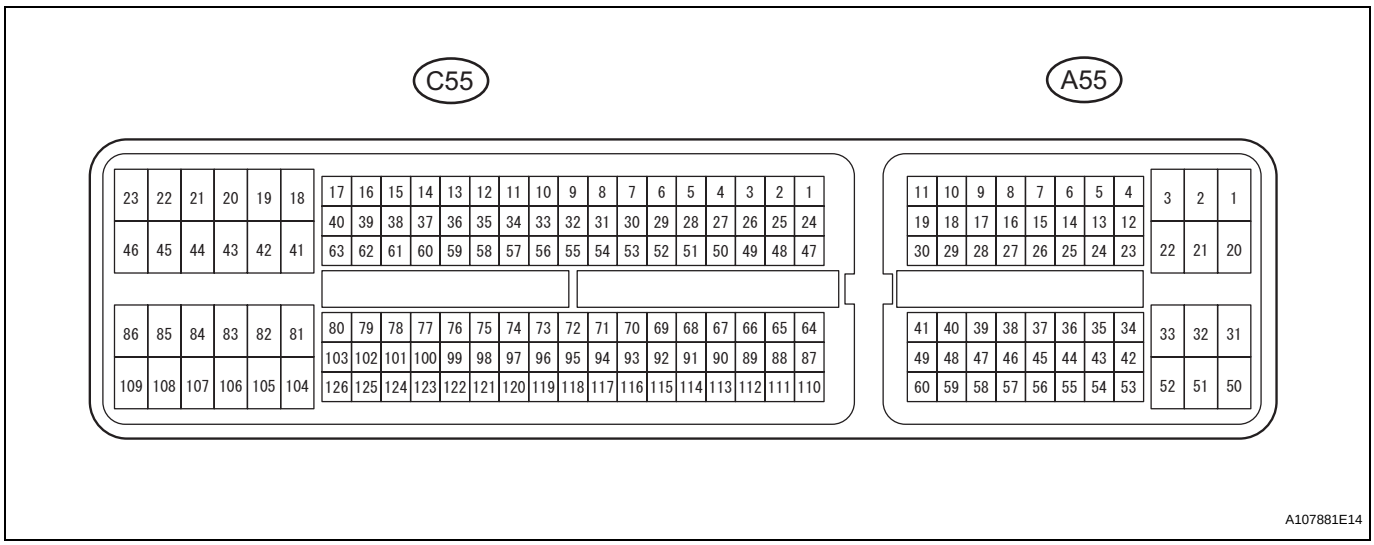


(a) Disconnect the E51 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
SGND (E51-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND (E51-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
B (E51-7) - Body ground	P - Body ground	+B power supply	Always	10 to 14 V
IG2 (E51-6) - Body ground	B - Body ground	Ignition power supply	Engine switch off	0 V
			Engine switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.

5. CHECK ECM

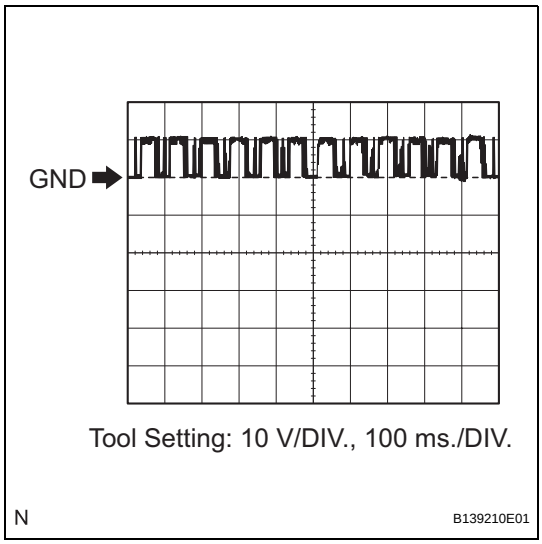


(a) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E1 (C55-81) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E01 (C55-22) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E02 (C55-21) - Body ground	B-W - Body ground	Ground	Always	Below 1 Ω
E03 (C55-104) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
E04 (C55-23) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
E05 (C55-46) - Body ground	W - Body ground	Ground	Always	Below 1 Ω
ME01 (C55-20) - Body ground	B - Body ground	Ground	Always	Below 1 Ω
BATT (A55-20) - E1 (C55-81)	Y - W-B	Battery (for measuring battery voltage and for ECM memory)	Always	10 to 14 V
+B (A55-2) - E1 (C55-81)	R - W-B	Power source of ECM	Engine switch off	Below 1 V
			Engine switch on (IG)	10 to 14 V
IMI (A55-11) - E1 (C55-81)	Y - W-B	Immobiliser code ECU input signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 1)
IMO (A55-10) - E1 (C55-81)	G - W-B	Immobiliser code ECU output signal	Engine switch off	Below 1 V
			Engine switch on (IG)	Pulse generation (see waveform 2)

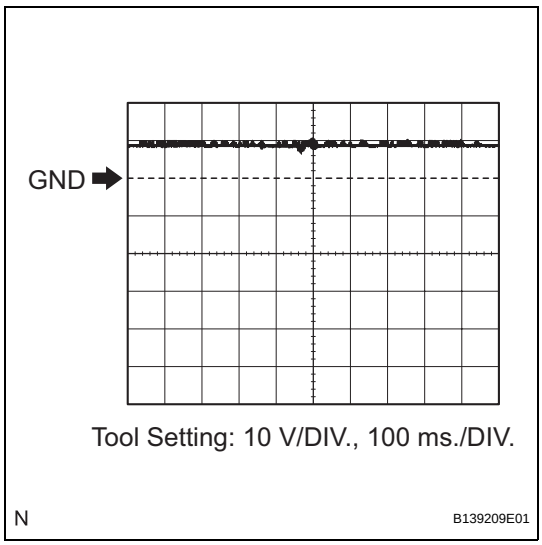
If the result is not as specified, the ECM may have a malfunction.

EI



(b) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)

Item	Content
Symbols (Terminal No.)	IMI (A55-11) - E1 (C55-81)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)



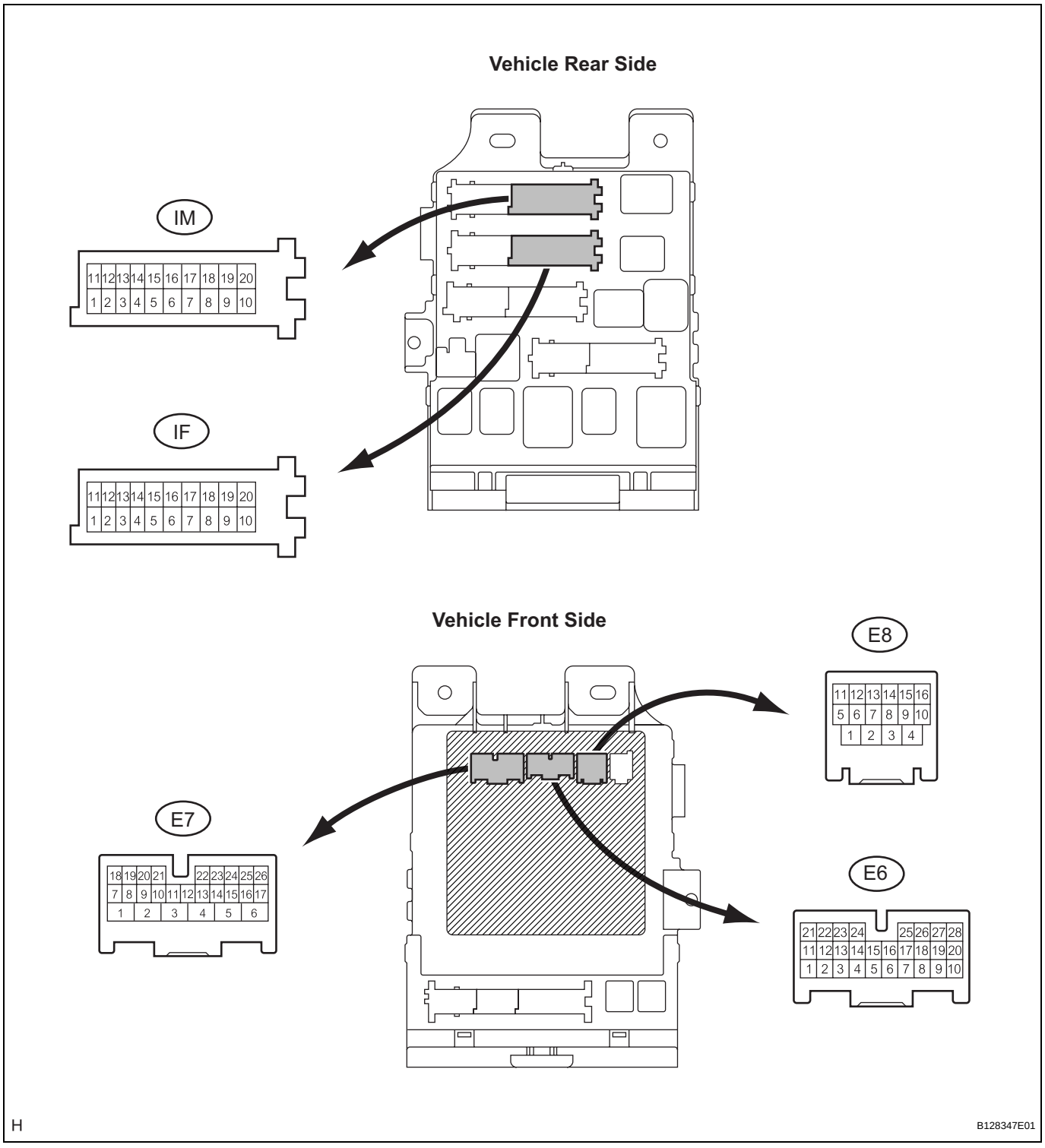
(2) Waveform 2 (Reference)

Item	Content
Symbols (Terminal No.)	IMO (A55-10) - E1 (C55-10)
Tool Setting	10 V/DIV., 100 ms./DIV.
Condition	Engine switch on (IG)

6. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the IF and IM junction block connectors.

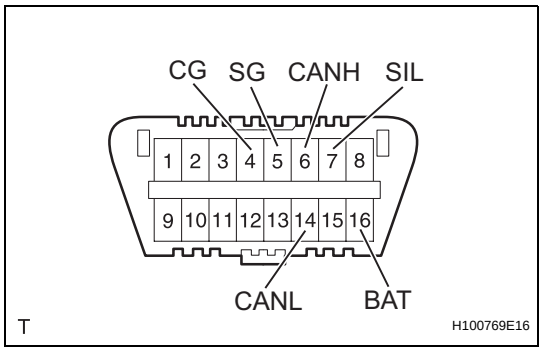
(b) Disconnect the E8, E7 and E6 main body ECU connectors.



(c) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND3 (E8-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
AM1 (E7-6) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V
AM2 (E6-1) - Body ground	L - Body ground	+B power supply	Always	10 to 14 V

If the result is not as specified, there may be a malfunction on the wire harness side.



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

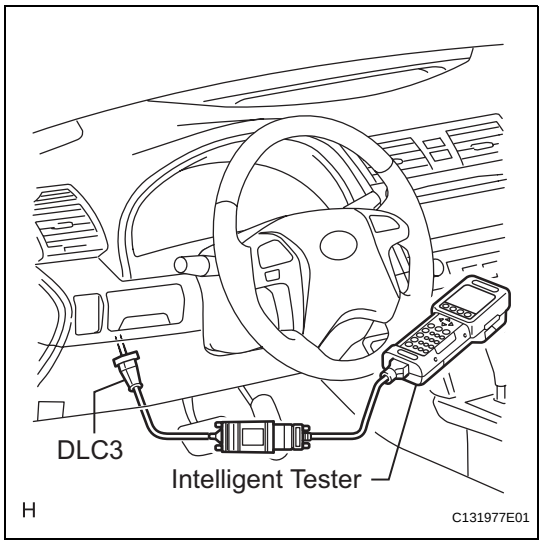
Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine switch off*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

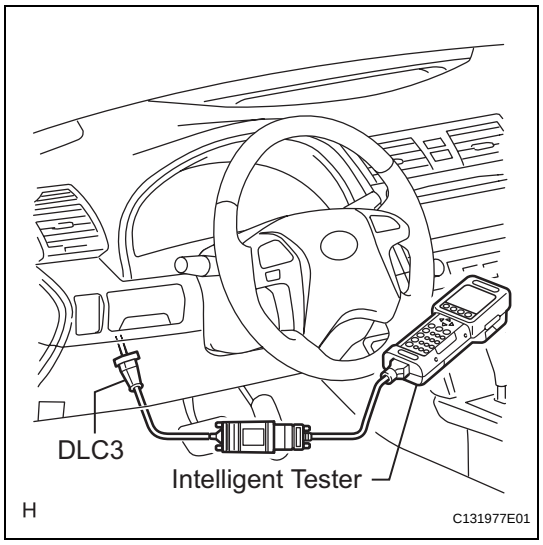
EI



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the engine switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or tester side.

HINT:

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the DLC3.

(b) Turn the engine switch on (IG).

(c) Read the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the engine switch on (IG).

(c) Erase the DTCs by following the directions on the tester's screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester to read the DATA LIST allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful as intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the DATA LIST information early in troubleshooting is one way to save diagnostic time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the engine switch on (IG).
(c) Read the DATA LIST.

SMART:

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
IG SW	Engine switch on (IG) signal / ON or OFF	ON: Engine switch on (ACC, IG) or start OFF: Engine switch off	-
ACC SW	Engine switch on (ACC) signal / ON or OFF	ON: Engine switch on (ACC, IG) or start OFF: Engine switch off	-
IMMOBILISER	Immobiliser system status / SET or UNSET	SET: Key is not in cabin UNSET: Key is in cabin	-
MASTER KEY	Master key code signal / MATCH or NO MATCH	MATCH: Master key code is sent NO MATCH: Unmatched master key code is sent	-
SUB KEY	Sub-key (Master key) code signal / MATCH or NO MATCH	MATCH: Sub-key (master key) code is sent NO MATCH: Unmatched sub-key (master key) code is sent	-
BCC	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
STATUS	Transponder chip data / OK or NG	OK: Data OK NG: Data error	-
ENCRYPT CODE	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
SERIAL NUMBER	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-
FRAME	Transponder chip signal / OK or NG	OK: Correct data sent NG: Incorrect data sent	-

EI

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the engine switch on (IG).
(c) Perform the ACTIVE TEST by following the directions on the tester screen.

SMART:

Item	Test Details	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

Certification ECU Diagnostic Trouble Code Chart:

DTC No.	Detection Item	Trouble Area	See page
B2784	Antenna Coil Open / Short	1. Wire harness 2. Engine switch 3. Certification ECU	EI-27
B2785	Communication Malfunction between ECUs Connected by LIN	1. Wire harness 2. Certification ECU 3. Main body ECU 4. Steering lock ECU 5. ID code box	EI-29
B2786	No Response from Steering Lock ECU	1. Wire harness 2. Certification ECU 3. Steering lock ECU	EI-32
B2789	No Response from ID BOX	1. Wire harness 2. Certification ECU 3. ID code box	EI-34
B278A	Short to GND in Immobiliser System Power Source Circuit	1. Wire harness 2. Engine switch 3. Certification ECU	EI-36
B2790	ID BOX EEPROM Malfunction	ID code box	EI-39
B2791	Communication Condition Failure between ECM	1. Wire harness 2. ID code box 3. ECM	EI-40

ECM Diagnostic Trouble Code Chart:

DTC No.	Detection Item	Trouble Area	See page
B2799	Engine Immobiliser System	1. Wire harness 2. ECM 3. ID code box	EI-42

HINT:
The DTCs for the engine immobiliser system are specified above. If other codes are output, check the DTC chart for the SFI system.

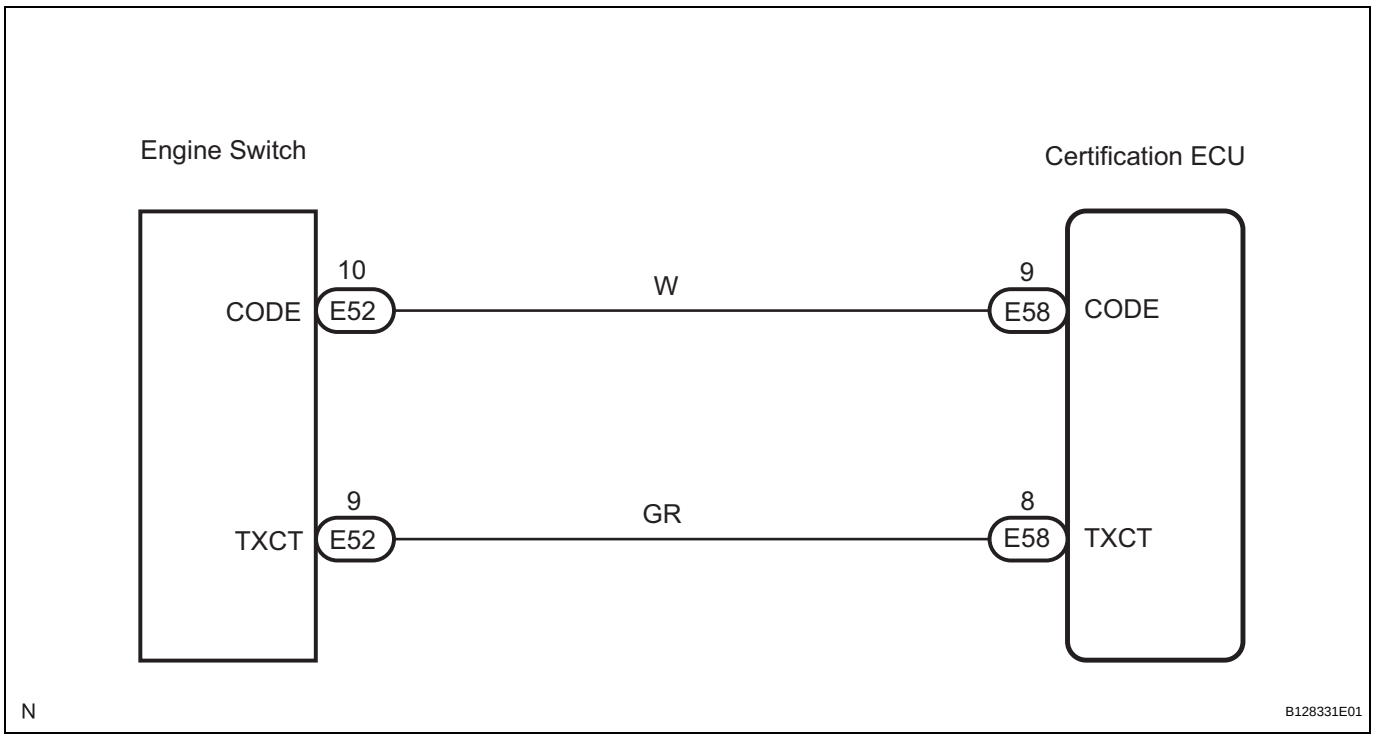
DTC	B2784	Antenna Coil Open / Short

DESCRIPTION

This DTC is output when there is an open or short malfunction in the key coil (built into engine switch).

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/short	• Wire harness • Engine switch • Certification ECU

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).

(b) Recheck for DTCs (See page EI-24).

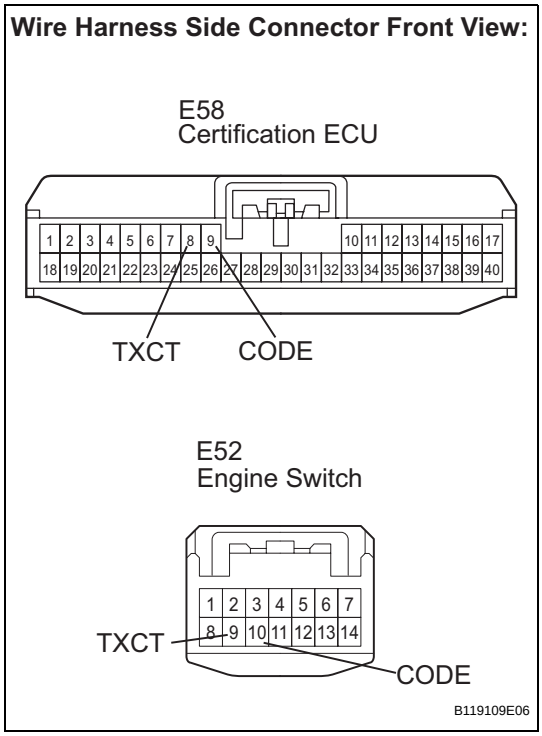
Result

Result	Proceed to
B2784 output reoccurs	A
B2784 output does not reoccur	B

B → END

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ENGINE SWITCH)



(a) Disconnect the E58 ECU and E52 switch connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-9 (CODE) - E52-10 (CODE)	Below 1 Ω
E58-8 (TXCT) - E52-9 (TXCT)	
E58-9 (CODE) - Body ground	10 kΩ or higher
E58-8 (TXCT) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK ENGINE SWITCH

(a) After replacing the engine switch (See page ST-152) with a normal one, check that the engine starts.

OK:

The engine starts.

NG → REPLACE CERTIFICATION ECU

OK

END

EI

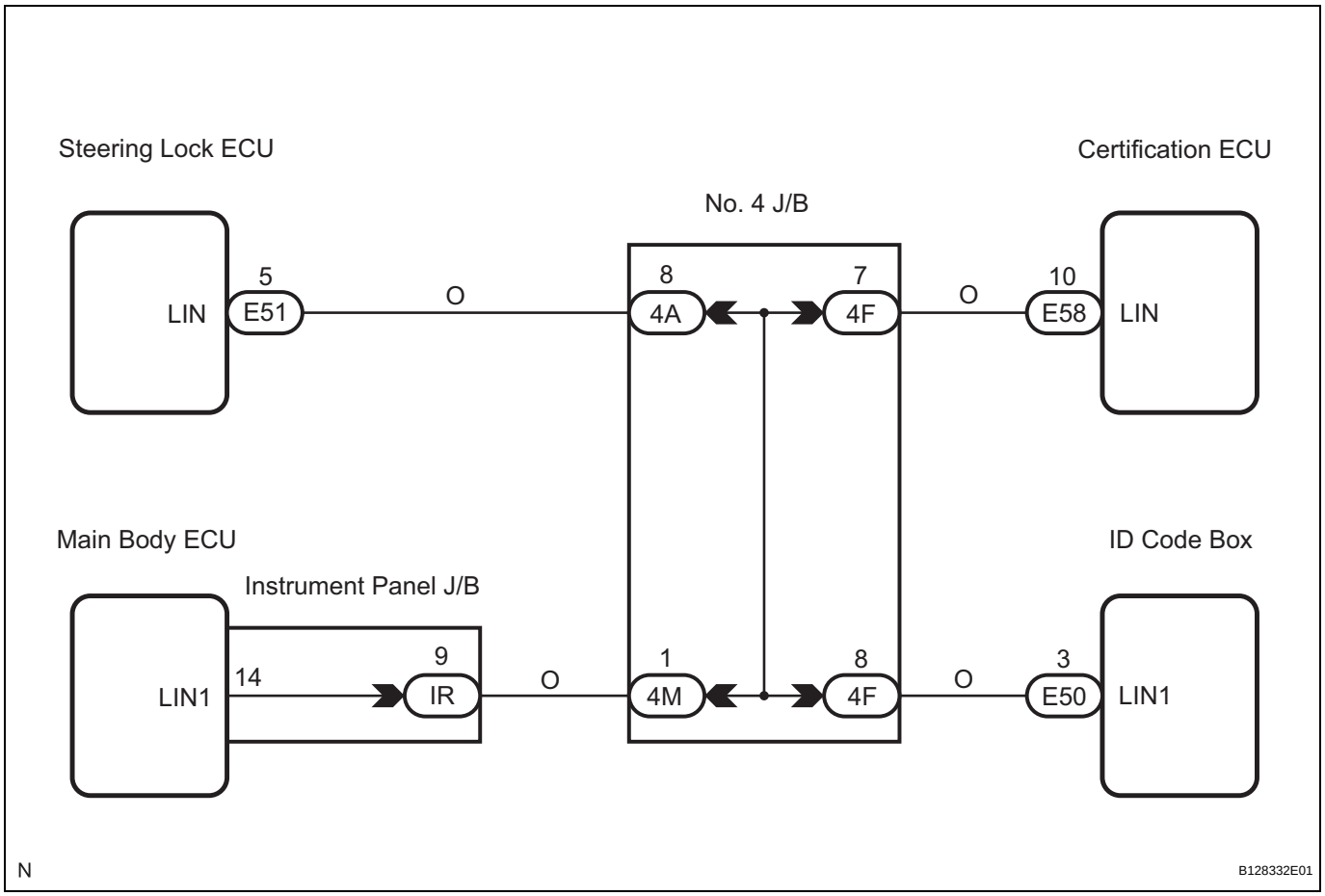
DTC	B2785	Communication Malfunction between ECUs Connected by LIN

DESCRIPTION

This DTC is output when LIN communication from the certification ECU stops for a certain amount of time.

DTC No.	DTC Detection Condition	Trouble Area
B2785	LIN communication from certification ECU stops for a certain amount of time • Open or short in wire harness between ECUs	• Wire harness • Certification ECU • Main body ECU • Steering lock ECU • ID code box

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the certification ECU or ID code box is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the steering lock ECU or main body ECU is replaced, register the ECU code and ECU communication ID (See page EI-8).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).

EI

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

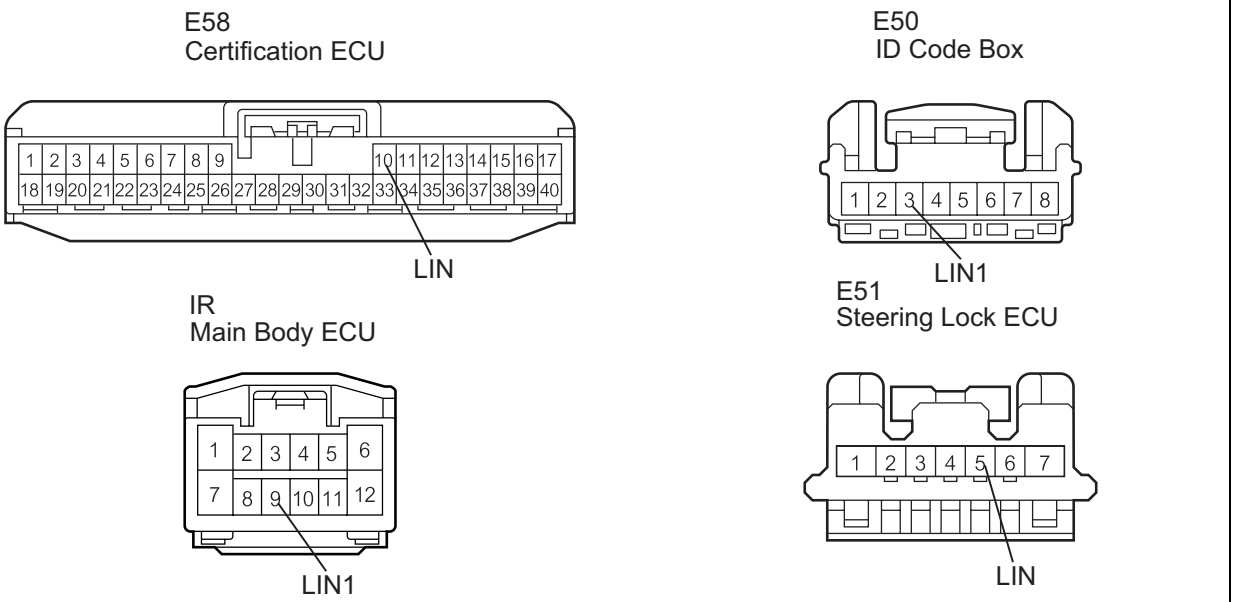
B → END

A

2 CHECK HARNESS AND CONNECTOR (LIN COMMUNICATION LINE)

(a) Disconnect the E58, E51, IR and E50 ECU connectors.

Wire Harness Side Connector Front View:



(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E50-3 (LIN1)	Below 1 Ω
E58-10 (LIN) - IR-9 (LIN1)	
E58-10 (LIN) - E51-5 (LIN)	
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK CERTIFICATION ECU

(a) After replacing the certification ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

B → END

A

4 CHECK MAIN BODY ECU

(a) After replacing the main body ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

B → END

A

5 CHECK STEERING LOCK ECU

(a) After replacing the steering lock ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2785 output reoccurs	A
B2785 output does not reoccur	B

B → END

A

REPLACE ID CODE BOX

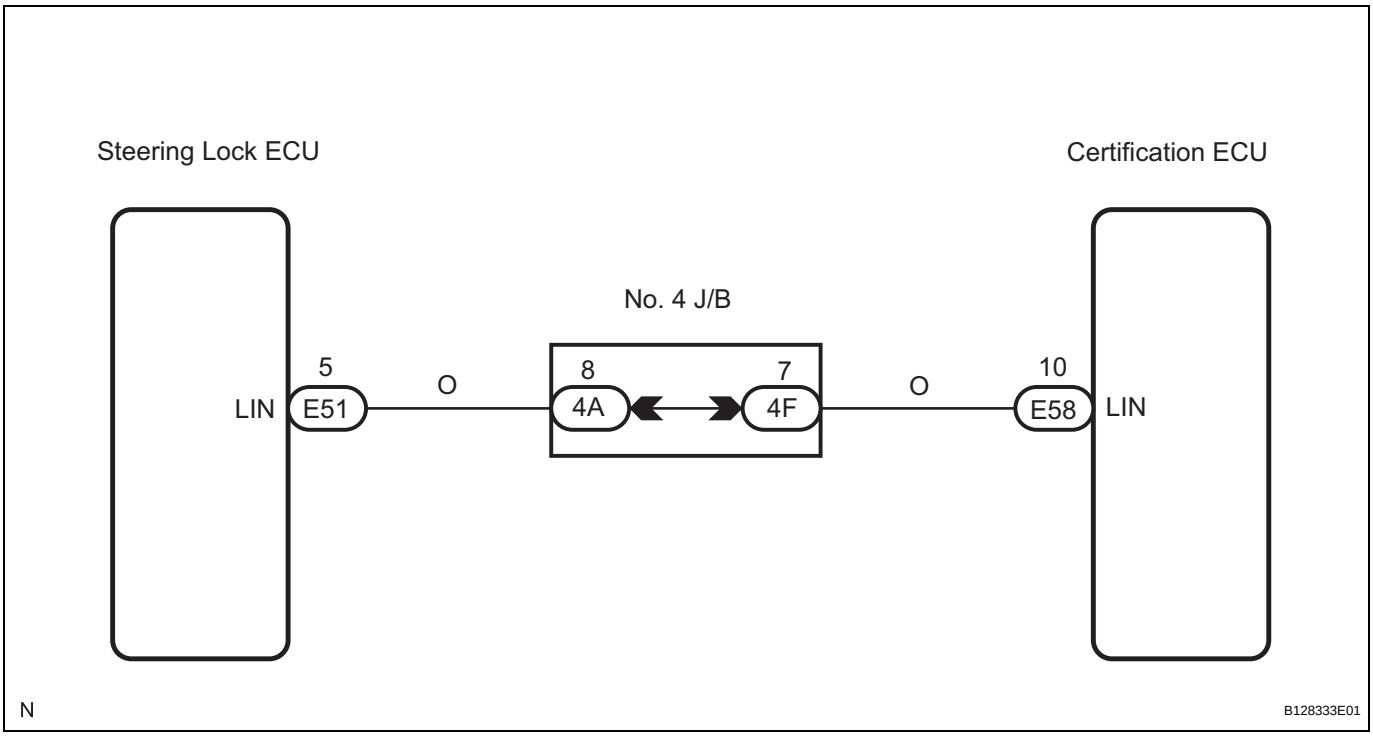
DTC	B2786	No Response from Steering Lock ECU

DESCRIPTION

This DTC is output when the certification ECU does not receive LIN communication from the steering lock ECU for 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B2786	Certification ECU does not receive LIN communication from steering lock ECU for 10 seconds	• Wire harness • Certification ECU • Steering lock ECU

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

- **If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the steering lock ECU is replaced, register the ECU code and ECU communication ID (See page EI-8).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).

Result

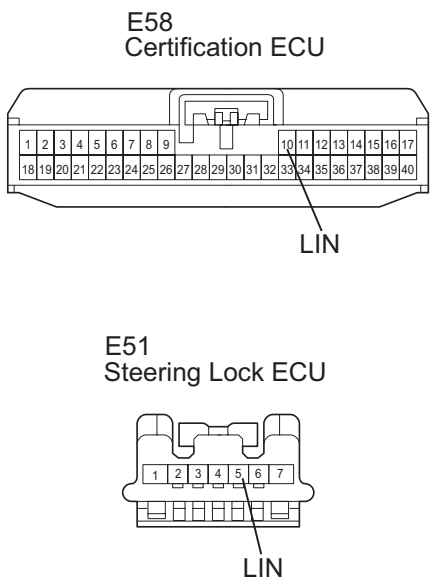
Result	Proceed to
B2786 output reoccurs	A
B2786 output does not reoccur	B

B	END

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - STEERING LOCK ECU)

Wire Harness Side Connectro Front View:



(a) Disconnect the E58 and E51 ECU connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E51-5 (LIN)	Below 1 Ω
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK CERTIFICATION ECU

(a) After replacing the certification ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2786 output reoccurs	A
B2786 output does not reoccur	B

B → **END**

A

REPLACE STEERING LOCK ECU

EI

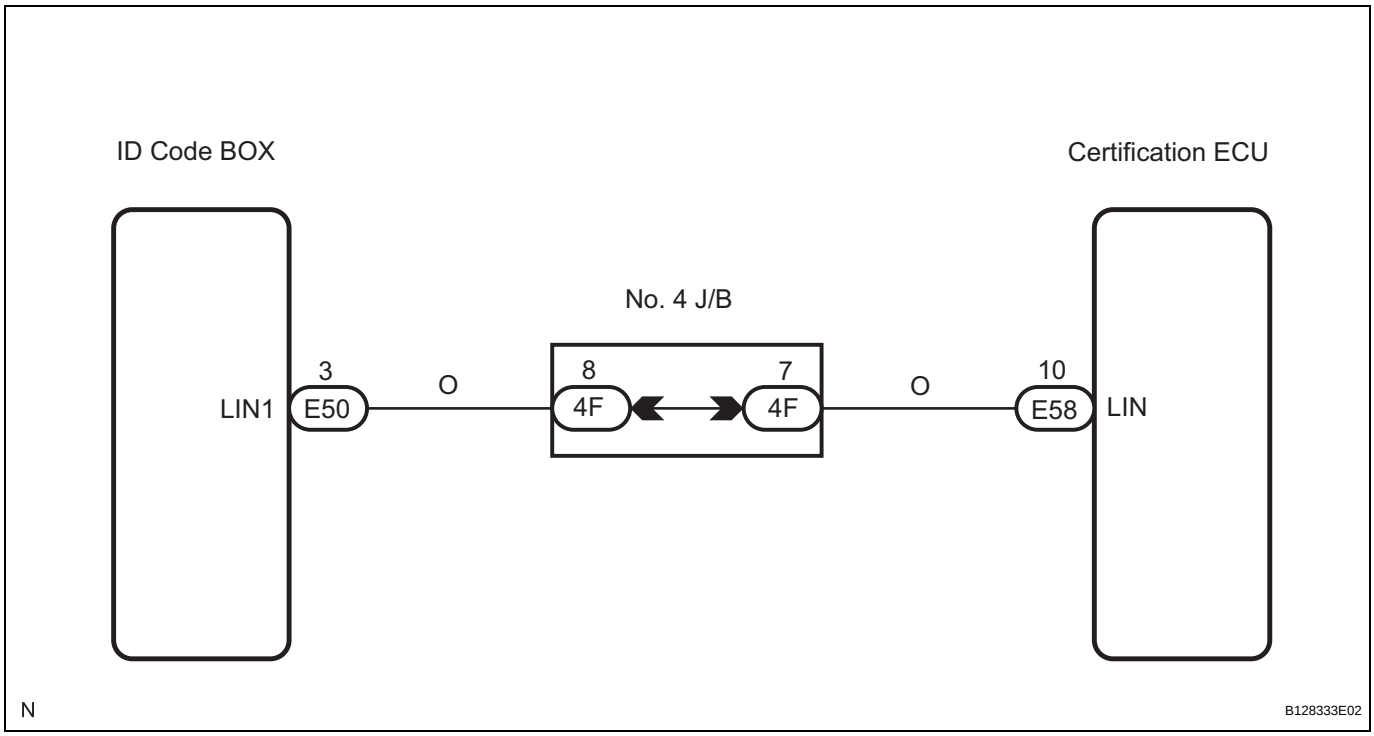
DTC	B2789	No Response from ID BOX

DESCRIPTION

This DTC is output when the certification ECU does not receive LIN communication from the ID code box for 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B2789	Certification ECU does not receive LIN communication from ID code box • Open or short in wire harness between ECUs	• Wire harness • Certification ECU • ID code box

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

If the certification ECU or ID code box is replaced, register the key and ECU communication ID (See page EI-8).

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).

(b) Recheck for DTCs (See page EI-24).

Result

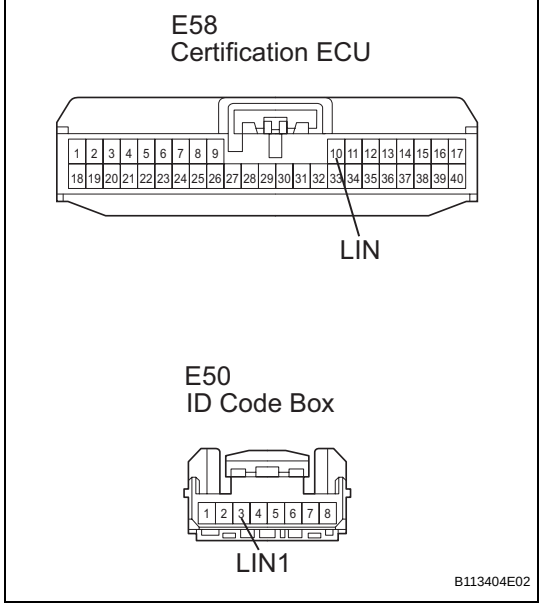
Result	Proceed to
B2789 output reoccurs	A
B2789 output does not reoccur	B

B	END

A

2 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ID CODE BOX)

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU and E50 ID code box connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E58-10 (LIN) - E50-3 (LIN1)	Below 1 Ω
E58-10 (LIN) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 CHECK CERTIFICATION ECU

(a) After replacing the certification ECU with a normal one, check for DTCs (See page EI-24).

Result

Result	Proceed to
B2789 output reoccurs	A
B2789 output does not reoccur	B

B → **END**

A

REPLACE ID CODE BOX

EI

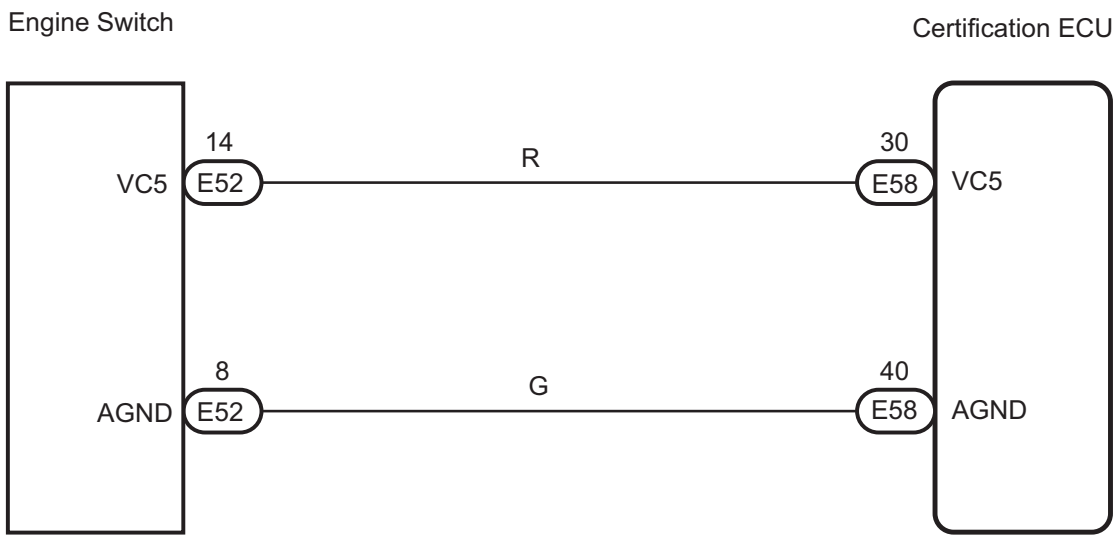
DTC	B278A	Short to GND in Immobiliser System Power Source Circuit

DESCRIPTION

This DTC is output when the engine switch power source supply line is open or shorted.

DTC No.	DTC Detection Condition	Trouble Area
B278A	Engine switch power source supply line is open or shorted	• Wire harness • Engine switch • Certification ECU

WIRING DIAGRAM



EI

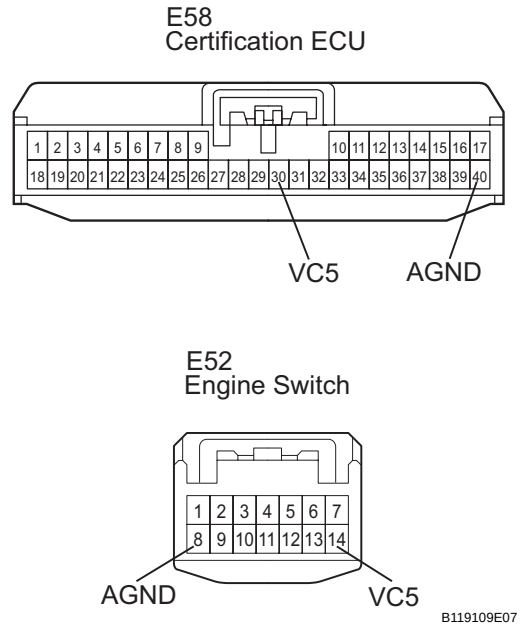
INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).

1 CHECK WIRE HARNESS (CERTIFICATION ECU - ENGINE SWITCH)

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU and E52 switch connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

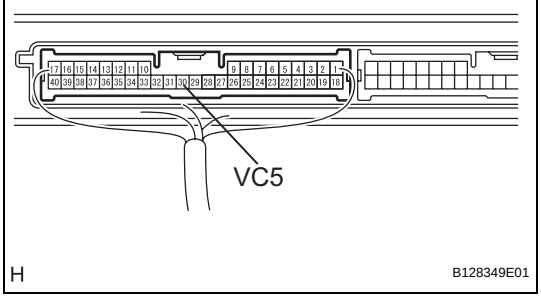
Tester Connection	Specified Condition
E58-30 (VC5) - E52-14 (VC5)	Below 1 Ω
E58-40 (AGND) - E52-8 (AGND)	
E58-30 (VC5) - Body ground	10 kΩ or higher
E58-40 (AGND) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2 CHECK HARNESS AND CONNECTOR (ENGINE SWITCH POWER SOURCE)

Wire Harness Side Connector Rear View:



(a) Reconnect the E58 ECU and E52 switch connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E58-30 (VC5) - Body ground	Key is not in cabin	Below 1 V
	Press engine switch	4.6 to 5.4 V

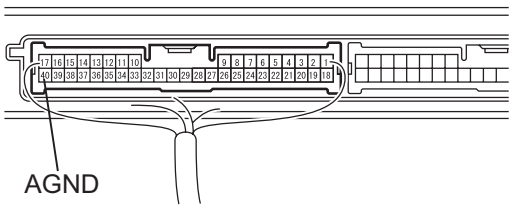
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

3	CHECK HARNESS AND CONNECTOR (ENGINE SWITCH BODY GROUND)

Wire Harness Side Connector Rear View:



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E58-40 (AGND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK ENGINE SWITCH

(a) After replacing the engine switch (See page ST-152) with a normal one, check that the engine starts.
OK:
The engine starts.

NG → **REPLACE CERTIFICATION ECU**

OK

EI

END

DTC	B2790	ID BOX EEPROM Malfunction

DESCRIPTION

This DTC is output when the ID code box detects an internal malfunction.

DTC No.	DTC Detection Condition	Trouble Area
B2790	ID code box detects internal malfunction	ID code box

INSPECTION PROCEDURE

NOTICE:

If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).

1	REPLACE ID CODE BOX

NEXT

END

DTC	B2791	Communication Condition Failure between ECM

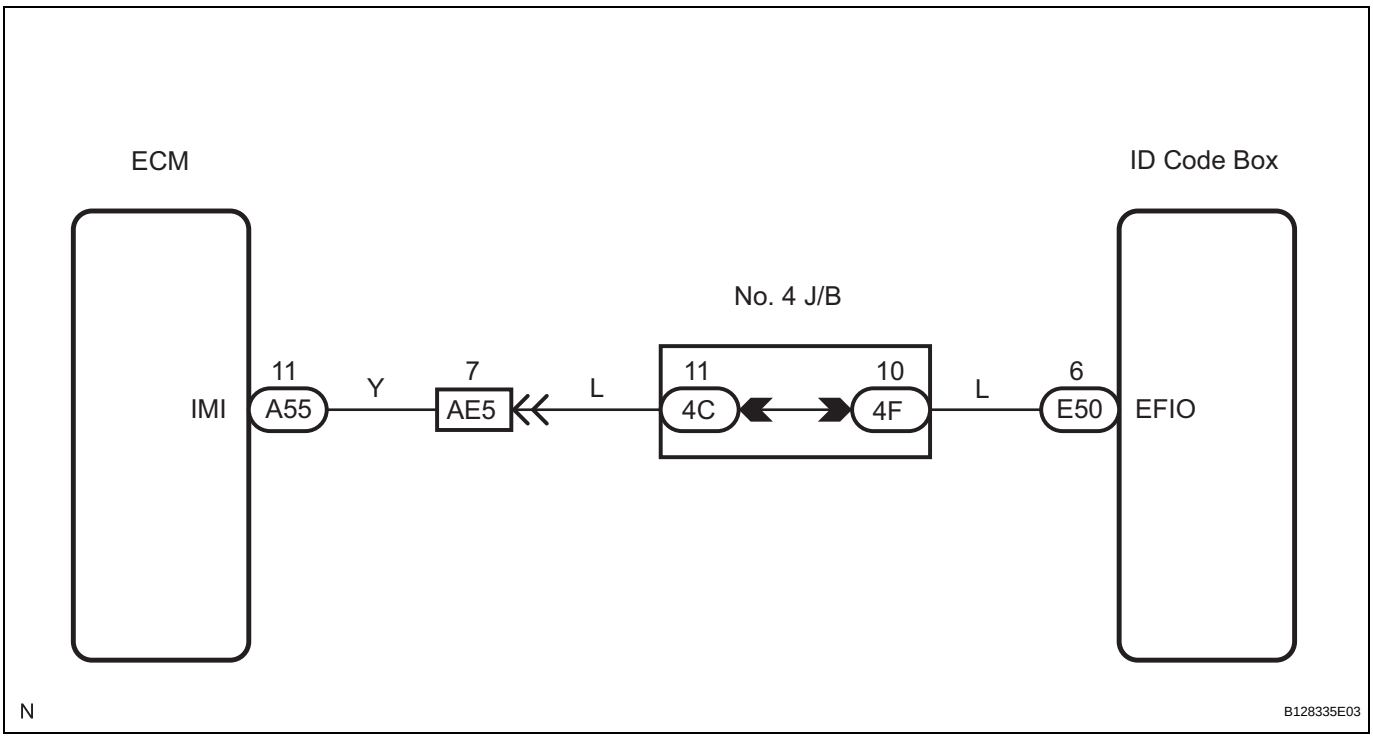
DESCRIPTION

This DTC is output when the ID code box does not respond to a verification request signal from the ECM.
HINT:

- If the engine switch is turned off immediately after an engine start, this DTC is also detected.
- If this DTC is detected simultaneously with DTC B2799, troubleshoot DTC B2799 first.

DTC No.	DTC Detection Condition	Trouble Area
B2791	ID code box does not respond to a verification request signal from ECM	• Wire harness • ID code box • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the ECM is replaced, register the ECU communication ID (See page EI-8).**
- **If the engine can be started even when DTC B2791 is output, the ID code box can be considered normal. Be sure to recheck for DTCs after clearing the DTCs (See page EI-24).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).
Result

Result	Proceed to
B2791 and other DTC output	A

Result	Proceed to
No DTC output	B

B → **END**

A

REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

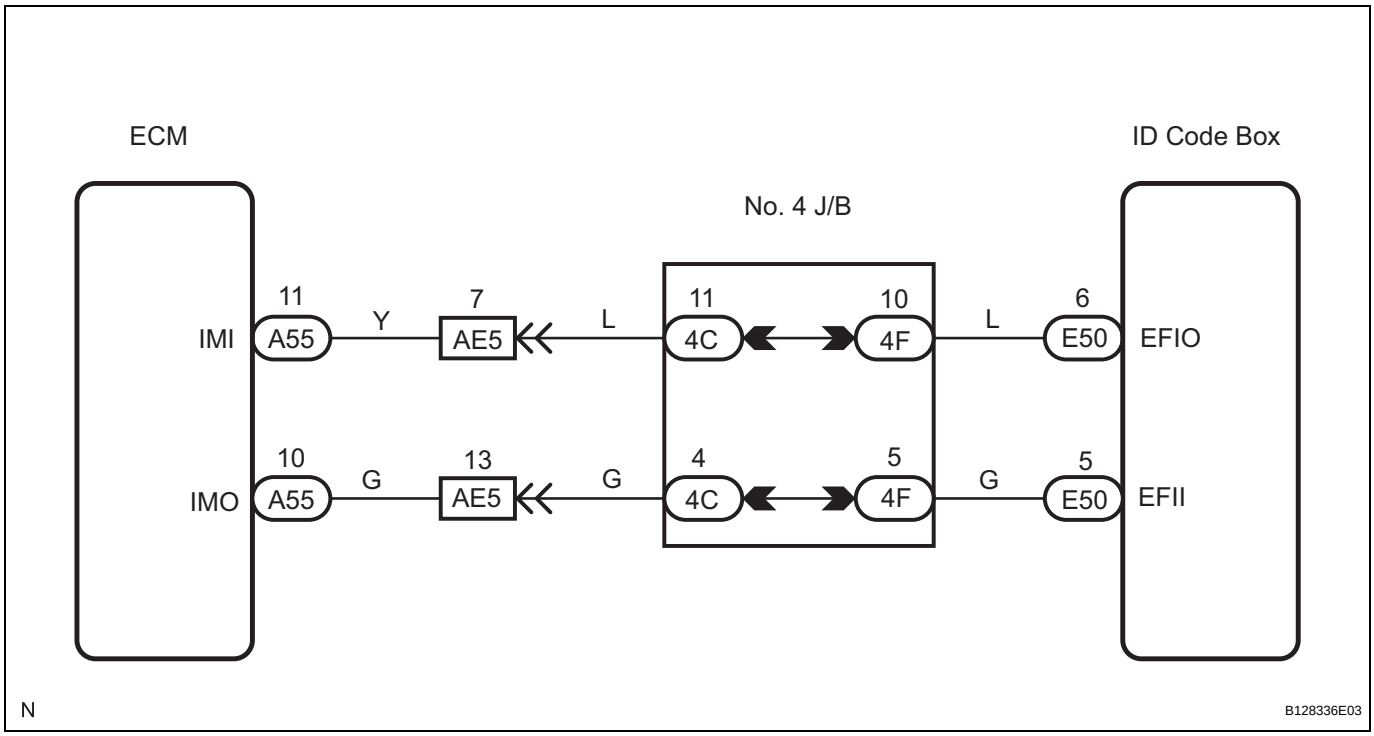
DTC	B2799	Engine Immobiliser System

DESCRIPTION

This DTC is output when one of the following occurs: 1) the ECM detects errors in its own communications with the ID code box; 2) the ECM detects errors in the communication lines; or 3) the ECU communication ID between the ID code box and ECM is different and an engine start is attempted. Before troubleshooting for this DTC, make sure no certification ECU DTCs are present. If present, troubleshoot the certification ECU DTCs first.

DTC No.	DTC Detection Condition	Trouble Area
B2799	One of following conditions is met: • Error in communication between ECM and ID code box • Error in communication lines • Communication ID is different with ID code box during communication	• Wire harness • ECM • ID code box

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).**
- **If the ECM is replaced, register the ECU communication ID (See page EI-8).**

1	CHECK DTC OUTPUT

(a) Delete the DTCs (See page EI-24).
(b) Recheck for DTCs (See page EI-24).

Result

Result	Proceed to
B2799 output reoccurs	A

Result	Proceed to
B2799 output does not reoccur	B

B → END

A

2 RE-REGISTER ECU COMMUNICATION ID

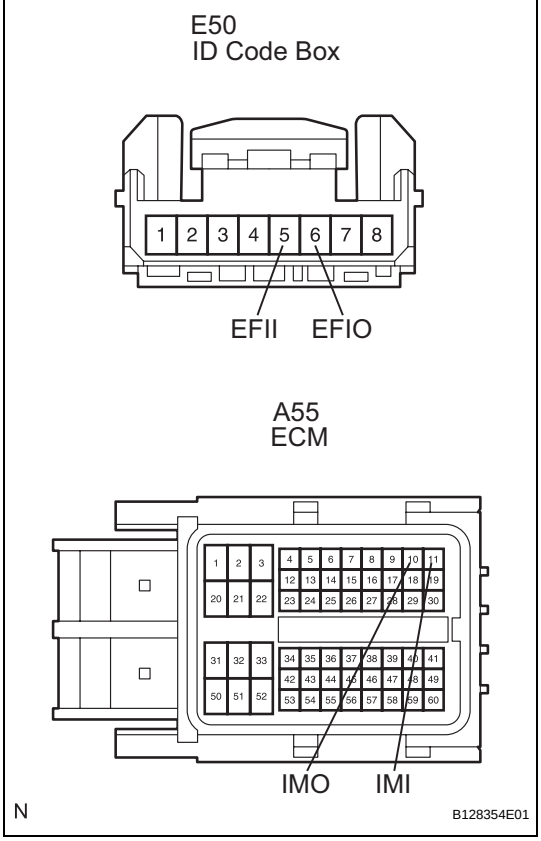
(a) Re-register the ECU communication ID (See page EI-8) between the ID code box and ECM.
(b) Check that the engine starts.
OK:
Engine starts.

OK → END

NG

3 CHECK HARNESS AND CONNECTOR (ID CODE BOX - ECM)

Wire Harness Side Connecter Front View:



(a) Disconnect the E50 ID code box and A55 ECM connectors.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E50-5 (EFII) - A55-10 (IMO)	Below 1 Ω
E50-6 (EFIO) - A55-11 (IMI)	
E50-5 (EFII) - Body ground	10 kΩ or higher
E50-6 (EFIO) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

EI

4	CHECK ECM

(a) After replacing the ECM (See page ES-518) with a normal one, check for DTCs (See page EI-8).

Result

Result	Proceed to
B2799 output reoccurs	A
B2799 output does not reoccur	B

A → REPLACE ID CODE BOX

B

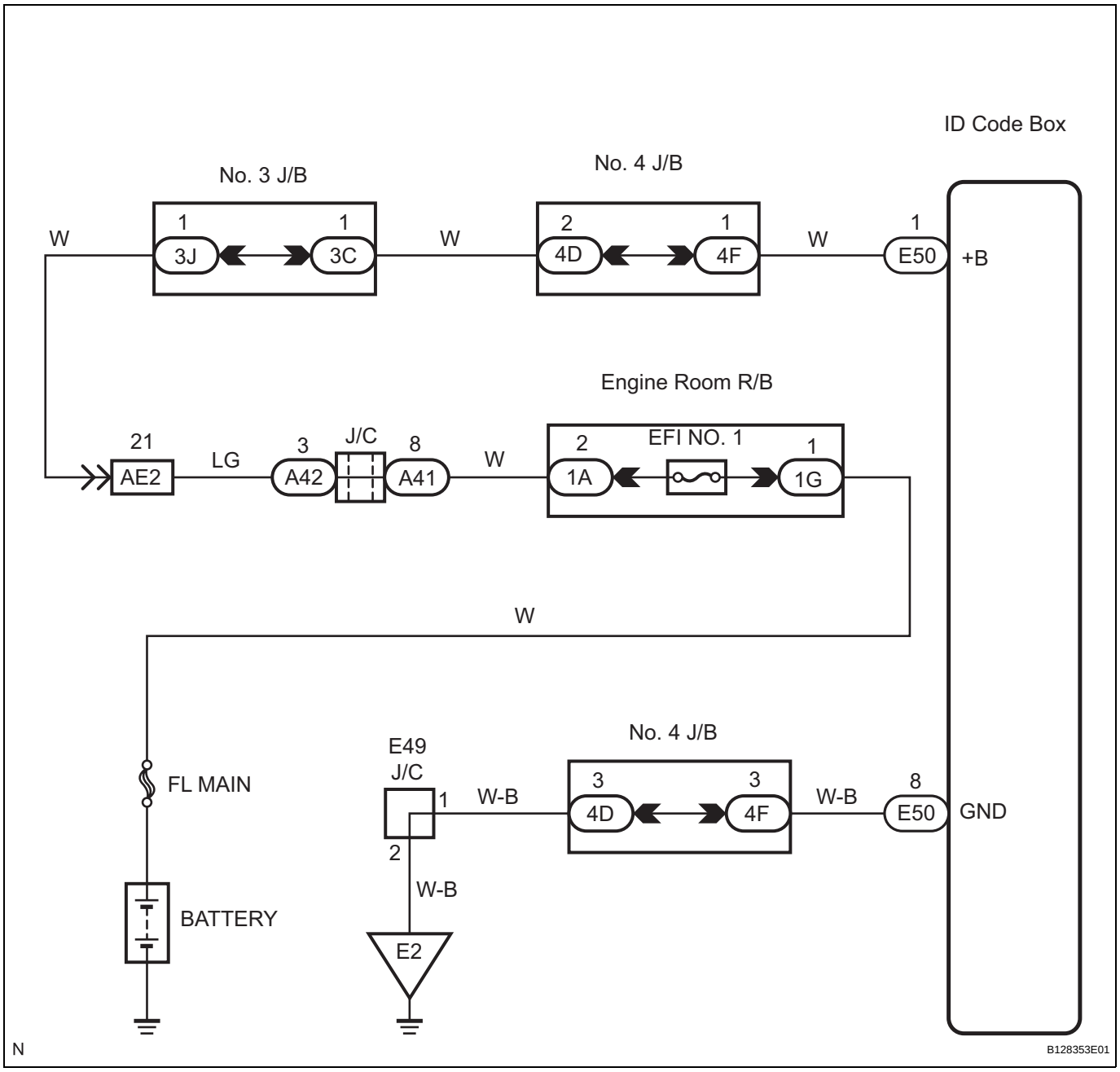
END

ID Code Box Power Source Circuit

DESCRIPTION

This circuit provides power to operate the ID code box.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the ID code box is replaced, register the key and ECU communication ID (See page EI-8).

EI

1	INSPECT FUSE (EFI NO. 1)

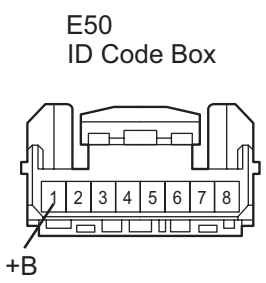
(a) Remove the EFI No. 1 fuse from the No. 1 engine room R/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK HARNESS AND CONNECTOR (ID CODE BOX - BATTERY)

Wire Harness Side Connector Front View:



(a) Disconnect the E50 ID code box connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Specified Condition
E50-1 (+B) - Body ground	10 to 14 V

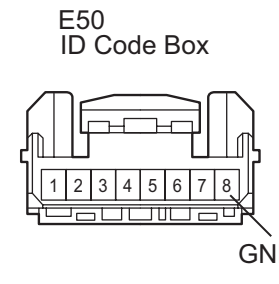
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

3	CHECK HARNESS AND CONNECTOR (ID CODE BOX - BODY GROUND)

Wire Harness Side Connector Front View:



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E50-8 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

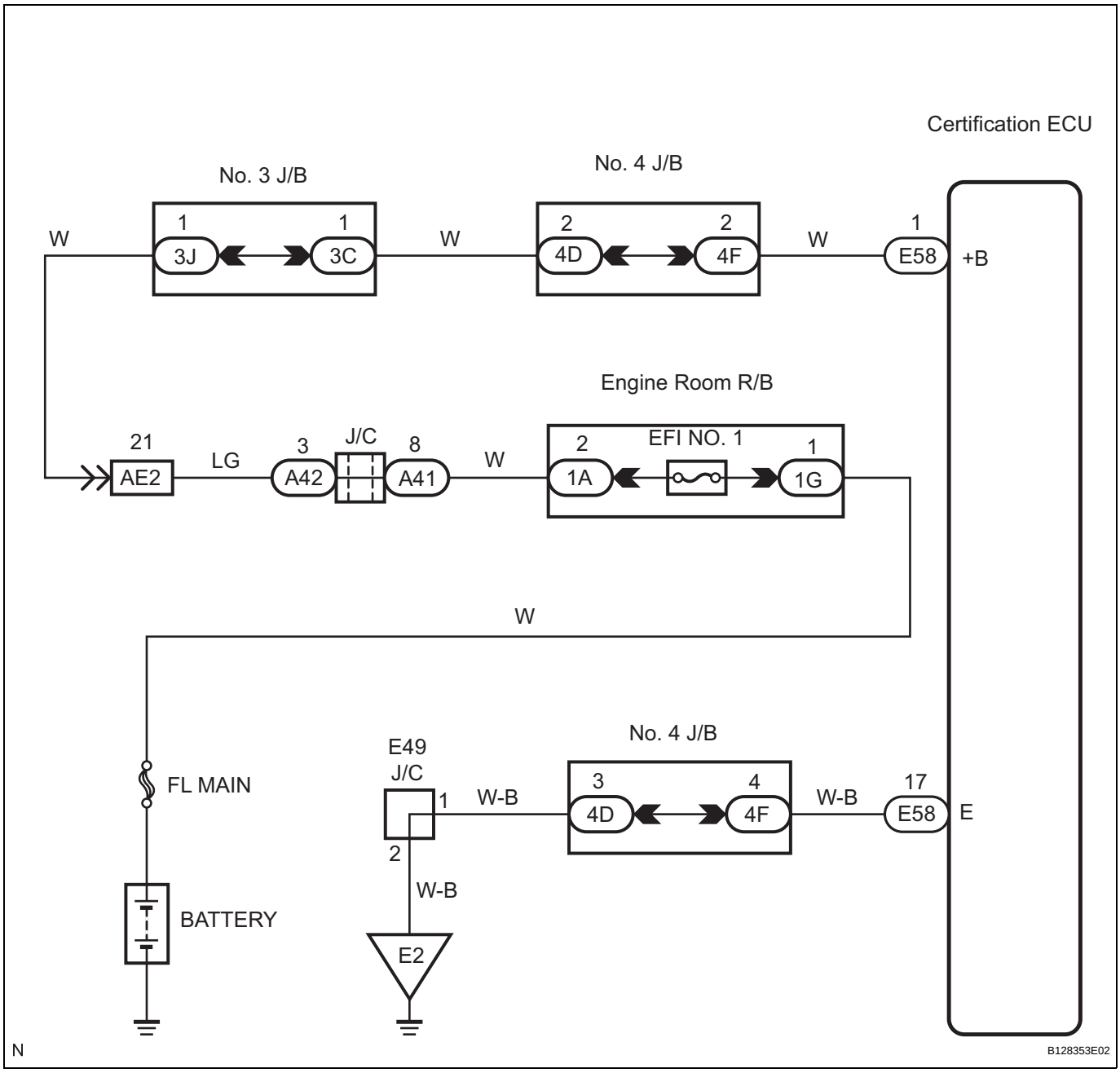
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Certification ECU Power Source Circuit

DESCRIPTION

This circuit provides power to operate the certification ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the certification ECU is replaced, register the key and ECU communication ID (See page EI-8).

1	INSPECT FUSE (EFI NO. 1)

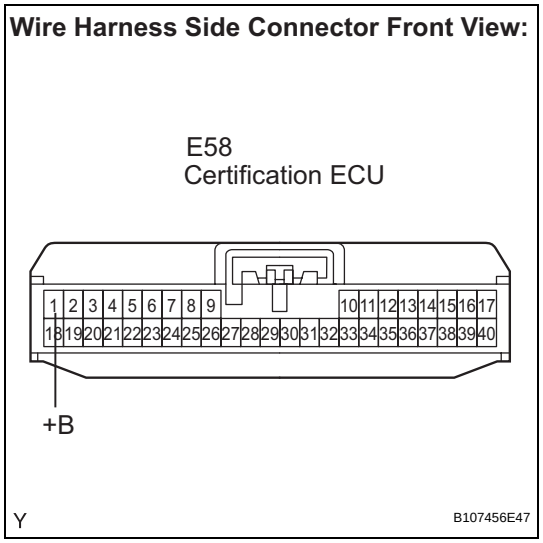
(a) Remove the EFI No. 1 fuse from the No. 1 engine room R/B.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	CHECK WIRE HARNESS (CERTIFICATION ECU - BATTERY)

Wire Harness Side Connector Front View:



(a) Disconnect the E58 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

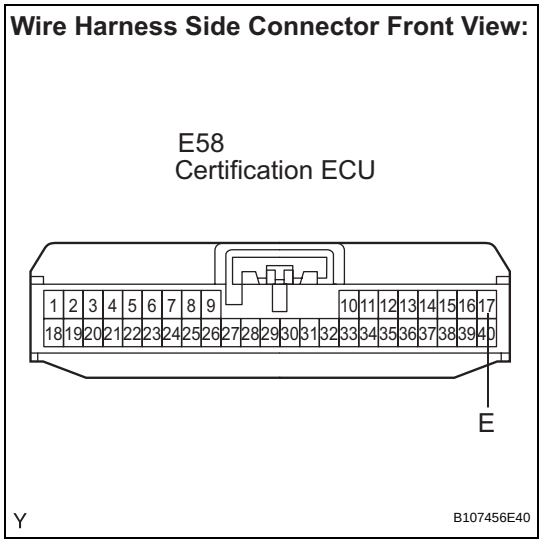
Tester Connection	Specified Condition
E58-1 (+B) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BODY GROUND)

Wire Harness Side Connector Front View:



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E58-17 (E) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

EI

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

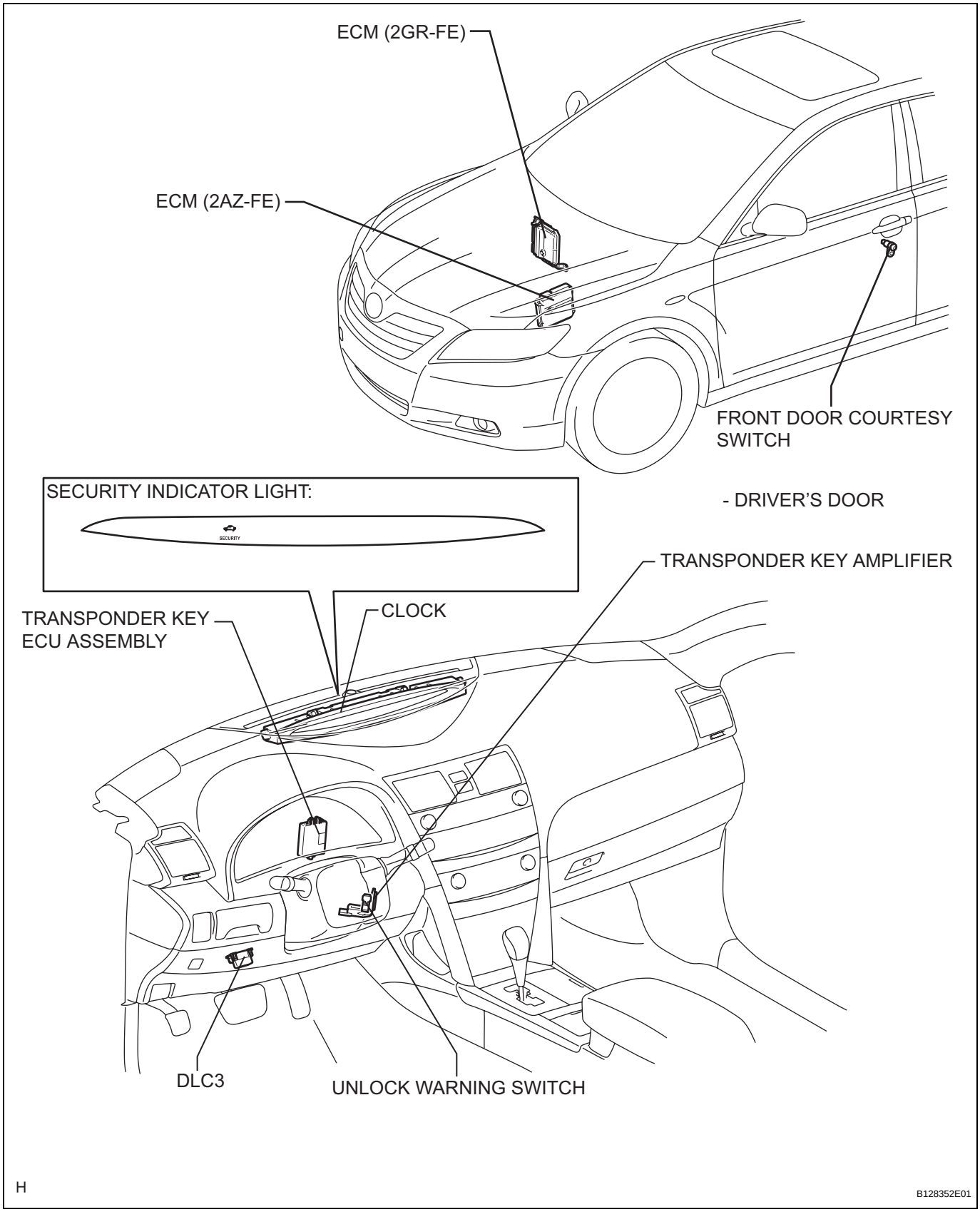
ENGINE IMMOBILISER SYSTEM (w/o Smart Key System)

PRECAUTION

1. PRECAUTIONS FOR THE KEY

(a) The key is a precision instrument. Be sure to observe the following:
  (1) Do not drop or strike the key.
  (2) Do not allow the key to be kept in a high temperature place for a long time.
  (3) Do not use an ultrasonic washing machine to clean the key.
  (4) Keep the key away from magnets or magnetized items during use.
  (5) Do not attach any stickers to the key.

PARTS LOCATION



EI

H

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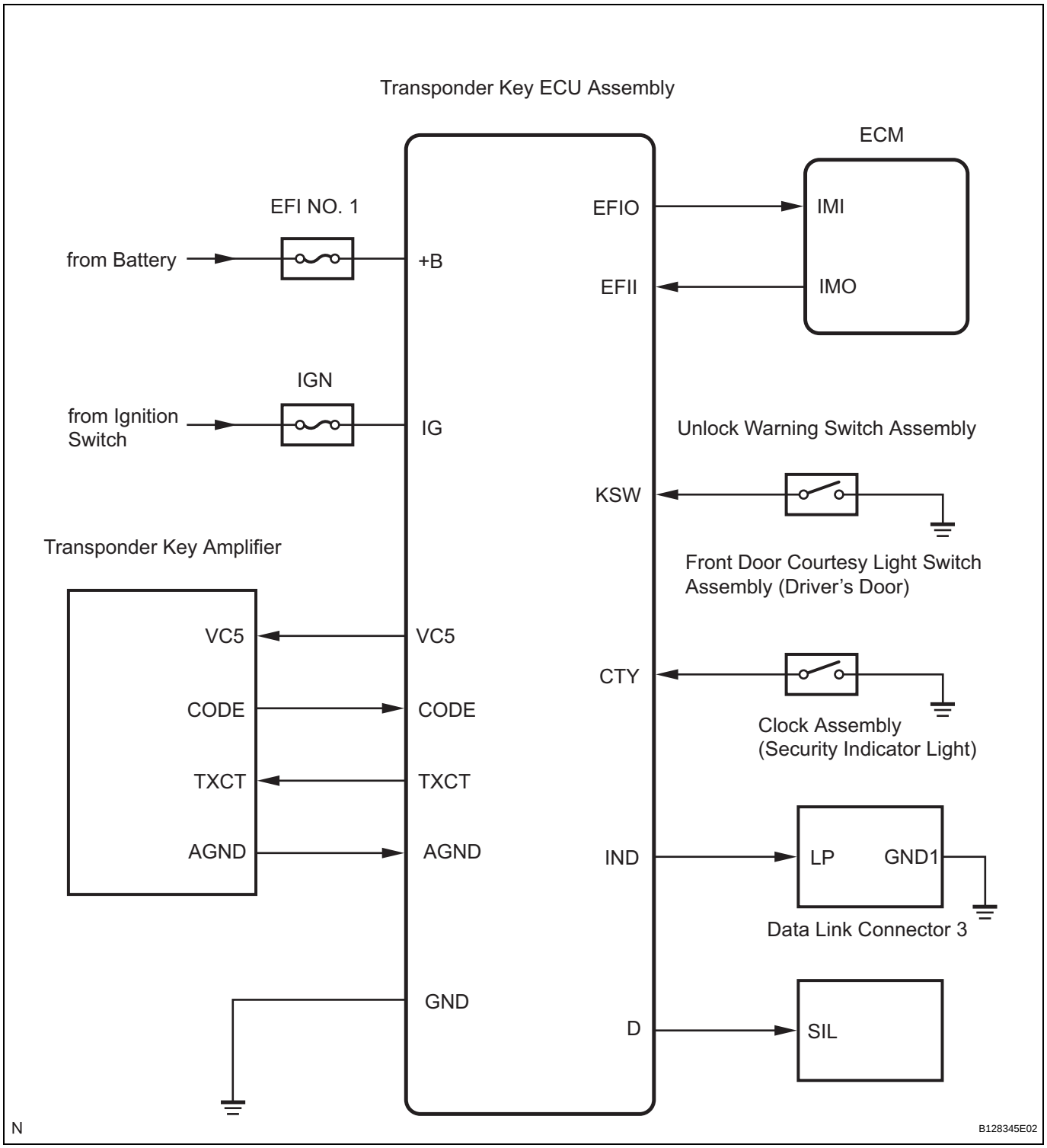
SYSTEM DIAGRAM



EI

SYSTEM DESCRIPTION

1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

The engine immobiliser system is designed to prevent the vehicle from being stolen. This system uses the transponder key ECU assembly that stores the key codes of authorized ignition keys. If an attempt is made to start the engine using an unauthorized key, the ECU sends a signal to the ECM to prohibit fuel delivery and ignition, effectively disabling the engine.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Transponder key coil/amplifier	When key is inserted in ignition key cylinder, key coil receives key code. Then amplifier amplifies ID code and outputs it to transponder key ECU assembly.
Unlock warning switch assembly	Detects if key is in ignition key cylinder and outputs results to transponder key ECU assembly.
ECM	ECM receives ID verification results from transponder key ECU assembly. ECM also verifies ECUs. Then judgement of whether to immobilise engine is made.
Security indicator	Depending on operation of transponder key ECU assembly, interior security indicator light comes on or starts blinking.

Security Indicator Light:

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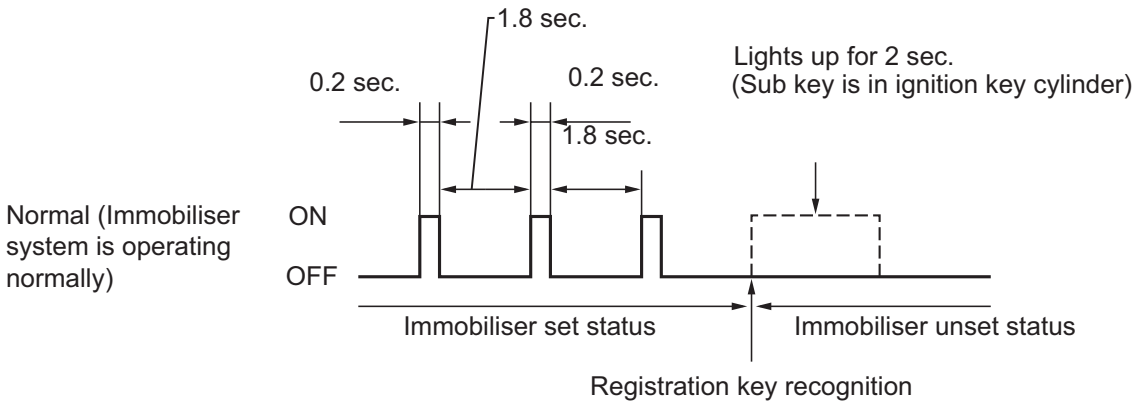
3. SYSTEM FUNCTION

(a) When the transponder key ECU assembly detects that the key unlock warning switch is ON, the ECU provides current to the transponder key coil and produces an electric wave. A transponder chip in the key grip receives the electric wave. Upon receiving the electric wave, the transponder chip outputs a key ID code signal. The transponder key coil receives this signal, the signal is amplified by the transponder key amplifier, and the signal is transmitted to the ECU.
The ECU matches the key's ID code with the vehicle's ID code, which was previously registered in the ECU, and communicates the results to the ECM.
After the identification results show that the key's ID code matches the vehicle's ID code and the ECU has confirmed their match: 1) the immobiliser system does not immobilise the engine and the engine starting controls (fuel injection control and ignition control) enter standby mode; and 2) the ECU transmits a security indicator signal that communicates "indicator off" to the clock. Then, the clock turns off the security indicator light.

(b) The security indicator pattern is as shown below (when changing from the immobiliser set status to the unset status):

EI

Security Indicator:



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EI

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:
Use this procedure to troubleshoot the engine immobiliser system.
The intelligent tester should be used in steps 3, 4, and 6.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CRANK ENGINE FOR MORE THAN 10 SECONDS

NEXT

3	CHECK FOR DTCS

(a) Check for DTCs and note any codes that are output.
(b) Delete the DTCs.
(c) Recheck for DTCs. Try to duplicate the DTC (SFI system and engine immobiliser system) by simulating the symptoms indicated by the DTC.
  (1) If the DTC does not reoccur, proceed to A.
  (2) If the DTC (SFI system) reoccurs, proceed to B.
  (3) If the DTC (engine immobiliser system) reoccurs, proceed to C.

B	GO TO SFI SYSTEM
C	GO TO DTC CHART

EI

A

4	READ VALUE ON INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester on.
(c) Read the DATA LIST according to the display on the tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-

OK:
ON (Key is in ignition key cylinder) appears on the screen.

NG → **GO TO DTC B2780**

OK

5	PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed on the problem symptoms table, proceed to A.
(b) If the fault is listed on the problem symptoms table, proceed to B.

B → **GO TO STEP 7**

A

6	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Inspection with the intelligent tester (DATA LIST).
(b) Inspection with the intelligent tester (ACTIVE TEST).
(c) TERMINALS OF ECU (See page EI-63).

NEXT

7	ADJUST, REPAIR OR REPLACE

NEXT

8	CONFIRMATION TEST

NEXT

END

REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

HINT:

The key has 2 codes: The key code (immobiliser code) and the wireless code. Both of these codes need to be registered. Refer to page for the wireless code registration procedures.

(a) When adding master keys or sub keys (Additional registration):

(1) Register key code (immobiliser code) in the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "A"

(b) When replacing the transponder key ECU (New registration):

(1) Register the key code (immobiliser code) in the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "B"

(2) Register the ECU communication ID between the ECM and the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "C"

(c) When replacing the ECM:

(1) Register the ECU communication ID between the ECM and the transponder key ECU.

Target ECU	See Procedure
Transponder key ECU	Procedure "C"

2. KEY REGISTRATION

(a) Automatic registration (Procedure "B"):

The new registration of the key codes (immobiliser codes) is made automatically.

HINT:

- When installing a new transponder key ECU, the key codes (immobiliser codes) must be registered.
- A new transponder key ECU starts in the automatic key code registration mode. In this mode, a maximum of 4 key codes for 3 master keys and 1 sub key can be registered. Since the transponder key ECU can distinguish types of keys, any registration order is acceptable.

Automatic Key Code Registration (New Registration):

Procedure	Security Indicator Condition
1. Start (Procedure "D")	Blinking occurs until the first key is inserted.
2. Insert the key into the ignition key cylinder.	ON
3. Registration begins. HINT: The registration will be completed approx. 1 sec. after the key is inserted.	OFF HINT: Approx. 1 sec.

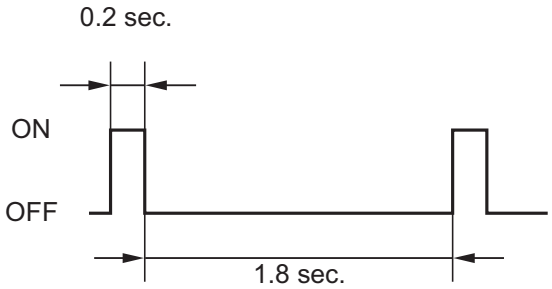
Procedure	Security Indicator Condition
4. Remove the key.	ON HINT: When the maximum number of the key codes is registered, the security indicator remains off until the last key registered is removed. After it is removed, the security indicator starts blinking.
5. Register another key ? Yes: Go to procedure "D" No: Go to procedure "E"	
6. End (Procedure "E")	

HINT:

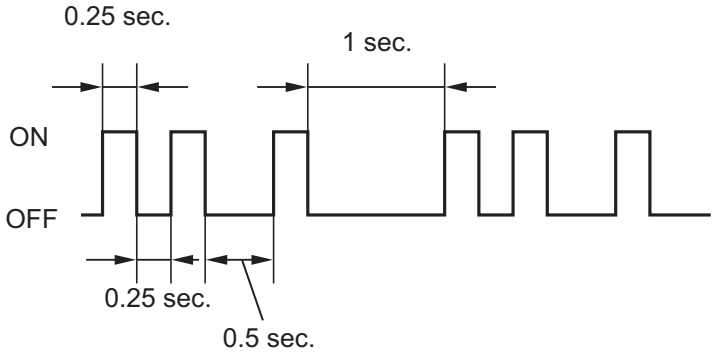
- When no key is inserted in the key cylinder while the system is in automatic key code registration mode, the security indicator remains on.
- When the immobiliser system is operating normally and the key is pulled out, the security indicator blinks continuously.
- If the key code registration has failed in the automatic key code registration mode, code 2-1 will be output from the security indicator. Trying to register an already registered key will cause code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 will be output from the security indicator. The output details are shown below.

Security Indicator:

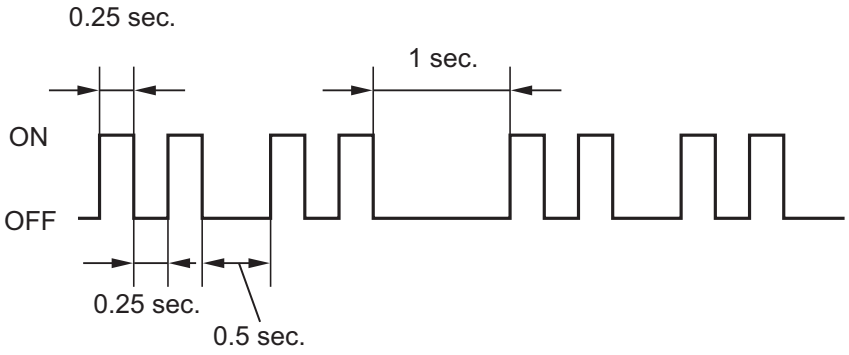
Normal (Immobiliser system is operating normally)



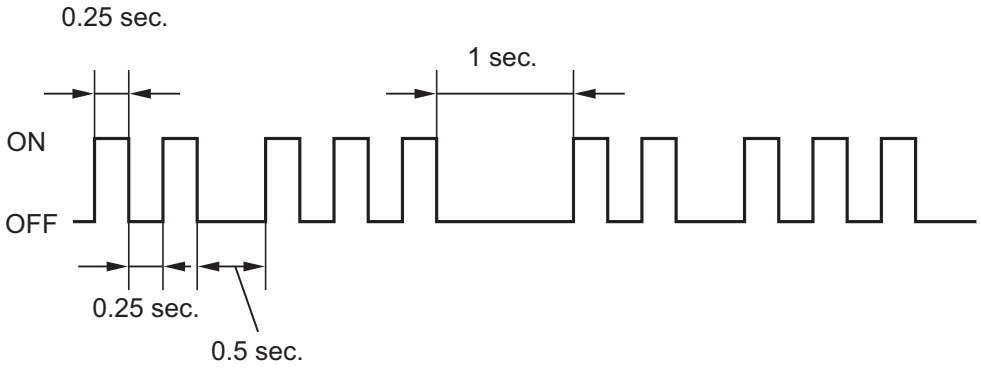
Code 2 - 1



Code 2 - 2



Code 2 - 3



EI

N

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(b) Finish the automatic key code registration mode. The automatic key code registration mode can be forced to end, when at least 1 key code (immobiliser code) for the master key has been registered.
(1) Turn the ignition switch on and off 5 times within 10 seconds using the master key that has already been registered.

3. REGISTRATION OF ADDITIONAL KEY

(a) Additional registration (Procedure "A"):
Register an additional key by using the intelligent tester.
HINT:
- A maximum of 5 key codes and 3 sub key codes can be registered.
- Registration mode will end if any step is not completed within the specified time.
- When the ignition cylinder or the key cylinder set is replaced, remove the transmitter module from the original master key. Then install this transmitter module to a new key and use it as the master key. If necessary, use this master key to register other keys.

NOTICE:
When only the ignition key cylinder has been replaced, you can lock or unlock doors by wireless operation using the new key with built in transmitter but not by inserting it in the door key cylinder. Therefore, keep the original key for the door lock or unlock operation in order to avoid malfunctions caused by a dead transmitter battery in the new key.

Additional Registration:

Procedure	Time (Completion of operation)	Security Indicator Condition
1. Start	-	Indicator blinks until the first key is inserted.
2. Insert the already registered master key in the ignition key cylinder and turn the ignition switch on.		
3. Intelligent tester operation (1) Select IMMOBILISER (2) Select ID UTILITY (3) Select IMMOB CODE REG HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the tester screen.	Within 120 sec.	OFF
4. Remove the master key.	Within 20 sec. of the instruction on the tester	ON
5. Insert the key to be registered in the ignition key cylinder.	Within 10 sec.	
6. After 60 sec. the key is registered. HINT: The security indicator goes off.	-	Blinking
7. Next		OFF
8. End		

EI

NOTICE:
If the key code registration has failed in automatic key code registration mode, code 2-1 will be output from the security indicator. Trying to register an already registered key will cause code 2-2 to be output when the key is inserted. If the number of registered key codes exceeds the limit, code 2-3 will be output from the security indicator. The output details are shown in procedure "B".
HINT:
- A brief outline of procedures for key code registration is shown above. For detailed information, refer to the screen of the intelligent tester.
- When the immobiliser system is operating normally and the key is pulled out, the security indicator will blink.

4. ERASURE OF KEY CODE

(a) Erase the key codes by using the intelligent tester.
HINT:
- All key codes will be erased except for the master key which is used for erasing the key codes. In order to use a key for which the code has been erased, it is necessary to register the key code again.
- The registration operation will be cancelled if any step is not completed within the specified time.

Erasing Key Code:

Procedure	Time (Operation Completion Time)	Security Indicator Condition
1. Start	-	Indicator blinks until the first key is inserted.
2. Insert the already registered master key in the ignition key cylinder and turn the ignition switch on.		
3. Intelligent tester operation (1) Select IMMOBILISER (2) Select ID UTILITY (3) Select IMMOB CODE ERA HINT: After completing the above operation, proceed to the next step in accordance with the prompts on the tester screen.	Within 120 sec.	OFF
4. Remove the master key.	Within 10 sec. of the instruction on the tester	ON for 1 sec. then OFF
5. Next	-	Blinking
6. End		

HINT:
- A brief outline of procedures for key code registration is shown above. For detailed information, refer to the screen of the intelligent tester.
- When the immobiliser system is operating normally and the key is pulled out, the security indicator will blink.

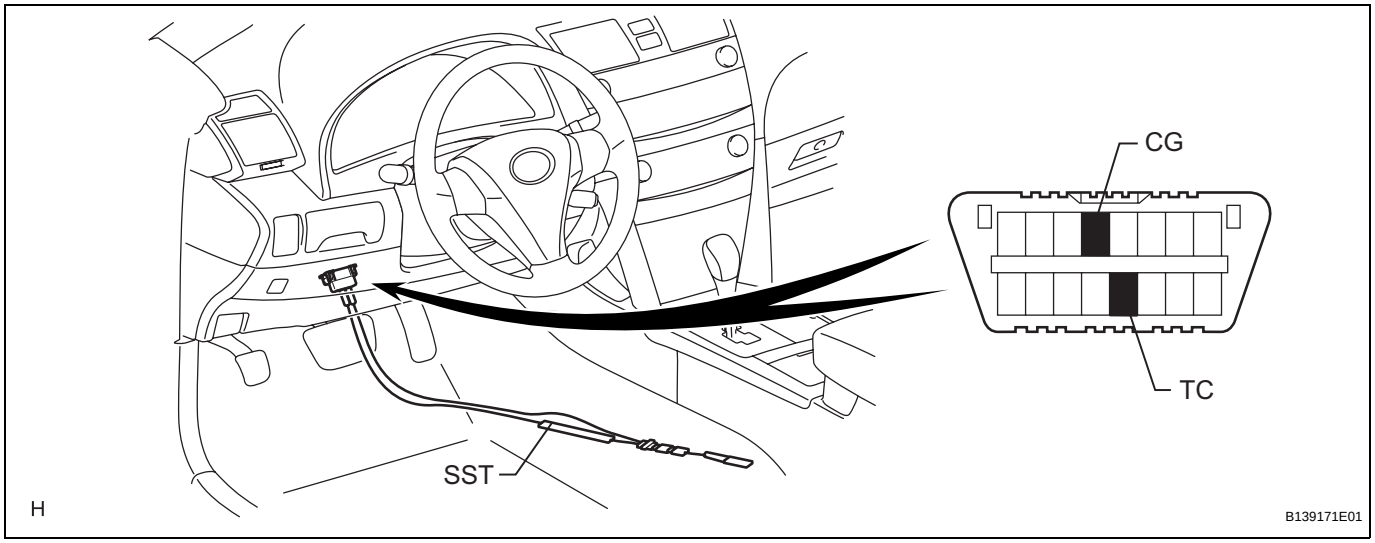
5. ECU COMMUNICATION ID REGISTRATION

NOTICE:

- **The ECU communication ID should be registered when the transponder key ECU and/or the ECM is replaced in order to match it to the ECM communication ID.**
- **The SFI system cannot be started unless the ECM communication ID matches.**

(a) ECU communication ID registration (Procedure "C"):

Register the ECU communication ID, after the transponder key ECU and/or the ECM is replaced.



(1) Using SST, connect terminals TC and CG of the DLC3.

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(2) Turn the ignition switch to the ON position and leave the vehicle as is for 30 minutes.

(3) Check that the engine starts.

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem symptom. The potential cases of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

ENGINE IMMOBILISER SYSTEM:

Symptom	Suspected area	See page
Unable to register the key.	1. Door courtesy switch circuit	EI-92
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
Engine does not start.	1. Key	EI-70
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
	4. SFI system (2AZ-FE)	ES-11
	5. SFI system (2GR-FE)	ES-15
Security indicator is always ON.	1. Security indicator light circuit	EI-89
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
Security indicator is OFF.	1. Security indicator light circuit	EI-89
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-
Security indicator is blinking abnormally.	Transponder key ECU assembly	-
No code is output.	1. Diagnosis circuit	EI-98
	2. ECU power source circuit	EI-94
	3. Transponder key ECU assembly	-

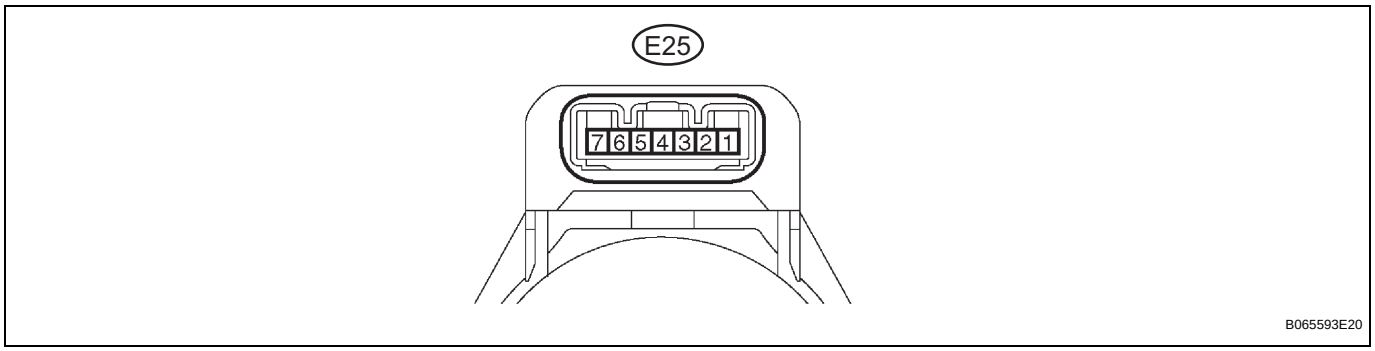
HINT:

- If the engine does not start, check that the key which did not start the engine control system has been registered, and that it is possible to start with another registered key.
- If the security indicator is always ON, finish the automatic registration mode in case the mode still operates.

TERMINALS OF ECU

1. CHECK TRANSPONDER KEY AMPLIFIER

(a) Disconnect the E25 amplifier connector and measure the resistance between the terminal of the wire harness side connector and body ground.



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E25-7) - Body ground	V - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

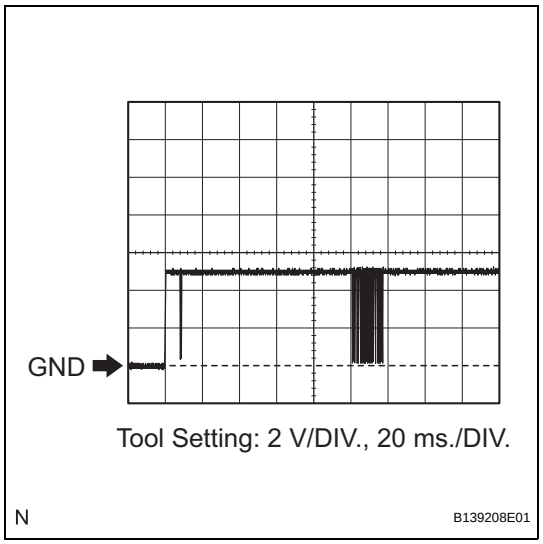
(b) Reconnect the E25 amplifier connector and measure the resistance and voltage of each terminal of the connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
VC5 (E25-1) - AGND (E25-7)	O - V	Power source	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	4.6 to 5.4 V
CODE (E25-4) - AGND (E25-7)	BR - V	Demodulated signal of key code data	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 1
TXCT (E25-5) - AGND (E25-7)	R - V	Key code output signal	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 2
AGND (E25-7) - Body ground	V - Body ground	Ground	Always	Below 1 Ω

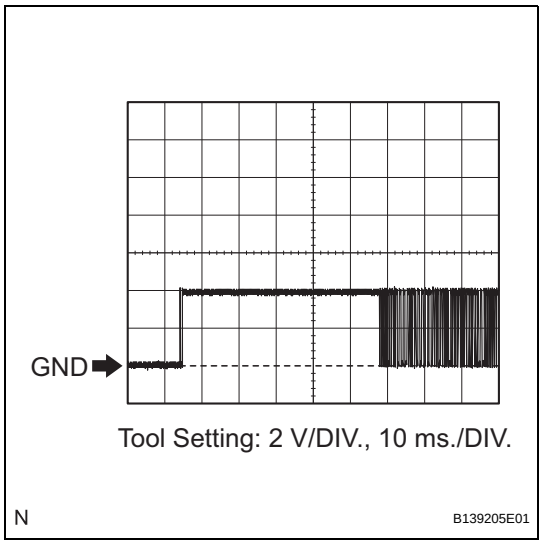
If the result is not as specified, the amplifier may have a malfunction.

(c) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)

Terminal	CODE (E25-4) - AGND (E25-7)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key is in ignition key cylinder



EI

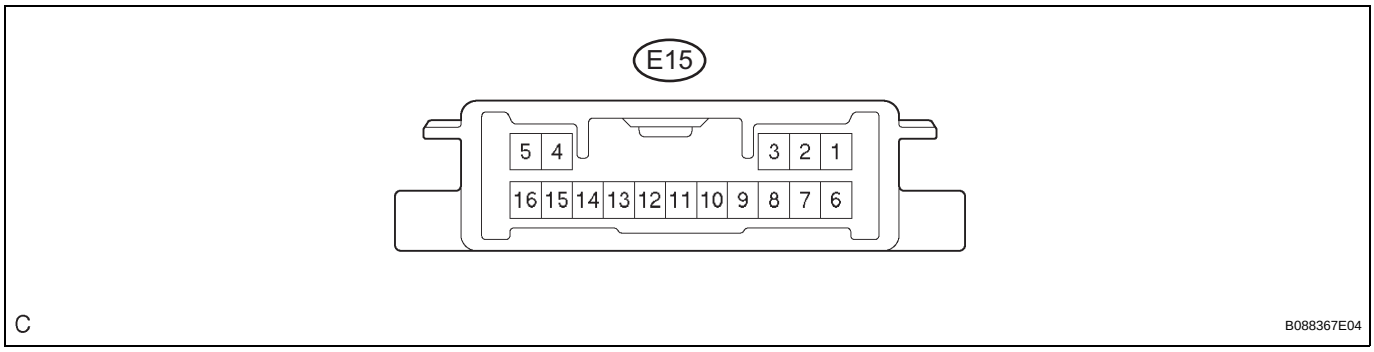


(2) Waveform 2 (Reference)

Terminal	TXCT (E25-5) - AGND (E25-7)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key is in ignition key cylinder

2. CHECK TRANSPONDER KEY ECU ASSEMBLY

(a) Disconnect the E15 ECU connector and measure the resistance and voltage between each terminal of the wire harness side connector.



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (E15-16) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
+B (E15-1) - GND (E15-16)	W - W-B	Battery	Always	10 to 14 V
IG (E15-2) - GND (E15-16)	LG - W-B	Ignition switch signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	10 to 14 V
KSW (E15-3) - GND (E15-16)	B - W-B	Unlock warning switch signal	No key is in ignition key cylinder	10 kΩ or higher
			Key is in ignition key cylinder	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(b) Reconnect the E15 ECU connector and measure the voltage of each terminal of the connector.

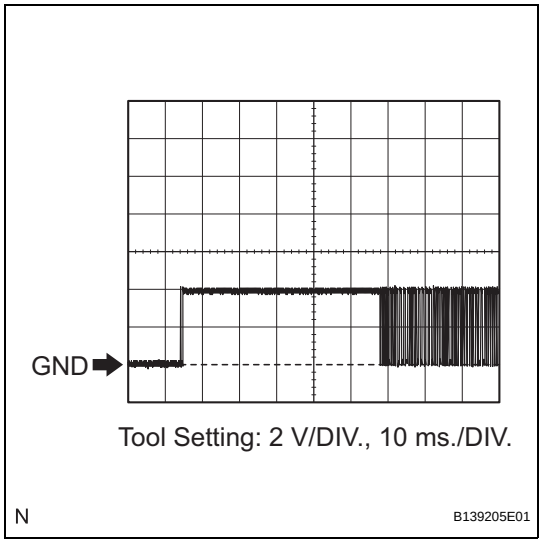
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AGND (E15-5) - Body ground	V - Body ground	Ground	Always	Below 1 Ω
KSW (E15-3) - GND (E15-16)	B - W-B	Unlock warning switch signal	No key is in ignition key cylinder	10 to 14 V
			Key is in ignition key cylinder	Below 1 V
VC5 (E15-14) - AGND (E15-5)	O - V	Power source	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	4.6 to 5.4 V
TXCT (E15-4) - AGND (E15-5)	R - V	Transponder key amplifier communication signal	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 1
CODE (E15-15) - AGND (E15-5)	BR - V	Transponder key amplifier communication signal	No key is in ignition key cylinder	Below 1 V
			Key is in ignition key cylinder	Waveform 2

EI

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
EFIO (E15-13) - GND (E15-16)	L - W-B	ECM output signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	Waveform 3
EFII (E15-12) - GND (E15-16)	G - W-B	ECM input signal	Ignition switch OFF	Below 1 V
			Ignition switch ON	Waveform 4
D (E15-9) - GND (E15-16)	GR - W-B	Diagnostic tester communication	Without communication	Below 1 V
			During communication	Pules generation
CTY (E15-7) - GND (E15-16)	Y - W-B	Door courtesy signal	Switch pushed	10 to 14 V
			Switch free	Below 1 V
IND (E15-8) - GND (E15-16)	P - W-B	Security indicator signal	Security indicator light is on	10 to 14 V
			Security indicator light is off	Below 1 V

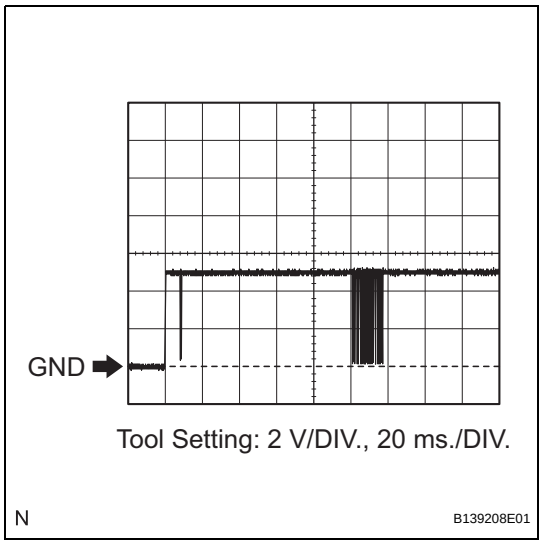
If the result is not as specified, the ECU may have a malfunction.

(c) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



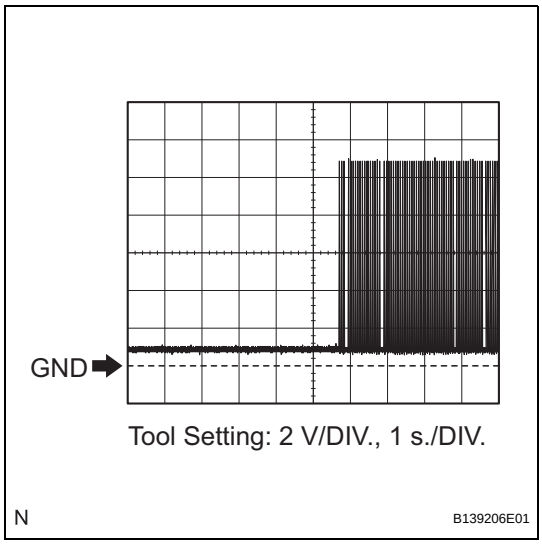
Terminal	TXCT (E15-4) - AGND (E15-5)
Tool Setting	2 V/DIV., 10 ms./DIV.
Condition	Key is in ignition key cylinder

(2) Waveform 2 (Reference)



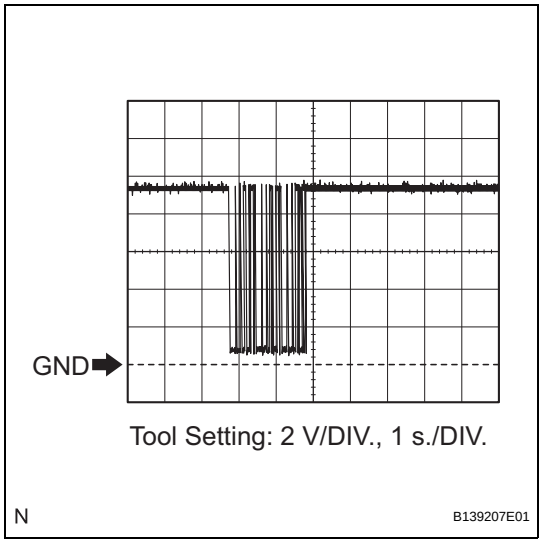
Terminal	CODE (E15-15) - AGND (E15-5)
Tool Setting	2 V/DIV., 20 ms./DIV.
Condition	Key is in ignition key cylinder

EI



(3) Waveform 3 (Reference)

Terminal	EFIO (E15-13) - GND (E15-16)
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON



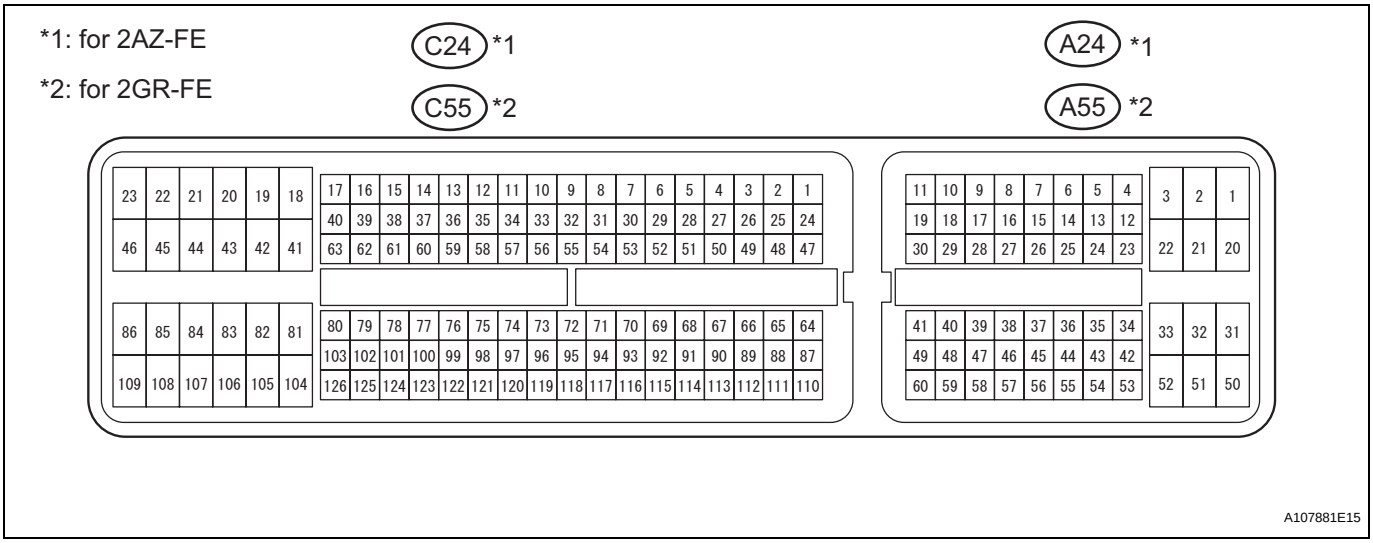
(4) Waveform 4 (Reference)

Terminal	EFII (E15-12) - GND (E15-16)
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON

3. CHECK ECM

(a) Disconnect the C24*1 or C55*2 ECM connector and measure the resistance between the terminal of the wire harness side connector and body ground.

EI



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E1 (C24-104)*1 - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
E1 (C55-81)*2 - Body ground				

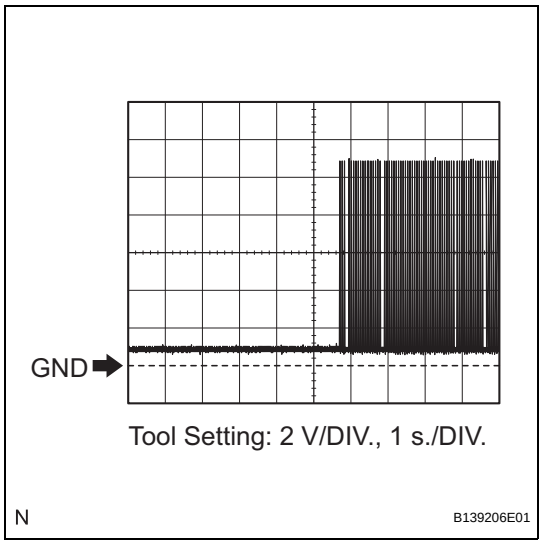
*1: for 2AZ-FE
*2: for 2GR-FE
If the result is not as specified, there may be a malfunction on the wire harness side.

(b) Reconnect the C24*1 or C55*2 ECM connector. Measure the voltage between each terminal of the connector according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IMI (A24-11)*1 - E1 (C24-104)*1	Y - W-B	Transponder key ECU input signal	Ignition switch OFF	Below 1 V
IMI (A55-11)*2 - E1 (C55-81)*2			Ignition switch ON	Waveform 1
IMO (A24-10)*1 - E1 (C24-104)*1	G - W-B	Transponder key ECU output signal	Ignition switch OFF	Below 1 V
IMO (A55-10)*2 - E1 (C55-81)*2			Ignition switch ON	Waveform 2

*1: for 2AZ-FE
*2: for 2GR-FE
If the result is not as specified, the ECM may have a malfunction.

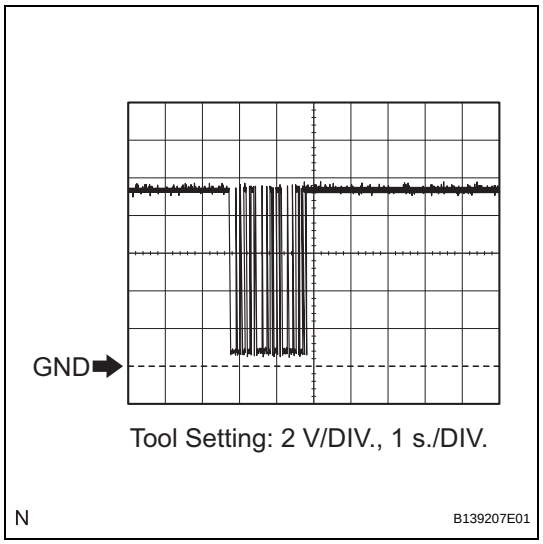
(c) Inspect using an oscilloscope.
(1) Waveform 1 (Reference)



Terminal	IMI (A24-11)*1 - E1 (C24-104)*1
	IMI (A55-11)*2 - E1 (C55-81)*2
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON

*1: for 2AZ-FE
*2: for 2GR-FE

(2) Waveform 2 (Reference)



Terminal	IMO (A24-10)*1 - E1 (C24-104)*1
	IMO (A55-10)*2 - E1 (C55-81)*2
Tool Setting	2 V/DIV., 1 s./DIV.
Condition	Ignition switch ON

*1: for 2AZ-FE
*2: for 2GR-FE

EI

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the DATA LIST displayed on the intelligent tester, the values of the switches, sensors, actuators, etc. can be checked without part removal. Reading the DATA LIST as the first step in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read the DATA LIST according to the display on the tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ON or OFF	ON: Key is in ignition key cylinder OFF: No key is in ignition key cylinder	-
IG SW	Ignition switch signal/ON or OFF	ON: Ignition switch ON or START OFF: Ignition switch ACC or OFF	-
IMMOBILISER	Immobiliser system status/SET or UNSET	UNSET: Ignition switch ON SET: Without key	-
PERMIT (START)	Permit (Start) signal/OK or NG	NG: No permission for engine start OK: Engine start permission	-
RESPONSE	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
FRAME	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
SERIAL NUMBER	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
ENCRYPT CODE	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
STATUS	Transponder chip data/NG or OK	NG: Data error OK: Data OK	-
BCC	Transponder chip data/NG or OK	NG: Incorrect data being sent OK: Correct data being sent	-
SUB KEY	Sub key code signal/NOMATCH or MATCH	NOMATCH: Non-matching sub key code is sent MATCH: Sub key code is sent	-
MASTER KEY	Master key code signal/ NOMATCH or MATCH	NOMATCH: Non-matching master key code is sent MATCH: Master key code is sent	-
REGIST SUB CODE	Number of registered sub key/ min. 0, max. 15	Number of registered sub key	-
REGIST MAS CODE	Number of registered master key/ min. 0, max. 15	Number of registered master key	-
REG CODE SPACE	Memory space for key codes registration/NOT FULL or FULL	NOT FULL: More key code registration possible FULL: No more key code registration possible	-
+B	Power source/BRAKE or NORMAL	BRAKE: Power source open NORMAL: Power source normal	-
ANTENNA COIL	Antenna coil condition/NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows a relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Perform the ACTIVE TEST according to the display on the tester.

IMMOBILISER:

Item	Test Details	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

DIAGNOSTIC TROUBLE CODE CHART

TRANSPONDER KEY ECU DIAGNOSTIC TROUBLE CODE CHART:

DTC No.	Detection Item	Trouble Area	See page
B2780	Push Switch / Key Unlock Warning Switch Malfunction	1. Wire harness 2. Unlock warning switch assembly 3. Transponder key ECU assembly	EI-72
B2784	Antenna Coil Open / Short	1. Wire harness 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-76
B2793	Transponder Chip Malfunction	Key	EI-79
B2794	Unmatched Encryption Code	Key	EI-80
B2795	Unmatched Key Code	Key	EI-81
B2796	No Communication in Immobiliser System	1. Key 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-82
B2797	Communication Malfunction No. 1	1. Key 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-84
B2798	Communication Malfunction No. 2	1. Key 2. Transponder key amplifier 3. Transponder key ECU assembly	EI-82

ECM DIAGNOSTIC TROUBLE CODE CHART:

DTC No.	Detection Item	Trouble Area	See page
B2799	Engine Immobiliser System	1. Wire harness 2. Transponder key ECU assembly 3. ECM	EI-86

HINT:
The DTCs for the engine immobiliser system are specified above. If other codes are output, check the DTC chart for the SFI system.

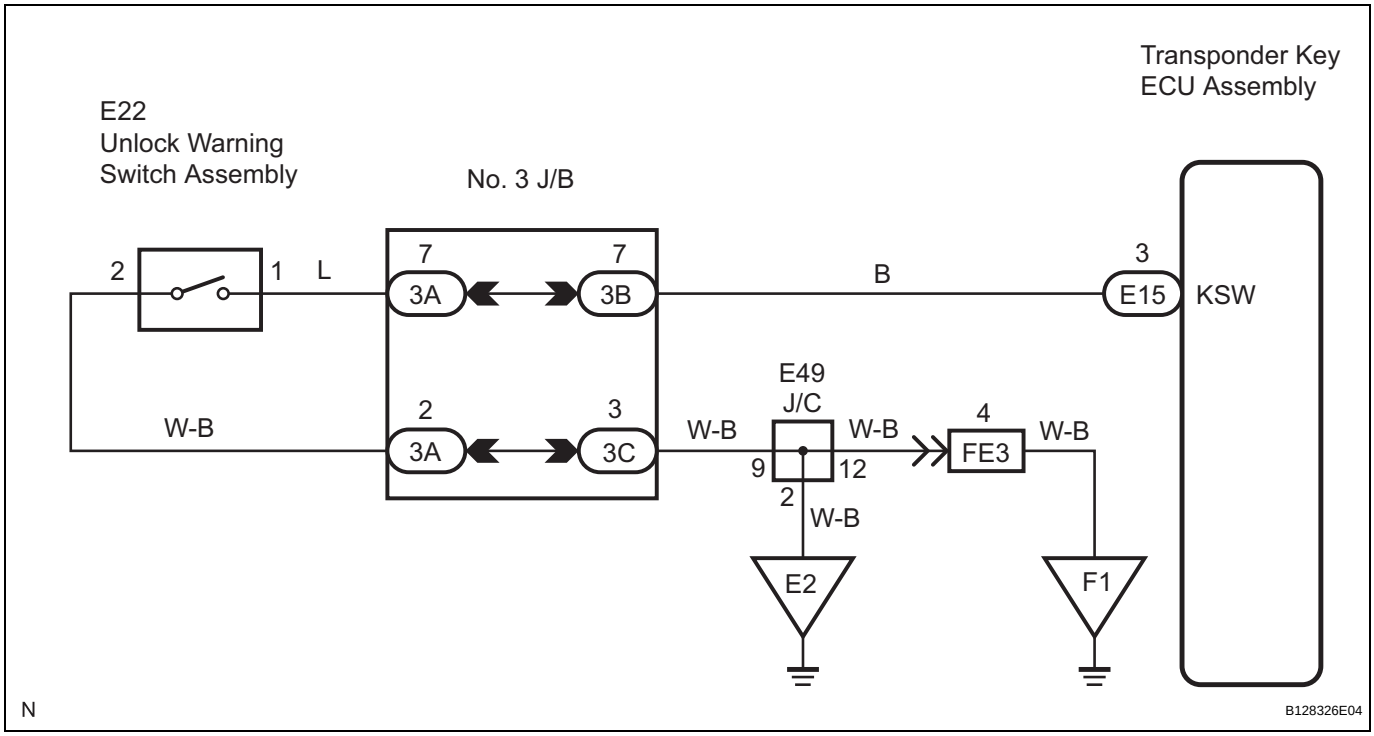
DTC	B2780	Push Switch / Key Unlock Warning Switch Malfunction

DESCRIPTION

This DTC will be output if the transponder key ECU assembly does not detect that the unlock warning switch is ON even when the ignition switch is ON. Under normal conditions, the unlock warning switch assembly is ON when the ignition switch is ON.

DTC No.	DTC Detection Condition	Trouble Area
B2780	"Unlock warning switch ON" is not detected when ignition switch is ON.	• Unlock warning switch assembly • Wire harness • Transponder key ECU assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position and turn the intelligent tester main switch on.

(c) Select KEY SW in the DATA LIST and read the value displayed on the tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
KEY SW	Unlock warning switch signal/ON or OFF	OFF: Key is in ignition key cylinder ON: No key is in ignition key cylinder	-

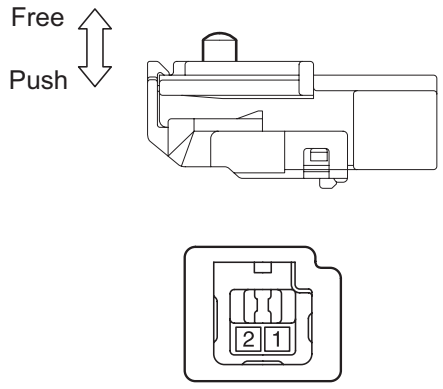
OK:
ON (Key is in ignition key cylinder) appears on the screen.

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG

2 INSPECT UNLOCK WARNING SWITCH ASSEMBLY

Unlock Warning Switch Assembly:



(a) Remove the unlock warning switch assembly (See page DL-225).
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Switch Position	Specified Condition
1 - 2	Switch pushed (Key set)	Below 1 Ω
	Switch free (Key removed)	10 kΩ or higher

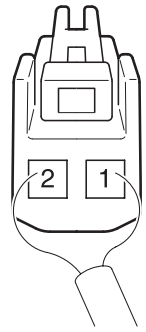
NG → **REPLACE UNLOCK WARNING SWITCH ASSEMBLY**

OK

EI

3 CHECK HARNESS AND CONNECTOR (UNLOCK WARNING SWITCH - BODY GROUND)

Wire Harness Side Connector Rear View:



E22
Unlock Warning Switch Assembly

P B124194E02

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E22-2 - Body ground	Always	Below 1 Ω

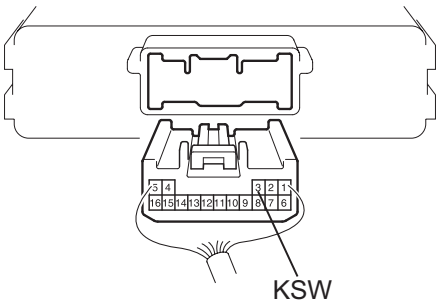
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

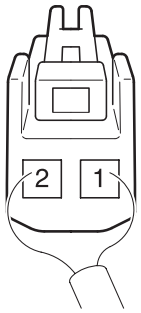
4 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - UNLOCK WARNING SWITCH)

Wire Harness Side Connector Rear View:

E15
Transponder Key ECU Assembly



E22
Unlock Warning Switch Assembly



P B128340E02

(a) Disconnect the E15 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

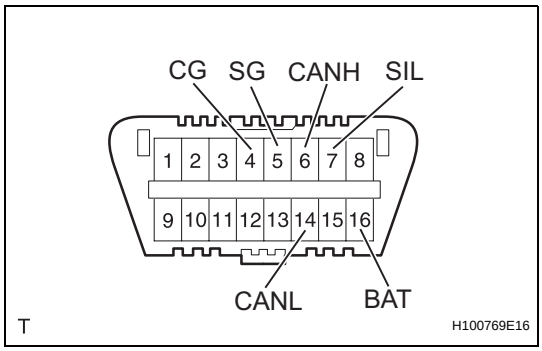
Tester Connection	Condition	Specified Condition
E15-3 (KSW) - E22-1	Always	Below 1 Ω
E22-1 - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

EI

OK

REPLACE TRANSPONDER KEY ECU ASSEMBLY



DIAGNOSIS SYSTEM

1. CHECK DLC3

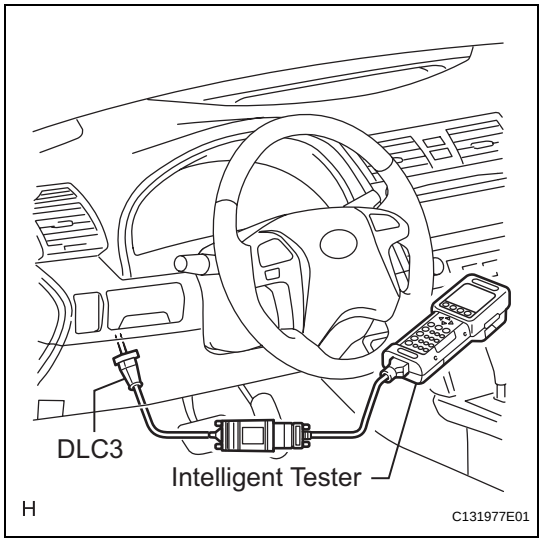
(a) The vehicle's ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

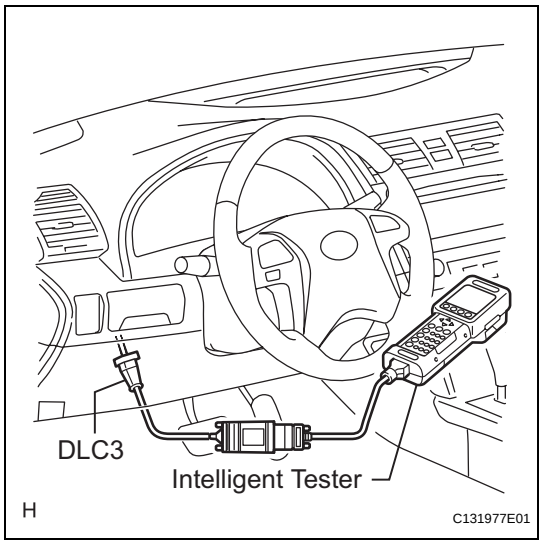


(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch to the ON position and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side of the tester side.

HINT:

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

EI



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Read the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position.

(c) Erase the DTCs by following the directions on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

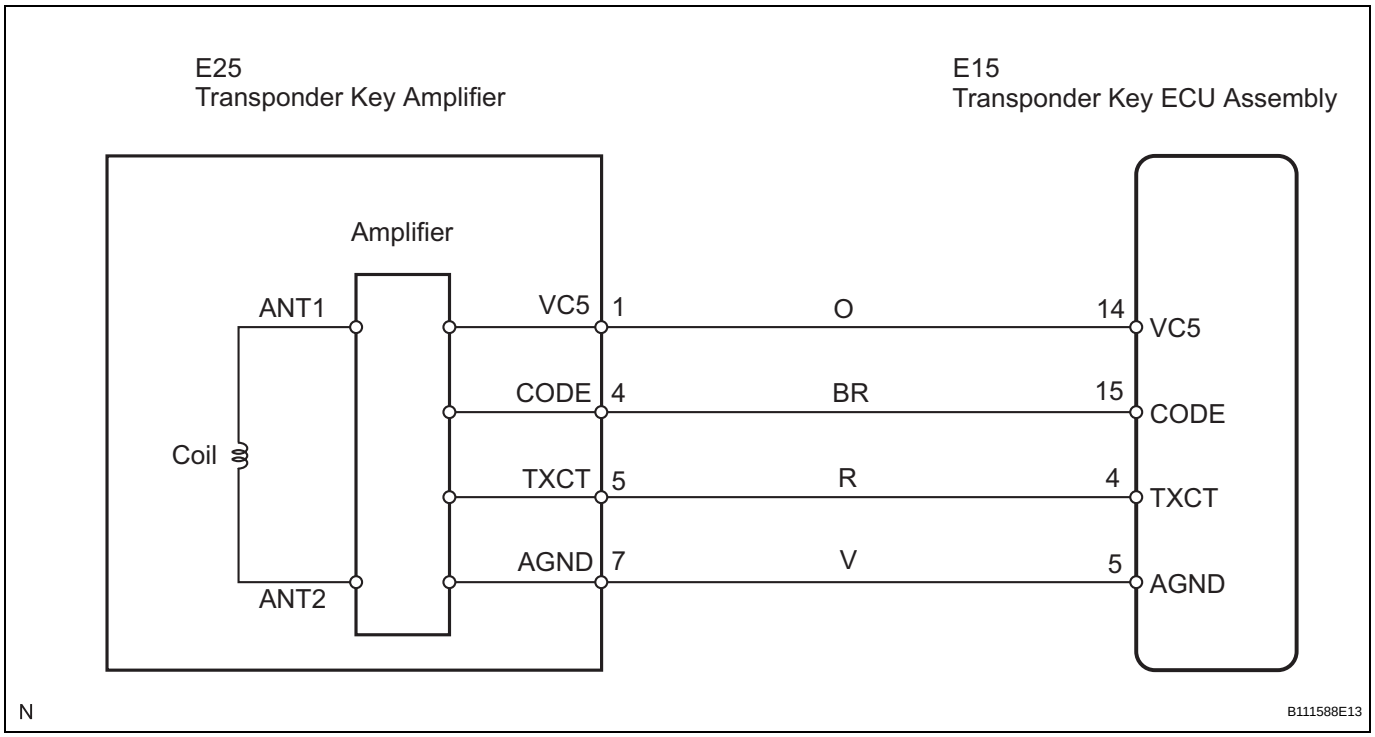
DTC	B2784	Antenna Coil Open / Short

DESCRIPTION

The transponder key coil is built into the transponder key amplifier and receives a key code signal from the transponder chip in the key. This signal is amplified by the amplifier, then it is output to the transponder key ECU assembly.

DTC No.	DTC Detection Condition	Trouble Area
B2784	Antenna coil is open/shorted	• Wire harness • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM



EI

INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch to the ON position and turn the intelligent tester on.

(c) Select ANTENNA COIL in the DATA LIST and read the value displayed on the intelligent tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
ANTENNA COIL	Transponder key amplifier coil condition/NORMAL or FAIL	NORMAL: Antenna coil is normal FAIL: Antenna coil is malfunctioning	-

OK:

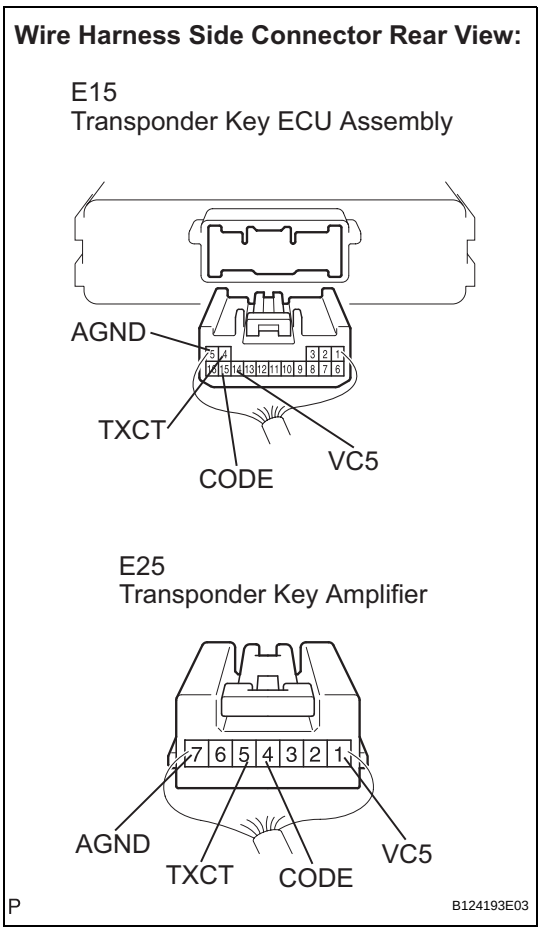
NORMAL (Antenna coil is normal) appears on the screen.

OK → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

NG

2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - TRANSPONDER KEY AMPLIFIER)

Wire Harness Side Connector Rear View:



(a) Disconnect the E15 ECU and E25 amplifier connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

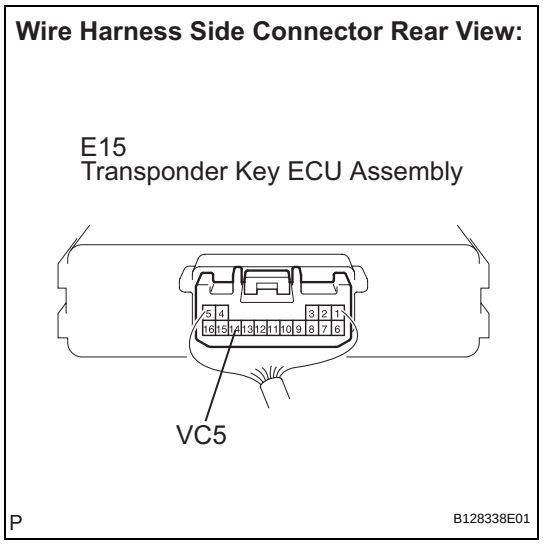
Tester Connection	Condition	Specified Condition
E15-4 (TXCT) - E25-5 (TXCT)	Always	Below 1 Ω
E15-5 (AGND) - E25-7 (AGND)		
E15-14 (VC5) - E25-1 (VC5)		
E15-15 (CODE) - E25-4 (CODE)		
E15-4 (TXCT) - Body ground		10 kΩ or higher
E15-5 (AGND) - Body ground		
E15-14 (VC5) - Body ground		
E15-15 (CODE) - Body ground		

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

3	INSPECT TRANSPONDER KEY ECU ASSEMBLY (TRANSPONDER KEY AMPLIFIER POWER SOURCE)



(a) Reconnect the E15 ECU and E25 amplifier connectors.
(b) Measure the voltage according to the value(s) in the table below.

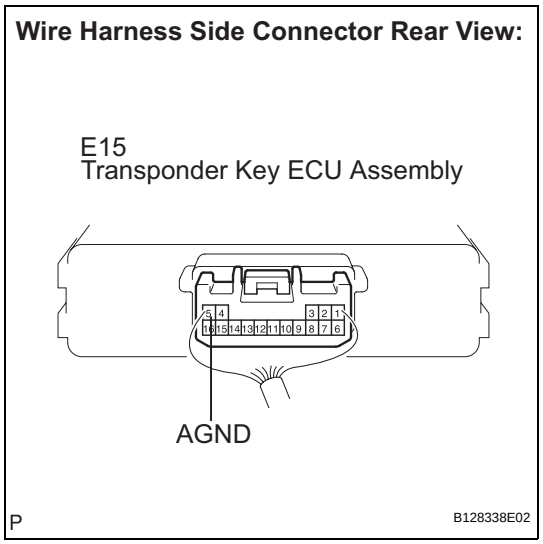
Standard voltage

Tester Connection	Condition	Specified Condition
E15-14 (VC5) - Body ground	No key is in ignition key cylinder	Below 1 V
	Key is in ignition key cylinder	4.6 to 5.4 V

NG → REPLACE TRANSPONDER KEY ECU ASSEMBLY

OK

4	INSPECT TRANSPONDER KEY ECU ASSEMBLY (TRANSPONDER KEY AMPLIFIER GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E15-5 (AGND) - Body ground	Always	Below 1 Ω

NG → REPLACE TRANSPONDER KEY ECU ASSEMBLY

OK

REPLACE TRANSPONDER KEY AMPLIFIER

EI

DTC	B2793	Transponder Chip Malfunction

DESCRIPTION

This DTC is output when a malfunction is found in the key during key code registration or a key code is not registered normally. Replace the key if the key code registration is not performed normally and this DTC is detected.

DTC No.	DTC Detection Condition	Trouble Area
B2793	Transponder chip malfunction	Key

INSPECTION PROCEDURE

NOTICE:
If the key is replaced, register the key (See page EI-57).

1	RE-REGISTER KEY

(a) Delete the DTCs (See page EI-69).
(b) Re-register the key (See page EI-57) and insert this key into the ignition key cylinder. Check that the engine starts with this key.
OK:
The engine starts.

NG → **REPLACE KEY**

OK

END

DTC	B2794	Unmatched Encryption Code

DESCRIPTION

This DTC is output when a key with an incomplete key code is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2794	Key with incomplete key code is inserted	Key

INSPECTION PROCEDURE

NOTICE:

If the key is replaced, register the key (See page EI-57).

1	REPLACE KEY

NEXT

END

DTC	B2795	Unmatched Key Code

DESCRIPTION

This DTC is output when a key with a key code that has not been registered in the ECU is inserted into the ignition key cylinder.

DTC No.	DTC Detection Condition	Trouble Area
B2795	Key with unregistered key code is inserted	Key

INSPECTION PROCEDURE

NOTICE:

If the key is replaced, register the key (See page EI-57).

1	RE-REGISTER KEY

(a) Delete the DTCs (See page EI-69).

(b) Re-register the key (See page EI-57) and insert this key into the ignition key cylinder. Check that the engine starts with this key.

OK:

The engine starts.

NG → **REPLACE KEY**

OK ↓

END

DTC	B2796	No Communication in Immobiliser System

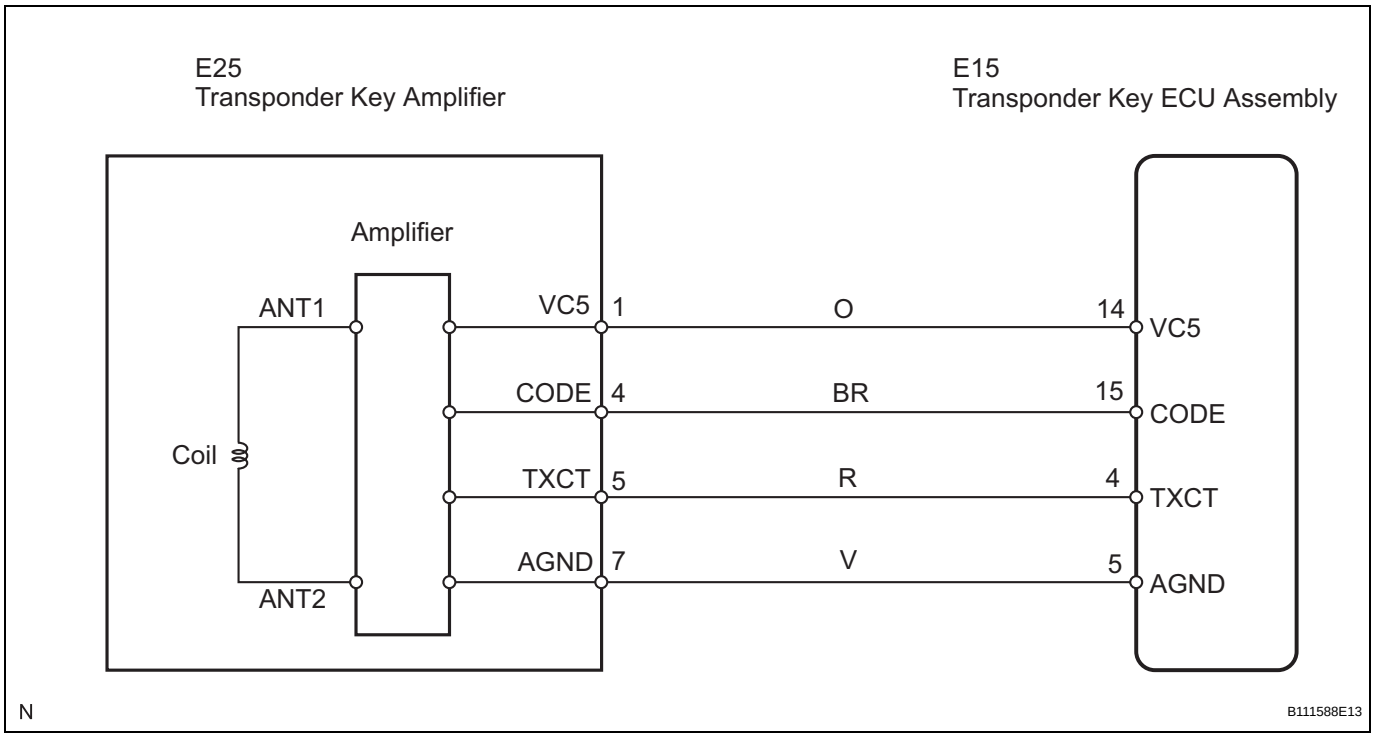
DTC	B2798	Communication Malfunction No. 2

DESCRIPTION

These DTCs are output if a key that does not have a transponder chip is inserted into the ignition key cylinder or if communication between the key and transponder key ECU assembly is impossible.

DTC No.	DTC Detection Condition	Trouble Area
B2796	The key code cannot be transmitted	• Key • Transponder key amplifier • Transponder key ECU assembly
B2798	Key code identification cannot be completed within the specified time	• Key • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).**
- **If the key is replaced, register the key (See page EI-57).**

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position and turn the intelligent tester on.

EI

(c) Select IMMOBILISER in the DATA LIST and read the value displayed on the intelligent tester.

IMMOBILISER:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
IMMOBILISER	Immobiliser system status/SET or UNSET	UNSET: Ignition switch ON SET: Without key	-

OK:

UNSET (Ignition switch ON) appears on the screen.

OK → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

NG

2 CHECK KEYS

(a) Insert the vehicle's other key into the ignition key cylinder.

(b) Check that the engine starts with this key.

OK:

The engine starts.

OK → **RE-REGISTER OR REPLACE KEY THAT CANNOT START ENGINE**

NG

3 CHECK TRANSPONDER KEY AMPLIFIER

(a) After replacing the transponder key amplifier (See page LI-112) with a normally functioning amplifier, check that the engine starts.

OK:

The engine starts.

NG → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

OK

END

EI

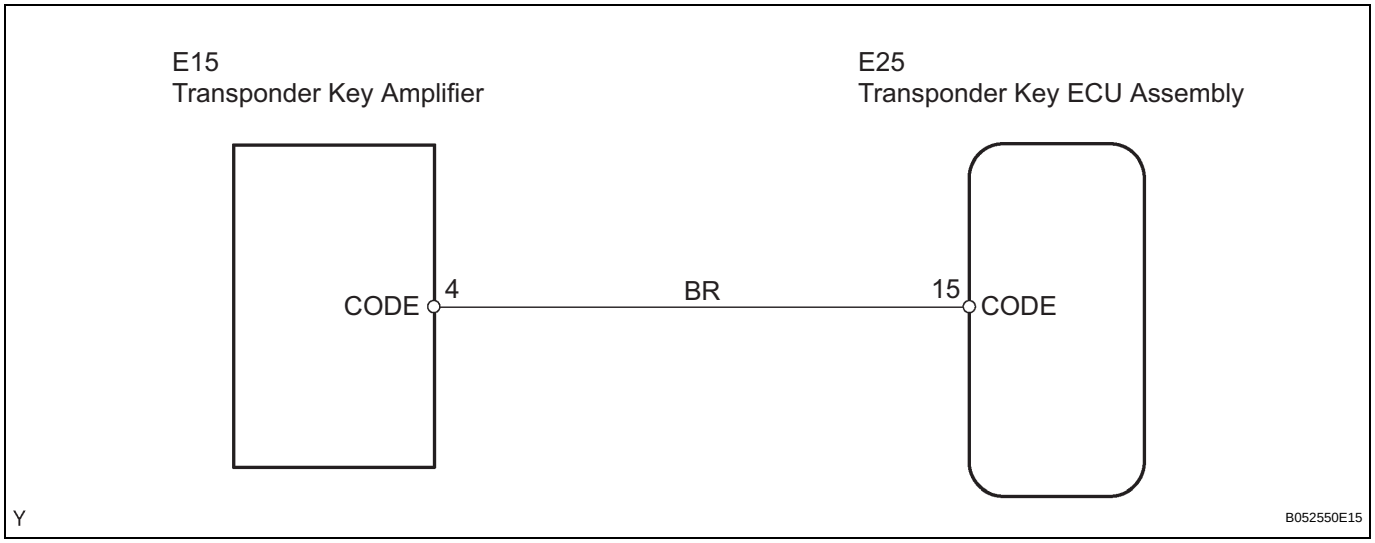
DTC	B2797	Communication Malfunction No. 1

DESCRIPTION

This DTC is output when an error occurs in communication between the transponder key amplifier and the transponder key ECU.
HINT:
Some noise is found in the communication line.

DTC No.	DTC Detection Condition	Trouble Area
B2797	Keys are positioned too close to each other, or noise occurred in communication line	• Key • Transponder key amplifier • Transponder key ECU assembly

WIRING DIAGRAM

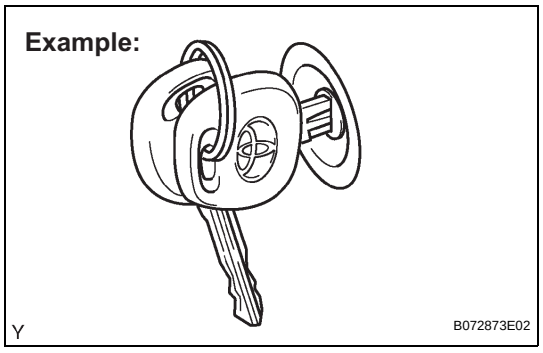


INSPECTION PROCEDURE

NOTICE:
If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

EI

1	CHECK KEYS



(a) Check whether the ignition key being used is near other ignition keys, as shown in the illustration. Also, check whether the key ring is in contact with the key grip.
Result

Result	Proceed to
Key is near other keys and/or key ring is in contact with key grip.	A
Key is not near other keys and/or key ring is not in contact with key grip.	B

B → **Go to step 3**

A

2	CHECK DTC OUTPUT

(a) Separate the keys from each other, or remove the key ring.
(b) Delete the DTCs (See page EI-69).
(c) Insert a key into the ignition key cylinder and remove the key. Repeat for all the other keys of the vehicle.
OK:
No code is output.

OK → **END**

NG

3	CHECK TRANSPONDER KEY AMPLIFIER

(a) After replacing the transponder key amplifier (See page LI-112) with a normally functioning amplifier, check that the engine starts.
OK:
The engine starts.

NG → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

OK

END

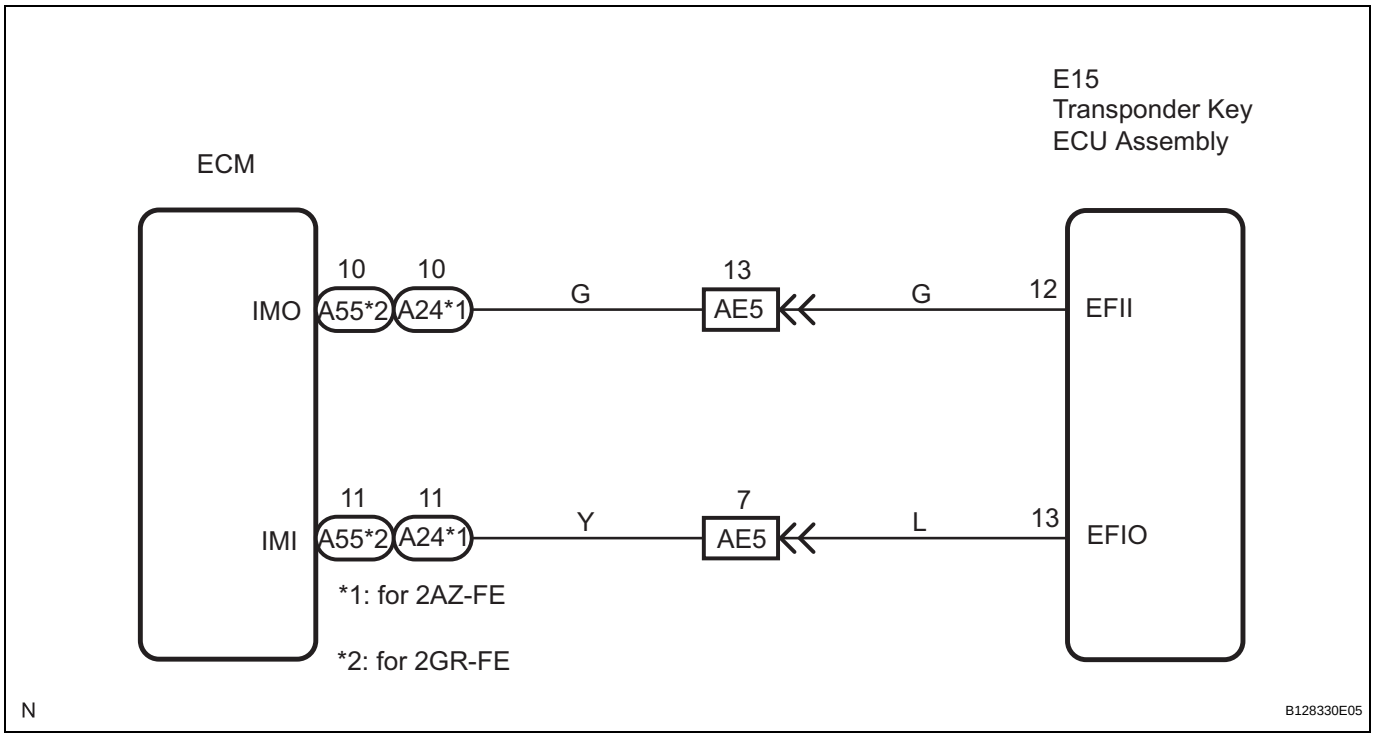
DTC	B2799	Engine Immobiliser System

DESCRIPTION

This DTC is output when the ECM detects errors in communication with the transponder key ECU, and in the communication lines.
This DTC is also output when an engine start is attempted while the ECU communication ID between the transponder key ECU and the ECM is different.
Before troubleshooting for this DTC, make sure that there is no DTC detected in the transponder key ECU. If there is any key code related DTC detected in the transponder key ECU, repair it first.

DTC No.	DTC Detection Condition	Trouble Area
B2799	Error in communication between ECM and transponder key ECU assembly, and in communication line Communication ID is different during communication with transponder key ECU	• Wire harness • Transponder key ECU assembly • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).**
- **If the ECM is replaced, register the ECU communication ID (See page EI-57).**

1	RE-REGISTER ECU COMMUNICATION ID

(a) Re-register the ECU communication ID (See page EI-57) between the transponder key ECU assembly and ECM.
(b) Check that the engine starts.
OK:
The engine starts.

EI

OK → END

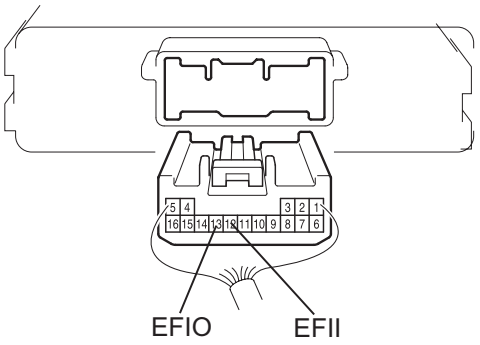
NG

2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - ECM)

(a) Disconnect the E15 ECU and A24*1 or A55*2 ECM connectors.

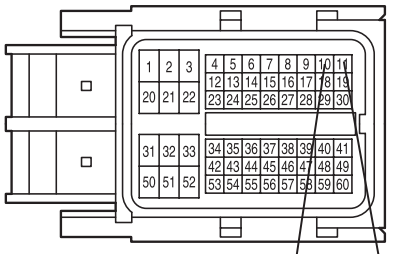
Wire Harness Side Connector Front View:

E15
Transponder Key ECU Assembly



Wire Harness Side Connector Rear View:

A24*1
A55*2
ECM



*1: for 2AZ-FE
*2: for 2GR-FE

B139202E01

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E15-12 (EFII) - A24*1, A55*2-10 (IMO)	Always	Below 1 Ω
E15-13 (EFIO) - A24*1, A55*2-11 (IMI)		
E15-12 (EFII) - Body ground		10 kΩ or higher
E15-13 (EFIO) - Body ground		

*1: for 2AZ-FE
*2: for 2GR-FE

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 REPLACE TRANSPONDER KEY ECU ASSEMBLY

(a) After replacing the transponder key ECU assembly with a normally functioning transponder key ECU assembly, check that the engine starts.

OK:

The engine starts.

EI

NG → **REPLACE ECM**

OK

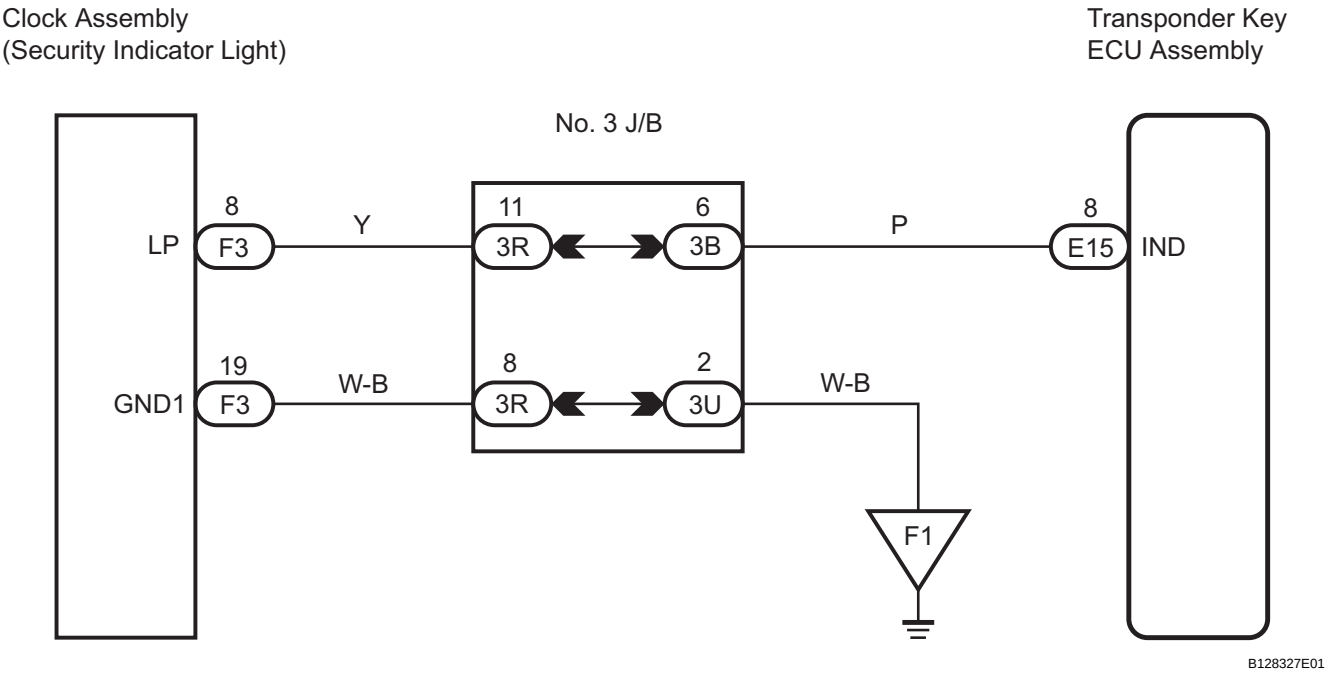
END

Security Indicator Light Circuit

DESCRIPTION

When the transponder key is registered, the transponder key ECU assembly outputs the key registration condition by lighting up, blinking or turning off the security indicator.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch to the ON position.
(c) Perform the ACTIVE TEST according to the display on the tester.

IMMOBILISER:

Item	Tester Details	Diagnostic Note
SECURITY INDIC	Turn security indicator ON/OFF	-

OK:

Security indicator turns on and off.

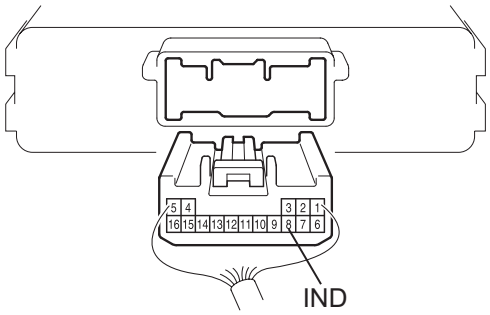
OK	**PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

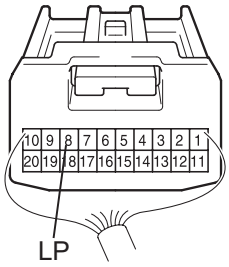
2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - SECURITY INDICATOR LIGHT)

Wire Harness Side Connector Rear View:

E15
Transponder Key ECU Assembly



F3
Clock Assembly (Security Indicator Light)



P B128342E01

(a) Disconnect the E15 ECU and F3 combination meter connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E15-8 (IND) - F3-8 (LP)	Always	Below 1 Ω
E15-8 (IND) - Body ground		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

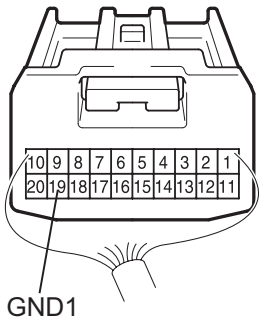
OK

EI

3 CHECK HARNESS AND CONNECTOR (SECURITY INDICATOR LIGHT - BODY GROUND)

Wire Harness Side Connector Rear View:

F3
Clock Assembly (Security Indicator Light)



P B128343E01

(a) Measure the resistance according to the value(s) in the table below.

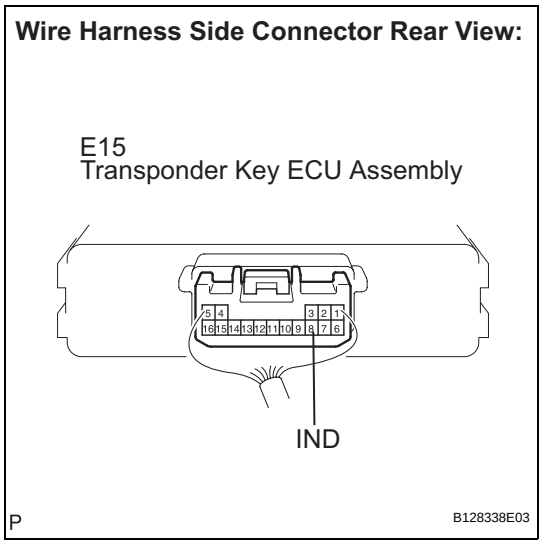
Standard resistance

Tester Connection	Condition	Specified Condition
F3-19 (GND1) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	INSPECT TRANSPONDER KEY ECU ASSEMBLY



(a) Reconnect the E15 ECU and F3 combination meter connectors.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E15-8 (IND) - Body ground	Immobiliser set state (No key is in ignition key cylinder)	Repeats 10 to 14 V and below 1 V

NG → **REPLACE TRANSPONDER KEY ECU ASSEMBLY**

OK

REPLACE CLOCK ASSEMBLY

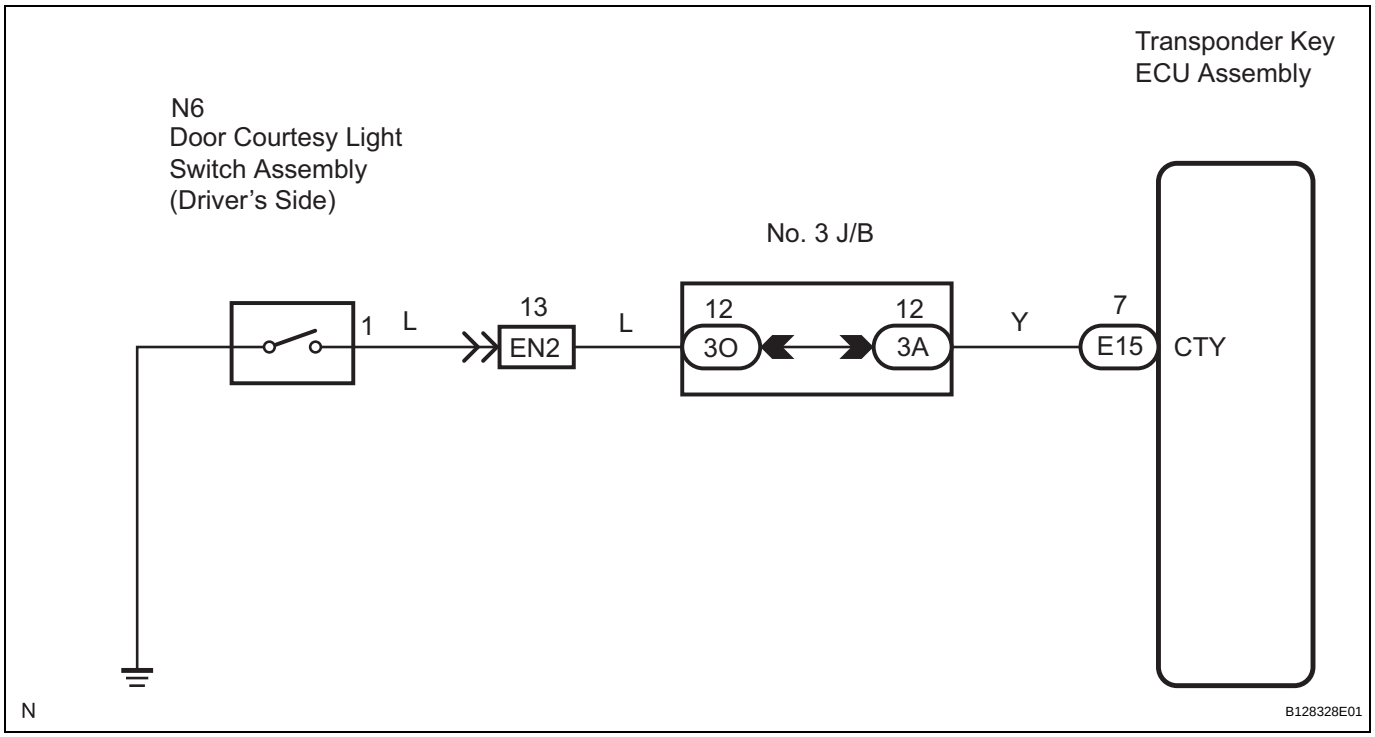
EI

Door Courtesy Switch Circuit

DESCRIPTION

When an additional transponder key is registered, the transponder key ECU assembly detects the front door courtesy light switch open/close condition, and enters the key registration mode.

WIRING DIAGRAM



INSPECTION PROCEDURE

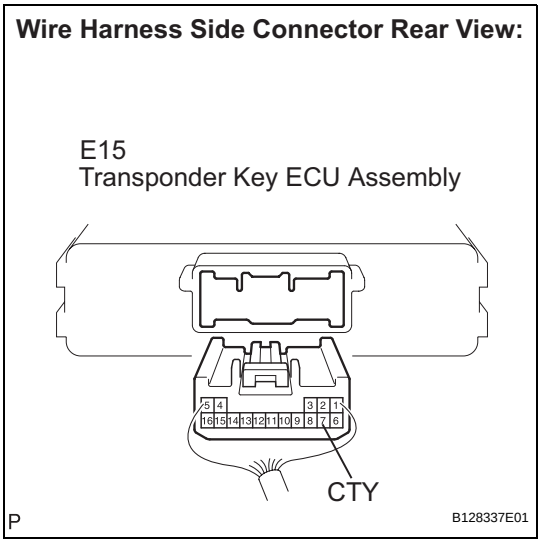
NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

EI

1	CHECK HARNESS AND CONNECTOR (FRONT DOOR COURTESY LIGHT SWITCH CIRCUIT)

Wire Harness Side Connector Rear View:



(a) Disconnect the E15 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

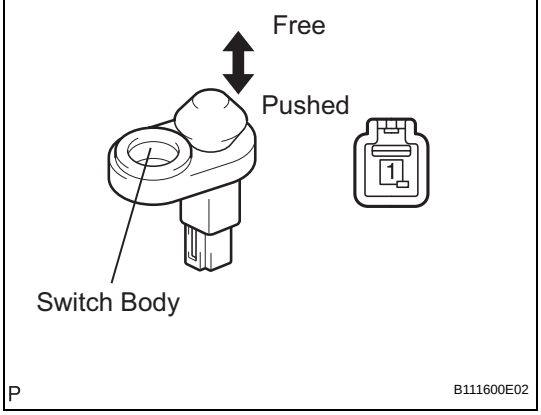
Tester Connection	Condition	Specified Condition
E15-7 (CTY) - Body ground	Courtesy switch pushed (Door closed)	10 kΩ or higher
	Courtesy switch free (Door open)	Below 1 Ω

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY

Front Door Courtesy Light Switch Side Connector Front View:



(a) Remove the driver side front door courtesy light switch (See page LI-128).
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Switch body	Courtesy switch pushed (Door closed)	10 kΩ or higher
	Courtesy switch free (Door open)	Below 1 Ω

NG → **REPLACE FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (TRANSPONDER KEY ECU - FRONT DOOR COURTESY LIGHT SWITCH)

EI

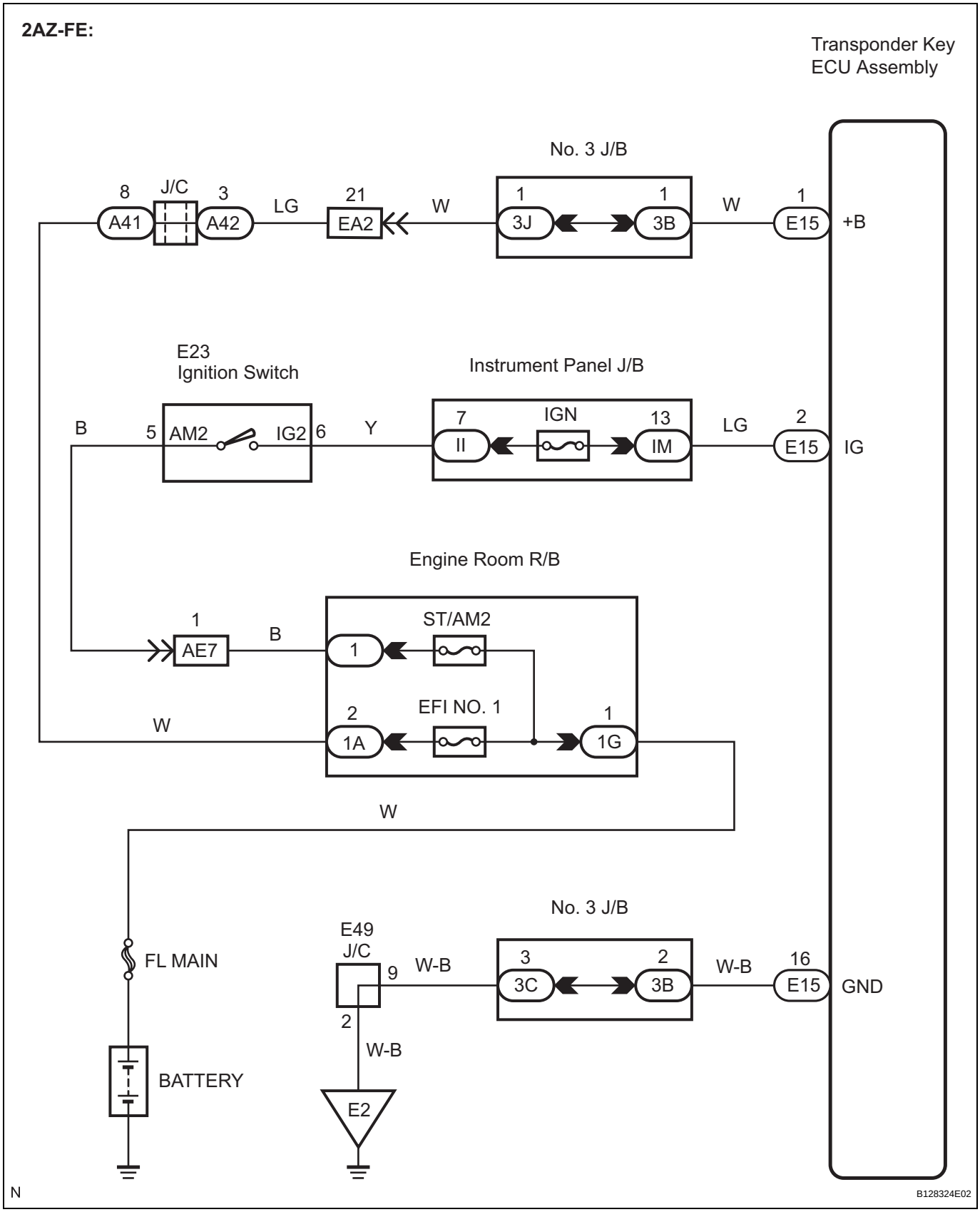
ECU Power Source Circuit

DESCRIPTION

This circuit provides power to operate the transponder key ECU assembly.

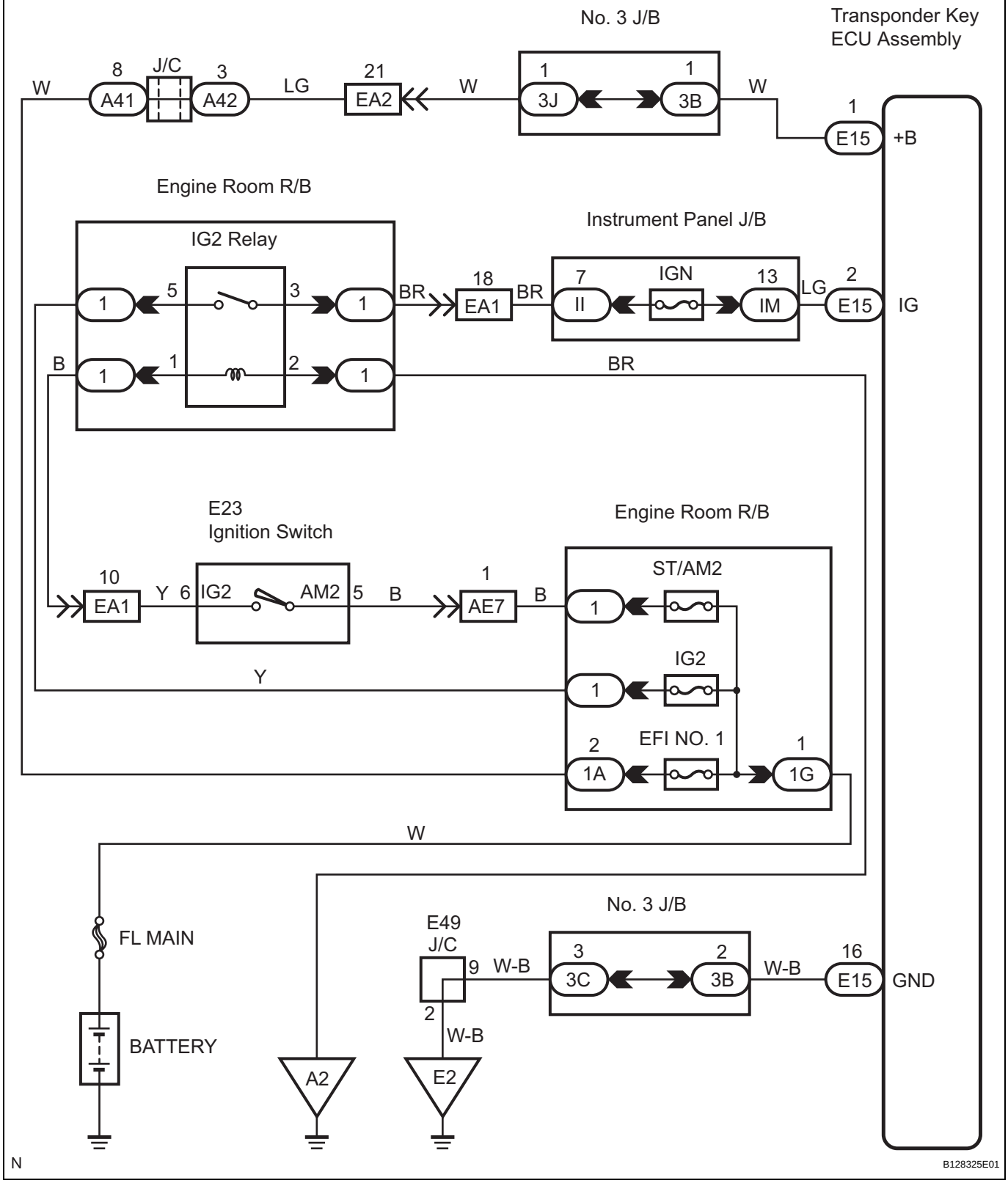
WIRING DIAGRAM

2AZ-FE:



EI

2GR-FE:

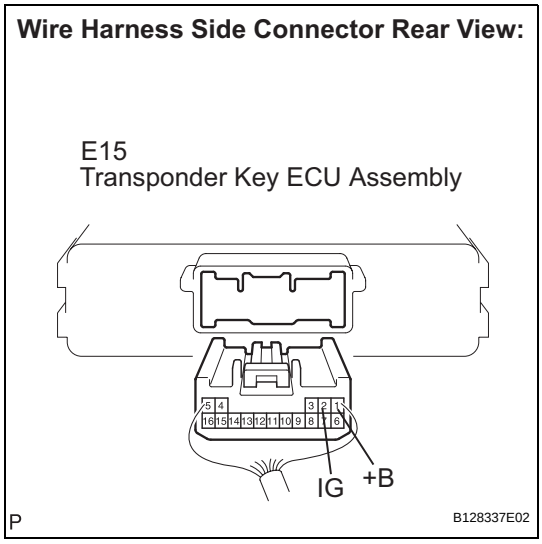


INSPECTION PROCEDURE

NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

1 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - BATTERY)



(a) Disconnect the E15 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

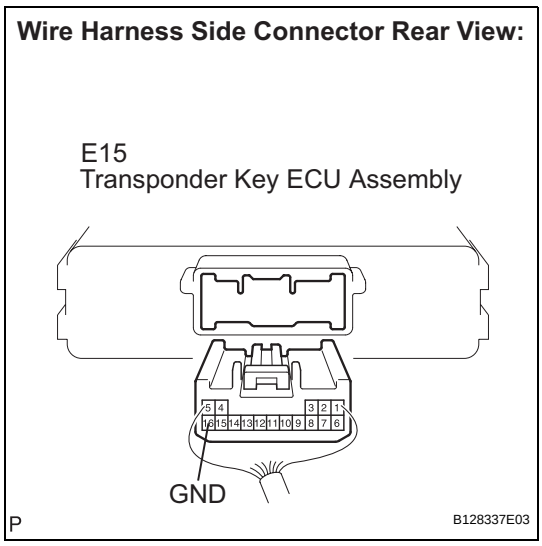
Standard voltage

Tester Connection	Condition	Specified Condition
E15-1 (+B) - Body ground	Always	10 to 14 V
E15-2 (IG) - Body ground	Ignition switch OFF	Below 1 V
	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR, OR REPLACE FUSE**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E15-16 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

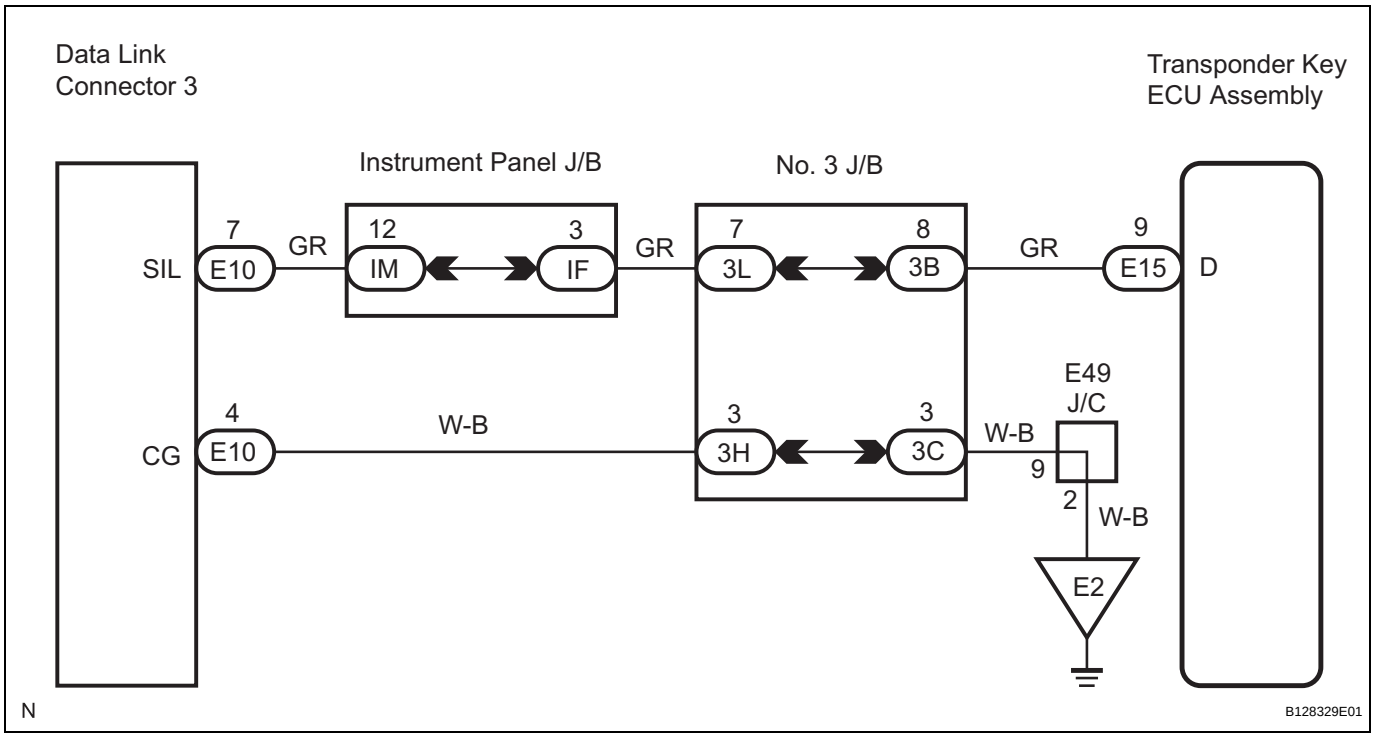
EI

Diagnosis Circuit

DESCRIPTION

This circuit is used to read the DTCs that are output from the transponder key ECU assembly with the intelligent tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

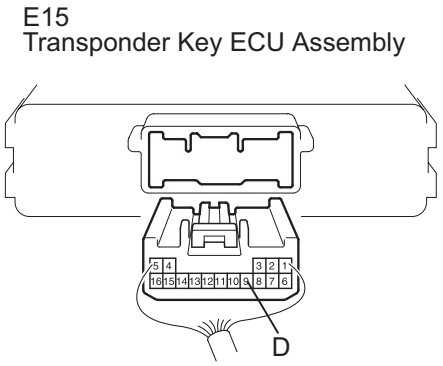
NOTICE:

If the transponder key ECU assembly is replaced, register the key and ECU communication ID (See page EI-57).

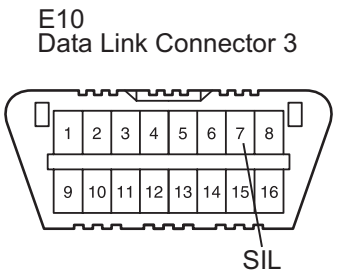
EI

1 CHECK HARNESS AND CONNECTOR (TRANSPONDER KEY ECU - DLC3)

Wire Harness Side Connector Rear View:



Wire Harness Side Connector Front View:



P B128341E01

(a) Disconnect the E15 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E15-9 (D) - E10-7 (SIL)	Always	Below 1 Ω
E15-9 (D) - Body ground		10 kΩ or higher

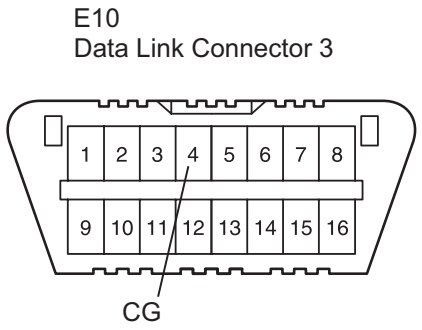
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

EI

2 CHECK HARNESS AND CONNECTOR (DLC3 - BODY GROUND)

Wire Harness Side Connector Front View:



P B124215E08

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

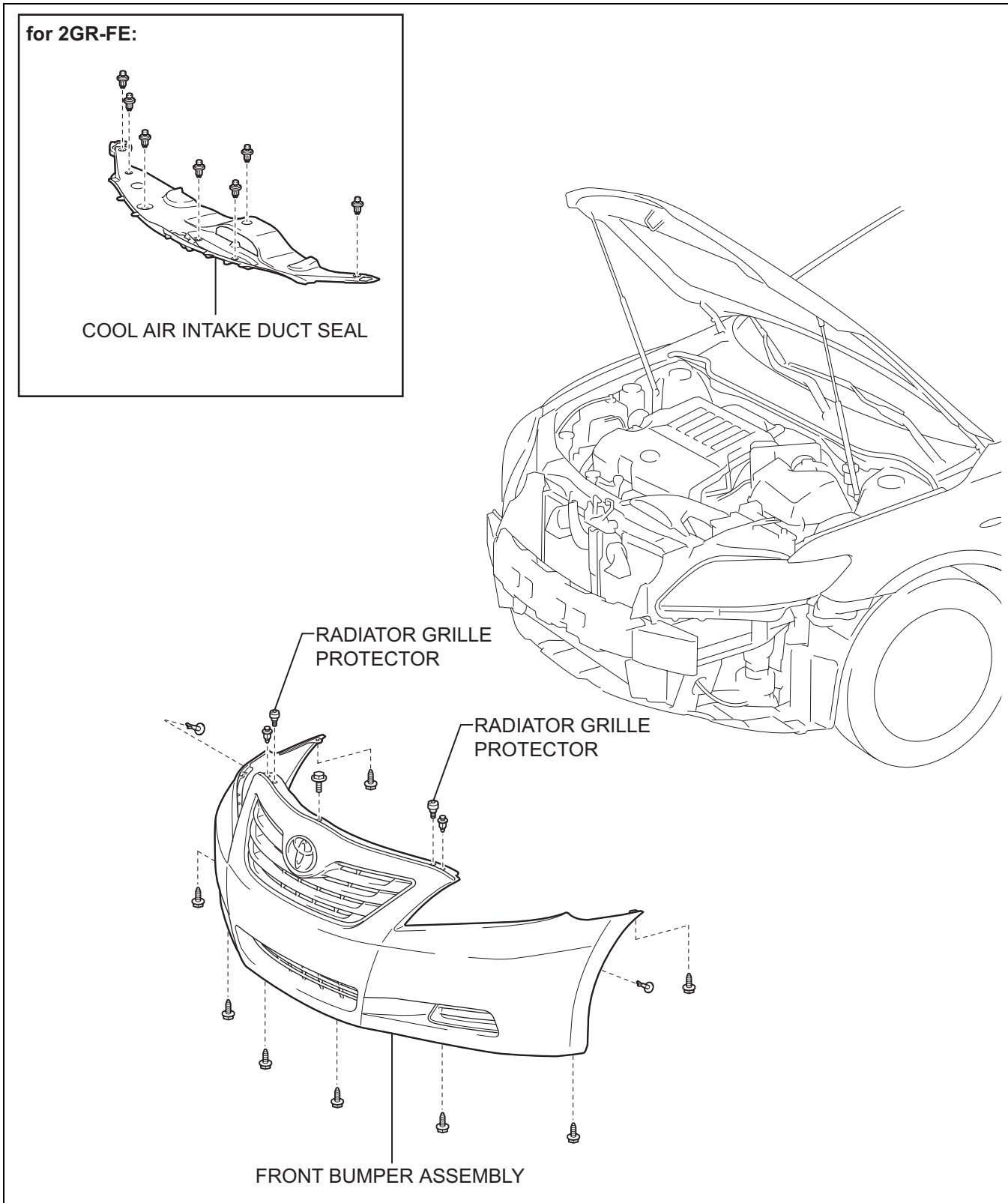
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

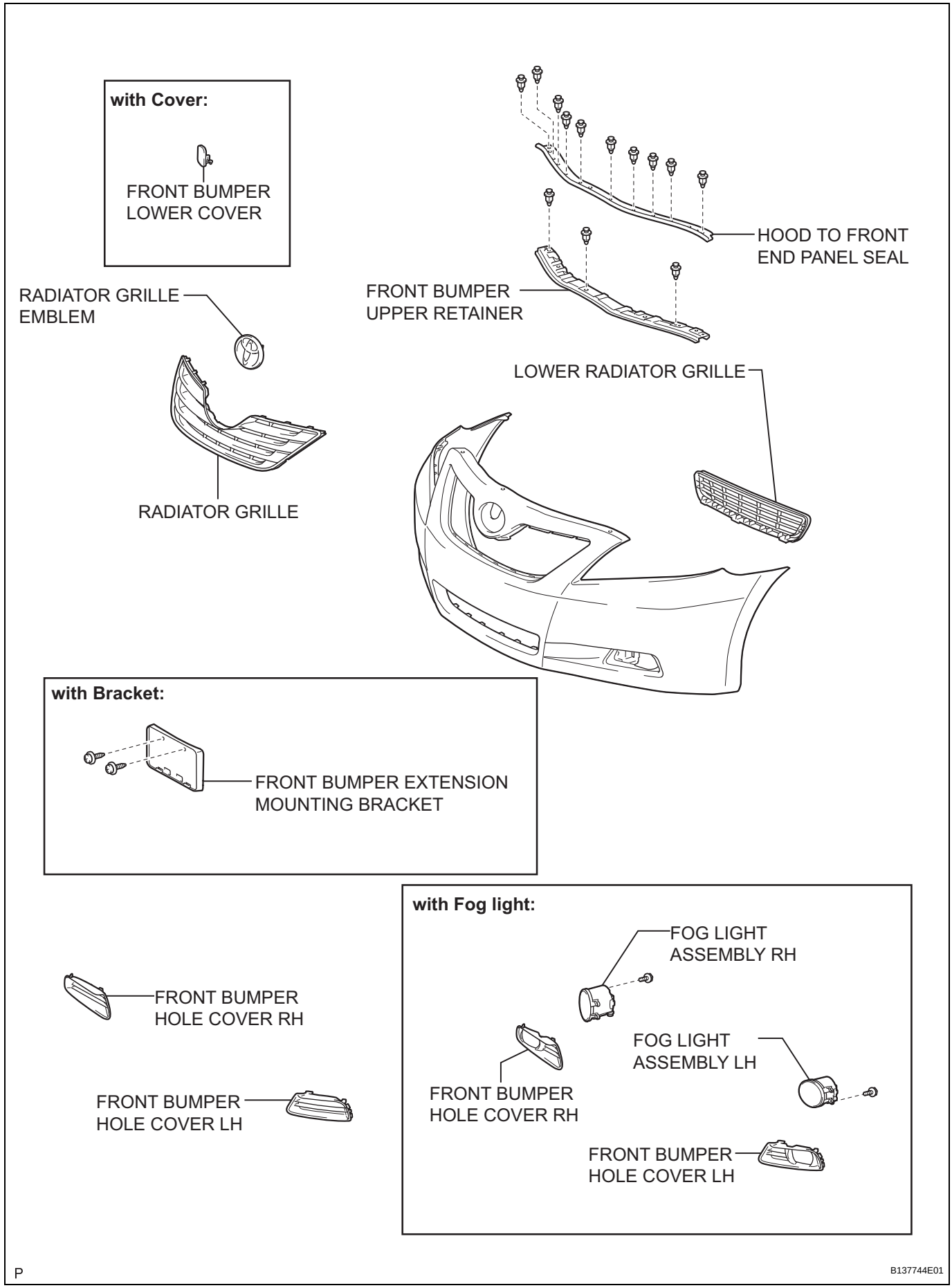
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

FRONT BUMPER

COMPONENTS

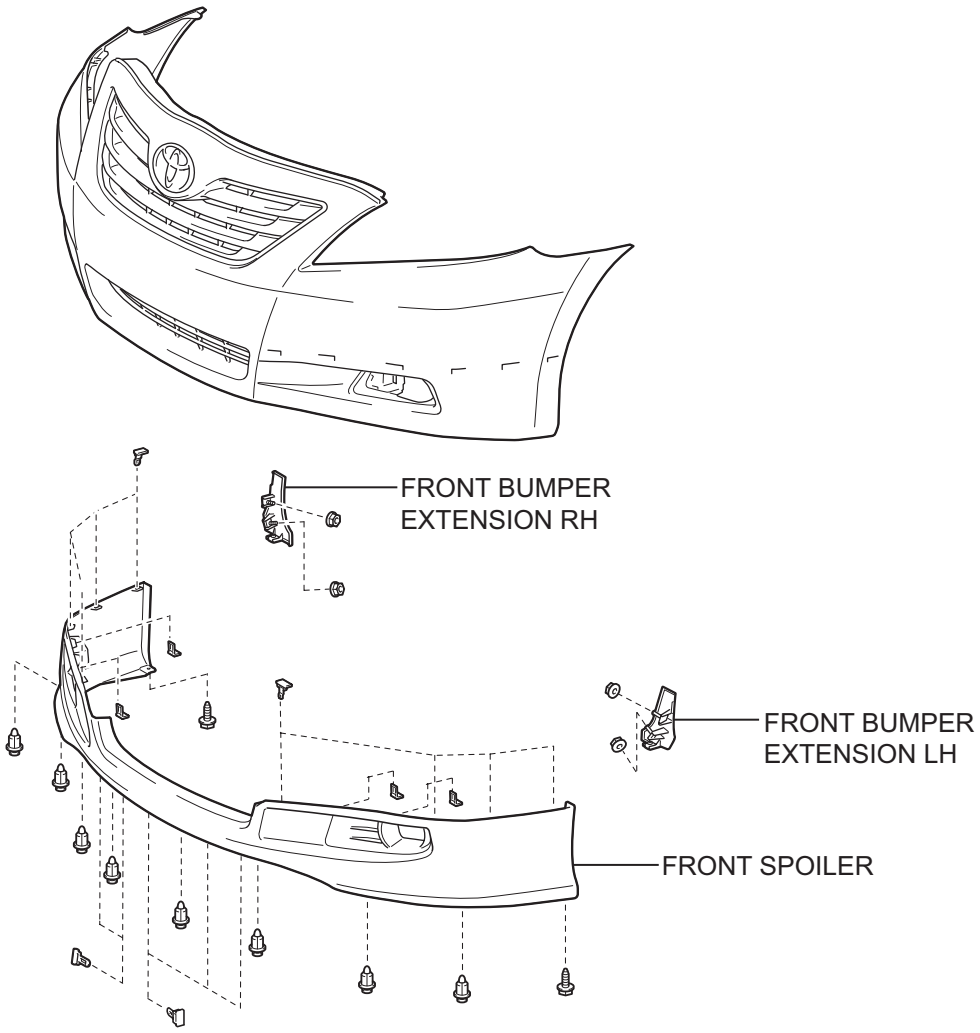




P

B137744E01

with Front Spoiler:

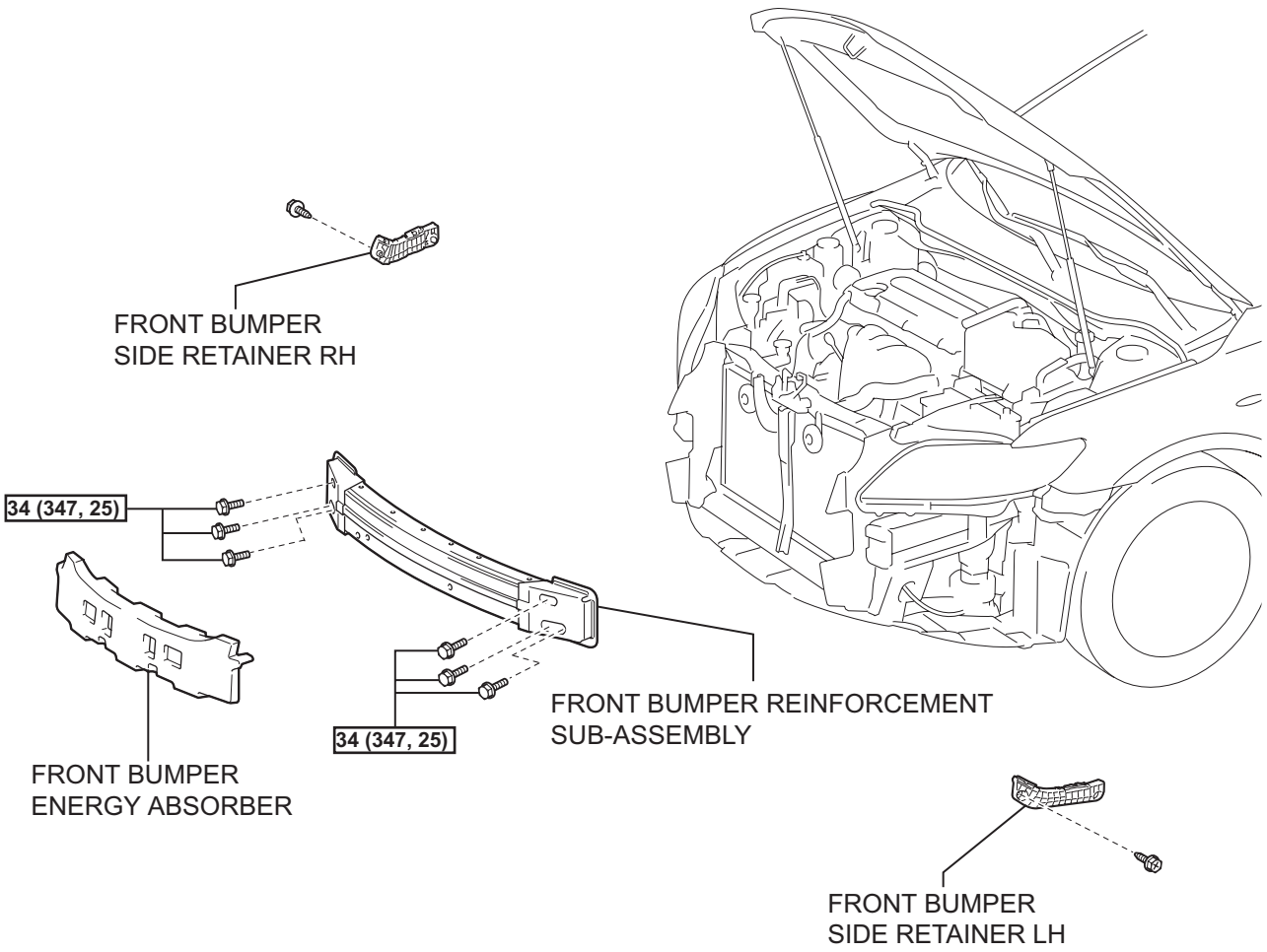


P

B137745E01

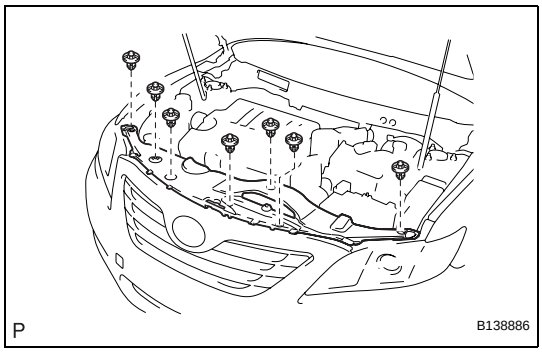
ET

ET



N*m (kgf*cm, ft.*lbf): Specified torque

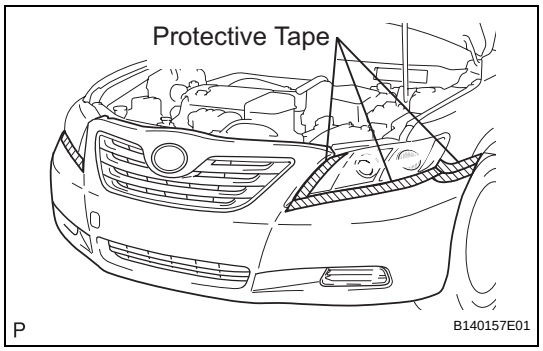
P B137743E01



P B138886

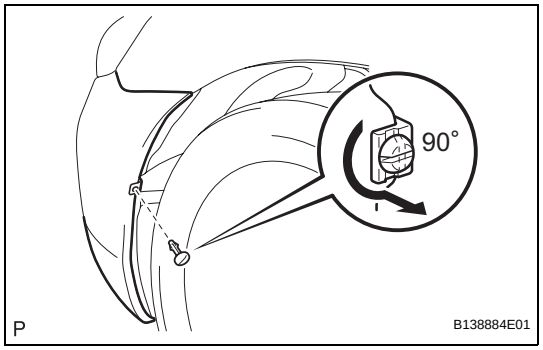
REMOVAL

1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE)**
   (a) Remove the 7 clips and cool air intake duct seal.

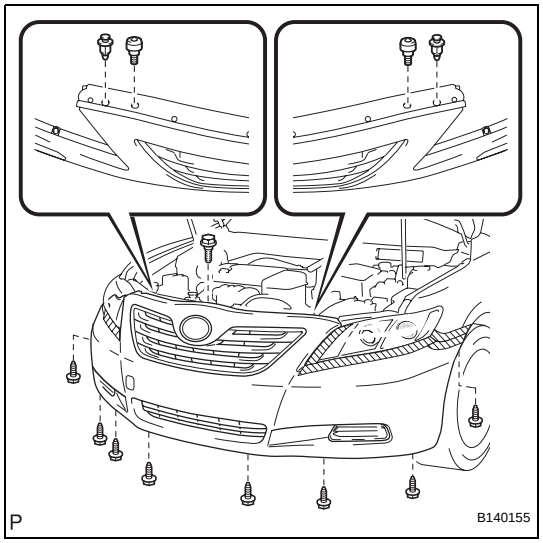


2. REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light)

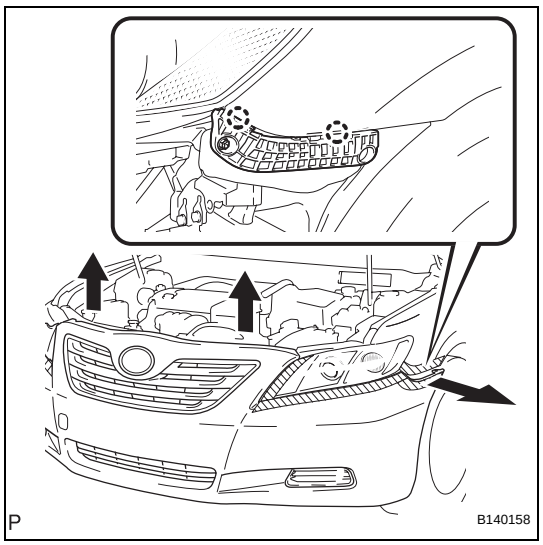
(a) Put protective tape around the front bumper assembly.



(b) Using a screwdriver, turn the pin 90 degrees and remove the pin hold clip.
HINT:
Use the same procedures for the RH side and LH side.

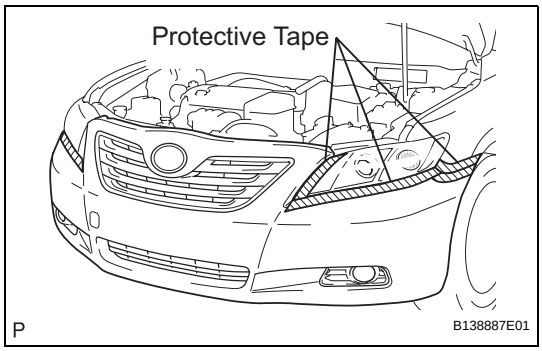


(c) Remove the 8 screws, 2 clips, 2 radiator grille protectors and bolt.



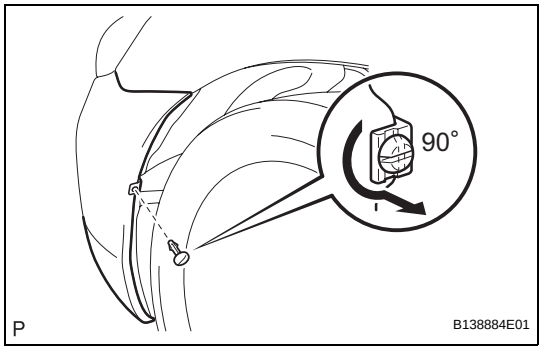
(d) Disengage the 2 claws and disconnect the front bumper assembly as shown in the illustration.
HINT:
Use the same procedures for the RH side and LH side.

(e) Remove the front bumper assembly.

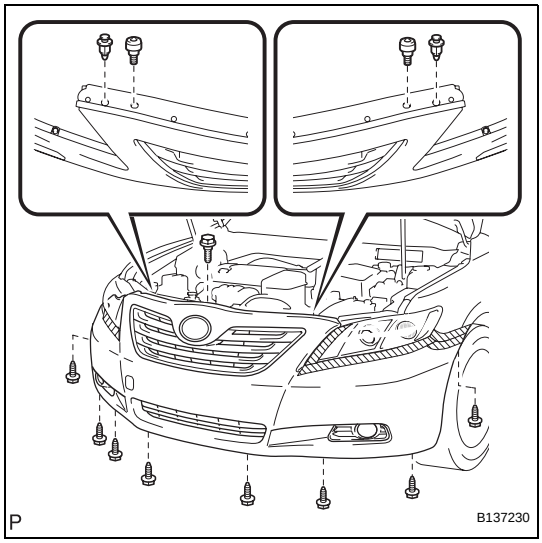


3. REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light)

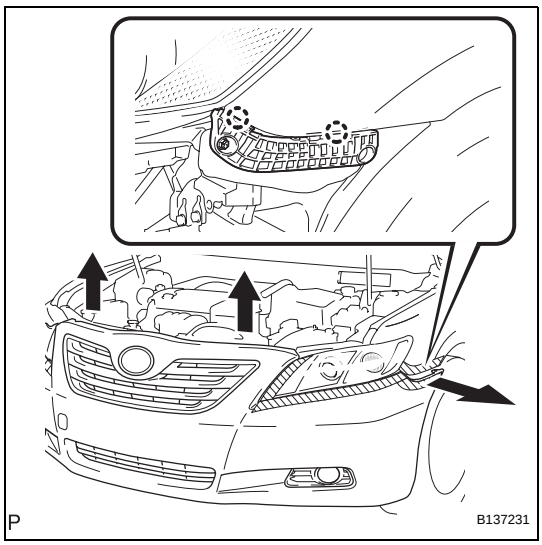
(a) Put protective tape around the front bumper assembly.



(b) Using a screwdriver, turn the pin 90 degrees and remove the pin hold clip.
HINT:
Use the same procedures for the RH side and LH side.



(c) Remove the 8 screws, 2 clips, 2 radiator grille protectors and bolt.

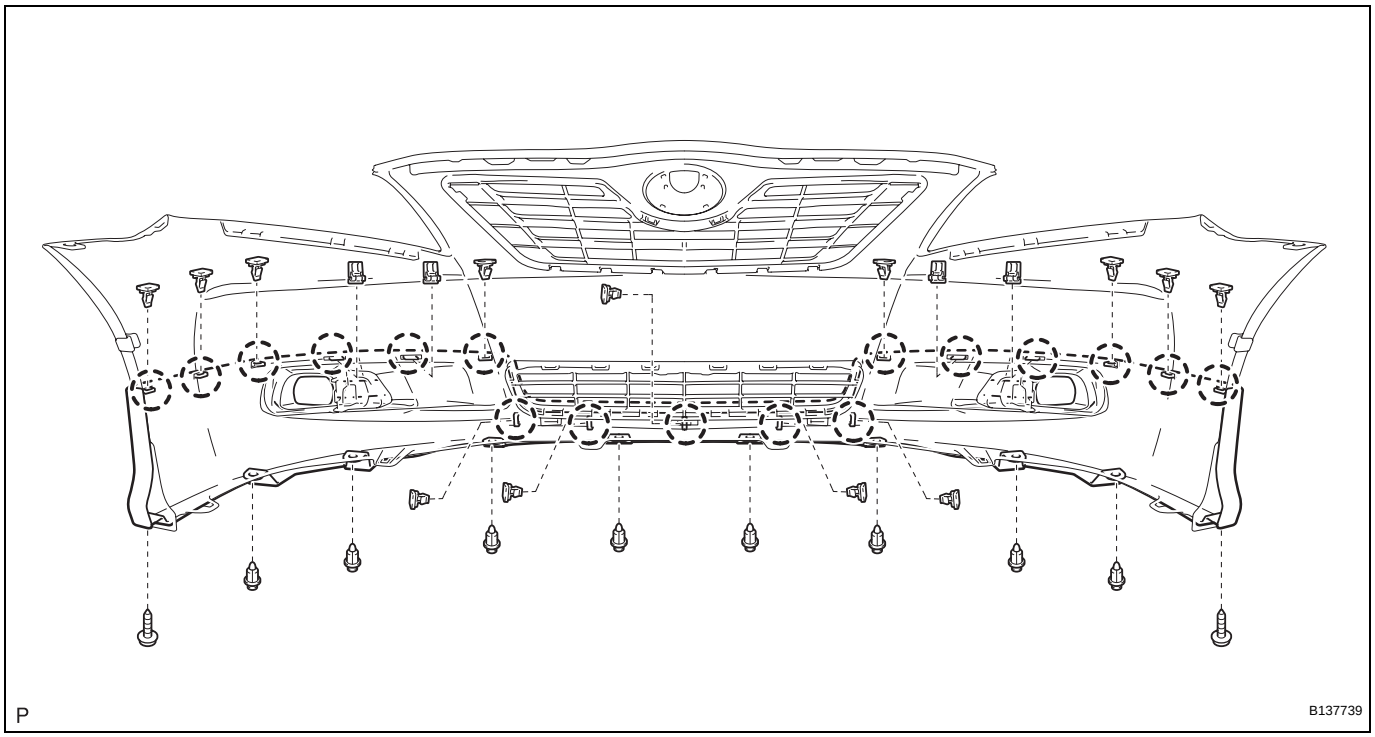


(d) Disengage the 2 claws and disconnect the front bumper assembly as shown in the illustration.
HINT:
Use the same procedures for the RH side and LH side.

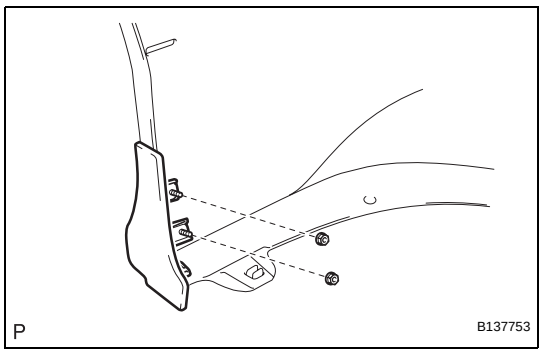
(e) Disconnect each connector, and then remove the front bumper assembly.

DISASSEMBLY

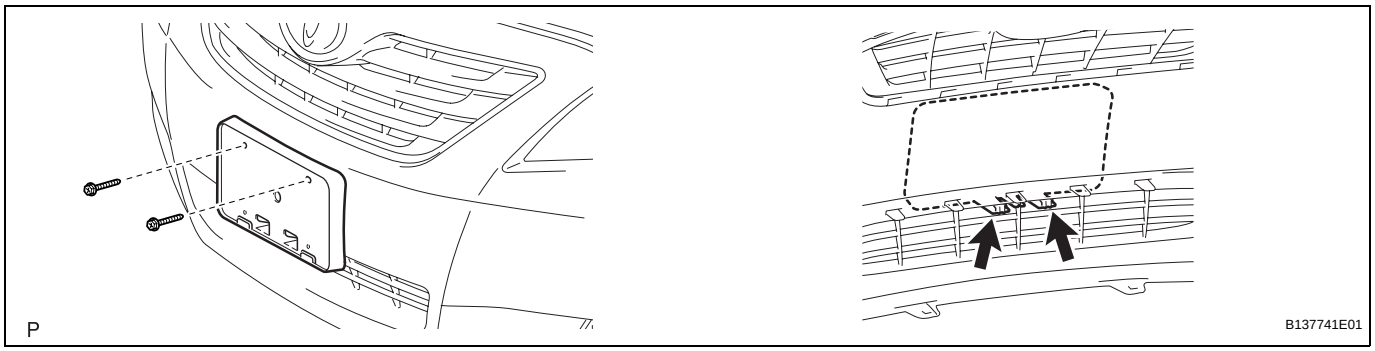
1. **REMOVE FOG LIGHT ASSEMBLY LH (w/ Fog Light) (See page LI-79)**
2. **REMOVE FOG LIGHT ASSEMBLY RH (w/ Fog Light)**
3. **REMOVE FRONT SPOILER (w/ Front Spoiler)**
   (a) Remove the 2 screws and 25 clips.



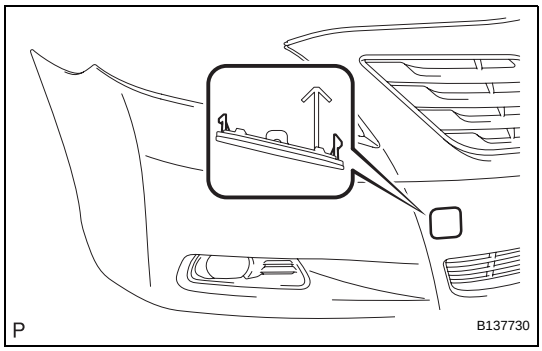
   (b) Disengage the 17 claws and remove the front spoiler.



4. **REMOVE FRONT BUMPER EXTENSION LH (w/ Front Spoiler)**
   (a) Remove the 2 nuts and front bumper extension LH.
5. **REMOVE FRONT BUMPER EXTENSION RH (w/ Front Spoiler)**
6. **REMOVE FRONT BUMPER EXTENSION MOUNTING BRACKET (w/ Bracket)**
   (a) Remove the 2 screws.

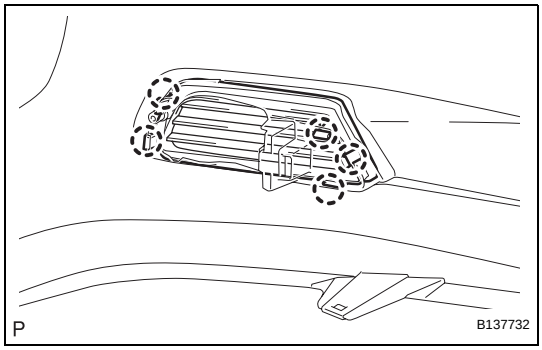


(b) Disengage the 2 claws and remove the front bumper extension mounting bracket.



7. REMOVE FRONT BUMPER LOWER COVER (w/ Cover)

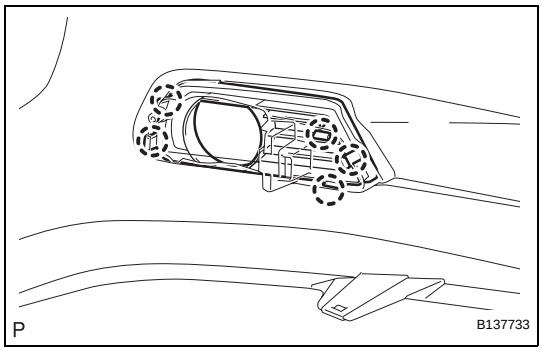
(a) Disengage the 2 claws and remove the front bumper lower cover.



8. REMOVE FRONT BUMPER HOLE COVER LH (w/o Fog Light)

(a) Disengage the 5 claws and remove the front bumper hole cover LH.

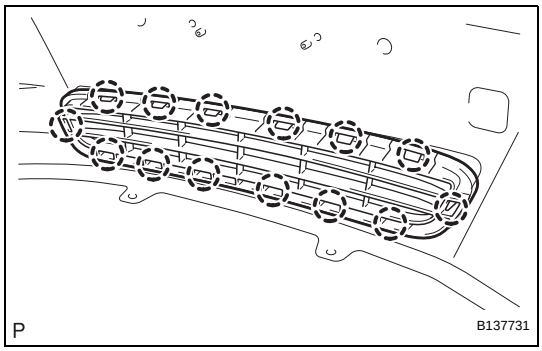
9. REMOVE FRONT BUMPER HOLE COVER RH (w/o Fog Light)



10. REMOVE FRONT BUMPER HOLE COVER LH (w/ Fog Light)

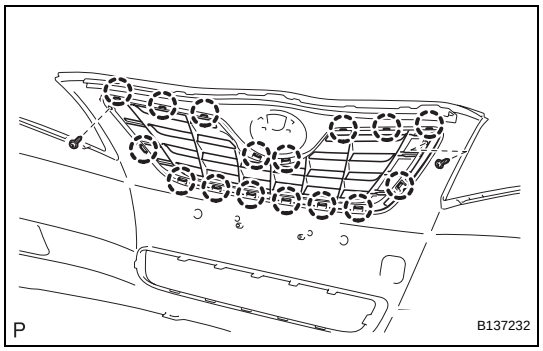
(a) Disengage the 5 claws and remove the front bumper hole cover LH.

11. REMOVE FRONT BUMPER HOLE COVER RH (w/ Fog Light)



12. REMOVE LOWER RADIATOR GRILLE

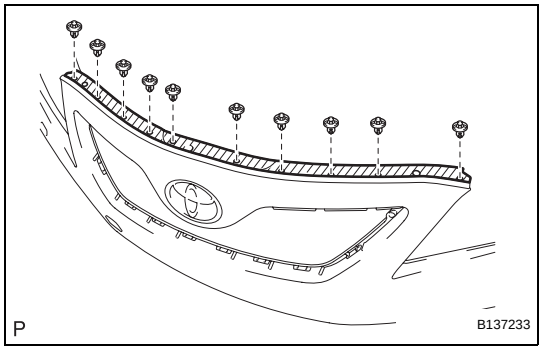
(a) Disengage the 14 claws and remove the lower radiator grille.



13. REMOVE RADIATOR GRILLE

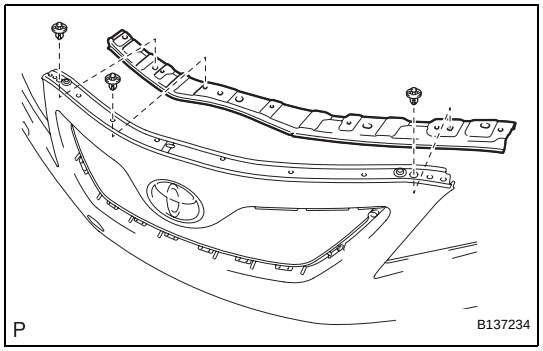
(a) Remove the 2 screws.

(b) Disengage the 16 claws and remove the radiator grille.



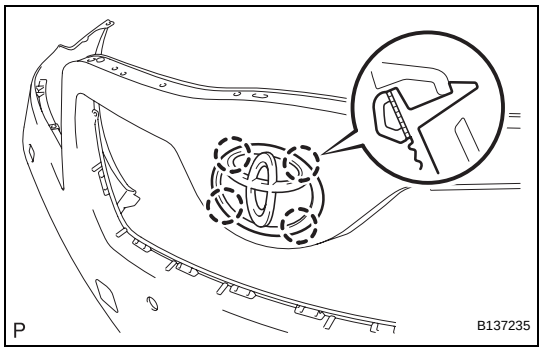
14. REMOVE HOOD TO FRONT END PANEL SEAL

(a) Remove the 10 clips and hood to front end panel seal.



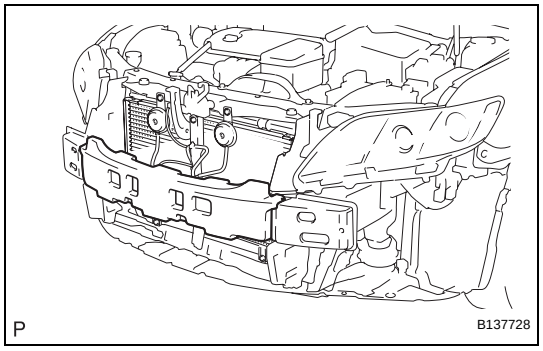
15. REMOVE FRONT BUMPER UPPER RETAINER

(a) Remove the 3 clips and front bumper upper retainer.



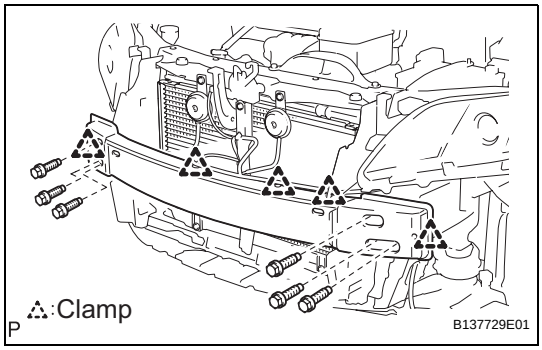
16. REMOVE RADIATOR GRILLE EMBLEM

(a) Disengage the 4 claws and remove the radiator grille emblem.

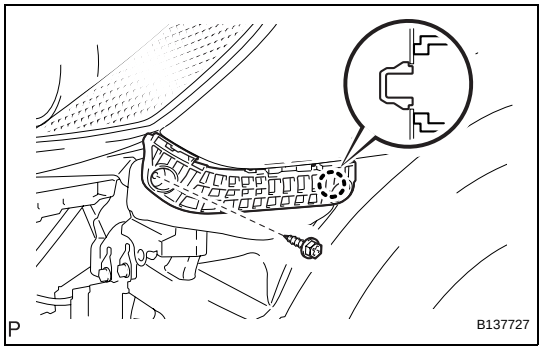


17. REMOVE FRONT BUMPER ENERGY ABSORBER

(a) Remove the front bumper energy absorber from the front bumper reinforcement sub-assembly.



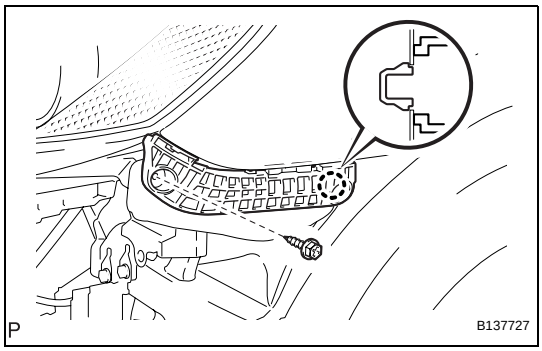
18. REMOVE FRONT BUMPER REINFORCEMENT SUB-ASSEMBLY
(a) Disengage each clamp.
(b) Remove the 6 bolts and front bumper reinforcement sub-assembly.



19. REMOVE FRONT BUMPER SIDE RETAINER LH
(a) Remove the screw.
(b) Disengage the claw and remove the front bumper side retainer LH.

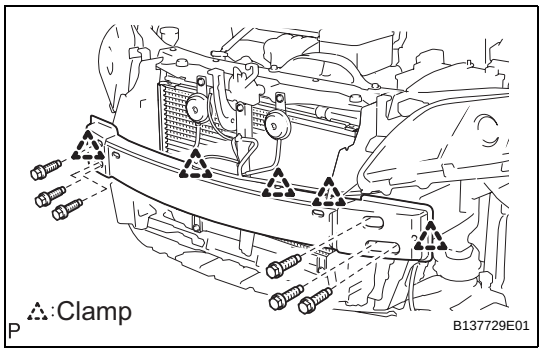
20. REMOVE FRONT BUMPER SIDE RETAINER RH

REASSEMBLY

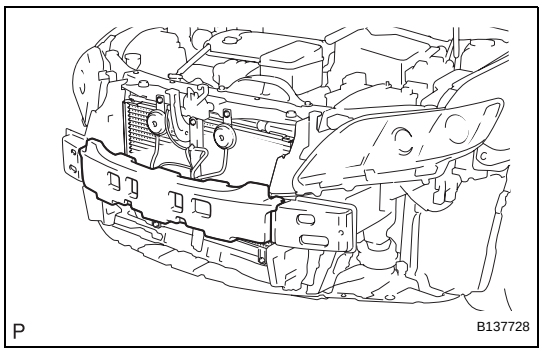


1. INSTALL FRONT BUMPER SIDE RETAINER LH
(a) Engage the claw and install the front bumper side retainer LH.
(b) Install the screw.

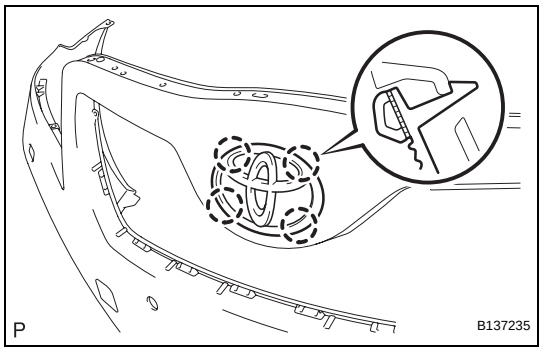
2. INSTALL FRONT BUMPER SIDE RETAINER RH



3. INSTALL FRONT BUMPER REINFORCEMENT SUB-ASSEMBLY
(a) Install the front bumper reinforcement sub-assembly with the 6 bolts.
Torque: 34 N*m (347 kgf*cm, 25 ft.*lbf)
(b) Engage each clamp.

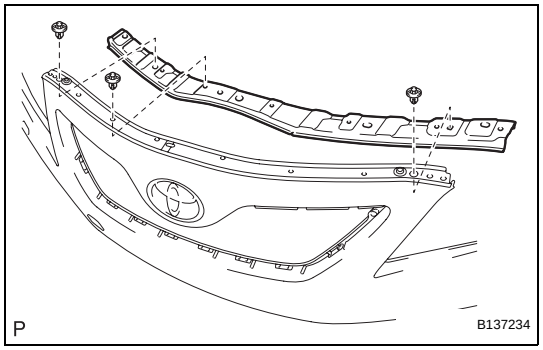


4. INSTALL FRONT BUMPER ENERGY ABSORBER
(a) Install the front bumper energy absorber to the front bumper reinforcement sub-assembly.



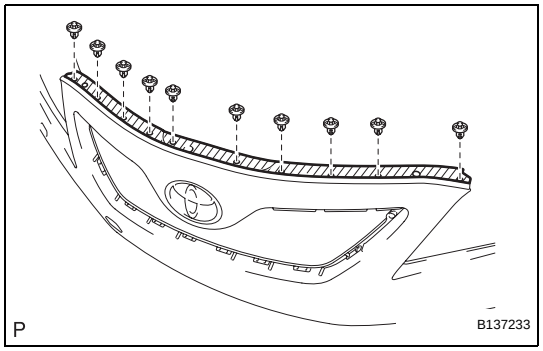
5. INSTALL RADIATOR GRILLE EMBLEM

(a) Engage the 4 claws and install the radiator grille emblem.



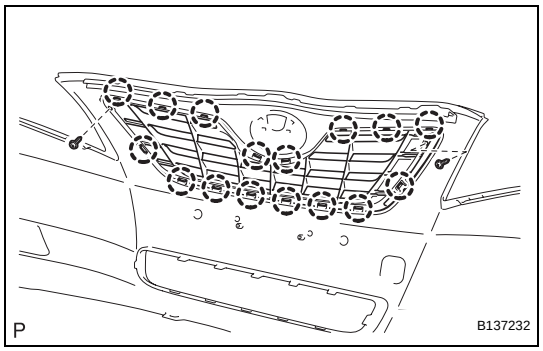
6. INSTALL FRONT BUMPER UPPER RETAINER

(a) Install the front bumper upper retainer with the 3 clips.



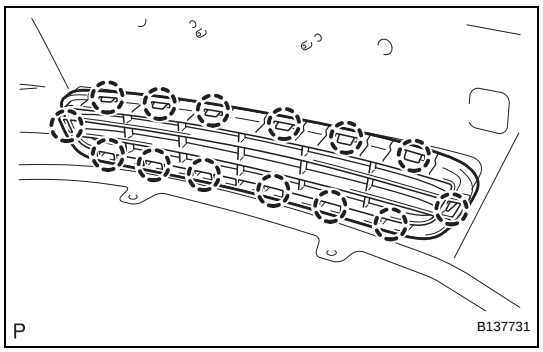
7. INSTALL HOOD TO FRONT END PANEL SEAL

(a) Apply new double-sided tape to the hood to front end panel seal.
(b) Remove the release paper from the hood to front end panel seal.
(c) Install the hood to front end panel seal with the 10 clips.



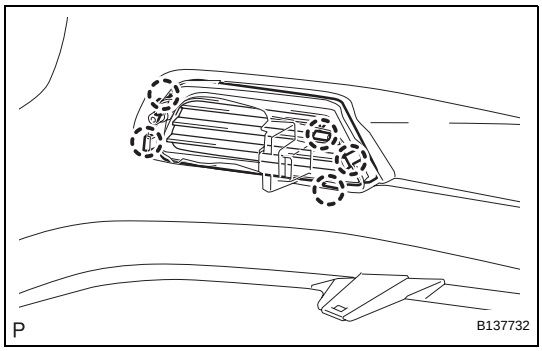
8. INSTALL RADIATOR GRILLE

(a) Engage the 16 claws and install the radiator grille.
(b) Install the 2 screws.



9. INSTALL LOWER RADIATOR GRILLE

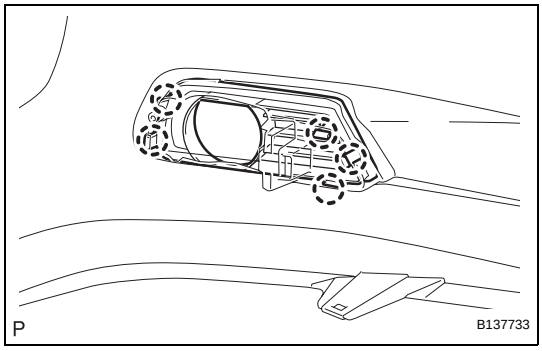
(a) Engage the 14 claws and install the lower radiator grille.



10. INSTALL FRONT BUMPER HOLE COVER LH (w/o Fog Light)

(a) Engage the 5 claws and install the front bumper hole cover LH.

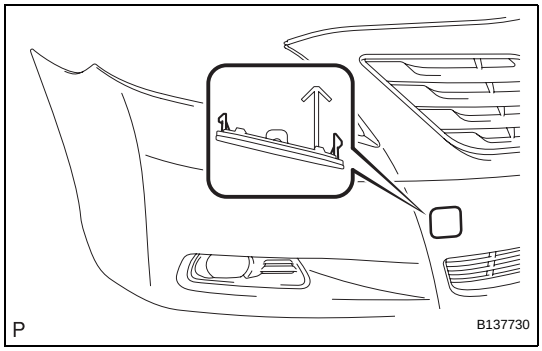
11. INSTALL FRONT BUMPER HOLE COVER RH (w/o Fog Light)



12. INSTALL FRONT BUMPER HOLE COVER LH (w/ Fog Light)

(a) Engage the 5 claws and install the front bumper hole cover LH.

13. INSTALL FRONT BUMPER HOLE COVER RH (w/ Fog Light)

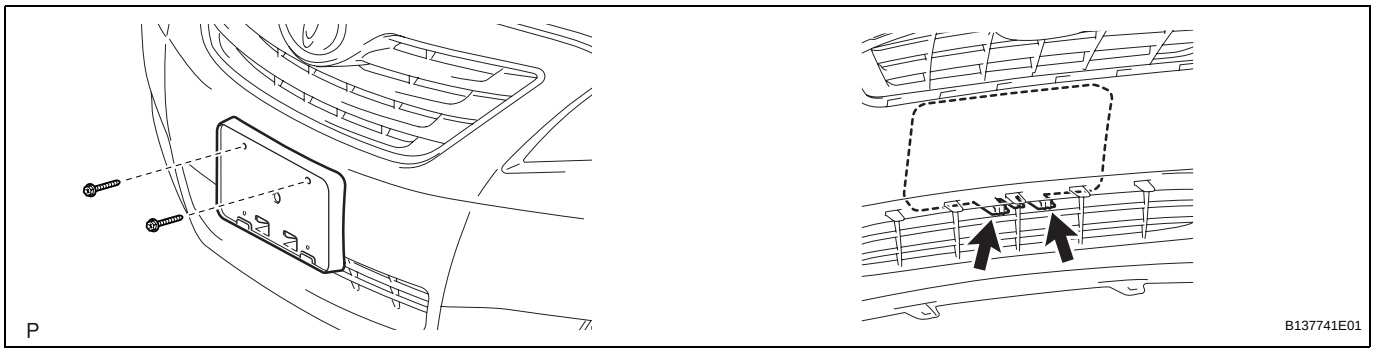


14. INSTALL FRONT BUMPER LOWER COVER (w/ Cover)

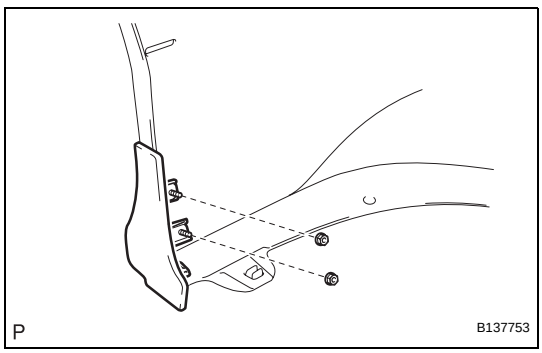
(a) Engage the 2 claws and install the front bumper lower cover.

15. INSTALL FRONT BUMPER EXTENSION MOUNTING BRACKET (w/ Bracket)

(a) Engage the 2 claws and install the front bumper extension mounting bracket.



(b) Install the 2 screws.



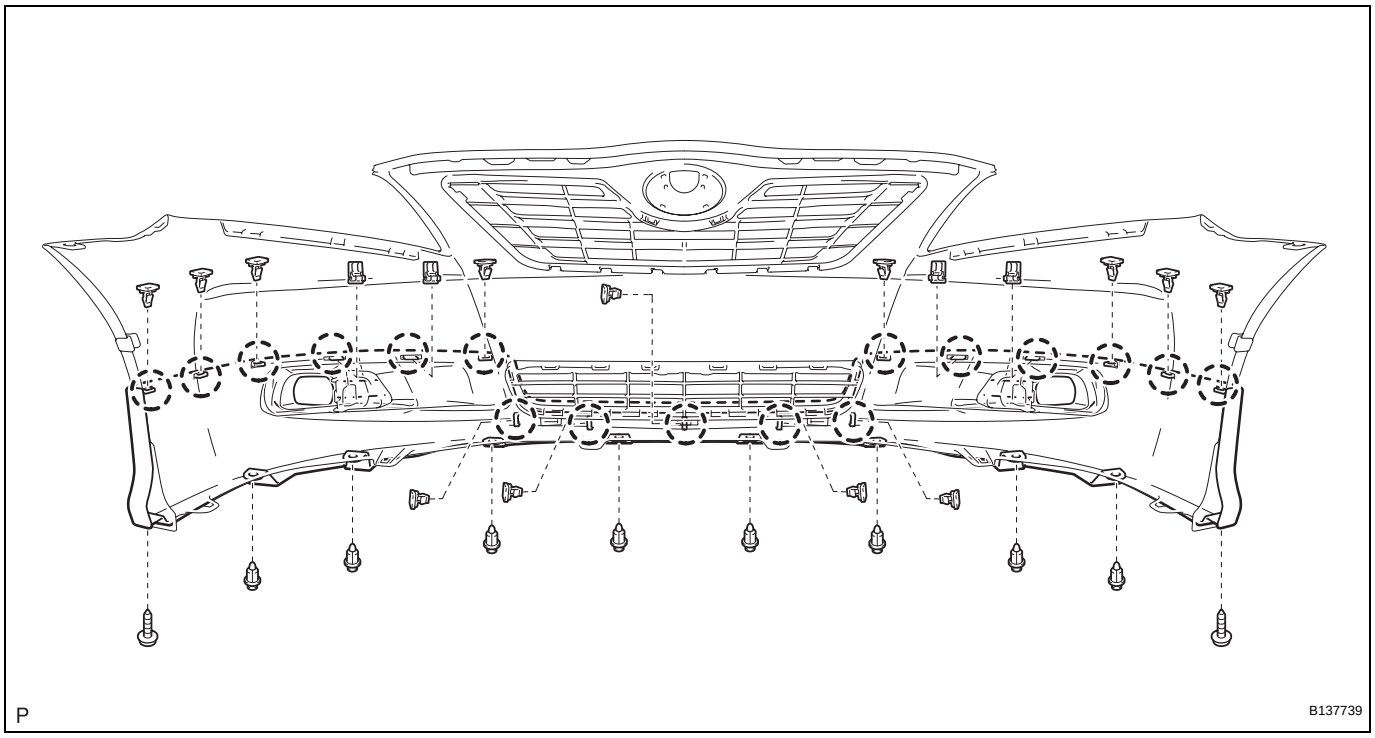
16. INSTALL FRONT BUMPER EXTENSION LH (w/ Front Spoiler)

(a) Install the front bumper extension LH with the 2 nuts.

17. INSTALL FRONT BUMPER EXTENSION RH (w/ Front Spoiler)

18. INSTALL FRONT SPOILER (w/ Front Spoiler)

(a) Engage the 17 claws and install the front spoiler.

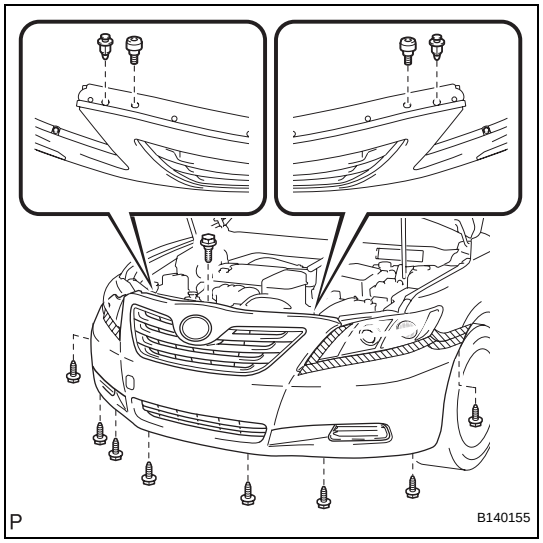


(b) Install the 25 clips and 2 screws.

19. INSTALL FOG LIGHT ASSEMBLY LH (w/ Fog Light) (See page LI-82)

20. INSTALL FOG LIGHT ASSEMBLY RH (w/ Fog Light)

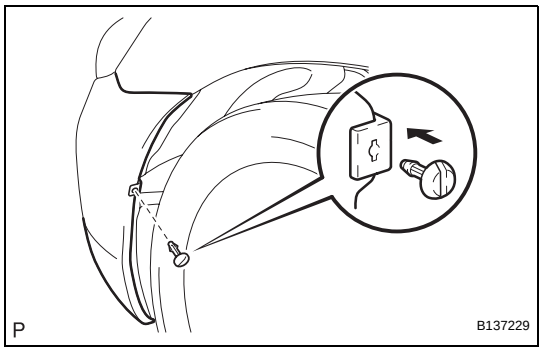
INSTALLATION



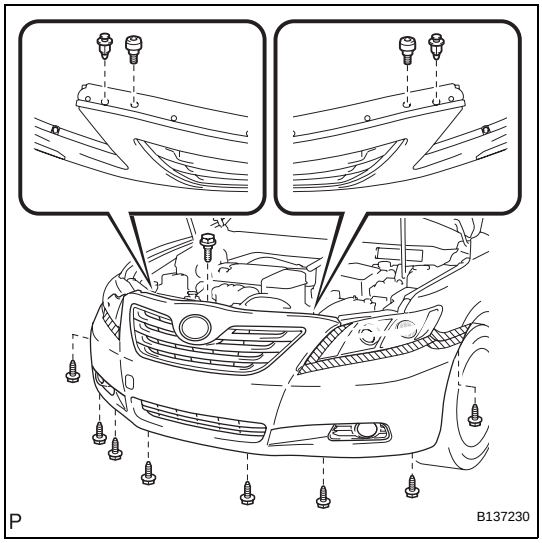
1. INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light)

(a) Engage each claw.

(b) Install the front bumper assembly with the 8 screws, 2 clips, 2 radiator grille protectors and bolt.

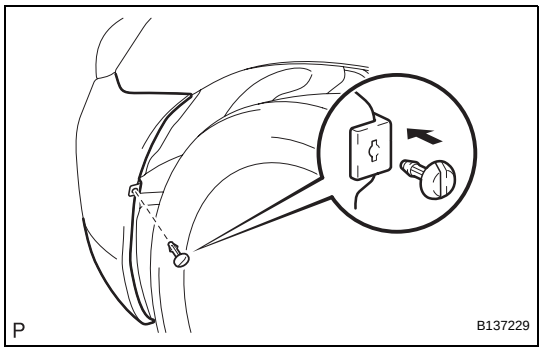


(c) Install the pin hold clip.
HINT:
Use the same procedures for the RH side and LH side.

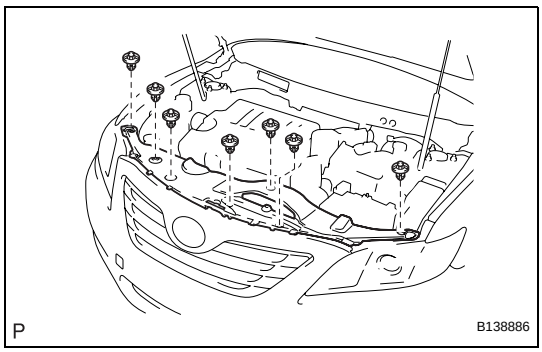


2. INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light)

(a) Connect each connector.
(b) Engage each claw.
(c) Install the front bumper assembly with the 8 screws, 2 clips, 2 radiator grille protectors and bolt.



(d) Install the pin hold clip.
HINT:
Use the same procedures for the RH side and LH side.



3. INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE)

(a) Install the cool air intake duct seal with the 7 clips.

4. VEHICLE PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-79)

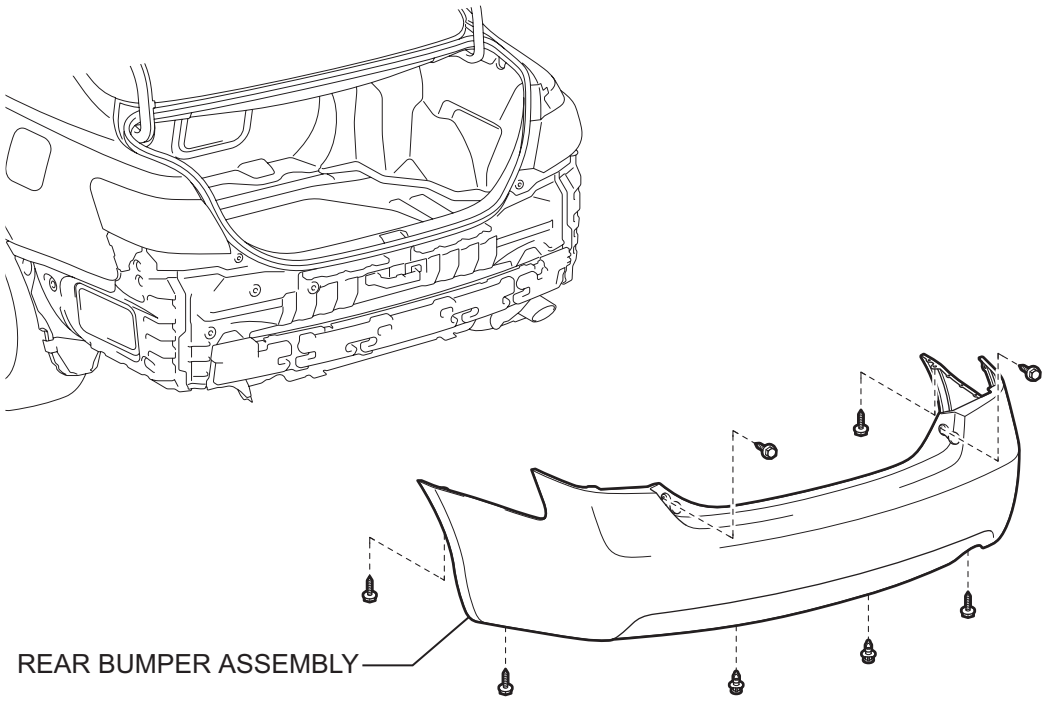
5. PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-80)

6. INSPECT FOG LIGHT AIMING (w/ Fog Light) (See page LI-81)

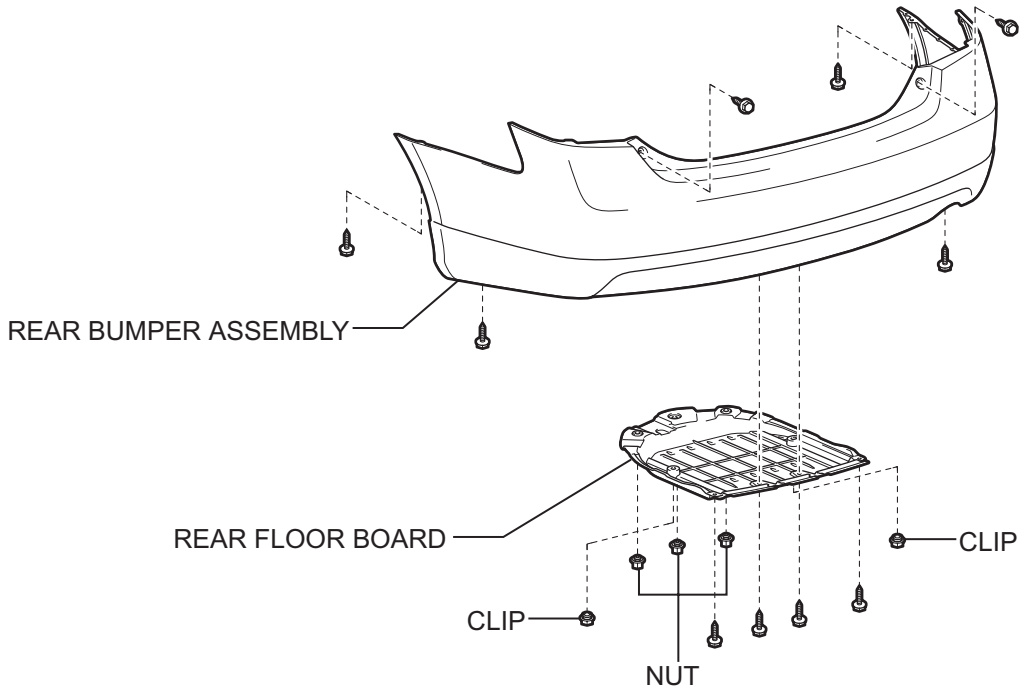
7. ADJUST FOG LIGHT AIMING (w/ Fog Light) (See page LI-82)

REAR BUMPER

COMPONENTS

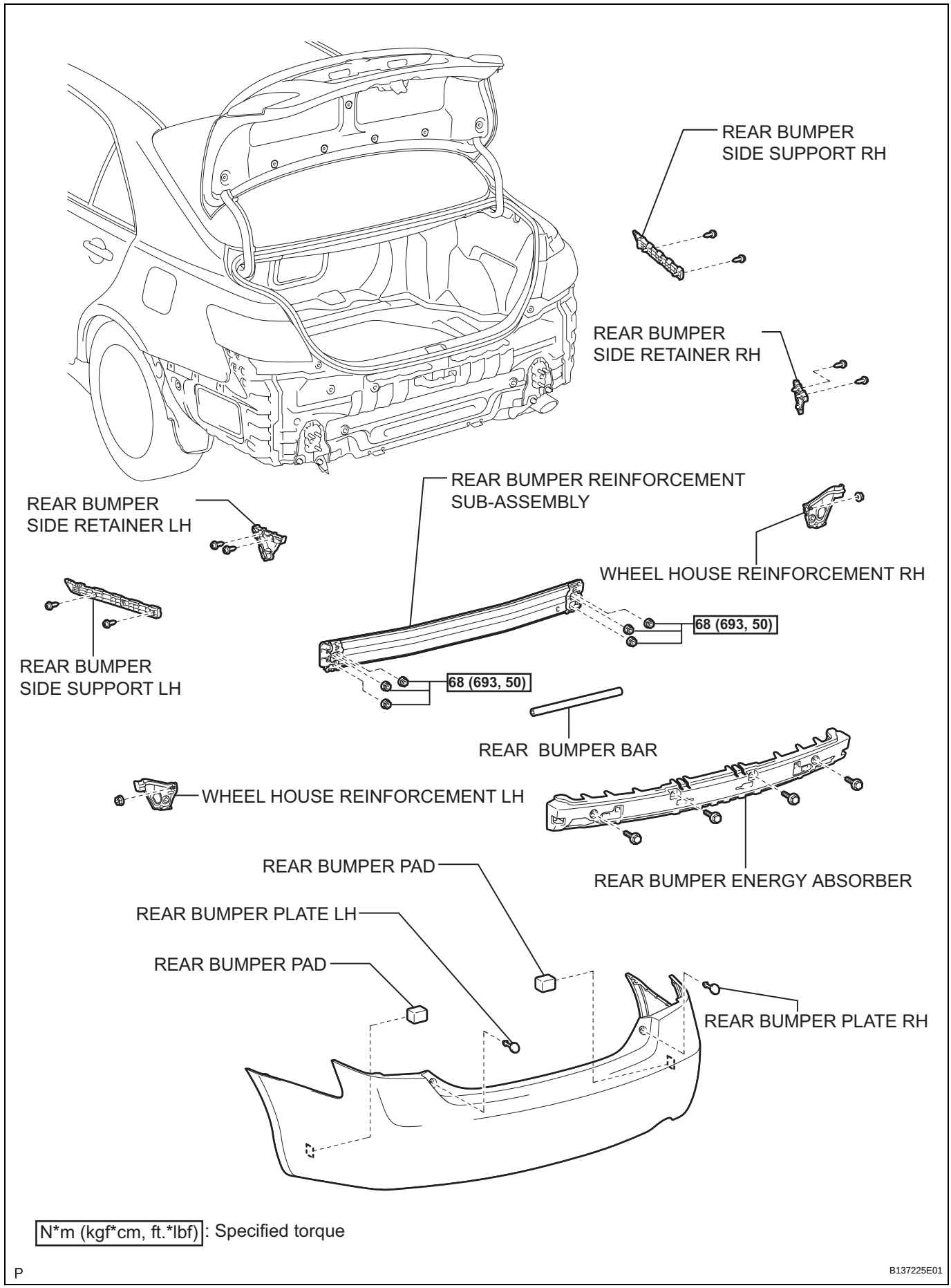


with Rear Lower Spoiler:



P

B137224E01

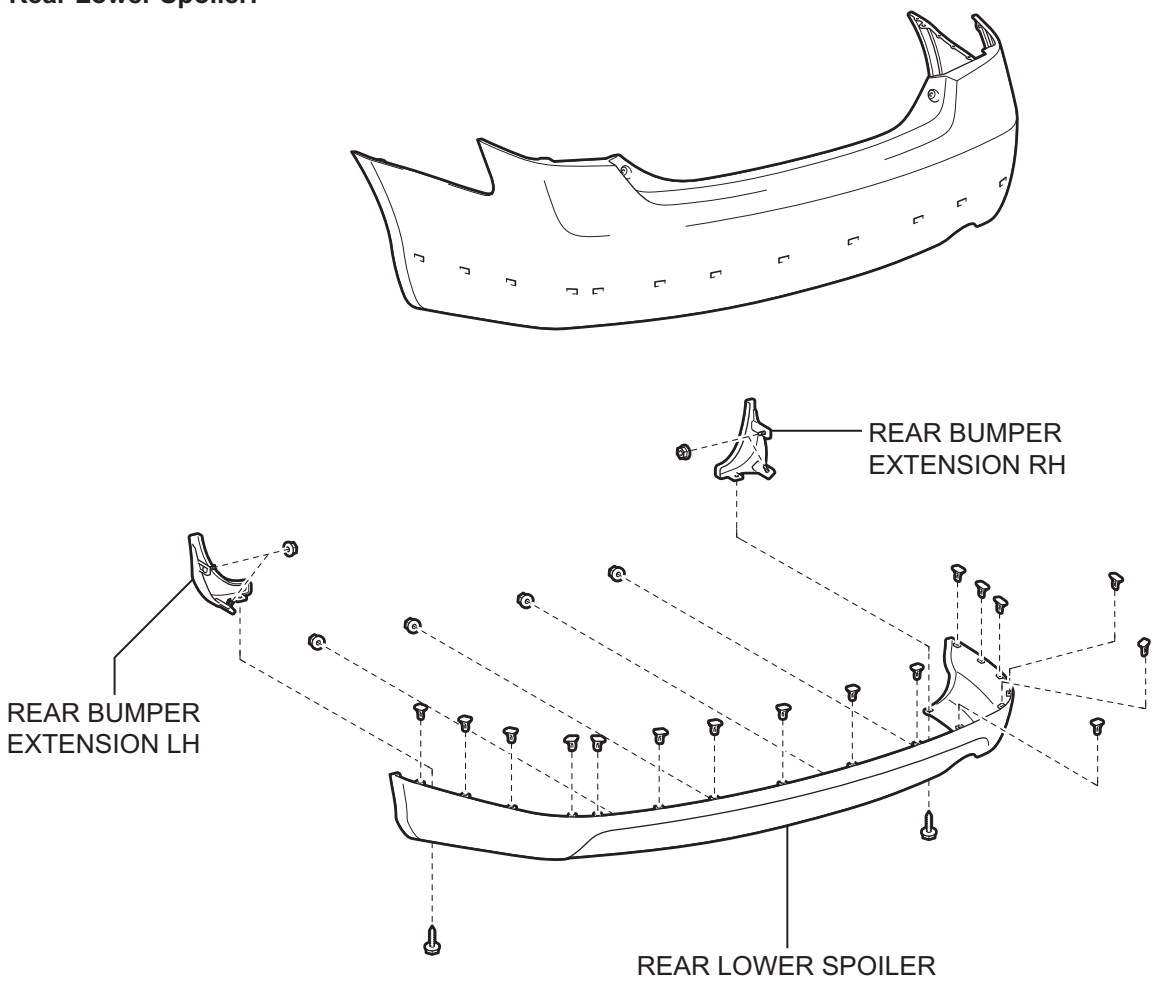


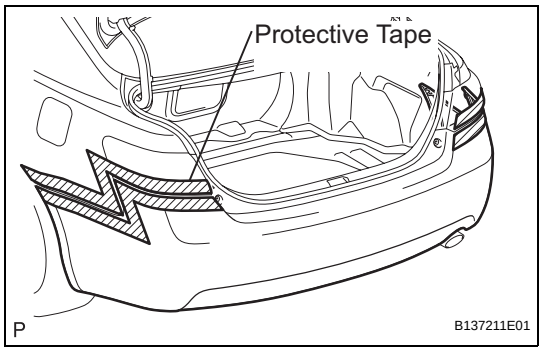
N*m (kgf*cm, ft.*lbf): Specified torque

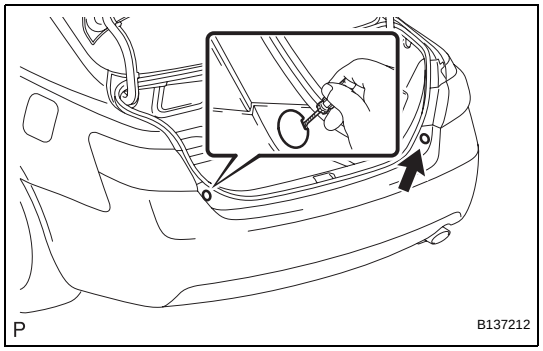
P

B137225E01

with Rear Lower Spoiler:





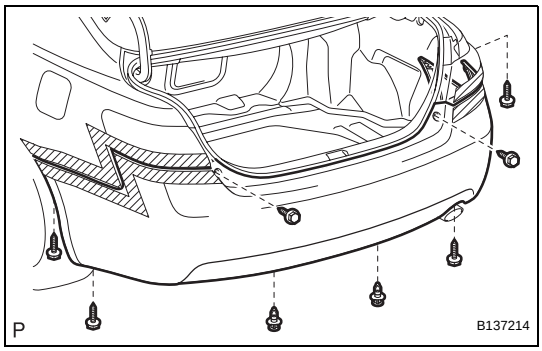


REMOVAL

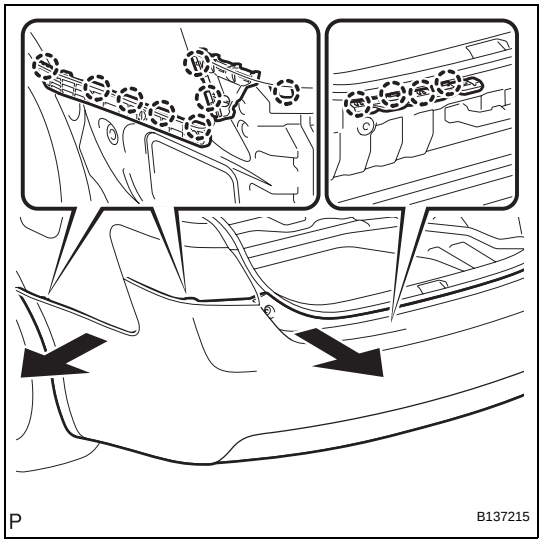
1. REMOVE REAR BUMPER ASSEMBLY (w/o Rear Lower Spoiler)

(a) Put protective tape around the rear bumper assembly.

(b) Using a screwdriver, open the 2 rear bumper plates.
HINT:
Tape the screwdriver tip before use.

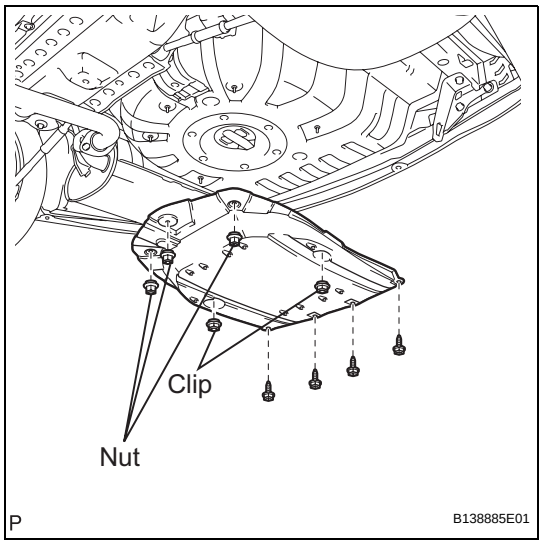


(c) Remove the 6 screws and 2 clips.



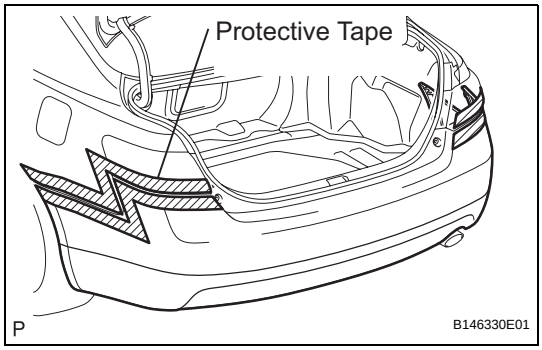
(d) Disengage the 12 claws and disconnect the rear bumper assembly as shown in the illustration.
HINT:
Use the same procedures for the RH side and LH side.

(e) Remove the rear bumper assembly.



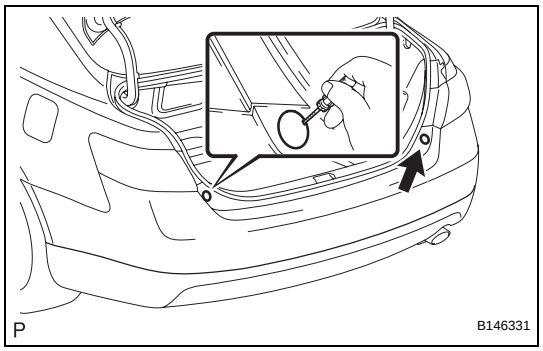
2. REMOVE REAR FLOOR BOARD (w/ Rear Lower Spoiler)

(a) Remove the 4 screws, 2 clips, 3 nuts and rear floor board.

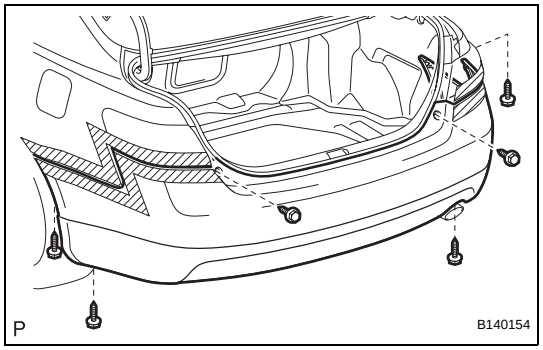


3. REMOVE REAR BUMPER ASSEMBLY (w/ Rear Lower Spoiler)

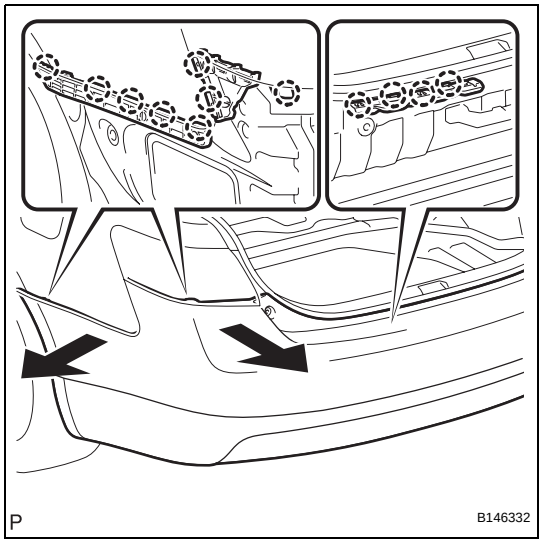
(a) Put protective tape around the rear bumper assembly.



(b) Using a screwdriver, open the 2 rear bumper plates.
HINT:
Tape the screwdriver tip before use.



(c) Remove the 6 screws.



(d) Disengage the 12 claws and disconnect the rear bumper assembly as shown in the illustration.
HINT:
Use the same procedures for the RH side and LH side.

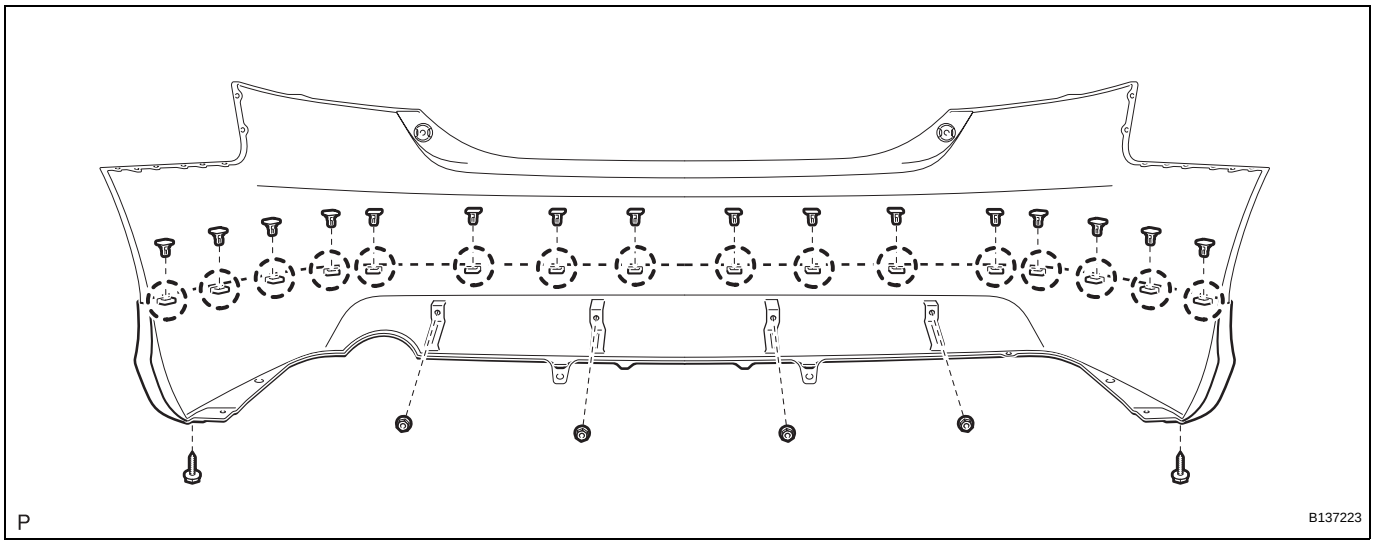
(e) Remove the rear bumper assembly.

ET

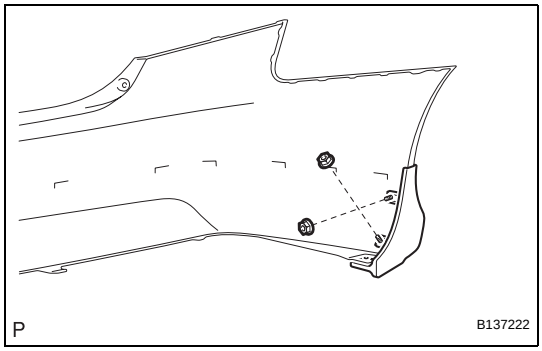
DISASSEMBLY

1. REMOVE REAR LOWER SPOILER (w/ Rear Lower Spoiler)

(a) Remove the 2 screws, 4 nuts and 16 clips.



(b) Disengage the 16 claws and remove the rear lower spoiler.



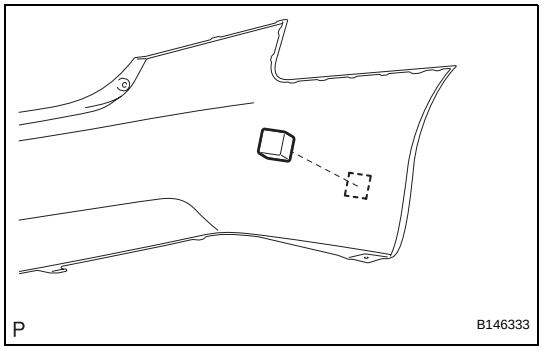
2. REMOVE REAR BUMPER EXTENSION LH (w/ Rear Lower Spoiler)

(a) Remove the 2 nuts and rear bumper extension LH.

3. REMOVE REAR BUMPER EXTENSION RH (w/ Rear Lower Spoiler)

4. REMOVE REAR BUMPER PLATE LH

5. REMOVE REAR BUMPER PLATE RH

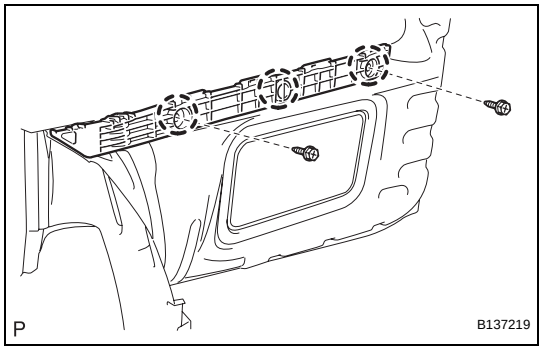


6. REMOVE REAR BUMPER PAD

(a) Remove the rear bumper pad.

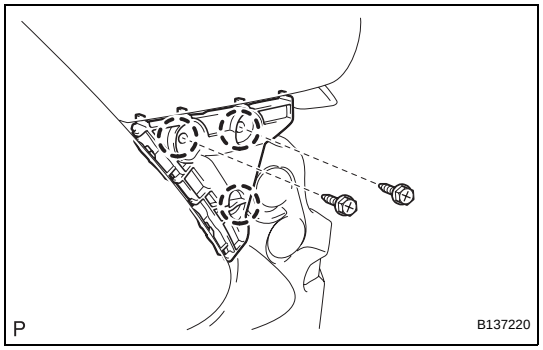
HINT:

Use the same procedures for the RH side and LH side.



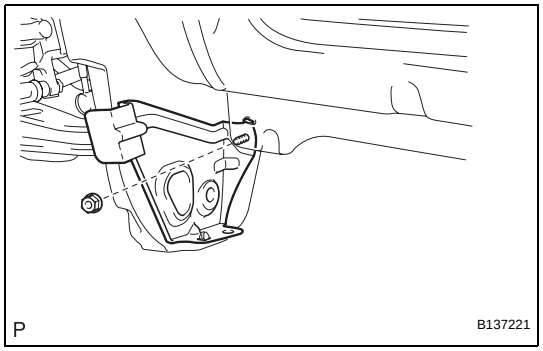
7. REMOVE REAR BUMPER SIDE SUPPORT LH
(a) Remove the 2 screws.
(b) Disengage the 3 claws and remove the rear bumper side support LH.

8. REMOVE REAR BUMPER SIDE SUPPORT RH



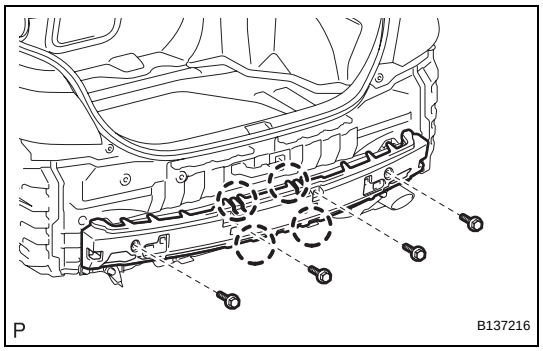
9. REMOVE REAR BUMPER SIDE RETAINER LH
(a) Remove the 2 screws.
(b) Disengage the 3 claws and remove the rear bumper side retainer LH.

10. REMOVE REAR BUMPER SIDE RETAINER RH

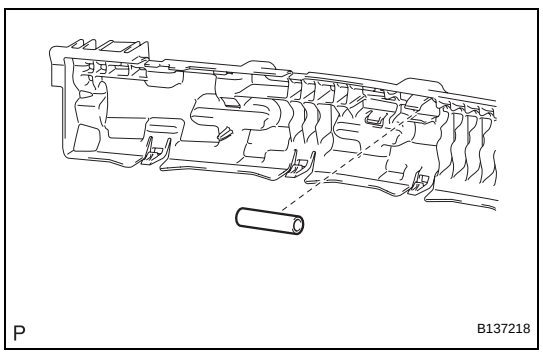


11. REMOVE WHEEL HOUSE REINFORCEMENT LH
(a) Remove the nut and wheel house reinforcement LH.

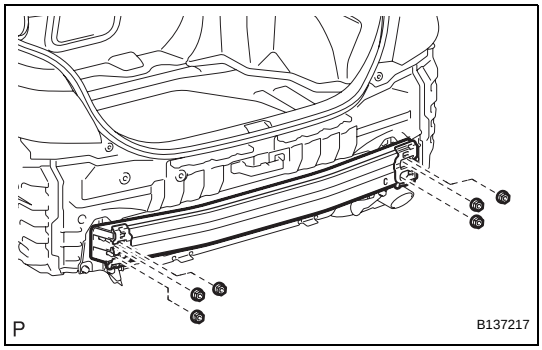
12. REMOVE WHEEL HOUSE REINFORCEMENT RH



13. REMOVE REAR BUMPER ENERGY ABSORBER
(a) Remove the 4 bolts.
(b) Disengage the 4 claws and remove the rear bumper energy absorber.



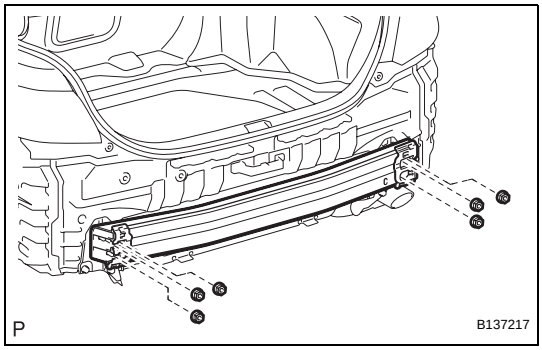
14. REMOVE REAR BUMPER BAR
(a) Remove the rear bumper bar from the rear bumper energy absorber.



15. REMOVE REAR BUMPER REINFORCEMENT SUB-ASSEMBLY

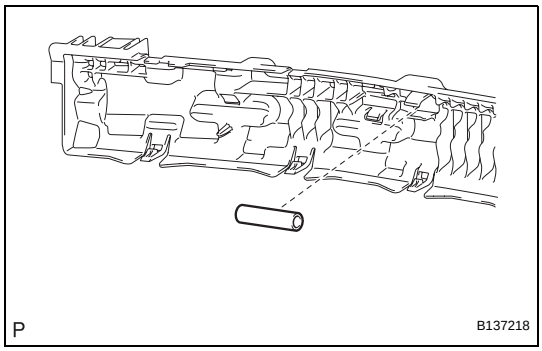
(a) Remove the 6 nuts and rear bumper reinforcement sub-assembly.

REASSEMBLY



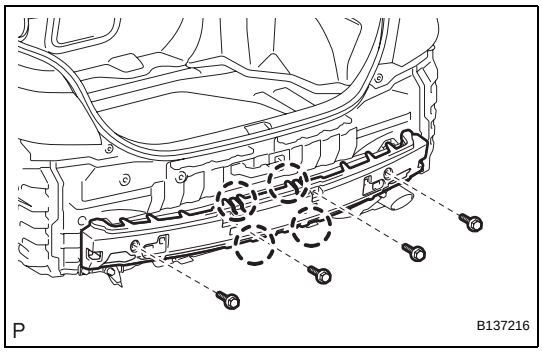
1. INSTALL REAR BUMPER REINFORCEMENT SUB-ASSEMBLY

(a) Install the rear bumper reinforcement sub-assembly with the 6 nuts.
Torque: 68 N*m (693 kgf*cm, 50 ft.*lbf)



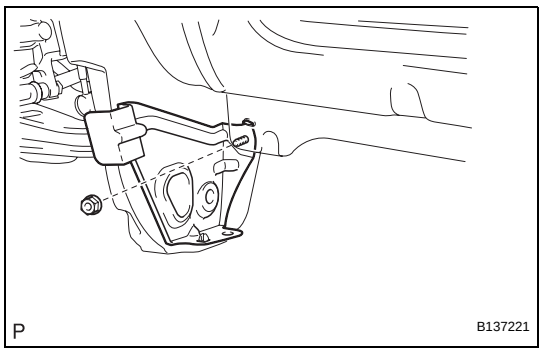
2. INSTALL REAR BUMPER BAR

(a) Install the rear bumper bar on the rear bumper energy absorber.



3. INSTALL REAR BUMPER ENERGY ABSORBER

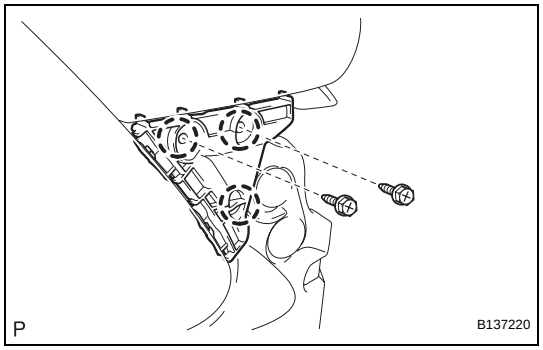
(a) Engage the 4 claws and install the rear bumper energy absorber.
(b) Install the 4 bolts.



4. INSTALL WHEEL HOUSE REINFORCEMENT LH

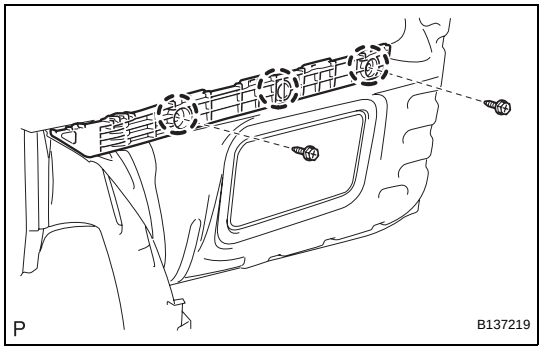
(a) Install the wheel house reinforcement LH with the nut.

5. INSTALL WHEEL HOUSE REINFORCEMENT RH



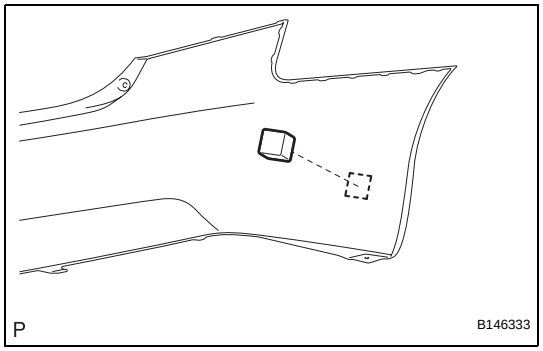
6. INSTALL REAR BUMPER SIDE RETAINER LH
(a) Engage the 3 claws and install the rear bumper side retainer LH.
(b) Install the 2 screws.

7. INSTALL REAR BUMPER SIDE RETAINER RH



8. INSTALL REAR BUMPER SIDE SUPPORT LH
(a) Engage the 3 claws and install the rear bumper side support LH.
(b) Install the 2 screws.

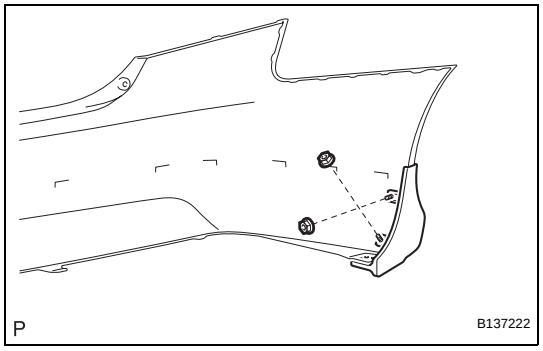
9. INSTALL REAR BUMPER SIDE SUPPORT RH



10. INSTALL REAR BUMPER PAD
(a) Apply new double-sided tape to the rear bumper pad.
(b) Remove the release paper from the rear bumper pad.
(c) Install the rear bumper pad.
HINT:
Use the same procedures for the RH side and LH side.

11. INSTALL REAR BUMPER PLATE LH

12. INSTALL REAR BUMPER PLATE RH

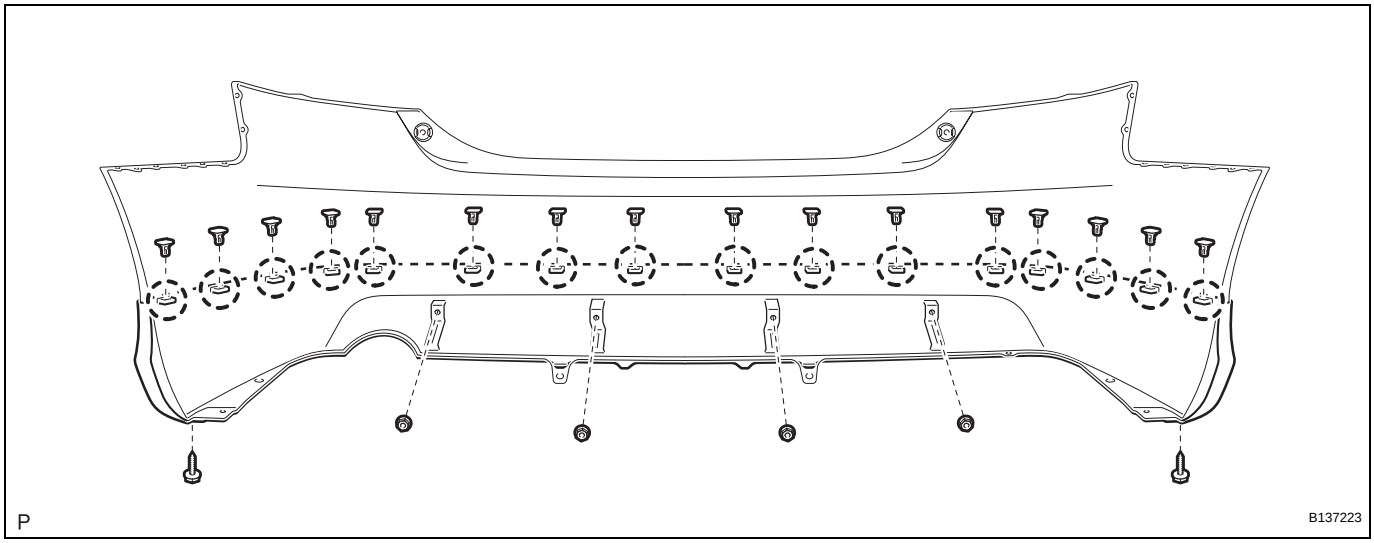


13. INSTALL REAR BUMPER EXTENSION LH (w/ Rear Lower Spoiler)
(a) Install the rear bumper extension LH with the 2 nuts.

14. INSTALL REAR BUMPER EXTENSION RH (w/ Rear Lower Spoiler)

15. INSTALL REAR LOWER SPOILER (w/ Rear Lower Spoiler)

(a) Engage the 16 claws and install the rear lower spoiler.



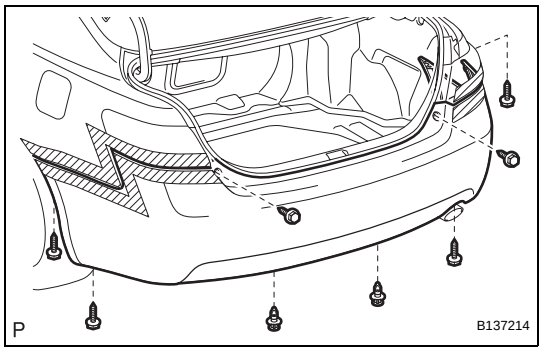
(b) Install the 16 clips, 4 nuts and 2 screws.

INSTALLATION

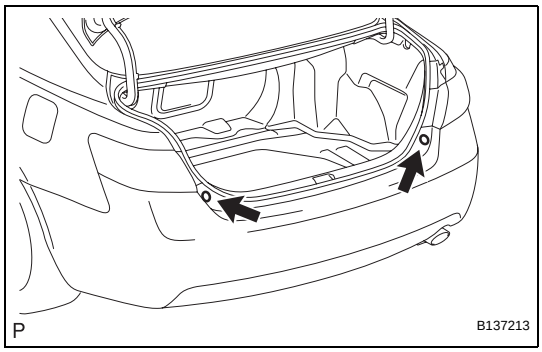
1. INSTALL REAR BUMPER ASSEMBLY (w/o Rear Lower Spoiler)

(a) Engage each claw.

(b) Install the rear bumper assembly with the 6 screws and 2 clips.



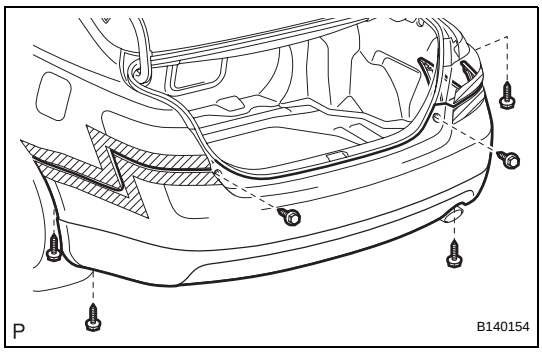
(c) Install the 2 rear bumper plates.

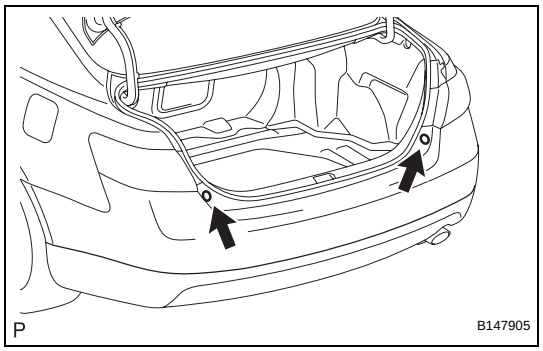


2. INSTALL REAR BUMPER ASSEMBLY (w/ Rear Lower Spoiler)

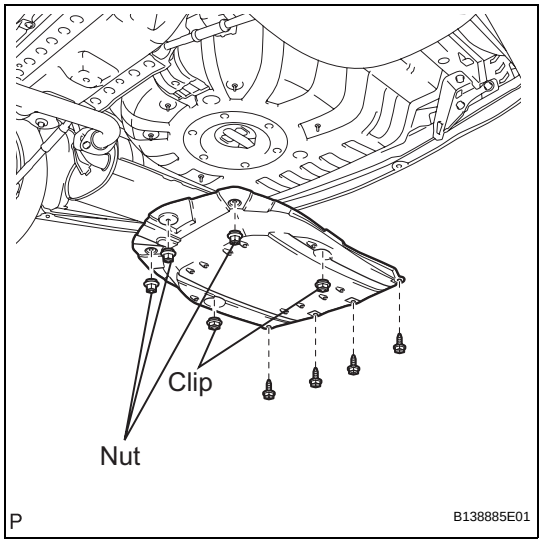
(a) Engage each claw.

(b) Install the rear bumper assembly with the 6 screws.





(c) Install the 2 rear bumper plates.

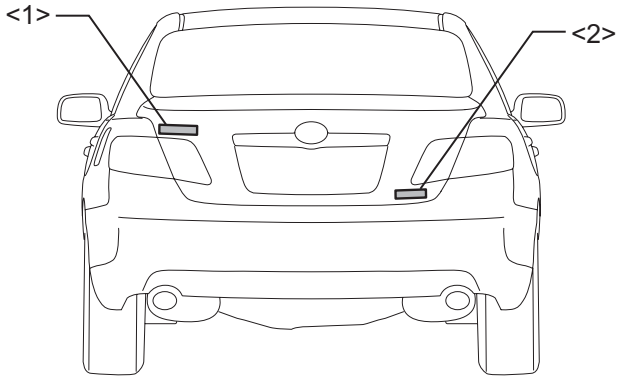


3. INSTALL REAR FLOOR BOARD (w/ Rear Lower Spoiler)

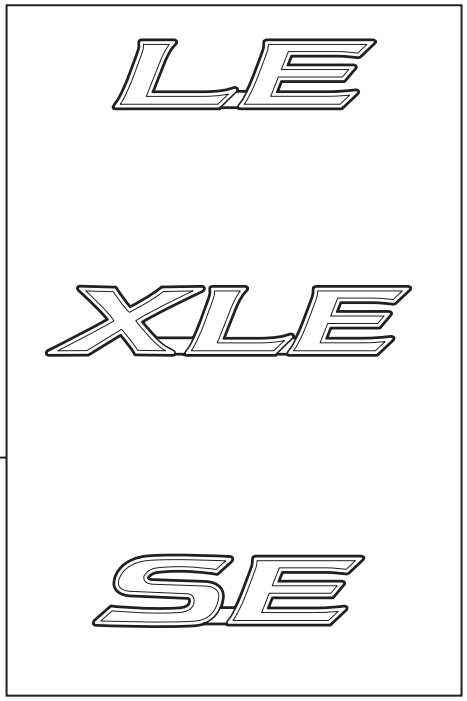
(a) Install the rear floor board with the 3 nuts, 2 clips and 4 screws.

NAME PLATE

COMPONENTS



<1> NO. 2 LUGGAGE COMPARTMENT DOOR NAME PLATE



<2> NO. 3 LUGGAGE COMPARTMENT DOOR NAME PLATE

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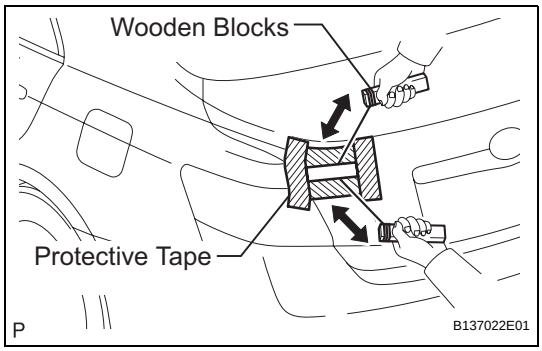
REMOVAL

HINT:
When removing the name plate, heat the vehicle body and name plate using a heat light.

Heating temperature

Item	Temperature
Vehicle Body	**40 to 60°C (104 to 140°F)**
Name Plate	**20 to 30°C (68 to 86°F)**

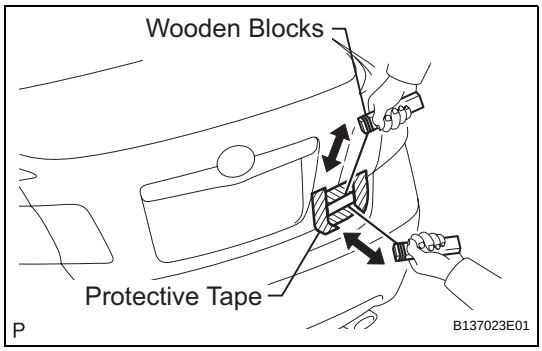
NOTICE:
Do not heat the vehicle body and name plate excessively.



1. REMOVE NO. 2 LUGGAGE COMPARTMENT DOOR NAME PLATE

(a) Put protective tape around the name plate.
(b) Insert a piano wire between the vehicle body and name plate.
(c) Tie objects that can serve as handles (for example, wooden blocks) to both wire ends.
(d) Pull the piano wire and scrape off the double-sided tape that holds the name plate to the vehicle body.
NOTICE:
- **If reusing the name plate, take care not to damage the name plate.**
- **Be careful not to damage the vehicle body.**

(e) Remove the name plate.



2. REMOVE NO. 3 LUGGAGE COMPARTMENT DOOR NAME PLATE

(a) Put protective tape around the name plate.
(b) Insert a piano wire between the vehicle body and name plate.
(c) Tie objects that can serve as handles (for example, wooden blocks) to both wire ends.
(d) Pull the piano wire and scrape off the double-sided tape that holds the name plate to the vehicle body.
NOTICE:
- **If reusing the name plate, take care not to damage the name plate.**
- **Be careful not to damage the vehicle body.**

(e) Remove the name plate.

INSTALLATION

HINT:
When installing the name plate, heat the vehicle body and name plate using a heat light.

Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Name Plate	20 to 30°C (68 to 86°F)

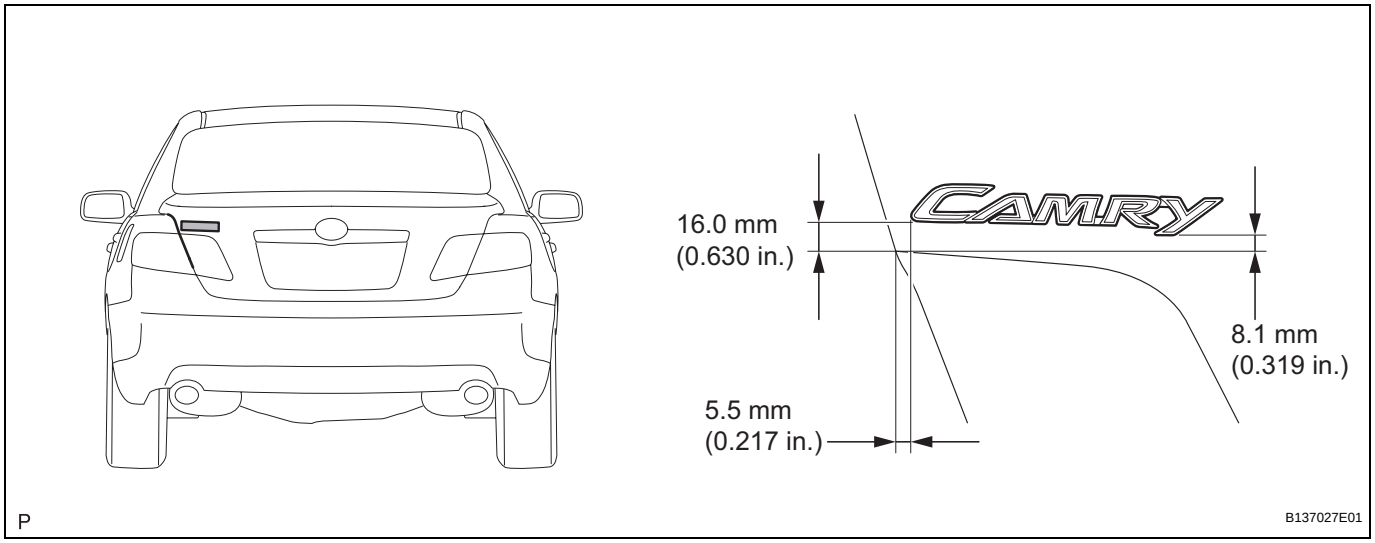
NOTICE:
Do not heat the vehicle body and name plate excessively.

1. INSTALL NO. 2 LUGGAGE COMPARTMENT DOOR NAME PLATE

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the name plate. (If reusing the name plate)
  (1) Using a heat light, heat the name plate.
  (2) Remove the double-sided tape from the name plate.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the name plate.

(c) Install the name plate.



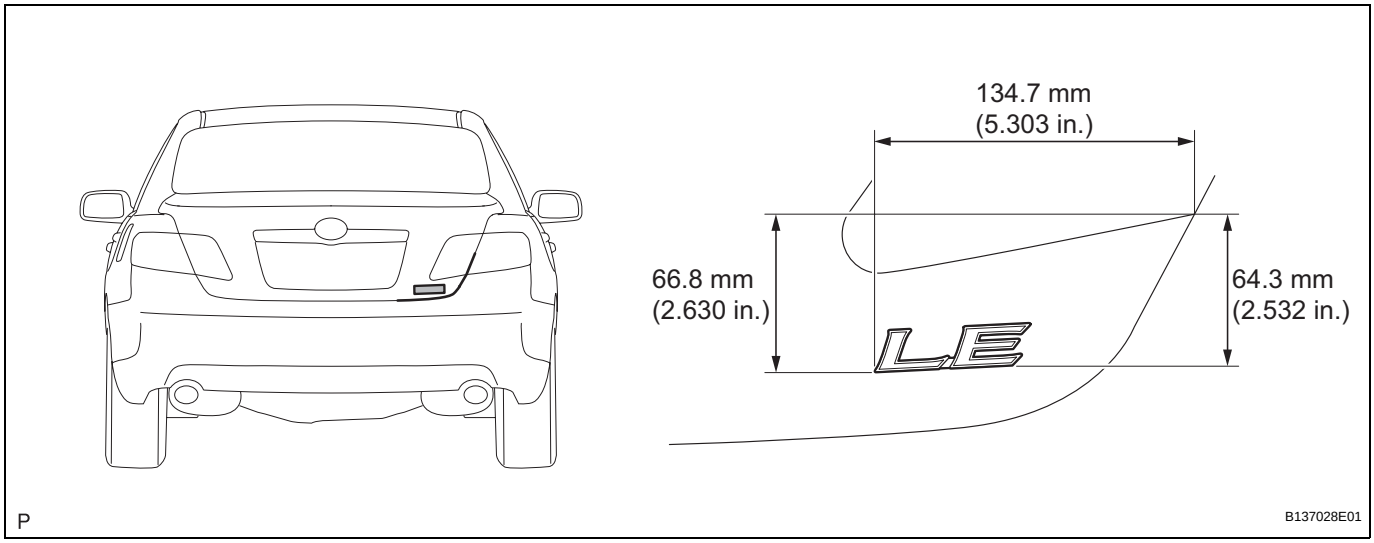
  (1) Using a heat light, heat the vehicle body and name plate.
  (2) Remove the release paper from the name plate.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.
  (3) Install the name plate.

2. INSTALL NO. 3 LUGGAGE COMPARTMENT DOOR NAME PLATE

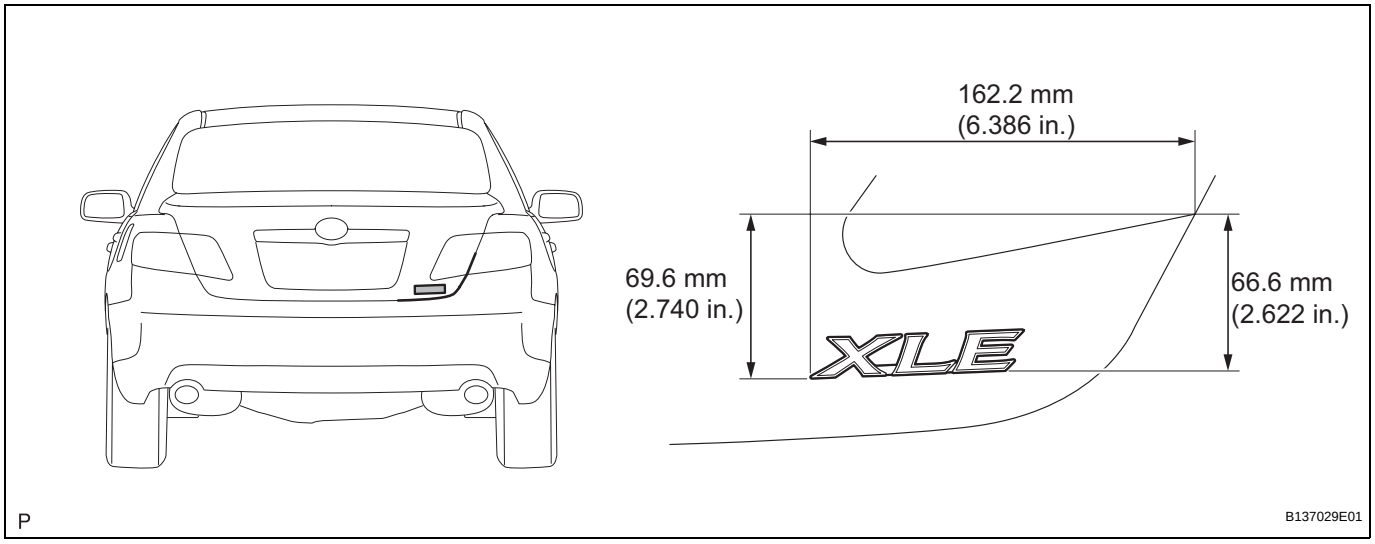
(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the name plate. (If reusing the name plate)
  (1) Using a heat light, heat the name plate.
  (2) Remove the double-sided tape from the name plate.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the name plate.

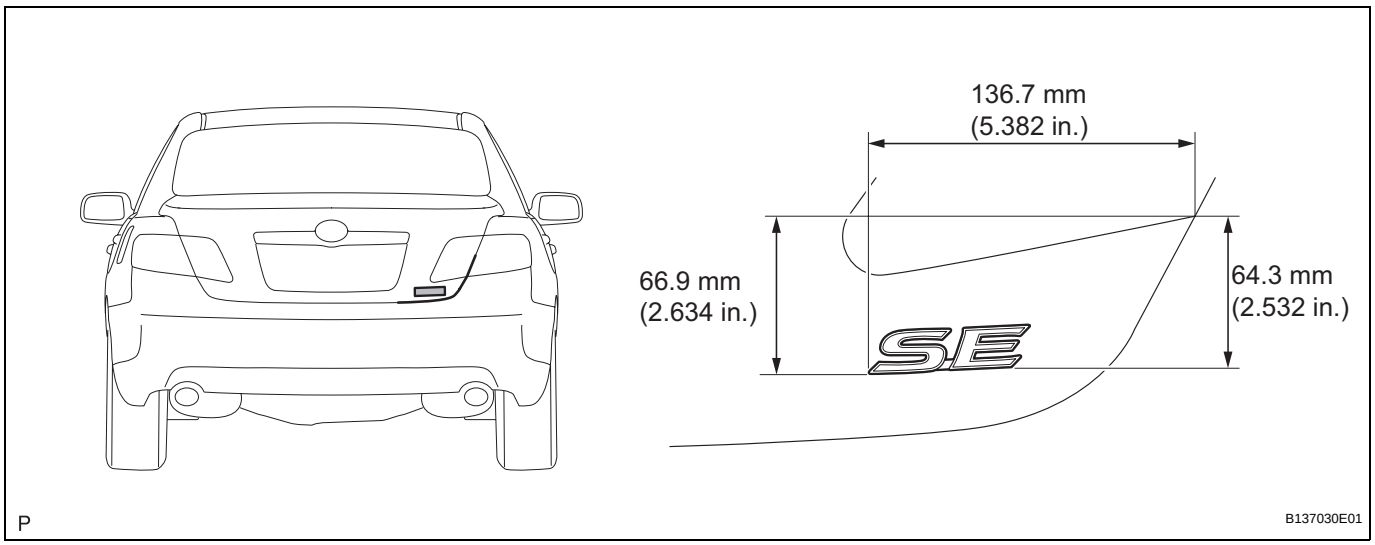
(c) Install the name plate.
  (1) Using a heat light, heat the vehicle body and name plate.
  (2) Remove the release paper from the name plate.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.
  (3) Install the name plate.
  For name plate LE:



For name plate XLE:

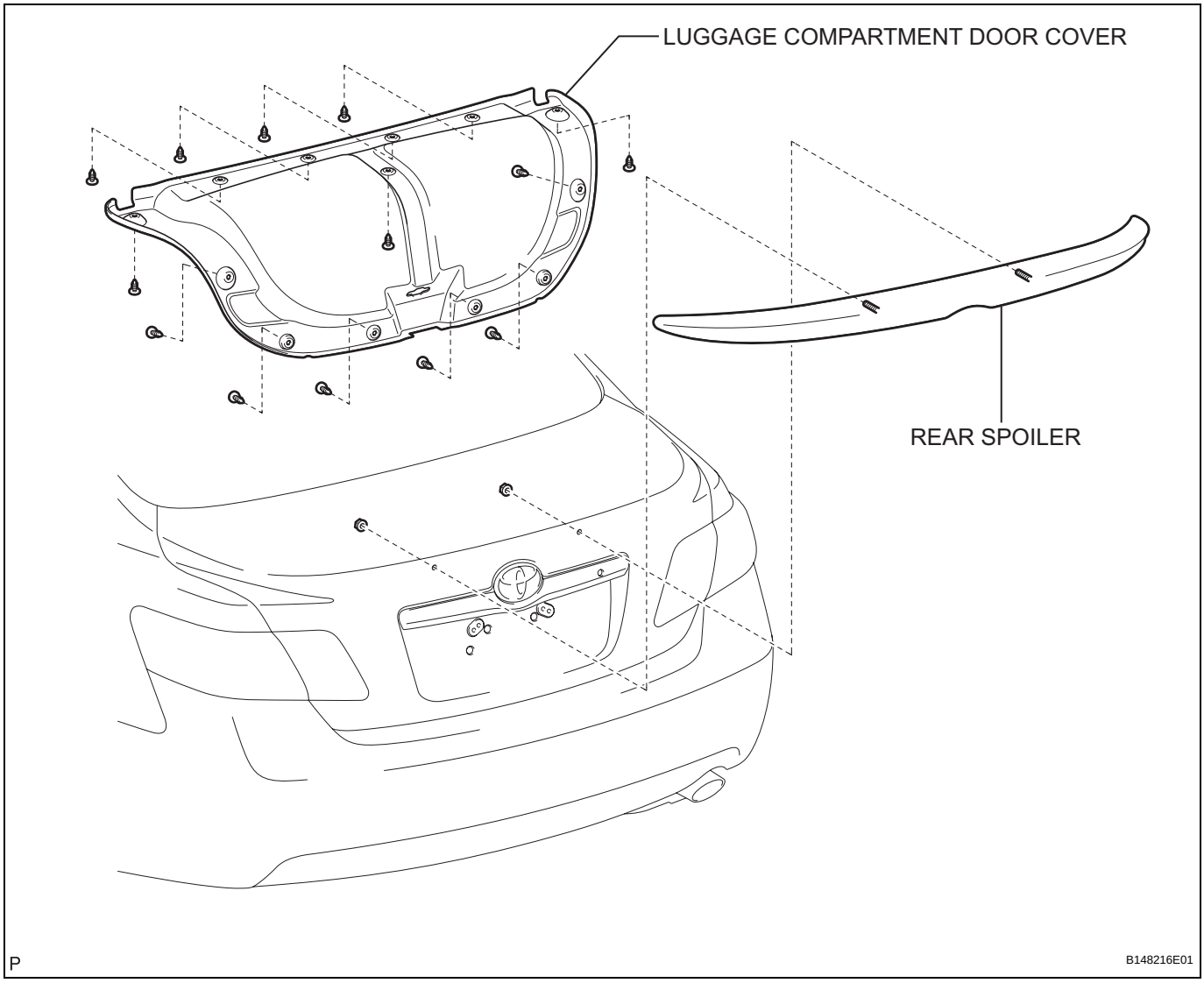


For name plate SE:



REAR SPOILER

COMPONENTS



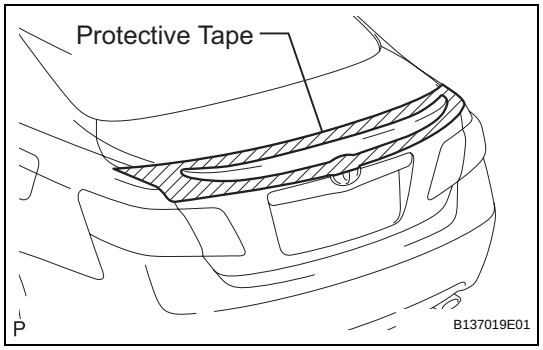
REMOVAL

1. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)**

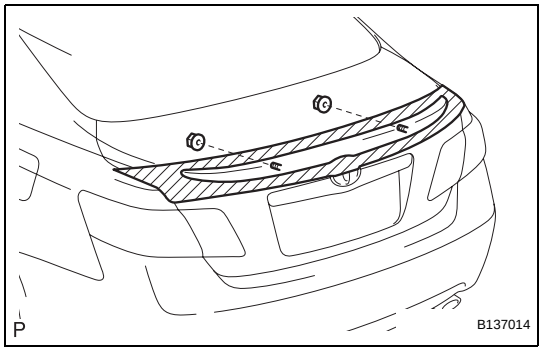
2. **REMOVE REAR SPOILER**
   HINT:
   When removing the rear spoiler, heat the vehicle body and rear spoiler using a heat light.
   Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Spoiler	20 to 30°C (68 to 86°F)

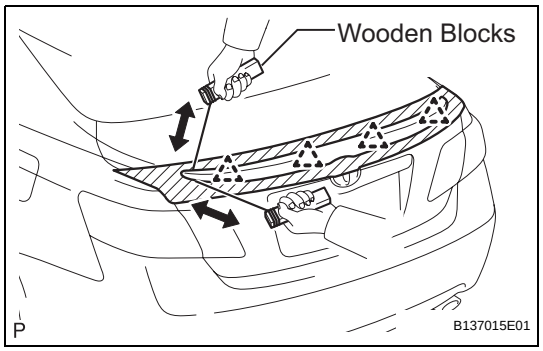
NOTICE:
Do not heat the vehicle body and spoiler excessively.



(a) Put protective tape around the rear spoiler.

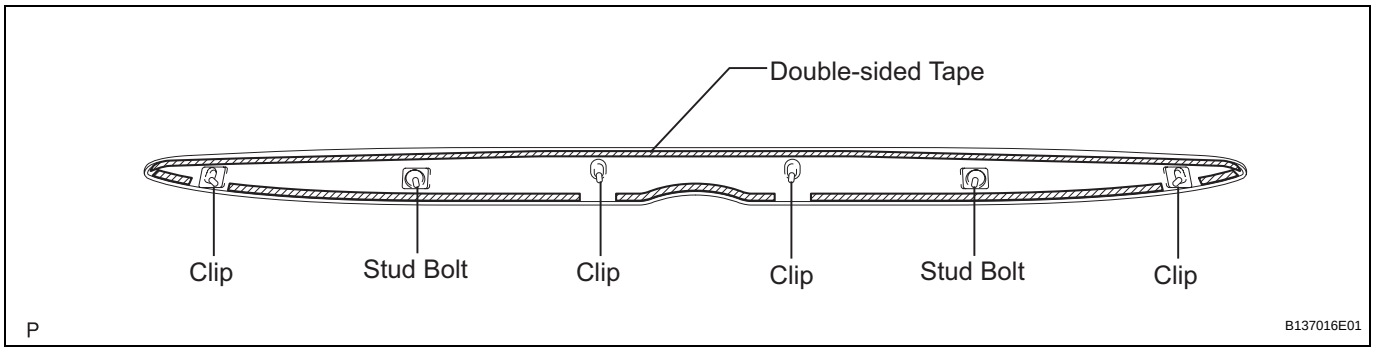


(b) Remove the 2 nuts.



(c) Insert a piano wire between the vehicle body and rear spoiler.
(d) Tie objects that can serve as handles (for example, wooden blocks) to both wire ends.

(e) Pull the piano wire and scrape off the double-sided tape that holds the spoiler to the vehicle body.



ET

NOTICE:

- **If reusing the spoiler, take care not to damage the spoiler.**
- **Be careful not to damage the vehicle body.**

(f) Disengage the 4 clips and remove the rear spoiler.

INSTALLATION

1. INSTALL REAR SPOILER

HINT:

When installing the spoiler, heat the vehicle body and spoiler using a heat light.

Heating temperature

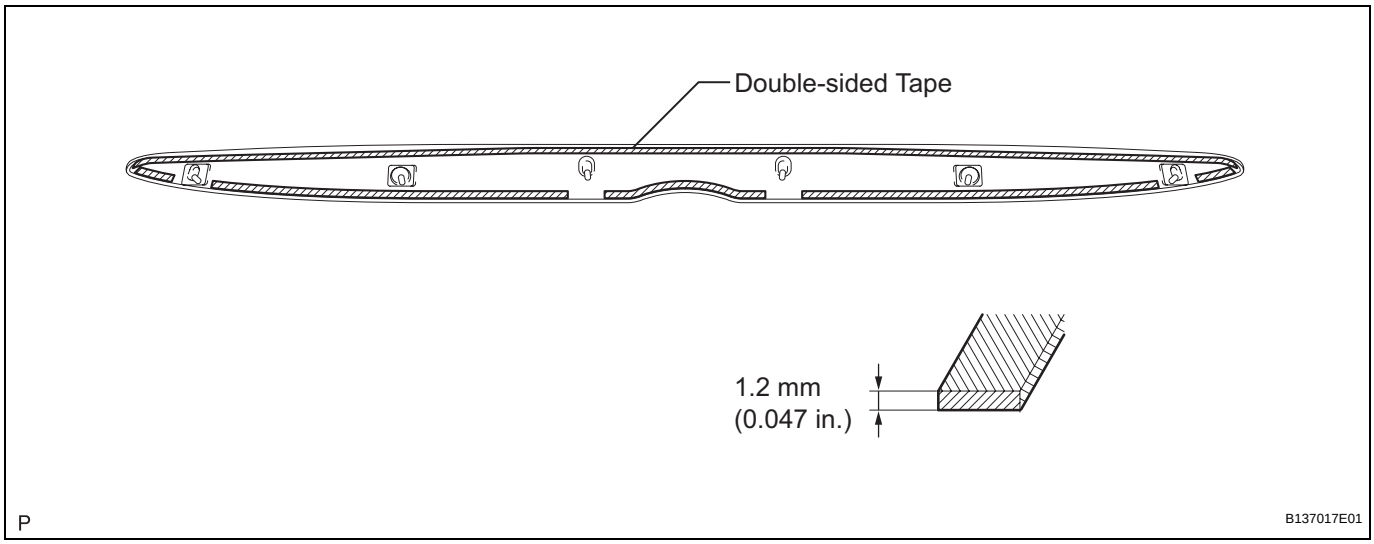
Item	Temperature
Vehicle Body	**40 to 60°C (104 to 140°F)**
Spoiler	**20 to 30°C (68 to 86°F)**

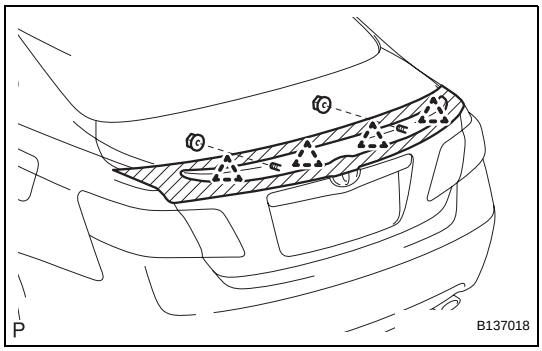
NOTICE:

Do not heat the vehicle body and rear spoiler excessively.

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the rear spoiler. (If reusing the rear spoiler)
  (1) Using a heat light, heat the rear spoiler.
  (2) Remove the double-sided tape from the rear spoiler.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the rear spoiler.



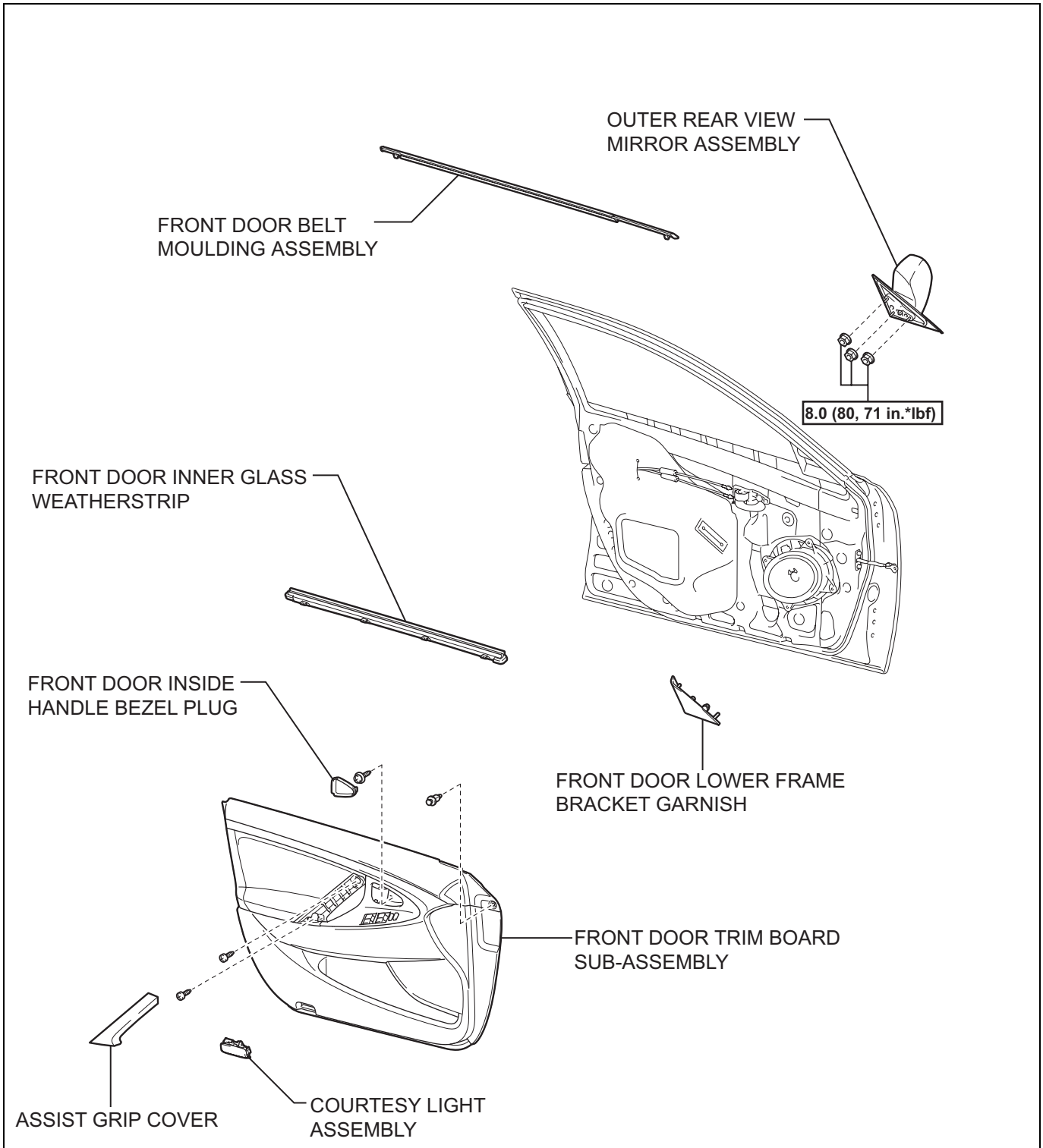


(c) Install the rear spoiler.
  (1) Using a heat light, heat the vehicle body and rear spoiler.
  (2) Remove the release paper from the rear spoiler.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.
  (3) Engage the 4 clips and install the rear spoiler with the 2 nuts.

2. INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)

FRONT DOOR BELT MOULDING

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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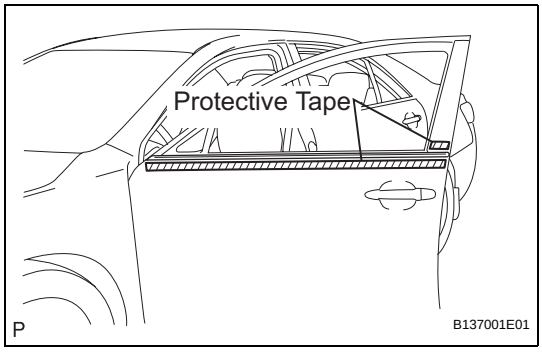
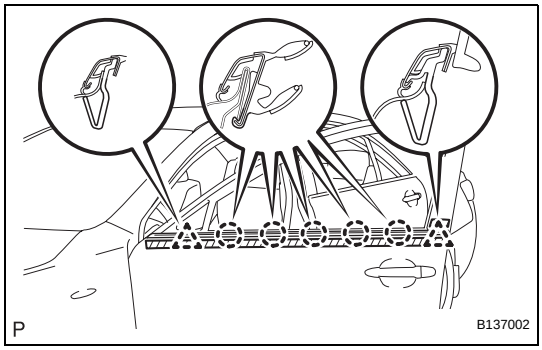
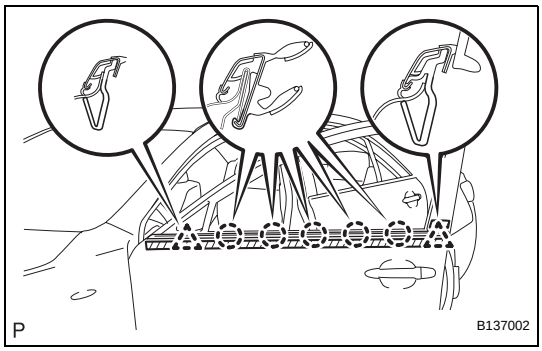
REMOVAL

1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)**
3. **REMOVE ASSIST GRIP COVER (See page ED-15)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)**
6. **REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-16)**
7. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-15)**
8. **REMOVE FRONT DOOR BELT MOULDING ASSEMBLY**
   (a) Fully open the front door glass.
   (b) Put protective tape around the front door belt moulding assembly.





   (c) Using a moulding remover, disengage the 2 clips and 5 claws, and remove the front door belt moulding assembly.
   HINT:
   Tape the remover tip before use.
   NOTICE:
   Be careful when removing the moulding as there are claws attached to the front and rear ends of the moulding.



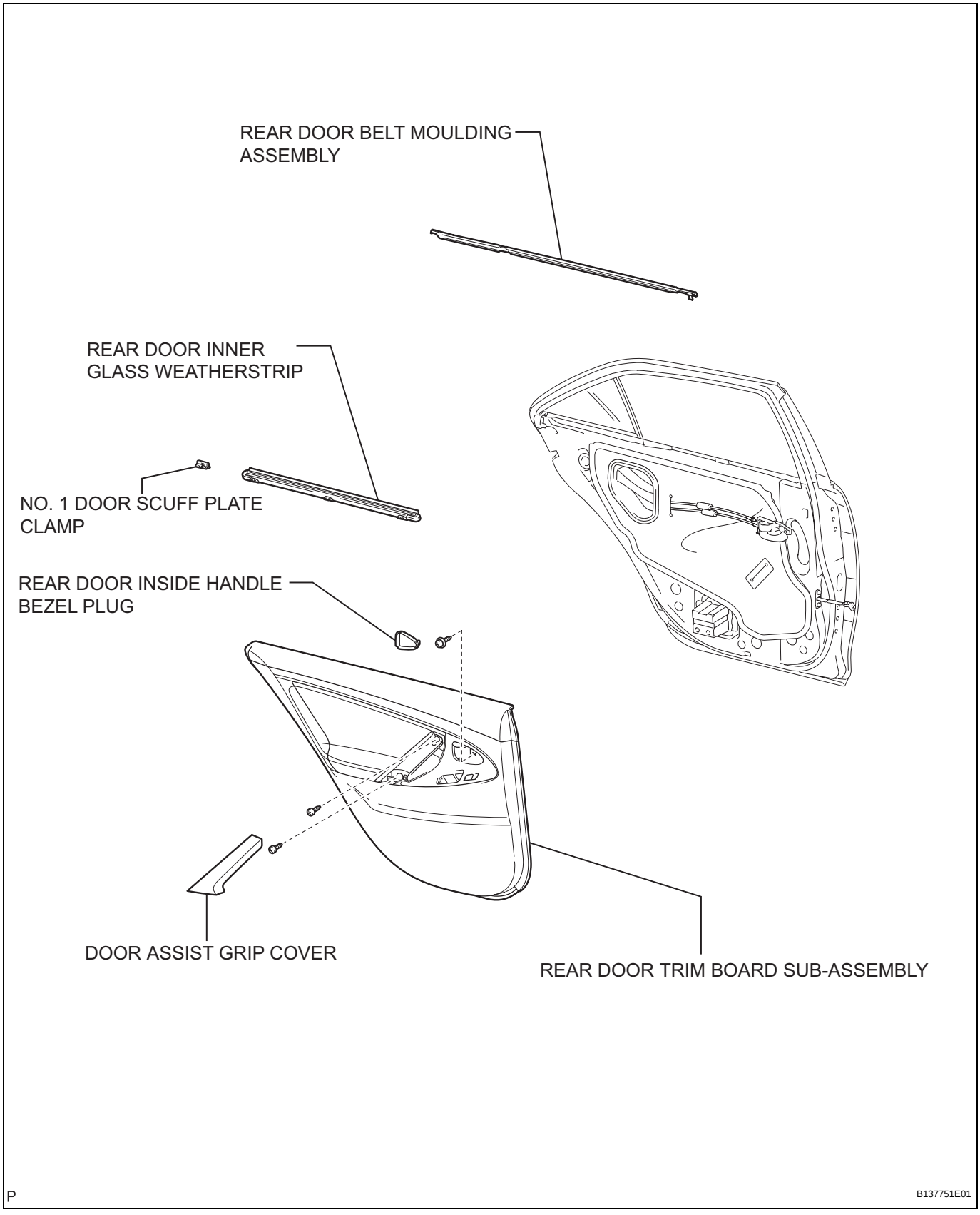
INSTALLATION

1. **INSTALL FRONT DOOR BELT MOULDING ASSEMBLY**
   (a) Engage the 2 clips and 5 claws, and install the front door belt moulding assembly.
2. **INSTALL OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-17)**
3. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-32)**
4. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**
5. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-34)**

6. **INSTALL ASSIST GRIP COVER (See page ED-34)**
7. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**
8. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

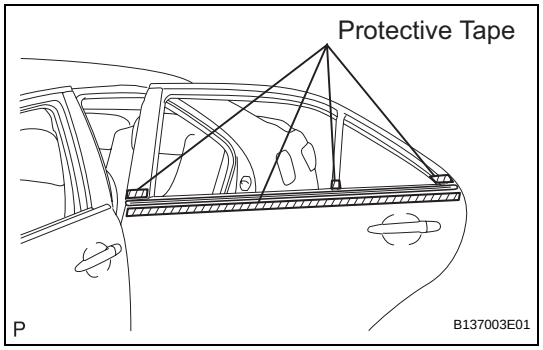
REAR DOOR BELT MOULDING

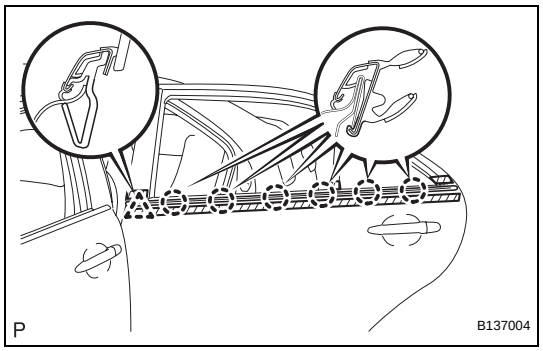
COMPONENTS



REMOVAL

1. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-38)**
2. **REMOVE DOOR ASSIST GRIP COVER (See page ED-38)**
3. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-39)**
4. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-40)**
5. **REMOVE REAR DOOR BELT MOULDING ASSEMBLY**
   (a) Fully open the rear door glass.
   (b) Put protective tape around the rear door belt moulding assembly.

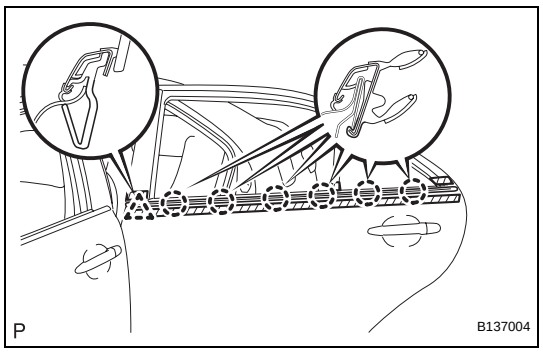




   (c) Using a moulding remover, disengage the clip and 6 claws, and remove the rear door belt moulding assembly.
   HINT:
   Tape the remover tip before use.
   NOTICE:
   Be careful when removing the moulding as there are claws attached to the front end of the moulding.

INSTALLATION

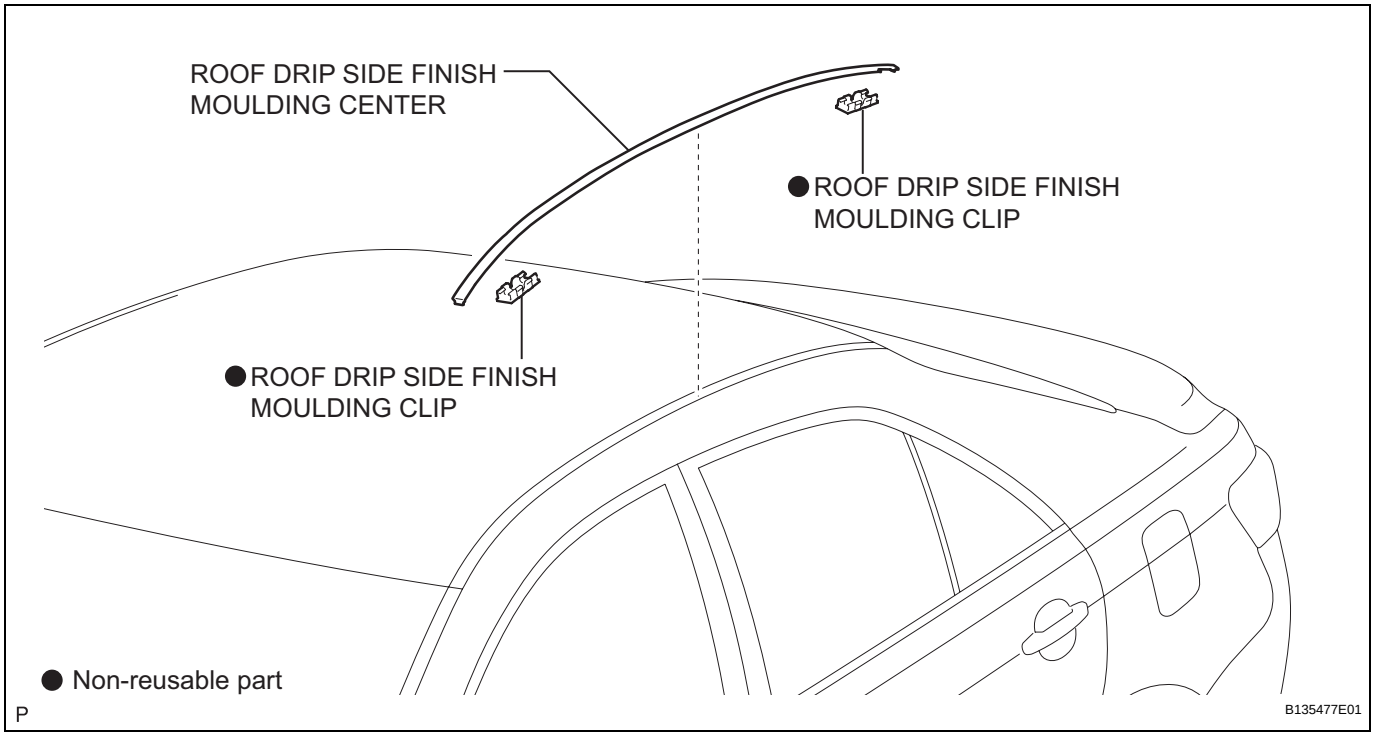
1. **INSTALL REAR DOOR BELT MOULDING ASSEMBLY**
   (a) Engage the clip and 6 claws, and install the rear door belt moulding assembly.
2. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-54)**
3. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-55)**
4. **INSTALL DOOR ASSIST GRIP COVER (See page ED-56)**
5. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-56)**



ET

ROOF DRIP SIDE FINISH MOULDING

COMPONENTS



REMOVAL

1. REMOVE ROOF DRIP SIDE FINISH MOULDING CENTER

HINT:

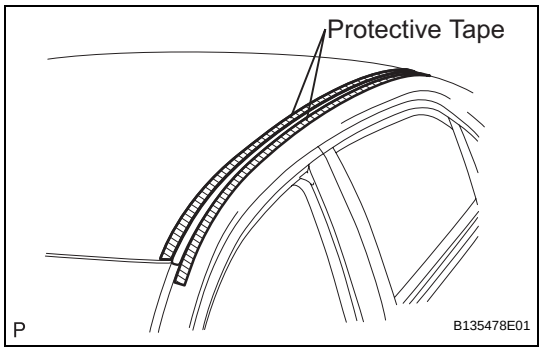
When removing the roof drip side finish moulding center, heat the body and roof drip side finish moulding center using a heat light.

Heating temperature

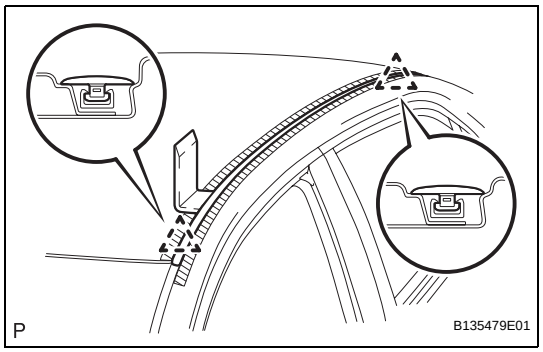
Item	Temperature
Vehicle Body	**40 to 60°C (104 to 140°F)**
Moulding	**20 to 30°C (68 to 86°F)**

NOTICE:

Do not heat the vehicle body and moulding excessively.



(a) Put protective tape around the roof drip side finish moulding center.



(b) Using a moulding remover, disengage the 2 clips and remove the roof drip side finish moulding center.

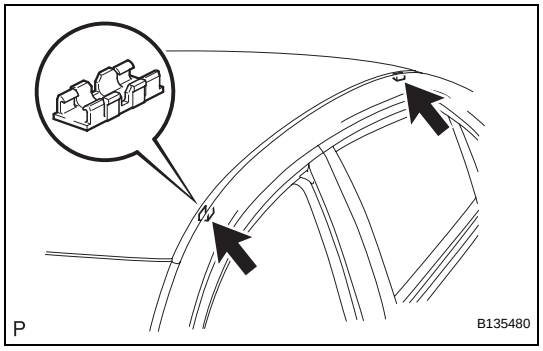
NOTICE:

- **Do not remove the clips.**
- **If the clips are damaged or dropped off, replace them with new ones.**

2. REMOVE ROOF DRIP SIDE FINISH MOULDING CLIP

HINT:

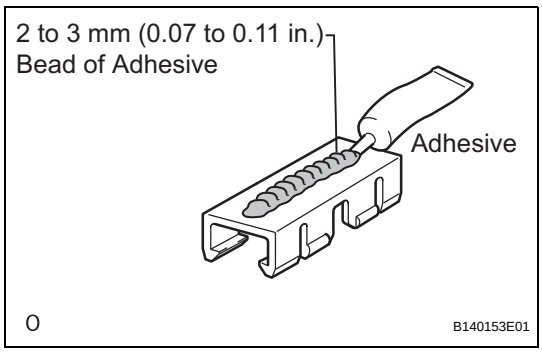
Perform the following procedure if replacing the roof drip side finish moulding clips.



(a) Remove the 2 roof drip side finish moulding clips.

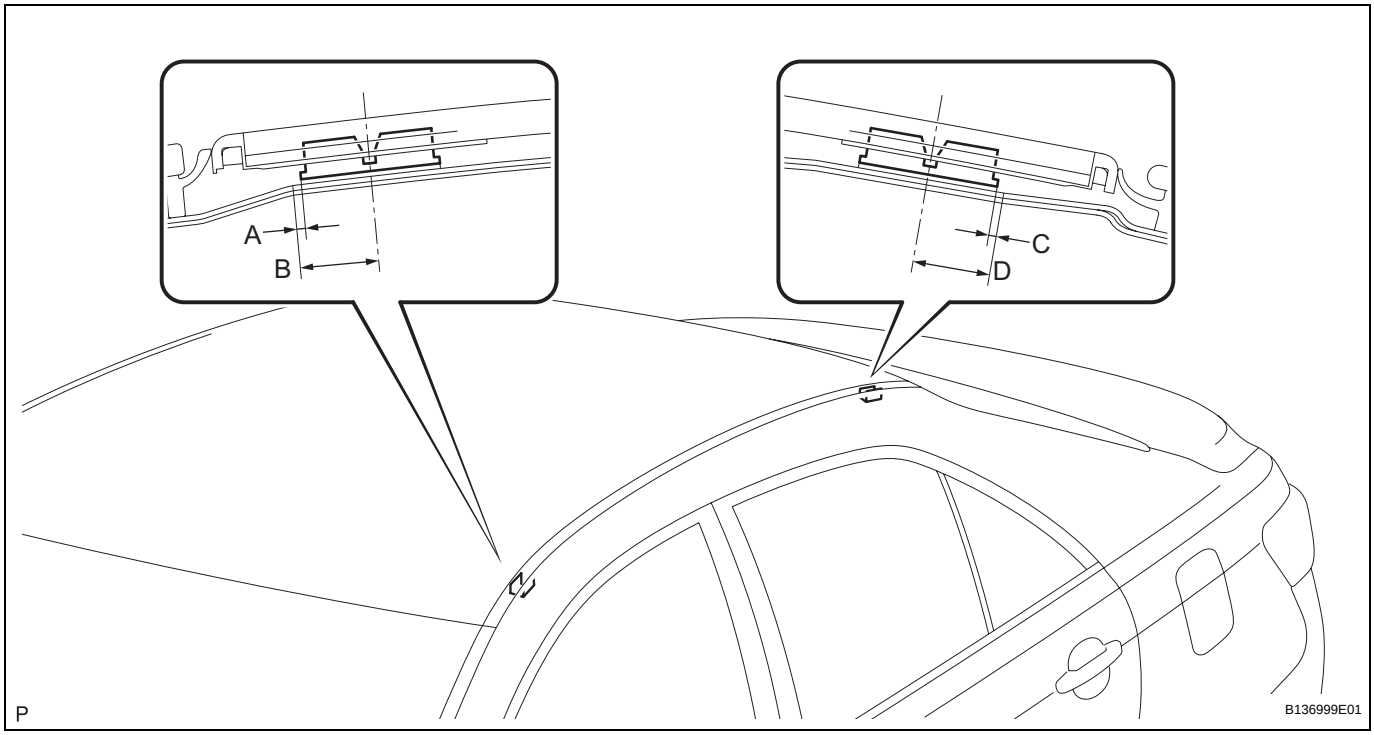
INSTALLATION

1. INSTALL ROOF DRIP SIDE FINISH MOULDING CLIP
NOTICE:
If installing new clips, remove the double-sided tape remaining where the clips will be installed on the body and clean the body with a non-residue type solvent.



(a) Apply a 2 to 3 mm (0.07 to 0.11 in.) bead of adhesive (3M DP-105 or equivalent) to new roof drip side finish moulding clips.
HINT:
Adhesive strength (tensile strength): 13.7 MPa (140 kgf/cm^2) or more (when the temperature is 23°C)

(b) Install the roof drip side finish moulding clips to the positions on the roof panel shown in the illustration. Determine the locations and firmly press and install the roof drip side finish moulding clips after lightly rubbing up adhesive (3M DP-105 or equivalent).



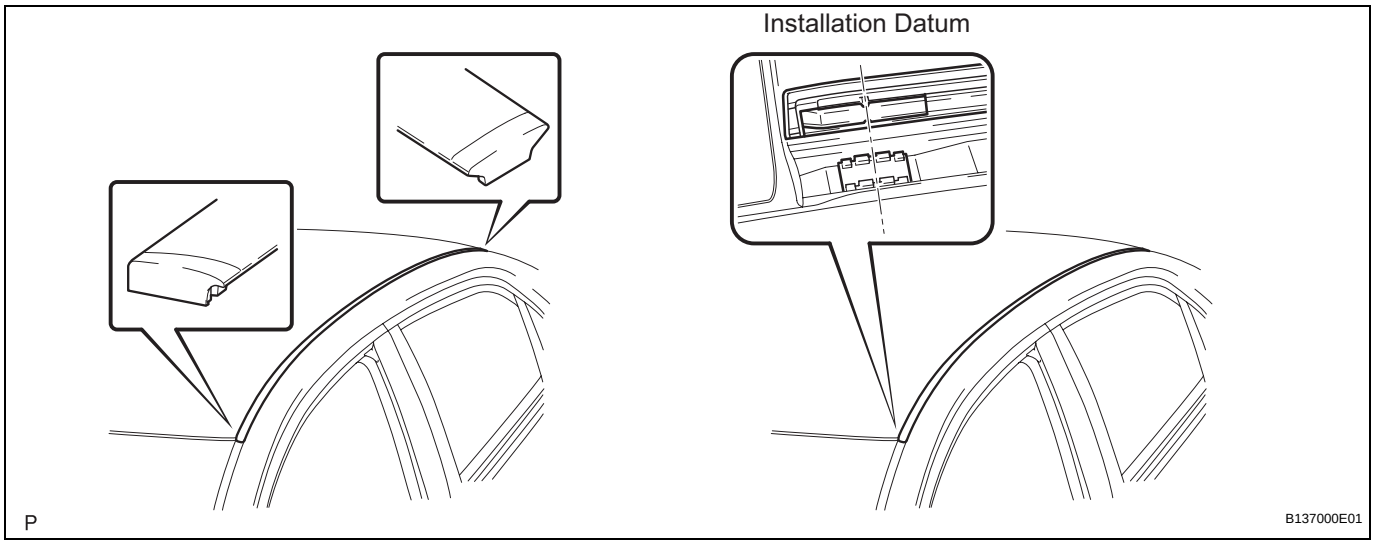
Standard dimension

Area	Dimension
A	1.4 mm (0.055 in.)
B	12.4 mm (0.488 in.)
C	1.1 mm (0.043 in.)
D	12.1 mm (0.476 in.)

HINT:
- Initial hardening time: 20 minutes
- Complete hardening time: 48 hours

2. INSTALL ROOF DRIP SIDE FINISH MOULDING CENTER

(a) Install the roof drip side finish moulding center when 20 minutes or more have elapsed after pressing and installing the roof drip side finish moulding clips.

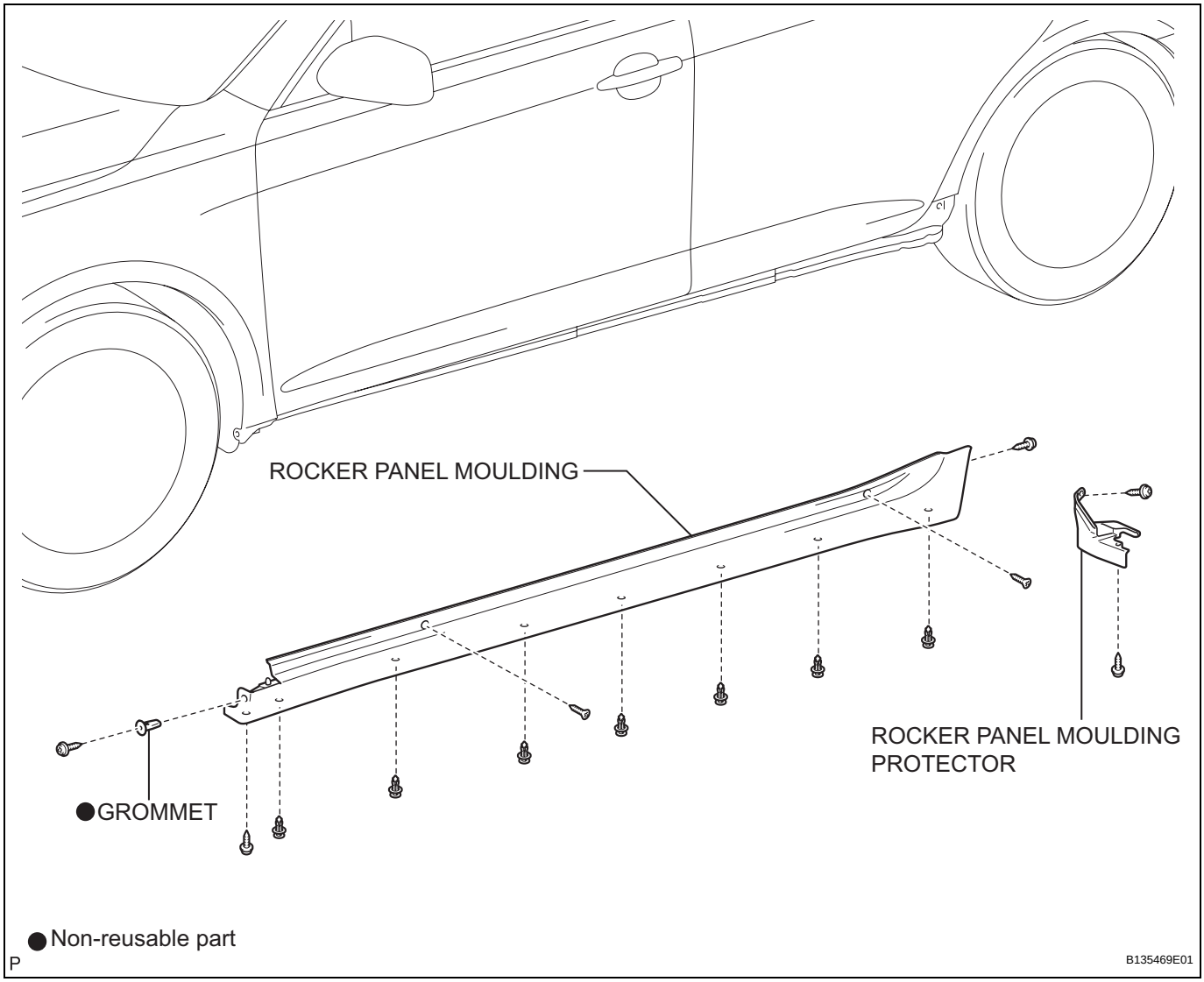


NOTICE:

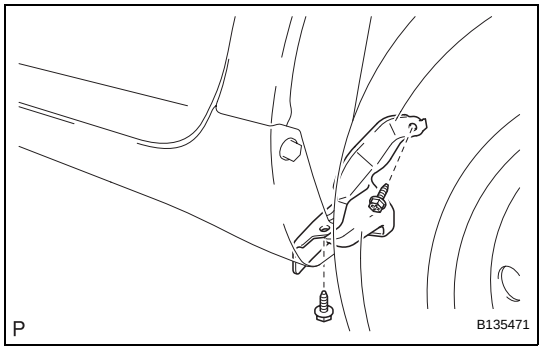
- **Install the roof drip side finish moulding center in the proper direction.**
- **Set the front clip to the installation datum. Make sure that the front clip and roof drip side finish moulding center are fit each other.**

ROCKER PANEL MOULDING

COMPONENTS



REMOVAL

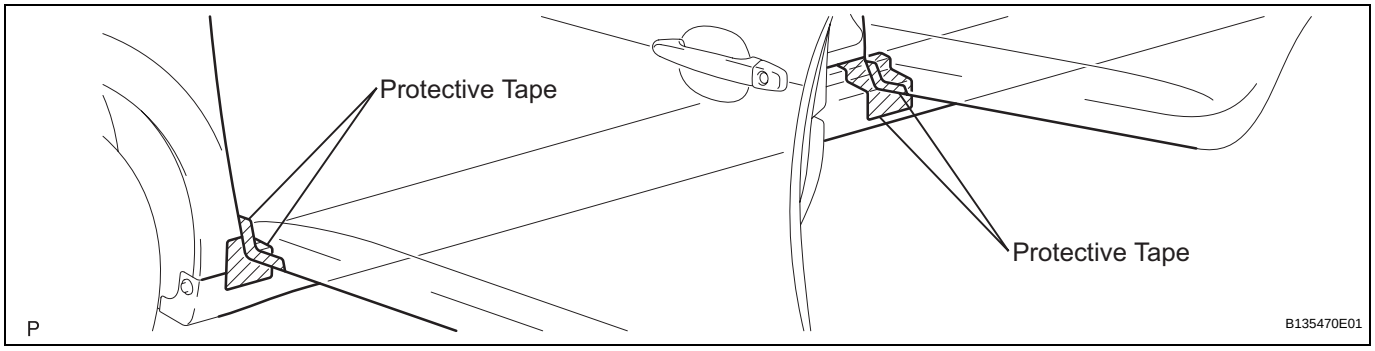


1. REMOVE ROCKER PANEL MOULDING PROTECTOR

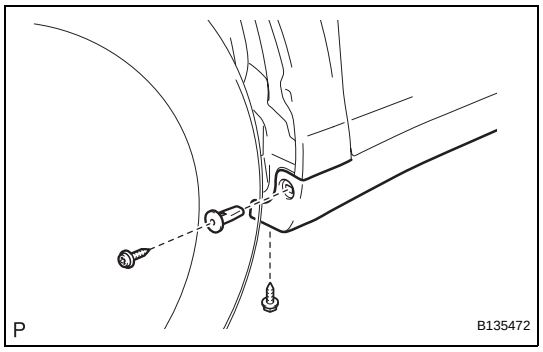
(a) Remove the 2 screws and rocker panel moulding protector.

2. REMOVE ROCKER PANEL MOULDING

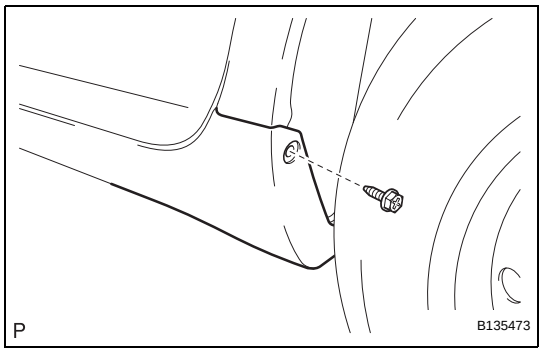
(a) Put protective tape around the rocker panel moulding.



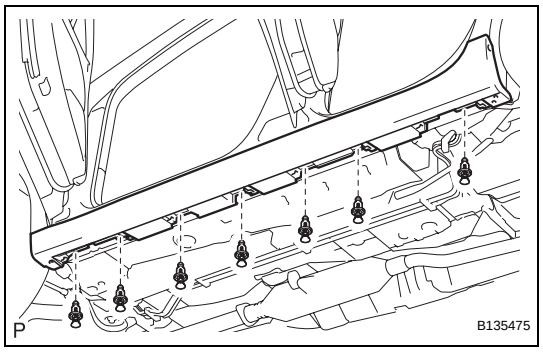
(b) Remove the 2 screws and grommet.



(c) Remove the screw.



(d) Remove the 7 clips.



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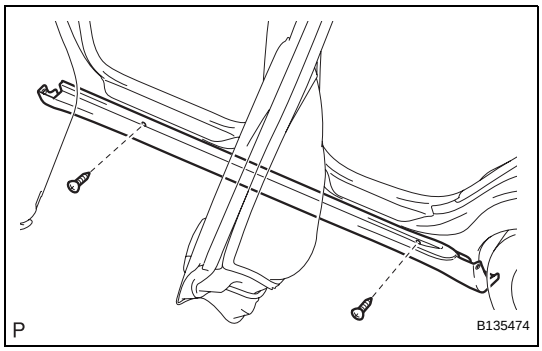
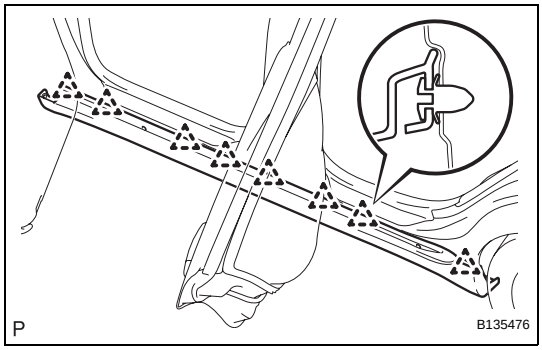


(e) Remove the 2 screws.



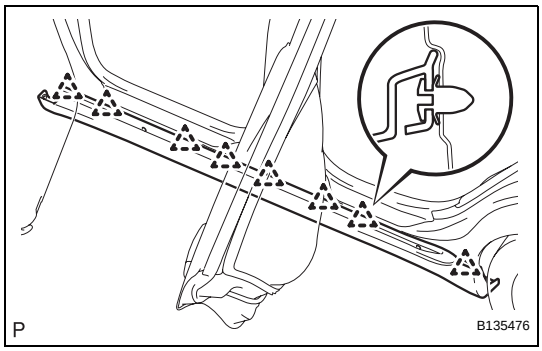
(f) Disengage the 8 clips and remove the rocker panel moulding.

ET

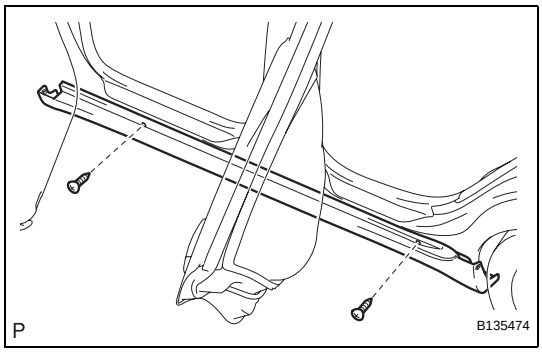
INSTALLATION

1. INSTALL ROCKER PANEL MOULDING

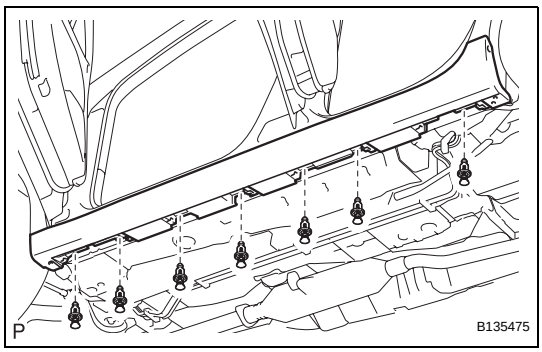
(a) Engage the 8 clips and install the rocker panel moulding.

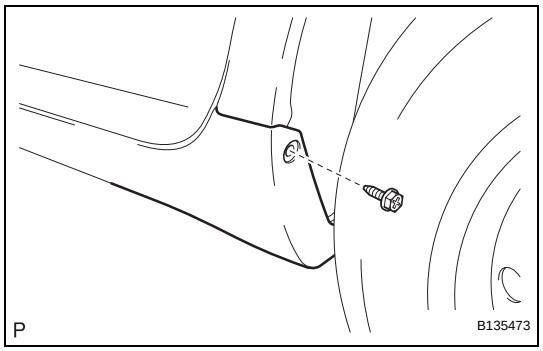


(b) Install the 2 screws.

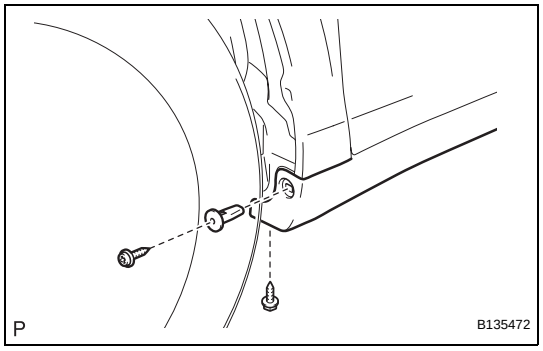


(c) Install the 7 clips.

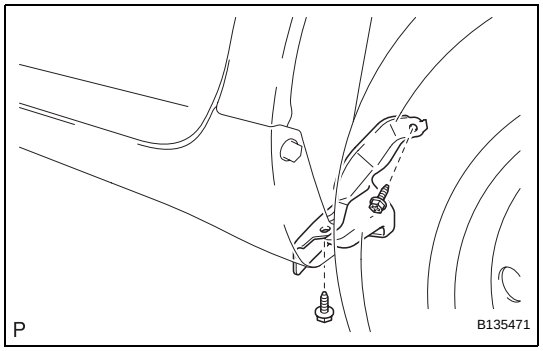




(d) Install the screw.



(e) Install a new grommet and 2 screws.

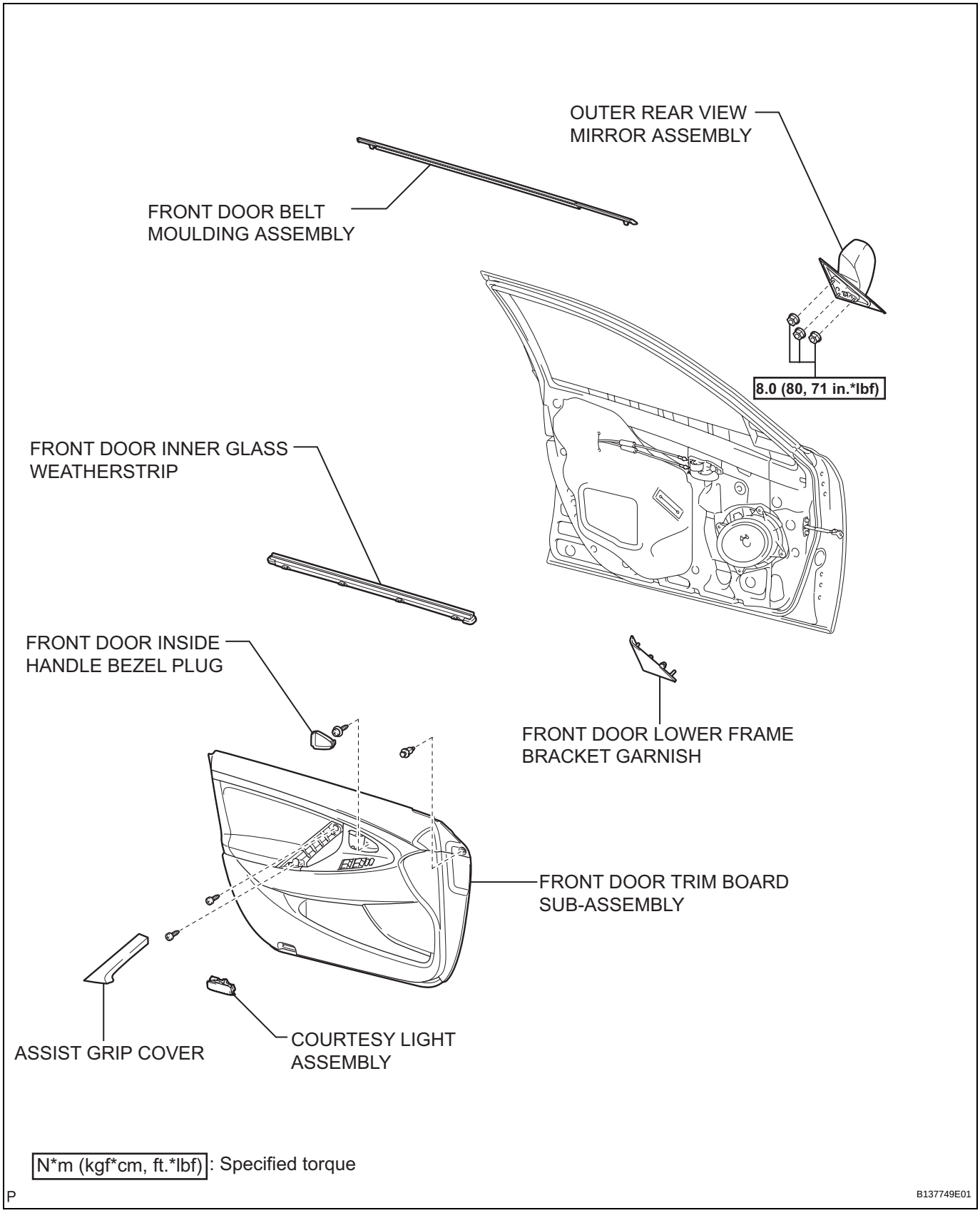


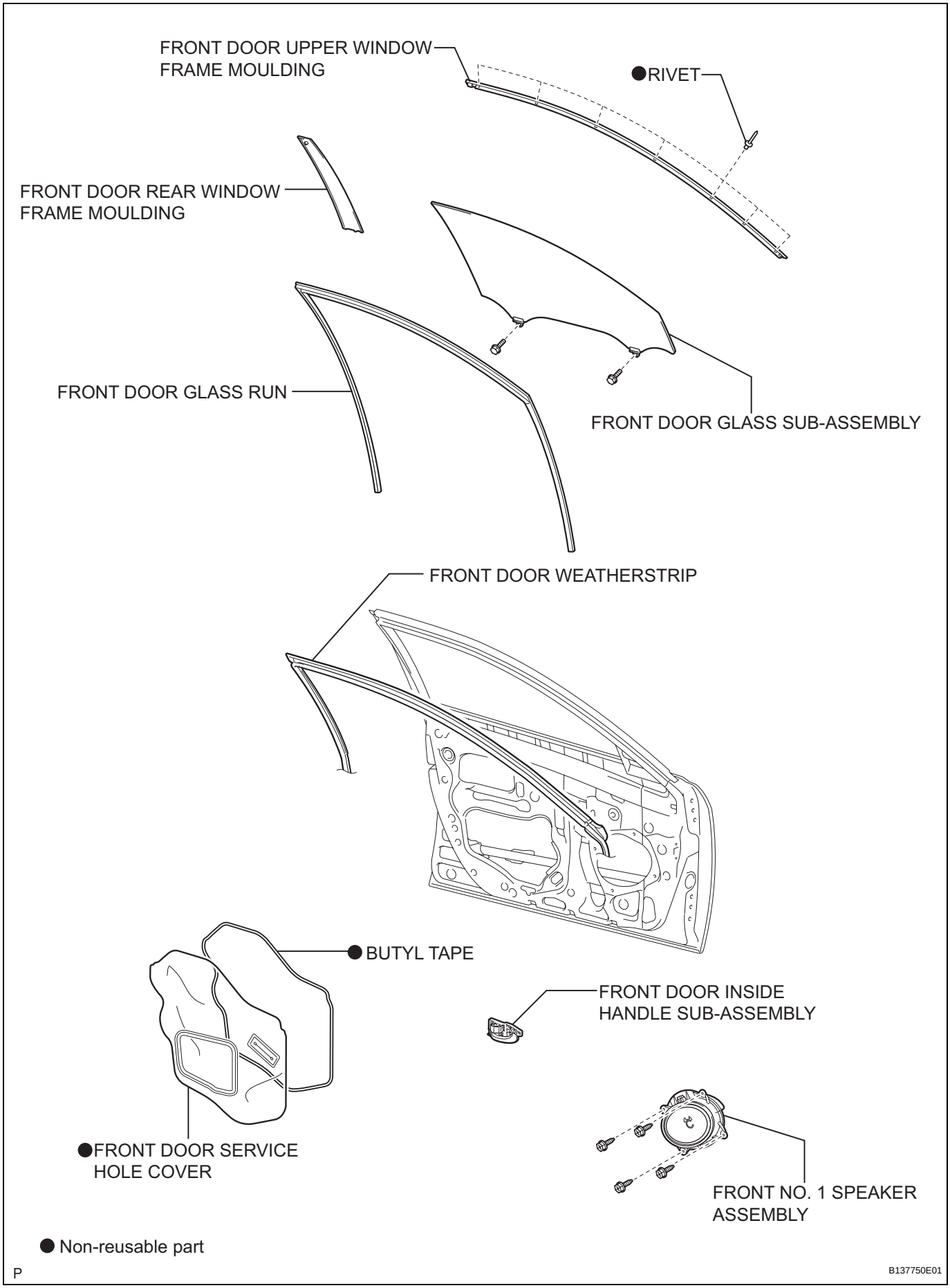
2. INSTALL ROCKER PANEL MOULDING PROTECTOR

(a) Install the rocker panel moulding protector with the 2 screws.

FRONT DOOR WINDOW FRAME MOULDING

COMPONENTS




FRONT DOOR UPPER WINDOW FRAME MOULDING
●RIVET
FRONT DOOR REAR WINDOW FRAME MOULDING
FRONT DOOR GLASS RUN
FRONT DOOR GLASS SUB-ASSEMBLY
FRONT DOOR WEATHERSTRIP
● BUTYL TAPE
FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY
●FRONT DOOR SERVICE HOLE COVER
FRONT NO. 1 SPEAKER ASSEMBLY
● Non-reusable part
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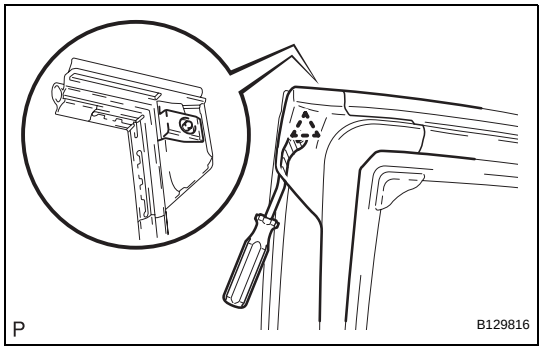
REMOVAL

1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)**
3. **REMOVE ASSIST GRIP COVER (See page ED-15)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)**
6. **REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-16)**
7. **REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-17)**
8. **REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-155)**
9. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-15)**
10. **REMOVE FRONT DOOR SERVICE HOLE COVER (See page ED-17)**
11. **REMOVE FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-17)**
12. **REMOVE FRONT DOOR GLASS RUN (See page ED-19)**
13. **REMOVE FRONT DOOR WEATHERSTRIP**
    (a) Using a clip remover, disengage the clip and remove the front door weatherstrip.

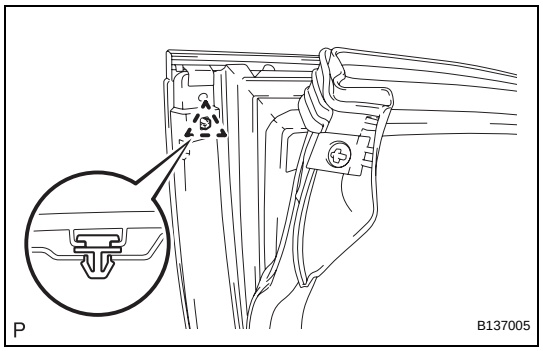


14. **REMOVE FRONT DOOR REAR WINDOW FRAME MOULDING**
    HINT:
    When removing the front door rear window frame moulding, heat the vehicle body and front door rear window frame moulding using a heat light.
    Heating temperature

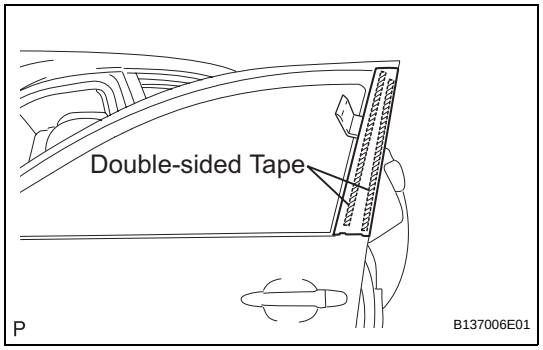
Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

NOTICE:
Do not heat the vehicle body and moulding excessively.

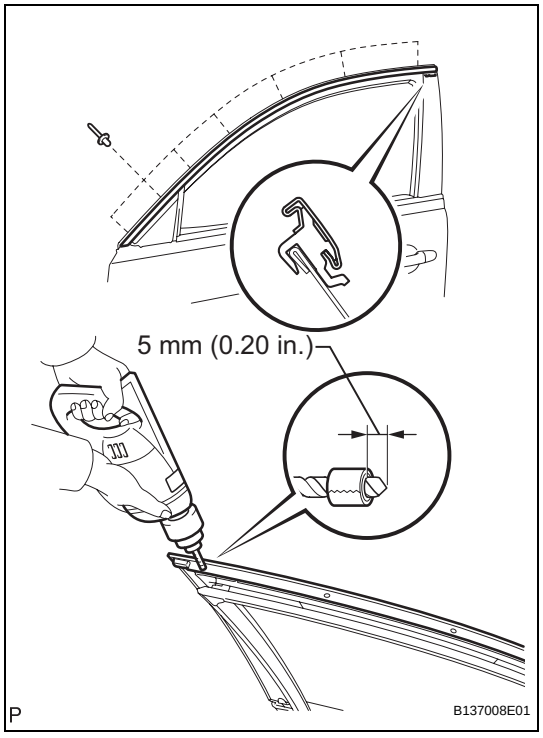
(a) Using a heat light, heat the front door rear window frame moulding.



(b) Disengage the clip.



(c) Using a moulding remover, remove the front door rear window frame moulding.



15. REMOVE FRONT DOOR UPPER WINDOW FRAME MOULDING

(a) Put a 4 mm (0.16 in.) drill bit into a drill.

(b) Tape the drill bit without the portion of 5 mm (0.20 in.) from the tip covered.
HINT:
Tape the drill bit to prevent the drill bit from going too deep.

(c) Lightly press the drill against the rivets, drill off the flanges of the rivets, and remove the 7 rivets.
NOTICE:
- **Pressing the drill too firmly will cause the rivet to turn and result in the rivet not being drilled through.**
- **Do not pry the rivets with the drill, because this may cause damage to the installation holes of the rivets or the drill bit.**
- **Be careful when touching the drilled rivets as they may become hot.**

(d) Using a vacuum cleaner, remove the rivet fragments and shavings from the drilled areas.

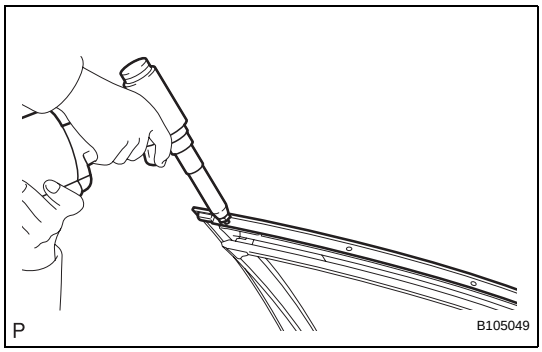
(e) Remove the front door upper window frame moulding from the door frame.

INSTALLATION

1. INSTALL FRONT DOOR UPPER WINDOW FRAME MOULDING

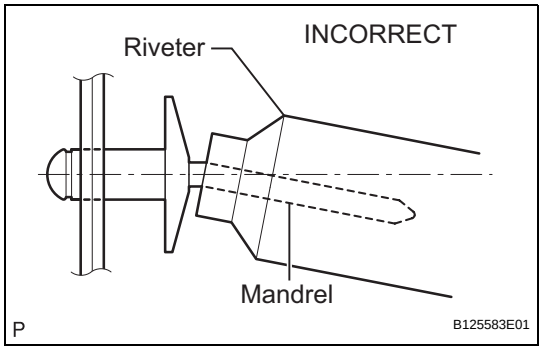
(a) Install the front door upper window frame moulding to the door frame.

(b) Using an air riveter or hand riveter with a nose piece, install the front door upper window frame moulding with 7 new rivets.
HINT:
If the rivet cannot be cut, pull it once and cut it.

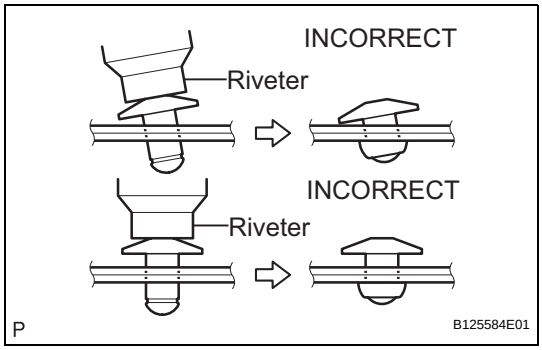


NOTICE:

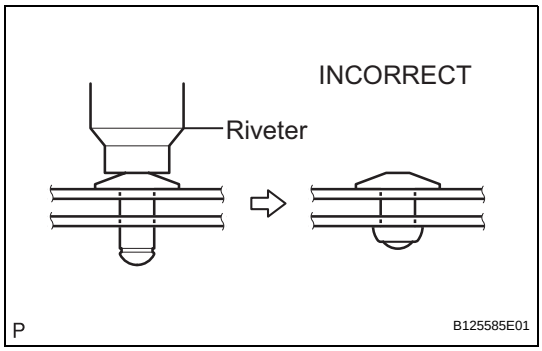
- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**



- **Confirm that the rivets are seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any space between the rivet head and moulding.**



- **Do not leave any space between the moulding and door frame. Firmly hold together the 2 items while installing the rivet.**



2. INSTALL FRONT DOOR REAR WINDOW FRAME MOULDING

HINT:
When installing the front door rear window frame moulding, heat the vehicle body and front door rear window frame moulding using a heat light.

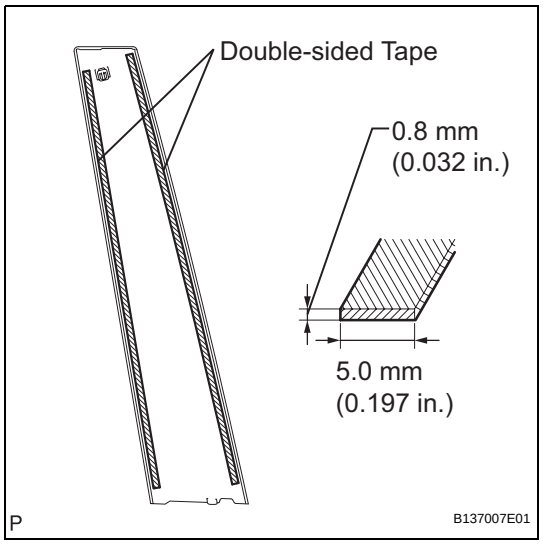
Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

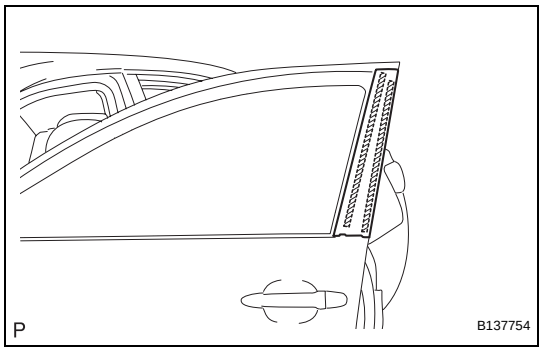
NOTICE:
Do not heat the vehicle body and front door window frame moulding excessively.

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

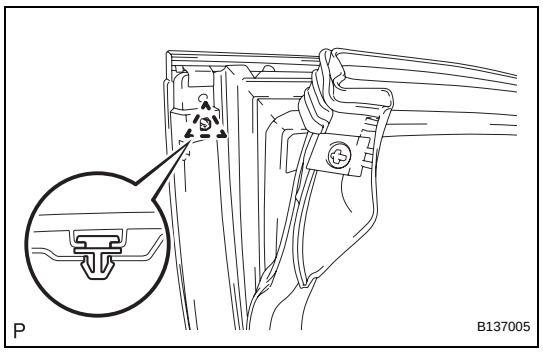
(b) Clean the front door rear window frame moulding. (If reusing the front door rear window frame moulding)
  (1) Using a heat light, heat the front door rear window frame moulding.
  (2) Remove the double-sided tape from the front door rear window frame moulding.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the front door rear window frame moulding.

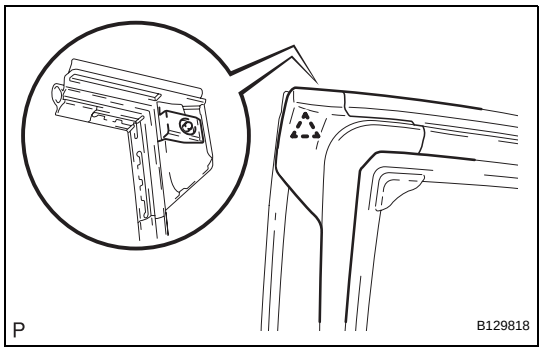


(c) Install the front door rear window frame moulding.
  (1) Using a heat light, heat the vehicle body and front door rear window frame moulding.
  (2) Remove the release paper from the front door rear window frame moulding.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.



  (3) Engage the clip and install the front door rear window frame moulding.

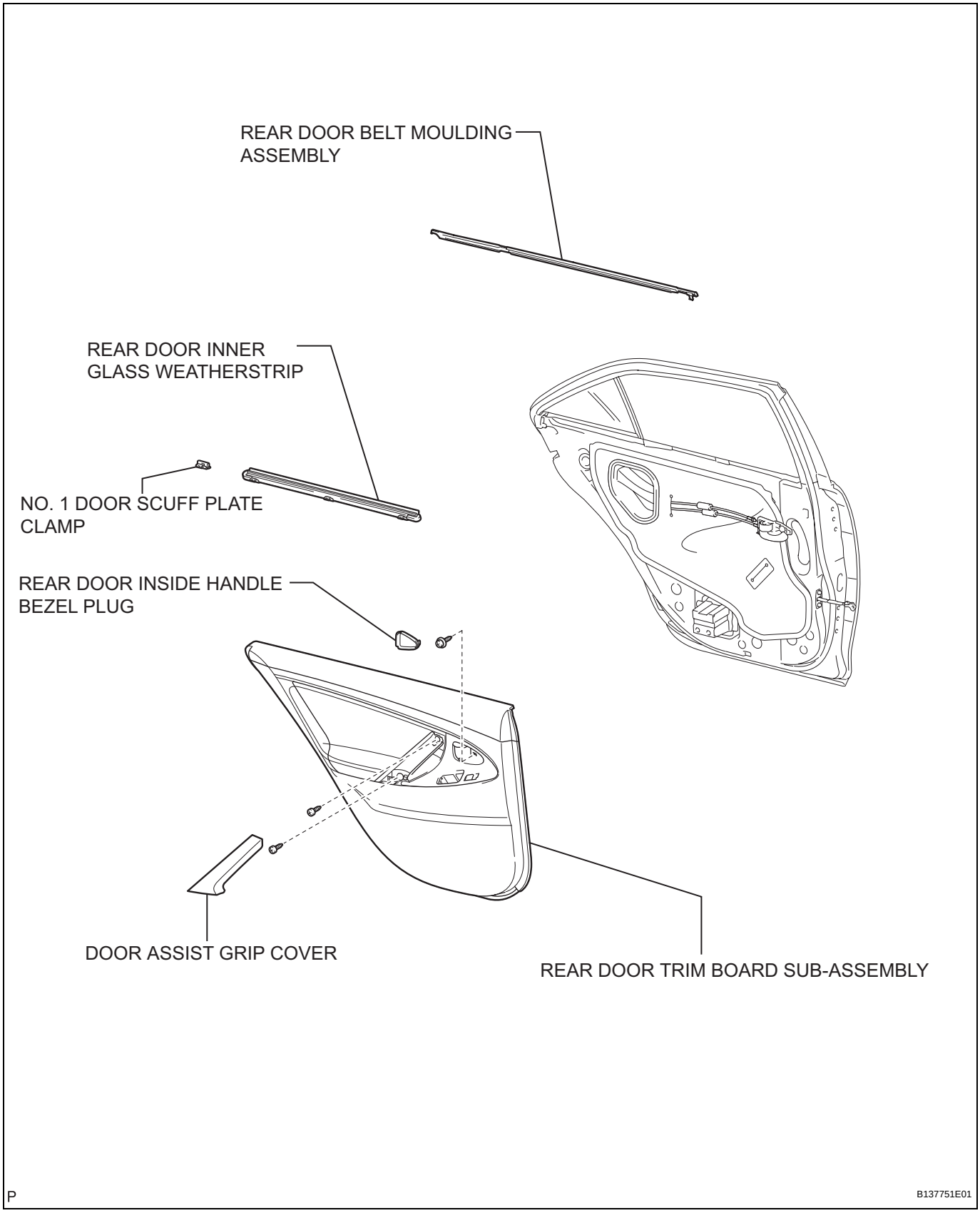




3. **INSTALL FRONT DOOR WEATHERSTRIP**
   (a) Engage the clip and install the front door weatherstrip.
4. **INSTALL FRONT DOOR GLASS RUN (See page ED-30)**
5. **INSTALL FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-31)**
6. **INSTALL FRONT DOOR SERVICE HOLE COVER (See page ED-32)**
7. **INSTALL OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-17)**
8. **INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-157)**
9. **INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-33)**
10. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-32)**
11. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**
12. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-34)**
13. **INSTALL ASSIST GRIP COVER (See page ED-34)**
14. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**
15. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

REAR DOOR WINDOW FRAME MOULDING

COMPONENTS



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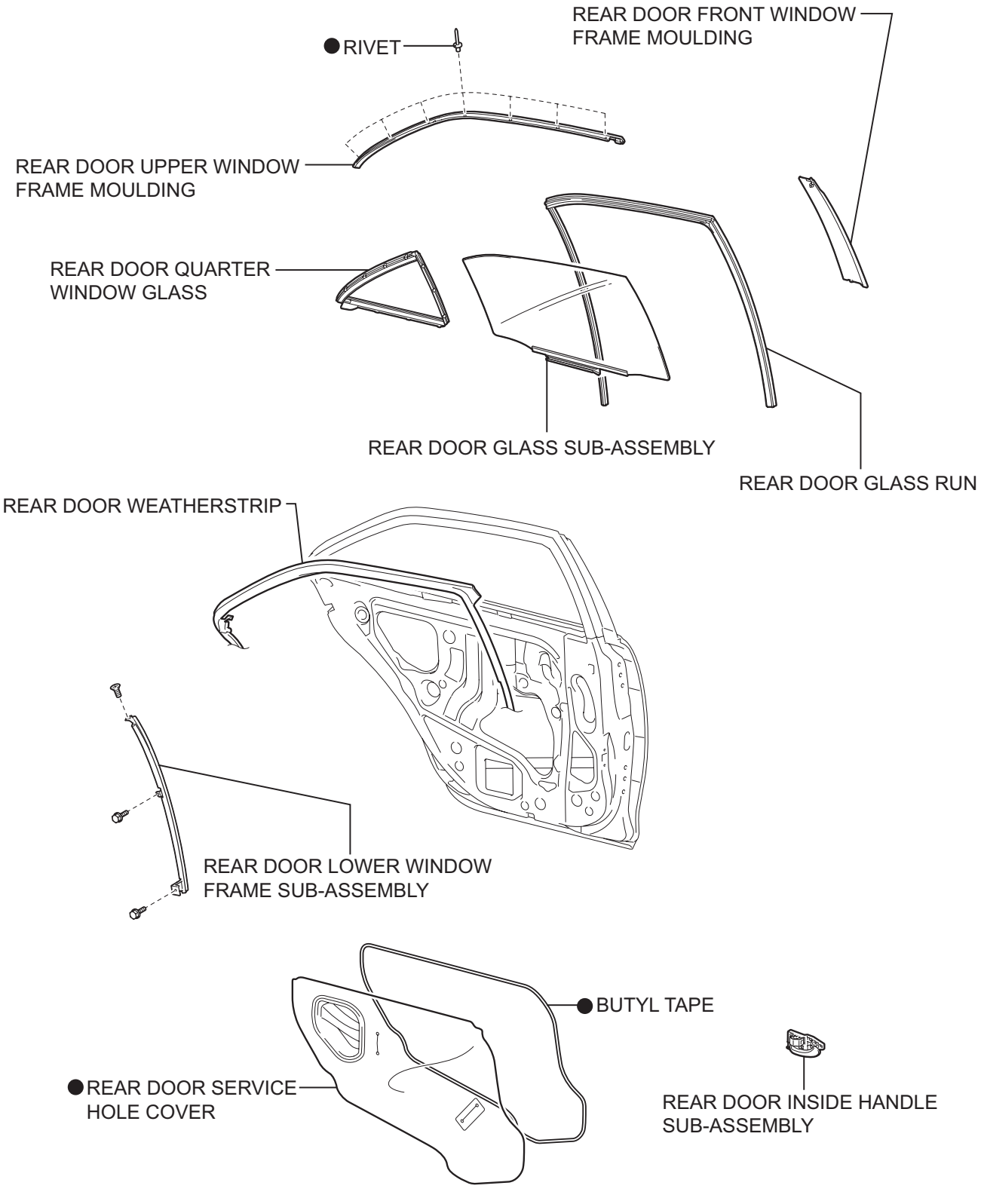

● Non-reusable part

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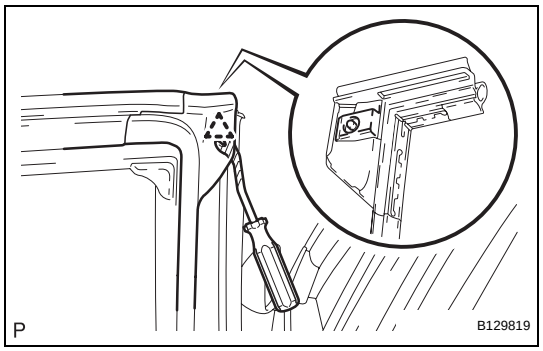
REMOVAL

1. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-38)**
2. **REMOVE DOOR ASSIST GRIP COVER (See page ED-38)**
3. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-39)**
4. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-40)**
5. **REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-40)**
6. **REMOVE REAR DOOR SERVICE HOLE COVER (See page ED-41)**
7. **REMOVE REAR DOOR GLASS RUN (See page ED-42)**
8. **REMOVE REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-42)**
9. **REMOVE REAR DOOR QUARTER WINDOW GLASS (See page ED-43)**
10. **REMOVE REAR DOOR GLASS SUB-ASSEMBLY (See page ED-43)**
11. **REMOVE REAR DOOR WEATHERSTRIP**
    (a) Using a clip remover, disengage the clip and remove the rear door weatherstrip.

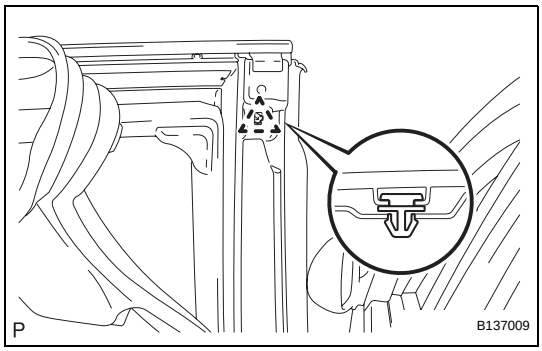


12. **REMOVE REAR DOOR FRONT WINDOW FRAME MOULDING**
    HINT:
    When removing the rear door front window frame moulding, heat the vehicle body and rear door front window frame moulding using a heat light.
    Heating temperature

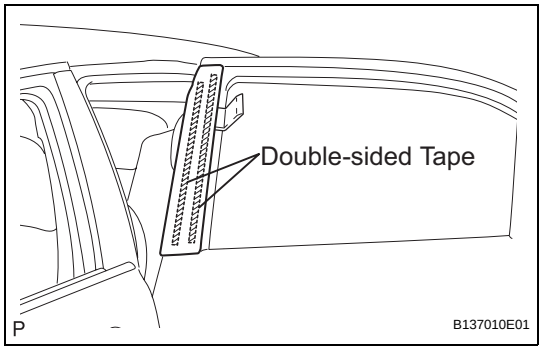
Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

NOTICE:
Do not heat the vehicle body and moulding excessively.

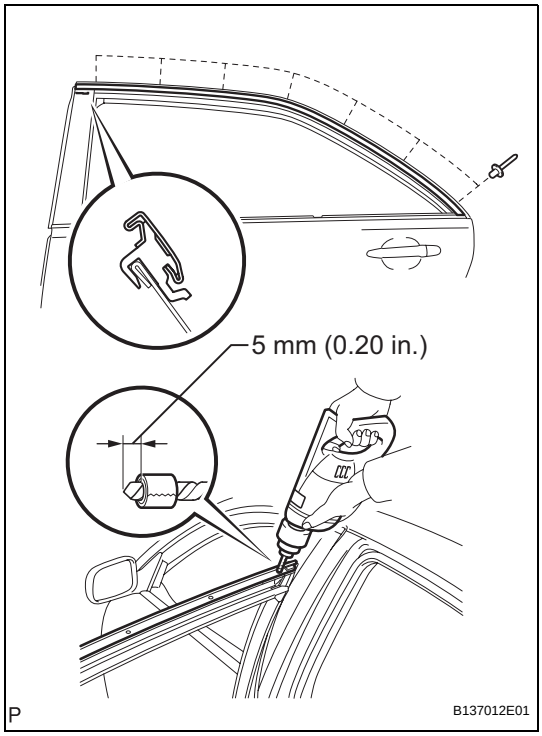
(a) Using a heat light, heat the rear door front window frame moulding.



(b) Disengage the clip.



(c) Using a moulding remover, remove the rear door front window frame moulding.



13. REMOVE REAR DOOR UPPER WINDOW FRAME MOULDING

(a) Put a 4 mm (0.16 in.) drill bit into a drill.

(b) Tape the drill bit without the portion of 5 mm (0.20 in.) from the tip covered.
HINT:
Tape the drill bit to prevent the drill bit from going too deep.

(c) Lightly press the drill bit against the rivets, drill off the flanges of the rivets, and remove the 7 rivets.
NOTICE:
- **Pressing the drill too firmly will cause the rivet to turn and result in the rivet not being drilled through.**
- **Do not pry the rivets with the drill, as this may cause damage to the installation holes of the rivets or the drill bit.**
- **Be careful when touching the drilled rivets, as they may become hot.**

(d) Using a vacuum cleaner, remove the rivet fragments and shavings from the drilled areas.

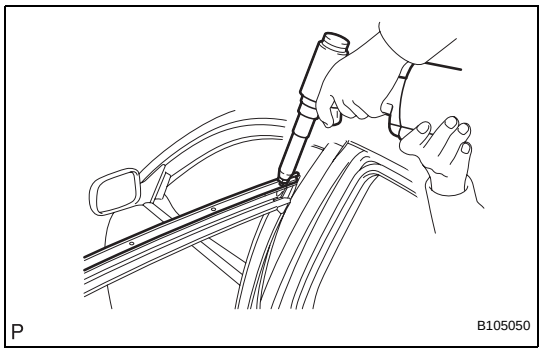
(e) Remove the rear door upper window frame moulding from the door frame.

INSTALLATION

1. INSTALL REAR DOOR UPPER WINDOW FRAME MOULDING

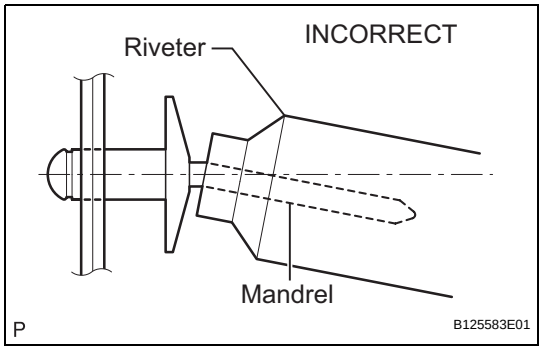
(a) Install the rear door upper window frame moulding to the door frame.

(b) Using an air riveter or hand riveter with a nose piece, install the rear door upper window frame moulding with 7 new rivets.
HINT:
If the rivet cannot be cut, pull it once and cut it.

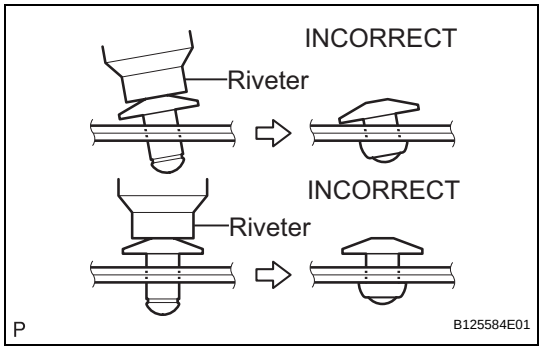


NOTICE:

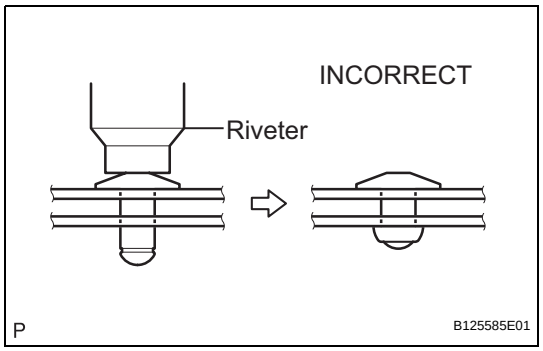
- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**



- **Confirm that the rivets are seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any space between the rivet head and moulding.**



- **Do not leave any space between the moulding and door frame. Firmly hold together the 2 items while installing the rivet.**



2. INSTALL REAR DOOR FRONT WINDOW FRAME MOULDING

HINT:
When installing the rear door front window frame moulding, heat the vehicle body and rear door front window frame using a heat light.

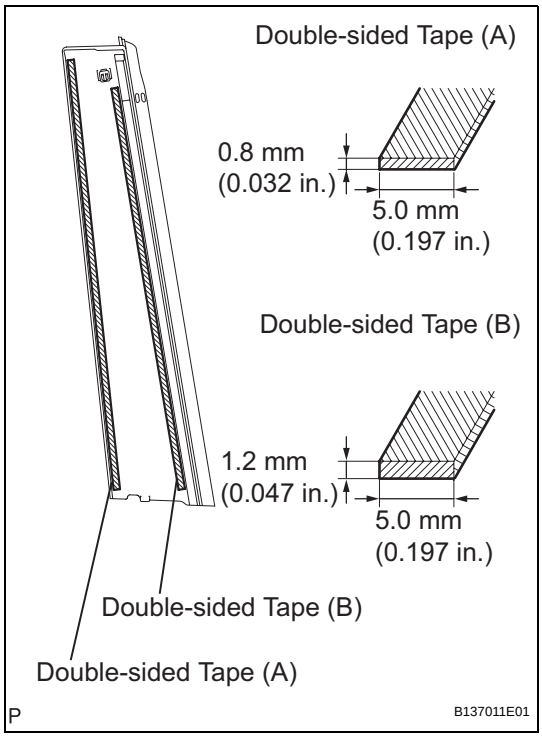
Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)
Moulding	20 to 30°C (68 to 86°F)

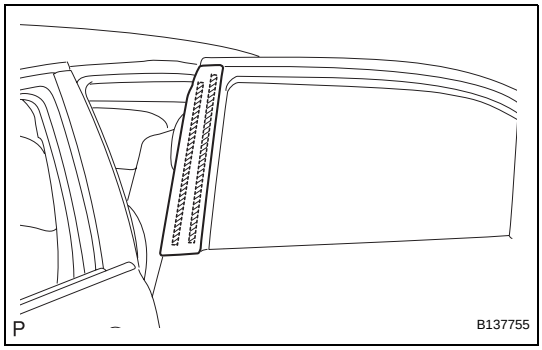
NOTICE:
Do not heat the vehicle body and rear door window frame moulding excessively.

(a) Clean the vehicle body surface.
  (1) Using a heat light, heat the vehicle body surface.
  (2) Remove the double-sided tape from the vehicle body.
  (3) Wipe off any tape adhesive residue with cleaner.

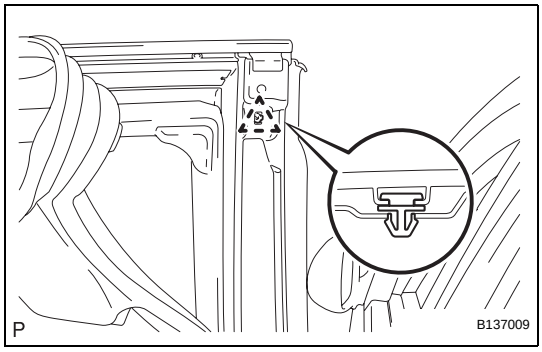
(b) Clean the rear door front window frame moulding. (If reusing the rear door front window frame moulding)
  (1) Using a heat light, heat the rear door front window frame moulding.
  (2) Remove the double-sided tape from the rear door front window frame moulding.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the rear door front window frame moulding.

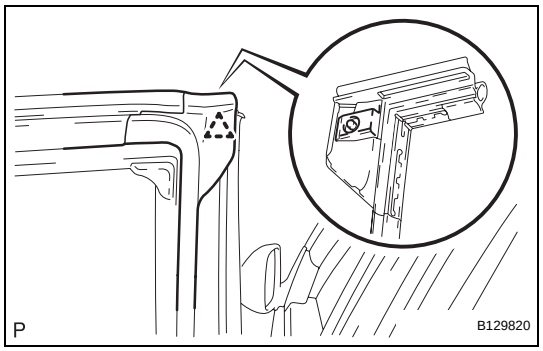


(c) Install the rear door front window frame moulding.
  (1) Using a heat light, heat the vehicle body and rear door front window frame moulding.
  (2) Remove the release paper from the rear door front window frame moulding.
  HINT:
  After removing the release paper, keep the exposed adhesive free from foreign matter.



  (3) Engage the clip and install the rear door front window frame moulding.

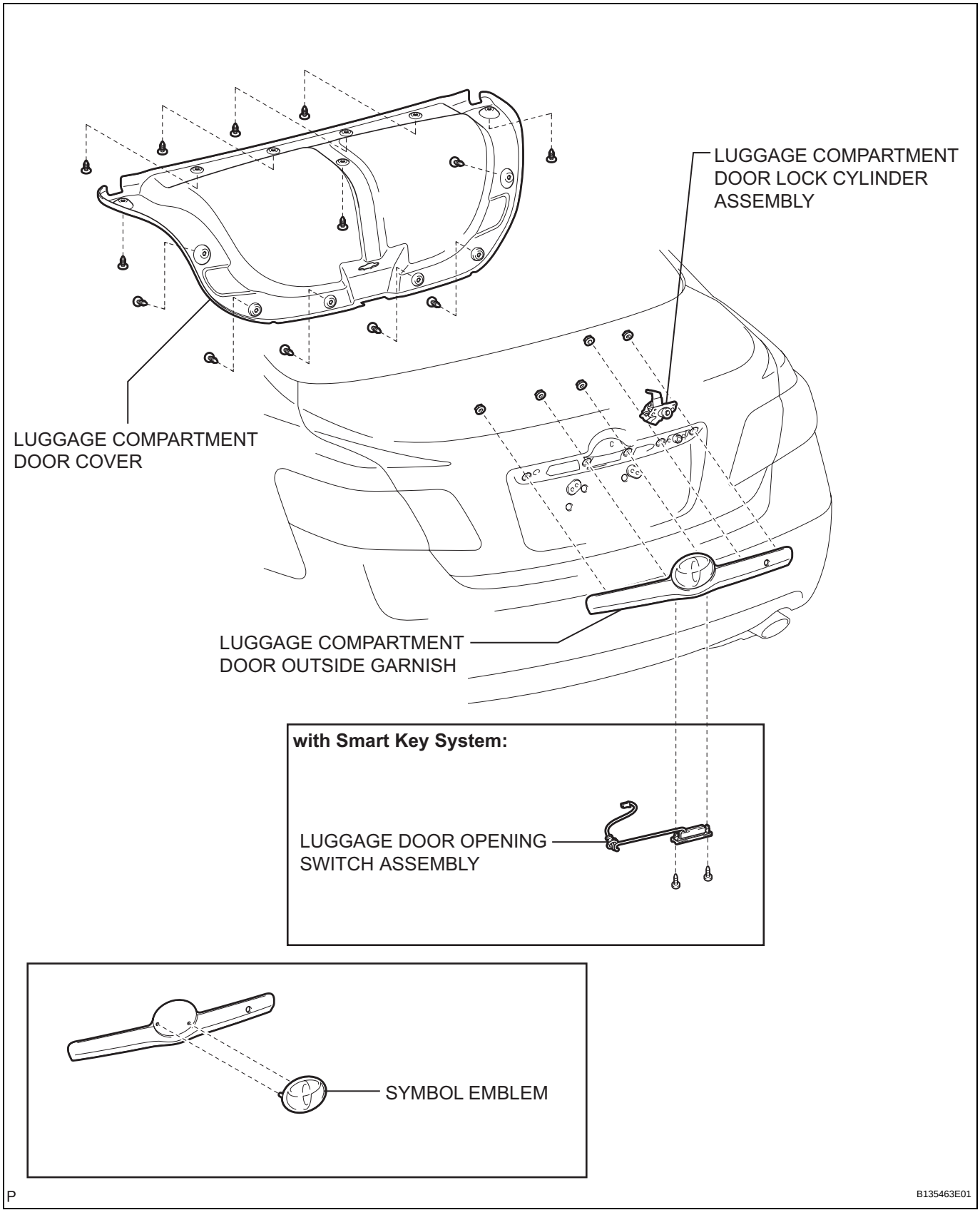


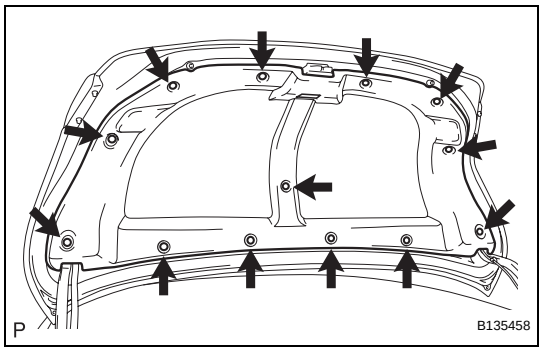


3. **INSTALL REAR DOOR WEATHERSTRIP**
   (a) Engage the clip and install the rear door weatherstrip.
4. **INSTALL REAR DOOR GLASS SUB-ASSEMBLY (See page ED-52)**
5. **INSTALL REAR DOOR QUARTER WINDOW GLASS (See page ED-52)**
6. **INSTALL REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-52)**
7. **INSTALL REAR DOOR GLASS RUN (See page ED-52)**
8. **INSTALL REAR DOOR SERVICE HOLE COVER (See page ED-53)**
9. **INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-55)**
10. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-54)**
11. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-55)**
12. **INSTALL DOOR ASSIST GRIP COVER (See page ED-56)**
13. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-56)**

LUGGAGE COMPARTMENT DOOR GARNISH

COMPONENTS



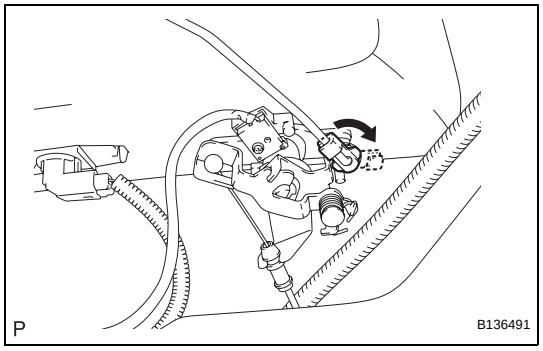


REMOVAL

1. REMOVE LUGGAGE COMPARTMENT DOOR COVER

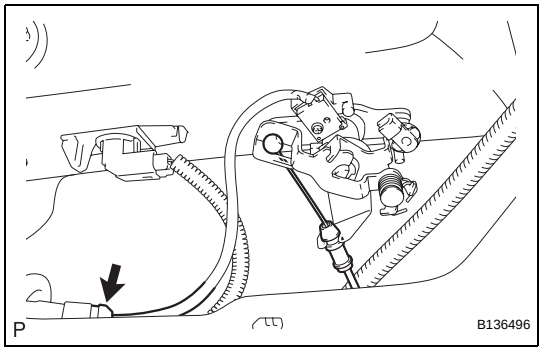
(a) Using a clip remover, remove the 13 clips and luggage compartment door cover.

2. REMOVE LUGGAGE DOOR OPENING SWITCH ASSEMBLY (w/ Smart Key System) (See page DL-246)

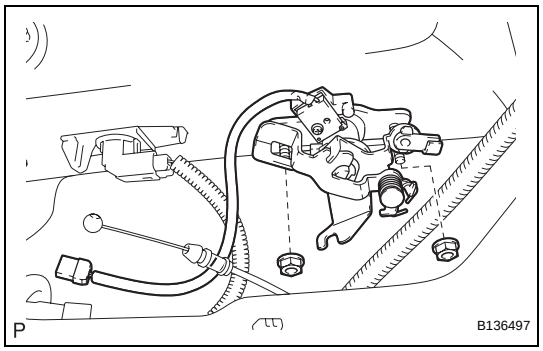


3. REMOVE LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY

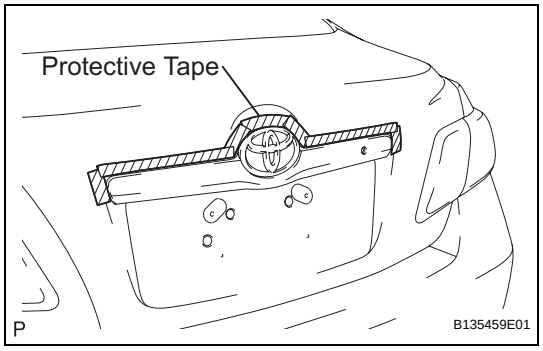
(a) Disconnect the rod.



(b) Disconnect the cable and connector.

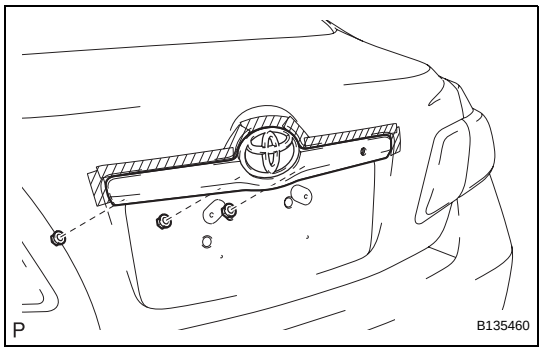


(c) Remove the 2 nuts and luggage compartment door lock cylinder assembly.

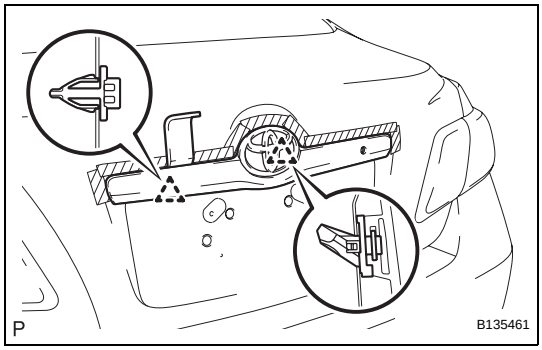


4. REMOVE LUGGAGE COMPARTMENT DOOR OUTSIDE GARNISH

(a) Put protective tape around the luggage compartment door outside garnish.



(b) Remove the 3 nuts.



(c) Using a moulding remover, disengage the 2 clips and remove the luggage compartment door outside garnish.

5. REMOVE SYMBOL EMBLEM

HINT:

When removing the symbol emblem, heat the luggage compartment door outside garnish and symbol emblem using a heat light.

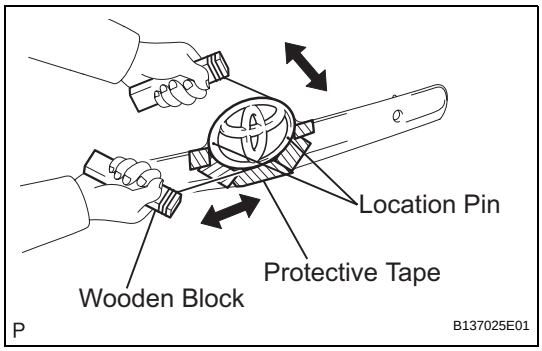
Heating temperature

Item	Temperature
Luggage compartment door outside garnish	**40 to 60°C (104 to 140°F)**
Symbol emblem	**20 to 30°C (68 to 86°F)**

NOTICE:

Do not heat the luggage compartment door outside garnish and symbol emblem excessively.

(a) Put protective tape around the symbol emblem.



(b) Insert a piano wire between the luggage compartment door outside garnish and symbol emblem.

(c) Tie objects that can serve as handles (for example, wooden blocks) to both wire ends.

(d) Pull the piano wire and scrape off the double-sided tape that holds the symbol emblem to the luggage compartment door outside garnish.

NOTICE:

- **If reusing the symbol emblem, take care not to damage the symbol emblem.**
- **Be careful not to damage the luggage compartment door outside garnish.**

(e) Remove the symbol emblem.

INSTALLATION

1. INSTALL SYMBOL EMBLEM

HINT:

When installing the symbol emblem, heat the luggage compartment door outside garnish and symbol emblem using a heat light.

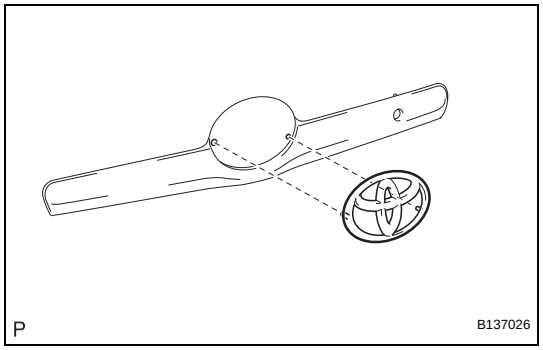
Heating temperature

Item	Temperature
Luggage compartment door outside garnish	**40 to 60°C (104 to 140°F)**
Symbol emblem	**20 to 30°C (68 to 86°F)**

NOTICE:

Do not heat the luggage compartment door outside garnish and symbol emblem excessively.

(a) Clean the luggage compartment door outside garnish surface.
  (1) Using a heat light, heat the luggage compartment door outside garnish surface.
  (2) Remove the double-sided tape from the luggage compartment door outside garnish.
  (3) Wipe off any tape adhesive residue with cleaner.



(b) Clean the symbol emblem. (If reusing the symbol emblem)
  (1) Using a heat light, heat the symbol emblem.
  (2) Remove the double-sided tape from the symbol emblem.
  (3) Wipe off any tape adhesive residue with cleaner.
  (4) Apply new double-sided tape to the symbol emblem.

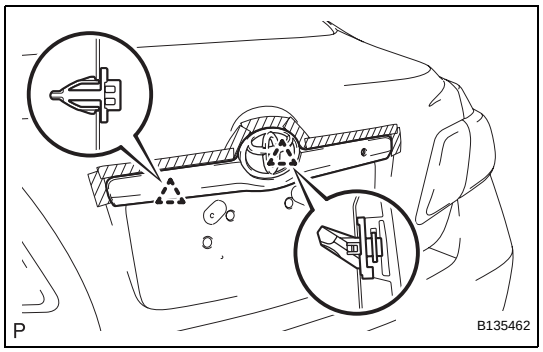
(c) Install the symbol emblem.
  (1) Using a heat light, heat the luggage compartment door outside garnish and symbol emblem.
  (2) Remove the release paper from the symbol emblem.

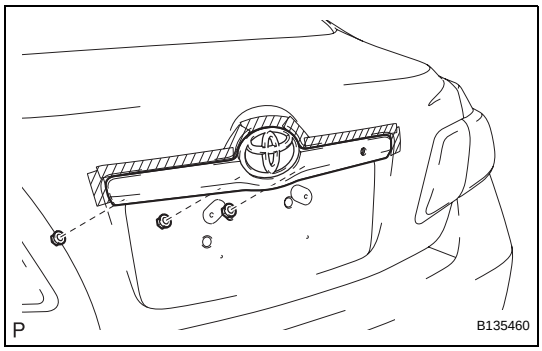
  HINT:

  After removing the release paper, keep the exposed adhesive free from foreign matter.
  (3) Install the symbol emblem.

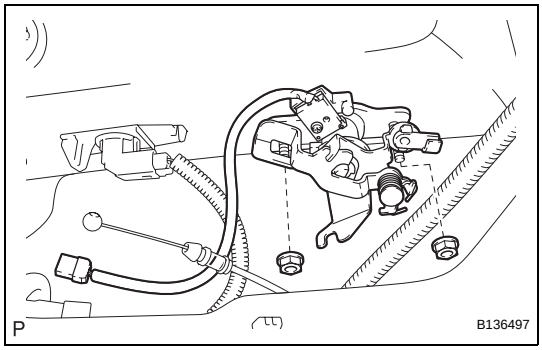
2. INSTALL LUGGAGE COMPARTMENT DOOR OUTSIDE GARNISH

(a) Engage the 2 clips and install the luggage compartment door outside garnish.



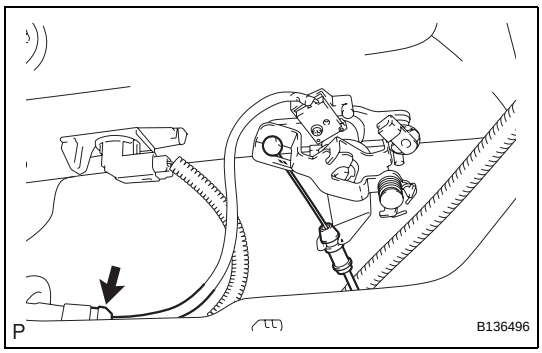


(b) Install the 3 nuts.

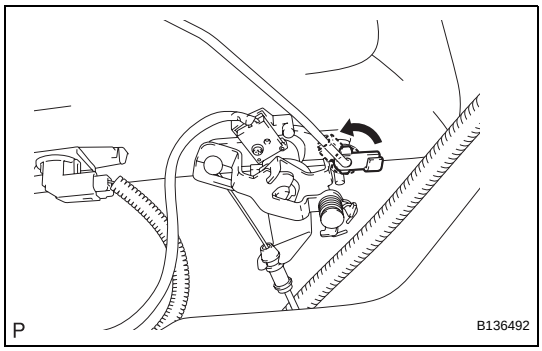


3. INSTALL LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY

(a) Install the luggage compartment door lock cylinder with the 2 nuts.

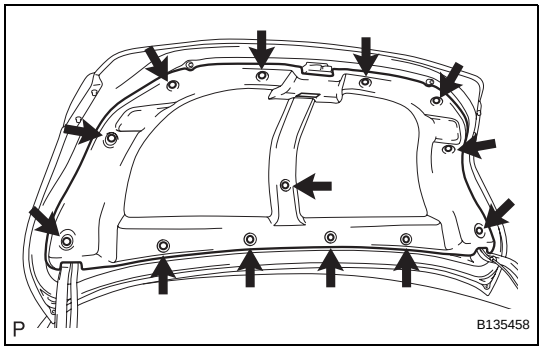


(b) Connect the cable and connector.



(c) Connect the rod.

4. INSTALL LUGGAGE DOOR OPENING SWITCH ASSEMBLY (w/ Smart Key System) (See page DL-246)

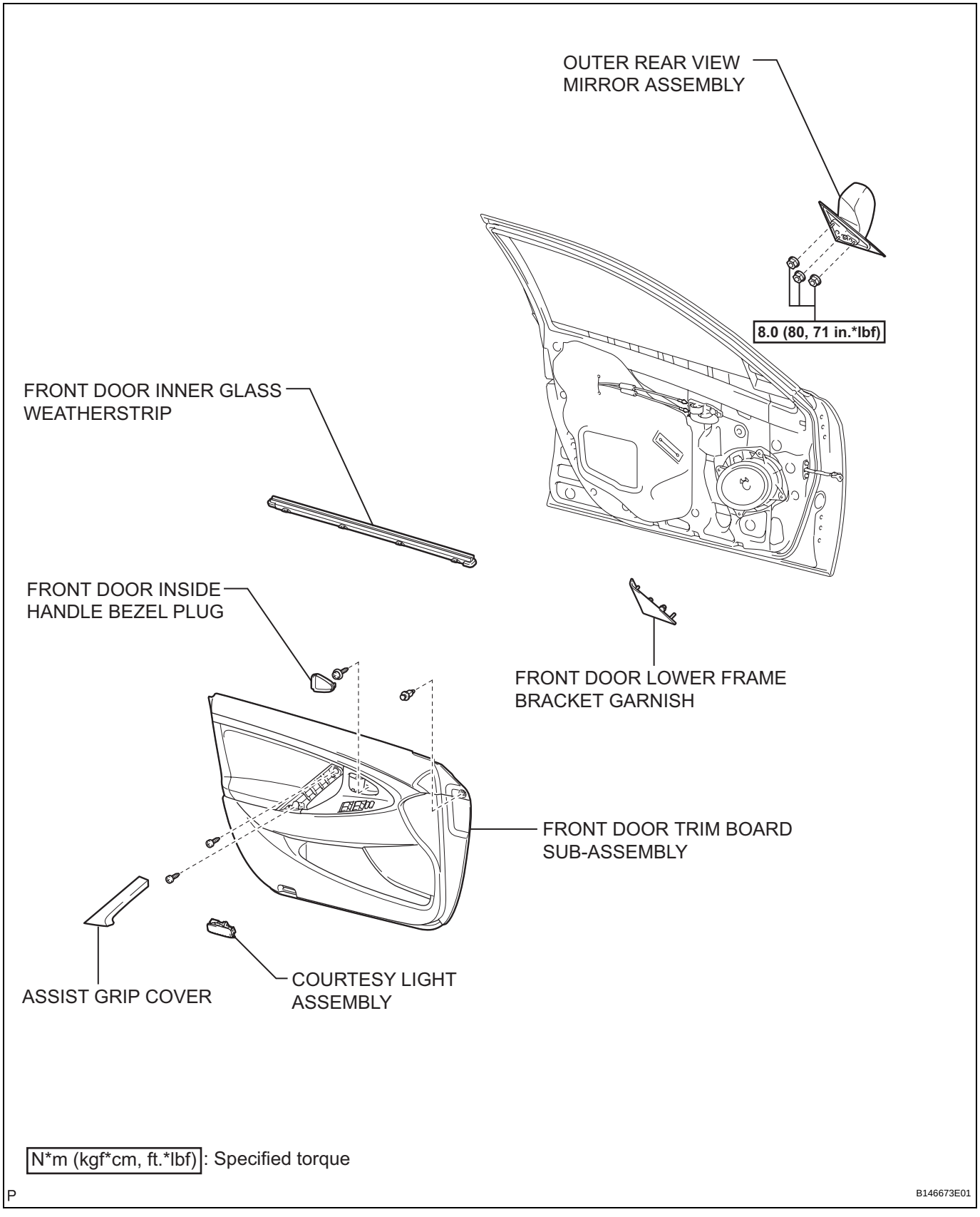


5. INSTALL LUGGAGE COMPARTMENT DOOR COVER

(a) Install the luggage compartment door cover with the 13 clips.

FRONT DOOR BLACK OUT TAPE

COMPONENTS



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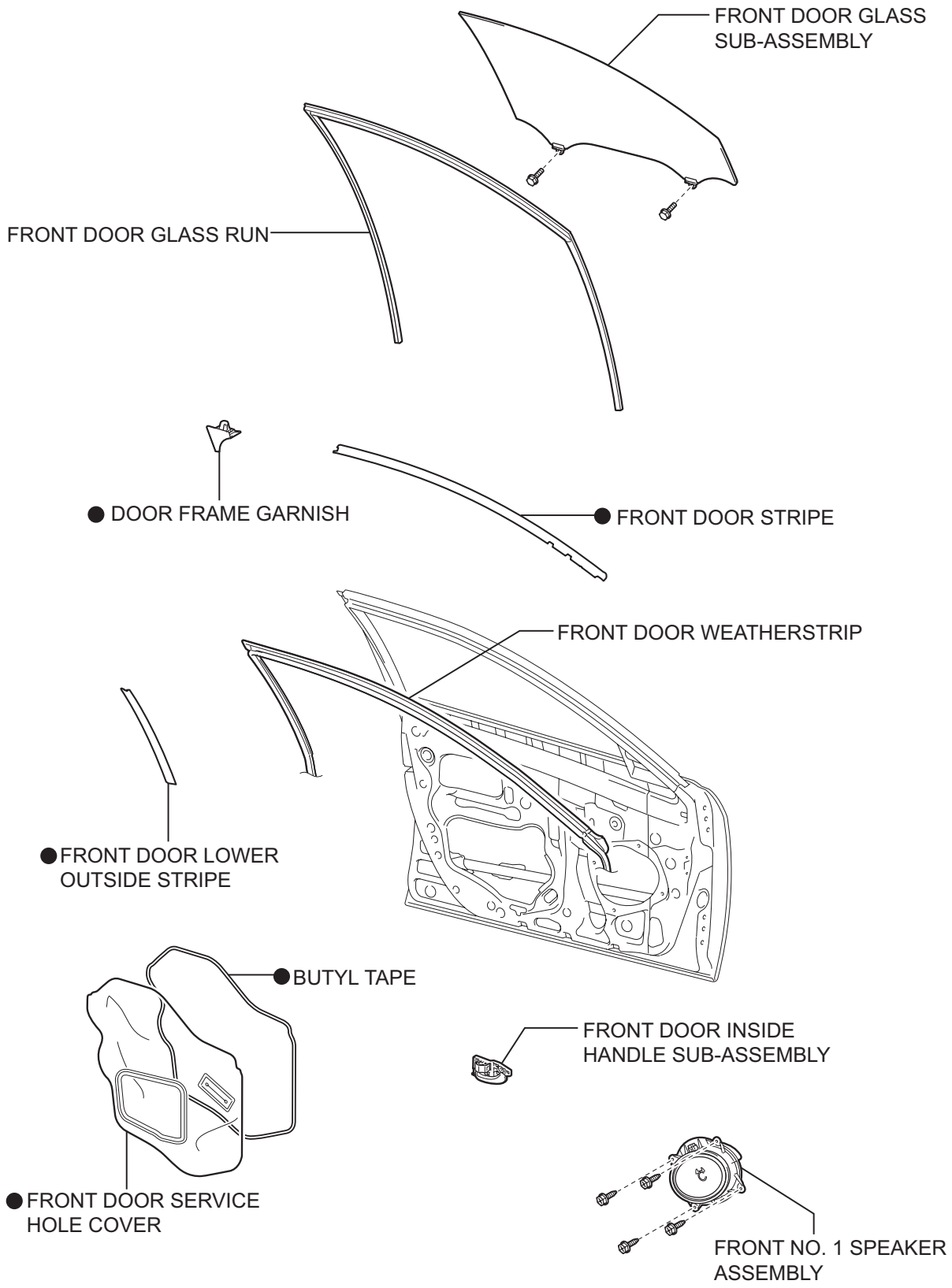

● Non-reusable part

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REMOVAL

1. **REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)**
2. **REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)**
3. **REMOVE ASSIST GRIP COVER (See page ED-15)**
4. **REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)**
5. **REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)**
6. **REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-16)**
7. **REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-17)**
8. **REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-155)**
9. **REMOVE OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-15)**
10. **REMOVE FRONT DOOR SERVICE HOLE COVER (See page ED-17)**
11. **REMOVE FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-17)**
12. **REMOVE FRONT DOOR GLASS RUN (See page ED-19)**
13. **REMOVE FRONT DOOR WEATHERSTRIP (See page ET-48)**
14. **REMOVE DOOR FRAME GARNISH (See page ED-19)**
15. **REMOVE FRONT DOOR STRIPE**
    (a) Using a heat light, heat the front door stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.
    (b) Pull back an edge of the front door stripe and pull it parallel to the vehicle body to pull it off.
16. **REMOVE FRONT DOOR LOWER OUTSIDE STRIPE**
    (a) Using a heat light, heat the front door lower outside stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.

(b) Pull back an edge of the front door lower outside stripe and pull it parallel to the vehicle body to pull it off.

INSTALLATION

1. REPAIR INSTRUCTION

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

Heating temperature

Item	Temperature
Vehicle Body	**40 to 60°C (104 to 140°F)**

NOTICE:

Do not heat the vehicle body excessively.

(2) Wipe off any tape adhesive residue with cleaner.

(b) Installation temperature

(1) When ambient temperature is below 15°C, perform the installation procedure after warming the vehicle body surface (installation surface of the door frame) and tape up to between 20 to 30°C using a heat light. When ambient temperature is above 35°C, cool the vehicle body surface (installation surface of the door frame) and tape down to between 20 to 30°C prior to installation.

HINT:

- The most appropriate temperature for installing the tape is 25°C.
- When the temperature is low, the tape turns stiff and comes off easily. When the temperature is high, the tape looses elasticity.

(c) Before installation

(1) Remove any roughness of coating and dirt on and around the vehicle body surface where the tape will be installed (installation surface of the door frame). If any roughness or dirt remains when pressing the tape onto the surface, air will be trapped under the tape and result in a poor appearance.

HINT:

Spray water on the shop floor to settle any dust.

(d) Key points for handling the tape

(1) The tape bends and rolls up easily. Store the tape between flat pieces of cardboard or other similar objects and keep it dry and level.

NOTICE:

Do not bend the tape or leave it in high temperature places.

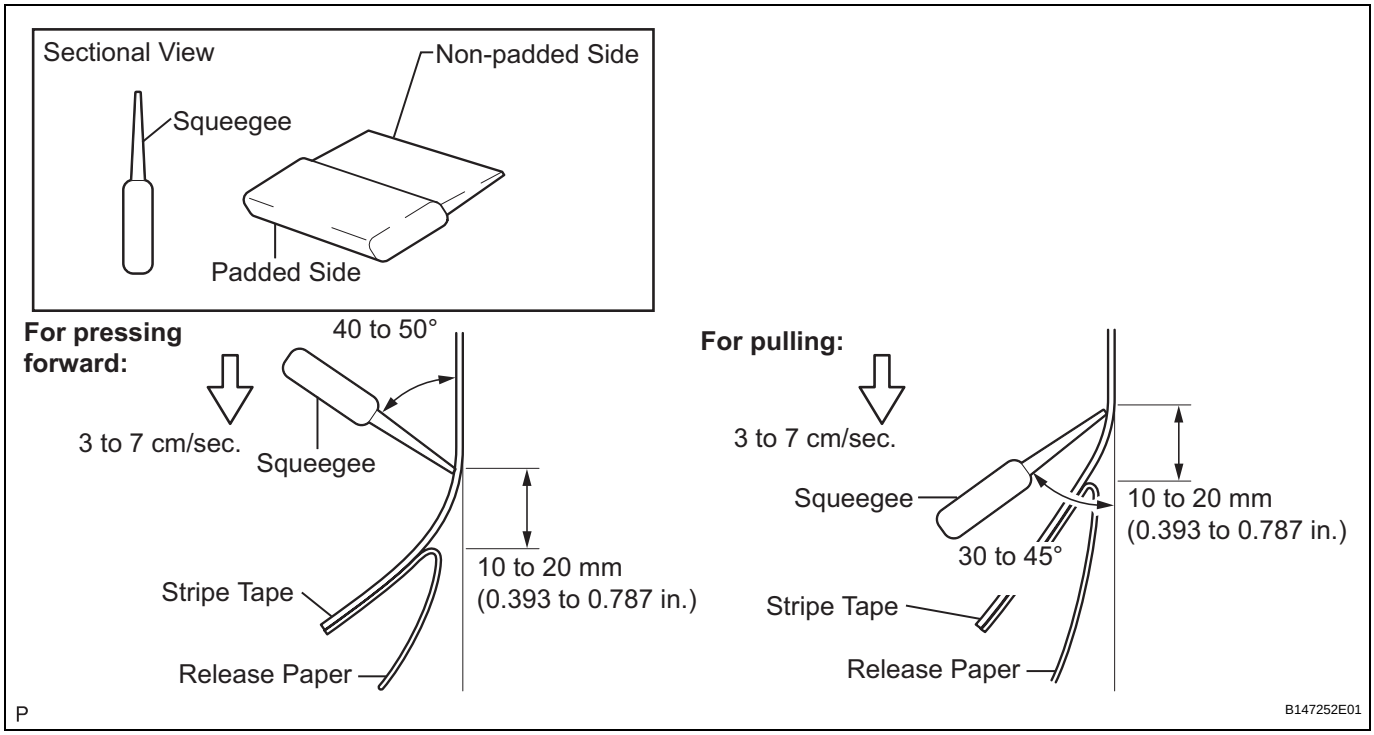
(e) Key points for installation of the tape (how to use a squeegee and installation procedure for flat surfaces)

NOTICE:

- **Conduct positioning of the tape with a high accuracy to achieve a neat finish and to avoid peeling.**

- **The tape cannot be reused because it deforms or does not fit any more after being removed.**

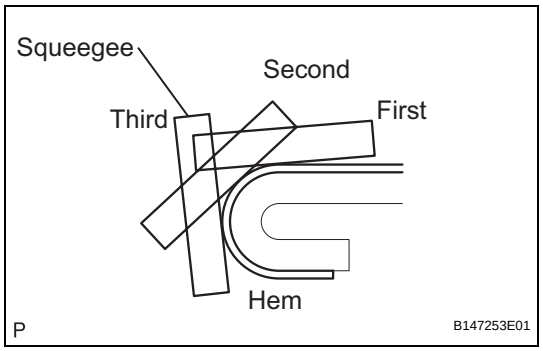
(1) To avoid air bubbles, slightly raise the part of the tape that are going to be applied so that its adhesive surface does not touch the vehicle body while applying the tape. Tilt the squeegee at a 40 to 50° (for pressing forward) or 30 to 45° (for pulling) to the vehicle body surface and press the tape onto the vehicle body surface with a force of 20 to 30 N (2 to 3 kgf) at a constant slow speed of 3 to 7 cm per second.



NOTICE:
Be sure to observe the specified pressing speed, force, and angle of the squeegee to avoid wrinkles or air bubbles.

HINT:

- Either angle of the squeegee (for pressing forward or for pulling) is acceptable.
- Be sure to apply the tape while removing the release paper 10 to 20 mm from the edge of the squeegee.



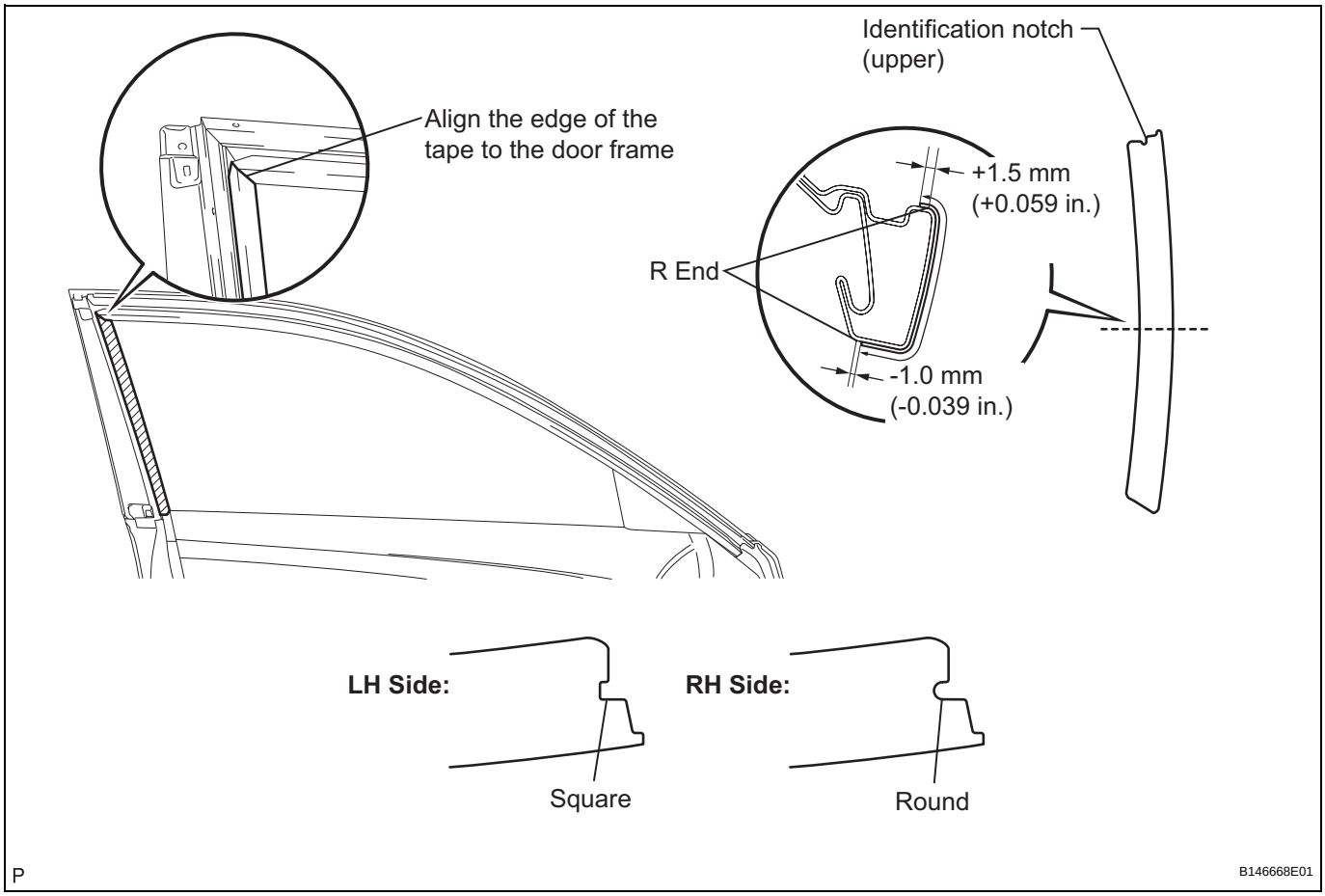
(f) Key points for installation of the tape (how to use a squeegee and installation procedure for hemming surfaces)
  (1) If it is difficult to press the tape, press it in several steps as shown in the illustration. Use your fingers or the padded surface of a squeegee to slowly apply the tape to the hem of the vehicle, especially for a small hem.
  HINT:
  When applying the tape to the backside of a hem, remove the release paper and use your fingers or the padded surface of a squeegee.

(g) Key points for installation of the tape (how to use a squeegee and installation procedure for corners)
  (1) Remove the release paper and apply the tape carefully with your fingers.
  (2) Before applying the tape to each corner, heat the tape using a heat light and gradually apply it, to avoid wrinkles on the tape and achieve a neat finish.

(h) Check after installation
  (1) After completing the application, check if the tape is applied neatly. If the tape is not applied neatly, reapply using new tape.
  NOTICE:
  Do not reuse the tape.

2. INSTALL FRONT DOOR LOWER OUTSIDE STRIPE

(a) Refer to the illustration to position the front door lower outside stripe.



(b) Remove the release paper and apply the stripe.

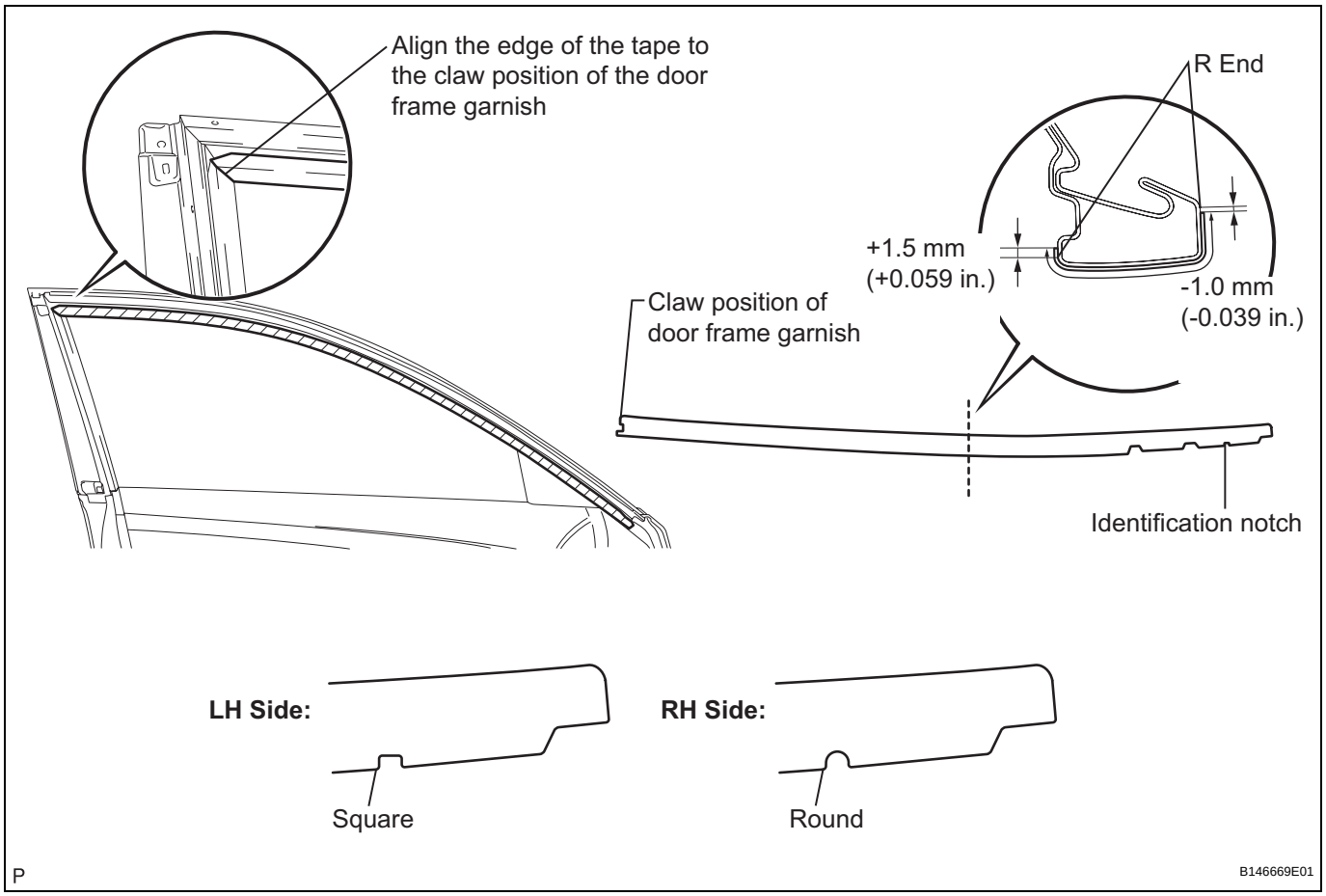
3. INSTALL FRONT DOOR STRIPE

NOTICE:

Be sure to install the front door stripe after applying the front door lower outside stripe.

ET

(a) Refer to the illustration to position the front door stripe.



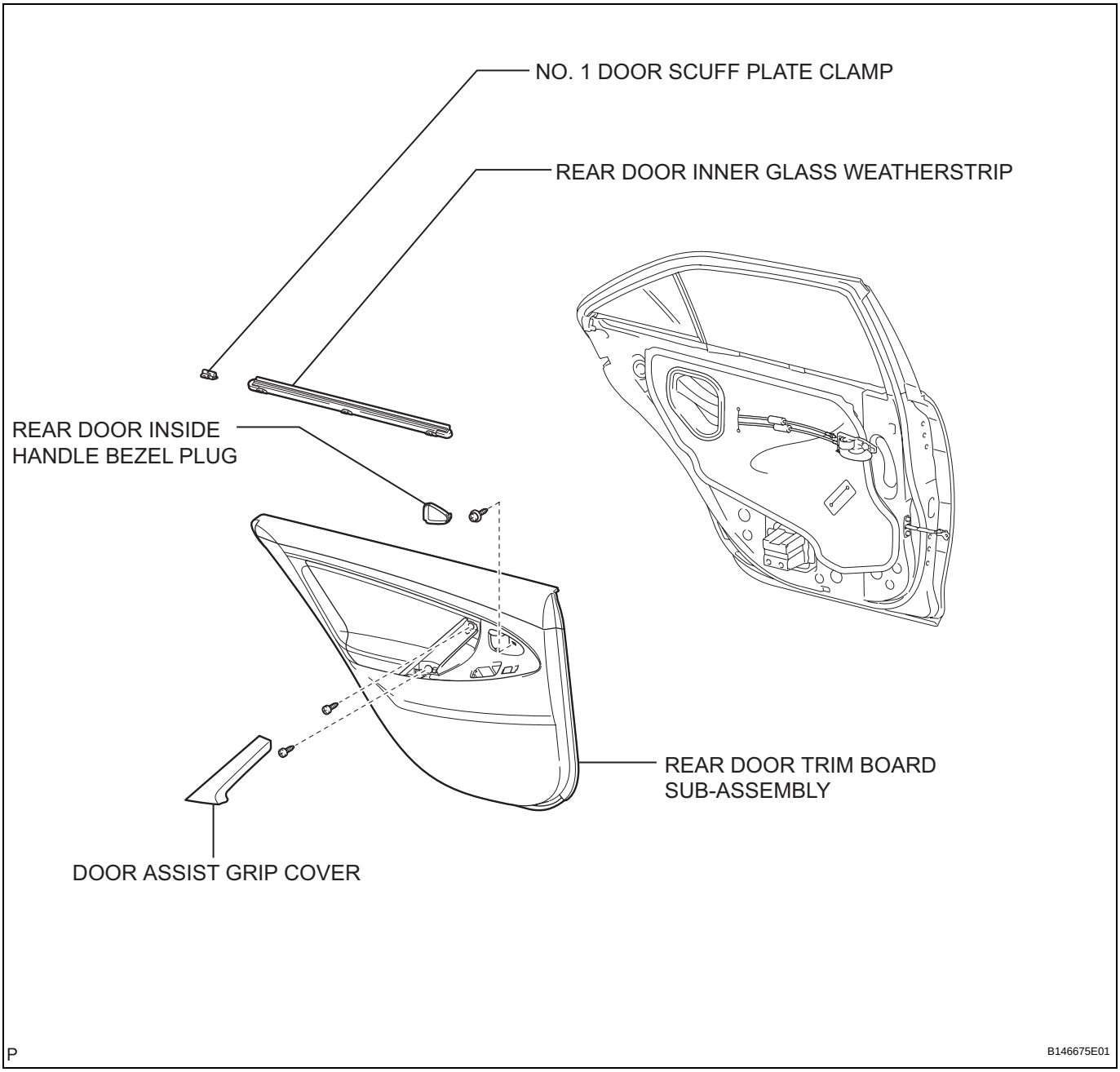
(b) Remove the release paper and apply the stripe.

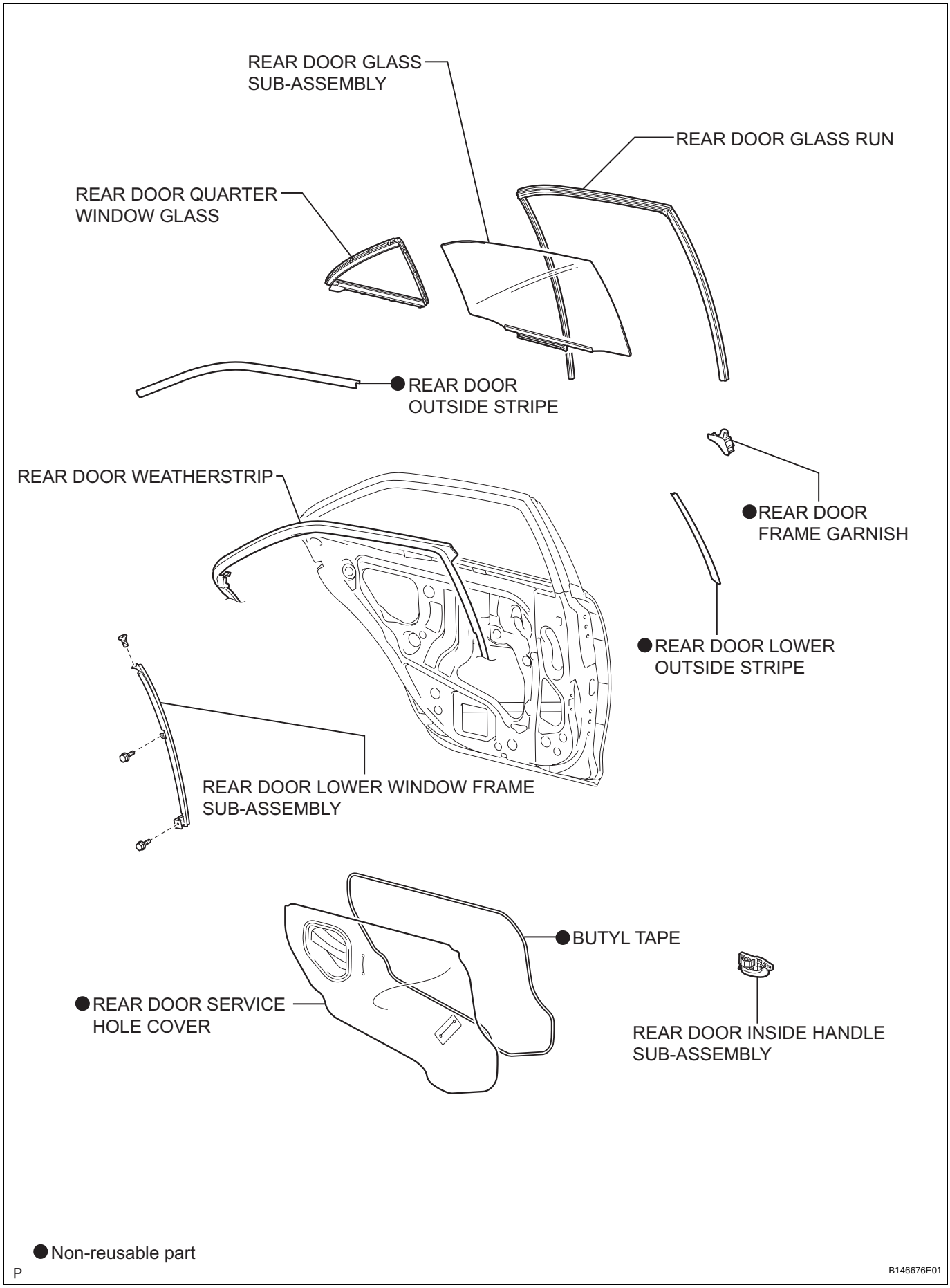
4. **INSTALL DOOR FRAME GARNISH (See page ED-30)**
5. **INSTALL FRONT DOOR WEATHERSTRIP (See page ET-51)**
6. **INSTALL FRONT DOOR GLASS RUN (See page ED-30)**
7. **INSTALL FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-31)**
8. **INSTALL FRONT DOOR SERVICE HOLE COVER (See page ED-32)**
9. **INSTALL OUTER REAR VIEW MIRROR ASSEMBLY (See page MI-17)**
10. **INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-157)**
11. **INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-33)**
12. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-32)**
13. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**

14. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-34)**
15. **INSTALL ASSIST GRIP COVER (See page ED-34)**
16. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**
17. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

REAR DOOR BLACK OUT TAPE

COMPONENTS




REAR DOOR GLASS SUB-ASSEMBLY
REAR DOOR GLASS RUN
REAR DOOR QUARTER WINDOW GLASS
● REAR DOOR OUTSIDE STRIPE
REAR DOOR WEATHERSTRIP
● REAR DOOR FRAME GARNISH
● REAR DOOR LOWER OUTSIDE STRIPE
REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY
● BUTYL TAPE
● REAR DOOR SERVICE HOLE COVER
REAR DOOR INSIDE HANDLE SUB-ASSEMBLY
● Non-reusable part
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ET

ET

REMOVAL

1. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-38)**
2. **REMOVE DOOR ASSIST GRIP COVER (See page ED-38)**
3. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-39)**
4. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-40)**
5. **REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-40)**
6. **REMOVE REAR DOOR SERVICE HOLE COVER (See page ED-41)**
7. **REMOVE REAR DOOR GLASS RUN (See page ED-42)**
8. **REMOVE REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-42)**
9. **REMOVE REAR DOOR QUARTER WINDOW GLASS (See page ED-43)**
10. **REMOVE REAR DOOR GLASS SUB-ASSEMBLY (See page ED-43)**
11. **REMOVE REAR DOOR WEATHERSTRIP (See page ET-55)**
12. **REMOVE REAR DOOR OUTSIDE STRIPE**
    (a) Using a heat light, heat the rear door outside stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.
    (b) Pull back an edge of the rear door outside stripe and pull it parallel to the vehicle body to pull it off.
13. **REMOVE REAR DOOR LOWER OUTSIDE STRIPE**
    (a) Using a heat light, heat the rear door lower outside stripe.
    Heating temperature

Item	Temperature
Vehicle Body	40 to 60°C (104 to 140°F)

    NOTICE:
    Do not heat the vehicle body excessively.
    (b) Pull back an edge of the rear door lower outside stripe and pull it parallel to the vehicle body to pull it off.

INSTALLATION

1. REPAIR INSTRUCTION

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

Heating temperature

Item	Temperature
Vehicle Body	**40 to 60°C (104 to 140°F)**

NOTICE:

Do not heat the vehicle body excessively.

(2) Wipe off any tape adhesive residue with cleaner.

(b) Installation temperature

(1) When ambient temperature is below 15°C, perform the installation procedure after warming the vehicle body surface (installation surface of the door frame) and tape up to between 20 to 30°C using a heat light. When ambient temperature is above 35°C, cool the vehicle body surface (installation surface of the door frame) and tape down to between 20 to 30°C prior to installation.

HINT:

- The most appropriate temperature for installing the tape is 25°C.
- When the temperature is low, the tape turns stiff and comes off easily. When the temperature is high, the tape looses elasticity.

(c) Before installation

(1) Remove any roughness of coating and dirt on and around the vehicle body surface where the tape will be installed (installation surface of the door frame). If any roughness or dirt remains when pressing the tape onto the surface, air will be trapped under the tape and result in a poor appearance.

HINT:

Spray water on the shop floor to settle any dust.

(d) Key points for handling the tape

(1) The tape bends and rolls up easily. Store the tape between flat pieces of cardboard or other similar objects and keep it dry and level.

NOTICE:

Do not bend the tape or leave it in high temperature places.

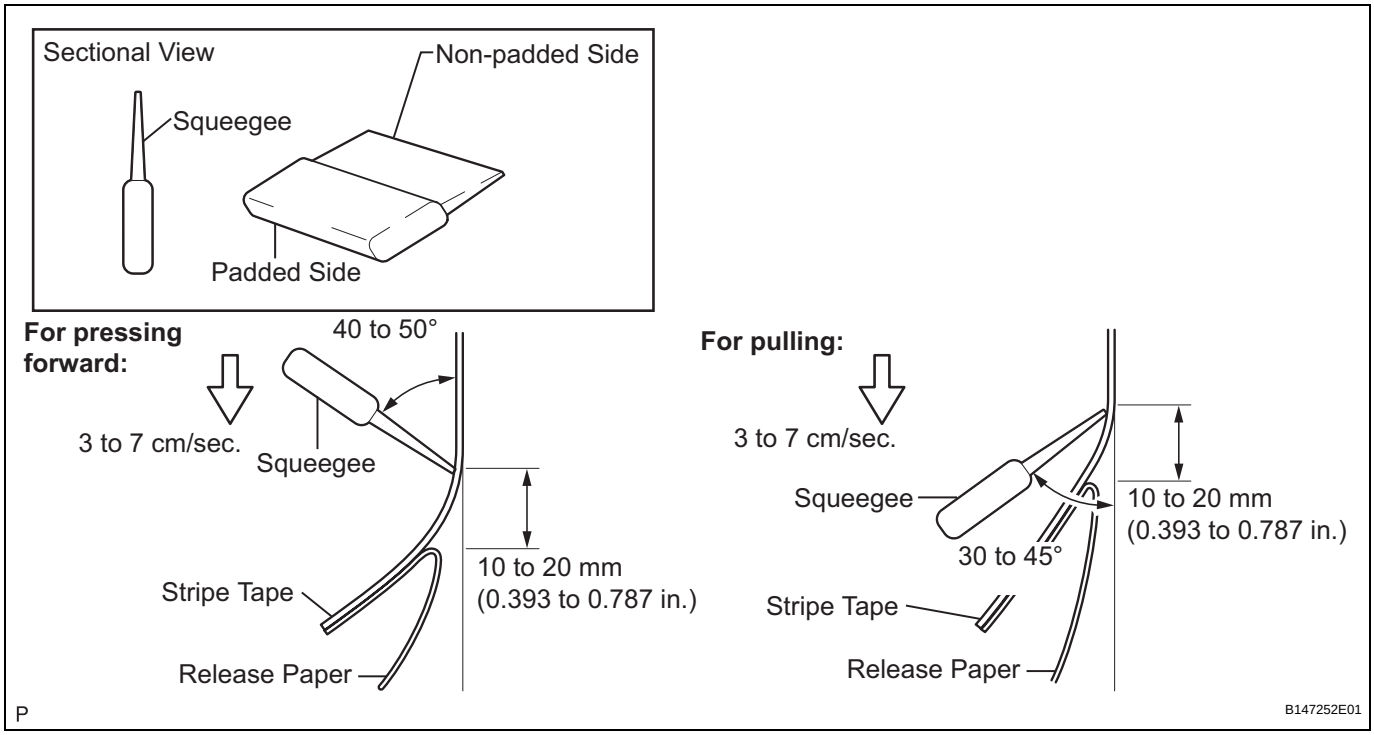
(e) Key points for installation of the tape (how to use a squeegee and installation procedure for flat surfaces)

NOTICE:

- **Conduct positioning of the tape with a high accuracy to achieve a neat finish and to avoid peeling.**

- **The tape cannot be reused because it deforms or does not fit any more after being removed.**

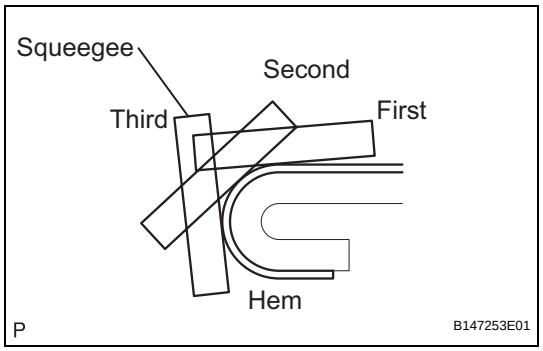
(1) To avoid air bubbles, slightly raise the part of the tape that are going to be applied so that its adhesive surface does not touch the vehicle body while applying the tape. Tilt the squeegee at a 40 to 50° (for pressing forward) or 30 to 45° (for pulling) to the vehicle body surface and press the tape onto the vehicle body surface with a force of 20 to 30 N (2 to 3 kgf) at a constant slow speed of 3 to 7 cm per second.



NOTICE:
Be sure to observe the specified pressing speed, force, and angle of the squeegee to avoid wrinkles or air bubbles.

HINT:

- Either angle of the squeegee (for pressing forward or for pulling) is acceptable.
- Be sure to apply the tape while removing the release paper 10 to 20 mm from the edge of the squeegee.



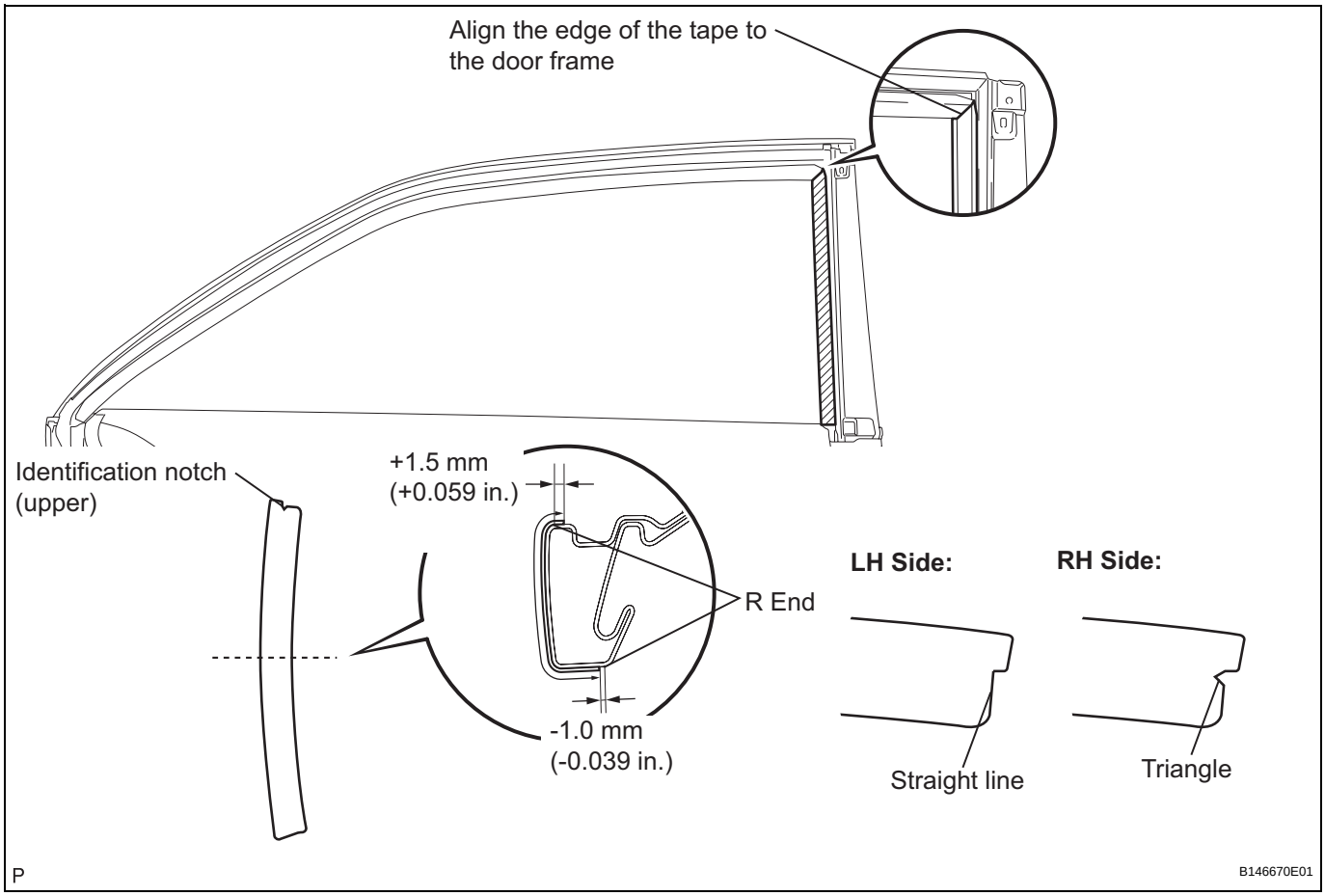
(f) Key points for installation of the tape (how to use a squeegee and installation procedure for hemming surfaces)
  (1) If it is difficult to press the tape, press it in several steps as shown in the illustration. Use your fingers or the padded surface of a squeegee to slowly apply the tape to the hem of the vehicle, especially for a small hem.
  HINT:
  When applying the tape to the backside of a hem, remove the release paper and use your fingers or the padded surface of a squeegee.

(g) Key points for installation of the tape (how to use a squeegee and installation procedure for corners)
  (1) Remove the release paper and apply the tape carefully with your fingers.
  (2) Before applying the tape to each corner, heat the tape using a heat light and gradually apply it, to avoid wrinkles on the tape and achieve a neat finish.

(h) Check after installation
  (1) After completing the application, check if the tape is applied neatly. If the tape is not applied neatly, reapply using new tape.
  NOTICE:
  Do not reuse the tape.

2. INSTALL REAR DOOR LOWER OUTSIDE STRIPE

(a) Refer to the illustration to position the rear door lower outside stripe.



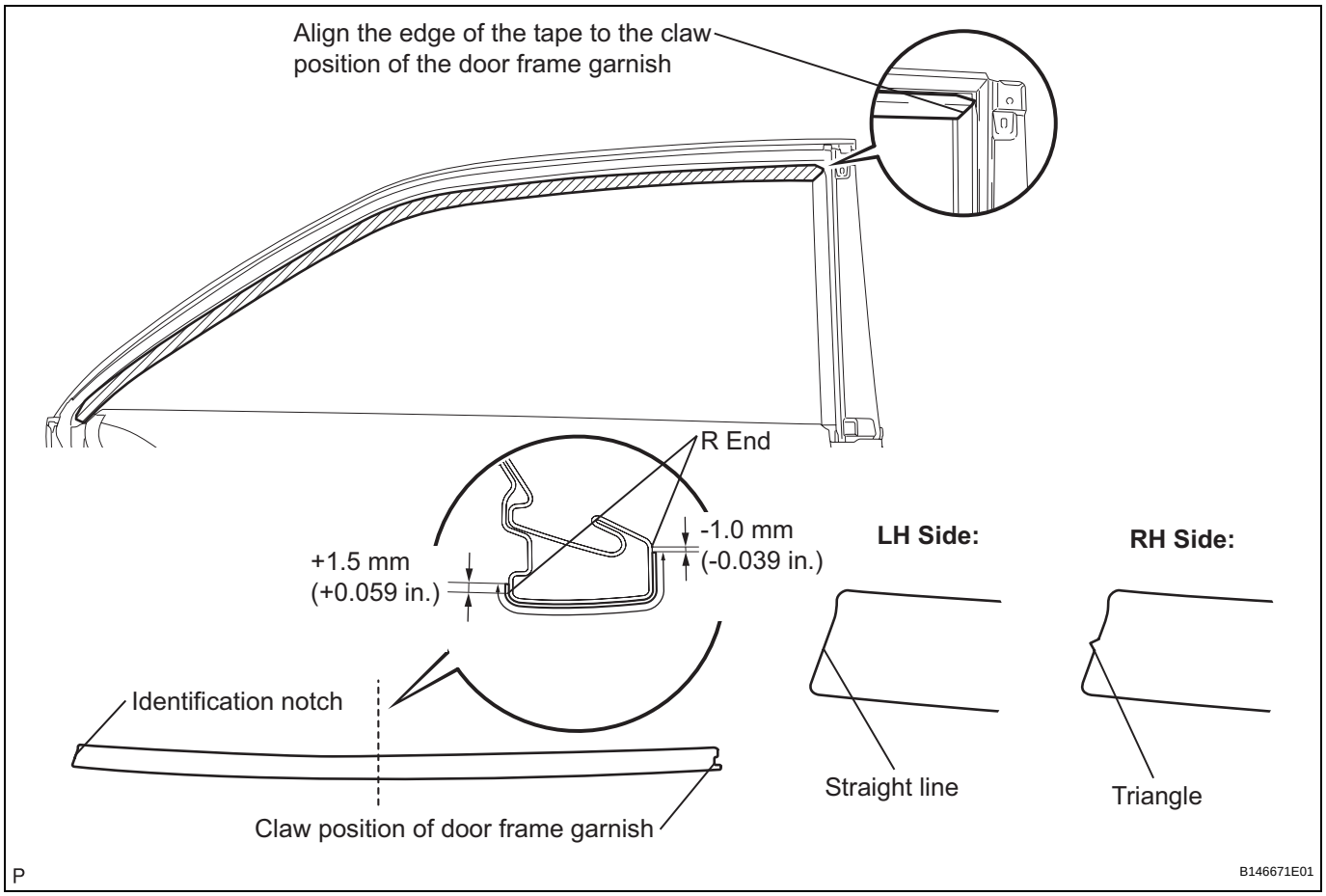
(b) Remove the release paper and apply the stripe.

3. INSTALL REAR DOOR OUTSIDE STRIPE

NOTICE:

Be sure to install the rear door outside stripe after applying the rear door lower outside stripe.

(a) Refer to the illustration to position the rear door outside stripe.



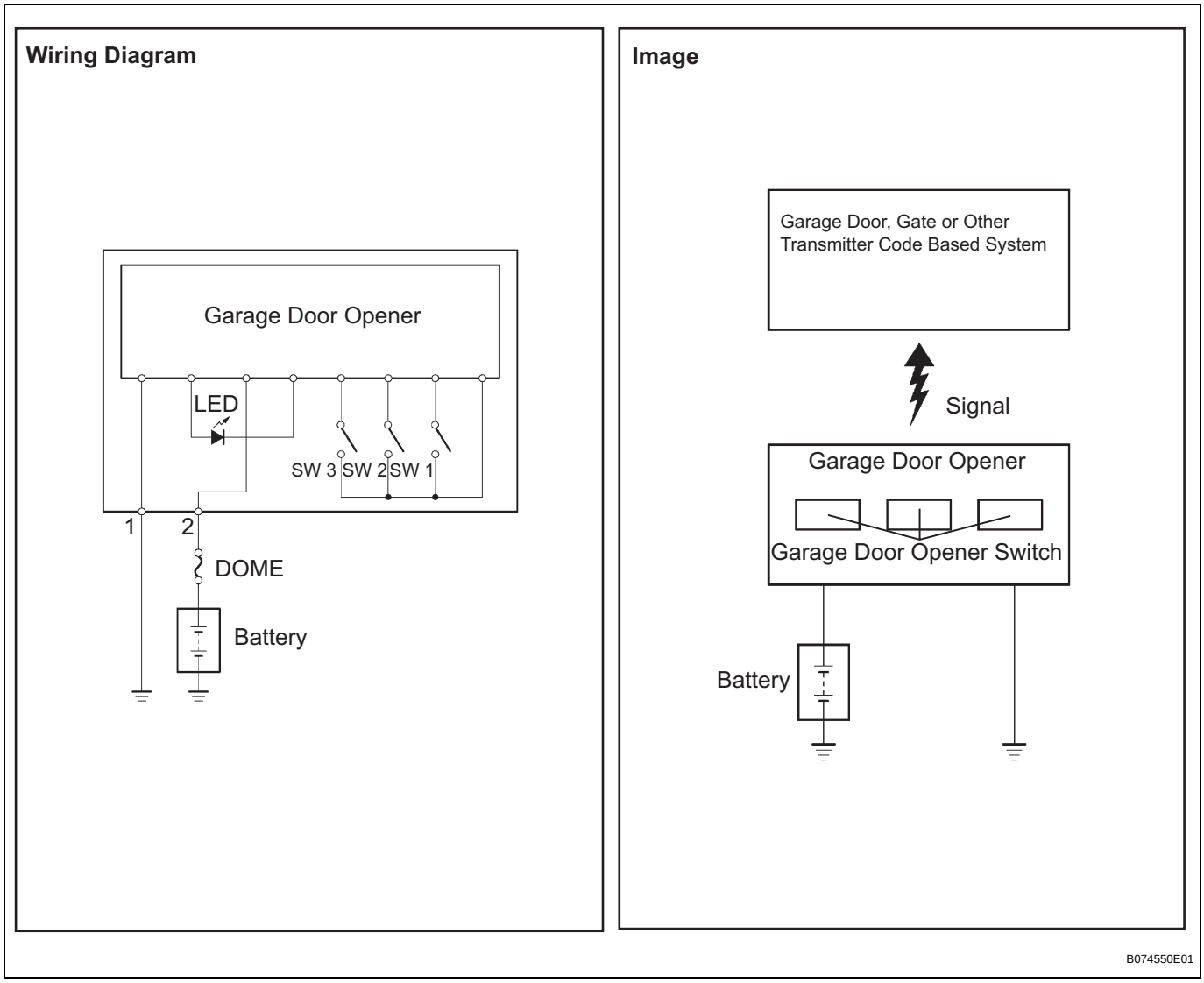
(b) Remove the release paper and apply the stripe.

4. **INSTALL REAR DOOR FRAME GARNISH (See page ED-51)**
5. **INSTALL REAR DOOR WEATHERSTRIP (See page ET-59)**
6. **INSTALL REAR DOOR GLASS SUB-ASSEMBLY (See page ED-52)**
7. **INSTALL REAR DOOR QUARTER WINDOW GLASS (See page ED-52)**
8. **INSTALL REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-52)**
9. **INSTALL REAR DOOR GLASS RUN (See page ED-52)**
10. **INSTALL REAR DOOR SERVICE HOLE COVER (See page ED-53)**
11. **INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY (See page ED-55)**
12. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-54)**
13. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-55)**

14. **INSTALL DOOR ASSIST GRIP COVER (See page ED-56)**
15. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-56)**

GARAGE DOOR OPENER SYSTEM

SYSTEM DIAGRAM



1. DESCRIPTION

(a) A maximum of three codes for transmitter code based systems such as garage doors, gates, and entry gates can be registered to the vehicle's garage door opener system. These stored codes can then be used to activate the transmitter controlled systems. It will not be necessary to keep the original handheld transmitters in the vehicle.

REGISTRATION

1. RESISTER TRANSMITTER CODE

HINT:

- The vehicle's garage door opener system records transmitter codes for systems such as garage doors, gates, door locks, home lighting systems, security systems, or other transmitter-code based systems.
- The garage door opener system is built into the roof console box assembly. If the roof console box assembly is replaced, transmitter codes previously registered in the garage door opener system must be re-registered.
- Ensure that the customer is aware that existing codes may be cleared from the garage door opener system while performing diagnosis of the system. All remotes required to reprogram the system should be made available at the time of inspection or repair of the garage door opener system.

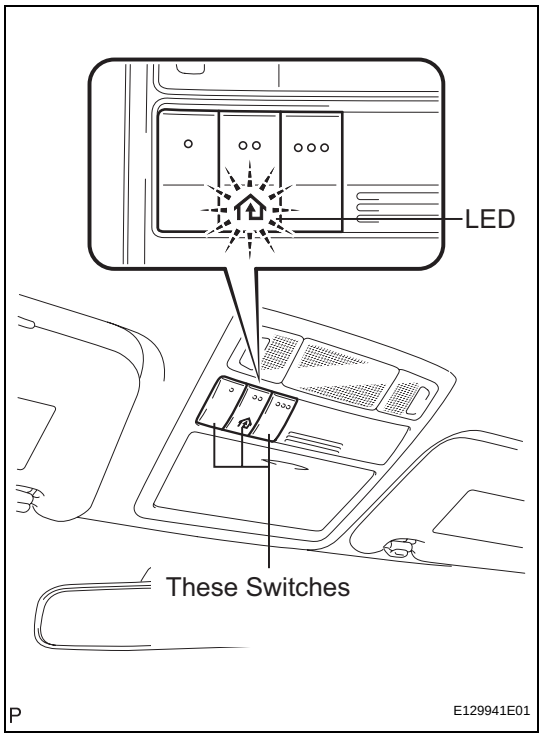
(a) Re-registration of codes in the garage door opener system. (registration mode)

NOTICE:

- **When programming a garage door opener system, you may operate a garage door or other device. To prevent injury, it is necessary to make sure that people and objects are out of the way of the garage door or other device.**
- **Before beginning programming of the garage door opener system, turn off the engine and remove the key from the ignition key cylinder.**
- **The garage door opener system cannot be used with openers that:**
  (1) Were manufactured before April 1, 1982.
  (2) Do not meet Federal Safety Standards (for example, garage doors without a jam protection function).

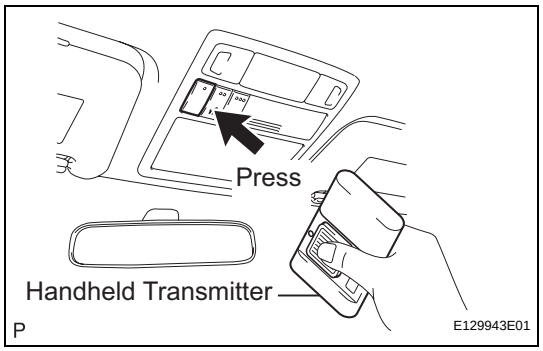
HINT:

- 3 transmitter codes can be registered with the garage door opener system. It is possible to register one handheld transmitter code (original transmitter) for each of the three garage door opener system switches.
- Disconnecting the vehicle's battery will not erase the transmitter codes registered in the garage door opener system.
- An attempt to overwrite a previously registered code may fail. In this case, the previously registered handheld transmitter code will not be erased.
- To successfully program the garage door opener system, it may be necessary to replace the handheld transmitter battery before programming.

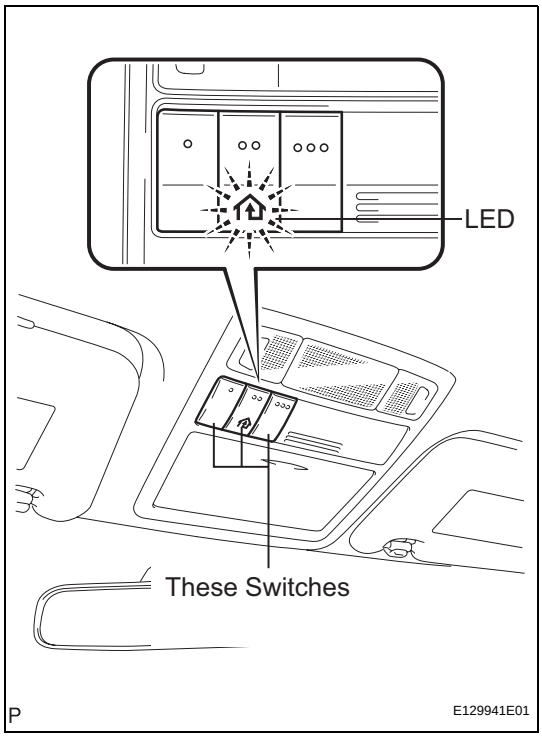


(1) Select one of the garage door opener system switches to program.

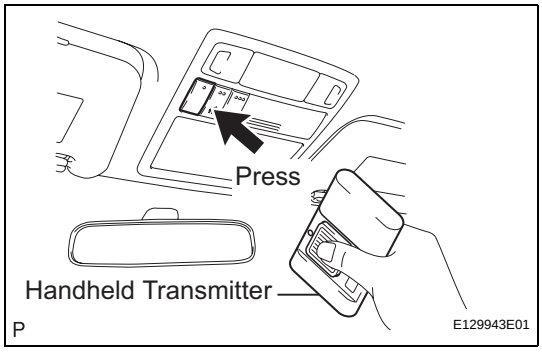
(2) Press and hold the selected switch for 20 seconds. The garage door opener system will enter registration mode. Continue to hold this switch during steps 3 and 4.
HINT:
The garage door opener system LED should stay on while holding the selected switch for the 20 second period. After entering registration mode, the LED will flash approximately 1 time per second (1 Hz). This indicates that the garage door opener system has entered registration mode and is listening for a code from a handheld transmitter.



(3) After the garage door opener system has entered registration mode, bring the original handheld transmitter within 2 to 9 cm (1 to 3 in.) of the garage door opener system. Press and hold the switch on the handheld transmitter. If the flashing speed of the garage door indicator light changes from the slow speed to a faster speed, proceed to step 4.
HINT:
Some handheld transmitters stop transmitting after 1 to 2 seconds. In this case, continue to hold the selected garage door opener system switch while pressing the handheld transmitter switch for two seconds at a time. Repeat the cycle of pressing and releasing the transmitter switch while monitoring for a change of the flashing speed of the indicator LED.

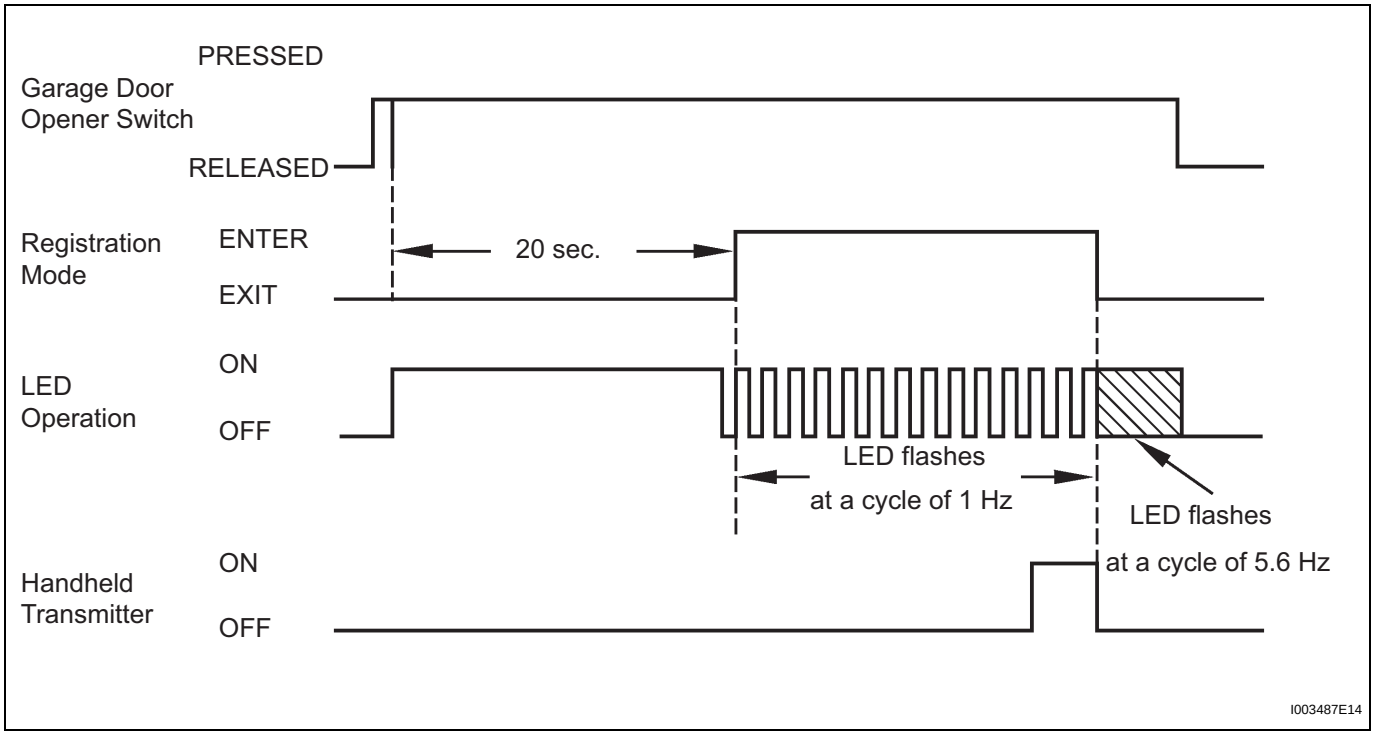


(4) When the indicator light begins to flash more rapidly, release both switches. This indicates that the garage door opener system has been successfully programmed. If the garage door opener system fails to program, review all hints before trying the programming process again.



HINT:

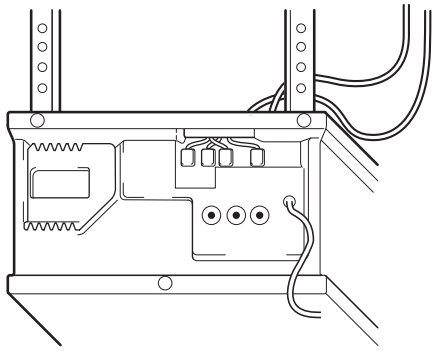
- If transmitter registration fails:
  (1) The battery in the handheld transmitter may be weak or need to be replaced.
  (2) The handheld transmitter and opener device to be registered may not be compatible with the vehicle's garage door opener system.
- After entering the garage door opener system registration mode, registration of the handheld transmitter code must be completed within 90 seconds. If 90 seconds have elapsed, the garage door opener system will enter low power mode.
- For first time programming it may be necessary to press and hold the two outside switches until the indicator light begins to flash rapidly. The length of time that it is necessary to hold the switches for in this case should be approximately 20 seconds.
- In some cases, the garage door indicator light may flash slowly (1 time per second (1 Hz)) as soon as the selected garage door opener system switch is pressed. This indicates that the system is ready or "listening" for a code from a handheld transmitter. Continue to hold the switch and proceed from step 3.



(b) Erasure of transmitter codes in the garage door opener system. (clear mode)
HINT:
All three codes registered in the garage door opener system will be erased. No option exists for erasing only one transmitter code.
(1) Press and hold the left and right switches of the garage door opener system for 20 seconds. The LED will begin to flash approximately 5 times per second (5.6 Hz.) This indicates that the codes contained in the vehicle garage door opener system have been erased. Releasing the switches ends clear mode.
HINT:
- If the switches are released within 10 seconds after the transmitter codes have been erased, the system will enter registration mode immediately the next time a garage door opener system switch is pressed.
- If the switches are held for 10 seconds or more after the transmitter codes have been erased, default codes will be set to the three switches of the garage door opener system. These default codes may in some cases be used for training an opener device that uses rolling codes.

(c) Low power mode:
(1) If the garage door opener switch is stuck or held for 100 seconds or more, the garage door opener will enter low power mode to economize on power consumption. When the garage door opener has entered low power mode, the LED turns off. When the garage door opener switch is released, low power mode will end.

Example:



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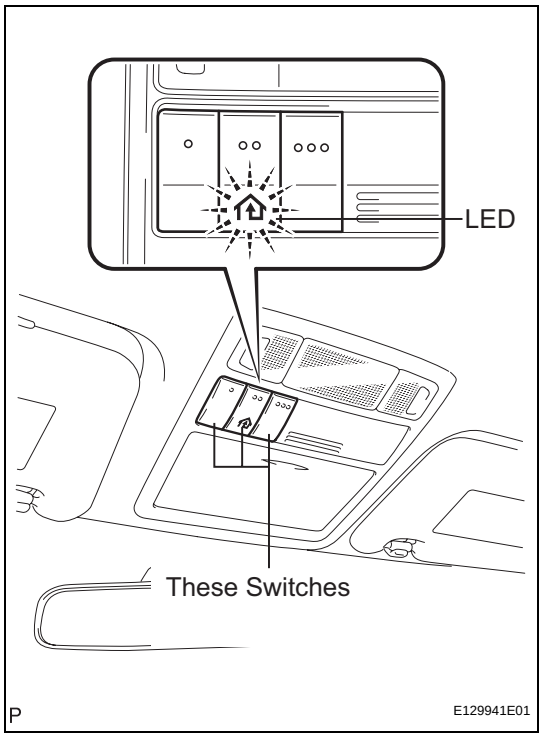
2. ROLLING CODE SYSTEMS

(a) If the handheld transmitter for the opener device (customer's garage door) being programmed uses a rolling code, it may be necessary to "train" the garage door opener device.
HINT:
- "Train" refers to causing the opener device (customer's ceiling mounted garage door opener) to recognize a non-rolling code.
- The steps required to "train" an opener device may vary depending on the model, type, age, and manufacturer of the device.

(1) Locate the "training" button on the opener device.
(2) Press the training button.
(3) Within 30 seconds press and release the vehicle's programmed "HomeLink" switch twice. Some opener devices may require the vehicle's switch to be pressed three times.
(4) The vehicle's garage door opener system should now operate the opener device.
HINT:
Opener device refers to a device such as a ceiling mounted garage door opener, which is located at the customer's residence. It is necessary to read the instructions for the customer's opener device, to allow the above procedure to be performed safely and successfully. The customer should be aware that performing this procedure will result in a lowered level of security for the customer's opener device.



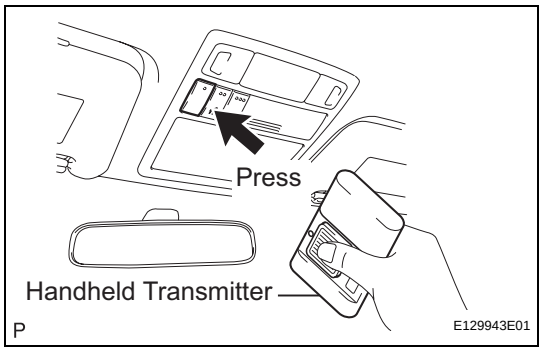
INSPECTION

1. INSPECT GARAGE DOOR OPENER

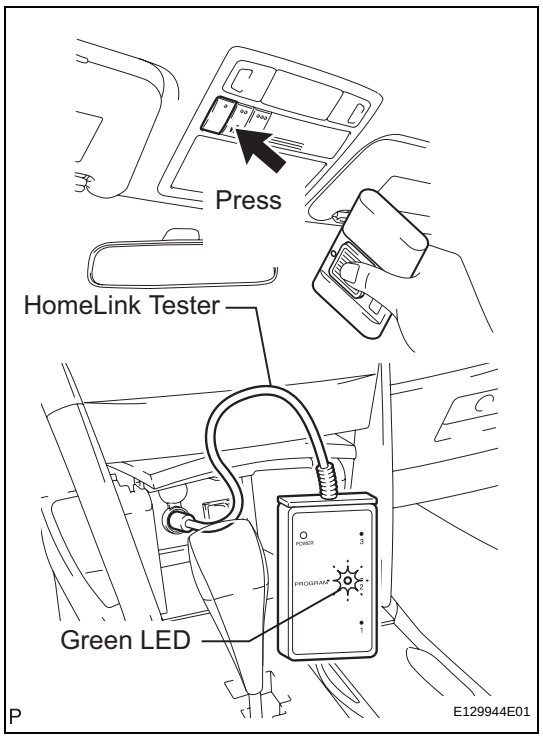
(a) To inspect the garage door opener system, press each switch and check that the LED in the "HomeLink" logo illuminates as illustrated. If one or more of the switches do not cause the LED to illuminate, confirm that the fuse and the wiring to the garage door opener system unit is normal. If the fuse and wiring are normal, and the LED does not work, replace the garage door opener system unit located in the roof console box assembly.

2. INSPECT GARAGE DOOR OPENER REGISTRATION AND TRANSMITTIMG OPERATION

HINT:
Use the KENT-MOORE "HomeLink" tester, and the KENT-MOORE handheld transmitter for this test. First erase the customer's transmitter codes, and then register the tester's handheld transmitter code to the garage door opener system.



(a) Check if the tester's handheld transmitter code was successfully registered.
HINT:
If the handheld transmitter's code cannot be registered, replace the garage door opener system unit.

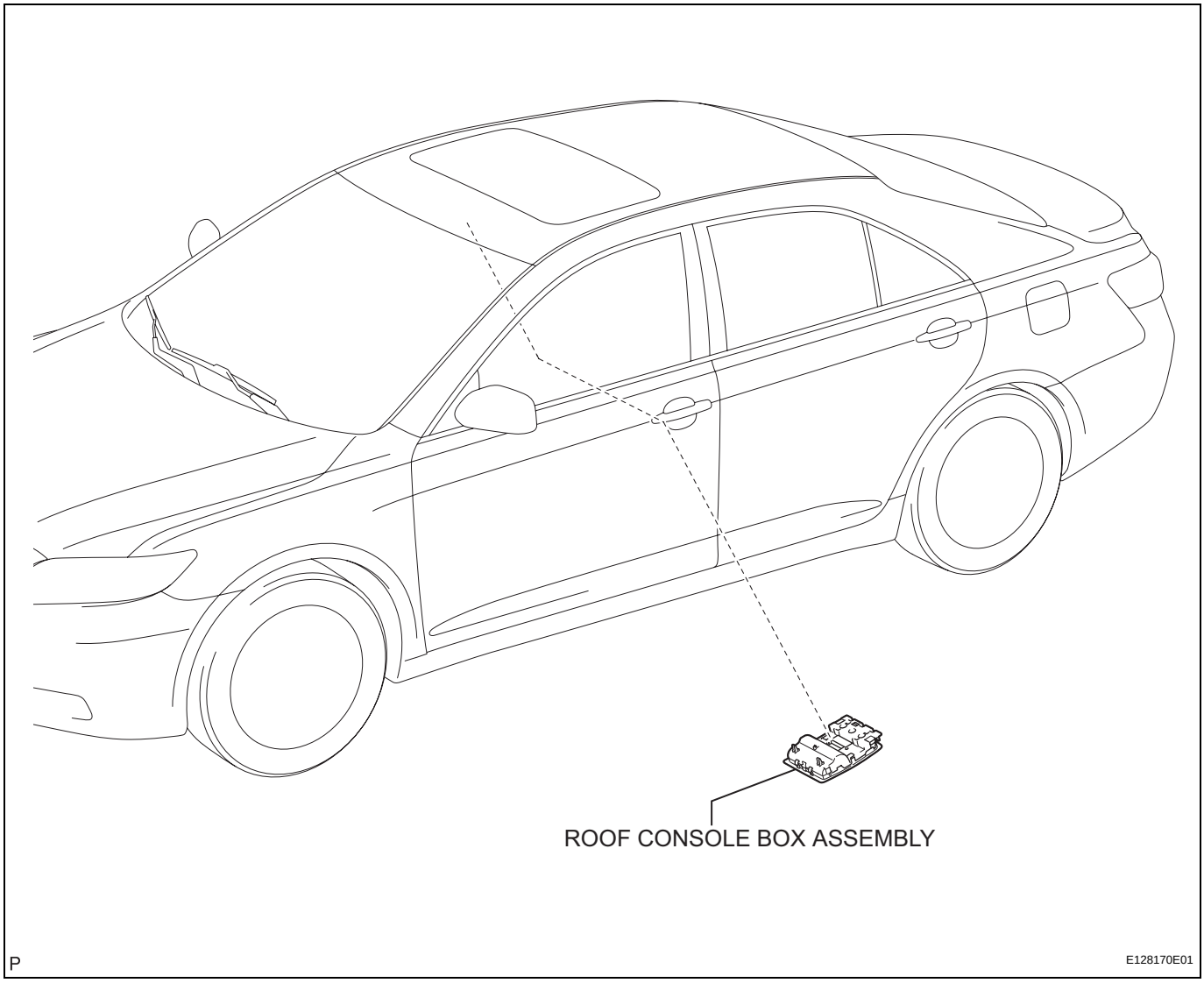


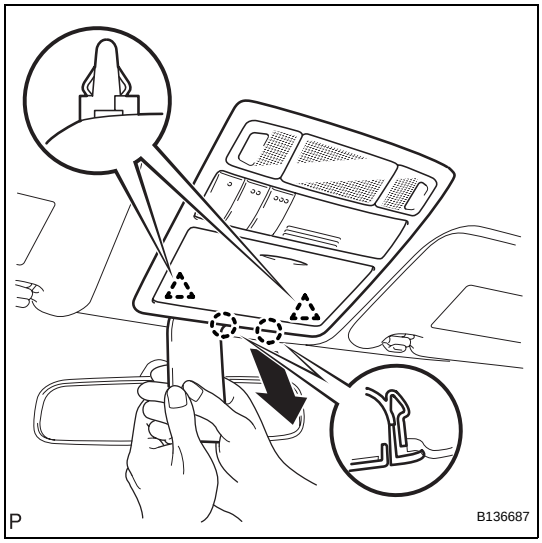
(b) Press the garage door opener switch that was used to copy the signal from the handheld transmitter. Check if the "HomeLink" tester's green LED illuminates.
HINT:
If the green LED does not illuminate, replace the garage door opener system unit that is located in the dome light No. 1.

(c) When the inspection is complete, re-register the customer's handheld transmitter codes.

GARAGE DOOR OPENER SWITCH

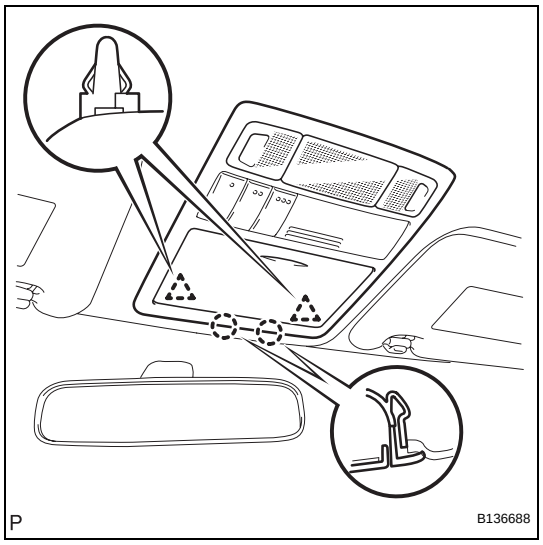
COMPONENTS





REMOVAL

1. **REMOVE ROOF CONSOLE BOX ASSEMBLY**
   (a) Using a moulding remover, disengage the 2 clips and the 2 claws.
   (b) Disconnect the connectors and remove the roof console box assembly.



INSTALLATION

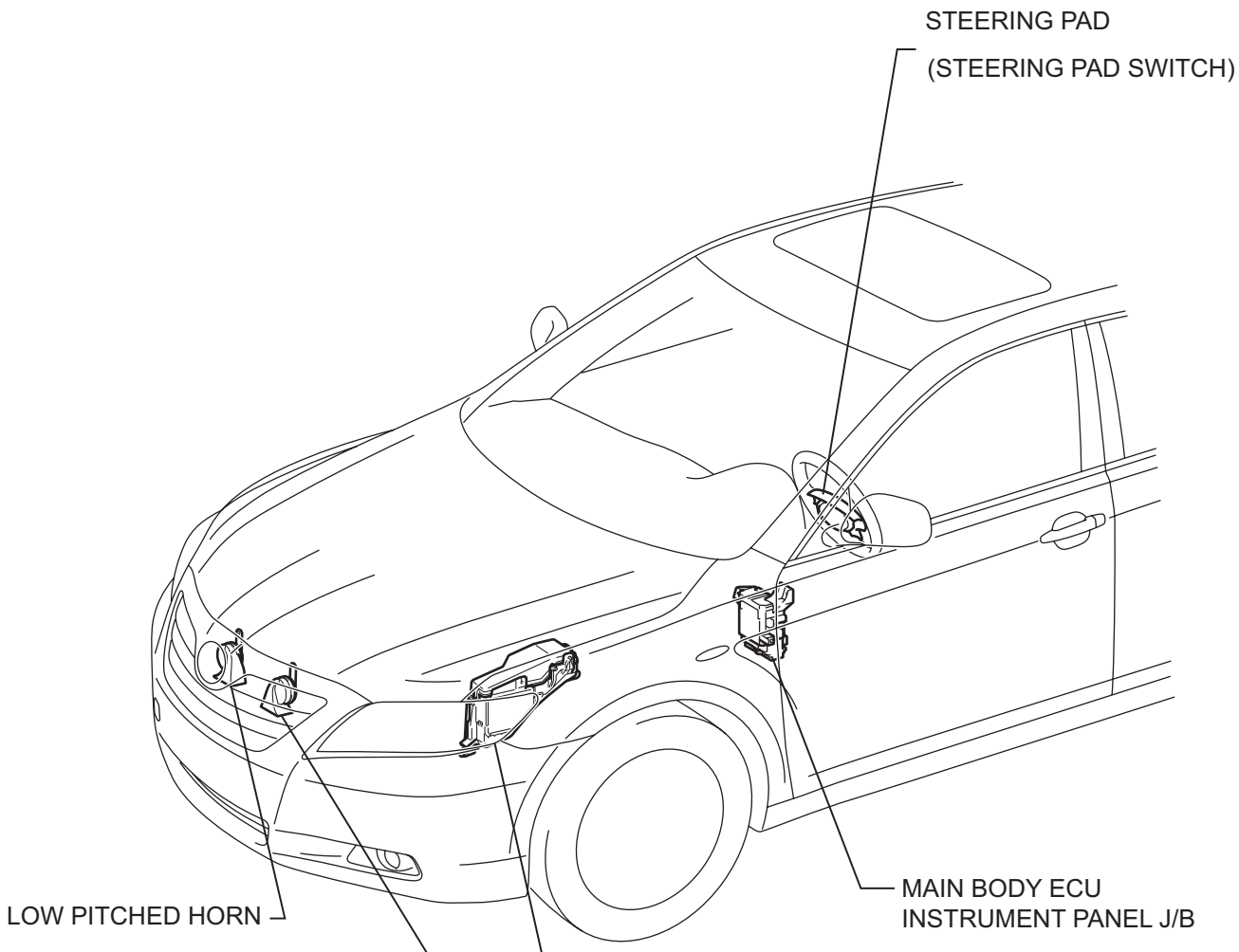
1. INSTALL ROOF CONSOLE BOX ASSEMBLY

(a) Connect the connectors .

(b) Engage the 2 claws and the 2 clips to install the roof console box assembly.

HORN SYSTEM

PARTS LOCATION



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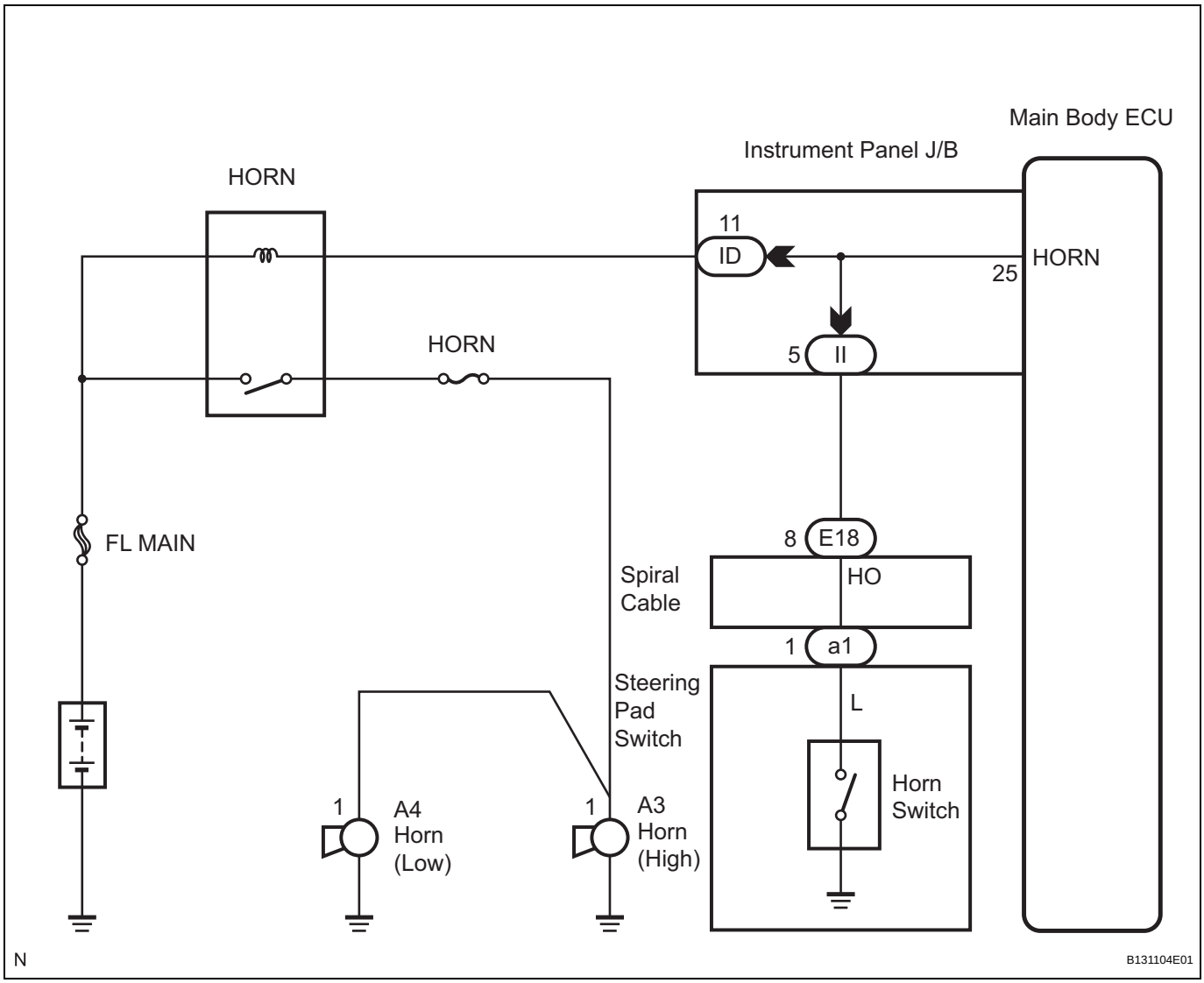
SYSTEM DIAGRAM



PROBLEM SYMPTOMS TABLE

HORN SYSTEM

Symptom	Suspected area	See page
Horn does not sound	1. HORN fuse	HO-3
	2. Horn relay	HO-3
	3. Steering pad switch	RS-347
	4. Spiral cable	RS-364
	5. Wire harness	-
Horn blows all the time	1. Horn relay	HO-3
	2. Steering pad switch	RS-347
	3. Wire harness	-
Low pitched horn operates but high pitched horn does not operate	1. High pitched horn	HO-7
	2. Wire harness	-
High pitched horn operates but low pitched horn does not operate	1. Low pitched horn	HO-5
	2. Wire harness	-

HORN RELAY

INSPECTION

1. INSPECT FUSE (HORN)

(a) Check the resistance of the HORN fuse.

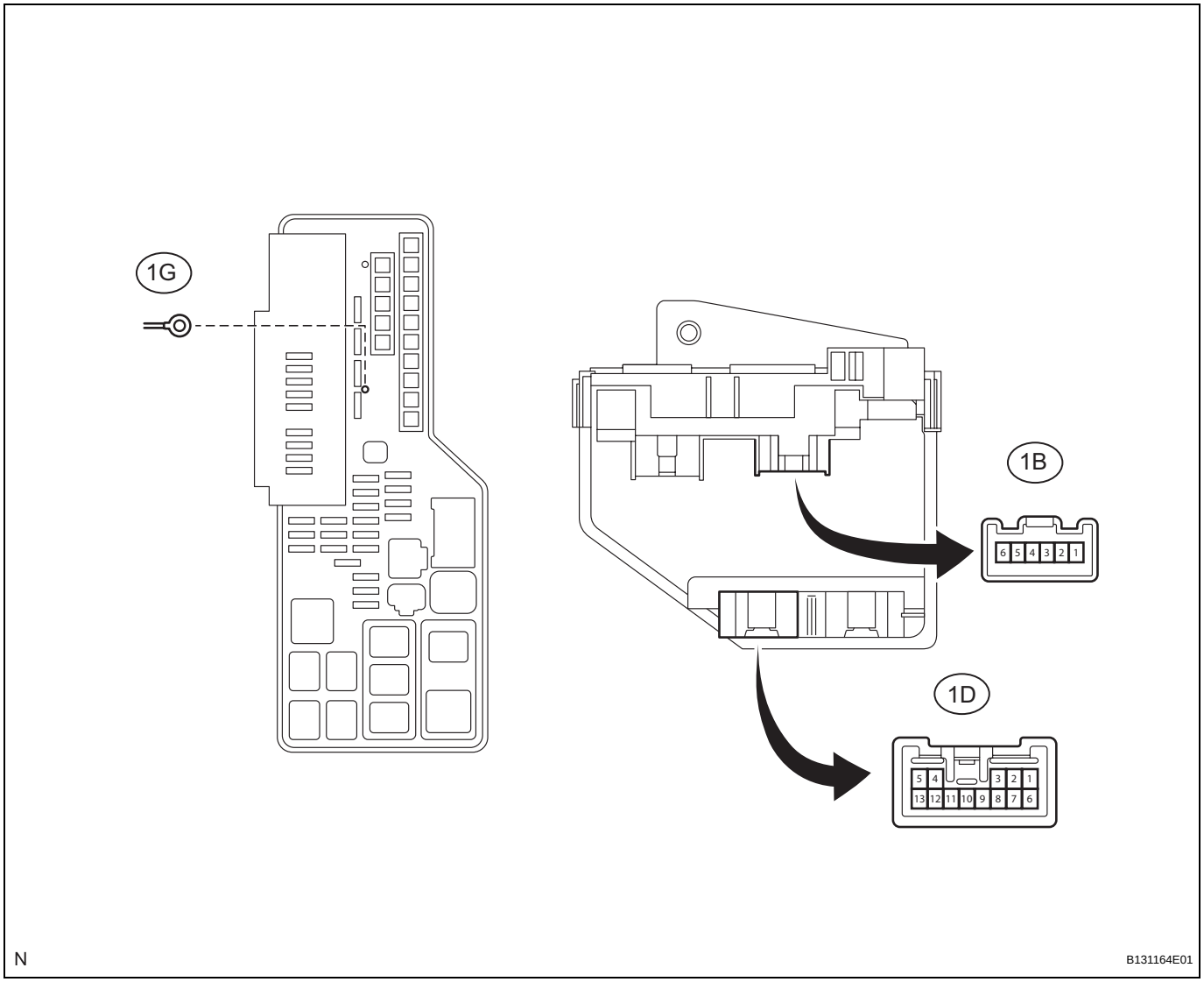
Standard:

Below 1 Ω

2. INSPECT HORN RELAY

(a) Remove the engine room R/B and J/B (horn relay).

(b) Measure the resistance according to the value(s) in the table below.

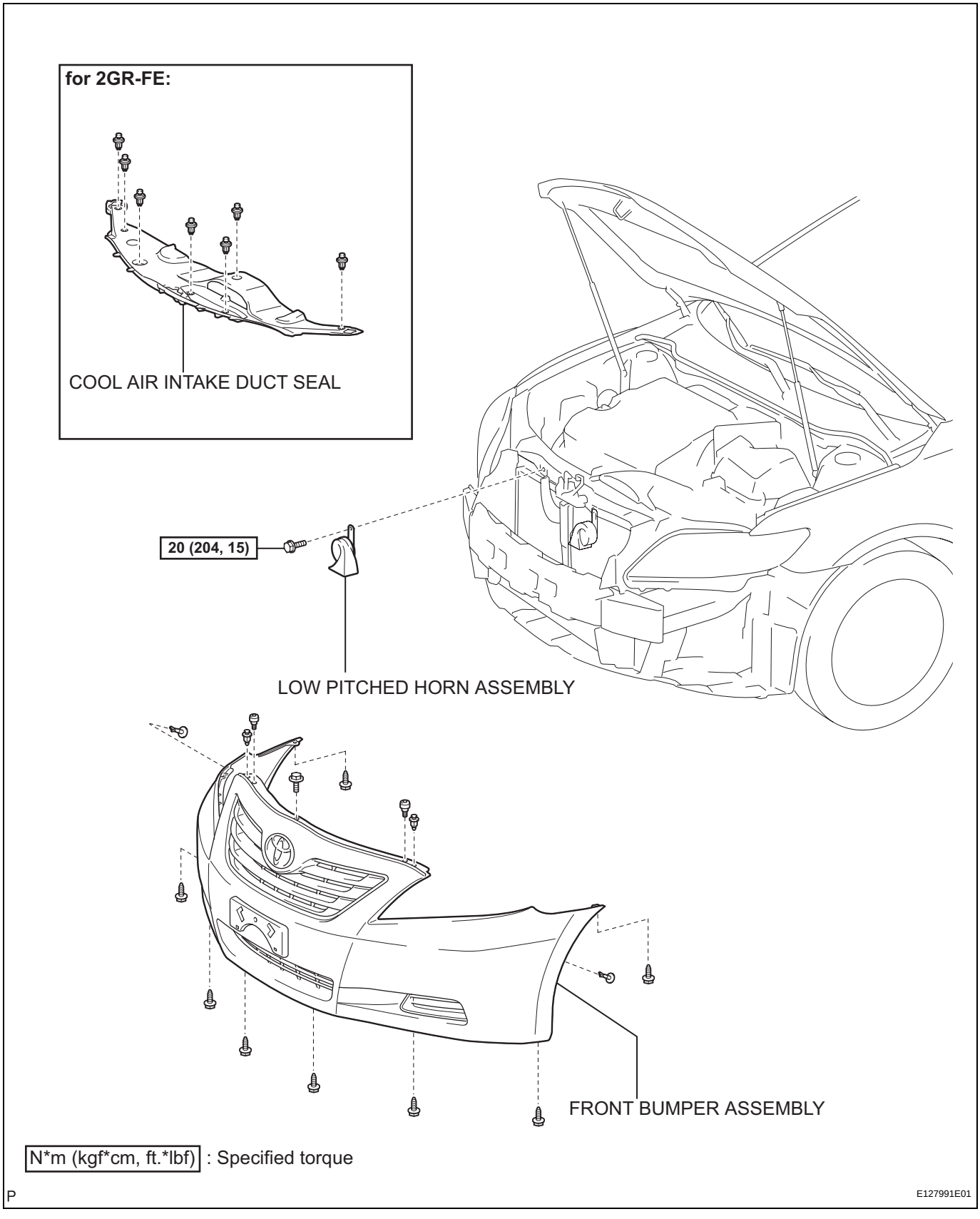


Standard resistance

Tester Connection	Condition	Specified Condition
1G-1 - 1B-6	Always	10 kΩ or higher
1G-1 - 1B-6	When battery voltage is applied to terminals 1G-1 and 1D-10	Below 1 Ω

LOW PITCHED HORN

COMPONENTS



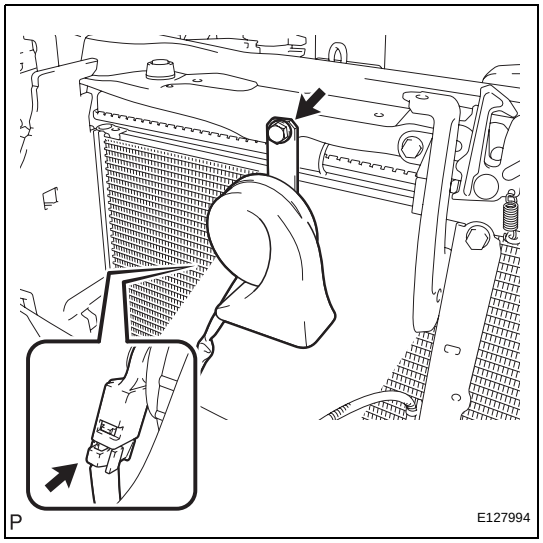
N*m (kgf*cm, ft.*lbf) : Specified torque

P

E127991E01

REMOVAL

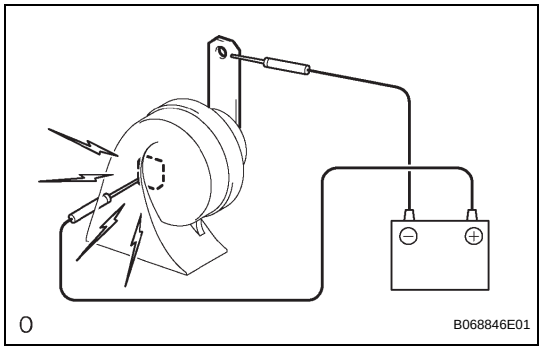
1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (See page ET-5)**
3. **REMOVE LOW PITCHED HORN ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the bolt and the low pitched horn assembly.



INSPECTION

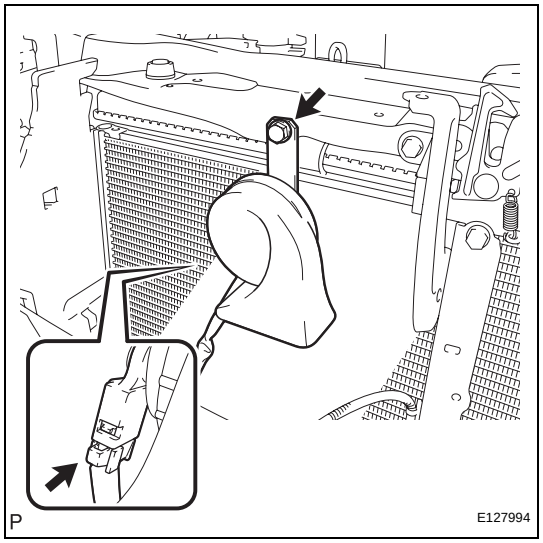
1. **INSPECT LOW PITCHED HORN**
   (a) Apply battery voltage and check operation of the horn, as shown in the table below.
   Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Body ground	Horn sounds



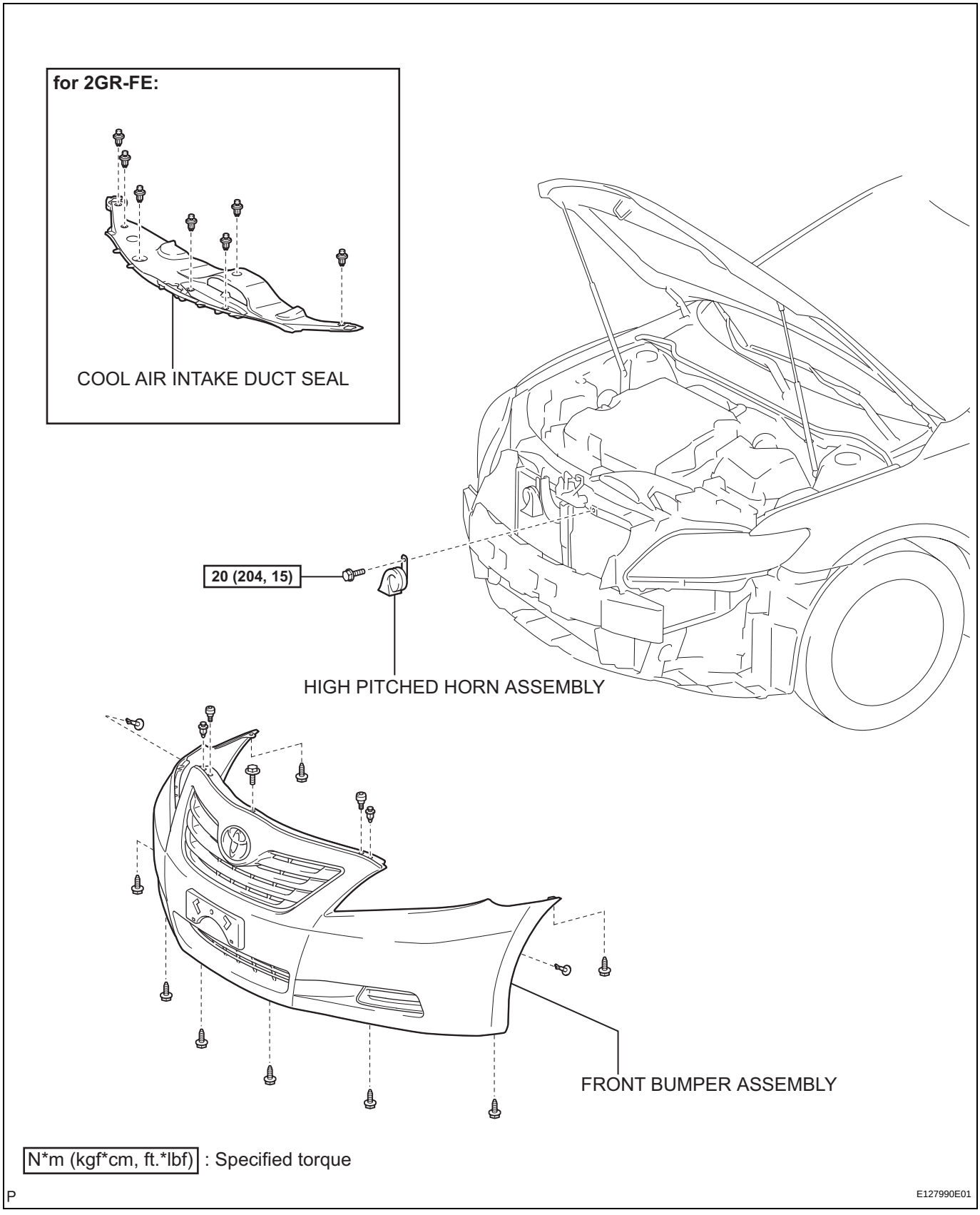
INSTALLATION

1. **INSTALL LOW PITCHED HORN ASSEMBLY**
   (a) Install the low pitched horn assembly with the bolt.
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
   (b) Connect the connector.
2. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-13)**
3. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**



HIGH PITCHED HORN

COMPONENTS



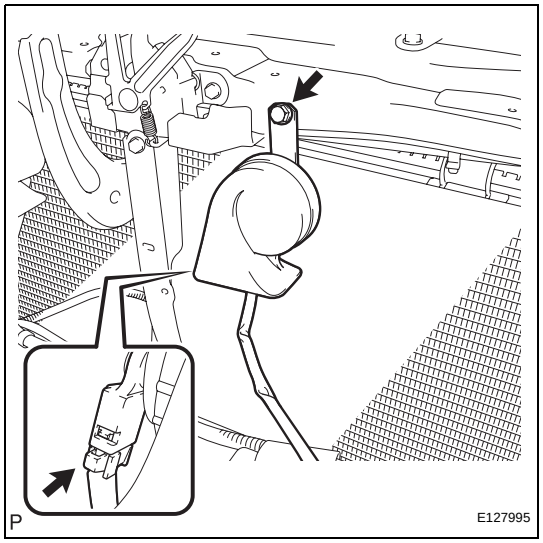
N*m (kgf*cm, ft.*lbf) : Specified torque

P

E127990E01

REMOVAL

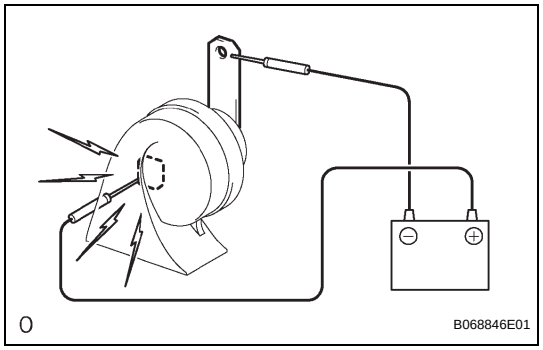
1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (See page ET-5)**
3. **REMOVE HIGH PITCHED HORN ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the bolt and the high pitched horn assembly.



INSPECTION

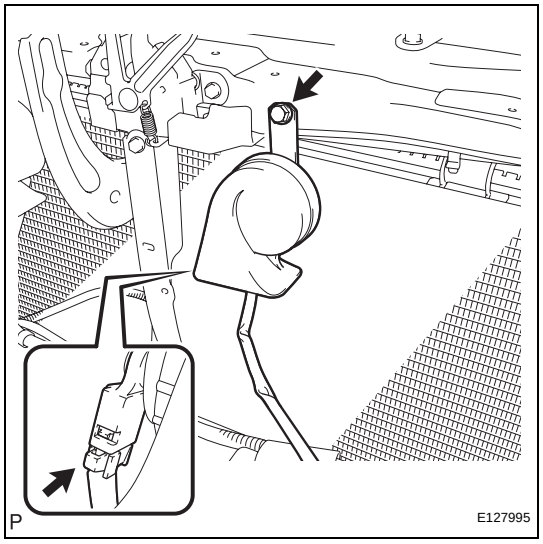
1. **INSPECT HIGH PITCHED HORN**
   (a) Apply battery voltage and check operation of the horn, as shown in the table below.
   Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Body ground	Horn sounds



INSTALLATION

1. **INSTALL HIGH PITCHED HORN ASSEMBLY**
   (a) Install the high pitched horn assembly with the bolt.
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
   (b) Connect the connector.
2. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-13)**
3. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**



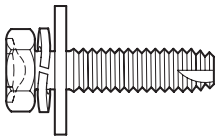
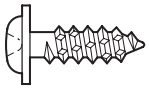
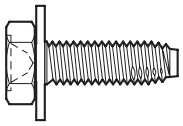
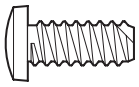
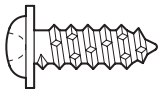
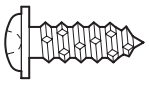
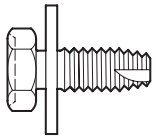
INSTRUMENT PANEL SAFETY PAD

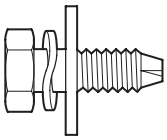
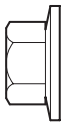
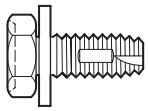
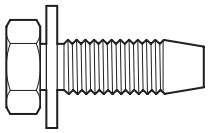
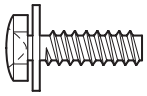
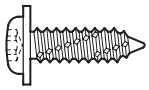
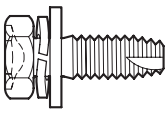
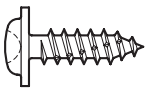
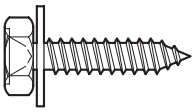
PRECAUTION

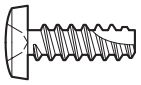
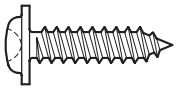
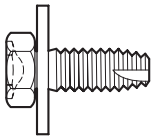
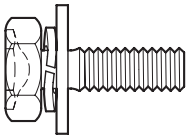
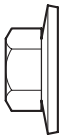
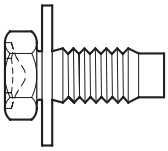
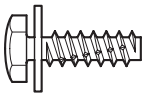
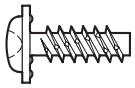
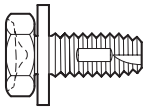
1. PRECAUTION FOR VEHICLE WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

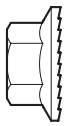
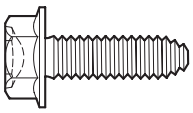
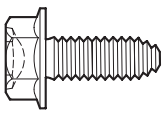
(a) Some operations in this section may affect the SRS airbags. Prior to performing the corresponding operations, read the SRS airbag NOTICE.

2. TABLE OF BOLT, SCREW AND NUT

Code	Shape	Size	Parts No.
<A>		ϕ=6 mm (0.24 in.) Length=20 mm (0.79 in.)	90119-06166
<B>		ϕ=5 mm (0.20 in.) Length=16 mm (0.63 in.)	93567-55016
<C>		ϕ=6 mm (0.24 in.) Length=20 mm (0.79 in.)	90159-60610
<D>		ϕ=5 mm (0.20 in.) Length=15 mm (0.59 in.)	90164-50034
<E>		ϕ=5 mm (0.20 in.) Length=20 mm (0.79 in.)	93567-15020
<F>		ϕ=5 mm (0.20 in.) Length=16 mm (0.63 in.)	93567-15016
<G>		ϕ=6 mm (0.24 in.) Length=16 mm (0.63 in.)	90119-06480

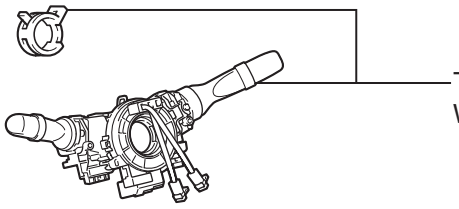
Code	Shape	Size	Parts No.
<H>		ϕ=6 mm (0.24 in.) Length=18 mm (0.71 in.)	90119-06428
<I>		ϕ=6 mm (0.24 in.)	90179-06206
<J>		ϕ=6 mm (0.24 in.) Length=15 mm (0.59 in.)	90119-06915
<K>		ϕ=8 mm (0.31 in.) Length=20 mm (0.79 in.)	91633-60820
<L>		ϕ=5 mm (0.20 in.) Length=16 mm (0.63 in.)	90159-50305
<M>		ϕ=5 mm (0.20 in.) Length=16 mm (0.63 in.)	93565-15016
<N>		ϕ=6 mm (0.24 in.) Length=18 mm (0.71 in.)	90080-11664
<O>		ϕ=5 mm (0.20 in.) Length=16 mm (0.63 in.)	90080-16097
<P>		ϕ=5 mm (0.20 in.) Length=22 mm (0.87 in.)	90159-A0006

Code	Shape	Size	Parts No.
<Q>		ϕ=5 mm (0.20 in.) Length=15 mm (0.59 in.)	90080-16106
<R>		ϕ=5 mm (0.20 in.) Length=20 mm (0.79 in.)	90167-A0001
<S>		ϕ=6 mm (0.24 in.) Length=16 mm (0.63 in.)	90080-11717
<T>		ϕ=6 mm (0.24 in.) Length=16 mm (0.63 in.)	90080-11736
<U>		ϕ=6 mm (0.24 in.)	90080-18071
<V>		ϕ=8 mm (0.31 in.) Length=20 mm (0.79 in.)	90119-A0011
<W>		ϕ=5 mm (0.20 in.) Length=16 mm (0.63 in.)	90159-A0021
<X>		ϕ=5 mm (0.20 in.) Length=14 mm (0.55 in.)	90167-A0005
<Y>		ϕ=6 mm (0.24 in.) Length=15 mm (0.59 in.)	90080-11545

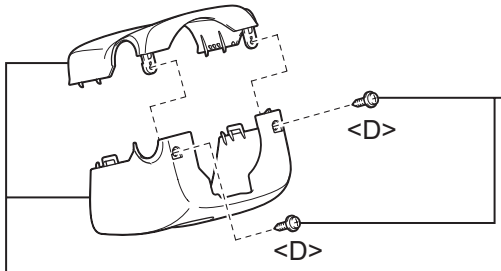
Code	Shape	Size	Parts No.
<Z>		ϕ=6 mm (0.24 in.)	90179-06115
<a>		ϕ=6 mm (0.24 in.) Length=20 mm (0.79 in.)	90084-10051
<b>		ϕ=6 mm (0.24 in.) Length=16 mm (0.63 in.)	90080-10171

COMPONENTS

for TMC Made:



TURN SIGNAL SWITCH ASSEMBLY
WITH SPIRAL CABLE SUB-ASSEMBLY



2.0 (20, 18 in.*lbf)

<D>

<D>

STEERING COLUMN COVER

STEERING WHEEL ASSEMBLY

50 (510, 37)

LOWER NO. 2 STEERING
WHEEL COVER

LOWER NO. 3 STEERING
WHEEL COVER

8.8 (90, 78 in.*lbf)

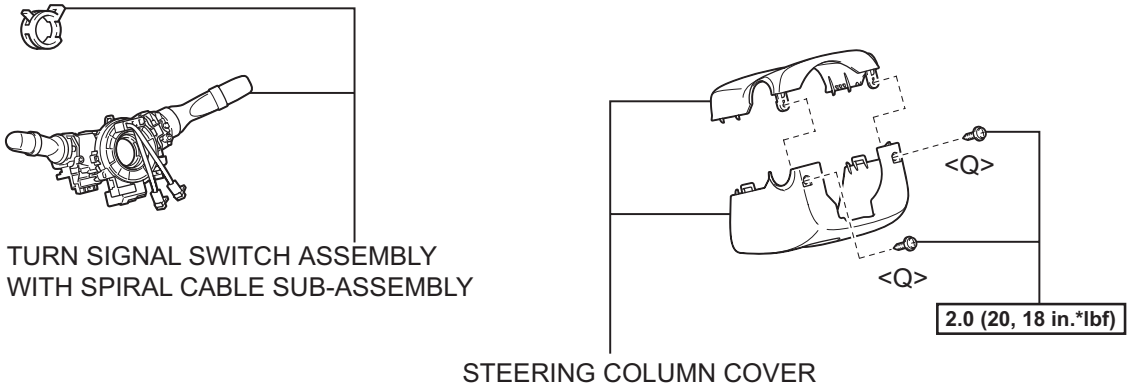
STEERING PAD

N*m (kgf*cm, ft.*lbf) : Specified torque

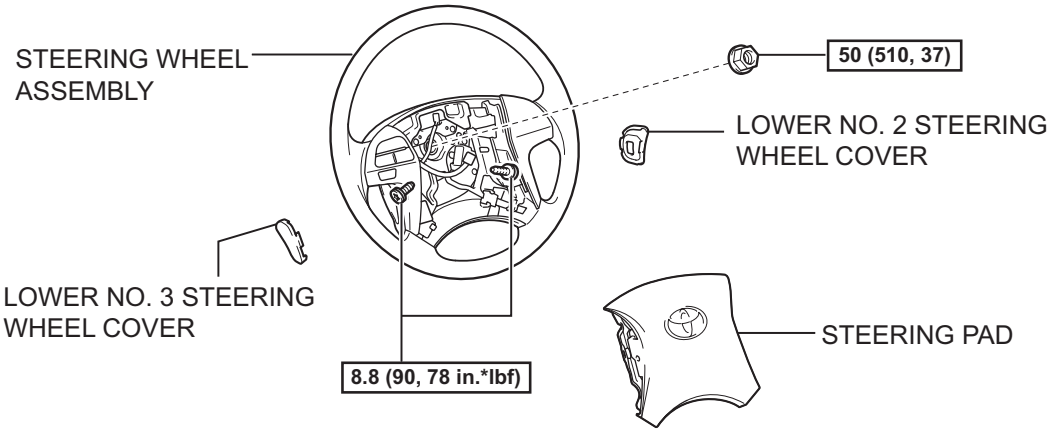
P

B137279E01

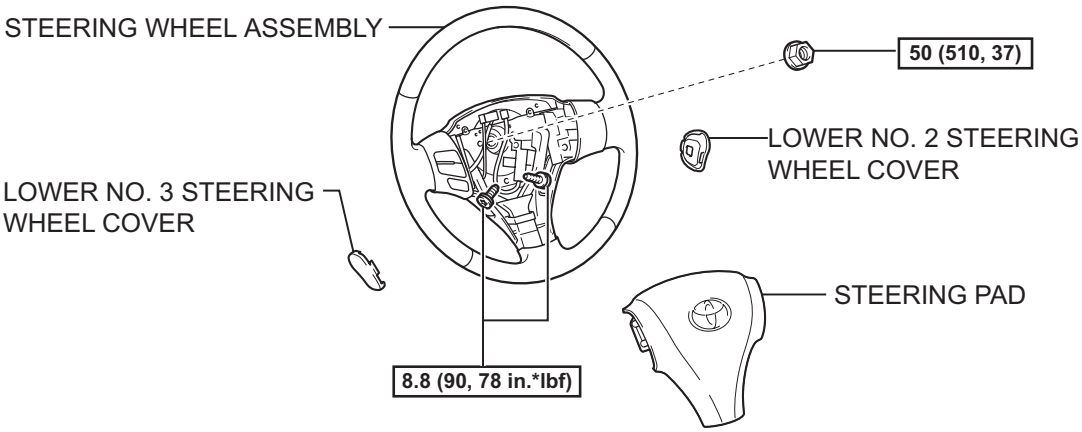
for TMMK Made:



for 4 Spoke:



for 3 Spoke:

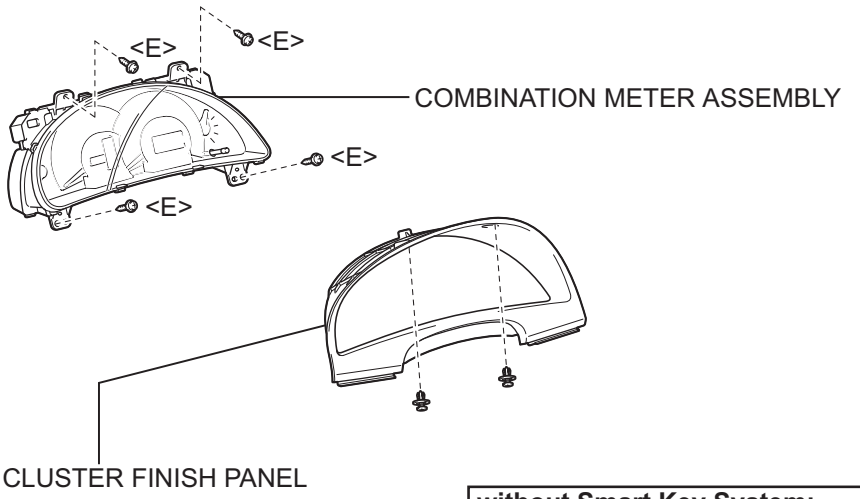


N*m (kgf*cm, ft.*lbf) : Specified torque

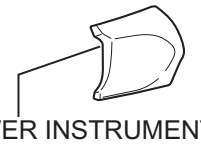
P

B137280E01

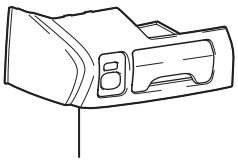
for TMC Made:



without Smart Key System:

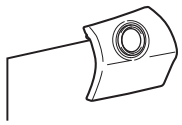


LOWER INSTRUMENT PANEL FINISH PANEL

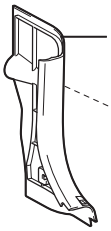


NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY

with Smart Key System:

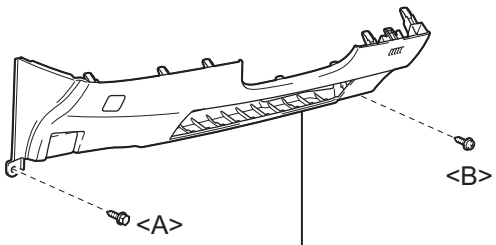


LOWER INSTRUMENT PANEL FINISH PANEL



COWL SIDE TRIM SUB-ASSEMBLY LH

COWL SIDE TRIM CLIP



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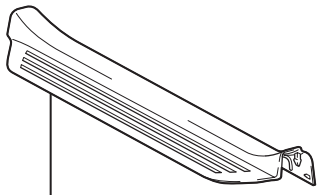
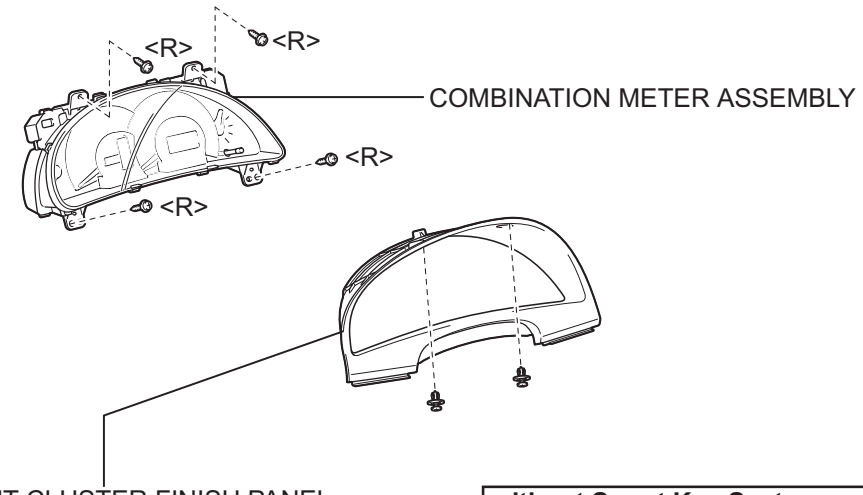


FRONT DOOR SCUFF PLATE LH

P

B137281E01

for TMMK Made:



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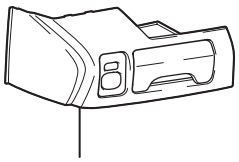

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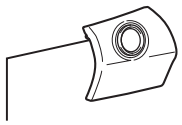

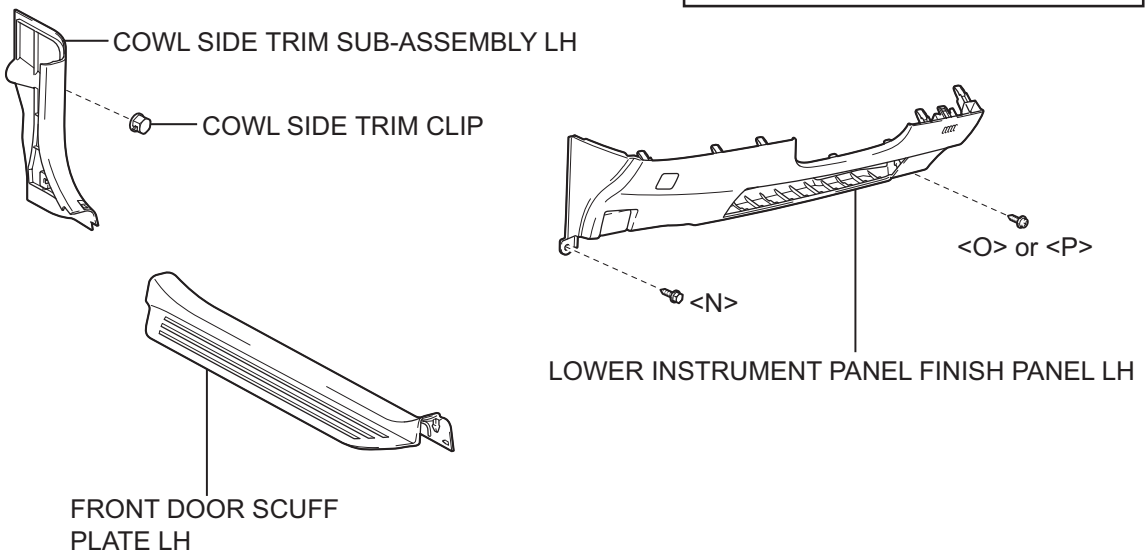

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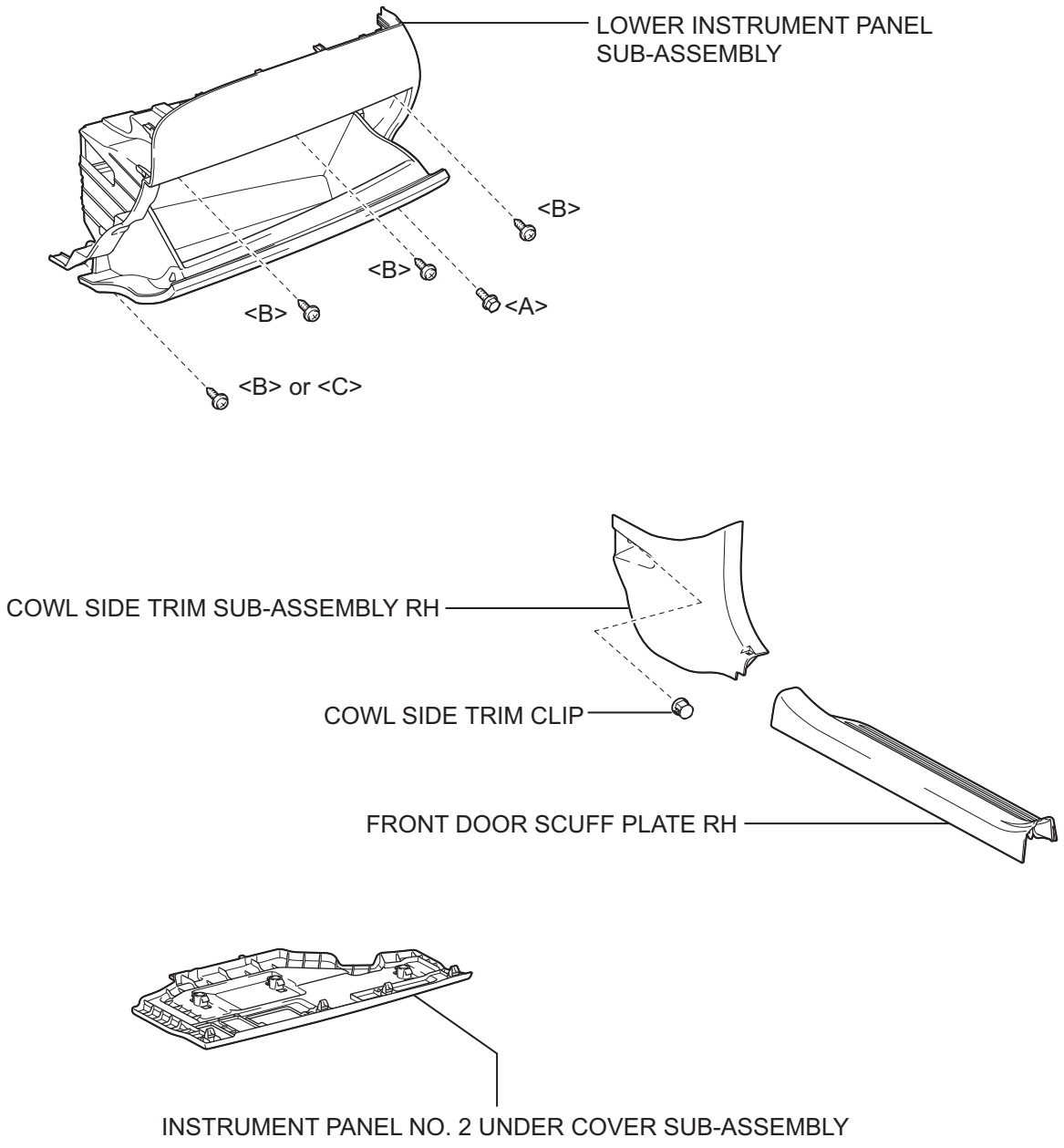
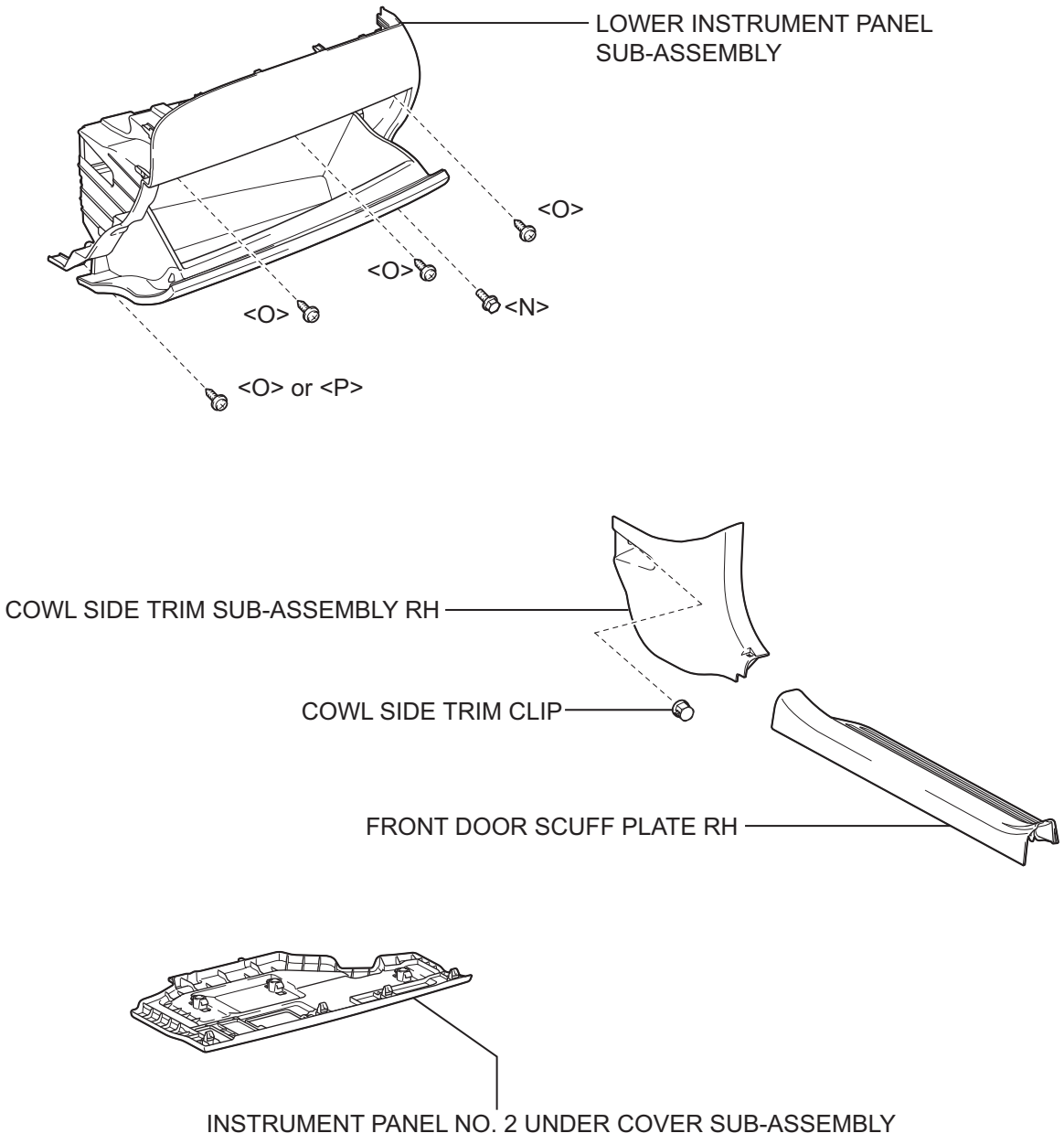


P

B137282E01

IP

for TMMK Made:



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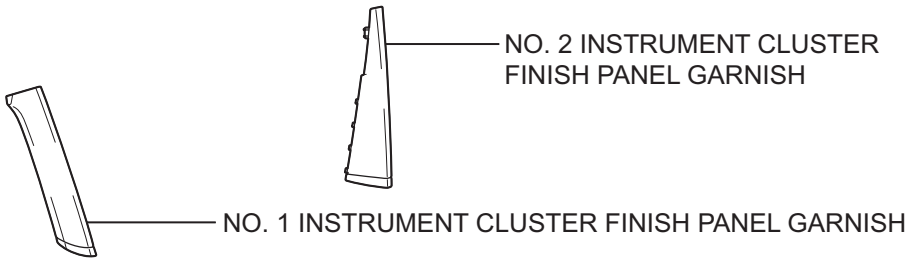

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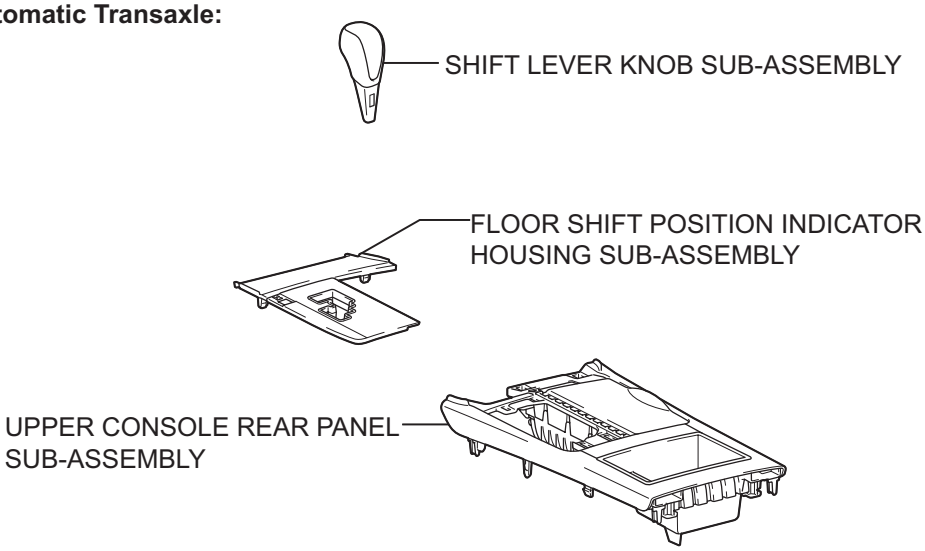

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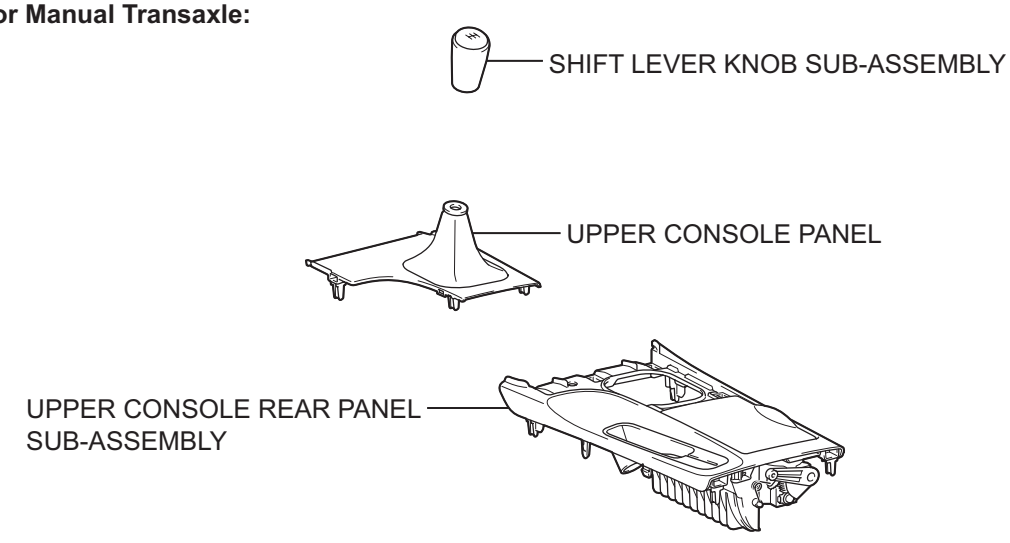

P

B137283E01

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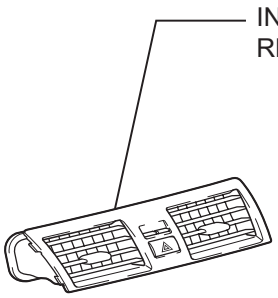

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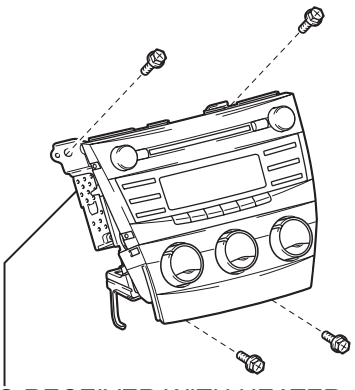

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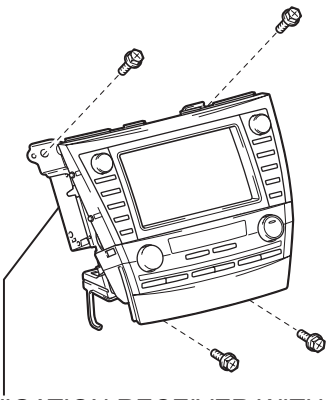

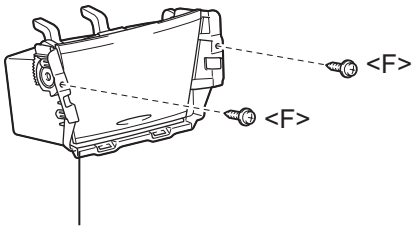

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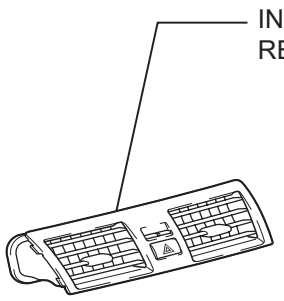

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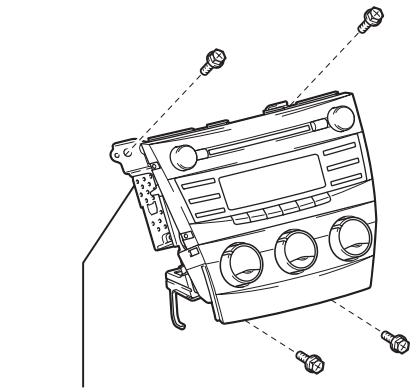

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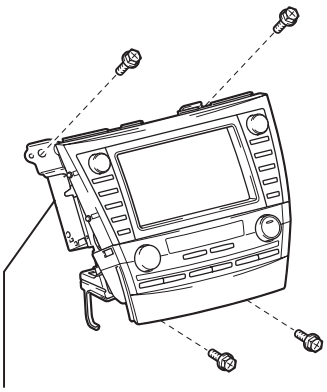

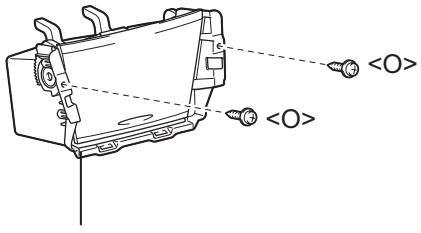

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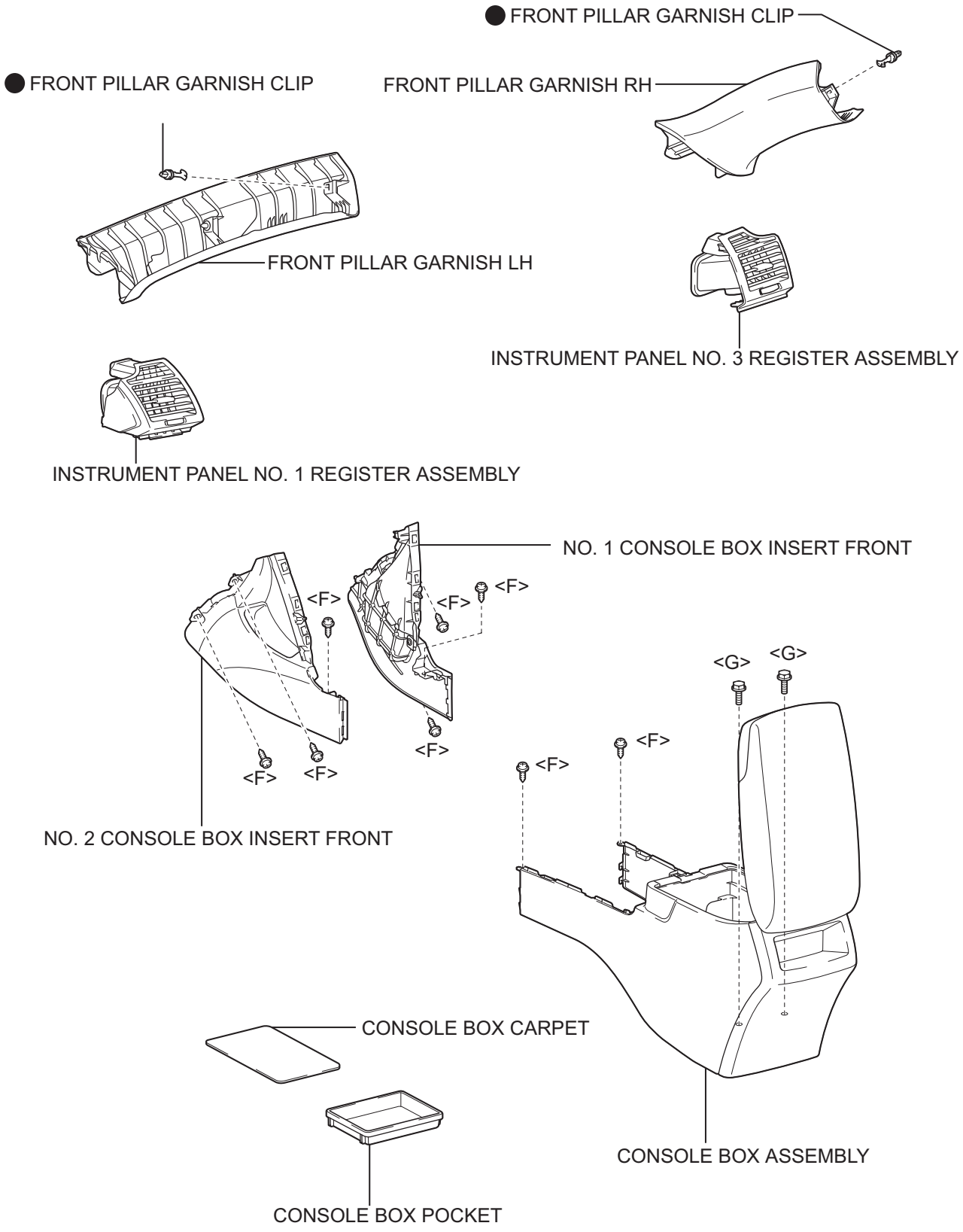
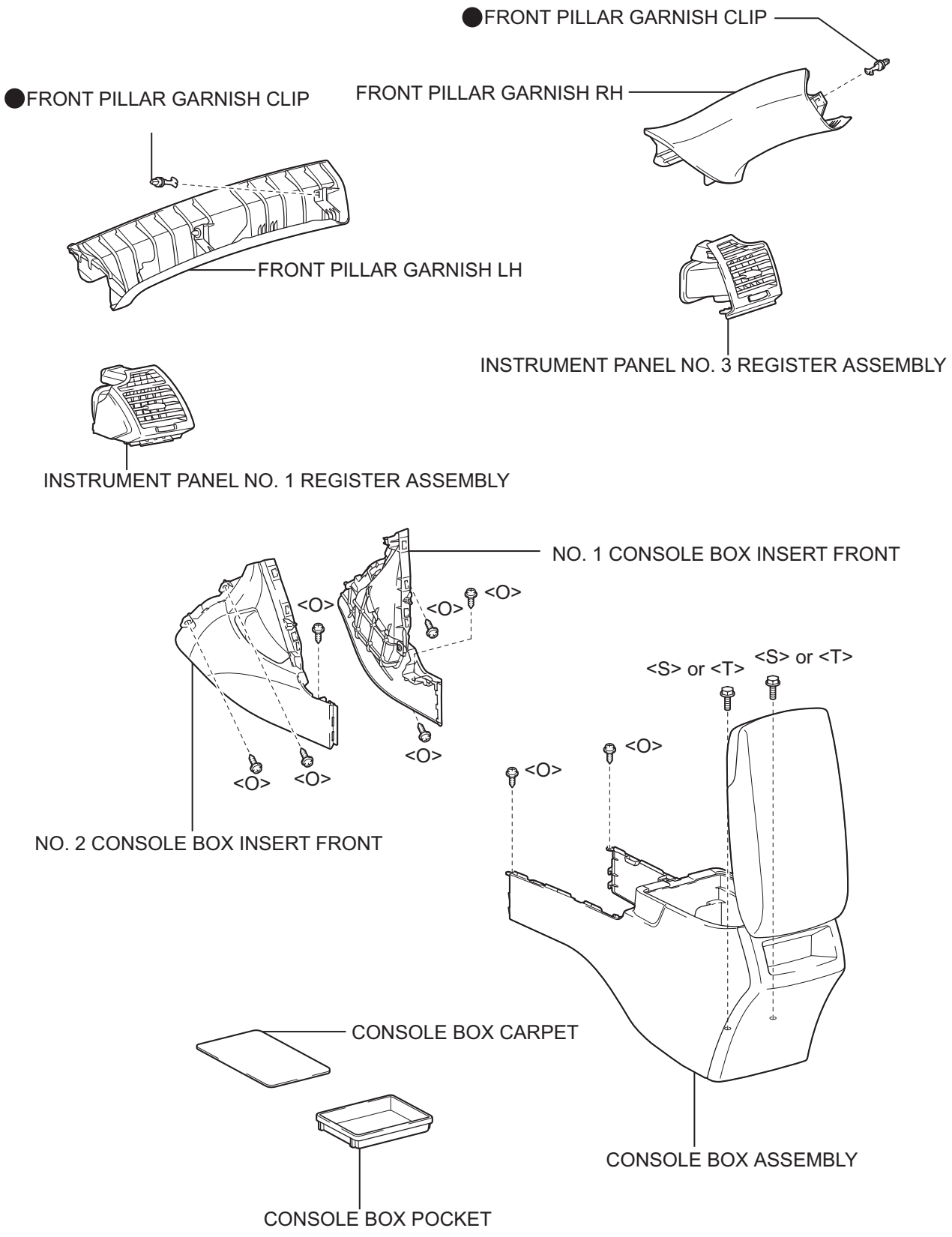


● Non-reusable part

P

B137285E01

for TMMK Made:



● Non-reusable part

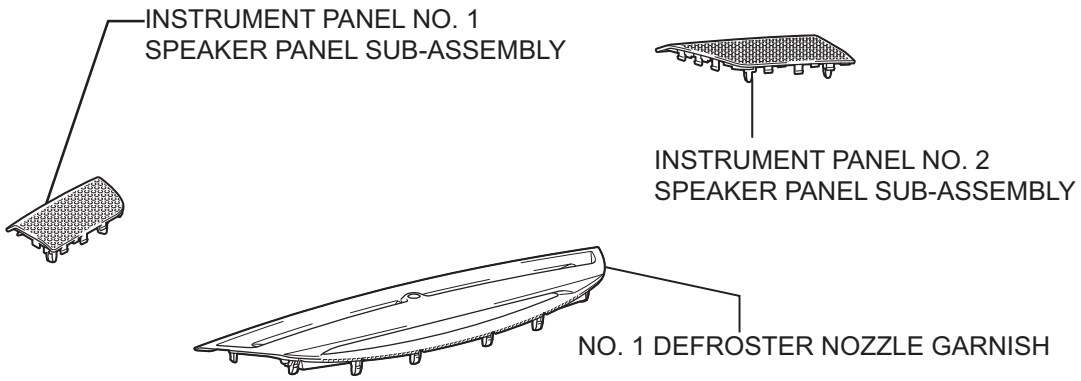
P

B137285E03

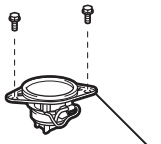
IP

IP

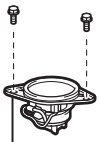
for TMC Made:

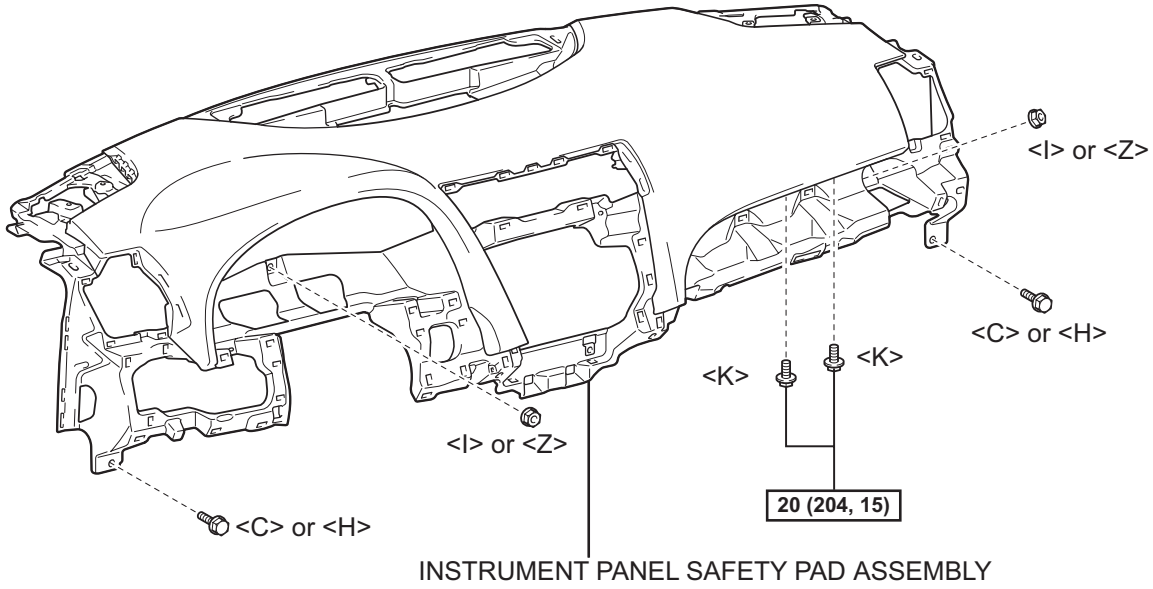


for LH Side:



for RH Side:



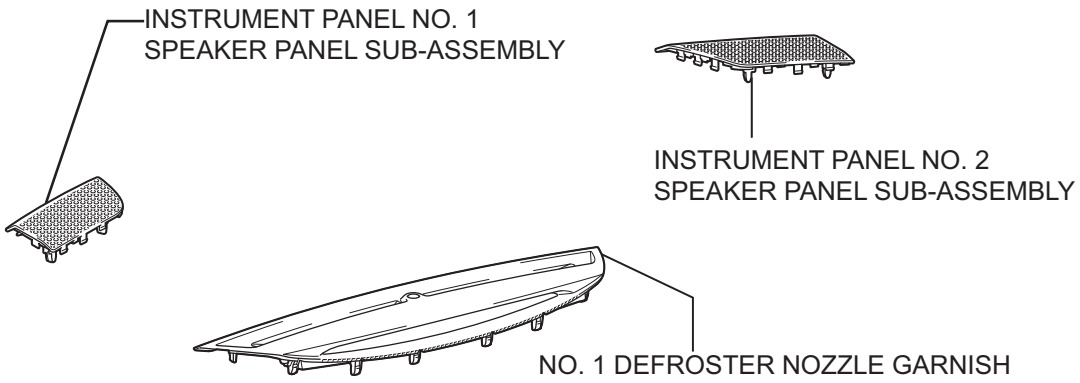


N*m (kgf*cm, ft.*lbf) : Specified torque

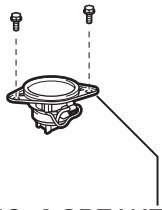
P

B137286E01

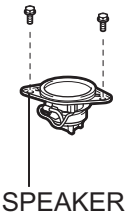
for TMMK Made:

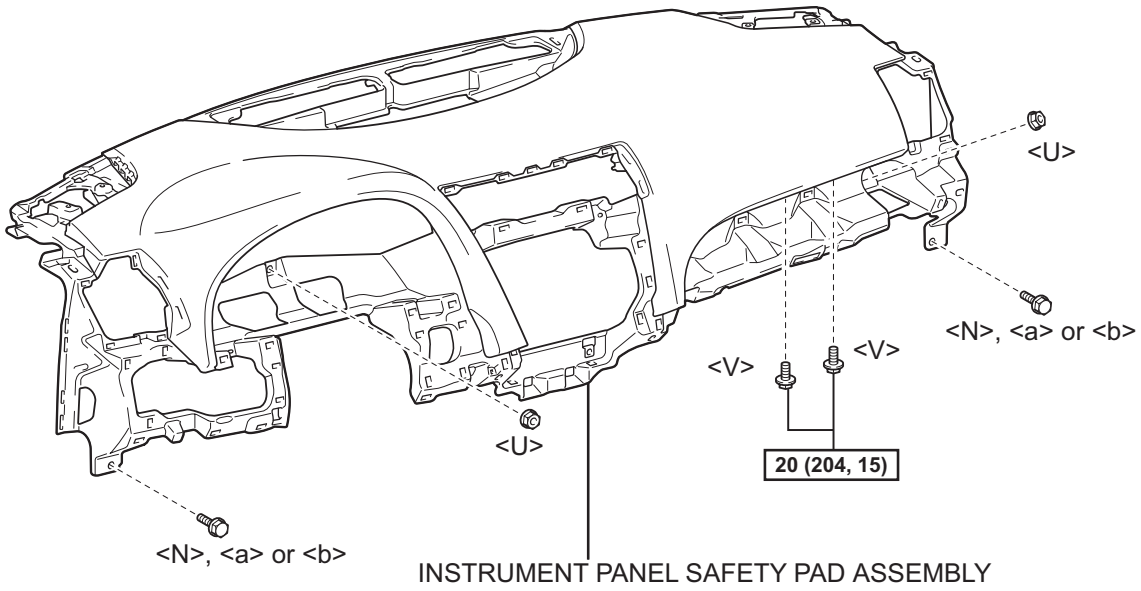


for LH Side:



for RH Side:





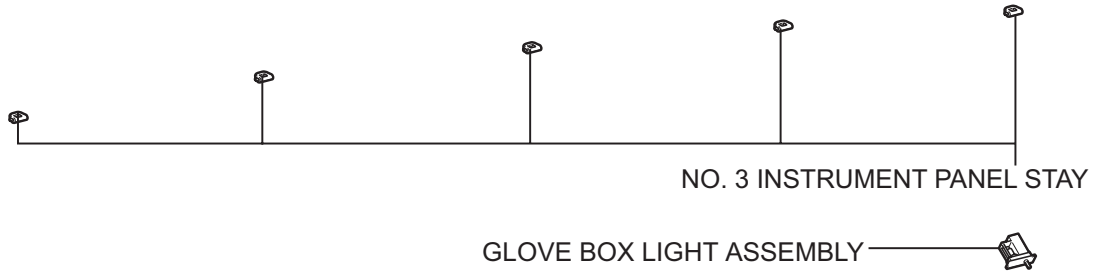
N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137286E03

IP

for TMC Made:



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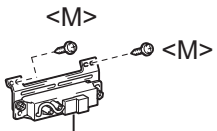

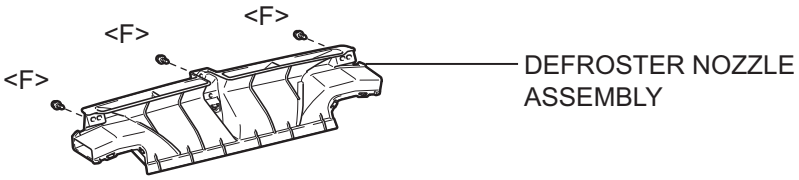

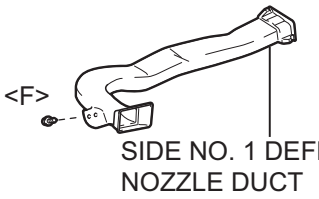

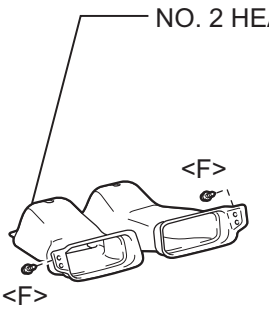

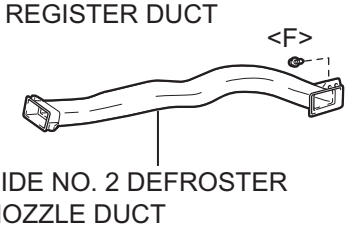

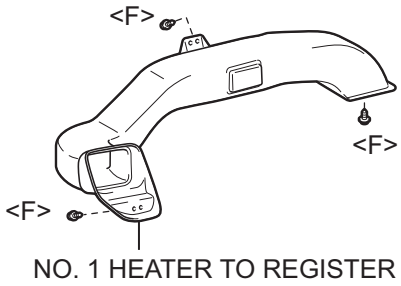

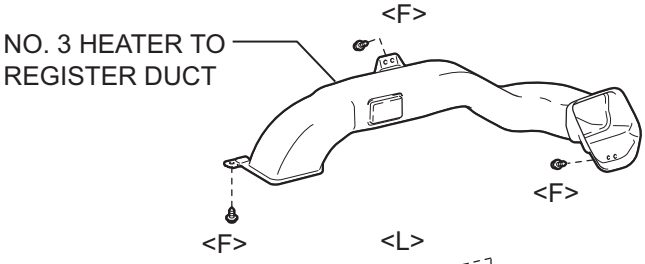

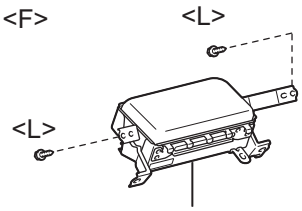

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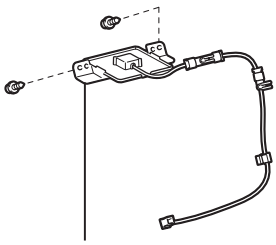
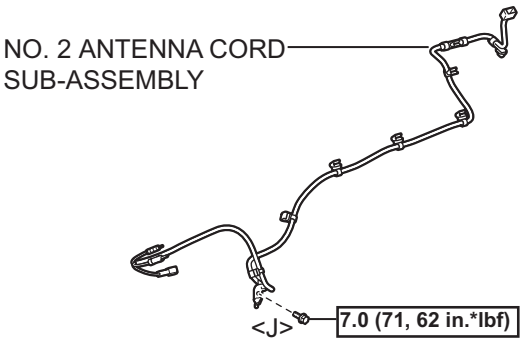


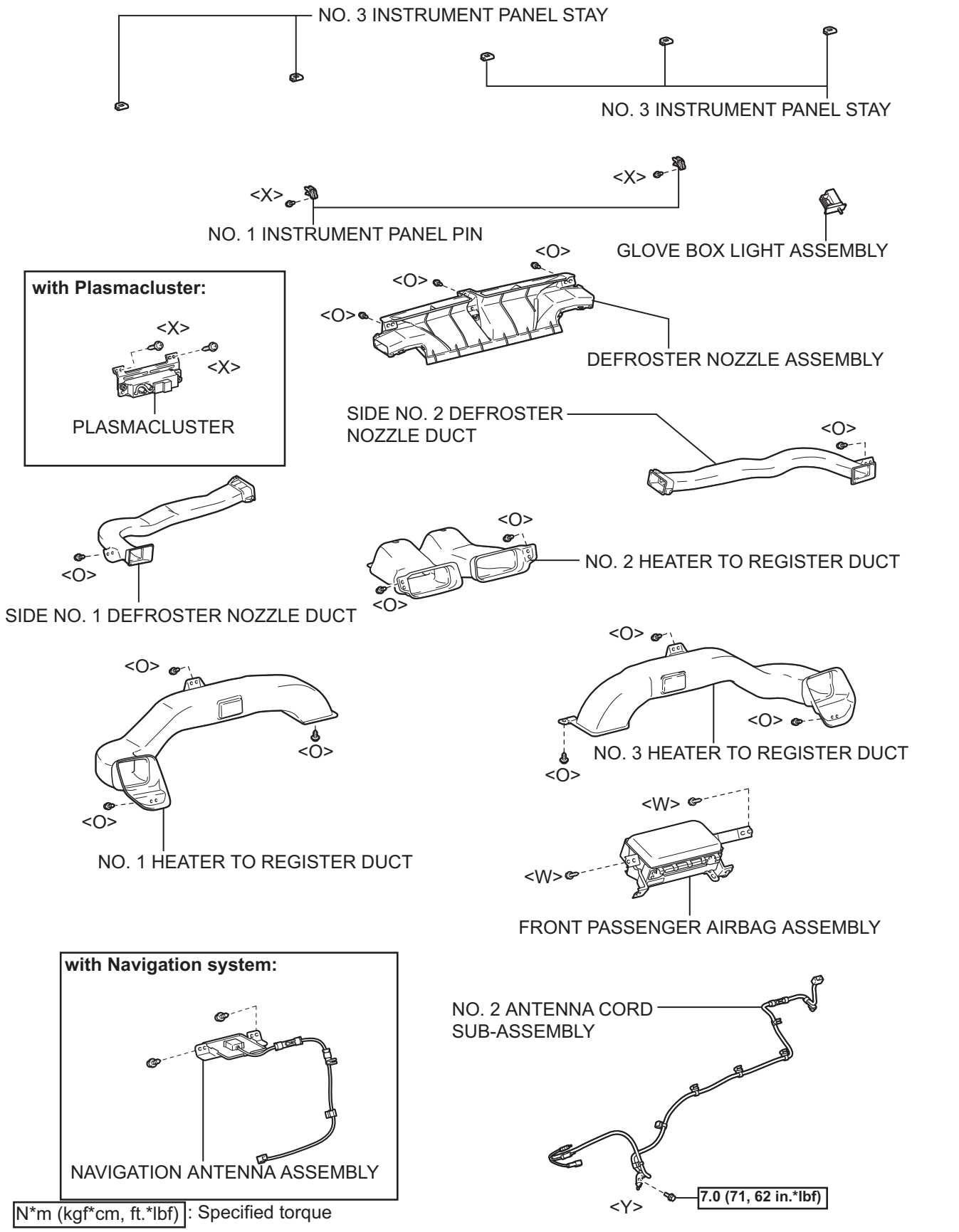


N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137288E01

for TMMK Made:



N*m (kgf*cm, ft.*lbf) : Specified torque

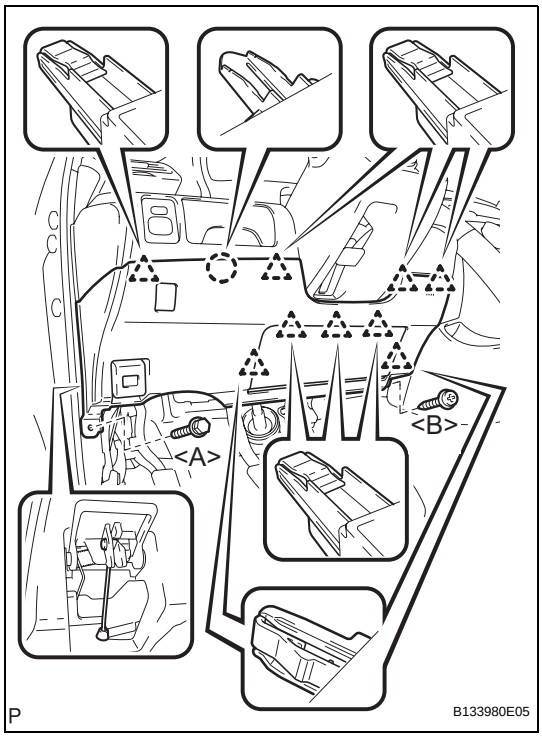
P

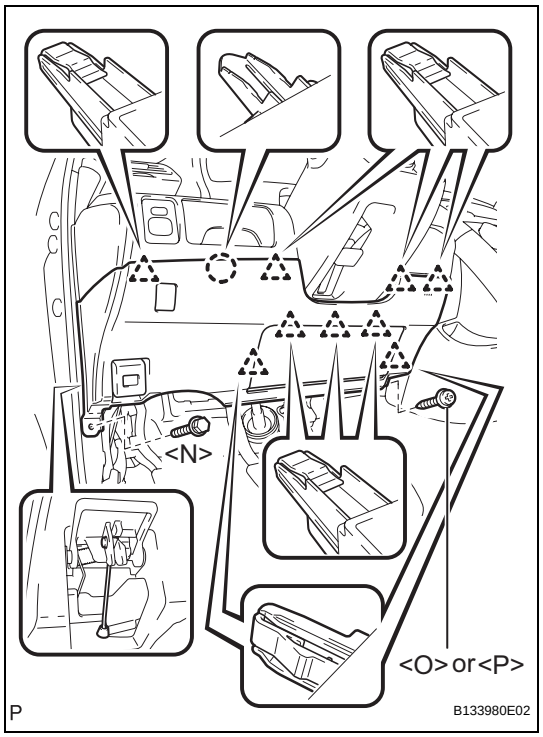
B137287E01

IP

REMOVAL

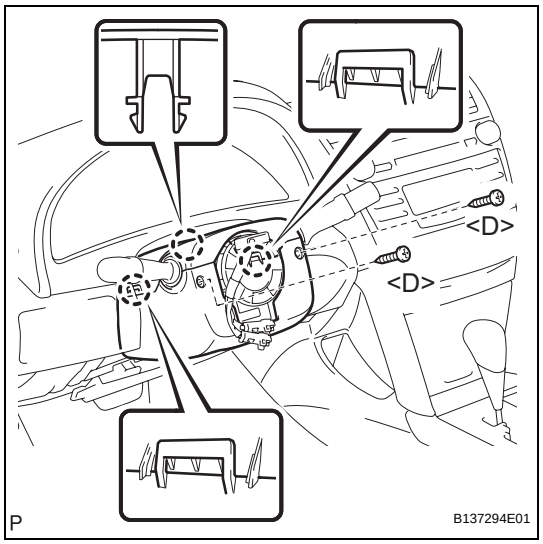
1. **PRECAUTION**
   (See page IP-1)
2. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
4. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)**
5. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)**
6. **REMOVE STEERING PAD (See page RS-350)**
7. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
8. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
9. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made)**
    (a) Remove the bolt <A> and the screw <B>.
    (b) Disconnect the hood lock control cable assembly.
    (c) Disengage the claw and the 9 clips.
    (d) Remove the air hose, disconnect the connector, and then remove the lower instrument panel finish panel LH.





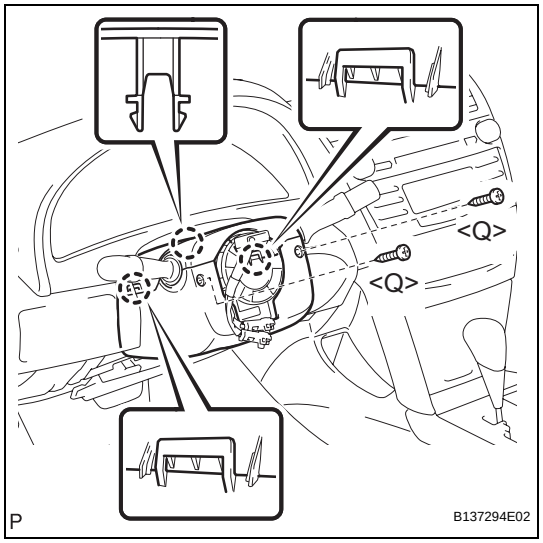
11. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made)

(a) Remove the bolt <N> and the screw <O> or <P>.
(b) Disconnect the hood lock control cable assembly.
(c) Disengage the claw and the 9 clips.
(d) Remove the air hose, disconnect the connector, and then remove the lower instrument panel finish panel LH.



12. REMOVE STEERING COLUMN COVER (for TMC Made)

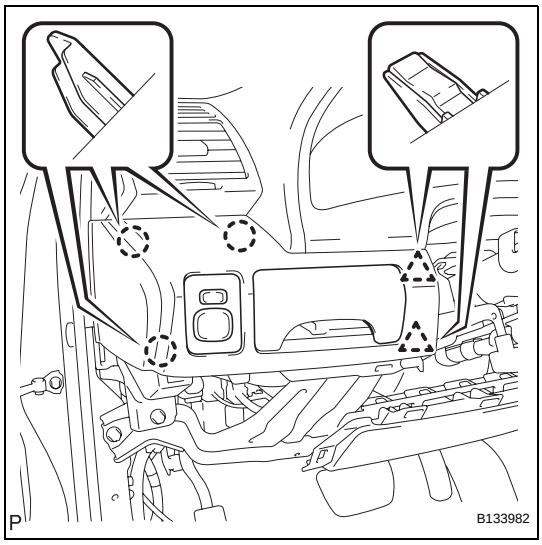
(a) Remove the 2 screws <D>.
(b) Disengage the 2 claws and remove the lower steering column cover.
(c) Disengage the claw and remove the upper steering column cover.



13. REMOVE STEERING COLUMN COVER (for TMMK Made)

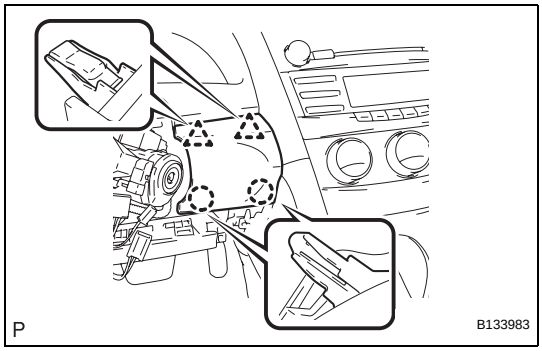
(a) Remove the 2 screws <Q>.
(b) Disengage the 2 claws and remove the lower steering column cover.
(c) Disengage the claw and remove the upper steering column cover.

14. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)



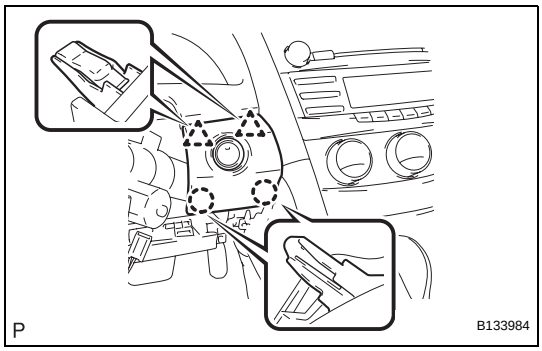
15. REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY

(a) Disengage the 3 claws and the 2 clips.
(b) Disconnect the connector and remove the instrument panel sub-assembly.



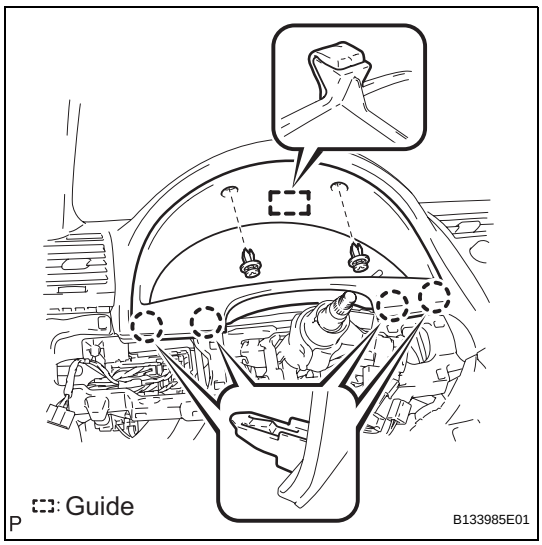
16. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System)

(a) Disengage the 2 claws and 2 clips, and then remove the lower instrument panel finish panel.



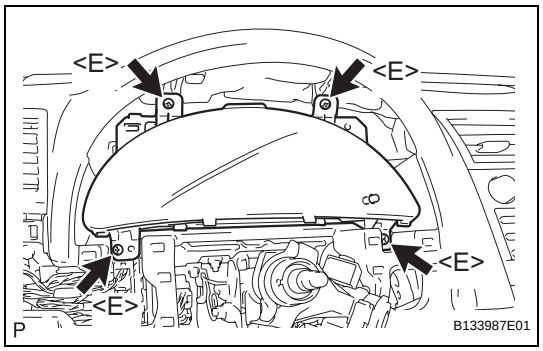
17. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System)

(a) Disengage the 2 claws and 2 clips.
(b) Disconnect the connector and remove the lower instrument panel finish panel.



18. REMOVE INSTRUMENT CLUSTER FINISH PANEL

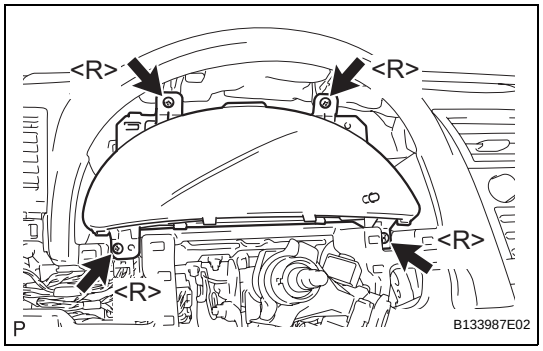
(a) Remove the 2 clips.
(b) Disengage the guide and 4 claws, and then remove the instrument cluster finish panel.



19. REMOVE COMBINATION METER ASSEMBLY (for TMC Made)

(a) Remove the 4 screws <E>.

(b) Disconnect each connector and remove the combination meter assembly.



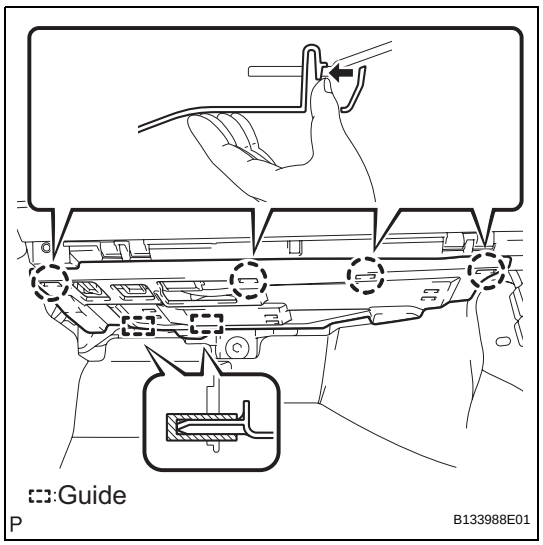
20. REMOVE COMBINATION METER ASSEMBLY (for TMMK Made)

(a) Remove the 4 screws <R>.

(b) Disconnect each connector and remove the combination meter assembly.

21. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)

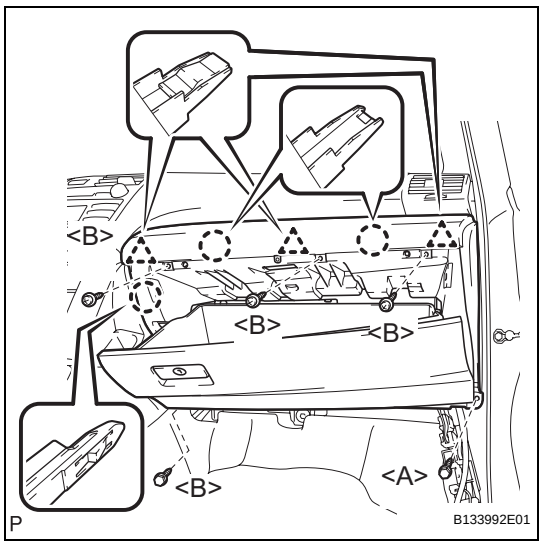
22. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)



23. REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY

(a) Disengage the 4 claws.

(b) Disengage the 2 guides and remove the No. 2 under cover sub-assembly.



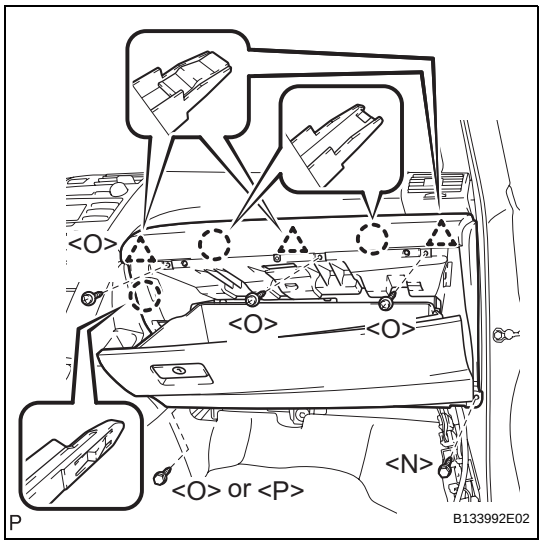
24. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made)

(a) Remove the bolt <A>.

(b) Remove the 4 screws <B>.

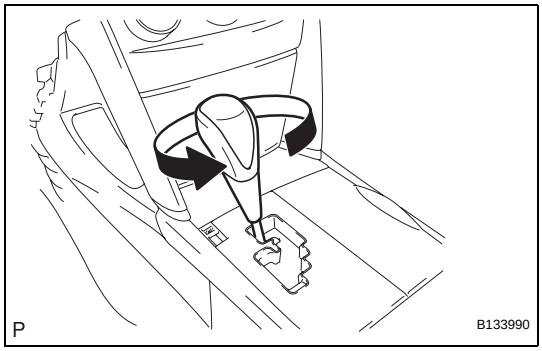
(c) Disengage the 3 claws and the 3 clips.

(d) Disconnect the connector and remove the lower instrument panel sub-assembly.



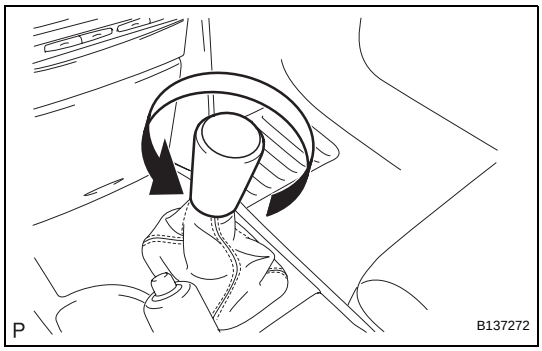
25. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made)

(a) Remove the bolt <N>.
(b) Remove the screw <O> or <P> and the 3 screws <O>.
(c) Disengage the 3 claws and the 3 clips.
(d) Disconnect the connector and remove the lower instrument panel sub-assembly.



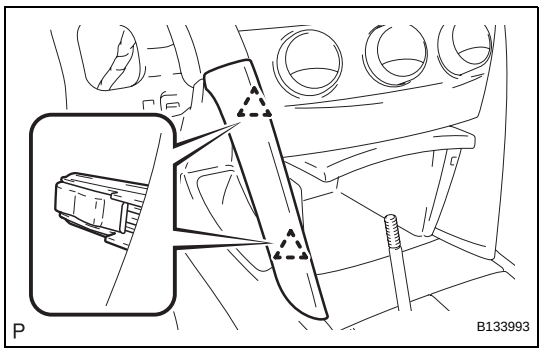
26. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle)

(a) Turn the shift lever knob counterclockwise and remove the shift lever knob sub-assembly.



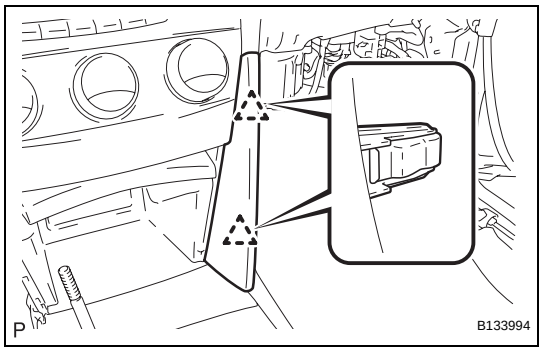
27. REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)

(a) Turn the shift lever knob counterclockwise and remove the shift lever knob sub-assembly.



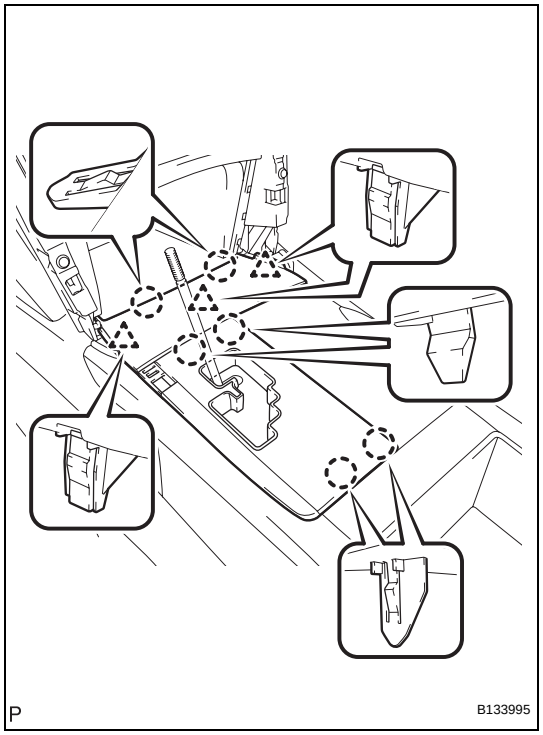
28. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Disengage the 2 clips and remove the No. 1 instrument cluster finish panel garnish.



29. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Disengage the 2 clips and remove the No. 2 instrument cluster finish panel garnish.

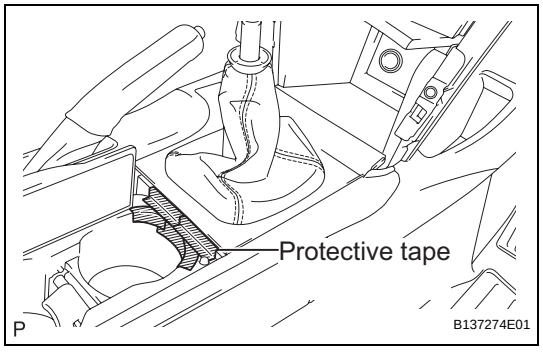


30. REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle)

(a) Disengage the 6 claws and the 3 clips, and then remove the floor shift position indicator housing sub-assembly.

(b) with Seat Heater System:

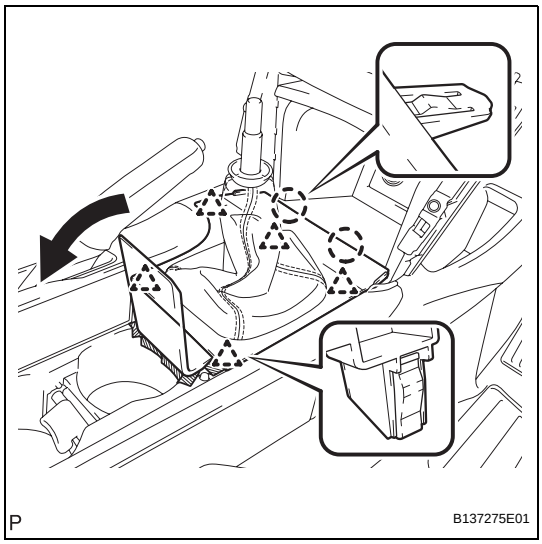
(1) Disconnect each connector.



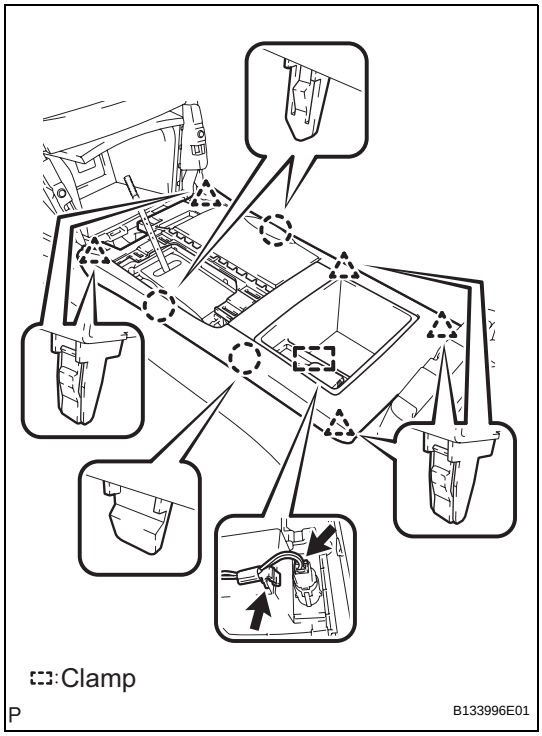
31. REMOVE UPPER CONSOLE PANEL (for Manual Transaxle)

(a) Open the lid of the upper console panel.

(b) Apply protective tape to the area shown in the illustration.

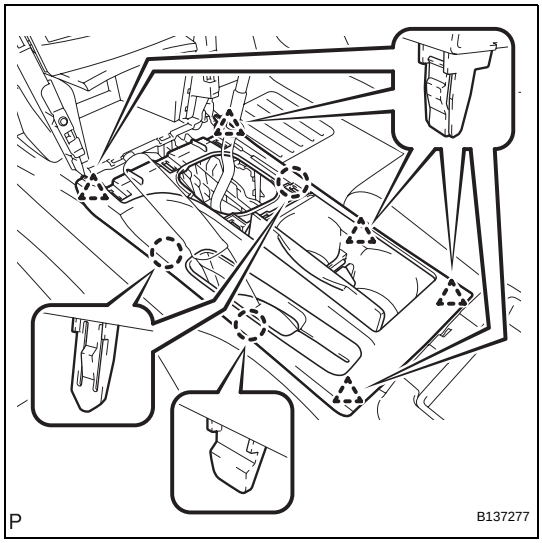


(c) Using a moulding remover, disengage the 2 claws and the 5 clips, and then remove the upper console panel as shown in the illustration.



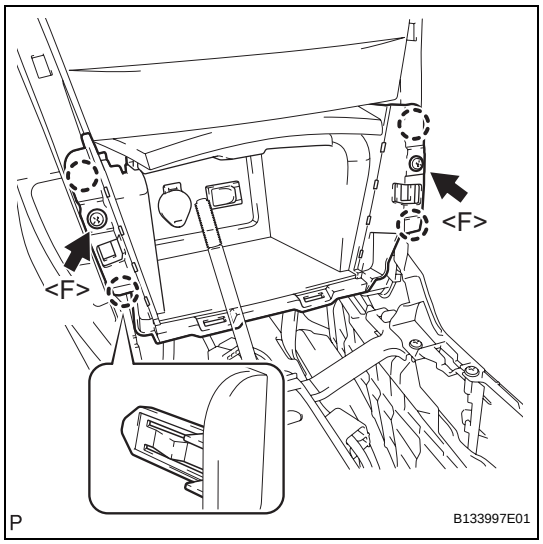
32. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle)

(a) Disengage the 3 claws and the 5 clips.
(b) Disengage the clamp.
(c) Disconnect the connector and remove the upper console rear panel sub-assembly.



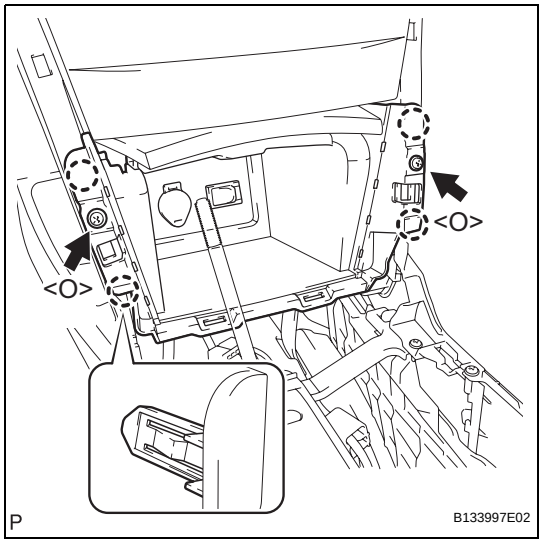
33. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle)

(a) Disengage the 3 claws and the 5 clips.
(b) Disconnect the connector and remove the upper console rear panel sub-assembly.



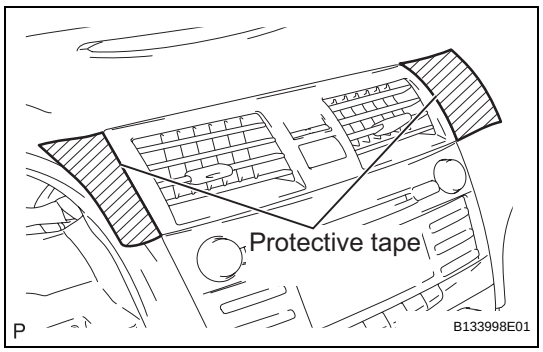
34. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made)

(a) Remove the 2 screws <F>.
(b) Disengage the 4 claws.
(c) Disconnect each connector and remove the upper console panel sub-assembly.



35. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made)

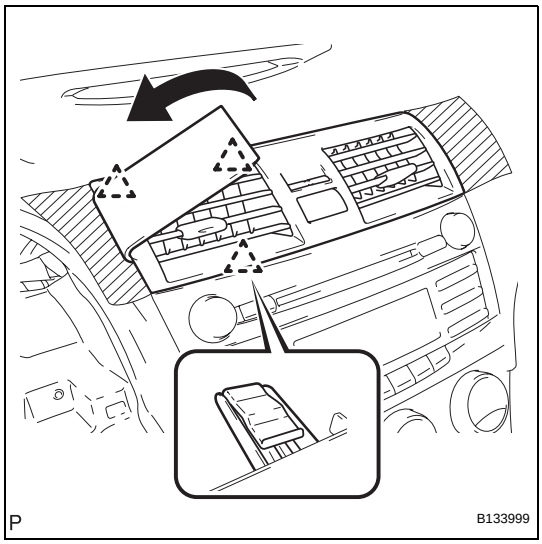
(a) Remove the 2 screws <O>.
(b) Disengage the 4 claws.
(c) Disconnect each connector and remove the upper console panel sub-assembly.



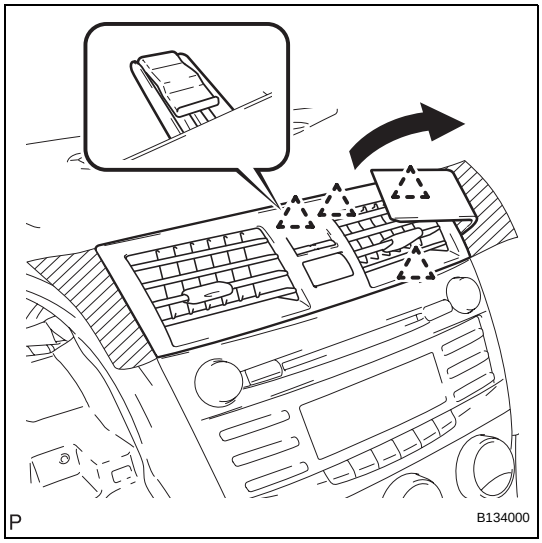
36. REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY

(a) Apply protective tape to the areas shown in the illustration.

IP



(b) Using a moulding remover, disengage the 3 clips.

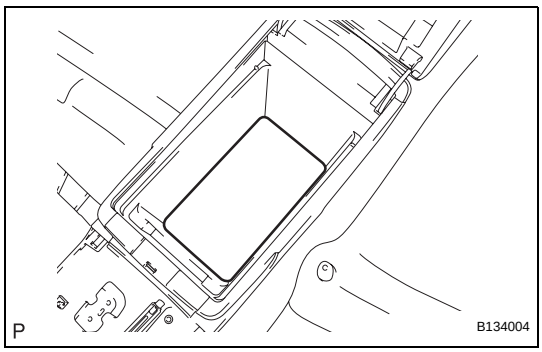


(c) Using a moulding remover, disengage the 4 clips.
(d) Disconnect the connector and remove the instrument panel No. 2 register assembly.

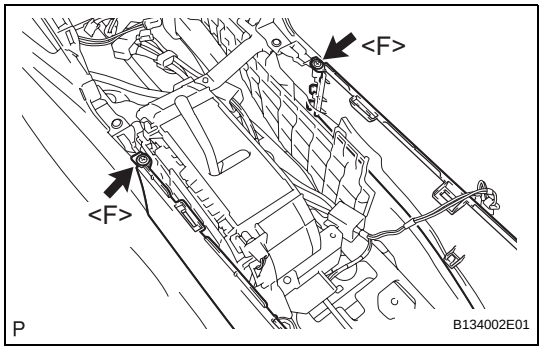
37. REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-146)

38. REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-195)

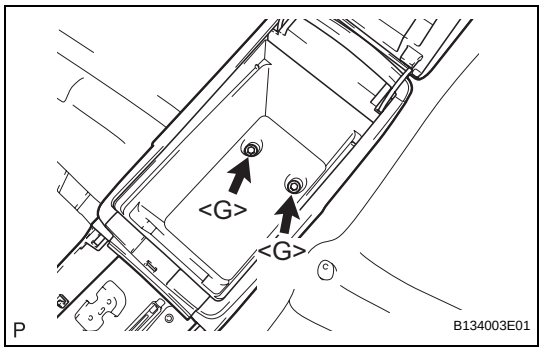
39. REMOVE CONSOLE BOX POCKET
(a) Remove the console box pocket.



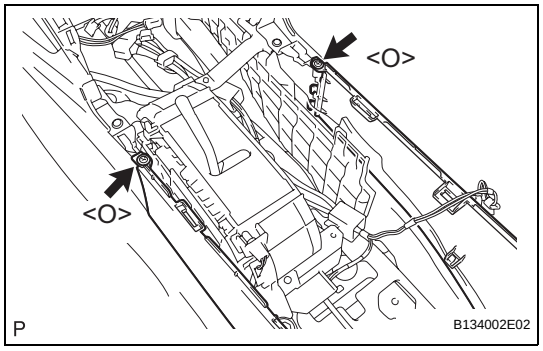
40. REMOVE CONSOLE BOX CARPET
(a) Remove the console box carpet.



41. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made)
(a) Remove the 2 screws <F>.

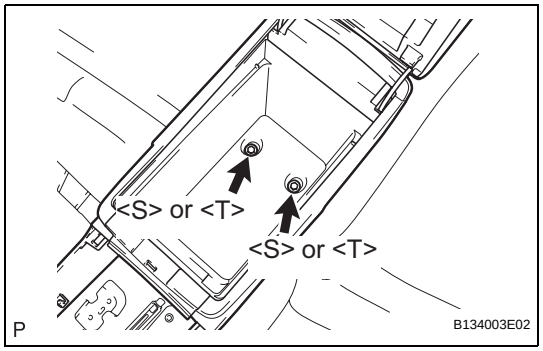


(b) Remove the 2 bolts <G> and the console box assembly.

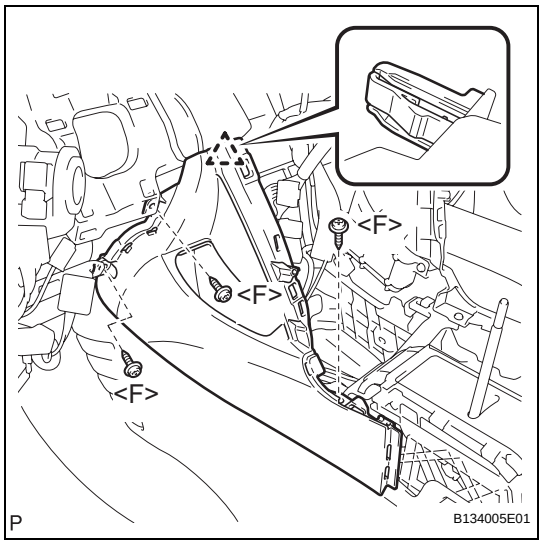


42. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made)

(a) Remove the 2 screws <O>.



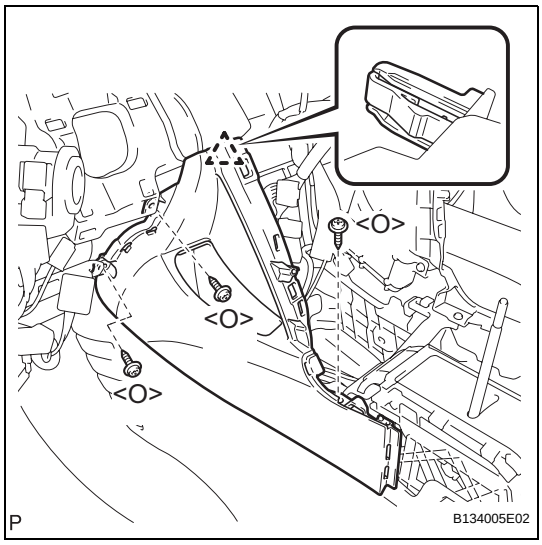
(b) Remove the 2 bolts <S> or <T> and the console box assembly.



43. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made)

(a) Remove the 3 screws <F>.

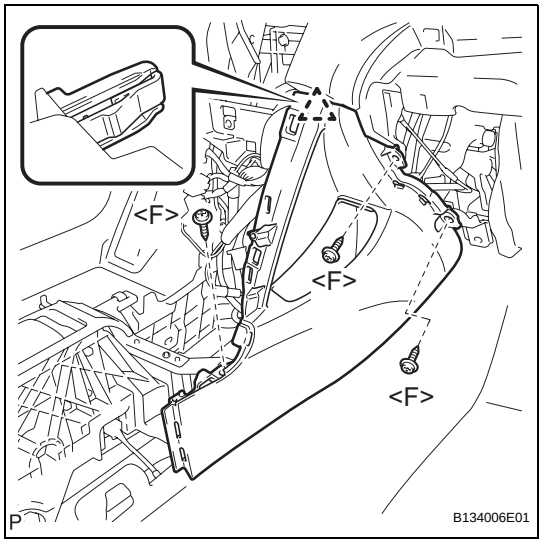
(b) Disengage the clip and remove the No. 2 console box insert front.



44. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made)

(a) Remove the 3 screws <O>.

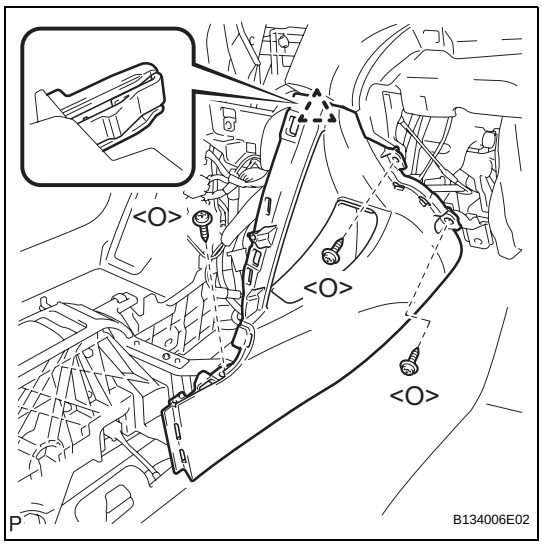
(b) Disengage the clip and remove the No. 2 console box insert front.



45. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made)

(a) Remove the 3 screws <F>.

(b) Disengage the clip and remove the No. 1 console box insert front.

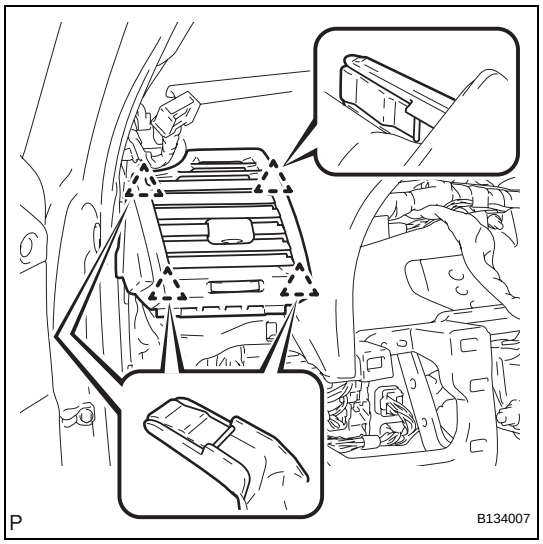


46. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made)

(a) Remove the 3 screws <O>.

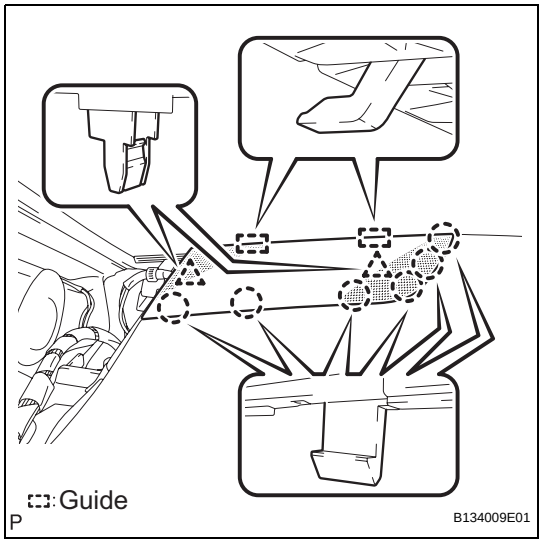
(b) Disengage the clip and remove the No. 1 console box insert front.

47. REMOVE FRONT PILLAR GARNISH LH (See page IR-27)



48. REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY

(a) Disengage the 4 clips and remove the instrument panel No. 1 register assembly.



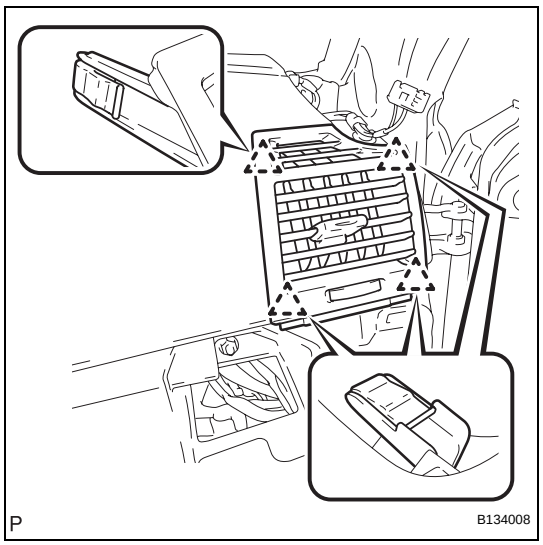
49. REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY

(a) Disengage the 6 claws and the 2 clips.

(b) Disengage the 2 guides and remove the instrument panel No. 1 speaker panel sub-assembly.

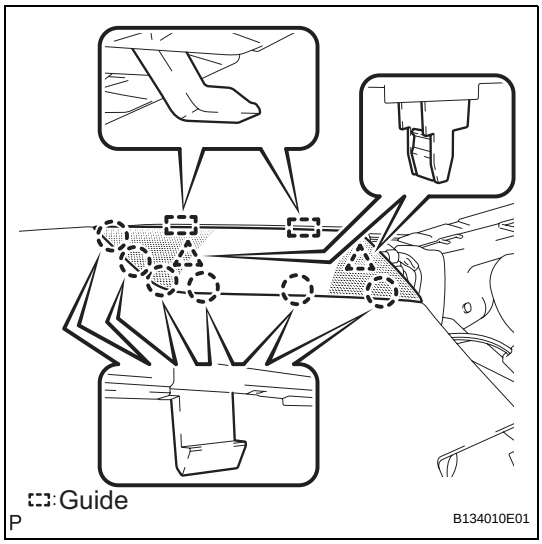
50. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)

51. REMOVE FRONT PILLAR GARNISH RH (See page IR-27)



52. REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY

(a) Disengage the 4 clips and remove the instrument panel No. 3 register assembly.

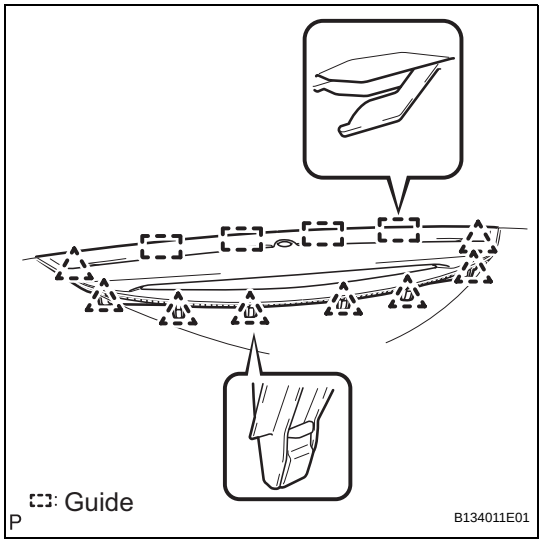


53. REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY

(a) Disengage the 6 claws and the 2 clips.
(b) Disengage the 2 guides and remove the instrument panel No. 2 speaker panel sub-assembly.

54. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)

HINT:
Use the same procedures for the RH side and the LH side (See page AV-156).



55. REMOVE NO. 1 DEFROSTER NOZZLE GARNISH

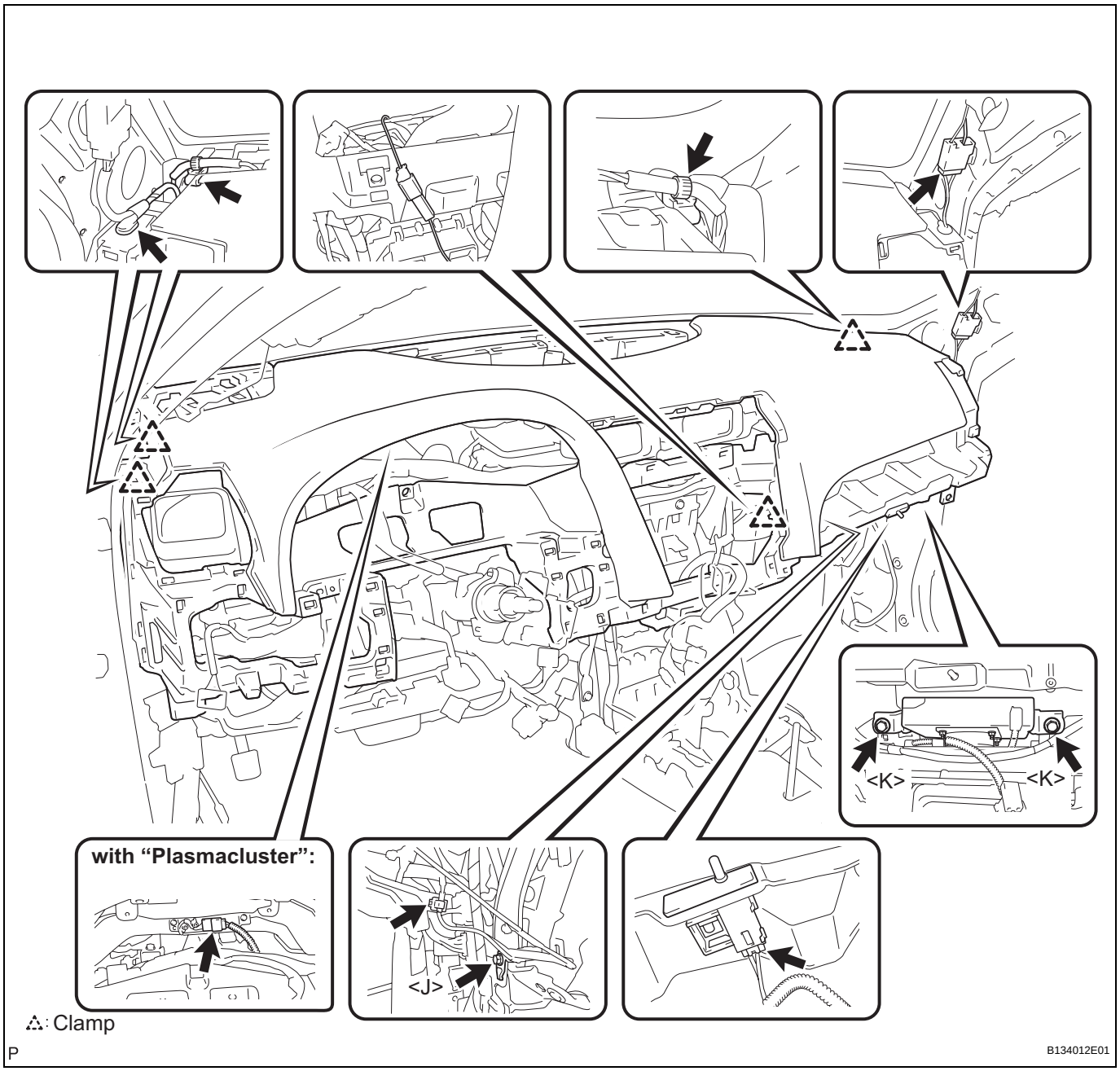
(a) Disengage the 8 clips and the 4 guides.
(b) Disengage each connector and remove the No. 1 defroster nozzle garnish.

56. DISCONNECT INSTRUMENT PANEL WIRE ASSEMBLY (See page RS-393)

57. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made)

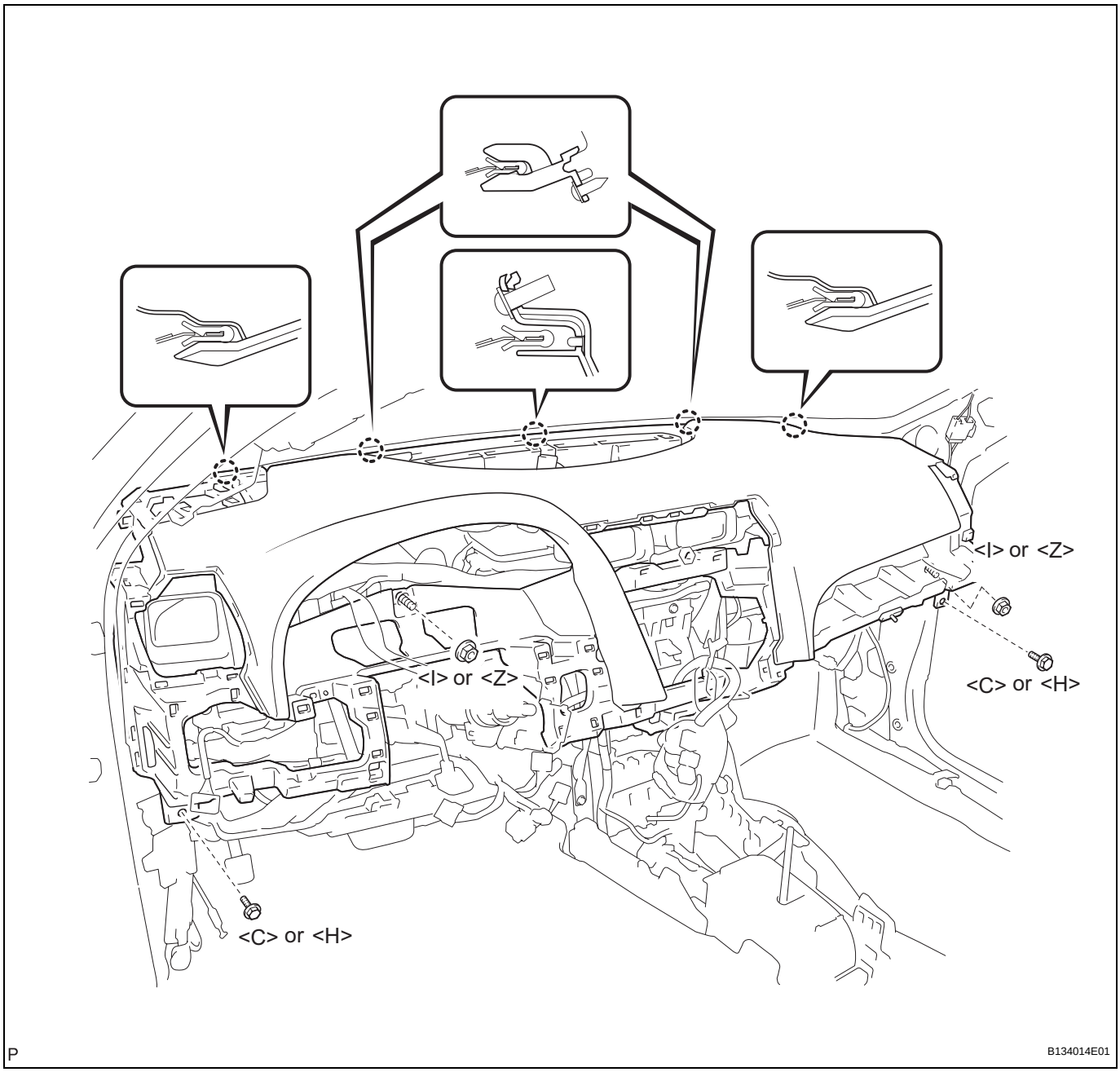
(a) Disengage each clamp.
(b) Disconnect each connector.
(c) Remove the bolt <J>.
(d) Remove the 2 passenger airbag bolts <K>.

(e) with "Plasmacluster":
(1) Disconnect the connector.



(f) Remove the 2 bolts <C> or <H>.
(g) Remove the 2 nuts <I> or <Z>.

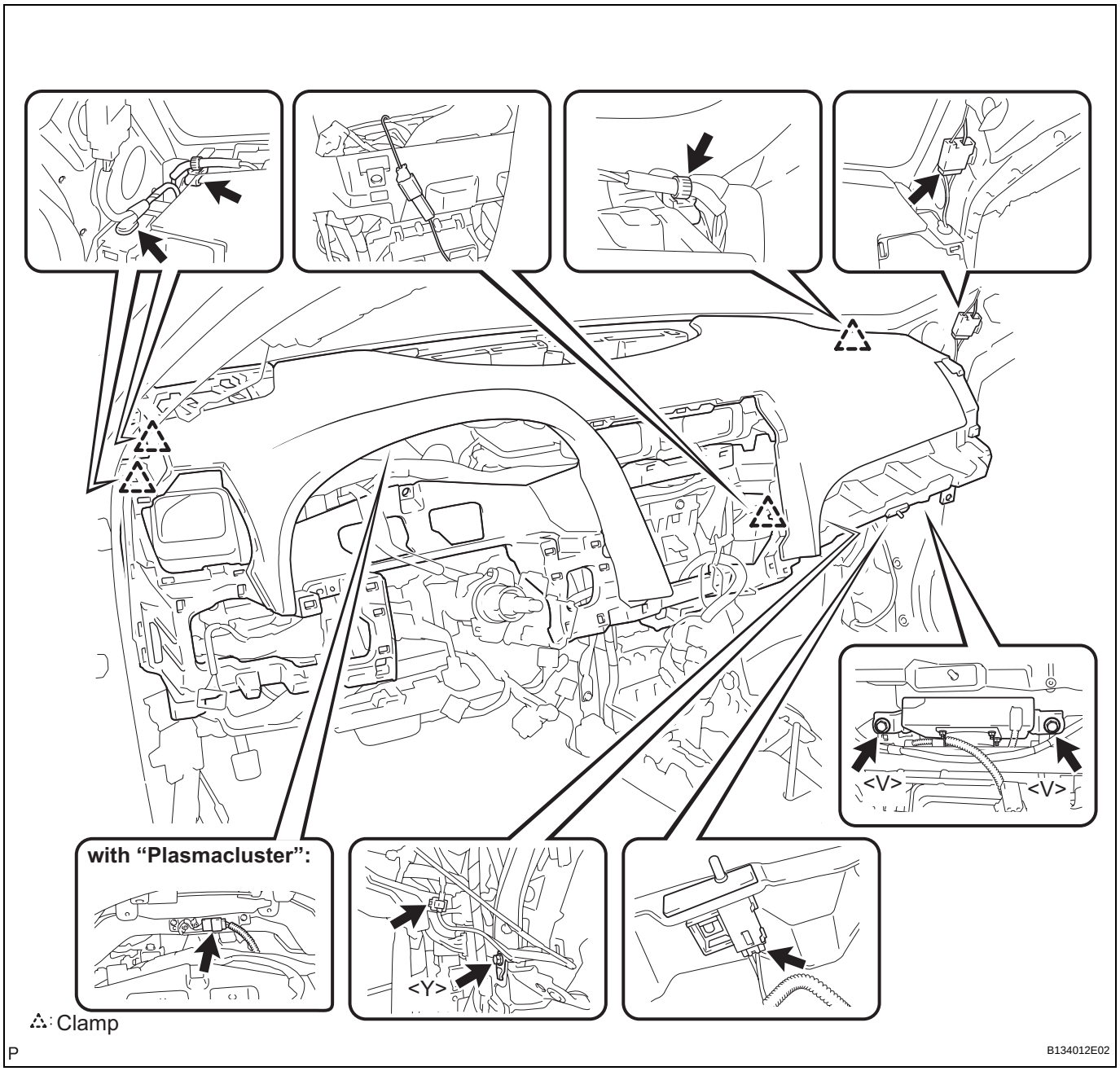
(h) Disengage the 5 claws and remove the instrument panel safety pad assembly.



58. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made)

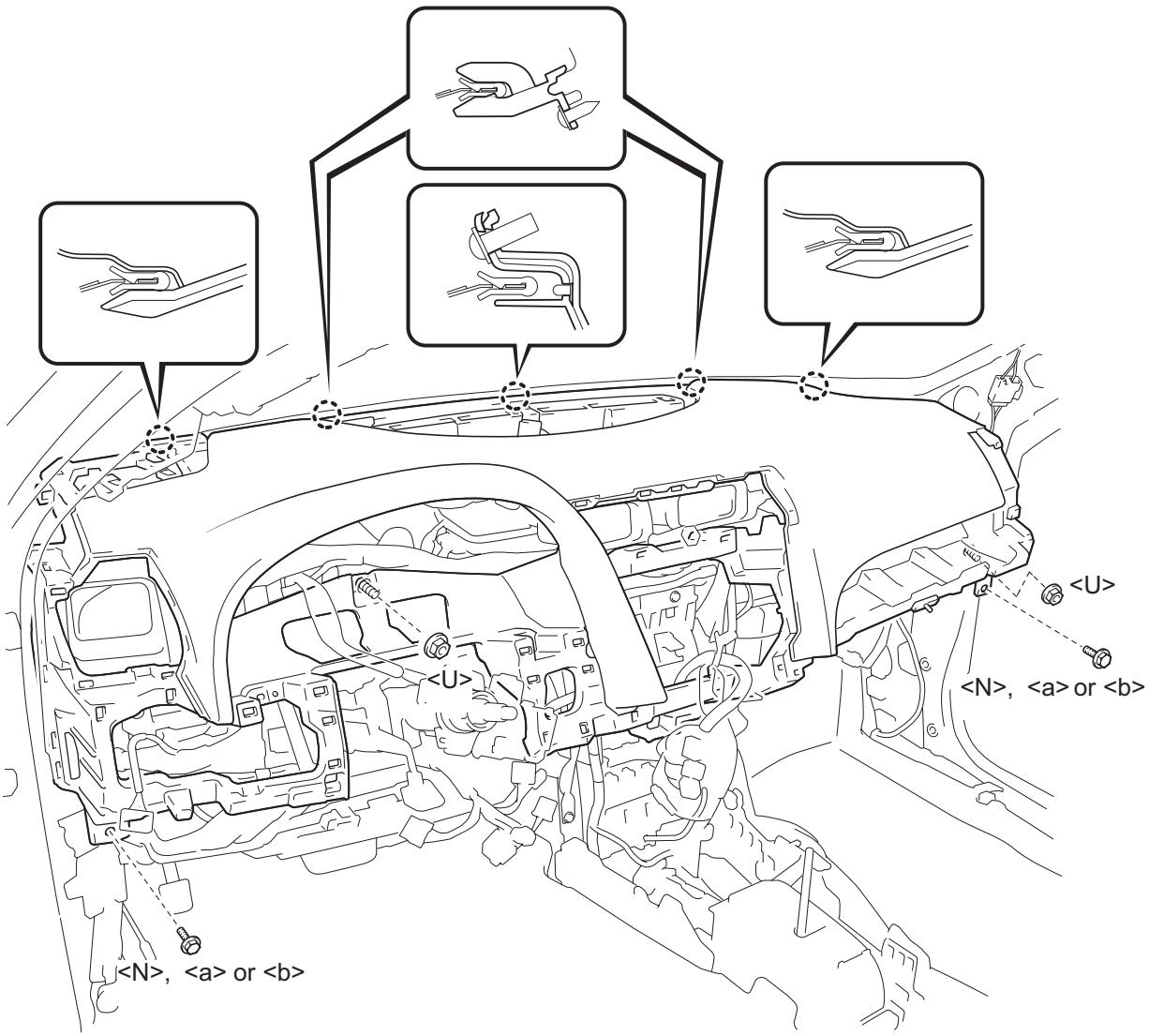
(a) Disengage each clamp.
(b) Disconnect each connector.
(c) Remove the bolt <Y>.
(d) Remove the 2 passenger airbag bolts <V>.

(e) with "Plasmacluster":
(1) Disconnect the connector.



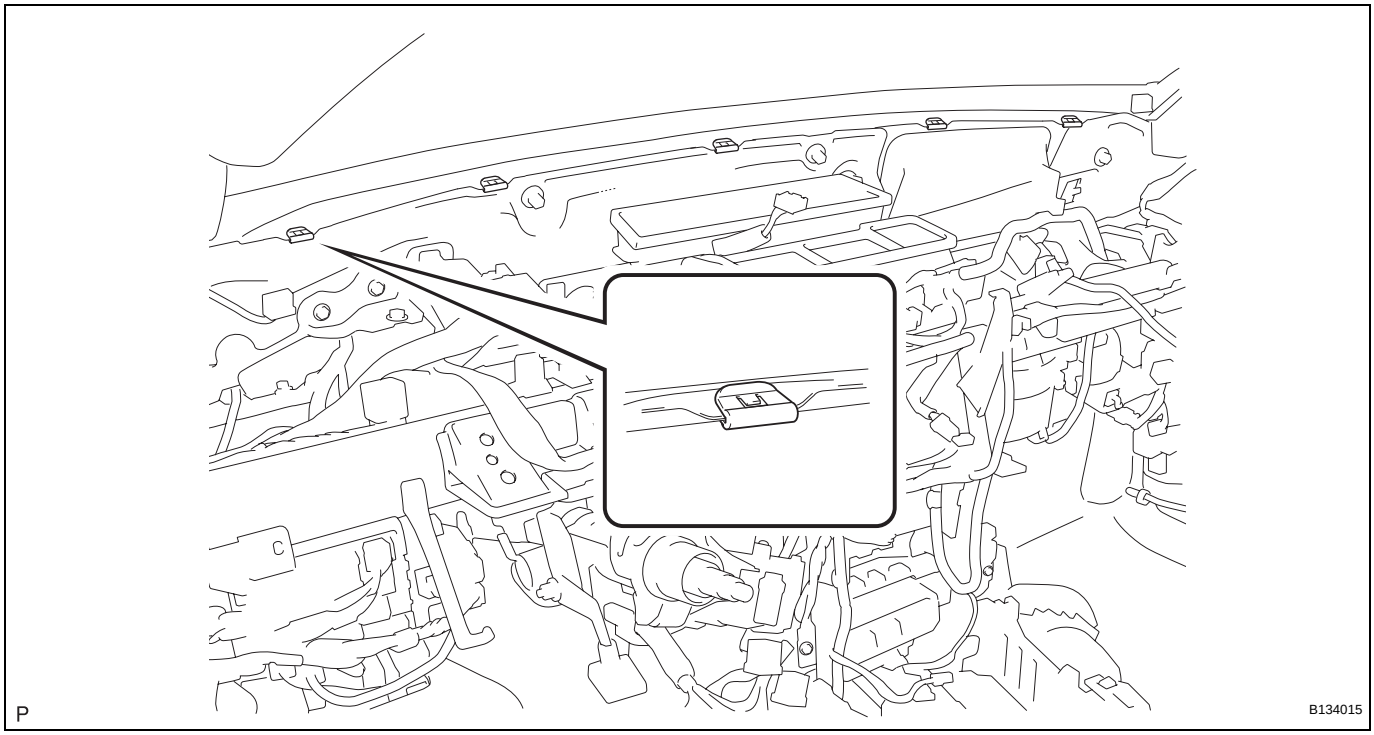
(f) Remove the 2 bolts <N>, <a> or <b>.
(g) Remove the 2 nuts <U>.

(h) Disengage the 5 claws and remove the instrument panel safety pad assembly.

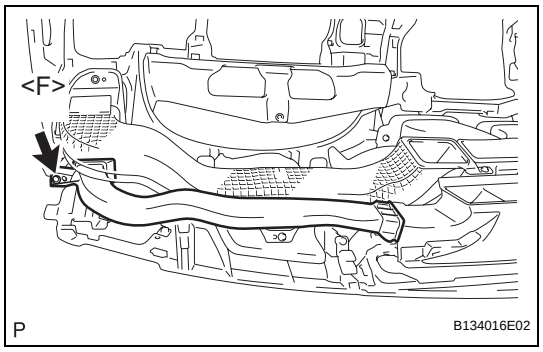


59. REMOVE NO. 3 INSTRUMENT PANEL STAY

(a) Disengage the claw and remove the 5 No. 3 instrument panel stays.

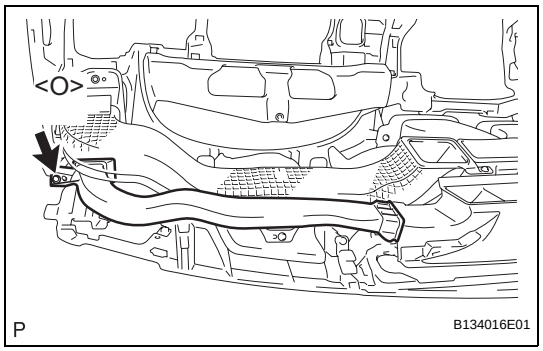


DISASSEMBLY



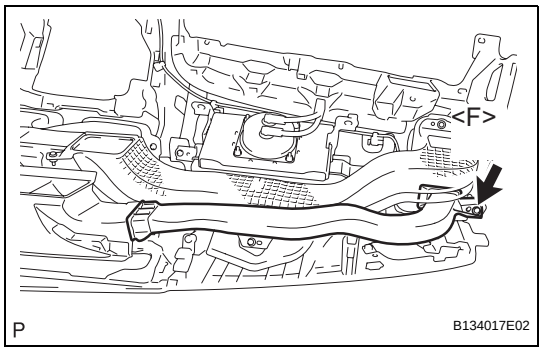
1. REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMC Made)

(a) Remove the screw <F> and the side No. 1 defroster nozzle duct.



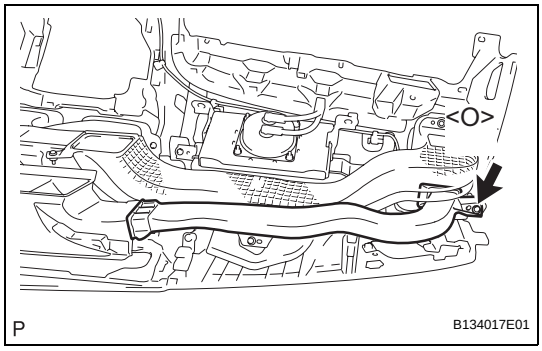
2. REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMMK Made)

(a) Remove the screw <O> and the side No. 1 defroster nozzle duct.



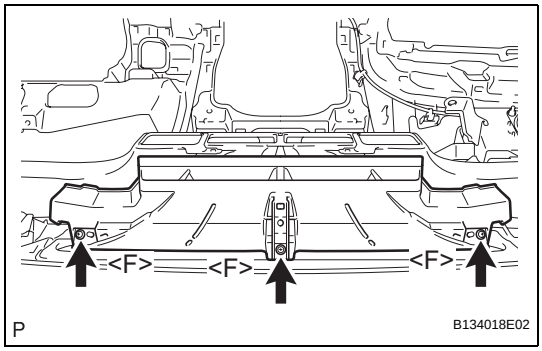
3. REMOVE SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMC Made)

(a) Remove the screw <F> and the side No. 2 defroster nozzle duct.



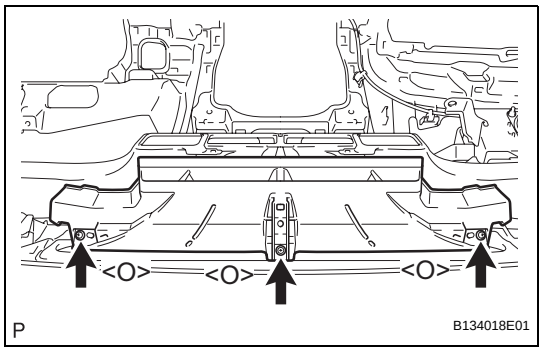
4. REMOVE SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMMK Made)

(a) Remove the screw <O> and the side No. 2 defroster nozzle duct.



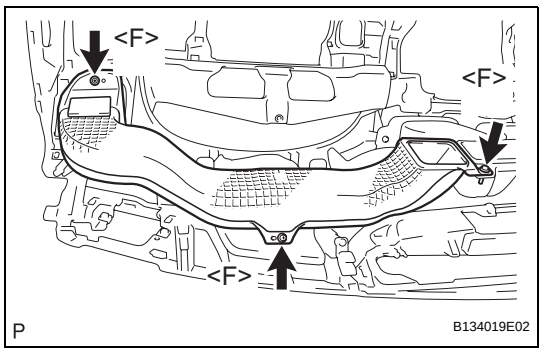
5. REMOVE DEFROSTER NOZZLE ASSEMBLY (for TMC Made)

(a) Remove the 3 screws <F> and the defroster nozzle assembly.



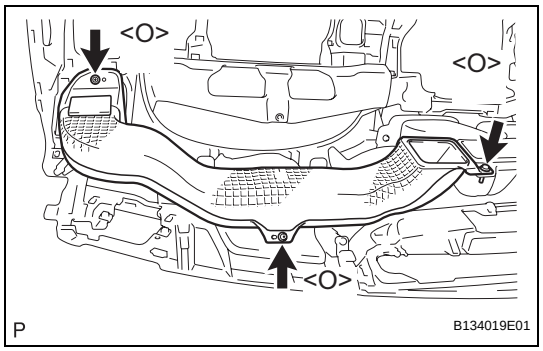
6. REMOVE DEFROSTER NOZZLE ASSEMBLY (for TMMK Made)

(a) Remove the 3 screws <O> and the defroster nozzle assembly.



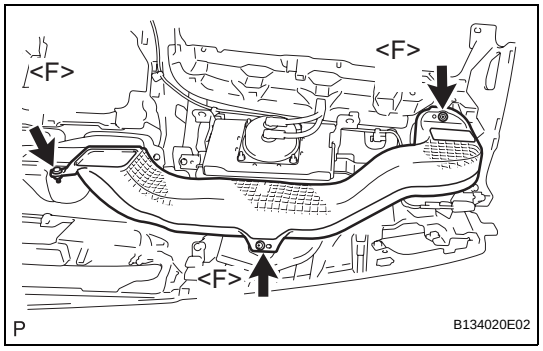
7. REMOVE NO. 1 HEATER TO REGISTER DUCT (for TMC Made)

(a) Remove the 3 screws <F> and the No. 1 heater to register duct.



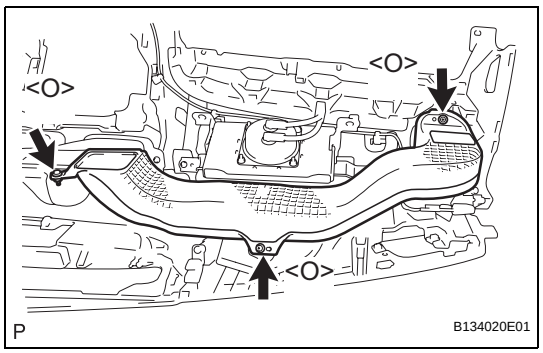
8. REMOVE NO. 1 HEATER TO REGISTER DUCT (for TMMK Made)

(a) Remove the 3 screws <O> and the No. 1 heater to register duct.



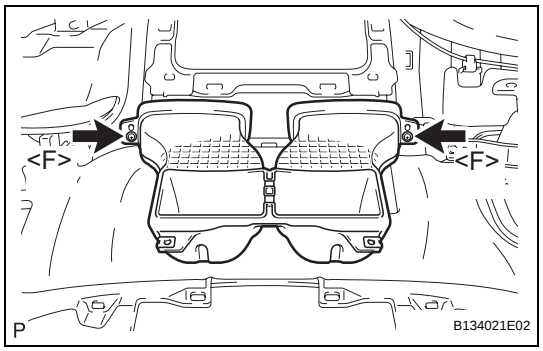
9. REMOVE NO. 3 HEATER TO REGISTER DUCT (for TMC Made)

(a) Remove the 3 screws <F> and the No. 3 heater to register duct.



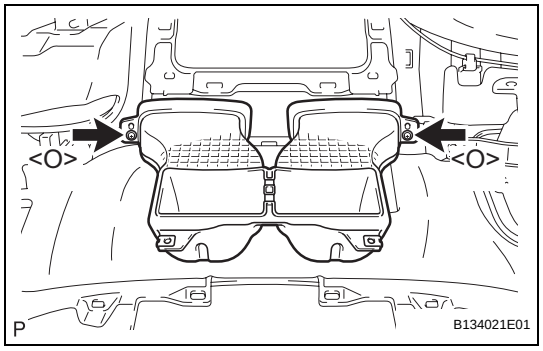
10. REMOVE NO. 3 HEATER TO REGISTER DUCT (for TMMK Made)

(a) Remove the 3 screws <O> and the No. 3 heater to register duct.



11. REMOVE NO. 2 HEATER TO REGISTER DUCT (for TMC Made)

(a) Remove the 2 screws <F> and the No. 2 heater to register duct.



12. REMOVE NO. 2 HEATER TO REGISTER DUCT (for TMMK Made)

(a) Remove the 2 screws <O> and the No. 2 heater to register duct.

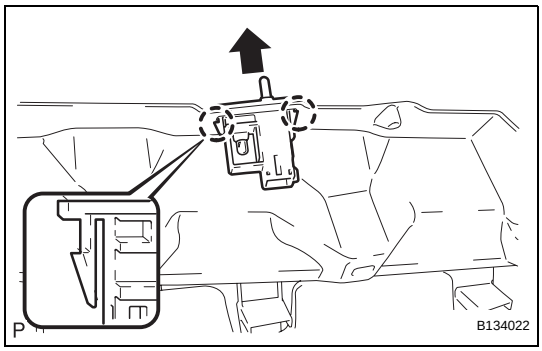
13. REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY (See page AV-196)

14. REMOVE NAVIGATION ANTENNA ASSEMBLY (See page NS-214)

15. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-395)

16. REMOVE GLOVE BOX LIGHT ASSEMBLY

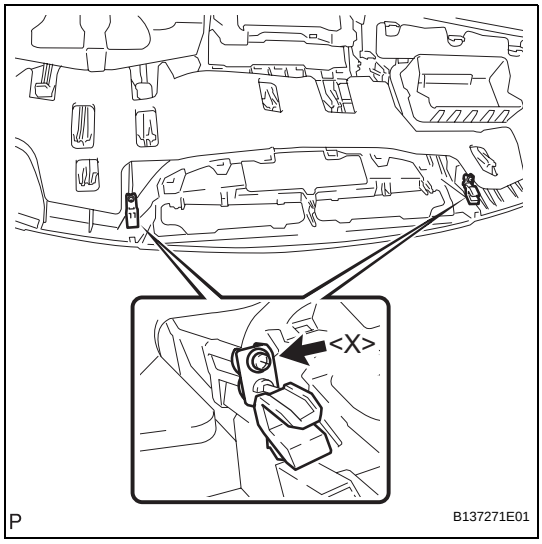
(a) Disengage the 2 claws and remove the glove box light assembly.



17. REMOVE PLASMACLUSTER (w/ Plasmacluster) (See page AC-276)

18. REMOVE NO. 1 INSTRUMENT PANEL PIN (for TMMK Made)

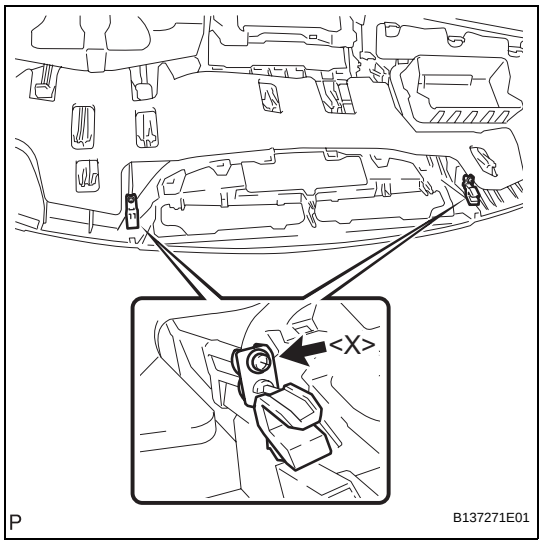
(a) Remove the 2 screws <X> and 2 No. 1 instrument panel pins.



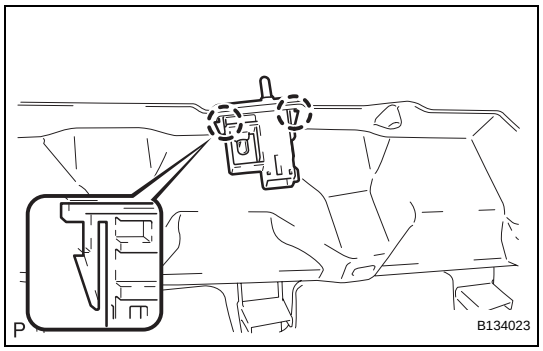
REASSEMBLY

1. INSTALL NO. 1 INSTRUMENT PANEL PIN (for TMMK Made)

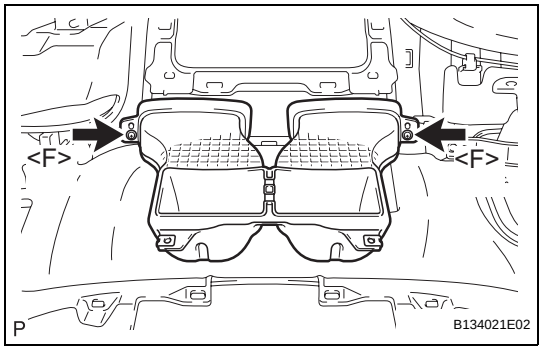
(a) Install the 2 No. 1 instrument panel pins with the 2 screws <X>.



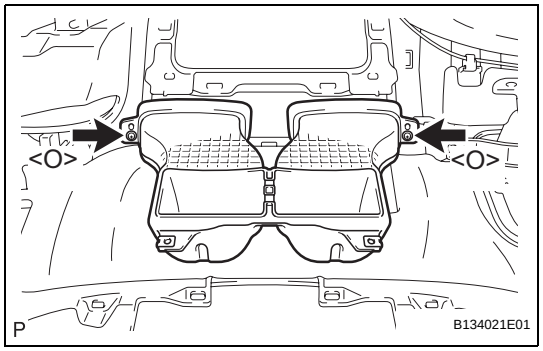
2. INSTALL PLASMACLUSTER (w/ Plasmacluster) (See page AC-276)



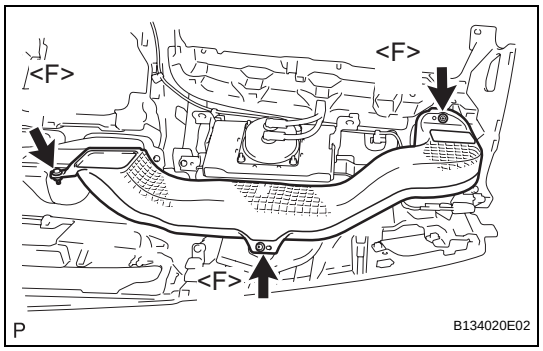
3. **INSTALL GLOVE BOX LIGHT ASSEMBLY**
   (a) Engage the 2 claws and install the glove box light.
4. **INSTALL NAVIGATION ANTENNA ASSEMBLY (See page NS-214)**
5. **INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY (See page AV-210)**



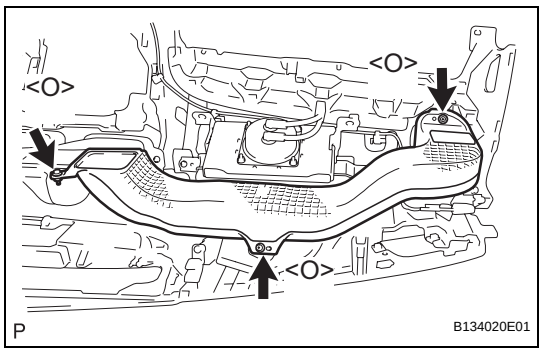
6. **INSTALL NO. 2 HEATER TO REGISTER DUCT (for TMC Made)**
   (a) Install the No. 2 heater to register duct with the 2 screws <F>.



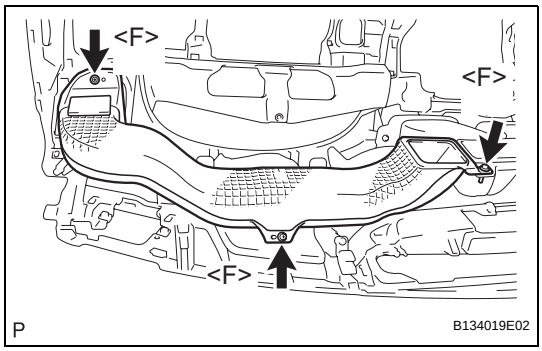
7. **INSTALL NO. 2 HEATER TO REGISTER DUCT (for TMMK Made)**
   (a) Install the No. 2 heater to register duct with the 2 screws <O>.



8. **INSTALL NO. 3 HEATER TO REGISTER DUCT (for TMC Made)**
   (a) Install the No. 3 heater to register duct with the 3 screws <F>.

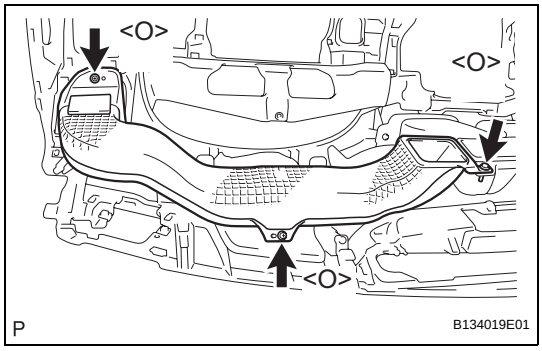


9. **INSTALL NO. 3 HEATER TO REGISTER DUCT (for TMMK Made)**
   (a) Install the No. 3 heater to register duct with the 3 screws <O>.



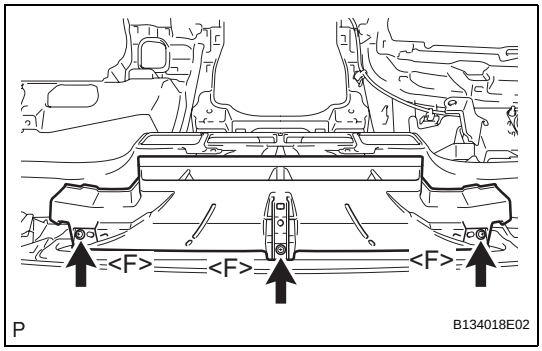
10. INSTALL NO. 1 HEATER TO REGISTER DUCT (for TMC Made)

(a) Install the No. 1 heater to register duct with the 3 screws <F>.



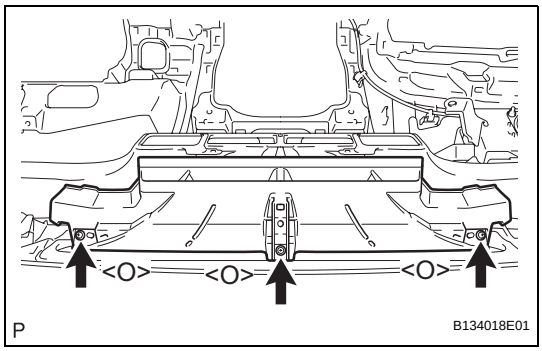
11. INSTALL NO. 1 HEATER TO REGISTER DUCT (for TMMK Made)

(a) Install the No. 1 heater to register duct with the 3 screws <O>.



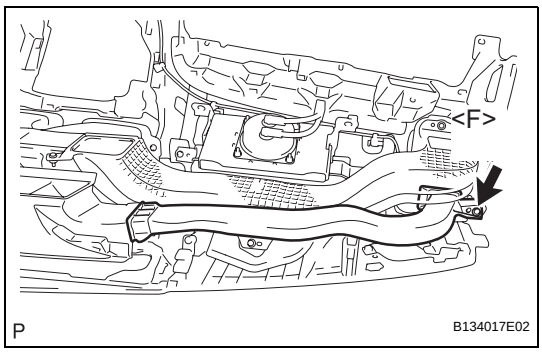
12. INSTALL DEFROSTER NOZZLE ASSEMBLY (for TMC Made)

(a) Install the defroster nozzle assembly with the 3 screws <F>.



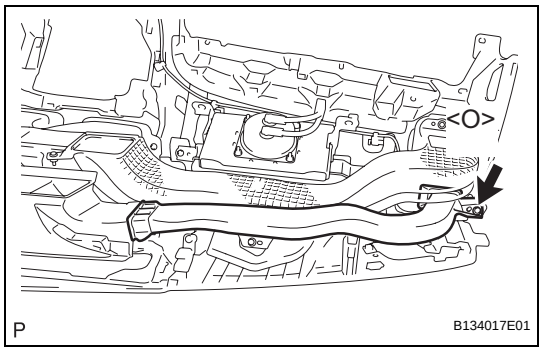
13. INSTALL DEFROSTER NOZZLE ASSEMBLY (for TMMK Made)

(a) Install the defroster nozzle assembly with the 3 screws <O>.



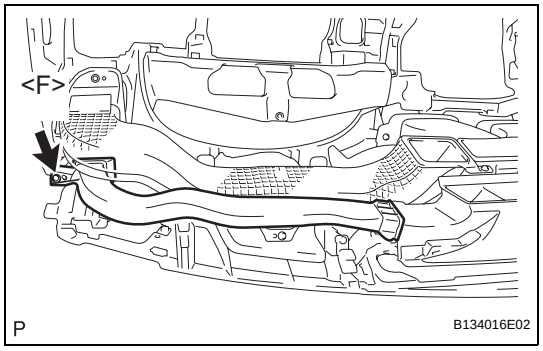
14. INSTALL SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMC Made)

(a) Install the side No. 2 defroster nozzle duct with the screw <F>.



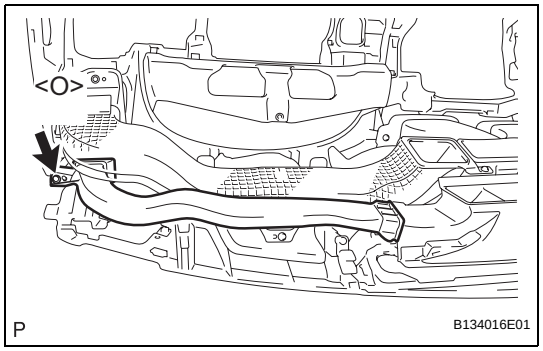
15. INSTALL SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMMK Made)

(a) Install the side No. 2 defroster nozzle duct with the screw <O>.



16. INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMC Made)

(a) Install the side No. 1 defroster nozzle duct with the screw <F>.



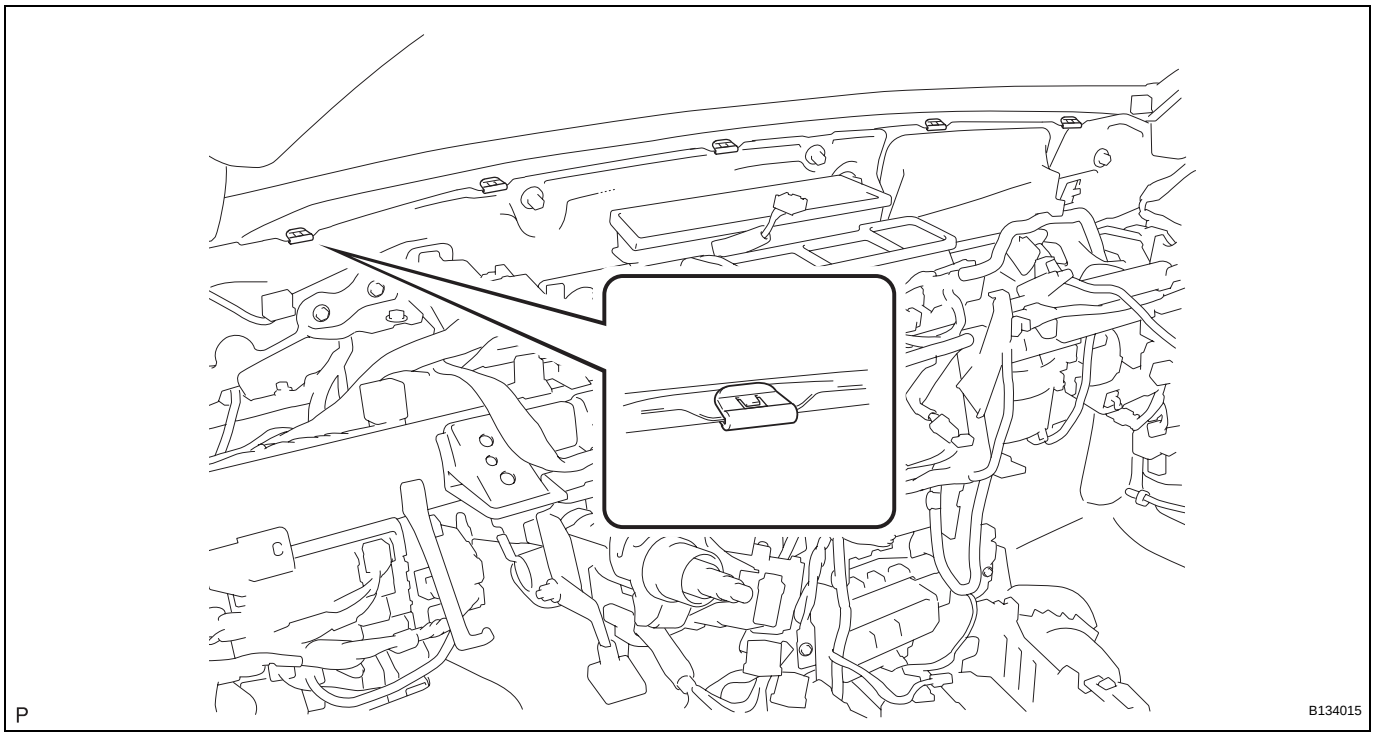
17. INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMMK Made)

(a) Install the side No. 1 defroster nozzle duct with the screw <O>.

INSTALLATION

1. INSTALL NO. 3 INSTRUMENT PANEL STAY

(a) Engage the claw and install the 5 No. 3 instrument panel stays.

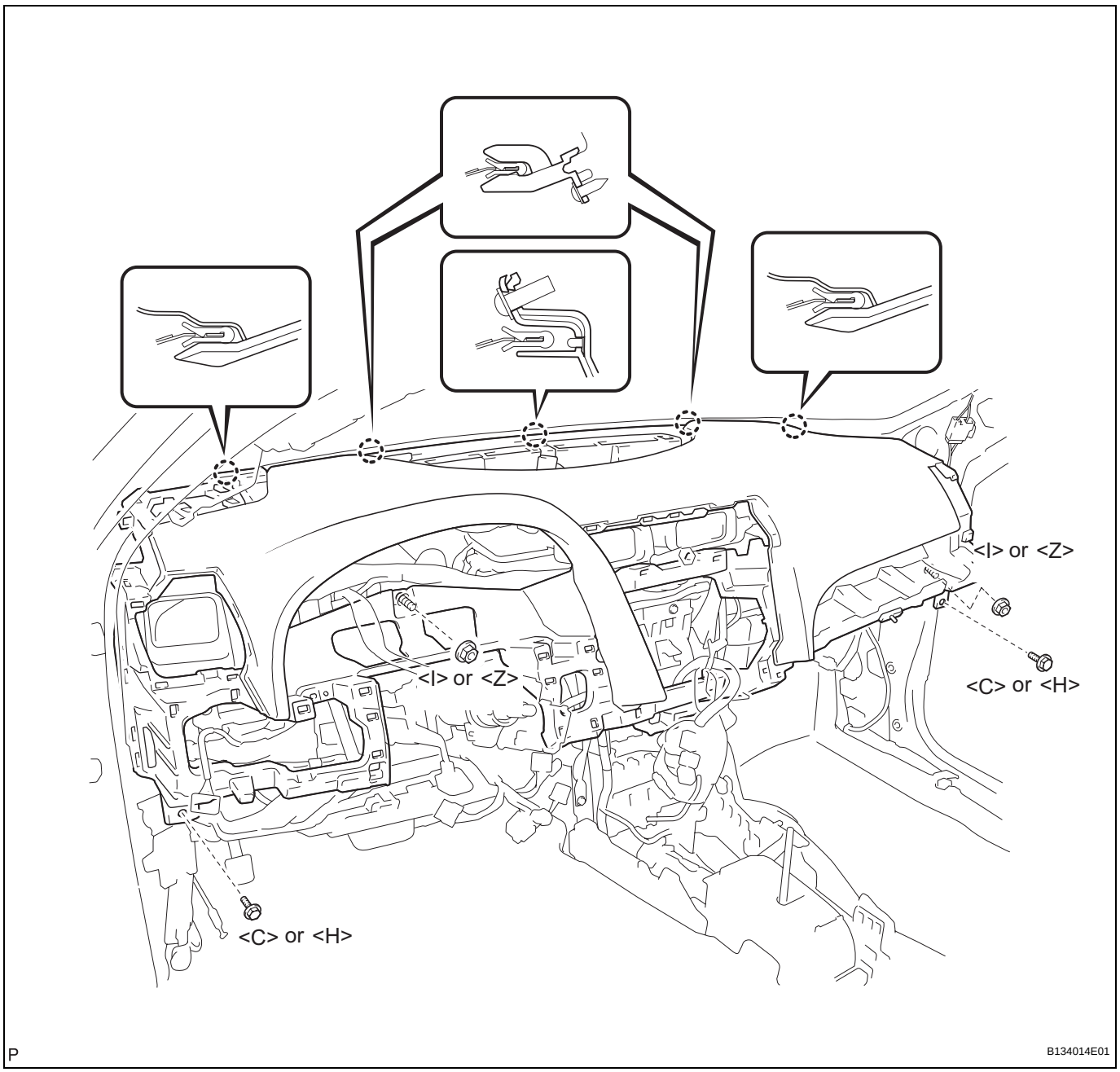


2. INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made)

(a) Engage the 5 claws.

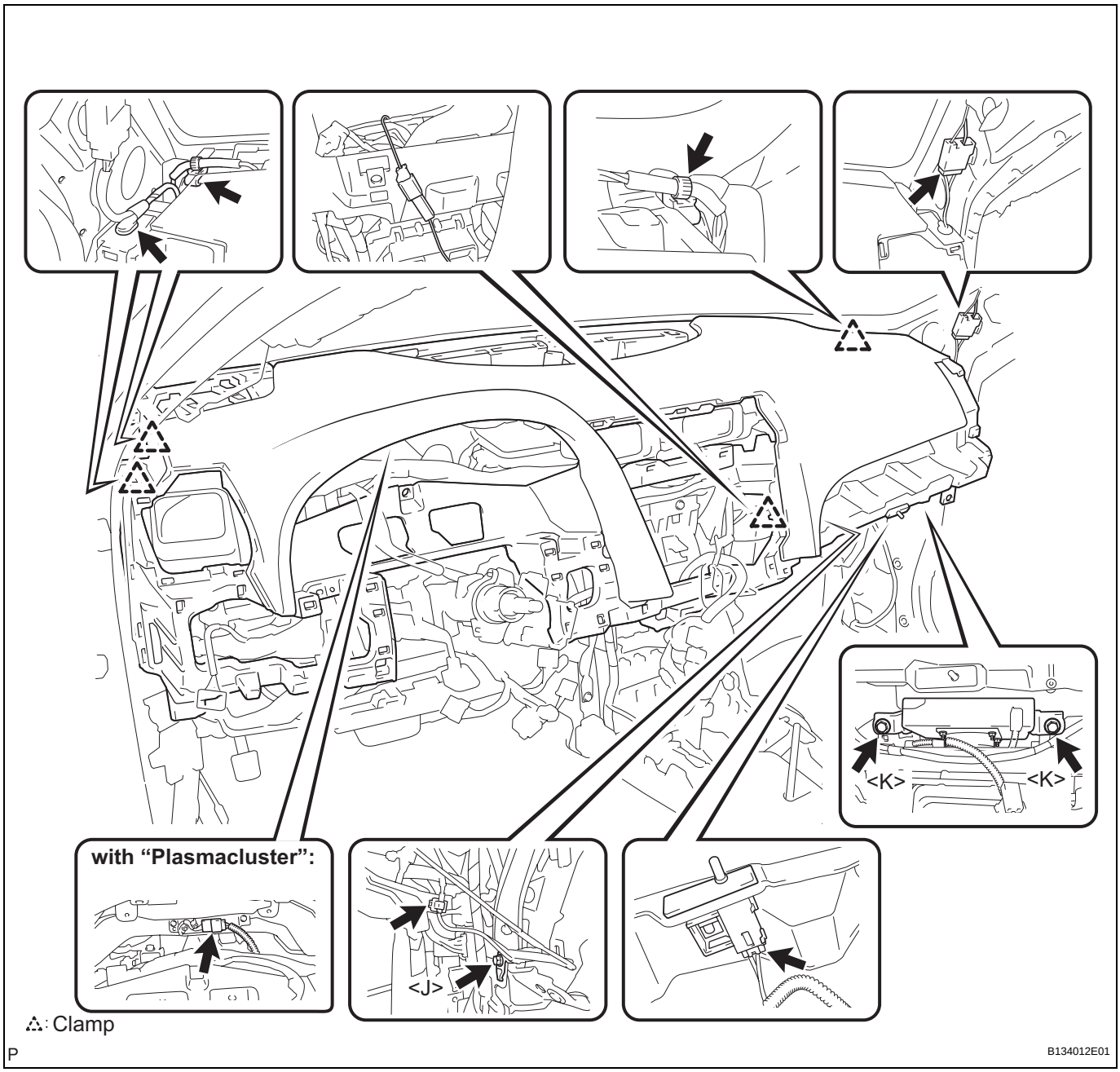
NOTICE:
Do not allow the wire harness to get caught in the claws.

(b) Install the 2 bolts <C> or <H> and 2 nuts <I> or <Z>.



(c) Engage each clamp.
(d) Install the bolt <J>.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)
(e) Install the 2 passenger airbag bolts <K>.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
(f) Connect each connector and install the instrument panel safety pad assembly.

(g) with "Plasmacluster":
(1) Connect the connector.

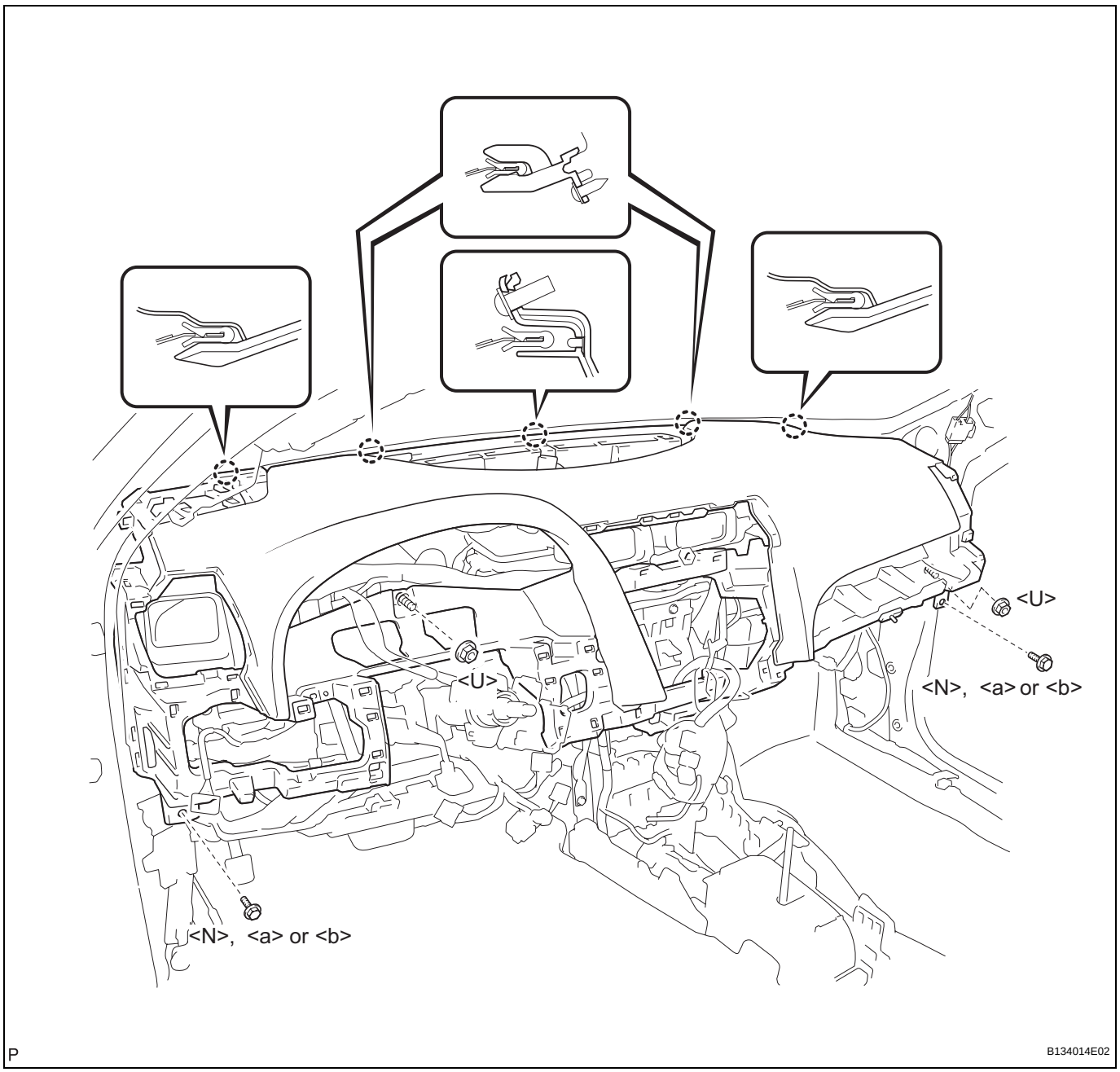


3. INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made)

(a) Engage the 5 claws.

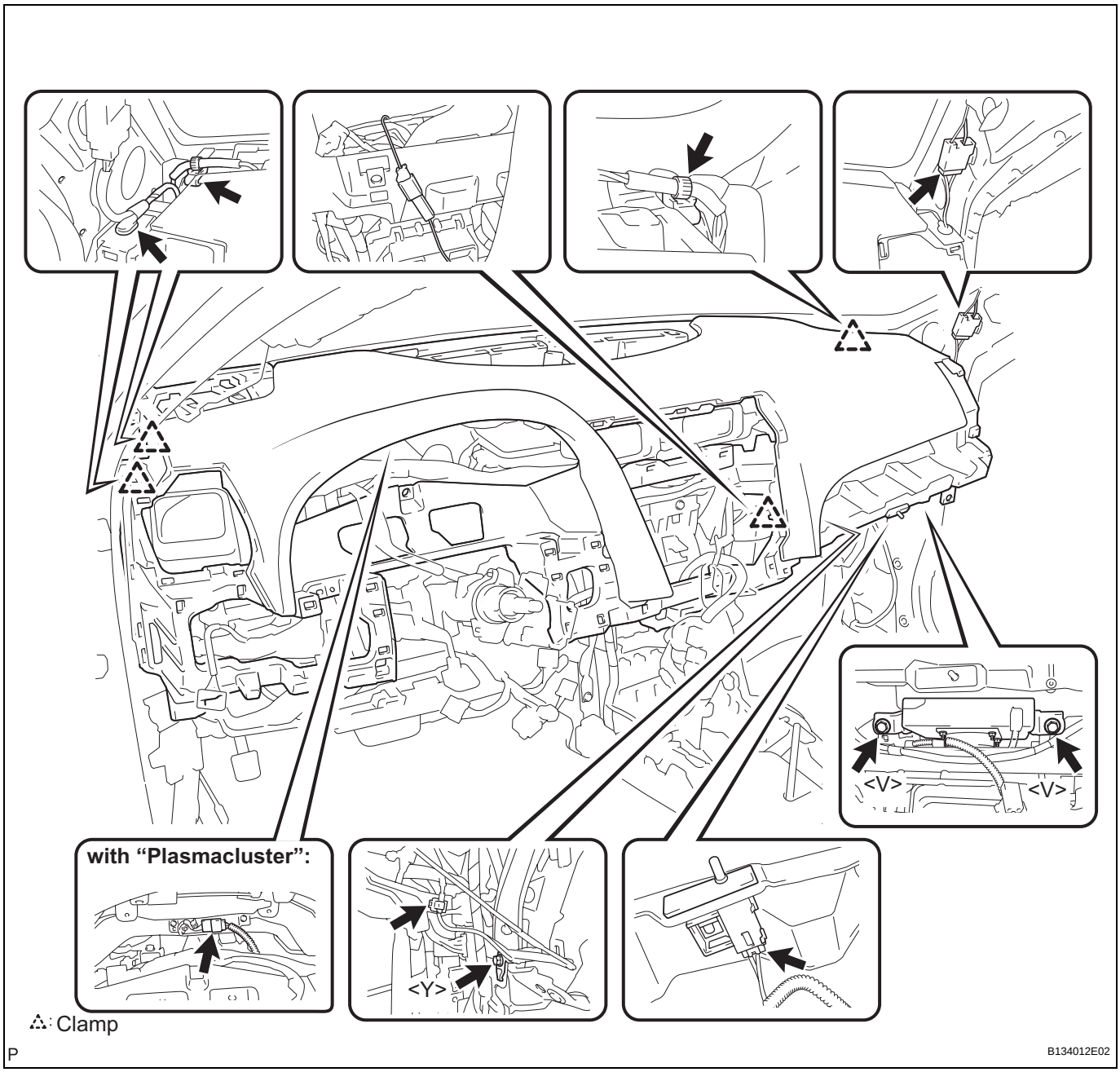
NOTICE:
Do not allow the wire harness to get caught in the claws.

(b) Install the 2 bolts <N>, <a> or <b> and 2 nuts <U>.

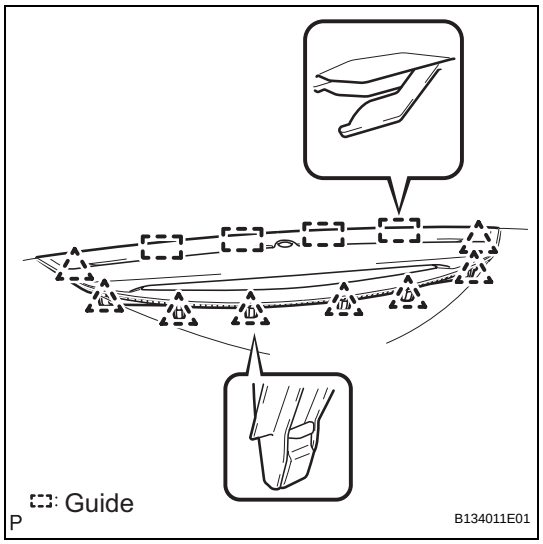


(c) Engage each clamp.
(d) Install the bolt <Y>.
Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)
(e) Install the 2 passenger airbag bolts <V>.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
(f) Connect each connector and install the instrument panel safety pad assembly.

(g) with "Plasmacluster":
(1) Connect the connector.

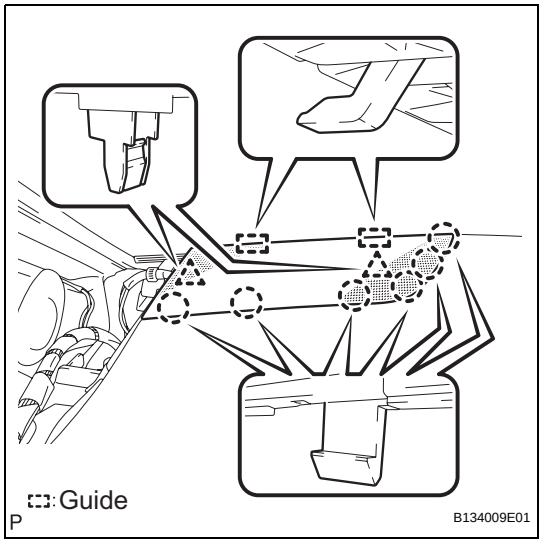


4. CONNECT INSTRUMENT PANEL WIRE ASSEMBLY (See page RS-398)

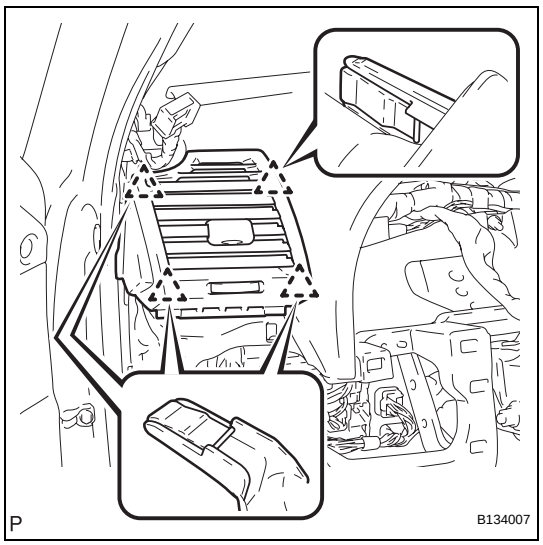


5. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH**
   (a) Connect each connector.
   (b) Engage the 4 guides.
   (c) Engage the 8 clips and install the No. 1 defroster nozzle garnish.

6. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**



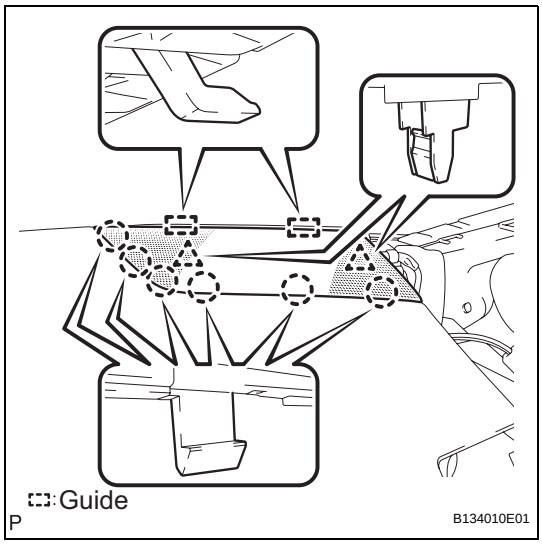
7. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY**
   (a) Engage the 2 guides.
   (b) Engage the 6 claws and the 2 clips to install the instrument panel No. 1 speaker panel sub-assembly.



8. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY**
   (a) Engage the 4 clips and install the instrument panel No. 1 register assembly.

9. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**

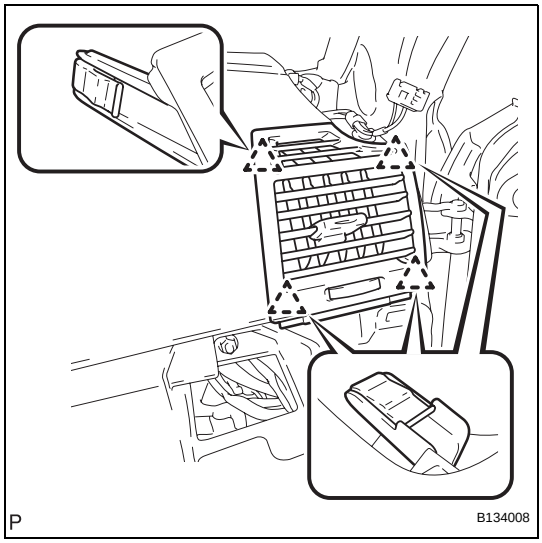
10. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**
    HINT:
    Use the same procedures for the RH side and the LH side (See page AV-156).



11. INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY

(a) Engage the 2 guides.

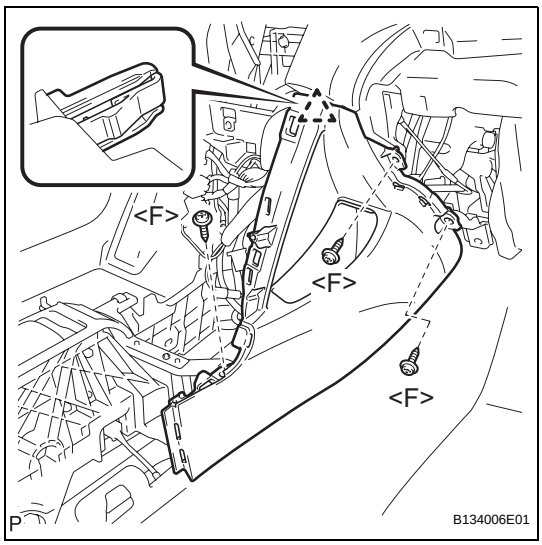
(b) Engage the 6 claws and the 2 clips to install the instrument panel No. 2 speaker panel sub-assembly.



12. INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY

(a) Engage the 4 clips and install the instrument panel No. 3 register assembly.

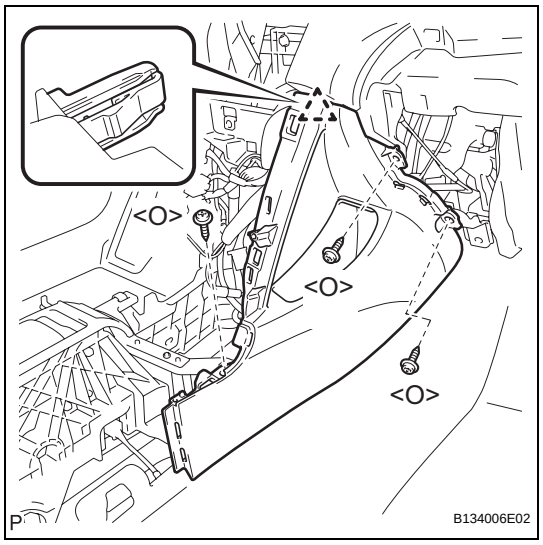
13. INSTALL FRONT PILLAR GARNISH RH (See page IR-52)



14. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made)

(a) Engage the clip.

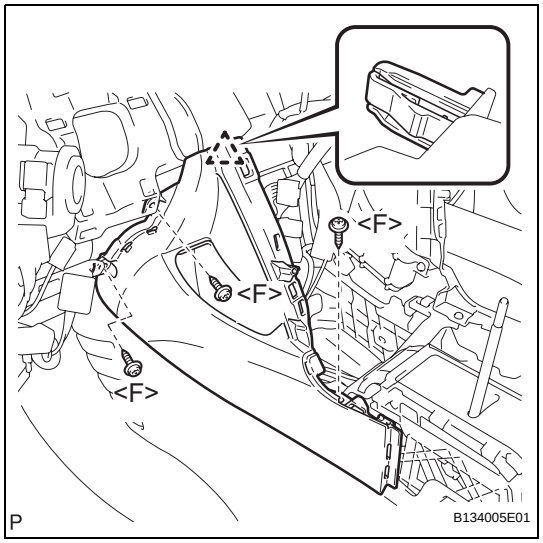
(b) Install the No. 1 console box insert front with the 3 screws <F>.



15. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made)

(a) Engage the clip.

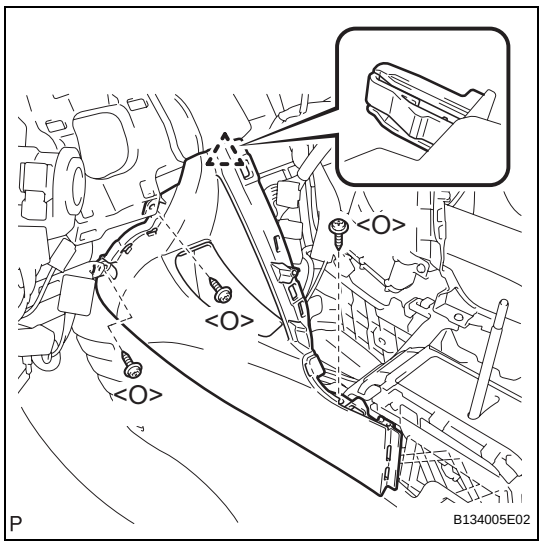
(b) Install the No. 1 console box insert front with the 3 screws <O>.



16. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made)

(a) Engage the clip.

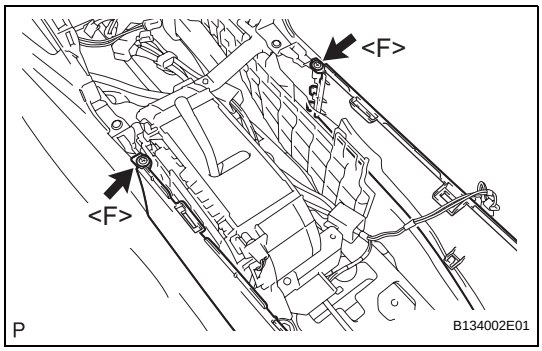
(b) Install the No. 2 console box insert front with the 3 screws <F>.



17. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made)

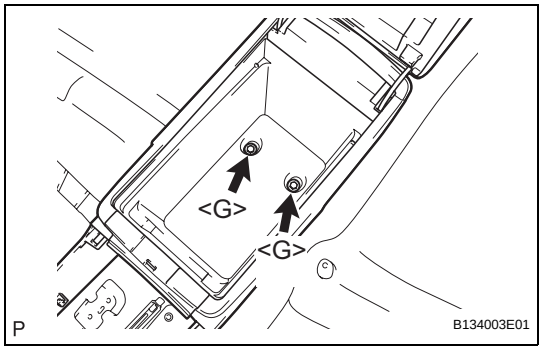
(a) Engage the clip.

(b) Install the No. 2 console box insert front with the 3 screws <O>.

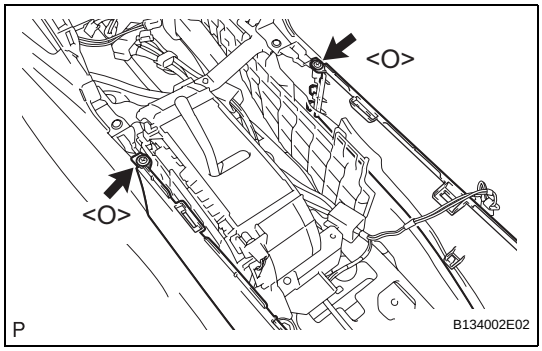


18. INSTALL CONSOLE BOX ASSEMBLY (for TMC Made)

(a) Install the 2 screws <F>.

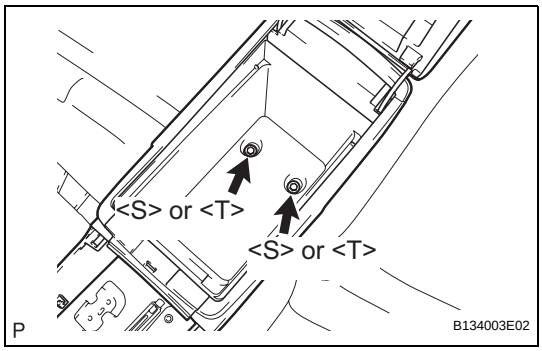


(b) Install the console box assembly with the 2 bolts <G>.

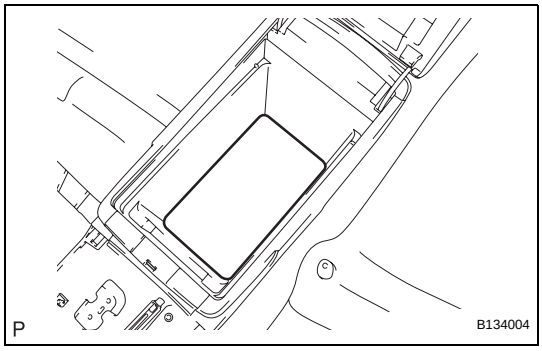


19. INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made)

(a) Install the 2 screws <O>.



(b) Install the console box assembly with the 2 bolts <S> or <T>.



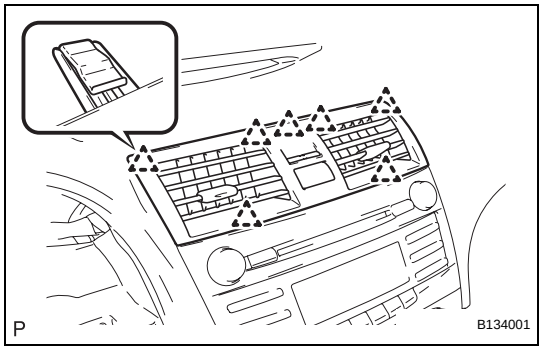
20. INSTALL CONSOLE BOX CARPET

(a) Install the console box carpet.

21. INSTALL CONSOLE BOX POCKET

(a) Install the console box pocket.

22. INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-147)



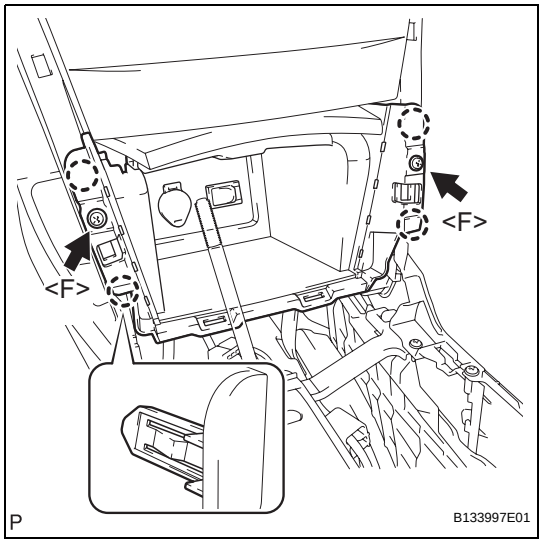
23. INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-196)

24. INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY

(a) Engage the 7 clips and install the instrument panel No. 2 register assembly.

25. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made)

(a) Connect each connector.

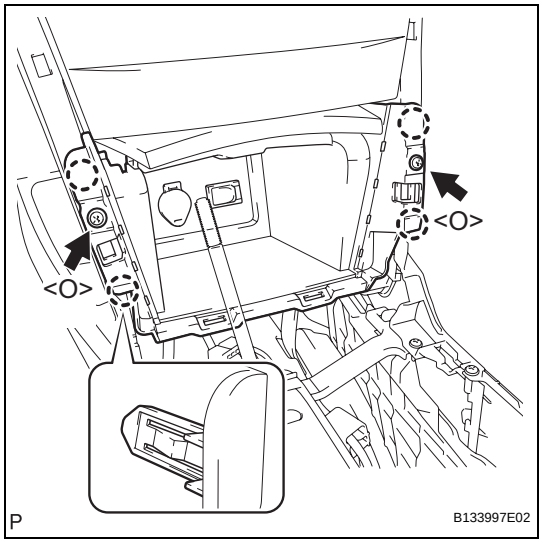


(b) Engage the 4 claws.

(c) Install the upper console panel sub-assembly with the 2 screws <F>.

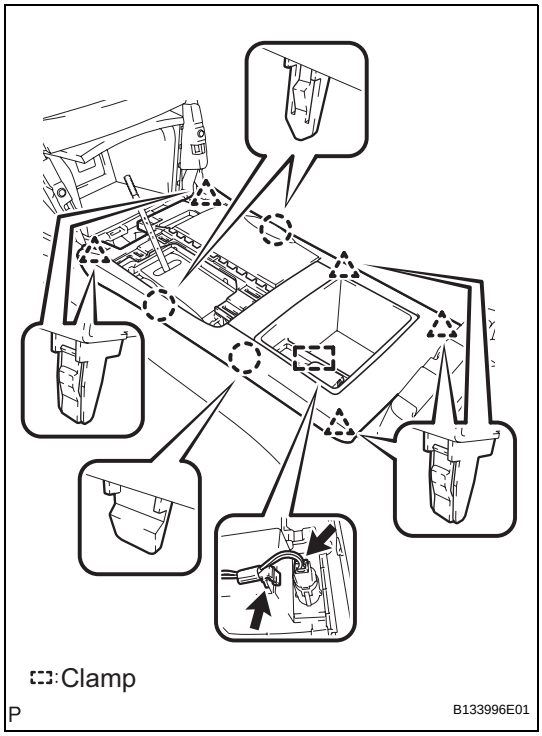
26. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made)

(a) Connect each connector.



(b) Engage the 4 claws.

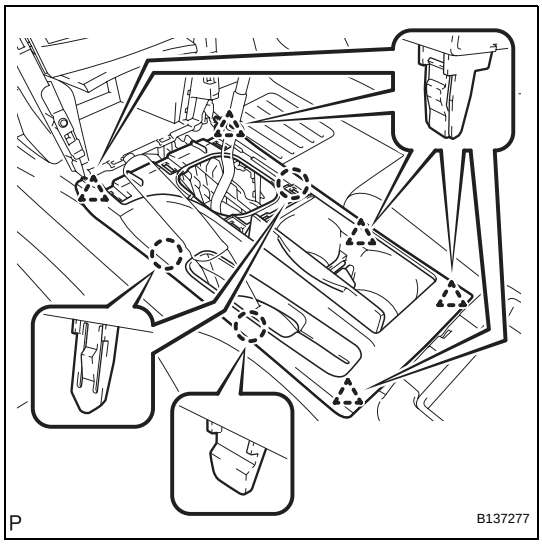
(c) Install the upper console panel sub-assembly with the 2 screws <O>.



27. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle)

(a) Connect the connector and engage the clamp.

(b) Engage the 3 claws and 5 clips to install the upper console rear panel sub-assembly.



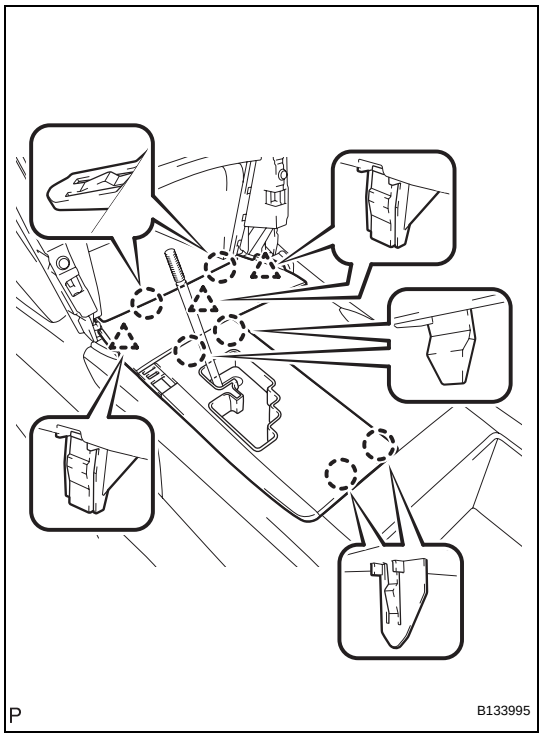
28. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle)

(a) Engage the 3 claws and 5 clips to install the upper console rear panel sub-assembly.

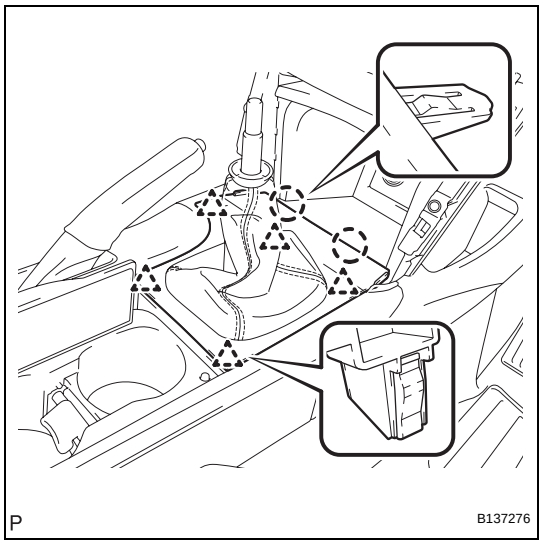
29. INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle)

(a) with Seat Heater System:

(1) Connect each connector.

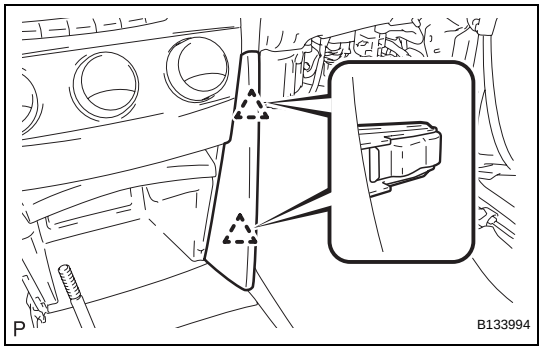


(b) Engage the 6 claws and the 3 clips to install the floor shift position indicator housing sub-assembly.



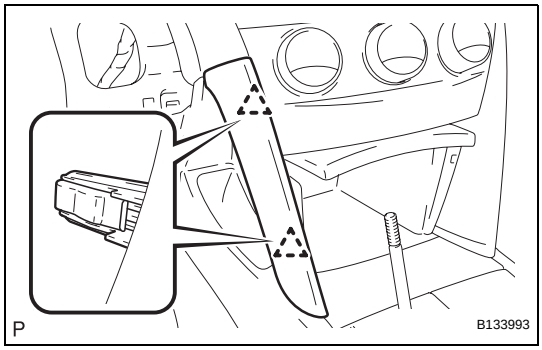
30. INSTALL UPPER CONSOLE PANEL (for Manual Transaxle)

(a) Engage the 2 claws and the 5 clips to install the upper console panel as shown in the illustration.



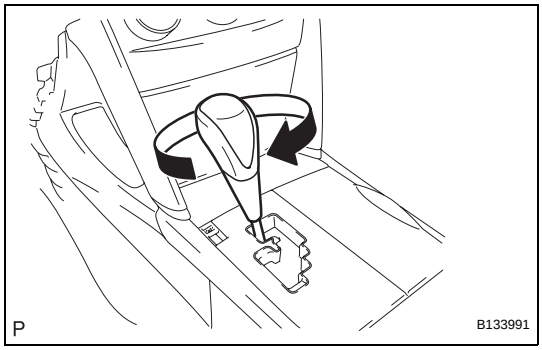
31. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Engage the 2 clips and install the No. 2 instrument cluster finish panel garnish.



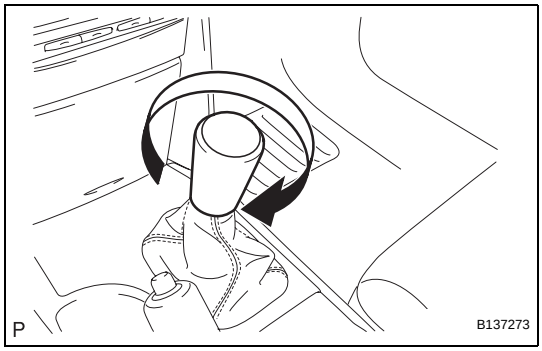
32. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Engage the 2 clips and install the No. 1 instrument cluster finish panel garnish.



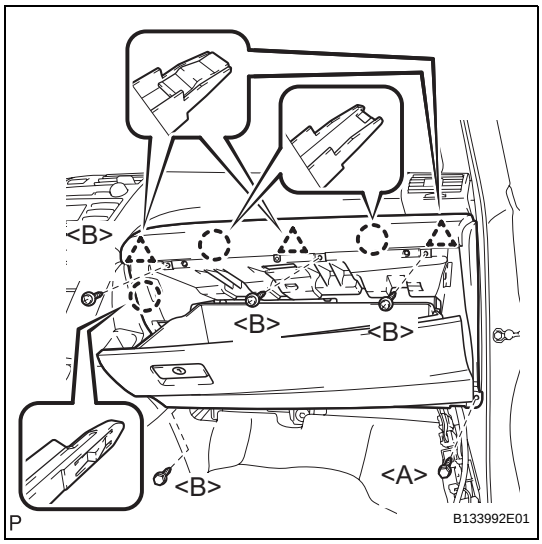
33. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle)

(a) Install the shift lever knob sub-assembly.



34. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle)

(a) Install the shift lever knob sub-assembly.

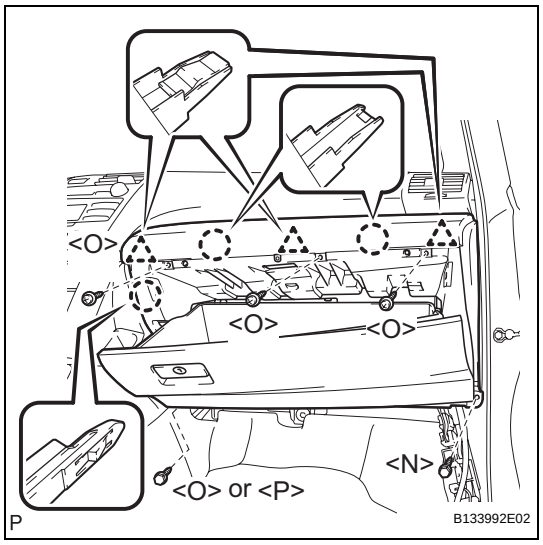


35. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made)

(a) Engage the 3 claws and 3 clips.

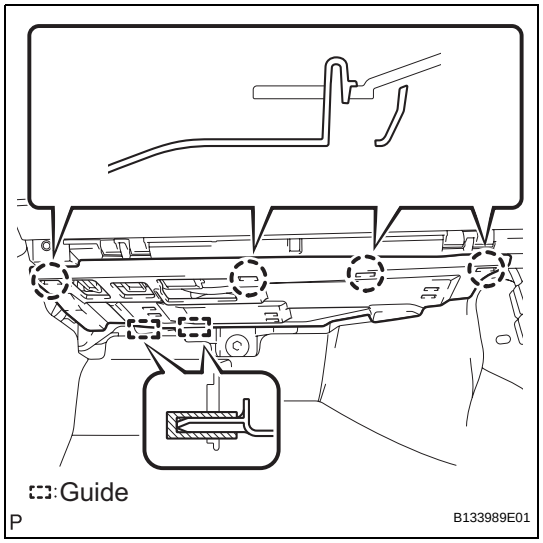
(b) Install the 4 screws <B>.

(c) Install the lower instrument panel sub-assembly with the bolt <A>.



36. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made)

(a) Engage the 3 claws and 3 clips.
(b) Install the screw <O> or <P> and 3 screws <O>.
(c) Install the lower instrument panel sub-assembly with the bolt <N>.

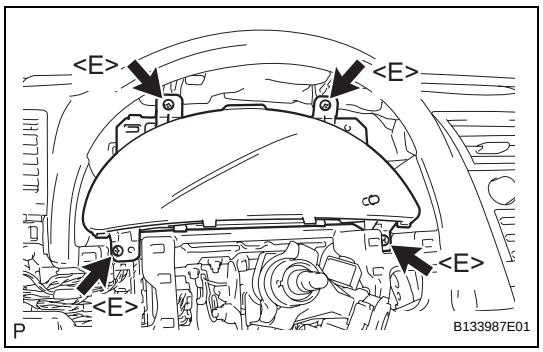


37. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY

(a) Engage the 4 claws and 2 guides and install the instrument panel No. 2 under cover.

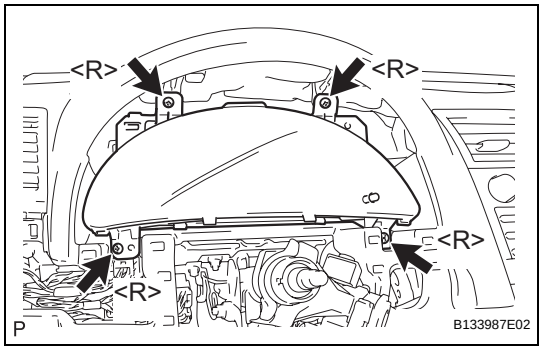
38. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)

39. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)



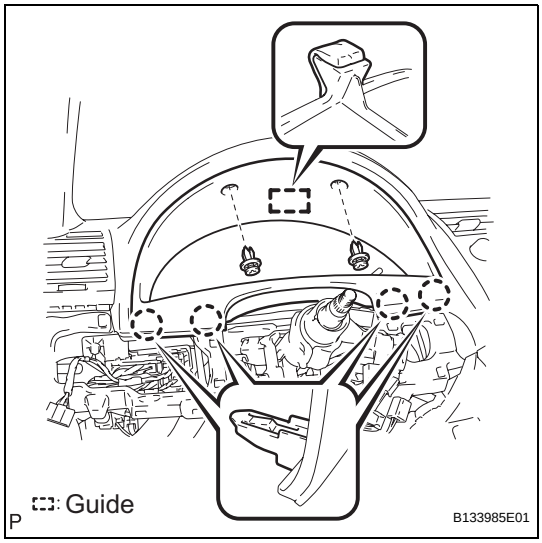
40. INSTALL COMBINATION METER ASSEMBLY (for TMC Made)

(a) Connect each connector.
(b) Install the combination meter assembly with the 4 screws <E>.



41. INSTALL COMBINATION METER ASSEMBLY (for TMMK Made)

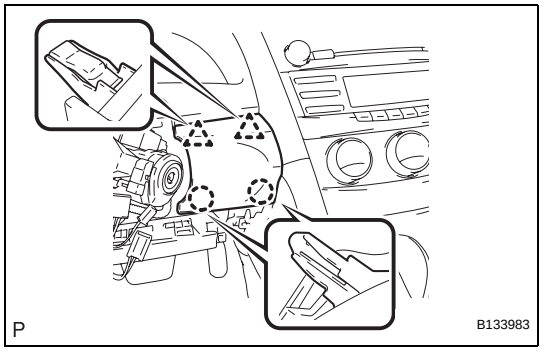
(a) Connect each connector.
(b) Install the combination meter assembly with the 4 screws <R>.



42. INSTALL INSTRUMENT CLUSTER FINISH PANEL

(a) Engage the guide and the 4 claws.

(b) Install the instrument cluster finish panel with the 2 clips.

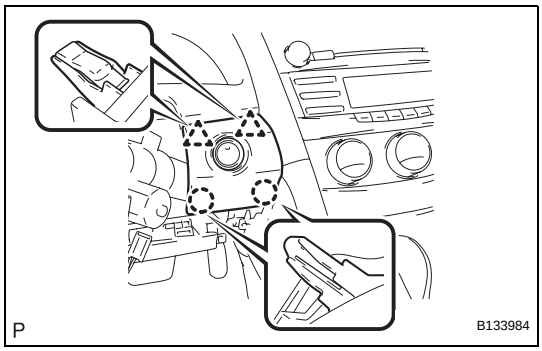


43. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System)

(a) Engage the 2 claws and 2 clips to install the lower instrument panel finish panel.

44. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System)

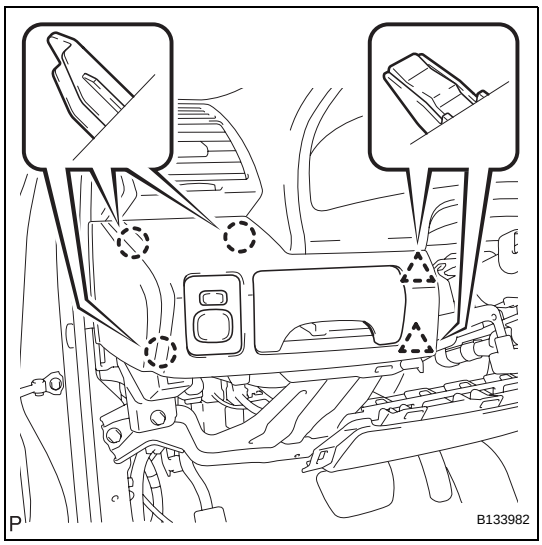
(a) Connect the connector.



(b) Engage the 2 claws and 2 clips to install the lower instrument panel finish panel.

45. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY

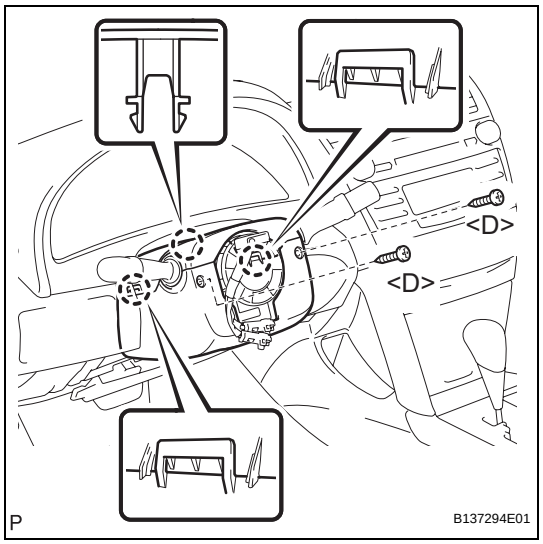
(a) Connect the connector.



(b) Engage the 3 claws and 2 clips to install the No. 1 instrument panel sub-assembly.

46. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-50)

47. ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)



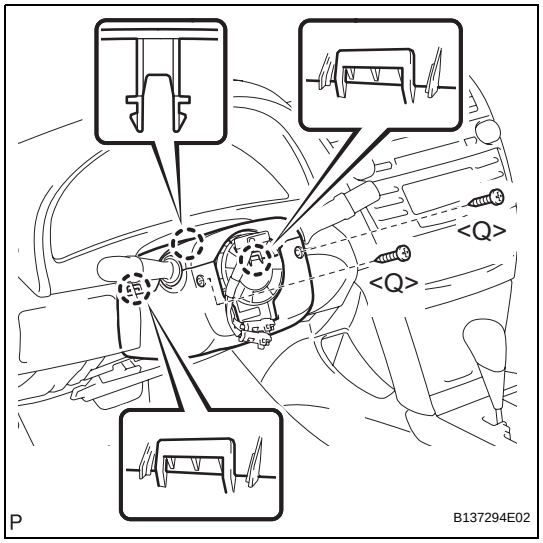
48. INSTALL STEERING COLUMN COVER (for TMC Made)

(a) Engage the claw and install the upper steering column cover.

(b) Engage the 2 claws and install the lower steering column cover.

(c) Install the steering column cover with the 2 screws <D>.

Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)



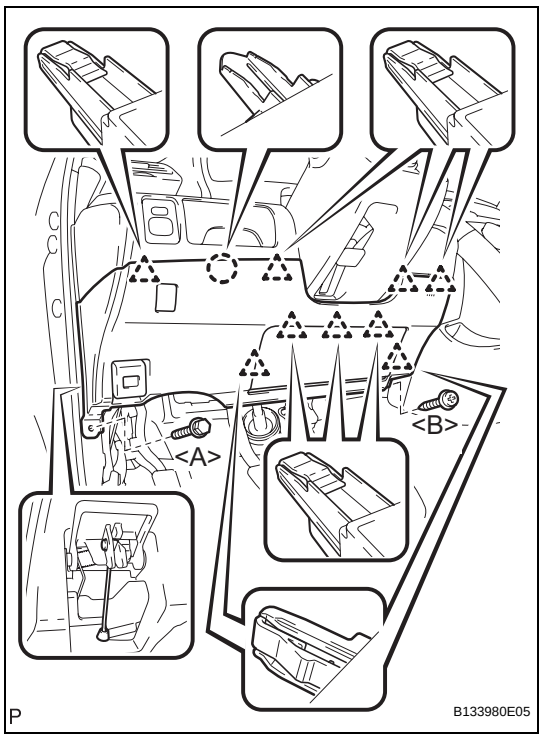
49. INSTALL STEERING COLUMN COVER (for TMMK Made)

(a) Engage the claw and install the upper steering column cover.

(b) Engage the 2 claws and install the lower steering column cover.

(c) Install the steering column cover with the 2 screws <Q>.

Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)



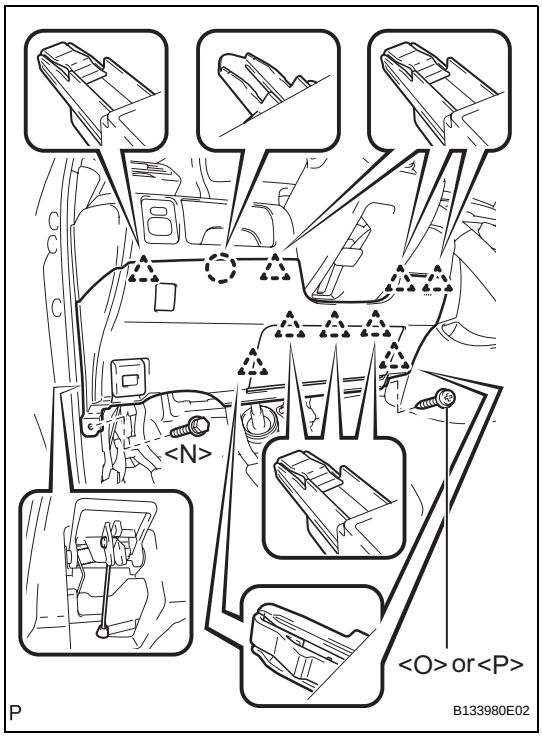
50. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made)

(a) Install the air hose and connect the connector.

(b) Engage the claw and the 9 clips.

(c) Instal the instrument panel finish panel LH with the screw <B> and bolt <A>.

IP



51. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made)
(a) Install the air hose and connect the connector.
(b) Engage the claw and the 9 clips.
(c) Instal the instrument panel finish panel LH with the screw <O> or <P> and bolt <N>.

52. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)

53. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)

54. INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)

55. INSTALL STEERING PAD (See page RS-350)

56. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)

57. INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)

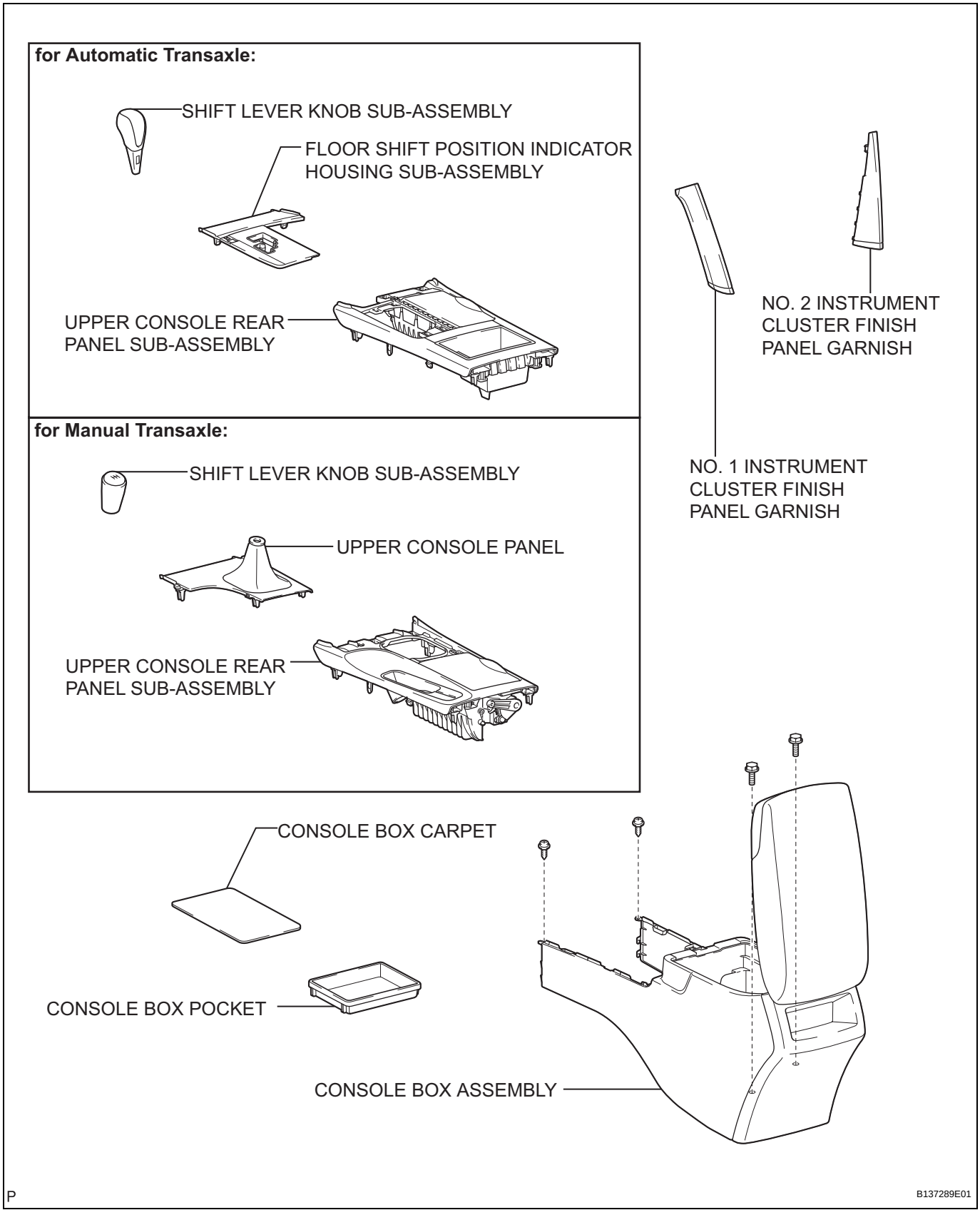
58. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

59. INSPECT STEERING PAD (See page RS-352)

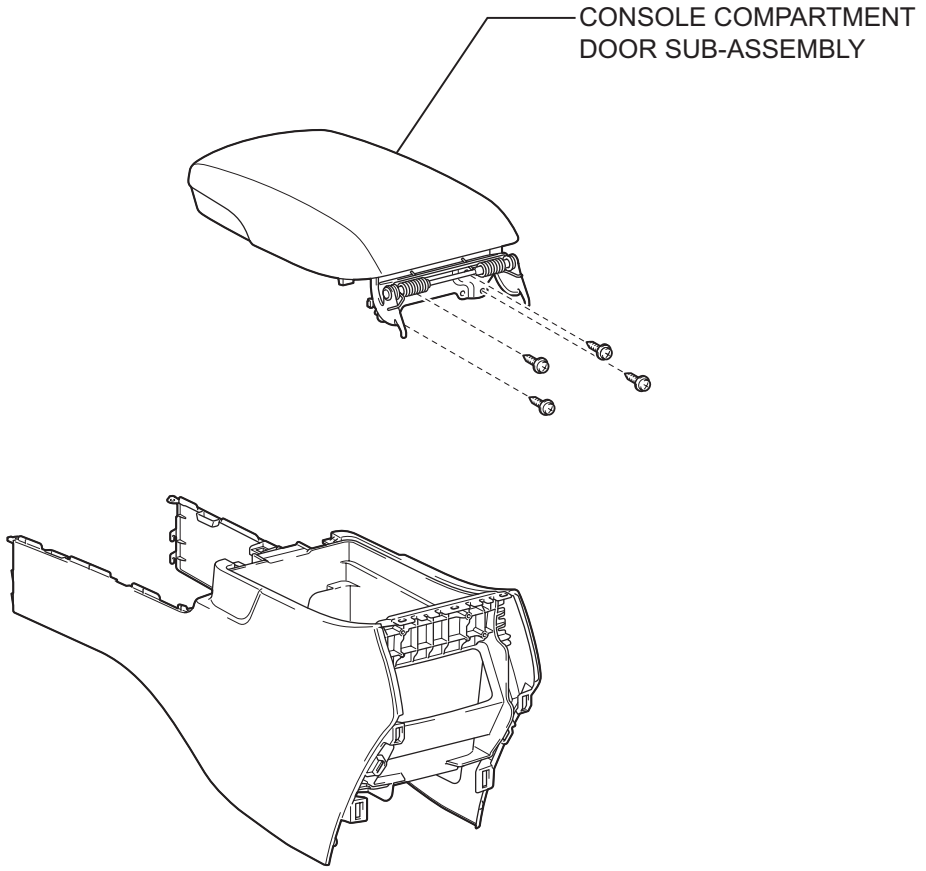
60. INSPECT SRS WARNING LIGHT
(RS-32)

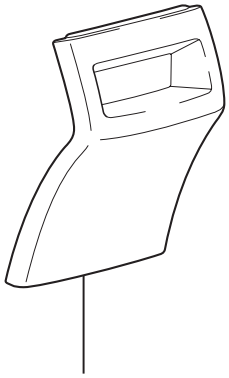
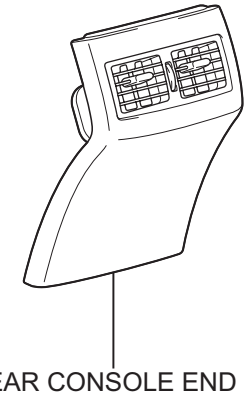
REAR CONSOLE BOX

COMPONENTS



IP



for Manual Air Conditioning System:	for Automatic Air Conditioning System:
	
REAR CONSOLE END PANEL SUB-ASSEMBLY	REAR CONSOLE END PANEL SUB-ASSEMBLY

P

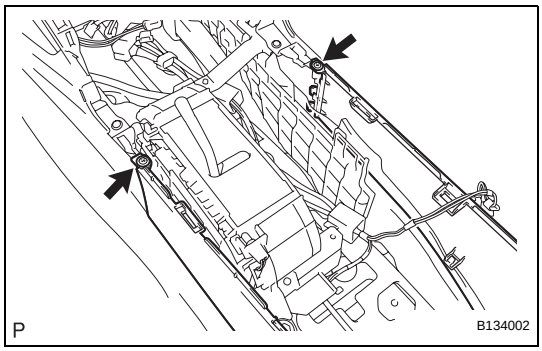
B137290E01

IP

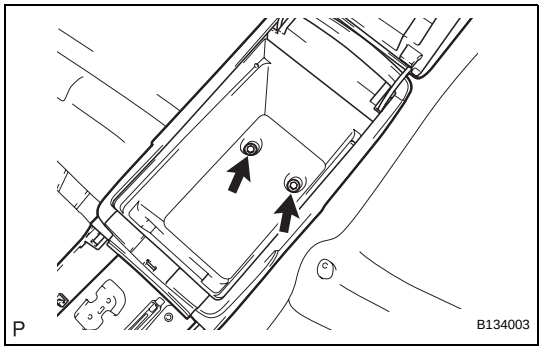
REMOVAL

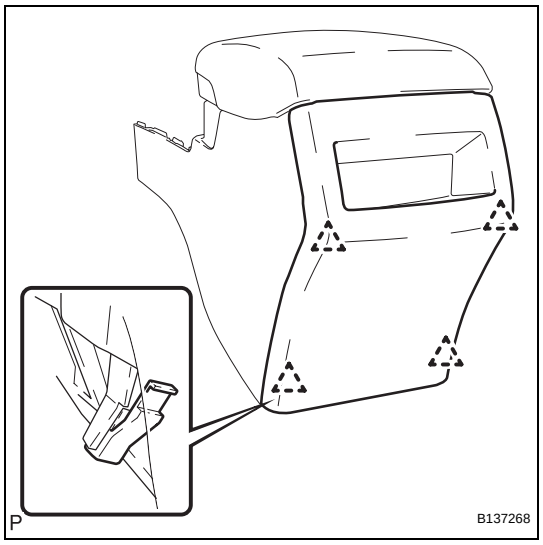
1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
3. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
4. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
5. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
6. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
7. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
8. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
9. **REMOVE CONSOLE BOX POCKET (See page IP-28)**
10. **REMOVE CONSOLE BOX CARPET (See page IP-28)**
11. **REMOVE CONSOLE BOX ASSEMBLY**

(a) Remove the 2 screws.



(b) Remove the 2 bolts and the console box assembly.

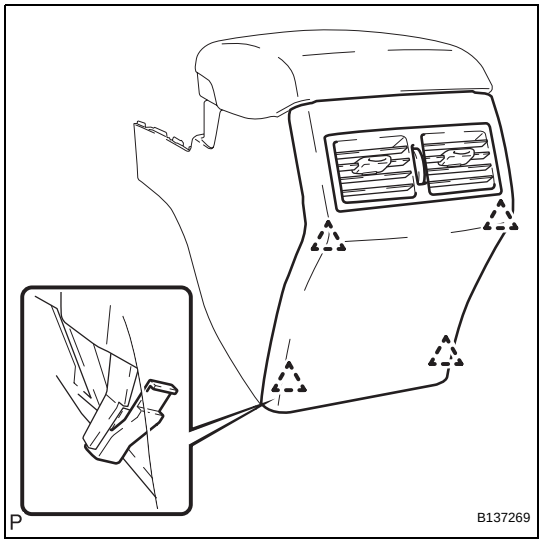




DISASSEMBLY

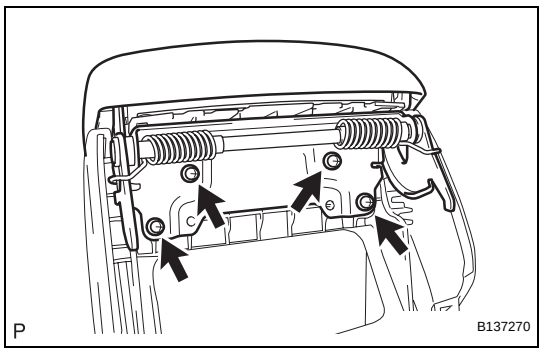
1. REMOVE REAR CONSOLE END PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)

(a) Disengage the 4 clips and remove the rear console end panel sub-assembly.



2. REMOVE REAR CONSOLE END PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)

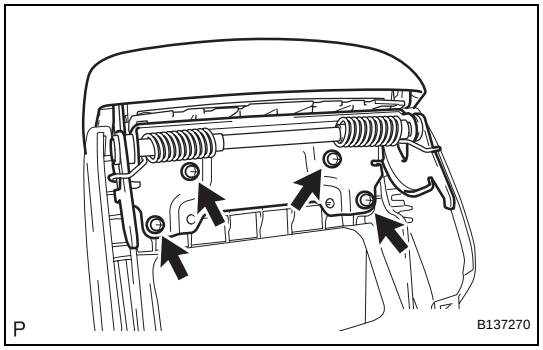
(a) Disengage the 4 clips and remove the rear console end panel sub-assembly.



3. REMOVE CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY

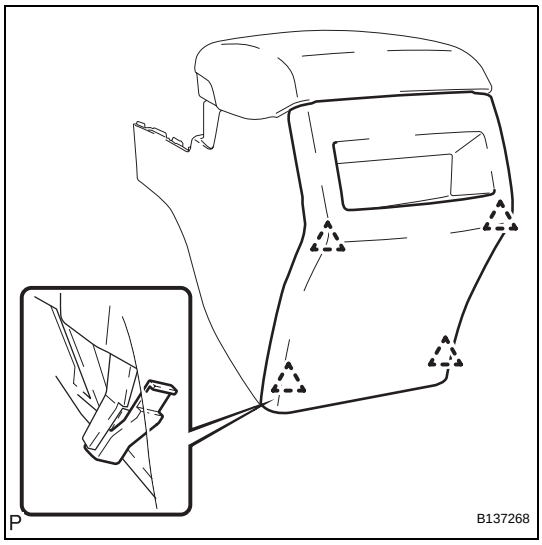
(a) Remove the 4 screws and the console compartment door sub-assembly.

REASSEMBLY

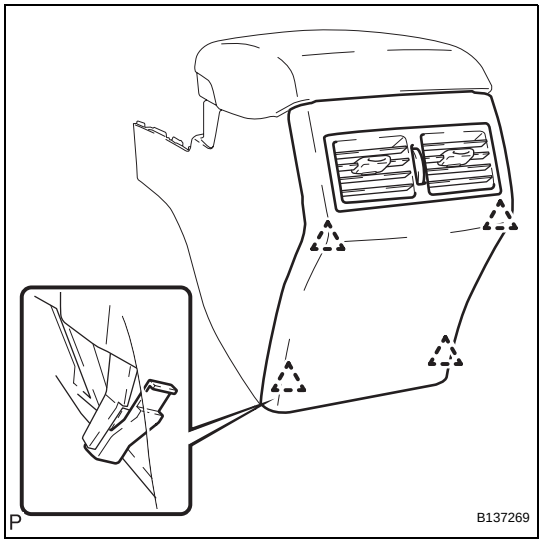


1. INSTALL CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY

(a) Install the console compartment door sub-assembly with the 4 screws.

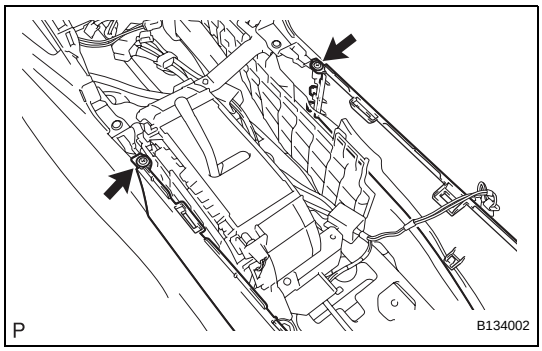


2. **INSTALL REAR CONSOLE END PANEL SUB-ASSEMBLY (for Manual Air Conditioning System)**
   (a) Engage the 4 clips and install the rear console end panel sub-assembly.

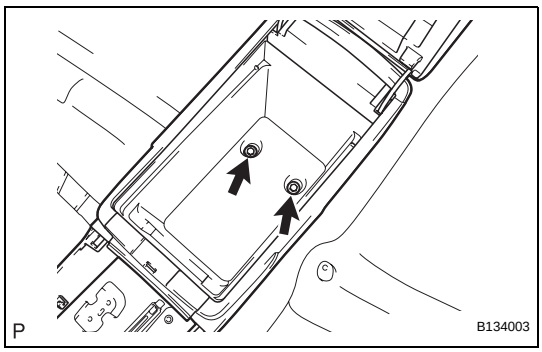


3. **INSTALL REAR CONSOLE END PANEL SUB-ASSEMBLY (for Automatic Air Conditioning System)**
   (a) Engage the 4 clips and install the rear console end panel sub-assembly.

INSTALLATION



1. **INSTALL CONSOLE BOX ASSEMBLY**
   (a) Install the 2 screws.



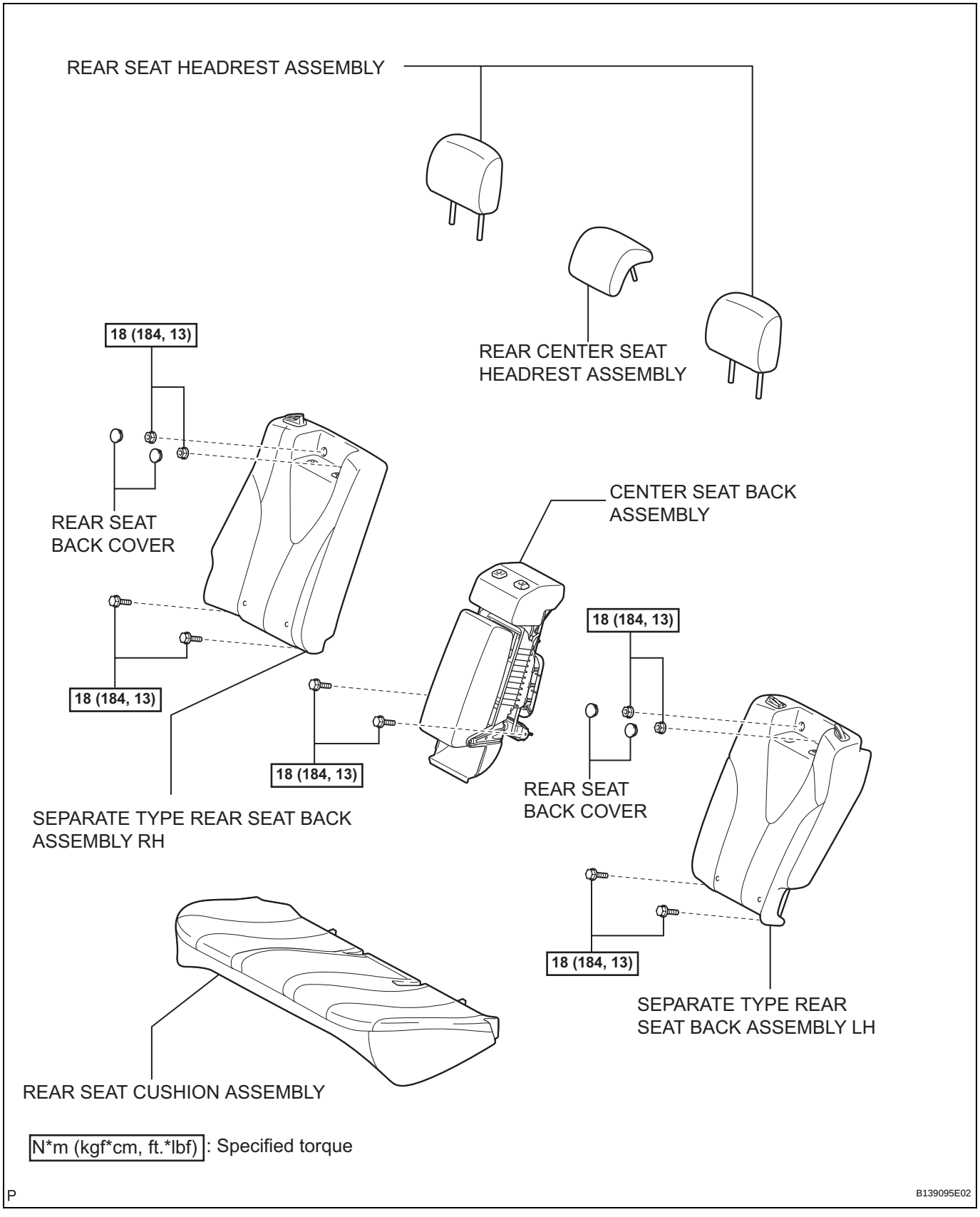
   (b) Install the console box assembly with the 2 bolts.

2. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
3. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
4. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
5. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**

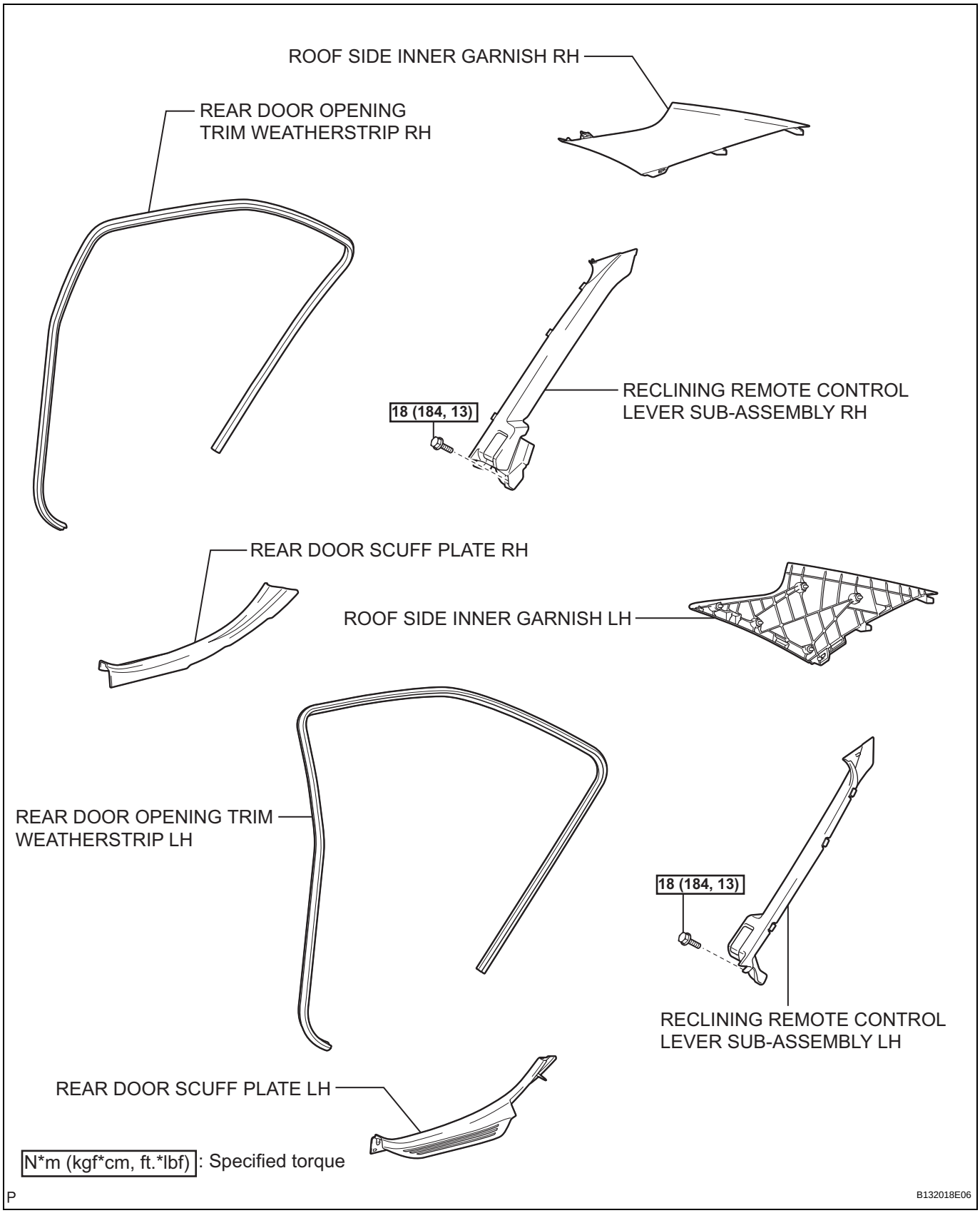
6. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
7. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
8. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
9. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
10. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
11. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**

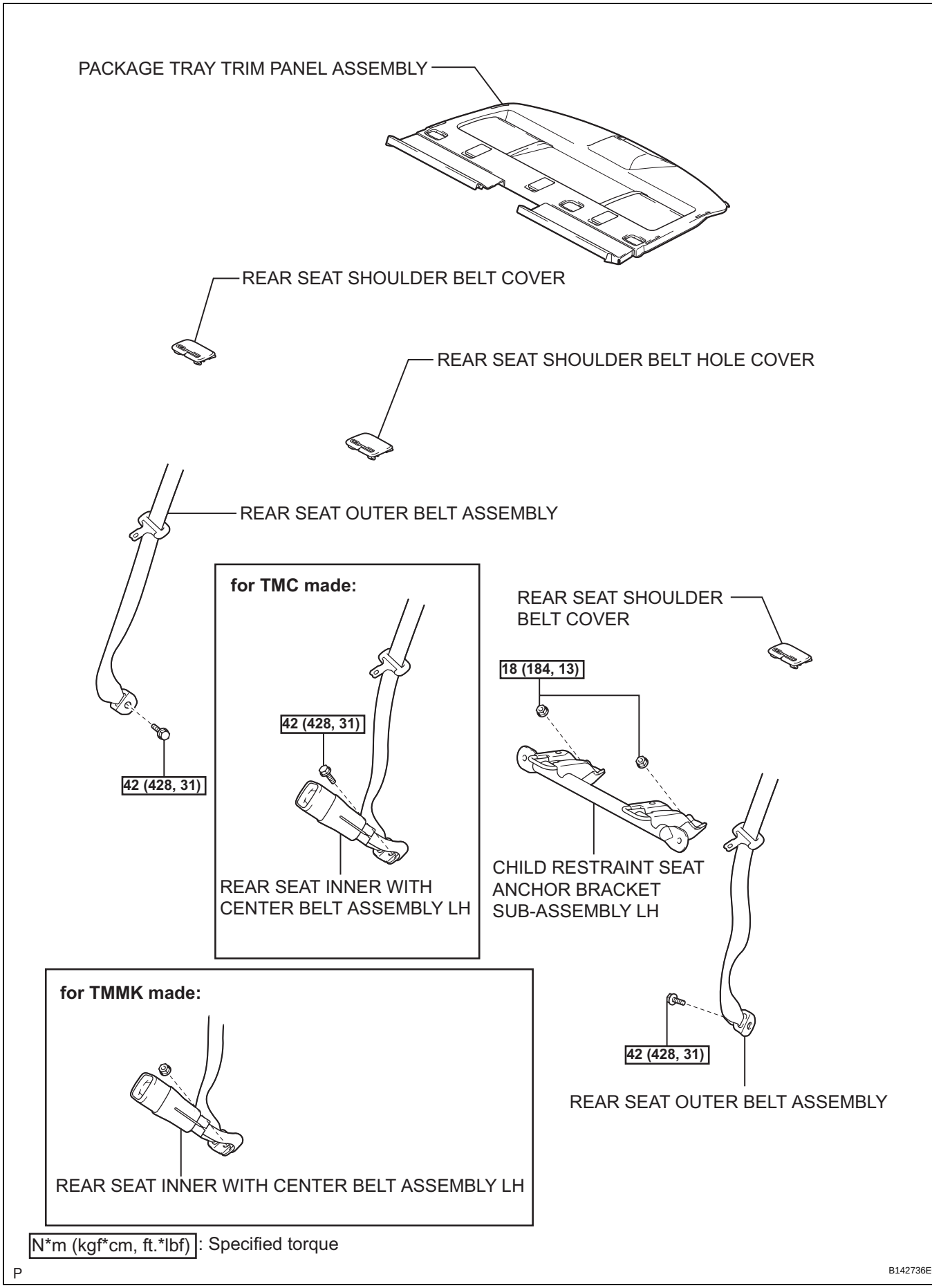
REAR SUNSHADE ASSEMBLY

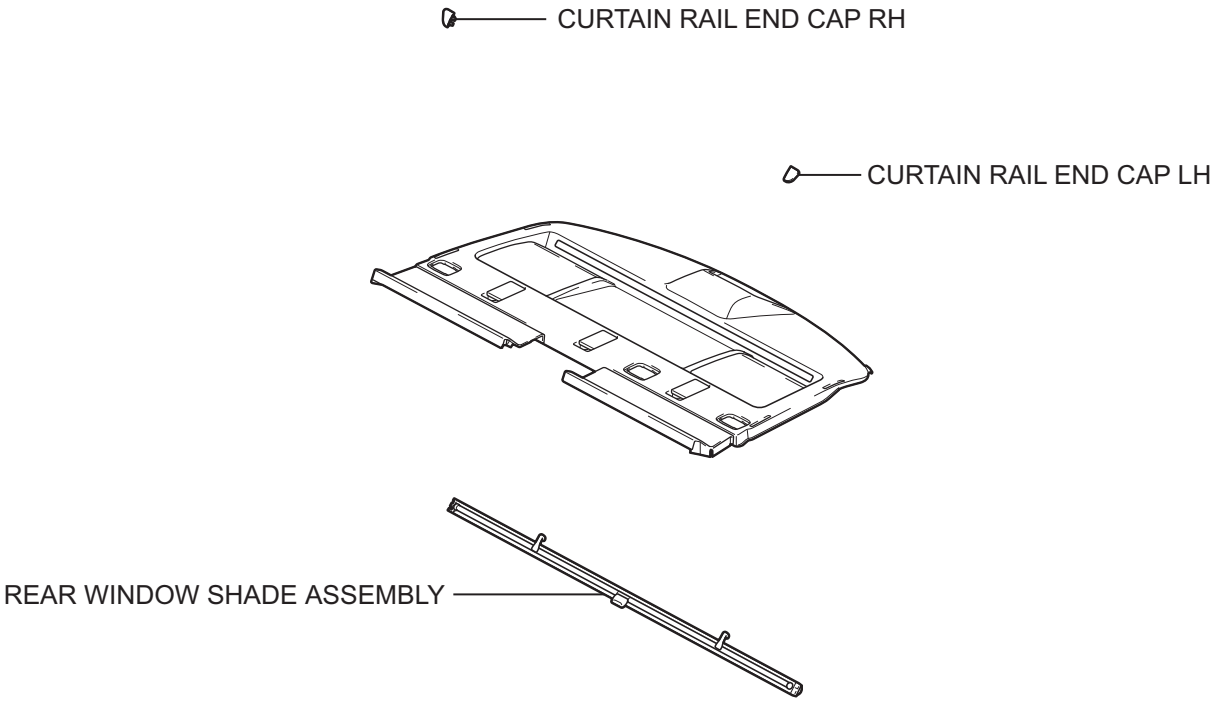
COMPONENTS



IR


ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR SCUFF PLATE RH
ROOF SIDE INNER GARNISH LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132018E06


PACKAGE TRAY TRIM PANEL ASSEMBLY
REAR SEAT SHOULDER BELT COVER
REAR SEAT SHOULDER BELT HOLE COVER
REAR SEAT OUTER BELT ASSEMBLY
42 (428, 31)
for TMC made:
42 (428, 31)
REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH
REAR SEAT SHOULDER BELT COVER
18 (184, 13)
CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH
42 (428, 31)
REAR SEAT OUTER BELT ASSEMBLY
for TMMK made:
REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH
N*m (kgf*cm, ft.*lbf) : Specified torque
P
B142736E01


CURTAIN RAIL END CAP RH
CURTAIN RAIL END CAP LH
REAR WINDOW SHADE ASSEMBLY
P
B132127E01

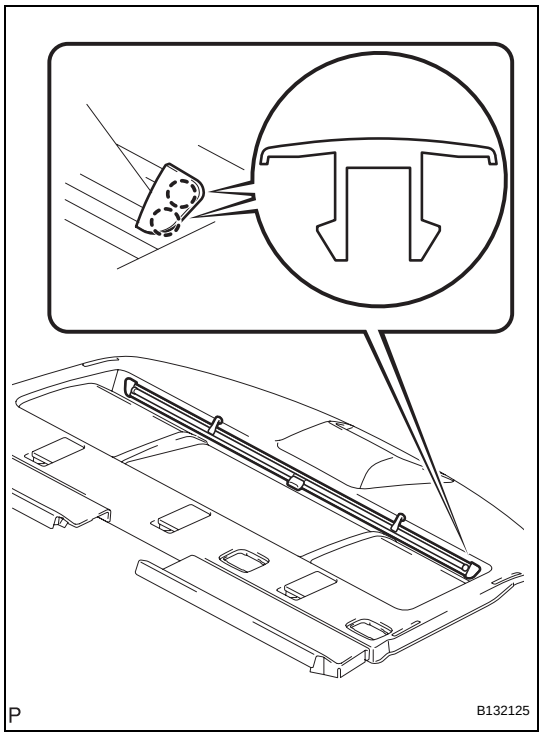
REMOVAL

1. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-62)**
2. **REMOVE REAR SEAT HEADREST ASSEMBLY**
3. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
4. **REMOVE REAR SEAT BACK COVER (See page SE-63)**
5. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (See page SE-63)**
6. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (See page SE-64)**
7. **REMOVE CENTER SEAT BACK ASSEMBLY (See page SE-64)**
8. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)**
9. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH**
10. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)**
11. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH**
12. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (See page SE-68)**
13. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH**
    HINT:
    Use the same procedures for the RH side and the LH side.
14. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)**
15. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-35)**
16. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-35)**
17. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)**
18. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)**
19. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-36)**
20. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-36)**

21. REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-36)

22. REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-36)

23. REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-37)



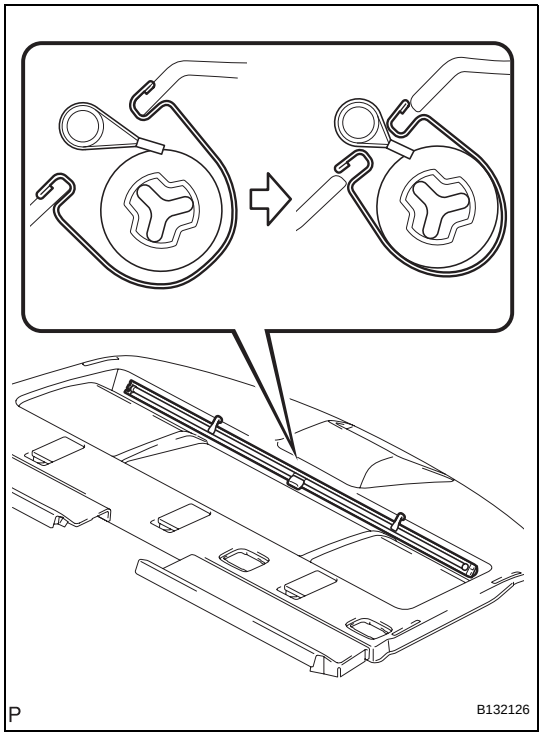
24. REMOVE CURTAIN RAIL END CAP LH

(a) Disengage the 2 claws and remove the curtain rail end cap LH.

25. REMOVE CURTAIN RAIL END CAP RH

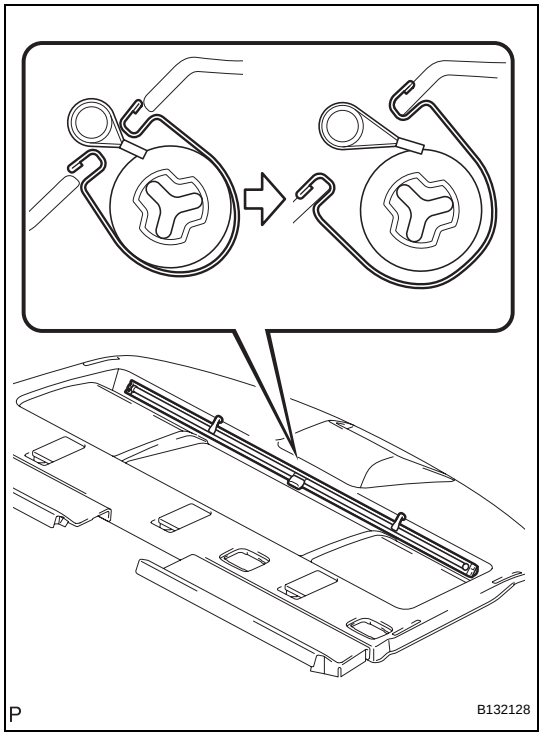
HINT:

Use the same procedures for the RH side and the LH side.



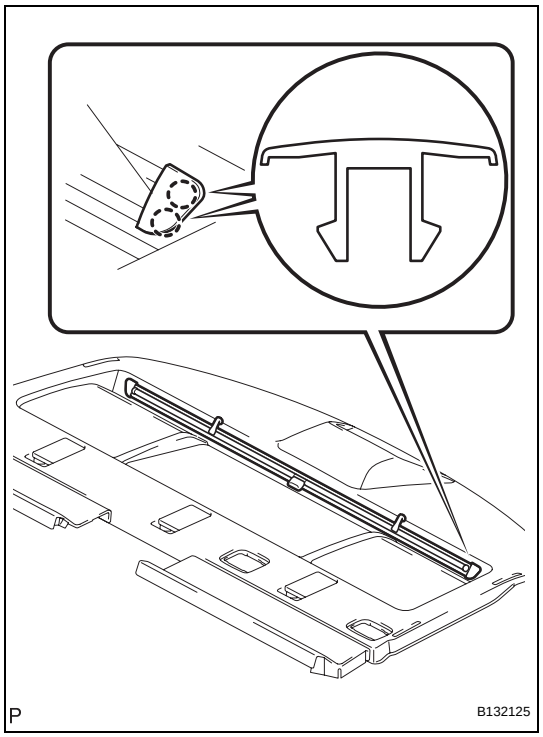
26. REMOVE REAR WINDOW SHADE ASSEMBLY

(a) Remove the rear window shade assembly as shown in the illustration.



INSTALLATION

1. **INSTALL REAR WINDOW SHADE ASSEMBLY**
   (a) Install the rear window shade assembly as shown in the illustration.



2. **INSTALL CURTAIN RAIL END CAP LH**
   (a) Engage the 2 claws and install the curtain rail end cap LH.

3. **INSTALL CURTAIN RAIL END CAP RH**
   HINT:
   Use the same procedures for the RH side and the LH side.

4. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-39)**

5. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-39)**

6. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-39)**

7. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-39)**

8. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-40)**

9. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)**

10. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)**

11. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-40)**

12. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-40)**

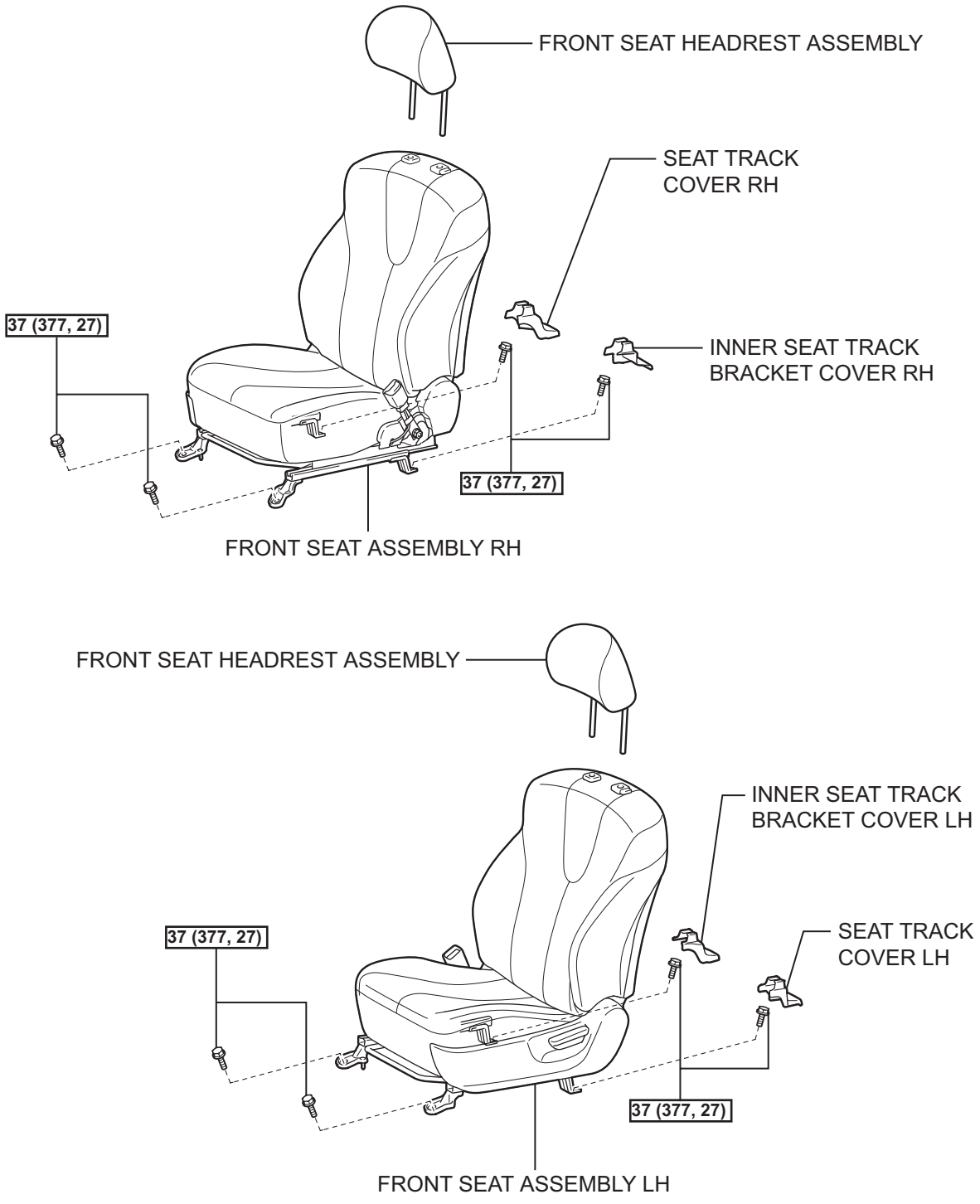
13. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)**

14. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (See page SE-69)**
15. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH**
    HINT:
    Use the same procedures for the RH side and the LH side.
16. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**
17. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**
18. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)**
19. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**
20. **INSTALL CENTER SEAT BACK ASSEMBLY (See page SE-71)**
21. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (See page SE-72)**
22. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (See page SE-71)**
23. **INSTALL REAR SEAT BACK COVER**
24. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
25. **INSTALL REAR SEAT HEADREST ASSEMBLY**
26. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-73)**

ROOF HEADLINING

COMPONENTS

for Manual Seat:



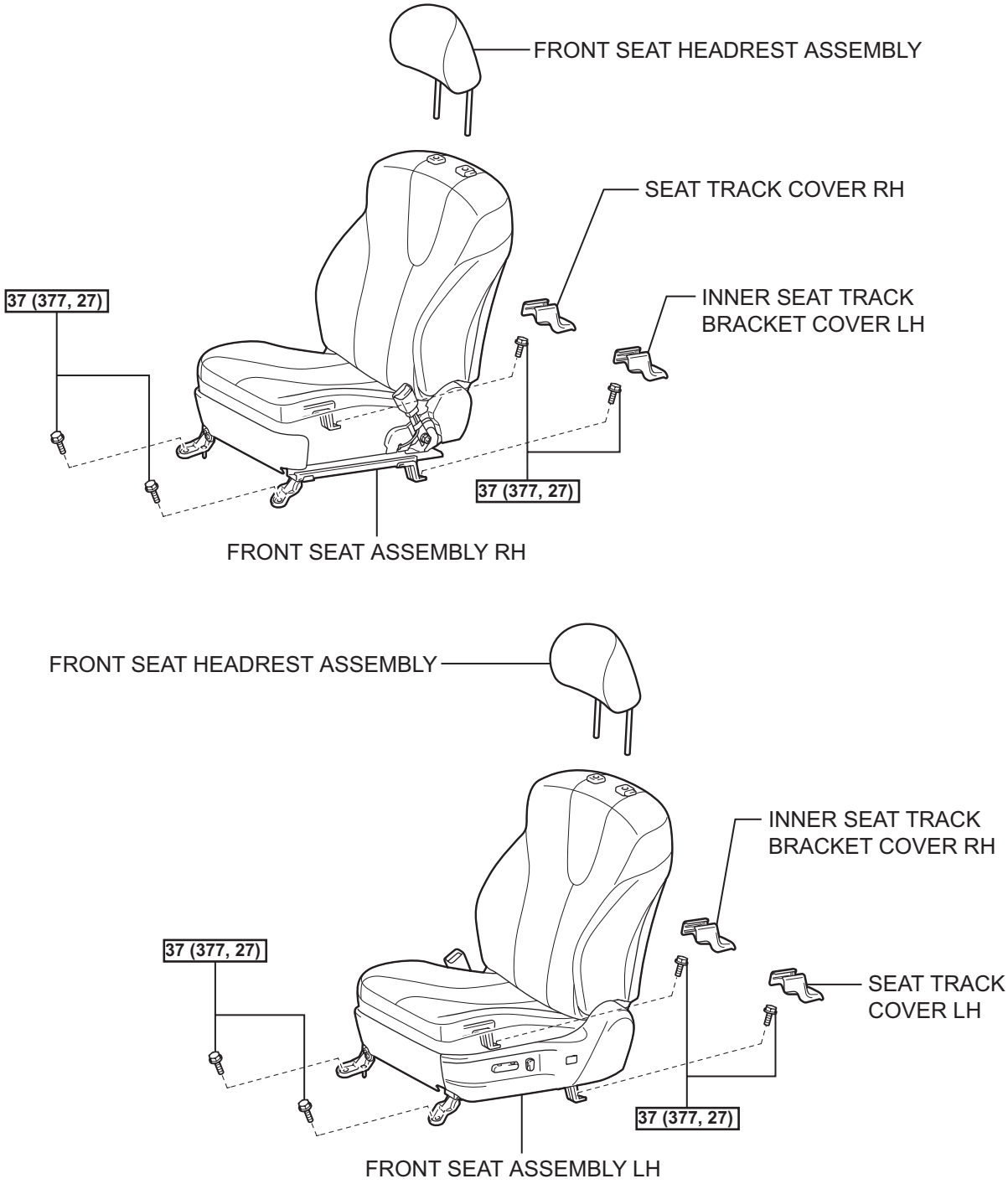
N*m (kgf*cm, ft.*lbf) : Specified torque

P

B132048E01

IR

for Power Seat:

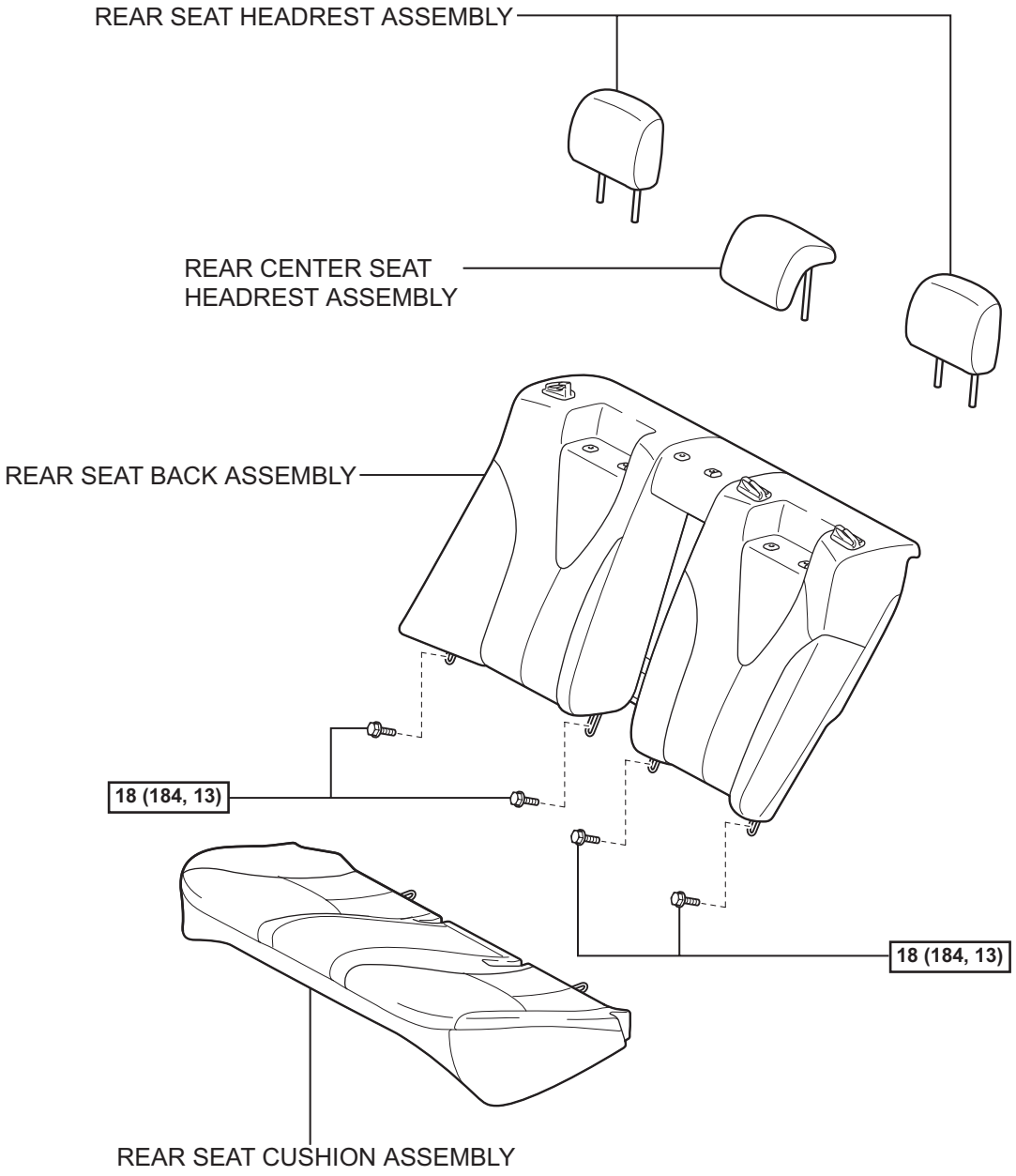


N*m (kgf*cm, ft.*lbf): Specified torque

P

B132047E01

for Fixed Seat Type:

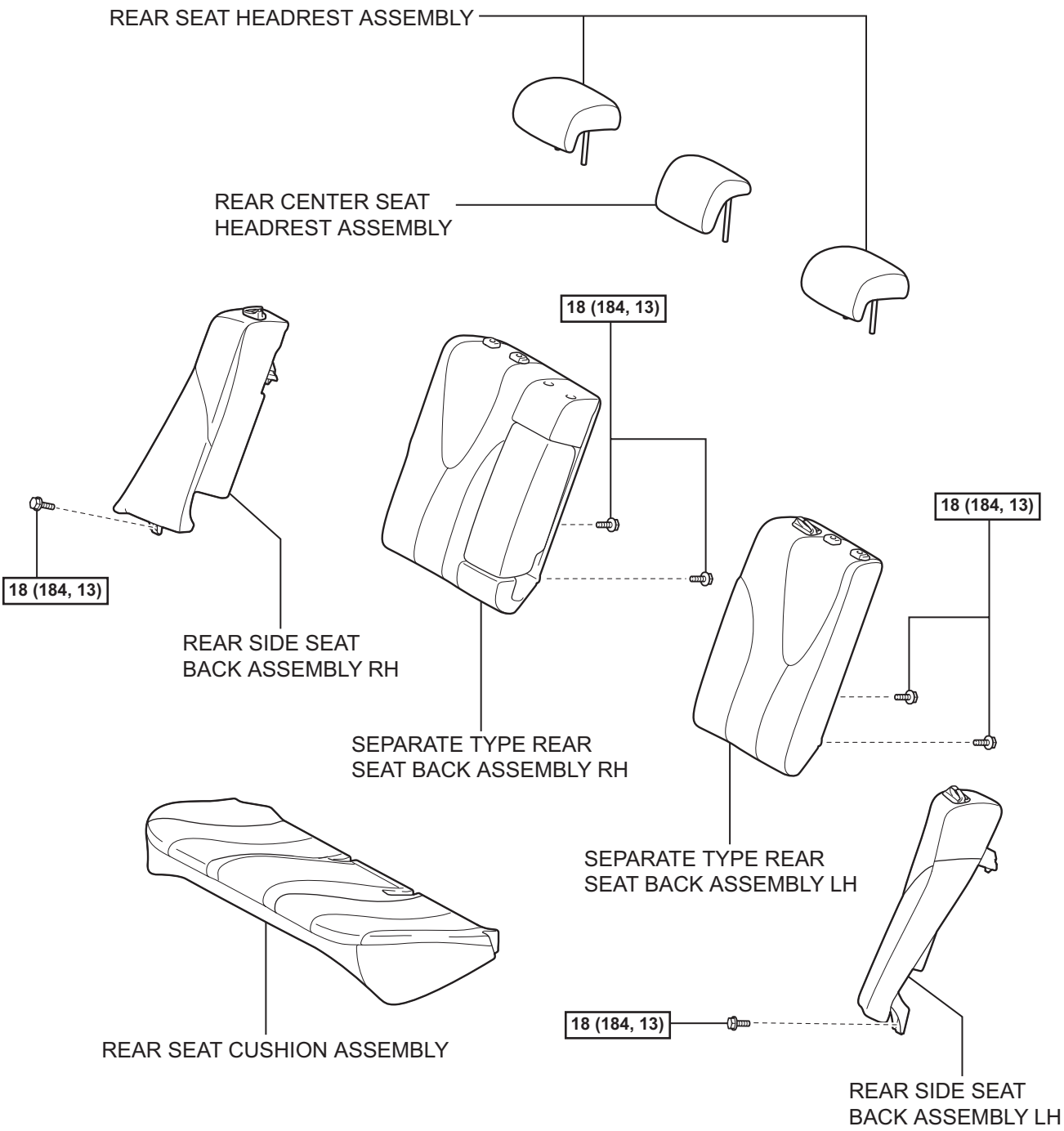


N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

for Fold Down Seat Type:

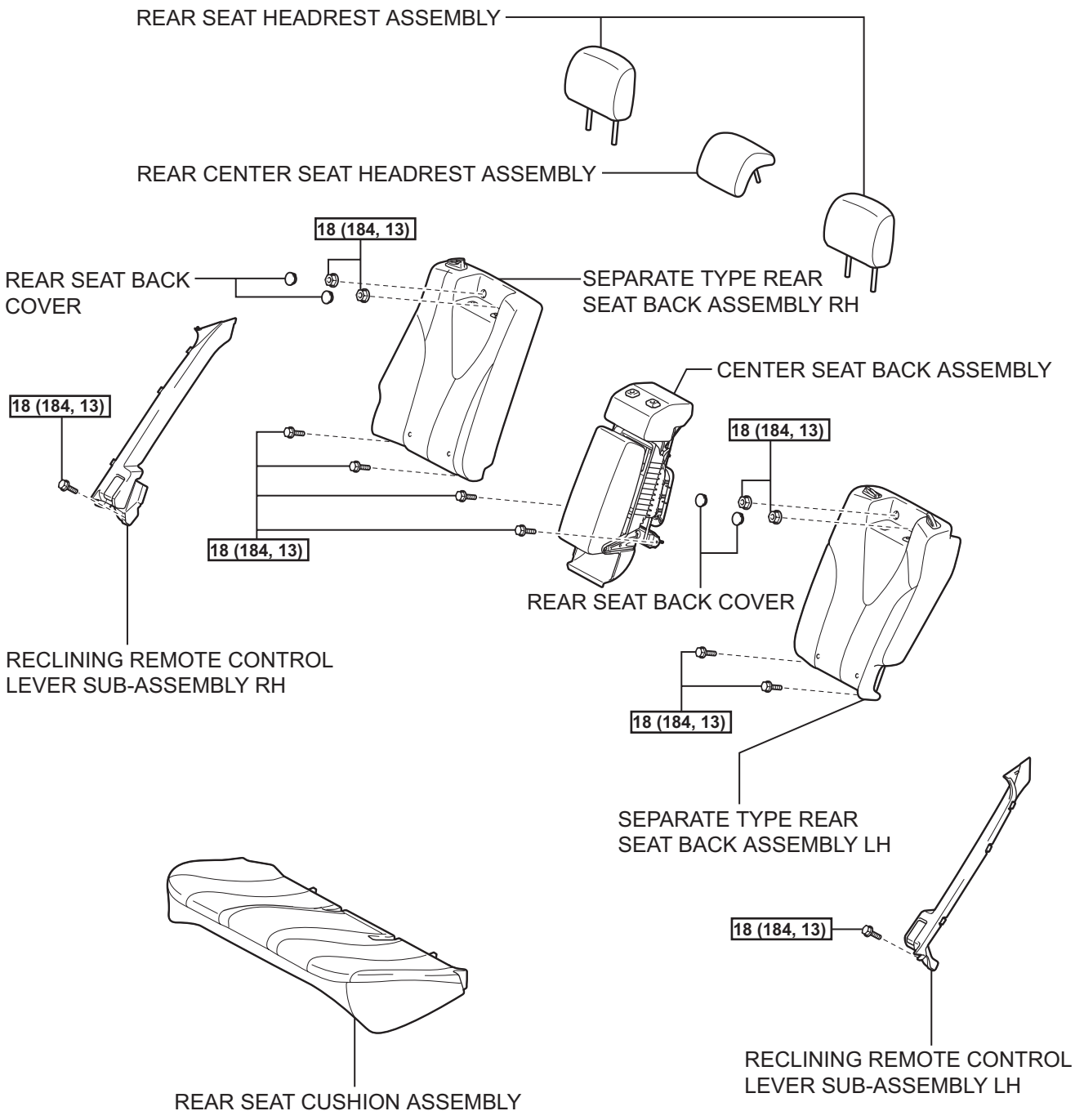


N*m (kgf*cm, ft.*lbf) : Specified torque

P

B136564E02

for Reclining Seat Type:

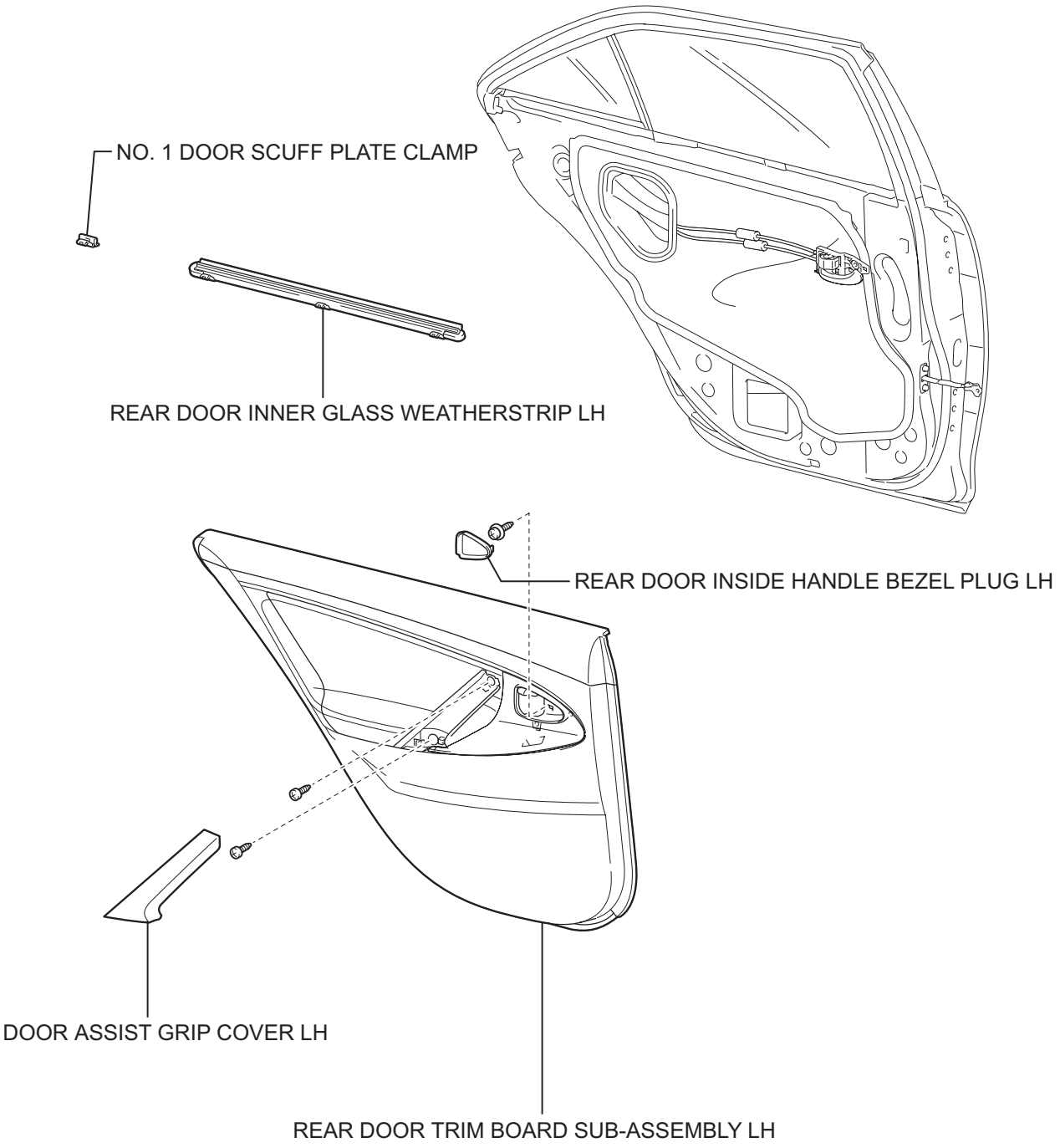


N*m (kgf*cm, ft.*lbf): Specified torque

P

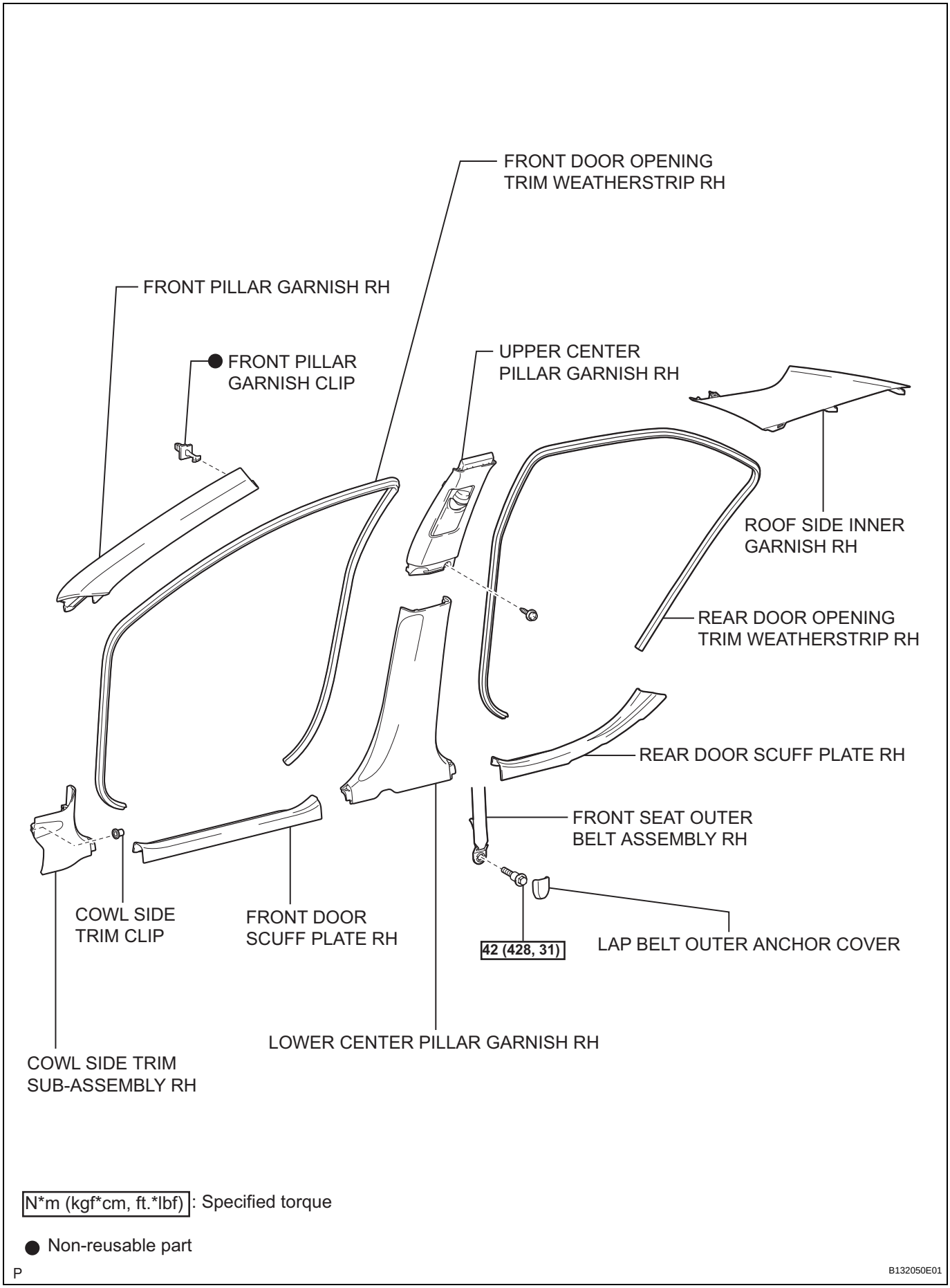
B139577E01

IR



P

B139576E01



N*m (kgf*cm, ft.*lbf): Specified torque

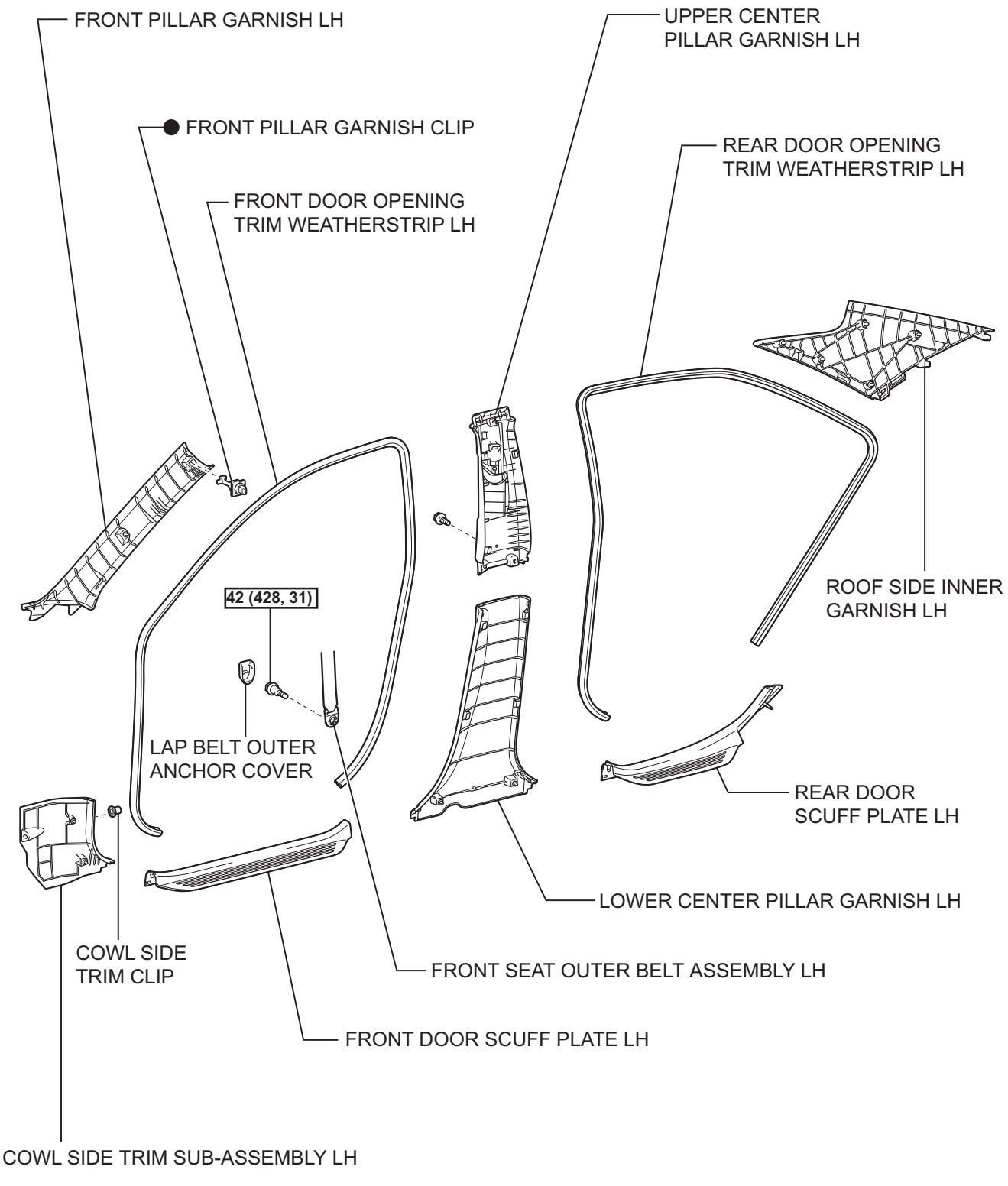
● Non-reusable part

P

B132050E01

IR

IR



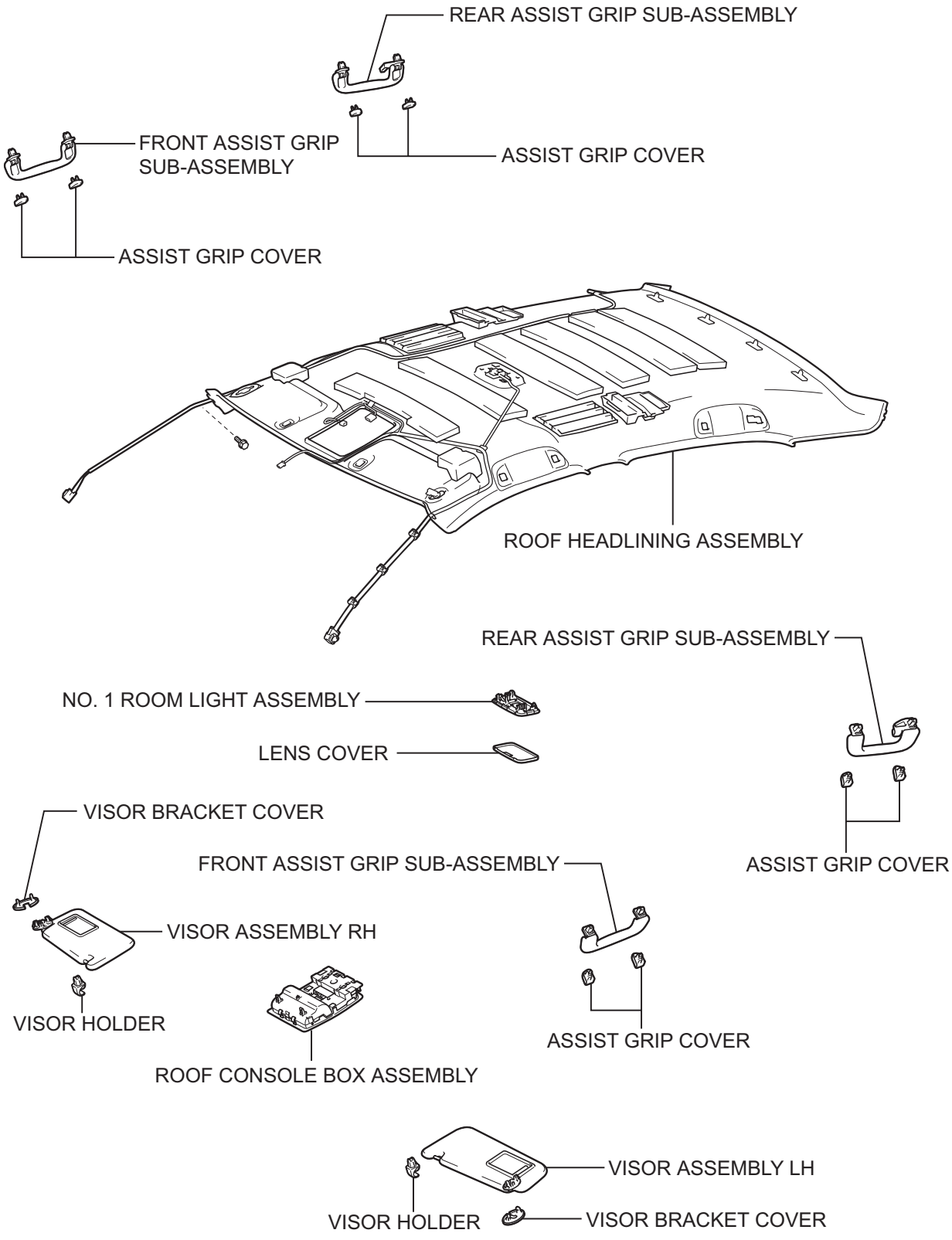
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

B132049E01

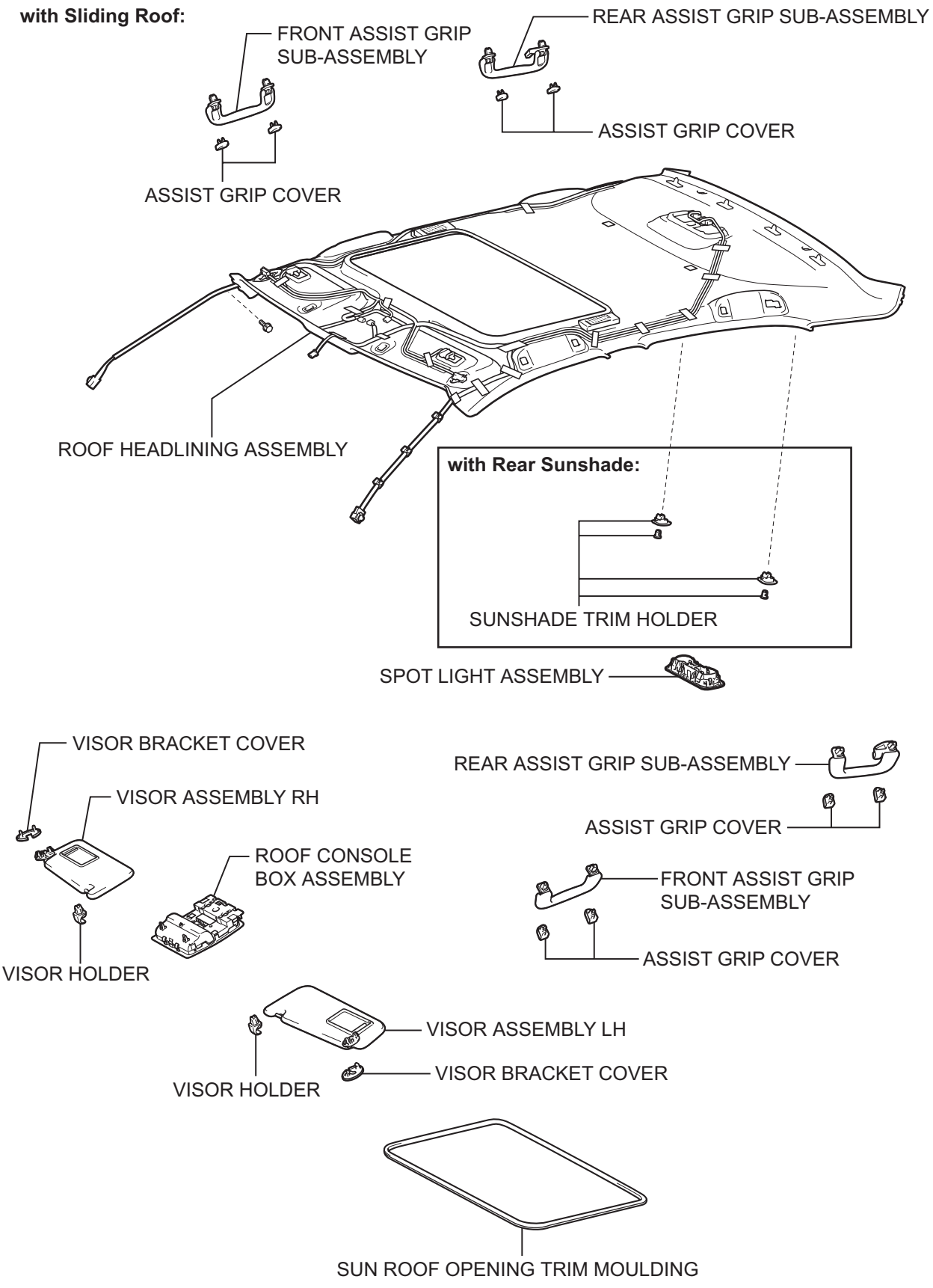
without Sliding Roof:



P

B132051E01

IR

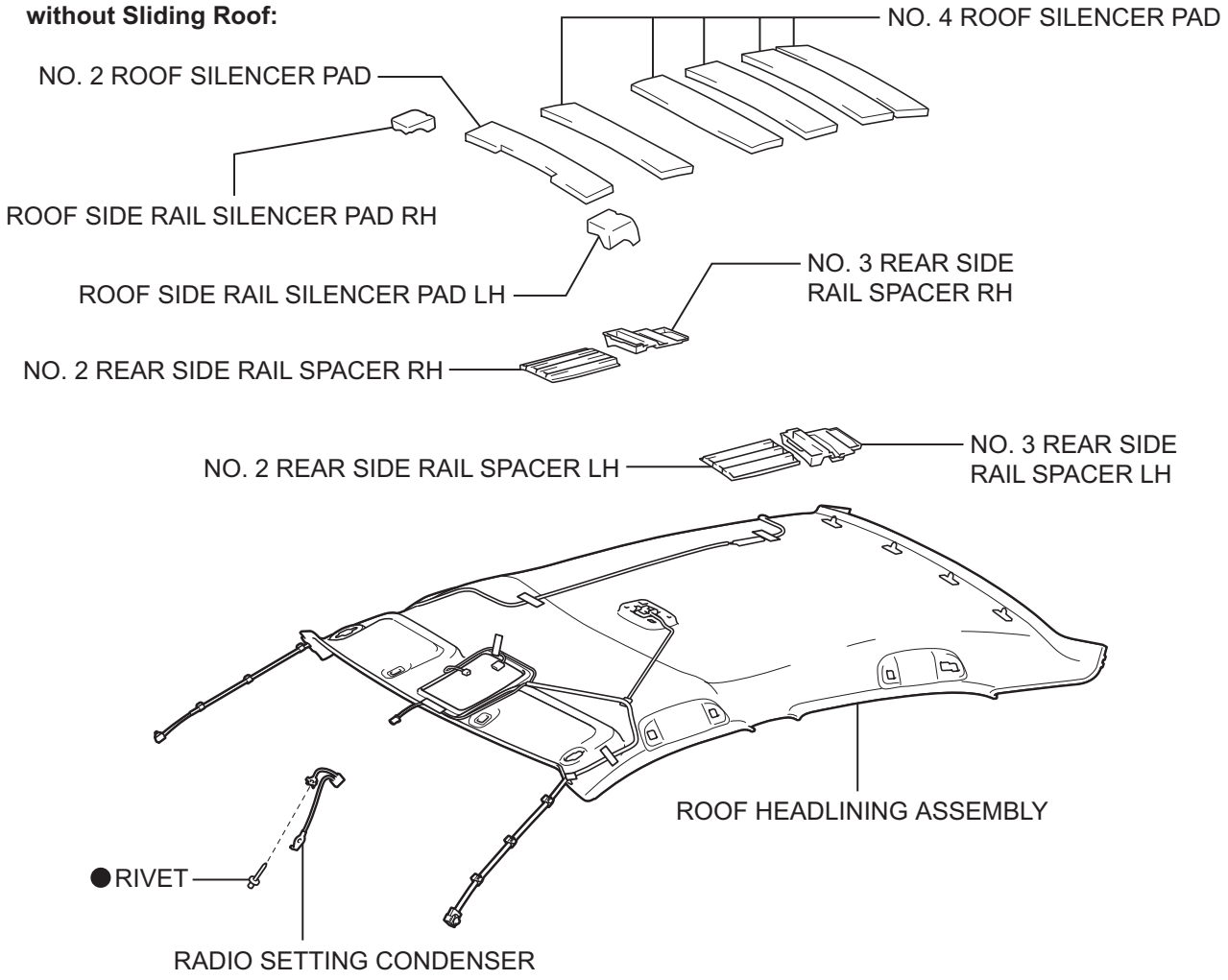


IR

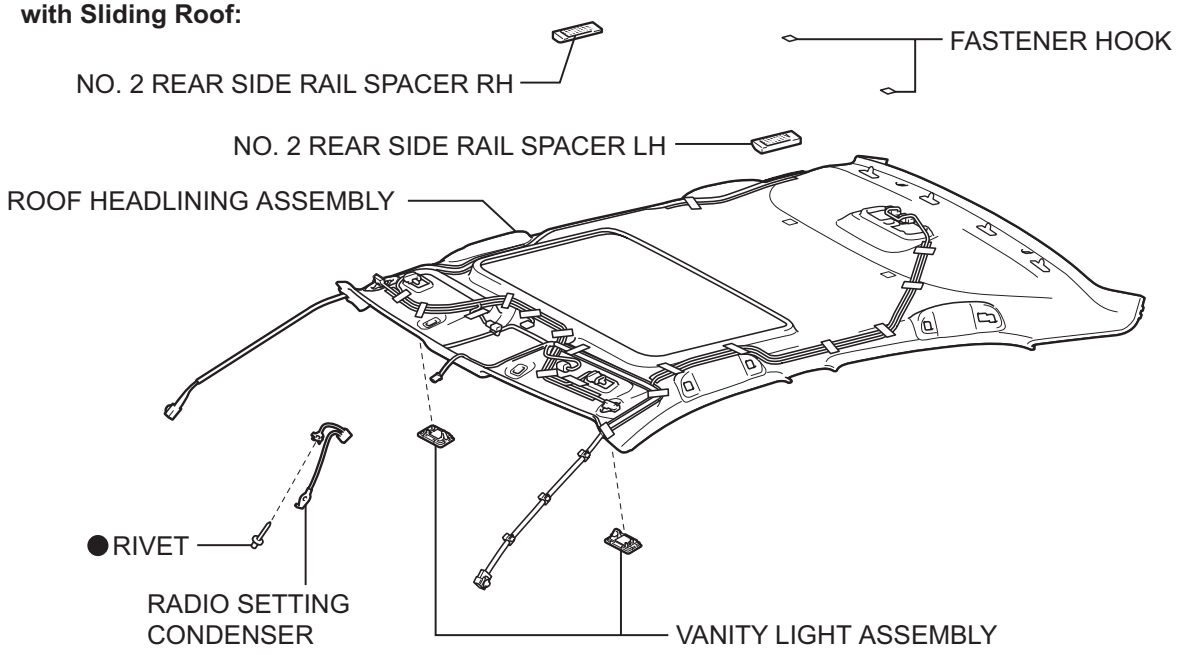
P

B132052E01

without Sliding Roof:



with Sliding Roof:



● Non-reusable part

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B132053E01

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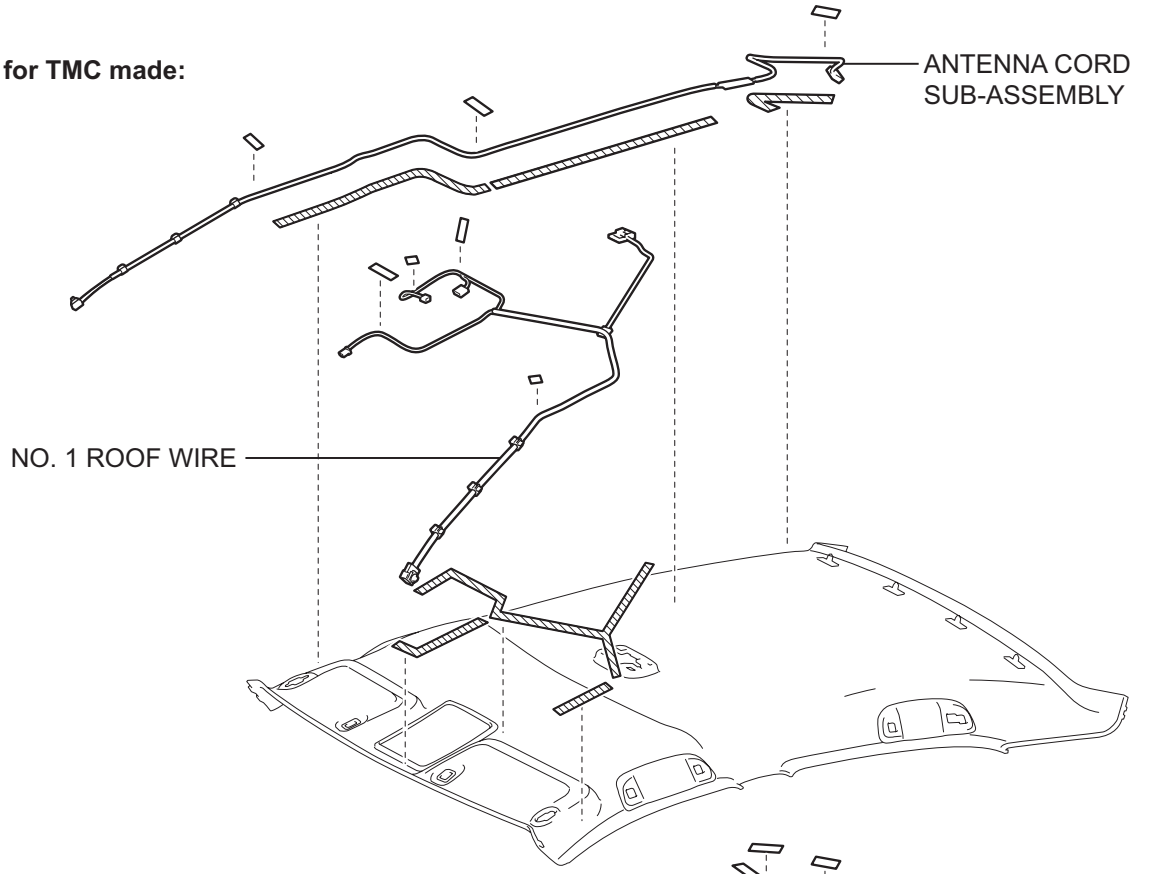
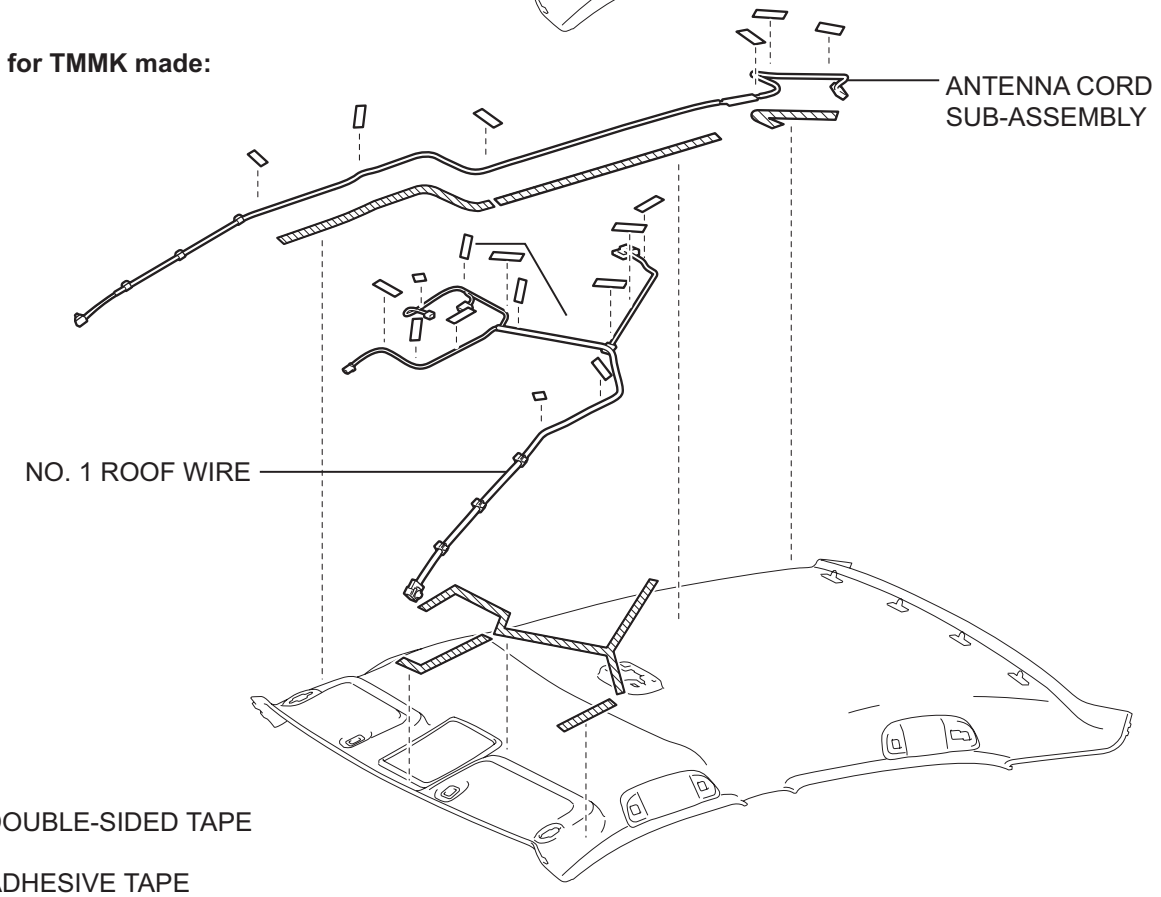
without Sliding Roof:

for TMC made:



for TMMK made:



DOUBLE-SIDED TAPE

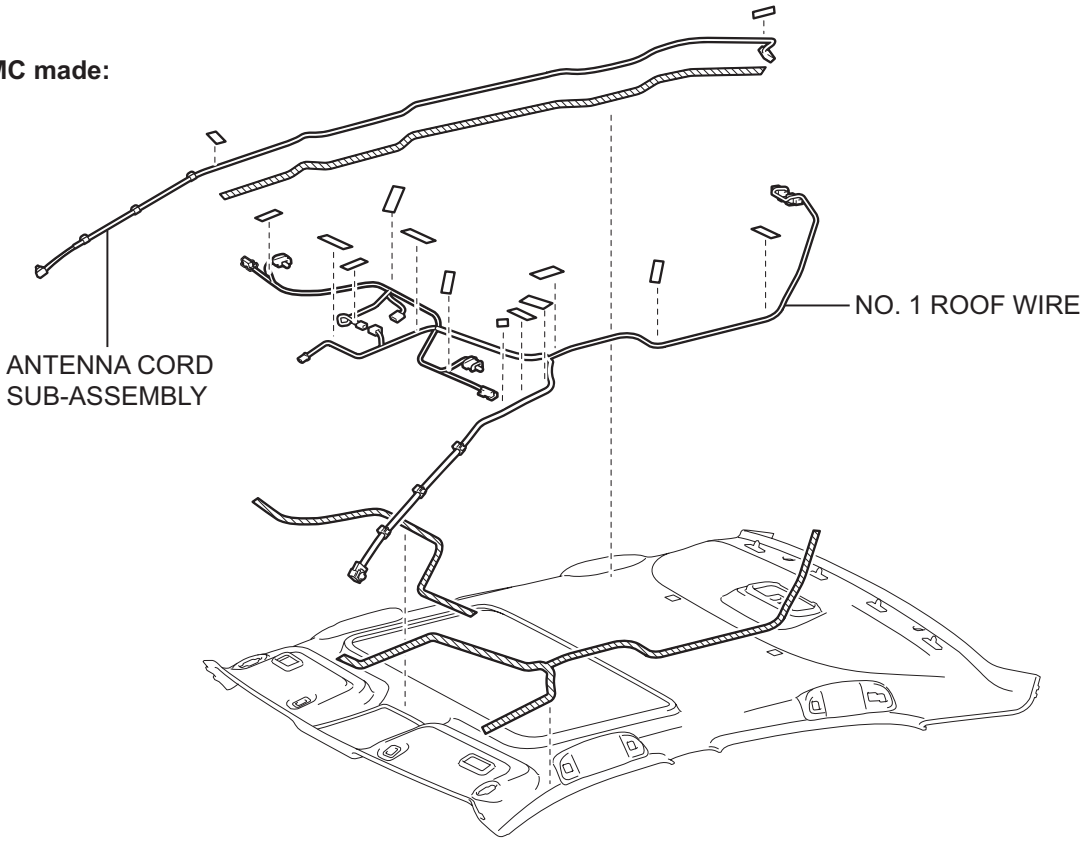
ADHESIVE TAPE

P

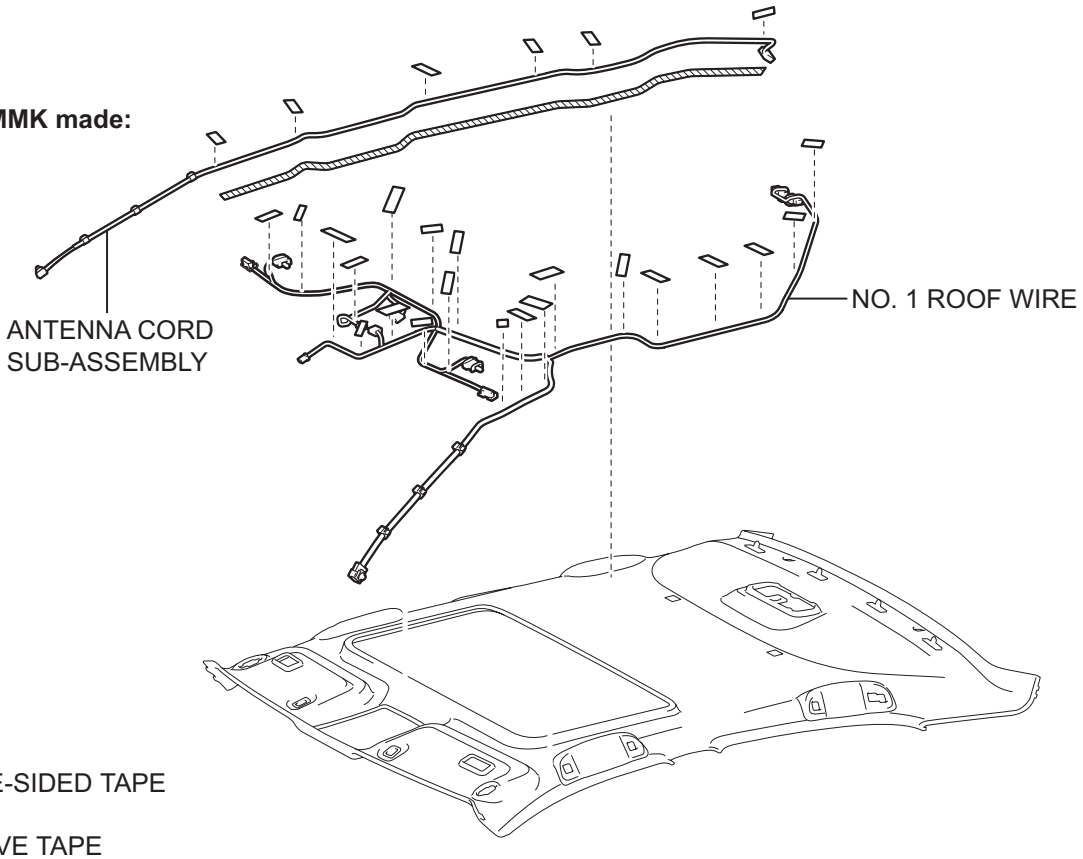
B132131E01

with Sliding Roof:

for TMC made:



for TMMK made:



DOUBLE-SIDED TAPE

ADHESIVE TAPE

P

B132130E01

IR

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
2. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
3. **REMOVE SEAT TRACK COVER LH (for Manual Seat) (See page SE-16)**
4. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-16)**
5. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-16)**
6. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
7. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-30)**
8. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Power Seat) (See page SE-30)**
9. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-30)**
10. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
11. **REMOVE SEAT TRACK COVER RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
12. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
13. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
14. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
15. **REMOVE SEAT TRACK COVER RH (for Power Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.

16. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

17. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

18. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)**

19. **REMOVE REAR SEAT HEADREST ASSEMBLY**

20. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**

21. **REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**

22. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)**

23. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)**

24. **REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)**

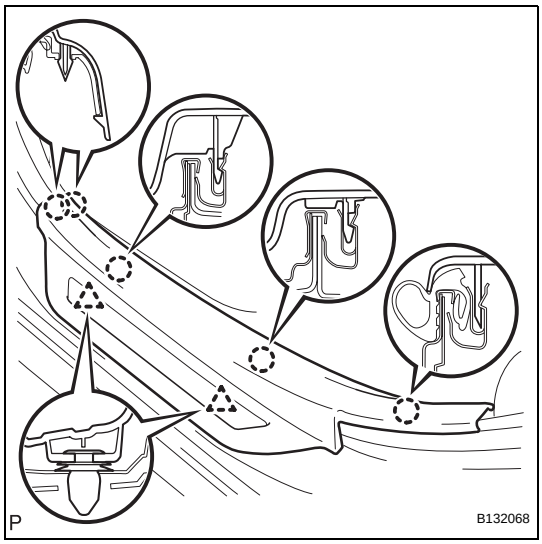
25. **REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)**

26. **REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)**

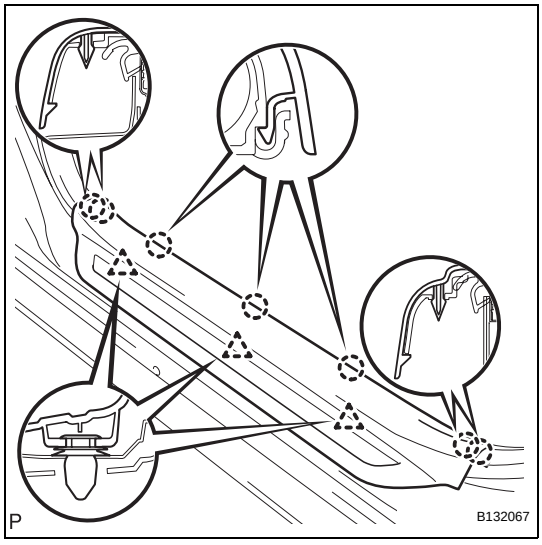
27. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)**

28. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)**

29. **REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)**



30. **REMOVE REAR DOOR SCUFF PLATE LH**
    (a) Disengage the 5 claws and 2 clips, and remove the rear door scuff plate LH.
31. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**
32. **REMOVE REAR DOOR SCUFF PLATE RH**
    HINT:
    Use the same procedures for the RH side and the LH side.
33. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**
34. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)**
35. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
36. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-38)**
37. **REMOVE DOOR ASSIST GRIP COVER LH (See page ED-38)**
38. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-39)**
39. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-40)**



40. **REMOVE FRONT DOOR SCUFF PLATE LH**
    (a) Disengage the 7 claws and 3 clips, and remove the front door scuff plate LH.

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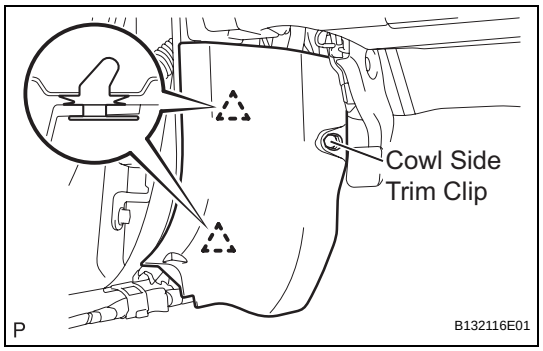
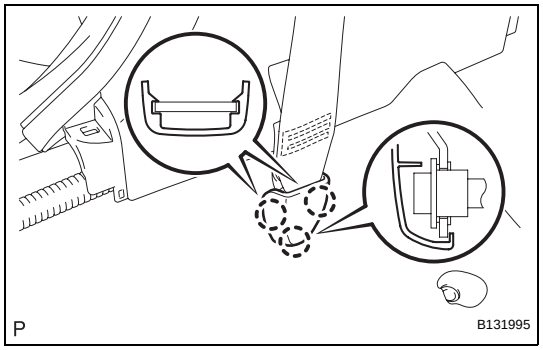


41. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH

(a) Remove the cowl side trim clip.

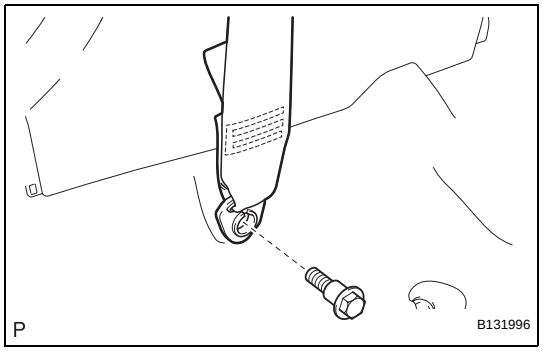
(b) Disengage the 2 clips and remove the cowl side trim sub-assembly LH.

42. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH



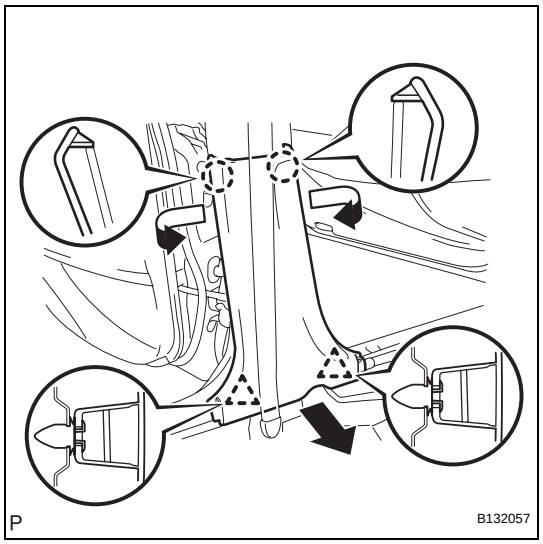
43. REMOVE LAP BELT OUTER ANCHOR COVER (for LH Side)

(a) Disengage the 3 claws and remove the lap belt outer anchor cover.



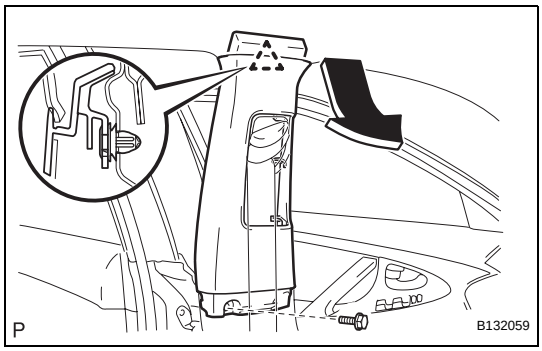
44. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH

(a) Remove the bolt and disconnect the floor end of the front seat outer belt assembly.



45. REMOVE LOWER CENTER PILLAR GARNISH LH

(a) Disengage the 2 claws and 2 clips, and remove the lower center pillar garnish LH.



46. REMOVE UPPER CENTER PILLAR GARNISH LH
(a) Remove the bolt.
(b) Disengage the clip and remove the upper center pillar garnish LH.

47. REMOVE FRONT DOOR SCUFF PLATE RH
HINT:
Use the same procedures for the RH side and the LH side.

48. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH
HINT:
Use the same procedures for the RH side and the LH side.

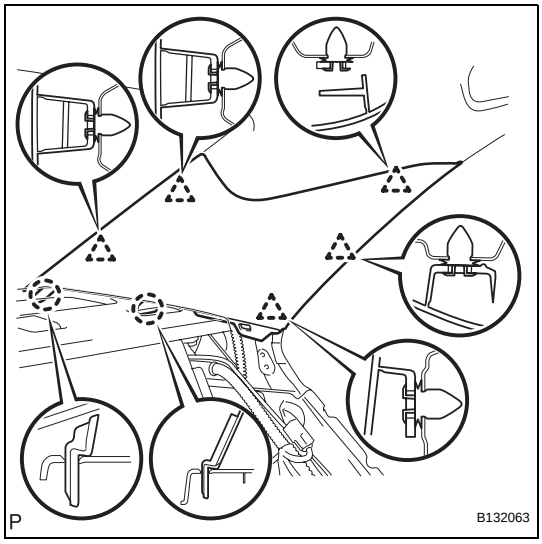
49. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH

50. REMOVE LAP BELT OUTER ANCHOR COVER (for RH Side)
HINT:
Use the same procedures for the RH side and the LH side.

51. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY RH
HINT:
Use the same procedures for the RH side and the LH side.

52. REMOVE LOWER CENTER PILLAR GARNISH RH
HINT:
Use the same procedures for the RH side and the LH side.

53. REMOVE UPPER CENTER PILLAR GARNISH RH
HINT:
Use the same procedures for the RH side and the LH side.



54. REMOVE ROOF SIDE INNER GARNISH LH
(a) Disengage the 5 clips and 2 claws, and remove the roof side inner garnish LH.

55. REMOVE ROOF SIDE INNER GARNISH RH
HINT:
Use the same procedures for the RH side and the LH side.

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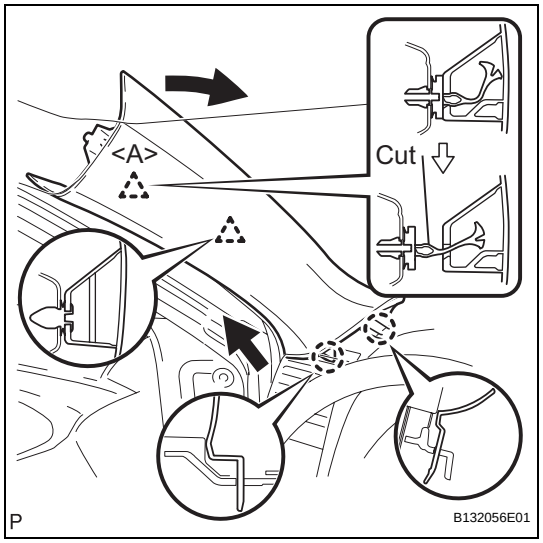
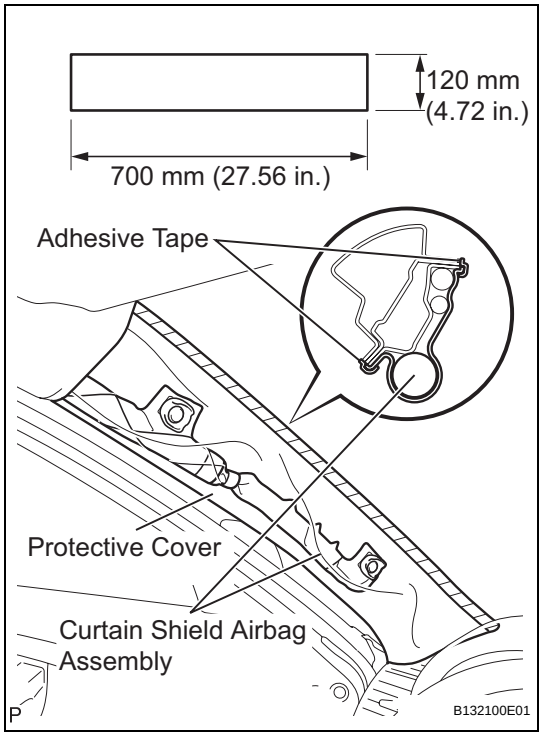
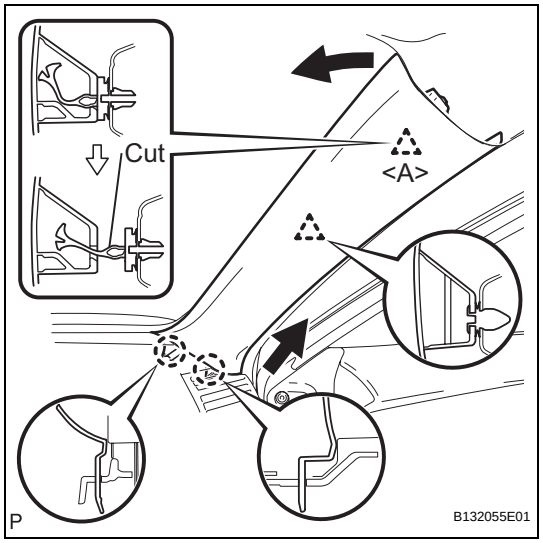


56. REMOVE FRONT PILLAR GARNISH LH

(a) Pull the upper part of the garnish toward the inside of the cabin and disengage the 2 clips.
(b) Cut off the clip <A>.
(c) Disengage the 2 claws and remove the front pillar garnish LH.
(d) Remove the clip <A> from the vehicle body.

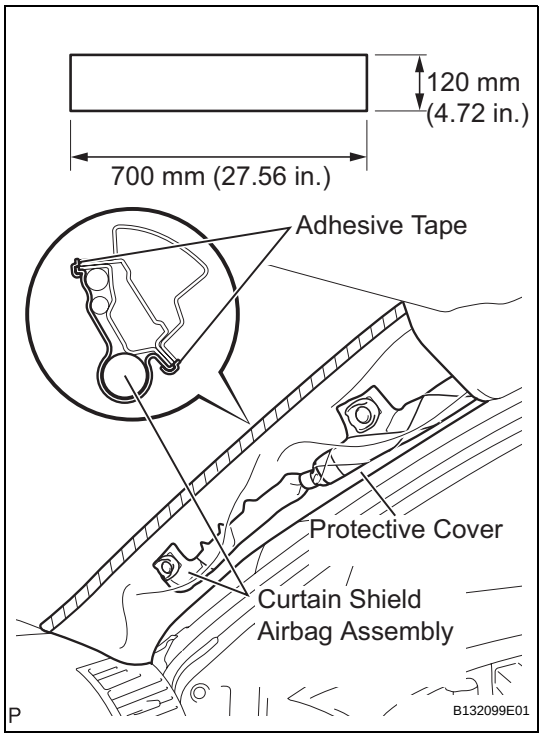


(e) Protect the curtain shield airbag assembly.
(1) Cover the airbag with a 700 mm (27.56 in.) x 120 mm (4.72 in.) cloth or piece of nylon and fix the ends of the cover with tape, as shown in the illustration.
NOTICE:
Cover the curtain shield airbag with a protective cover as soon as the front pillar garnish is removed.

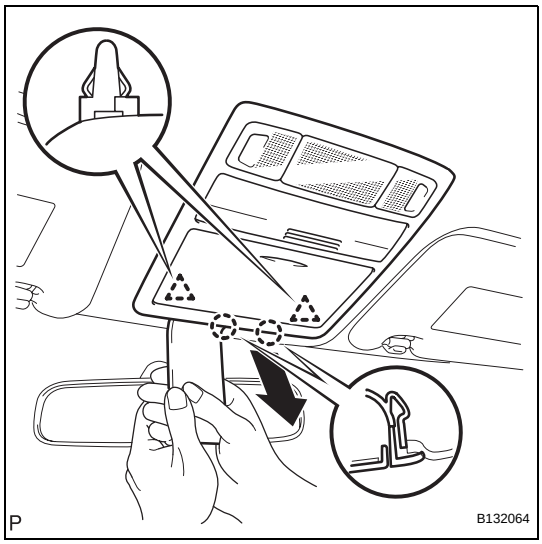


57. REMOVE FRONT PILLAR GARNISH RH

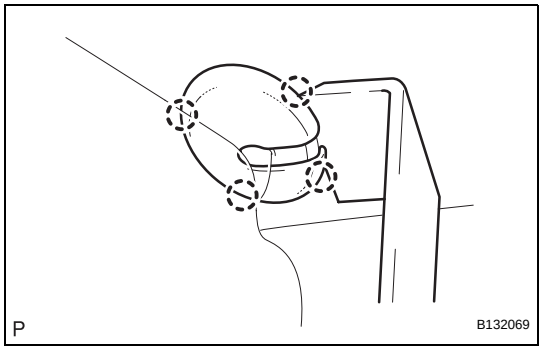
(a) Pull the upper part of the garnish toward the inside of the cabin and disengage the 2 clips.
(b) Cut off the clip <A>.
(c) Disengage the 2 claws and remove the front pillar garnish RH.
(d) Remove the clip <A> from the vehicle body.



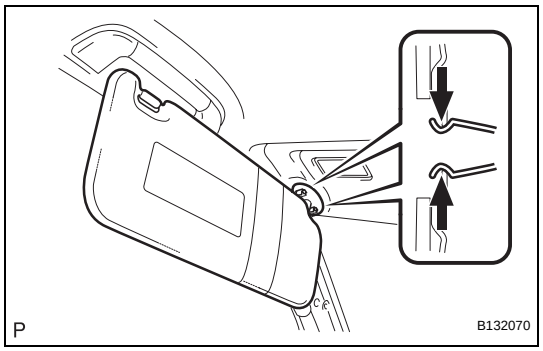
(e) Protect the curtain shield airbag assembly.
(1) Cover the airbag with a 700 mm (27.56 in.) x 120 mm (4.72 in.) cloth or piece of nylon and fix the ends of the cover with tape, as shown in the illustration.
NOTICE:
Cover the curtain shield airbag with a protective cover as soon as the front pillar garnish is removed.



58. REMOVE ROOF CONSOLE BOX ASSEMBLY
(a) Using a moulding remover, disengage the 2 clips and 2 claws.
(b) Disconnect the connectors and remove the roof console box assembly.



59. REMOVE VISOR ASSEMBLY LH
(a) Using a moulding remover, disengage the 4 claws and remove the visor bracket cover.



(b) Disengage the 2 clips and remove the visor assembly LH.

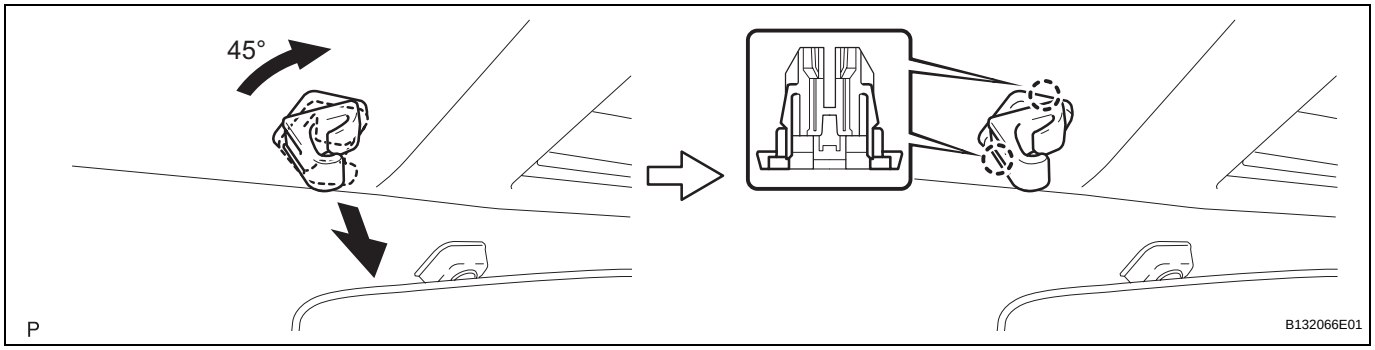
60. REMOVE VISOR ASSEMBLY RH

HINT:
Use the same procedures for the RH side and the LH side.

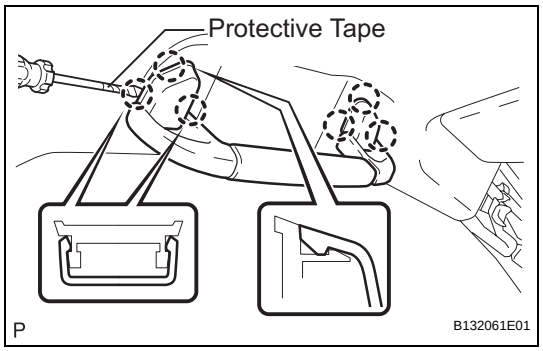
61. REMOVE VISOR HOLDER

(a) Turn the visor holder approximately 45° and pull it out as shown in the illustration.

(b) Disengage the 2 claws and remove the visor holder.

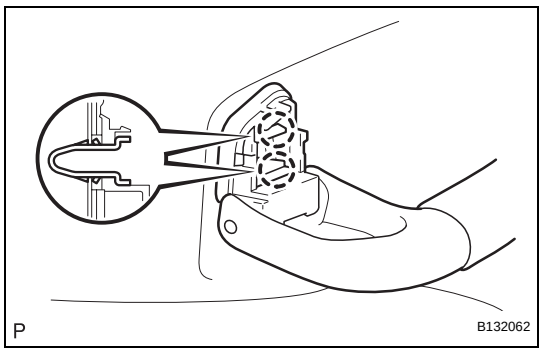


HINT:
Use the same procedures for the RH side and the LH side.



62. REMOVE FRONT ASSIST GRIP SUB-ASSEMBLY

(a) Using a screwdriver, disengage the 6 claws and remove the 2 assist grip covers.
HINT:
Tape the screwdriver tip before use.



(b) Disengage the 2 clips and remove the front assist grip sub-assembly.
HINT:
Use the same procedures for the RH side and the LH side.

63. REMOVE REAR ASSIST GRIP SUB-ASSEMBLY

HINT:
Use the same procedures for the rear side and the front side.

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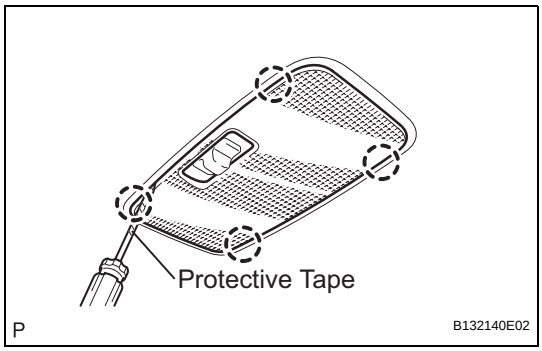
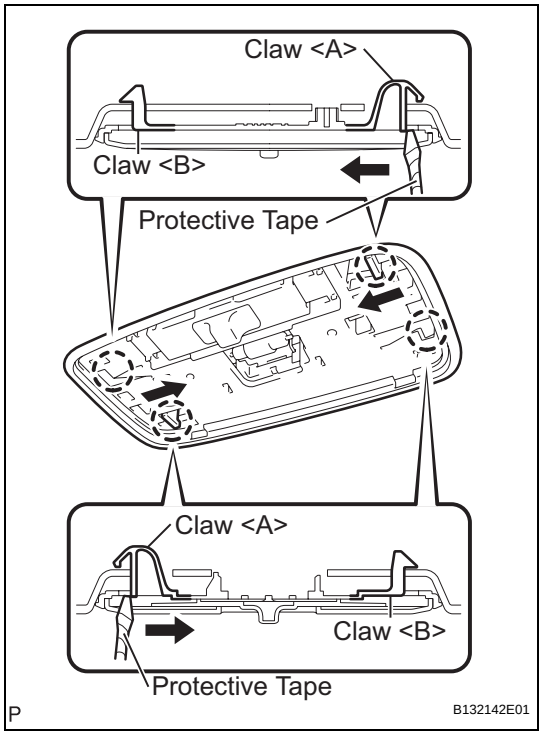


64. REMOVE NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof)

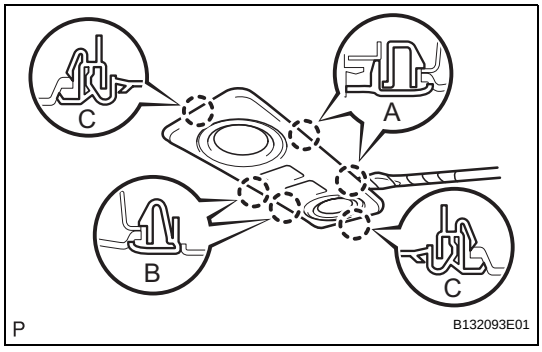
(a) Using a screwdriver, disengage the 4 claws and remove the lens cover.
HINT:
Tape the screwdriver tip before use.



(b) Using a screwdriver, disengage the 2 claws <A> as shown in the illustration.
HINT:
Tape the screwdriver tip before use.

(c) Disengage the 2 claws <B> and remove the No. 1 room light assembly.

(d) Disconnect the room light connector.

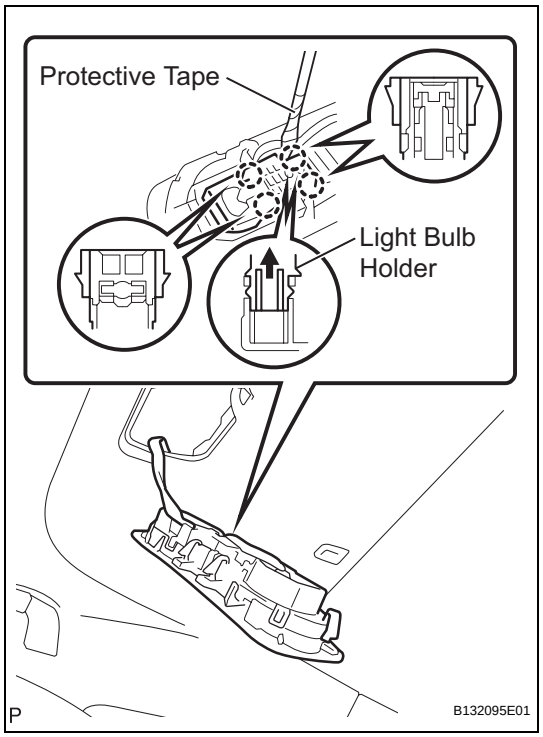


65. REMOVE SPOT LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Using a screwdriver, disengage the 2 claws labeled A and 2 claws labeled B from the vehicle body.
HINT:
Tape the screwdriver tip before use.

(b) Using a screwdriver, disengage the 2 claws labeled C and remove the spot light assembly from the headlining.
HINT:
Tape the screwdriver tip before use.

IR

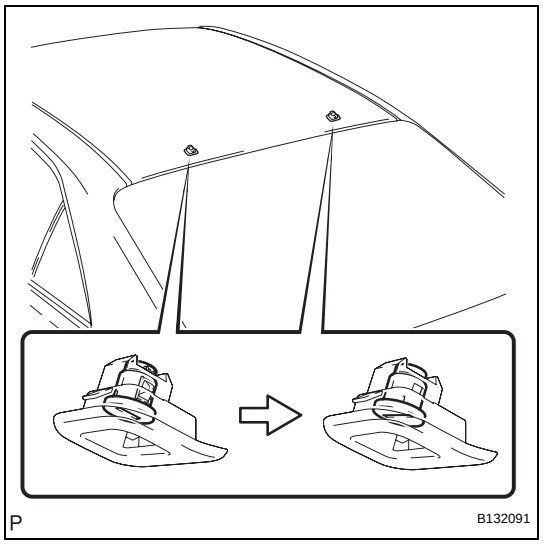


(c) Using a screwdriver, disengage the 4 claws.
HINT:
Tape the screwdriver tip before use.

(d) Pull the light bulb holder in the direction indicated by the arrow in the illustration to detach the claw. Then remove the spot light assembly from the light bulb holder.

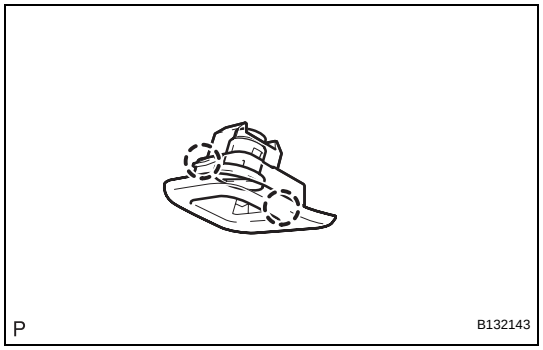
66. REMOVE SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof)

(a) Remove the sun roof opening trim moulding.



67. REMOVE SUNSHADE TRIM HOLDER (w/ Rear Sunshade)

(a) Using a screwdriver, turn the pin of each sunshade trim holder 90°.



(b) Disengage the 2 claws and remove the sunshade trim holder.

68. REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)

(a) Disconnect the No. 1 roof wire connector and disengage each clamp from the front pillar LH.

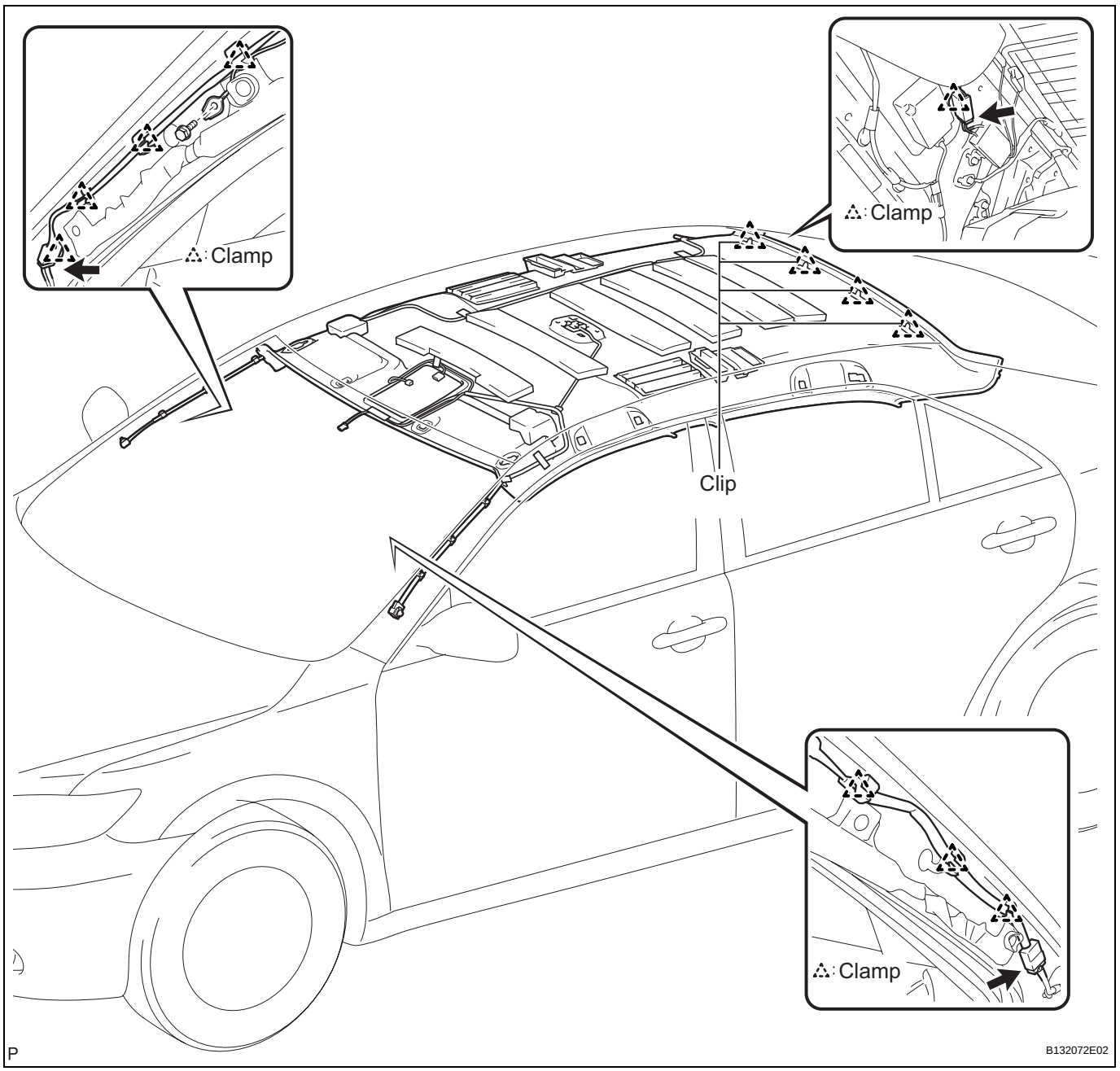
(b) Remove the bolt and disconnect the radio setting condenser from the front pillar RH.

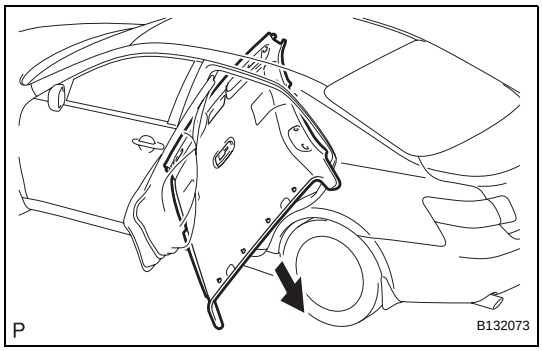
(c) Disconnect the antenna cord sub-assembly connector and disengage each clamp from the front pillar RH.

(d) Disconnect the antenna cord sub-assembly connector and disengage the clamp from the rear pillar RH.

IR

(e) Disengage the 4 clips.



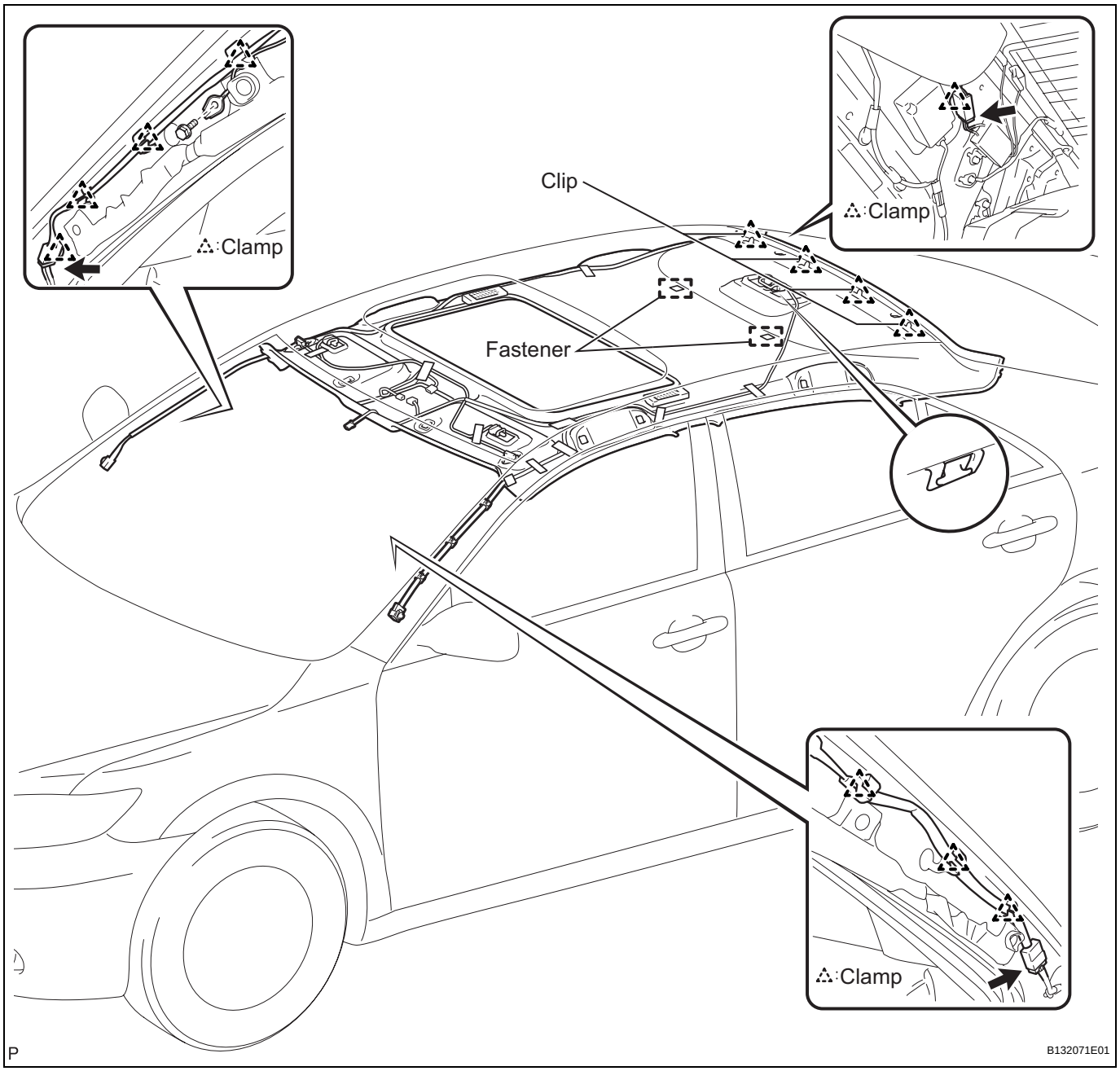


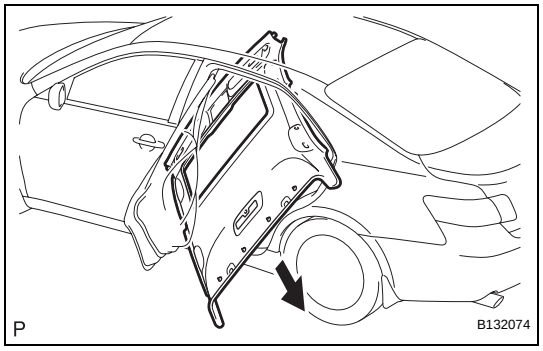
(f) Remove the roof headlining assembly from the vehicle through the rear left door.

69. REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)

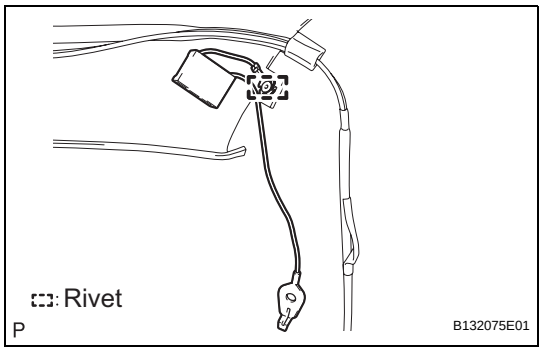
(a) Disconnect the No. 1 roof wire connector and disengage each clamp from the front pillar LH.
(b) Remove the bolt and disconnect the radio setting condenser from the front pillar RH.
(c) Disconnect the antenna cord sub-assembly connector and disengage each clamp from the front pillar RH.
(d) Disconnect the antenna cord sub-assembly connector and disengage the clamp from the rear pillar RH.

(e) Disconnect the sliding roof drive gear connector.
(f) Disengage the hook, 4 clips, and 2 fasteners.

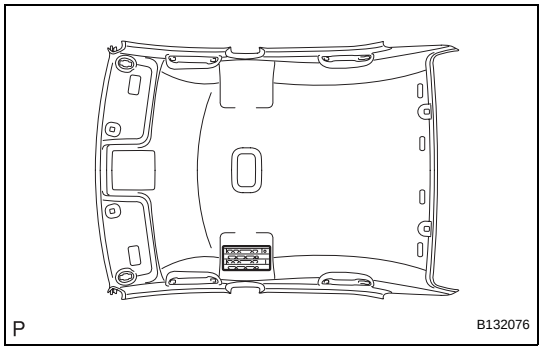




(g) Remove the roof headlining assembly from the vehicle through the rear left door.

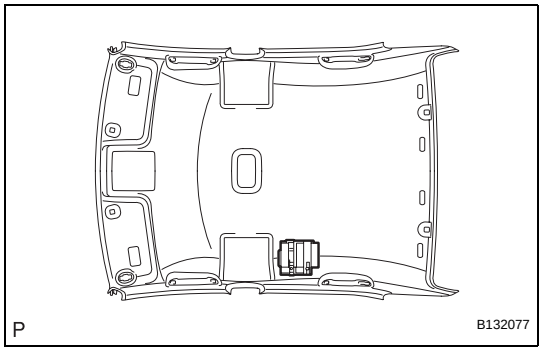


70. REMOVE RADIO SETTING CONDENSER
(a) Remove the rivet and radio setting condenser.



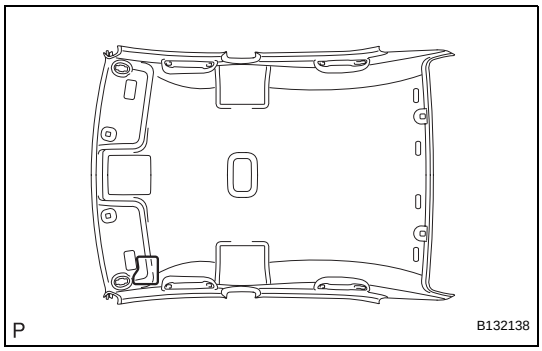
71. REMOVE NO. 2 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)
(a) Remove the No. 2 rear side rail spacer LH.

72. REMOVE NO. 2 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)
HINT:
Use the same procedures for the RH side and the LH side.



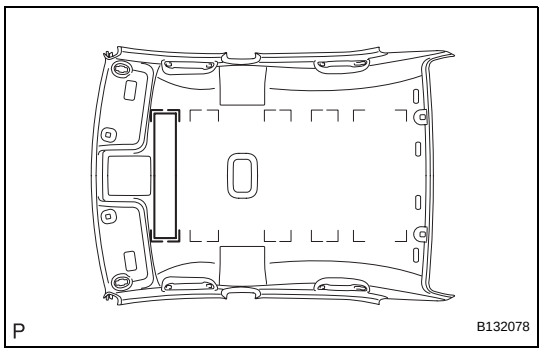
73. REMOVE NO. 3 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)
(a) Remove the No. 3 rear side rail spacer LH.

74. REMOVE NO. 3 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)
HINT:
Use the same procedures for the RH side and the LH side.



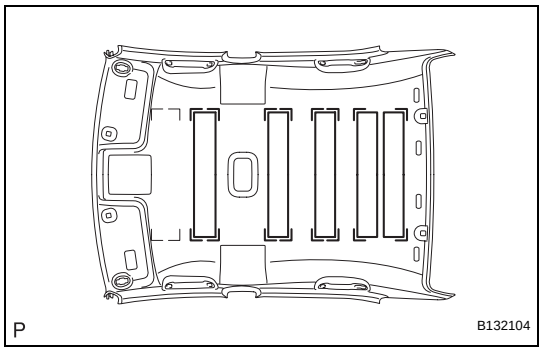
75. REMOVE ROOF SIDE RAIL SILENCER PAD LH (w/o Sliding Roof)
(a) Remove the roof side rail silencer pad LH.

76. REMOVE ROOF SIDE RAIL SILENCER PAD RH (w/o Sliding Roof)
HINT:
Use the same procedures for the RH side and the LH side.



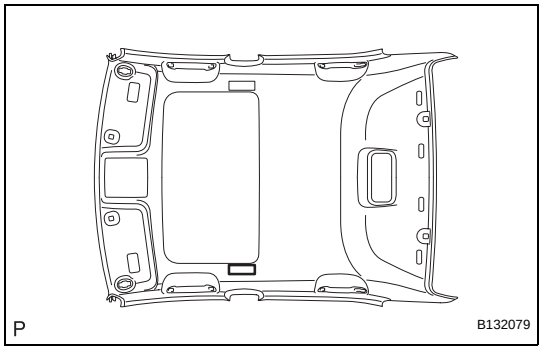
77. REMOVE NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)
(a) Remove the No. 2 roof silencer pad.

IR



78. REMOVE NO. 4 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Remove the 5 No. 4 roof silencer pads.



79. REMOVE NO. 2 REAR SIDE RAIL SPACER LH (w/ Sliding Roof)

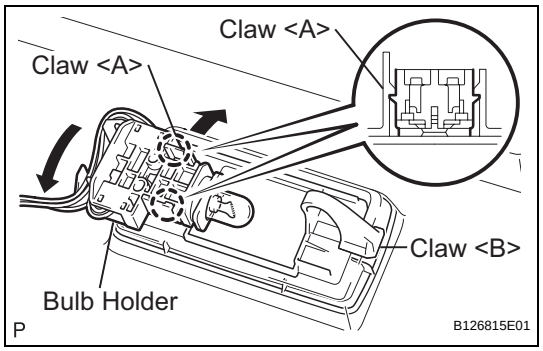
(a) Remove the No. 2 rear side rail spacer LH.

80. REMOVE NO. 2 REAR SIDE RAIL SPACER RH (w/ Sliding Roof)

HINT:
Use the same procedures for the RH side and the LH side.

81. REMOVE FASTENER HOOK (w/ Sliding Roof)

82. REMOVE ANTENNA CORD SUB-ASSEMBLY (See page AV-199)



83. REMOVE VANITY LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Disengage the 2 claws <A> and separate the bulb holder from the vanity light assembly as shown in the illustration.

(b) Disengage the claw <B> and remove the vanity light assembly.
HINT:
Use the same procedure to remove the light on the other side.

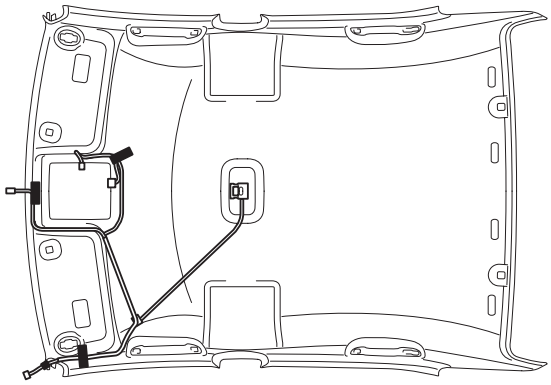
84. REMOVE NO. 1 ROOF WIRE (w/o Sliding Roof)

(a) Remove the adhesive tape from the roof headlining assembly.

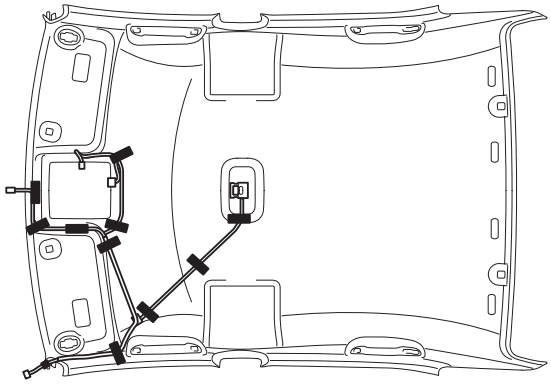
(b) Remove the No. 1 roof wire from the roof headlining assembly.

(c) Remove the double-sided tape from the roof headlining assembly.

for TMC made:



for TMMK made:



: Adhesive Tape

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B132085E01

85. REMOVE NO. 1 ROOF WIRE (w/ Sliding Roof)

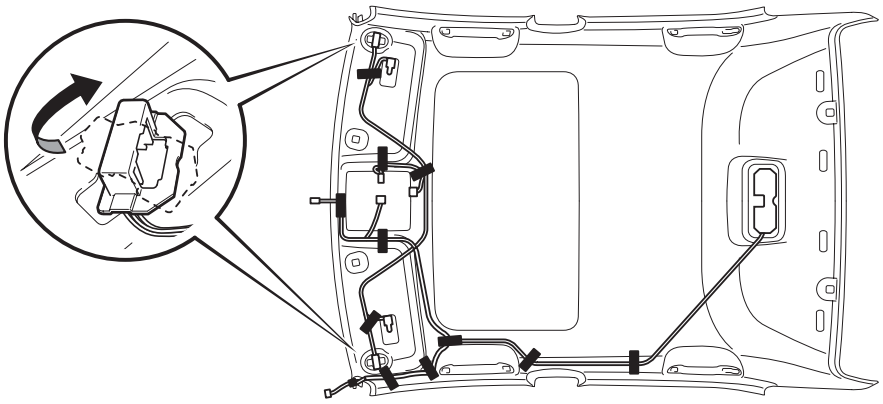
(a) Turn the visor connectors clockwise approximately 90° and separate the connectors from the roof headlining assembly.

(b) Remove the adhesive tape from the roof headlining assembly.

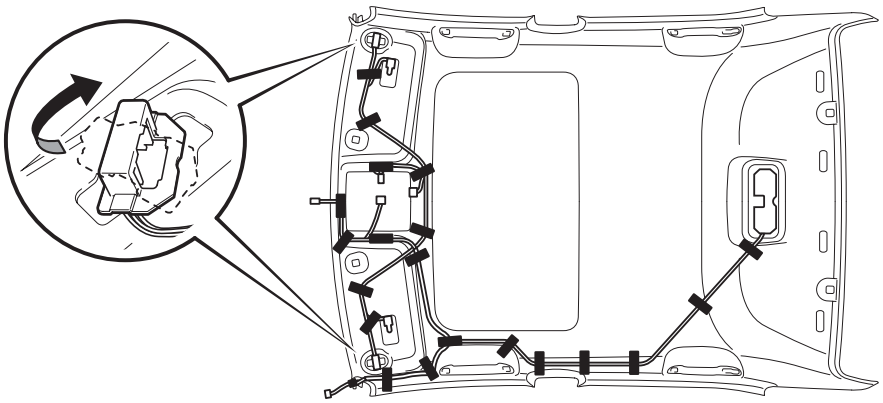
(c) Remove the No. 1 roof wire from the roof headlining assembly.

(d) Remove the double-sided tape from the roof headlining assembly.

for TMC made:



for TMMK made:



■ : Adhesive Tape

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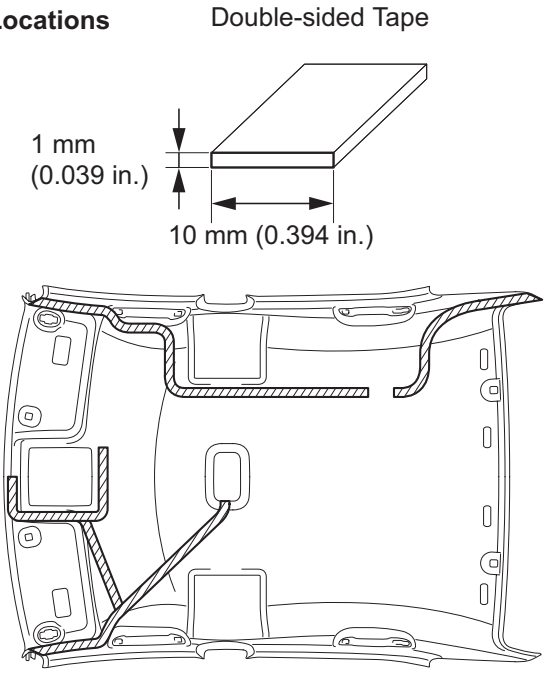
INSTALLATION

1. INSTALL NO. 1 ROOF WIRE (w/o Sliding Roof)

(a) Apply new double-sided tape to locations shown in the illustration while aligning the tape with the markings on the roof headlining.

Reference: Tape Attachment Locations



NOTICE:
Securely apply the double-sided tape to prevent it from being out of alignment and peeling off.

(b) Peel off the release paper from the double-sided tape.

(c) Attach the No. 1 roof wire along the double-sided tape so that the marking surface of the wire harness faces downward.

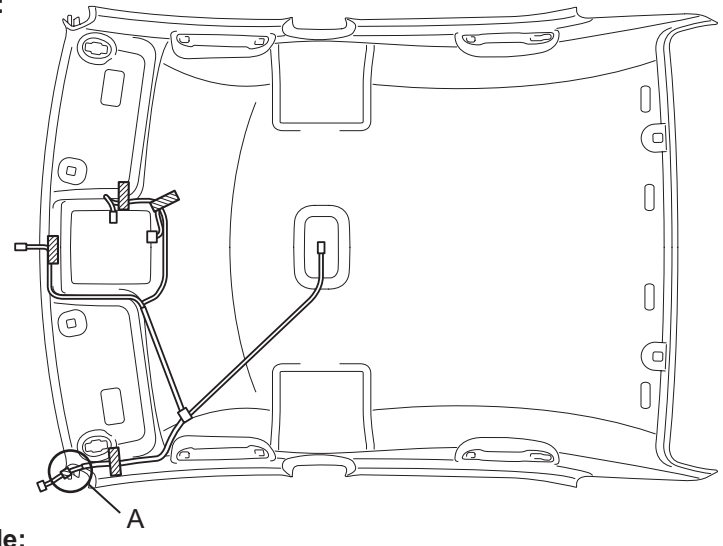
NOTICE:
- **Securely attach the No. 1 roof wire.**
- **Failure to do so may cause abnormal noise.**

IR

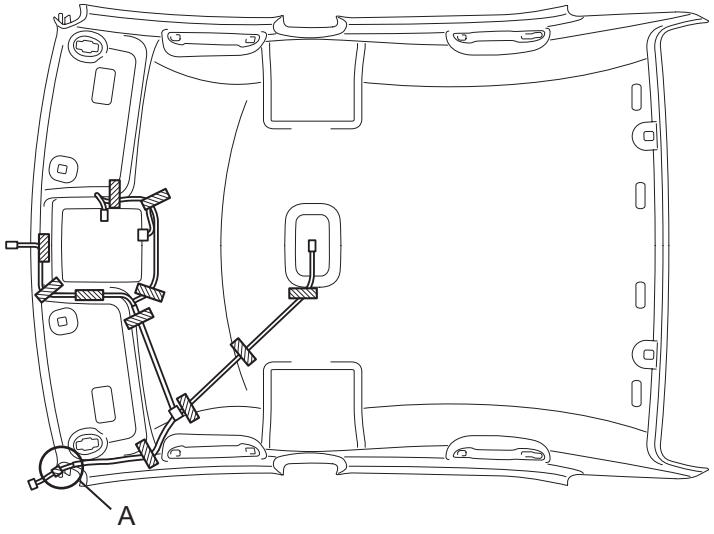
(d) Apply adhesive tape to locations shown in the illustration.

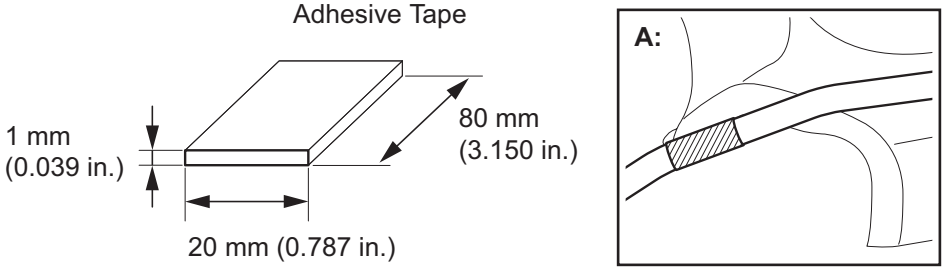
Reference: Tape Attachment Locations

for TMC made:



for TMMK made:





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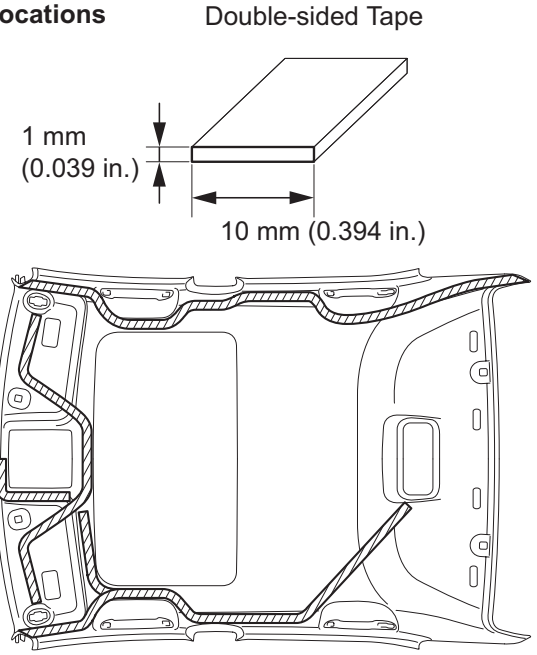
B132089E01

HINT:
As shown at point A in the illustration, line up and secure the reference tape of the wire harness to the tip of the roof headlining assembly.

2. INSTALL NO. 1 ROOF WIRE (w/ Sliding Roof)

(a) Apply new double-sided tape to locations shown in the illustration while aligning the tape with the markings on the roof headlining.

Reference: Tape Attachment Locations



NOTICE:
Securely apply the double-sided tape to prevent it from being out of alignment and peeling off.

(b) Peel off the release paper from the double-sided tape.

(c) Attach the No. 1 roof wire along the double-sided tape so that the marking surface of the wire harness faces downward.

NOTICE:
- **Securely attach the No. 1 roof wire.**
- **Failure to do so may cause abnormal noise.**

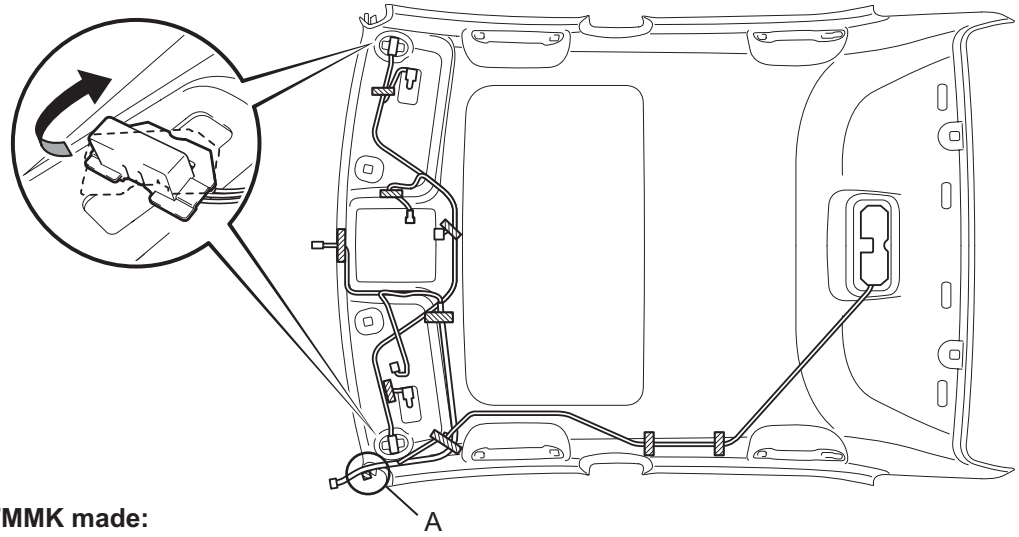
(d) Turn the visor connectors clockwise approximately 90° to install the connectors to the roof headlining.

IR

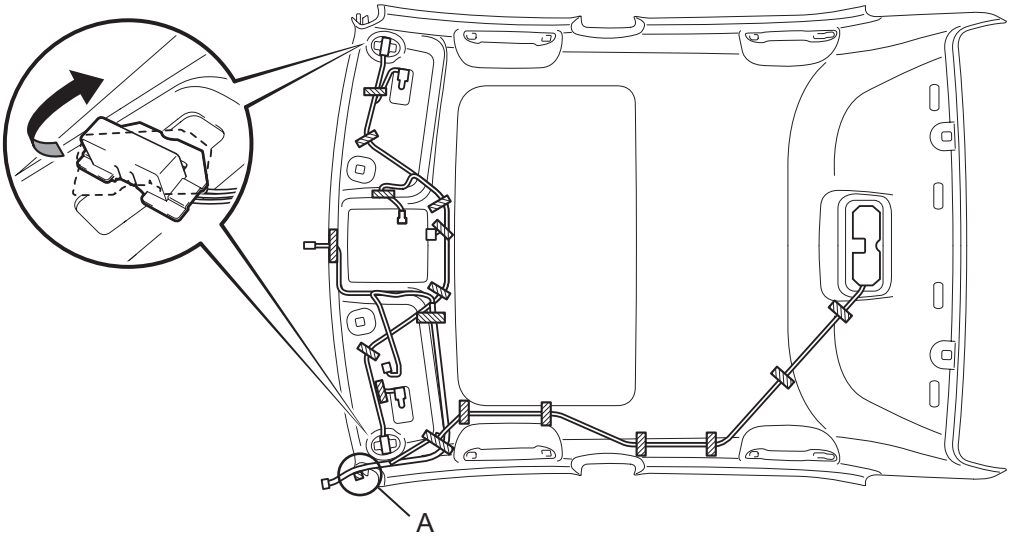
(e) Apply adhesive tape to locations shown in the illustration.

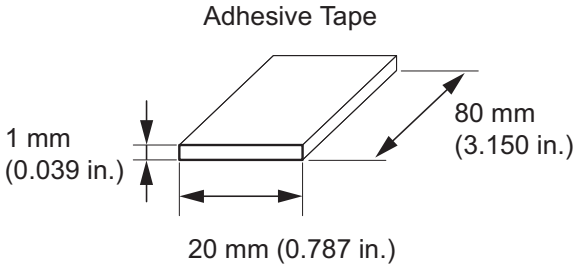
Reference: Tape Attachment Locations

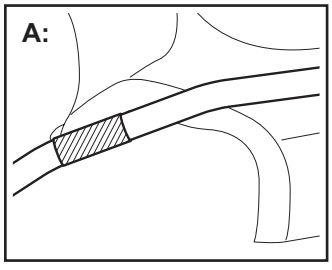
for TMC made:



for TMMK made:







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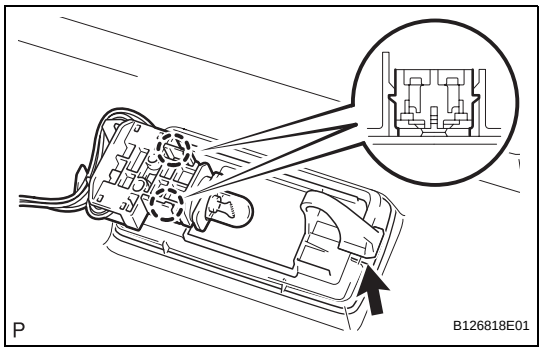
HINT:
As shown at point A in the illustration, line up and secure the reference tape of the wire harness to the tip of the roof headlining assembly.

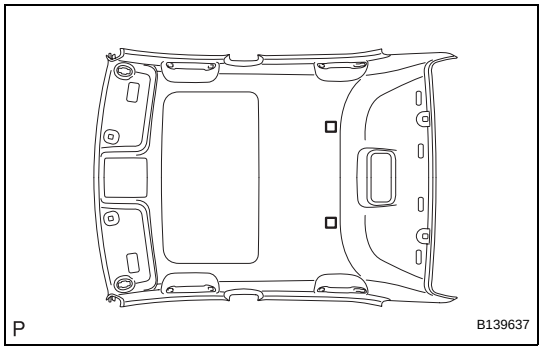
3. **INSTALL ANTENNA CORD SUB-ASSEMBLY (See page AV-202)**

IR



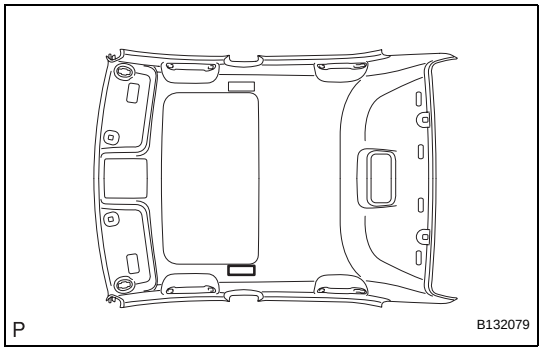
4. INSTALL VANITY LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Engage the 3 claws and install the vanity light assembly.
HINT:
Use the same procedure to install the light on the other side.



5. INSTALL FASTENER HOOK (w/ Sliding Roof)

(a) Align the markings on the roof headlining assembly with the fastener hooks and install the fastener hooks using hot melt glue as shown in the illustration.

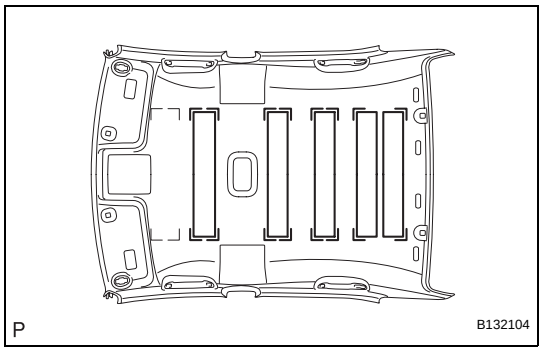


6. INSTALL NO. 2 REAR SIDE RAIL SPACER LH (w/ Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 rear side rail spacer LH and install the spacer using hot melt glue as shown in the illustration.

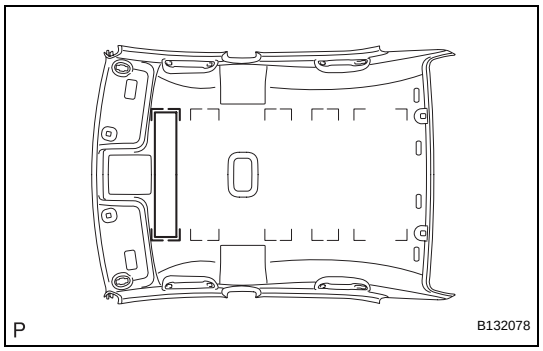
7. INSTALL NO. 2 REAR SIDE RAIL SPACER RH (w/ Sliding Roof)

HINT:
Use the same procedures for the RH side and the LH side.



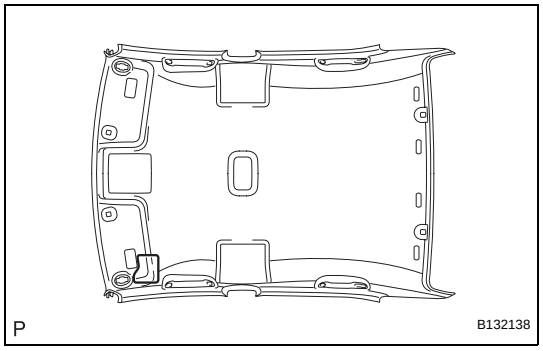
8. INSTALL NO. 4 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 4 roof silencer pads and install the silencer pads using hot melt glue or double-sided tape as shown in the illustration.



9. INSTALL NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 roof silencer pad and install the silencer pad using hot melt glue or double-sided tape as shown in the illustration.



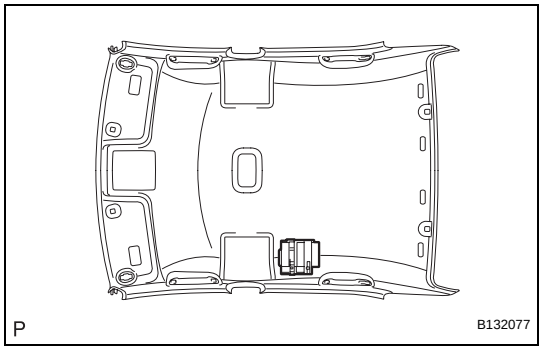
10. INSTALL ROOF SIDE RAIL SILENCER PAD LH (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the roof side rail silencer pad LH and install the silencer pad using hot melt glue as shown in the illustration.

11. INSTALL ROOF SIDE RAIL SILENCER PAD RH (w/o Sliding Roof)

HINT:

Use the same procedures for the RH side and the LH side.



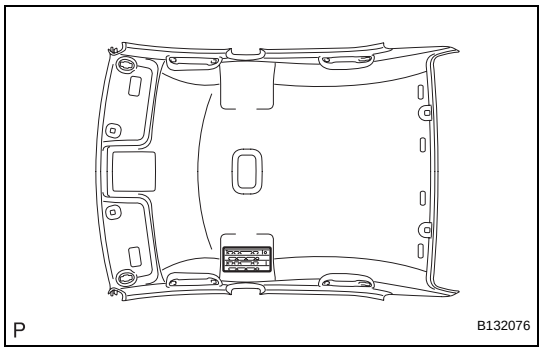
12. INSTALL NO. 3 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 3 rear side rail spacer LH and install the spacer using hot melt glue as shown in the illustration.

13. INSTALL NO. 3 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)

HINT:

Use the same procedures for the RH side and the LH side.



14. INSTALL NO. 2 REAR SIDE RAIL SPACER LH (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 rear side rail spacer LH and install the spacer using hot melt glue as shown in the illustration.

15. INSTALL NO. 2 REAR SIDE RAIL SPACER RH (w/o Sliding Roof)

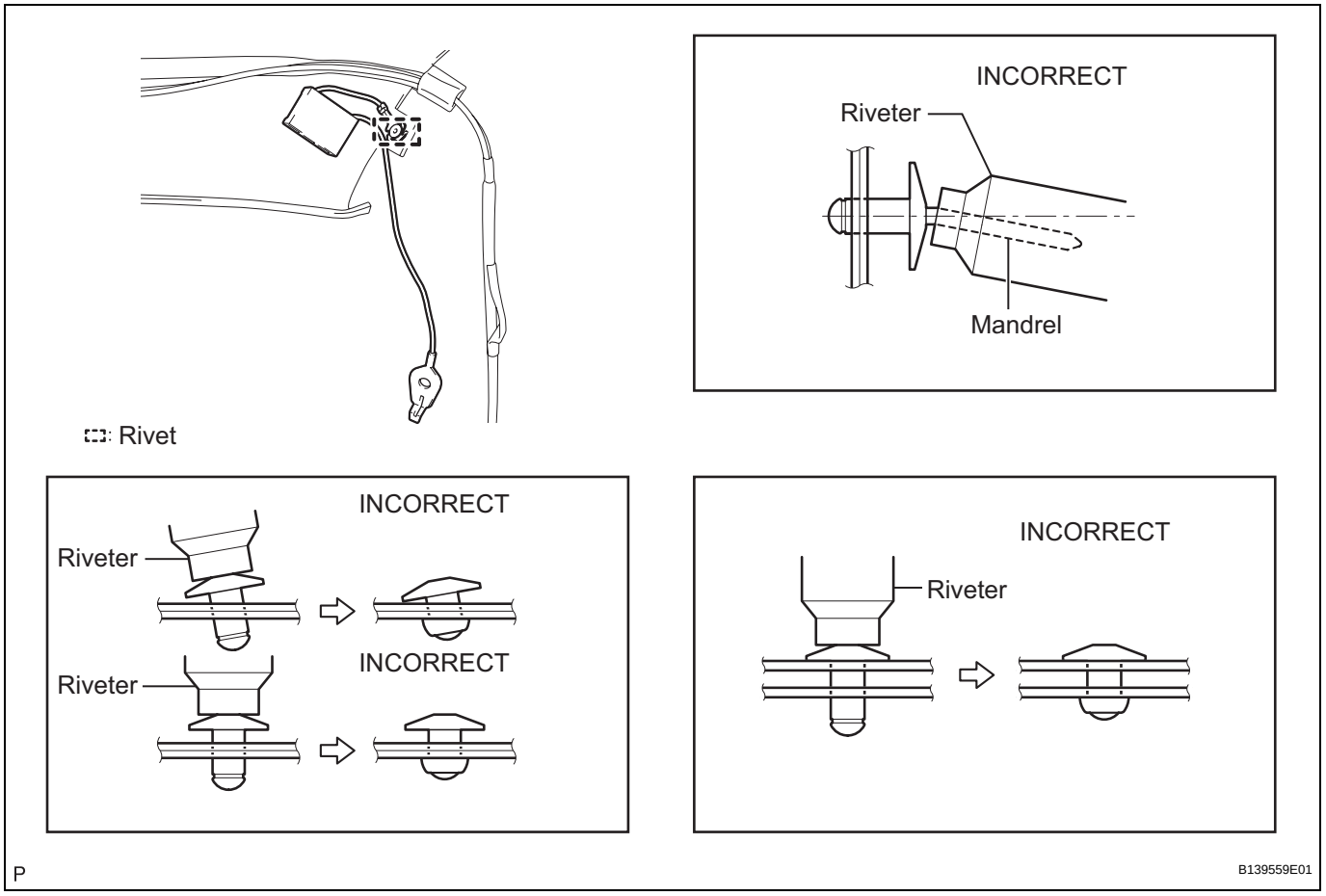
HINT:

Use the same procedures for the RH side and the LH side.

IR

16. INSTALL RADIO SETTING CONDENSER

(a) Using an air riveter or hand riveter with a nose piece, install the radio setting condenser with a new rivet.

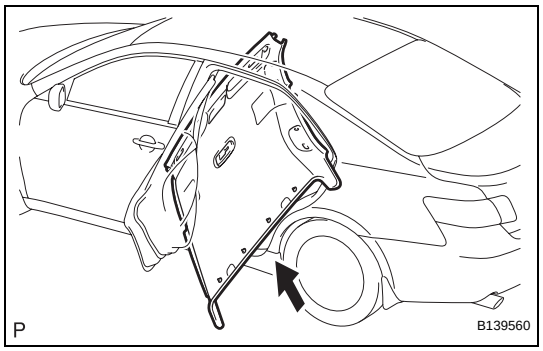


NOTICE:

- **Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.**
- **Confirm that the rivet is seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any space between the rivet head and moulding.**
- **Do not leave any space between the moulding and door frame. Firmly hold the 2 items together while installing the rivet.**

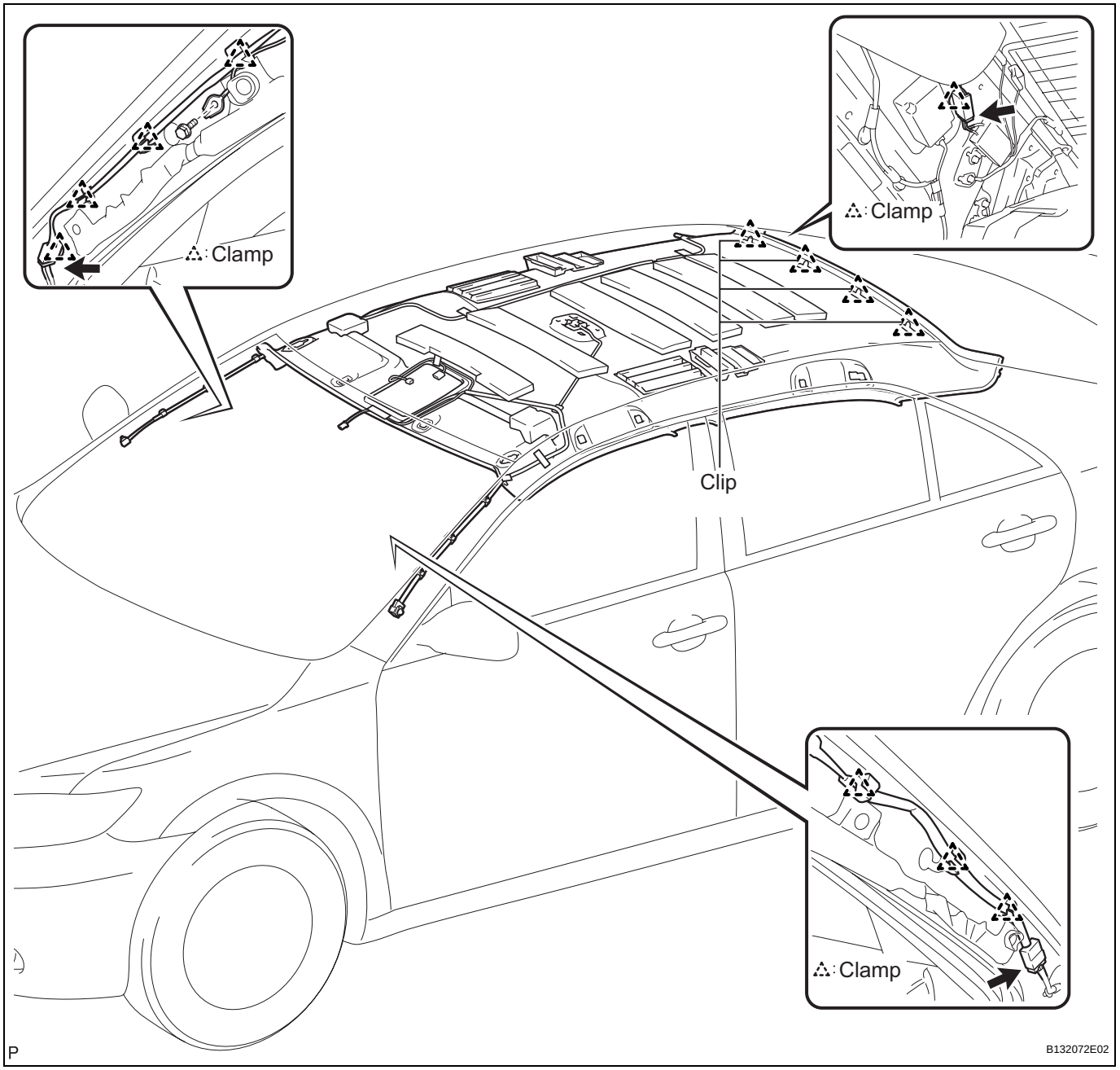
HINT:

If the rivet cannot be cut, pull it once and cut it.

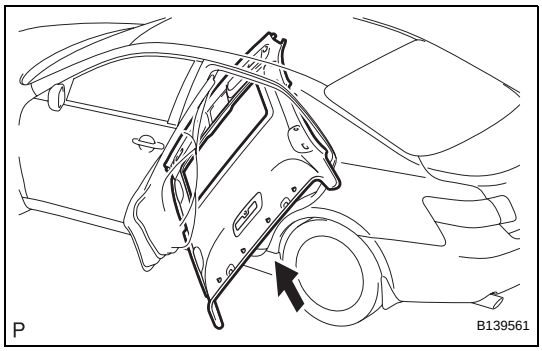


17. INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)

(a) Pull the roof headlining assembly into the vehicle through the rear left door.
(b) Engage the 4 clips.
(c) Connect the antenna cord sub-assembly connector and engage the clamp to the rear pillar RH.
(d) Connect the antenna cord sub-assembly connector and engage each clamp to the front pillar RH.
(e) Install the radio setting condenser to the front pillar RH with the bolt.
(f) Connect the No. 1 roof wire connector and engage each clamp to the front pillar LH.

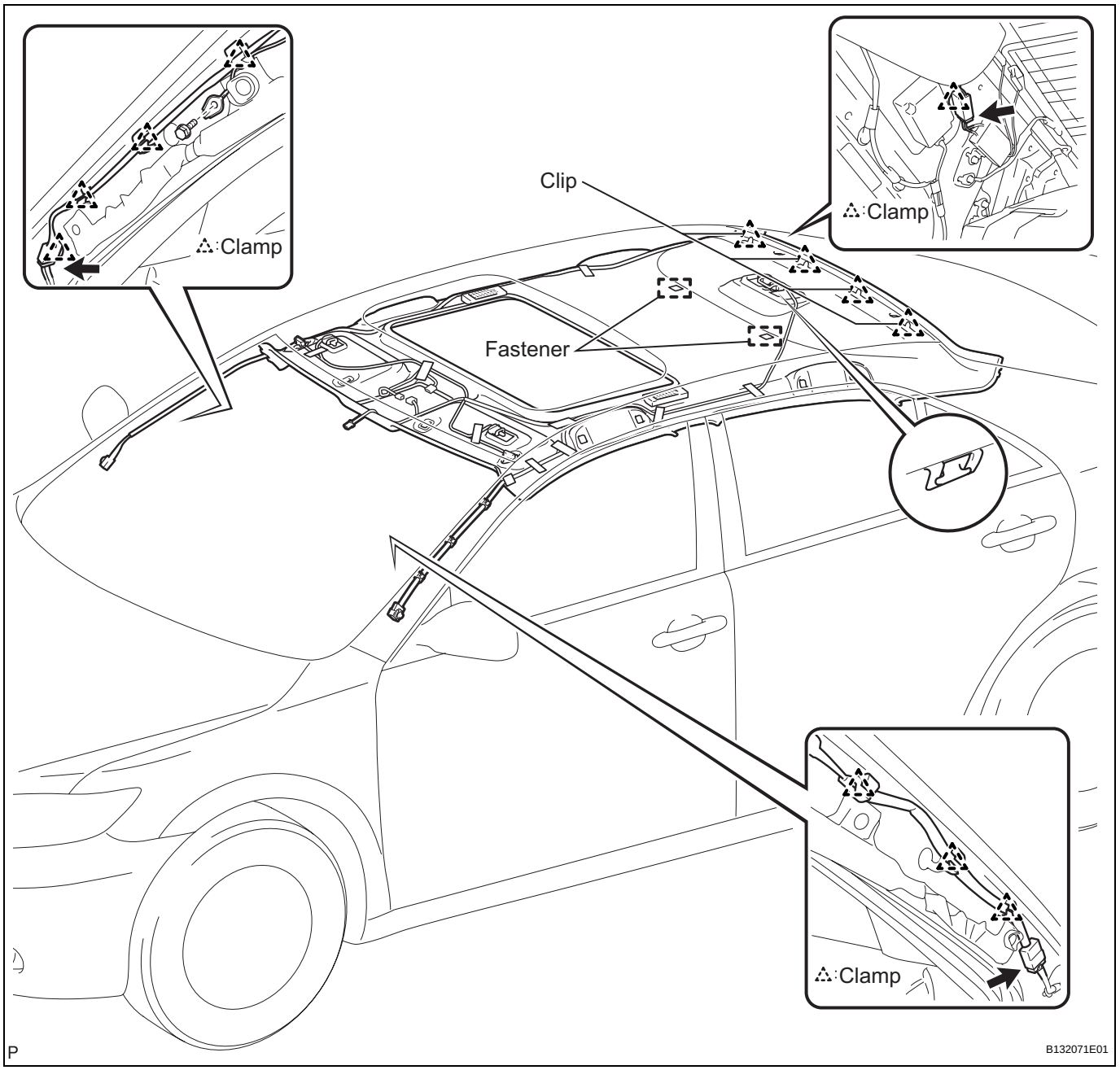


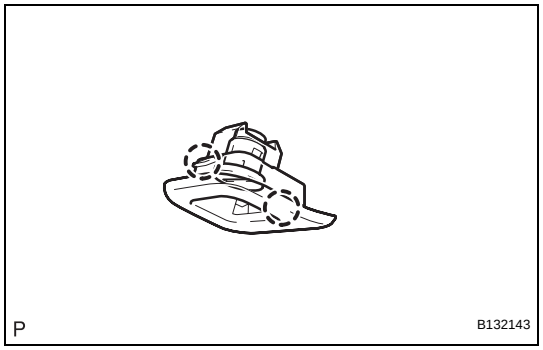
IR



18. INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)

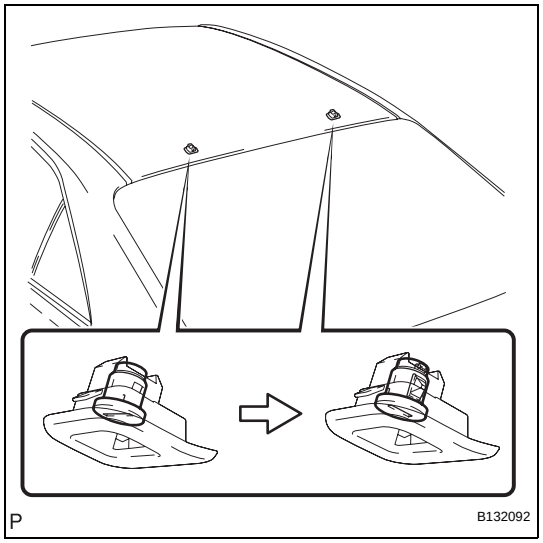
(a) Pull the roof headlining assembly into the vehicle through the rear left door.
(b) Engage the hook, 4 clips, and 2 fasteners.
(c) Connect the sliding roof drive gear connector.
(d) Connect the antenna cord sub-assembly connector and engage the clamp to the rear pillar RH.
(e) Connect the antenna cord sub-assembly connector and engage each clamp to the front pillar RH.
(f) Install the radio setting condenser to the front pillar RH with the bolt.
(g) Connect the No. 1 roof wire connector and engage each clamp to the front pillar LH.



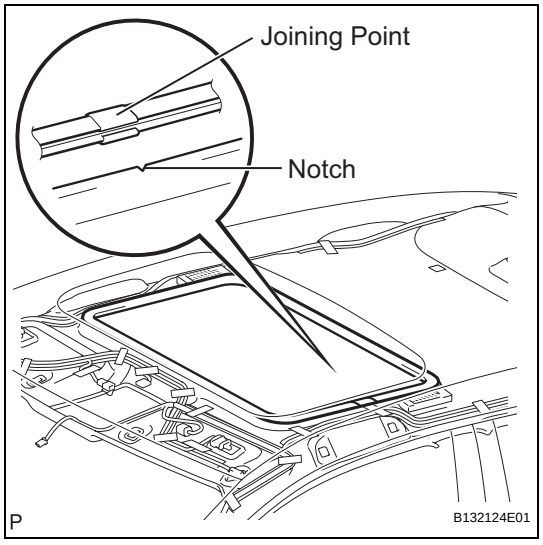


19. INSTALL SUNSHADE TRIM HOLDER (w/ Rear Sunshade)

(a) Engage the 2 claws.



(b) Using a screwdriver, turn the pin of each sunshade trim holder 90° to install the sunshade trim holders.

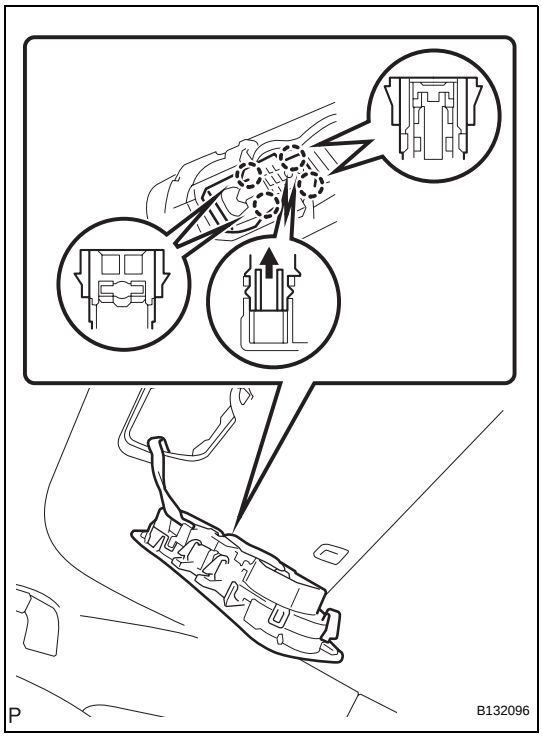


20. INSTALL SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof)

(a) Align the joining point of the moulding with the notch of the roof headlining assembly, and install the sun roof opening trim moulding.

NOTICE:

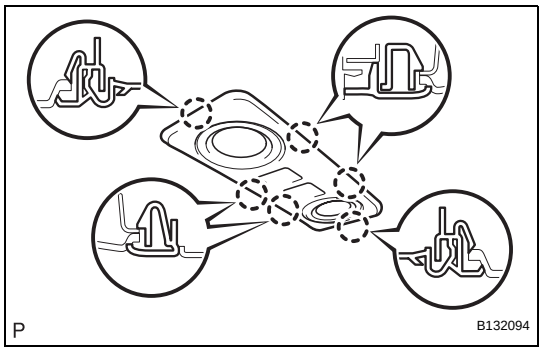
After installation, check that the corners fit correctly.



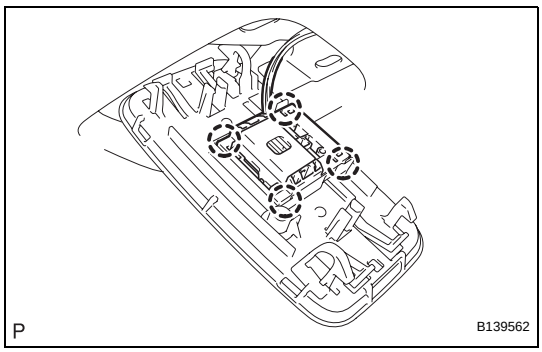
21. INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Push the light bulb holder in the direction indicated by the arrow in the illustration to engage the claw.

(b) Engage the 4 claws.

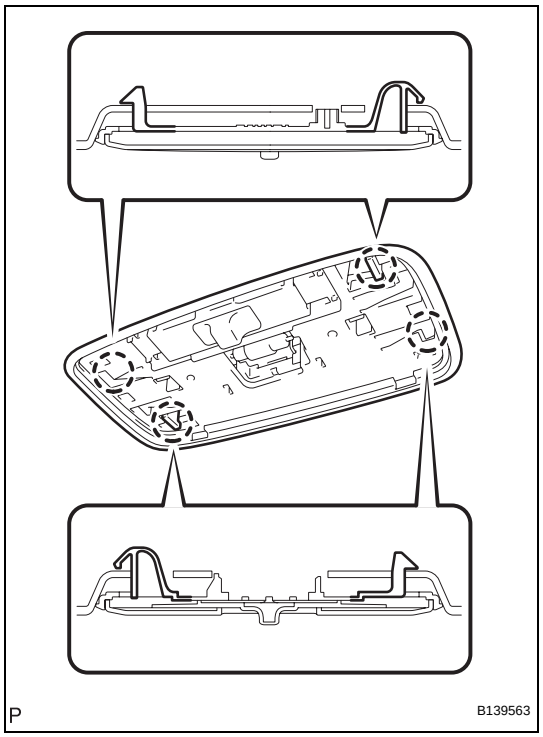


(c) Engage the 6 claws and install the spot light assembly.

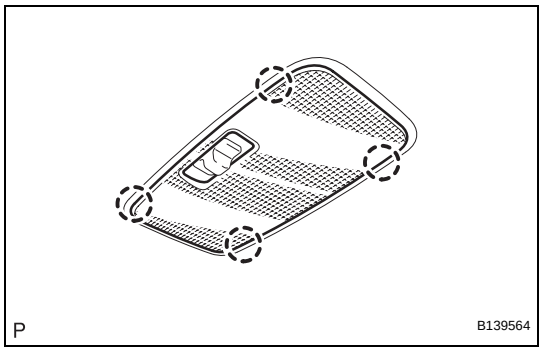


22. INSTALL NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof)

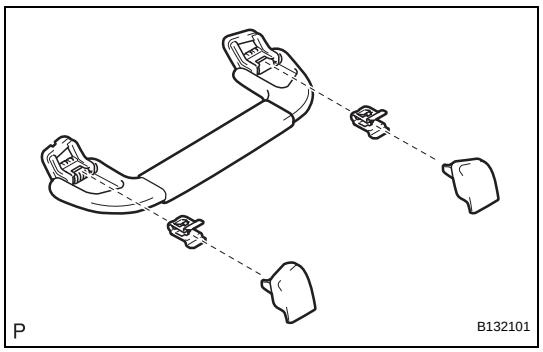
(a) Engage the 4 claws and install the room light switch base to the No. 1 room light assembly.



(b) Engage the 4 claws.

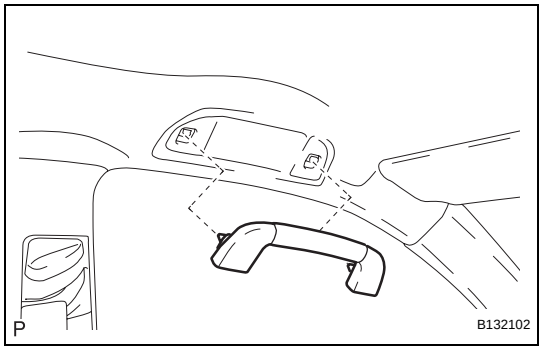


(c) Engage the 4 claws and install the lens cover.



23. INSTALL FRONT ASSIST GRIP SUB-ASSEMBLY

(a) Assemble the front assist grip sub-assembly as shown in the illustration.



(b) Install the front assist grip sub-assembly.
HINT:
Use the same procedures for the RH side and the LH side.

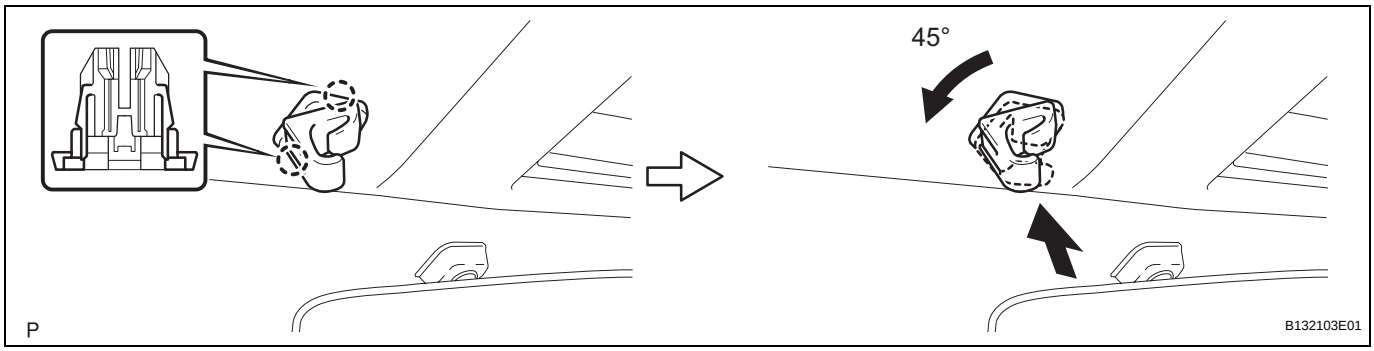
24. INSTALL REAR ASSIST GRIP SUB-ASSEMBLY

HINT:
Use the same procedures for the rear side and the front side.

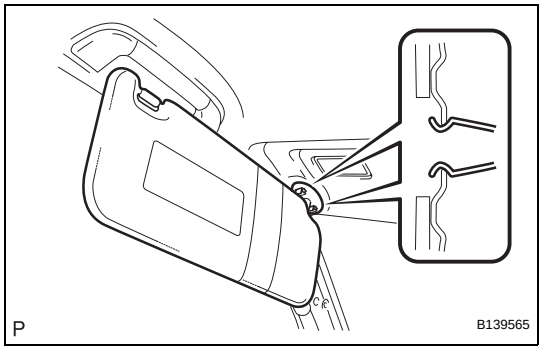
25. INSTALL VISOR HOLDER

(a) Engage the 2 claws.

(b) Push in the visor holder and turn it approximately 45°as shown in the illustration.

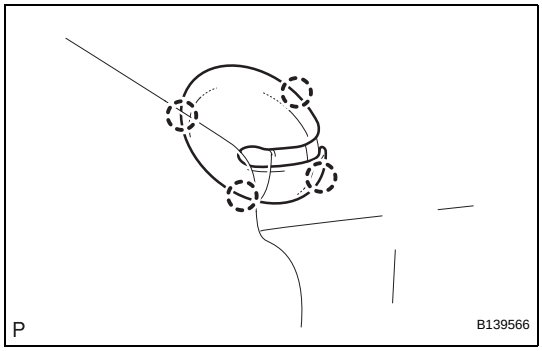


HINT:
Use the same procedures for the RH side and the LH side.



26. INSTALL VISOR ASSEMBLY LH

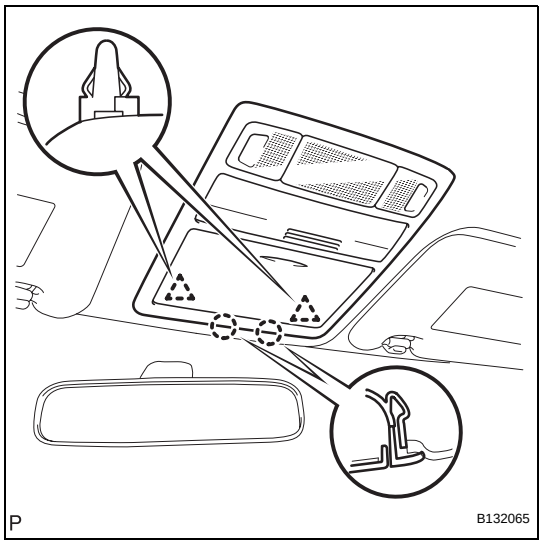
(a) Engage the 2 clips and install the visor assembly LH.



(b) Engage the 4 claws and install the visor bracket cover.

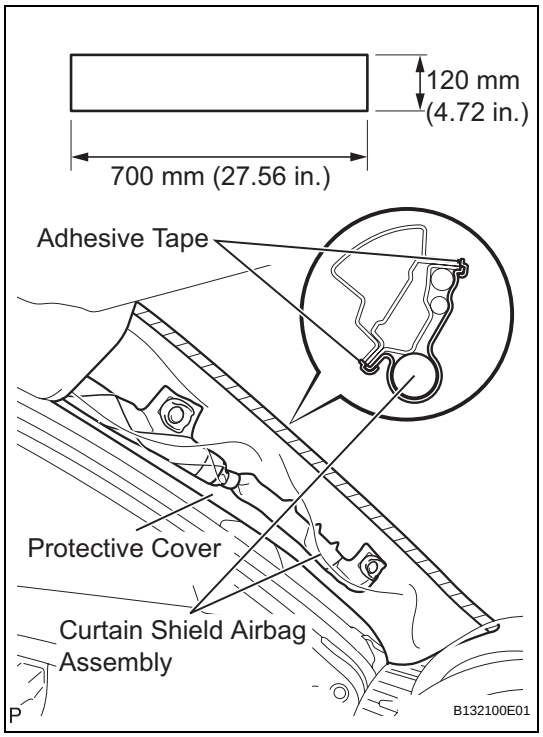
27. INSTALL VISOR ASSEMBLY RH

HINT:
Use the same procedures for the RH side and the LH side.



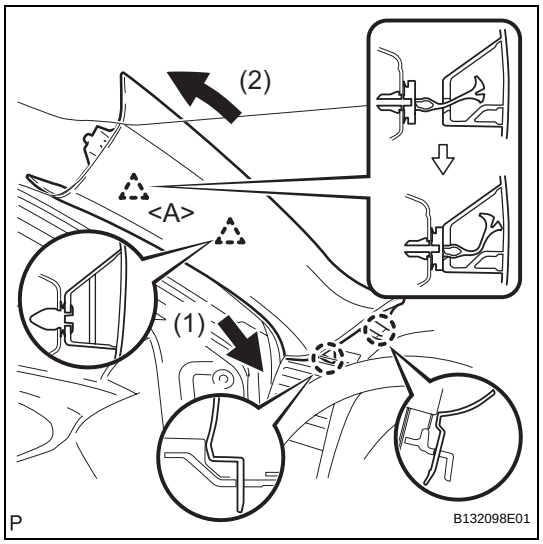
28. INSTALL ROOF CONSOLE BOX ASSEMBLY

(a) Connect the connectors.
(b) Engage the 2 claws and 2 clips, and then install the roof console box assembly.



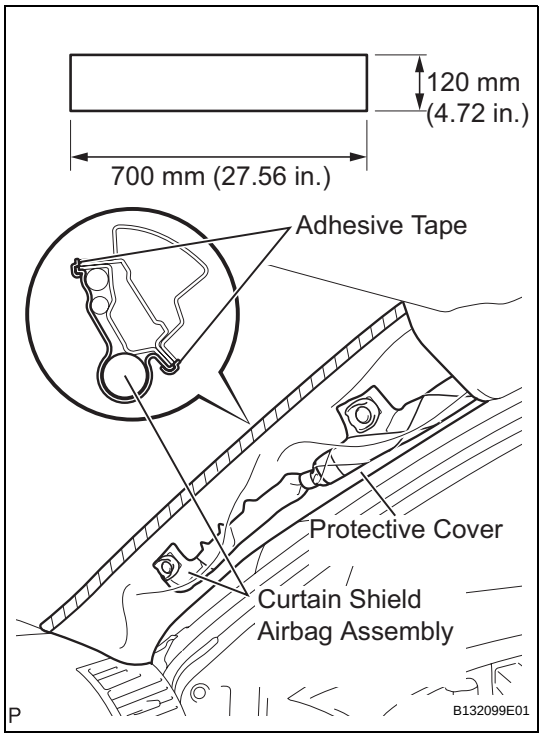
29. INSTALL FRONT PILLAR GARNISH LH

(a) Remove the protective cover.



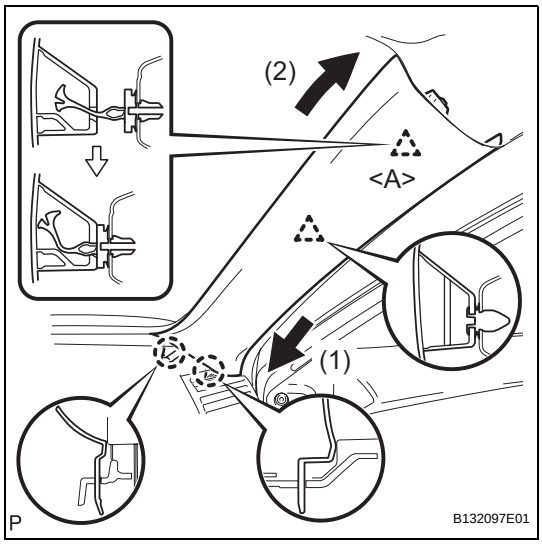
(b) Install a new clip <A> on the front pillar garnish LH.

(c) Engage the 2 claws and 2 clips, then install the front pillar garnish LH.



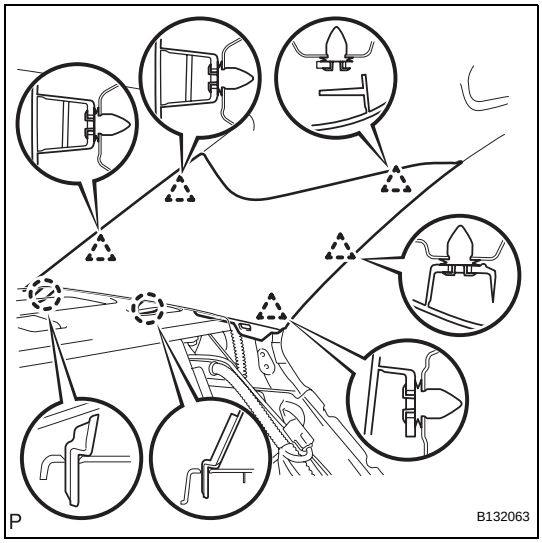
30. INSTALL FRONT PILLAR GARNISH RH

(a) Remove the protective cover.



(b) Install a new clip <A> on the front pillar garnish RH.

(c) Engage the 2 claws and 2 clips, then install the front pillar garnish RH.



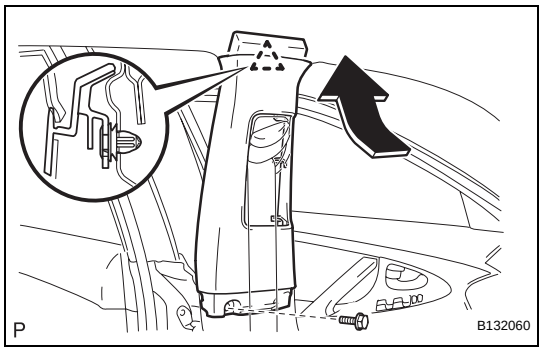
31. INSTALL ROOF SIDE INNER GARNISH LH

(a) Engage the 5 clips and 2 claws, then install the roof side inner garnish LH.

32. INSTALL ROOF SIDE INNER GARNISH RH

HINT:

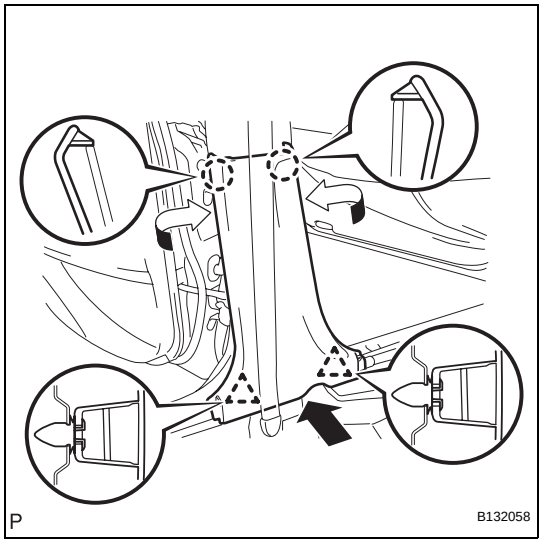
Use the same procedures for the RH side and the LH side.



33. INSTALL UPPER CENTER PILLAR GARNISH LH

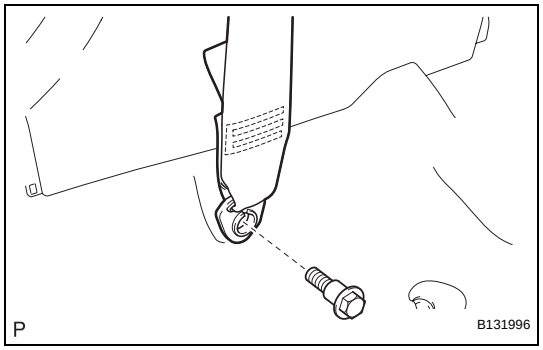
(a) Engage the clip.

(b) Install the upper center pillar garnish LH with the bolt.



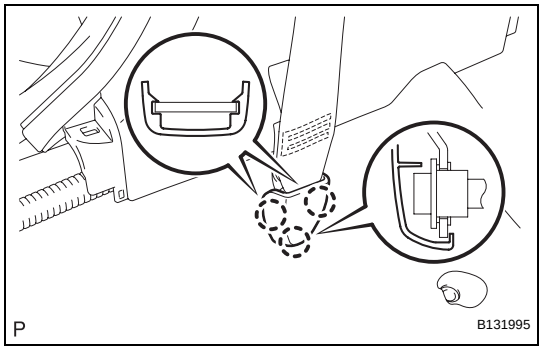
34. INSTALL LOWER CENTER PILLAR GARNISH LH

(a) Engage the 2 claws and 2 clips, then install the lower center pillar garnish LH.



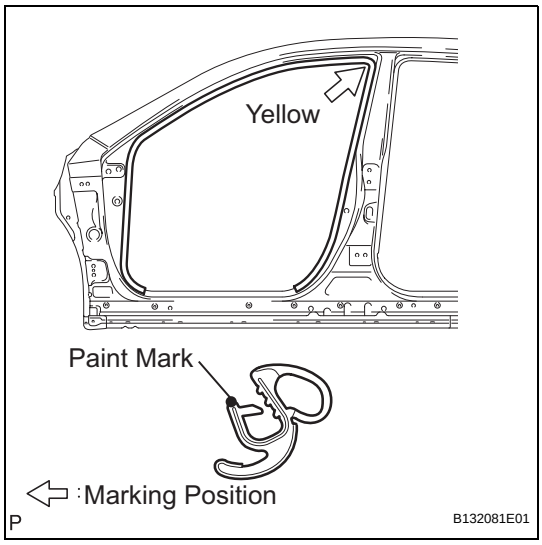
35. CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH

(a) Install the floor end of the front seat outer belt assembly with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)



36. INSTALL LAP BELT OUTER ANCHOR COVER (for LH Side)

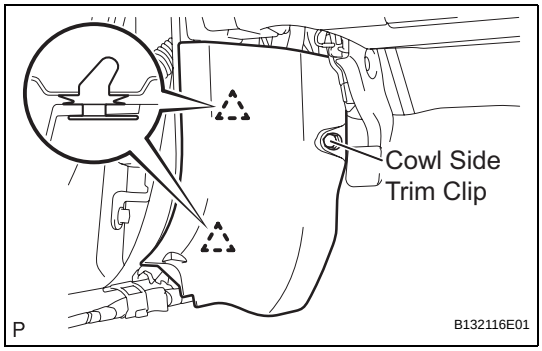
(a) Engage the 3 claws and install the lap belt outer anchor cover.



37. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH

(a) Install the front door opening trim weatherstrip LH as shown in the illustration.

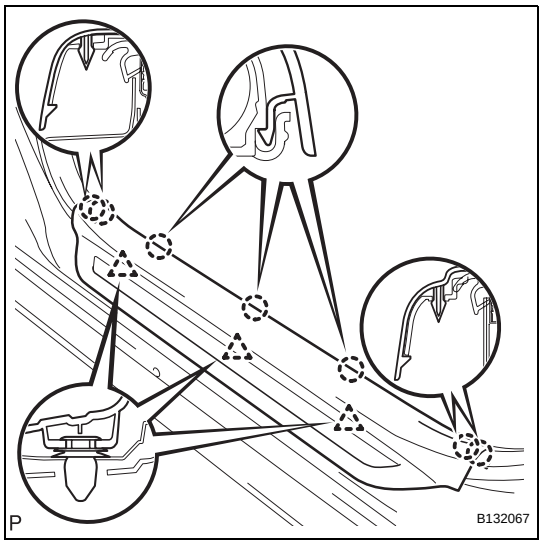
NOTICE:
After installation, check that the corners fit correctly.



38. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH

(a) Engage the 2 clips.

(b) Install the cowl side trim sub-assembly LH with the cowl side trim clip.



39. INSTALL FRONT DOOR SCUFF PLATE LH

(a) Engage the 7 claws and 3 clips, then install the front door scuff plate LH.

40. INSTALL UPPER CENTER PILLAR GARNISH RH

HINT:
Use the same procedures for the RH side and the LH side.

41. INSTALL LOWER CENTER PILLAR GARNISH RH

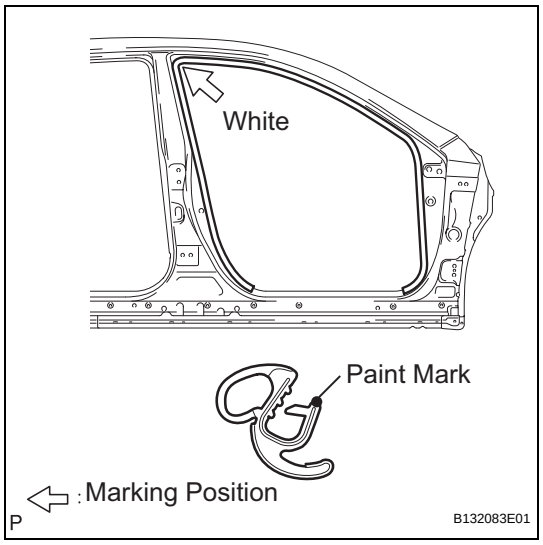
HINT:
Use the same procedures for the RH side and the LH side.

42. CONNECT FRONT SEAT OUTER BELT ASSEMBLY RH

HINT:
Use the same procedures for the RH side and the LH side.

43. INSTALL LAP BELT OUTER ANCHOR COVER (for RH Side)

HINT:
Use the same procedures for the RH side and the LH side.



44. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
    (a) Install the front door opening trim weatherstrip RH as shown in the illustration.
    NOTICE:
    After installation, check that the corners fit correctly.

45. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH**
    HINT:
    Use the same procedures for the RH side and the LH side.

46. **INSTALL FRONT DOOR SCUFF PLATE RH**
    HINT:
    Use the same procedures for the RH side and the LH side.

47. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-54)**

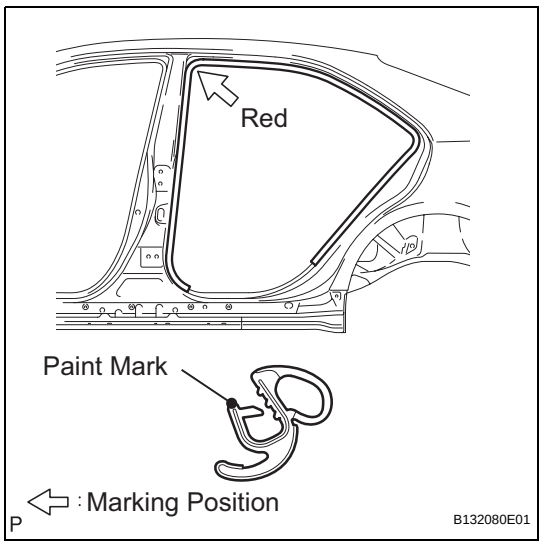
48. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-55)**

49. **INSTALL DOOR ASSIST GRIP COVER LH (See page ED-56)**

50. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-56)**

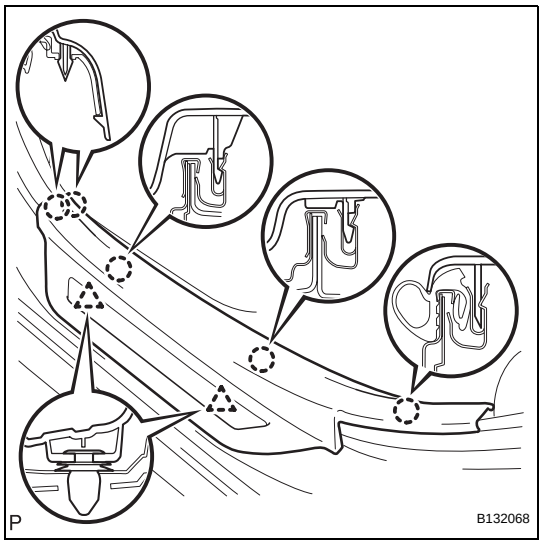
51. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)**

52. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.

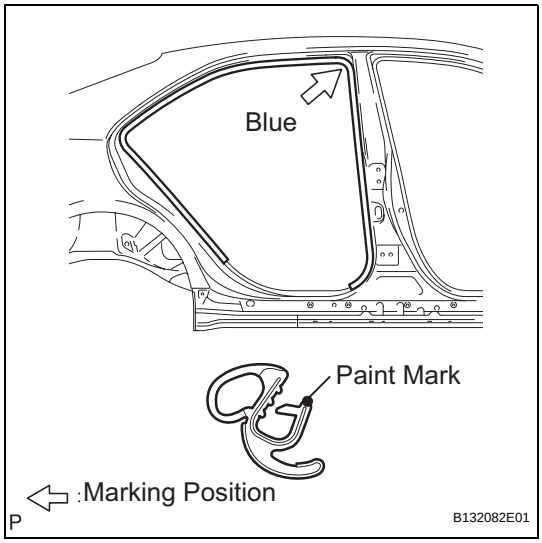


53. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH**
    (a) Install the rear door opening trim weatherstrip LH as shown in the illustration.
    NOTICE:
    After installation, check that the corners fit correctly.

IR



54. **INSTALL REAR DOOR SCUFF PLATE LH**
    (a) Engage the 5 claws and 2 clips, then install the rear door scuff plate LH.



55. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH**
    (a) Install the rear door opening trim weatherstrip RH as shown in the illustration.
    NOTICE:
    After installation, check that the corners fit correctly.

56. **INSTALL REAR DOOR SCUFF PLATE RH**
    HINT:
    Use the same procedures for the RH side and the LH side.

57. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**

58. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**

59. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**

60. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**

61. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**

62. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.

63. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**

64. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**

65. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**

66. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**

67. **INSTALL REAR SEAT HEADREST ASSEMBLY**

68. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-84)**

69. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-41)**

70. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Power Seat) (See page SE-42)**

71. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-42)**

72. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

73. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-24)**

74. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-25)**

75. **INSTALL SEAT TRACK COVER LH (for Manual Seat) (See page SE-25)**

76. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

77. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

78. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

79. **INSTALL SEAT TRACK COVER RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

80. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

81. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

82. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

83. **INSTALL SEAT TRACK COVER RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

84. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

85. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**

86. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)**
(See page RS-242)

87. **INSPECT SRS WARNING LIGHT**
(See page RS-32)

88. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat)**
(See page SE-42)

89. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

HOW TO USE THIS MANUAL

GENERAL INFORMATION

1. GENERAL DESCRIPTION

(a) This manual is written in accordance with SAE J2008.
  (1) Diagnosis
  (2) Removing / Installing, Replacing, Disassembling / Reassembling, Checking and Adjusting
  (3) Final Inspection

(b) The following procedures are omitted from this manual. However, these procedures must be performed.
  (1) Use a jack or lift to perform operations
  (2) Clean all removed parts
  (3) Perform a visual check

2. INDEX

(a) An alphabetical INDEX section is provided at the end of the manual as a reference to help you find the item to be repaired.

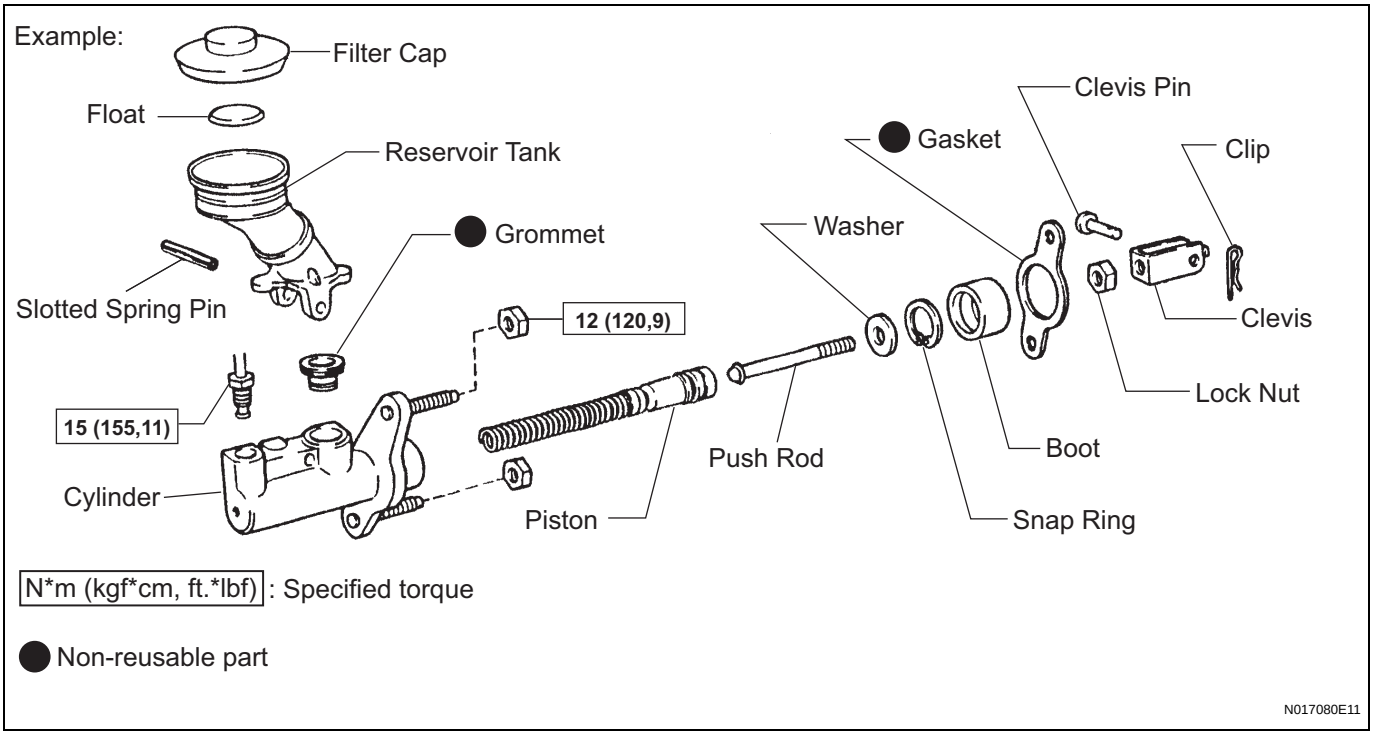
3. PREPARATION

(a) Use of Special Service Tools (SST) and Special Service Materials (SSM) may be required, depending on the repair procedure. Be sure to use SST and SSM when they are required and follow the working procedure properly. A list of SST and SSM is in the "Preparation" section of this manual.

4. REPAIR PROCEDURES

(a) A component illustration is placed under the title where necessary.

(b) Non-reusable parts, grease application areas, precoated parts and torque specifications are noted in the component illustrations.
The following illustration is an example.



(c) Torque specifications, grease application areas and non-reusable parts are emphasized in the procedures.
HINT:
There are cases where such information can only be explained by using an illustration. In these cases, torque, oil and other information are described in the illustration.

(d) Only items with key points are described in the text. What to do and other details are explained using illustrations next to the text. Both the text and illustrations are accompanied by standard values and notices.

Illustration	What to do and where to do it
Task heading	What work will be performed
Explanation text	How to perform the task Also has information such as specifications and warnings, which are written in boldface text

(e) Illustrations of similar vehicle models are sometimes used. In these cases, minor details may be different from the actual vehicle.

(f) Procedures are presented in a step-by-step format.

5. SERVICE SPECIFICATIONS

(a) SPECIFICATIONS are presented in boldface text throughout the manual. The specifications are also found in the "Service Specifications" section for reference.

6. TERM DEFINITIONS

CAUTION	Possibility of injury to you or other people.
NOTICE	Possibility of damage to components being repaired.
HINT	Provides additional information to help you perform repairs.

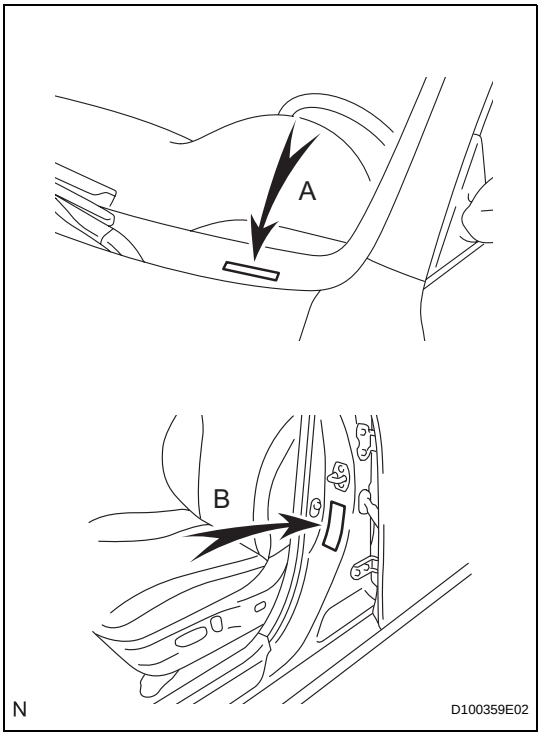
7. INTERNATIONAL SYSTEM OF UNITS

(a) The units used in this manual comply with the International System of Units (SI UNIT) standard. Units from the metric system and the English systems are also provided.
Example:
Torque: 30 N*m (310 kgf*cm, 22 ft.*lbf)

IN

IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION AND SERIAL NUMBERS

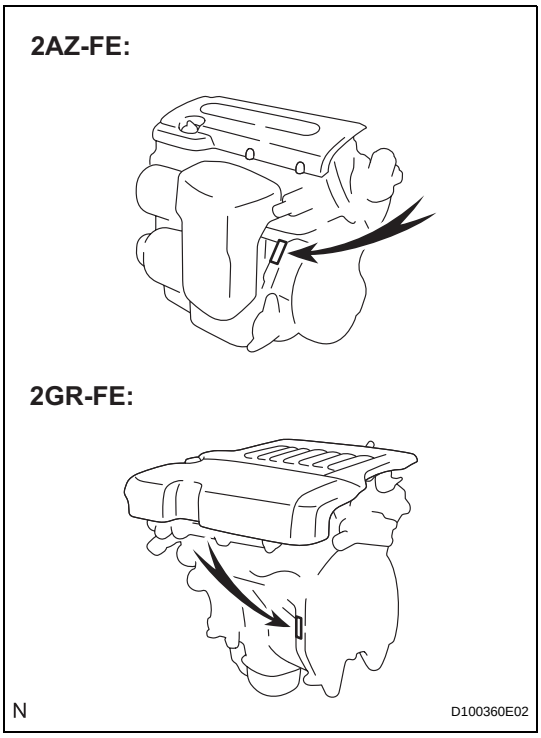


1. VEHICLE IDENTIFICATION NUMBER

(a) The vehicle identification number is stamped on the vehicle body and on the certification label, as shown in the illustration.

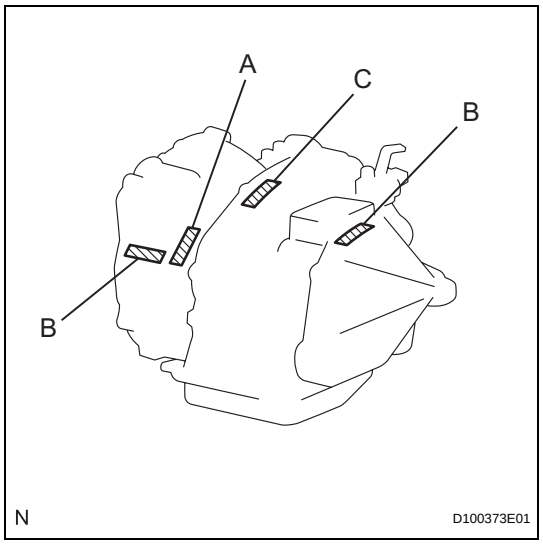
A:
Vehicle Identification Number

B:
Certification Label



2. ENGINE SERIAL NUMBER AND TRANSAXLE SERIAL NUMBER

(a) The engine serial number is stamped on the cylinder block of the engine as shown in the illustration.



(b) The transaxle serial number is stamped on the housing as shown in the illustration.

A:
E351E Transaxle Serial Number

B:
U250E Transaxle Serial Number

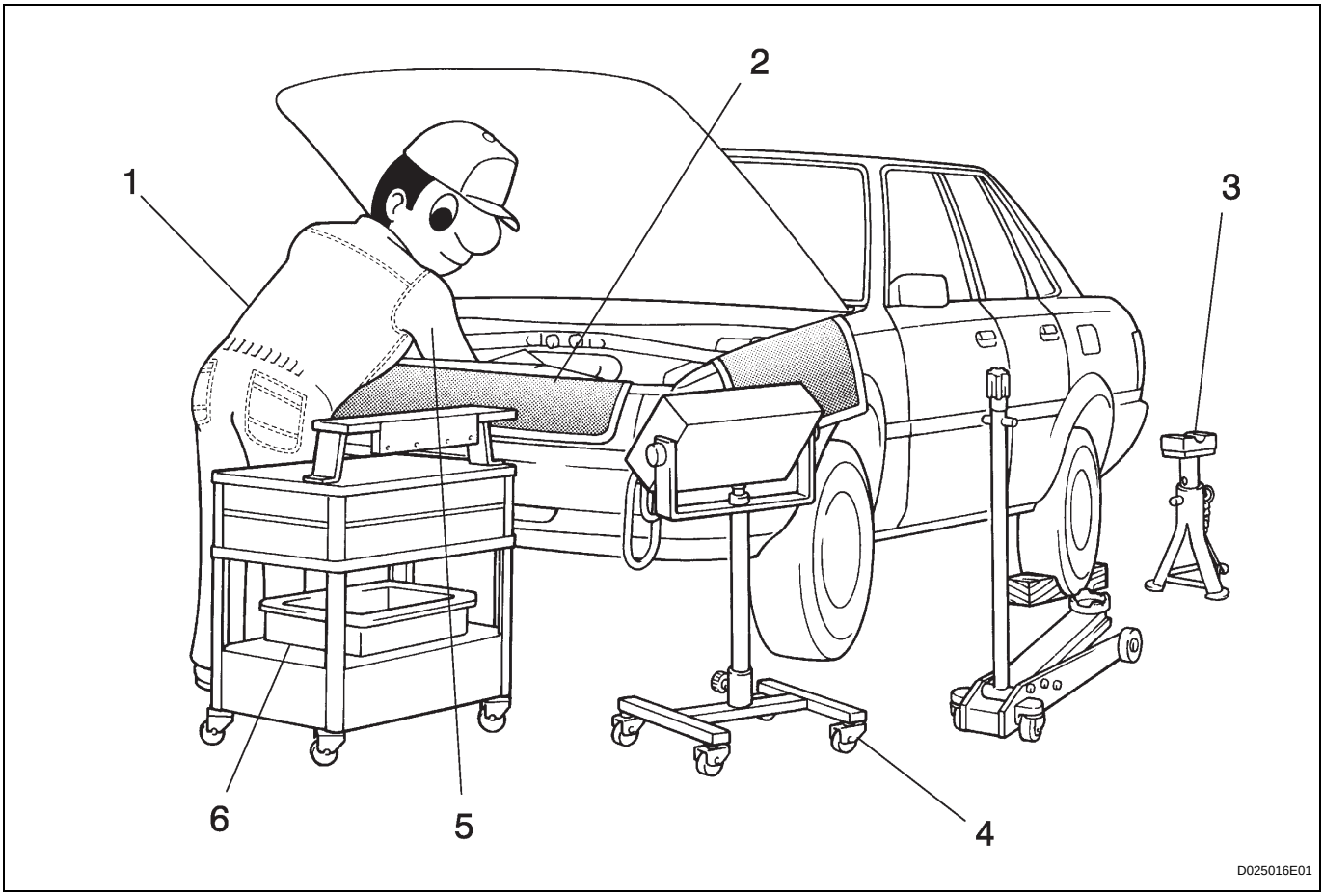
C:
U660E Transaxle Serial Number

REPAIR INSTRUCTION

PRECAUTION

1. BASIC REPAIR HINT

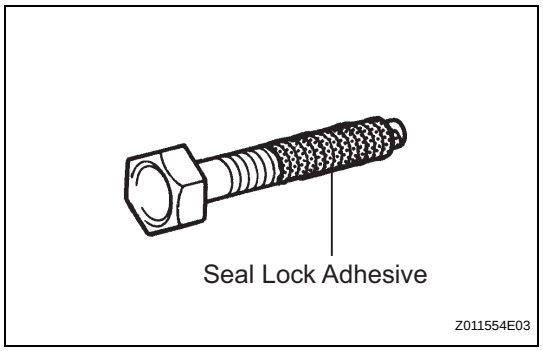
(a) HINTS ON OPERATIONS



1	Attire	• Always wear a clean uniform. • Hat and safety shoes must be worn.
2	Vehicle protection	Prepare a grille cover, fender cover, seat cover and floor mat before starting the operation.
3	Safety operation	• When working with 2 or more persons, be sure to check safety for one another. • When working with the engine running, make sure to provide ventilation for exhaust fumes in the workshop. • If working on high temperature, high pressure, rotating, moving, or vibrating parts, wear appropriate safety equipment and take extra care not to injure yourself or others. • When jacking up the vehicle, be sure to support the specified location with a safety stand. • When lifting up the vehicle, use appropriate safety equipment.
4	Preparation of tools and measuring gauge	Before starting operation, prepare a tool stand, SST, gauge, oil and parts for replacement.
5	Removal and installation, disassembly and assembly operations	• Diagnose with a thorough understanding of proper procedures and of the reported problem. • Before removing the parts, check the general condition of the assembly and for deformation and damage. • When the assembly is complicated, take notes. For example, note the total number of electrical connections, bolts, or hoses removed. Add matchmarks to insure reassembly of components in the original positions. Temporarily mark hoses and their fittings if needed. • Clean and wash the removed parts if necessary and assemble them after a thorough check.

6	Removed parts	• Place the removed parts in a separate box to avoid mixing them up with the new parts or contaminating the new parts. • For non-reusable parts such as gaskets, O-rings, and self-locking nuts, replace them with new ones as instructed in this manual. • Retain the removed parts for customer inspection, if requested.

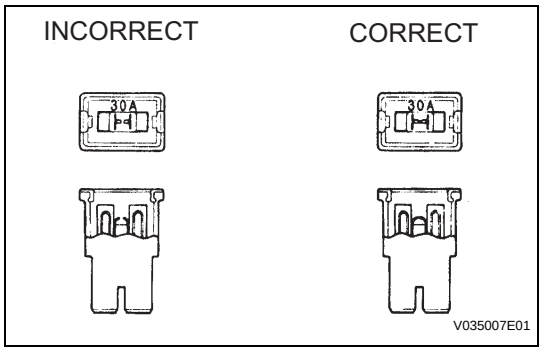
(b) JACKING UP AND SUPPORTING VEHICLE
(1) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.



(c) PRECOATED PARTS
(1) Precoated parts are bolts and nuts that are coated with a seal lock adhesive at the factory.
(2) If a precoated part is retightened, loosened or moved in any way, it must be recoated with the specified adhesive.
(3) When reusing a precoated part, clean off the old adhesive and dry the part with compressed air. Then apply new seal lock adhesive appropriate to that part.
(4) Some seal lock agents harden slowly. You may have to wait for the seal lock adhesive to harden.

(d) GASKETS
(1) When necessary, use a sealer on gaskets to prevent leaks.

(e) BOLTS, NUTS AND SCREWS
(1) Carefully follow all the specifications for tightening torques. Always use a torque wrench.



(f) FUSES
(1) When inspecting a fuse, check that the wire of the fuse is not broken.
(2) When replacing fuses, be sure that the new fuse has the correct amperage rating. Do not exceed the rating or use one with a lower rating.

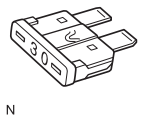
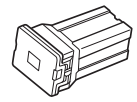
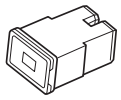
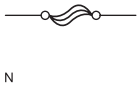
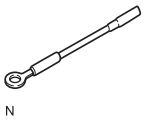
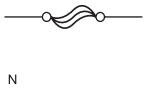
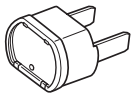
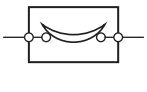
Illustration	Symbol	Part Name	Abbreviation
 N	N	FUSE	FUSE

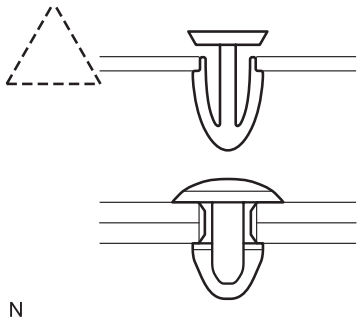
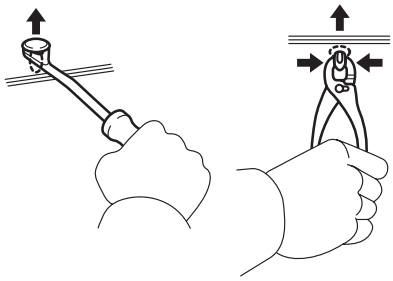
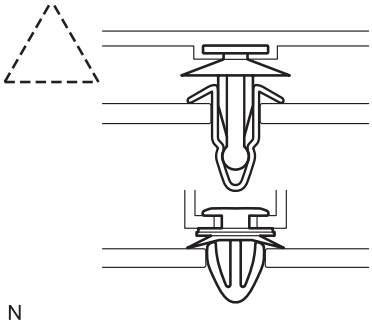
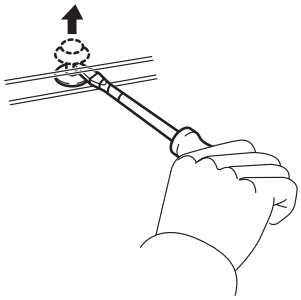
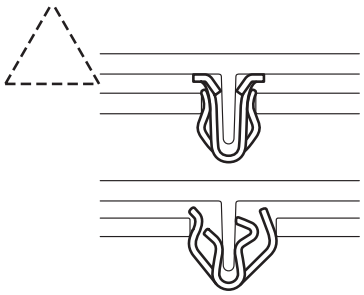
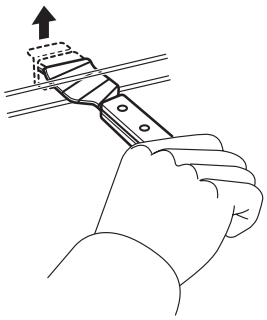
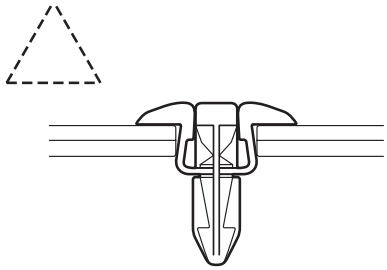
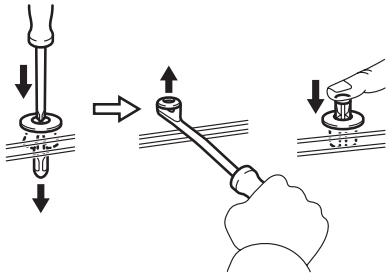
Illustration	Symbol	Part Name	Abbreviation
 N	N	MEDIUM CURRENT FUSE	M-FUSE
 N	 N	HIGH CURRENT FUSE	H-FUSE
 N	 N	FUSIBLE LINK	FL
 N	 N	CIRCUIT BREAKER	CB

(g) CLIPS

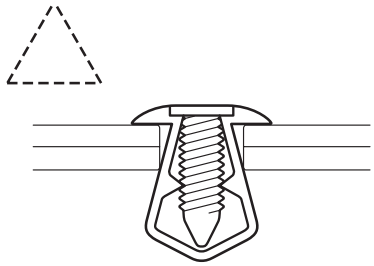
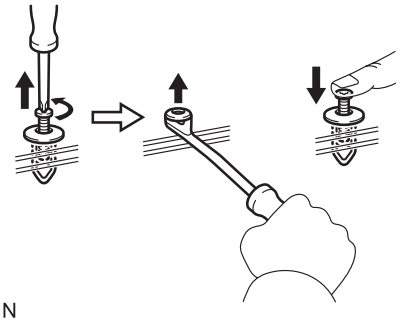
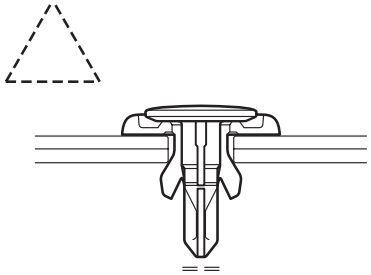
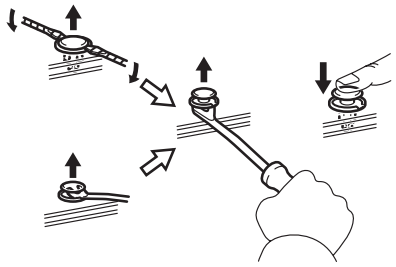
(1) The removal and installation methods of typical clips used for vehicle body parts are shown in the table below.

HINT:

If clips are damaged during work, always replace the damaged clip with a new one.

Shape (Example)	Removal/Installation
 N	Remove clips with clip remover or pliers.  N
 N	Remove fasteners with clip remover or screwdriver.  N
 N	Remove clips with wide scraper to prevent panel damage.  N
 N	Remove clips by pushing center pin through and prying out shell.  N

IN

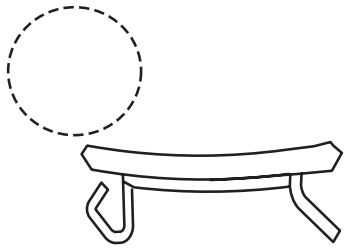
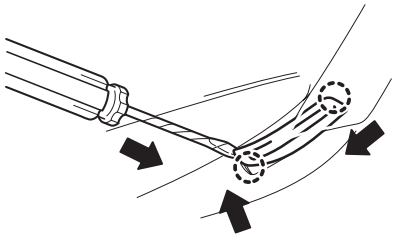
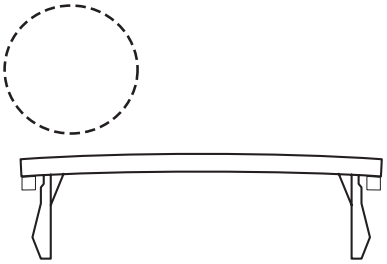
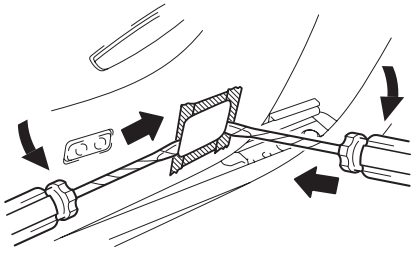
Shape (Example)	Removal/Installation
 N	Remove clips by unscrewing center pin and prying out shell.  N
 N	Remove clips by prying out pin and then prying out shell.  N

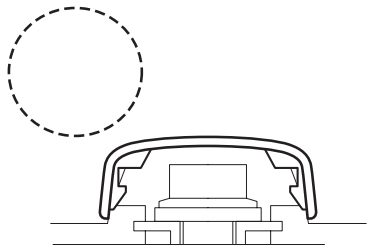
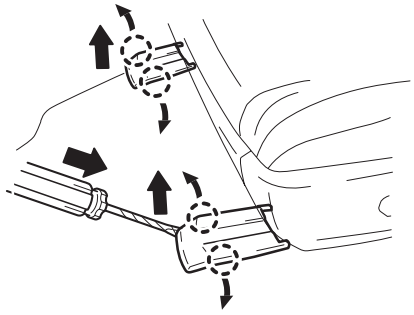
(h) CLAWS

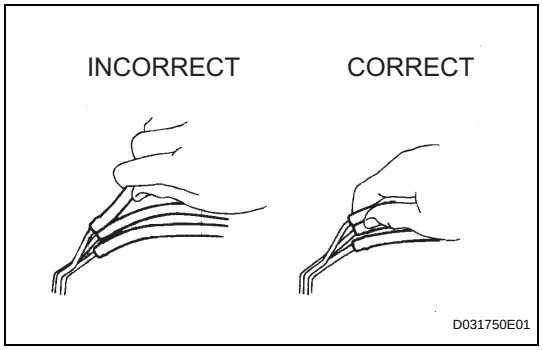
(1) The removal and installation methods of typical claws used for vehicle body parts are shown in the table below.

HINT:

If claws are damaged during a procedure, always replace the damaged claws with a new caps or covers.

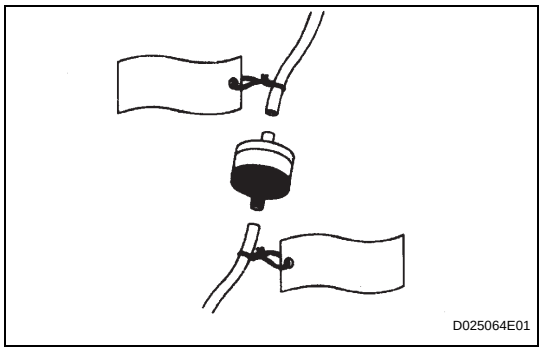
Shape (Example)	Illustration	Procedures
		1. Using a screwdriver, detach the claws and remove the cap or covers.
		1. Using a screwdriver, detach the claws and remove the cap or covers.

Shape (Example)	Illustration	Procedures
		1. Using a screwdriver, detach the claws and remove the cap or covers.



(i) REMOVAL AND INSTALLATION OF VACUUM HOSES

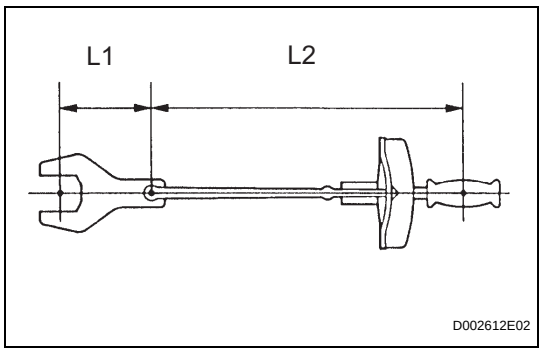
(1) To disconnect a vacuum hose, pull and twist from the end of the hose. Do not pull from the middle of the hose as this may damage the hose.



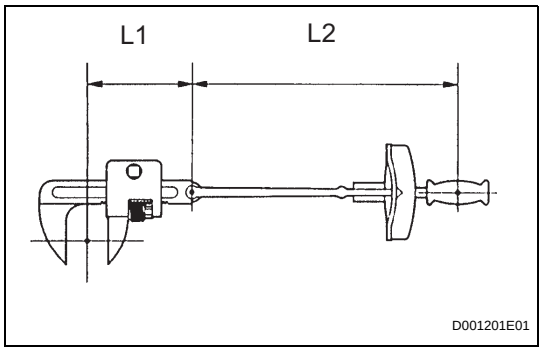
(2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.

(3) After completing any hose related repairs, double check that the vacuum hoses are properly connected. The label under the hood shows the proper layout.

(4) When using a vacuum gauge, never force the hose onto a connector that is too large. If a hose has been stretched, air may leak. Use a step-down adapter if necessary.



(j) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL



(1) Use the formula below to calculate special torque values for situations where SST or an extension tool is combined with the torque wrench.

Formula:

T' = L2/(L1 + L2) * T

T'	**Reading of torque wrench {N*m (kgf*cm, ft.*lbf)}**
T	**Torque {N*m (kgf*cm, ft.*lbf)}**
L1	**Length of SST or extension tool {cm (in.)}**
L2	**Length of torque wrench {cm (in.)}**

NOTICE:

If an extension tool or SST is combined with a torque wrench and the wrench is used to tighten to a torque specification in this manual, the actual torque will be excessive and parts will be damaged.

2. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

The CAMRY is equipped with a Supplemental Restraint System (SRS).

CAUTION:

Failure to carry out the service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing and lead to serious injury. Furthermore, if a mistake is made when servicing SRS, it is possible that the SRS may fail to operate properly. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following section carefully.

(a) GENERAL NOTICE

(1) As malfunctions of the SRS are difficult to confirm, the Diagnostic Trouble Codes (DTCs) become the most important source of information when troubleshooting. When troubleshooting the SRS, always check the DTCs before disconnecting the battery.

(2) Work must be started at least 90 seconds after the ignition switch is turned off and after the cable is disconnected from the negative (-) battery terminal.
The SRS is equipped with a back-up power source. If work is started within 90 seconds after turning the ignition switch off and disconnecting the cable from the negative (-) battery terminal, the SRS may deploy.
When the cable is disconnected from the negative (-) battery terminal, clock and audio system memory is erased. Before starting work, make a note of the settings of each memory system. When work is finished, reset the clock and audio system as before.
CAUTION:
Never use a back-up power source (battery or other) to avoid erasing the system memory. The back-up power source may inadvertently power the SRS and cause it to deploy.

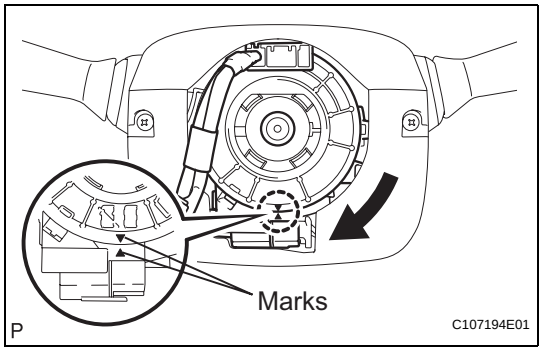
(3) In minor collisions where the SRS does not deploy, the steering pad, front passenger airbag assembly, driver side knee airbag assembly, front seat side airbag assembly, curtain shield airbag assembly and front seat outer belt assembly should be inspected before further use of the vehicle.
(See page RS-352 for steering pad)
(See page RS-399 for front passenger airbag assembly)
(See page RS-371 for driver side knee airbag assembly)
(See page RS-432 for front seat side airbag assembly)
(See page RS-426 for curtain shield airbag assembly)
(See page SB-23 for front seat outer belt assembly)

(4) Never use SRS parts from another vehicle. When replacing parts, use new parts.

(5) Before repairs, remove the airbag sensor assemblies if impacts are likely to be applied to the sensor during repairs.

(6) Never disassemble and attempt to repair all airbag sensor assemblies and all airbag assemblies.
1. Steering pad
2. Front passenger airbag assembly
3. Driver side knee airbag assembly
4. Front seat side airbag assembly
5. Curtain shield airbag assembly
6. Front seat outer belt assembly

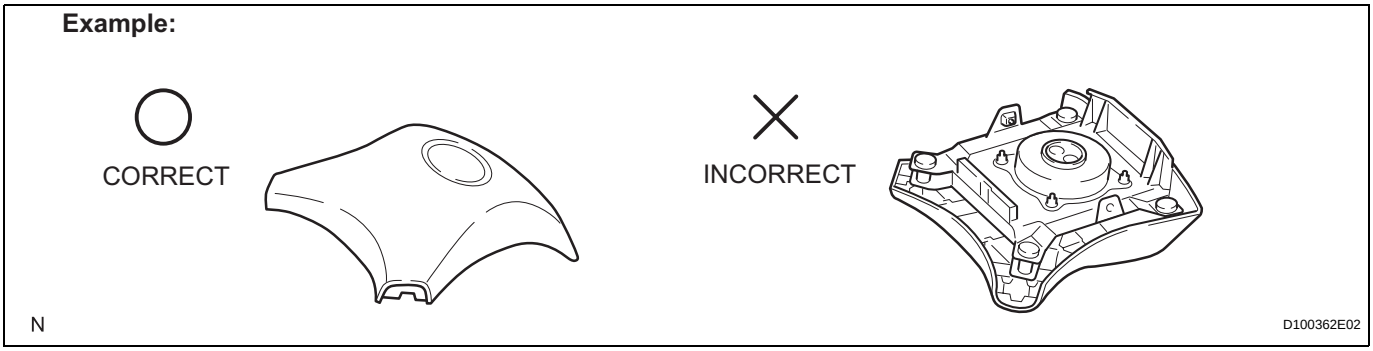
(7) Replace the airbag sensor assemblies and the airbag assemblies if: 1) damage has occurred from being dropped, or 2) cracks, dents or other defects in the case, bracket or connector are present.
(8) Do not directly expose the airbag sensor assembly or airbag assembly to hot air or flames.
(9) Use a voltmeter/ohmmeter with high impedance (minimum=10 kΩ) for troubleshooting electrical circuits.
(10) Information labels are attached to the SRS components. Follow the instructions on the labels.
(11) After work on the SRS is completed, check the SRS warning light.



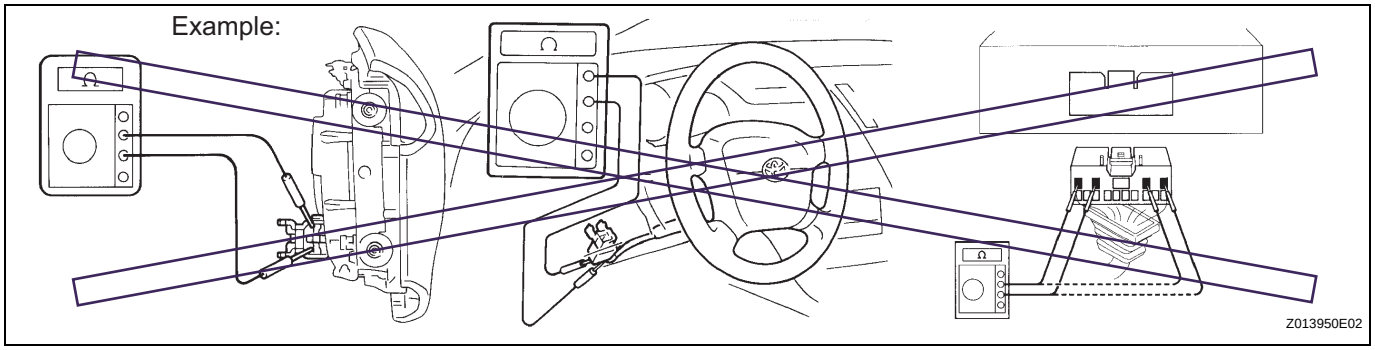
(b) SPIRAL CABLE
(1) The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, as cable disconnection and other problems may occur. Refer to the information about correct installation of the steering wheel (See page RS-366).

(c) STEERING PAD
(1) Always place a removed or new steering pad surface upward as shown in the illustration. Placing the horn button with the pad surface facing down could cause a serious accident if the airbag inflates. Also, do not place anything on top of the horn button.

Example:



(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



(3) Grease or detergents of any kind should not be applied to the horn button.

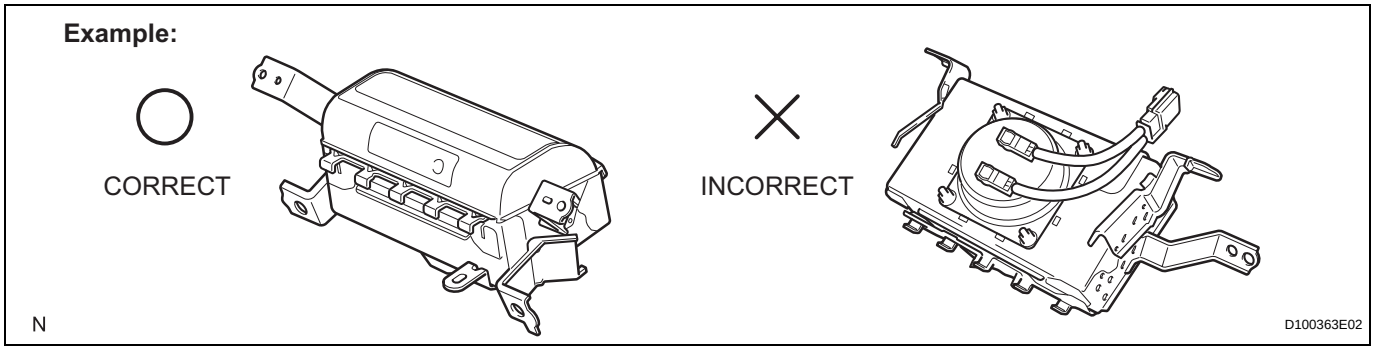
(4) Store the horn button assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

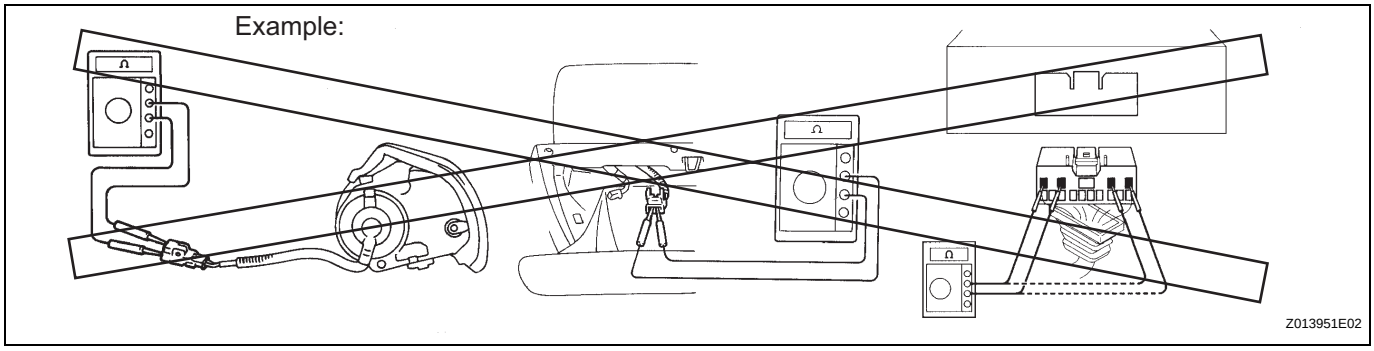
(6) When disposing of the vehicle or the horn button assembly by itself, the airbag should be deployed using SST before disposal (See page RS-352). Activate the airbag in a safe place away from electrical noise.

(d) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always place a removed or new front passenger airbag assembly with the pad surface facing upward as shown in the illustration. Placing the airbag assembly with the airbag inflation direction facing down could cause a serious accident if the airbag inflates.

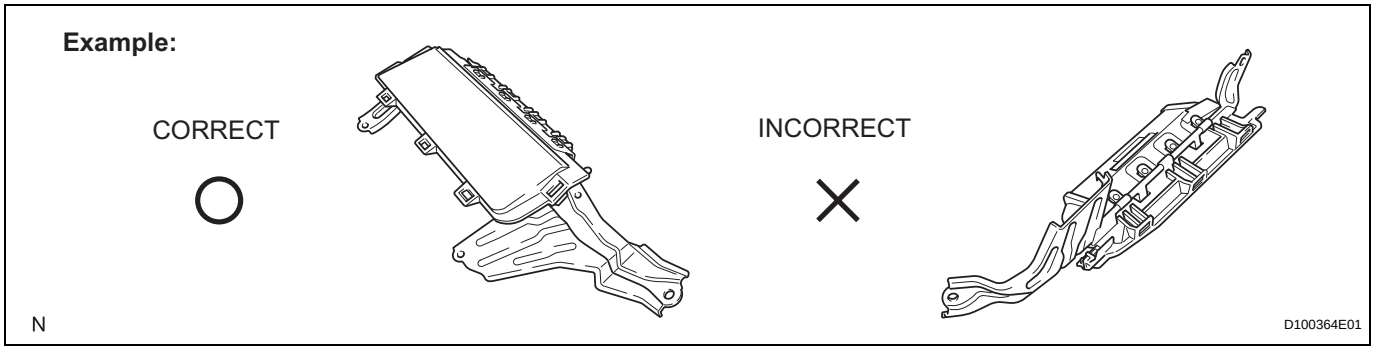


(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.

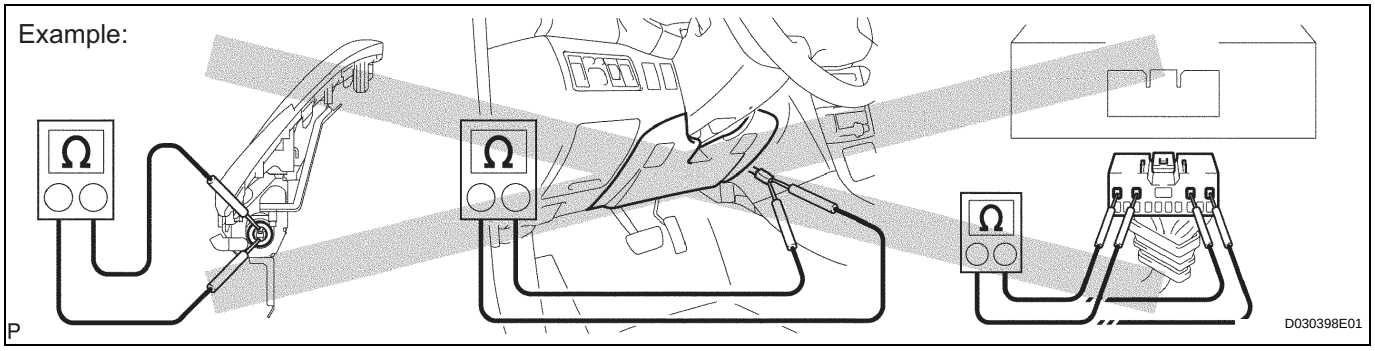


(3) Grease or detergents of any kind should not be applied to the front passenger airbag assembly.
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.
(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
(6) When disposing of the vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (See page RS-399). Activate the airbag in a safe place away from electrical noise.

(e) DRIVER SIDE KNEE AIRBAG ASSEMBLY
(1) Always place a removed or new knee airbag assembly with the airbag inflation direction facing upward. Placing the airbag assembly with the airbag inflation direction facing downward could cause a serious accident if the airbag inflates.

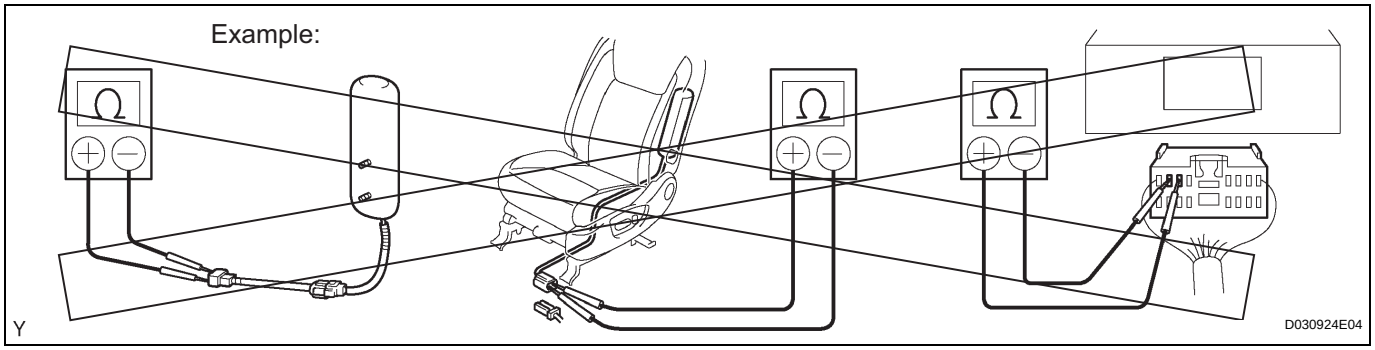


(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



(3) Grease or detergents of any kind should not be applied to the knee airbag assembly.
(4) Store the knee airbag assembly where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.
(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.
(6) When disposing of a vehicle or knee airbag assembly unit by itself, the airbag should be inflated using SST before disposal (See page RS-371). Activate the airbag in a safe place away from electrical noise.

(f) FRONT SEAT SIDE AIRBAG ASSEMBLY
(1) Always place a removed or new front seat side airbag assembly with the airbag inflation direction facing up.
(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



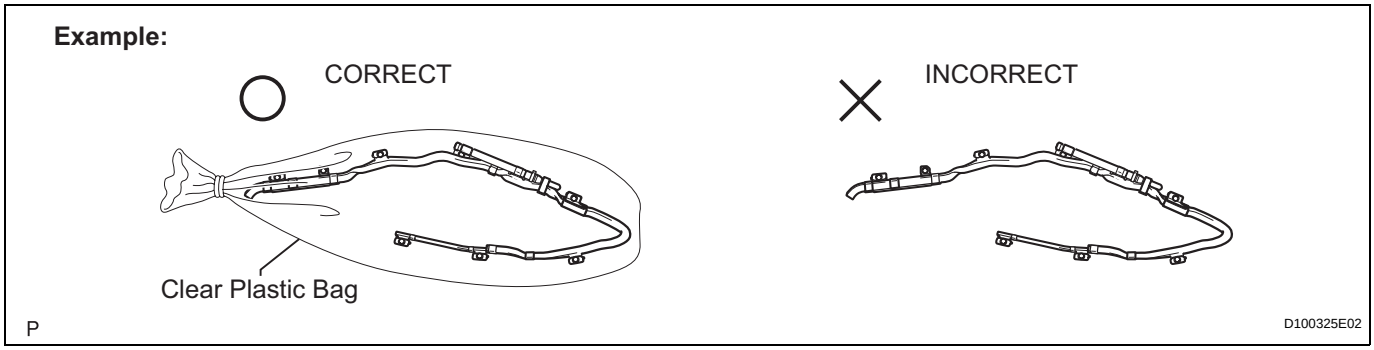
(3) Grease or detergents of any kind should not be applied to the front seat side airbag assembly.
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (See page RS-432). Activate the airbag in a safe place away from electrical noise.

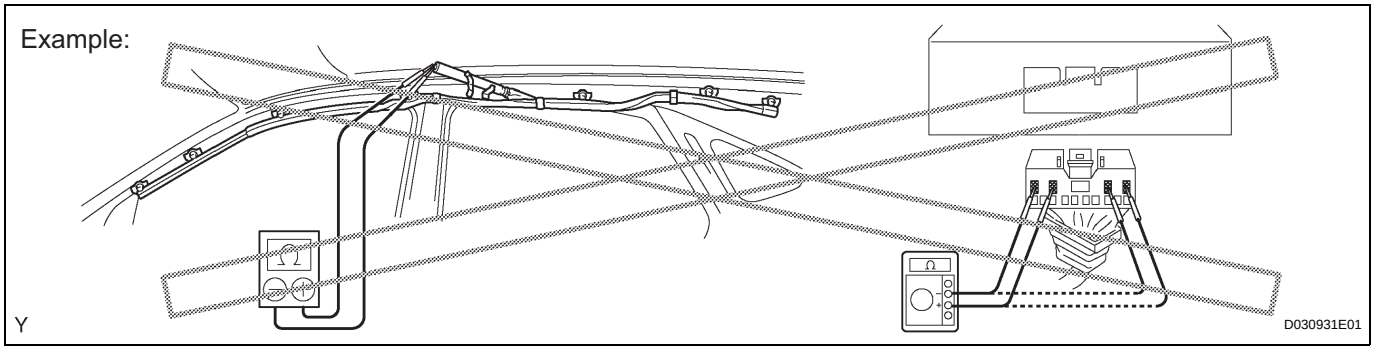
(g) CURTAIN SHIELD AIRBAG ASSEMBLY

(1) Always place a removed or new curtain shield airbag assembly in a clear plastic bag, and keep it in a safe place.



CAUTION:
The plastic bag is not reusable.
NOTICE:
Never disassemble the curtain shield airbag assembly.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to inflate, which could cause serious injury.



(3) Grease or detergents of any kind should not be applied to the curtain shield airbag assembly.

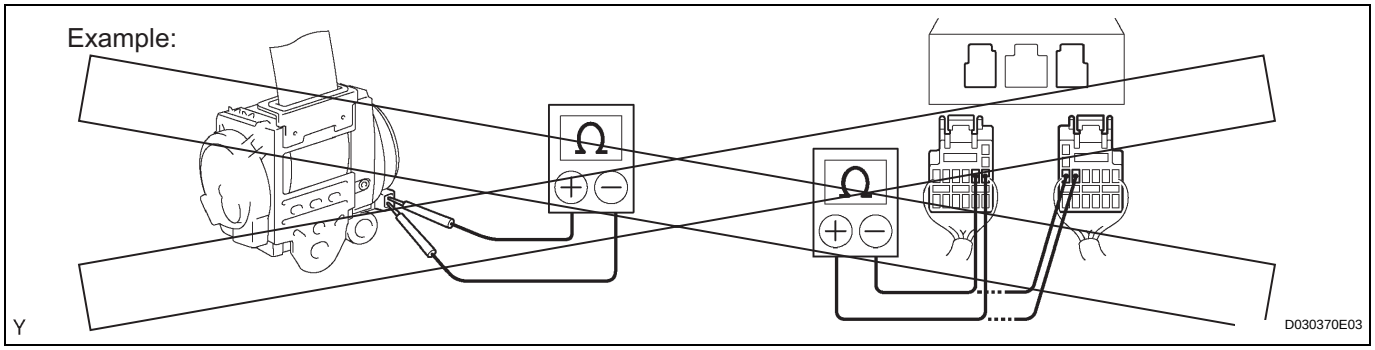
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (4 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal (See page RS-426). Activate the airbag in a safe place away from electrical noise.

(h) FRONT SEAT OUTER BELT ASSEMBLY AND REAR SEAT OUTER BELT ASSEMBLY (SEAT BELT PRETENSIONER)

(1) Never measure the resistance of the seat outer belt. This may cause the pretensioner of the seat belt to activate, which could cause serious injury.



(2) Never disassemble the seat outer belt.

(3) Never install the seat outer belt on another vehicle.

(4) Store the seat outer belt in an area where the ambient temperature is below 80°C (176°F), the humidity is not high and there is no electrical noise.

(5) When using electric welding anywhere on the vehicle, disconnect the airbag ECU connectors (2 pins). These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

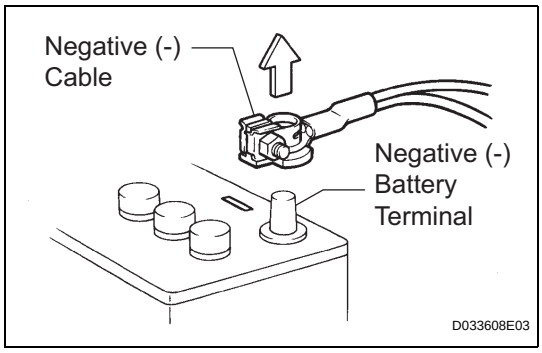
(6) When disposing of a vehicle or the seat outer belt unit by itself, the seat outer belt should be activated before disposal (See page SB-23). Activate the seat outer belt in a safe place away from electrical noise.

(7) As the seat outer belt is hot after being activated, allow some time for it to cool down sufficiently before disposal. Never apply water to cool down the seat outer belt.

(8) Grease, detergents, oil or water should not be applied to the front seat outer belt.

(i) AIRBAG SENSOR ASSEMBLY
(1) Never reuse an airbag sensor assembly that has been involved in a collision where the SRS has deployed.
(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor placed on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not placed on the floor, the SRS may activate.
(3) Work must be started at least 90 seconds after the ignition switch is turned off and the cable is disconnected from the negative (-) battery terminal, even if only loosening the set bolts of the airbag sensor assembly.

(j) WIRE HARNESS AND CONNECTOR
(1) The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken, repair or replace it.



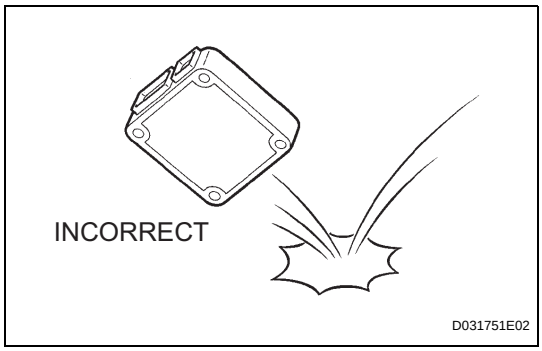
3. ELECTRONIC CONTROL

(a) REMOVAL AND INSTALLATION OF BATTERY TERMINAL

NOTICE:

Certain systems need to be initialized after reconnecting the cable to the negative (-) battery terminal.

(1) Before performing electronic work, disconnect the cable from the negative (-) battery terminal to prevent component and wire damage caused by accidental short circuits.
(2) When disconnecting the cable, turn the ignition switch and headlight dimmer switch off and loosen the cable nut completely. Perform these operations without twisting or prying the cable. Then disconnect the cable.
(3) Clock settings, radio settings, audio system memory, DTCs and other data are erased when the cable is disconnected from the negative (-) battery terminal. Write down any necessary data before disconnecting the cable.

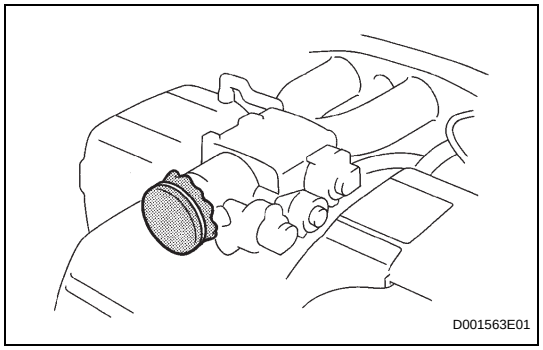


(b) HANDLING OF ELECTRONIC PARTS
(1) Do not open the cover or case of the ECU unless absolutely necessary. If the IC terminals are touched, the IC may be rendered inoperative by static electricity.
(2) Do not pull the wires when disconnecting electronic connectors. Pull the connector itself.
(3) Do not drop electronic components, such as sensors or relays. If they are dropped on a hard surface, they should be replaced.

(4) When cleaning the engine with steam, protect the electronic components, air filter and emission-related components from water.
(5) Never use an impact wrench to remove or install temperature switches or temperature sensors.
(6) When measuring the resistance between terminals of a wire connector, insert the tester probe carefully to prevent terminals from bending.

4. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

(a) PLACE FOR REMOVING AND INSTALLING FUEL SYSTEM PARTS
(1) Work in a location with good air ventilation that does not have welders, grinders, drills, electric motors, stoves, or any other ignition sources.
(2) Never work in a pit or near a pit as vaporized fuel will collect in those places.
(b) REMOVING AND INSTALLING FUEL SYSTEM PARTS
(1) Prepare a fire extinguisher before starting the operation.
(2) To prevent static electricity, install a ground wire to the fuel changer, vehicle and fuel tank, do not spray the surrounding area with water. Be careful when performing work in this area, as the work surface will become slippery. Do not clean up gasoline spills with water, as this may cause the gasoline to spread, and possibly create a fire hazard.
(3) Avoid using electric motors, working lights and other electric equipments that can cause sparks or high temperatures.
(4) Avoid using iron hammers as they may create sparks.
(5) Dispose of fuel-contaminated cloth separately using a fire resistant container.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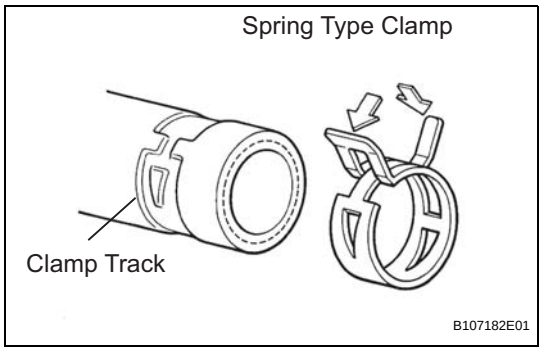
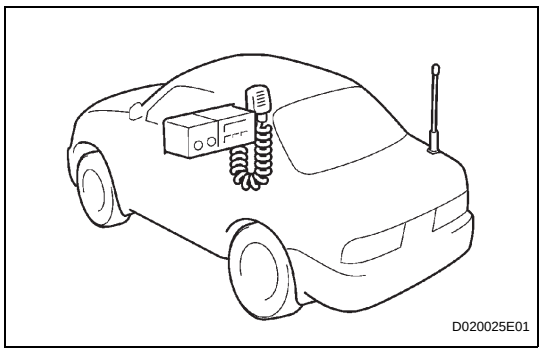
5. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS

(a) If any metal particles enter inlet system parts, this may damage the engine.
(b) When removing and installing inlet system parts, cover the openings of the removed parts and engine openings. Use gummed tape or other suitable materials.
(c) When installing inlet system parts, check that no metal particles have entered the engine or the installed parts.



6. HANDLING OF HOSE CLAMPS

(a) Before removing the hose, check the clamp position so that it can be reinstalled in the same position.
(b) Replace any deformed or dented clamps with new ones.
(c) When reusing a hose, attach the clamp on the clamp track portion of the hose.
(d) For a spring type clamp, you may want to spread the tabs slightly after installation by pushing in the direction of the arrows as shown in the illustration.



7. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEMS

(a) Install the antenna far away from the ECU and sensors of the vehicle electronic systems as possible.
(b) Install an antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle electronic systems. For details about ECU and sensors locations, refer to the section on the applicable components.
(c) Keep the antenna and feeder separate from other wirings as much as possible. This will prevent signals sent from the communication equipment from affecting vehicle equipment and vice-versa.
(d) Check that the antenna and feeder are correctly adjusted.
(e) Do not install any high-powered mobile communication system.

8. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TRAC) AND VEHICLE STABILITY CONTROL (VSC) SYSTEMS

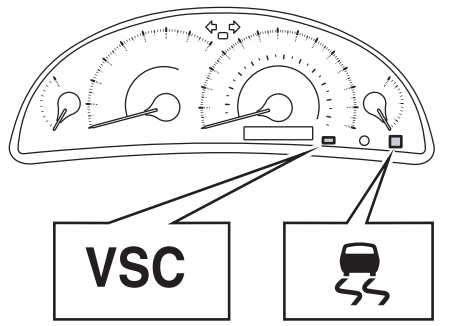
When testing with a 2-wheel drum tester such as a speedometer tester, a combination tester for the speedometer and brake, a chassis dynamometer, or when jacking up the front wheels and turning the wheels, perform the following procedure to enter the inspection mode and stop the TRAC and VSC systems.

(a) Activating inspection mode (Not using the intelligent tester)
HINT:
- Perform procedures "D" to "J" within 30 seconds.
- Perform procedures "G" and "H" within 15 seconds each.

(1) Ensure that the ignition switch is off and the engine is stopped (Procedure "A").
(2) Make sure that the shift lever is in the P position (Procedure "B").
(3) Start the engine (Procedure "C").
(4) Parking Brake Lever Type:
Apply the parking brake by pulling the parking brake lever (Procedure "D").

(5) Parking Brake Pedal Type:
Apply the parking brake by depressing the parking brake pedal (Procedure "E").
(6) Depress and release the brake pedal twice (Procedure "F").
(7) While holding the brake pedal down, release and apply the parking brake twice (Procedure "G").
(8) With the parking brake applied, depress and release the brake pedal twice (Procedure "H").
(9) without Multi-information Display:
Check that the VSC warning light and SLIP indicator light come on (Procedure "I").
HINT:
- If the VSC warning light and SLIP indicator light do not come on in procedure "I", repeat the procedures from "A" to "I".
- Turning the ignition switch off ends inspection mode.

without Multi-information Display:



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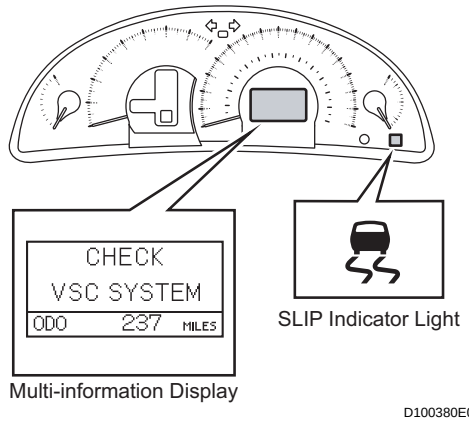
with Multi-information Display:



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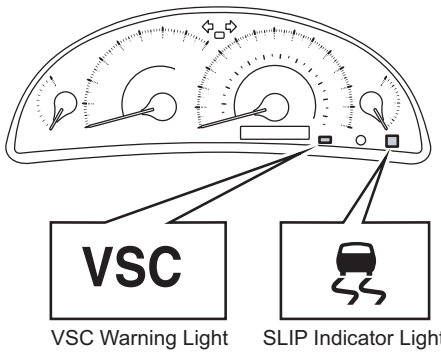
(10) with Multi-information Display:
Check that the "CHECK VSC SYSTEM" message appears on the multi-information display and SLIP indicator light come on (Procedure "J").
HINT:
- If the "CHECK VSC SYSTEM" message appears on the multi-information display and SLIP indicator light do not come on in procedure "J", repeat the procedures from "A" to "J".
- Turning the ignition switch off ends inspection mode.

(b) Activating inspection mode (Using the intelligent tester)
(1) Ensure that the ignition switch is off and the engine is stopped (Procedure "A").
(2) Make sure that the shift lever is in the P position (Procedure "B").
(3) Connect the intelligent tester to the DLC3 (Procedure "C").
(4) Start the engine (Procedure "D").
(5) Turn the intelligent tester main switch on (Procedure "E").
(6) Select the following menu items: ABS/ INSPECTION MODE (Procedure "F").

without Multi-information Display:



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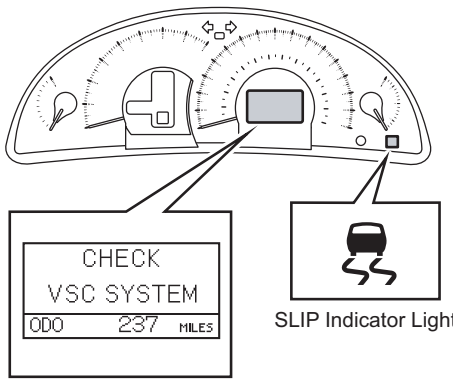
(7) without Multi-information Display:
Check that the VSC warning light and SLIP indicator light come on (Procedure "G").
HINT:
- If the VSC warning light and SLIP indicator light do not come on in procedure "G", repeat the procedures from "A" to "G".
- Turning the ignition switch off ends inspection mode.

with Multi-information Display:



H

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(8) with Multi-information Display:
Check that the "CHECK VSC SYSTEM" message appears on the multi-information display and SLIP indicator light come on (Procedure "H").
HINT:
- If the "CHECK VSC SYSTEM" message appears on the multi-information display and SLIP indicator light do not come on in procedure "H", repeat the procedures from "A" to "H".
- Turning the ignition switch off ends inspection mode.

9. FOR VEHICLES EQUIPPED WITH CATALYTIC CONVERTER

CAUTION:

If a large amount of unburned gasoline or gasoline vapors flow into the converter, it may cause overheating and create a fire hazard. To prevent this, observe the following precautions.

(a) Use only unleaded gasoline.
(b) Avoid idling the engine for more than 20 minutes.
(c) Avoid performing unnecessary spark jump tests.
  (1) Perform a spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
  (2) While testing, never race the engine.
(d) Avoid a prolonged engine compression measurement. Engine compression measurements must be performed as rapidly as possible.
(e) Do not run the engine when the fuel tank is nearly empty. This may cause the engine to misfire and create an extra load on the converter.

VEHICLE LIFT AND SUPPORT LOCATIONS

1. NOTICE ABOUT VEHICLE CONDITION WHEN JACKING UP

(a) As a rule, the vehicle must be unloaded when jacking up. Never jack up or lift up the vehicle loaded with things of heavy weight.

(b) When removing any parts of heavy weight like the engine and transaxle, the center of gravity of the vehicle moves. Place a balance weight so as to keep it from rolling, or hold the jacking support location using the mission jack.

2. NOTICE FOR USING 4 POST LIFT

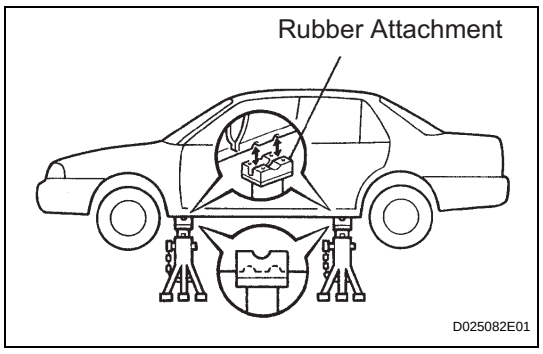
(a) Follow the instruction manual for a safety operation.

(b) Do not damage tires or wheels with a free wheel beam.

(c) Using a wheel stopper, fix the vehicle.

3. NOTICE FOR USING JACK AND SAFETY STAND

(a) Work in the flat place using a wheel stopper at all times.



(b) Use a safety stand with a rubber attachment, as shown in the illustration.

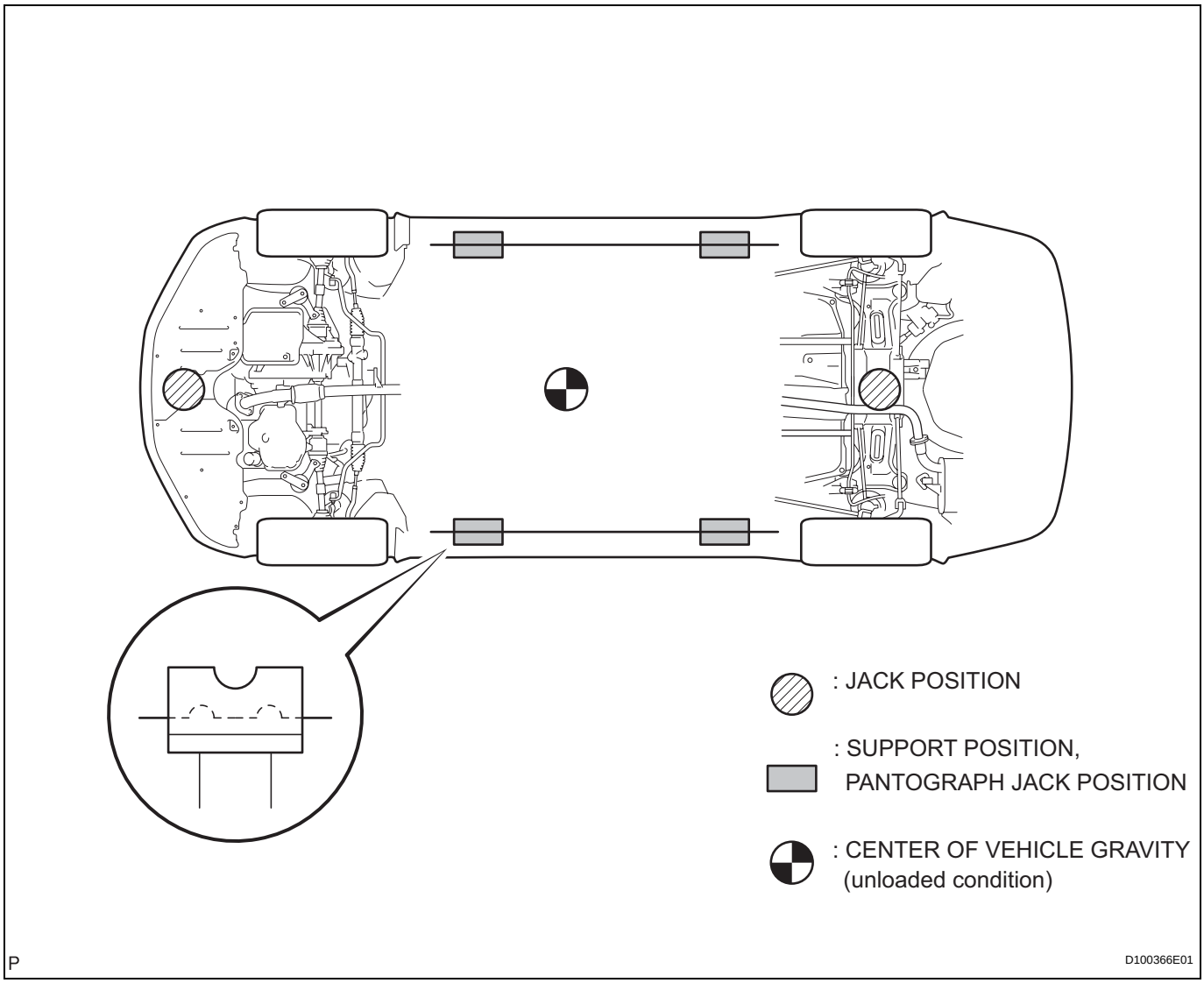
(c) Support the specified location with a jack and safety stand accurately.

(d) When jacking up the front wheels, release the parking brake and place wheel stoppers only behind the rear wheels. When jacking up the rear wheels, place wheel stoppers only in front of the front wheels.

(e) Do not work or leave the vehicle supported only by a jack. Be sure to support the vehicle with a safety stand.

(f) When jacking up only the front wheels or only the rear wheels, place wheel stoppers to both sides of the wheels that contact ground.

(g) When jacking down the vehicle with its front wheels jacked up, release the parking brake and place wheel stoppers only in front of the rear wheels. When jacking down the vehicle with its rear wheels jacked up, place wheel stoppers only behind the front wheels.



4. NOTICE FOR USING SWING ARM TYPE LIFT

(a) Follow the instruction manual of the lift for a safety operation.
(b) Use a cradle with a rubber attachment, as shown in the illustration.
(c) Set in the vehicle so as to make its center of gravity as close as possible to the center of the lift.
(d) Place the vehicle horizontally by adjusting the height of the cradle, and match the groove of the cradle and the safety stand support location accurately.
(e) Be sure to lock the swing arm during the operation.
(f) Lift the vehicle up until the tires float, and shake the vehicle to make sure that the vehicle is stable.

5. NOTICE FOR USING PLATE TYPE LIFT

(a) Follow the instruction manual of the lift for a safety operation.

(b) Use a plate lift attachment.

(c) Be sure to set the vehicle to the specified position.

Right and left set position	• Place the vehicle over the center of the lift.
Front and rear set position	• Align the cushion gum ends of the plate with the attachment lower ends (A and C). • Align the attachment upper end (B) with the rocker flange front side notch.

(d) Lift the vehicle up until the tires float a bit, and shake the vehicle to make sure that the vehicle is stable.

IN

Swing Arm Type Lift:

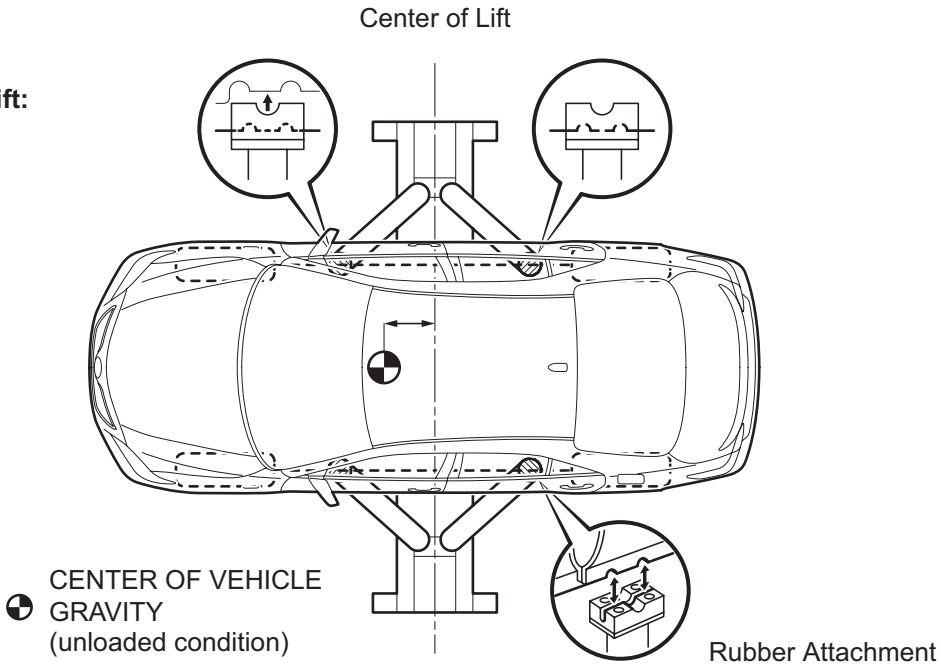
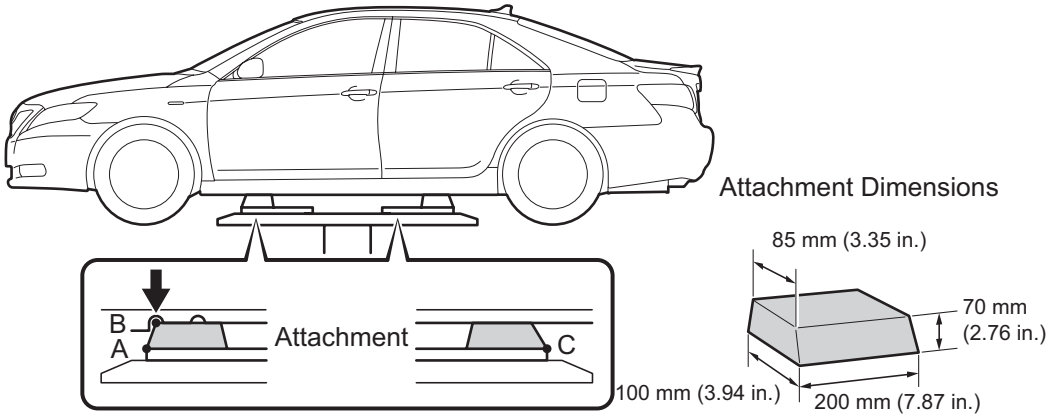


Plate Type Lift:



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CUSTOMIZE PARAMETERS

1. AIR CONDITIONING SYSTEM

HINT:

The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

AIR CONDITIONER (AUTO A/C)

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
SET TEMP SHIFT (Set Temperature Shift)	NORMAL	To shift the temperature against the displayed temperature	+2 C / +1 C / NORMAL / -1 C / -2 C
AIR INLET MODE (Air Inlet Mode)	AUTO	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATION mode	MANUAL / AUTO
COMPRESSOR MODE (Compressor Mode)	AUTO	Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF	MANUAL / AUTO
COMPRS / DEF OPER (Compressor / Air Inlet DEF Operation)	LINK	Function to turn the A/C ON automatically linked with the FRONT DEF button when the A/C is OFF	NORMAL / LINK
EVAP CTRL (Evaporator Control)	AUTO	Function to set the evaporator control to the AUTOMATIC position (AUTO) to save power, or to the coldest position (MANUAL) to dehumidify the air and to prevent the windows from fogging up	MANUAL / AUTO
FOOT / DEF MODE (Foot / DEF auto mode)	ON	Function to turn the airflow from FOOT / DEF ON automatically when AUTO MODE is ON	OFF / ON
AUTO BLOW UP (Foot / DEF automatic blower up function)	ON	Function to change the blower level automatically when the defroster is ON	OFF / ON
AMBIENT TMP SFT (Ambient Temperature Shift)	NORMAL	Function to shift the ambient temperature against the displayed ambient temperature	+3 C / +2 C / +1 C / NORMAL / -1 C / -2 C / -3 C

2. THEFT DETERRENT SYSTEM (w/o Smart Key System)

HINT:

The following items can be customized.

NOTICE:

- **After confirming whether the items requested by the customer are applicable or not for customization, perform customizing operations.**
- **Be sure to record the current settings before customization.**
- **When troubleshooting, make sure that the item in question is not set to "OFF" as a result of customization (Example: For the system, "the wireless function does not operate", first check that the wireless function is not set to "OFF", then perform troubleshooting).**

THEFT DETERRENT SYSTEM

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
PASSIVE MODE (Passive Arming Mode)	OFF	PASSIVE MODE is a function that switches theft deterrent system from arming preparation state to armed state 30 seconds after key is not in the key cylinder and all doors, engine hood and luggage compartment door are closed, even if doors are not locked by wireless or door key lock operation In PASSIVE MODE, if you do not perform following operations within 14 seconds after door is opened during armed state, theft deterrent system will judge that condition as a theft and switch to alarm sounding state – Unlock any door by key or wireless operation – Turn the ignition switch ON – Open luggage compartment door by key or wireless operation	ON/OFF
WARN BY HORN (Warning by horn)	ON	Function that makes vehicle horn and theft deterrent horn be able to be used as a warning device	ON/OFF
ENTRY DELAY (Entry delay time)	14 s	Function that changes entry delay time (time before warning starts) for PASSIVE MODE	0 s/14 s/30 s

3. THEFT DETERRENT SYSTEM (w/ Smart Key System)

HINT:

The following items can be customized.

NOTICE:

- **After confirming whether the items requested by the customer are applicable or not for customization, perform customizing operations.**
- **Be sure to record the current settings before customization.**
- **When troubleshooting, make sure that the item in question is not set to "OFF" as a result of customization (Example: For the system, "the wireless function does not operate", first check that the wireless function is not set to "OFF", then perform troubleshooting).**

THEFT DETERRENT SYSTEM

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
PASSIVE MODE (Passive Arming Mode)	OFF	PASSIVE MODE is a function that switches theft deterrent system from arming preparation state to armed state 30 seconds after key is not in the actuation area and all doors, engine hood and luggage compartment door are closed, even if doors are not locked by wireless or door key lock operation In PASSIVE MODE, if you do not perform following operations within 14 seconds after door is opened during armed state, theft deterrent system will judge that condition as a theft and switch to alarm sounding state – Unlock any door by key or wireless operation – Turn the engine switch on (IG) – Open luggage compartment door by key or wireless operation	ON/OFF
WARN BY HORN (Warning by horn)	ON	Function that makes vehicle horn and theft deterrent horn be able to be used as a warning device	ON/OFF
ENTRY DELAY (Entry delay time)	14 s	Function that changes entry delay time (time before warning starts) for PASSIVE MODE	0 s/14 s/30 s

4. LIGHTING SYSTEM

HINT:

The followings are the possible items to be customized.

NOTICE:

- **Before attempting to customize vehicle settings, confirm whether it is possible to make the change that the customer has requested.**
- **Be sure to record the current value before customizing.**
- **In case of performing the troubleshooting, pay attention because there is a possibility that the function has been disabled by customizing. (Example: In case of the symptom in which "The wireless operation does not function", check that the wireless operation has not been disabled by customizing, then perform the troubleshooting.)**

ILLUMINATED ENTRY:

Display	Default	Contents	Setting
LIGHTING TIME	15 s	Changes the lighting time of the interior light and ignition key cylinder light.	7.5 s / 15 s / 30 s
I/L ON / UNLOCK	ON	Lights up the interior light and ignition key cylinder light when a door is unlocked.	ON / OFF
I/L ON / ACC OFF	ON	Lights up the interior light and ignition key cylinder light when the ignition switch is turned from on (ACC) to off	ON / OFF

LIGHT CONTROL:

Display	Default	Contents	Setting
LIGHT OFF DELAY	30 s	Keeps the headlights on for a certain period of time after turning the ignition switch off and closing all the doors with the headlights on.	OFF / 30 s / 60 s / 90 s
SENSITIVITY	NORMAL	Adjusts the sensitivity of the automatic light control system. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DISP EX ON SEN	NORMAL	Changes the ambient brightness level required to dim the clock display illumination. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DISP EX OFF SEN	NORMAL	Changes the ambient brightness level required to cancel the dimming of the clock display illumination.	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2

HINT:
Sensitivity adjustment can hardly be confirmed. Check by driving the customer's vehicle.

Illustration *1

Ambient Brightness Level	Dark ◄——————————► Bright				
Setting	DARK2	DARK1	NORMAL	LIGHT1	LIGHT2

5. POWER DOOR LOCK CONTROL SYSTEM

CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:
The following items can be customized.

NOTICE:

- **Before attempting to customize vehicle settings, confirm whether it is possible to make the change that the customer has requested.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting, make sure that the item in question has not been disabled using the customizing function.**

DOOR LOCK:

Display (Item)	Default	Contents	Setting
UNLOCK/PARK (Unlock w/ engine switch on (IG), shift P, speed 0 km/h (0 mph))	A/T: ON M/T: OFF (Cannot be changed)	Function that unlocks doors when the shift lever is moved to the P position from any other position while the ignition switch is on (IG)	ON/OFF
ALL UNLK/OPN-CL (All unlock w/ D door open-close)	A/T: OFF M/T: ON	Function that unlocks all other doors when opening driver side door within 10 seconds after turning the ignition switch off from on (IG)	ON/OFF
UNLK/KEY TWICE (Unlock w/ 2 times D key operation)	ON	• Function that unlocks only the driver side door when the driver side door key cylinder is turned to unlock once and unlocks all the doors when it is turned to unlock twice • In the OFF setting, turning it once unlocks all doors	ON/OFF
AUTO LOCK/SHIFT (Auto lock/shift not P)	A/T: ON M/T: OFF (Cannot be changed)	Function that locks doors when the shift lever is moved from the P position to any other position	ON/OFF
AUTO LOCK	OFF	Function that locks doors when vehicle reaches a vehicle speed 20 km/h (13 mph)	ON/OFF

WIRELESS D LOCK:

Display (Item)	Default	Contents	Setting
AUTO LOCK DELAY	60s	Function that selects AUTO LOCK time (30 sec. or 60 sec.)	30s/60s

6. WIRELESS DOOR LOCK CONTROL SYSTEM (w/ Smart Key System)

HINT:

The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

WIRELESS DOOR LOCK CONTROL SYSTEM

Display (item)	Default	Function	Setting
WIRELESS OPER (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF	ON/OFF

Display (item)	Default	Function	Setting
HAZARD ANS BACK (Hazard answer-back for wireless door lock control)	ON	• When the doors are locked by wireless operation, the hazard warning lights flash once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice.	ON/OFF
OPEN DOOR WARN (Door ajar warning)	ON	The buzzer sounds when LOCK is pressed when any of the doors are ajar.	ON/OFF
AUTO LOCK DELAY (Auto lock time)	60 s	This function regulates the interval between unlocking and automatic relocking of doors.	30 s/60 s
UNLOCK /2OPER (Wireless unlock operated twice)	ON	This function unlocks the driver's door when the UNLOCK switch is pressed once, and unlocks all doors when pressed twice within 3 seconds. If set to OFF, pressing UNLOCK once unlocks all doors.	ON/OFF
ALARM FUNCTION (Panic function)	ON	This function operates the theft deterrent system when PANIC is pressed and held for 0.8 seconds.	ON/OFF
WIRLS BUZZ RESP (Wireless buzzer answer-back)	ON	Wireless door lock buzzer response/ON or OFF	ON/OFF
TRUNK LID OPER (Wireless trunk opener function setting)	0.6 s PR ON	This function changes operation method of transmitter to open luggage compartment door. 1 TIME: Push 1 time 2 TIMES: Push 2 times 0.6 s PR: Push 0.6 seconds OFF: Does not operate	1 TIME/2 TIMES/0.6 s PR/ OFF

7. WIRELESS DOOR LOCK CONTROL SYSTEM (w/o Smart Key System)

HINT:

The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that customization of the function(s) is possible.**
- **Be sure to record the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is not set to OFF.**

WIRELESS DOOR LOCK CONTROL SYSTEM:

Display (item)	Default	Function	Setting
WIRELESS OPER (Wireless door lock control function)	ON	Function that turns wireless door lock function ON/OFF	ON/OFF
HAZARD ANS BACK (Hazard answer-back for wireless door lock control)	ON	• When the doors are locked by wireless operation, the hazard warning lights flash once. • When the doors are unlocked by wireless operation, the hazard warning lights flash twice.	ON/OFF
OPEN DOOR WARN (Door ajar warning)	ON	The buzzer sounds when LOCK is pressed when any of the doors are ajar.	ON/OFF
AUTO LOCK DELAY (Auto lock time)	60 s	This function regulates the interval between unlocking and automatic relocking of doors.	30 s/60 s

Display (item)	Default	Function	Setting
UNLOCK /2OPER (Wireless unlock operated twice)	ON	This function unlocks the driver's door when the UNLOCK switch is pressed once, and unlocks all doors when pressed twice within 3 seconds. If set to OFF, pressing UNLOCK once unlocks all doors.	ON/OFF
ALARM FUNCTION (Panic function)	ON	This function operates the theft deterrent system when PANIC is pressed and held for 0.8 seconds.	ON/OFF
WIRLS BUZZ RESP (Wireless buzzer answer-back)	ON	Wireless door lock buzzer response/ON or OFF	ON/OFF
TRUNK LID OPER (Wireless trunk opener function setting)	0.6 s ON	This function changes operation method of transmitter to open luggage compartment door. 1 TIME: Push 1 time 2 TIMES: Push 2 times 0.6 s PR: Push 0.6 seconds OFF: Does not operate	1 TIME/2 TIMES/0.6 s PR/ OFF

8. SMART KEY SYSTEM (Door Lock)

(a) CUSTOMIZING FUNCTION WITH INTELLIGENT TESTER

HINT:

The items in the table below can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current setting before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

HINT:

The following functions' default settings are ON.

Part of these functions can be customized.

SMART:

Display (Item)	Default	Contents	Setting
PARK WAIT TIME (Wait time to permit opening door after locking)	2.5s	Function that sets waiting time to permit opening door after door is locked with entry lock function.	0.5s / 1.5s / 2.5s / 5.0s
SMART UNLOCK	D_DOOR	Function that switches the entry unlock detection area.	ALL / D_DOOR
SMART IGNITION (SMART ignition available area)	ALL	Function to choose the available area for electrical key to start E/G and cancel the steering lock.	FRONT / ALL
SMART TRUNK (Luggage compartment opening operation)	ON	Function to open a luggage compartment when the driver has the electrical key and presses the luggage open button.	ON / OFF

WIRELESS DOOR LOCK:

Display (Item)	Default	Contents	Setting
ALARM FUNCTION (Panic function)	ON	Function to operate the theft deterrent system by keeping pressing the lock button of the transmitter for 2.5 seconds. If there is a panic button, press the panic button instead of the lock button.	ON / OFF

WARNING:

Display (Item)	Default	Contents	Setting
KEY LOW-BATT WRN	ON	Function to set a warning function for the time when a key battery becomes weak.	ON / OFF

(b) Entry Unlock Mode Switching Function

(1) To change the vehicle to entry unlock mode switching function, make sure the vehicle power is off and simultaneously press and hold the electrical key's LOCK switch and another electrical key switch for 4.5 seconds.
When the switches are pressed and held for 4.5seconds, the entry door unlock mode changes in the following order: driver door mode, all door mode.
NOTICE:
After pressing and holding the switches for 4.5 seconds, wait 5 seconds before performing the same procedure again.
- Driver door unlock mode:
  When the driver door's touch sensor is touched, only the driver door unlocks. When another touch sensor is touched, all doors unlock.
- All door unlock mode:
  When the touch sensor is touched, all doors unlock.

(2) The certification ECU receives this signal from the entry door control receiver and changes the smart key system to the entry unlock mode.

(3) The certification ECU sounds the buzzers of the wireless door lock buzzer and combination meter to inform the user that the mode has been switched.

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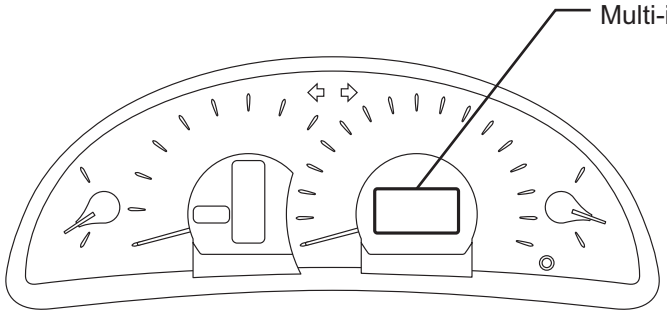
Mode	Wireless Door Lock Buzzer	Combination Meter		
		Multi-information Display		Buzzer
Driver Door (Default)	ON OFF Sounds 3 times	 Displayed for 5 sec.	Passenger, rear LH and RH door “open” indication	Sounds once
All Doors (Customized)	ON OFF Sounds 2 times	 Displayed for 5 sec.	All door “open” indication	Sounds once



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HINT:
The function only changes the entry unlock mode of the smart key system. It does not switch the unlocking of the wireless door lock control.

(c) Electrical Key Cancel
The electrical key cancel operation disables the following functions:
- Entry Ignition
- Entry Unlock/Lock
- Entry Luggage Compartment Open
- Electrical Key Lock-in Prevention
- Warning

- Memory Call

(1) The operation procedures are as follows:
Precondition:
Engine switch off, driver side door closed and unlocked.
1. Unlock the driver side door once with the UNLOCK switch of the electrical key.
2. Open the driver door within 5 seconds.
3. Unlock the driver side door twice with the UNLOCK switch of the electrical key within 5 seconds.
4. Repeat open → close twice for the driver door within 30 seconds, and open again.
(Driver door: Open → Close → Open → Close → Open)
5. Unlock the driver side door twice with the UNLOCK switch of the electrical key within 5 seconds.
6. Repeat open → close once for the driver door within 30 seconds, and open again.
(Driver door: Open → Close → Open)
7. Close the driver door within 5 seconds.
When electrical key cancel is activated, the wireless door lock buzzer sounds twice.
To return to the original condition, perform the procedures again. When the original condition is returned, the wireless door lock buzzer sounds once.

9. KEY REMINDER WARNING SYSTEM

PARAMETERS (USING INTELLIGENT TESTER)
HINT:
The following items can be customized.
NOTICE:
- **Be sure to record current values before customizing.**
- **When performing troubleshooting, be aware that the functions may be set to OFF by customizing. (Example: In case of the symptom in which "The wireless operation does not function", check that the wireless operation is not set to OFF by customizing, then perform the troubleshooting.)**

METER:

Display (Item)	Default	Contents	Setting
KEY REMND VOLUM	LARGE	Function to change volume of the key reminder warning buzzer.	LARGE/MEDIUM/SMALL
KEY REMND SOUND	NORMAL	Function to change cycle of the key reminder warning buzzer.	FAST/NORMAL/SLOW

10. METER/GAUGE SYSTEM

COMBINATION METER ASSEMBLY
NOTICE:
Be sure to record the current value before customizing.

HINT:
The following items can be customized using intelligent tester.

METER:

Display (Item)	Default	Contents	Setting
KEY REMND VOLUM	LARGE	Function to change the volume of the key remind warning buzzer	LARGE, MEDIUM, SMALL
KEY REMND SOUND	NORMAL	Function to change the cycle of the key remind warning buzzer	FAST, NORMAL, SLOW
SEAT-BELT WARN	D/P ON	Function to change the setting of the seat belt buzzer.	D/P on, D ON, P on, D/P off

HINT:
This setting is only valid for the buzzer which sounds at the 5 km/h (3 mph) or more.

(a) SEAT BELT BUZZER ON/OFF SETTING (Procedure "A")
The seat belt buzzer ON/OFF setting, which is a setting of the buzzer function of the combination meter, can disable the driver and front passenger side seat belt buzzers.

NOTICE:

- **These buzzers should be on for safe driving. Perform these procedures only if it is necessary to set the buzzer off (disabled).**
- **When either the battery cable or the combination meter connector is disconnected, these buzzers are set on (enabled).**
- **Odometer returns to 0 after starting this procedure, although it is not displayed.**

HINT:
"b-oFF" indicates that the buzzer is OFF. "b-on" indicates that the buzzer is ON. The seat belt buzzer ON/OFF setting will be finished (the odometer will display "ODO") if the ODO/TRIP switch is not operated for 10 seconds or more. In this case, perform step 11 to check that the buzzer ON/OFF setting is complete. If it is not complete, start from step 1 again.

(1) Driver and front passenger side seat belt buzzers
1. Turn the ignition switch on (IG).
2. Press the ODO/TRIP switch until the odometer displays "ODO".
3. Ignition switch off.
4. Turn the ignition switch on (IG).
5. Press the ODO/TRIP switch immediately (within 6 seconds) and hold it down for 10 seconds or more.
6. Continue holding down the ODO/TRIP switch and fasten the driver side seat belt.
7. Check that the odometer displays either "b-on" or "b-oFF".
8. Press the ODO/TRIP switch to change the display to "b-oFF".

9. Ignition switch off.
10. Turn the ignition switch on (IG).
11. Check that no buzzer sounds.

(2) Front passenger side seat belt buzzer

1. Turn the ignition switch on (IG).
2. Press the ODO/TRIP switch until the odometer displays "ODO".
3. Ignition switch off.
4. Turn the ignition switch on (IG).
5. Sit in the front passenger seat. Press the ODO/TRIP switch immediately (within 6 seconds) and hold it down for 10 seconds or more.
6. Sit in the front passenger seat. Continue holding down the ODO/TRIP switch and fasten the front passenger side seat belt.
7. Check that the odometer displays either "b-on" or "b-oFF".
8. Press the ODO/TRIP switch to change the display to "b-oFF".
9. Ignition switch off.
10. Turn the ignition switch on (IG).
11. Check that no buzzer sounds.

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

GENERAL INFORMATION

A large number of ECU controlled systems are used in the CAMRY. In general, ECU controlled systems are considered to be very intricate, requiring a high level of technical knowledge to troubleshoot. However, most problem checking procedures only involve inspecting the ECU controlled system's circuits one by one. An adequate understanding of the system and a basic knowledge of electricity is enough to perform effective troubleshooting, accurate diagnoses and necessary repairs.

FOR USING INTELLIGENT TESTER

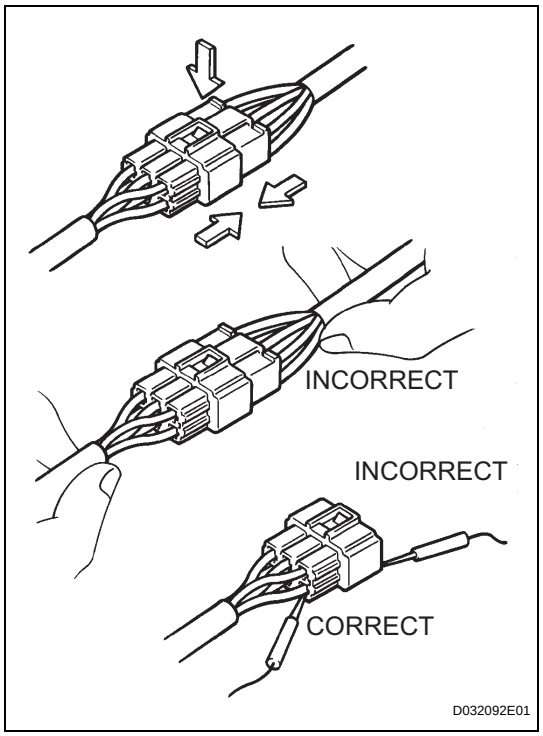
– Before using the intelligent tester, read the tester operator's manual thoroughly.
– If the tester cannot communicate with the ECU controlled systems when the tester is connected to the DLC3 with the ignition switch on and the tester turned on, there is a problem on the vehicle side or tester side.
  (1) If communication is normal when the tester is connected to another vehicle, inspect the diagnosis data link line (Bus (+) line) or ECU power circuit of the vehicle.
  (2) If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Perform the Self Test procedures outlined in the tester operator's manual.

ELECTRONIC CIRCUIT INSPECTION PROCEDURE

1. BASIC INSPECTION

(a) WHEN MEASURING RESISTANCE OF ELECTRONIC PARTS

(1) Unless otherwise stated, all resistance measurements should be made at an ambient temperature of 20°C (68°F). Resistance measurements may be inaccurate if measured at high temperatures, i.e. immediately after the vehicle has been running. Measurements should be made after the engine has cooled down.



(b) HANDLING CONNECTORS

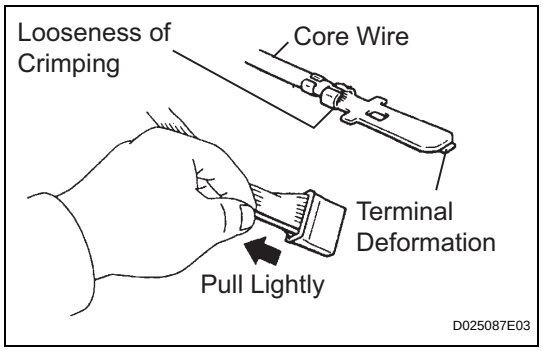
(1) When disconnecting a connector, first squeeze the mating connector housing halves tightly together to release the lock, and then press the lock claw and separate the connector.

(2) When disconnecting a connector, do not pull on the harnesses. Grasp the connector directly and separate it.

(3) Before connecting a connector, check that there are no deformations, damage, looseness or missing terminals.

(4) When connecting a connector, press firmly until it locks with a "click" sound.

(5) If checking a connector with a TOYOTA electrical tester, check the connector from the backside (harness side) using a mini test lead.
NOTICE:
- **As a waterproof connector cannot be checked from the backside, check it by connecting a sub-harness.**
- **Do not damage the terminals by moving the inserted tester needle.**



(c) CHECKING CONNECTORS

(1) Checking when a connector is disconnected: Squeeze the connector together to confirm that they are fully connected and locked.

(2) Checking when a connector is disconnected: Check by pulling the wire harness lightly from the backside of the connector. Look for unlatched terminals, missing terminals, loose crimps or broken conductor wires. Check visually for corrosion, metallic or foreign matter and water, and bent, rusted, overheated, contaminated, or deformed terminals.

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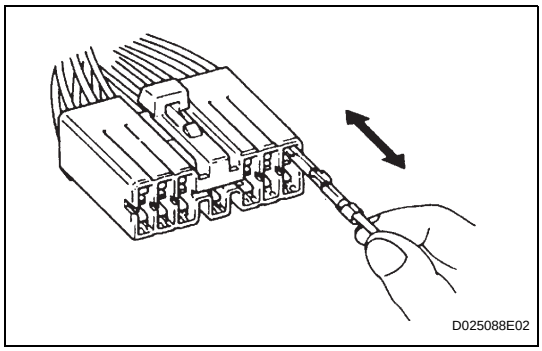
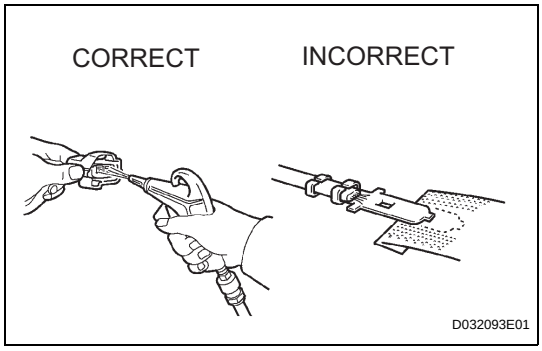
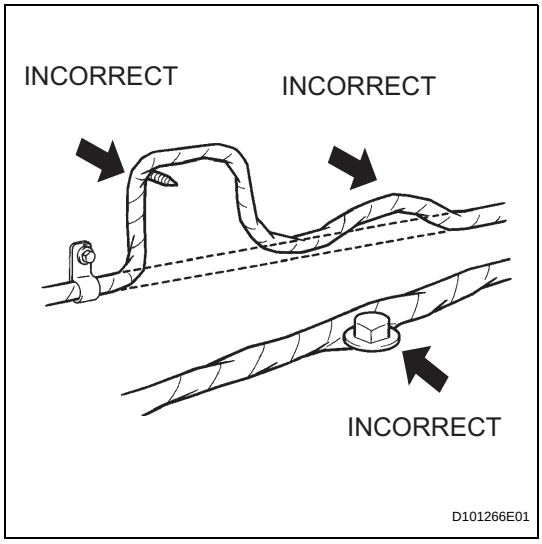


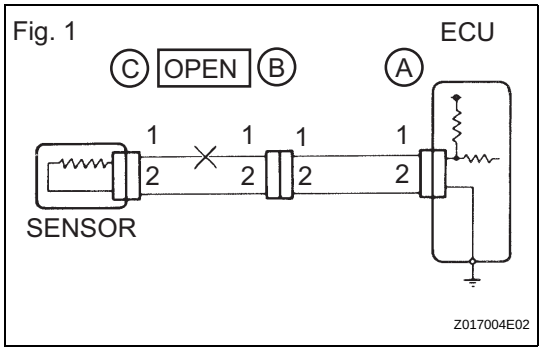
(3) Checking the contact pressure of the terminal:
Prepare a spare male terminal. Insert it into a female terminal, and check for ample tension when inserting and after full engagement.
NOTICE:
When testing a gold-plated female terminal, always use a gold-plated male terminal.



(d) REPAIR METHOD OF CONNECTOR TERMINAL
(1) If there is any foreign matter on the terminal, clean the contact point with compressed air or a cloth. Never rub the contact point using sandpaper as the plating may come off.
(2) If there is abnormal contact pressure, replace the female terminal. If the male terminal is gold-plated (gold color), use a gold-plated female terminal; if it is silver-plated (silver color), use a silver-plated female terminal.
(3) Damaged, deformed, or corroded terminals should be replaced. If the terminal does not lock into the housing, the housing may have to be replaced.



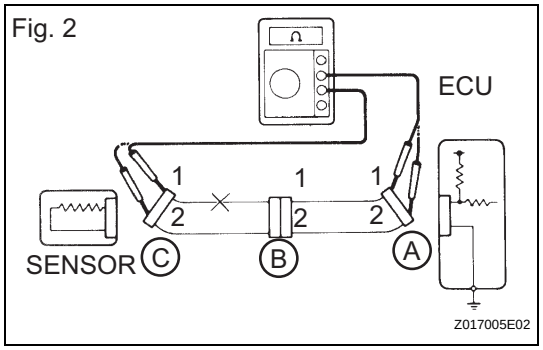
(e) HANDLING OF WIRE HARNESS
(1) If removing a wire harness, check the wiring and clamping before proceeding so that it can be restored in the same way.
(2) Never twist, pull or slacken the wire harness more than necessary.
(3) The wire harness should never come into contact with a high temperature part, or rotating, moving, vibrating or sharp-edged parts. Avoid contact with panel edges, screw tips and other sharp items.
(4) When installing parts, never pinch the wire harness.
(5) Never cut or break the cover of the wire harness. If it is cut or broken, replace it or repair it with vinyl tape.



2. CHECK FOR OPEN CIRCUIT

(a) For an open circuit in the wire harness in Fig. 1, the resistance or voltage, as described below.

Fig. 2



(b) Check the resistance.

(1) Disconnect connectors A and C and measure the resistance between the terminals of the connectors.

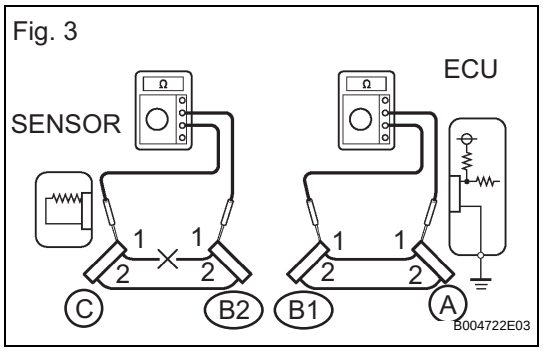
Standard resistance (Fig. 2)

Tester Connection	Specified Condition
Connector A terminal 1 - Connector C terminal 1	10 kΩ or higher
Connector A terminal 2 - Connector C terminal 2	Below 1 Ω

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally. If the results match the examples above, an open circuit exists between terminal 1 of connector A and terminal 1 of connector C.

Fig. 3



(2) Disconnect connector B and measure the resistance between the terminals of the connectors.

Standard resistance (Fig. 3)

Tester Connection	Specified Condition
Connector A terminal 1 - Connector B1 terminal 1	Below 1 Ω
Connector B2 terminal 2 - Connector C terminal 2	10 kΩ or higher

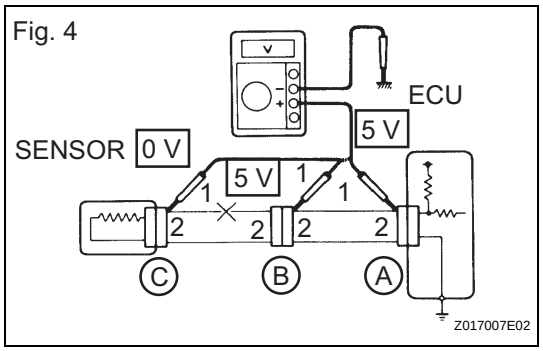
If the results match the examples above, an open circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

(c) Check the voltage.

(1) In a circuit in which voltage is applied to the ECU connector terminal, an open circuit can be checked by conducting a voltage check.
With each connector still connected, measure the voltage between the body ground and these terminals (in this order): 1) terminal 1 of connector A, 2) terminal 1 of connector B, and 3) terminal 1 of connector C.

Standard voltage (Fig. 4)

Fig. 4



Tester Connection	Specified Condition
Connector A terminal 1 - Body ground	5 V
Connector B terminal 1 - Body ground	5 V
Connector C terminal 1 - Body ground	Below 1 V

If the results match the examples above, an open circuit exists in the wire harness between terminal 1 of connector B and terminal 1 of connector C.

Fig. 5

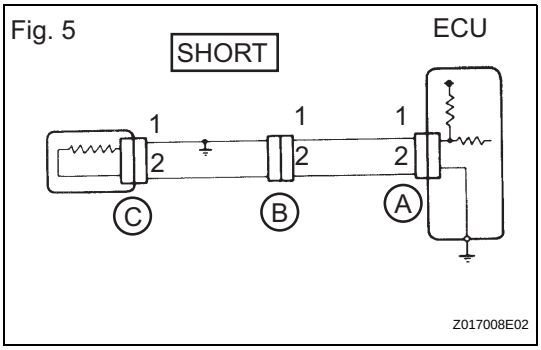


Fig. 6

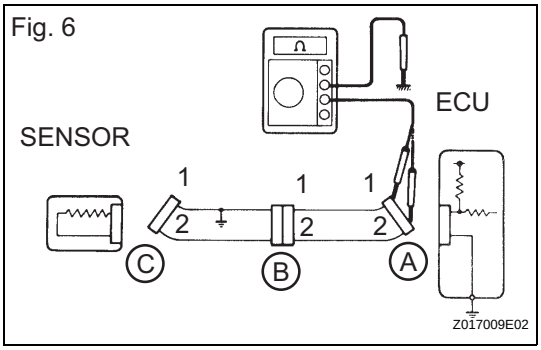
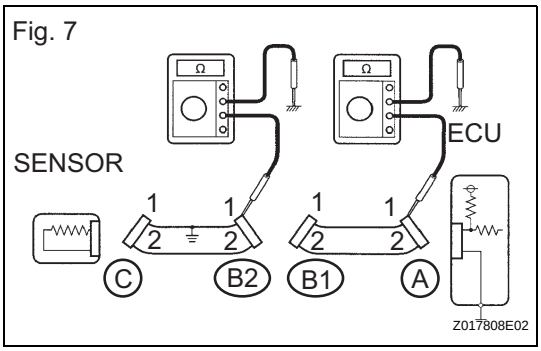


Fig. 7



3. CHECK FOR SHORT CIRCUIT

(a) If the wire harness is ground shorted (Fig. 5), locate the section by conducting a resistance check with the body ground (below).

(b) Check the resistance with the body ground.

(1) Disconnect connectors A and C and measure the resistance.

Standard resistance (Fig. 6)

Tester Connection	Specified Condition
Connector A terminal 1 - Body ground	Below 1 Ω
Connector A terminal 2 - Body ground	10 kΩ or higher

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally. If your results match the examples above, an open circuit exists between terminal 1 of connector A and terminal 1 of connector C.

(2) Disconnect connector B and measure the resistance.

Standard resistance (Fig. 7)

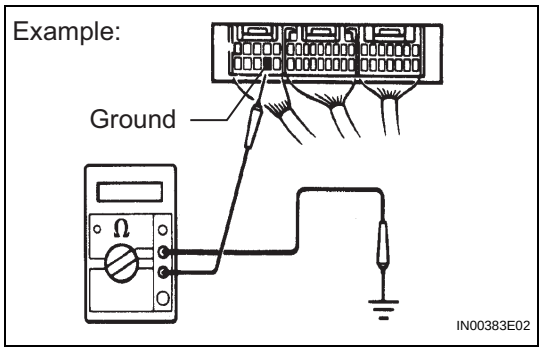
Tester Connection	Specified Condition
Connector A terminal 1 - Body ground	10 kΩ or higher
Connector B2 terminal 2 - Body ground	Below 1 Ω

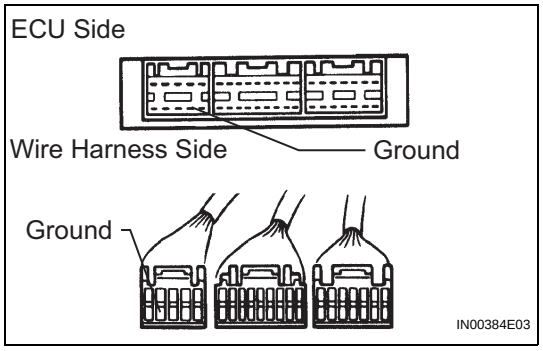
If the results match the examples above, a short circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

4. CHECK AND REPLACE ECU

NOTICE:

- **The connector should not be disconnected from the ECU. Perform the inspection from the backside of the connector on the wire harness side.**
- **When no measuring condition is specified, perform the inspection with the engine stopped and the ignition switch on.**
- **Check that the connectors are fully seated. Check for loose, corroded or broken wires.**





(a) First, check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. Temporarily replace the ECU with a normally functioning one and check if the symptoms occur. If the trouble symptoms disappear, replace the original ECU.

(1) Measure the resistance between the ECU ground terminal and body ground.
Standard resistance:
Below 1 Ω

(2) Disconnect the ECU connector. Check the ground terminal on the ECU side and wire harness side for bending, corrosion or foreign matter. Lastly, check the contact pressure of the female terminals.

IN

HOW TO PROCEED WITH TROUBLESHOOTING

1. OPERATION FLOW

HINT:
Perform troubleshooting in accordance with the procedures below. The following is an outline of basic troubleshooting procedures. Confirm the troubleshooting procedures for the circuit you are working on before beginning troubleshooting.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Ask the customer about the conditions and environment when the problem occurred.

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4	SYMPTOM CONFIRMATION AND DTC (AND FREEZE FRAME DATA) CHECK

(a) Visually check the wire harnesses, connectors and fuses for open and short circuits.
(b) Warm up the engine to the normal operating temperature.
(c) Confirm the problem symptoms and conditions, and check for DTCs

Result

Result	Proceed to
DTC is output	A
DTC is not output	B

B → **Go to step 6**

A

5	DTC CHART

(a) Check the results obtained in step 4. Then find the output DTC in the DTC chart. Look at the "Trouble Area" column for a list of potentially malfunctioning circuits and/or parts.

NEXT → **Go to step 7**

6	PROBLEM SYMPTOMS CHART

(a) Check the results obtained in step 4. Then find the problem symptoms in the problem symptoms table. Look at the "Suspected Area" column for a list of potentially malfunctioning circuits and/or parts.

NEXT

7	CIRCUIT INSPECTION OR PARTS INSPECTION

(a) Identify the malfunctioning circuit or part.

NEXT

8	ADJUST, REPAIR OR REPLACE

(a) Adjust, repair or replace the malfunctioning circuit or parts.

NEXT

9	CONFIRMATION TEST

(a) After the adjustment, repairs or replacement, confirm that the malfunction no longer exists. If the malfunction does not reoccur, perform a confirmation test under the same conditions and in the same environment as when the malfunction occurred the first time.

NEXT

END

2. CUSTOMER PROBLEM ANALYSIS

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

What	Vehicle model, system name
When	Date, time, occurrence frequency
Where	Road conditions
Under what conditions?	Running conditions, driving conditions, weather conditions
How did it happen?	Problem symptoms

3. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE

HINT:

The diagnostic system in the CAMRY has various functions.

- The first function is the Diagnostic Trouble Code (DTC) check. A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs. In a DTC check, a previous malfunction's DTC can be checked by a technician during troubleshooting.
- Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly.

  By using these functions, the problem areas can be narrowed down and troubleshooting is more effective. Diagnostic functions are incorporated in the following system in the CAMRY.

System	DTC Check (Normal Mode)	DTC Check (Check Mode)	Sensor Check/Test Mode (Input Signal Check)	Data List	Active Test
2AZ-FE SFI System	○	○		○	○
2GR-FE SFI System	○	○		○	○
Smart Key System (Starting)	○			○	○
U250E Automatic Transaxle System	○	○		○	○
U660E Automatic Transaxle System	○	○		○	○
Tire Pressure Warning System	○		○	○	
Anti-lock Brake System	○		○	○	○
Vehicle Stability Control System (for BOSCH made)	○		○	○	○

System	DTC Check (Normal Mode)	DTC Check (Check Mode)	Sensor Check/Test Mode (Input Signal Check)	Data List	Active Test
Vehicle Stability Control System (for ADVICS made)	○		○	○	○
Electric Steering Lock	○			○	○
Air Conditioning System	○			○	○
Airbag System	○	○		○	
Occupant Classification System	○			○	
Seat Belt Warning System					○
Theft Deterrent System (w/ Smart Key System)				○	○
Theft Deterrent System (w/o Smart Key System)				○	○
Engine Immobilizer System (w/ Smart Key System)	○			○	○
Engine Immobilizer System (w/o Smart Key System)	○			○	○
Cruise Control System	○			○	
Lighting System	○			○	○
Power Door Lock Control System	○			○	○
Wireless Door Lock Control System (w/ Smart Key System)	○			○	○
Wireless Door Lock Control System (w/o Smart Key System)	○			○	○
Smart Key System (Door Lock)	○			○	○
Key Reminder Warning System				○	○
Meter/Gauge System	○			○	○
Audio and Visual System	○				
Navigation System	○				
Power Window Control System	○			○	○
Window Defogger System					○
Sliding Roof System	○			○	○

- In the DTC check, it is very important to determine whether the problem indicated by the DTC either: 1) still occurs, or 2) occurred in the past but has returned to normal. In addition, the DTC should be compared to the problem symptom to see if they are related. For this reason, DTCs should be checked before and after confirmation of symptoms (i.e., whether or not problem symptoms exist) to determine current system conditions, as shown in the flowchart below.
- Never skip the DTC check. Failing to check DTCs may, depending on the case, result in unnecessary troubleshooting for systems operating normally or lead to repairs not related to the problem. Follow the procedures listed in the flowchart in the correct order.
- The following flowchart shows how to proceed with troubleshooting using the DTC check. Directions from the flowchart will indicate how to proceed either to DTC troubleshooting or to the troubleshooting of each problem symptom.

1 **DTC CHECK**

NEXT

2 **MAKE A NOTE OF DTCS DISPLAYED AND THEN CLEAR MEMORY**

NEXT

3 **SYMPTOM CONFIRMATION**

Result

Result	Proceed to
No symptoms exist	A
Symptoms exist	B

B → **Go to step 5**

A

4 **SIMULATION TEST USING SYMPTOM SIMULATION METHODS**

NEXT

5 **DTC CHECK**

Result

Result	Proceed to
DTC is not output	A

Result	Proceed to
DTC is output	B

B → **TROUBLESHOOTING OF PROBLEM INDICATED BY DTC**

A

IN

6 SYMPTOM CONFIRMATION

Result

Result	Proceed to
No symptoms exist	A
Symptoms exist	B

If a DTC was displayed in the initial DTC check, the problem may have occurred in a wire harness or connector in that circuit in the past. Check the wire harness and connectors.

B → **SYSTEM NORMAL**

A

TROUBLESHOOTING OF EACH PROBLEM SYMPTOM

The problem still occurs in a place other than the diagnostic circuit (the DTC displayed first is either for a past problem or a secondary problem).

4. SYMPTOM SIMULATION

HINT:

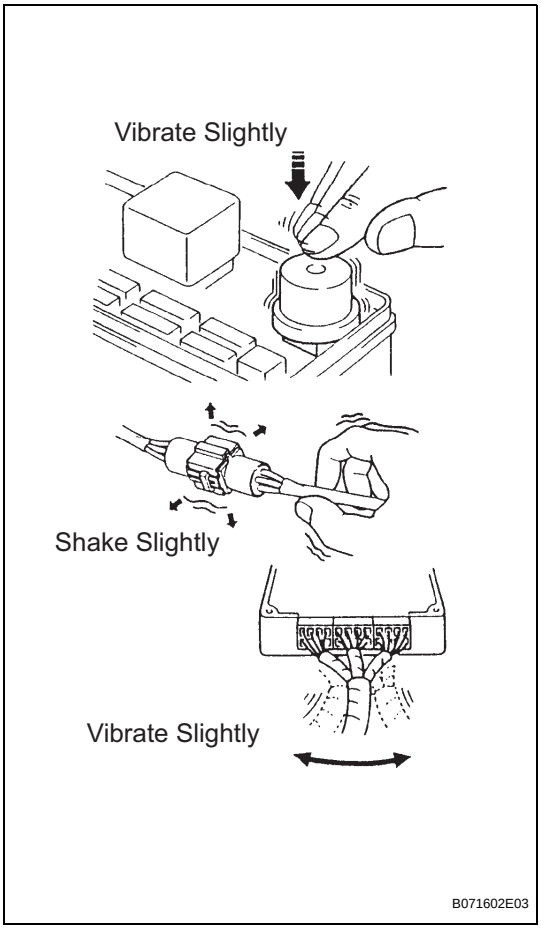
The most difficult case in troubleshooting is when no problem symptoms occur. In such a case, a thorough problem analysis must be carried out. A simulation of the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to important repairs being overlooked and mistakes or delays.

For example:

With a problem that only occurs when the engine is cold or as a result of vibration caused by the road during driving, the problem can never be determined if the symptoms are being checked on a stationary vehicle or a vehicle with a warmed-up engine. Vibration, heat or water penetration (moisture) are difficult to reproduce. The symptom simulation tests below are effective substitutes for the conditions and can be applied to a stationary vehicle. Important points in the symptom simulation test:

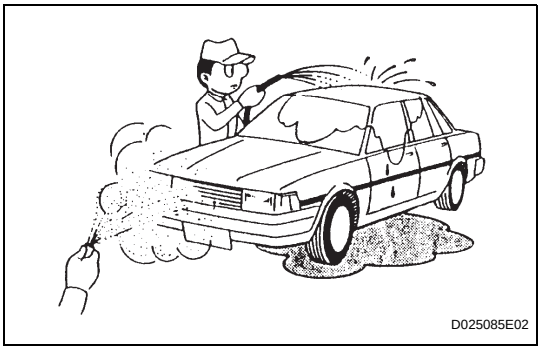
IN

In the symptom simulation test, the problem symptoms as well as the problem area or parts must be confirmed. First, narrow down the possible problem circuits according to the symptoms. Then, connect the tester and carry out the symptom simulation test, judging whether the circuit being tested is defective or normal. Also, confirm the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes.



(a) VIBRATION METHOD: When a malfunction seems to occur as a result of vibration.
  (1) PART AND SENSOR
  Apply slight vibration with a finger to the part of the sensor suspected to be the cause of the problem, and check whether the malfunction occurs.
  NOTICE:
  Applying strong vibration to relays may open relays.
  (2) CONNECTORS
  Slightly shake the connector vertically and horizontally.
  (3) WIRE HARNESS
  Slightly shake the wire harness vertically and horizontally.
  HINT:
  The connector joint and fulcrum of the vibration are the major areas that should be checked thoroughly.

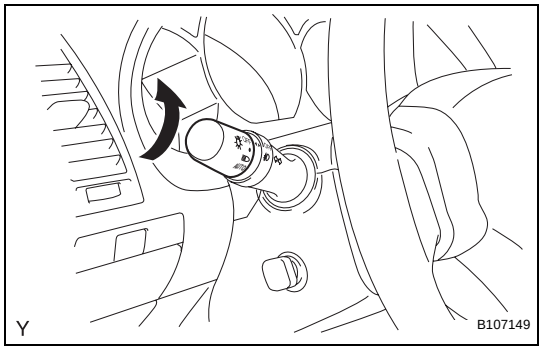
(b) HEAT METHOD: When a malfunction seems to occur when the area in question is heated.
  (1) Heat the component that is the possible cause of the malfunction with a hair dryer or similar device. Check if the malfunction occurs.
  NOTICE:
  - **Do not heat to more than 60°C (140°F). Exceeding this temperature may damage the components.**
  - **Do not apply heat directly to the parts in the ECU.**



(c) WATER SPRINKLING METHOD: When a malfunction seems to occur on a rainy day or in high-humidity.
  (1) Sprinkle water onto the vehicle and check if the malfunction occurs.
  NOTICE:
  - **Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by spraying water onto the front of the radiator.**
  - **Never apply water directly onto the electronic components.**

HINT:
If the vehicle has or had a water leakage problem, the leakage may have damaged the ECU or connections. Look for evidence of corrosion or short circuits. Proceed with caution during water tests.

(d) HIGH ELECTRICAL LOAD METHOD: When a malfunction seems to occur when an electrical load is excessive.
(1) Turn on the heater blower, headlight, rear window defogger and all other electrical loads. Check if the malfunction reoccurs.



5. DIAGNOSTIC TROUBLE CODE CHART

Look for output Diagnostic Trouble Codes (DTCs) (from the DTC checks) in the appropriate section's Diagnostic Trouble Code Chart. Use the chart to determine the trouble area and the proper inspection procedure. A description of each of the chart's columns is shown in the table below.

Item	Description
DTC No.	Indicates the diagnostic trouble code
Detection Item	Indicates the system or details of the problem
Trouble Area	Indicates the suspected areas of the problem
See Page	Indicates the page where the inspection procedures for each circuit is to be found, or gives instruction for checking and repairs.

6. PROBLEM SYMPTOMS TABLE

When a "Normal" code is output during a DTC check but the problem still occurs, use the Problem Symptoms Table. The suspected areas (circuits or parts) for each problem symptoms are in the table. The suspected areas are listed in order of probability. A description of each of the chart's columns is shown in the table below.

HINT:
In some cases, the problem is not detected by the diagnostic system even though a problem symptom occurs. It is possible that the problem occurs outside the detection range of the diagnostic system, or that the problem occurs in a completely different system.

Item	Description
Problem Symptom	-
Circuit Inspection, Inspection Order	Indicates the order in which the circuits need to be checked
Circuit or Part Name	Indicates the circuit or part which needs to be checked
See Page	Indicates the page where the flowchart for each circuit is located

7. CIRCUIT INSPECTION

A description of the main areas of each circuit inspection is shown in the table below.

Item	Description
Circuit Description	The major role, operation of the circuit and its component parts are explained.
Diagnostic Trouble Code No. and Detection Item	Indicates the diagnostic trouble codes, diagnostic trouble code settings and suspected areas for a problem

Item	Description
Wiring Diagram	This shows a wiring diagram of the circuit. Use this diagram together with ELECTRICAL WIRING DIAGRAM to thoroughly understand the circuit. Wire colors are indicated by an alphabetical code. B = Black, L = Blue, R = Red, BR = Brown, LG = Light Green, V = Violet, G = Green, O = Orange, W = White, GR = Gray, P = Pink, Y = Yellow, SB = Sky Blue The first letter indicates the basic wire color and the second letter indicates the color of the stripe.
Inspection Procedures	Use the inspection procedures to determine if the circuit is normal or abnormal. If abnormal, use the inspection procedures to determine whether the problem is located in the sensors, actuators, wire harnesses or ECU.
Indicates the condition of the connector of the ECU during the check	Connector being checked is connected. Connections of tester are indicated by (+) or (-) after the terminal name. Connector being checked is disconnected. The inspections between a connector and body ground, information about the body ground is not shown in the illustration.

TERMS

ABBREVIATIONS USED IN MANUAL

Abbreviations	Meaning
ABS	Anti-Lock Brake System
A/C	Air Conditioner
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACM	Active Control Engine Mount
ACSD	Automatic Cold Start Device
A.D.D	Automatic Disconnecting Differential
A/F	Air-Fuel Ratio
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
ASSY	Assembly
A/T, ATM	Automatic Transmission (Transaxle)
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
AWD	All Wheel Drive Vehicle
B+	Battery Voltage
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
BDC	Bottom Dead Center
B/L	Bi-Level
B/S	Bore-Stroke Ratio
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
CAN	Controller Area Network
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CCV	Canister Closed Valve
CD	Compact Disc
CF	Cornering Force
CG	Center of Gravity
CH	Channel
CKD	Complete Knock Down
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System

Abbreviations	Meaning
CTR	Center
C/V	Check Valve
CV	Control Valve
CW	Curb Weight
DC	Direct Current
DEF	Defogger
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLC	Data Link Connector
DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
DTC	Diagnostic Trouble Code
DVD	Digital Versatile Disc
EBD	Electric Brake Force Distribution
EC	Electrochromic
ECAM	Engine Control And Measurement System
ECD	Electronically Controlled Diesel
ECDY	Eddy Current Dynamometer
ECT	Electronic Controlled Automatic Transmission
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDU	Electronic Driving Unit
EDIC	Electric Diesel Injection Control
EFI	Electronic Fuel Injection
E/G	Engine
EGR	Exhaust Gas Recirculation
EGR-VM	EGR-Vacuum Modulator
ELR	Emergency Locking Retractor
EPS	Electric Power Steering
ENG	Engine
ES	Easy & Smooth
ESA	Electronic Spark Advance
ETCS-i	Electronic Throttle Control System-intelligent
EVAP	Evaporative Emission Control
EVP	Evaporator
E-VRV	Electric Vacuum Regulating Valve
EX	Exhaust
FE	Fuel Economy
FF	Front-Engine-Front-Wheel-Drive
F/G	Fuel Gauge
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up

IN

Abbreviations	Meaning
FR	Front
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GND	Ground
GPS	Global Positioning System
GSA	Gear Shift Actuator
HAC	High Altitude Compensator
H/B	Hatchback
H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Headlight)
HPU	Hydraulic Power Unit
HSG	Housing
HT	Hard Top
HV	Hybrid Vehicle
HWS	Heated Windshield System
IC	Integrated Circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
ISC	Idle Speed Control
J/B	Junction Block
J/C	Junction Connector
KD	Kick-Down
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left-Hand
LHD	Left-Hand Drive
LIN	Local Interconnect Network
L/H/W	Length, Height, Width
LLC	Long-Life Coolant
LNG	Liquefied Natural Gas
LO	Low
LPG	Liquefied Petroleum Gas
LSD	Limited Slip Differential
LSP & BV	Load Sensing Proportioning and Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAP	Manifold Absolute Pressure
MAX.	Maximum
MIC	Microphone

Abbreviations	Meaning
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MG1	Motor Generator No. 1
MG2	Motor Generator No. 2
MMT	Multi-mode Manual Transmission
MP	Multipurpose
MPI	Multipoint Electronic Injection
MPX	Multiplex Communication System
M/T, MTM	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
NO.	Number
O2S	Oxygen Sensor
OC	Oxidation Catalyst
OCV	Oil Control Valve
O/D	Overdrive
OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
ORVR	On-board Refilling Vapor Recovery
O/S	Oversize
P & BV	Proportioning and Bypass Valve
PBD	Power Back Door
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PROM	Programmable Read Only Memory
PS	Power Steering
PSD	Power Slide Door
PTC	Positive Temperature Coefficient
PTO	Power Take-Off
PZEV	Partial Zero Emission Vehicle
P/W	Power Window
R & P	Rack and Pinion
RAM	Random Access Memory
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
RR	Rear
RRS	Rigid Rear Suspension

Abbreviations	Meaning
RSE	Rear Seat Entertainment
RWD	Rear-Wheel Drive
SC	Supercharger
SCV	Swirl Control Valve
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold-Start Fuel Injection
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TBI	Throttle Body Electronic Fuel Injection
TC	Turbocharger
TCCS	TOYOTA Computer-Controlled System
TCM	Transmission Control Module
TCV	Timing Control Valve
TDC	Top Dead Center
TEMP.	Temperature
TFT	TOYOTA Free-Tronic
TIS	Total Information System for Vehicle Development
T/M	Transmission
TMC	TOYOTA Motor Corporation
TMMIN	PT. TOYOTA Motor Manufacturing Indonesia
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TMT	TOYOTA Motor Thailand Co. Ltd.
TRAC/TRC	Traction Control System
TURBO	Turbocharge
TVIP	TOYOTA Vehicle Instruction Protection
TWC	Three-Way Catalyst
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VDIM	Vehicle Dynamics Integrated Management
VENT	Ventilator
VIM	Vehicle Interface Module
VGRS	Variable Gear Ratio Steering
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Skid Control
VSV	Vacuum Switching Valve

Abbreviations	Meaning
VTV	Vacuum Transmitting Valve
VVT-i	Variable Valve Timing-intelligent
W/	With
WGN	Wagon
W/H	Wire Harness
W/O	Without
1ST	First
2ND	Second
2WD	Two Wheel Drive Vehicle (4 x 2)
3RD	Third
4TH	Fourth
4WD	Four Wheel Drive Vehicle (4 x 4)
4WS	Four Wheel Steering System
5TH	Fifth

IN

GLOSSARY OF SAE AND TOYOTA TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their TOYOTA equivalents.

SAE ABBREVIATIONS	SAE TERMS	TOYOTA TERMS ( )-ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner, A/CL
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	HAC
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection	Direct Injection (DI./INJ)
DI	Distributor Ignition	-
DLC3	Data Link Connector 3	OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Trouble Code
DTM	Diagnostic Test Mode	-
ECL	Engine Coolant Level	-
ECM	Engine Control Module	Engine Electronic Control Unit (ECU)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Distributorless Ignition (DLI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_2S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-

SAE ABBREVIATIONS	SAE TERMS	TOYOTA TERMS ( )-ABBREVIATIONS
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Airflow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Light	Check Engine Light
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalytic Convert (OC), CCo
OL	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E-ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter
TCM	Transmission Control Module	Transmission ECU, ECT ECU
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) Manifold Converter CC_{RO}

SAE ABBREVIATIONS	SAE TERMS	TOYOTA TERMS ( )-ABBREVIATIONS
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	-
3GR	Third Gear	-
4GR	Fourth Gear	-

LIGHTING SYSTEM

PRECAUTION

1. PRECAUTION FOR USING BATTERY DURING INSPECTION

(a) While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

2. PRECAUTION FOR HEADLIGHT BULB REPLACEMENT

(a) If even a thin film of oil is left on the surface of the halogen light, the bulb may be damaged because the light will burn at a higher temperature.

(b) Handle any halogen light with great care. Dropping, hitting or damaging the bulb, in any way, may result in exploding and shattering because the internal pressure is high.

(c) Always prepare a new bulb for immediate replacement. While replacing the bulb, the lens may attract dust and moisture if removed from the vehicle for too long.

(d) Always use a bulb of the same wattage for replacement.

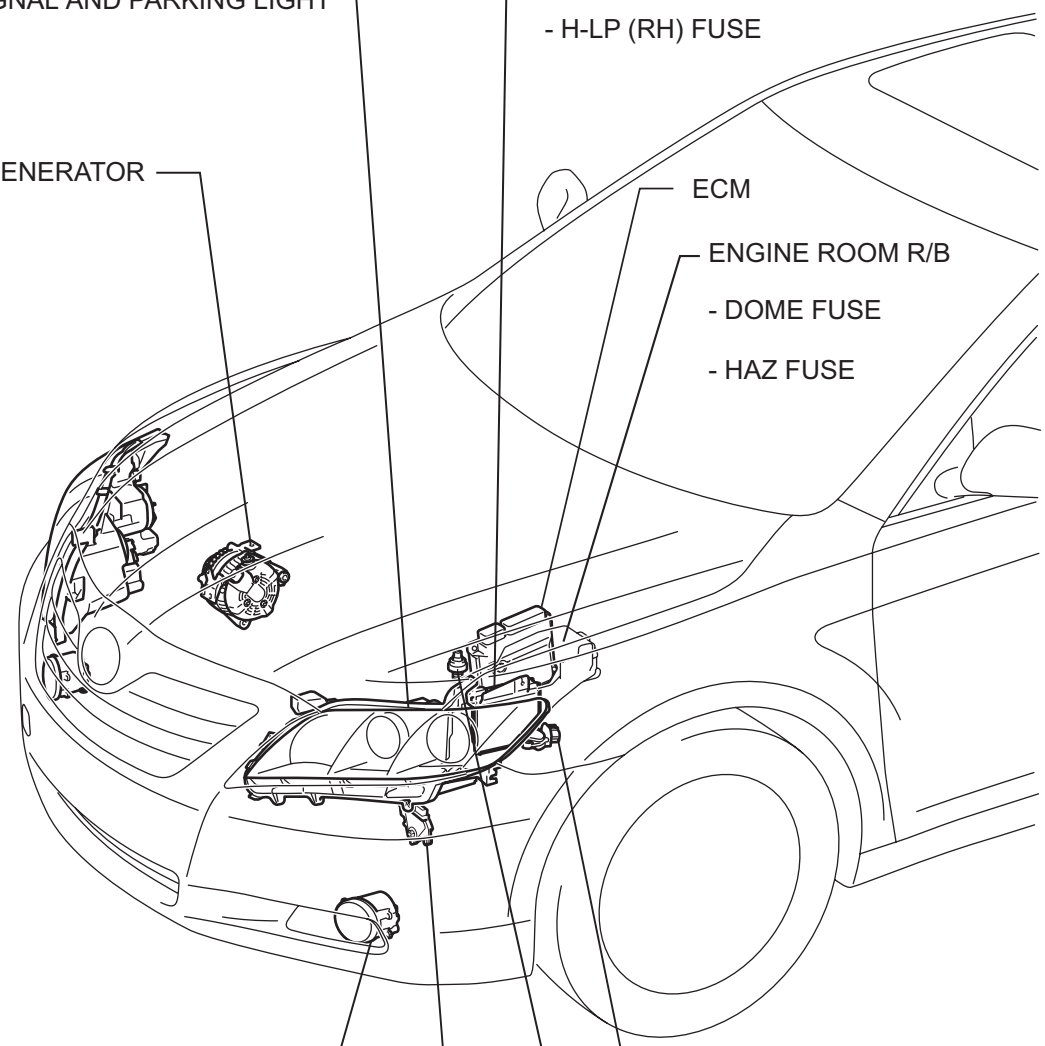
(e) Firmly reinstall the socket after bulb replacement. The lens may become cloudy or the light cavity may fill with water through the gaps around the socket.

3. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this section.

Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start

PARTS LOCATION



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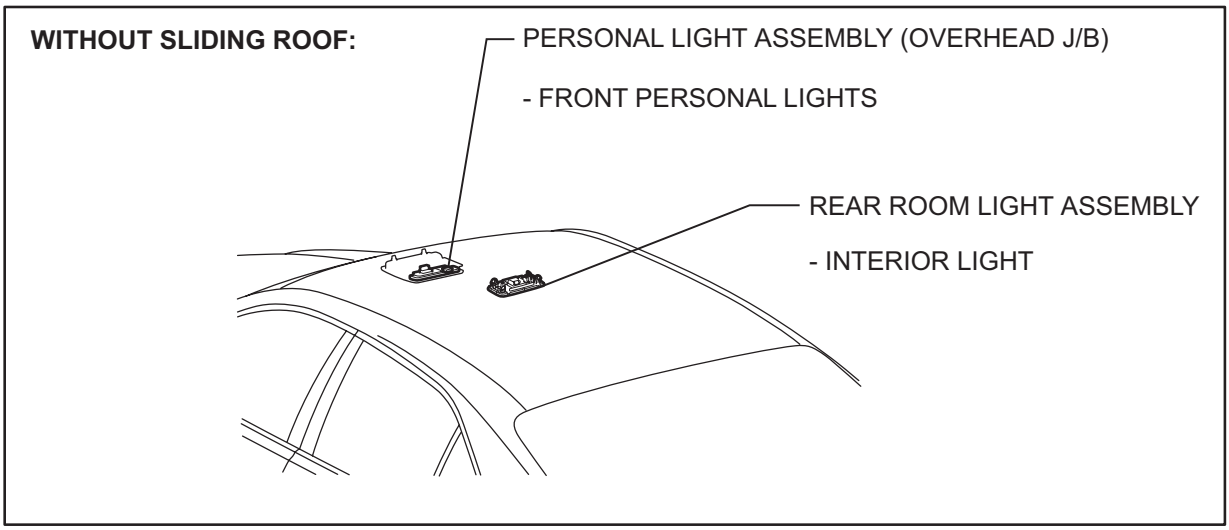
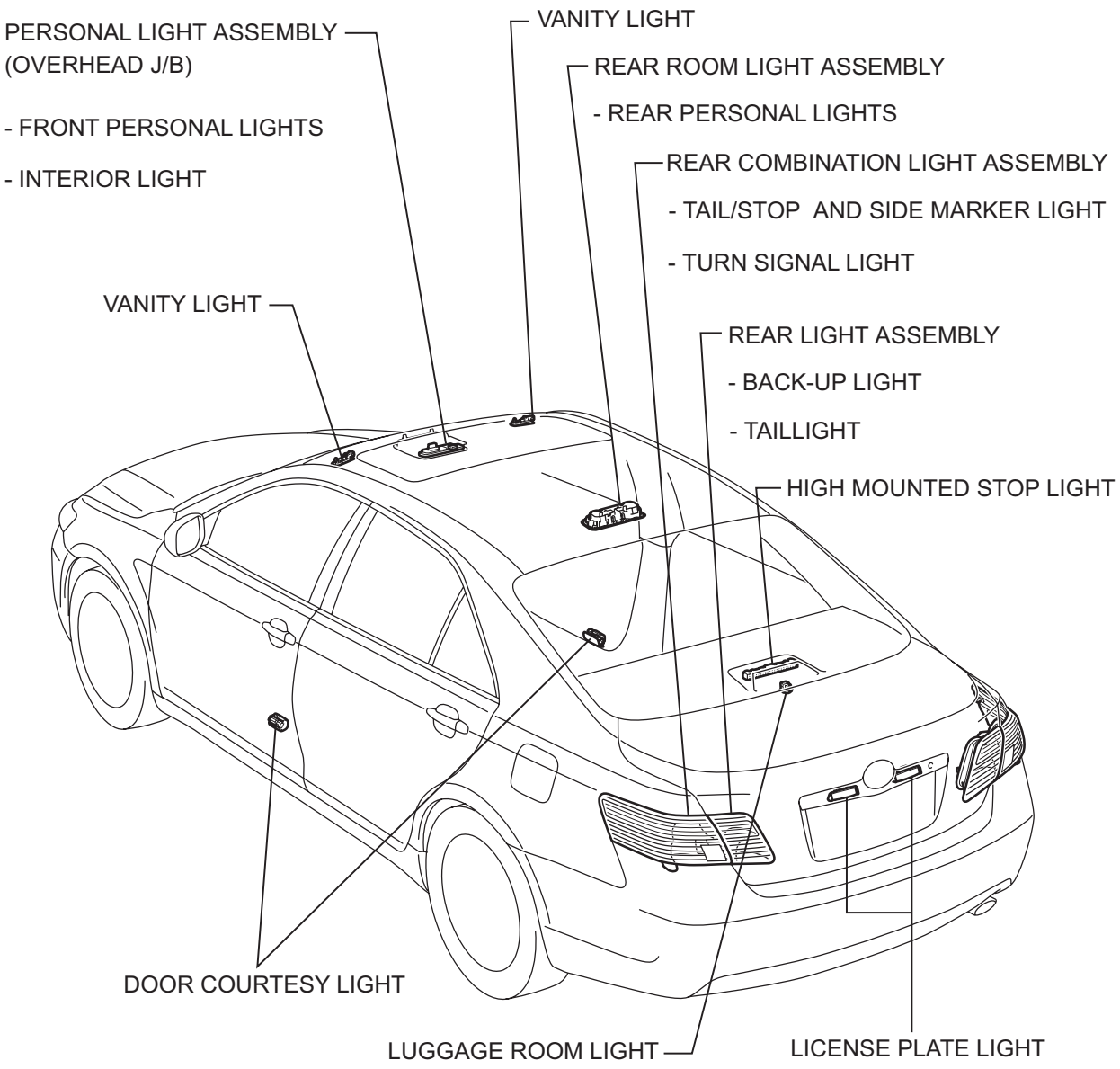
WITHOUT SLIDING ROOF:





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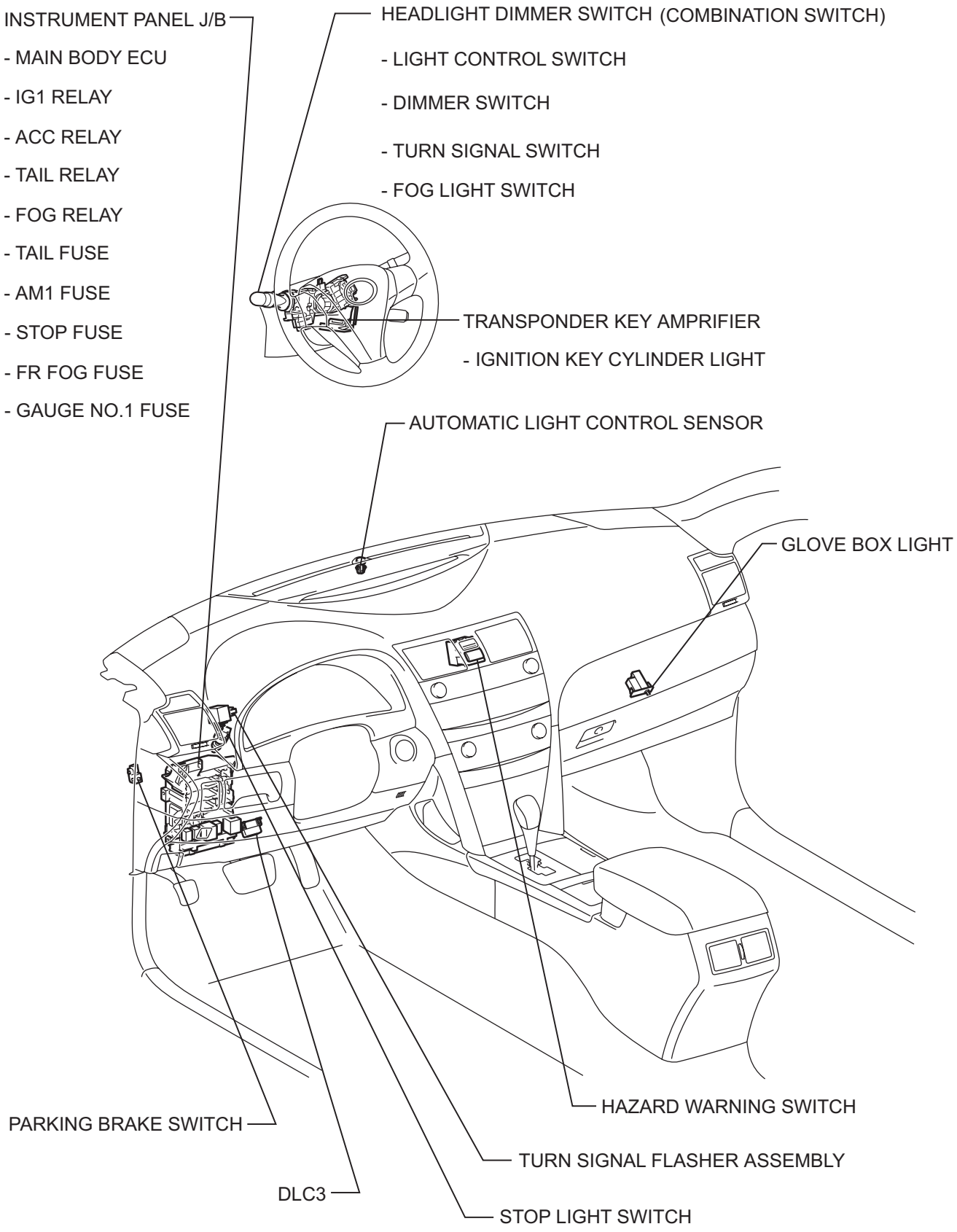

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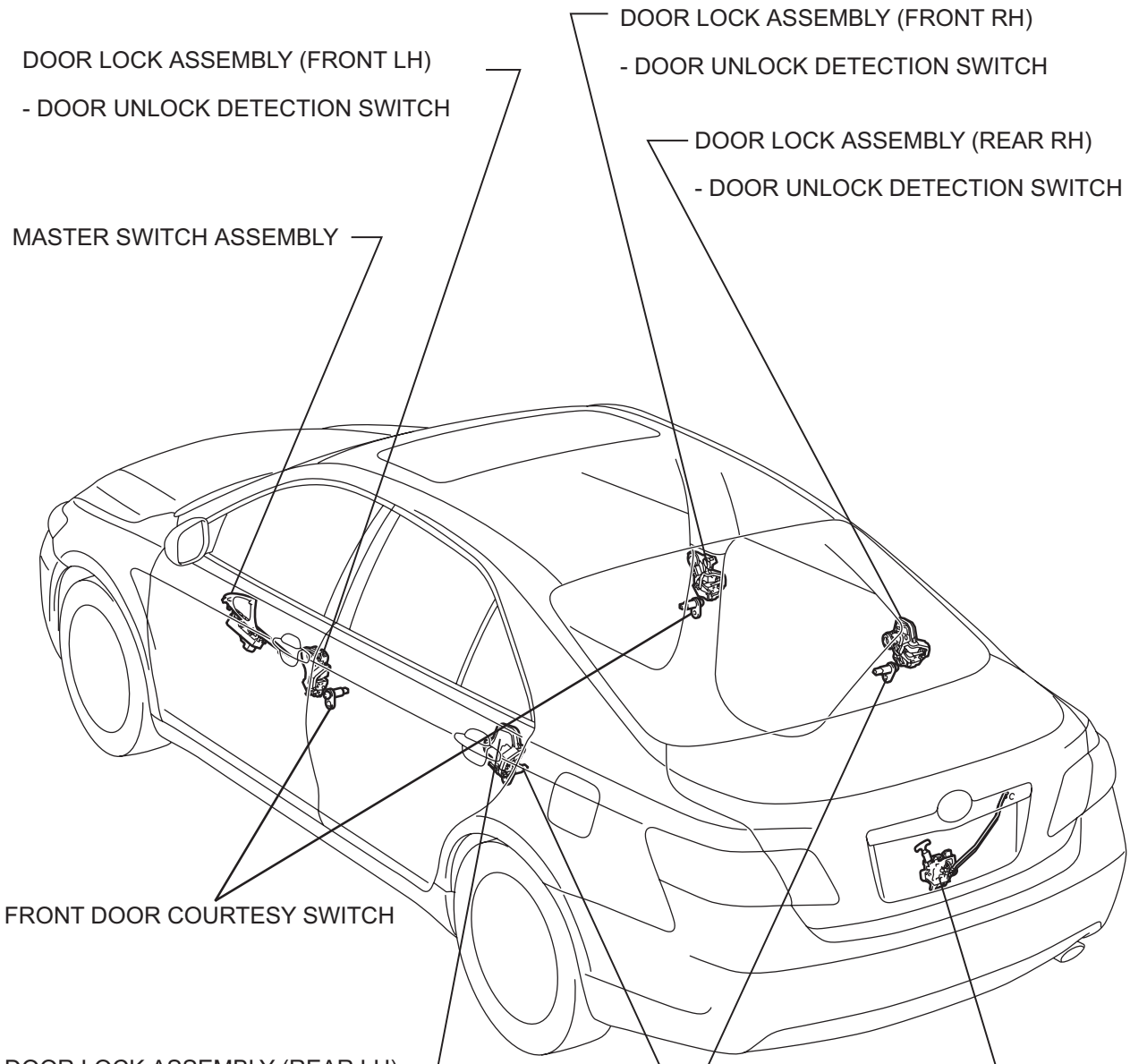

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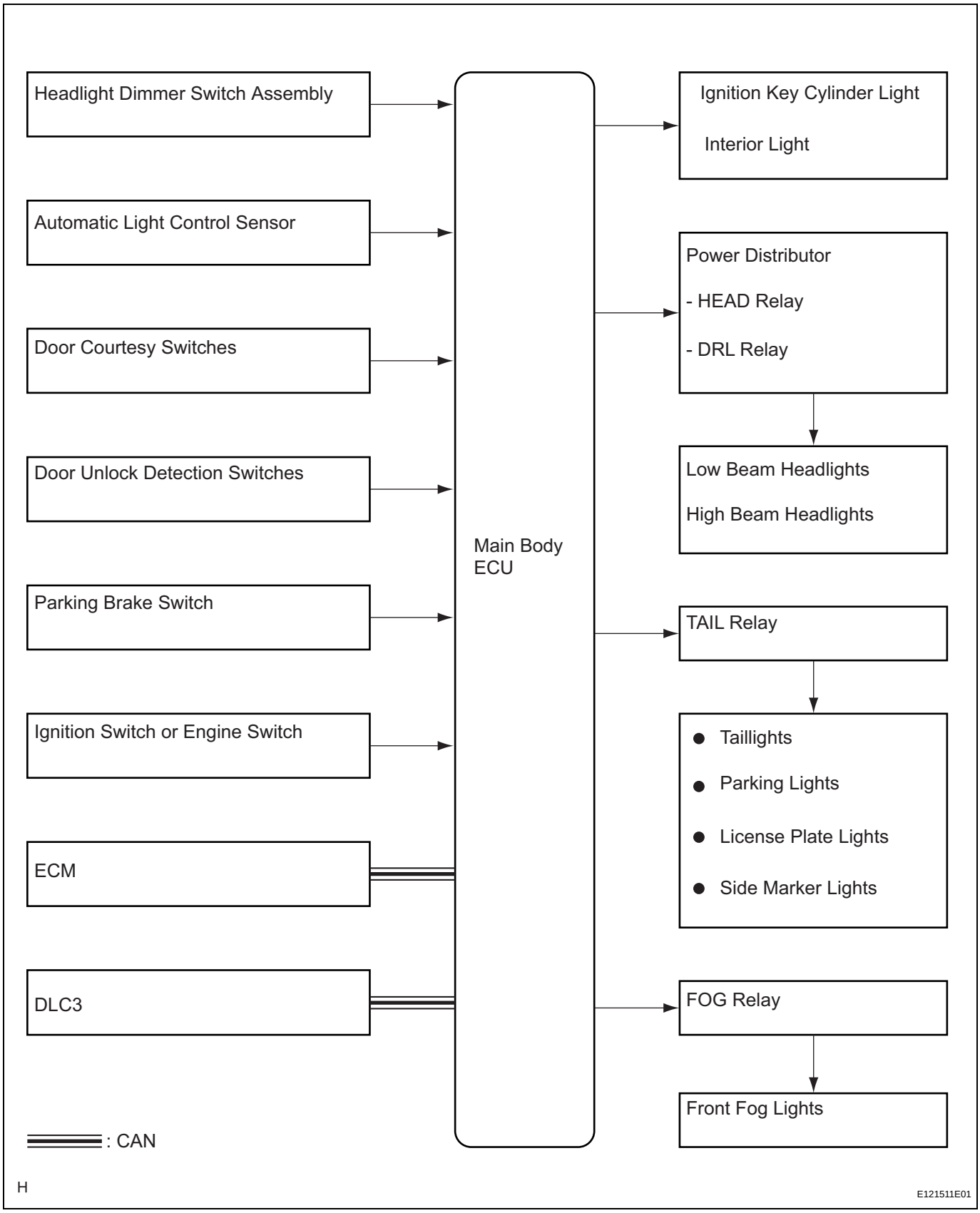
SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. MANUAL LIGHT CONTROL SYSTEM

This system functions if the lights such as the headlights and taillights come on by manual operation of the light control switch.

(a) The main body ECU controls this system based on the signals listed below.

Input	Output	Lights that illuminate
Light control switch TAIL signal	Taillight relay drive signal	• Taillights • License plate lights • Side marker lights • Parking lights
Light control switch HEAD signal	Headlight relay drive signal	Low beam headlights

2. AUTOMATIC LIGHT CONTROL SYSTEM

When the light control switch is in the AUTO position, the automatic light control sensor detects ambient light, converts it into an electrical signal, and outputs it to the main body ECU. The main body ECU automatically turns the headlights and taillights on or off according to the signal.

(a) The main body ECU controls this system based on the signals listed below.

Input	Output	Lights that illuminate
• Light control switch AUTO signal • Automatic light control sensor signal	• Headlight relay drive signal • Taillight relay drive signal	• Low beam headlights • Taillights • License plate lights • Side marker lights • Parking lights

3. LIGHT AUTO TURN OFF SYSTEM

When the headlights and taillights are on through the operation of the automatic light control system or through the light control switch, if the ignition switch is turned off and all doors are closed, this system continues to illuminate the headlights and taillights for approximately 30 seconds, and then turns off the headlights and taillights.

However, if the ignition switch is turned off and all doors are locked, this system turns off the headlights and taillights immediately.

(a) The main body ECU controls this system based on the signals listed below.

Input	Output	Lights that operate
• Door courtesy switch signal • Ignition switch or engine switch signal	• Headlight relay OFF demand • Taillight relay OFF demand • DRL relay OFF demand • FOG light relay OFF demand	• Low beam headlights • Taillights, license plate lights, parking lights, and side marker lights • High beam headlights • Front fog lights

4. DAYTIME RUNNING LIGHT SYSTEM

The daytime running light system is designed to automatically illuminate the headlights (dimmed HI beams), during the daytime to make the car more visible to other vehicle.

(a) The main body ECU controls this system.
The daytime running light system starts operating when all of the following conditions are met:

Items	Conditions
Ignition switch or engine switch	On (IG)
Engine	Running
Light control switch position	OFF, TAIL or AUTO position (if headlight-on control is not being performed by the automatic light control)
Parking brake switch	Released (OFF)

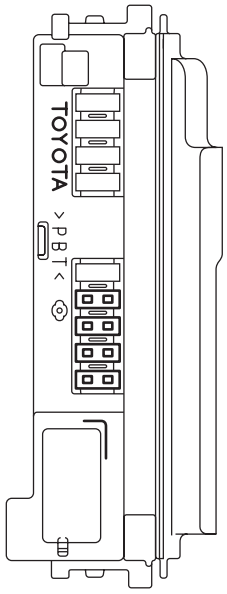
5. ILLUMINATED ENTRY SYSTEM

When a door is unlocked through a key or transmitter operation, or if a door is opened, the illuminated entry system turns on the interior light and the ignition key cylinder light.

(a) The main body ECU controls this system. The operation and condition of the illuminated entry system are described below.

Operation	Condition
Fade in	When any of the following conditions is met, the interior light and ignition key cylinder light fade in. • Any door is opened. • Any door is unlocked when the ignition switch is off and all doors are closed. • Ignition switch is turned from on (ACC) to off when all doors are closed.
Fade out immediately	When either of the following conditions is met, the interior light and ignition key cylinder light fade out immediately. • Ignition switch is turned from off to on (ACC or IG) when all doors are closed. • All doors are locked when the ignition switch is off.
Illuminate for approximately 15 seconds, and then fade out	All doors are closed when the ignition switch is off.
Fade out (Battery saving)	When the following conditions are met, the interior light and ignition key cylinder light fade out. • A key is not in the actuation area (with smart key system). • A key is not inserted in the ignition key cylinder (without smart key system). • There are no changes in the condition of the doors for 20 minutes.

Power Distributor (Engine Room J/B)



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6. POWER DISTRIBUTOR

(a) The power distributor (engine room J/B assembly) is installed in the engine room R/B.

(b) The HEAD relay and DRL relay are installed in the power distributor (engine room J/B assembly).

(c) When a short circuit occurs between the power distributor (engine room J/B assembly) and high beam headlight bulbs, a fail-safe function operates.

(d) When the fail-safe function operates, the power distributor stops the operation of the DRL relay.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the lighting system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

NEXT

3 INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4 INSPECT CAN COMMUNICATION SYSTEM*

(a) Use the intelligent tester to check if the CAN communication system is functioning normally.

Result

Result	Proceed to
CAN communication system DTC is not output	A
CAN communication system DTC is output	B

B → Go to step 8

A

5 CHECK FOR DTC*

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → Go to step 8

A

6	PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → Go to step 8

A

7	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) Data List / Active Test (See page LI-21)
(b) Terminals of ECU (See page LI-16)

NEXT

8	ADJUST, REPAIR OR REPLACE

NEXT

9	CONFIRMATION TEST

NEXT

END

CUSTOMIZE PARAMETERS

HINT:
The followings are the possible items to be customized.
NOTICE:

- **Before attempting to customize vehicle settings, confirm whether it is possible to make the change that the customer has requested.**
- **Be sure to record the current value before customizing.**
- **In case of performing the troubleshooting, pay attention because there is a possibility that the function has been disabled by customizing. (Example: In case of the symptom in which "The wireless operation does not function", check that the wireless operation has not been disabled by customizing, then perform the troubleshooting.)**

ILLUMINATED ENTRY:

Display	Default	Contents	Setting
LIGHTING TIME	15 s	Changes the lighting time of the interior light and ignition key cylinder light.	7.5 s / 15 s / 30 s
I/L ON / UNLOCK	ON	Lights up the interior light and ignition key cylinder light when a door is unlocked.	ON / OFF
I/L ON / ACC OFF	ON	Lights up the interior light and ignition key cylinder light when the ignition switch is turned from on (ACC) to off	ON / OFF

LIGHT CONTROL:

Display	Default	Contents	Setting
LIGHT OFF DELAY	30 s	Keeps the headlights on for a certain period of time after turning the ignition switch off and closing all the doors with the headlights on.	OFF / 30 s / 60 s / 90 s
SENSITIVITY	NORMAL	Adjusts the sensitivity of the automatic light control system. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DISP EX ON SEN	NORMAL	Changes the ambient brightness level required to dim the clock display illumination, etc. *1	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2
DISP EX OFF SEN	NORMAL	Changes the ambient brightness level required to cancel the dimming of the clock display illumination, etc.	LIGHT 2 / LIGHT 1 / NORMAL / DARK 1 / DARK 2

HINT:
Sensitivity adjustment can hardly be confirmed. Check by driving the customer's vehicle.

Illustration *1

Ambient Brightness Level	Dark ← → Bright				
Setting	DARK2	DARK1	NORMAL	LIGHT1	LIGHT2

PROBLEM SYMPTOMS TABLE

1. Headlight system:

Symptom	Suspected area	See page
One side LO-beam headlight does not illuminate	1. H-LP RL fuse or H-LP LL fuse	-
	2. Bulb	-
	3. Harness or connector	-
	4. Power distributor (Engine room J/B)	-
Both left and right LO-beam headlights do not illuminate	1. H-LP RL fuse and H-LP LL fuse	-
	2. Bulb	-
	3. Light control switch circuit	LI-48
	4. Headlight relay circuit	LI-35
	5. Main body ECU (Instrument panel J/B)	-
One side HI-beam headlight does not illuminate	1. H-LP RH fuse or H-LP LH fuse	-
	2. Bulb	-
	3. Harness or connector	-
	4. Power distributor (Engine room J/B)	-
Both left and right HI-beam headlights do not illuminate	1. H-LP RH fuse and H-LP LH fuse	-
	2. Bulb	-
	3. Light control switch circuit	LI-48
	4. Headlight (HI-BEAM) circuit	LI-39
	5. Main body ECU (Instrument panel J/B)	-
"Flash" headlights do not illuminate	1. Light control switch circuit	LI-48
	2. Main body ECU (Instrument panel J/B)	-
LO-beam headlights or HI-beam headlights do not go off	1. Headlight dimmer switch assembly	LI-120
	2. Power distributor (Engine room J/B)	-
	3. Harness or connector	-
	4. Main body ECU (Instrument panel J/B)	-

2. Daytime running light system:

Symptom	Suspected area	See page
Day time running light system does not operate	1. Light control switch circuit	LI-48
	2. Parking brake switch circuit	LI-61
	3. Power distributor (Engine room J/B)	-
	4. Main body ECU (Instrument panel J/B)	-
	5. ECM	-

3. Taillight system:

Symptom	Suspected area	See page
Front parking light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Rear taillight does not illuminate	1. Bulb	-
	2. Harness or connector	-
License plate light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Front side marker light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Taillight system does not operate (Taillights, front side marker lights, parking lights, and license plate lights do not illuminate)	1. TAIL fuse	-
	2. Taillight relay	LI-141
	3. Light control switch circuit	LI-48
	4. Taillight relay circuit	LI-65
	5. Main body ECU (Instrument panel J/B)	-

4. Stop light system:

Symptom	Suspected area	See page
Stop light system does not operate	1. Bulb	-
	2. Stop fuse	-
	3. Stop light switch	LI-125
	4. Harness or connector	-
One side stop light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Hi-mounted stop light does not illuminate	1. Bulb	-
	2. Harness or connector	-

5. Front fog light system:

Symptom	Suspected area	See page
One side fog light does not illuminate	1. Bulb	-
	2. Harness or connector	-
Both left and right fog lights do not illuminate (Taillight system is normal)	1. FR FOG fuse	-
	2. FR FOG relay	LI-142
	3. Light control switch circuit	LI-48
	4. Front fog light circuit	LI-44
	5. Main body ECU (Instrument panel J/B)	-

6. Turn signal and hazard warning system:

Symptom	Suspected area	See page
Hazard warning lights do not operate (Turn signal lights are normal)	1. HAZ fuse	-
	2. Hazard warning signal switch	LI-123
	3. Clock assembly	OT-4
	4. Turn signal flasher assembly	LI-138
	5. Harness or connector	-
Turn signal lights do not operate (Hazard warning lights are normal)	1. GAUGE No. 1 fuse	-
	2. Headlight dimmer switch assembly (Turn signal switch)	LI-120
	3. Turn signal flasher assembly	LI-138
	4. Harness or connector	-
"Hazard" and "Turn" do not operate	1. HAZ fuse and GAUGE No. 1 fuse	-
	2. Bulb	-
	3. Turn signal flasher assembly	LI-138
	4. Hazard warning signal switch	LI-123
	5. Headlight dimmer switch assembly (Turn signal switch)	LI-120
	6. Clock assembly	OT-4
	7. Harness or connector	-
Turn signal lights do not operate in one direction	1. Headlight dimmer switch assembly (Turn signal switch)	LI-120
	2. Turn signal flasher assembly	LI-138
	3. Harness or connector	-
Only one bulb does not operate	1. Bulb	-
	2. Harness or connector	-

7. Buck-up light system:

Symptom	Suspected area	See page
One side back-up light does not illuminate	1. Bulb	-
	2. Harness or connector	-

Symptom	Suspected area	See page
Both left and right back-up lights do not illuminate	1. Bulb	-
	2. GAUGE No. 1 fuse	-
	3. Buck-up light switch (for M/T)	LI-127
	4. Park/Neutral position switch (for U250E A/T)	AX-129
	5. Park/Neutral position switch (for U660E A/T)	AX-175
	6. Harness or connector	-

8. Illuminated entry system:

Symptom	Suspected area	See page
Only interior light does not illuminate	1. Bulb	-
	2. Personal light assembly (with sliding roof)	LI-105
	3. Rear room light assembly (without sliding roof)	LI-108
	4. Harness or connector	-
Only ignition key cylinder light does not illuminate	1. Transponder key amplifier (Ignition key cylinder light)	LI-113
	2. Harness or connector	-
Interior light and ignition key cylinder light do not operate normally	1. DOME fuse	-
	2. Personal light assembly	LI-105
	3. Rear room light assembly	LI-108
	4. Transponder key amplifier	LI-113
	5. Door courtesy switch circuit	LI-52
	6. Door lock position switch circuit	LI-55
	7. Ignition switch circuit	LI-28
	8. Interior light circuit	LI-57
	9. Main body ECU (Instrument panel J/B)	-

9. Vanity light system:

Symptom	Suspected area	See page
Vanity light does not illuminate	1. Bulb	-
	2. Vanity light assembly	LI-116
	3. Visor assembly (Vanity light switch)	-
	4. Harness or connector	-

10. Luggage compartment light system:

Symptom	Suspected area	See page
Luggage compartment light does not illuminate	1. Luggage compartment light	LI-111
	2. Luggage compartment door lock assembly (Door courtesy switch)	LI-132
	3. Harness or connector	-

11. Glove box light system:

Symptom	Suspected area	See page
Glove box light does not illuminate	1. Bulb	-
	2. Glove box light assembly	LI-115
	3. Harness or connector	-

12. Door courtesy light system:

Symptom	Suspected area	See page
Door courtesy light does not illuminate	1. Door courtesy light	LI-109
	2. Front door courtesy switch	LI-129
	3. Harness or connector	-

13. Personal light system:

Symptom	Suspected area	See page
Front personal lights do not illuminate	1. Bulb	-
	2. Personal light assembly	LI-105
	3. Harness or connector	-
Rear personal lights do not illuminate	1. Bulb	-
	2. Rear room light assembly	LI-108
	3. Harness or connector	-

14. Automatic light control system:

Symptom	Suspected area	See page
Automatic light control system does not operate normally	1. Light control switch circuit	LI-48
	2. Automatic light control sensor circuit	LI-23
	3. Main body ECU (Instrument panel J/B)	-

15. Light auto turn off system:

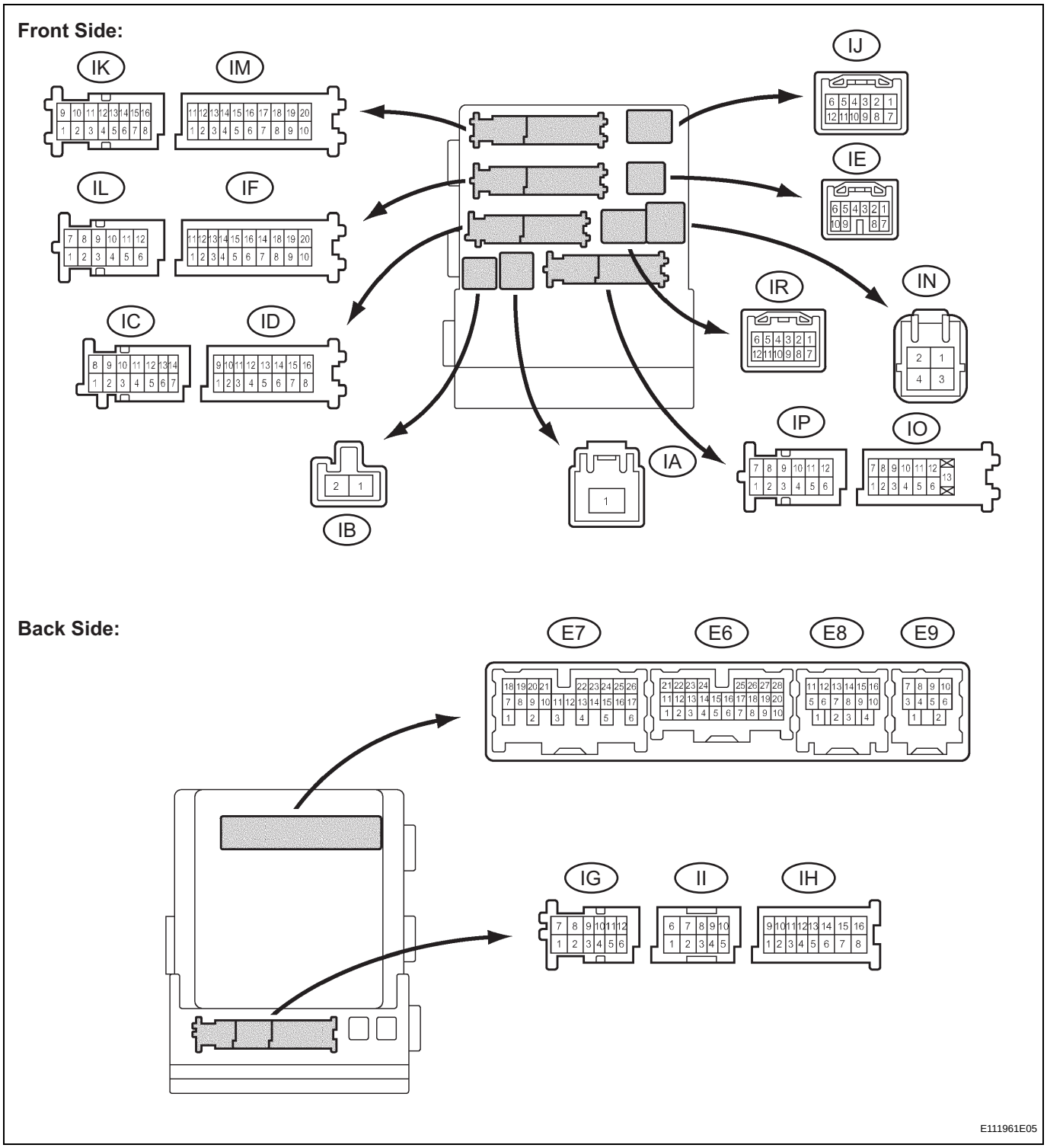
Symptom	Suspected area	See page
Light auto turn off system does not operate normally	1. Light control switch circuit	LI-48
	2. Door courtesy switch circuit	LI-52
	3. Main body ECU (Instrument panel J/B)	-

16. Battery saving system:

Symptom	Suspected area	See page
Battery saving function does not operate	1. Door courtesy switch circuit	LI-52
	2. Main body ECU (Instrument panel J/B)	-

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)



(a) Disconnect the IA, ID, IF and IM J/B connectors.
(b) Measure the voltage and resistance between the specified terminals of the wire harness side connectors and body ground.

Standard voltage

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
IA-1 - Body ground	B - Body ground	Battery power supply	Always	10 to 14 V

LI

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
ALTB (ID-16) - Body ground	W - Body ground	Generator power supply	Always	10 to 14 V

Standard resistance

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the IA, ID, IF, and IM J/B connectors.

(d) Measure the resistance and voltage between the specified terminals of the J/B connectors and body ground.

Standard resistance

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
CLTE (E6-18) - Body ground	BR - Body ground	Automatic light control ground	Always	Below 1 Ω

Standard voltage

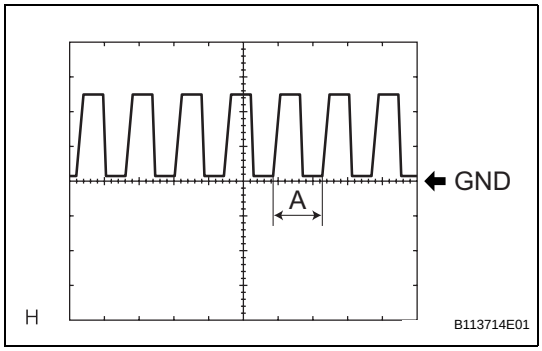
Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
PKB (IC-14) - Body ground (*3)	L - Body ground	Parking brake switch input	Parking brake switch ON	Below 1 V
			Parking brake switch OFF	10 to 14 V
HRLY (ID-3) - Body ground	P - Body ground	Headlight relay drive output	Light control switch in HEAD	Below 1 V
			Light control switch not in HEAD	10 to 14 V
DRL (ID-9) - Body ground	V - Body ground	High beam headlights drive output	Dimmer switch in HIGH or HIGH FLASH	Below 1 V
			Dimmer switch in LOW	10 to 14 V
HU (IG-5) - Body ground	LG - Body ground	Dimmer switch HIGH input	Dimmer switch in HIGH or HIGH FLASH	10 to 14 V
			Dimmer switch in LOW	Below 1 V
ILE (II-10) - Body ground (*2)	BR - Body ground	Interior light and ignition key cylinder light drive output	Interior light and ignition key cylinder light ON	Below 1 V
			Interior light and ignition key cylinder light OFF	10 to 14 V
PKB (IM-2) - Body ground (*4)	Y - Body ground	Parking brake switch input	Parking brake switch ON	Below 1 V
			Parking brake switch OFF (Released)	10 to 14 V
LCTY (IO-7) - Body ground	LG - Body ground	Rear left door courtesy switch input	Rear left door open	Below 1 V
			Rear left door closed	10 to 14 V
LSR (IP-5) - Body ground (*2)	GR - Body ground	Rear left door lock position switch input	Rear left door locked	10 to 14 V
			Rear left door unlocked	Below 1 V
LSWL (IP-5) - Body ground (*2)	GR - Body ground	Rear left door lock position switch input	Rear left door locked	10 to 14 V
			Rear left door unlocked	Below 1 V
HEAD (E6-17) - Body ground	P - Body ground	Light control switch HEAD input	Light control switch in HEAD	Below 1 V
			Light control switch not in HEAD	10 to 14 V

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
CLTS (E6-19) - Body ground	G - Body ground	Automatic light control sensor signal input	Ignition switch off	Below 1 V
			Automatic light control system operates	Pulse generation (See waveform 1)
CLTB (E6-20) - Body ground	B - Body ground	Automatic light control sensor power supply output	Ignition switch off	Below 1 V
			Ignition switch on (IG) and light control switch in AUTO	10 to 14 V
PCTY (E6-21) - Body ground	Y - Body ground	Passenger side door courtesy switch input	Passenger side door open	Below 1 V
			Passenger side door closed	10 to 14 V
LGCY (E6-25) - Body ground	W - Body ground	Luggage courtesy switch input	Luggage compartment door open	Below 1 V
			Luggage compartment door closed	10 to 14 V
LSWP (E6-27) - Body ground	LG - Body ground	Passenger side door lock position switch input	Passenger side door locked	10 to 14 V
			Passenger side door unlocked	Below 1 V
FFOG (E6-28) - Body ground	V - Body ground	Front fog light switch input	Front fog light switch ON	Below 1 V
			Front fog light switch OFF	10 to 14 V
LSWR (E6-5) - Body ground (*1)	V - Body ground	Rear right door lock position switch input	Rear right door locked	10 to 14 V
			Rear right door unlocked	Below 1 V
RCTY (E6-5) - Body ground (*2)	GR - Body ground	Rear right door courtesy switch input	Rear right door open	Below 1 V
			Rear right door closed	10 to 14 V
RCTY (E6-7) - Body ground (*1)	GR - Body ground	Rear right door courtesy switch input	Rear right door open	Below 1 V
			Rear right door closed	10 to 14 V
HF (E7-13) - Body ground	R - Body ground	Dimmer switch HIGH FLASH signal input	Dimmer switch in HIGH FLASH position	Below 1 V
			Dimmer switch not in HIGH FLASH position	10 to 14 V
SSW2 (E7-16) - Body ground (*1)	V - Body ground	Engine switch input	Engine switch not pushed	10 to 14 V
			Engine switch pushed	Below 1 V
SSW1 (E7-17) - Body ground (*1)	L - Body ground	Engine switch input	Engine switch not pushed	10 to 14 V
			Engine switch pushed	Below 1 V
A (E7-21) - Body ground	G - Body ground	Light control switch AUTO signal input	Light control switch in AUTO	Below 1 V
			Light control switch not in AUTO	10 to 14 V
ACCD (E7-22) - Body ground (*1)	W - Body ground	Accessory relay drive output	Ignition switch on (ACC)	Below 1 V
			Ignition switch off	10 to 14 V
TAIL (E7-23) - Body ground	B - Body ground	Light control switch TAIL signal input	Light control switch in TAIL or HEAD	Below 1 V
			Light control switch in neither TAIL nor HEAD	10 to 14 V
DCTY (E7-24) - Body ground	L - Body ground	Driver side door courtesy switch input	Driver side door open	Below 1 V
			Driver side door closed	10 to 14 V
IG1D (E7-3) - Body ground (*1)	P - Body ground	Ignition 1 relay drive output	Ignition switch on (IG)	Below 1 V
			Ignition switch off	10 to 14 V

Symbols	Wiring Color	Terminal Description	Condition	Specified Condition
FFGO (E7-4) - Body ground	R - Body ground	Front fog light relay drive output	Light control switch in HEAD and front fog light switch ON	Below 1 V
			Front fog light switch OFF	10 to 14 V
LSWD (E7-9) - Body ground	L - Body ground	Driver side door lock position switch input	Driver side door locked	10 to 14 V
			Driver side door unlocked	Below 1 V
CANH (E8-5) - Body ground	R - Body ground	Control system CAN communication	Ignition switch on (IG)	Pulse generation
			Ignition switch off	Below 1 V
CANL (E8-6) - Body ground	W - Body ground	Control system CAN communication	Ignition switch on (IG)	Pulse generation
			Ignition switch off	Below 1 V

If the result is not as specified, the main body ECU (Instrument panel J/B) may have a malfunction.
HINT:
*1: with smart key system
*2: without smart key system
*3: Pedal type parking brake
*4: Lever type parking brake

(1) Waveform 1



Item	Contents
Tool setting	5 V/DIV., 5 ms./DIV.

HINT:
If the ambient light becomes brighter, width A becomes narrower.

LI

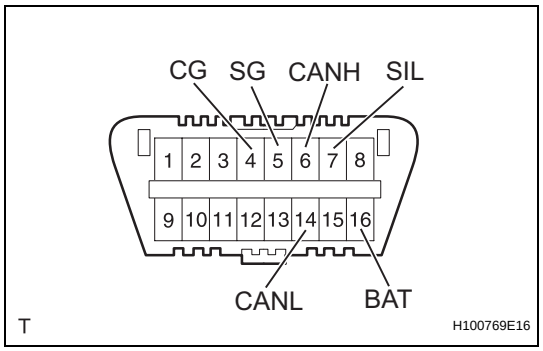
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Lighting system data and the Diagnostic Trouble Codes (DTCs) can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

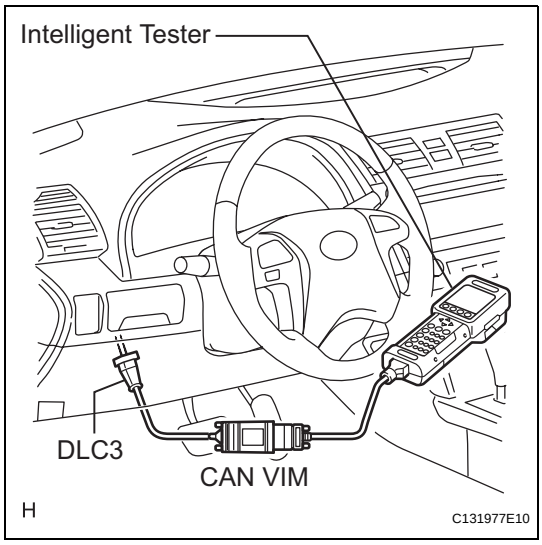


Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch off*	6 kΩ or higher

NOTICE:

***Before measuring the resistance, leave the vehicle as is for at least 1minute and do not operate the ignition switch, any other switches, or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



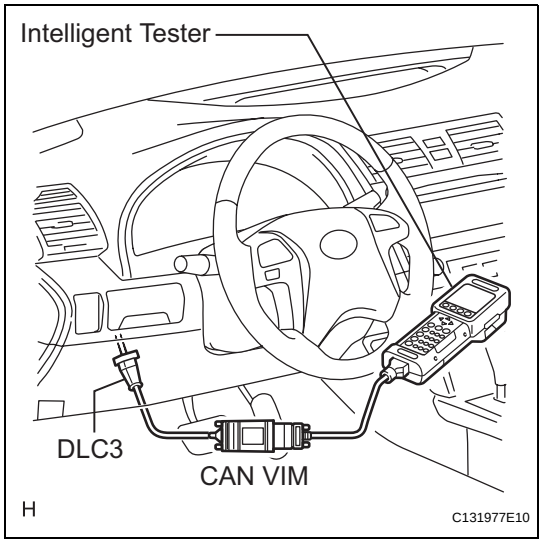
(b) Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.
HINT:
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Read the DTCs by following the directions on the tester screen.
HINT:
Please refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Erase the DTCs by following the directions on the tester screen.
HINT:
Please refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester DATA LIST allows switch, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Read the DATA LIST according to the display on the tester.

MAIN BODY (MAIN BODY ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC SW	Ignition switch or engine switch ACC signal / ON or OFF	ON: Ignition switch on (ACC or IG) OFF: Ignition switch off	-
IG SW	Ignition switch or engine switch IG signal / ON or OFF	ON: Ignition switch on (IG) OFF: Ignition switch off	-
D DOR CTY SW	Driver side door courtesy switch signal / ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	-
P DOR CTY SW	Passenger side door courtesy switch signal / ON or OFF	ON: Front passenger side door is open OFF: Front passenger side door is closed	-
RR DOR CTY SW	Rear right door courtesy switch signal / ON or OFF	ON: Rear right door is open OFF: Rear right door is closed	-
RL DOR CTY SW	Rear left door courtesy switch signal / ON or OFF	ON: Rear left door is open OFF: Rear left door is closed	-
D LOCK POS SW	Driver side door lock position switch signal / ON or OFF	ON: Driver side door is unlocked OFF: Driver side door is locked	-
P LOCK POS SW	Passenger side door lock position switch signal / ON or OFF	ON: Front passenger side door is unlocked OFF: Front passenger side door is locked	-
RR LOCK POS SW (with Smart Key System)	Rear right door lock position switch signal / ON or OFF	ON: Rear right door is unlocked OFF: Rear right door is locked	-
RL. LOCK POS SW (with Smart Key System)	Rear left door lock position switch signal / ON or OFF	ON: Rear left door is unlocked OFF: Rear left door is locked	-
DIMMER SW	Dimmer switch HIGH signal / ON or OFF	ON: Dimmer switch in HIGH or HIGH FLASH OFF: Dimmer switch in LOW	-
HIGH FLASHER SW	Dimmer switch HIGH FLASH signal / ON or OFF	ON: Dimmer switch in HIGH FLASH OFF: Dimmer switch not in HIGH FLASH	-
F FOG LIGHT SW	Fog light switch signal / ON or OFF	ON: Fog light switch ON OFF: Fog light switch OFF	-
AUTO LIGHT SW	Light control switch AUTO signal / ON or OFF	ON: Light control switch in AUTO OFF: Light control switch not in AUTO	-
HEAD LIGHT SW	Light control switch HEAD signal / ON or OFF	ON: Light control switch in HEAD OFF: Light control switch not in HEAD	-
TAIL LIGHT SW	Light control switch TAIL signal / ON or OFF	ON: Light control switch in TAIL or HEAD OFF: Light control switch not in TAIL or HEAD	-

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ILLUMINATE RATE	Illumination rate information / 0 ms. to 99.99 ms.	0.8 ms. to 22.0 ms. (Value is output according to ambient illuminance)	-
PARKING BRAKE SW	Parking brake switch signal / ON or OFF	ON: Parking brake switch is ON OFF: Parking brake switch is OFF	-

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows a relay, VSV, actuator, and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY (MAIN BODY ECU):

Item	Test Details	Diagnostic Note
F FOG LIGHT RLY	Front fog light relay ON / OFF	-
HEAD LIGHT	Headlight relay ON / OFF	-
HEAD LIGHT (HI)	High beam headlights ON / OFF	-
TAIL LIGHT	Taillight ON / OFF	-
DIMMER SIG	Dimmer signal ON / OFF	-
ILLUMI OUTPUT	Interior light and ignition key cylinder light ON / OFF (Interior light switch in DOOR position and all doors are closed)	-

DIAGNOSTIC TROUBLE CODE CHART

LIGHTING SYSTEM:

DTC No.	Detection Item	Suspected Area	See page
B1244	Light Sensor Circuit Malfunction	1. Automatic light control sensor 2. Harness or connector 3. Main body ECU (Instrument panel J/B)	LI-23

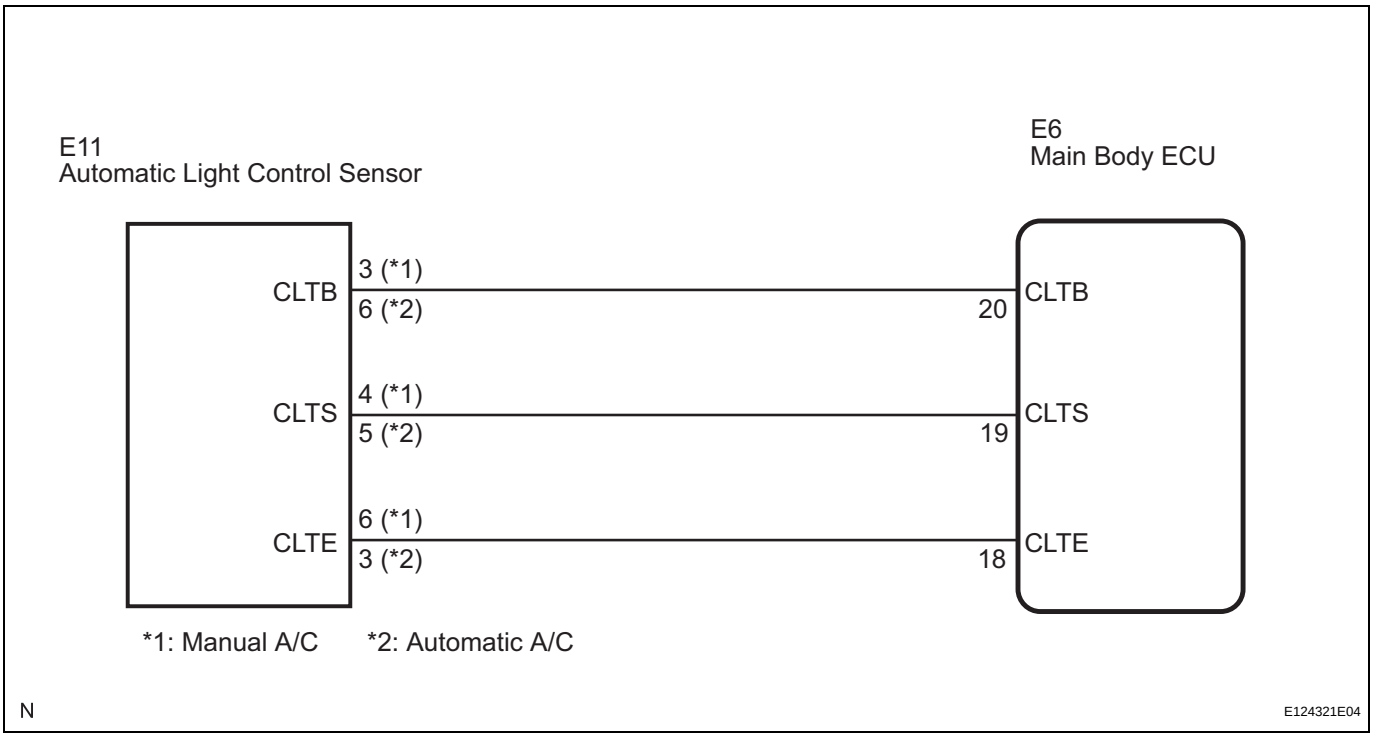
DTC	B1244	Light Sensor Circuit Malfunction

DESCRIPTION

The automatic light control sensor detects ambient light, converts it into an electrical signal, and outputs it to the main body ECU. The main body ECU turns on or off the headlights and taillights according to the signal.

DTC No.	DTC Detecting Condition	Trouble Area
B1244	• Malfunction in automatic light control sensor • Open or short in automatic light control sensor circuit	• Automatic light control sensor • Harness or connector • Main body ECU (Instrument panel J/B)

WIRING DIAGRAM



INSPECTION PROCEDURE

LI

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ILLUMINATE RATE	Illumination rate information / 0 ms to 99.99 ms	0.8 ms to 22.0 ms (Value is output according to ambient illuminance)	-

OK:

Normal condition listed above is displayed.

OK → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY**

NG

2 CHECK VEHICLE CONDITION

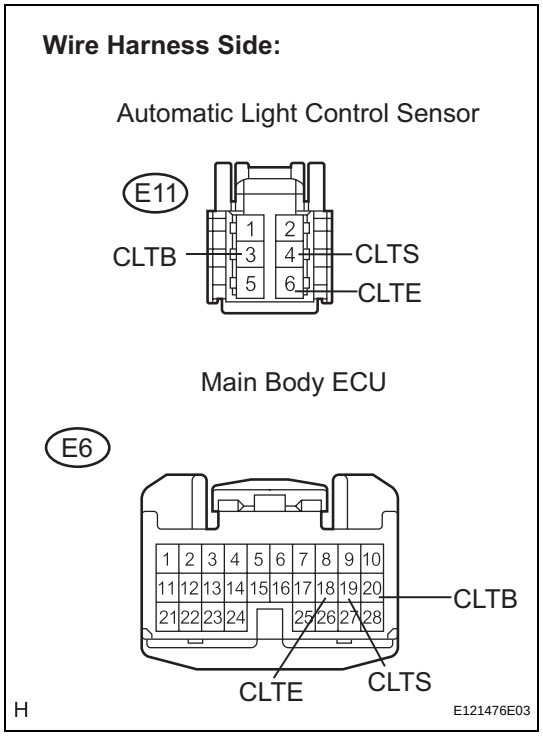
Result

Vehicle Condition	Proceed to
Manual Air Conditioning System	A
Automatic Air Conditioning System	B

B → **Go to step 6**

A

3 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)



(a) Disconnect the E11 automatic light control sensor connector.
(b) Disconnect the E6 main body ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

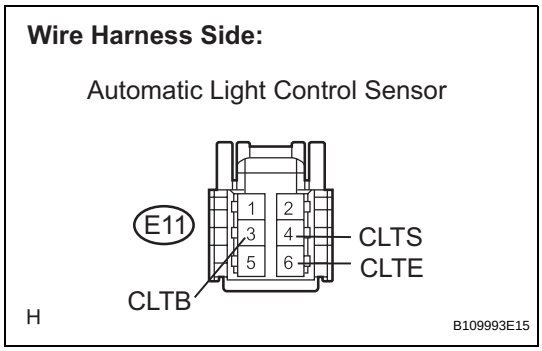
Tester Connection	Condition	Specified Condition
E6-18 (CLTE) - E11-6 (CLTE)	Always	Below 1 Ω
E6-19 (CLTS) - E11-4 (CLTS)	Always	Below 1 Ω
E6-20 (CLTB) - E11-3 (CLTB)	Always	Below 1 Ω
E6-18 (CLTE) - Body ground	Always	10 kΩ or higher
E6-19 (CLTS) - Body ground	Always	10 kΩ or higher
E6-20 (CLTB) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)

(a) Reconnect the main body ECU connector.



(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-3 (CLTB) - E11-6 (CLTE)	Ignition switch off	Below 1 V
	Ignition switch on (IG)	10 to 14 V

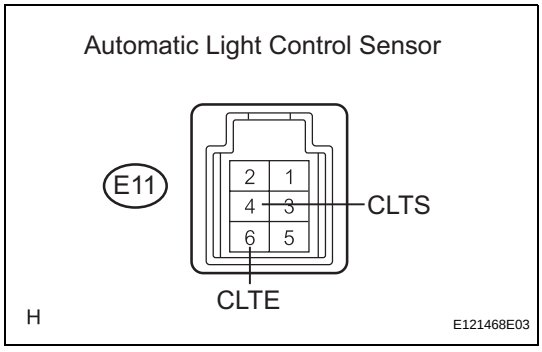
Standard resistance

Tester Connection	Condition	Specified Condition
E11-6 (CLTE) - Body ground	Always	Below 1 Ω

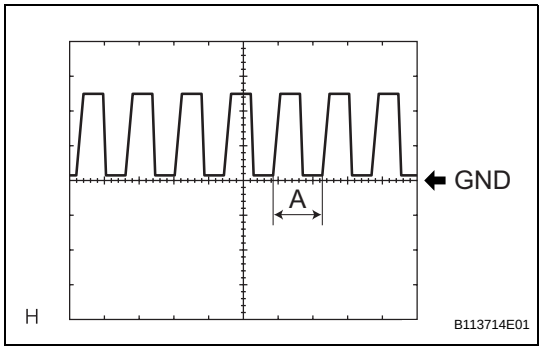
NG → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY**

OK

5 INSPECT AUTOMATIC LIGHT CONTROL SENSOR



(a) Reconnect the automatic light control sensor connector.
(b) Connect an oscilloscope to the automatic light control sensor connector.



(c) Check the waveform.

OK

Tester Connection	Tool Setting	Condition	Specified Condition
E11-6 (CLTE) - E11-4 (CLTS)	5 V/DIV., 5 ms./ DIV.	Ignition switch on (IG), light control switch in AUTO	Correct waveform is as shown

HINT:
If the ambient light becomes brighter, width A becomes narrower.

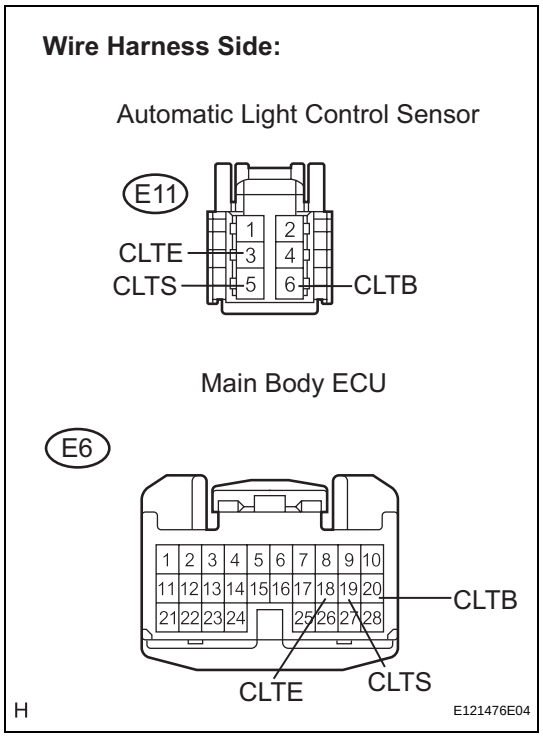
NG → **REPLACE AUTOMATIC LIGHT CONTROL SENSOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

LI

6 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - AUTOMATIC LIGHT CONTROL SENSOR)



(a) Disconnect the E11 automatic light control sensor connector.
(b) Disconnect the E6 main body ECU connector.

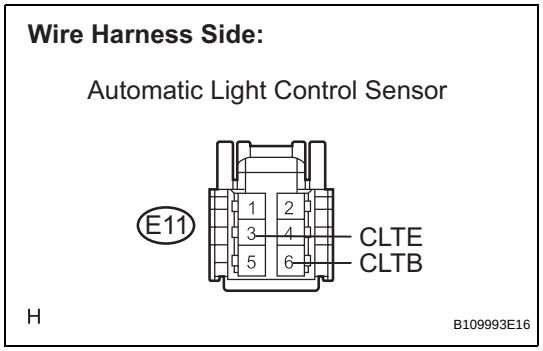
Standard resistance

Tester Connection	Condition	Specified Condition
E6-18 (CLTE) - E11-3 (CLTE)	Always	Below 1 Ω
E6-19 (CLTS) - E11-5 (CLTS)	Always	Below 1 Ω
E6-20 (CLTB) - E11-6 (CLTB)	Always	Below 1 Ω
E6-18 (CLTE) - Body ground	Always	10 kΩ or higher
E6-19 (CLTS) - Body ground	Always	10 kΩ or higher
E6-20 (CLTB) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7 INSPECT MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)



(a) Reconnect the main body ECU connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-6 (CLTB) - E11-3 (CLTE)	Ignition switch off	Below 1 V
E11-6 (CLTB) - E11-3 (CLTE)	Ignition switch on (IG)	10 to 14 V

Standard resistance

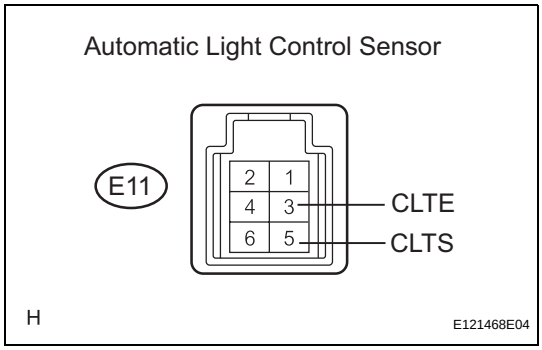
Tester Connection	Condition	Specified Condition
E11-3 (CLTE) - Body ground	Always	Below 1 Ω

NG → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY**

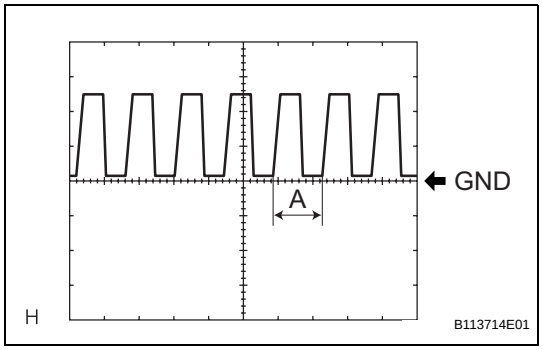
OK

LI

8	**INSPECT AUTOMATIC LIGHT CONTROL SENSOR**



(a) Reconnect the automatic light control sensor connector.
(b) Connect an oscilloscope to the automatic light control sensor connector.



(c) Check the waveform.
OK

Tester Connection	Tool Setting	Condition	Specified Condition
E11-3 (CLTE) - E11-5 (CLTS)	5 V/DIV., 5 ms./ DIV.	Ignition switch on (IG), light control switch in AUTO	Correct waveform is as shown

HINT:
If the ambient light becomes brighter, width A becomes narrower.

NG → **REPLACE AUTOMATIC LIGHT CONTROL SENSOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

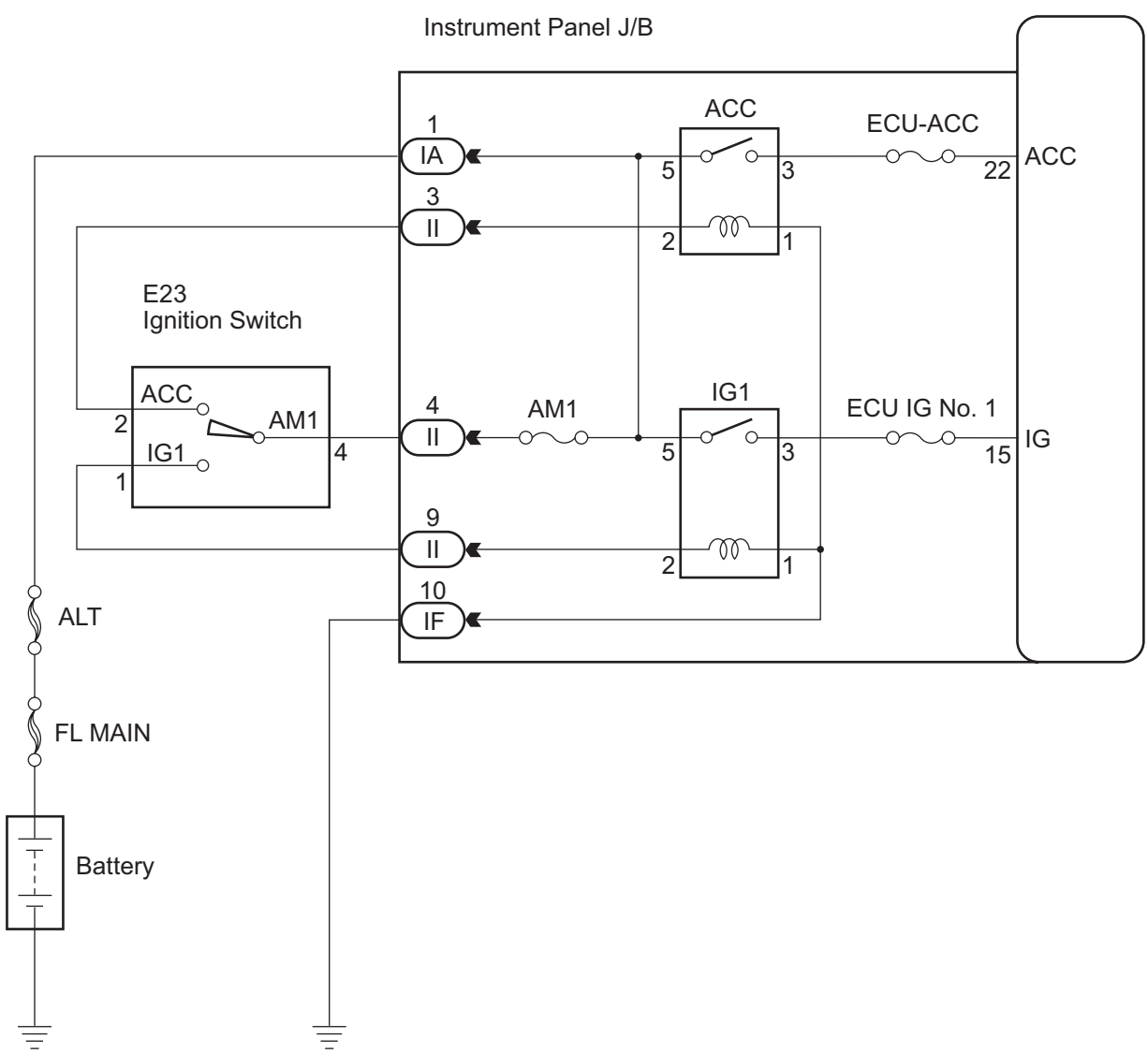
Ignition Switch Circuit

DESCRIPTION

This circuit detects the state of the ignition switch or engine switch, and sends it to the main body ECU.

WIRING DIAGRAM

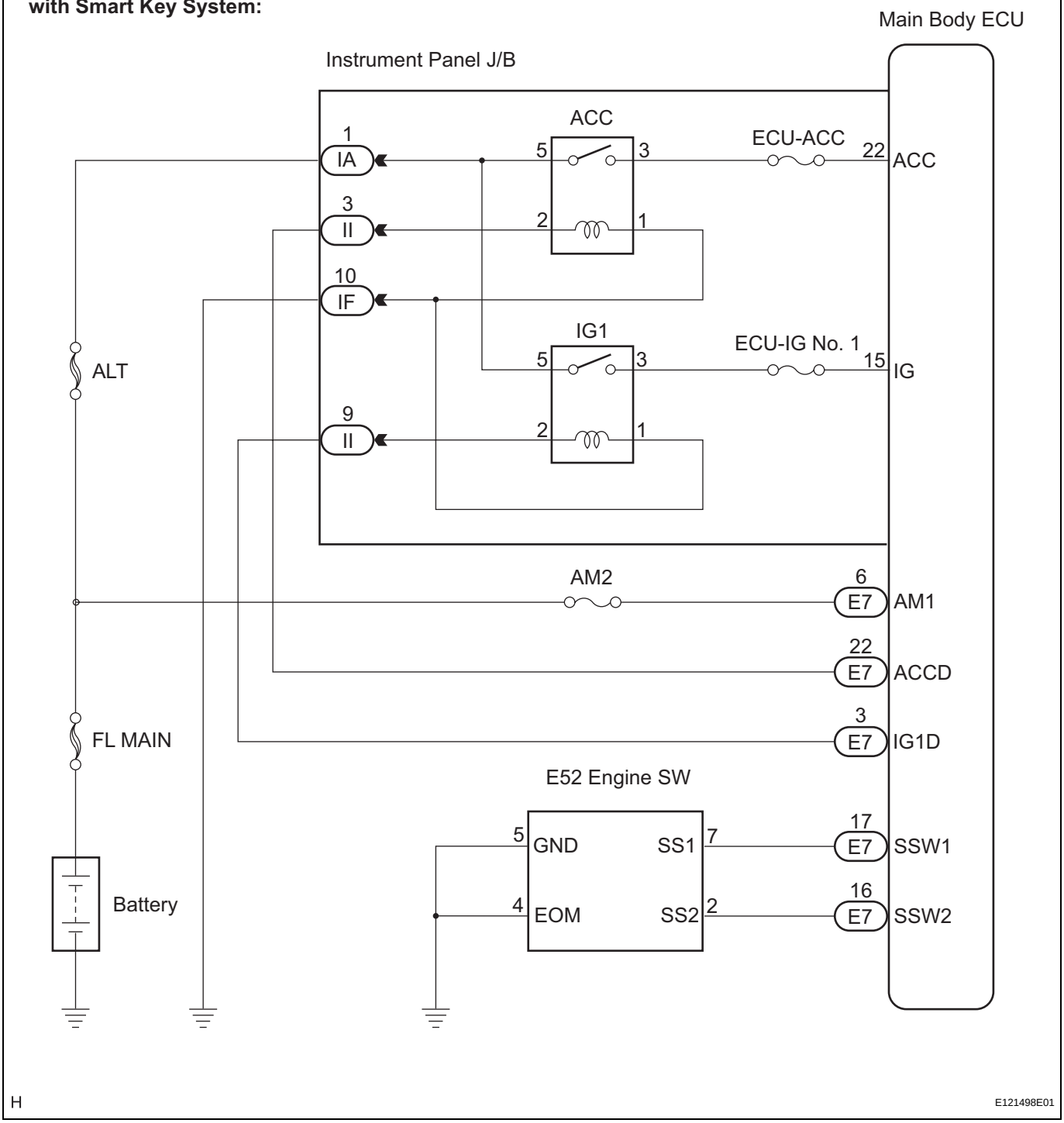
without Smart Key System:



H

E121497E02

with Smart Key System:



INSPECTION PROCEDURE

1	**READ VALUE OF INTELLIGENT TESTER**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.

LI

(c) Select the items below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

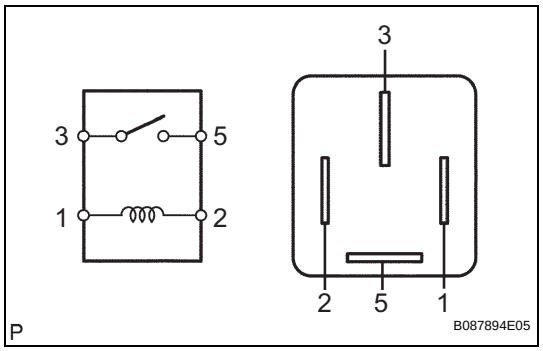
Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC SW	Ignition switch or engine switch ACC signal / ON or OFF	ON: Ignition switch on (IG or ACC) OFF: Ignition switch off	-
IG SW	Ignition switch or engine switch IG signal / ON or OFF	ON: Ignition switch on (IG) OFF: Ignition switch off	-

OK:
Normal conditions listed above are displayed.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT ACC RELAY



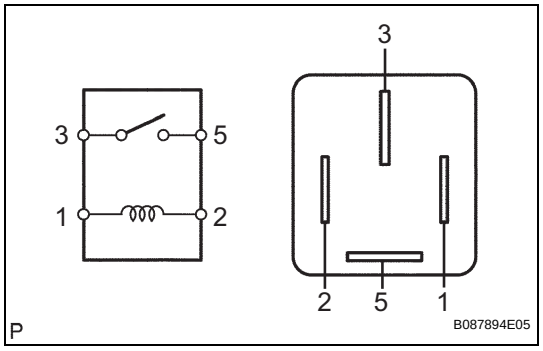
(a) Remove the ACC relay from the instrument panel J/B assembly.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE ACC RELAY**

OK

3 INSPECT NO. 1 IGNITION RELAY



(a) Remove the No. 1 ignition relay from the instrument panel J/B assembly.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE NO. 1 IGNITION RELAY**

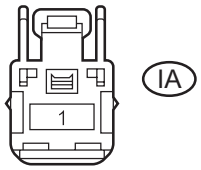
OK

LI

4	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B ASSEMBLY - BATTERY AND GROUND)

Wire Harness Side:

Instrument Panel J/B Assembly



H E121505E01

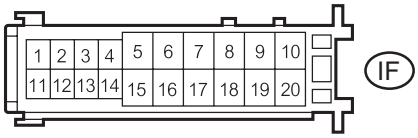
(a) Disconnect the IA instrument panel J/B assembly connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

Wire Harness Side:

Instrument Panel J/B Assembly



H E121504E01

(c) Disconnect the IF instrument panel J/B assembly connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
IF-10 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	CHECK VEHICLE CONDITION

(a) Check the vehicle condition.

Result

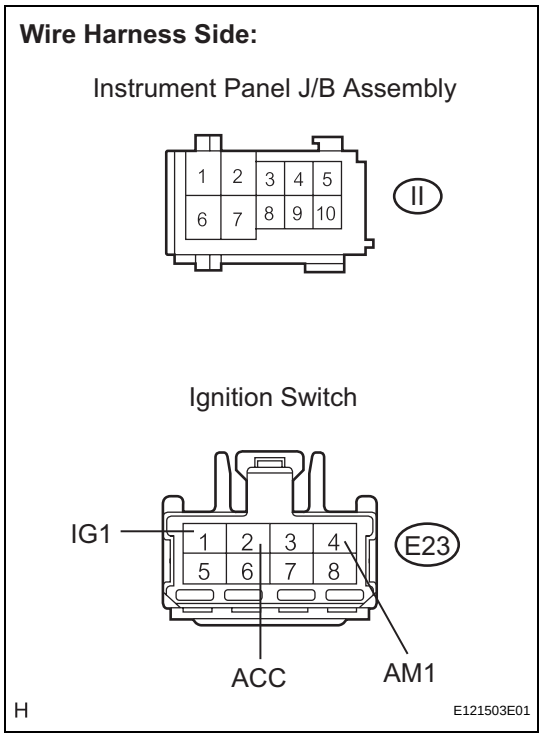
Condition	Proceed to
without Smart Key System	A
with Smart Key System	B

B → **Go to step 8**

A

LI

6	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B ASSEMBLY - IGNITION SWITCH)



(a) Disconnect the E23 ignition switch connector.
(b) Disconnect the II instrument panel J/B assembly connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
II-3 - E23-2 (ACC)	Always	Below 1 Ω
II-4 - E23-4 (AM1)	Always	Below 1 Ω
II-9 - E23-1 (IG1)	Always	Below 1 Ω
II-3 - Body ground	Always	10 kΩ or higher
II-4 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

7	INSPECT IGNITION SWITCH

(a) Inspect the ignition switch (See page ST-155)

OK:

Ignition switch is normal.

NG → **REPLACE IGNITION SWITCH**

OK

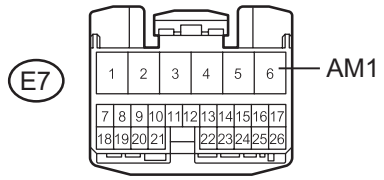
REPLACE INSTRUMENT PANEL J/B ASSEMBLY

LI

8 CHECK HARNESS AND CONNECTOR (BATTERY - MAIN BODY ECU)

Wire Harness Side:

Main Body ECU



H E121506E01

(a) Disconnect the E7 main body ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E7-6 (AM1) - Body ground	Always	10 to 14 V

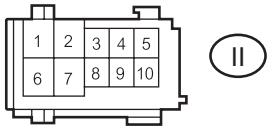
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

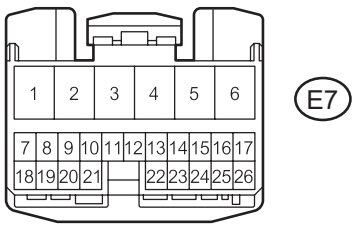
9 CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B ASSEMBLY - MAIN BODY ECU)

Wire Harness Side:

Instrument Panel J/B Assembly



Main Body ECU



H E121484E02

(a) Disconnect the E7 main body ECU connector.
(b) Disconnect the II instrument panel J/B assembly connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

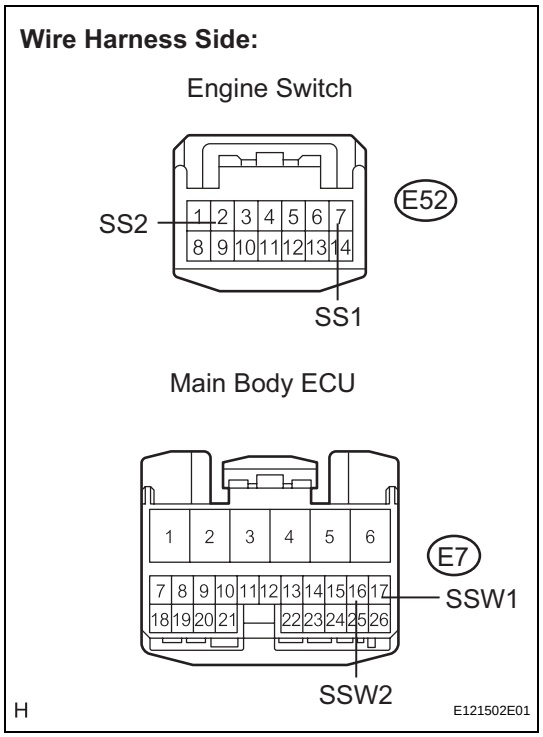
Tester Connection	Condition	Specified Condition
II-3 - E7-22 (ACCD)	Always	Below 1 Ω
II-9 - E7-3 (IG1D)	Always	Below 1 Ω
II-3 - Body ground	Always	10 kΩ or higher
II-9 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

LI

10	CHECK HARNESS AND CONNECTOR (ENGINE SWITCH - MAIN BODY ECU AND BODY GROUND)



(a) Disconnect the E52 engine switch connector.
(b) Disconnect the E7 main body ECU connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E52-7 (SS1) - E7-17 (SSW1)	Always	Below 1 Ω
E52-2 (SS2) - E7-16 (SSW2)	Always	Below 1 Ω
E52-5 (GND) - Body ground	Always	10 kΩ or higher
E52-4 (EOM) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

11	INSPECT ENGINE SWITCH

(a) Inspect the engine switch (See page ST-153).

OK:

Engine switch is normal.

NG → **REPLACE ENGINE SWITCH**

OK

REPLACE INSTRUMENT PANEL J/B ASSEMBLY

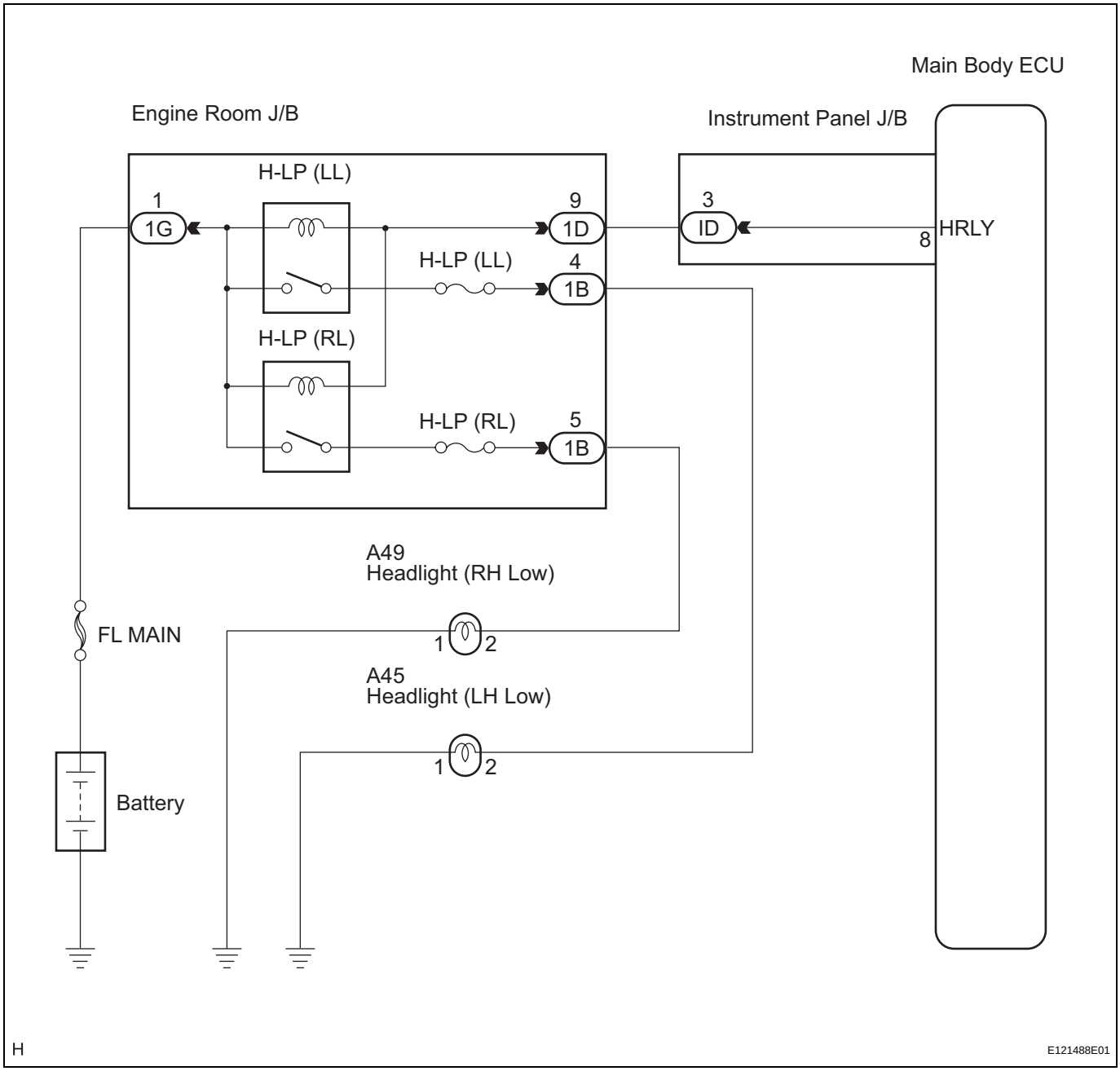
LI

Headlight Relay Circuit

DESCRIPTION

The main body ECU receives a light control switch HEAD signal from the headlight dimmer switch assembly, and turns the low beam headlights on. The headlight relay is installed in the power distributor (engine room J/B assembly).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

MAIN BODY (MAIN BODY ECU):

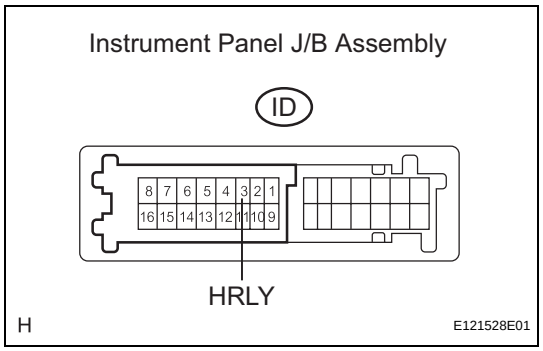
Item	Test Details	Diagnostic Note
HEAD RELAY	Headlight Relay ON / OFF	-

OK:
Headlight relay operates. (Low beam headlights illuminate.)

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



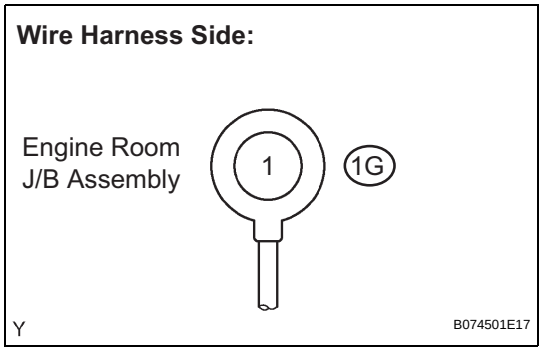
(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
ID-3 (HRLY) - Body ground	Light control switch OFF → HEAD	10 to 14 V → Below 1 V

OK → **Go to step 6**

NG

3 CHECK HARNESS AND CONNECTOR (BATTERY - ENGINE ROOM J/B ASSEMBLY)



(a) Disconnect the 1G engine room J/B assembly connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connector	Condition	Specified Condition
1G - Body ground	Always	10 to 14 V

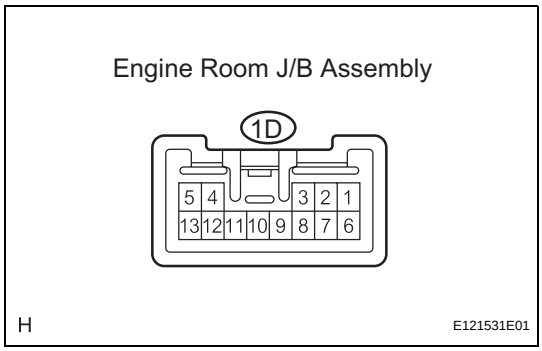
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT ENGINE ROOM J/B BLOCK ASSEMBLY

(a) Reconnect the 1G engine room J/B assembly connector.

LI



(b) Disconnect the 1D engine room J/B assembly connector.
(c) Measure the voltage according to the value(s) in the table below.

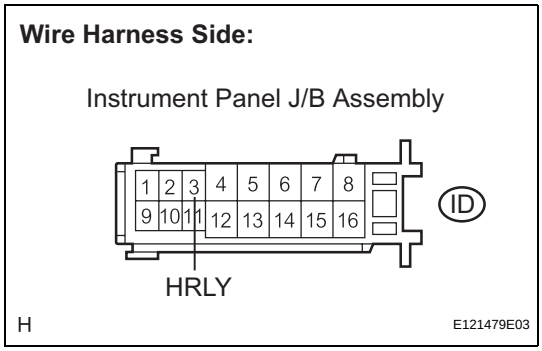
Standard voltage

Tester Connection	Condition	Specified Condition
1D-9 - Body ground	Always	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

OK

5	CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B ASSEMBLY - INSTRUMENT PANEL J/B ASSEMBLY)



(a) Reconnect the 1D engine room J/B assembly connector.
(b) Disconnect the ID instrument panel J/B assembly connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

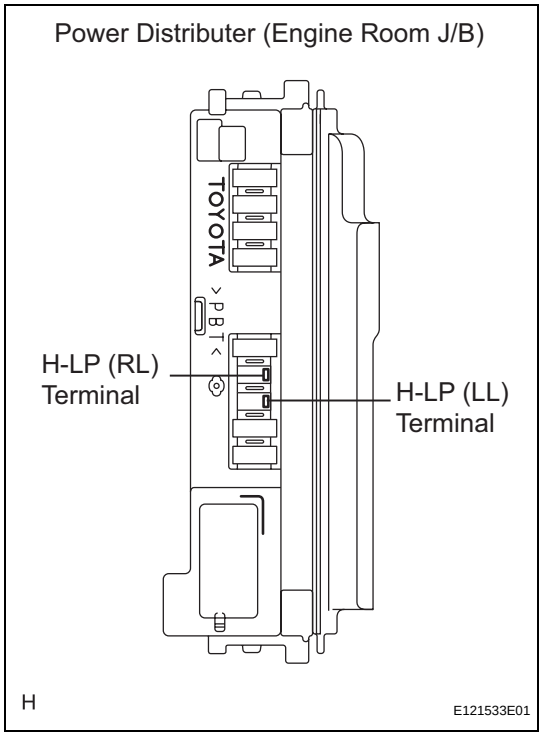
Tester Connection	Condition	Specified Condition
ID-3 (HRLY) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

6	INSPECT ENGINE ROOM JUNCTION BLOCK ASSEMBLY



(a) Remove the H-LP (RL) fuse and H-LP (LL) fuse from the engine room J/B assembly.
(b) Measure the voltage between the loading slot of each fuse and body ground.

Standard voltage

Tester Connection	Condition	Specified Condition
H-LP (RL) Terminal - Body ground	Light control switch in HEAD	10 to 14 V
H-LP (LL) Terminal - Body ground	Light control switch in HEAD	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

OK

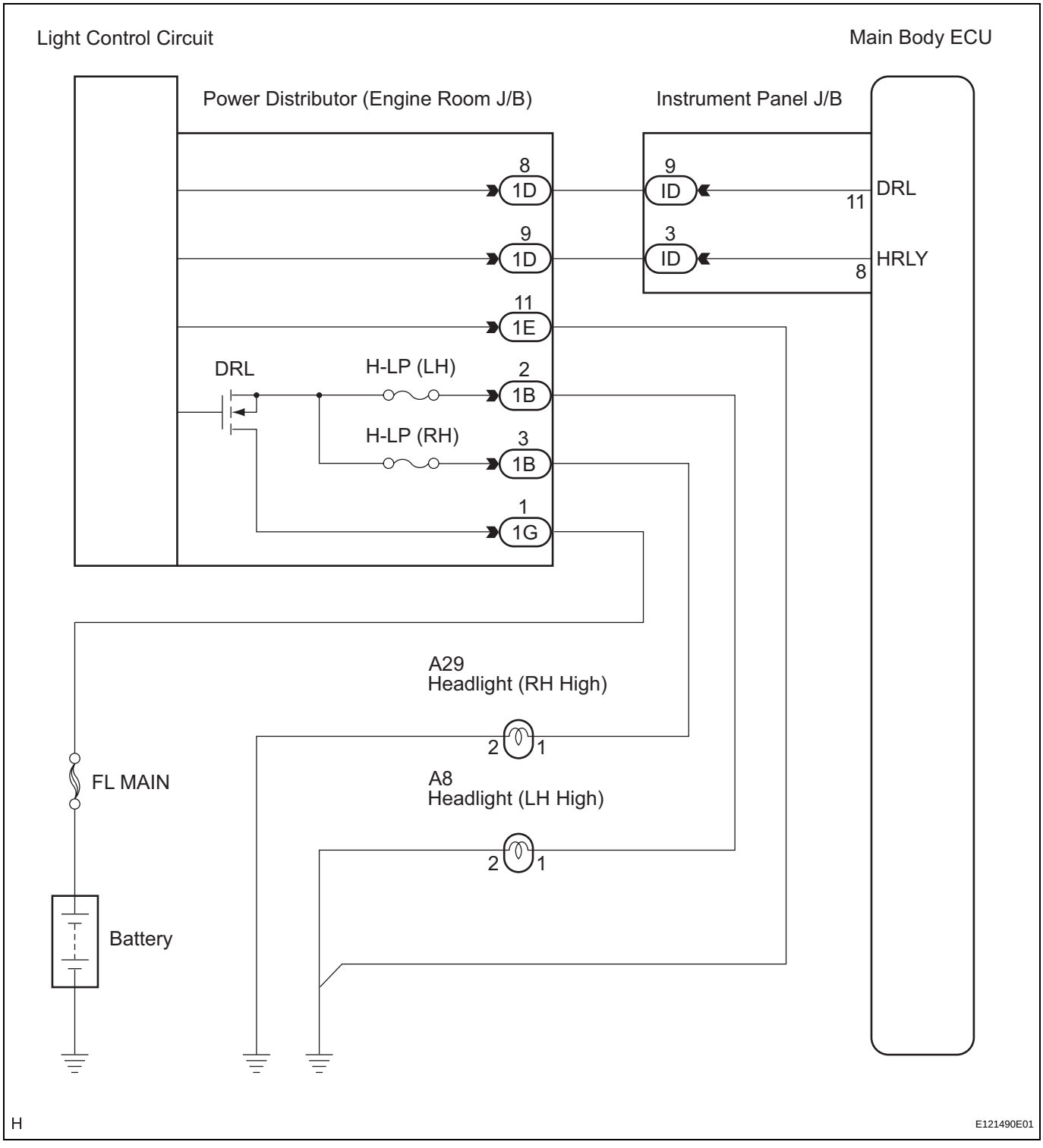
REPAIR OR REPLACE HARNESS OR CONNECTOR (FUSE - BODY GROUND)

Headlight (HI-BEAM) Circuit

DESCRIPTION

The main body ECU receives dimmer switch HIGH signal and light control switch HEAD signal from the headlight dimmer switch assembly, and turns the high beam headlights on.
HINT:
When a short circuit occurs between the power distributor (engine room J/B assembly) and high beam headlight, the power distributor stops the DRL relay operation (Fail-safe function).

WIRING DIAGRAM



LI

INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

MAIN BODY (MAIN BODY ECU):

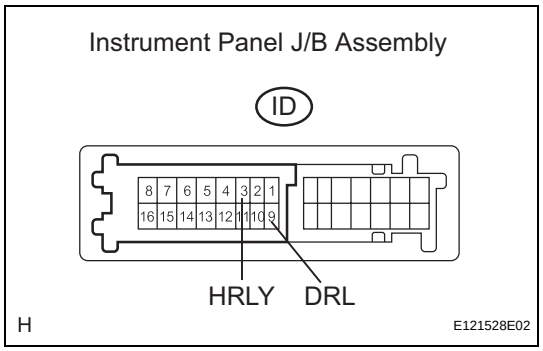
Item	Test Details	Diagnostic Note
HEAD LIGHT (HI)	High beam headlights ON / OFF	-

OK:
Relay operates. (High beam headlights illuminate.)

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



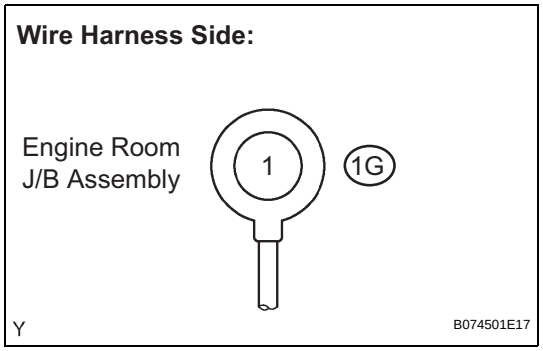
(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
ID-3 (HRLY) - Body ground	Light control switch OFF → HEAD	10 to 14 V → Below 1 V
ID-9 (DRL) - Body ground	Light control switch in HEAD, dimmer switch LOW → HIGH	10 to 14 V → Below 1 V

OK → **Go to step 6**

NG

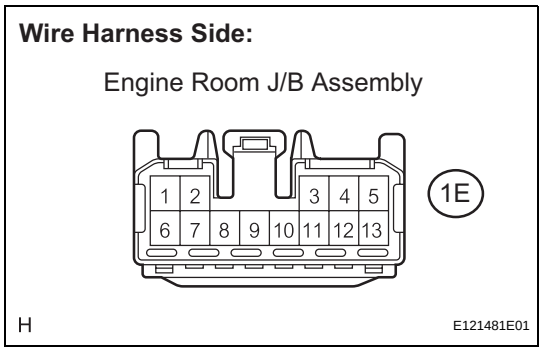
3	CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B ASSEMBLY - BATTERY AND BODY GROUND)



(a) Disconnect the 1G engine room J/B assembly connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
1G-1 - Body ground	Always	10 to 14 V

LI



(c) Disconnect the 1E engine room J/B assembly connector.
(d) Measure the resistance according to the value(s) in the table below.

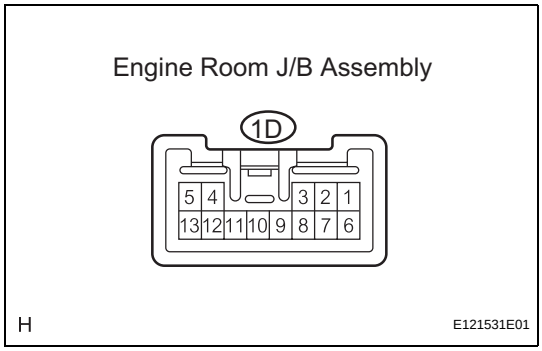
Standard resistance

Tester Connection	Condition	Specified Condition
1E-11 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 INSPECT ENGINE ROOM JUNCTION BLOCK ASSEMBLY



(a) Reconnect the 1G and 1E engine room J/B assembly connectors.
(b) Disconnect the 1D engine room J/B assembly connector.
(c) Measure the voltage according to the value(s) in the table below.

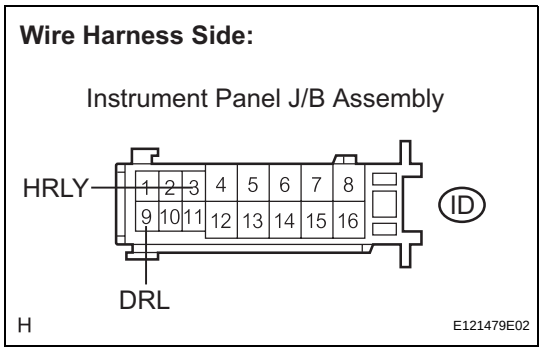
Standard voltage

Tester Connection	Condition	Specified Condition
1D-8 - Body ground	Always	10 to 14 V
1D-9 - Body ground	Always	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

OK

5 CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B ASSEMBLY - INSTRUMENT PANEL J/B ASSEMBLY)



(a) Reconnect the 1D engine room J/B assembly connector.
(b) Disconnect the ID instrument panel J/B connector.
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
ID-3 (DRL) - Body ground	Always	10 to 14 V
ID-9 (HRLY) - Body ground	Always	10 to 14 V

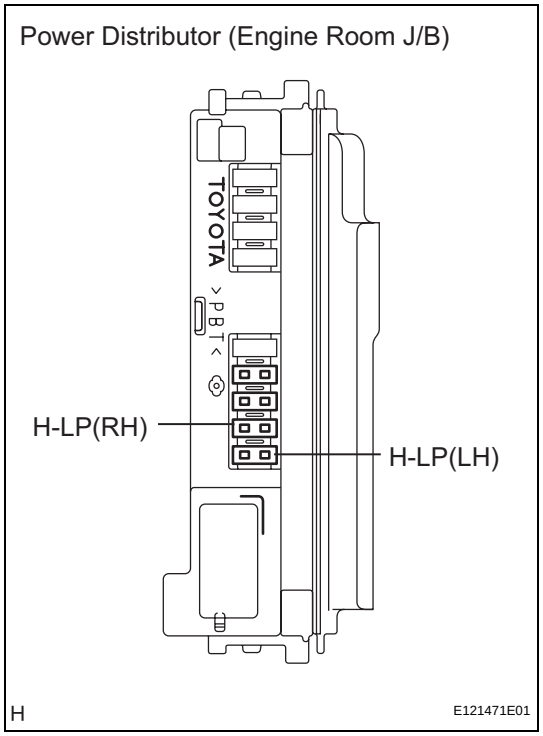
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

LI

6 CHECK HARNESS AND CONNECTOR (SHORT IN RELAY-DRIVEN CIRCUIT)



(a) Remove the H-LP (RH) fuse from the engine room J/B assembly.
(b) Turn the light control switch to the HEAD position and turn the dimmer switch to the HIGH position.
(c) Check if the high beam headlight LH illuminates.
(d) Turn the dimmer switch to the LOW position.
(e) Install the H-LP (RH) fuse and remove the H-LP (LH) fuse.
(f) Turn the dimmer switch to the HIGH position.
(g) Check if the high beam headlight RH illuminates.

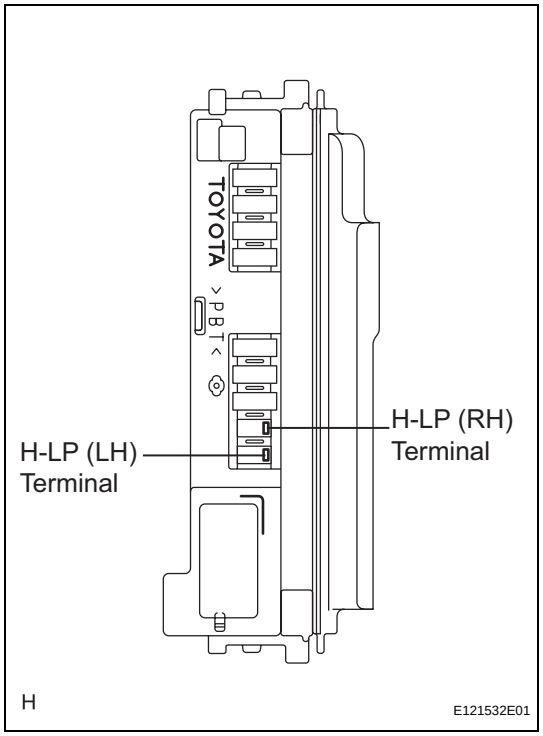
OK:

Either high beam headlight LH or RH illuminates.

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR (SHORT CIRCUIT BETWEEN FUSE AND BULB)**

NG

7 INSPECT ENGINE ROOM JUNCTION BLOCK ASSEMBLY



(a) Remove the H-LP (RH) fuse and H-LP (LH) fuse from the engine room J/B assembly.
(b) Measure the voltage between the loading slot of each fuse and body ground.

Standard voltage

Tester Connection	Condition	Specified Condition
H-LP (RH) Terminal - Body ground	Light control switch in HEAD and dimmer switch in HIGH	10 to 14 V
H-LP (LH) Terminal - Body ground	Light control switch in HEAD and dimmer switch in HIGH	10 to 14 V

NG → **REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY (POWER DISTRIBUTOR)**

LI

OK

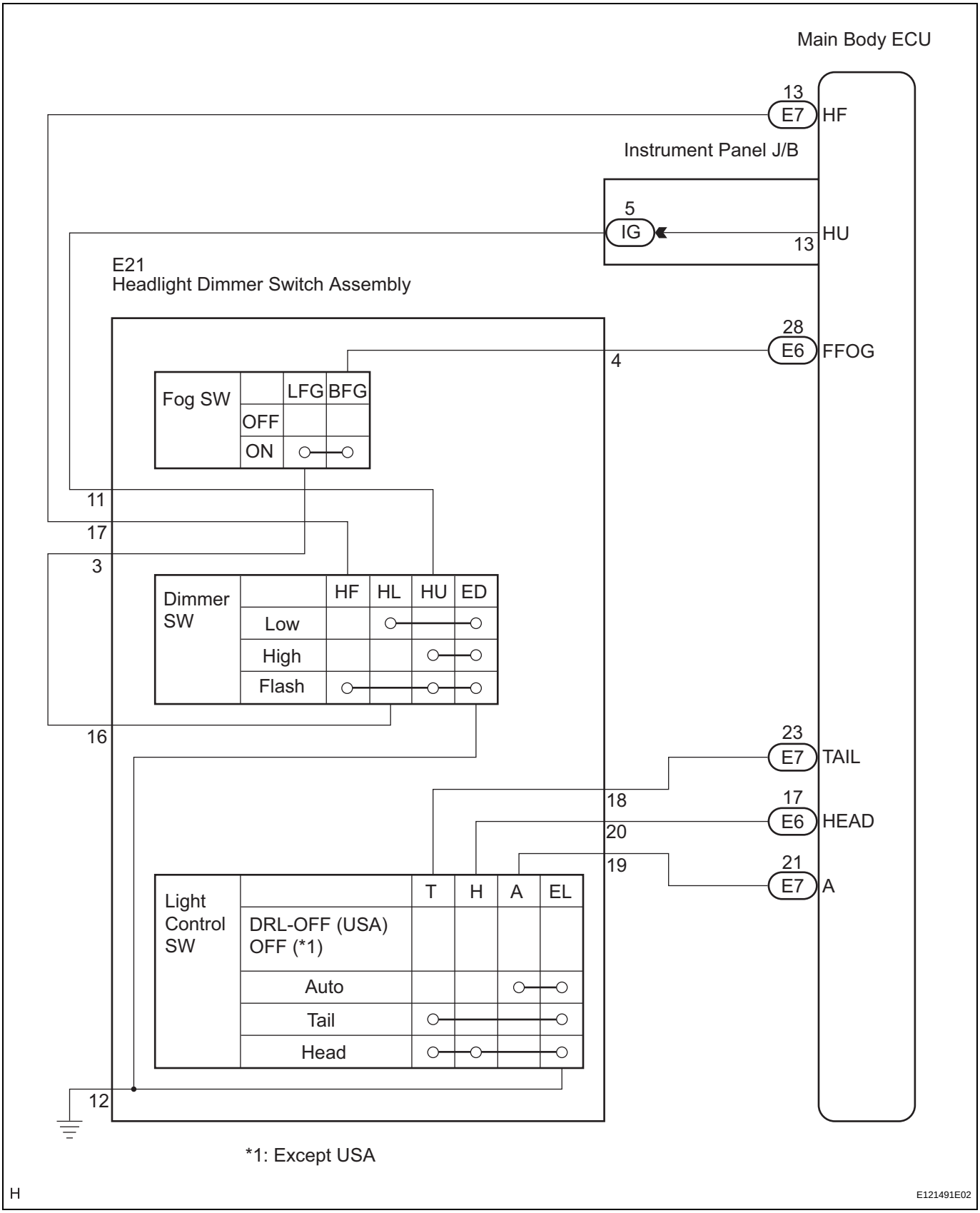
REPAIR OR REPLACE HARNESS OR CONNECTOR (OPEN CIRCUIT BETWEEN FUSE AND BODY GROUND)

Light Control Switch Circuit

DESCRIPTION

This circuit detects the condition of the headlight dimmer switch assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the items below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
DIMMER SW	Dimmer switch HIGH signal / ON or OFF	ON: Dimmer switch in HIGH or FLASH OFF: Dimmer switch in neither HIGH nor FLASH	-
HIGH FLASHER SW	Dimmer switch FLASH signal / ON or OFF	ON: Dimmer switch in FLASH OFF: Dimmer switch not in FLASH	-
F FOG LIGHT SW	Front fog light switch signal / ON or OFF	ON: Fog light switch ON OFF: Fog light switch OFF	-
AUTO LIGHT SW	Light control switch AUTO signal / ON or OFF	ON: Light control switch in AUTO OFF: Light control switch not in AUTO	-
HEAD LIGHT SW	Light control switch HEAD signal / ON or OFF	ON: Light control switch in HEAD OFF: Light control switch not in HEAD	-
TAIL LIGHT SW	Light control switch TAIL signal / ON or OFF	ON: Light control switch in TAIL or HEAD OFF: Light control switch in neither TAIL nor HEAD	-

OK:
Normal conditions listed above are displayed.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2	INSPECT HEADLIGHT DIMMER SWITCH ASSEMBLY

(a) Inspect the headlight dimmer switch assembly (See page LI-120).
OK:
Headlight dimmer switch assembly is normal.

NG → **REPLACE HEADLIGHT DIMMER SWITCH ASSEMBLY**

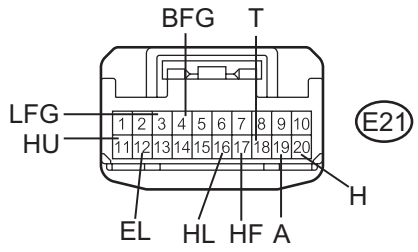
OK

LI

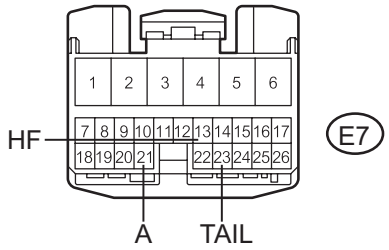
3	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B ASSEMBLY - SWITCH ASSEMBLY)

Wire Harness Side:

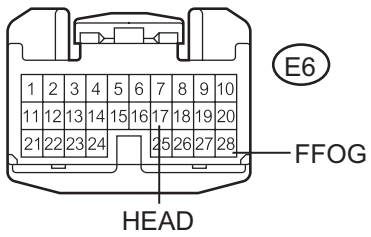
Headlight Dimmer Switch Assembly



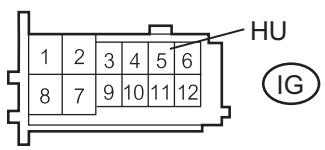
Main Body ECU



Main Body ECU



Instrument Panel J/B Assembly



H

E121507E02

(a) Disconnect the E21 headlight dimmer switch assembly connector.
(b) Disconnect the E6 and E7 main body ECU connectors.
(c) Disconnect the IG instrument panel J/B connector.
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E21-3 (LFG) - E21-16 (HL)	Always	Below 1 Ω
E21-4 (BFG) - E6-28 (FFOG)	Always	Below 1 Ω
E21-11 (HU) - IG-5 (HU)	Always	Below 1 Ω
E21-17 (HF) - E7-13 (HF)	Always	Below 1 Ω
E21-18 (T) - E7-23 (TAIL)	Always	Below 1 Ω
E21-19 (A) - E7-21 (A)	Always	Below 1 Ω
E21-20 (H) - E6-17 (HEAD)	Always	Below 1 Ω
E21-3 (LFG) - Body ground	Always	10 kΩ or higher
E21-4 (BFG) - Body ground	Always	10 kΩ or higher
E21-11 (HU) - Body ground	Always	10 kΩ or higher
E21-17 (HF) - Body ground	Always	10 kΩ or higher
E21-18 (T) - Body ground	Always	10 kΩ or higher
E21-19 (A) - Body ground	Always	10 kΩ or higher
E21-20 (H) - Body ground	Always	10 kΩ or higher
E21-12 (EL) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

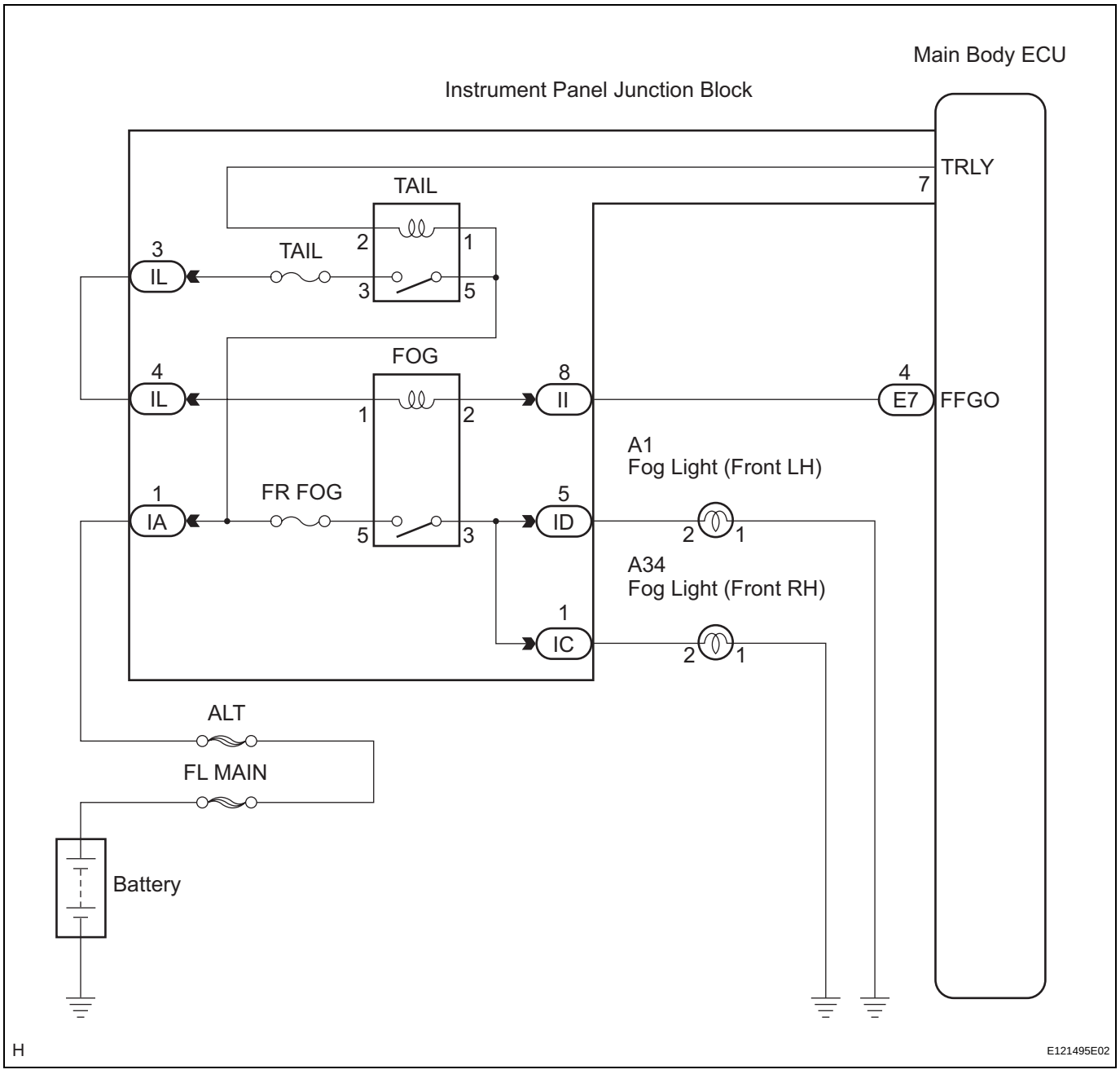
LI

Front Fog Light Circuit

DESCRIPTION

The main body ECU controls the FOG relay when a signal is received from the headlight dimmer switch assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

MAIN BODY (MAIN BODY ECU):

Item	Test Details	Diagnostic Note
F FOG LIGHT RLY	Front fog light relay ON / OFF	-

OK:
Front fog light relay operates. (Front fog lights come on.)

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

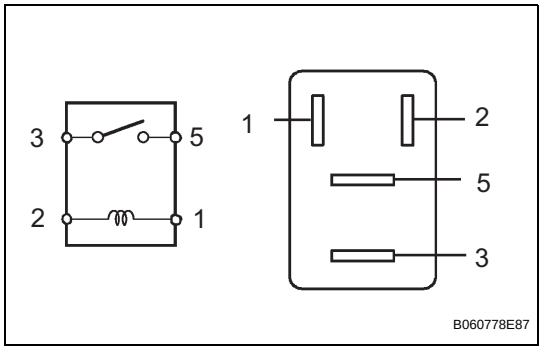
2 INSPECT FUSE (FR FOG)

(a) Remove the FR FOG fuse from the instrument panel J/B assembly.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

3 INSPECT FOG LIGHT RELAY



(a) Remove the front fog light relay from the instrument panel J/B assembly.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

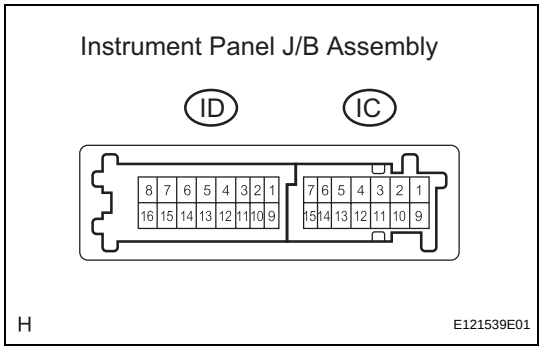
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE FOG LIGHT RELAY**

OK

LI

4 INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



(a) Measure the voltage according to the value(s) in the table below.

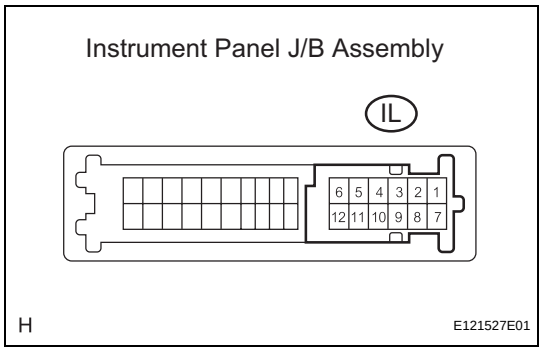
Standard voltage

Tester Connection	Condition	Specified Condition
IC-1 - Body ground	Light control switch in HEAD, front fog light switch OFF → ON	Below 1 V → 10 to 14 V
ID-5 - Body ground	Light control switch in HEAD, front fog light switch OFF → ON	Below 1 V → 10 to 14 V

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL J/B ASSEMBLY - BODY GROUND)**

NG

5 INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



(a) Measure the voltage according to the value(s) in the table below.

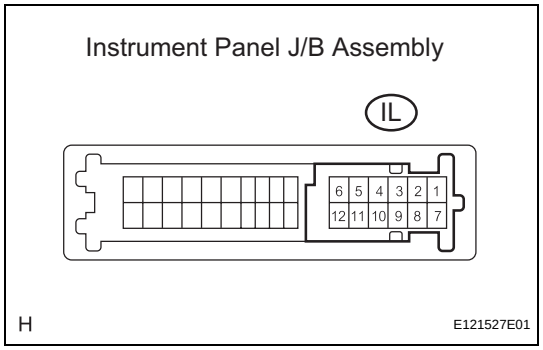
Standard voltage

Tester Connection	Condition	Specified Condition
IL-3 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V

NG → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY**

OK

6 CHECK HARNESS AND CONNECTOR (BETWEEN CONNECTOR IL-3 AND CONNECTOR IL-4)



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

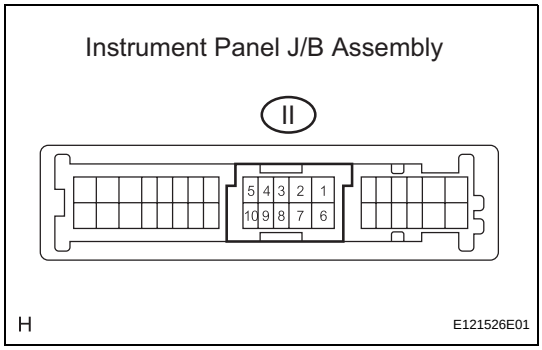
Tester Connection	Condition	Specified Condition
IL-4 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

LI

7	**INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY**



(a) Disconnect the II instrument panel J/B assembly connector.
(b) Measure the voltage according to the value(s) in the table below.

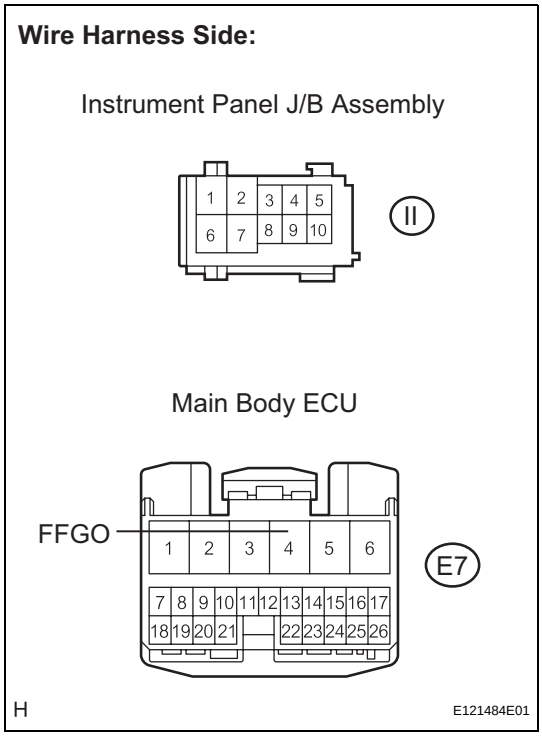
Standard voltage

Tester Connection	Condition	Specified Condition
II-8 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V

NG → **REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY**

OK

8	**CHECK HARNESS AND CONNECTOR (BODY ECU - INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)**



(a) Disconnect the E7 main body ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E7-4 - II-8	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

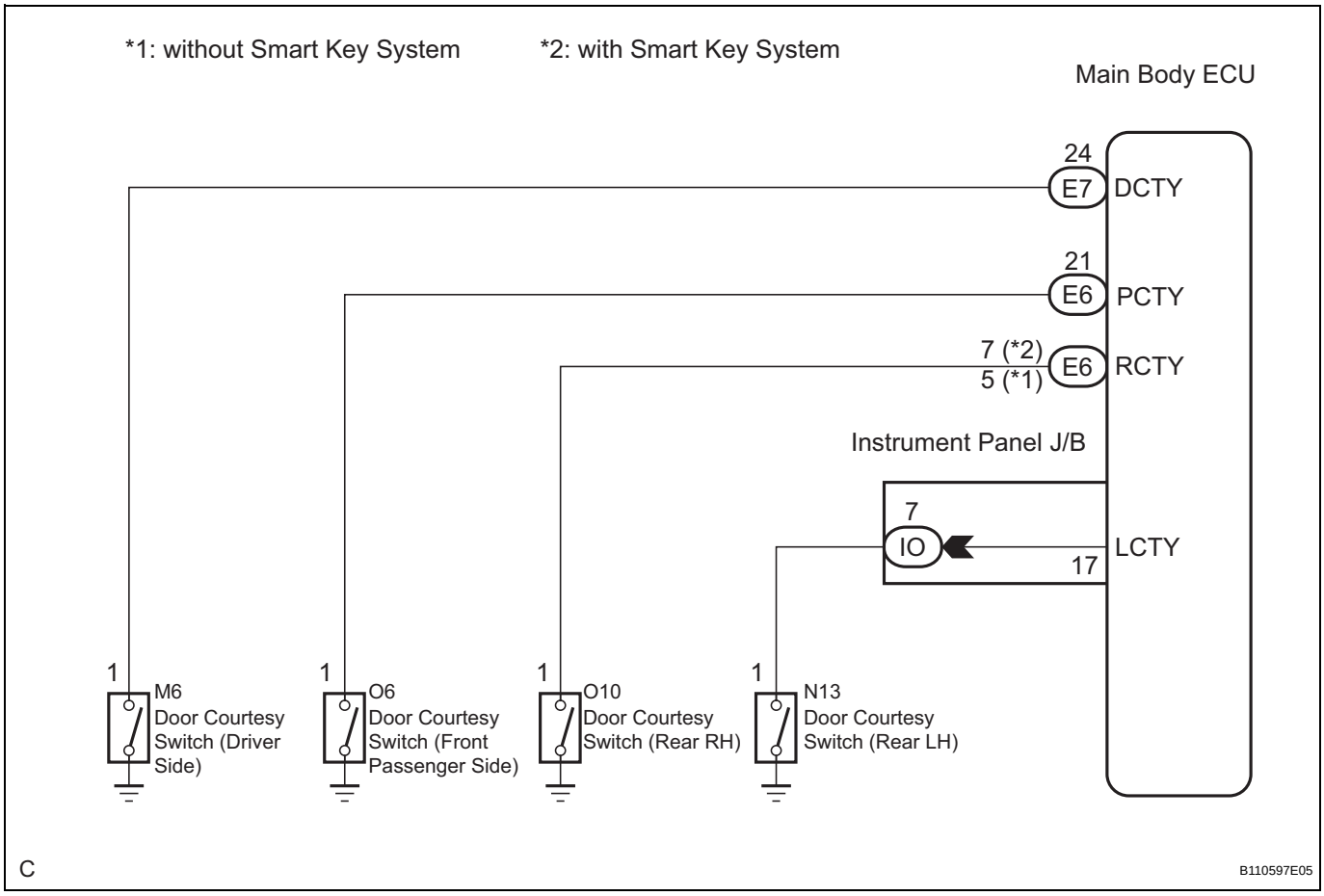
LI

Door Courtesy Switch Circuit

DESCRIPTION

The main body ECU detects the condition of the door courtesy switches.

WIRING DIAGRAM



INSPECTION PROCEDURE

LI

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the items below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
D DOR CTY SW	Driver side door courtesy switch signal / ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	-
P DOR CTY SW	Passenger side door courtesy switch signal / ON or OFF	ON: Passenger side door is open OFF: Passenger side door is closed	-
RR DOR CTY SW	Rear right door courtesy switch signal / ON or OFF	ON: Rear right door is open OFF: Rear right door is closed	-

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
RL DOR CTY SW	Rear left door courtesy switch signal / ON or OFF	ON: Rear left door is open OFF: Rear left door is closed	-

OK:
Normal conditions listed above are displayed.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT DOOR COURTESY SWITCH

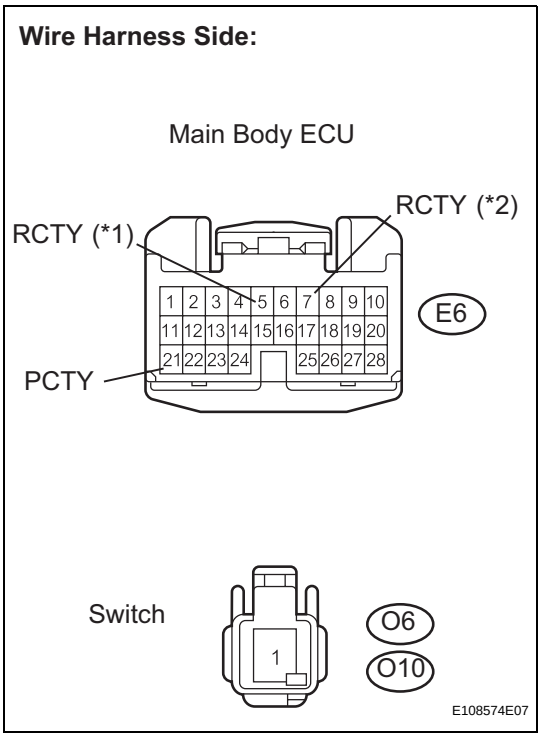
(a) Inspect the front door courtesy switch (See page LI-129).
(b) Inspect the rear door courtesy switch (See page LI-131).

OK:
Door courtesy switches are normal.

NG → **REPLACE DOOR COURTESY SWITCH**

OK

3 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - DOOR COURTESY SWITCH)



(a) Check the harness and connector between the main body ECU and door courtesy switches (passenger side and rear RH).
(1) Disconnect the E6 main body ECU connector.
(2) Disconnect the O6 and O10 switch connectors.
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

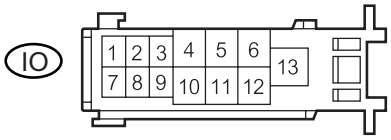
Tester Connection	Condition	Specified Condition
E6-5 (*1) - O10-1 (Rear RH)	Always	Below 1 Ω
E6-7 (*2) - O10-1 (Rear RH)	Always	Below 1 Ω
E6-21 (PCTY) - O6-1 (Front passenger side)	Always	Below 1 Ω
O10-1 (Rear RH) - Body ground	Always	10 kΩ or higher
O6-1 (Front passenger side) - Body ground	Always	10 kΩ or higher

HINT:
*1: without Smart Key System
*2: with Smart Key System

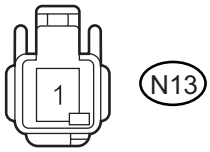
LI

Wire Harness Side:

Instrument Panel J/B Assembly



Door Courtesy Switch



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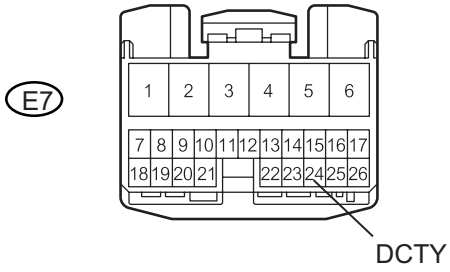
(b) Check the harness and connector between the instrument panel J/B assembly and rear LH door courtesy switch.
(1) Disconnect the IO instrument panel J/B assembly connector.
(2) Disconnect the N13 switch connector.
(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

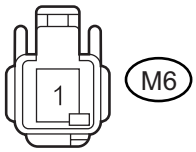
Tester Connection	Condition	Specified Condition
IO-7 (LCTY) - N13-1 (Rear LH)	Always	Below 1 Ω
IO-7 (LCTY) - Body ground	Always	10 kΩ or higher

Wire Harness Side:

Main Body ECU



Door Courtesy Switch



H

E121487E01

(c) Check the harness and connector between the main body ECU and driver side door courtesy switch.
(1) Disconnect the E7 main body ECU connector.
(2) Disconnect the M6 switch connector.
(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
E7-24 (DCTY) - M6-1 (Driver side)	Always	Below 1 Ω
E7-24 (DCTY) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

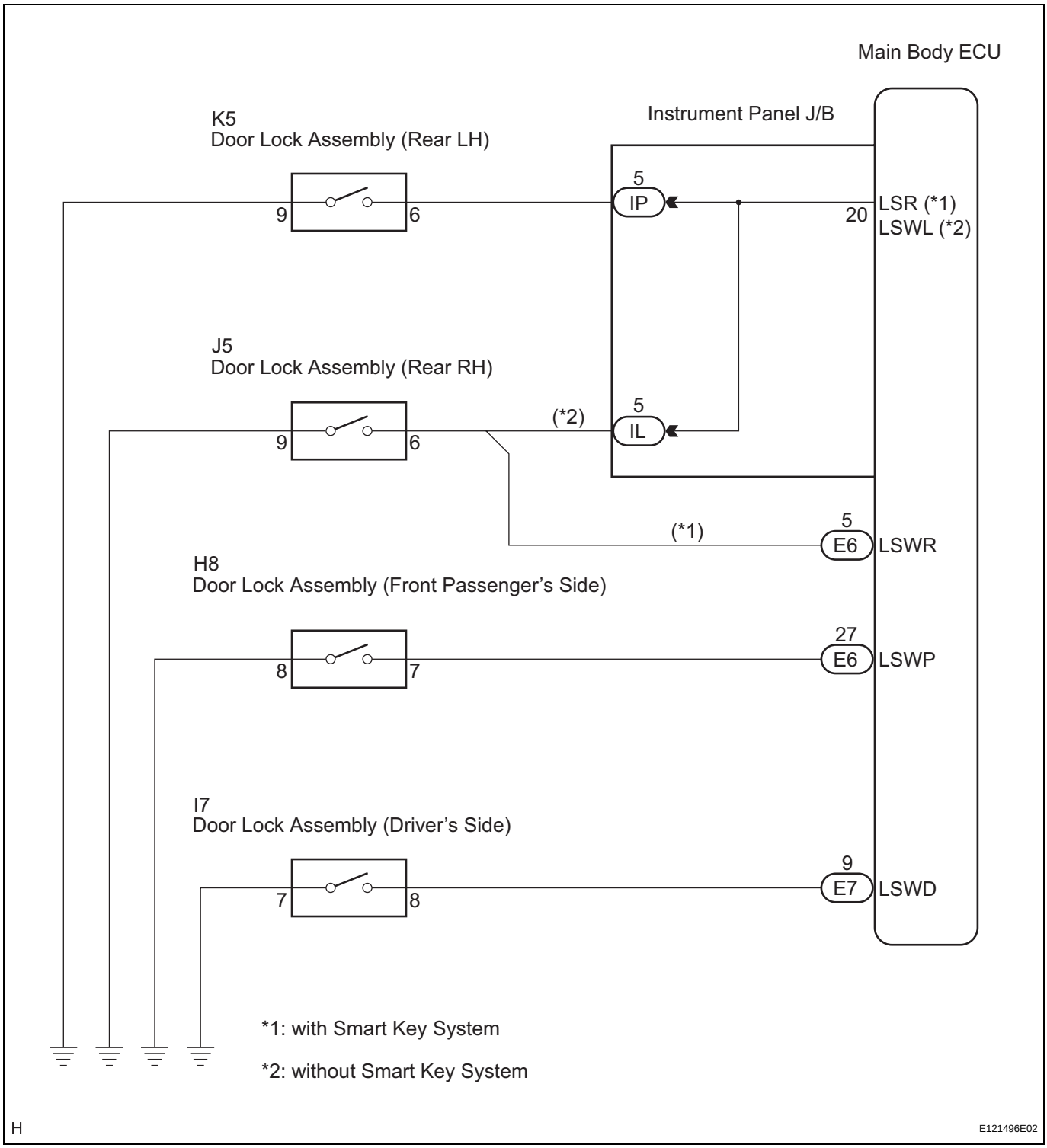
LI

Door LOCK Position Circuit

DESCRIPTION

The main body ECU receives each door lock position switch signal to control the illuminated entry system.

WIRING DIAGRAM



LI

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the items below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
D LOCK POS SW	Driver side door lock position switch signal / ON or OFF	ON: Driver side door is unlocked OFF: Driver side door is locked	-
P LOCK POS SW	Passenger side door lock position switch signal / ON or OFF	ON: Passenger side door is unlocked OFF: Passenger side door is locked	-
RR LOCK POS SW (with Smart Key System)	Rear right door lock position switch signal / ON or OFF	ON: Rear right door is unlocked OFF: Rear right door is locked	-
RL LOCK POS SW (with Smart Key System)	Rear left door lock position switch signal / ON or OFF	ON: Rear left door is unlocked OFF: Rear left door is locked	-

OK:
Normal conditions listed above are displayed.

NG → **GO TO POWER DOOR LOCK CONTROL SYSTEM**

OK

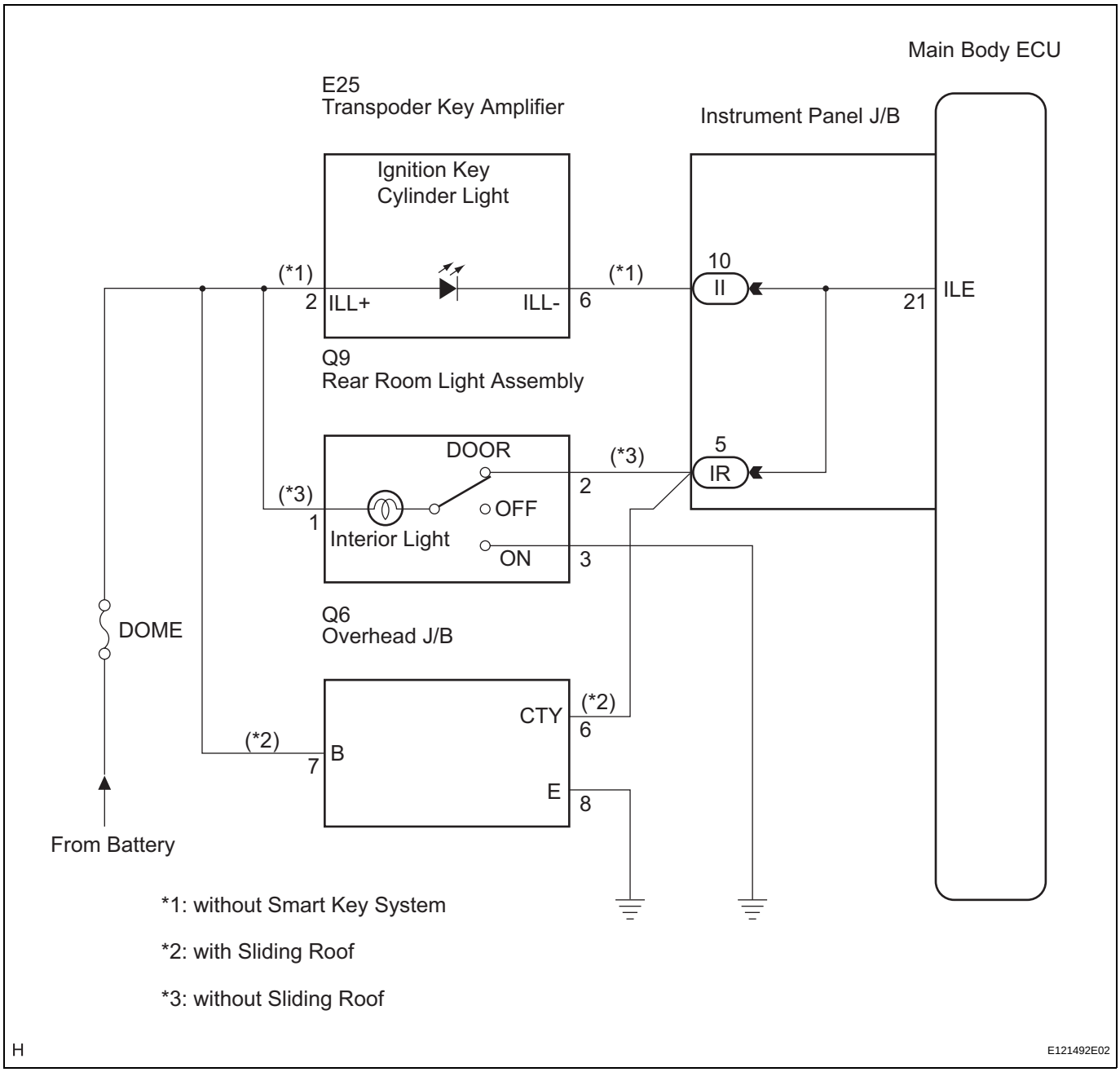
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Interior Light Circuit

DESCRIPTION

The main body ECU controls the illuminated entry system (interior light and ignition key cylinder light).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn intelligent tester main switch on.

(c) Select the item(s) below in the ACTIVE TEST, and check the operation.

MAIN BODY (MAIN BODY ECU):

Item	Test Details	Diagnostic Note
INTERIOR LAMP	Interior light and ignition key cylinder light ON / OFF (Interior light switch in DOOR position and all doors are closed).	-

OK:

Each light illuminates.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 CHECK VEHICLE CONDITION

(a) Check the vehicle condition.

Result

Condition	Proceed to
without Sliding Roof	**A**
with Sliding Roof	**B**

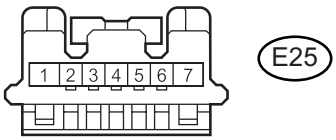
B → **Go to step 4**

A

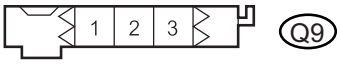
3	CHECK HARNESS AND CONNECTOR (LIGHT - BATTERY AND INSTRUMENT PANEL J/B ASSEMBLY)

Wire Harness Side:

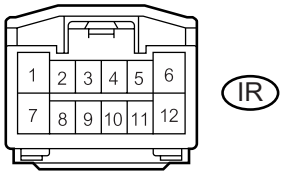
Transponder Key Amplifier (*1)



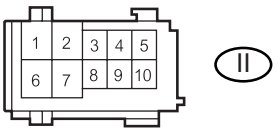
Rear Room Light Assembly



Instrument Panel J/B Assembly



Instrument Panel J/B Assembly



H

E121508E01

(a) Disconnect the E25 transponder key amplifier connector (*1).
(b) Disconnect the Q9 rear room light assembly connector.
(c) Disconnect the IR and II instrument panel J/B assembly connectors.
(d) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E25-2 - Body ground (*1)	Always	10 to 14 V
Q9-1 - Body ground	Always	10 to 14 V

Standard resistance

Tester Connection	Condition	Specified Condition
II-10 - E25-6 (*1)	Always	Below 1 Ω
IR-5 - Q9-2	Always	Below 1 Ω
II-10 - Body ground	Always	10 kΩ or higher
IR-5 - Body ground	Always	10 kΩ or higher

HINT:
*1: without Smart Key System

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

LI

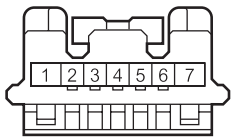
OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

4	**CHECK HARNESS AND CONNECTOR (LIGHT - BATTERY AND INSTRUMENT PANEL J/B ASSEMBLY)**

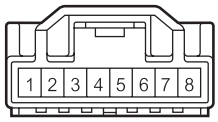
Wire Harness Side:

Transponder Key Amplifier (*1)



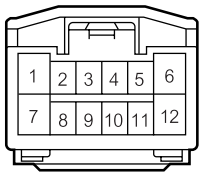
E25

Overhead J/B



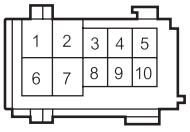
Q6

Instrument Panel J/B Assembly



IR

Instrument Panel J/B Assembly



II

H

E121509E01

(a) Disconnect the E25 transponder key amplifier connector (*1).
(b) Disconnect the Q6 overhead J/B connector.
(c) Disconnect the IR and II instrument panel J/B assembly connectors.
(d) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E25-2 - Body ground (*1)	Always	10 to 14 V
Q6-7 - Body ground	Always	10 to 14 V

Standard resistance

Tester Connection	Condition	Specified Condition
II-10 - E25-6 (*1)	Always	Below 1 Ω
IR-5 - Q6-6	Always	Below 1 Ω
II-10 - Body ground	Always	10 kΩ or higher
IR-5 - Body ground	Always	10 kΩ or higher

HINT:
*1: without Smart Key System

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

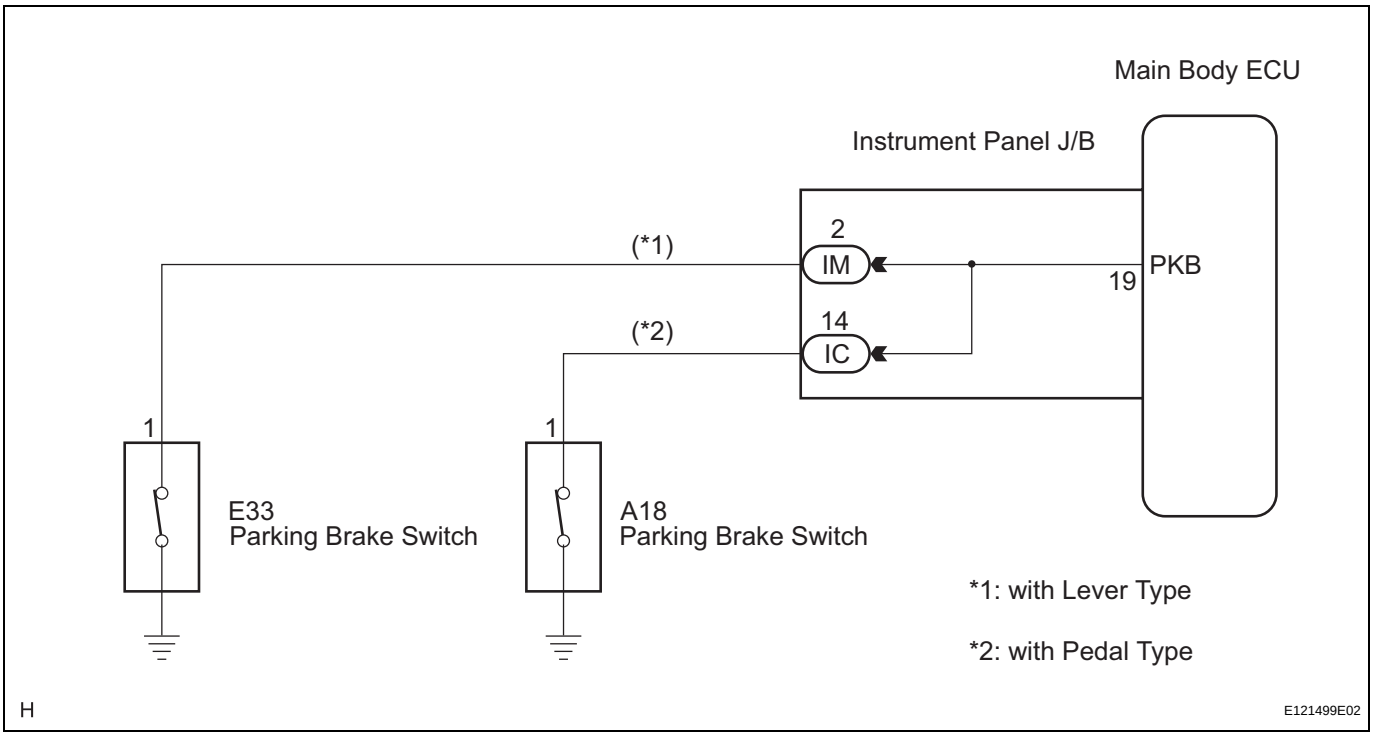
LI

Parking Brake Switch Circuit

DESCRIPTION

The main body ECU receives a parking brake switch signal to control the daytime running light system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch and turn the intelligent tester main switch on.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

MAIN BODY (MAIN BODY ECU):

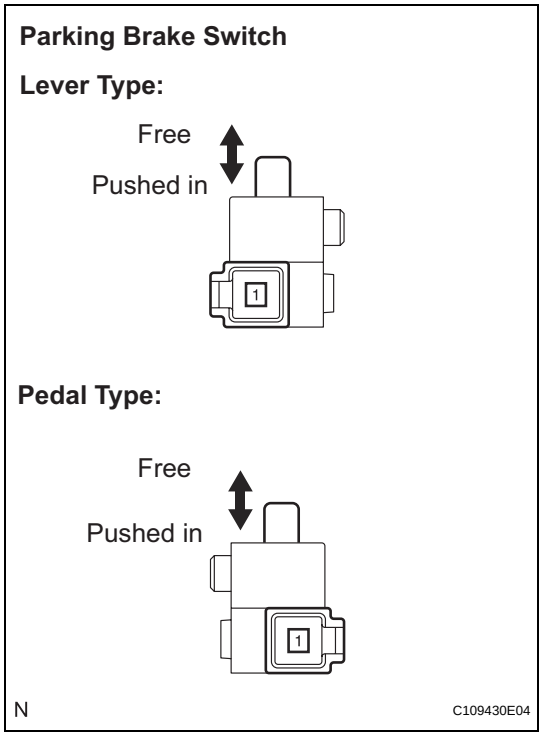
Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
PARKING BRAKE SW	Parking brake SW signal / ON or OFF	ON: Parking brake switch is ON OFF: Parking brake switch is OFF	-

OK:
Normal conditions listed above are displayed.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

2 INSPECT PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the parking brake switch assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - Switch body	Shaft is pushed in	10 kΩ or higher
1 - Switch body	Shaft is not pushed in	Below 1 Ω

NG → **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

OK

3 CHECK VEHICLE CONDITION

(a) Check the vehicle condition.

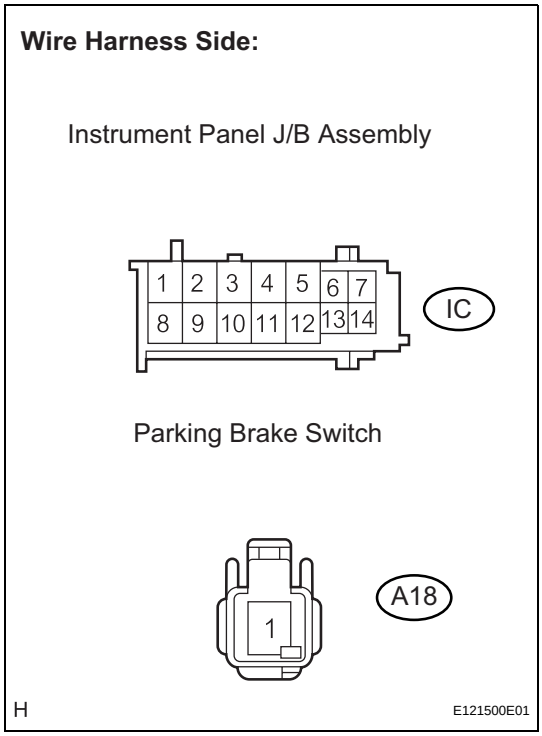
Result

Condition	Proceed to
with Pedal Type Parking Brake	A
with Lever Type Parking Brake	B

B → **Go to step 5**

A

4	CHECK HARNESS AND CONNECTOR (SWITCH - INSTRUMENT PANEL J/B ASSEMBLY)



(a) Disconnect the IC instrument panel J/B assembly connector.
(b) Disconnect the A18 switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

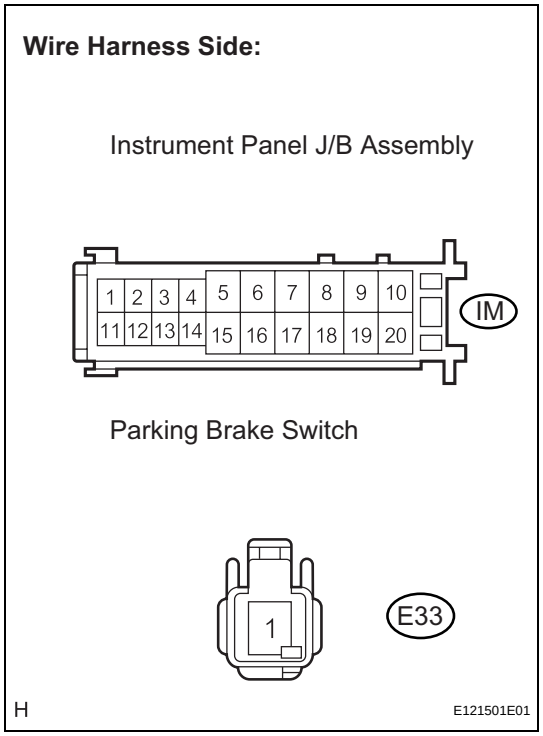
Tester Connection	Condition	Specified Condition
IC-14 - A18-1	Always	Below 1 Ω
IC-14 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

5	CHECK HARNESS AND CONNECTOR (SWITCH - INSTRUMENT PANEL J/B ASSEMBLY)



(a) Disconnect the IM instrument panel J/B assembly connector.
(b) Disconnect the E33 switch connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
IM-2 - E33-1	Always	Below 1 Ω
IM-2 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

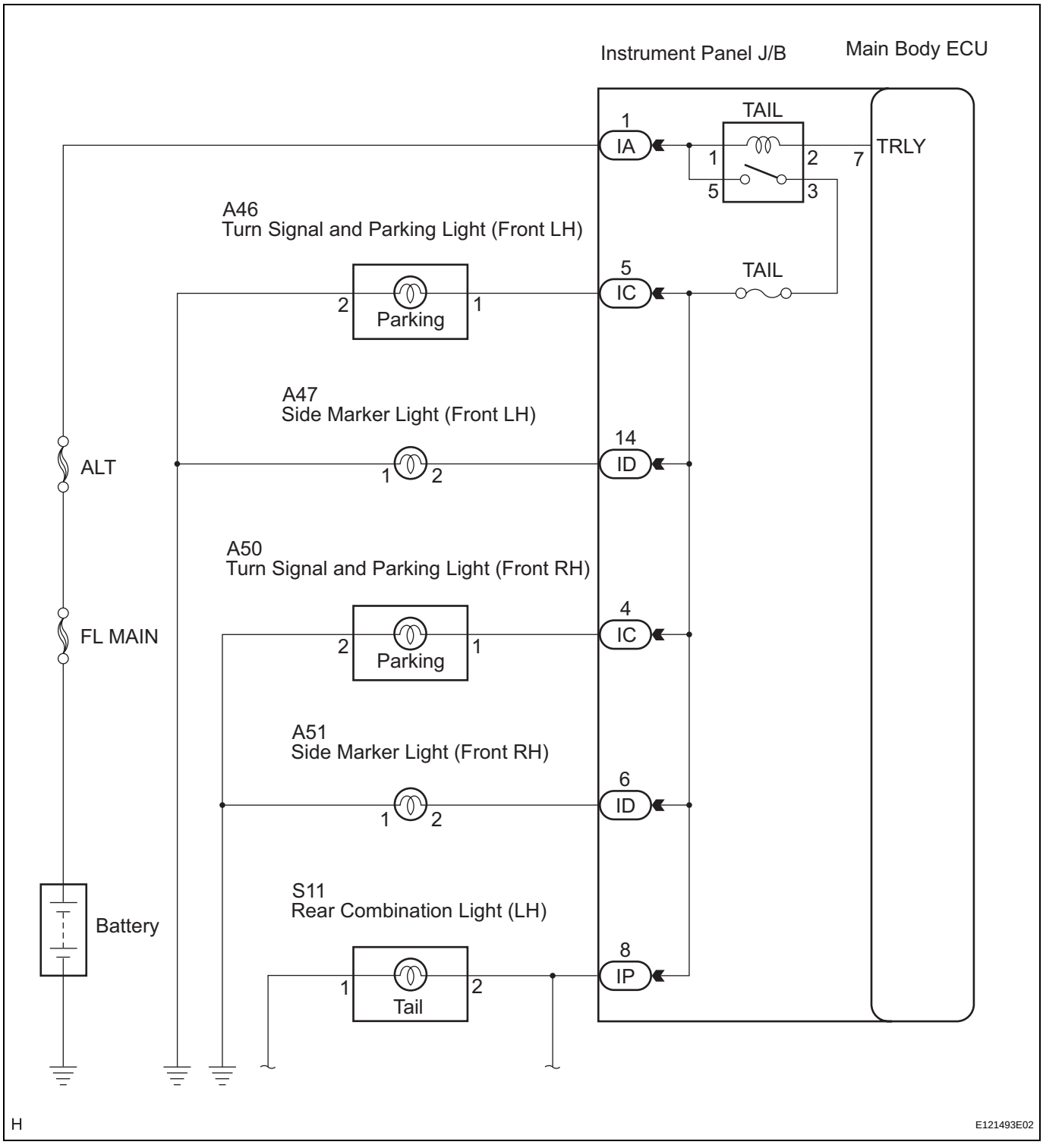
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

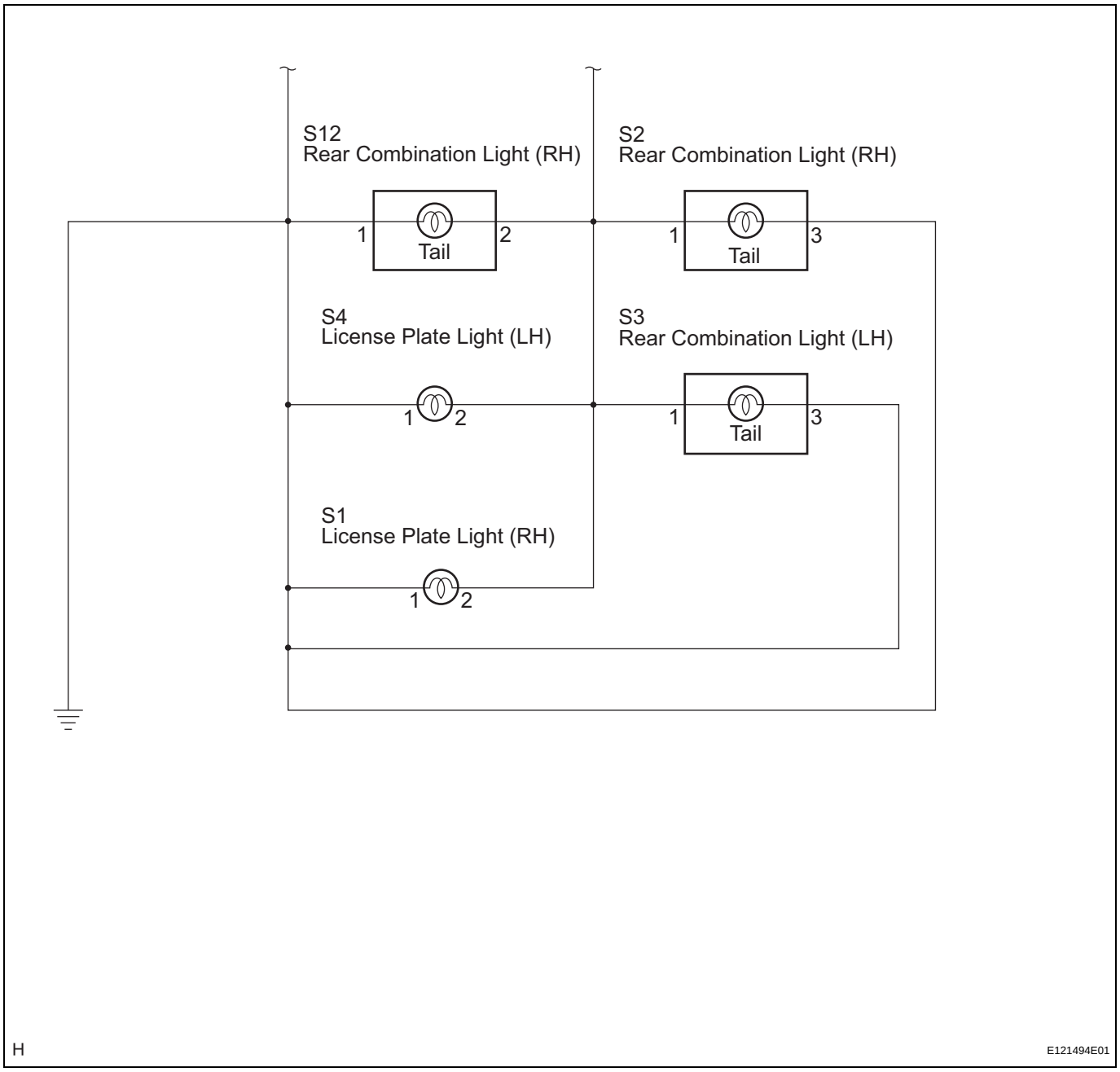
Taillight Relay Circuit

DESCRIPTION

The main body ECU receives a light control switch TAIL signal from the headlight dimmer switch assembly, and turns the taillight relay on.

WIRING DIAGRAM





INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

MAIN BODY (MAIN BODY ECU):

Item	Test Details	Diagnostic Note
TAIL LIGHT	Taillight relay ON / OFF	-

OK:
Taillight relay operates. (Taillights illuminate.)

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

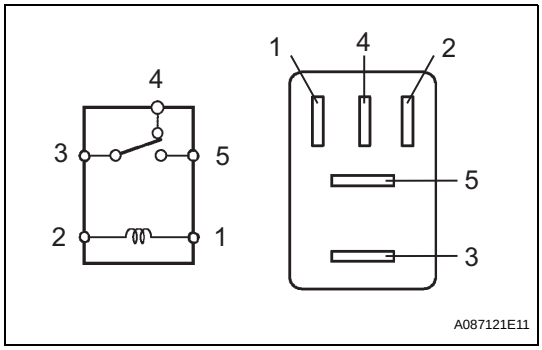
2 INSPECT FUSE (TAIL)

(a) Remove the TAIL fuse from the instrument panel J/B assembly.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

3 INSPECT TAILLIGHT RELAY



(a) Remove the taillight relay from the instrument panel J/B assembly.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

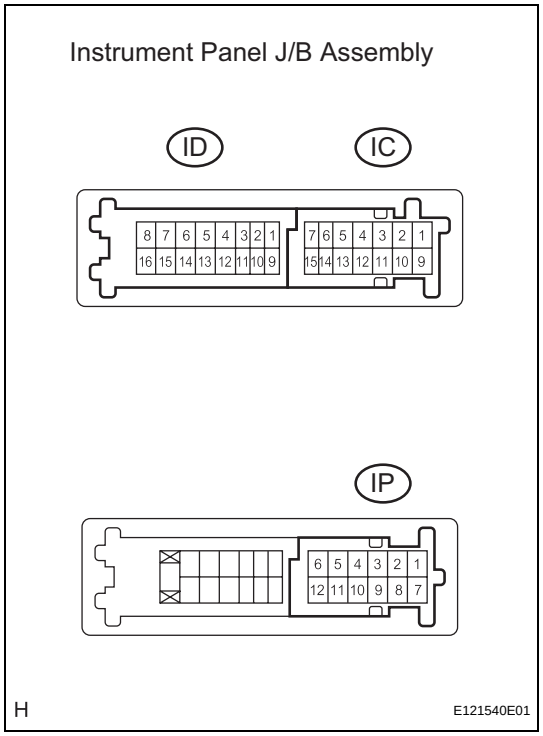
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)
3 - 4	Below 1 Ω
	10 kΩ or higher (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE TAILLIGHT RELAY**

LI

OK

4 INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY



(a) Measure the voltage according to the value(s) in the table below.

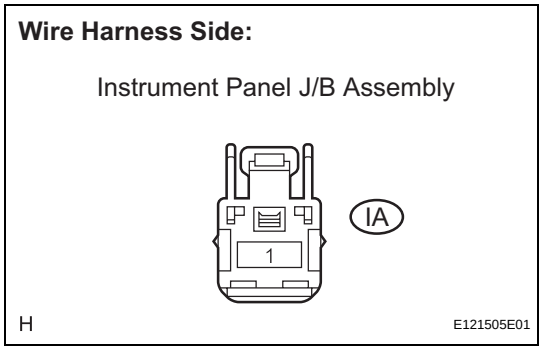
Standard voltage

Tester Connection	Condition	Specified Condition
IC-4 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
IC-5 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
ID-6 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
ID-14 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V
IP-8 - Body ground	Light control switch OFF → TAIL	Below 1 V → 10 to 14 V

OK → **REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND)**

NG

5 CHECK HARNESS AND CONNECTOR (BATTERY - INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)



(a) Disconnect the IA instrument panel J/B assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
IA-1 - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

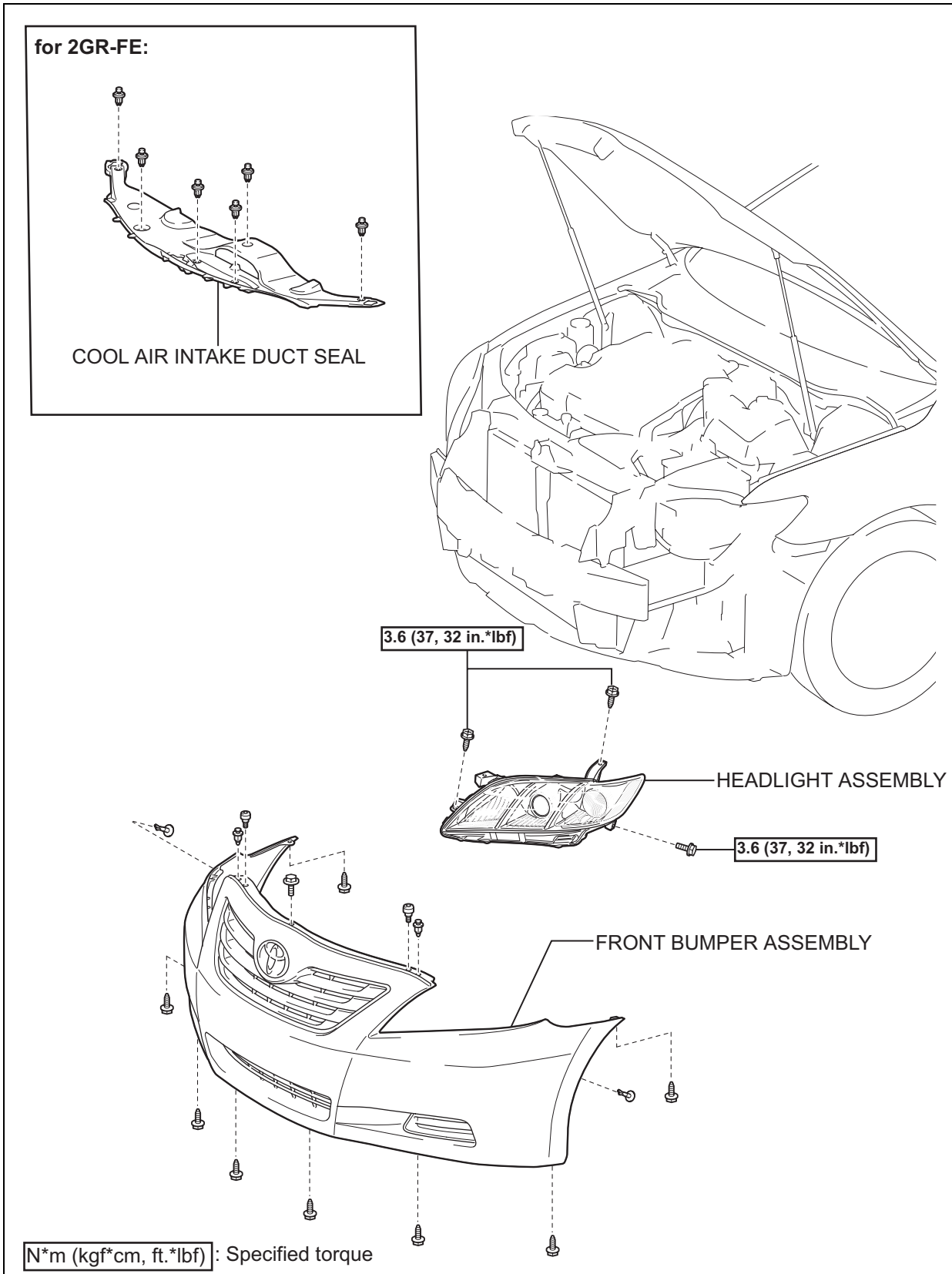
OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

LI

HEADLIGHT ASSEMBLY

COMPONENTS



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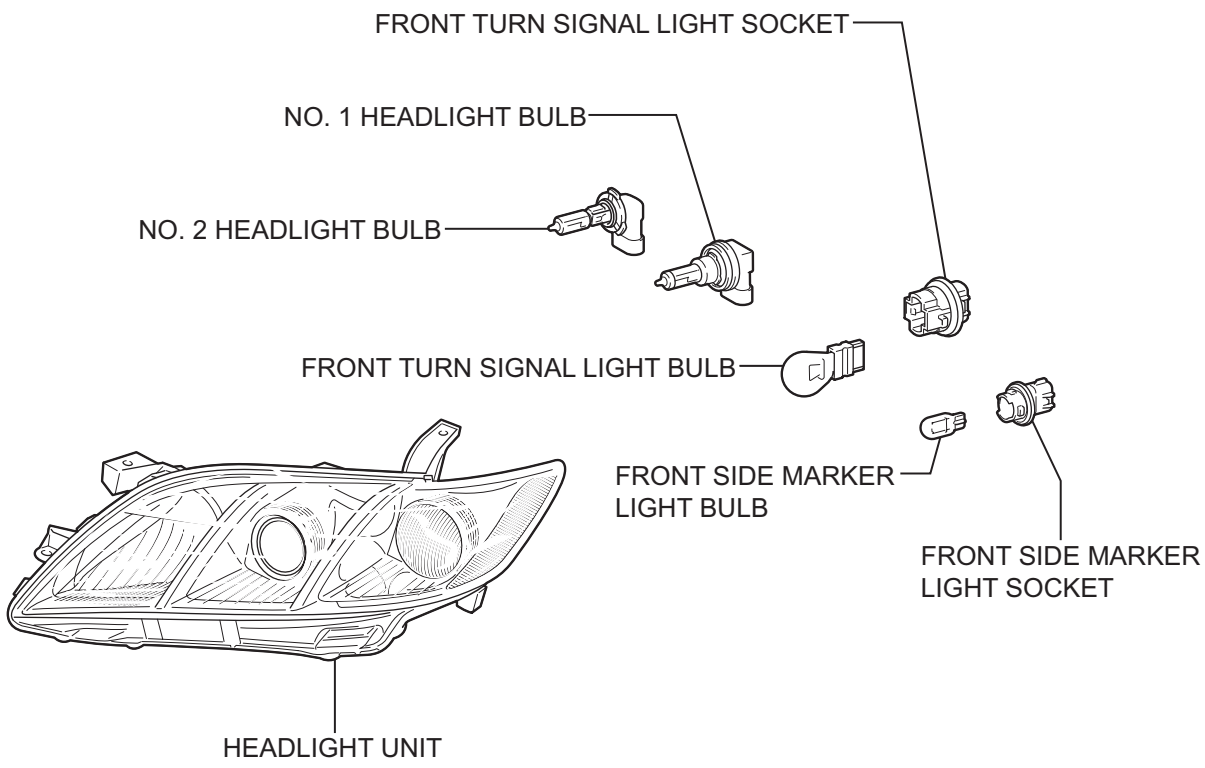
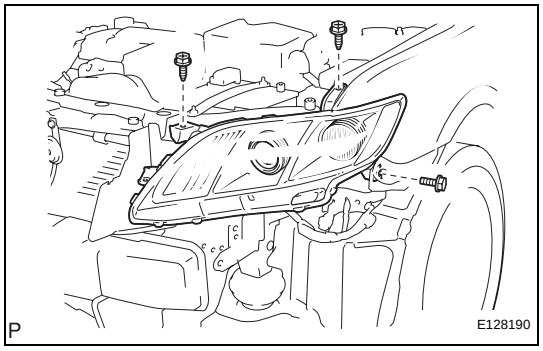

FRONT TURN SIGNAL LIGHT SOCKET
NO. 1 HEADLIGHT BULB
NO. 2 HEADLIGHT BULB
FRONT TURN SIGNAL LIGHT BULB
FRONT SIDE MARKER LIGHT BULB
FRONT SIDE MARKER LIGHT SOCKET
HEADLIGHT UNIT
P
E128161E01

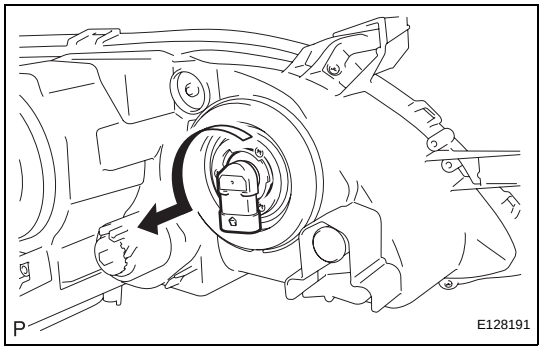
REMOVAL

1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**
3. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
4. **REMOVE HEADLIGHT ASSEMBLY**
   (a) Remove the bolt and 2 screws.
   (b) Disconnect the connectors and remove the headlight assembly.

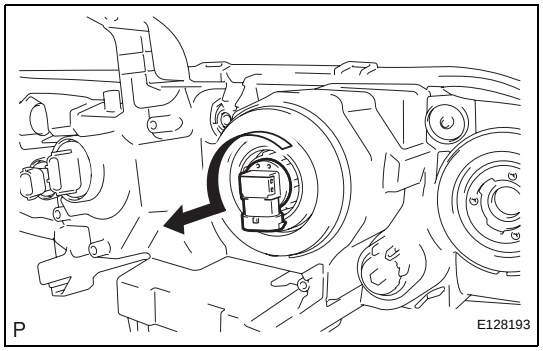


DISASSEMBLY

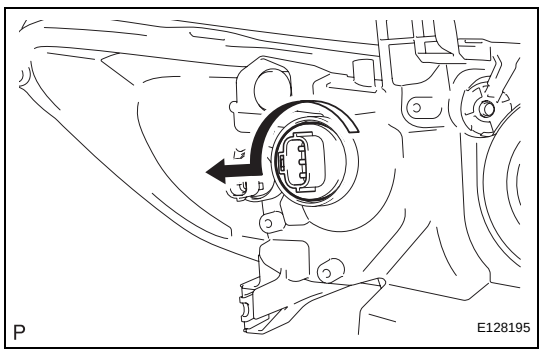
1. **REMOVE NO. 2 HEADLIGHT BULB**
   (a) Remove the No. 2 headlight bulb as shown in the illustration.



2. **REMOVE NO. 1 HEADLIGHT BULB**
   (a) Remove the No. 1 headlight bulb as shown in the illustration.



3. **REMOVE FRONT TURN SIGNAL LIGHT BULB**
   (a) Turn the front turn signal light bulb and the front turn signal light socket in the direction indicated by the arrow and remove them as a unit.
   (b) Remove the front turn signal light bulb from the front turn signal light socket.



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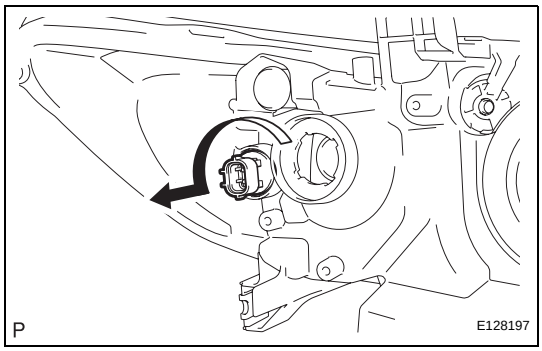


4. REMOVE FRONT SIDE MARKER LIGHT BULB

(a) Turn the front side marker light bulb and the front side marker light socket in the direction indicated by the arrow and remove them as a unit.

(b) Remove the front side marker light bulb from the front side marker light socket.

ADJUSTMENT

HINT:
It is possible that a bulb is incorrectly installed, affecting headlight aim. Bulb installation should be considered prior to performing the adjustment procedure.

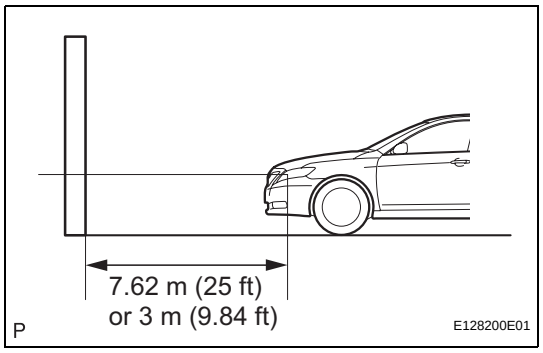
1. VEHICLE PREPARATION FOR HEADLIGHT AIM ADJUSTMENT

(a) Prepare the vehicle according to the following conditions:
- Ensure there is no damage or deformation to the body around the headlights.
- Fill the fuel tank.
- Make sure that the oil is filled to the specified level.
- Make sure that the coolant is filled to the specified level.
- Inflate the tires to the appropriate pressure.
- Unload the trunk and vehicle, ensuring that the spare tire, tools, and jack are in their original positions.
- Sit a person of average weight (68 kg, 150 lb) in the driver's seat.

2. PREPARATION FOR HEADLIGHT AIMING (Using a headlight aim test machine)

(a) Adjust the headlight aim in accordance with the headlight aim test machine instructions.

3. PREPARATION FOR HEADLIGHT AIMING (for Using a Screen)



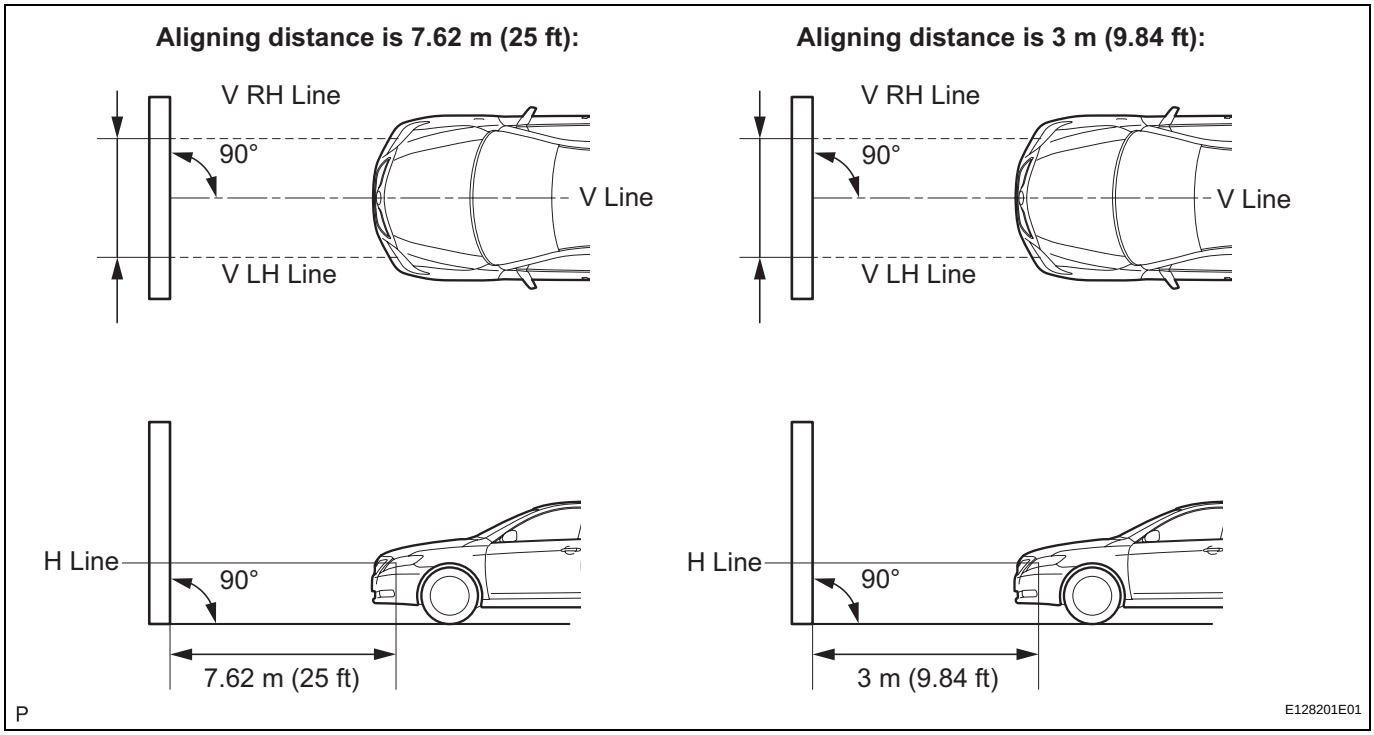
(a) Prepare the vehicle:
- Place the vehicle in a location that is dark enough to clearly observe the cutoff line. The cutoff line is a distinct line, below which light from the headlights can be observed and above which it cannot.
- Place the vehicle at a 90° angle to the wall.
- Create a 7.62 m (25 ft) distance between the vehicle (headlight bulb center) and the wall.
- Make sure that the vehicle is on a level surface.
- Bounce the vehicle up and down to settle the suspension.

NOTICE:
A distance of 7.62 m (25 ft) between the vehicle (headlight bulb center) and the wall is necessary for proper aim adjustment. If sufficient space is not available, secure a distance of exactly 3 m (9.84 ft) to allow for checking and adjustment of headlight aim. (The size of the target zone will change with the distance, so follow the instructions in the illustration.)

(b) Prepare a piece of thick white paper (approximately 2 m (6.6 ft) (height) x 4 m (13.1 ft) (width)) to use as a screen.

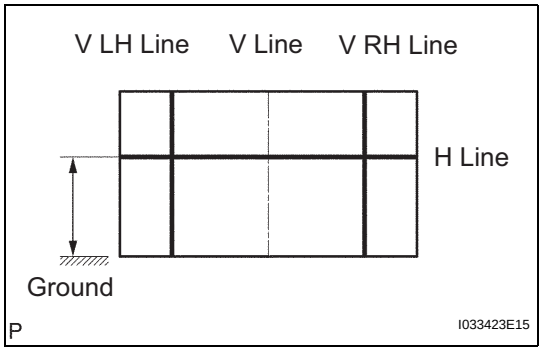
(c) Draw a vertical line down the center of the screen (V line).

(d) Set the screen as shown in the illustration.



HINT:

- Stand the screen perpendicular to the ground.
- Align the V line on the screen with the center of the vehicle.



(e) Draw base lines (H, V LH, and V RH lines) on the screen as shown in the illustration.

HINT:

- The base lines differ for "low-beam inspection" and "high-beam inspection".
- Mark the headlight bulb center marks on the screen. If the center mark cannot be observed on the headlight, use the center of the headlight bulb or the manufacturer's name marked on the headlight as the center mark.

(1) H Line (Headlight height):
Draw a horizontal line across the screen so that it passes through the center marks. The H line should be at the same height as the headlight bulb center marks of the low-beam headlights.

(2) V LH Line, V RH Line (Center mark position of left-hand (LH) and right-hand (RH) headlights):
Draw two vertical lines so that they intersect the H line at each center mark (aligned with the center of the low-beam headlight bulbs).

4. HEADLIGHT AIMING INSPECTION

(a) Cover the headlight or disconnect the connector of the headlight on the opposite side to prevent light from the headlight that is not being inspected from affecting the headlight aiming inspection.

NOTICE:

Do not keep the headlight covered for more than 3 minutes. The headlight lens is made of synthetic resin, which may melt or be damaged due to excessive heat.

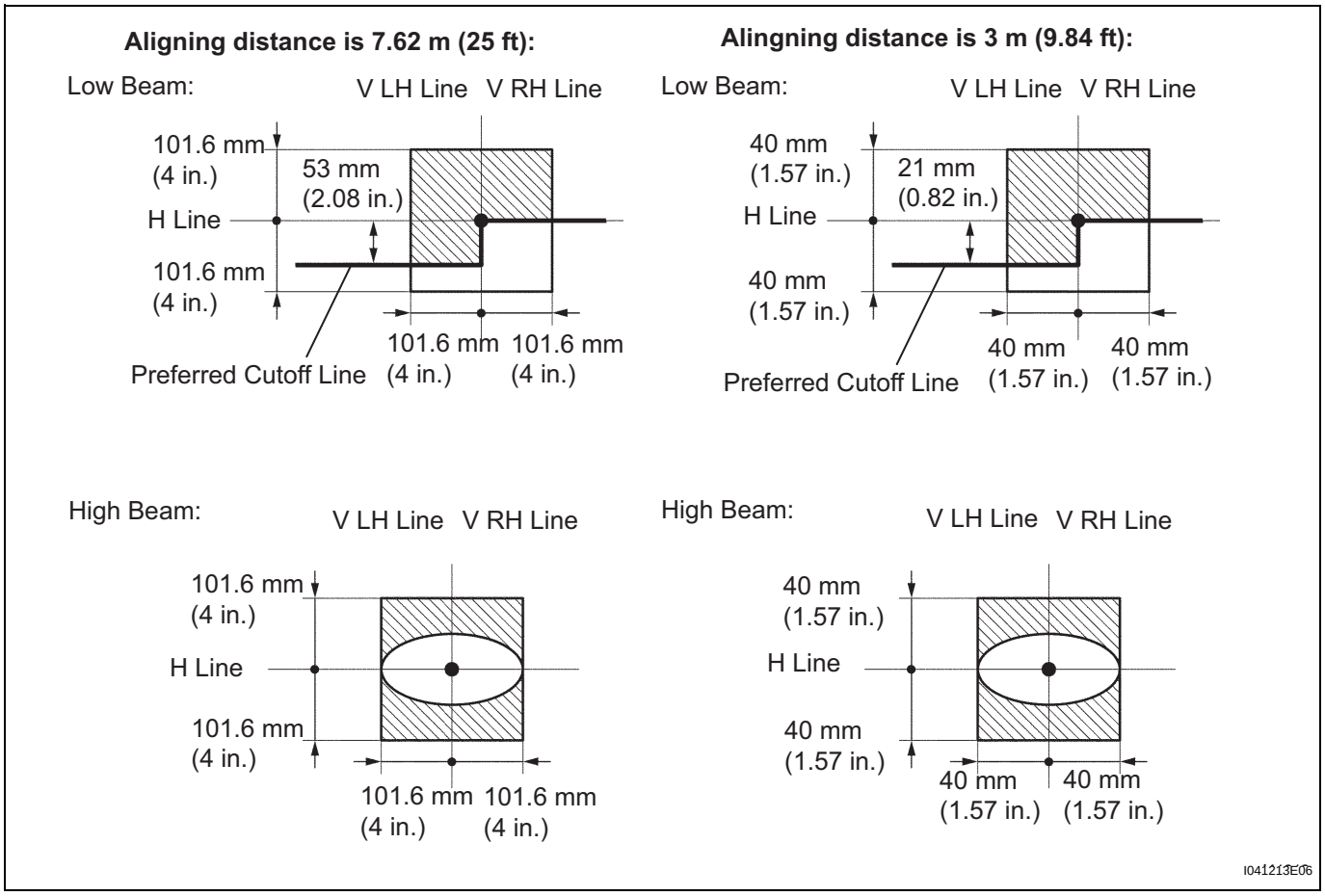
HINT:

When checking the aim of the high-beam, cover the low-beam or disconnect the connector.

(b) Start the engine.

(c) Replacement text:

Turn on the headlight and check if the cutoff line matches the preferred cutoff line in the following illustration.



HINT:

- Since the low-beam light and the high-beam light are a unit, if the aim on the low beam is correct, the high beam should also be correct. However, check both beams just to make sure.

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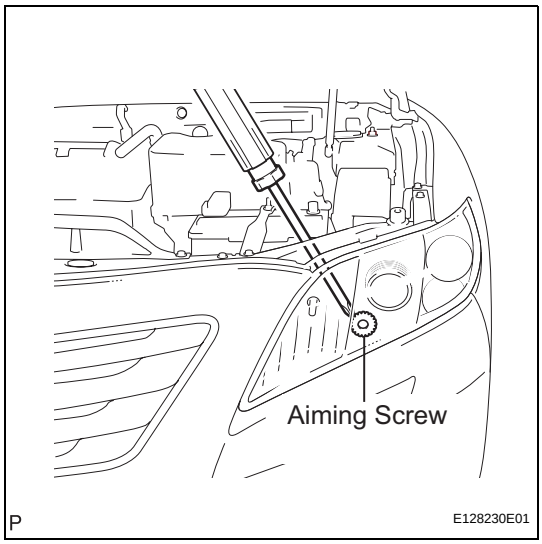
- If the alignment distance is 7.62 m (25 ft):
  The cutoff line should be within 101.6 mm (4 in.) above or below the H line as well as 101.6 mm (4 in.) left or right of the V line with low-beam (SAE J599).
- If the alignment distance is 3 m (9.84 ft):
  The low beam cutoff line should be within 40 mm (1.57 in.) above or below the H line as well as 40 mm (1.57 in.) left or right of the V line (SAE J599).
- If the alignment distance is 7.62 m (25 ft):
  The high beam center of intensity should be within 101.6 mm (4 in.) above or below the H line as well as 101.6 mm (4 in.) left or right of the V line (SAE J599).
- If the alignment distance is 3 m (9.84 ft):
  The high beam center of intensity should be within 40 mm (1.57 in.) above or below the H line as well as 40 mm (1.57 in.) left or right of the V line (SAE J599).
- If the alignment distance is 7.62 m (25 ft):
  The low beam cutoff line should be 53 mm (2.08 in.) below the H line (preferred cutoff line target).
- If the alignment distance is 3 m (9.84 ft):
  The low beam cutoff line should be 21 mm (0.82 in.) below the H line (preferred cutoff line target).



5. HEADLIGHT AIMING ADJUSTMENT

(a) Adjust the aim vertically:
Adjust the headlight aim into the specified range by turning aiming screw with a screwdriver.

NOTICE:

The final turn of the aiming screw should be made in the clockwise direction. If the screw is tightened excessively, loosen it and then retighten it, so that the final turn of the screw is in the clockwise direction.

HINT:

- The low-beam light and the high-beam light are a unit. Adjusting the aim on the low-beam to the correct position should also result in the high-beam adjustment being correct.
- If it is not possible to correctly adjust headlight aim, check bulb, headlight unit, and headlight unit reflector installation.
- The headlight aim moves up when turning the aiming screw clockwise, and moves down when turning the aiming screw counterclockwise.

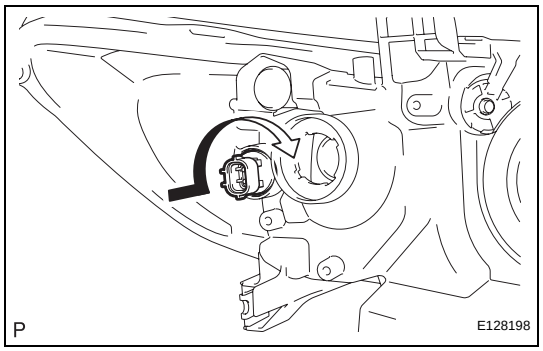
LI

REASSEMBLY

1. INSTALL FRONT SIDE MARKER LIGHT BULB

(a) Install the front side marker light bulb to the front side marker light socket.

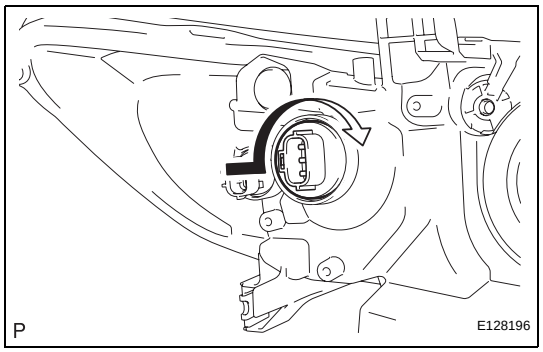
(b) Turn the front side marker light bulb and front side marker light socket in the direction indicated by the arrow and install them as a unit.



2. INSTALL FRONT TURN SIGNAL LIGHT BULB

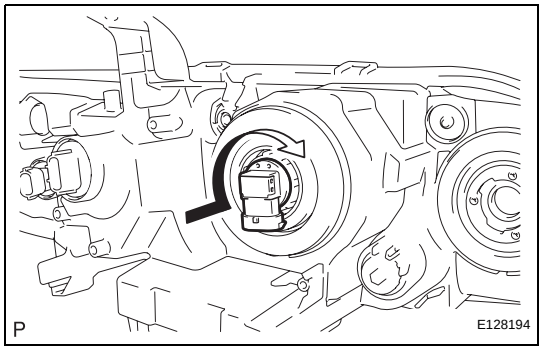
(a) Install the front turn signal light bulb to the front turn signal light socket.

(b) Turn the front turn signal light bulb and front turn signal light socket in the direction indicated by the arrow and install them as a unit.



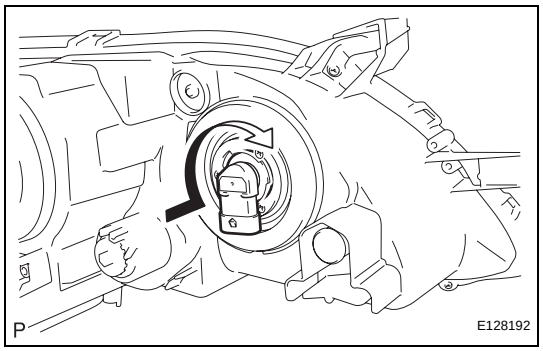
3. INSTALL NO. 1 HEADLIGHT BULB

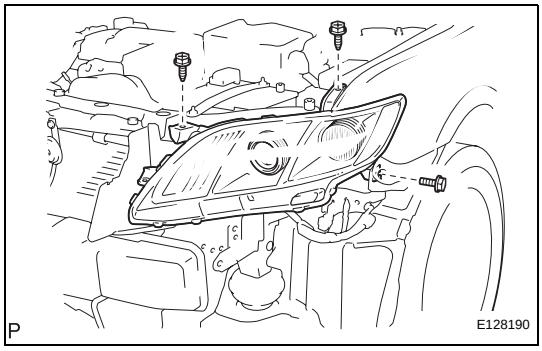
(a) Install the No. 1 headlight bulb as shown in the illustration.



4. INSTALL NO. 2 HEADLIGHT BULB

(a) Install the No. 2 headlight bulb as shown in the illustration.



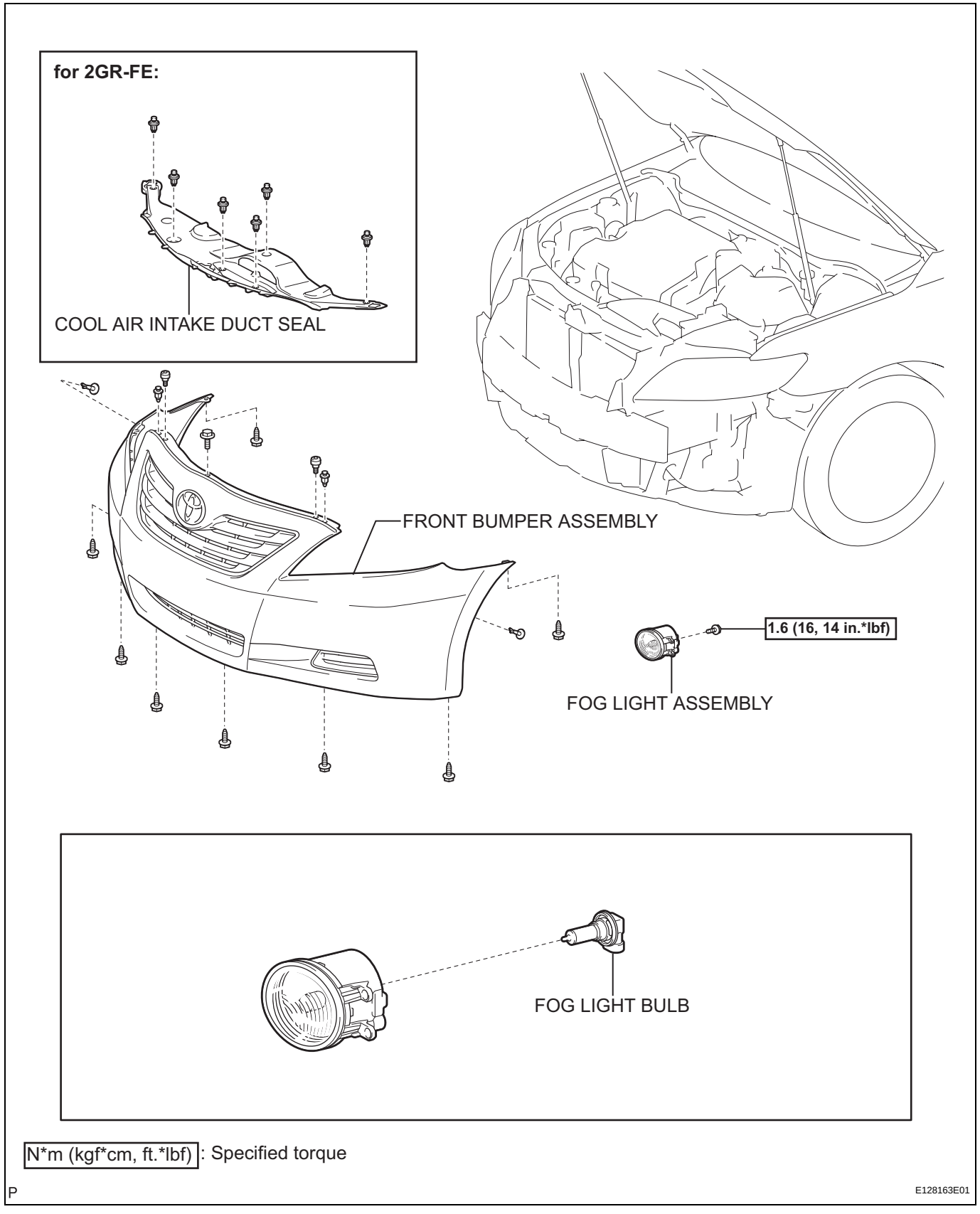


INSTALLATION

1. **INSTALL HEADLIGHT ASSEMBLY**
   (a) Connect the connectors.
   (b) Install the headlight assembly with the bolt and 2 screws.
   Torque: 3.6 N*m (37 kgf*cm, 32 in.*lbf)
2. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
3. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
4. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**
5. **VEHICLE PREPARATION FOR HEADLIGHT AIM ADJUSTMENT (See page LI-71)**
6. **PREPARATION FOR HEADLIGHT AIMING (Using a tester) (See page LI-72)**
7. **PREPARATION FOR HEADLIGHT AIMING (Using a screen) (See page LI-72)**
8. **HEADLIGHT AIMING INSPECTION (See page LI-74)**
9. **HEADLIGHT AIMING ADJUSTMENT (See page LI-75)**
10. **VEHICLE PREPARATION FOR FOG LIGHT AIM (w/ Fog Light) (See page LI-79)**
11. **PREPARATION FOR FOG LIGHT AIMING (w/ Fog Light) (See page LI-80)**
12. **FOG LIGHT AIMING INSPECTION (w/ Fog Light) (See page LI-81)**
13. **FOG LIGHT AIMING ADJUSTMENT (w/ Fog Light) (See page LI-82)**

FOG LIGHT ASSEMBLY

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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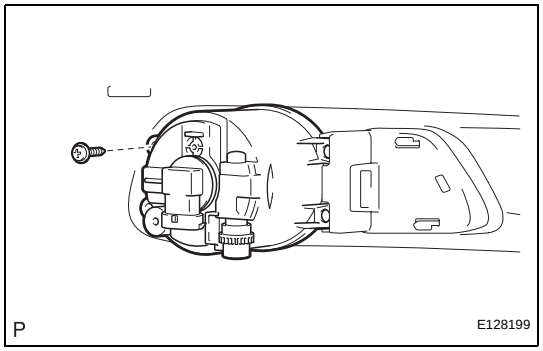
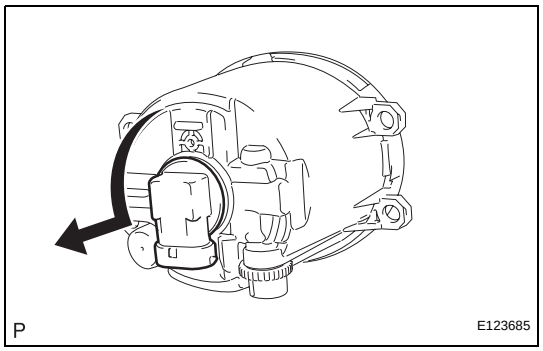
REMOVAL

1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (See page ET-6)**
3. **REMOVE FOG LIGHT ASSEMBLY**
   (a) Remove the screw and the fog light assembly.



DISASSEMBLY

1. **REMOVE FOG LIGHT BULB**
   (a) Remove the fog light bulb as shown in the illustration.

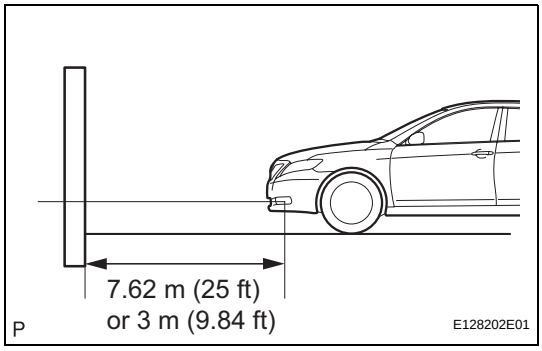


ADJUSTMENT

HINT:
It is possible that a bulb is incorrectly installed, affecting fog light aim. Bulb installation should be considered prior to performing the adjustment procedure.

1. VEHICLE PREPARATION FOR FOG LIGHT AIM

(a) Prepare the vehicle according to the following conditions:
- Ensure there is no damage or deformation to the body around the fog lights.
- Fill the fuel tank.
- Make sure that the oil is filled to the specified level.
- Make sure that the coolant is filled to the specified level.
- Inflate the tires to the appropriate pressure.
- Unload the trunk and vehicle, ensuring that the spare tire, tools, and jack are in their original positions.
- Sit a person of average weight (68 kg, 150 lb) in the driver's seat.
- Vehicles with height adjustable suspension should set the vehicle height to the lowest setting prior to adjusting the fog light aim.



2. PREPARATION FOR FOG LIGHT AIMING

(a) Prepare the vehicle:
- Place the vehicle in a location that is dark enough to clearly observe the cutoff line. The cutoff line is a distinct line, below which light from the fog lights can be observed and above which it cannot.
- Place the vehicle at a 90° angle to the wall.
- Create a 7.62 m (25 ft) distance between the vehicle (fog light bulb center) and the wall.
- Make sure that the vehicle is on a level surface.
- Bounce the vehicle up and down to settle the suspension.

  NOTICE:
  A distance of 7.62 m (25 ft) between the vehicle (fog light bulb center) and the wall is necessary for proper aim adjustment. If unavailable, secure a distance of exactly 3 m (9.84 ft) for check and adjustment. (The target zone will change with the distance, so follow the instructions in the illustration.)

(b) Prepare a piece of thick white paper (approximately 2 m (6.6 ft) (height) x 4 m (13.1 ft) (width)) to use as a screen.

(c) Draw a vertical line down the center of the screen (V line).

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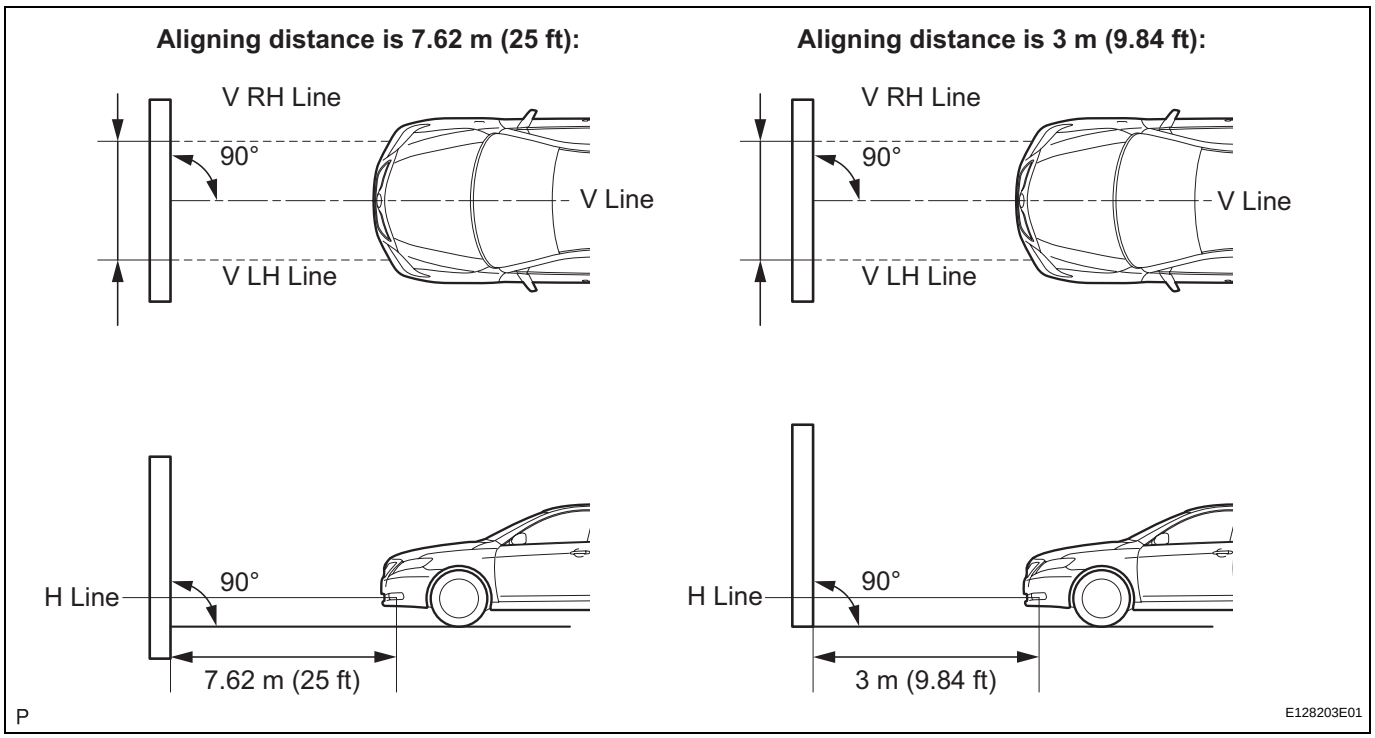
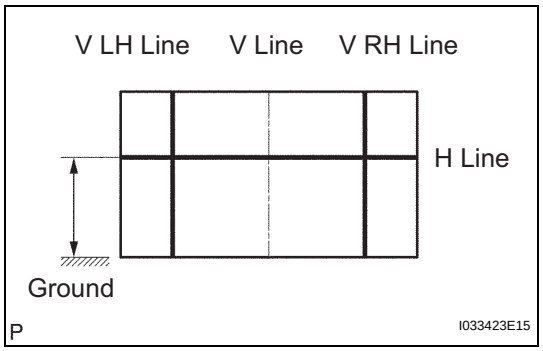
(d) Set the screen as shown in the illustration.



HINT:
- Stand the screen perpendicular to the ground.
- Align the V line on the screen with the center of the vehicle.



(e) Draw base lines (H, V LH, and V RH lines) on the screen as shown in the illustration.
HINT:
Mark the fog light bulb center marks on the screen. If the center mark cannot be observed on the fog light, use the center of the fog light bulb or the manufacturer's name marked on the fog light as the center mark.
   (1) H Line (Fog light height):
   Draw a horizontal line across the screen so that it passes through the center marks. The H line should be at the same height as the fog light bulb center marks of the low-beam fog lights.
   (2) V LH Line, V RH Line (Center mark position of left-hand (LH) and right-hand (RH) fog lights):
   Draw two vertical lines so that they intersect the H line at each center mark.

3. FOG LIGHT AIMING INSPECTION

(a) Cover the fog light or disconnect the connector of the fog light on the opposite side to prevent light from the fog light that is not being inspected from affecting the fog light aiming inspection.
NOTICE:
Do not keep the fog light covered for more than 3 minutes. The fog light lens is made of synthetic resin, which may melt or be damaged due to excessive heat.

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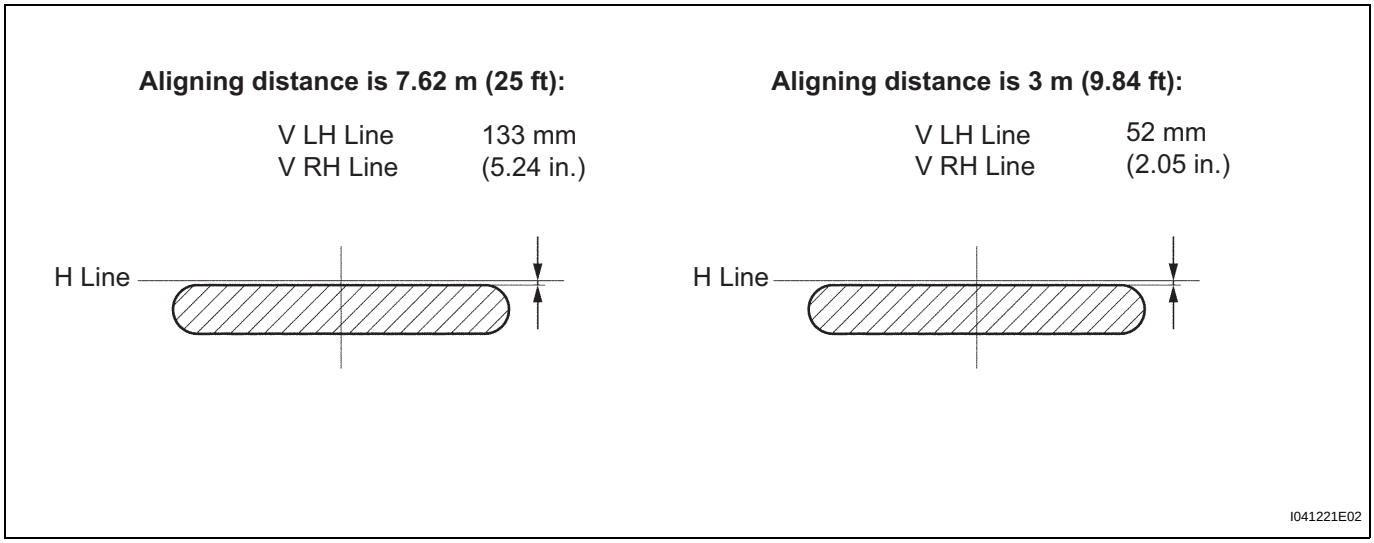
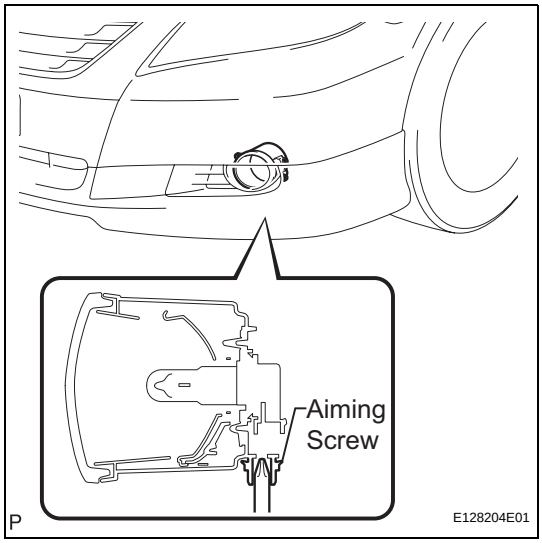
(b) Start the engine.
(c) Turn on the fog light and check if the cut off line falls within the specified area in the following illustration.

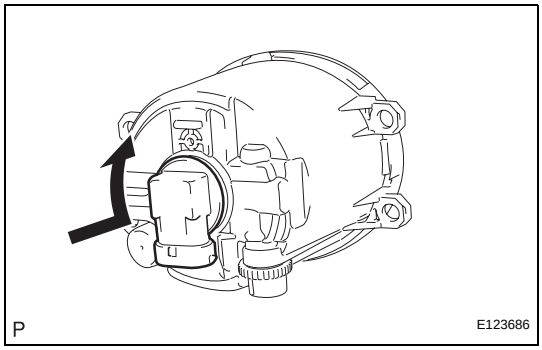




4. FOG LIGHT AIMING ADJUSTMENT

(a) Adjust the aim vertically:
Adjust the aim of each fog light to the specified range by turning each aiming screw with a screwdriver.
NOTICE:
The final turn of the aiming screw should be made in the clockwise direction. If the screw is tightened excessively, loosen it and then retighten it, so that the final turn of the screw is in the clockwise direction.
HINT:
If it is not possible to correctly adjust fog light aim, check bulb, fog light unit, and fog light unit reflector installation.

REASSEMBLY



1. INSTALL FOG LIGHT BULB

(a) Install the fog light bulb as shown in the illustration.

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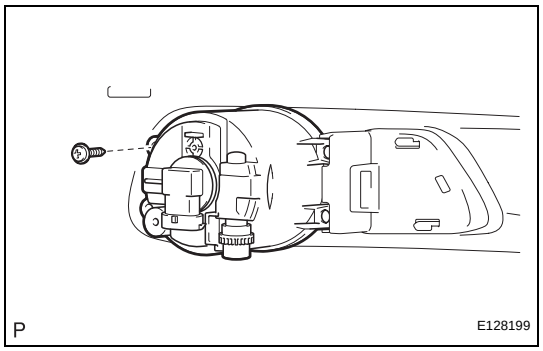
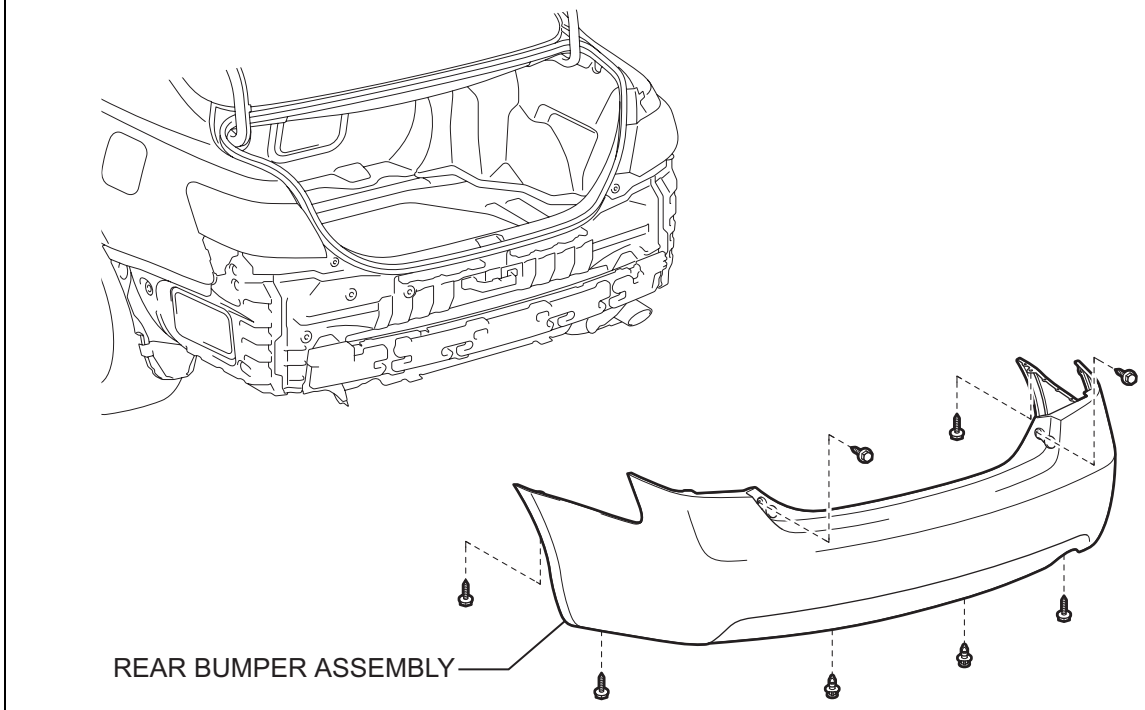


INSTALLATION

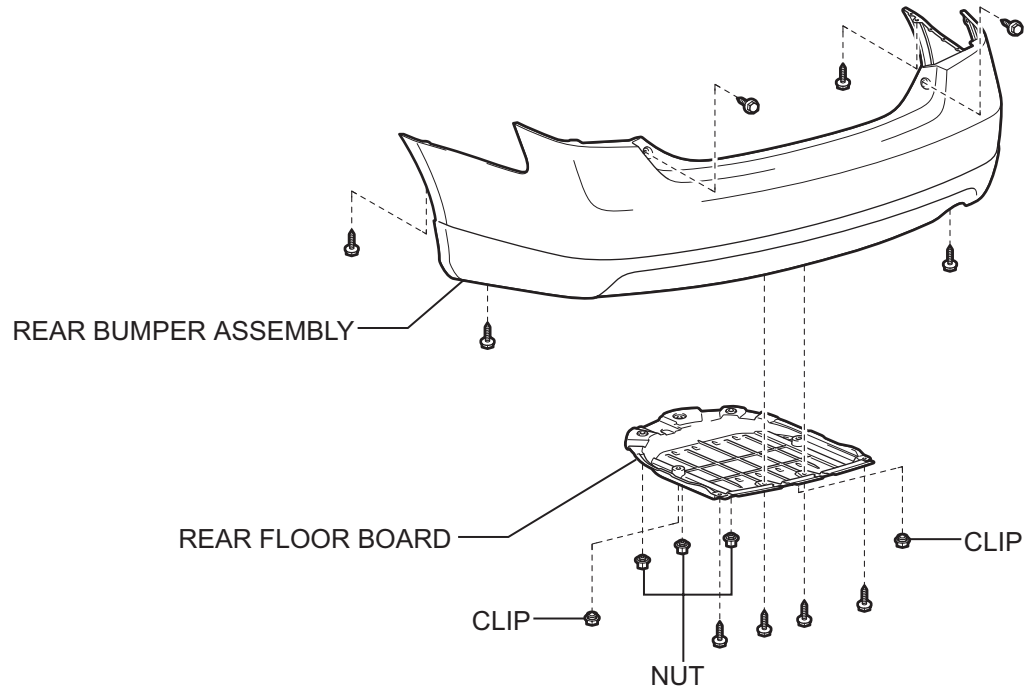
1. **INSTALL FOG LIGHT ASSEMBLY**
   (a) Install the fog light assembly with the screw.
   Torque: 1.6 N*m (16 kgf*cm, 14 in.*lbf)
2. **INSTALL FRONT BUMPER ASSEMBLY (See page ET-14)**
3. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**
4. **VEHICLE PREPARATION FOR FOG LIGHT AIM (See page LI-79)**
5. **PREPARATION FOR FOG LIGHT AIMING (See page LI-80)**
6. **FOG LIGHT AIMING INSPECTION (See page LI-81)**
7. **FOG LIGHT AIMING ADJUSTMENT (See page LI-82)**

REAR COMBINATION LIGHT ASSEMBLY

COMPONENTS



with Rear Lower Spoiler:



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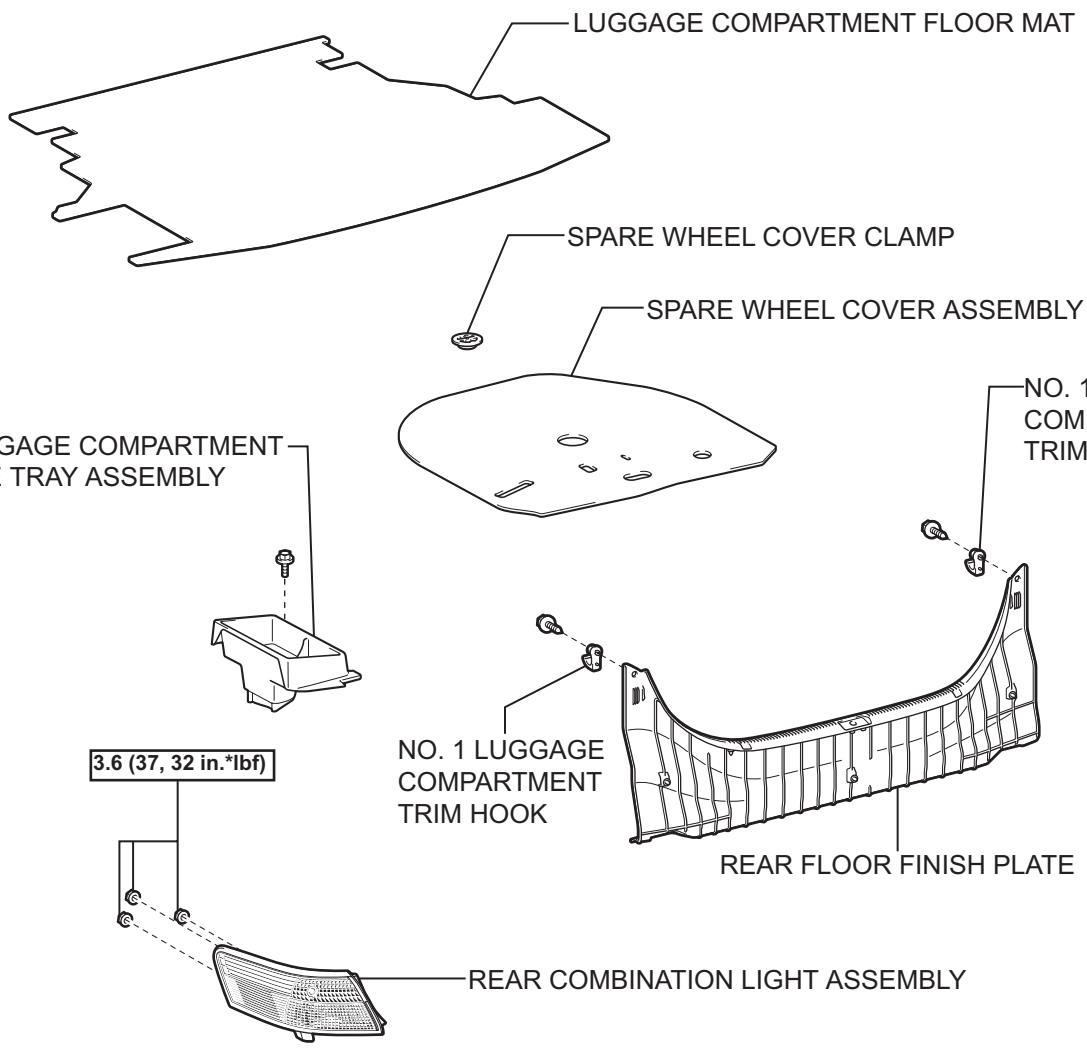
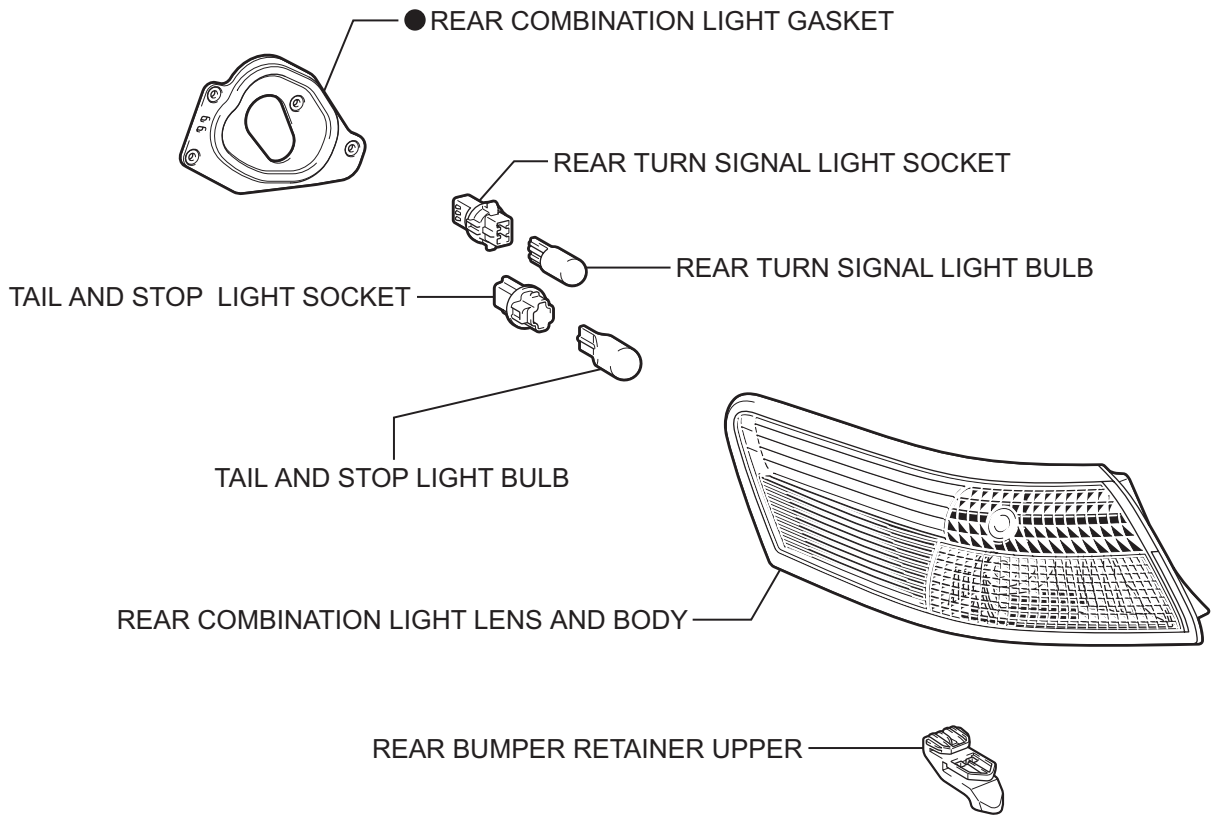


N*m (kgf*cm, ft.*lbf): Specified torque

P

E129958E01

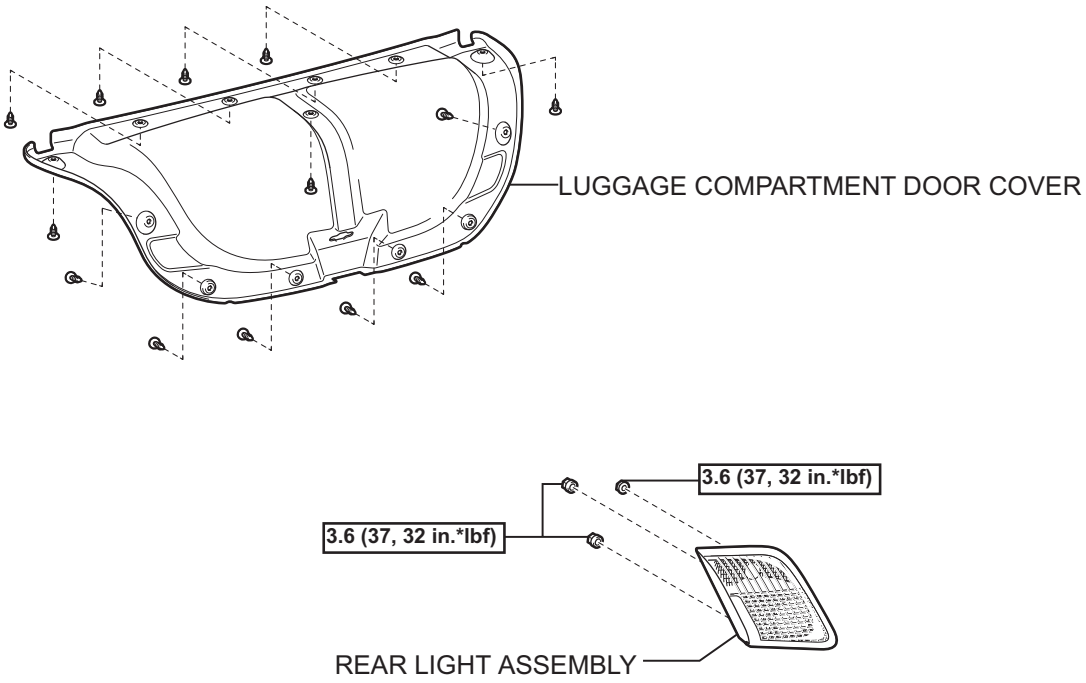


● Non-reusable part

P

E128165E01

LI



LI

N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

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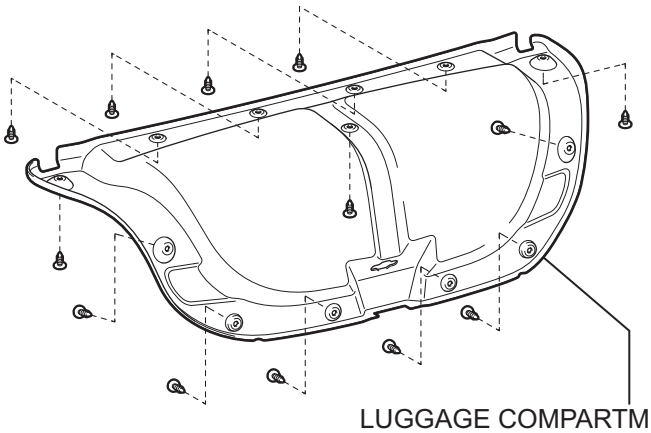
LICENSE PLATE LIGHT ASSEMBLY

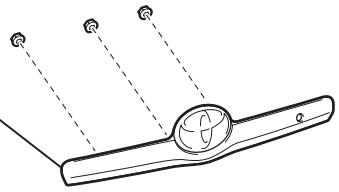
COMPONENTS



LUGGAGE COMPARTMENT DOOR COVER

LICENSE PLATE LIGHT ASSEMBLY

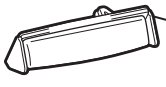
LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY



LUGGAGE COMPARTMENT DOOR OUTSIDE GARNISH

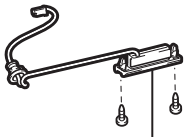
LICENSE PLATE LIGHT SOCKET

LICENSE PLATE LIGHT BULB



LICENSE PLATE LIGHT LENS

with Smart Key System:



LUGGAGE DOOR OPENING SWITCH ASSEMBLY

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E128168E01

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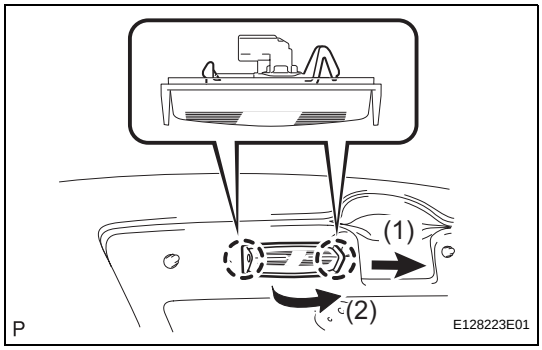
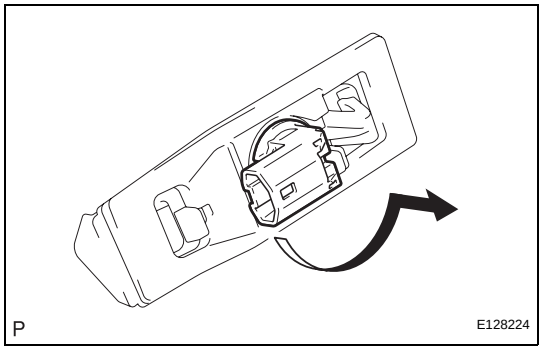
REMOVAL

1. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)**
2. **REMOVE LUGGAGE DOOR OPENING SWITCH ASSEMBLY (w/ Smart Key System) (See page DL-246)**
3. **REMOVE LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY (See page ET-61)**
4. **REMOVE LUGGAGE COMPARTMENT DOOR OUTSIDE GARNISH (See page ET-61)**
5. **REMOVE LICENSE PLATE LIGHT ASSEMBLY**
   (a) Disconnect the connector.
   (b) Disengage the 2 claws and remove the license plate light assembly as shown in the illustration.



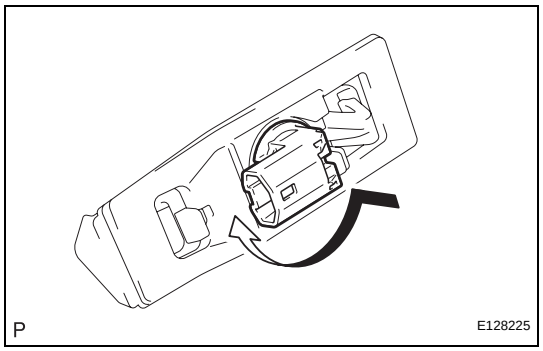
DISASSEMBLY

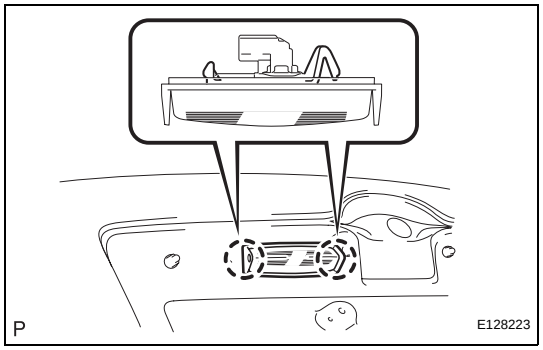
1. **REMOVE LICENSE PLATE LIGHT BULB**
   (a) Turn the license plate light bulb and the license plate light socket in the direction indicated by the arrow and remove them as a unit.
   (b) Remove the license plate light bulb from the license plate light socket.



REASSEMBLY

1. **INSTALL LICENSE PLATE LIGHT BULB**
   (a) Install the license plate light blub to the license plate light socket.
   (b) Turn the license plate light blub and the license plate light socket in the direction indicated by the arrow and install them as a unit.



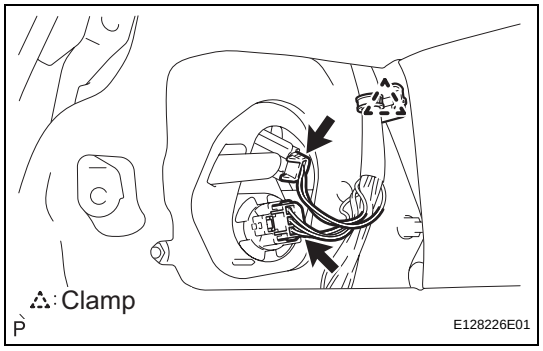


INSTALLATION

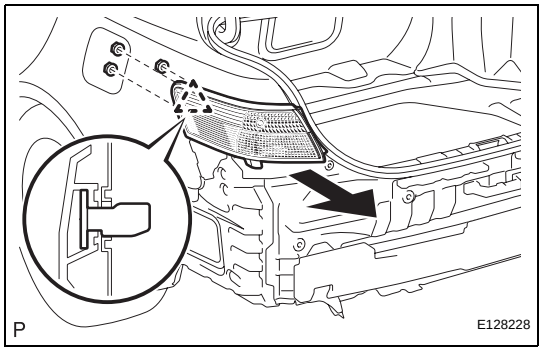
1. **INSTALL LICENSE PLATE LIGHT ASSEMBLY**
   (a) Engage the 2 claws to install the license plate light assembly.
   (b) Connect the connector.
2. **INSTALL LUGGAGE COMPARTMENT DOOR OUTSIDE GARNISH (See page ET-63)**
3. **INSTALL LUGGAGE COMPARTMENT DOOR LOCK CYLINDER ASSEMBLY (See page ET-64)**
4. **INSTALL LUGGAGE DOOR OPENING SWITCH ASSEMBLY (w/ Smart Key System) (See page DL-246)**
5. **INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)**

REMOVAL

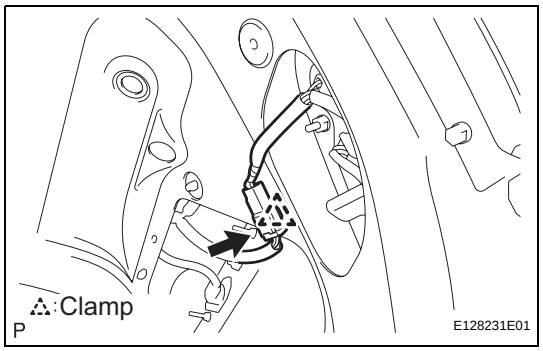
1. **REMOVE REAR BUMPER ASSEMBLY (w/o Rear Lower Spoiler) (See page ET-17)**
2. **REMOVE REAR FLOOR BOARD (w/ Rear Lower Spoiler) (See page ET-18)**
3. **REMOVE REAR BUMPER ASSEMBLY (w/ Rear Lower Spoiler) (See page ET-18)**
4. **REMOVE LUGGAGE COMPARTMENT FLOOR MAT**
5. **REMOVE SPARE WHEEL COVER CLAMP**
6. **REMOVE SPARE WHEEL COVER ASSEMBLY**
7. **REMOVE LUGGAGE COMPARTMENT SIDE TRAY ASSEMBLY (See page ED-66)**
8. **REMOVE NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-66)**
9. **REMOVE REAR FLOOR FINISH PLATE (See page ED-66)**
10. **REMOVE REAR COMBINATION LIGHT ASSEMBLY**
    (a) Disconnect the 2 connectors and clamp.



    (b) Remove the 3 nuts.
    (c) Disengage the clip and remove the rear combination light assembly.



11. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)**
12. **REMOVE REAR LIGHT ASSEMBLY**
    (a) Disconnect the connector and clamp.



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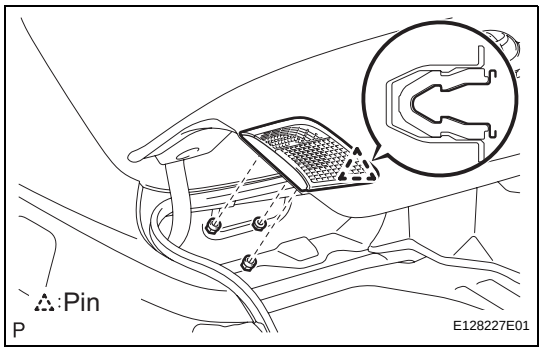
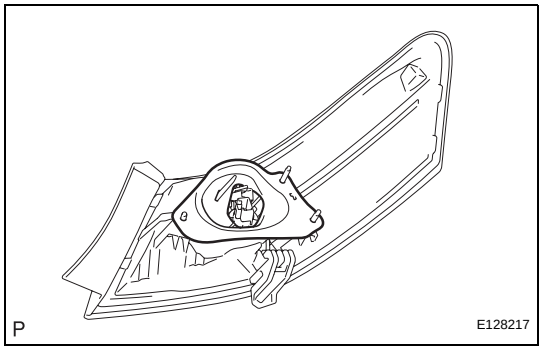


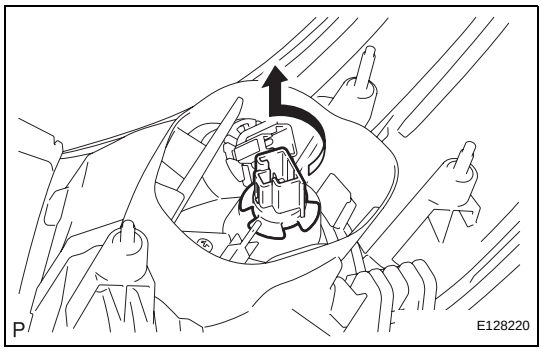
(b) Remove the 3 nuts.
(c) Disengage the pin and remove the rear light assembly.
HINT:
Be careful not to break the engaging portion of the pin when removing the rear light assembly.



DISASSEMBLY

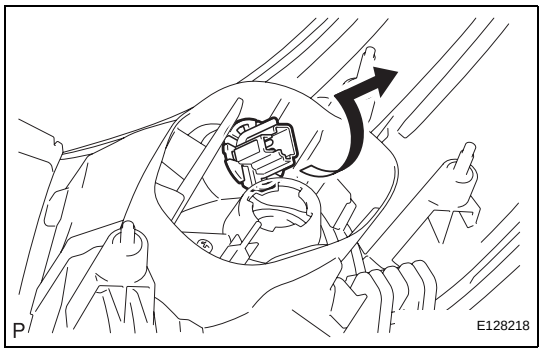
1. REMOVE REAR COMBINATION LIGHT GASKET

(a) Remove the rear combination light gasket.
NOTICE:
- **Be sure to remove the all traces of the old gasket from the body.**
- **Do not reuse the removed gasket. Be sure to install a new rear combination light gasket to prevent water ingress.**



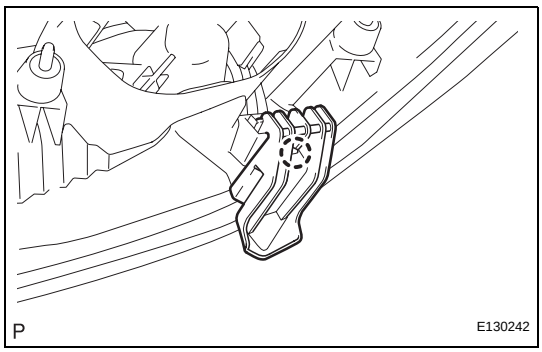
2. REMOVE TAIL AND STOP LIGHT BULB

(a) Turn the tail and stop light bulb and the rear combination light socket in the direction indicated by the arrow and disconnect them as a unit.
(b) Remove the tail and stop light bulb from the tail and stop light socket.



3. REMOVE REAR TURN SIGNAL LIGHT BULB

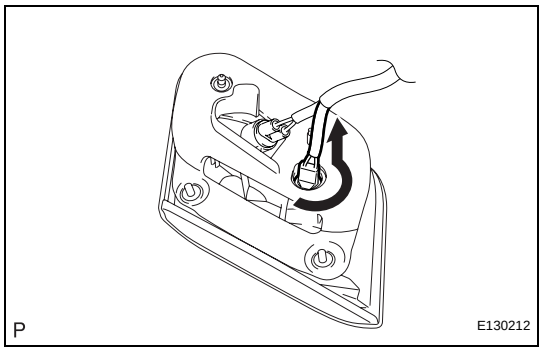
(a) Turn the rear turn signal light bulb and the rear light socket and wire in the direction indicated by the arrow and disconnect them as a unit.
(b) Remove the rear turn signal light bulb from the rear light socket and wire.



4. REMOVE REAR BUMPER RETAINER UPPER

(a) Disengage the claw and remove the rear bumper retainer upper.

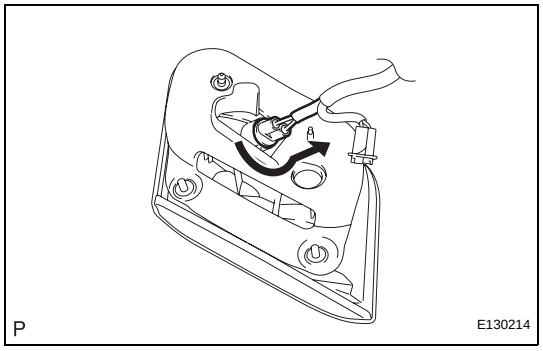
LI



5. REMOVE BACK UP LIGHT BULB

(a) Turn the back up light bulb and the rear light socket and wire in the direction indicated by the arrow and remove them as a unit.

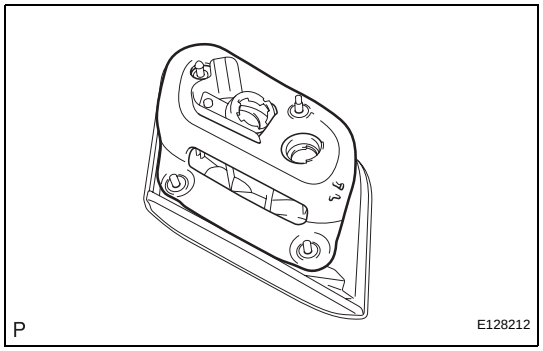
(b) Remove the back up light bulb from the rear light socket and wire.



6. REMOVE TAIL LIGHT BULB

(a) Turn the tail light bulb and the rear light socket and wire in the direction indicated by the arrow and remove them as a unit.

(b) Remove the tail light bulb from the rear light socket and wire.



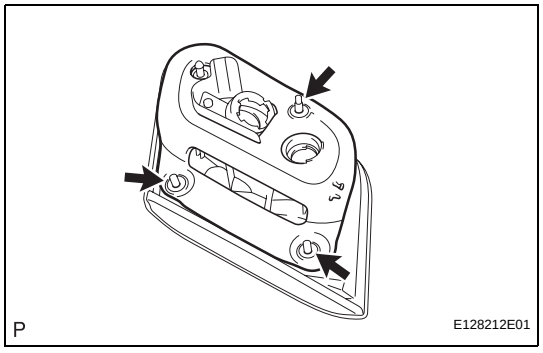
7. REMOVE REAR LIGHT GASKET

(a) Remove the rear light gasket.

NOTICE:

- **Be sure to remove all traces of the old gasket from the body.**
- **Do not reuse the removed gasket. Be sure to install a new rear light gasket to prevent water ingress.**

REASSEMBLY



1. INSTALL REAR LIGHT GASKET

(a) Remove the release paper from a new rear light gasket.

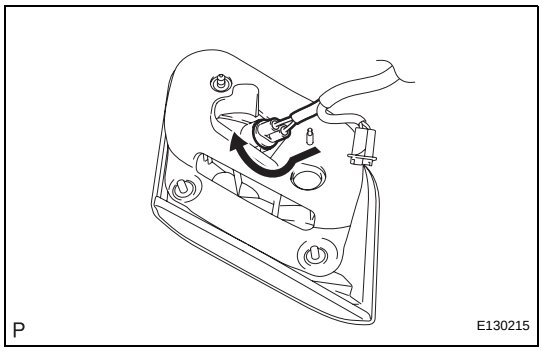
NOTICE:

- **Be sure to remove all traces of the old gasket from the body.**
- **Do not reuse the removed gasket. Be sure to install a new rear light gasket to prevent water ingress.**

(b) Align the rear light gasket with the 3 stud bolts and install the gasket as shown in the illustration.

2. INSTALL TAIL LIGHT BULB

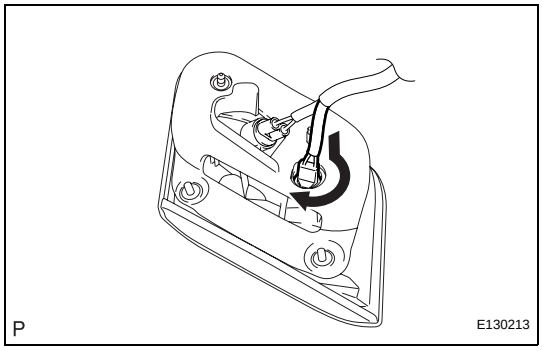
(a) Install the tail light bulb to the rear light socket and wire.



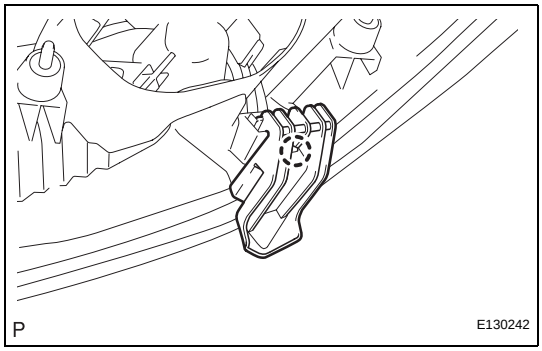
(b) Turn the tail light bulb and rear light socket and wire in the direction indicated by the arrow and install them as a unit.

3. INSTALL BACK UP LIGHT BULB

(a) Install the back up light bulb to the rear light socket and wire.



(b) Turn the back up light bulb and rear light socket and wire in the direction indicated by the arrow and install them as a unit.

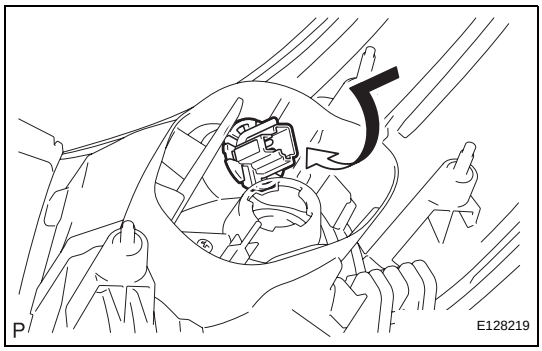


4. INSTALL REAR BUMPER RETAINER UPPER

(a) Engage the claw and install the rear bumper retainer upper.

5. INSTALL REAR TURN SIGNAL LIGHT BULB

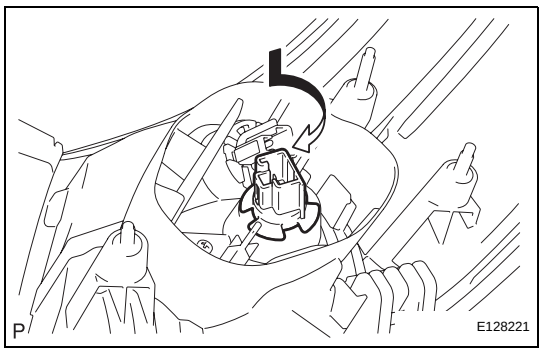
(a) Install the rear turn signal light bulb to the rear turn signal light socket.



(b) Turn the rear turn signal light bulb and rear turn signal light socket in the direction indicated by the arrow and install them as a unit.

6. INSTALL TAIL AND STOP LIGHT BULB

(a) Install the tail and stop light bulb to the tail and stop light socket.



(b) Turn the tail and stop light bulb and tail and stop light socket in the direction indicated by the arrow and install them as a unit.

7. INSTALL REAR COMBINATION LIGHT GASKET

(a) Remove the release paper from a new rear combination light gasket.

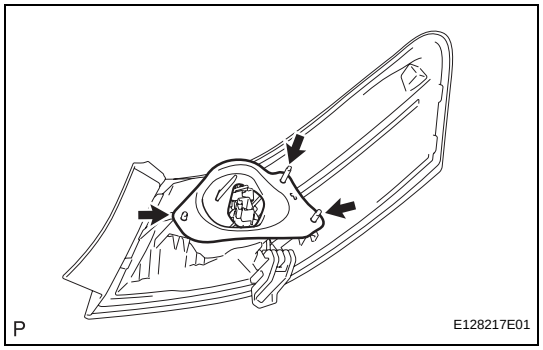
NOTICE:

- **Be sure to remove all traces of the old gasket from the body.**

LI

- **Do not reuse the removed gasket. Be sure to install a new rear combination light gasket to prevent water ingress.**

(b) Align the rear combination light gasket with the 3 stud bolts and install the gasket as shown in the illustration.

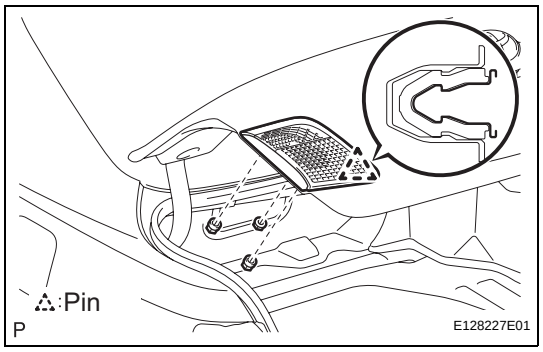


INSTALLATION

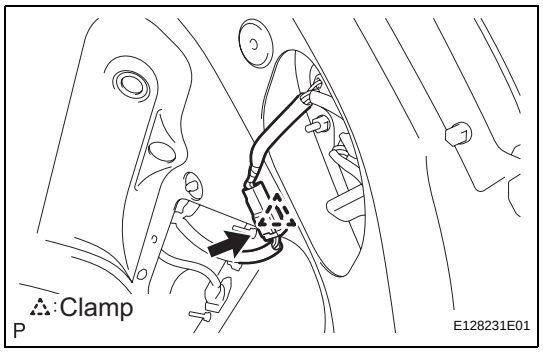
1. INSTALL REAR LIGHT ASSEMBLY

(a) Engage the pin and install the rear light assembly.

(b) Install the 3 nuts.
Torque: 3.6 N*m (37 kgf*cm, 32 in.*lbf)



(c) Connect the connector and clamp.

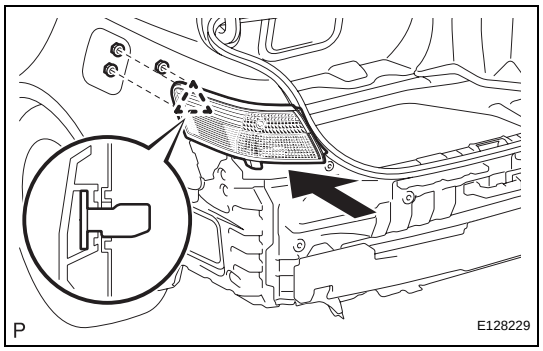


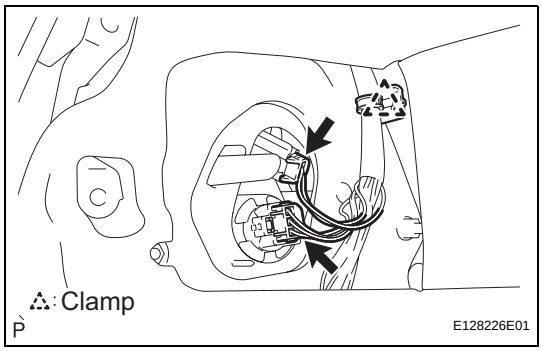
2. INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)

3. INSTALL REAR COMBINATION LIGHT ASSEMBLY

(a) Engage the clip and install the rear combination light assembly.

(b) Install the 3 nuts.
Torque: 3.6 N*m (37 kgf*cm, 32 in.*lbf)





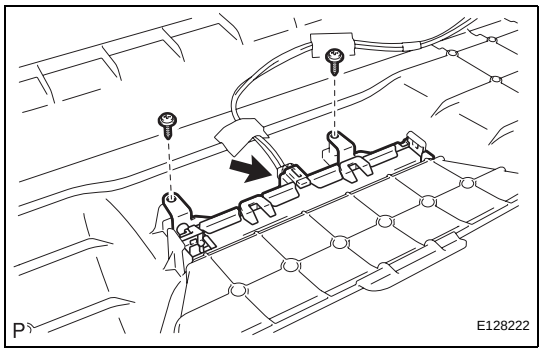
(c) Connect the 2 connectors and clamp.

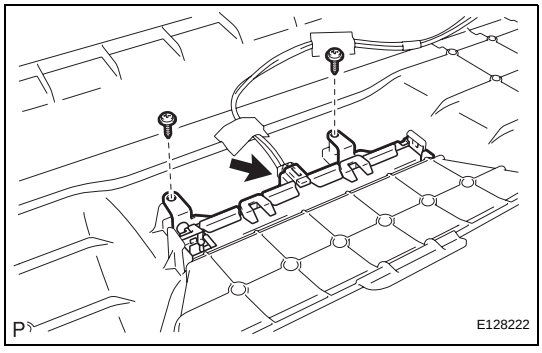
4. **INSTALL REAR FLOOR FINISH PLATE (See page ED-72)**
5. **INSTALL NO. 1 LUGGAGE COMPARTMENT TRIM HOOK (See page ED-72)**
6. **INSTALL LUGGAGE COMPARTMENT SIDE TRAY ASSEMBLY (See page ED-72)**
7. **INSTALL SPARE WHEEL COVER ASSEMBLY**
8. **INSTALL SPARE WHEEL COVER CLAMP**
9. **INSTALL LUGGAGE COMPARTMENT FLOOR MAT**
10. **INSTALL REAR BUMPER ASSEMBLY (w/o Rear Lower Spoiler) (See page ET-23)**
11. **INSTALL REAR BUMPER ASSEMBLY (w/ Rear Lower Spoiler) (See page ET-24)**
12. **INSTALL REAR FLOOR BOARD (w/ Rear Lower Spoiler) (See page ET-24)**

REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)
2. REMOVE REAR SEAT HEADREST ASSEMBLY
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
4. REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)
5. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)
6. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)
7. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)
8. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)
9. REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)
10. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)
11. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)
12. REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)
13. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)
14. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH
15. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)
16. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH
17. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)
18. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
19. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)

20. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-35)**
21. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-35)**
22. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)**
23. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)**
24. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-36)**
25. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-36)**
26. **REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-36)**
27. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-36)**
28. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-37)**
29. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-37)**
30. **REMOVE CENTER STOP LIGHT SET**
    (a) Disconnect the connector.
    (b) Remove the 2 screws and the center stop light set.





INSTALLATION

1. **INSTALL CENTER STOP LIGHT SET**
    (a) Connect the connector.
    (b) Install the center stop light set with the 2 screws.
    Torque: 1.6 N*m (16 kgf*cm, 14 in.*lbf)
2. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-38)**
3. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-39)**
4. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-39)**
5. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-39)**

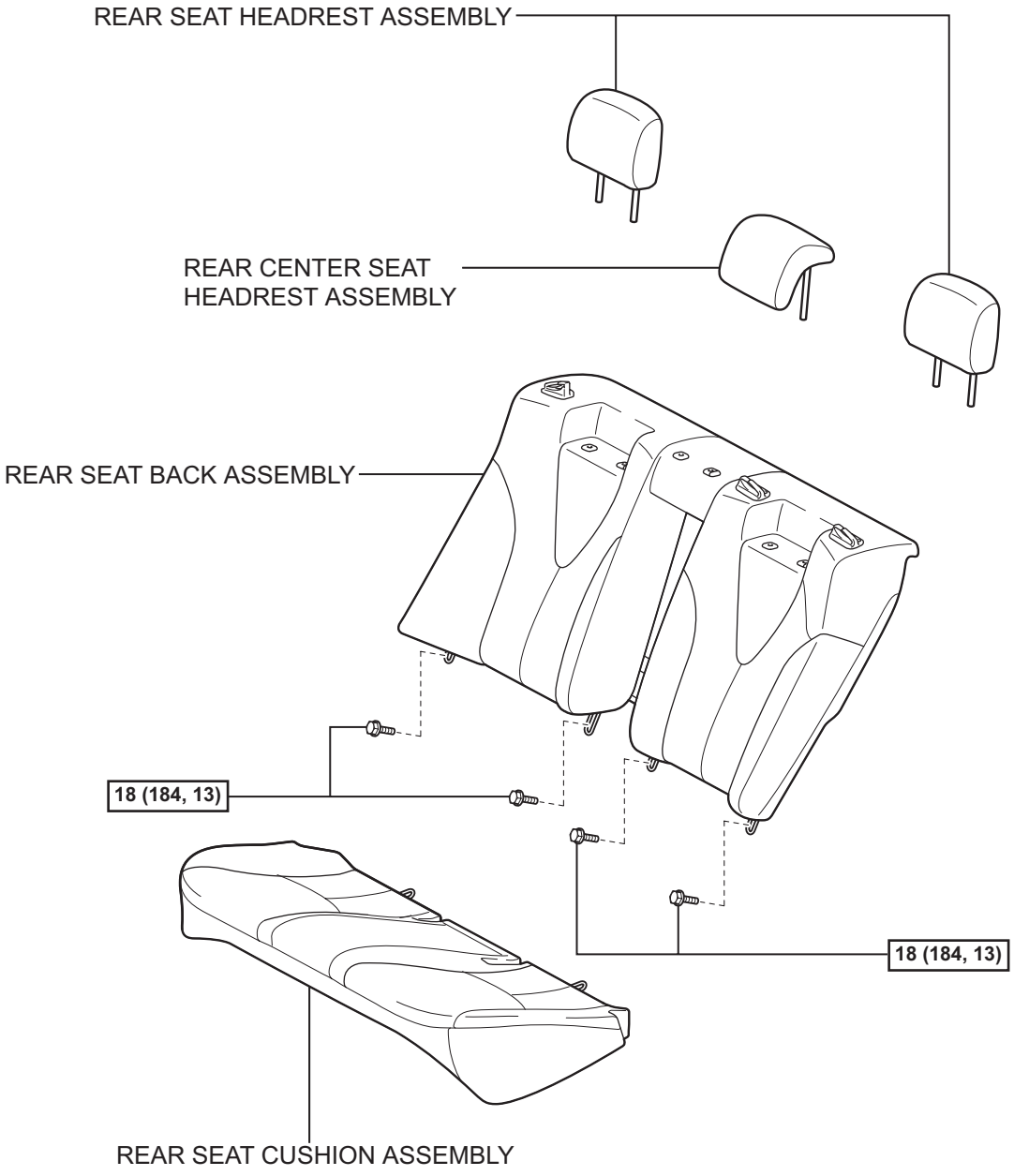
6. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-39)
7. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-40)
8. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)
9. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)
10. INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-40)
11. INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-40)
12. INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)
13. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)
14. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
15. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH
16. INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)
17. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH
18. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)
19. INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)
20. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)
21. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)
22. INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)
23. INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)
24. INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)
25. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)

26. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
27. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
28. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
29. **INSTALL REAR SEAT HEADREST ASSEMBLY**
30. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-84)**

HIGH MOUNTED STOP LIGHT ASSEMBLY

COMPONENTS

for Fixed Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

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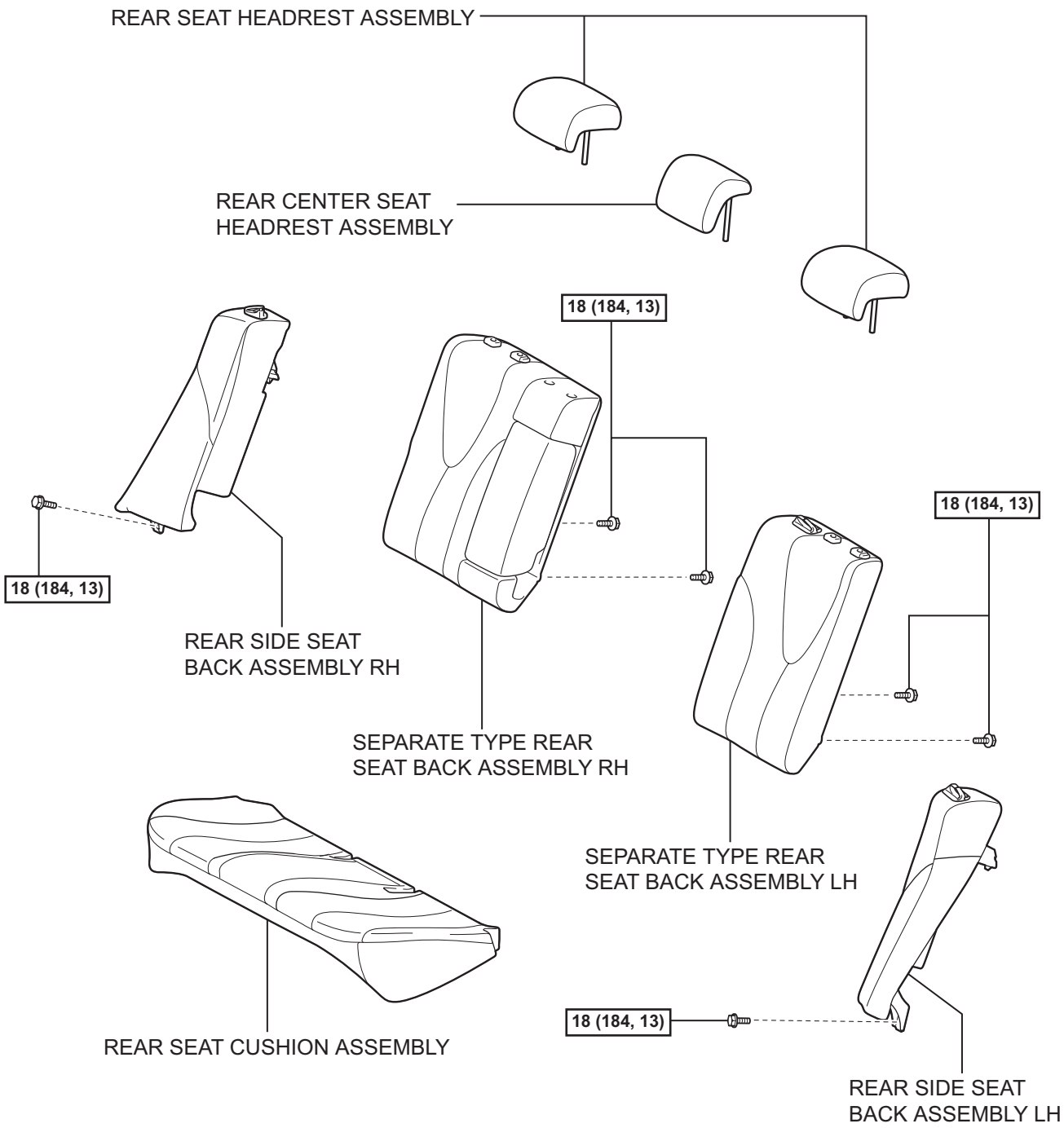
for Fold Down Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

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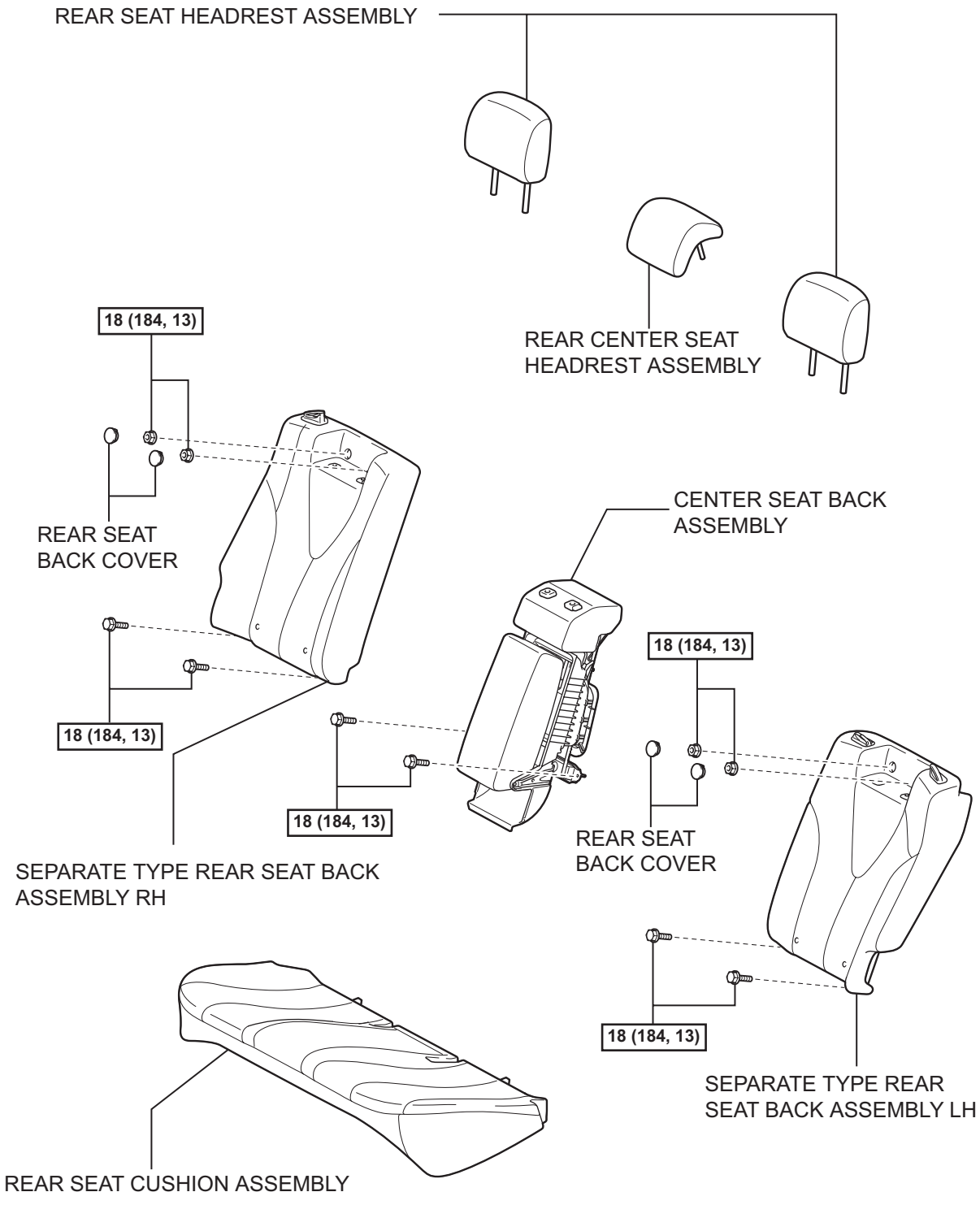
for Reclining Seat Type:

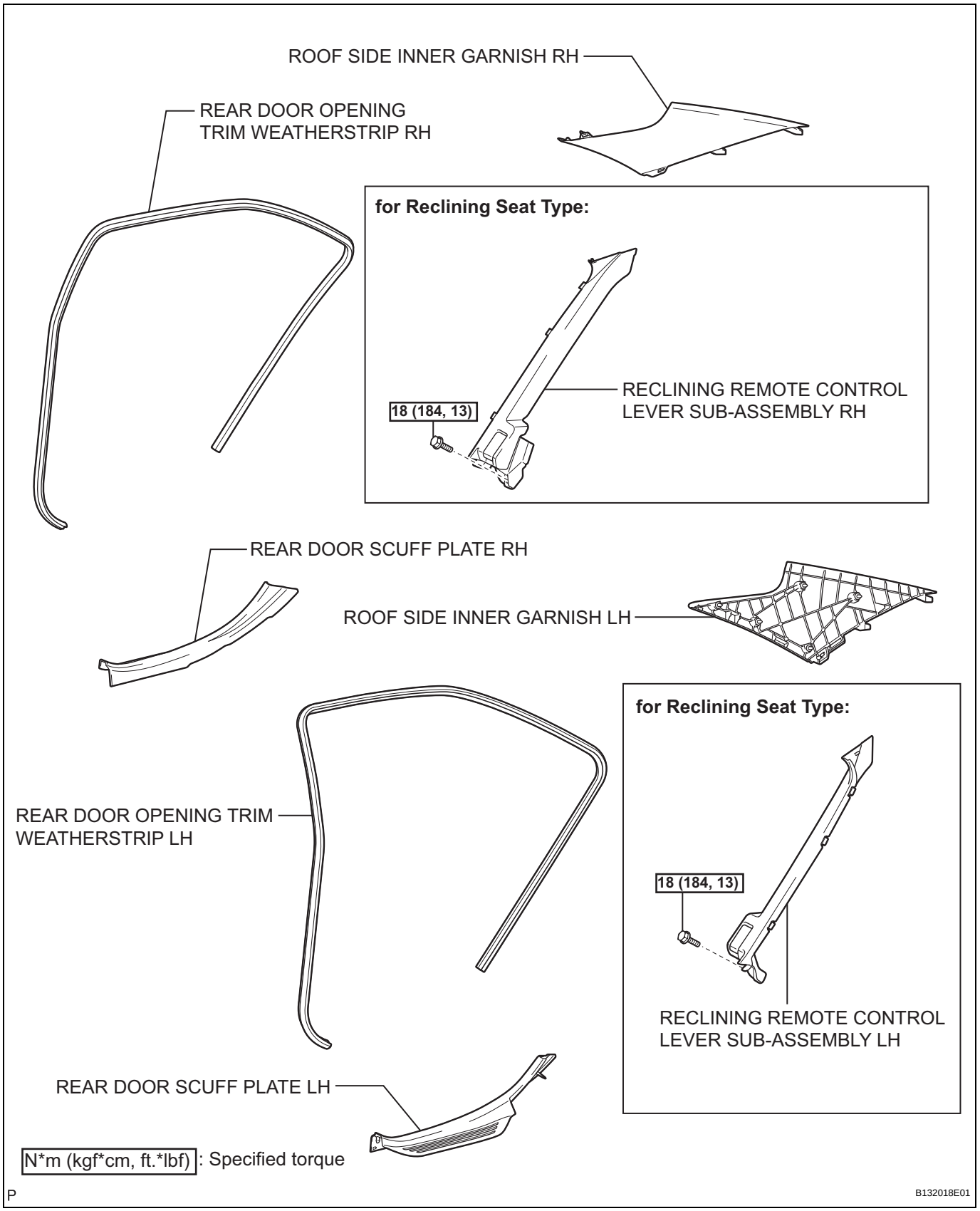


N*m (kgf*cm, ft.*lbf): Specified torque

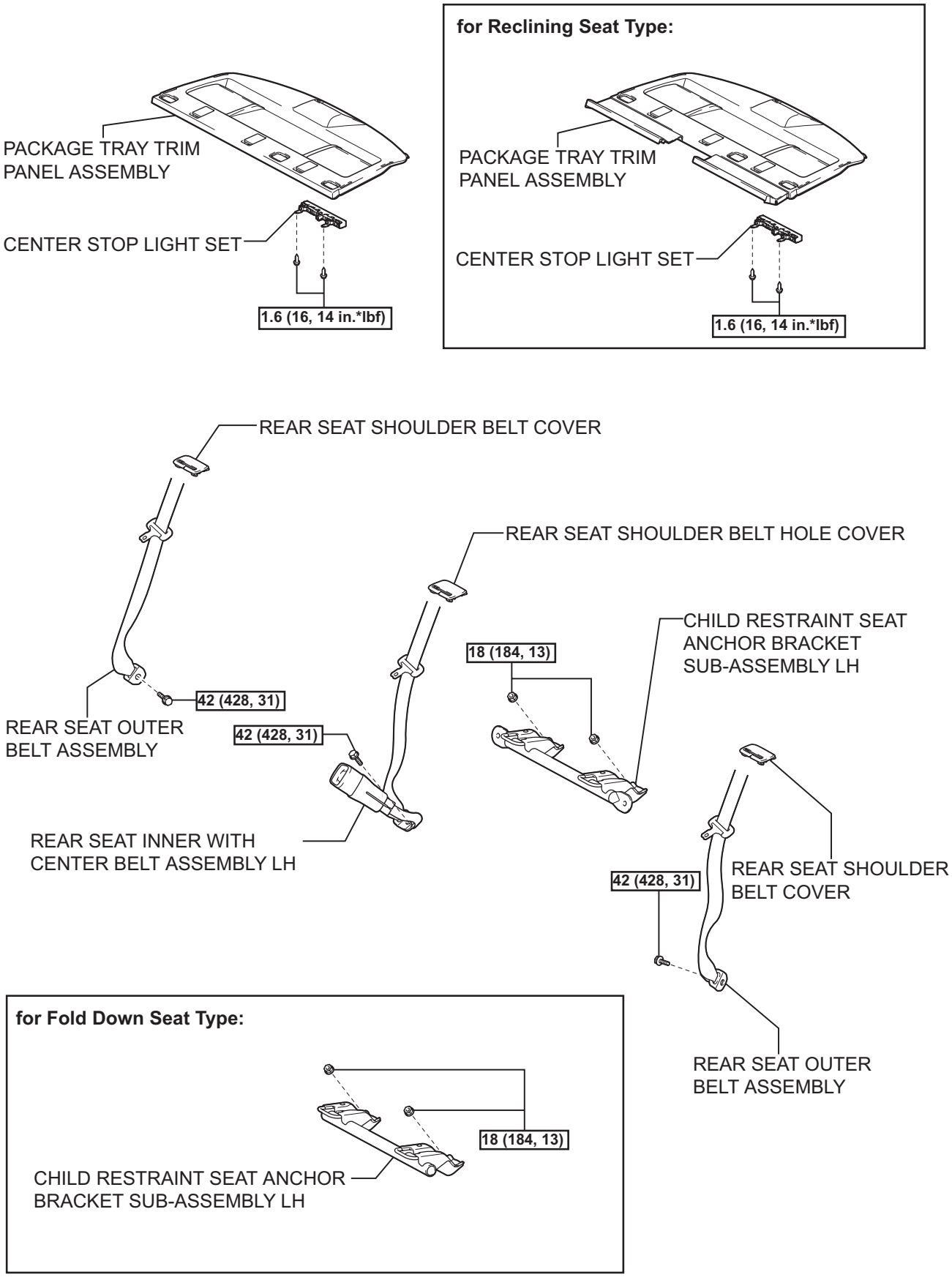
LI

P

B139095E03


ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR SCUFF PLATE RH
ROOF SIDE INNER GARNISH LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132018E01

LI



N*m (kgf*cm, ft.*lbf): Specified torque

LI

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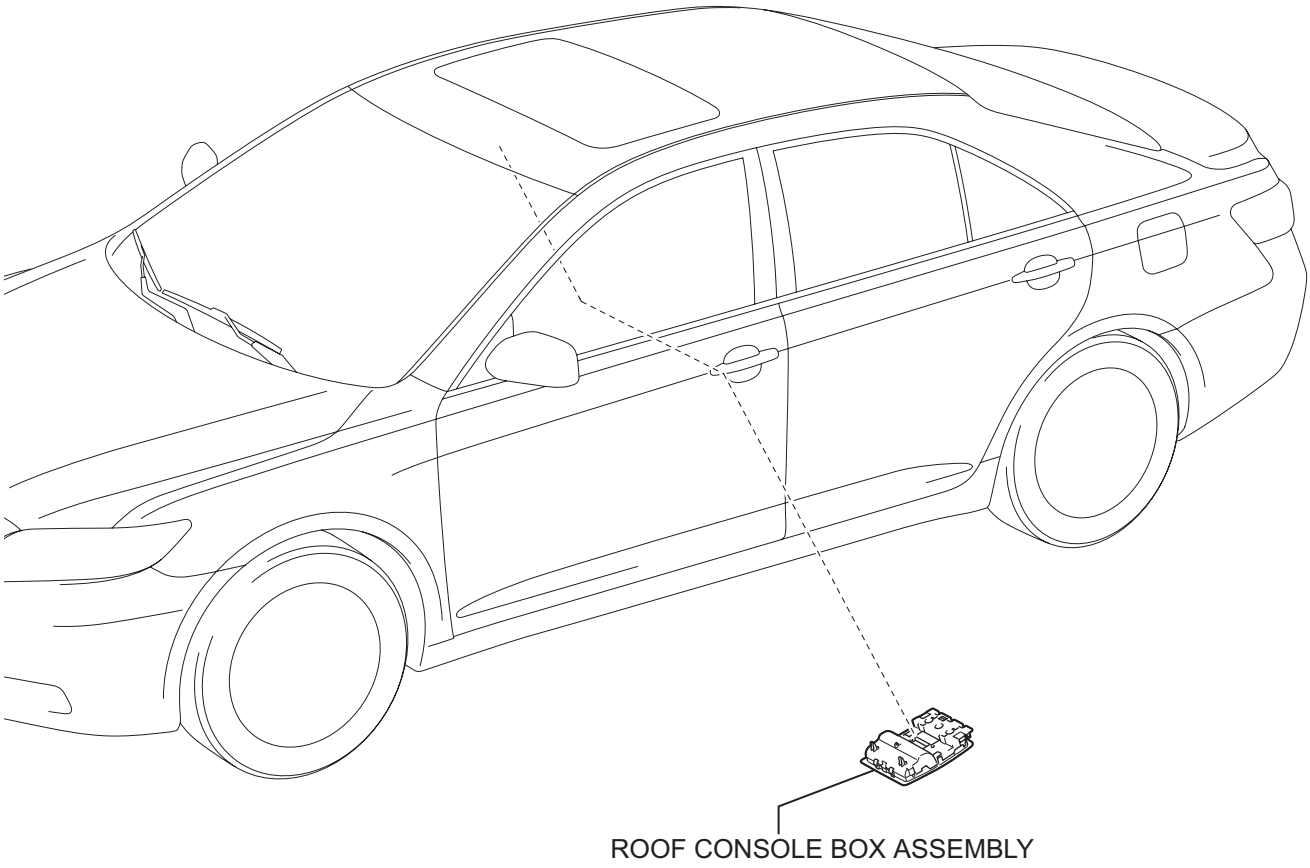
PERSONAL LIGHT ASSEMBLY

COMPONENTS

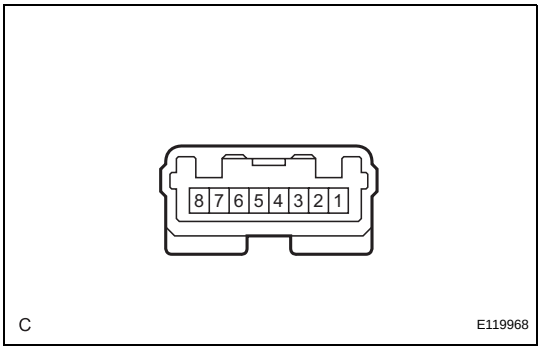


REMOVAL

1. **REMOVE ROOF CONSOLE BOX ASSEMBLY (See page IR-28)**

INSPECTION

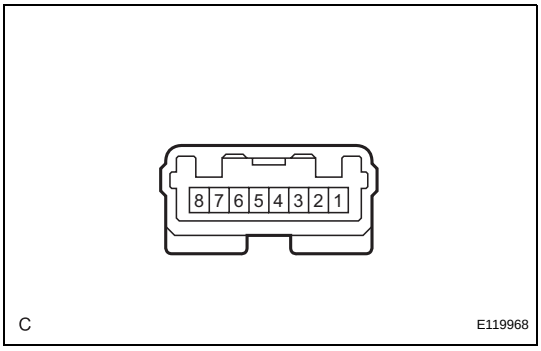
1. **INSPECT ROOF CONSOLE BOX ASSEMBLY (with Sliding Roof)**
   (a) Apply battery voltage to the roof console box assembly.
   (b) Check that the interior light and personal lights come on.
   OK



Measurement Condition	Switch Condition	Specified Condition
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 6	Interior light switch in DOOR	Interior light comes on
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 8	Interior light switch ON	Interior light comes on
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 8	Front RH personal light switch ON	Front RH personal light comes on
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 8	Front LH personal light switch ON	Front LH personal light comes on

If the result is not as specified, replace the roof console box assembly.

2. **INSPECT ROOF CONSOLE BOX ASSEMBLY (without Sliding Roof)**
   (a) Apply battery voltage to the roof console box assembly.
   (b) Check that each personal light comes on.
   OK



Measurement Condition	Switch Condition	Specified Condition
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 8	Front RH personal light switch ON	Front RH personal light comes on
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 8	Front LH personal light switch ON	Front LH personal light comes on

If the result is not as specified, replace the roof console box assembly.

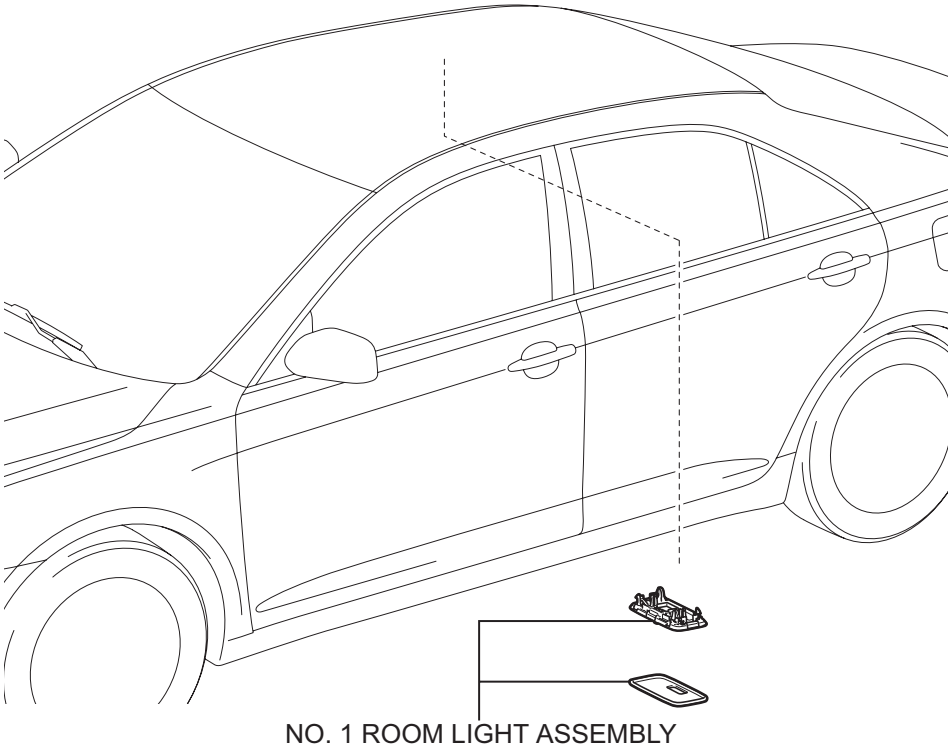
INSTALLATION

1. **INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-50)**

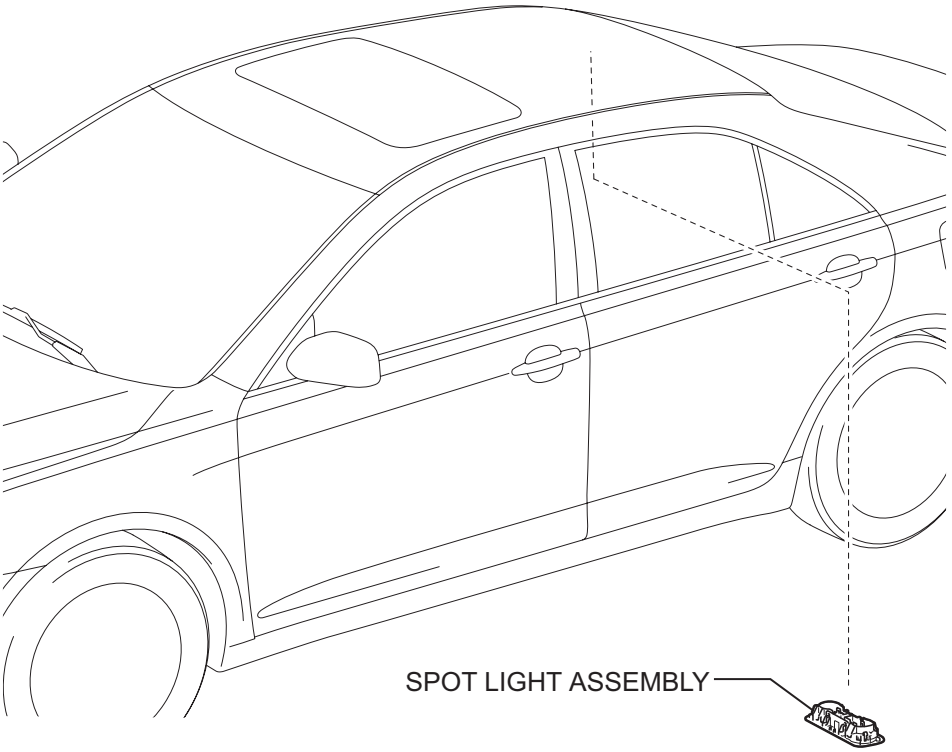
REAR ROOM LIGHT ASSEMBLY

COMPONENTS

without Sliding Roof:



with Sliding Roof:



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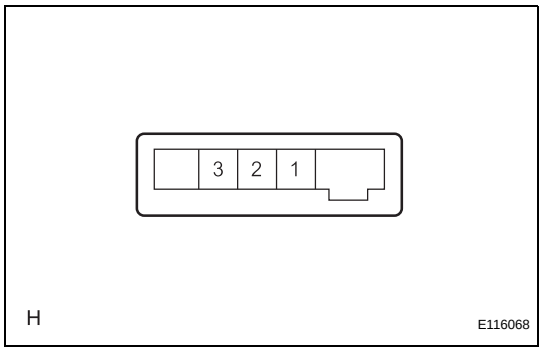
REMOVAL

1. **REMOVE NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-30)**
2. **REMOVE SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-30)**

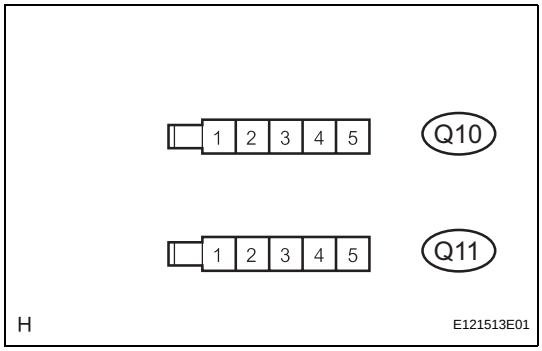
INSPECTION



1. **INSPECT NO. 1 ROOM LIGHT ASSEMBLY (without Sliding Roof)**
   (a) Apply battery voltage to the No. 1 room light assembly connector.
   (b) Check that the interior light comes on.
   OK

Measurement Condition	Switch Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	DOOR	Interior light comes on
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 3	ON	Interior light comes on

If the result is not as specified, replace the room light assembly.



2. **INSPECT SPOT LIGHT ASSEMBLY (with Sliding Roof)**
   (a) Apply battery voltage to the spot light assembly connector.
   (b) Check that the rear personal light comes on.
   OK

Measurement Condition	Switch Condition	Specified Condition
Battery positive (+) → Terminal Q10-2 Battery negative (-) → Terminal Q10-4	Pushed (ON)	Rear RH personal light comes on
Battery positive (+) → Terminal Q10-2 Battery negative (-) → Terminal Q10-3	Always	Rear RH personal light comes on
Battery positive (+) → Terminal Q11-2 Battery negative (-) → Terminal Q11-4	Pushed (ON)	Rear LH personal light comes on
Battery positive (+) → Terminal Q11-2 Battery negative (-) → Terminal Q11-5	Always	Rear LH personal light comes on

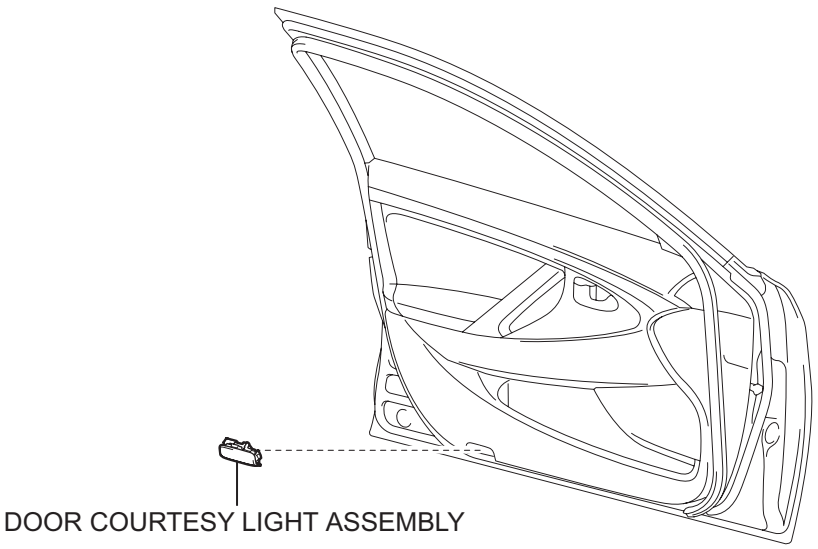
If the result is not as specified, replace the spot light assembly.

INSTALLATION

1. **INSTALL NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-48)**
2. **INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-48)**

DOOR COURTESY LIGHT

COMPONENTS



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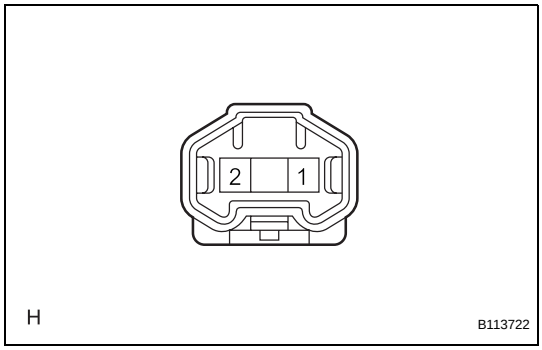


REMOVAL

1. **REMOVE DOOR COURTESY LIGHT ASSEMBLY (See page ED-15)**

INSPECTION

1. **INSPECT DOOR COURTESY LIGHT ASSEMBLY**
   (a) Apply battery voltage to the door courtesy light assembly connector.
   (b) Check that the door courtesy light comes on.
   OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Door courtesy light comes on

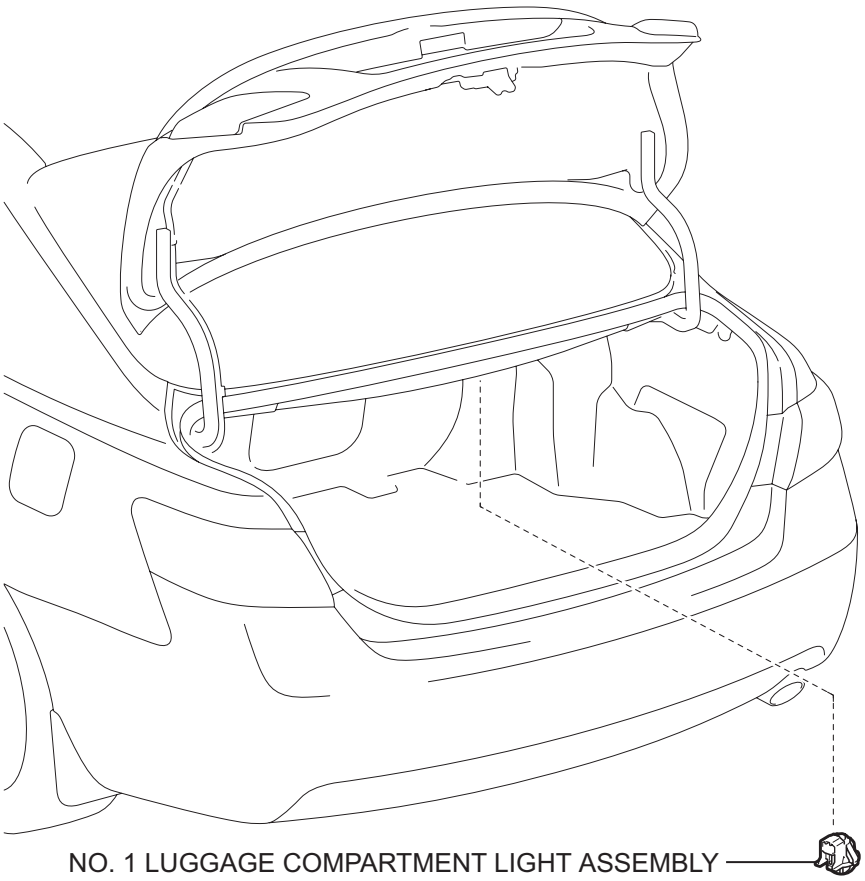
If the result is not as specified, replace the door courtesy light assembly.

INSTALLATION

1. **INSTALL DOOR COURTESY LIGHT ASSEMBLY (See page ED-34)**

LUGGAGE COMPARTMENT ROOM LIGHT

COMPONENTS



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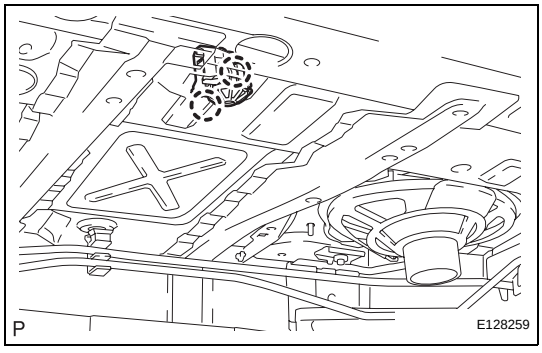
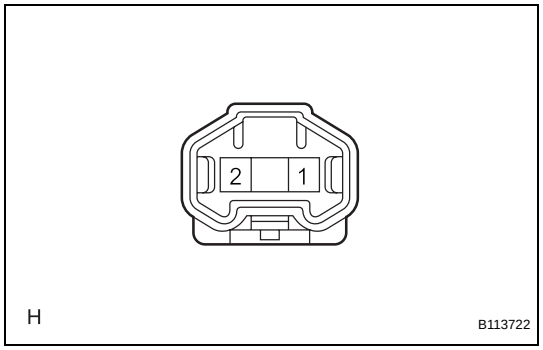


REMOVAL

1. **REMOVE NO. 1 LUGGAGE COMPARTMENT LIGHT ASSEMBLY**
   (a) Disengage the 2 claws and disconnect the No. 1 luggage compartment light assembly.
   (b) Disconnect the connector and remove the No. 1 luggage compartment light assembly.



INSPECTION

1. INSPECT NO. 1 LUGGAGE COMPARTMENT LIGHT ASSEMBLY

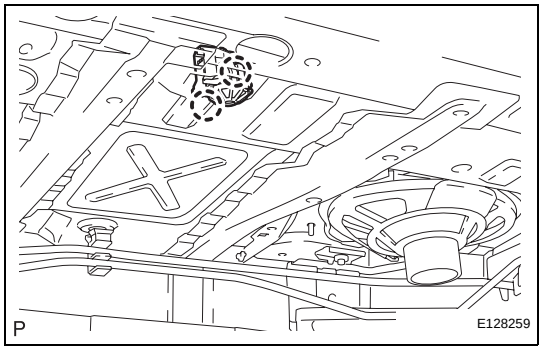
(a) Apply battery voltage to the No. 1 luggage compartment light assembly connector.

(b) Check that the No. 1 luggage compartment light comes on.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Luggage compartment light comes on

If the result is not as specified, replace the luggage compartment light assembly.



INSTALLATION

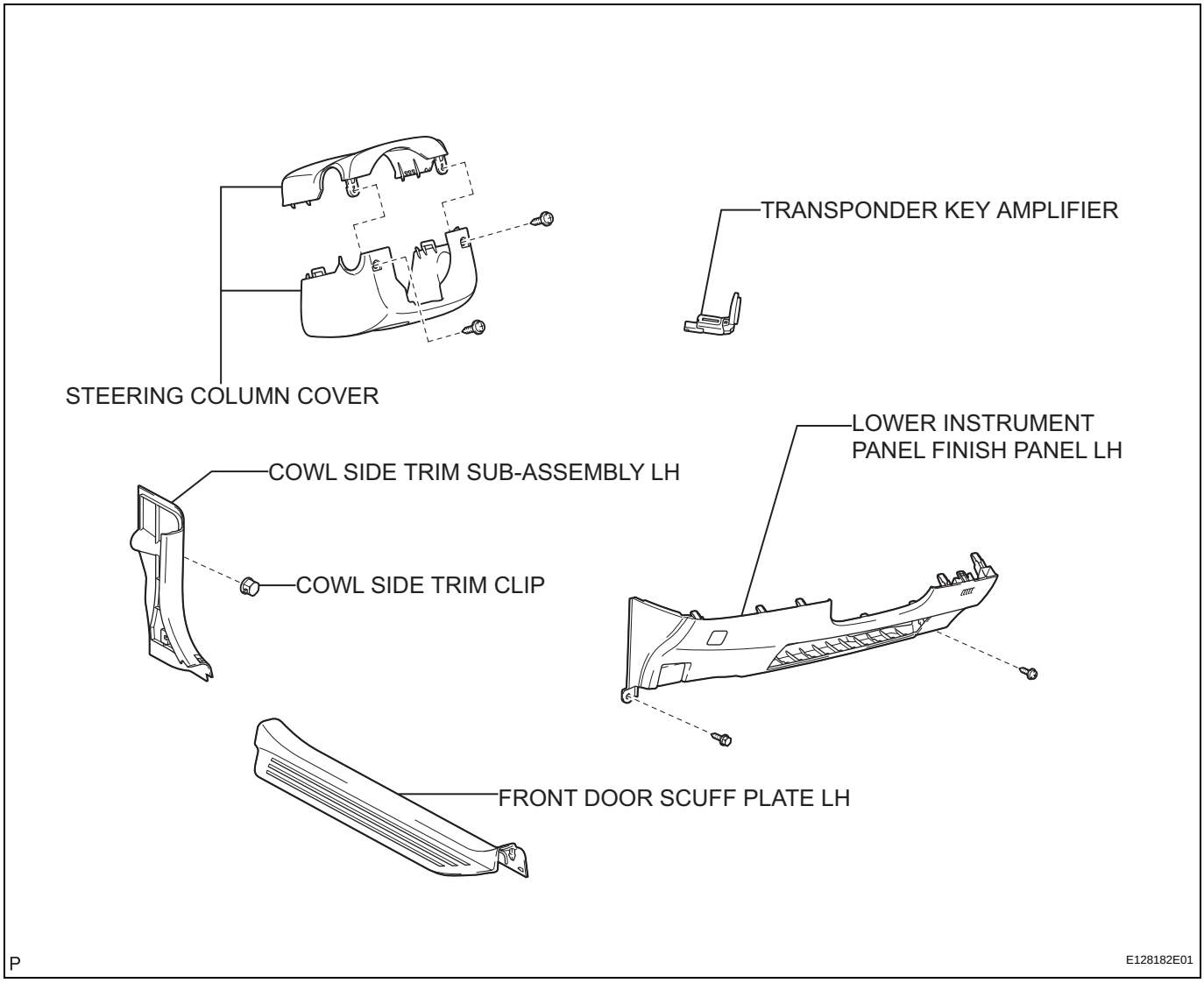
1. INSTALL NO. 1 LUGGAGE COMPARTMENT LIGHT ASSEMBLY

(a) Connect the connector.

(b) Engage the 2 claws and install the No. 1 luggage compartment light assembly.

IGNITION KEY CYLINDER LIGHT

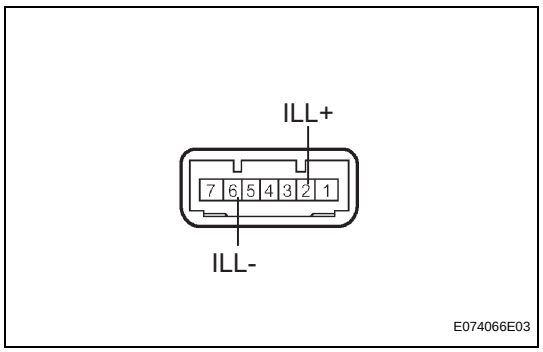
COMPONENTS



REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-26)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-26)**
3. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
5. **REMOVE STEERING COLUMN COVER (See page SR-39)**
6. **REMOVE TRANSPONDER KEY AMPLIFIER (See page SR-42)**

INSPECTION



1. **INSPECT TRANSPONDER KEY AMPLIFIER**
   (a) Apply battery voltage to the transponder key amplifier connector.
   (b) Check that the ignition key cylinder light comes on.
   OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 (ILL+) **Battery negative (-) → Terminal 6 (ILL-)**	**Ignition key cylinder light comes on**

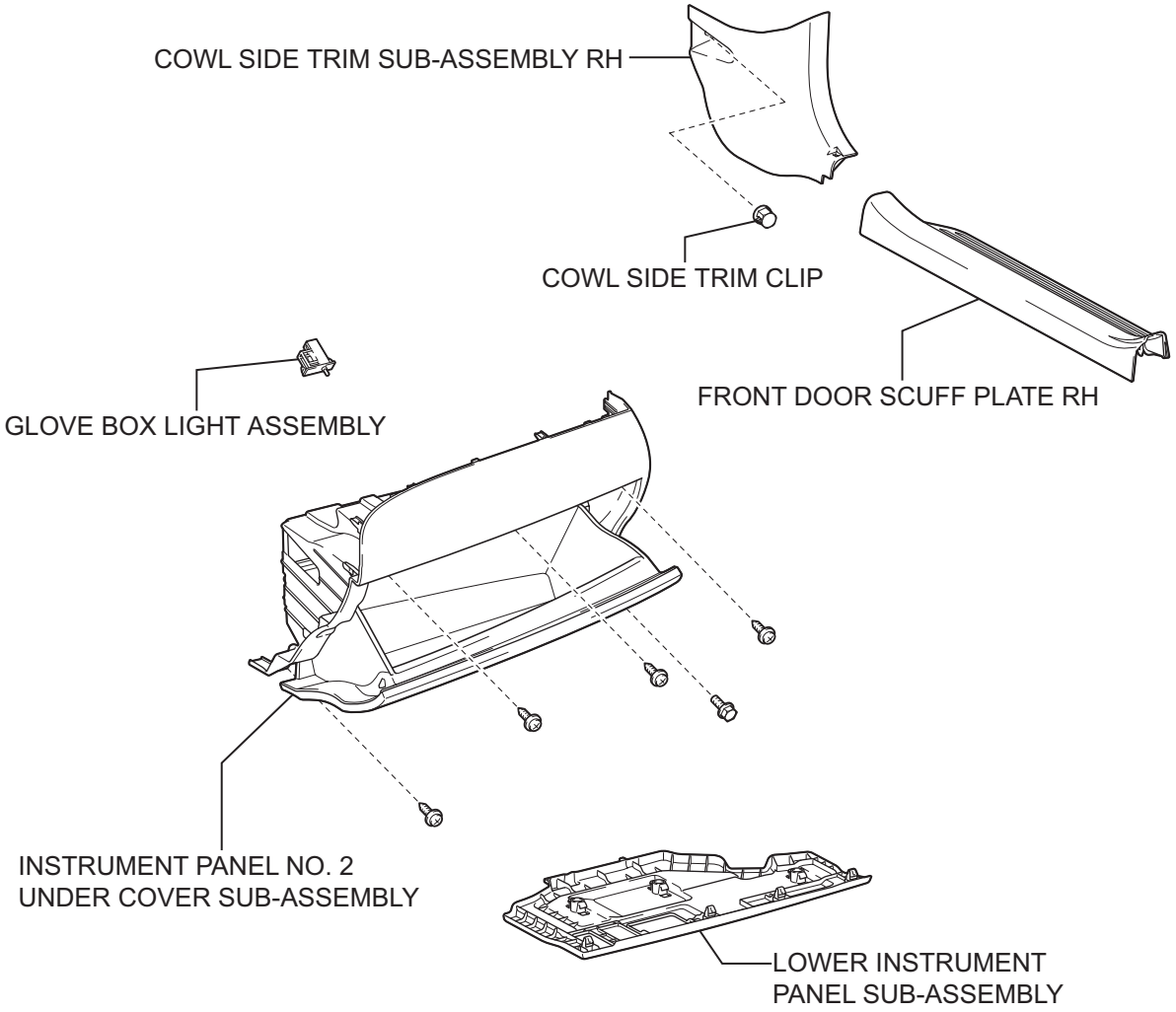
If the result is not as specified, replace the transponder key amplifier.

INSTALLATION

1. **INSTALL TRANSPONDER KEY AMPLIFIER (See page SR-46)**
2. **INSTALL STEERING COLUMN COVER (See page SR-50)**
3. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
4. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
5. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
6. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**

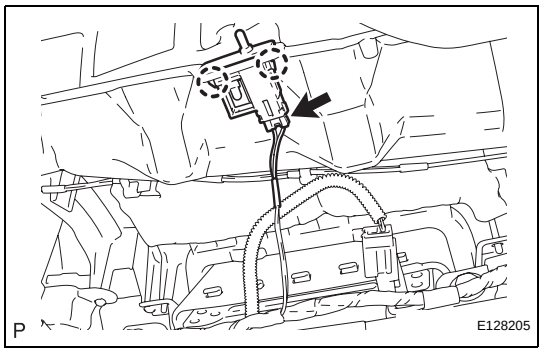
GLOVE BOX LIGHT

COMPONENTS



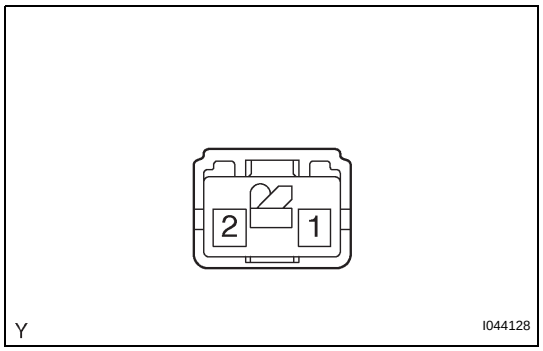
REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
3. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**
4. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**
5. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**
6. **REMOVE GLOVE BOX LIGHT ASSEMBLY**
   (a) Disconnect the connector.
   (b) Disengage the 2 claws and remove the glove box light assembly.



INSPECTION

1. **INSPECT GLOVE BOX LIGHT ASSEMBLY**
   (a) Apply battery voltage to the glove box light assembly connector.
   (b) Check that the glove box light comes on.
   OK

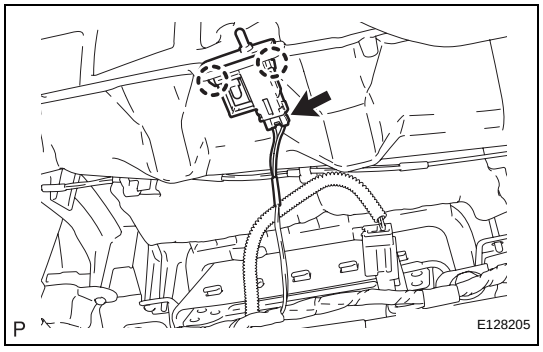


Measurement Condition	Switch Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Glove box light switch ON	Glove box light comes on

If the result is not as specified, replace the glove box light assembly.

INSTALLATION

1. **INSTALL GLOVE BOX LIGHT ASSEMBLY**
   (a) Engage the 2 claws and install the glove box light assembly.
   (b) Connect the connector.
2. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
3. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
4. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
5. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**



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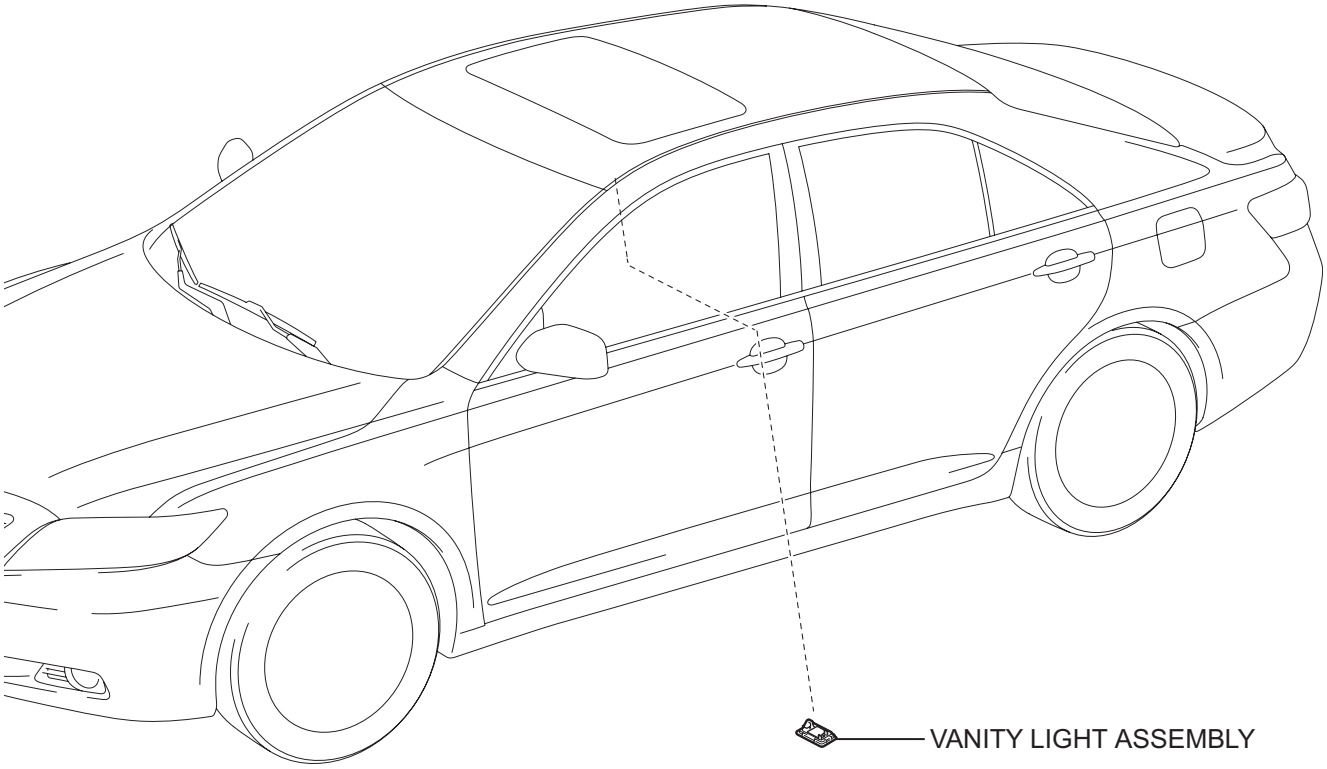
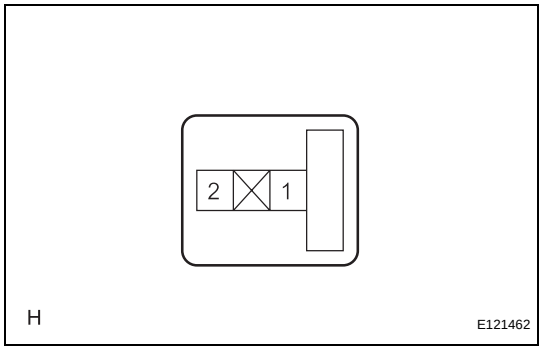
6. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**

VANITY LIGHT

COMPONENTS





REMOVAL

1. **REMOVE VANITY LIGHT ASSEMBLY (See page IR-35)**

INSPECTION

1. **INSPECT VANITY LIGHT ASSEMBLY**
   (a) Apply battery voltage to the vanity light assembly connector.
   (b) Check that the vanity light comes on.
   OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Vanity light comes on

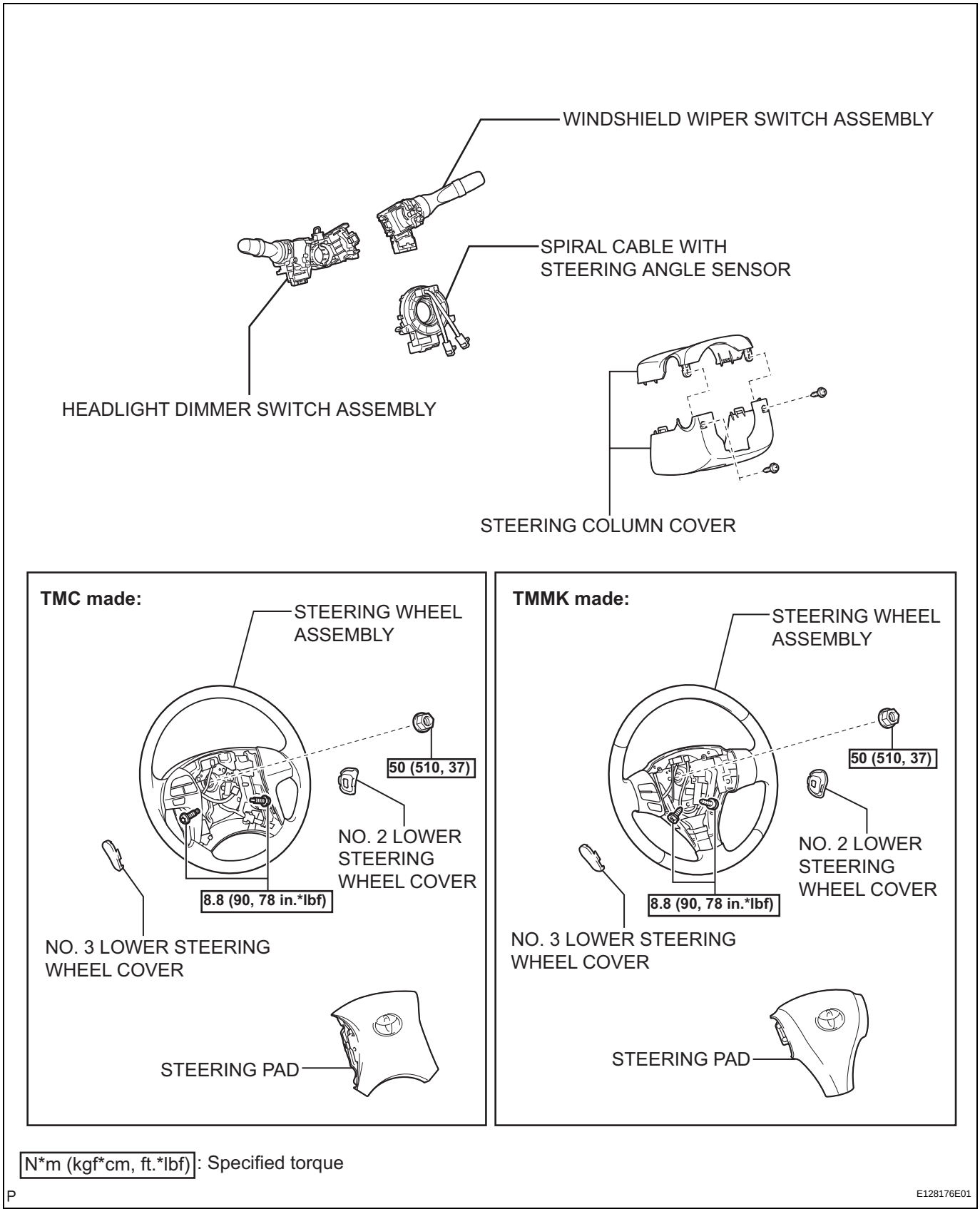
If the result is not as specified, replace the vanity light assembly.

INSTALLATION

1. **INSTALL VANITY LIGHT ASSEMBLY (See page IR-42)**

HEADLIGHT DIMMER SWITCH

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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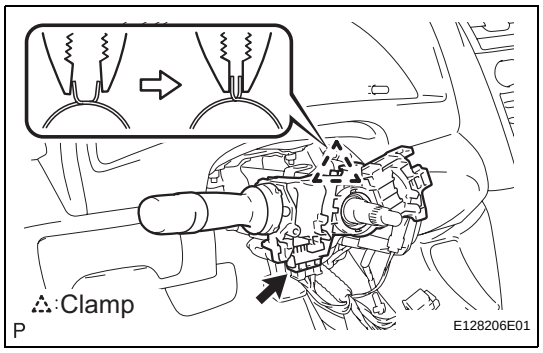
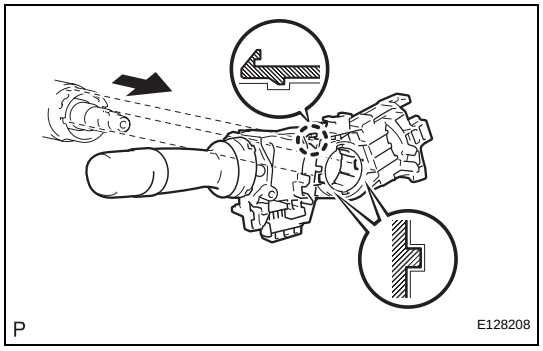
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment. (See page RS-1)
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **REMOVE NO. 2 LOWER STEERING WHEEL COVER (See page RS-349)**
4. **REMOVE NO. 3 LOWER STEERING WHEEL COVER (See page RS-349)**
5. **REMOVE STEERING PAD (See page RS-350)**
6. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
7. **REMOVE STEERING COLUMN COVER (See page SR-39)**
8. **REMOVE SPIRAL CABLE WITH STEERING ANGLE SENSOR (See page RS-364)**
9. **REMOVE WINDSHIELD WIPER SWITCH ASSEMBLY (See page WW-21)**
10. **REMOVE HEADLIGHT DIMMER SWITCH ASSEMBLY**
    (a) Disconnect the connector.
    (b) Disengage the clamp as shown in the illustration.



(c) Disengage the claw and remove the headlight dimmer switch assembly as shown in the illustration.



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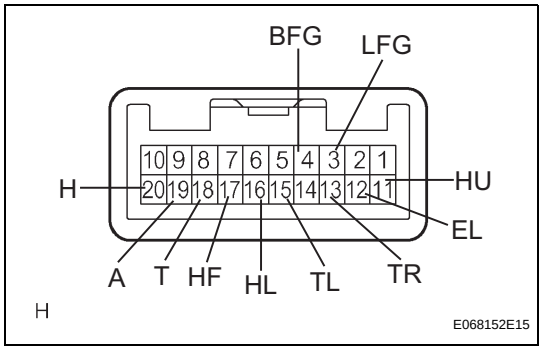


INSPECTION

1. INSPECT HEADLIGHT DIMMER SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

Light control switch

Tester Connection	Switch Condition	Specified Condition
12 (EL) - 20 (H) - 18 (T) - 19 (A)	OFF	10 kΩ or higher
12 (EL) - 18 (T)	TAIL	Below 1 Ω
12 (EL) - 20 (H) - 18 (T)	HEAD	Below 1 Ω
12 (EL) - 19 (A)	AUTO	Below 1 Ω

Dimmer switch

Tester Connection	Switch Condition	Specified Condition
17 (HF) - 12 (EL)	FLASH	Below 1 Ω
16 (HL) - 12 (EL)	LOW	Below 1 Ω
11 (HU) - 12 (EL)	HIGH	Below 1 Ω

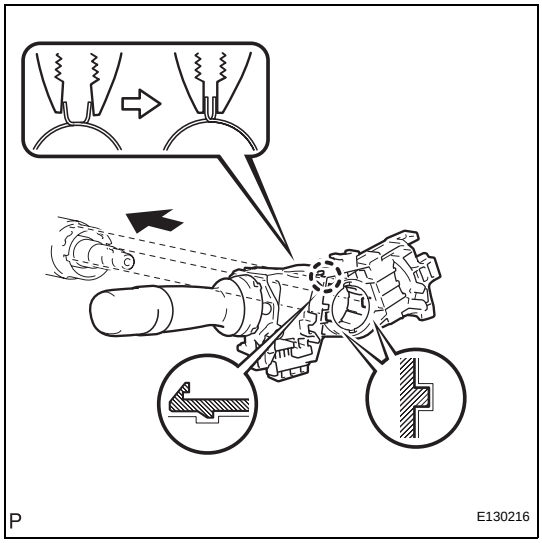
Turn signal switch

Tester Connection	Switch Condition	Specified Condition
13 (TR) - 12 (EL) - 15 (TL)	OFF	10 kΩ or higher
13 (TR) - 12 (EL)	RH	Below 1 Ω
15 (TL) - 12 (EL)	LH	Below 1 Ω

Fog light switch

Tester Connection	Switch Condition	Specified Condition
3 (LFG) - 4 (BFG)	OFF	10 kΩ or higher
3 (LFG) - 4 (BFG)	ON	Below 1 Ω

If the result is not as specified, replace the headlight dimmer switch assembly.



INSTALLATION

1. INSTALL HEADLIGHT DIMMER SWITCH ASSEMBLY

(a) Engage the claw while loosening the clamp as shown in the illustration.

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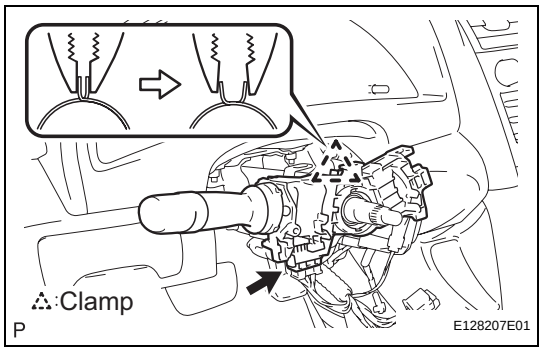
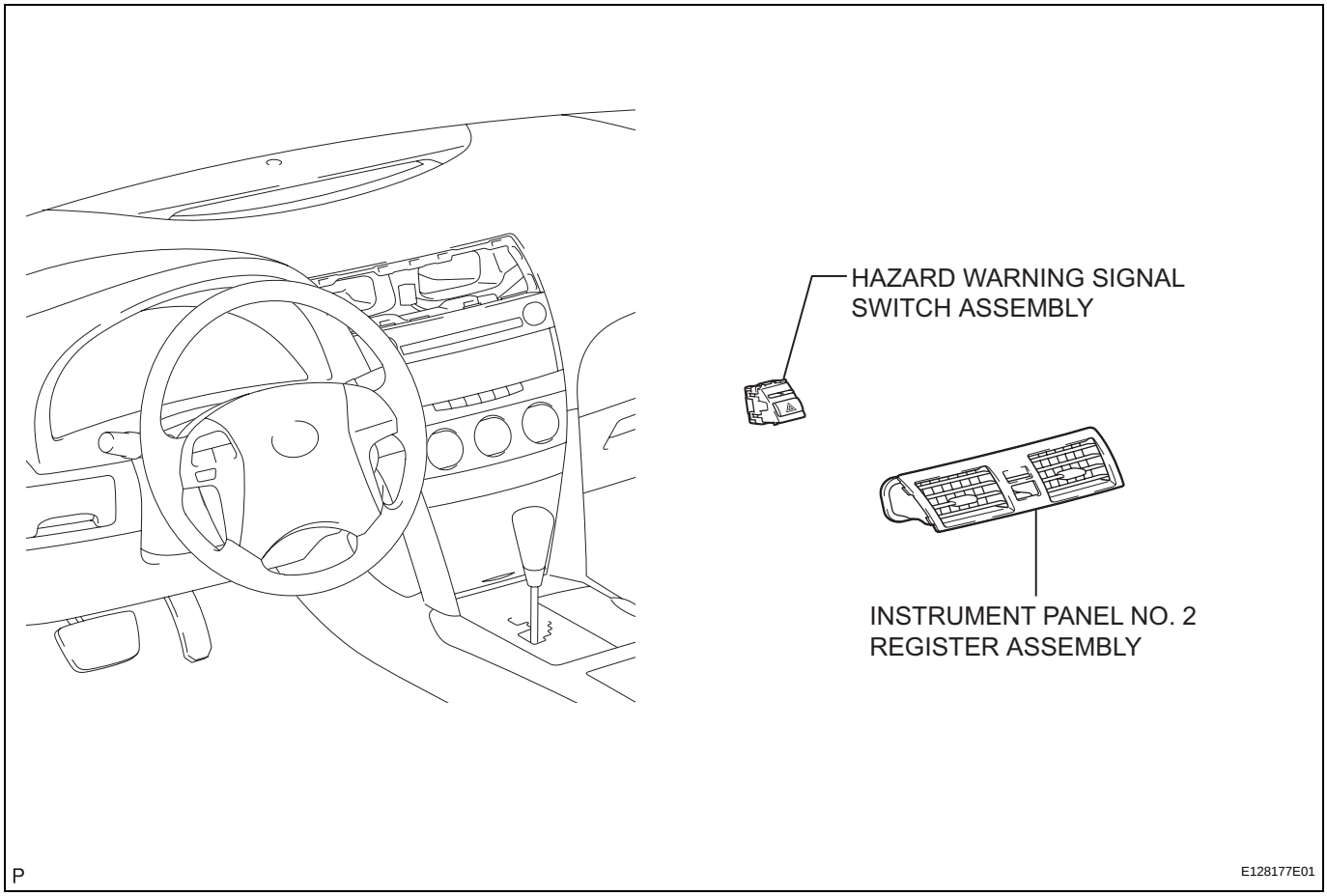


(b) Install the headlight dimmer switch assembly with the clamp.
(c) Connect the connector.

2. **INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY (See page WW-23)**
3. **INSTALL SPIRAL CABLE WITH STEERING ANGLE SENSOR (See page RS-366)**
4. **INSTALL STEERING COLUMN COVER (See page SR-50)**
5. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)**
6. **INSPECT STEERING WHEEL CENTER POINT**
7. **INSTALL STEERING PAD (See page RS-350)**
8. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-351)**
9. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-352)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
11. **INSPECT STEERING PAD (See page RS-352)**
12. **INSPECT SRS WARNING LIGHT** (See page RS-32)

HAZARD WARNING SWITCH

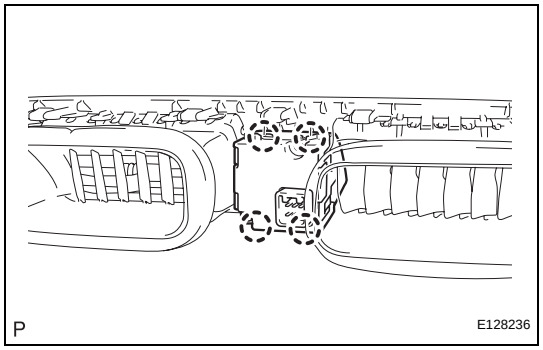
COMPONENTS



REMOVAL

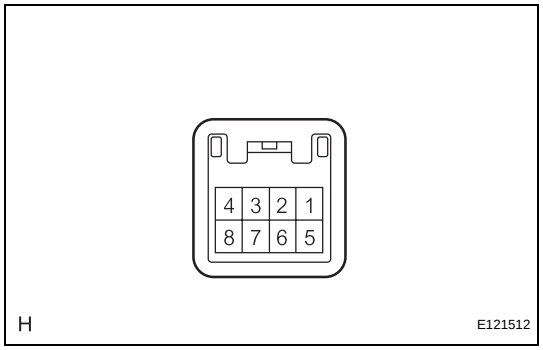
1. **REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)**

2. **REMOVE HAZARD WARNING SIGNAL SWITCH ASSEMBLY**
   (a) Disengage the 4 claws and remove the hazard warning signal switch assembly.



INSPECTION

1. **INSPECT HAZARD WARNING SIGNAL SWITCH ASSEMBLY**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance



Tester Connection	Condition	Specified Condition
5 - 4	OFF	10 kΩ or higher
5 - 4	ON	Below 1 Ω

   If the result is not as specified, replace the hazard warning signal switch assembly.
   (b) Apply battery voltage to the hazard warning signal switch assembly connector.
   OK

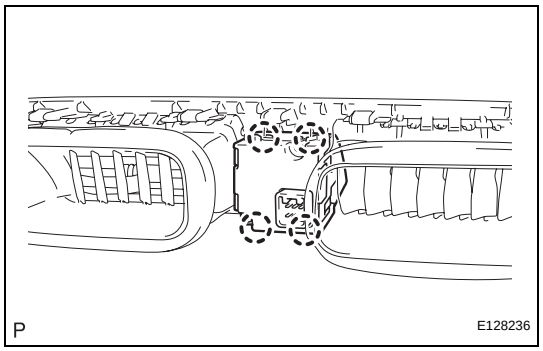
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 7 Battery negative (-) → Terminal 8	Illumination comes on

   If the result is not as specified, replace the hazard warning signal switch assembly.

INSTALLATION

1. **INSTALL HAZARD WARNING SIGNAL SWITCH ASSEMBLY**
   (a) Engage the 4 claws and install the hazard warning signal switch assembly.

2. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)**



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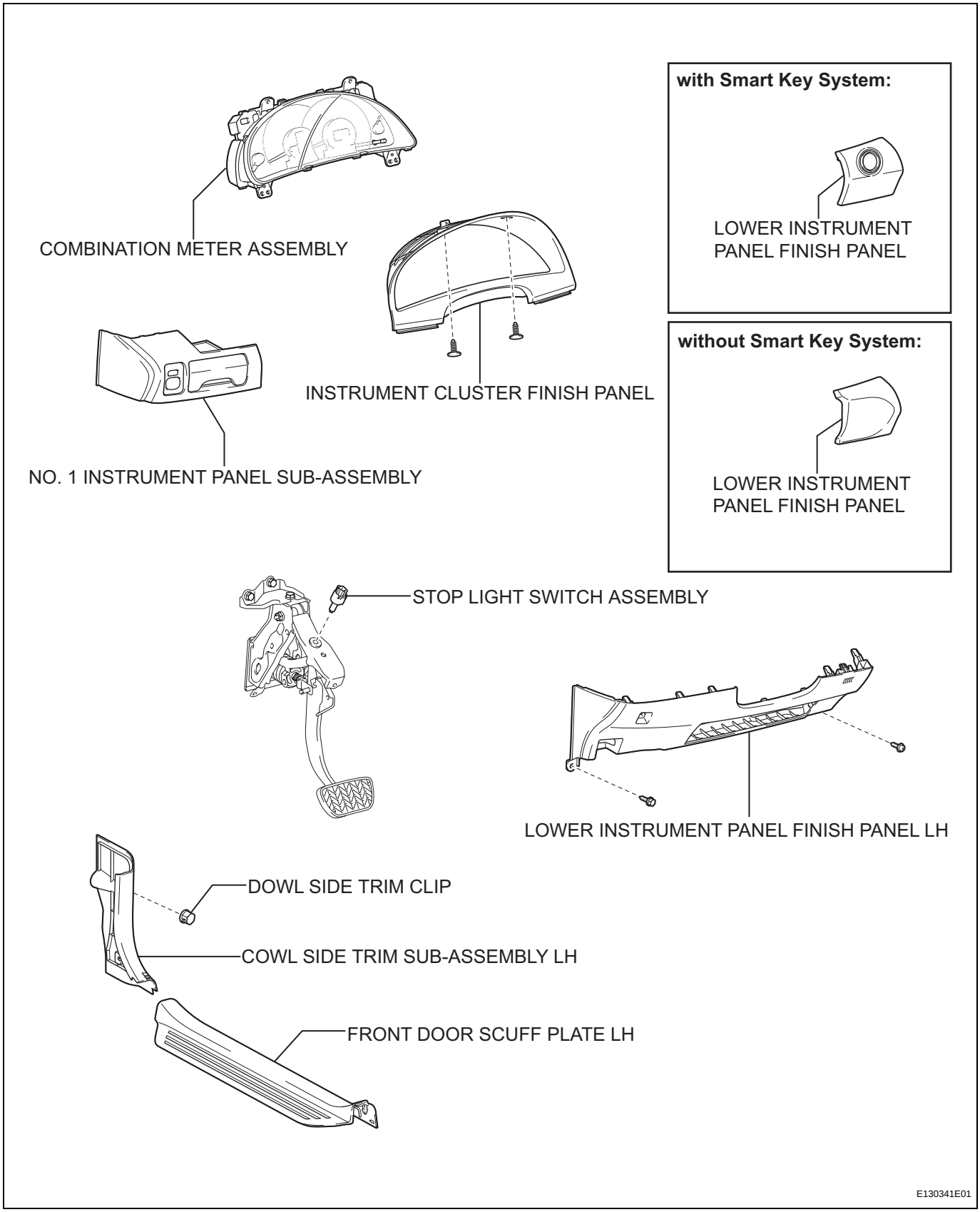
STOP LIGHT SWITCH

COMPONENTS



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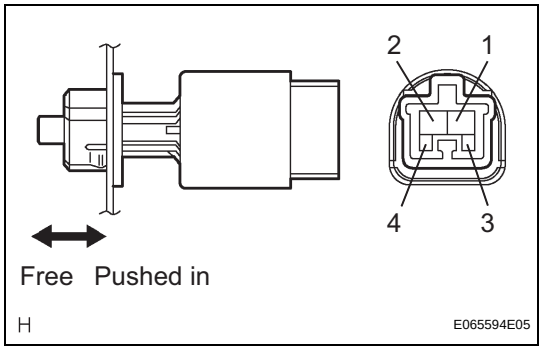
REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
3. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-20)**
4. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
7. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page ME-65)**
8. **REMOVE COMBINATION METER ASSEMBLY (See page ME-65)**
9. **REMOVE STOP LIGHT SWITCH ASSEMBLY (See page BR-71)**

INSPECTION



1. **INSPECT STOP LIGHT SWITCH ASSEMBLY**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Switch Position	Specified Condition
1 - 2	Switch pin free	10 kΩ or higher
3 - 4	Switch pin free	Below 1 Ω
1 - 2	Switch pin pushed in	Below 1 Ω
3 - 4	Switch pin pushed in	10 kΩ or higher

If the result is not as specified, replace the stop light switch assembly.

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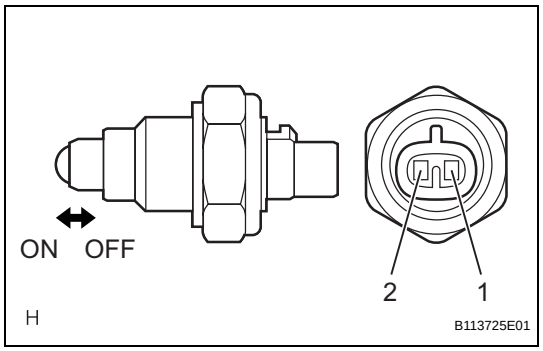
INSTALLATION

1. **INSTALL STOP LIGHT SWITCH ASSEMBLY (See page BR-72)**
2. **INSTALL COMBINATION METER ASSEMBLY (See page ME-67)**
3. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page ME-68)**
4. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
5. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
6. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
7. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-55)**
8. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
9. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**



BACK-UP LIGHT SWITCH

INSPECTION

1. INSPECT BACK-UP LIGHT BULB (for Manual Transmission)

(a) Measure the resistance according to the value(s) in the table below.

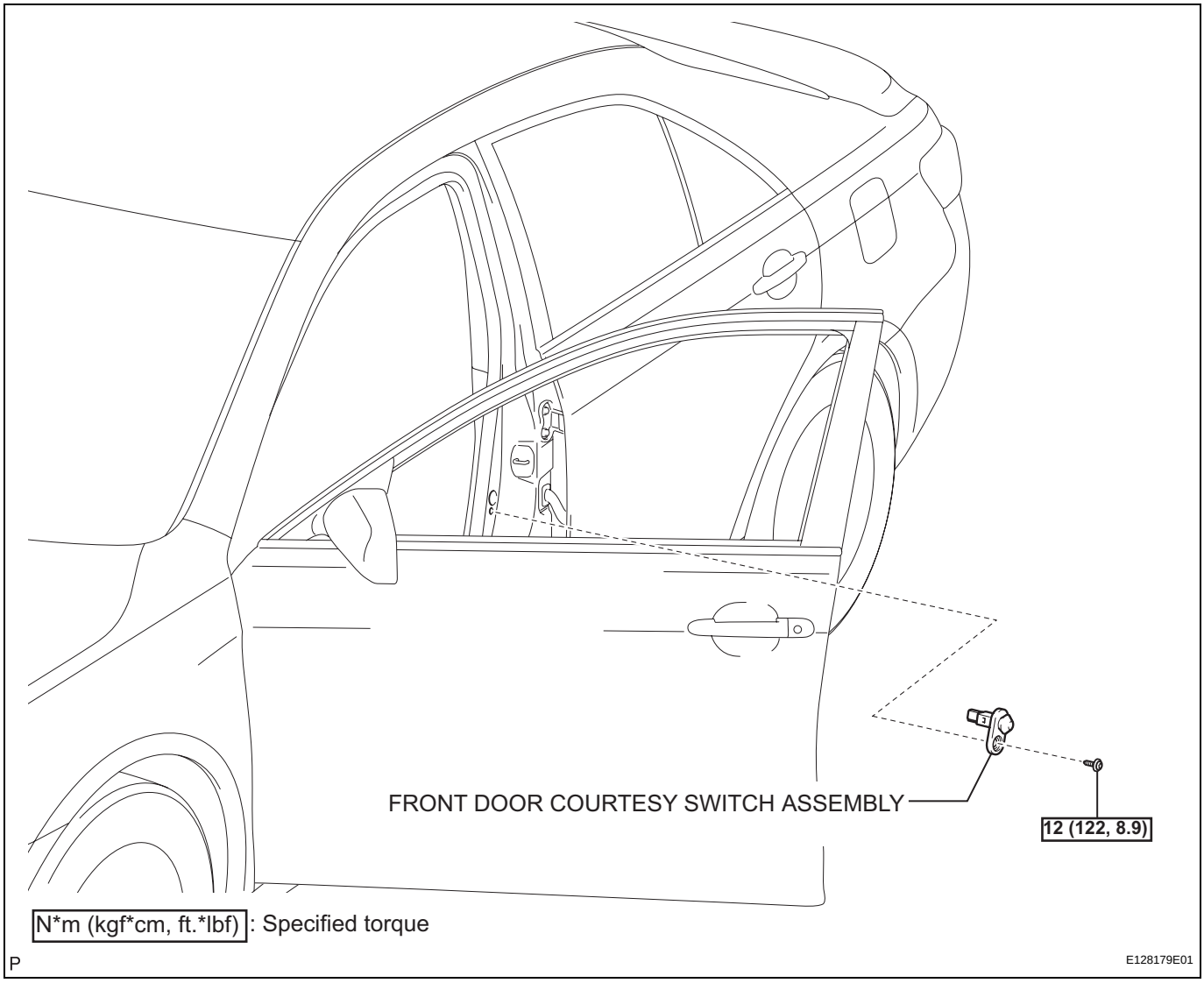
Standard resistance

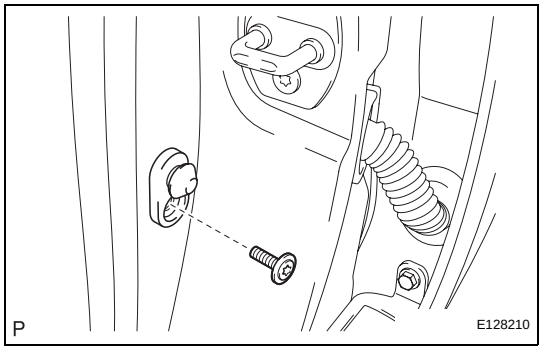
Tester Connection	Switch Operation	Specified Condition
1 - 2	Switch ON (Ball is not pressed)	10 kΩ or higher
1 - 2	Switch OFF (Ball is pressed)	Below 1 Ω

If the result is not as specified, replace the back-up light switch.

FRONT DOOR COURTESY SWITCH

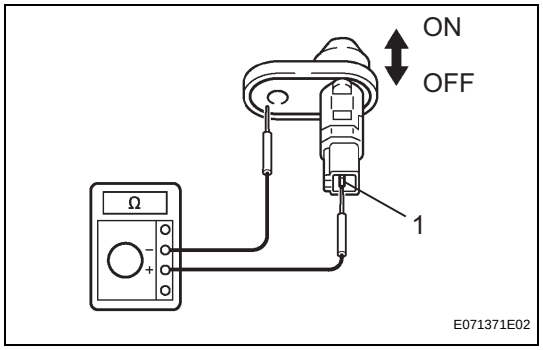
COMPONENTS





REMOVAL

1. **REMOVE FRONT DOOR COURTESY SWITCH ASSEMBLY**
   (a) Using a "TORX" socket wrench (T30), remove the "TORX" bolt.
   (b) Disconnect the connector and remove the front door courtesy switch assembly.



INSPECTION

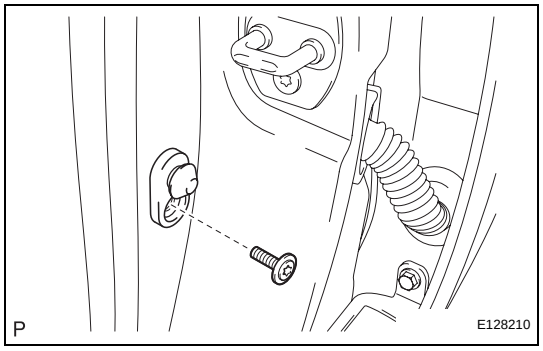
1. INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Operation	Specified Condition
1 - Switch body	Not pushed (ON)	Below 1 Ω
	Pushed (OFF)	10 kΩ or higher

If the result is not as specified, replace the front door courtesy light switch assembly.



INSTALLATION

1. INSTALL FRONT DOOR COURTESY SWITCH ASSEMBLY

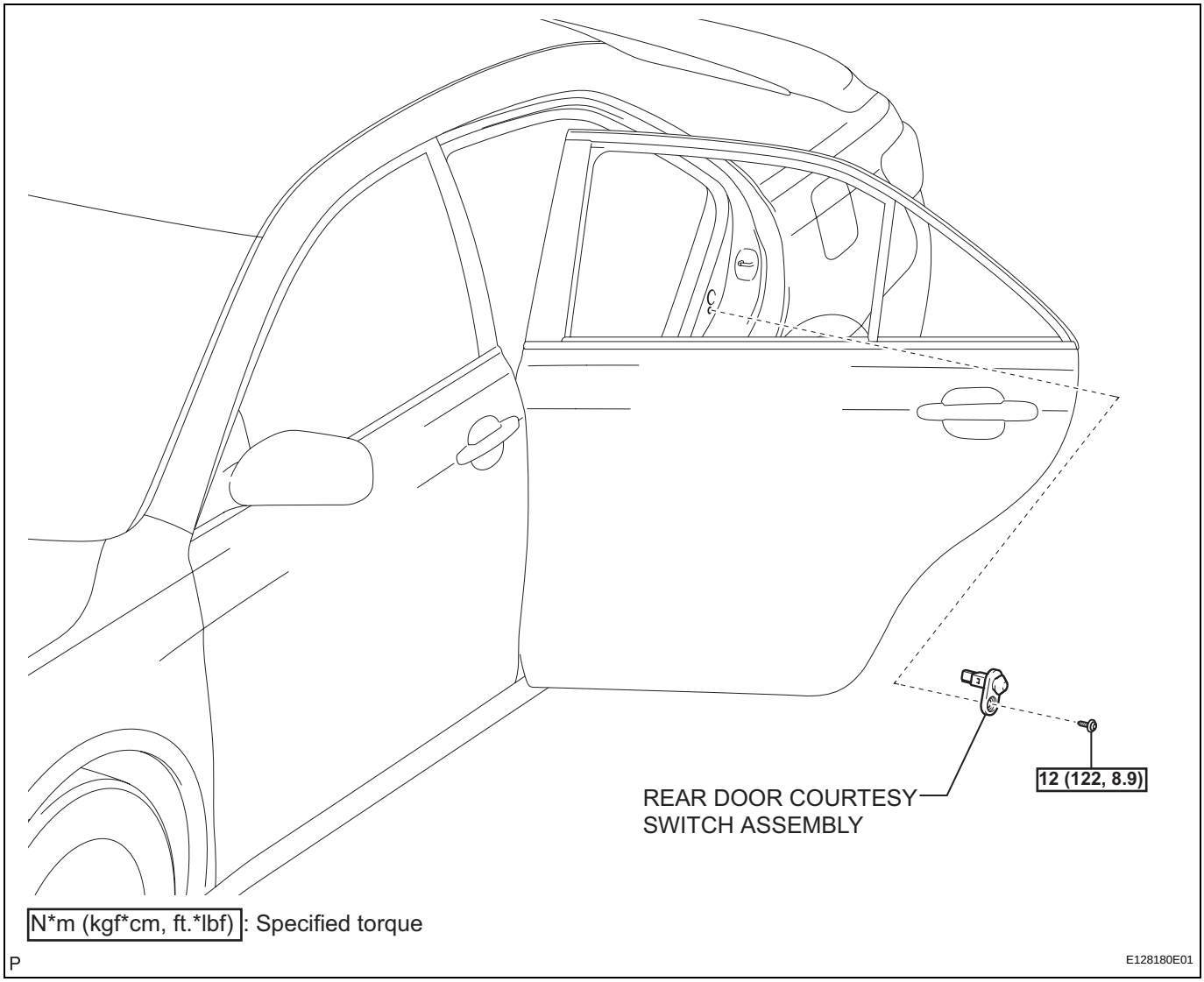
(a) Connect the connector.

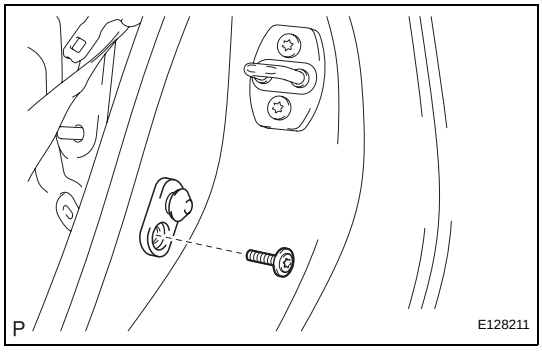
(b) Using a "TORX" socket wrench (T30), install the front door courtesy switch assembly with the "TORX" bolt.

Torque: 12 N*m (122 kgf*cm, 8.9 ft.*lbf)

REAR DOOR COURTESY SWITCH

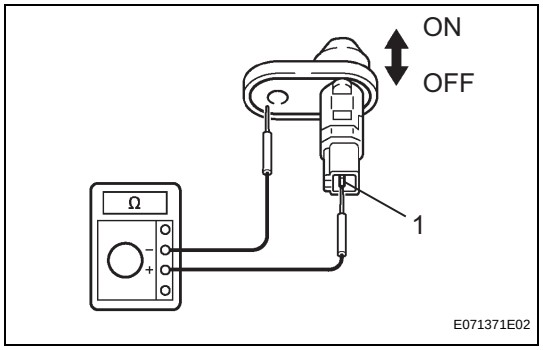
COMPONENTS





REMOVAL

1. **REMOVE REAR DOOR COURTESY SWITCH ASSEMBLY**
   (a) Using a "TORX" socket wrench (T30), remove the "TORX" bolt.
   (b) Disconnect the connector and remove the rear door courtesy switch assembly.



INSPECTION

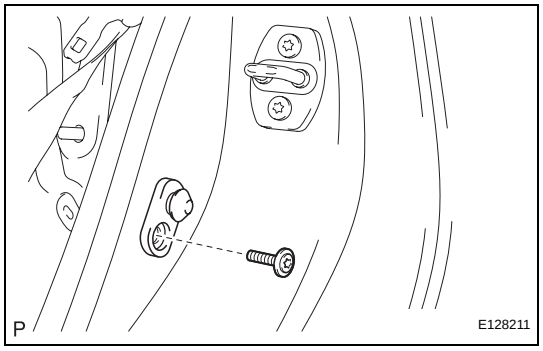
1. INSPECT REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Operation	Specified Condition
1 - Switch body	Not pushed (ON)	Below 1 Ω
	Pushed (OFF)	10 kΩ or higher

If the result is not as specified, replace the rear door courtesy light switch assembly.



INSTALLATION

1. INSTALL REAR DOOR COURTESY SWITCH ASSEMBLY

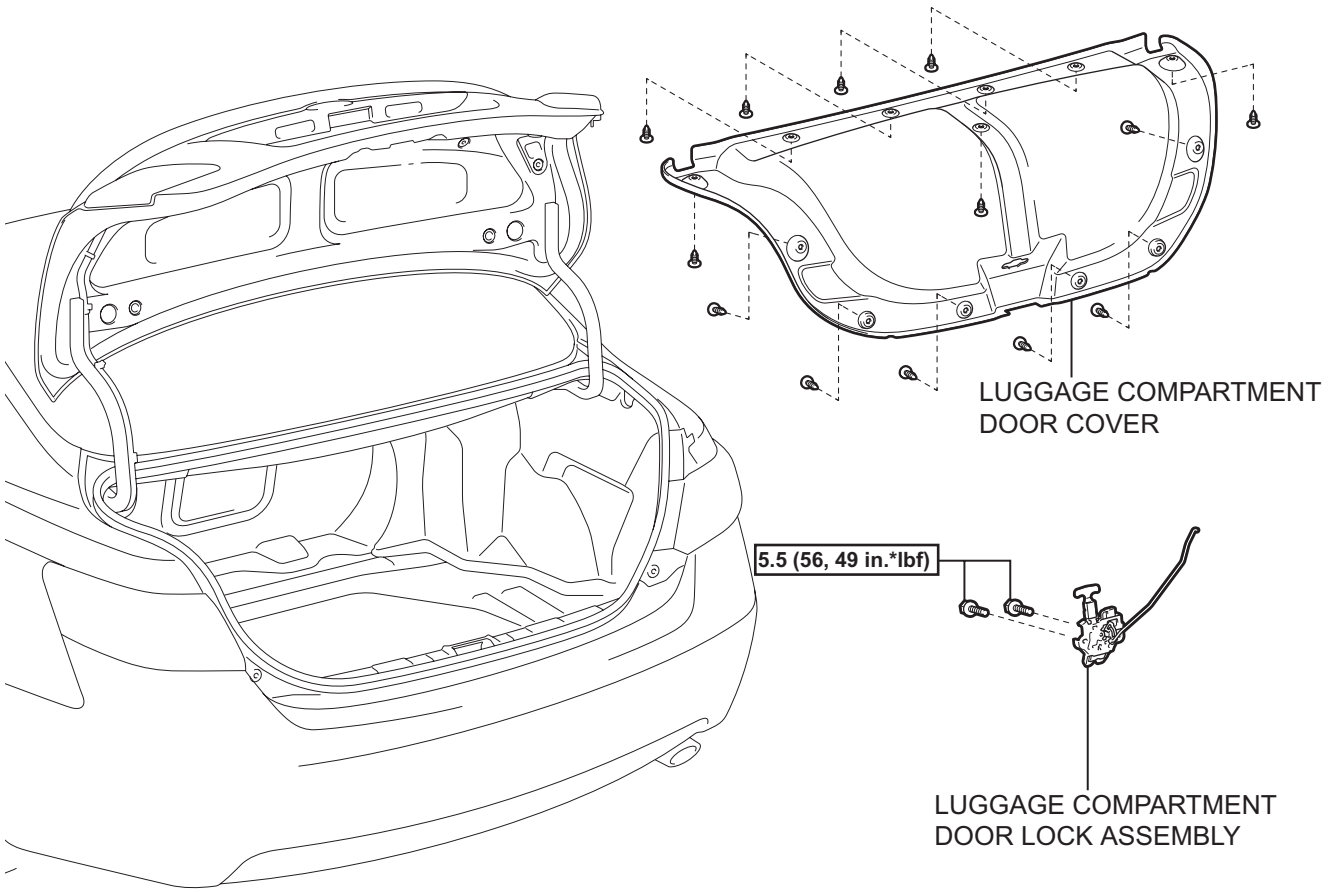
(a) Connect the connector.

(b) Using a "TORX" socket wrench (T30), install the rear door courtesy switch assembly with the "TORX" bolt.

Torque: 12 N*m (122 kgf*cm, 8.9 ft.*lbf)

BACK DOOR COURTESY SWITCH

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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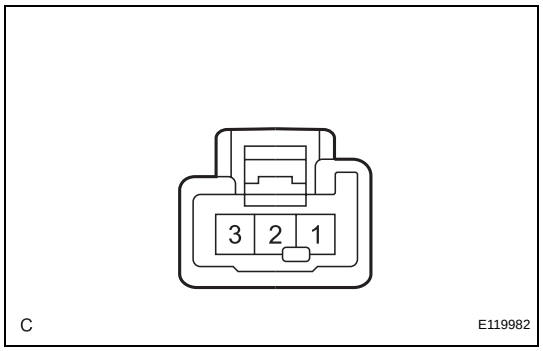
REMOVAL

1. **REMOVE LUGGAGE COMPARTMENT DOOR COVER (See page ET-61)**
2. **REMOVE LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (See page ED-63)**

INSPECTION



1. **INSPECT LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Door is closed	10 kΩ or higher
1 - 2	Door is open	Below 1 Ω

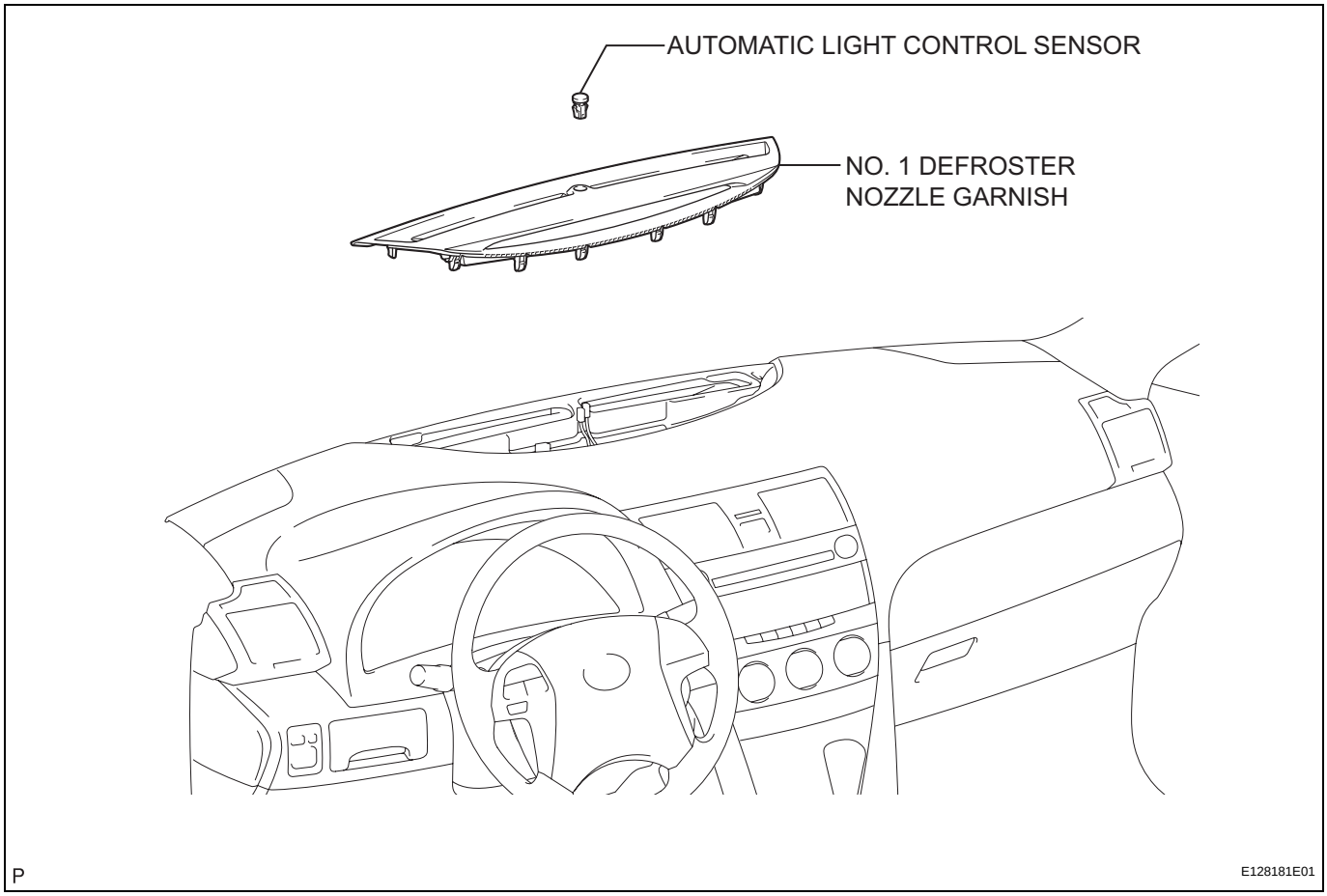
If the result is not as specified, replace the luggage compartment door lock assembly.

INSTALLATION

1. **INSTALL LUGGAGE COMPARTMENT DOOR LOCK ASSEMBLY (See page ED-64)**
2. **INSTALL LUGGAGE COMPARTMENT DOOR COVER (See page ET-64)**

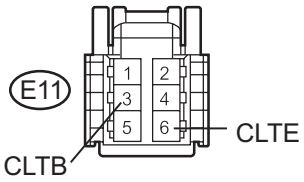
AUTOMATIC LIGHT CONTROL SENSOR

COMPONENTS



Wire Harness Side:

Automatic Light Control Sensor



ON-VEHICLE INSPECTION

1. INSPECT AUTOMATIC LIGHT CONTROL SENSOR (for Manual Air Conditioning System)

(a) Disconnect the E11 automatic light control sensor connector.

(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-3 (CLTB) - E11-6 (CLTE)	Ignition switch off	Below 1 V
	Ignition switch on (IG)	10 to 14 V

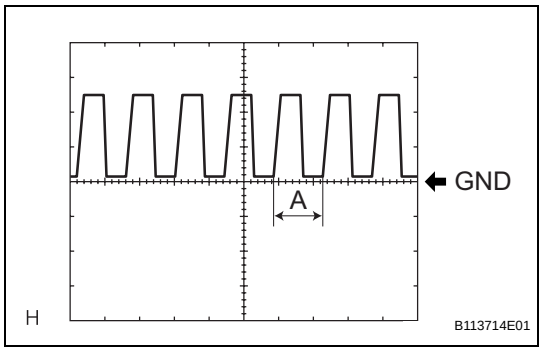
Standard resistance

Tester Connection	Specified Condition
E11-6 (CLTE) - Body ground	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the automatic light control sensor connector.

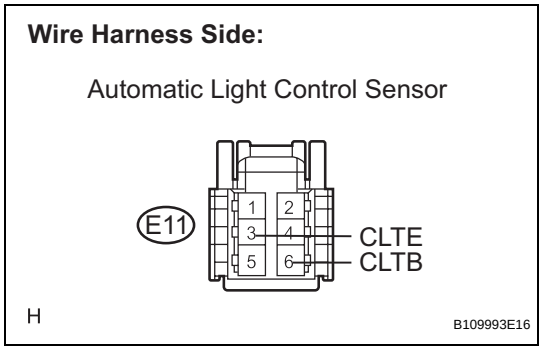
(d) Connect an oscilloscope to the automatic light control sensor connector.



(e) Check the waveform.
OK

Tester Connection	Tool Setting	Condition	Specified Condition
E11-6 (CLTE) - E11-4 (CLTS)	5 V/DIV., 5 ms./ DIV	Ignition switch on (IG), light control switch in AUTO	Correct waveform is as shown

HINT:
If the ambient light becomes brighter, width A becomes narrower.
If the result is not as specified, replace the automatic light control sensor.



2. INSPECT AUTOMATIC LIGHT CONTROL SENSOR (for Automatic Air Conditioning System)

(a) Disconnect the E11 automatic light control sensor connector.

(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E11-6 (CLTB) - E11-3 (CLTE)	Ignition switch off	Below 1 V
	Ignition switch on (IG)	10 to 14 V

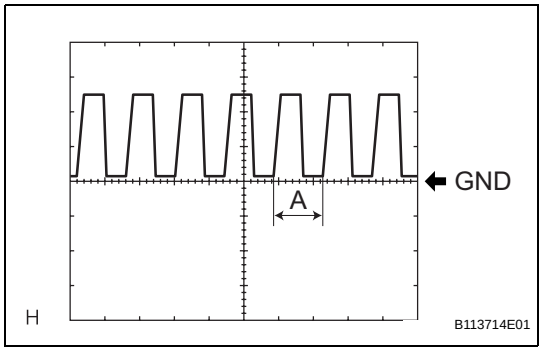
Standard resistance

Tester Connection	Specified Condition
E11-3 (CLTE) - Body ground	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the automatic light control sensor connector.

(d) Connect an oscilloscope to the automatic light control sensor connector.



(e) Check the waveform.
OK

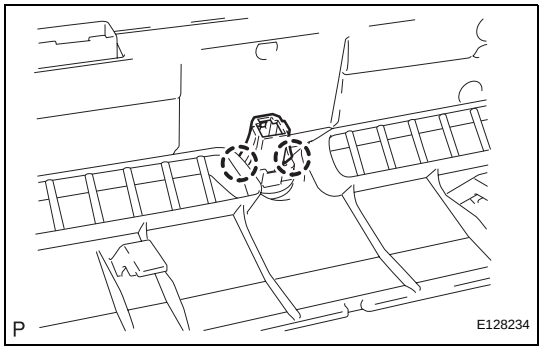
Tester Connection	Tool Setting	Condition	Specified Condition
E11-3 (CLTE) - E11-5 (CLTS)	5 V/DIV., 5 ms./ DIV	Ignition switch on (IG), light control switch in AUTO	Correct waveform is as shown

HINT:
If the ambient light becomes brighter, width A becomes narrower.
If the result is not as specified, replace the automatic light control sensor.

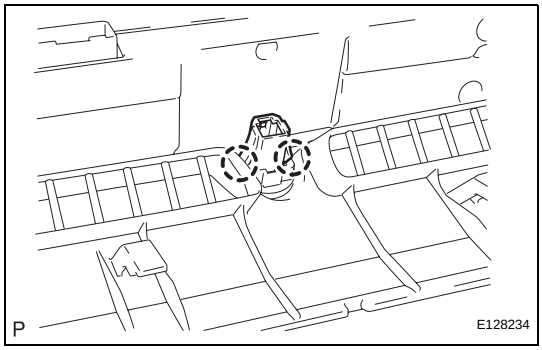
REMOVAL

1. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-32)**

2. **REMOVE AUTOMATIC LIGHT CONTROL SENSOR**
   (a) Disengage the 2 claws and remove the automatic light control sensor.



INSTALLATION

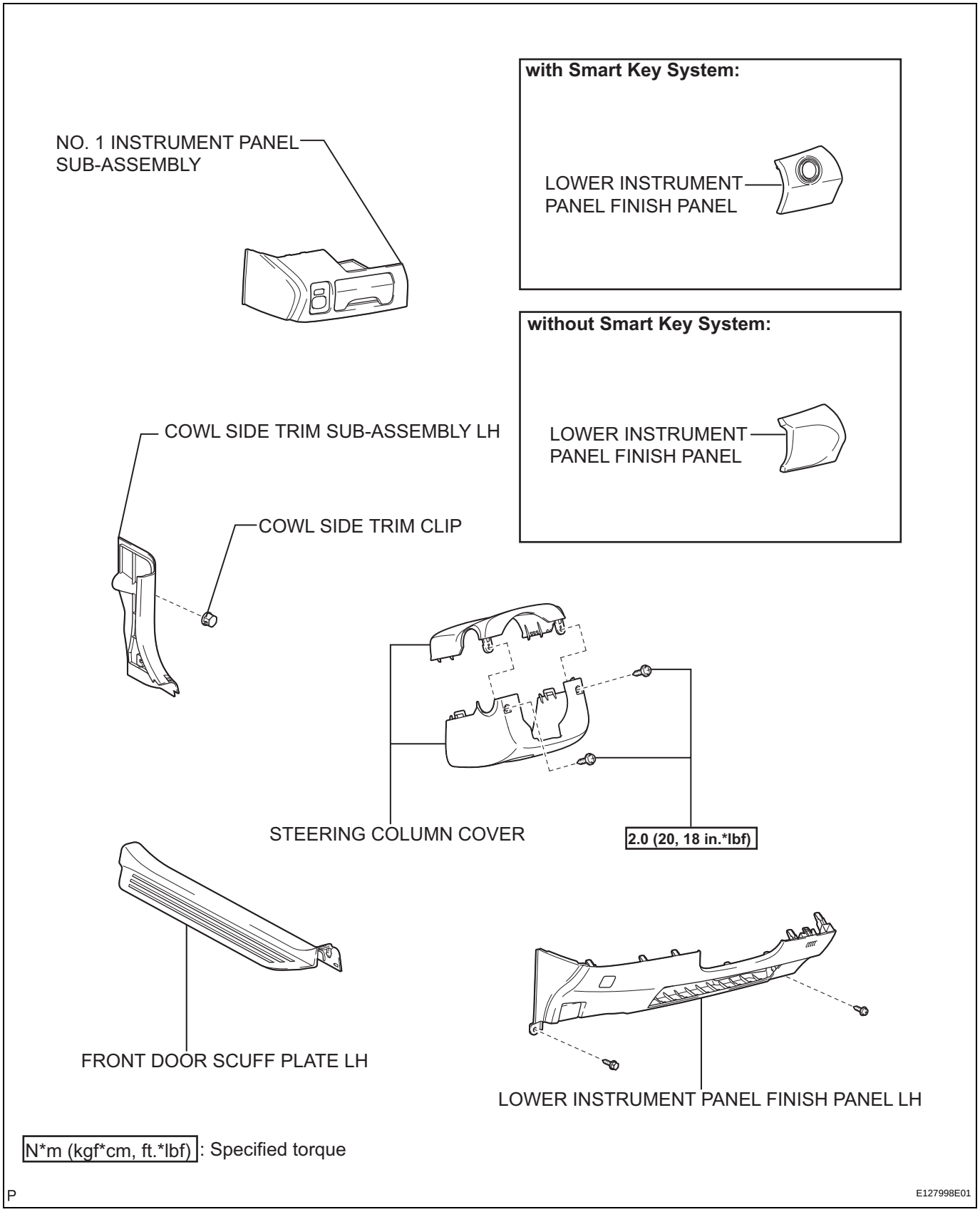


1. **INSTALL AUTOMATIC LIGHT CONTROL SENSOR**
   (a) Engage the 2 claws and install the automatic light control sensor.

2. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-48)**

TURN SIGNAL FLASHER ASSEMBLY

COMPONENTS



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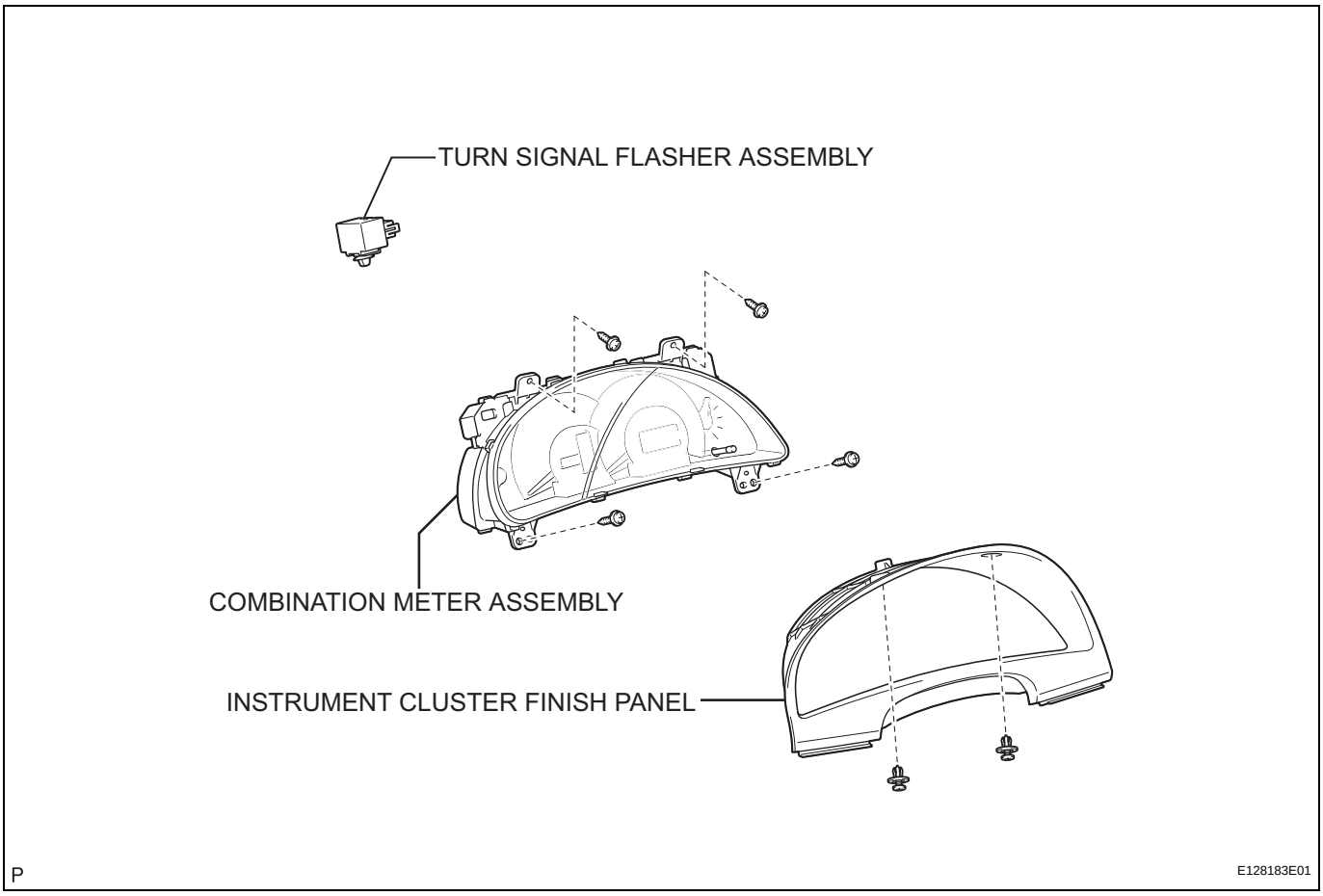
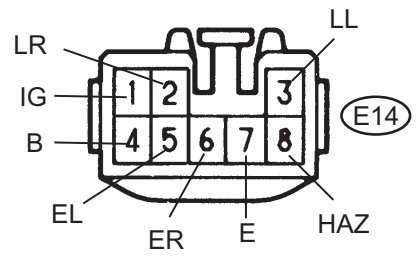


Wire Harness Side:



ON-VEHICLE INSPECTION

1. INSPECT TURN SIGNAL FLASHER ASSEMBLY

(a) Disconnect the E14 turn signal flasher assembly connector.

(b) Measure the voltage and resistance according the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E14-1 (IG) - Body ground	Ignition switch off	Below 1 V
E14-1 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V
E14-4 (B) - Body ground	Always	10 to 14 V

Standard resistance

Tester Connection	Condition	Specified Condition
E14-5 (EL) - Body ground	Turn signal switch OFF	10 kΩ or higher
E14-5 (EL) - Body ground	Turn signal switch in LH position	Below 1 Ω
E14-6 (ER) - Body ground	Turn signal switch OFF	10 kΩ or higher
E14-6 (ER) - Body ground	Turn signal switch in RH position	Below 1 Ω
E14-7 (E) - Body ground	Always	Below 1 Ω
E14-8 (HAZ) - Body ground	Hazard warning switch OFF	10 kΩ or higher

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Tester Connection	Condition	Specified Condition
E14-8 (HAZ) - Body ground	Hazard warning switch ON	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the turn signal flasher assembly connector.

(d) Measure the voltage according to the valve(s) in the table below.

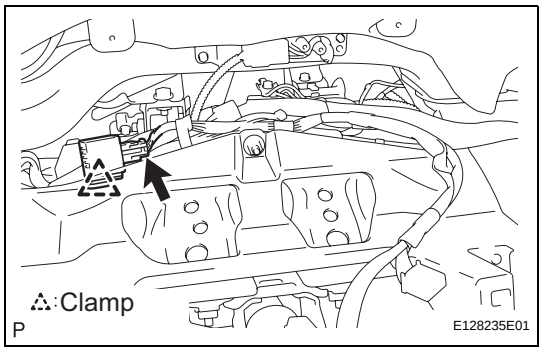
Standard voltage

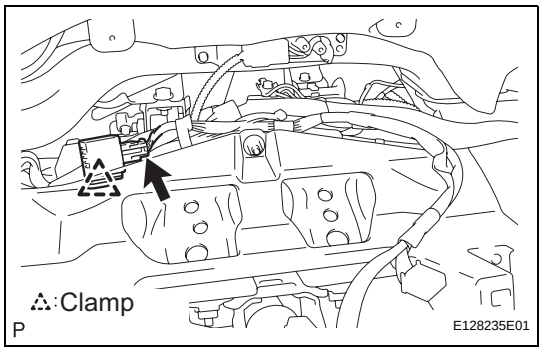
Tester Connection	Condition	Specified Condition
E14-2 (LR) - Body ground	Hazard warning switch OFF	Below 1 V
E14-2 (LR) - Body ground	Hazard warning switch ON	10 to 14 V (60 to 120 times per minute)
E14-2 (LR) - Body ground	Turn signal switch OFF	Below 1 V
E14-2 (LR) - Body ground	Ignition switch on (IG) and turn signal switch in RH position	10 to 14 V (60 to 120 times per minute)
E14-3 (LL)- Body ground	Hazard warning switch OFF	Below 1 V
E14-3 (LL) - Body ground	Hazard warning switch ON	10 to 14 V (60 to 120 times per minute)
E14-3 (LL) - Body ground	Turn signal switch OFF	Below 1 V
E14-3 (LL) - Body ground	Ignition switch on (IG) and turn signal switch in LH position	10 to 14 V (60 to 120 times per minute)
E14-5 (EL) - Body ground	Ignition switch on (IG) and turn signal switch OFF	10 to 14 V
E14-5 (EL) - Body ground	Ignition switch on (IG) and turn signal switch in LH position	Below 1 V
E14-6 (ER) - Body ground	Ignition switch on (IG) and turn signal switch OFF	10 to 14 V
E14-6 (ER) - Body ground	Ignition switch on (IG) and turn signal switch in RH position	Below 1 V
E14-8 (HAZ) - Body ground	Hazard warning switch OFF	10 to 14 V
E14-8 (HAZ) - Body ground	Hazard warning switch ON	Below 1 V

If the result is not as specified, replace the turn signal flasher assembly.

REMOVAL

1. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
2. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
3. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-20)**
4. **REMOVE STEERING COLUMN COVER (See page SR-39)**
5. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
8. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page ME-65)**
9. **REMOVE COMBINATION METER ASSEMBLY (See page ME-65)**
10. **REMOVE TURN SIGNAL FLASHER ASSEMBLY**
    (a) Disconnect the connector.
    (b) Remove the clamp and the turn signal flasher assembly.

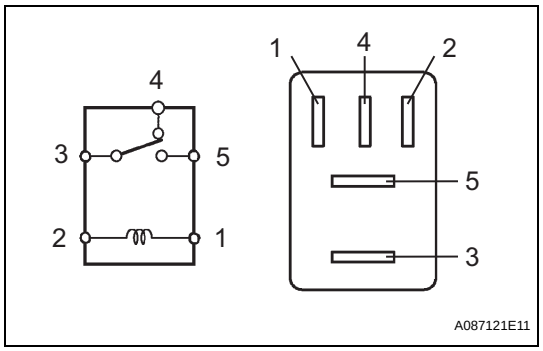




INSTALLATION

1. **INSTALL TURN SIGNAL FLASHER ASSEMBLY**
    (a) Install the clamp and the turn signal flasher assembly.
    (b) Connect the connector.
2. **INSTALL COMBINATION METER ASSEMBLY (See page ME-67)**
3. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page ME-68)**
4. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
5. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
6. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
7. **INSTALL STEERING COLUMN COVER (See page SR-50)**

8. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-58)**
9. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
10. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**



TAILLIGHT RELAY

ON-VEHICLE INSPECTION

1. INSPECT TAILLIGHT RELAY

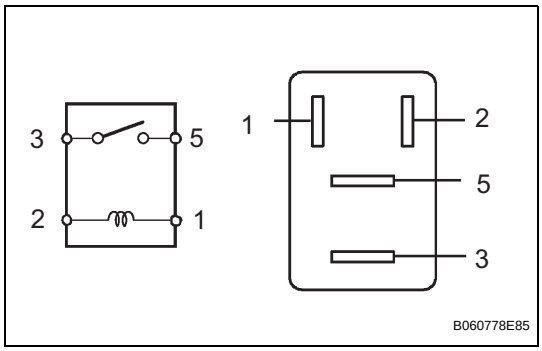
(a) Remove the taillight relay from the instrument panel J/B assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)
3 - 4	Below 1 Ω
	10 kΩ or higher (When battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the taillight relay.



FOG LIGHT RELAY

ON-VEHICLE INSPECTION

1. INSPECT FOG LIGHT RELAY

(a) Remove the fog light relay from the instrument panel J/B assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the fog light relay.

OUTSIDE VEHICLE

GENERAL MAINTENANCE

Check the parts of the vehicle described below on a daily basis. Performing maintenance checks on the vehicle is the owner's responsibility. The owner may take the vehicle to a service center but it is recommended that the owner perform the checks.
In most cases, special tools are not required.
The procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (months) elapsed, whichever reaches the specification first.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. TIRES

(a) Check the tire pressure with a gauge. Make adjustments if necessary.
(b) Check the surfaces of tires for cuts, damage or excessive wear.

3. WHEEL NUTS

(a) Check for nuts that are loose or missing. Tighten them if necessary.

4. TIRE ROTATION

Check the maintenance schedule in the owner's manual supplement.

5. WINDSHIELD WIPER BLADES

(a) Check the blades for wear or cracks when they are unable to wipe the windshield clean. Replace them if necessary.

6. FLUID LEAKS

(a) Check under the vehicle for leaking fuel, oil, water and other fluids.
NOTICE:
If you smell gasoline fumes or notice any leaks, locate the cause and repair it.

7. DOORS AND ENGINE HOOD

(a) Check that all of the doors operate smoothly, and that all the latches lock securely.
(b) When the primary latch is released, check that the engine hood secondary latch prevents the hood from opening.

INSIDE VEHICLE

GENERAL MAINTENANCE

Check the parts of the vehicle described below on a daily basis. Performing maintenance checks on the vehicle is the owner's responsibility. The owner may take the vehicle to a service center but it is recommended that the owner perform the checks.
In most cases, special tools are not required.
The procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Determine the appropriate time to service the vehicle using either miles driven or time (months) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights illuminate or blink. Also, check that they have enough brightness.

3. WARNING LIGHTS AND BUZZERS

(a) Check that all the warning lights and buzzers are working.

4. HORNS

(a) Check that the horn is working.

5. WINDSHIELD GLASS

(a) Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check that the washers are aimed properly. Also, check that the washer fluid hits the center of the operating range of each wiper on the windshield.
(b) Check that the wipers streak or not. Replace the wiper if necessary.

7. WINDSHIELD DEFROSTER

(a) When the heater or air conditioner is on the defroster setting, check that air comes out of the defroster outlet.

8. REAR VIEW MIRROR

(a) Check that the rear view mirror is securely mounted.

9. SUN VISORS

(a) Check that the sun visors move freely and are securely mounted.

10. STEERING WHEEL

(a) Check that the steering wheel has the proper free play. Also check for steering difficulty, unusual noises (See page SR-1).

11. SEATS

(a) Check that the seat adjusters, seatback recliner and other front seat controls operate smoothly.
(b) Check that all the latches lock securely in all positions.
(c) Check that the locks hold securely in all positions.
(d) Check that the headrests move up and down smoothly and that the locks hold securely in all latched positions.
(e) When the rear seatbacks are folded down, check that the latches lock securely.

12. SEAT BELTS

(a) Check that the seat belt system such as the buckles, retractors and anchors operate properly and smoothly.
(b) Check that the belt webbing is not cut, frayed, worn or damaged.

13. ACCELERATOR PEDAL

(a) Check that the pedal operates smoothly. In other words, check that the pedal does not have uneven pedal resistance or become stuck in certain positions.

14. CLUTCH PEDAL

(a) Check that the pedal operates smoothly.
(b) Check if the pedal has the proper free play (See page CL-5).

15. BRAKE PEDAL

(a) Check that the pedal has the proper reserve distance and free play (See page BR-19).
(b) Start the engine and check the brake booster function.

16. BRAKES

(a) In a safe place, check that the vehicle remains straight when applying the brakes.

17. PARKING BRAKE

(a) Check that the pedal or lever has the proper range of motion (See page PB-1).
(b) On a low incline, check that the parking brake alone can stabilize the vehicle.

18. AUTOMATIC TRANSAXLE "PARK" MECHANISM

(a) Check the lock release button of the shift lever for proper and smooth operation.
(b) When the shift lever is in the P position and all brakes are released on a low incline, check that the vehicle is stable.

UNDER HOOD

GENERAL MAINTENANCE

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. WINDSHIELD WASHER FLUID

(a) Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

(a) Check that the coolant level is between the "FULL" and "LOW" lines on the see-through reservoir.

4. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and free of leaves, dirt and bugs.

(b) Check the hoses for cracks, kinks, rotting or loose connections.

5. BATTERY ELECTROLYTE LEVEL

(a) Check that the electrolyte level of all the battery cells is between the upper and lower lines on the case.

HINT:

If the electrolyte level is difficult to see, lightly shake the vehicle.

6. BRAKE FLUID LEVEL

(a) Check that the brake fluid levels are near the upper level line on the see-through reservoirs.

7. ENGINE DRIVE BELT

(a) Check the drive belt for fraying, cracks, wear or oiliness.

8. POWER STEERING FLUID LEVEL

(a) Check the fluid level in the fluid reservoir.

HINT:

If the fluid is hot, check that the fluid level is within the HOT range on the fluid reservoir. If the fluid is cold, check that the fluid level is within the COLD range.

9. ENGINE OIL LEVEL

(a) Check that the level of engine oil is between "F" and "L" on the dipstick with the engine turned off.

10. AUTOMATIC TRANSAXLE FLUID LEVEL (for U250E)
(See page AX-123)

11. MANUAL TRANSAXLE OIL LEVEL
(See page MX-2)

12. EXHAUST SYSTEM

(a) Check for unusual exhaust sounds or abnormal exhaust fumes. Locate the cause and repair it.

ENGINE

GENERAL MAINTENANCE

HINT:
Inspect these items on a cooled down engine.

1. INSPECT DRIVE BELT

Type	See procedures
2AZ-FE	See page EM-6
2GR-FE	See page EM-6

2. REPLACE ENGINE OIL AND OIL FILTER

Type	See procedures
2AZ-FE	See page LU-1
2GR-FE	See page LU-1

3. REPLACE ENGINE COOLANT

Type	See procedures
2AZ-FE	See page CO-5
2GR-FE	See page CO-5

4. INSPECT EXHAUST PIPES AND MOUNTINGS

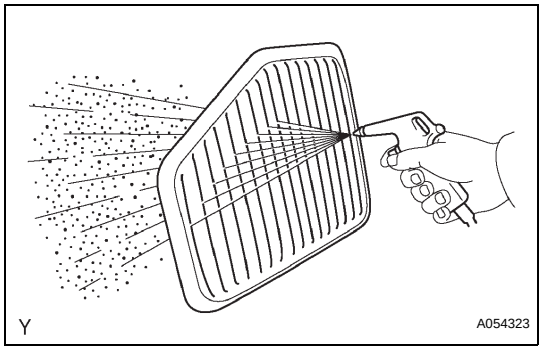
(a) Visually check the pipes, hangers and connections for severe corrosion, leaks or damage.

5. INSPECT SPARK PLUGS

Type	See procedures
2AZ-FE	See page IG-5
2GR-FE	See page IG-5

6. INSPECT BATTERY

Type	See procedures
2AZ-FE	See page CH-4
2GR-FE	See page CH-4



7. INSPECT AIR CLEANER FILTER

(a) Remove the air filter.
(b) Visually check that the air filter is not excessively damaged or oily. If necessary, replace the air filter.
(c) Reinstall the air filter.

8. REPLACE AIR CLEANER FILTER

(a) Replace the air filter with a new one.

9. INSPECT FUEL TANK CAP GASKET

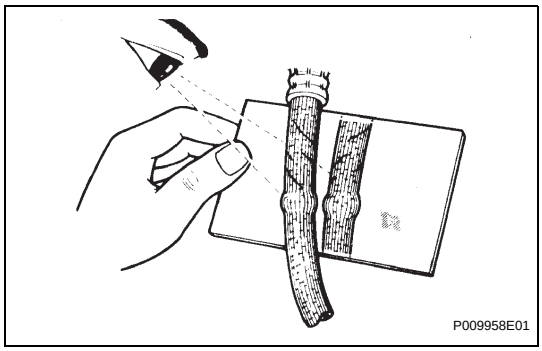
Type	See procedures
2AZ-FE	See page EC-5
2GR-FE	See page EC-5

10. INSPECT FUEL LINES AND CONNECTIONS AND FUEL TANK VAPOR VENT SYSTEM HOSES AND FUEL TANK BANDS

(a) Visually check the fuel lines for cracks, leakage, loose connections, deformation or tank band looseness.

11. INSPECT CHARCOAL CANISTER

Type	See procedures
2AZ-FE	See page EC-9
2GR-FE	See page EC-9



MA

BRAKE

GENERAL MAINTENANCE

1. INSPECT BRAKE LINE PIPES AND HOSES

HINT:

Work in a well-lighted area. Turn the front wheels fully to the right or left before beginning the inspection.

(a) Using a mirror, check the entire circumference and length of the brake lines and hoses for:
- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

(b) Check all the clamps for tightness and the connections for leakage.

(c) Check that the hoses and lines are not near sharp edges, moving parts or the exhaust system.

(d) Check that the lines are installed properly and pass through the center of the grommets.

2. INSPECT BRAKE PEDAL

(See page BR-19)

3. INSPECT PARKING BRAKE

(See page PB-1)

4. INSPECT BRAKE LININGS

(a) Check the brake linings. Also check the brake linings of parking brake.

5. INSPECT FRONT BRAKE

(a) Check the front brake pads and discs (See page BR-50).

6. INSPECT REAR BRAKE

(a) Check the rear brake pads, discs linings and drums (See page BR-62).

7. INSPECT OR CHANGE BRAKE FLUID

(See page BR-6)

Fluid:

SAE J1703 or FMVSS No. 116 DOT3

CHASSIS

GENERAL MAINTENANCE

1. INSPECT STEERING LINKAGE & GEAR HOUSING

(a) Check the steering wheel free play (See page SR-1).

(b) Check the steering linkage for looseness or damage.

(1) Check that the tie rod ends do not have excessive play.

(2) Check that the dust seals and boots are not damaged.

(3) Check that the boot clamps are not loose.

(4) Check that the steering gear housing is not damaged.

(5) Check that the connector are properly connected to the steering gear housing.

2. INSPECT BALL JOINT AND DUST COVER

(a) Inspect the ball joints for excessive looseness.

(1) Jack up the front of the vehicle and place wooden blocks with a height of 180 to 200 mm (7.09 to 7.87 in.) under the front tires.

(2) Lower the vehicle until the front coil spring has about half its ordinary load. Place stands under the vehicle for safety.

(3) Check that the front wheels are pointing straight ahead. Use wheel chocks on all 4 wheels.

(4) Using a lever, pry up the end of the lower arm. Check the amount of play.

Maximum ball joint vertical play:
0 mm (0 in.)

If there is any play, replace the ball joint.

(b) Check the dust cover for damage.

3. INSPECT DRIVE SHAFT BOOTS

(a) Check the drive shaft boots for loose clamps, grease leakage, kinks or damage.

4. CHECK AUTOMATIC TRANSAXLE FLUID

(a) Visually check the transaxle for fluid leakage. If oil is leaking, find the cause and repair it.

5. CHECK MANUAL TRANSAXLE OIL (FLUID)

(a) Visually check the transmission for oil (fluid) leakage. If oil is leaking, find the cause and repair it.

6. INSPECT FRONT AND REAR SUSPENSION

Type	See procedures
Front Suspension	See page SP-4
Rear Suspension	See page SP-13

BODY

GENERAL MAINTENANCE

1. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

(a) Where necessary, tighten all the parts of the chassis.
- Front axle and suspension
- Drive train
- Rear axle and suspension
- Brake system
- Engine mounting, etc.

(b) Where necessary, tighten all the parts of the body.
- Seat belt system
- Seat
- Doors and hood
- Body mountings
- Fuel tank
- Exhaust pipe system, etc.

2. REPLACE AIR CONDITIONING FILTER

(a) Remove the glove compartment assembly.
(b) Remove the filter case from the filter outlet.
(c) Remove the filter from the filter case.
(d) Replace the filter with a new one.
(e) Installation is in the reverse order.

3. ROAD TEST

(a) Check the engine and chassis for abnormal noises.
(b) Check that the vehicle does not wander or pull to one side.
(c) Check that the brakes work properly and do not drag.
(d) Do setting of the parking brake shoes.

4. BODY INSPECTION

(a) Check the body exterior for dents, scratches and rust.
(b) Check the underbody for rust and damage.
If necessary, replace or repair.

5. FINAL INSPECTION

(a) Check the operation of the body parts.
(1) Hood
- Auxiliary catch operates properly.
- Hood locks securely when closed.

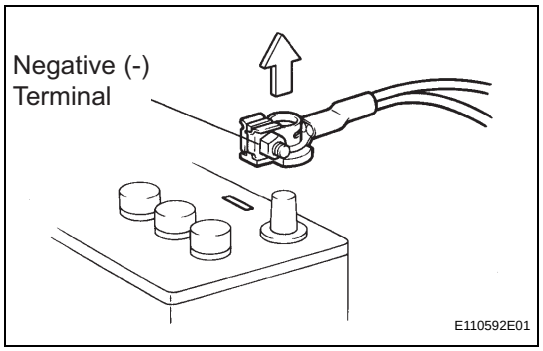
(2) Front and rear doors
- Door locks operate properly.
- Doors close properly.

(3) Back door
- Door lock operates properly.

(4) Seats
- Seat adjusts easily and locks securely in any position.
- Front seatback locks securely in any position.

- Folding-down rear seatbacks lock securely.

(5) Be sure to deliver a clean car. Especially check:
- Steering wheel
- Shift lever knob
- All switch knobs
- Door handles
- Seats



METER / GAUGE SYSTEM

PRECAUTION

1. REMOVAL AND INSTALLATION OF THE BATTERY TERMINAL

(a) Before performing electrical work, disconnect the battery negative (-) terminal in order to prevent a short in the system.

(b) When disconnecting and reconnecting the battery cable, turn the ignition switch and lighting switches off and loosen the terminal nut completely. Perform these operations without prying on the terminal.

2. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle. The expressions listed in the table below are used in this section.

Switch Type / Expression	Ignition Switch (position)	Engine Switch (condition)
Ignition switch off	LOCK	Off
Ignition switch on (IG)	ON	On (IG)
Ignition switch on (ACC)	ACC	On (ACC)
Engine start	START	Start

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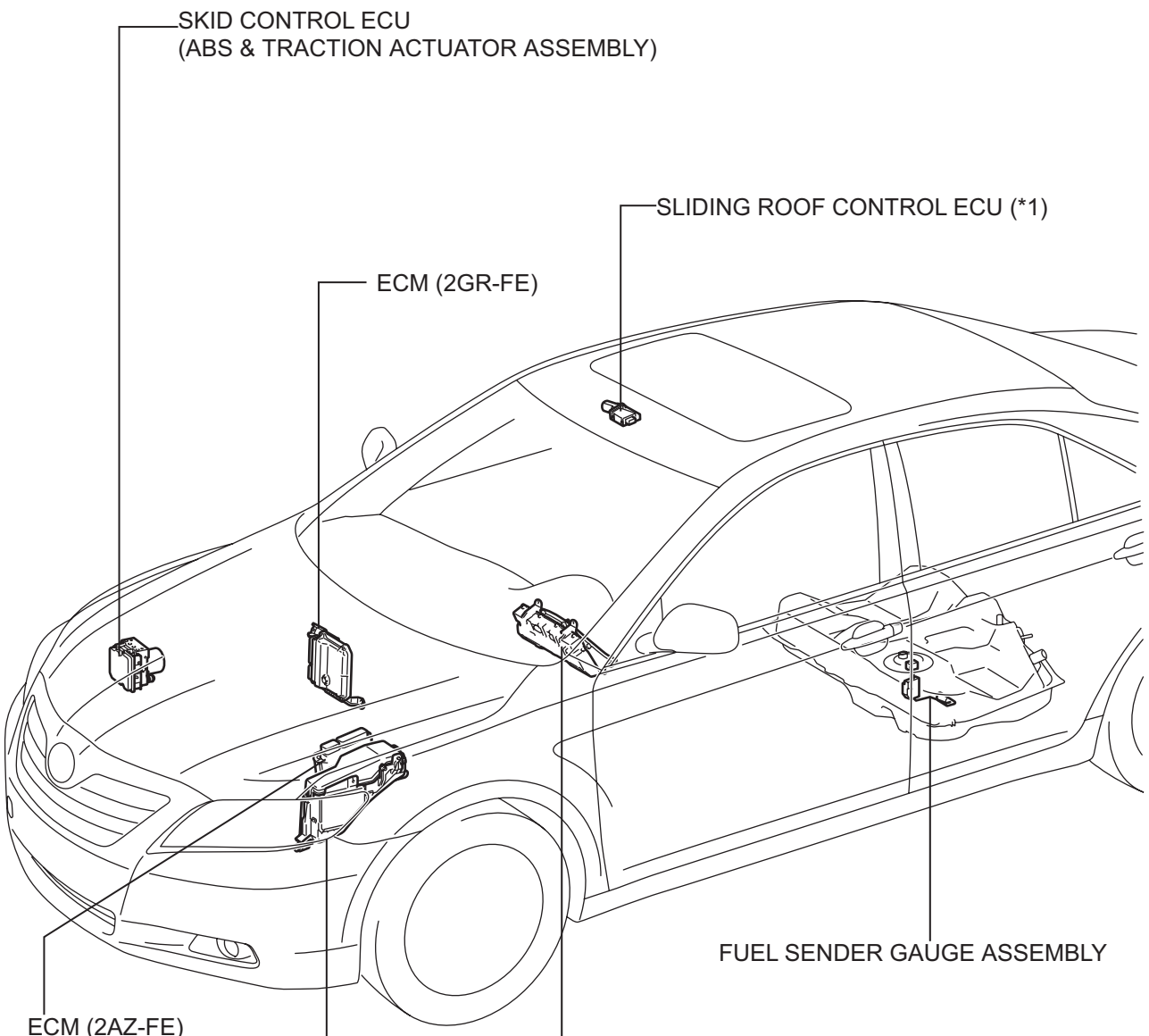
PARTS LOCATION



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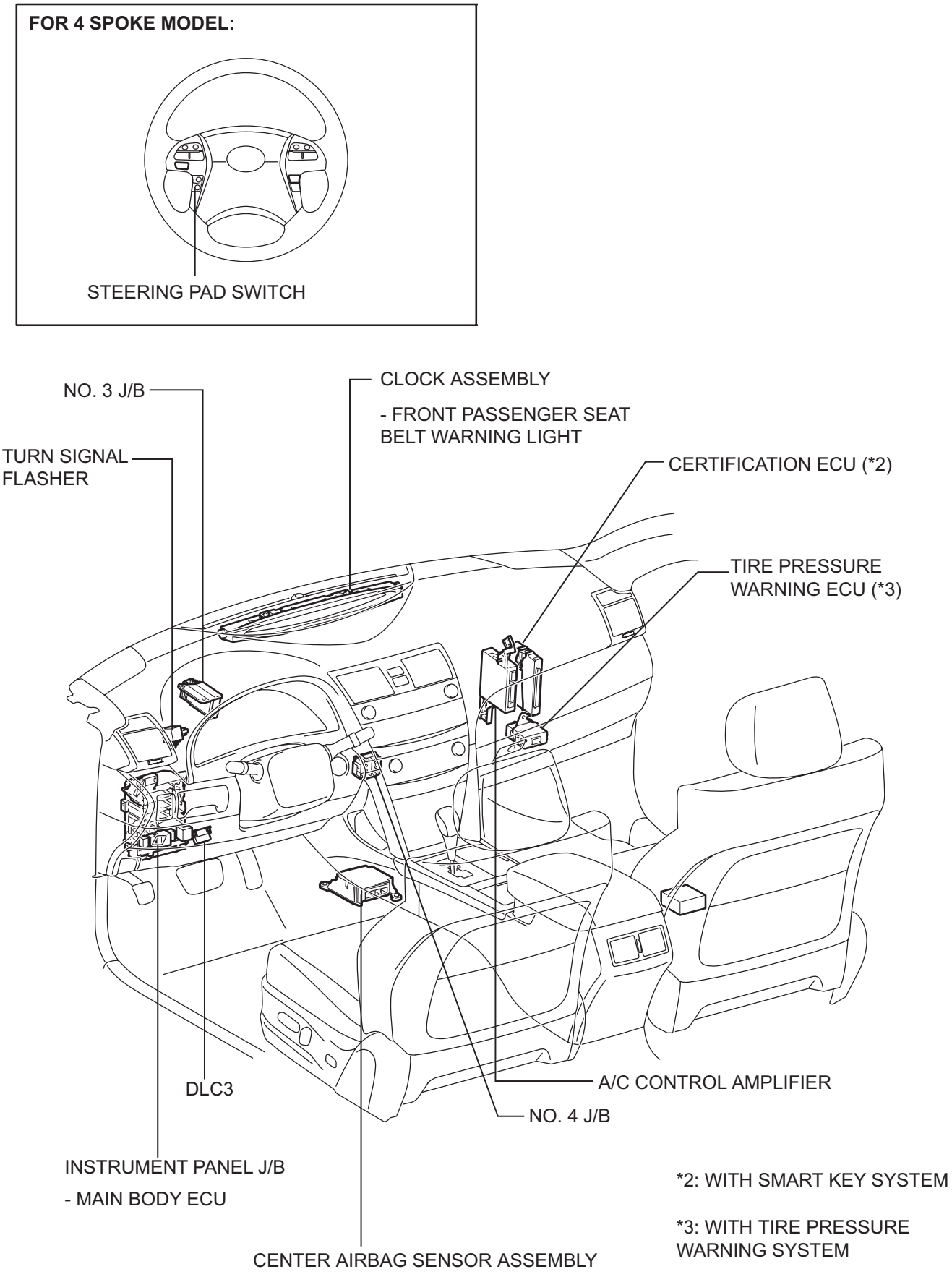
FOR 4 SPOKE MODEL:
STEERING PAD SWITCH
NO. 3 J/B
CLOCK ASSEMBLY
- FRONT PASSENGER SEAT BELT WARNING LIGHT
TURN SIGNAL FLASHER
CERTIFICATION ECU (*2)
TIRE PRESSURE WARNING ECU (*3)
DLC3
A/C CONTROL AMPLIFIER
NO. 4 J/B
INSTRUMENT PANEL J/B
- MAIN BODY ECU
CENTER AIRBAG SENSOR ASSEMBLY
*2: WITH SMART KEY SYSTEM
*3: WITH TIRE PRESSURE WARNING SYSTEM
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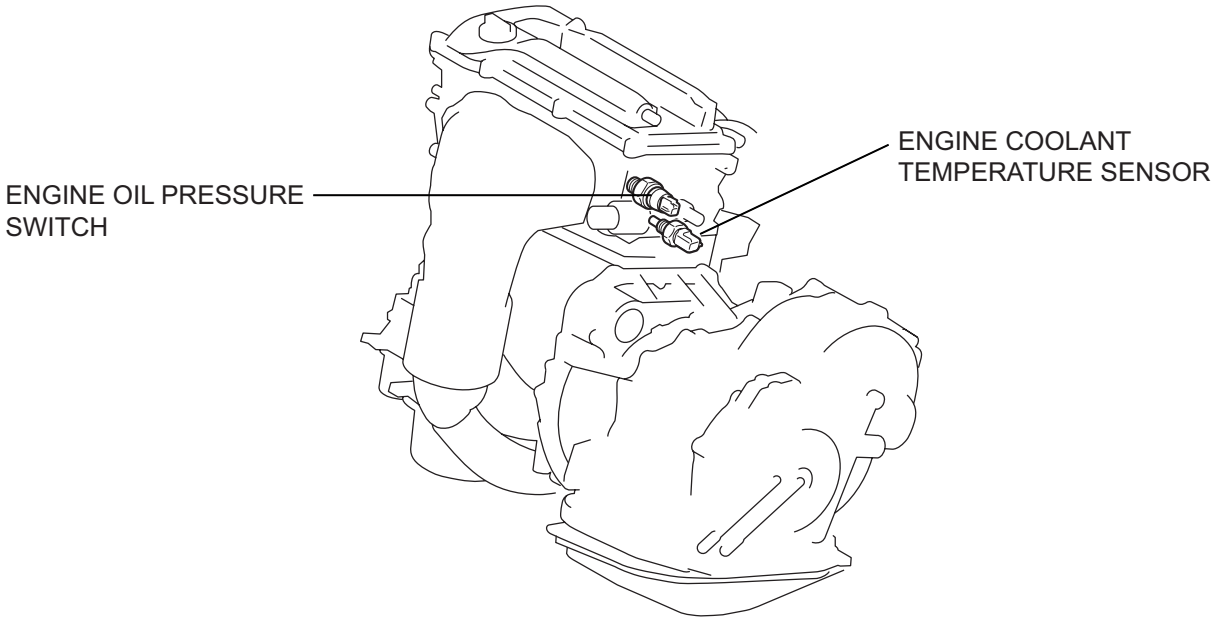
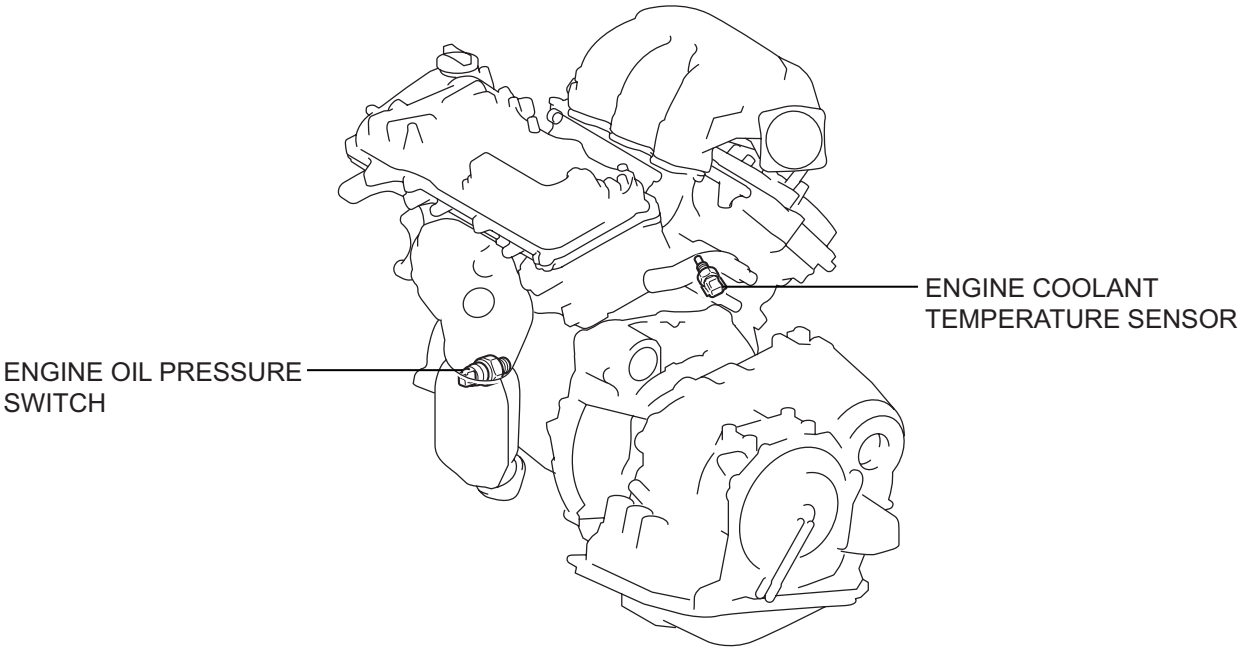
2AZ-FE:



2GR-FE:



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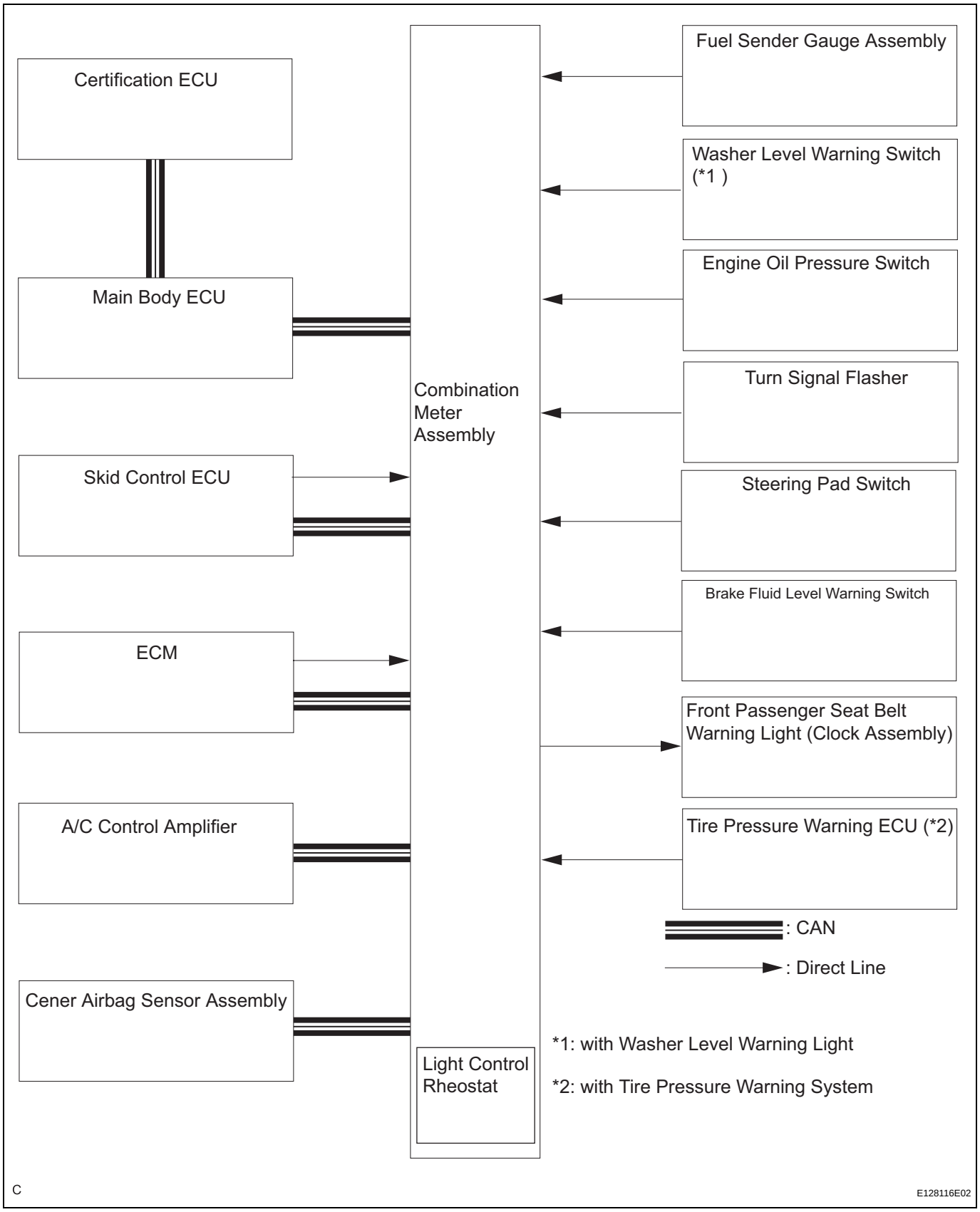
SYSTEM DIAGRAM



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INPUT AND OUTPUT SIGNALS OF THE COMBINATION METER ASSEMBLY:

Sender	Receiver	Communication Signal	Communication Line
Combination Meter Assembly	• ECM • A/C Control Amplifier • Center Airbag Sensor Assembly • Main Body ECU	Vehicle speed signal	CAN (CAN No. 1 Bus)
	Certification ECU		CAN (CAN MS Bus)
	• Main Body ECU • A/C Control Amplifier	Rheostat duty signal	CAN (CAN No. 1 Bus)
		Tail cancel signal	
	Main Body ECU	Lounge illumination signal	CAN (CAN No. 1 Bus)
	• Center Airbag Sensor Assembly • ECM	Vehicle specification signal (Destination/Handle code)	CAN (CAN No. 1 Bus)
	Certification ECU	Odometer signal	CAN (CAN MS Bus)
	Clock assembly	Passenger seat belt warning light signal	Direct Line
ECM	Combination Meter Assembly	Starter signal	CAN (CAN No. 1 Bus)
		Test mode signal	
		Cruise operation indicator	
		Cruise control warning	
		Charge light indicator	
		TM oil temperature range	
		Engine coolant temperature signal	
		Engine type information	
		Shift position signal (*1)	
		Reject buzzer signal	
		Gear position signal	
		Sports mode indicator (*1)	
		Engine RPM data	
Main Body ECU	Combination Meter Assembly	Illuminance data	CAN (CAN No. 1 Bus)
		Auto dimmer signal	
		ACC switch signal	
		Key switch signal	
		Each door courtesy switch signal	
		Slide roof signal (*2)	
		Smart key signal (*3)	
		Driver side seat belt switch signal	
		Parking brake switch signal	
		High beam indicator light signal	
		Head (*4)/Tail (*5) indicator light signal	
		Front fog indicator light signal	
• Main Body ECU • Certification ECU	Combination Meter Assembly	Hood courtesy switch signal	CAN (CAN MS Bus)

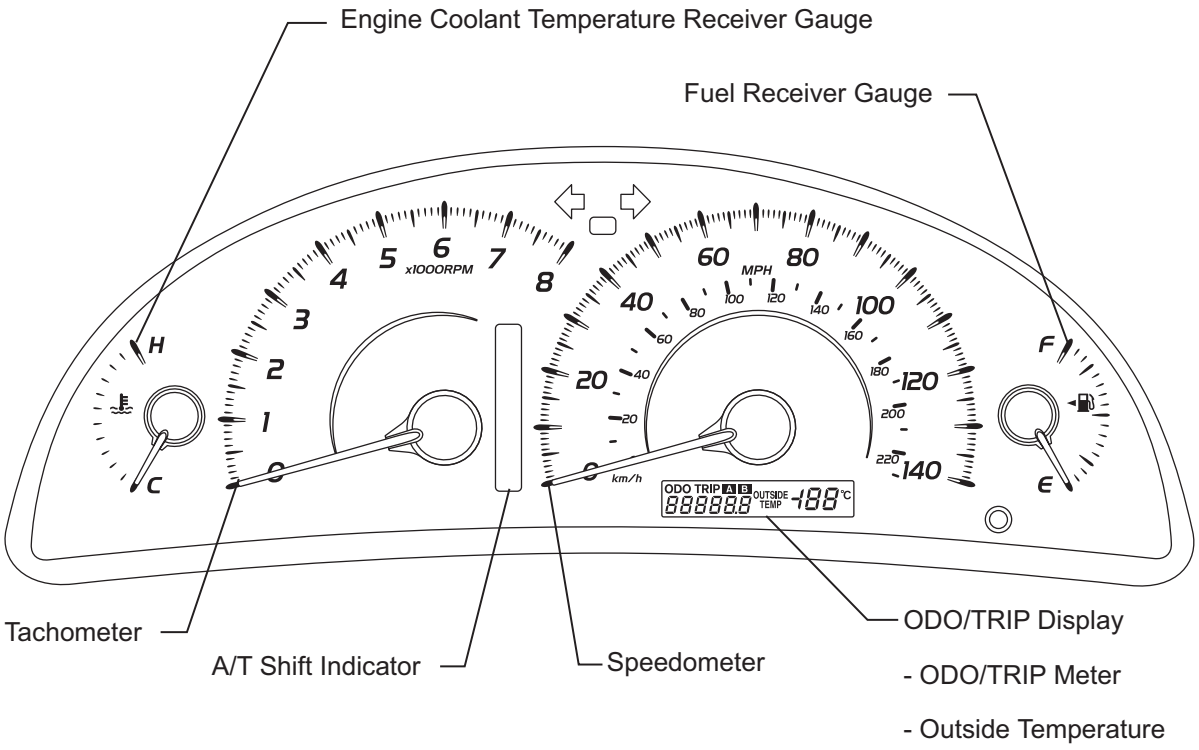
Sender	Receiver	Communication Signal	Communication Line
Certification ECU	Combination Meter Assembly	Meter buzzer request signal	CAN (CAN MS Bus)
		Each door open display signal	
		Key lose warning signal (*3)	
		Low key battery warning signal (*3)	
		Shift position warning signal	
		Steeling lock abnormal warning (*3)	
		Steeling lock unlock warning (*3)	
		Immobiliser Key Identification Completion	
Skid Control ECU	Combination Meter Assembly	Vehicle speed signal	CAN (CAN No. 1 Bus)
		Brake Warning light Control Flag	
		ABS Warning Light signal	
		Slip Indicator light signal (*6)	
		VSC Warning light signal (*6)	
• ECM • Skid Control ECU	Combination Meter Assembly	Diagnosis signal	CAN (CAN No. 1 Bus)
A/C Control Amplifier	Combination Meter Assembly	Ambient temperature display signal	CAN (CAN No. 1 Bus)
Center Airbag Sensor Assembly	Combination Meter Assembly	Airbag warning light signal	CAN (CAN No. 1 Bus)
		Front passenger seat condition signal	Direct Line
		Front passenger seat belt condition signal	
Steering Pad Switch	Combination Meter Assembly	Steering pad switch operation signal	Direct Line
Oil Pressure Switch	Combination Meter Assembly	Engine oil pressure warning light signal	Direct Line
Fuel Sender Gauge Assembly	Combination Meter Assembly	Fuel level signal	Direct Line
Turn Signal flasher	Combination Meter Assembly	Turn LH/RH indicator light signal	Direct Line
Tire Pressure Warning ECU (*7)	Combination Meter Assembly	Tire pressure warning light signal	Direct Line
Washer Level Switch (*8)	Combination Meter Assembly	Washer fluid level warning light signal	Direct Line
Brake Fluid Level Warning Switch	Combination Meter Assembly	Brake fluid level warning light signal	Direct Line

*1: for Automatic Transaxle
*2: with Sliding Roof
*3: with Smart Key System
*4: for U.S.A.
*5: for Canada
*6: with VSC
*7: with Tire Pressure Warning System
*8: with Washer Level Warning Light

SYSTEM DESCRIPTION

1. METER GAUGE

without Multi-information Display:



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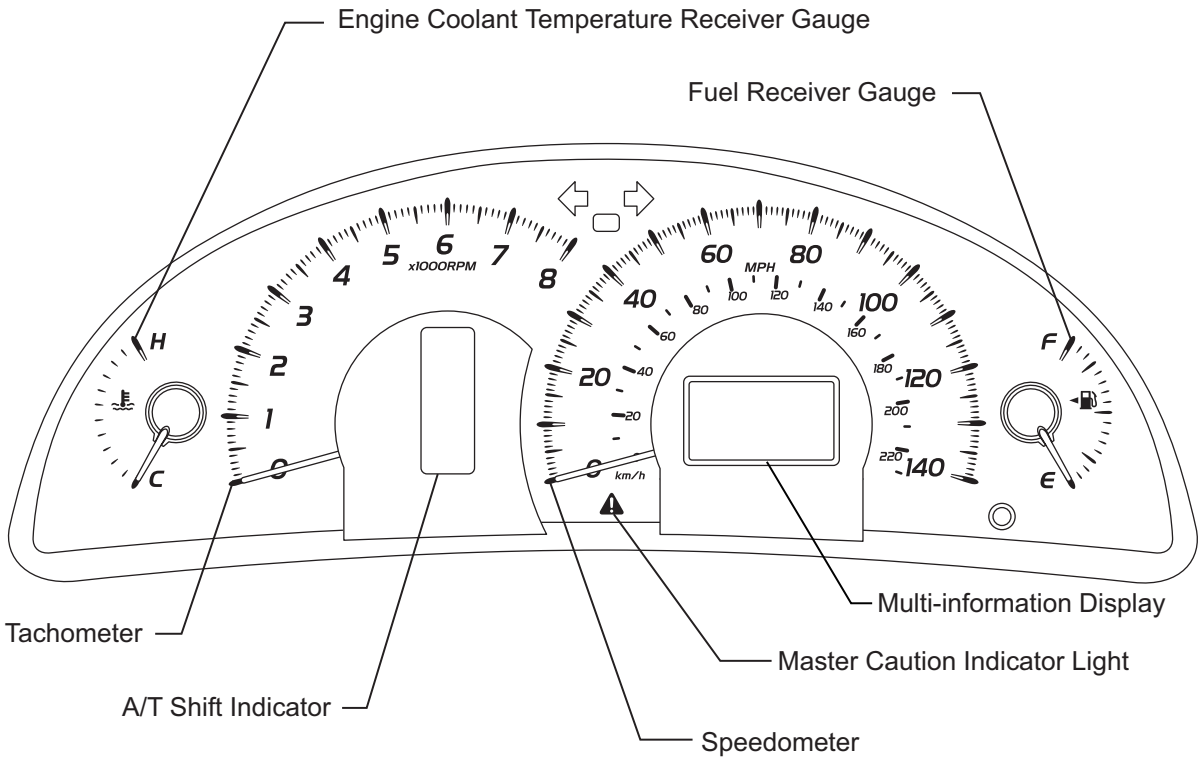
with Multi-information Display:



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METER GAUGE:

Item	Detail
Speedometer	Indicates the vehicle speed receiving a signal from the skid Control ECU. (CAN (CAN No. 1 Bus))
Tachometer	Indicates the engine speed based on a signal received from the ECM. (CAN (CAN No. 1 Bus))
Engine Coolant Temperature Receiver Gauge	Indicates the engine coolant temperature based on a signal received from the ECM. (CAN (CAN No. 1 Bus))
Fuel Receiver Gauge	Indicates the fuel level based on a signal the fuel sender gauge. (Direct Line)

WARNING/INDICATOR:

Item	Detail
TURN SIGNAL	Receives a turn signal from the turn signal flasher. (Direct Line)
BEAM	Receives a beam signal from the main body ECU. (CAN (CAN No. 1 Bus))
CHARGE	Receives a charge light signal from the alternator L terminal. (Direct Line)
CHECK E/G	Receives a check engine light signal from the ECM. (Direct Line)
DOOR	Open door indicator light comes on receiving a door condition signal from the main body ECU. (CAN (CAN MS Bus))
D-BELT	Receives a driver side seat belt signal from the center airbag sensor assembly. (CAN (CAN No. 1 Bus))
P-BELT	Receives a passenger side seat belt signal from the center airbag sensor assembly via the main body ECU (CAN) and transmits a passenger side seat belt condition signal to the clock assembly. (Direct Line)
HEAD (*1)	Receives a HEAD indicator light signal from main body ECU. (CAN (CAN No. 1 Bus))
TAIL (*2)	Receives a TAIL indicator light signal from the main body ECU. (CAN (CAN No. 1 Bus))
A/T SHIFT	Receives an A/T shift condition and A/T gear position signal from the park/neutral position switch and the ECM. (CAN (CAN No. 1 Bus))
FUEL	Receives a fuel signal from the fuel sender gauge. (Direct Line)
ABS	Receives an ABS signal from the skid Control ECU. (CAN (CAN No. 1 Bus))

Item	Detail
SLIP (*3)	Receives a SLIP signal from the skid Control ECU. (CAN (CAN No. 1 Bus))
VSC (*3)	Receives a VSC signal from the skid Control ECU. (CAN (CAN No. 1 Bus))
BRAKE	Receives a brake signal from the brake fluid level warning switch (Direct Line) and the skid Control ECU and main body ECU. (CAN (CAN No. 1 Bus))
CRUISE	Receives a cruise signal from the ECM. (CAN (CAN No. 1 Bus))
AIRBAG	Receives an airbag signal from the center airbag sensor assembly. (CAN (CAN No. 1 Bus))
Oil pressure	Receives an oil pressure signal from the engine oil pressure switch. (Direct Line)
Tire pressure (*4)	Receives a tire pressure signal from the tire pressure warning ECU. (Direct Line)
Washer (*5)	Receives a washer signal from the washer level warning switch. (Direct Line)
Maintenance required (*1)	An oil change reminder light comes on/blinks to remind the driver to change the engine oil depending on the vehicle driving distance.

*1: for U.S.A.
*2: except for U.S.A.
*3: with VSC
*4: with Tire Pressure Warning System
*5: with Washer Level Indicator

HINT:

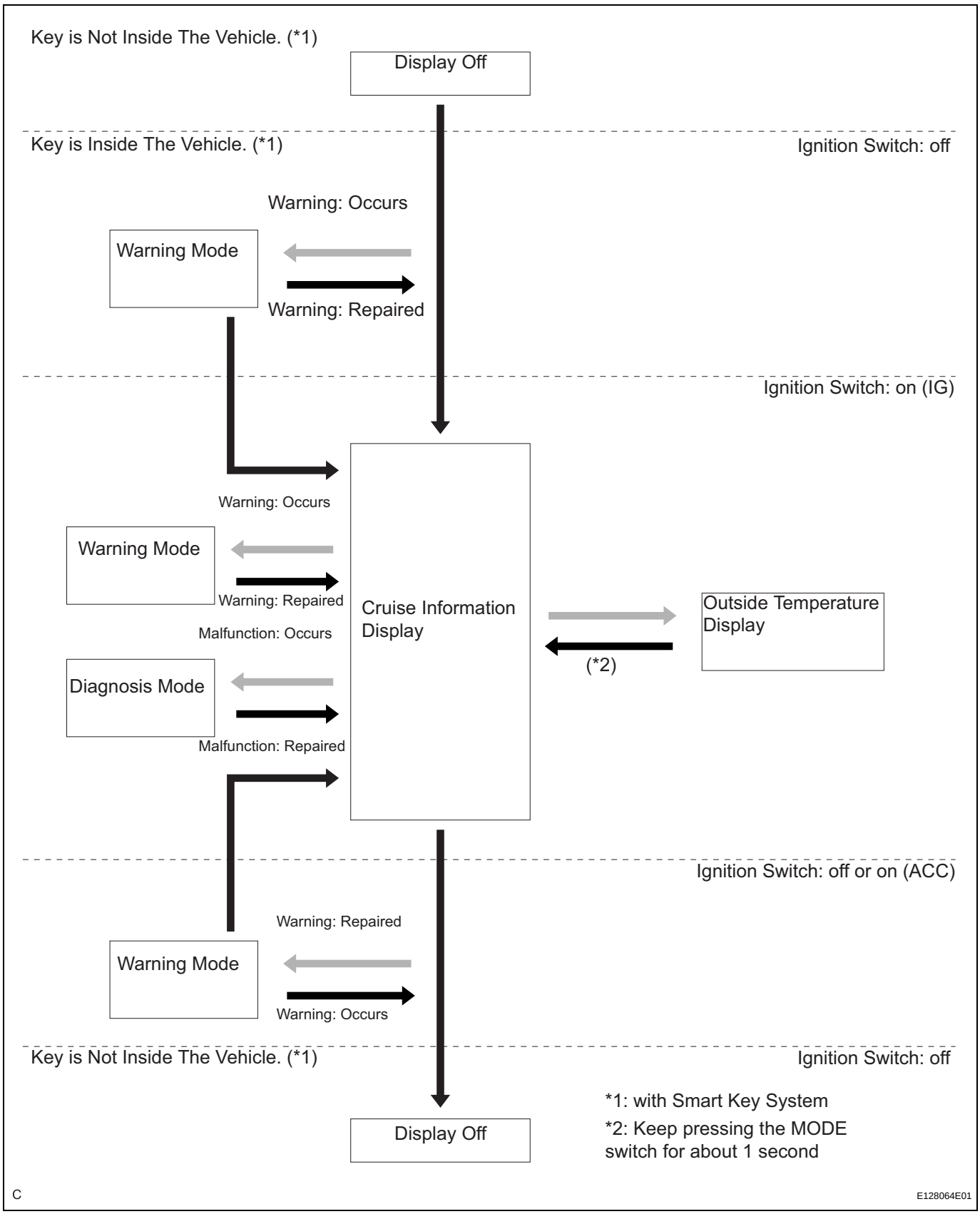
- The multi-information display has been located in the center of the combination meter assembly.
- The display shows a message or animation for each of the functions described in the table below.

MULTI-INFORMATION DISPLAY:

Item	Detail
Door warning	When a door (driver/passenger/rear left/rear right/back/hood) of the vehicle is opened or closed, this item displays a warning message and animation to inform the driver of the condition of the door.
Maintenance required (*1)	• A maintenance required will display the warning message to remind the driver to change the engine oil depending on the vehicle driving distance. • Displays the mode while in the maintenance request reset mode.
ODO/TRIP display	• This display switches between odometer, trip meter A, and trip meter B in accordance with the operation of the ODO/TRIP switch. • It is possible to reset the trip display to keep pressing the trip reset knob for 0.8 second or more.
Outside temperature display	Displays the outside temperature in accordance with the ambient temperature signal from the A/C control amplifier.
Average fuel consumption (after refueling)	• Displays the value that has been calculated by the meter CPU, which is based on the driven distance and the fuel consumption volume after the ignition switch is on (IG). • The average fuel consumption exceeds 99.9 or more, the indication will be "99.9".
Possible running distance	Displays the value that has been calculated by the meter CPU, which is based on the the fuel consumption volume, fuel level, and vehicle speed.
Cruising distance	Displays the cruising distance after starting the engine.
Average vehicle speed	Displays the average vehicle speed after starting the engine.
Warning message	Illuminates or blinks the master warning light and displays a warning message for each type of system failure.
DTC (Diagnostic Trouble Code) display (*3)	Displays the DTCs pertaining to the VSC function.

*1: for U.S.A.
*2: Except for U.S.A.
*3: with VSC

2. MULTI-INFORMATION DISPLAY



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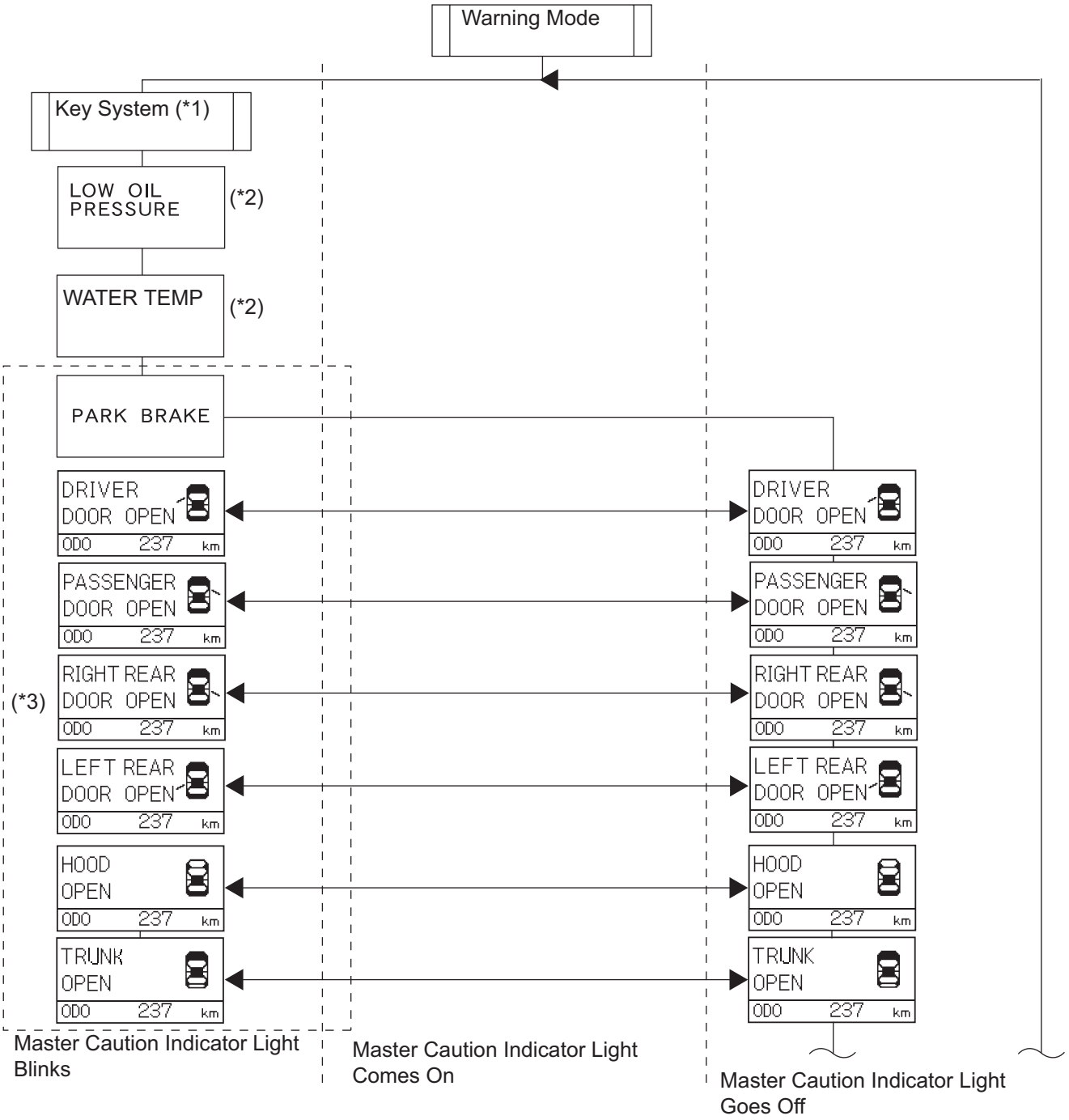

*1: with Smart Key System

*2: Warning buzzer sounds when the indication appears.

*3: When the vehicle speed is 5 km/h (3mph) or more, the waring buzzer sounds.

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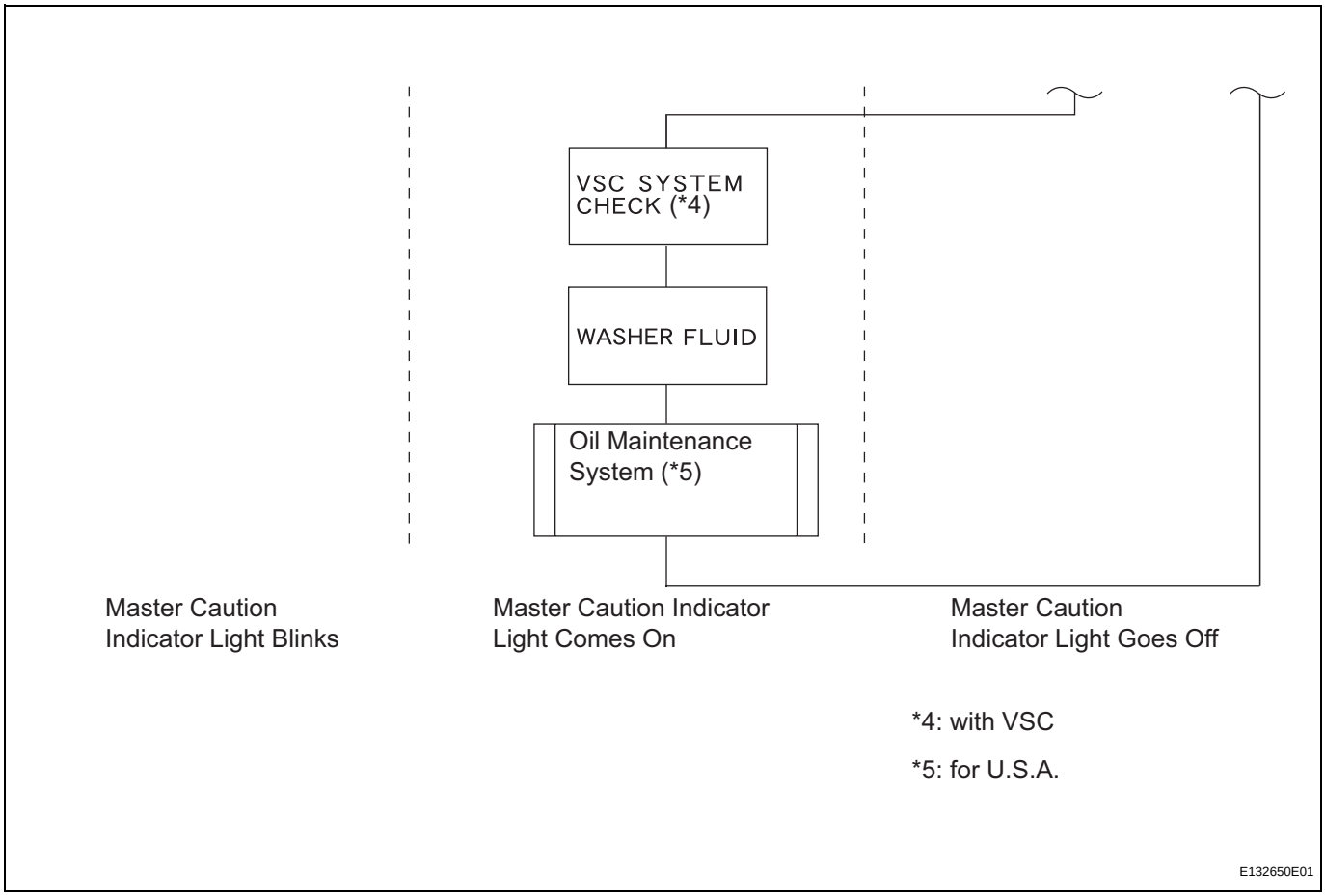
VSC SYSTEM CHECK (*4)
WASHER FLUID
Oil Maintenance System (*5)
Master Caution Indicator Light Blinks
Master Caution Indicator Light Comes On
Master Caution Indicator Light Goes Off
*4: with VSC
*5: for U.S.A.
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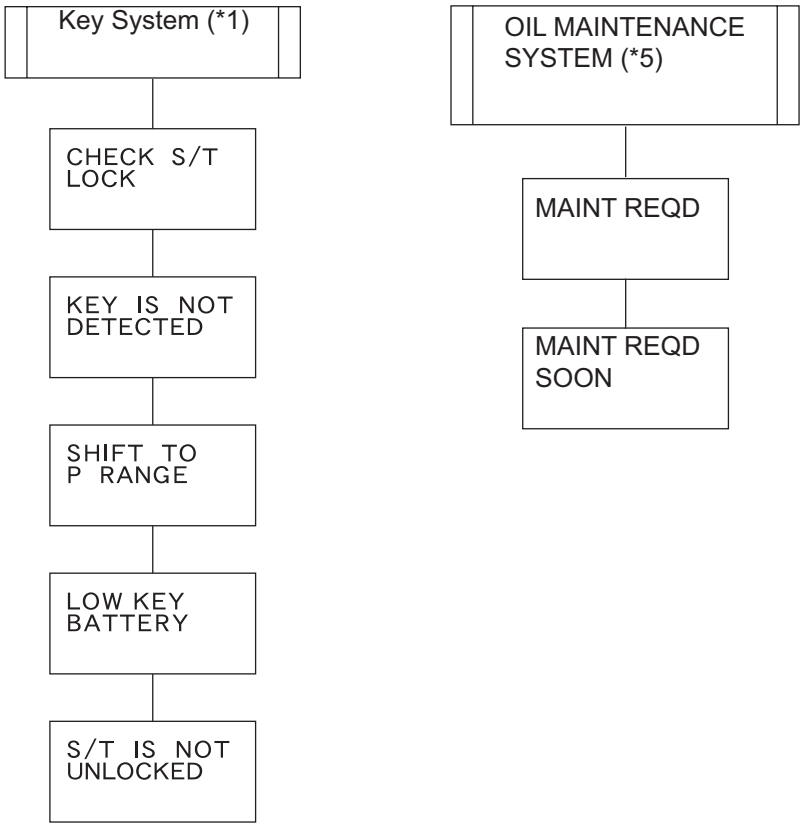

3. DIAGNOSIS SYSTEM

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HINT:

- The multi-information display shows "DIAG" when turn the ignition switch on (IG) (See page BC-141 for Advics, BC-302 for Bosch).
- Diagnosis information can be displayed on the multi-information display after connecting a jumper wire between TC and CG of the DLC3 connector.

HOW TO PROCEED WITH TROUBLESHOOTING

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	CHECK CAN COMMUNICATION SYSTEM

(a) Check for DTC output.
HINT:
See page CA-25.

⇨	CAN DTC OUTPUT (PROCEED TO "CAN COMMUNICATION SYSTEM")
⇨	NO CAN DTC (GO TO STEP 4)

4	PROBLEM SYMPTOM CONFIRMATION

NEXT

5	PROBLEM SYMPTOMS TABLE

HINT:
See page ME-19.

NEXT

6	CIRCUIT INSPECTION

NEXT

7	REPAIR OR REPLACE

NEXT

8	**CONFIRMATION TEST**

NEXT

END

CUSTOMIZE PARAMETERS

1. COMBINATION METER ASSEMBLY

NOTICE:

Be sure to record the current value before customizing.

HINT:

The following items can be customized using intelligent tester.

METER:

Display (Item)	Default	Contents	Setting
KEY REMND VOLUM	LARGE	Function to change the volume of the key remind warning buzzer	LARGE, MEDIUM, SMALL
KEY REMND SOUND	NORMAL	Function to change the cycle of the key remind warning buzzer	FAST, NORMAL, SLOW
SEAT-BELT WARN	D/P ON	Function to change the setting of the seat belt buzzer.	D/P on, D ON, P on, D/P off

HINT:

This setting is only valid for the buzzer which sounds at the 5 km/h (3 mph) or more.

2. SEAT BELT BUZZER ON/OFF SETTING (Procedure "A")

The seat belt buzzer ON/OFF setting, which is a setting of the buzzer function of the combination meter, can disable the driver and front passenger side seat belt buzzers.

NOTICE:

- **These buzzers should be on for safe driving. Perform these procedures only if it is necessary to set the buzzer off (disabled).**
- **When either the battery cable or the combination meter connector is disconnected, these buzzers are set on (enabled).**
- **Odometer returns to 0 after starting this procedure, although it is not displayed.**

HINT:

"b-oFF" indicates that the buzzer is OFF. "b-on" indicates that the buzzer is ON. The seat belt buzzer ON/OFF setting will be finished (the odometer will display "ODO") if the ODO/TRIP switch is not operated for 10 seconds or more. In this case, perform step 11 to check that the buzzer ON/OFF setting is complete. If it is not complete, start from step 1 again.

(a) Driver and front passenger side seat belt buzzers

(1) Turn the ignition switch on (IG).

(2) Press the ODO/TRIP switch until the odometer displays "ODO".

(3) Ignition switch off.

(4) Turn the ignition switch on (IG).

(5) Press the ODO/TRIP switch immediately (within 6 seconds) and hold it down for 10 seconds or more.

(6) Continue holding down the ODO/TRIP switch and fasten the driver side seat belt.

(7) Check that the odometer displays either "b-on" or "b-oFF".
(8) Press the ODO/TRIP switch to change the display to "b-oFF".
(9) Ignition switch off.
(10) Turn the ignition switch on (IG).
(11) Check that no buzzer sounds.

(b) Front passenger side seat belt buzzer
(1) Turn the ignition switch on (IG).
(2) Press the ODO/TRIP switch until the odometer displays "ODO".
(3) Ignition switch off.
(4) Turn the ignition switch on (IG).
(5) Sit in the front passenger seat. Press the ODO/TRIP switch immediately (within 6 seconds) and hold it down for 10 seconds or more.
(6) Sit in the front passenger seat. Continue holding down the ODO/TRIP switch and fasten the front passenger side seat belt.
(7) Check that the odometer displays either "b-on" or "b-oFF".
(8) Press the ODO/TRIP switch to change the display to "b-oFF".
(9) Ignition switch off.
(10) Turn the ignition switch on (IG).
(11) Check that no buzzer sounds.

INITIALIZATION

1. OIL MAINTENANCE INFORMATION MODE RESET OPERATION

HINT:

- The trip meter reset knob is located on the right side of the combination meter assembly.
- This reset operation is required only for U.S.A..

(a) without multi-information display:

(1) Turn the ignition switch on (IG).

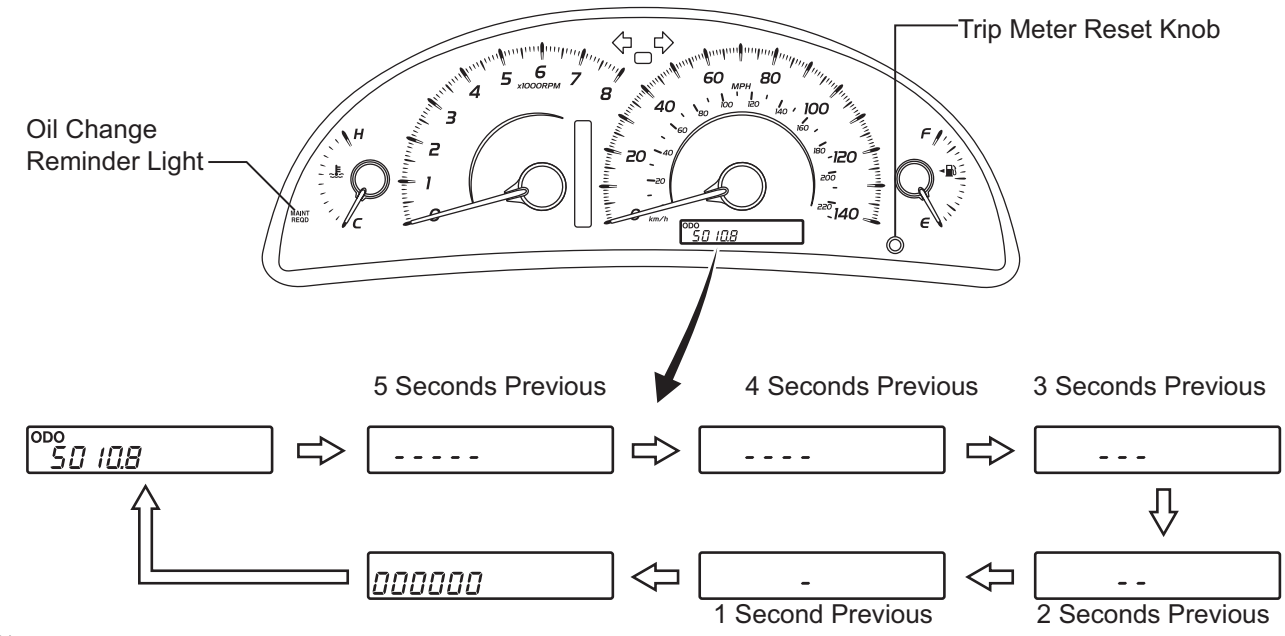
(2) Press the ODO/TRIP switch until the odometer appears.

(3) Ignition switch off.

(4) Turn the ignition switch on (IG).

(5) Turn the ignition switch on (IG) while pressing and holding the trip meter reset knob. Hold the trip meter reset knob until the following conditions are met and 5 seconds have passed.

without Multi-information display:



- When oil change reminder light turns off, the reset is complete.

(b) with multi-information display:

(1) Turn the ignition switch on (IG).

(2) Press the ODO/TRIP switch until the odometer appears.

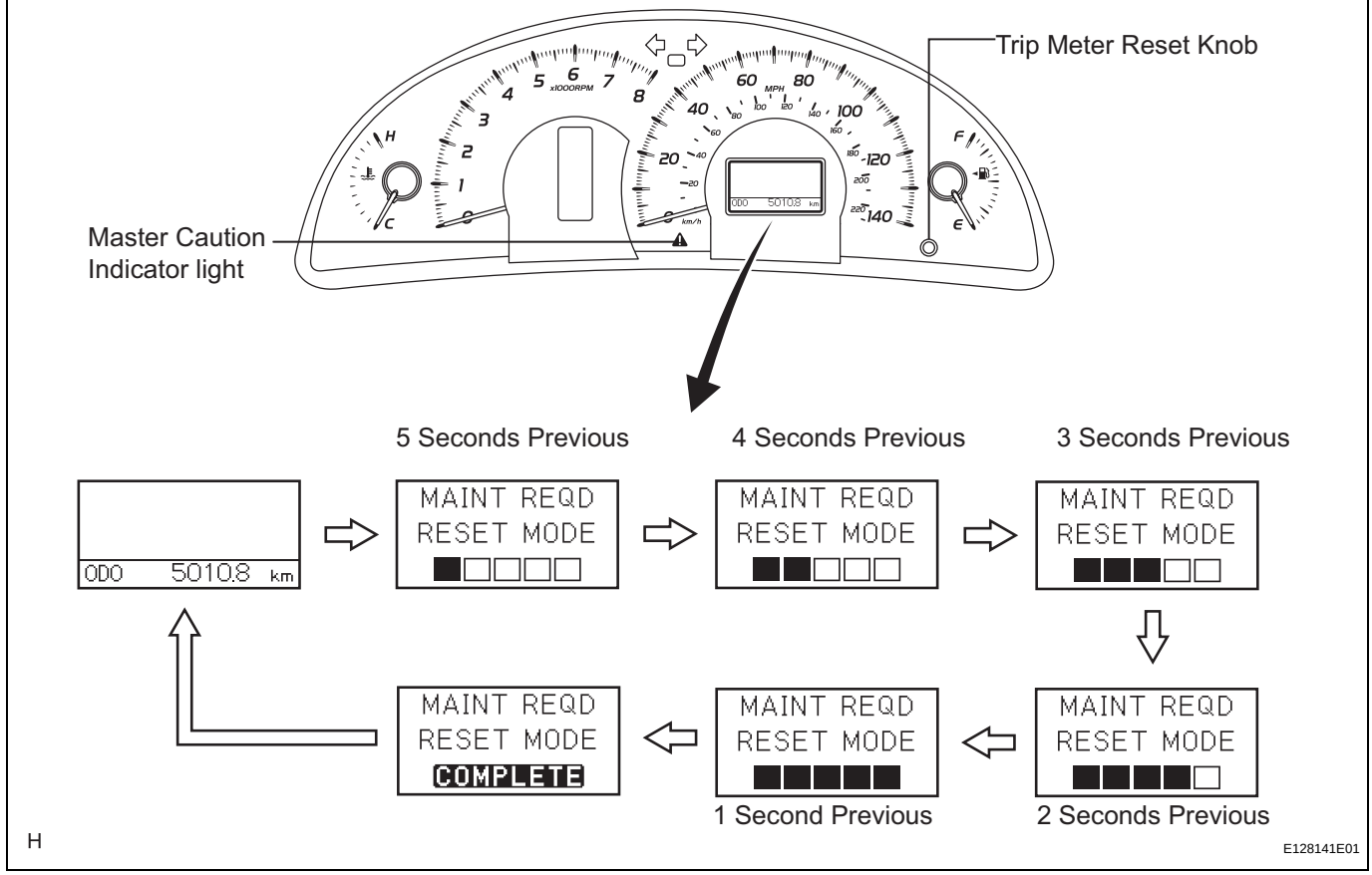
(3) Ignition switch off.

(4) Turn the ignition switch on (IG).

ME

(5) Turn the ignition switch on (IG) while pressing and holding the trip meter reset knob. Hold the trip meter reset knob until the following conditions are met and 5 seconds have passed.

with Multi-information display:



- The multi-information display shows "MAINT REQD RESET MODE".
- The master caution indicator light illuminates.
- When oil change reminder light turns off, the reset is complete.

(6) When "MAINT REQD RESET MODE COMPLETE" disappears and the master caution indicator light turns off, the reset is complete.

PROBLEM SYMPTOMS TABLE

ENTIRE SYSTEM:

Symptom	Suspected area	See page
Entire combination meter does not operate.	Power Source Circuit	ME-42
Meter illumination is always dark.	Meter Illumination Circuit	ME-57
Meter illumination does not dim at night.	Meter Illumination Circuit	ME-59

METER GAUGES:

Symptom	Suspected area	See page
Speedometer malfunction	Speedometer Circuit	ME-44
Tachometer malfunction	Tachometer Circuit	ME-47
Fuel receiver gauge malfunction	Fuel Receiver Gauge Circuit	ME-50
Engine coolant temperature malfunction	Engine Coolant Temperature Receiver Gauge Circuit	ME-54

WARNING LIGHTS:

Symptom	Suspected area	See page
Check engine warning light does not come on.	1. MIL Circuit (for 2AZ-FE)	ES-397
	2. MIL Circuit (for 2GR-FE)	ES-471
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-63
Charge warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. ECM (for 2AZ-FE)	-
	4. ECM (for 2GR-FE)	-
	5. Combination Meter Assembly	ME-63
Brake warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Brake Warning Light Circuit (without VSC)	BC-91
	4. Brake Warning Light Circuit (with VSC, Bosch Made)	BC-404
	5 Brake Warning Light Circuit (with VSC, Advics Made)	BC-91
	6. Main Body ECU	-
	7. Parking Brake Switch	-
	8. Combination Meter Assembly	ME-63
Brake warning light does not go off.	1. Combination Meter (LED)	ME-63
	2. Wire Harness or Connector	-
	3. Brake Warning Light Circuit (without VSC)	BC-91
	4. Brake Warning Light Circuit (with VSC, Bosch Made)	BC-404
	5. Brake Warning Light Circuit (with VSC, Advics Made)	BC-252
	6. Main Body ECU	-
	7. Parking Brake Switch	-
	8. Combination Meter Assembly	ME-63
ABS warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. ABS Warning Light Circuit (without VSC)	BC-78
	4. ABS Warning Light Circuit (with VSC, Bosch Made)	BC-385
	5. ABS Warning Light Circuit (with VSC, Advics Made)	BC-233
	6. Combination Meter Assembly	ME-63

Symptom	Suspected area	See page
ABS warning light does not go off.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. ABS Warning Light Circuit (without VSC)	BC-78
	4. ABS Warning Light Circuit (with VSC, Bosch Made)	BC-385
	5. ABS Warning Light Circuit (with VSC, Advics)	BC-233
	6. Combination Meter Assembly	ME-63
Airbag warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Airbag Warning Light Circuit	RS-228
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-63
Airbag warning light does not go off.	1. Combination Meter (LED)	ME-32
	2. Airbag Warning Light Circuit	RS-222
	3. Wire Harness or Connector	-
	4. Combination Meter Assembly	ME-63
Open door warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Door Courtesy Switch	LI-129
	4. Main Body ECU	-
	5. Combination Meter Assembly	ME-63
Fuel level warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Fuel Sender Gauge Assembly (for 2AZ-FE)	ME-71
	4. Fuel Sender Gauge Assembly (for 2GR-FE)	ME-74
	5. Combination Meter Assembly	ME-63
Low oil pressure warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Low Oil Pressure Switch	ME-37
	4. Combination Meter Assembly	ME-63
Driver seat belt warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Driver Seat Belt Warning Light Circuit	SB-9
	4. Main Body ECU	-
	5. Center Airbag Sensor Assembly	-
	6. Combination Meter Assembly	ME-63
Front passenger seat belt warning light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Front Passenger Seat Belt Warning Light Circuit	SB-11
	4. Combination Meter Assembly	ME-63
	5. Center Airbag Sensor Assembly	-
	6. Clock Assembly	OT-4
Tire pressure warning light does not come on. (with Tire Pressure Warning System)	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Tire Pressure Warning System	TW-65
	4. Combination Meter Assembly	ME-63
Washer level warning light does not come on (with washer level warning light). (with Washer Level Warning Light)	1. Wire Harness or Connector	-
	2. Combination Meter Assembly	-
	3. Washer Level Switch	-

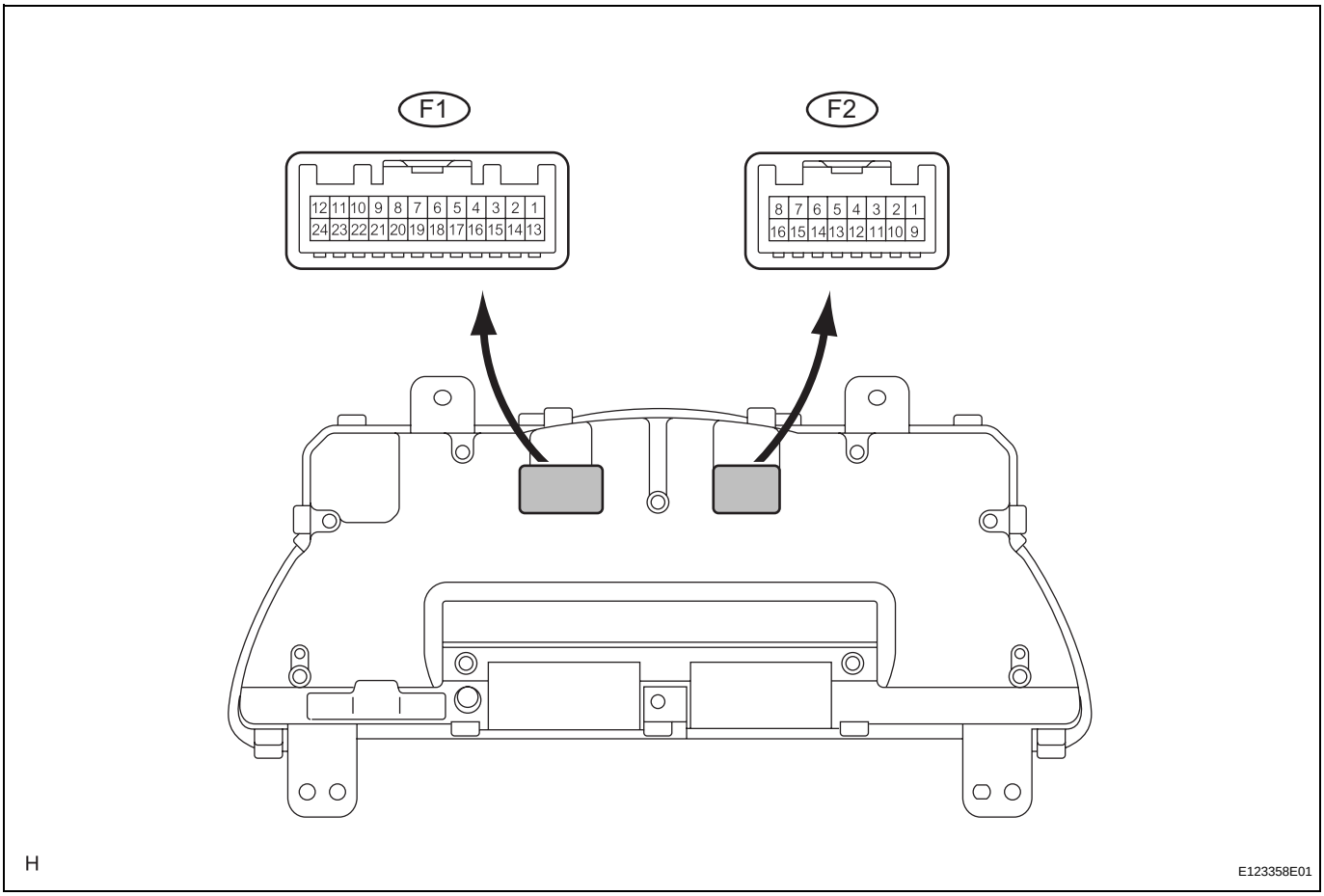
Symptom	Suspected area	See page
VSC warning light does not come on (without Multi-information Display, with VSC).	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. VSC Indicator Light Circuit (with VSC, Bosch Made)	BC-392
	4. VSC Indicator Light Circuit (with VSC, Advics Made)	BC-240
	5. Combination Meter Assembly	ME-63
VSC warning light does not come on (without Multi-information Display, with VSC).	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. VSC Indicator Light Circuit (with VSC, Bosch Made)	BC-392
	4. VSC Indicator Light Circuit (with VSC, Advics Made)	BC-240
	5. Combination Meter Assembly	ME-63

INDICATOR LIGHTS:

Symptom	Suspected area	See page
Shift indicator light does not come on. (for 2AZ-FE, Automatic Transaxle)	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Transmission Range Sensor Circuit	AX-39
	4. ECM	ES-432
	5. Combination Meter Assembly	ME-63
Shift indicator light does not come on. (for 2GR-FE, Automatic Transaxle,)	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Park/Neutral Position Switch Circuit	AX-158
	4. Transmission Control Switch Circuit	AX-154
	5. ECM	ES-518
	6. Combination Meter Assembly	ME-63
Turn indicator light does not come on.	1. Wire Harness or Connector	-
	2. Turn Indicator Light Circuit	LI-12
	3. Combination Meter Assembly	ME-63
SLIP indicator light does not come on (with VSC).	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. SLIP Indicator Light Circuit (with VSC, Bosch Made)	BC-412
	4. SLIP Indicator Light Circuit (with VSC, Advics Made)	BC-259
	5. Combination Meter Assembly	ME-63
SLIP indicator light does not go off (with VSC).	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. SLIP Indicator Light Circuit (with VSC, Bosch Made)	BC-412
	4. SLIP Indicator Light Circuit (with VSC, Advics Made)	BC-259
	5. Combination Meter Assembly	ME-63
CRUISE indicator light does not come on.	1. Combination Meter (LED)	ME-32
	2. Wire Harness or Connector	-
	3. Cruise Main Indicator Light Circuit	CC-34
	4. Combination Meter Assembly	ME-63
High beam indicator light does not come on.	1. Wire Harness of Connector	-
	2. Headlight Dimmer Switch	-
	3. Main Body ECU	-
	4. Combination Meter Assembly	ME-63

TERMINALS OF ECU

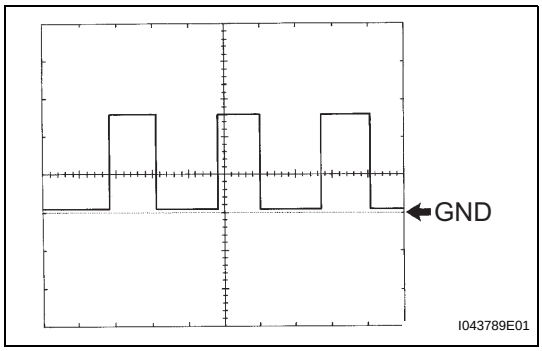
1. COMBINATION METER ASSEMBLY



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (F2-1) - Body ground	G - Body ground	Turn indicator light signal	Turn the ignition switch on (IG), turn signal RH indicator light OFF	Below 1 V
			Turn the ignition switch on (IG), turn signal RH indicator light ON	10 to 14 V
B (F2-2) - Body ground	L - Body ground	Turn indicator light signal	Turn the ignition switch on (IG), turn signal LH indicator light OFF	Below 1 V
			Turn the ignition switch on (IG), turn signal LH indicator light ON	10 to 14 V
CHK (F2-4) - Body ground	R - Body ground	Malfunction indicator lamp signal	Turn the ignition switch on (IG), CHECK ENGINE warning light ON	Below 3 V
			Turn the ignition switch on (IG), CHECK ENGINE warning light OFF	10 to 14 V
B/LE (F2-6) - Body ground	LG - Body ground	Brake fluid level warning light signal	Turn the ignition switch on (IG), BRAKE warning light OFF	10 to 14 V
			Turn the ignition switch on (IG), BRAKE warning light ON	Below 1 V
+S (F2-12) - Body ground	V - Body ground	Speed signal (Output)	Turn the wheel slowly	Pulse generation (See waveform 1)
SI (F2-14) - Body ground	V - Body ground	Speed signal (Input)	Turn the ignition switch on (IG), turn the wheel slowly	Pulse generation (See waveform 1)

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
FR (F2-15) - Body ground	GR - Body ground	Fuel signal	Turn the ignition switch on (IG), fuel level is FULL	Below 1 V
			Turn the ignition switch on (IG), fuel level is EMPTY	3 to 7 V
FE (F2-16) - Body ground	P - Body ground	Ground (Fuel ground)	Always	Below 1 V
B2 (F1-1) - Body ground	R - Body ground	Battery	Always	10 to 14 V
B (F1-2) - Body ground	V - Body ground	Battery	Always	10 to 14 V
WLVL (F1-5) (*1) - Body ground	LG - Body ground	Washer level warning switch signal	Turn the ignition switch on (IG), washer level warning light ON	Below 1 V
			Turn the ignition switch on (IG), washer level warning light off	10 to 14 V
TIRE (F1-7) (*2) - Body ground	L - Body ground	Tire pressure warning light signal	Turn the ignition switch on (IG), tire pressure warning light ON	0.9 to 3.2 V
			Turn the ignition switch on (IG), tire pressure warning light off	3.2 V or higher
S (F1-8) - Body ground	O - Body ground	Engine oil pressure warning light signal	Turn the ignition switch on (IG), engine oil pressure warning light OFF	10 to 14 V
			Turn the ignition switch on (IG), engine oil pressure warning light ON	Below 1 V
P/SB (F1-9) - Body ground	P - Body ground	Passenger seat belt warning light signal	Sit on the front passenger seat, turn the ignition switch on (IG), front passenger seat belt warning light OFF	10 to 14 V
			Sit on the front passenger seat, turn the ignition switch on (IG), front passenger seat belt warning light Blinks	10 to 14 V ←→ Below 1 V
ILL- (F1-11) - Body ground	BR - Body ground	Illumination signal	Turn the ignition switch on (IG)	10 to 14 V ←→ Below 1 V
E2 (F1-12) - Body ground	W-B - Body ground	Ground (Power ground)	Always	Below 1 V
IG+ (F1-13) - Body ground	GR - Body ground	Ignition switch signal	Turn the ignition switch off	Below 1 V
			Turn the ignition switch on (IG)	10 to 14 V
CANH (F1-17) - Body ground	B - Body ground	CAN communication signal	-	-
CANL (F1-18) - Body ground	W - Body ground	CAN communication signal	-	-
DISP (F1-22) - Body ground	V - Body ground	Steering pad switch signal	Turn the ignition switch on (IG), DISP switch off	4 to 6 V
			Turn the ignition switch on (IG), DISP switch ON	Below 1 V
CHG- (F1-23) - Body ground	L - Body ground	Charge warning light signal	Turn the ignition switch on (IG), CHARGE warning light OFF	10 to 14 V
			Turn the ignition switch on (IG), CHARGE warning light ON	Below 1 V
ES (F1-24) - Body ground	BR - Body ground	Ground (Signal ground)	Always	Below 1 V

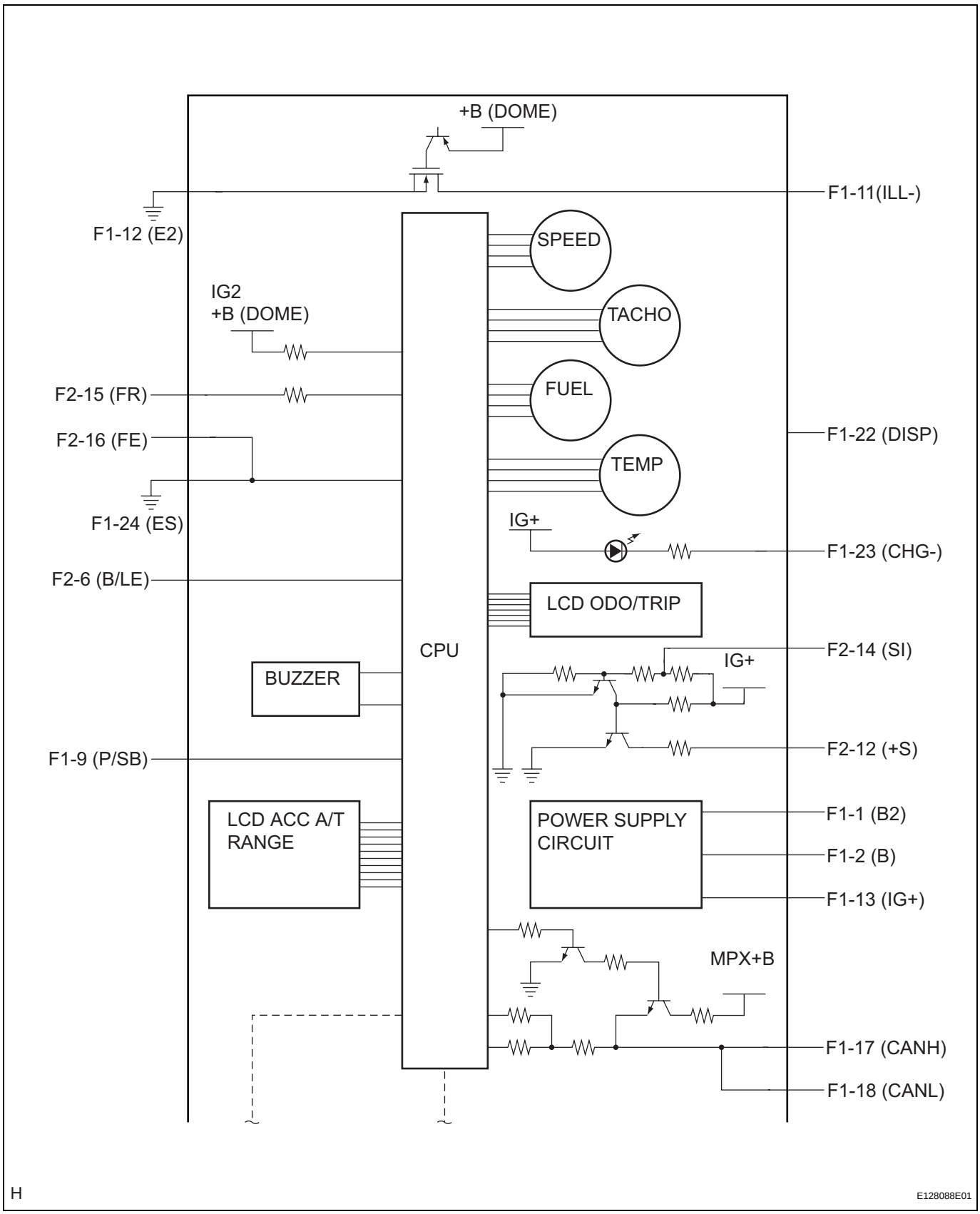
*1: with Washer Level Warning Light
*2: with Tire Pressure Warning System



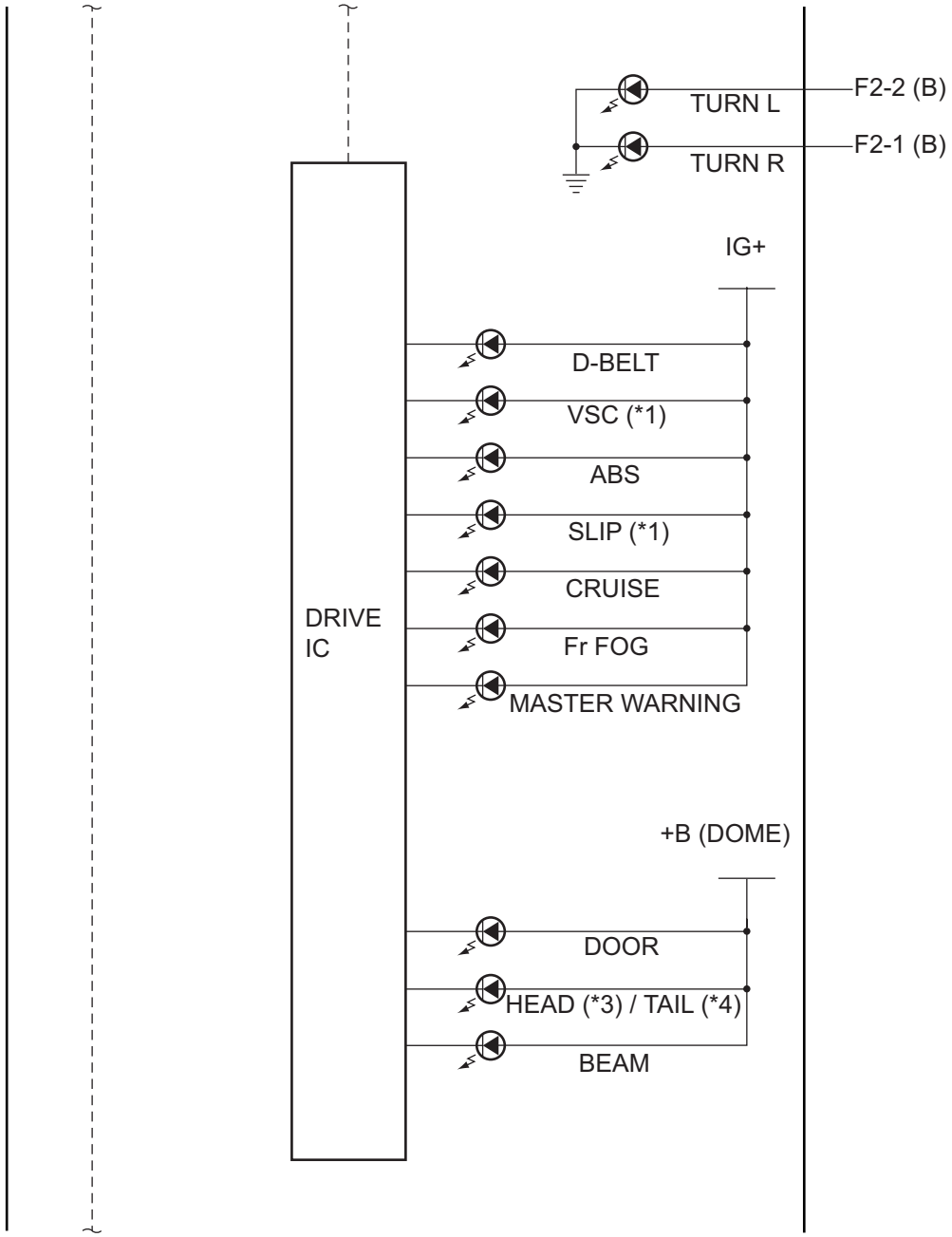
(a) Waveform 1 (Reference): Using oscilloscope:

Item	Condition
Tool setting	5 V/DIV., 20 ms/DIV.
Vehicle condition	Driving at approx. 20 km/h (12 mph)

2. COMBINATION METER INNER CIRCUIT



ME



*1: with VSC *2: for Automatic Transaxle *3: for U.S.A. *4: for Canada

H

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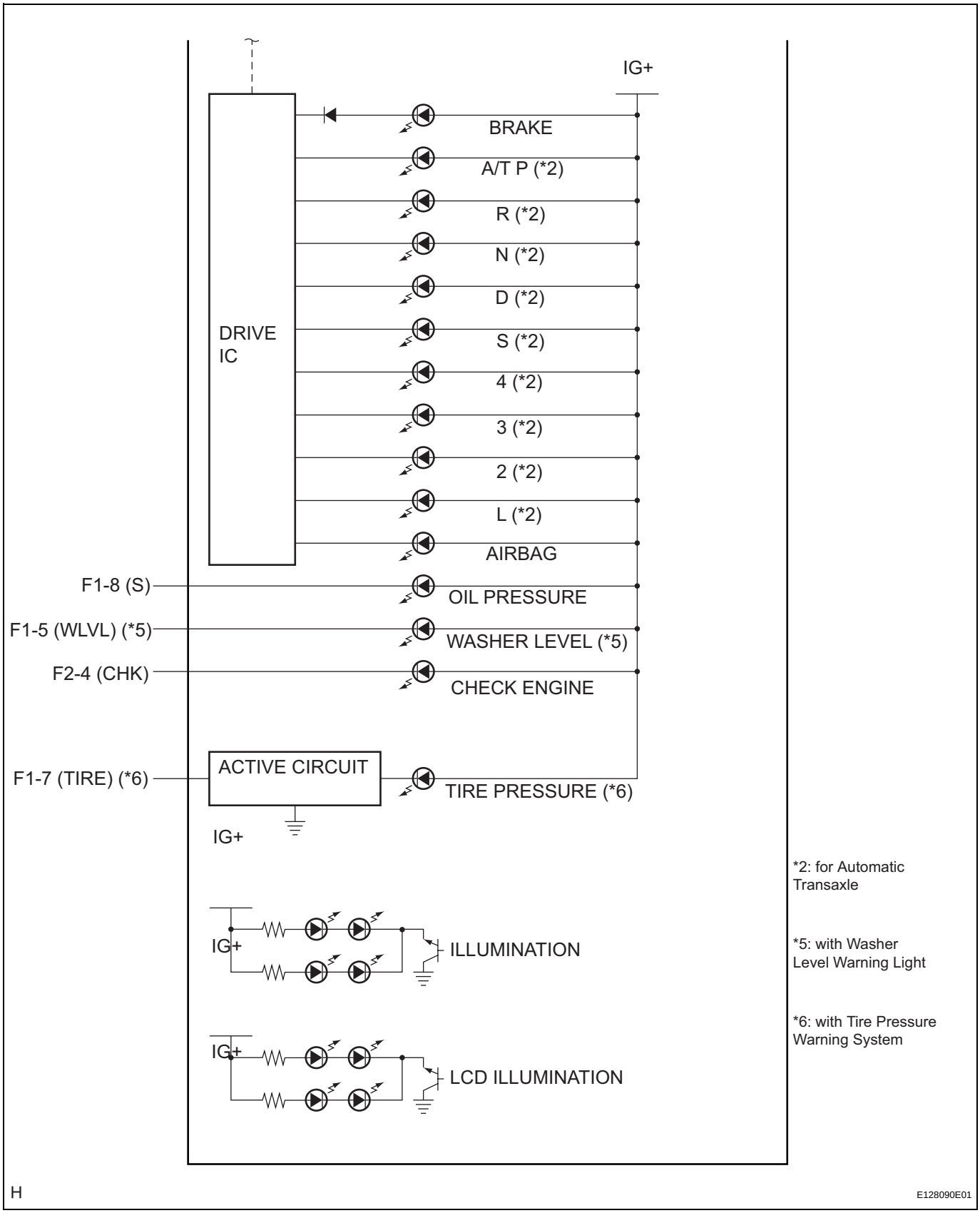
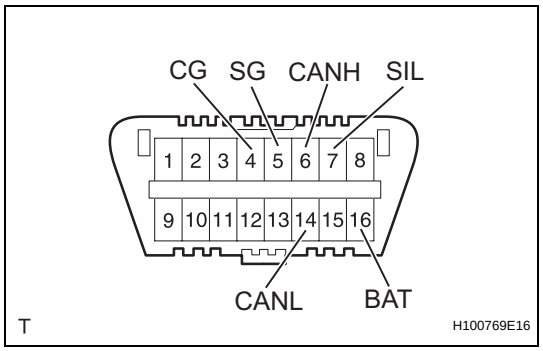
ME


IG+
DRIVE IC
BRAKE
A/T P (*2)
R (*2)
N (*2)
D (*2)
S (*2)
4 (*2)
3 (*2)
2 (*2)
L (*2)
AIRBAG
F1-8 (S)
OIL PRESSURE
F1-5 (WLVL) (*5)
WASHER LEVEL (*5)
F2-4 (CHK)
CHECK ENGINE
F1-7 (TIRE) (*6)
ACTIVE CIRCUIT
TIRE PRESSURE (*6)
IG+
IG+
ILLUMINATION
IG+
LCD ILLUMINATION
*2: for Automatic Transaxle
*5: with Washer Level Warning Light
*6: with Tire Pressure Warning System
H
E128090E01

ME

Terminal No.		Wire harness side
F2	1	Turn Signal Flasher (B)
	2	Turn Signal Flasher (B)
	3	-
	4	ECM (CHK)
	5	-
	6	Brake Fluid Level Warning Switch (B/LE)
	7	-
	8	-
	9	-
	10	-
	11	-
	12	Each part that uses speed signal
	13	-
	14	Brake Actuator Assembly (*1) / ABS & Traction Actuator Assembly (*2) (SI)
	15	Fuel Sender Gauge Assembly (FR)
	16	Fuel Sender Gauge Assembly (FE)
F1	1	MPX-B Fuse
	2	DOME Fuse
	3	-
	4	-
	5	Washer Level Warning Switch (*3)
	6	-
	7	Tire Pressure Warning ECU (*4)
	8	Oil Pressure Warning Switch
	9	Clock Assembly (P/SB)
	10	-
	11	PANEL Fuse
	12	Ground (E2)
	13	No. 2 GAUGE Fuse
	14	-
	15	-
	16	-
	17	CAN Communication Line (CAN H)
	18	CAN Communication Line (CAN L)
	19	-
	20	-
	21	-
	22	Steering Pad Switch (DISP)
	23	Alternator L Terminal
	24	Ground (ES)

*1: without VSC
*2: with VSC
*3: with Washer Level Warning Light
*4: with Tire Pressure Warning System



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches ISO 15765-4 format. If the result is not as specified, the DLC3 may have a malfunction. Repair or replace harness and connector.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
CG (4) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off*	200 kΩ or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off*	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off*	6 kΩ or higher

NOTICE:

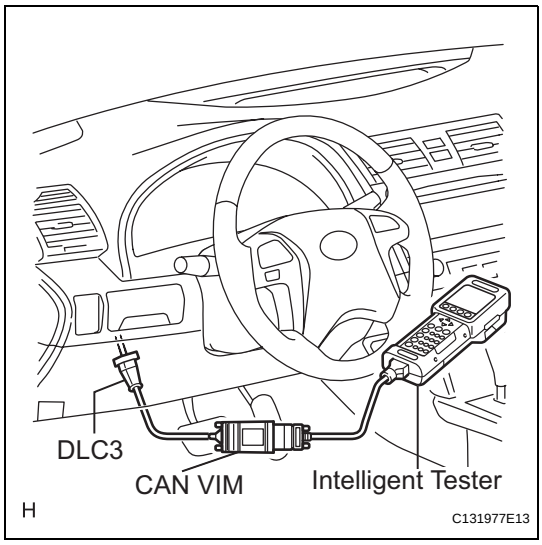
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

If the display shows an error message after having connected the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG), and operated the tester, there is a problem on either the vehicle side or the tool side.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following menus: DIAGNOSTICS / OBD/ MOBD / METER / DTC INFO / CURRENT CODES.
(d) Check for DTCs.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following menus: DIAGNOSTICS / OBD/ MOBD / METER / DTC INFO / CURRENT CODES.
(d) Erase DTCs by pressing the YES button on the tester.

FAIL-SAFE CHART

ENGINE COOLANT TEMPERATURE GAUGE:

Condition	Response	Recovery
Engine coolant temperature data is interrupted for 3.1 seconds.	The gauge needle indicates between / and C.	Engine coolant temperature data is received.

SHIFT INDICATOR:

Condition	Response	Recovery
Shift position data is interrupted for 3.1 seconds.	All indicator light go off.	Normal data is received.
Gear position data is interrupted for 3 seconds.	The gear position indicator light goes off.	Normal data is received.

ABS & BRAKE:

Condition	Response	Recovery
ABS & brake data is interrupted for 1 second.	The warning light comes on.	Normal data is received.

DOOR:

Condition	Response	Recovery
Each door condition data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

DRIVER SIDE SEAT BELT:

Condition	Response	Recovery
Driver side front seat inner belt assembly data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

TIRE PRESSURE:

Condition	Response	Recovery
Tire pressure data is interrupted for 10 seconds.	The tire pressure indicator light blinks for 60 to 64 seconds, then comes on.	Normal data is received.

OIL MAINTENANCE (*1):

Condition	Response	Recovery
The running distance after performing oil maintenance reminder light resetting procedure.	Oil change reminder light comes on.	Normal data is received.

HEAD (*1)/TAIL (*2):

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

BEAM:

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

AIRBAG:

Condition	Response	Recovery
Airbag data is interrupted for 10 seconds.	The warning light comes on.	Normal data is received.
Turn the ignition switch on (IG), then the combination meter (meter CPU) can't detect the voltage of 9 V or more for 60 seconds.		

FRONT PASSENGER SIDE SEAT BELT:

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

CRUISE:

Condition	Response	Recovery
Regular data is interrupted for 10 seconds.	The data received most recently remains indicated.	Normal data is received.

CHARGE:

Condition	Response	Recovery
Regular data is interrupted.	The warning light goes off.	Normal data is received.

MULTI-INFORMATION DISPLAY:

Condition	Response	Recovery
Cruise information data is interrupted for 60 seconds.	The display becomes blank (only measurement units are displayed).	Normal data is received.

*1: for U.S.A.
*2: Except for U.S.A.

DATA LIST / ACTIVE TEST

1. DATA LIST

According to the DATA LIST displayed by the intelligent tester, you can read the values of the switches, sensors, actuators and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten work time.

(a) Warm up the engine.
(b) Ignition switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn the tester ON.
(f) Enter following menus: DIAGNOSIS / OBD/MOBD / METER / DATA LIST.
(g) Check values by referring to the table below.

METER:

ITEM	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
TAIL CANCEL SW	TAIL CANCEL switch is ON/OFF	ON: Rheostat knob turns fully clockwise	-
		OFF: Rheostat knob turns fully counterclockwise	-
ODO/TRIP SW	ODO/TRIP switch is ON/OFF	ON: Switch is pushed	-
		OFF: Switch is released	-
P-BELT BUCKL SW	Front passenger buckle switch is ON/OFF	ON: Seat belt is fastened	-
		OFF: Seat belt is unfastened	-
SPEED METER	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual vehicle speed (When driving)	If data received from the skid control ECU exceeds the range that can be displayed on the meter, the meter continues to display the maximum value of the range.
TACHO METER	Engine speed/Min.: 0 rpm, Max.: 12,750 rpm	Almost same at the meter rpm (When engine is running)	If data received from the ECM exceeds the range that can be displayed on the meter, the meter continues to display the maximum value of the range.
COOLANT TEMP	Engine coolant temperature 0°C (32°F) to 127.5°C (261.5°F)	After warming up: 78°C (172.4°F) to 105°C (221°F)	•If -40°C (-40°F): sensor circuit open •If 140°C (284°F) or more: sensor circuit shorted
WASHER SW	Washer level warning switch is ON/OFF	ON: Washer level is more than low	-
		OFF: Washer level is less than low	-
MULTI DISP SW	MODE switch in the steering pad is ON/OFF	ON: Mode switch is ON	-
		OFF: Mode switch is OFF	-
+B VOLTAGE VAL	Battery voltage/Min.: 0 V, Max.: 25.5 V	10 to 14 V	-
OIL MAINTENANCE	Oil maintenance warning value: Min.: 0, Max. 25500	The running distance after performing oil maintenance resetting procedure is displayed	If the value is 5,000 or more, perform oil maintenance resetting procedure after changing the oil.
FUEL GAUGE	Fuel input signal Min.: 0, Max. 255	Fuel gauge indicates (F): 35	-
		Fuel gauge indicates (3/4): 85	-
		Fuel gauge indicates (1/2): 145	-
		Fuel gauge indicates (1/4): 186	-
		Fuel gauge indicates (E): 205	-

ITEM	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
AMBIENT TEMP	Outside temperature: Min.: -40°C (-40°F) to 87.5°C (189.5°F)	Almost same as actual outside temperature	The temperature displayed on the multi-information display is -22 to 122°C (-30 to 50 °F)
RHEOSTAT	Light Control Rheostat/Min.: 0, Max.: 100	Light control rheostat switch is Dark (0) → Bright (100)	-
KEY REMND SOUND	The cycle of the key reminder warning buzzer is FAST, NORMAL, SLOW	The customized setting of the cycle of the key reminder warning buzzer is displayed.	-
SEAT-BELT WARN	The volume of the seat belt warning buzzer is D/P ON, D ON, P ON, D/P OFF	The customized setting of the volume of the seat belt warning buzzer is displayed.	-
KEY REMND VOLUM	The volume of the key reminder warning buzzer is LARGE, MEDIUM, SMALL	The customized setting of the volume of the key reminder warning buzzer is displayed.	-

ABS/TRAC/VSC:

ITEM	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
FR/FL/RR/RL WHEEL SPD	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual vehicle speed (When driving)	-
VEHICLE SPD	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual vehicle speed (When driving)	-

ENGINE:

ITEM	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
ENGINE SPD	Vehicle speed/Min.: 0 rpm, Max.: 16,383.75 rpm	Almost same as actual vehicle speed (When driving)	-
COOLANT TEMP	Engine coolant temperature: Min.: -40°C (-40°F), Max.: 140°C (284°F)	80 to 100°C (176 to 212°F): After warming up	• If -40°C (-40°F): sensor circuit open • If 140°C (284°F) or more: sensor circuit shorted

2. ACTIVE TEST

Performing the ACTIVE TEST using the intelligent tester allows the meters, indicators and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one way to shorten labor time.

It is possible to display the DATA LIST on the intelligent tester during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter following menus: DIAGNOSIS / OBD/MOBD / METER / ACTIVE TEST.
(e) From the display on the tester, performing the "ACTIVE TEST".

ME

METER:

Item	Test Details	Diagnostic Note
SPEED METER	0, 40 (24), 80 (48), 120 (72), 160 (96), 200 (120) km/h (mph)	-
TACHOMETER	0, 1,000, 2,000, 3,000, 4,000, 5,000, 6,000, 7,000 (rpm)	-
FUEL GAUGE	EMPTY, 1/2, FULL	-
COOLANT TEMP	LOW, NORM, HIGH	-
A/T INDIC (1) (*1)	A/T shift indicator light L, 2, 3, 4, S, D, N, R, P is OFF/ON	-
A/T INDIC (2) (*1)	A/T gear range indicator light is OFF/ON	

Item	Test Details	Diagnostic Note
METER DISPLAY 1	All the dot in the multi-information display OFF/ON	Confirm that the vehicle is stopped, engine idling
METER DISPLAY 2	All the dot in the A/T shift indicator display OFF/ON	Confirm that the vehicle is stopped, engine idling
SRS WARN	SRS warning light is OFF/ON	-
OPEN DOOR WARN	Open door indicator is OFF/ON	-
P-BELT REMIND	P-belt indicator is OFF/ON	-
D-BELT REMIND	D-belt indicator is OFF/ON	-
ABS WARN	ABS OFF indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
DISCHARGE WARN	Charge warning light is OFF/ON	-
VSC WARN (*2)	VSC warning light is OFF/ON	-
SLIP INDIC	SLIP indicator is OFF/ON	-
HIGH BEAM INDIC	Hi-beam indicator is OFF/ON	-
HEADLIGHT INDIC (*3)	HEAD indicator is OFF/ON	-
TAILLIGHT INDIC (*4)	TAIL indicator is OFF/ON	-
Fr FOG INDIC	Fr FOG indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
D DOOR OPEN	D DOOR OPEN indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
P DOOR OPEN	P DOOR OPEN indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
RR DOOR OPEN	RR DOOR OPEN indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
RL DOOR OPEN	RL DOOR OPEN indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
LUGG DOOR OPEN	Luggage DOOR OPEN indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
LOW WASHER WARN (*5)	LOW WASHER warning light is OFF/ON	Confirm that the vehicle is stopped, engine idling
LOW FUEL WARN	Fuel warning light is OFF/ON	-
TIRE PRESS WARN (*6)	TIRE PRESS warning is OFF/ON	-
ECB INDIC	BRAKE warning light is OFF/ON	Confirm that the vehicle is stopped, engine idling
CRUISE INDIC	CRUISE indicator is OFF/ON	-
BRAKE WARN	BRAKE warning light is OFF/ON	Confirm that the vehicle is stopped, engine idling
OIL MAINTENANCE (*3)	MAINTENANCE indicator light is OFF/ON	Confirm that the vehicle is stopped, engine idling
MST WARN INDIC	MASTER WARNING light is OFF/ON	Confirm that the vehicle is stopped, engine idling

*1: for Automatic Transaxle
*2: without Multi-information Display, with VSC
*3: for U.S.A.
*4: for Canada
*5: with Washer Level Warning Light
*6: with Tire Pressure Warning System

DIAGNOSTIC TROUBLE CODE CHART

DTC No.	Detection Item	Trouble Area	See page
U0100	Lost Communication with ECM/ PCM "A"	- ECM - CAN communication system	ME-38
U0129	Lost Communication with Skid Control ECU	- ABS and traction actuator assembly (Skid control ECU) - CAN communication system	ME-40

ON-VEHICLE INSPECTION

1. INSPECT SPEEDOMETER

(a) Check the operation.

(1) Using a speedometer tester (calibrated chassis dynamometer), check the speedometer indication according to the table below.

Reference: mph (U.S.A.)

Chassis dynamometer indication	Acceptable range
20 mph	20.0 to 23.0 mph
40 mph	40.0 to 43.5 mph
60 mph	60.0 to 64.0 mph
80 mph	80.0 to 84.5 mph
100 mph	100.0 to 105.0 mph
120 mph	120.0 to 125.5 mph
140 mph	140.0 to 146.0 mph
160 mph	160.0 to 166.5 mph

Reference: km/h (Canada)

Chassis dynamometer indication	Acceptable range Data in ( ) is for reference
20 km/h	(17.5 to 21.5 km/h)
40 km/h	38.0 to 42.0 km/h
60 km/h	58.0 to 63.0 km/h
80 km/h	78.0 to 84.0 km/h
100 km/h	98.5 to 104.5 km/h
120 km/h	119.0 to 125.0 km/h
140 km/h	139.0 to 146.0 km/h
160 km/h	159.0 to 167.0 km/h
180 km/h	179.0 to 188.0 km/h
200 km/h	199.0 to 209.0 km/h
220 km/h	219.0 to 230.0 km/h
240 km/h	239.0 to 251.0 km/h

NOTICE:
Tire wear as well as over or under inflation will cause errors.

(2) Check the deviation from the acceptable range of the speedometer indication.

Reference:
Less than 0.5 km/h (0.3 mph)

HINT:
If the indication is not as specified, go to problem symptoms table (See page ME-19).

2. INSPECT TACHOMETER

(a) Connect a tune-up tachometer, and start the engine.

(b) Compare the test results with the tachometer indications.

DC 13.5 V, at 25°C (77°F)

Tune-up tachometer indication (rpm)	Acceptable range Data in ( ) is for reference
700	630 to 770
1,000	(900 to 1,100)
2,000	(1,850 to 2,150)

Tune-up tachometer indication (rpm)	Acceptable range Data in ( ) is for reference
3,000	2,800 to 3,200
4,000	(3,800 to 4,200)
5,000	4,800 to 5,200
6,000	(5,750 to 6,250)
7,000	6,700 to 7,300
8,000	(7,700 to 8,300)

HINT:
If the indication is not as specified, go to the problem symptoms table (See page ME-19).

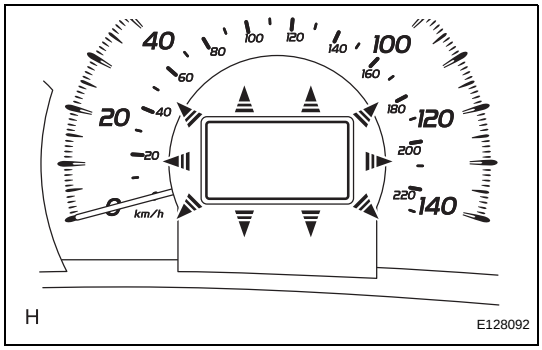
3. INSPECT ENGINE OIL PRESSURE SWITCH

(a) Disconnect the connector from the engine oil pressure switch.
(b) Turn the ignition switch on (IG).
(c) Ground the terminal of the wire harness side connector, then check the low oil pressure warning light or message.

OK

Vehicle Specification	Condition	Result
with multi-information display	**Turn the ignition switch on (IG) and engine idling for 10 seconds or more**	**Warning message is displayed.**
without multi-information display	**Turn the ignition switch on (IG) and engine off**	**Oil pressure warning light comes on.**
	Turn the ignition switch on (IG) and engine idling	**Oil pressure warning light goes off.**

HINT:
If the warning light or message is not displayed, go to the problem symptoms table (See page ME-19).



4. INSPECT MULTI-INFORMATION DISPLAY

(a) Ignition switch off.
(b) Press the "DISP" button and hold it down.
(c) Ignition switch on (IG).

OK:

All the dots in the multi-information display come on.

HINT:
This test is also available on "ACTIVE TEST" (See page ME-32).

(d) Ignition switch off to finish this test mode.

HINT:
If the result is not as specified, replace the combination meter assembly.

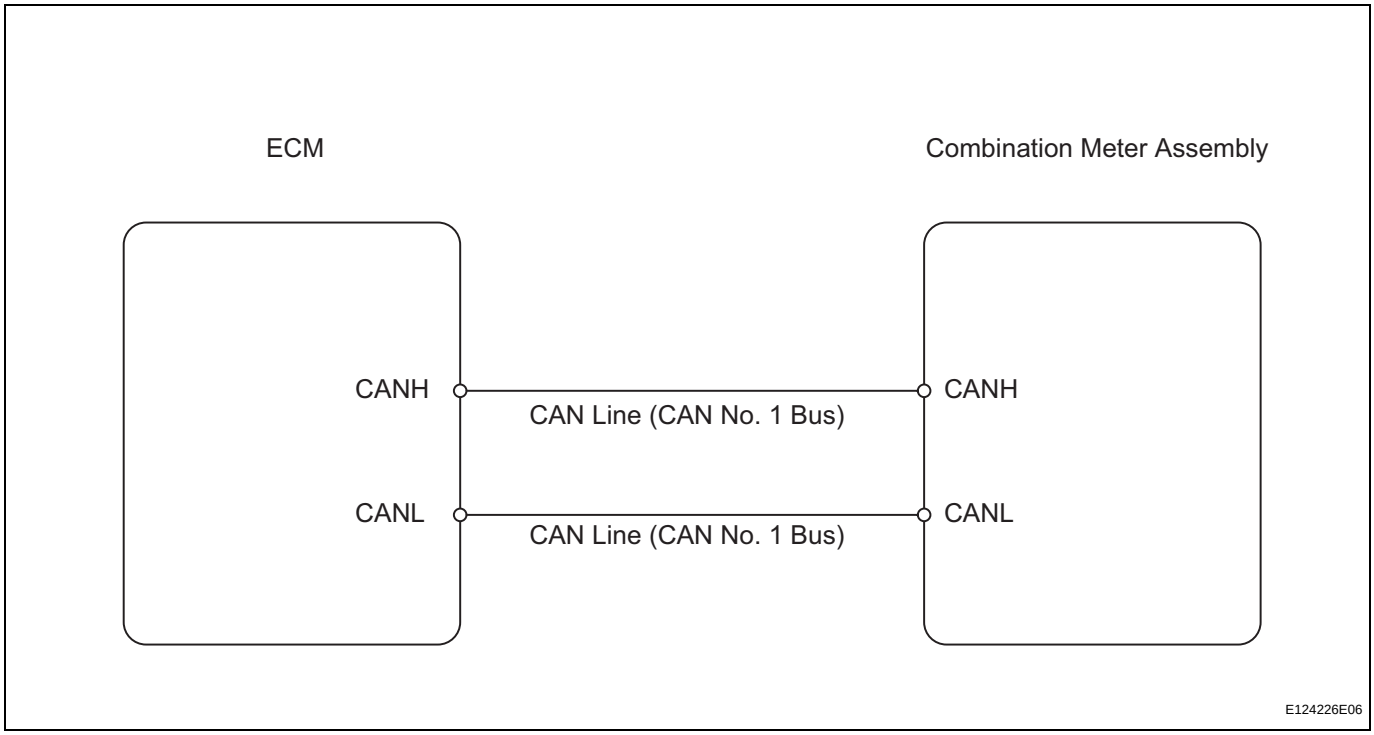
DTC	U0100	Lost Communication with ECM/PCM "A"

DESCRIPTION

The combination meter assembly communicates with the ECM via the CAN communication lines (CAN No. 1 Bus).

DTC No.	DTC Detection Conditions	Trouble Areas
U0100	When either of following conditions detected: 1. Vehicle speed 5 km/h (3.1 mph) or more and IG voltage 10.5 V or more 2. No communication with ECM continues for 3 seconds or more (No communication to ECM or skid control ECU continues for 60 seconds or more)	• CAN communication system • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CONFIRM DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Clear the stored DTCs by selecting the following menu items on the tester: DIAGNOSIS / OBD / MOBD / METER / DTC INFO / CLEAR CODES.
(e) Drive the vehicle at more than 5 km/h (3.1 mph) for at least 60 seconds.
(f) Stop the vehicle.
(g) Check for DTCs (See page CA-25).

Result

Result	Proceed to
DTC output	A (See page CA-31)
DTC not output	B

B → **USE SIMULATION METHOD TO CHECK**

A

GO TO CAN COMMUNICATION SYSTEM

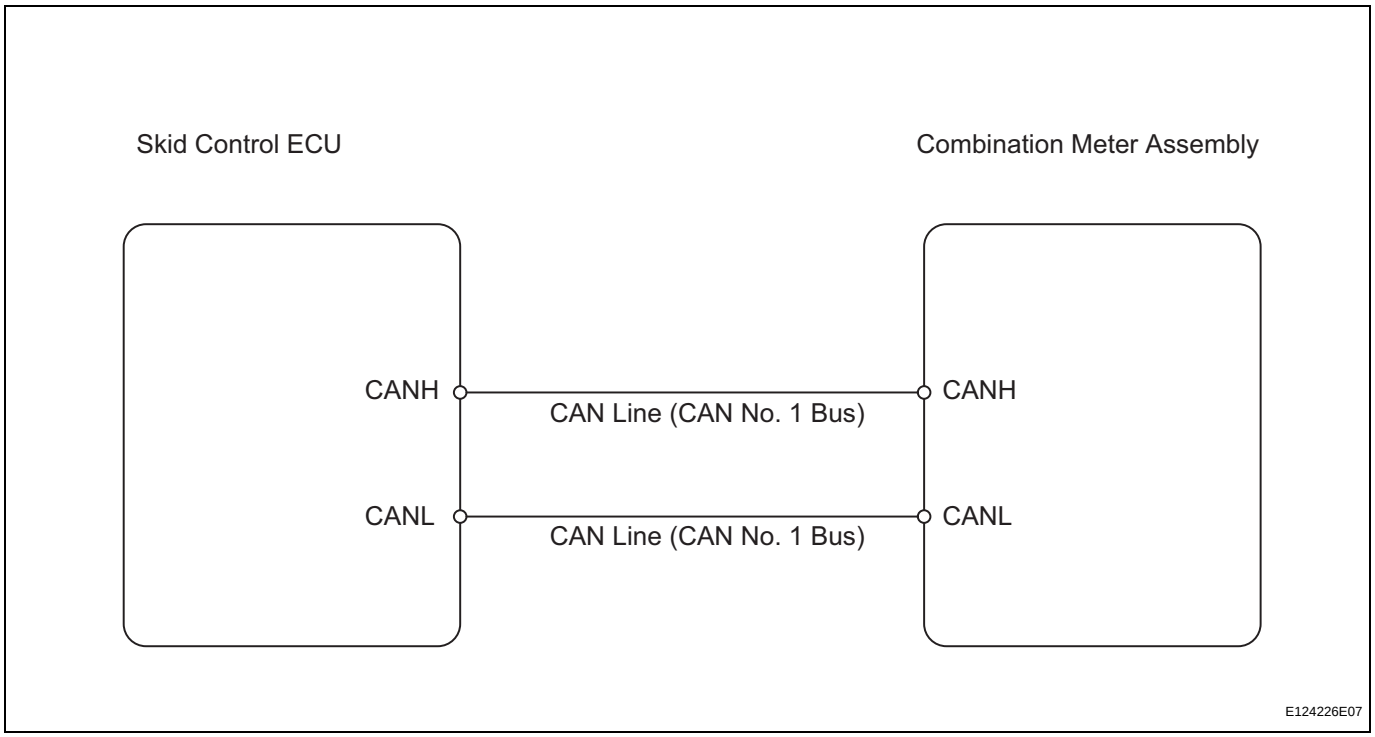
DTC	U0129	Lost Communication with Skid Control ECU

DESCRIPTION

The combination meter assembly communicates with the ABS and traction actuator (skid control ECU) via the CAN communication lines (CAN No. 1 Bus).

DTC No.	DTC Detection Conditions	Trouble Areas
U0129	When either of following conditions detected: 1. 15 seconds have elapsed since engine started and IG voltage 10.5 V or more 2. No communication with ABS and traction actuator (skid control ECU) continues for 3 seconds or more (No communication with ECM or skid control ECU continues for 60 seconds or more)	• ABS and traction actuator assembly (Skid control ECU) • CAN communication system

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CONFIRM DTC OUTPUT

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester on.
(d) Clear the stored DTCs by selecting the following menu items on the tester: DIAGNOSIS / OBD / MOBD / METER / DTC INFO / CLEAR CODES.
(e) Drive the vehicle at more than 5 km/h (3.1 mph) for at least 60 seconds.
(f) Stop the vehicle.
(g) Check for DTCs (See page CA-25).

Result

Result	Proceed to
DTC output	A (See page CA-31)
DTC not output	B

B → **USE SIMULATION METHOD TO CHECK**

A

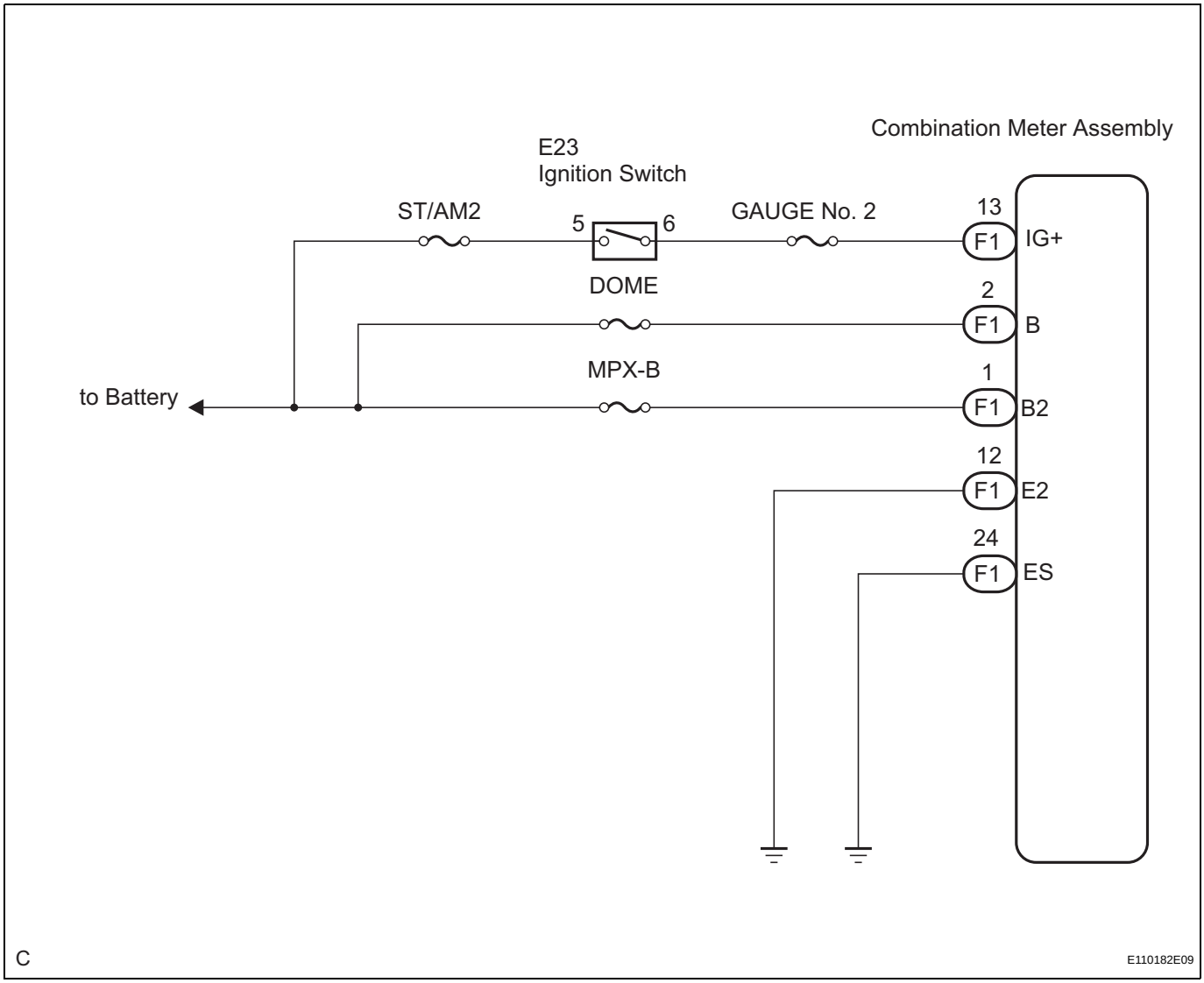
GO TO CAN COMMUNICATION SYSTEM

Entire Combination Meter does not Operate

DESCRIPTION

This circuit is the power source circuit for the meter. This circuit provides two types of power sources; one is a constant power source mainly used as a backup power source, and the other is a power source mainly used for signal transmission. The constant power source is mainly used as a backup power source of the meter CPU, however, it is also used for communication. If a voltage of 12 V is not applied to terminal IG+ when turn the ignition switch on (IG), the indicator will not operate.

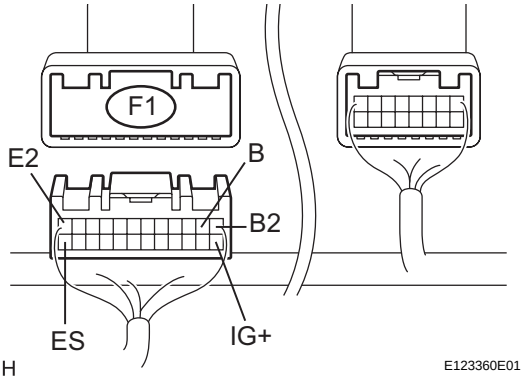
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT COMBINATION METER ASSEMBLY

Combination Meter Assembly Wire Harness View:



(a) Disconnect the F1 connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-12 (E2) - Body ground	Always	Below 1 Ω
F1-24 (ES) - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F1-13 (IG+) - Body ground	Turn the ignition switch on (IG)	10 to 14 V
F1-1 (B2) - Body ground	Always	10 to 14 V
F1-2 (B) - Body ground	Always	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

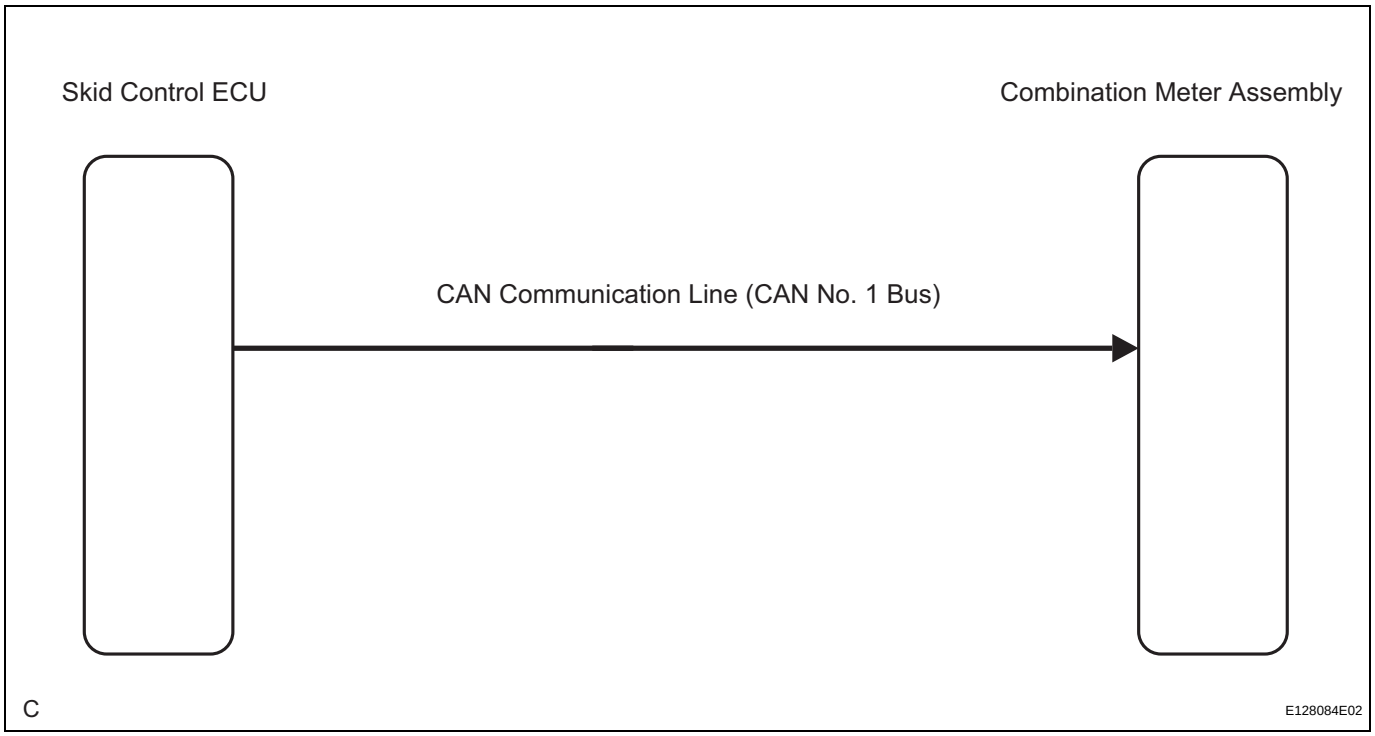
REPLACE COMBINATION METER ASSEMBLY

Speedometer Malfunction

DESCRIPTION

The meter CPU receives vehicle speed signals from the skid control ECU via the CAN communication lines (CAN No. 1 Bus). The vehicle speed sensor detects the voltage that varies according to the vehicle speed. The skid control ECU supplies power to the vehicle speed sensor. The skid control ECU detects vehicle speed signals based on the pulses of the voltage.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if CAN communication DTC is output (See page CA-25).

Result

Result	Proceed to
CAN communication DTC is not output.	A
CAN communication DTC is output.	B (See page CA-31)

B → GO TO CAN COMMUNICATION SYSTEM

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).

ME

(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / ACTIVE TEST.
(e) Check the values by referring to the values in the table below.

METER:

Item	Test Details	Diagnostic Note
SPEED METER	0, 40, (24), 80 (48), 120 (72), 160 (96), 200 (120) km/h (mph)	-

OK:
Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

3	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / DATA TEST.
(e) Check the values by referring to the values in the table below.

METER:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
SPEED METER	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 255 km/h (158 mph)	Almost same as actual speed (When driving)	If data received from the skid control ECU exceeds the range that can be displayed on the meter, the meter continues to display the maximum value of the range.

OK:
Vehicle speed displayed on the tester is almost the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG → **Go to step 4**

OK

ME

REPLACE COMBINATION METER ASSEMBLY

4	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / ABS/TRAC/VSC / DATA LIST.

(e) Check the values by referring to the table below.

ABS/TRAC/VSC:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
(FL/FR/RL/RR) WHEEL SPD	Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph)	Almost same as actual speed (When driving)	-

OK:

Vehicle speed displayed on the tester is almost the same as the actual vehicle speed.

NG → **GO TO BRAKE CONTROL SYSTEM**

OK ↓

5	REPLACE SKID CONTROL ECU

(a) Replace the skid control ECU to a new or a normal one.

OK:

The operation of the speedometer returns to normal.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK ↓

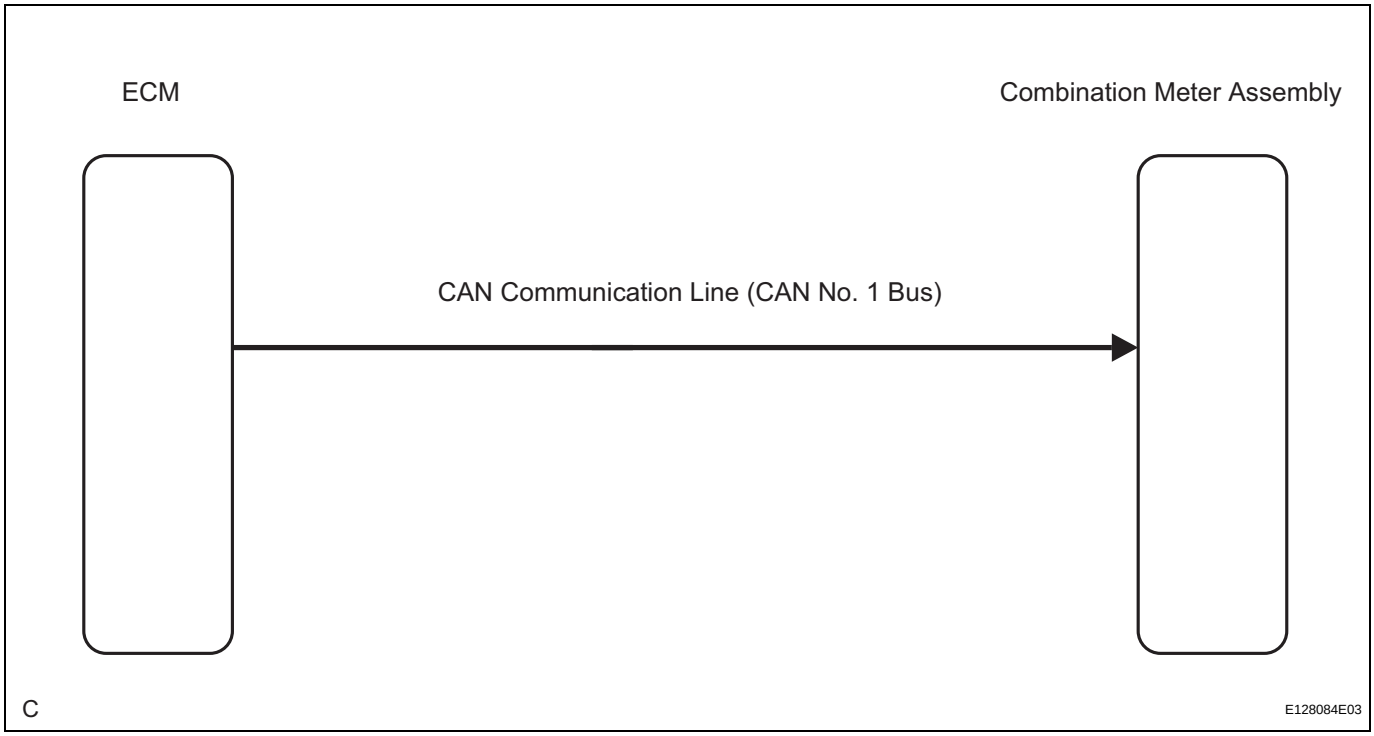
END

Tachometer Malfunction

DESCRIPTION

The meter CPU receives engine revolution signals from the ECM via the CAN communication lines (CAN No. 1 Bus). The meter CPU displays engine revolution data that is calculated based on the data received from the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if CAN communication DTC is output (See page CA-25).

Result

Result	Proceed to
CAN communication DTC is not output.	A
CAN communication DTC is output.	B (See page CA-31)

B → GO TO CAN COMMUNICATION SYSTEM

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.

ME

(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / ACTIVE TEST.
(e) Check the values by referring to the values in the table below.

METER:

Item	Test Details	Diagnostic Note
TACHO METER	0, 1,000, 2,000, 3,000, 4,000, 5,000, 6,000, 7,000, (rpm)	-

OK:
Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

3 **READ VALUE OF INTELLIGENT TESTER (ENGINE SPEED SIGNAL)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / DATA LIST.
(e) Check the values by referring to the values in the table below.

METER:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
TACHO METER	Engine speed/Min.: 0 rpm, Max.: 12,750 rpm	Almost same as actual engine speed (When engine is running)	If data received from the ECM exceeds the range that can be displayed on the meter, the meter continues to display the maximum value of the range.

OK:
Engine speed displayed on the tester is almost the same as the actual engine speed.

NG → **Go to step 4**

OK

REPLACE COMBINATION METER ASSEMBLY

ME

4 **READ VALUE OF INTELLIGENT TESTER (ENGINE SPEED SIGNAL)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / ENGINE / DATA LIST.

(e) Check the values by referring to the table below.

ENGINE:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
ENGINE SPD	Engine speed/Min.: 0 rpm, Max.: 12,800 rpm	Almost same as actual engine speed (When engine is running)	-

OK:

Engine speed displayed on the tester is almost the same as the actual engine speed.

NG → **GO TO SFI SYSTEM**

OK

5	REPLACE ECM

(a) Replace the ECM to a new or a normal one.

OK:

The operation of the tachometer returns to normal.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

END

Fuel Receiver Gauge Malfunction

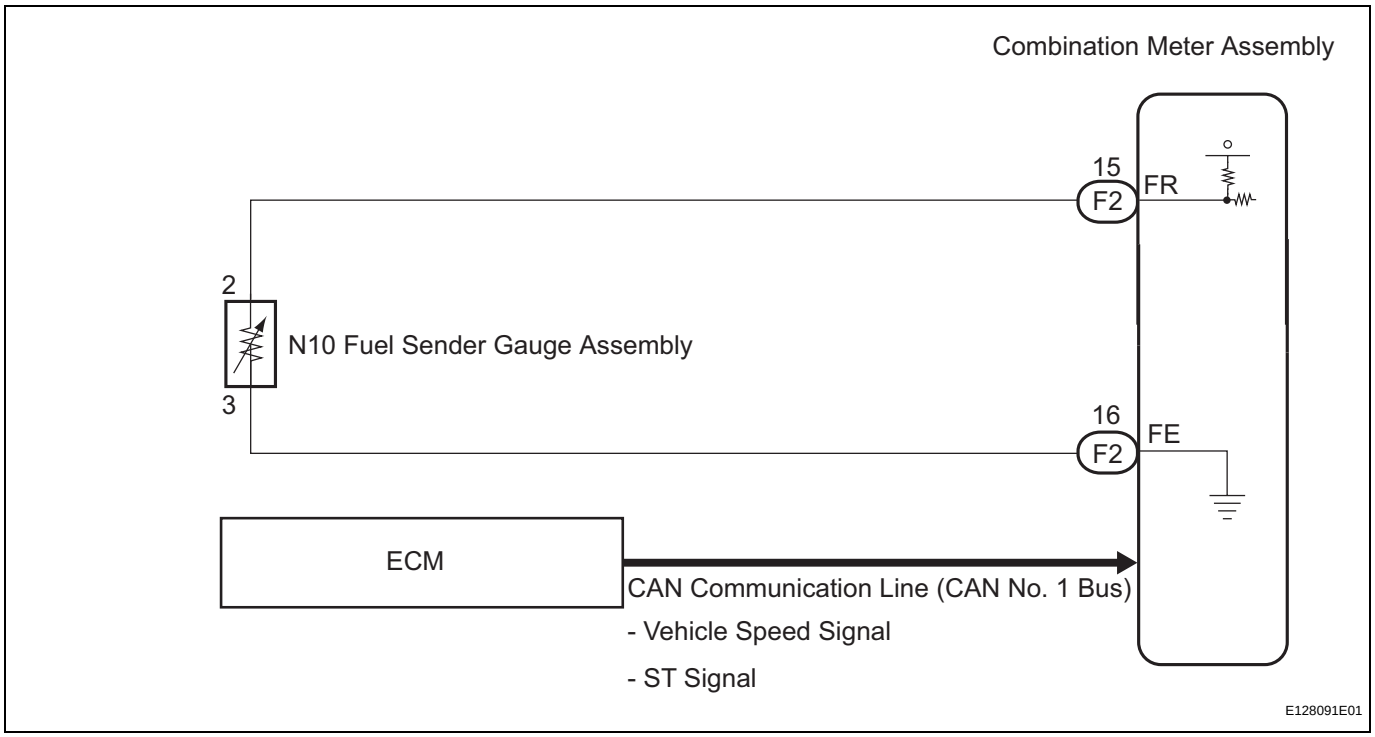
DESCRIPTION

The meter CPU uses the fuel sender gauge assembly to determine the level of the fuel in the fuel tank. The resistance of the fuel sender gauge will vary between approximately 15 Ω with the float at the full position, and 410 Ω with the float at the empty position. The meter outputs battery voltage through two 820 Ω resistors that are mounted in parallel inside the meter ECU. The meter CPU measures the voltage between the variable resistor in the fuel sender gauge and the two resistors mounted in parallel in the meter. Voltage measured at this point will vary as the float of the fuel sender gauge is moved. The highest voltage observed should be approximately half of battery voltage.

HINT:

The fuel level warning light will come on when the fuel level is below 10.5 liters.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if CAN communication DTC is output (See page CA-25).

Result

Result	Proceed to
CAN communication DTC is not output	A
CAN communication DTC is output	B (See page CA-31)

B → GO TO CAN COMMUNICATION SYSTEM

A

ME

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter following menus: DIAGNOSIS / OBD/MOBD / METER / ACTIVE TEST.
(e) Check the values by referring to the table below.

METER:

Item	Test Details	Diagnostic Note
FUEL GAUGE	EMPTY, 1/2, FULL	-

OK:
Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

3	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter following menus: DIAGNOSIS / OBD/MOBD / METER / DATA LIST.
(e) Check the values by referring to the table below.

METER:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
FUEL GAUGE	Fuel input signal Min.: 0, Max.: 255	Fuel gauge indicates (F): 35 Fuel gauge indicates (3/4): 85 Fuel gauge indicates (1/2): 145 Fuel gauge indicates (3/4): 186 Fuel gauge indicates (E): 205	-

OK:
Fuel value signal displayed on the tester is almost the same as needle indication.

NG → **Go to step 4**

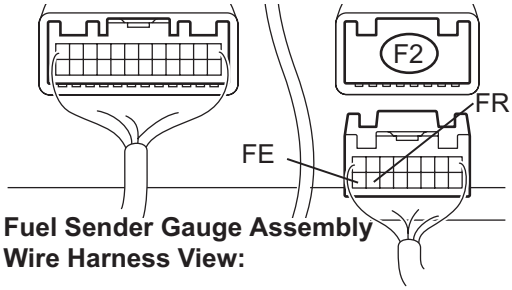
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

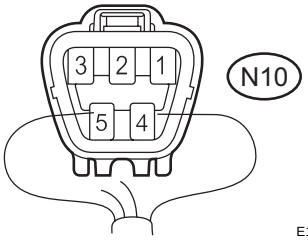
ME

4	**CHECK HARNESS AND CONNECTOR (COMBINATION METER - FUEL SENDER GAUGE ASSEMBLY)**

Combination Meter Assembly Wire Harness View:



Fuel Sender Gauge Assembly Wire Harness View:



E128085E02

OK

(a) Disconnect the F2 and N10 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

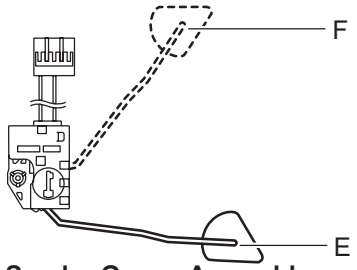
Tester Connection	Condition	Specified Condition
F2-15 (FR) - N10-2	Always	Below 1 Ω
F2-16 (FE) - N10-3	Always	Below 1 Ω
N10-2 - Body ground	Always	10 kΩ or higher
F2-16 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

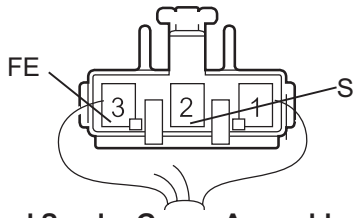
ME

5	INSPECT FUEL SENDER GAUGE ASSEMBLY

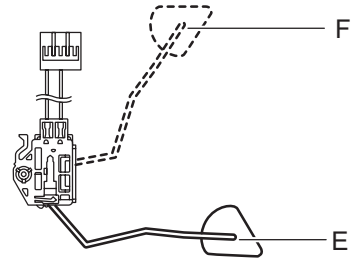
Fuel Sender Gauge Assembly (for 2GR-FE):



Fuel Sender Gauge Assembly Wire Harness View:



Fuel Sender Gauge Assembly (for 2AZ-FE):



E128086E01

(a) Disconnect the fuel sender gauge connector.
(b) Remove the fuel sender gauge assembly.
(c) Check that the float moves smoothly between F and E.
(d) Measure the resistance between the terminals 2 (S) and 3 (FE) of connector according to the value(s) in the table below.

Standard resistance

Float Level	Resistance (Ω)
F	13.5 to 16.5
Between E and F	13.5 to 414.5 (Gradually changes)
E	405.5 to 414.5

NG → **REPLACE FUEL SENDER GAUGE ASSEMBLY**

OK

6	REPLACE COMBINATION METER ASSEMBLY

(a) Replace the combination meter assembly to a new one or a normal one.

OK:

The operation of the combination meter assembly returns to normal.

NG → **REPLACE ECM**

OK

END

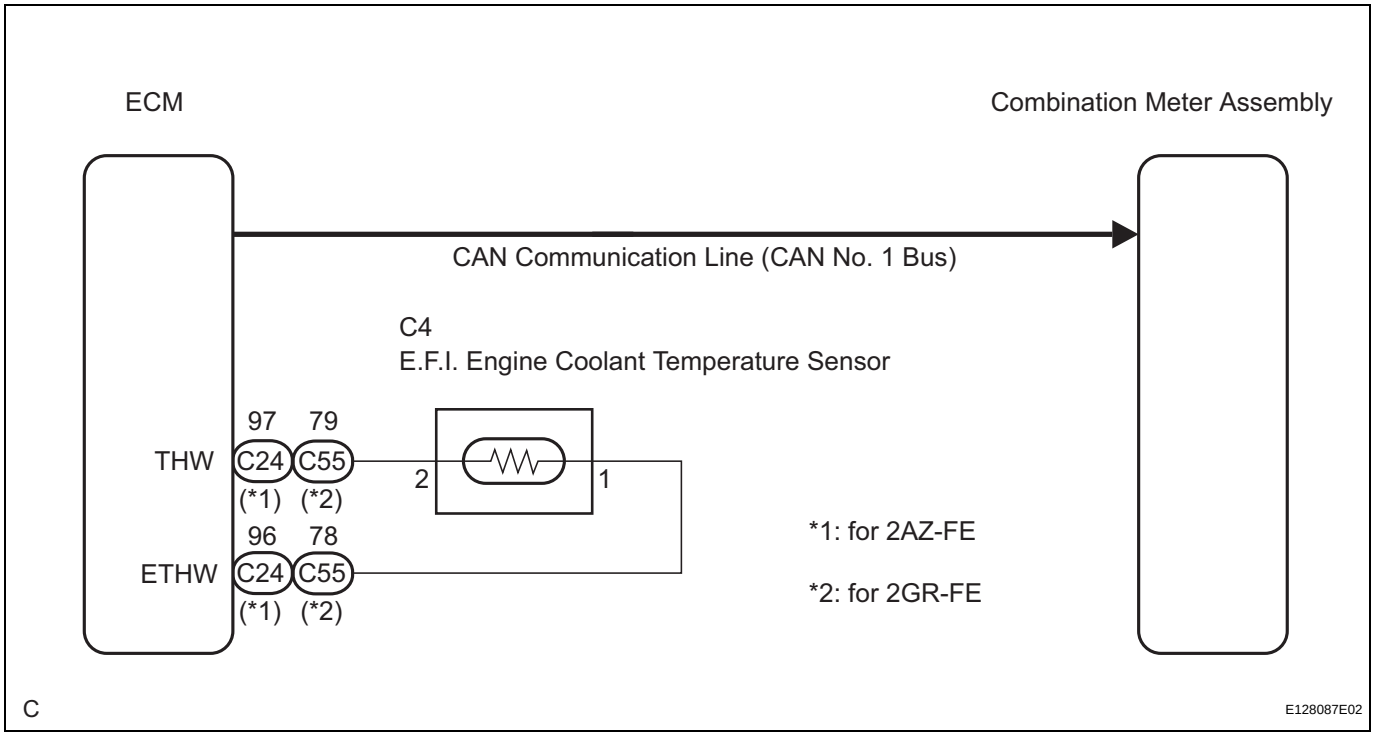
ME

Engine Coolant Temperature Receiver Gauge Malfunction

DESCRIPTION

The meter CPU receives engine coolant temperature signals from the ECM via the CAN communication lines (CAN No. 1 Bus). The meter CPU displays engine coolant temperature that is calculated based on the data received from the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
If there is an open or short in the engine coolant temperature sensor circuit, the ECM outputs the DTCs. Perform troubleshooting with the "SFI System" (See page ES-38 for 2AZ-FE, ES-63 for 2GR-FE).

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if CAN communication DTC is output (See page CA-25).

Result

Result	Proceed to
CAN communication DTC is not output.	A
CAN communication DTC is output.	B (See page CA-31)

B → GO TO CAN COMMUNICATION SYSTEM

A

ME

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / ACTIVE TEST.
(e) Check the values by referring to the values in the table below.

METER:

Item	Test Details	Diagnostic Note
COOLANT TEMP	LOW, NORMAL, HI	-

OK:
Needle indication is normal.

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

3	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / DATA LIST.

METER:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
COOLANT TEMP	Engine coolant temperature: 0°C (-40°F) to 127.5°C (284°F)	After warming up: 80 to 95°C (176 to 203°F)	•If -40°C (-40°F): sensor circuit open •If 140°C (284°F) or more: sensor circuit shorted

OK:
Engine coolant temperature value displayed on the tester is almost the same as needle indication.

NG → **Go to step 4**

OK

REPLACE COMBINATION METER ASSEMBLY

4	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/MOBD / ENGINE / DATA LIST.

(e) Check the values by referring to the values in the table below.

ENGINE:

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
WATER TEMP	Engine coolant temperature: -40°C (-40°F) to 140°C (284°F)	80 to 100°C (176 to 212°F): After warming up	•If -40°C (-40°F): sensor circuit open •If 140°C (284°F) or more: sensor circuit shorted

OK:

Engine coolant temperature value displayed on the tester is almost the same as needle indication.

NG → **GO TO SFI SYSTEM**

OK

5	REPLACE COMBINATION METER ASSEMBLY

(a) Replace the combination meter assembly to a new or a normal one.

OK:

The operation of the combination meter assembly returns to normal.

NG → **GO TO SFI SYSTEM**

OK

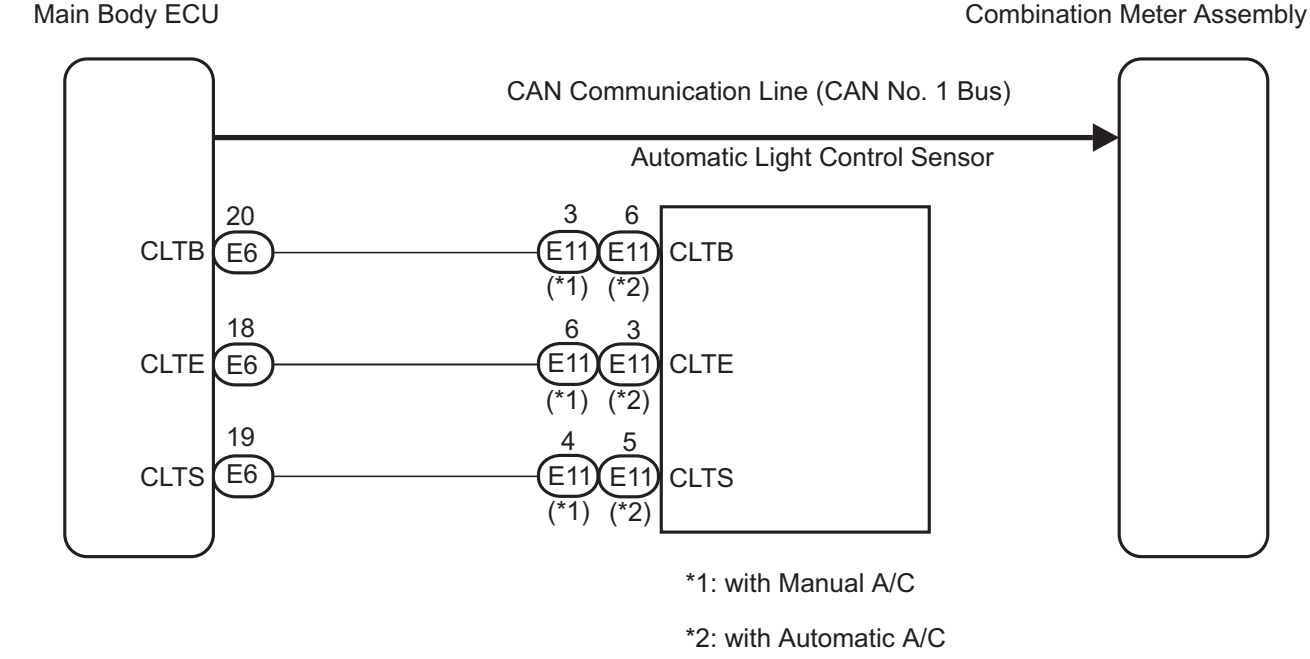
END

Meter Illumination is Always Dark

DESCRIPTION

The meter CPU receives auto dimmer signals from the main body ECU via the CAN communication lines (CAN No. 1 Bus). When the meter CPU receives an auto dimmer signal, it dims the meter illumination. The main body ECU determines whether it is daytime, twilight, or nighttime based on the waveform transmitted from the automatic light control sensor. If the main body ECU determines that it is daytime, the ECU does not send auto dimmer signals. Therefore, the meter illumination (warning and indicator lights) will not dim even if the driver accidentally turns the light control switch to the TAIL or HEAD position in daytime.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if CAN communication DTC is output (See page CA-25).

ME

Result

Result	Proceed to
CAN communication DTC is not output.	A
CAN communication DTC is output.	B (See page CA-31)

B → GO TO CAN COMMUNICATION SYSTEM

A

2	CHECK DTC

(a) Check if DTC B1244 is output (See page LI-20).

Result

Result	Proceed to
B1244 is not output	A
B1244 is output	B (See page LI-23)

B → GO TO LIGHTING SYSTEM

A

3	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / BODY / MAIN BODY / ACTIVE TEST.
(e) Check the meter illumination.

MAIN BODY:

Item	Test Details	Diagnostic Note
DIMMER SIG	Auto dimmer signal ON/OFF	-

OK:
The meter illumination is dimmed when the DIMMER SIG is ON.
HINT:
Refer to the sensitivity setting in the customization table of the automatic light control system. (See page LI-10)

NG → **Go to step 4**

OK

CHECK LIGHTING SETTING

4	REPLACE COMBINATION METER ASSEMBLY

(a) Replace the combination meter assembly to a new or a normal one.

OK:
The operation of the combination meter assembly returns to normal.

NG → **REPLACE MAIN BODY ECU**

OK

END

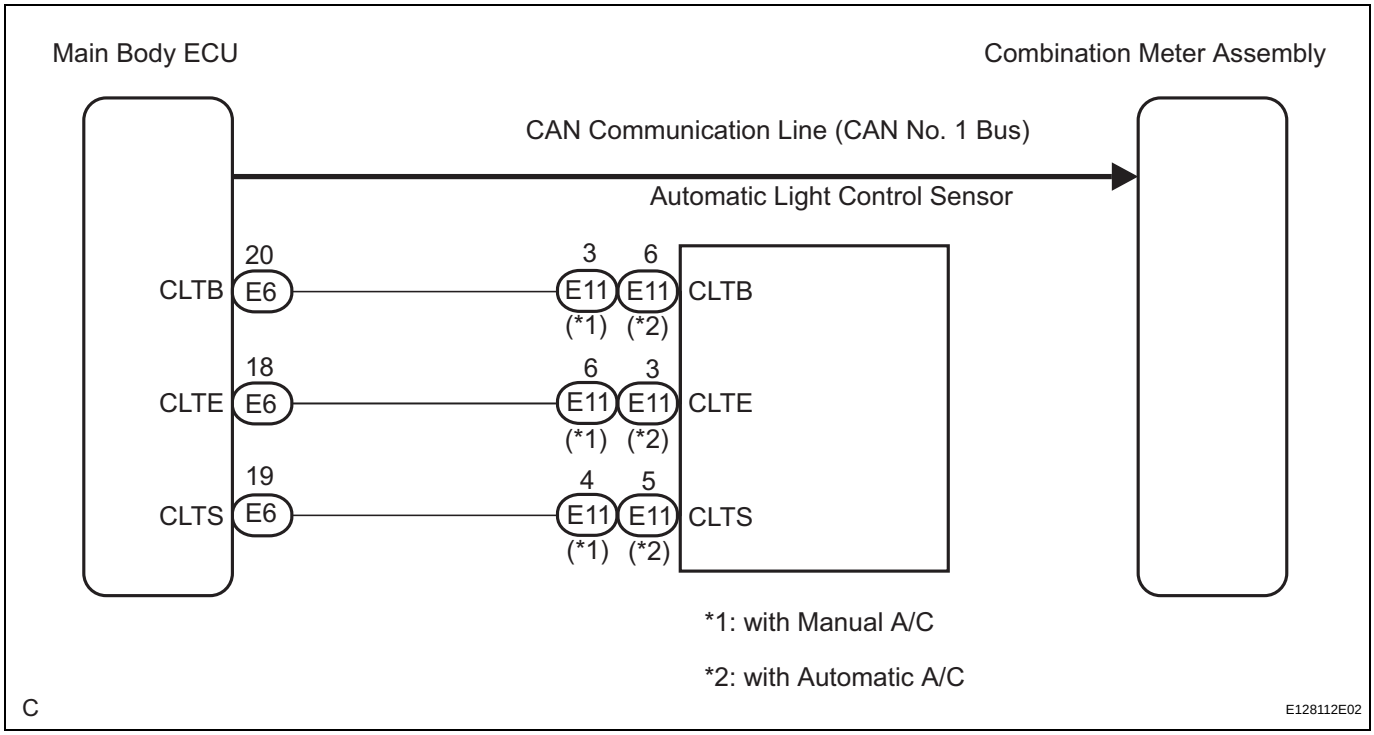
ME

Meter Illumination does not Dim at Night

DESCRIPTION

The meter CPU receives auto dimmer signals from the main body ECU via the CAN communication lines (CAN No. 1 Bus). When the meter CPU receives an auto dimmer signal, it dims the meter illumination. The main body ECU determines whether it is daytime, twilight, or nighttime based on the waveform transmitted from the automatic light control sensor. If the main body ECU determines that it is daytime, the ECU does not send auto dimmer signals. Therefore, the meter illumination (warning and indicator lights) will not dim even if the driver accidentally turns the light control switch to the TAIL or HEAD position in daytime.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if CAN communication DTC is output (See page CA-25).

ME

Result

Result	Proceed to
CAN communication DTC is not output.	A
CAN communication DTC is output.	B (See page CA-31)

B → GO TO CAN COMMUNICATION SYSTEM

A

2	CHECK DTC

(a) Check if DTC B1244 is output (See page LI-20).

Result

Result	Proceed to
B1244 is not output	A
B1244 is output	B (See page LI-23)

B → GO TO LIGHTING SYSTEM

A

3	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / BODY / MAIN BODY / ACTIVE TEST.
(e) Check the meter illumination.

MAIN BODY:

Item	Test Details	Diagnostic Note
DIMMER SIG	Auto dimmer signal ON/OFF	-

OK:
The meter illumination is dimmed when the DIMMER SIG is ON.
HINT:
Refer to the sensitivity setting in the customization table of the automatic light control system. (See page LI-12)

NG → **Go to step 4**

OK

CHECK LIGHTING SETTING

4	REPLACE COMBINATION METER ASSEMBLY

(a) Replace the combination meter assembly to a new or a normal one.

OK:
The operation of the combination meter assembly returns to normal.

NG → **REPLACE MAIN BODY ECU RH**

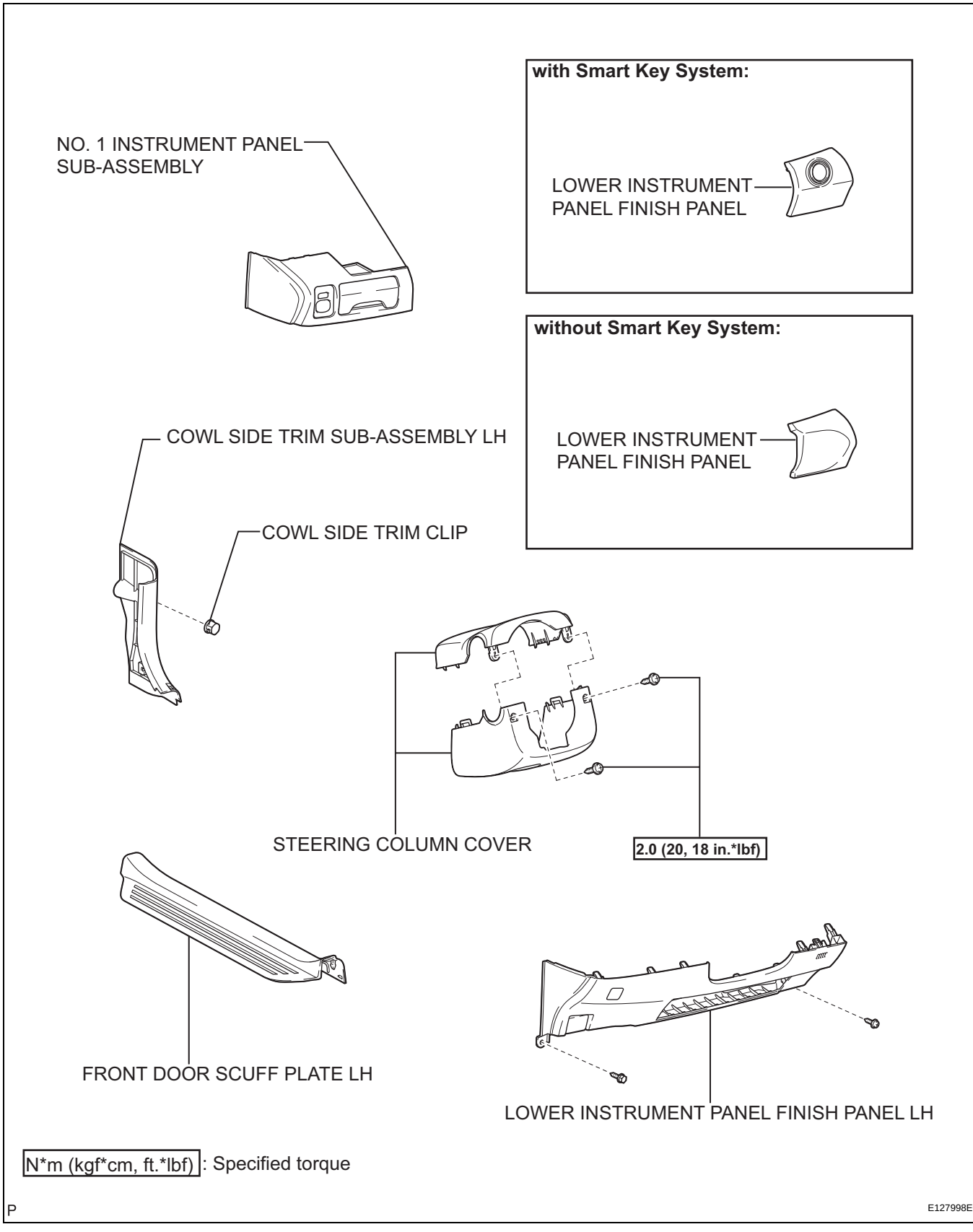
OK

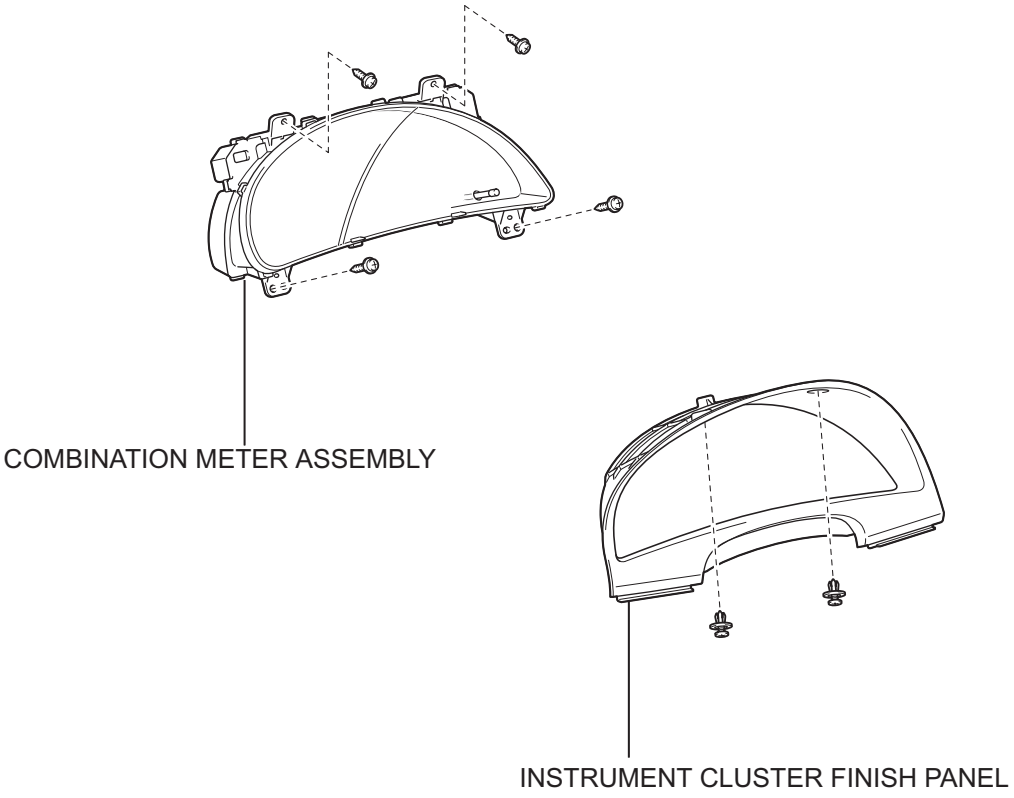
END

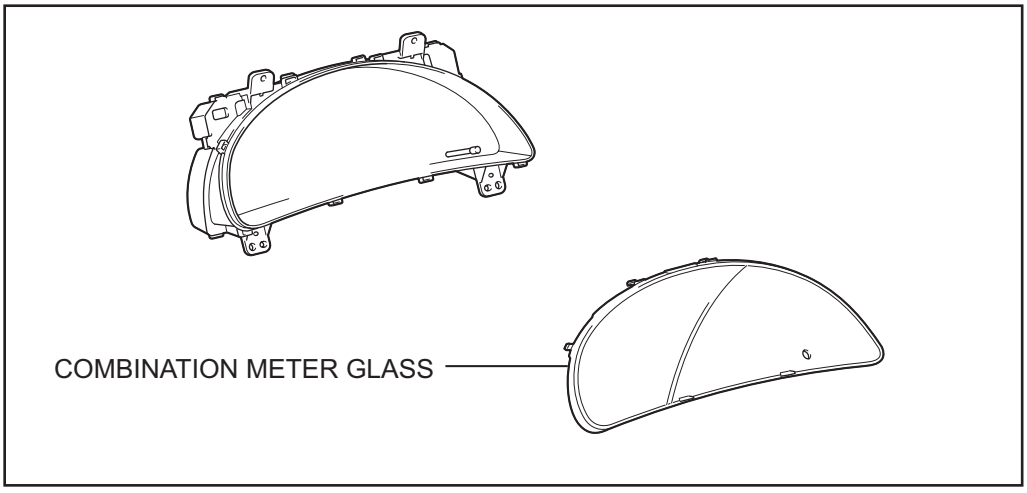
ME

COMBINATION METER

COMPONENTS







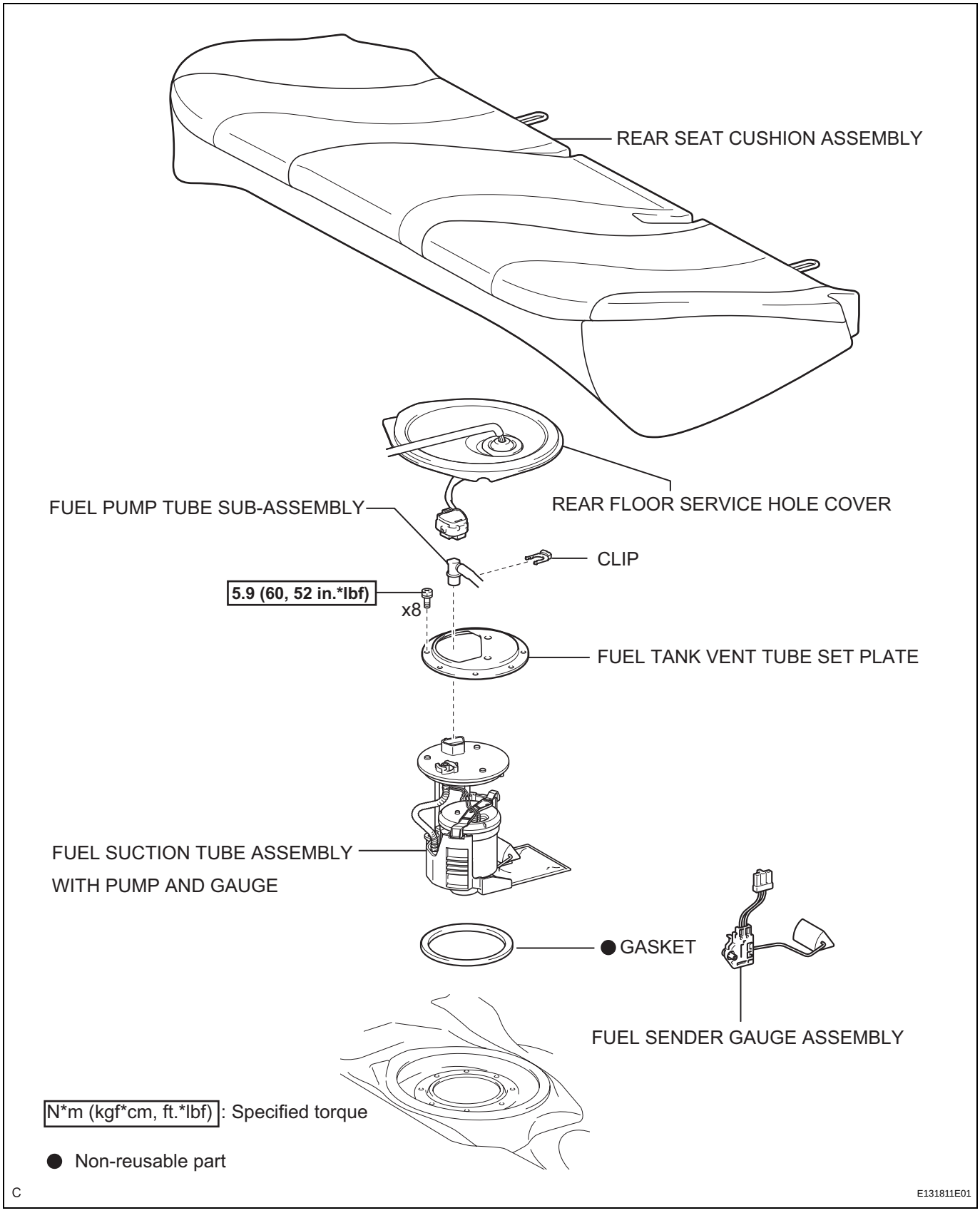
ME

P

E127999E01

FUEL SENDER GAUGE ASSEMBLY (for 2AZ-FE)

COMPONENTS



ME

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   (See page FU-1)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
4. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
5. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
6. **REMOVE REAR FLOOR SERVICE HOLE COVER (See page FU-23)**
7. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-23)**
8. **REMOVE FUEL TANK VENT TUBE SET PLATE (See page FU-24)**
9. **REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-24)**
10. **REMOVE FUEL SENDER GAUGE ASSEMBLY (See page FU-24)**

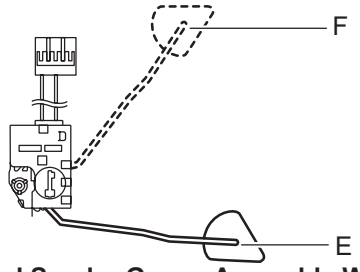
INSPECTION

1. **INSPECT FUEL SENDER GAUGE ASSEMBLY**
   (a) Remove the fuel sender gauge assembly.
   (b) Check that the float moves smoothly between F and E.
   (c) Measure the resistance between the terminals 2 (S) and 3 (FE) of connector according to the value(s) in the table below.
   Standard resistance

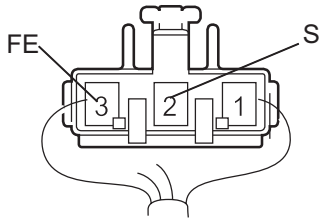
Float Level	Resistance (Ω)
F	13.5 to 16.5
Between E and F	13.5 to 414.5 (Gradually changes)
E	405.5 to 414.5

HINT:
If the value is not as specified, replace the fuel sender gauge assembly.

Fuel Sender Gauge Assembly:



Fuel Sender Gauge Assembly Wire Harness View:



E132666E01

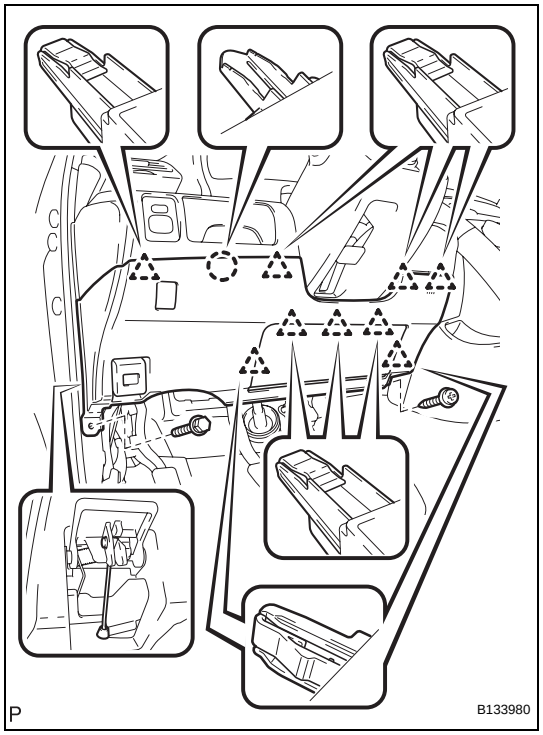
ME

INSTALLATION

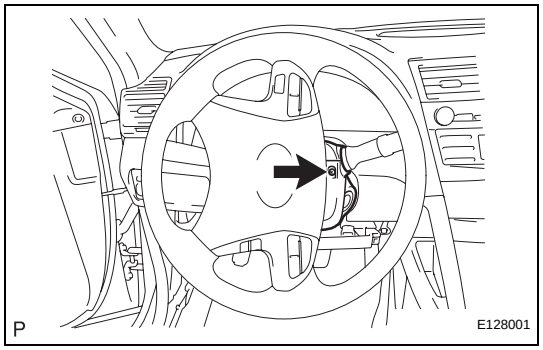
1. **INSTALL FUEL SENDER GAUGE ASSEMBLY (See page FU-30)**
2. **INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-30)**
3. **INSTALL FUEL TANK VENT TUBE SET PLATE (See page FU-31)**
4. **CONNECT FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-31)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
6. **CHECK FOR FUEL LEAKS (See page FU-8)**
7. **INSTALL REAR FLOOR SERVICE HOLE COVER (See page FU-31)**
8. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
9. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**
10. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**

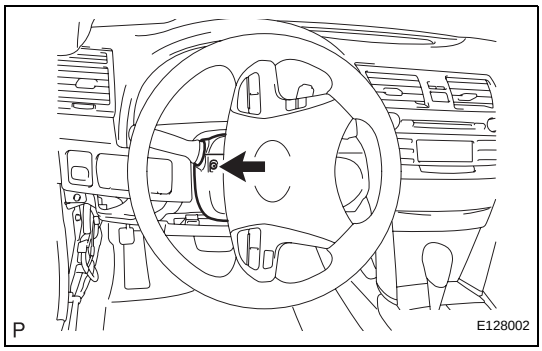
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
2. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH**
   (a) Remove the screw and the bolt.
   (b) Disconnect the hood lock control cable assembly.
   (c) Disengage the claw and the 9 clips.
   (d) Remove the air hose, disconnect the connector, and then remove the lower instrument panel finish panel LH.

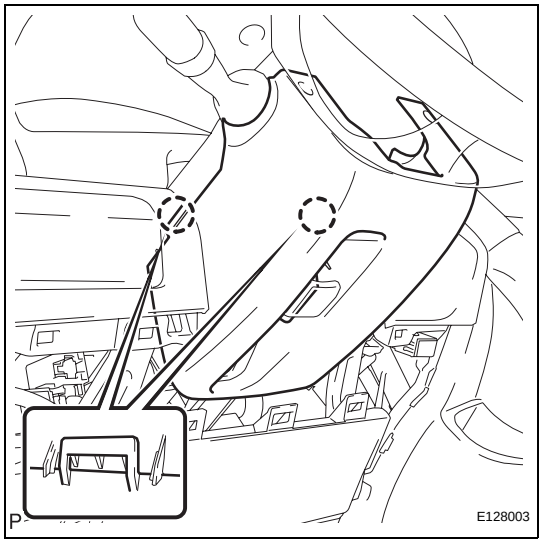


5. **REMOVE STEERING COLUMN COVER**
   (a) Turn the steering wheel assembly to the right and remove the screw as shown in the illustration.

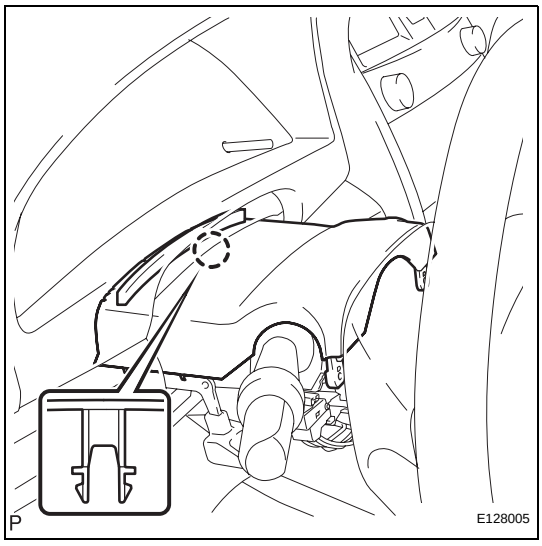




(b) Turn the steering wheel assembly to the left and remove the screw as shown in the illustration.



(c) Disengage the 2 claws and remove the steering column cover lower.

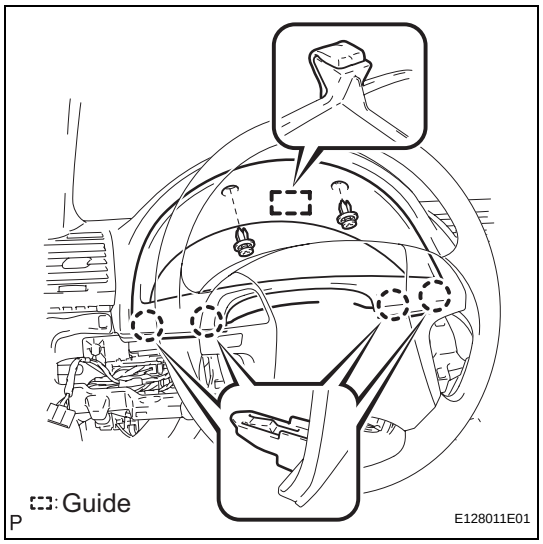


(d) Disengage the claw and remove the steering column cover upper.

6. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**

7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**

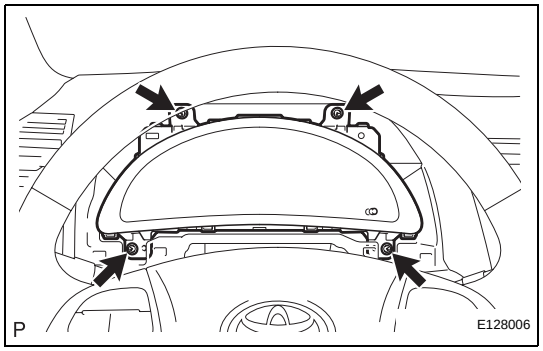
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**



9. REMOVE INSTRUMENT CLUSTER FINISH PANEL

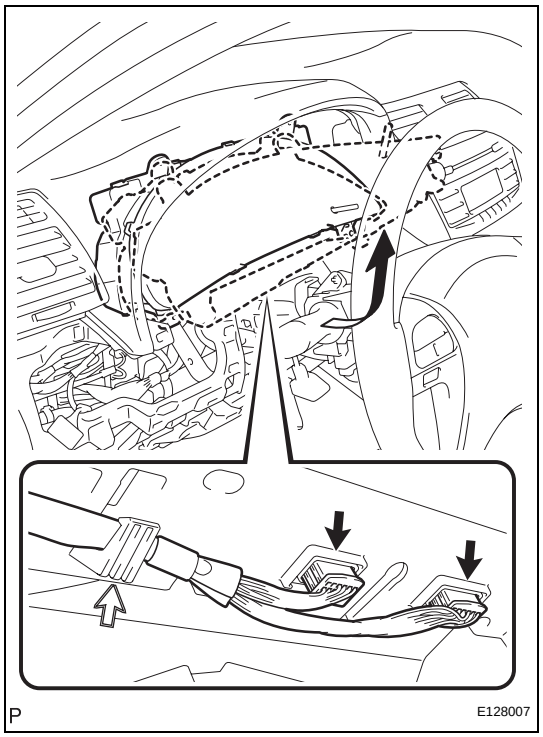
(a) Remove the 2 clips.

(b) Disengage the guide and the 4 claws, and then remove the instrument cluster finish panel.



10. REMOVE COMBINATION METER ASSEMBLY

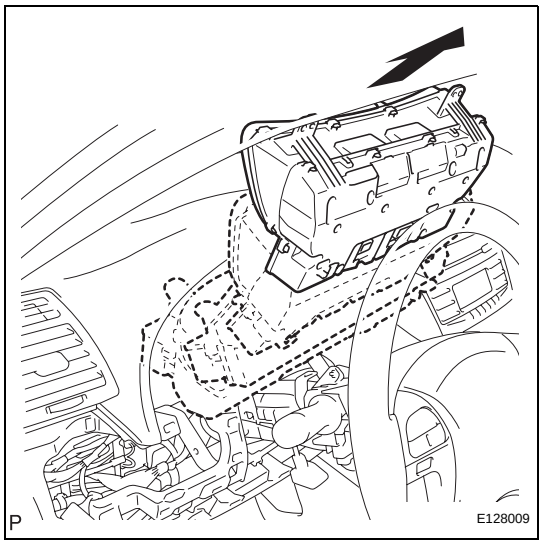
(a) Remove the 4 screws.



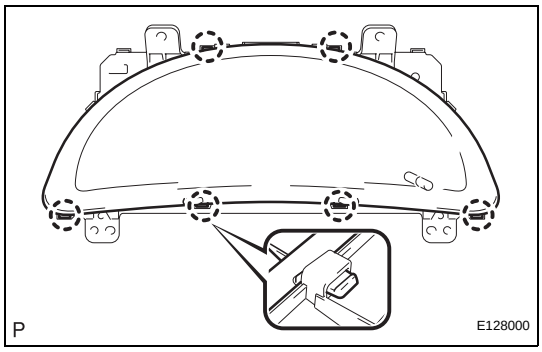
(b) Disconnect the 2 connectors.

(c) Disengage the wire harness from the combination meter assembly.

ME



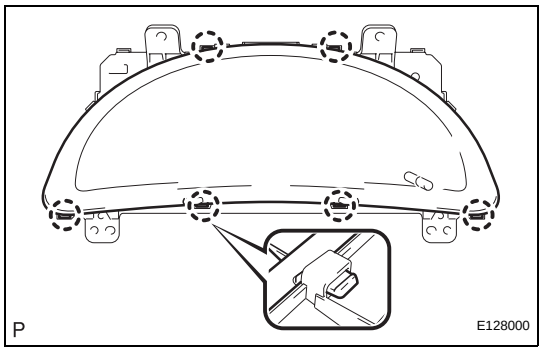
(d) Remove the combination meter assembly as shown in the illustration.



DISASSEMBLY

1. REMOVE COMBINATION METER GLASS

(a) Disengage the 6 claws and remove the combination meter glass.



REASSEMBLY

1. INSTALL COMBINATION METER GLASS

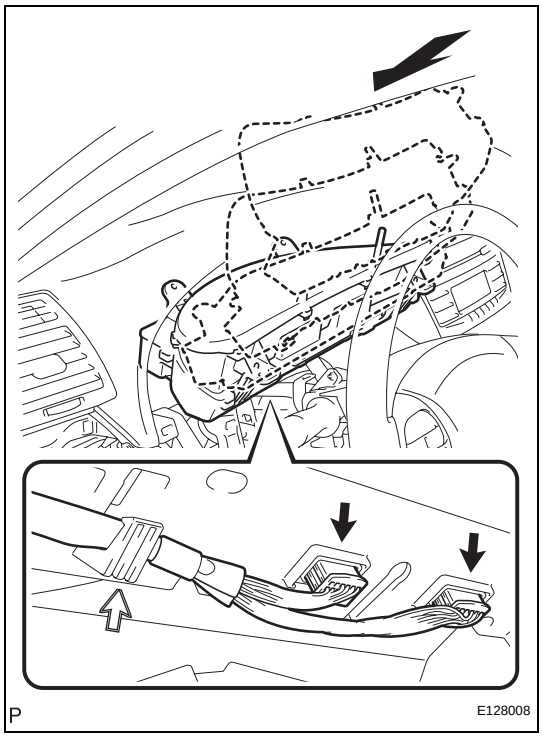
(a) Engage the 6 claws and install the combination meter glass.

INSTALLATION

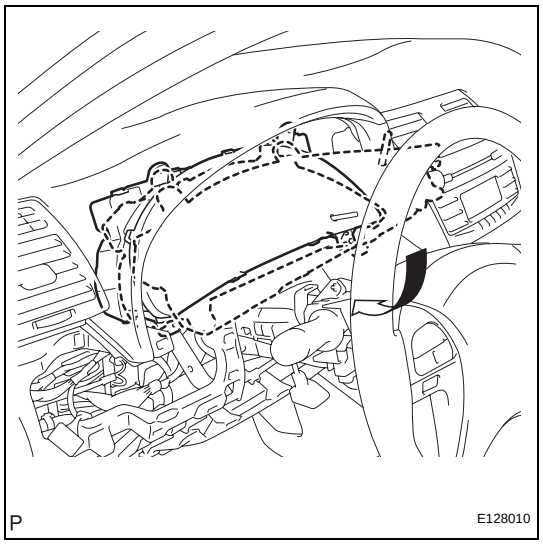
1. INSTALL COMBINATION METER ASSEMBLY

(a) Connect the 2 connectors as shown in the illustration.

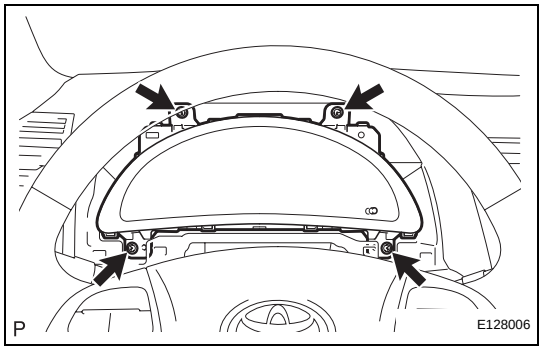
(b) Secure the wire harness to the combination meter assembly.

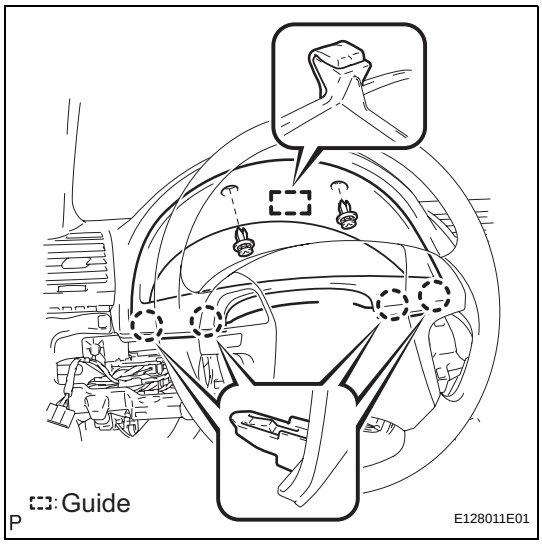


(c) Install the combination meter assembly as shown in the illustration.



(d) Install the 4 screws.





2. INSTALL INSTRUMENT CLUSTER FINISH PANEL

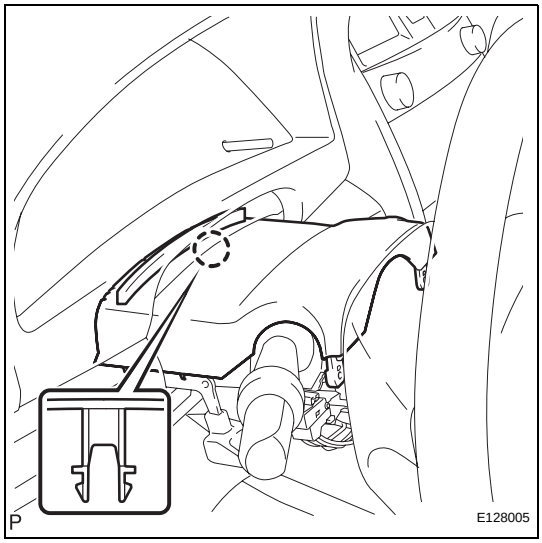
(a) Engage the 4 claws and the guide.

(b) Install the instrument cluster finish panel with the 2 clips.

3. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)

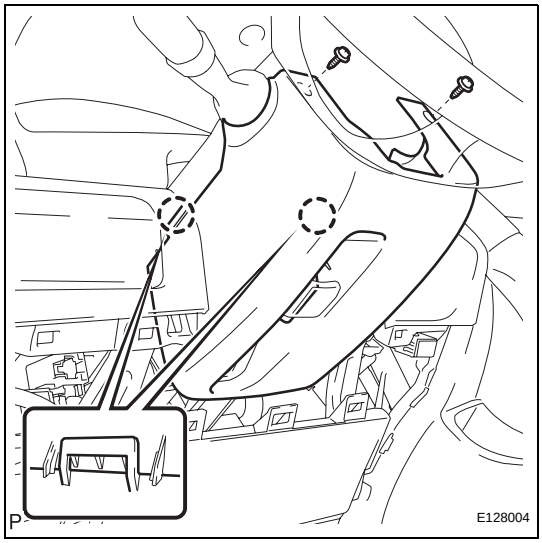
4. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)

5. INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)



6. INSTALL STEERING COLUMN COVER

(a) Engage the claw and install the upper steering column cover.



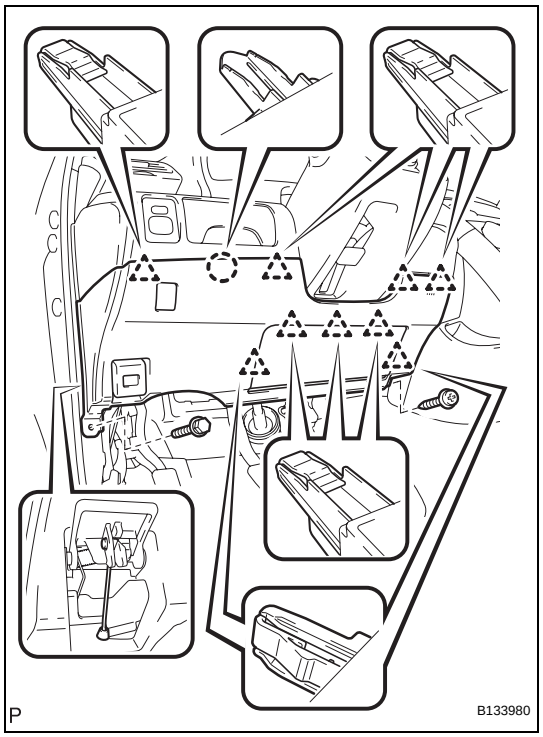
(b) Engage the 2 claws.

(c) Install the lower steering column cover with the 2 screws.

Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)

7. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH

(a) Install the air hose and connect the connector.



(b) Engage the claw and the 9 clips.
(c) Connect the hood lock control cable assembly.
(d) Install the lower instrument panel finish panel LH with the screw and bolt.

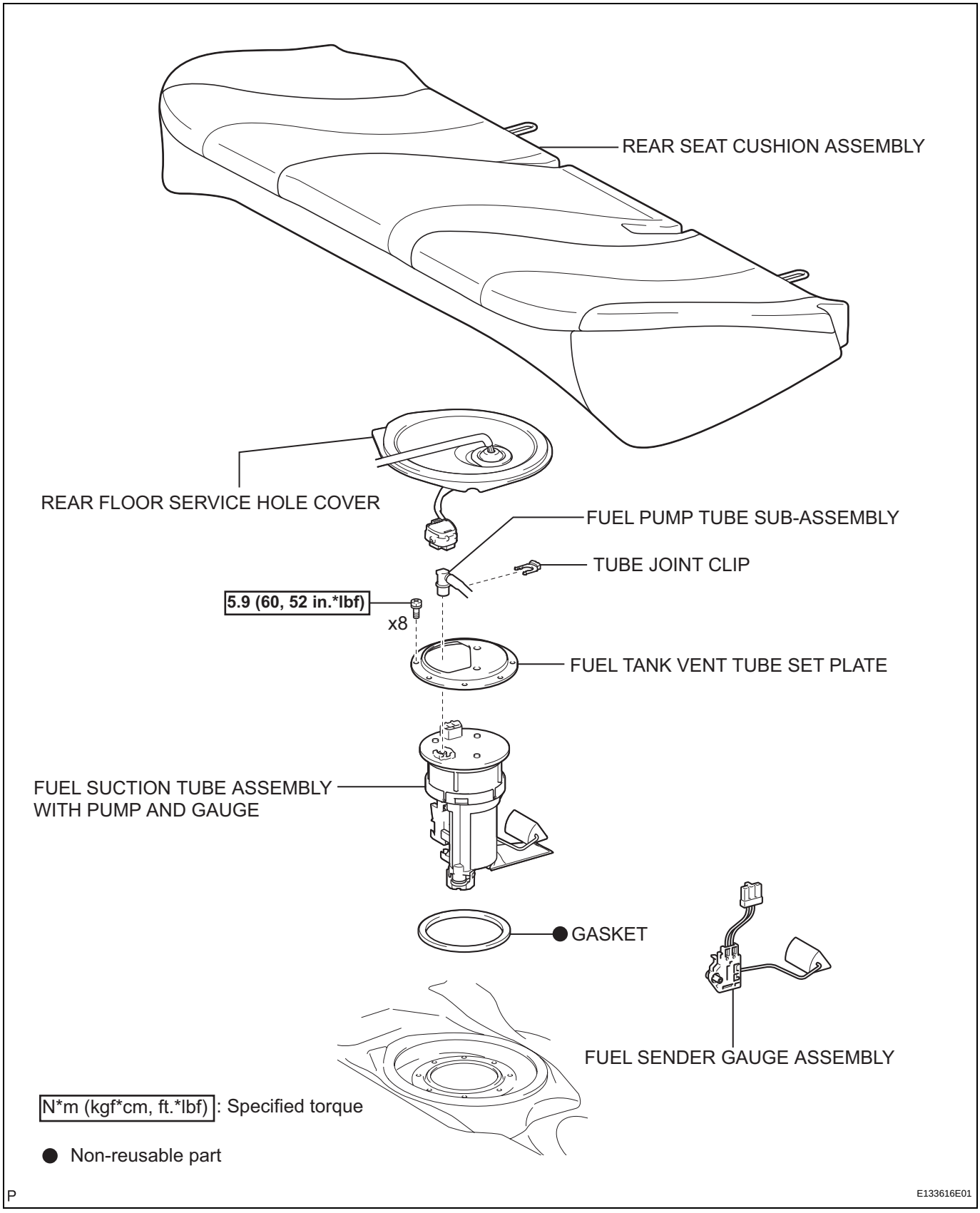
8. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**

9. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**

10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

FUEL SENDER GAUGE ASSEMBLY (for 2GR-FE)

COMPONENTS



ME

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   (See page FU-1)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
4. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
5. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
6. **REMOVE REAR FLOOR SERVICE HOLE COVER (See page FU-27)**
7. **SEPARATE FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-27)**
8. **REMOVE FUEL TANK VENT TUBE SET PLATE (See page FU-28)**
9. **REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-28)**
10. **REMOVE FUEL SENDER GAUGE ASSEMBLY (See page FU-28)**

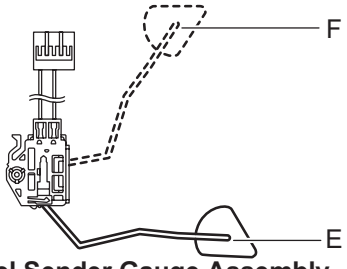
INSPECTION

1. **INSPECT FUEL SENDER GAUGE ASSEMBLY**
   (a) Remove the fuel sender gauge assembly.
   (b) Check that the float moves smoothly between F and E.
   (c) Measure the resistance between the terminals 2 (S) and 3 (FE) of connector according to the value(s) in the table below.
   Standard resistance

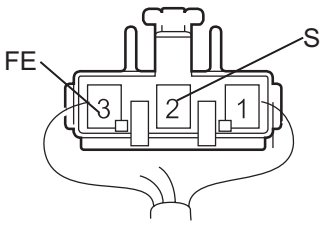
Float Level	Resistance (Ω)
F	13.5 to 16.5
Between E and F	13.5 to 414.5 (Gradually changes)
E	405.5 to 414.5

HINT:
If the value is not as specified, replace the fuel sender gauge assembly.

Fuel Sender Gauge Assembly:



Fuel Sender Gauge Assembly Wire Harness View:



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ME

INSTALLATION

1. INSTALL FUEL SENDER GAUGE ASSEMBLY (See page FU-31)
2. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE (See page FU-32)
3. INSTALL FUEL TANK VENT TUBE SET PLATE (See page FU-32)
4. CONNECT FUEL PUMP TUBE SUB-ASSEMBLY (See page FU-33)
5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
6. CHECK FOR FUEL LEAKS (See page FU-8)
7. INSTALL REAR FLOOR SERVICE HOLE COVER (See page FU-33)
8. INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)
9. INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)
10. INSTALL REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)

ENGINE OIL PRESSURE SWITCH

ON-VEHICLE INSPECTION

1. INSPECT ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Disconnect the connector from the oil pressure switch assembly.

(b) With the switch still installed, measure the resistance between the terminal of the engine oil pressure switch and engine ground.

Standard resistance:

Engine stopped:

Below 1 Ω

Engine idling:

10 kΩ or higher

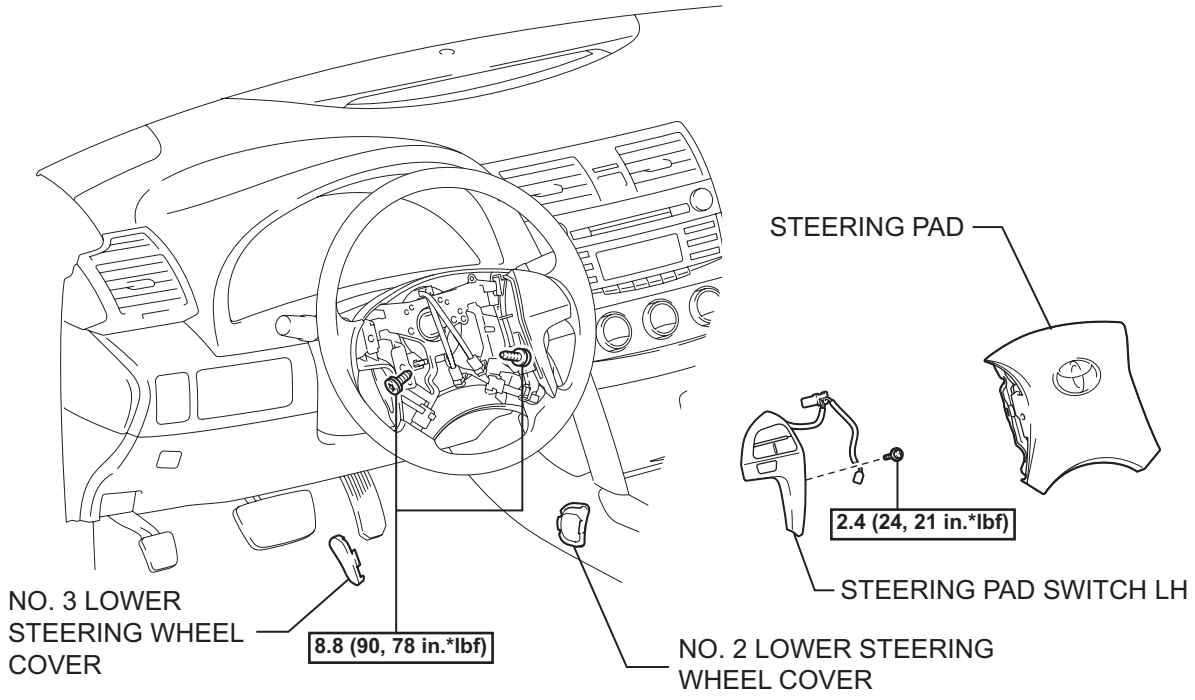
HINT:

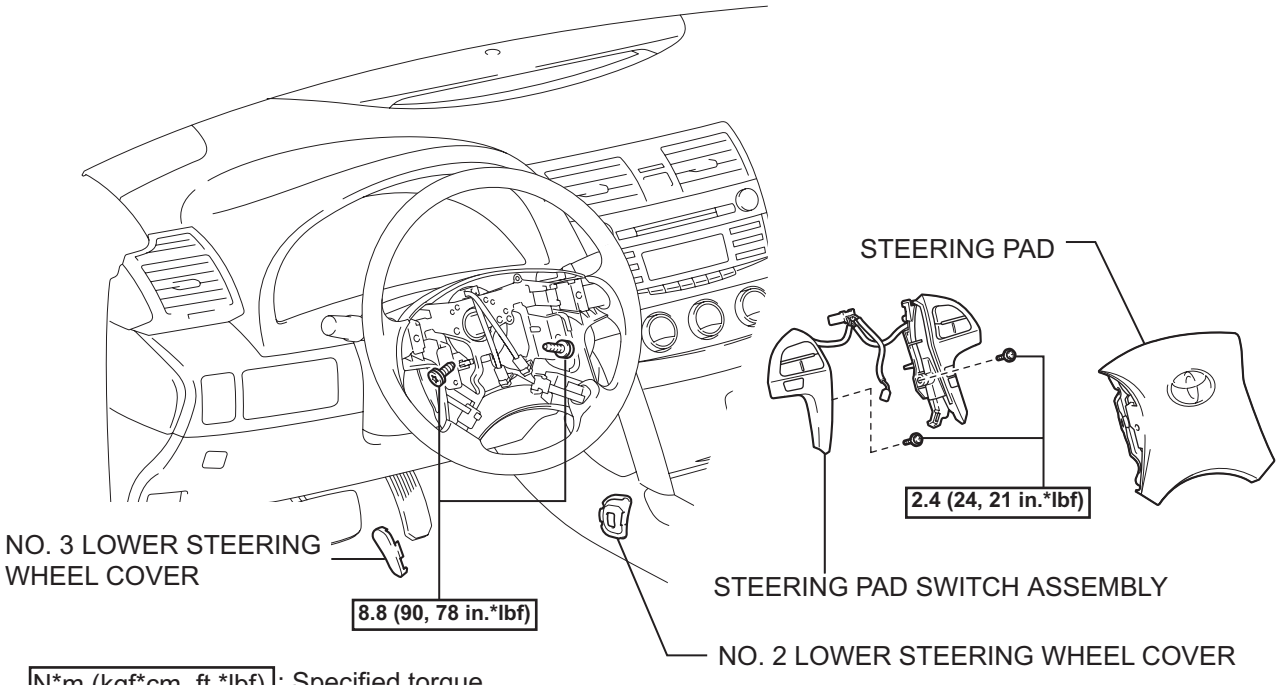
If the value is not as specified, replace the engine oil pressure switch.

STEERING PAD SWITCH

COMPONENTS

for 4 Spoke:





N*m (kgf*cm, ft.*lbf) : Specified torque

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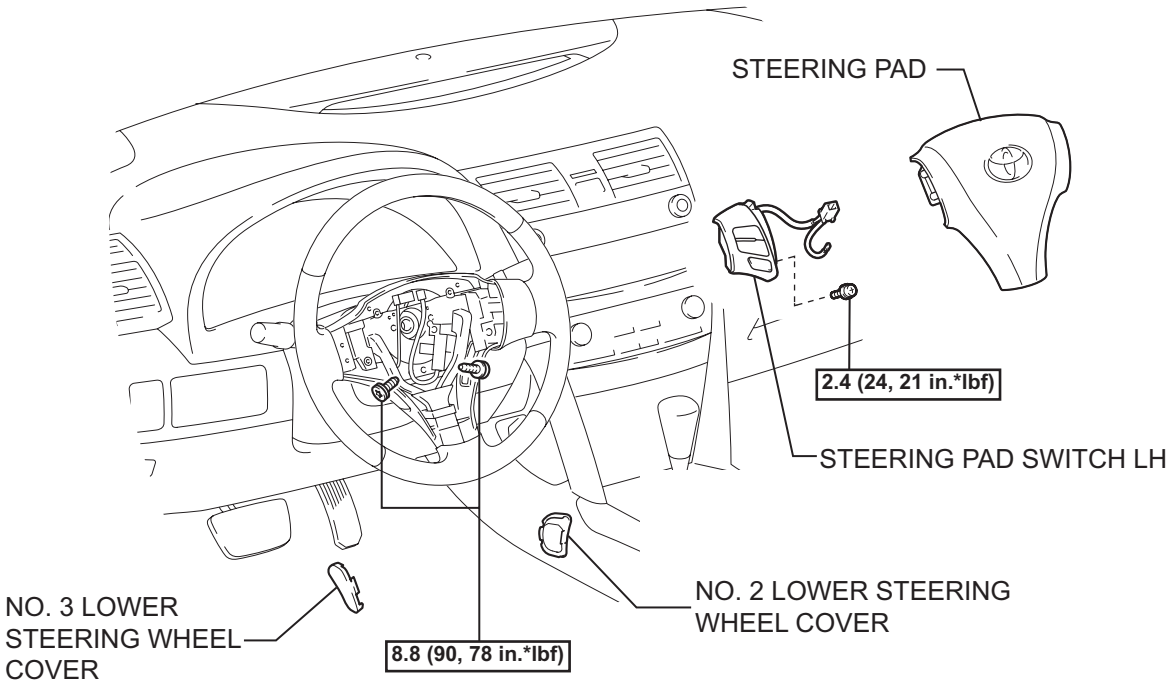
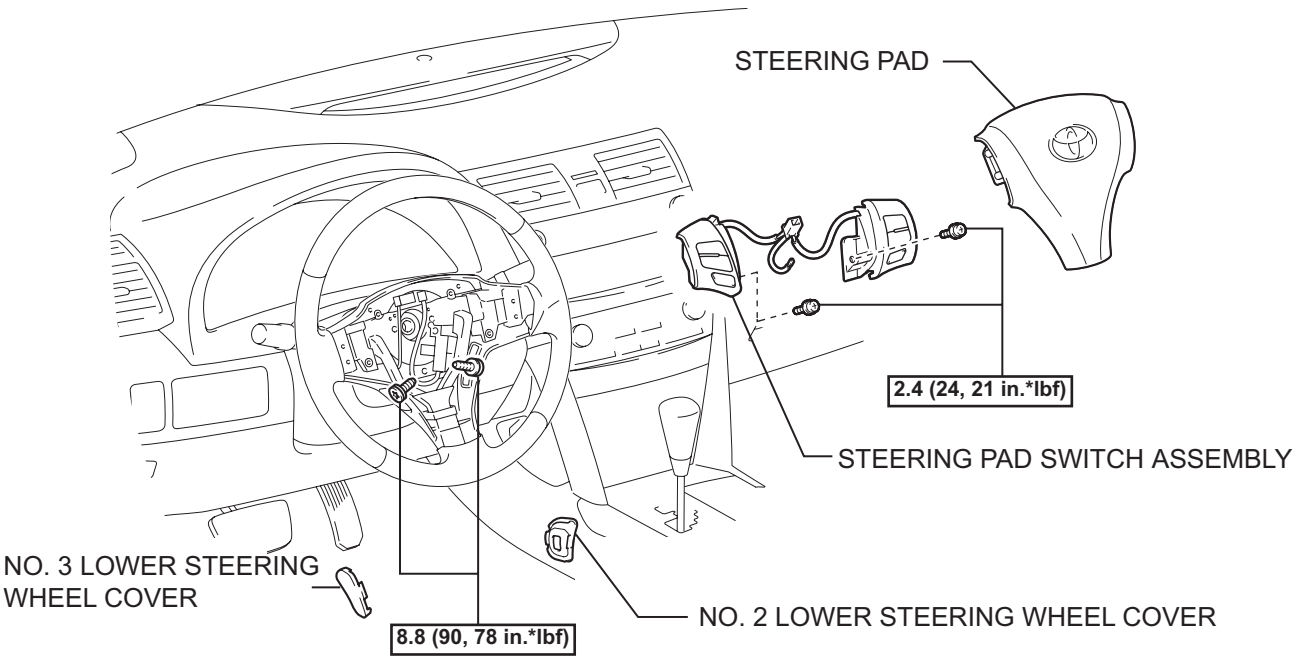
for 3 Spoke:





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N*m (kgf*cm, ft.*lbf): Specified torque

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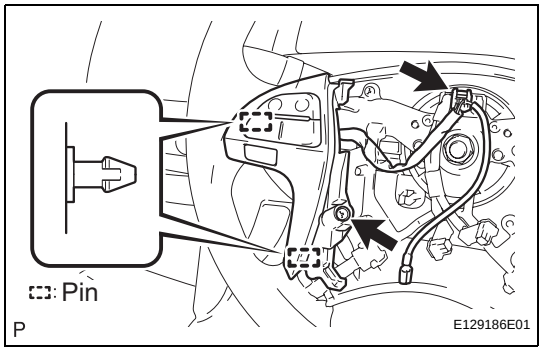
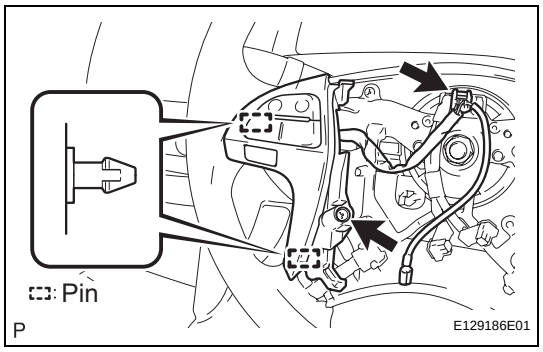
REMOVAL

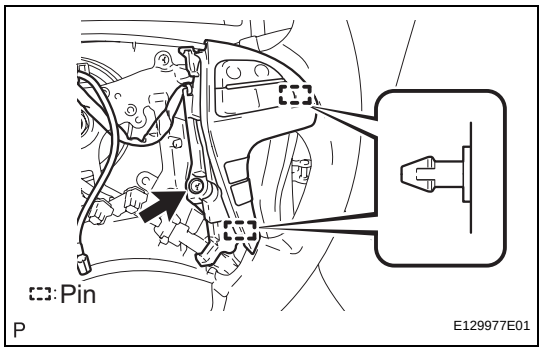
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
2. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)**
3. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)**
4. **REMOVE STEERING PAD (See page RS-350)**
5. **REMOVE STEERING PAD SWITCH LH (for 4 Spoke)**
   (a) Disconnect the pad switch connector from the spiral cable.
   (b) Remove the screw.
   (c) Disengage the 2 pins and remove the steering pad switch LH.



6. **REMOVE STEERING PAD SWITCH ASSEMBLY (for 4 Spoke)**
   (a) Disconnect the pad switch connector from the spiral cable.
   (b) Remove the screw.
   (c) Disengage the 2 pins and remove the steering pad switch.



   (d) Remove the screw.
   (e) Disengage the 2 pins and remove the steering pad switch assembly.



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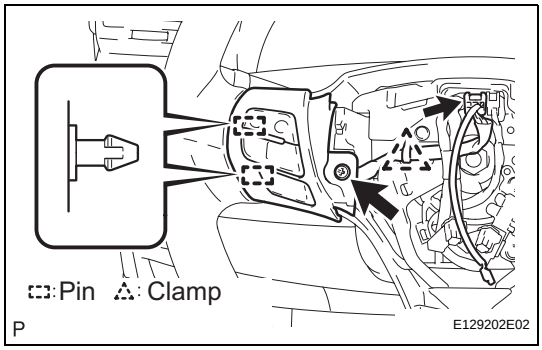
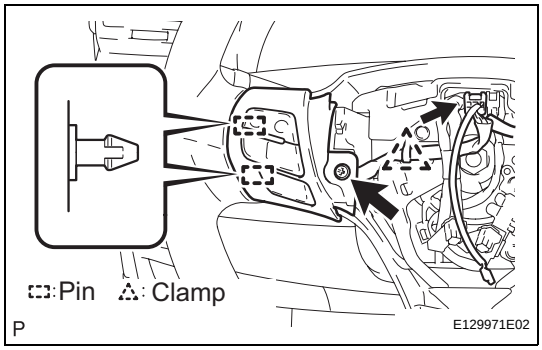


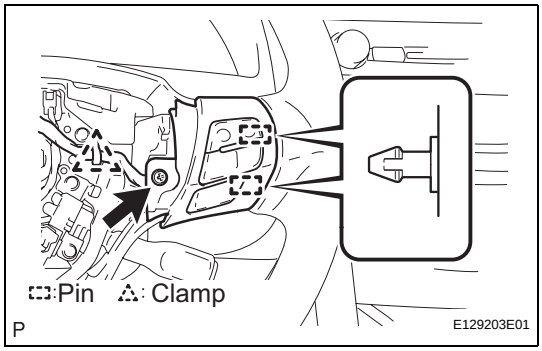
7. REMOVE STEERING PAD SWITCH LH (for 3 Spoke)

(a) Disconnect the pad switch connector from the spiral cable and disengage the clamp.
(b) Remove the screw.
(c) Disengage the 2 pins and remove the steering pad switch LH.



8. REMOVE STEERING PAD SWITCH ASSEMBLY (for 3 Spoke)

(a) Disconnect the pad switch connector from the spiral cable.
(b) Disengage the clamp and remove the screw.
(c) Disengage the 2 pins and remove the steering pad switch.



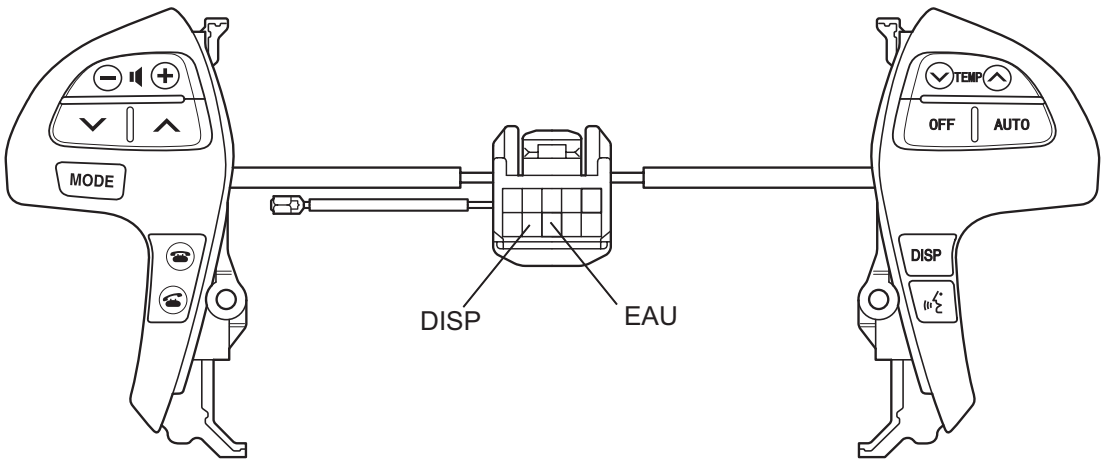
(d) Disengage the clamp and remove the screw.
(e) Disengage the 2 pins and remove the steering pad switch assembly.

INSPECTION

1. INSPECT STEERING PAD SWITCH

(a) Disconnect the steering pad switch connector.

4 Spoke Model:



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(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
DISP - EAU	DISP switch is not pushed in.	10 kΩ or higher
DISP - EAU	DISP switch is pushed in.	Below 1 Ω

HINT:

- This inspection is needed only for 4 spoke model steering pad switch.
- If the value is not as specified, replace the steering pad switch.

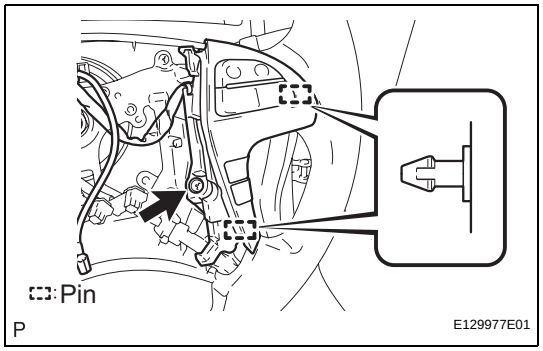
INSTALLATION

1. INSTALL STEERING PAD SWITCH ASSEMBLY (for 4 Spoke)

(a) Engage the 2 pins and install the steering pad switch assembly.

(b) Install the screw.

Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)



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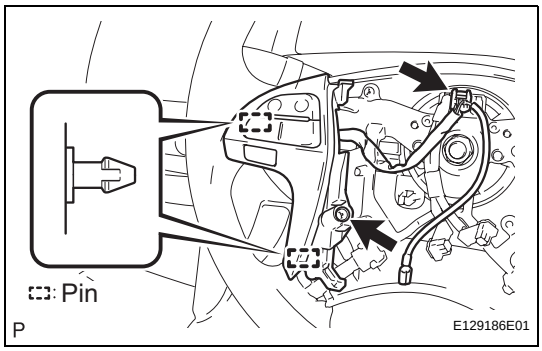
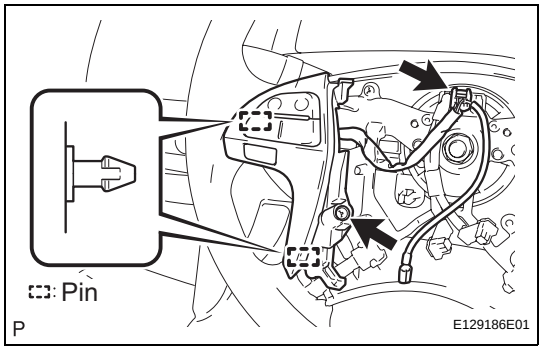
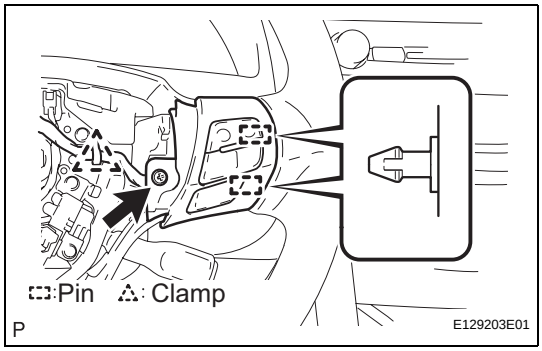


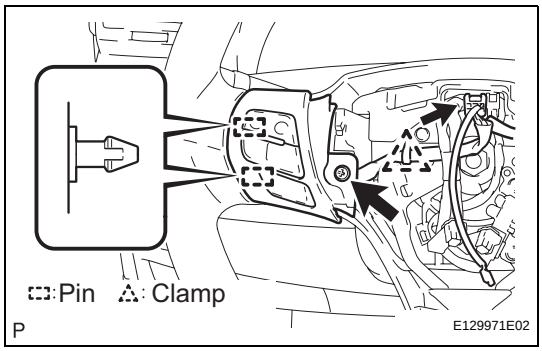
(c) Engage the 2 pins and install the steering pad switch assembly.
(d) Install the screw.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(e) Connect the connector to the spiral cable.



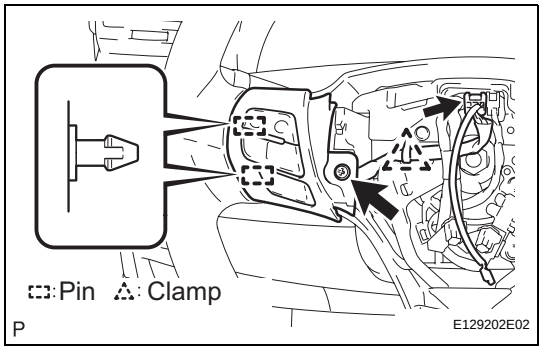
2. INSTALL STEERING PAD SWITCH LH (for 4 Spoke)
(a) Engage the 2 pins and install the steering pad switch LH.
(b) Install the screw.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(c) Connect the connector to the spiral cable.



3. INSTALL STEERING PAD SWITCH ASSEMBLY (for 3 Spoke)
(a) Engage the 2 pins and install the steering pad switch assembly.
(b) Install the screw and engage the clamp.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)



(c) Engage the 2 pins and install the steering pad switch assembly.
(d) Install the screw and engage the clamp.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(e) Connect the connector to the spiral cable.



4. INSTALL STEERING PAD SWITCH LH (for 3 Spoke)
(a) Engage the 2 pins and install the steering pad switch LH.
(b) Install the screw and engage the clamp.
Torque: 2.4 N*m (24 kgf*cm, 21 in.*lbf)
(c) Connect the connector to the spiral cable.

5. INSTALL STEERING PAD (See page RS-350)

6. INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)

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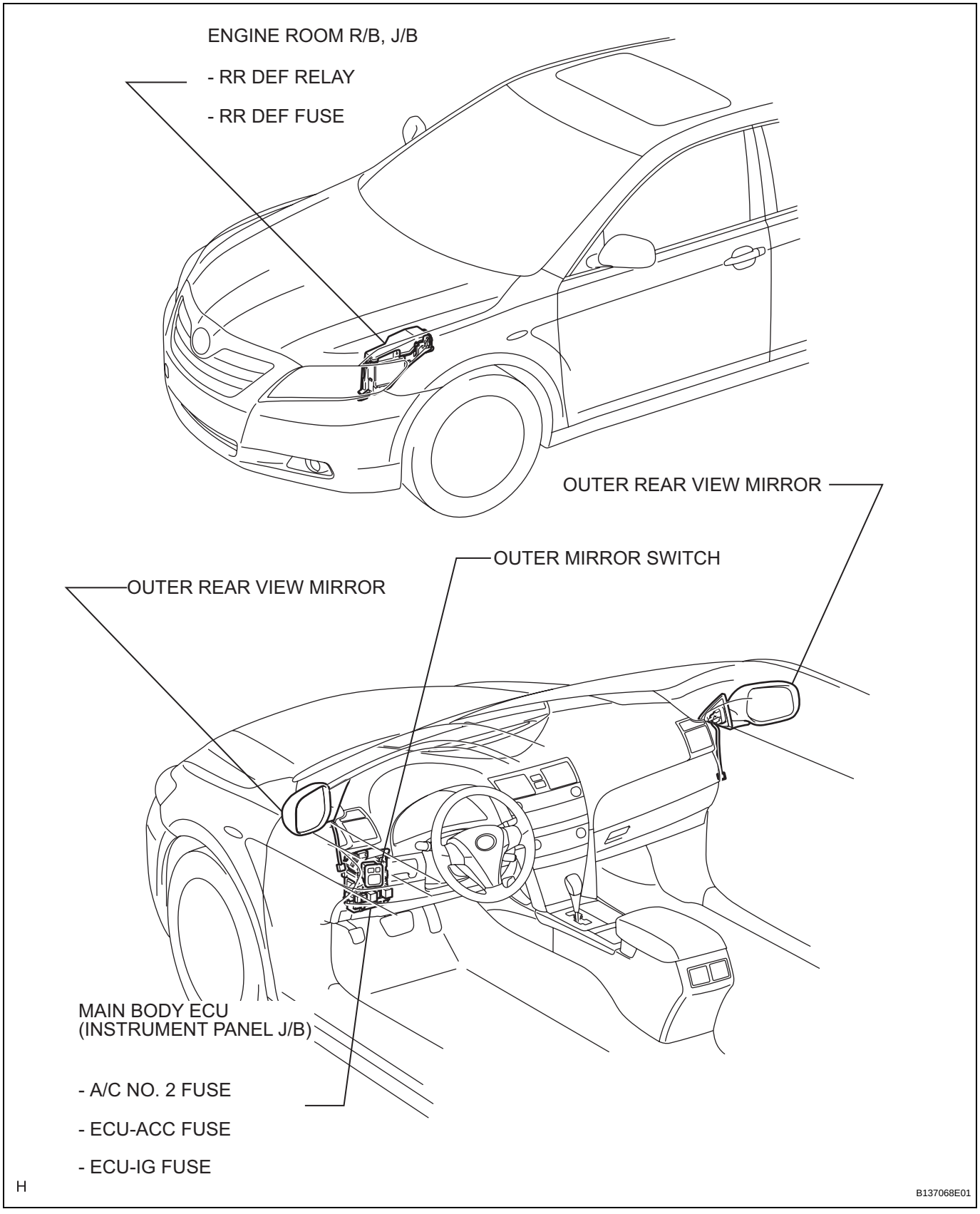
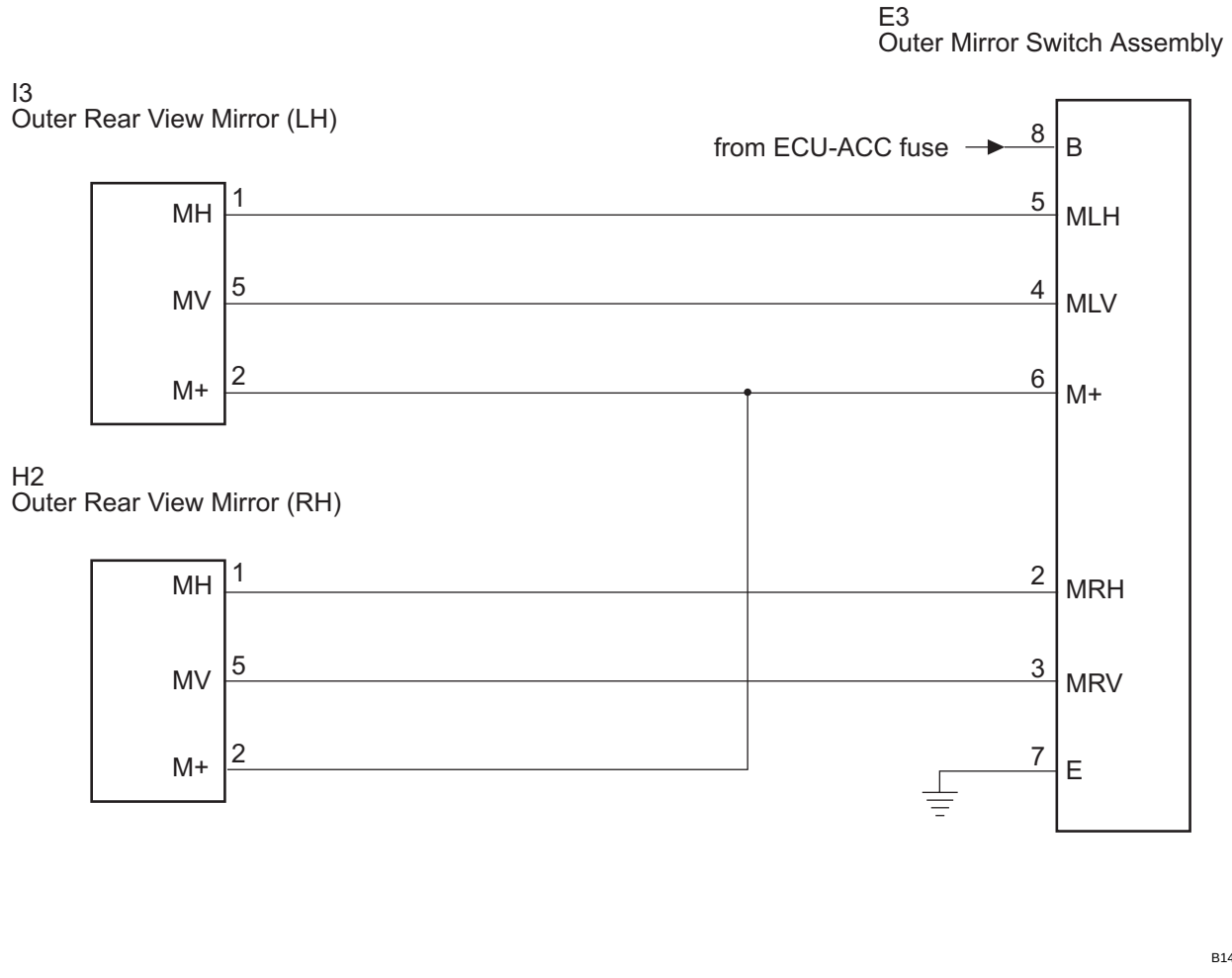
7. **INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)**
8. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
9. **INSPECT SRS WARNING LIGHT (See page RS-352)**

POWER MIRROR CONTROL SYSTEM

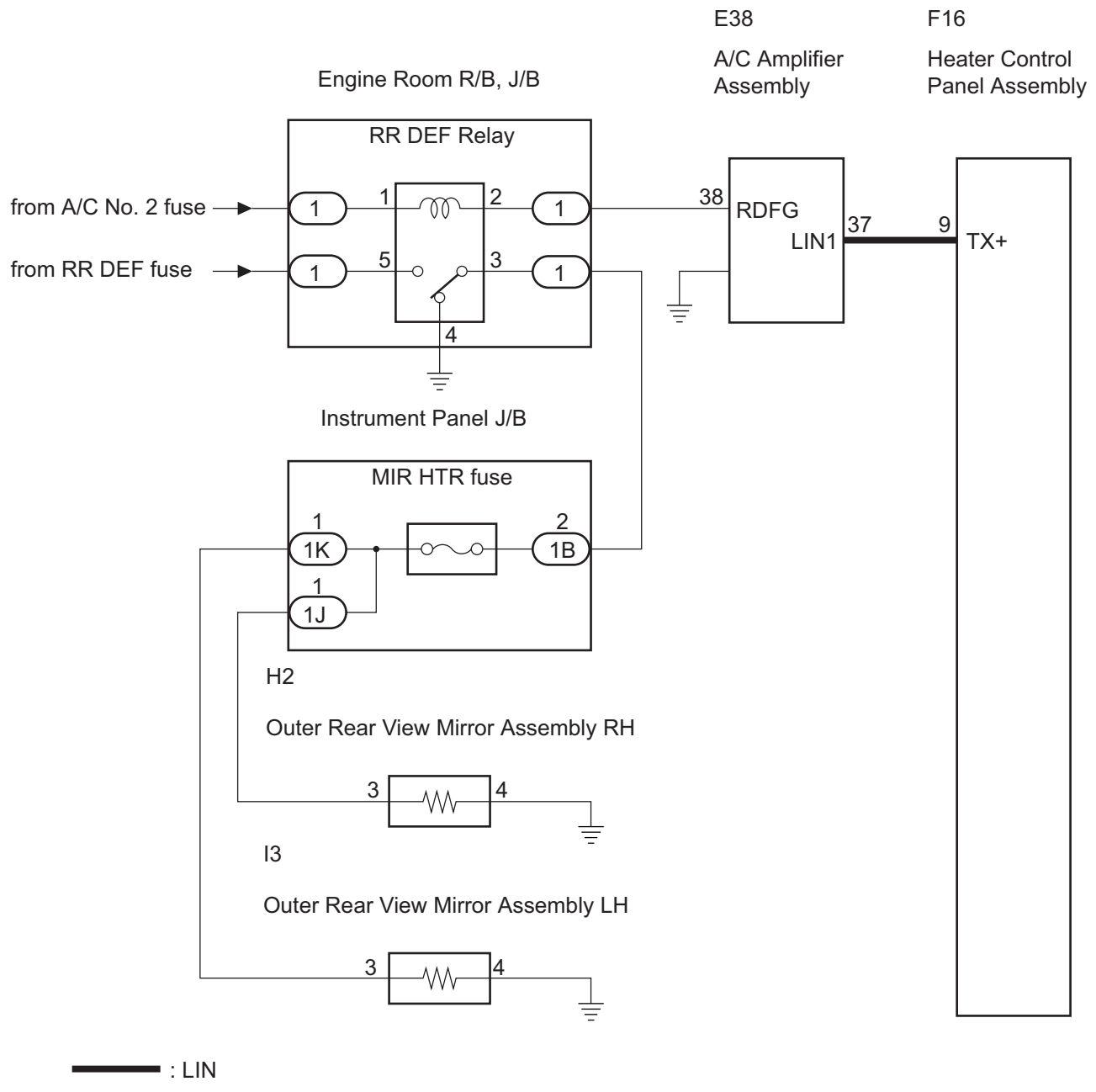
PARTS LOCATION



SYSTEM DIAGRAM



Mirror Heater Operation:



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MI

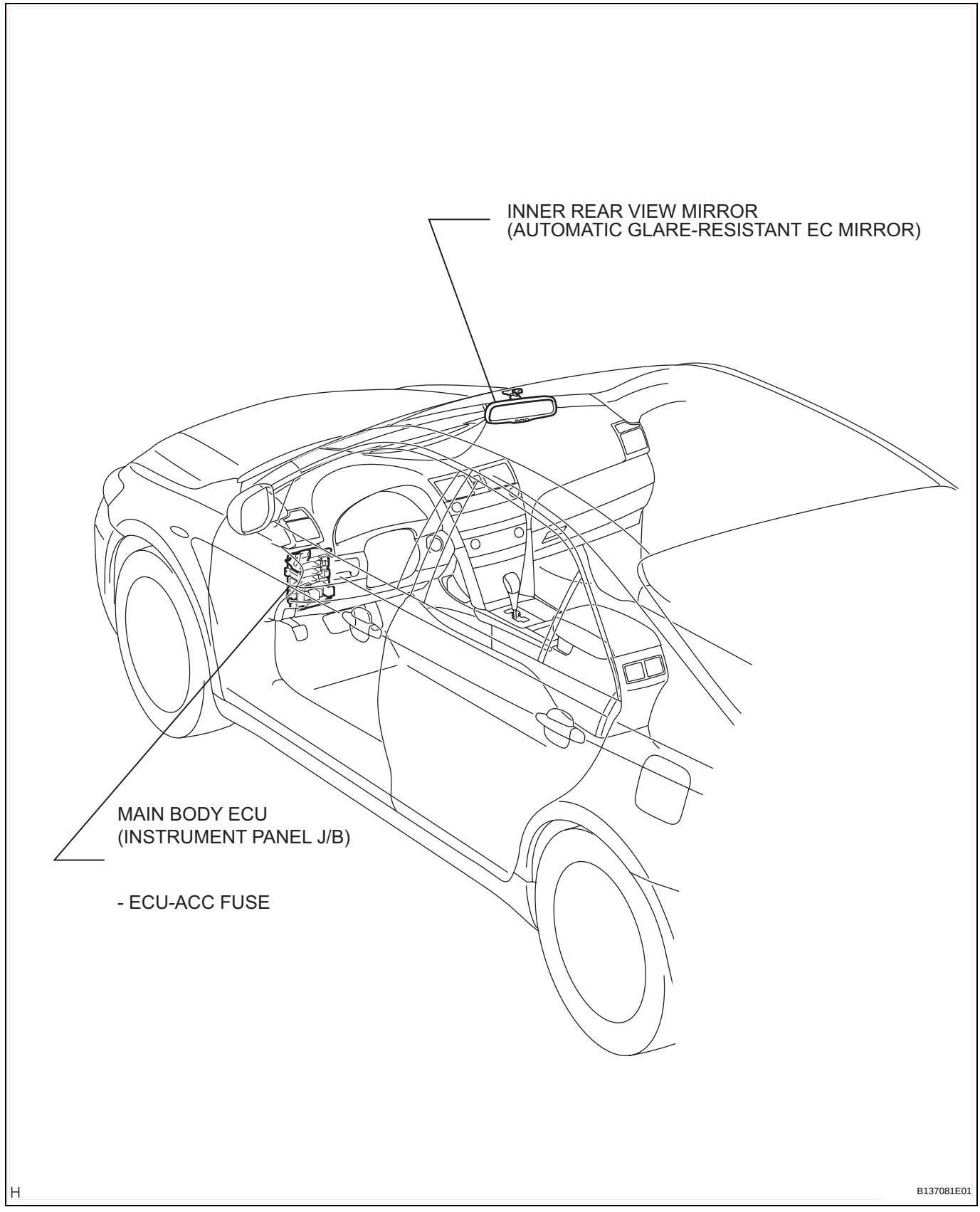
PROBLEM SYMPTOMS TABLE

Power Mirror Control System

Symptom	Suspected area	See page
Power mirrors cannot be adjusted manually	1. ECU-ACC fuse	-
	2. Outer mirror switch	MI-22
	3. Outer rear view mirror LH/RH	MI-12
	4. Wire harness	-
Mirror heater does not operate	1. MIR HTR, A/C No. 2, RR DEF fuses	-
	2. Heater control panel assembly	-
	3. A/C amplifier assembly	-
	4. RR DEF relay	-
	5. Outer rear view mirror LH/RH	MI-12
	6. Wire harness	-

INNER REAR VIEW MIRROR

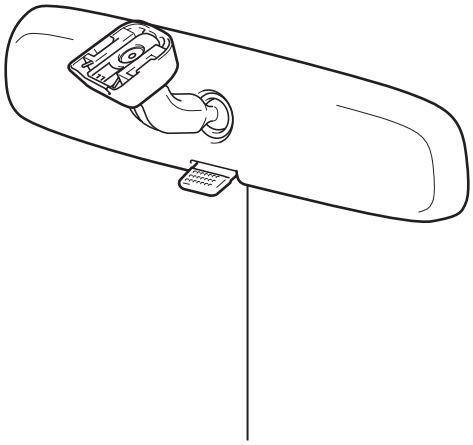
PARTS LOCATION



COMPONENTS

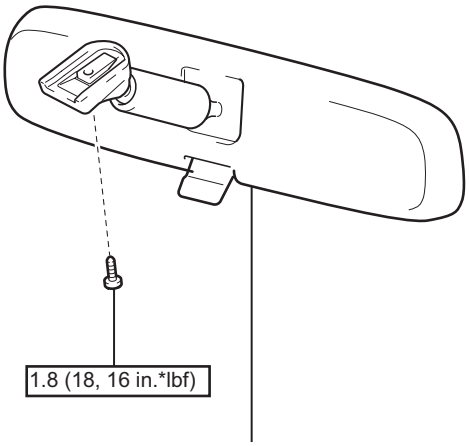
without EC Mirror:

TMC made:



INNER REAR VIEW MIRROR ASSEMBLY

TMMK made:



INNER REAR VIEW MIRROR ASSEMBLY

N*m (kgf*cm, ft.*lbf): Specified torque

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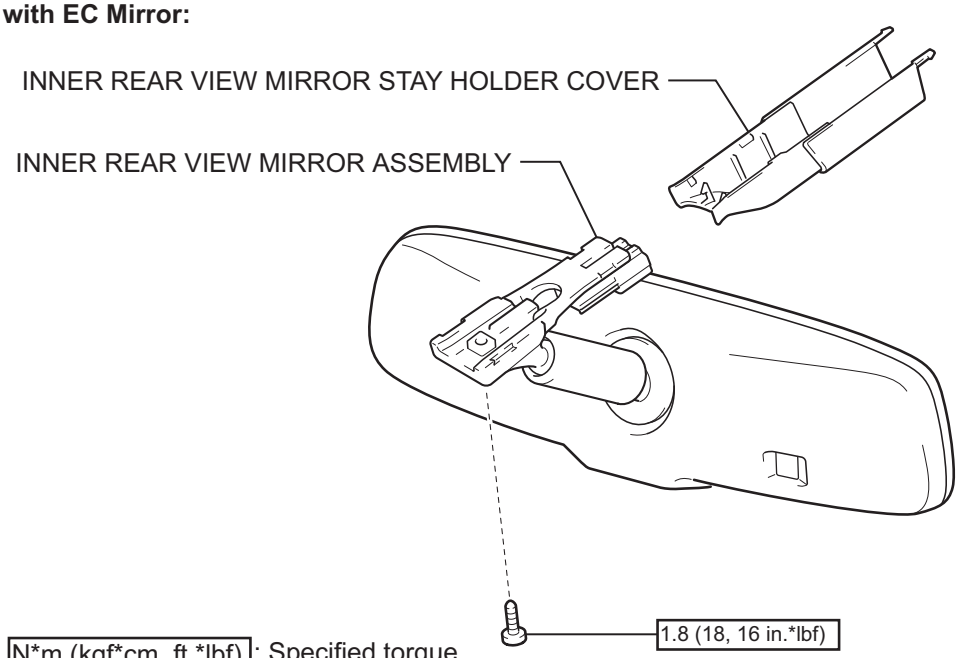
with EC Mirror:



N*m (kgf*cm, ft.*lbf): Specified torque

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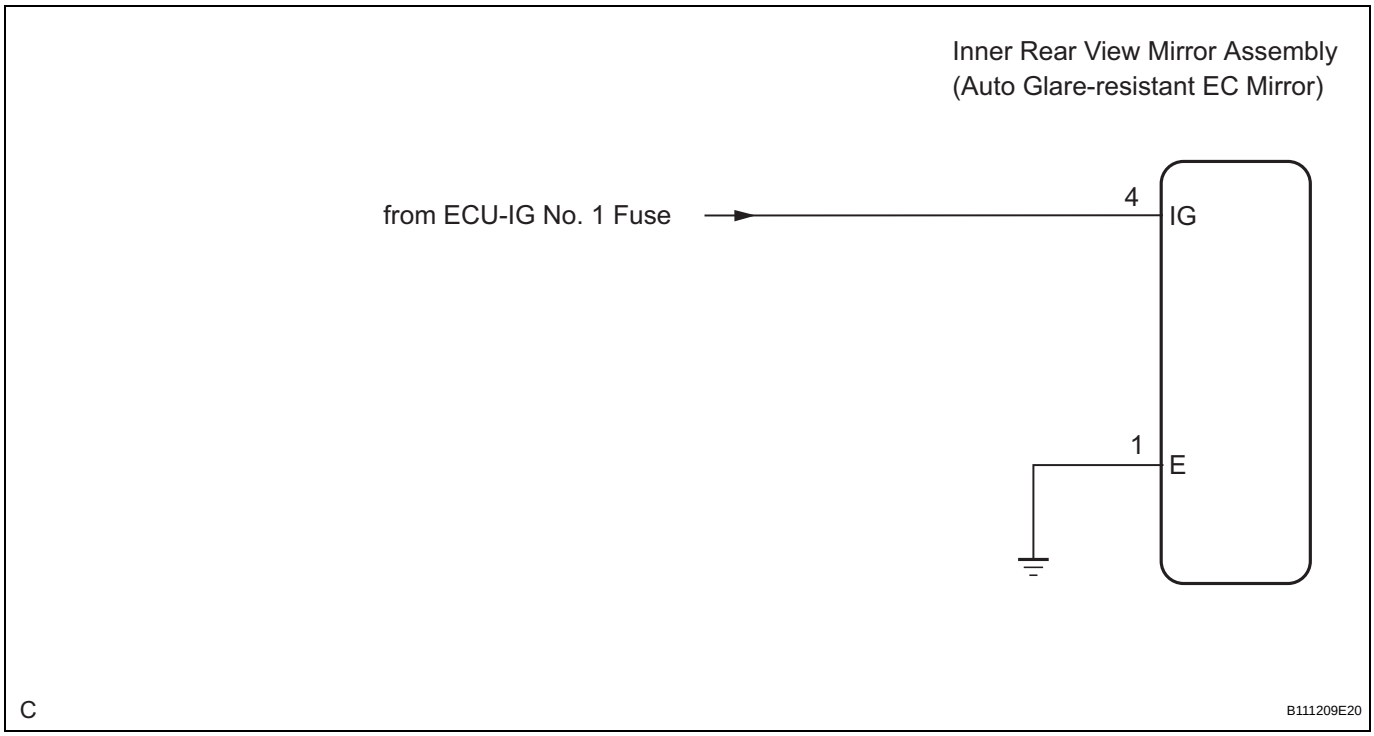
MI

SYSTEM DIAGRAM



MI

CALIBRATION

1. SELECT COMPASS DISPLAY MODE

(a) The COMP switch allows you to select the Display or Non-display mode of the compass.

2. SET ZONE

(a) Deviation between the "magnetic north" and "actual north" differs depending on the location. Therefore, adjustment of the magnetism is required. Since the magnetic condition differs depending on the area where the vehicle is used, it is necessary for each user to set the zone (Refer to Compass Zone Map). The zone setting can be changed using the COMP switch of the inner mirror.

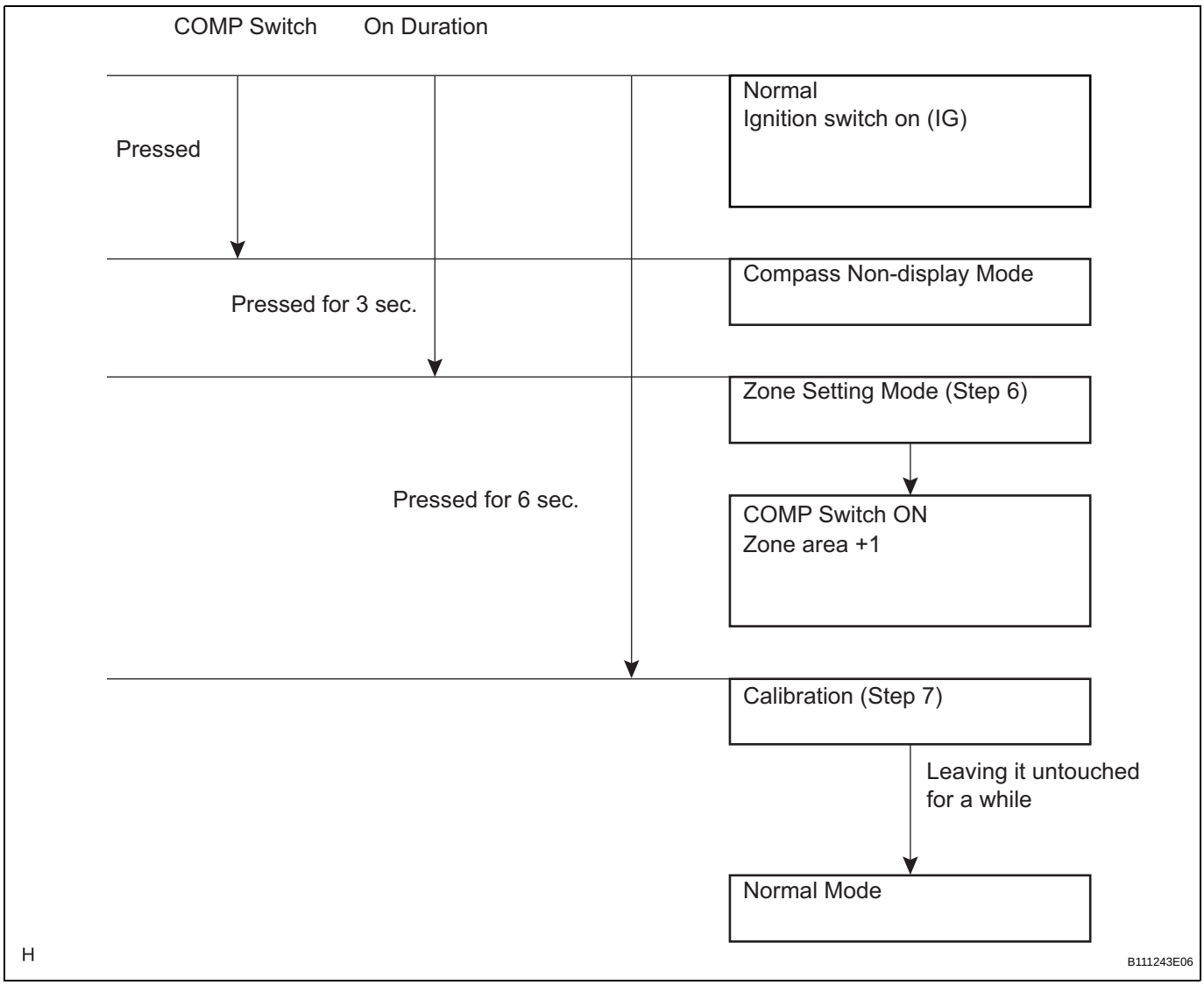
3. PERFORM CALIBRATION

(a) Because each vehicle has its own magnetic field, calibration should be performed for each vehicle. This compass function is used when storing the record of the vehicle's magnetic field.

4. WHEN COMPASS IS MAGNETIZED

(a) A compass could be magnetized during shipping by vessels or freight cars. Therefore, make sure to perform calibration and ensure that calibration is performed properly before delivery. If it cannot be done (cannot be completed in spite of driving around several times), it may be caused by magnetization. Demagnetize the vehicle using a demagnetizer and perform calibration again.

5. SET COMPASS



6. ZONE SETTING MODE

(a) Pressing the COMP switch for 3 seconds in the normal mode will activate the zone setting mode. A number (1 to 15) is displayed on the compass display.
NOTICE:
In the initial state, "8" is displayed.

(b) The displayed number increases by 1 every time the COMP switch is pressed. Referring to the map, check the number for the area where the vehicle will be used and set the zone number.

(c) Leave it untouched for several seconds after setting and check that the compass display shows an azimuthal direction (N, NE, E, SE, S, SW, W or NW) or "C".

7. CALIBRATION SETTING MODE

(a) Pressing the COMP switch for 6 seconds in the normal mode will activate the calibration setting mode.

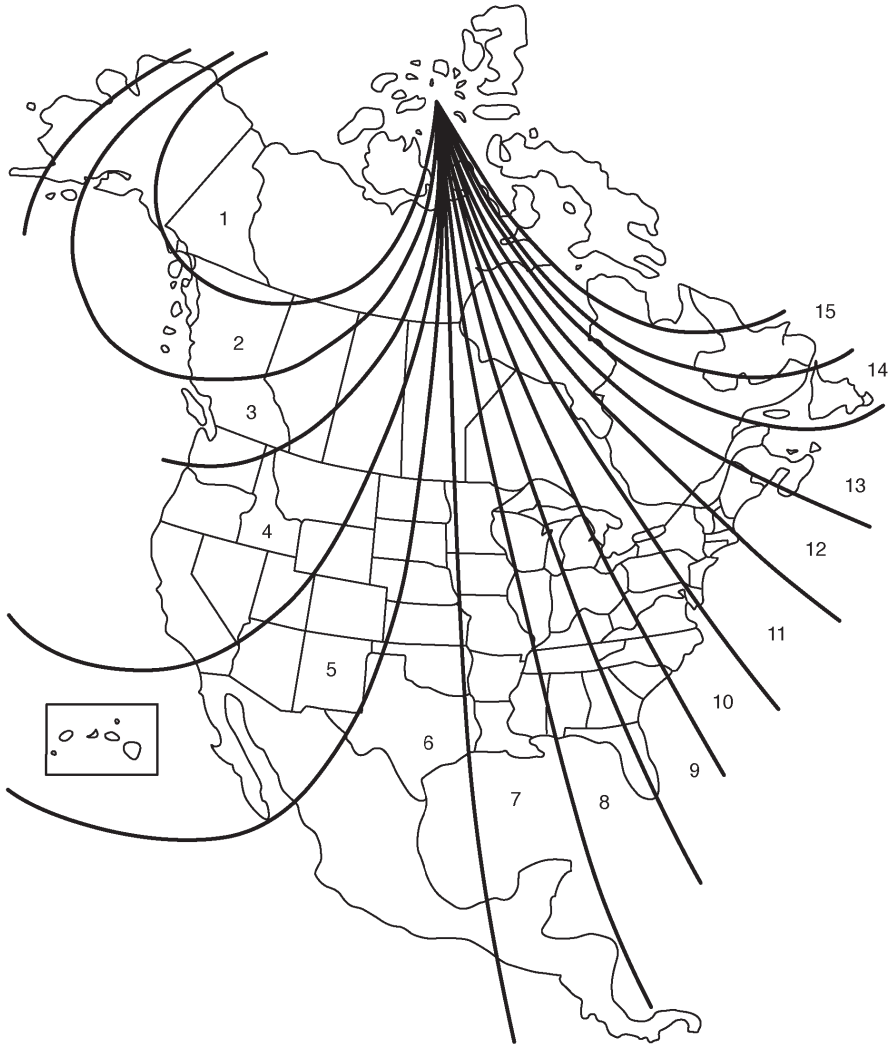
(b) Drive the vehicle at a slow speed of 8 km/h (5 mph) or less in the circular direction.

(c) Driving around the circle 1 to 3 times will display the azimuthal direction on the display, completing the calibration.

NOTICE:

After the calibration is completed, it is not necessary to perform the above procedures unless the magnetic field strength is drastically changed. If this happens, the azimuthal display will be changed to "C".

Zone Setting Map:



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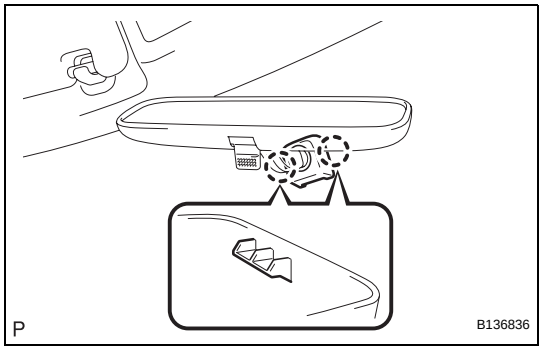
PROBLEM SYMPTOMS TABLE

AUTOMATIC GLARE-RESISTANT EC MIRROR

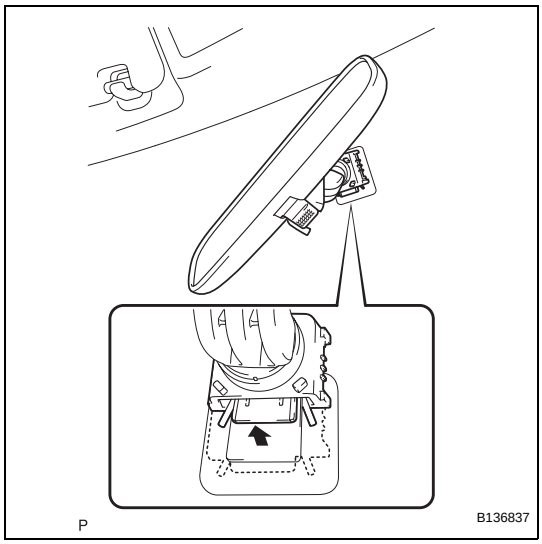
Symptom	Suspected area	See page
Auto glare-resistant EC mirror does not operate	1. ECU-IG No. 1 fuse	-
	2. Inner rear view mirror	MI-12
	3. Wire harness	-

REMOVAL

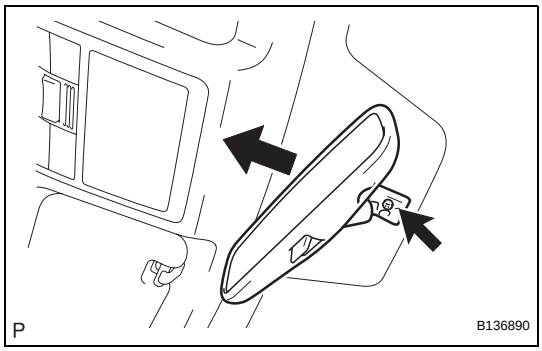


1. REMOVE INNER REAR VIEW MIRROR ASSEMBLY (for TMC Made without EC Mirror)

(a) Disengage the 2 claws and the cover.



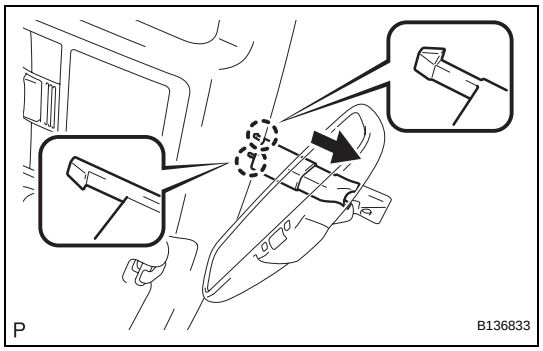
(b) Pull the lever in the direction indicated by the arrow shown in the illustration and slide the inner rear view mirror assembly upward to remove it.



2. REMOVE INNER REAR VIEW MIRROR ASSEMBLY (for TMMK Made without EC Mirror)

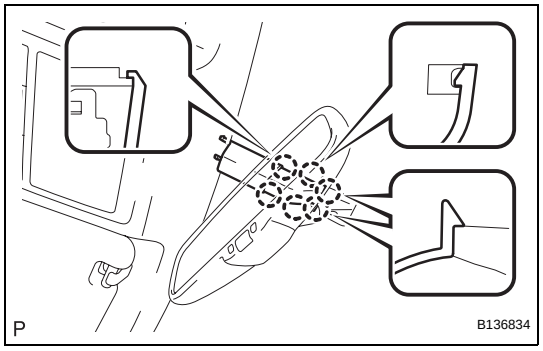
(a) Using a "torx" socket wrench (T20), remove the screw.

(b) Slide the inner rear view mirror assembly in the direction indicated by the arrow shown in the illustration to remove it.

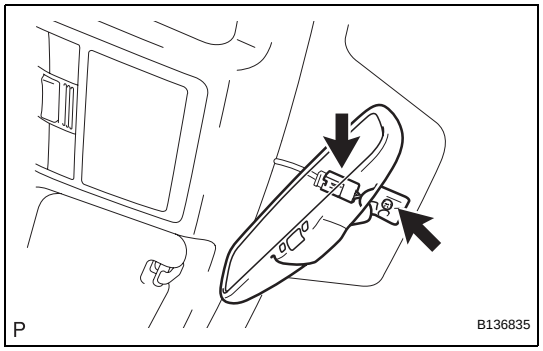


3. REMOVE INNER REAR VIEW MIRROR STAY HOLDER COVER (w/ EC Mirror)

(a) Disengage the 2 claws and slide the inner rear view mirror stay holder cover as shown in the illustration.



(b) Disengage the 6 claws and remove the inner rear view mirror stay holder cover.

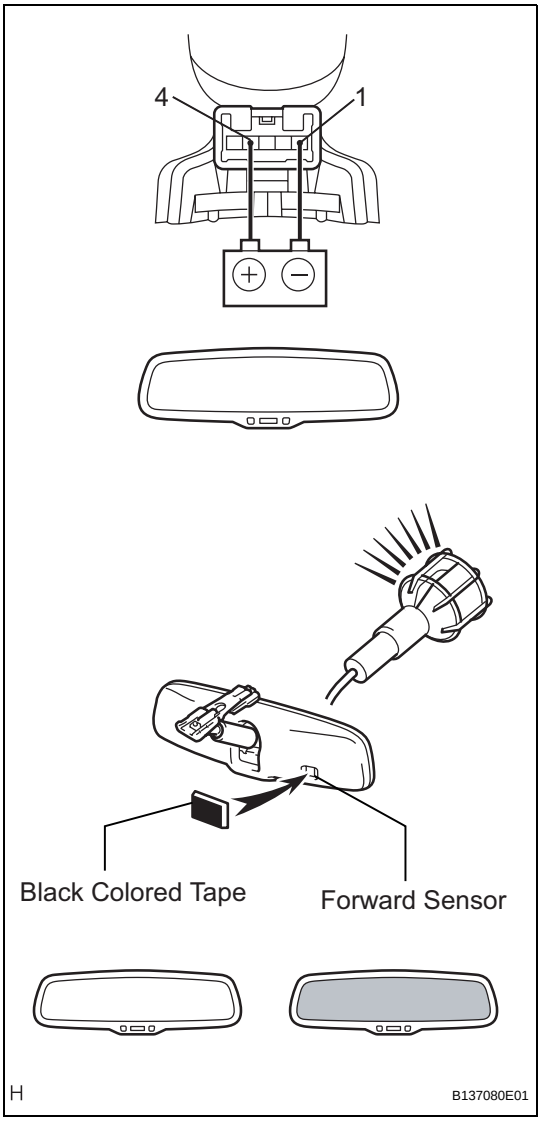


4. REMOVE INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror)

(a) Disconnect the connector.

(b) Using a "torx" socket wrench (T20), remove the screw and the inner rear view mirror.

MI



INSPECTION

1. INSPECT INNER REAR VIEW MIRROR ASSEMBLY

(a) Inspect operation of the electrochromic inner mirror.

(1) Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 1.

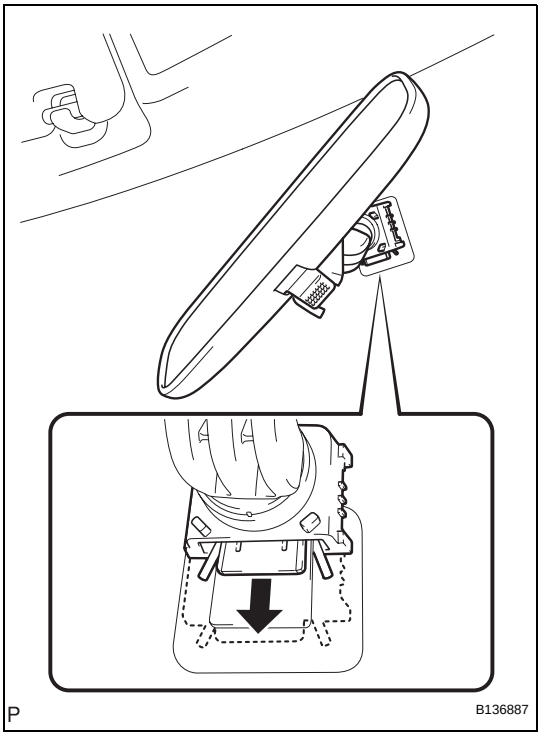
(2) Attach black colored tape to the forward sensor to prevent it from sensing.

(3) Light up the mirror with an electric light, and check that the mirror surface changes from bright to dark.

Standard:

Mirror surface changes from bright to dark.

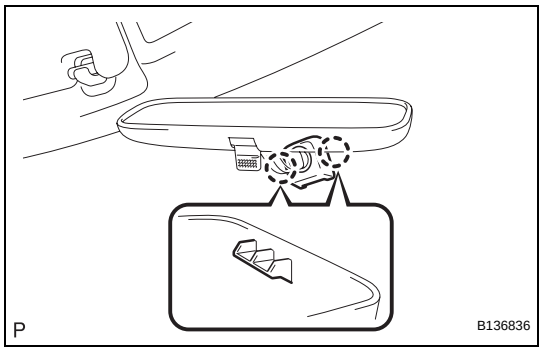
If the result is not as specified, replace the mirror assembly.



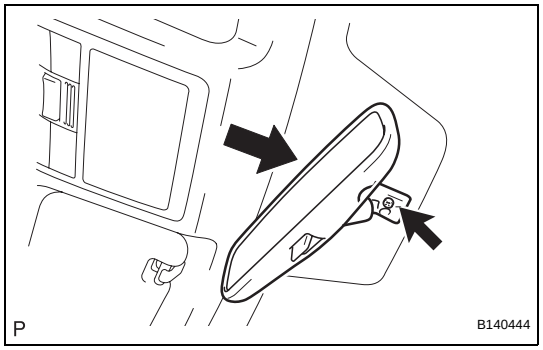
INSTALLATION

1. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (for TMC Made without EC Mirror)

(a) Slide the inner rear view mirror assembly in the direction indicated by the arrow shown in the illustration to install it.



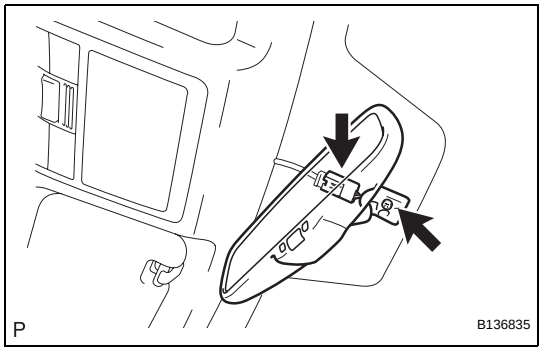
(b) Engage the 2 claws and install the cover.



2. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (for TMMK Made without EC Mirror)

(a) Slide the inner rear view mirror assembly in the direction indicated by the arrow shown in the illustration to install it.

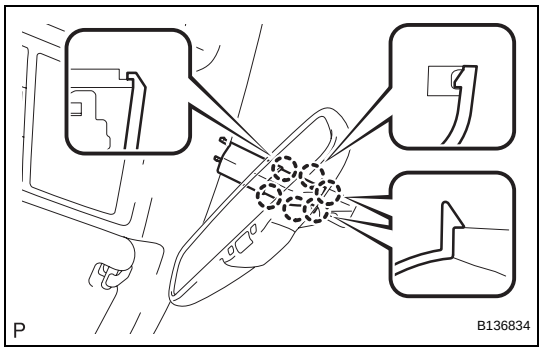
(b) Using a "torx" socket wrench (T20), install the screw.
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)



3. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror)

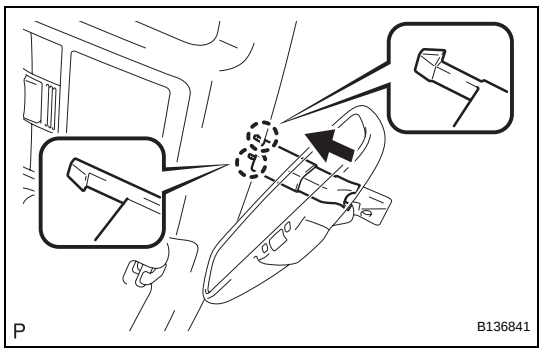
(a) Using a "torx" socket wrench (T20), install the inner rear view mirror with the screw.
Torque: 1.8 N*m (18 kgf*cm, 16 in.*lbf)

(b) Connect the connector.



4. INSTALL INNER REAR VIEW MIRROR STAY HOLDER COVER (w/ EC Mirror)

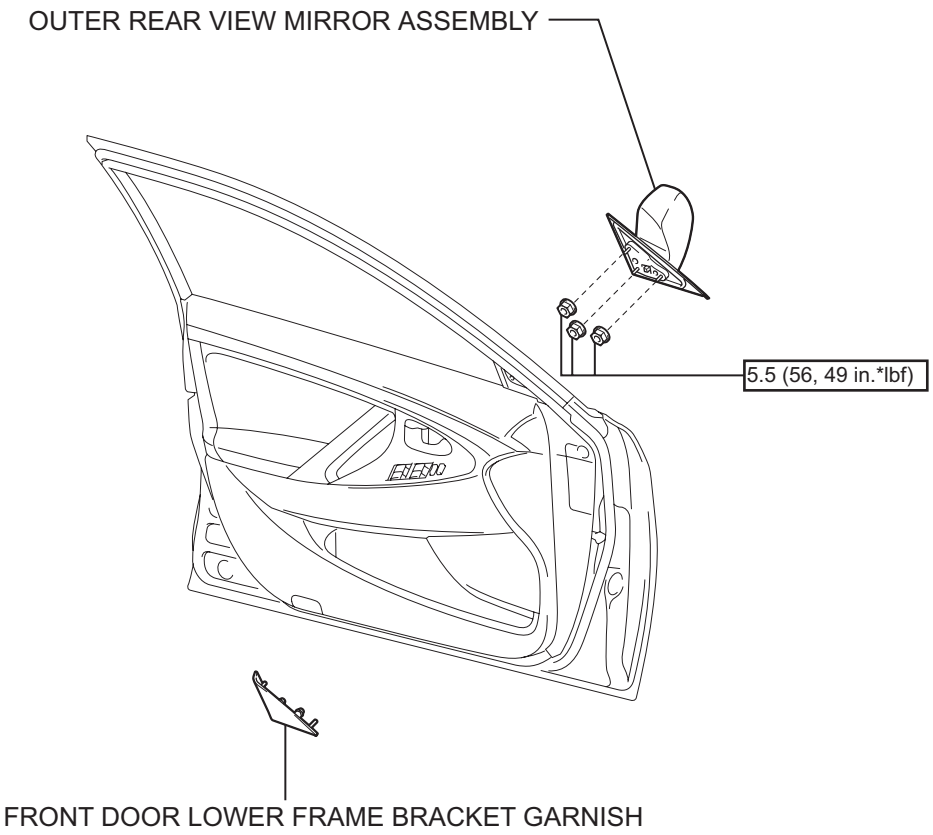
(a) Engage the 6 claws and install the inner rear view mirror stay holder cover.



(b) Engage the 2 claws and install the inner rear view mirror stay holder cover as shown in the illustration.

OUTER REAR VIEW MIRROR

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

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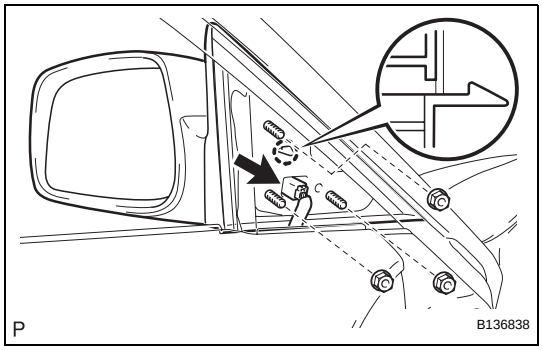
REMOVAL

1. REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)

2. REMOVE OUTER REAR VIEW MIRROR ASSEMBLY

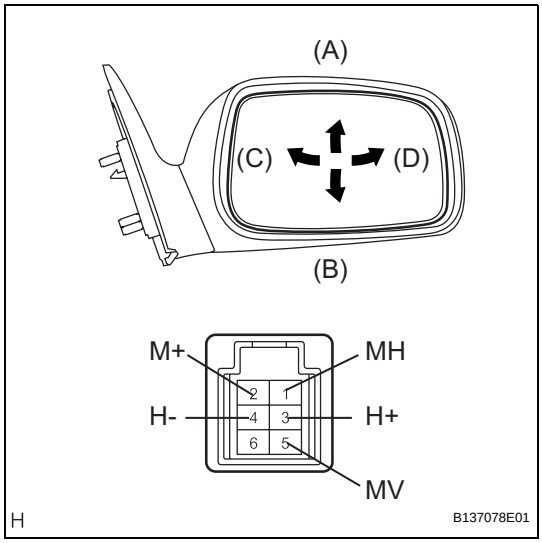
(a) Disconnect the connector.
(b) Remove the 3 nuts.
(c) Disengage the claw and remove the outer rear view mirror assembly.



INSPECTION

1. INSPECT OUTER REAR VIEW MIRROR ASSEMBLY RH

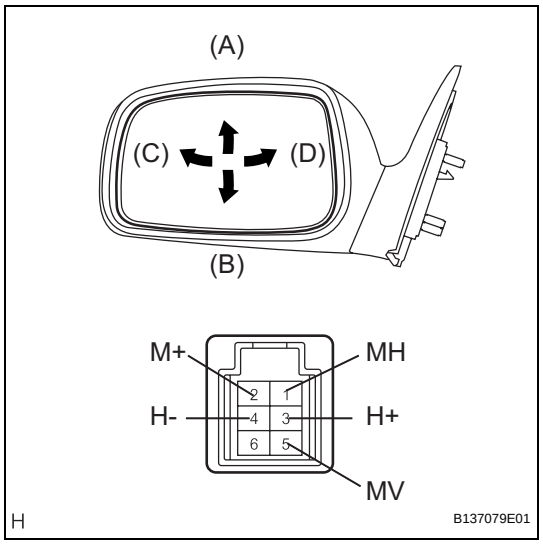
(a) Inspect outer mirror motor operation.
(1) Apply battery voltage and check operation of the mirror face, as shown in the table and illustration.
Standard



Measurement Condition	Specified Condition
Battery positive (+) → Terminal 5 (MV) Battery negative (-) → Terminal 2 (M+)	Turns upward (A)
Battery positive (+) → Terminal 2 (M+) Battery negative (-) → Terminal 5 (MV)	Turns downward (B)
Battery positive (+) → Terminal 1 (MH) Battery negative (-) → Terminal 2 (M+)	Turns left (C)
Battery positive (+) → Terminal 2 (M+) Battery negative (-) → Terminal 1 (MH)	Turns right (D)

(b) Inspect outer mirror heater operation.
(1) Apply battery voltage and check operation of the mirror face, as shown in the table below.
Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 3 (H+) Battery negative (-) → Terminal 4 (H-)	Mirror surface temperature becomes higher



2. INSPECT OUTER REAR VIEW MIRROR ASSEMBLY LH

(a) Inspect outer mirror motor operation.

(1) Remove the outer rear view mirror assembly.

(2) Apply battery voltage and check operation of the mirror face, as shown in the table and illustration.

Standard

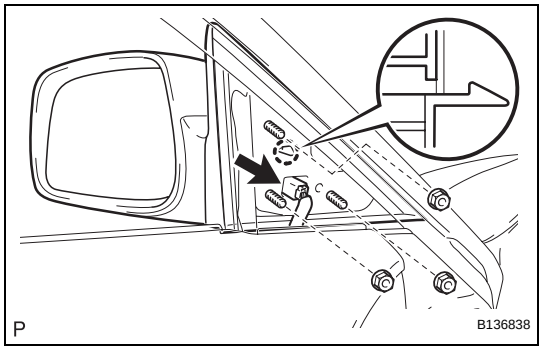
Measurement Condition	Specified Condition
Battery positive (+) → Terminal 5 (MV) Battery negative (-) → Terminal 2 (M+)	Turns upward (A)
Battery positive (+) → Terminal 2 (M+) Battery negative (-) → Terminal 5 (MV)	Turns downward (B)
Battery positive (+) → Terminal 1 (MH) Battery negative (-) → Terminal 2 (M+)	Turns left (C)
Battery positive (+) → Terminal 2 (M+) Battery negative (-) → Terminal 1 (MH)	Turns right (D)

(b) Inspect outer mirror heater operation.

(1) Apply battery voltage and check operation of the mirror face, as shown in the table below.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 3 (H+) Battery negative (-) → Terminal 4 (H-)	Mirror surface temperature becomes higher



INSTALLATION

1. INSTALL OUTER REAR VIEW MIRROR ASSEMBLY

(a) Engage the claw to install the outer rear view mirror assembly.

(b) Install the outer rear view mirror assembly with the 3 nuts.

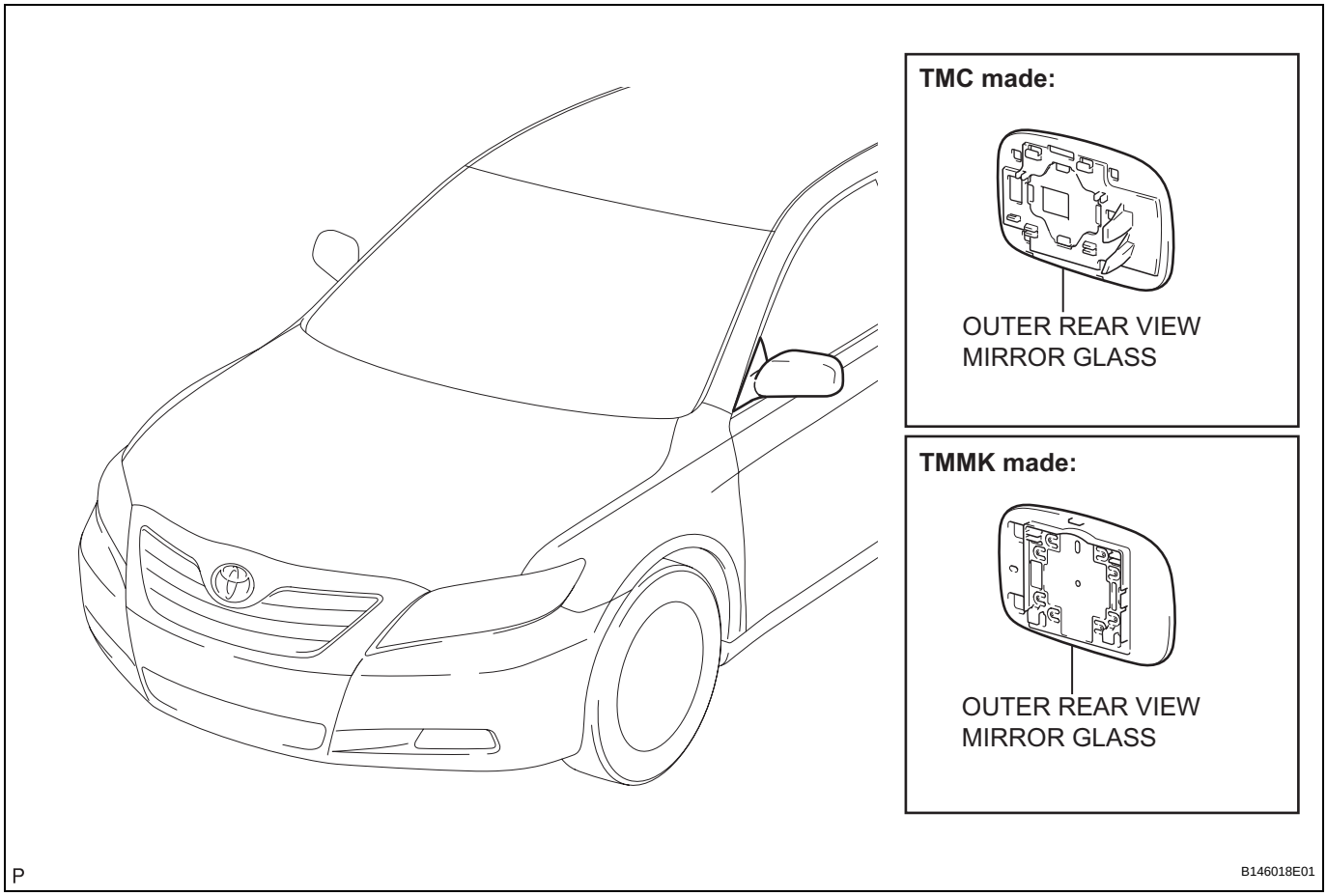
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

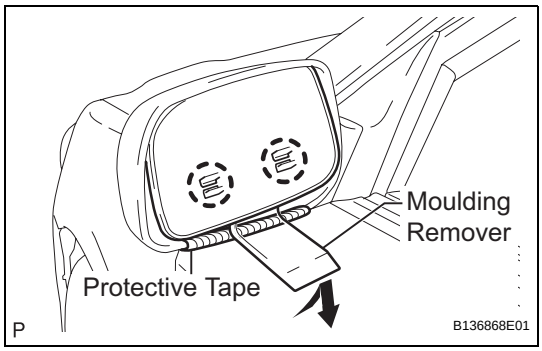
(c) Connect the connector.

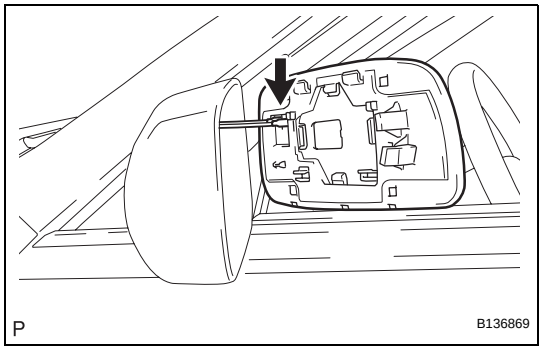
2. INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)

OUTER REAR VIEW MIRROR GLASS

COMPONENTS







REPLACEMENT

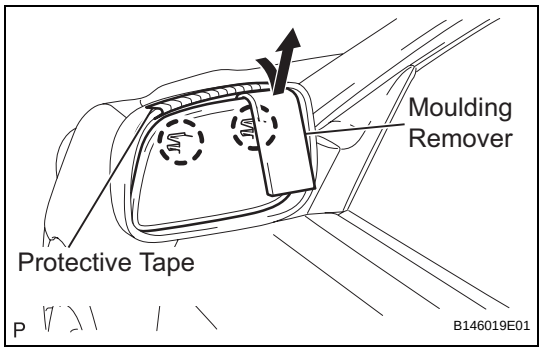
1. REMOVE OUTER REAR VIEW MIRROR GLASS (for TMC Made)

(a) Push the upper part of the mirror surface and tilt it.

(b) Using a moulding remover, disengage the 2 claws at the lower part of the outer rear view mirror, and remove the outer rear view mirror glass.

(c) with Mirror Heater:

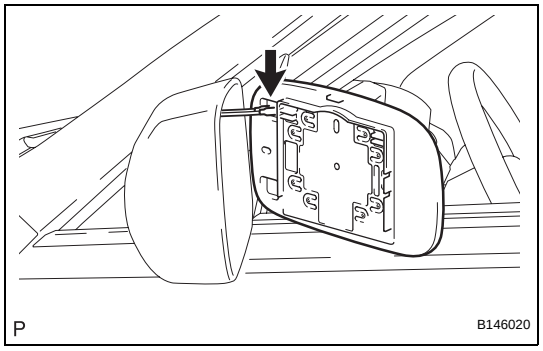
(1) Disconnect the connector and remove the outer rear view mirror glass.



2. REMOVE OUTER REAR VIEW MIRROR GLASS (for TMMK Made)

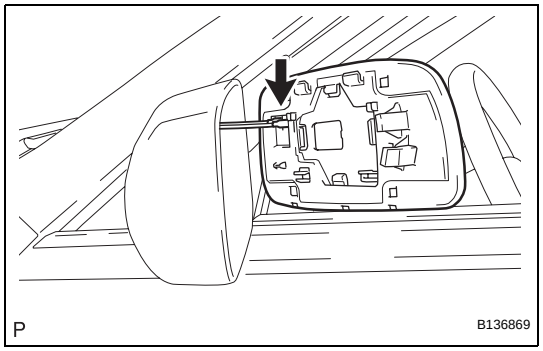
(a) Push the lower part of the mirror surface and tilt it.

(b) Using a moulding remover, disengage the 2 claws at the upper part of the outer rear view mirror, and remove the outer rear view mirror glass.



(c) with Mirror Heater:

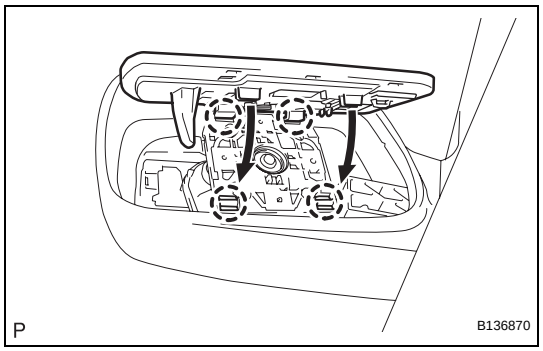
(1) Disconnect the connector and remove the outer rear view mirror glass.



3. INSTALL OUTER REAR VIEW MIRROR GLASS (for TMC Made)

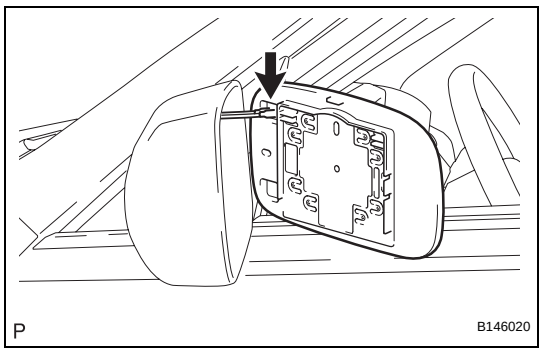
(a) with Mirror Heater:

(1) Connect the connector.



(b) Engage the 2 claws on the upper part of the outer rear view mirror glass to the outer rear view mirror.

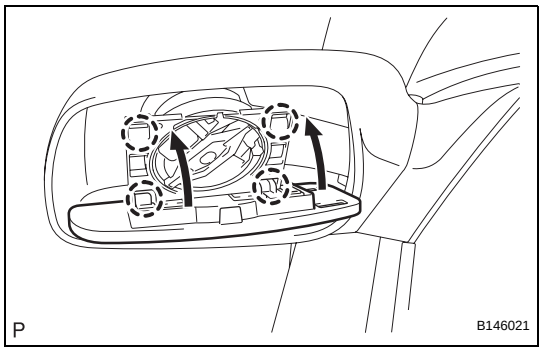
(c) Engage the 2 claws on the lower part of the outer rear view mirror glass to the outer rear view mirror as shown in the illustration.



4. INSTALL OUTER REAR VIEW MIRROR GLASS (for TMMK Made)

(a) with Mirror Heater:

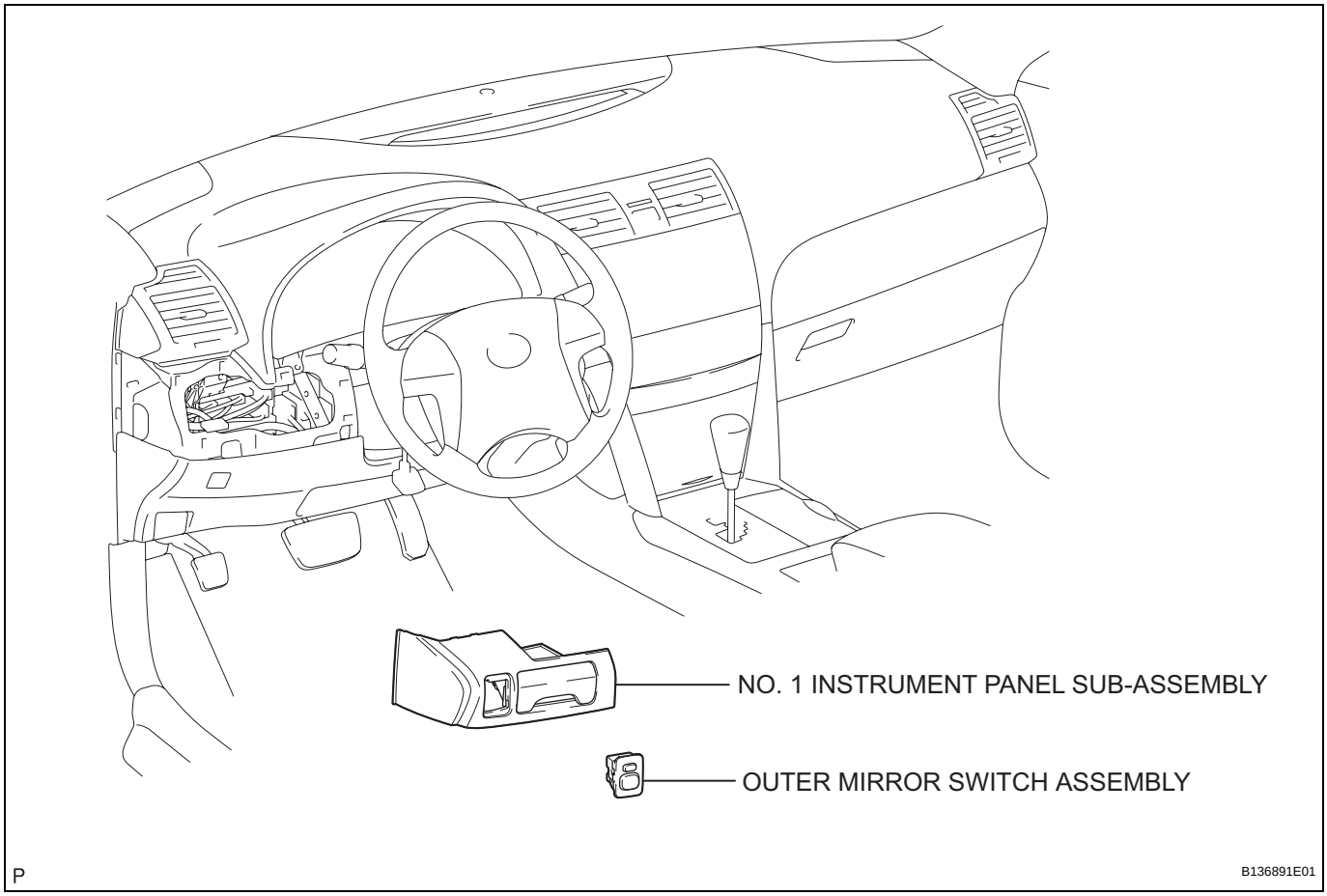
(1) Connect the connector.



(b) Engage the 2 claws on the lower part of the outer rear view mirror glass to the outer rear view mirror.
(c) Engage the 2 claws on the upper part of the outer rear view mirror glass to the outer rear view mirror as shown in the illustration.

OUTER MIRROR SWITCH

COMPONENTS

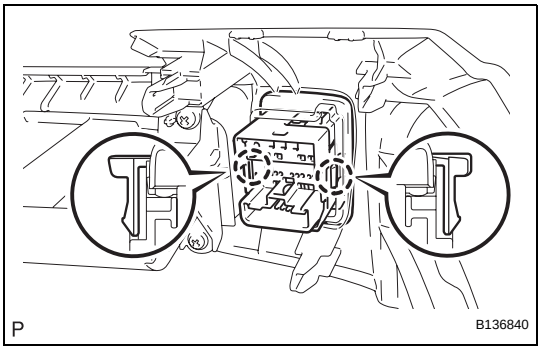


MI

REMOVAL

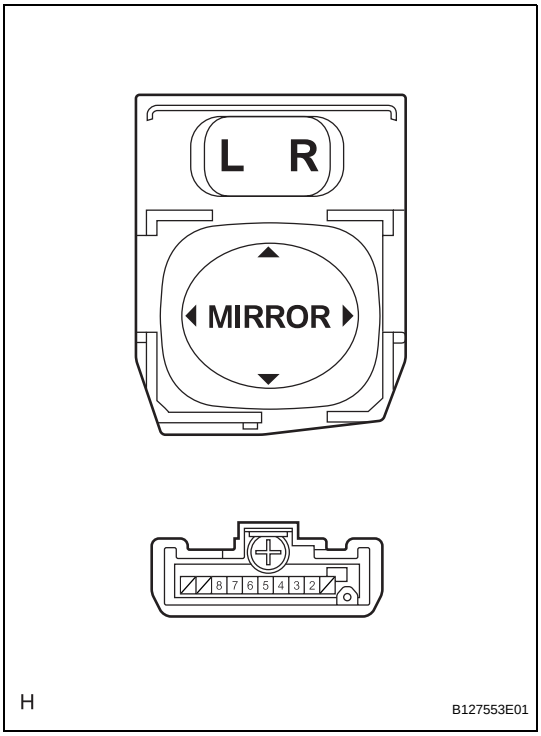
1. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**

2. **REMOVE OUTER MIRROR SWITCH ASSEMBLY**
   (a) Disengage the 2 claws and remove the outer mirror switch assembly.



INSPECTION

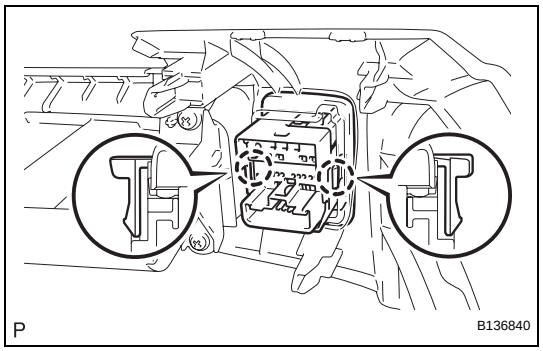
1. **INSPECT OUTER MIRROR SWITCH ASSEMBLY**
   (a) Inspect the outer mirror switch.
      (1) Measure the resistance according to the value(s) in the table below when the switch is operated.
      Standard resistance:
      Select "L" on the left/right adjustment switch



Tester Connection	Switch Position	Specified Condition
4 - 8	UP	Below 1 Ω
6 - 7		
4 - 7	DOWN	
6 - 8		
5 - 8	LEFT	
6 - 7		
5 - 7	RIGHT	
6 - 8		

Select "R" on the left/right adjustment switch

Tester Connection	Switch Position	Specified Condition
3 - 8	UP	Below 1 Ω
6 - 7		
3 - 7	DOWN	
6 - 8		
2 - 8	LEFT	
6 - 7		
2 - 7	RIGHT	
6 - 8		



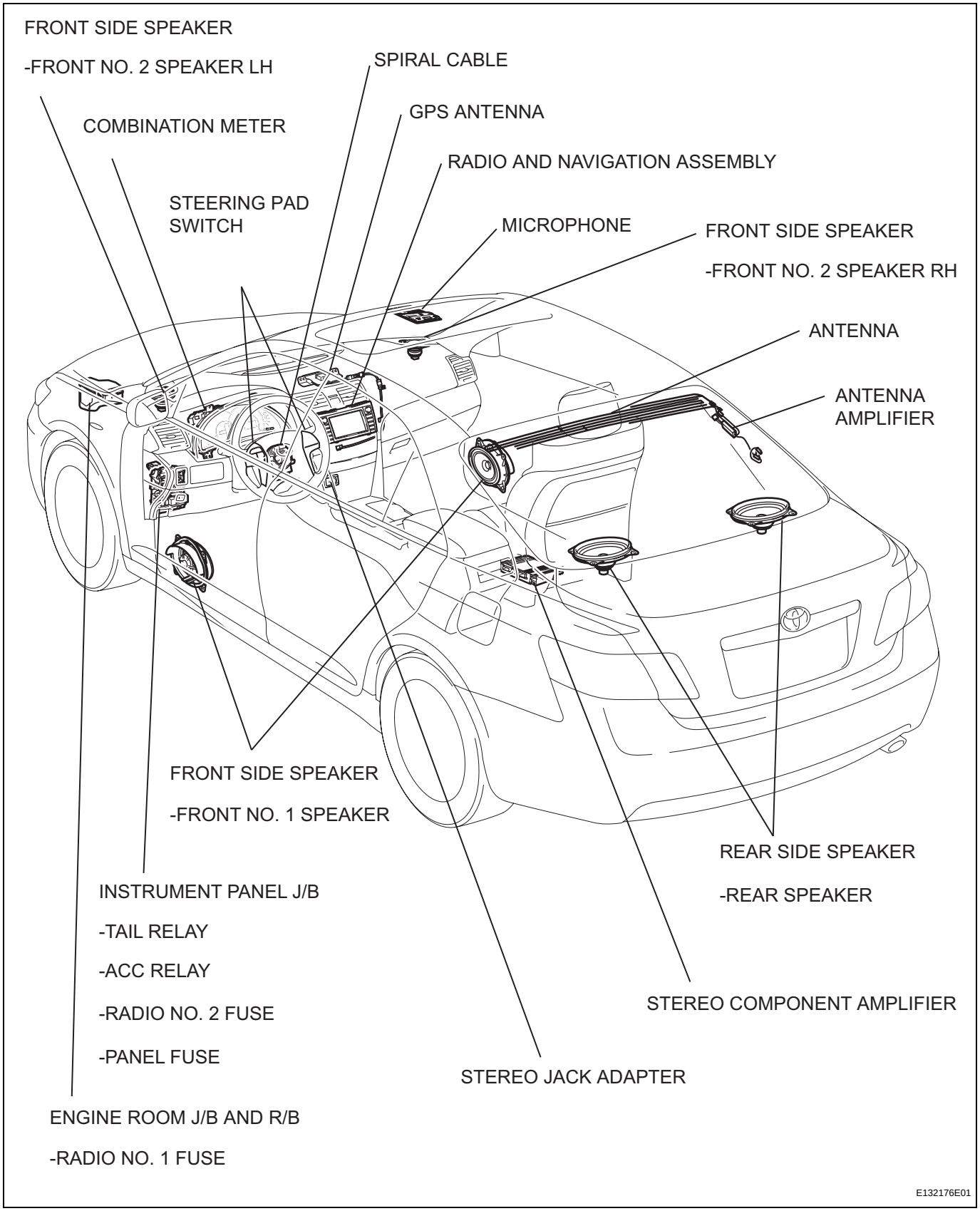
INSTALLATION

1. **INSTALL OUTER MIRROR SWITCH ASSEMBLY**
   (a) Engage the 2 claws and install the outer mirror switch assembly.

2. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**

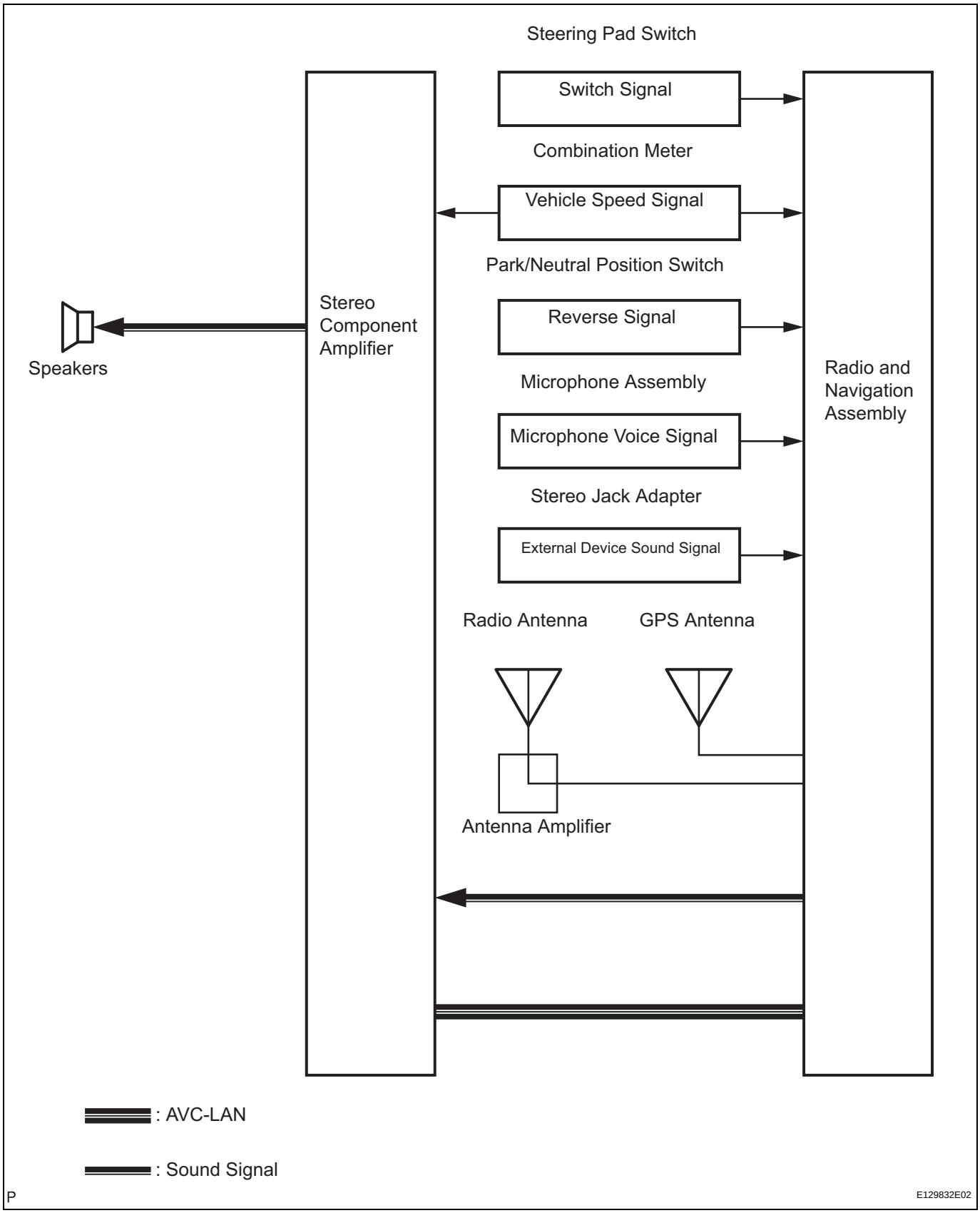
NAVIGATION SYSTEM

PARTS LOCATION



NS

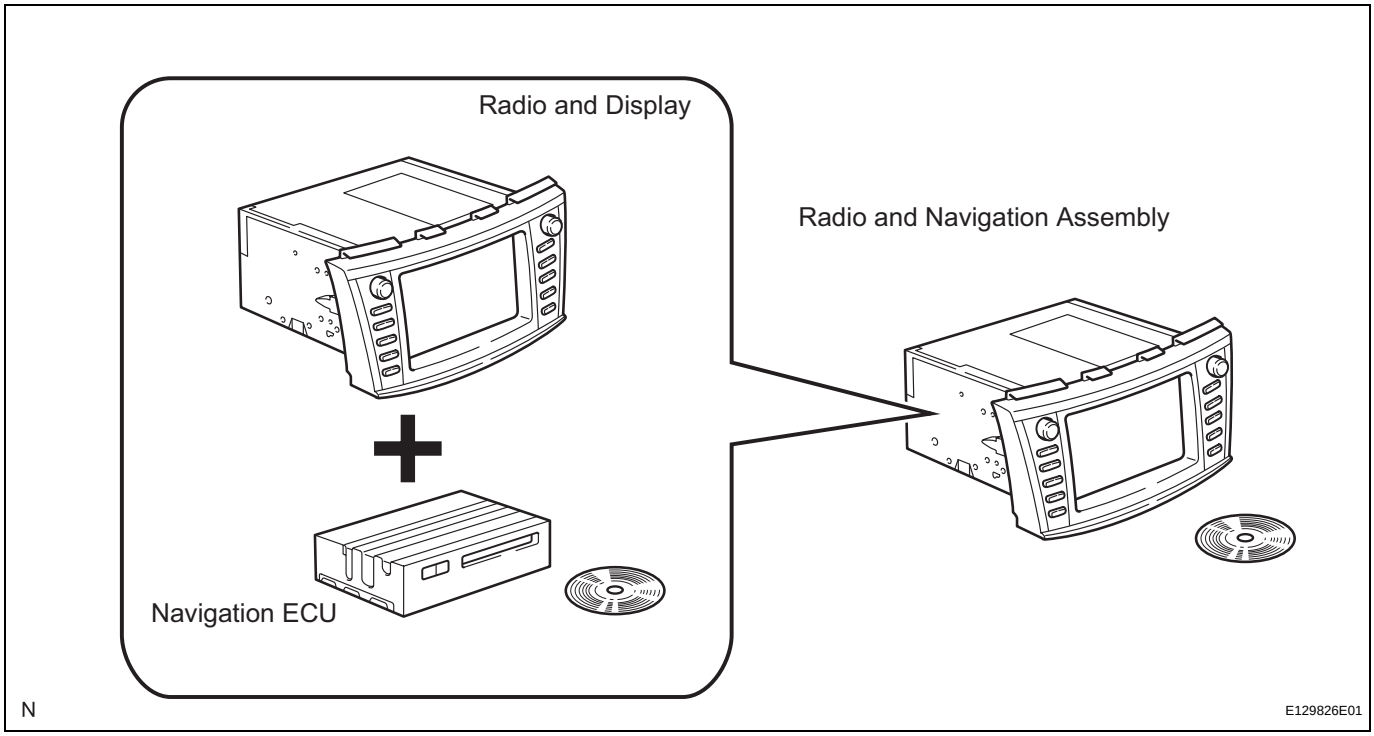
SYSTEM DIAGRAM



SYSTEM DESCRIPTION

1. Radio and navigation assembly outline

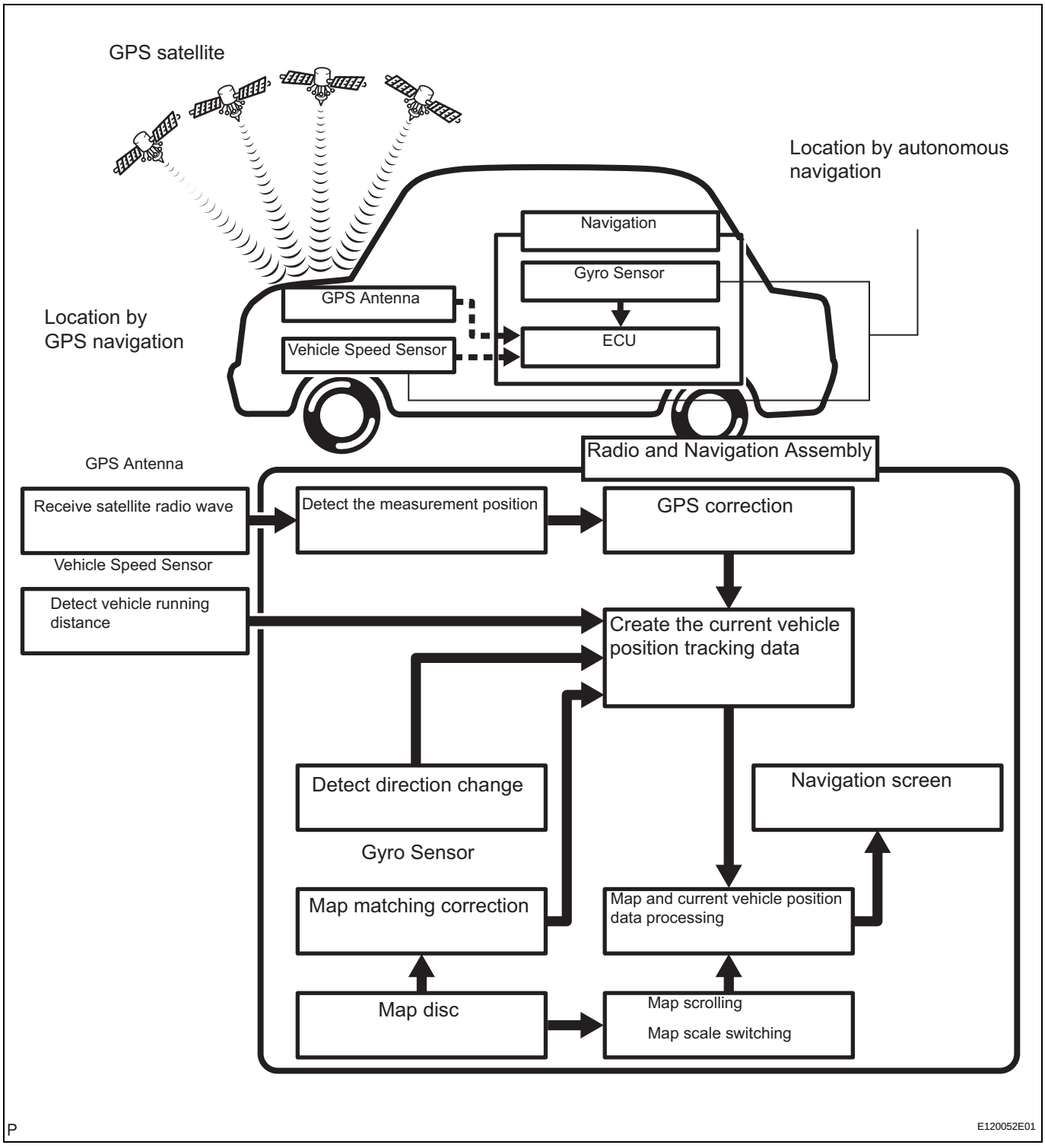
(a) Conventionally, 2 separate devices, a "radio and display" and a "navigation ECU" are used. This model has adopted a new type, combining these devices into a single unit.



2. Navigation system outline

(a) Vehicle position tracking methods

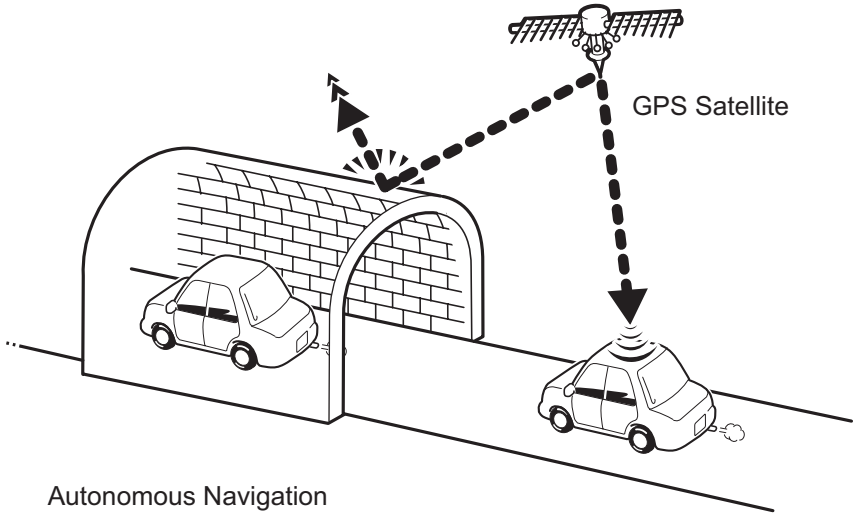
It is essential that the navigation system correctly tracks the current vehicle position and displays it on the map. There are 2 methods to track the current vehicle position: autonomous (dead reckoning) and GPS* (satellite) navigation. Both navigation methods are used in conjunction with each other.
*GPS (Global Positioning System)



Operation	Description
Vehicle Position Calculation	The radio and navigation assembly calculates the current vehicle position (direction and current position) using the direction deviation signal from the gyro sensor and the running distance signal from the vehicle speed sensor and creates the driving route.
Map Display Processing	The radio and navigation assembly displays the vehicle track on the map by processing the vehicle position data, vehicle running track, and map data from the map disc.
Map Matching	The map data from the map disc is compared to the vehicle position and running track data. Then, the vehicle position is matched with the nearest road.
GPS Correction	The vehicle position is matched to the position measured by GPS. Then, the measurement position data from the GPS unit is compared with the vehicle position and running track data. If the position is widely different, the GPS measurement position is used.
Distance Correction	The running distance signal from the vehicle speed sensor includes the error caused by tire wear and slippage between the tires and road surface. Distance correction is performed to account for this. The radio and navigation assembly automatically offsets the running distance signal to make up for the difference between it and the distance data of the map. The offset is automatically updated.

Navigation is performed even where the GPS radio wave does not reach.

- In a tunnel
- In an indoor parking lot
- Between tall buildings
- Under an overpass
- On a forest or tree-lined path



Autonomous Navigation

Autonomous Navigation and GPS Wave Navigation

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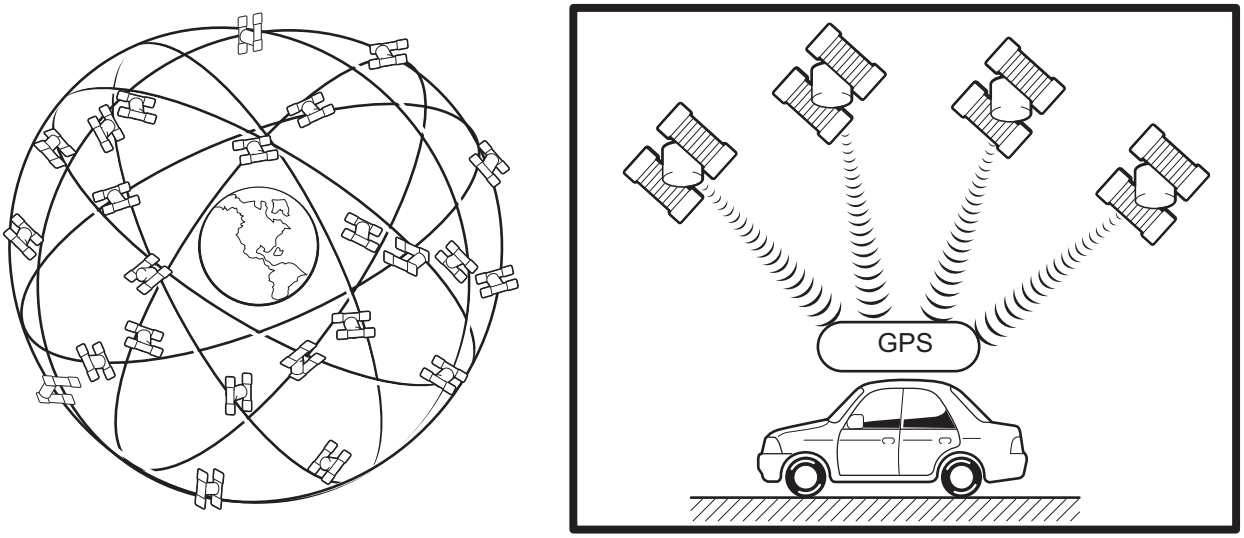
HINT:
The combination of autonomous and GPS navigation makes it possible to display the vehicle position even when the vehicle is in places where the GPS radio wave cannot receive a signal. When only autonomous navigation is used, however, the mapping accuracy may slightly decline.

(b) Autonomous navigation
This method determines the relative vehicle position based on the running track determined by the gyro and vehicle speed sensors located in the radio and navigation assembly.
(1) Gyro sensor
Calculates the direction by detecting angular velocity. It is located in the radio and navigation assembly.
(2) Vehicle speed sensor
Used to calculate the vehicle running distance.

(c) GPS navigation (Satellite navigation)
This method detects the absolute vehicle position using radio waves from a GPS satellite.
* GPS satellites were launched by the U.S. Department of Defence for military purposes.

Current longitude/latitude/altitude is determined using the radio wave arrival time from four satellites.



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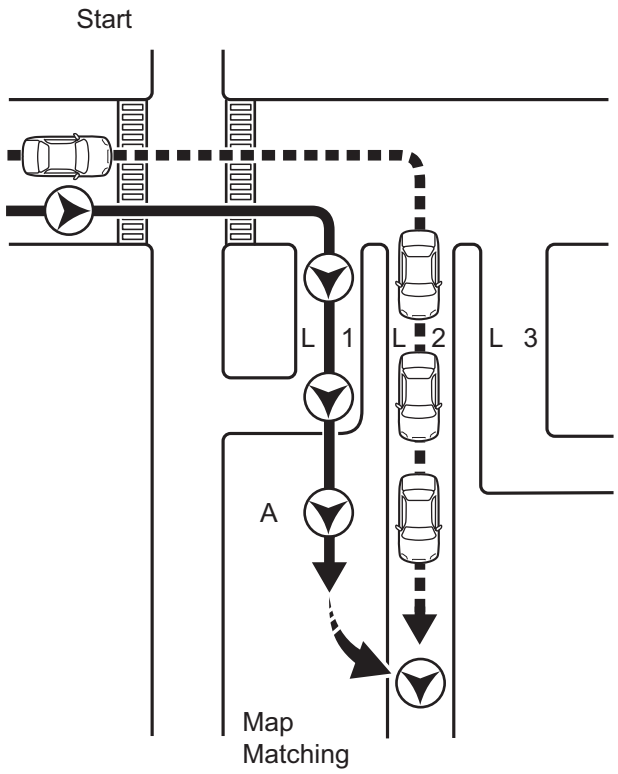
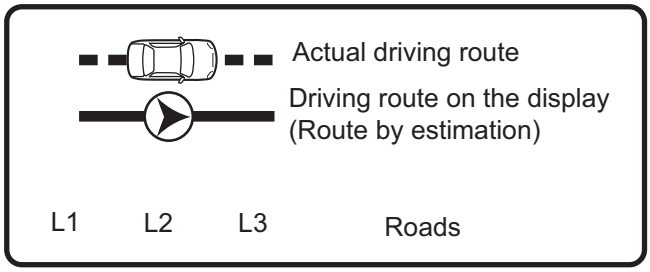
Number of satellites	Measurement	Description
2 or less	Measurement impossible	Vehicle position cannot be obtained because the number of satellites is not enough.
3	2-dimensional measurement is possible	Vehicle position is obtained based on the current longitude and latitude. (This is less precise than 3-dimensional measurement.)
4	3-dimensional measurement is possible	Vehicle position is obtained based on the current longitude, latitude and altitude.

(d) Map matching
The current driving route is calculated by autonomous navigation (according to the gyro sensor and vehicle speed sensor) and GPS navigation. This information is then compared with possible road shapes from the map data in the map disc and the vehicle position is set onto the most appropriate road.





The system compares the shape of the roads L1, L2 and L3 to the estimated running track after the vehicle makes a right turn. At point A, the vehicle position differs enough from the shape of L1 that the display switches to the road L2.

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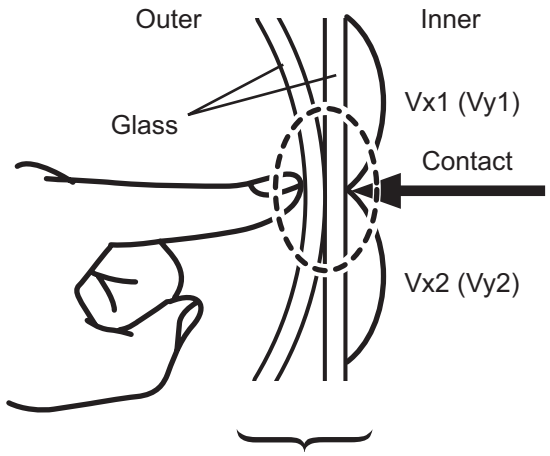
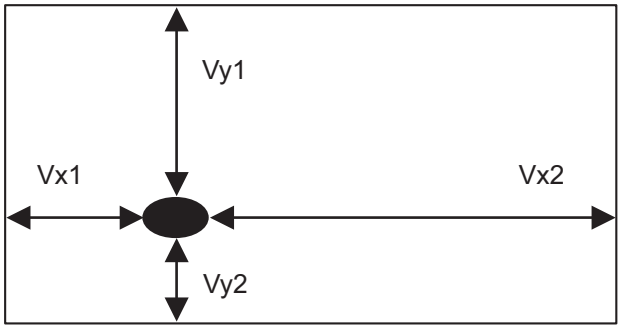
(e) Touch switch
Touch switches are touch-sensitive (interactive) switches operated by touching the screen. When a switch is pressed, the outer glass bends in to contact the inner glass at the pressed position. By doing this, the voltage ratio is measured and the pressed position is detected.



Touch-sensitive switch position



The touch switch detects the voltage ratio and calculates the position on the screen.

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3. DVD (Digital Versatile Disc) player outline (for navigation map)

(a) The radio and navigation assembly (built-in navigation ECU) uses a laser pickup to read the digital signals recorded on a DVD.
HINT:
- Do not disassemble any part of the radio and navigation assembly (built-in navigation ECU).
- Do not apply oil to the radio and navigation assembly (built-in navigation ECU).
- Do not insert anything but a DVD into the radio and navigation assembly (built-in navigation ECU).

NS

CAUTION:
Do not look directly at the laser pickup because the radio and navigation assembly (built-in navigation ECU) uses an invisible laser beam. Be sure to only operate the navigation system as instructed.

4. CD (Compact Disc) player outline

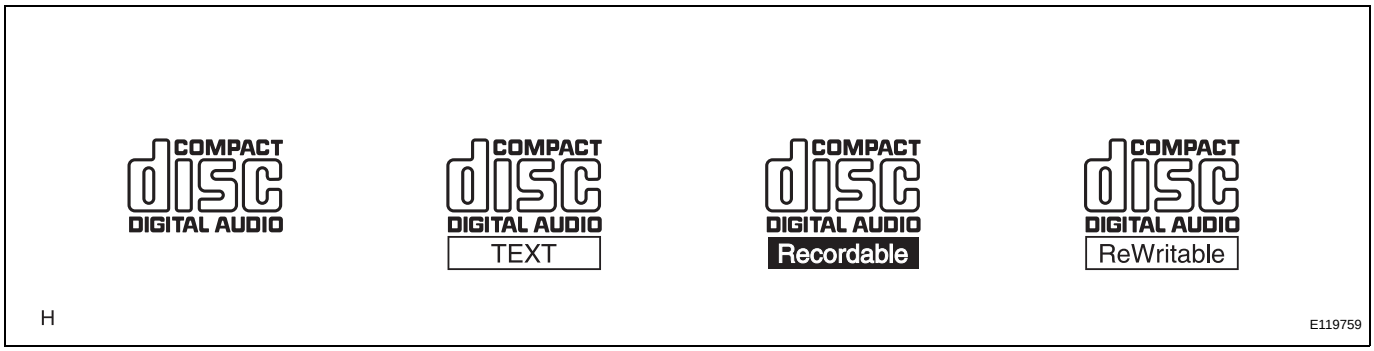
(a) A compact disc player uses a laser pickup to read digital signals recorded on a compact disc (CD). By converting the digital signals to analog, it can play music and other content.

NOTICE:
- **Do not disassemble any part of the CD player.**
- **Do not apply oil to the CD player.**
- **Do not insert anything but a CD into the CD player.**

CAUTION:
Do not look directly at the laser pickup because the CD player uses an invisible laser beam. Be sure to only operate the player as instructed.

(b) Usable discs

(1) This player can only play audio CDs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) that have any of the following marks:



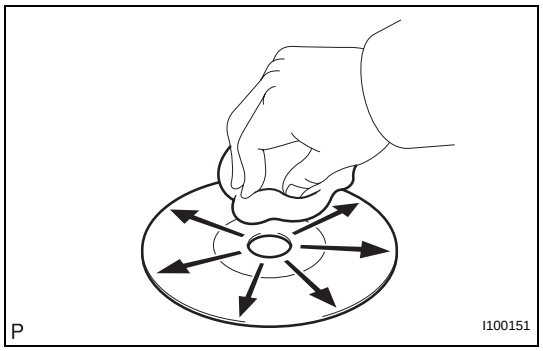
(c) Precautions for use of discs

NOTICE:
- **Copy-protected CDs cannot be played.**
- **CD-Rs and CD-RWs may not be played depending on the recording conditions or characteristics of the discs, or due to damage, dirt, or deterioration caused by leaving the discs in the cabin for a long time.**
- **Unfinalized CD-Rs and CD-RWs cannot be played.**
- **DualDiscs that mate DVD recorded material on one side with CD digital audio material on the other cannot be played.**
- **Keep the discs away from dirt. Be careful not to damage the discs or leave your fingerprints on them.**
- **Hold discs by the outer edge and center hole with the label side up.**

- **Leaving the disc exposed halfway out of the slot for a long time after pressing the disc eject button may cause deformation of the disc, making the disc unusable.**
- **If discs have adhesive tape, stickers, CDR labels, or any traces of such labels attached, the discs may not be ejected or player malfunctions may result.**
- **Keep the discs away from direct sunlight. (Exposure to direct sunlight may cause deformation of the disc, making the disc unusable.)**
- **Do not use odd-shaped CDs because these may cause player malfunctions.**
- **Do not use discs whose recording portion is transparent or translucent because they may not be inserted, ejected, or played normally.**

HINT:

- When it is cold or it is raining, if the windows mist up, mist and also dew may form in the player. In such a case, the CD may skip or the CD may stop in the middle of play. Ventilate or dehumidify the cabin for a while before using the player.
- The CD may skip if the player experiences strong vibrations when the vehicle is driven on rough road or similar uneven surface(s).



(d) Cleaning

NOTICE:

Do not use a lens cleaner because it may cause a malfunction in the pickup portion of the player.

(1) If dirt is on the disc surface, wipe it clean with a soft dry cloth such as an eyeglass cleaner for plastic lenses from the inside to the outside in a radial direction.

NOTICE:

- **Pressing on the disc by hand or rubbing the disc with a hard cloth may scratch the disc surface.**
- **Use of solvent such as a record spray, antistatic agent, alcohol, benzine, and thinner, or a chemical cloth may cause damage to the disc, making the disc unusable.**

5. MP3/WMA OUTLINE

(a) Playable MP3 file standards

Compatible standard	MP3 (MPEG1 LAYER3, MPEG2 LSF LAYER 3)
Compatible sampling frequency	• MPEG1 LAYER3: 32, 44.1, 48 (kHz) • MPEG2 LSF LAYER3: 16, 22.05, 24 (kHz)
Compatible bit rate	• MPEG1 LAYER3: 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 (kbps) • MPEG2 LSF LAYER3: 64, 80, 96, 112, 128, 144, 160 (kbps) • Compatible with VBR
Compatible channel mode	Stereo, joint stereo, dual channel, monaural

(b) Playable WMA file standards

Compatible standard	WMA Ver. 7, 8, and 9
Compatible sampling frequency	32, 44.1, 48 (kHz)
Compatible bit rate	• Ver. 7, 8: CBR48, 64, 80, 96, 128, 160, 192 (kbps) • Ver. 9: CBR48, 64, 80, 96, 128, 160, 192, 256, 320 (kbps) • Compatible with playback of channel 2 only

(c) ID3 tag and WMA tag

(1) Additional textual information called ID3 tag can be input to MP3 files. Information such as song titles and artist names can be stored.

HINT:

This player is compatible with the ID3 tags of ID3 Ver. 1.0 and 1.1, and ID3 Ver. 2.2 and 2.3. (Number of characters complies with ID3 Ver. 1.0 and 1.1.)

(2) Additional textual information called WMA tag can be input to WMA files. Information such as song titles and artist names can be stored.

(d) Usable media

(1) Only CD-ROMs, CD-Rs (CD-Recordable), and CD-RWs (CD-ReWritable) can be used to play MP3/WMA files.

NOTICE:

- **CD-Rs and CD-RWs are more easily affected by a hot and humid environment than discs used for normal audio CDs. For this reason, some CD-Rs and CD-RWs may not be played.**
- **If there are fingerprints or scratches on the disc, the disc may not be played or the CD may skip.**
- **Some CD-Rs and CD-RWs deteriorate if they are left in the cabin for a long time.**
- **Keep CD-Rs and CD-RWs in a storage case that is impenetrable to light.**

(e) Usable media format

(1) Usable media format

Disc format	CD-ROM Mode 1, CD-ROM XA Mode 2 Form 1
File format	ISO9660 Level 1 and Level 2 (Joliet, Romeo)

HINT:

- As for MP3/WMA files written in any format other than those above, the contents of the files may not be played normally or the file names or folder names may not be displayed correctly.
- This player is compatible with multi-session discs and can play CD-Rs and CD-RWs on which MP3/WMA files are added. However, only the first session can be played.
- Discs whose first session includes both music data and MP3 or WMA format data cannot be played.

(2) Standard and restrictions

Maximum directory levels	8 levels
Maximum number of characters for a folder name/file name	32 characters
Maximum number of folders	192 (Including empty folders, route folders, and folders that do not contain MP3/WMA files)
Maximum number of files in a disc	255 (Including non-MP3/WMA files)

(f) File names

(1) Only files with an extension of ".mp3" or ".wma" can be recognized and played as MP3 or WMA files.

(2) Save MP3 or WMA files with an extension of ".mp3" or ".wma".

NOTICE:

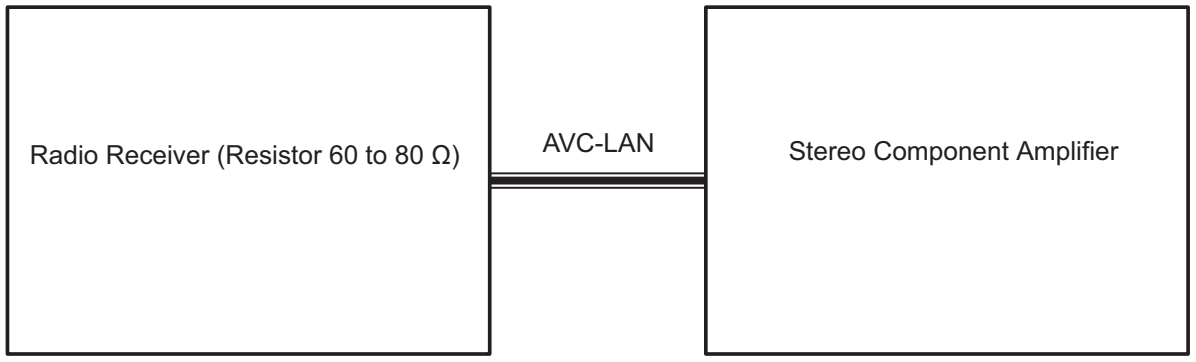
If saving non-MP3 or non-WMA files with an extension of ".mp3" or ".wma", those files are wrongly recognized as MP3 or WMA files and played. A loud noise may occur and damage to the speaker may result.

6. AVC-LAN Description

(a) What is AVC-LAN?

AVC-LAN, an abbreviation for "Audio Visual Communication Local Area Network", is a united standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

Example:



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(b) Purpose:
Recently, car audio systems have rapidly developed and the functions have vastly changed. The conventional car audio system is being integrated with multi-media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows:
(1) To solve sound problems, etc. caused by using components of different manufacturers through signal standardization.
(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.
HINT:
- If a short to +B or short to ground is detected in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.
- If the audio system has a navigation system installed, the multi-display unit acts as the master unit.
If the navigation system is not installed, the audio head unit acts as the master unit instead. If the radio and navigation assembly is installed, it is the master unit.
- The radio and navigation assembly contains a resistor that is necessary to enable communication on the different AVC-LAN circuits.
- The car audio system with an AVC-LAN circuit has a diagnostic function.
- Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

7. Communication system outline
(a) Components of the navigation system communicate with each other via the AVC-LAN.
(b) The radio and navigation assembly has enough resistance (60 to 80 Ω) necessary for communication.
(c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the navigation system will stop functioning.

8. Diagnostic function outline
(a) The audio system has a diagnostic function (the result is indicated on the master unit).
(b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.

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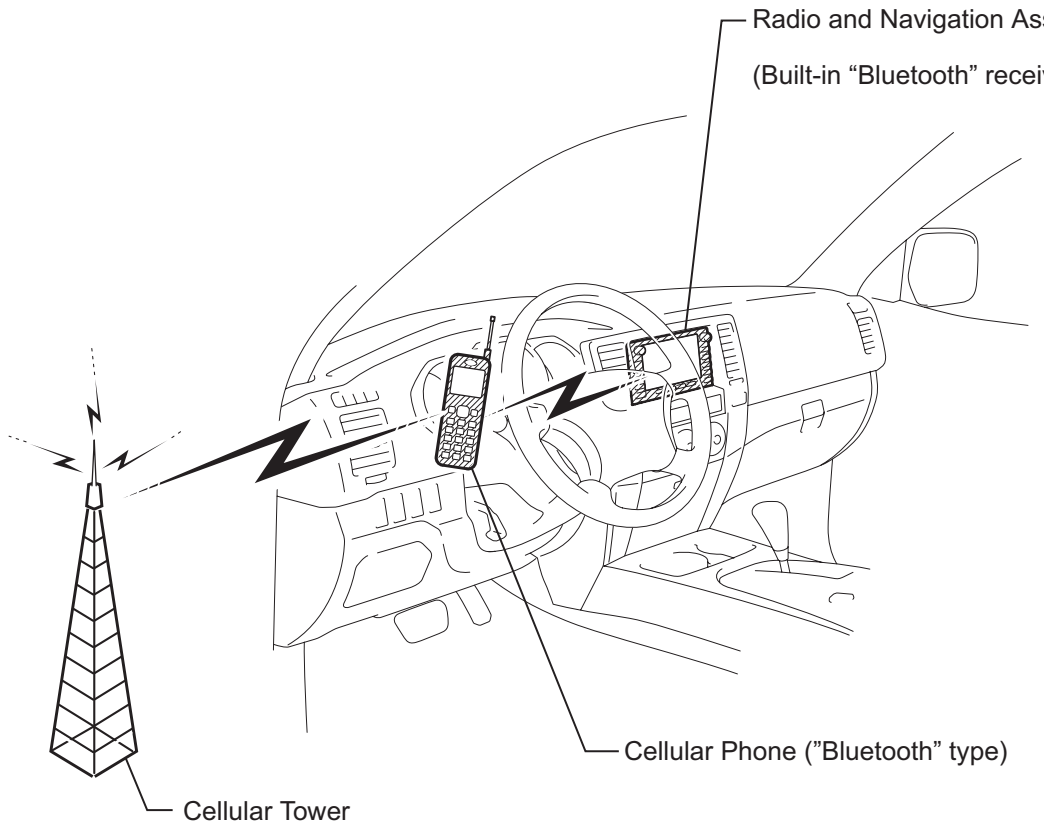
9. "Bluetooth" outline

(a) "Bluethooth" is a trademark owned by Bluetooth SIG. Inc.

(b) "Bluetooth" is a new wireless connection technology that uses the 2.4 GHz frequency band. This makes it possible to connect a cellular phone ("Bluetooth" compatible phone *1) to the radio and navigation assembly (the "Bluetooth" system is built in), and use the handsfree function of the cellular phone, even if it is in a pocket or bag. As a result, it is not necessary to use a connector attached directly to the cellular phone.

*1: Some versions of "Bluetooth" compatible cellular phones may not function.

Example:



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HINT:

The communication performance of "Bluetooth" may vary depending on obstructions or radio wave conditions between communication devices, electromagnetic radiation, communication device sensitivity, or antenna capacity.

HOW TO PROCEED WITH TROUBLESHOOTING

1	**VEHICLE BROUGHT INTO A WORKSHOP**

NEXT

2	**DIAGNOSTIC QUESTIONING AND SYMPTOM CONFIRMATION**

(a) Ask the customer about symptoms and confirm malfunctions.

- **THE SCREEN DISPLAYS NOTHING (GO TO STEP 8, AND PROCEED TO "BLACK SCREEN")**
- **OTHER SYMPTOMS (GO TO STEP 3)**

3	**CONFIRM THE SYSTEM NORMAL CONDITION**

- **APPLICABLE (THIS IS NOT A MALFUNCTION)**
- **NOT APPLICABLE (GO TO STEP 4)**

4	**CHECK DTC**

HINT:
If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits and repair or replace the problem part.

- **A CODE IS OUTPUT (GO TO STEP 5)**
- **A CODE IS NOT OUTPUT (GO TO STEP 8)**

5	**DTC CLEAR**

(a) Clear the DTCs and finish the diagnostic mode.
HINT:
The currently output DTCs may not indicate actual malfunctions depending on the vehicle conditions.

NEXT

6	RECHECK DTC

HINT:
- If the system cannot enter the diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits.
- Even if the malfunction symptom is not confirmed, check for diagnostic trouble codes. This is because the system stores past diagnostic trouble codes.
- Refer to the detailed description on the diagnostic screen as necessary (See page NS-30).
- Check the diagnostic trouble code and inspect the area the code indicates.

	A CODE IS OUTPUT (GO TO STEP 7)
	A CODE IS NOT OUTPUT (GO TO STEP 8)

7	DIAGNOSTIC TROUBLE CODE CHART

(a) Find the output code in the diagnostic trouble code chart (See page NS-52).

NEXT	**GO TO STEP 10**

8	PROBLEM SYMPTOMS TABLE

(a) Find the applicable symptom code in the problem symptoms table (See page NS-41).
HINT:
If the symptom does not recur and no code is output, perform the symptom reproduction method (See page IN-40).

	THERE IS AN APPLICABLE SYMPTOM CODE IN THE TABLE (GO TO STEP 10)
	THERE IS NO APPLICABLE SYMPTOM CODE IN THE TABLE (GO TO STEP 9)

9	CHECK THE ECU TERMINAL ARRANGEMENT BASED ON THE MALFUNCTION SYMPTOM

NEXT

10	CHECK THE CIRCUIT

(a) Adjust, repair, or replace as necessary.

NEXT

11	RECHECK THE DIAGNOSTIC TROUBLE CODE

HINT:
After deleting the DTCs, recheck for diagnostic trouble codes.

NEXT

12	PERFORM CONFIRMATION TEST

NEXT

END

IDENTIFICATION OF NOISE SOURCE

1. Radio Description

(a) Radio frequency band

(1) Radio broadcasts use the radio frequency bands shown in the table below.

Frequency	30 kHz	300 kHz	30 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio Wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency MF: Medium Frequency HF: High Frequency VHF: Very High Frequency

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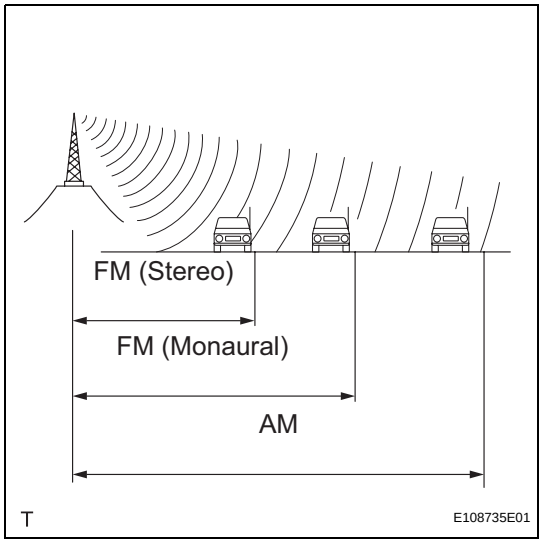


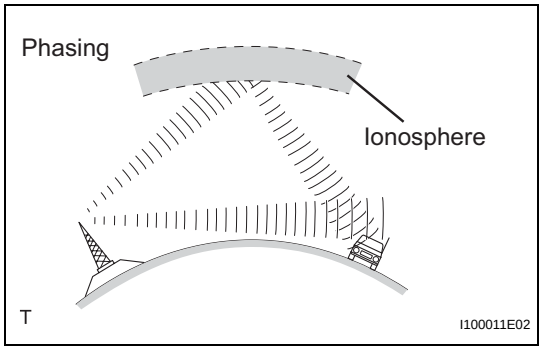
(b) Service area

(1) The service areas of AM and FM broadcasts are vastly different. Sometimes an AM broadcast can be received very clearly but an FM stereo cannot. FM stereo has the smallest service area, and is prone to pick up static and other types of interference such as noise.

(c) Radio reception problems

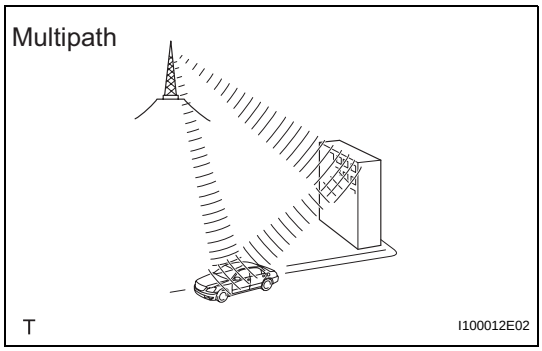
HINT:

In addition to static, other problems such as "phasing", "multipath", and "fade out" exist. These problems are not caused by electrical noise, but by the radio signal propagation method itself.

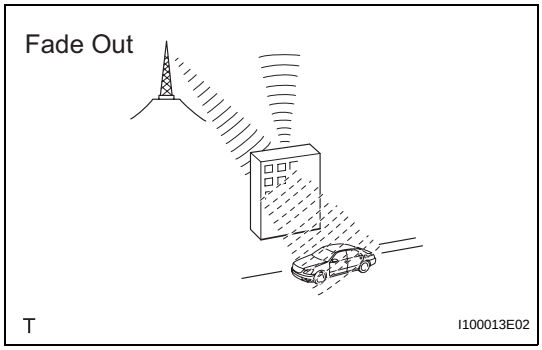


(1) Phasing

AM broadcasts are susceptible to electrical interference and another kind of interference called phasing. Occurring only at night, phasing is the interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off the ionosphere and the other signal is received directly from the transmitter.



(2) Multipath
Multipath is a type of interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off buildings or mountains and the other signal is received directly from the transmitter.



(3) Fade out
Fade out is caused by objects (buildings, mountains, and other such large obstacles) that deflect away part of a signal, resulting in a weaker signal when the object is between the transmitter and vehicle. High frequency radio waves, such as FM broadcasts, are easily deflected by obstructions. Low frequency radio waves, such as AM broadcasts, are much more difficult to deflect.

(d) Noise problem
Technicians must have a clear understanding about each customer's noise complaint. Use the following table to diagnose noise problems.

Radio Frequency	Noise Occurrence Condition	Presumable Cause
AM	Noise occurs in a specified area	Foreign noise
AM	Noise occurs when listening to an intermittent broadcast	An identical program transmitted from multiple towers can cause noise where the signals overlap
AM	Noise occurs only at night	Music beat from a distant broadcast
FM	Noise occurs while driving in a specified area	Multipath or phasing noise resulting from a change in FM frequency

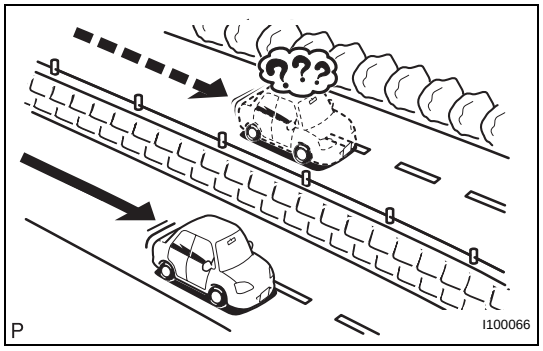
HINT:
If the noise does not match the examples above, refer to the descriptions about phasing and multipath.

SYSTEM NORMAL CONDITION CHECK

1. CHECK NORMAL CONDITION

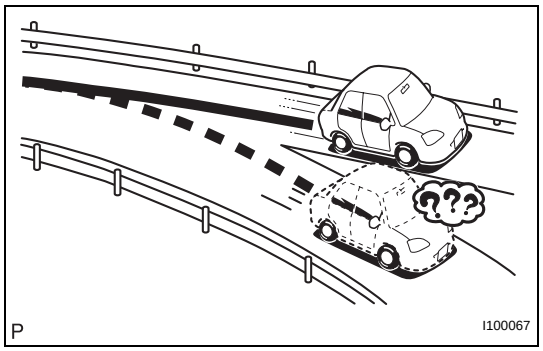
(a) If the symptom is applicable to any of the following, it is intended behavior, and not a malfunction.

Symptom	Answer
A longer route than expected is chosen.	Depending on the road conditions, the radio and navigation assembly may determine that a longer route is quicker.
Even when distance priority is high, the shortest route is not shown.	Some paths may not be advised due to safety concerns.
When the vehicle is put into motion immediately after the engine starts, the navigation system deviates from the actual position.	If the vehicle starts before the navigation system activates, the system may not react.
When running on certain types of roads, especially new roads, the vehicle position deviates from the actual position.	When the vehicle is driving on new roads not available on the map disc, the system attempts to match it to another nearby road, causing the position mark to deviate.

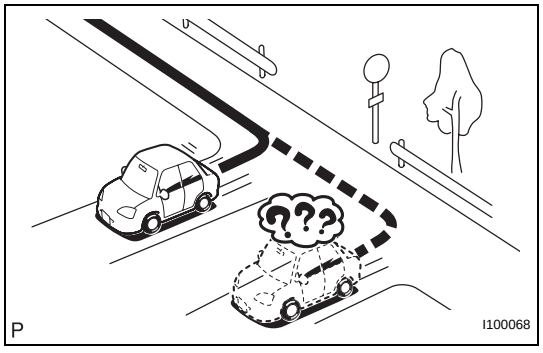


(b) The following symptoms are not a malfunction, but are caused by errors inherent in the GPS, gyro sensor, speed sensor, and radio and navigation assembly.

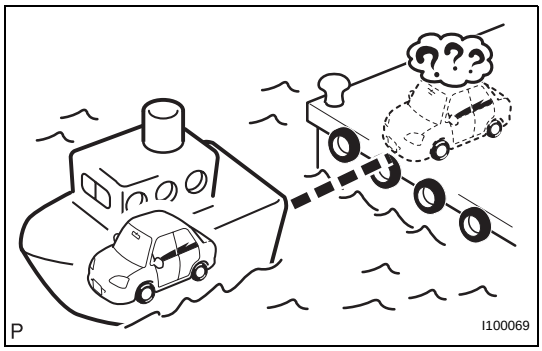
(1) The current position mark may be displayed on a nearby parallel road.



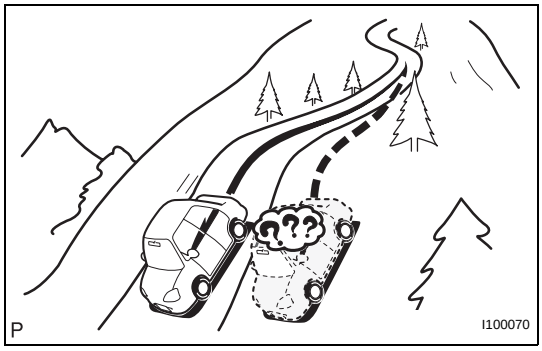
(2) Immediately after a fork in the road, the current vehicle position mark may be displayed on the wrong road.



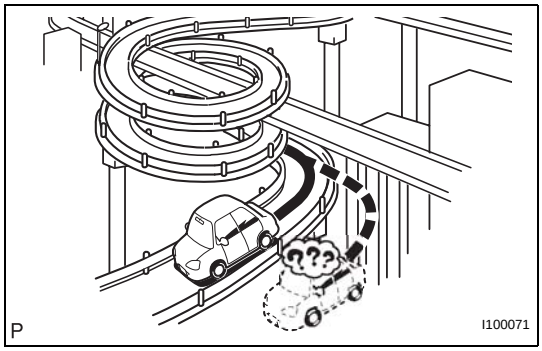
(3) When the vehicle turns right or left at an intersection, the current vehicle position mark may be displayed on a nearby parallel road.



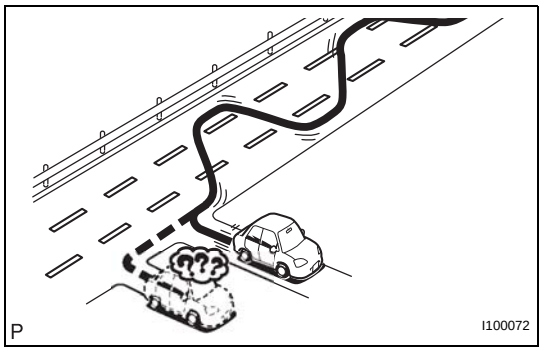
(4) When the vehicle is carried, such as on a ferry, and the vehicle itself is not running, the current vehicle position mark may be displayed in the position where the vehicle was until a measurement can be performed by GPS.



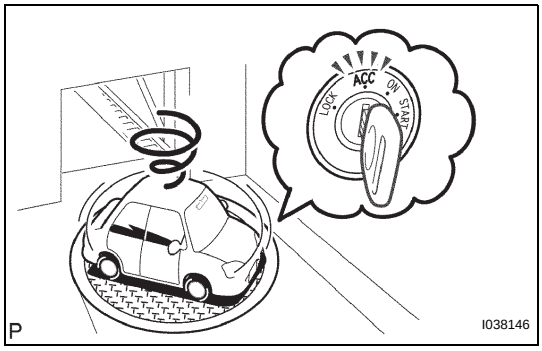
(5) When the vehicle runs on a steep hill, the current vehicle position mark may deviate from the correct position.



(6) When the vehicle makes a continuous turn of 360, 720, 1,080, etc. degrees, the current vehicle position mark may deviate from the correct position.

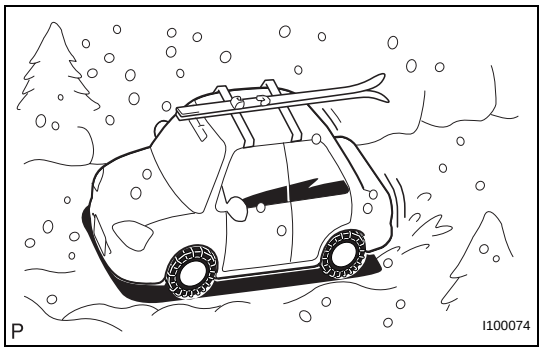


(7) When the vehicle moves erratically, such as constant lane changes, the current vehicle position mark may deviate from the correct position.

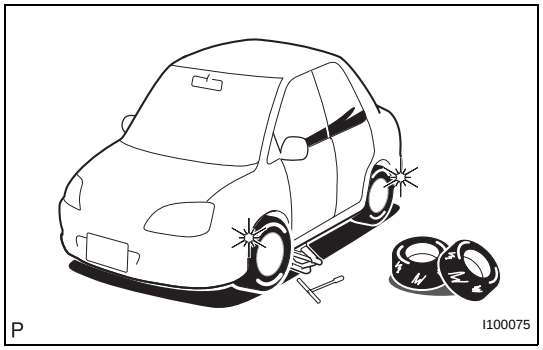


(8) When the ignition switch is turned on (ACC or IG) on a turntable before parking, the current vehicle position mark may not point in the correct direction. The same will occur when the vehicle comes out of parking.

NS



(9) When the vehicle runs on a snowy road or a mountain path with the chains installed or using a spare tire, the current vehicle position mark may deviate from the correct position.



(10) When a tire is changed, the current vehicle position mark may deviate from the correct position.
HINT:
- Diameter of the tire may change, causing a speed sensor error.
- Performing the "tire change" in calibration mode will allow the system to correct the current vehicle position faster.

DISPLAY CHECK MODE

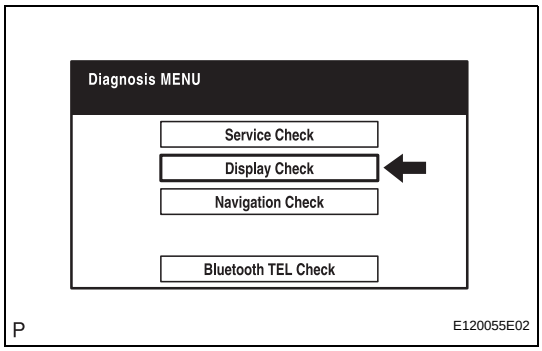
HINT:

- This mode checks the color display on the display.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. ENTER DIAGNOSTIC MODE (See page NS-46)

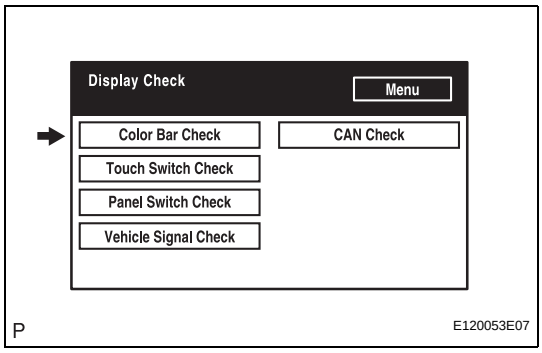
2. DISPLAY CHECK

(a) Select "Display Check" from the "Diagnosis MENU" screen.



3. COLOR BAR CHECK

(a) Select "Color Bar Check" from the "Display Check" screen.

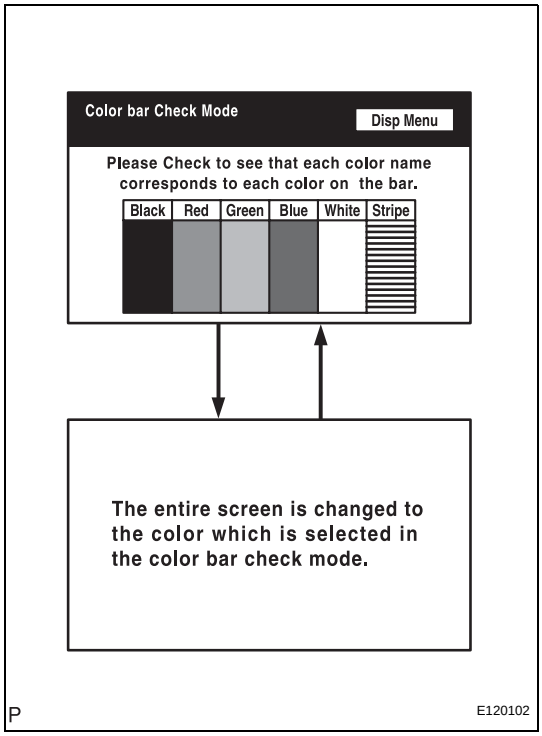


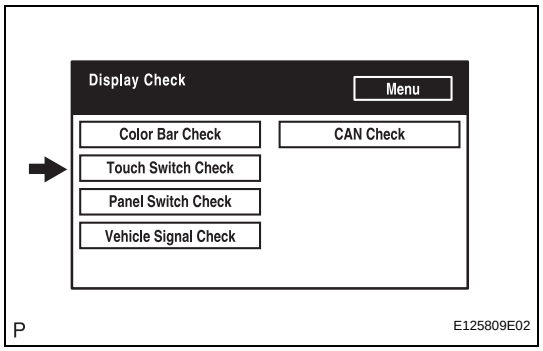
(b) Select a color bar from the "Color Bar Check Mode" screen.

(c) Check the display color.

HINT:

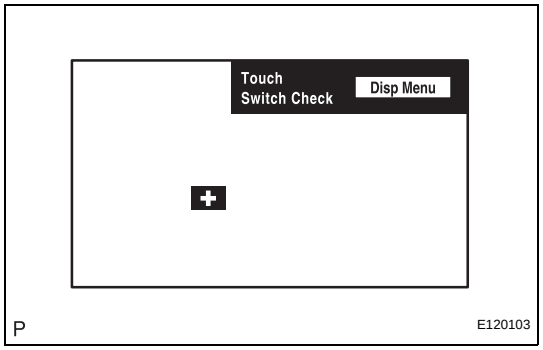
- The entire screen turns to the color or stripe selected.
- Touching the display will return to the "Color Bar Check" screen.



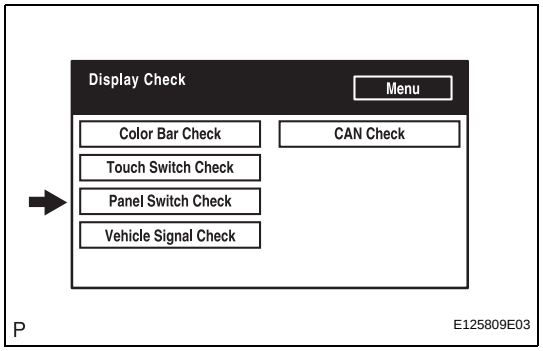


4. TOUCH SWITCH CHECK

(a) Select "Touch Switch Check" from the "Display Check" screen.

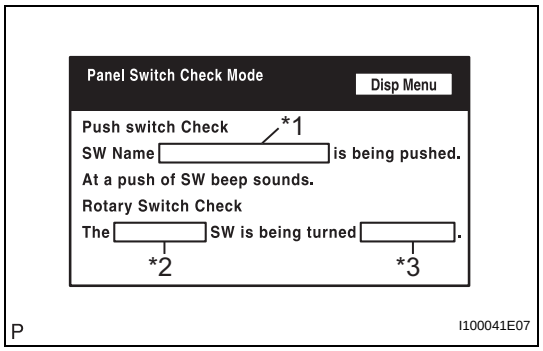


(b) Touch the display anywhere in the open area to perform the check when the "Touch Switch Check" screen is displayed.
HINT:
- A "+" mark is displayed where the display is touched.
- The "+" mark remains on the display even after the finger is removed.



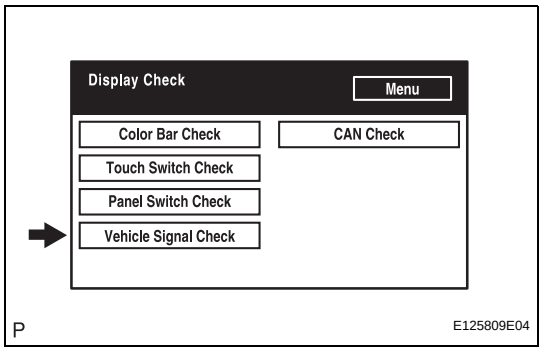
5. PANEL SWITCH CHECK

(a) Select "Panel Switch Check" from the "Display Check" screen.



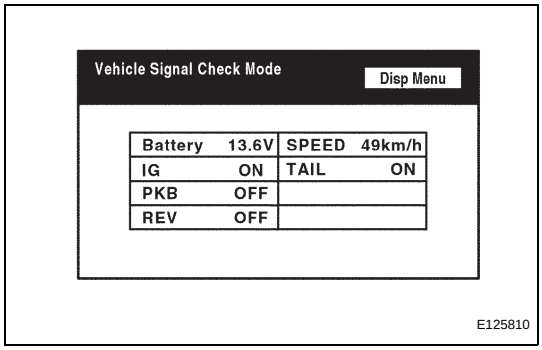
(b) Operate each switch and check that the switch name and condition are correctly displayed.

Display	Contents
Push switch name/*1	• Name of the pressed switch is displayed. • If more than one switch is pressed, "MULTIPLE" is displayed.
Rotary switch name/*2	Name of the rotary switch is displayed.
Rotary switch direction/*3	Direction of the rotary switch is displayed.



6. VEHICLE SIGNAL CHECK

(a) Select "Vehicle Signal Check" from the "Display Check" screen.

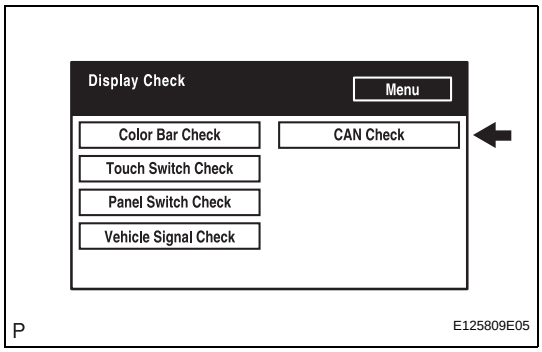


(b) When the "Vehicle Signal Check Mode" screen is displayed, check all the vehicle signal conditions.
HINT:
- Only conditions having inputs are displayed.
- This screen is updated once per second when input signals to the vehicle are changed.
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-30).

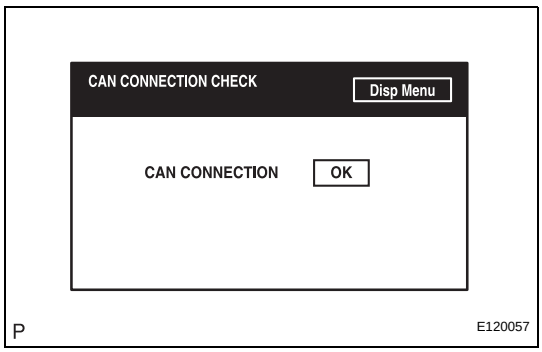
7. CAN CHECK

NOTICE:
This function operates only for the systems connected to the CAN system.

(a) Select "CAN Check" from the "Display Check" screen.



(b) Check the CAN connection check result.
HINT:
For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-30).

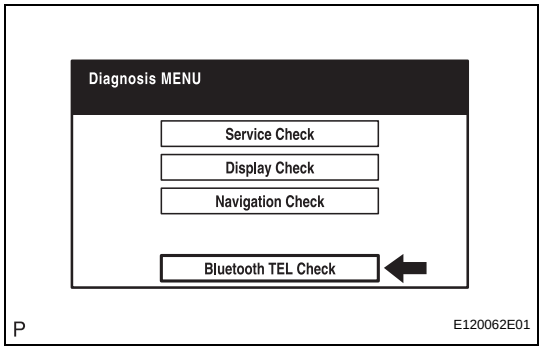


BLUETOOTH TEL CHECK MODE

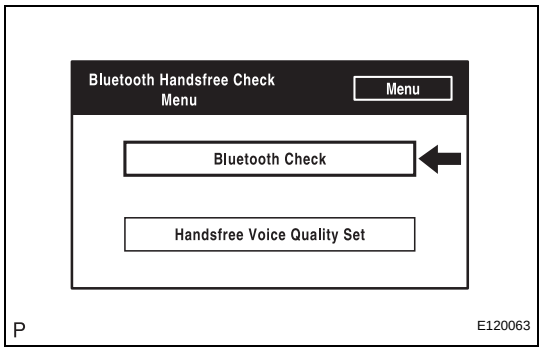
HINT:
Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. **ENTER DIAGNOSTIC MODE (See page NS-46)**

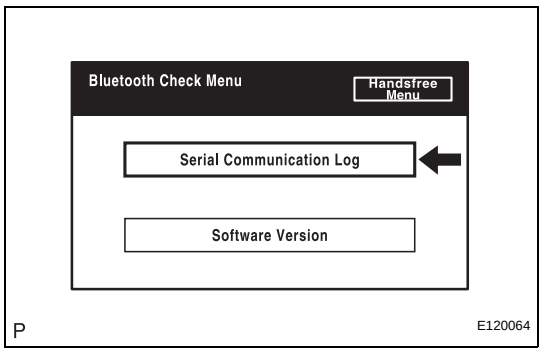
2. **"BLUETOOTH" TEL CHECK**
   (a) Select "'Bluetooth' TEL Check" from the "Diagnosis MENU" screen.



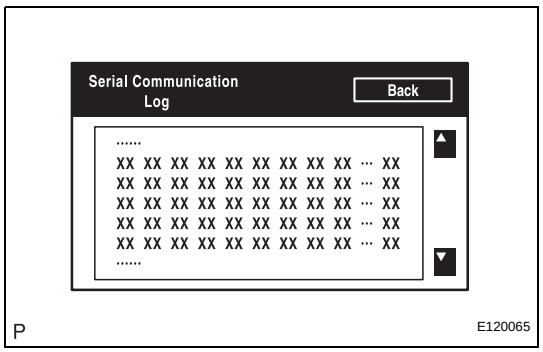
3. **"BLUETOOTH" CHECK**
   (a) Select "'Bluetooth' Check" from the "'Bluetooth' Handsfree Check Menu" screen.

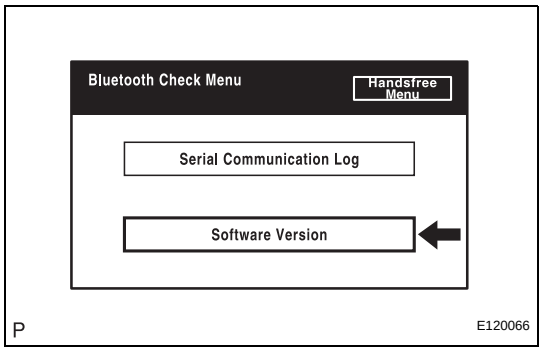


   (b) Select "Serial Communication Log" from the "'Bluetooth' Check Menu" screen.

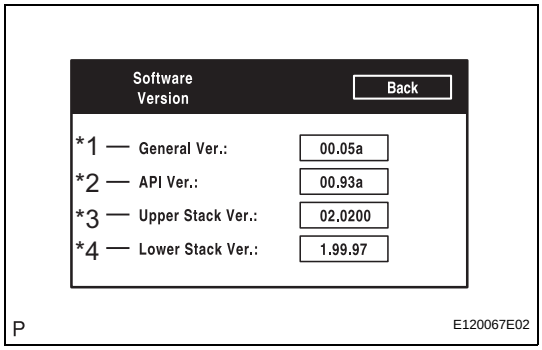


   (1) The communication log data in the display ECU are displayed on this screen.
   HINT:
   The displayed data can be used as a reference.





(c) Select "Software Version" from the "'Bluetooth' Check Menu" screen.

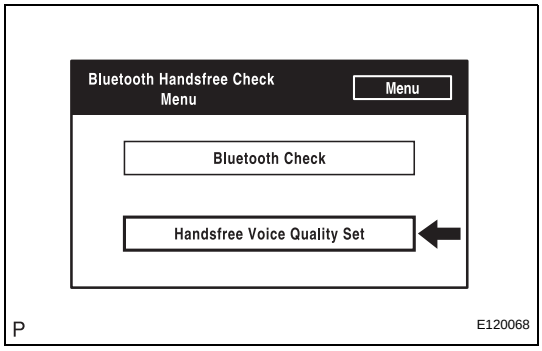


(1) Check the software version of the "Bluetooth" module.

Screen Description:

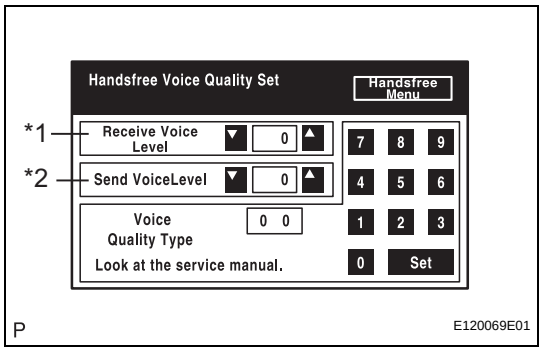
Display	Contents
General Version/*1	• General software version of "Bluetooth" module • If any of the API version, upper stack version, and low stack version is updated, the general version is upgraded.
API Version/*2	API software version is displayed.
Upper Stack Version/*3	Upper Stack version is displayed.
Lower Stack Version/*4	Lower Stack version is displayed.

HINT:
This function is controlled by the built-in display ECU.



4. HANDSFREE VOICE QUALITY SET

(a) Select "Handsfree Voice Quality Set" from the "'Bluetooth' Handsfree Check Menu" screen.



(b) Check the handsfree voice level.

Screen Description:

Display	Contents
Received voice level adjustment/*1	Setting possible for the voice level received from "Bluetooth" compatible phones.
Sent voice level adjustment/*2	Setting possible for the voice level sent to "Bluetooth" compatible phones.

HINT:
This function is controlled by the built-in display ECU.
NOTICE:
"Voice Quality Type" should not be changed.

NAVIGATION CHECK MODE

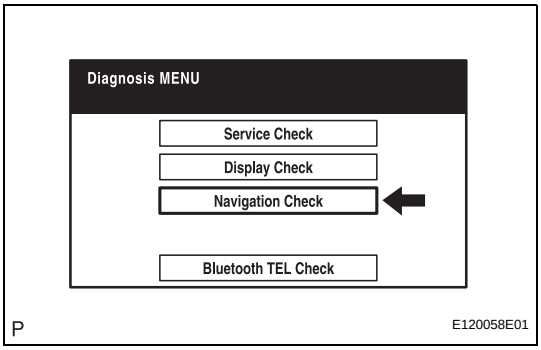
HINT:

- This mode displays GPS satellite information.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. ENTER DIAGNOSTIC MODE (See page NS-46)

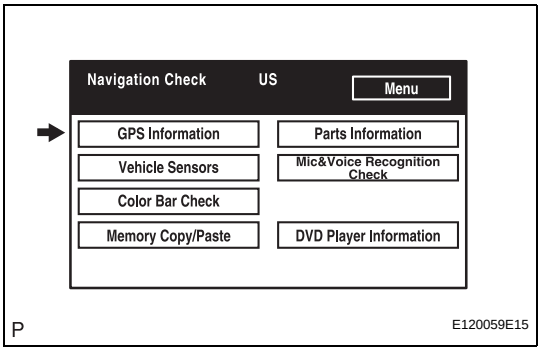
2. NAVIGATION CHECK

(a) Select "Navigation Check" from the "Diagnosis MENU" screen.



3. GPS INFORMATION

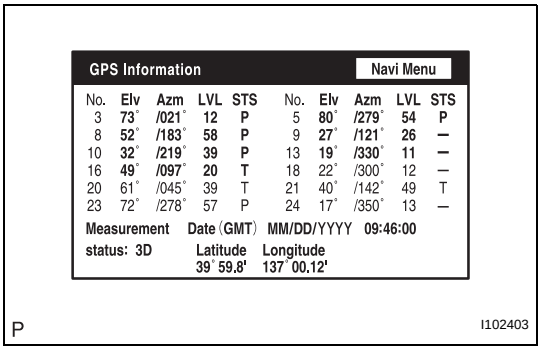
(a) Select "GPS Information" from the "Navigation Check" screen.



(b) When GPS information is displayed, check the GPS conditions.

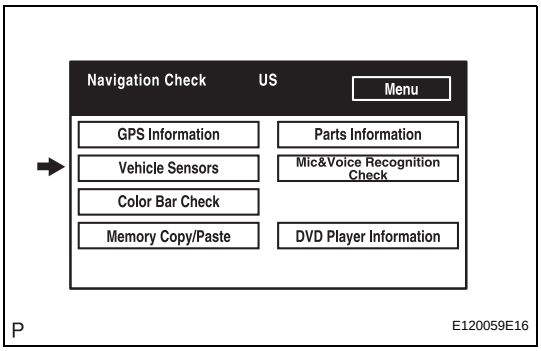
HINT:

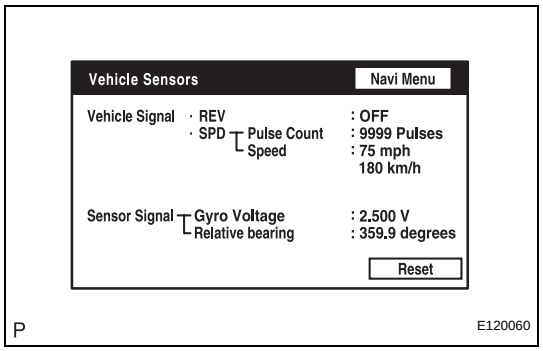
- This screen is updated once per second when input signals to the vehicle are changed.
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-30).



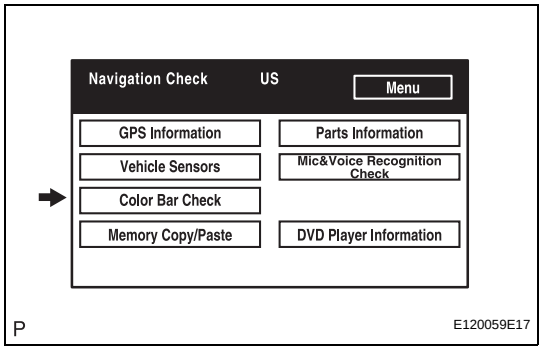
4. VEHICLE SENSORS

(a) Select "Vehicle Sensors" from the "Navigation Check" screen.



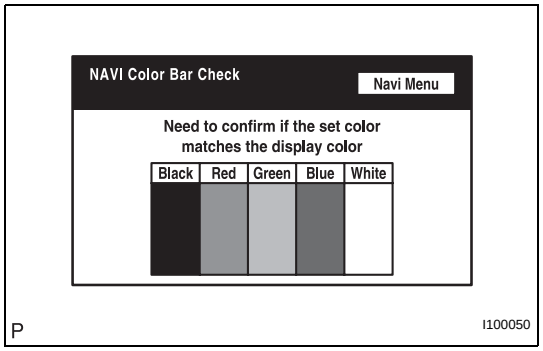


(b) Check all the signals and sensors when vehicle signal information is displayed.
HINT:
- This screen is updated once per second when input signals to the vehicle are changed.
- This screen displays vehicle signals input to the built-in navigation ECU.
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-30).

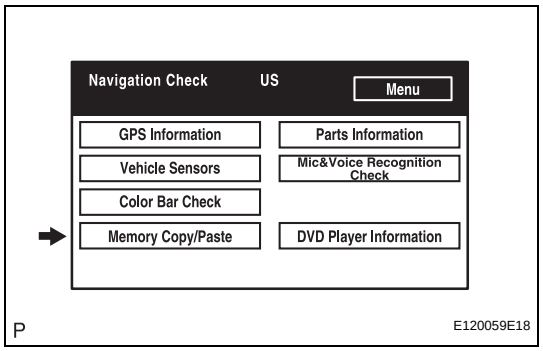


5. COLOR BAR CHECK

(a) Select "Color Bar Check" from the "Navigation Check" screen.

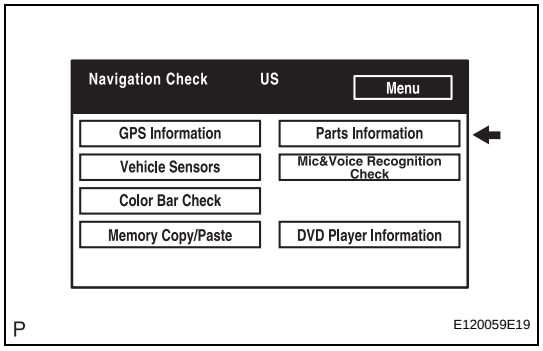


(b) Check each color of the color bar when the "NAVI Color Bar Check" screen is displayed.
HINT:
- Colors will not be displayed full-screen as in "Display Check Mode".
- This screen displays the built-in navigation ECU display color.



6. MEMORY COPY/PASTE CHECK

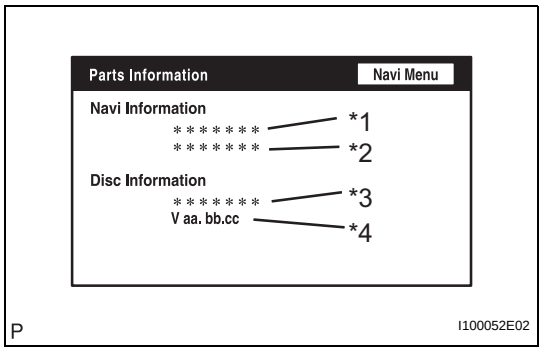
HINT:
This function cannot be used.



7. PARTS INFORMATION

(a) Select "Parts Information" from the "Navigation Check" screen.

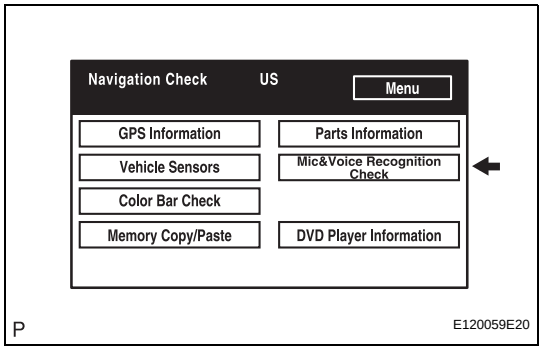
NS



(b) Check the navigation and disc information when the "Parts Information" screen is displayed.

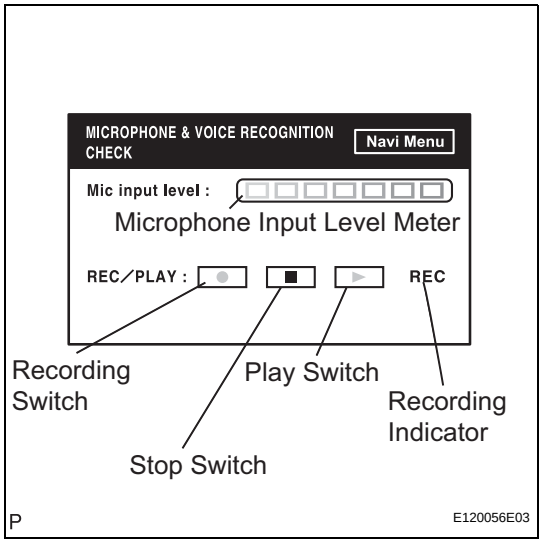
Screen Description:

Display	Contents
Navigation Manufacturer/*1	Radio and navigation assembly manufacturer is displayed.
Navigation Version/*2	Radio and navigation assembly version is displayed.
Disc Manufacturer/*3	Map disc manufacturer is displayed.
Disc Version/*4	Map disc version is displayed.



8. MIC & VOICE RECOGNITION CHECK

(a) Select "Mic & Voice Recognition Check" on the "Display Check" screen to display the "MICROPHONE & VOICE RECOGNITION CHECK" screen.



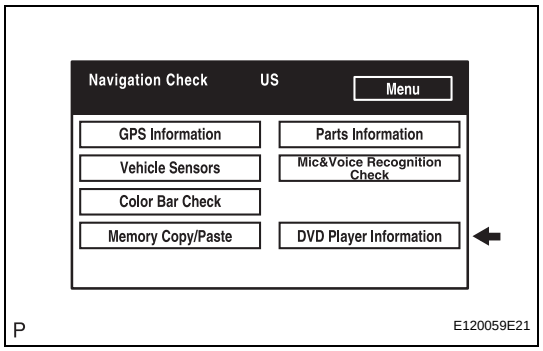
(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.

(c) Push the recording switch and perform voice recording.

(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally.

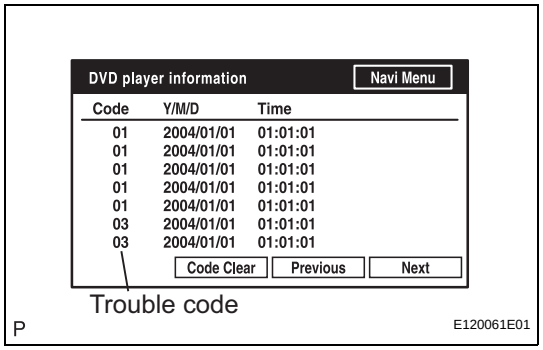
HINT:

- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-30).
- This function is controlled by the built-in navigation ECU.



9. DVD PLAYER INFORMATION CHECK

(a) Select "DVD Player Information" from the "Navigation Check" screen.



(b) Check for DTCs.
HINT:
- This is a DVD player check function in the radio and navigation assembly (built-in navigation ECU).
- For details of this function, refer to DIAGNOSIS DISPLAY DETAILED DESCRIPTION (See page NS-30).

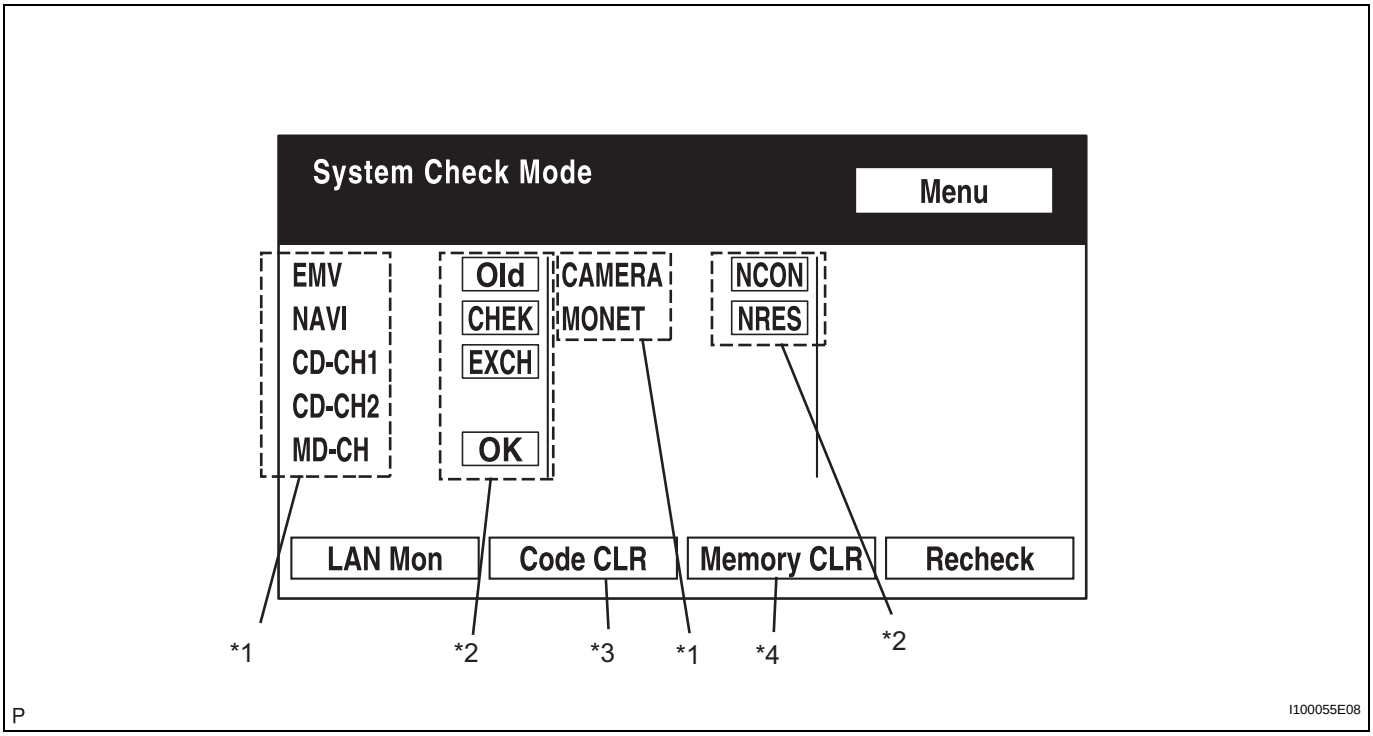
DIAGNOSIS DISPLAY DETAILED DESCRIPTION

HINT:

- This section contains a detailed description of displays within diagnostic mode.
- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.

1. SYSTEM CHECK

(a) System Check Mode Screen



(1) Device Names and Hardware Address/*1

HINT:

- Registered device names are displayed.
- If a device name is unknown to the system, its physical address is shown instead.

Address No.	Name	Address No.	Name
110	EMV	120	AVX
128	1DIN TV	140	AVN
144	G-BOOK	178	NAVI
17C	MONET	190	AUDIO H/U
1AC	CAMERA-C	1B0	Rr-TV
1C0	Rr-CONT	19D	BT-HF
1C4	PANEL	1C6	G/W
1C8	FM-M-LCD	1D8	CONT-SW
1EC	Body	118	EMVN
1F1	XM	1F2	SIRIUS
230	TV-TUNER	240	CD-CH2
250	DVD-CH	280	CAMERA
360	CD-CH1	3A0	MD-CH

Address No.	Name	Address No.	Name
17D	TEL	440	DSP-AMP
530	ETC	1F6	RSE
1A0	DVD-P	1D6	CLOCK
238	DTV	480	AMP

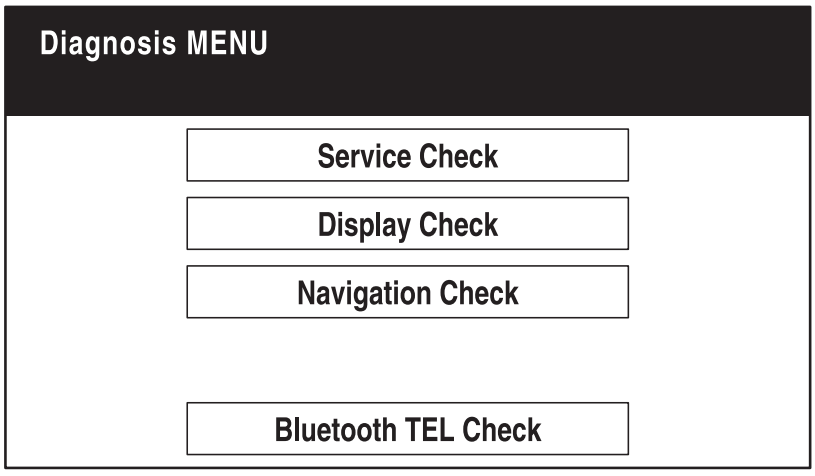
(2) Check Result/*2
HINT:
Result codes for all devices are displayed.

Result	Meaning	Action
OK	The device did not respond with a DTC (excluding communication DTCs from the AVC-LAN).	-
EXCH	The device responds with a "replace"-type DTC.	Look up the DTC in "Unit Check Mode" and replace the device.
CHEK	The device responds with a "check"-type DTC.	Look up the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.
Old	The device responds with an "old"-type DTC.	Look up the DTC in "Unit Check Mode".
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.

(3) Code Clear/*3
- Present DTCs are cleared.
- Press the "Code CLR" switch for 3 seconds.

(4) Memory Clear/*4
- Present and past DTCs and registered connected device names are cleared.
- Press the "Memory CLR" switch for 3 seconds.

(b) Diagnosis MENU Screen

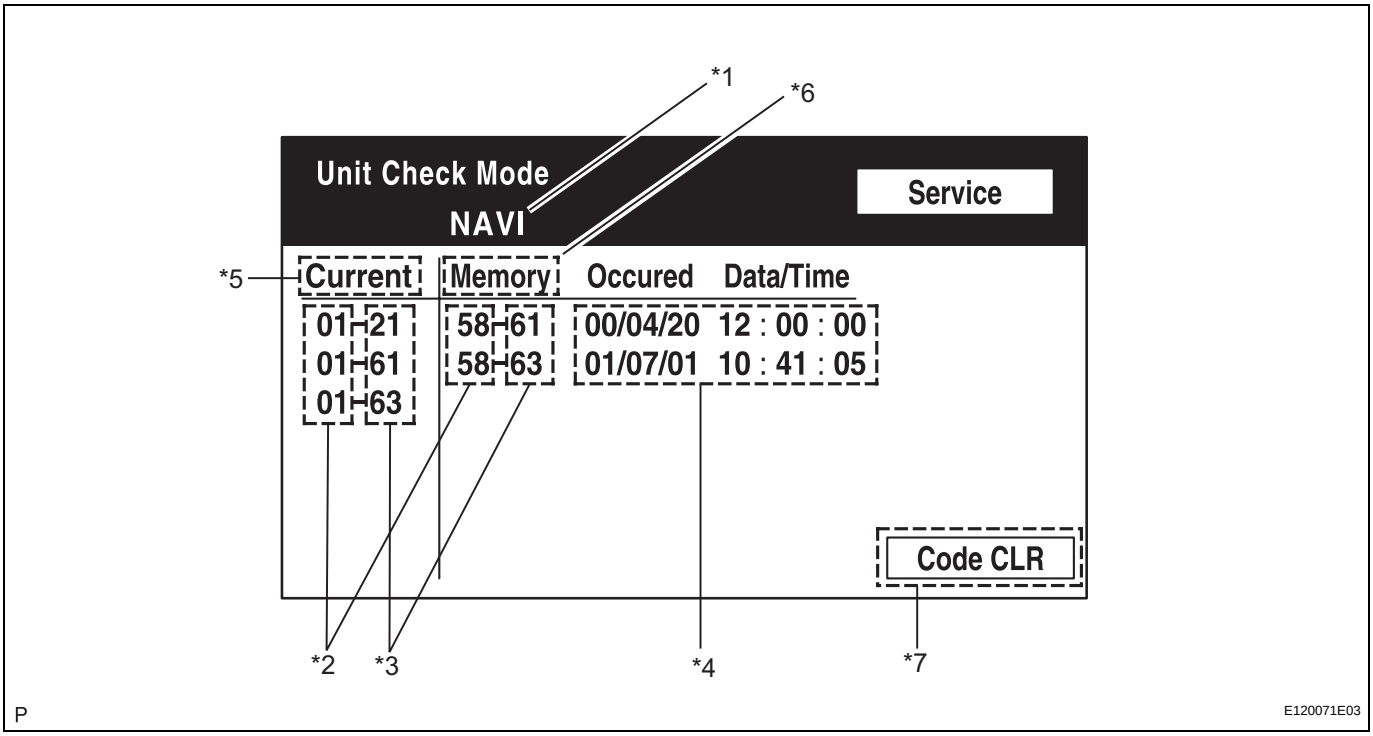


P E120070E01

NS

HINT:
Each item is grayed out or not displayed based on the device settings.

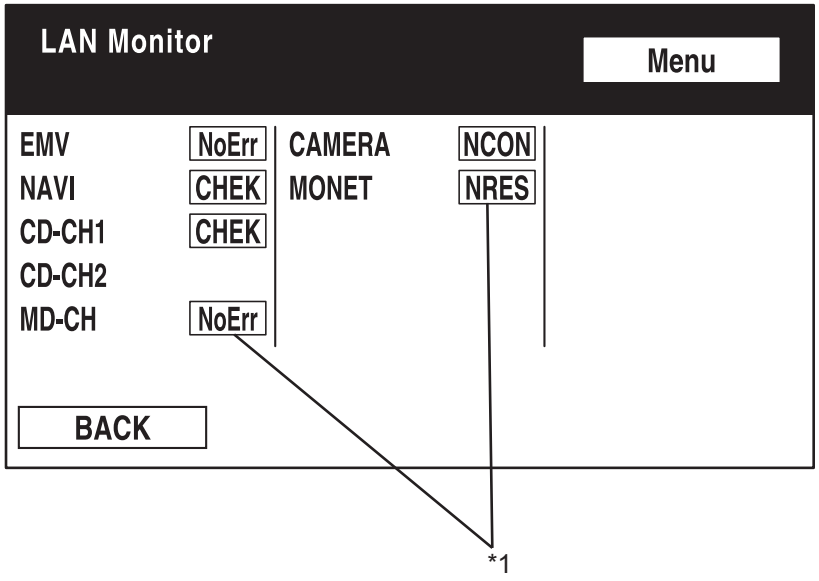
(c) Unit Check Mode Screen



Screen Description:

Display	Contents
Device name/*1	Target device
Segment/*2	Target device logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Timestamp/*4	The time and date of past DTCs are displayed. (The year is displayed in 2-digit format.)
Present code/*5	DTCs output at the service check are displayed.
Past code/*6	Diagnostic memory results and recorded DTCs are displayed.
Diagnosis clear switch/*7	Pushing this switch for 3 seconds clears the diagnostic memory data of the target device. (Both response to diagnostic system check result and the displayed data are cleared.)

(d) LAN Monitor (Original) Screen



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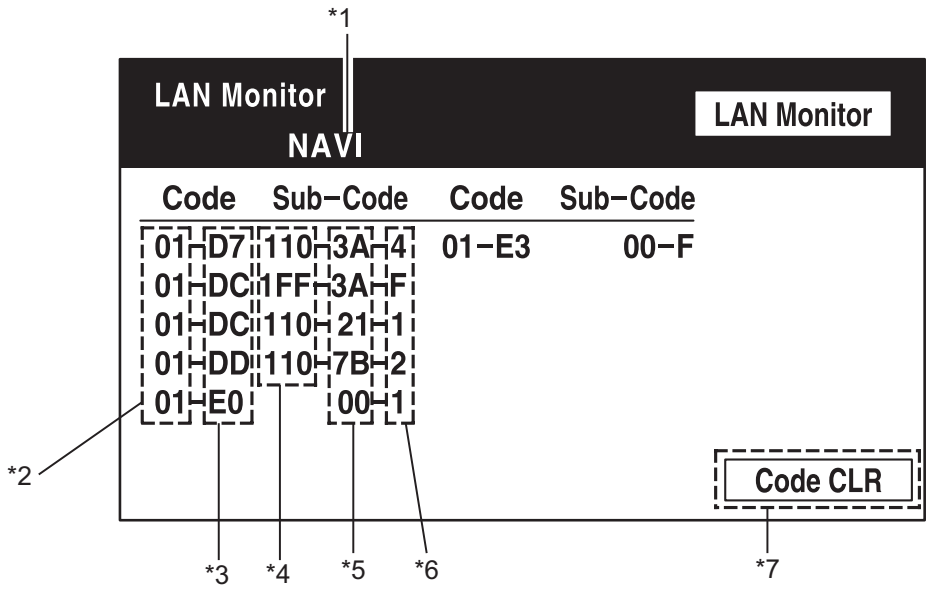
(1) Check Result/*1
HINT:
Check results of all the devices are displayed.

Result	Meaning	Action
No Err (OK)	There are no communication DTCs.	-
CHEK	The device responds with a "check"-type DTC.	Look up the DTC in "Unit Check Mode".
NCON	The device was previously present, but does not respond in diagnostic mode.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.
Old	The device responds with an "old"-type DTC.	Look up the DTC in "Unit Check Mode".
NRES	The device responds in diagnostic mode, but gives no DTC information.	1. Check power supply wire harness of the device. 2. Check the AVC-LAN of the device.

(e) LAN Monitor (Individual) Screen



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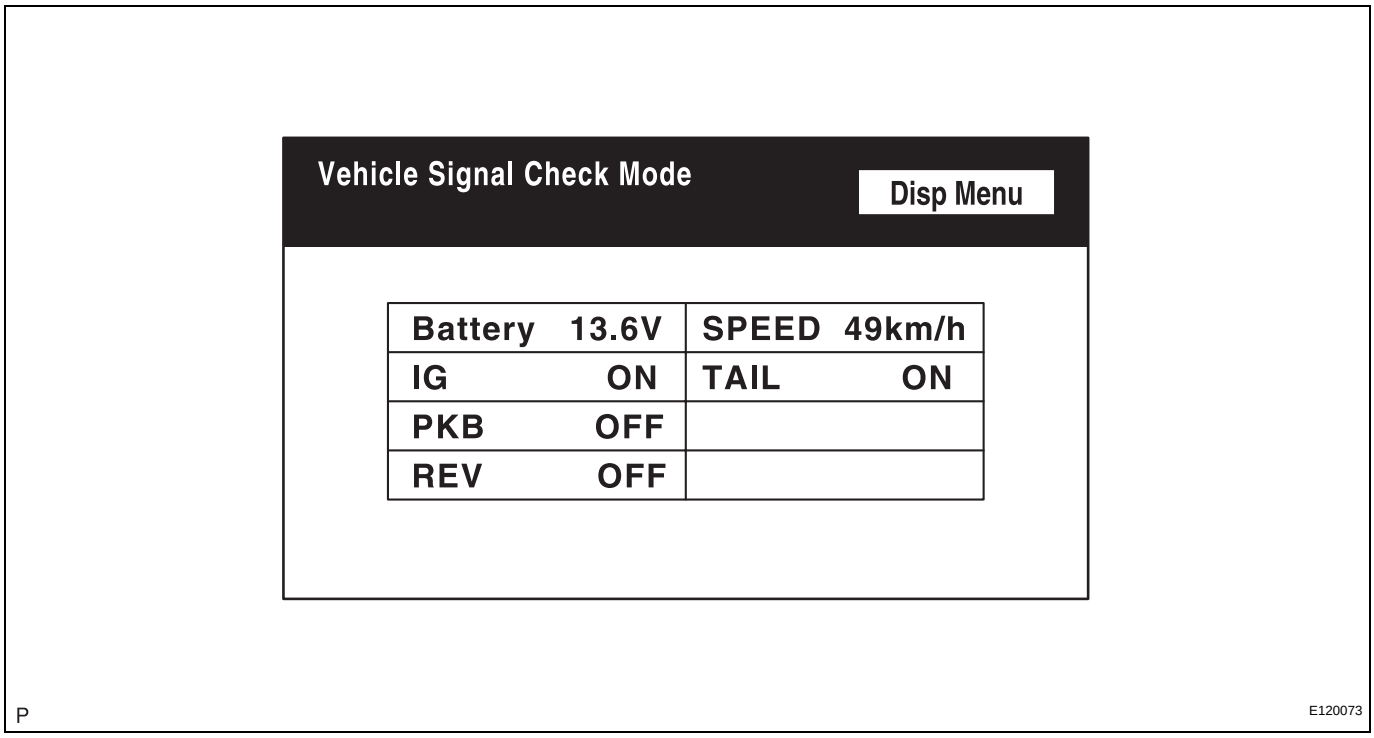
E120072E01

Screen Description:

Display	Contents
Device name/*1	Target device
Segment/*2	Target logical address
DTC/*3	DTC (Diagnostic Trouble Code)
Sub-code (device address)/*4	Physical address stored with DTC (If there is no address, nothing is displayed.)
Connection check No./*5	Connection check number stored with DTC
DTC occurrence/*6	Number of times the same DTC has been recorded
Diagnosis clear switch/*7	Pushing this switch for 3 seconds clears the diagnostic memory data of the target device. (Both response to diagnostic system check result and the displayed data are cleared.)

2. DISPLAY CHECK

(a) Vehicle Signal Check Mode Screen



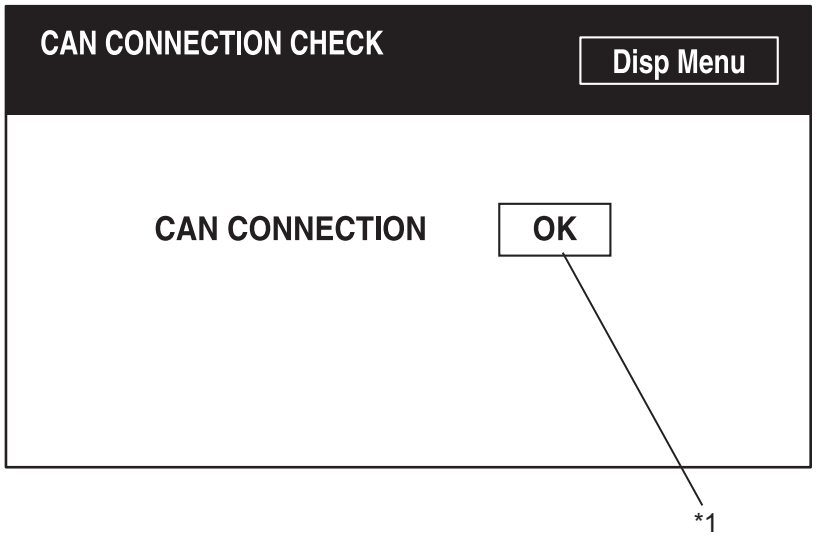
Screen Description:

Name	Contents
Battery	Battery voltage is displayed.
PKB	Parking brake ON/OFF state is displayed.
REV	Reverse signal ON/OFF state is displayed.
IG	IG switch ON/OFF state is displayed.
TAIL	TAIL signal (Light control switch) ON/OFF state is displayed.
SPEED	Vehicle speed is displayed in km/h.

HINT:

- Only items sending a vehicle signal will be displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

(b) CAN Connection Check Screen



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E120075E01

Screen Description:

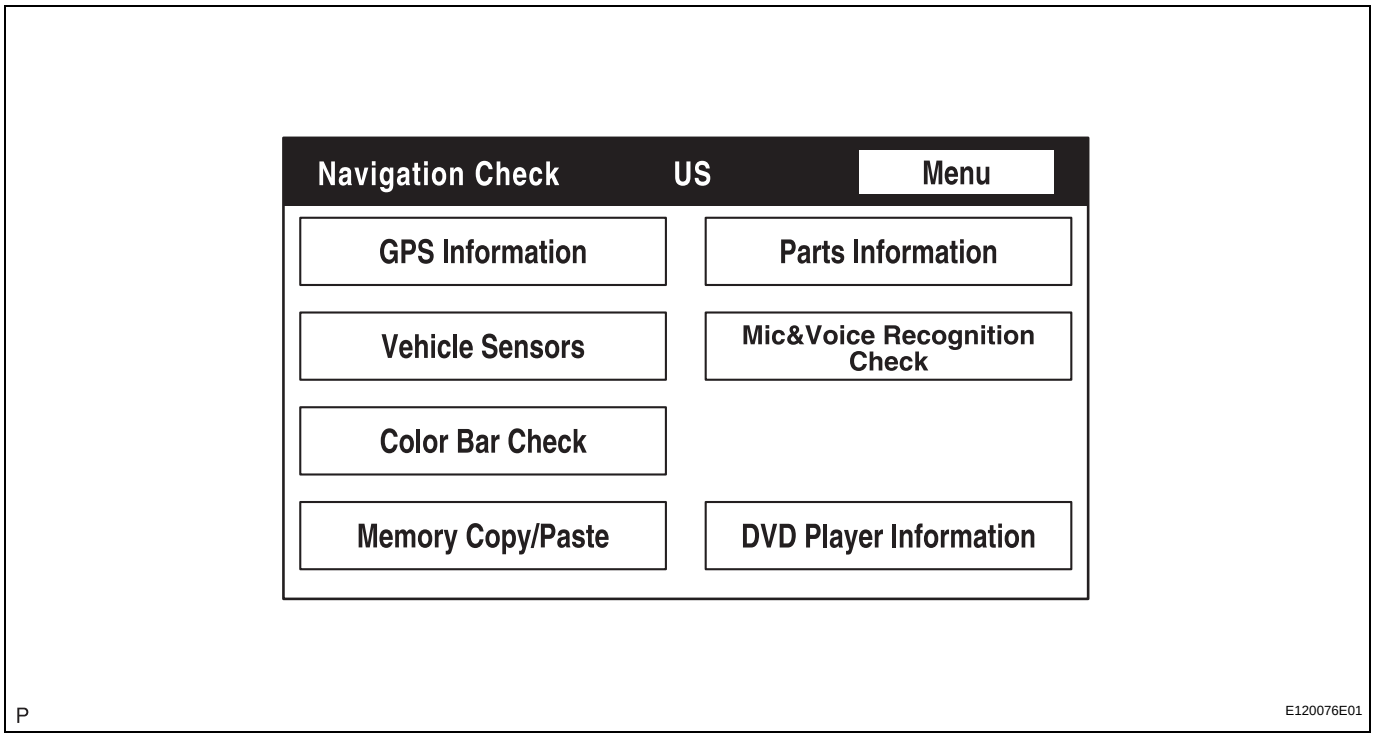
Name	Contents
CAN connection check result/*1	• For systems connected to the CAN system, the results of the CAN connection check are displayed. • "NG" - The ignition switch is on (ACC or IG) and the CAN communication lines are malfunctioning or the CAN bus lines are not connected. • "OK" - The ignition switch is on (ACC or IG) and the CAN communication lines are normal. • Blank - CAN connection check is performed with the ignition switch on (ACC) or off.

HINT:

- This function operates only for the systems connected to the CAN system.
- When the ignition switch is turned off, the bus lines are disconnected, or a malfunction occurs in the bus lines while the CAN connection check result is being displayed, the problem will be reflected on the screen in real time.

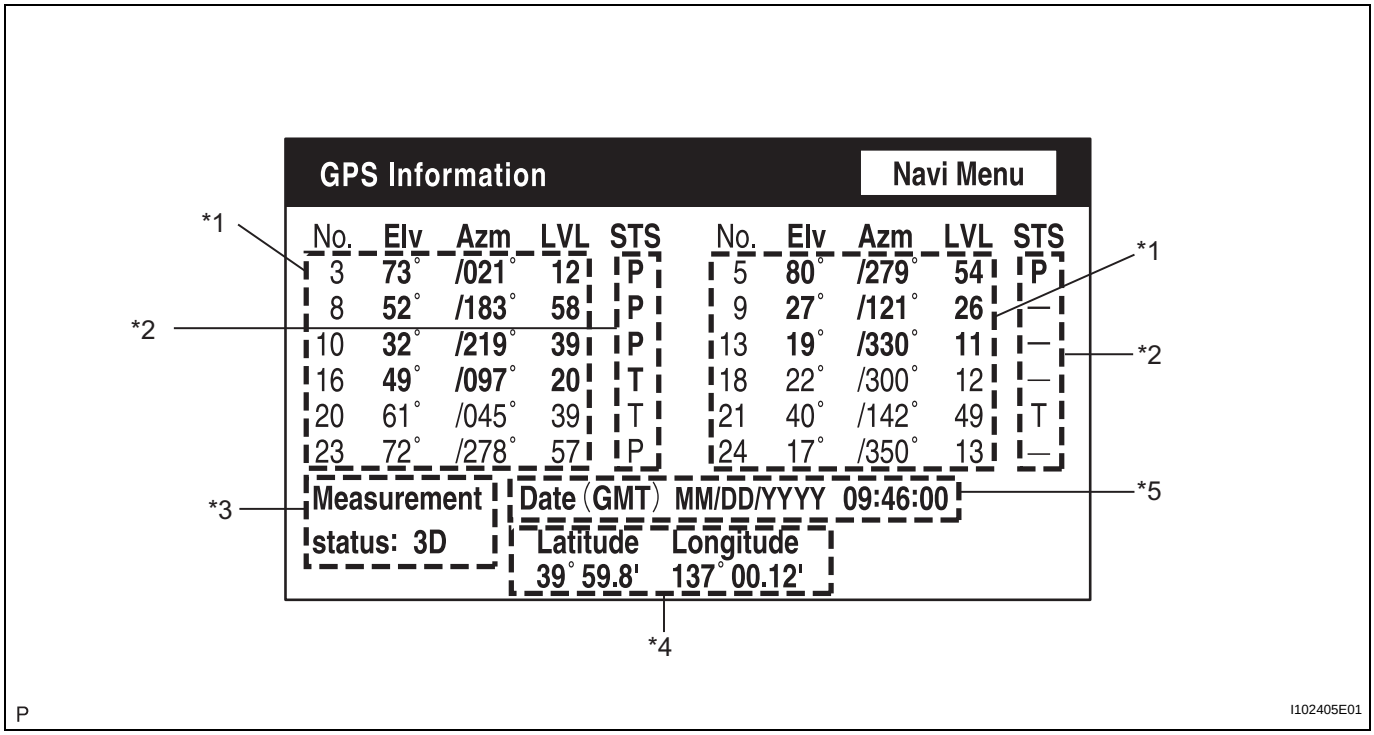
3. NAVIGATION CHECK

(a) Navigation Check Screen



HINT:
Each item is grayed out or not displayed based on the device settings.

(b) GPS Information Screen



(1) Satellite information/*1
Information from a maximum of 12 satellites is displayed on the screen. This information includes the target GPS satellite number, elevation angle, direction, and signal level.

NS

(2) Receiving condition/*2

(DENSO model):

Display	Contents
T	The system is receiving a GPS signal, but is not using it for location.
P	The system is using the GPS signal for location.
-	The system cannot receive a GPS signal.

(AISIN AW model):

Display	Contents
01H	The system cannot receive a GPS signal.
02H	The system is tracing a satellite.
03H	The system is receiving a GPS signal, but is not using it for location.
04H	The system is using the GPS signal for location.

Measurement information/*3:

Display	Contents
2D	2-dimensional location method is being used.
3D	3-dimensional location method is being used.
NG	Location data cannot be used.
Error	Reception error has occurred.
-	Any other state.

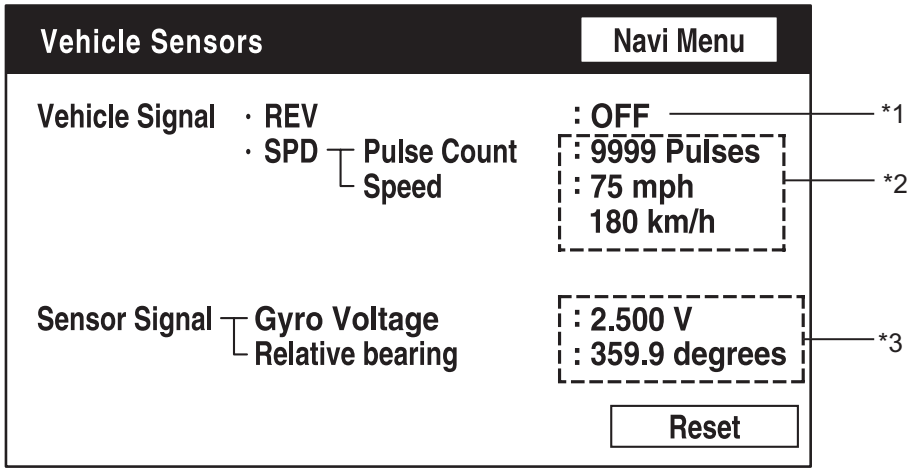
Position information/*4

Display	Contents
Position	Latitude and longitude information on the current position is displayed.

Date information/*5:

Display	Contents
Date	The date/time information obtained from GPS signal is displayed in Greenwich mean time (GMT). The last 4 digits are displayed.

(c) Vehicle Sensors Screen



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NS

Vehicle signal:

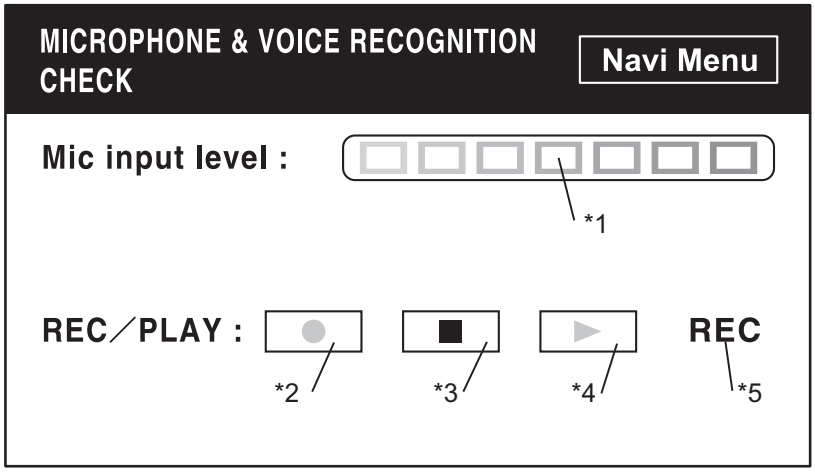
Display	Contents
REV/*1	REV signal ON/OFF state is displayed.
SPD/*2	SPD signal condition is displayed.

Sensor signal:

Display	Contents
Gyro sensor/*3	Gyro sensor output condition is displayed (when the vehicle runs straight or is stationary, the voltage is approximately 2.5 V).

HINT:
Signals are updated once per second only when vehicle sensor signals are changed.

(d) Microphone & Voice Recognition Check Screen



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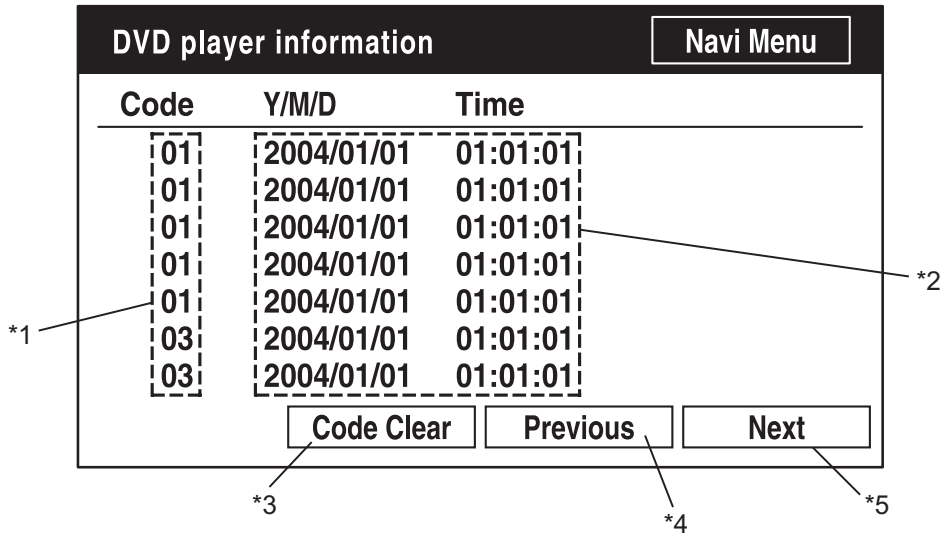
Screen Description:

Display	Contents
Microphone input level meter/*1	Monitors the microphone input level every 100 ms and displays the results in 8 different levels.
Recording switch/*2	Starts recording.
Stop switch/*3	Stops recording.
Play switch/*4	Plays the recorded voice.
Recording indicator/*5	Comes on while recording.

HINT:

- The microphone input function is on at all times when this screen is displayed.
- While recording or playing, the switches other than the stop switch cannot be pushed.
- When no voice is recorded, the play switch cannot be pushed.
- Recording will stop after 5 seconds or by pushing the stop switch.

(e) DVD Player Information Screen



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E120078E01

Screen Description:

Display	Contents
Trouble code/*1	Each code corresponding to the malfunctions is displayed. For details, refer to "Trouble Code Description".
Occurrence time/*2	• The date (year, month, day) and time (hour, minute, second) when the trouble code was detected are displayed as a time stamp. (Greenwich mean time) • The time data to be displayed are received from the GPS receiver.
Trouble code clear switch/*3	All code data being displayed are cleared by pushing this switch for 3 seconds.
Returning switch/*4	The previous page is displayed. If the current displayed page is the first page, this switch cannot be operated.
Proceeding switch/*5	The next page is displayed. If the current displayed page is the last page, this switch cannot be operated.

Trouble Code Description:

Code	Malfunction	Countermeasure
01	Cannot be recognized	Replace radio and navigation assembly.
03	Cannot be read	Follow the inspection procedure for DTC 58-42 (See page NS-83).

HINT:
This is a DVD player check function in the radio and navigation assembly (built-in navigation ECU).

PROBLEM SYMPTOMS TABLE

HINT:

- Before inspecting the suspected areas listed in the table below, check the fuse and relay.
- Before inspecting the suspected areas listed in the table below, check the DTCs.
- Methods used to verify the cause of the problem are listed in order of probability in the suspected area column.

Display function:

Symptom	Suspected area	See page
Pressing PWR switch does not turn on system.	1. Proceed to "Pressing Power Switch does not Turn on System"	NS-101
	2. Radio and navigation assembly power source circuit	NS-191
	3. AVC-LAN circuit	NS-175
	4. Radio and navigation assembly	NS-194
Black screen (No image appears on navigation/audio screen).	1. Proceed to "Black Screen"	NS-146
	2. Illumination circuit	NS-156
	3. AVC-LAN circuit	NS-175
	4. Radio and navigation assembly	NS-194
Illumination for panel switch does not come on with TAIL switch on.	1. Proceed to "Illumination for Panel Switch does not Come on with TAIL Switch ON"	NS-111
	2. Illumination circuit	NS-156
	3. Radio and navigation assembly	NS-194
Display does not dim (Night Screen) with TAIL switch on.	1. Proceed to "Display does not DIM when Light Control Switch is Turned ON"	NS-112
	2. Illumination circuit	NS-156
	3. Radio and navigation assembly	NS-194
Power does not turn off (The screen remains on).	1. Radio and navigation assembly power source circuit	NS-191
	2. Radio and navigation assembly	NS-194
Panel switches do not function.	1. Proceed to "Panel Switches do not Function"	NS-113
	2. Steering pad switch circuit	NS-151
	3. Radio and navigation assembly power source circuit	NS-191
	4. Radio and navigation assembly	NS-194
Touch panel switch does not function.	1. Proceed to "Touch Panel Switch does not Function"	NS-114
	2. Steering pad switch circuit	NS-151
	3. Radio and navigation assembly power source circuit	NS-191
	4. Radio and navigation assembly	NS-194
Display panel does not open, tilt, or tilts improperly.	1. Proceed to "Display Panel does not Open, Tilt, or Tilts Improperly"	NS-115
	2. Radio and navigation assembly power source circuit	NS-191
	3. Radio and navigation assembly	NS-194
Screen is distorted.	1. Radio and navigation assembly power source circuit	NS-191
	2. Radio and navigation assembly	NS-194
Screen flicker or color distortion.	1. Proceed to "Screen Flicker or Color Distortion"	NS-116
	2. Radio and navigation assembly power source circuit	NS-191
	3. Radio and navigation assembly	NS-194
Navigation function switches can be operated while vehicle is running.	Proceed to "Vehicle Speed Signal Circuit between Radio and Navigation Assembly and Combination Meter"	NS-147

Audio function:

Symptom	Suspected area	See page
No sound can be heard from speakers (audio is mute).	1. Proceed to "No Sound can be Heard from Speakers"	NS-102
	2. Stereo component amplifier power source circuit	AV-142
	3. Proceed to "Mute Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-172
	4. Proceed to "Sound Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-168
	5. Speaker circuit	NS-163
	6. Stereo component amplifier	AV-150
	7. Radio and navigation assembly	NS-194
Radio broadcast cannot be received or poor reception.	Proceed to "Radio Broadcast cannot be Received or Poor Reception"	NS-108
CD cannot be inserted / played or CD is ejected right after insertion.	Proceed to "CD cannot be Inserted / Played or CD is Ejected Right After Insertion"	NS-104
CD cannot be ejected.	Proceed to "CD cannot be Ejected"	NS-103
CD sound skips.	Proceed to "CD Sound Skips"	NS-106
Abnormal noise occurs.	Proceed to "Noise Occurs"	NS-99
Poor sound quality in all modes (low volume).	1. Proceed to "Poor Sound Quality in All Modes (Low Volume)"	NS-118
	2. Proceed to "Mute Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-172
	3. Stereo component amplifier power source circuit	AV-142
	4. Radio and navigation assembly power source circuit	NS-191
	5. Stereo component amplifier	AV-150
	6. Radio and navigation assembly	NS-194
External device sound cannot be heard or sound quality is bad (Stereo jack is used).	1. Proceed to "Sound Signal Circuit between Radio and Navigation Assembly and Stereo Jack Adapter"	NS-170
	2. Stereo jack adapter	AV-223
	3. Radio and navigation assembly	NS-194
ASL does not function.	Proceed to "Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter"	AV-120

Navigation function:

Symptom	Suspected area	See page
Map disc cannot be inserted.	1. Proceed to "Map Disc cannot be Inserted"	NS-119
	2. Radio and navigation assembly power source circuit	NS-191
	3. Radio and navigation assembly	NS-194
Map disc cannot be ejected.	1. Radio and navigation assembly power source circuit	NS-191
	2. Radio and navigation assembly	NS-194
Vehicle position mark deviates.	1. Proceed to "Vehicle Position Mark Deviates Greatly"	NS-120
	2. GPS antenna	NS-210
	3. Radio and navigation assembly	NS-194
Cursor or map rotates when vehicle is stopped.	1. Proceed to "Cursor or Map Rotates When Vehicle is Stopped"	NS-122
	2. Radio and navigation assembly	NS-194
Vehicle position mark is not updated.	1. Proceed to "Vehicle Position Mark is not Updated"	NS-123
	2. Map disc	-
	3. Radio and navigation assembly	NS-194
Current position display does not appear.	1. Proceed to "Current Position Display does not Appear"	NS-124
	2. Map disc	-
	3. GPS antenna	NS-210
	4. Radio and navigation assembly	NS-194

Symptom	Suspected area	See page
GPS mark is not displayed.	1. Proceed to "GPS Mark is not Displayed"	NS-125
	2. GPS antenna	NS-210
	3. Radio and navigation assembly	NS-194
Voice guidance does not function.	1. Proceed to "Voice Guidance does not Function"	NS-128
	2. Proceed to "Mute Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier"	NS-172
	3. Navigation voice circuit	NS-180
	4. Speaker circuit	NS-163
	5. Map disc	-
	6. Radio and navigation assembly	NS-194
	7. Stereo component amplifier	AV-150
Map display incomplete.	1. Proceed to "Map Display Incomplete"	NS-131
	2. Map disc	-
	3. Radio and navigation assembly	NS-194
Route cannot be calculated.	1. Proceed to "Route cannot be Calculated"	NS-132
	2. Map disc	-
	3. Radio and navigation assembly	NS-194
Voice recognition difficulty.	1. Proceed to "Voice Recognition Difficulty"	NS-133
	2. Radio and navigation assembly	NS-194
Voice is not recognized.	1. Proceed to "Voice is not Recognized"	NS-135
	2. Proceed to "Microphone Circuit between Microphone and Radio and Navigation Assembly"	NS-182
	3. Steering pad switch circuit	NS-151
	4. Microphone	AV-232
	5. Radio and navigation assembly	NS-194
Speed signal does not change in the navigation check mode.	Proceed to "Vehicle Speed Signal Circuit between Radio and Navigation Assembly and Combination Meter"	NS-147
Reverse signal does not change in the navigation check mode.	Reverse signal circuit	NS-177

Steering pad switch function:

Symptom	Suspected area	See page
The system cannot be operated by the steering pad switch.	1. Steering pad switch circuit	NS-151
	2. Radio and navigation assembly	NS-194
Illumination for steering pad switch does not come on with TAIL switch on.	1. Illumination circuit	NS-156
	2. Radio and navigation assembly	NS-194

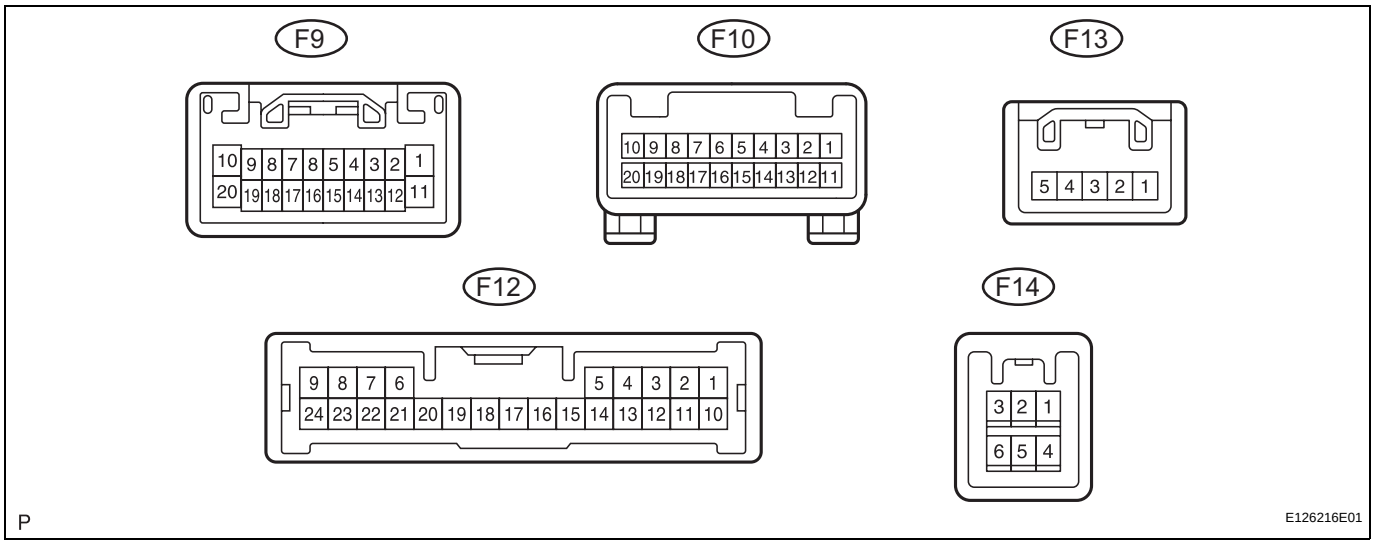
"Bluetooth" function:

Symptom	Suspected area	See page
Cellular phone registration failure, phone directory transfer failure.	Proceed to "Cellular Phone Registration Failure, Phone Directory Transfer Failure"	NS-137
Cellular phone cannot send / receive.	1. Proceed to "Cellular Phone cannot Send / Receive"	NS-139
	2. Steering pad switch circuit	NS-151
	3. Radio and navigation assembly	NS-194
Cannot call in a certain place.	Proceed to "Cannot Call in a Certain Place"	NS-141
The other caller's voice cannot be heard, is too quiet, or distorted.	1. Proceed to "The Other Caller's Voice cannot be Heard, is too Quiet, or Distorted"	NS-142
	2. Navigation voice circuit	NS-180
	3. Radio and navigation assembly	NS-194
	4. Stereo component amplifier	AV-150

Symptom	Suspected area	See page
The other caller cannot hear your voice, or your voice is too quiet or distorted.	1. Proceed to "The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted"	NS-144
	2. Proceed to "Microphone Circuit between Microphone and Radio and Navigation Assembly"	NS-182
	3. Microphone	AV-232
	4. Radio and navigation assembly	NS-194

TERMINALS OF ECU

1. RADIO AND NAVIGATION ASSEMBLY



Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
SPD (F13-3) - GND (F9-20)	V - BR	Speed signal from combination meter	See "Vehicle Signal Check" (See page NS-22)	-
REV (F13-5) - GND (F9-20)	R - BR	Reverse signal	See "Vehicle Signal Check" (See page NS-22)	-
SWG (F10-6) - Body ground	P - Body ground	Steering pad switch ground	Always	Below 1 V
SW1 (F10-7) - SWG (F10-6)	O - P	Steering pad switch signal	No switch is pushed → SEEK+ switch pushed → SEEK- switch pushed → VOL+ switch pushed → VOL- switch pushed	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
SW2 (F10-8) - SWG (F10-6)	Y - P	Steering pad switch signal	No switch is pushed → MODE switch pushed → ON HOOK switch pushed → OFF HOOK switch pushed → VOICE switch pushed	4 V or more → Approx. 0.5 V → Approx. 0.9 V → Approx. 2.0 V → Approx. 3.4 V
IVO+ (F10-11) - GND (F9-20)	R - BR	Voice guidance signal	Voice guidance is playing	A waveform synchronized with sounds is output
IVO- (F10-12) - GND (F9-20)	G - BR	Voice guidance signal	Voice guidance is playing	A waveform synchronized with sounds is output
SLD1 (F10-13) - Body ground	Shielded - Body ground	Voice sound signal shielded ground	Always	Below 1 V
B (F9-1) - GND (F9-20)	L-Y - BR	Battery	Always	10 to 14 V
ILL+ (F9-2) - GND (F9-20)	G - BR	Illumination signal	Turn ignition switch on (IG) Light control switch OFF → TAIL or ON	Below 1V → 10 to 14 V
ATX+ (F9-5) - GND (F9-20)	R - BR	AVC-LAN communication signal	Turn ignition switch on (ACC)	2 to 3 V
MUTE (F9-7) - GND (F9-20)	O - BR	Mute signal	Audio system is playing → Changing	Above 3.5 V → Below 1 V
R+ (F9-8) - GND (F9-20)	R - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specification
L+ (F9-9) - GND (F9-20)	B - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
SLD (F9-10) - Body ground	Shielded - Body ground	Shielded ground	Always	Below 1 V
ACC (F9-11) - GND (F9-20)	GR - BR	Accessory (ON)	Turn ignition switch off → on (ACC or IG)	Below 1 V → 10 to 14 V
ILL- (F9-12) - GND (F9-20)	W-B - BR	Illumination signal	Turn ignition switch on (IG) Light control switch OFF → TAIL or ON	Below 1 V →10 to 14 V
ANT (F9-13) - GND (F9-20)	O - BR	Power source of antenna	Radio switch ON and AM or FM	10 to 14 V
ATX- (F9-15) - GND (F9-20)	G - BR	AVC-LAN communication signal	Turn ignition switch on (ACC)	2 to 3 V
R- (F9-18) - GND (F9-20)	G - BR	Sound signal (Right)	Audio system is playing	A waveform synchronized with sounds is output
L- (F9-19) - GND (F9-20)	W - BR	Sound signal (Left)	Audio system is playing	A waveform synchronized with sounds is output
GND (F9-20) - Body ground	BR - Body ground	Ground	Always	Below 1 V
MIC- (F12-9) - Body ground	R - Body ground	Microphone voice signal	See "Microphone Check" (See page NS-27)	-
TSW- (F12-12) - GND (F9 -20)	P - BR	Telephone relation switch signal	Always	Below 1 V
MACC (F12-17) - GND (F9-20)	LG - BR	Microphone AMP power supply	Turn ignition switch off → on (IG)	Below 1 V → 5 V
SGND (F12-18) - GND (F9-20)	P - BR	Ground	Always	Below 1 V
MIC+ (F12-19) - GND (F9-20)	G - BR	Microphone voice signal	See "Microphone Check" (See page NS-27)	-
VAR+ (F14-2) - GND (F9-20)	G - BR	Sound signal (Right)	External device is playing (When stereo jack is used)	A waveform synchronized with sounds is output
VAL+ (F14-3) - GND (F9-20)	R - BR	Sound signal (Left)	External device is playing (When stereo jack is used)	A waveform synchronized with sound is output
VA- (F14-5) - Body ground	BR - Body ground	Shielded ground	Always	Below 1 V
ADPG (F14 - 6) - GND (F9-20)	G - BR	External device connection detection signal	External device is connected	Below 1 V

2. STEREO COMPONENT AMPLIFIER (See page AV-15)

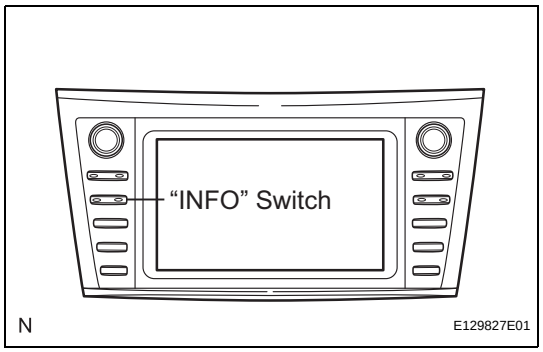
DTC CHECK / CLEAR

HINT:

- Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.
- If the system cannot enter the diagnostic mode, inspect all AVC-LAN communication components and repair or replace problem parts (See page NS-175).
- After the ignition switch is turned on (IG), check that the map is displayed before starting the diagnostic mode. Otherwise, some items cannot be checked.

1. START DIAGNOSTIC MODE

(a) There are 2 methods to start diagnostic mode. Start the mode by using one of them.

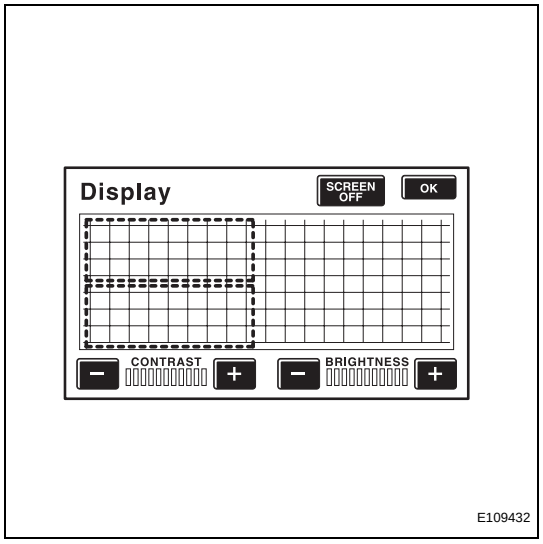


(b) Method 1

(1) Start the engine.

(2) While pressing and holding the "INFO" switch, operate the light control switch: OFF → Turn ON → Turn OFF → Turn ON → Turn OFF → Turn ON → Turn OFF.

(3) The diagnostic mode starts and the "System Check Mode" screen will be displayed. Service inspection starts automatically and the result will be displayed.



(c) Method 2

(1) Start the engine.

(2) Switch to the "Display Check" screen.

(3) From the display quality adjustment screen, touch the corners of the screen in the following order: upper left → lower left → upper left → lower left → upper left → lower left.

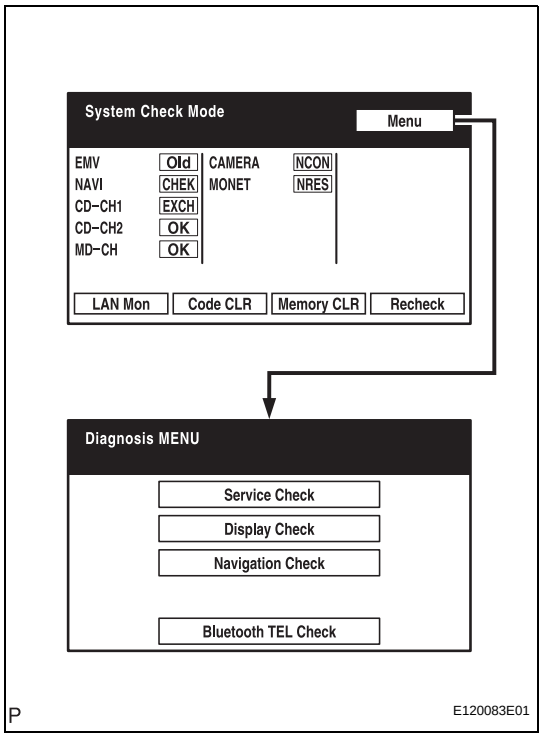
(4) The diagnostic mode starts and the "System Check Mode" screen will be displayed. Service inspection starts automatically and the result will be displayed.

2. FINISH DIAGNOSTIC MODE

(a) There are 2 methods to end diagnostic mode. Use one of them.

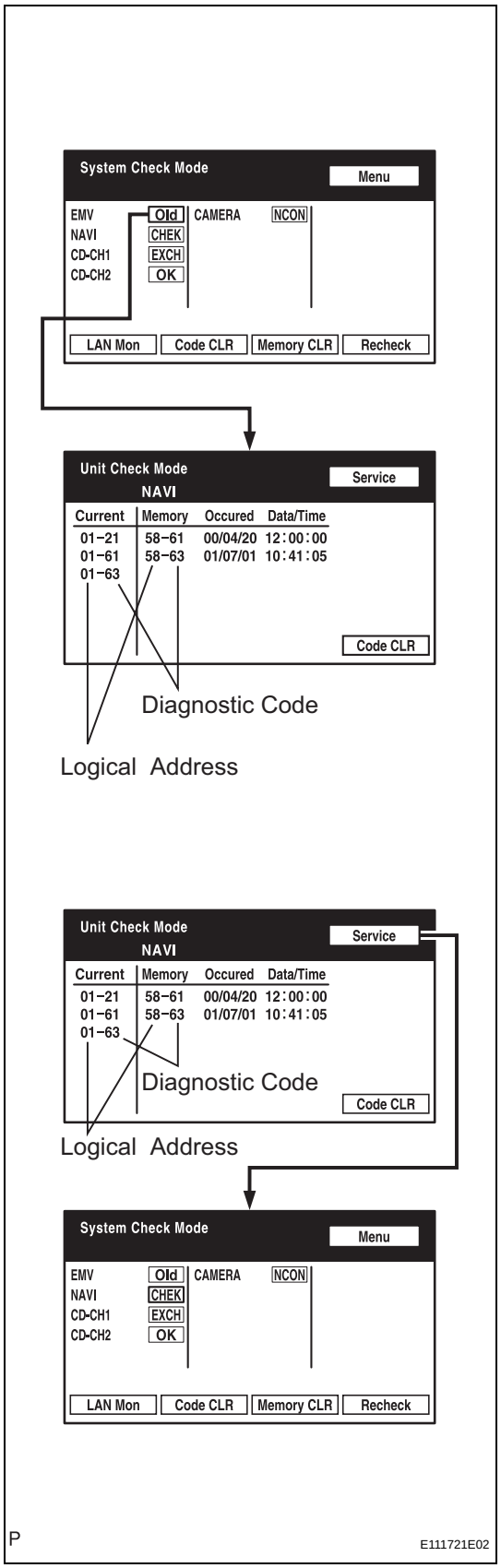
(1) Turn the ignition switch off.

(2) Press and hold the "DISP" switch for 3 seconds.



3. DIAGNOSIS MENU

(a) The "Diagnosis MENU" screen will be displayed by pressing the "Menu" switch on the "System Check Mode" screen.



4. CHECK DTC

(a) Read the system check result.

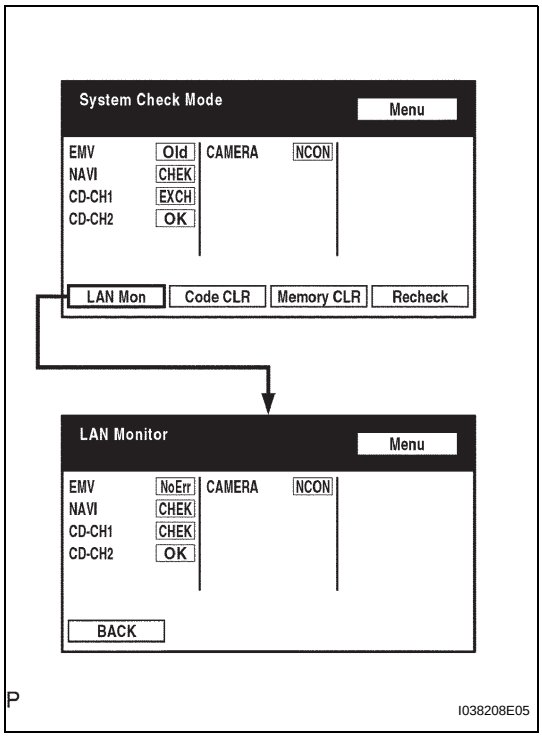
(1) If the check result is "EXCH", "CHEK" or "Old", touch the displayed check result to view the results on the "Unit Check Mode" screen and record them.

HINT:

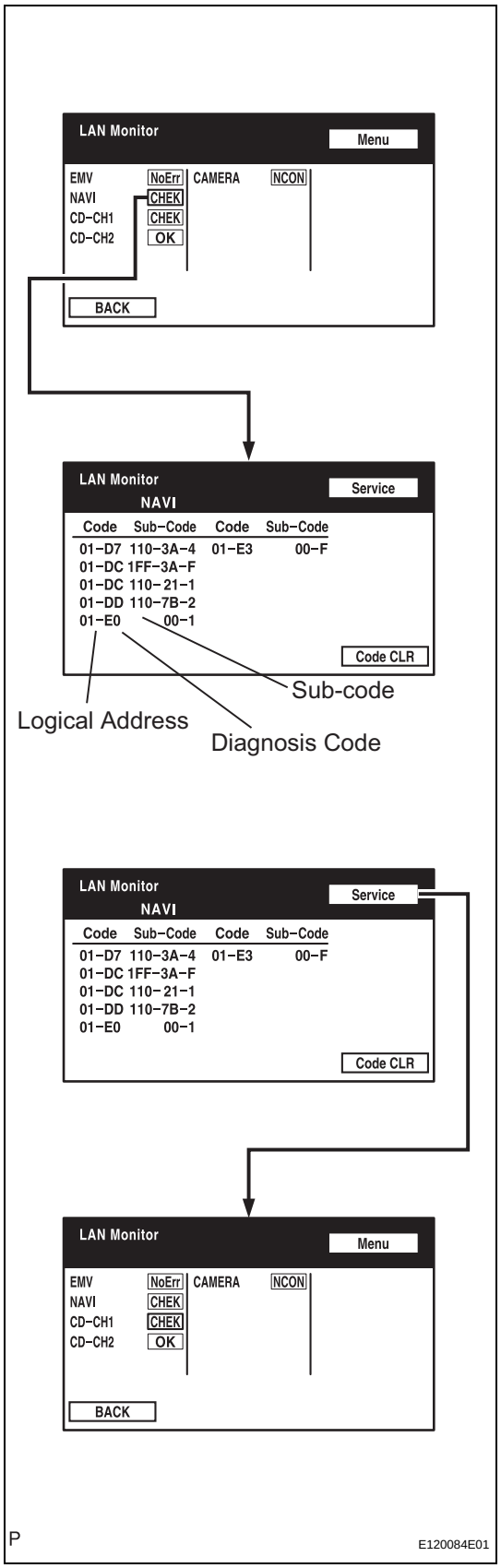
- If all check results are "OK", go to communication DTC check.
- If a device name is not known, its physical address is displayed.

HINT:

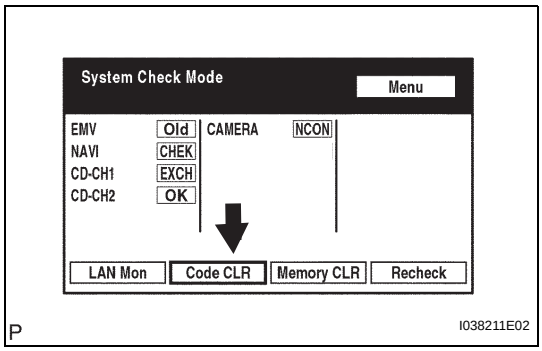
When proceeding to view the results of another device, press the "Service" switch to return to the "System Check Mode" screen. Repeat this step.



(b) Read the communication diagnostic check result.
(1) Return to the "System Check Mode" screen, and press the "LAN Mon" switch to enter the "LAN Monitor" screen.



(2) If the check result is "CHEK" or "Old", touch the displayed check result to view the results on the individual communication diagnostic screen and record them.
HINT:
- If all check results are "No Err", the system judges that no DTC exists.
- The sub-code (relevant device) will be indicated by its physical address.
- When proceeding to view the results of another device, press the "Service" switch to return to the original "LAN Monitor" screen. Repeat this step.

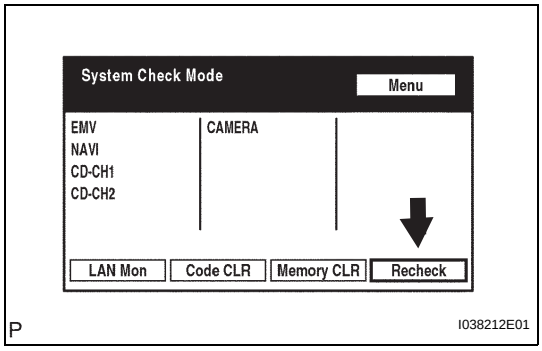


5. DTC CLEAR/RECHECK

(a) Clear DTC

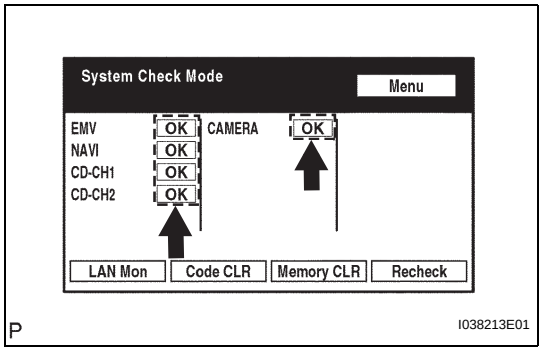
(1) Press the "Code CLR" switch for 3 seconds.

(2) The check results are cleared.

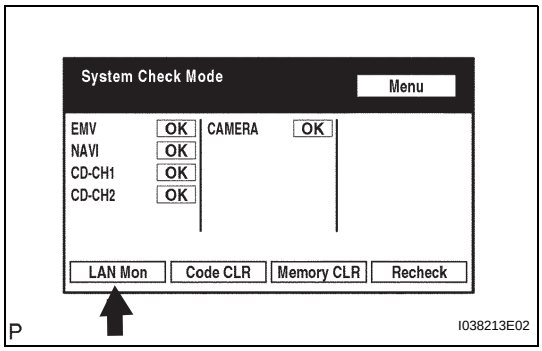


(b) Recheck

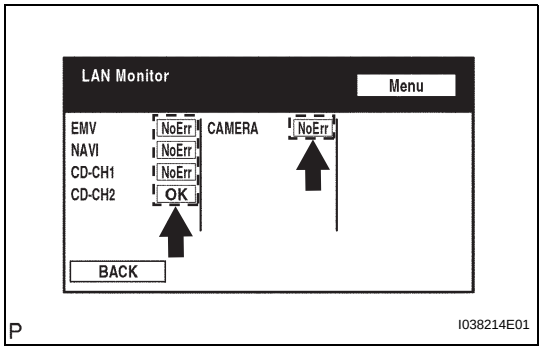
(1) Press the "Recheck" switch.



(2) Confirm that all diagnostic codes are "OK" when the check results are displayed. If a code other than "OK" is displayed, troubleshoot again.



(3) Press the "LAN Mon" switch to change to the "LAN Monitor" screen.



(4) Confirm that all diagnostic codes are "No Err". If a code other than "No Err" is displayed, troubleshoot again.

NS

DIAGNOSTIC TROUBLE CODE CHART

COMMUNICATION DIAGNOSIS:

DTC No.	Detection Item	Trouble Area	See page
01-21	ROM Error	Radio and navigation assembly	NS-56
01-22	RAM Error	Radio and navigation assembly	NS-56
01-D5	Absence of Registration Unit	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-57
01-D6	No Master	1. Radio and navigation assembly power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 4. Component which has stored this code 5. Radio and navigation assembly	NS-59
01-D7	Connection Check Error	1. Radio and navigation assembly power source circuit 2. Power source circuit of the component which has stored this code 3. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 4. Component which has stored this code 5. Radio and navigation assembly	NS-59
01-D8	No Response for Connection Check	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-57
01-D9	Last Mode Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-57
01-DA	No Response Against ON / OFF Command	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-57

DTC No.	Detection Item	Trouble Area	See page
01-DB	Mode Status Error	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-57
01-DC	Transmission Error	If the same sub-code is recorded in other components, check harness for power supply and communication system of all components shown by code	NS-63
01-DD	Master Reset	1. Radio and navigation assembly power source circuit 2. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 3. Radio and navigation assembly 4. Component which has stored this code	NS-66
01-DE	Slave Reset	1. Power source circuit of the component shown by the sub-code 2. AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code 3. Component shown by the sub-code	NS-57
01-DF	Master Error	1. Radio and navigation assembly power source circuit 2. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 3. AVC-LAN circuit between the master unit and the sub-master unit (radio receiver) 4. Radio and navigation assembly 5. Component which has stored this code	NS-70
01-E0	Registration Complete Indication Error	-	NS-74
01-E1	Voice Processing Device ON Error	1. Radio and navigation assembly power source circuit 2. AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code 3. Radio and navigation assembly 4. Component which has stored this code	NS-66
01-E2	ON / OFF Indication Parameter Error	Radio and navigation assembly	NS-75
01-E3	Registration Demand Transmission	-	NS-74
01-E4	Multiple Frame Incomplete	-	NS-74

SW:

DTC No.	Detection Item	Trouble Area	See page
21-10	Panel Switch Error	Radio and navigation assembly	NS-76

DTC No.	Detection Item	Trouble Area	See page
21-11	Touch Switch Error	Radio and navigation assembly	NS-76

SW WITH NAME:

DTC No.	Detection Item	Trouble Area	See page
23-10	Panel Switch Error	Radio and navigation assembly	NS-76
23-11	Touch Switch Error	Radio and navigation assembly	NS-76

SW CONVERTING:

DTC No.	Detection Item	Trouble Area	See page
24-10	Panel Switch Error	Radio and navigation assembly	NS-76
24-11	Touch Switch Error	Radio and navigation assembly	NS-76

COMMAND SW:

DTC No.	Detection Item	Trouble Area	See page
25-10	Panel Switch Error	Radio and navigation assembly	NS-76
25-11	Touch Switch Error	Radio and navigation assembly	NS-76

FRONT MONITOR:

DTC No.	Detection Item	Trouble Area	See page
34-10	Error in Picture Circuit	Radio and navigation assembly	NS-77
34-11	No Current in Back-light	Radio and navigation assembly	NS-77
34-12	Excess Current in Back-light	Radio and navigation assembly	NS-77

TELEPHONE:

DTC No.	Detection Item	Trouble Area	See page
57-47	Bluetooth Module Initialization Failed	Radio and navigation assembly	NS-78

NAVI:

DTC No.	Detection Item	Trouble Area	See page
58-10	Gyro Error	1. Gyro sensor 2. Radio and navigation assembly	NS-79
58-11	GPS Receiver Error	Radio and navigation assembly	NS-81
58-40	GPS Antenna Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
58-41	GPS Antenna Power Source Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
58-42	Map Disc Read Error	1. Map Disc 2. Radio and navigation assembly	NS-83
58-43	SPD Signal Error	1. Speed signal circuit 2. Radio and navigation assembly	NS-85
58-44	Player Error	Radio and navigation assembly	NS-86
58-45	High Temperature	Radio and navigation assembly	NS-87

IN-DASH CD CHANGER:

DTC No.	Detection Item	Trouble Area	See page
63-10	CD Changer Mechanical Error	Radio and navigation assembly	NS-88
63-11	CD Insertion and Ejection Error	Radio and navigation assembly	NS-88
63-12	CD Reading Abnormal	Radio and navigation assembly	NS-88
63-41	Wrong Disc	1. CD 2. Radio and navigation assembly	NS-89
63-42	Disc cannot be Read	1. CD 2. Radio and navigation assembly	NS-89

DTC No.	Detection Item	Trouble Area	See page
63-43	CD-ROM Abnormal	1. CD 2. Radio and navigation assembly	NS-91
63-44	CD Abnormal	Radio and navigation assembly	NS-92
63-45	Eject Error	Radio and navigation assembly	NS-93
63-46	Scratched / Reversed Disc	1. CD 2. Radio and navigation assembly	NS-94
63-47	High Temperature	Radio and navigation assembly	NS-96
63-48	Excess Current	Radio and navigation assembly	NS-92
63-50	Tray Insertion / Ejection Error	Radio and navigation assembly	NS-92
63-51	Elevator Error	Radio and navigation assembly	NS-93
63-52	Clamp Error	Radio and navigation assembly	NS-93
63-78	DSP Error	-	NS-97
63-7D	Disc cannot be Played	1. CD 2. Radio and navigation assembly	NS-98
63-7E	No Playable Files	1. CD 2. Radio and navigation assembly	NS-98
63-7F	Copyright Protection Error	1. CD 2. Radio and navigation assembly	NS-98

GPS:

DTC No.	Detection Item	Trouble Area	See page
80-10	Gyro Error	1. Gyro sensor 2. Radio and navigation assembly	NS-79
80-11	GPS Receiver Error	Radio and navigation assembly	NS-81
80-40	GPS Antenna Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
80-41	GPS Antenna Power Source Error	1. Wire harness 2. GPS antenna 3. Radio and navigation assembly	NS-82
80-42	Map Disc Read Error	1. Map disc 2. Radio and navigation assembly	NS-83
80-43	SPD Signal Error	1. Speed signal circuit 2. Radio and navigation assembly	NS-85
80-44	Player Error	Radio and navigation assembly	NS-86
80-45	High Temperature	Radio and navigation assembly	NS-87

DTC	01-21	ROM Error

DTC	01-22	RAM Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-21	A malfunction exists in ROM.	Radio and navigation assembly
01-22	A malfunction exists in RAM.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	01-D5	Absence of Registration Unit

DTC	01-D8	No Response for Connection Check

DTC	01-D9	Last Mode Error

DTC	01-DA	No Response Against ON / OFF Command

DTC	01-DB	Mode Status Error

DTC	01-DE	Slave Reset

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D5 *1, *4	• A component shown by the sub-code is (was) disconnected from the system when turning the ignition switch on (ACC or IG). • The communication condition with the device that the code shows cannot be obtained when the engine starts.	• Power source circuit of the component shown by the sub-code • AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code • Component shown by the sub-code
01-D8 *2, *4	A component shown by the sub-code is (was) disconnected from the system after engine start.	
01-D9 *1, *4	The device that had functioned before the engine stopped is (was) disconnected from the system when turning the ignition switch is on (ACC or IG).	
01-DA *4	• No response is identified when changing mode. • Detected when sound and image do not change by switch operation.	
01-DB *1, *4	A dual alarm is detected.	
01-DE *3, *4	A slave device has been disconnected after engine start.	

HINT:

- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: If the power connector is disconnected after the engine starts, this code is stored after 180 seconds.
- *3: This code may be stored if the engine is started and then the ignition switch is turned to the START position again. (Key type ignition switch only)
- *4: If it is reported that the device does not exist during verification, check the power source circuit and AVC-LAN circuit for the device.

NOTICE:

- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio and navigation assembly is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:

Be sure to read DESCRIPTION before performing the following procedures.

1	**CHECK "RADIO AND NAVIGATION ASSEMBLY COMMUNICATION ERROR" IN FLOW CHART**

Refer to the radio and navigation assembly communication error (See page NS-188).

NEXT

END

DTC	01-D6	No Master

DTC	01-D7	Connection Check Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-D6 *1	When either of the following conditions is met: • The component which has stored the code has (had) been disconnected when the ignition switch is turned on (ACC or IG). • The master device has (had) been disconnected when this code is stored.	• Radio and navigation assembly power source circuit • Power source circuit of the component which has stored this code • AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code • Component which has stored this code • Radio and navigation assembly
01-D7 *2	When either of the following conditions is met: • The component which has stored the code has (had) been disconnected after the engine starts (started). • The master device has (had) been disconnected when this code is (was) stored.	

HINT:
- *1: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.
- *2: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the ignition switch on (ACC or IG), this code is stored.

NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio and navigation assembly is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

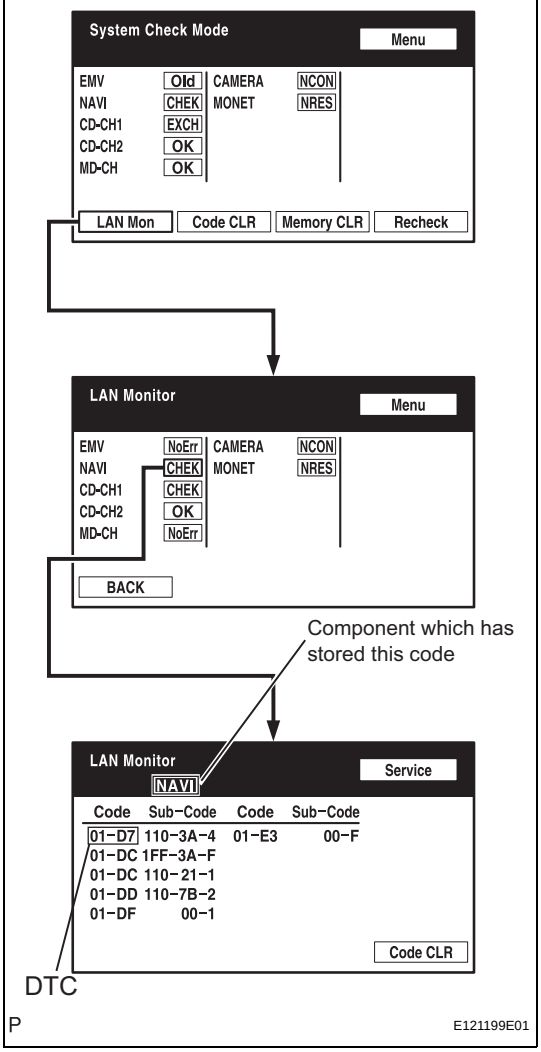
1	CHECK RADIO AND NAVIGATION ASSEMBLY POWER SOURCE CIRCUIT

Refer to the radio and navigation assembly power source circuit (See page NS-191).
If the power source circuit is operating normally, proceed to the next step.

NEXT

2 IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

Example:



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(a) Enter the diagnostic mode.
(b) Press the "LAN Mon" switch to change to "LAN Monitor" mode.
(c) Identify the component which has stored this code.

Component Table:

Display	Component
DSP-AMP	Stereo component amplifier

HINT:
"NAVI" is the component which has stored this code in the example shown in the illustration.

NEXT

3 CHECK POWER SOURCE CIRCUIT OF COMPONENT WHICH HAS STORED THIS CODE

(a) Inspect the power source circuit of the component which has stored this code.
If the power source circuit is operating normally, proceed to the next step.

Component Table:

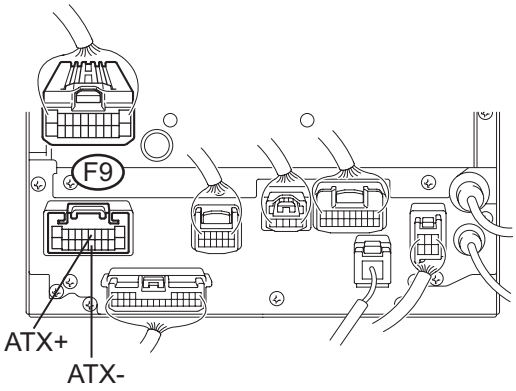
Component	Proceed to
Stereo component amplifier (DSP-AMP)	Stereo component amplifier power source circuit (See page AV-142)

NEXT

NS

4	CHECK RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F9-5) - ATX- (F9-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

5	CHECK HARNESS AND CONNECTOR

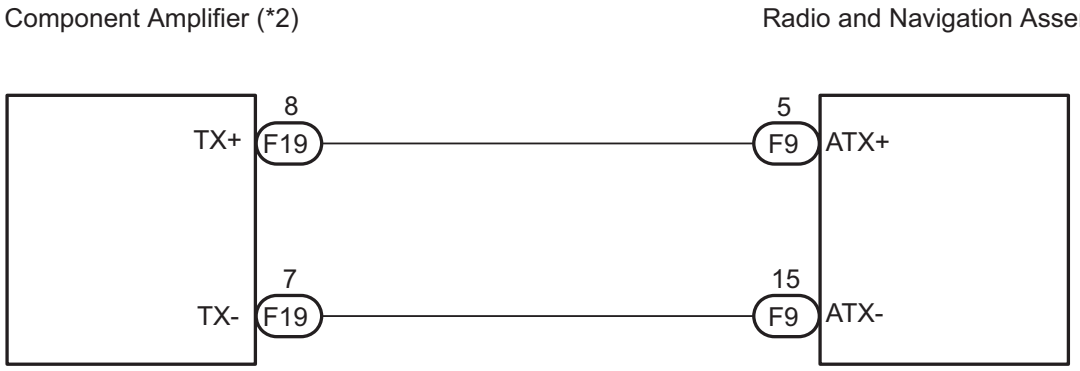
HINT:
For details of the connectors, refer to "TERMINALS OF ECU" (See page NS-45).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.
  (1) Disconnect all connectors between the radio and navigation assembly and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.

OK:

There is no open or short circuit.

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P

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NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	REPLACE COMPONENT WHICH HAS STORED THIS CODE

(a) Replace the component which has stored this code with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

NS

DTC 01-DC Transmission Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DC *1	Transmission to component shown by sub-code failed. (Detecting this DTC does not always mean actual failure.)	If the same sub-code is recorded in other components, check harness for power supply and communication system of all components shown by code

HINT:
*1: This code may be stored if the engine is started, idled for 60 seconds and then the ignition switch is turned to the START position again. (Key type ignition switch only)
NOTICE:
- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio and navigation assembly is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

1 CHECK FOR DTC OF OTHER COMPONENTS

(a) Check if the component shown by the sub-code is displayed in the check result of the other components.
  (1) Check if "01-DC" is output for the other components.
  (2) If "01-DC" is output for any other components, check if the same physical address is displayed.
  HINT:
  For the list of the components shown by sub-codes, refer to the table in step 2.
  Result

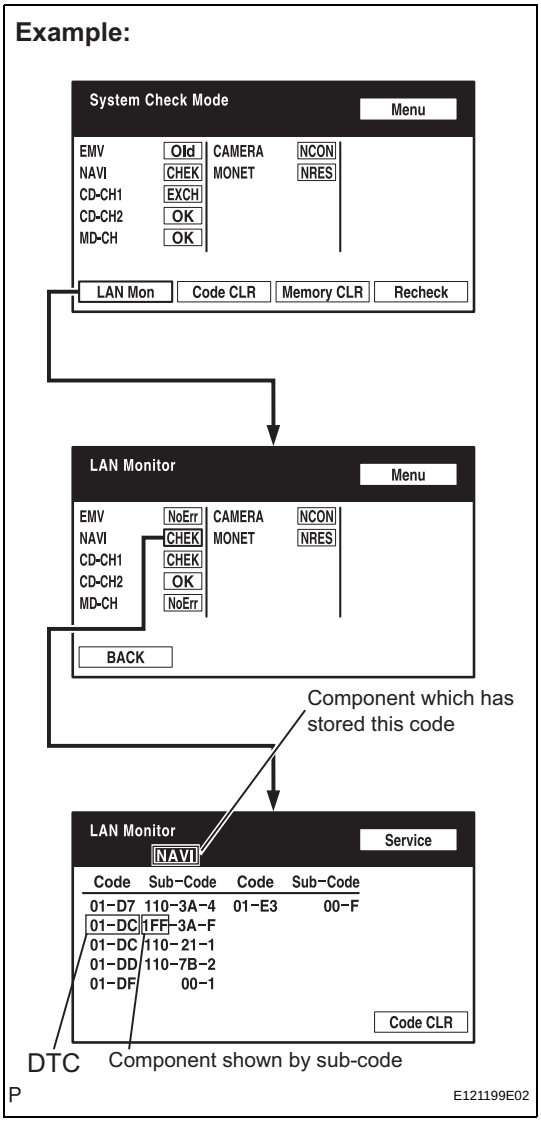
Result	Proceed to
"01-DC" is output and the same physical address is displayed	**A**
"01-DC" is not output or the same physical address is not displayed	**B**

B → **Go to step 4**

A

2 IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

Example:



(a) Enter the diagnostic mode.
(b) Press the "LAN Mon" switch to change to "LAN Monitor" mode.
(c) Identify the component which has stored this code.

Component Table:

Display	Component
DSP-AMP (440)	Stereo component amplifier
AVN (140)	Radio and navigation assembly

HINT:
"NAVI" is the component which has stored this code in the example shown in the illustration.

NEXT

3 CHECK COMPONENT WHICH HAS STORED THIS CODE

(a) Select the component which has stored this code.

Component Table:

Component	Proceed to
Radio and navigation assembly (AVN)	Radio and navigation assembly communication error (See page NS-188)
Stereo component amplifier (DSP-AMP)	Stereo component amplifier communication error (See page NS-185)

NEXT

END

4	CLEAR DTC

(a) Clear the DTCs (See page NS-46).
HINT:
If "01-DC" is output for only one component, this may not indicate a malfunction.

NEXT

5	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.

OK:
Malfunction disappears.

NG → **Go to step 3**

OK

END

DTC	01-DD	Master Reset

DTC	01-E1	Voice Processing Device ON Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DD *1	The device that should be the master has been disconnected after the engine starts.	• Radio and navigation assembly power source circuit • AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code • Radio and navigation assembly • Component which has stored this code
01-E1 *2	The AMP device records that the AMP output does not function even while the source device is operating.	

HINT:

- *1: This code may be stored if the engine is started and the ignition switch is turned to the START position again. (Key type ignition switch only)
- *2: Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.

NOTICE:

- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio and navigation assembly is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:

Be sure to read DESCRIPTION before performing the following procedures.

1	CHECK RADIO AND NAVIGATION ASSEMBLY POWER SOURCE CIRCUIT

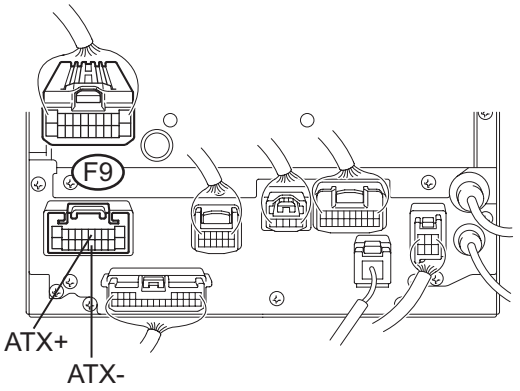
Refer to the radio and navigation assembly power source circuit (See page NS-191).

If the power source circuit is operating normally, proceed to the next step.

NEXT

2	INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

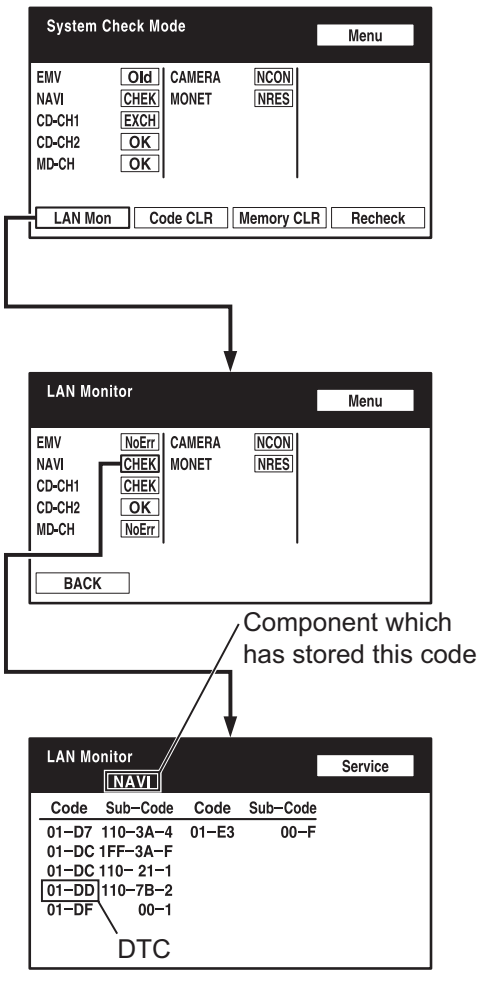
Tester connection	Condition	Specified condition
ATX+ (F9-5) - ATX- (F9-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

3 IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

Example:



P E111829E03

(a) Enter the diagnostic mode.
(b) Press the "LAN Mon" switch to change to "LAN Monitor" mode.
(c) Identify the component which has stored this code.

Component Table:

Display	Component
DSP-AMP	Stereo component amplifier

HINT:
"NAVI" is the component which has stored this code in the example shown in the illustration.

NEXT

4 CHECK HARNESS AND CONNECTOR

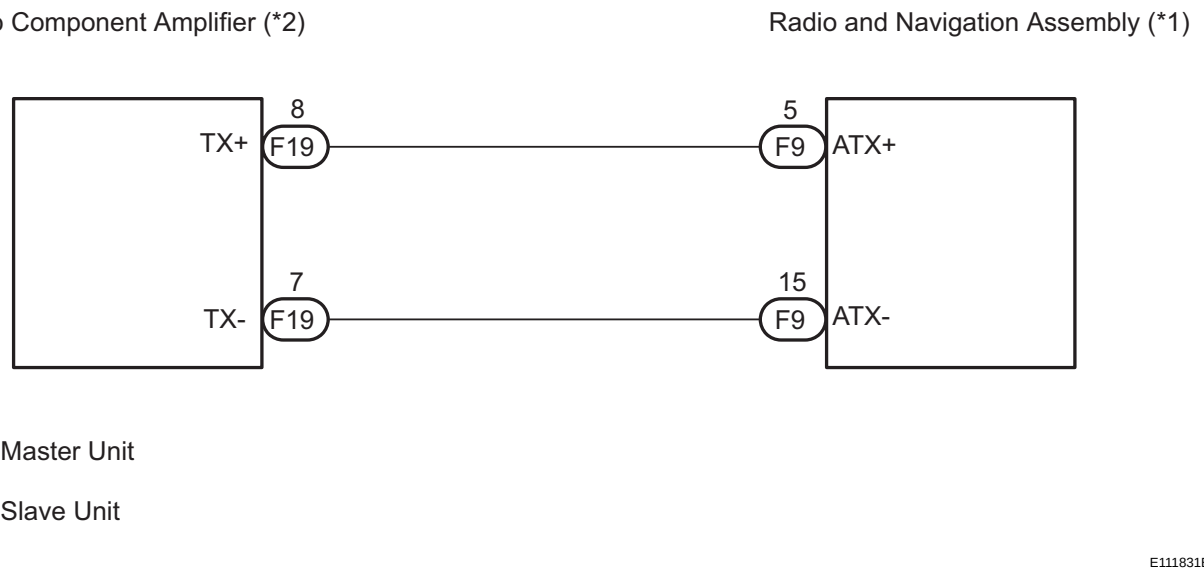
HINT:
For details of the connectors, refer to "TERMINALS OF ECU" (See page NS-45).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.
  (1) Disconnect all connectors between the radio and navigation assembly and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.

NS

OK:
There is no open or short circuit.

AVC-LAN WIRING DIAGRAM



NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	REPLACE RADIO AND NAVIGATION ASSEMBLY

(a) Replace the radio and navigation assembly with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE COMPONENT WHICH HAS STORED THIS CODE**

OK

END

DTC	01-DF	Master Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-DF *1	• The device with a display fails and the master is switched to the audio device. • A communication error between the sub-master (radio receiver) and master occurs.	• Radio and navigation assembly power source circuit • AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code • AVC-LAN circuit between the radio and navigation assembly and the radio receiver • Radio and navigation assembly • Component which has stored this code

HINT:
*1: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the ignition switch on (ACC or IG), this code is stored.

NOTICE:

- **Before starting troubleshooting, be sure to clear DTCs to erase codes stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.**
- **The radio and navigation assembly is the master unit.**
- **Be sure to clear and recheck DTCs after the inspection is completed to confirm that no DTCs are output.**

INSPECTION PROCEDURE

NOTICE:
Be sure to read DESCRIPTION before performing the following procedures.

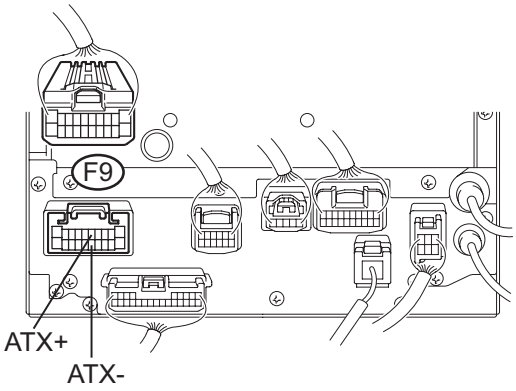
1	CHECK RADIO AND NAVIGATION ASSEMBLY POWER SOURCE CIRCUIT

Refer to the radio and navigation assembly power source circuit (See page NS-191).
If the power source circuit is operating normally, proceed to the next step.

NEXT

2	INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

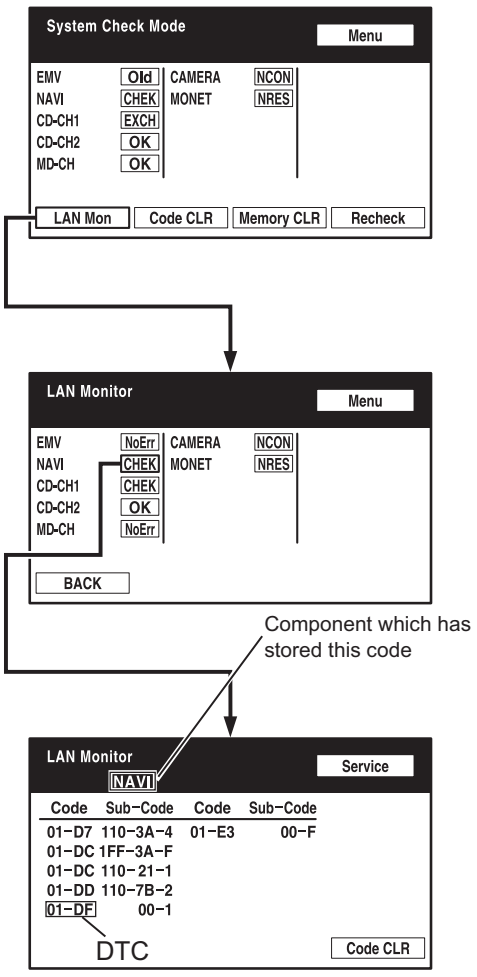
Tester connection	Condition	Specified condition
ATX+ (F9-5) - ATX- (F9-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

3 IDENTIFY THE COMPONENT WHICH HAS STORED THIS CODE

Example:



P E121199E04

(a) Enter the diagnostic mode.
(b) Press the "LAN Mon" switch to change to "LAN Monitor" mode.
(c) Identify the component which has stored this code.

Component Table:

Display	Component
DSP-AMP	Stereo component amplifier

HINT:
"NAVI" is the component which has stored this code in the example shown in the illustration.

NEXT

4 CHECK HARNESS AND CONNECTOR

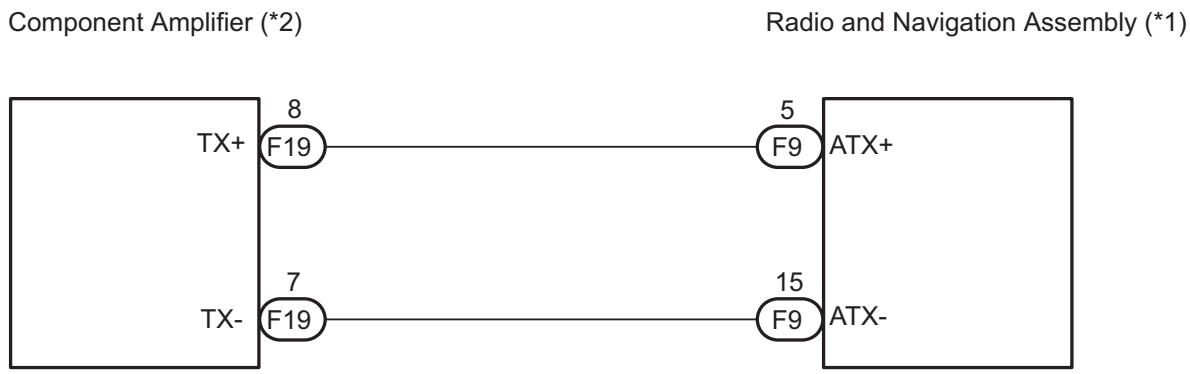
HINT:
For details of the connectors, refer to "TERMINALS OF ECU" (See page NS-45).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.
  (1) Disconnect all connectors between the radio and navigation assembly and the component which has stored this code.
  (2) Check for an open or short in the AVC-LAN circuit between the radio and navigation assembly and the component which has stored this code.

NS

OK:
There is no open or short circuit.

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P

E111831E09

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	REPLACE RADIO AND NAVIGATION ASSEMBLY

(a) Replace the radio and navigation assembly with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE COMPONENT WHICH HAS STORED THIS CODE**

OK

END

DTC	01-E0	Registration Complete Indication Error

DTC	01-E3	Registration Demand Transmission

DTC	01-E4	Multiple Frame Incomplete

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-E0	"Registration complete" signal from the master device cannot be received.	-
01-E3	The registration demand signal from the slave device is output. Or the registration demand signal is output by receiving connection confirmation signal from the sub-master device.	-
01-E4	The multiple frame transmission is incomplete.	-

HINT:
Even if no fault is present, this trouble code may be stored depending on the battery condition or engine start voltage.

INSPECTION PROCEDURE

HINT:
- After the inspection is completed, clear the DTCs.
- These DTCs do not indicate a malfunction.

DTC	01-E2	ON / OFF Indication Parameter Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
01-E2	The signal for ON/OFF control from the master device has a problem.	Radio and navigation assembly

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	21-10	Panel Switch Error

DTC	21-11	Touch Switch Error

DTC	23-10	Panel Switch Error

DTC	23-11	Touch Switch Error

DTC	24-10	Panel Switch Error

DTC	24-11	Touch Switch Error

DTC	25-10	Panel Switch Error

DTC	25-11	Touch Switch Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
21-10	The panel switch detection circuit has a problem.	Radio and navigation assembly
21-11	The touch panel switch has a problem.	
23-10	The panel switch detection circuit has a problem.	
23-11	The touch panel switch has a problem.	
24-10	The panel switch detection circuit has a problem.	
24-11	The touch panel switch has a problem.	
25-10	The panel switch detection circuit has a problem.	
25-11	The touch panel switch has a problem.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	34-10	Error in Picture Circuit

DTC	34-11	No Current in Back-light

DTC	34-12	Excess Current in Back-light

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
34-10	Error in power supply system for picture circuit	Radio and navigation assembly
34-11	Decline in power output from inverter circuit for back-light	
34-12	Excess power output from inverter circuit for back-light	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	57-47	Bluetooth Module Initialization Failed

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
57-47	• "Bluetooth" module is not installed. • Problem with "Bluetooth" module • Problem in communication line to "Bluetooth" module	Radio and navigation assembly

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	58-10	Gyro Error

DTC	80-10	Gyro Error

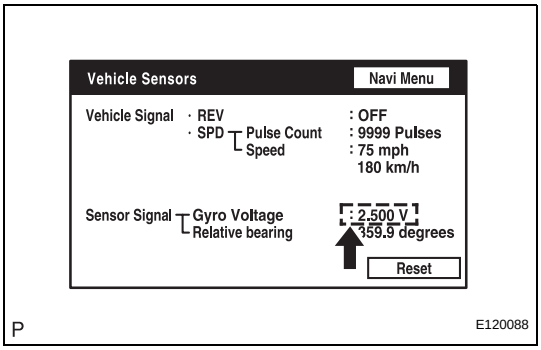
DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
58-10	Ground short, power supply short, or open circuit in the gyro signal	• Gyro sensor • Radio and navigation assembly
80-10	Ground short, power supply short, or open circuit in the gyro signal	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1 CHECK VEHICLE SENSOR (NAVIGATION CHECK MODE)



(a) Enter the "Navigation Check" mode (Vehicle Sensors) (See page NS-27).
(b) Check the gyro voltage.
Standard voltage:
0.1 to 4.5 V

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

2 CLEAR DTC

(a) Clear the DTCs (See page NS-46).

NEXT

3 RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
HINT:
If DTCs are detected frequently, replace the radio and navigation assembly.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	58-11	GPS Receiver Error

DTC	80-11	GPS Receiver Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
58-11	• RTC, ROM, and RAM of the GPS receiver and TCXO error • GPS receiver is failed.	Radio and navigation assembly
80-11	• RTC, ROM, and RAM of the GPS receiver and TCXO error • GPS receiver is failed.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	58-40	GPS Antenna Error

DTC	58-41	GPS Antenna Power Source Error

DTC	80-40	GPS Antenna Error

DTC	80-41	GPS Antenna Power Source Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
58-40	GPS antenna error	• Wire harness • GPS antenna • Radio and navigation assembly
58-41	Error of the power source to the GPS antenna	
80-40	GPS antenna error	
80-41	Error of the power source to the GPS antenna	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK HARNESS AND CONNECTOR (GPS ANTENNA - RADIO AND NAVIGATION ASSEMBLY)

(a) Check that the GPS antenna cord is securely connected to the radio and navigation assembly connector.
OK:
The cord is securely connected.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ↓

2	REPLACE GPS ANTENNA

(a) Replace the GPS antenna with a normal one and check if the same problem occurs again.
(1) Clear the DTCs (See page NS-46).
(2) Recheck for DTCs and check if the same trouble occurs again.
OK:
Same problem does not occur.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK ↓

END

DTC	58-42	Map Disc Read Error

DTC	80-42	Map Disc Read Error

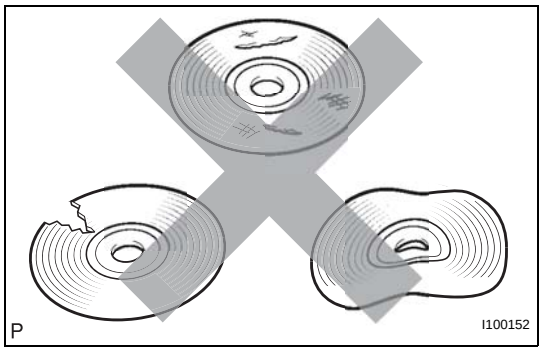
DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
58-42	• Player error • Scratches or dirt on the disc • Access to an invalid address due to software error	• Map disc • Radio and navigation assembly
80-42	• Player error • Scratches or dirt on the disc • Access to an invalid address due to software error	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1 CHECK MAP DISC

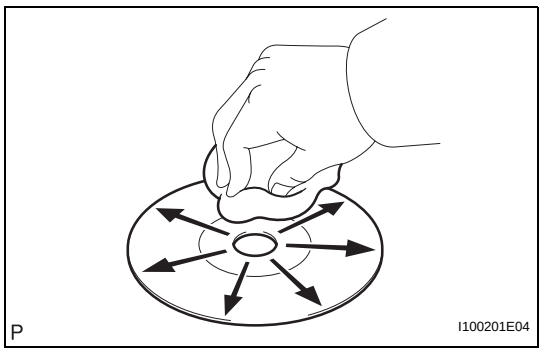


(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on the map disc.

NG → **Go to step 4**

OK

2 DISC CLEANING



(a) Disc cleaning
(1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

NEXT

3 DTC CLEAR AND RECHECK

(a) Clear the DTCs (See page NS-46).

(b) Recheck for DTCs and check if the same trouble occurs again.
OK:
Same problem does not occur.

OK → **END**

NG

4	REPLACE MAP DISC

(a) Replace the map disc.
(b) Clear the DTCs and recheck for DTCs.
(c) Check if the same trouble occurs again.
OK:
Same problem does not occur.

OK → **END**

NG

REPLACE RADIO AND NAVIGATION ASSEMBLY

DTC	58-43	SPD Signal Error

DTC	80-43	SPD Signal Error

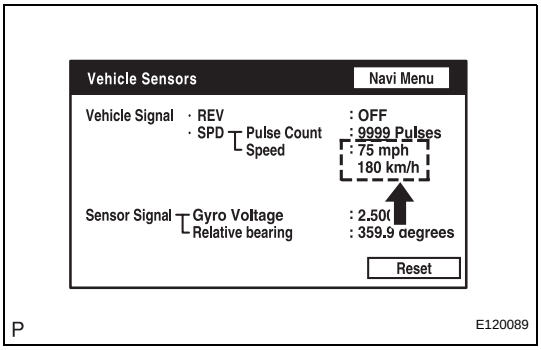
DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
58-43	A difference between the GPS speed and SPD pulse is detected.	• Speed signal circuit • Radio and navigation assembly
80-43	A difference between the GPS speed and SPD pulse is detected.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK VEHICLE SENSOR (NAVIGATION CHECK MODE)



(a) Enter the "Navigation Check" mode (Vehicle Sensors) (See page NS-27).
(b) While driving the vehicle, compare the "SPD" indicator to the reading on the speedometer. Check if these readings are almost equal.
OK:
The readings are almost equal.

OK → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

NG

2	PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Refer to "Speed signal does not change in the navigation check mode" in the problem symptoms table (See page NS-41).

NEXT

END

DTC	58-44	Player Error

DTC	80-44	Player Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
58-44	Map player error is detected.	Radio and navigation assembly
80-44	Map player error is detected.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK RADIO AND NAVIGATION ASSEMBLY

(a) Check if a disc can be inserted or ejected normally.
OK:
A disc can be inserted or ejected normally.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK ↓

2	DTC CLEAR AND RECHECK

(a) Clear the DTCs (See page NS-46).
(b) Recheck for DTCs and check if the same trouble occurs again.
OK:
Same problem does not occur.

OK → **END**

NG ↓

REPLACE RADIO AND NAVIGATION ASSEMBLY

DTC	58-45	High Temperature

DTC	80-45	High Temperature

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
58-45	High map disc player temperature is detected (Over 80°C).	Radio and navigation assembly
80-45	High map disc player temperature is detected (Over 80°C).	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK RADIO AND NAVIGATION ASSEMBLY

(a) Park the vehicle in a cool place.
(b) Check that the temperature of the radio and navigation assembly has becomes sufficiently low, then start the engine to verify the malfunction symptom.
OK:
Same problem does not occur.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	63-10	CD Changer Mechanical Error

DTC	63-11	CD Insertion and Ejection Error

DTC	63-12	CD Reading Abnormal

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-10	A mechanical error in the CD changer is detected while the CD is not being inserted or ejected.	Radio and navigation assembly
63-11	CD insertion or ejection is failed.	
63-12	CD read problem occurs.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	REPLACE RADIO AND NAVIGATION ASSEMBLY

NEXT

END

DTC	63-41	Wrong Disc

DTC	63-42	Disc cannot be Read

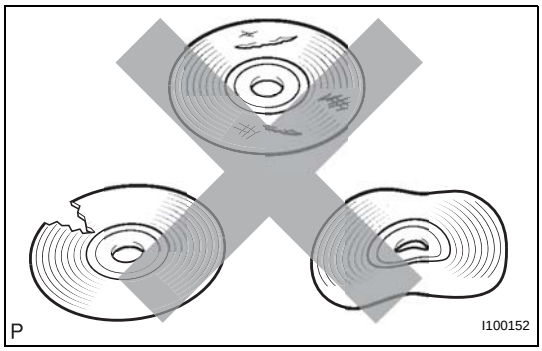
DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-41	An unsuitable disc is inserted.	• CD • Radio and navigation assembly
63-42	The disc cannot be read.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK DISC

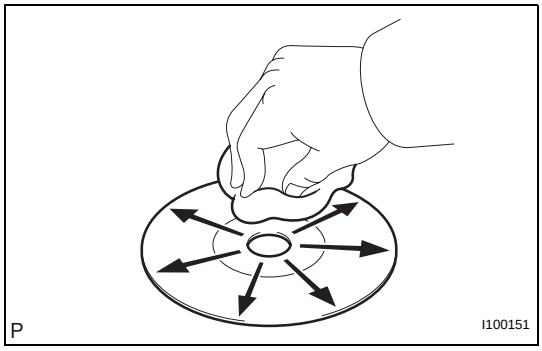


(a) Check that the disc is not deformed or cracked.
OK:
No deformations or cracks on the disc.

NG → **CHANGE DISC**

OK

2	DISC CLEANING



(a) Disc cleaning
(1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

NEXT

3	CLEAR DTC

(a) Clear the DTCs (See page NS-46).

NEXT

4	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

OK → **END**

NG

5	REPLACE DISC WITH ANOTHER AND RECHECK

(a) Replace the disc with another and recheck.
(1) Replace the disc with another normal one.
(2) Clear the DTCs (See page NS-46).
(3) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	63-43	CD-ROM Abnormal

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-43	CD-ROM operation is abnormal.	• CD • Radio and navigation assembly

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK IF A PROPER CD IS INSERTED

(a) Make sure that the CD is an audio CD or a CD with an MP3 or WMA file, and that it is not deformed, flawed, stained, burred, or otherwise defective.
OK:
Normal CD
HINT:
- Translucent or uniquely-shaped CDs cannot be played.
- CD with adhesive paper labels should not be played.
- Commercial audio CDs can be played.
- CD-DA files on CD-ROMs, CD-Rs, and CD-RWs can be played.
- MP3 and WMA files on CD-ROMs, CD-Rs, and CD-RWs can be played.
- For details on playable CDs, refer to the Owner's Manual.

NG → **CD IS FAULTY**

OK ↓

2	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with another and recheck.
(1) Replace the CD with another normal one.
(2) Clear the DTCs (See page NS-46).
(3) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK ↓

END

DTC	63-44	CD Abnormal

DTC	63-48	Excess Current

DTC	63-50	Tray Insertion / Ejection Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-44	Operation error in the CD mechanism	Radio and navigation assembly
63-48	Excess current is present in the CD changer.	
63-50	Malfunction in insertion/ejection system	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CLEAR DTC

(a) Clear the DTCs (See page NS-46).

NEXT

2	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
HINT:
If DTCs are detected frequently, replace the radio and navigation assembly.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	63-45	Eject Error

DTC	63-51	Elevator Error

DTC	63-52	Clamp Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-45	Magazine cannot be ejected.	Radio and navigation assembly
63-51	Mechanical error occurs during elevator operation.	
63-52	Error occurs in CD changer clamp.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK RADIO AND NAVIGATION ASSEMBLY

(a) Check if a disc can be changed, inserted, or ejected normally.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	63-46	Scratched / Reversed Disc

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-46	Scratches or dirt is found on CD surface or CD is set upside down.	• CD • Radio and navigation assembly

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

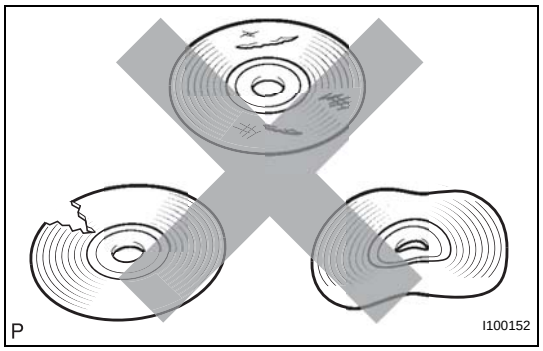
1 CHECK THAT CD IS INSERTED PROPERLY

(a) Check that the CD is not inserted upside down.
OK:
CD is properly inserted.

NG → **INSERT CD PROPERLY**

OK

2 CHECK DISC

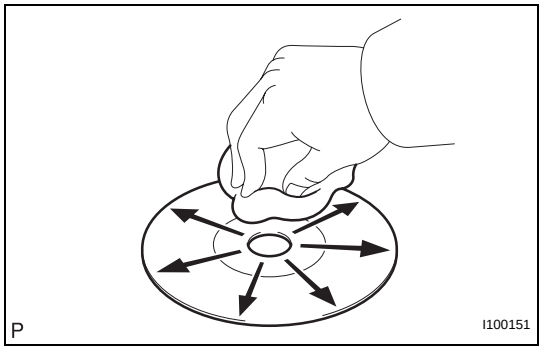


(a) Check that the disc is not deformed or cracked.
OK:
No deformations or cracks on the disc.

NG → **CHANGE DISC**

OK

3 DISC CLEANING



(a) Disc cleaning
(1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

NEXT

4	CLEAR DTC

(a) Clear the DTCs (See page NS-46).

NEXT

5	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

OK → **END**

NG

6	REPLACE DISC WITH ANOTHER AND RECHECK

(a) Replace the disc with another and recheck.
(1) Replace the disc with another normal one.
(2) Clear the DTCs (See page NS-46).
(3) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	63-47	High Temperature

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-47	Sensor detects that CD unit temperature is high (Over 80°C).	Radio and navigation assembly

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHECK RADIO AND NAVIGATION ASSEMBLY

(a) Park the vehicle in a cool place.
(b) Check that the temperature of the radio and navigation assembly becomes sufficiently low, then start the engine. Check that the malfunction disappears.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	63-78	DSP Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-78	An error occurs during the decode process (MP3/ WMA).	-

INSPECTION PROCEDURE

HINT:
After the inspection completed, clear the DTCs.
NOTICE:
- **This code may be output even if there is no malfunction.**
- **If this code is output frequently, replace the radio and navigation assembly.**

1	CLEAR DTC

(a) Clear the DTCs (See page NS-46).
HINT:
These DTCs do not indicate a malfunction.

NEXT

2	RECHECK DTC

(a) Recheck for DTCs and check if the same trouble occurs again.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

END

DTC	63-7D	Disc cannot be Played

DTC	63-7E	No Playable Files

DTC	63-7F	Copyright Protection Error

DESCRIPTION

DTC No.	DTC Detection Condition	Trouble Area
63-7D	• An incompatible MP3/WMA file is used. • Although the file has an extension of ".mp3" or ".wma", the header information cannot be read.	• CD • Radio and navigation assembly
63-7E	• A disc with no music data is used. • Playable files are not on the disc (MP3/WMA).	
63-7F	A copy-protected file, which cannot be played, is used.	

INSPECTION PROCEDURE

HINT:
After the inspection is completed, clear the DTCs.

1	CHANGE DISC

(a) Insert a disc with a playable file and check if the disc can be played correctly.
HINT:
For details on playable files and discs, refer to the Owner's Manual.
OK:
The disc can be played correctly.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

DISC IS FAULTY

Noise Occurs

INSPECTION PROCEDURE

1 **NOISE CONDITION**

(a) Check from which direction the noise comes (front left or right, or rear left or right).
(1) Check from which direction the noise comes.
OK:
The location of the noise source can be determined.

NG → **Go to step 3**

OK

2 **CHECK SPEAKERS**

(a) Check the installation conditions of the speaker units that are located near the noise source and that there are no cracks, scratches, deformation, or other failures.

Result

Condition	Proceed to
A speaker is installed incorrectly	A
Foreign objects are in the speaker	B
A speaker cone paper is broken	C
No malfunction is found	D

A → **REINSTALL SPEAKER**

B → **REMOVE FOREIGN OBJECT**

C → **REPLACE SPEAKER**

D

3 **CHECK NOISE CONDITIONS**

(a) Check the noise condition.
HINT:
The radio has a noise prevention function to reduce noise when listening to the radio. If a loud noise occurs, check whether the ground at the antenna mounting base and the noise prevention unit are installed and wired correctly.

Conditions under which noise occurs	Noise source
Noise increases when the accelerator pedal is depressed, but stops when the engine is stopped.	Generator
Noise occurs during A/C or heater operation.	Blower motor
Noise occurs when the vehicle accelerates rapidly on an unpaved road or after the ignition switch is turned on (IG or ACC).	Fuel pump

Conditions under which noise occurs	Noise source
Noise occurs when the horn switch is pressed and released or when pressed and held.	Horn
Noise occurs synchronously with the blink of the turn signal.	Flasher
Noise occurs during window washer operation.	Washer
Noise occurs while the engine is running, and continues even after the engine is stopped.	Water temperature sensor
Noise occurs during wiper operation.	Wiper
Noise occurs when the brake pedal is depressed.	Stop light switch
Others	Static electricity

HINT:

- In the chart's left column, find the situation that matches the customer's complaint. Then, in the right column, find the part that is causing the noise. Check the noise filter on or for the part.
- To save time and avoid a misdiagnosis, first make sure that the noise is not coming from outside the vehicle.
- Noise should be removed in descending order of loudness.
- Setting the radio to a frequency where no signal is received may make recognition of the noise problem easier.

OK:

The noise source cannot be determined.

NG → **REPAIR OR REPLACE NOISE SOURCE**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Pressing Power Switch does not Turn on System

INSPECTION PROCEDURE

1	CHECK CABIN

(a) Check that conditions in the cabin are not likely to cause condensation.
HINT:
This problem occurs when the cabin is humid and the temperature rapidly changes. This condition may produce condensation, resulting in a short circuit.
OK:
Condensation is not likely to occur.

NG → **DRY CABIN AND RECHECK CONDITIONS**

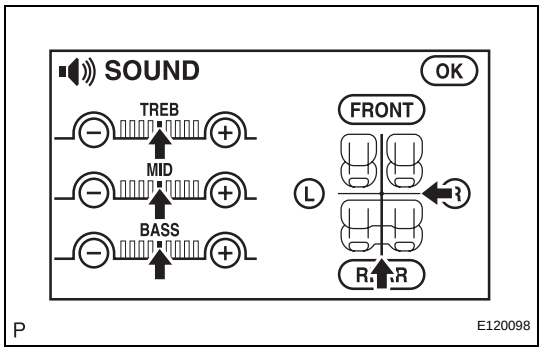
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

No Sound can be Heard from Speakers

INSPECTION PROCEDURE

1	CHECK AUDIO SETTINGS



(a) Enter the sound adjustment screen by pressing the "SOUND" switch on the AUDIO display.
(b) Set volume, fader, and balance to the initial values and check that sound is normal.
OK:
Audio system returns to normal.
HINT:
Sound quality adjustment items vary depending on the type of the amplifier.

OK → **END**

NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

CD cannot be Ejected

INSPECTION PROCEDURE

1	**CHECK OPERATION**

(a) Press the disc eject switch of the radio receiver for 5 seconds or more and check that the CD is ejected.
OK:
CD is ejected.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

2	**REPLACE CD WITH ANOTHER AND RECHECK**

(a) Insert another CD and check if it is ejected.
OK:
CD is ejected.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

CD IS FAULTY

CD cannot be Inserted / Played or CD is Ejected Right After Insertion

INSPECTION PROCEDURE

1	CHECK IF A PROPER CD IS INSERTED

(a) Make sure that the CD is an audio CD or a CD with an MP3 or WMA file, and that it is not deformed, flawed, stained, burred, or otherwise defective.
OK:
Normal CD
HINT:
- Translucent or uniquely-shaped CDs cannot be played.
- Commercial audio CDs can be played.
- CD-DA files on CD-ROMs, CD-Rs, and CD-RWs can be played.
- MP3 and WMA files on CD-ROMs, CD-Rs and CD-RWs can be played.
- For details on playable CDs, refer to the Owner's Manual.

NG → **CD IS FAULTY**

OK

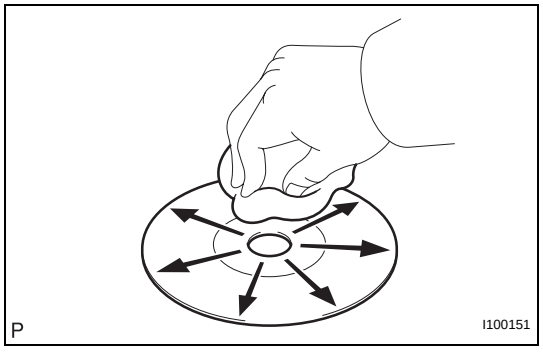
2	CHECK THAT CD IS INSERTED PROPERLY

(a) Check whether or not the CD is inserted upside down.
OK:
CD is properly inserted.

NG → **SET CD PROPERLY**

OK

3	CHECK CD



(a) Clean the disc by wiping it with a soft cloth from the inside to the outside in a radial direction.
OK:
Malfunction disappears.
NOTICE:
Do not use a conventional record cleaner or antistatic preservative.

OK → **CD WAS DIRTY**

NG

4	REPLACE CD WITH ANOTHER AND RECHECK

(a) Replace the CD with a normal one and check that the malfunction disappears.
OK:
Malfunction disappears.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

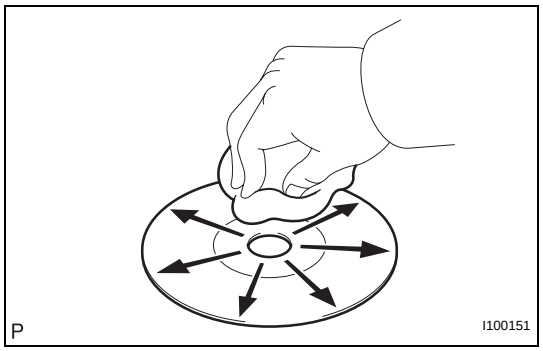
OK

CD IS FAULTY

CD Sound Skips

INSPECTION PROCEDURE

1 CHECK CD

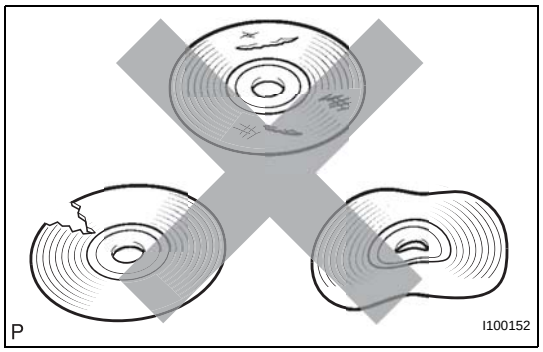


(a) Check the CD.
OK:
The CD is clean.
HINT:
If dirt is on the CD surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.

NG → **CLEAN CD**

OK

2 CHECK CD



(a) Check that the CD is not deformed or cracked.
OK:
No deformation or cracks on the CD.

NG → **CD IS FAULTY**

OK

3 CHECK OPERATION OF ANOTHER CD

(a) Check using another CD.
(1) Check if the problem recurs using another CD.
OK:
The problem does not occur.

OK → **CD IS FAULTY**

NG

4 CHECK RADIO AND NAVIGATION ASSEMBLY

(a) Check the radio and navigation assembly installation condition.
(1) Check that the radio and navigation assembly is properly installed.

NS

OK:
Radio and navigation assembly is properly installed.

NG → **REINSTALL RADIO AND NAVIGATION ASSEMBLY**

OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

Radio Broadcast cannot be Received or Poor Reception

INSPECTION PROCEDURE

1	CHECK RADIO AND NAVIGATION ASSEMBLY

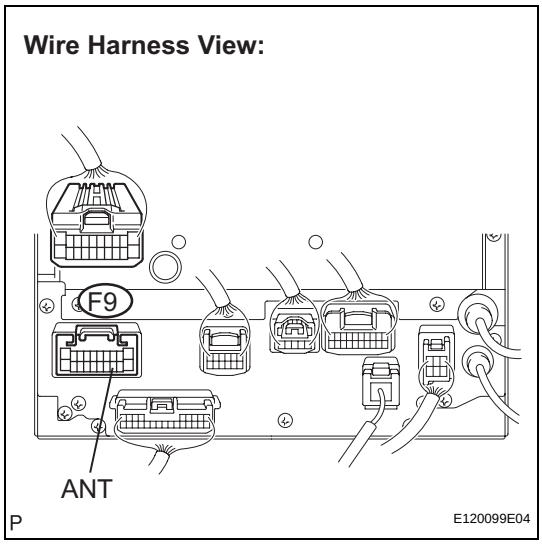
(a) Check the radio's automatic station search function.
(1) Check the radio's automatic station search function by activating it.
OK:
The radio's automatic station search function works properly.

OK → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

NG

2	INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector F9.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester connection	Condition	Specified condition
ANT - Body ground	Ignition SW on (IG) Radio SW ON	10 to 14 V

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

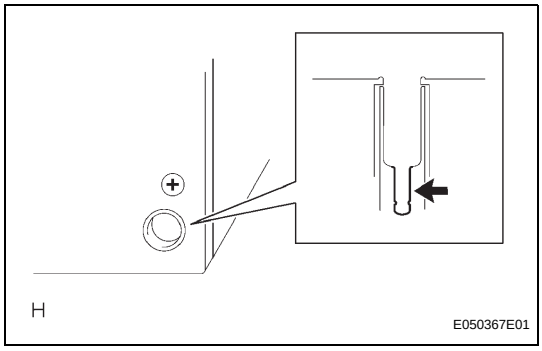
3	CHECK OPTIONAL COMPONENTS

(a) Check optional components (sun-shade film, telephone antenna, etc.).
(1) Check if any optional components, such as sunshade film or telephone antenna that may decrease reception capacity, are installed.
OK:
Optional components are installed.
NOTICE:
Do not remove any optional components installed by the customer without his or her consent.

OK → **REMOVE AND RECHECK OPTIONAL COMPONENTS (SEE NOTICE ABOVE)**

NG

4 CHECK RADIO AND NAVIGATION ASSEMBLY



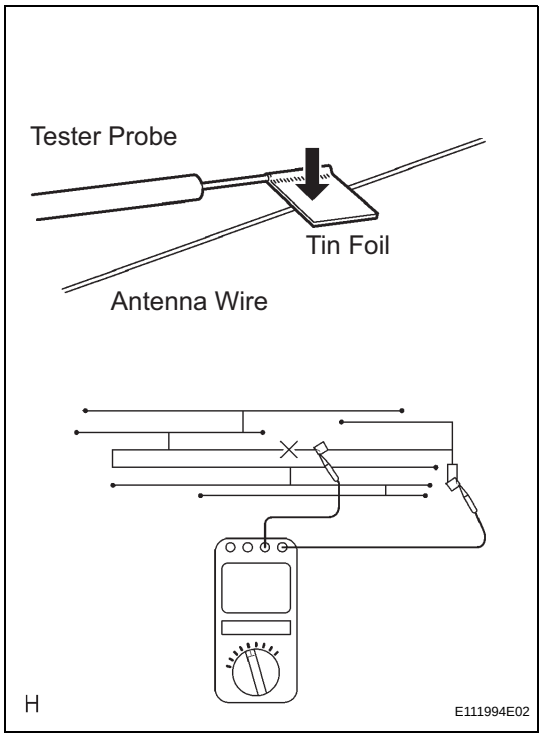
(a) Preparation for check
  (1) Remove the antenna plug from the radio and navigation assembly.

(b) Check for noise
  (1) Turn the ignition switch on (ACC) with the radio and navigation assembly connector connected.
  (2) Turn the radio on and put into AM mode.
  (3) Place a screwdriver, thin wire, or other metal object on the radio receiver's antenna jack and check that noise can be heard from the speaker.
  OK:
  Noise occurs.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

5 CHECK GLASS ANTENNA



(a) Check for continuity of the antenna.
  HINT:
  Check for continuity at the center of each antenna wire as shown in the illustration.
  NOTICE:
  When cleaning the glass, wipe it in the direction of the wire with a soft dry cloth. Take care not to damage the wire. Do not use detergents or glass cleaners with abrasive ingredients. When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown in the illustration.
  OK:
  There is continuity in the antenna.

NG → **REPAIR GLASS ANTENNA**

OK

NS

6	REPLACE ANTENNA AMPLIFIER

(a) Replace the antenna amplifier and check that it operates normally.
OK:
The antenna amplifier operates normally.

OK → **END**

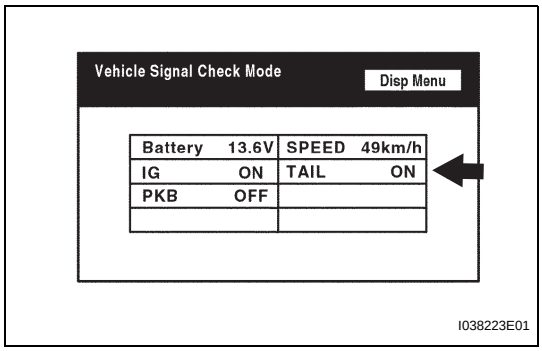
NG

REPLACE RADIO AND NAVIGATION ASSEMBLY

Illumination for Panel Switch does not Come on with Tail Switch ON

INSPECTION PROCEDURE

1	CHECK VEHICLE SIGNAL (DISPLAY CHECK MODE)



(a) Enter the "Display Check" mode (Vehicle Signal Check Mode) (See page NS-22).

(b) Check that the display changes between ON and OFF according to the light control switch operation.

OK

Light Control Switch	Display
TAIL or ON	ON
OFF	OFF

HINT:
This display is updated once per second. As a result, it is normal for the display to lag behind the actual change in the switch.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

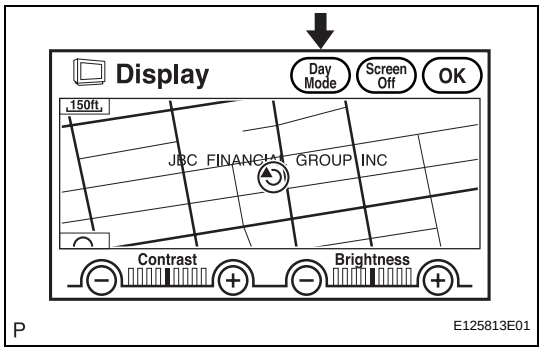
OK ↓

REPLACE RADIO AND NAVIGATION ASSEMBLY

Display does not Dim when Light Control Switch is Turned ON

INSPECTION PROCEDURE

1 CHECK IMAGE QUALITY SETTING



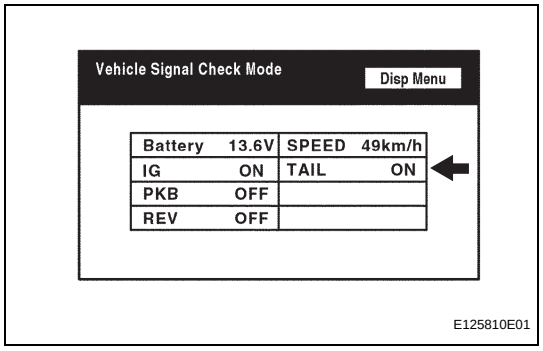
(a) Enter the display adjustment screen by pressing the "DISP" switch.
(b) Turn the light control switch to the TAIL position.
(c) Check if "DAY MODE" on the display adjustment is ON.
OK:
"DAY MODE" is ON.

NG → **Go to step 2**

OK

TURN "DAY MODE" SETTING OFF

2 CHECK VEHICLE SIGNAL (DISPLAY CHECK MODE)



(a) Enter the "Display Check" mode (Vehicle Signal Check) (See page NS-22).
(b) Check that the display changes between ON and OFF according to the light control switch operation.
OK

Light Control Switch	Display
TAIL or ON	ON
OFF	OFF

HINT:
The display is updated once per second. It is normal for the display to lag behind the actual switch operation.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

Panel Switches do not Function

INSPECTION PROCEDURE

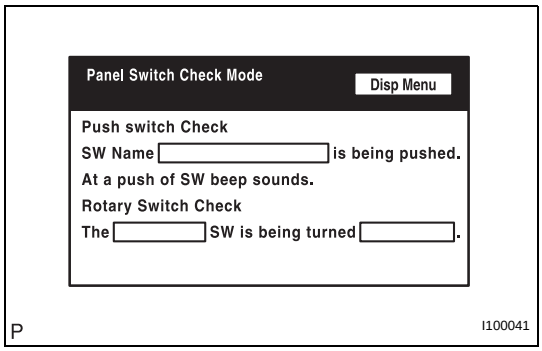
1	CHECK PANEL SWITCH

(a) Check for foreign matter around the switches that might prevent operation.
OK:
No foreign matter is found.

NG → **REMOVE ANY FOREIGN MATTER FOUND**

OK

2	CHECK PANEL SWITCH (DISPLAY CHECK MODE)



(a) Enter the "Display Check" mode (Panel Switch Check) (See page NS-22).
(b) Operate the abnormal switch and check if the switch name and status are correctly displayed.
OK:
The switch name and status are correctly displayed as operated.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

Touch Panel Switch does not Function

INSPECTION PROCEDURE

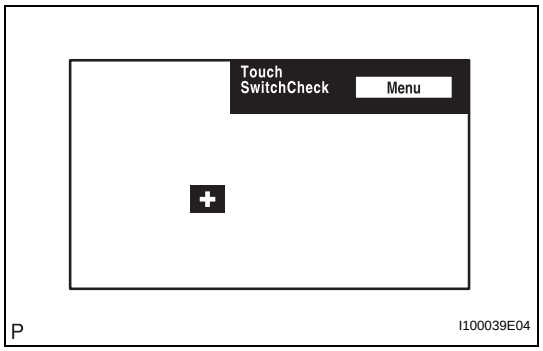
1	CHECK TOUCH PANEL

(a) Check for foreign matter on the display.
OK:
The display is clean.

NG → **CLEAN DISPLAY AND RECHECK TOUCH PANEL**

OK

2	CHECK TOUCH SWITCH (DISPLAY CHECK MODE)



(a) Enter the "Display Check" mode (Touch Switch Check) (See page NS-22).
(b) Touch the display in the area where the switch malfunction occurs.
OK:
A "+" mark appears at the touched position.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

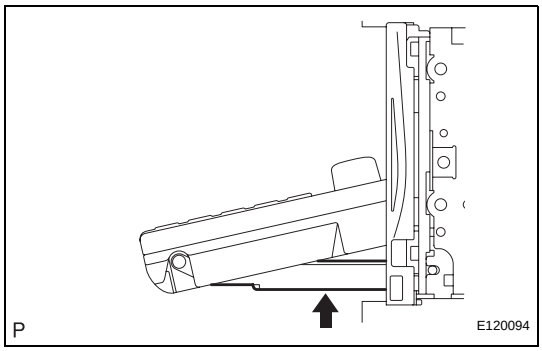
OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

Display Panel does not Open, Tilt or Tilts Improperly

INSPECTION PROCEDURE

1	CHECK RADIO AND NAVIGATION ASSEMBLY



(a) Check for foreign matter or obstructions caught in the moving parts of the panel.
OK:
No obstruction or foreign matter found.

NG → **REMOVE ANY OBSTRUCTION OR FOREIGN MATTER FOUND**

OK

2	CHECK OPERATION

(a) Check if the navigation and audio systems function properly.
OK:
Navigation and audio systems function properly.

OK → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

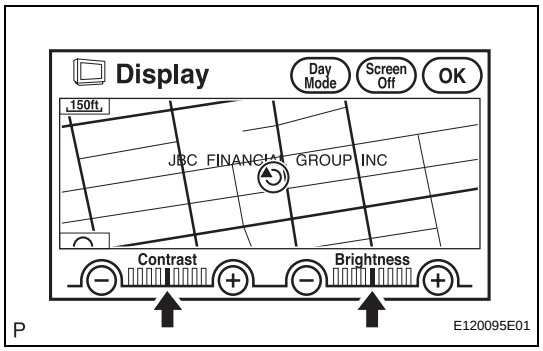
NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Screen Flicker or Color Distortion

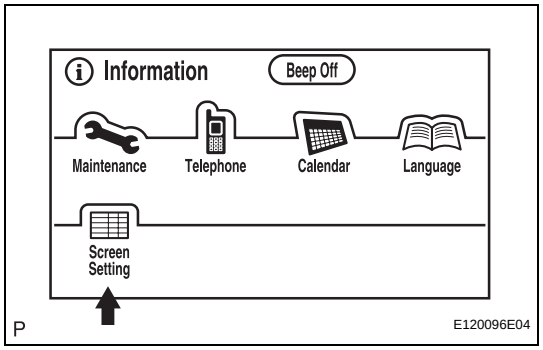
INSPECTION PROCEDURE

1 CHECK DISPLAY SETTING

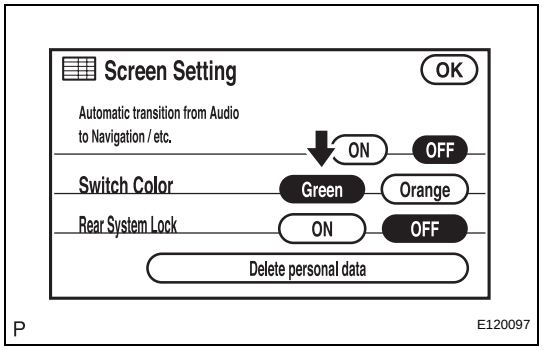


(a) Enter the display adjustment screen by pressing the "DISPLAY" switch.

(b) Reset display settings (contrast, brightness) and check that the screen appears normal.



(c) Press the "INFO" switch and then select "Screen Setting."



(d) Set the "Switch Color" to "Green" (initial setting) and check if the display returns to normal.

OK:

Returns to normal.

NG	**Go to step 2**

OK

END

2 CHECK CABIN

(a) Check that the cabin temperature is warmer than -20°C (-4.0°F).

OK:

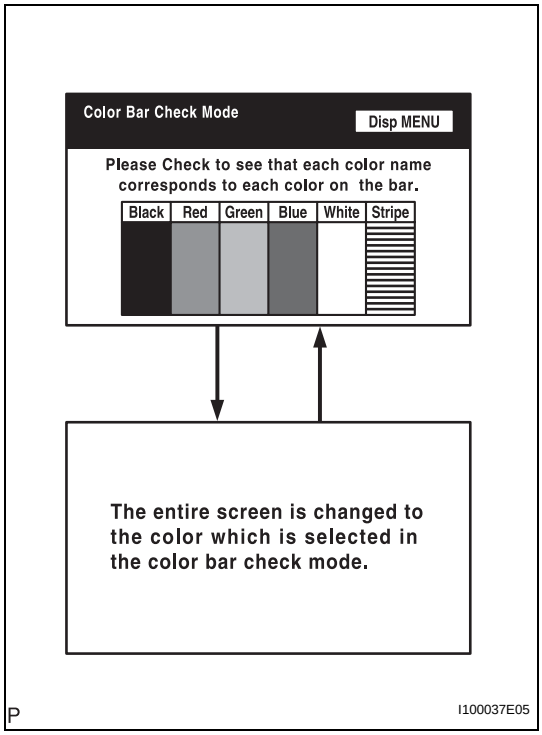
Cabin is warmer than -20°C (-4.0°F).

NG	**HEAT CABIN AND RECHECK TEMPERATURE**

NS

OK

3	CHECK COLOR BAR (DISPLAY CHECK MODE)

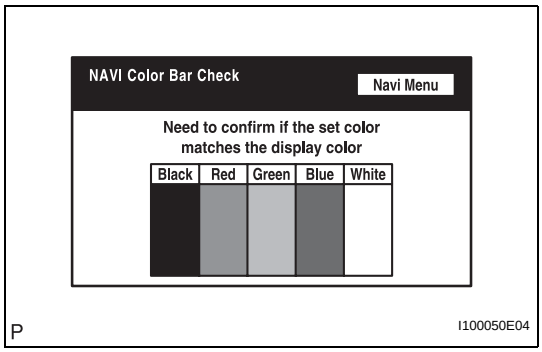


(a) Enter the "Display Check" mode (Color Bar Check) (See page NS-22).
(b) Check that the color bars match the displayed names.
OK:
Color bars match the displayed names.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

4	CHECK NAVI COLOR BAR (NAVIGATION CHECK MODE)



(a) Enter the "Navigation Check" mode (NAVI Color Bar Check) (See page NS-27).
(b) Check that the color bars match the displayed names.
OK:
Color bars match the displayed names.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Poor Sound Quality in All Modes (Low Volume)

INSPECTION PROCEDURE

1	CHECK AUDIO SETTINGS

(a) Set "BASS", "MID" and "TREB" to the initial values and check that sound is normal.
OK:
Malfunction disappears.

OK → END

NG

2	COMPARE WITH ANOTHER VEHICLE OF SAME MODEL

(a) Compare with another vehicle of the same model.
(1) Compare with another vehicle of the same model which does not have trouble to see if there is any difference in the sound quality.
OK:
No difference is found.

OK → END

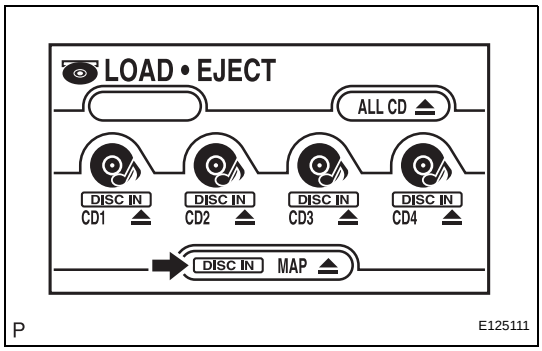
NG

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

MAP Disc cannot be Inserted

INSPECTION PROCEDURE

1	CHECK RADIO AND NAVIGATION ASSEMBLY

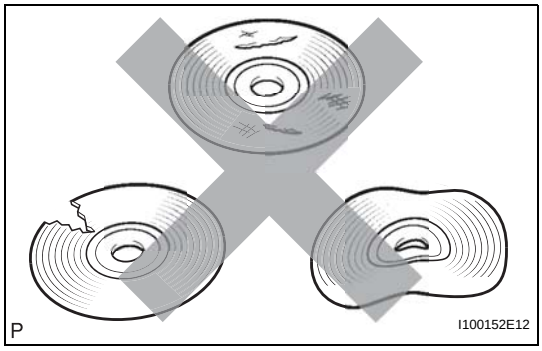


(a) Check if a disc is inserted into the MAP disc slot.
(1) Check if "DISC IN" is displayed.
OK:
"DISC IN" is displayed.

NG → **EJECT DISC**

OK

2	CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

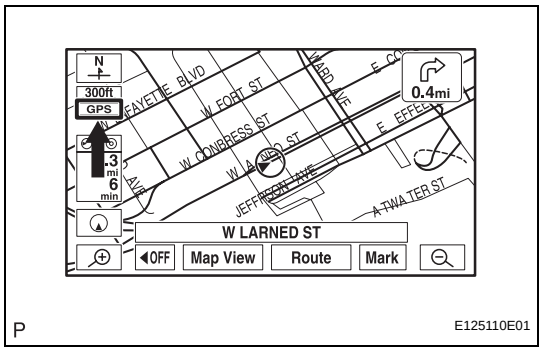
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Vehicle Position Mark Deviates Greatly

INSPECTION PROCEDURE

1 CHECK GPS MARK

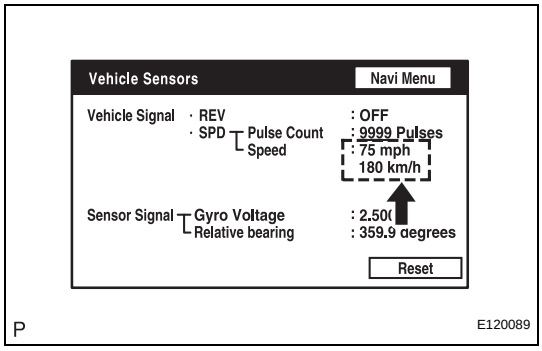


(a) Check that the GPS mark is displayed.
OK:
GPS mark is displayed.

NG → **GO TO "GPS MARK IS NOT DISPLAYED" IN PROBLEM SYMPTOMS TABLE**

OK

2 CHECK VEHICLE SENSOR (NAVIGATION CHECK MODE)

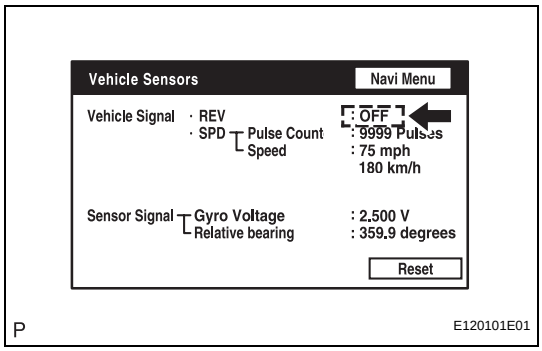


(a) Enter the "Navigation Check" mode (Vehicle Sensors) (See page NS-27).
(b) While driving the vehicle, compare the "Speed" indicator to the reading on the speedometer. Check that these readings are almost equal.
OK:
The readings are almost equal.

NG → **GO TO "SPEED SIGNAL DOES NOT CHANGE IN NAVIGATION CHECK MODE" IN PROBLEM SYMPTOMS TABLE**

OK

3 CHECK VEHICLE SENSOR (NAVIGATION CHECK MODE)



(a) Check that the display changes between ON and OFF according to the shift lever operation.
OK

Shift Lever Position	Display
Except Reverse	OFF
Reverse	ON

HINT:
The display is updated once per second. It is normal for the display to lag behind the actual switch operation.

NG → **GO TO "REVERSE SIGNAL DOES NOT CHANGE IN NAVIGATION CHECK MODE" IN PROBLEM SYMPTOMS TABLE**

NS

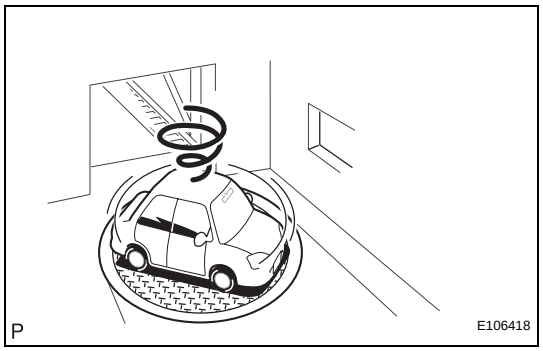
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Cursor or MAP Rotates when Vehicle Stopped

INSPECTION PROCEDURE

1	CHECK CONDITION



(a) Check with the customer if the vehicle has been turned by a turntable.
OK:
Vehicle has not been turned by turntable.
HINT:
If the vehicle is turned on a turntable with the ignition switch on (IG), the system may store the angular velocity. As a result, the vehicle position cursor may deviate.

NG → **TURN IGNITION SWITCH ON (IG) WHEN VEHICLE IS COMPLETELY STOPPED**

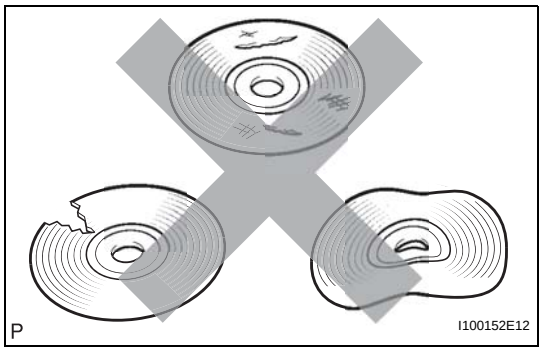
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Vehicle Position Mark is not Updated

INSPECTION PROCEDURE

1 CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

OK

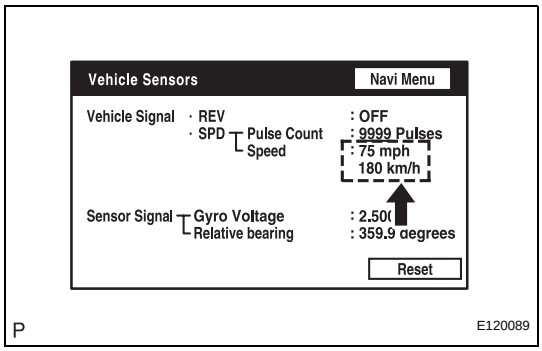
2 CHECK NAVIGATION DISPLAY

(a) Check if a touch scroll can be performed on the map display.
OK:
Touch scroll can be performed.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

3 CHECK VEHICLE SENSOR (NAVIGATION CHECK MODE)



(a) Enter the "Navigation Check" mode (Vehicle Sensors) (See page NS-27).
(b) While driving the vehicle, compare the "Speed" indicator to the reading on the speedometer. Check if these readings are almost equal.
OK:
The readings are almost equal.

NG → **GO TO "SPEED SIGNAL DOES NOT CHANGE IN NAVIGATION CHECK MODE" IN PROBLEM SYMPTOMS TABLE**

OK

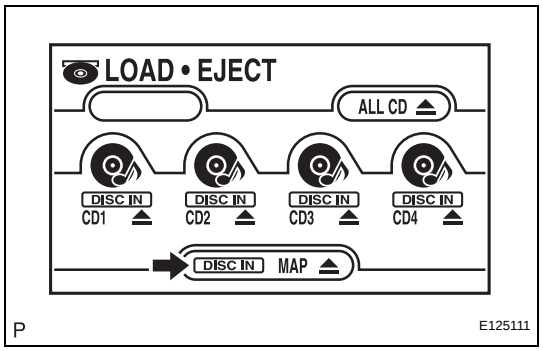
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

NS

Current Position Display does not Appear

INSPECTION PROCEDURE

1	CHECK RADIO AND NAVIGATION ASSEMBLY

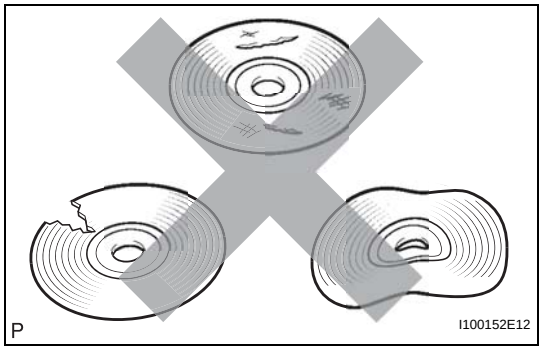


(a) Check if a map disc is inserted into the map disc slot.
OK:
A map disc is inserted.

NG → **INSERT MAP DISC IN MAP SIDE SLOT**

OK

2	CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

GPS Mark is not Displayed

INSPECTION PROCEDURE

1	CHECK CABIN

(a) Check the cabin for any object that might interrupt radio reception on the instrument panel. If such an object exists, remove it and check if the GPS mark reappears.
HINT:
The GPS uses extremely faint radio waves originating from satellites. If the signal is interrupted by obstructions or other radio waves, the GPS may not be able to properly receive the signal.
OK:
Mark appears.

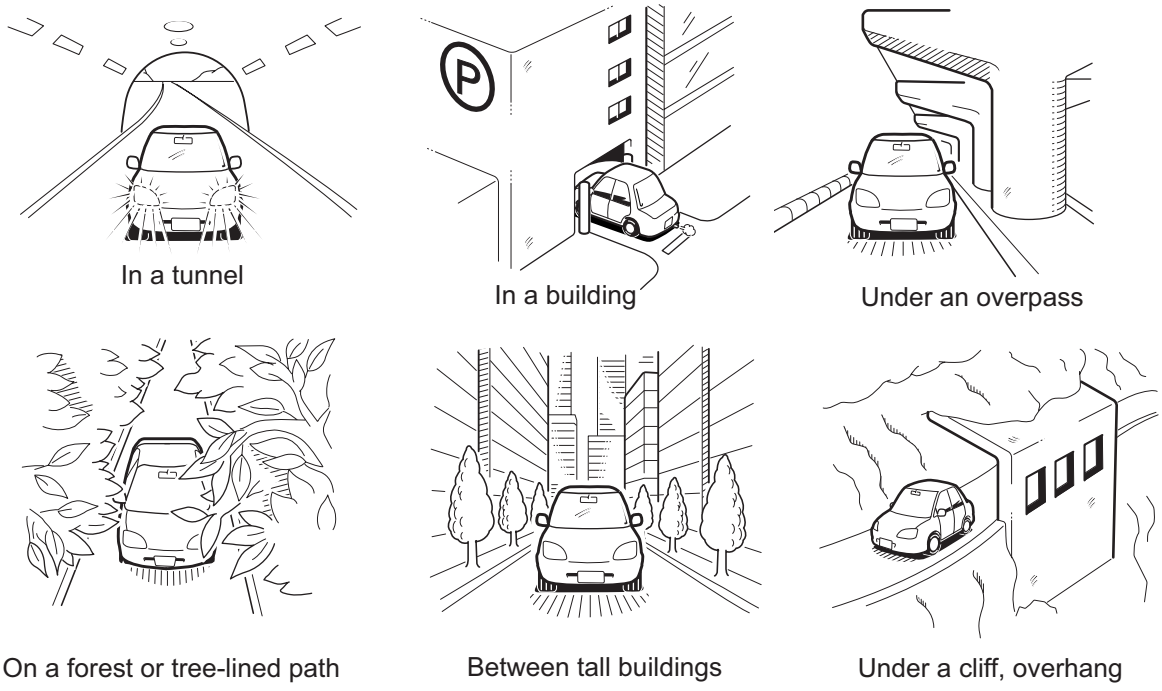
NG → **Go to step 2**

OK

NORMAL OPERATION

2	CHECK SURROUNDINGS

(a) Check if the vehicle is in a location where GPS signal reception is poor. If the vehicle is in such a place, relocate the vehicle and check if the GPS mark reappears.
HINT:
The GPS uses 24 satellites in 6 orbits. At any point in time, 4 satellites should be able to pinpoint your vehicle. However, GPS signals may not reach the vehicle due to influence from the surroundings, vehicle direction, and time. For illustrated examples, see below.



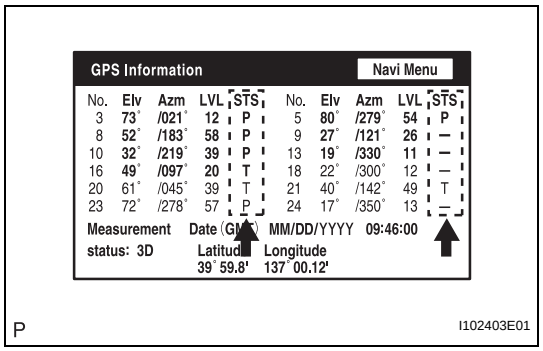
OK:
GPS mark is displayed.

NG → **Go to step 3**

OK

SYSTEM RETURNS TO NORMAL

3 CHECK GPS INFORMATION (NAVIGATION CHECK MODE)



(a) Enter the "Navigation Check" mode (GPS Information) (See page NS-27).
(b) Check how many of the following codes appear in the "STS" column.
For DENSO Made:
T, P
For AISIN AW Made:
08H, 04H
OK:
At least 3 codes appear.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NS

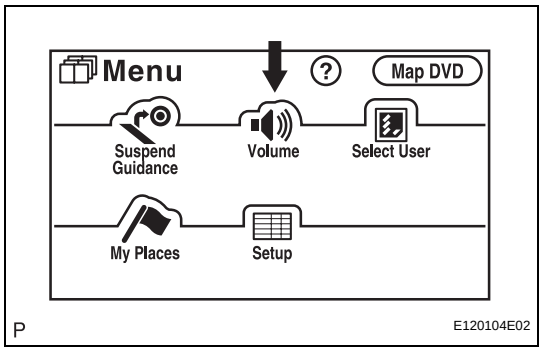
OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

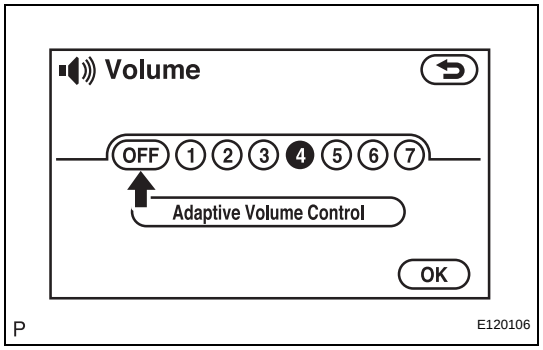
Voice Guidance does not Function

INSPECTION PROCEDURE

1 CHECK NAVIGATION SETTING



(a) Enter the "Menu" screen by pressing the "MENU" switch.
(b) Select "Volume".

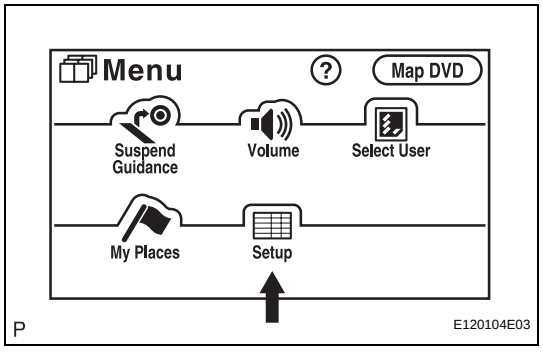


(c) Check that "OFF" is not selected.
OK:
"OFF" is not selected.

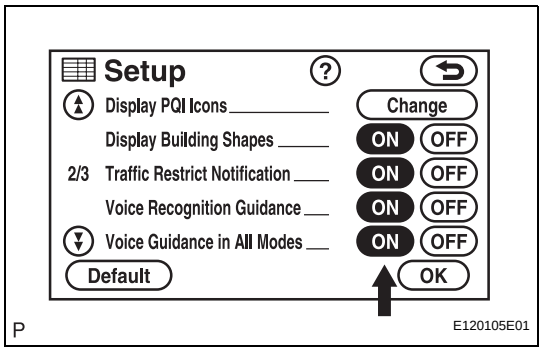
NG → **TURN VOICE GUIDANCE VOLUME UP TO 4 USING VOICE ADJUSTMENT SWITCHES**

OK

2 CHECK NAVIGATION SETTING



(a) Enter the "Menu" screen by pressing the "MENU" switch.
(b) Select "Set up".

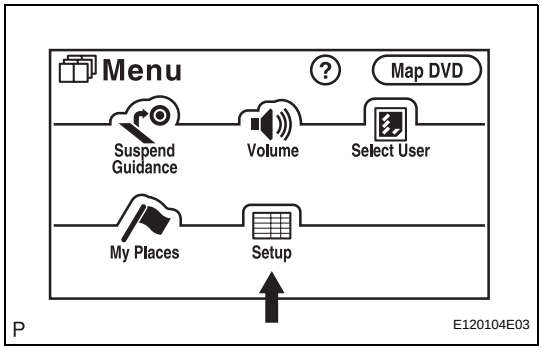


(c) Check that "Voice Guidance in All Modes" is not OFF.
OK:
Voice guidance in all modes is not OFF.

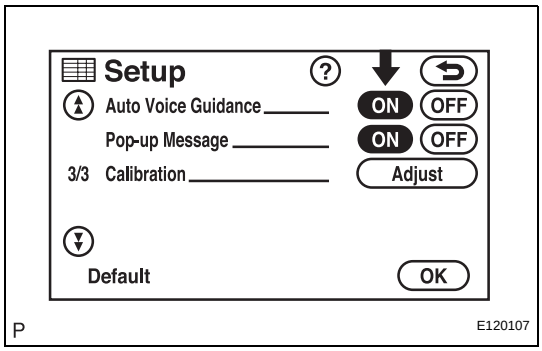
NG → **TURN VOICE GUIDANCE IN ALL MODES "ON"**

OK

3 CHECK NAVIGATION SETTING



(a) Enter the "Menu" screen by pressing the "MENU" switch.
(b) Select "Setup".

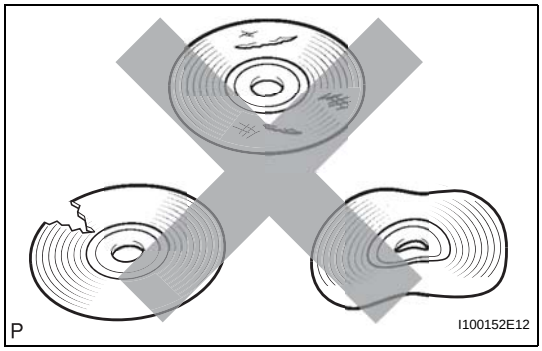


(c) Check that "Auto Voice Guidance" is not OFF.
OK:
Auto voice guidance is not OFF.

NG → **TURN AUTO VOICE GUIDANCE "ON"**

OK

4 CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

OK

5	CHECK RADIO AND NAVIGATION ASSEMBLY

(a) Check that audio sound can be heard from the driver side speaker.
OK:
Audio sound can be heard.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

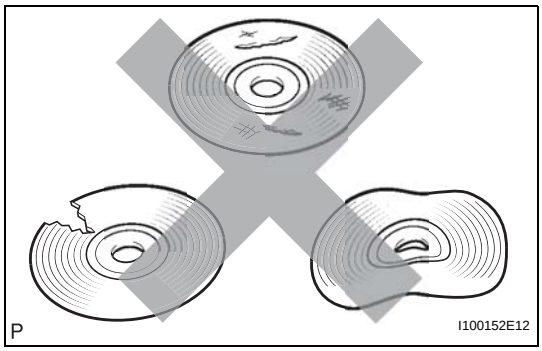
OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

MAP Display Incomplete

INSPECTION PROCEDURE

1	CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

OK

2	CHECK NAVIGATION DISPLAY

(a) Check that displays other than the navigation display are complete.
OK:
No other incomplete displays are found.

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

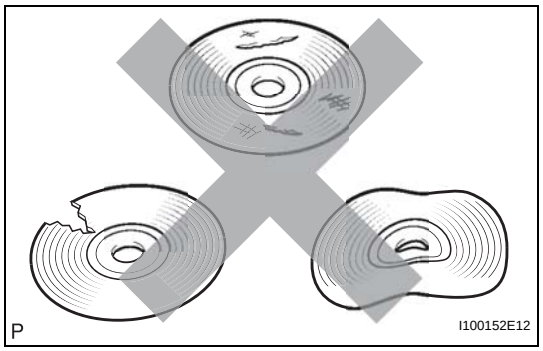
NG

REPLACE RADIO AND NAVIGATION ASSEMBLY

Route cannot be Calculated

INSPECTION PROCEDURE

1	CHECK MAP DISC



(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

OK

2	SET DESTINATION

(a) Set another destination and check if the system can calculate the route correctly.
OK:
Route can be correctly calculated.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

NORMAL OPERATION

Voice Recognition Difficulty

INSPECTION PROCEDURE

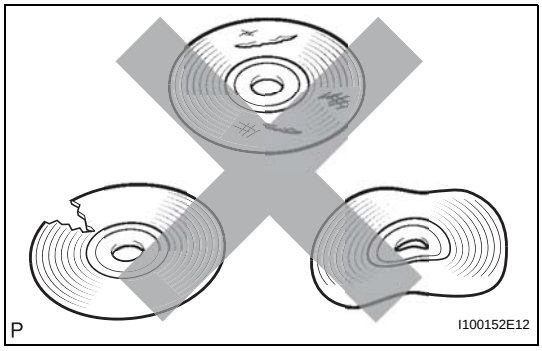
1 **CHECK CONDITION**

(a) Check if the system's voice recognition level is low by using only one particular voice.
OK:
System's voice recognition level is low with any voice.
HINT:
System's voice recognition level varies depending on voice and pronunciation. This is not a malfunction.

NG → **END**

OK

2 **CHECK MAP DISC**

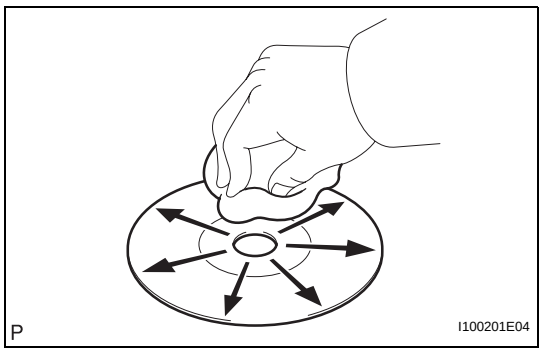


(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

OK

3 **CHECK MAP DISC**

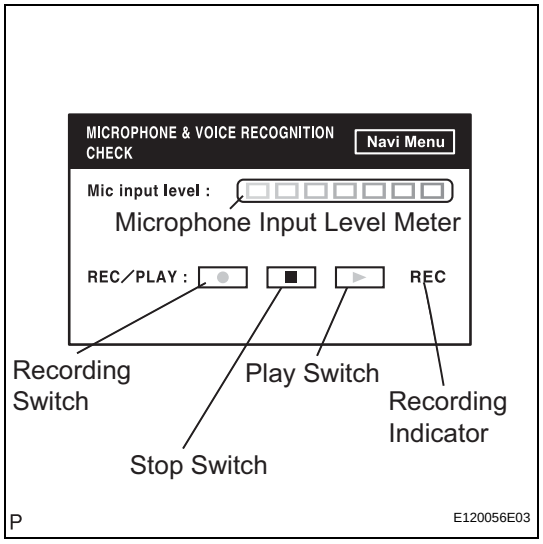


(a) Check for dirt on the map disc surface.
OK:
No dirt is on map disc surface.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.
HINT:
If the disc is dirty, clean the disc by wiping the disc's surface radially with a soft cloth.

NG → **CLEAN MAP DISC**

OK

4	CHECK MICROPHONE (NAVIGATION CHECK MODE)



(a) Enter the "MICROPHONE & VOICE RECOGNITION CHECK" mode (See page NS-27).
(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.
(c) Push the recording switch and perform voice recording.
HINT:
Voice can be recorded up to 5 seconds.
(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally without noise or distortion.
OK:
All check results are normal.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

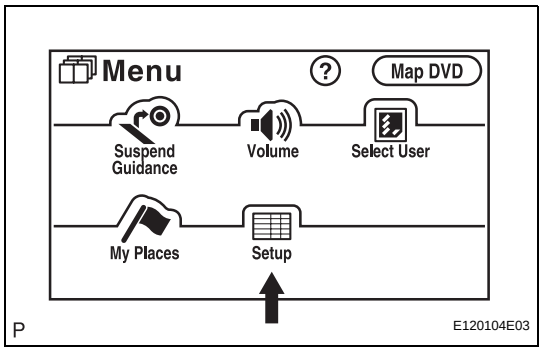
OK

END

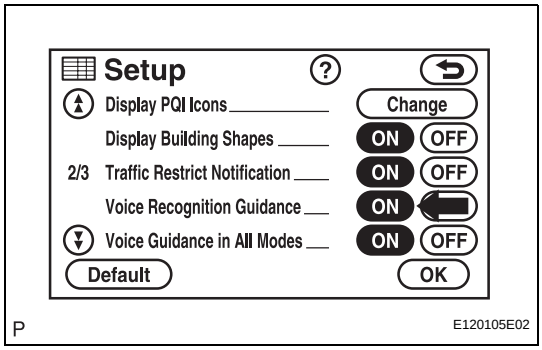
Voice is not Recognized

INSPECTION PROCEDURE

1 CHECK NAVIGATION SETTING



(a) Enter the "Menu" screen by pressing the "MENU" switch.
(b) Select "Setup".

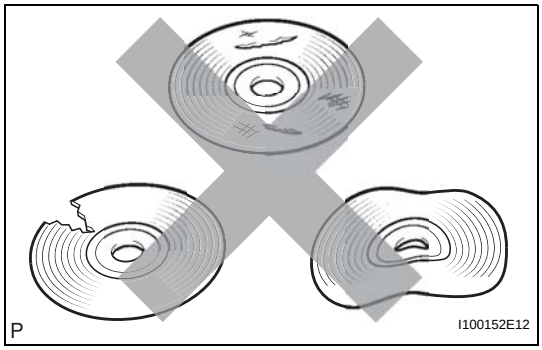


(c) Check that "Voice Recognition Guidance" is not OFF.
OK:
Voice Recognition Guidance is not OFF.

NG → **TURN VOICE RECOGNITION GUIDANCE "ON"**

OK

2 CHECK MAP DISC

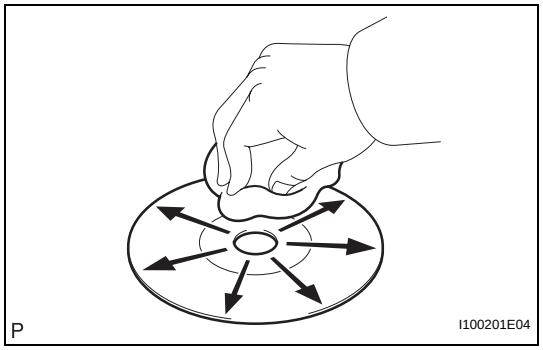


(a) Check that the map disc is not deformed or cracked.
OK:
No deformations or cracks on map disc.

NG → **REPLACE MAP DISC**

OK

3	CHECK MAP DISC

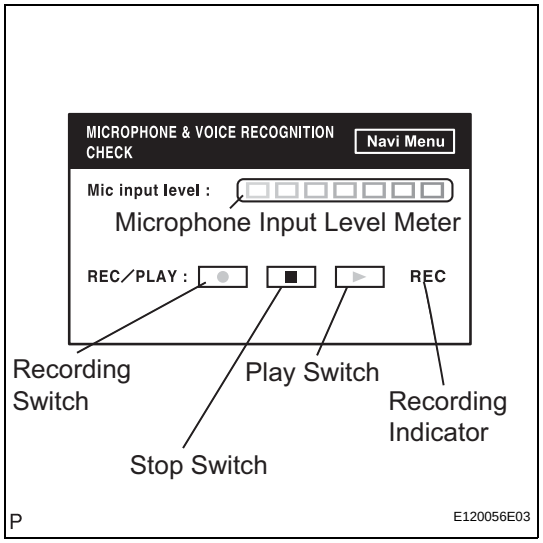


(a) Check for dirt on the map disc surface.
OK:
No dirt is on the map disc surface.
NOTICE:
Do not use a conventional record cleaner or anti-static preservative.
HINT:
If the disc is dirty, clean the disc by wiping the disc's surface radially with a soft cloth.

NG → **CLEAN MAP DISC**

OK

4	CHECK MICROPHONE (NAVIGATION CHECK MODE)



(a) Enter the "MICROPHONE & VOICE RECOGNITION CHECK" mode (See page NS-27).
(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.
(c) Push the recording switch and perform voice recording.
HINT:
Voice can be recorded up to 5 seconds.
(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally without noise or distortion.
OK:
All check results are normal.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

Cellular Phone Registration Failure, Phone Directory Transfer Failure

INSPECTION PROCEDURE

1	CHECK CURRENT CONDITIONS

(a) Proceed to the next step according to the table below.

Result

Conditions	Proceed to
Another "Bluetooth" compatible cellular phone is present.	A
Another "Bluetooth" compatible vehicle is present.	B
None of the above	C

B → Go to step 3

C → Go to step 4

A

2	CHECK USING ANOTHER CELLULAR PHONE

(a) Check if the system functions using another "Bluetooth" compatible cellular phone.
HINT:
- Confirm that either the same or a different version of another "Bluetooth" compatible cellular phone complies with the system.
- Depending on the version, some "Bluetooth" compatible cellular phones cannot be used.

OK:
The system functions.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

USE A "BLUETOOTH" COMPATIBLE CELLULAR PHONE

3	CHECK USING ANOTHER "BLUETOOTH" COMPATIBLE VEHICLE

(a) Register the cellular phone with another vehicle and check if the system functions normally.
HINT:
Depending on the version, some "Bluetooth" compatible cellular phones cannot be used.

OK:
The system functions.

OK → REPLACE RADIO AND NAVIGATION ASSEMBLY

NG

USE A "BLUETOOTH" COMPATIBLE CELLULAR PHONE

4	CHECK CELLULAR PHONE

(a) Check if the cellular phone is "Bluetooth" compatible.
HINT:
Some versions of "Bluetooth" compatible cellular phones may not function.
OK:
The phone is "Bluetooth" compatible.

NG → USE A "BLUETOOTH" COMPATIBLE CELLULAR PHONE

OK

5	CHECK CELLULAR PHONE

(a) Check if a call can be made from the cellular phone.
HINT:
When the battery is low, registration or directory transfer cannot be done.
OK:
A call can be made from the cellular phone.

NG → REPAIR OR REPLACE CELLULAR PHONE

OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

Cellular Phone cannot Send / Receive

INSPECTION PROCEDURE

1	CHECK "BLUETOOTH" SETTINGS

(a) Check if the "Bluetooth" settings are correct.
OK:
"Bluetooth" settings are correct.

NG → **SET SETTINGS CORRECTLY**

OK ↓

2	CHECK CELLULAR PHONE

(a) Check if the cellular phone is "Bluetooth" compatible.
HINT:
Some versions of "Bluetooth" compatible cellular phones may not function.
OK:
Phone is "Bluetooth" compatible.

NG → **END (ONLY A "BLUETOOTH" COMPATIBLE CELLULAR PHONE CAN BE USED)**

OK ↓

3	CHECK SETTINGS

(a) Check if the cellular phone functions.
HINT:
The cellular phone is unable to call under any of the following conditions.
- The cellular phone is locked.
- The directory is being transferred.
- The line is crossed.
- Transmission is regulated.
- The power is off.
- The cellular phone is not connected to "Bluetooth" ("BT" is displayed while connected).

OK:
None of the above conditions exist.

NG → **SET CORRECTLY**

OK ↓

4	CHECK CELLULAR PHONE

(a) Check if the cellular phone can make a call.

HINT:
When the battery is low, calls cannot be made or received.
OK:
Cellular phone can make a call.

NG → **REPAIR OR REPLACE CELLULAR PHONE**

OK

5	**CHECK RECEPTION**

(a) Set the cellular phone so that it can receive calls.
(b) Place the cellular phone close to the radio and navigation assembly.
(c) Check if the cellular phone has reception according to the radio and navigation assembly.
OK:
Cellular phone has reception.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Cannot Call in a Certain Place

INSPECTION PROCEDURE

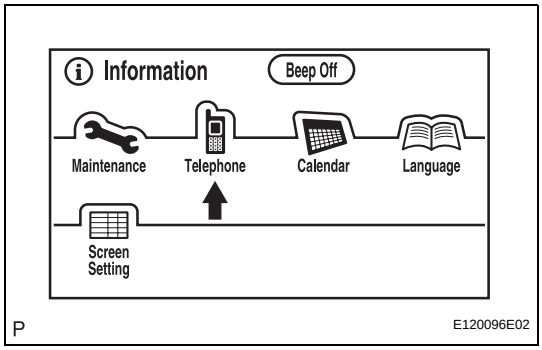
1	CHECK SURROUNDING CONDITIONS

(a) Check if the cellular phone can make calls in a certain place.
OK:
It can make calls.

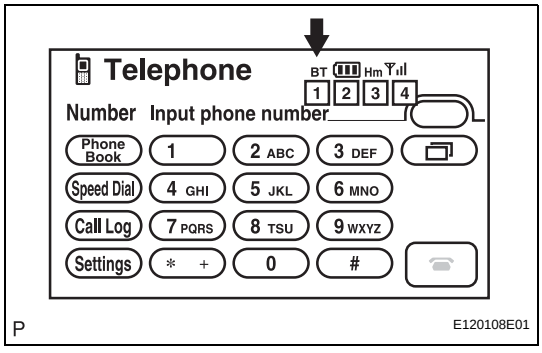
NG → **END (CELLULAR PHONES CAN ONLY FUNCTION IN CELLULAR SERVICE AREAS)**

OK

2	CHECK RECEPTION



(a) Enter the "Information" screen by pressing the "INFO" switch.
(b) Select "Telephone".



(c) Check the "Bluetooth" connection indicator ("BT" indicator).

Result

Condition	Procedure
Yellow color	Bring the cellular phone to a location where the "BT" mark turns blue.
Blue color	Replace radio and navigation assembly.
No connection mark is displayed	Select a registered cellular phone or register a "Bluetooth" compatible phone.

NEXT

END

NS

The Other Caller's Voice cannot be Heard, is too Quiet, or Distorted

INSPECTION PROCEDURE

1	CHECK CELLULAR PHONE

(a) Check if the voice on the other side can be heard using a cellular phone.
OK:
Voice can be heard.

NG → **REPAIR OR REPLACE CELLULAR PHONE**

OK

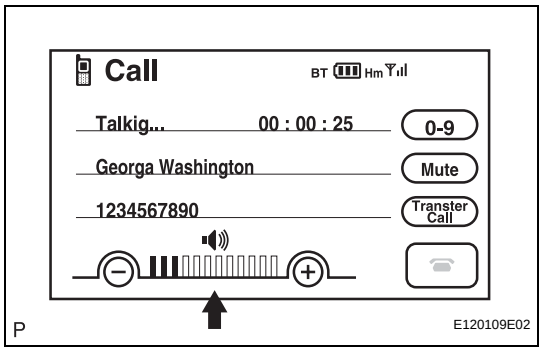
2	CHECK NAVIGATION SYSTEM

(a) Check that navigation sound can be heard from the driver side speaker.
OK:
Audio sound can be heard.

NG → **GO TO "VOICE GUIDANCE DOES NOT FUNCTION" IN PROBLEM SYMPTOMS TABLE**

OK

3	CHECK SETTINGS



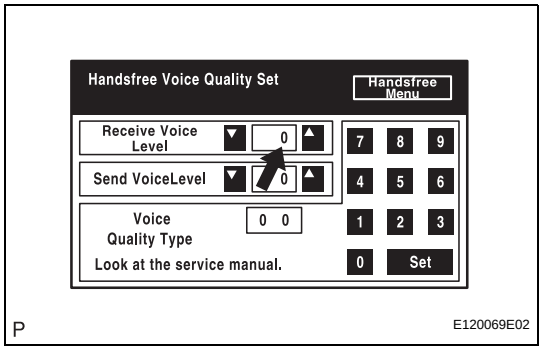
(a) Check if the volume level is set to low on the CALL screen.
OK:
The level is not set low.

NG → **SET VOLUME TO HIGH**

OK

NS

4	CHECK SETTINGS



(a) Enter the "Handsfree Voice Quality Set" mode (See page NS-25).

(b) Check if the Receive Voice Level is set to "0".
HINT:
The Receive Voice Level can be set to 11 different levels, -5 to +5, with a 3 dB difference.

(c) Check if the Receive Voice Level is set to the minimum or maximum level.
HINT:
When the Receive Voice Level is set to the minimum or maximum level, the sound may be distorted.
OK:
The Receive Voice Level is set to "0".

NG → **SET RECEIVE VOICE LEVEL TO "0"**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted

INSPECTION PROCEDURE

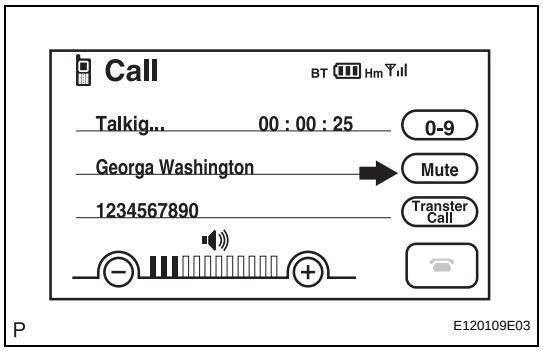
1 CHECK CELLULAR PHONE

(a) Check if the other side can hear your voice properly.
OK:
Your voice can be heard correctly.

NG → **REPLACE CELLULAR PHONE**

OK

2 CHECK SETTINGS

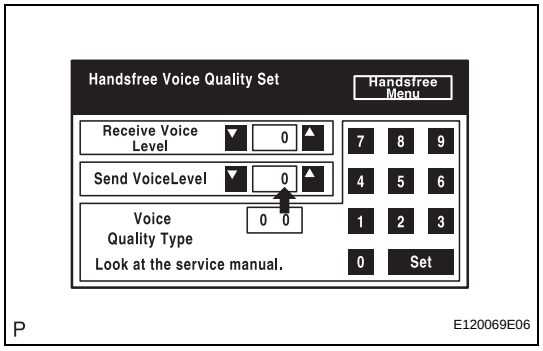


(a) Check if the mute switch is set to ON.
OK:
Mute switch is not set to ON.

NG → **TURN MUTE SWITCH OFF**

OK

3 CHECK SETTINGS



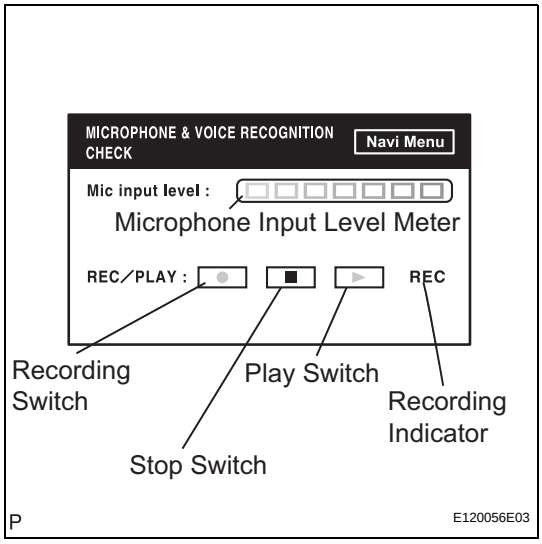
(a) Enter the "Handsfree Voice Quality Set" mode (See page NS-25).
(b) Check if the Send Voice Level is set to "0".
HINT:
The Send Voice Level can be set to 11 different levels, -5 to +5, with a 3 dB difference.
(c) Check if the Send Voice Level is set to the minimum or maximum level.
HINT:
When the Send Voice Level is set to the minimum or maximum level, the sound may be distorted.
OK:
The Send Voice Level is set to "0".

NG → **SET SEND VOICE LEVEL TO "0"**

OK

NS

4	CHECK MICROPHONE (NAVIGATION CHECK MODE)



(a) Enter the "MICROPHONE & VOICE RECOGNITION CHECK" mode (See page NS-27).
(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.
(c) Push the recording switch and perform voice recording.
HINT:
Voice can be recorded up to 5 seconds.
(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally without noise or distortion.
OK:
All check results are normal.

NG → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

Black Screen

INSPECTION PROCEDURE

1 **CHECK DISPLAY SETTING**

(a) Check that the display is not in "Screen OFF" mode.
OK:
The display setting is not in "Screen OFF" mode.

NG → **CHANGE SCREEN TO "SCREEN ON" MODE**

OK ↓

2 **CHECK IMAGE QUALITY SETTING**

(a) Check that the screen color quality can be set.
OK:
Setting is possible.

NG → **Go to step 3**

OK ↓

PRESS PANEL SWITCH "DISPLAY" AND SET SCREEN COLOR QUALITY TO NORMAL

3 **CHECK CABIN**

(a) Check that condensation is not likely to occur in the cabin, and that the temperature is not high or extremely low in the cabin.
HINT:
- A humid cabin and a rapid change in temperature may lead to condensation. Condensation in the cabin may short circuit the screen.
- The appropriate cabin temperature is 20 to 30°C (68 to 86°F).

OK:
Condensation is not likely and temperature is not high or extremely low.

NG → **SET CABIN TO APPROPRIATE TEMPERATURE**

OK ↓

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

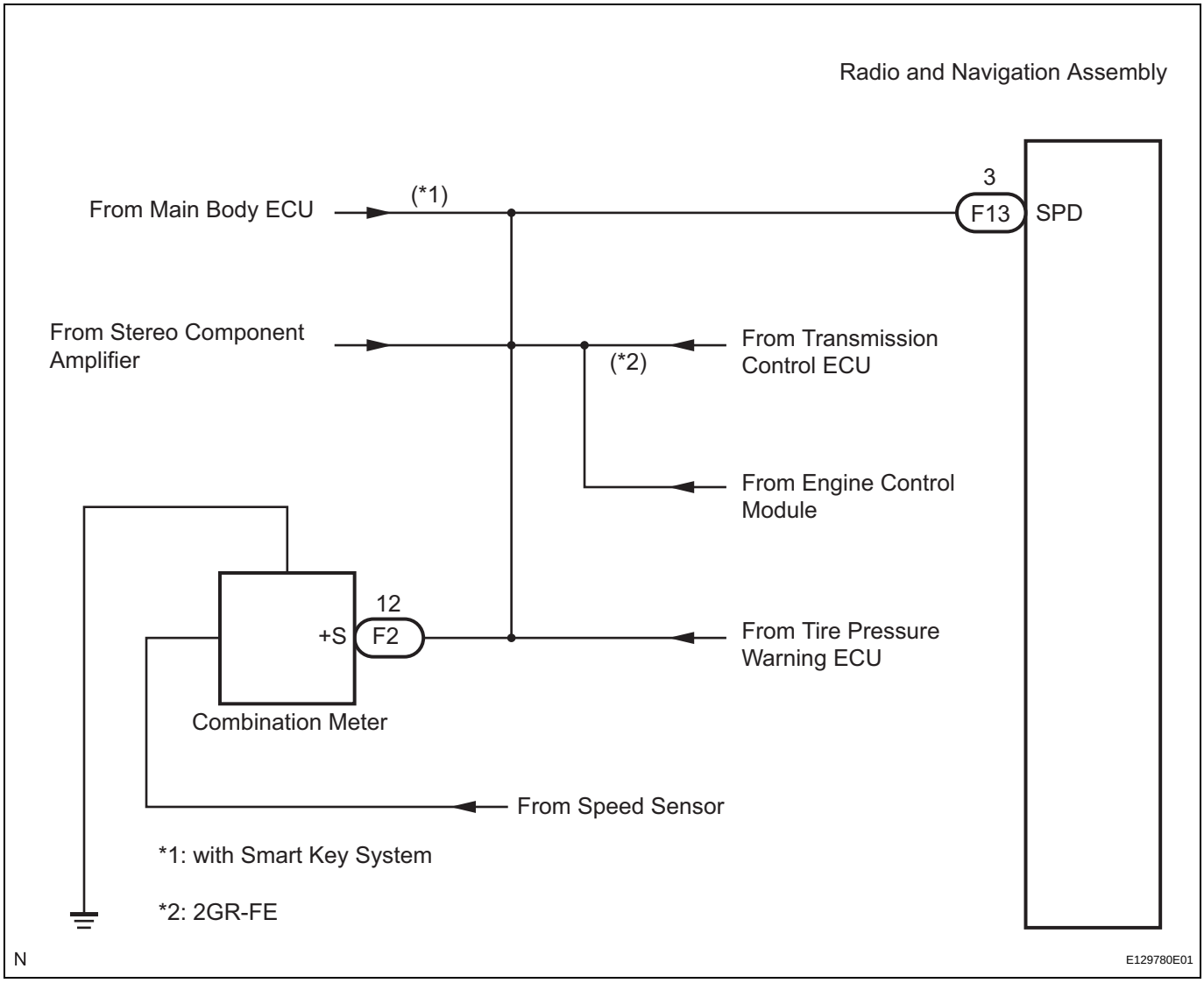
Vehicle Speed Signal Circuit between Radio and Navigation Assembly and Combination Meter

DESCRIPTION

The radio and navigation assembly receives a vehicle speed signal from the combination meter and information about the GPS antenna, and then adjusts vehicle position.
HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram below will not operate normally.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OPERATION OF SPEEDOMETER

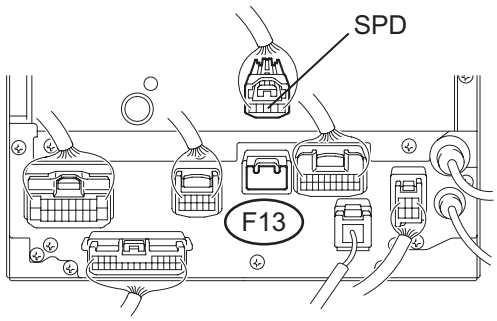
(a) Drive the vehicle and check if the function of the speedometer on the combination meter is normal.
OK:
Actual vehicle speed and the speed indicated on the speedometer are the same.
HINT:
The vehicle speed sensor is functioning normally when the indication on the speedometer is normal.

NG → **GO TO COMBINATION METER SYSTEM**

OK

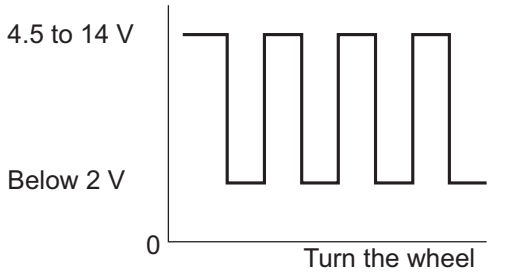
2	INSPECT RADIO AND NAVIGATION ASSEMBLY

Radio and Navigation Assembly Wire Harness View:



P E113510E05

(a) Disconnect the radio and navigation assembly connector F13.
(b) Measure the voltage.
(1) Jack up either one of the drive wheels.
(2) Move the shift lever to the neutral position.
(3) Turn the ignition switch on (IG).



H E110855E01

(4) Measure the voltage between terminal SPD of the wire harness connector and body ground when the drive wheels are turned slowly.
OK:
Voltage pulses as shown in the illustration.

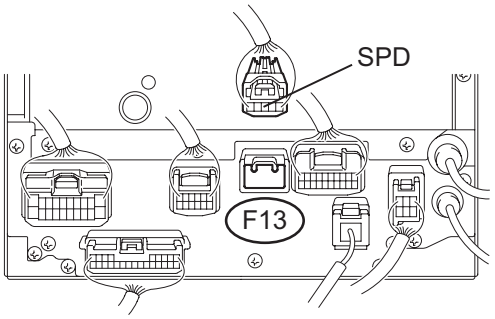
OK → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

NG

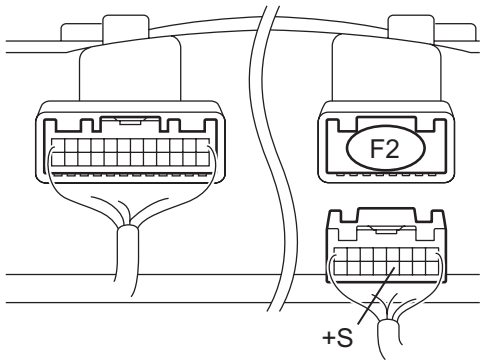
NS

3	CHECK HARNESS AND CONNECTOR (COMBINATION METER - RADIO AND NAVIGATION ASSEMBLY)

Radio and Navigation Assembly Wire Harness View:



Combination Meter Wire Harness View:



P E129818E01

(a) Disconnect the radio and navigation assembly connector F13 and combination meter connector F2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

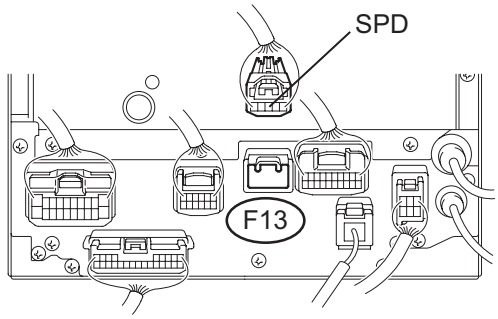
Tester connection	Condition	Specified condition
SPD - +S	Ignition switch off	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR (RADIO AND NAVIGATION ASSEMBLY - BODY GROUND)

Radio and Navigation Assembly Wire Harness View:



P E113510E05

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SPD - Body ground	Ignition switch off	10 kΩ or higher

HINT:
If the resistance between terminal SPD and body ground is less than 10 kΩ, there may be a short in a wire harness, connector, or an ECU.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR OR CHECK EACH ECU**

NS

OK

REPLACE COMBINATION METER

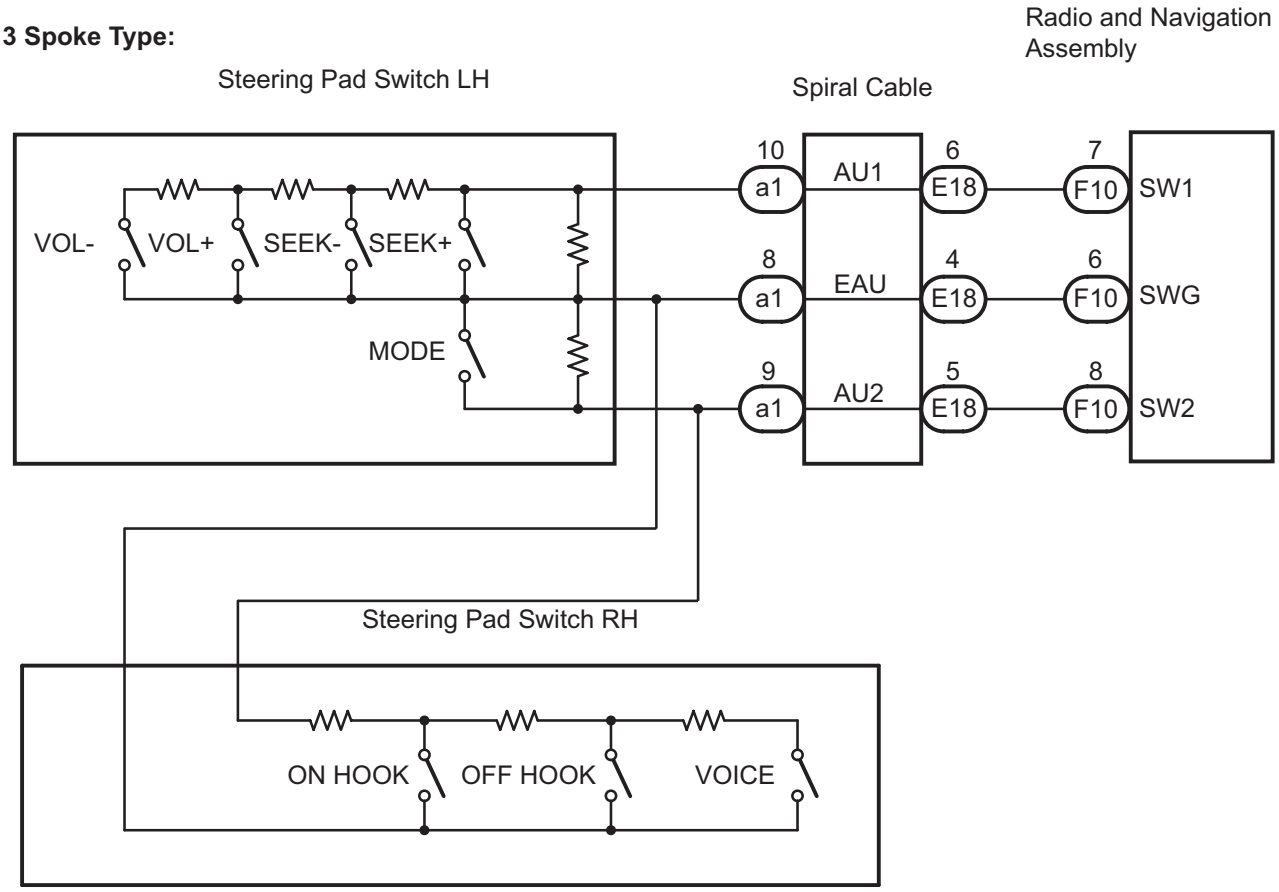
Steering Pad Switch Circuit

DESCRIPTION

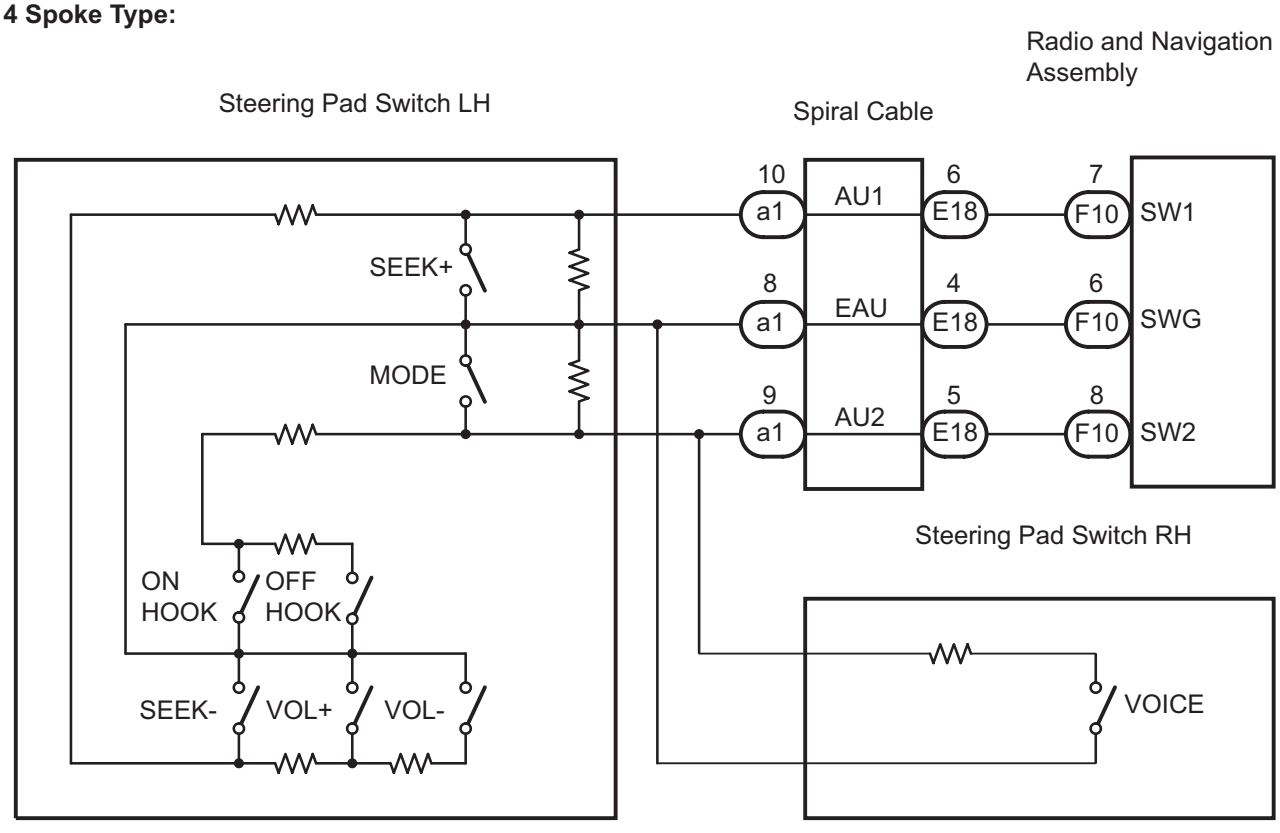
This circuit sends an operation signal from the steering pad switch to the radio and navigation assembly. If there is an open in the circuit, the navigation system cannot be operated using the steering pad switch. If there is a short in the circuit, the resulting condition is the same as if the switch were continuously depressed. Therefore, the radio and navigation assembly cannot be operated using the steering pad switch, and the radio and navigation assembly itself cannot function.

WIRING DIAGRAM

3 Spoke Type:



4 Spoke Type:



P

E129781E02

NS

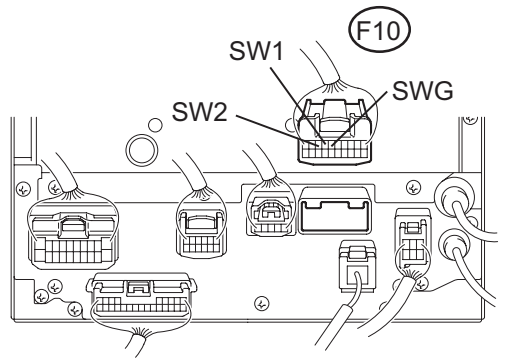
INSPECTION PROCEDURE

NOTICE:

The vehicle is equipped with an SRS (Supplemental Restraint System) such as the airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the Supplemental Restraint System (See page RS-1).

1	INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector F10.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SW1 - SWG	No switch is pushed	Approx. 100 kΩ
SW1 - SWG	SEEK+ switch: push	0 to 2.5 Ω
SW1 - SWG	SEEK- switch: push	Approx. 0.3 kΩ
SW1 - SWG	VOL+ switch: push	Approx. 1 kΩ
SW1 - SWG	VOL- switch: push	Approx. 3.1 kΩ
SW2 - SWG	No switch is pushed	Approx. 100 kΩ
SW2 - SWG	MODE switch: push	0 to 2.5 Ω
SW2 - SWG	VOICE switch: push	Approx. 3.1 kΩ
SW2 - SWG	ON HOOK switch: push	Approx. 0.3 kΩ
SW2 - SWG	OFF HOOK switch: push	Approx. 1 kΩ

NG → **Go to step 2**

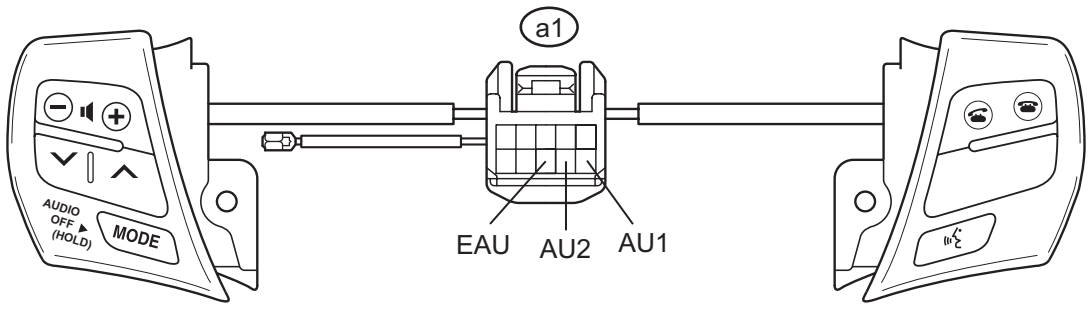
OK →

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

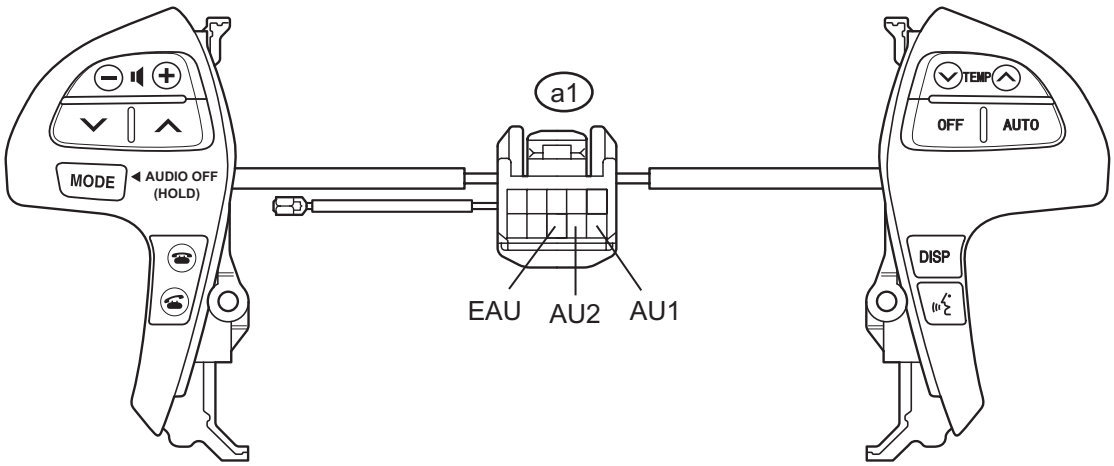
2	INSPECT STEERING PAD SWITCH ASSEMBLY

(a) Disconnect the steering pad switch assembly connector a1.

3 Spoke Type:



4 Spoke Type:



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(b) Measure the resistance according to the value(s) in the table below.

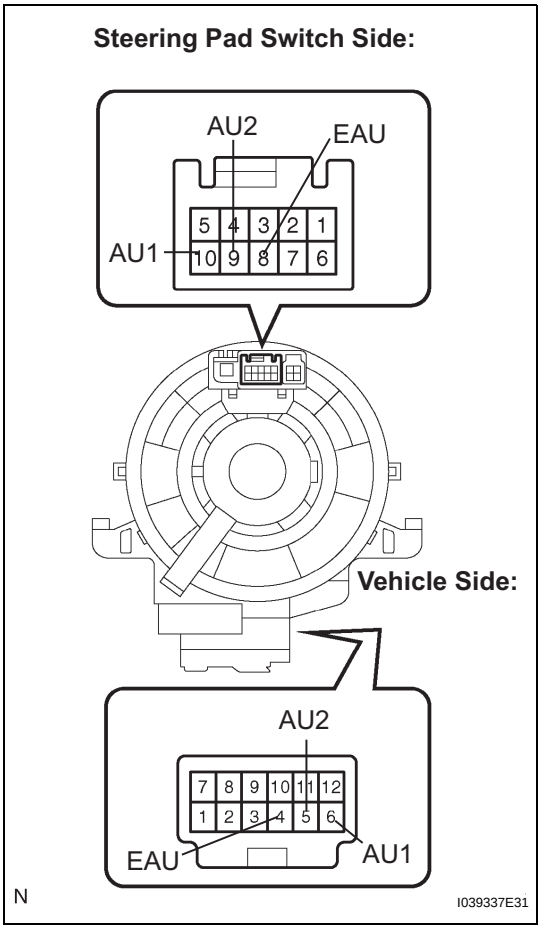
Standard resistance

Tester connection	Condition	Specified condition
AU1 - EAU	No switch is pushed	Approx. 100 kΩ
AU1 - EAU	SEEK+ switch: push	0 to 2.5 Ω
AU1 - EAU	SEEK- switch: push	Approx. 0.3 kΩ
AU1 - EAU	VOL+ switch: push	Approx. 1 kΩ
AU1 - EAU	VOL- switch: push	Approx. 3.1 kΩ
AU2 - EAU	No switch is pushed	Approx. 100 kΩ
AU2 - EAU	MODE switch: push	0 to 2.5 Ω
AU2 - EAU	VOICE switch: push	Approx. 3.1 kΩ
AU2 - EAU	ON HOOK switch: push	Approx. 0.3 kΩ
AU2 - EAU	OFF HOOK switch: push	Approx. 1 kΩ

NG → REPLACE STEERING PAD SWITCH ASSEMBLY

OK

3 INSPECT SPIRAL CABLE



(a) Disconnect the steering pad switch assembly and spiral cable connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Spiral cable position	Specified condition
EAU - EAU	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
AU1 - AU1	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
AU2 - AU2	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

NOTICE:
The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may prevent the airbag from deploying. Be sure to read the page shown in the brackets.

HINT:

- Removal (See page RS-363)
- Installation (See page RS-366)

NG → REPLACE SPIRAL CABLE

OK

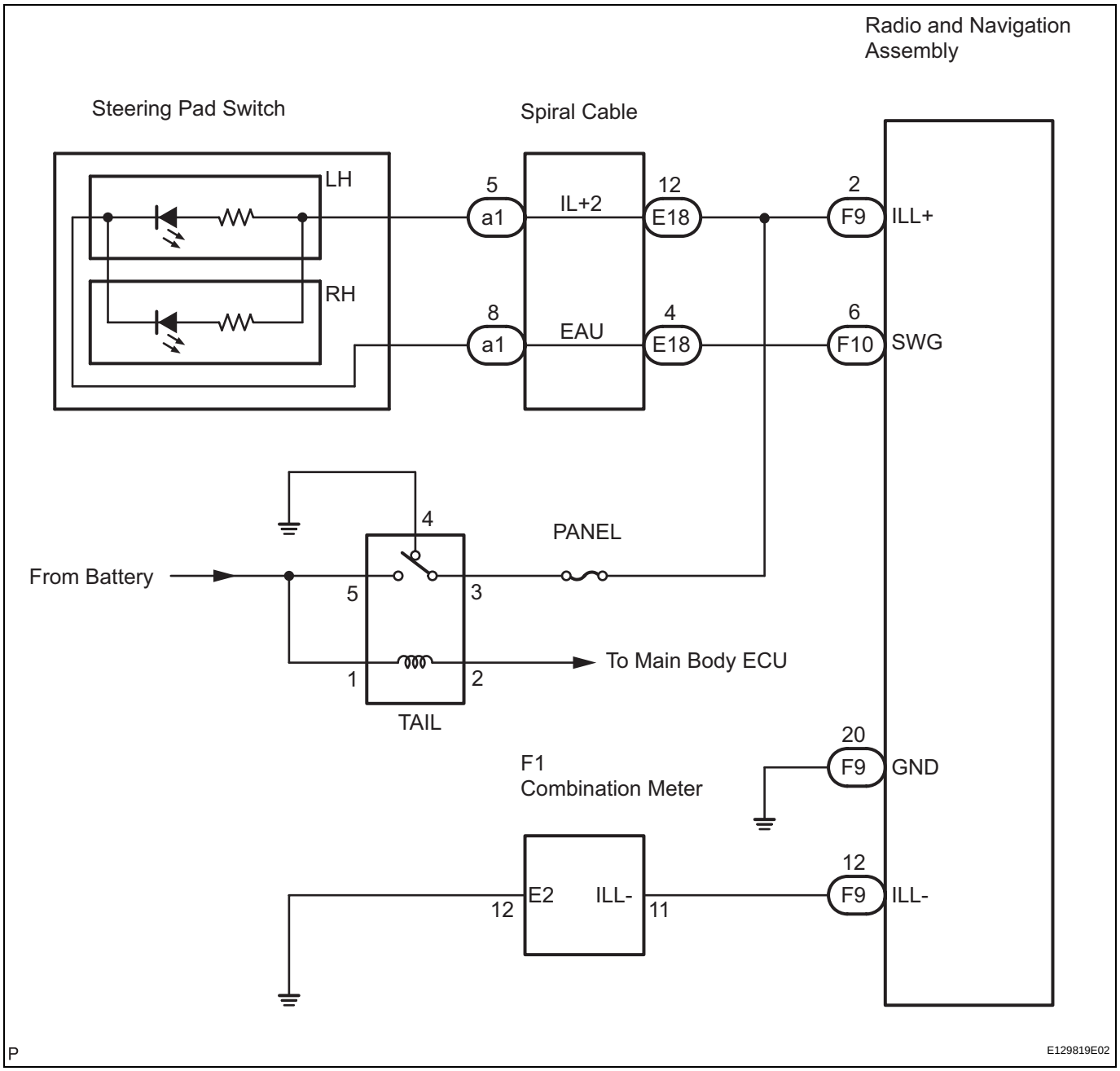
REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL CABLE - RADIO AND NAVIGATION ASSEMBLY)

Illumination Circuit

DESCRIPTION

Power is supplied to the radio and navigation assembly and steering pad switch illumination when the light control switch is in the TAIL or HEAD position.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

The vehicle is equipped with an SRS (Supplemental Restraint System) such as the airbags. Before servicing (including removal or installation of parts), be sure to read the precautionary notice for the Supplemental Restraint System (See page RS-1).

1	CHECK ILLUMINATION

(a) Check if the illumination for the radio and navigation assembly, steering pad switch, glove box or others (Hazard switch, transmission control switch, etc.) comes on when the light control switch is turned to the HEAD or TAIL position.

Result

Condition	Proceed to
Illumination comes on for all components except steering pad switch.	A
Illumination comes on for all components except radio and navigation assembly.	B
No illumination comes on (radio receiver, hazard switch, glove box, etc.)	C
Illumination comes on only for glove box and steering pad switch.	D

B → Go to step 6

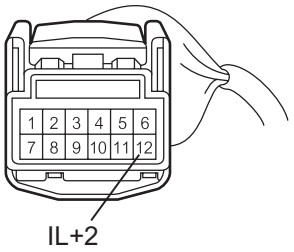
C → GO TO LIGHTING SYSTEM

D → GO TO COMBINATION METER SYSTEM

A

2	CHECK HARNESS AND CONNECTOR (BATTERY - SPIRAL CABLE)

Spiral Cable Connector Front View:



H

E120026E07

(a) Disconnect the spiral cable connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
IL+2 - Body ground	Light control switch TAIL or HEAD	10 to 14 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

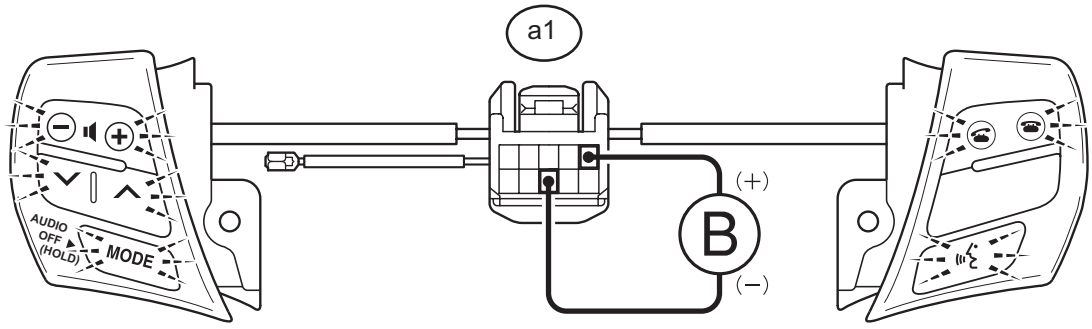
OK

NS

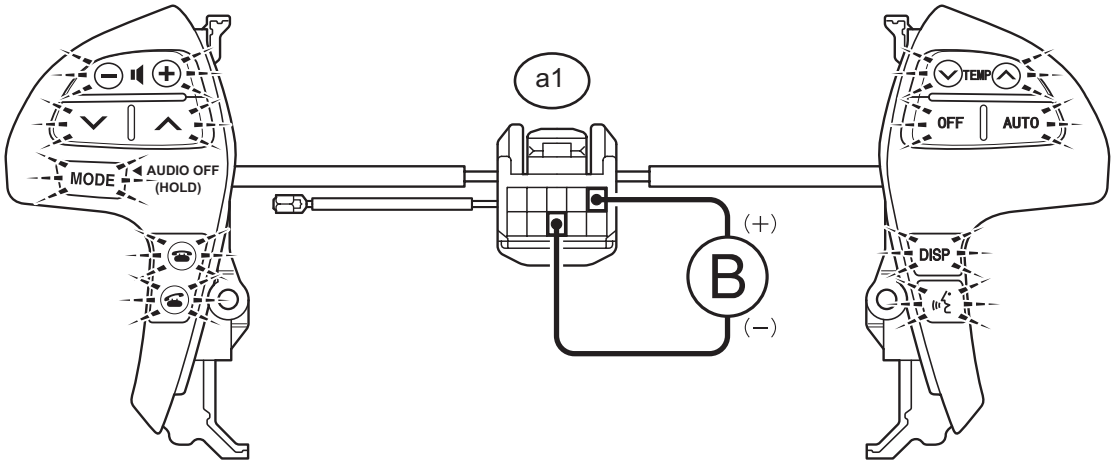
3	CHECK STEERING PAD SWITCH ASSEMBLY

(a) Disconnect the steering pad switch assembly connector.

3 Spoke Type:



4 Spoke Type:



P E129805E01

(b) Connect the positive (+) lead to terminal ILL+ and the negative (-) lead to terminal EAU of the steering pad switch connector.

(c) Check if the illumination for the steering pad switch comes on.

OK:

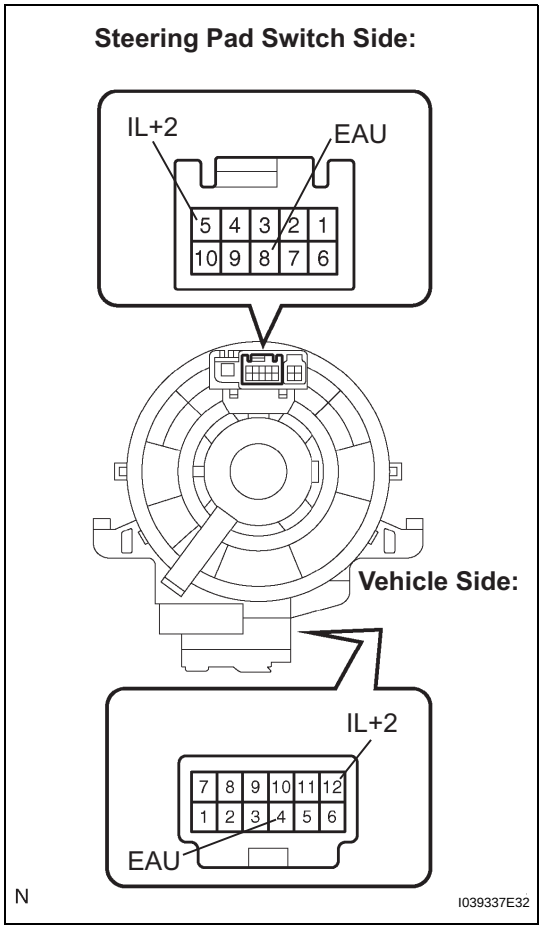
Illumination for the steering pad switch assembly comes on.

NG	**REPLACE STEERING PAD SWITCH ASSEMBLY**

OK

NS

4	INSPECT SPIRAL CABLE



(a) Disconnect the steering pad switch and spiral cable connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Spiral cable position	Specified Condition
EAU - EAU	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
ILL+ - ILL+	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

NOTICE:
The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may prevent the airbag from deploying. Be sure to read the page shown in the brackets.

HINT:

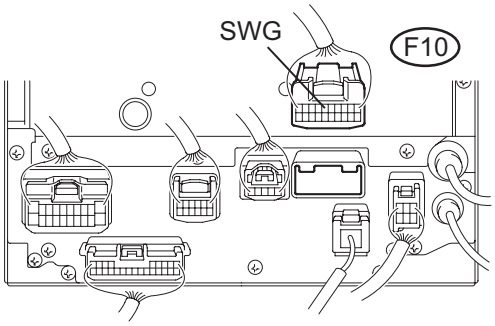
- Removal (See page RS-363)
- Installation (See page RS-366)

NG → **REPLACE SPIRAL CABLE**

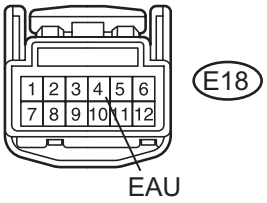
OK

5	CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - RADIO AND NAVIGATION ASSEMBLY)

Radio and Navigation Assembly Wire Harness View:



Spiral Cable Connector Front View:



P E120116E03

(a) Disconnect the connectors from the radio and navigation assembly and spiral cable.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
SWG - EAU	Always	Below 1 Ω
SWG - Body ground	Always	10 kΩ or higher

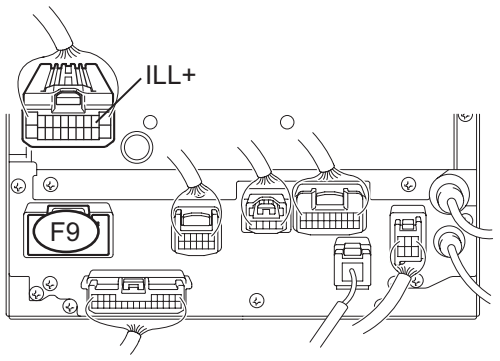
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE RADIO AND NAVIGATION ASSEMBLY

6	CHECK HARNESS AND CONNECTOR (BATTERY - RADIO AND NAVIGATION ASSEMBLY)

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector F9.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

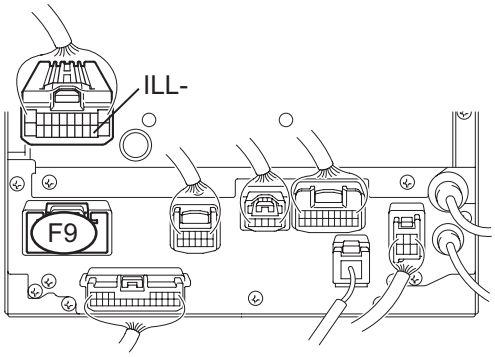
Tester connection	Condition	Specified condition
ILL+ - Body ground	Light control switch TAIL or HEAD	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

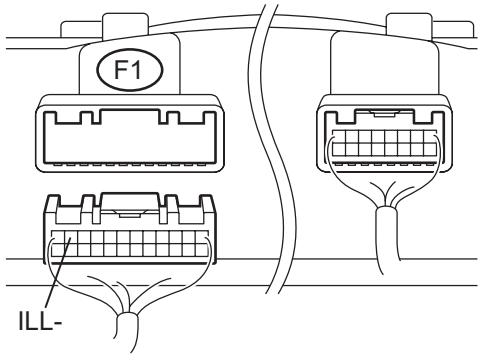
OK

7	CHECK HARNESS AND CONNECTOR (RADIO AND NAVIGATION ASSEMBLY - COMBINATION METER)

Radio and Navigation Assembly Wire Harness View:



Combination Meter Wire Harness View:



(a) Disconnect the radio and navigation assembly and combination meter connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ILL- - ILL-	Always	Below 1 Ω
ILL- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NS

OK

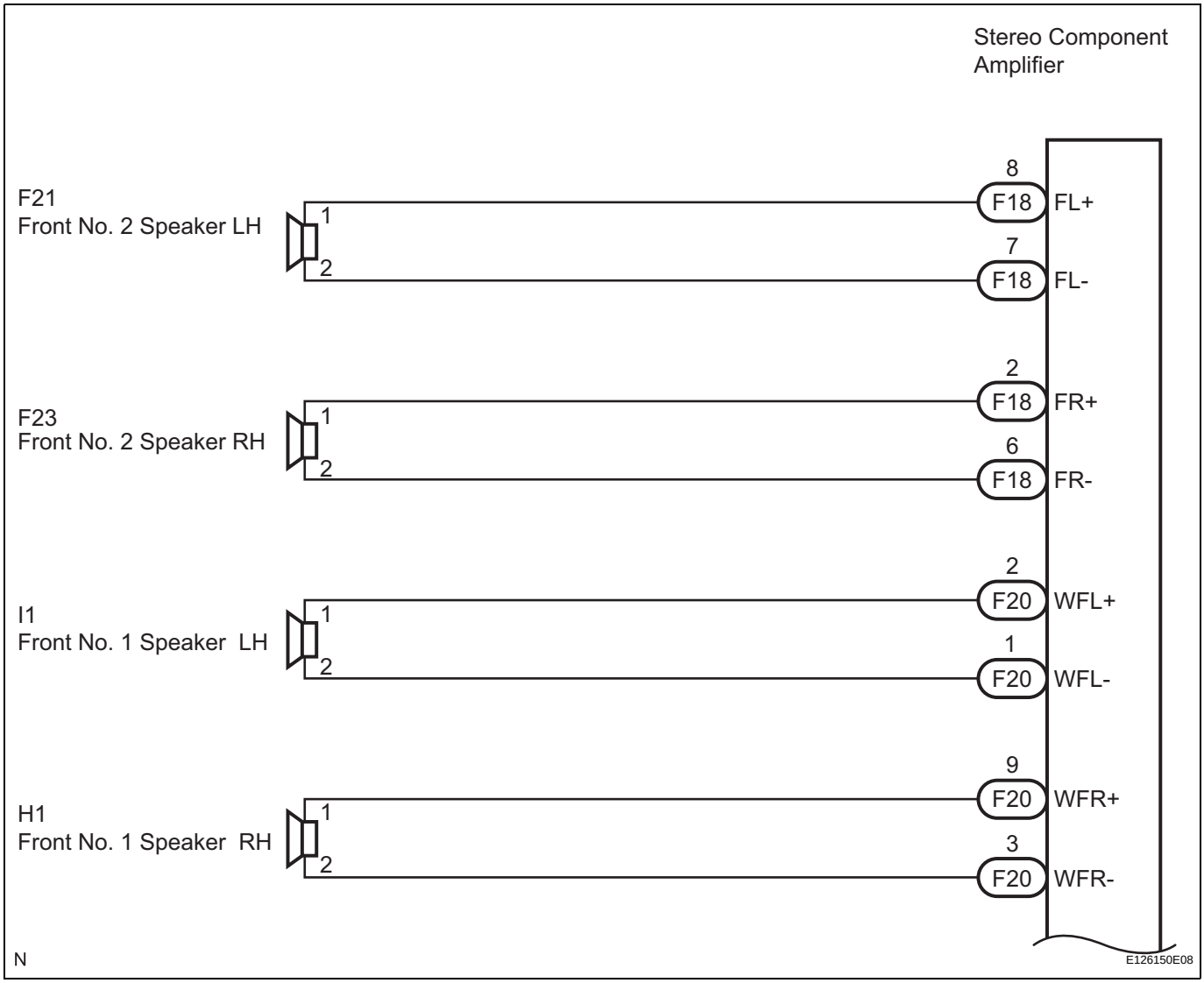
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

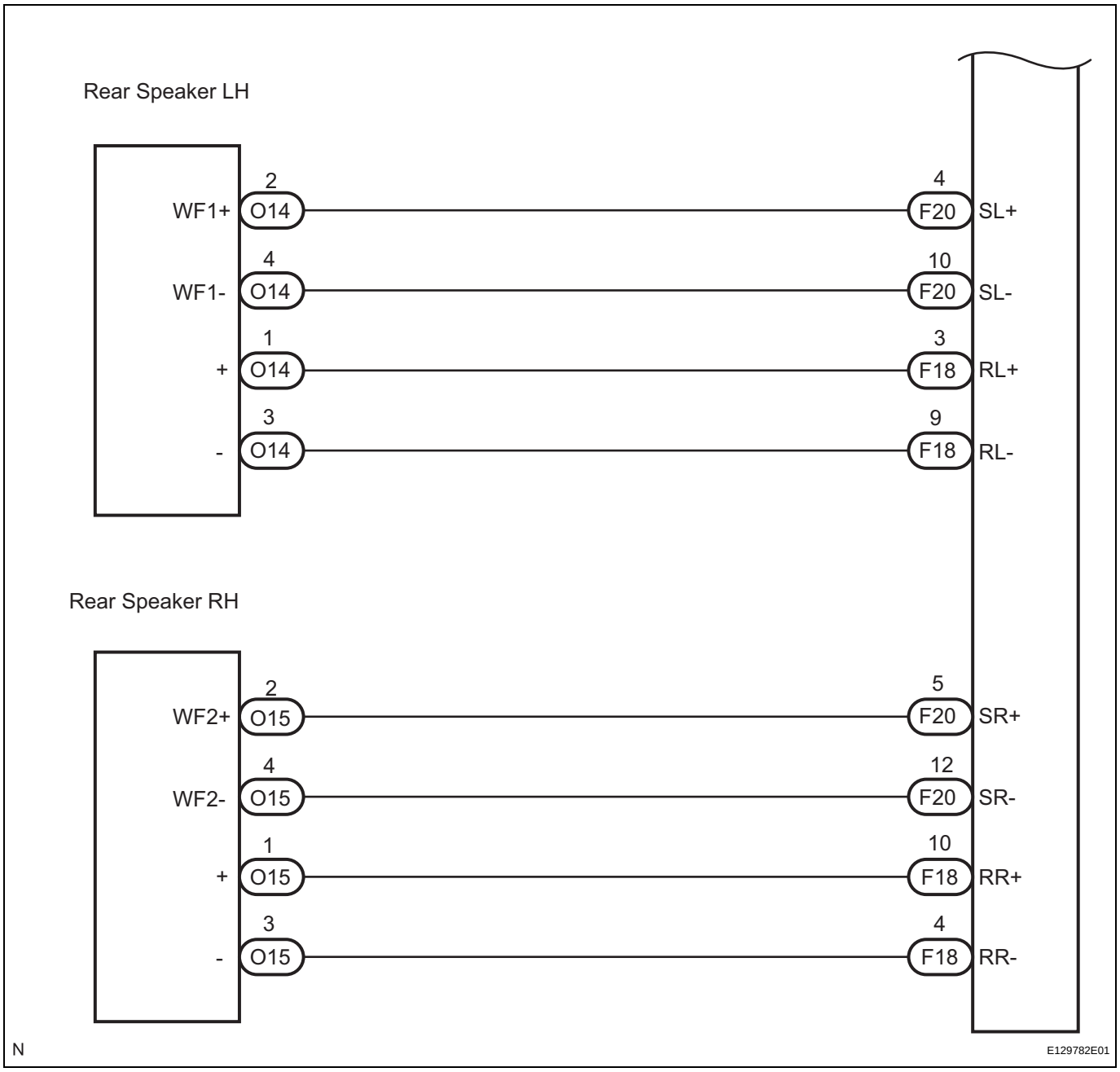
Speaker Circuit

DESCRIPTION

The sound signal that has been amplified by the stereo component amplifier is sent to the speakers from the stereo component amplifier through this circuit.
If there is a short in this circuit, the stereo component amplifier detects it and stops output to the speakers. Thus sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier or speakers.

WIRING DIAGRAM

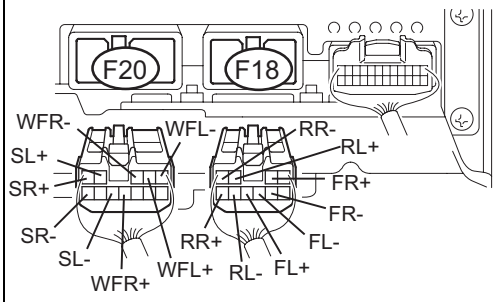



Rear Speaker LH
WF1+
2
O14
4
F20
SL+
WF1-
4
O14
10
F20
SL-
+
1
O14
3
F18
RL+
-
3
O14
9
F18
RL-
Rear Speaker RH
WF2+
2
O15
5
F20
SR+
WF2-
4
O15
12
F20
SR-
+
1
O15
10
F18
RR+
-
3
O15
4
F18
RR-
N
E129782E01

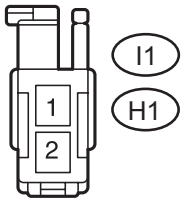
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR

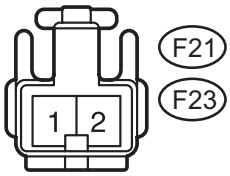
Stereo Component Amplifier Wire Harness View:



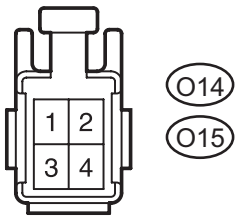
Front No. 1 Speaker Connector Front View:



Front No. 2 Speaker Connector Front View:



Rear Speaker Connector Front View:



P E129821E04

(a) Disconnect the connectors shown in the illustration on the left from the stereo component amplifier and speakers.
(b) Measure the resistance between each of the front No. 2 speakers and the stereo component amplifier to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω
(c) Measure the resistance between each of the rear speakers and the stereo component amplifier to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω
(d) Measure the resistance between each of the front No. 1 speakers and the stereo component amplifier to check for an open circuit in the wire harness.
Standard resistance:
Below 1 Ω
(e) Measure the resistance between each speaker and body ground to check for a short circuit in the wire harness.
Standard resistance:
10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT FRONT NO. 1 SPEAKER

(a) Resistance check.

NS

(1) Measure the resistance between the terminals of the speaker.
Standard resistance:
1.8 to 2.6 Ω

NG → **REPLACE FRONT NO. 1 SPEAKER**

OK

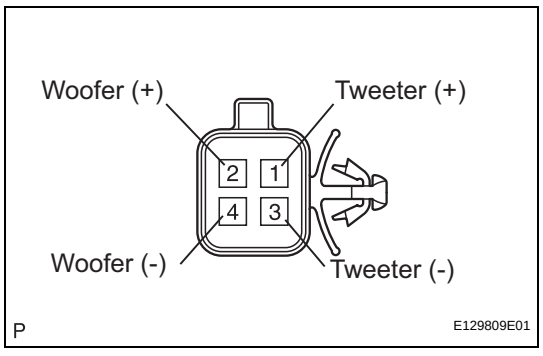
3 INSPECT FRONT NO. 2 SPEAKER

(a) Check that the malfunction disappears when another speaker in good condition is installed.
OK:
Malfunction disappears.
HINT:
- Connect all the connectors to the front No. 2 speakers.
- When there is a possibility that either the right or left front speaker is defective, inspect by interchanging the right one with the left one.
- Perform the above inspection on both LH and RH sides.

OK → **REPLACE FRONT NO. 2 SPEAKER**

NG

4 INSPECT REAR SPEAKER



(a) Woofer speaker:
(1) Measure the resistance according to the value(s) in the table below.
NOTICE:
The speaker should not be removed for checking.
Standard resistance

Tester connection	Condition	Specified condition
2 - 4	Always	1.8 to 2.6 Ω

(b) Tweeter speaker:
(1) Check that the malfunction disappears when another rear speaker in good condition is installed.

OK:
Malfunction appears.
HINT:
- Connect all the connectors to the rear speaker.
- When there is a possibility that either the right or left rear speaker is detective, inspect by interchanging the right one with the left one.

NG → **REPLACE REAR SPEAKER**

NS

OK

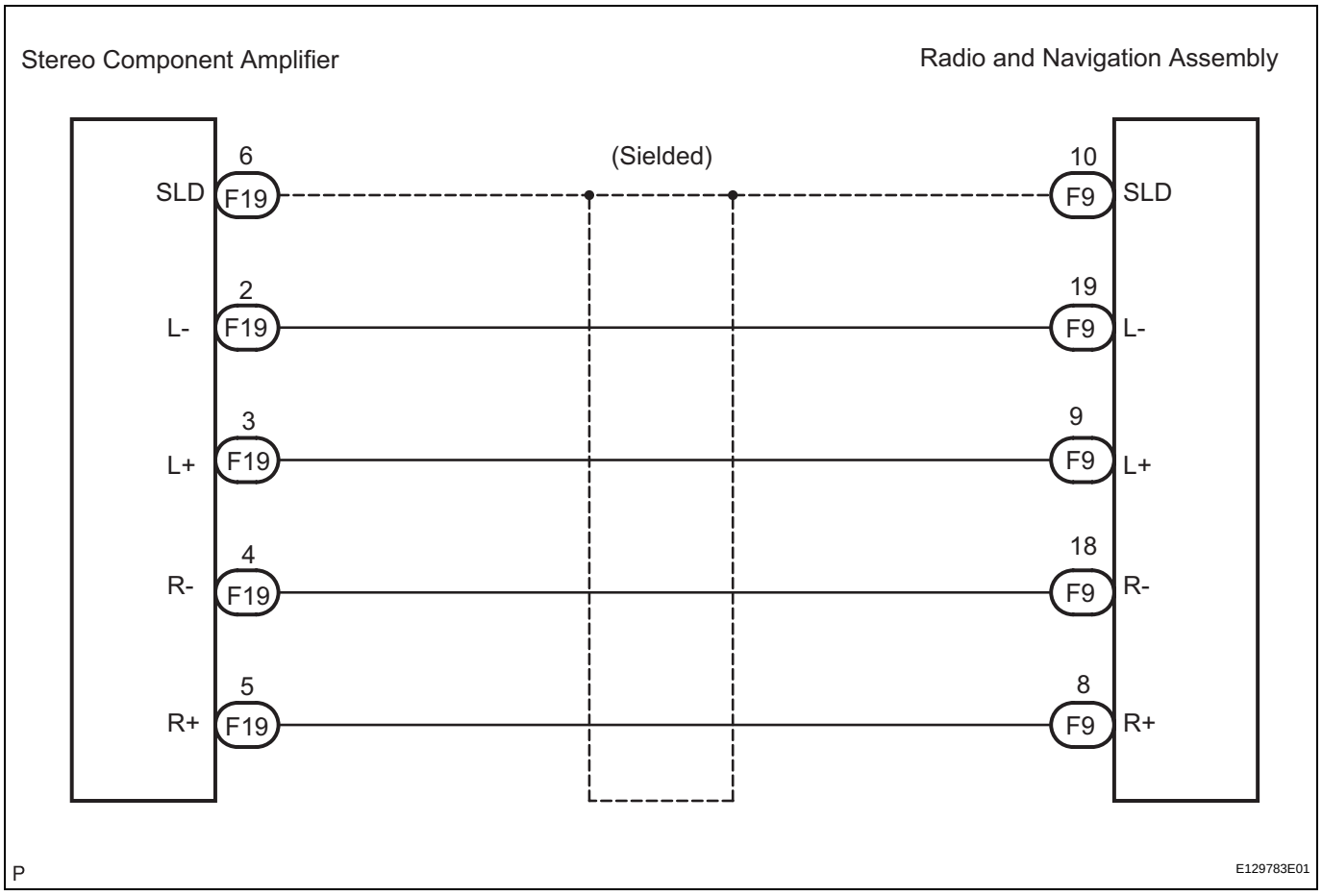
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Sound Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier

DESCRIPTION

The radio and navigation assembly sends a sound signal to the stereo component amplifier through this circuit.
The sound signal that has been sent is amplified by the stereo component amplifier, and then is sent to the speakers.
If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier or speakers.

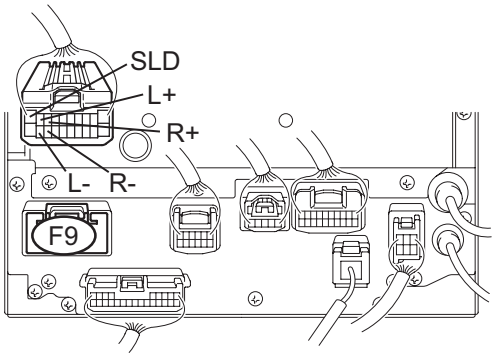
WIRING DIAGRAM



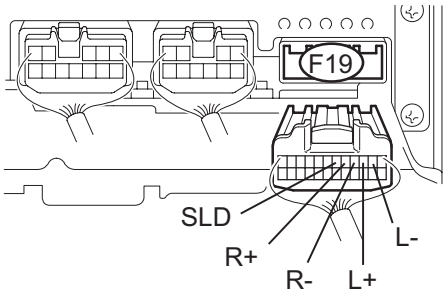
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO AND NAVIGATION ASSEMBLY - STEREO COMPONENT AMPLIFIER)

Radio and Navigation Assembly Wire Harness View:



Stereo Component Amplifier Wire Harness View:



P E129822E01

(a) Disconnect the connectors from the radio and navigation assembly and stereo component amplifier.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
L+ - L+	Always	Below 1 Ω
L- - L-	Always	Below 1 Ω
R+ - R+	Always	Below 1 Ω
R- - R-	Always	Below 1 Ω
SLD - SLD	Always	Below 1 Ω
L+ - Body ground	Always	10 kΩ or higher
L- - Body ground	Always	10 kΩ or higher
R+ - Body ground	Always	10 kΩ or higher
R- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

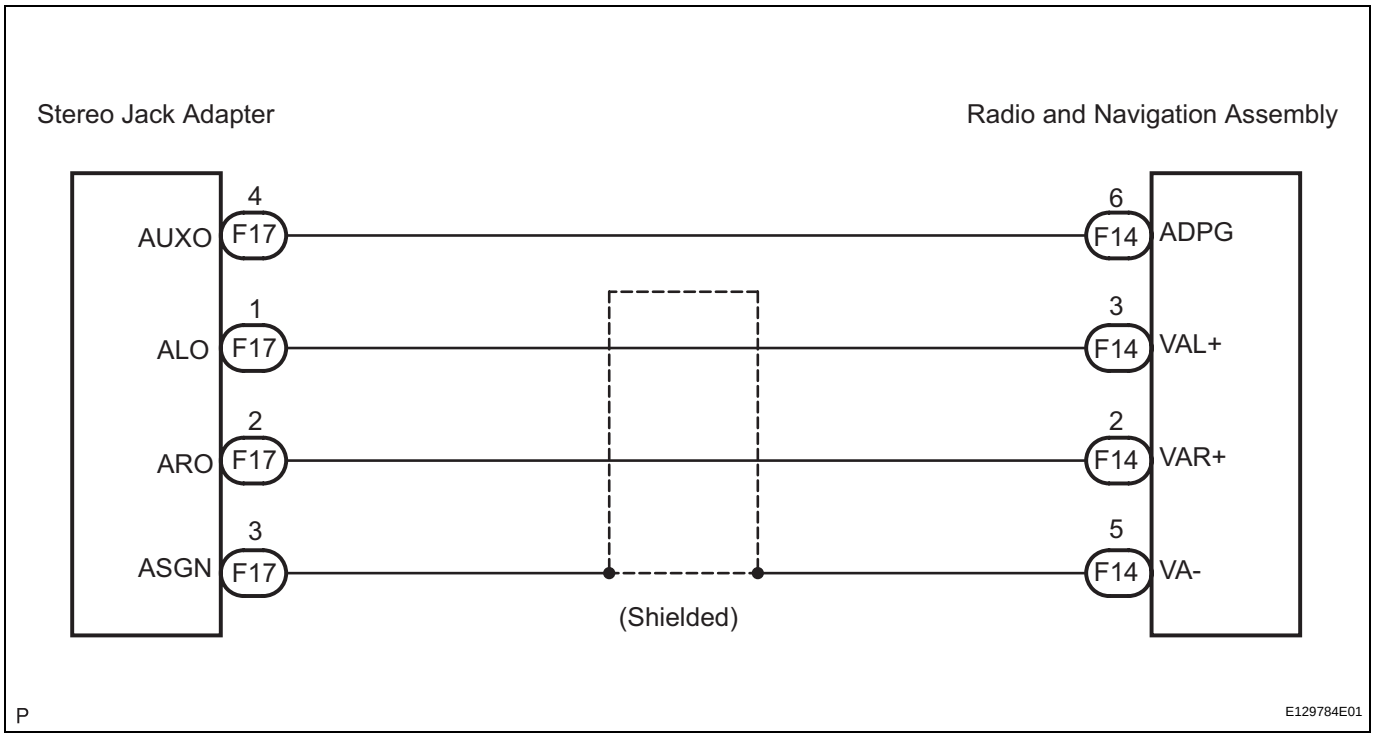
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Sound Signal Circuit between Radio and Navigation Assembly and Stereo Jack Adapter

DESCRIPTION

The stereo jack adapter sends an external device sound signal to the radio and navigation assembly through this circuit.
The sound signal that has been sent is amplified by the stereo component amplifier and then is sent to the speakers.
If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier, radio and navigation assembly, or speakers.

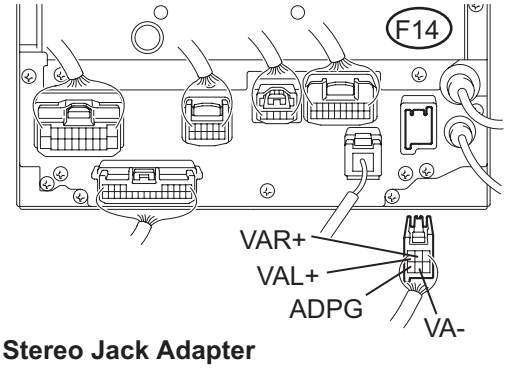
WIRING DIAGRAM



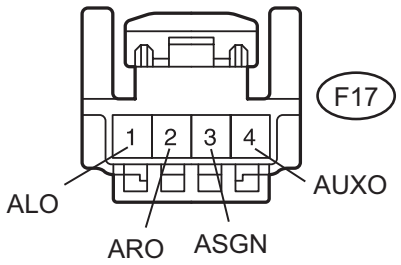
INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (RADIO AND NAVIGATION ASSEMBLY - STEREO JACK ADAPTER)

Radio and Navigation Assembly Wire Harness View:



Stereo Jack Adapter Connector Front View:



P E129823E03

(a) Disconnect the connectors from the stereo jack adapter and radio and navigation assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
AUXO - ADPG	Always	Below 1 Ω
ASGN - VA-	Always	Below 1 Ω
ARO - VAR+	Always	Below 1 Ω
ALO - VAL+	Always	Below 1 Ω
AUXO - Body ground	Always	10 kΩ or higher
ASGN - Body ground	Always	10 kΩ or higher
ARO - Body ground	Always	10 kΩ or higher
ALO - Body ground	Always	10 kΩ or higher

NG → **REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Mute Signal Circuit between Radio and Navigation Assembly and Stereo Component Amplifier

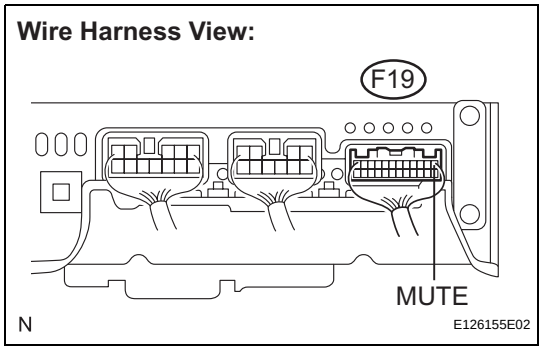
DESCRIPTION

This circuit sends a signal to the stereo component amplifier to mute noise. Because of that, the noise produced by changing the sound source ceases.
If there is an open in the circuit, noise can be heard from the speakers when changing the sound source.
If there is a short in the circuit, even though the stereo component amplifier is normal, no sound, or only an extremely small sound, can be produced.

WIRING DIAGRAM

INSPECTION PROCEDURE

1	INSPECT STEREO COMPONENT AMPLIFIER



(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

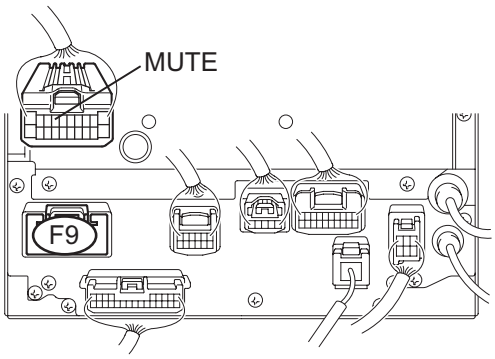
Tester connection	Condition	Specified condition
MUTE - Body ground	Turn ignition switch on (ACC), Audio system is playing → Changing	Above 3.5 V → Below 1 V

OK → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

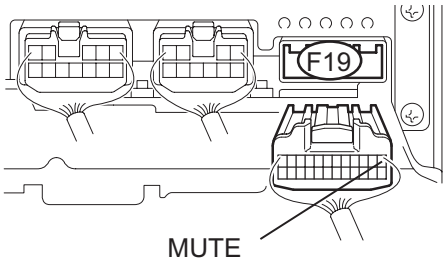
NG

2	CHECK HARNESS AND CONNECTOR (RADIO AND NAVIGATION ASSEMBLY - STEREO COMPONENT AMPLIFIER)

Radio and Navigation Assembly Wire Harness View:



Stereo Component Amplifier Wire Harness View:



P

E129822E02

OK

(a) Disconnect the radio and navigation assembly connector F9 and stereo component amplifier connector F19.

(b) Measure the resistance according to the value(s) in the table below.

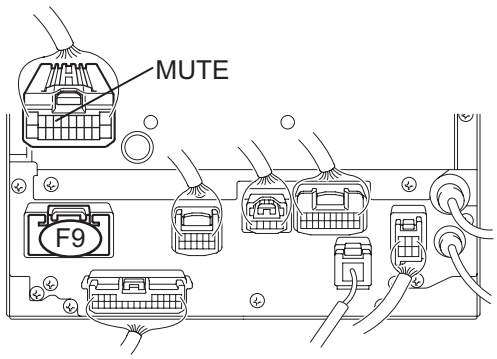
Standard resistance

Tester connection	Condition	Specified condition
MUTE (F9-7) - MUTE (F19-1)	Always	Below 1 Ω
MUTE - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

3	INSPECT STEREO COMPONENT AMPLIFIER (OUTPUT SIGNAL)

Wire Harness View:



(a) Reconnect the stereo component amplifier connector F19.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
MUTE - Body ground	Turn ignition switch on (ACC) Audio system is playing	Above 3.5 V

NG → **REPLACE STEREO COMPONENT AMPLIFIER**

OK → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

AVC-LAN Circuit

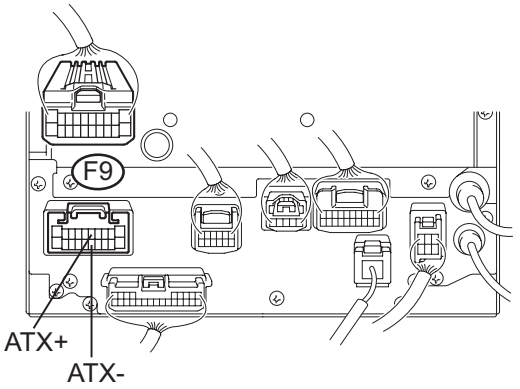
DESCRIPTION

Each unit of the navigation system connected to the AVC-LAN (communication bus) transfers the signal of each switch by communication.
When a short to +B or short to ground occurs in this AVC-LAN, the navigation system will not function normally as the communication is discontinued.

INSPECTION PROCEDURE

1	INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F19-5) - ATX- (F19-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

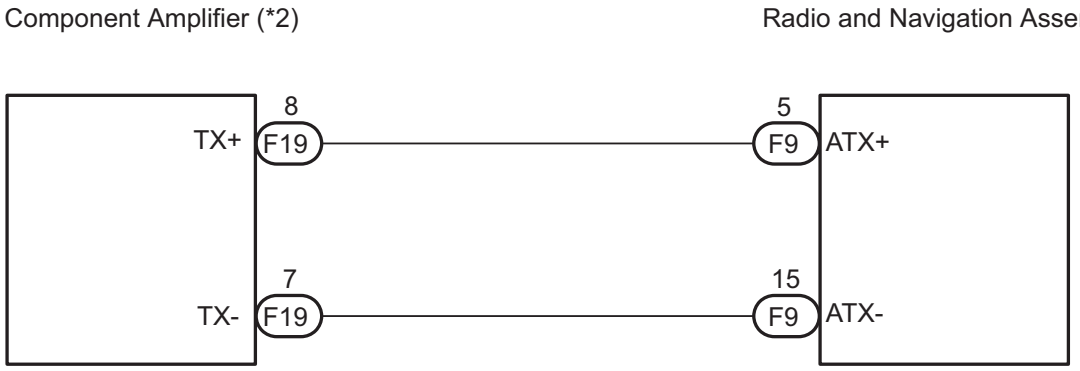
OK

2	CHECK HARNESS AND CONNECTOR

HINT:
For details of the connectors, refer to "TERMINALS OF ECU" (See page NS-45).

(a) Referring to the AVC-LAN wiring diagram below, check all AVC-LAN circuits.
  (1) Disconnect all connectors in all AVC-LAN circuits.
  (2) Check for an open or short in all AVC-LAN circuits.

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P

E111831E09

OK:
There is no open or short circuit.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

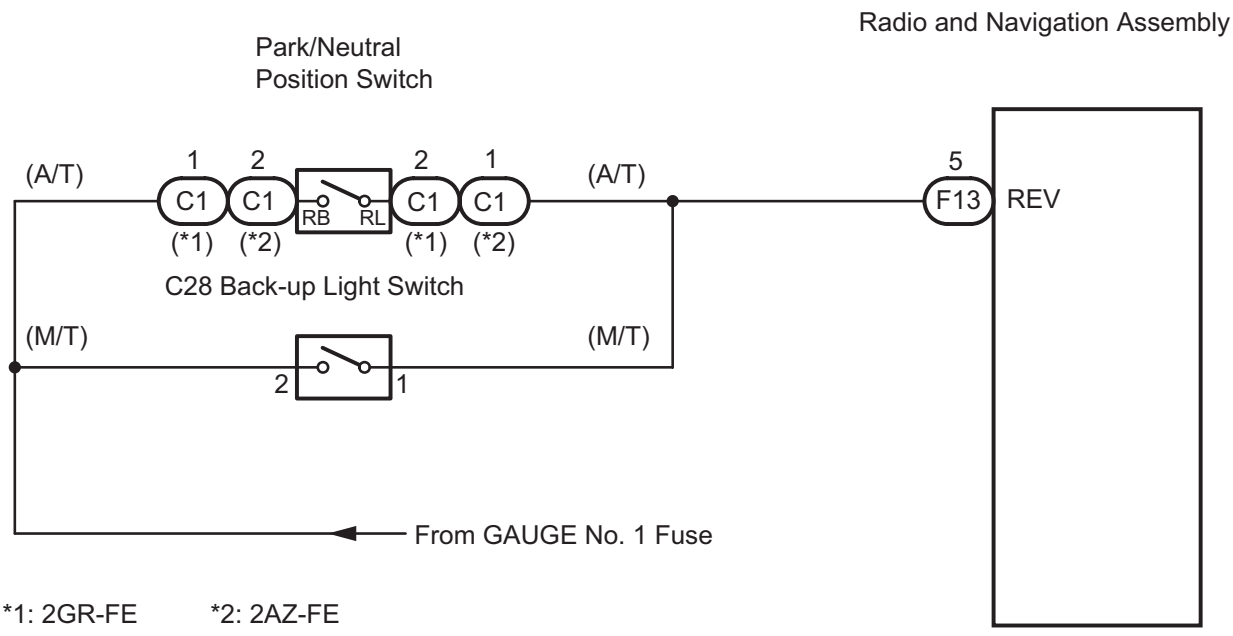
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Reverse Signal Circuit

DESCRIPTION

The radio and navigation assembly receives a reverse signal from the park/neutral position switch and information about the GPS antenna, and then adjusts vehicle position.

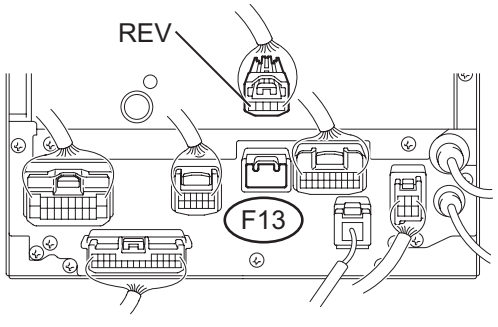
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector F13.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
REV - Body ground	Ignition switch on (IG). Shift lever is moved to R position.	10 to 14 V
REV - Body ground	Ignition switch on (IG). Shift lever is moved to any position except R.	Below 1 V

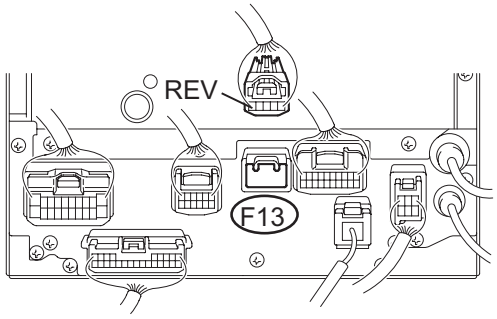
OK → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

NG

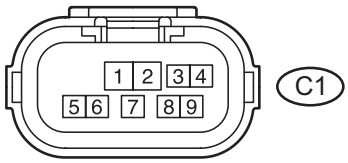
NS

2	CHECK HARNESS AND CONNECTOR

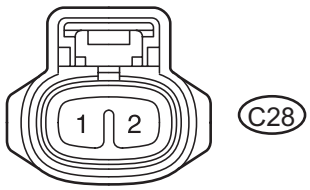
Radio and Navigation Assembly Wire Harness View:



Park/Neutral Position Switch Connector Front View:



Back-up Light Switch Connector Front View:



P E129830E02

(a) Disconnect the radio and navigation assembly connector F13 and park/neutral position switch connector C1 or back-up light switch connector C28.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
REV - C1-1 (*1)	Always	Below 1 Ω
REV - C1-2 (*2)	Always	Below 1 Ω
REV - C28-1 (*3)	Always	Below 1 Ω
REV - Body ground	Always	10 kΩ or higher

*1: 2AZ-FE, A/T
*2: 2GR-FE, A/T
*3: M/T

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK VEHICLE TYPE

(a) Choose type to be inspected.

NS

Result

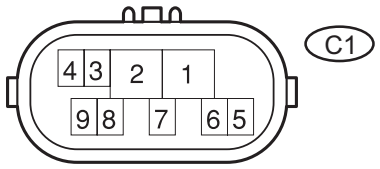
Type	Go to step
A/T	A
M/T	B

B → **Go to step 5**

A

4 INSPECT PARK/NEUTRAL POSITION SWITCH

Park/Neutral Position Switch:



(a) Disconnect the park/neutral position switch connector C1.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
C1-1 - C1-2	Shift lever is moved to R.	Below 1 Ω
C1-1 - C1-2	Shift lever is moved to any position except R.	10 kΩ or higher

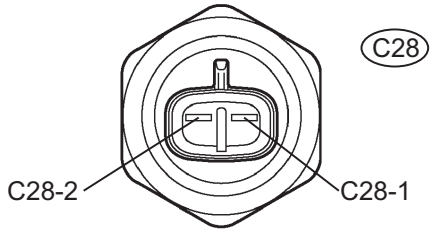
NG → **REPLACE PARK/NEUTRAL POSITION SWITCH**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

5 INSPECT BACK-UP LIGHT SWITCH

Back-up Light Switch:



(a) Disconnect the buck-up light switch connector C28.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
C28-1 - C28-2	Shift lever is moved to R.	Below 1 Ω
C28-1 - C28-2	Shift lever is moved to any position except R.	10 kΩ or higher

NG → **REPLACE BACK-UP LIGHT SWITCH**

NS

OK

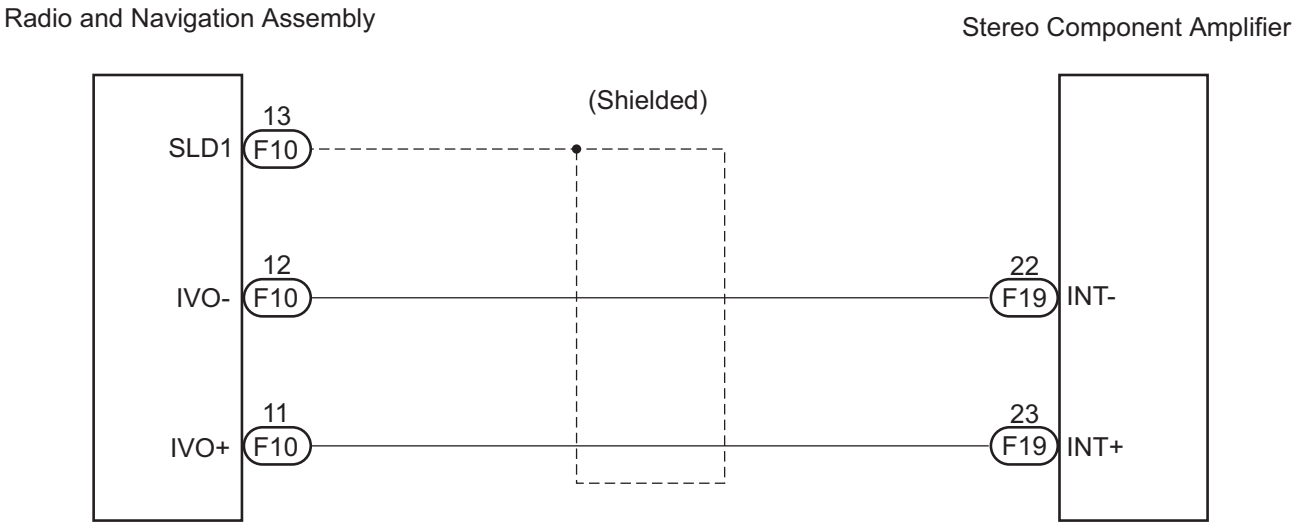
REPAIR OR REPLACE HARNESS OR CONNECTOR

Navigation Voice Circuit

DESCRIPTION

This circuit is used when the voice guidance in the navigation system is on.

WIRING DIAGRAM



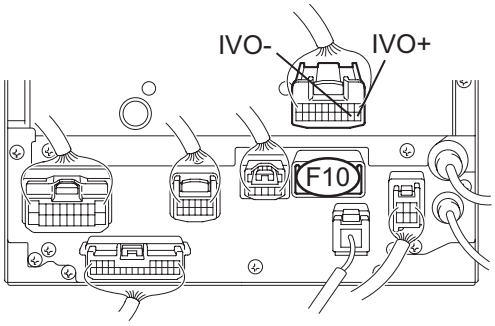
H

E119672E03

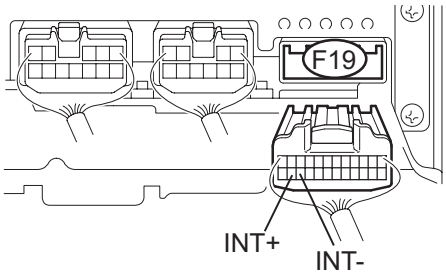
INSPECTION PROCEDURE

1	**CHECK HARNESS AND CONNECTOR (RADIO AND NAVIGATION ASSEMBLY - STEREO COMPONENT AMPLIFIER)**

Radio and Navigation Assembly Wire Harness View:



Stereo Component Amplifier Wire Harness View:



P E129824E01

(a) Disconnect the radio and navigation assembly connector F10 and stereo component amplifier connector F19.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
IVO+ - INT+	Always	Below 1 Ω
IVO- - INT-	Always	Below 1 Ω
IVO+ - Body ground	Always	10 kΩ or higher
IVO- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

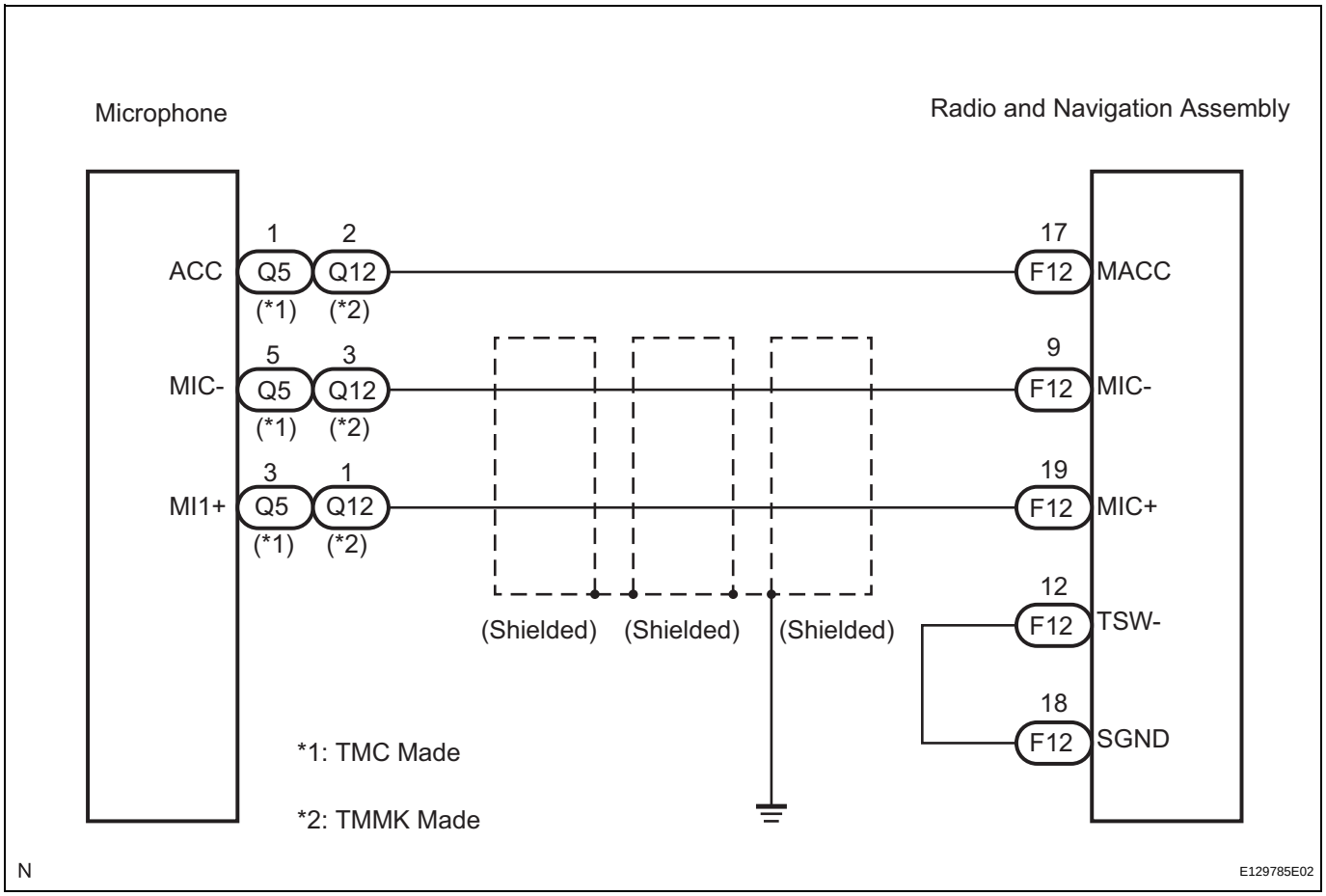
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Microphone Circuit between Microphone and Radio and Navigation Assembly

DESCRIPTION

This circuit sends a microphone signal from the microphone to the radio and navigation assembly. It also supplies power from the radio and navigation assembly to the microphone.

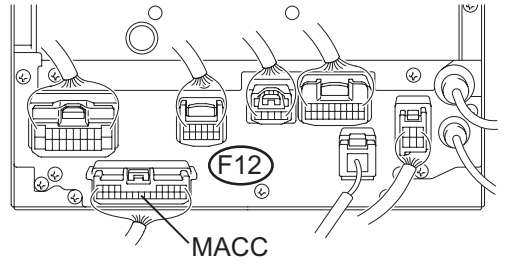
WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

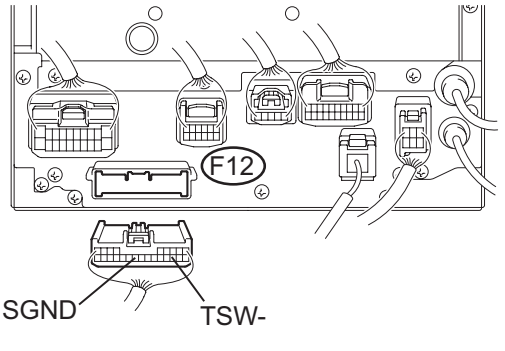
Tester connection	Condition	Specified condition
MACC - Body ground	Ignition SW on (ACC)	4 to 6 V

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

2 CHECK HARNESS AND CONNECTOR

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector F12.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

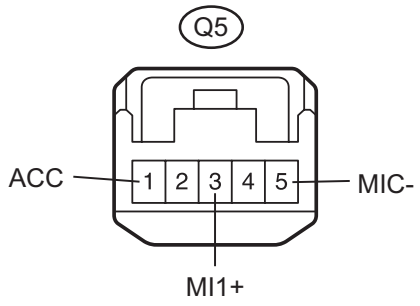
Tester connection	Condition	Specified condition
SGND - TSW-	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

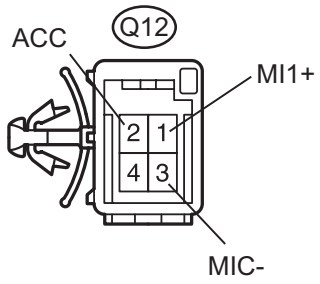
OK

3	CHECK HARNESS AND CONNECTOR (MICROPHONE - RADIO AND NAVIGATION ASSEMBLY)

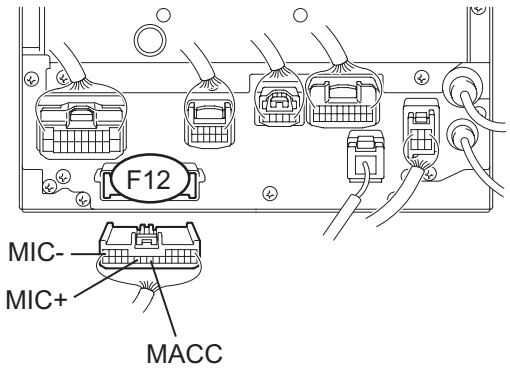
Microphone Connector Front View (TMC Made):



Microphone Connector Front View (TMMK Made):



Radio and Navigation Assembly Wire Harness View:



P E131896E01

(a) Disconnect the microphone connector Q5 or Q12 and radio and navigation assembly connector F12.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ACC - MACC	Always	Below 1 Ω
MI1+ - MIC+	Always	Below 1 Ω
MIC- - MIC-	Always	Below 1 Ω
MACC - Body ground	Always	10 kΩ or higher
MIC+ - Body ground	Always	10 kΩ or higher
MIC- - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

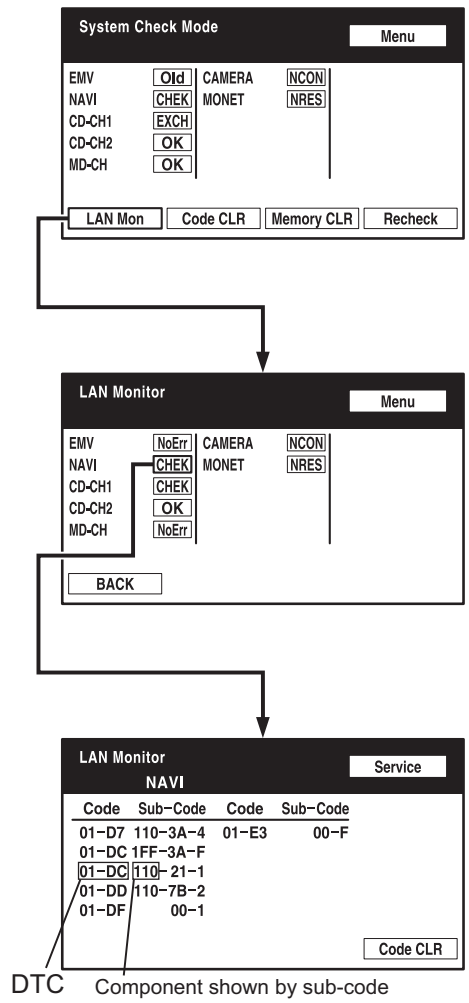
NS

Stereo Component Amplifier Communication Error

INSPECTION PROCEDURE

1 IDENTIFY THE COMPONENT SHOWN BY SUB-CODE

Example:



(a) Enter the diagnostic mode.
(b) Press the "LAN Mon" switch to change to "LAN Monitor" mode.
(c) Identify the component shown by the sub-code.
HINT:
- "110 (multi-display)" is the component shown by the sub-code in the example shown in the illustration.
- The sub-code will be indicated by its physical address.
- For the component list, refer to "DIAGNOSIS DISPLAY DETAILED DESCRIPTION" (See page NS-30).

NEXT

2 CHECK POWER SOURCE CIRCUIT OF COMPONENT SHOWN BY SUB-CODE

(a) Inspect the power source circuit of the component shown by the sub-code.
If the power source circuit is operating normally, proceed to the next step.

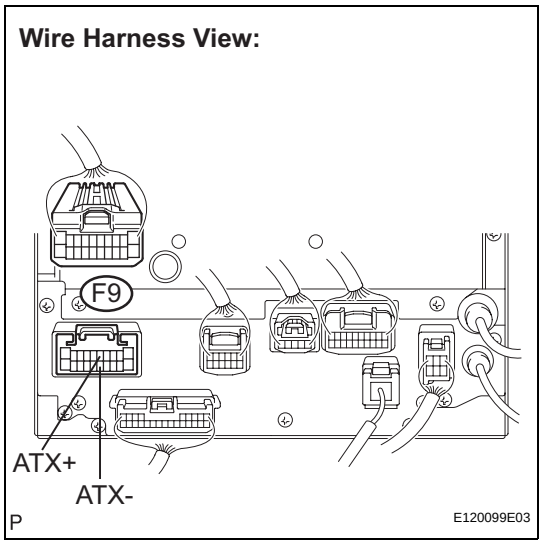
Component Table:

Component	Proceed to
Radio and navigation assembly (140)	Radio and navigation assembly power source circuit (See page NS-191)

NS

NEXT

3	CHECK RADIO AND NAVIGATION ASSEMBLY



(a) Disconnect the radio and navigation assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F9-5) - ATX- (F9-15)	Always	60 to 80 Ω

NG → REPLACE RADIO AND NAVIGATION ASSEMBLY

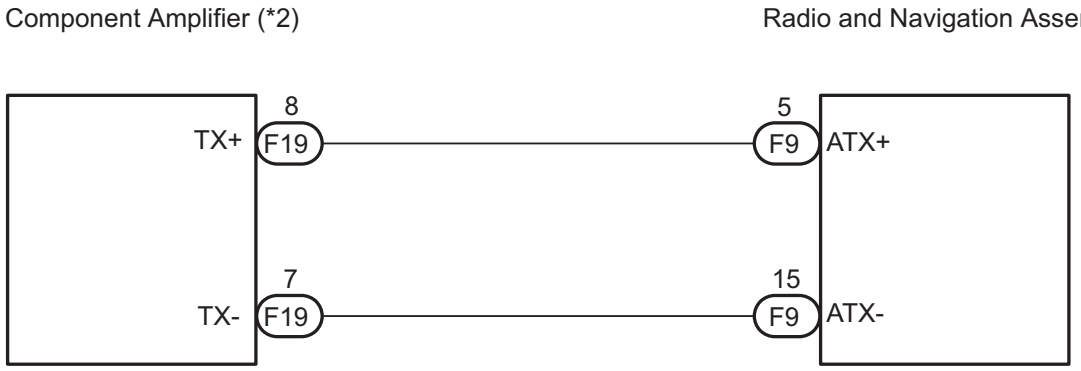
OK

4	CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER - COMPONENT SHOWN BY SUB-CODE)

HINT:
- Start the check from the circuit that is near the component shown by the sub-code first.
- For details of the connectors, refer to "TERMINALS OF ECU" (See page NS-45).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the stereo component amplifier and the component shown by the sub-code.
  (1) Disconnect all connectors between the stereo component amplifier and the component shown by the sub-code.
  (2) Check for an open or short in the AVC-LAN circuit between the stereo component amplifier and the component shown by the sub-code.

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P

E111831E09

OK:
There is no open or short circuit.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	**REPLACE COMPONENT SHOWN BY SUB-CODE**

(a) Replace the component shown by the sub-code with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE STEREO COMPONENT AMPLIFIER**

OK

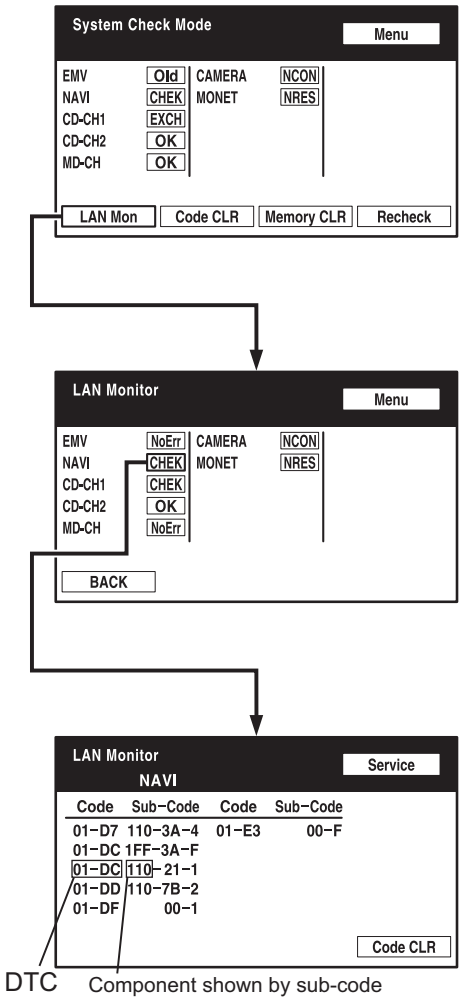
END

Radio and Navigation Assembly Communication Error

INSPECTION PROCEDURE

1 IDENTIFY THE COMPONENT SHOWN BY SUB-CODE

Example:



(a) Enter the diagnostic mode.
(b) Press the "LAN Mon" switch to change to "LAN Monitor" mode.
(c) Identify the component shown by the sub-code.
HINT:
- "110 (multi-display)" is the component shown by the sub-code in the example shown in the illustration.
- The sub-code will be indicated by its physical address.
- For the component list, refer to "DIAGNOSIS DISPLAY DETAILED DESCRIPTION" (See page NS-30).

NEXT

2 CHECK POWER SOURCE CIRCUIT OF COMPONENT SHOWN BY SUB-CODE

(a) Inspect the power source circuit of the component shown by the sub-code.
If the power source circuit is operating normally, proceed to the next step.

Component Table:

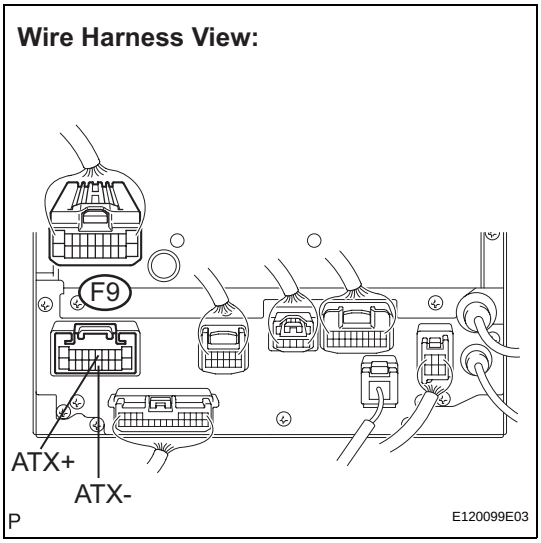
Component	Proceed to
Stereo component amplifier (440)	Stereo component amplifier power source circuit (See page AV-142)

NS

NEXT

3	CHECK RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
ATX+ (F9-5) - ATX- (F9-15)	Always	60 to 80 Ω

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

4	CHECK HARNESS AND CONNECTOR

HINT:

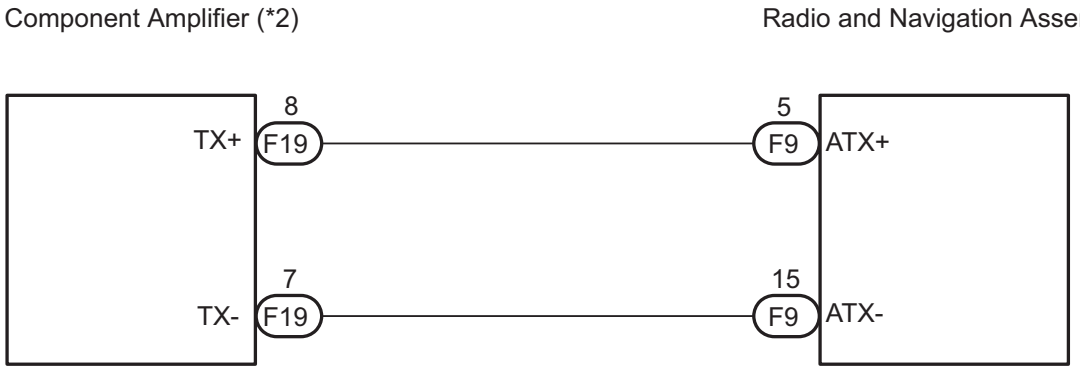
- Start the check from the circuit that is near the component shown by the sub-code first.
- For details of the connectors, refer to "TERMINALS OF ECU" (See page NS-45).

(a) Referring to the AVC-LAN wiring diagram below, check the AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code.

(1) Disconnect all connectors between the radio and navigation assembly and the component shown by the sub-code.

(2) Check for an open or short in the AVC-LAN circuit between the radio and navigation assembly and the component shown by the sub-code.

AVC-LAN WIRING DIAGRAM



*1: Master Unit

*2: Slave Unit

P E111831E09

OK:
There is no open or short circuit.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	**REPLACE COMPONENT SHOWN BY SUB-CODE**

(a) Replace the component shown by the sub-code with a normal one and check if the same problem occurs again.
OK:
Same problem does not occur.

NG → **REPLACE RADIO AND NAVIGATION ASSEMBLY**

OK

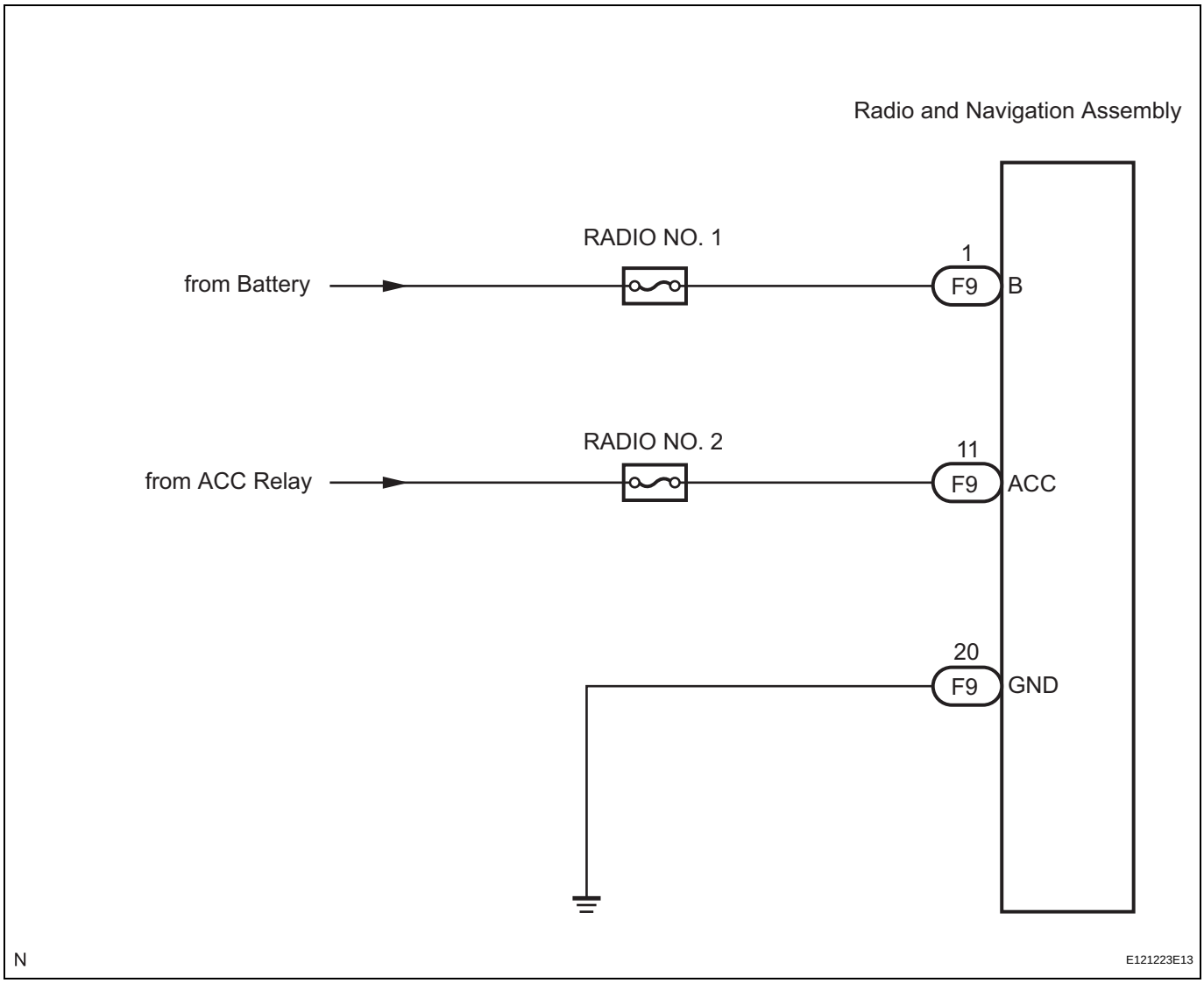
END

Radio and Navigation Assembly Power Source Circuit

DESCRIPTION

This is the power source circuit to operate the radio and navigation assembly.

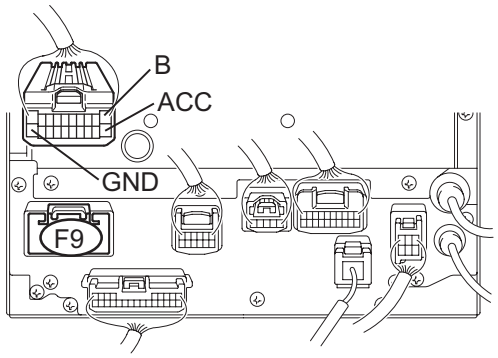
WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT RADIO AND NAVIGATION ASSEMBLY

Wire Harness View:



(a) Disconnect the radio and navigation assembly connector F9.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
GND - Body ground	Always	Below 1 Ω

(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
B - GND	Always	10 to 14 V
ACC - GND	Ignition SW on (ACC)	10 to 14 V

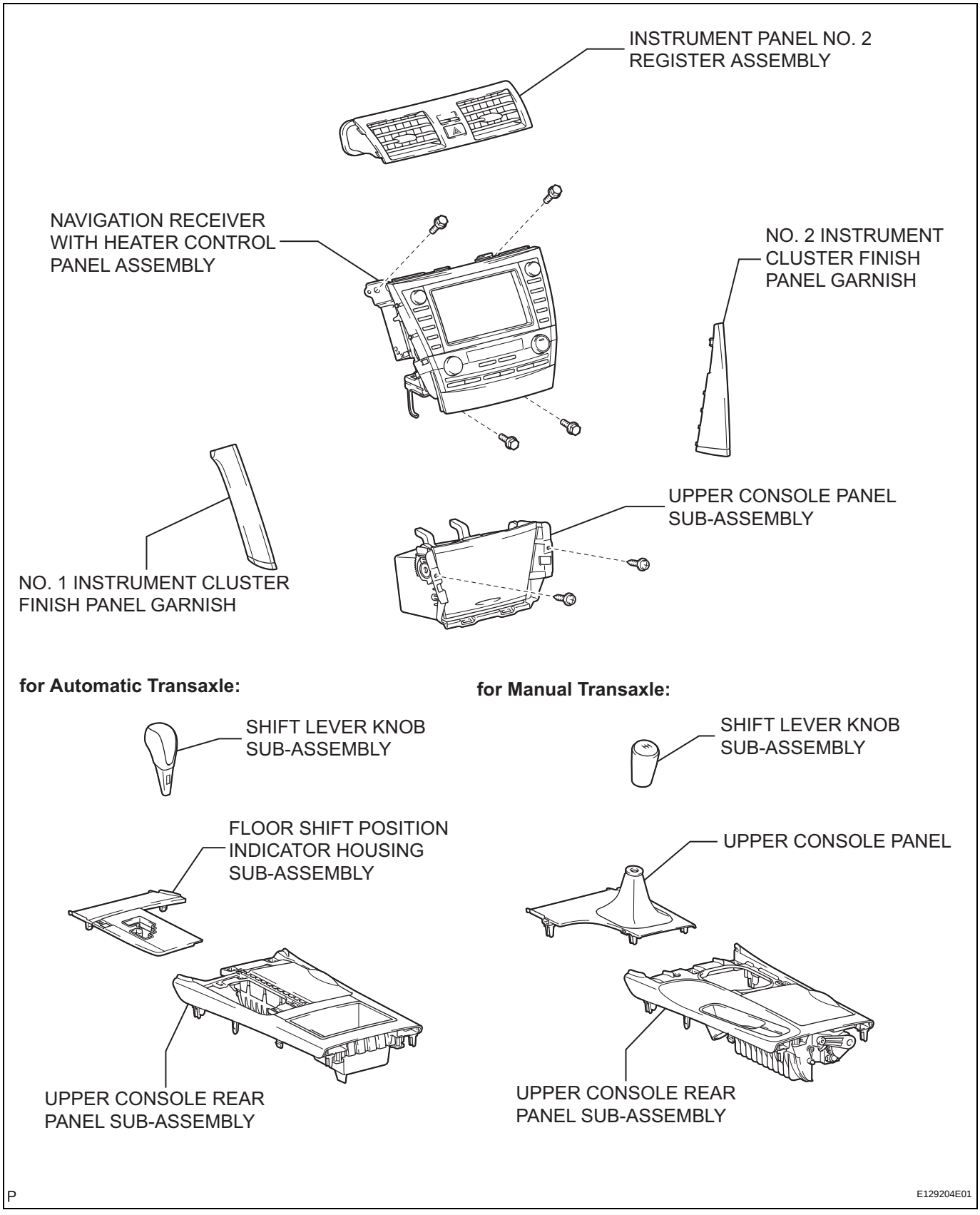
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

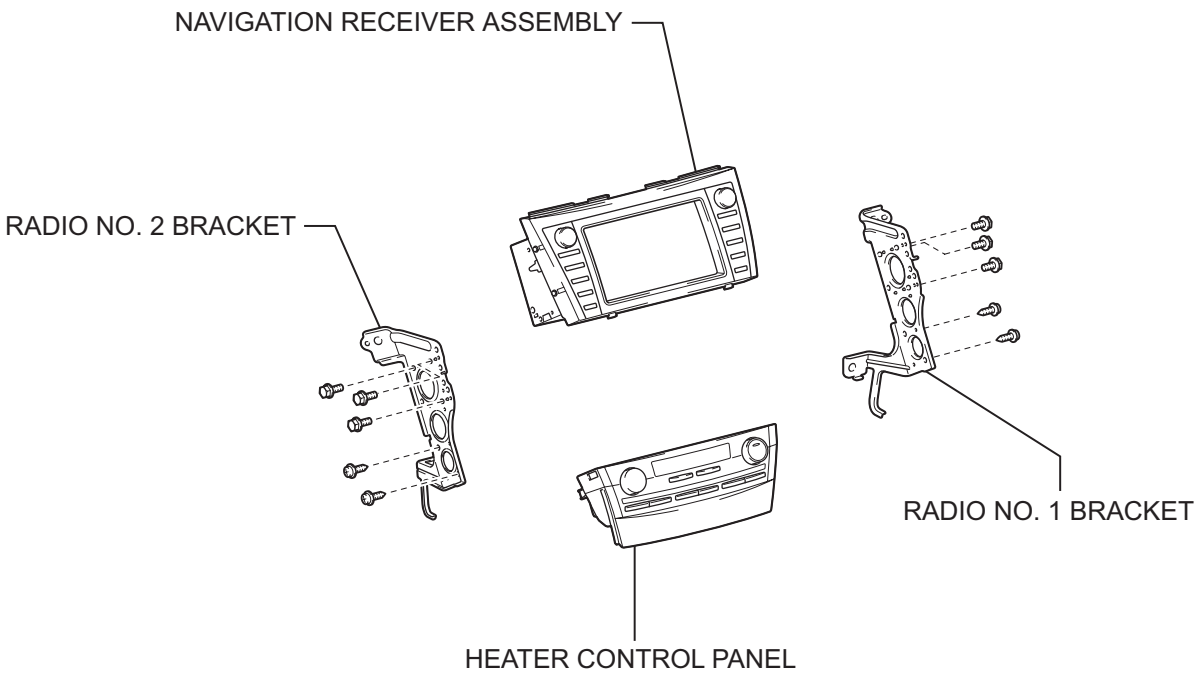
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

MULTI-DISPLAY

COMPONENTS

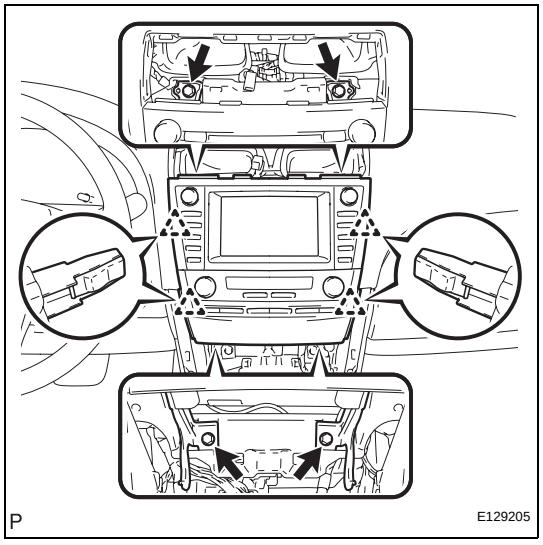


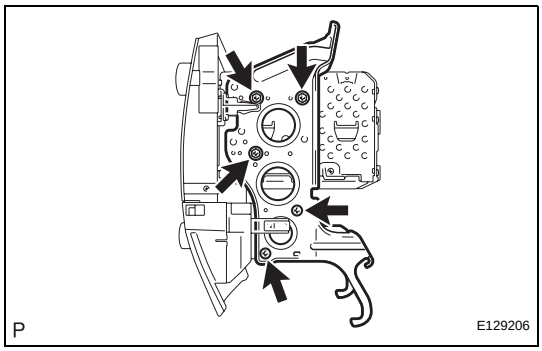
NS


NAVIGATION RECEIVER ASSEMBLY
RADIO NO. 2 BRACKET
RADIO NO. 1 BRACKET
HEATER CONTROL PANEL
P
E129972E01

REMOVAL

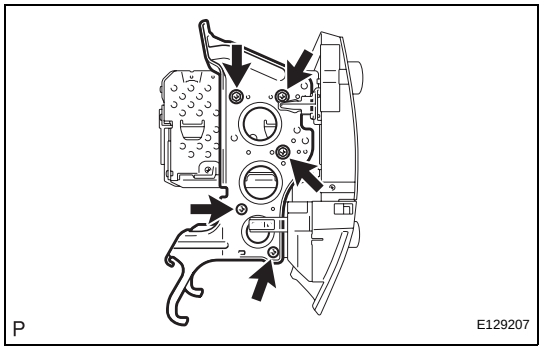
1. **EJECT MAP DISC**
   (a) Turn the ignition switch on (ACC).
   (b) Push the "CLOSE" button.
   (c) Touch "MAP EJECT" on the navigation screen to eject the map disc.
2. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
3. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
4. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
5. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
6. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
7. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
8. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
9. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
10. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-27)**
11. **REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)**
12. **REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY**
    (a) Remove the 4 bolts.
    (b) Pull the navigation receiver with heater control panel assembly toward the rear of the vehicle and disengage the 4 clips.
    (c) Disconnect each connector and remove the navigation receiver with heater control panel assembly.





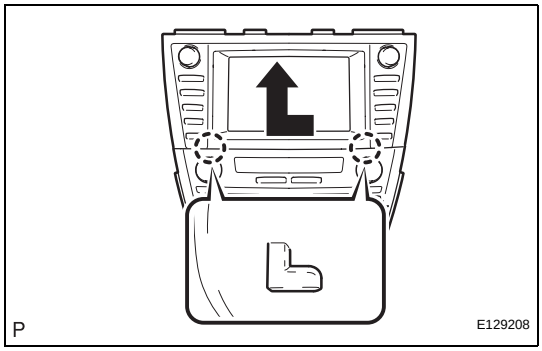
13. REMOVE RADIO NO. 1 BRACKET

(a) Remove the 5 bolts and radio No. 1 bracket.



14. REMOVE RADIO NO. 2 BRACKET

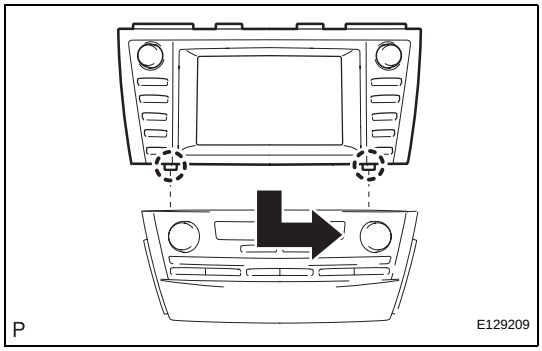
(a) Remove the 5 bolts and radio No. 2 bracket.



15. REMOVE NAVIGATION RECEIVER ASSEMBLY

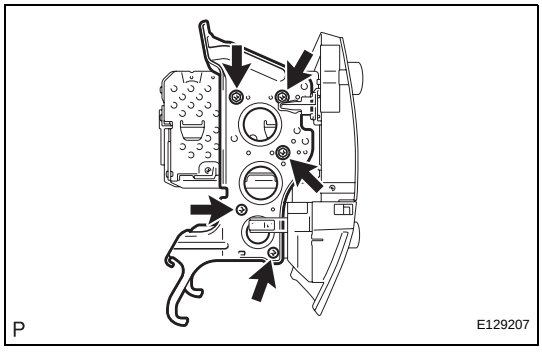
(a) Remove the navigation receiver assembly as shown in the illustration.

INSTALLATION



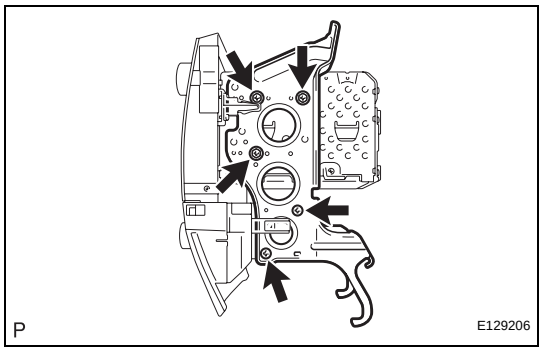
1. INSTALL NAVIGATION RECEIVER ASSEMBLY

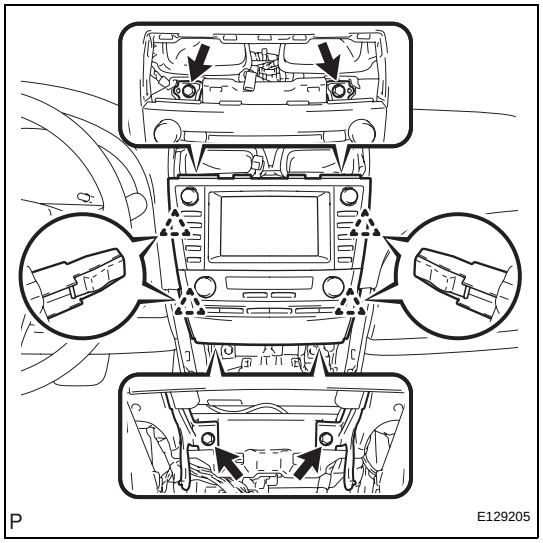
(a) Install the navigation receiver assembly as shown in the illustration.



2. INSTALL RADIO NO. 2 BRACKET

(a) Install the radio No. 2 bracket with the 5 bolts.





3. **INSTALL RADIO NO. 1 BRACKET**
   (a) Install the radio No. 1 bracket with the 5 bolts.

4. **INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY**
   (a) Connect each connector.
   (b) Engage the 4 clips.
   (c) Install the navigation receiver with heater control panel assembly with the 4 bolts.

5. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)**

6. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-52)**

7. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**

8. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**

9. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**

10. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**

11. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**

12. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**

13. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**

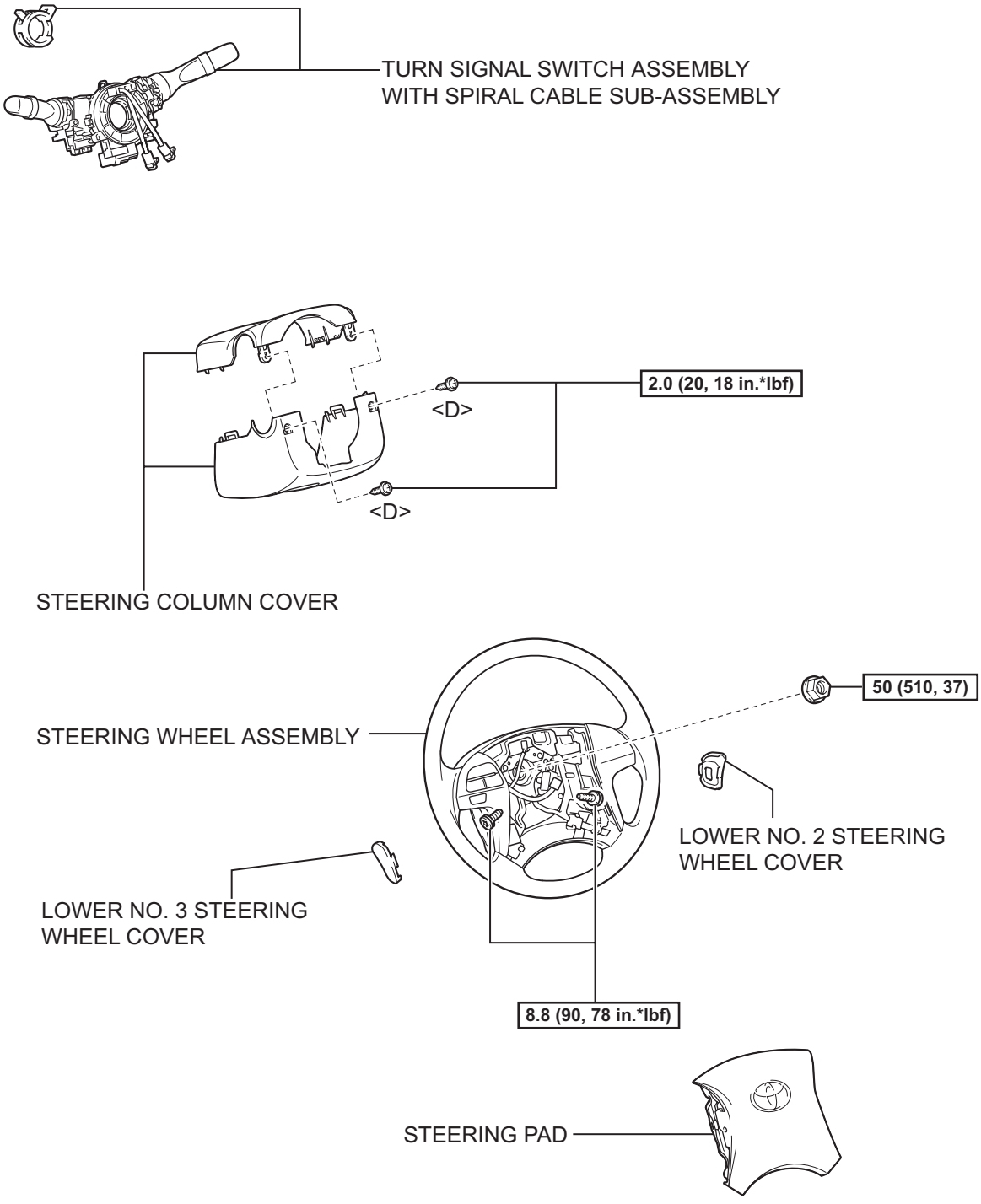
14. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**

15. **INSERT MAP DISC**

NAVIGATION ANTENNA CORD

COMPONENTS

for TMC Made:



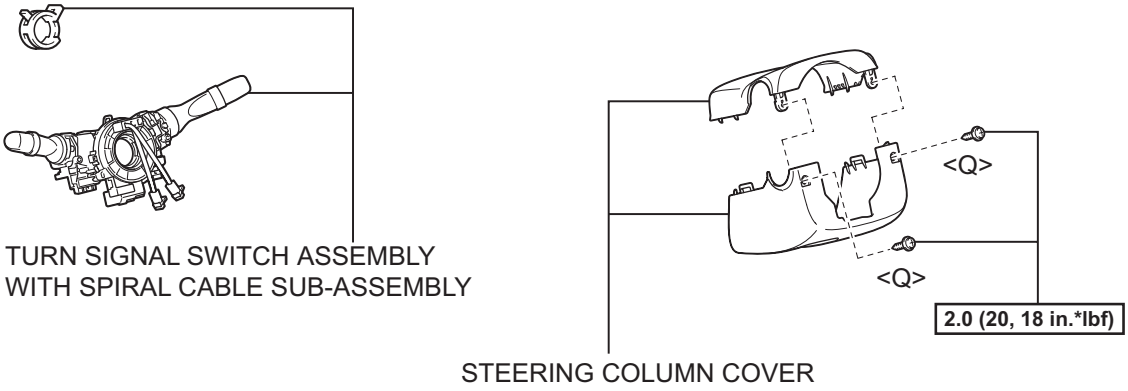
N*m (kgf*cm, ft.*lbf) : Specified torque

P

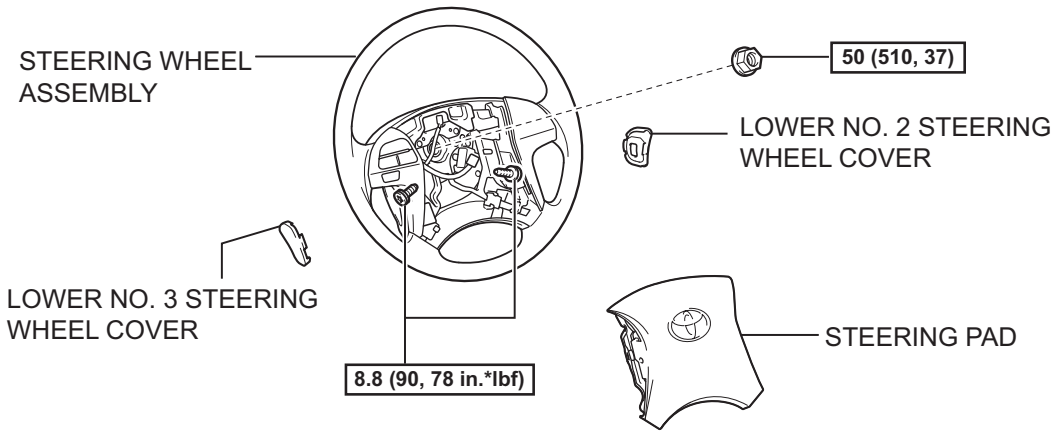
B137279E01

NS

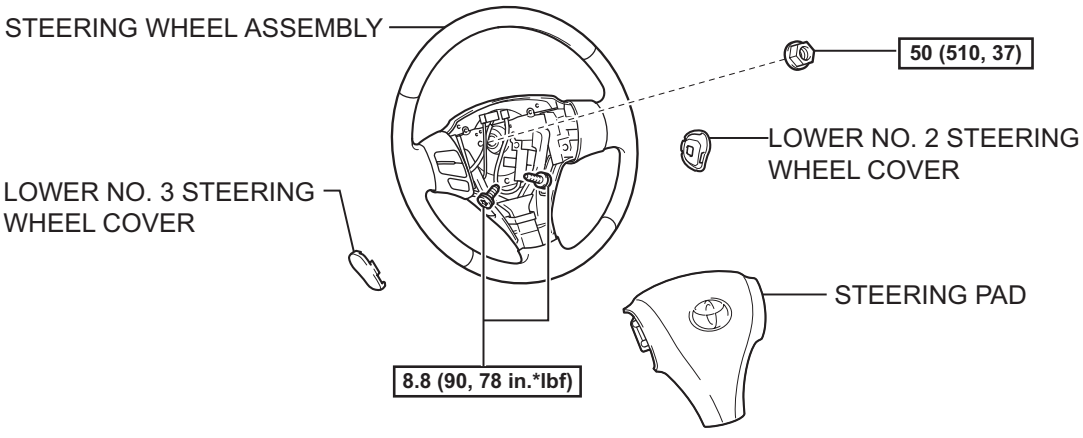
for TMMK Made:



for 4 Spoke:



for 3 Spoke:



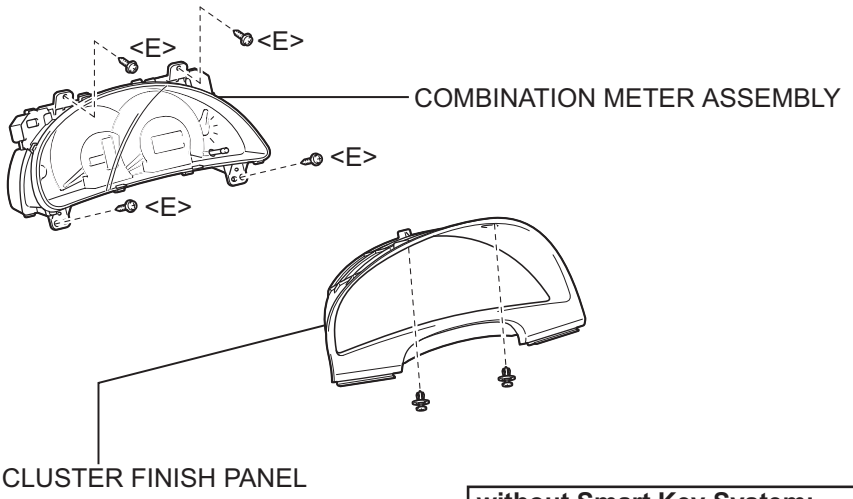
NS

N*m (kgf*cm, ft.*lbf) : Specified torque

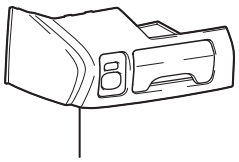
P

B137280E01

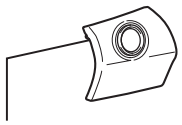
for TMC Made:

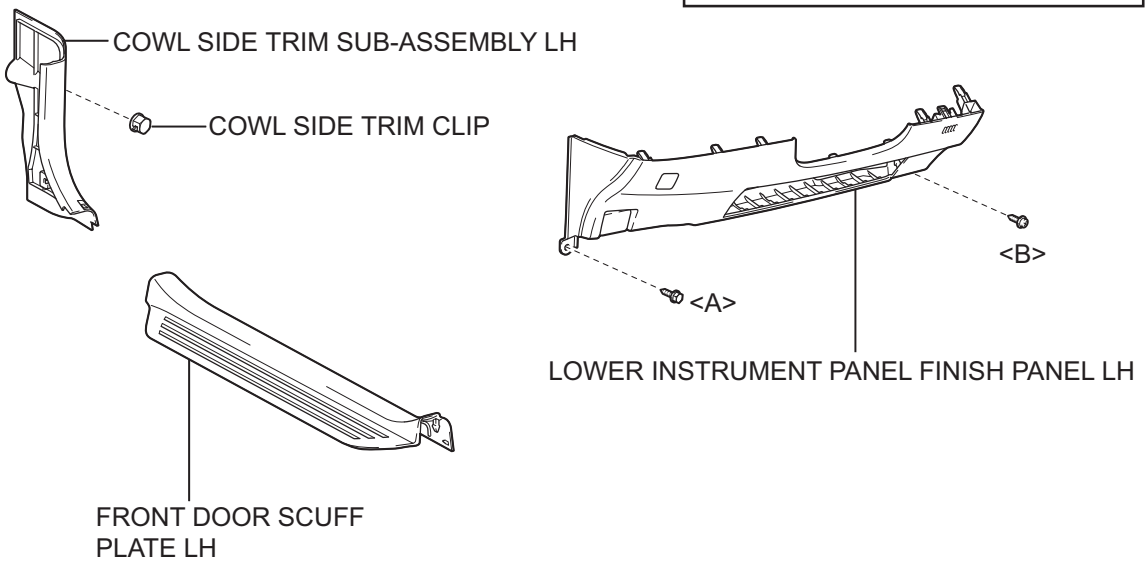


without Smart Key System:



with Smart Key System:





NS

P

B137281E01

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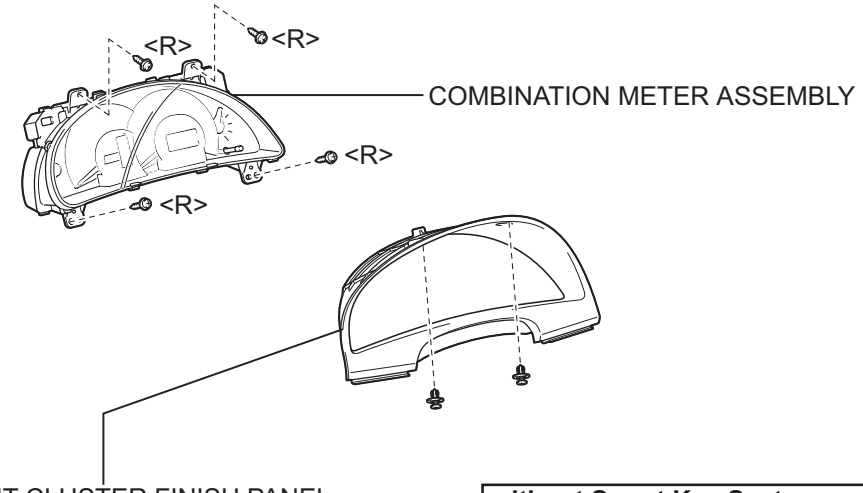
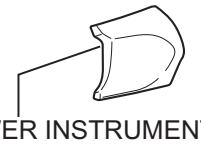
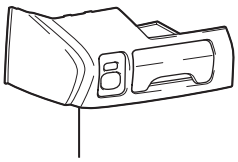
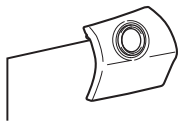


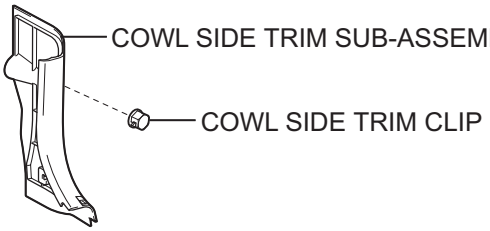
without Smart Key System:

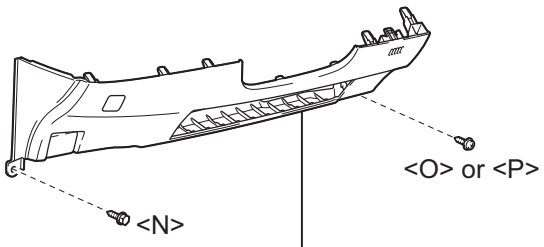


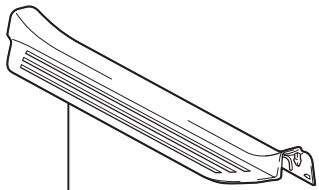


with Smart Key System:







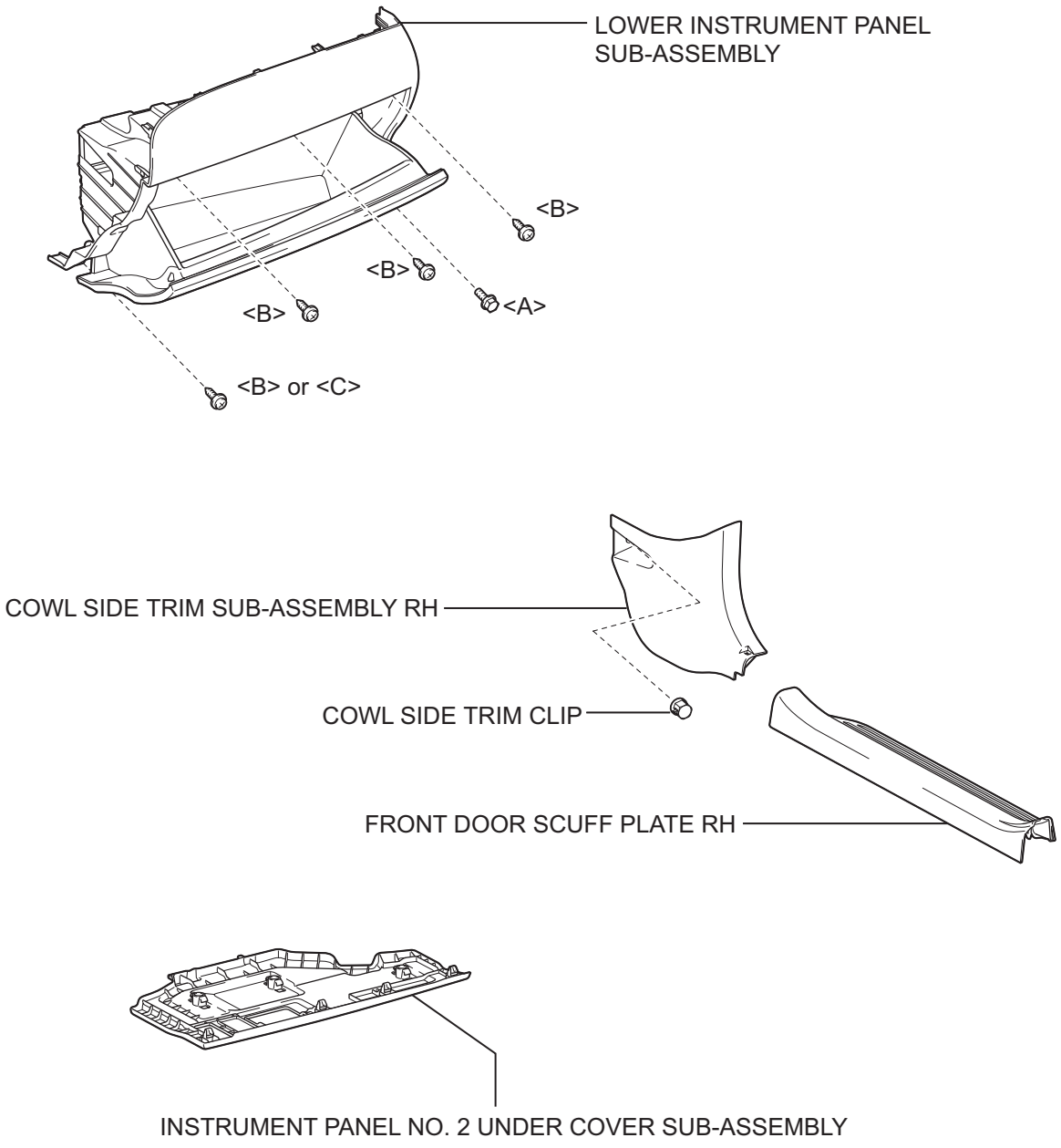


NS

P

B137281E03

for TMC Made:



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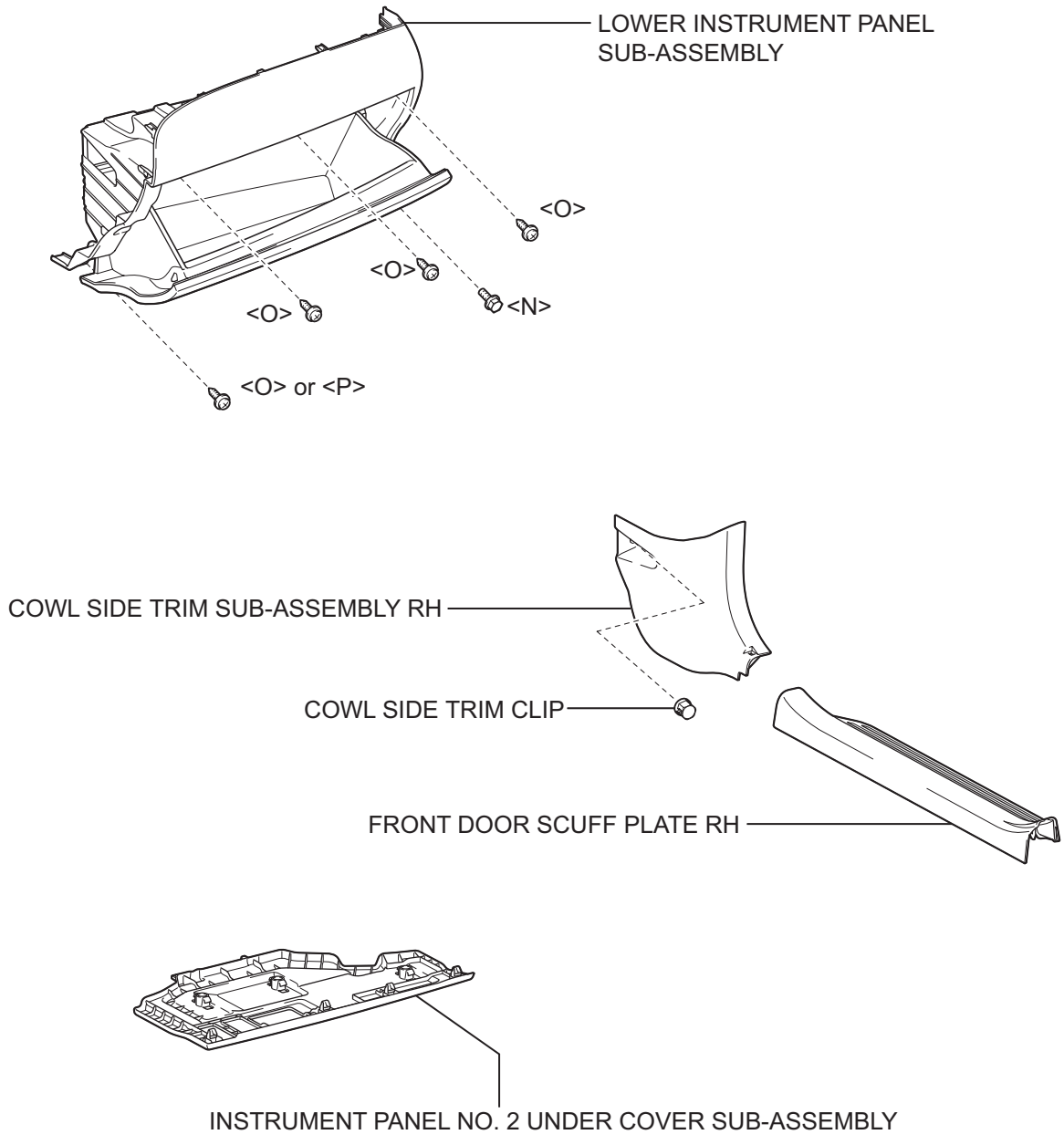
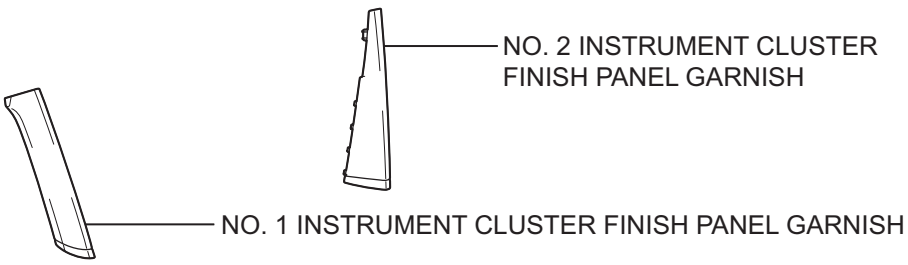
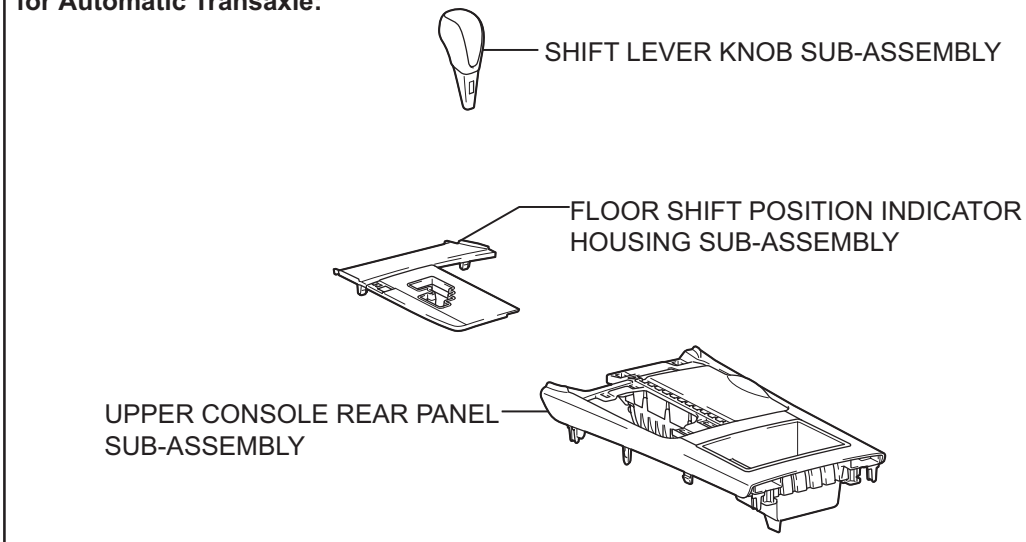
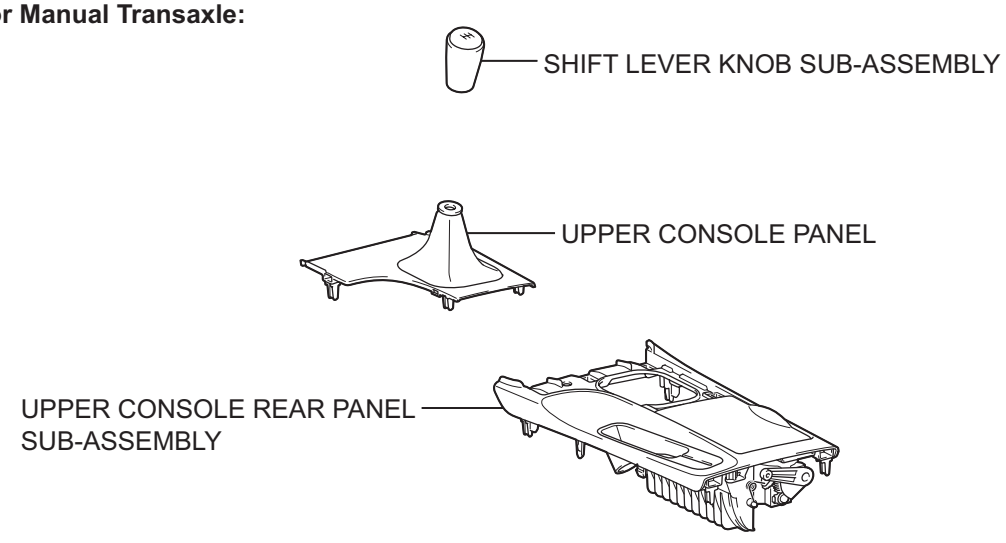




for Automatic Transaxle:



for Manual Transaxle:



NS

P

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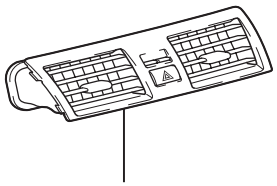
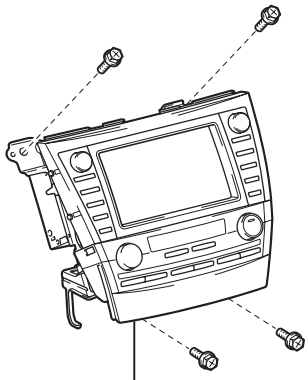
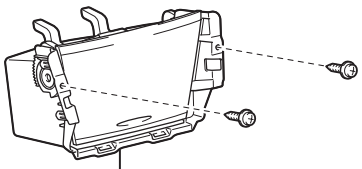


INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY



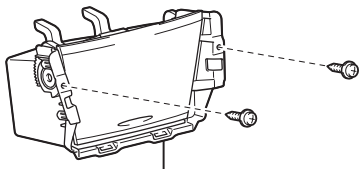
NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY

for TMC Made:



UPPER CONSOLE PANEL SUB-ASSEMBLY

for TMMK Made:

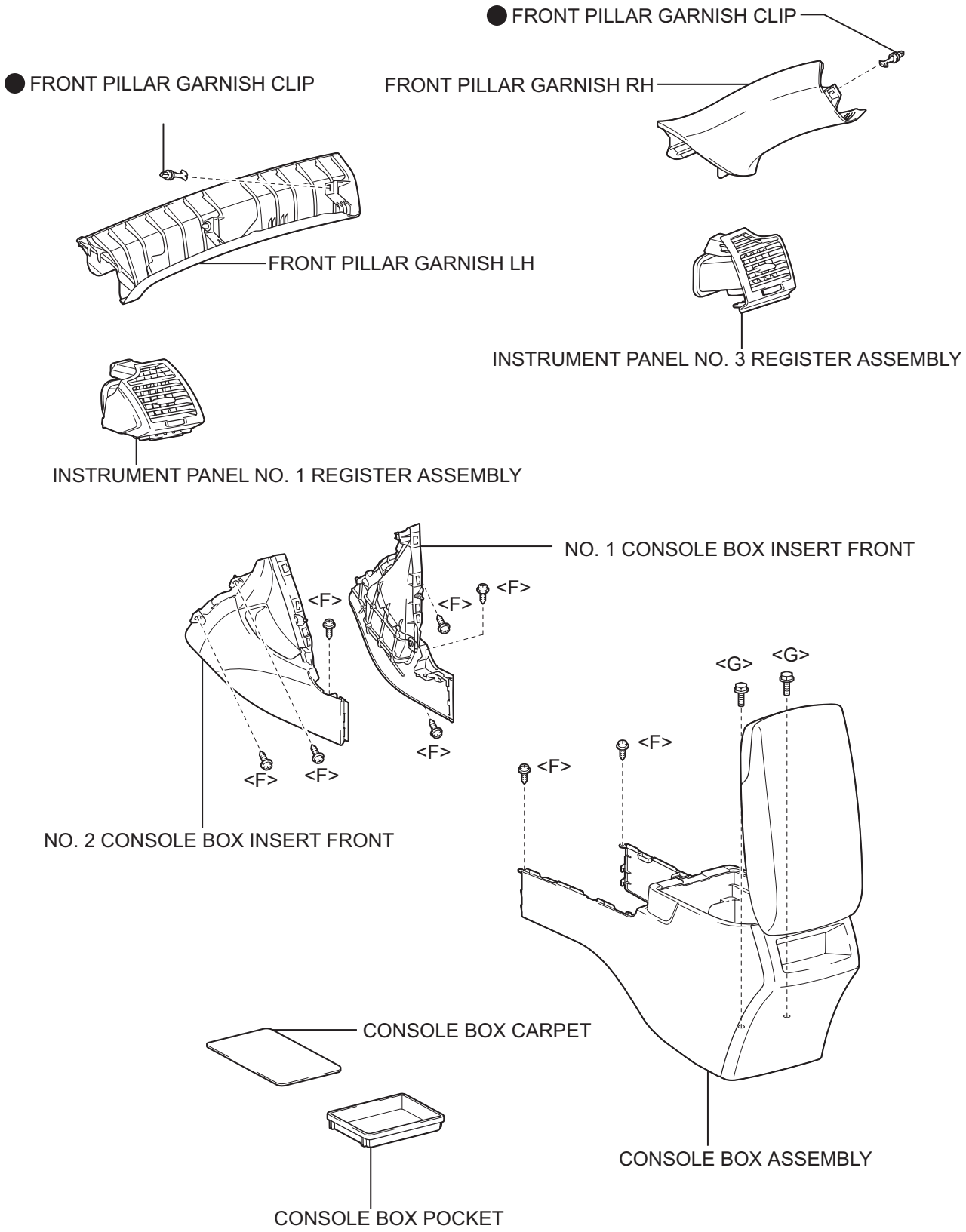


UPPER CONSOLE PANEL SUB-ASSEMBLY

P

E133838E01

for TMC Made:



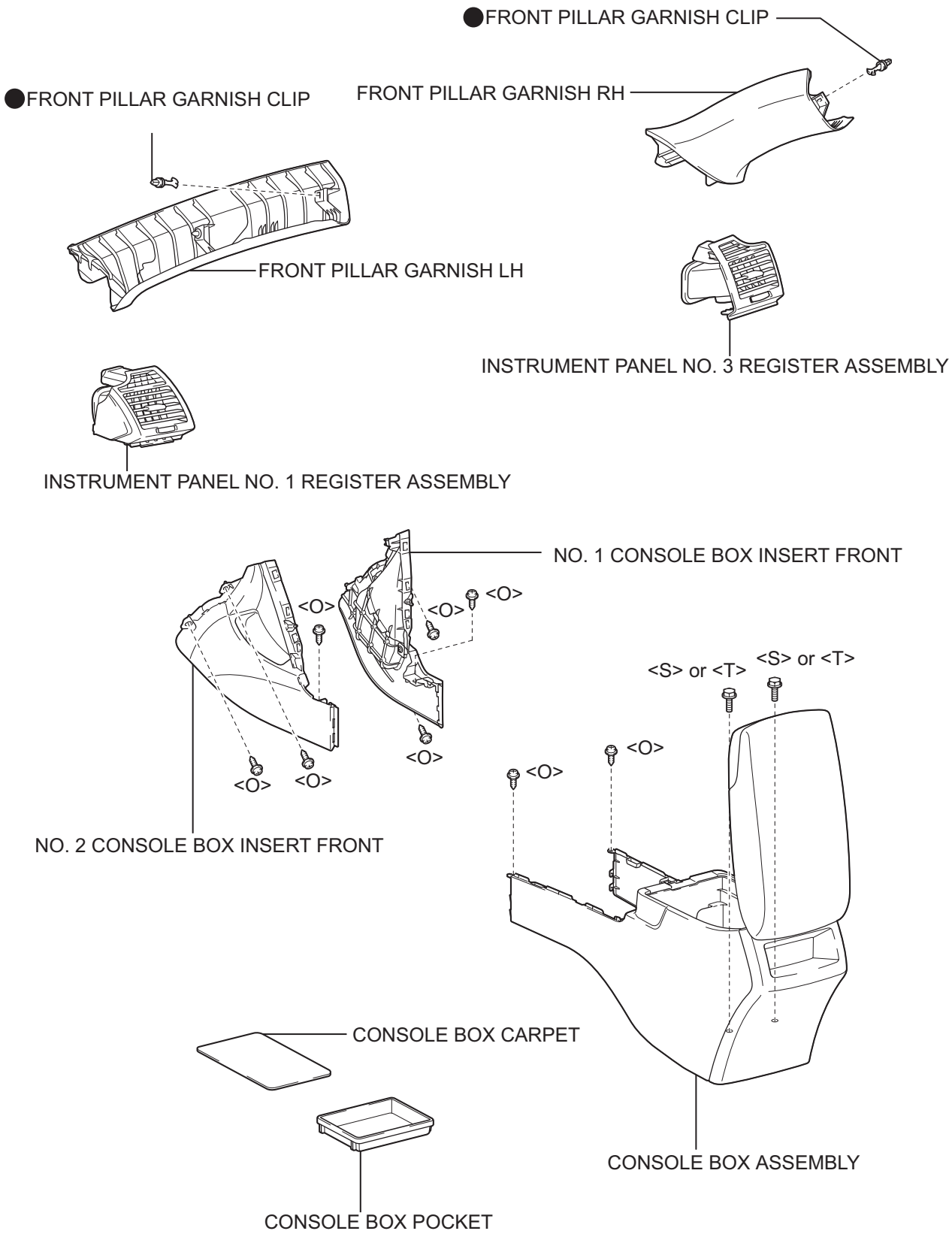
● Non-reusable part

P

B137285E01

NS

for TMMK Made:



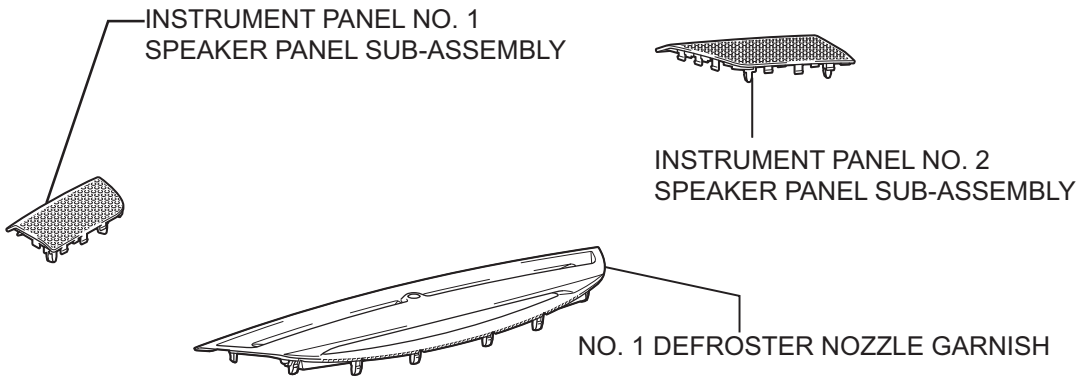
● Non-reusable part

P

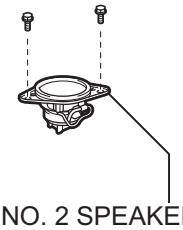
B137285E03

NS

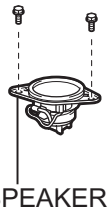
for TMC Made:

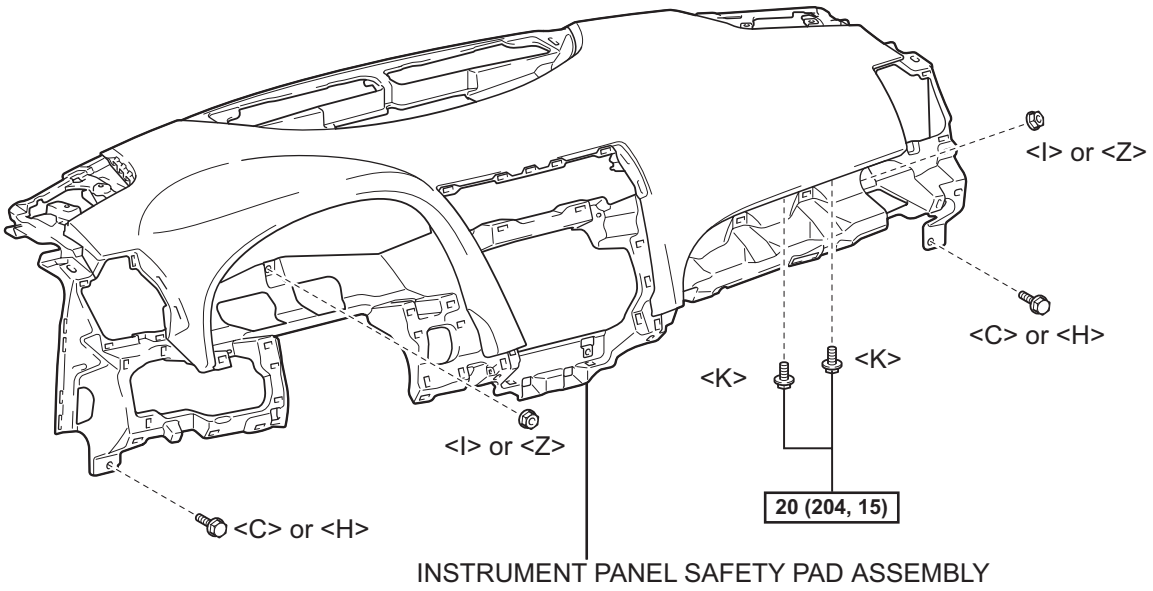


for LH Side:



for RH Side:





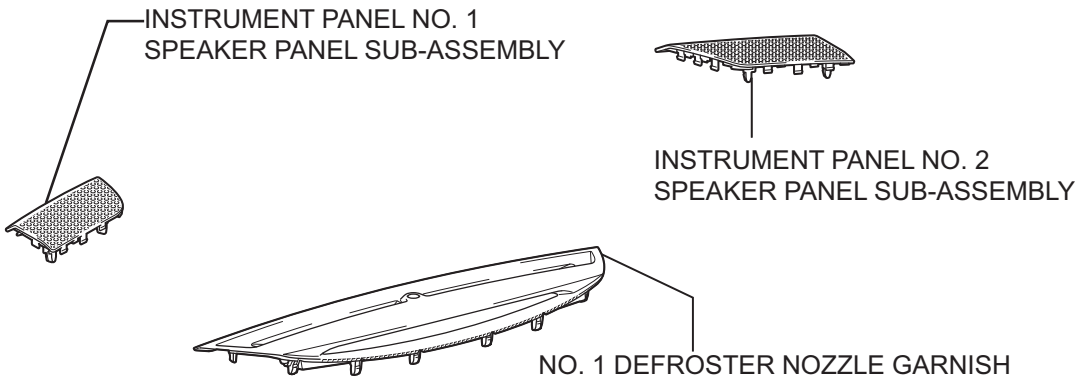
NS

N*m (kgf*cm, ft.*lbf) : Specified torque

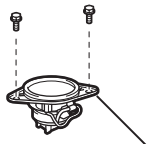
P

B137286E01

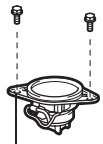
for TMMK Made:

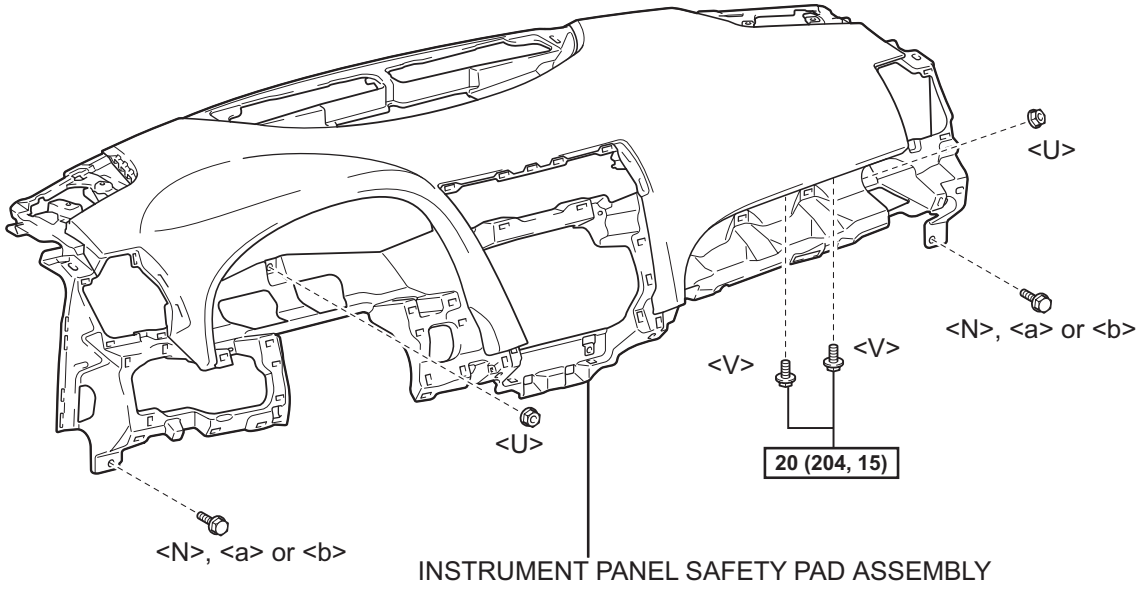


for LH Side:



for RH Side:



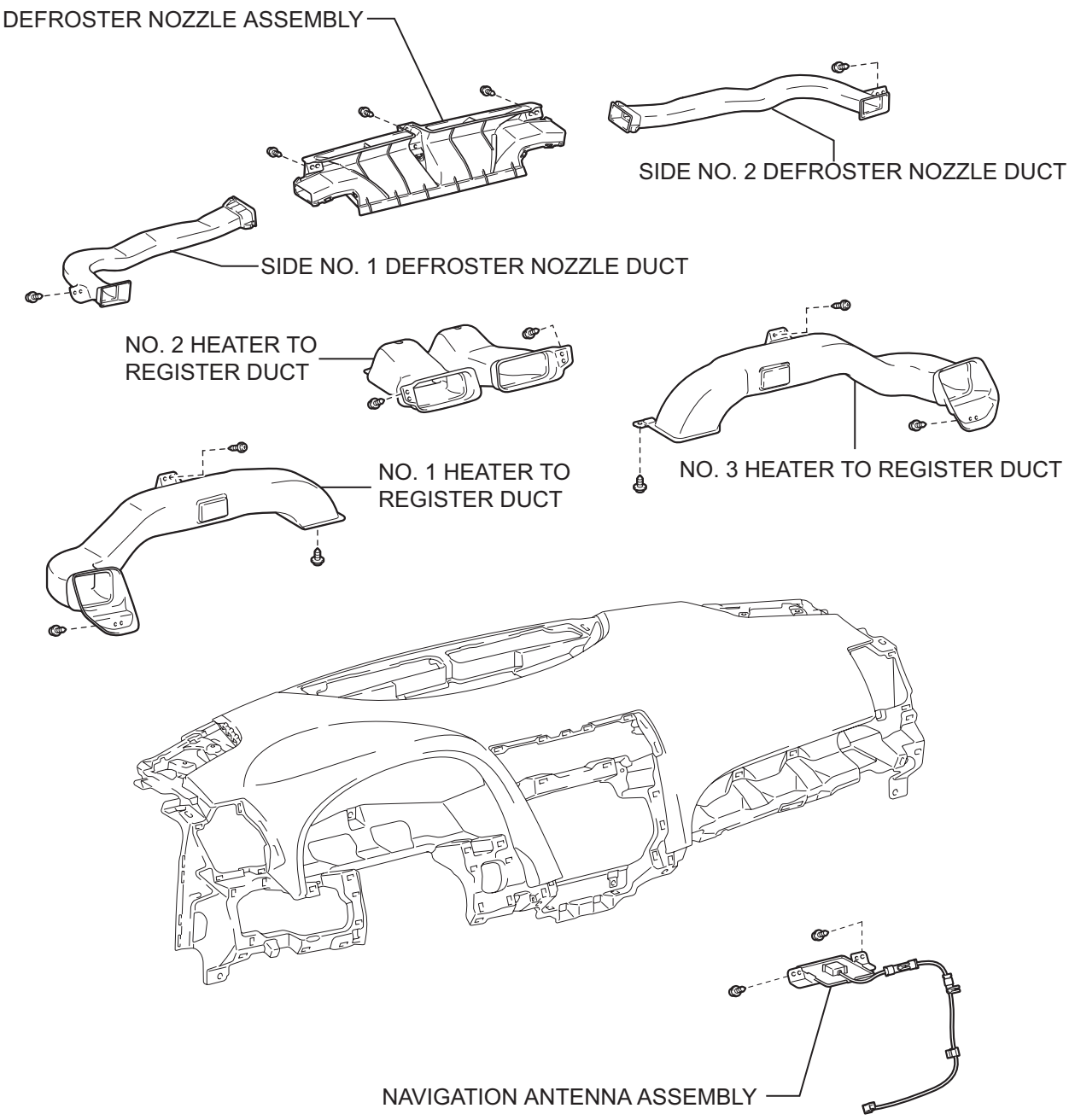


NS

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137286E03


DEFROSTER NOZZLE ASSEMBLY
SIDE NO. 2 DEFROSTER NOZZLE DUCT
SIDE NO. 1 DEFROSTER NOZZLE DUCT
NO. 2 HEATER TO REGISTER DUCT
NO. 3 HEATER TO REGISTER DUCT
NO. 1 HEATER TO REGISTER DUCT
NAVIGATION ANTENNA ASSEMBLY
P
E129932E01

REMOVAL

1. **PRECAUTION**
   (See page IP-1)
2. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
4. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)**
5. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)**
6. **REMOVE STEERING PAD (See page RS-350)**
7. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
8. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
9. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
11. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
12. **REMOVE STEERING COLUMN COVER (for TMC Made) (See page IP-21)**
13. **REMOVE STEERING COLUMN COVER (for TMMK Made) (See page IP-21)**
14. **REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)**
15. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
16. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
17. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
18. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)**
19. **REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)**
20. **REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)**
21. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**

22. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH**
23. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**
24. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**
25. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**
26. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
27. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
28. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
29. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
30. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
31. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
32. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
33. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
34. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)**
35. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)**
36. **REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)**
37. **REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-195)**
38. **REMOVE CONSOLE BOX POCKET (See page IP-28)**
39. **REMOVE CONSOLE BOX CARPET (See page IP-28)**
40. **REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)**
41. **REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)**
42. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)**
43. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

44. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)**
45. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**
46. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**
47. **REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-31)**
48. **REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-31)**
49. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**
50. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**
51. **REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-31)**
52. **REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-32)**
53. **REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**
    HINT:
    Use the same procedures for the RH side and the LH side (See page AV-156).
54. **REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-32)**
55. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-32)**
56. **REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-34)**
57. **REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-37)**
58. **REMOVE SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-37)**
59. **REMOVE SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-38)**
60. **REMOVE SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-38)**
61. **REMOVE DEFROSTER NOZZLE ASSEMBLY (for TMC Made) (See page IP-38)**
62. **REMOVE DEFROSTER NOZZLE ASSEMBLY (for TMMK Made) (See page IP-38)**
63. **REMOVE NO. 1 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-38)**
64. **REMOVE NO. 1 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-39)**

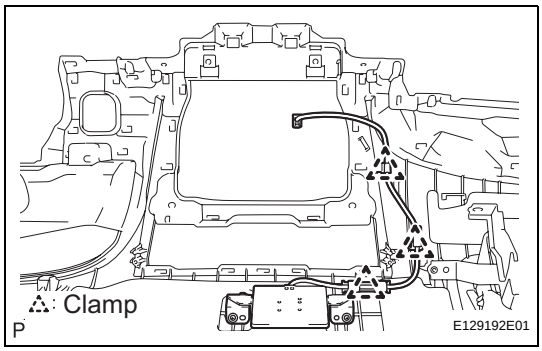
65. **REMOVE NO. 3 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-39)**

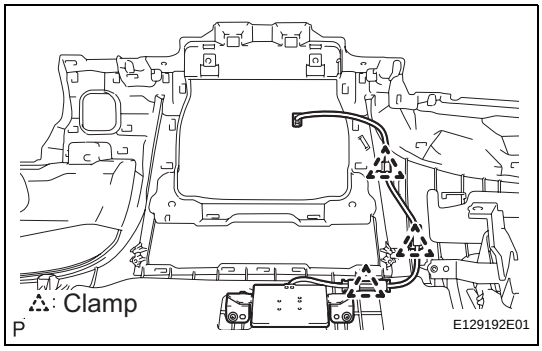
66. **REMOVE NO. 3 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-39)**

67. **REMOVE NO. 2 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-39)**

68. **REMOVE NO. 2 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-39)**

69. **REMOVE NAVIGATION ANTENNA ASSEMBLY**
    (a) Disengage the 3 clamps.
    (b) Remove the 2 screws and navigation antenna assembly.





INSTALLATION

1. **INSTALL NAVIGATION ANTENNA ASSEMBLY**
    (a) Install the navigation antenna assembly with the 2 screws.
    (b) Engage the 3 clamps.

2. **INSTALL NO. 2 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-41)**

3. **INSTALL NO. 2 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-41)**

4. **INSTALL NO. 3 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-41)**

5. **INSTALL NO. 3 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-41)**

6. **INSTALL NO. 1 HEATER TO REGISTER DUCT (for TMC Made) (See page IP-42)**

7. **INSTALL NO. 1 HEATER TO REGISTER DUCT (for TMMK Made) (See page IP-42)**

8. **INSTALL DEFROSTER NOZZLE ASSEMBLY (for TMC Made) (See page IP-42)**

9. **INSTALL DEFROSTER NOZZLE ASSEMBLY (for TMMK Made) (See page IP-42)**

10. **INSTALL SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-42)**

11. **INSTALL SIDE NO. 2 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-43)**

12. **INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMC Made) (See page IP-43)**

13. **INSTALL SIDE NO. 1 DEFROSTER NOZZLE DUCT (for TMMK Made) (See page IP-43)**
14. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-44)**
15. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-45)**
16. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-48)**
17. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**
18. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-48)**
19. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-48)**
20. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**
21. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side)**
    HINT:
    Use the same procedures for the RH side and the LH side (See page AV-156).
22. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-49)**
23. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-49)**
24. **INSTALL FRONT PILLAR GARNISH RH (See page IR-52)**
25. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)**
26. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
27. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
28. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
29. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**
30. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
31. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
32. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
33. **INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (See page NS-196)**
34. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)**

35. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)**
36. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
37. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
38. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
39. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
40. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
41. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
42. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
43. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
44. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**
45. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
46. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
47. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
48. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
49. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
50. **INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)**
51. **INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)**
52. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)**
53. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
54. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
55. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**

56. **INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY**
57. **ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)**
58. **INSTALL STEERING COLUMN COVER (for TMC Made) (See page IP-58)**
59. **INSTALL STEERING COLUMN COVER (for TMMK Made) (See page IP-58)**
60. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
61. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
62. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
63. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
64. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)**
65. **INSTALL STEERING PAD (See page RS-350)**
66. **INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)**
67. **INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)**
68. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
69. **INSPECT STEERING PAD (See page RS-352)**
70. **INSPECT SRS WARNING LIGHT**
(See page RS-32)

PARKING BRAKE SYSTEM

PROBLEM SYMPTOMS TABLE

Use the table below to help determine the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

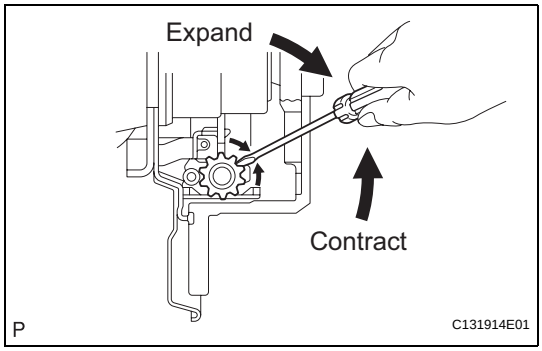
Symptom	Suspected area	See page
Brake drag	1. Parking brake lever travel (Out of adjustment)	PB-1
	2. Parking brake pedal travel (Out of adjustment)	PB-1
	3. Parking brake wire (Sticking) [No. 1 cable]	PB-48
	4. Parking brake wire (Sticking) [No. 2/No. 3 cable]	PB-48
	5. Parking brake shoe clearance (Out of adjustment)	PB-1
	6. Parking brake shoe lining (Cracked or distorted)	PB-60
	7. Tension or return spring (Damaged)	PB-58

ADJUSTMENT

1. REMOVE REAR WHEEL

2. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Temporarily install the hub nuts.
(b) Remove the shoe adjusting hole plug.

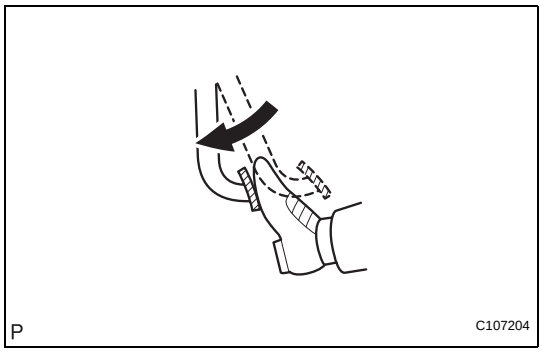


(c) Turn the shoe adjuster and expand the shoe until the disc locks.
(d) Turn and contract the shoe adjuster until the disc can rotate smoothly.
Standard:
Return 8 notches
(e) Check that there is no brake drag against the shoe.
(f) Install the shoe adjusting hole plug.
(g) Remove the hub nuts.

3. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

4. INSPECT PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle)

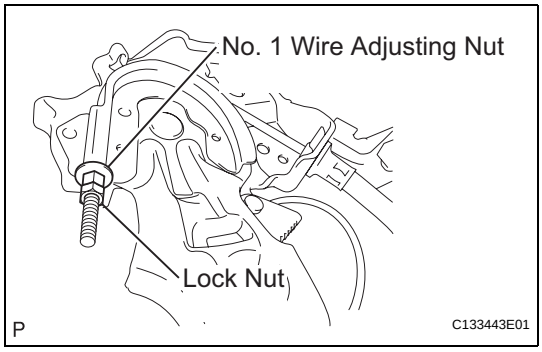
(a) Fully depress the parking brake pedal and release it to engage the parking brake.
(b) Depress the pedal to the floor again, and release it to disengage the parking brake.



(c) Slowly depress the parking brake pedal to the floor, and count the number of clicks.
Parking brake pedal travel:
7 to 10 notches at 300 N (31 kgf, 67 lbf)

5. ADJUST PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle)

(a) Depress the parking brake pedal. Hold the No. 1 wire adjusting nut using a wrench and loosen the lock nut.
(b) Release the parking brake pedal.

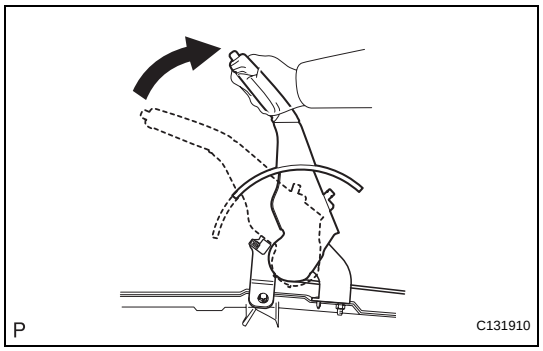


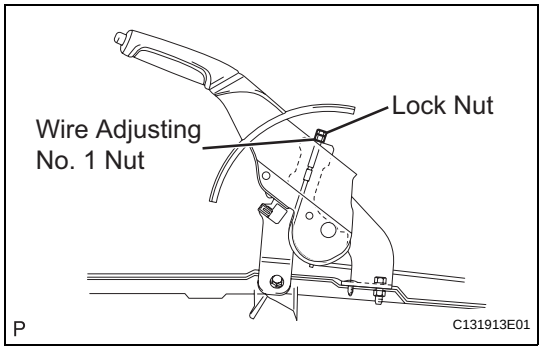
(c) Turn the No. 1 wire adjusting nut until the parking brake pedal travel meets the above specification.
(d) Hold the No. 1 wire adjusting nut using a wrench or an equivalent tool and tighten the lock nut.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
(e) Count the number of clicks after depressing and releasing the parking brake pedal 3 or 4 times.
(f) Check whether the parking brake drags.
(g) When operating the parking brake pedal, check that the parking brake indicator light comes on.

6. INSPECT PARKING BRAKE LEVER TRAVEL (for Manual Transaxle)

(a) Pull the parking brake lever firmly.
(b) Release the parking brake lock, and return the parking brake lever to its off position.

PB





(c) Slowly pull the parking brake lever all the way up, and count the number of clicks.
Parking brake lever travel:
7 to 9 notches at 200 N (20 kgf, 45 lbf)

7. ADJUST PARKING BRAKE LEVER TRAVEL (for Manual Transaxle)

(a) Pull up the parking brake lever. Hold the No. 1 wire adjusting nut using a wrench and loosen the lock nut.

(b) Release the parking brake lever.

(c) Turn the No. 1 wire adjusting nut until the parking brake lever travel meets the above specification.

(d) Hold the No. 1 wire adjusting nut using a wrench or an equivalent tool and tighten the lock nut.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

(e) Count the number of clicks after depressing and releasing the parking brake lever 3 or 4 times.

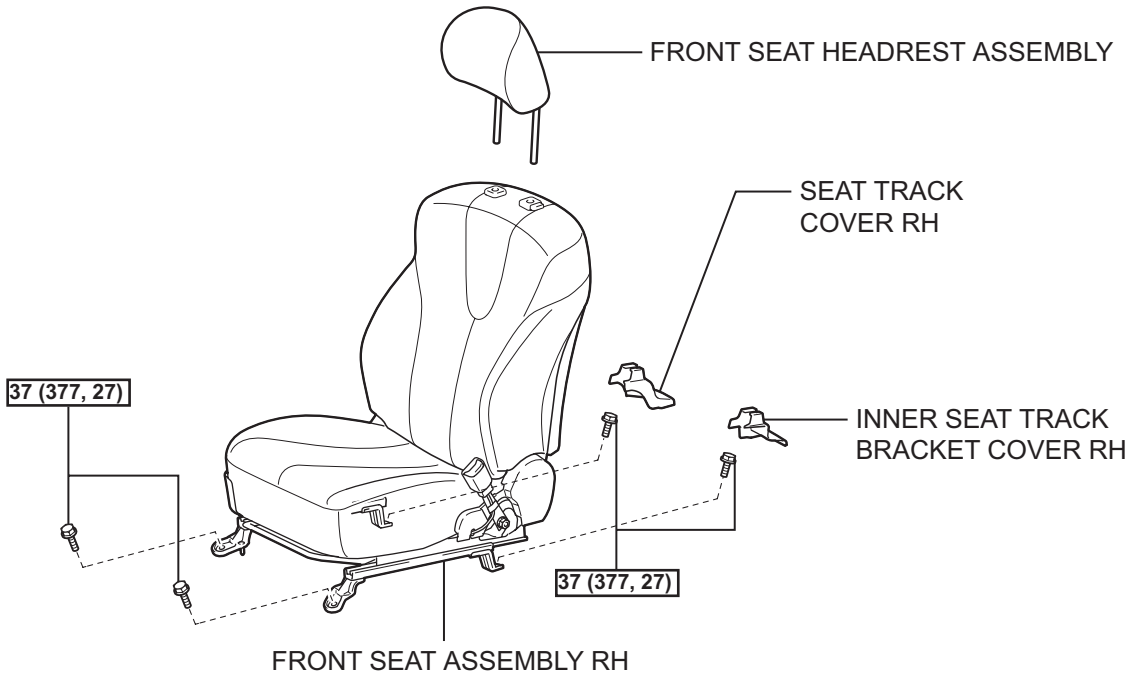
(f) Check whether the parking brake drags.

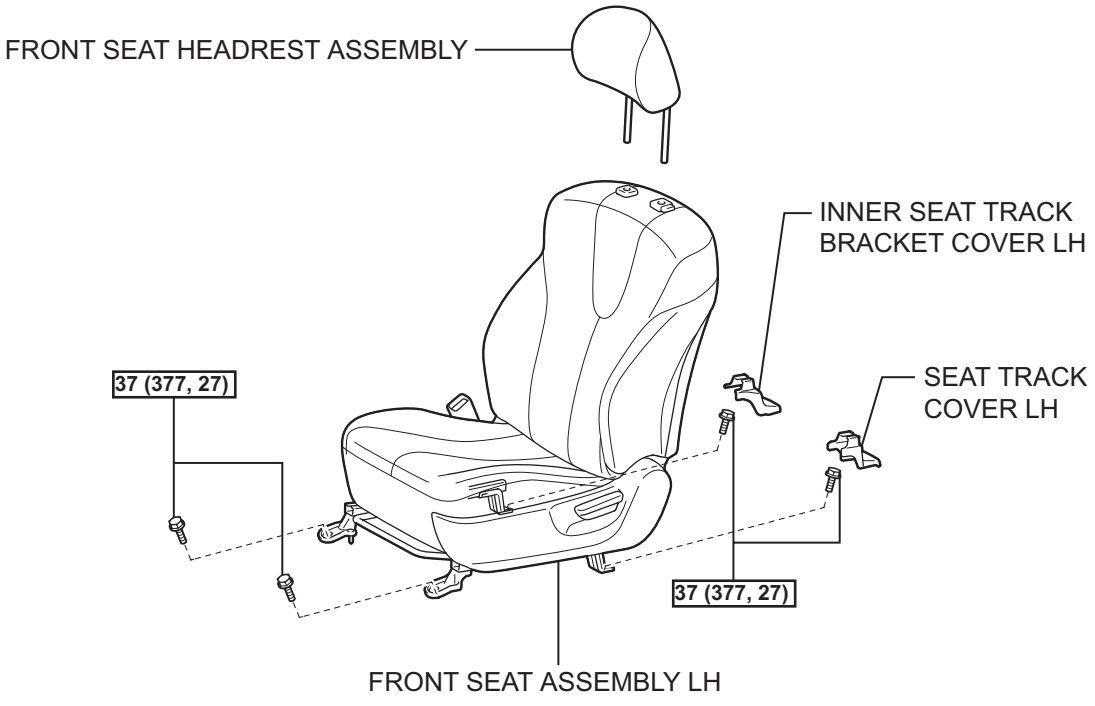
(g) When operating the parking brake lever, check that the parking brake indicator light comes on.

PARKING BRAKE LEVER

COMPONENTS

for Manual Seat:





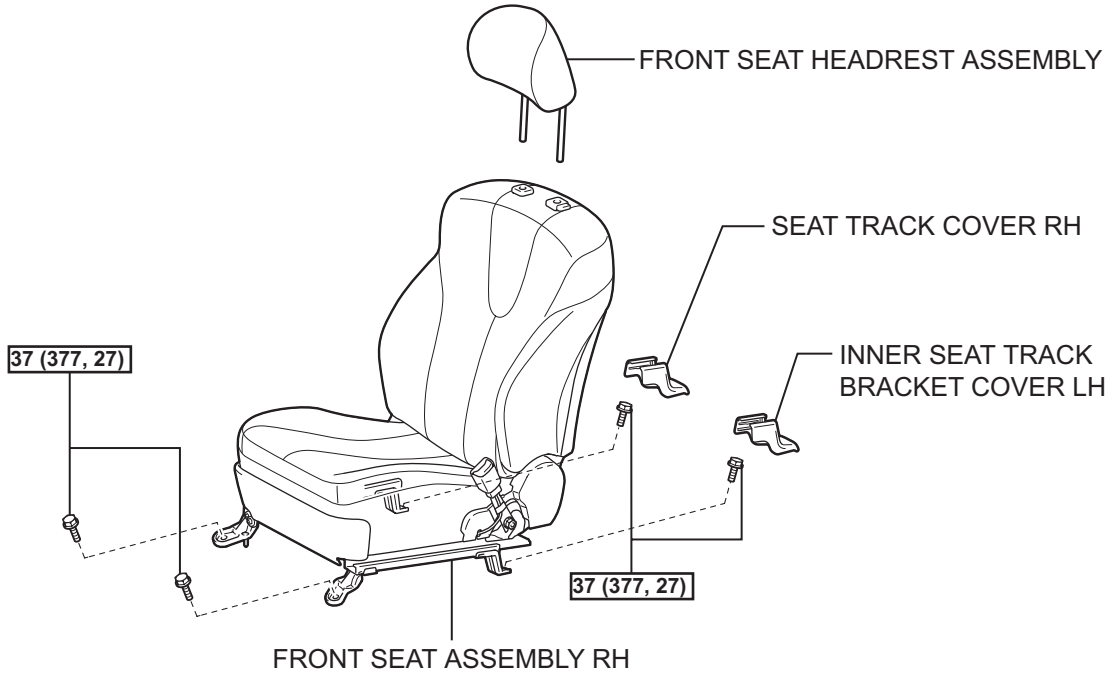
N*m (kgf*cm, ft.*lbf) : Specified torque

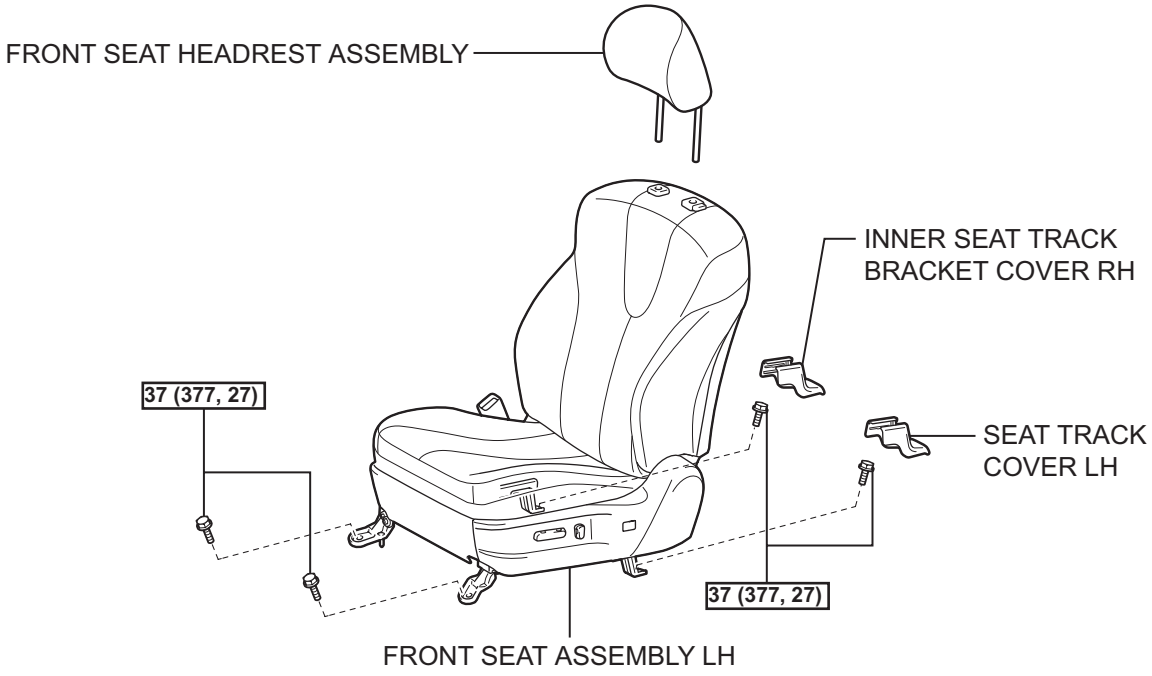
P

B132048E01

PB

for Power Seat:



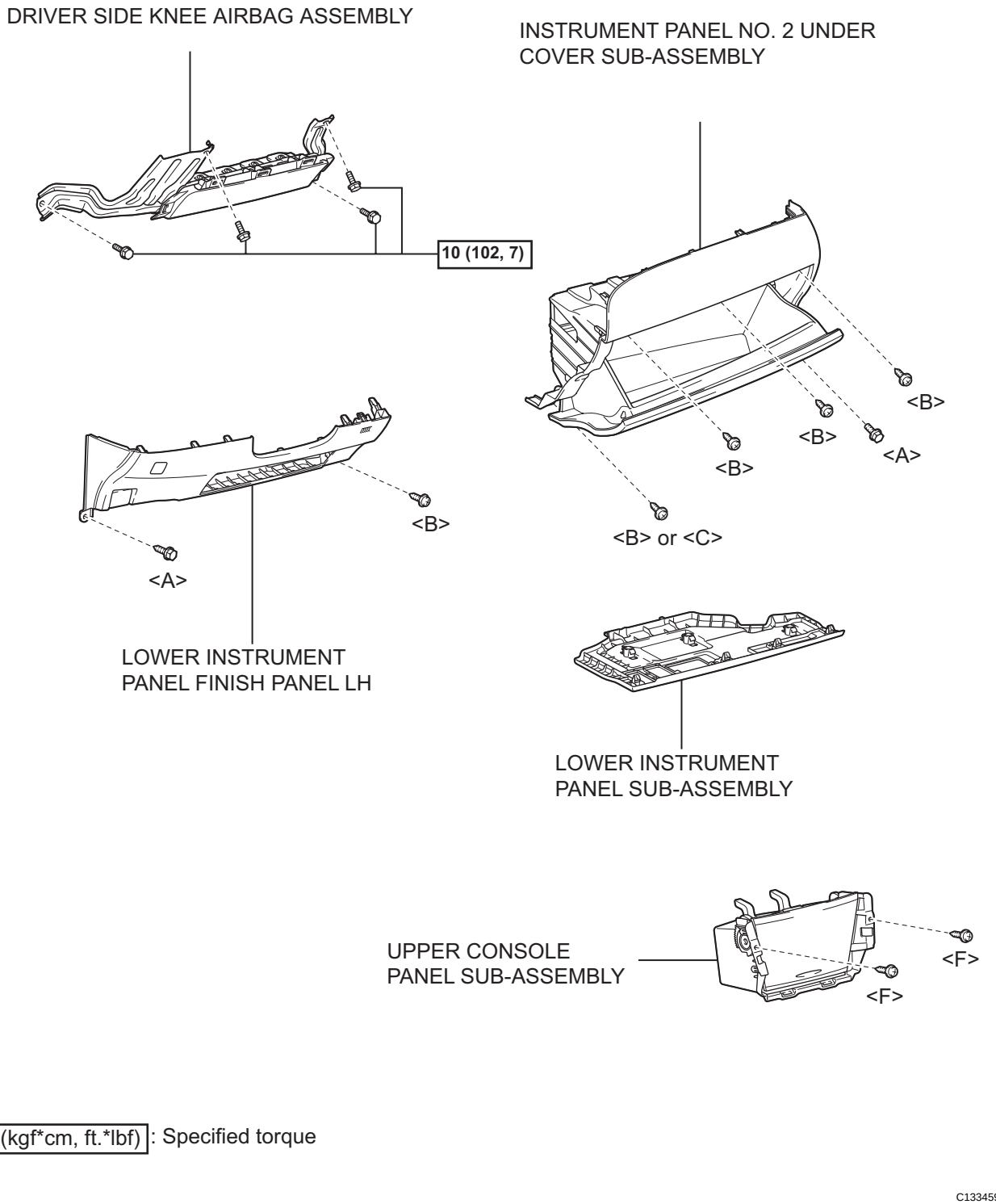


N*m (kgf*cm, ft.*lbf): Specified torque

P

B132047E01

for TMC made:

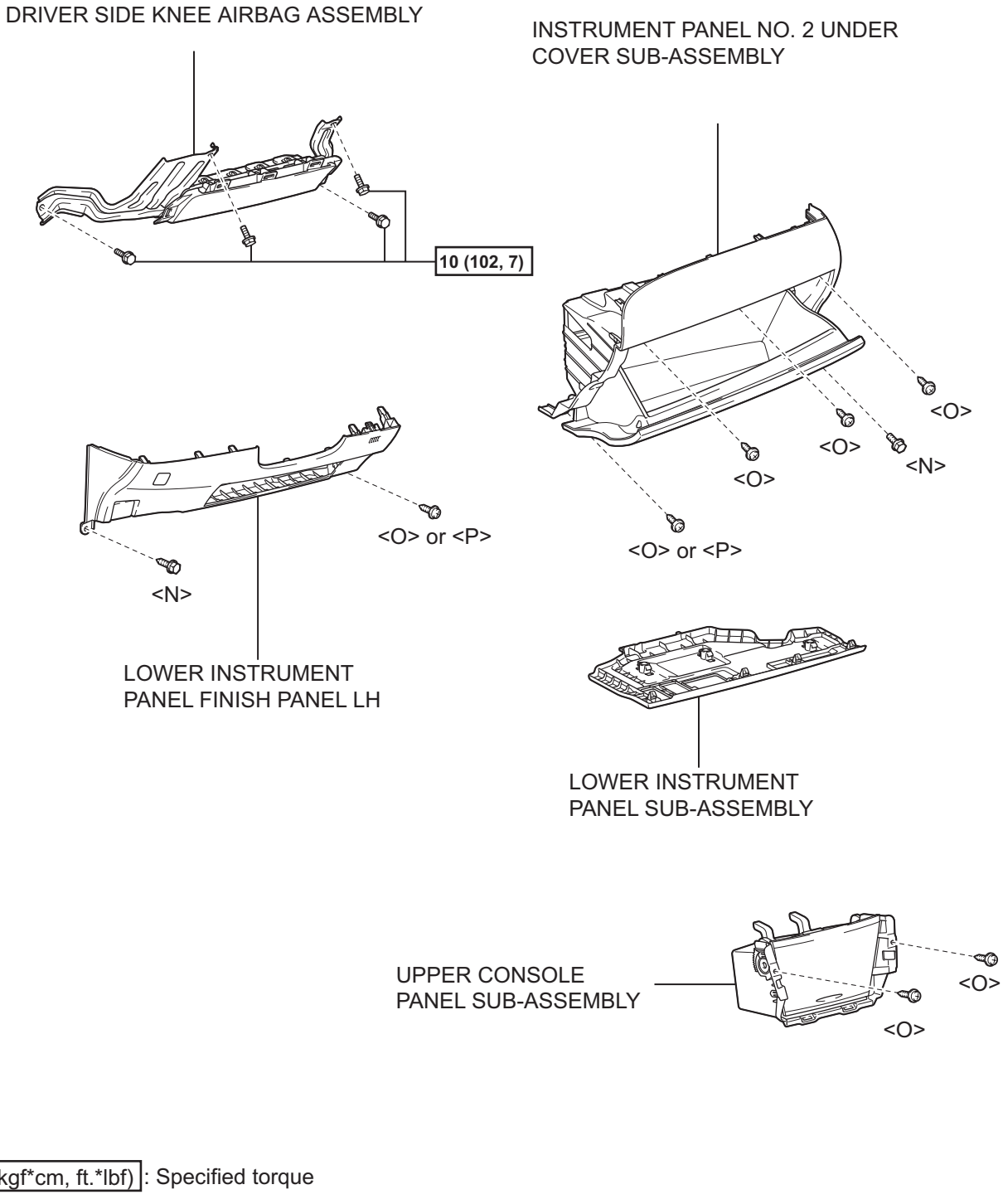


N*m (kgf*cm, ft.*lbf) : Specified torque

C133459E01

PB

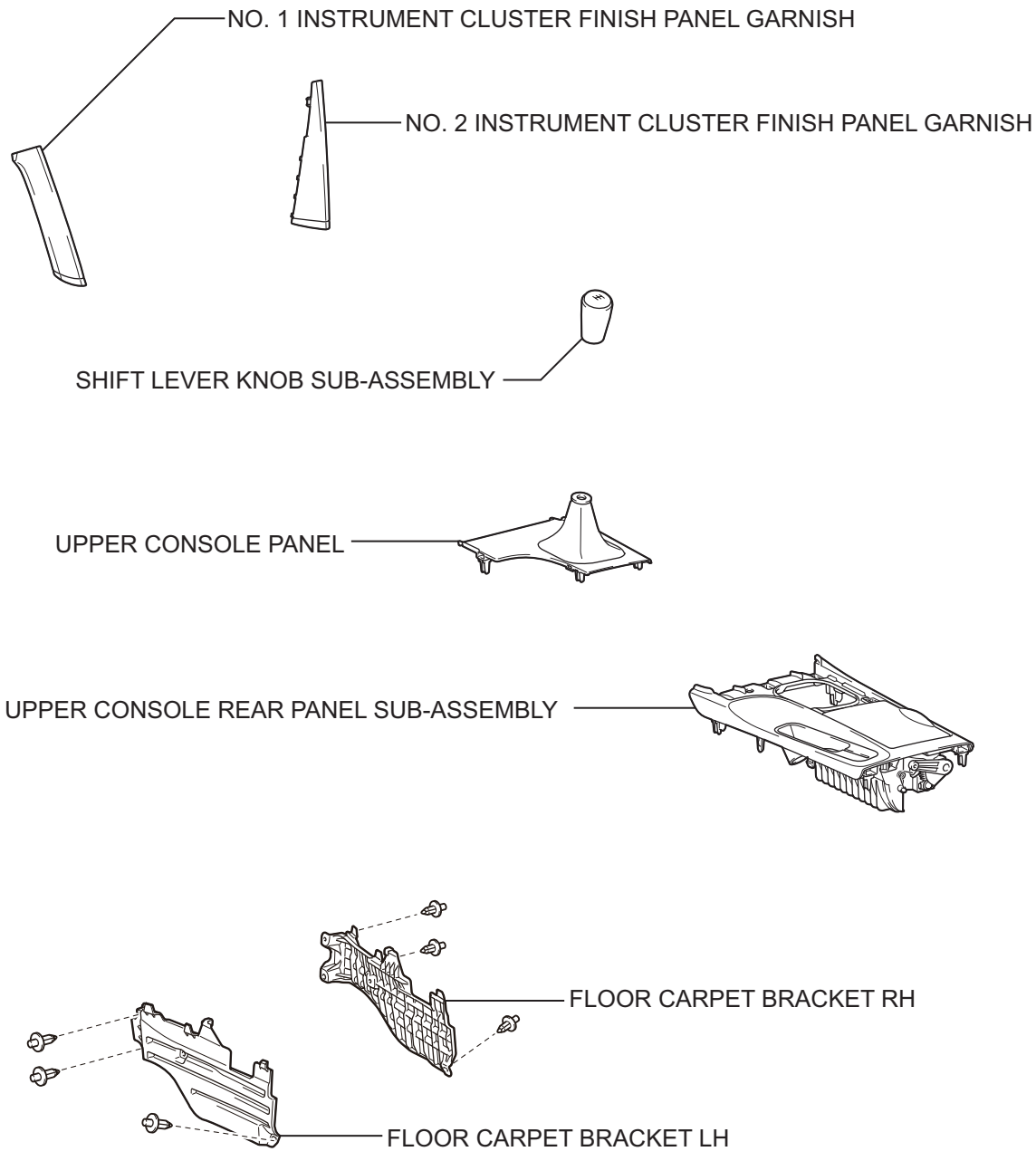
for TMMK made:



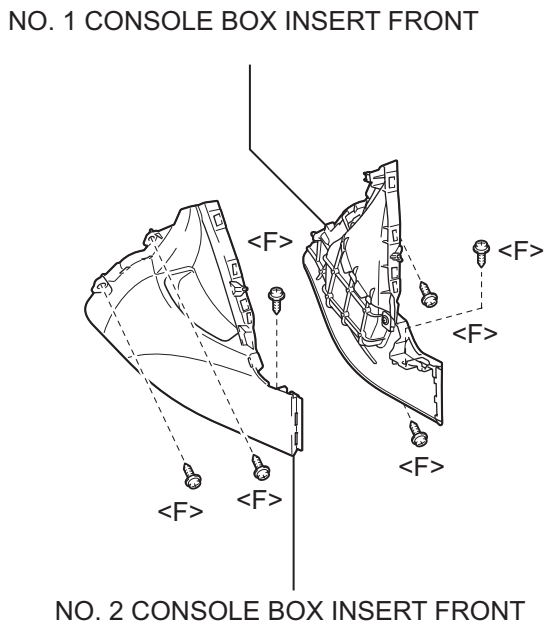
N*m (kgf*cm, ft.*lbf): Specified torque

C133459E02

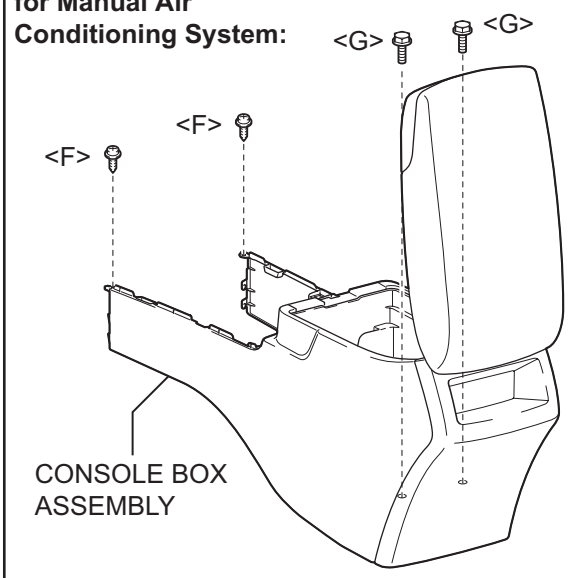
PB


NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
SHIFT LEVER KNOB SUB-ASSEMBLY
UPPER CONSOLE PANEL
UPPER CONSOLE REAR PANEL SUB-ASSEMBLY
FLOOR CARPET BRACKET RH
FLOOR CARPET BRACKET LH
C133456E01

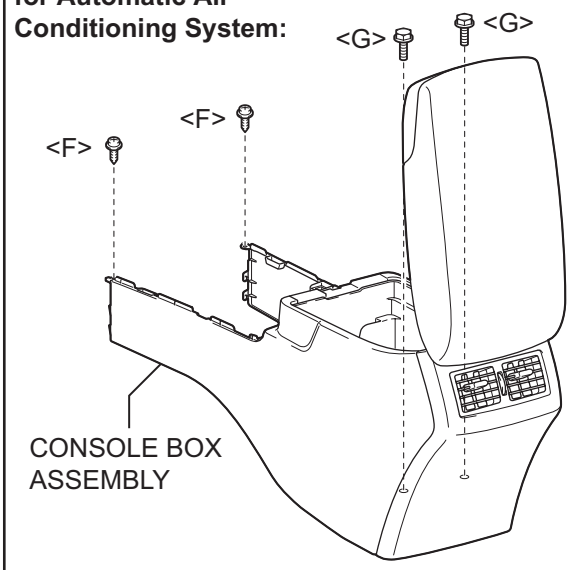
for TMC made:



for Manual Air Conditioning System:



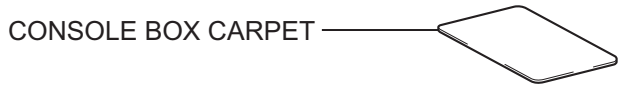
for Automatic Air Conditioning System:

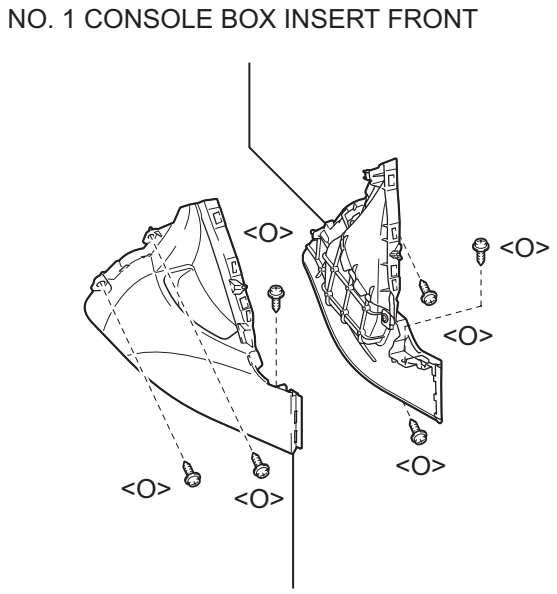


C141955E01

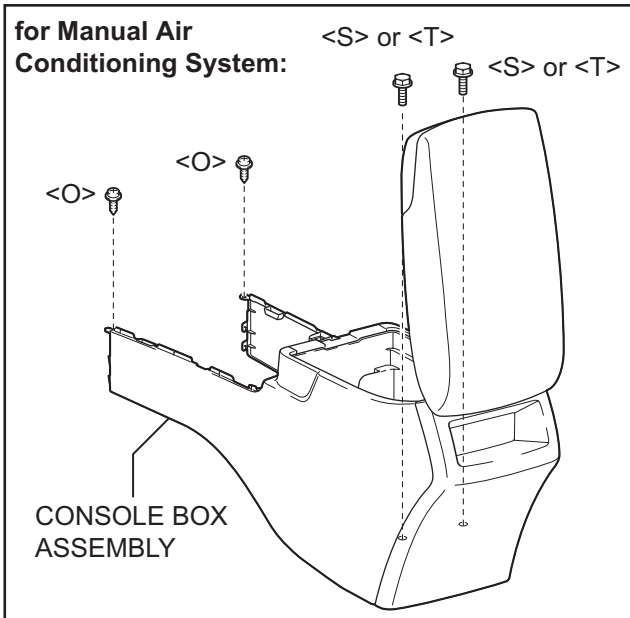
PB

for TMMK made:

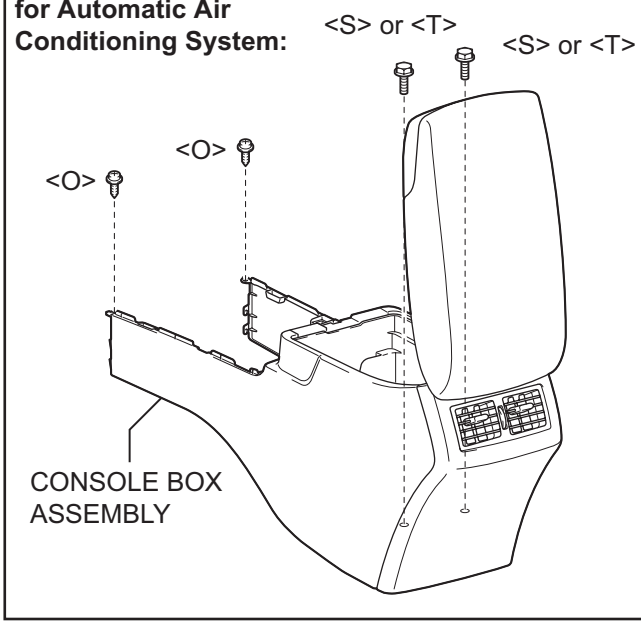




for Manual Air Conditioning System:

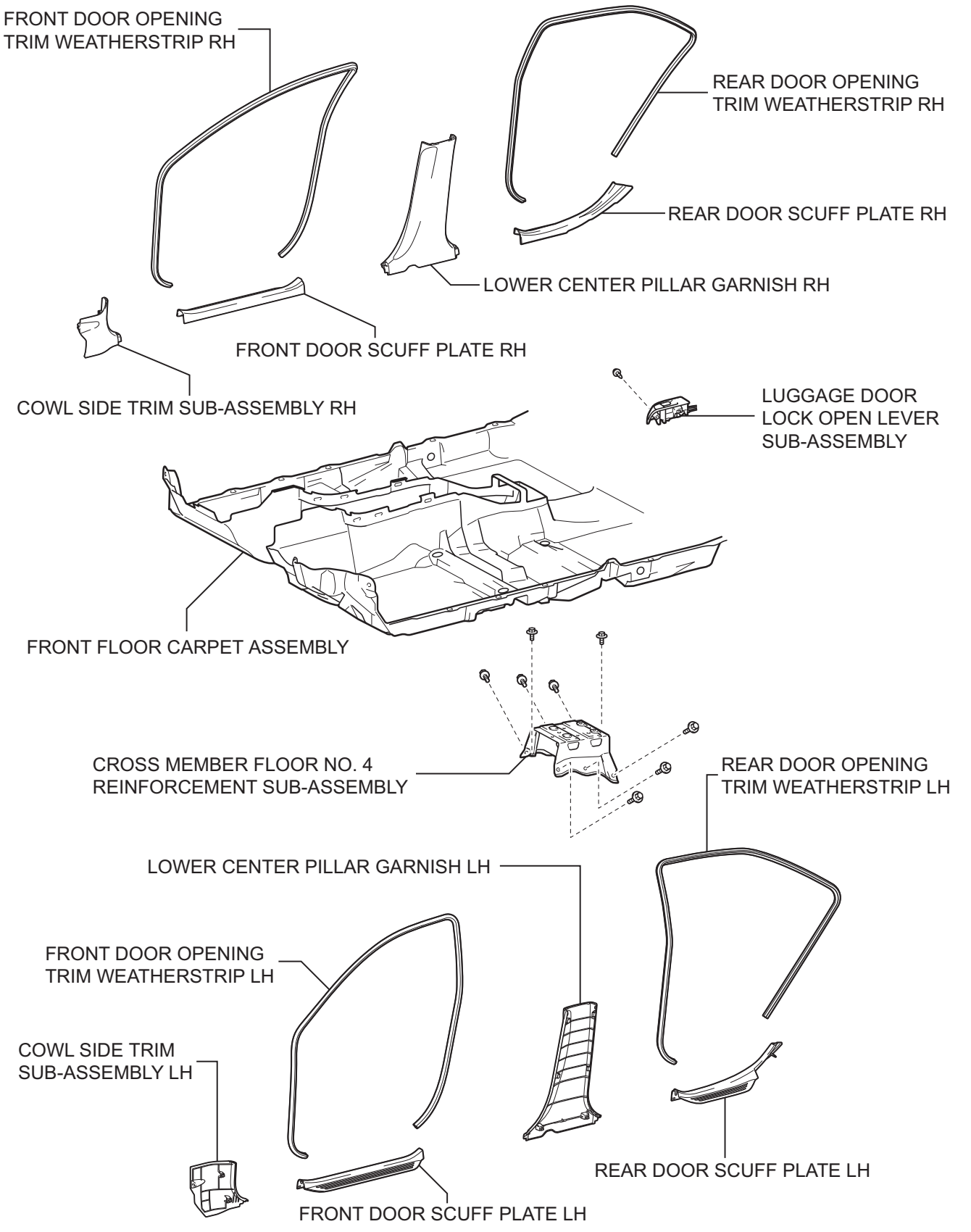


for Automatic Air Conditioning System:



C141955E02

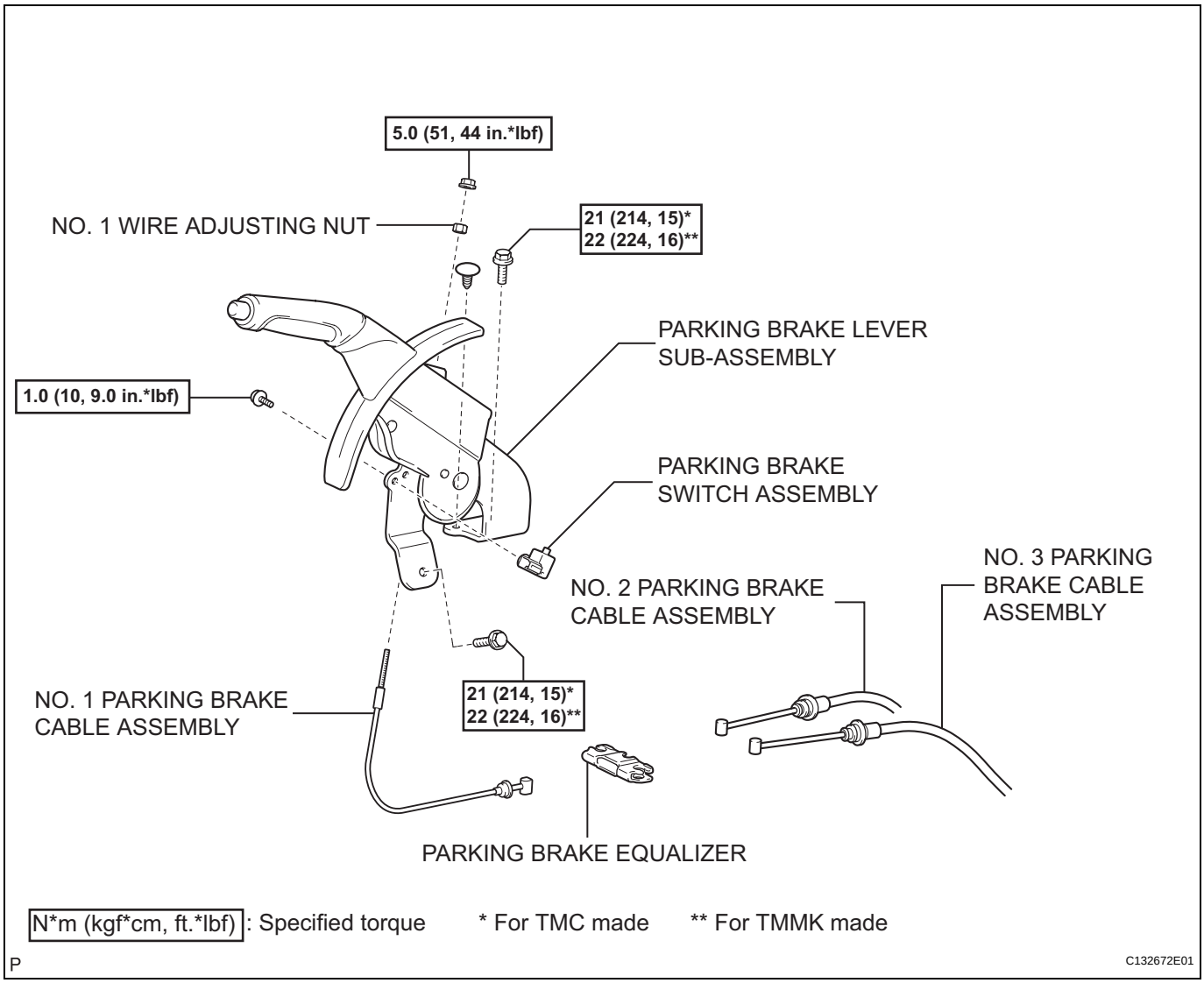
PB



PB

P

C132673E01



N*m (kgf*cm, ft.*lbf): Specified torque * For TMC made ** For TMMK made

P

C132672E01

PB

REMOVAL

1. **PRECAUTION**
(See page IP-1)

2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent the airbag working. (See page RS-1)

3. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat)**
HINT:
Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-16)

4. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

5. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat)**
HINT:
Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-30)

6. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

7. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**

8. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**

9. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**

10. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**

11. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**

12. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**

13. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**

14. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**

15. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-24)**

16. REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)
17. REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)
18. REMOVE UPPER CONSOLE PANEL (See page IP-25)
19. REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)
20. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)
21. REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)
22. REMOVE CONSOLE BOX POCKET (See page IP-28)
23. REMOVE CONSOLE BOX CARPET (See page IP-28)
24. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
25. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)
26. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)
27. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
28. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)
29. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
30. REMOVE FLOOR CARPET BRACKET LH (See page AC-155)
31. REMOVE FLOOR CARPET BRACKET RH (See page AC-155)
32. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)
33. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH
34. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)
35. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH
36. REMOVE LOWER CENTER PILLAR GARNISH LH (See page IR-25)
37. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)
38. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH

39. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)

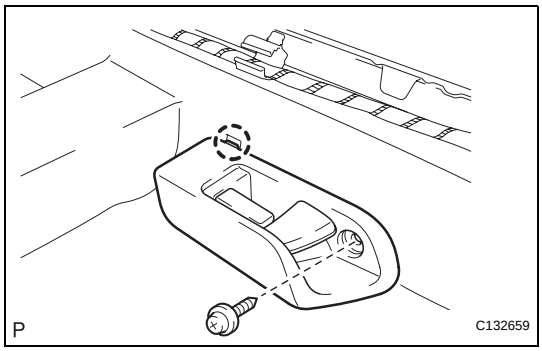
40. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH

41. REMOVE LOWER CENTER PILLAR GARNISH RH (See page IR-26)

42. REMOVE LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY

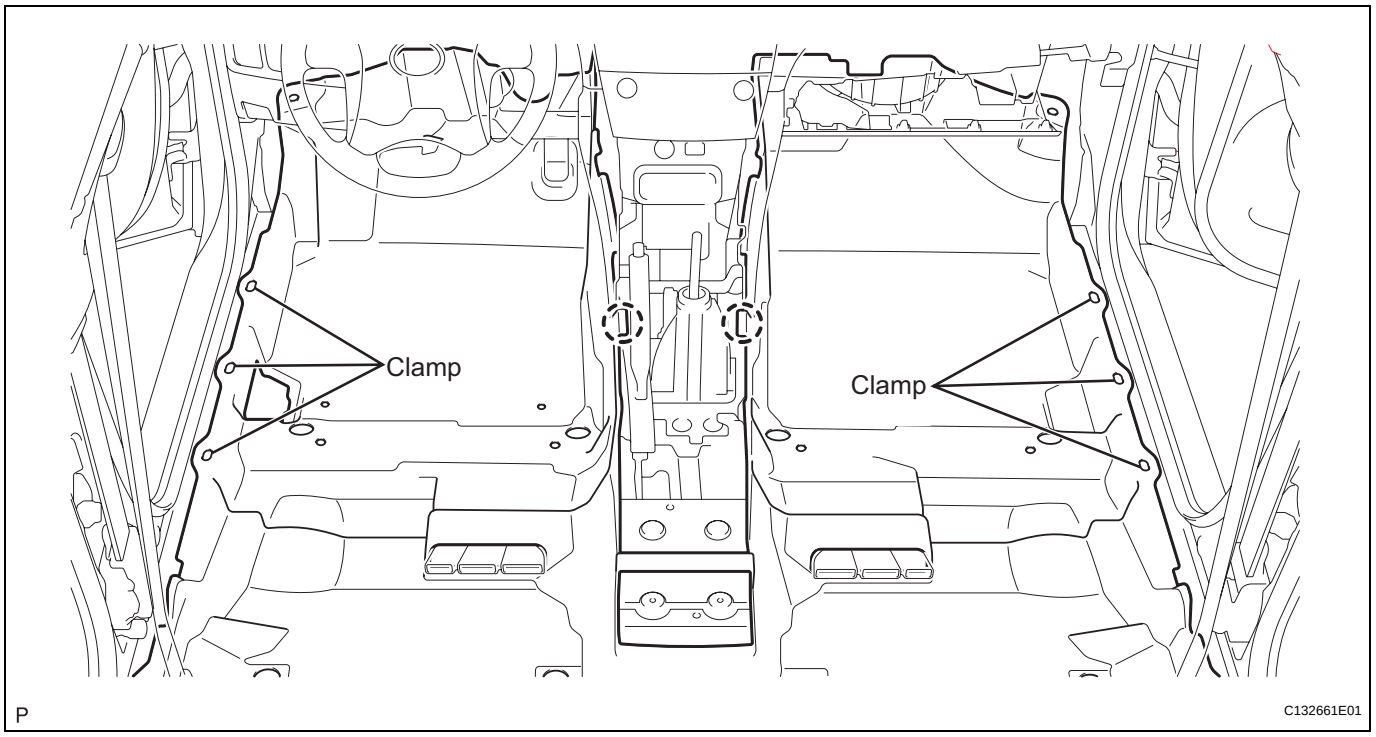
(a) Remove the screw.

(b) Disengage the claw and remove the luggage door open lever sub-assembly.



43. REMOVE FRONT FLOOR CARPET ASSEMBLY

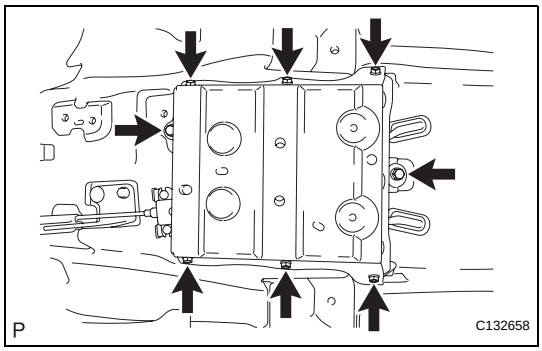
(a) Disengage the 6 clamps and the 2 claws.

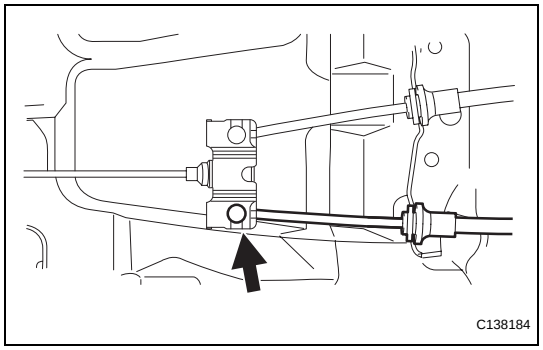


(b) Turn back the front floor carpet assembly until the bolts of the cross member floor No. 4 reinforcement sub-assembly can be seen.

44. REMOVE CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY

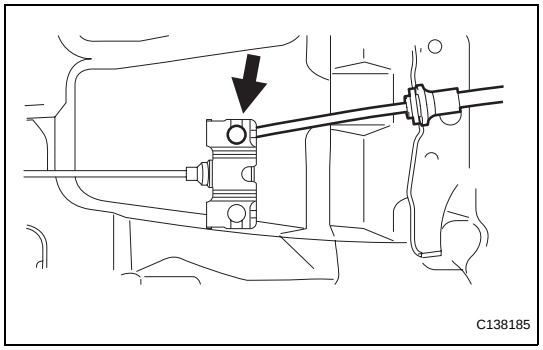
(a) Remove the 8 bolts and the cross member floor No. 4 reinforcement sub-assembly.





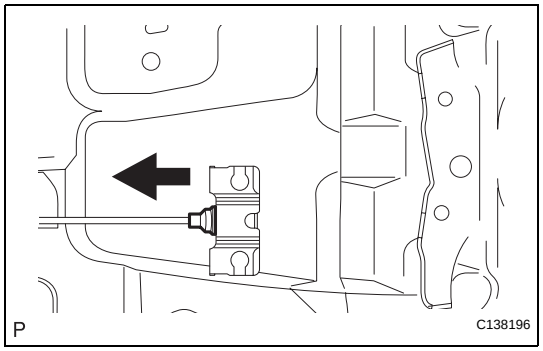
45. SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Separate the No. 3 parking brake cable assembly from the parking brake equalizer.



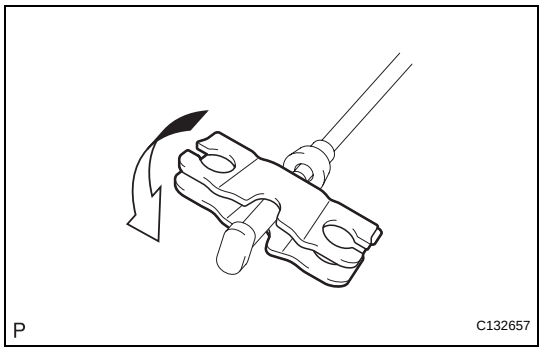
46. SEPARATE NO. 2 PARKING BRAKE CABLE ASSEMBLY

Separate the No. 2 parking brake cable assembly from the parking brake equalizer.

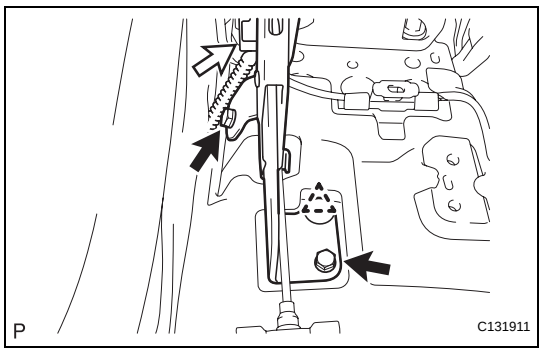


47. REMOVE PARKING BRAKE EQUALIZER

(a) Slide the rubber boot as shown in the illustration.



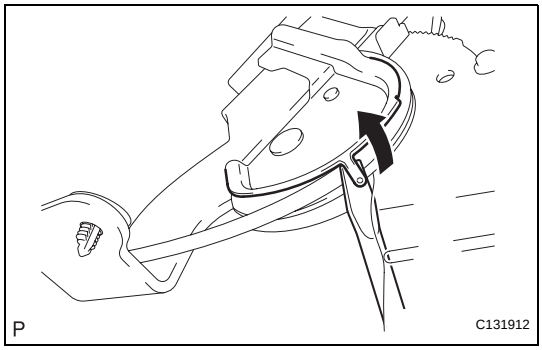
(b) Remove the parking brake equalizer from the No. 1 parking brake cable assembly.



48. REMOVE PARKING BRAKE LEVER SUB-ASSEMBLY

(a) Disconnect the parking brake switch connector.

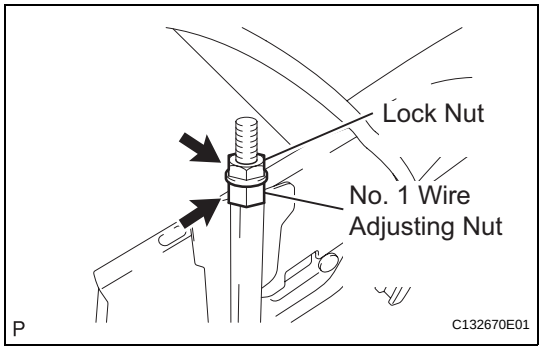
(b) Remove the 2 bolts, the clip, and the parking brake lever.



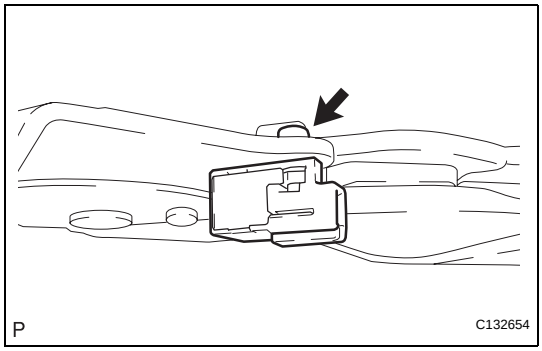
DISASSEMBLY

1. REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY

(a) Using a screwdriver, pull up the parking brake lever claw.



(b) Remove the lock nut, the No. 1 wire adjusting nut, and the No. 1 parking brake cable assembly from the parking brake lever sub-assembly.



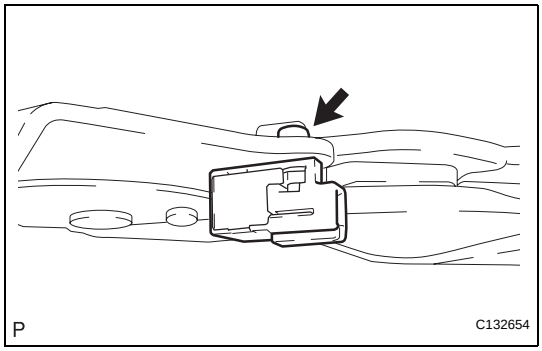
2. REMOVE PARKING BRAKE SWITCH ASSEMBLY

(a) Remove the screw and the parking brake switch assembly.

REASSEMBLY

1. INSTALL PARKING BRAKE SWITCH ASSEMBLY

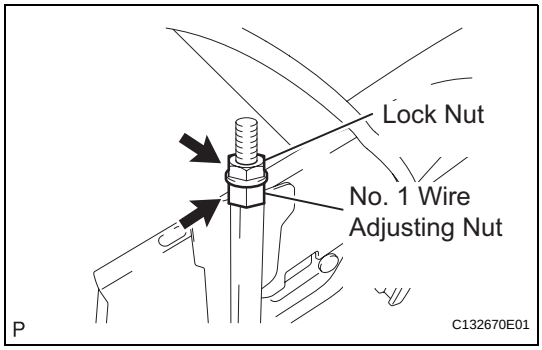
(a) Install the parking brake switch assembly with the screw.
Torque: 1.0 N*m (10 kgf*cm, 9.0 in.*lbf)

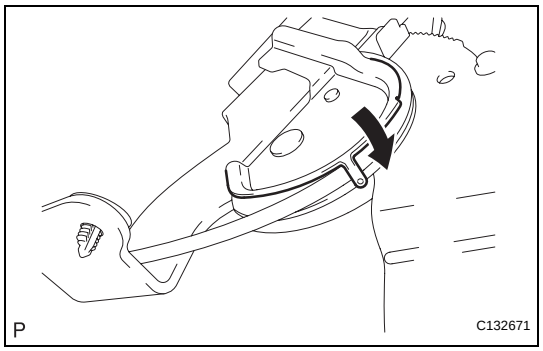


2. INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY

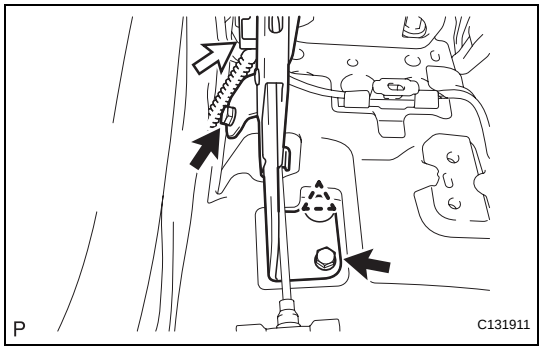
(a) Pass the No. 1 parking brake cable assembly through the parking brake lever sub-assembly.

(b) Temporarily tighten the lock nut and the No. 1 wire adjusting nut.
NOTICE:
Fully tighten the lock nut when adjusting the parking brake lever travel.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)





(c) Bend the parking brake lever claw.



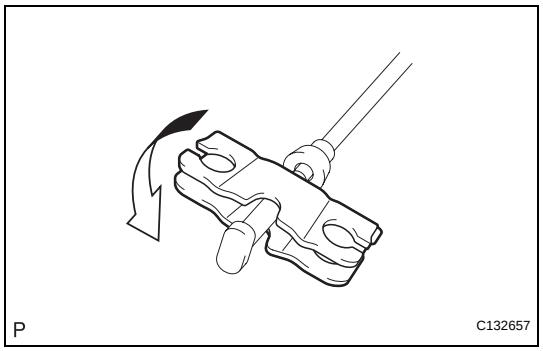
INSTALLATION

1. INSTALL PARKING BRAKE LEVER SUB-ASSEMBLY

(a) Install the parking brake lever sub-assembly with the 2 bolts and the clip.

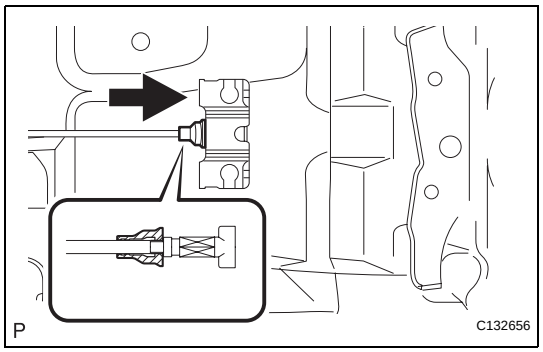
Torque: for TMC made
21 N*m (214 kgf*cm, 15 ft.*lbf)
for TMMK made
22 N*m (224 kgf*cm, 16 ft.*lbf)

(b) Connect the parking brake switch connector.

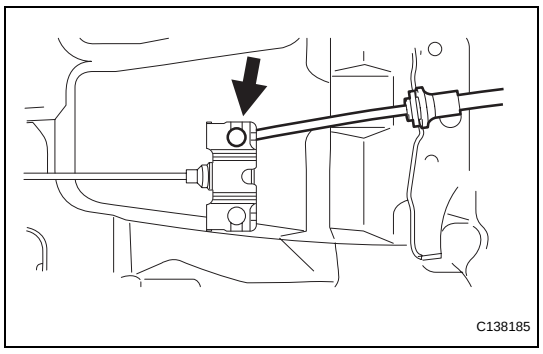


2. INSTALL PARKING BRAKE EQUALIZER

(a) Install the parking brake equalizer to the No. 1 parking brake cable assembly.



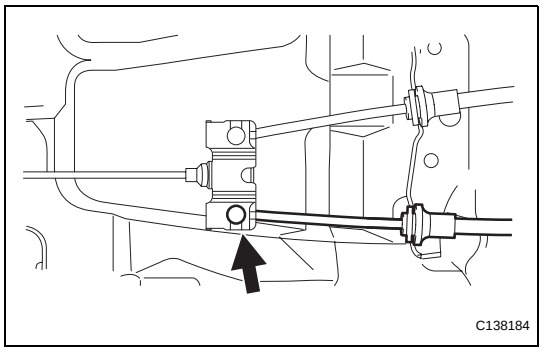
(b) Slide the rubber boot back as shown in the illustration.



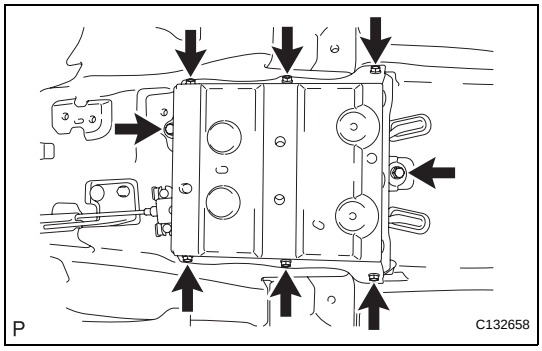
3. INSTALL NO. 2 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the No. 2 parking brake cable assembly to the parking brake equalizer.

PB



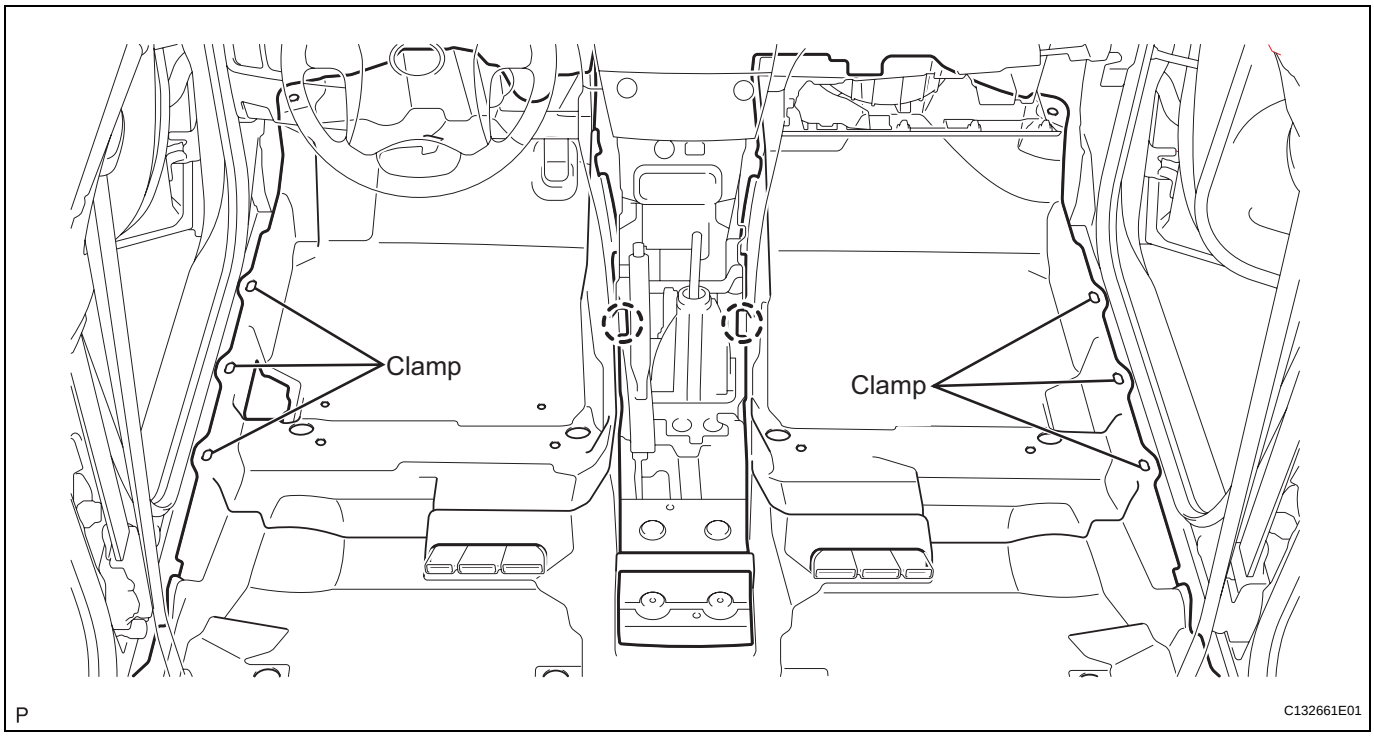
4. **INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY**
   (a) Connect the No. 3 parking brake cable assembly to the parking brake equalizer.

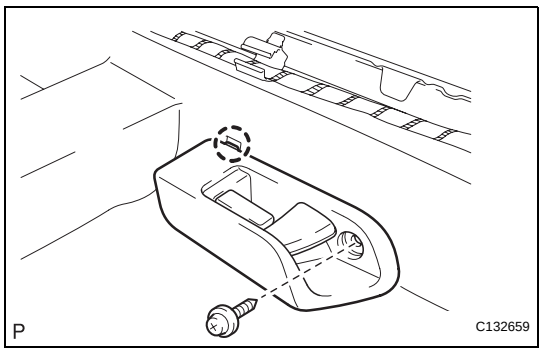


5. **INSTALL CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY**
   (a) Install the cross member floor No. 4 reinforcement sub-assembly with the 8 bolts.

6. **INSTALL FRONT FLOOR CARPET ASSEMBLY**
   (a) Engage the 6 clamps and the 2 claws and install the front floor carpet assembly.

PB





7. **INSTALL LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY**
   (a) Engage the claw and install the luggage door open lever sub-assembly with the screw.

8. **INSTALL LOWER CENTER PILLAR GARNISH LH (See page IR-53)**

9. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**

10. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**

11. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-54)
12. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
13. INSTALL LOWER CENTER PILLAR GARNISH RH (See page IR-54)
14. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)
15. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)
16. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-55)
17. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)
18. INSTALL FLOOR CARPET BRACKET LH
19. INSTALL FLOOR CARPET BRACKET RH
20. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)
21. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)
22. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)
23. INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)
24. INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)
25. INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)
26. INSTALL CONSOLE BOX CARPET (See page IP-51)
27. INSTALL CONSOLE BOX POCKET (See page IP-51)
28. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)
29. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)
30. INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)
31. INSTALL UPPER CONSOLE PANEL (See page IP-54)
32. INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)
33. INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)
34. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-55)

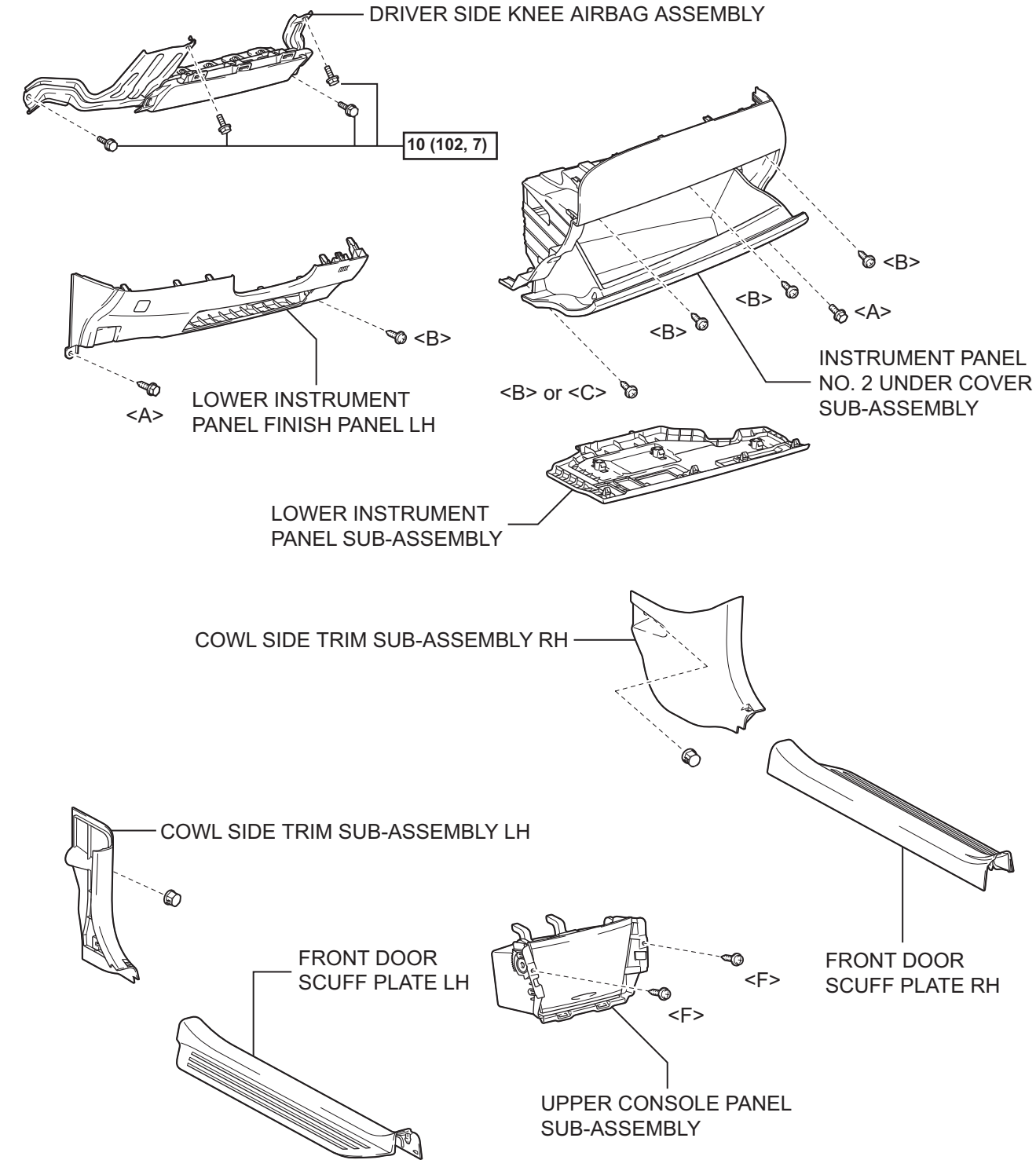
35. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
36. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
37. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
38. **INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**
39. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
40. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
41. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
42. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
43. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-24)
44. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
45. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-41)
46. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
47. **INSPECT PARKING BRAKE LEVER TRAVEL (See page PB-2)**
48. **ADJUST PARKING BRAKE LEVER TRAVEL (See page PB-2)**
49. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
50. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
    (See page RS-242)
51. **INSPECT SRS WARNING LIGHT**
52. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

53. INSPECT FRONT SEAT ASSEMBLY (for Power Seat)
(See page SE-42)

PARKING BRAKE PEDAL

COMPONENTS

for TMC made:

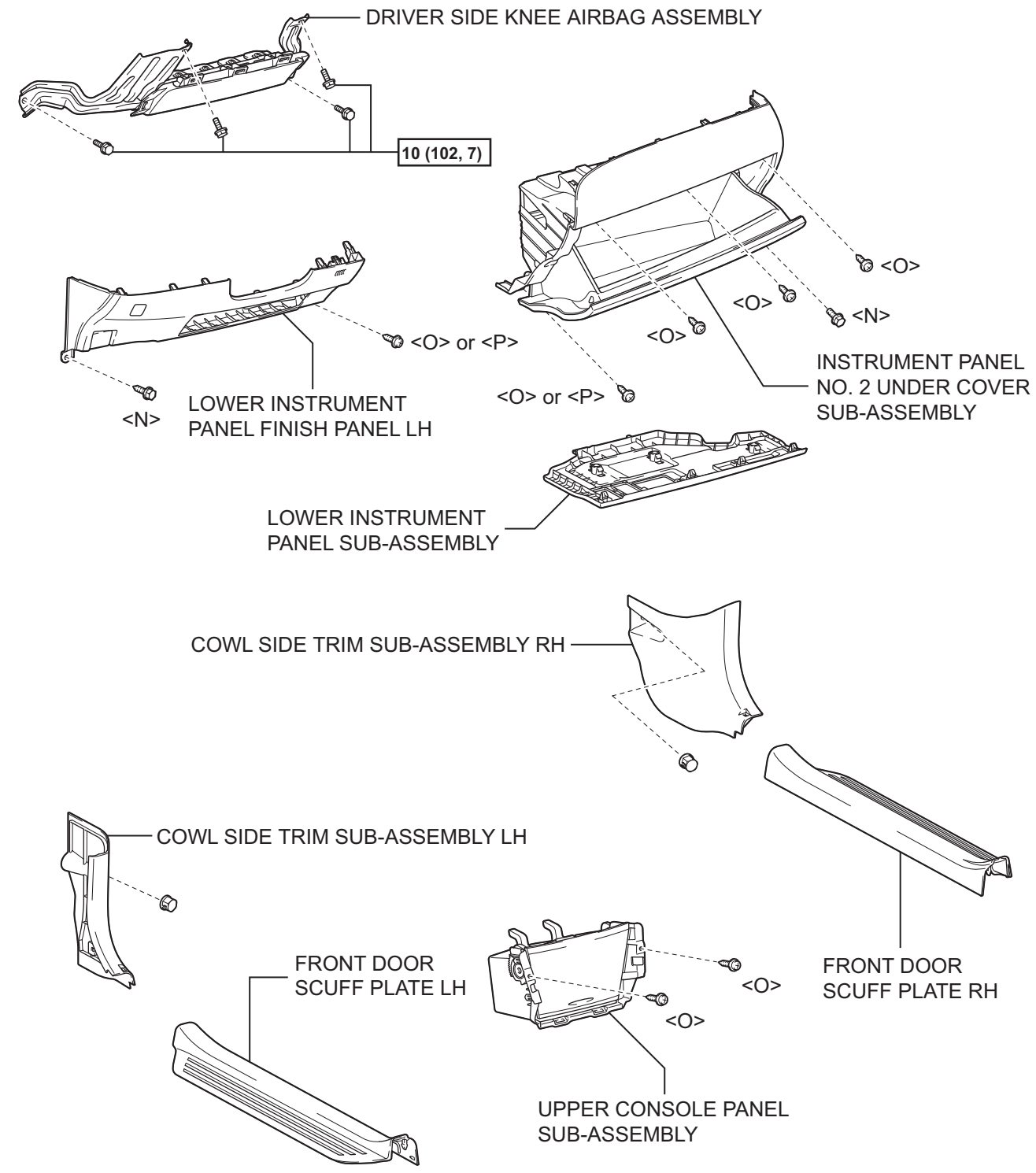


N*m (kgf*cm, ft.*lbf) : Specified torque

C133466E01

PB

for TMMK made:

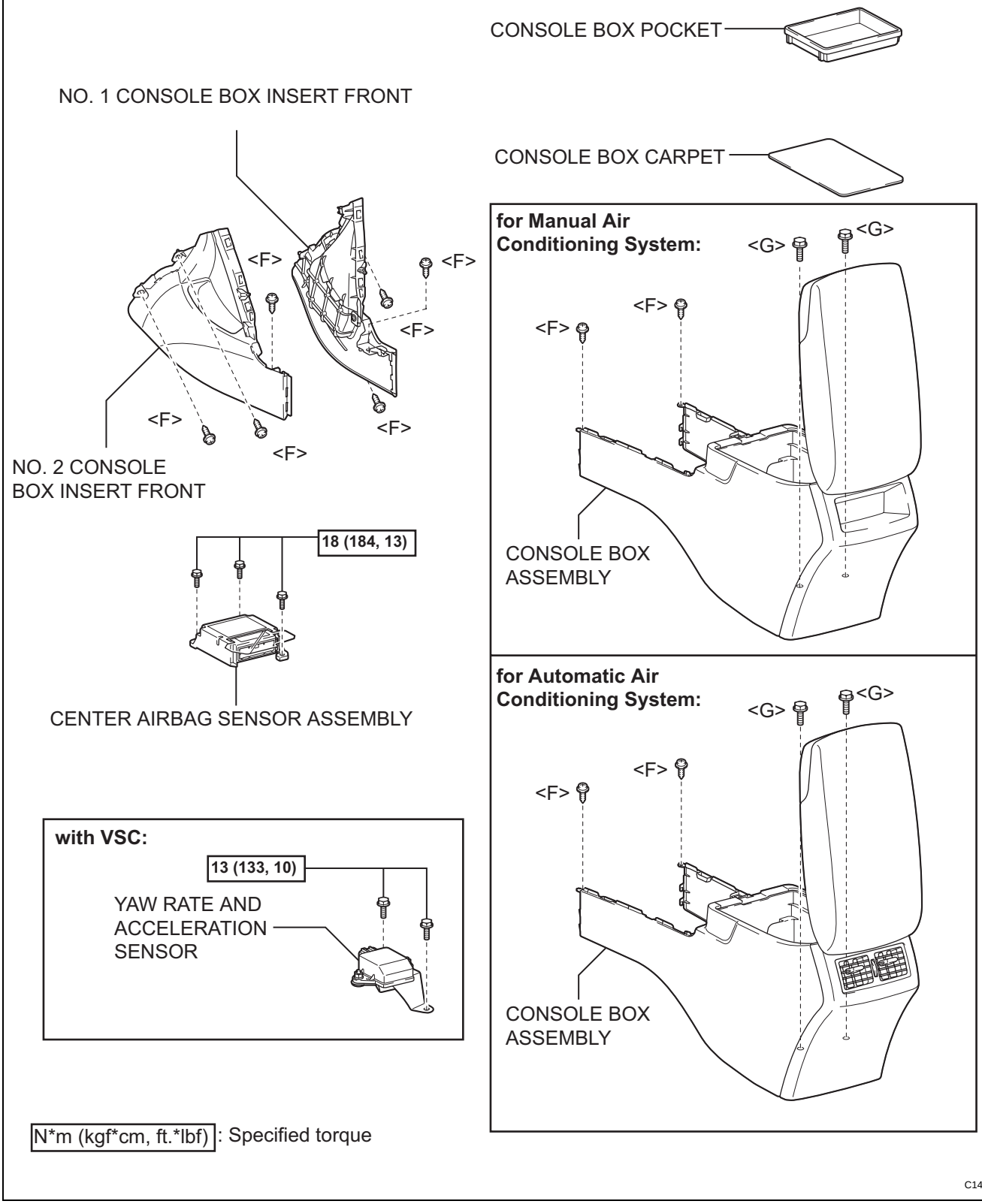


N*m (kgf*cm, ft.*lbf) : Specified torque

C133466E02

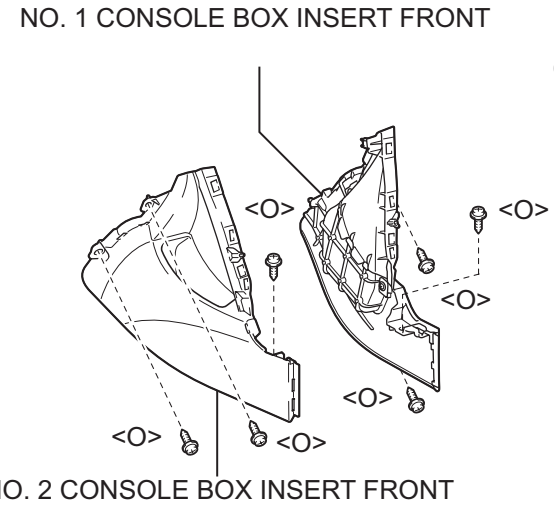
PB

for TMC made:

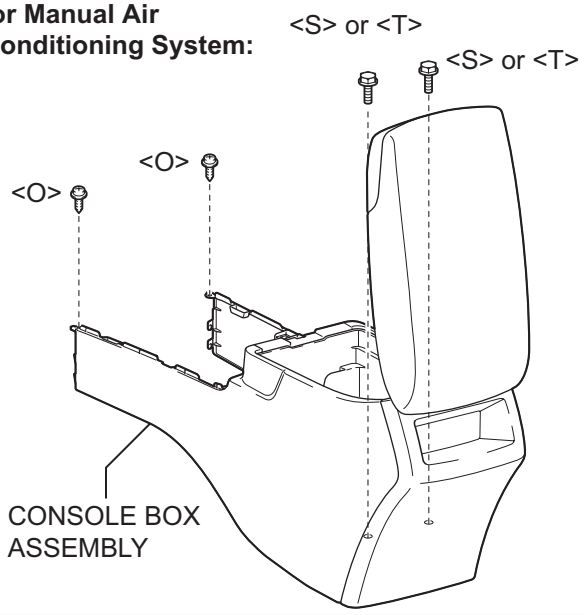


PB

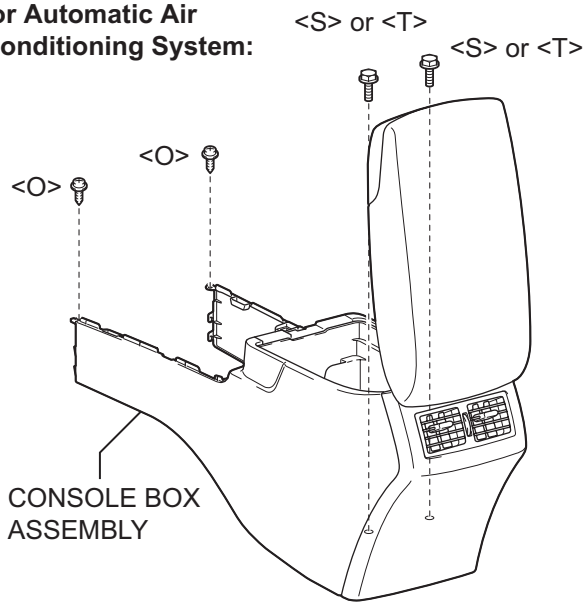
for TMMK made:

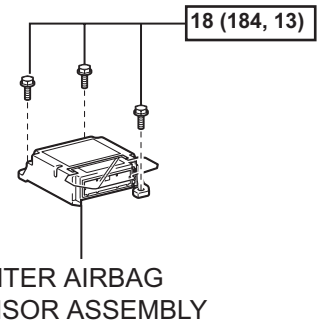


for Manual Air Conditioning System:

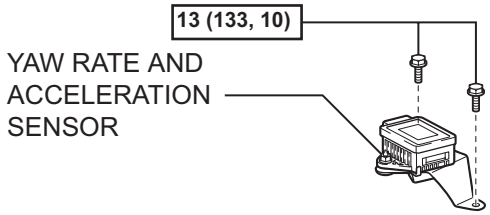


for Automatic Air Conditioning System:





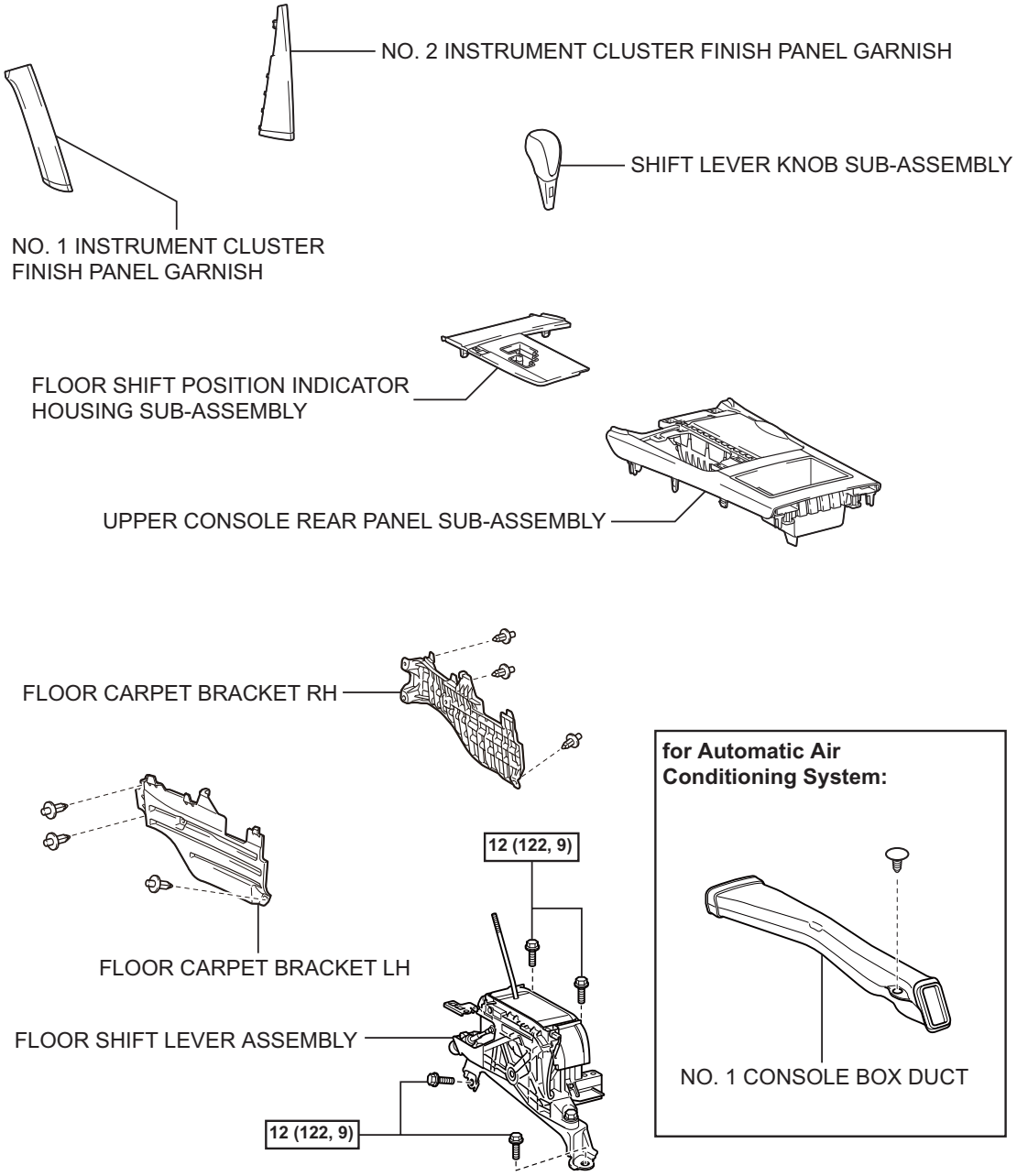
with VSC:



N*m (kgf*cm, ft.*lbf): Specified torque

C141957E01

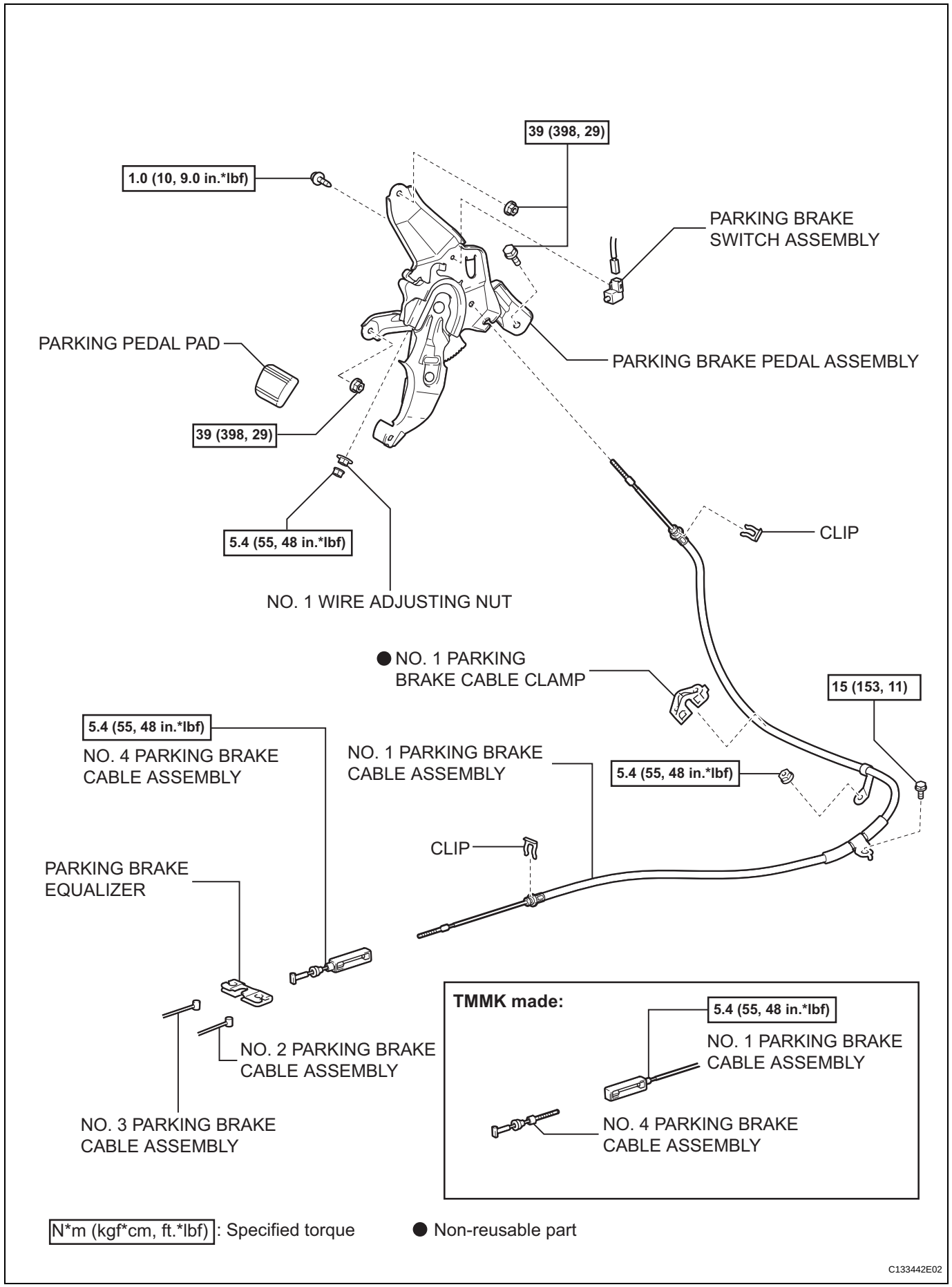
PB



PB

N*m (kgf*cm, ft.*lbf): Specified torque

C133457E02



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C133442E02

REMOVAL

1. **PRECAUTION**
(See page IP-1)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent the airbag working. (See page RS-1)
3. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
4. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
5. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
6. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
9. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**
10. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**
11. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**
12. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**
13. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-24)**
14. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
15. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
16. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-25)**
17. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)**
18. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)**
19. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)**
20. **REMOVE CONSOLE BOX POCKET (See page IP-28)**
21. **REMOVE CONSOLE BOX CARPET (See page IP-28)**

22. **REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)**

23. **REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)**

24. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)**

25. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

26. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)**

27. **REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**

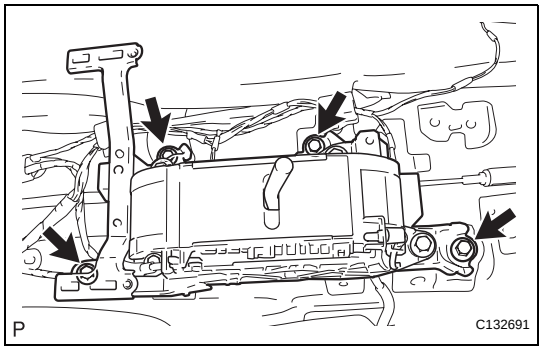
28. **REMOVE NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-154)**

29. **REMOVE FLOOR CARPET BRACKET LH (See page AC-155)**

30. **REMOVE FLOOR CARPET BRACKET RH (See page AC-155)**

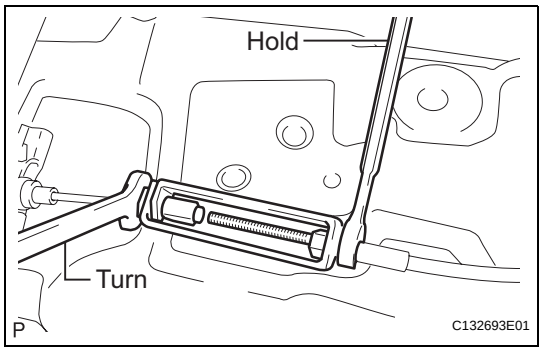
31. **REMOVE YAW RATE AND ACCELERATION SENSOR (w/ VSC) (See page BC-447)**

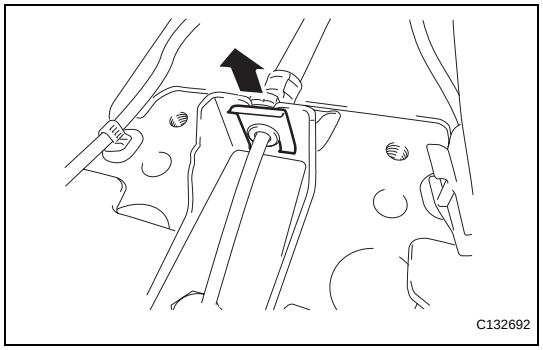
32. **REMOVE FLOOR SHIFT LEVER ASSEMBLY**
    (a) Remove the 4 bolts and the floor shift lever assembly.



33. **REMOVE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**

34. **DISCONNECT NO. 4 PARKING BRAKE CABLE ASSEMBLY**
    (a) Using a wrench, hold the lock nut and loosen the turnbuckle.
    (b) Disconnect the No. 4 parking brake cable assembly from the No. 1 parking brake cable assembly.

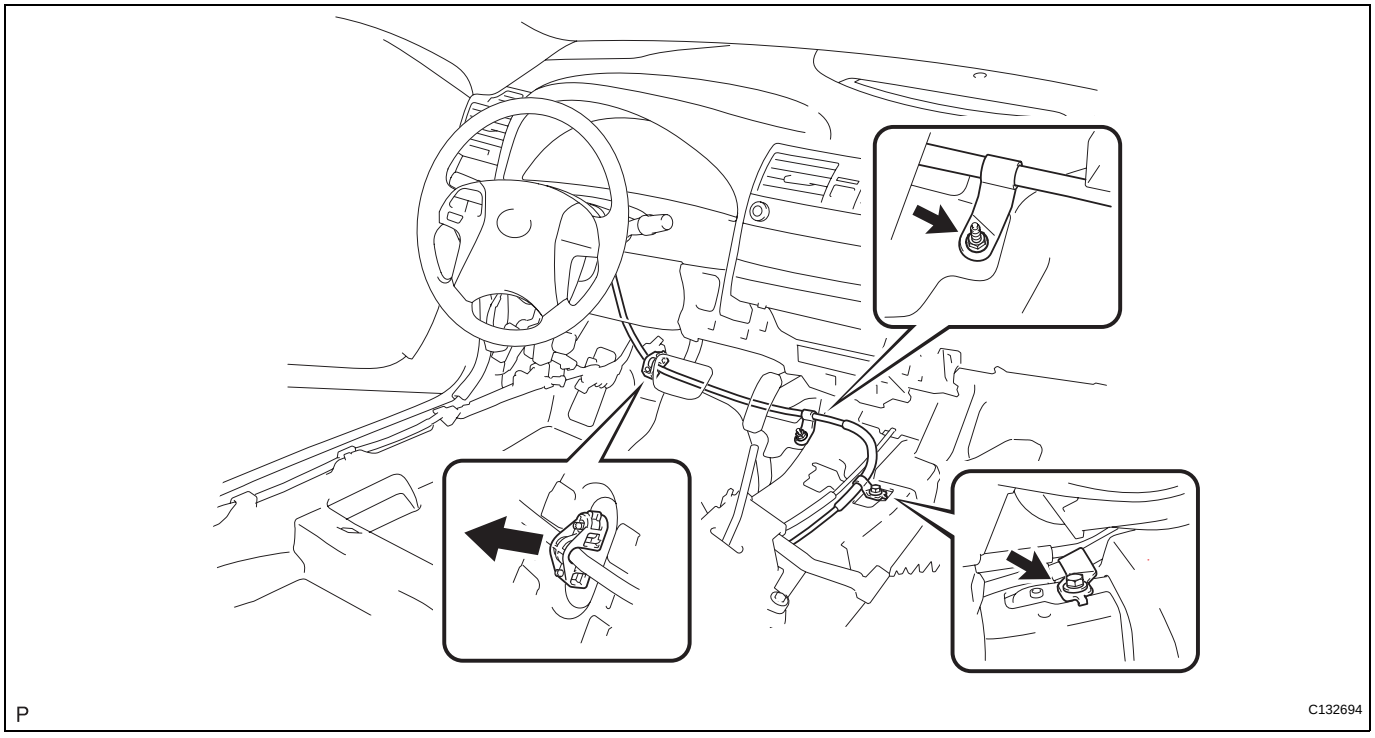




35. REMOVE PARKING BRAKE PEDAL ASSEMBLY

(a) Using needle-nose pliers, remove the clip from the No. 1 parking brake cable assembly.

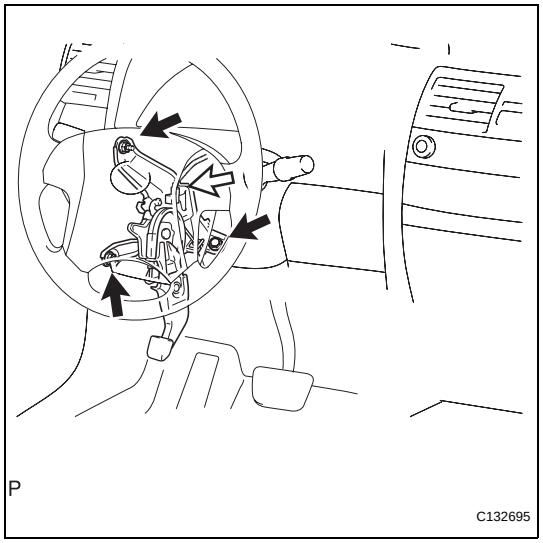
(b) Remove the bolt, nut, and the No. 1 parking brake cable clamp.



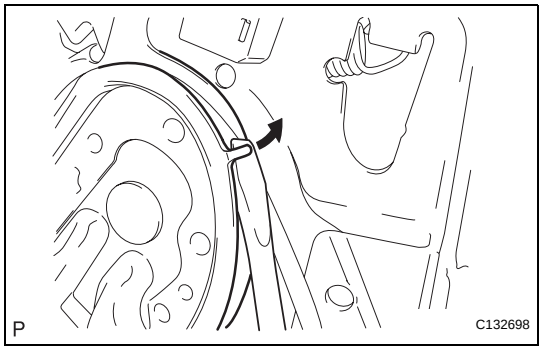
(c) Separate the No. 1 parking brake cable assembly from the body.

(d) Disconnect the parking brake switch connector.

(e) Remove the bolt, 2 nuts, and the parking brake pedal assembly with the No. 1 parking brake cable assembly from the body.



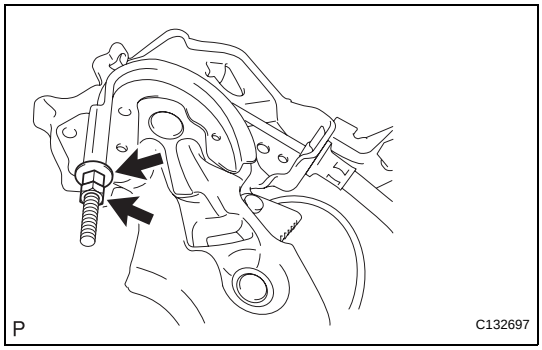
PB



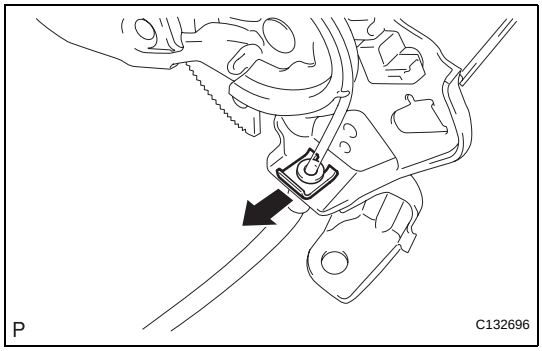
DISASSEMBLY

1. REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY

(a) Using a screwdriver, pull up the parking brake pedal claw.

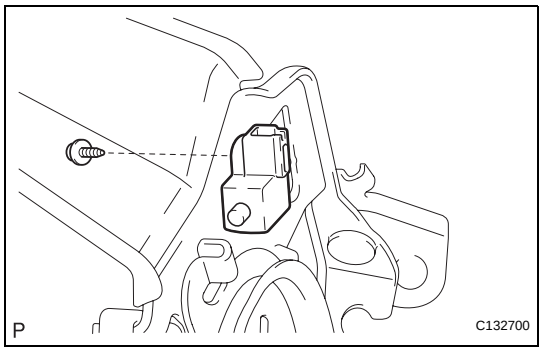


(b) Remove the lock nut and the No. 1 wire adjusting nut.



(c) Using needle nose pliers, remove the clip and the No. 1 parking brake cable from the parking brake pedal assembly.

2. REMOVE PARKING BRAKE SWITCH ASSEMBLY



(a) Remove the screw and the parking brake switch assembly.

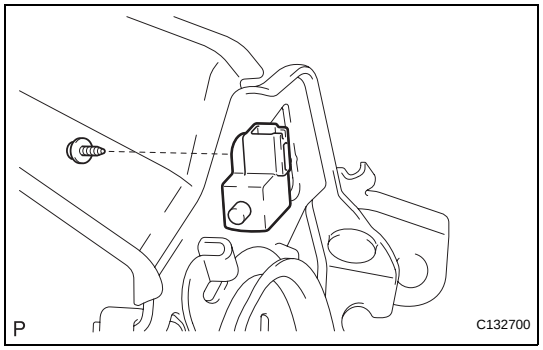
3. REMOVE PARKING PEDAL PAD

(a) Remove the parking pedal pad.

REASSEMBLY

1. INSTALL PARKING PEDAL PAD

(a) Install the parking pedal pad to the parking brake pedal assembly.

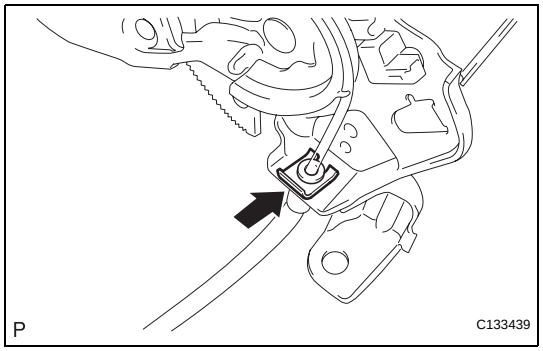


2. INSTALL PARKING BRAKE SWITCH ASSEMBLY

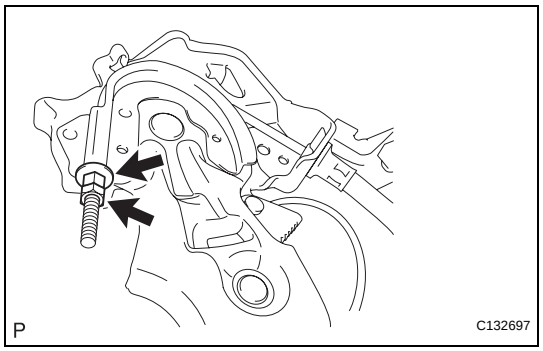
(a) Install the parking brake switch assembly with the screw.
Torque: 1.0 N*m (10 kgf*cm, 9.0 in.*lbf)

3. INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY

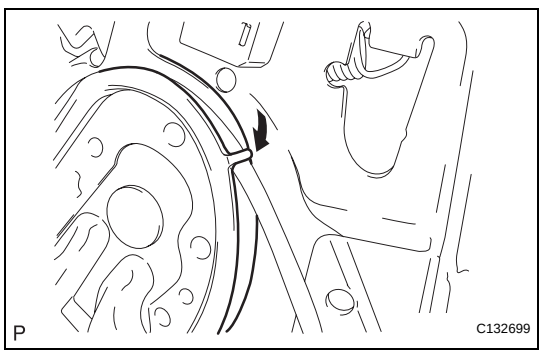
(a) Pass the No. 1 parking brake cable assembly through the pedal guide.



(b) Using a brass bar and a hammer, install the clip to the No. 1 parking brake cable assembly.

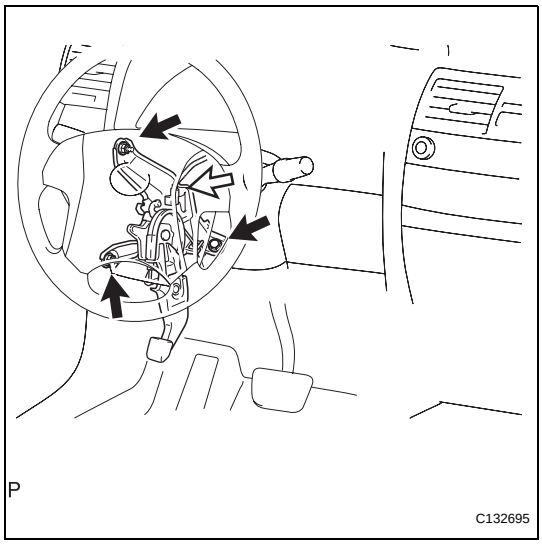


(c) Temporarily tighten the the lock nut and No. 1 wire adjusting nut.
NOTICE:
Fully tighten the lock nut and the No. 1 wire adjusting nut when adjusting the parking brake pedal travel.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



(d) Bend the parking brake pedal claw.

PB



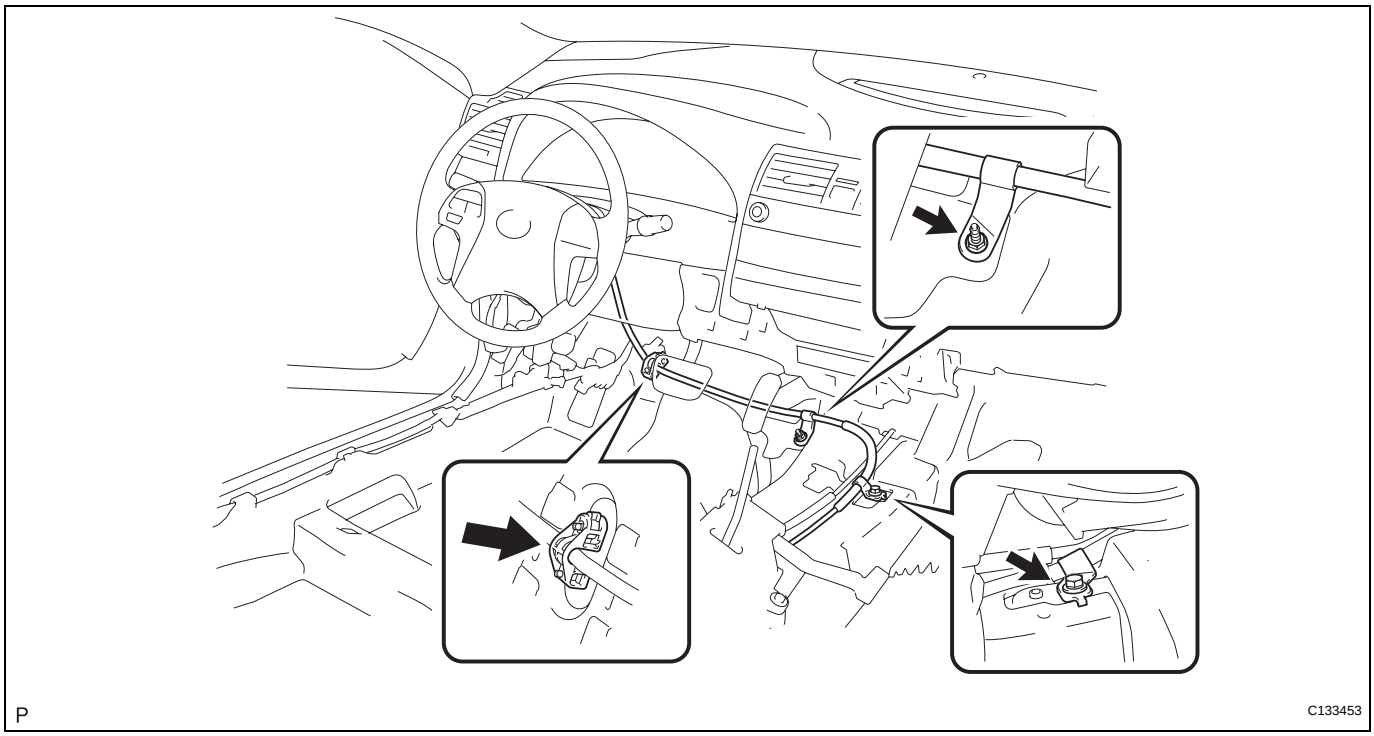
INSTALLATION

1. INSTALL PARKING BRAKE PEDAL ASSEMBLY

(a) Install the parking brake pedal assembly with the bolt and 2 nuts.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)

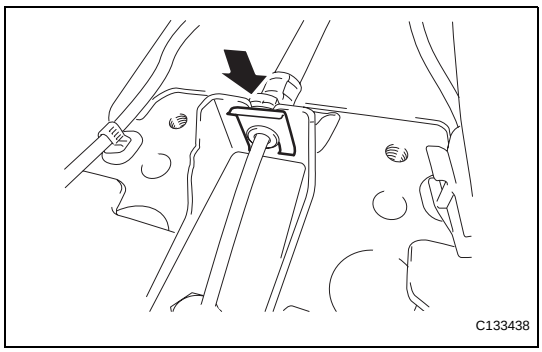
(b) Connect the parking brake switch connector.

(c) Install the No. 1 parking brake cable assembly to the body with the bolt, the nut, and a new No. 1 parking brake cable clamp.



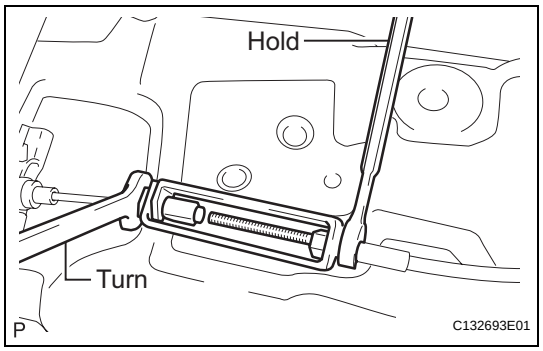
Torque: Bolt
15 N*m (153 kgf*cm, 11 ft.*lbf)
Nut
5.4 N*m (55 kgf*cm, 48 in.*lbf)

(d) Using a brass bar and a hammer, install the clip to the No. 1 parking brake cable assembly.



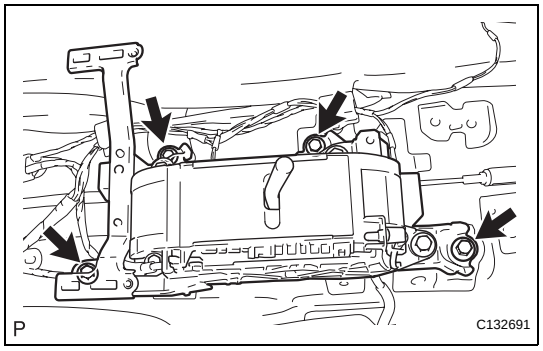
2. CONNECT NO. 4 PARKING BRAKE CABLE ASSEMBLY

(a) Connect the No. 4 parking brake cable assembly to the No. 1 parking brake cable assembly.



(b) Using a wrench, hold the lock nut and tighten the turnbuckle.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

3. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**



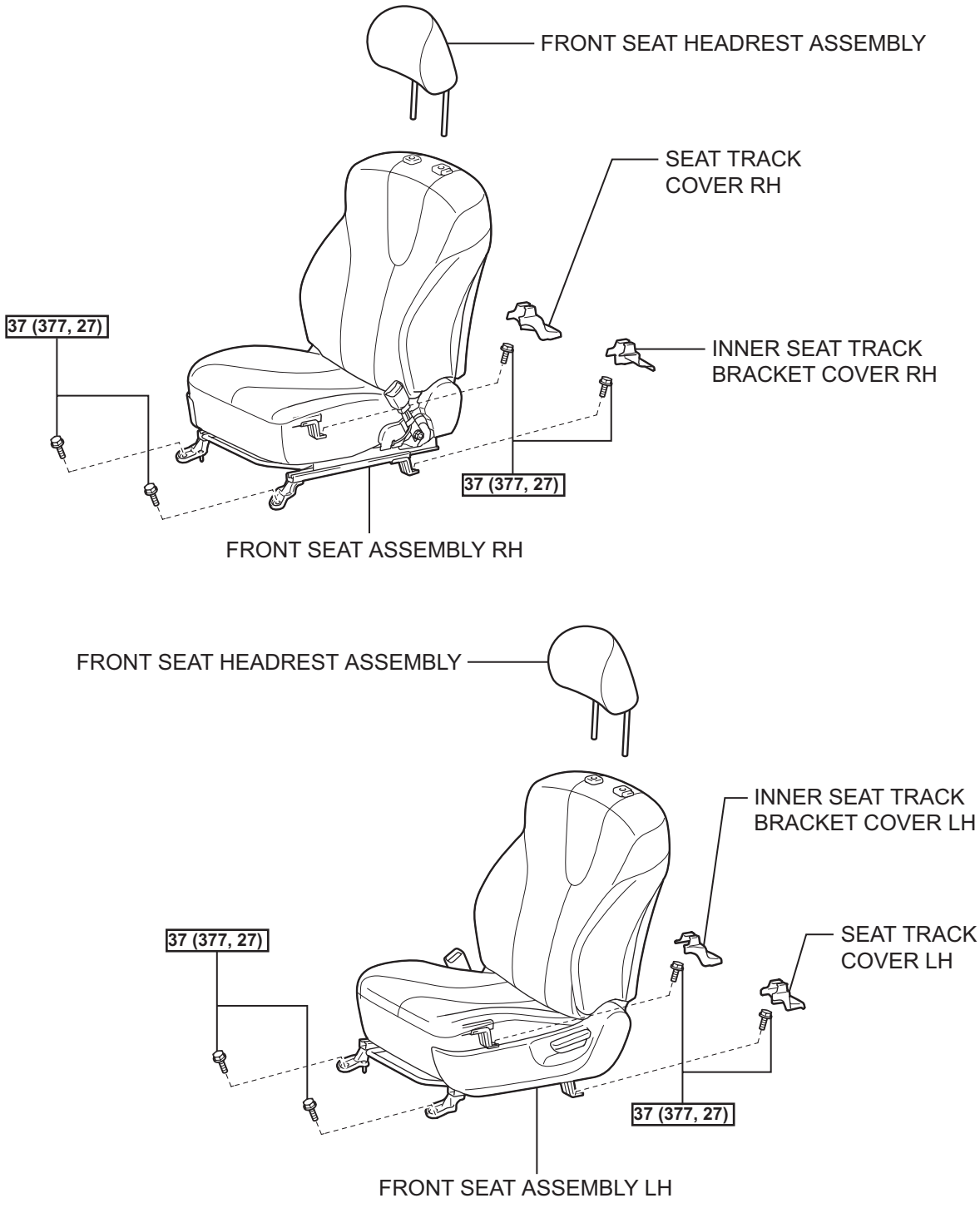
4. **INSTALL FLOOR SHIFT LEVER ASSEMBLY**
(a) Install the floor shift lever assembly with the 4 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)
5. **INSTALL YAW RATE AND ACCELERATION SENSOR (w/ VSC) (See page BC-448)**
6. **INSTALL FLOOR CARPET BRACKET LH**
7. **INSTALL FLOOR CARPET BRACKET RH**
8. **INSTALL NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-177)**
9. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
10. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
11. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)**
12. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
13. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**
14. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
15. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
16. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
17. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)**
18. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
19. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
20. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
21. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
22. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**

23. INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-55)
24. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)
25. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)
26. INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)
27. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)
28. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)
29. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)
30. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
31. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)
32. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)
33. INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)
34. INSPECT PARKING BRAKE PEDAL TRAVEL (See page PB-1)
35. ADJUST PARKING BRAKE PEDAL TRAVEL (See page PB-1)
36. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
37. INSPECT SENSOR SIGNAL (See page BC-448)

PARKING BRAKE CABLE

COMPONENTS

for Manual Seat:



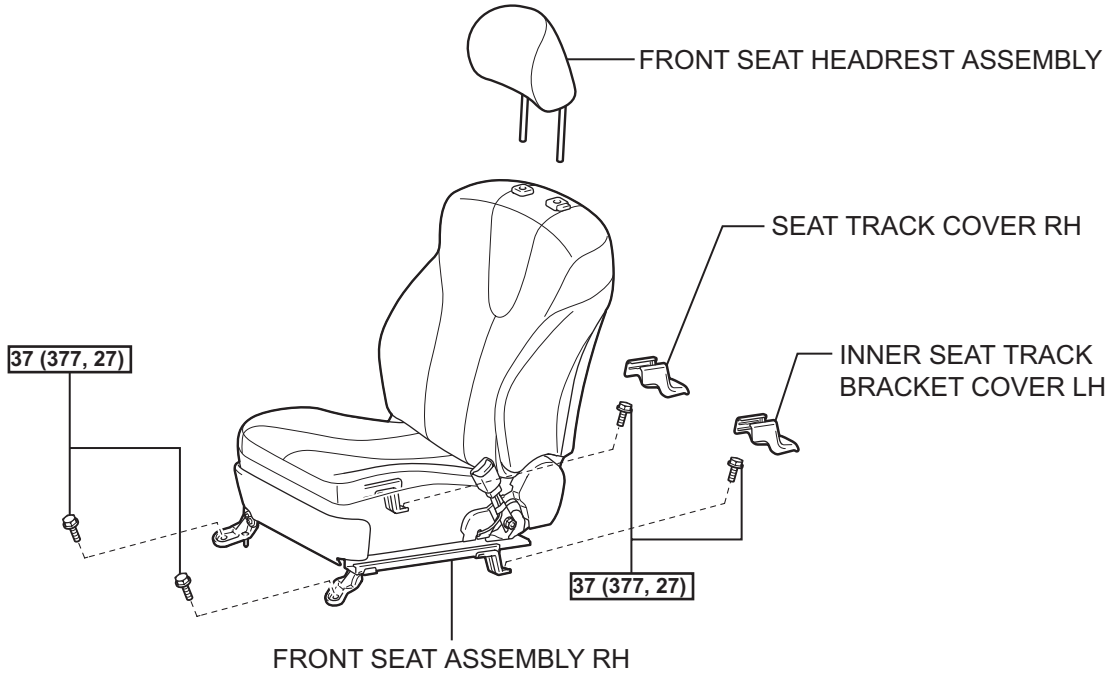
N*m (kgf*cm, ft.*lbf) : Specified torque

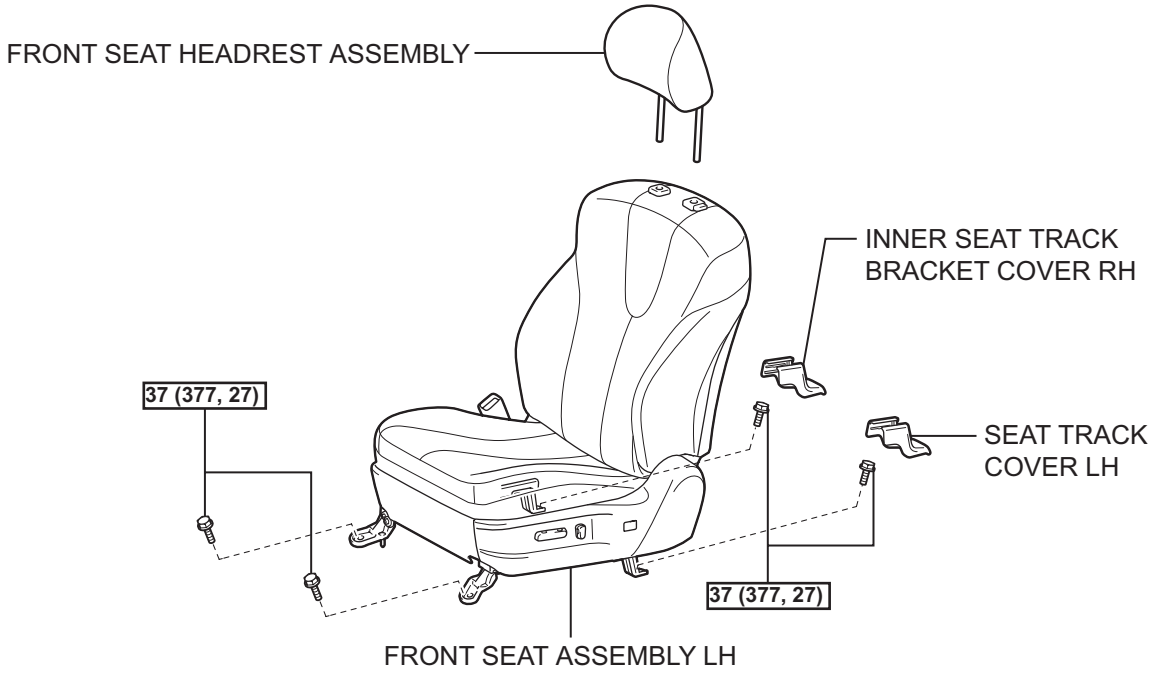
P

B132048E01

PB

for Power Seat:



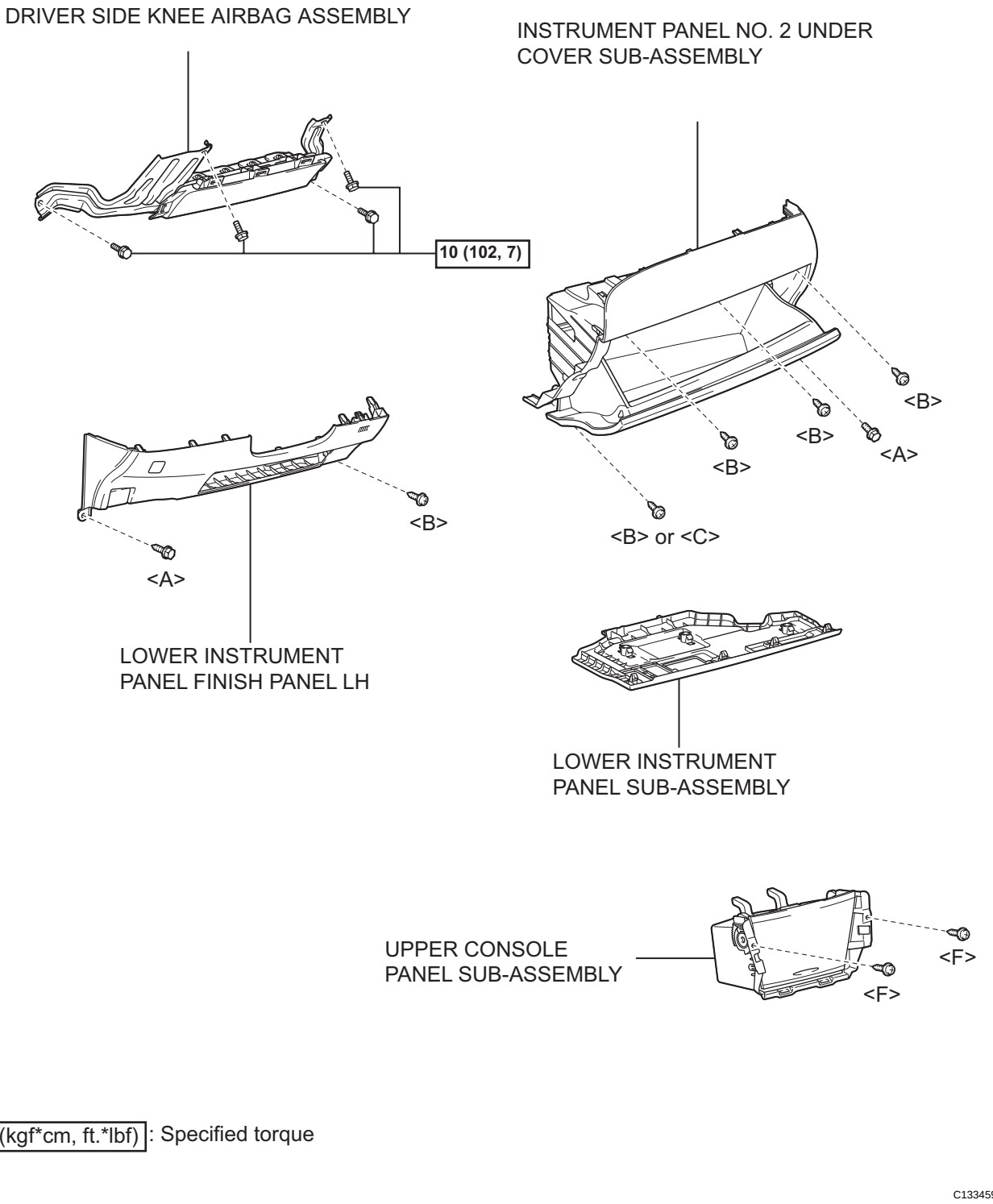


N*m (kgf*cm, ft.*lbf): Specified torque

P

B132047E01

for TMC made:

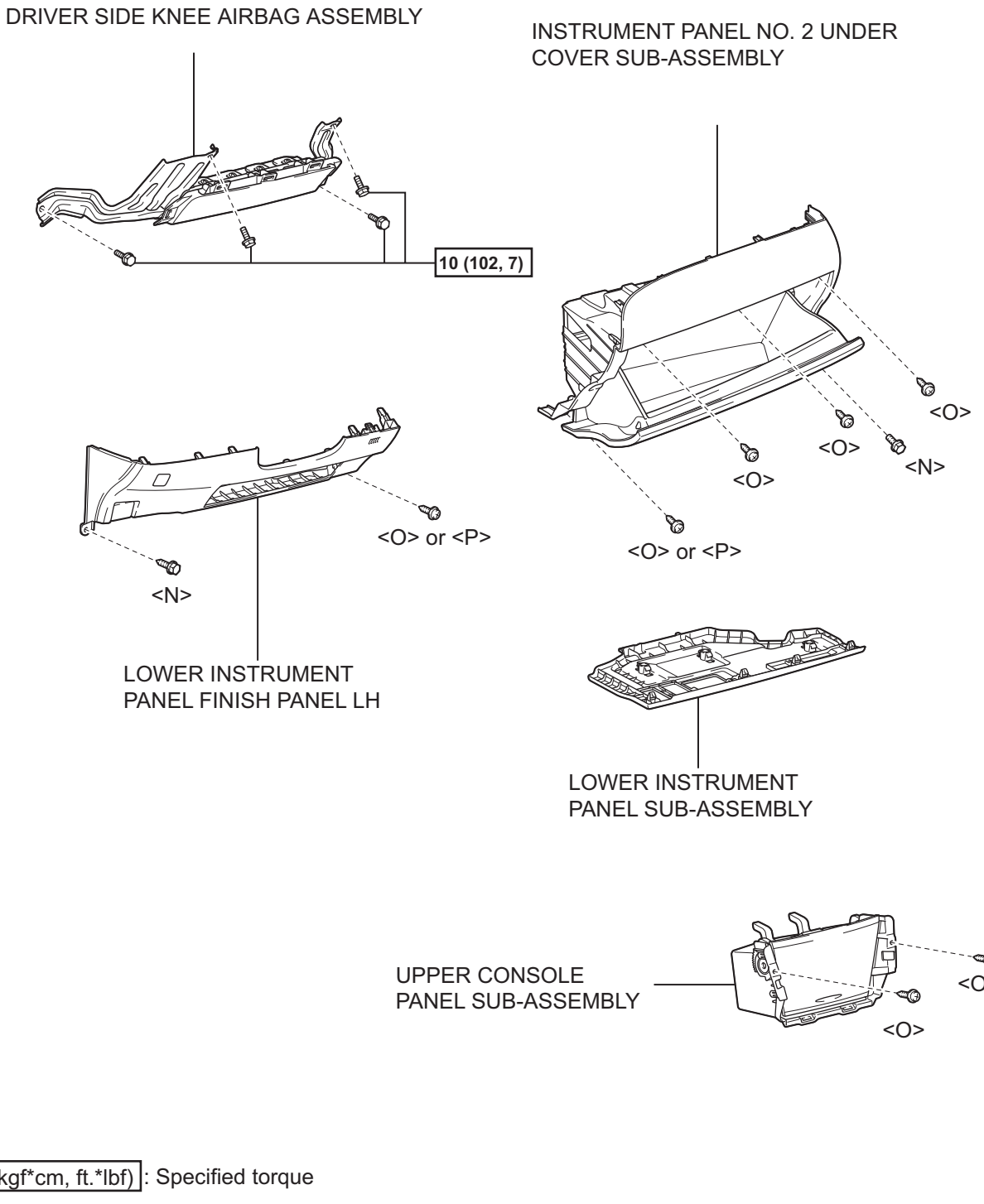


N*m (kgf*cm, ft.*lbf) : Specified torque

C133459E01

PB

for TMMK made:

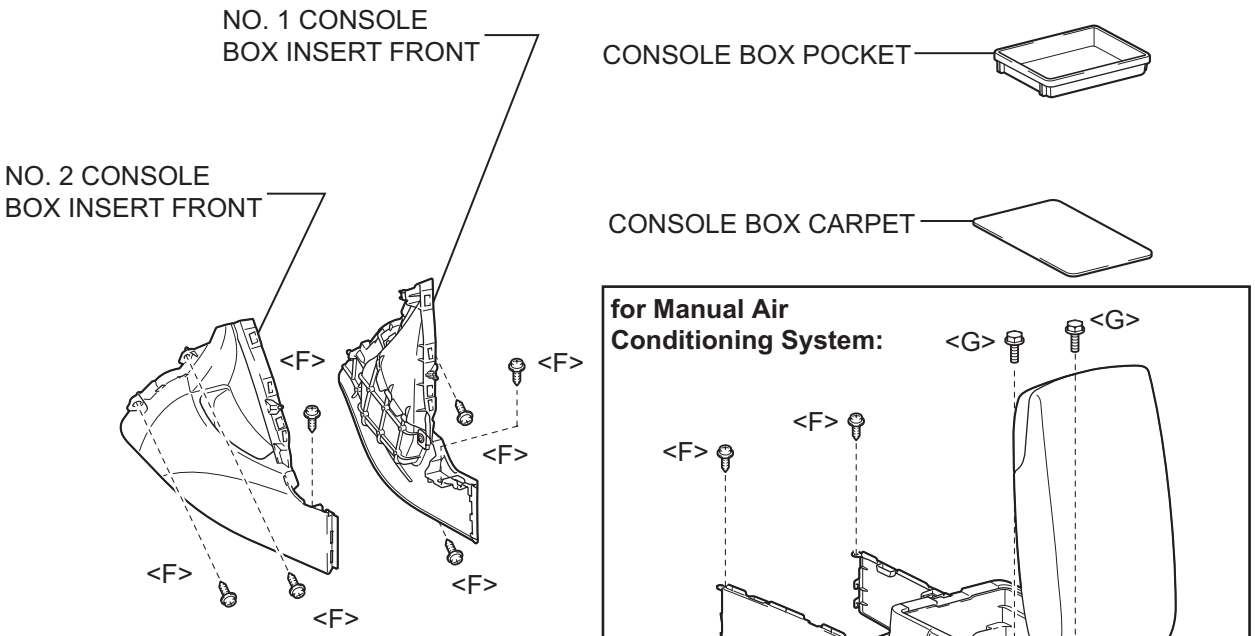


N*m (kgf*cm, ft.*lbf): Specified torque

C133459E02

PB

for TMC made:

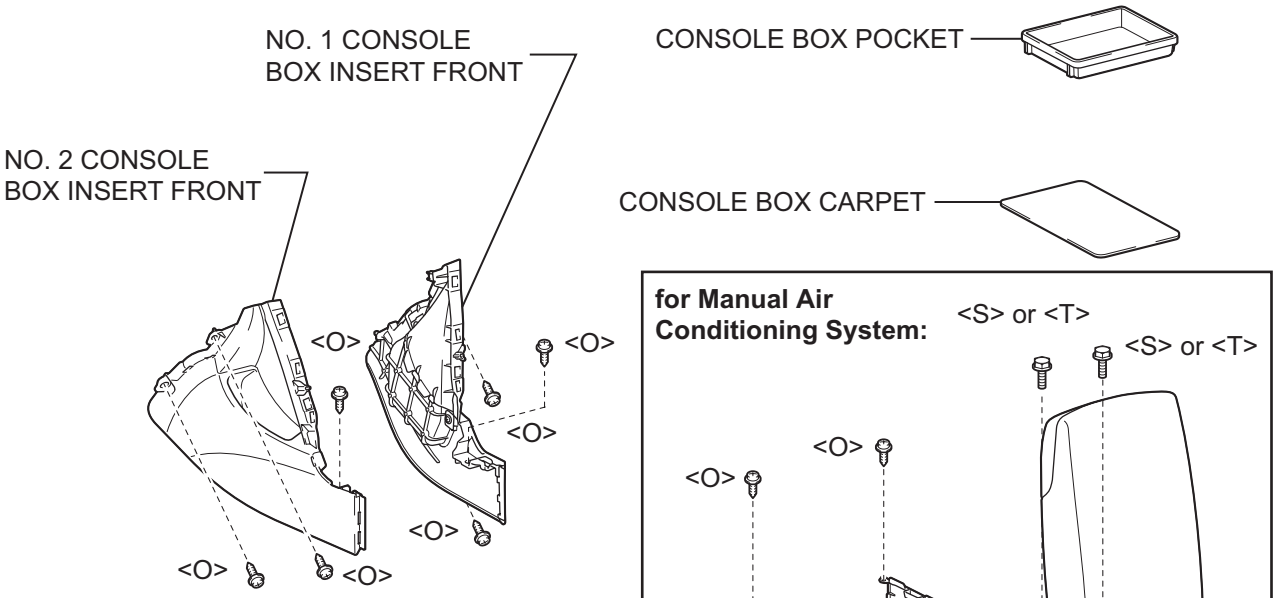


N*m (kgf*cm, ft.*lbf): Specified torque

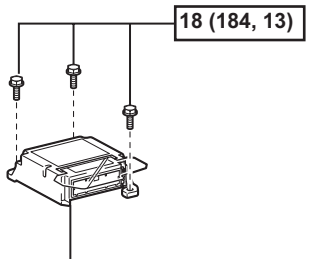
C141956E02

PB

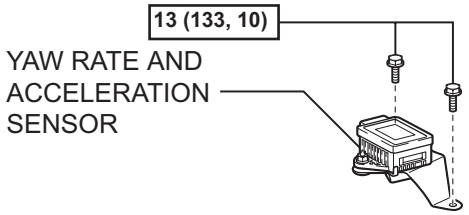
for TMMK made:



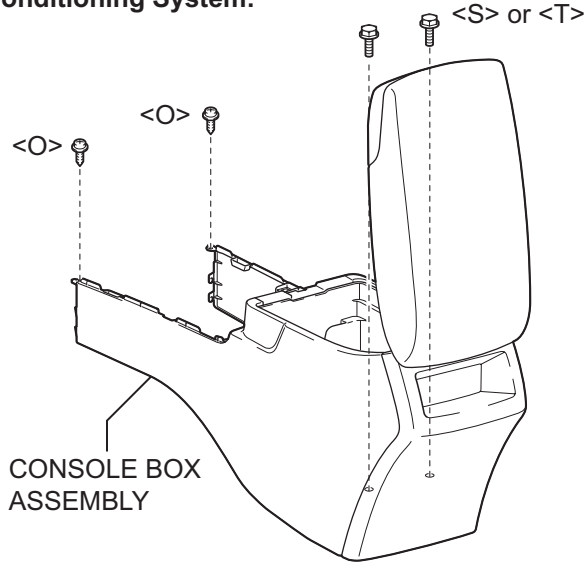
for Automatic Transaxle:



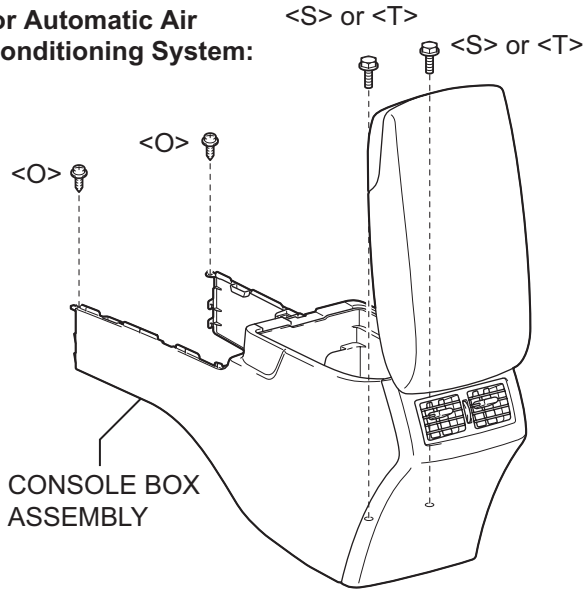
for Automatic Transaxle with VSC:



for Manual Air Conditioning System:



for Automatic Air Conditioning System:

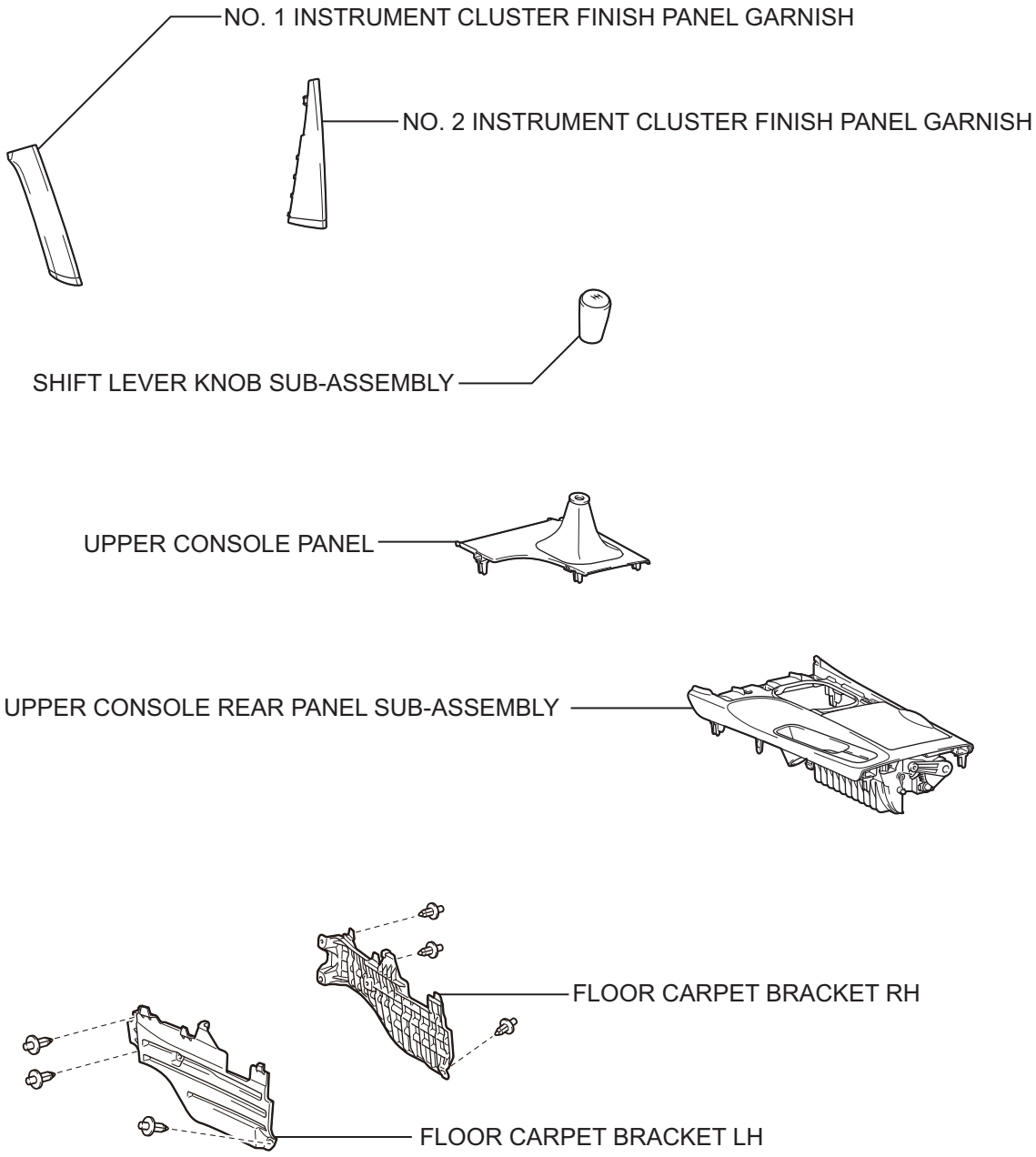


N*m (kgf*cm, ft.*lbf): Specified torque

C141957E02

PB

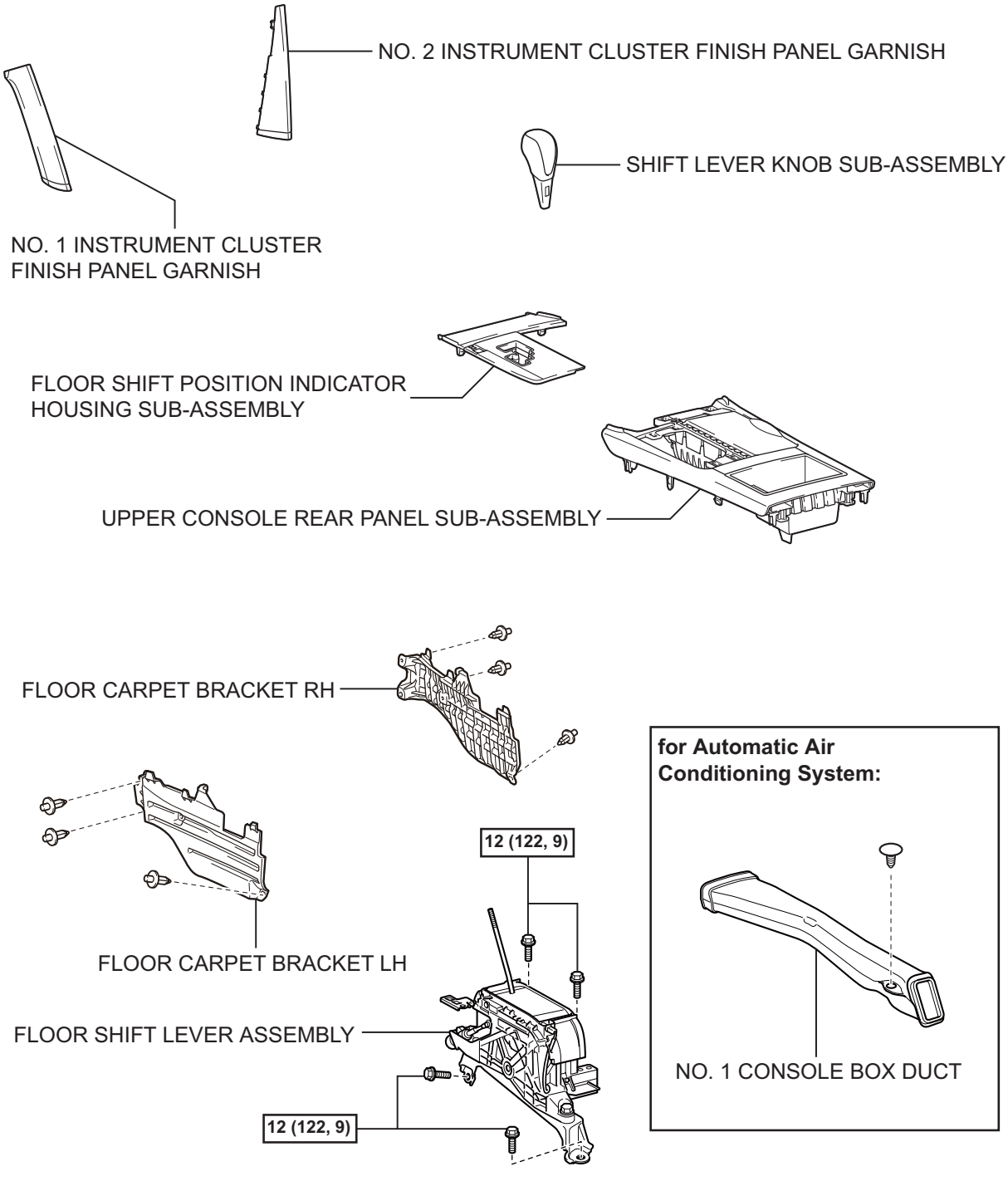
for Manual Transaxle:



C133456E02

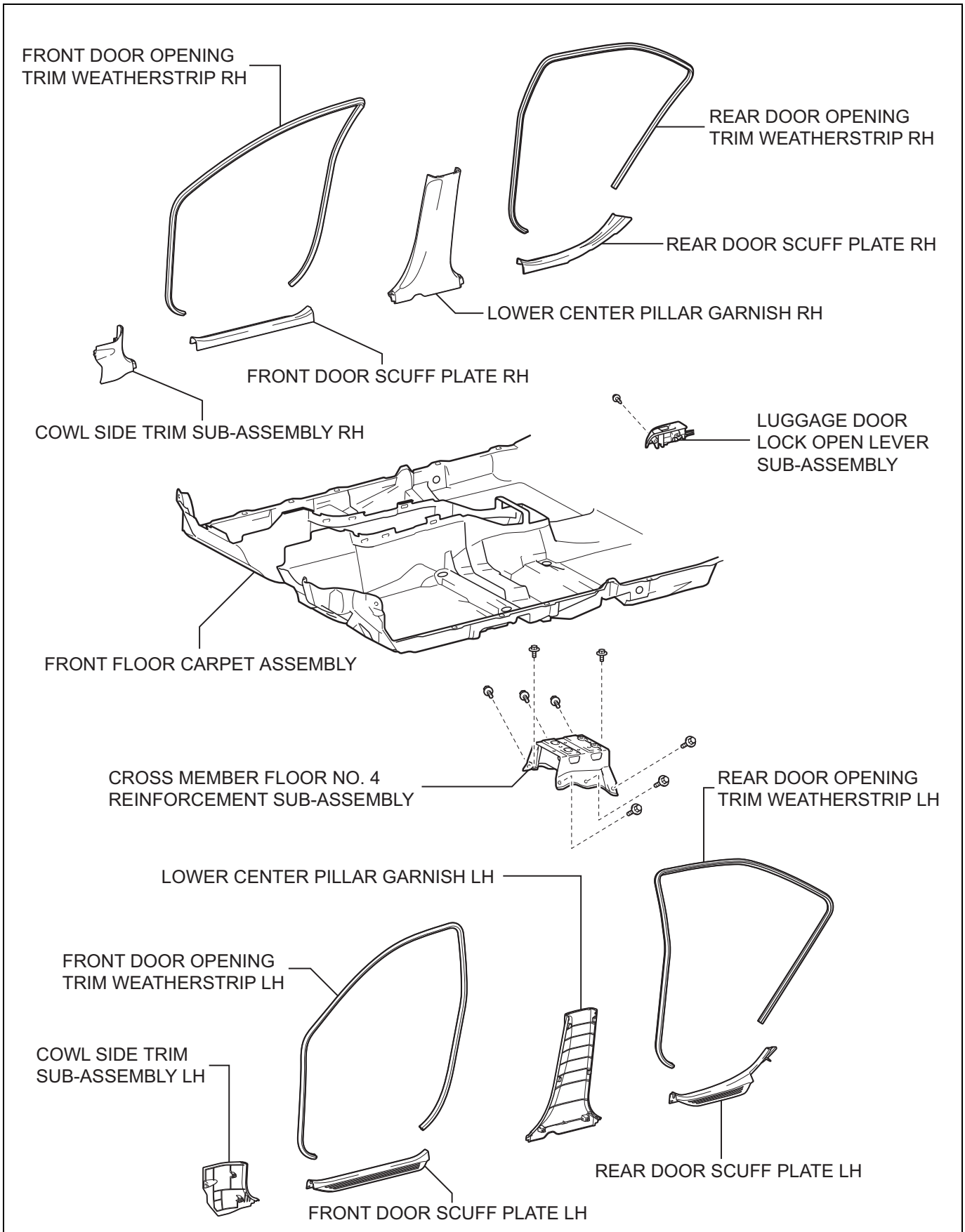
PB

for Automatic Transaxle:



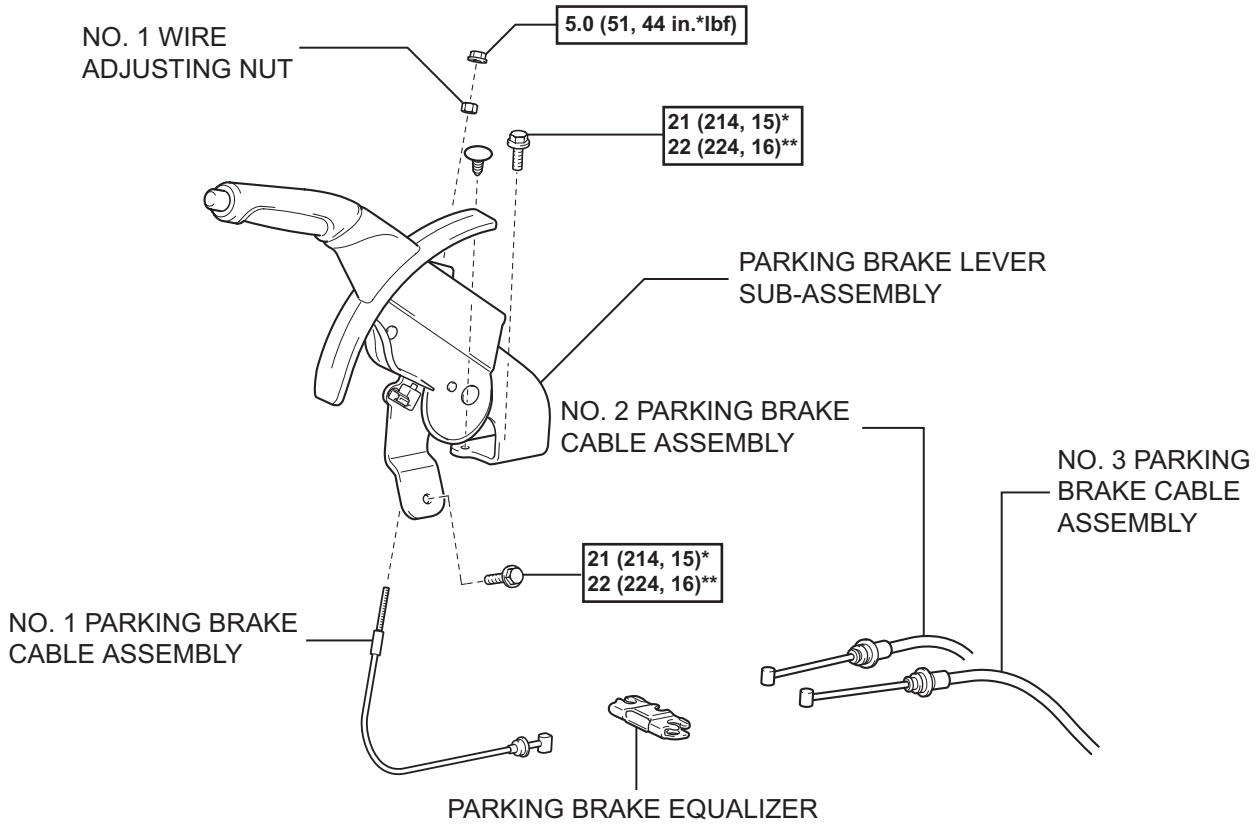
N*m (kgf*cm, ft.*lbf): Specified torque

C133457E03


FRONT DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
REAR DOOR SCUFF PLATE RH
LOWER CENTER PILLAR GARNISH RH
FRONT DOOR SCUFF PLATE RH
COWL SIDE TRIM SUB-ASSEMBLY RH
LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY
FRONT FLOOR CARPET ASSEMBLY
CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY
REAR DOOR OPENING TRIM WEATHERSTRIP LH
LOWER CENTER PILLAR GARNISH LH
FRONT DOOR OPENING TRIM WEATHERSTRIP LH
COWL SIDE TRIM SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
FRONT DOOR SCUFF PLATE LH
P
C132673E01

PB

for Manual Transaxle:



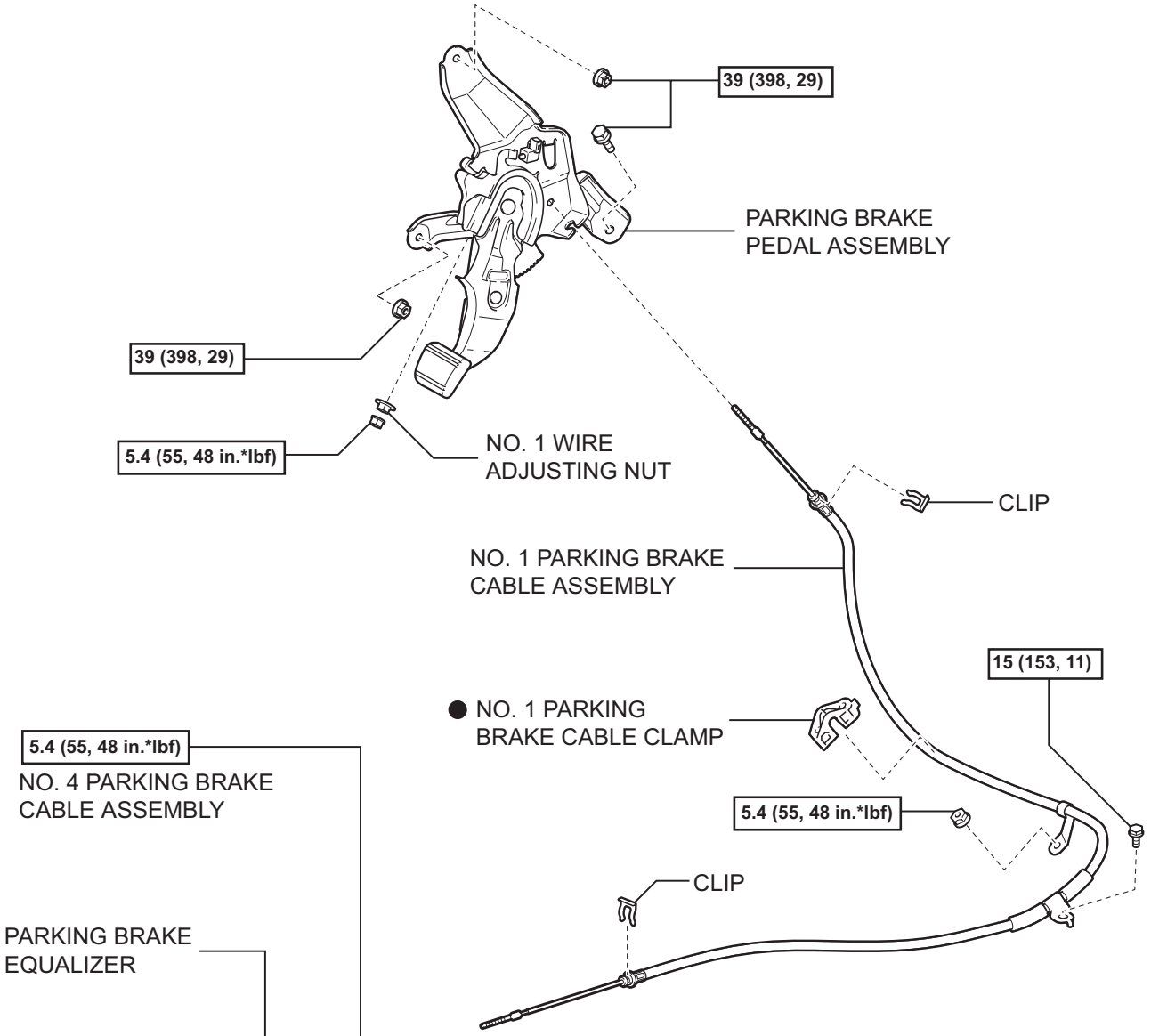
N*m (kgf*cm, ft.*lbf): Specified torque * For TMC made ** For TMMK made

P

C138181E01

PB

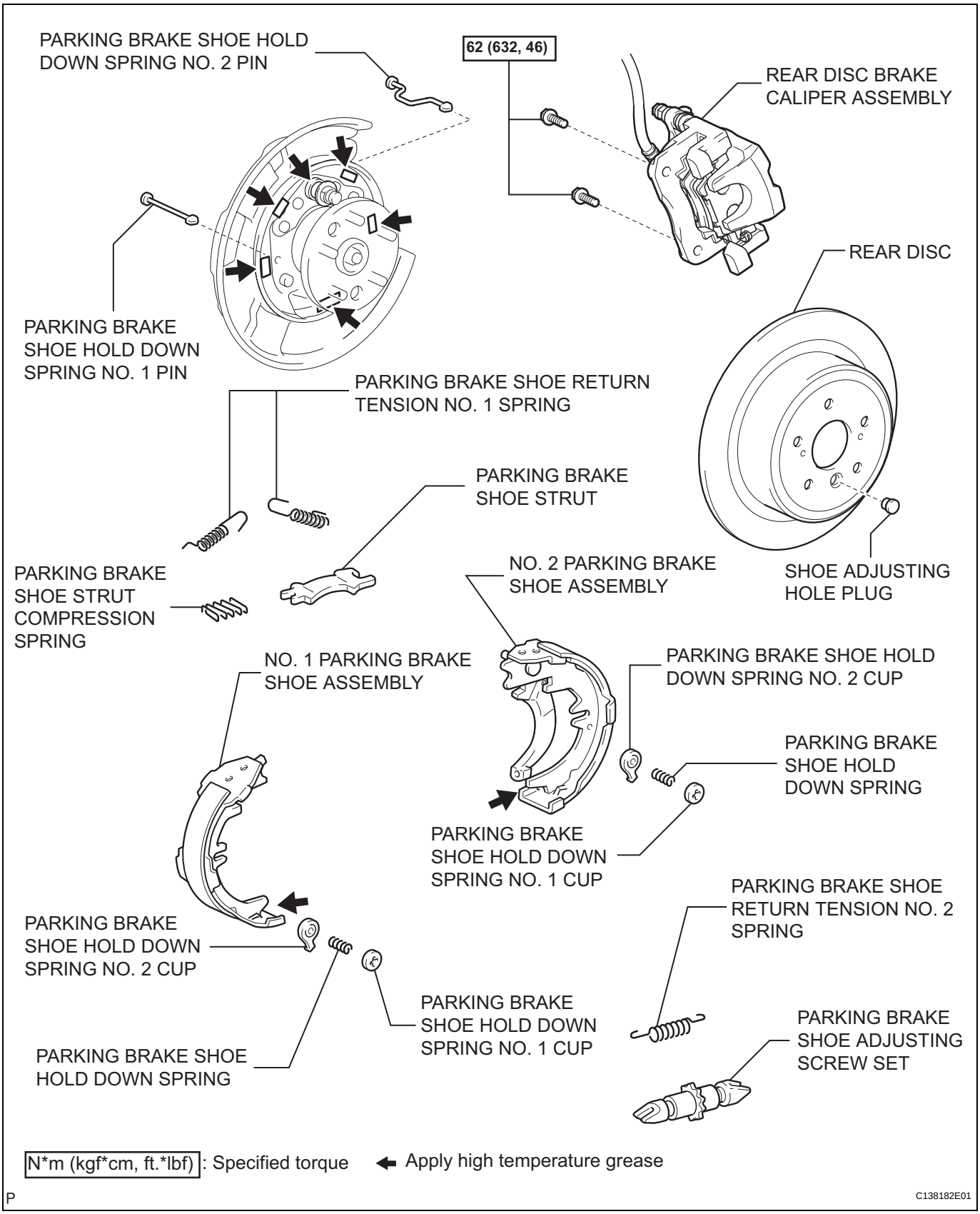
for Automatic Transaxle:



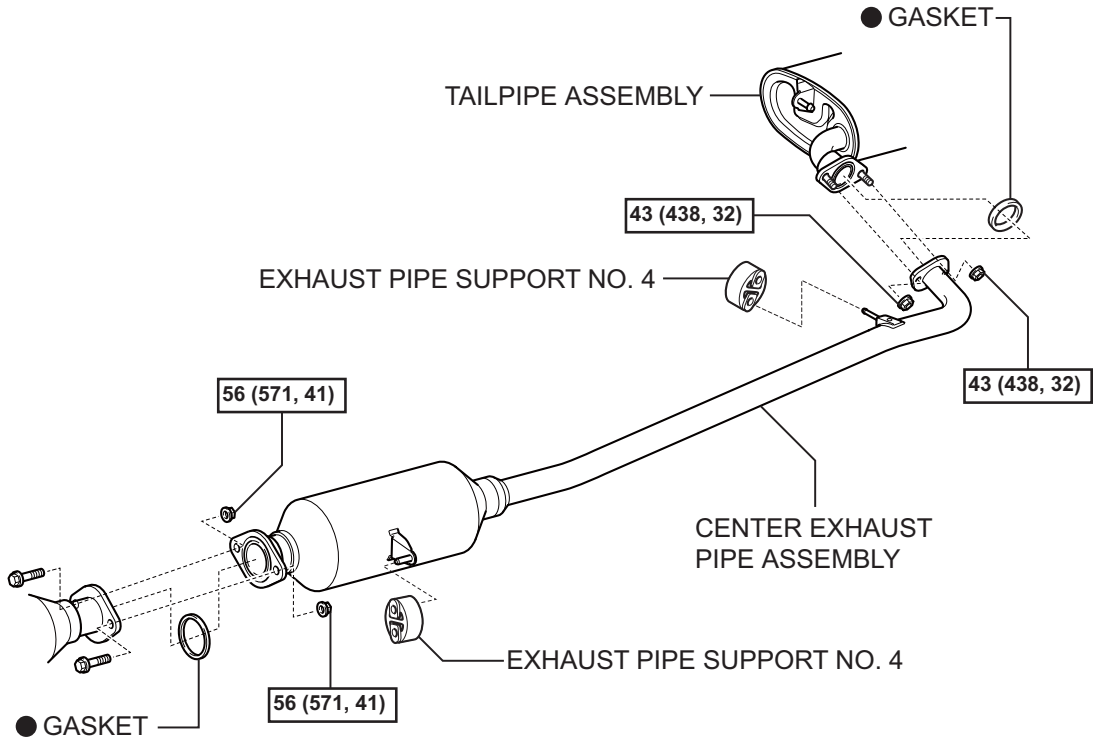
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C138178E01

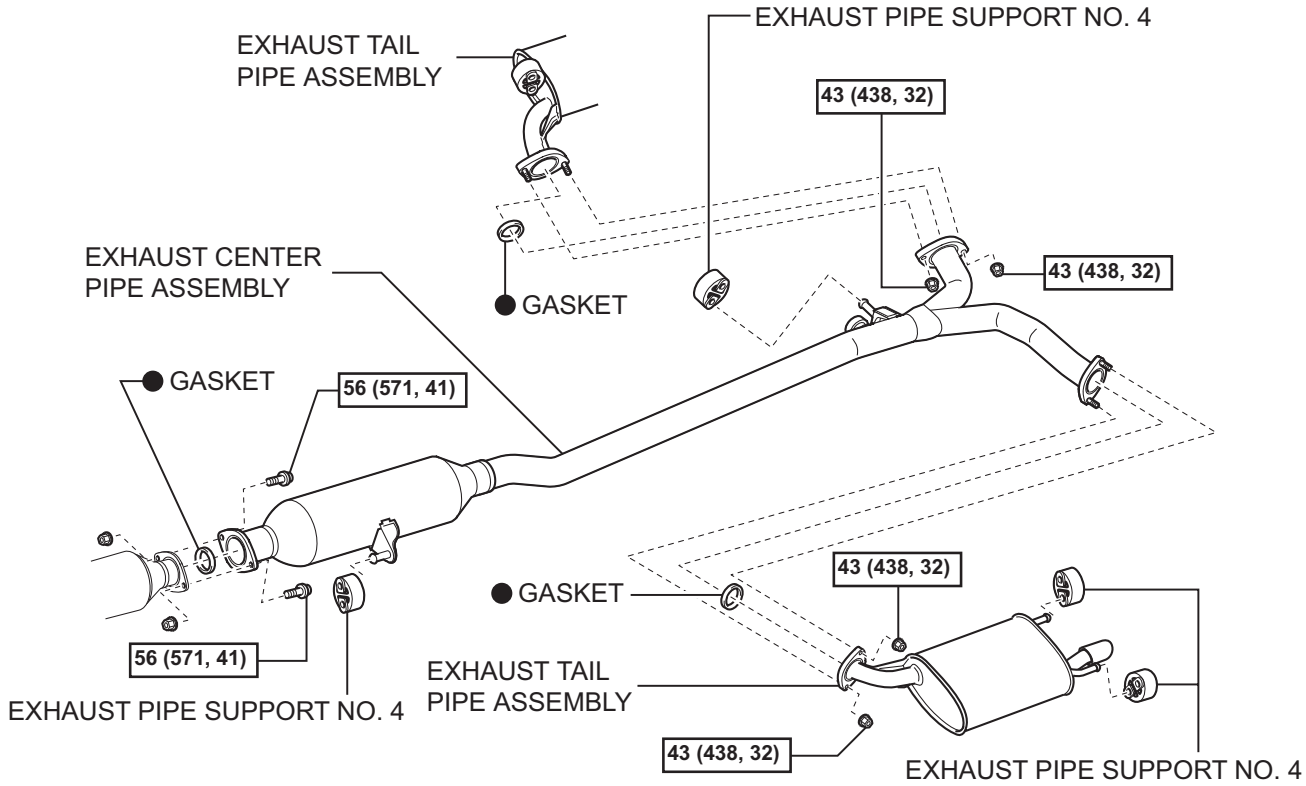
PB


PARKING BRAKE SHOE HOLD DOWN SPRING NO. 2 PIN
62 (632, 46)
REAR DISC BRAKE CALIPER ASSEMBLY
REAR DISC
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 1 PIN
PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING
PARKING BRAKE SHOE STRUT
PARKING BRAKE SHOE STRUT COMPRESSION SPRING
NO. 2 PARKING BRAKE SHOE ASSEMBLY
SHOE ADJUSTING HOLE PLUG
NO. 1 PARKING BRAKE SHOE ASSEMBLY
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 2 CUP
PARKING BRAKE SHOE HOLD DOWN SPRING
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 1 CUP
PARKING BRAKE SHOE RETURN TENSION NO. 2 SPRING
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 2 CUP
PARKING BRAKE SHOE HOLD DOWN SPRING NO. 1 CUP
PARKING BRAKE SHOE HOLD DOWN SPRING
PARKING BRAKE SHOE ADJUSTING SCREW SET
N*m (kgf*cm, ft.*lbf): Specified torque
Apply high temperature grease
P
C138182E01

for 2AZ-FE:



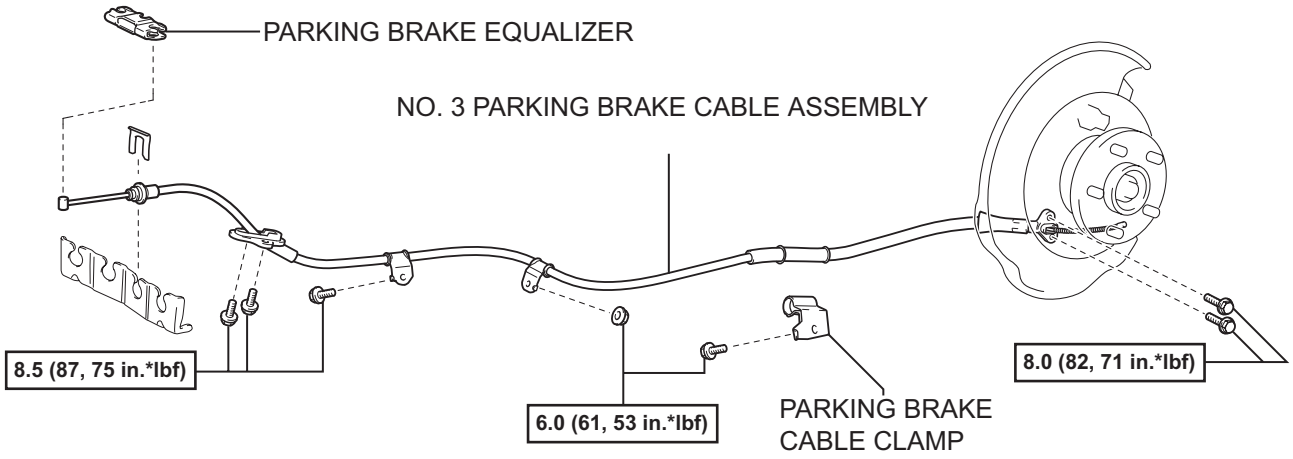
for 2GR-FE:



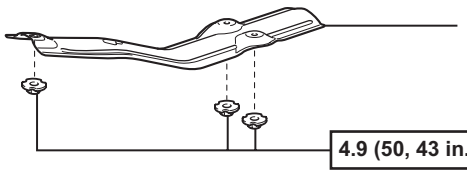
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C138183E01

PB



for 2AZ-FE:



N*m (kgf*cm, ft.*lbf) : Specified torque

P

C131895E01

PB

REMOVAL

HINT:

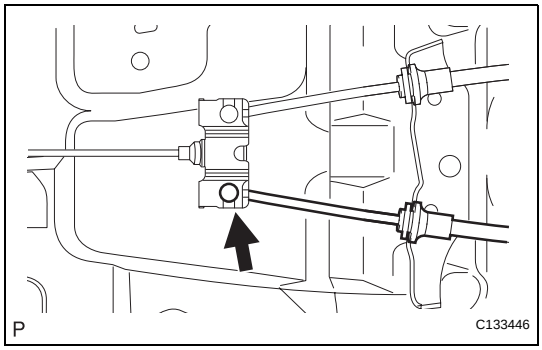
- Use the same procedures for the No. 2 parking brake cable assembly and No. 3 parking brake cable assembly.
- The procedures listed below are for the No. 3 parking brake cable assembly.

1. **PRECAUTION**
   (See page IP-20)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent the airbag working. (See page RS-1)
3. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat)**
   HINT:
   Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-16)
4. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side.
5. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat)**
   HINT:
   Refer to the procedures up to "REMOVE FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-30)
6. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side.
7. **REMOVE PARKING BRAKE LEVER SUB-ASSEMBLY (for Manual Transaxle)**
   HINT:
   Refer to the procedures up to "REMOVE PARKING BRAKE LEVER". (See page PB-11)
8. **REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Manual Transaxle) (See page PB-15)**
9. **REMOVE PARKING BRAKE PEDAL ASSEMBLY (for Automatic Transaxle)**
   HINT:
   Refer to the procedures up to "REMOVE PARKING BRAKE PEDAL". (See page PB-27)
10. **REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle) (See page PB-30)**

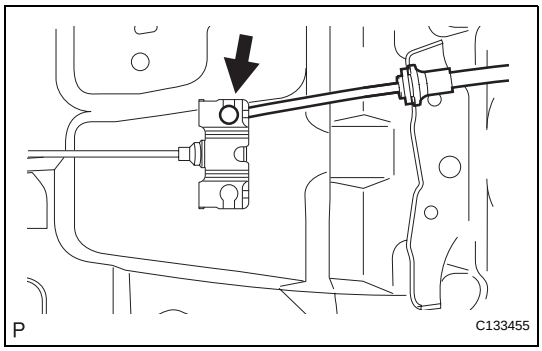
11. **REMOVE LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-13)**

12. **REMOVE FRONT FLOOR CARPET ASSEMBLY (for Automatic Transaxle) (See page PB-14)**

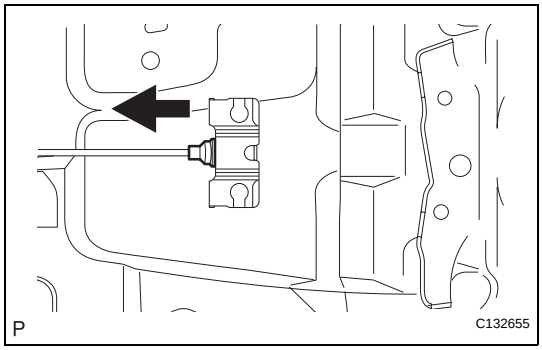
13. **REMOVE CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-14)**



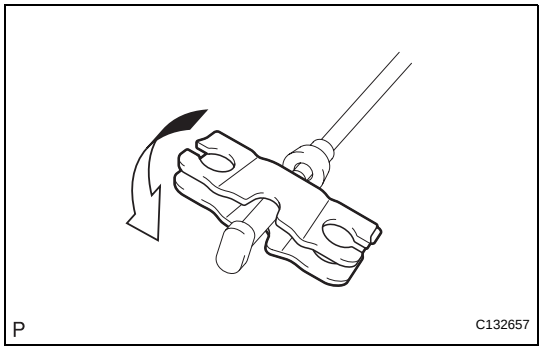
14. **SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Separate the No. 3 parking brake cable assembly from the parking brake equalizer.



15. **SEPARATE NO. 2 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Separate the No. 2 parking brake cable assembly from the parking brake equalizer.



16. **REMOVE NO. 4 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Slide the rubber boot as shown in the illustration.

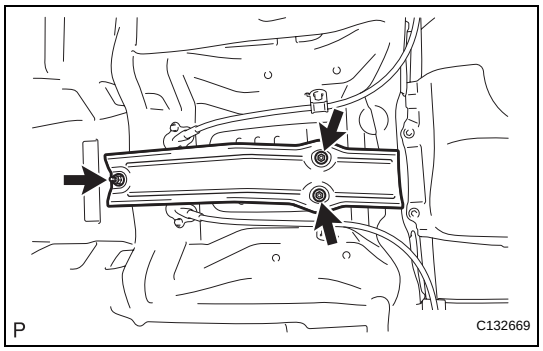


    (b) Remove the No. 4 parking brake cable assembly from the parking brake equalizer as shown in the illustration.

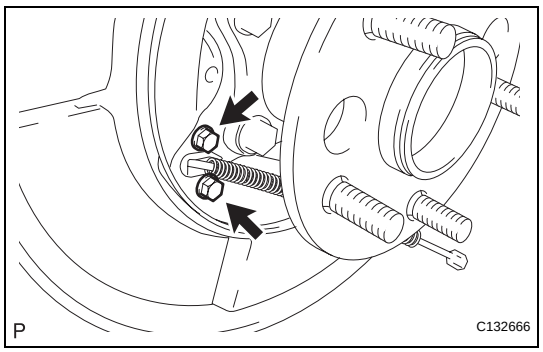
17. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-2)**

18. **REMOVE EXHAUST TAIL PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**

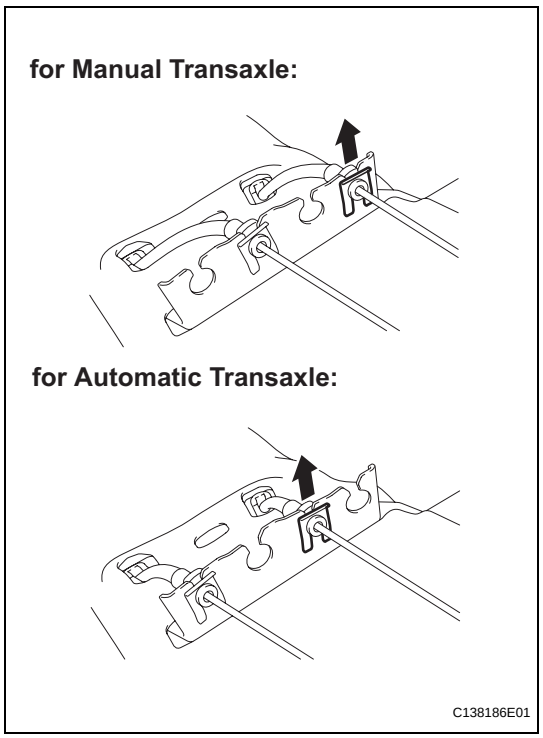
19. **REMOVE EXHAUST CENTER PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**



20. **REMOVE NO. 2 FRONT FLOOR HEAT LOWER INSULATOR (for 2AZ-FE)**
    (a) Remove the 3 nuts and the No. 2 front floor heat lower insulator.
21. **REMOVE REAR WHEEL**
22. **SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY (See page PB-58)**
23. **REMOVE REAR DISC (See page PB-58)**
24. **REMOVE PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING (See page PB-58)**
25. **REMOVE PARKING BRAKE SHOE STRUT (See page PB-58)**
26. **REMOVE NO. 1 PARKING BRAKE SHOE ASSEMBLY (See page PB-58)**
27. **REMOVE PARKING BRAKE SHOE ADJUSTING SCREW SET (See page PB-59)**
28. **REMOVE NO. 2 PARKING BRAKE SHOE ASSEMBLY (See page PB-59)**
29. **REMOVE NO. 3 PARKING BRAKE CABLE ASSEMBLY**
    (a) Remove the 2 bolts and separate the No. 3 parking brake cable assembly from the backing plate.

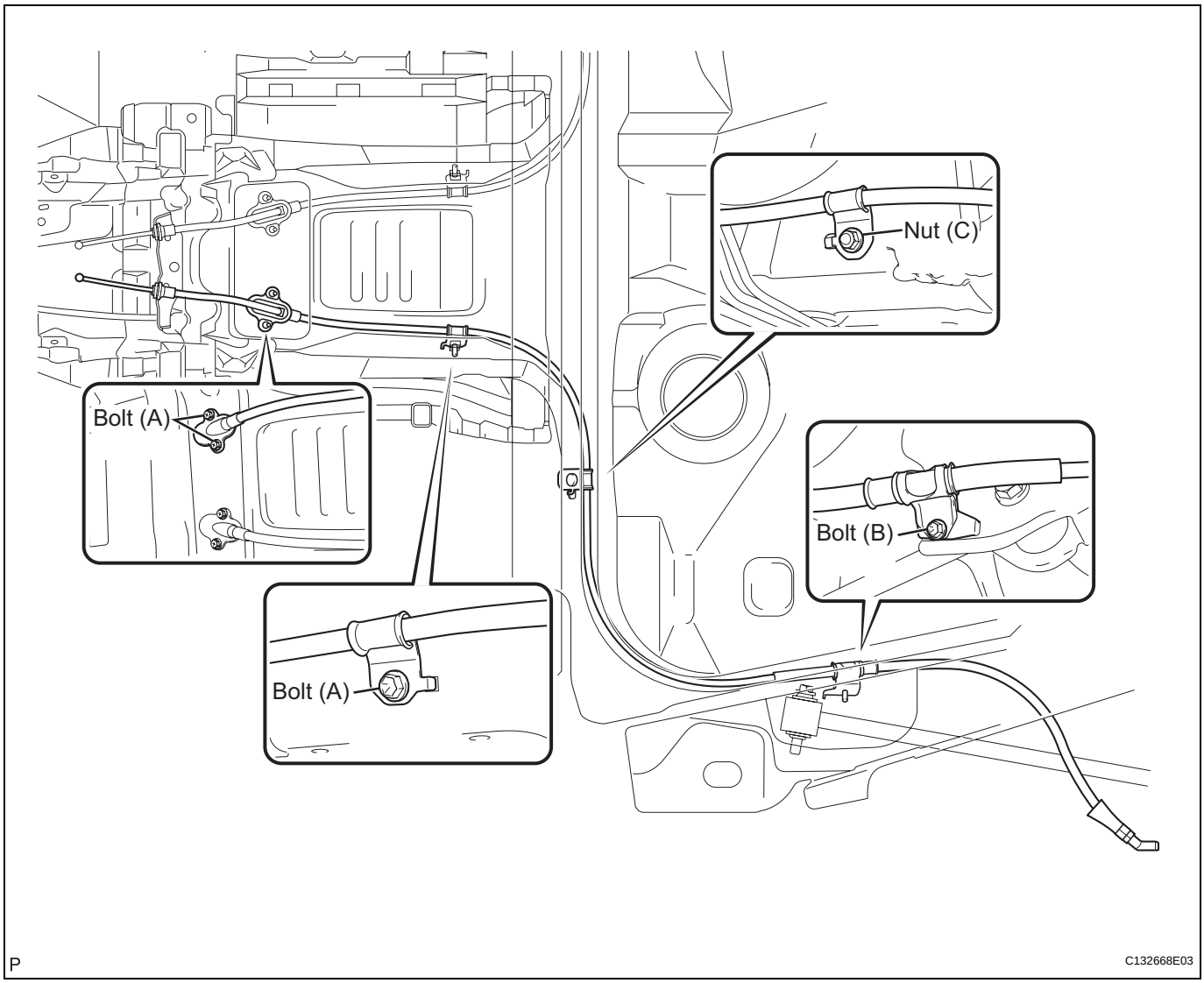


(b) Using needle-nose pliers, remove the clip from the No. 3 parking brake cable assembly.



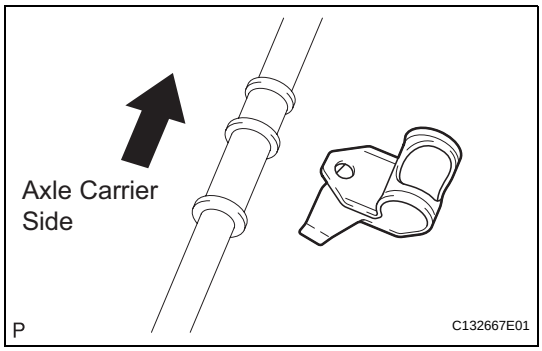
PB

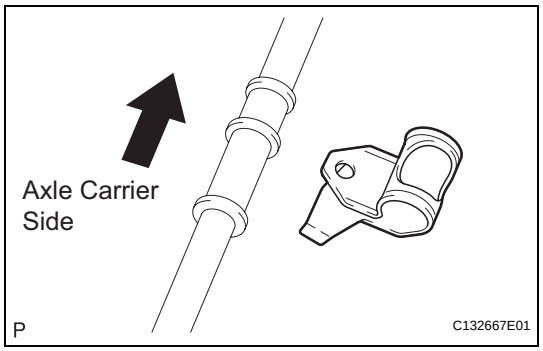
(c) Remove the 3 bolts (A), the bolt (B), and the nut (C), and disengage each claw.



(d) Remove the No. 3 parking brake cable assembly from the body.

(e) Remove the parking brake cable clamp.





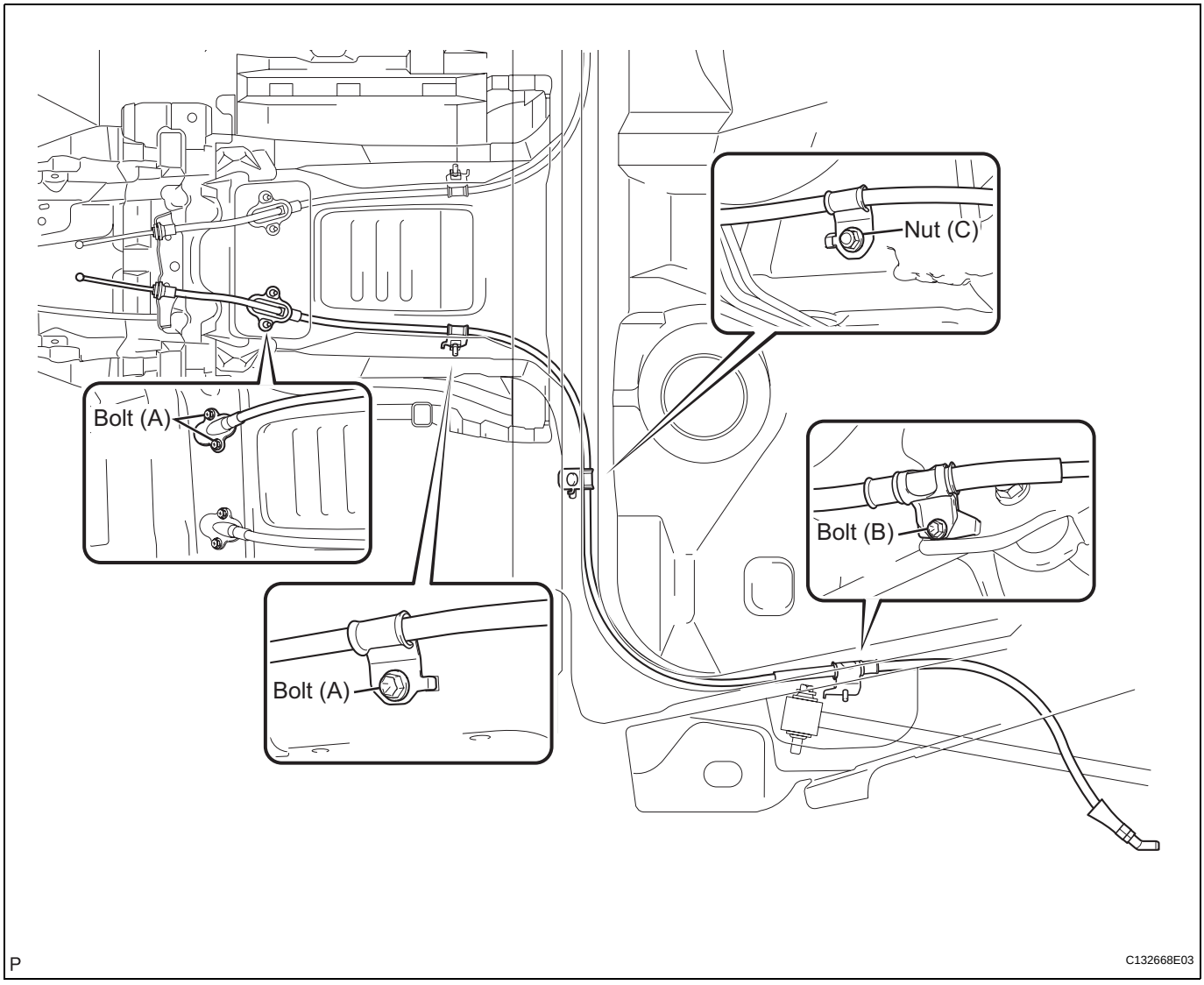
INSTALLATION

1. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

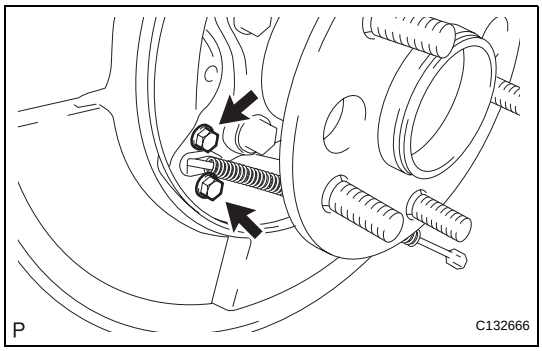
(a) Install the parking brake cable clamp to the No. 3 parking brake cable assembly.

(b) Install the No. 3 parking brake cable assembly with the 3 bolts (A), the bolt (B) and the nut (C), and engage each claw.

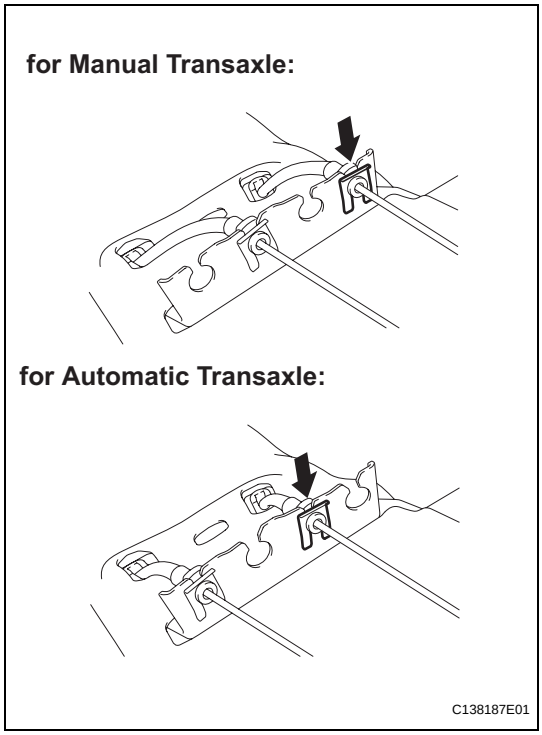
Torque: Bolt (A)
8.5 N*m (87 kgf*cm, 75 in.*lbf)
Bolt (B) and Nut (C)
6.0 N*m (61 kgf*cm, 53 in.*lbf)



PB

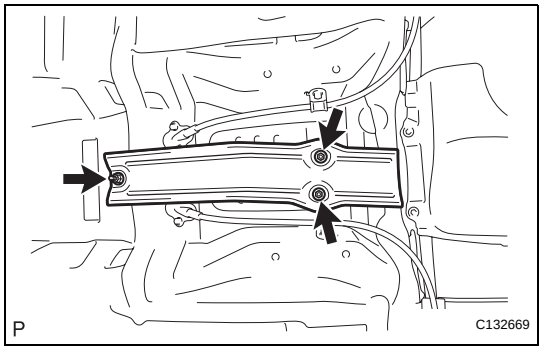


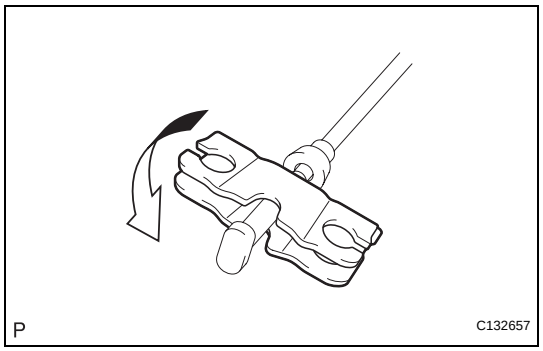
(c) Install the No. 3 parking brake cable assembly to the backing plate with the 2 bolts.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



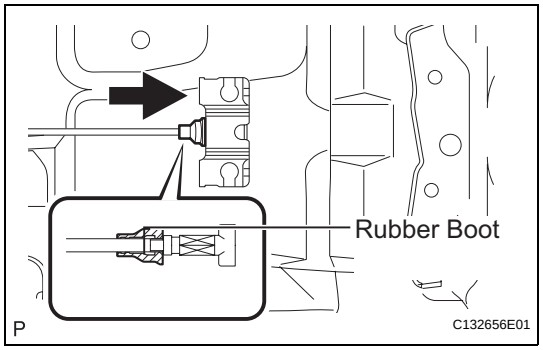
(d) Using a brass bar and a hammer, install the clip to the No. 3 parking brake cable assembly.

2. **INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY (See page PB-61)**
3. **INSTALL PARKING BRAKE SHOE ADJUSTING SCREW SET (See page PB-62)**
4. **INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY (See page PB-62)**
5. **INSTALL PARKING BRAKE SHOE STRUT (See page PB-62)**
6. **INSTALL PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING (See page PB-62)**
7. **CHECK PARKING BRAKE INSTALLATION (See page PB-63)**
8. **INSTALL REAR DISC (See page PB-63)**
9. **ADJUST PARKING BRAKE SHOE CLEARANCE (See page PB-63)**
10. **INSTALL REAR DISC BRAKE CALIPER ASSEMBLY (See page PB-63)**
11. **INSTALL REAR WHEEL**
12. **INSTALL NO. 2 FRONT FLOOR HEAT LOWER INSULATOR (for 2AZ-FE)**
    (a) Install the No. 2 front floor heat lower insulator with the 3 nuts.
    Torque: 4.9 N*m (50 kgf*cm, 43 in.*lbf)
13. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-4)**
14. **INSTALL EXHAUST CENTER PIPE ASSEMBLY (for 2GR-FE) (See page EX-4)**
15. **INSTALL EXHAUST TAIL PIPE ASSEMBLY (for 2GR-FE) (See page EX-5)**

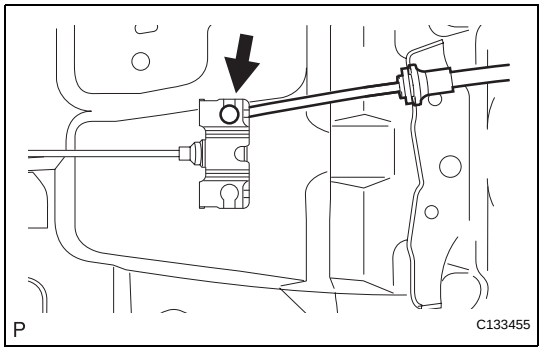




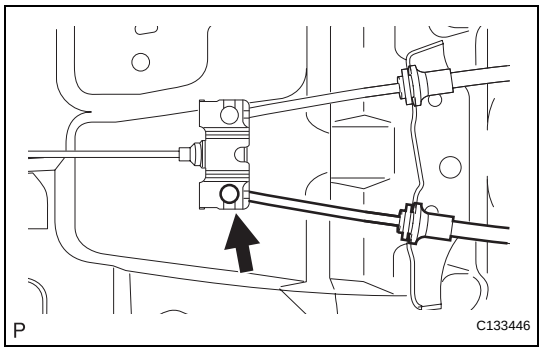
16. **INSTALL NO. 4 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Install the No. 4 parking brake cable assembly to the parking brake equalizer.



    (b) Slide the rubber boot back as shown in the illustration.



17. **CONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Connect the No. 2 parking brake cable assembly to the parking brake equalizer.



18. **CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle)**
    (a) Connect the No. 3 parking brake cable assembly to the parking brake equalizer.

19. **INSTALL CROSS MEMBER FLOOR NO. 4 REINFORCEMENT SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-18)**

20. **INSTALL FRONT FLOOR CARPET ASSEMBLY (for Automatic Transaxle) (See page PB-18)**

21. **INSTALL LUGGAGE DOOR LOCK OPEN LEVER SUB-ASSEMBLY (for Automatic Transaxle) (See page PB-18)**

22. **INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Manual Transaxle) (See page PB-16)**

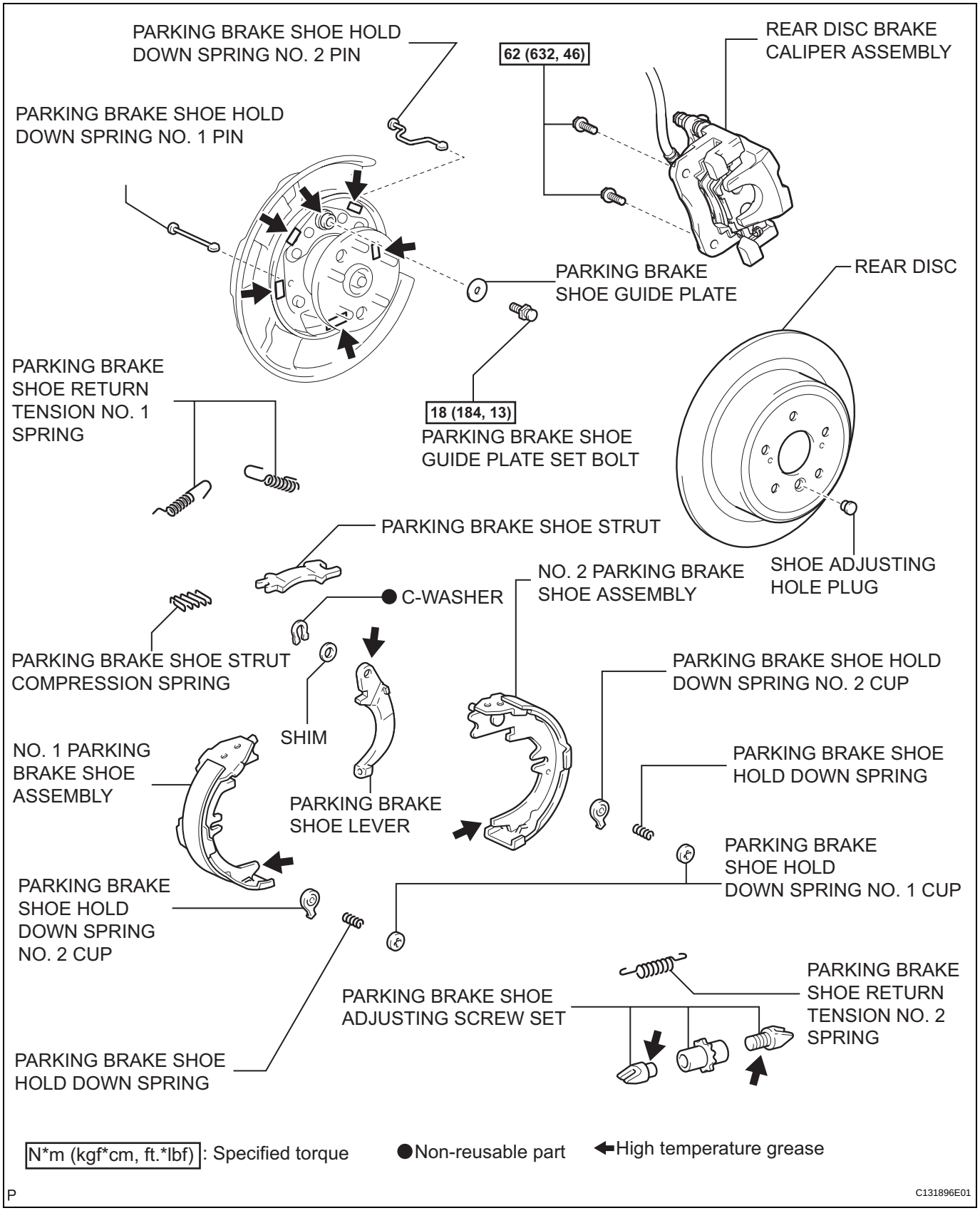
23. **INSTALL PARKING BRAKE LEVER SUB-ASSEMBLY (for Manual Transaxle)**
    HINT:
    Refer to the procedures up to "INSTALL PARKING BRAKE LEVER". (See page PB-17)

PB

24. **INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY (for Automatic Transaxle) (See page PB-31)**
25. **INSTALL PARKING BRAKE PEDAL ASSEMBLY (for Automatic Transaxle)**
    HINT:
    Refer to the procedures up to "INSTALL PARKING BRAKE PEDAL". (See page PB-32)
26. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Manual Seat)". (See page SE-24)
27. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
28. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat)**
    HINT:
    Refer to the procedures up to "INSTALL FRONT SEAT ASSEMBLY (for Power Seat)". (See page SE-41)
29. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
30. **INSPECT PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)**
31. **INSPECT PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)**
32. **ADJUST PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)**
33. **ADJUST PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)**
34. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
35. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
    HINT:
    (See page RS-242)
36. **INSPECT SRS WARNING LIGHT**
37. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**
38. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-42)**
39. **CHECK FOR EXHAUST GAS LEAKS (See page EX-5)**

PARKING BRAKE ASSEMBLY

COMPONENTS



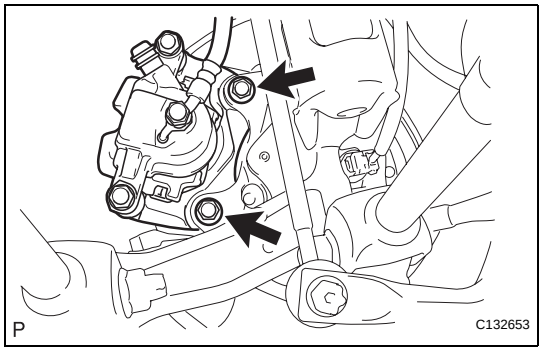
PB

DISASSEMBLY

HINT:

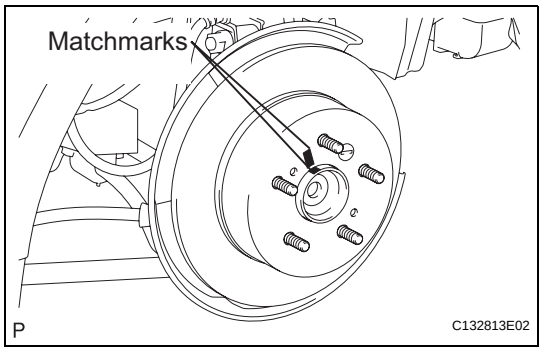
- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.

1. REMOVE REAR WHEEL



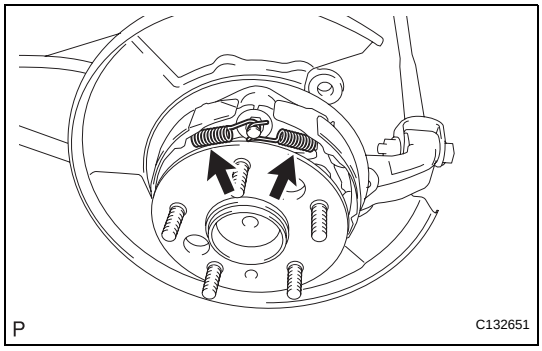
2. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY

(a) Remove the 2 bolts and separate the rear disc brake caliper assembly.
HINT:
Do not disconnect the flexible hose from the disc brake caliper assembly.



3. REMOVE REAR DISC

(a) Release the parking brake and place the matchmarks on the rear disc and the axle hub.
(b) Remove the rear disc.
HINT:
If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.

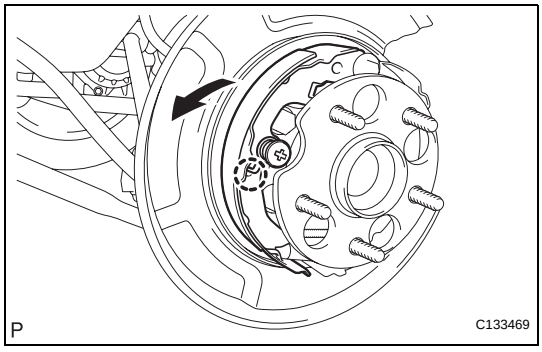


4. REMOVE PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING

(a) Using needle-nose pliers, remove the 2 parking brake shoe return tension No. 1 springs.

5. REMOVE PARKING BRAKE SHOE STRUT

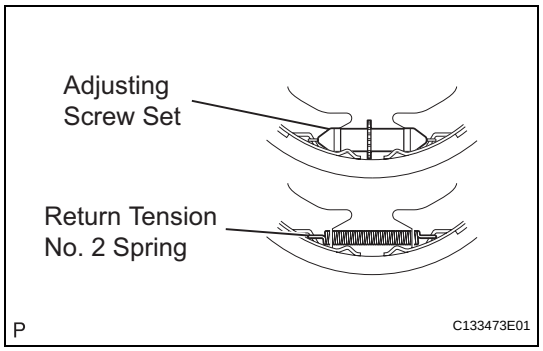
(a) Remove the parking brake shoe strut and the parking brake shoe strut compression spring.



6. REMOVE NO. 1 PARKING BRAKE SHOE ASSEMBLY

(a) Release the claw of the parking brake shoe hold down spring No. 1 cup.
(b) Remove the No. 1 parking brake shoe assembly as shown in the illustration.
(c) Remove the parking brake shoe hold down spring No. 1 cup, the parking brake shoe hold down spring, the parking brake shoe hold down spring No. 2 cup, and the parking brake shoe hold down spring No. 1 pin.

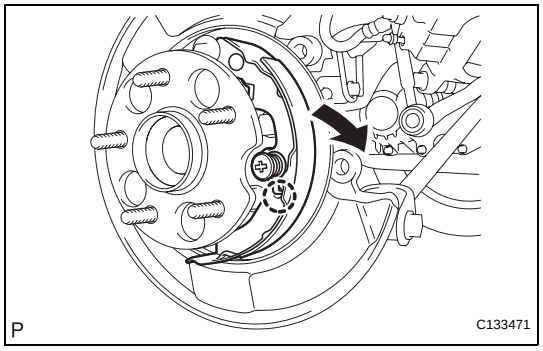
PB



7. REMOVE PARKING BRAKE SHOE ADJUSTING SCREW SET

(a) Remove the parking brake shoe adjusting screw set.

(b) Remove the parking brake shoe return tension No. 2 spring.

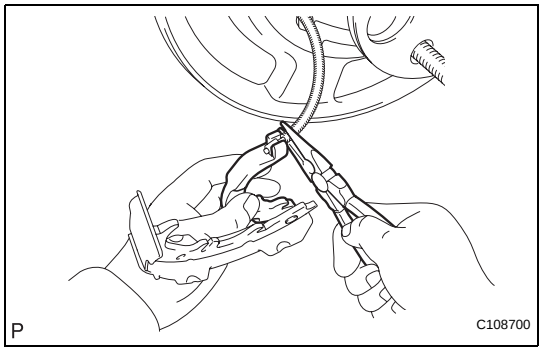


8. REMOVE NO. 2 PARKING BRAKE SHOE ASSEMBLY

(a) Release the claw of the the parking brake shoe hold down spring No. 1 cup.

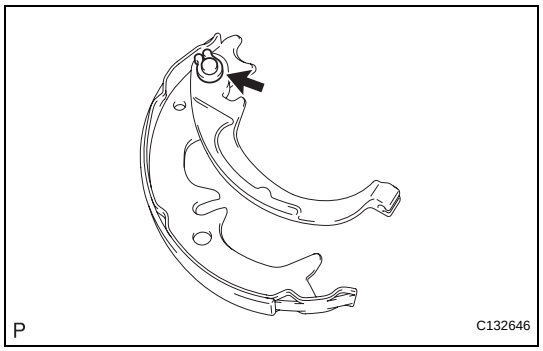
(b) Remove the No. 2 parking brake shoe assembly as shown in the illustration.

(c) Remove the parking brake shoe hold down spring No. 1 cup, the parking brake shoe hold down spring, the parking brake shoe hold down spring No. 2 cup, and the parking brake shoe hold down spring No. 2 pin.



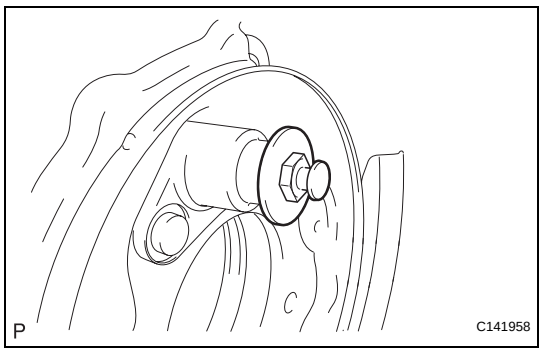
(d) Using needle-nose pliers, disconnect the No. 3 parking brake cable assembly from the parking brake shoe lever.

NOTICE:
Be careful not to damage the No. 3 parking brake cable assembly.



9. REMOVE PARKING BRAKE SHOE LEVER

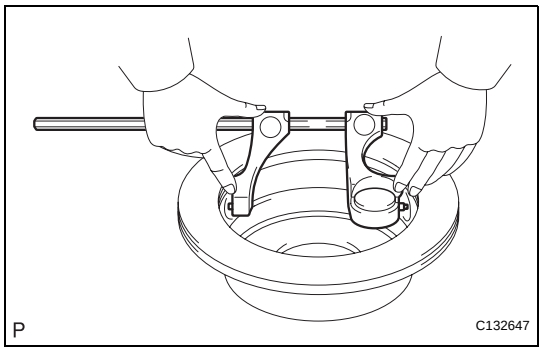
(a) Using a screwdriver, remove the C-washer, shim and the parking brake shoe lever.



10. REMOVE PARKING BRAKE SHOE GUIDE PLATE

(a) Remove the parking brake shoe guide plate set bolt and the parking brake shoe guide plate.

PB



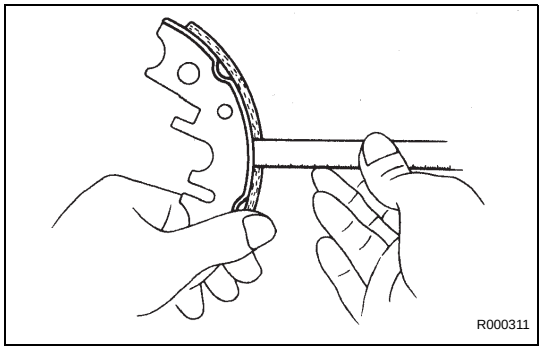
INSPECTION

1. INSPECT BRAKE DISC INSIDE DIAMETER

(a) Using a brake drum gauge or an equivalent tool, measure the inside diameter of the disc.

Standard inside diameter:
170 mm (6.69 in.)
Maximum inside diameter:
171 mm (6.73 in.)

If the inside diameter is more than the maximum, replace the disc.



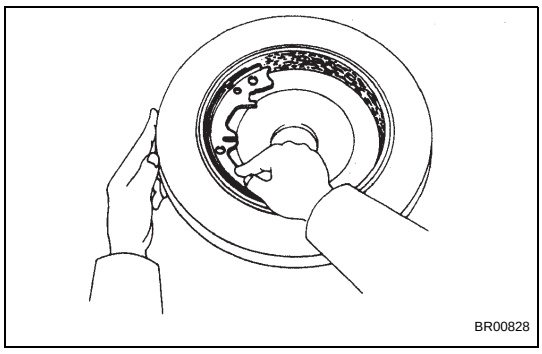
2. INSPECT PARKING BRAKE SHOE LINING THICKNESS

(a) Using a ruler, measure the thickness of the shoe lining.

Standard thickness:
2.0 mm (0.079 in.)
Minimum thickness:
1.0 mm (0.039 in.)

If the lining thickness is less than the minimum, or if there is severe or uneven wear, replace the brake shoe.

NOTICE:
Always replace both the right and left parking brake shoes together.



3. INSPECT BRAKE DISC AND PARKING BRAKE SHOE LINING FOR PROPER CONTACT

(a) Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit the disc.
If the contact between the disc and the brake shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe.

PB

REASSEMBLY

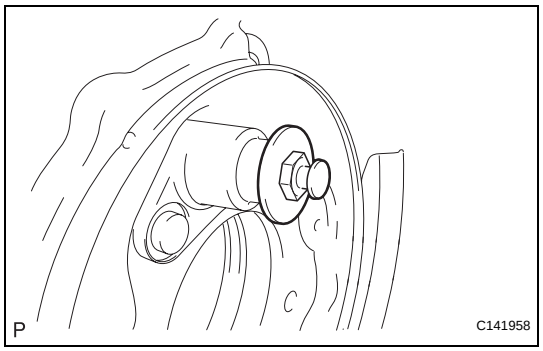
1. APPLY HIGH TEMPERATURE GREASE

(a) Apply high temperature grease to the backing plate which makes contact with the shoe.

2. INSTALL PARKING BRAKE SHOE GUIDE PLATE

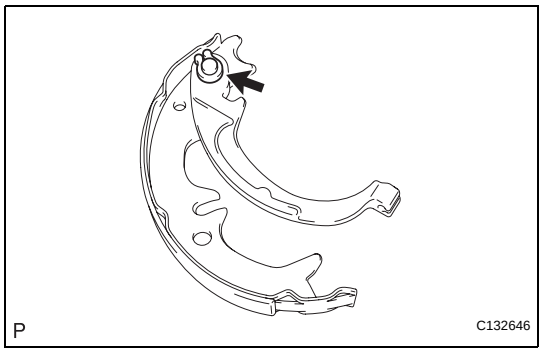
(a) Apply adhesive to the threads of the parking brake shoe guide plate set bolt.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

(b) Install the parking brake shoe guide plate with the parking brake shoe guide plate set bolt.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

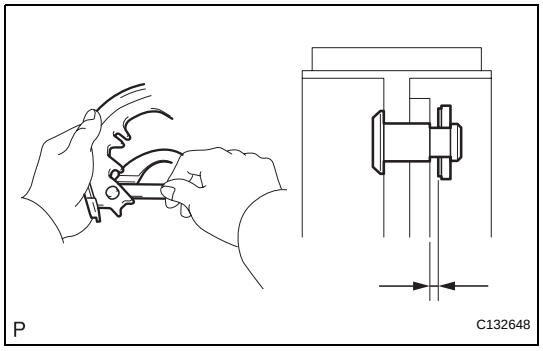


3. INSTALL PARKING BRAKE SHOE LEVER

(a) Install the parking brake shoe lever and shim to the No. 2 parking brake shoe assembly with a new C-washer.



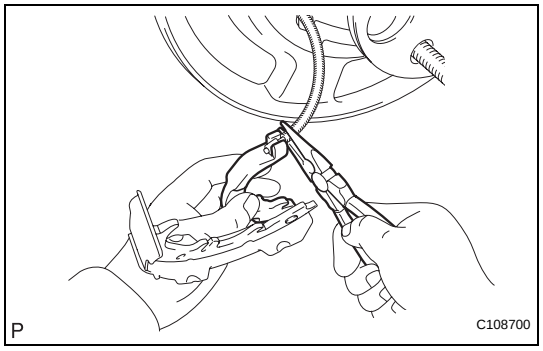
(b) Using a feeler gauge, measure the clearance between the No. 2 parking brake shoe assembly and parking brake shoe lever.
Standard clearance:
Less than 0.35 mm (0.014 in.)
If the clearance is not as specified, replace the shim with one of the correct size.

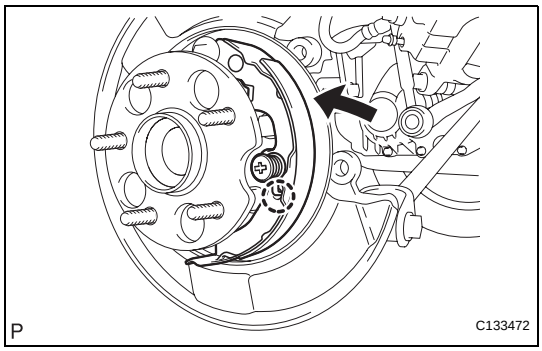


Shim Thickness	Shim Thickness
0.3 mm (0.012 in.)	0.9 mm (0.035 in.)
0.6 mm (0.024 in.)	-

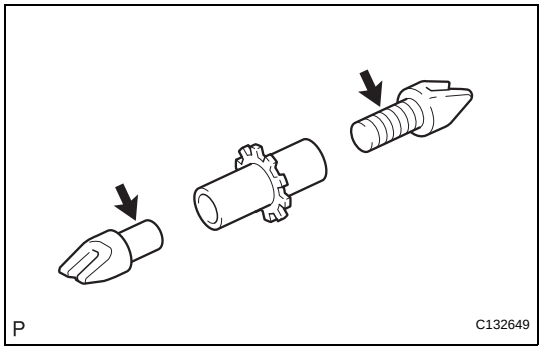
4. INSTALL NO. 2 PARKING BRAKE SHOE ASSEMBLY

(a) Using needle-nose pliers, connect the No. 3 parking brake cable assembly to the parking brake shoe lever.





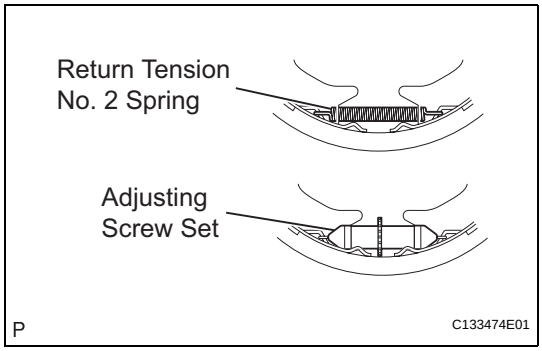
(b) Install the No. 2 parking brake shoe assembly with the parking brake shoe hold down spring No. 2 pin, the parking brake shoe hold down spring No. 2 cup, the parking brake shoe hold down spring and the parking brake shoe hold down spring No. 1 cup.
(c) Engage the claw of the parking brake shoe hold down spring No. 1 cup to the No. 2 parking brake shoe assembly.



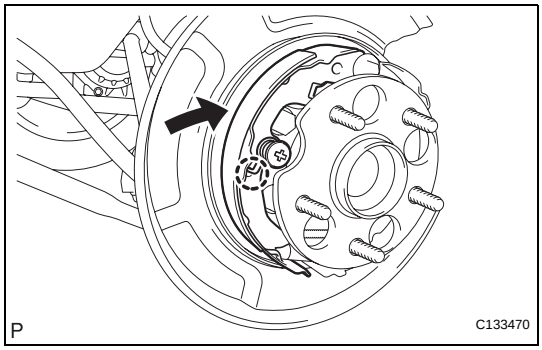
5. INSTALL PARKING BRAKE SHOE ADJUSTING SCREW SET

(a) Apply high temperature grease to the parking brake adjusting screw as shown in the illustration.

PB



(b) Install the parking brake shoe return tension No. 2 spring to the No. 1 parking brake shoe assembly and the No. 2 parking brake shoe assembly.
(c) Install the parking brake shoe adjusting screw set to the No. 1 parking brake shoe assembly and the No. 2 parking brake shoe assembly.

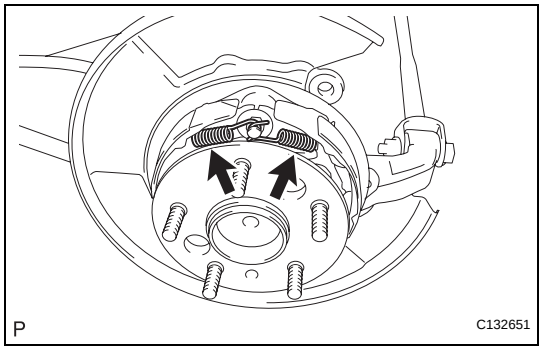


6. INSTALL NO. 1 PARKING BRAKE SHOE ASSEMBLY

(a) Install the No. 1 parking brake shoe assembly with the parking brake shoe hold down spring No. 1 pin, parking brake shoe hold down spring No. 2 cup, parking brake shoe hold down spring and parking brake shoe hold down spring No. 1 cup.

7. INSTALL PARKING BRAKE SHOE STRUT

(a) Attach the parking brake shoe strut and the parking brake shoe strut compression spring to the No. 1 parking brake shoe assembly and No. 2 parking brake shoe assembly.

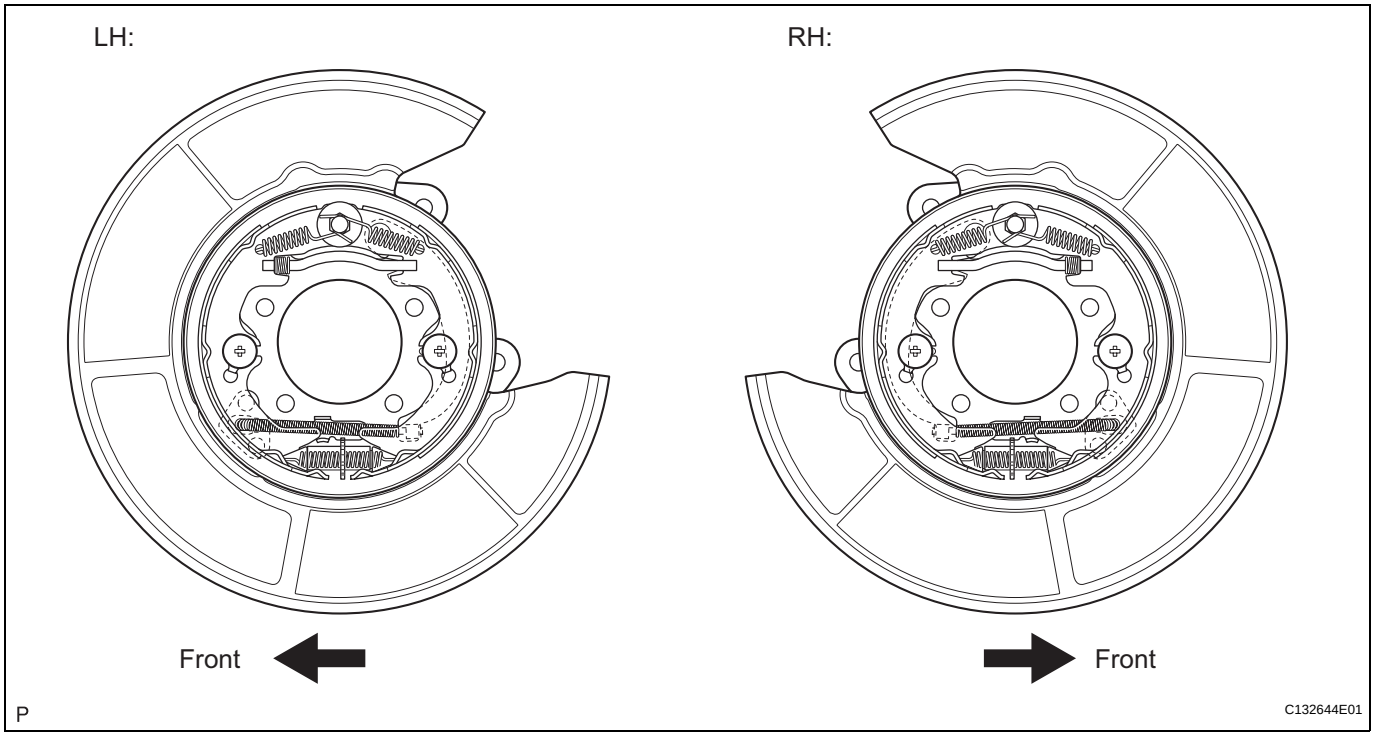


8. INSTALL PARKING BRAKE SHOE RETURN TENSION NO. 1 SPRING

(a) Using needle-nose pliers, install the 2 parking brake shoe return tension No. 1 springs.
HINT:
First install the front side spring and then the rear side spring.

9. CHECK PARKING BRAKE INSTALLATION

(a) Check that each part is installed properly.



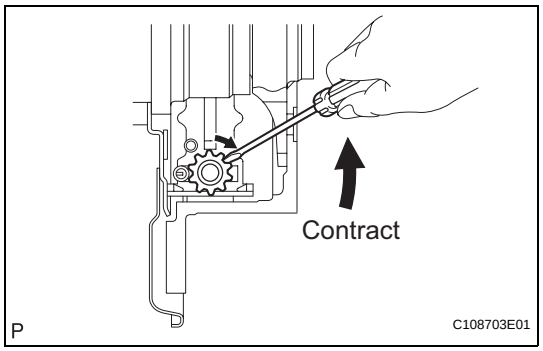
NOTICE:
There should be no oil or grease on the friction surface of the shoe lining and disc.

10. INSTALL REAR DISC

(a) Align the matchmarks and install the rear disc.

11. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Temporarily install the hub nuts.
(b) Remove the shoe adjusting hole plug.
(c) Turn the adjuster and expand the shoes until the disc locks.
(d) Contract the shoe adjuster until the disc rotates smoothly.
Standard:
Return 8 notches
(e) Check that the shoe has no brake drag.
(f) Install the shoe adjusting hole plug.



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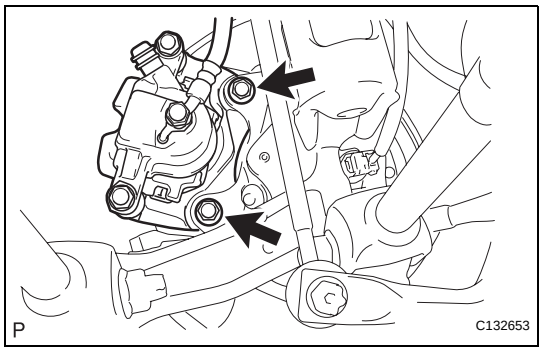


12. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY

(a) Install the rear disc brake caliper assembly with the 2 bolts.
Torque: 62 N*m (632 kgf*cm, 46 ft.*lbf)

13. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

14. INSPECT PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)

15. INSPECT PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)

16. ADJUST PARKING BRAKE PEDAL TRAVEL (for Automatic Transaxle) (See page PB-1)

17. ADJUST PARKING BRAKE LEVER TRAVEL (for Manual Transaxle) (See page PB-2)

POWER STEERING SYSTEM

PRECAUTION

1. HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

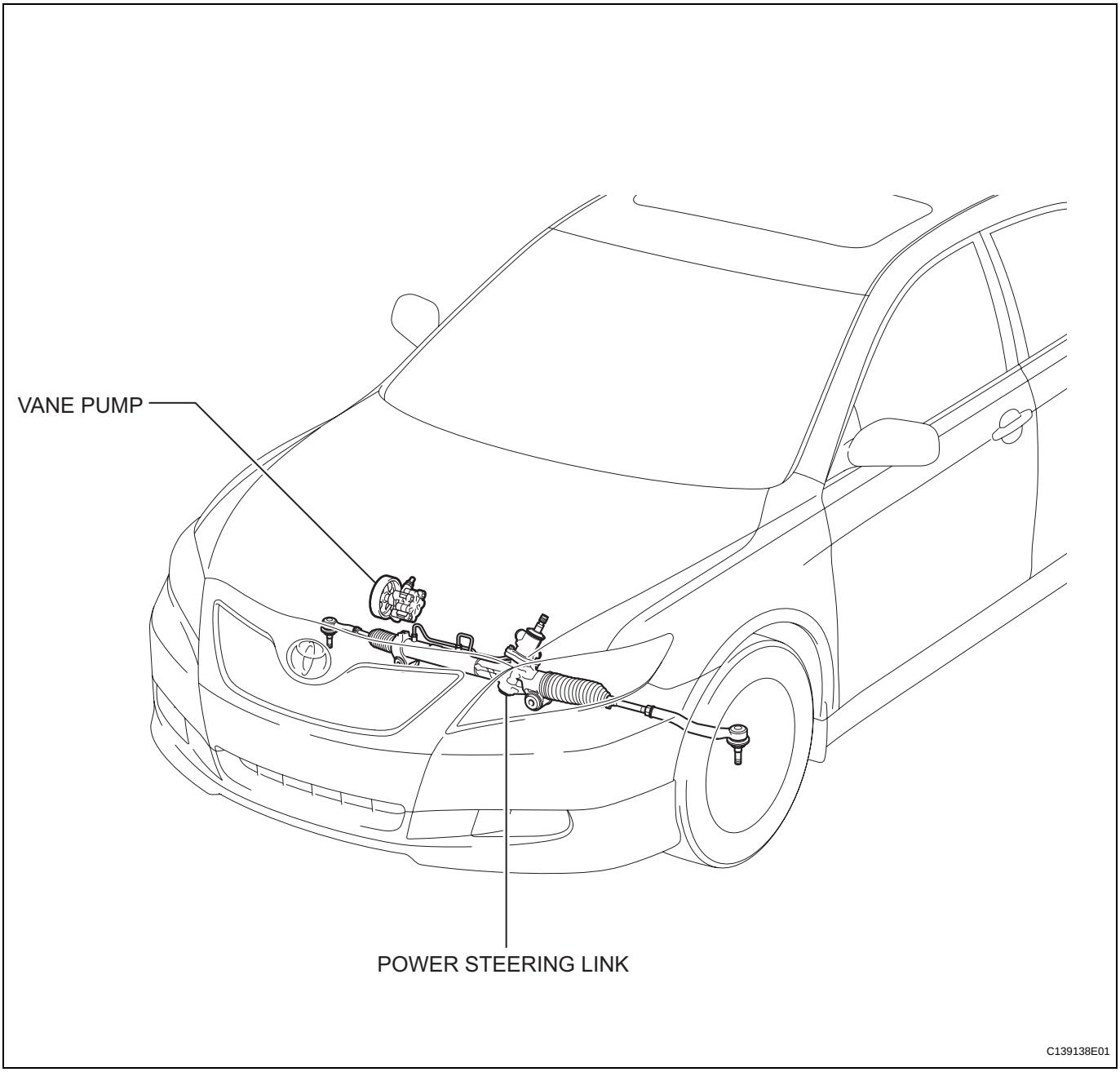
(a) The vehicle is equipped with an SRS (Supplemental Restraint System) such as airbags. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident. Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System (See page RS-1).

2. PRECAUTIONS FOR REMOVAL, INSTALLATION AND REPLACEMENT OF POWER STEERING COMPONENTS

(a) Be sure to turn the front wheels straight ahead when removing and installing the power steering link assembly.

(b) If disconnecting the steering sliding yoke and the pinion shaft of the power steering link assembly, be sure to put matchmarks before starting the operation.

PARTS LOCATION



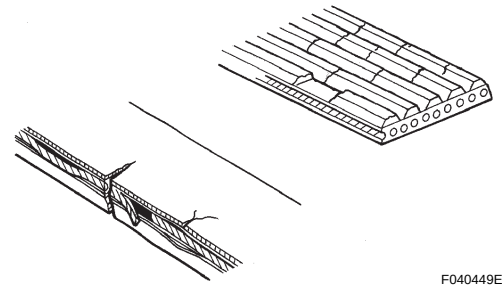
PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem. The numbers indicate likely causes of the problem in descending order. Check each part in order. If necessary, repair or replace faulty parts.

POWER STEERING SYSTEM

Symptom	Suspected area	See page
Hard steering	1. Tire (Improperly inflated)	TW-3
	2. Power steering fluid level (Low)	PS-3
	3. Drive belt (Loose) (for 2AZ-FE)	EM-6
	4. Drive belt (Loose) (for 2GR-FE)	EM-6
	5. Front wheel alignment (Incorrect)	SP-4
	6. Steering system joints (Worn)	-
	7. Suspension arm ball joints (Worn)	SP-28
	8. Steering column (Binding)	SR-38
	9. Power steering vane pump (for 2AZ-FE)	PS-10
	10. Power steering vane pump (for 2GR-FE)	PS-24
	11. Power steering gear	PS-40
Poor return	1. Tire (Improperly inflated)	TW-3
	2. Front wheel alignment (Incorrect)	SP-4
	3. Steering column (Binding)	SR-38
	4. Power steering gear	PS-40
Excessive free play	1. Steering system joints (Worn)	-
	2. Suspension arm ball joints (Worn)	SP-28
	3. Front wheel bearing (Worn)	AH-5
	4. Power steering gear	PS-40
Abnormal noise	1. Power steering fluid level (Low)	PS-3
	2. Steering system joints (Worn)	-
	3. Power steering vane pump (for 2AZ-FE)	PS-10
	4. Power steering vane pump (for 2GR-FE)	PS-24
	5. Power steering gear	PS-40

Example:



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ON-VEHICLE INSPECTION

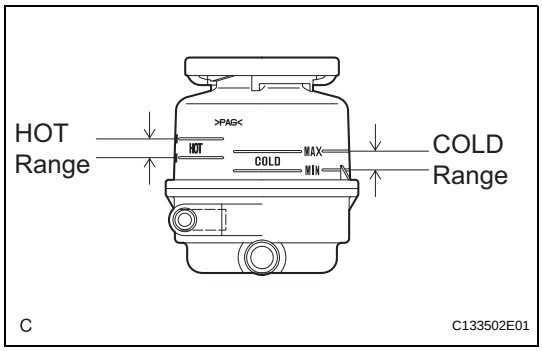
1. INSPECT DRIVE BELT

(a) Visually check the drive belt for excessive wear, frayed cords, etc.
If any defect is found, replace the drive belt.
HINT:
Cracks on the rib side of a belt are considered acceptable. Replace the belt if there are any missing ribs.

2. CHECK POWER STEERING FLUID LEVEL

(a) Keep the vehicle level.

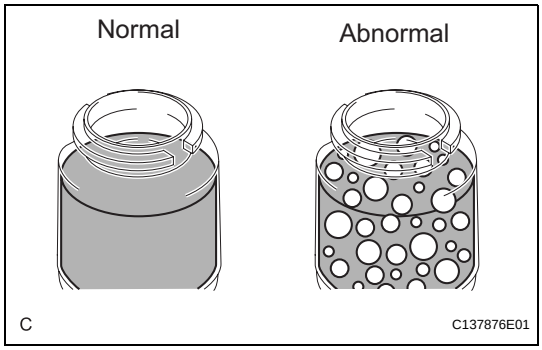
PS



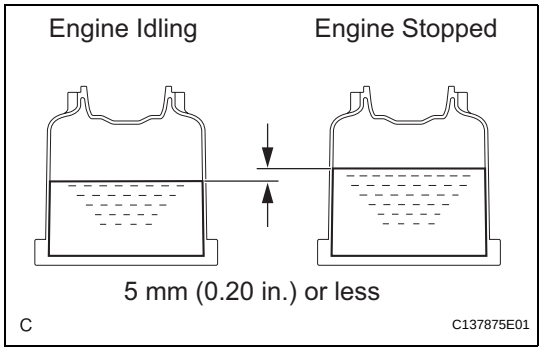
(b) With the engine stopped, check the fluid level in the fluid reservoir.
If necessary, add fluid.
Fluid:
ATF DEXRON II or III, or equivalent
HINT:
If the fluid is hot, check that the fluid level is within the HOT range on the fluid reservoir. If the fluid is cold, check that the fluid level is within the COLD range.

(c) Start the engine and run it at idle.

(d) Turn the steering wheel from lock to lock several times to raise fluid temperature.
Fluid temperature:
70 to 80°C (158 to 176°F)



(e) Check for foaming or emulsification.
If foaming or emulsification is identified, bleed the power steering system (See page PS-7).



(f) With the engine idling, measure the fluid level in the fluid reservoir.

(g) Stop the engine.

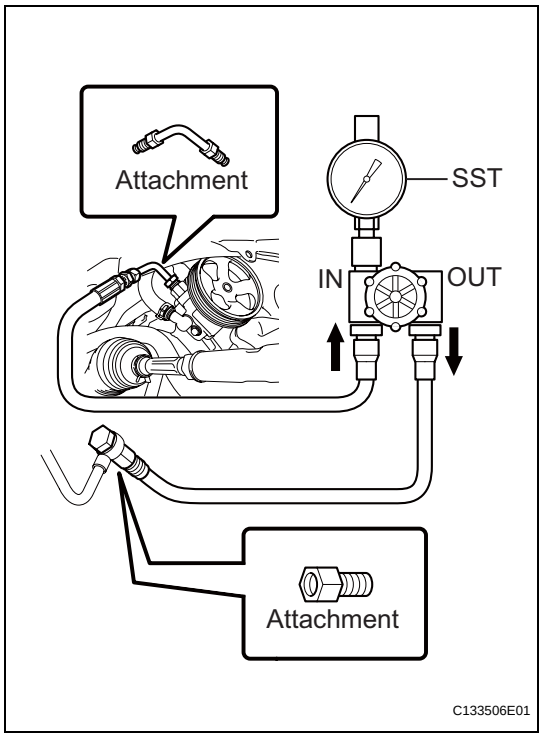
(h) Wait a few minutes and remeasure the fluid level in the fluid reservoir.
Maximum fluid level rise:
5 mm (0.20 in.)
If a problem is found, bleed the power steering system (See page PS-7).

(i) Check the fluid level.

3. INSPECT STEERING FLUID PRESSURE

(a) Disconnect the pressure feed tube assembly from the vane pump assembly (See page PS-10 for 2AZ-FE, PS-24 for 2GR-FE).

PS

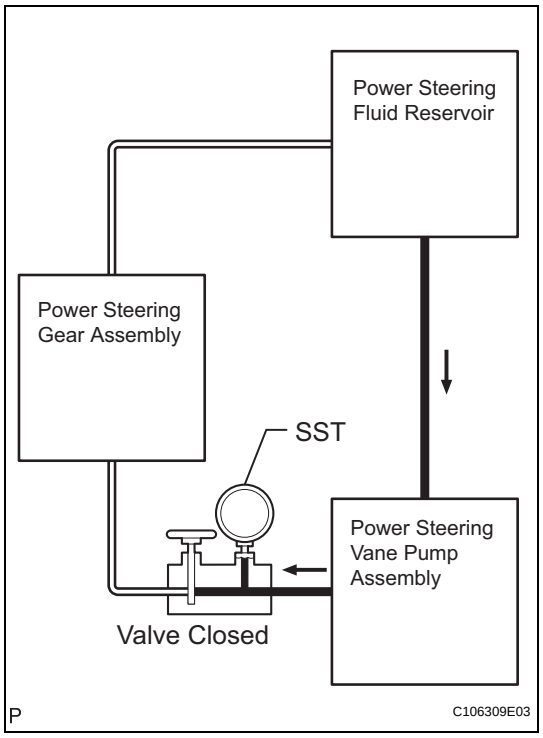


(b) Connect SST as shown in the illustration.
SST 09640-10010 (09641-01010, 09641-01060, 09641-01030)
NOTICE:
Check that the valve of the SST is in the open position.

(c) Bleed the power steering system (See page PS-7).

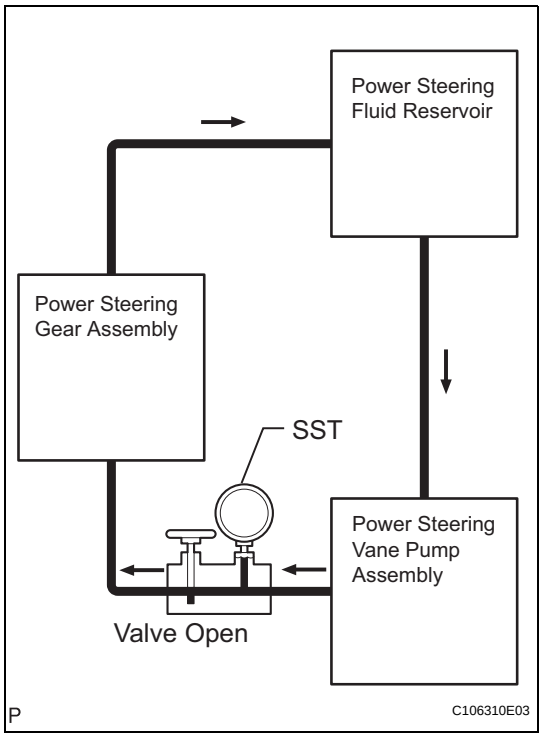
(d) Start the engine and run it at idle.

(e) Turn the steering wheel from lock to lock several times to raise fluid temperature.
Fluid temperature:
70 to 80°C (158 to 176°F)

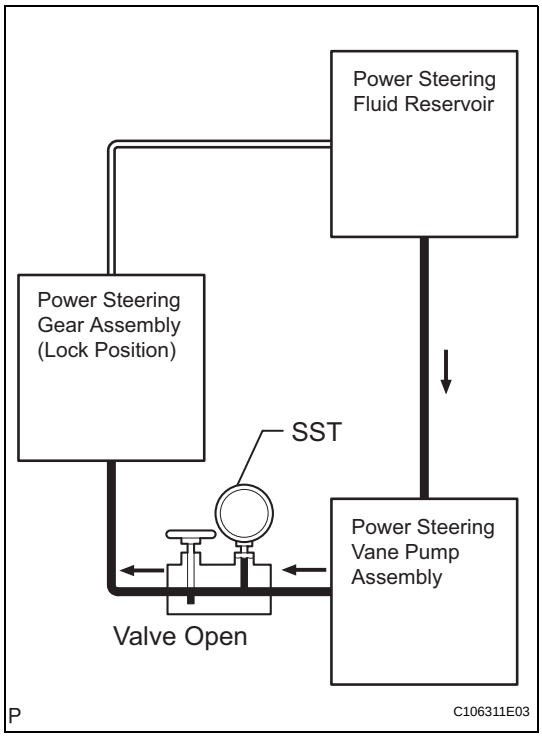


(f) With the engine idling, close the valve of the SST and observe the reading on the SST.
Minimum fluid pressure:
7,800 to 8,300 kPa (79.5 to 84.6 kgf/cm^2, 1,131 to 1,204 psi)
NOTICE:
- **Do not keep the valve closed for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

PS



(g) With the engine idling, open the valve fully.
(h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.
Fluid pressure difference:
490 kPa (5 kgf/cm^2, 71 psi) or less
NOTICE:
Do not turn the steering wheel.



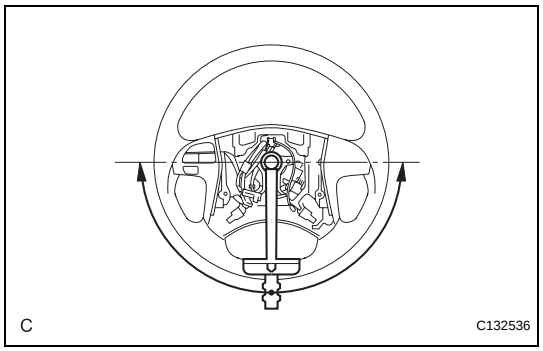
(i) With the engine idling and the valve fully opened, turn the steering wheel left or right to the full lock position. Observe the reading on the SST.
Minimum fluid pressure:
7,800 to 8,300 kPa (79.5 to 84.6 kgf/cm^2, 1,131 to 1,204 psi)
NOTICE:
- **Do not keep the steering wheel in the full lock position for more than 10 seconds.**
- **Do not allow the fluid temperature to become too high.**

(j) Disconnect the SST.
(k) Connect the pressure feed tube assembly to the vane pump assembly (See page PS-20 for 2AZ-FE, PS-34 for 2GR-FE).
(l) Bleed the power steering system (See page PS-7).

4. CHECK STEERING EFFORT

(a) Stop the vehicle on a level, paved surface and turn the wheels straight ahead.
(b) Disconnect the negative (-) battery cable from the battery (See page RS-1).
(c) Remove the steering pad (See page RS-349).
(d) Connect the negative (-) battery cable to the battery.
(e) Using a torque wrench, check if the steering wheel set nut is properly tightened.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
(f) Start the engine and run it at idle.

PS



(g) Turn the steering wheel 90 degrees to the right and check steering effort (torque) while turning the wheel. Check the opposite direction in the same manner.
Torque: Steering effort (Reference)
6.0 N*m (61 kgf*cm, 53 in.*lbf) (LE Grade, XLE Grade)
Steering effort (Reference)
6.8 N*m (69 kgf*cm, 60 in.*lbf) (SE Grade)
HINT:
Check tire type, pressure, and the road surface before making your diagnosis.

(h) Disconnect the negative (-) battery cable from the battery.

(i) Torque the steering wheel set nut.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)

(j) Install the steering pad (See page RS-350).

(k) Connect the negative (-) battery cable to the battery.

(l) Clear the DTCs (See page RS-41).

(m) Inspect the airbag warning light (See page RS-32).

PS

POWER STEERING FLUID

BLEEDING

1. BLEED POWER STEERING SYSTEM

(a) Check the fluid level (See page PS-3).

(b) Jack up the front of the vehicle and support it with stands.

(c) Turn the steering wheel.

(1) With the engine stopped, turn the steering wheel slowly from lock to lock several times.

(d) Lower the vehicle.

(e) Start the engine.

(1) Run the engine at idle for a few minutes.

(f) Turn the steering wheel.

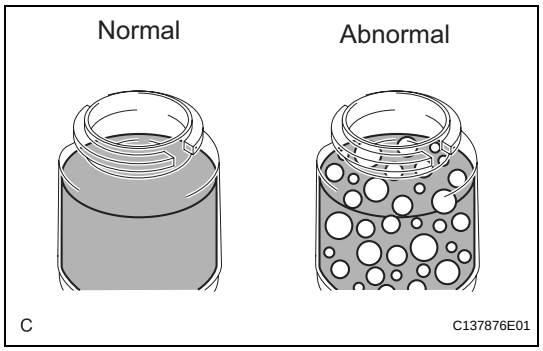
(1) With the engine idling, turn the steering wheel left or right to the full lock position and keep it in that position for 2 to 3 seconds, then turn the steering wheel to the opposite full lock position and keep it there for 2 to 3 seconds.

(2) Repeat this procedure several times.

(g) Stop the engine.

(h) Check for foaming or emulsification.
If the system has to be bled twice because of forming or emulsification, be sure to check for fluid leaks in the system.

(i) Check the fluid level (See page PS-3).



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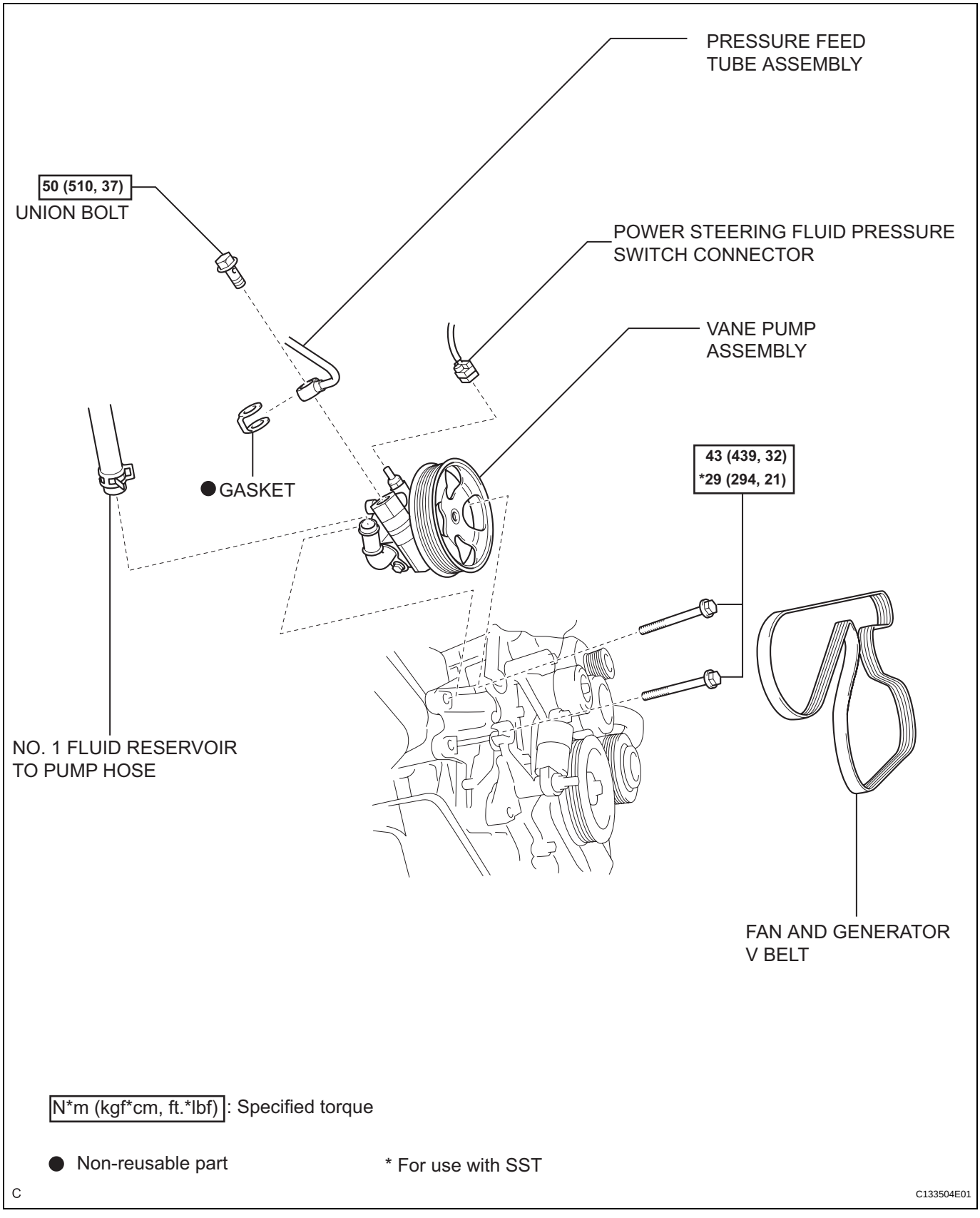
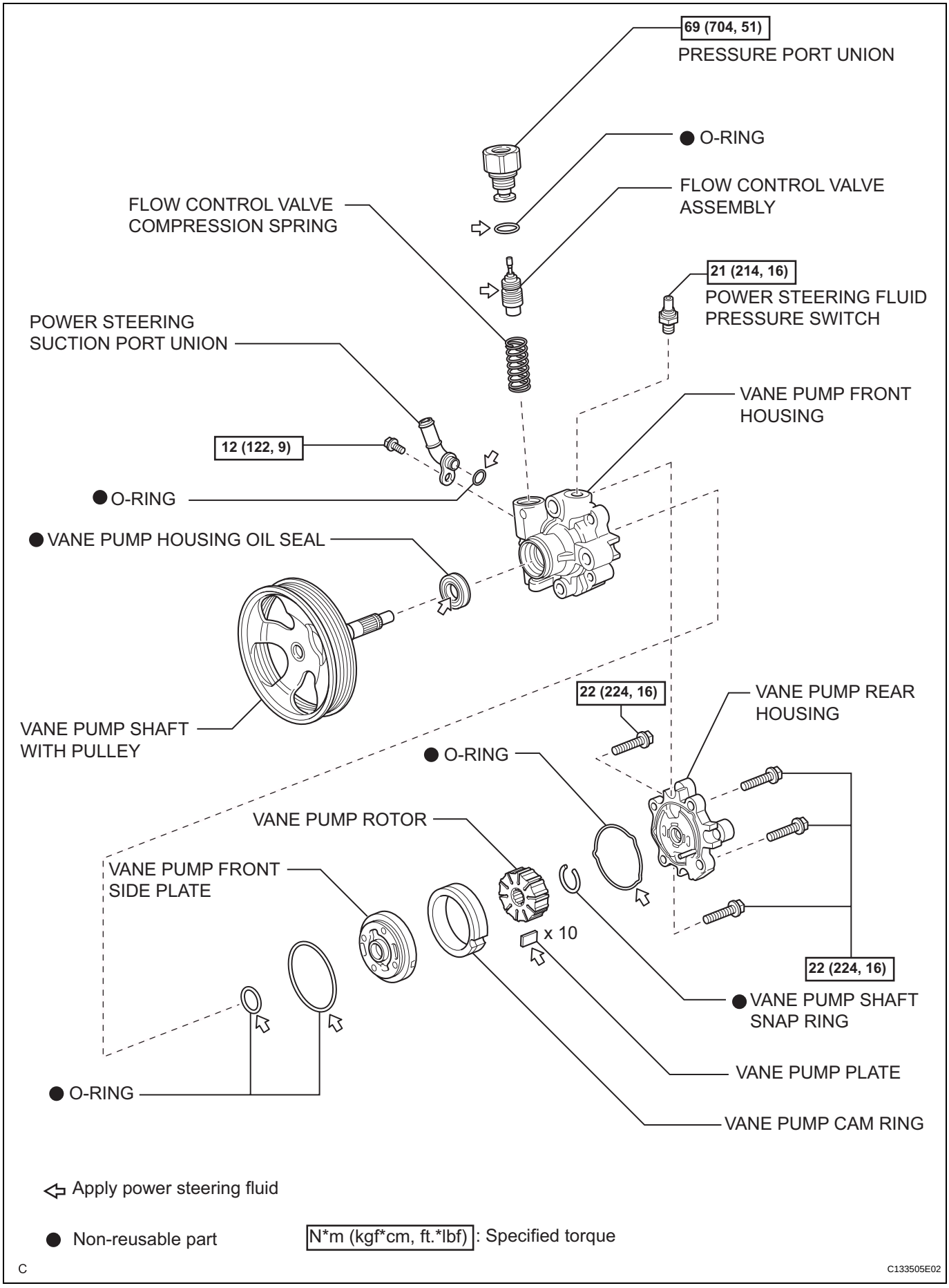
VANE PUMP (for 2AZ-FE)

COMPONENTS



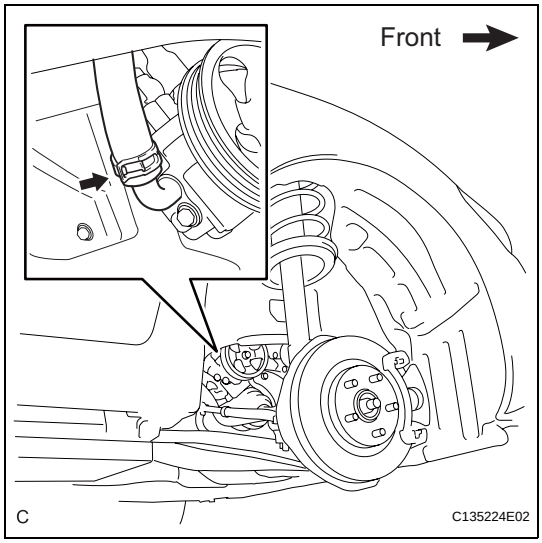
PS


69 (704, 51)
PRESSURE PORT UNION
● O-RING
FLOW CONTROL VALVE ASSEMBLY
FLOW CONTROL VALVE COMPRESSION SPRING
21 (214, 16)
POWER STEERING FLUID PRESSURE SWITCH
POWER STEERING SUCTION PORT UNION
VANE PUMP FRONT HOUSING
12 (122, 9)
● O-RING
● VANE PUMP HOUSING OIL SEAL
VANE PUMP SHAFT WITH PULLEY
22 (224, 16)
VANE PUMP REAR HOUSING
● O-RING
VANE PUMP ROTOR
VANE PUMP FRONT SIDE PLATE
x 10
22 (224, 16)
● VANE PUMP SHAFT SNAP RING
VANE PUMP PLATE
● O-RING
VANE PUMP CAM RING
⇦ Apply power steering fluid
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
C
C133505E02

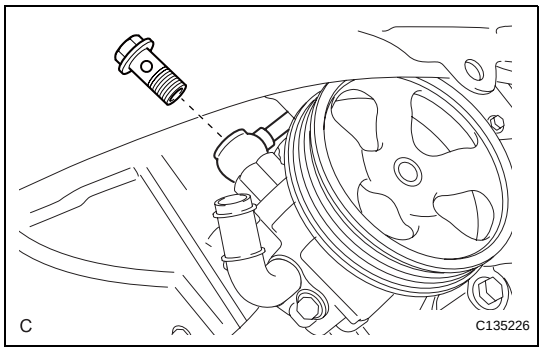
PS

REMOVAL

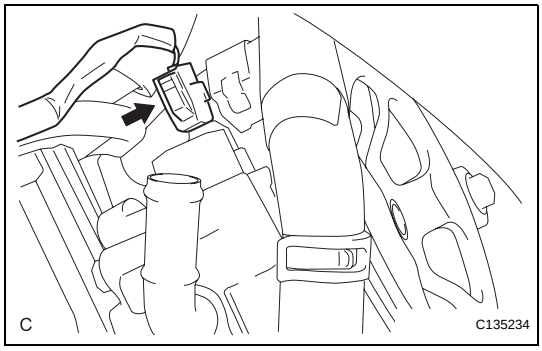
1. **DRAIN POWER STEERING FLUID**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **REMOVE FRONT FENDER APRON SEAL RH**
5. **REMOVE FAN AND GENERATOR V BELT (See page EM-6)**



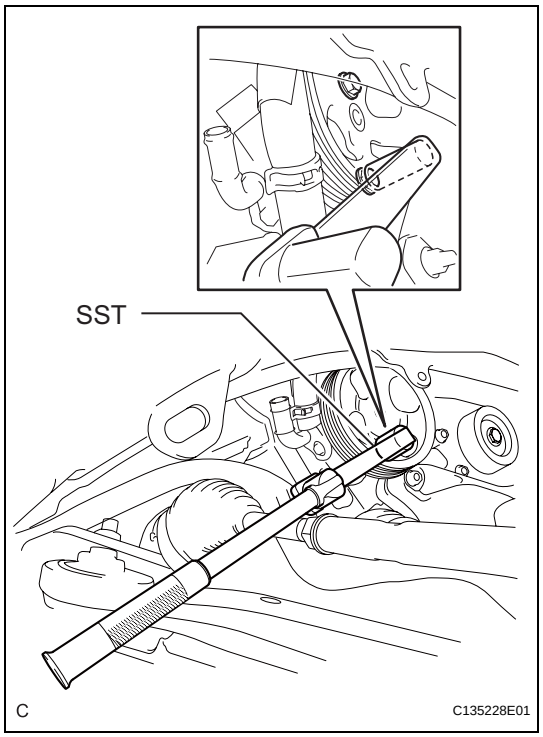
6. **DISCONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE**
   (a) Slide the clip and disconnect the No. 1 fluid reservoir to pump hose from the vane pump assembly.



7. **DISCONNECT PRESSURE FEED TUBE ASSEMBLY**
   (a) Remove the union bolt and disconnect the pressure feed tube assembly from the vane pump assembly.
   (b) Remove the gasket from the pressure feed tube assembly.

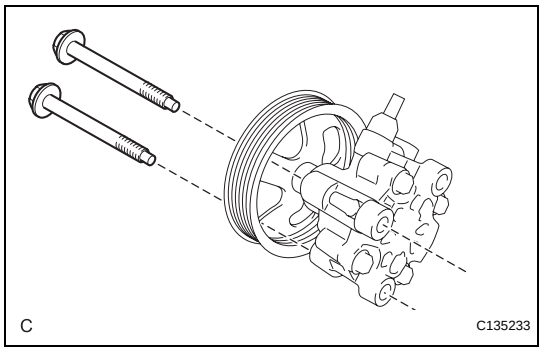


8. **DISCONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR**
   (a) Disconnect the power steering fluid pressure switch connector.



9. REMOVE VANE PUMP ASSEMBLY

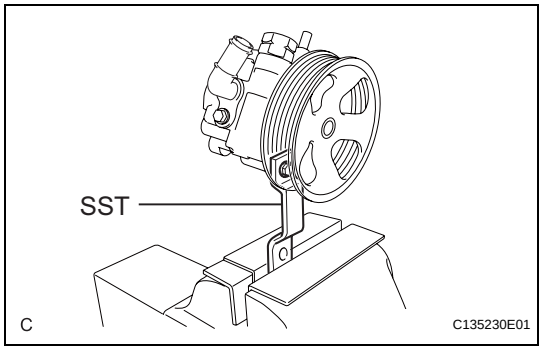
(a) Using SST, loosen the 2 bolts and remove the vane pump assembly.
SST 09249-63010



(b) Remove the 2 bolts from the vane pump assembly.

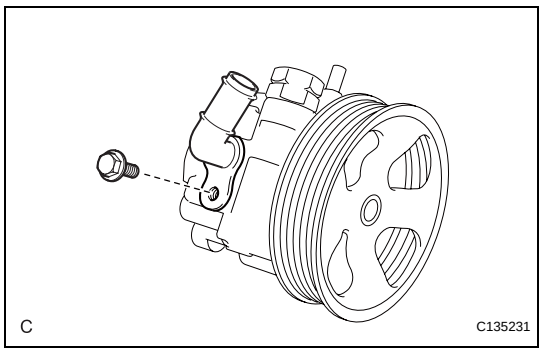
PS

DISASSEMBLY



1. HOLD VANE PUMP ASSEMBLY

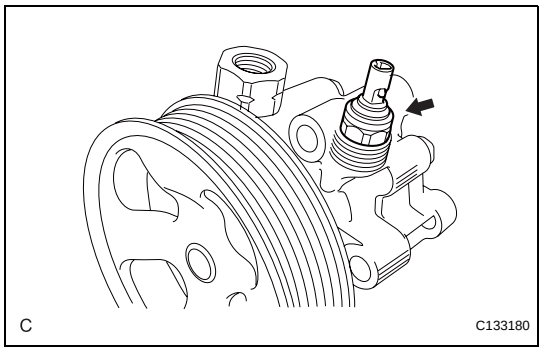
(a) Using SST, hold the vane pump assembly in a vise.
SST 09630-00014 (09631-00132)



2. REMOVE POWER STEERING SUCTION PORT UNION

(a) Remove the bolt and power steering suction port union from the vane pump assembly.

(b) Using a screwdriver, remove the O-ring from the power steering suction port union.

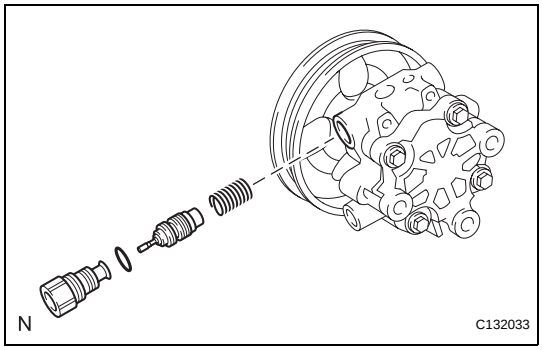


3. REMOVE POWER STEERING FLUID PRESSURE SWITCH

(a) Remove the power steering fluid pressure switch from the vane pump assembly.

NOTICE:

Perform this procedure only when the power steering fluid pressure switch is replaced.

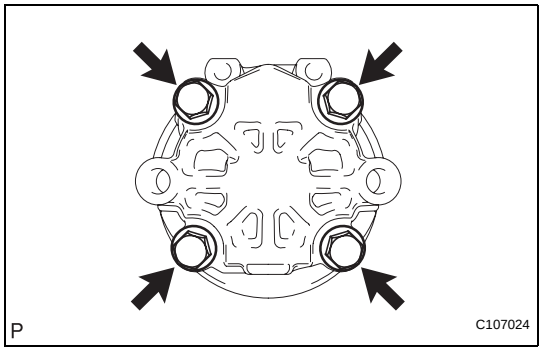


4. REMOVE FLOW CONTROL VALVE ASSEMBLY

(a) Remove the pressure port union.

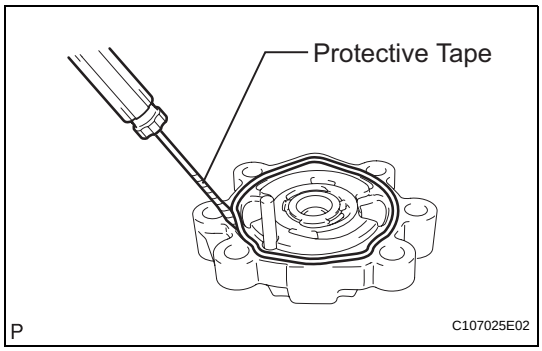
(b) Remove the O-ring from the pressure port union.

(c) Remove the flow control valve assembly and the flow control valve compression spring.



5. REMOVE VANE PUMP REAR HOUSING

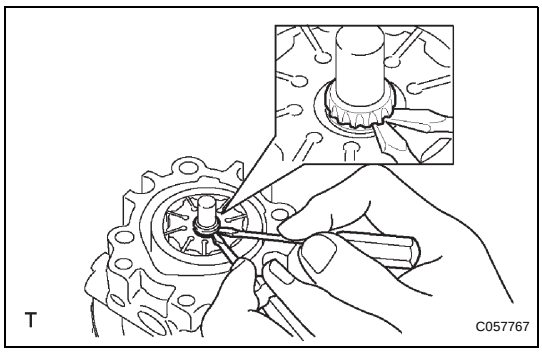
(a) Remove the 4 bolts and vane pump rear housing from the vane pump front housing.



(b) Using a screwdriver, remove the O-ring from the vane pump rear housing.

HINT:

Tape the screwdriver tip before use.

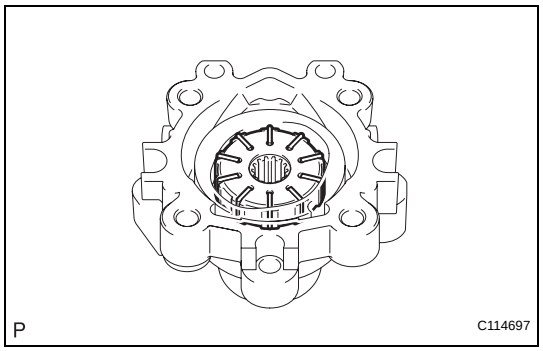


6. REMOVE VANE PUMP SHAFT WITH PULLEY

(a) Using 2 screwdrivers, remove the vane pump shaft snap ring from the vane pump shaft with pulley.

(b) Remove the vane pump shaft with pulley.

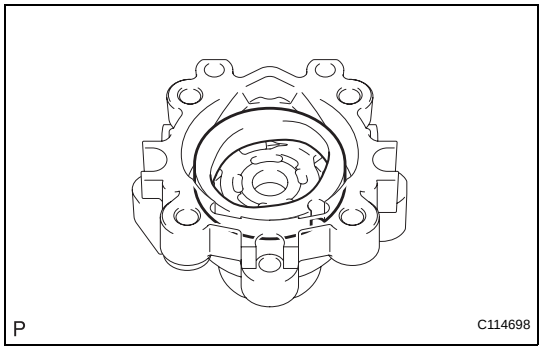
PS



7. REMOVE VANE PUMP ROTOR

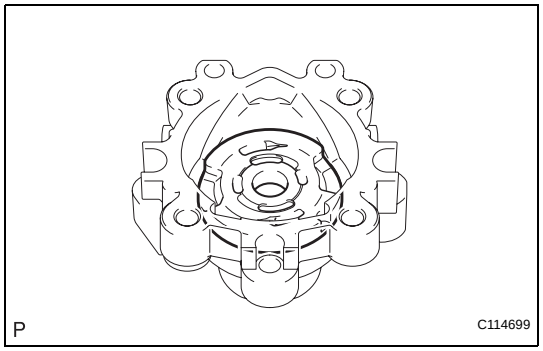
(a) Remove the 10 vane pump plates.

(b) Remove the vane pump rotor.



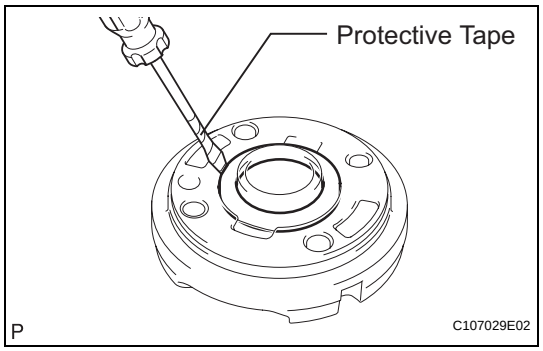
8. REMOVE VANE PUMP CAM RING

(a) Remove the vane pump cam ring from the vane pump front housing.

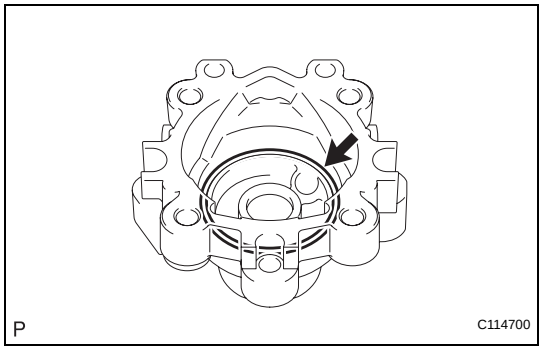


9. REMOVE VANE PUMP FRONT SIDE PLATE

(a) Remove the vane pump front side plate from the vane pump front housing.

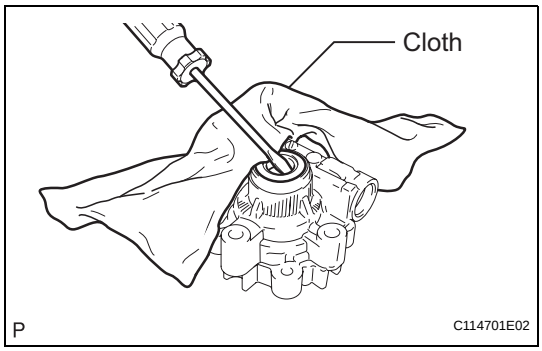


(b) Using a screwdriver, remove the O-ring from the vane pump front side plate.
HINT:
Tape the screwdriver tip before use.



(c) Remove the O-ring from the vane pump front housing.

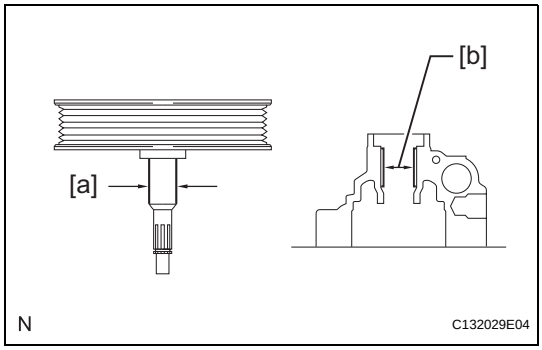
PS



10. REMOVE VANE PUMP HOUSING OIL SEAL

(a) Using a screwdriver and a shop rag or a piece of cloth, remove the vane pump housing oil seal.
NOTICE:
Be careful not to damage the vane pump front housing.

INSPECTION



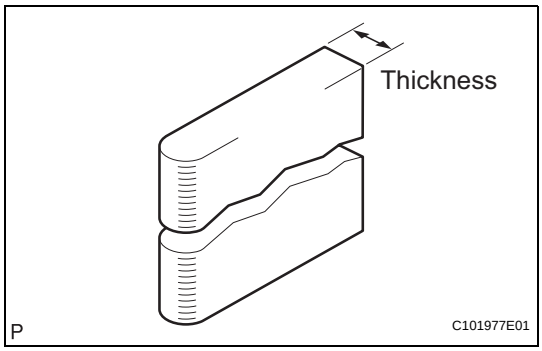
1. INSPECT VANE PUMP SHAFT AND BUSHING IN VANE PUMP FRONT HOUSING

(a) Using a micrometer, measure the outer diameter [a] of the vane pump shaft with pulley.

(b) Using a vernier caliper, measure the inner diameter [b] of the vane pump front housing bushing.

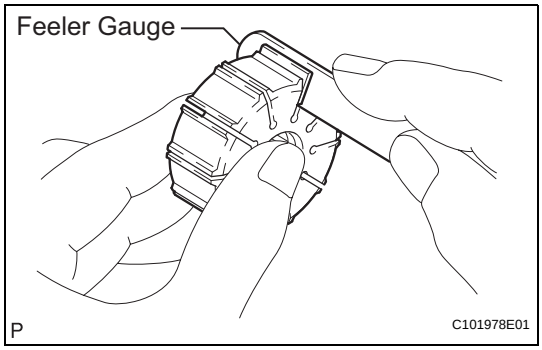
(c) Calculate the oil clearance.
Oil clearance = Inner diameter of the bushing [b] - Outer diameter of the shaft [a].
Maximum oil clearance:
0.07 mm (0.0028 in.)
If oil clearance exceeds the maximum, replace the vane pump assembly.

PS

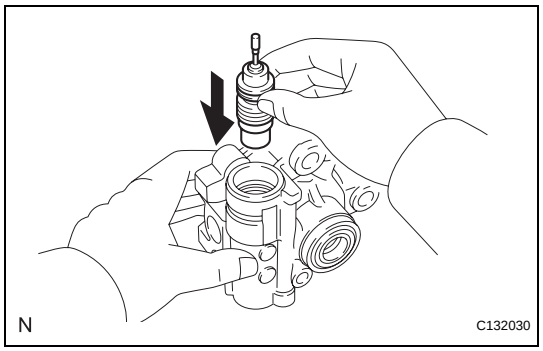


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATE CLEARANCE

(a) Using a micrometer, measure the thickness of the vane pump plates.
Standard thickness:
1.405 to 1.411 mm (0.05531 to 0.05555 in.)
If the thickness is not within the specified range, replace the vane pump assembly.

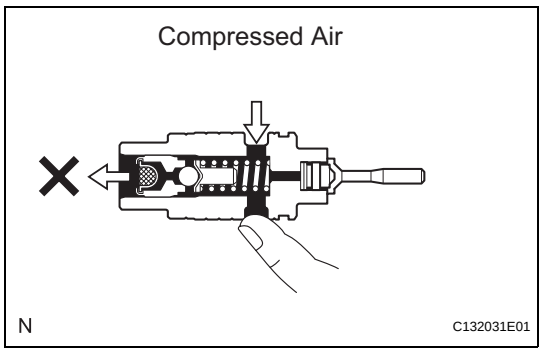


(b) Using a feeler gauge, measure the clearance between the side face of the vane pump rotor groove and the vane pump plates.
Maximum clearance:
0.03 mm (0.0012 in.)
If clearance exceeds the maximum, replace the vane pump assembly.

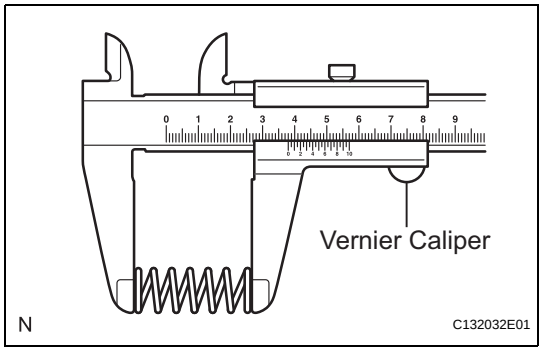


3. INSPECT FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid and check that it falls smoothly into the flow control valve due to its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



(b) Check the flow control valve assembly for leakage. Close one of the holes and apply compressed air, 392 to 490 kPa (4 to 5 kgf/cm^2, 57 to 71 psi), into the opposite side hole, and confirm that air does not come out from the end holes.
If air leaks, replace the vane pump assembly.

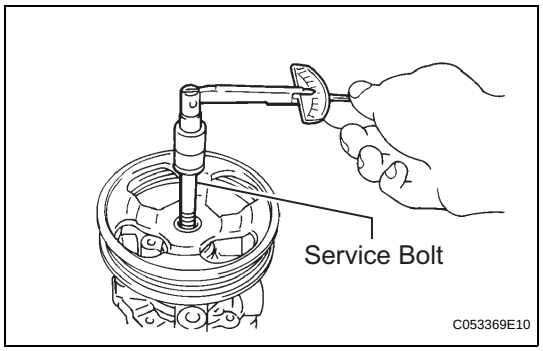


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the flow control valve compression spring.
Minimum free length:
29.2 mm (1.150 in.)
If the length is less than the minimum, replace the vane pump assembly.

5. INSPECT PRESSURE PORT UNION

If the union seat in the pressure port union is severely damaged, replace the vane pump assembly.



6. INSPECT TOTAL PRELOAD

(a) Check that the pump rotates smoothly without abnormal noise.

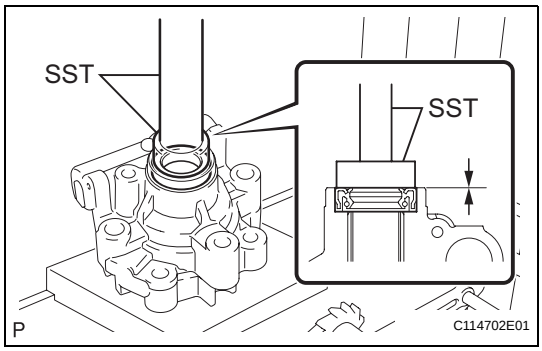
(b) Temporarily install the service bolt.
Recommended service bolt:
Thread diameter:
10 mm (0.39 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

(c) Using a torque wrench, check the pump rotating torque.
Rotating torque:
0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf) or less
If the rotating torque is not as specified, check the vane pump housing oil seal.

PS

REASSEMBLY

NOTICE:
When installing parts, coat the parts indicated by arrows with power steering fluid (See page PS-8).



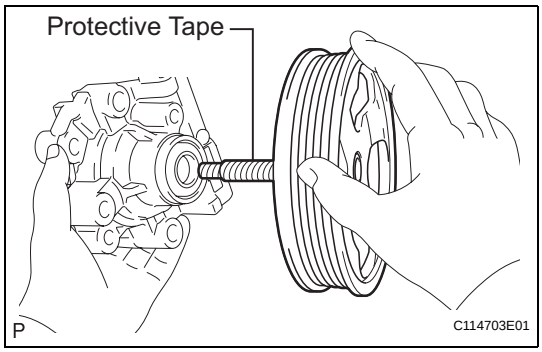
1. INSTALL VANE PUMP HOUSING OIL SEAL

(a) Coat a new vane pump housing oil seal lip with power steering fluid.

(b) Using SST and a press, install the vane pump housing oil seal.

SST 09950-60010 (09951-00280), 09950-70010 (09951-07100)

NOTICE:
Make sure that the oil seal is installed facing in the correct direction as shown in the illustration.



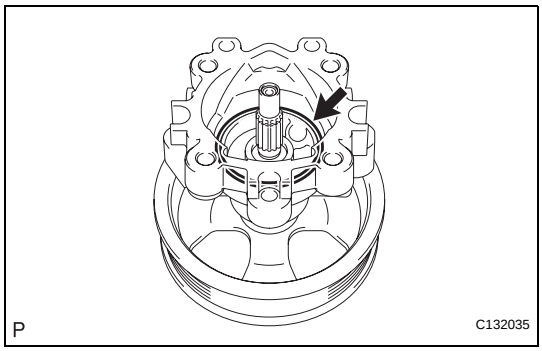
2. INSTALL VANE PUMP SHAFT WITH PULLEY

(a) Coat the inside surface of the bushing in the vane pump front housing with power steering fluid.

(b) Gradually insert the vane pump shaft with pulley.

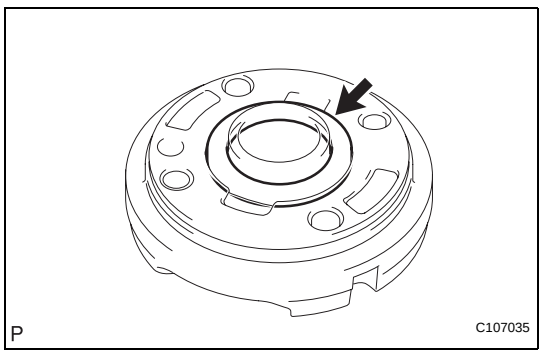
NOTICE:
Do not damage the oil seal lip in the front housing.

HINT:
Wrap protective tape around the spline of the vane pump shaft with pulley in order to prevent damage to the oil seal.



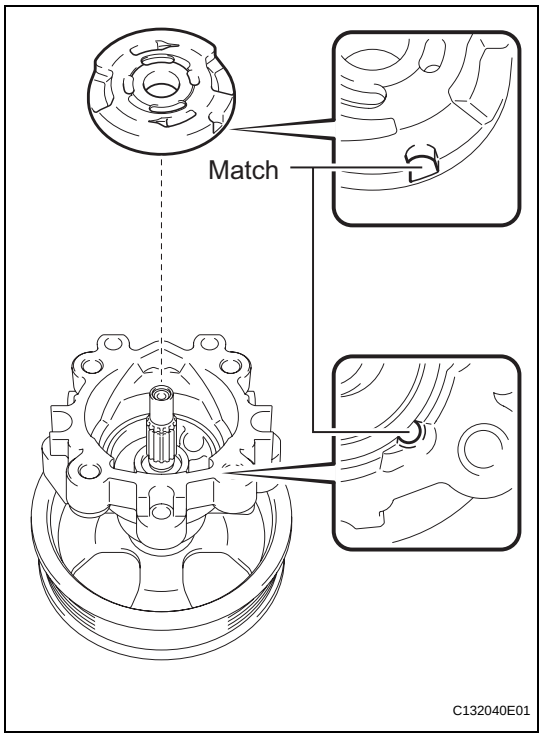
3. INSTALL VANE PUMP FRONT SIDE PLATE

(a) Coat a new O-ring with power steering fluid and install it into the vane pump front housing.

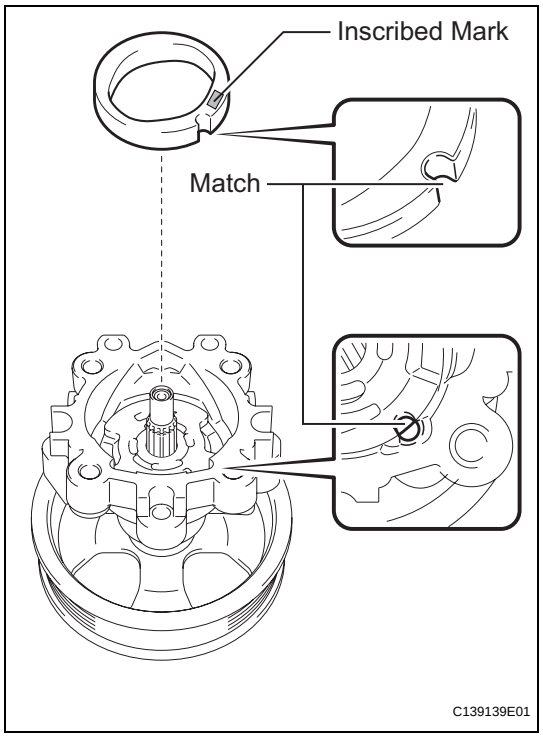


(b) Coat a new O-ring with power steering fluid and install it onto the vane pump front side plate.

PS



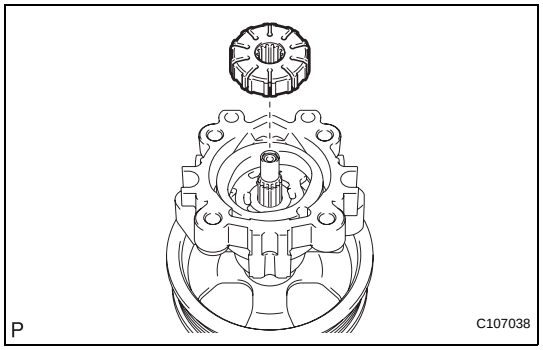
(c) Align the notch of the vane pump front side plate with that of the vane pump front housing, and install the vane pump front side plate.
NOTICE:
Make sure that the vane pump front side plate is installed facing in the correct direction.



4. INSTALL VANE PUMP CAM RING

(a) Align the notch of the cam ring with that of the vane pump front side plate, and install the vane pump cam ring with the inscribed mark facing upward.
NOTICE:
Make sure that the vane pump cam ring is installed facing in the correct direction.

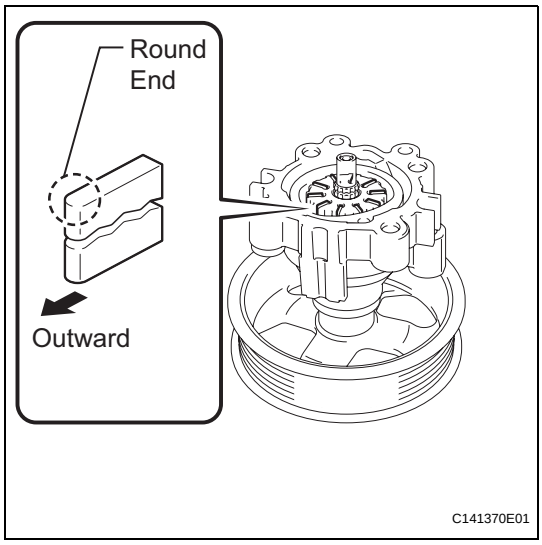
PS



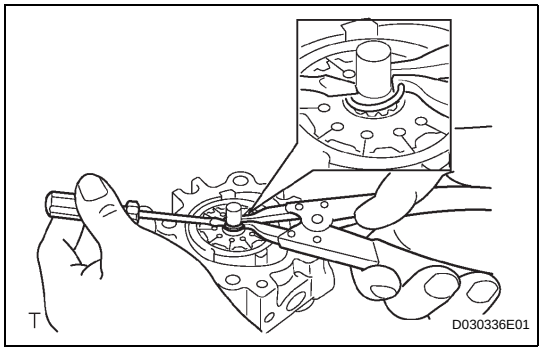
5. INSTALL VANE PUMP ROTOR

(a) Install the vane pump rotor.
HINT:
Vane pump rotor can be installed in both directions.

(b) Coat the 10 vane pump plates with power steering fluid.

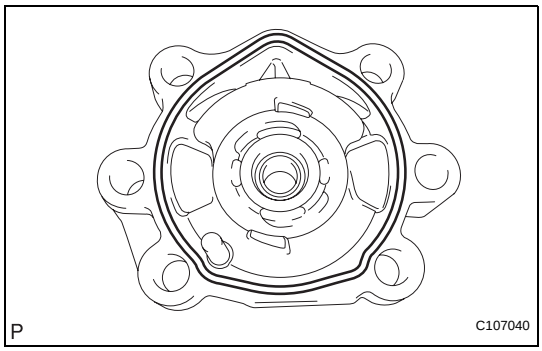


(c) Install the vane pump plates with the round end facing outward.
NOTICE:
Make sure that the vane pump plates are installed facing in the correct direction.



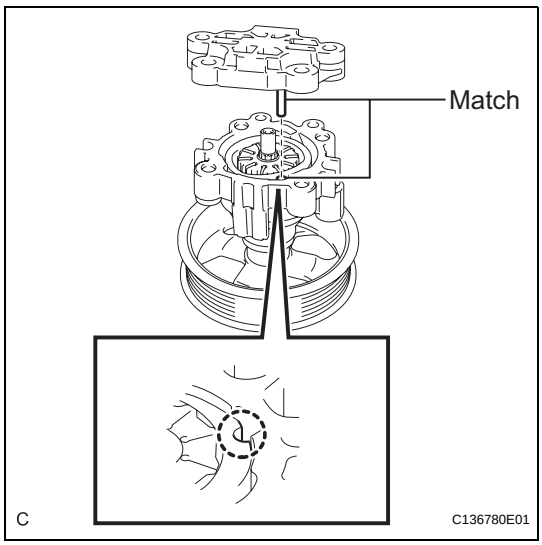
6. INSTALL VANE PUMP SHAFT SNAP RING

(a) Using a screwdriver and a snap ring expander, install a new vane pump shaft snap ring onto the vane pump shaft with pulley.

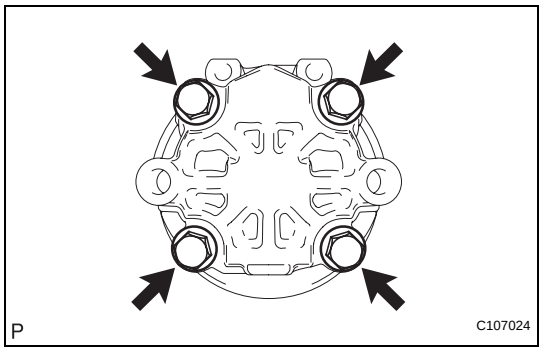


7. INSTALL VANE PUMP REAR HOUSING

(a) Coat a new O-ring with power steering fluid and install it onto the vane pump rear housing.

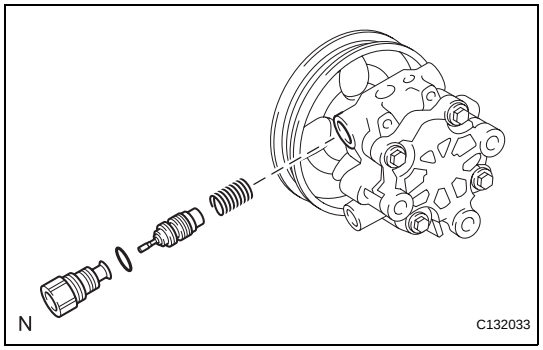


(b) Align the straight pin of the vane pump rear housing with the notches of the vane pump cam ring, vane pump front side plate, and vane pump front housing.



(c) Install the vane pump rear housing with the 4 bolts.
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)

8. INSPECT TOTAL PRELOAD (See page PS-15)



9. INSTALL FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid.

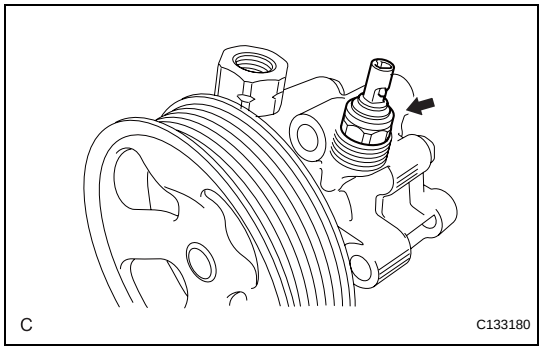
(b) Install the flow control valve compression spring and the flow control valve assembly to the vane pump front housing.

(c) Coat a new O-ring with power steering fluid and install it onto the pressure port union.

(d) Install the pressure port union to the vane pump front housing.
Torque: 69 N*m (704 kgf*cm, 51 ft.*lbf)

10. INSTALL POWER STEERING FLUID PRESSURE SWITCH

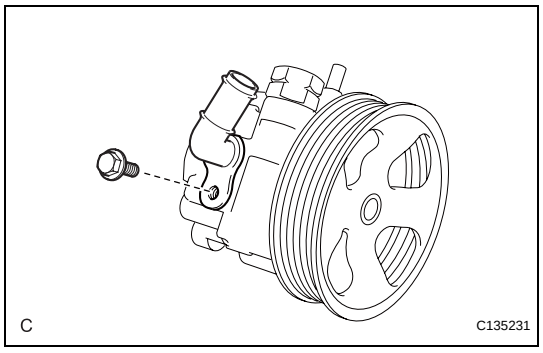
(a) Coat the new O-ring attached to the new power steering fluid pressure switch with power steering fluid.



(b) Install the power steering fluid pressure switch to the vane pump assembly.
Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)
NOTICE:
Do not use a power steering fluid pressure switch that has been subjected an impact; for example, due to it having been dropped.

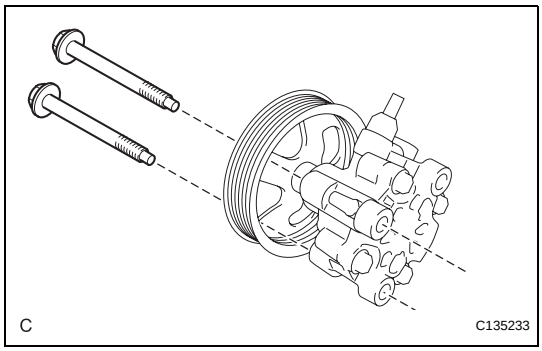
11. INSTALL POWER STEERING SUCTION PORT UNION

(a) Coat a new O-ring with power steering fluid and install it to the power steering suction port union.



(b) Install the power steering suction port union to the vane pump assembly with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

PS

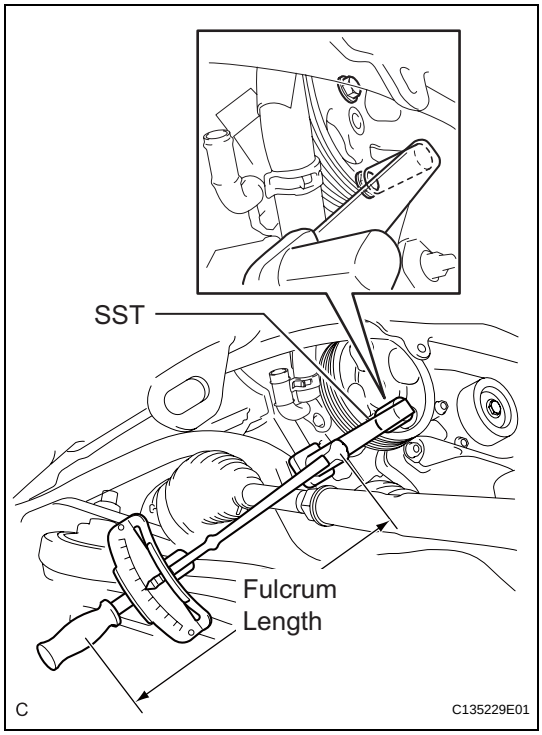


INSTALLATION

1. INSTALL VANE PUMP ASSEMBLY

(a) Temporarily install the 2 bolts to the vane pump assembly.

(b) Install the vane pump assembly.



(c) Using SST, tighten the 2 bolts.

SST 09249-63010

Torque: Without SST

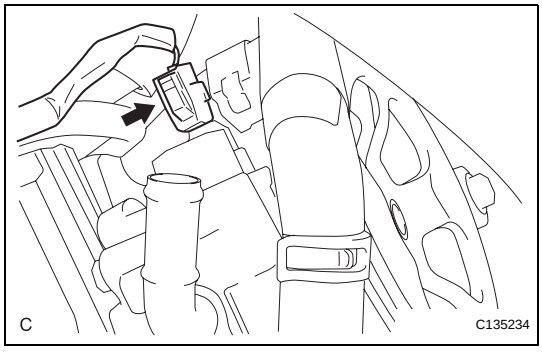
43 N*m (439 kgf*cm, 32 ft.*lbf)

With SST

29 N*m (294 kgf*cm, 21 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is accurate when SST is parallel to the torque wrench.**



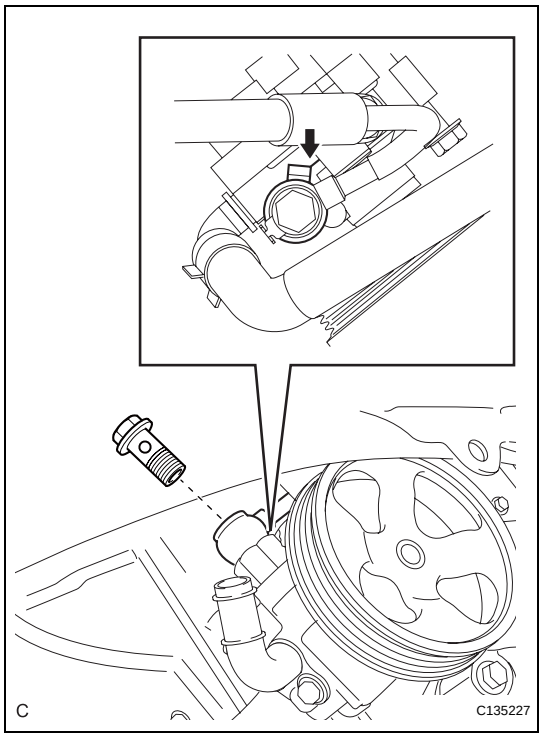
2. CONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR

(a) Connect the connector to the power steering fluid pressure switch.

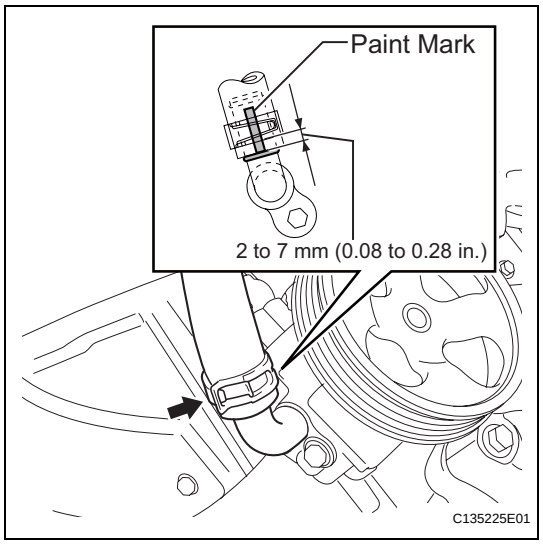
3. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Install a new gasket to the pressure feed tube assembly.

PS



(b) Connect the pressure feed tube assembly to the vane pump assembly with the union bolt.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
NOTICE:
Make sure that the stopper of the pressure feed tube assembly contacts the vane pump assembly securely as shown in the illustration.



4. CONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE

(a) Connect the No. 1 fluid reservoir to pump hose to the vane pump assembly with the clip.
NOTICE:
- **Connect the No. 1 oil reservoir to pump hose with the paint mark facing toward the rear of the vehicle.**
- **Push the No. 1 oil reservoir to pump hose as far as it will go as shown in the illustration.**
- **Install the clip at the position specified in the illustration.**

5. INSTALL FAN AND GENERATOR V BELT (See page EM-6)

6. ADD POWER STEERING FLUID

7. BLEED POWER STEERING FLUID (See page PS-7)

8. CHECK POWER STEERING FLUID LEVEL (See page PS-3)

9. CHECK FOR POWER STEERING FLUID LEAKS

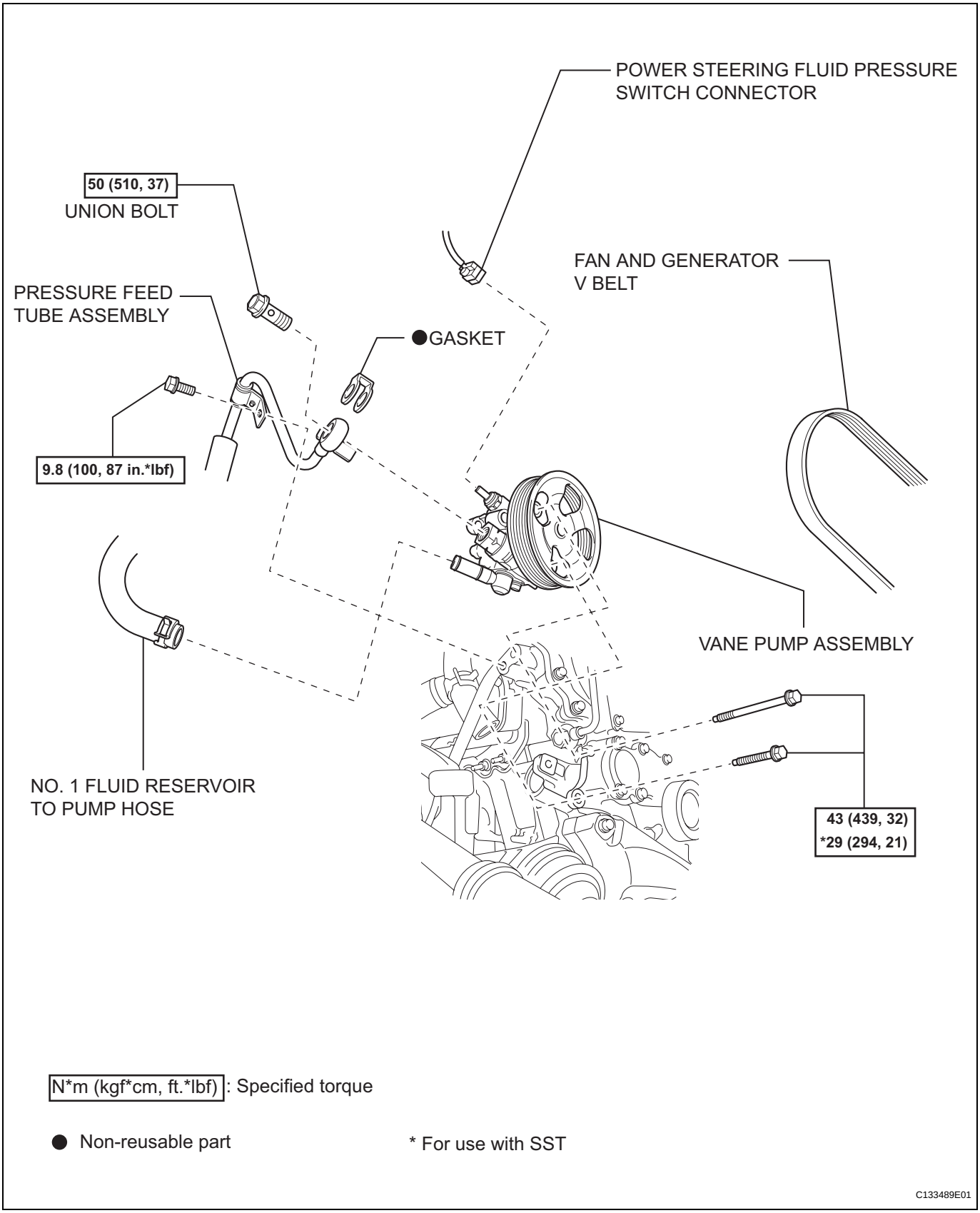
10. INSTALL FRONT FENDER APRON SEAL RH

11. INSTALL ENGINE UNDER COVER RH

12. INSTALL FRONT WHEEL RH
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

VANE PUMP (for 2GR-FE)

COMPONENTS



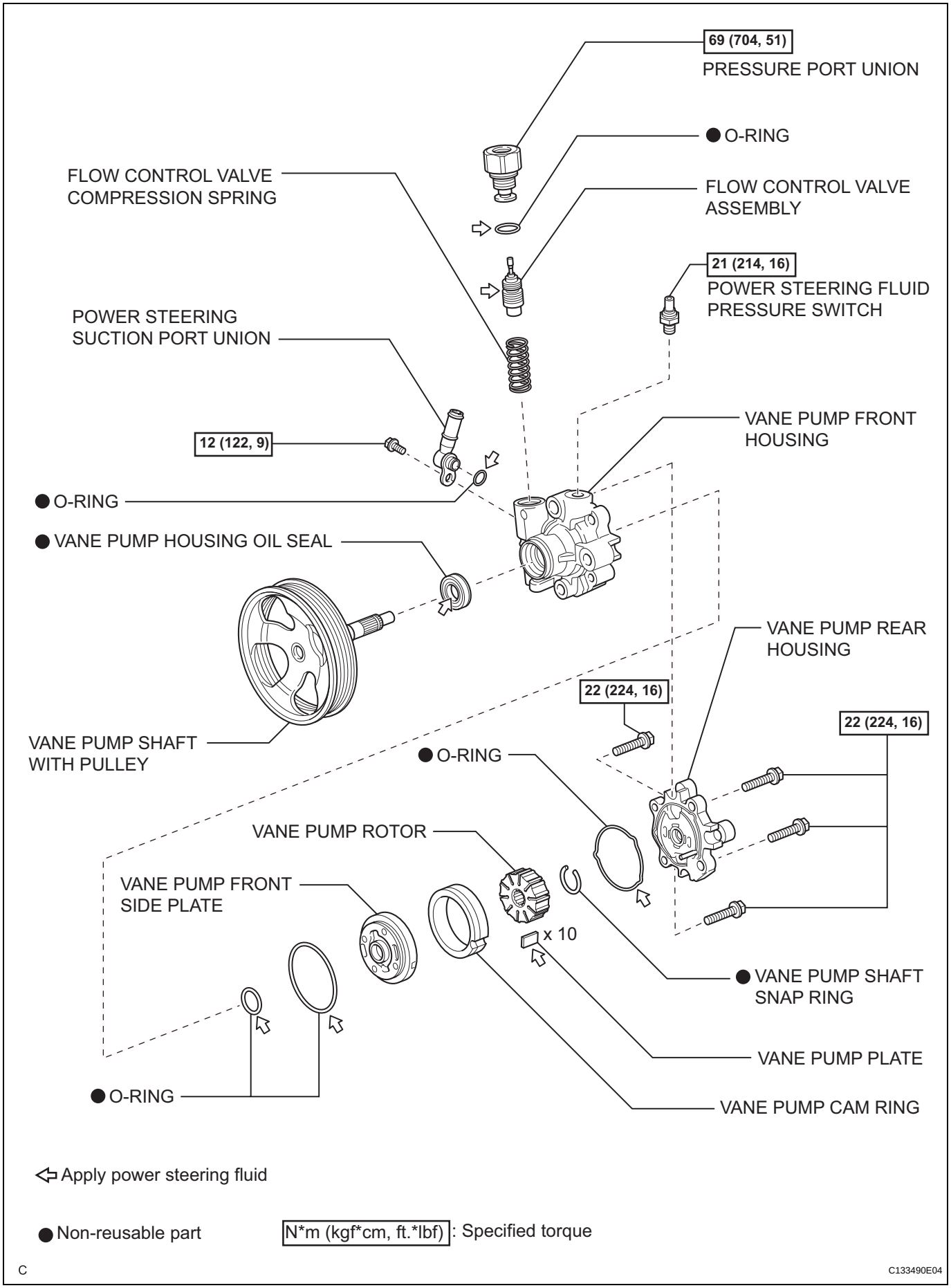
PS

N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

* For use with SST

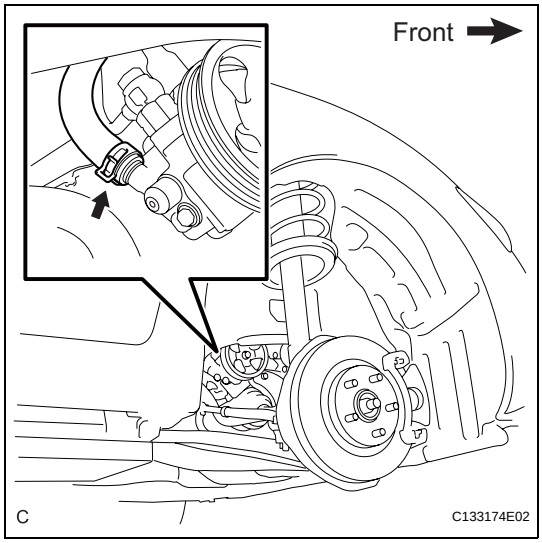
C133489E01


69 (704, 51)
PRESSURE PORT UNION
● O-RING
FLOW CONTROL VALVE
COMPRESSION SPRING
FLOW CONTROL VALVE
ASSEMBLY
21 (214, 16)
POWER STEERING FLUID
PRESSURE SWITCH
POWER STEERING
SUCTION PORT UNION
12 (122, 9)
VANE PUMP FRONT
HOUSING
● O-RING
● VANE PUMP HOUSING OIL SEAL
VANE PUMP REAR
HOUSING
22 (224, 16)
22 (224, 16)
VANE PUMP SHAFT
WITH PULLEY
● O-RING
VANE PUMP ROTOR
VANE PUMP FRONT
SIDE PLATE
x 10
● VANE PUMP SHAFT
SNAP RING
VANE PUMP PLATE
● O-RING
VANE PUMP CAM RING
⇦ Apply power steering fluid
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
C
C133490E04

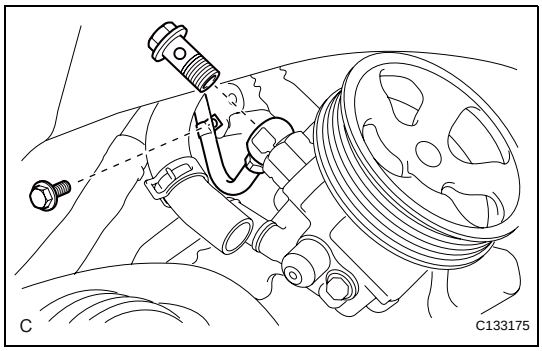
PS

REMOVAL

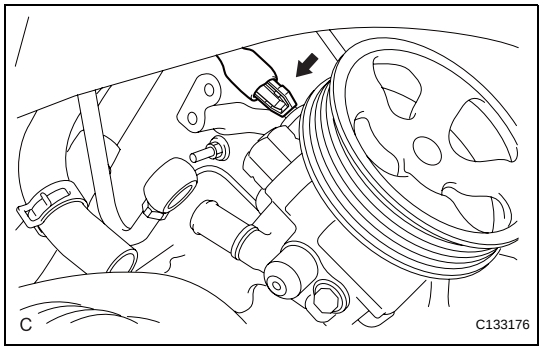
1. **DRAIN POWER STEERING FLUID**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE FRONT FENDER APRON SEAL RH**
4. **REMOVE V-BANK COVER SUB-ASSEMBLY**
5. **REMOVE FAN AND GENERATOR V BELT (See page EM-6)**



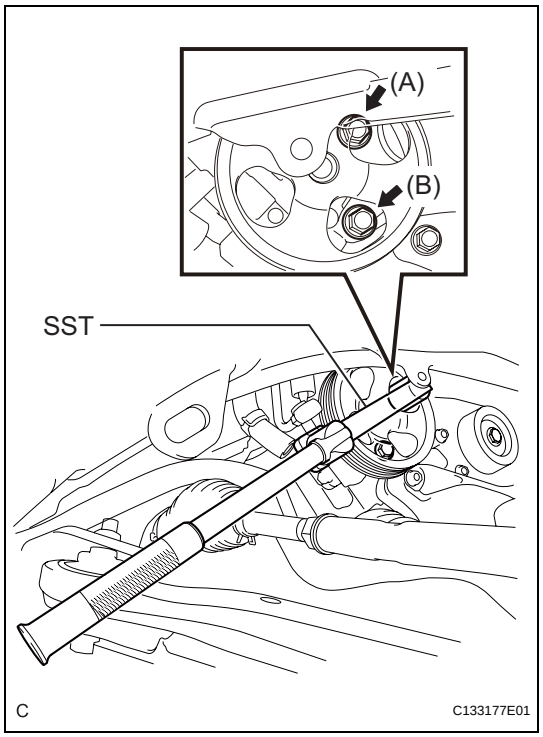
6. **DISCONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE**
   (a) Slide the clip and disconnect the No. 1 fluid reservoir to pump hose from the vane pump assembly.



7. **DISCONNECT PRESSURE FEED TUBE ASSEMBLY**
   (a) Remove the union bolt and disconnect the pressure feed tube assembly from the vane pump assembly.
   (b) Remove the bolt and separate the pressure feed tube clamp.
   (c) Remove the gasket from the pressure feed tube assembly.

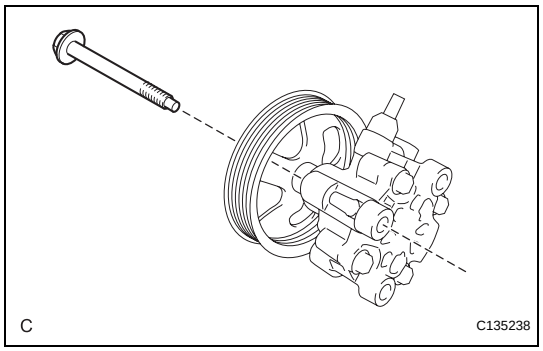


8. **DISCONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR**
   (a) Disconnect the power steering fluid pressure switch connector.



9. REMOVE VANE PUMP ASSEMBLY

(a) Using SST, loosen bolt (A) and remove bolt (B), and then remove the vane pump assembly.
SST 09249-63010



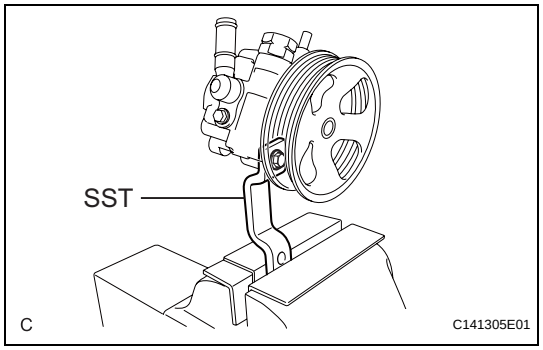
(b) Remove the bolt from the vane pump assembly.

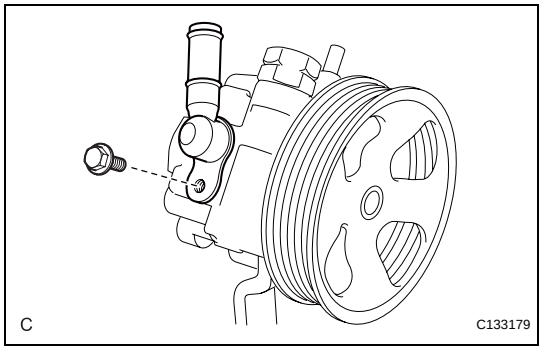
PS

DISASSEMBLY

1. HOLD VANE PUMP ASSEMBLY

(a) Using SST, hold the vane pump assembly in a vise.
SST 09630-00014 (09631-00132)

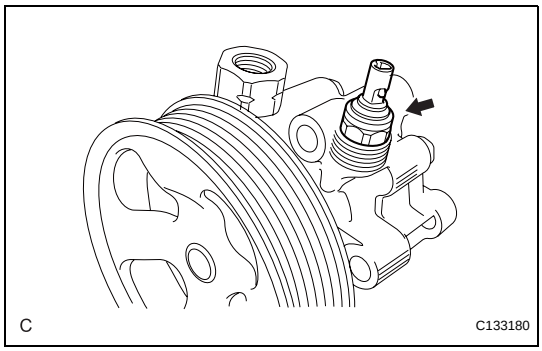




2. REMOVE POWER STEERING SUCTION PORT UNION

(a) Remove the bolt and the power steering suction port union from the vane pump assembly.

(b) Using a screwdriver, remove the O-ring from the power steering suction port union.

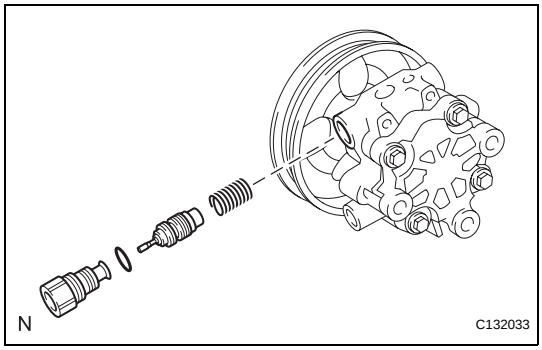


3. REMOVE POWER STEERING FLUID PRESSURE SWITCH

(a) Remove the power steering fluid pressure switch from the vane pump assembly.

NOTICE:

Perform this procedure only when the power steering fluid pressure switch is replaced.

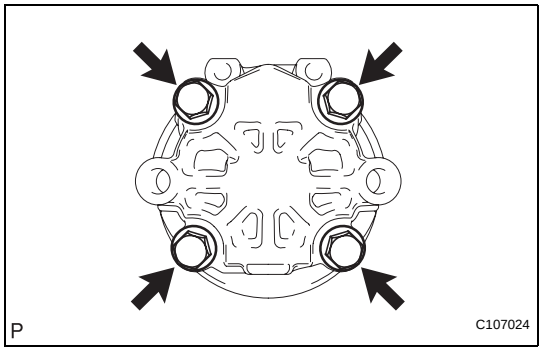


4. REMOVE FLOW CONTROL VALVE ASSEMBLY

(a) Remove the pressure port union.

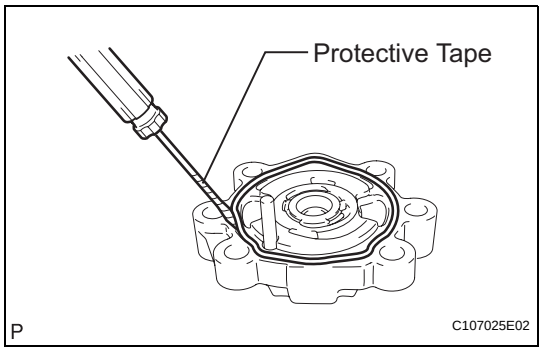
(b) Remove the O-ring from the pressure port union.

(c) Remove the flow control valve assembly and the flow control valve compression spring.



5. REMOVE VANE PUMP REAR HOUSING

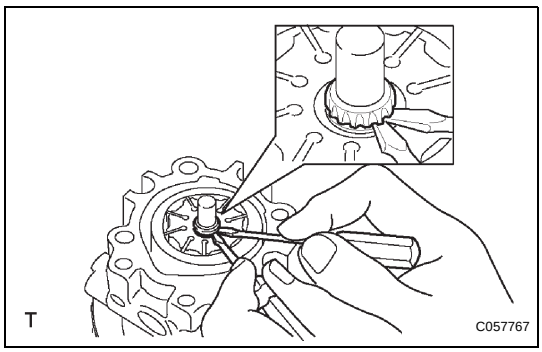
(a) Remove the 4 bolts and vane pump rear housing from the vane pump front housing.



(b) Using a screwdriver, remove the O-ring from the vane pump rear housing.

HINT:

Tape the screwdriver tip before use.

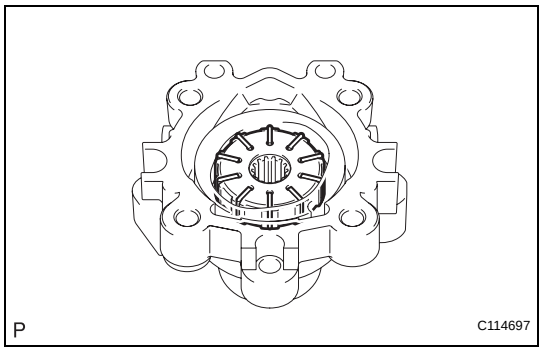


6. REMOVE VANE PUMP SHAFT WITH PULLEY

(a) Using 2 screwdrivers, remove the vane pump shaft snap ring from the vane pump shaft with pulley.

(b) Remove the vane pump shaft with pulley.

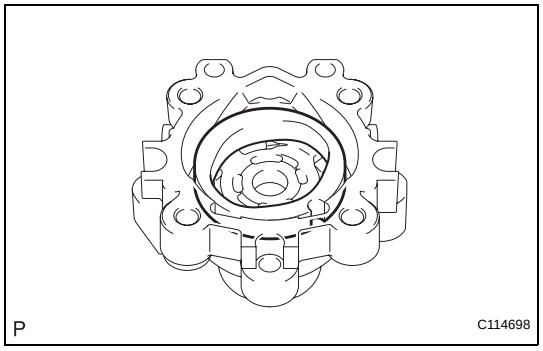
PS



7. REMOVE VANE PUMP ROTOR

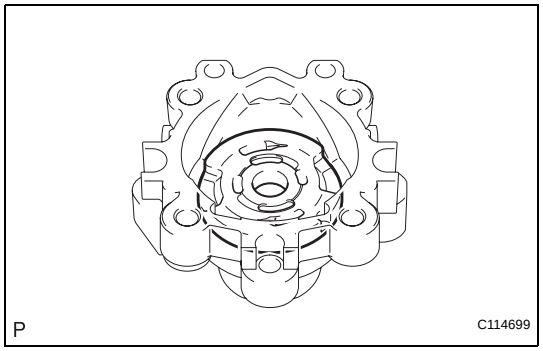
(a) Remove the 10 vane pump plates.

(b) Remove the vane pump rotor.



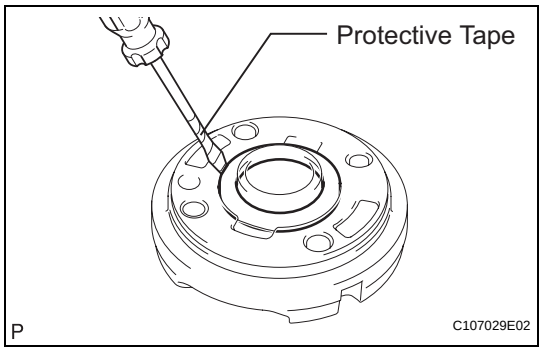
8. REMOVE VANE PUMP CAM RING

(a) Remove the vane pump cam ring from the vane pump front housing.

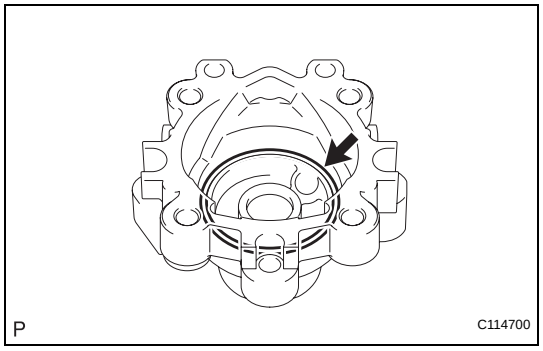


9. REMOVE VANE PUMP FRONT SIDE PLATE

(a) Remove the vane pump front side plate from the vane pump front housing.

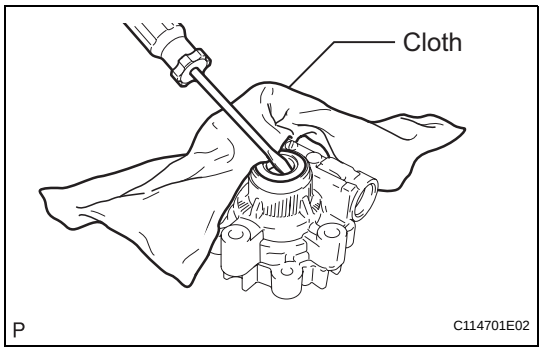


(b) Using a screwdriver, remove the O-ring from the vane pump front side plate.
HINT:
Tape the screwdriver tip before use.



(c) Remove the O-ring from the vane pump front housing.

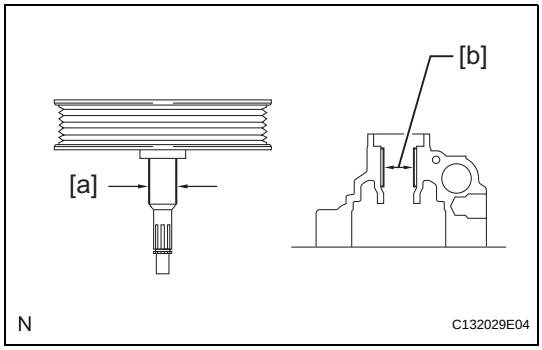
PS



10. REMOVE VANE PUMP HOUSING OIL SEAL

(a) Using a screwdriver and a shop rag or a piece of cloth, remove the vane pump housing oil seal.
NOTICE:
Be careful not to damage the vane pump front housing.

INSPECTION



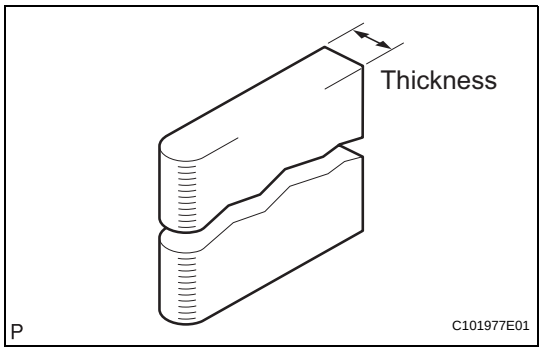
1. INSPECT VANE PUMP SHAFT AND BUSHING IN VANE PUMP FRONT HOUSING

(a) Using a micrometer, measure the outer diameter [a] of the vane pump shaft with pulley.

(b) Using a vernier caliper, measure the inner diameter [b] of the vane pump front housing bushing.

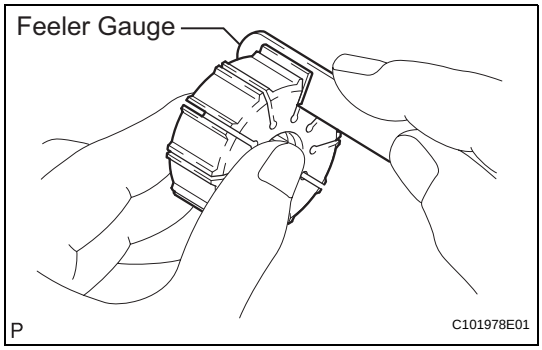
(c) Calculate the oil clearance.
Oil clearance = Inner diameter of the bushing [b] - Outer diameter of the shaft [a].
Maximum oil clearance:
0.07 mm (0.0028 in.)
If oil clearance exceeds the maximum, replace the vane pump assembly.

PS

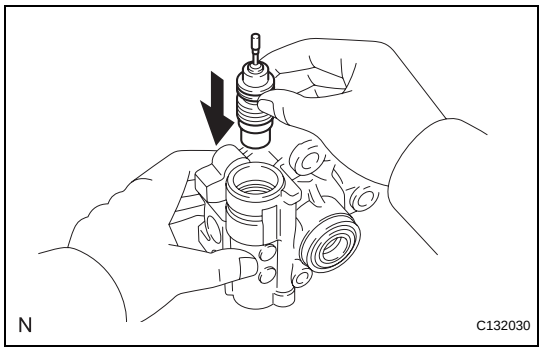


2. INSPECT VANE PUMP ROTOR AND VANE PUMP PLATE CLEARANCE

(a) Using a micrometer, measure the thickness of the vane pump plates.
Standard thickness:
1.405 to 1.411 mm (0.05531 to 0.05555 in.)
If the thickness is not within the specified range, replace the vane pump assembly.

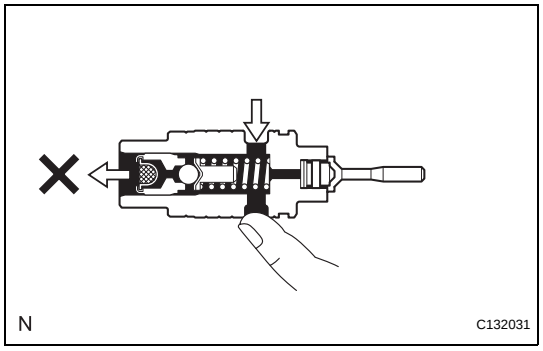


(b) Using a feeler gauge, measure the clearance between the side face of the vane pump rotor groove and the vane pump plates.
Maximum clearance:
0.03 mm (0.0012 in.)
If clearance exceeds the maximum, replace the vane pump assembly.

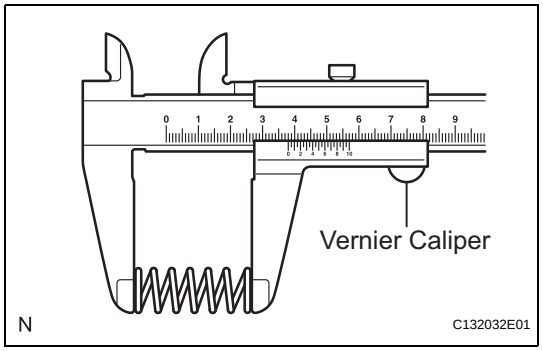


3. INSPECT FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid and check that it falls smoothly into the flow control valve due to its own weight.
If the control valve does not fall into the hole smoothly, replace the vane pump assembly.



(b) Check the flow control valve assembly for leakage. Close one of the holes and apply compressed air, 392 to 490 kPa (4 to 5 kgf/cm^2, 57 to 71 psi), into the opposite side hole, and confirm that air does not come out from the end holes.
If air leaks, replace the vane pump assembly.

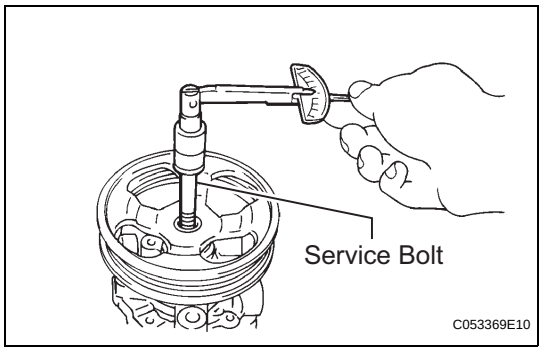


4. INSPECT FLOW CONTROL VALVE COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the flow control valve compression spring.
Minimum free length:
29.2 mm (1.150 in.)
If the length is less than the minimum, replace the vane pump assembly.

5. INSPECT PRESSURE PORT UNION

If the union seat in the pressure port union is severely damaged, replace the vane pump assembly.



6. INSPECT TOTAL PRELOAD

(a) Check that the pump rotates smoothly without abnormal noise.

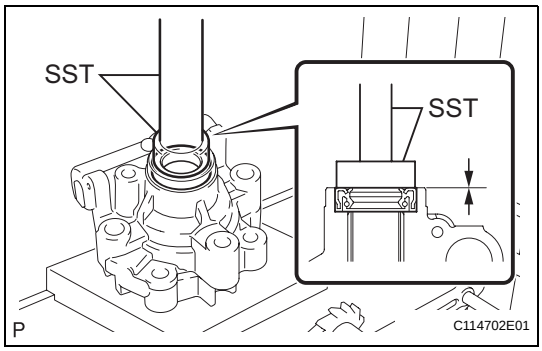
(b) Temporarily install the service bolt.
Recommended service bolt:
Thread diameter:
10 mm (0.39 in.)
Thread pitch:
1.25 mm (0.0492 in.)
Bolt length:
50 mm (1.97 in.)

(c) Using a torque wrench, check the pump rotating torque.
Rotating torque:
0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf) or less
If the rotating torque is not as specified, check the vane pump housing oil seal.

PS

REASSEMBLY

NOTICE:
When installing parts, coat the parts indicated by arrows with power steering fluid (See page PS-22).



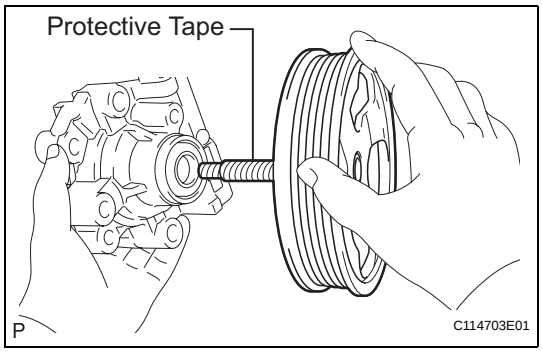
1. INSTALL VANE PUMP HOUSING OIL SEAL

(a) Coat a new vane pump housing oil seal lip with power steering fluid.

(b) Using SST and a press, install the vane pump housing oil seal.

SST 09950-60010 (09951-00280), 09950-70010 (09951-07100)

NOTICE:
Make sure that the oil seal is installed facing in the correct direction as shown in the illustration.



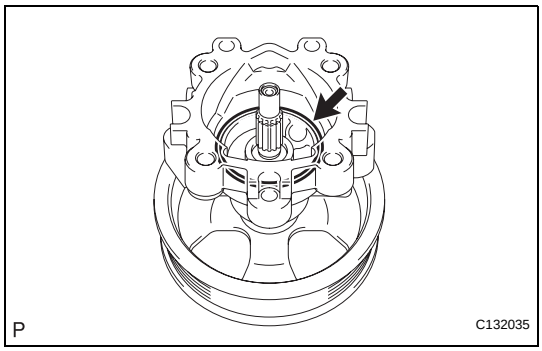
2. INSTALL VANE PUMP SHAFT WITH PULLEY

(a) Coat the inside surface of the busing in the vane pump front housing with power steering fluid.

(b) Gradually insert the vane pump shaft with pulley.

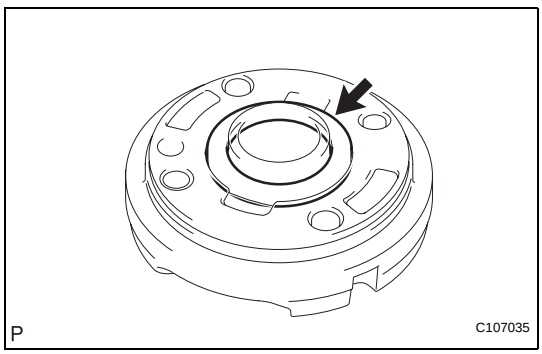
NOTICE:
Do not damage the oil seal lip in the front housing.

HINT:
Wrap protective tape around the spline of the vane pump shaft with pulley in order to prevent damage to the oil seal.



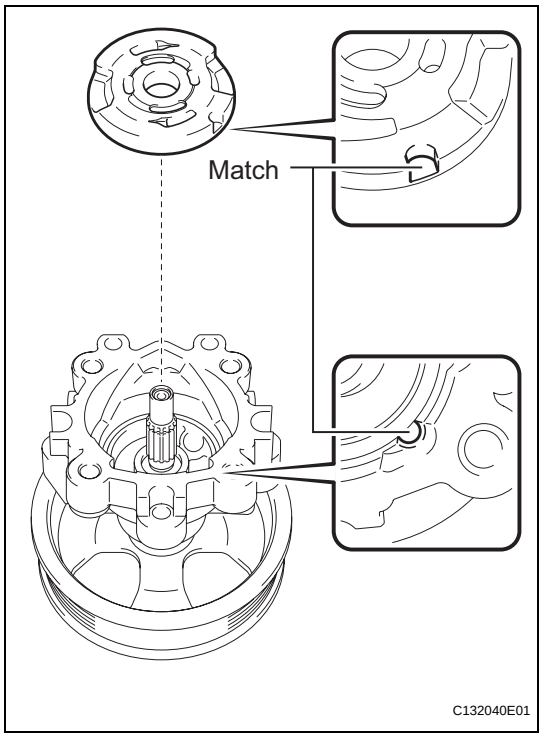
3. INSTALL VANE PUMP FRONT SIDE PLATE

(a) Coat a new O-ring with power steering fluid and install it into the vane pump front housing.

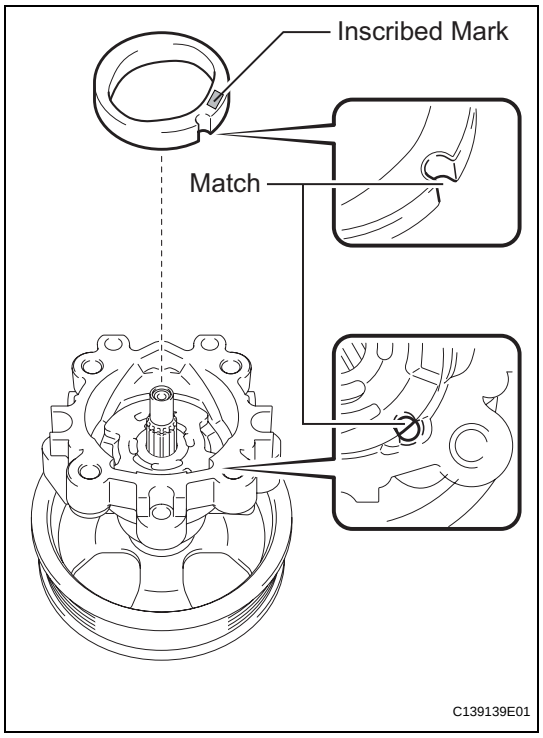


(b) Coat a new O-ring with power steering fluid and install it onto the vane pump front side plate.

PS



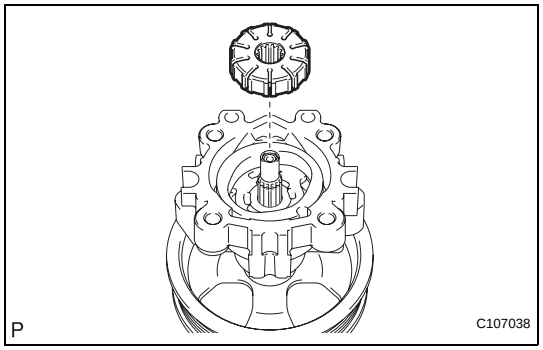
(c) Align the notch of the vane pump front side plate with that of the vane pump front housing, and install the vane pump front side plate.
NOTICE:
Make sure that the vane pump front side plate is installed facing in the correct direction.



4. INSTALL VANE PUMP CAM RING

(a) Align the notch of the cam ring with that of the vane pump front side plate, and install the vane pump cam ring with the inscribed mark facing upward.
NOTICE:
Make sure that the vane pump cam ring is installed facing in the correct direction.

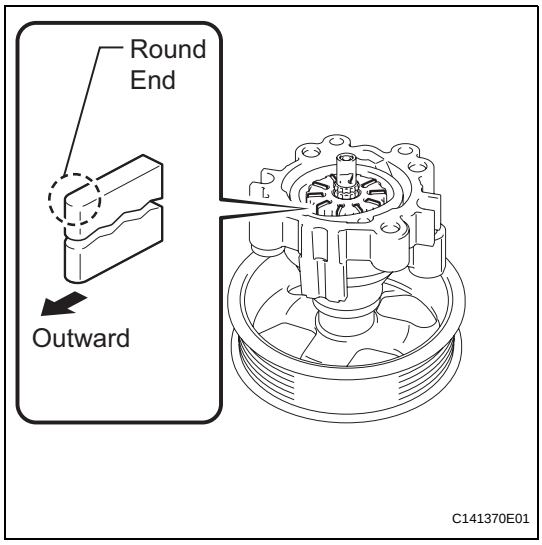
PS



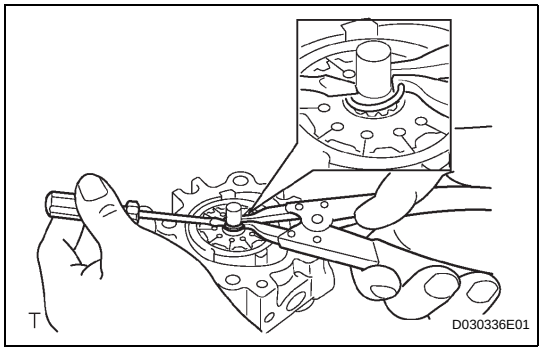
5. INSTALL VANE PUMP ROTOR

(a) Install the vane pump rotor.
HINT:
Vane pump rotor can be installed in both directions.

(b) Coat the 10 vane pump plates with power steering fluid.



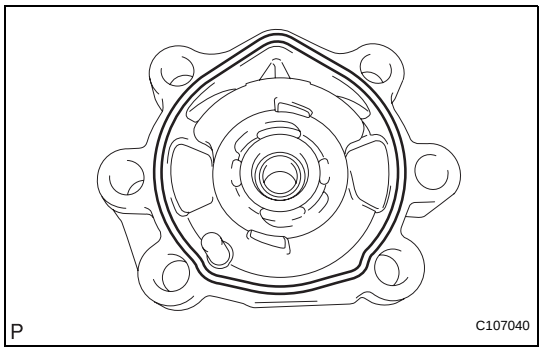
(c) Install the vane pump plates with the round end facing outward.
NOTICE:
Make sure that the vane pump plates are installed facing in the correct direction.



6. INSTALL VANE PUMP SHAFT SNAP RING

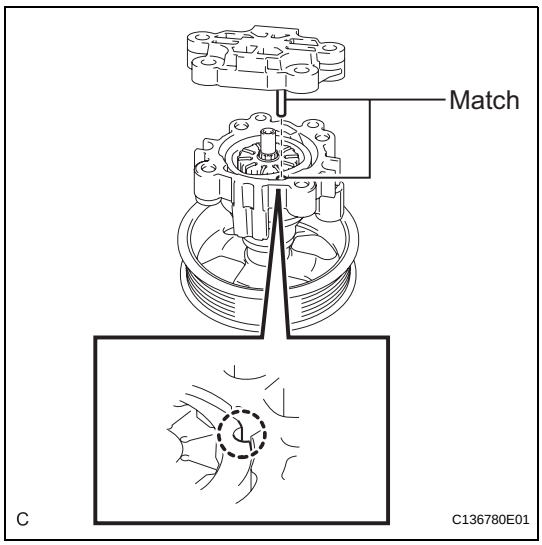
(a) Using a screwdriver and a snap ring expander, install a new vane pump shaft snap ring onto the vane pump shaft with pulley.

PS

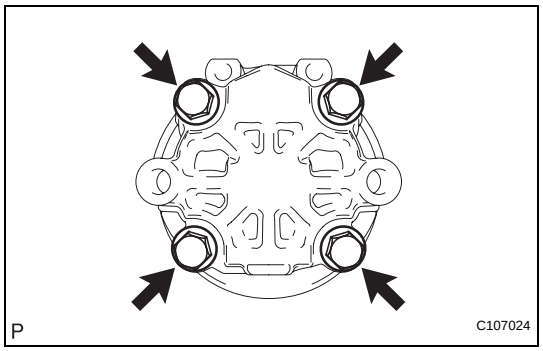


7. INSTALL VANE PUMP REAR HOUSING

(a) Coat a new O-ring with power steering fluid and install it onto the vane pump rear housing.

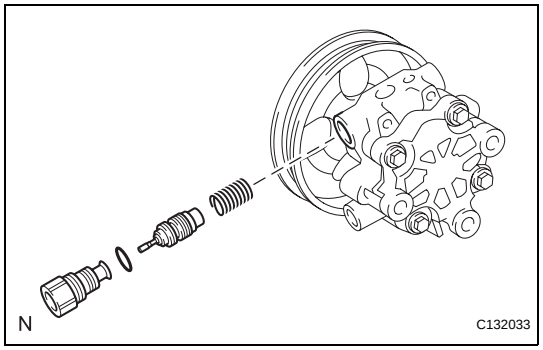


(b) Align the straight pin of the vane pump rear housing with the notches of the vane pump cam ring, vane pump front side plate, and vane pump front housing.



(c) Install the vane pump rear housing with the 4 bolts.
Torque: 22 N*m (224 kgf*cm, 16 ft.*lbf)

8. INSPECT TOTAL PRELOAD (See page PS-29)



9. INSTALL FLOW CONTROL VALVE ASSEMBLY

(a) Coat the flow control valve assembly with power steering fluid.

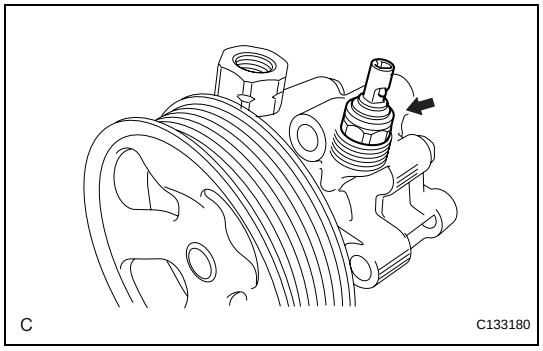
(b) Install the flow control valve compression spring and the flow control valve assembly to the vane pump front housing.

(c) Coat a new O-ring with power steering fluid and install it onto the pressure port union.

(d) Install the pressure port union to the vane pump front housing.
Torque: 69 N*m (704 kgf*cm, 51 ft.*lbf)

10. INSTALL POWER STEERING FLUID PRESSURE SWITCH

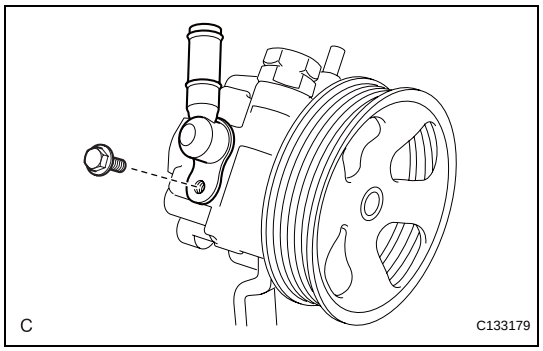
(a) Coat the new O-ring attached to the new power steering fluid pressure switch with power steering fluid.



(b) Install the power steering fluid pressure switch to the vane pump assembly.
Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)
NOTICE:
Do not use a power steering fluid pressure switch that has been subjected an impact; for example, due to it having been dropped.

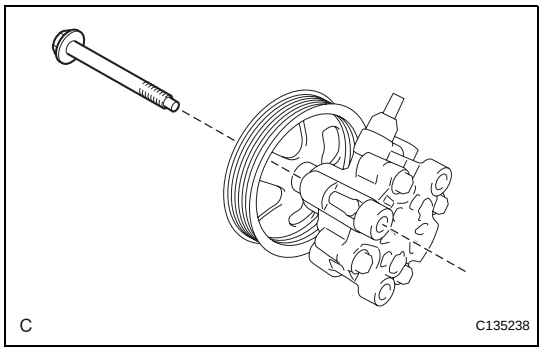
11. INSTALL POWER STEERING SUCTION PORT UNION

(a) Coat a new O-ring with power steering fluid and install it to the power steering suction port union.



(b) Install the power steering suction port union to the vane pump assembly with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

PS

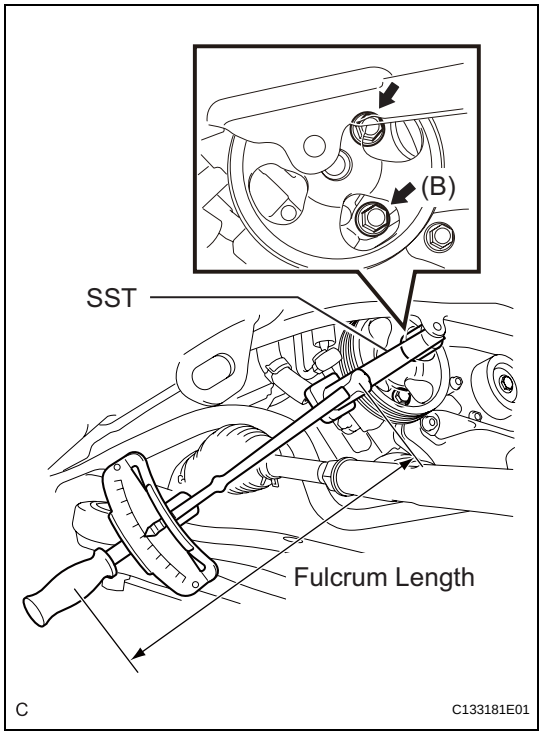


INSTALLATION

1. INSTALL VANE PUMP ASSEMBLY

(a) Temporarily install the bolt to the vane pump assembly.

(b) Install the vane pump assembly.



(c) Using SST, install bolt (B) and tighten the 2 bolts.

SST 09249-63010

Torque: Without SST

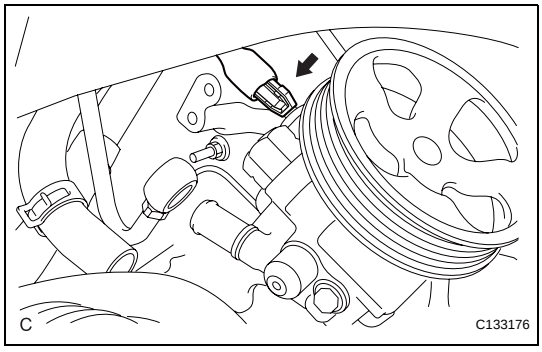
43 N*m (439 kgf*cm, 32 ft.*lbf)

With SST

29 N*m (294 kgf*cm, 21 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is accurate when SST is parallel to the torque wrench.**



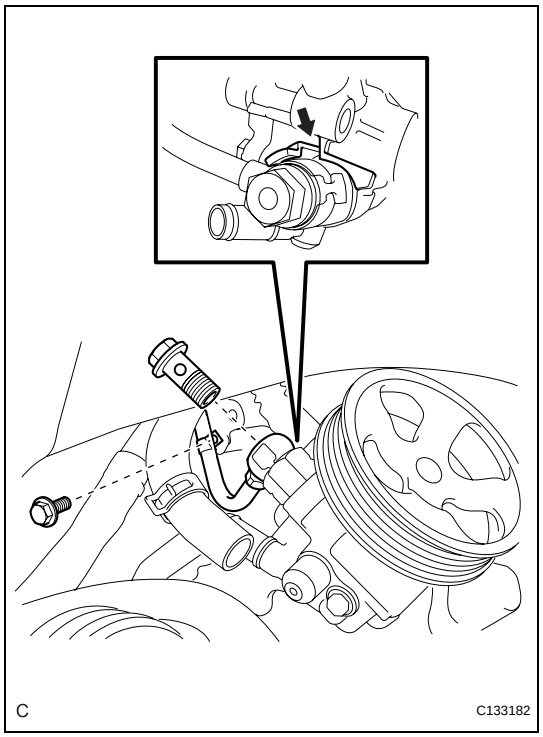
2. CONNECT POWER STEERING FLUID PRESSURE SWITCH CONNECTOR

(a) Connect the connector to the power steering fluid pressure switch.

3. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Install a new gasket to the pressure feed tube assembly.

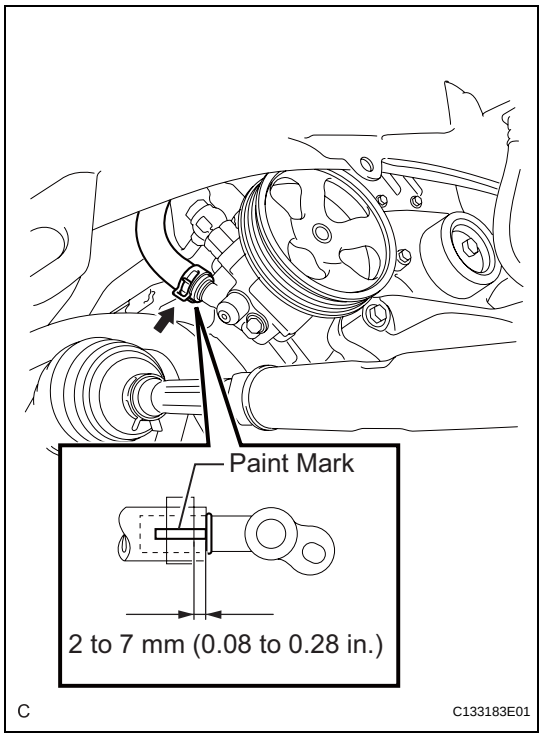
PS



(b) Temporarily connect the pressure feed tube assembly to the vane pump assembly with the union bolt.

(c) Install the pressure feed tube assembly clamp with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
NOTICE:
Install the pressure feed tube assembly clamp in the correct position.

(d) Fully tighten the union bolt.
Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
NOTICE:
Make sure that the stopper of the pressure feed tube assembly contacts the vane pump assembly securely as shown in the illustration.



4. CONNECT NO. 1 FLUID RESERVOIR TO PUMP HOSE

(a) Connect the No. 1 fluid reservoir to pump hose to the vane pump assembly with the clip.
NOTICE:
- **Connect the No. 1 fluid reservoir to pump hose with the paint mark facing toward the rear of the vehicle.**
- **Push the No. 1 fluid reservoir to pump hose as far as it will go as shown in the illustration.**
- **Install the clip at the position specified in the illustration.**

5. INSTALL FAN AND GENERATOR V BELT (See page EM-7)

6. ADD POWER STEERING FLUID

7. BLEED POWER STEERING FLUID (See page PS-7)

8. CHECK POWER STEERING FLUID LEVEL (See page PS-3)

9. CHECK FOR POWER STEERING FLUID LEAKS

10. INSTALL V-BANK COVER SUB-ASSEMBLY

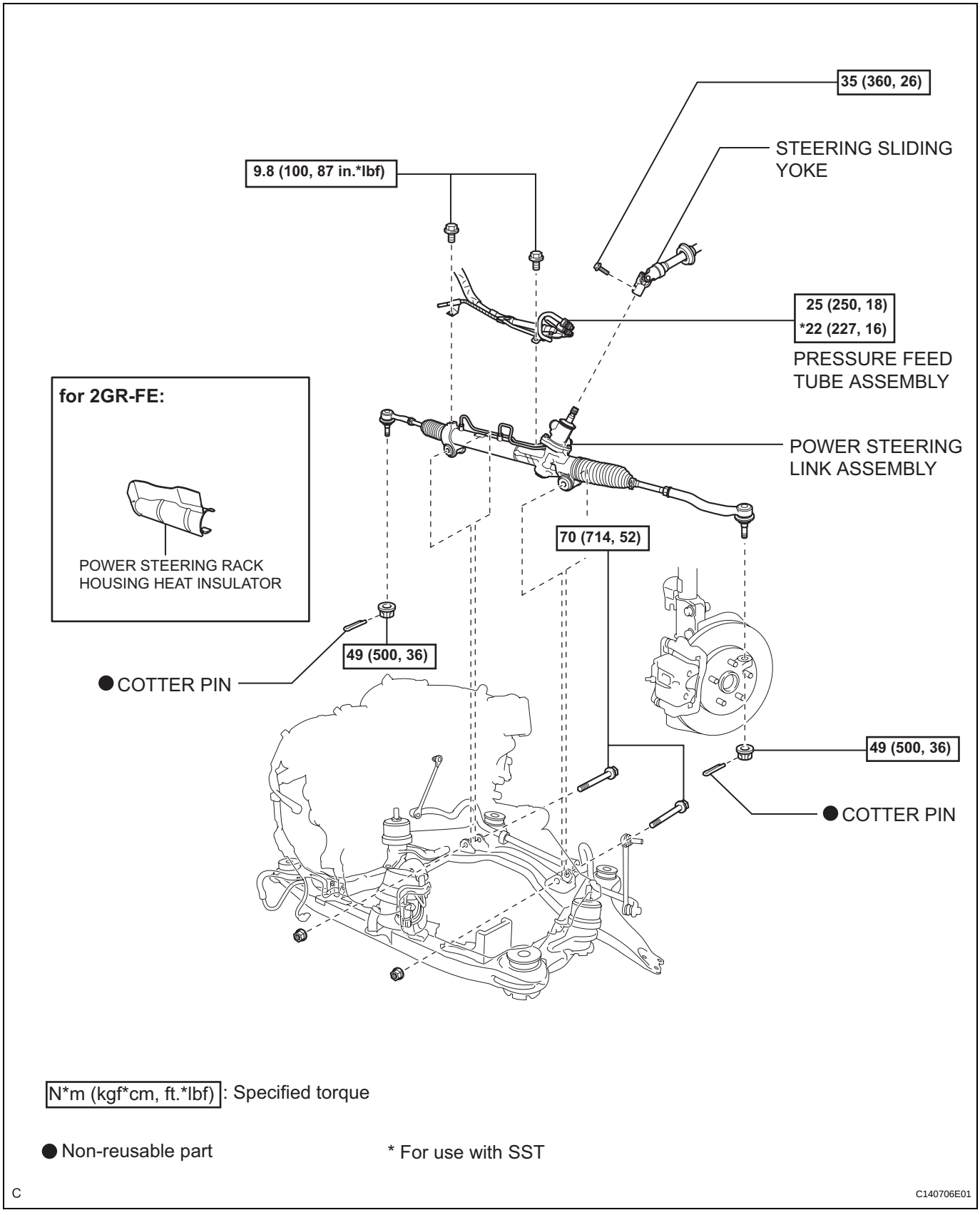
11. INSTALL FRONT FENDER APRON SEAL RH

12. INSTALL FRONT WHEEL RH
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

PS

POWER STEERING LINK

COMPONENTS



PS

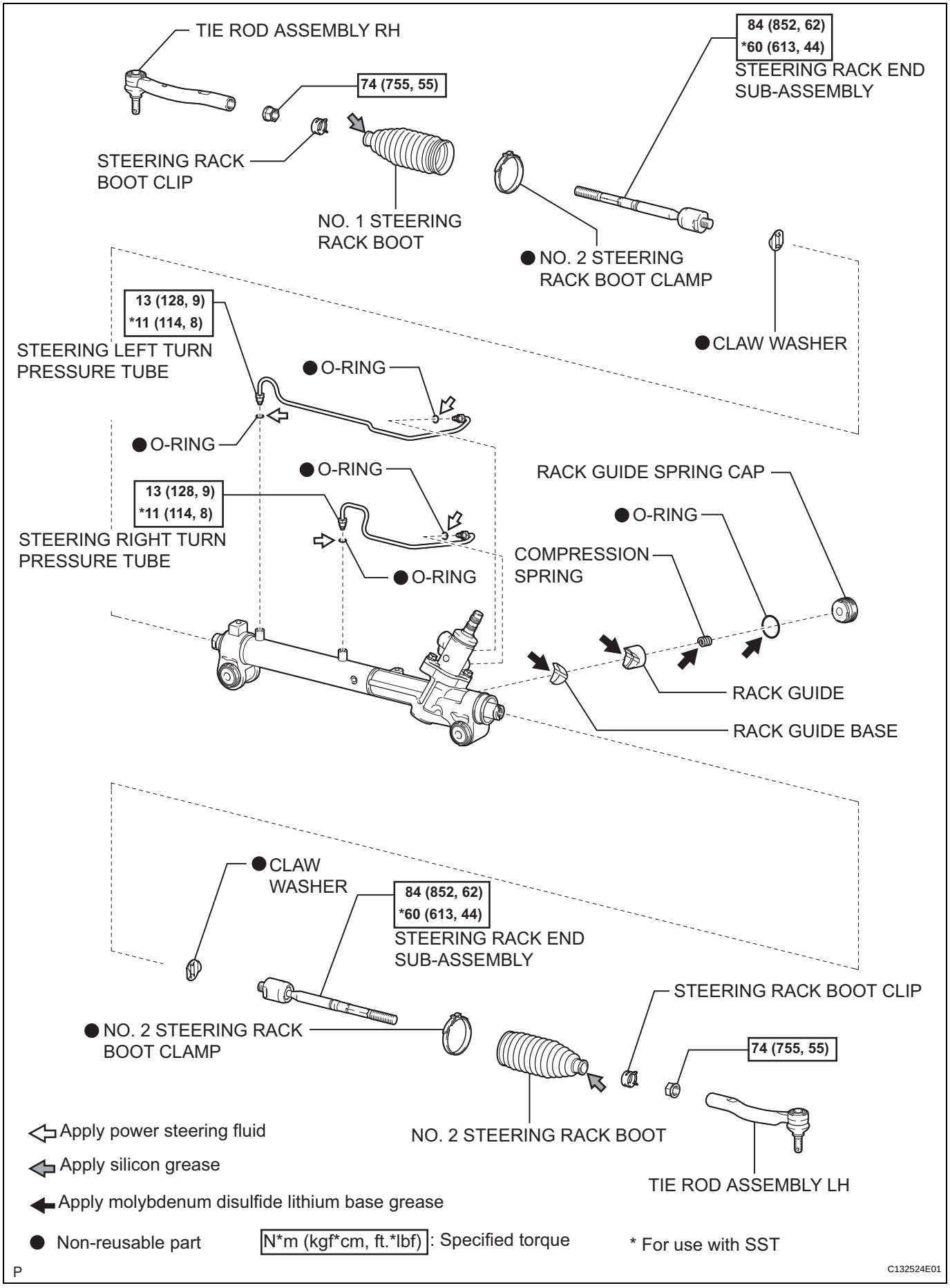
N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

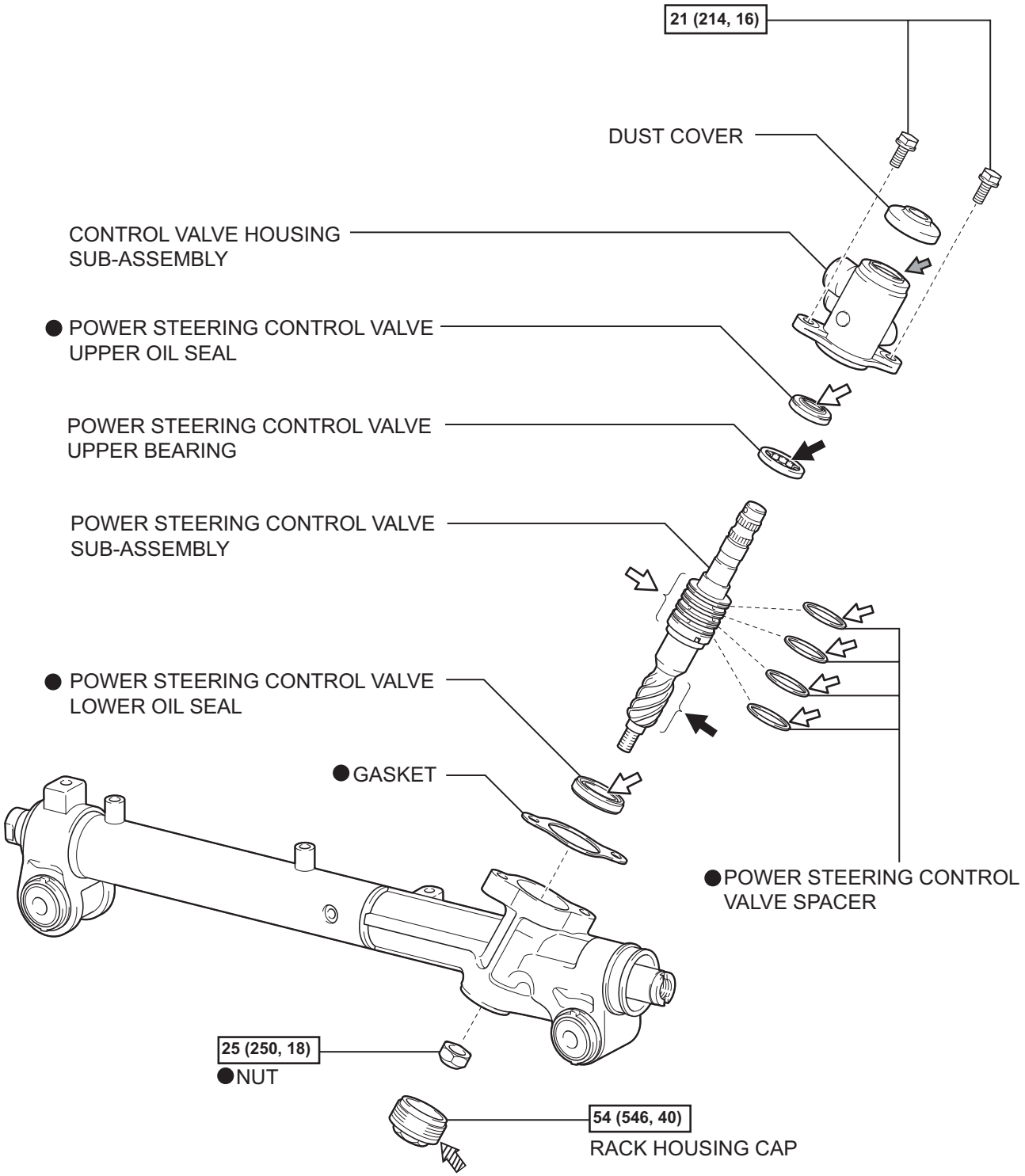
* For use with SST

C

C140706E01


TIE ROD ASSEMBLY RH
74 (755, 55)
STEERING RACK BOOT CLIP
NO. 1 STEERING RACK BOOT
84 (852, 62)
*60 (613, 44)
STEERING RACK END SUB-ASSEMBLY
● NO. 2 STEERING RACK BOOT CLAMP
● CLAW WASHER
13 (128, 9)
*11 (114, 8)
STEERING LEFT TURN PRESSURE TUBE
● O-RING
● O-RING
● O-RING
13 (128, 9)
*11 (114, 8)
STEERING RIGHT TURN PRESSURE TUBE
● O-RING
RACK GUIDE SPRING CAP
● O-RING
COMPRESSION SPRING
RACK GUIDE
RACK GUIDE BASE
● CLAW WASHER
84 (852, 62)
*60 (613, 44)
STEERING RACK END SUB-ASSEMBLY
STEERING RACK BOOT CLIP
● NO. 2 STEERING RACK BOOT CLAMP
74 (755, 55)
NO. 2 STEERING RACK BOOT
TIE ROD ASSEMBLY LH
Apply power steering fluid
Apply silicon grease
Apply molybdenum disulfide lithium base grease
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
* For use with SST
P
C132524E01

PS



Precoated part

Apply MP grease

Apply power steering fluid

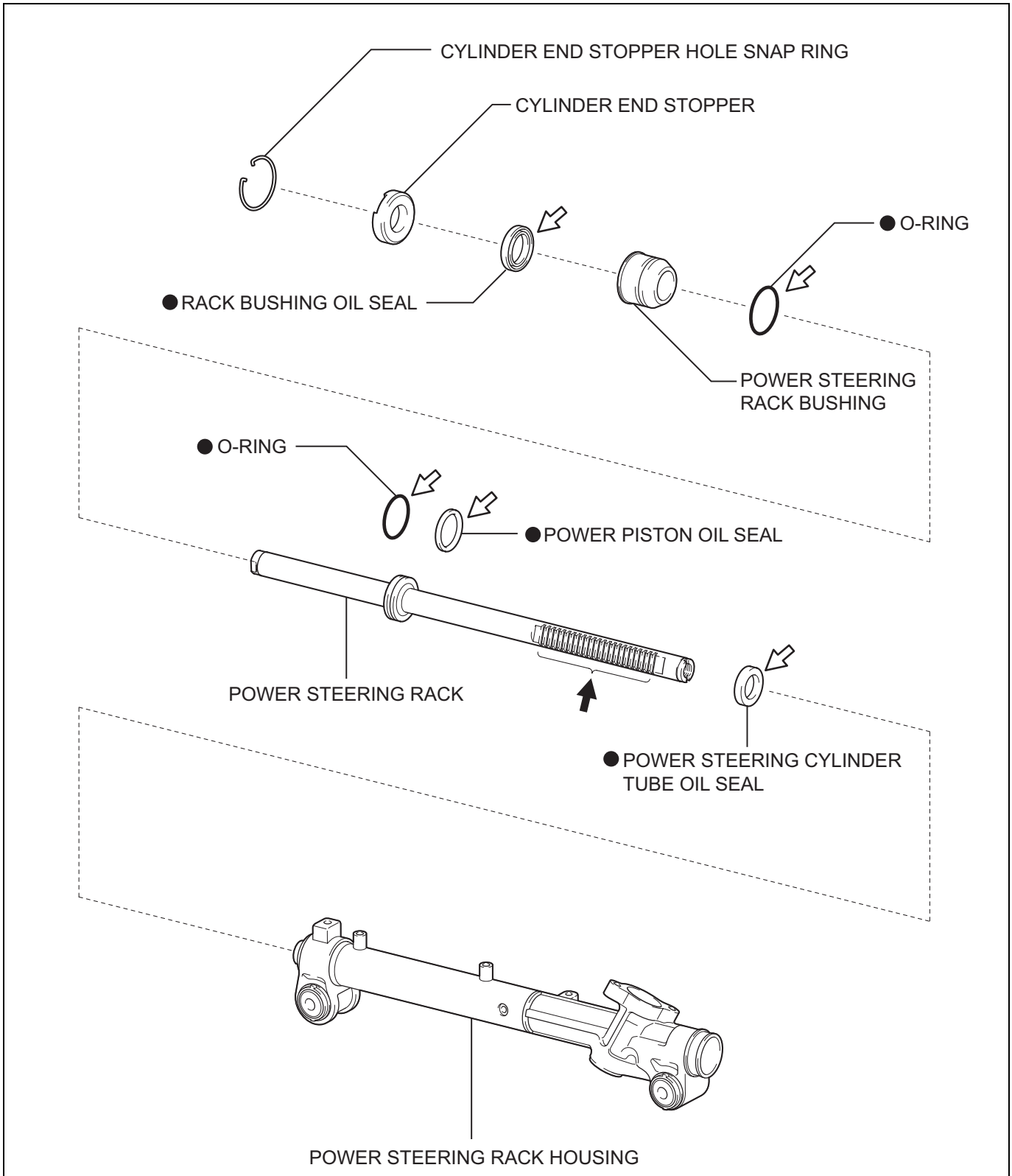
Apply molybdenum disulfide lithium base grease

● Non-reusable part

N*m (kgf*cm, ft.*lbf): Specified torque

P

C132525E01



⇦ Apply power steering fluid

⬅ Apply molybdenum disulfide lithium base grease

● Non-reusable part

P

C132526E01

PS

REMOVAL

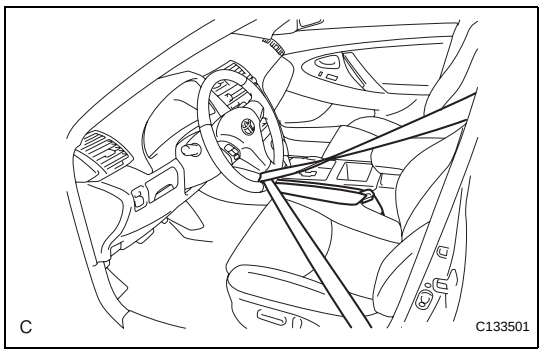
1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

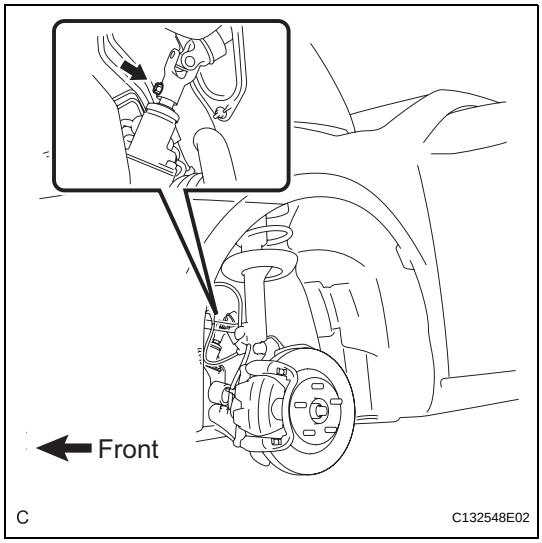
3. REMOVE FRONT WHEELS

4. SEPARATE STEERING SLIDING YOKE

(a) Secure the steering wheel with the seat belt in order to prevent rotation.
HINT:
This operation is useful to prevent damage to the spiral cable.

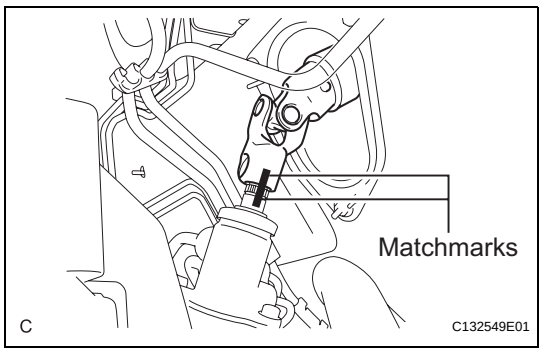


(b) Remove the bolt and slide the steering sliding yoke.
NOTICE:
Do not separate the steering sliding yoke from the power steering link assembly.



(c) Put matchmarks on the steering sliding yoke and the power steering link assembly.

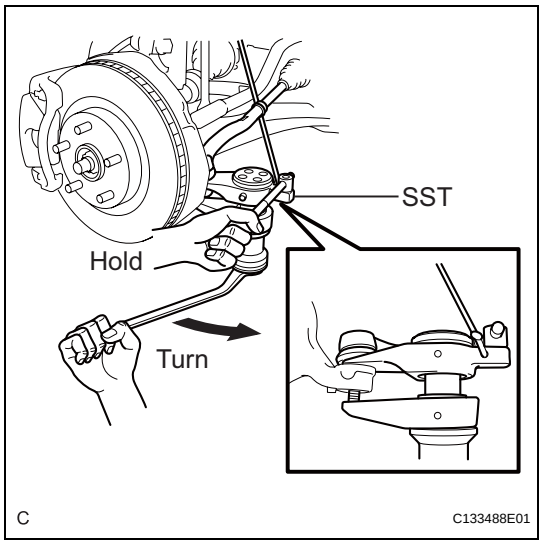
(d) Separate the steering sliding yoke from the power steering link assembly.



5. SEPARATE TIE ROD ASSEMBLY LH

(a) Remove the cotter pin and the nut.

PS

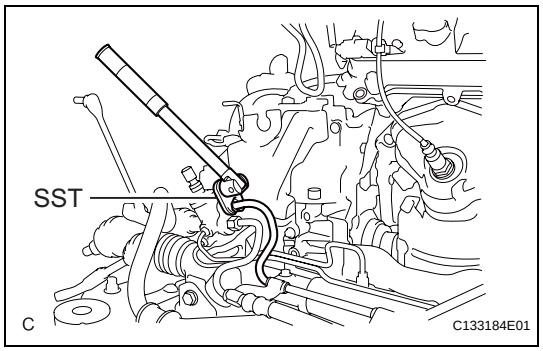


(b) Using SST, separate the tie rod assembly LH from the steering knuckle.
SST 09628-00011
NOTICE:
- **Hang SST with a string, etc. to prevent it from falling.**
- **Do not damage the front disc brake dust cover.**
- **Do not damage the ball joint dust cover.**
- **Do not damage the steering knuckle.**

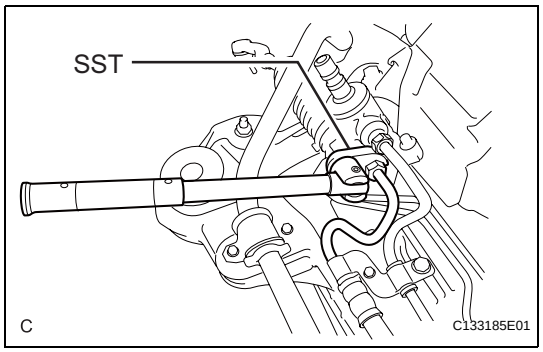
6. SEPARATE TIE ROD ASSEMBLY RH
HINT:
Perform the same procedure as for the LH side.

7. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE
HINT:
Refer to the instructions for removal of the engine assembly (See page EM-94 for 2AZ-FE, EM-23 for 2GR-FE).

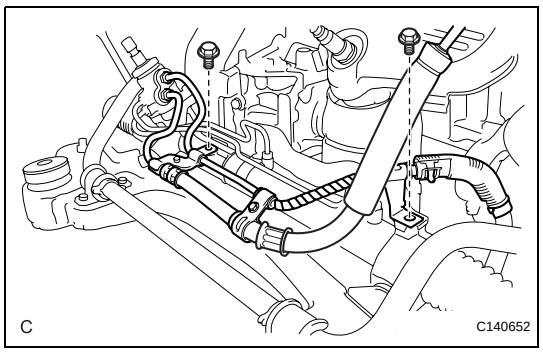
8. DISCONNECT PRESSURE FEED TUBE ASSEMBLY



(a) Using SST, disconnect the pressure feed tube assembly (return tube side) from the power steering link assembly.
SST 09023-12701

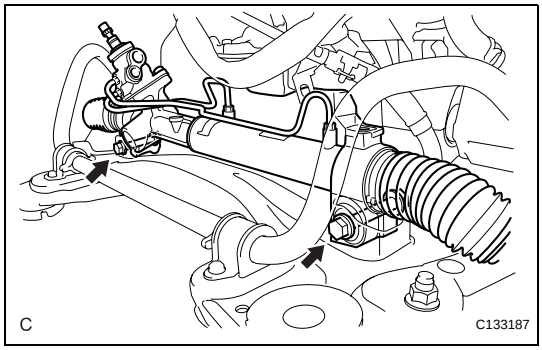


(b) Using SST, disconnect the pressure feed tube assembly (pressure feed tube side) from the power steering link assembly.
SST 09023-12701



(c) Remove the 2 bolts and separate the pressure feed tube clamp.

PS

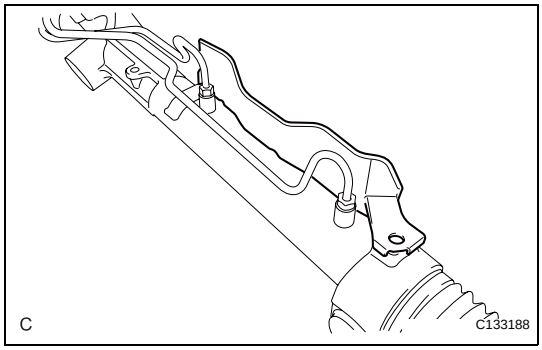


9. REMOVE POWER STEERING LINK ASSEMBLY

(a) Remove the 2 bolts, 2 nuts, and the power steering link assembly.

NOTICE:

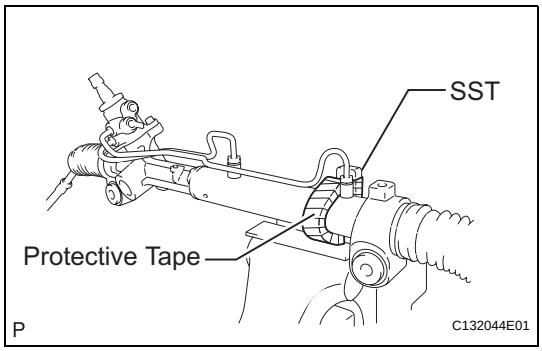
Because the nut has its own stopper, do not turn the nut. Loosen the bolt with the nut fixed.



10. REMOVE POWER STEERING RACK HOUSING HEAT INSULATOR (for 2GR-FE)

(a) Remove the power steering rack housing heat insulator from the power steering link assembly.

DISASSEMBLY



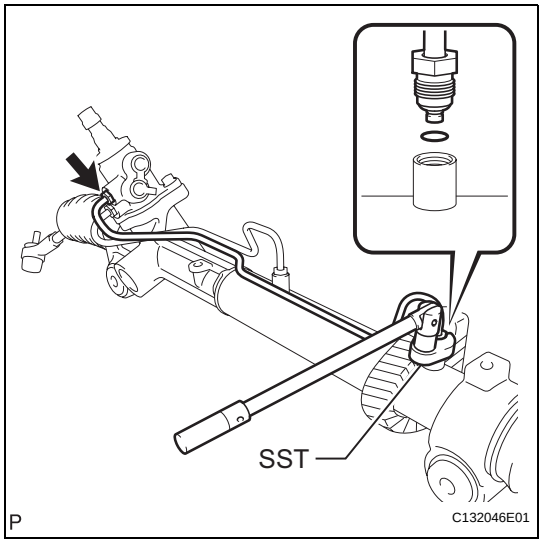
1. SECURE POWER STEERING LINK ASSEMBLY

(a) Using SST, secure the power steering link assembly.

SST 09612-00012

HINT:

Tape the SST before use.



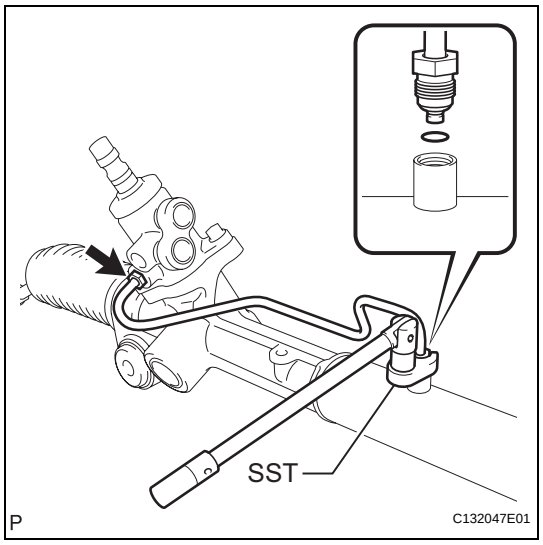
2. REMOVE STEERING LEFT TURN PRESSURE TUBE

(a) Using SST, remove the steering left turn pressure tube.

SST 09023-38201

(b) Remove the 2 O-rings from the steering left turn pressure tube.

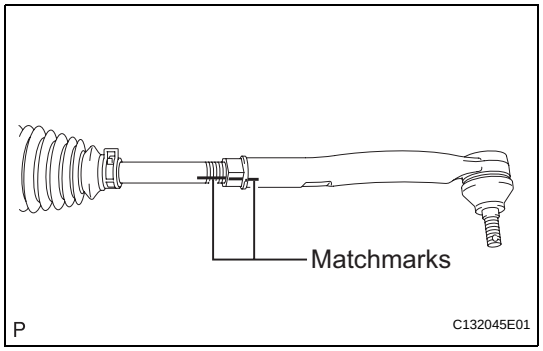
PS



3. REMOVE STEERING RIGHT TURN PRESSURE TUBE

(a) Using SST, remove the steering right turn pressure tube.
SST 09023-38201

(b) Remove the 2 O-rings from the steering right turn pressure tube.



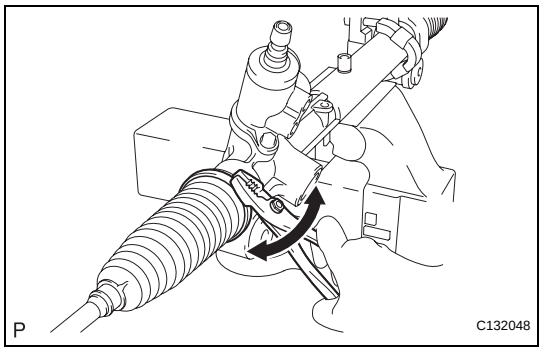
4. REMOVE TIE ROD ASSEMBLY LH

(a) Put matchmarks on the tie rod assembly LH and the steering rack end sub-assembly.

(b) Loosen the lock nut, and remove the tie rod assembly LH and the lock nut.

5. REMOVE TIE ROD ASSEMBLY RH

HINT:
Perform the same procedure as for the LH side.



6. REMOVE STEERING RACK BOOT CLIP

(a) Using pliers, remove the 2 steering rack boot clips.

7. REMOVE NO. 2 STEERING RACK BOOT CLAMP

(a) Using pliers, remove the 2 No. 2 steering rack boot clamps as shown in the illustration.
NOTICE:
Be careful not to damage the No. 2 steering rack boot.

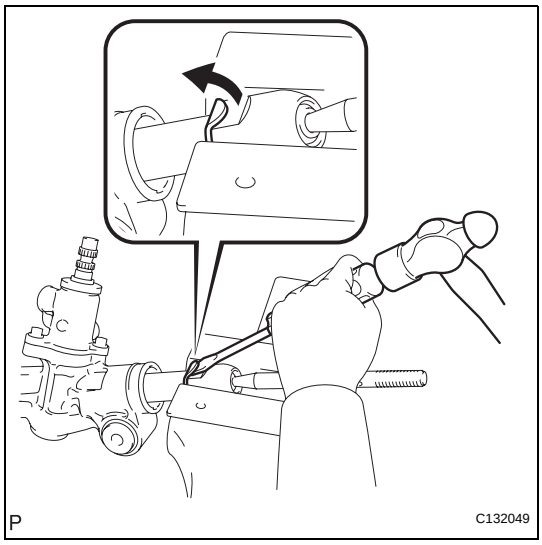
8. REMOVE NO. 2 STEERING RACK BOOT

(a) Remove the No. 2 steering rack boot.

9. REMOVE NO. 1 STEERING RACK BOOT

(a) Remove the No. 1 steering rack boot.

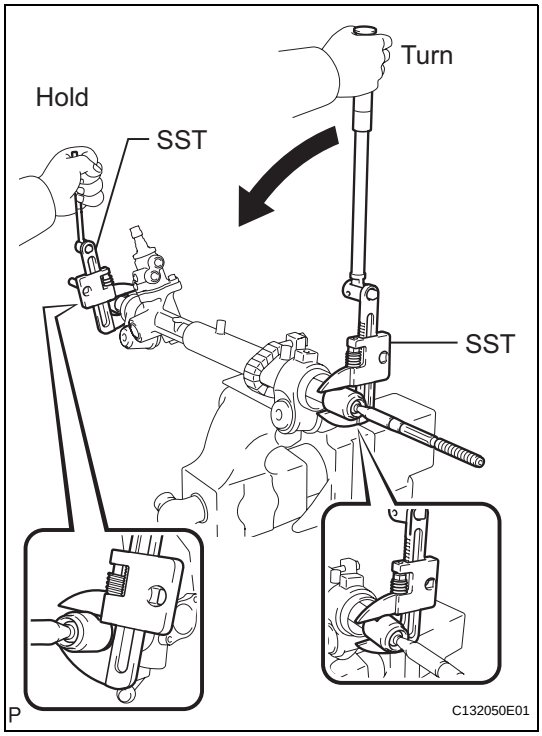
PS



10. REMOVE STEERING RACK END SUB-ASSEMBLY

(a) Using a screwdriver and a hammer, unstake the RH and LH claw washers.

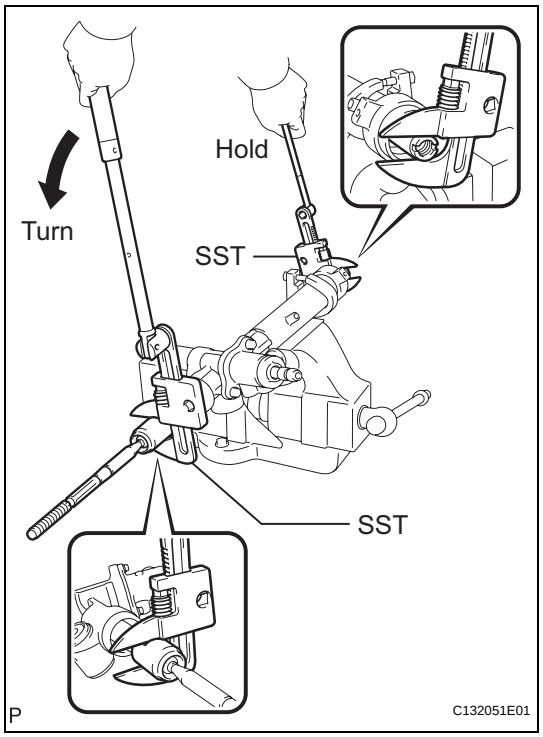
NOTICE:
Avoid any impact to the steering rack.



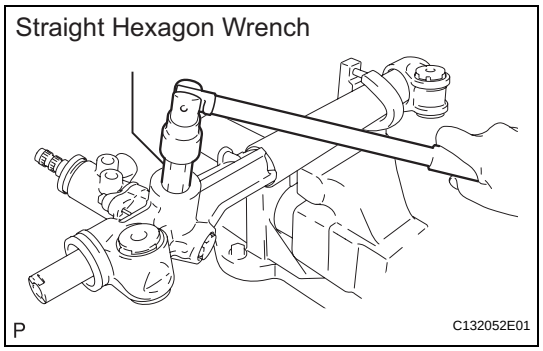
(b) Using SST, remove the steering rack end sub-assembly (RH side) and the claw washer.

SST 09922-10010
NOTICE:
Use SST 09922-10010 as shown in the illustration.

PS

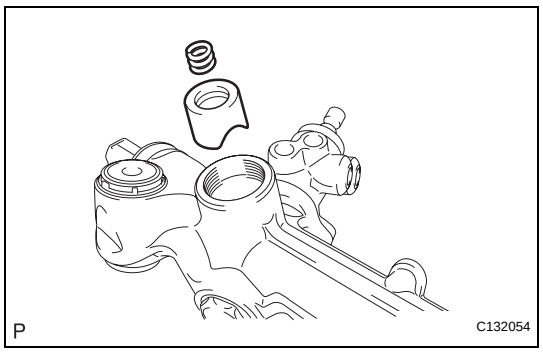


(c) Using SST, remove the steering rack end sub-assembly (LH side) and the claw washer.
SST 09922-10010
NOTICE:
Use SST 09922-10010 as shown in the illustration.
HINT:
Using SST, hold the rack and remove the steering rack end sub-assembly.

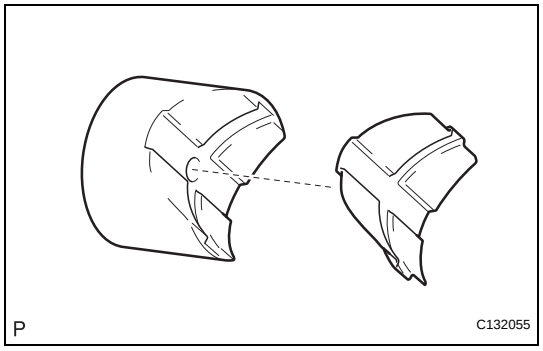


11. REMOVE RACK GUIDE

(a) Using a straight hexagon wrench (24 mm (0.94 in.)), remove the rack guide spring cap.

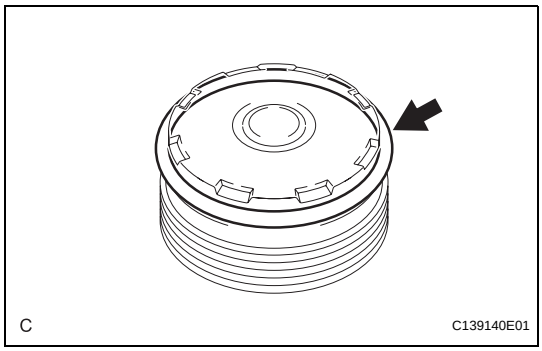


(b) Remove the compression spring and the rack guide sub-assembly.

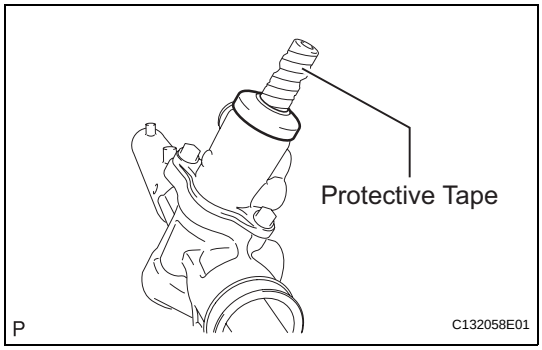


(c) Remove the rack guide base from the rack guide.

PS



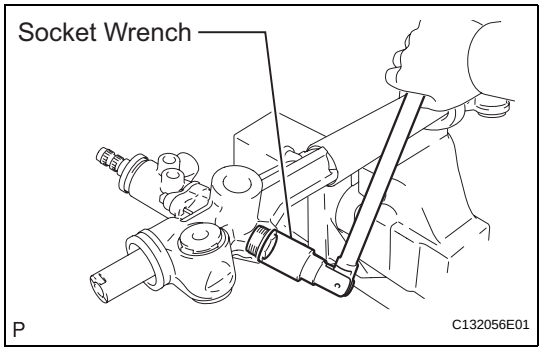
(d) Remove the O-ring from the rack guide spring cap.



12. REMOVE DUST COVER

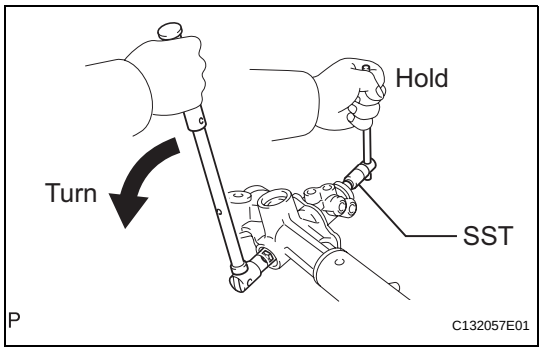
(a) Wrap protective tape around the spline of the control valve in order to prevent damaging the dust cover.

(b) Remove the dust cover.

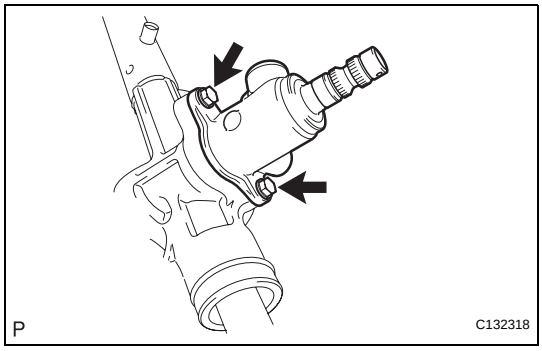


13. REMOVE POWER STEERING CONTROL VALVE ASSEMBLY

(a) Using a socket wrench (27 mm (1.06 in.)), remove the rack housing cap.



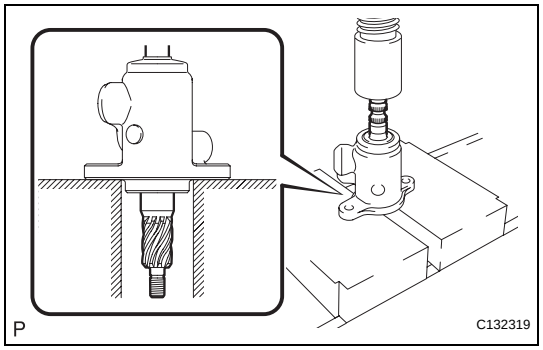
(b) Using SST, hold the control valve shaft and remove the nut.
SST 09616-00011



(c) Remove the 2 bolts and the power steering control valve assembly.

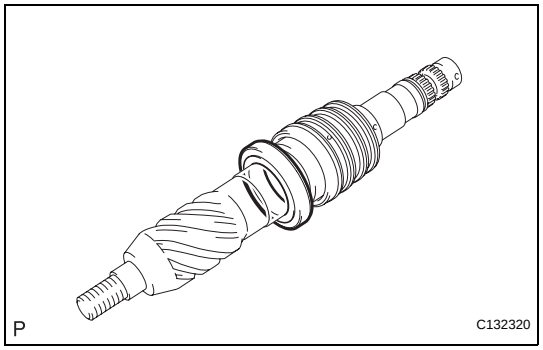
(d) Remove the gasket.

PS



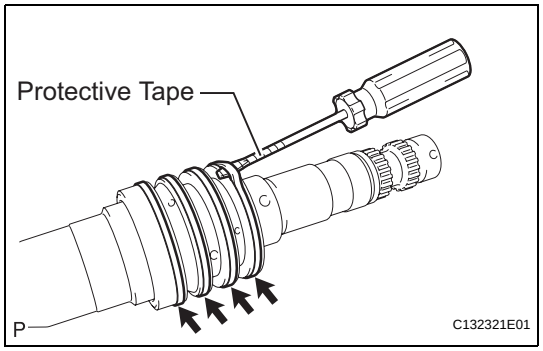
14. REMOVE POWER STEERING CONTROL VALVE SUB-ASSEMBLY

(a) Using a press, remove the power steering control valve sub-assembly.



15. REMOVE POWER STEERING CONTROL VALVE LOWER OIL SEAL

(a) Remove the power steering control valve lower oil seal from the power steering control valve sub-assembly.



16. REMOVE POWER STEERING CONTROL VALVE SPACER

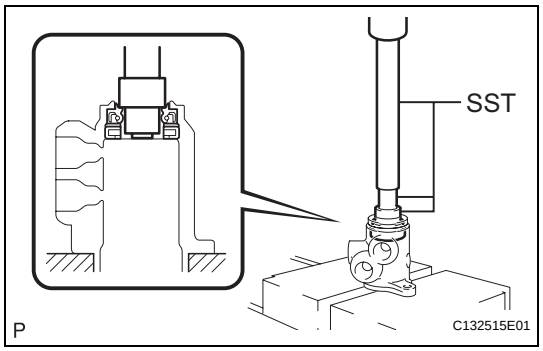
(a) Using a screwdriver, remove the 4 power steering control valve spacers from the power steering control valve sub-assembly.

NOTICE:

Be careful not to damage the spacer grooves on the control valve.

HINT:

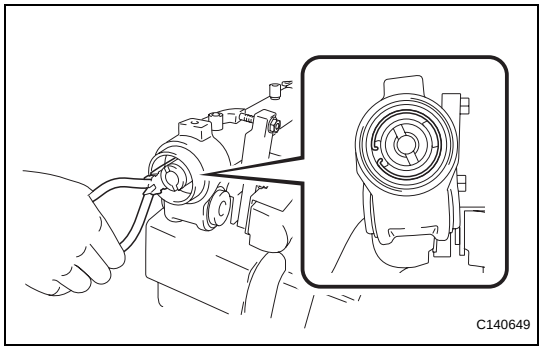
Tape the screwdriver tip before use.



17. REMOVE POWER STEERING CONTROL VALVE UPPER OIL SEAL

(a) Using SST and a press, press out the power steering control valve upper oil seal and the power steering control valve upper bearing from the control valve housing sub-assembly.

SST 09950-70010 (09951-07150), 09950-60010 (09951-00250, 09951-00180, 09952-06010)



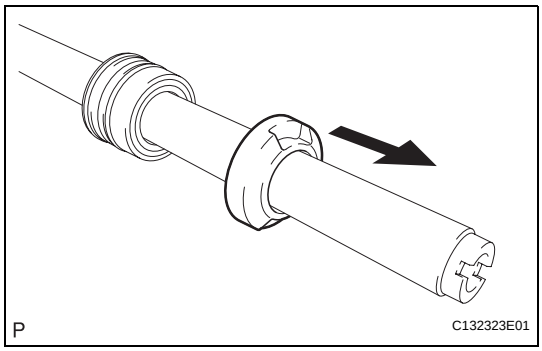
18. REMOVE CYLINDER END STOPPER HOLE SNAP RING

(a) Using needle-nose pliers, remove the cylinder end stopper hole snap ring from the power steering rack housing.

19. REMOVE POWER STEERING RACK SUB-ASSEMBLY

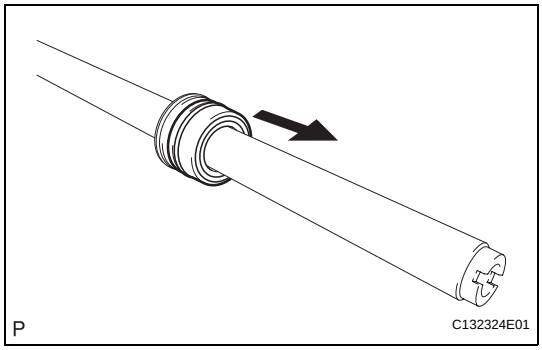
(a) Remove the power steering rack sub-assembly with the cylinder end stopper and power steering rack bushing.

PS



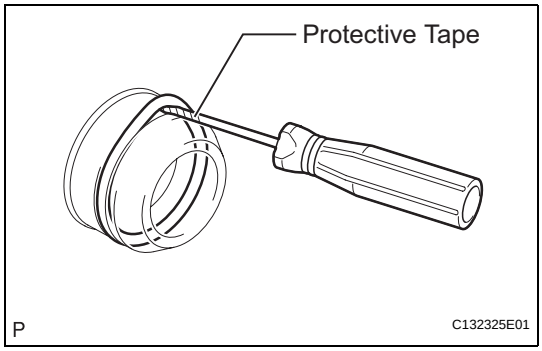
20. REMOVE CYLINDER END STOPPER

(a) Remove the cylinder end stopper from the power steering rack sub-assembly.

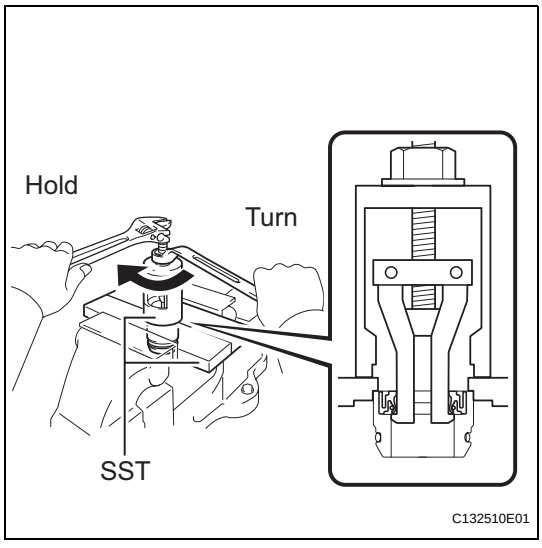


21. REMOVE POWER STEERING RACK BUSHING

(a) Remove the power steering rack bushing from the power steering rack sub-assembly.

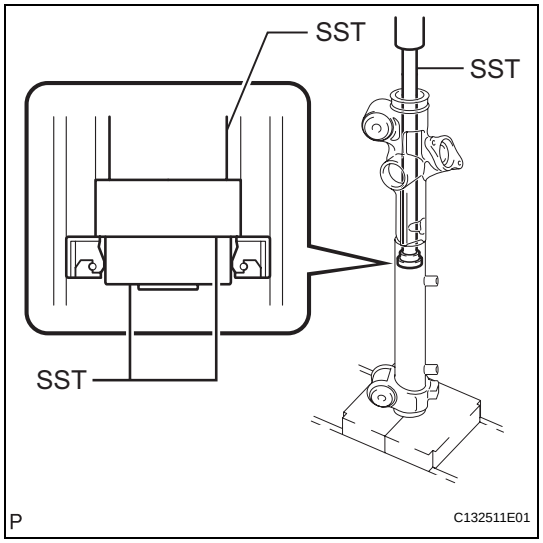


(b) Using a screwdriver, remove the O-ring from the power steering rack bushing.
HINT:
Tape the screwdriver tip before use.



(c) Using SST, remove the rack bushing oil seal from the power steering rack bushing.
SST 09527-21011, 09612-24014 (09613-22011)
NOTICE:
Be careful not to drop the power steering rack bushing.

PS



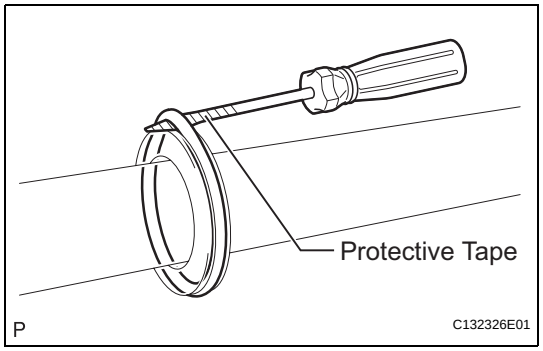
22. REMOVE POWER STEERING CYLINDER TUBE OIL SEAL

(a) Using SST and a press, remove the power steering cylinder tube oil seal.

SST 09950-70010 (09951-07360), 09950-60010 (09951-00290, 09951-00250)

NOTICE:

Be careful not to damage the inside surface of the power steering rack housing.



23. REMOVE POWER PISTON OIL SEAL

(a) Using a screwdriver, remove the power piston oil seal and the O-ring from the power steering rack.

NOTICE:

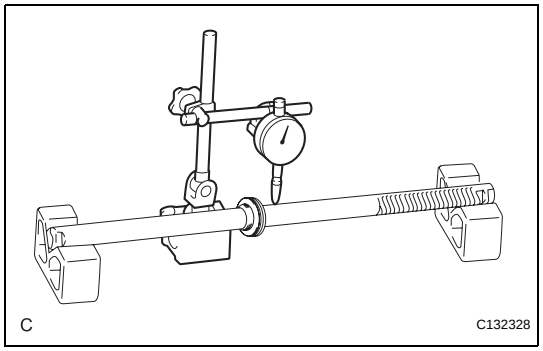
Be careful not to damage the power piston oil seal groove on the power steering rack.

HINT:

Tape the screwdriver tip before use.

PS

INSPECTION



1. INSPECT POWER STEERING RACK

(a) Using a dial indicator, check for runout of the steering rack.

Maximum runout:

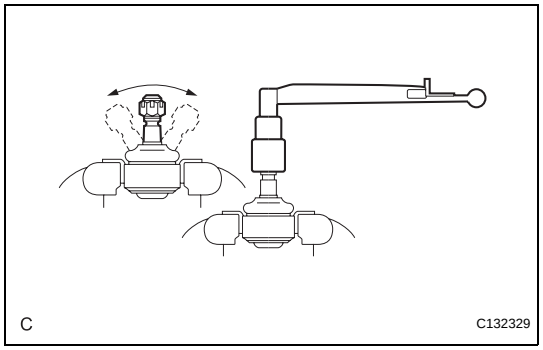
0.3 mm (0.0118 in.)

NOTICE:

Make sure that the steering rack is placed horizontally.

If runout exceeds the maximum, replace the power steering link assembly.

(b) Check the rack surface for wear and damage.



2. INSPECT TIE ROD ASSEMBLY LH

(a) Secure the tie rod assembly LH in a vise.

(b) Install the nut to the stud bolt.

(c) Flip the ball joint back and forth 5 times or more.

(d) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: Turning torque

0.98 to 3.92 N*m (10 to 40 kgf*cm, 8.7 to 34.7 in.*lbf)

If turning torque is not within the specified range, replace the tie rod assembly LH.

3. INSPECT TIE ROD ASSEMBLY RH

HINT:

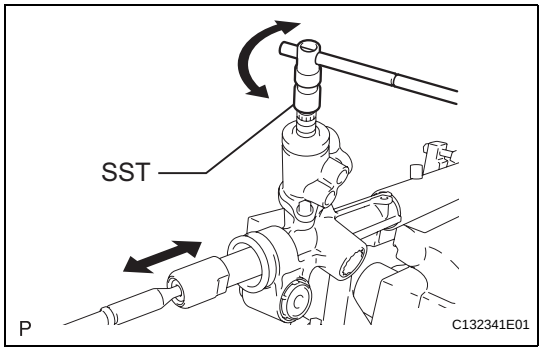
Perform the same procedure as for the LH side.

4. INSPECT TOTAL PRELOAD

(a) Temporarily install the 2 steering rack ends to the power steering rack.

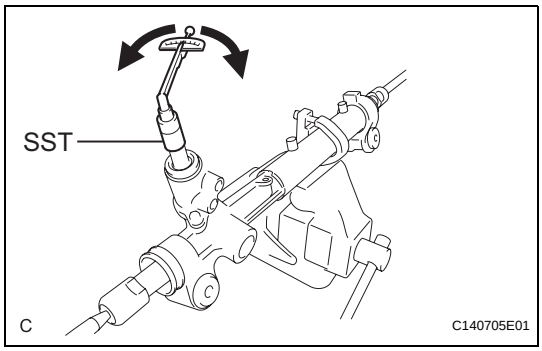
NOTICE:

Do not fully turn the power steering rack without the steering rack ends as it may damage the oil seal in the rack housing.



(b) Using SST, fully turn the power steering rack right and left 10 times to settle it.

SST 09616-00011



(c) Using SST, turn the control valve and measure the preload.

SST 09616-00011

Torque: Standard preload (turning)

1.5 N*m (15.3 kgf*cm, 13.3 in.*lbf) or less

If the preload exceeds the specified value, proceed to INSTALL RACK GUIDE (See page PS-56).

(d) Remove the 2 steering rack ends from the power steering rack.

PS

REASSEMBLY

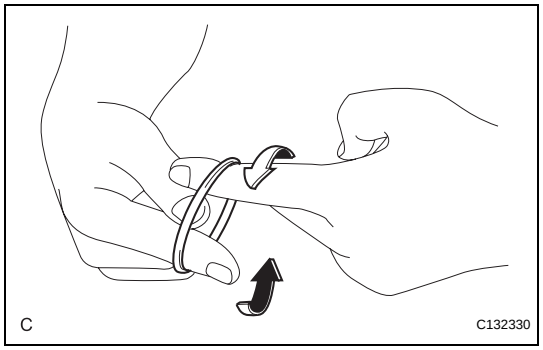
NOTICE:
When installing parts, coat the parts indicated by arrows with power steering fluid, molybdenum disulfide lithium base grease, MP grease or silicon grease (See page PS-36).

1. INSTALL POWER PISTON OIL SEAL

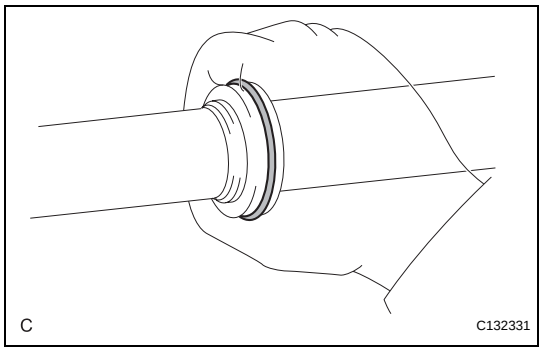
(a) Coat a new O-ring with power steering fluid and install it to the steering rack.

(b) Expand a new power piston oil seal with your fingers.
NOTICE:
Be careful not to expand the oil seal excessively.

(c) Coat the power piston oil seal with power steering fluid.



(d) Install the power piston oil seal to the steering rack, and adjust it with your fingers.



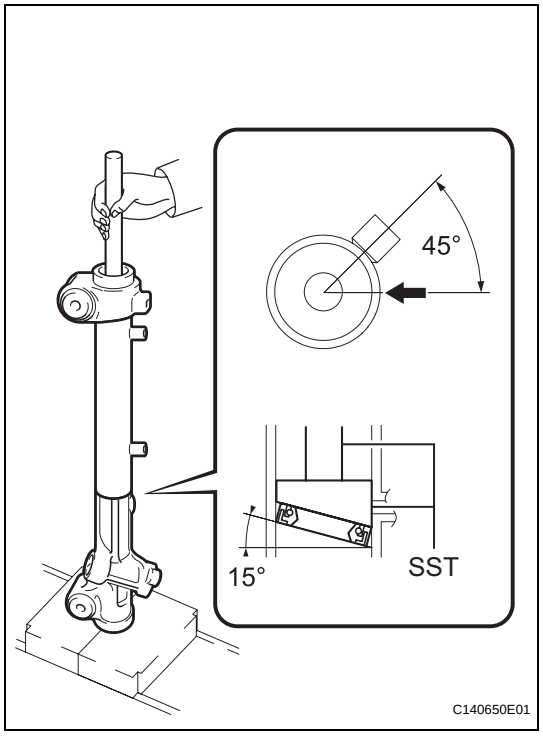
2. INSTALL POWER STEERING CYLINDER TUBE OIL SEAL

(a) Apply power steering fluid to the lip of a new power steering cylinder tube oil seal.

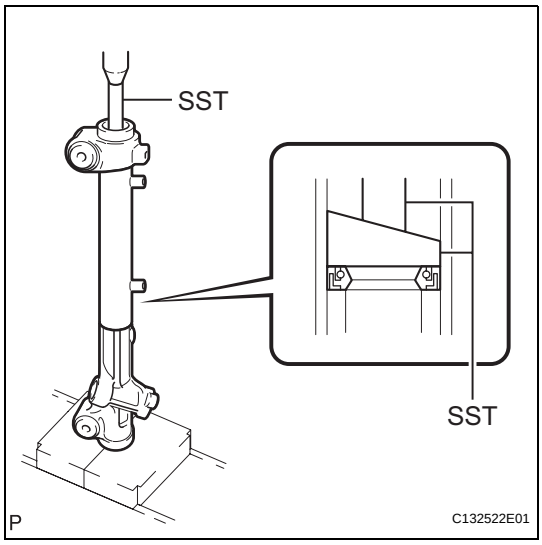
(b) Install the power steering cylinder tube oil seal to the rack housing at a slant.

(c) Using SST, insert the power steering cylinder tube oil seal by pushing the SST in by hand until the oil seal passes the 2 ports.
SST 09950-70010 (09951-07360), 09631-00200
NOTICE:
- **Ensure that the power steering cylinder tube oil seal is installed in the correct direction as shown in the illustration.**
- **Install the power steering cylinder tube oil seal at an angle of approximately 15° so that the lowermost part comes to the point, indicated by the arrow in the illustration, to prevent damage to the side of the oil seal when it passes the 2 ports.**
- **Do not turn the SST when inserting the oil seal.**

(d) Install SST (09631-00200) to SST (09951-07360) upside down.



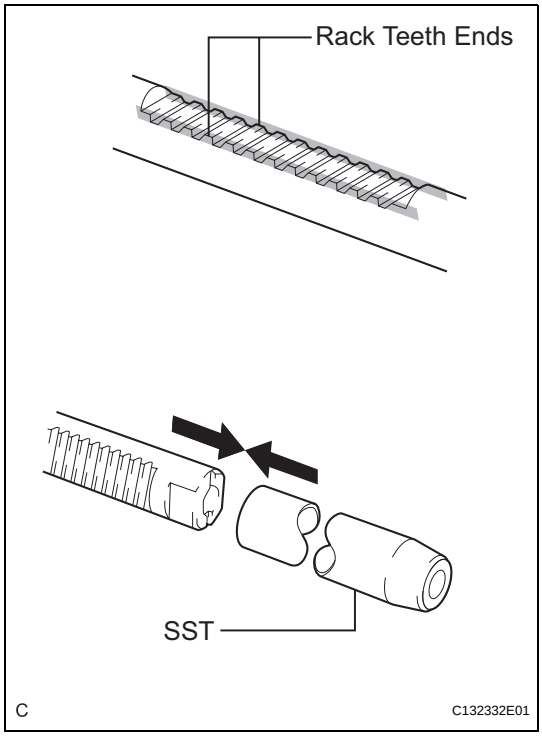
PS



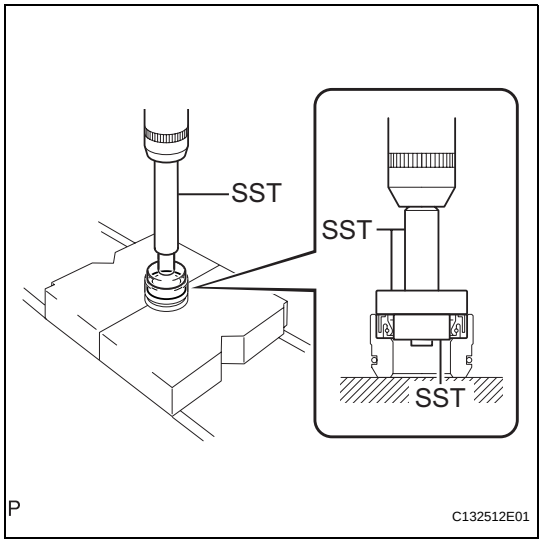
(e) Using SST, level the power steering cylinder tube oil seal by pushing the SST in by hand. Using SST and a press, install the oil seal.
SST 09950-70010 (09951-07360), 09631-00200

3. INSTALL POWER STEERING RACK SUB-ASSEMBLY

(a) Apply molybdenum disulfide lithium base grease to the rack teeth ends.

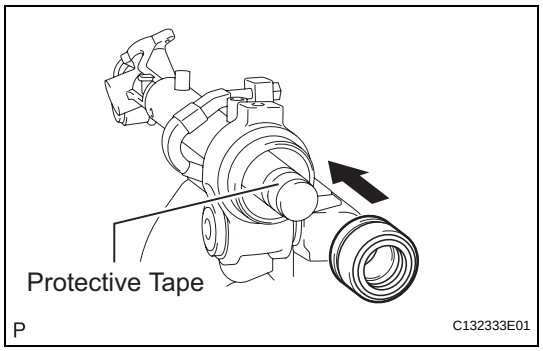


(b) Connect SST to the power steering rack sub-assembly.
SST 09631-33010
(c) Coat SST with power steering fluid.
(d) Install the power steering rack sub-assembly to the power steering rack housing.
(e) Remove SST.

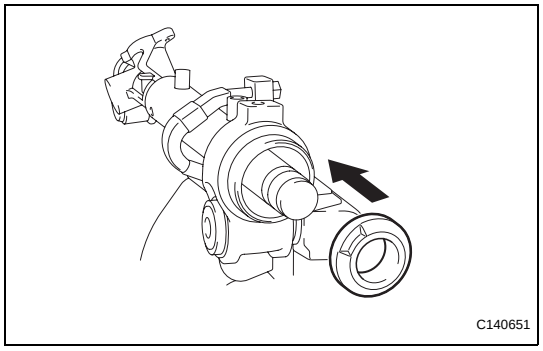


4. INSTALL POWER STEERING RACK BUSHING

(a) Using SST and a press, install the rack bushing oil seal to the power steering rack bushing.
SST 09950-70010 (09951-07100), 09950-60010 (09951-00400, 09951-00250, 09952-06010)
NOTICE:
Ensure that the rack bushing oil seal is installed in the correct direction as shown in the illustration.
(b) Coat a new O-ring with power steering fluid and install it to the rack bushing.
(c) Coat the rack bushing oil seal lip with power steering fluid.

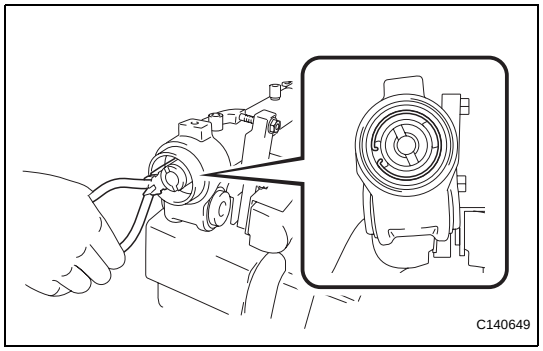


(d) Install the power steering rack bushing to the power steering rack housing.
NOTICE:
Do not damage the rack bushing oil seal.
HINT:
Wrap protective tape around the end of the steering rack in order to prevent damage to the rack bushing oil seal.



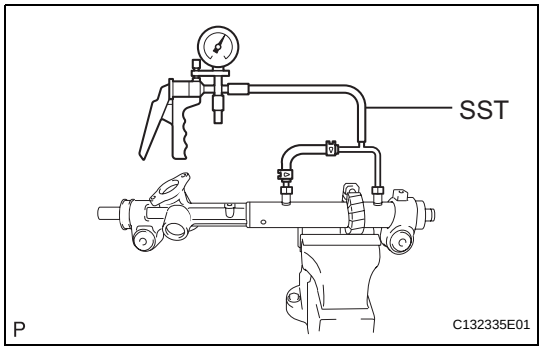
5. INSTALL CYLINDER END STOPPER

(a) Install the cylinder end stopper to the power steering rack housing.



6. INSTALL CYLINDER END STOPPER HOLE SNAP RING

(a) Using needle nose pliers, install the cylinder end stopper hole snap ring to the power steering rack housing.
NOTICE:
- **Make sure that the cylinder end stopper hole snap ring is securely installed in the power steering rack housing groove.**
- **Make sure that the cylinder end stopper hole snap ring claws are aligned with the cylinder end stopper notch.**



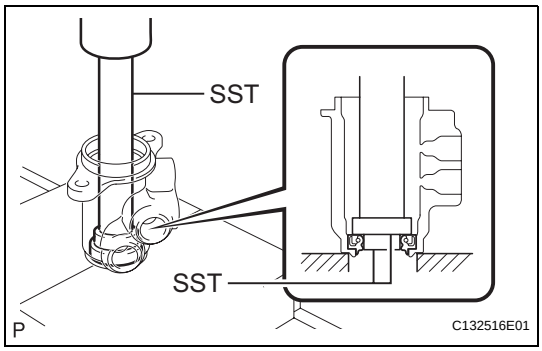
7. AIR TIGHTNESS TEST

(a) Install SST to the power steering rack housing.
SST 09631-12071 (09633-00010)
(b) Apply a vacuum of 53 kPa (398 mmHg, 15.65 in.Hg) for approximately 30 seconds.
(c) Check that there is no change in the vacuum pressure.
If there is a change in the vacuum pressure, check the installation of the oil seals.

8. INSTALL POWER STEERING CONTROL VALVE UPPER OIL SEAL

(a) Coat a new power steering control valve upper oil seal lip with power steering fluid.

PS

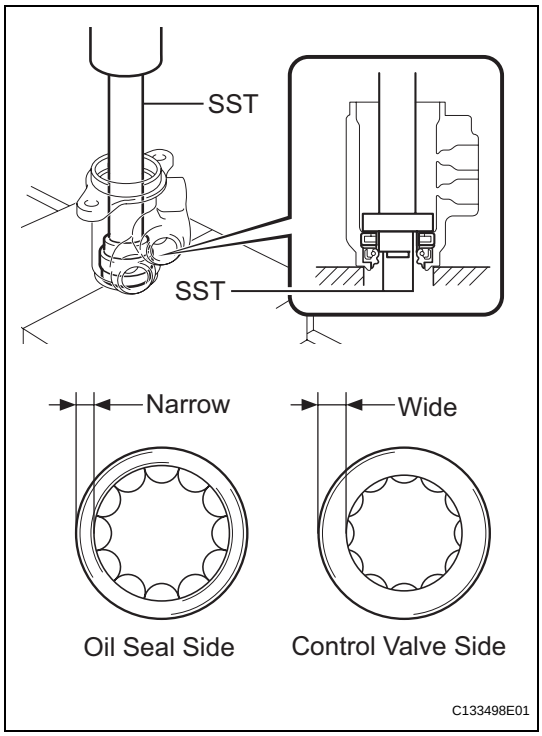


(b) Using SST and a press, press in the power steering control valve upper oil seal.
SST 09950-70010 (09951-07150), 09950-60010 (09951-00180, 09952-06010, 09951-00320)
NOTICE:
Make sure that the power steering control valve upper oil seal is installed in the correct direction as shown in the illustration.

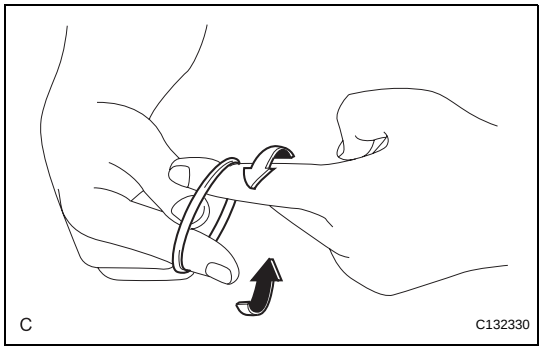
9. INSTALL POWER STEERING CONTROL VALVE UPPER BEARING

(a) Coat the power steering control valve upper bearing with molybdenum disulfide lithium base grease.

(b) Using SST and a press, press in the power steering control valve upper bearing.
SST 09950-70010 (09951-07150), 09950-60010 (09951-00180, 09951-00340)
NOTICE:
Make sure that the power steering control valve upper bearing is installed in the correct direction as shown in the illustration.



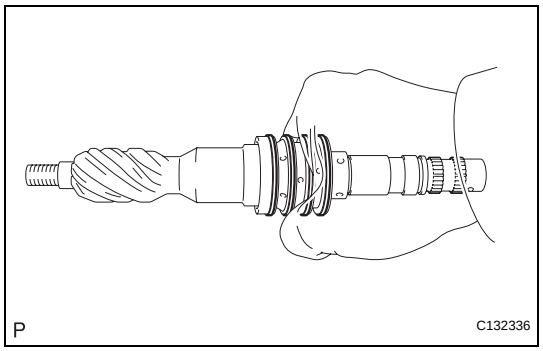
PS



10. INSTALL POWER STEERING CONTROL VALVE SPACER

(a) Expand 4 new power steering control valve spacers with your fingers.
NOTICE:
Be careful not to expand the power steering control valve spacers excessively.

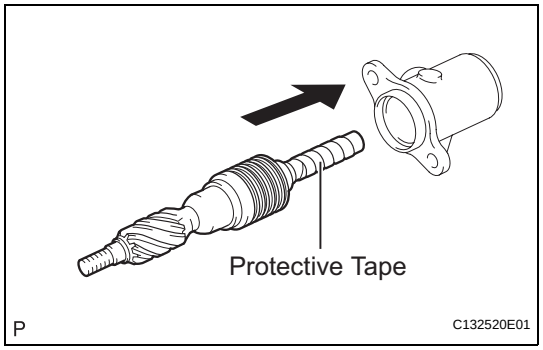
(b) Coat the 4 power steering control valve spacers with power steering fluid.



(c) Install the 4 power steering control valve spacers to the control valve, and adjust them with your fingers.

11. INSTALL POWER STEERING CONTROL VALVE SUB-ASSEMBLY

(a) Coat the power steering control valve sub-assembly with power steering fluid.



(b) Install the power steering control valve sub-assembly into the control valve housing sub-assembly.

NOTICE:

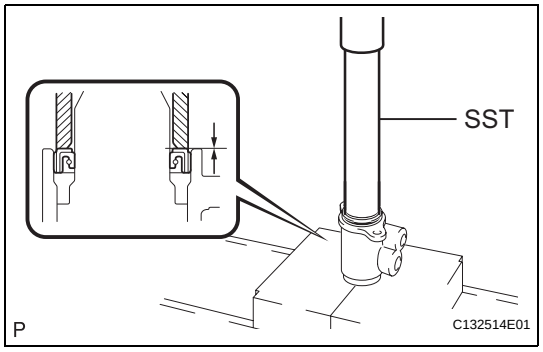
Be careful not to damage the power steering control valve spacers and power steering control valve upper oil seal lip.

HINT:

Wrap protective tape around the spline of the power steering control valve sub-assembly in order to prevent damage to the oil seal.

12. INSTALL POWER STEERING CONTROL VALVE LOWER OIL SEAL

(a) Coat a new power steering control valve lower oil seal lip with power steering fluid.

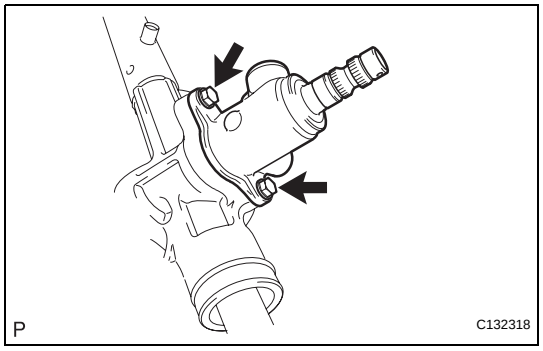


(b) Using SST and a press, install the power steering control valve lower oil seal to the control valve assembly.

SST 09612-22011

NOTICE:

- **Make sure that the power steering control valve lower oil seal is installed in the correct direction as shown in the illustration.**
- **Do not damage the power steering control valve lower oil seal.**

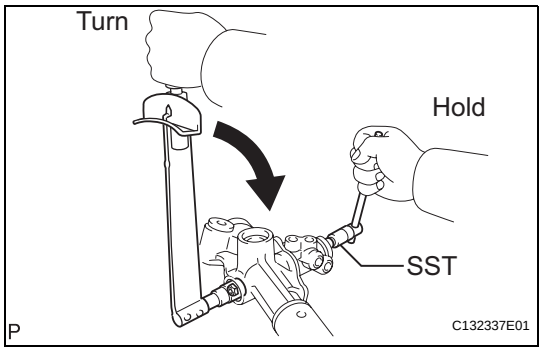


13. INSTALL POWER STEERING CONTROL VALVE ASSEMBLY

(a) Install the power steering control valve assembly and a new gasket to the power steering rack housing with the 2 bolts.

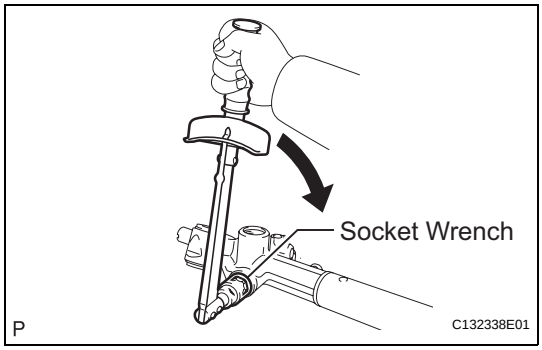
Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

PS

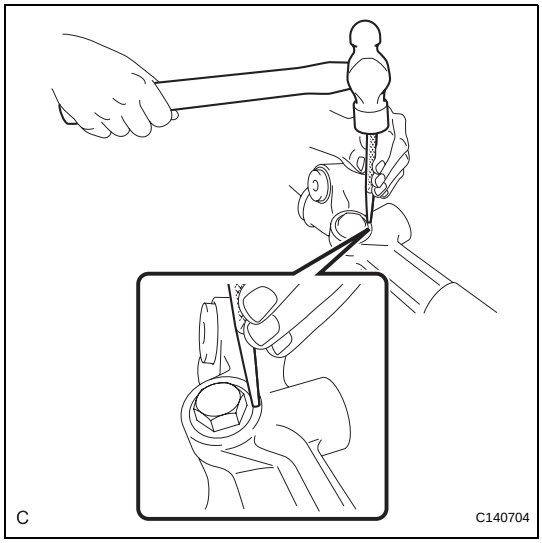


(b) Using SST, hold the control valve shaft and install a new nut.
SST 09616-00011
Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

(c) Apply sealant to 2 or 3 threads of the rack housing cap.
Sealant:
TOYOTA genuine adhesive 1344, THREE BOND 1344 or equivalent

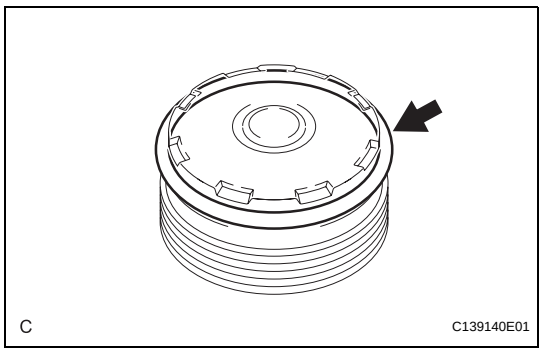


(d) Using a socket wrench (27 mm (1.06 in.)), install the rack housing cap.
Torque: 54 N*m (546 kgf*cm, 40 ft.*lbf)



(e) Using a punch and a hammer, stake the rack housing cap and the power steering rack housing.

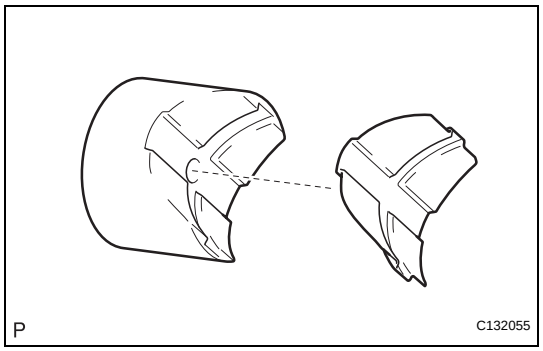
PS



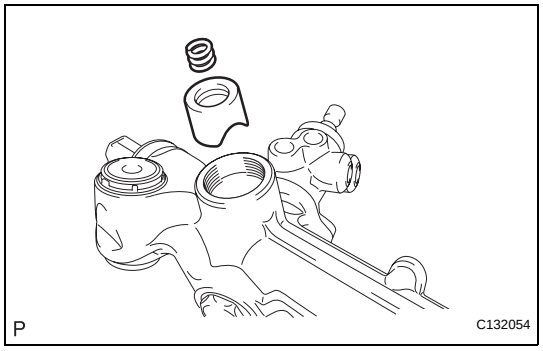
14. INSTALL RACK GUIDE

(a) Coat a new O-ring with molybdenum disulfide lithium base grease and install it to the rack guide spring cap.
NOTICE:
Make sure that no foreign matter, such as aluminum dust, is on the power steering rack housing and rack guide spring cap.

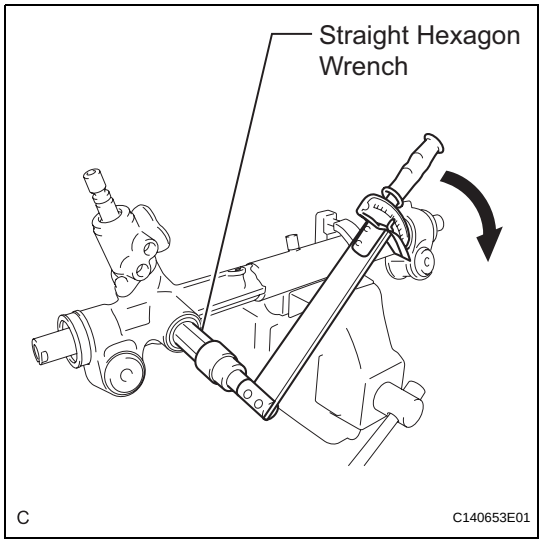
(b) Apply molybdenum disulfide lithium base grease to the rack guide base and rack guide.



(c) Install the rack guide base to the rack guide.
(d) Apply molybdenum disulfide lithium base grease to the compression spring and the contact surface of the rack guide sub-assembly and the power steering rack.

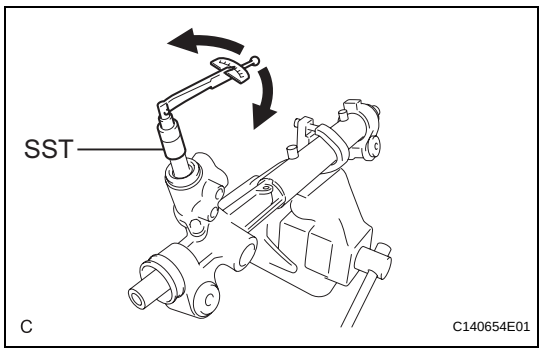


(e) Install the compression spring and rack guide sub-assembly to the power steering rack housing.

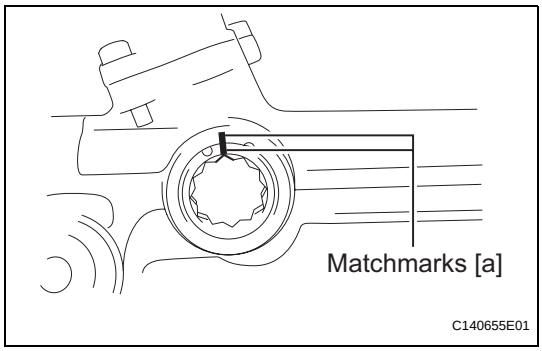


(f) Using a straight hexagon wrench (24 mm (0.94 in.)), install the rack guide spring cap to the power steering rack housing.
Torque: 50 to 70 N*m (514 to 714 kgf*cm, 37 to 52 ft.*lbf)

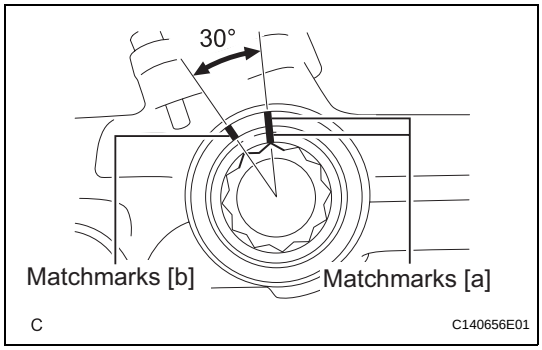
PS



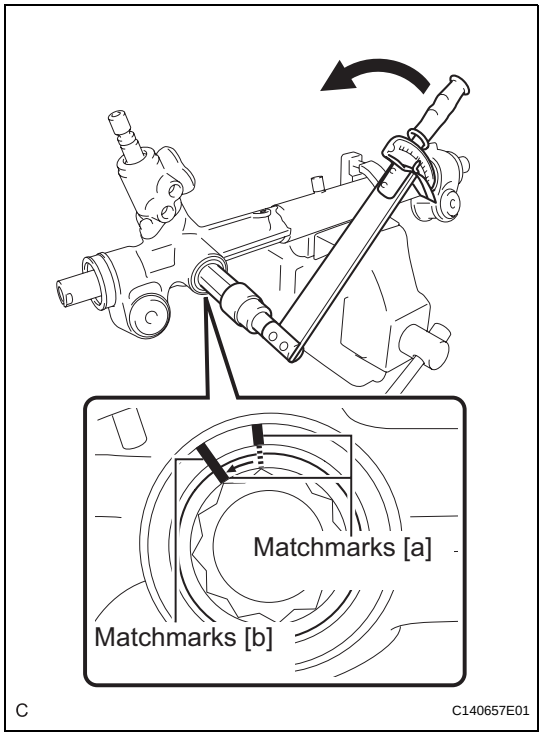
(g) Using SST, turn the control valve and measure the turning torque.
Torque: 6.0 N*m (61 kgf*cm, 54 in.*lbf) or more



(h) Put matchmarks <a> on the power steering rack housing and the rack guide spring cap.

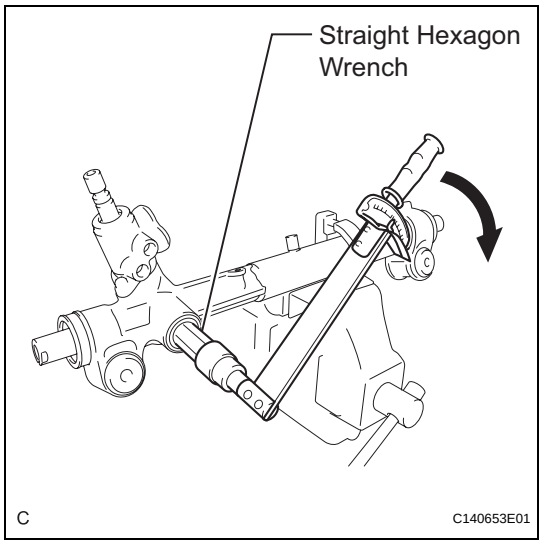


(i) Put matchmarks <b> 30° counterclockwise from matchmarks <a> on the power steering rack housing.



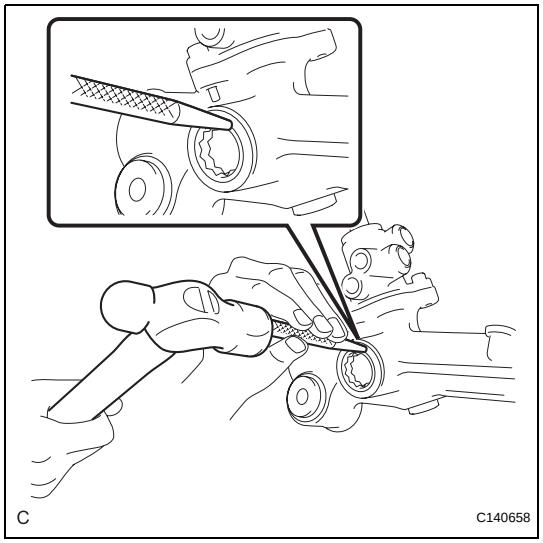
(j) Using a straight hexagon wrench (24 mm (0.94 in.)), loosen the rack guide spring cap until matchmarks <b> and matchmarks <a> on the rack guide spring cap are aligned. Measure the rotating torque required when loosening the rack guide spring cap.
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf) or more

PS

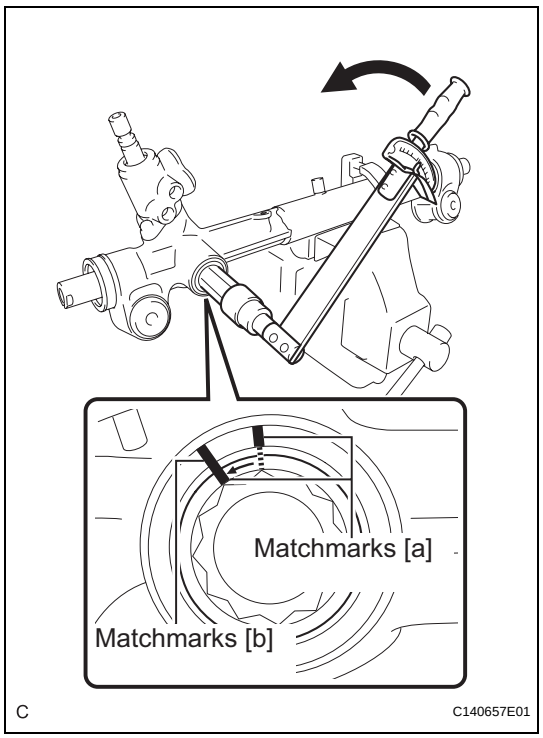


(k) If the rotating torque required when loosening is below the specified value, perform the following procedure to achieve the specified value.

(1) Using a straight hexagon wrench (24 mm (0.94 in.)), re-tighten the rack guide spring cap.
Torque: 50 to 70 N*m (510 to 714 kgf*cm, 37 to 52 ft.*lbf)



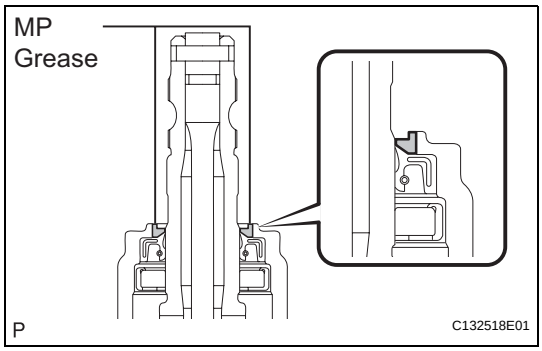
(2) Using a punch and hammer, stake the power steering rack housing and rack guide spring cap at 3 equally spaced positions.
HINT:
Tap the power steering rack housing and rack guide spring cap strongly and repeatedly to stake them securely.



(3) Using a straight hexagon wrench (24 mm (0.94 in.)), loosen the rack guide spring cap until matchmarks <b> and matchmarks <a> on the rack guide spring cap are aligned. Measure the rotating torque required when loosening the rack guide spring cap.
Torque: 10 N*m (102 kgf*cm, 7.4 ft.*lbf) or more

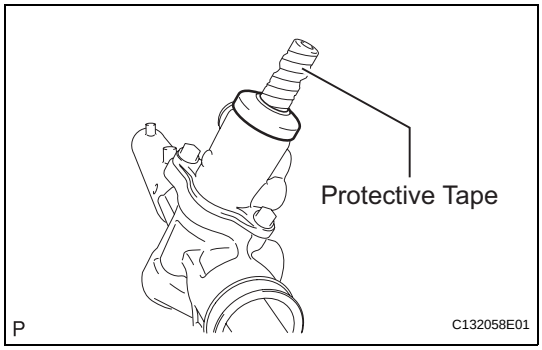
15. INSPECT TOTAL PRELOAD (See page PS-50)

PS



16. INSTALL DUST COVER

(a) Apply MP grease around the control valve shaft as shown in the illustration.

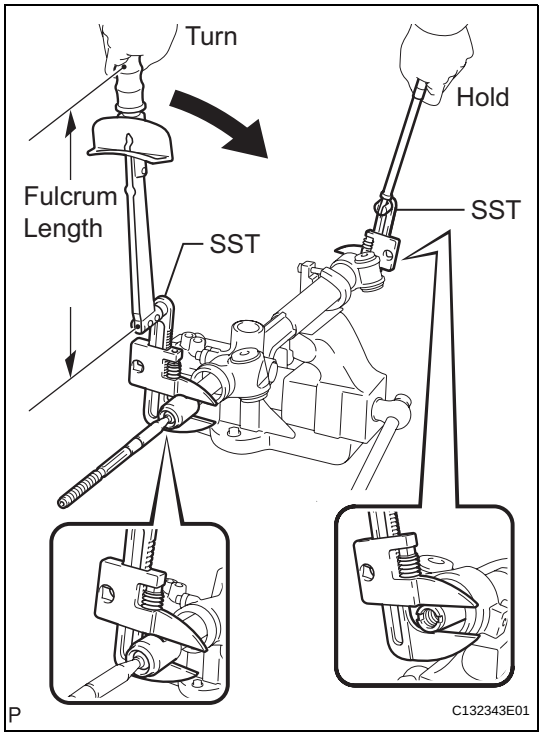


(b) Wrap vinyl tape around the spline of the control valve.

(c) Install the dust cover to the control valve assembly.

17. INSTALL STEERING RACK END SUB-ASSEMBLY

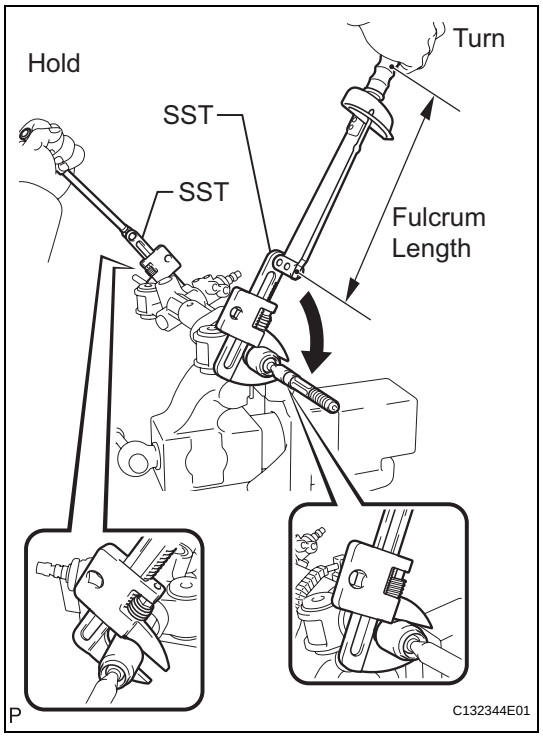
(a) Install 2 new claw washers.
HINT:
Align the claws of the claw washer with the steering rack grooves.



(b) Using SST, install the steering rack end sub-assembly (LH side).
SST 09922-10010
Torque: Without SST
84 N*m (852 kgf*cm, 62 ft.*lbf)
With SST
60 N*m (613 kgf*cm, 44 ft.*lbf)
NOTICE:
- **Use SST 09922-10010 as shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 345 mm (13.58 in.)**
- **This torque value is effective when SST is parallel to the torque wrench.**

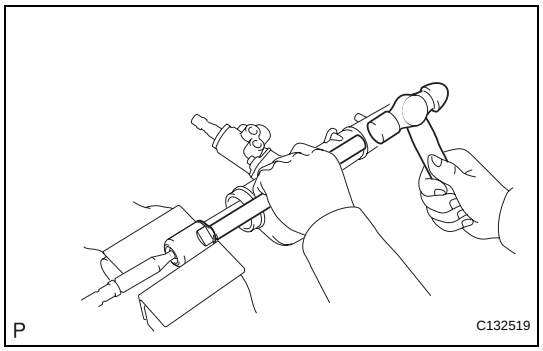
HINT:
Using SST, hold the steering rack and install the steering rack end sub-assembly (LH side).

PS



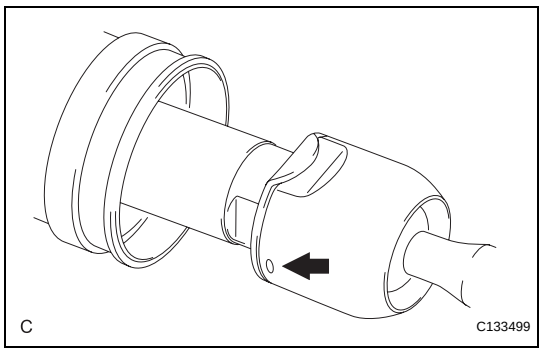
(c) Using SST, install the steering rack end sub-assembly (RH side).
SST 09922-10010
Torque: Without SST
84 N*m (852 kgf*cm, 62 ft.*lbf)
With SST
60 N*m (613 kgf*cm, 44 ft.*lbf)
NOTICE:
- **Use SST 09922-10010 as shown in the illustration.**
- **Use a torque wrench with a fulcrum length of 345 mm (13.58 in.)**
- **This torque value is effective when SST is parallel to the torque wrench.**

HINT:
Using SST, hold the steering rack end sub-assembly (LH side) and install the steering rack end sub-assembly (RH side).

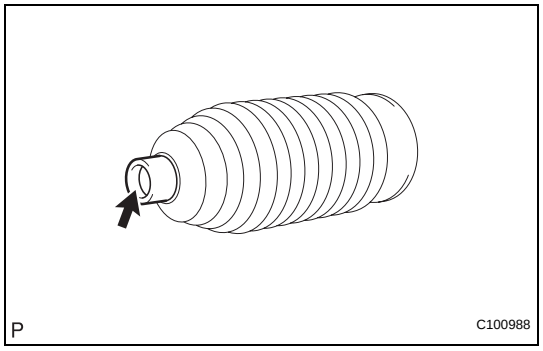


(d) Using a brass bar and a hammer, stake the 2 claw washers.
NOTICE:
Avoid any impact to the steering rack.

PS



(e) Ensure that the holes of the rack ends are not clogged with grease.
HINT:
If the hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.



18. INSTALL NO. 2 STEERING RACK BOOT

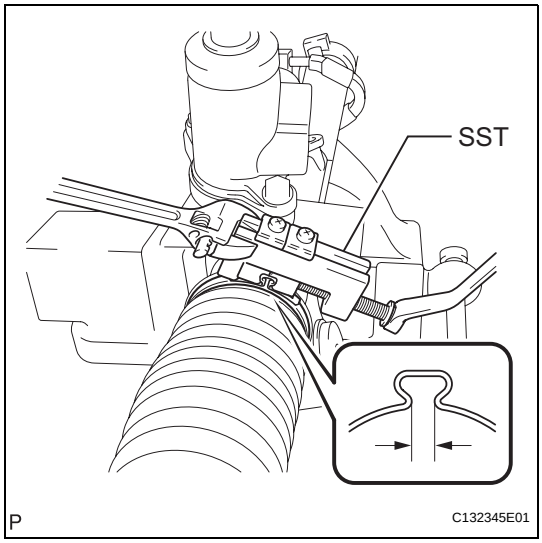
(a) Apply silicon grease to the inside of the small opening of the No. 2 steering rack boot.

(b) Install the No. 2 steering rack boot to the groove on the rack housing.
NOTICE:
Be careful not to damage or twist the No. 2 steering rack boot.

19. INSTALL NO. 1 STEERING RACK BOOT

HINT:

Perform the same procedure as for the No. 2 steering rack boot.



20. INSTALL NO. 2 STEERING RACK BOOT CLAMP

(a) Using SST, tighten the 2 No. 2 steering rack boot clamps as shown in the illustration.

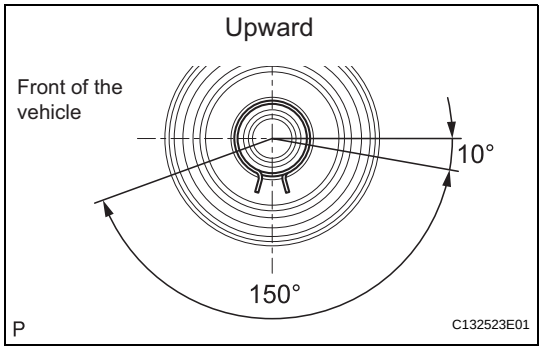
SST 09521-24010

Clearance:

2.0 mm (0.079 in.) or less

NOTICE:

Be careful not to damage the No. 2 steering rack boot.

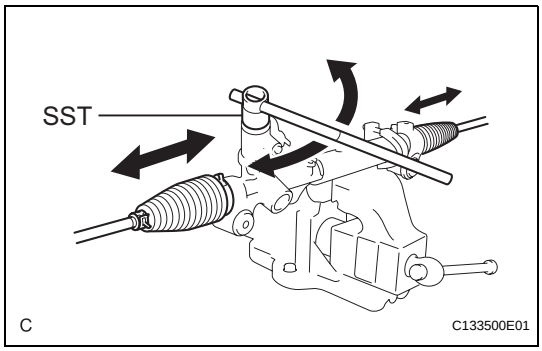


21. INSTALL STEERING RACK BOOT CLIP

(a) Using pliers, install the 2 steering rack boot clips.

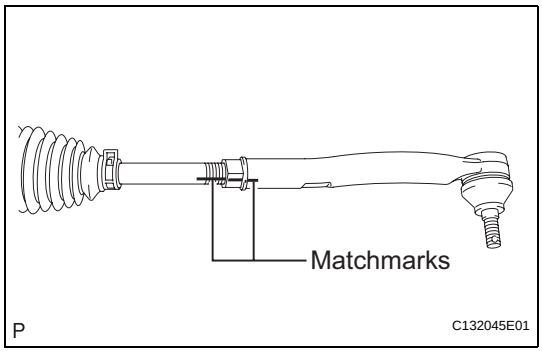
NOTICE:

Make sure that each clip claw is positioned within the area shown in the illustration.



(b) Using SST, turn the pinion and check that the rack boots expand and contract smoothly.

SST 09616-00011



22. INSTALL TIE ROD ASSEMBLY LH

(a) Install the lock nut and the tie rod assembly LH to the steering rack end sub-assembly until the matchmarks are aligned.

HINT:

After adjusting toe-in, torque the lock nut.

23. INSTALL TIE ROD ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

PS

24. INSTALL STEERING RIGHT TURN PRESSURE TUBE

(a) Coat 2 new O-rings with power steering fluid and install them to the steering right turn pressure tube.

(b) Using SST, install the right turn pressure tube to the power steering link assembly.

SST 09023-38201

Torque: Without SST

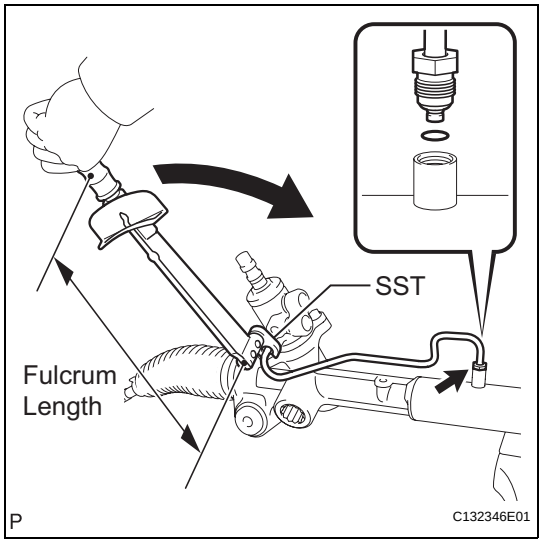
13 N*m (128 kgf*cm, 9 ft.*lbf)

With SST

11 N*m (114 kgf*cm, 8 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**



25. INSTALL STEERING LEFT TURN PRESSURE TUBE

(a) Coat 2 new O-rings with power steering fluid and install them to the steering left turn pressure tube.

(b) Using SST, install the left turn pressure tube to the power steering link assembly.

SST 09023-38201

Torque: Without SST

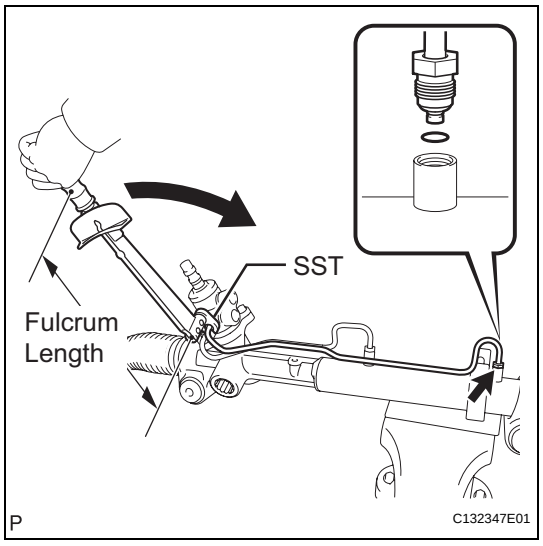
13 N*m (128 kgf*cm, 9 ft.*lbf)

With SST

11 N*m (114 kgf*cm, 8 ft.*lbf)

NOTICE:

- **Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**

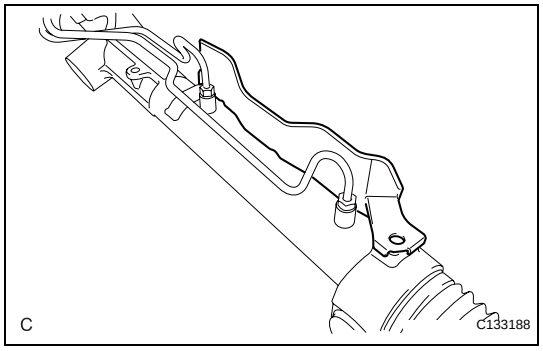


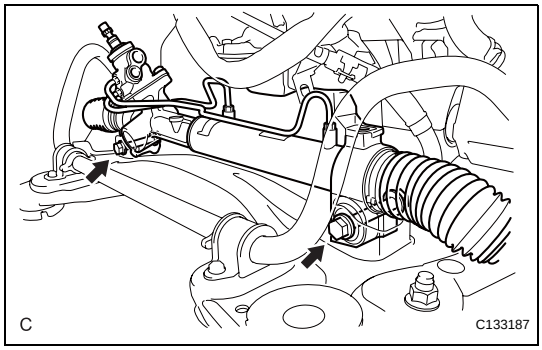
PS

INSTALLATION

1. INSTALL POWER STEERING RACK HOUSING HEAT INSULATOR (for 2GR-FE)

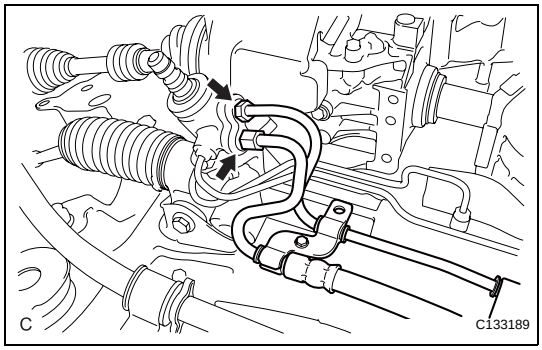
(a) Install the power steering rack housing heat insulator to the power steering link assembly.





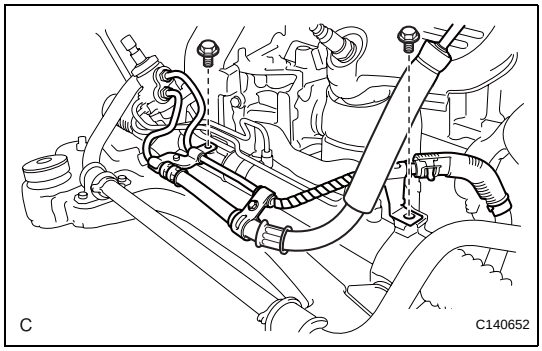
2. INSTALL POWER STEERING LINK ASSEMBLY

(a) Install the power steering link assembly with the 2 bolts and 2 nuts.
Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)



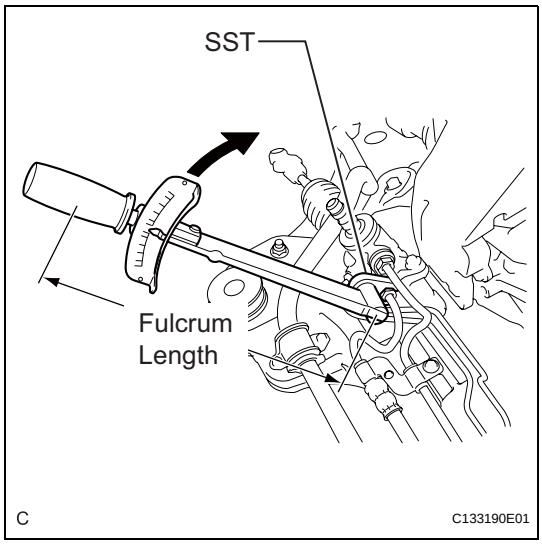
3. CONNECT PRESSURE FEED TUBE ASSEMBLY

(a) Temporarily connect the pressure feed tube assembly to the power steering link assembly.

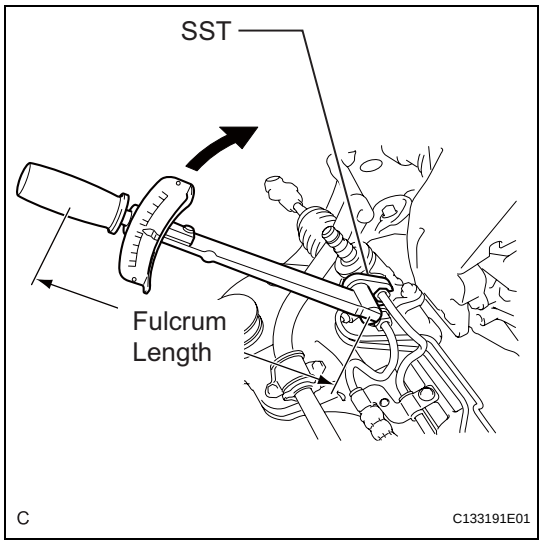


(b) Install the pressure feed tube assembly clamp with the 2 bolts.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

PS



(c) Using SST, tighten the pressure feed tube assembly (pressure feed tube side).
SST 09023-12701
Torque: Without SST
25 N*m (250 kgf*cm, 18 ft.*lbf)
With SST
22 N*m (227 kgf*cm, 16 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to the torque wrench.**

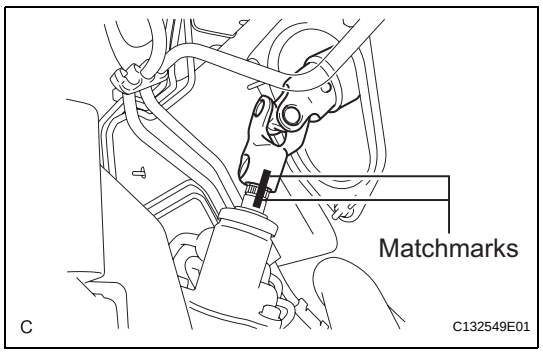


(d) Using SST, tighten the pressure feed tube assembly (return tube side).
SST 09023-12701
Torque: Without SST
25 N*m (250 kgf*cm, 18 ft.*lbf)
With SST
22 N*m (227 kgf*cm, 16 ft.*lbf)
NOTICE:
- **Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).**
- **This torque value is effective when SST is parallel to a torque wrench.**

4. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE
HINT:
Refer to the instructions for installation of the engine assembly (See page EM-107 for 2AZ-FE, EM-37 for 2GR-FE).

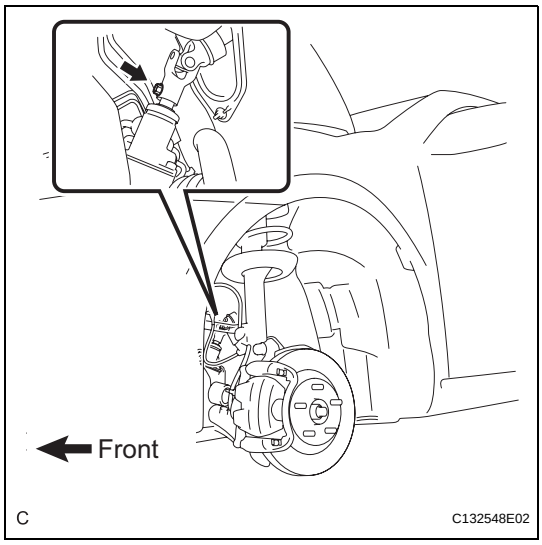
5. CONNECT TIE ROD ASSEMBLY LH
(a) Connect the tie rod assembly LH to the steering knuckle with the nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
(b) Install a new cotter pin.
NOTICE:
Further tighten the nut up to 60° if the holes for the cotter pin are not aligned.

6. CONNECT TIE ROD ASSEMBLY RH
HINT:
Perform the same procedure on the other side.



7. CONNECT STEERING SLIDING YOKE
(a) Align the matchmarks on the steering sliding yoke and the steering link assembly.

PS



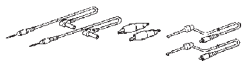
(b) Install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)

8. **INSTALL FRONT WHEELS**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
9. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
10. **BLEED POWER STEERING FLUID (See page PS-7)**
11. **CHECK POWER STEERING FLUID LEVEL (See page PS-3)**
12. **CHECK FOR POWER STEERING FLUID LEAKAGE**
13. **CHECK FOR EXHAUST GAS LEAKS**
14. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
15. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
HINT:
(See page SP-4)

PS

2AZ-FE ENGINE CONTROL SYSTEM

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

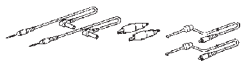
EQUIPMENT

Ohmmeter	
Radiator cap tester	
Service Wire Harness	
Torque wrench	

2GR-FE ENGINE CONTROL SYSTEM

RECOMMENDED TOOLS

PP

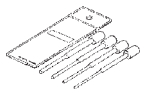
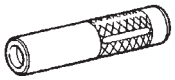
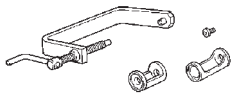
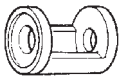
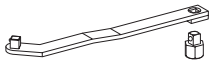
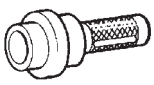
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Ohmmeter	
Radiator cap tester	
Service Wire Harness	
Torque wrench	

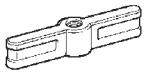
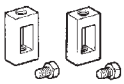
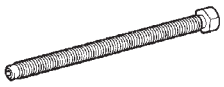
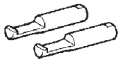
2AZ-FE ENGINE MECHANICAL

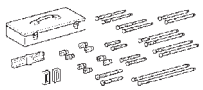
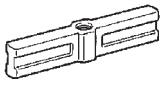
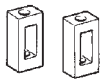
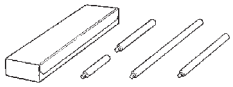
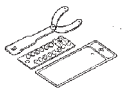
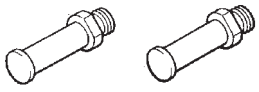
SST

	09032-00100	Oil Pan Seal Cutter	
	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01050)	Valve Guide Bushing Remover & Replacer 5	
	09201-41020	Valve Stem Oil Seal Replacer	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09213-54015	Crankshaft Pulley Holding Tool	
	(91651-60855)	Bolt	
	09216-42010	Belt Tension Wrench Set	
	09223-15030	Oil Seal & Bearing Replacer	
	09223-22010	Crankshaft Front Oil Seal Replacer	

PP

PP

	09228-06501	Oil Filter Wrench	
	09309-37010	Transmission Bearing Replacer	
	09330-00021	Companion Flange Holding Tool	
	09817-33190	Sensor Socket Wrench	
	09843-18030	Tacho-pulse Pickup Wire No.2	
	09843-18040	Diagnosis Check Wire No.2	
	09950-40011	Puller B Set	
	(09951-04010)	Hanger 150	
	(09952-04010)	Slide Arm	
	(09953-04030)	Center Bolt 200	
	(09954-04010)	Arm 25	
	(09955-04041)	Claw No.4	

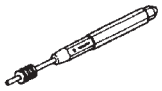
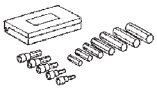
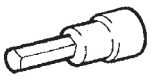
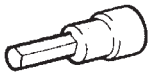
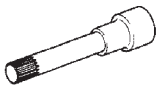
	(09957-04010)	Attachment	
	(91111-51014)	Bolt	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05021)	Claw No.2	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assembly	
	(09963-01000)	Pin 10	

PP

SSM

Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent
Toyota Genuine Seal Packing 1282B, Three Bond 1282B or Equivalent
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09031-00040	Pin Punch	
	09040-00011	Hexagon Wrench Set	
	(09043-20060)	Socket Hexagon Wrench 6	
	(09043-20100)	Socket Hexagon Wrench 10	
	09043-50100	Bi-hexagon Wrench 10 mm	
	09090-04020	Engine Sling Device	
	09200-00010	Engine Adjust Kit	

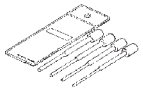
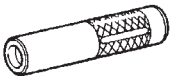
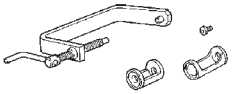
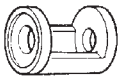
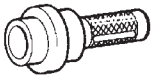
EQUIPMENT

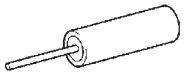
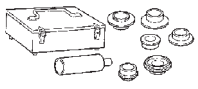
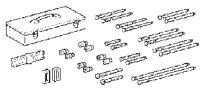
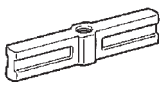
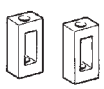
Abrasive compound	Valve
Brush	Piston
Caliper gauge	
Carbide cutter	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Groove cleaning tool	Piston ring groove
Heater	
Hexagon wrench (1.5 mm)	Timing belt tensioner
Micrometer	
Pin hole grinder	Connecting rod bushing
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Reamer	Cylinder
Ridge reamer	Cylinder
Soft brush	Cylinder head Cylinder block
Solvent	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Torx socket wrench	
Valve seat cutter	
Valve guide bushing brush	
V-block	
Vernier calipers	
Wire brush	Valve Cylinder head

HINT:
Torx is registered trademark of Textron Inc.

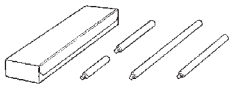
2GR-FE ENGINE MECHANICAL

SST

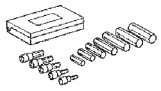
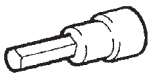
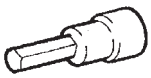
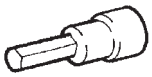
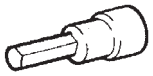
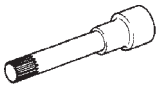
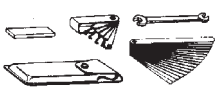
	09032-00100	Oil Pan Seal Cutter	
	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01050)	Valve Guide Bushing Remover & Replacer 5	
	09201-41020	Valve Stem Oil Seal Replacer	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09213-70011	Crankshaft Pully Holding Tool	
	(09213-70020)	Bolt	
	09223-15030	Oil Seal & Bearing Replacer	
	09223-22010	Crankshaft Front Oil Seal Replacer	
	09228-06501	Oil Filter Wrench	

	09249-63010	Torque Wrench Adaptor	
	09276-75010	Valve Lifter Tool	
	09316-60011	Transmission & Transfer Bearing Replacer	
	(09316-00011)	Replacer Pipe	
	09330-00021	Companion Flange Holding Tool	
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	
	09843-18030	Tacho-pulse Pickup Wire No.2	
	09843-18040	Diagnosis Check Wire No.2	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	

PP

	(09954-05021)	Claw No.2	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	
	(09951-07150)	Handle 150	

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09040-00011	Hexagon Wrench Set	
	(09043-20050)	Socket Hexagon Wrench 5	
	(09043-20060)	Socket Hexagon Wrench 6	
	(09043-20080)	Socket Hexagon Wrench 8	
	(09043-20100)	Socket Hexagon Wrench 10	
	(09043-30140)	Straight Hexagon Wrench 14	
	09043-30190	Straight Hexagon Wrench 19	
	09043-50100	Bi-hexagon Wrench 10 mm	
	09090-04020	Engine Sling Device	
	09200-00010	Engine Adjust Kit	

PP

	(09857-00031)	Spark Plug Gap Gauge	

EQUIPMENT

Abrasive compound	
Brush	
Caliper gauge	
Carbide cutter (30°)	
Carbide cutter (45°)	
Carbide cutter (60°)	
Carbide cutter (75°)	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Groove cleaning tool	
Heater	
Micrometer	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Reamer (5.5 mm)	
Ridge reamer	
Soft brush	
Solvent	
Spring tester	
Steel square	
Thermometer	
Torque wrench	
Torx socket wrench	
Valve seat cutter	
Valve guide bushing brush	
V-block	
Vernier calipers	
Wire brush	
Bar	
Chain Block	
CO/HC meter	
Compression gauge	
Dial indicator with magnetic base	
Engine Sling Device	
Feeler gauge	
Radiator cap tester	
Slide calipers	
Tachometer	
Timing light	
Wooden block	
Deep socket wrench 24 mm	

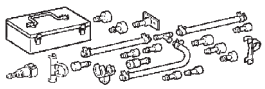
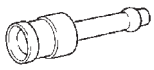
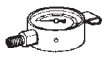
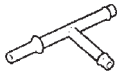
HINT:
Torx is registered trademark of Textron Inc.

SSM

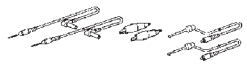
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent
Toyota Genuine Seal Packing 1282B, Three Bond 1282B or Equivalent
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent

2AZ-FE FUEL

SST

	09268-31011	Injection Measuring Tool Set	
	(09268-41110)	Adaptor	
	(09268-41300)	Clamp	
	(09268-41500)	Fuel Tube Connector	
	(90467-13001)	Clip	
	(95336-08070)	Hose	
	09268-45014	EFI Fuel Pressure Gauge	
	(09268-41200)	Gauge	
	(09268-41220)	Hose	
	(09268-41250)	T Joint	
	09842-30080	Wire H EFI Inspection	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

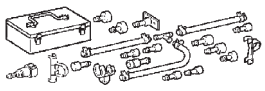
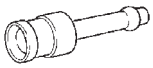
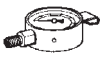
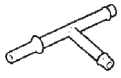
Measuring Flask	
Ohmmeter	
Service Wire Harness	
Stopwatch	
Torque wrench	
Vernier calipers	

SSM

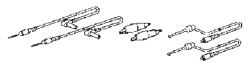
	08850-00065	Butyl Tape Set	

2GR-FE FUEL

SST

	09268-31011	Injection Measuring Tool Set	
	(09268-41500)	Fuel Tube Connector	
	(90467-13001)	Clip	
	(95336-08070)	Hose	
	09268-41140	Adapter	
	09268-41400	Clamp	
	09268-45014	EFI Fuel Pressure Gauge	
	(09268-41200)	Gauge	
	(09268-41220)	Hose	
	(09268-41250)	T Joint	
	09842-30080	Wire H EFI Inspection	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Measuring Flask	
Ohmmeter	
Service Wire Harness	
Stopwatch	
Torque wrench	
Vernier calipers	

SSM

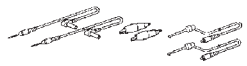
	08850-00065	Butyl Tape Set	

2AZ-FE EMISSION CONTROL

SST

	09224-00010	O2 Sensor Wrench	

RECOMMENDED TOOLS

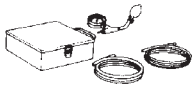
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

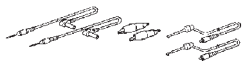
Intelligent vacuum pump	
Ohmmeter	
Service Wire Harness	
Torque wrench	
Vacuum gauge	

2GR-FE EMISSION CONTROL

SST

	09224-00010	O2 Sensor Wrench	
	09992-00242	Turbocharger Pressure Gauge	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Intelligent vacuum pump	
Ohmmeter	
Service Wire Harness	
Torque wrench	
Vacuum gauge	

2AZ-FE INTAKE

EQUIPMENT

Intelligent tester	
Ohmmeter	
Intelligent vacuum pump	

2GR-FE INTAKE

EQUIPMENT

Intelligent tester	
Ohmmeter	
Intelligent vacuum pump	

2AZ-FE EXHAUST

EQUIPMENT

Torque wrench	

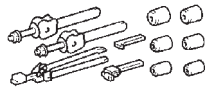
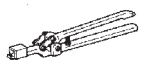
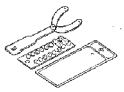
2GR-FE EXHAUST

EQUIPMENT

Torque wrench	

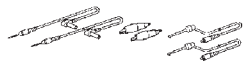
2AZ-FE COOLING

SST

	09230-01010	Radiator Service Tool Set	
	(09231-01010)	Overhaul Handle	
	(09231-01030)	Claw	
	09231-14010	Punch	
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assembly	
	(09963-00700)	Pin 7	

PP

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Ohmmeter	
Radiator cap tester	
Thermometer	
Torque wrench	
Vernier calipers	

COOLANT

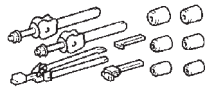
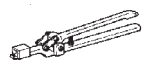
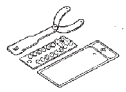
Capacity	Classification
6.2 liters (6.6 US qts, 5.5 Imp. qts)	Use only "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

SSM

Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent	

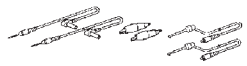
2GR-FE COOLING

SST

	09230-01010	Radiator Service Tool Set	
	(09231-01010)	Overhaul Handle	
	(09231-01030)	Claw	
	09231-14010	Punch	
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assembly	
	(09963-00700)	Pin 7	

PP

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Ohmmeter	
Radiator cap tester	
Thermometer	
Torque wrench	
Vernier calipers	

COOLANT

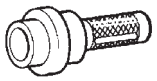
Capacity	Classification
9.0 liters (9.5 US qts, 7.9 Imp. qts)	Use only "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

SSM

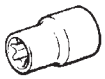
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent	

2AZ-FE LUBRICATION

SST

	09223-22010	Crankshaft Front Oil Seal Replacer	
	09228-06501	Oil Filter Wrench	

RECOMMENDED TOOLS

	09044-00020	Torx Socket E10	
	09200-00010	Engine Adjust Kit	

HINT:
Torx is registered trademark of Textron Inc.

EQUIPMENT

Precision straight edge	
Torque wrench	
Vernier calipers	
Deep socket wrench (24 mm)	
Socket wrench (27 mm)	
Oil pressure gauge	

LUBRICANT

Item	Condition	Capacity	Classification
Oil grade	-	-	Use ILSAC multigrade engine oil. SAE 5W-20 and SAE 0W-20 engine oil may be used. However, SAE0W-20 is the best choice for good fuel economy and good starting in cold weather.
Drain and refill	with oil filter change	4.3 liters (4.5 US qts, 3.8 Imp. qts)	-
	without oil filter change	4.1 liters (4.3 US qts, 3.6 Imp. qts)	-
Dry fill	Dry fill	5.0 liters (5.3 US qts, 4.4 Imp. qts)	-

EQUIPMENT

Precision straight edge	
Torque wrench	
Vernier calipers	
Deep socket wrench (24 mm)	
Socket wrench (27 mm)	
Oil pressure gauge	

LUBRICANT

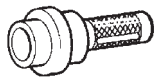
Item	Condition	Capacity	Classification
Oil grade	-	-	Use ILSAC multigrade engine oil. SAE 5W-20 and SAE 0W-20 engine oil may be used. However, SAE0W-20 is the best choice for good fuel economy and good starting in cold weather.
Drain and refill	with oil filter change	4.3 liters (4.5 US qts, 3.8 Imp. qts)	-
	without oil filter change	4.1 liters (4.3 US qts, 3.6 Imp. qts)	-
Dry fill	Dry fill	5.0 liters (5.3 US qts, 4.4 Imp. qts)	-

SSM

Toyota Genuine Adhesive 1344, Three Bond 1344B or Equivalent	
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent	

2GR-FE LUBRICATION

SST

	09223-22010	Crankshaft Front Oil Seal Replacer	
	09228-06501	Oil Filter Wrench	
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	

RECOMMENDED TOOLS

	09200-00010	Engine Adjust Kit	

EQUIPMENT

Deep socket wrench (24 mm) -	
Hose	
Oil pressure gauge	
Socket wrench (27 mm)	
Precision straight edge	
Torque wrench	

LUBRICANT

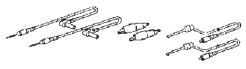
Item	Condition	Capacity	Classification
Oil grade	-	-	Use ILSAC multigrade engine oil. SAE 5W-30 engine oil may be used. However, SAE 5W-30 is the best choice for good fuel economy and good starting in cold weather.
Drain and refill	with oil filter change	6.1 liters (6.4 US qts, 5.4 Imp. qts)	-
	without oil filter change	5.7 liters (6.0 US qts, 5.0 Imp. qts)	-
Dry fill	Dry fill	6.5 liters (6.9 US qts, 5.7 Imp. qts)	-

SSM

Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent	
Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent	
Toyota Genuine Seal Packing 1282B, Three Bond 1282B or Equivalent	

2AZ-FE IGNITION

RECOMMENDED TOOLS

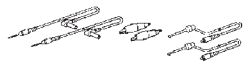
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Spark plug cleaner	
Torque wrench	

2GR-FE IGNITION

RECOMMENDED TOOLS

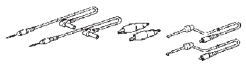
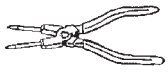
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Spark plug cleaner	
Torque wrench	

2AZ-FE STARTING

RECOMMENDED TOOLS

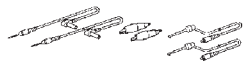
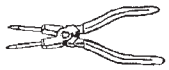
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	
	09905-00013	Snap Ring Pliers	

EQUIPMENT

Torque wrench	
Service Wire Harness	
Vernier calipers	
Sandpaper (#400)	

2GR-FE STARTING

RECOMMENDED TOOLS

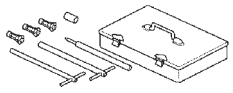
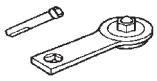
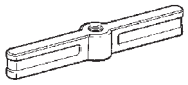
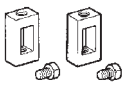
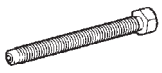
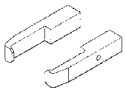
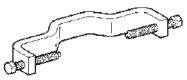
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	
	09905-00013	Snap Ring Pliers	

EQUIPMENT

Torque wrench	
Service Wire Harness	
Vernier calipers	
Sandpaper (#400)	

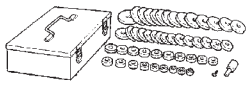
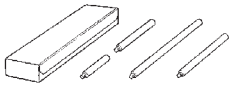
2AZ-FE CHARGING

SST

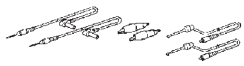
	09612-70100	Power Steering Oil Seal Remover Set	
	(09612-07240)	Collar	
	09820-63020	Alternator Pulley Wrench Set	
	09950-40011	Puller B Set	
	(09951-04020)	Hanger 200	
	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09954-04010)	Arm 25	
	(09955-04071)	Claw No.7	
	(09957-04010)	Attachment	
	(09958-04011)	Holder	

PP

PP

	09950-60010	Replacer Set	
	(09951-00250)	Replacer 25	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	

RECOMMENDED TOOLS

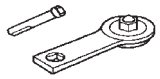
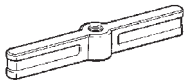
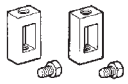
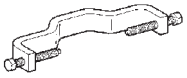
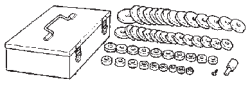
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

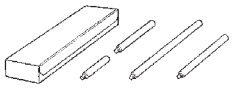
Torque wrench	
Vernier calipers	
Pin (ϕ1 mm)	

2GR-FE CHARGING

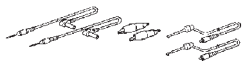
SST

	09820-63020	Alternator Pulley Wrench Set	
	09950-40011	Puller B Set	
	(09951-04020)	Hanger 200	
	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09954-04010)	Arm 25	
	(09955-04071)	Claw No.7	
	(09957-04010)	Attachment	
	(09958-04011)	Holder	
	09950-60010	Replacer Set	
	(09951-00250)	Replacer 25	

PP

	(09951-00470)	Replacer 47	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	

RECOMMENDED TOOLS

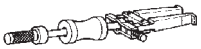
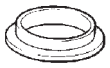
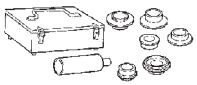
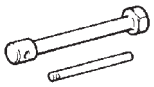
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

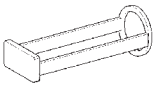
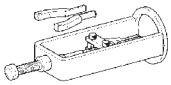
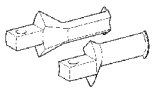
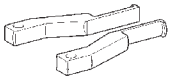
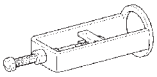
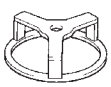
EQUIPMENT

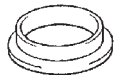
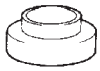
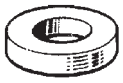
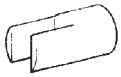
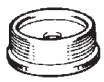
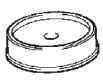
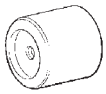
Torque wrench	
Vernier calipers	
Pin (ϕ1 mm)	

U250E AUTOMATIC TRANSAXLE

SST

	09023-12701	Union Nut Wrench 17mm	
	09223-15030	Oil Seal & Bearing Replacer	
	09308-00010	Oil Seal Puller	
	09316-12010	Transfer Bearing Replacer	
	09316-20011	Transfer Bearing Replacer	
	09316-60011	Transmission & Transfer Bearing Replacer	
	(09316-00011)	Replacer Pipe	
	09350-32014	TOYOTA Automatic Transmission Tool Set	
	(09351-32010)	One-way Clutch Test Tool	
	(09351-32020)	Stator Stopper	
	(09351-32070)	No.2 Piston Spring Compressor	

	(09351-32140)	Oil Seal Replacer	
	09387-00020	Direct Clutch Wrench	
	09387-00030	Counter Drive Gear Holding Tool	
	09387-00041	Bearing Puller Assembly	
	(09387-01010)	Claw No.1	
	(09387-01021)	Claw No.2	
	(09387-01030)	Pin	
	(09387-01040)	Bearing Puller Body	
	09387-00050	Under Drive Gear Puller	
	09387-00060	Second Brake Wrench	
	09387-00070	First & Reverse Brake Wrench	
	09387-00080	Counter Drive Gear Nut Wrench	

	09495-65040	Axle Hub Oil Seal Replacer	
	09502-24010	Bearing Replacer	
	09515-21010	Rear Axle Shaft Bearing Replacer	
	09523-36010	Rear Axle Hub Guide Tool	
	09527-17011	Rear Axle Shaft Bearing Remover	
	09550-60010	Differential Side Bearing Replacer	
	(09951-00480)	Replacer 48	
	(09951-00790)	Replacer 79	
	09564-32011	Differential Preload Adaptor	
	09608-10010	Steering Knuckle Oil Seal Replacer	
	09608-32010	Steering Knuckle Oil Seal Replacer	
	09649-17010	Steering Knuckle Tool	

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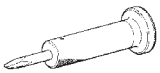
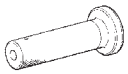
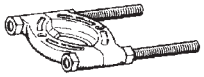
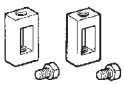
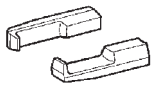
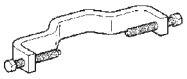
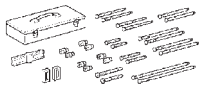
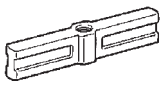
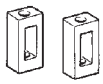
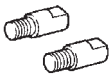
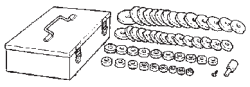
	09710-04081	Base	
	09726-36010	Lower Control Arm Bushing Replacer	
	09726-40010	Lower Control Shaft Bearing Replacer	
	09820-00031	Alternator Rotor Rear Bearing Replacer	
	09930-00010	Drive Shaft Nut Chisel	
	(09931-00010)	Handle	
	(09931-00020)	Nut Chisel	
	09950-00020	Bearing Remover	
	09950-00030	Bearing Remover Attachment	
	09950-40011	Puller B Set	
	(09952-04010)	Slide Arm	
	(09954-04010)	Arm 25	

	(09955-04061)	Claw No.6	
	(09957-04010)	Attachment	
	(09958-04011)	Holder	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05021)	Claw No.2	
	(09955-05010)	Adapter No.1	
	09950-60010	Replacer Set	
	(09951-00230)	Replacer 23	
	(09951-00260)	Replacer 26	

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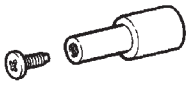
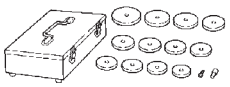
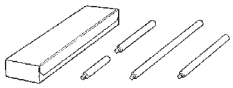
	(09951-00320)	Replacer 32	
	(09951-00360)	Replacer 36	
	(09951-00450)	Replacer 45	
	(09951-00480)	Replacer 48	
	(09951-00500)	Replacer 50	
	(09951-00590)	Replacer 59	
	(09951-00630)	Replacer 63	
	(09952-06010)	Adapter	
	09950-60020	Replacer Set No.2	
	(09951-00720)	Replacer 72	
	(09951-00750)	Replacer 75	
	(09951-00810)	Replacer 81	

	(09951-00890)	Replacer 89	
	09950-70010	Handle Set	
	(09951-00710)	Replacer 71	
	(09951-00780)	Replacer 78	
	(09951-07100)	Handle 100	
	(09951-07150)	Handle 150	
	(09951-07200)	Handle 200	

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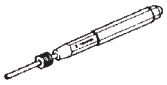
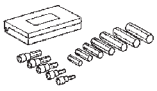
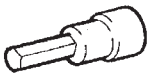
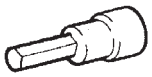
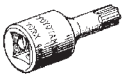
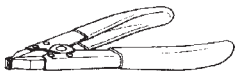
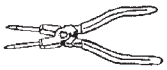
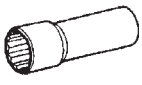
RECOMMENDED TOOLS

	09031-00030	Pin Punch	
	09040-00011	Hexagon Wrench Set	
	(09043-20060)	Socket Hexagon Wrench 6	
	(09043-20100)	Socket Hexagon Wrench 10	
	09042-00010	Torx Socket T30	
	09905-00012	Snap Ring No.1 Expander	
	09905-00013	Snap Ring Pliers	
	(09904-00090)	Claw Set	
	09924-12411	Deep Socket Wrench 41	

HINT:
Torx is registered trademark of Textron Inc.

EQUIPMENT

Dial indicator with magnetic base	
Feeler gauge	
Vernier calipers	
Torque wrench	
Plastic hammer	
Straight edge	
Press	
Punch	

LUBRICANT

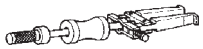
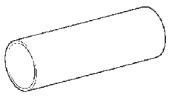
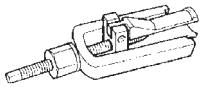
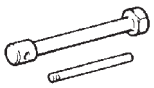
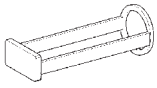
Automatic transaxle fluid		
Dry fill	8.0 liter (8.5 USqts, 7.0 Imp.qts)	ATF WS
Drain and refill	3.5 liter (3.7 USqts, 3.1 Imp.qts)	

SSM

Toyata Genuine Seal Packing 1281, Three Bond 1281 or Equivalent	
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent	
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent	

U660E AUTOMATIC TRANSAXLE

SST

	09223-15030	Oil Seal & Bearing Replacer	
	09308-00010	Oil Seal Puller	
	09308-14010	Replacer Pipe A	
	09316-10010	Remover & Replacer	
	09319-60020	Output Shaft Needle Roller Bearing Remover	
	09350-32014	TOYOTA Automatic Transmission Tool Set	
	(09351-32010)	One-way Clutch Test Tool	
	(09351-32020)	Stator Stopper	
	(09351-32140)	Oil Seal Replacer	
	09387-00020	Direct Clutch Wrench	
	09387-00060	Second Brake Wrench	

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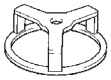
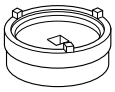
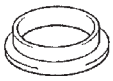
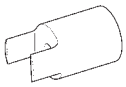
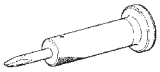
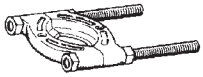
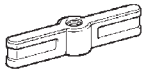
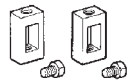
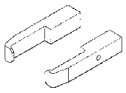
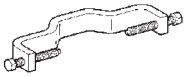
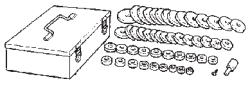
	09387-00070	First & Reverse Brake Wrench	
	09387-00130	Counter Drive Gear Nut Wrench	
	09495-65040	Axle Hub Oil Seal Replacer	
	09527-17011	Rear Axle Shaft Bearing Remover	
	09564-33010	Drive Pinion Lock Nut Socket	
	09710-04081	Base	
	09843-18040	Diagnosis Check Wire No.2	
	09930-00010	Drive Shaft Nut Chisel	
	09950-00020	Bearing Remover	
	09950-00030	Bearing Remover Attachment	
	09950-40011	Puller B Set	
	(09951-04010)	Hanger 150	

	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09954-04010)	Arm 25	
	(09955-04071)	Claw No.7	
	(09957-04010)	Attachment	
	(09958-04011)	Holder	
	09950-60010	Replacer Set	
	(09951-00220)	Replacer 22	
	(09951-00230)	Replacer 23	
	(09951-00320)	Replacer 32	
	(09951-00400)	Replacer 40	
	(09951-00420)	Replacer 42	

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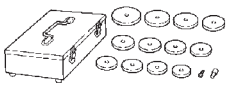
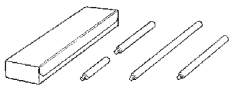
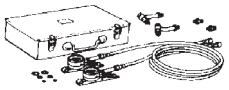
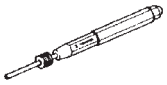
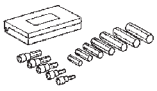
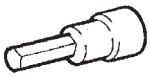
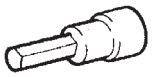
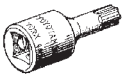
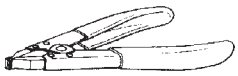
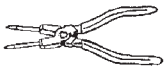
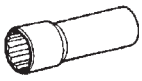
	(09951-00480)	Replacer 48	
	(09951-00530)	Replacer 53	
	(09951-00540)	Replacer 54	
	(09951-00580)	Replacer 58	
	(09951-00650)	Replacer 65	
	09950-60020	Replacer Set No.2	
	(09951-00710)	Replacer 71	
	(09951-00790)	Replacer 79	
	(09951-00810)	Replacer 81	
	(09951-01030)	Replacer 103	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	

	(09951-07150)	Handle 150	
	(09951-07200)	Handle 200	
	09951-01100	Replacer 110	
	09992-00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992-00231)	Adaptor C	
	(09992-00271)	Gauge Assy	

PP

RECOMMENDED TOOLS

	09031-00030	Pin Punch	
	09040-00011	Hexagon Wrench Set	
	(09043-20060)	Socket Hexagon Wrench 6	
	(09043-20100)	Socket Hexagon Wrench 10	
	09042-00010	Torx Socket T30	
	09905-00012	Snap Ring No.1 Expander	
	09905-00013	Snap Ring Pliers	
	(09904-00090)	Claw Set	
	09924-12411	Deep Socket Wrench 41	

HINT:
Torx is registered trademark of Textron Inc.

EQUIPMENT

Dial indicator with magnetic base	
Feeler gauge	
Vernier calipers	
Torque wrench	
Plastic hammer	
Straight edge	
Press	
Punch	

LUBRICANT

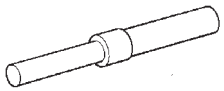
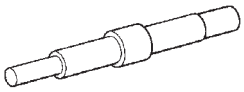
Automatic transaxle fluid		
Dry fill	6.57 liter (6.94 USqts, 5.78 Imp.qts)	ATF WS

SSM

Toyata Genuine Seal Packing 1281, Three Bond 1281 or Equivalent	
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent	
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent	

CLUTCH

SST

	09023-00101	Union Nut Wrench 10 mm	
	09301-00210	Clutch Guide Tool	
	09301-00220	Clutch Guide Tool	
	09333-00013	Universal Joint Bearing Remover & Replacer	

EQUIPMENT

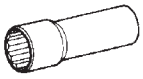
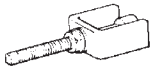
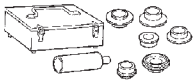
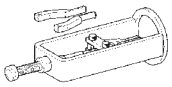
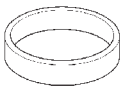
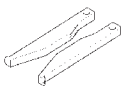
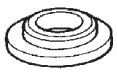
Vernier calipers	
Dial indicator with magnetic base	
Torque wrench	

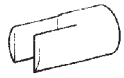
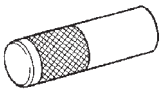
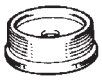
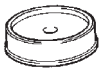
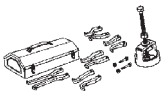
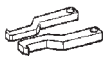
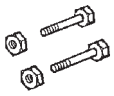
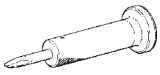
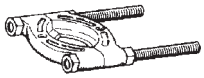
LUBRICANT

Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT3

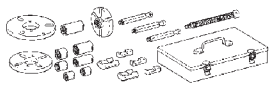
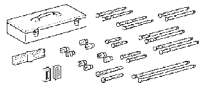
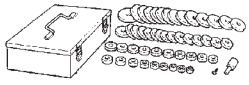
E351 MANUAL TRANSAXLE

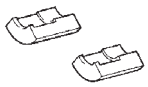
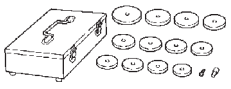
SST

	09229-55010	Oil Cooler Relief Valve Wrench	
	09308-00010	Oil Seal Puller	
	09309-12020	5th Driven Gear Replacer	
	09316-20011	Transfer Bearing Replacer	
	09316-60011	Transmission & Transfer Bearing Replacer	
	(09316-00031)	Replacer B	
	(09316-00041)	Replacer C	
	09387-00041	Bearing Puller Assembly	
	(09387-02010)	Oil Seal Replacer	
	(09387-02020)	One-way Clutch Test Tool Set	
	09506-30012	Differential Drive Pinion Rear Bearing Cone Replacer	

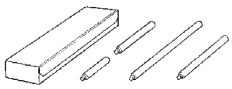
	09564-32011	Differential Preload Adaptor	
	09608-00071	Drive Pinion Rear Bearing Cone Replacer	
	09608-06041	Front Hub Inner Bearing Cone Replacer	
	09608-10010	Steering Knuckle Oil Seal Replacer	
	09608-32010	Steering Knuckle Oil Seal Replacer	
	09612-65014	Steering Worm Bearing Puller	
	(09612-01040)	Claw D	
	(09612-01050)	Hanger Pin with Nut	
	09631-12090	Seal Ring Tool	
	09930-00010	Drive Shaft Nut Chisel	
	09950-00020	Bearing Remover	
	09950-00030	Bearing Remover Attachment	

PP

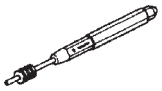
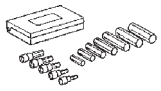
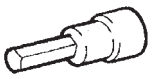
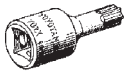
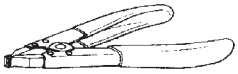
	09950-30012	Puller A Set	
	(09951-03010)	Upper Plate	
	(09953-03010)	Center Bolt	
	(09954-03010)	Arm	
	(09957-04010)	Attachment	
	09950-40011	Puller B Set	
	(09957-04010)	Attachment	
	09950-50013	Puller C Set	
	(09957-04010)	Attachment	
	09950-60010	Replacer Set	
	(09951-00180)	Replacer 18	
	(09951-00280)	Replacer 28	

	(09951-00320)	Replacer 32	
	(09951-00420)	Replacer 42	
	(09951-00430)	Replacer 43	
	(09951-00490)	Replacer 49	
	(09951-00560)	Replacer 56	
	(09951-00570)	Replacer 57	
	(09951-00600)	Replacer 60	
	(09951-00680)	Replacer 68	
	(09955-03011)	Claw No.1	
	09950-60020	Replacer Set No.2	
	(09951-00680)	Replacer 68	
	(09951-00730)	Replacer 73	

PP

	(09951-00790)	Replacer 79	
	(09951-00890)	Replacer 89	
	(09951-00910)	Replacer 91	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	
	(09951-07150)	Handle 150	
	(09951-07200)	Handle 200	

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09031-00040	Pin Punch .	
	09040-00011	Hexagon Wrench Set	
	(09043-20060)	Socket Hexagon Wrench 6	
	09042-00050	Torx Socket T45	
	09905-00012	Snap Ring No.1 Expander	

HINT:
Torx is registered trademark of Textron Inc.

EQUIPMENT

Dial indicator with magnetic base	
Torque wrench	
Slide calipers	
V-block	
Micrometer	
Dial indicator	
Cylinder gauge	
Feeler gauge	
Precision straight edge	

LUBRICANT

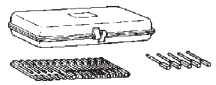
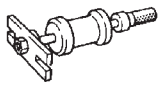
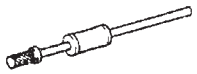
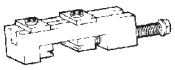
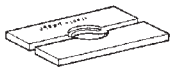
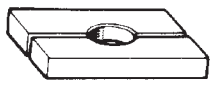
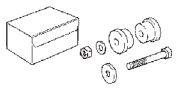
Item	Capacity	Classification
Manual transaxle oil (w/ Differential oil)	2.5 liters (2.6 US qts, 2.2 Imp. qts)	API GL-4 or GL-5 SAE 75W-90

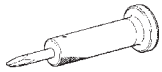
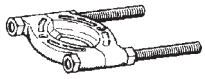
SSM

Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent	
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent	

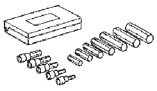
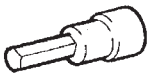
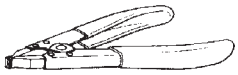
DRIVE SHAFT

SST

	09240-00020	Wire Gauge Set	
	09520-01010	Drive Shaft Remover Attachment	
	09520-24010	Differential Side Gear Shaft Puller	
	(09520-32040)	Shocker Set	
	09521-24010	Rear Axle Shaft Puller	
	09527-10011	Rear Axle Shaft Bearing Remover	
	09527-30010	Rear Axle Shaft Bearing Remover	
	09608-16042	Front Hub Bearing Adjusting Tool	
	(09608-02021)	Bolt & Nut	
	(09608-02041)	Retainer	
	09628-00011	Ball Joint Puller	

	09726-40010	Lower Control Shaft Bearing Replacer	
	09930-00010	Drive Shaft Nut Chisel	
	09950-00020	Bearing Remover	

RECOMMENDED TOOLS

	09011-12301	Socket Wrench 30 mm	
	09040-00011	Hexagon Wrench Set	
	(09043-20060)	Socket Hexagon Wrench 6	
	09905-00012	Snap Ring No.1 Expander	

EQUIPMENT

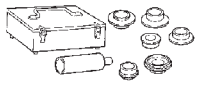
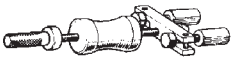
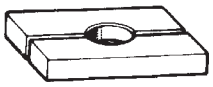
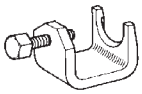
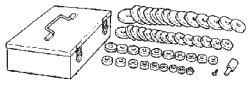
Torque wrench	

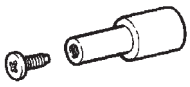
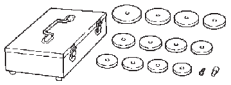
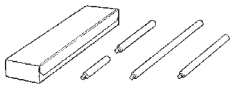
LUBRICANT

Item		Capacity
2GR-FE	Outboard joint grease	164 to 184 g (5.8 to 6.5 oz.)
2AZ-FE (for TMC made)	Outboard joint grease	190 to 200 g (6.7 to 7.1 oz.)
2AZ-FE (for TMMK made)	Outboard joint grease	100 to 120 g (3.5 to 4.2 oz.)
2GR-FE	Inboard joint grease	155 to 175 g (5.5 to 6.2 oz.)
2AZ-FE (for TMC made)	Inboard joint grease	175 to 185 g (6.2 to 6.5 oz.)
2AZ-FE (for TMMK made)	Inboard joint grease	170 to 190 g (6.0 to 6.7 oz.)

AXLE

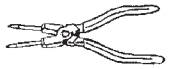
SST

	09316-60011	Transmission & Transfer Bearing Replacer	
	(09316-00011)	Replacer Pipe	
	(09316-00031)	Replacer B	
	09520-00031	Rear Axle Shaft Puller	
	09527-17011	Rear Axle Shaft Bearing Remover	
	09527-20011	Rear Axle Shaft Bearing Remover	
	09555-55010	Differential Drive Pinion Bearing Replacer	
	09608-32010	Steering Knuckle Oil Seal Replacer	
	09628-10011	Ball Joint Puller	
	09950-60010	Replacer Set	
	(09951-00400)	Replacer 40	

	(09951-00430)	Replacer 43	
	(09951-00600)	Replacer 60	
	(09952-06010)	Adapter	
	09950-60020	Replacer Set No.2	
	(09951-00810)	Replacer 81	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	

PP

RECOMMENDED TOOLS

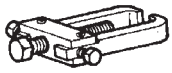
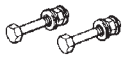
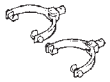
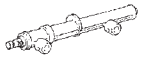
	09011-12301	Socket Wrench 30 mm	
	09905-00013	Snap Ring Pliers	

EQUIPMENT

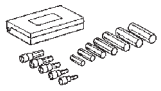
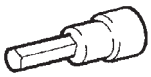
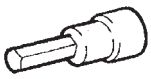
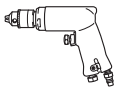
Torque wrench	
Dial indicator with magnetic base	

SUSPENSION

SST

	09628-62011	Boll Joint Puller	
	09727-30021	Coil Spring Compressor	
	(09727-00010)	Bolt Set	
	(09727-00021)	Arm Set	
	(09727-00031)	Compressor	

RECOMMENDED TOOLS

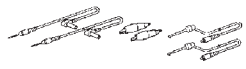
	09011-12301	Socket Wrench 30 mm	
	09040-00011	Hexagon Wrench Set	
	(09043-20050)	Socket Hexagon Wrench 5	
	(09043-20060)	Socket Hexagon Wrench 6	
	09050-00032	Air Drill	

EQUIPMENT

Torque wrench	
Dial indicator with magnetic base	
Tire pressure gauge	
Alignment tester	
Toe-in gauge	
Angle gauge	
Slide Calipers	
Wooden block	
Camber-caster-kingpin gauge	
Drill (Safety equipment: protective goggles, etc.)	Shock absorber disposal

TIRE AND WHEEL

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

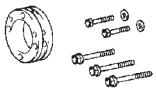
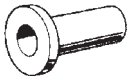
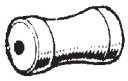
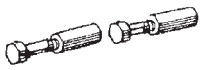
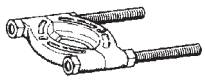
PP

EQUIPMENT

Tire pressure gauge	
Dial indicator with magnetic base	
Wheel balancer	
Torque wrench	

BRAKE CONTROL

SST

	09023-00101	Union Nut Wrench 10 mm	
	09023-38200	Union Nut Wrench 12mm	
	09213-58013	Crankshaft Pulley Holding Tool	
	09309-36010	Transmission Rear Bearing Replacer	
	09520-00031	Rear Axle Shaft Puller	
	(09520-00040)	Shocker	
	(09521-00010)	Rod with Grip	
	09521-00020	Drive Shaft Boot Clamping Tool	
	09950-00020	Bearing Remover	

PP

EQUIPMENT

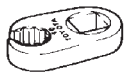
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT 3

BRAKE

SST

	09023-00101	Union Nut Wrench 10 mm	
	09023-38200	Union Nut Wrench 12mm	
	09330-00021	Companion Flange Holding Tool	
	09737-00020	Brake Booster Push Rod Wrench	

EQUIPMENT

Ruler	
Micrometer	
Dial indicator with magnetic base	
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116 DOT 3

PARKING BRAKE

EQUIPMENT

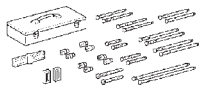
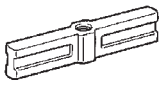
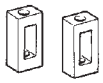
Torque wrench	
Slide calipers	
Brake drum gauge	
Feeler gauge	

SSM

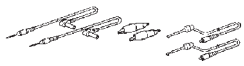
Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent	

STEERING COLUMN

SST

	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05031)	Claw No.3	

RECOMMENDED TOOLS

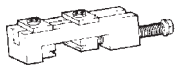
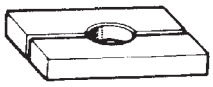
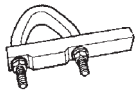
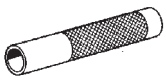
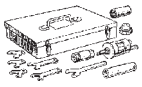
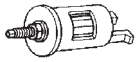
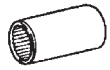
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

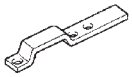
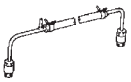
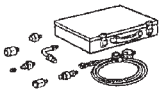
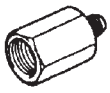
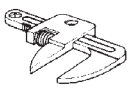
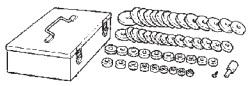
Torque wrench	

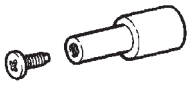
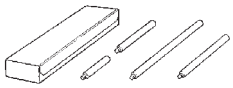
POWER STEERING

SST

	09023-12701	Union Nut Wrench 17mm	
	09023-38201	Union Nut Wrench 12mm	
	09249-63010	Torque Wrench Adaptor	
	09521-24010	Rear Axle Shaft Puller	
	09527-21011	Rear Axle Shaft Bearing Remover	
	09612-00012	Rack & Pinion Steering Rack Housing Stand	
	09612-22011	Tilt Handle Bearing Replacer	
	09612-24014	Steering Gear Housing Overhaul Tool Set	
	(09613-22011)	Steering Rack Shaft Bushing Puller	
	09616-00011	Steering Worm Bearing Adjusting Socket	
	09628-00011	Ball Joint Puller	

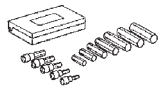
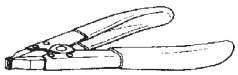
PP

	09630-00014	Power Steering Gear Housing Overhaul Tool Set	
	(09631-00132)	Vane Pump Bracket	
	09631-00200	Rack Seal Guide NO.2	
	09631-12071	Steering Rack Oil Seal Test Tool	
	(09633-00010)	Packing	
	09631-33010	Steering Rack Cover I	
	09640-10010	Power Steering Pressure Gauge Set	
	(09641-01010)	Gauge Assy	
	(09641-01030)	Attachment B	
	(09641-01060)	Attachment E	
	09922-10010	Variable Open Wrench	
	09950-60010	Replacer Set	

	(09951-00180)	Replacer 18	
	(09951-00250)	Replacer 25	
	(09951-00280)	Replacer 28	
	(09951-00290)	Replacer 29	
	(09951-00320)	Replacer 32	
	(09951-00340)	Replacer 34	
	(09951-00400)	Replacer 40	
	(09952-06010)	Adapter	
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	
	(09951-07150)	Handle 150	
	(09951-07360)	Handle 360	

PP

RECOMMENDED TOOLS

	09040-00011	Hexagon Wrench Set	
	(09043-30240)	Straight Hexagon Wrench 24	
	09905-00012	Snap Ring No.1 Expander	

EQUIPMENT

Torque wrench	
Vernier calipers	
Dial indicator	
Feeler gauge	
Micrometer	
V-block	

LUBRICANT

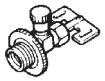
Item	Capacity	Classification
Power steering fluid (Total)	1.0 liters (1.1 US qts, 0.9 Imp. qts)	ATF DEXRON II or III or equivalent

SSM

TOYOTA genuine adhesive 1344, THREE BOND 1344, or equivalent	

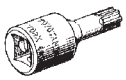
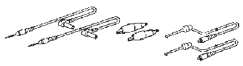
AIR CONDITIONING

SST

	07110-58060	Air Conditioner Service Tool Set	
	(07117-58060)	Refrigerant Drain Service Valve	
	(07117-58070)	T-Joint	
	(07117-58080)	Quick Disconnect Adapter	
	(07117-58090)	Quick Disconnect Adapter	
	(07117-78050)	Refrigerant Charging Gauge	
	(07117-88060)	Refrigerant Charging Hose	
	(07117-88070)	Refrigerant Charging Hose	
	(07117-88080)	Refrigerant Charging Hose	

PP

RECOMMENDED TOOLS

	09042-00020	TORX Socket T40	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	
	09904-00010	Expander Set	
	(09904-00050)	No. 4 Claw	

HINT:
TORX is a registered trademark of Textron Inc.

EQUIPMENT

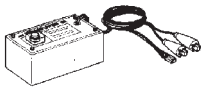
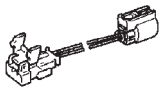
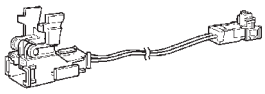
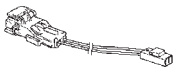
Vinyl tape	
Hexagon wrench 4mm	
Hexagon wrench 12 mm	
Gas leak detector	
Dial indicator with magnetic base	
Torque wrench	

LUBRICANT

Item	Capacity	Classification
Compressor oil	-	ND-OIL 8 or equivalent

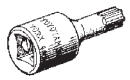
SUPPLEMENTAL RESTRAINT SYSTEM

SST

	09082-00700	SRS Airbag Deployment Tool	
	09082-00750	Airbag Deployment Wire Sub-harness No.3	
	09082-00770	Airbag Deployment Wire Sub-harness No.5	
	09082-00780	Airbag Deployment Wire Sub-harness No.6	
	09082-00802	Airbag Deployment Wire Sub-Harness No. 8	
	(09082-10801)	Wire A	
	(09082-20801)	Wire B	
	(09082-30801)	Wire C	
	09843-18060	SRS Check Wire	

PP

RECOMMENDED TOOLS

	09042-00010	Torx Socket T30	

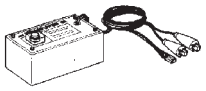
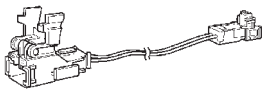
HINT:
Torx is a registered trademark of Textron Inc.

EQUIPMENT

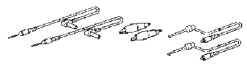
Torque wrench	
Feeler gauge	
Battery	
Tape	
Bolt Length: 35.0 mm (1.378 in.) Diameter: 6.0 mm (0.236 in.) Pitch: 1.0 mm (0.039 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diameter: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diameter: 360 mm (14.17 in.)	Airbag disposal
Wire harness	Airbag disposal
Plastic bag	Airbag disposal

SEAT BELT

SST

	09082-00700	SRS Airbag Deployment Tool	
	09082-00770	Airbag Deployment Wire Sub-harness No.5	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

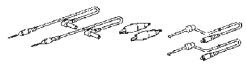
EQUIPMENT

Torque wrench	
Protective tape	

THEFT DETERRENT SYSTEM

RECOMMENDED TOOLS

PP

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

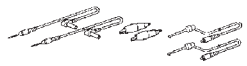
Torque wrench	

ENGINE IMMOBILISER

SST

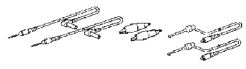
	09843-18040	Diagnosis Check Wire No.2	

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

CRUISE CONTROL

RECOMMENDED TOOLS

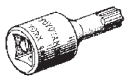
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	

LIGHTING

RECOMMENDED TOOLS

	09042-00010	TORX Socket T30	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

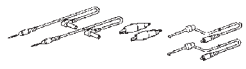
EQUIPMENT

Clip remover	
Torque wrench	
Tire pressure gage	
White paper	

WIPER AND WASHER

RECOMMENDED TOOLS

PP

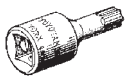
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Protective tape	
Torque wrench	
Wire brush	
MP grease	

DOOR LOCK

RECOMMENDED TOOLS

	09042-00010	Torx Socket T30	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

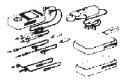
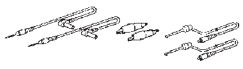
HINT:
Torx is a registered trademark of Textron Inc.

EQUIPMENT

MP grease	
Protective tape	
Torque wrench	

METER

RECOMMENDED TOOLS

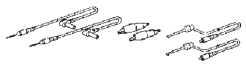
	09082-00050	TOYOTA Electrical Tester Set	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	

AUDIO / VISUAL

RECOMMENDED TOOLS

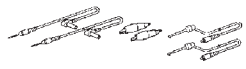
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	
Double-sided tape	
Tape	

NAVIGATION

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

HORN

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	

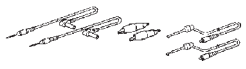
GARAGE DOOR OPENER

RECOMMENDED TOOLS

	09070-20010	Moulding Remover	

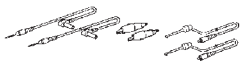
OTHER SYSTEM

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

WINDSHIELD / WINDOWGLASS

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

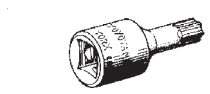
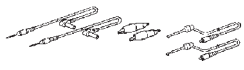
Torque wrench	
Protective Tape	
Knife	
Suction cup	
Piano wire	
Wooden block or similar object	
Plastic sheet	
Scraper	
Brush or sponge	
Sealer gun	

SSM

Toyota Genuine Windshield Glass Adhesive or Equivalent	

MIRROR

RECOMMENDED TOOLS

	09042-00030	TORX Socket T20	
	09070-20010	Moulding Remover	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

HINT:
TORX is a registered trademark of Textron Inc.

EQUIPMENT

Torque wrench	
Protective tape	

INSTRUMENT PANEL

RECOMMENDED TOOLS

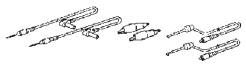
	09070-20010	Moulding Remover	

EQUIPMENT

Torque wrench	
Tape	To avoid surface damage

SEAT

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester	-
	(09083-00150)	Test Lead Set	-

EQUIPMENT

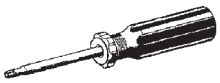
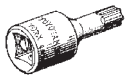
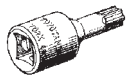
Hog ring	-
Hog ring pliers	-
Tape	To avoid surface damage
Torque wrench	-

ENGINE HOOD / DOOR

SST

	09804-24010	Luggage Compartment Door Torsion Bar Tool	
	09812-00010	Door Hinge Set Bolt Wrench	

RECOMMENDED TOOLS

	09041-00020	TORX Driver T25	
	09042-00010	TORX Socket T30	
	09042-00020	TORX Socket T40	

HINT:
TORX is a registered trademark of Textron Inc.

EQUIPMENT

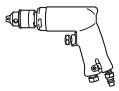
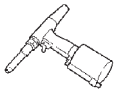
Protective goggle	
Metal saw	
Torque wrench	
MP grease	
Clip remover	
Protective tape	

EQUIPMENT

Protective goggle	
Metal saw	
Torque wrench	
MP grease	
Clip remover	
Protective tape	

EXTERIOR

RECOMMENDED TOOLS

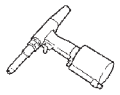
	09050-00032	Air Drill	
	09050-20010	Air Riveter	
	(09050-02020)	Nose Piece No.1	
	09070-20010	Moulding Remover	

EQUIPMENT

Torque wrench	
Protective tape	To avoid surface damage
Heat light	
Double-sided tape	
Piano wire	
Clip remover	
Wooden block or similar object	For tying both piano wire ends
Drill (Safety equipment: protective goggles, etc.)	
Drill bit	
Hand riveter	
Rivet	
Vacuum cleaner	

INTERIOR

RECOMMENDED TOOLS

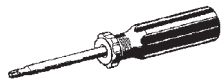
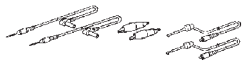
	09050-20010	Air Riveter	
	09070-20010	Moulding Remover	

EQUIPMENT

Clip remover	
Torque wrench	
Protective tape	
Double-sided tape	
Adhesive tape	
Drill (Safety equipment: protective goggles, etc.)	
Hand riveter	
Rivet	

SLIDING ROOF

RECOMMENDED TOOLS

	09041-00020	TORX Driver T25	
	09082-00040	TOYOTA Electrical Tester	
	(09083-00150)	Test Lead Set	

EQUIPMENT

Torque wrench	
Protective tape	

FRONT POWER SEAT CONTROL SYSTEM

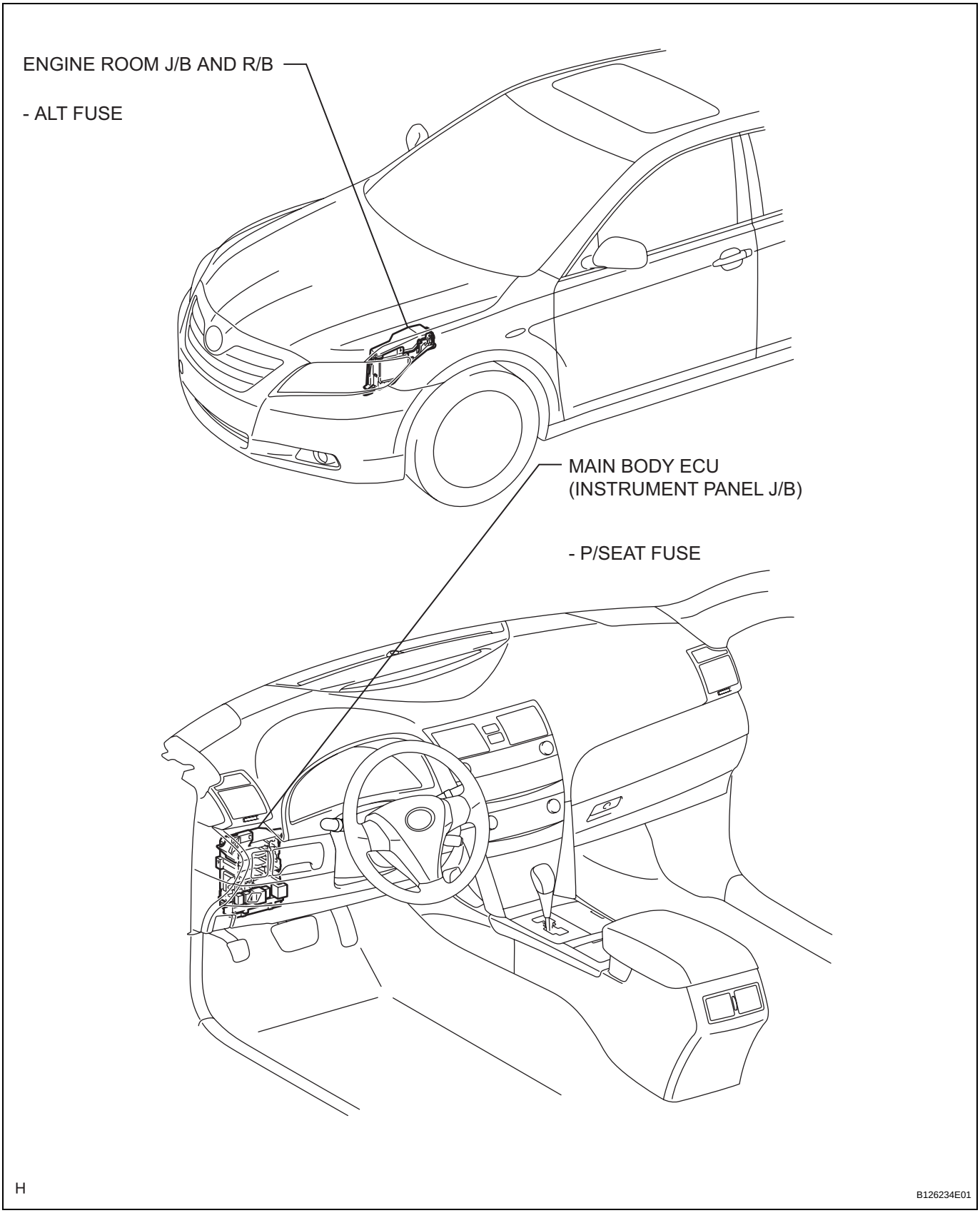
PRECAUTION

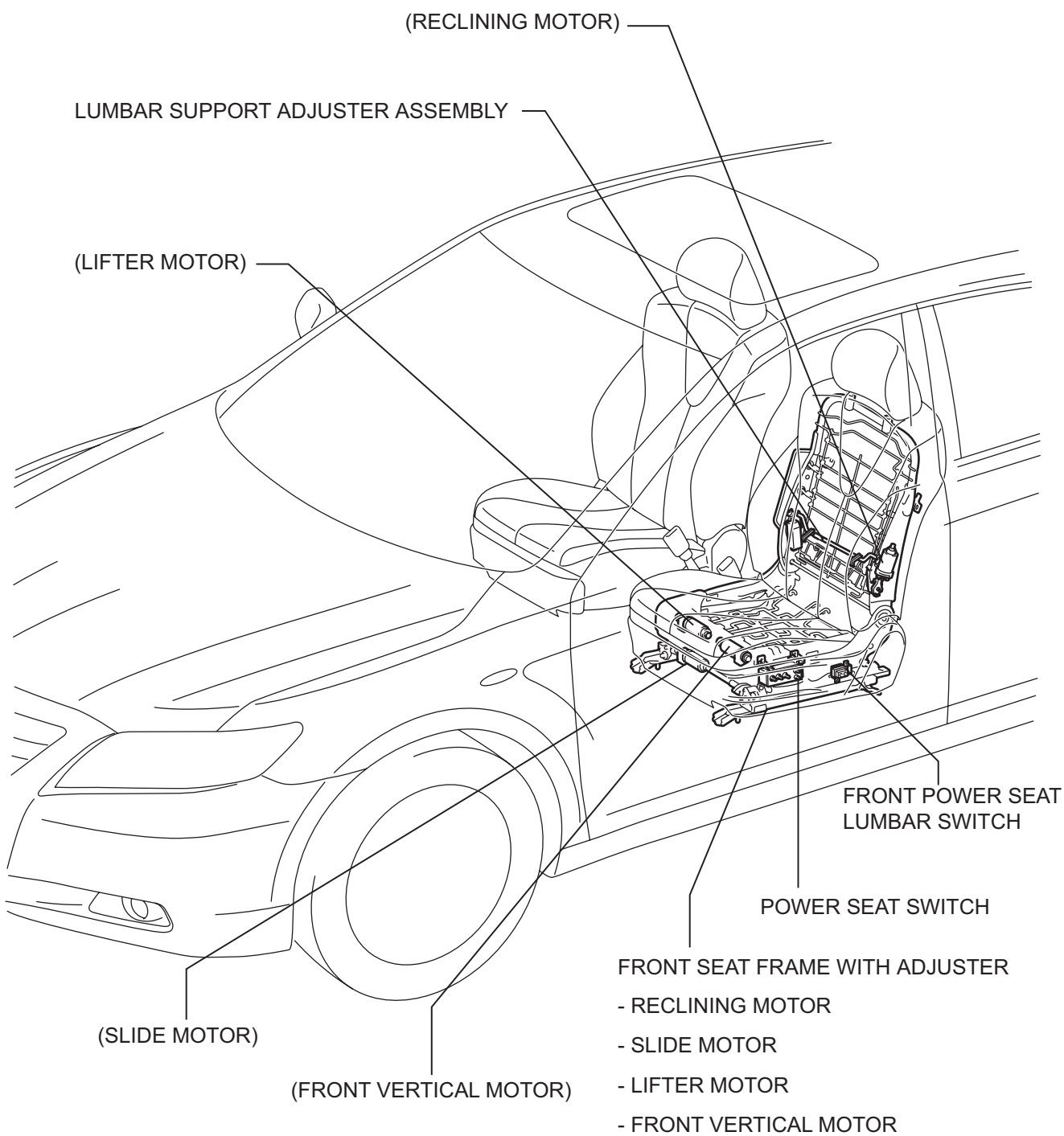
1. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start

PARTS LOCATION





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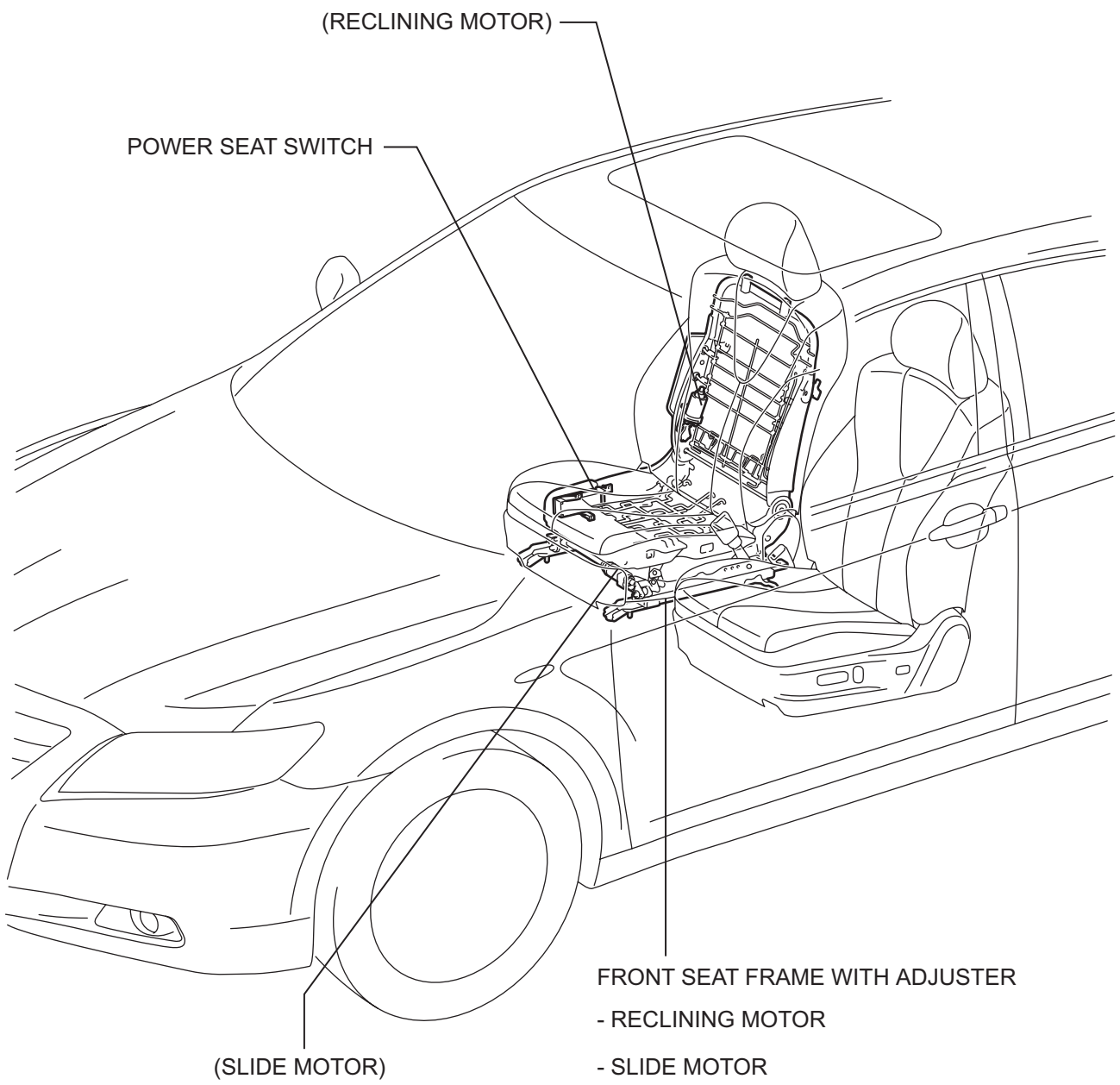

H

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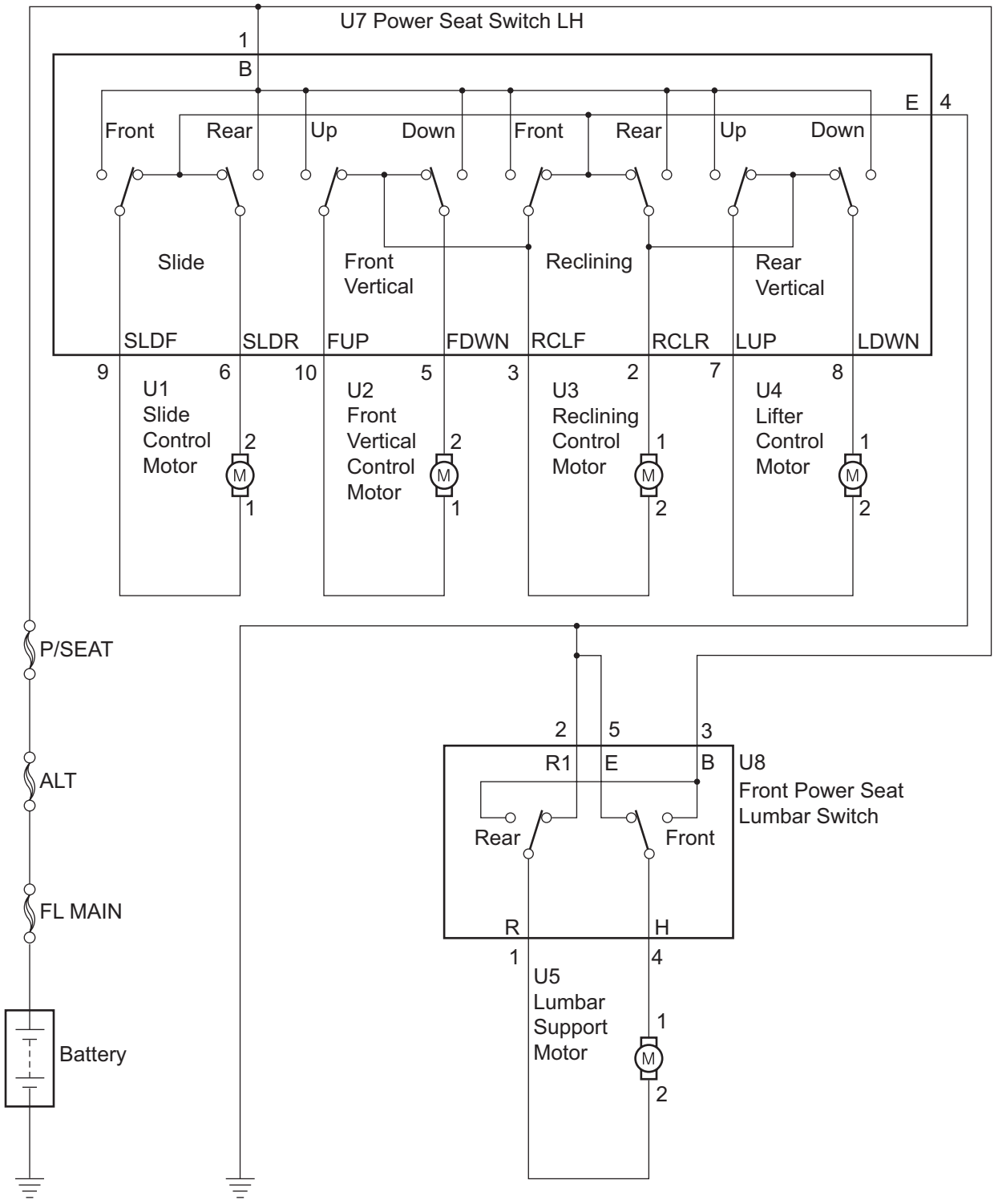
SYSTEM DIAGRAM

Driver Side:



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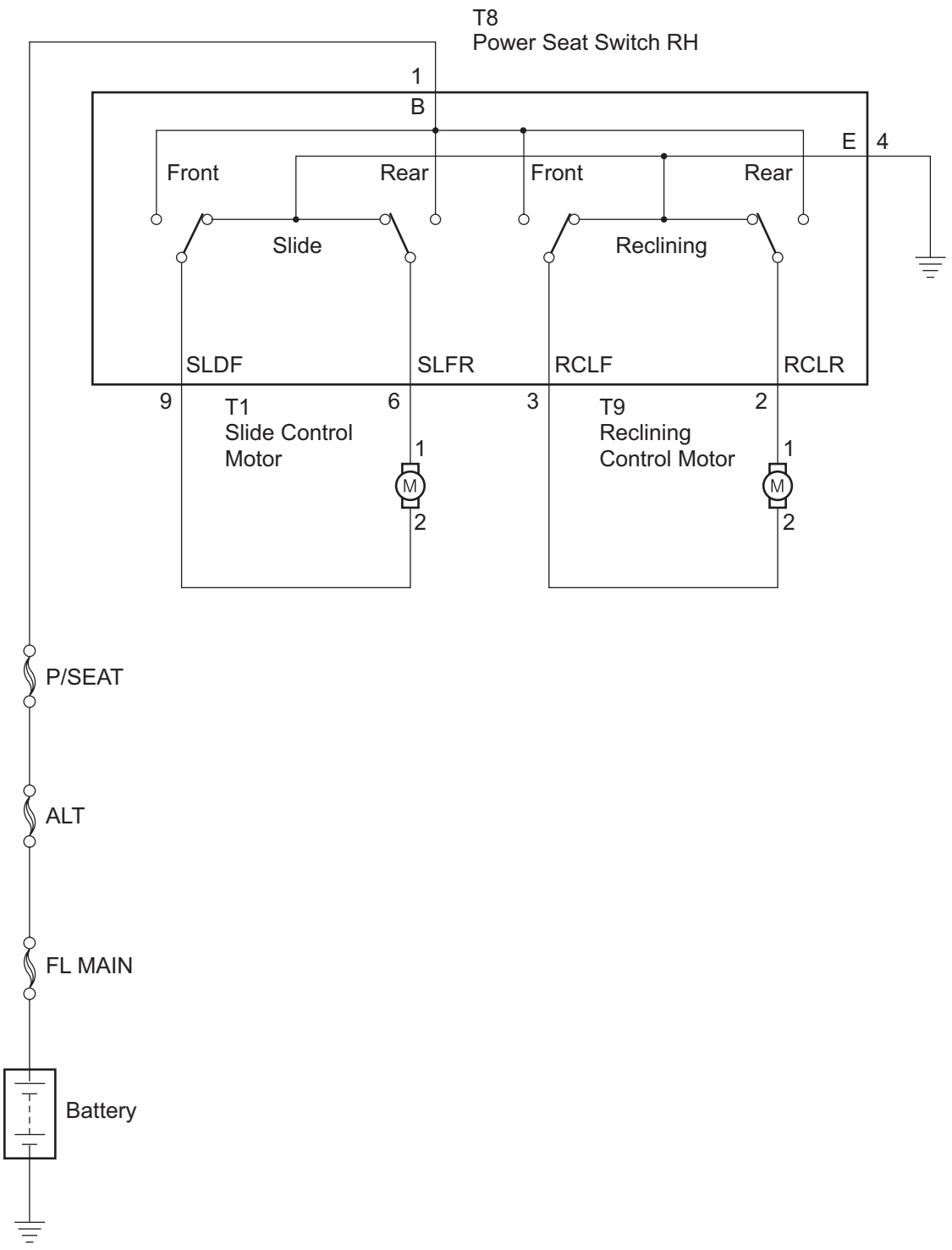
SE

Front Passenger Side:



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SYSTEM DESCRIPTION

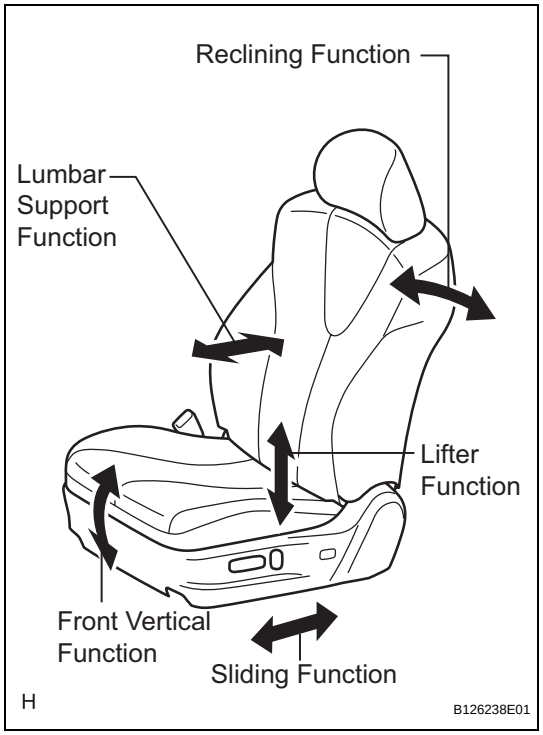
1. FRONT POWER SEAT CONTROL SYSTEM DESCRIPTION

The driver seat and front passenger seat are equipped with slide, reclining, lifter, front vertical, and lumbar support adjustment functions.

2. FUNCTION OF MAIN COMPONENTS

The following functions are available:

Components	Function
Power seat motor assembly (slide motor)	Activated based on a signal from the power seat switch, a motor is activated and slides the seat forward and rearward.
Power seat motor assembly (reclining motor)	Activated based on a signal from the power seat switch, a motor is activated and tilts and reclines the seat.
Power seat motor assembly (front vertical motor)	Activated based on a signal from the power seat switch and raises and lowers the seat cushion front vertically.
Power seat motor assembly (lifter motor)	Activated based on a signal from the power seat switch and raises and lowers the seat vertically.
Lumbar support adjuster motor	Activated based on a signal from the front power seat lumbar switch and adjusts lumbar support.
Front power seat lumbar switch	Based on switches operated, the seat is adjusted accordingly.



OPERATION CHECK

1. CHECK POWER SEAT FUNCTION

(a) Check the basic functions.

(1) Operate the power seat switches and check that the following functions work:

- Sliding
- Reclining
- Lumbar support (Driver side only)
- Front vertical (Driver side only)
- Lifter (Driver side only)

PROBLEM SYMPTOMS TABLE

HINT:

- Inspect the fuses and relays before confirming the suspected areas in the table below.
- Inspect each suspected area in numerical order for the corresponding symptom.

Front Power Seat Control System (Driver Side):

Symptom	Suspected area	See page
Power seat does not operate (slide, front vertical, lifter, reclining).	1. P/SEAT fuse	-
	2. Power seat switch LH	SE-87
	3. Wire harness or connector	-
Only slide operation function does not operate.	1. Power seat switch LH	SE-87
	2. Front seat frame with adjuster LH (slide motor)	SE-90
	3. Wire harness or connector	-
Only front vertical operation function does not operate.	1. Power seat switch LH	SE-87
	2. Front seat frame with adjuster LH (front vertical motor)	SE-90
	3. Wire harness or connector	-
Only lifter operation function does not operate.	1. Power seat switch LH	SE-87
	2. Front seat frame with adjuster LH (lifter motor)	SE-90
	3. Wire harness or connector	-
Only reclining operation function does not operate.	1. Power seat switch LH	SE-87
	2. Front seat frame with adjuster LH (reclining motor)	SE-90
	3. Wire harness or connector	-
Only lumbar support operation function does not operate.	1. Front power seat lumbar switch LH	SE-94
	2. Lumbar support adjuster assembly LH	SE-98
	3. Wire harness or connector	-

Front Power Seat Control System (Front Passenger Side):

Symptom	Suspected area	See page
Power seat does not operate (slide and reclining).	1. P/SEAT fuse	-
	2. Power seat switch RH	SE-89
	3. Wire harness or connector	-
Only slide operation function does not operate.	1. Power seat switch RH	SE-89
	2. Front seat frame with adjuster RH (slide motor)	SE-91
	3. Wire harness or connector	-
Only reclining operation function does not operate.	1. Power seat switch RH	SE-89
	2. Front seat frame with adjuster RH (reclining motor)	SE-91
	3. Wire harness or connector	-

SEAT HEATER SYSTEM

PRECAUTION

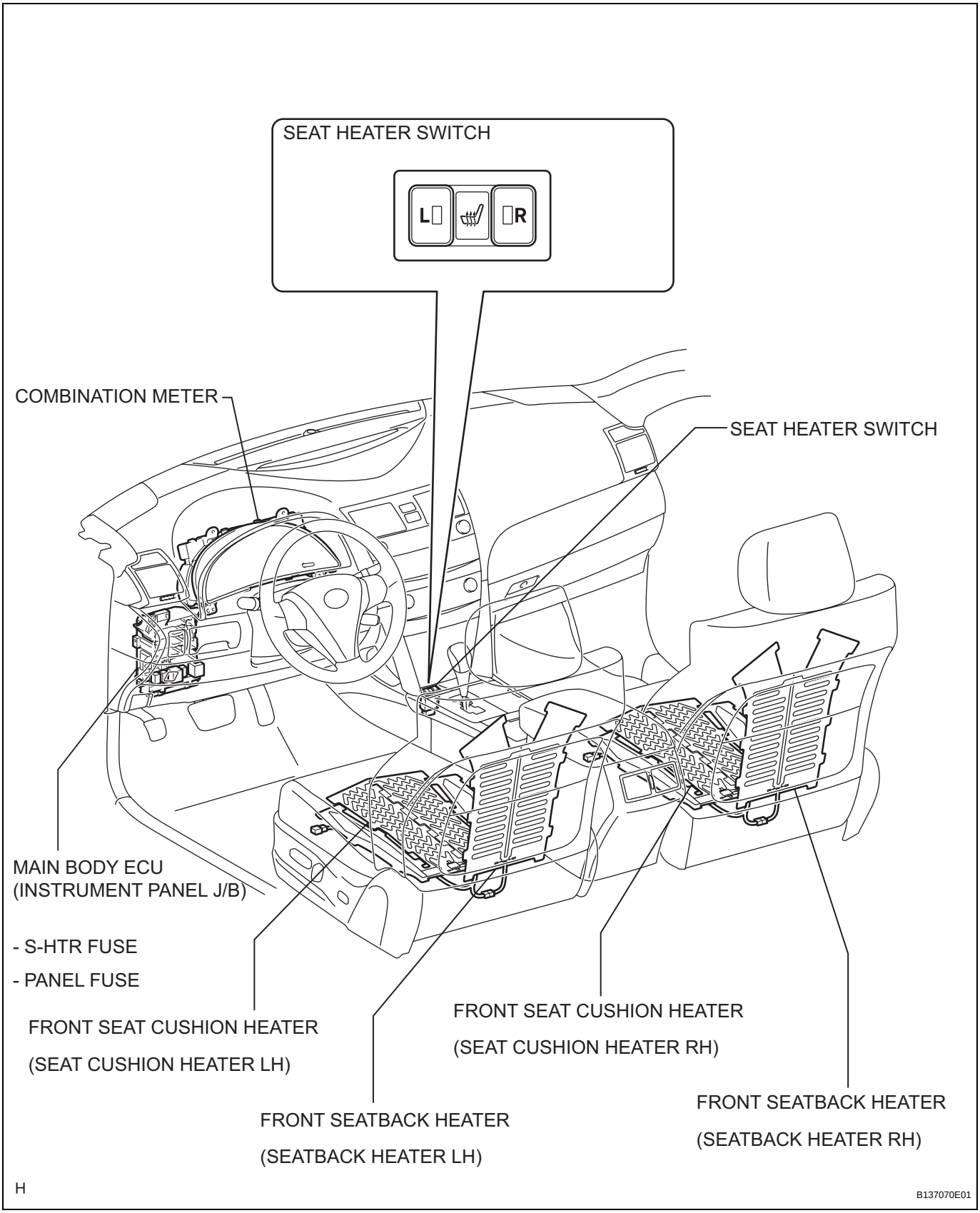
1. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

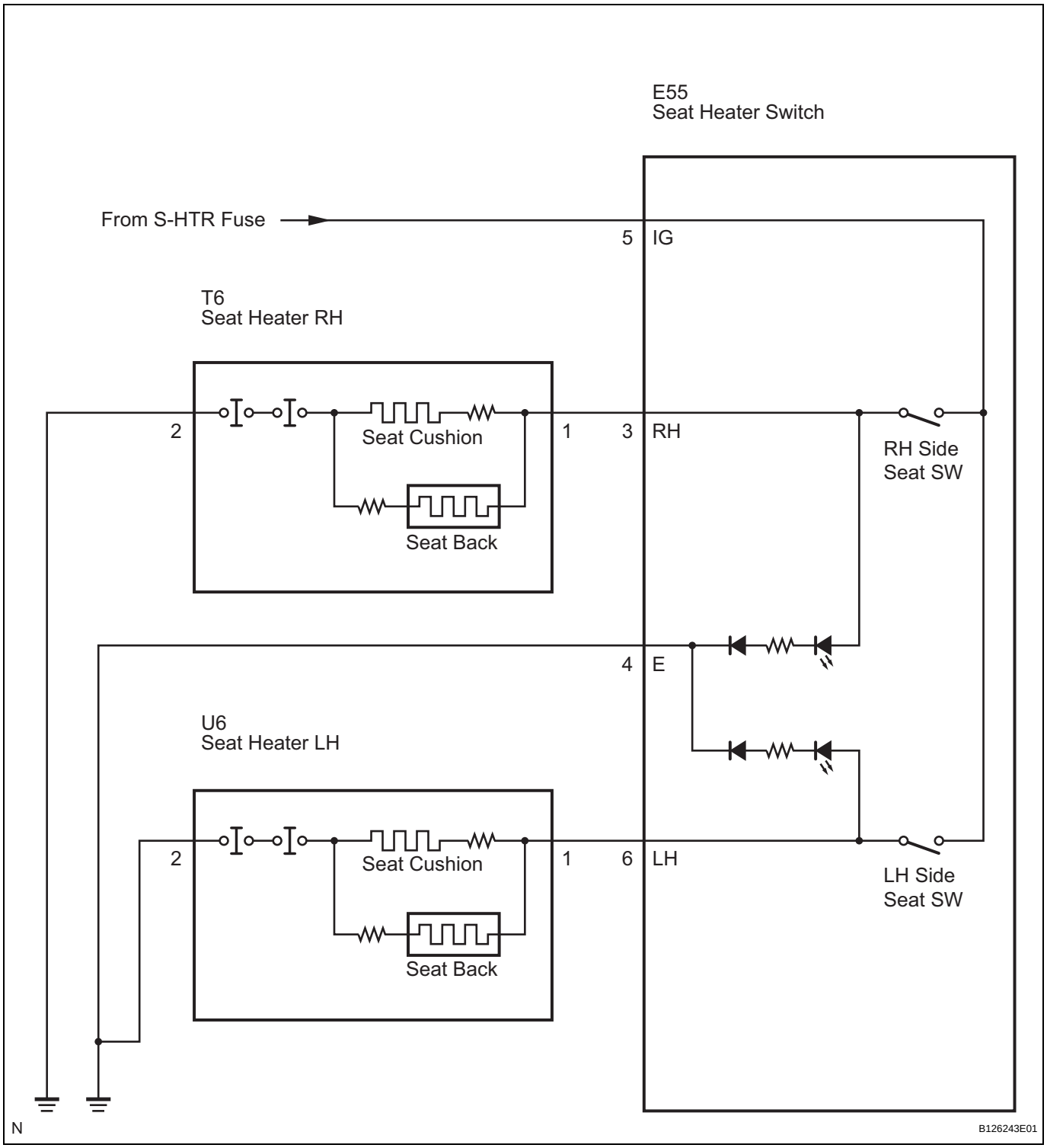
Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start

PARTS LOCATION

SE



SYSTEM DIAGRAM



SE

SYSTEM DESCRIPTION

1. GENERAL DESCRIPTION

(a) By operating the seat heater switch, which is located in the console box, the temperature can be controlled within the range of 30 to 40°C (86 to 104°F).

(b) The seat heater switch indicator light provides seat heater on/off status.

(c) The seat heaters of both seats are controlled by the seat heater controls, which are located under the respective seat.

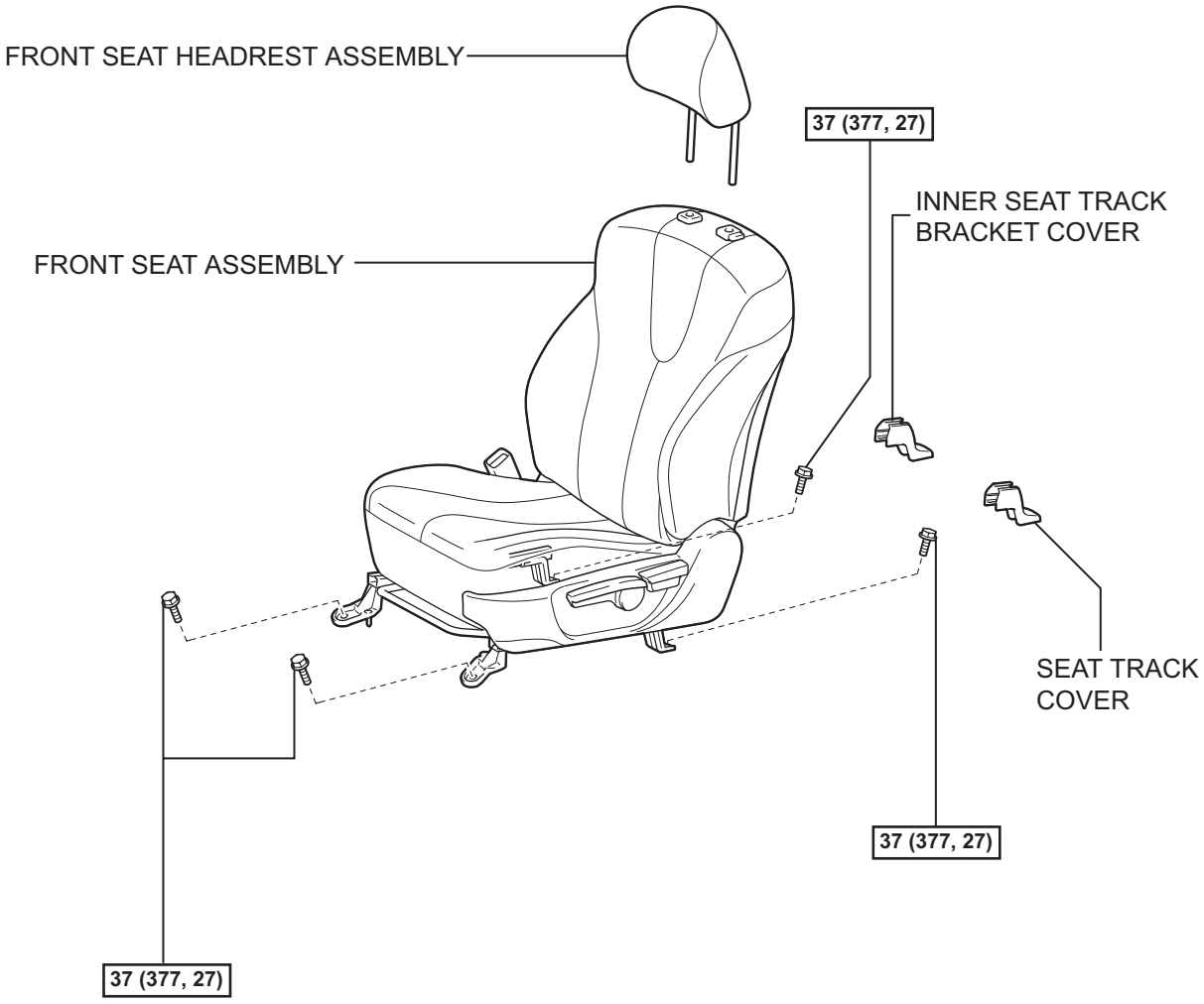
PROBLEM SYMPTOMS TABLE

SEAT HEATER SYSTEM:

Symptom	Suspected area	See page
Seat heater does not operate. (Front LH side)	1. S-HTR fuse	-
	2. Seat heater switch	SE-101
	3. Front seat cushion heater	SE-106
	4. Front seat back heater	SE-111
	5. Wire harness	-
Seat heater does not operate. (Front RH side)	1. S-HTR fuse	-
	2. Seat heater switch	SE-101
	3. Front seat cushion heater	SE-106
	4. Front seat back heater	SE-111
	5. Wire harness	-
Temperature of seat heater cannot be adjusted.	Seat heater switch	SE-101

FRONT SEAT ASSEMBLY (for Manual Seat)

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

P

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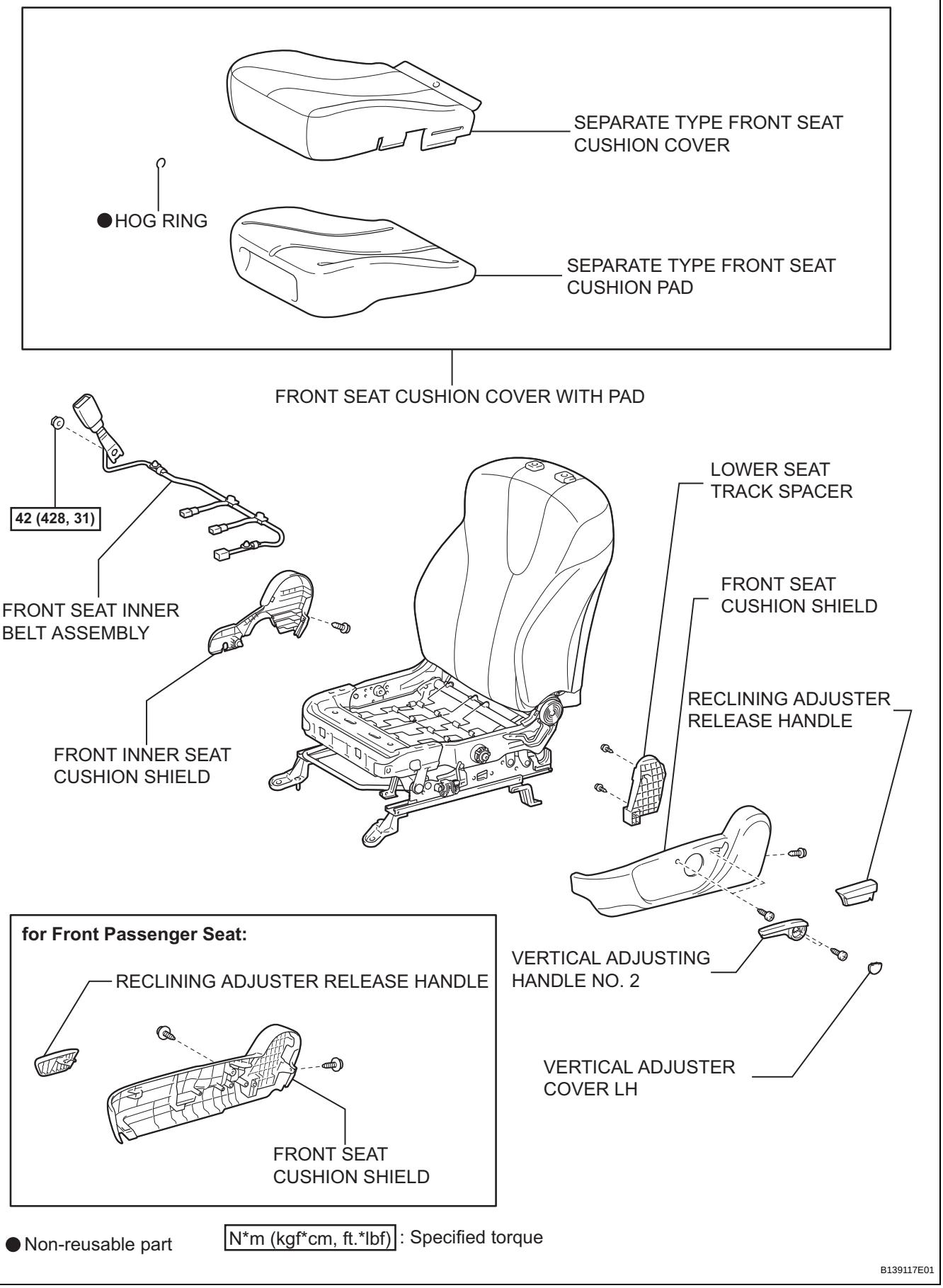
SE

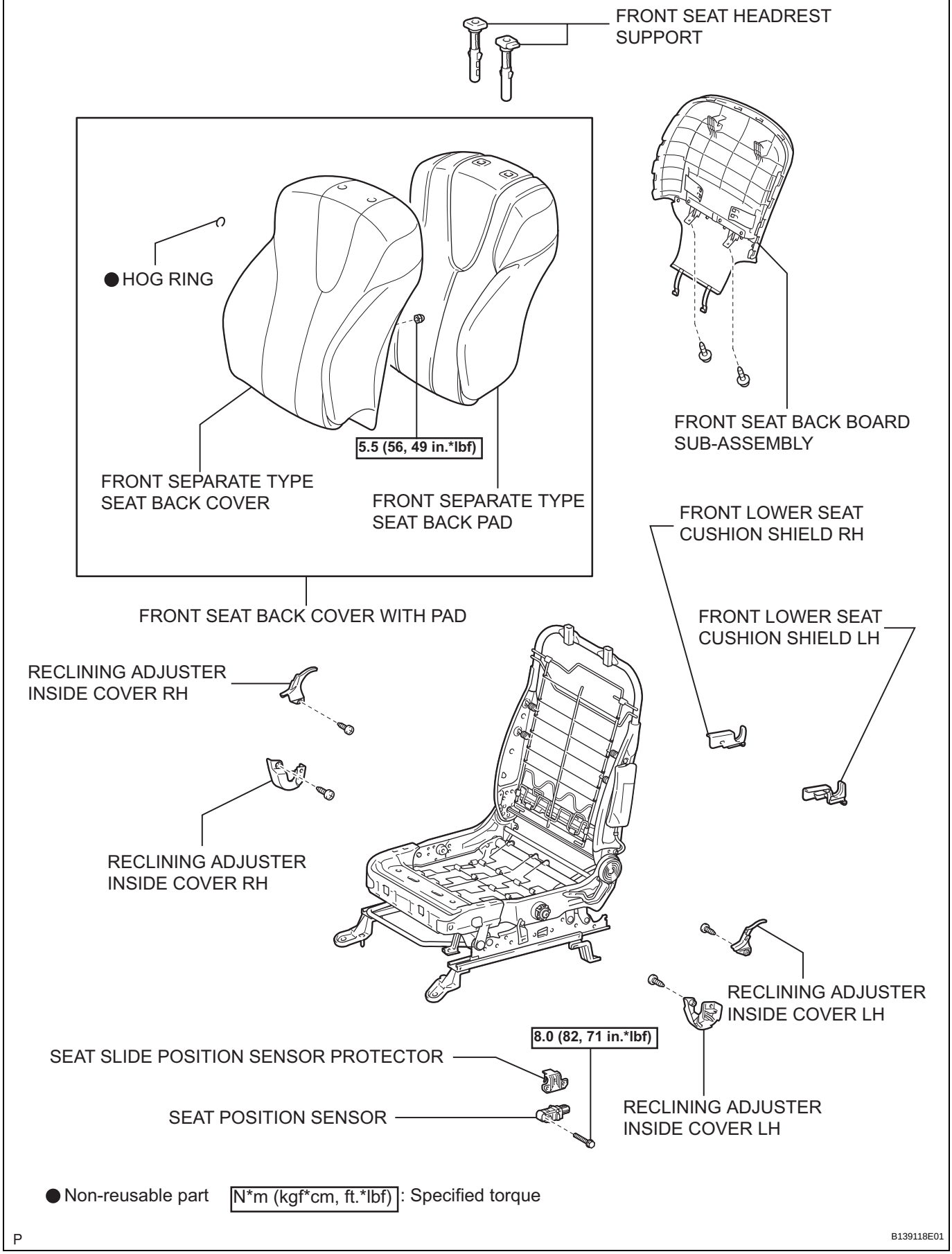


● Non-reusable part

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B139117E01


FRONT SEAT HEADREST SUPPORT
● HOG RING
5.5 (56, 49 in.*lbf)
FRONT SEPARATE TYPE SEAT BACK COVER
FRONT SEPARATE TYPE SEAT BACK PAD
FRONT SEAT BACK BOARD SUB-ASSEMBLY
FRONT SEAT BACK COVER WITH PAD
FRONT LOWER SEAT CUSHION SHIELD RH
FRONT LOWER SEAT CUSHION SHIELD LH
RECLINING ADJUSTER INSIDE COVER RH
RECLINING ADJUSTER INSIDE COVER RH
RECLINING ADJUSTER INSIDE COVER LH
8.0 (82, 71 in.*lbf)
SEAT SLIDE POSITION SENSOR PROTECTOR
SEAT POSITION SENSOR
RECLINING ADJUSTER INSIDE COVER LH
● Non-reusable part
N*m (kgf*cm, ft.*lbf): Specified torque
P
B139118E01

SE

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

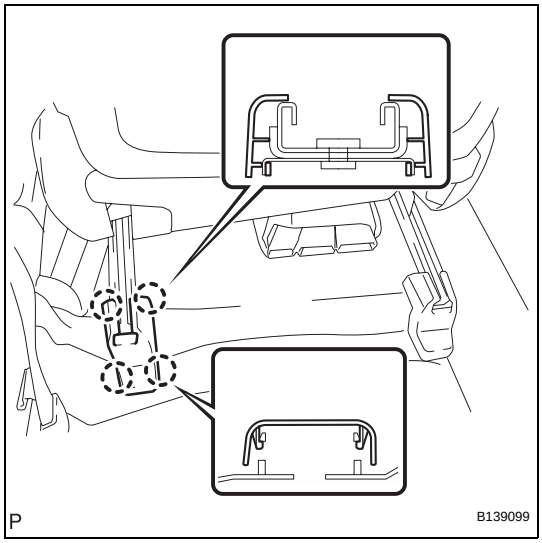
Wait for 90 seconds after disconnecting the cable to prevent the airbag from deploying (See page RS-1).

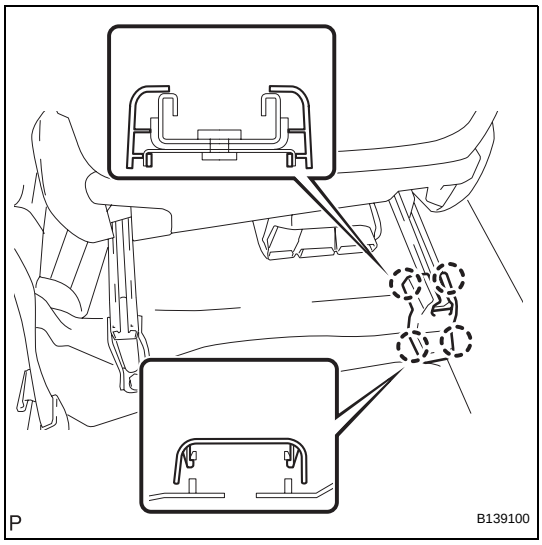
2. REMOVE FRONT SEAT HEADREST ASSEMBLY

3. REMOVE SEAT TRACK COVER

(a) Move the front seat assembly fully forward by operating the slide handle.

(b) Using a screwdriver, disengage the 4 claws and remove the seat track cover.
HINT:
Tape the screwdriver tip before use.



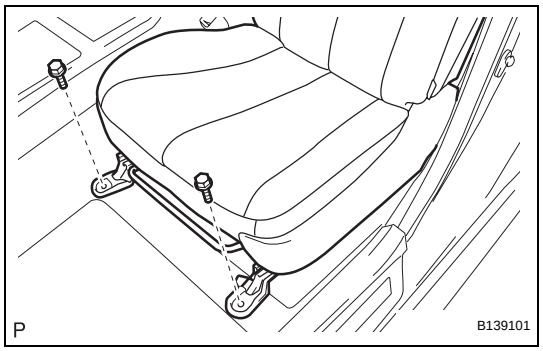


4. REMOVE INNER SEAT TRACK BRACKET COVER

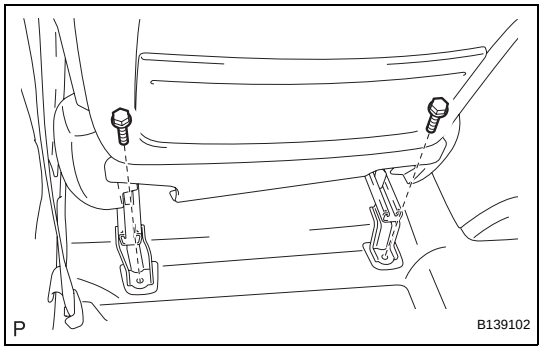
(a) Using a screwdriver, disengage the 4 claws and remove the inner seat track bracket cover.
HINT:
Tape the screwdriver tip before use.

5. REMOVE FRONT SEAT ASSEMBLY

(a) Move the front seat assembly to the rearmost position by operating the slide handle.



(b) Remove the 2 bolts on the front seat track bracket.
(c) Move the front seat assembly fully forward by operating the slide handle.



(d) Remove the 2 bolts on the rear seat track bracket.
(e) Move the front seat assembly to the center position and adjust the seatback to the vertical position by operating the slide and reclining adjuster release handle.
(f) Disconnect the connectors and clamp.
(g) Remove the front seat assembly.

SE

INSTALLATION

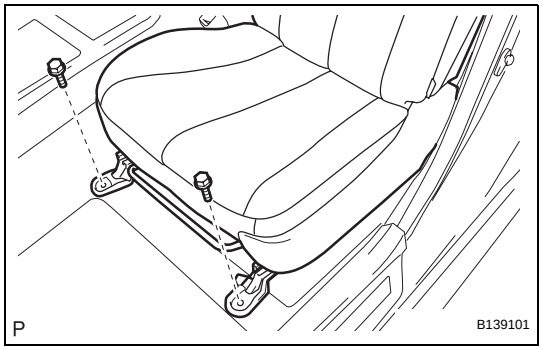
1. INSTALL FRONT SEAT ASSEMBLY

(a) Place the front seat assembly in the vehicle and align the adjuster pin with the hole on the vehicle side.

(b) Connect the connector and clamp.

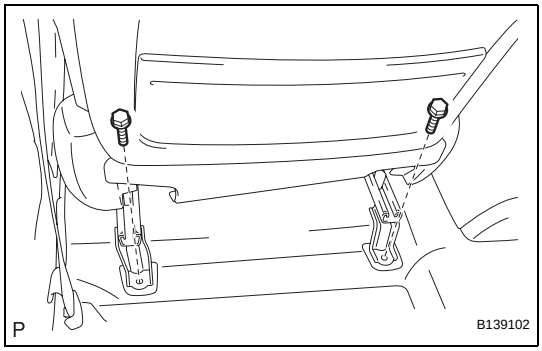
(c) Move the front seat assembly to the rearmost position by operating the slide handle.
NOTICE:
Check that the seat is locked.

SE



(d) Temporarily install the front seat track bracket with the 2 bolts.

(e) Move the front seat assembly fully forward by operating the slide handle.
NOTICE:
Check that the seat is locked.



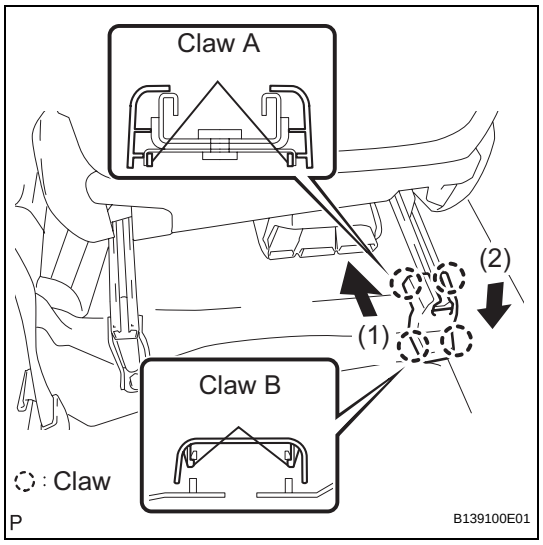
(f) Temporarily install the rear seat track bracket with the 2 bolts.

(g) Move the front seat assembly to the rearmost position by operating the slide handle.
NOTICE:
Check that the seat is locked.

(h) Fully tighten the 2 bolts on the front seat track bracket in the order of the inner side bolt and then the outer side bolt.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

(i) Move the front seat assembly fully forward by operating the slide handle.
NOTICE:
Check that the seat is locked.

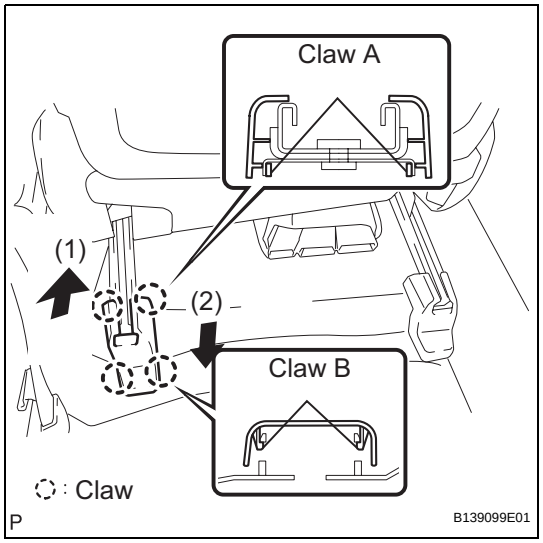
(j) Fully tighten the 2 bolts on the rear seat track bracket in the order of the inner side bolt and then the outer side bolt.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)



2. INSTALL INNER SEAT TRACK BRACKET COVER

(a) Slide the inner seat track bracket cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.

(b) Push the seat track bracket cover inner to engage claw B.



3. INSTALL SEAT TRACK COVER

(a) Slide the seat track cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.

(b) Push the seat track cover to engage claw B.

4. INSTALL FRONT SEAT HEADREST ASSEMBLY

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. INSPECT SLIDE ADJUSTER LOCK

7. PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)
(See page RS-242)

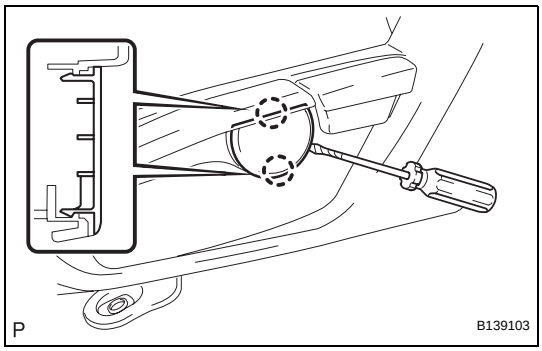
8. INSPECT SRS WARNING LIGHT
Check the SRS warning light (See page RS-32).

SE

SE

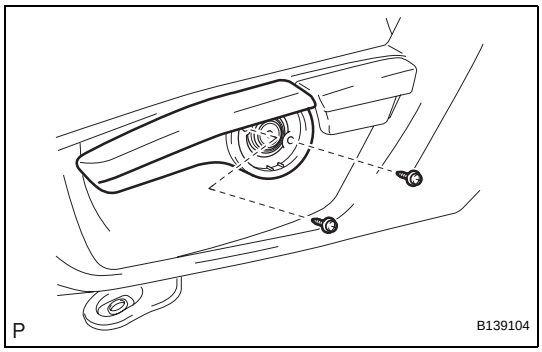
DISASSEMBLY

NOTICE:
Wear protective gloves. Sharp areas on the seat frame and adjuster may injure your hands.



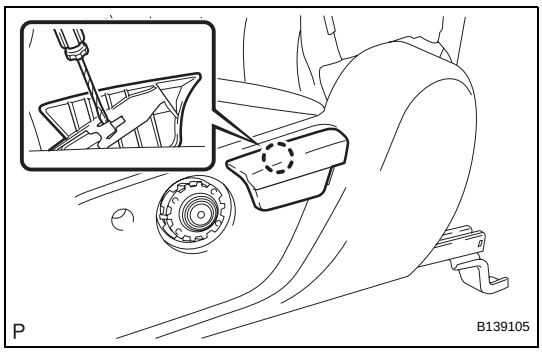
1. REMOVE VERTICAL ADJUSTER COVER LH (for Driver Seat)

(a) Using a screwdriver, disengage the 2 claws and remove the vertical adjuster cover LH.
HINT:
Tape the screwdriver tip before use.



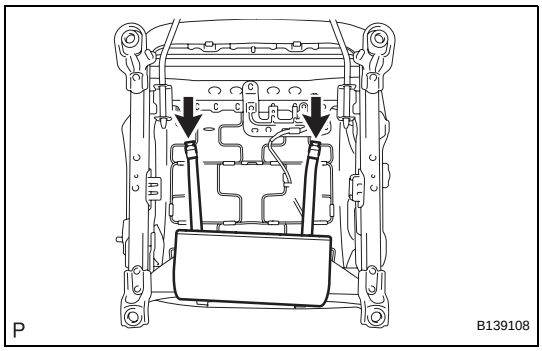
2. REMOVE VERTICAL ADJUSTING HANDLE NO. 2 (for Driver Seat)

(a) Remove the 2 screws and vertical adjusting handle.



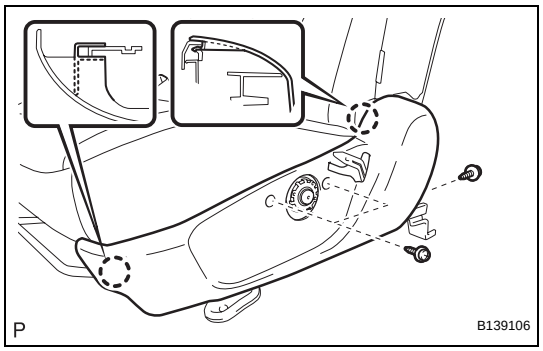
3. REMOVE RECLINING ADJUSTER RELEASE HANDLE

(a) Lift the reclining adjuster release handle.
(b) Using a screwdriver, disengage the claw and remove the reclining adjuster release handle.
HINT:
Tape the screwdriver tip before use.

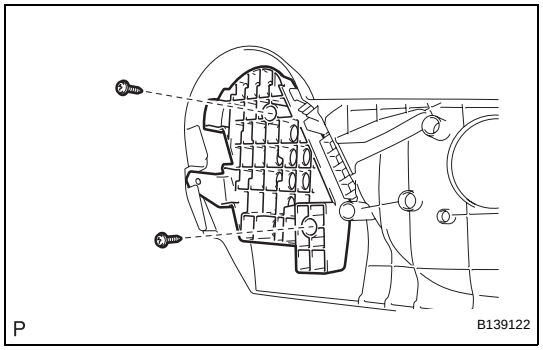


4. REMOVE FRONT SEAT CUSHION SHIELD

(a) Disengage the 2 hooks.

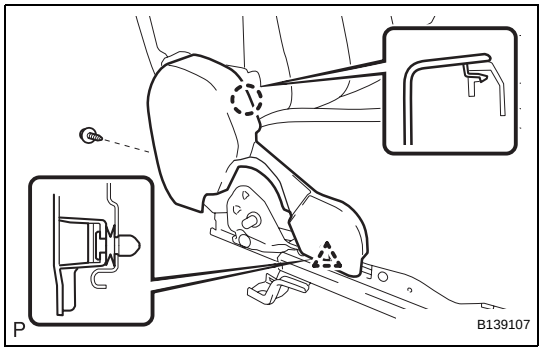


(b) Remove the 3 screws.
(c) Disengage the 2 claws and remove the front seat cushion shield.

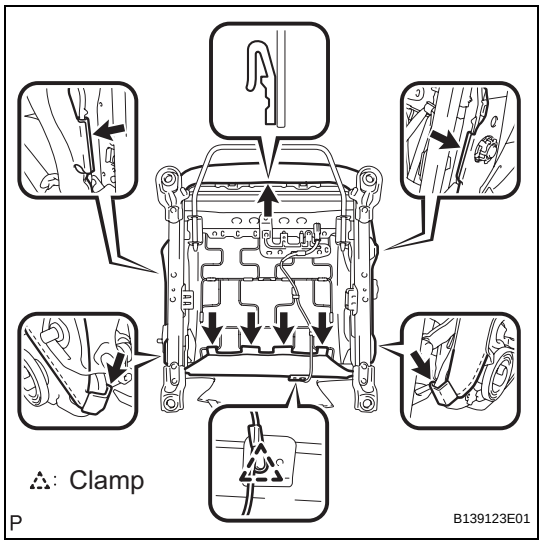


5. REMOVE LOWER SEAT TRACK SPACER
(a) Remove the 2 screws and lower seat track spacer.

6. REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-15)

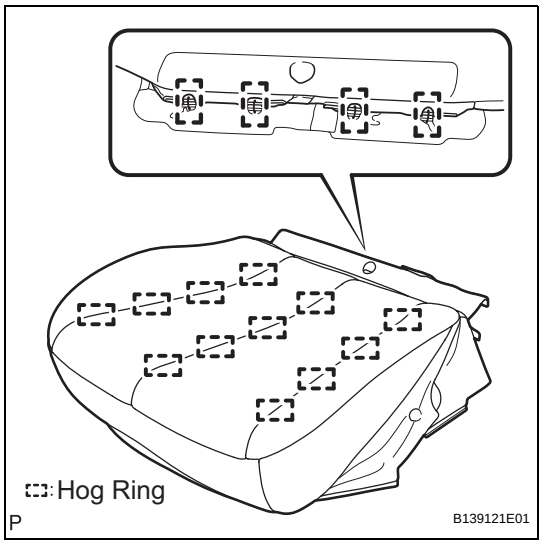


7. REMOVE FRONT INNER SEAT CUSHION SHIELD
(a) Remove the screw.
(b) Disengage the claw and clip, and then remove the front inner seat cushion shield.



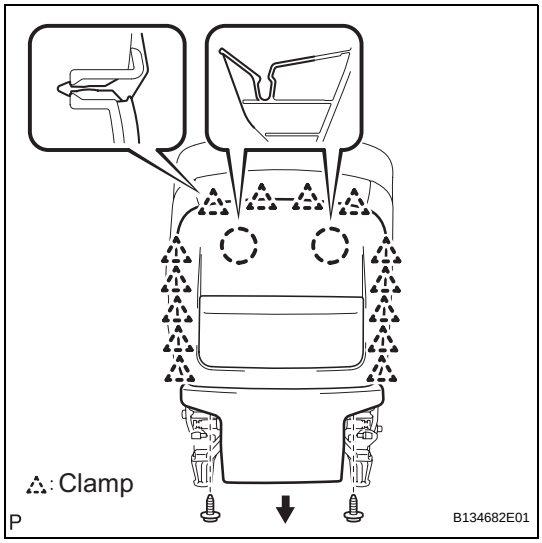
8. REMOVE FRONT SEAT CUSHION COVER WITH PAD
(a) Disengage the clamp.
(b) Disengage the hooks and remove the front seat cushion cover with pad.

SE



9. REMOVE SEPARATE TYPE FRONT SEAT CUSHION COVER

(a) Remove the 16 hog rings and separate type front seat cushion cover.

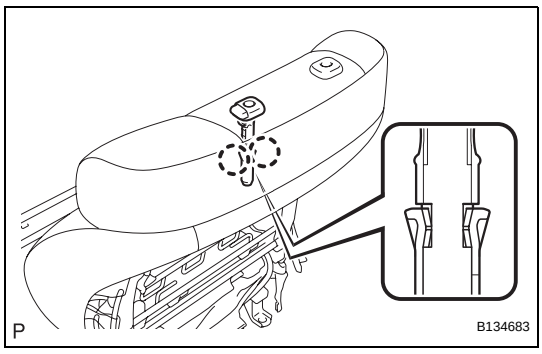


10. REMOVE FRONT SEAT BACK BOARD SUB-ASSEMBLY

(a) Remove the 2 screws.

(b) Disconnect the 14 clamps and front separate type seat back cover.

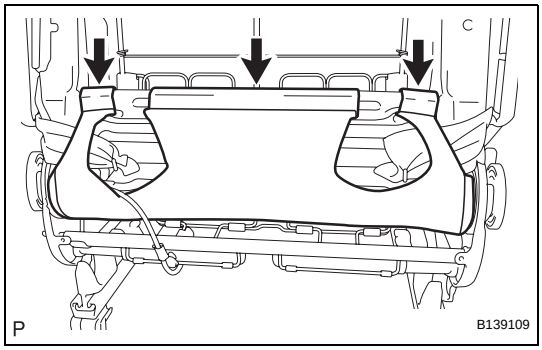
(c) Pull the seat back board in the direction indicated by the arrow in the illustration to detach the 2 claws. Then, remove the seat back board.



11. REMOVE FRONT SEAT HEADREST SUPPORT

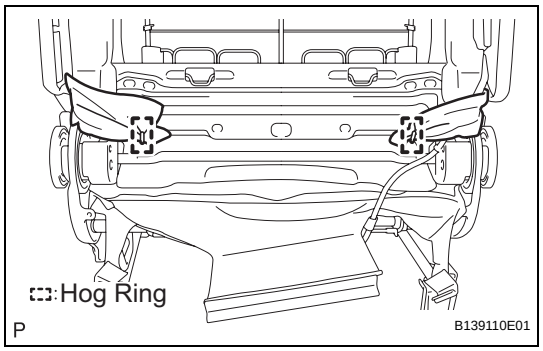
(a) Detach the 2 claws and remove the headrest support.

12. REMOVE FRONT SEAT HEADREST SUPPORT

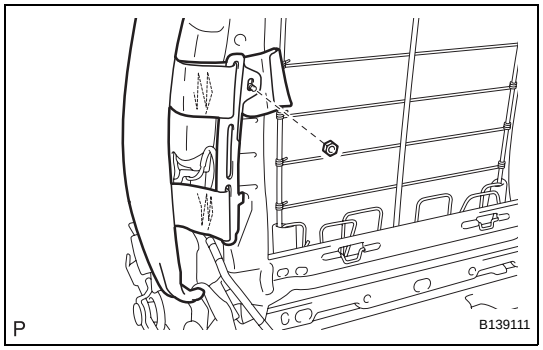


13. REMOVE FRONT SEAT BACK COVER WITH PAD

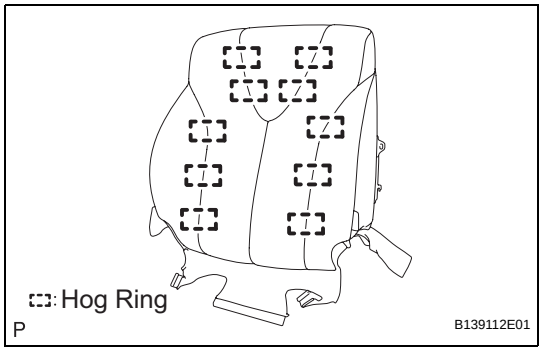
(a) Disengage the 3 hooks.



(b) Remove the 2 hog rings.



(c) Remove the nut and separate the 2 brackets.
(d) Remove the front seat back cover with pad.

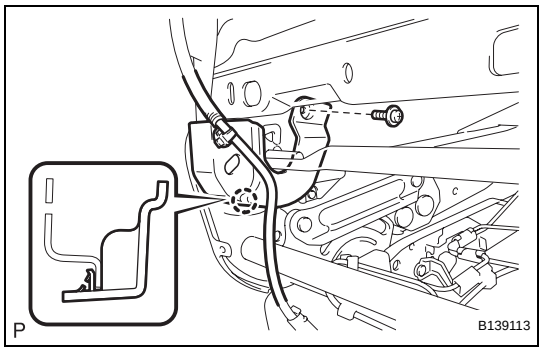


14. REMOVE FRONT SEPARATE TYPE SEAT BACK COVER

(a) Remove the 10 hog rings and front separate type seat back cover.

15. REMOVE RECLINING ADJUSTER INSIDE COVER LH

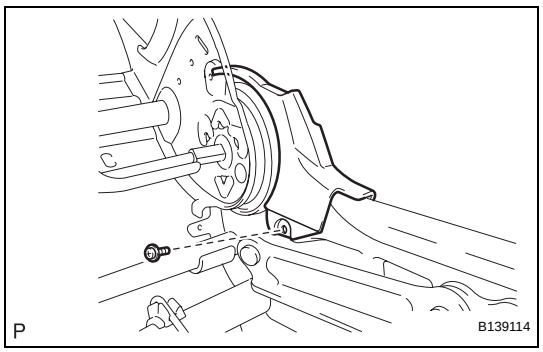
(a) Disconnect the clamp.



(b) Remove the screw.
(c) Disengage the claw and remove the reclining adjuster inside cover LH.

16. REMOVE RECLINING ADJUSTER INSIDE COVER RH

HINT:
Use the same procedures for the RH side and LH side.



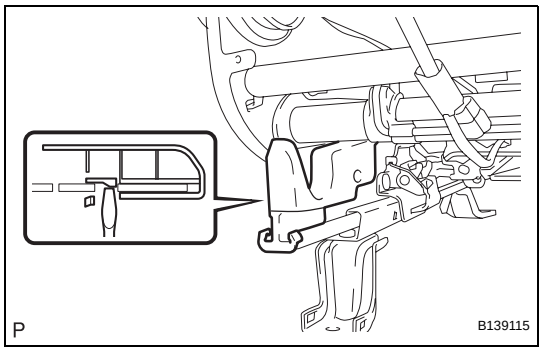
17. REMOVE RECLINING ADJUSTER INSIDE COVER LH

(a) Remove the screw and reclining adjuster inside cover LH.

18. REMOVE RECLINING ADJUSTER INSIDE COVER RH

HINT:
Use the same procedures for the RH side and LH side.

SE



19. REMOVE FRONT LOWER SEAT CUSHION SHIELD LH

(a) Using a screwdriver, disengage the claw and remove the front lower seat cushion shield LH.

20. REMOVE FRONT LOWER SEAT CUSHION SHIELD RH

HINT:

Use the same procedures for the RH side and LH side.

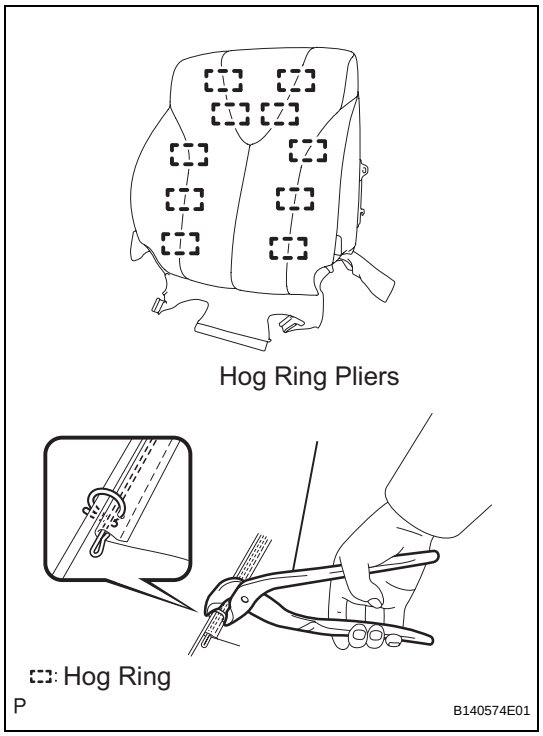
21. REMOVE SEAT POSITION SENSOR (for Driver Seat) (See page RS-461)

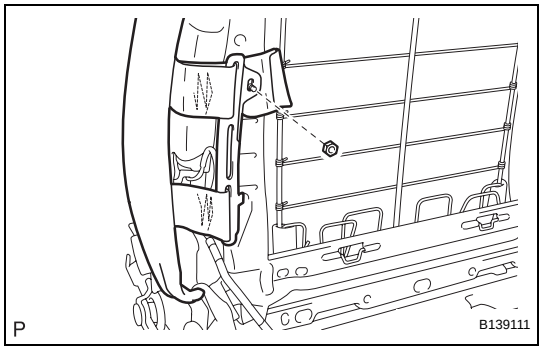
SE

REASSEMBLY

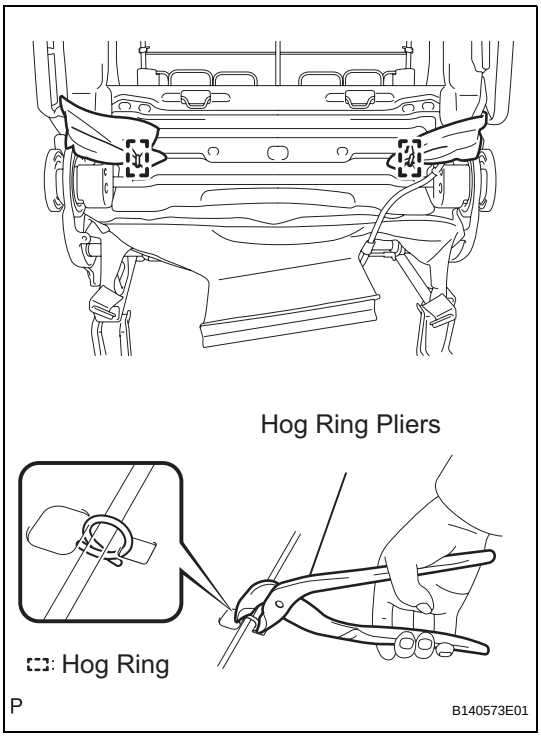
NOTICE:
Wear protective gloves. Sharp areas on the seat frame and adjuster may injure your hands.

1. **INSTALL SEAT POSITION SENSOR (for Driver Side) (See page RS-464)**
2. **INSTALL FRONT LOWER SEAT CUSHION SHIELD LH**
3. **INSTALL FRONT LOWER SEAT CUSHION SHIELD RH**
4. **INSTALL RECLINING ADJUSTER INSIDE COVER LH**
5. **INSTALL RECLINING ADJUSTER INSIDE COVER RH**
6. **INSTALL RECLINING ADJUSTER INSIDE COVER LH**
7. **INSTALL RECLINING ADJUSTER INSIDE COVER RH**
8. **INSTALL FRONT SEPARATE TYPE SEAT BACK COVER**
   (a) Using hog ring pliers, install the front separate type seat back cover to the front separate type seat back pad with 10 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**

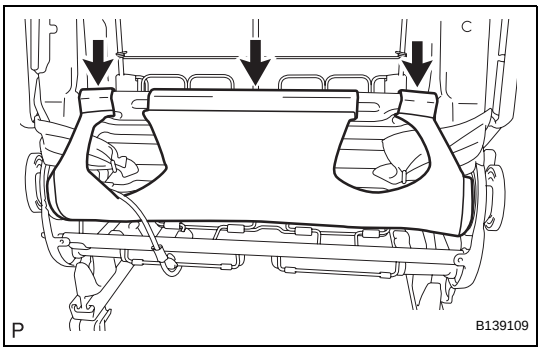




9. **INSTALL FRONT SEAT BACK COVER WITH PAD**
   (a) Fully cover the airbag with the 2 seat back cover brackets and tighten the nut.
   Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)
   NOTICE:
   - **For vehicles with side airbags, the seat back cover must be securely installed. Otherwise, the side airbags may not deploy properly.**
   - **Make sure that the strap is not twisted after installing the bracket.**
   - **Install the bracket securely.**

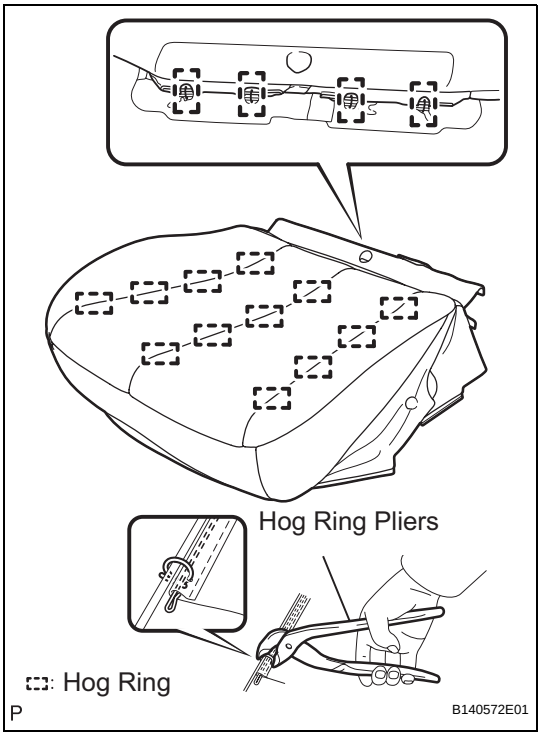


(b) Using hog ring pliers, install the seat back cover (with pad) to the seat frame with 2 new hog rings, and attach the hooks.



(c) Engage the 3 hooks.

10. **INSTALL FRONT SEAT HEADREST SUPPORT**
11. **INSTALL FRONT SEAT HEADREST SUPPORT**
12. **INSTALL FRONT SEAT BACK BOARD SUB-ASSEMBLY**



13. **INSTALL SEPARATE TYPE FRONT SEAT CUSHION COVER**
    (a) Using hog ring pliers, install the separate type front seat cushion cover to the seat back pad with 16 new hog rings.
    NOTICE:
    - **Be careful not to damage the cover.**
    - **When installing the hog rings, take care to minimize wrinkles as much as possible.**
14. **INSTALL FRONT SEAT CUSHION COVER WITH PAD**
15. **INSTALL FRONT INNER SEAT CUSHION SHIELD**
16. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-16)**
17. **INSTALL LOWER SEAT TRACK SPACER**
18. **INSTALL FRONT SEAT CUSHION SHIELD (for Driver Seat)**
19. **INSTALL RECLINING ADJUSTER RELEASE HANDLE**

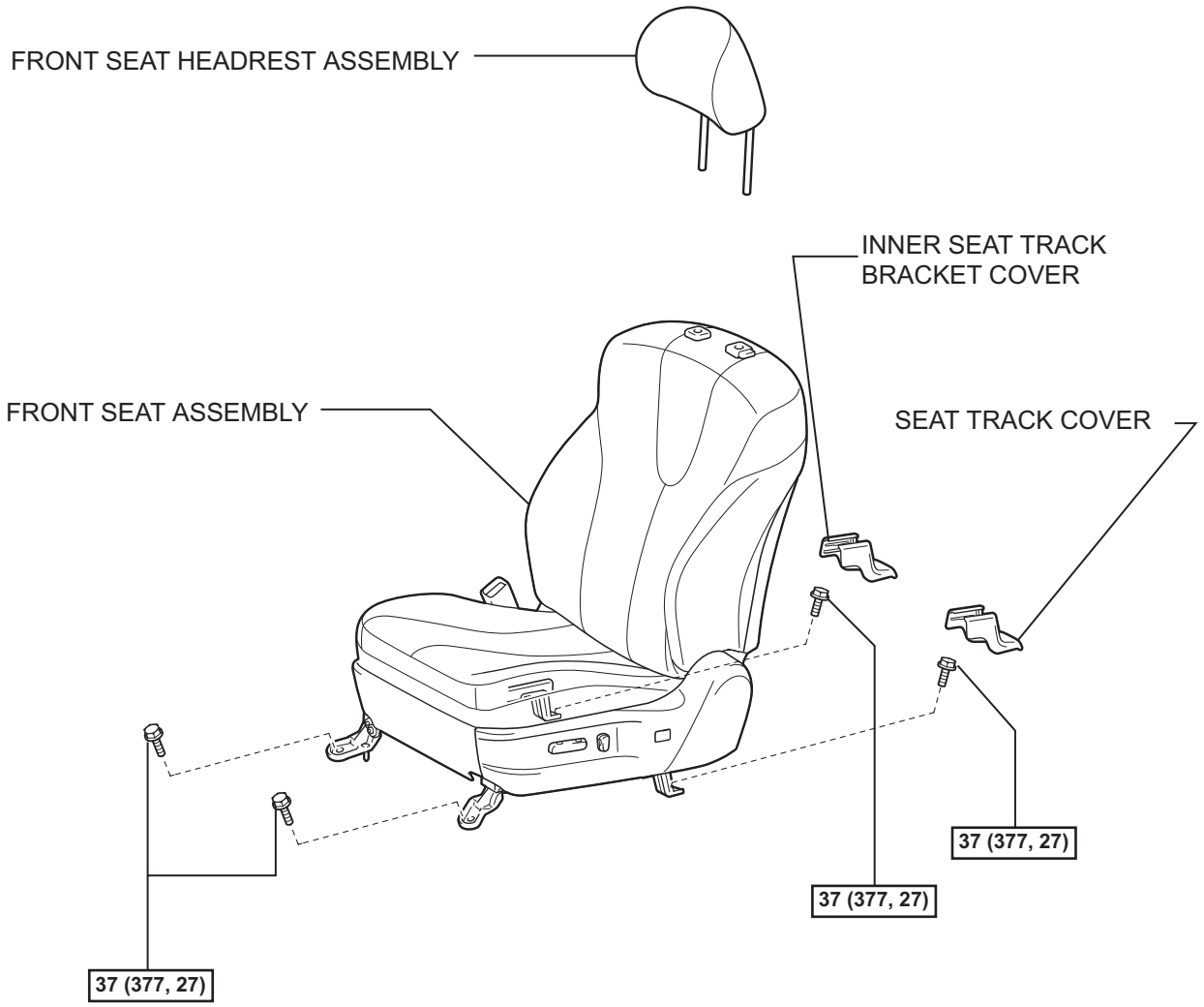
20. INSTALL VERTICAL ADJUSTING HANDLE NO. 2 (for Driver Seat)

21. INSTALL VERTICAL ADJUSTER COVER LH (for Driver Seat)

FRONT SEAT ASSEMBLY (for Power Seat)

COMPONENTS

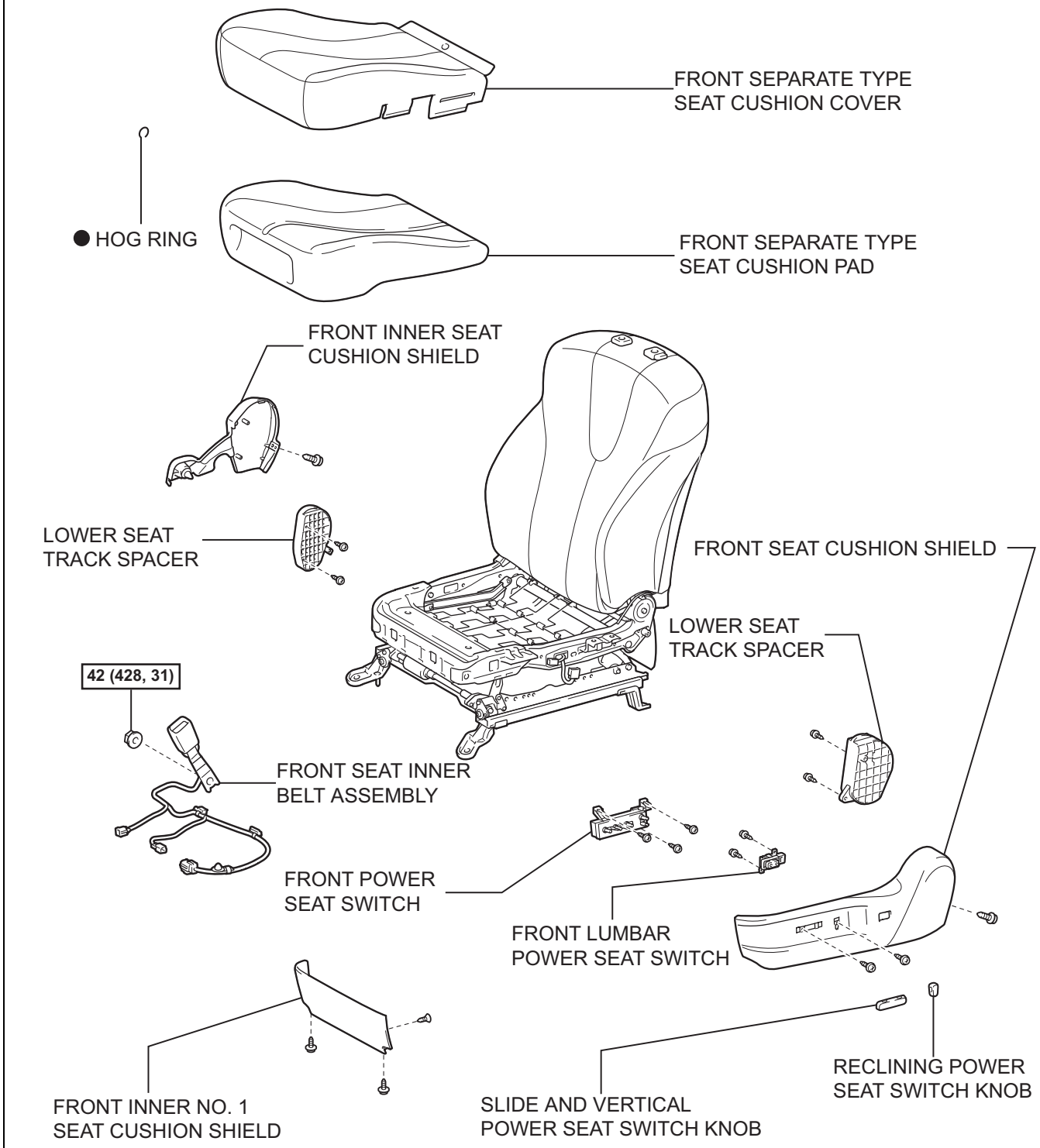
SE



N*m (kgf*cm, ft.*lbf): Specified torque

P

B134694E01

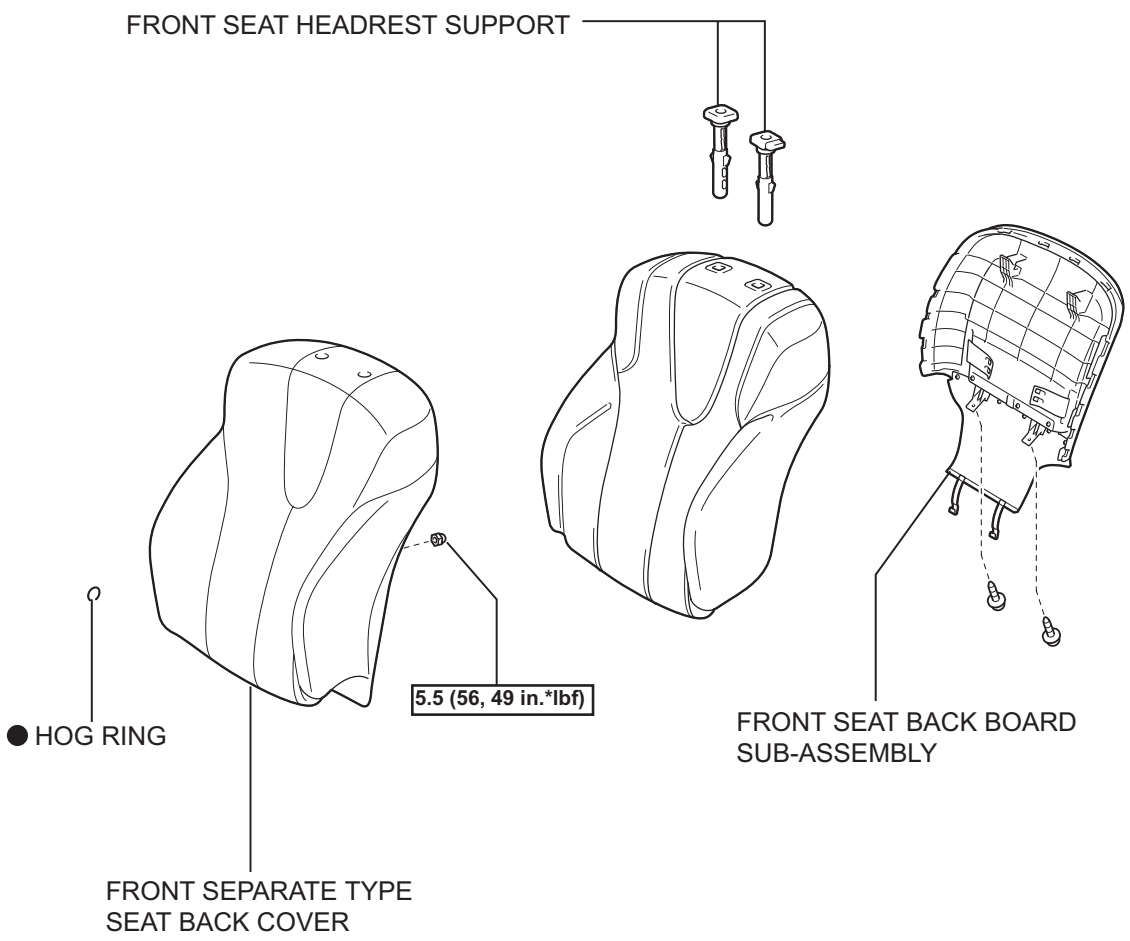


● Non-reusable part N*m (kgf*cm, ft.*lbf) : Specified torque

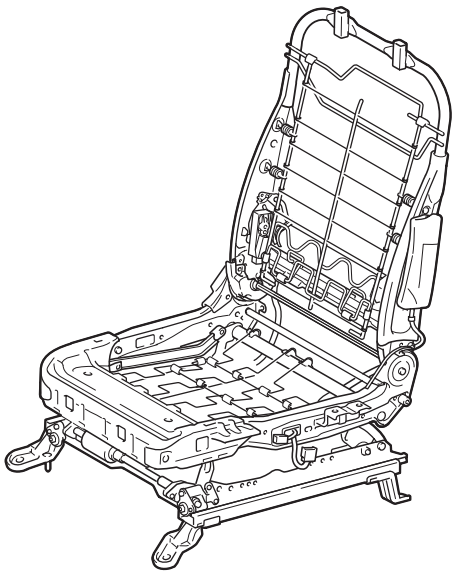
P

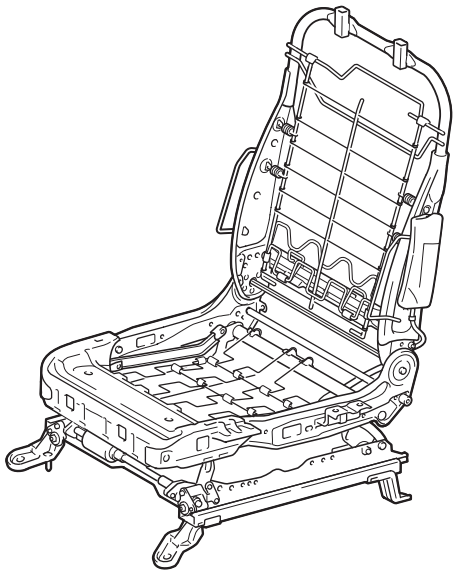
B134695E01

SE



for Sport Seat Type :

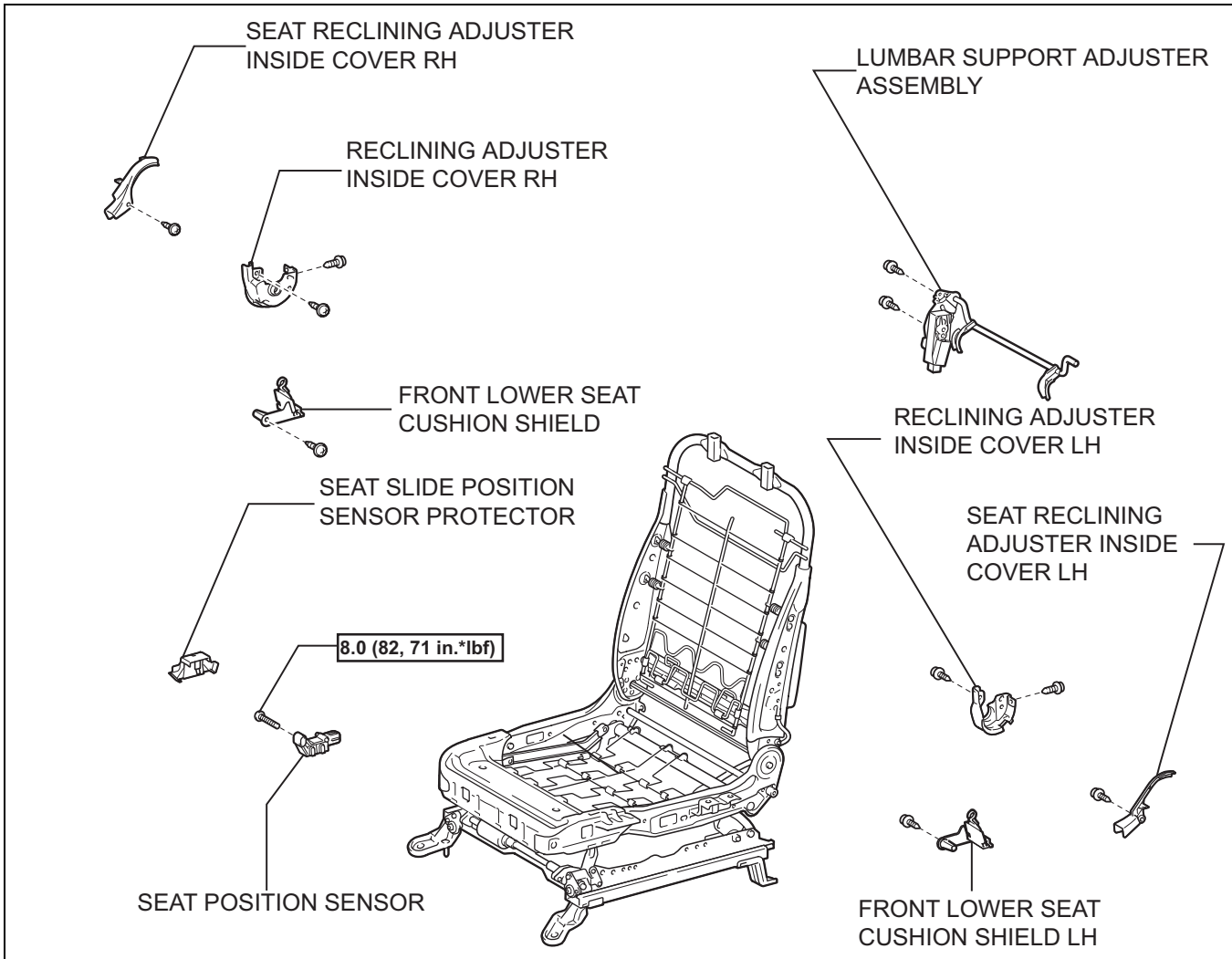


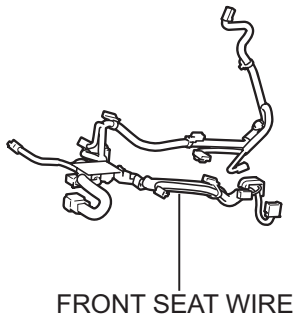


● Non-reusable part N*m (kgf*cm, ft.*lbf): Specified torque

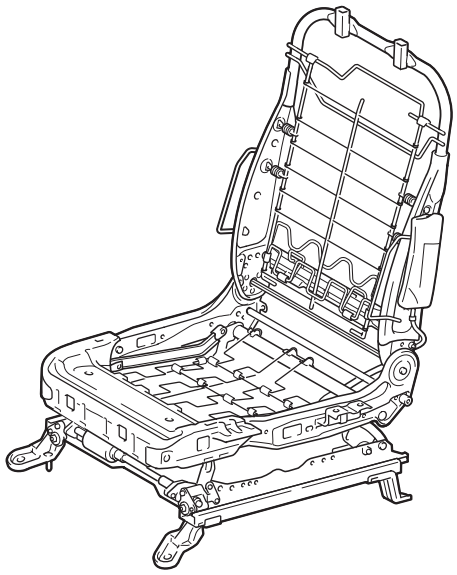
P

B134696E01





for Sport Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

P

B144024E01

SE

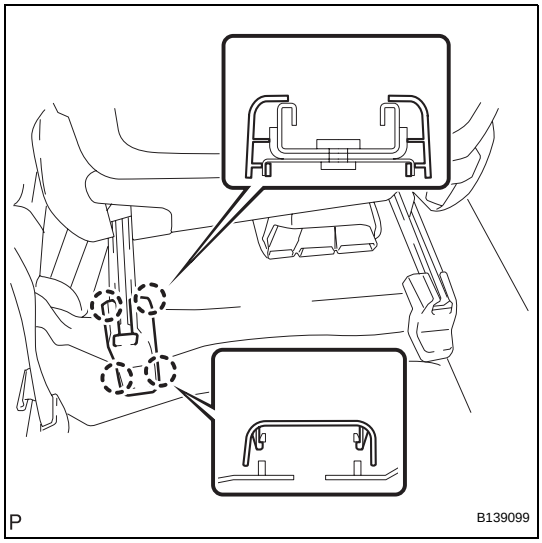
REMOVAL

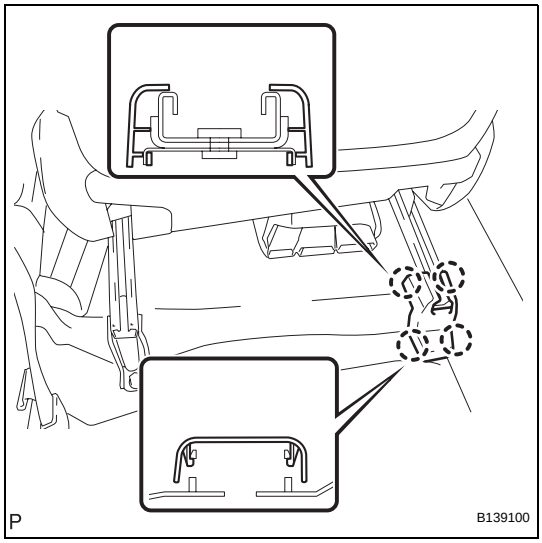
1. REMOVE FRONT SEAT HEADREST ASSEMBLY

2. REMOVE SEAT TRACK COVER

(a) Operate the power seat switch knob and move the seat to the position farthest forward.

(b) Using a screwdriver, detach the 4 claws and remove the seat track cover.
HINT:
Tape the screwdriver tip before use.



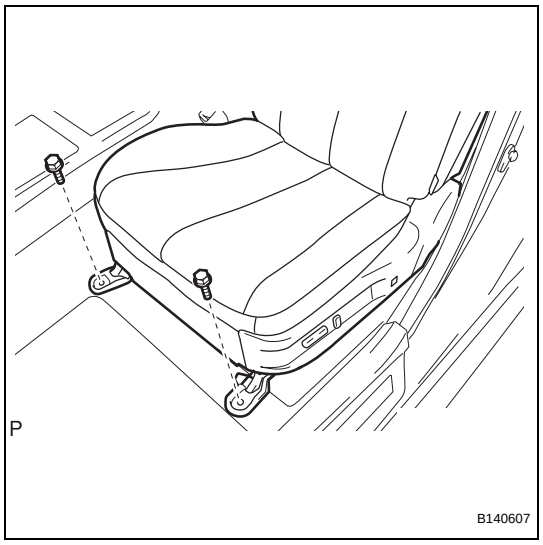


3. REMOVE INNER SEAT TRACK BRACKET COVER

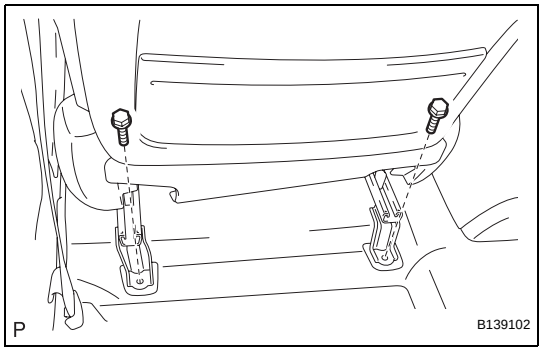
(a) Using a screwdriver, detach the 4 claws and remove the inner seat track bracket cover.

4. REMOVE FRONT SEAT ASSEMBLY

(a) Operate the power seat switch knob and move the seat to the rearmost position.



(b) Remove the 2 bolts on the front seat track bracket.
(c) Operate the power seat switch knob and move the seat to the position farthest forward.

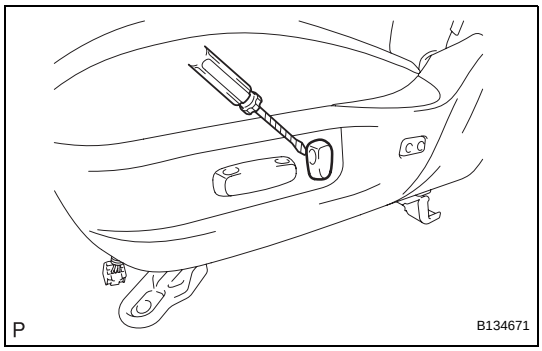


(d) Remove the 2 bolts on the rear seat track bracket.
(e) Disconnect the cable from the negative (-) battery terminal.
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent the airbag and seat belt pretensioner from deploying (See page RS-1).
(f) Disconnect the connectors under the seat. Then remove the front seat assembly.

SE

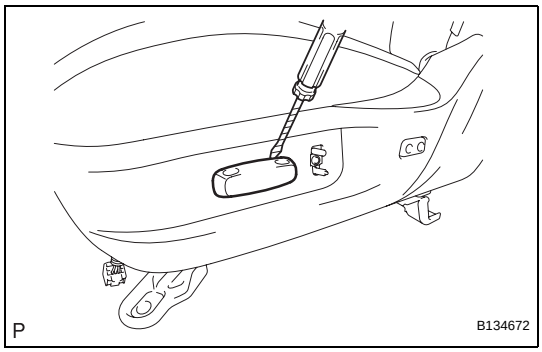
DISASSEMBLY

CAUTION:
Wear protective gloves. Sharp areas on the seat frame and adjuster may injure your hands.



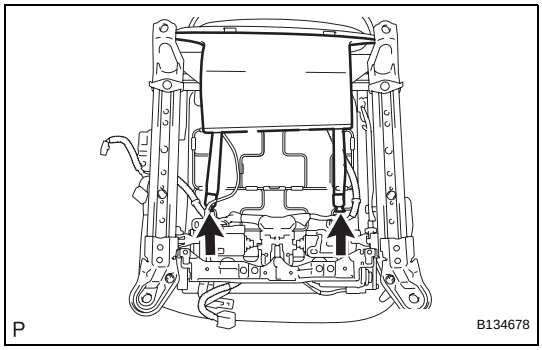
1. REMOVE RECLINING POWER SEAT SWITCH KNOB

(a) Using a screwdriver, detach the reclining power seat switch knob.
HINT:
Tape the screwdriver tip before use.



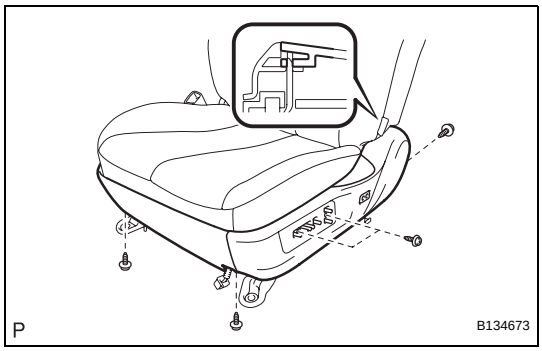
2. REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB

(a) Using a screwdriver, detach the slide and vertical power seat switch knob.
HINT:
Tape the screwdriver tip before use.

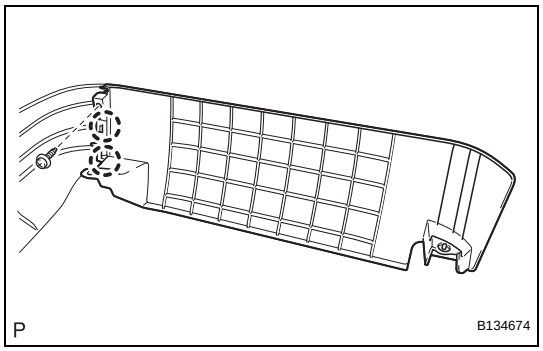


3. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY

(a) Disconnect the 2 hooks.



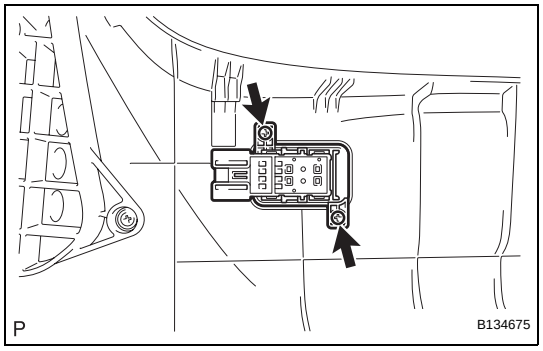
(b) Remove the 5 screws.
(c) Disengage the claw and separate the front seat cushion shield assembly.
(d) Disconnect the connector from the front power seat lumbar switch.



4. REMOVE FRONT INNER NO. 1 SEAT CUSHION SHIELD

(a) Remove the screw.

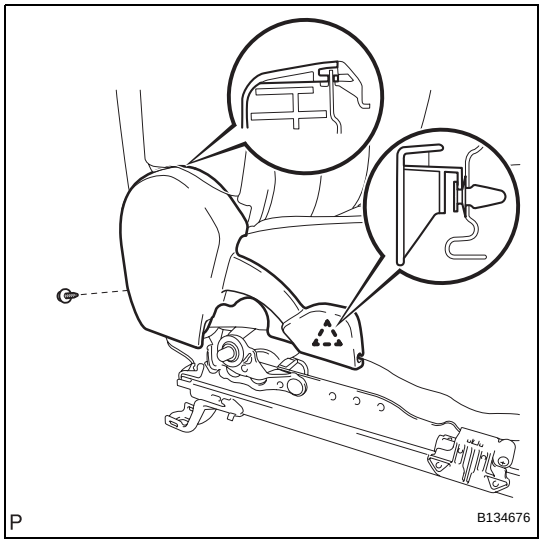
(b) Detach the 2 claws and remove the front inner No. 1 seat cushion shield.



5. REMOVE FRONT LUMBAR POWER SEAT SWITCH

(a) Remove the 2 screws and front lumbar power seat switch.

6. REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-16)



7. REMOVE FRONT INNER SEAT CUSHION SHIELD

(a) Remove the screw.

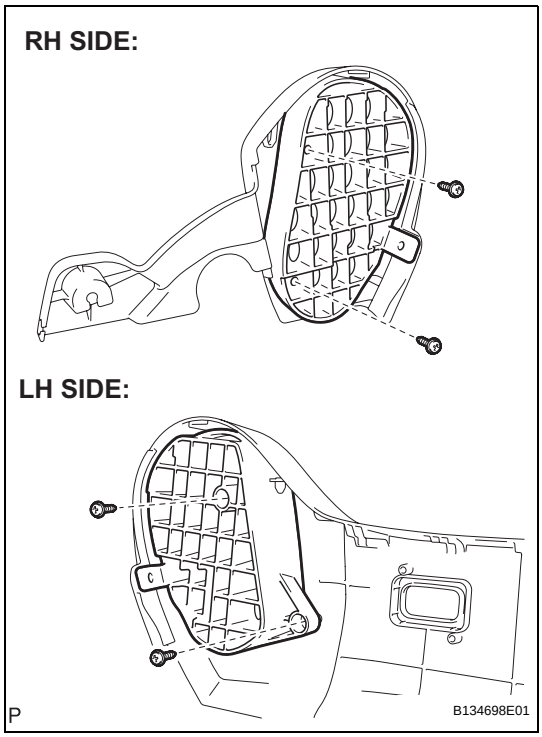
(b) Using a clip remover, detach the clip.

(c) Using a screwdriver, detach the claw and remove the front inner seat cushion shield.

HINT:

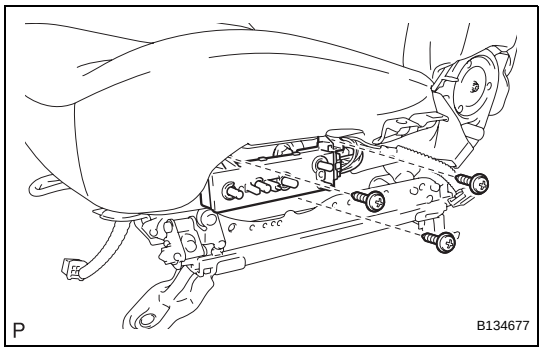
Tape the screwdriver tip before use.

SE



8. REMOVE LOWER SEAT TRACK SPACER

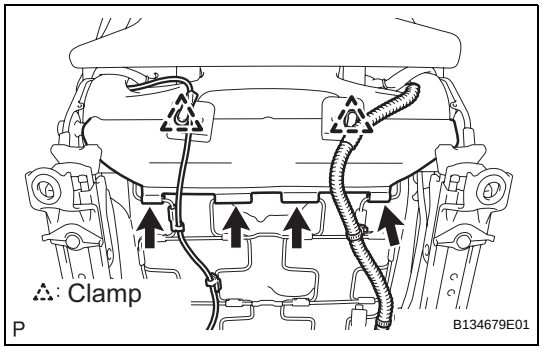
(a) Remove the 2 screws and lower seat track spacer.



9. REMOVE FRONT POWER SEAT SWITCH

(a) Remove the 3 screws.

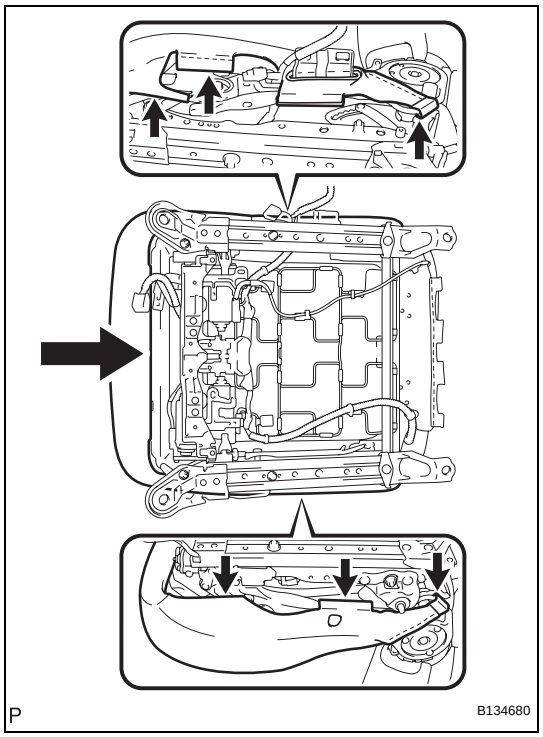
(b) Disconnect the connector and remove the front power seat switch.



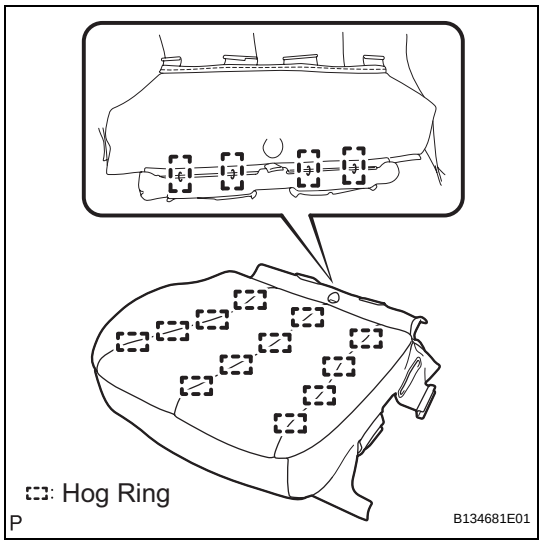
10. REMOVE FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY

(a) Disconnect the 2 clamps.

(b) Remove the 4 hooks.

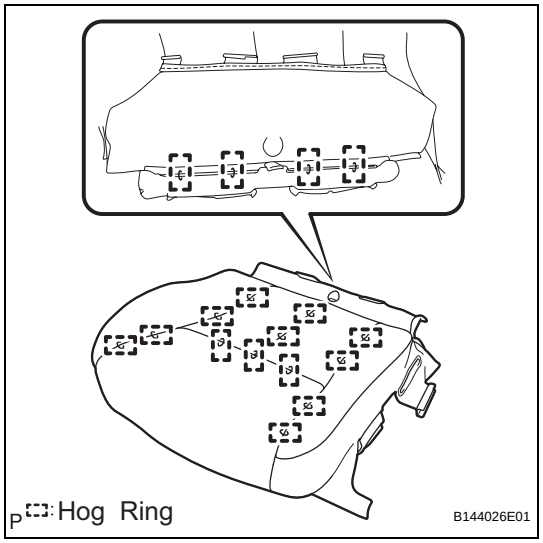


(c) Using a screwdriver, detach the hooks and remove the front separate type seat cushion assembly.



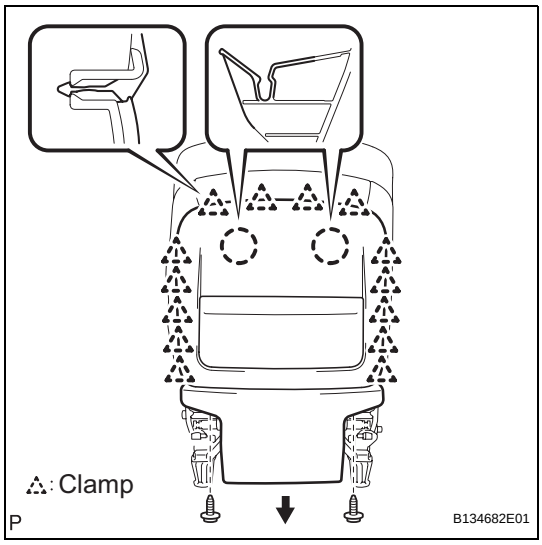
11. REMOVE FRONT SEPARATE TYPE SEAT CUSHION COVER (for Except Sports Seat Type)

(a) Remove the 16 hog rings and front separate type seat cushion cover from the seat cushion pad.



12. REMOVE FRONT SEPARATE TYPE SEAT CUSHION COVER (for Sports Seat Type)

(a) Remove the 17 hog rings and front separate type seat cushion cover from the seat cushion pad.

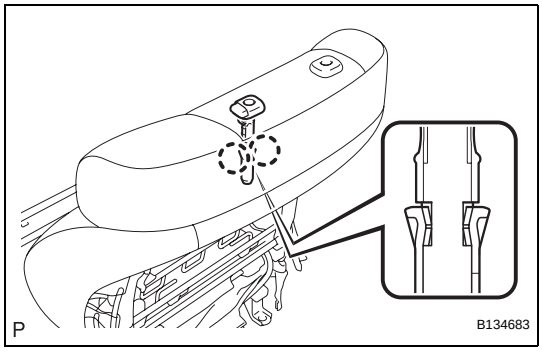


13. REMOVE FRONT SEAT BACK BOARD SUB-ASSEMBLY

(a) Remove the 2 screws.

(b) Disconnect the 14 clamps and front separate type seat back cover.

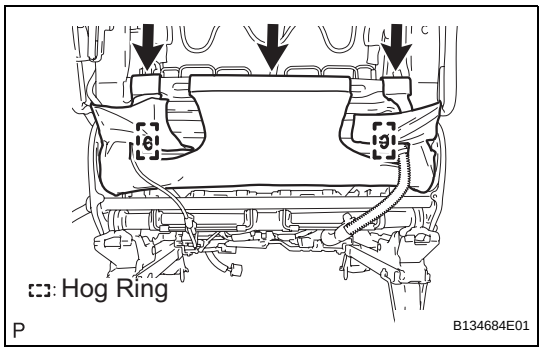
(c) Pull the seat back board in the direction indicated by the arrow in the illustration to detach the 2 claws. Then, remove the seat back board.



14. REMOVE FRONT SEAT HEADREST SUPPORT

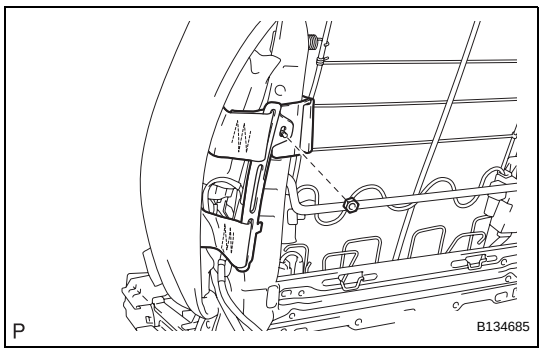
(a) Detach the 2 claws and remove the headrest support.

15. REMOVE FRONT SEAT HEADREST SUPPORT

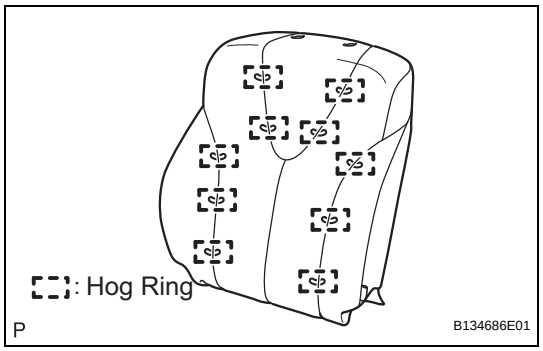


16. REMOVE FRONT SEPARATE TYPE SEAT BACK ASSEMBLY

(a) Remove the 2 hog rings and 3 hooks.

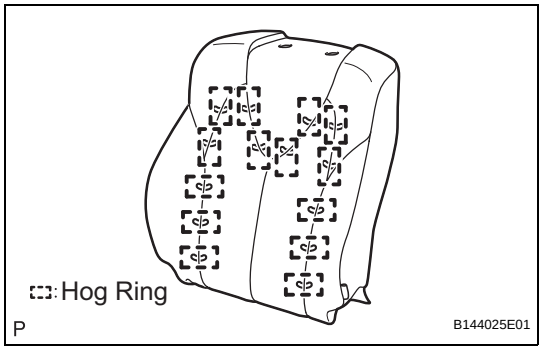


(b) Remove the nut and 2 seat back cover brackets.



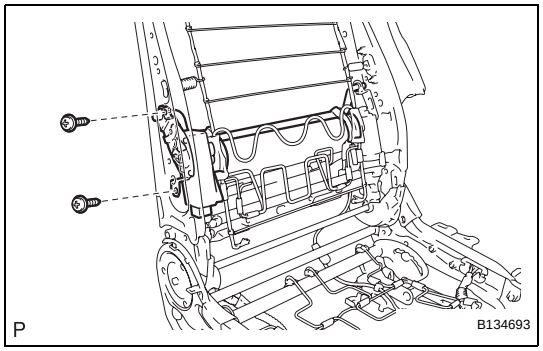
17. REMOVE FRONT SEPARATE TYPE SEAT BACK COVER (for Except Sports Seat Type)

(a) Remove the 10 hog rings and front separate type seat back cover from the seat back pad.



18. REMOVE FRONT SEPARATE TYPE SEAT BACK COVER (for Sports Seat Type)

(a) Remove the 14 hog rings and front separate type seat back cover from the seat back pad.



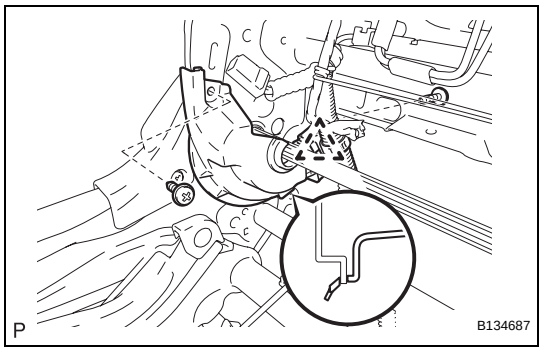
19. REMOVE LUMBAR SUPPORT ADJUSTER ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 2 screws and lumbar support adjuster assembly.

20. REMOVE RECLINING ADJUSTER INSIDE COVER RH

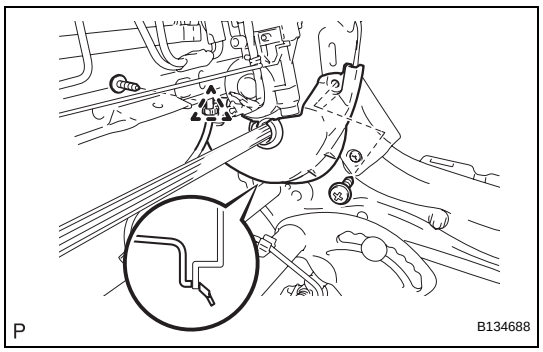
(a) Disconnect the harness.



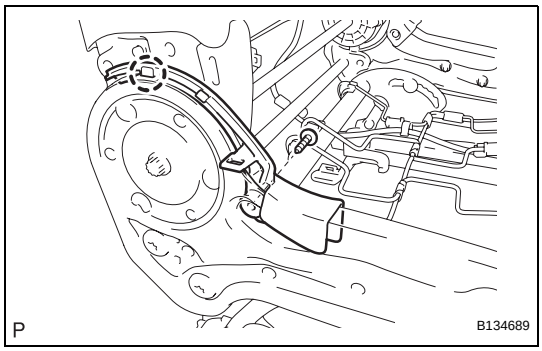
(b) Remove the 2 screws and reclining adjuster inside cover RH.

21. REMOVE RECLINING ADJUSTER INSIDE COVER LH

(a) Disconnect the harness.



(b) Remove the 2 screws and reclining adjuster inside cover LH.

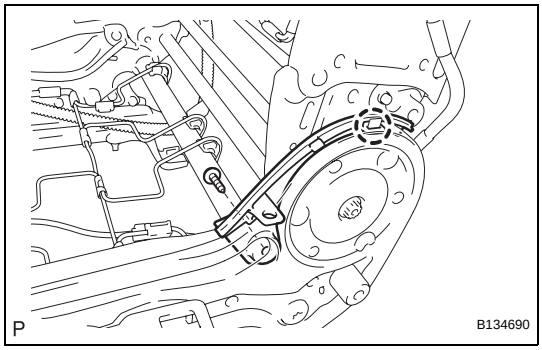


22. REMOVE SEAT RECLINING ADJUSTER INSIDE COVER RH

(a) Remove the screw.

(b) Detach the claw and remove the seat reclining adjuster inside cover RH.

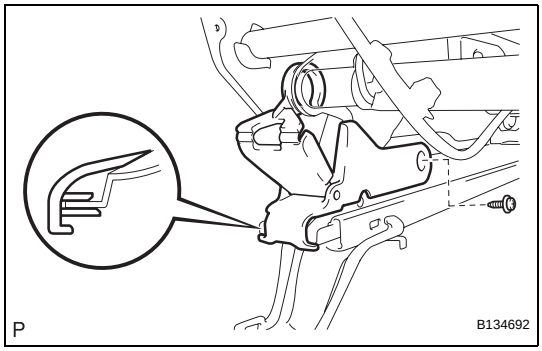
SE



23. REMOVE SEAT RECLINING ADJUSTER INSIDE COVER LH

(a) Remove the screw.

(b) Detach the claw and remove the seat reclining adjuster inside cover LH.



24. REMOVE FRONT LOWER SEAT CUSHION SHIELD LH

(a) Remove the screw and detach the hook of the front lower seat cushion shield LH.

25. REMOVE FRONT LOWER SEAT CUSHION SHIELD

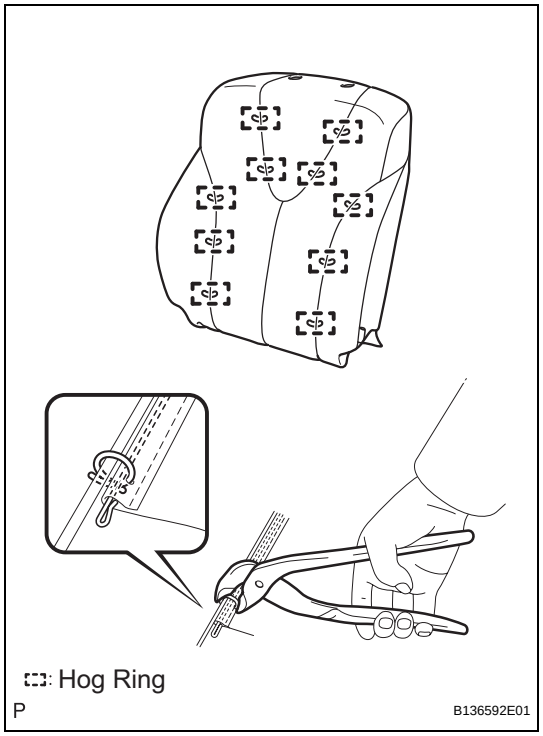
26. REMOVE SEAT POSITION SENSOR (for Driver Side) (See page RS-462)

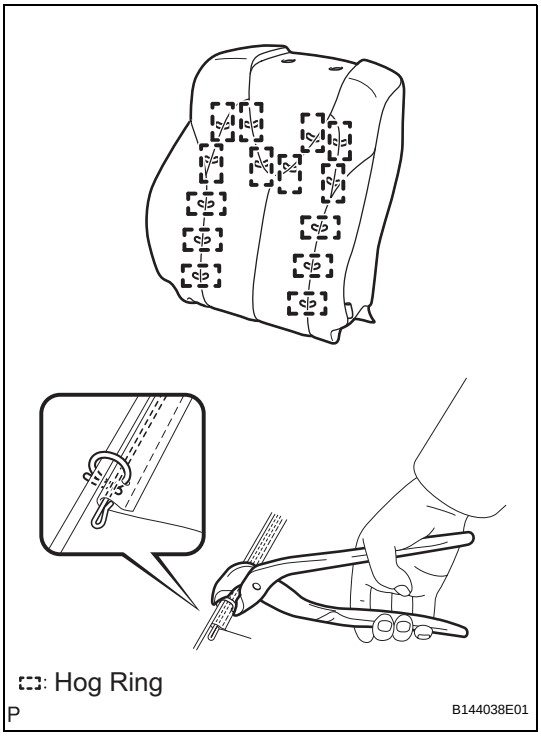
27. REMOVE FRONT SEAT WIRE

REASSEMBLY

CAUTION:
Wear protective gloves. Sharp areas on the seat adjuster may injure your hands.

1. **INSTALL FRONT SEAT WIRE**
2. **INSTALL SEAT POSITION SENSOR (for Driver Side) (See page RS-462)**
3. **INSTALL FRONT LOWER SEAT CUSHION SHIELD**
4. **INSTALL FRONT LOWER SEAT CUSHION SHIELD LH**
5. **INSTALL SEAT RECLINING ADJUSTER INSIDE COVER LH**
6. **INSTALL SEAT RECLINING ADJUSTER INSIDE COVER RH**
7. **INSTALL RECLINING ADJUSTER INSIDE COVER LH**
8. **INSTALL RECLINING ADJUSTER INSIDE COVER RH**
9. **INSTALL LUMBAR SUPPORT ADJUSTER ASSEMBLY**
10. **INSTALL FRONT SEPARATE TYPE SEAT BACK COVER (for Except Sports Seat Type)**
    (a) Using hog ring pliers, install the front separate type seat back cover to the front seat back pad with 16 new hog rings.
    NOTICE:
    - **Be careful not to damage the cover.**
    - **When installing the hog rings, take care to minimize wrinkles as much as possible.**



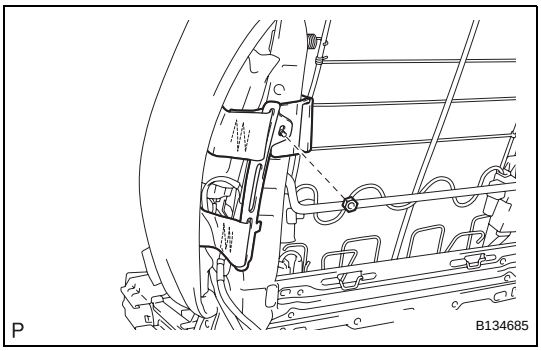


11. INSTALL FRONT SEPARATE TYPE SEAT BACK COVER (for Sports Seat Type)

(a) Using hog ring pliers, install the front separate type seat back cover to the front seat back pad with 14 new hog rings.

NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**



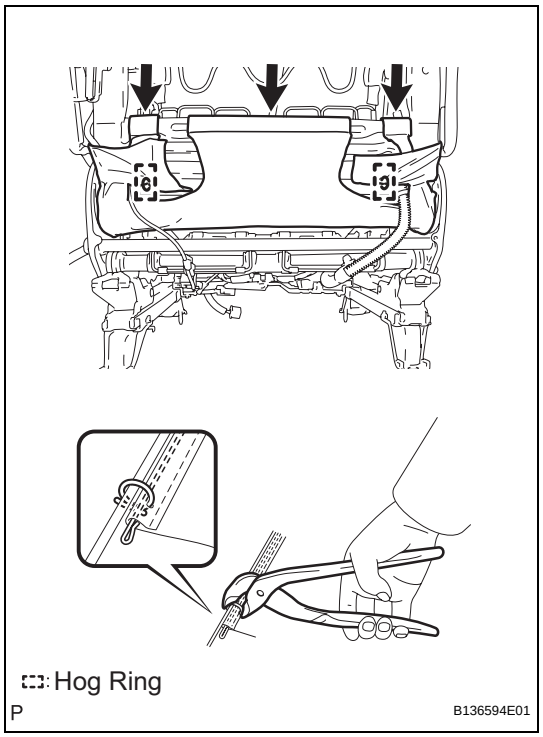
12. INSTALL FRONT SEPARATE TYPE SEAT BACK ASSEMBLY

(a) Fully cover the airbag with the 2 seat back cover brackets and tighten the nut.

Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

NOTICE:

- **For vehicles with side airbags, the seat back cover must be securely installed. Otherwise, the side airbags may not deploy properly.**
- **Make sure that the strap is not twisted after installing the bracket.**
- **Install the bracket securely.**



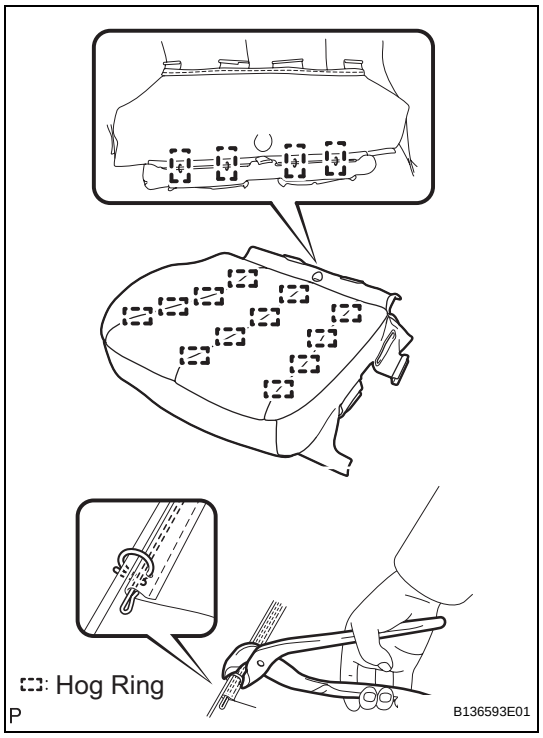
(b) Engage the 3 hooks.
(c) Using hog ring pliers, install 2 new hog rings.
NOTICE:
- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

13. INSTALL FRONT SEAT HEADREST SUPPORT

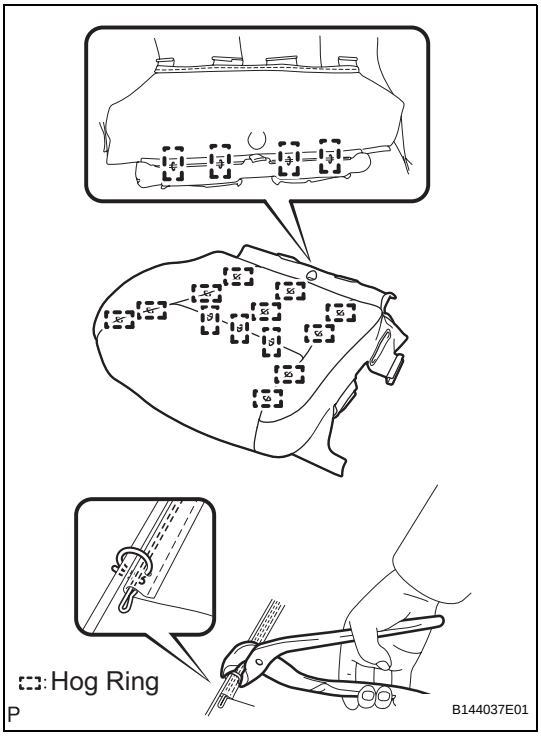
14. INSTALL FRONT SEAT HEADREST SUPPORT

15. INSTALL FRONT SEAT BACK BOARD SUB-ASSEMBLY

SE



16. INSTALL FRONT SEPARATE TYPE SEAT CUSHION COVER (for Except Sports Seat Type)
(a) Using hog ring pliers, install the front separate type seat cushion cover to the front separate type seat pad with 16 new hog rings.
NOTICE:
- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**



17. INSTALL FRONT SEPARATE TYPE SEAT CUSHION COVER (for Sports Seat Type)

(a) Using hog ring pliers, install the front separate type seat cushion cover to the front separate type seat pad with 17 new hog rings.

NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

18. INSTALL FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY

19. INSTALL FRONT POWER SEAT SWITCH

20. INSTALL LOWER SEAT TRACK SPACER

21. INSTALL FRONT INNER SEAT CUSHION SHIELD

22. INSTALL FRONT LUMBAR POWER SEAT SWITCH

23. INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)

24. INSTALL FRONT INNER NO. 1 SEAT CUSHION SHIELD

25. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY

26. INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB

27. INSTALL RECLINING POWER SEAT SWITCH KNOB

INSTALLATION

1. INSTALL FRONT SEAT ASSEMBLY

(a) Place the seat in the cabin.

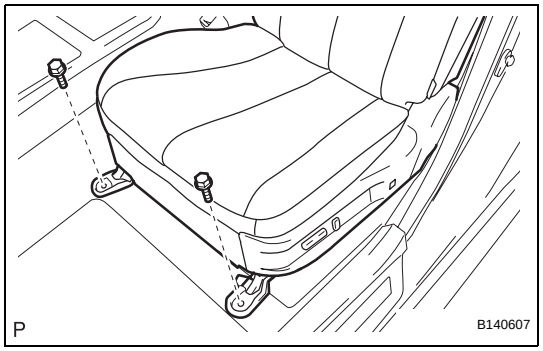
(b) Connect the connectors under the seat.

(c) Connect the cable to the negative (-) battery terminal.

(d) Move the front seat assembly fully forward by operating the slide and vertical power seat switch knob.

NOTICE:

Check that the seat is locked.

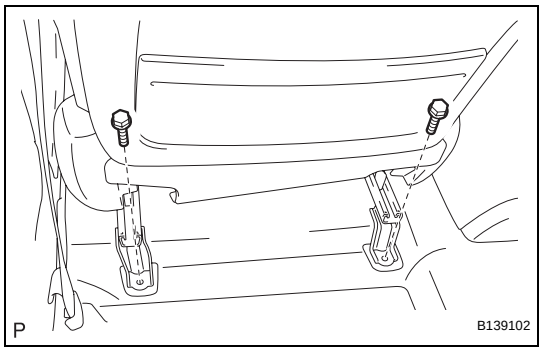


(e) Temporarily install the front side of the front seat assembly with the 2 bolts.

(f) Move the front seat assembly fully forward by operating the slide and vertical power seat switch knob.

NOTICE:

Check that the seat is locked.



(g) Temporarily install the rear side of the front seat assembly with the 2 bolts.

(h) Move the front seat assembly to the rearmost position by operating the slide and vertical power seat switch knob.

NOTICE:

Check that the seat is locked.

(i) Fully tighten the 2 bolts on the front side of the front seat assembly in the order of the inner side bolt and then the outer side bolt.

Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

(j) Move the front seat assembly fully forward by operating the slide and vertical power seat switch knob.

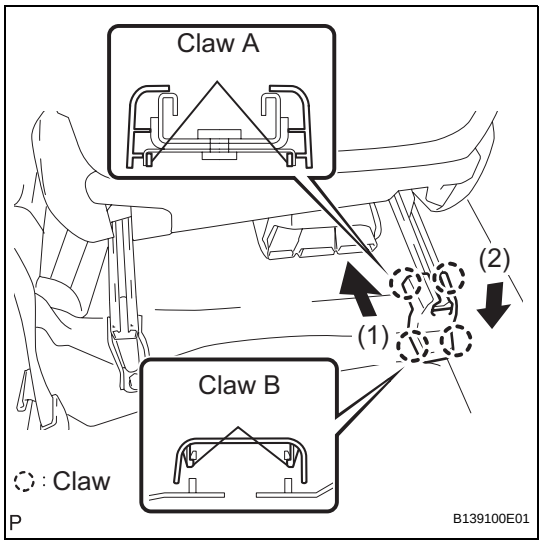
NOTICE:

Check that the seat is locked.

(k) Fully tighten the 2 bolts on the rear side of the front seat assembly in the order of the inner side bolt and then the outer side bolt.

Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

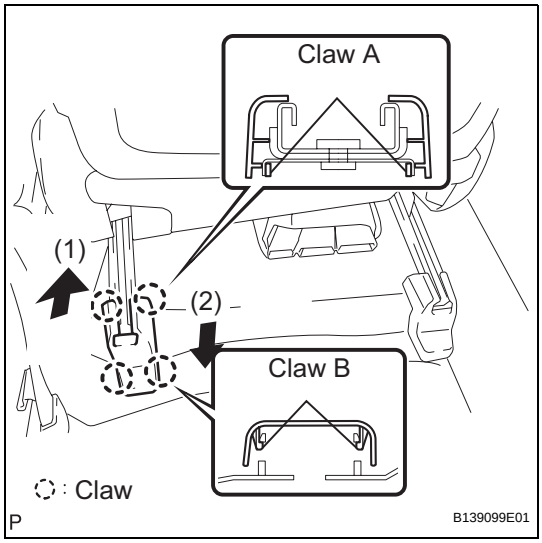
SE



2. INSTALL INNER SEAT TRACK BRACKET COVER

(a) Slide the inner seat track bracket cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.

(b) Push the inner seat track bracket cover to engage claw B.



3. INSTALL SEAT TRACK COVER

(a) Slide the seat track cover along the seat rail toward the front of the vehicle. Engage claw A to the seat rail.

(b) Push the seat track cover to engage claw B.

4. INSTALL FRONT SEAT HEADREST ASSEMBLY

5. PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)

(See page RS-242)

6. CHECK SRS WARNING LIGHT

Check the SRS warning light. (See page RS-32)

7. INSPECT FRONT SEAT ASSEMBLY

(a) Check the power seat operation.

(b) Check the seat heater operation (with seat heater system).

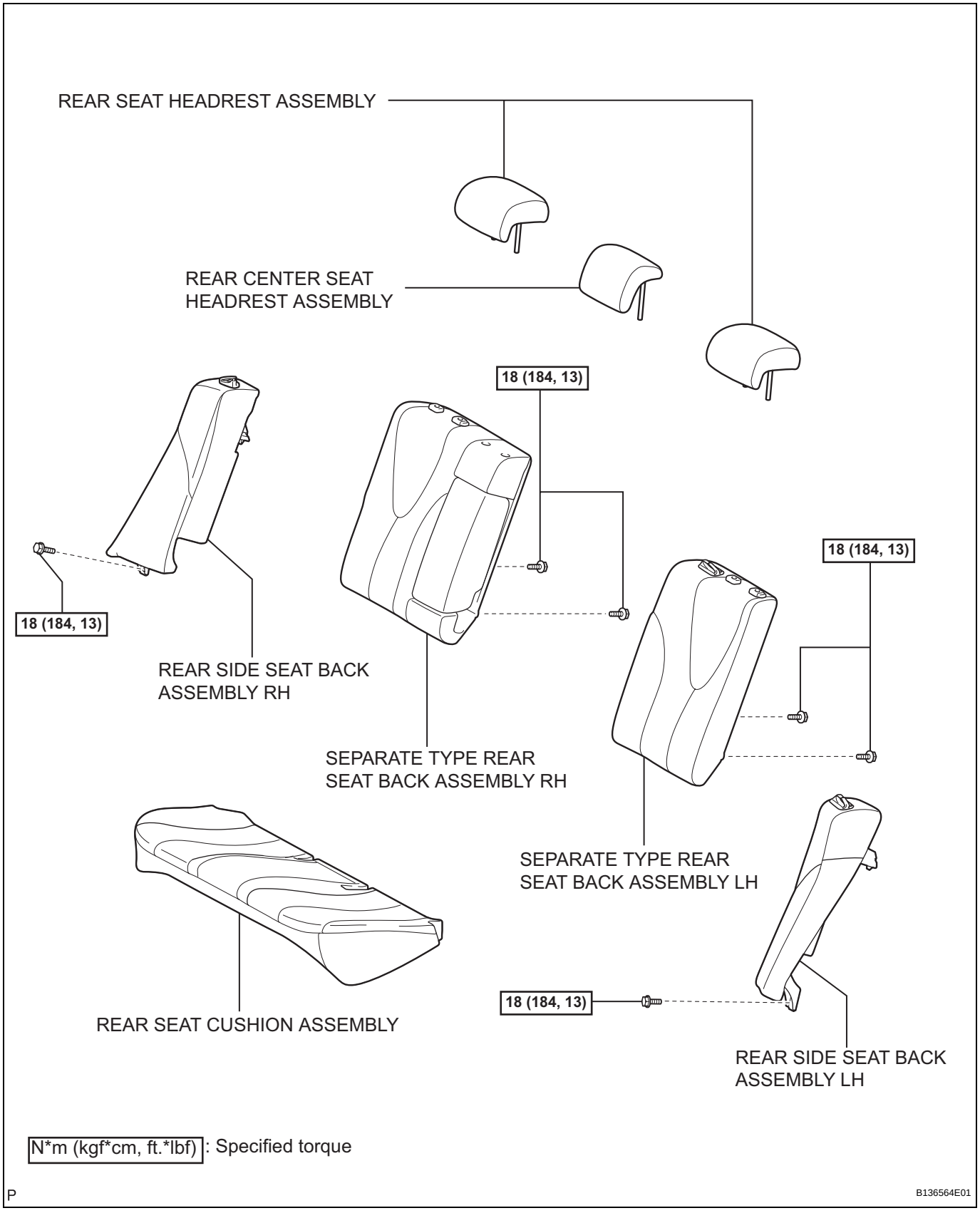
(1) Turn the ignition switch on (IG).

(2) Turn the seat heater switch ON.

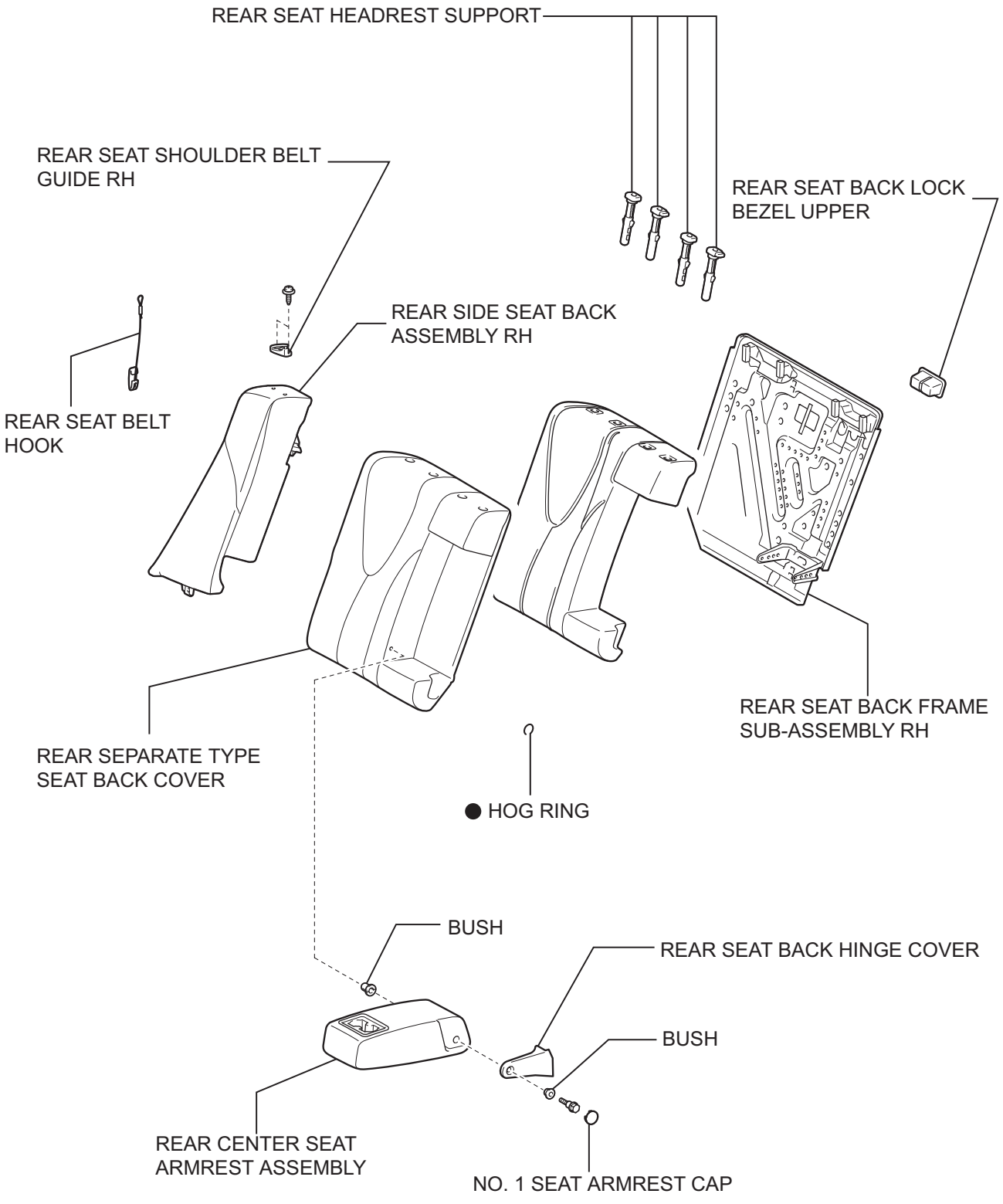
(3) Wait 5 minutes or more and confirm that the seat surface becomes warm.

REAR SEAT ASSEMBLY (for Fold Down Seat Type)

COMPONENTS



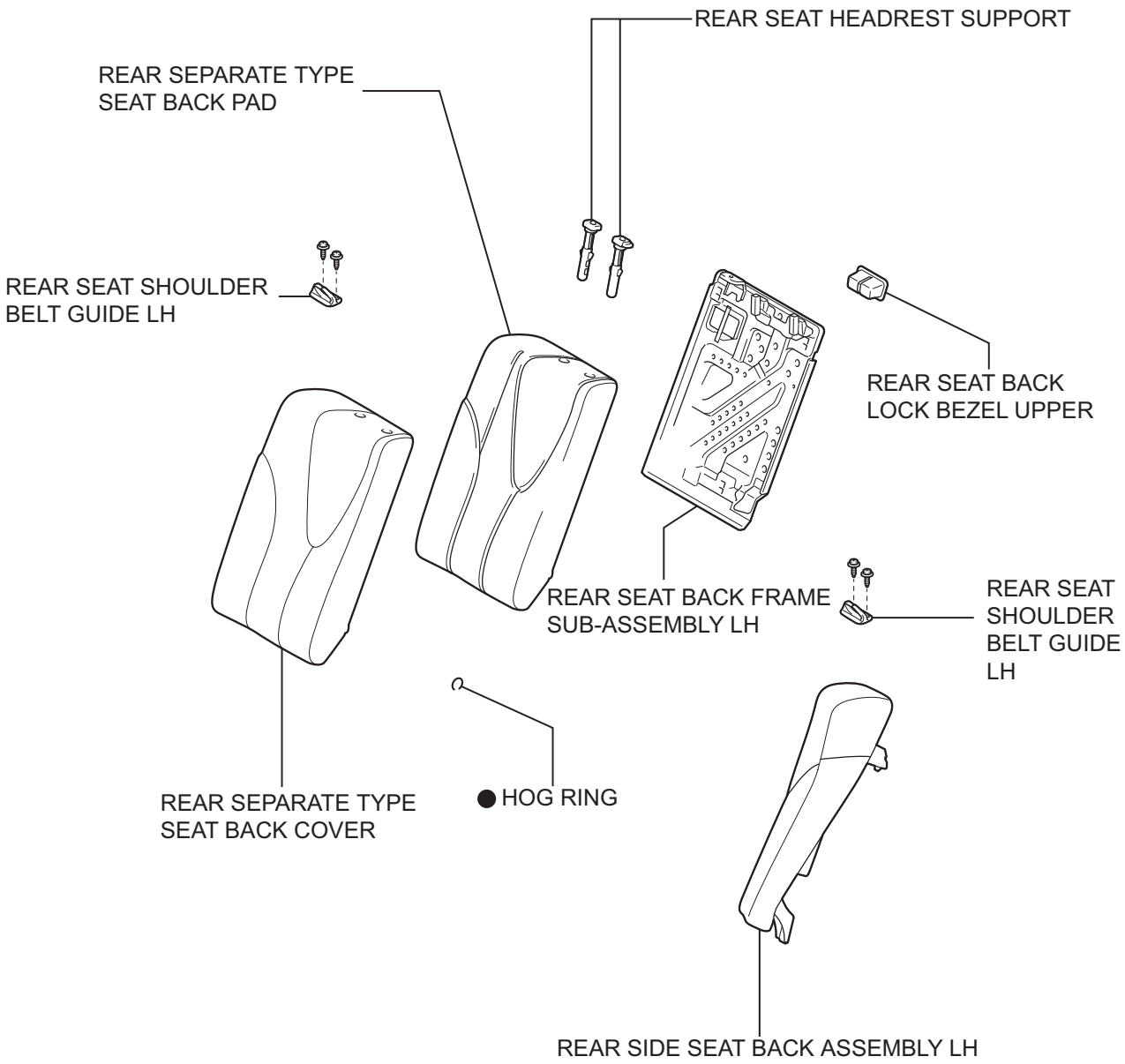
SE



● Non-reusable part

P

B136565E01

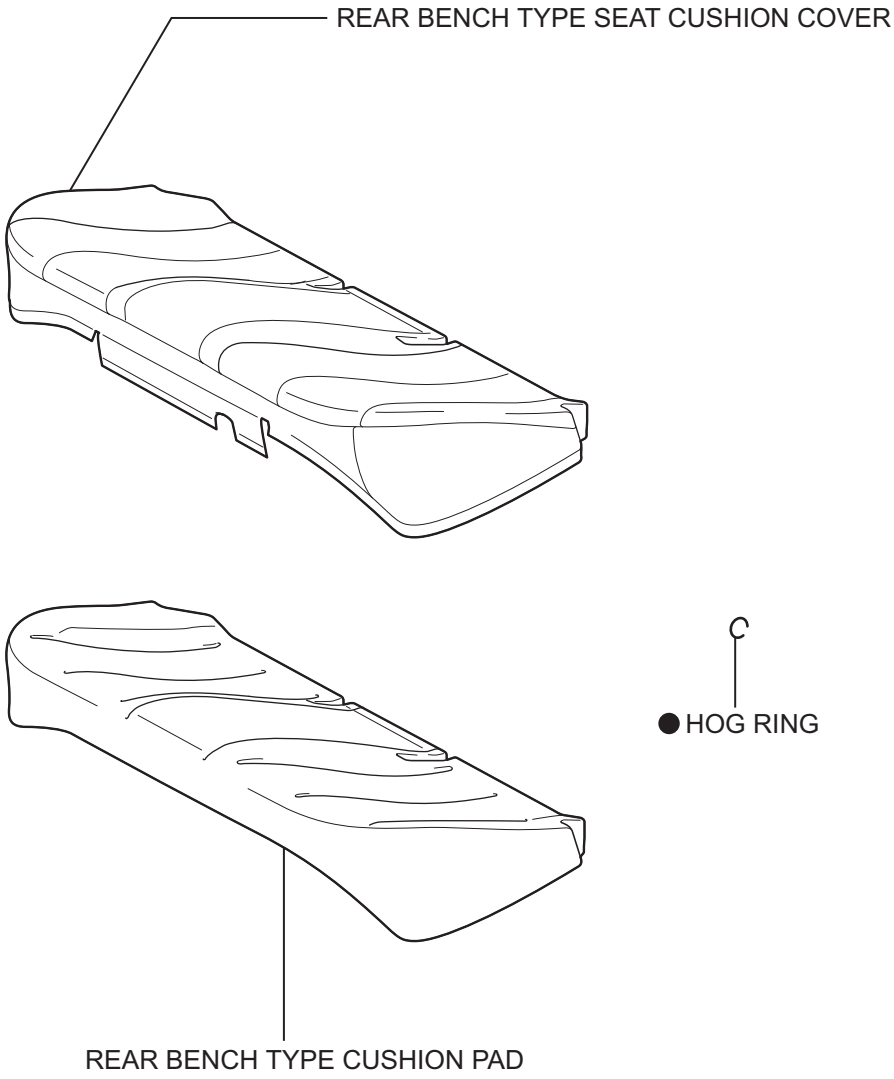


● Non-reusable part

P

B136566E01

SE



● Non-reusable part

P

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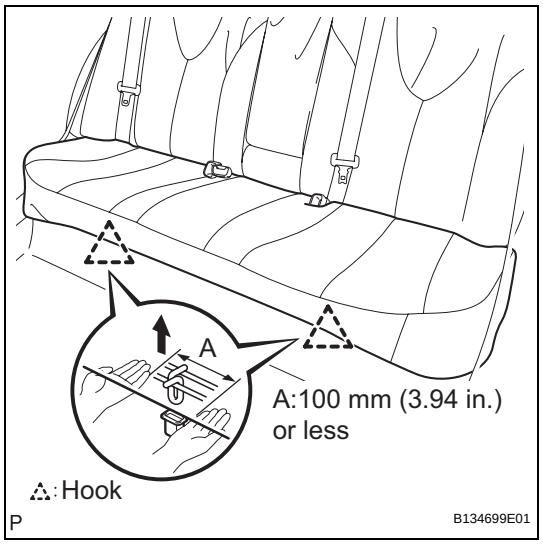


REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY

(a) Detach the 2 front hooks of the seat cushion from the vehicle body.

NOTICE:

Follow the instructions below carefully as the cushion frame can be deformed easily.

(1) Choose a hook to detach first. Place your hands near the hook as shown in the illustration. Then lift the seat cushion to detach the hook.

(2) Repeat the step above for the other hook.

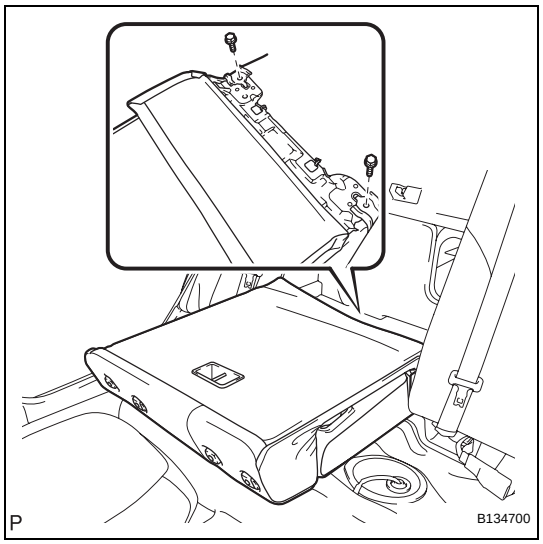
(b) Remove the seat cushion.

2. REMOVE REAR SEAT HEADREST ASSEMBLY

(a) Remove the 2 rear seat headrest assemblies.

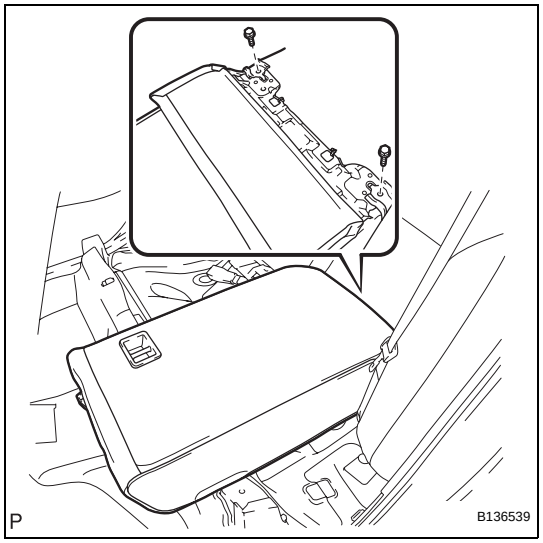
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY

(a) Remove the rear center seat headrest assembly.



4. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH

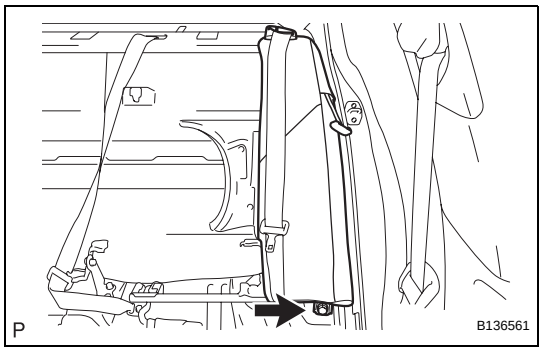
(a) Remove the 2 bolts and separate type rear seat back assembly RH.



5. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH

(a) Remove the 2 bolts and separate type rear seat back assembly LH.

SE



6. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH

(a) Remove the bolt and rear side seat back assembly LH.

7. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH

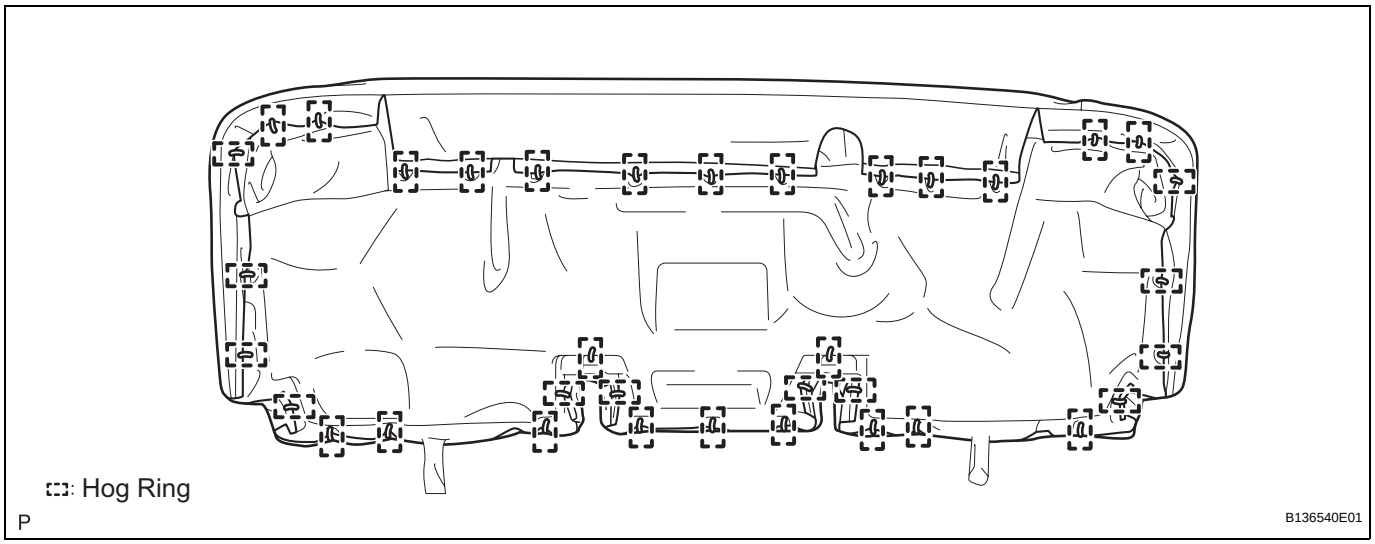
HINT:

Use the same procedures for the RH side and LH side.

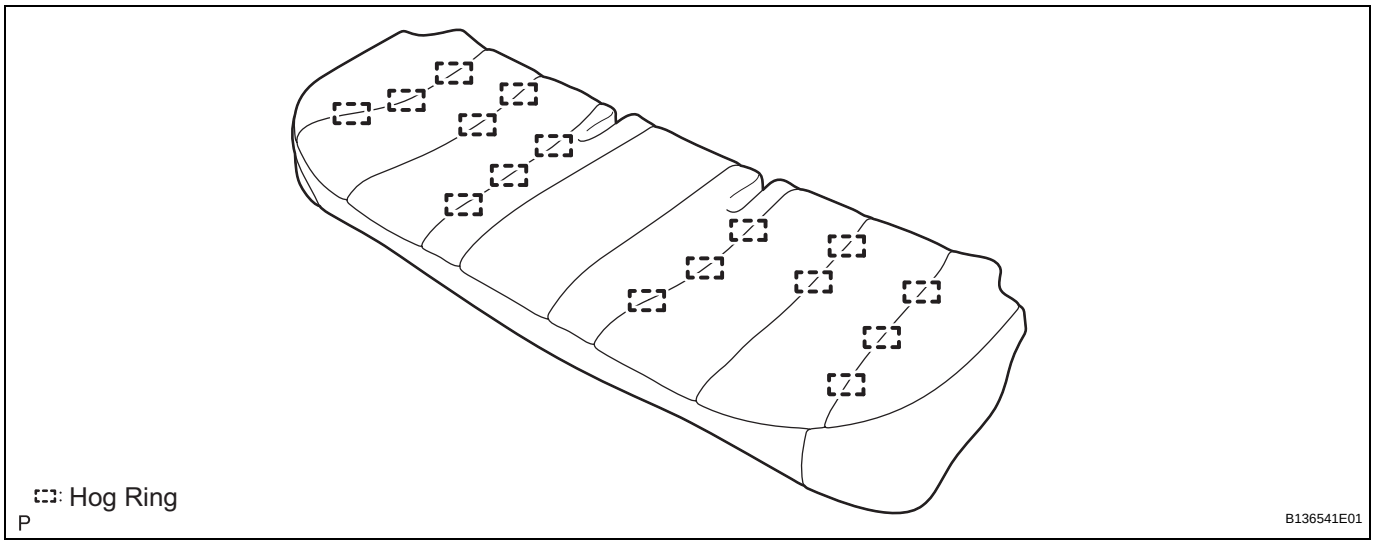
DISASSEMBLY

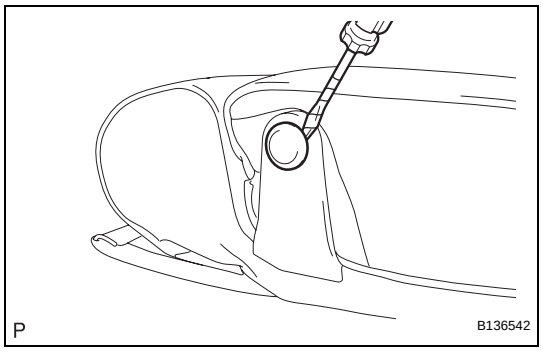
1. REMOVE REAR BENCH TYPE SEAT CUSHION COVER

(a) Remove the 36 hog rings.



(b) Remove the 16 hog rings and rear bench type seat cushion cover.



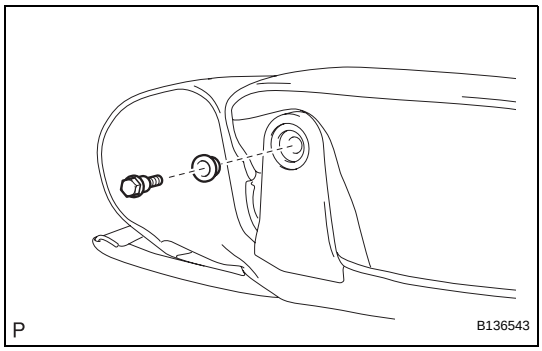


2. REMOVE NO. 1 SEAT ARMREST CAP

(a) Using a screwdriver, remove the No. 1 seat armrest cap.

HINT:

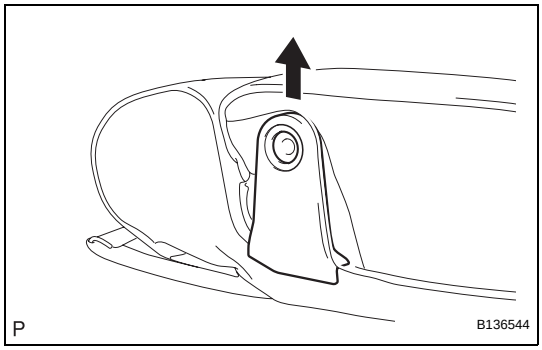
Tape the screwdriver tip before use.



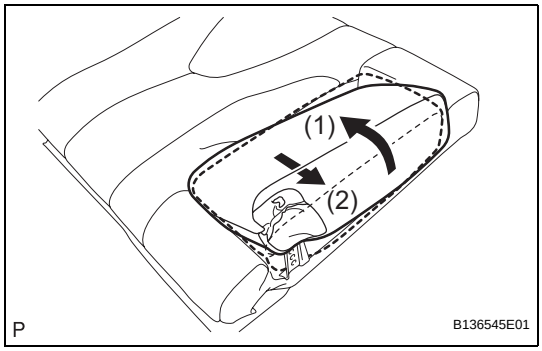
3. REMOVE REAR SEAT BACK HINGE COVER

(a) Remove the bolt and bush.

SE

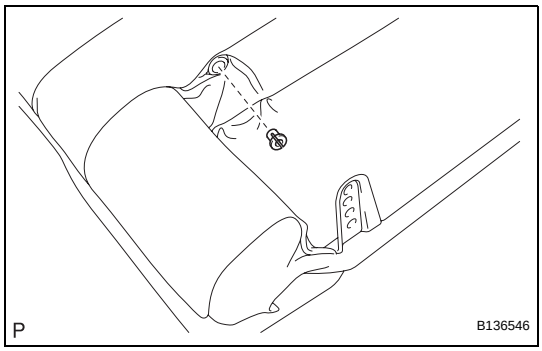


(b) Remove the rear seat back hinge cover.

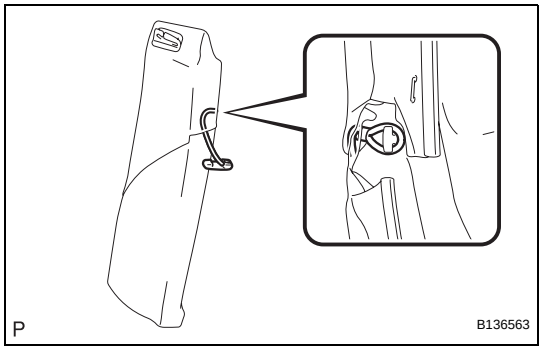


4. REMOVE REAR CENTER SEAT ARMREST ASSEMBLY

(a) Remove the rear center seat armrest assembly as shown in the illustration.

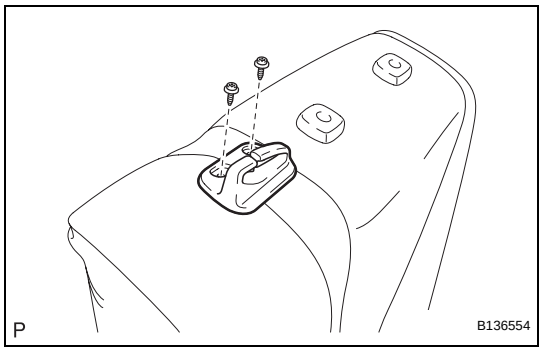


(b) Remove the bush.



5. REMOVE REAR SEAT BELT HOOK

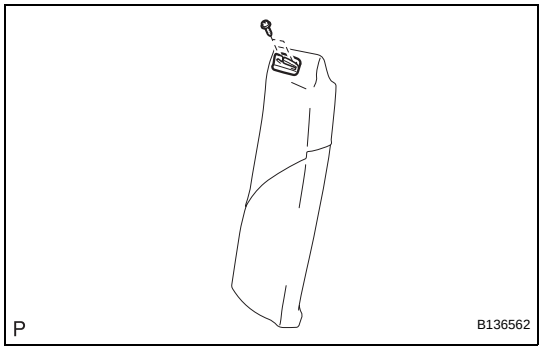
(a) Remove the rear seat belt hook.
HINT:
Use the same procedures for the RH side and LH side.



6. REMOVE REAR SEAT SHOULDER BELT GUIDE LH

(a) Seat Back:

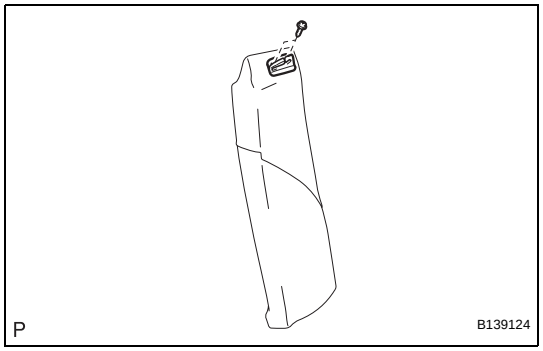
(1) Remove the 2 screws and rear seat shoulder belt guide LH.



(b) Side Seat Back:

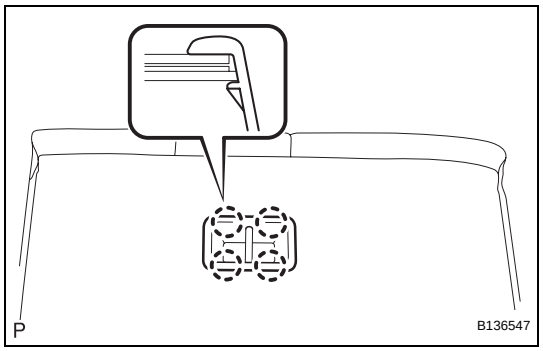
(1) Remove the 2 screws and rear seat shoulder belt guide LH.

SE



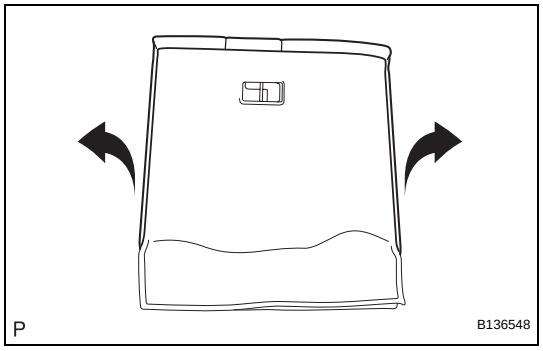
7. REMOVE REAR SEAT SHOULDER BELT GUIDE RH

(a) Remove the 2 screws and rear seat shoulder belt guide RH.



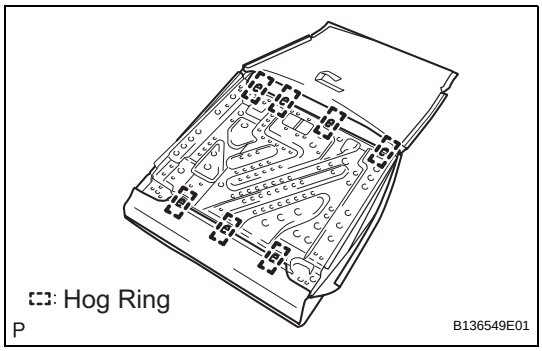
8. REMOVE REAR SEAT BACK LOCK BEZEL UPPER (for RH Side)

(a) Disengage the 4 claws and remove the rear seat back lock bezel upper.



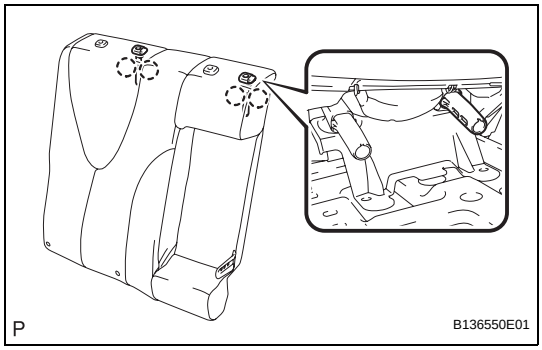
9. REMOVE REAR SEAT HEADREST SUPPORT (for RH Side)

(a) Disengage the 2 hooks and separate the rear separate type seat back cover.



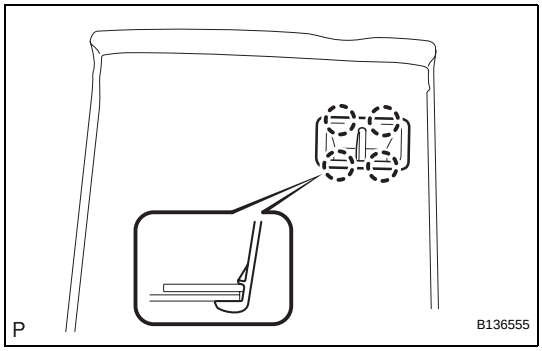
(b) Remove the 7 hog rings.

SE



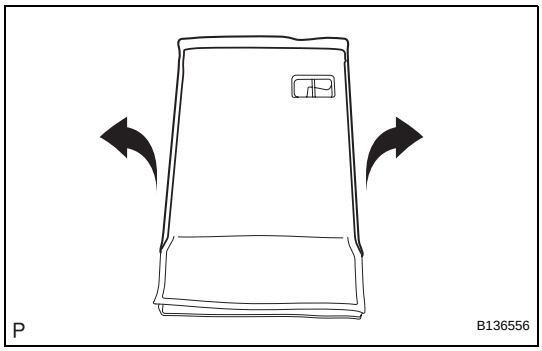
(c) Disengage the 4 claws and remove the 2 rear seat headrest supports.

10. REMOVE REAR SEAT HEADREST SUPPORT (for RH Side)



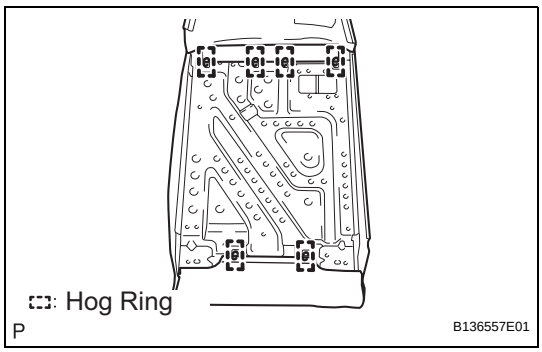
11. REMOVE REAR SEAT BACK LOCK BEZEL UPPER (for LH Side)

(a) Disengage the 4 claws and remove the rear seat back lock bezel upper.

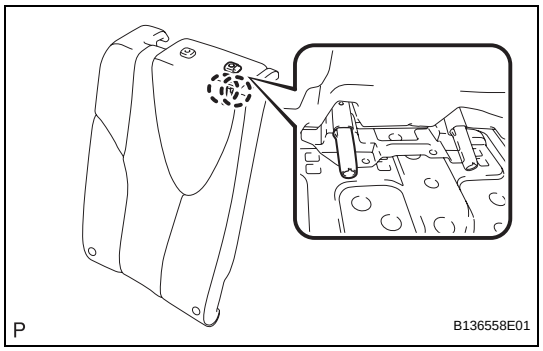


12. REMOVE REAR SEAT HEADREST SUPPORT (for LH Side)

(a) Disengage the 2 hooks and separate the rear separate type seat back cover.

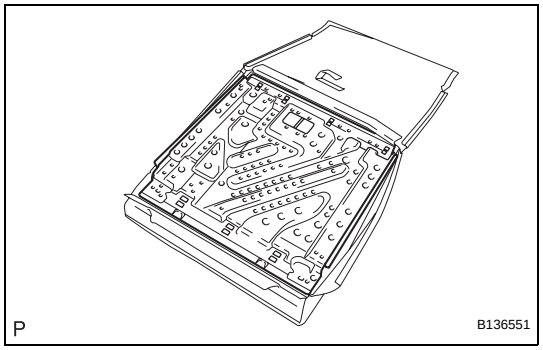


(b) Remove the 6 hog rings.



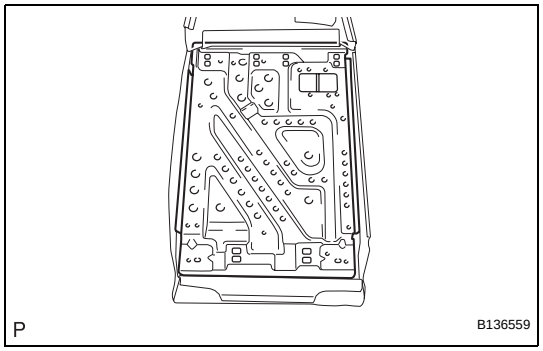
(c) Disengage the 2 claws and remove the rear seat headrest support.

13. REMOVE REAR SEAT HEADREST SUPPORT (for LH Side)



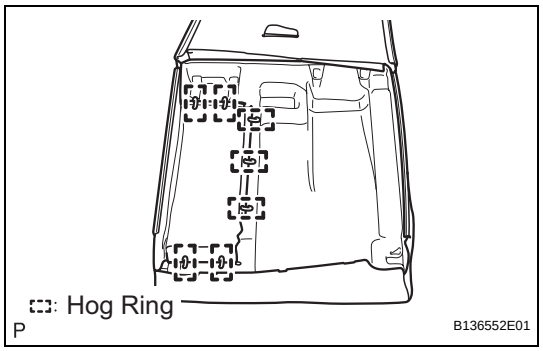
14. REMOVE REAR SEAT BACK FRAME SUB-ASSEMBLY RH

(a) Remove the rear seat back frame sub-assembly RH.



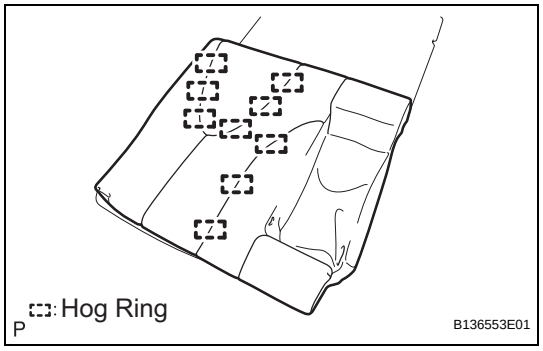
15. REMOVE REAR SEAT BACK FRAME SUB-ASSEMBLY LH

(a) Remove the rear seat back frame sub-assembly LH.

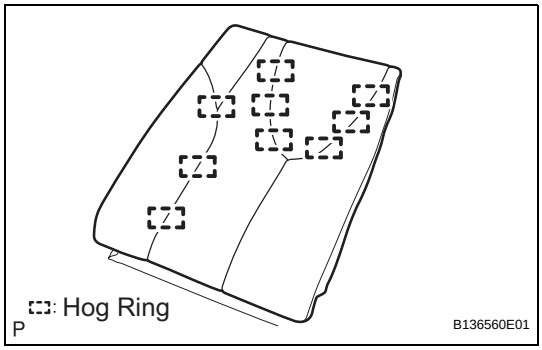


16. REMOVE REAR SEPARATE TYPE SEAT BACK COVER (for RH Side)

(a) Remove the 7 hog rings.



(b) Remove the 9 hog rings and rear separate type seat back cover.

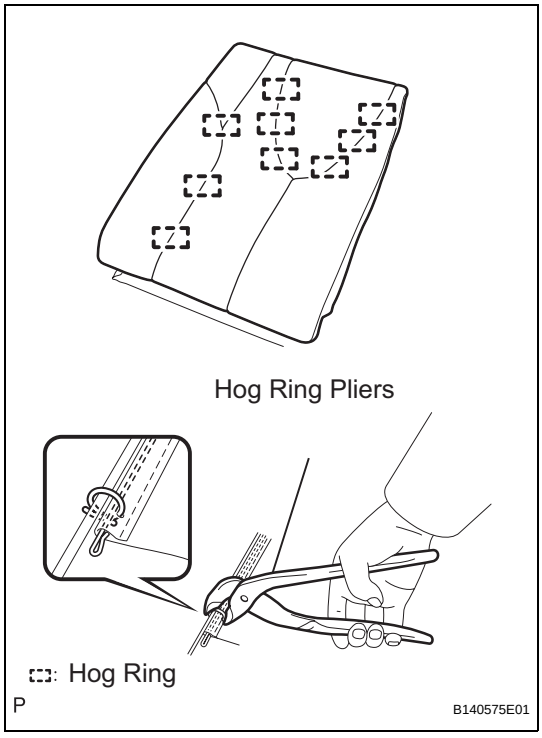


17. REMOVE REAR SEPARATE TYPE SEAT BACK COVER (for LH Side)

(a) Remove the 9 hog rings and rear separate type seat back cover.

SE

REASSEMBLY

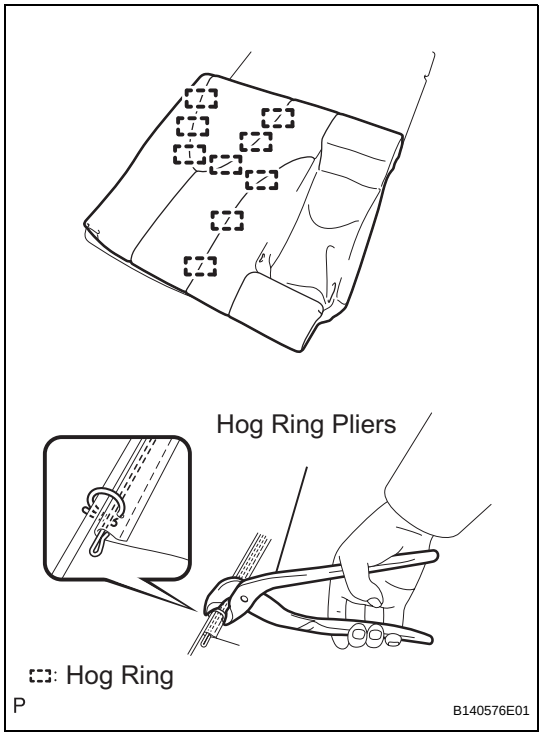


1. INSTALL REAR SEPARATE TYPE SEAT BACK COVER (for LH Side)

(a) Using hog ring pliers, install the rear separate type seat back cover with 9 new hog rings.

NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

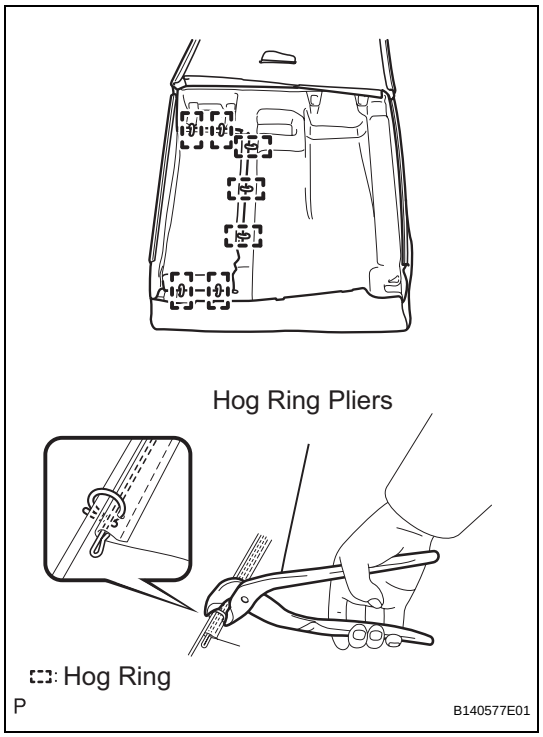


2. INSTALL REAR SEPARATE TYPE SEAT BACK COVER (for RH Side)

(a) Using hog ring pliers, install the rear separate type seat back cover to the seat back pad with 9 new hog rings.

NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**



(b) Using hog ring pliers, install the rear separate type seat back cover to the seat back pad with 7 new hog rings.

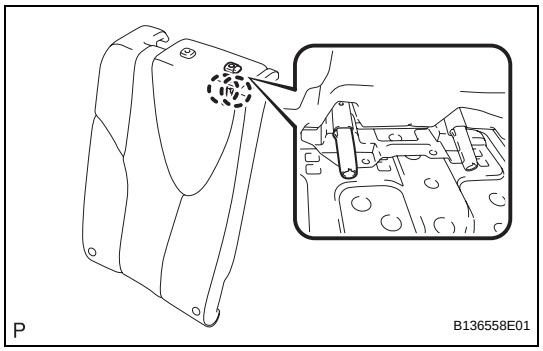
NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

3. INSTALL REAR SEAT BACK FRAME SUB-ASSEMBLY RH

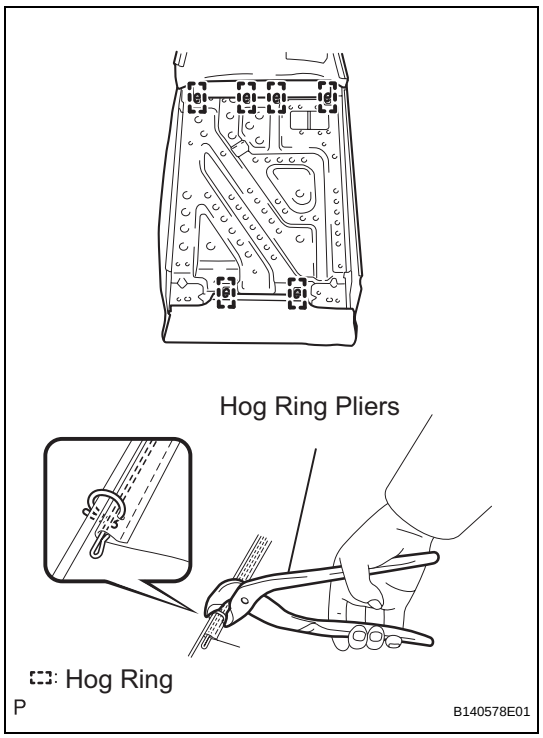
4. INSTALL REAR SEAT BACK FRAME SUB-ASSEMBLY LH

SE



5. INSTALL REAR SEAT HEADREST SUPPORT (for LH Side)

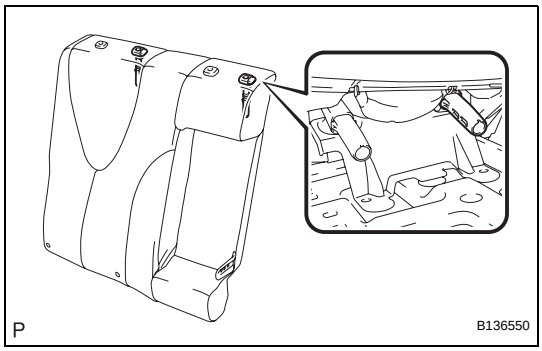
(a) Engage the 2 claws to install the 2 front seat headrest supports.



(b) Using hog ring pliers, install the rear separate type seat back cover to the seat back frame with 6 new hog rings.

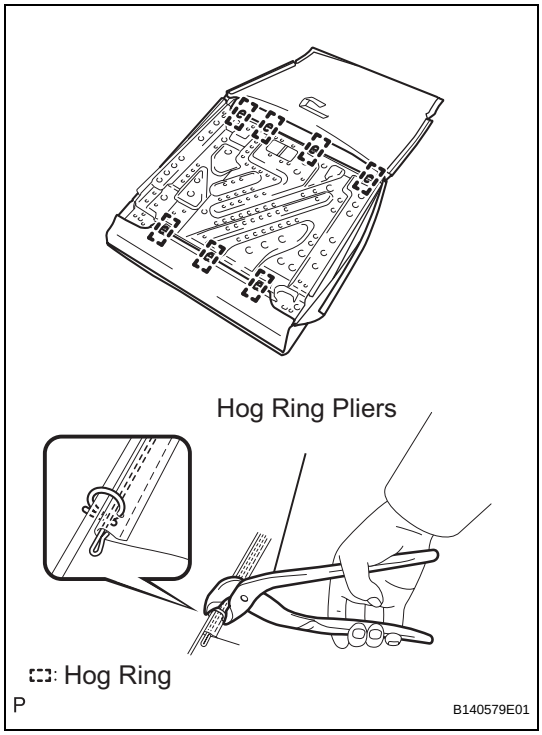
NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**



6. **INSTALL REAR SEAT HEADREST SUPPORT (for LH Side)**
   (a) Engage the 2 claws to install the 2 front seat headrest supports.

SE

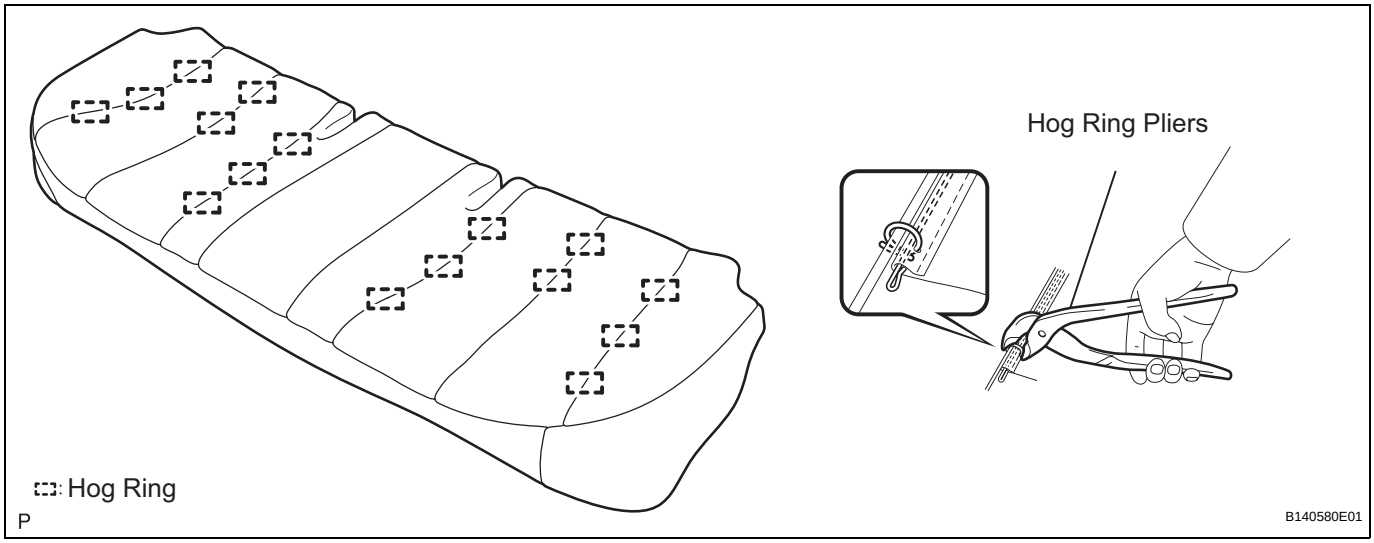


   (b) Using hog ring pliers, install the rear separate type seat back cover to the seat back frame with 7 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**

7. **INSTALL REAR SEAT BACK LOCK BEZEL UPPER**
8. **INSTALL REAR SEAT HEADREST SUPPORT (for RH Side)**
9. **INSTALL REAR SEAT HEADREST SUPPORT (for RH Side)**
10. **INSTALL REAR SEAT BACK LOCK BEZEL UPPER (for RH Side)**
11. **INSTALL REAR SEAT SHOULDER BELT GUIDE RH**
12. **INSTALL REAR SEAT SHOULDER BELT GUIDE LH**
13. **INSTALL REAR SEAT BELT HOOK**
14. **INSTALL REAR CENTER SEAT ARMREST ASSEMBLY**
15. **INSTALL REAR SEAT BACK HINGE COVER**
16. **INSTALL NO. 1 SEAT ARMREST CAP**

17. INSTALL REAR BENCH TYPE SEAT CUSHION COVER

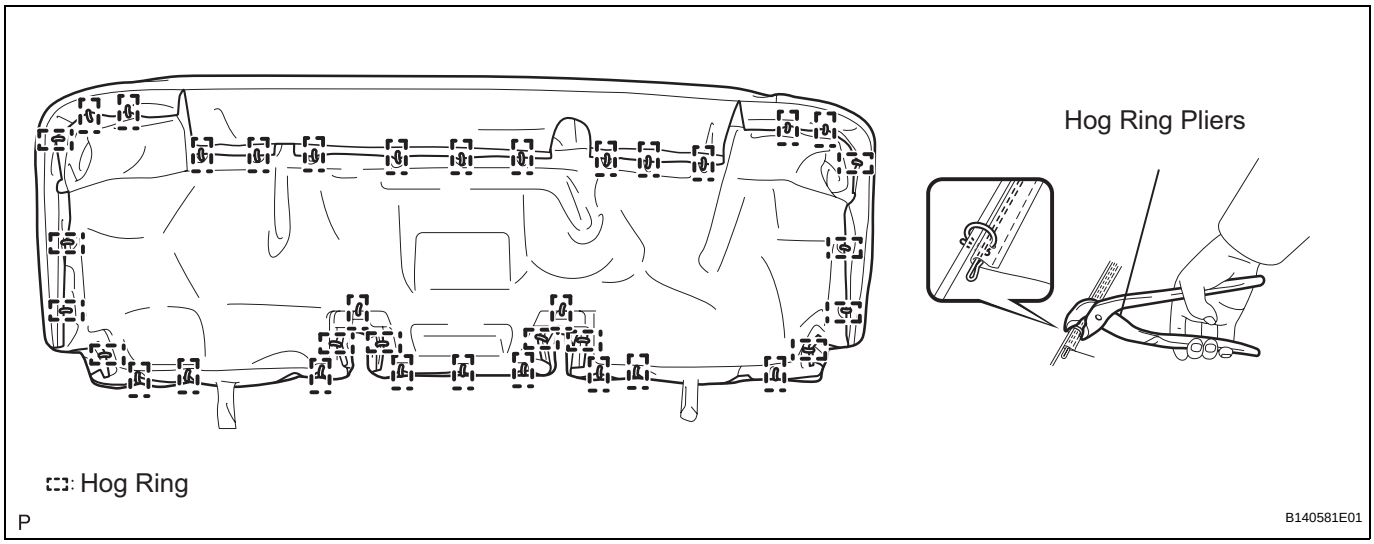
(a) Using hog ring pliers, install 16 new hog rings.



NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

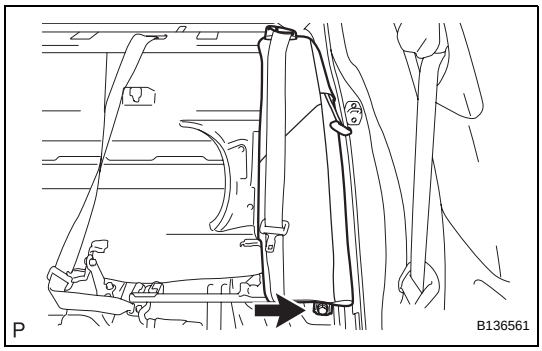
(b) Using hog ring pliers, install the rear bench type seat cushion cover to the seat cushion pad with 36 new hog rings.



NOTICE:

- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

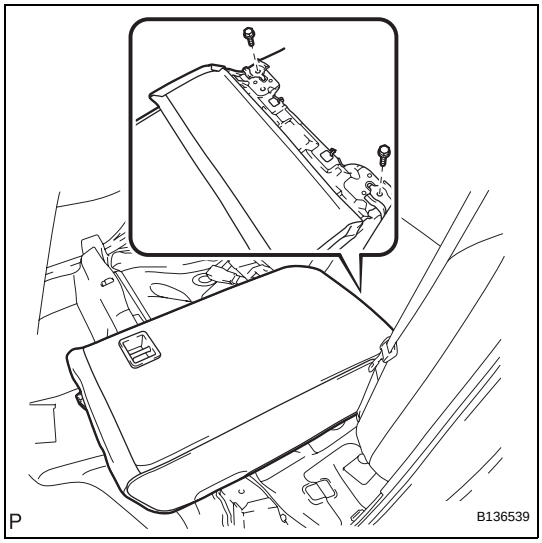
SE



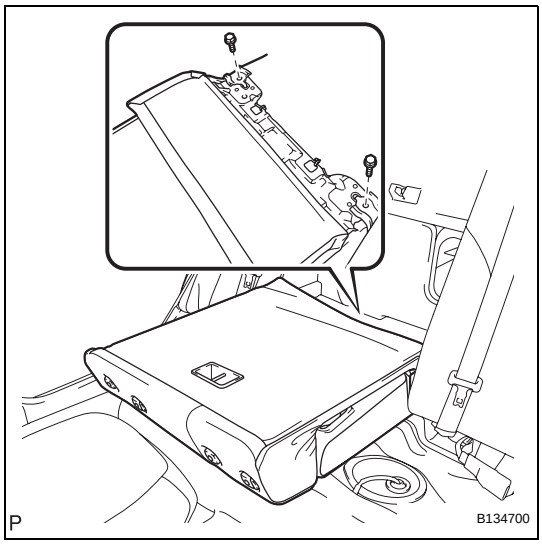
INSTALLATION

1. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH**
   (a) Install the rear side seat back assembly with the bolt.
   Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)
2. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH**

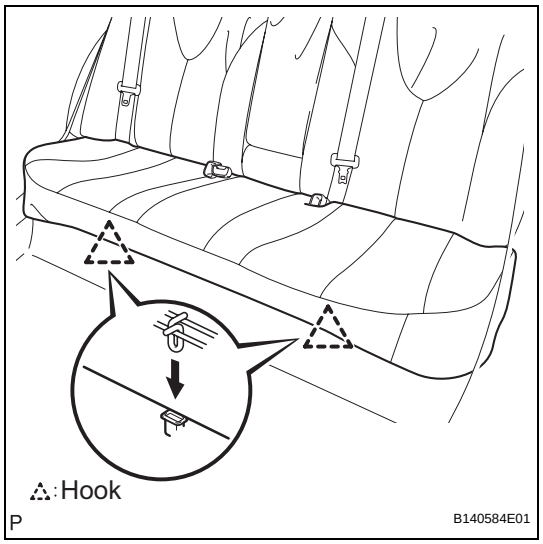
SE



3. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH**
   (a) Install the separate type rear seat back assembly with the 2 bolts.
   Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



4. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH**
   (a) Install the separate type rear seat back assembly with the 2 bolts.
   Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)
5. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
6. **INSTALL REAR SEAT HEADREST ASSEMBLY**



7. INSTALL REAR SEAT CUSHION ASSEMBLY

(a) Attach the front hooks of the bench type rear seat cushion assembly to the vehicle body.

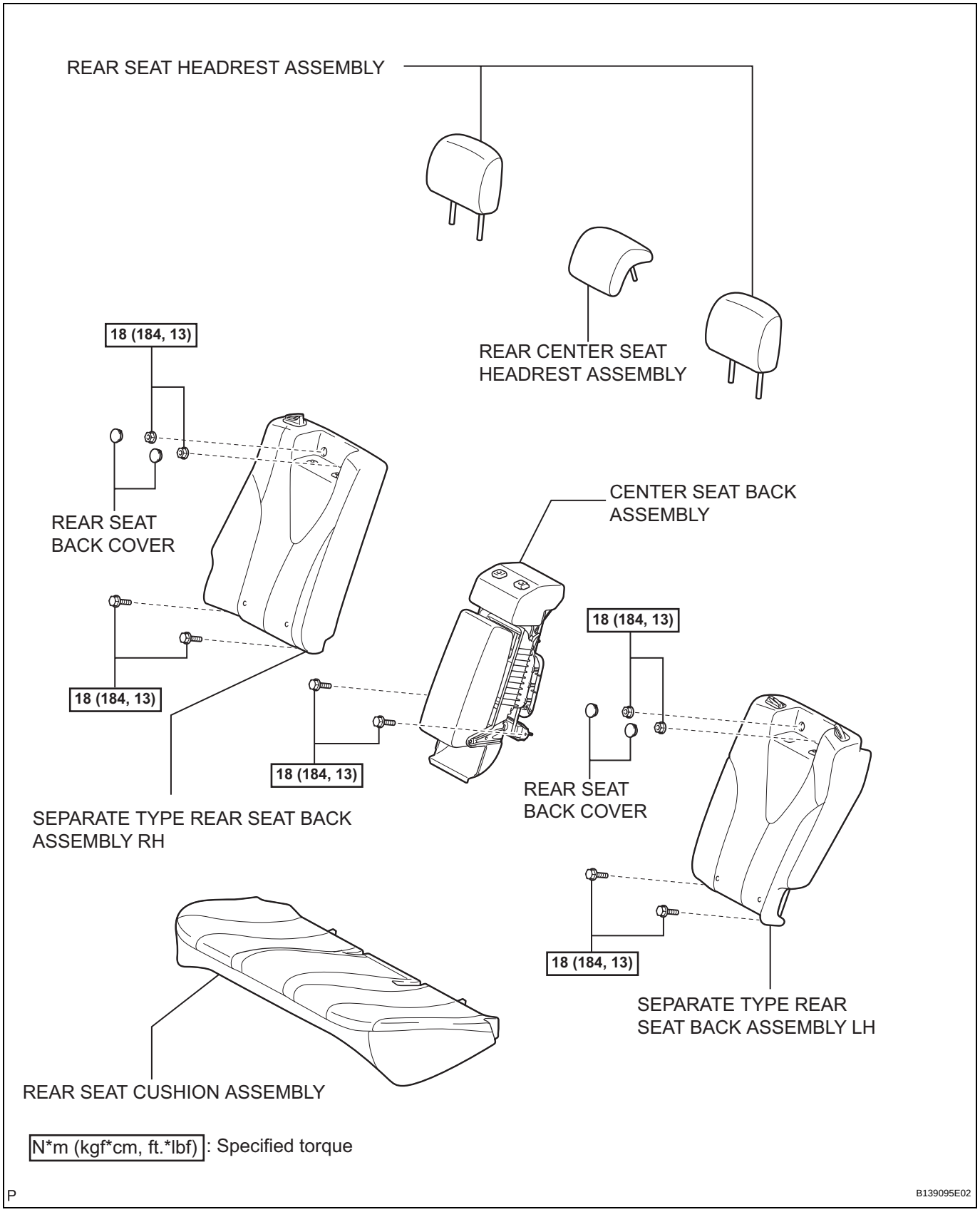
(b) Confirm that the seat cushion is firmly installed.

NOTICE:

When installing the bench type rear seat cushion assembly, make sure that the seat belt buckle is not under the bench type rear seat cushion assembly.

REAR SEAT ASSEMBLY (for Reclining Seat Type)

COMPONENTS

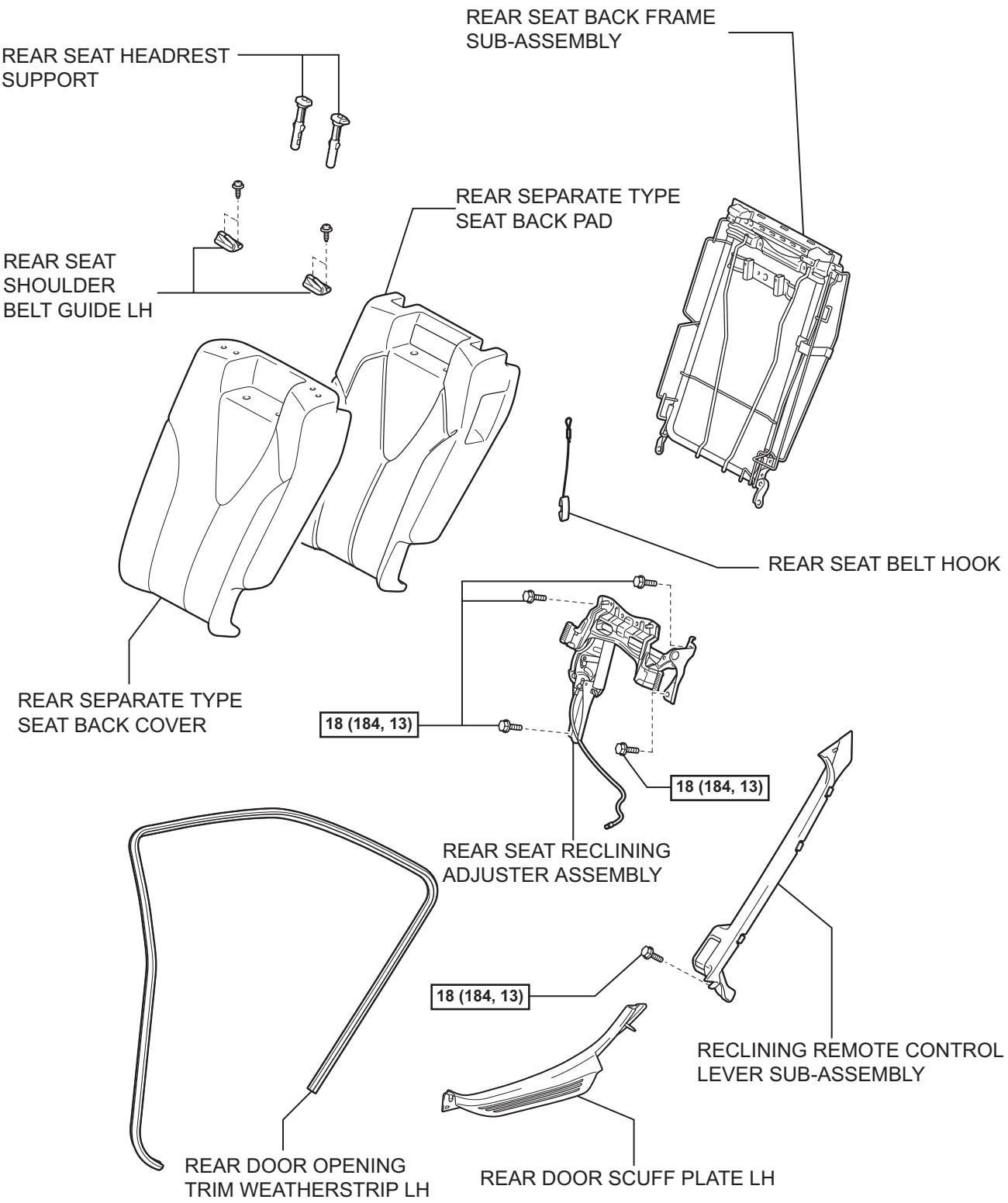


N*m (kgf*cm, ft.*lbf): Specified torque

P

B139095E02

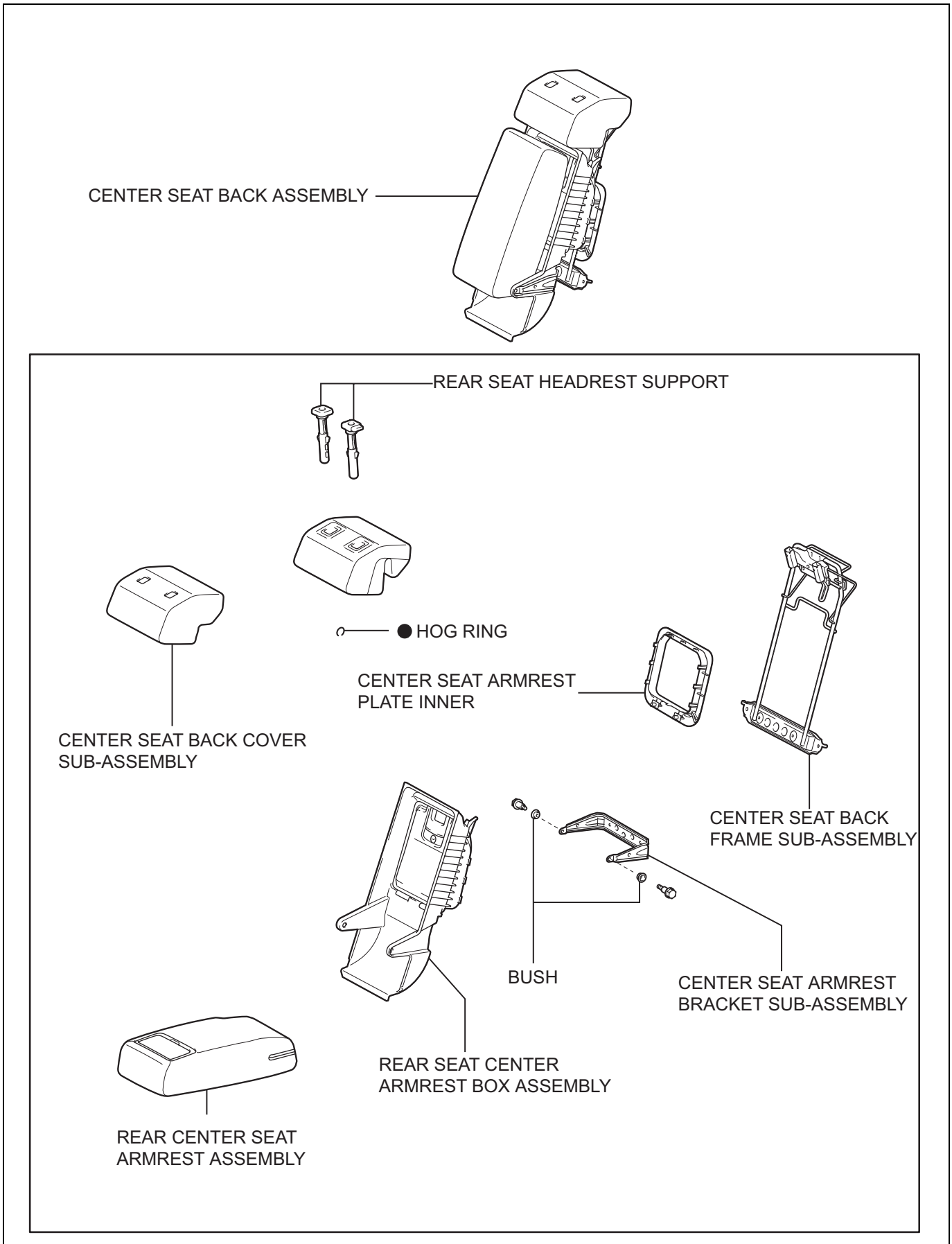
SE



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B139096E01

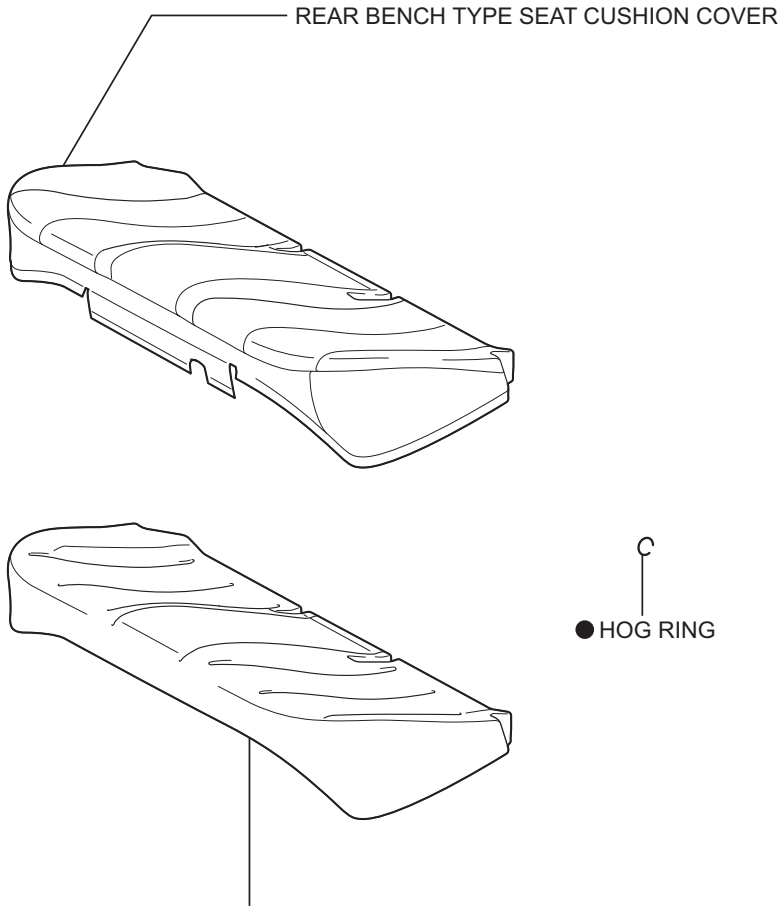


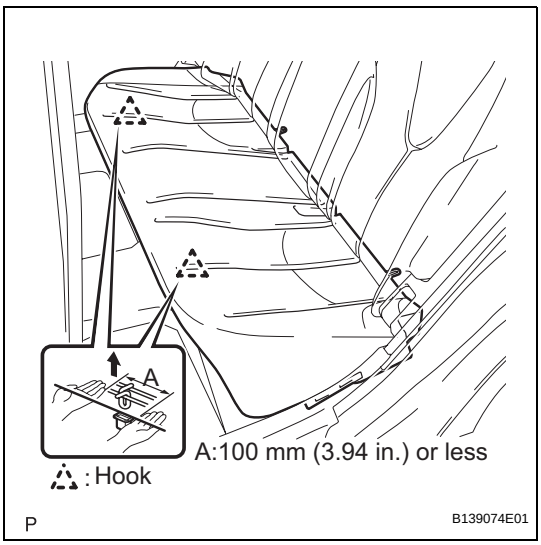
● Non-reusable part

P

B139097E02

SE





REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY

(a) Detach the 2 front hooks of the seat cushion from the vehicle body.

NOTICE:

Follow the instructions below carefully as the cushion frame can be deformed easily.

(1) Choose a hook to detach first. Place your hands near the hook as shown in the illustration. Then lift the seat cushion to detach the hook.

(2) Repeat the step above for the other hook.

(b) Remove the seat cushion.

2. REMOVE REAR SEAT HEADREST ASSEMBLY

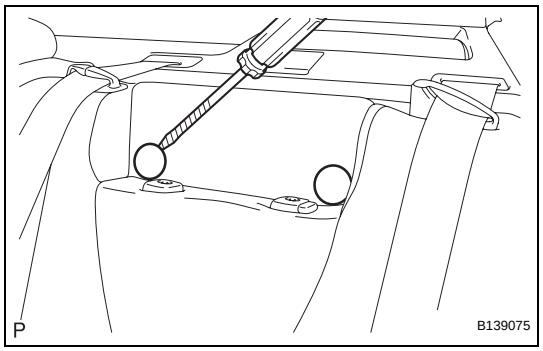
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY

4. REMOVE REAR SEAT BACK COVER

(a) Using a screwdriver, detach the claws and remove the 2 rear seat back covers.

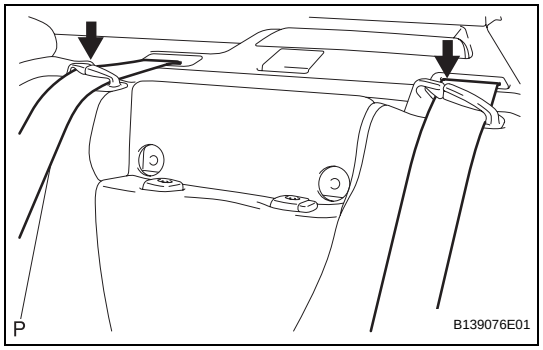
NOTICE:

- **Tape the screwdriver tip before use.**
- **Use the same procedures for the RH side and LH side.**

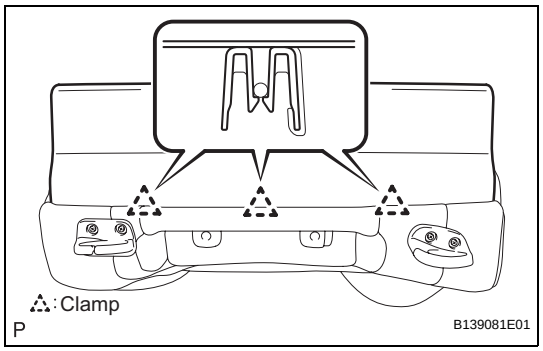


5. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH

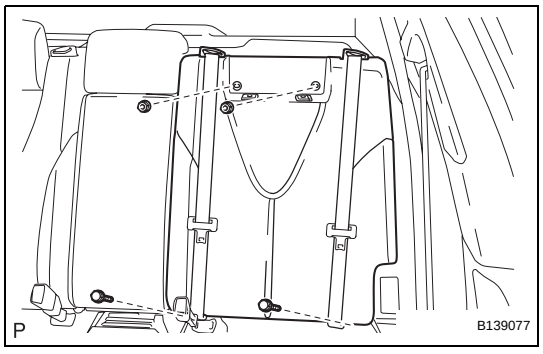
(a) Separate the 2 rear seat belts.

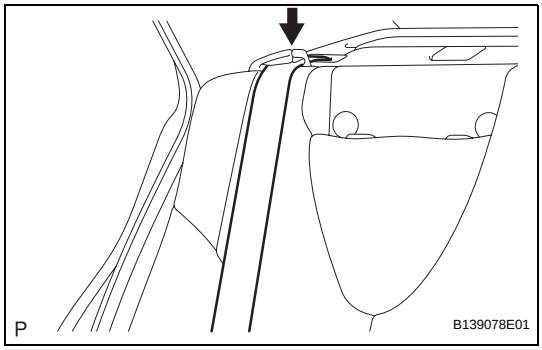


(b) Disengage the 3 clamps and then separate the cover.



(c) Remove the 2 bolts and 2 nuts and separate type rear seat back assembly LH.

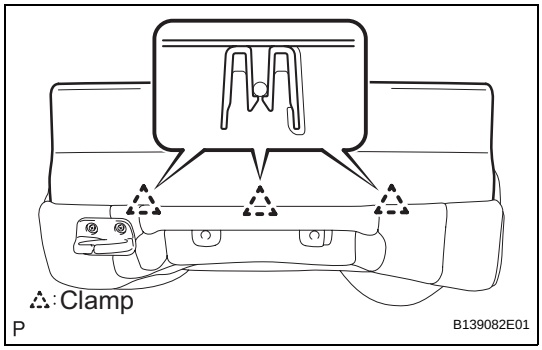




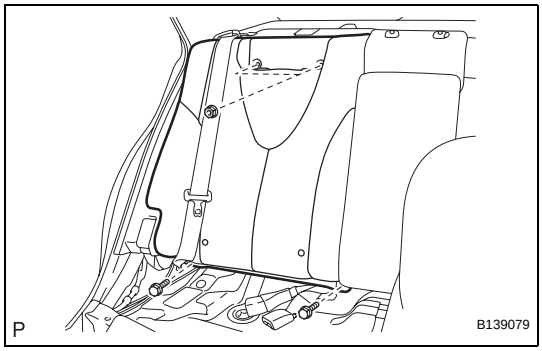
6. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH

(a) Separate the rear seat belt.

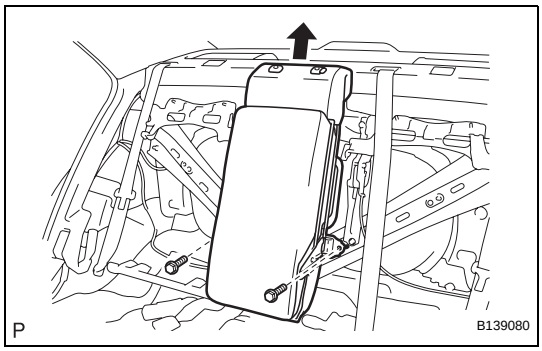
SE



(b) Disengage the 3 clamps and then separate the cover.



(c) Remove the 2 bolts and 2 nuts and separate type rear seat back assembly RH.



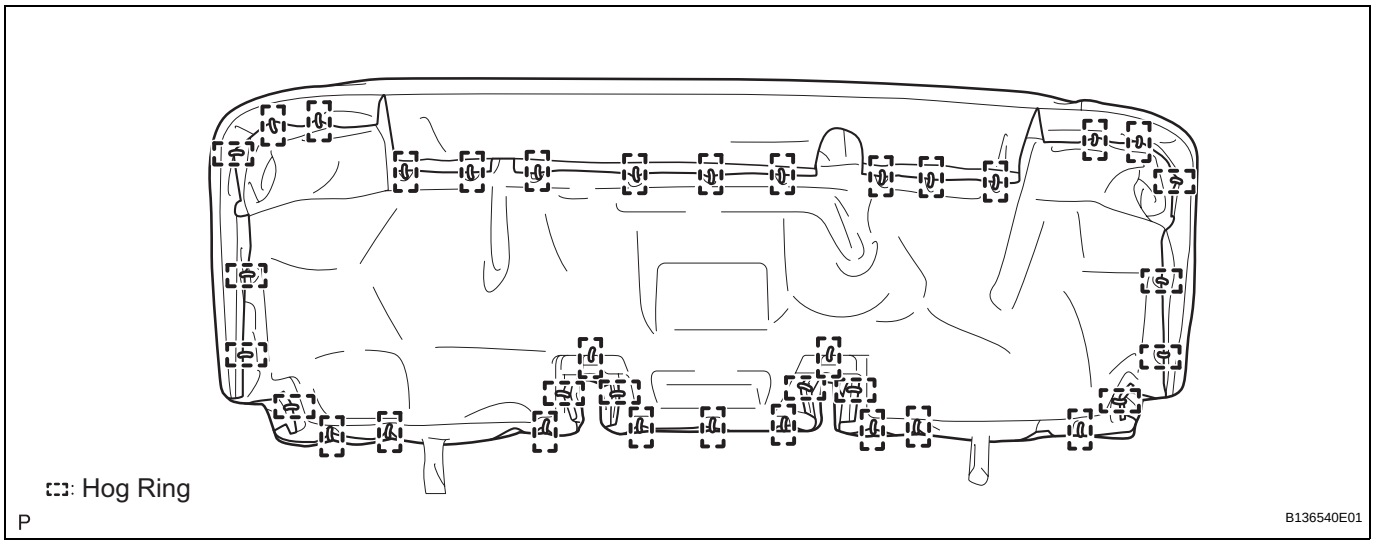
7. REMOVE CENTER SEAT BACK ASSEMBLY

(a) Remove the 2 bolts and center seat back assembly.

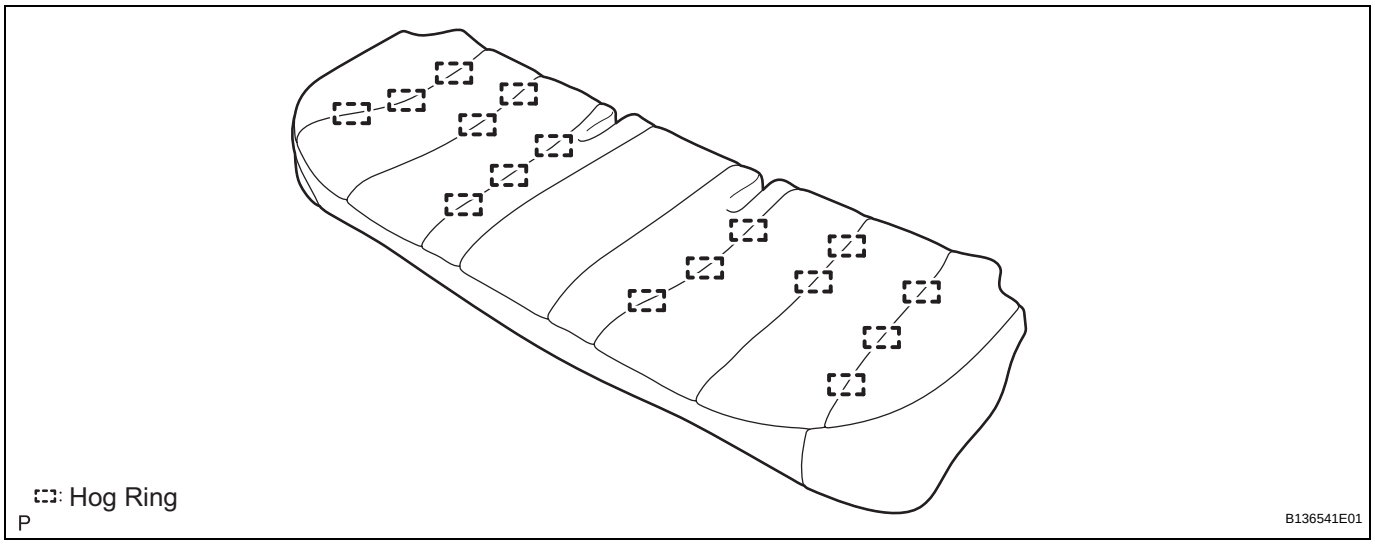
DISASSEMBLY

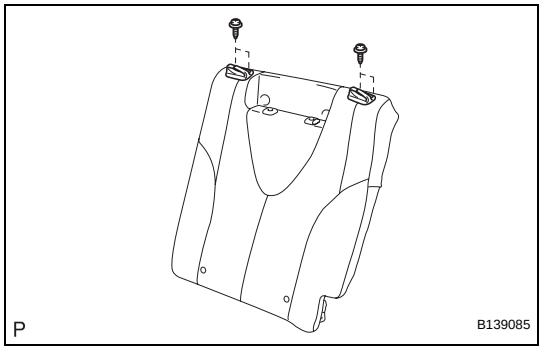
1. REMOVE REAR BENCH TYPE SEAT CUSHION COVER

(a) Remove the 36 hog rings.



(b) Remove the 16 hog rings and rear bench type seat cushion cover.

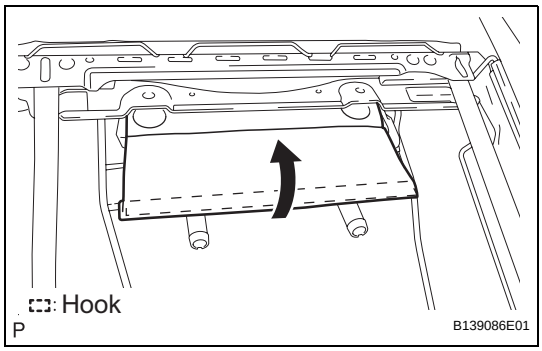




2. REMOVE REAR SEAT SHOULDER BELT GUIDE LH

(a) Remove the 4 screws and 2 rear seat shoulder belt guides LH.

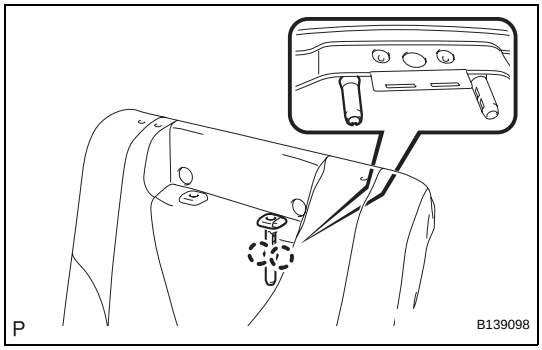
SE



3. REMOVE REAR SEAT HEADREST SUPPORT (for LH Side)

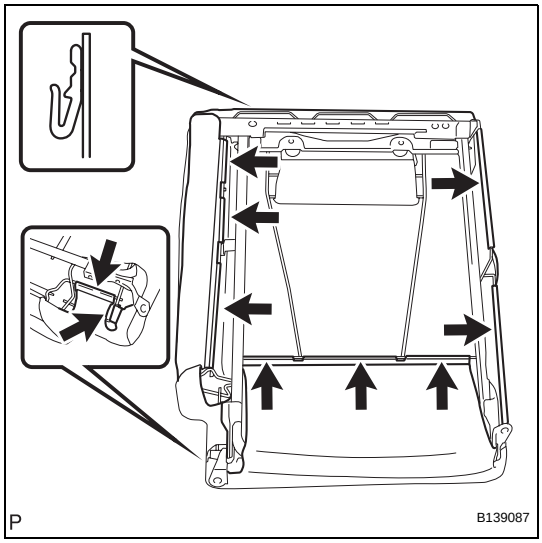
(a) Disengage the hook.

SE



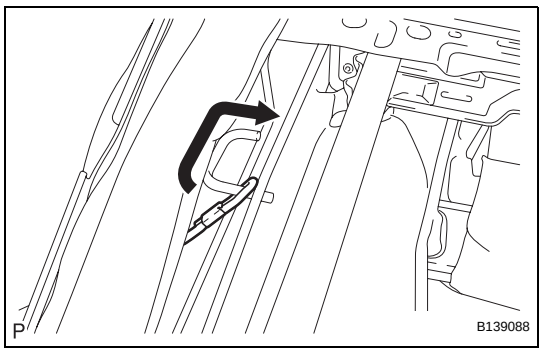
(b) Disengage the 2 claws and remove the rear seat headrest support.

4. REMOVE REAR SEAT HEADREST SUPPORT (for LH Side)

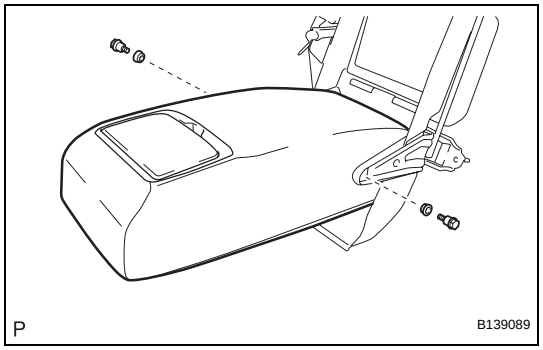


5. REMOVE REAR SEPARATE TYPE SEAT BACK COVER

(a) Disengage the hooks and remove the rear seat back assembly.



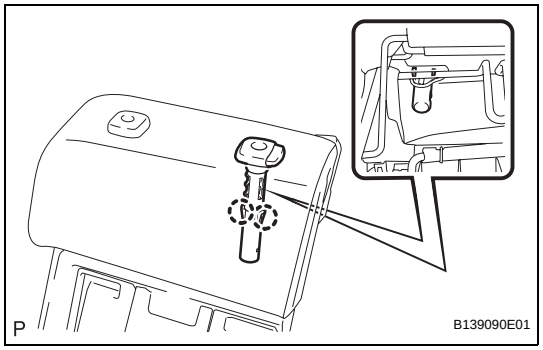
(b) Remove the rear seat belt hook.
(c) Remove the rear separate type seat back cover.



6. REMOVE REAR CENTER SEAT ARMREST ASSEMBLY

(a) Remove the 2 bolts and 2 bushes.

(b) Remove the rear center seat armrest assembly.



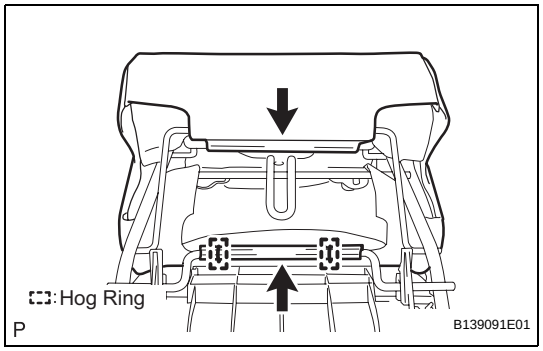
7. REMOVE REAR SEAT HEADREST SUPPORT

(a) Disengage the 2 claws and remove the rear seat headrest support.

8. REMOVE REAR SEAT HEADREST SUPPORT

HINT:

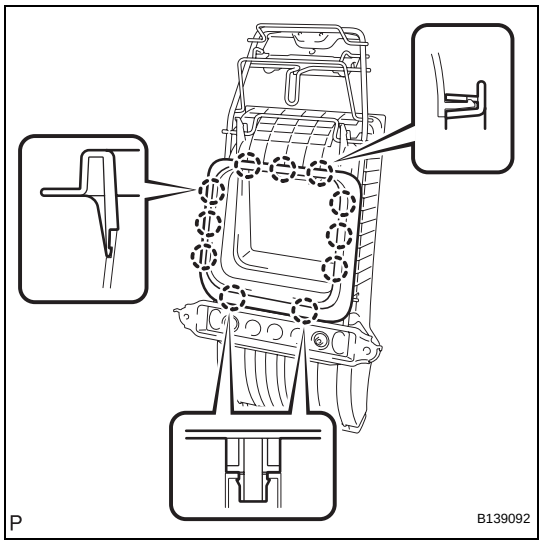
Use the same procedures for the RH side and LH side.



9. REMOVE CENTER SEAT BACK COVER SUB-ASSEMBLY

(a) Remove the 2 hog rings.

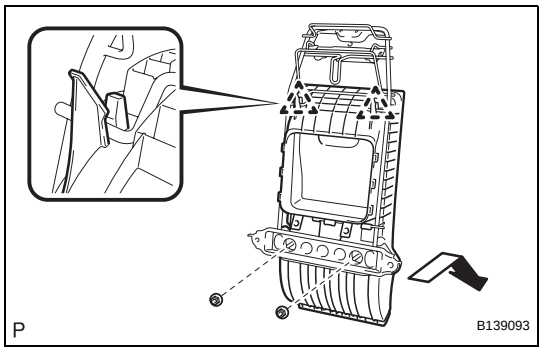
(b) Disengage the hooks and remove the center seat back cover sub-assembly.



10. REMOVE CENTER SEAT ARMREST PLATE INNER

(a) Disengage the 11 claws and then remove the center seat armrest plate inner.

SE



11. REMOVE REAR SEAT CENTER ARMREST BOX ASSEMBLY

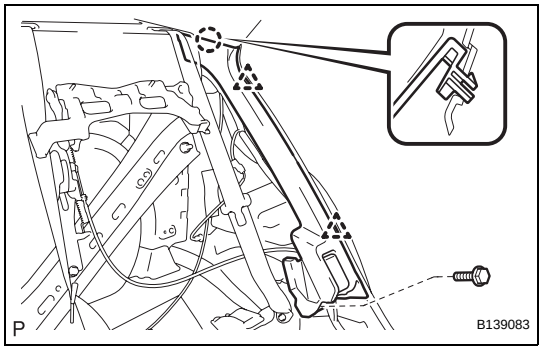
(a) Remove the 2 nuts.

(b) Disengage the 2 claws and then remove the rear seat center armrest box assembly.

12. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)

13. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH

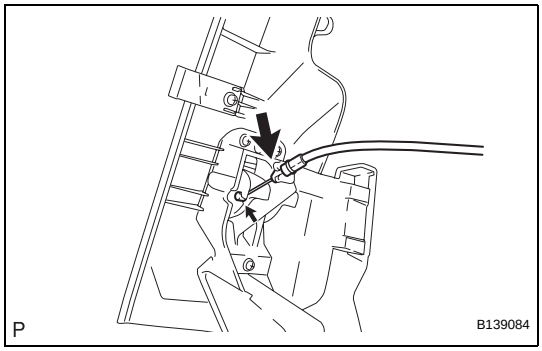
SE



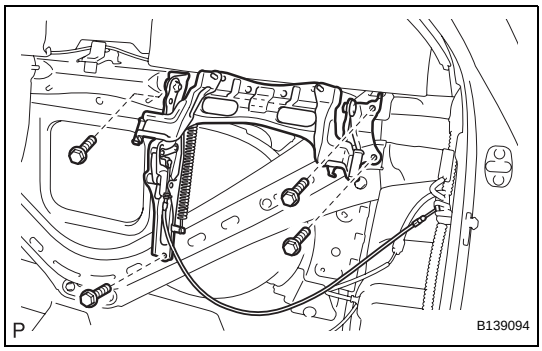
14. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY

(a) Remove the bolt.

(b) Disengage the 2 clips and the claw and then separate the reclining remote control lever sub-assembly.



(c) Separate the rear seat reclining control cable and remove the reclining remote control lever sub-assembly.

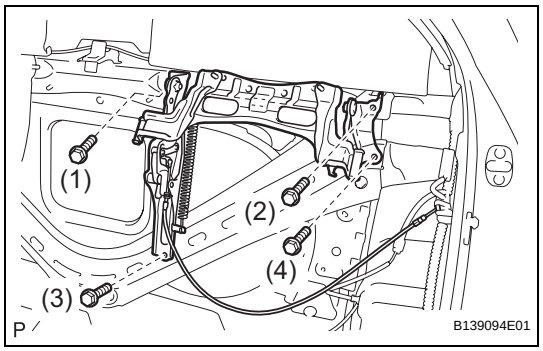


15. REMOVE REAR SEAT RECLINING ADJUSTER ASSEMBLY

(a) Remove the 4 bolts and rear seat reclining adjuster assembly.

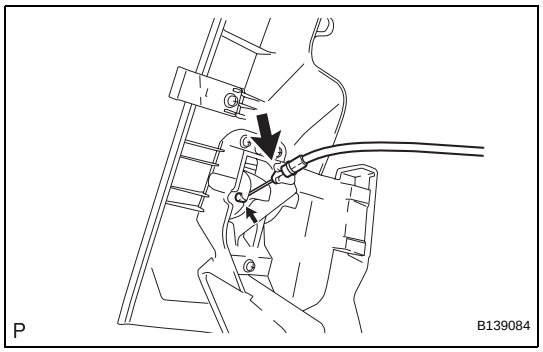
REASSEMBLY

HINT:
A bolt without a torque specification is shown in the standard bolt chart. (See page SS-2)



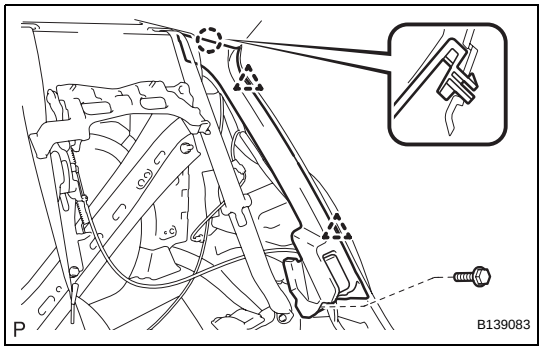
1. INSTALL REAR SEAT RECLINING ADJUSTER ASSEMBLY

(a) Install the rear seat reclining adjuster assembly with the 4 bolts.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)
NOTICE:
Tighten the bolts in the order shown in the illustration to install the rear seat reclining adjuster assembly.

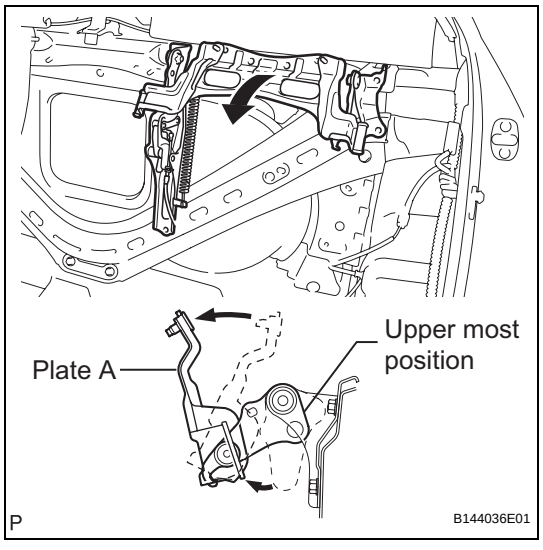


2. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY

(a) Install the rear seat reclining control cable.



(b) Engage the 2 clips and claw and then install the reclining remote control lever sub-assembly.
(c) Install the bolt.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



(d) Adjust the control lever to set the rear reclining adjuster assembly to its upper most position.
(e) Pull plate A toward the front of the vehicle to lock the plate.

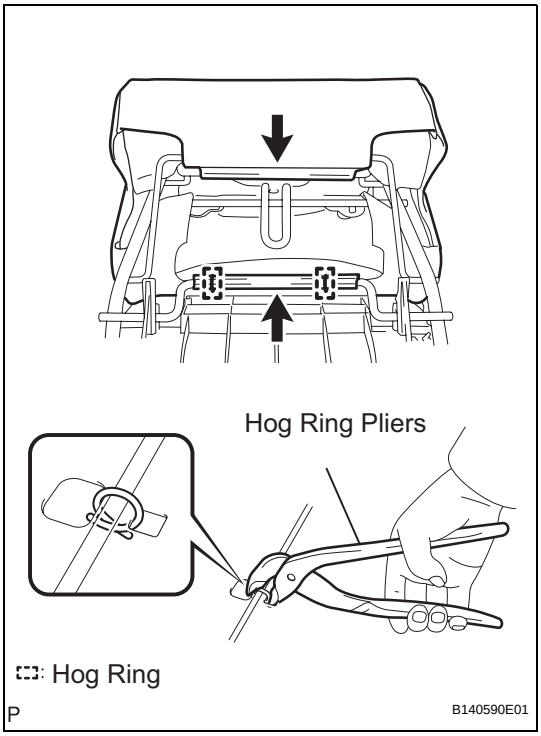
3. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH

4. INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)

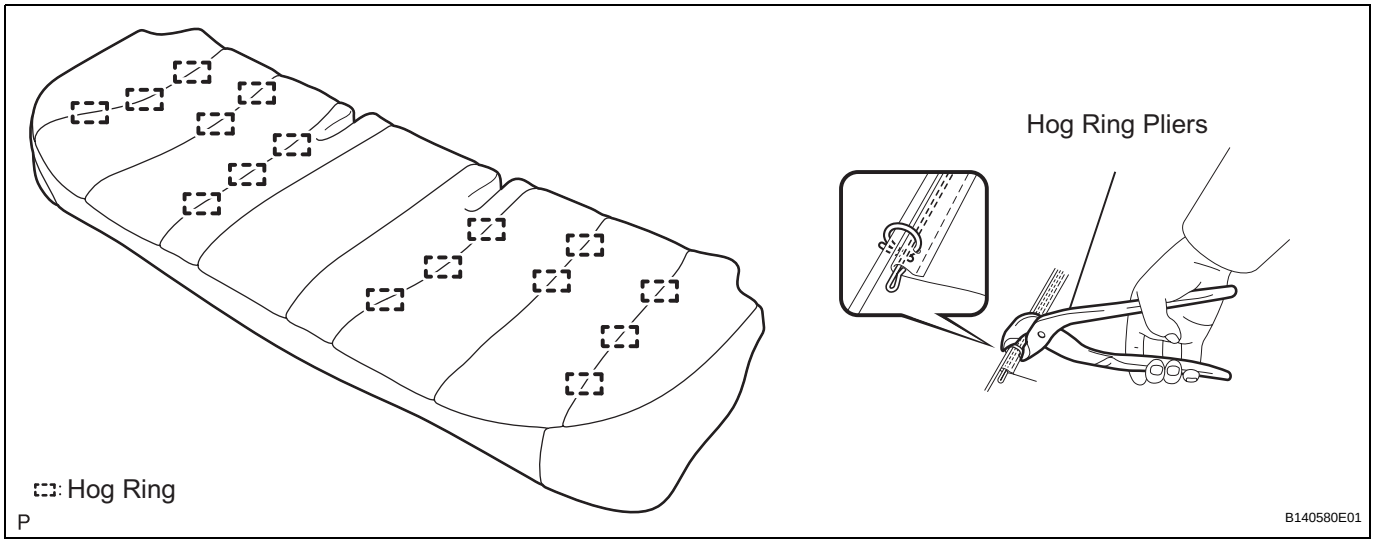
5. INSTALL REAR SEAT CENTER ARMREST BOX ASSEMBLY

6. INSTALL CENTER SEAT ARMREST PLATE INNER

SE

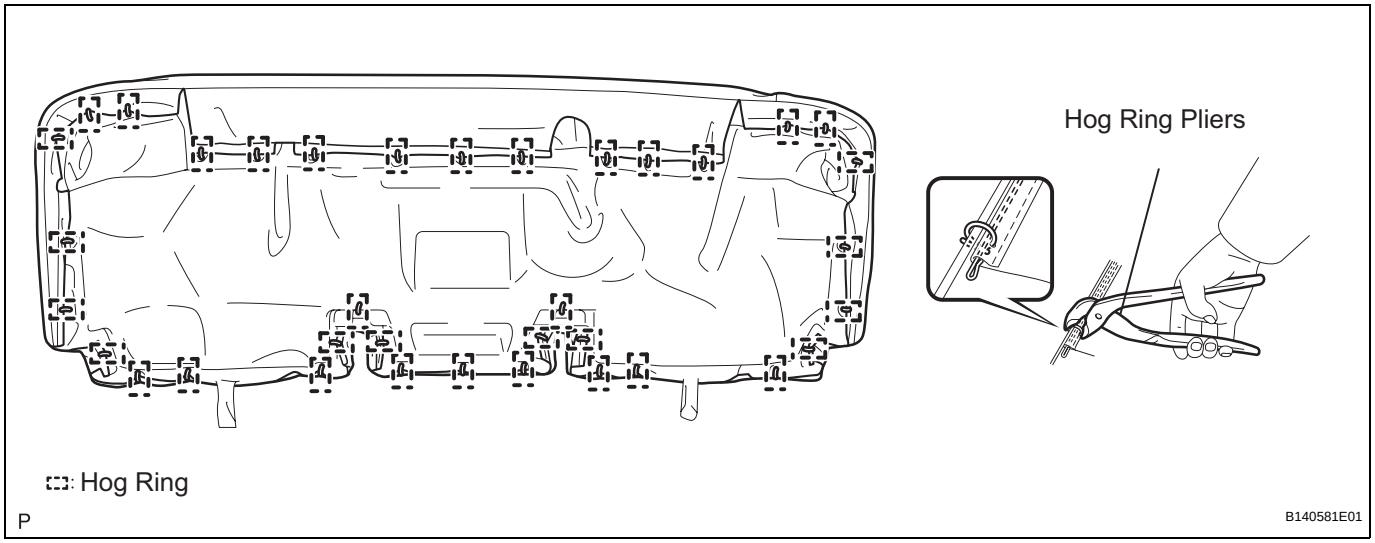


7. **INSTALL CENTER SEAT BACK COVER SUB-ASSEMBLY**
   (a) Install the center seat back cover sub-assembly with the hook.
   (b) Using hog ring pliers, install 2 new hog rings.
8. **INSTALL REAR SEAT HEADREST SUPPORT**
9. **INSTALL REAR SEAT HEADREST SUPPORT**
10. **INSTALL REAR CENTER SEAT ARMREST ASSEMBLY**
11. **INSTALL REAR SEPARATE TYPE SEAT BACK COVER**
12. **INSTALL REAR SEAT HEADREST SUPPORT (for LH Side)**
13. **INSTALL REAR SEAT HEADREST SUPPORT (for LH Side)**
14. **INSTALL REAR BENCH TYPE SEAT CUSHION COVER**
    (a) Using hog ring pliers, install 16 new hog rings.

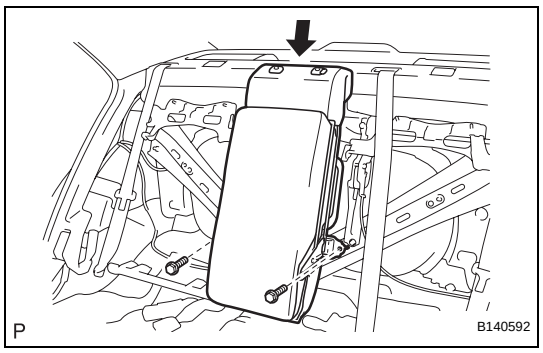


NOTICE:
- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

(b) Using hog ring pliers, install the rear bench type seat cushion cover to the seat cushion pad with 36 new hog rings.



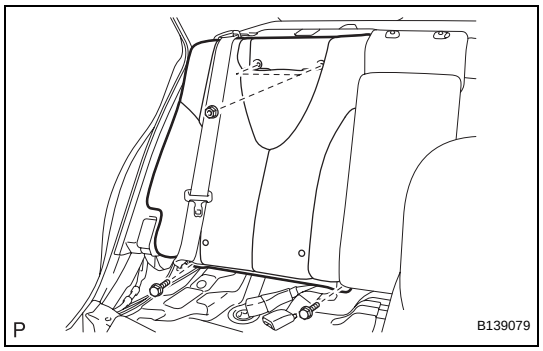
INSTALLATION



1. INSTALL CENTER SEAT BACK ASSEMBLY

(a) Install the center seat back assembly with the 2 bolts.

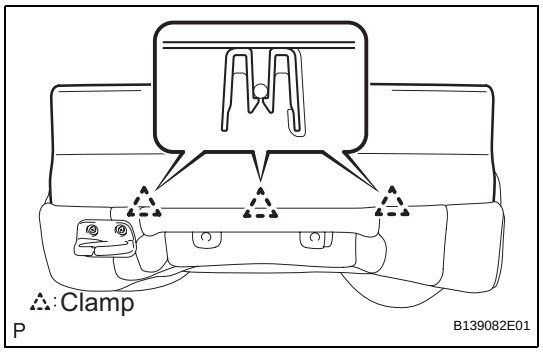
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



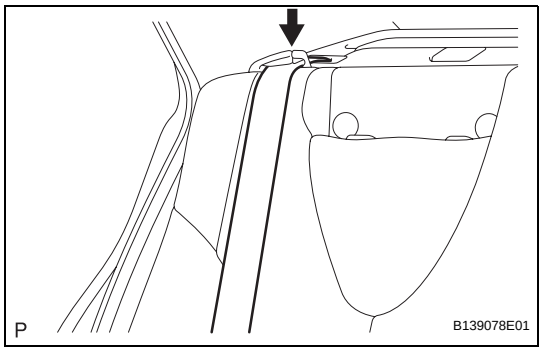
2. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH

(a) Install the separate type rear seat back assembly RH with the 2 bolts and 2 nuts.

Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

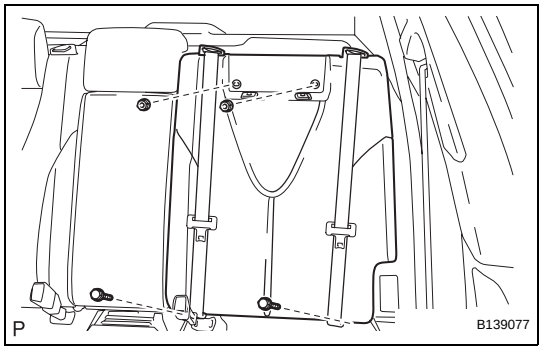


(b) Engage the 3 clamps and install the cover.



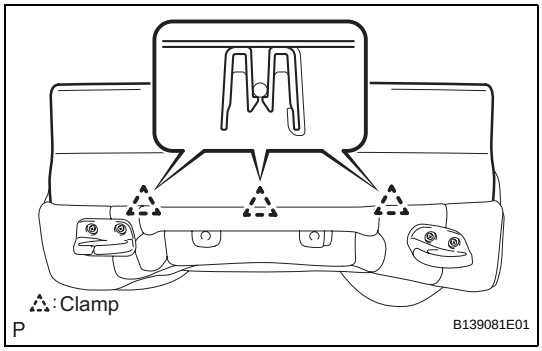
(c) Install the rear seat belt.

SE

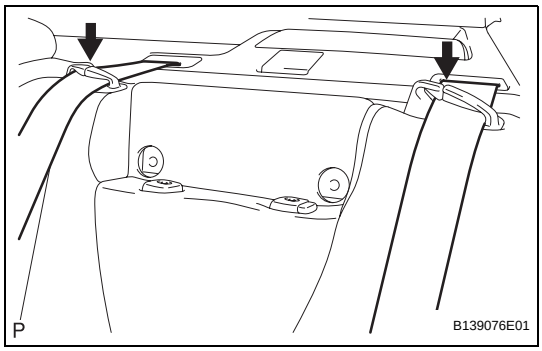


3. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH

(a) Install the separate type rear seat back assembly LH with the 2bolts and 2 nuts.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



(b) Engage the 3 clamps and install the cover.

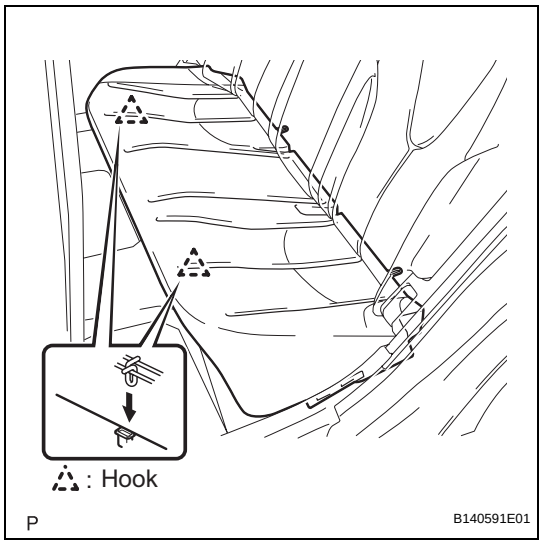


(c) Install the 2 rear seat belts.

4. INSTALL REAR SEAT BACK COVER

5. INSTALL REAR CENTER SEAT HEADREST ASSEMBLY

6. INSTALL REAR SEAT HEADREST ASSEMBLY



7. INSTALL REAR SEAT CUSHION ASSEMBLY

(a) Attach the front hooks of the bench type rear seat cushion assembly to the vehicle body.

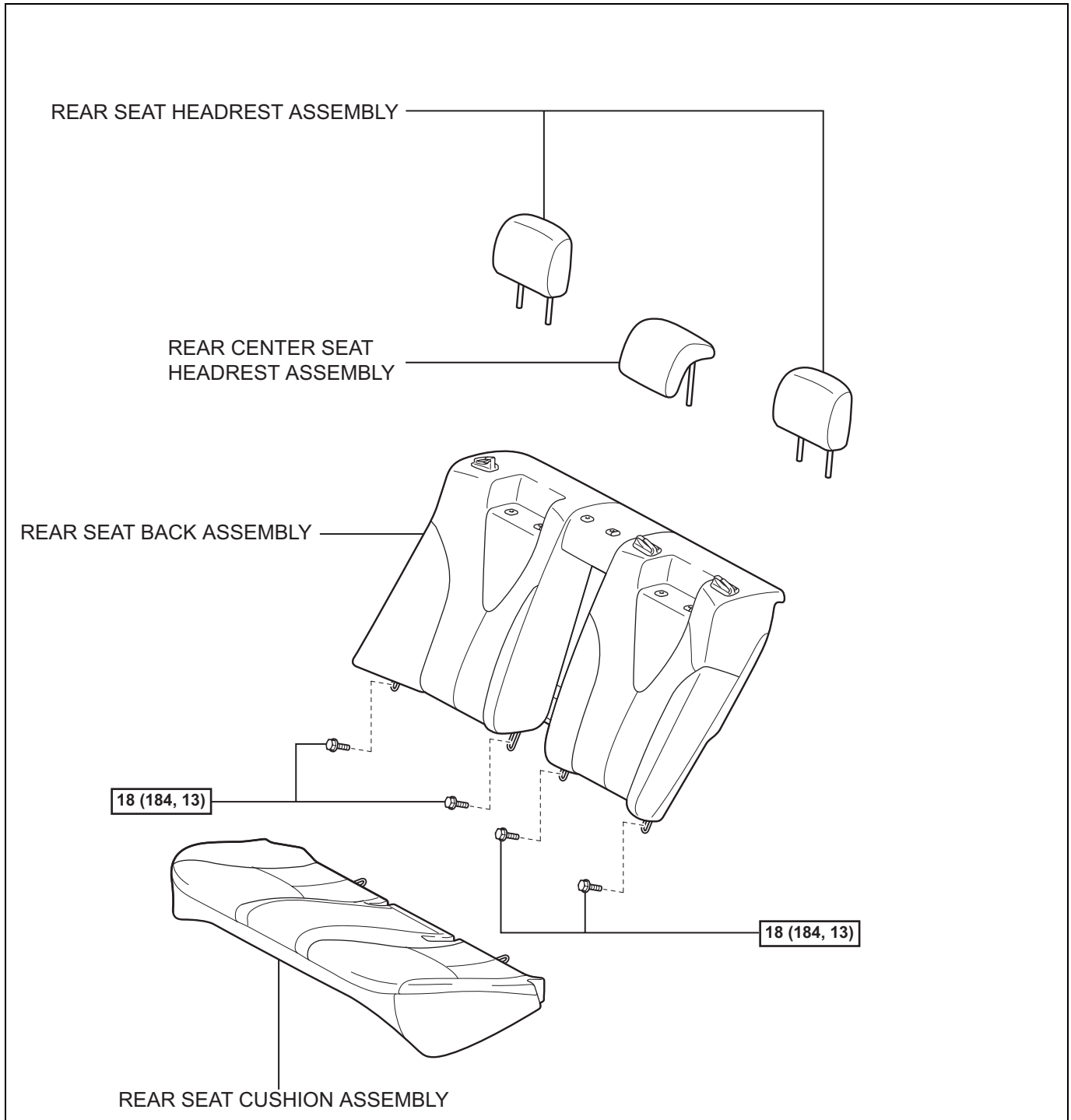
(b) Confirm that the seat cushion is firmly installed.

NOTICE:

When installing the bench type rear seat cushion assembly, make sure that the seat belt buckle is not under the bench type rear seat cushion assembly.

REAR SEAT ASSEMBLY (for Fixed Type)

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

P

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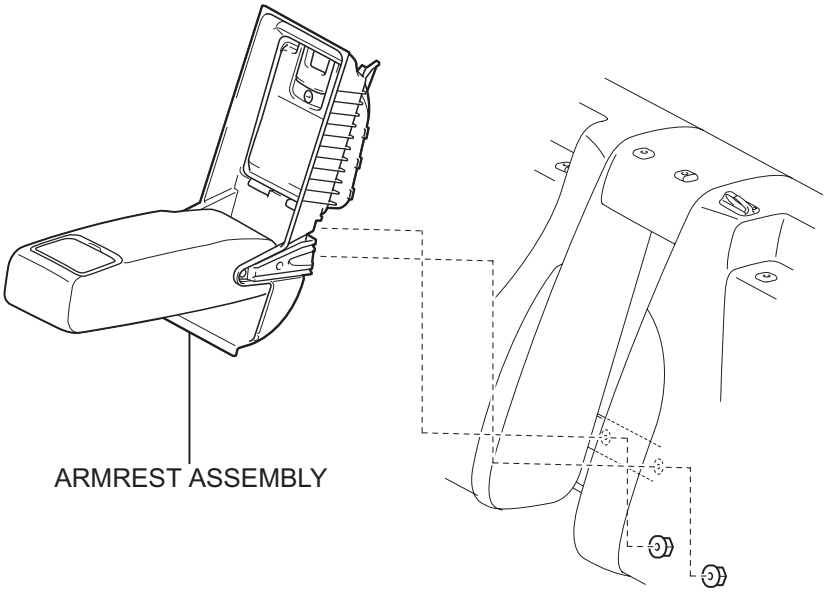

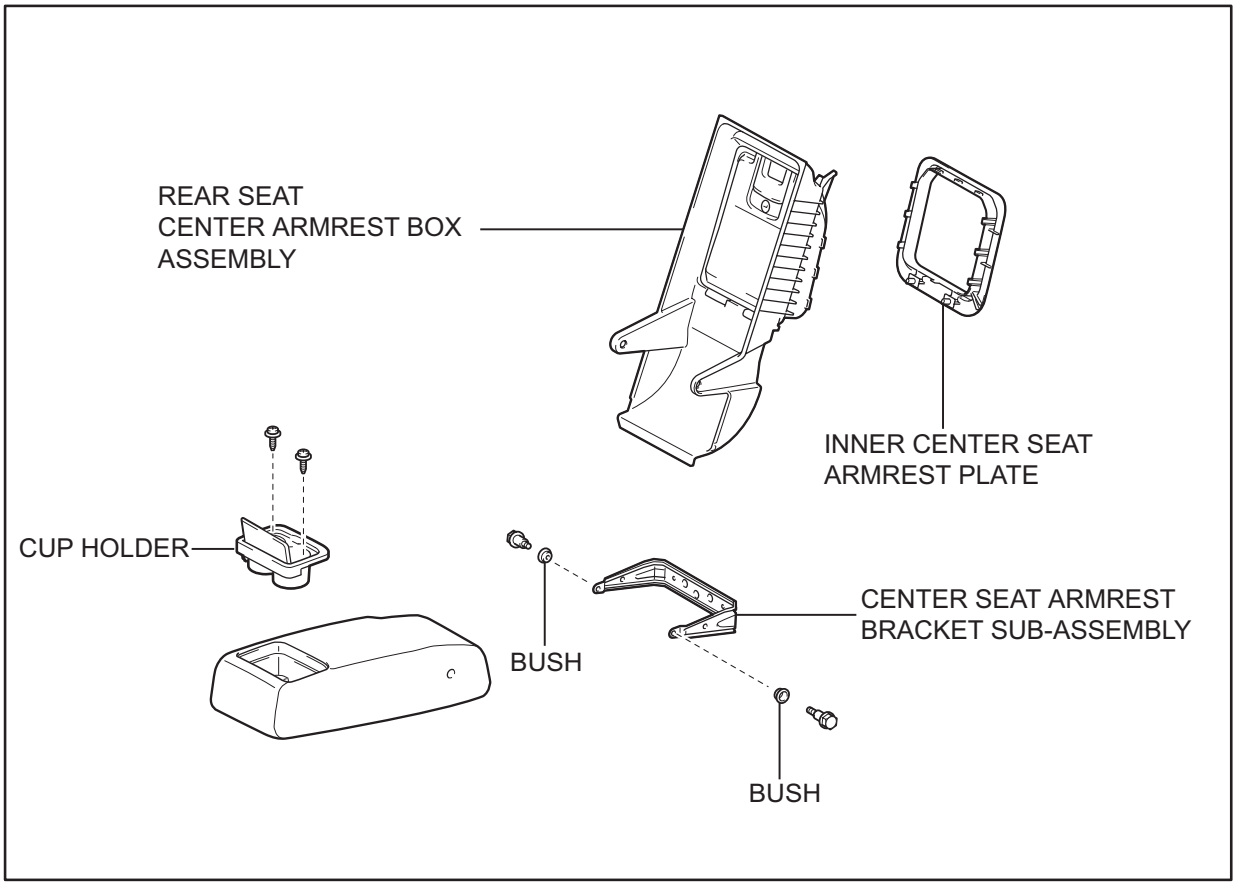

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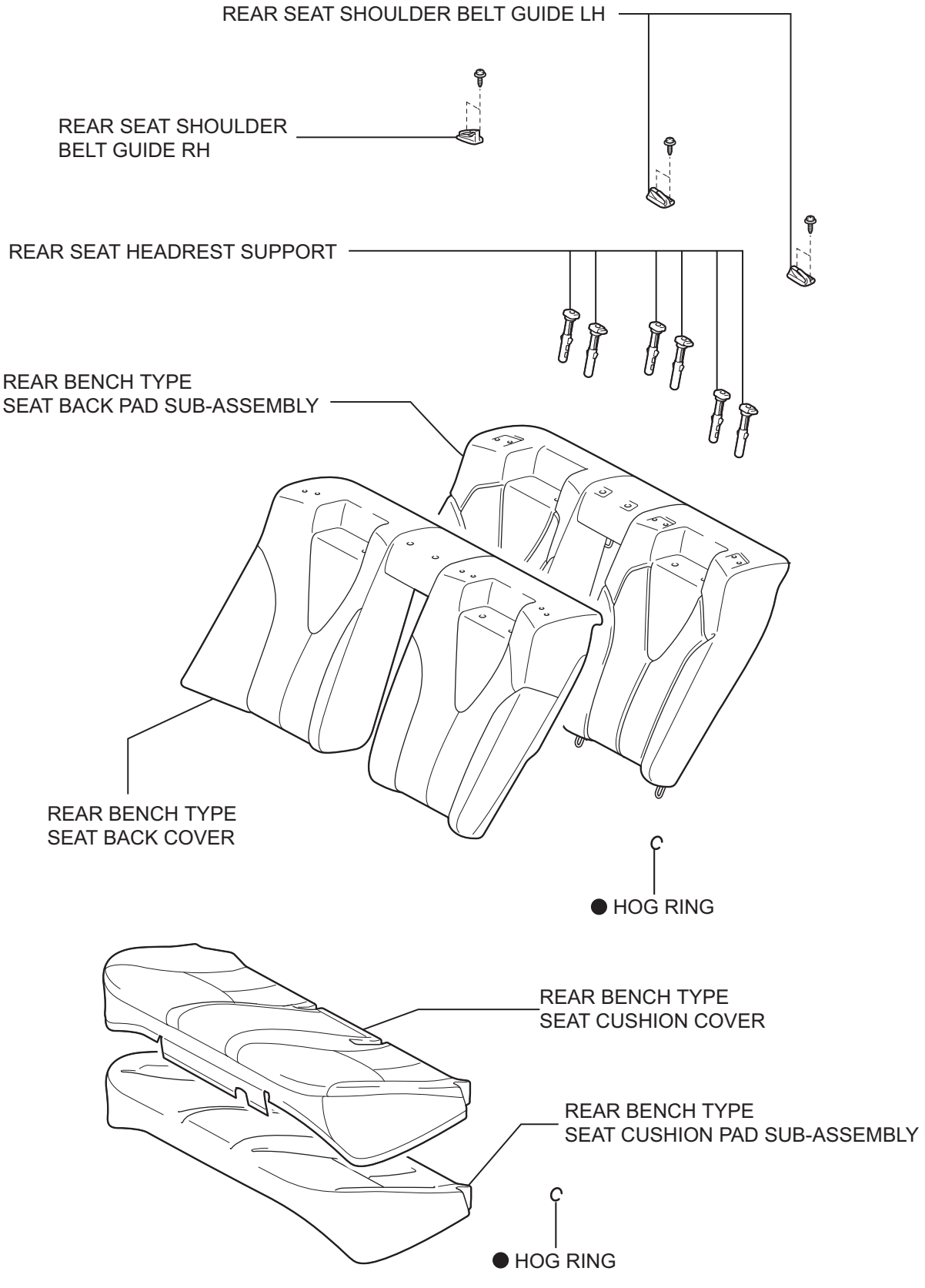
SE



● Non-reusable part

P

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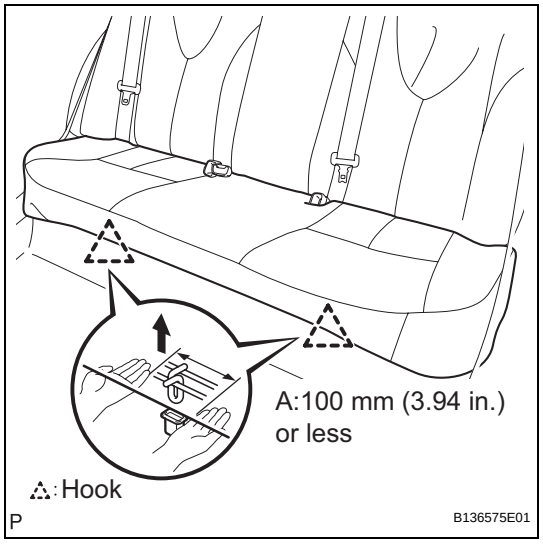


REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY

(a) Detach the 2 front hooks of the seat cushion from the vehicle body.

NOTICE:

Follow the instructions below carefully as the cushion frame can be deformed easily.

(1) Choose a hook to detach first. Place your hands near the hook as shown in the illustration. Then lift the seat cushion to detach the hook.

(2) Repeat the step above for the other hook.

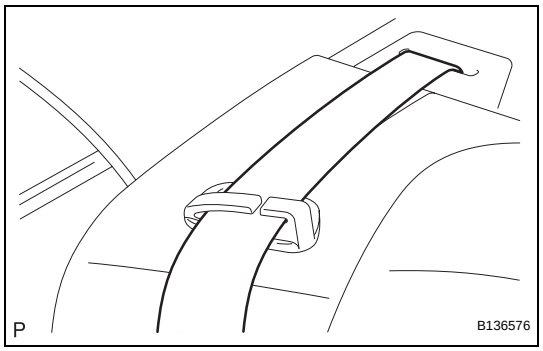
(b) Remove the rear seat cushion assembly.

2. REMOVE REAR SEAT HEADREST ASSEMBLY

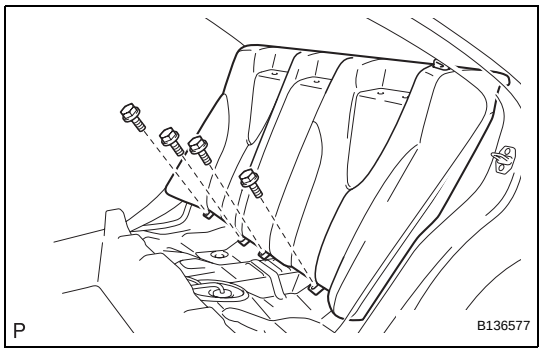
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY

4. REMOVE REAR SEAT BACK ASSEMBLY

(a) Remove the 3 rear seat belts from the 3 rear seat shoulder belt guides.



(b) Remove the 4 bolts and rear seat back assembly.



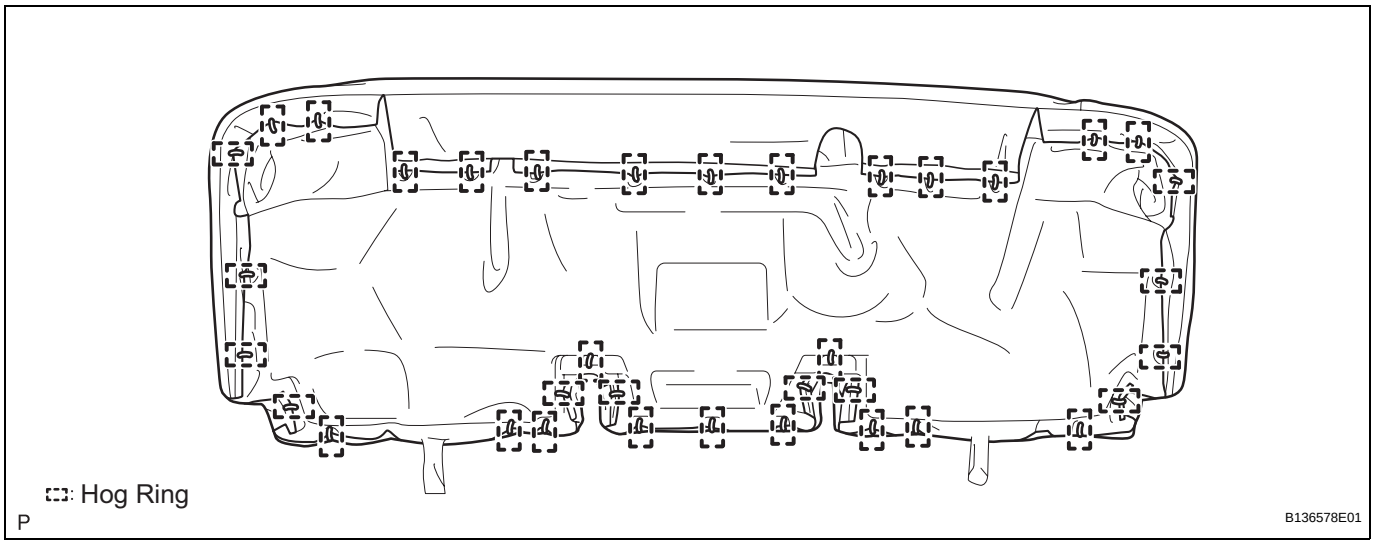
SE

SE

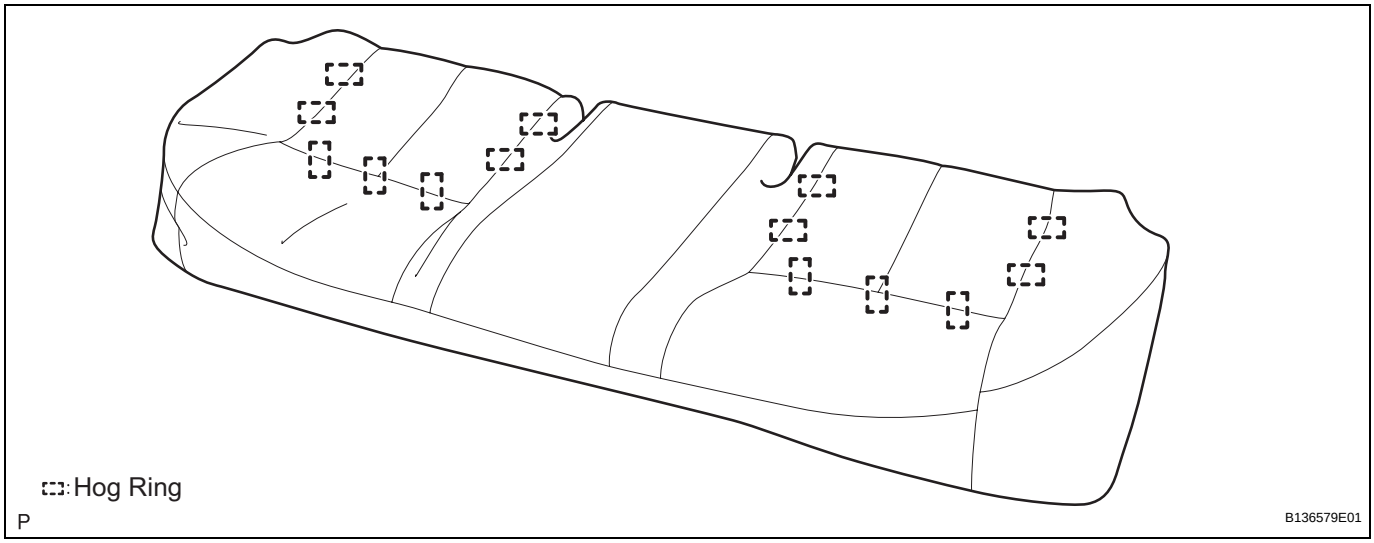
DISASSEMBLY

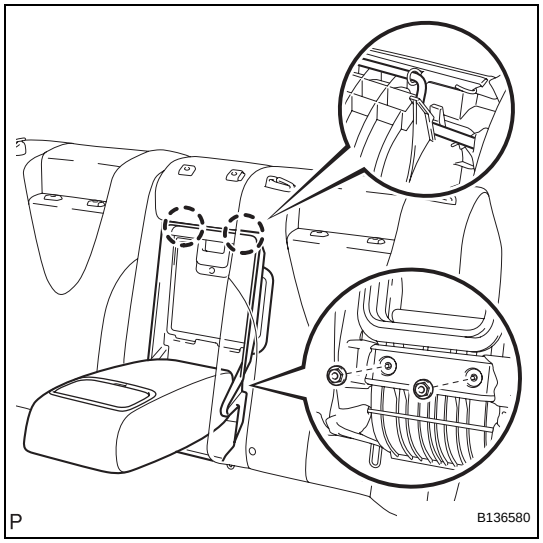
1. REMOVE REAR BENCH TYPE SEAT CUSHION COVER

(a) Remove the 36 hog rings.



(b) Remove the 14 hog rings and rear bench type seat cushion cover from the seat cushion frame (with pad).

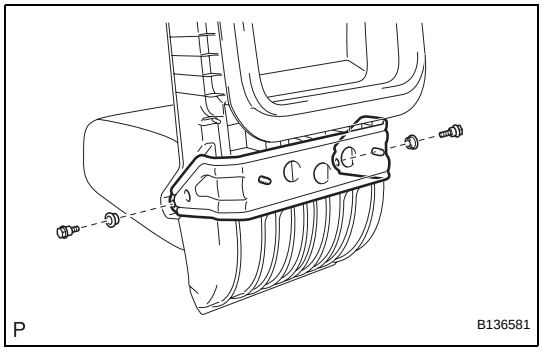




2. REMOVE ARMREST ASSEMBLY

(a) Remove the 2 nuts.

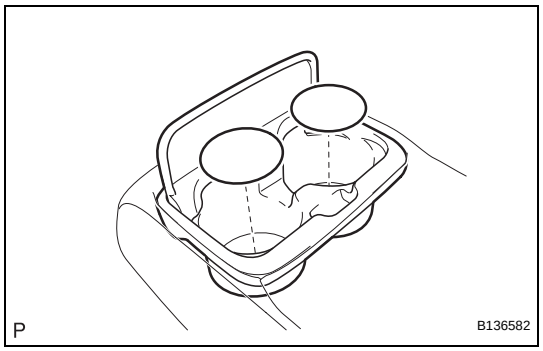
(b) Disengage the 2 claws and remove the armrest assembly.



3. REMOVE CENTER SEAT ARMREST BRACKET SUB-ASSEMBLY

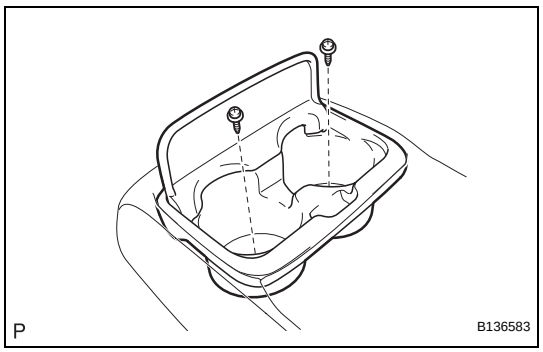
(a) Remove the 2 bolts and bushes.

(b) Remove the center seat armrest bracket sub-assembly.

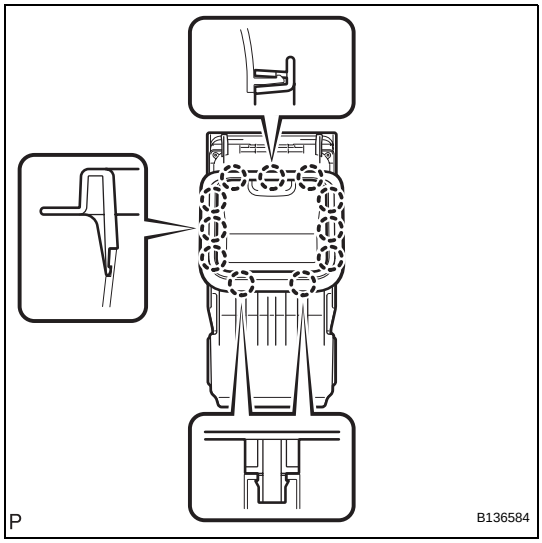


4. REMOVE CUP HOLDER

(a) Remove the 2 mats.



(b) Remove the 2 screws and cup holder.



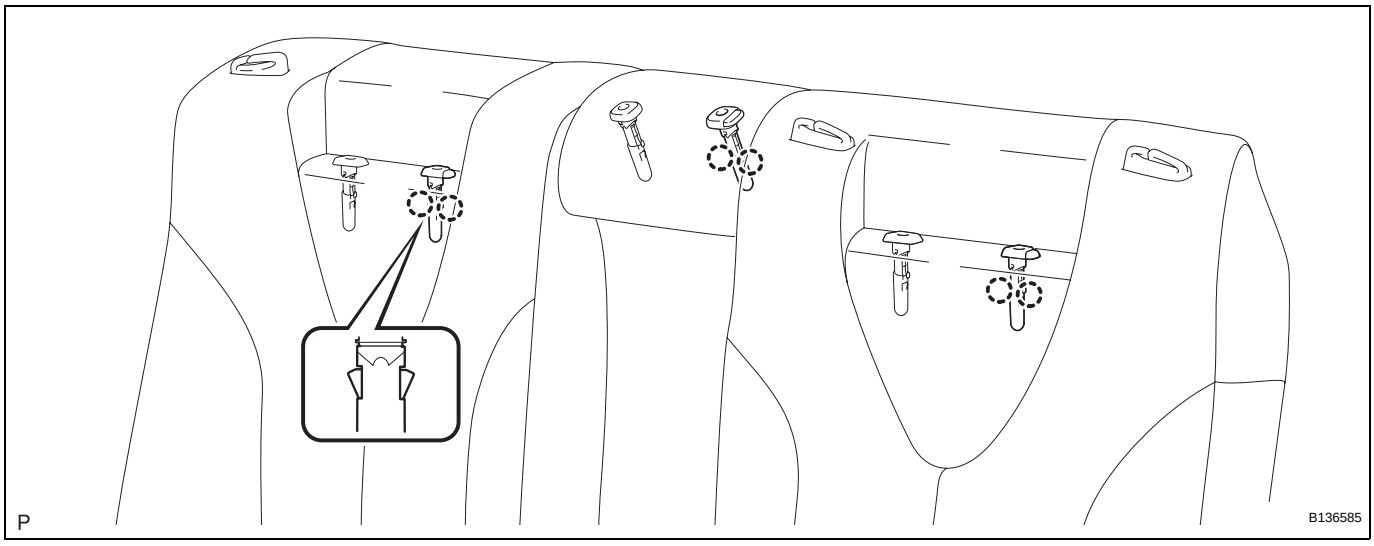
5. REMOVE INNER CENTER SEAT ARMREST PLATE

(a) Disengage the 11 claws and remove the inner center seat armrest plate.

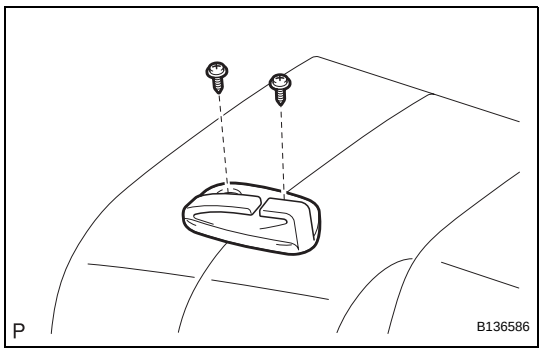
6. REMOVE REAR SEAT HEADREST SUPPORT

(a) Disengage the 6 claws and remove the 3 rear seat headrest supports.

SE



7. REMOVE REAR SEAT HEADREST SUPPORT



8. REMOVE REAR SEAT SHOULDER BELT GUIDE RH

(a) Remove the 2 screws and rear seat shoulder belt guide RH.

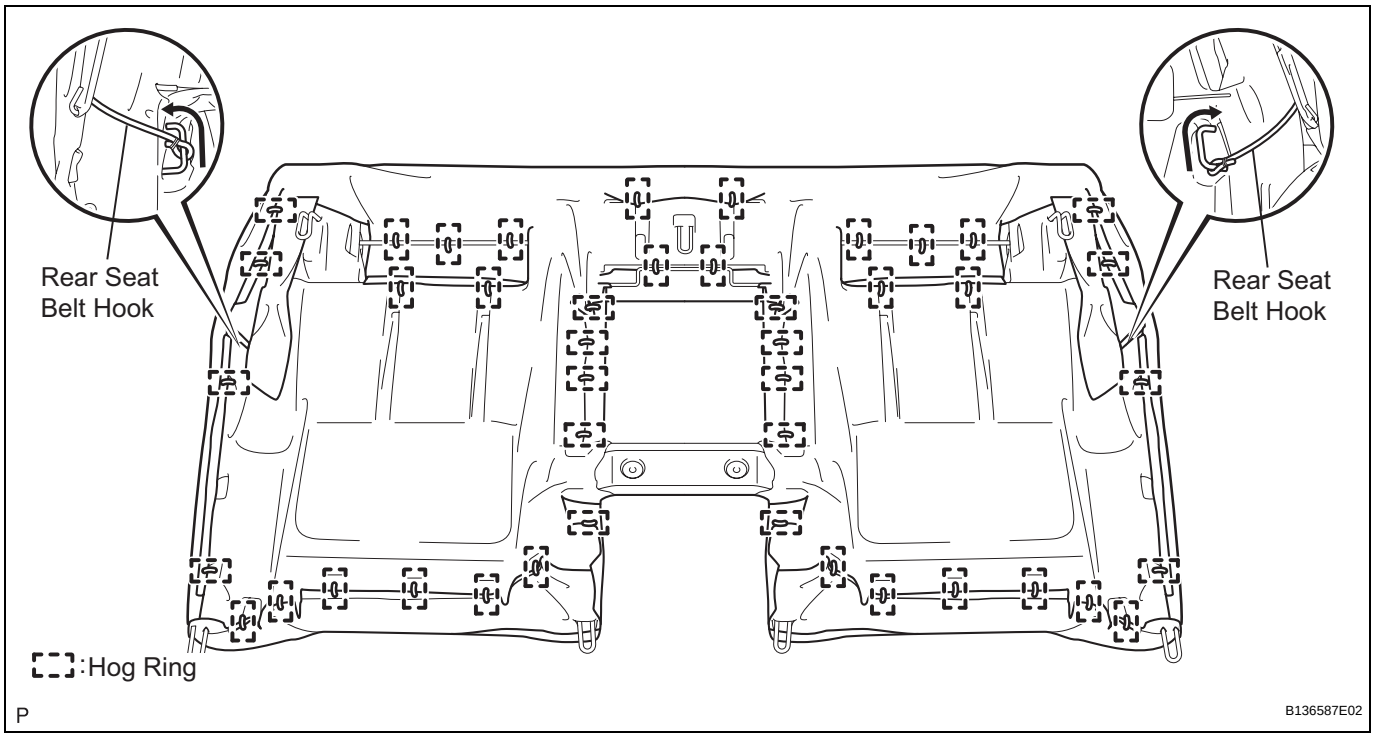
9. REMOVE REAR SEAT SHOULDER BELT GUIDE LH

HINT:

Use the same procedures for the RH side and LH side.

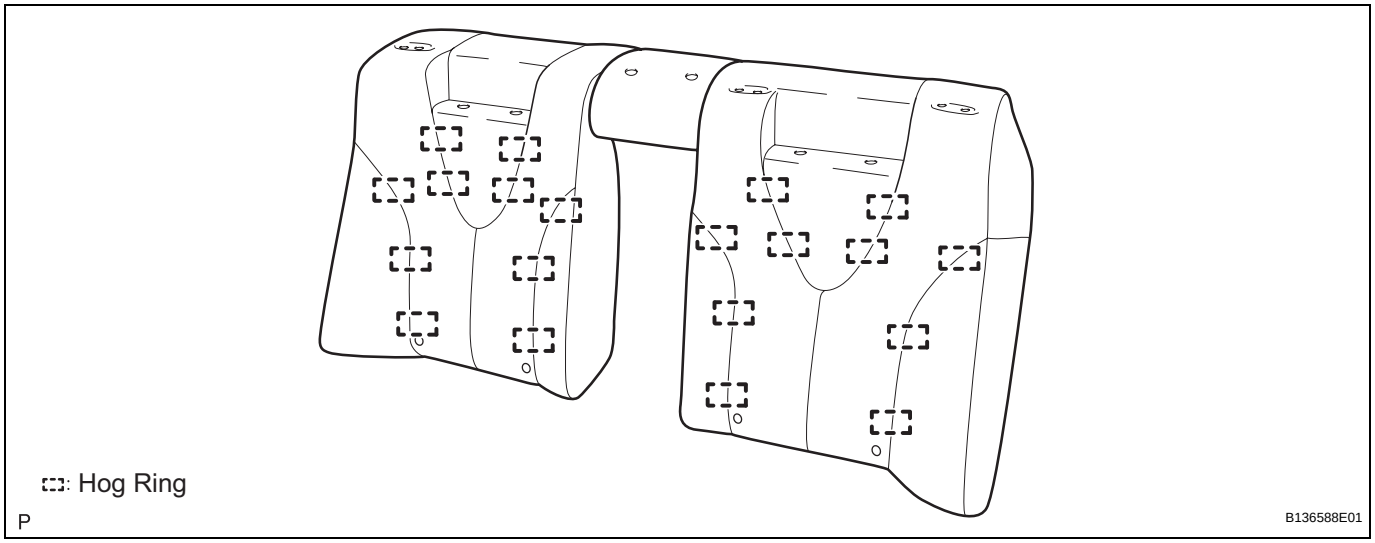
10. REMOVE REAR BENCH TYPE SEAT BACK COVER

(a) Remove the 44 hog rings and strap guide.



(b) Remove the 2 rear seat belt hooks.

(c) Remove the 20 hog rings and seat back cover from the seat back frame (with pad).



SE

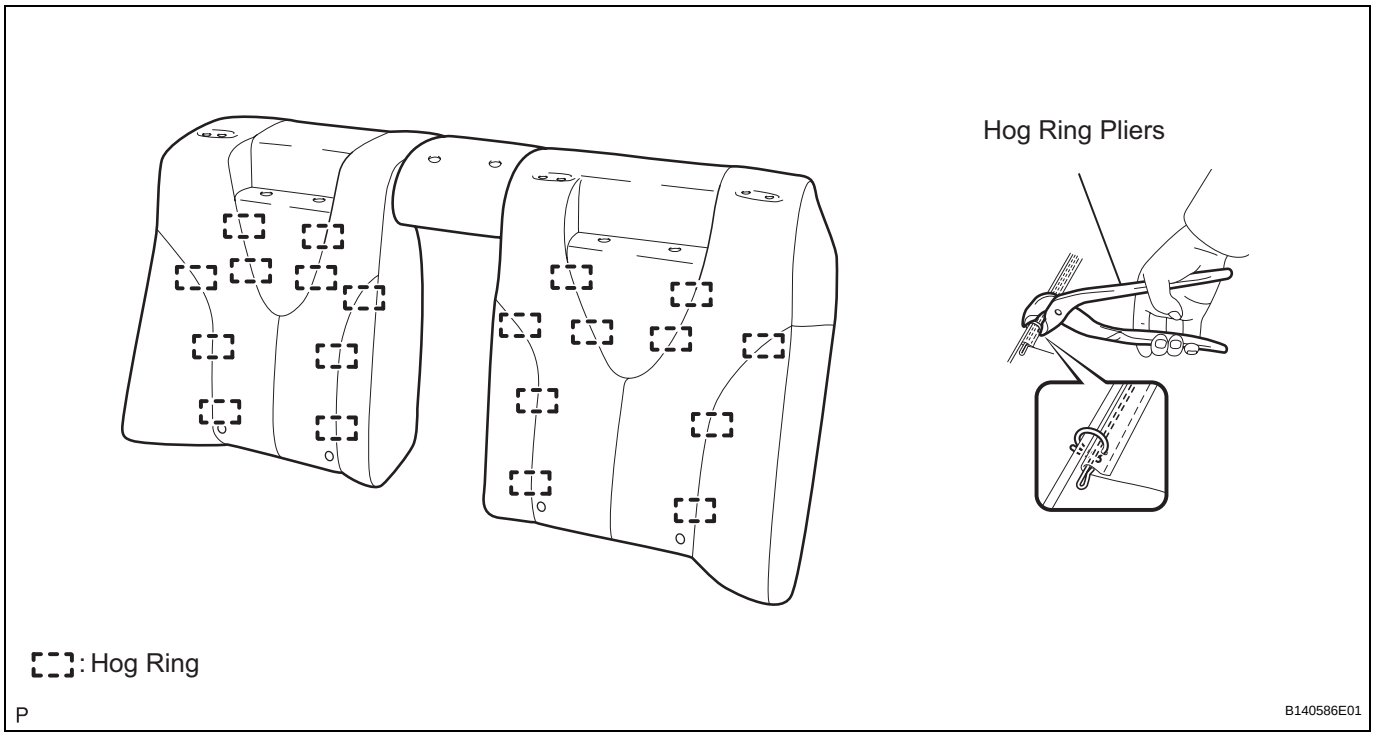
REASSEMBLY

HINT:
A bolt without a torque specification is shown in the standard bolt chart. (See page SS-2)

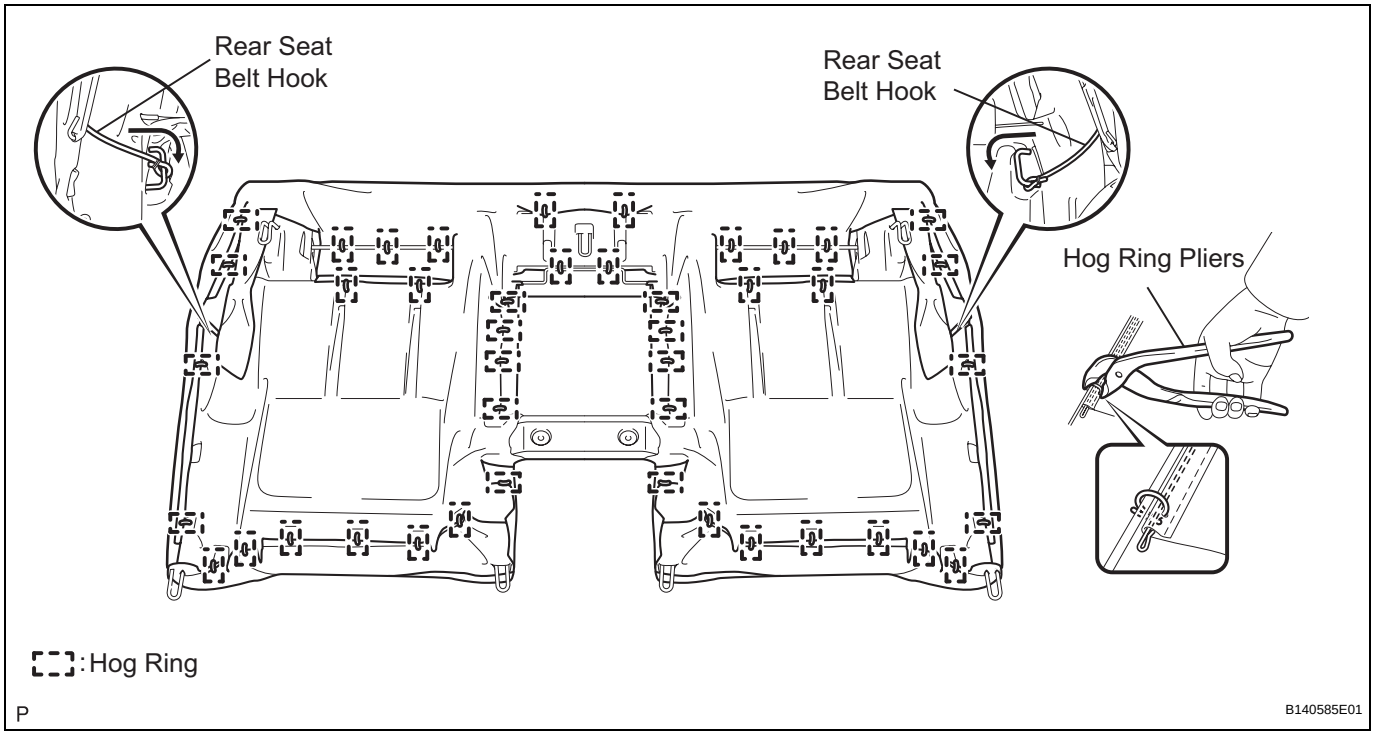
1. INSTALL REAR BENCH TYPE SEAT BACK COVER
NOTICE:
- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

(a) Using hog ring pliers, install 20 new hog rings.

SE



(b) Using hog ring pliers, install the rear bench type seat back cover to the seat back frame (with pad) with 44 new hog rings.



2. INSTALL REAR SEAT SHOULDER BELT GUIDE LH

3. INSTALL REAR SEAT SHOULDER BELT GUIDE RH

4. INSTALL REAR SEAT HEADREST SUPPORT

5. INSTALL REAR SEAT HEADREST SUPPORT

6. INSTALL INNER CENTER SEAT ARMREST PLATE

7. INSTALL CUP HOLDER

8. INSTALL CENTER SEAT ARMREST BRACKET SUB-ASSEMBLY

9. INSTALL ARMREST ASSEMBLY

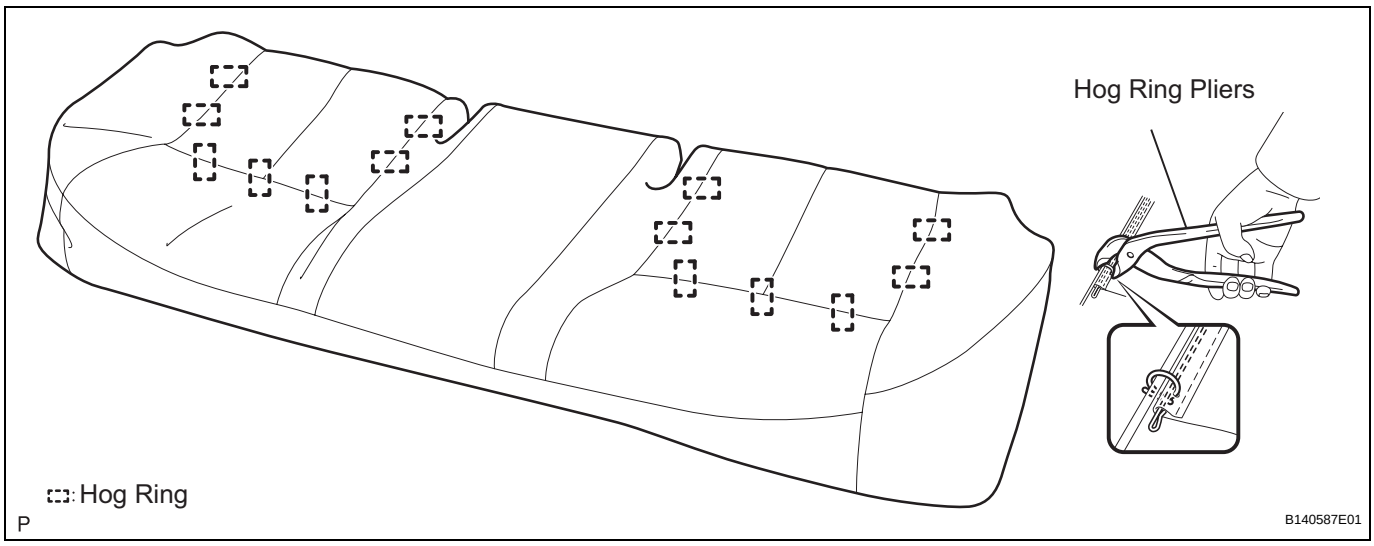
10. INSTALL REAR BENCH TYPE SEAT CUSHION COVER

NOTICE:

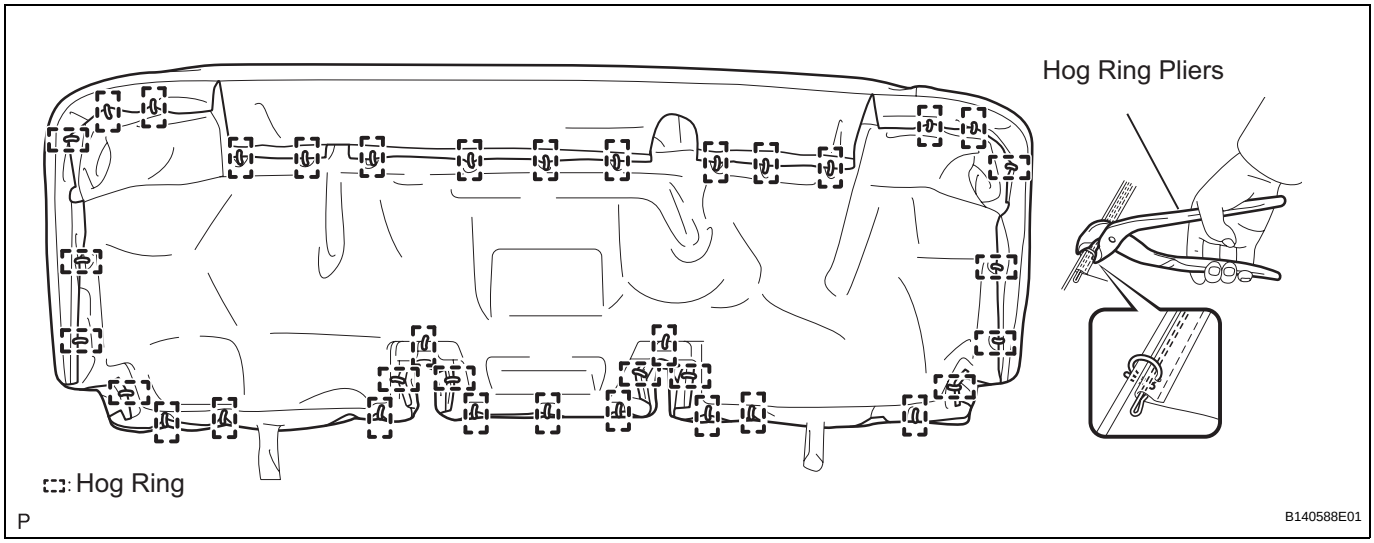
- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**

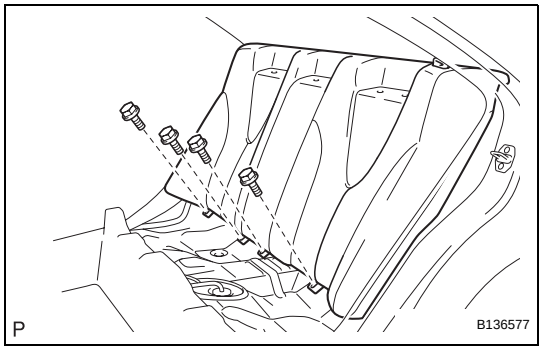
SE

(a) Using hog ring pliers, install 14 new hog rings.



(b) Using hog ring pliers, install the rear seat cushion cover to the rear seat cushion pad with 36 new hog rings.



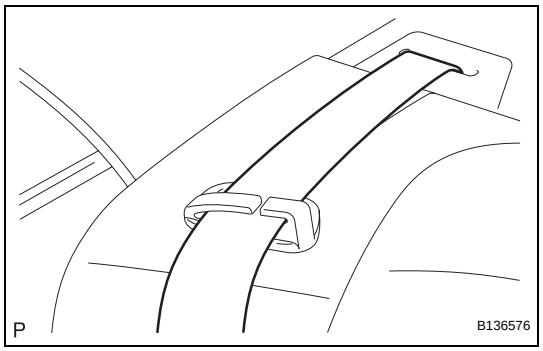


INSTALLATION

1. INSTALL REAR SEAT BACK ASSEMBLY

(a) Place the seat back in the cabin.
NOTICE:
Be careful not to damage the vehicle body.

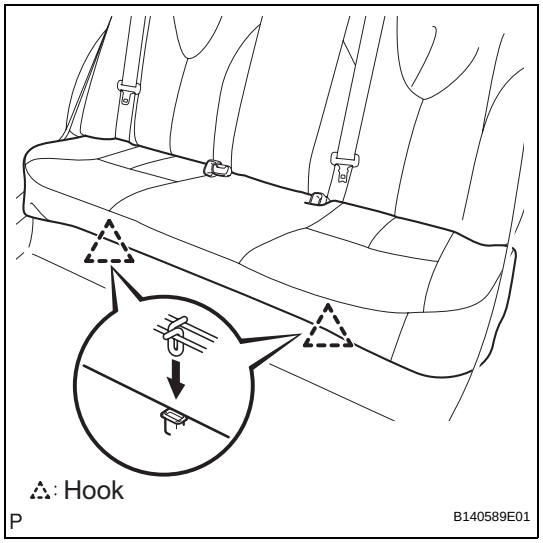
(b) Install the rear seat back assembly with the 4 bolts.
Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)



(c) Pass the 3 seat belts through and close the cap of the 2 rear seat shoulder belt guides.
(d) Install the floor anchor part with the bolt.

2. INSTALL REAR CENTER SEAT HEADREST ASSEMBLY

3. INSTALL REAR SEAT HEADREST ASSEMBLY



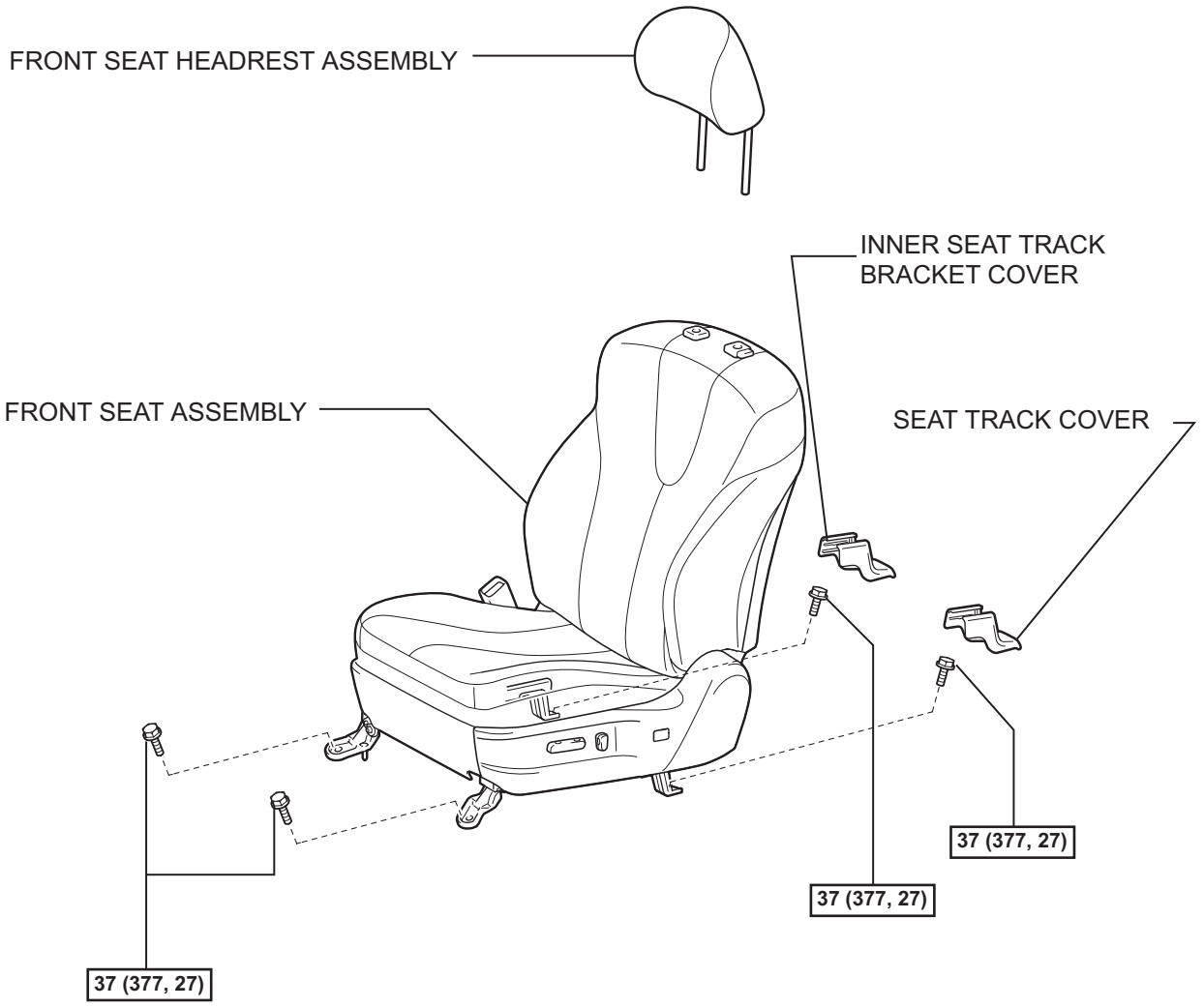
4. INSTALL REAR SEAT CUSHION ASSEMBLY

(a) Attach the 2 front hooks of the seat cushion to the vehicle body.
(b) Confirm that the seat cushion is firmly installed.
NOTICE:
When installing the seat cushion, make sure the seat belt buckle is not under the seat cushion.

SE

POWER SEAT SWITCH

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

P

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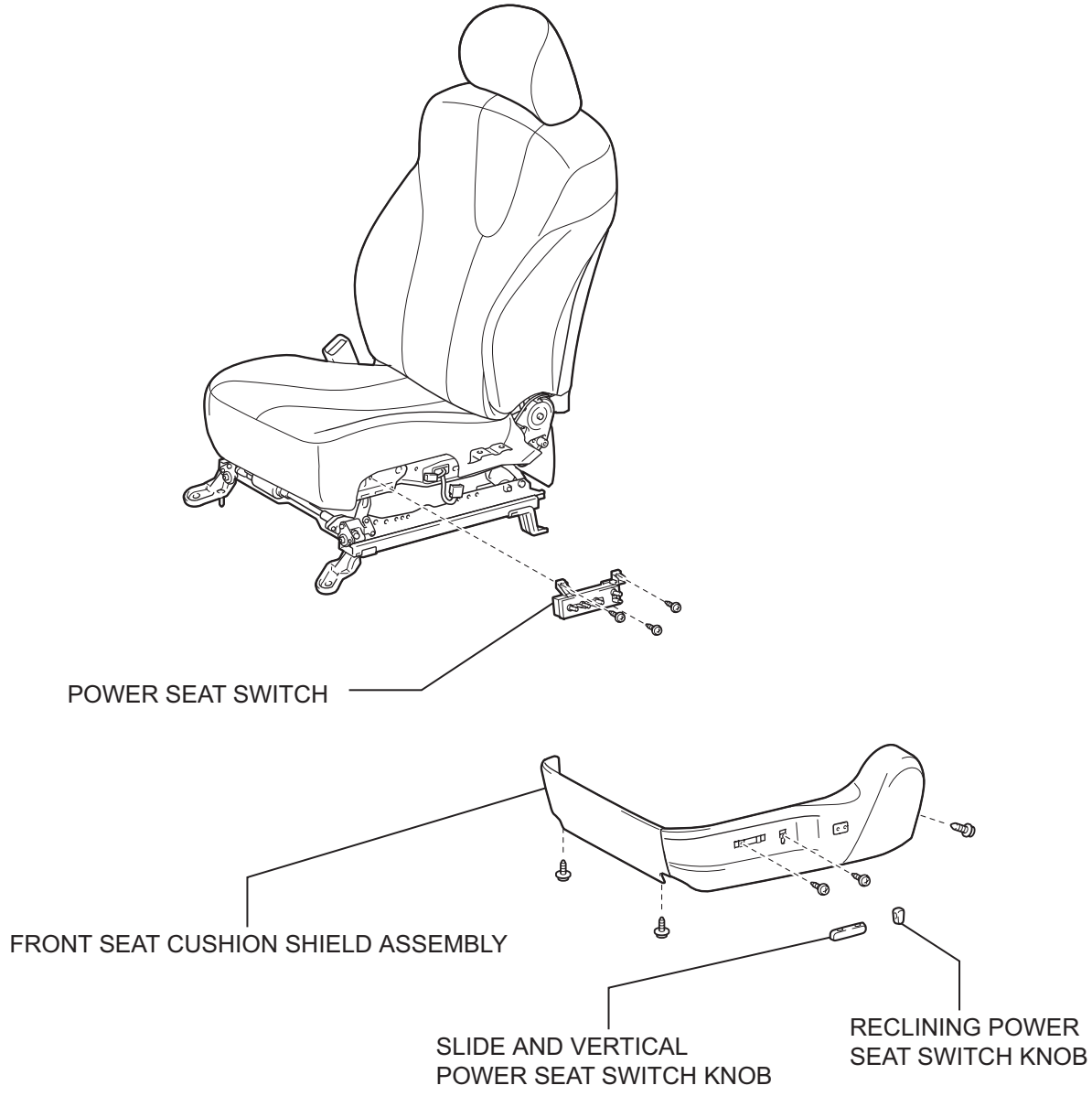
SE



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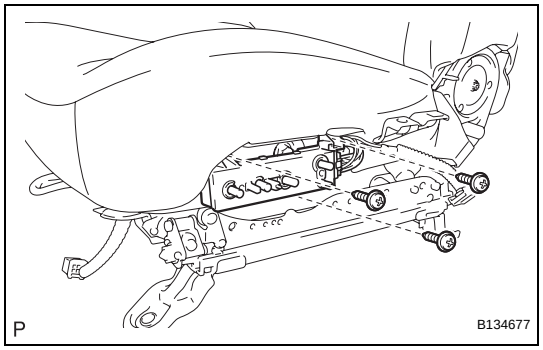
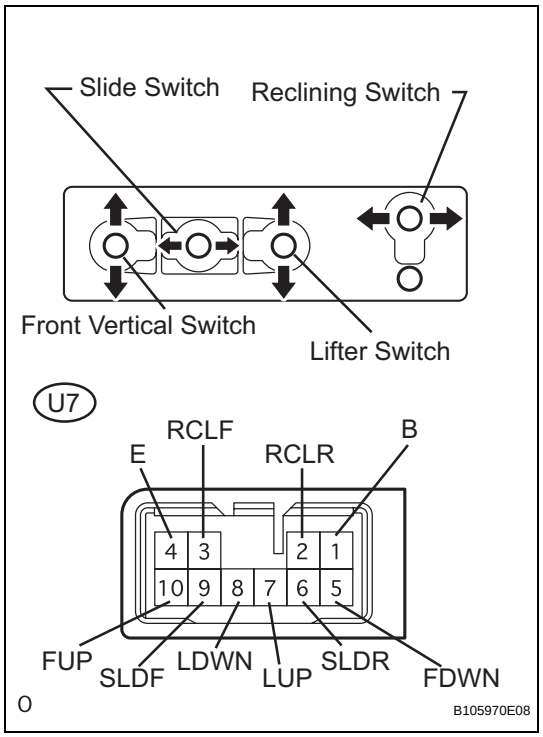
REMOVAL

1. REMOVE FRONT SEAT HEADREST ASSEMBLY
2. REMOVE SEAT TRACK COVER (See page SE-30)
3. REMOVE INNER SEAT TRACK BRACKET COVER (See page SE-30)
4. REMOVE FRONT SEAT ASSEMBLY (See page SE-30)
5. REMOVE RECLINING POWER SEAT SWITCH KNOB (See page SE-31)
6. REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB (See page SE-31)
7. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY (See page SE-32)
8. REMOVE POWER SEAT SWITCH
   (a) Remove the 3 screws.
   (b) Disconnect the connector and remove the power seat switch.





INSPECTION

1. INSPECT FRONT POWER SEAT SWITCH LH
   (a) Measure the resistance between the specified terminals when each switch is operated.
   Standard resistance (Slide switch)

Tester Connection	Switch Condition	Specified Condition
U7-1 (B) - U7-9 (SLDF)	FRONT	Below 1 Ω
U7-4 (E) - U7-6 (SLDR)	FRONT	Below 1 Ω
U7-1 (B) - U7-6 (SLDR)	FRONT	10 kΩ or higher
U7-4 (E) - U7-9 (SLDF)	FRONT	10 kΩ or higher
U7-4 (E) - U7-6 (SLDR)	OFF	Below 1 Ω
U7-4 (E) - U7-9 (SLDF)	OFF	Below 1 Ω
U7-1 (B) - U7-6 (SLDR)	OFF	10 kΩ or higher
U7-1 (B) - U7-9 (SLDF)	OFF	10 kΩ or higher
U7-1 (B) - U7-6 (SLDR)	REAR	Below 1 Ω
U7-4 (E) - U7-9 (SLDF)	REAR	Below 1 Ω
U7-1 (B) - U7-9 (SLDF)	REAR	10 kΩ or higher
U7-4 (E) - U7-6 (SLDR)	REAR	10 kΩ or higher

Standard resistance (Front vertical switch)

Tester Connection	Switch Condition	Specified Condition
U7-1 (B) - U7-10 (FUP)	UP	Below 1 Ω
U7-4 (E) - U7-5 (FDWN)	UP	Below 1 Ω
U7-1 (B) - U7-5 (FDWN)	UP	10 kΩ or higher
U7-4 (E) - U7-10 (FUP)	UP	10 kΩ or higher
U7-4 (E) - U7-5 (FDWN)	OFF	Below 1 Ω

Tester Connection	Switch Condition	Specified Condition
U7-4 (E) - U7-10 (FUP)	OFF	Below 1 Ω
U7-1 (B) - U7- 5 (FDWN)	OFF	10 kΩ or higher
U7-1 (B) - U7-10 (FUP)	OFF	10 kΩ or higher
U7-1 (B) - U7-5 (FDWN)	DOWN	Below 1 Ω
U7-4 (E) - U7-10 (FUP)	DOWN	Below 1 Ω
U7-1 (B) - U7-10 (FUP)	DOWN	10 kΩ or higher
U7-4 (E) - U7-5 (FDWN)	DOWN	10 kΩ or higher

Standard resistance (Lifter switch)

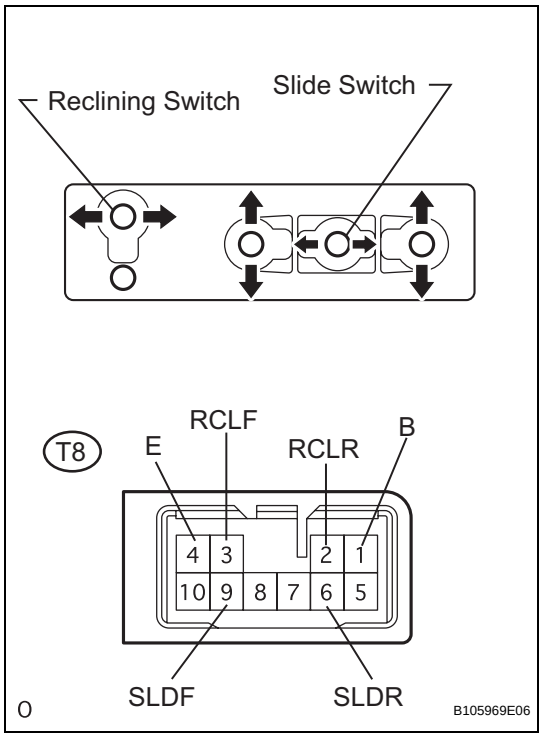
SE

Tester Connection	Switch Condition	Specified Condition
U7-1 (B) - U7-7 (LUP)	UP	Below 1 Ω
U7-4 (E) - U7-8 (LDWN)	UP	Below 1 Ω
U7-1 (B) - U7-8 (LDWN)	UP	10 kΩ or higher
U7-4 (E) - U7-7 (LUP)	UP	10 kΩ or higher
U7-4 (E) - U7-7 (LUP)	OFF	Below 1 Ω
U7-4 (E) - U7-8 (LDWN)	OFF	Below 1 Ω
U7-1 (B) - U7-7 (LUP)	OFF	10 kΩ or higher
U7-1 (B) - U7-8 (LDWN)	OFF	10 kΩ or higher
U7-1 (B) - U7-8 (LDWN)	DOWN	Below 1 Ω
U7-4 (E) - U7-7 (LUP)	DOWN	Below 1 Ω
U7-1 (B) - U7-7 (LUP)	DOWN	10 kΩ or higher
U7-4 (E) - U7-8 (LDWN)	DOWN	10 kΩ or higher

Standard resistance (Reclining switch)

Tester Connection	Switch Condition	Specified Condition
U7-1 (B) - U7-3 (RCLF)	FRONT	Below 1 Ω
U7-4 (E) - U7-2 (RCLR)	FRONT	Below 1 Ω
U7-1 (B) - U7-2 (RCLR)	FRONT	10 kΩ or higher
U7-4 (E) -U7-3 (RCLF)	FRONT	10 kΩ or higher
U7-4 (E) - U7-2 (RCLR)	OFF	Below 1 Ω
U7-4 (E) - U7-3 (RCLF)	OFF	Below 1 Ω
U7-1 (B) - U7-3 (RCLF)	OFF	10 kΩ or higher
U7-1 (B) - U7-2 (RCLR)	OFF	10 kΩ or higher
U7-1 (B) - U7-2 (RCLR)	REAR	Below 1 Ω
U7-4 (E) - U7-3 (RCLF)	REAR	Below 1 Ω
U7-1 (B) - U7-3 (RCLF)	REAR	10 kΩ or higher
U7-4 (E) - U7-2 (RCLR)	REAR	10 kΩ or higher

If the result is not as specified, replace the switch.



2. INSPECT FRONT POWER SEAT SWITCH RH

(a) Measure the resistance between the specified terminals when each switch is operated.

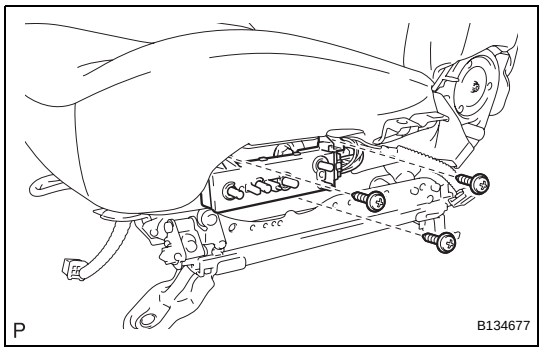
Standard resistance (Slide switch)

Tester Connection	Switch Condition	Specified Condition
T8-1 (B) - T8-9 (SLDF)	FRONT	Below 1 Ω
T8-4 (E) - T8-6 (SLDR)	FRONT	Below 1 Ω
T8-1 (B) - T8-6 (SLDR)	FRONT	10 kΩ or higher
T8-4 (E) - T8-9 (SLDF)	FRONT	10 kΩ or higher
T8-4 (E) - T8-6 (SLDR)	OFF	Below 1 Ω
T8-4 (E) - T8-9 (SLDF)	OFF	Below 1 Ω
T8-1 (B) - T8-6 (SLDR)	OFF	10 kΩ or higher
T8-1 (B) - T8-9 (SLDF)	OFF	10 kΩ or higher
T8-1 (B) - T8-6 (SLDR)	REAR	Below 1 Ω
T8-4 (E) - T8-9 (SLDF)	REAR	Below 1 Ω
T8-1 (B) - T8-9 (SLDF)	REAR	10 kΩ or higher
T8-4 (E) - T8-6 (SLDR)	REAR	10 kΩ or higher

Standard resistance (Reclining switch)

Tester Connection	Switch Condition	Specified Condition
T8-1 (B) - T8-3 (RCLF)	FRONT	Below 1 Ω
T8-4 (E) - T8-2 (RCLR)	FRONT	Below 1 Ω
T8-1 (B) - T8-2 (RCLR)	FRONT	10 kΩ or higher
T8-4 (E) - T8-3 (RCLF)	FRONT	10 kΩ or higher
T8-4 (E) - T8-2 (RCLR)	OFF	Below 1 Ω
T8-4 (E) - T8-3 (RCLF)	OFF	Below 1 Ω
T8-1 (B) - T8- 3 (RCLF)	OFF	10 kΩ or higher
T8-1 (B) - T8-2 (RCLR)	OFF	10 kΩ or higher
T8-1 (B) - T8-2 (RCLR)	REAR	Below 1 Ω
T8-4 (E) - T8-3 (RCLF)	REAR	Below 1 Ω
T8-1 (B) - T8-3 (RCLF)	REAR	10 kΩ or higher
T8-4 (E) - T8-2 (RCLR)	REAR	10 kΩ or higher

If the result is not as specified, replace the switch.



INSTALLATION

1. INSTALL POWER SEAT SWITCH

(a) Install the power seat switch with the 3 screws.

(b) Connect the connector.

2. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY

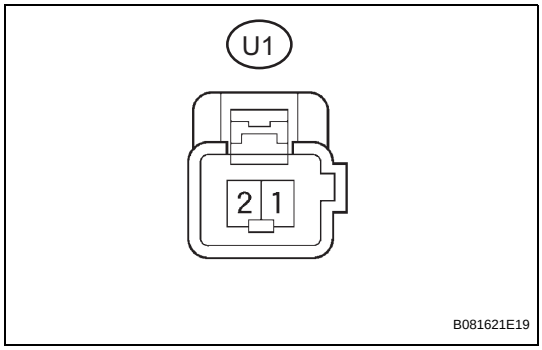
3. INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB

4. INSTALL RECLINING POWER SEAT SWITCH KNOB

5. INSTALL FRONT SEAT ASSEMBLY (See page SE-41)

6. INSTALL INNER SEAT TRACK BRACKET COVER (See page SE-42)

7. INSTALL SEAT TRACK COVER (See page SE-42)



FRONT SEAT FRAME WITH ADJUSTER

INSPECTION

1. INSPECT FRONT SEAT FRAME WITH ADJUSTER LH

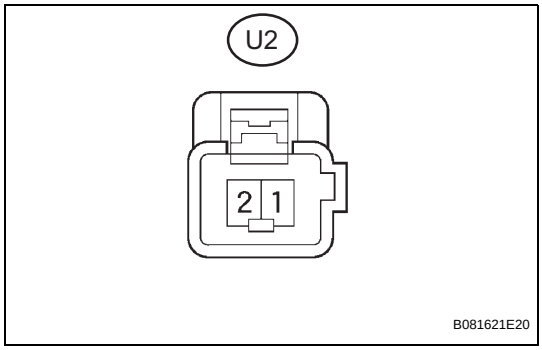
(a) Check operation of the seat frame (slide motor).

(1) Check if the seat frame moves smoothly when the battery is connected to the slide motor connector terminals.

OK

Measurement Condition	Operational Direction
Battery positive (+) → U1-1 Battery negative (-) → U1-2	Forward
Battery positive (+) → U1-2 Battery negative (-) → U1-1	Backward

If the result is not as specified, replace the seat frame with adjuster.



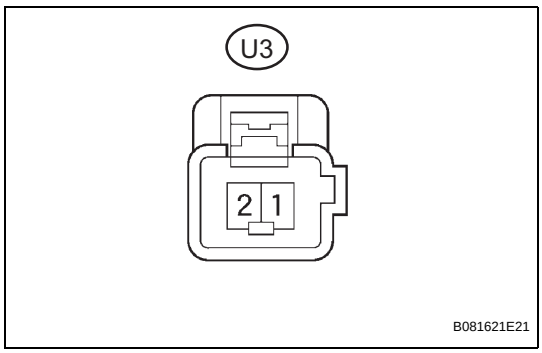
(b) Check operation of the seat frame (front vertical motor).

(1) Check if the seat frame moves smoothly when the battery is connected to the front vertical motor connector terminals.

OK

Measurement Condition	Operational Direction
Battery positive (+) → U2-1 Battery negative (-) → U2-2	Upward
Battery positive (+) → U2-2 Battery negative (-) → U2-1	Downward

If the result is not as specified, replace the seat frame with adjuster.



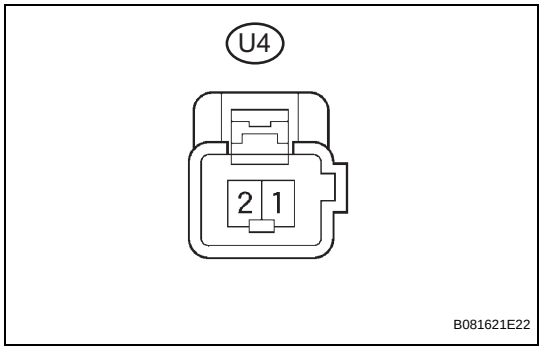
(c) Check operation of the seat frame (reclining motor).

(1) Check if the seat frame moves smoothly when the battery is connected to the reclining motor connector terminals.

OK

Measurement Condition	Operational Direction
Battery positive (+) → U3-2 Battery negative (-) → U3-1	Forward
Battery positive (+) → U3-1 Battery negative (-) → U3-2	Backward

If the result is not as specified, replace the seat frame with adjuster.

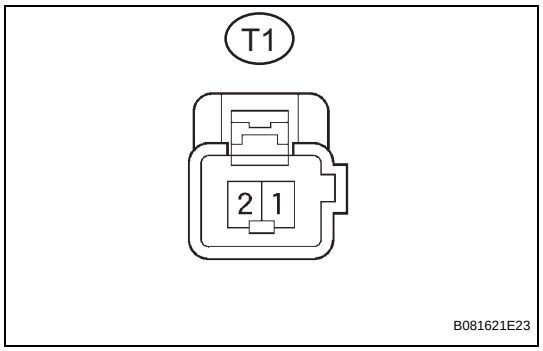


(d) Check operation of the seat frame (lifter motor).
(1) Check if the seat frame moves smoothly when the battery is connected to the lifter motor connector terminals.
OK

Measurement Condition	Operational Direction
Battery positive (+) → U4-2 Battery negative (-) → U4-1	**Upward**
Battery positive (+) → U4-1 Battery negative (-) → U4-2	**Downward**

If the result is not as specified, replace the seat frame with adjuster.

SE

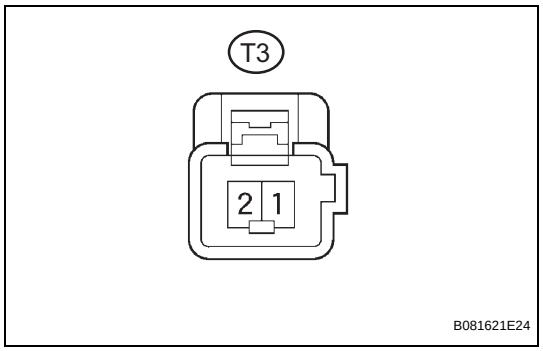


2. INSPECT FRONT SEAT FRAME WITH ADJUSTER RH

(a) Check operation of the seat frame (slide motor).
(1) Check if the seat frame moves smoothly when the battery is connected to the slide motor connector terminals.
OK

Measurement Condition	Operational Direction
Battery positive (+) → T1-2 Battery negative (-) → T1-1	**Forward**
Battery positive (+) → T1-1 Battery negative (-) → T1-2	**Backward**

If the result is not as specified, replace the seat frame with adjuster.



(b) Check operation of the seat frame (reclining motor).
(1) Check if the seat frame moves smoothly when the battery is connected to the reclining motor connector terminals.
OK

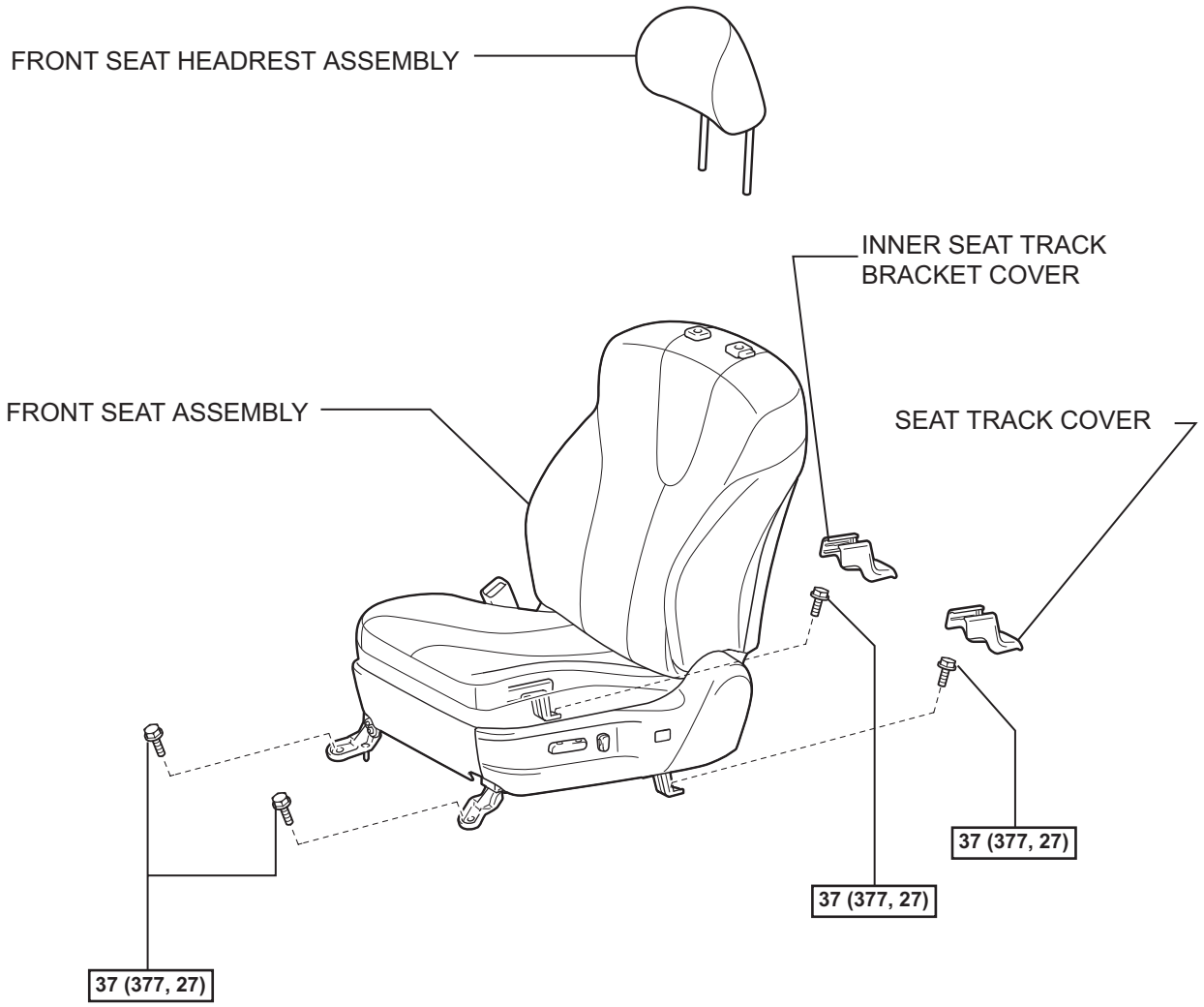
Measurement Condition	Operational Direction
Battery positive (+) → T3-2 Battery negative (-) → T3-1	**Forward**
Battery positive (+) → T3-1 Battery negative (-) → T3-2	**Backward**

If the result is not as specified, replace the seat frame with adjuster.

FRONT POWER SEAT LUMBAR SWITCH

COMPONENTS

SE



N*m (kgf*cm, ft.*lbf): Specified torque

P

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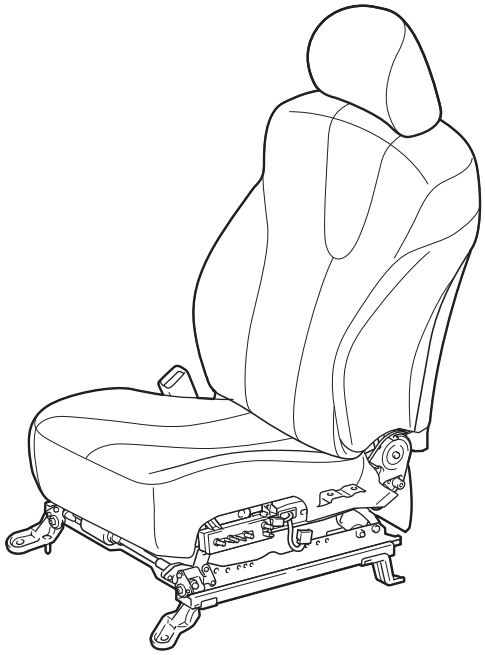
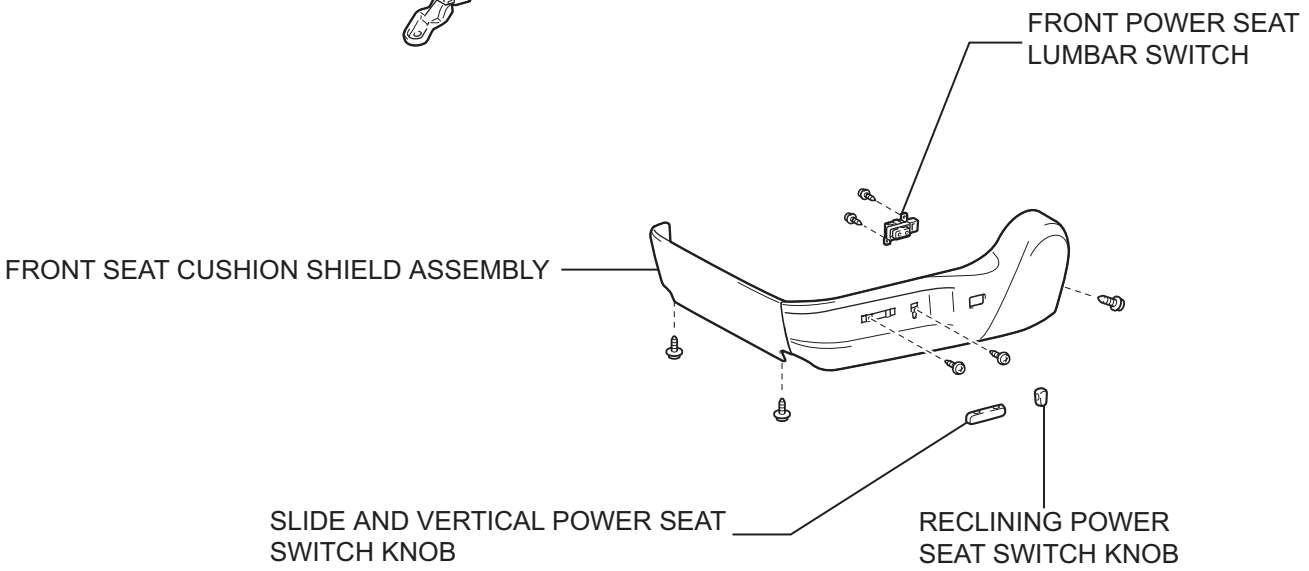
SE





P

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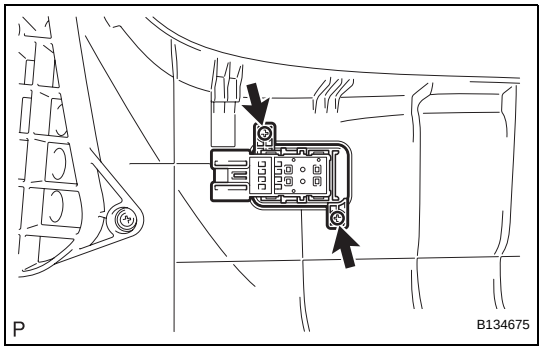
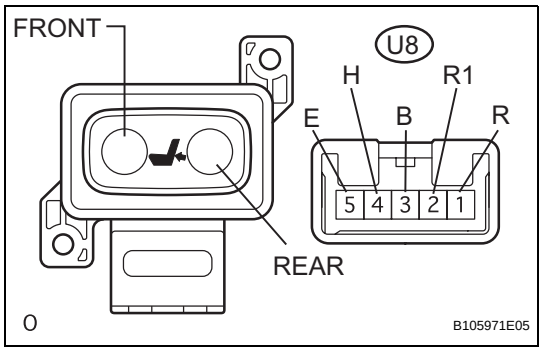
SE

REMOVAL

1. **REMOVE FRONT SEAT HEADREST ASSEMBLY**
2. **REMOVE SEAT TRACK COVER (See page SE-30)**
3. **REMOVE INNER SEAT TRACK BRACKET COVER (See page SE-30)**
4. **REMOVE FRONT SEAT ASSEMBLY (See page SE-30)**
5. **REMOVE RECLINING POWER SEAT SWITCH KNOB (See page SE-31)**
6. **REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB (See page SE-31)**
7. **REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY (See page SE-32)**
8. **REMOVE FRONT POWER SEAT LUMBAR SWITCH**
   (a) Remove the 2 screws and front power seat lumbar switch.



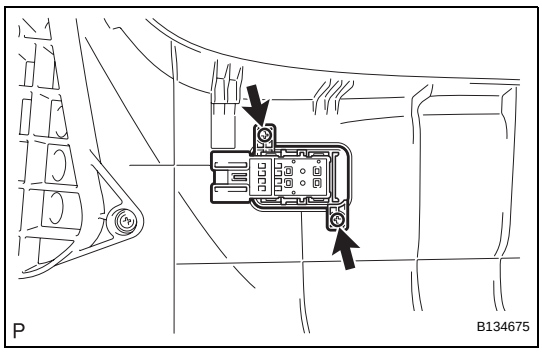


INSPECTION

1. **INSPECT FRONT POWER SEAT LUMBAR SWITCH LH**
   (a) Measure the resistance between the terminals when the switch is operated.
   Standard resistance

Tester Connection	Switch Condition	Specified Condition
U8-1 (R) - U8-2 (R1)	FRONT	Below 1 Ω
U8-3 (B) - U8-4 (H)	FRONT	Below 1 Ω
U8-1 (R) - U8-2 (R1)	OFF	Below 1 Ω
U8-4 (H) - U8-5 (E)	OFF	Below 1 Ω
U8-1 (R) - U8-3 (B)	REAR	Below 1 Ω
U8-4 (H) - U8-5 (E)	REAR	Below 1 Ω

If the result is not as specified, replace the switch.



INSTALLATION

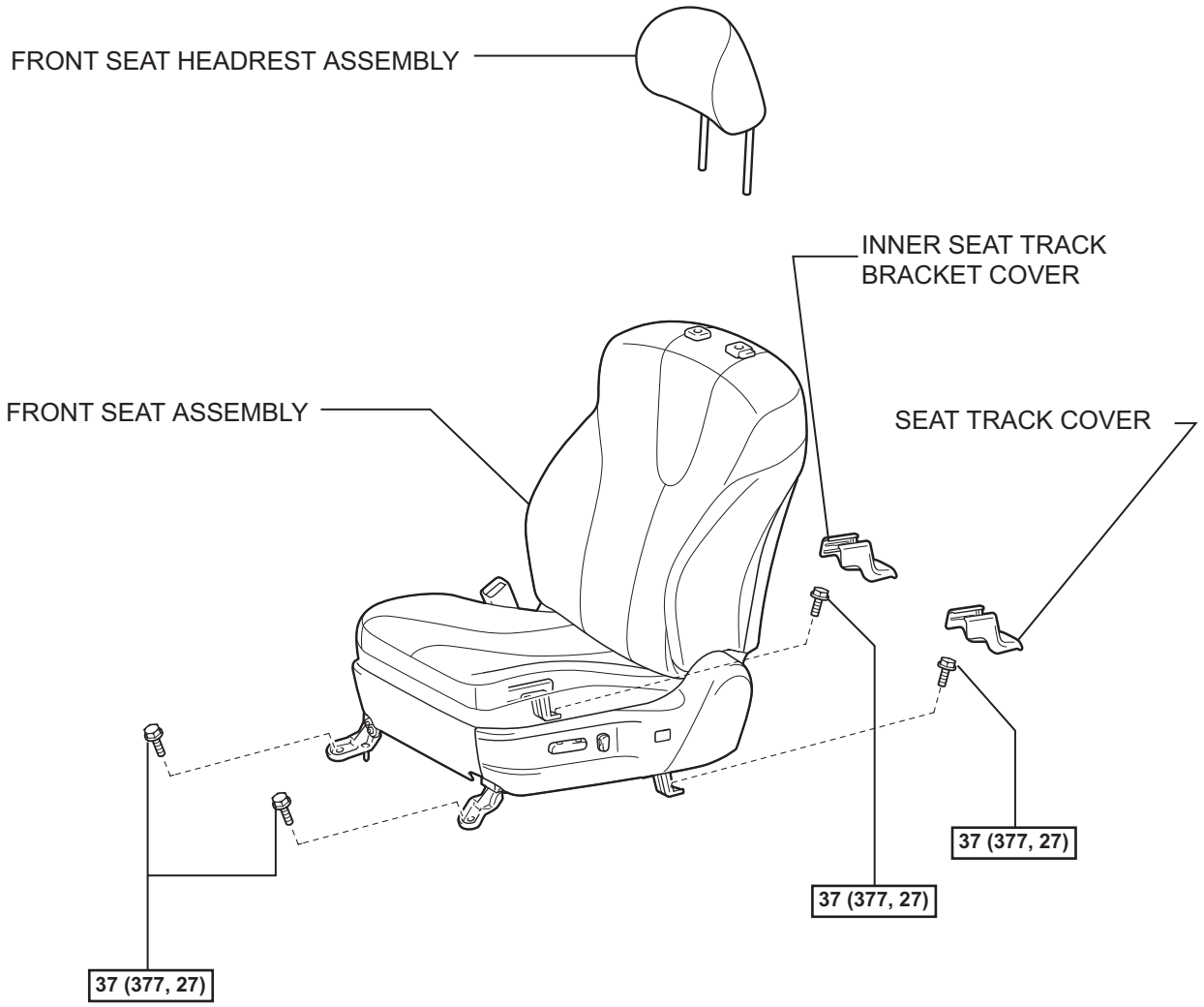
1. **INSTALL FRONT POWER SEAT LUMBAR SWITCH**
   (a) Install the front power seat lumbar switch with the 2 screws.
2. **INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY**
3. **INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB**
4. **INSTALL RECLINING POWER SEAT SWITCH KNOB**
5. **INSTALL FRONT SEAT ASSEMBLY (See page SE-41)**

6. **INSTALL INNER SEAT TRACK BRACKET COVER (See page SE-42)**
7. **INSTALL SEAT TRACK COVER (See page SE-42)**
8. **INSTALL FRONT SEAT HEADREST ASSEMBLY**

LUMBAR SUPPORT ADJUSTER ASSEMBLY

COMPONENTS

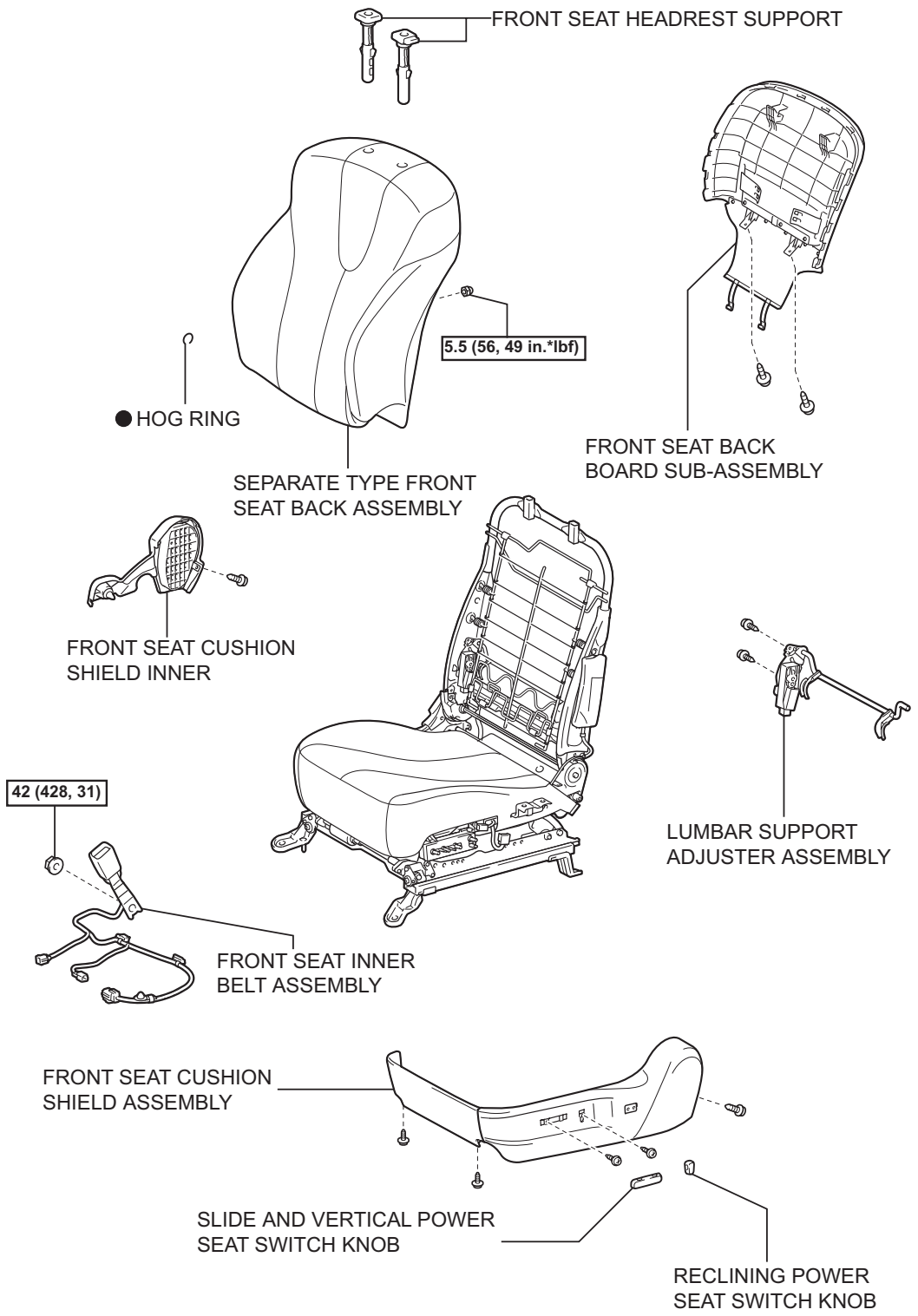
SE



N*m (kgf*cm, ft.*lbf): Specified torque

P

B134694E01



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

P

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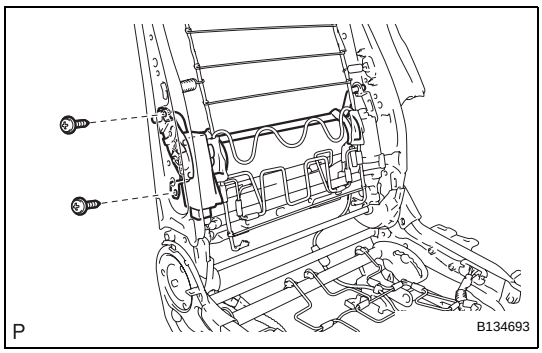
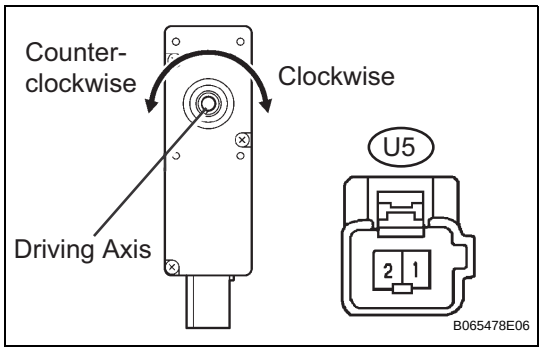
SE

REMOVAL

1. **REMOVE FRONT SEAT HEADREST ASSEMBLY**
2. **REMOVE SEAT TRACK COVER (See page SE-30)**
3. **REMOVE INNER SEAT TRACK BRACKET COVER (See page SE-30)**
4. **REMOVE FRONT SEAT ASSEMBLY (See page SE-30)**
5. **REMOVE RECLINING POWER SEAT SWITCH KNOB (See page SE-31)**
6. **REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB (See page SE-31)**
7. **REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY (See page SE-32)**
8. **REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-16)**
9. **REMOVE FRONT SEAT CUSHION SHIELD INNER (See page SE-33)**
10. **REMOVE FRONT SEAT BACK BOARD SUB-ASSEMBLY (See page SE-35)**
11. **REMOVE FRONT SEAT HEADREST SUPPORT (See page SE-35)**
12. **REMOVE FRONT SEAT HEADREST SUPPORT**
13. **REMOVE SEPARATE TYPE FRONT SEAT BACK ASSEMBLY (See page SE-35)**
14. **REMOVE LUMBAR SUPPORT ADJUSTER ASSEMBLY**
    (a) Disconnect the connector.
    (b) Remove the 2 screws and lumbar support adjuster.



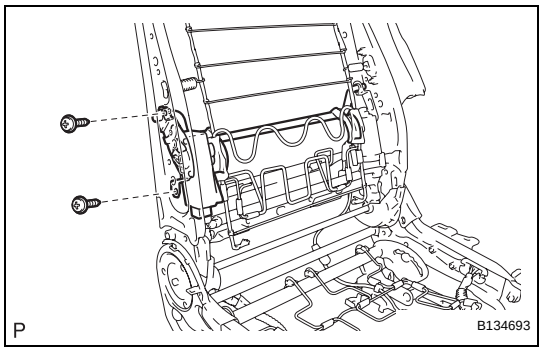


INSPECTION

1. **INSPECT LUMBAR SUPPORT ADJUSTER ASSEMBLY LH**
   (a) Check operation of the lumbar support adjuster.
      (1) Check if the lumber support adjuster moves smoothly when the battery is connected to the lumbar support adjuster motor connector terminals.
      OK

Measurement Condition	Operation Direction
Battery positive (+) → U5-2 Battery negative (-) → U5-1	Clockwise
Battery positive (+) → U5-1 Battery negative (-) → U5-2	Counterclockwise

If the result is not as specified, replace the lumbar support adjuster.

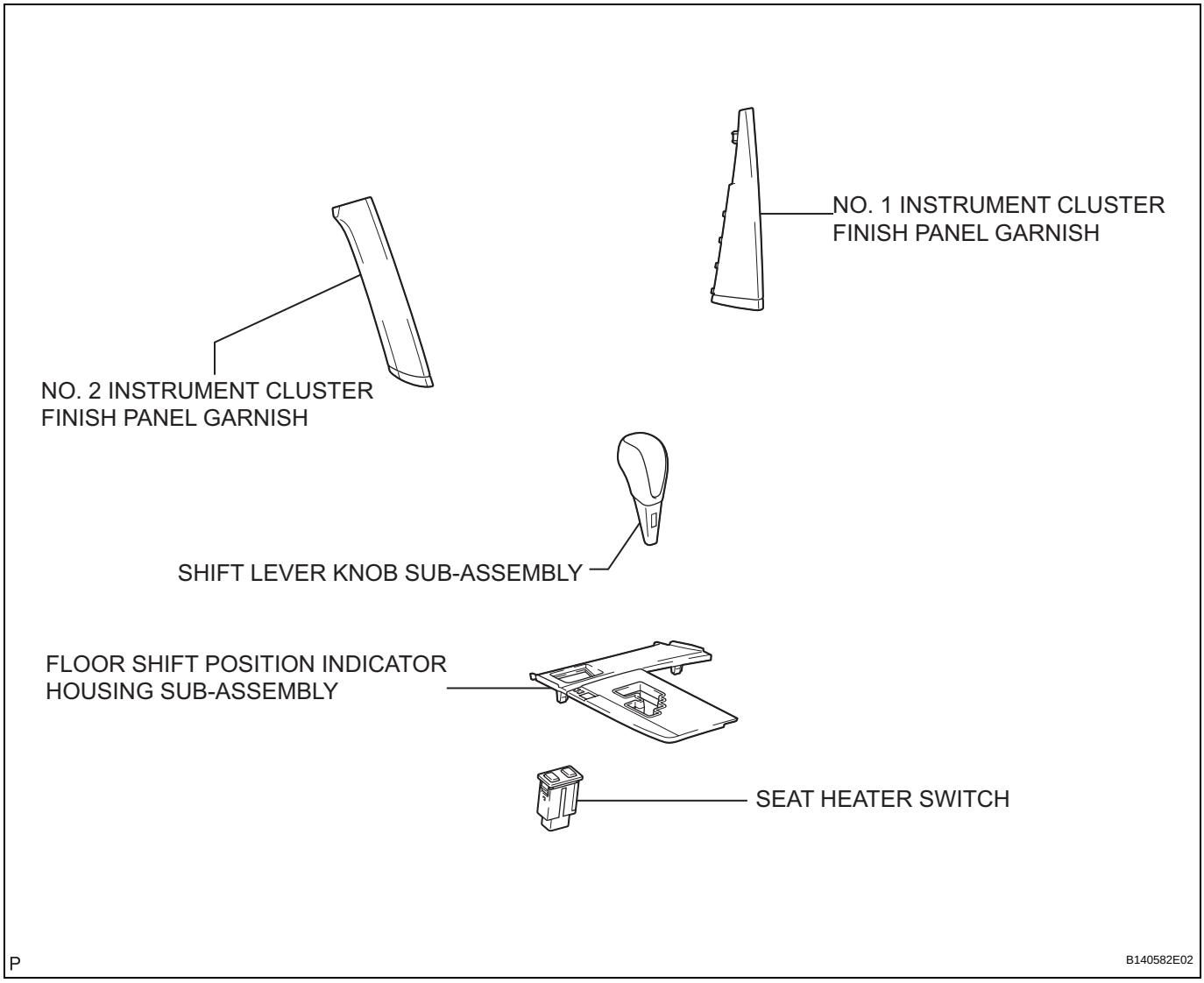


INSTALLATION

1. **INSTALL LUMBAR SUPPORT ADJUSTER ASSEMBLY**
   (a) Install the lumbar support adjuster assembly with the 2 screws.
   (b) Connect the connector.
2. **INSTALL SEPARATE TYPE FRONT SEAT BACK ASSEMBLY**
3. **INSTALL FRONT SEAT HEADREST SUPPORT**
4. **INSTALL FRONT SEAT HEADREST SUPPORT**
5. **INSTALL FRONT SEAT BACK BOARD SUB-ASSEMBLY**
6. **INSTALL FRONT SEAT CUSHION SHIELD INNER**
7. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)**
8. **INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY**
9. **INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB**
10. **INSTALL RECLINING POWER SEAT SWITCH KNOB**
11. **INSTALL FRONT SEAT ASSEMBLY**
12. **INSTALL INNER SEAT TRACK BRACKET COVER (See page SE-42)**
13. **INSTALL SEAT TRACK COVER (See page SE-42)**
14. **INSTALL FRONT SEAT HEADREST ASSEMBLY**

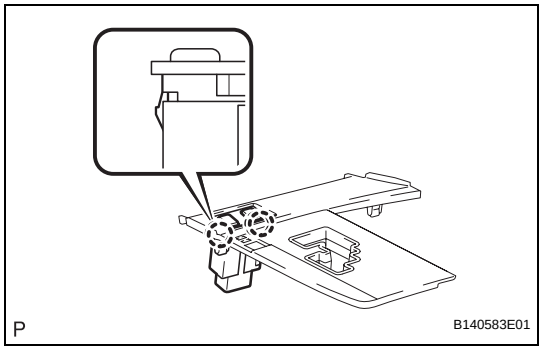
SEAT HEATER SWITCH

COMPONENTS



REMOVAL

1. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-24)**
2. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
3. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
4. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-25)**
5. **REMOVE SEAT HEATER SWITCH**
   (a) Disengage the 2 claws and remove the seat heater switch.



INSPECTION

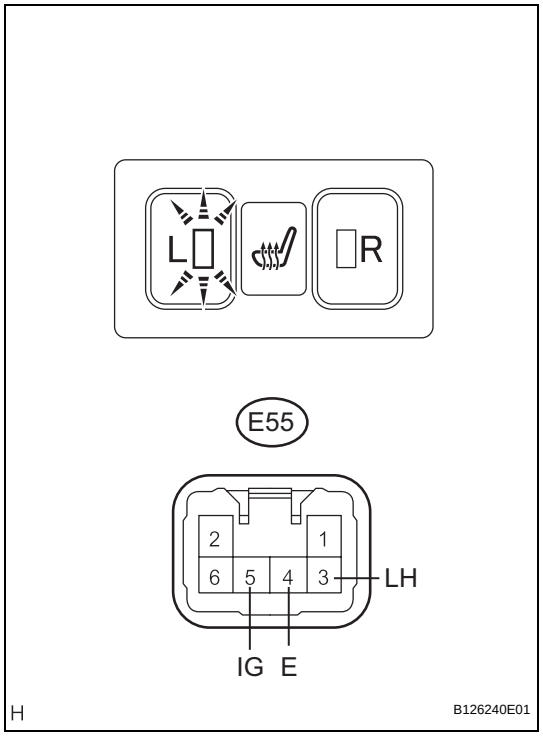
1. **INSPECT SEAT HEATER SWITCH**
   (a) Inspect the driver side seat heater switch operation.
      (1) Measure the resistance according to the value(s) in the table below.
      Standard resistance

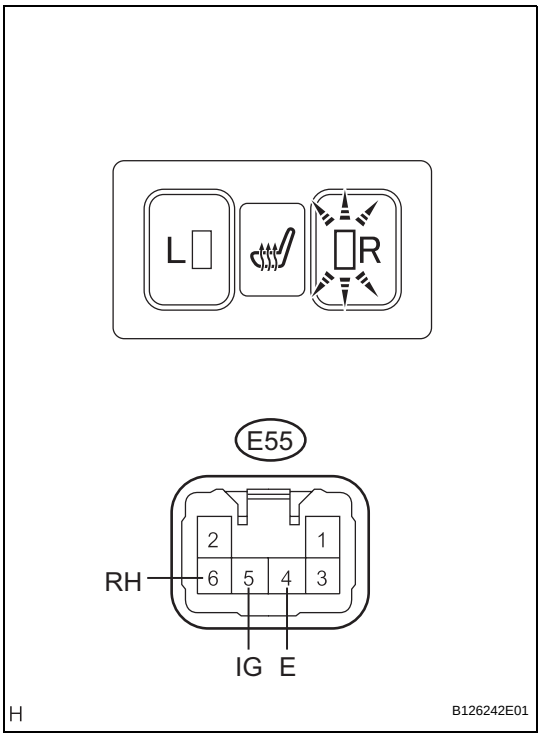
Tester Connection	Switch Position	Specified Condition
E55-3 (LH) - E55-5 (IG)	OFF	10 kΩ or higher
E55-3 (LH) - E55-5 (IG)	ON	Below 1 Ω

      If the result is not as specified, replace the switch.
      (2) Turn the seat heater switch on and check if the seat heater switch indicator comes on.
      OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal E55-5 (IG) Battery negative (-) → Terminal E55-4 (E)	Comes on

      If the result is not as specified, replace the switch.





(b) Inspect the front passenger side seat heater switch operation.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
E55-5 (IG) - E55-6 (RH)	OFF	10 kΩ or higher
E55-5 (IG) - E55-6 (RH)	ON	Below 1 Ω

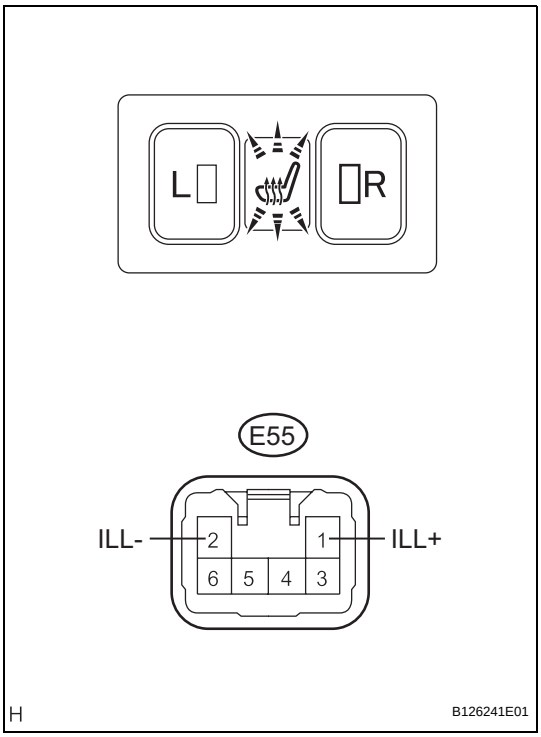
If the result is not as specified, replace the switch.

(2) Turn the seat heater switch on and check if the seat heater switch indicator comes on.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal E55-5 (IG) Battery negative (-) → Terminal E55-4 (E)	Comes on

If the result is not as specified, replace the switch.

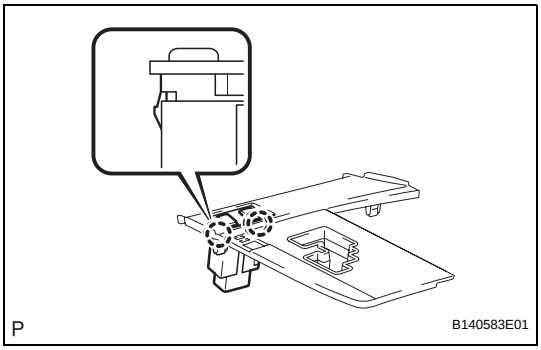


(c) Check if the seat heater switch indicator comes on.

OK

Measurement Condition	Specified Condition
Battery positive (+) → Terminal E55-1 (ILL+) Battery negative (-) → Terminal E55-2 (ILL-)	Comes on

If the result is not as specified, replace the switch.



INSTALLATION

1. **INSTALL SEAT HEATER SWITCH**

(a) Engage the 2 claws and install the seat heater switch.

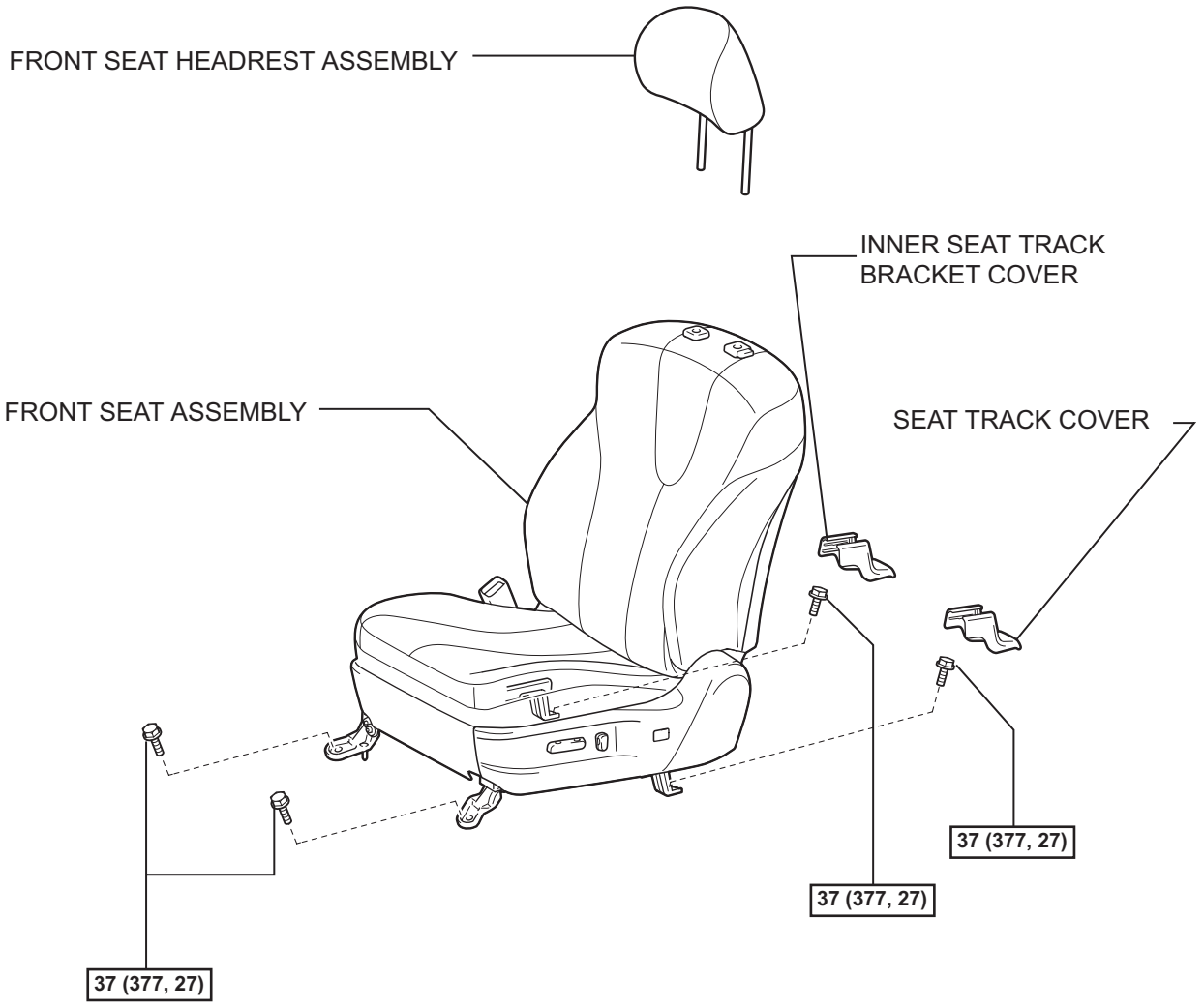
2. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**

3. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**

4. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
5. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (See page IP-55)**

FRONT SEATBACK HEATER

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

P

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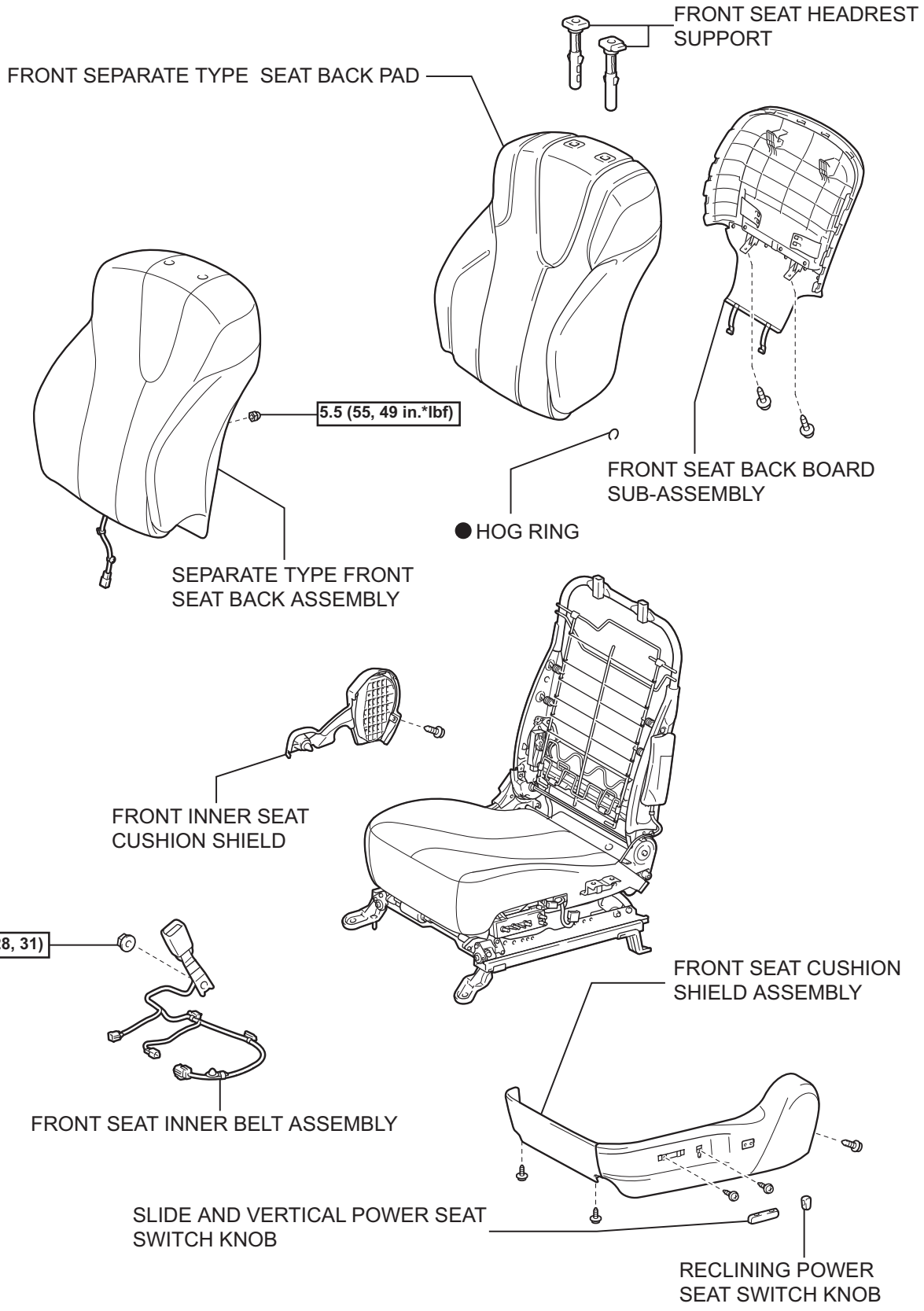
SE



N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

P

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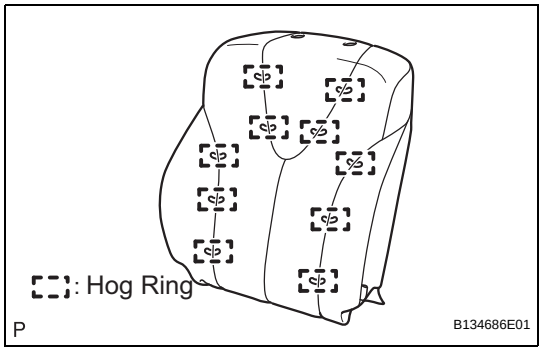
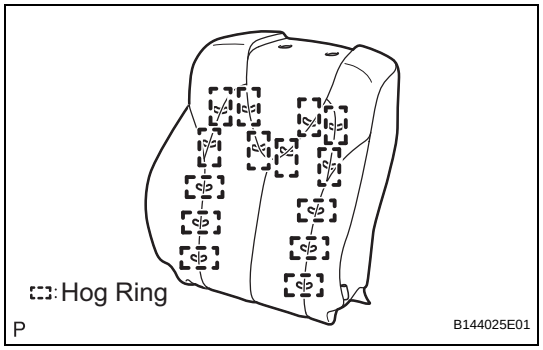
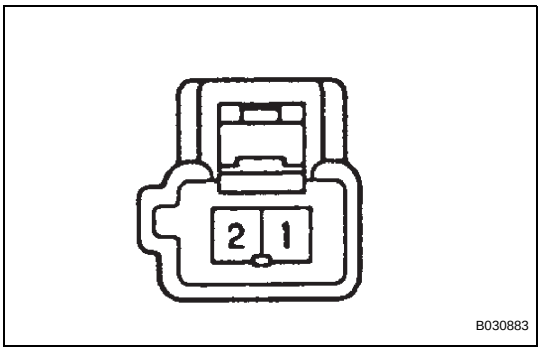
REMOVAL

1. REMOVE FRONT SEAT HEADREST ASSEMBLY
2. REMOVE SEAT TRACK COVER (See page SE-30)
3. REMOVE INNER SEAT TRACK BRACKET COVER (See page SE-30)
4. REMOVE FRONT SEAT ASSEMBLY (See page SE-30)
5. REMOVE RECLINING POWER SEAT SWITCH KNOB (See page SE-31)
6. REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB (See page SE-31)
7. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY (See page SE-32)
8. REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-16)
9. REMOVE FRONT INNER SEAT CUSHION SHIELD (See page SE-33)
10. REMOVE FRONT SEAT BACK BOARD SUB-ASSEMBLY (See page SE-35)
11. REMOVE FRONT SEAT HEADREST SUPPORT (See page SE-35)
12. REMOVE FRONT SEAT HEADREST SUPPORT
13. REMOVE SEPARATE TYPE FRONT SEAT BACK ASSEMBLY
14. REMOVE FRONT SEPARATE TYPE SEAT BACK COVER (for Except Sports Seat Type)
    (a) Remove the 10 hog rings and front separate type seat back cover from the seat back pad.



15. REMOVE FRONT SEPARATE TYPE SEAT BACK COVER (for Sports Seat Type)
    (a) Remove the 14 hog rings and front separate type seat back cover from the seat back pad.



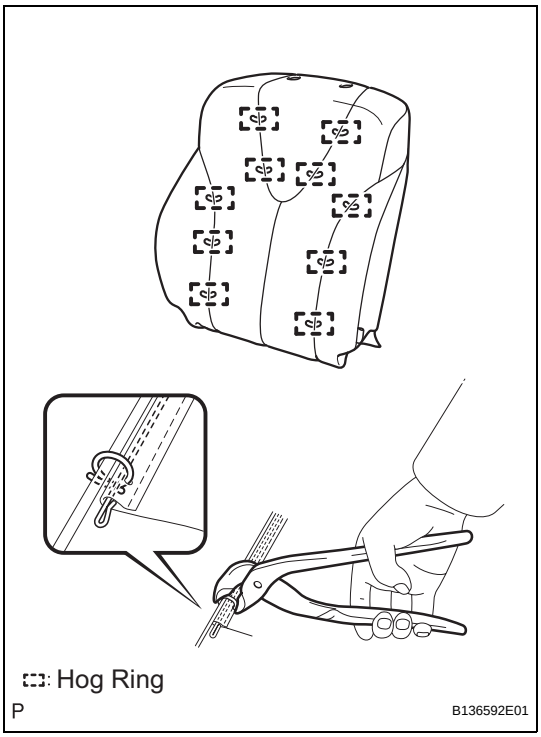


INSPECTION

1. **INSPECT FRONT SEAT BACK HEATER**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

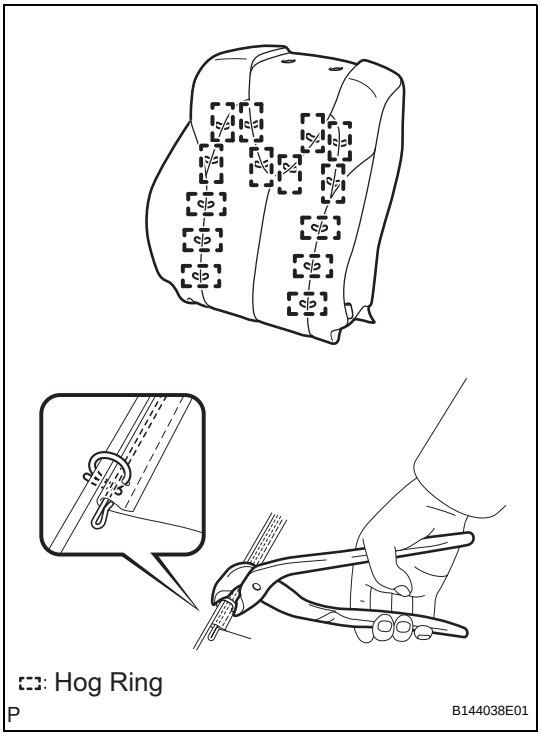
Tester Connection	Condition	Specified Condition
1 - 2	Always	Below 1 Ω

SE



INSTALLATION

1. **INSTALL FRONT SEPARATE TYPE SEAT BACK COVER (for Except Sports Seat Type)**
   (a) Using hog ring pliers, install the front separate type seat back cover to the front seat back pad with 10 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**



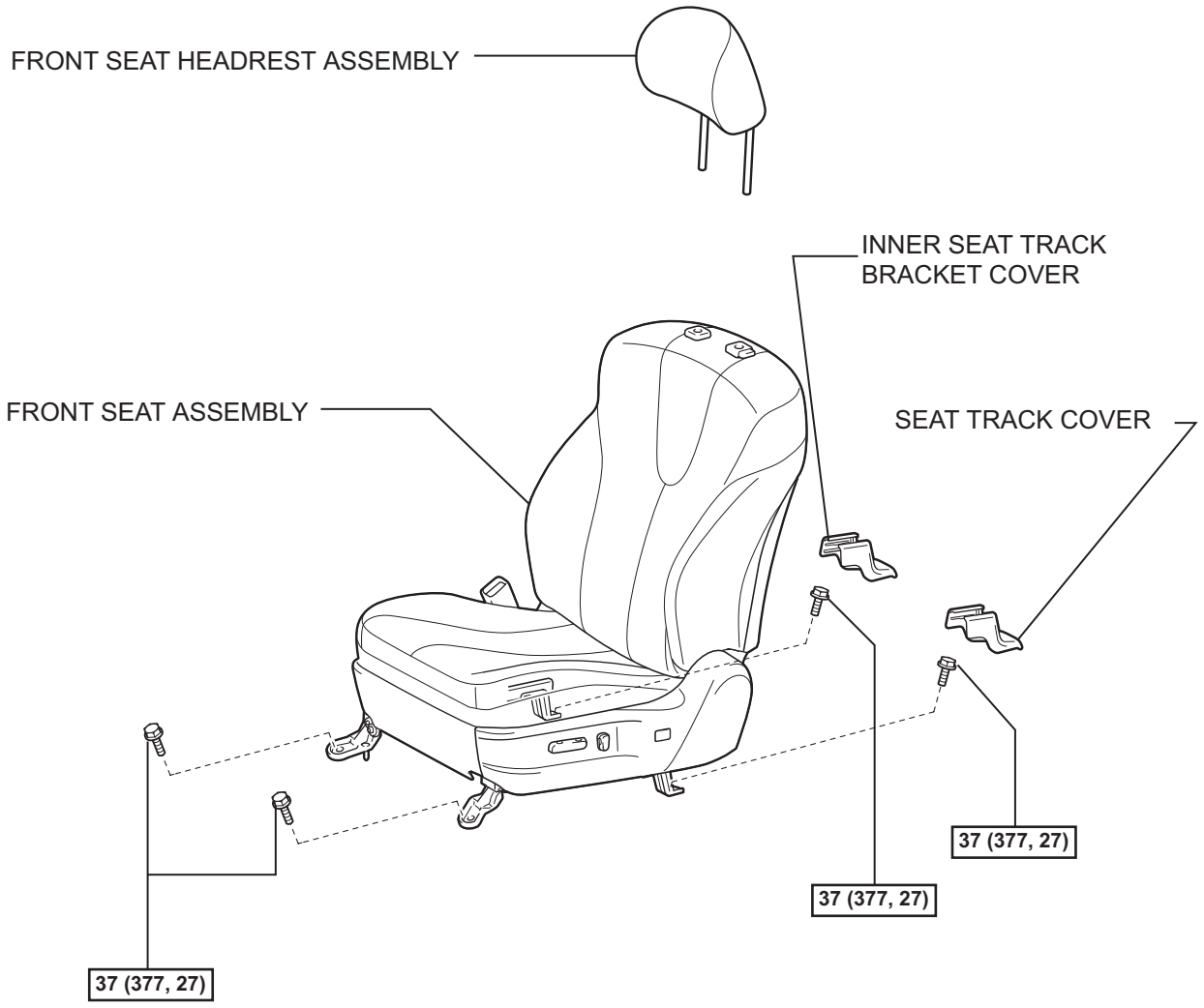
2. **INSTALL FRONT SEPARATE TYPE SEAT BACK COVER (for Sports Seat Type)**
   (a) Using hog ring pliers, install the front separate type seat back cover to the front seat back pad with 14 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**
3. **INSTALL SEPARATE TYPE FRONT SEAT BACK ASSEMBLY**
4. **INSTALL FRONT SEAT HEADREST SUPPORT**
5. **INSTALL FRONT SEAT HEADREST SUPPORT**
6. **INSTALL FRONT SEAT BACK BOARD SUB-ASSEMBLY**
7. **INSTALL FRONT INNER SEAT CUSHION SHIELD**
8. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)**

9. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY
10. INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB
11. INSTALL RECLINING POWER SEAT SWITCH KNOB
12. INSTALL FRONT SEAT ASSEMBLY (See page SE-41)
13. INSTALL INNER SEAT TRACK BRACKET COVER (See page SE-42)
14. INSTALL SEAT TRACK COVER (See page SE-42)
15. INSTALL FRONT SEAT HEADREST ASSEMBLY

FRONT SEAT CUSHION HEATER

COMPONENTS

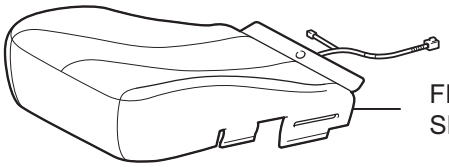
SE



N*m (kgf*cm, ft.*lbf): Specified torque

P

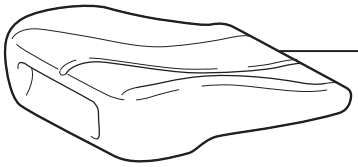
B134694E01



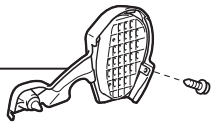
FRONT SEPARATE TYPE
SEAT CUSHION ASSEMBLY

SE

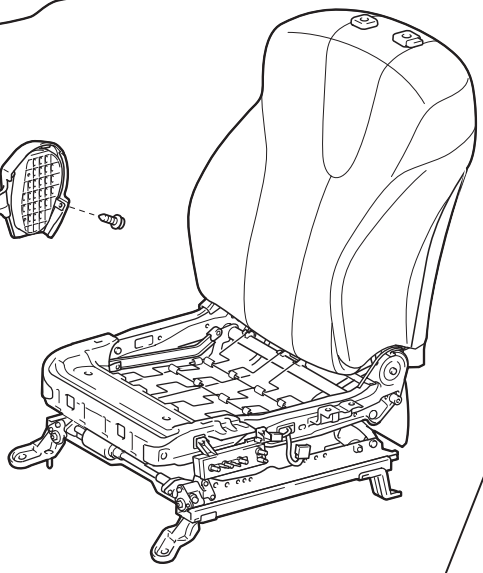
● HOG RING



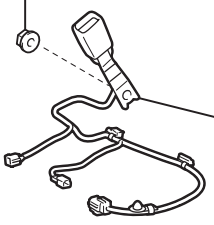
FRONT SEPARATE TYPE
SEAT CUSHION PAD



FRONT INNER SEAT
CUSHION SHIELD

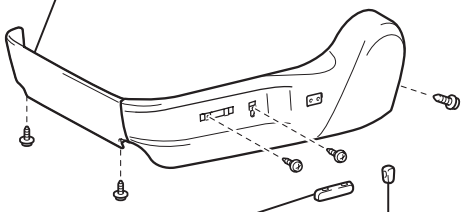


42 (428, 31)



FRONT SEAT INNER BELT ASSEMBLY

FRONT SEAT CUSHION
SHIELD ASSEMBLY



SLIDE AND VERTICAL POWER SEAT SWITCH KNOB

RECLINING POWER SEAT
SWITCH KNOB

N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

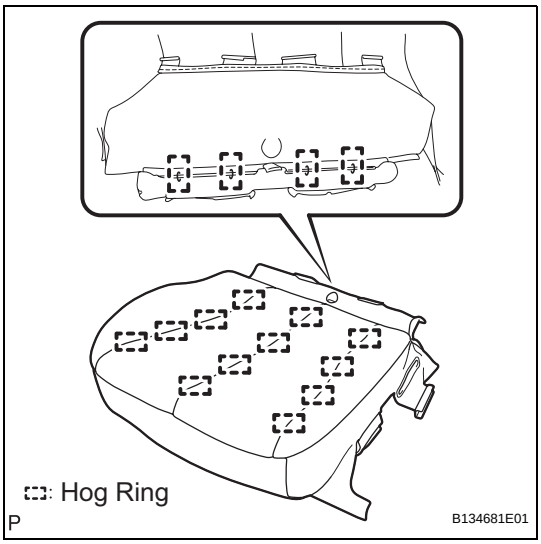
P

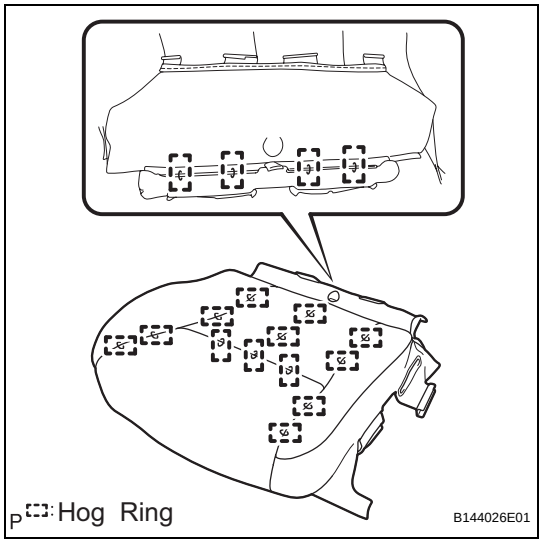
B139120E01

SE

REMOVAL

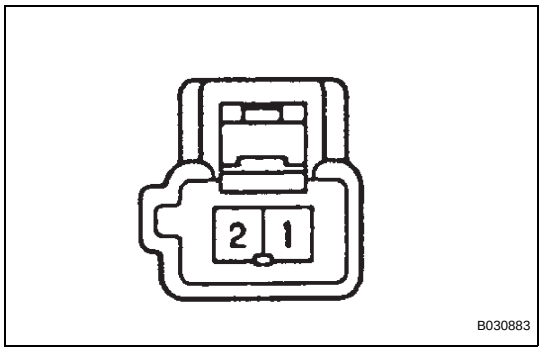
1. **REMOVE FRONT SEAT HEADREST ASSEMBLY**
2. **REMOVE SEAT TRACK COVER (See page SE-30)**
3. **REMOVE INNER SEAT TRACK BRACKET COVER (See page SE-30)**
4. **REMOVE FRONT SEAT ASSEMBLY (See page SE-30)**
5. **REMOVE RECLINING POWER SEAT SWITCH KNOB (See page SE-31)**
6. **REMOVE SLIDE AND VERTICAL POWER SEAT SWITCH KNOB (See page SE-31)**
7. **REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY (See page SE-32)**
8. **REMOVE FRONT SEAT INNER BELT ASSEMBLY (See page SB-16)**
9. **REMOVE FRONT INNER SEAT CUSHION SHIELD (See page SE-33)**
10. **REMOVE FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY (See page SE-34)**
11. **REMOVE FRONT SEPARATE TYPE SEAT CUSHION COVER (for Except Sport Seat Type)**
    (a) Remove the 16 hog rings and seat cushion cover from the seat cushion pad.





12. REMOVE FRONT SEPARATE TYPE SEAT CUSHION COVER (for Sport Seat Type)

(a) Remove the 17 hog rings and seat cushion cover from the seat cushion pad.



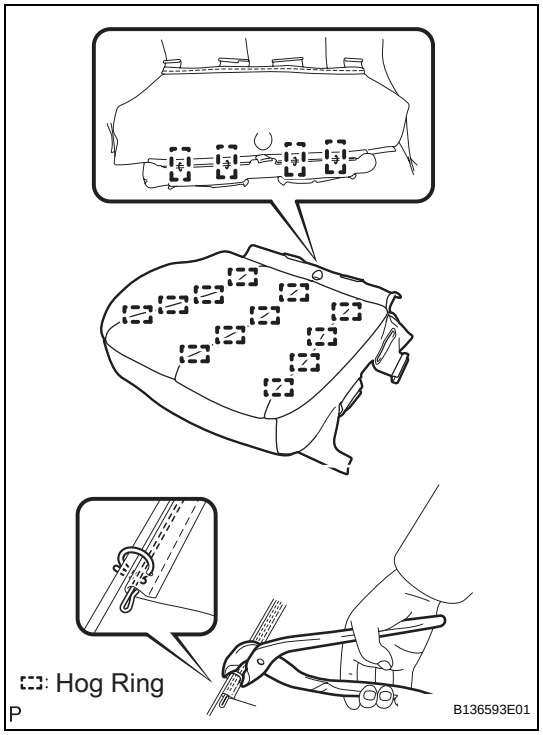
INSPECTION

1. INSPECT FRONT SEAT CUSHION HEATER

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	Always	Below 1 Ω



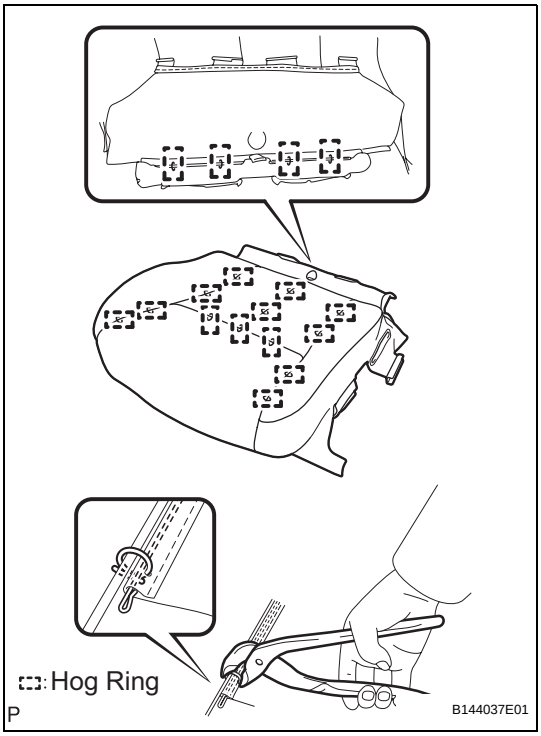
INSTALLATION

1. INSTALL FRONT SEPARATE TYPE SEAT CUSHION COVER (for Except Sport Seat Type)

(a) Using hog ring pliers, install 16 new hog rings.

NOTICE:

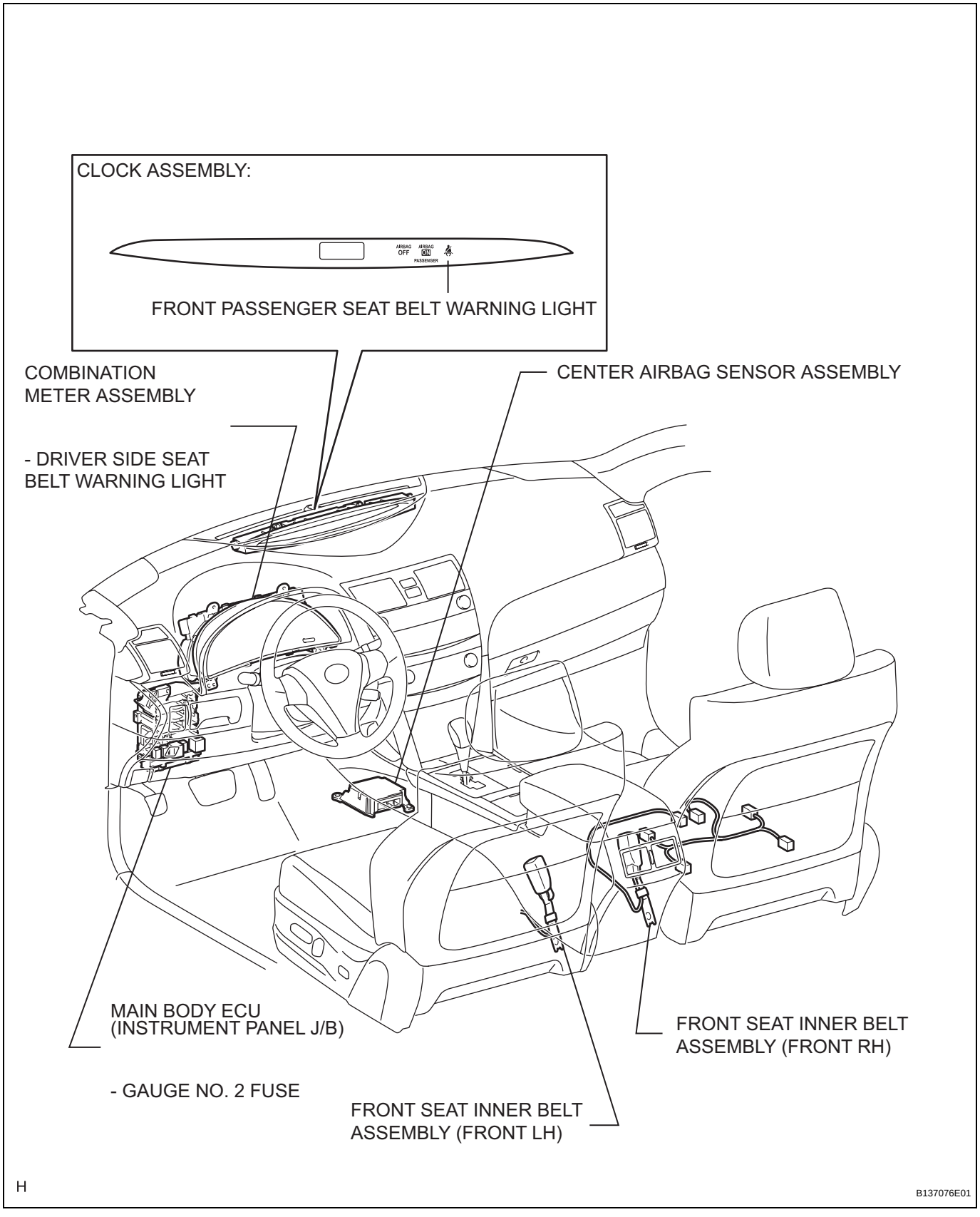
- **Be careful not to damage the cover.**
- **When installing the hog rings, take care to minimize wrinkles as much as possible.**



2. **INSTALL FRONT SEPARATE TYPE SEAT CUSHION COVER (for Sport Seat Type)**
   (a) Using hog ring pliers, install 17 new hog rings.
   NOTICE:
   - **Be careful not to damage the cover.**
   - **When installing the hog rings, take care to minimize wrinkles as much as possible.**
3. **INSTALL FRONT SEPARATE TYPE SEAT CUSHION ASSEMBLY**
4. **INSTALL FRONT INNER SEAT CUSHION SHIELD**
5. **INSTALL FRONT SEAT INNER BELT ASSEMBLY (See page SB-17)**
6. **INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY**
7. **INSTALL SLIDE AND VERTICAL POWER SEAT SWITCH KNOB**
8. **INSTALL RECLINING POWER SEAT SWITCH KNOB**
9. **INSTALL FRONT SEAT ASSEMBLY (See page SE-41)**
10. **INSTALL INNER SEAT TRACK BRACKET COVER (See page SE-42)**
11. **INSTALL SEAT TRACK COVER (See page SE-42)**
12. **INSTALL FRONT SEAT HEADREST ASSEMBLY**

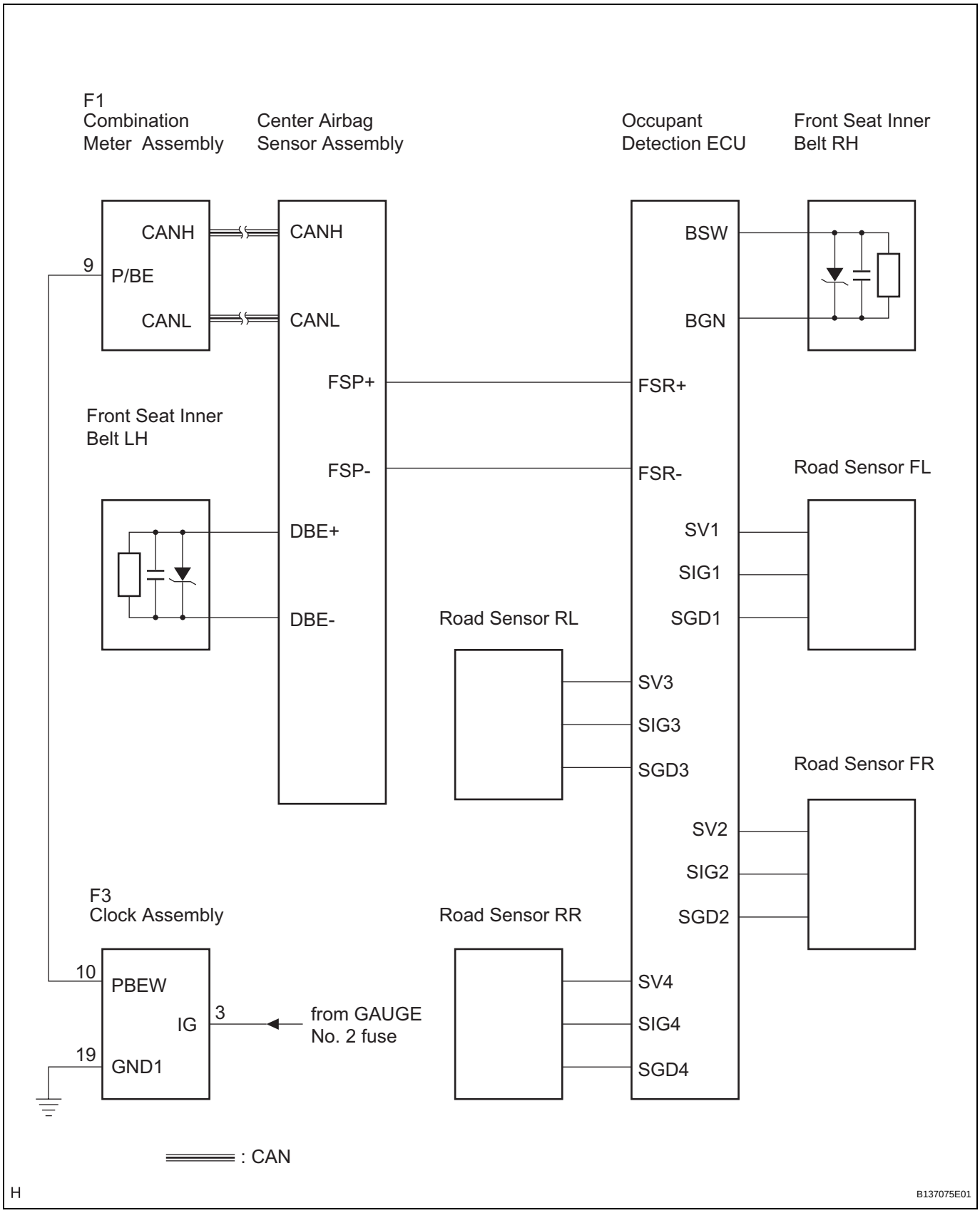
SEAT BELT WARNING SYSTEM

PARTS LOCATION



SB

SYSTEM DIAGRAM



SB

SYSTEM DESCRIPTION

1. Driver seat belt warning light

(a) When the driver seat belt is not fastened with the ignition switch on (IG), the driver seat belt warning light on the combination meter assembly comes on to inform the driver. The center airbag assembly detects the driver seat belt status and sends signals to the combination meter assembly using CAN.

2. Passenger seat belt warning

(a) When the passenger seat belt is not fastened with the ignition switch on (IG) and the passenger seat occupied, check that the passenger seat belt warning light on the clock display blinks. The combination meter assembly displays the passenger seat belt status and whether the passenger seat is occupied.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the seat belt warning system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

3	CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM (CAN)*

(a) Use the intelligent tester to check if the CAN Communication System (CAN) is functioning normally.
Result

Result	Proceed to
CAN DTC is not output	A
CAN DTC is output	B

B → GO TO CAN COMMUNICATION SYSTEM

A

4	PROBLEM SYMPTOMS TABLE

HINT:
See page SB-4.

NEXT

5	OVERALL ANALYSIS AND TROUBLESHOOTING*

(a) DATA LIST / ACTIVE TEST (See page SB-7)
(b) Terminals of ECU (See page SB-4)
(c) On-vehicle Inspection (See page SB-7)

NEXT

SB

6	**REPAIR OR REPLACE**

NEXT

7	**CONFIRMATION TEST**

NEXT

END

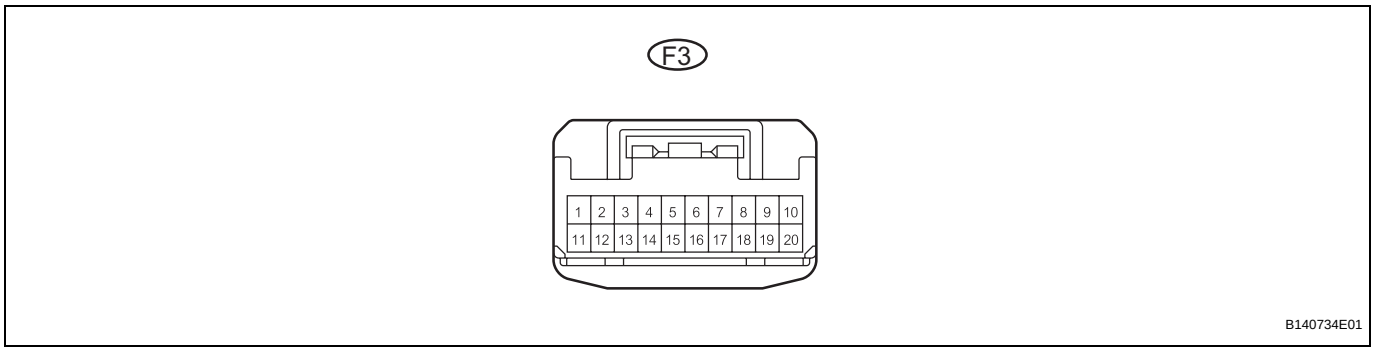
PROBLEM SYMPTOMS TABLE

SEAT BELT WARNING SYSTEM

Symptom	Suspected area	See page
Driver side seat belt warning light does not operate	1. Front seat inner belt LH	SB-9
	2. Center airbag sensor assembly	SB-9
	3. Combination meter assembly	SB-9
	4. Wire harness	SB-9
Front passenger seat belt warning light does not operate	1. Front seat inner belt RH	SB-11
	2. Occupant detection ECU	SB-11
	3. Road sensor	SB-11
	4. Center airbag sensor assembly	SB-11
	5. Combination meter assembly	SB-11
	6. Clock assembly	SB-11
	7. Wire harness	SB-11

TERMINALS OF ECU

1. CLOCK ASSEMBLY



Standard voltage

Terminal No. (Symbols)	Terminal Description	Condition	Specified Condition
F3-3 (IG) - Body ground	Power supply	Ignition switch OFF → ON (IG)	Below 1 V → 10 to 14 V

Standard resistance

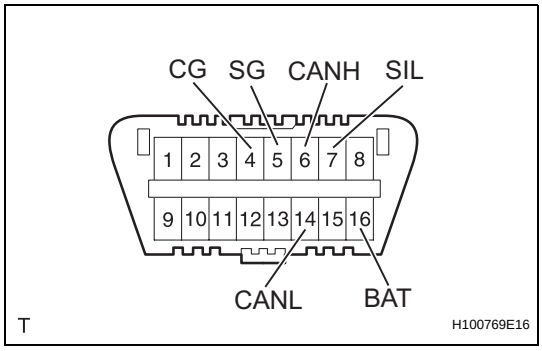
Terminal No. (Symbols)	Terminal Description	Condition	Specified Condition
F3-10 (PBEW) - Body ground	Passenger seat belt signal	The passenger seat is occupied, seat belt is fastened → unfastened	Below 1 Ω → 10 kΩ or higher
F3-19 (GND1) - Body ground	Ground	Always	Below 1 Ω

DIAGNOSIS SYSTEM

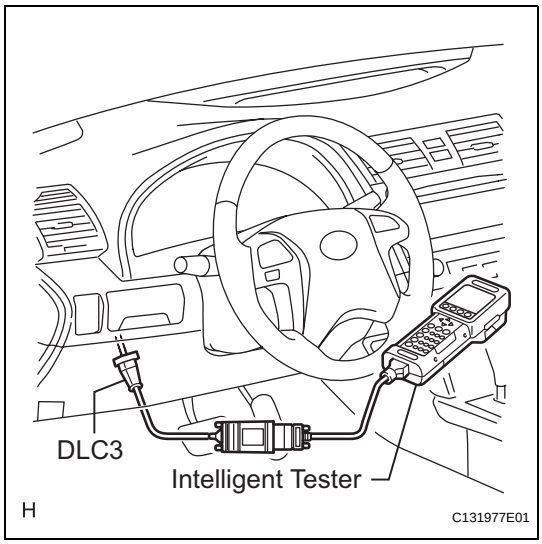
1. DESCRIPTION

(a) The seat belt warning system data can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



(a) The ECU uses ISO 15765-4 communication. The terminal arrangement of the DLC3 complies with SAE J 1962 and matches the ISO 15765-4 format.



Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or more

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the door.**

SB

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

DATA LIST / ACTIVE TEST

1. ACTIVE TEST

Performing the ACTIVE TEST using the intelligent tester allows the meters, indicators and so on to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) From the display on the tester, select the "ACTIVE TEST".

METER:

Item	Test Details	Diagnostic Note
D-BELT REMIND	D-SEAT BELT indicator light (OFF/ON)	Confirm that the vehicle is stopped with the engine idling
P-BELT REMIND	P-SEAT BELT indicator light (OFF/ON)	Confirm that the vehicle is stopped with the engine idling

ON-VEHICLE INSPECTION

1. INSPECT DRIVER SIDE SEAT BELT WARNING

(a) Turn the ignition switch on (IG).

(b) When the driver seat belt is not fastened, check that the driver seat belt warning light on the combination meter blinks.

(c) When the driver seat belt is fastened, check that the driver seat belt warning light on the combination meter is off.

2. INSPECT PASSENGER SIDE SEAT BELT WARNING

(a) Turn the ignition switch on (IG).

(b) When the front passenger seat belt is not fastened with the passenger seat occupied, check that the front passenger seat belt warning light on the clock display blinks.

(c) When the front passenger seat belt is fastened with the passenger seat occupied, check that the front passenger seat belt warning light on the clock display is off.

3. INSPECT SEAT BELT WARNING BUZZER

HINT:

If the buzzer does not sound, the buzzer cancel setting may be set to ON.

(a) Turn the ignition switch on (IG).

(b) When the vehicle is driven at approximately 25 km/h (16 mph) or more while the driver or front passenger seat belt is not being fastened, check that the buzzer in the combination meter assembly sounds at an interval of 1.2 seconds for 30 seconds.

(c) Check that the buzzer sounds at an interval of 0.4 seconds for 90 seconds.

(d) Check that the buzzer stops 2 minutes after the buzzer starts sounding.

(e) After the buzzer has stopped, turn the ignition switch off and then start the engine again. Drive the vehicle at approximately 25 km/h (16 mph) or more while the driver or front passenger seat belt is not being fastened, and then check that the buzzer sounds again.

(f) After the buzzer has stopped, fasten the driver and front passenger seat belts. Drive the vehicle at approximately 25 km/h (16 mph) or more and unfasten the driver or front passenger seat belt, and then check that the buzzer sounds again.

(g) After the buzzer has stopped, move the shift lever to the R position, and then move it to the D position. Drive the vehicle at approximately 25 km/h (16 mph) or more, and then check that the buzzer sounds again.

Driver Side Seat Belt Warning Light does not Operate

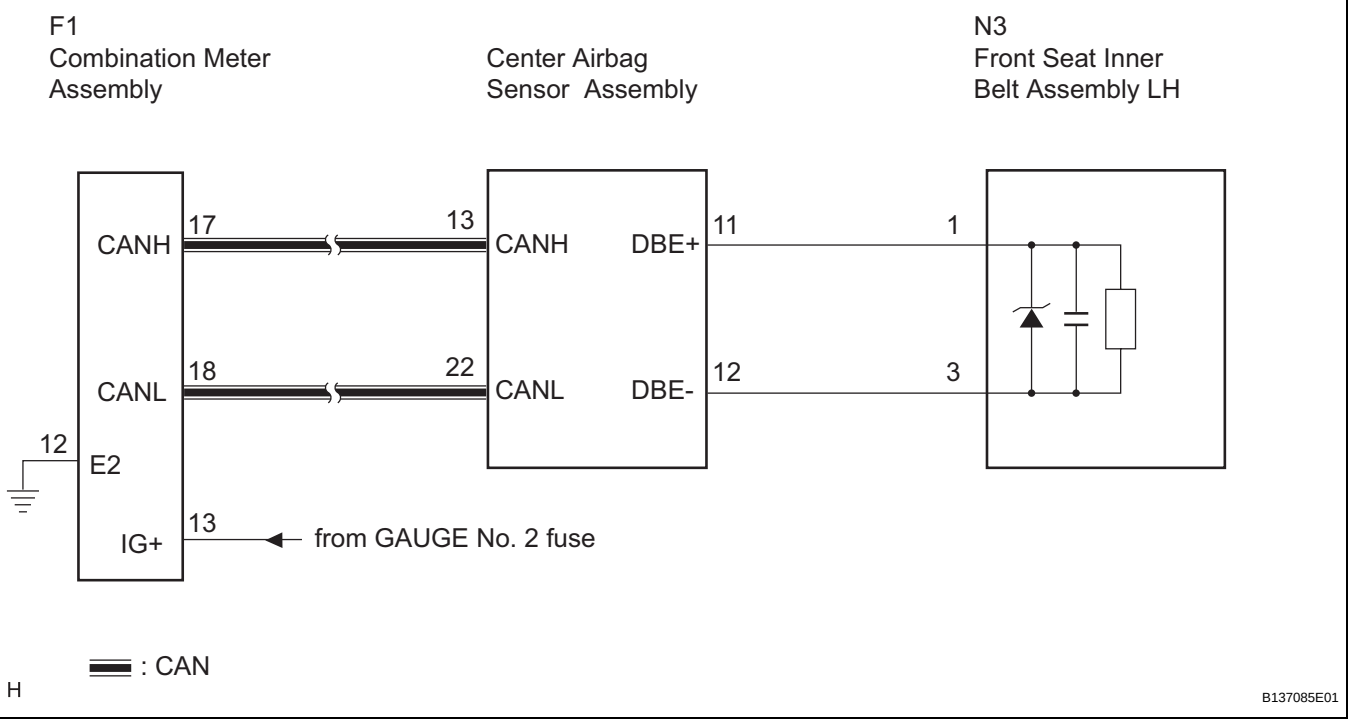
DESCRIPTION

When the ignition switch is on (IG), the center airbag sensor assembly transmits front seat inner belt state signals to the combination meter assembly through CAN. If the driver seat belt is not fastened, the combination meter assembly blinks the driver seat belt warning light. If the seat belt is fastened, the warning light goes off.

NOTICE:

The seat belt warning system uses CAN. Before troubleshooting the seat belt warning system, perform "COMMUNICATION FUNCTION CHECK" by following "HOW TO PROCEED WITH TROUBLESHOOTING" to confirm that the communication systems are normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCs

(a) Check for DTCs.

Result

Result	Proceed to
Output DTC (CAN communication)	A
Output DTC (Airbag system)	B
No output DTC	C

A	GO TO CAN COMMUNICATION SYSTEM
B	GO TO AIRBAG SYSTEM

SB

C

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Operate the intelligent tester according to the steps on the display and select "ACTIVE TEST".

METER

Item	Test Details	Diagnostic Note
D-BELT REMIND	D-SEAT BELT indicator light (OFF/ON)	Confirm that the vehicle is stopped with the engine idling

OK:
Switch condition (ON/OFF) can be switched by "ACTIVE TEST".

NG → **REPLACE COMBINATION METER ASSEMBLY**

OK

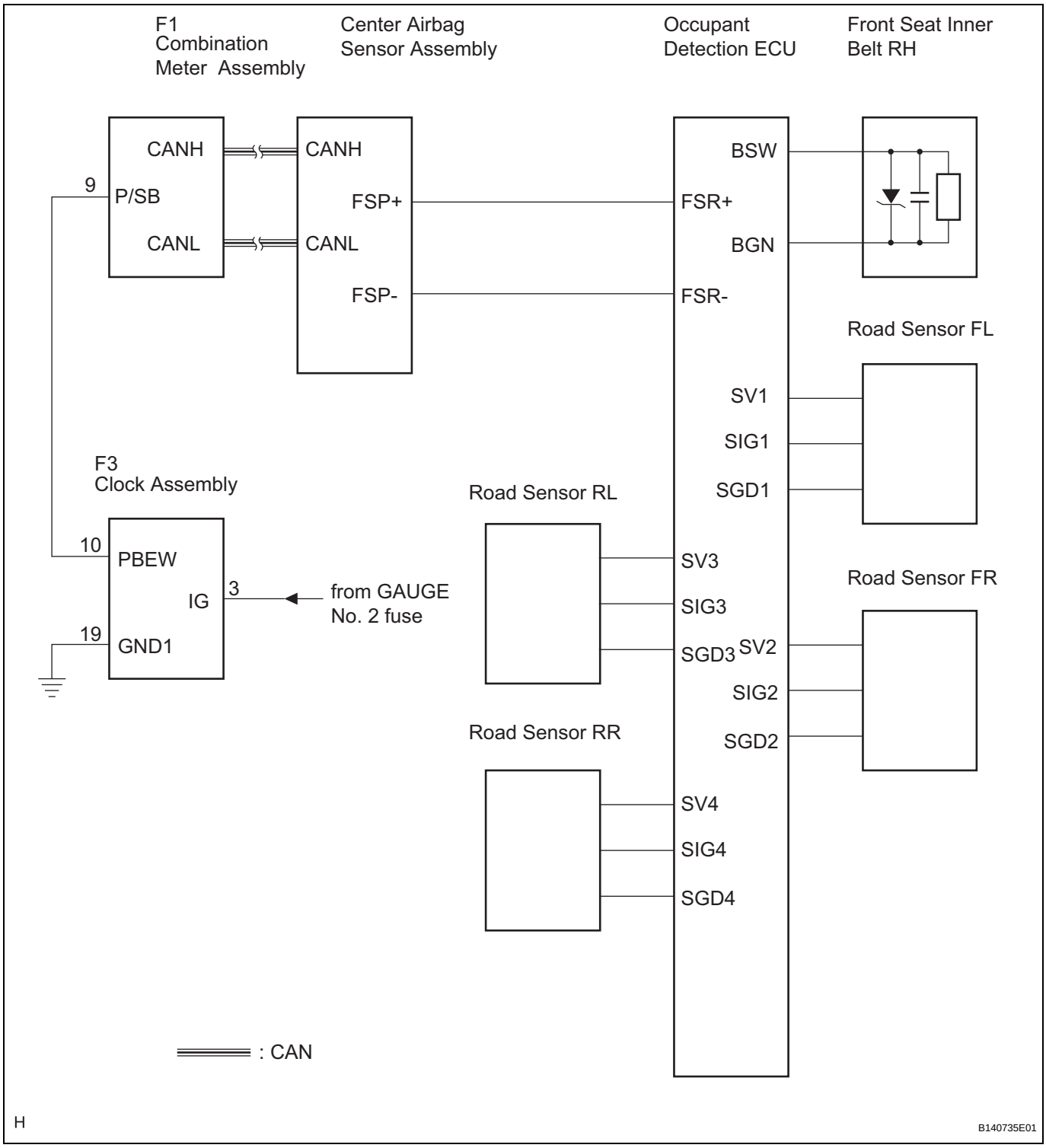
END

Front Passenger Side Seat Belt Warning Light Malfunction

DESCRIPTION

The occupant detection ECU detects the state of the front seat inner belt assembly RH and road sensor when the front passenger seat is occupied with the ignition switch on (IG). If the front passenger seat belt is not fastened, the front seat belt warning light on the clock display blinks. If the seat belt is fastened, the warning light goes off.

WIRING DIAGRAM



SB

INSPECTION PROCEDURE

1 CHECK FOR DTCs

(a) Check for DTCs.

Result

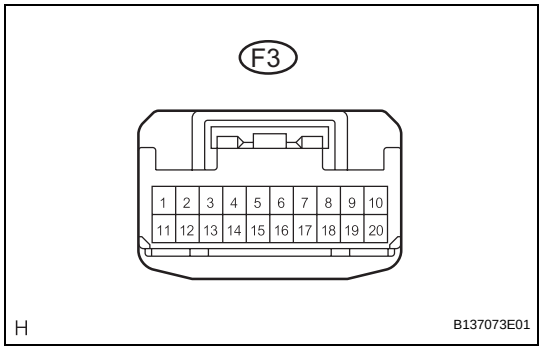
Result	Proceed to
No output DTC	A
Output DTC (CAN communication)	B
Output DTC (Occupant detection)	C

B → GO TO CAN COMMUNICATION SYSTEM

C → GO TO OCCUPANT CLASSIFICATION SYSTEM

A

2 CHECK WIRE HARNESS (BATTERY POSITIVE AND BODY GROUND)



(a) Disconnect the clock assembly connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F3-3 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

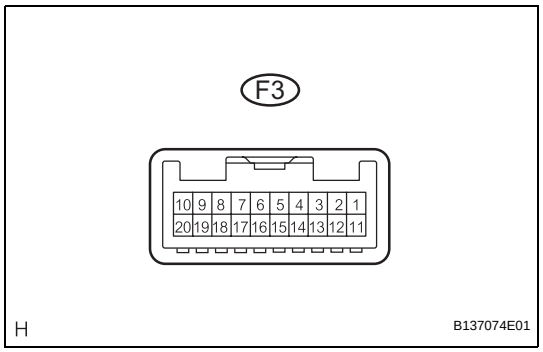
Standard resistance

Tester Connection	Condition	Specified Condition
F3-19 (GND1) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE GAUGE NO. 2 FUSE, HARNESS OR CONNECTOR

OK

3 CHECK CLOCK ASSEMBLY



(a) Disconnect the clock assembly connector.
(b) Apply battery voltage to the connector according to the table below.

Standard

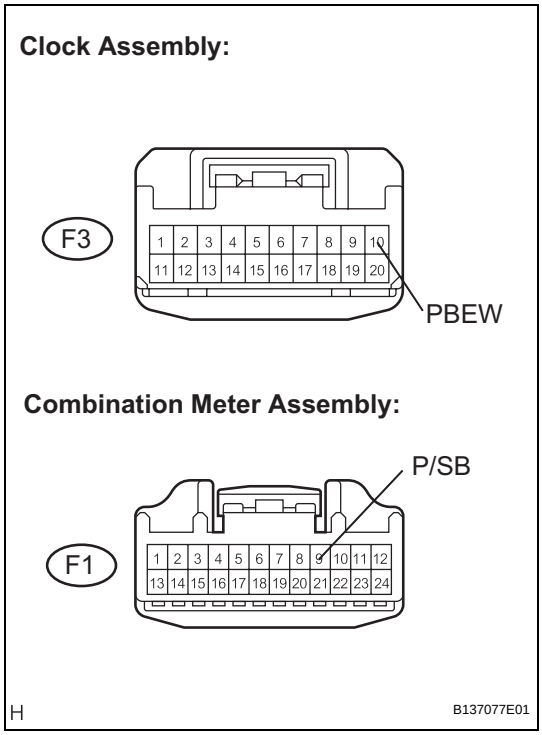
Condition	Specified Condition
Battery positive (+) → Terminal 3 (IG) Battery negative (-) → Terminal 10 (PBEW), 19 (GND1)	Lights up (Seat belt warning light)

NG → REPLACE CLOCK ASSEMBLY

SB

OK

4	CHECK WIRE HARNESS (CLOCK ASSEMBLY - COMBINATION METER ASSEMBLY)



(a) Disconnect the combination meter assembly and clock assembly connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-9 (P/SB) - F3-10 (PBEW)	Always	Below 1 Ω
F1-9 (P/SB) - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

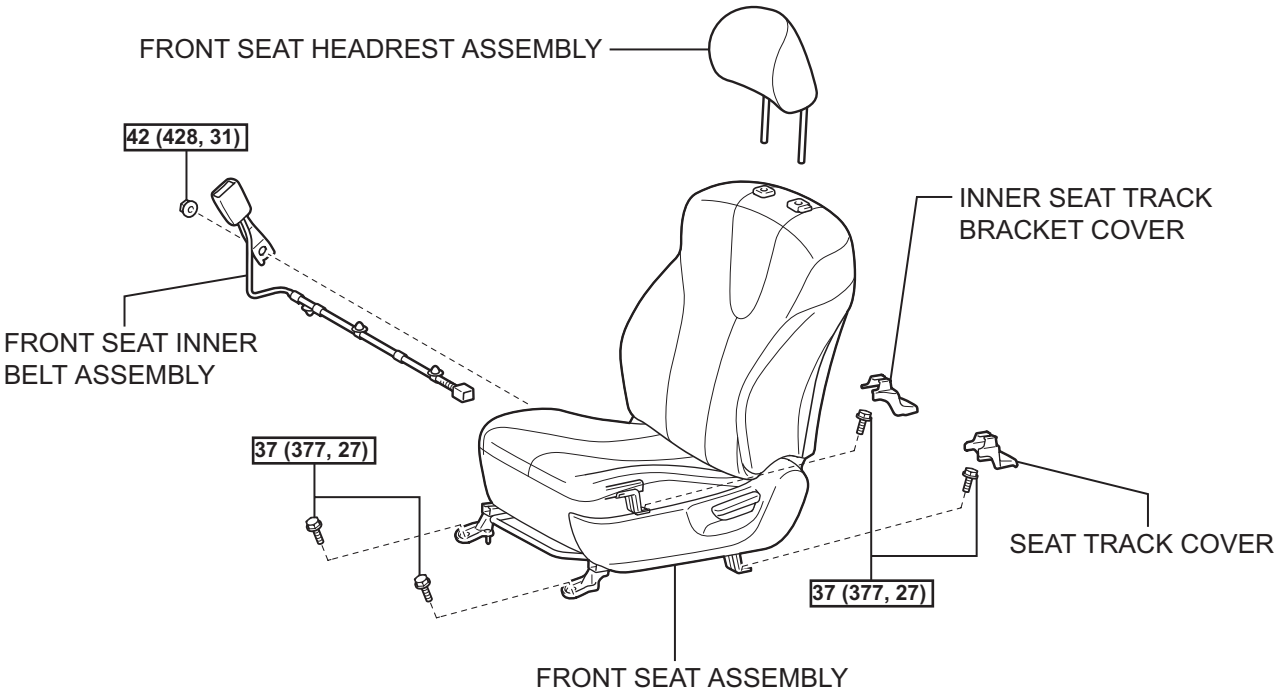
OK

SB → REPLACE COMBINATION METER ASSEMBLY

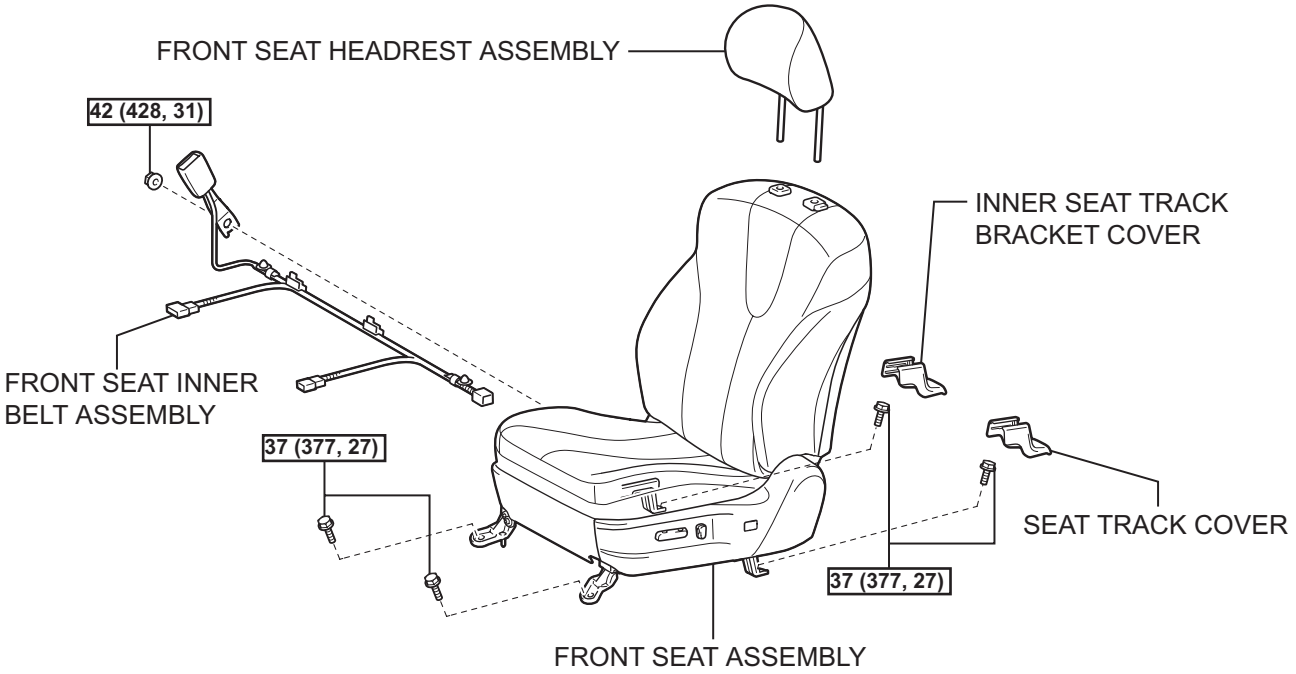
FRONT SEAT INNER BELT ASSEMBLY

COMPONENTS

for Manual Seat:



for Power Seat:



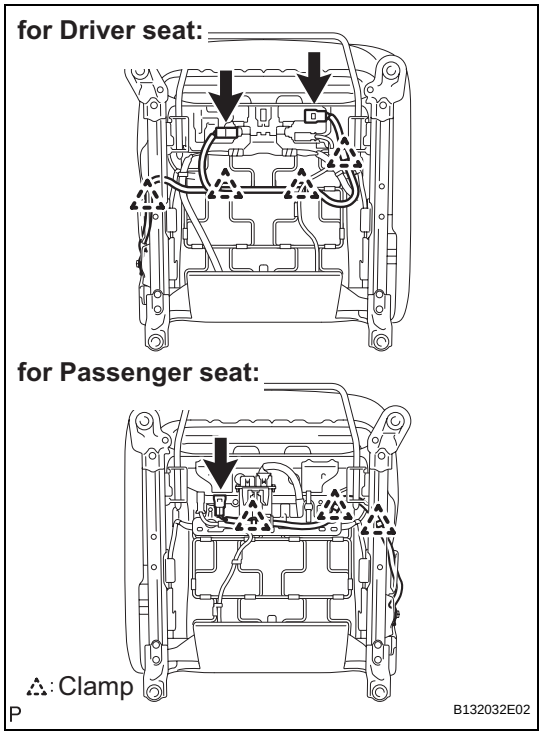
N*m (kgf*cm, ft.*lbf): Specified torque

P

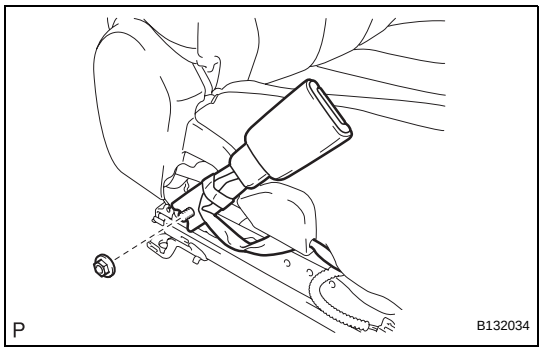
B132031E01

REMOVAL

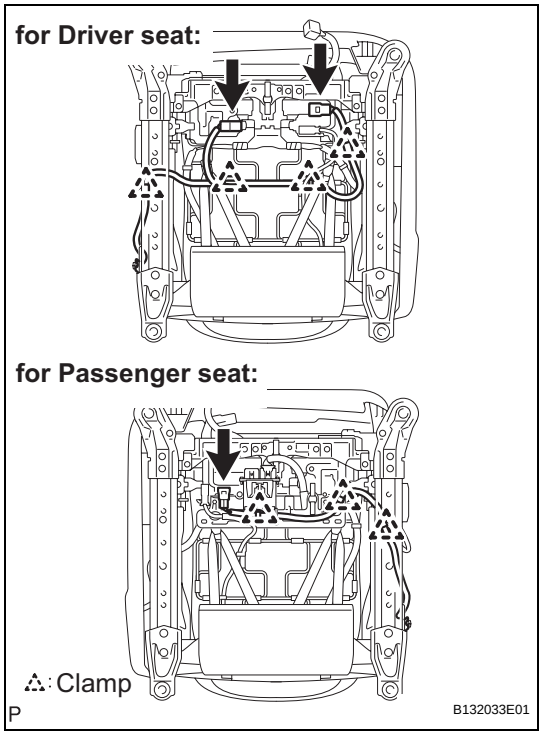
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
2. **REMOVE FRONT SEAT HEADREST ASSEMBLY**
3. **REMOVE SEAT TRACK COVER (for Manual Seat) (See page SE-16)**
4. **REMOVE INNER SEAT TRACK BRACKET COVER (for Manual Seat) (See page SE-16)**
5. **REMOVE FRONT SEAT ASSEMBLY (for Manual Seat) (See page SE-16)**
6. **REMOVE SEAT TRACK COVER (for Power Seat) (See page SE-30)**
7. **REMOVE INNER SEAT TRACK BRACKET COVER (for Power Seat) (See page SE-30)**
8. **REMOVE FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-30)**
9. **REMOVE FRONT SEAT INNER BELT ASSEMBLY (for Manual Seat)**
   (a) for Driver seat:
      (1) Disconnect the connectors and disengage the 4 clamps.
   (b) for Passenger seat:
      (1) Disconnect the connector and disengage the 3 clamps.



SB



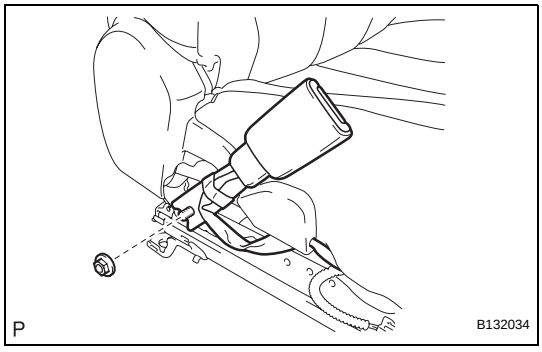
(c) Remove the nut and front seat inner belt assembly.



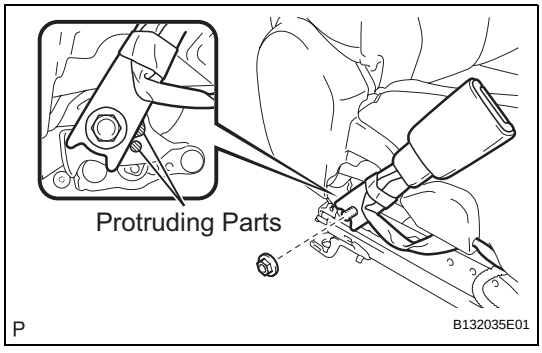
10. REMOVE FRONT SEAT INNER BELT ASSEMBLY (for Power Seat)

(a) for Driver seat:
  (1) Disconnect the connectors and disengage the 4 clamps.

(b) for Passenger seat:
  (1) Disconnect the connector and disengage the 3 clamps.



(c) Remove the nut and front seat inner belt assembly.



INSTALLATION

1. INSTALL FRONT SEAT INNER BELT ASSEMBLY (for Manual Seat)

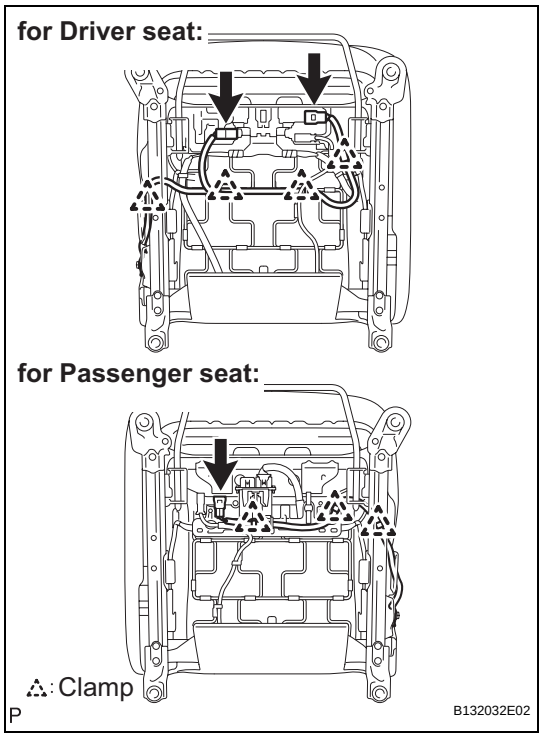
(a) Install the front seat inner belt assembly with the nut.

Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

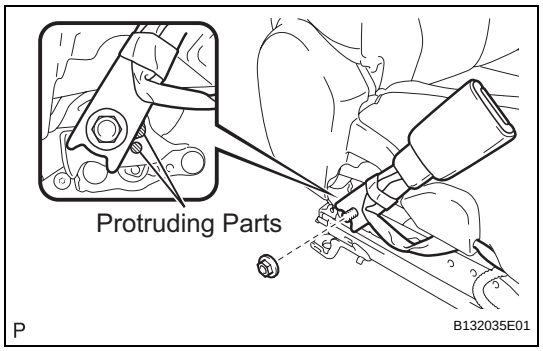
NOTICE:

Do not allow the anchor part of the front seat inner belt assembly to overlap the protruding parts of the front seat adjuster.

SB



(b) for Driver seat:
(1) Connect the connectors and engage the 4 clamps.
(c) for Passenger seat:
(1) Connect the connector and engage the 3 clamps.



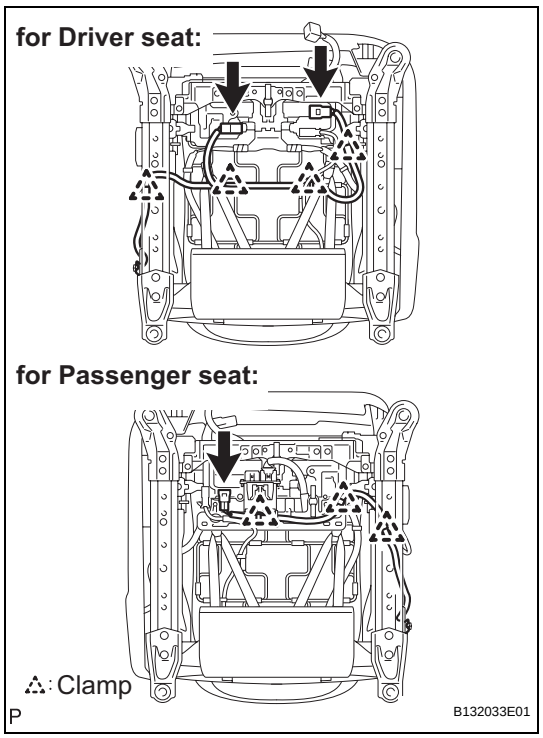
2. INSTALL FRONT SEAT INNER BELT ASSEMBLY (for Power Seat)

(a) Install the front seat inner belt assembly with the nut.

Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

NOTICE:

Do not allow the anchor part of the front seat inner belt assembly to overlap the protruding parts of the front seat adjuster.



(b) for Driver seat:
(1) Connect the connectors and engage the 4 clamps.
(c) for Passenger seat:
(1) Connect the connector and engage the 3 clamps.

3. INSTALL FRONT SEAT ASSEMBLY (for Manual Seat) (See page SE-24)

4. INSTALL INNER SEAT TRACK BRACKET COVER (for Manual Seat) (See page SE-25)

5. INSTALL SEAT TRACK COVER (for Manual Seat) (See page SE-25)

6. INSTALL FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-41)

7. INSTALL INNER SEAT TRACK BRACKET COVER (for Power Seat) (See page SE-42)

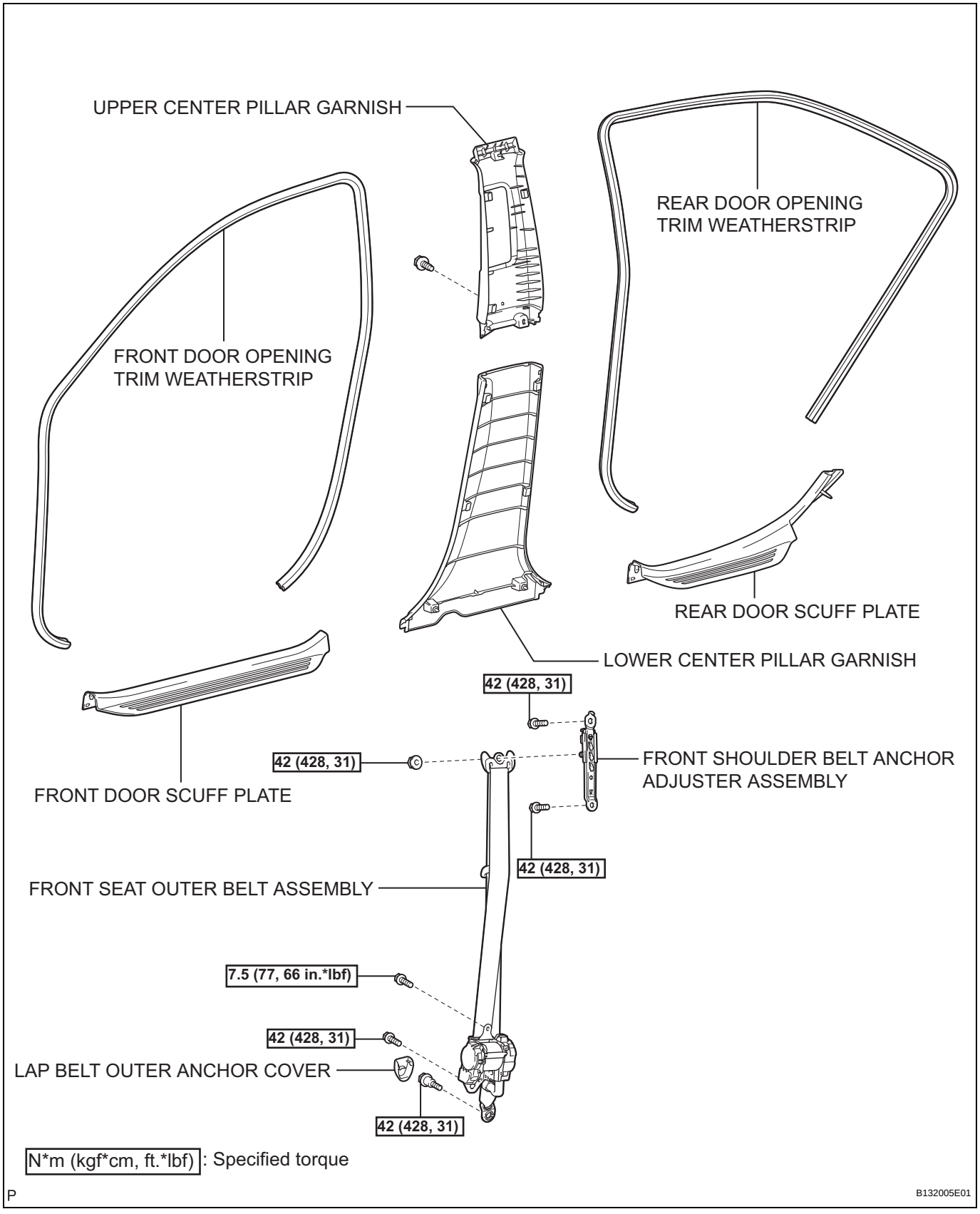
8. INSTALL SEAT TRACK COVER (for Power Seat) (See page SE-42)

SB

9. **INSTALL FRONT SEAT HEADREST ASSEMBLY**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
11. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)** (See page RS-242)
12. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**
13. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-42)**
14. **INSPECT SRS WARNING LIGHT** (See page RS-32)

FRONT SEAT OUTER BELT ASSEMBLY

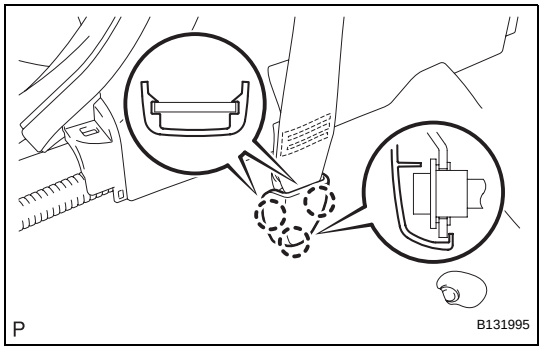
COMPONENTS



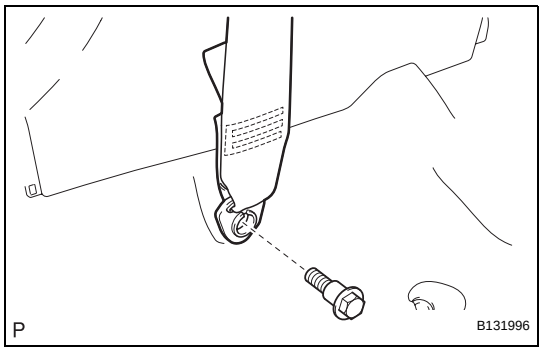
SB

REMOVAL

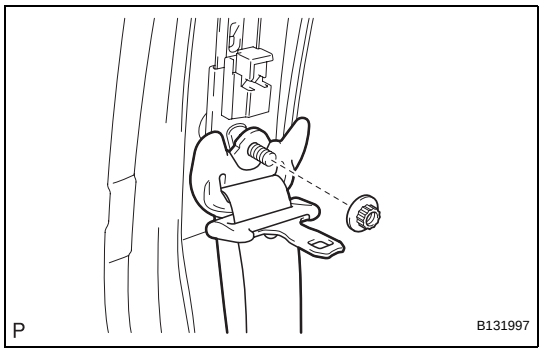
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).



2. **REMOVE LAP BELT OUTER ANCHOR COVER**
   (a) Disengage the 3 claws and remove the lap belt outer anchor cover.

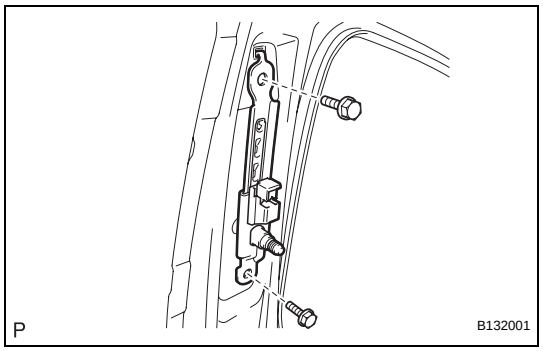


3. **DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY**
   (a) Remove the bolt and disconnect the floor end of the front seat outer belt assembly.
4. **REMOVE FRONT DOOR SCUFF PLATE (See page IR-24)**
5. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP**
6. **REMOVE REAR DOOR SCUFF PLATE (See page IR-24)**
7. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP**
8. **REMOVE LOWER CENTER PILLAR GARNISH (See page IR-25)**
9. **REMOVE UPPER CENTER PILLAR GARNISH (See page IR-26)**



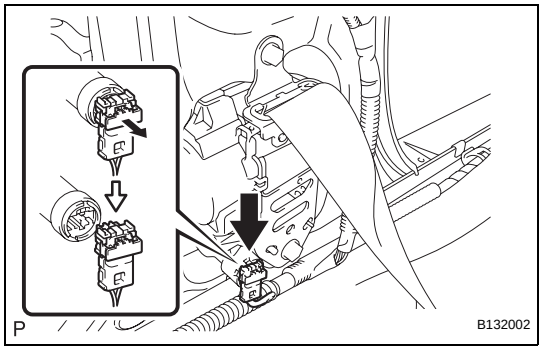
10. **DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY**
    (a) Remove the nut and disconnect the shoulder anchor of the front seat outer belt assembly.

SB



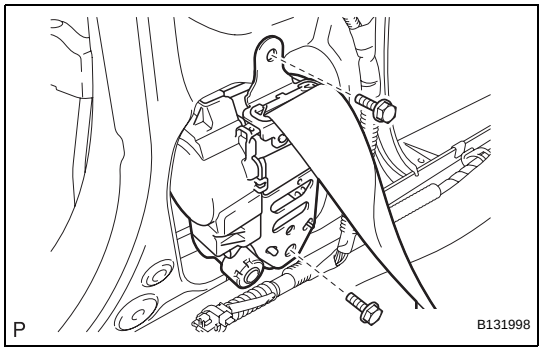
11. REMOVE FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY

(a) Remove the 2 bolts and the front shoulder belt anchor adjuster assembly.

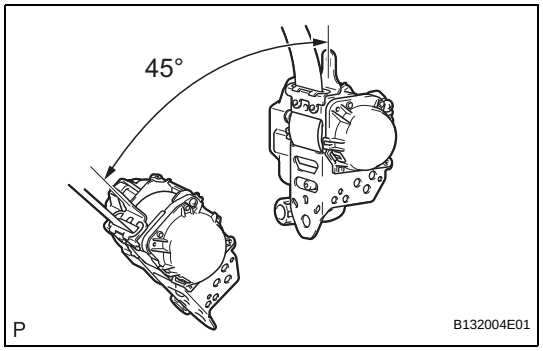


12. REMOVE FRONT SEAT OUTER BELT ASSEMBLY

(a) Using a screwdriver, pull out the locking button in the direction shown by the arrow to release the lock, and disconnect the connector as shown in the illustration.
HINT:
Tape the screwdriver tip before use.



(b) Remove the 2 bolts and the front seat outer belt assembly.

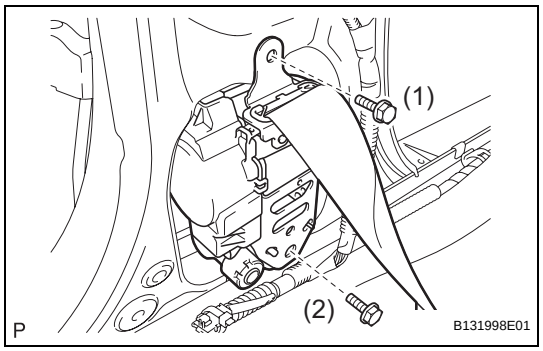


INSTALLATION

1. INSTALL FRONT SEAT OUTER BELT ASSEMBLY

(a) Check the degree of tilt when the ELR begins to lock.

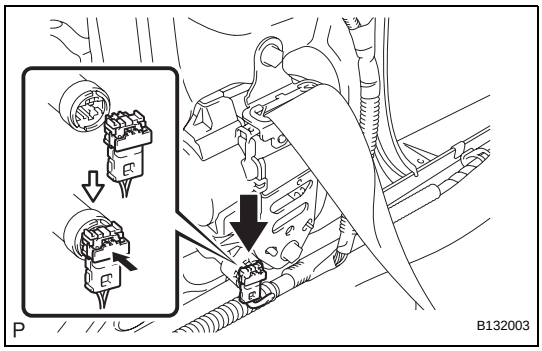
(1) Check that the belt does not lock at less than 15 degrees of tilt in any direction but locks at over 45 degrees of tilt while gently pulling the belt.
NOTICE:
Do not disassemble the retractor.



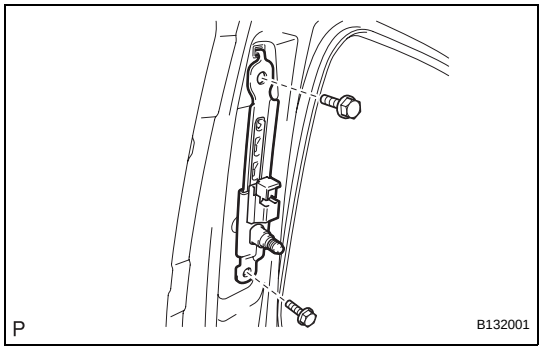
(b) Temporarily install the front seat outer belt assembly with the 2 bolts.

(c) Fully tighten the upper side bolt first, then the lower side bolt to install the front seat outer belt assembly.
Torque: For upper bolt
7.5 N*m (77 kgf*cm, 66 in.*lbf)
For lower bolt
42 N*m (428 kgf*cm, 31 ft.*lbf)

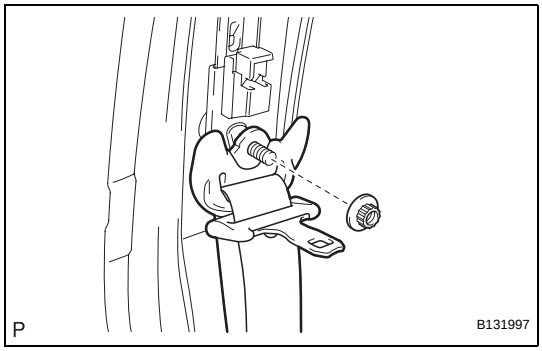
SB



(d) Connect the connector and lock the locking button as shown in the illustration.
NOTICE:
Securely lock the locking button.



2. INSTALL FRONT SHOULDER BELT ANCHOR ADJUSTER ASSEMBLY
(a) Install the front shoulder belt anchor adjuster assembly with the 2 bolts.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)



3. CONNECT FRONT SEAT OUTER BELT ASSEMBLY
(a) Connect the shoulder anchor of the front seat outer belt assembly with the nut.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

4. INSTALL UPPER CENTER PILLAR GARNISH (See page IR-53)

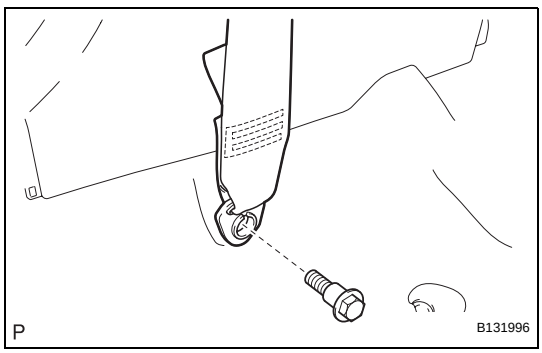
5. INSTALL LOWER CENTER PILLAR GARNISH (See page IR-53)

6. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP (See page IR-55)

7. INSTALL REAR DOOR SCUFF PLATE (See page IR-56)

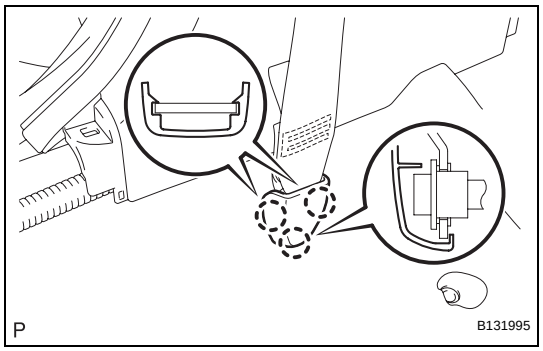
8. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP (See page IR-54)

9. INSTALL FRONT DOOR SCUFF PLATE (See page IR-54)



10. CONNECT FRONT SEAT OUTER BELT ASSEMBLY
(a) Install the floor end of the front seat outer belt assembly with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
(b) Check if the ELR locks.
NOTICE:
The check should be performed with the outer belt assembly installed.
(1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.

SB



11. INSTALL LAP BELT OUTER ANCHOR COVER

(a) Engage the 3 claws and install the lap belt outer anchor cover.

12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

13. INSPECT SRS WARNING LIGHT

(See page RS-32)

DISPOSAL

HINT:
When scrapping vehicles equipped with a seat belt pretensioner or disposing of a front seat outer belt (with a seat belt pretensioner), always deploy the seat belt pretensioner first in accordance with the procedures described below. If any abnormality occurs during deployment of the seat belt pretensioner, contact the SERVICE DEPT. of the TOYOTA MOTOR SALES, U.S.A., INC.

1. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN INSTALLED IN VEHICLE)

NOTICE:

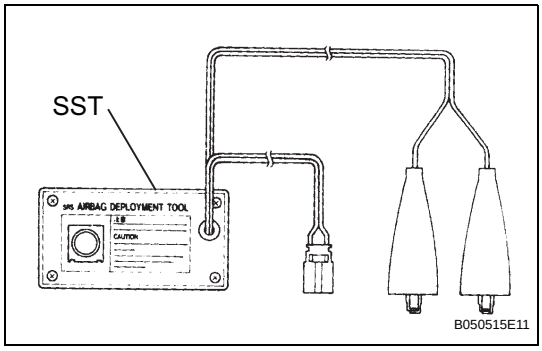
- **Never dispose of a front seat outer belt assembly with a pretensioner that has not been deployed.**
- **The seat belt pretensioner produces an exploding sound when it deploys, so perform the operation outdoors where it will not disturb local residents.**
- **When deploying a front seat outer belt (with a seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat belt with a deployed pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with a deployed pretensioner.**
- **When deploying the seat belt pretensioner, always use the specified SST (SRS airbag deployment tool). Perform the operation in a place away from electrical interference.**
- **Be sure to follow the procedures listed below when deploying the seat belt pretensioner.**

(a) Check the function of SST.

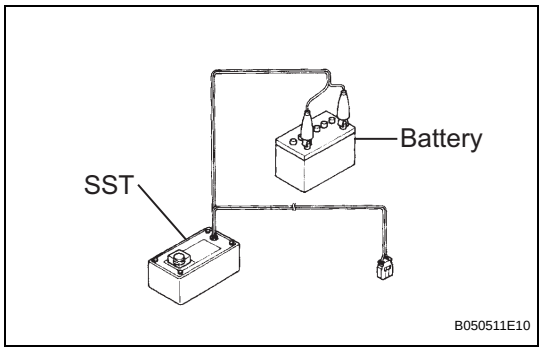
SST 09082-00700, 09082-00770

CAUTION:

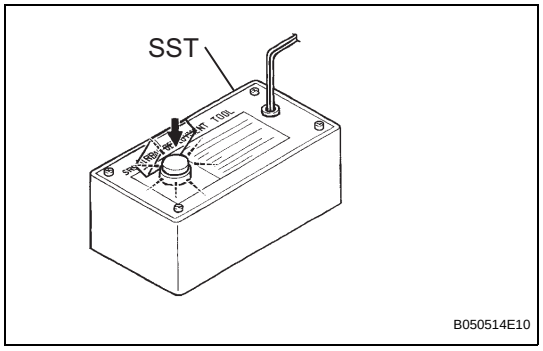
When deploying the seat belt pretensioner, always use the specified SST.



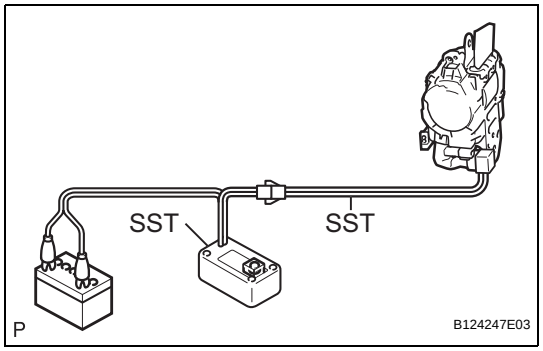
SB



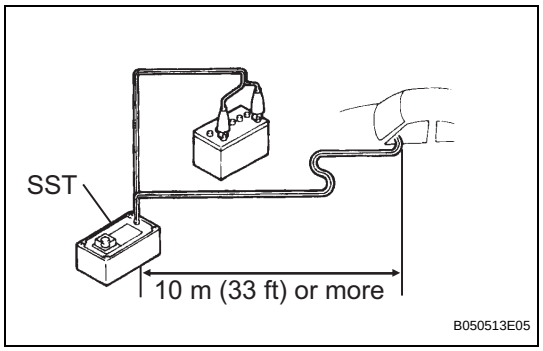
(1) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the battery negative (-) terminal.
HINT:
At this time, do not connect the yellow connector that will later be connected to the seat belt pretensioner.



(2) Press the SST deployment switch, and check that the LED of the SST deployment switch lights up.
CAUTION:
If the LED is lit when the deployment switch is not pressed, the SST may be malfunctioning. Therefore, do not use the SST.



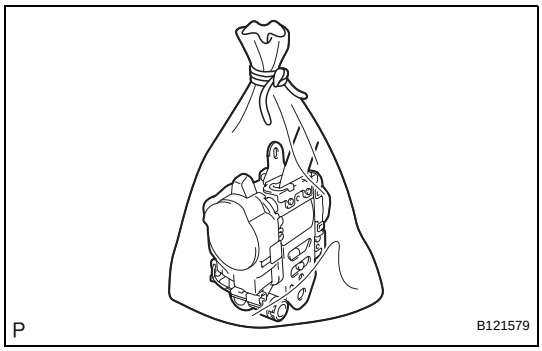
(b) Connect SST.
(1) Connect 2 SST, and then connect them to the front seat outer belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the pretensioner connector.



(2) Move the SST at least 10 m (33 ft) away from the front of the vehicle.
(3) Close all the doors and windows of the vehicle.
NOTICE:
Do not damage the SST wire harness.

(c) Deploy the front seat outer belt pretensioner.
(1) Confirm that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the negative (-) terminal.
(3) Press the SST deployment switch to deploy the front seat outer belt pretensioner.
HINT:
The seat belt pretensioner will deploy at the same time as the LED of the SST illuminates.

SB



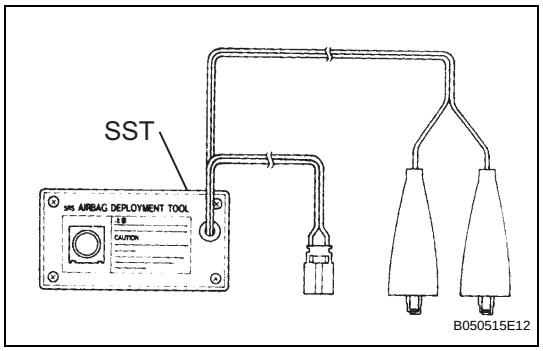
(d) Dispose of the front seat outer belt assembly.
(1) Remove the front seat outer belt assembly and SST.
(2) Place the outer belt in a plastic bag, tie the end tightly, and dispose of it in the same way as other general parts.

CAUTION:
- **The outer belt becomes very hot when the front seat outer belt pretensioner is deployed, so leave it untouched for at least 30 minutes after it has been deployed.**
- **Use gloves and safety glasses when handling an outer belt with a pretensioner that has been deployed.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt assembly with a pretensioner that has been deployed.**

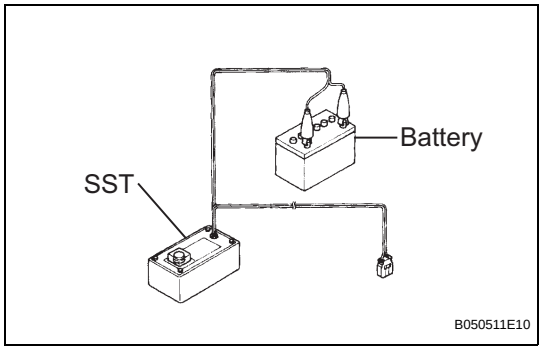
HINT:
When scrapping a vehicle, deploy the front seat outer belt pretensioners, and then scrap the vehicle with the deployed outer belt installed.

2. DISPOSE OF FRONT SEAT OUTER BELT ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)

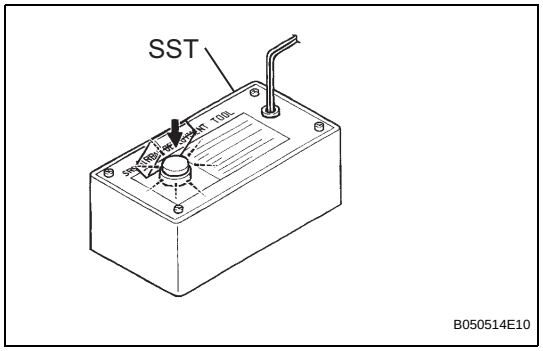
NOTICE:
- **Never dispose of a front seat outer belt assembly with a pretensioner that has not been deployed.**
- **The seat belt pretensioner produces an exploding sound when it deploys, so perform the operation outdoors where it will not disturb local residents.**
- **When deploying a front seat outer belt (with a seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling a front seat belt with a deployed pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with a deployed pretensioner.**
- **When disposing of a pretensioner equipped front seat outer belt, never deploy the belt in the customer's vehicle.**
- **Be sure to follow the procedures listed below when deploying the seat belt pretensioner.**



(a) Check the function of SST.
SST 09082-00700, 09082-00770
CAUTION:
When deploying the seat belt pretensioner, always use the specified SST.

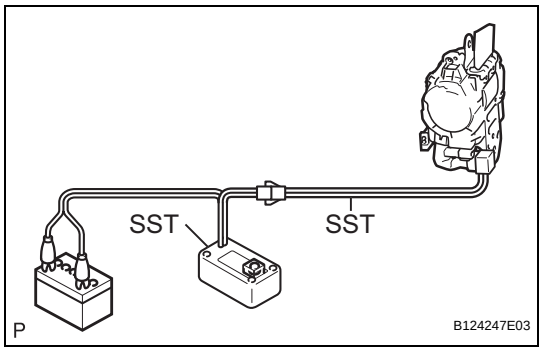


(1) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the battery negative (-) terminal.
HINT:
At this time, do not connect the yellow connector that will later be connected to the seat belt pretensioner.

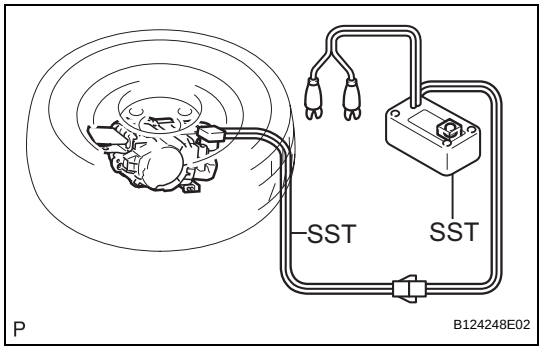


(2) Press the SST deployment switch, and check that the LED of the SST deployment switch lights up.
CAUTION:
If the LED is lit when the deployment switch is not pressed, the SST may be malfunctioning. Therefore, do not use the SST.

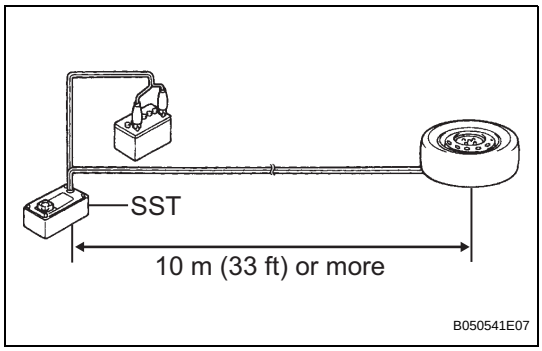
SB

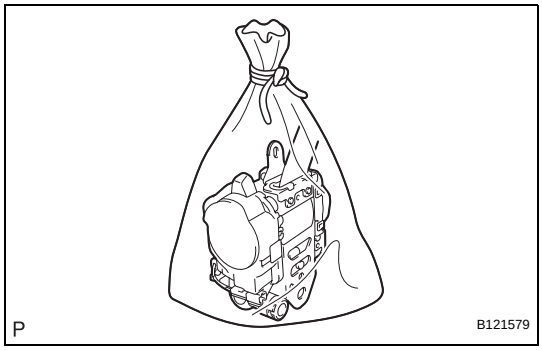


(b) Connect SST.
(1) Connect 2 SST, and then connect them to the front seat outer belt pretensioner.
SST 09082-00700, 09082-00770
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the pretensioner connector.



(2) Place the outer belt on the ground and cover it with a tire and wheel assembly.
NOTICE:
Position the front seat outer belt assembly as shown in the illustration.
(3) Position and hold the SST at least 10 m (33 ft) away from the wheel.
NOTICE:
Do not damage the SST wire harness.





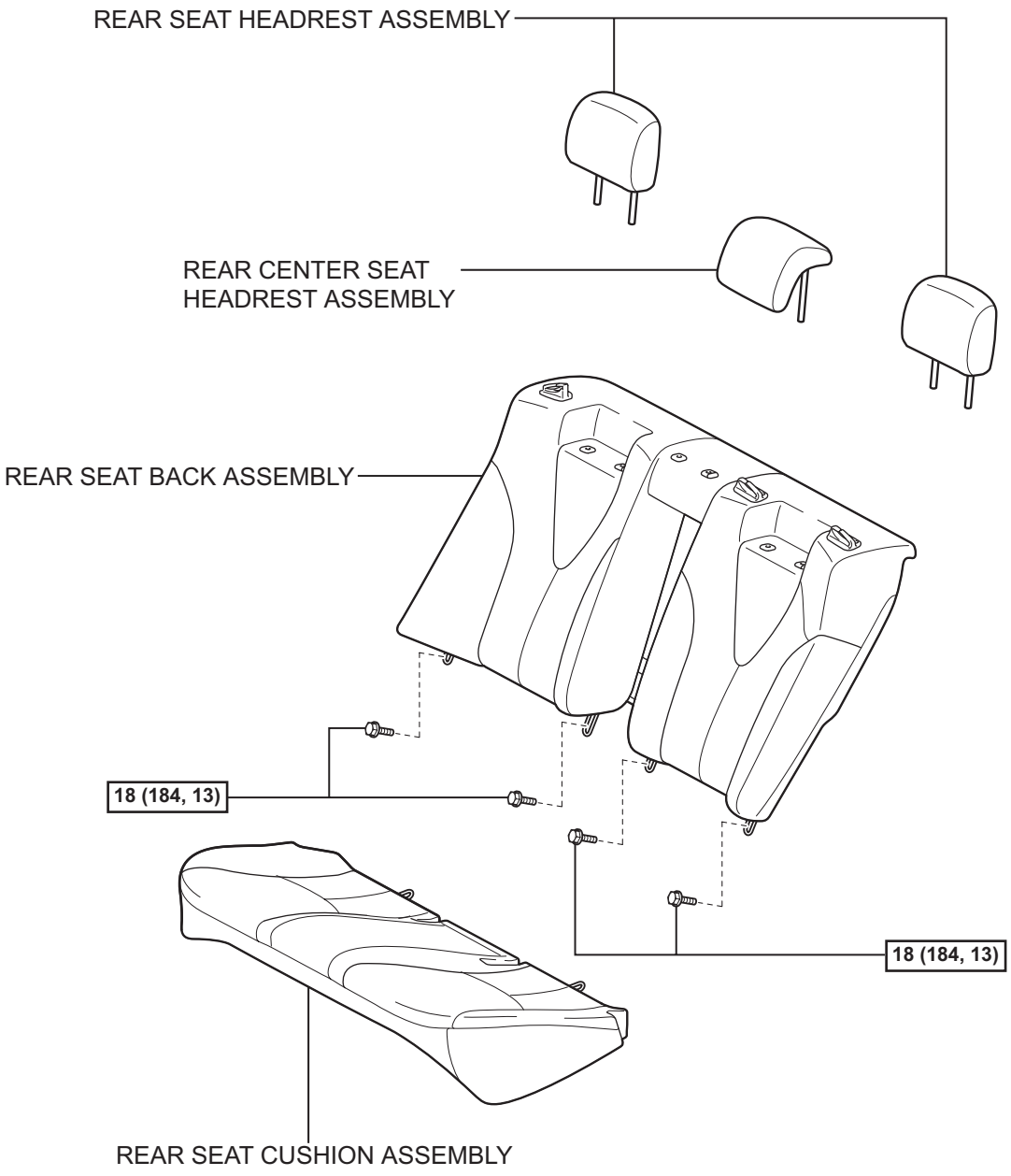
(c) Deploy the front seat outer belt pretensioner.
  (1) Check that no one is within a 10 m (33 ft) radius of the wheel.
  (2) Connect the red clip of the SST to the battery positive (+) terminal, and the black clip to the battery negative (-) terminal.
  (3) Press the SST deployment switch to deploy the front seat outer belt pretensioner.
  HINT:
  The seat belt pretensioner will deploy at the same time as the LED of the SST illuminates.

(d) Dispose of the front seat outer belt assembly.
  (1) Remove the wheel and SST.
  (2) Place the outer belt in a plastic bag, tie the end tightly, and dispose of it in the same way as other general parts.
  CAUTION:
  - **The outer belt becomes very hot when the front seat outer belt pretensioner is deployed, so leave it untouched for at least 30 minutes after it has been deployed.**
  - **Use gloves and safety glasses when handling an outer belt with a pretensioner that has been deployed.**
  - **Always wash your hands with water after completing the operation.**
  - **Do not apply water, etc. to a front seat outer belt assembly with a pretensioner that has been deployed.**
  HINT:
  When scrapping a vehicle, deploy the front seat outer belt pretensioners, and then scrap the vehicle with the deployed outer belt installed.

REAR SEAT INNER BELT ASSEMBLY

COMPONENTS

for Fixed Seat Type:



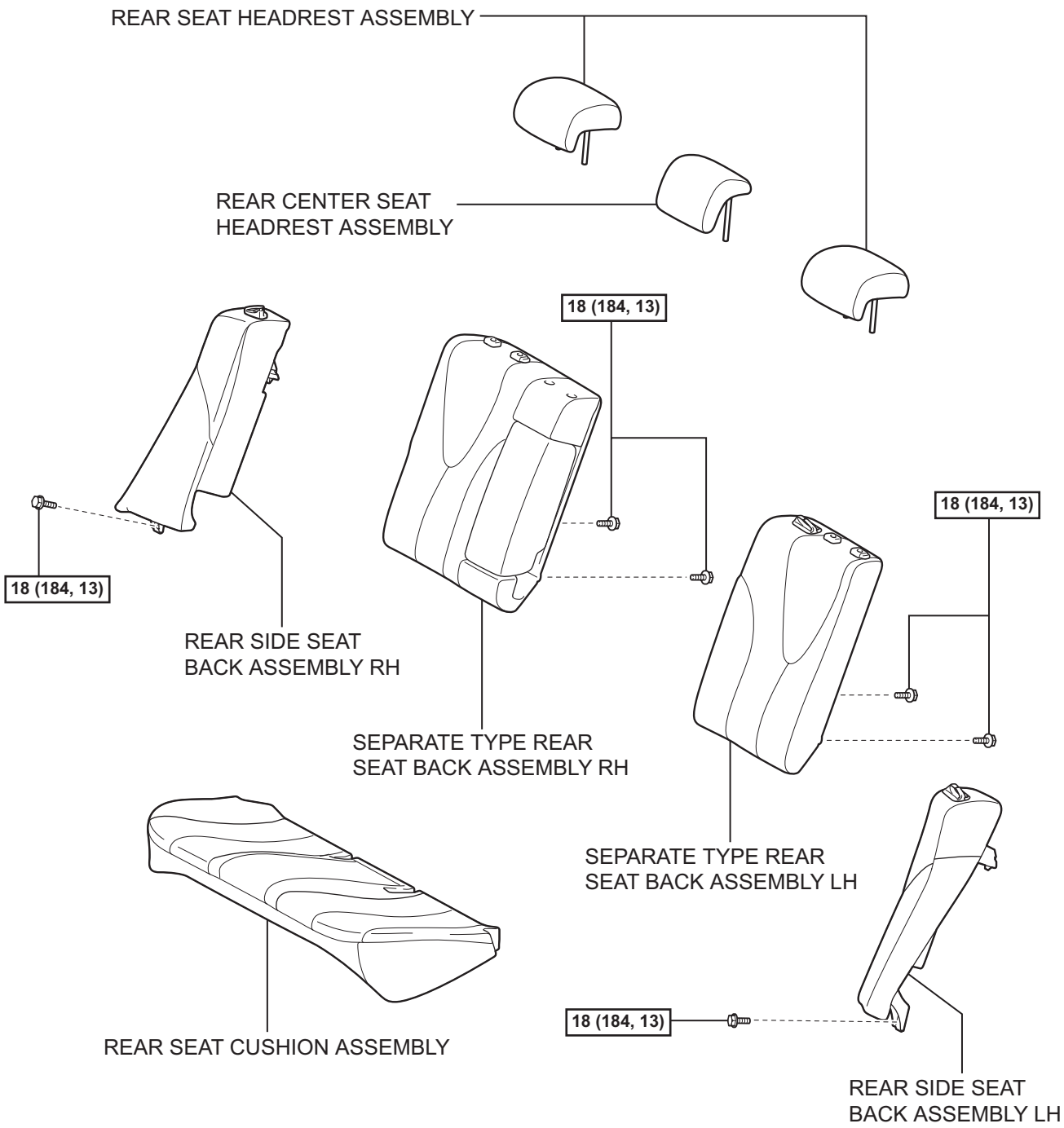
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

SB

for Fold Down Seat Type:



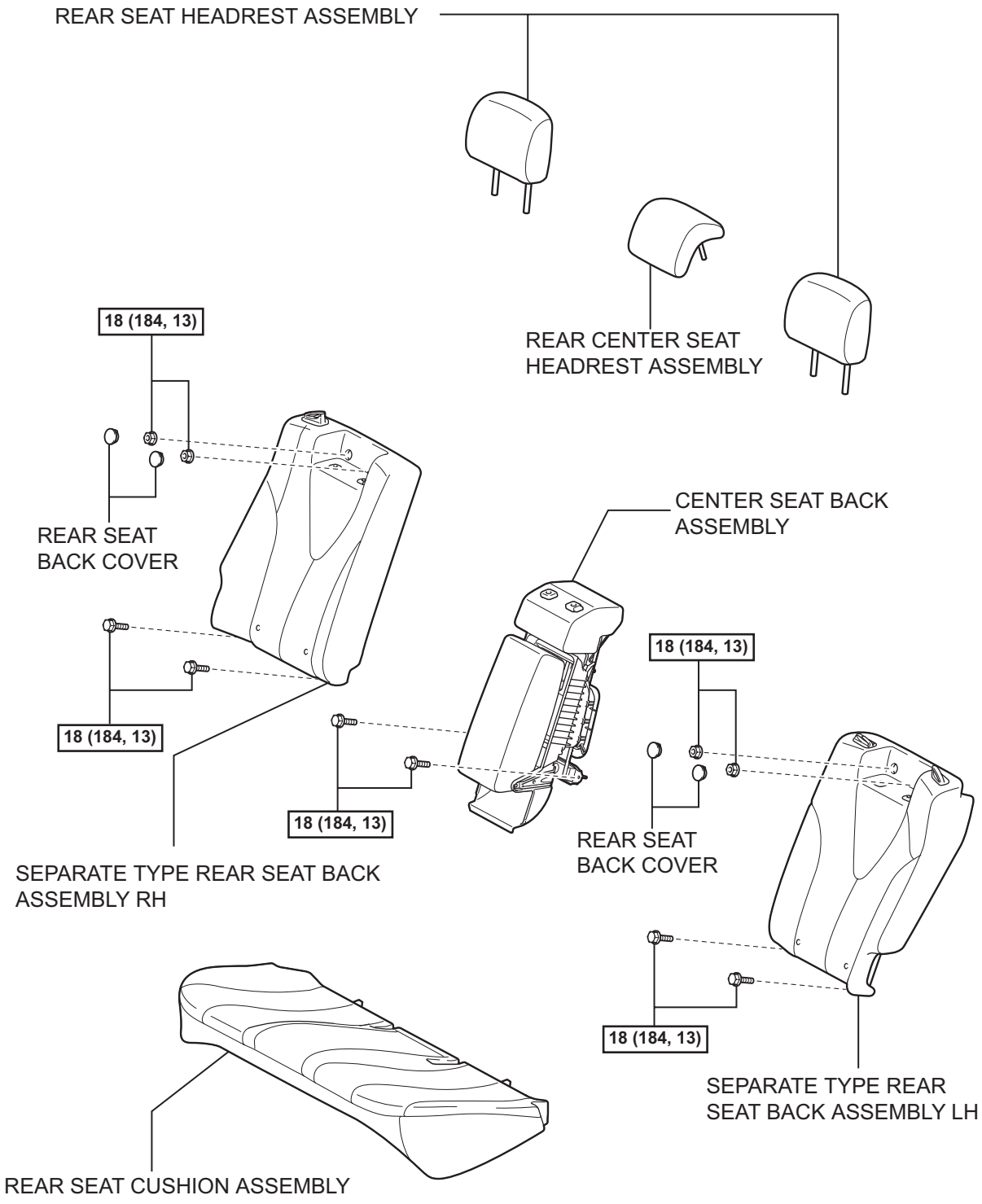
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136564E02

SB

for Reclining Seat Type:

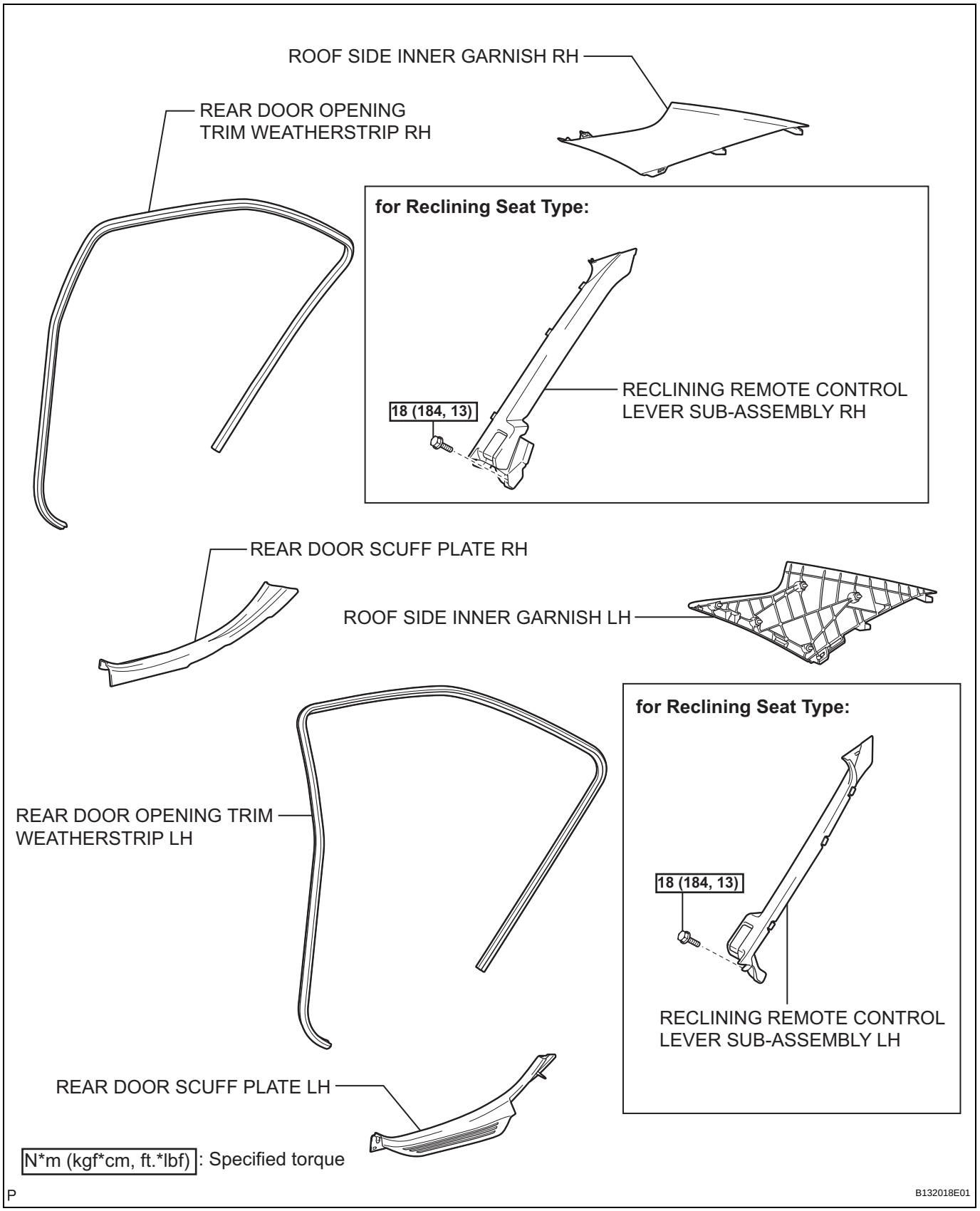


N*m (kgf*cm, ft.*lbf): Specified torque

SB

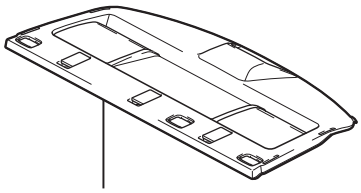
P

B139095E03


ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR SCUFF PLATE RH
ROOF SIDE INNER GARNISH LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132018E01

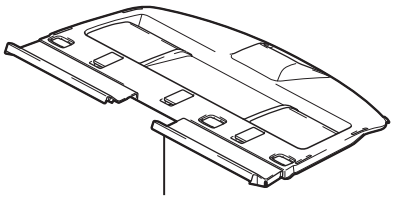
SB

for TMC made:

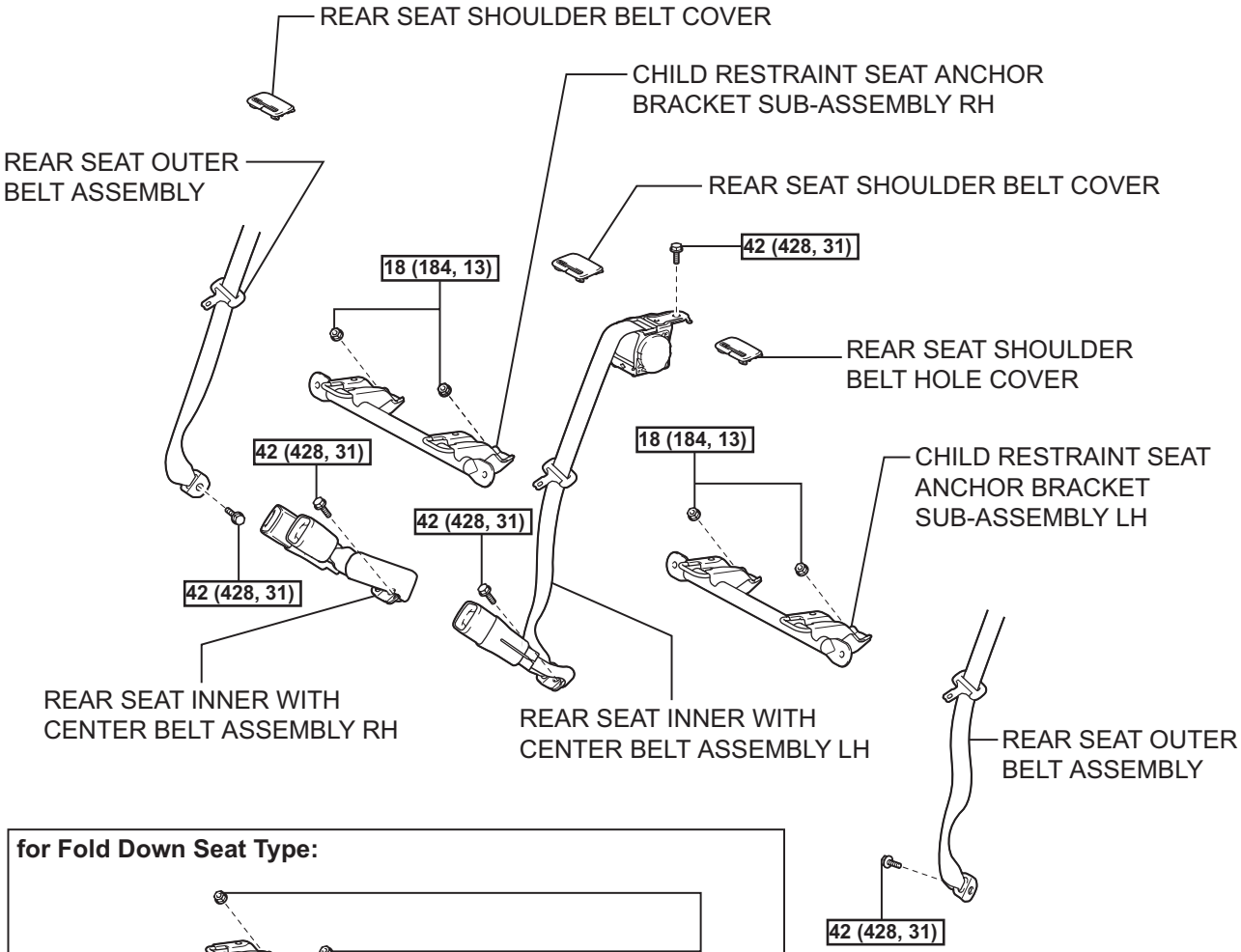


PACKAGE TRAY TRIM PANEL ASSEMBLY

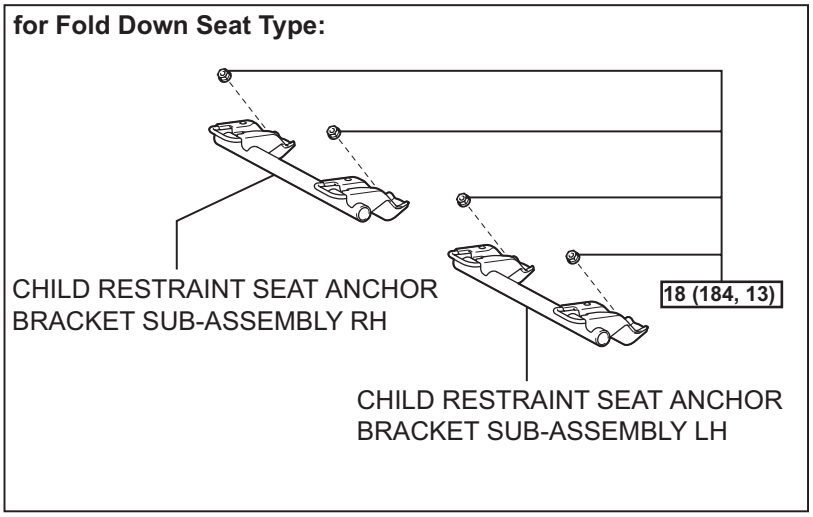
for Reclining Seat Type:



PACKAGE TRAY TRIM PANEL ASSEMBLY



for Fold Down Seat Type:

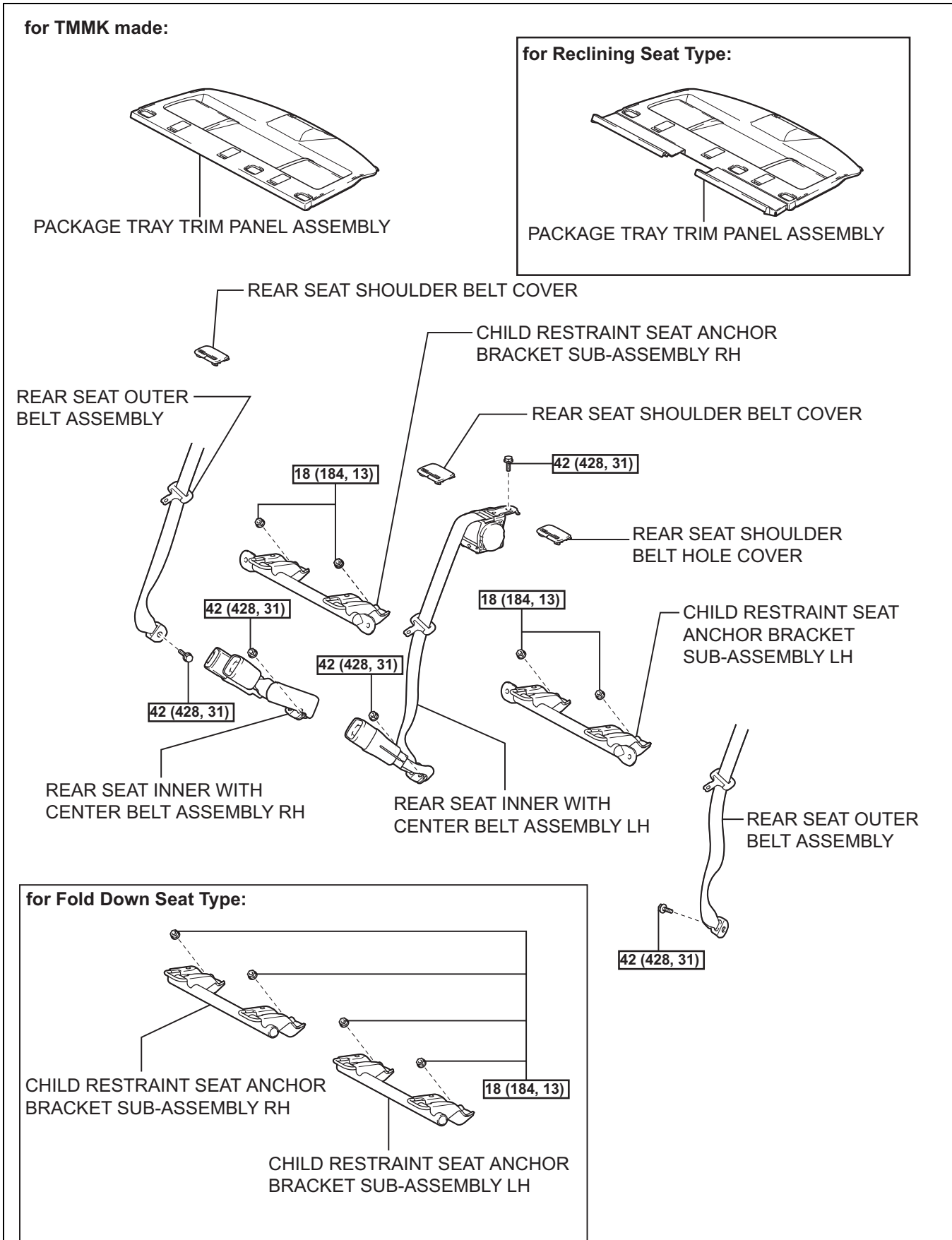


N*m (kgf*cm, ft.*lbf): Specified torque

SB

P

B132019E02



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B142737E01

SB

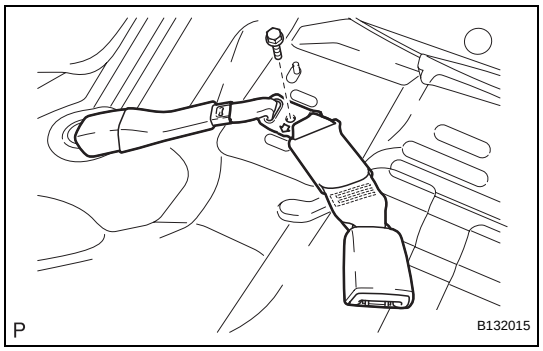
REMOVAL

1. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)**
2. **REMOVE REAR SEAT HEADREST ASSEMBLY**
3. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
4. **REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
5. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)**
6. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)**
7. **REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)**
8. **REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)**
9. **REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)**
10. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)**
11. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)**
12. **REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)**
13. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)**
14. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH**
15. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)**
16. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH**
17. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)**
18. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
19. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)**

20. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY RH

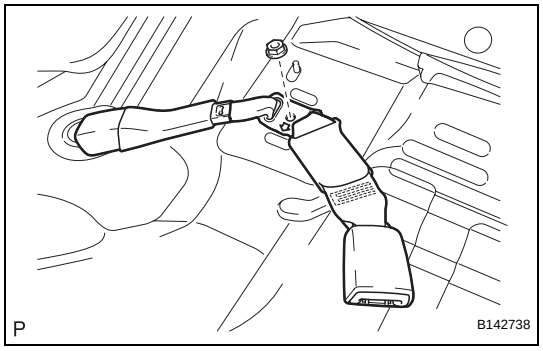
HINT:

Use the same procedures for the RH side and the LH side.



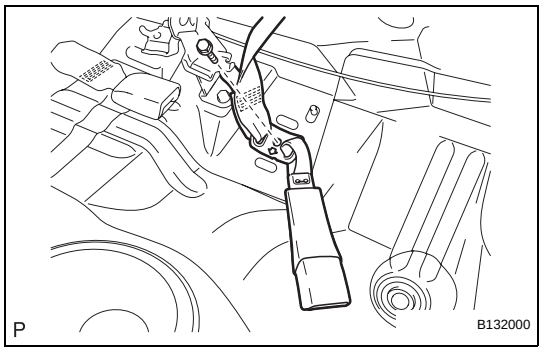
21. REMOVE REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH (for TMC Made)

(a) Remove the bolt and the rear seat inner with center belt assembly RH.



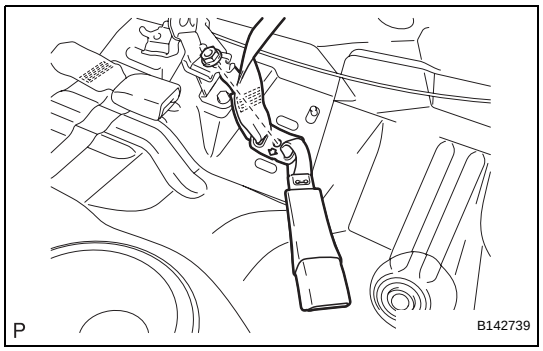
22. REMOVE REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH (for TMMK Made)

(a) Remove the nut and the rear seat inner with center belt assembly RH.



23. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made)

(a) Remove the bolt and disconnect the floor end of the rear seat inner with center belt assembly LH.



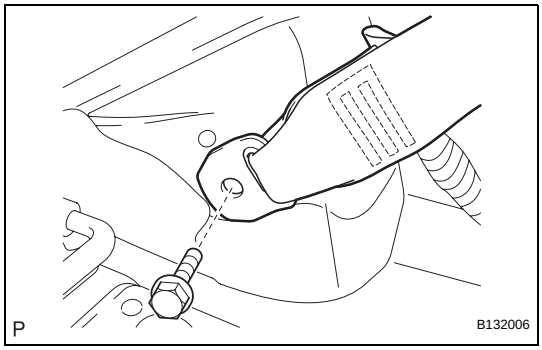
24. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made)

(a) Remove the nut and disconnect the floor end of the rear seat inner with center belt assembly LH.

25. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)

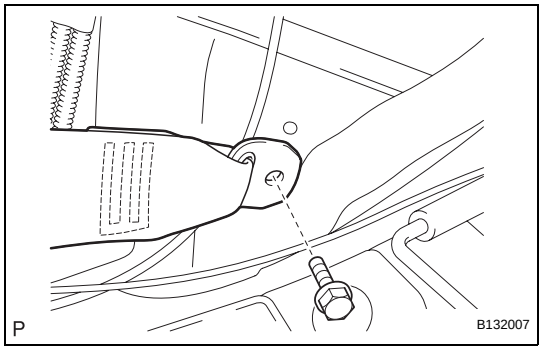
26. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)

SB



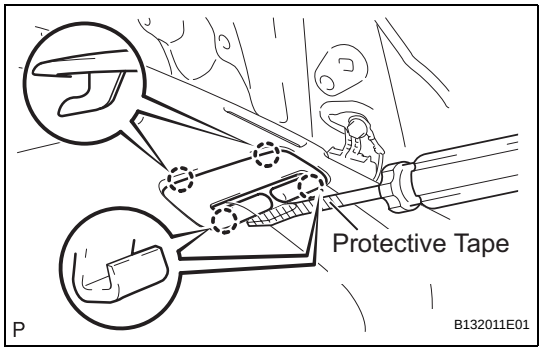
27. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side)

(a) Remove the bolt and disconnect the floor end of the rear seat outer belt assembly.



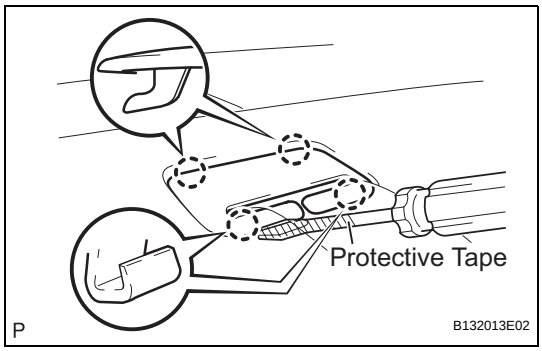
28. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side)

(a) Remove the bolt and disconnect the floor end of the rear seat outer belt assembly.



29. REMOVE REAR SEAT SHOULDER BELT COVER

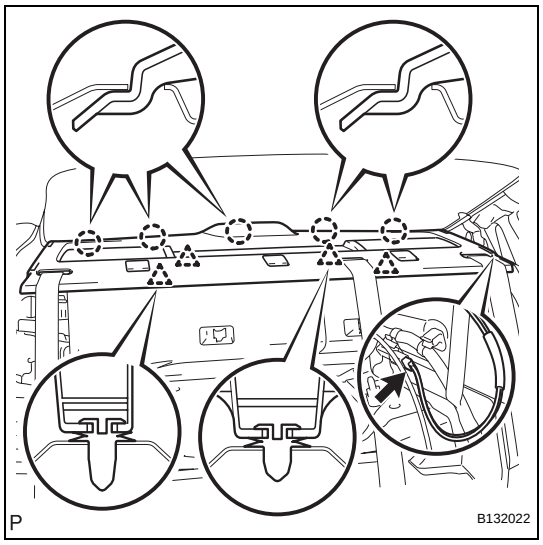
(a) Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder belt cover.
HINT:
- Tape the screwdriver tip before use.
- Use the same procedures for the RH side and the LH side.



30. REMOVE REAR SEAT SHOULDER BELT HOLE COVER

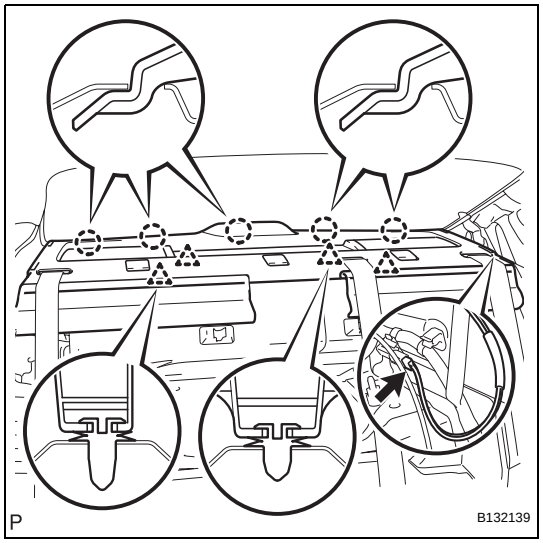
(a) Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder belt hole cover.
HINT:
Tape the screwdriver tip before use.

SB



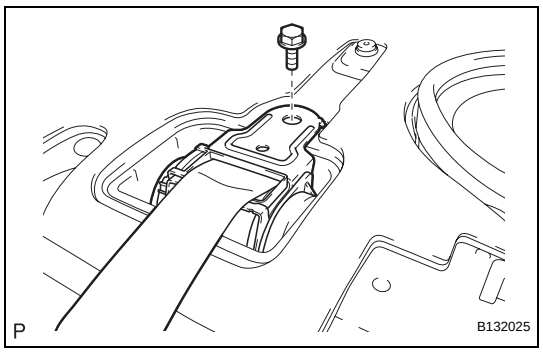
31. REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY

(a) Disconnect the connector.
(b) Disengage the 4 clips and the 5 claws.
(c) Pass the 3 rear seat belt floor anchors through the package tray trim panel assembly then remove the package tray trim panel assembly.



32. REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type)

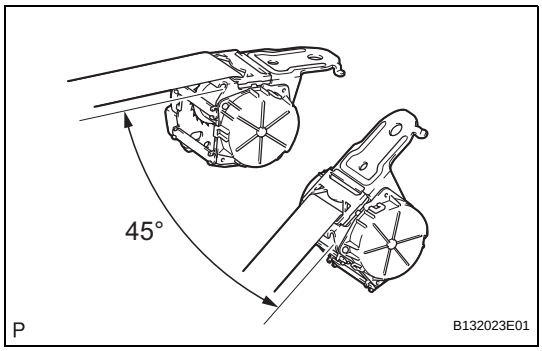
(a) Disconnect the connector.
(b) Disengage the 4 clips and the 5 claws.
(c) Pass the 3 rear seat belt floor anchors through the package tray trim panel assembly then remove the package tray trim panel assembly.



33. REMOVE REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH

(a) Remove the bolt and the rear seat inner with center belt assembly LH.

SB



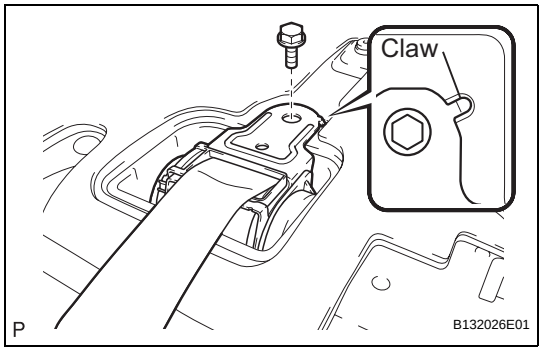
INSTALLATION

1. INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH

(a) Check the degree of the tilt when the ELR begins to lock.

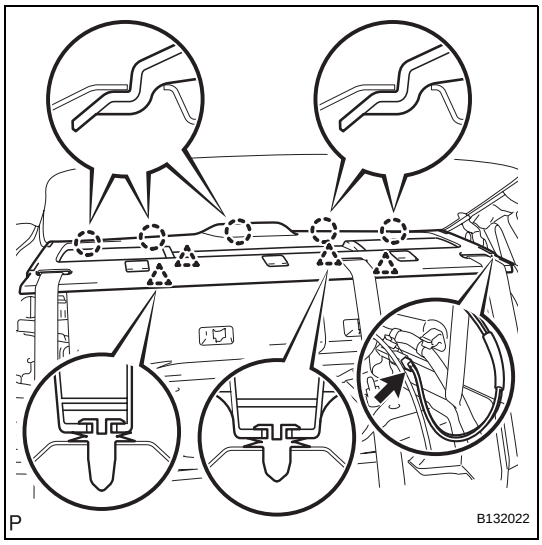
(1) Check that the belt does not lock at less than 15 degrees of tilt in any direction but locks at over 45 degrees of tilt while gently pulling the belt.

NOTICE:
Do not disassemble the retractor.



(b) Align the claw with the seat belt positioning hole and install the rear seat inner with center belt assembly LH with the bolt.

Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

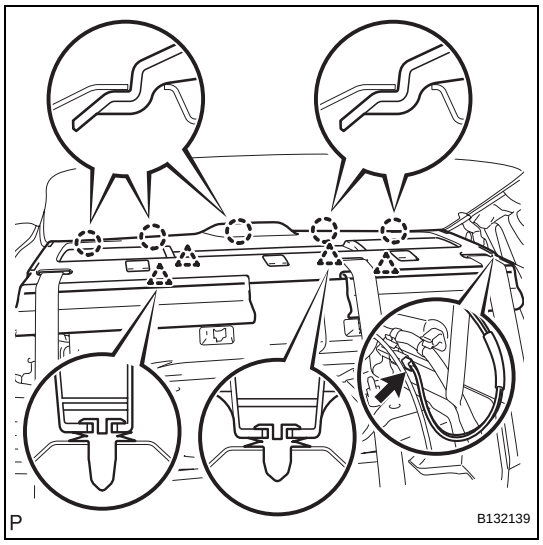


2. INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY

(a) Pass the 3 rear seat belt floor anchors through the package tray trim panel assembly.

(b) Engage the 4 clips and 5 claws and install the package tray trim panel assembly.

(c) Connect the connector.

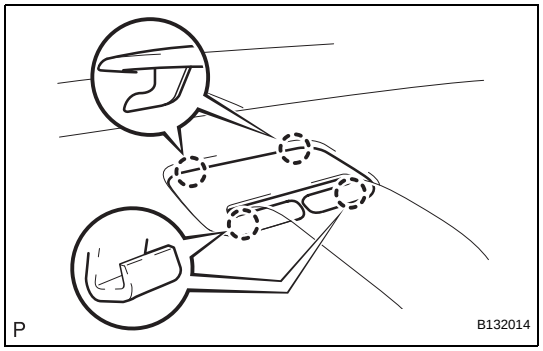


3. INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type)

(a) Pass the 3 rear seat belt floor anchors through the package tray trim panel assembly.

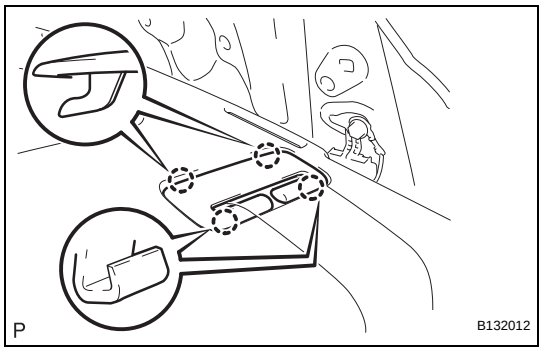
(b) Engage the 4 clips and 5 claws and install the package tray trim panel assembly.

(c) Connect the connector.



4. INSTALL REAR SEAT SHOULDER BELT HOLE COVER

(a) Engage the 4 claws and install the rear seat shoulder belt hole cover.

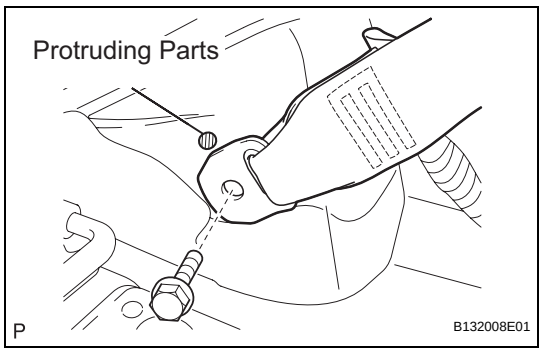


5. INSTALL REAR SEAT SHOULDER BELT COVER

(a) Engage the 4 claws and install the rear seat shoulder belt cover.

HINT:

Use the same procedures for the RH side and the LH side.



6. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side)

(a) Connect the floor end of the rear seat outer belt assembly with the bolt.

Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

NOTICE:

Do not allow the anchor part of the rear seat outer belt assembly to overlap the protruding parts of the floor panel.

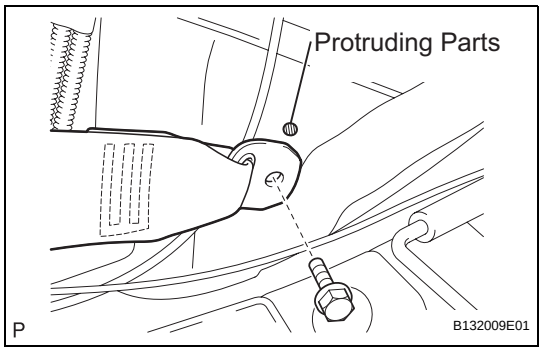
(b) Check if the ELR locks.

NOTICE:

The check should be performed with the outer belt assembly installed.

(1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.

SB



7. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side)

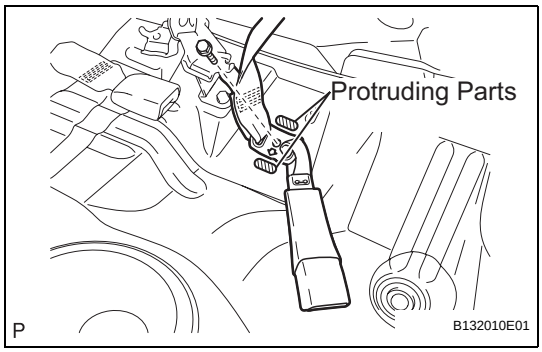
(a) Connect the floor end of the rear seat outer belt assembly with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
NOTICE:
Do not allow the anchor part of the rear seat outer belt assembly to overlap the protruding parts of the floor panel.

(b) Check if the ELR locks.
NOTICE:
The check should be performed with the outer belt assembly installed.

(1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.

8. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)

9. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)

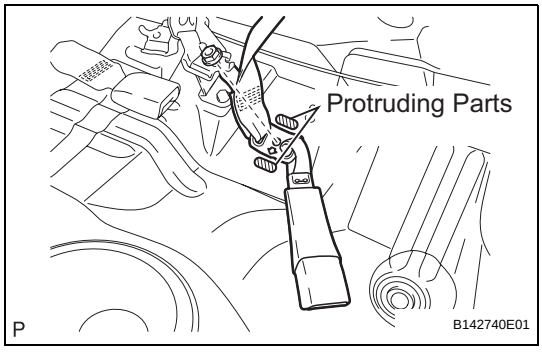


10. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made)

(a) Connect the floor end of the rear seat inner with center belt assembly LH with the bolt.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
NOTICE:
Do not allow the anchor part of the rear seat inner with center belt assembly LH to overlap the protruding parts of the floor panel.

(b) Check if the ELR locks.
NOTICE:
The check should be performed with the outer belt assembly installed.

(1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.



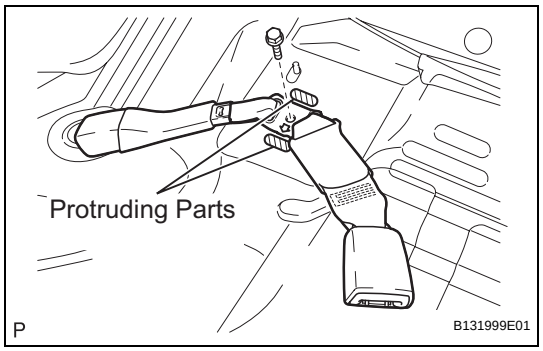
11. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made)

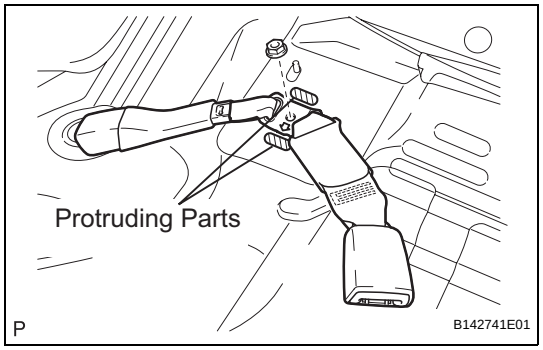
(a) Connect the floor end of the rear seat inner with center belt assembly LH with the nut.
Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
NOTICE:
Do not allow the anchor part of the rear seat inner with center belt assembly LH to overlap the protruding parts of the floor panel.

(b) Check if the ELR locks.
NOTICE:
The check should be performed with the outer belt assembly installed.

(1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.

SB





12. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH (for TMC Made)**
    (a) Install the rear seat inner with center belt assembly RH with the bolt.
    Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
    NOTICE:
    Do not allow the anchor part of the rear seat inner with center belt assembly RH to overlap the protruding parts of the floor panel.

13. **INSTALL REAR SEAT INNER WITH CENTER BELT ASSEMBLY RH (for TMMK Made)**
    (a) Install the rear seat inner with center belt assembly RH with the nut.
    Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)
    NOTICE:
    Do not allow the anchor part of the rear seat inner with center belt assembly RH to overlap the protruding parts of the floor panel.

14. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)**

15. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY RH**
    HINT:
    Use the same procedures for the RH side and the LH side.

16. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)**

17. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.

18. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**

19. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**

20. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)**

21. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**

22. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**

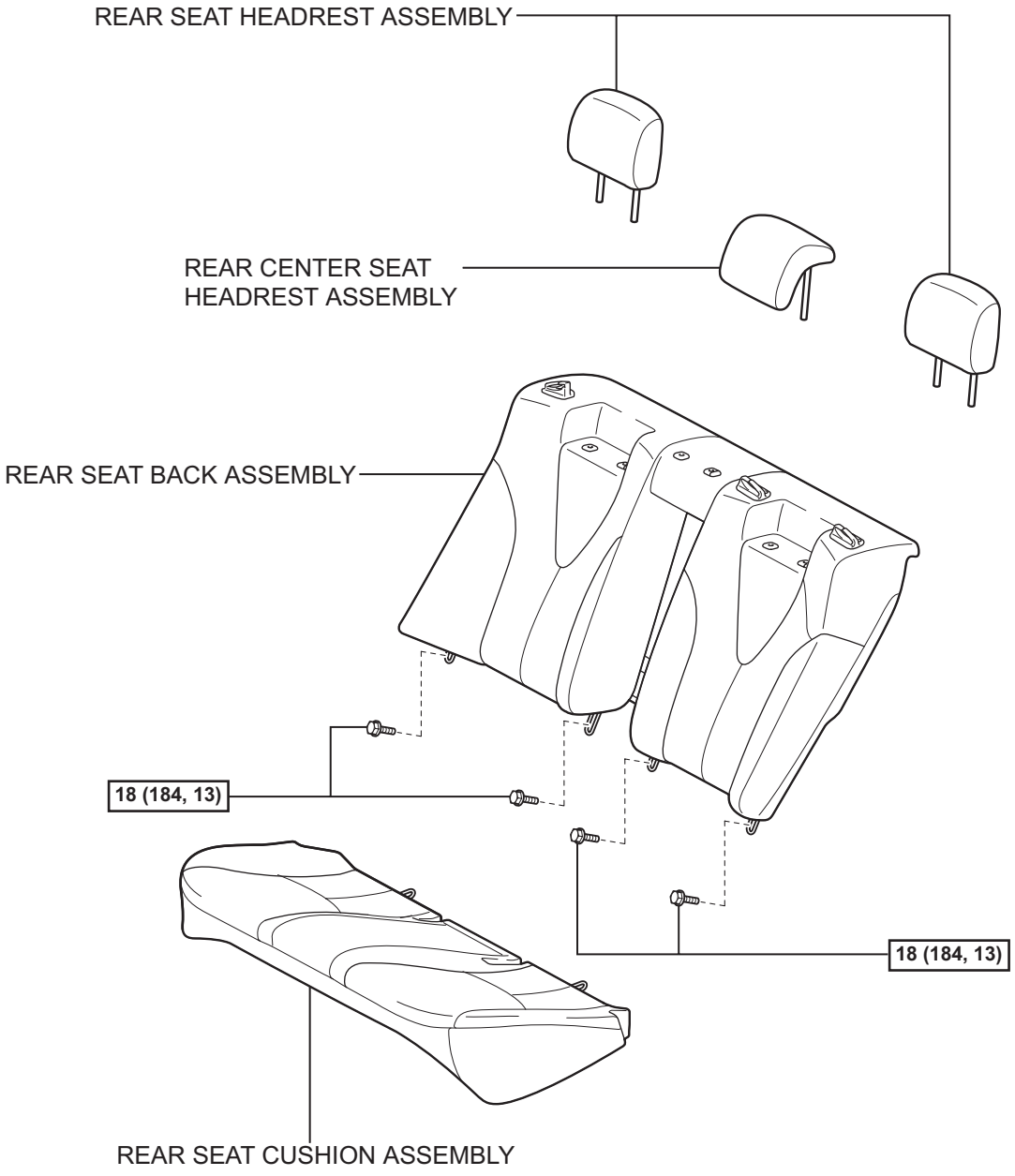
23. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**

24. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
25. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
26. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
27. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
28. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
29. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
30. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
31. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
32. **INSTALL REAR SEAT HEADREST ASSEMBLY**
33. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-84)**

REAR SEAT OUTER BELT ASSEMBLY

COMPONENTS

for Fixed Seat Type:



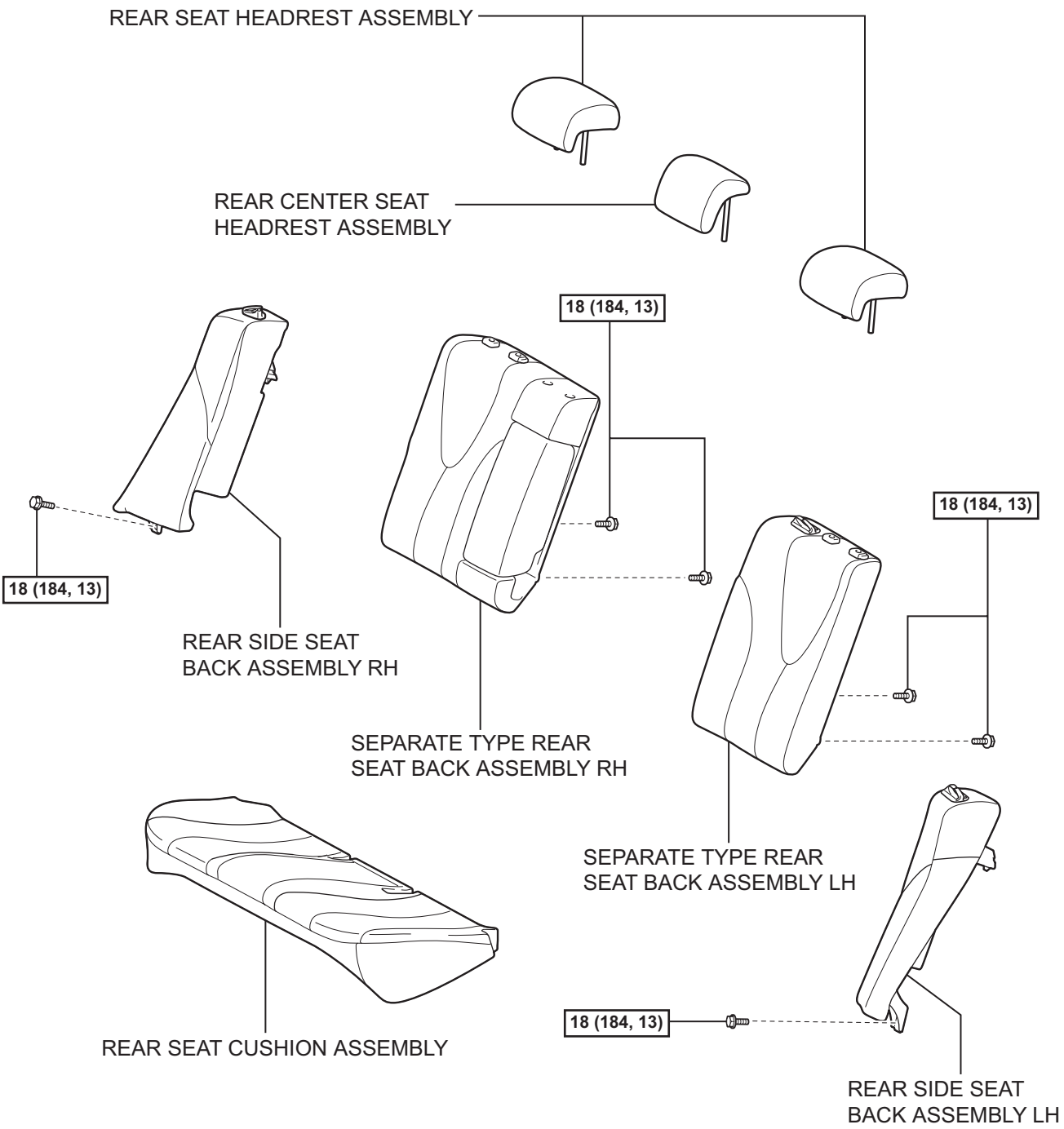
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

SB

for Fold Down Seat Type:



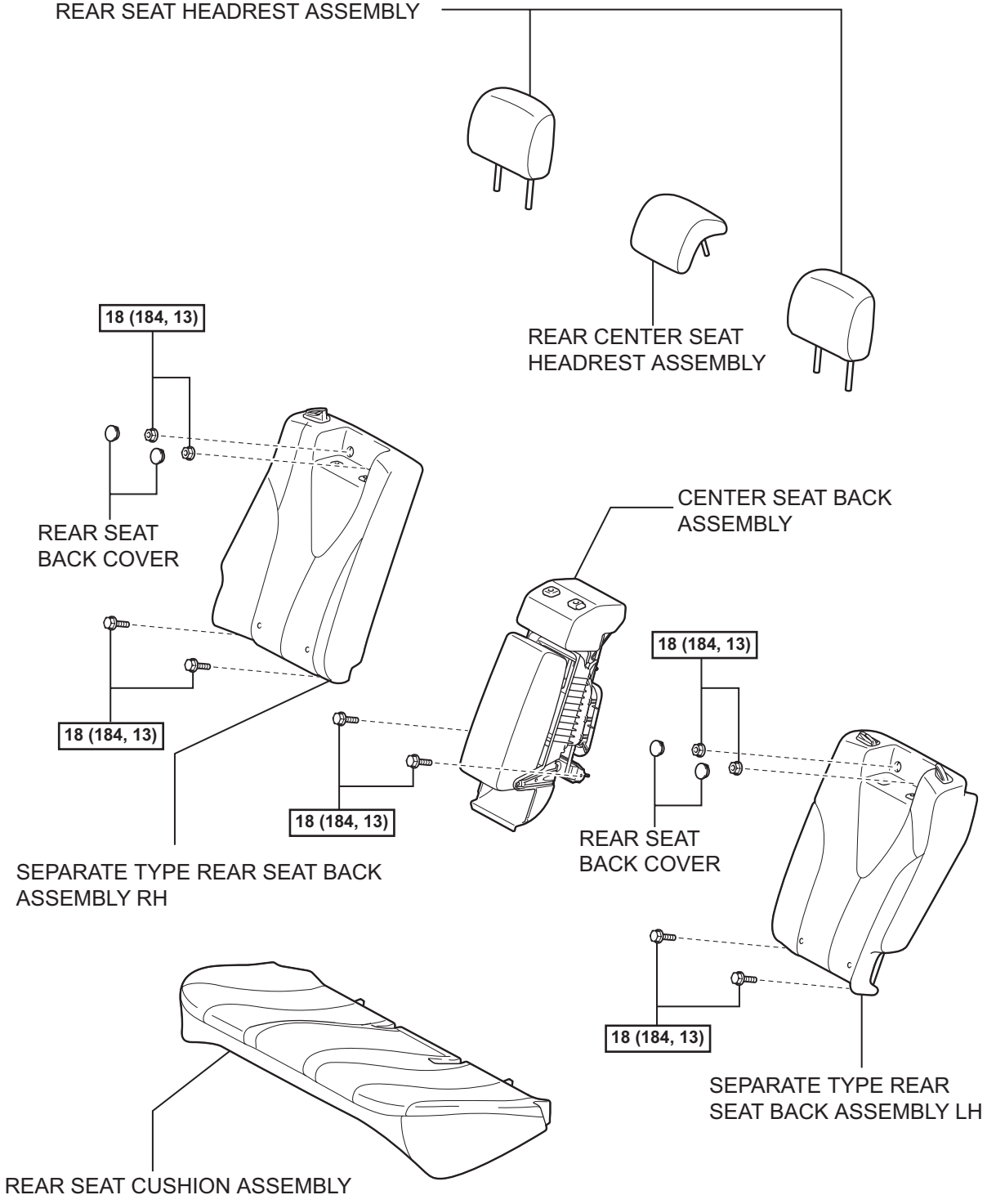
N*m (kgf*cm, ft.*lbf) : Specified torque

P

B136564E02

SB

for Reclining Seat Type:

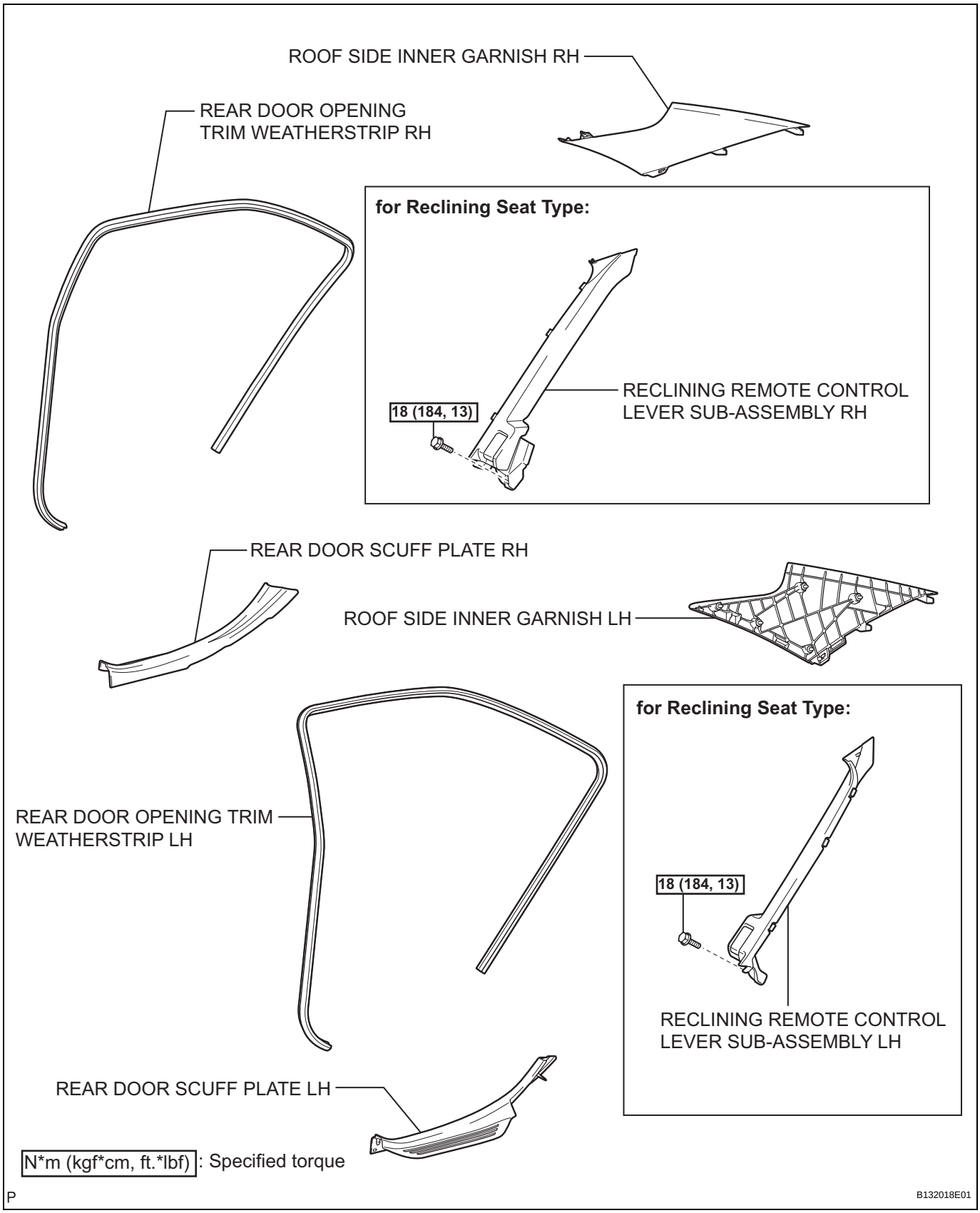


N*m (kgf*cm, ft.*lbf) : Specified torque

P

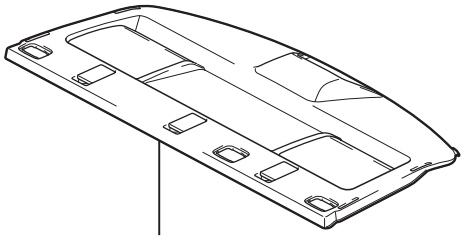
B139095E03

SB


ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR SCUFF PLATE RH
ROOF SIDE INNER GARNISH LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132018E01

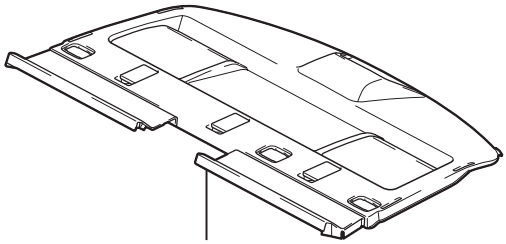
SB

for TMC made:



PACKAGE TRAY TRIM PANEL ASSEMBLY

for Reclining Seat Type:



PACKAGE TRAY TRIM PANEL ASSEMBLY

REAR SEAT SHOULDER BELT COVER

REAR SEAT SHOULDER BELT HOLE COVER

REAR SEAT SHOULDER BELT COVER

REAR SEAT OUTER BELT ASSEMBLY

42 (428, 31)

42 (428, 31)

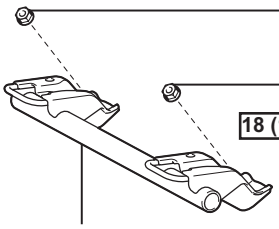
42 (428, 31)

18 (184, 13)

REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH

CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH

for Fold Down Seat Type:



18 (184, 13)

CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH

42 (428, 31)

REAR SEAT OUTER BELT ASSEMBLY

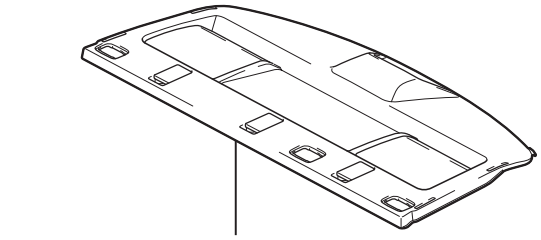
N*m (kgf*cm, ft.*lbf): Specified torque

P

B132113E02

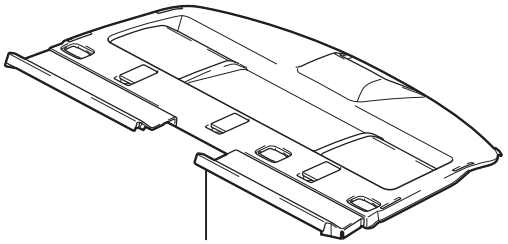
SB

for TMMK made:



PACKAGE TRAY TRIM PANEL ASSEMBLY

for Reclining Seat Type:



PACKAGE TRAY TRIM PANEL ASSEMBLY

REAR SEAT SHOULDER BELT COVER

REAR SEAT SHOULDER BELT HOLE COVER

REAR SEAT SHOULDER BELT COVER

REAR SEAT OUTER BELT ASSEMBLY

42 (428, 31)

42 (428, 31)

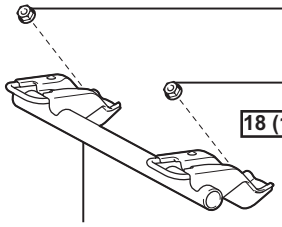
18 (184, 13)

42 (428, 31)

REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH

CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH

for Fold Down Seat Type:



18 (184, 13)

CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH

42 (428, 31)

REAR SEAT OUTER BELT ASSEMBLY

SB

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B142742E01

REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)
2. REMOVE REAR SEAT HEADREST ASSEMBLY
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
4. REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)
5. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)
6. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)
7. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)
8. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)
9. REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)
10. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)
11. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)
12. REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)
13. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)
14. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH
15. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)
16. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH
17. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)
18. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
    HINT:
    Use the same procedures for the RH side and the LH side.
19. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)

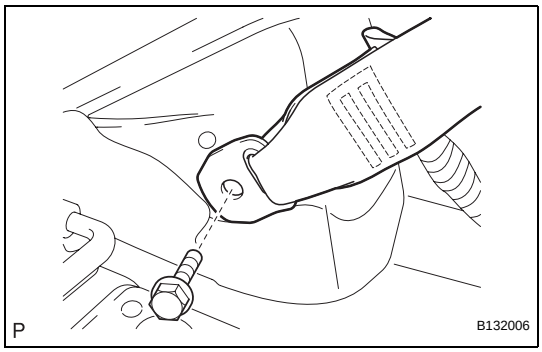
SB

20. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-35)

21. DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-35)

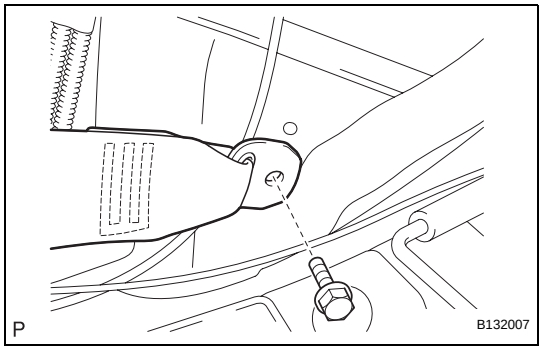
22. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)

23. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)



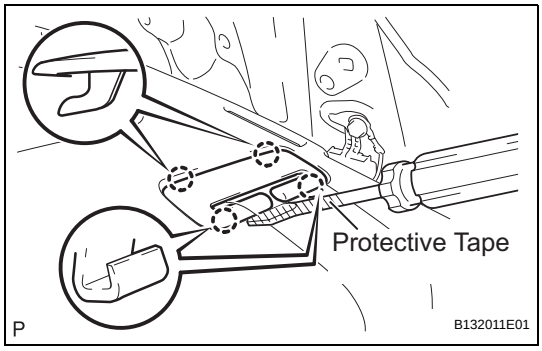
24. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side)

(a) Remove the bolt and disconnect the floor end of the rear seat outer belt assembly.



25. DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side)

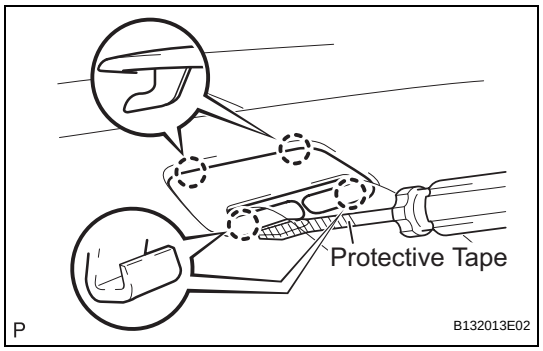
(a) Remove the bolt and disconnect the floor end of the rear seat outer belt assembly.



26. REMOVE REAR SEAT SHOULDER BELT COVER

(a) Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder belt cover.
HINT:
- Tape the screwdriver tip before use.
- Use the same procedures for the RH side and the LH side.

SB

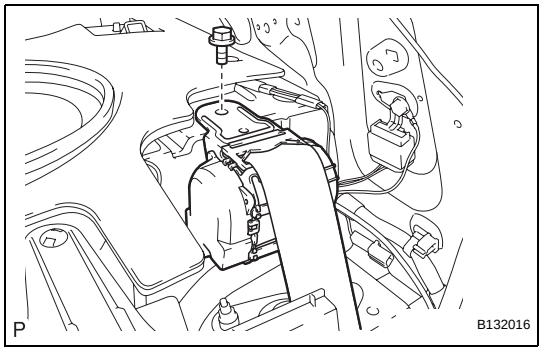


27. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER**
    (a) Using a screwdriver, disengage the 4 claws and remove the rear seat shoulder hole belt cover.
    HINT:
    Tape the screwdriver tip before use.

28. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-37)**

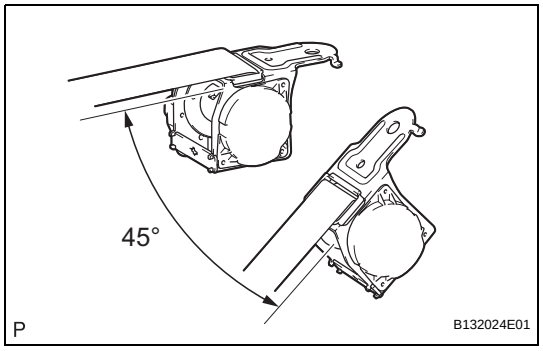
29. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-37)**

30. **REMOVE REAR SEAT OUTER BELT ASSEMBLY**
    (a) Remove the bolt and the rear seat outer belt assembly.

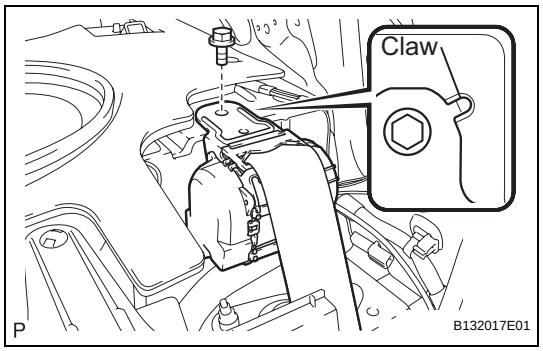


INSTALLATION

1. **INSTALL REAR SEAT OUTER BELT ASSEMBLY**
    (a) Check the degree of the tilt when the ELR begins to lock.
        (1) Check that the belt does not lock at less than 15 degrees of tilt in any direction but locks at over 45 degrees of tilt while gently pulling the belt.
        NOTICE:
        Do not disassemble the retractor.

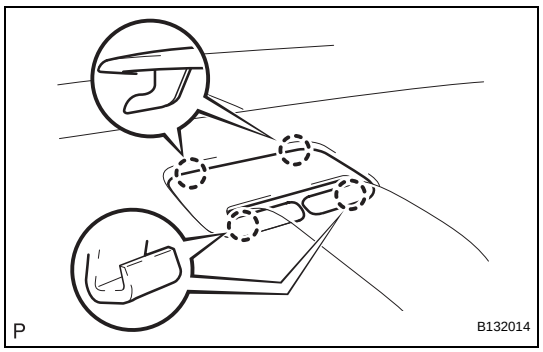


    (b) Align the claw with the seat belt positioning hole and install the rear seat outer belt assembly with the bolt.
    Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)



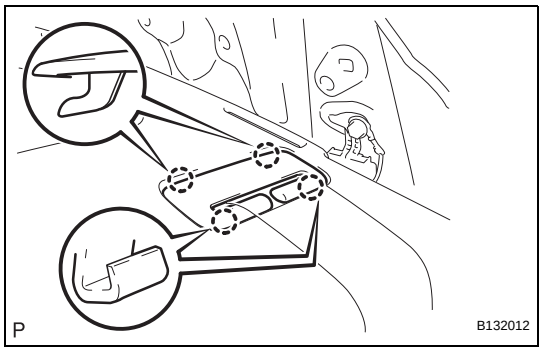
2. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-38)**

3. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-39)**



4. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER**
    (a) Engage the 4 claws and install the rear seat shoulder belt hole cover.

SB

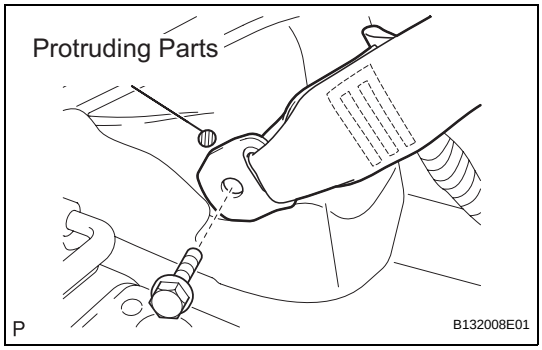


5. INSTALL REAR SEAT SHOULDER BELT COVER

(a) Engage the 4 claws and install the rear seat shoulder belt cover.

HINT:

Use the same procedures for the RH side and the LH side.



6. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side)

(a) Connect the floor end of the rear seat outer belt assembly with the bolt.

Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

NOTICE:

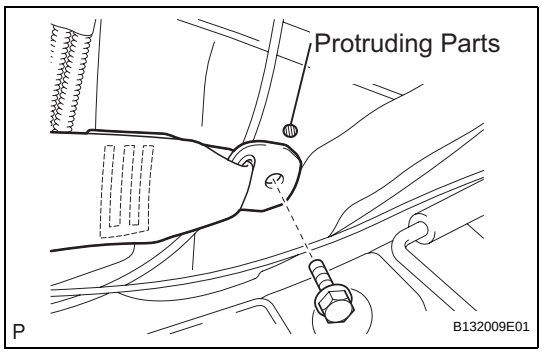
Do not allow the anchor part of the rear seat outer belt assembly to overlap protruding parts of the floor panel.

(b) Check if the ELR locks.

NOTICE:

The check should be performed with the outer belt assembly installed.

(1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.



7. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side)

(a) Connect the floor end of the rear seat outer belt assembly with the bolt.

Torque: 42 N*m (428 kgf*cm, 31 ft.*lbf)

NOTICE:

Do not allow the anchor part of the rear seat outer belt assembly to overlap protruding parts of the floor panel.

(b) Check if the ELR locks.

NOTICE:

The check should be performed with the outer belt assembly installed.

(1) With the belt assembly installed, check that the belt locks when it is pulled out quickly.

8. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)

9. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)

10. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-40)

11. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-40)

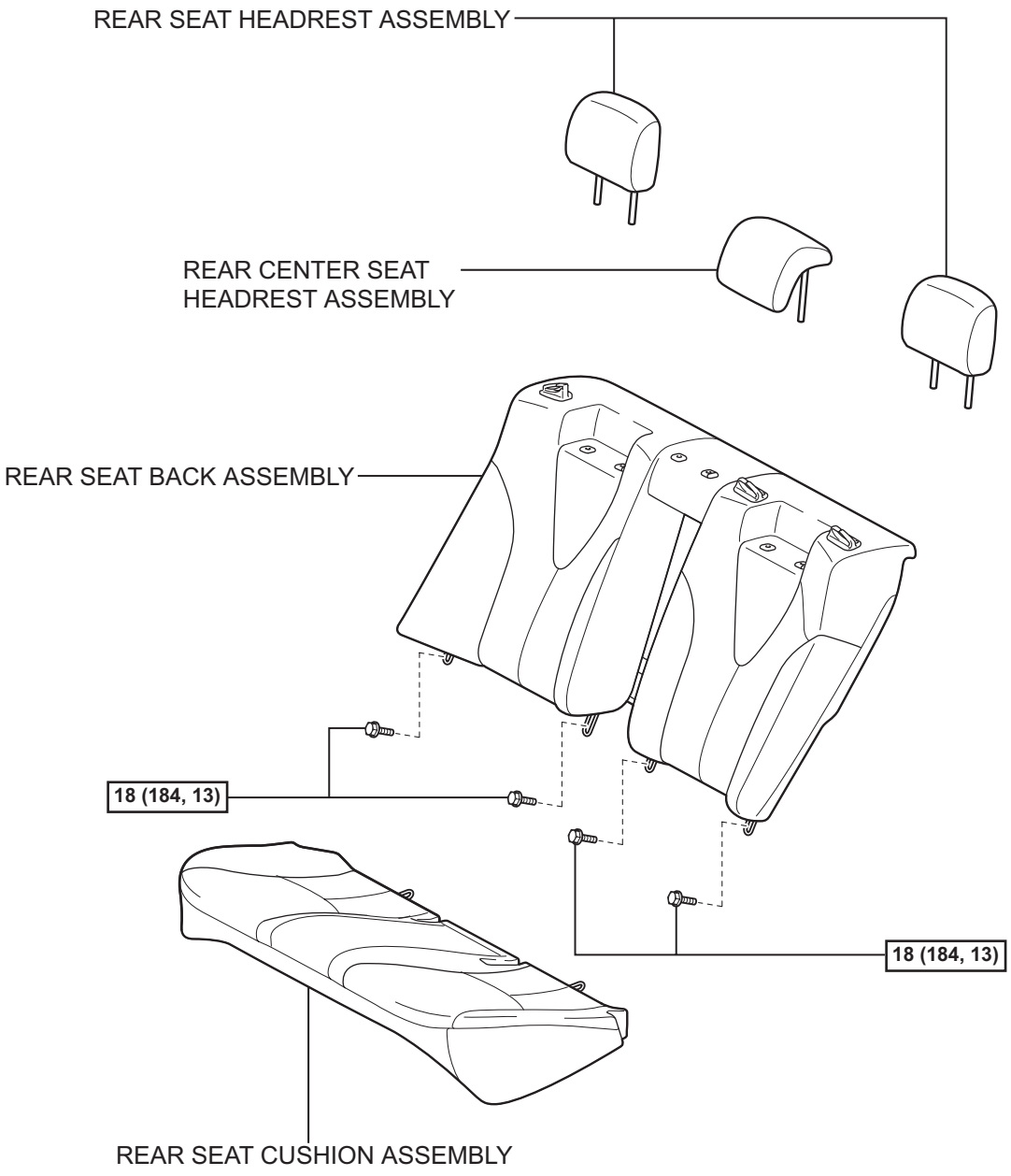
12. INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)

13. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)**
14. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
15. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**
16. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**
17. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)**
18. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**
19. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**
20. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**
21. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
22. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
23. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
24. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
25. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
26. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
27. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
28. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
29. **INSTALL REAR SEAT HEADREST ASSEMBLY**
30. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-84)**

CHILD RESTRAINT SEAT TETHER ANCHOR

COMPONENTS

for Fixed Seat Type:



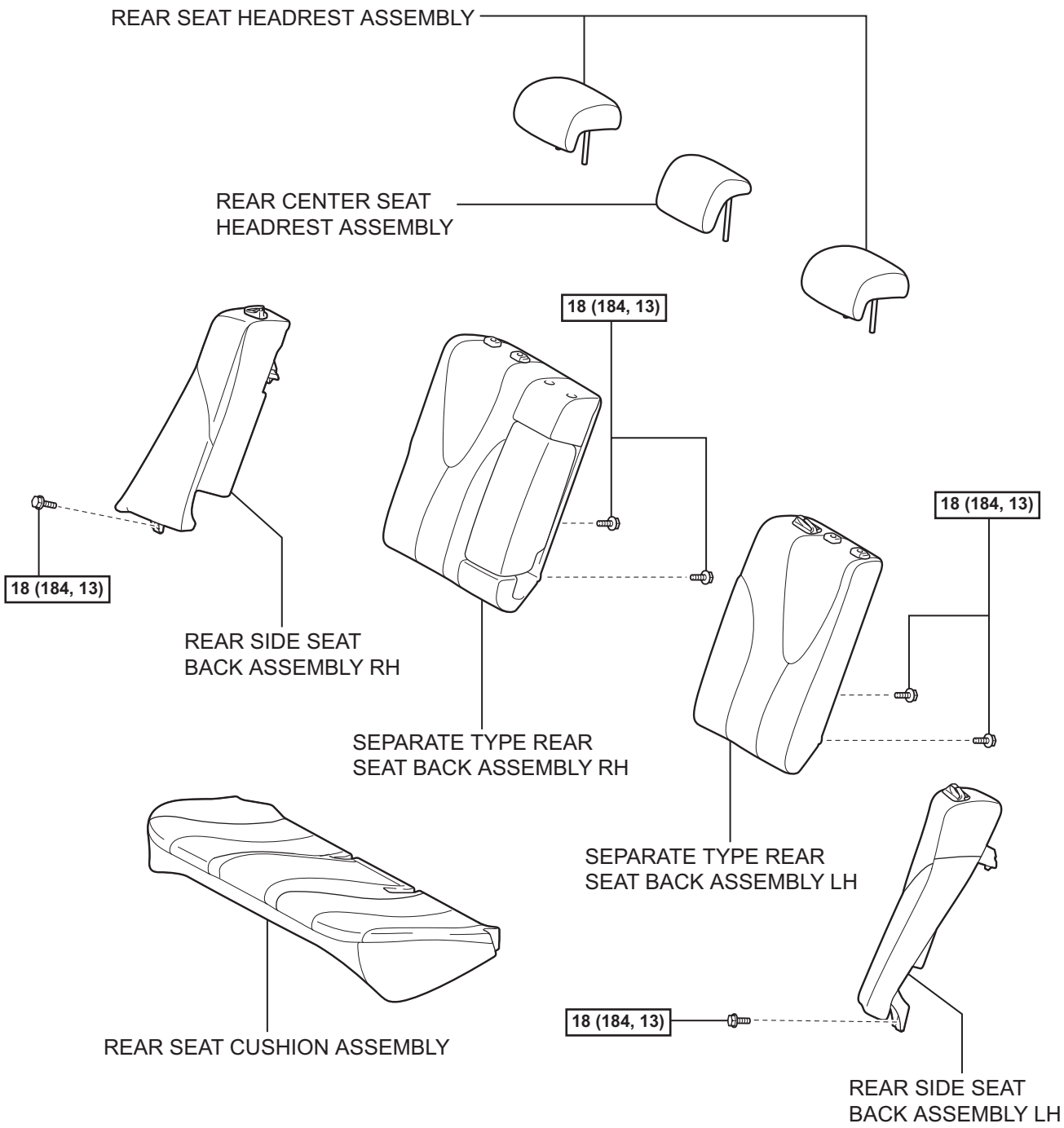
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

SB

for Fold Down Seat Type:



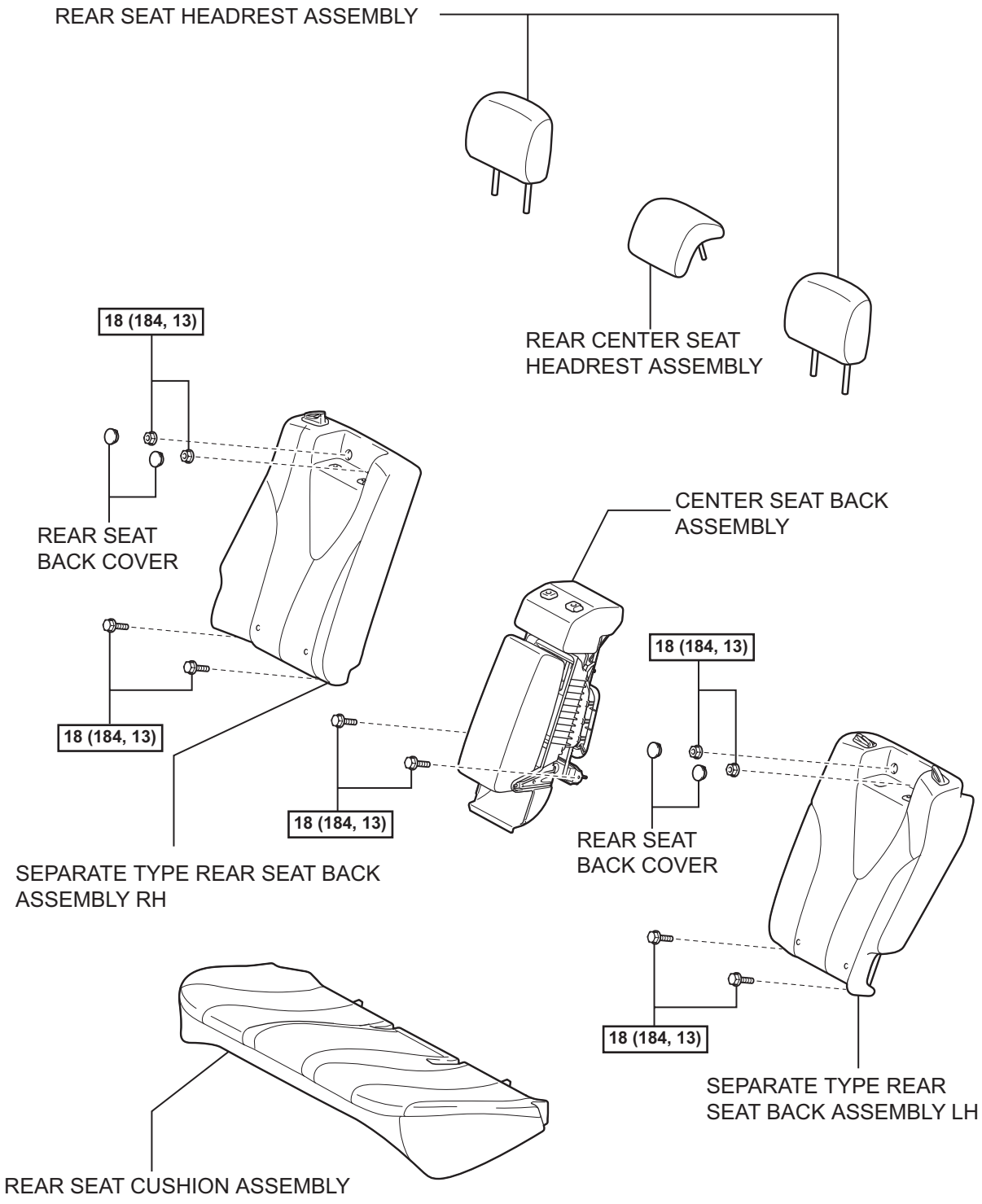
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136564E02

SB

for Reclining Seat Type:

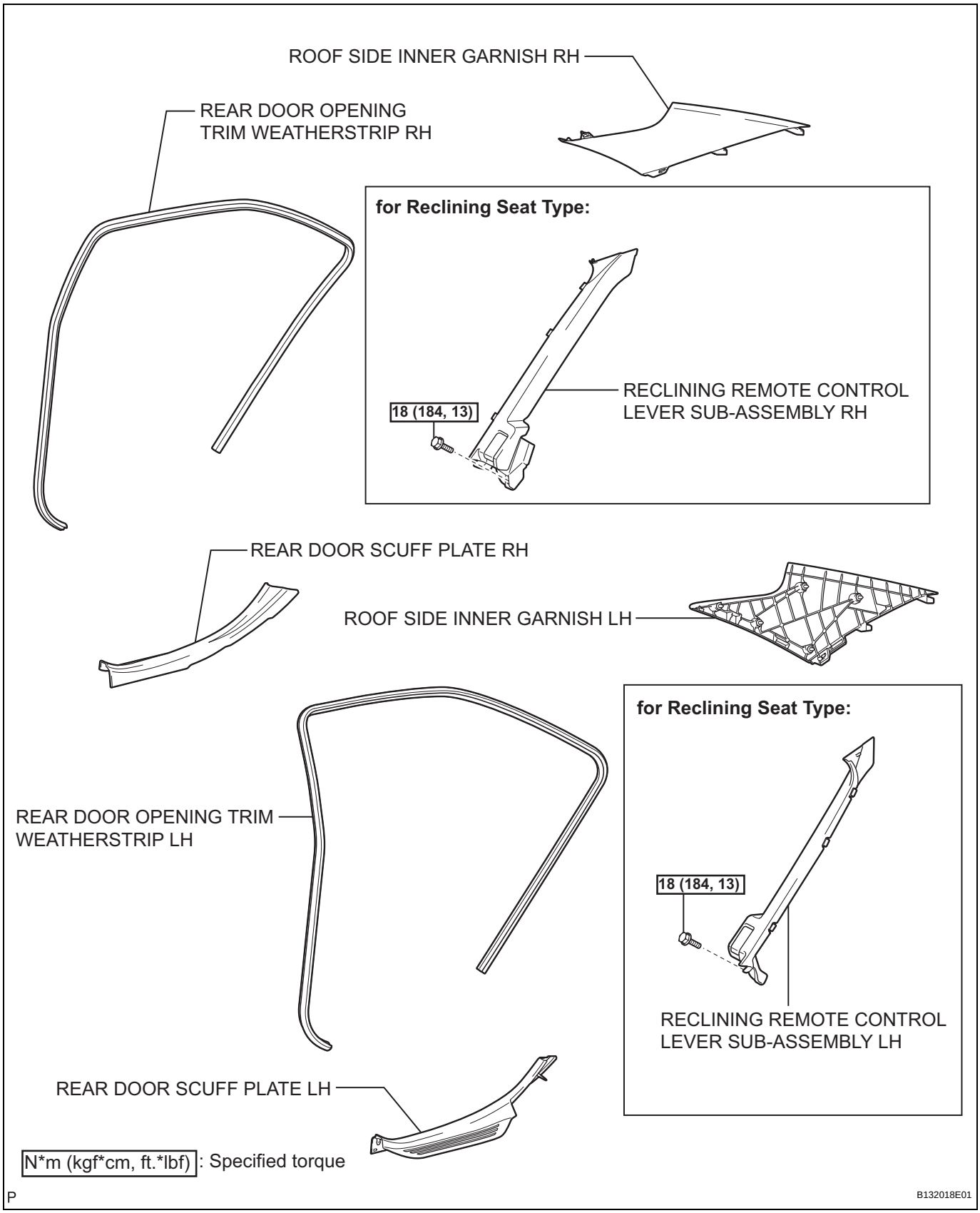


N*m (kgf*cm, ft.*lbf): Specified torque

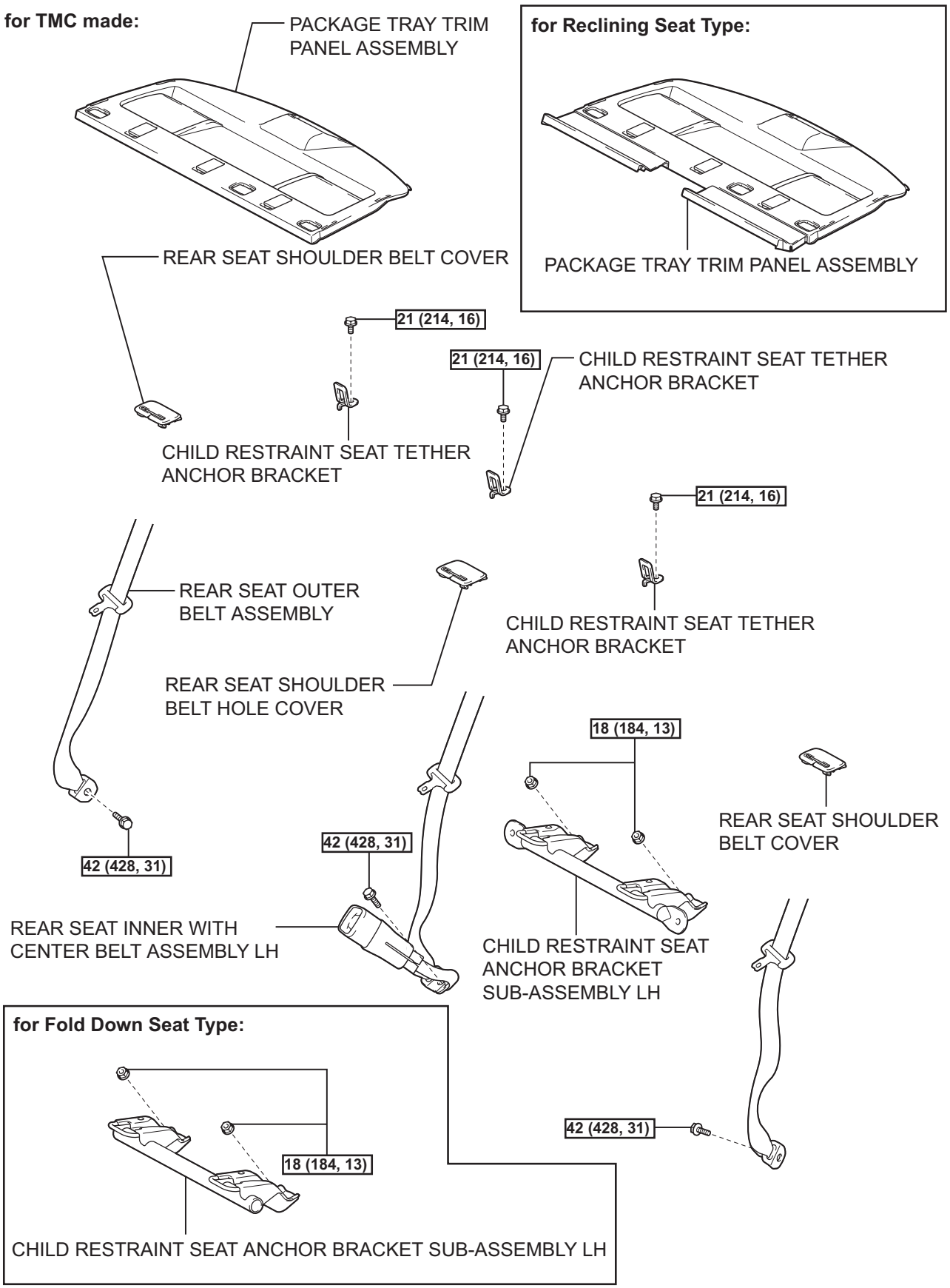
SB

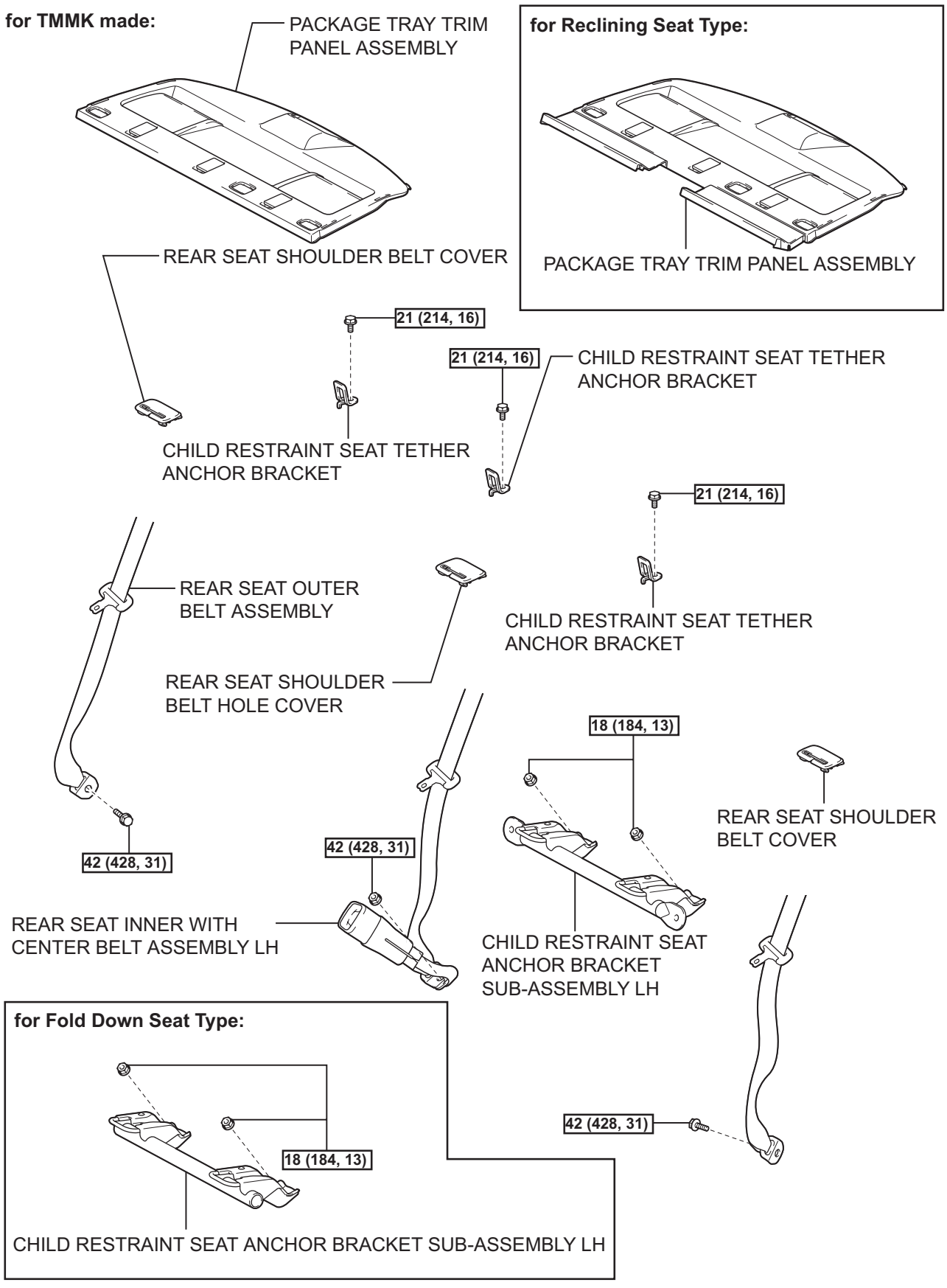
P

B139095E03


ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR SCUFF PLATE RH
ROOF SIDE INNER GARNISH LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132018E01

SB


for TMC made:
PACKAGE TRAY TRIM PANEL ASSEMBLY
REAR SEAT SHOULDER BELT COVER
for Reclining Seat Type:
PACKAGE TRAY TRIM PANEL ASSEMBLY
21 (214, 16)
21 (214, 16)
CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET
CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET
21 (214, 16)
CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET
REAR SEAT OUTER BELT ASSEMBLY
REAR SEAT SHOULDER BELT HOLE COVER
42 (428, 31)
42 (428, 31)
18 (184, 13)
REAR SEAT SHOULDER BELT COVER
REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH
CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH
for Fold Down Seat Type:
42 (428, 31)
18 (184, 13)
CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132114E03



SB

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B142743E01

REMOVAL

1. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)**
2. **REMOVE REAR SEAT HEADREST ASSEMBLY**
3. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**
4. **REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
5. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)**
6. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)**
7. **REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)**
8. **REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)**
9. **REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)**
10. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)**
11. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)**
12. **REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)**
13. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)**
14. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH**
15. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)**
16. **DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH**
17. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)**
18. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
19. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)**

20. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-35)**

21. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-35)**

22. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)**

23. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)**

24. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-36)**

25. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-36)**

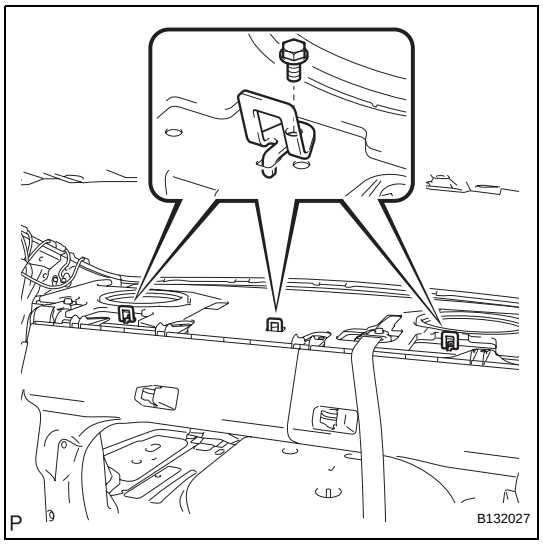
26. **REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-36)**

27. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-36)**

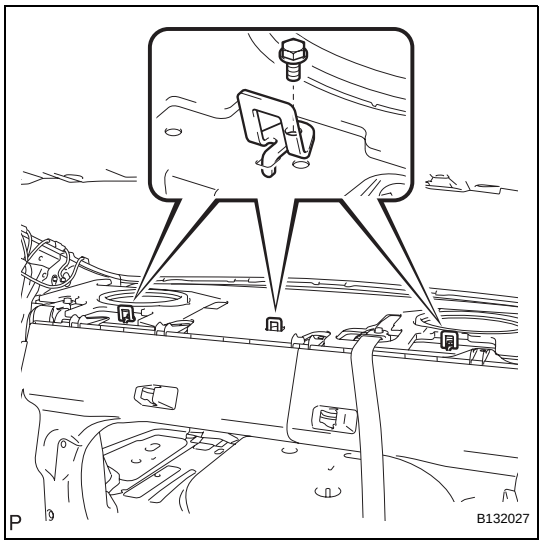
28. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-37)**

29. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-37)**

30. **REMOVE CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET**
    (a) Remove the 3 bolts and the 3 child restraint seat tether anchor brackets.



SB



INSTALLATION

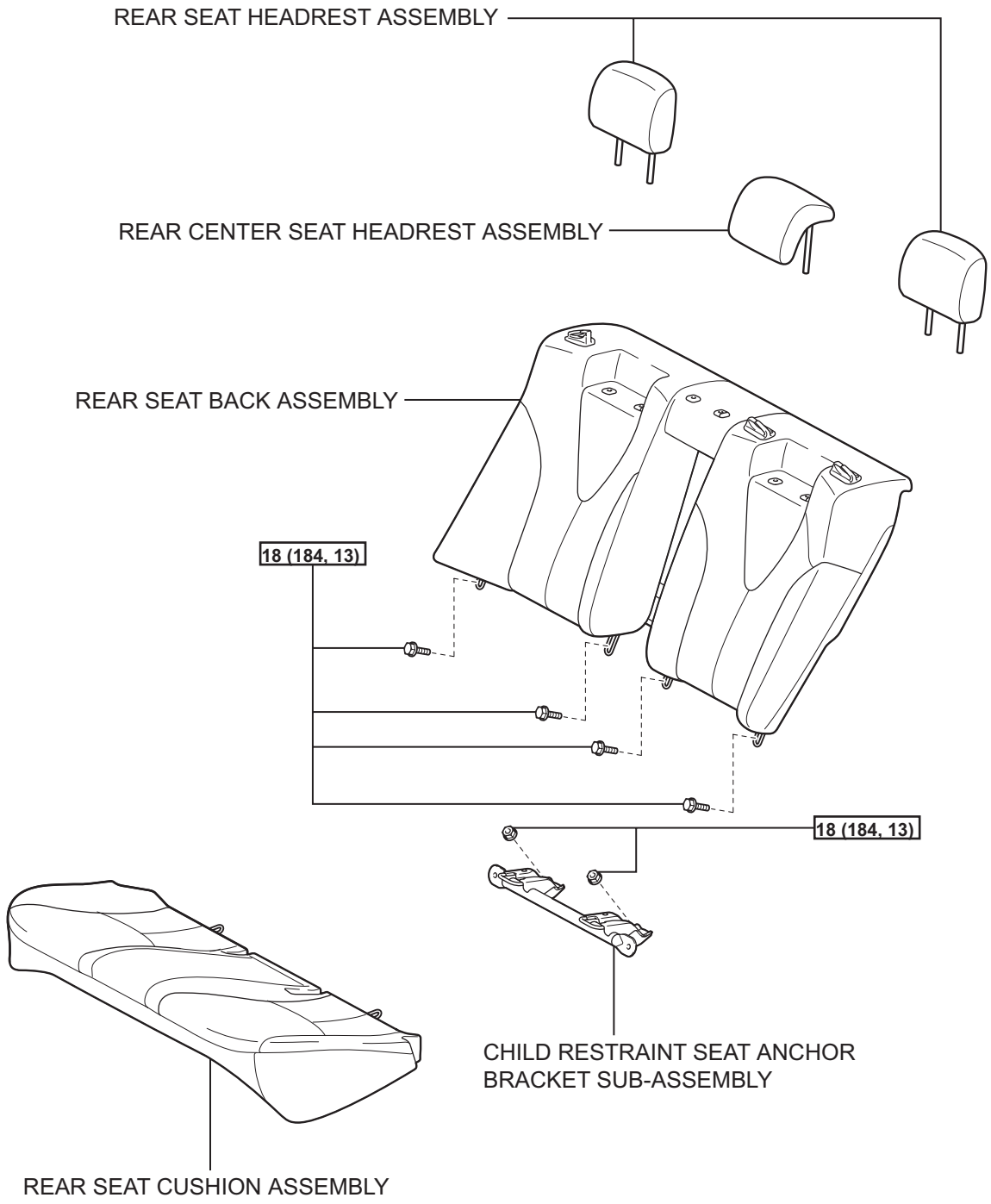
1. **INSTALL CHILD RESTRAINT SEAT TETHER ANCHOR BRACKET**
   (a) Install the 3 child restraint seat tether anchor brackets with the 3 bolts.
   Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)
2. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-38)**
3. **INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-39)**
4. **INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-39)**
5. **INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-39)**
6. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-39)**
7. **CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-40)**
8. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)**
9. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)**
10. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-40)**
11. **CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-40)**
12. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)**
13. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)**
14. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
15. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**
16. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**
17. **CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)**
18. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**
19. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**

20. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**
21. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
22. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
23. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
24. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
25. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
26. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
27. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
28. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
29. **INSTALL REAR SEAT HEADREST ASSEMBLY**
30. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-84)**

CHILD RESTRAINT SEAT ANCHOR BRACKET

COMPONENTS

for Fixed Seat Type:



N*m (kgf*cm, ft.*lbf) : Specified torque

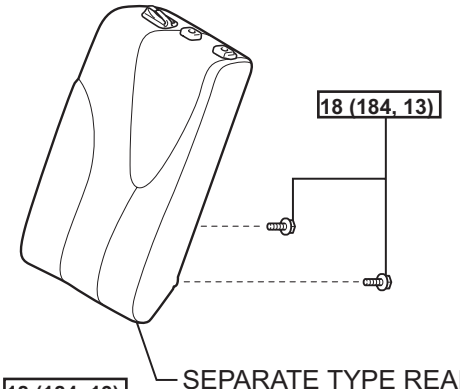
P

B147622E01

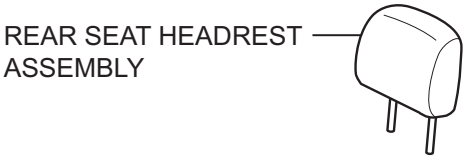
SB

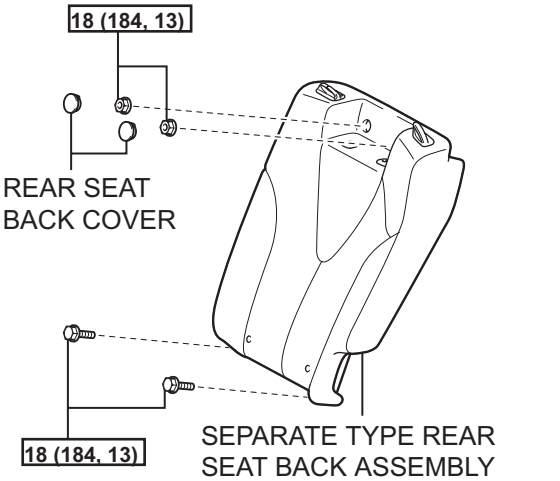
for Fold Down Seat Type:

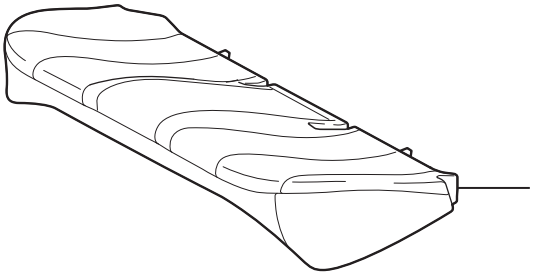
REAR SEAT HEADREST ASSEMBLY



for Reclining Seat Type:







REAR SEAT CUSHION ASSEMBLY

N*m (kgf*cm, ft.*lbf): Specified torque

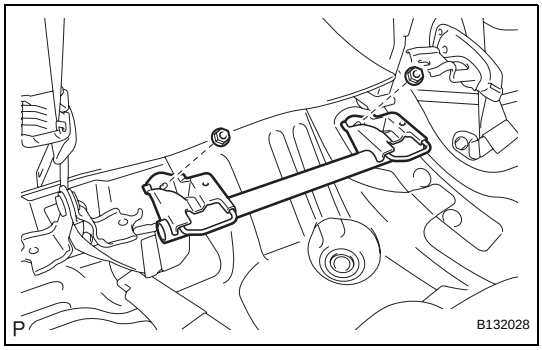
P

B142840E01

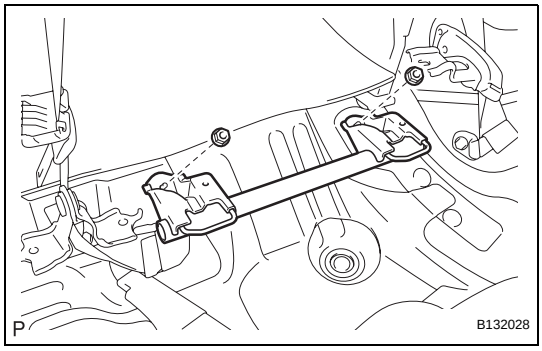
SB

REMOVAL

1. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)**
2. **REMOVE REAR SEAT HEADREST ASSEMBLY**
3. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
4. **REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
5. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
6. **REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)**
7. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-63)**
8. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Remove the 2 nuts and child restraint seat anchor bracket sub-assembly.



SB



INSTALLATION

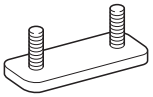
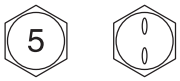
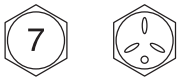
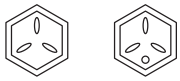
1. **INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY**
   (a) Install the child restraint seat anchor bracket sub-assembly with the 2 nuts.
   Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)
2. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-72)**
3. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
4. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY (for Fold Down Seat Type) (See page SE-57)**
5. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
6. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
7. **INSTALL REAR SEAT HEADREST ASSEMBLY**

8. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-84)**

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

Bolt Type

Hexagon Head Bolt			Stud Bolt	Weld Bolt	Class
Normal Recess Bolt		Deep Recess Bolt			
	No Mark	No Mark	No Mark		4T
					5T
	w/ Washer	w/ Washer			6T
					7T
					8T
					9T
					10T
					11T

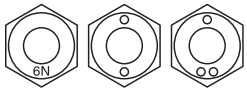
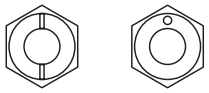
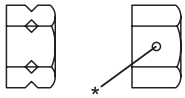
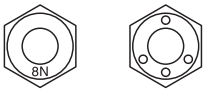
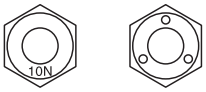
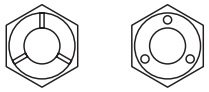
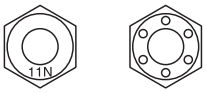
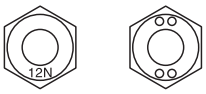
SS

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter (mm)	Pitch (mm)	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N*m	kgf*cm	ft.*lbf	N*m	kgf*cm	ft.*lbf
4T	6	1	5	55	48 in.*lbf	6	60	52 in.*lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 in.*lbf	7.5	75	65 in.*lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.*lbf	9	90	78 in.*lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

HOW TO DETERMINE NUT STRENGTH

Nut Type

Present Standard Hexagon Nut	Old Standard Hexagon Nut		Class
	Cold Forging Nut	Cutting Processed Nut	
No Mark			4N
No Mark (w/ Washer)	No Mark (w/ Washer)	No Mark	5N (4T)
			6N
			7N (5T)
			8N
		No Mark	10N (7T)
			11N
			12N

HINT:

- *: Nut with 1 or more marks on one side surface of the nut.
- Use the nut with the same number of the nut strength classification or greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example:

- Bolt = 4T
- Nut = 4N or more

2AZ-FE ENGINE CONTROL SYSTEM

SERVICE DATA

Camshaft timing oil control valve assembly		
Resistance	at 20°C (68°F)	6.9 to 7.9 Ω
Camshaft position sensor		
Standard resistance	1 (G+) - 2(G-)	835 to 1,400 Ω at Cold
	1 (G+) - 2(G-)	1,060 to 1,645 Ω at Hot
Crankshaft position sensor		
Standard resistance	Cold	985 to 1,600 Ω
	Hot	1,265 to 1,890 Ω
Throttle body assembly		
Resistance	at 20°C (68°F)	
	2 (M+) - 1 (M-)	0.3 to 100 kΩ
E.F.I. engine coolant temperature sensor		
Resistance	Approx. 20°C (68°F)	2.32 to 2.59 kΩ
	Approx. 80°C (176°F)	0.310 to 0.326 kΩ
Knock sensor		
Resistance	at 20°C (68°F)	120 to 280 kΩ
Circuit opening relay (engine room R/B Unit D)		
Specified condition	1E-8 - 1E-12	Below 1 Ω
	1E-7 - 1E-13	10 kΩ or higher
	1E-7 - 1E-13	Below 1 Ω (when battery voltage is applied to terminals 1G-5 and 1H-9)
EFI relay (engine room R/B Unit D)		
Specified condition	1E-9 - 1E-10	Below 1 Ω
	1E-7 - 1E-12	10 kΩ or higher
	1E-7 - 1E-12	Below 1 Ω (when battery voltage is applied to terminals 1H-10 and 1H-2)
A/F relay (engine room R/B Unit D)		
Specified condition	1E-7 - 1E-10	Below 1 Ω
	1A-3 - 1A-4	10 kΩ or higher
	1A-3 - 1A-4	Below 1 Ω (when battery voltage is applied to terminals 1D-5 and 1H-2)
Accelerator pedal rod		
Standard voltage (ACCEL POS #1)	Released	0.5 to 1.1 V
	Depressed	2.5 to 4.5 V
Standard voltage (ACCEL POS #2)	Released	1.2 to 2.0 V
	Depressed	3.4 to 5.0 V

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Throttle body assembly x Intake manifold	30	305	22
Knock sensor x Cylinder block sub-assembly	20	204	15
ECM x ECM bracket	3.0	30	27
ECM x Body	6.5	66	57
Accelerator pedal rod assembly x Body	5.4	55	48 in.*lbf
Camshaft timing oil control valve assembly x Cylinder head sub-assembly	9.0	92	80 in.*lbf
Vacuum hose clamp x Intake manifold	5.0	51	44 in.*lbf
Camshaft position sensor x Cylinder head sub-assembly	9.0	92	80 in.*lbf
Crankshaft position sensor x Timing chain cover sub-assembly	9.0	92	80 in.*lbf
Engine coolant temperature sensor x Cylinder head sub-assembly	20	204	15
Intake manifold x Cylinder head sub-assembly	30	306	22
Intake manifold x Cylinder block sub-assembly	30	306	22
Cowl top panel outer sub-assembly x Body	5.0	51	44 in.*lbf

2GR-FE ENGINE CONTROL SYSTEM

SERVICE DATA

Throttle body		
	Standard throttle valve opening percentage	60% or more
Camshaft timing oil control valve assembly		
Resistance	at 20°C (68°F)	6.9 to 7.9 Ω
Crankshaft position sensor		
	-10 to 50 °C (14 to 122 °F)	1,630 to 2,740 Ω
	50 to 100 °C (122 to 212 °F)	2,065 to 3,225 Ω
Throttle body		
Resistance	at 20°C (68°F)	
	2 (M+) - 1 (M-)	0.3 to 100 kΩ
	5 (VC) - 3 (E2)	1.2 to 3.2 kΩ
E.F.I. engine coolant temperature sensor		
Resistance	Approx. 20°C (68°F)	2.32 to 2.59 kΩ
	Approx. 80°C (176°F)	0.310 to 0.326 kΩ
Knock sensor		
Resistance	at 20°C (68°F)	120 to 280 kΩ
Circuit opening relay (engine room R/B Unit D)		
Specified condition	1E-8 - 1E-12	Below 1 Ω
	1E-7 - 1E-13	10 kΩ or higher
	1E-7 - 1E-13	Below 1 Ω (when battery voltage is applied to terminals 1G-5 and 1H-9)
EFI relay (engine room R/B Unit D)		
Specified condition	1E-9 - 1E-10	Below 1 Ω
	1E-7 - 1E-12	10 kΩ or higher
	1E-7 - 1E-12	Below 1 Ω (when battery voltage is applied to terminals 1H-10 and 1H-2)
A/F relay (engine room R/B Unit D)		
Specified condition	1E-7 - 1E-10	Below 1 Ω
	1A-3 - 1A-4	10 kΩ or higher
	1A-3 - 1A-4	Below 1 Ω (when battery voltage is applied to terminals 1D-5 and 1H-2)
IG2 Relay		
Standard resistance	3 - 5	10 kΩ or higher
	3 - 5	Below 1 Ω (Battery voltage applied between terminals 1 and 2)
Acceleration pedal rod		
Standard voltage (ACCEL POS #1)	Released	0.5 to 1.1 V
	Depressed	2.5 to 4.5 V
Standard voltage (ACCEL POS #2)	Released	1.2 to 2.0 V
	Depressed	3.4 to 5.0 V

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Throttle body assembly x Intake air surge tank	10	102	7
Knock sensor x Cylinder block sub-assembly	20	199	14
Water outlet x Cylinder head sub-assembly	15	153	11
ECM x Instrument panel reinforcement	5.5	56	49 in.*lbf
ECM x Blower assembly	5.5	56	49 in.*lbf
Accelerator pedal rod assembly x Body	5.4	55	48 in.*lbf
Camshaft timing oil control valve assembly x Cylinder head cover sub-assembly	10	102	7
VVT sensor x Cylinder head cover sub-assembly	10	102	7
Crankshaft position sensor x Cylinder block sub-assembly	10	102	7
Engine coolant temperature sensor x Cylinder head sub-assembly	20	204	15

2AZ-FE ENGINE MECHANICAL

SERVICE DATA

Ignition timing	with Terminals TC and CG of DLC3 connected	8 to 12°BTC at idle
	with Terminals TC and CG of DLC3 disconnected	5 to 15°BTC at idle
Idle speed	M/T	650 to 750 rpm
	A/T	610 to 710 rpm
Compression	Compression pressure	1.360 MPa (13.9 kgf/cm^2, 198 psi)
	Minimum pressure	0.98 MPa (10 kgf/cm^2, 142 psi)
	Difference between each cylinder	100 kPa (1.0 kgf/cm^2, 14 psi)
Valve clearance (cold)	Intake	0.19 to 0.29 mm (0.0075 to 0.0114 in.)
	Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)
Balanceshaft		
Standard thrust clearance		0.050 to 0.090 mm (0.0020 to 0.0035 in.)
Maximum thrust clearance		0.09 mm (0.0035 in.)
Standard oil clearance		0.004 to 0.049 mm (0.0002 to 0.0019 in.)
Maximum oil clearance		0.049 mm (0.0019 in.)
Housing journal bore diameter	Mark 1	26.000 to 26.006 mm (1.0236 to 1.0239 in.)
	Mark 2	26.007 to 26.012 mm (1.0239 to 1.0241 in.)
	Mark 3	26.013 to 26.018 mm (1.0241 to 1.0243 in.)
Journal diameter	Mark 1	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
	Mark 2	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
	Mark 3	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
	Standard bolt length	58.3 to 59.7 mm (2.295 to 2.350 in.)
	Maximum bolt length	60.3 mm (2.374 in.)
Bearing center wall thickness	Mark 1	1.486 to 1.489 mm (0.0585 to 0.0586 in.)
	Mark 2	1.490 to 1.492 mm (0.0586 to 0.0587 in.)
	Mark 3	1.493 to 1.495 mm (0.0587 to 0.0589 in.)
Oil pump drive sprocket	Minimum sprocket diameter (with chain)	48.2 mm (1.898 in.)
Oil pump drive shaft sprocket	Minimum sprocket diameter (with chain)	48.2 mm (1.898 in.)
Crankshaft timing sprocket	Minimum sprocket diameter (with chain)	51.6 mm (2.031 in.)
Chain tensioner slipper	Maximum wear	1.0 mm (0.039 in.)
Chain vibration damper No. 1	Maximum wear	1.0 mm (0.039 in.)
Chain tensioner plate	Maximum wear	0.5 mm (0.020 in.)
Cylinder head set bolt	Standard bolt length	141.3 to 142.7 mm (5.563 to 5.618 in.)
	Maximum bolt length	144.2 mm (5.677 in.)
Chain sub-assembly	Maximum chain elongation	114.5 mm (4.508 in.)
No. 2 Chain sub-assembly	Maximum chain elongation	102.2 mm (4.024 in.)
Camshaft timing gear assembly	Minimum gear or sprocket diameter (with chain)	97.3 mm (3.831 in.)
Camshaft timing sprocket	Minimum gear or sprocket diameter (with chain)	97.3 mm (3.831 in.)
Camshaft (Intake)		
Maximum circle runout		0.03 mm (0.0012 in.)
Standard cam lobe height		47.306 to 47.406 mm (1.8624 to 1.8664 in.)
Maximum cam lobe height		47.196 mm (1.8581 in.)
No. 1 journal diameter		35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Outer journal diameter		22.959 to 22.975 mm (0.9039 to 0.9045 in.)

Standard thrust clearance	Intake	0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Maximum thrust clearance		0.110 mm (0.0043 in.)
Standard oil clearance	No. 1 journal bearing mark 1	0.007 to 0.038 mm (0.0003 to 0.0015 in.)
	No. 1 journal bearing mark 2	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
	No. 1 journal bearing mark 3	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
Maximum oil clearance		0.070 mm (0.0028 in.)
Cylinder head journal bore diameter	Mark 1	40.000 to 40.008 mm (1.5748 to 1.5752 in.)
	Mark 2	40.009 to 40.017 mm (1.5752 to 1.5755 in.)
	Mark 3	40.018 to 40.025 mm (1.5755 to 1.5758 in.)
Standard bearing center wall thickness	Mark 1	2.000 to 2.004 mm (0.0787 to 0.0789 in.)
	Mark 2	2.005 to 2.008 mm (0.0789 to 0.0791 in.)
	Mark 3	2.009 to 2.012 mm (0.0791 to 0.0792 in.)
Camshaft journal diameter	Mark 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 2	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 3	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Camshaft No. 2 (Exhaust)		
Maximum circle runout		0.03 mm (0.0012 in.)
Standard cam lobe height		45.983 to 46.083 mm (1.8104 to 1.8143 in.)
Minimum cam lobe height		45.873 mm (1.8060 in.)
No. 1 journal diameter		35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other journal diameter		22.959 to 22.975 mm (0.9039 to 0.9045 in.)
Standard thrust clearance	Exhaust	0.080 to 0.135 mm (0.0032 to 0.0053 in.)
Maximum thrust clearance		0.150 mm (0.0059 in.)
Standard oil clearance	No. 1 journal	0.015 to 0.054 mm (0.0006 to 0.0021 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
Maximum oil clearance		0.100 mm (0.0039 in.)
Cylinder head journal bore diameter	Mark 1	40.000 to 40.008 mm (1.5748 to 1.5752 in.)
	Mark 2	40.009 to 40.017 mm (1.5752 to 1.5755 in.)
	Mark 3	40.018 to 40.025 mm (1.5755 to 1.5758 in.)
Standard bearing center wall thickness	Mark 1	2.000 to 2.004 mm (0.00787 to 0.0789 in.)
	Mark 2	2.005 to 2.008 mm (0.0789 to 0.0791 in.)
	Mark 3	2.009 to 2.012 mm (0.0791 to 0.0792 in.)
Camshaft journal diameter	Mark 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 2	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
	Mark 3	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Intake manifold	Maximum warpage	0.20 mm (0.0079 in.)
Exhaust manifold	Maximum warpage	0.70 mm (0.0276 in.)
Cylinder head		
Maximum warpage	Cylinder block side	0.05 mm (0.0020 in.)
	Intake manifold side	0.08 mm (0.0031 in.)
	Exhaust manifold side	0.08 mm (0.0031 in.)
Inner compression spring	Free length	47.43 mm (1.867 in.)
	Maximum deviation	1.6 mm (0.063 in.)
Intake valve	Standard overall length	101.71 mm (4.0043 in.)
	Minimum overall length	101.21 mm (3.9846 in.)
	Valve stem diameter	5.470 to 5.485 mm (0.2154 to 0.2159 in.)
	Standard margin thickness	1.05 to 1.45 mm (0.0413 to 0.0571 in.)
	Minimum margin thickness	0.50 mm (0.0197 in.)

Exhaust valve	Standard overall length	101.15 mm (3.9823 in.)
	Minimum overall length	100.70 mm (3.9646 in.)
	Valve stem diameter	5.465 to 5.480 mm (0.2152 to 0.2157 in.)
	Standard margin thickness	1.20 to 1.60 mm (0.0472 to 0.0630 in.)
	Minimum margin thickness	0.50 mm (0.0197 in.)
Intake valve guide bush	Bush inside diameter	5.510 to 5.530 mm (0.2169 to 0.2177 in.)
	Standard bush oil clearance	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
	Minimum bush oil clearance	0.080 mm (0.0031 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.6 to 10.0 mm (0.3779 to 0.3937 in.)
Standard oil clearance		0.025 to 0.060 mm (0.0010 to 0.0024 in.)
Exhaust valve guide bush	Bush inside diameter	5.510 to 5.530 mm (0.2169 to 0.2177 in.)
	Standard oil clearance	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
	Minimum oil clearance	0.100 mm (0.0039 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.6 to 10.0 mm (0.3779 to 0.3937 in.)
Standard oil clearance		0.030 to 0.065 mm (0.0012 to 0.0026 in.)
Valve lifter	Lifter diameter	30.966 to 30.976 mm (1.2191 to 1.2195 in.)
	Lifter bore diameter	31.009 to 31.025 mm (1.2208 to 1.2215 in.)
	Standard oil clearance	0.033 to 0.059 mm (0.0013 to 0.0023 in.)
	Maximum oil clearance	0.070 mm (0.0028 in.)
Connecting rod		
Standard thrust clearance		0.160 to 0.362 mm (0.0063 to 0.0143 in.)
Maximum thrust clearance		0.362 mm (0.0143 in.)
Standard oil clearance		0.032 to 0.063 mm (0.0013 to 0.0025 in.)
Maximum oil clearance		0.063 mm (0.0025 in.)
Connecting rod bearing center wall thickness (Reference)	Mark 1	1.485 to 1.488 mm (0.0585 to 0.0586 in.)
	Mark 2	1.489 to 1.491 mm (0.0586 to 0.0587 in.)
	Mark 3	1.492 to 1.494 mm (0.0587 to 0.0588 in.)
Connecting rod small end bore diameter		22.005 to 22.014 mm (0.8663 to 0.8667 in.)
Connecting rod small end bore diameter (Reference)	Mark A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
	Mark B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
	Mark C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)
Standard oil clearance		0.005 to 0.011 mm (0.0002 to 0.0004 in.)
Maximum oil clearance		0.011 mm (0.0004 in.)
Maximum rod out-of alignment per 100 mm (3.94 in.)		0.05 mm (0.0020 in.)
Maximum rod twist per 100 mm (3.94 in.)		0.15 mm (0.0059 in.)
Cylinder block	Maximum warpage	0.05 mm (0.0020 in.)
	Standard cylinder bore diameter	88.500 to 88.513 mm (3.4843 to 3.4847 in.)
	Maximum cylinder bore diameter	88.633 mm (3.4894 in.)
Piston		
Standard piston diameter		88.469 to 88.479 mm (3.4830 to 3.4834 in.)
Standard piston oil clearance		0.021 to 0.044 mm (0.0008 to 0.0017 in.)
Maximum piston oil clearance		0.10 mm (0.0039 in.)
Piston pin bore diameter		22.001 to 22.010 mm (0.8662 to 0.8665 in.)
Piston pin bore diameter (Reference)	Mark A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
	Mark B	22.005 to 22.007 mm (0.8663 to 0.8664 in.)
	Mark C	22.008 to 22.010 mm (0.8664 to 0.8665 in.)

Piston ring		
Ring groove clearance	No. 1 Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
	No. 2 Ring	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
	Oil Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
Standard end gap	No. 1 Ring	0.24 to 0.31 mm (0.0094 to 0.0122 in.)
	No. 2 Ring	0.33 to 0.43 mm (0.0130 to 0.0169 in.)
	Oil Ring	0.10 to 0.30 mm (0.0040 to 0.0119 in.)
Maximum end gap	No. 1 Ring	0.89 mm (0.0350 in.)
	No. 2 Ring	1.37 mm (0.0539 in.)
	Oil Ring	0.73 mm (0.0287 in.)
Piston pin		
Standard piston pin diameter		21.997 to 22.006 mm (0.8660 to 0.8664 in.)
Piston pin diameter (Reference)	Mark A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
	Mark B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
	Mark C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)
	Mark A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
	Mark B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
	Mark C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)
Standard oil clearance		0.001 to 0.007 mm (0.0004 to 0.0003 in.)
Maximum oil clearance		0.010 mm (0.0004 in.)
Connecting rod bolt	Standard diameter	7.0 to 7.3 mm (0.276 to 0.287 in.)
	Maximum diameter	7.0 mm (0.276 in.)
Crankshaft		
Standard thrust clearance		0.040 to 0.240 mm (0.0016 to 0.0095 in.)
Maximum thrust clearance		0.30 mm (0.0118 in.)
Thrust washer thickness		1.930 to 1.980 mm (0.0760 to 0.0780 in.)
Cylinder block main journal bore diameter (Reference)	Mark 0	59.000 to 59.002 mm (2.3228 to 2.3229 in.)
	Mark 1	59.003 to 59.004 mm (2.3230 to 2.3230 in.)
	Mark 2	59.005 to 59.006 mm (2.3230 to 2.3231 in.)
	Mark 3	59.007 to 59.009 mm (2.3231 to 2.3232 in.)
	Mark 4	59.010 to 59.011 mm (2.3232 to 2.3233 in.)
	Mark 5	59.012 to 59.013 mm (2.3233 to 2.3234 in.)
	Mark 6	59.014 to 59.016 mm (2.3234 to 2.3235 in.)
Main journal diameter		54.988 to 55.000 mm (2.1648 to 2.1654 in.)
Main journal diameter (Reference)	Mark 0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
	Mark 1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
	Mark 2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
	Mark 3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)
	Mark 4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)
	Mark 5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)
Standard main bearing center wall thickness (Reference)	Mark 1	1.993 to 1.996 mm (0.0785 to 0.0786 in.)
	Mark 2	1.997 to 1.999 mm (0.0786 to 0.0787 in.)
	Mark 3	2.000 to 2.002 mm (0.0787 to 0.0788 in.)
	Mark 4	2.003 to 2.005 mm (0.0789 to 0.0789 in.)
Maximum circle runout		0.03 mm (0.0012 in.)
Standard oil clearance		0.017 to 0.040 mm (0.0007 to 0.0016 in.)
Maximum oil clearance		0.060 mm (0.0024 in.)
Maximum main journal taper and out-of-round		0.003 mm (0.0001 in.)
Maximum crank pin taper and out-of round		0.003 mm (0.0001 in.)
Crank pin diameter		47.990 to 48.000 mm (1.8894 to 1.8898 in.)

Crankshaft bearing cap set bolt	Standard diameter	7.3 to 7.5 mm (0.287 to 0.295 in.)
	Minimum diameter	7.2 mm (0.284 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Engine mounting bracket No. 2 RH x Timing chain cover		52	531	38
Engine mounting bracket RH x Cylinder block		54	551	40
Engine moving control rod with bracket x Engine mounting bracket No. 2 RH		64	653	47
Engine moving control rod with bracket x Fender apron RH		64	653	47
Engine mounting stay No. 2 RH x Cylinder head		64	653	47
Engine mounting stay No. 2 RH x Engine mounting bracket No. 2 RH		64	653	47
Engine hanger No. 1 x Cylinder head		38	387	28
Engine hanger No. 2 x Cylinder head		38	387	28
ECT sensor x Cylinder head		20	204	15
Knock sensor x Cylinder block		20	204	15
Engine oil pressure switch assembly x Cylinder head		15	153	11
Water by-pass pipe No. 1 x Cylinder block		9.0	92	80 in.*lbf
Oil cooler pipe x Cylinder block		9.0	92	80 in.*lbf
Transverse engine engine mounting bracket x Cylinder block		54	551	40
Drive shaft bearing bracket x Cylinder block		64	653	47
V-ribbed belt tensioner assembly x Timing chain cover		60	607	44
Ignition coil assembly x Cylinder head		9.0	92	80 in.*lbf
Engine cover x Cylinder head cover		7.0	71	62 in.*lbf
Exhaust manifold converter x Cylinder head	Except PZEV	37	378	27
	For PZEV	37	378	27
Exhaust manifold stay x Exhaust manifold converter		44	449	32
Manifold converter insulator No. 1 x Exhaust manifold converter		12	122	9
Oil level gauge guide x Water by-pass pipe No. 1		9.0	92	80 in.*lbf
Intake manifold x Cylinder head		30	306	22
Drive plate and ring gear (A/T) x Crankshaft		98	1,000	72
Flywheel sub-assembly (M/T) x Crankshaft		130	1,330	96
Engine mounting insulator LH x Automatic transaxle assembly		95	969	70
Engine mounting insulator LH x Manual transaxle assembly		143	1,459	105
Engine mounting insulator RH x Engine mounting bracket RH	Nut A	95	969	70
Engine mounting insulator RH x Frame	Nut B	87	888	64
Engine mounting insulator FR x Engine mounting bracket FR		87	888	64
Engine mounting bracket rear No. 2 x Engine lateral control rod (M/T)		89	910	66
Vane pump assembly x Timing chain cover		43	439	32
Frame side plate x Front frame assembly	Bolt A	85	867	63
Frame side plate x Body	Bolt B	32	326	24
Front suspension member brace rear x Front frame assembly	Bolt C	85	867	63
Front suspension member brace rear x Body	Bolt D	32	326	24
Steering return tube clamp x Frame		8.0	80	69 in.*lbf
Compressor and magnetic clutch x Cylinder block		25	250	18
Battery clamp x Body	Bolt	9.0	92	80 in.*lbf
	Nut	3.5	36	31 in.*lbf
Speed sensor front LH (with ABS) x Steering knuckle		8.0	82	71 in.*lbf
Speed sensor front RH (with ABS) x Steering knuckle		8.0	82	71 in.*lbf
Air cleaner assembly x Body		5.0	51	44 in.*lbf
Air cleaner inlet assembly x Body		5.0	51	44 in.*lbf
Balanceshaft housing x Stiffening crankcase assembly	1st	22	220	16
	2nd	Turn 90°	Turn 90°	Turn 90°

Part Tightened		N*m	kgf*cm	ft.*lbf
Stiffening crankcase assembly x Cylinder block		24	245	18
with head taper screw plug No. 1 x Cylinder block		26	265	19
No. 1 oil nozzle sub-assembly x Cylinder block		7.0	71	62 in.*lbf
Oil control valve filter x Cylinder block		30	306	22
Cylinder block water drain cock x Stiffening crankcase assembly		25 13	255 130	18 9
Cylinder head x Cylinder block	1st	79	806	58
	2nd	Turn 90°	Turn 90°	Turn 90°
Camshaft timing gear assembly x Camshaft		54	551	40
Camshaft timing sprocket x Camshaft		54	551	40
Camshaft bearing cap No. 1 x Cylinder head		30	301	22
Camshaft bearing cap No. 2 x Cylinder head		30	301	22
Camshaft bearing cap No. 3 x Cylinder head		9.0	92	80 in.*lbf
Oil pump assembly x Stiffening crankcase assembly		19	194	14
Chain tensioner plate x Stiffening crankcase assembly		12	122	9
Oil pump drive sprocket x Oil pump		30	301	22
Chain vibration damper No. 1 x Cylinder head		9.0	92	80 in.*lbf
Chain vibration damper No. 1 x Cylinder block		9.0	92	80 in.*lbf
Chain tensioner slipper x Cylinder block		19	194	14
Timing chain guide x Crankshaft bearing cap No. 1		9.0	92	80 in.*lbf
Oil pan x Stiffening crankcase assembly		9.0	92	80 in.*lbf
Oil pan drain plug x Oil pan		25	255	18
Timing chain cover x Cylinder block, Cylinder head	Bolt A	9.0	92	80 in.*lbf
	Bolt B	25	255	18
	Bolt C	55	561	41
	Nut	11	112	8
Crankshaft position sensor x Timing chain cover		9.0	92	80 in.*lbf
Crankshaft pulley x Crankshaft	TMMK made	170	1,733	125
	TMC made	180	1,835	133
Chain tensioner assembly No. 1 x Timing chain cover		9.0	92	80 in.*lbf
Camshaft position sensor x Cylinder head		9.0	92	80 in.*lbf
Radio setting condenser x Cylinder head		10	102	7
Cylinder head cover x Cylinder head	Bolt A	11	112	8
	Bolt B	14	143	10
	Nut	11	112	8
Cylinder head cover x Engine wire		8.4	86	74 in.*lbf
Oil filter union x Stiffening crankcase assembly		30	306	22
Oil filter union x Stiffening crankcase assembly (with Oil cooler)	Oil filter union	79	806	58
	Nut	9.0	92	80 in.*lbf
	Union bolt	25	255	18
Oil filter x Oil filter union		13	133	10
Spark plug x Cylinder head		19	194	14
Ventilation valve x Cylinder head cover		19	194	14
No. 1 exhaust pipe support bracket x Body		19	194	14
Stud bolt	Bolt A	5	51	44 in.*lbf
	Bolt B	5	51	44 in.*lbf
	Bolt C	9.5	97	84 in.*lbf
	Bolt D	9.5	97	84 in.*lbf

Part Tightened		N*m	kgf*cm	ft.*lbf
Stud bolt	Bolt A	5.0	51	44 in.*lbf
	Bolt B	22	220	16
	Bolt C	9.5	97	84 in.*lbf
	Bolt D	5.0	51	44 in.*lbf
Crankshaft bearing cap x Cylinder block	1st	20	204	15
	2nd	40	408	29
	3rd	Turn 90°	Turn 90°	Turn 90°
Connecting rod cap x Connecting rod	1st	25	250	18
	2nd	Turn 90°	Turn 90°	Turn 90°

2GR-FE ENGINE MECHANICAL

SERVICE DATA

Ignition timing	Terminals TC and CG of DLC3 connected	8 to 12° BTDC at idle (Transmission in neutral)
	Terminals TC and CG of DLC3 disconnected	5 to 15° BTDC at idle (Transmission in neutral)
Idle speed		600 to 700 rpm (Transmission in neutral)
Compression	Compression pressure	1.4 MPa (14 kgf/cm^2, 199 psi) or more
	Minimum pressure	0.98 MPa (10 kgf/cm^2, 142 psi)
	Difference between each cylinder	0.1 MPa (1.0 kgf/cm^2, 15 psi) or less
Cylinder head set bolt		
Outside diameter	Standard	10.85 to 11.00 mm (0.4272 to 0.4331 in.)
	Minimum	10.70 mm (0.4213 in.)
Chain		
Elongation	Maximum	136.9 mm (5.390 in.)
No. 2 chain		
Elongation	Maximum	137.6 mm (5.417 in.)
Crankshaft timing gear		
Diameter (w/ chain)	Minimum	61.4 mm (2.417 in.)
Idle sprocket		
Diameter (w/ chain)	Minimum	61.4 mm (2.417 in.)
Idle gear shaft		
Idle gear shaft diameter		22.987 to 23.000 mm (0.9050 to 0.9055 in.)
Idle gear inside diameter		23.020 to 30.030 mm (0.9063 to 0.9067 in.)
Oil clearance	Standard	0.020 to 0.043 mm (0.0008 to 0.0017 in.)
	Maximum	0.093 mm (0.0037 in.)
Chain tensioner assembly No. 2		
Worn depth	Maximum	0.9 mm (0.035 in.)
Chain tensioner assembly No. 3		
Worn depth	Maximum	0.9 mm (0.035 in.)
Chain tensioner slipper		
Worn depth	Maximum	1.0 mm (0.039 in.)
Chain vibration damper No. 1		
Worn depth	Maximum	1.0 mm (0.039 in.)
Chain vibration damper No. 2		
Worn depth	Maximum	1.0 mm (0.039 in.)
Cylinder head sub-assembly		
	Cylinder head lower	0.05 mm (0.0020 in.)
	Intake	0.08 mm (0.0031 in.)
	Exhaust	0.08 mm (0.0031 in.)
Warpage	Maximum	0.10 mm (0.0039 in.)
Intake valve		
Valve stem diameter		5.470 to 5.485 mm (0.2154 to 0.2159 in.)
Margin thickness	Standard	1.0 mm (0.039 in.)
	Maximum	0.5 mm (0.0197 in.)
Overall length	Standard	105.85 mm (4.1673 in.)
	Maximum	105.35 mm (4.1476 in.)
Exhaust valve		
Valve stem diameter		5.465 to 5.480 mm (0.2152 to 0.2158 in.)

Margin thickness	Standard	1.0 mm (0.0394 in.)
	Maximum	0.5 mm (0.0197 in.)
Overall length	Standard	111.40 mm (4.3858 in.)
	Maximum	109.90 mm (4.3268 in.)
Inner compression spring		
Free length		45.46 mm (1.7898 in.)
Deviation	Maximum	1.0 mm (0.039 in.)
Angle (reference)	Maximum	2°
Intake valve guide bush		
Inside diameter		5.510 to 5.530 mm (0.2169 to 0.2177 in.)
Oil clearance	Standard	0.025 to 0.060 mm (0.0010 to 0.0024 in.)
	Maximum	0.08 mm (0.0031 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.3 to 9.7 mm (0.3661 to 0.3819 in.)
Exhaust valve guide bush		
Inside diameter		5.510 to 5.530 mm (0.2169 to 0.2177 in.)
Oil clearance	Standard	0.030 to 0.065 mm (0.0012 to 0.0026 in.)
	Maximum	0.10 mm (0.0039 in.)
Bush bore diameter	Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
	Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)
Protrusion height		9.30 to 9.70 mm (0.3661 to 0.3819 in.)
No. 1 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.316 to 44.416 mm (1.7447 to 1.7487 in.)
	Maximum	44.166 mm (1.7388 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm
No. 2 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.262 to 44.362 mm (1.7426 to 1.7465 in.)
	Maximum	44.112 mm (1.7367 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm
No. 3 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)

Cam lobe height	Standard	44.316 to 44.416 mm (1.7447 to 1.7487 in.)
	Maximum	44.166 mm (1.7388 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm
No. 4 camshaft		
Journal diameter	No. 1 journal	35.946 to 35.960 mm (1.4152 to 1.4157 in.)
	Other journals	25.959 to 25.975 mm (1.0220 to 1.0226 in.)
Circuit runout	Maximum	0.04 mm (0.0016 in.)
Cam lobe height	Standard	44.262 to 44.362 mm (1.7426 to 1.7465 in.)
	Maximum	44.112 mm (1.7367 in.)
Oil clearance	Standard No. 1 journal	0.040 to 0.079 mm (0.0016 to 0.0031 in.)
	Other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
	Maximum No. 1 journal	0.10 mm (0.0039 in.)
	Other journals	0.09 mm (0.0035 in.)
Thrust clearance	Standard	0.08 to 0.13 mm (0.0031 to 0.0051 in.)
	Maximum	0.15 mm
Ring pin for cylinder head sub-assembly		
Protrusion height		2.5 to 3.5 mm (0.098 to 0.138 in.)
Straight pin for cylinder head sub-assembly		
Protrusion height		17.5 to 19.5 mm (0.689 to 0.768 in.)
Connecting rod thrust clearance	Standard	0.15 to 0.40 mm (0.0059 to 0.0157 in.)
	Maximum	0.50 mm (0.020 in.)
Connecting rod oil clearance	Standard	0.045 to 0.067 mm (0.0018 to 0.0026 in.)
	Maximum	0.070 mm (0.0028 in.)
Crankshaft thrust clearance	Standard	0.04 to 0.24 mm (0.0016 to 0.0094 in.)
	Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness	2.43 to 2.48 mm (0.0957 to 0.0976 in.)
Cylinder block warpage	Maximum	0.07 mm (0.0028 in.)
Cylinder bore diameter	Standard	94.000 to 94.012 mm (3.7008 to 3.7013 in.)
	Maximum	94.200 mm (3.7087 in.)
Piston diameter		
	Distance	9.8 mm (0.3858 in.)
	Standard	93.960 to 93.980 mm (3.6992 to 3.7000 in.)
	Maximum	93.830 mm (3.6941 in.)
Oil clearance	Standard	0.02 to 0.052 mm (0.0008 to 0.0020 in.)
	Maximum	0.06 mm
Connecting rod out-of alignment	Maximum	0.05 mm (0.0020 in.) per 100 mm (3.94 in.)
Connecting rod twist	Maximum	0.15 mm (0.0059 in.) per 100 mm (3.94 in.)
Piston pin hole inside diameter		22.001 to 22.010 mm (0.8662 to 0.8665 in.)
Piston pin diameter		21.997 to 22.006 mm (0.8660 to 0.8664 in.)
Oil clearance	Standard	0.001 to 0.007 mm (0.00004 to 0.00028 in.)
	Maximum	0.015 mm (0.0006 in.)
Connecting rod bushing inside diameter		22.005 to 22.014 mm (0.8663 to 0.8667 in.)
Oil clearance	Standard	0.005 to 0.011 mm (0.0002 to 0.0004 in.)
	Maximum	0.03 mm (0.0012 in.)

Piston ring groove clearance	No. 1	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
	No. 2	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
	Oil	0.070 to 0.150 mm (0.0028 to 0.0059 in.)
Piston ring end gap	Standard No. 1	0.25 to 0.35 mm (0.0098 to 0.0138 in.)
	No. 2	0.50 to 0.60 mm (0.0197 to 0.0236 in.)
	Oil (Side rail)	0.10 to 0.40 mm (0.0039 to 0.0157 in.)
	Maximum No. 1	0.50 mm (0.0197 in.)
	No. 2	0.85 mm (0.0335 in.)
	Oil (Side rail)	0.60 mm (0.0236 in.)
Connecting rod bolt diameter	Standard	7.2 to 7.3 mm (0.283 to 0.287 in.)
	Maximum	7.0 mm (0.276 in.)
Crankshaft bearing cap set bolt diameter	Standard	10.8 to 11.0 mm (0.4252 to 0.4331 in.)
	Maximum	10.7 mm (0.4213 in.)
Crankshaft circle runout	Maximum	0.06 mm (0.0024 in.)
Main journal diameter		60.988 to 61.000 mm (2.4011 to 2.4016 in.)
Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
Crank pin diameter		52.992 to 53.000 mm (2.0863 to 2.0866 in.)
Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
Crankshaft oil clearance	Standard	0.026 to 0.047 mm (0.0010 to 0.0019 in.)
	Maximum	0.050 mm (0.0020 in.)
Straight pin for cylinder block sub-assembly		
Protrusion height	Pin A	23 mm (0.906 in.)
	Pin B	6 mm (0.236 in.)
	Pin C	11 mm (0.433 in.)
	Pin D	9 mm (0.354 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Ignition coil assembly x Cylinder head cover sub-assembly		10	102	7
Engine hanger No. 1 x Cylinder head sub-assembly RH		33	337	24
Engine hanger No. 2 x Cylinder head sub-assembly LH		33	337	24
Engine mounting bracket RH x Cylinder block sub-assembly		54	551	40
Oil level gauge guide x Cylinder head sub-assembly		21	214	15
Idler pulley sub-assembly No. 2 x Timing chain cover sub-assembly		43	438	32
V-ribbed belt tensioner assembly x Cylinder block sub-assembly		43	438	32
Intake manifold x Cylinder head sub-assembly		21	214	15
Exhaust manifold sub-assembly RH x Cylinder head sub-assembly RH		21	214	15
Exhaust manifold sub-assembly LH x Cylinder head sub-assembly LH		21	214	15
Drive plate & ring gear sub-assembly x Crankshaft		83	850	61
Air cleaner case x Body		5.0	51	44 in.*lbf
E.F.I engine coolant temperature x water by-pass joint RR		20	200	14
Engine assembly w/ Transaxle x Body	Bolt A	85	867	63
	Bolt B	32	329	24
	Bolt C	85	867	63
	Bolt D	32	329	24
Manifold stay No. 2 x Exhaust manifold sub-assembly LH		34	347	25
Air cleaner inlet No. 1 x Body		5.0	51	44 in.*lbf
Air cleaner inlet assembly x Body		5.0	51	44 in.*lbf
Battery clamp x Body	Bolt	9.0	92	80 in.*lbf
	Nut	3.5	36	31
Steering intermediate shaft x Steering gear		35	360	26
Stabilizer link x Shock absorber		74	755	55
Tie rod assembly x Steering gear		49	500	36
Speed sensor front x Front axle		8.0	82	71 in.*lbf
Front axle hub nut x Front drive shaft		294	2,998	217
Cooler compressor x V-ribbed belt tensioner		25	250	18
Engine mounting control bracket x Engine mounting bracket front No. 1 LH				
	Bolt A	44	450	32
	Bolt B	38	387	28
	Nut	23	235	17
Engine assembly w/ Transaxle x Front frame assembly	Bolt	87	887	64
	Nut	95	969	70
Drive shaft bearing bracket x Cylinder block sub-assembly		64	650	47
Exhaust manifold heat insulator No. 2 x Exhaust manifold sub-assembly LH		8.5	87	75 in.*lbf
Oil pressure switch x Oil pan sub-assembly		21	210	15
Engine mounting stay No. 2 RH x Intake manifold		21	214	15
Timing gear cover No. 2 x Chain cover sub-assembly		6.0	61	53 in.*lbf
Engine mounting bracket front No. 1 LH x Chain cover		54	551	40
Camshaft bearing cap x Camshaft housing	1st	10	102	7
	2nd	16	163	12
Camshaft housing x Cylinder head sub-assembly		28	286	21
Chain tensioner No. 1 x Cylinder head sub-assembly		10	102	7
Chain tensioner No. 2 x Cylinder head sub-assembly		21	214	15
Chain tensioner No. 3 x Cylinder head sub-assembly		21	214	15

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Part Tightened		N*m	kgf*cm	ft.*lbf
Camshaft timing gear assembly x Camshaft		100	1,020	74
Camshaft timing exhaust gear assembly x Camshaft		100	1,020	74
Engine rear oil seal retainer x Cylinder block sub-assembly		10	102	7
Knock sensor x Cylinder block sub-assembly		20	204	15
Water inlet pipe x Cylinder block sub-assembly		10	102	7
Cylinder head RH x Cylinder block sub-assembly	1st	36	367	27
	2nd	Turn 90°	Turn 90°	Turn 90°
	3nd	Turn 90°	Turn 90°	Turn 90°
Cylinder head sub-assembly LH x Cylinder block sub-assembly				
	Recessed head 1st	36	367	27
	2nd	Turn 90°	Turn 90°	Turn 90°
	3nd	Turn 90°	Turn 90°	Turn 90°
	14 mm (0.55 in.) head	30	306	22
Chain vibration damper No. 1 x Cylinder block sub-assembly		23	230	17
Idle gear No. 1 x Cylinder block sub-assembly		60	612	44
Timing chain cover plate x Timing chain cover sub-assembly		9.1	93	81 in.*lbf
Timing chain cover sub-assembly x Cylinder head and block				
	Areas 1: Bolt	21	214	15
	Areas 2: Bolt	21	214	15
	Areas 3: Bolt and Nut	21	214	15
	Areas 4: Bolt A	43	438	32
	Areas 4: Except Bolt A	21	214	15
Water pump assembly x Timing chain cover sub-assembly		9.1	93	81 in.*lbf
Oil pan baffle plate x Cylinder block sub-assembly		10	102	7
Oil pan stud bolt x Cylinder block and timing chain cover sub-assembly		10	102	7
Oil pan stud bolt x No. 2 oil pan sub-assembly		4.0	41	35 in.*lbf
Oil strainer stud bolt x Timing chain cover sub-assembly		4.0	41	35 in.*lbf
Oil strainer sub-assembly x Cylinder block and timing chain cover sub-assembly		10	102	7
Oil pan sub-assembly x Cylinder block and timing chain cover sub-assembly				
	bolt A	10	102	7
	except bolt A	21	214	15
Oil pan sub-assembly No. 2 x Oil pan sub-assembly		10	102	7
Oil pan drain plug x Oil pan sub-assembly No. 2		40	408	30
Crankshaft pulley x Crankshaft		250	2,550	184
Cylinder head cover sub-assembly x Cylinder head sub-assembly RH				
	bolt A	21	214	15
	except bolt A	10	102	7
Cylinder head cover sub-assembly LH x Cylinder head sub-assembly LH				
	bolt A	21	214	15
	except bolt A	10	102	7
Water outlet x Cylinder head sub-assembly	bolt	10	102	7
	nut	10	104	8
Water inlet housing set nut		10	102	7
Water inlet set bolt and nut		10	102	7
Oil filter cap x Oil pan		25	255	18
Camshaft position sensor		10	102	7

Part Tightened		N*m	kgf*cm	ft.*lbf
Ventilation valve x Cylinder head cover sub-assembly LH		27	275	20
Oil pipe union x Cylinder block sub-assembly		65	663	48
Oil pipe union x Cylinder head cover sub-assembly		65	663	48
Oil pipe x Cylinder head sub-assembly		10	102	7
Crankshaft position sensor x Cylinder block sub-assembly		10	102	7
Camshaft timing oil control valve assembly x Cylinder head cover		10	102	7
Cylinder block water drain cock sub-assembly x Cylinder block sub-assembly		25	255	18
Drain cock sub-assembly x Water inlet housing		30	306	22
Water drain cock plug x Water drain cock sub-assembly		13	130	9
Drain cock plug x Drain cock sub-assembly		13	130	9
Spark plug x Cylinder head sub-assembly		25	254	18
Stud bolt x Cylinder head sub-assembly	For A and B bolts	10	102	7
	For C bolts	4.0	41	35 in.*lbf
W/ head screw plug x Cylinder head sub-assembly		44	449	32
W/ head screw plug No. 2 x Cylinder head sub-assembly		80	816	59
Main bearing cap x Cylinder block sub-assembly	16 pointed head 1st	61	622	45
	2nd	Turn 90°	Turn 90°	Turn 90°
	14 mm head	52	525	38
Connecting rod cap x Connecting rod	1st	25	255	18
	2nd	Turn 90°	Turn 90°	Turn 90°
Stud bolt x Cylinder block sub-assembly	bolt A	10	102	7
	bolt B	17	173	13
Sub-assembly oil nozzle No. 1 x Cylinder block sub-assembly		9.0	92	80 in.*lbf

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2AZ-FE FUEL

SERVICE DATA

Fuel pressure		304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)
Fuel pressure : at fuel pressure remains for 5 minutes after engine has stopped		147 kPa (1.5 kgf/cm^3, 21 psi) or more
Fuel injector		
Resistance	at 20°C (68°F)	11.6 to 12.4 Ω
Injection volume		76 to 92 cm^2 (4.6 to 5.6 cu in.) per 15 seconds
Difference between each injector		16 cm^2 (0.98 cu in.) or less
Fuel drop		1 drop or less per 12 minutes
Fuel pump		
Resistance	at 20°C (68°F)	0.2 to 3.0 Ω

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Fuel delivery pipe x Cylinder head		20	204	15
Fuel pressure pulsation damper x Fuel delivery pipe		9.0	90	80 in.*lbf
Fuel tank bent tube set plate x Fuel tank assembly		5.9	60	52 in.*lbf
Fuel main tube support x Fuel tank assembly		5.4	55	48 in.*lbf
Fuel tank band sub-assembly No. 1 x Body		39	400	29
Fuel tank protector lower center x Fuel tank assembly		5.4	55	48 in.*lbf
Parking brake cable assembly No. 2 x Body	Bolt	6.0	61	53 in.*lbf
	Nut	8.5	87	75 in.*lbf
Parking brake cable assembly No. 3 x Body	Bolt	6.0	61	53 in.*lbf
	Nut	8.5	87	75 in.*lbf
Stabilizer bar bracket x Suspension member		31	316	23

2GR-FE FUEL

SERVICE DATA

Fuel pressure		304 to 343 kPa (3.1 to 3.5 kgf/cm^2, 44.1 to 49.7 psi)
Fuel pressure : at fuel pressure remains for 5 minutes after engine has stopped		147 kPa (1.5 kgf/cm^2, 21 psi) or more
Fuel injector		
Resistance	at 20°C (68°F)	11.6 to 12.4 Ω
Injection volume		84 to 100 cm^2 (5.1 to 6.0 cu in.) per 15 seconds
Difference between each injector		16 cm^3 (0.98 cu in.) or less
Fuel drop		1 drop or less per 16 minutes
Fuel pump		
Resistance	at 20°C (68°F)	0.2 to 3.0 Ω

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Fuel delivery pipe sub-assembly x Intake manifold		21	214	15
Intake air surge tank x Intake manifold	Bolt	18	184	13
	Nut	16	163	12
Intake air surge tank x Cylinder head		21	214	15
Vacuum hose clamp set bolt		5.4	55	48 in.*lbf
Fuel tank bent tube set plate x Fuel tank assembly		5.9	60	52 in.*lbf
Fuel main tube support x Fuel tank assembly		5.4	55	48 in.*lbf
Fuel tank band sub-assembly No. 1 x Body		39	400	29
Fuel tank protector lower center x Fuel tank assembly		5.4	55	48 in.*lbf
Parking brake cable assembly No. 2 x Body	Bolt	6.0	61	53 in.*lbf
	Nut	8.5	87	75 in.*lbf
Parking brake cable assembly No. 3 x Body	Bolt	6.0	61	53 in.*lbf
	Nut	8.5	87	75 in.*lbf
Stabilizer bar bracket x Suspension member		31	316	23

2AZ-FE EMISSION CONTROL

SERVICE DATA

VSV for EVAP		
Resistance	1 - 2	26 to 30 Ω at 20°C (68°F)
	1 - Body ground	10 MΩ or higher
	2 - Body ground	10 MΩ or higher
Air fuel ratio sensor		
Resistance	1 (HT) - 2 (+B)	1.8 to 3.4 Ω at 20°C (68°F)
Oxygen sensor		
Resistance	1 (HT) - 2 (+B)	11 to 16 Ω at 20°C (68°F)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Charcoal canister assembly x Body	39	398	29
Air fuel ratio sensor x Front pipe assembly	44	449	32
Oxygen sensor x Front pipe assembly	44	449	32

2GR-FE EMISSION CONTROL

SERVICE DATA

VSV for EVAP		
Resistance	1 - 2	26 to 30 Ω at 20°C (68°F)
	1 - Body ground	10 MΩ or higher
	2 - Body ground	10 MΩ or higher
Air fuel ratio sensor		
Resistance	1 (HT) - 2 (+B)	1.8 to 3.4 Ω at 20°C (68°F)
Oxygen sensor		
Resistance	1 (HT) - 2 (+B)	11 to 16 Ω at 20°C (68°F)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Charcoal canister assembly x Body	39	398	29
No. 1 Vacuum switching valve x Head cover	5.0	51	44 in.*lbf
Air fuel ratio sensor x Front pipe assembly	44	449	32
Oxygen sensor x Front pipe assembly	44	449	32

2GR-FE INTAKE

SERVICE DATA

Vacuum switching valve		
Resistance	1 - 2	37 to 44 Ω at 20°C (68°F)
	1 - Body ground	10 kΩ or higher
	2 - Body ground	10 kΩ or higher

2AZ-FE EXHAUST

SERVICE DATA

Compression spring	Minimum length: 38.5 mm (1.515 in.)

TORQUE SPECIFICATIONS

2AZ-FE:

Part Tightened	N*m	kgf*cm	ft.*lbf
Center exhaust pipe assembly x Tail exhaust pipe assembly	43	438	32
Front exhaust pipe assembly x Exhaust manifold RH	62	632	46
Front exhaust pipe assembly x Exhaust manifold LH	62	632	46
Front exhaust pipe assembly x Center exhaust pipe assembly	56	571	41
Exhaust pipe damper x Center exhaust pipe assembly	19	194	14
Exhaust pipe No. 1 support bracket x Body	33	337	24
Front exhaust pipe No. 1 support bracket x Body	33	337	24
Rear exhaust pipe No. 1 support bracket x Body	33	337	24
Exhaust pipe support No. 4 x Body	33	337	24
Exhaust pipe No. 4 support bracket sub-assembly x Body	39	398	29
Exhaust pipe No. 4 support bracket sub-assembly x Body	39	398	29
Heated oxygen sensor (Bank 1 Sensor 2) x Front exhaust pipe assembly	44	449	32
Heated oxygen sensor (Bank 2 Sensor 2) x Front exhaust pipe assembly	44	449	32

2GR-FE EXHAUST

SERVICE DATA

Compression spring	Minimum length: 38.5 mm (1.515 in.)

TORQUE SPECIFICATIONS

2GR-FE:

Part Tightened	N*m	kgf*cm	ft.*lbf
Center exhaust pipe assembly x Tail pipe assembly	43	438	32
Front exhaust pipe assembly x Exhaust manifold RH	62	632	46
Front exhaust pipe assembly x Exhaust manifold LH	62	632	46
Front exhaust pipe assembly x Center exhaust pipe assembly	56	571	41
Exhaust pipe damper x Center exhaust pipe assembly	19	194	14
Exhaust pipe No. 1 support bracket x Body	33	337	24
Front exhaust pipe No. 1 support bracket x Body	33	337	24
Rear exhaust pipe No. 1 support bracket x Body	33	337	24
Exhaust pipe support No. 4 x Body	33	337	24
Exhaust pipe No. 4 support bracket sub-assembly x Body	39	398	29
Exhaust pipe No. 4 support bracket sub-assembly x Body	39	398	29
Heated oxygen sensor (Bank 1 Sensor 2) x Front exhaust pipe assembly	44	449	32
Heated oxygen sensor (Bank 2 Sensor 2) x Front exhaust pipe assembly	44	449	32

2AZ-FE COOLING

SERVICE DATA

THERMOSTAT

Condition	Specified Condition
Standard valve opening temperature	80 to 84 °C (176 to 183 °F)
Standard valve lift	10 mm (0.39 in.) or more at 95 °C (203 °F)

COOLING FAN MOTOR

Item	Condition	Specified Condition
Cooling fan motor (w/o Trailer hitch)	at 20°C (68 °F)	7.9 to 10.9 A
Cooling fan motor (w/ Trailer hitch)	at 20°C (68 °F)	11.8 to 14.8 A
No. 2 cooling fan motorr (w/o Trailer hitch)	at 20°C (68 °F)	7.9 to 10.9 A
No. 2 cooling fan motor (w/ Trailer hitch)	at 20°C (68 °F)	7.9 to 10.9 A

COOLING FAN RELAY

Item	Tester Connection	Specified Condition
No. 1 fan relay	3 - 5	10 Ωor higher
	3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)
No. 2 fan relay	3 - 4	Below 1 Ω
	3 - 5	10 Ωor higher
	3 - 4	10 Ωor higher (when battery voltage is applied to terminals 1 and 2)
	3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)
No. 3 fan relay	3 - 5	10 Ωor higher
	3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

RADIATOR

Item	Condition	Specified Condition
Radiator reservoir cap	For brand-new cap	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
	After using cap	78.5 kPa (0.8 kgf/cm^2, 11.4 psi)

TORQUE SPECIFICATIONS

COOLANT

Part Tightened	N*m	kgf*cm	ft.*lbf
Cylinder block drain cock plug x Cylinder block	13	130	9

WATER PUMP

Part Tightened	N*m	kgf*cm	ft.*lbf
Water pump x Cylinder block	9.0	92	80 in.*lbf
Water pump pulley x Water pump	26	265	19

THERMOSTAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Water inlet x Cylinder block	9.0	92	80 in.*lbf

RADIATOR

Part Tightened		N*m	kgf*cm	ft.*lbf
Oil cooler assembly x Cooler pipe	for Bolt A	15	150	11
	for Nut B	8.3	85	73 in.*lbf
Condenser assembly x Radiator assembly		5.4	55	48 in.*lbf
Upper radiator support x Radiator support LH and RH		7.0	71	62 in.*lbf
Upper radiator support x Hood lock assembly		7.5	77	66 in.*lbf

2GR-FE COOLING

SERVICE DATA

THERMOSTAT

Condition	Specified Condition
Standard valve opening temperature	80 to 84°C (176 to 183°F)
Standard valve lift	7.7 mm (0.3031 in.) or more at 95°C (203°F)

COOLING FAN MOTOR

Item	Condition	Specified Condition
Cooling fan motor (w/o Trailer hitch)	at 20°C (68°F)	6.8 to 9.8 A
Cooling fan motor (w/ Trailer towing system)	at 20°C (68°F)	11.8 to 14.8 A
No. 2 cooling fan motor (w/o Trailer hitch)	at 20°C (68°F)	6.8 to 9.8 A
No. 2 cooling fan motor (w/ Trailer hitch)	at 20°C (68°F)	6.8 to 9.8 A

COOLING FAN ECU

Item	Condition	Specified Condition
Cooling fan ECU	Ignition switch on (IG). Turn the ignition switch to the ON position.	9 to 14 V

COOLING FAN RELAY

Item	Tester Connection	Specified Condition
Cooling fan relay	3 - 5	10 Ω or higher
	3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

RADIATOR

Item	Tester Connection	Specified Condition
Radiator reservoir cap	For brand-new cap	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
	After using cap	78.5 kPa (0.8 kgf/cm^2, 11.4 psi)

TORQUE SPECIFICATIONS

COOLANT

Part Tightened	N*m	kgf*cm	ft.*lbf
Cylinder block drain cock plug x Cylinder block	13	130	9

WATER PUMP

Part Tightened		N*m	kgf*cm	ft.*lbf
Water pump x Cylinder block	for bolt A	21	214	15
	for bolt B	9.1	93	81 in.*lbf
	for bolt C	9.1	93	81 in.*lbf
V-ribbed belt tensioner assembly x Cylinder block		43	438	32
No. 2 idler pulley sub-assembly x Cylinder block		43	438	32
Water pump pulley x Water pump		21	214	15
Water inlet housing x Cylinder block		10	102	7
Radiator reservoir tank x Body		5.0	51	44 in.*lbf

THERMOSTAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Water inlet x Water inlet housing	10	102	7

RADIATOR

Part Tightened		N*m	kgf*cm	ft.*lbf
Oil cooler assembly x Cooler pipe	for Bolt A	15	150	11
	for Nut B	8.3	85	73 in.*lbf
Condenser assembly x Radiator assembly		5.0	51	44in.*lbf
Radiator support upper x Radiator support LH and RH		7.0	71	62 in.*lbf
Radiator support upper x Hood lock assembly		7.5	77	66 in.*lbf

2AZ-FE LUBRICATION

SERVICE DATA

OIL PRESSURE

Condition	Specified Condition
Idle	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
3,000 rpm	170 to 300 kPa (1.7 to 3.1 kgf/cm^2, 24 to 44 psi)

OIL PUMP

Item	Condition	Specified Condition
Oil pump rotor	Standard side clearance	0.030 to 0.085 mm (0.0012 to 0.0033 in.)
	Maximum side clearance	0.16 mm (0.0063 in.)
	Standard tip clearance	0.080 to 0.160 mm (0.0031 to 0.0063 in.)
	Maximum tip clearance	0.35 mm (0.0138 in.)
	Standard body clearance	0.100 to 0.170 mm (0.0039 to 0.0067 in.)
	Maximum body clearance	0.325 mm (0.01128 in.)
Oil pump drive chain	Maximum chain elongation	52.4 mm (2.063 in.)
Oil pump sprocket	Minimum crankshaft sprocket diameter (with chain)	48.2 mm (1.898 in.)
	Minimum oil pump drive shaft sprocket	48.2 mm (1.898 in.)
Chain tensioner plate	Maximum wear	0.5 mm (0.020 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Oil filter x Stiffening crankcase		13	133	10
Oil drain plug x Oil pan		25	255	18
Oil pump cover x Oil pump		8.8	90	78 in.*lbf
Oil pump relief valve x Oil pump		49	500	36
Oil pump strainer x Oil pump		8.8	90	78 in.*lbf
Oil pump X Cylinder block		19	194	14
Oil pressure switch x Cylinder block		15	153	11
Timing chain cover x Cylinder block, Cylinder head	Bolt A	9.0	92	80 in.*lbf
	Bolt B	25	255	18
	Bolt C	55	561	41
	Nut	11	112	8
Stud bolt x Cylinder block		22	220	16
Oil cooler x Cylinder block	Union bolt	79	800	58
	Nut	9.0	92	80 in.*lbf

SS

2GR-FE LUBRICATION

SERVICE DATA

OIL PRESSURE

Condition	Specified Condition
Idle	80 kPa (0.8 kgf/cm^2, 11.6 psi) or more
3,000 rpm	380 kPa (3.9 kgf/cm^2, 55.5 psi) or more

OIL PUMP

Item	Condition	Specified Condition
Oil pump rotor	Standard side clearance	0.030 to 0.090 mm (0.0012 to 0.0035 in.)
	Maximum side clearance	0.090 mm (0.0035 in.)
	Standard tip clearance	0.060 to 0.160 mm (0.0024 to 0.0063 in.)
	Maximum tip clearance	0.16 mm (0.0063 in.)
	Standard body clearance	0.250 to 0.325 mm (0.0098 to 0.0128 in.)
	Maximum body clearance	0.325 mm (0.01128 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Oil pressure switch x Oil pan		15	153	11
Oil filter cap x Oil pan		25	255	18
Oil filter drain plug x Oil filter cap		13	127	10
Oil pan drain plug x No. 2 oil pan		40	408	30
Oil pump cover x Timing chain cover		9.1	93	81 in.*lbf
Plug X Oil pump cover		49	500	37
Timing chain cover x Cylinder block, Cylinder head, Oil pan	Area 1, 2 Bolt	21	214	15
	Area 3 bolt, nut	21	214	15
	Area 4 Bolt A	43	438	32
	Area 4 except bolt A	21	214	15

2AZ-FE IGNITION

SERVICE DATA

Spark Plug	Standard electrode gap	1.0 to 1.1 mm (0.039 to 0.043 in.) for new spark plug
	Maximum electrode gap	1.3 mm (0.051 in.) for used spark plug

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Spark plug x Cylinder head subassembly	19	194	14
Ignition coil assembly x Cylinder head cover	9.0	92	80 in.*lbf

2GR-FE IGNITION

SERVICE DATA

Spark plug	Standard electrode gap	1.0 to 1.1 mm (0.039 to 0.043 in.) for new spark plug
	Maximum electrode gap	1.4 mm (0.055 in.) for used spark plug

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Spark plug x Cylinder head subassembly	18	184	13
Ignition coil assembly x Cylinder head cover	7.5	76	66 in.*lbf

2AZ-FE STARTING

SERVICE DATA

Starter assembly	Rated voltage and output power		12 V 1.7 kW
	Specified current		90 A or less at 11.5 V
Starter armature assembly	Standard depth		3.1 mm (0.122 in.)
	Minimum depth		3.8 mm (0.150 in.)
Brush length	Standard length		9.0 mm (0.354 in.)
	Minimum length		4.0 mm (0.157 in.)
Starter relay	Specified condition	1 - 2	Below 1 Ω
		3 - 5	10 kΩ or higher
Ignition switch	Resistance	LOCK: Between all terminals	10 kΩ or higher
		ACC: 2 (ACC) - 4 (AM1)	Below 1 Ω
		ON: 1 (IG1) - 2 (ACC) - 4 (AM1)	
		ON: 5 (AM2) - 6 (IG2)	
		START: 1 (ST1) - 3 (ST1) - 4 (AM1)	
		START: 5 (AM2) - 6 (IG2) - 7 (ST2)	

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Starter x Engine	Bolt	37	380	28
	Terminal 30	9.8	100	87 in.*lbf
	Terminal C	10	102	7
Starter x Clutch flexible hose bracket	Bolt	12	120	9
Starter commutator end frame assembly x Starter yoke assembly	Bolt	6.0	61	53 in.*lbf
Magnetic switch x Starter drive housing	Screw	7.5	76	66 in.*lbf

2GR-FE STARTING

SERVICE DATA

Starter assembly	Rated voltage and output power		12 V 1.7 kW
	Specified current		90 A or less at 11.5 V
Starter armature assembly	Standard depth		3.1 mm (0.122 in.)
	Minimum depth		3.8 mm (0.150 in.)
Brush length	Standard length		9.0 mm (0.354 in.)
	Minimum length		4.0 mm (0.157 in.)
Starter relay	Specified condition	1 - 2	Below 1 Ω
		3 - 5	10 kΩ or higher
Ignition switch	Resistance	LOCK: Between all terminals	10 kΩ or higher
		ACC: 2 (ACC) - 4 (AM1)	Below 1 Ω
		ON: 1 (IG1) - 2 (ACC) - 4 (AM1)	
		ON: 5 (AM2) - 6 (IG2)	
		START: 1 (ST1) - 3 (ST1) - 4 (AM1)	
		START: 5 (AM2) - 6 (IG2) - 7 (ST2)	
Engine switch	Resistance	Pushed: 7 (SS1) - 5 (GND)	Below 1 Ω
		Pushed: 2 (SS2) - 5 (GND)	
		Not pushed: 7 (SS1) - 5 (GND)	10 kΩ or higher
		Not pushed: 2 (SS2) - 5 (GND)	

SS

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Starter x Engine	Bolt	37	380	28
	Terminal 30	9.8	100	87 in.*lbf
	Terminal C	10	102	7
Starter commutator end frame assembly x Starter yoke assembly	Bolt	6.0	61	53 in.*lbf
Magnetic switch x Starter drive housing	Screw	7.5	76	66 in.*lbf

2AZ-FE CHARGING

SERVICE DATA

Charging circuit without load	Standard amperage: 10 A or less
	Standard voltage: 13.2 to 14.8 V
Charging circuit with load	Standard amperage: 30 A or more
Brush length	Standard exposed length: 9.5 to 11.5 mm (0.374 to 0.453 in.)
	Minimum exposed length: 4.5 mm (0.177 in.)
Generator rotor assembly	Slip rings resistance: 2.3 to 2.7 kΩ at 20°C (68°F)
	Standard slip ring diameter: 14.2 to 14.4 mm (0.559 to 0.567 in.)
	Minimum slip ring diameter: 14.0 mm (0.551 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Bearing retainer plate x Generator drive end frame	2.3	23	20 in.*lbf
Generator coil assembly x Generator drive end frame	5.8	59	51 in.*lbf
Generator brush holder assembly x Generator coil assembly	1.8	18	16 in.*lbf
Generator rear end cover x Generator coil assembly	4.6	47	41 in.*lbf
Clutch pulley x Generator rotor assembly	111	1,125	81
Generator assembly x Cord clip	4.6	47	41 in.*lbf
Generator assembly x Wire harness bracket	8.4	86	74 in.*lbf
Bolt A: Generator assembly x Cylinder block	21	215	16
Bolt B: Generator assembly x Cylinder block	52	530	38
Generator wire x Terminal B	9.8	100	87 in.*lbf

2GR-FE CHARGING

SERVICE DATA

Charging circuit without load	Standard amperage: 10 A or less
	Standard voltage: 12.1 to 15.4 V
Charging circuit with load	Standard amperage: 30 A or more
Brush length	Standard exposed length: 9.5 to 11.5 mm (0.374 to 0.453 in.)
	Minimum exposed length: 4.5 mm (0.177 in.)
Generator rotor assembly	Slip rings resistance: 2.3 to 2.7 kΩ at 20°C (68°F)
	Standard slip ring diameter: 14.2 to 14.4 mm (0.559 to 0.567 in.)
	Minimum slip ring diameter: 14.0 mm (0.551 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Bearing retainer plate x Generator drive end frame	2.3	23	20 in.*lbf
Generator coil assembly x Generator drive end frame	5.8	59	51 in.*lbf
Generator brush holder assembly x Generator coil assembly	1.8	18	16 in.*lbf
Generator rear end cover x Generator coil assembly	4.6	47	41 in.*lbf
Clutch pulley x Generator rotor assembly	111	1,125	81
Generator assembly x Generator bracket	20	204	15
Cylinder block x Generator bracket	20	204	15
Generator assembly x wire harness clamp stay	8.4	86	74 in.*lbf
Generator assembly x Cylinder block	43	438	32
Bolt B: Generator assembly x Cylinder block	52	530	38
Generator wire x Terminal B	9.8	100	87 in.*lbf

U250E AUTOMATIC TRANSAXLE

SERVICE DATA

Line pressure (Wheel locked)		
Engine idling	D position	372 to 412 kPa (3.8 to 4.2 kgf*cm^2, 54 to 60 psi)
	R position	672 to 742 kPa (6.8 to 7.5 kgf*cm^2, 97 to 108 psi)
AT stall (Throttle valve fully open)	D position	931 to 1,031 kPa (9.5 to 10.5 kgf*cm^2, 135 to 150 psi)
	R position	1,768 to 1,968 kPa (18.0 to 20.0 kgf*cm^2, 256 to 285 psi)
Engine stall revolution	D position	2,160 to 2,460 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	650 to 750 rpm
Drive plate runout	Maximum	0.20 mm (0.0079 in.)
Torque converter runout	Maximum	0.30 mm (0.0118 in.)
Differential oil seal drive in depth	Transaxle housing oil seal	- 0.5 to 0.5 mm (-0.020 to 0.020 in.)
	Differential side bearing retainer oil seal	- 0.5 to 0.5 mm (-0.020 to 0.020 in.)
Shift schedule		
D position (Normal)		
Throttle valve fully open	1 → 2	47 to 54 km/h (29 to 34 mph)
	2 → 3	92 to 101 km/h (57 to 63 mph)
	3 → 4	145 to 160 km/h (90 to 99 mph)
	4 → 5	208 to 226 km/h (129 to 140 mph)
	5 → 4	201 to 218 km/h (125 to 135 mph)
	4 → 3	137 to 151 km/h (85 to 94 mph)
	3 → 2	84 to 93 km/h (52 to 58 mph)
	2 → 1	34 to 40 km/h (21 to 25 mph)
Throttle valve fully closed	4 → 5	68 to 75 km/h (42 to 47 mph)
	5 → 4	36 to 42 km/h (22 to 26 mph)
3 position		
Throttle valve fully open	1 → 2	47 to 54 km/h (29 to 34 mph)
	2 → 3	92 to 101 km/h (57 to 63 mph)
	4 → 3	141 to 155 km/h (85 to 94 mph)
	3 → 2	84 to 93 km/h (52 to 58 mph)
	2 → 1	34 to 40 km/h (21 to 25 mph)
2 position		
Throttle valve fully open	1 → 2	47 to 54 km/h (29 to 34 mph)
	3 → 2	89 to 98 km/h (52 to 58 mph)
	2 → 1	34 to 40 km/h (21 to 25 mph)
L position		
Throttle valve fully open	2 → 1	40 to 46 km/h (25 to 29 mph)
Lock-up point (Throttle valve opening 5%) D position		
5th gear	Lock-up ON	76 to 84 km/h (47 to 52 mph)
	Lock-up OFF	75 to 82 km/h (47 to 51 mph)
4th gear	Lock-up ON	76 to 85 km/h (47 to 53 mph)
	Lock-up OFF	75 to 82 km/h (47 to 51 mph)
Flex lock-up point (Throttle valve opening 5%) D position		

5th gear	Lock-up ON	56 to 63 km/h (35 to 39 mph)
	Lock-up OFF	55 to 62 km/h (34 to 39 mph)
4th gear	Lock-up ON	41 to 47 km/h (25 to 29 mph)
	Lock-up OFF	40 to 46 km/h (25 to 29 mph)
Oil pump		
Body clearance	STD	0.10 to 0.17 mm (0.0039 to 0.0067 in.)
	Maximum	0.17 mm (0.0067 in.)
Tip clearance	STD	0.07 to 0.15 mm (0.0028 to 0.0059 in.)
	Maximum	0.15 mm (0.0059 in.)
Side clearance	STD	0.02 to 0.05 mm (0.0008 to 0.0020 in.)
	Maximum	0.05 mm (0.0020 in.)
Drive gear thickness	Mark A	11.690 to 11.699 mm (0.4602 to 0.4606 in.)
	Mark B	11.700 to 11.709 mm (0.4606 to 0.4610 in.)
	Mark C	11.710 to 11.720 mm (0.4610 to 0.4614 in.)
	Mark D	11.721 to 11.730 mm (0.4615 to 0.4618 in.)
	Mark E	11.731 to 11.740 mm (0.4619 to 0.4622 in.)
Driven gear thickness	Mark A	11.690 to 11.699 mm (0.4602 to 0.4606 in.)
	Mark B	11.700 to 11.709 mm (0.4606 to 0.4610 in.)
	Mark C	11.710 to 11.720 mm (0.4610 to 0.4614 in.)
	Mark D	11.721 to 11.730 mm (0.4615 to 0.4618 in.)
	Mark E	11.731 to 11.740 mm (0.4619 to 0.4622 in.)
Pump body bushing inside diameter	STD	38.113 to 38.138 mm (1.50050 to 1.50149 in.)
	Maximum	38.188 mm (1.50346 in.)
Stator shaft bushing inside diameter	STD	21.500 to 21.526 mm (0.84646 to 0.84748 in.)
	Maximum	21.57 mm (0.8492 in.)
Multiple disc clutch hub		
Inside diameter	STD	23.025 to 23.046 mm (0.9065 to 0.9073 in.)
	Maximum	23.09 mm (0.9091 in.)
Over direct clutch drum sub-assembly		
Inside diameter	STD	23.025 to 23.046 mm (0.9065 to 0.9073 in.)
	Maximum	23.09 mm (0.9091 in.)
Forward clutch		
Pack clearance		0.85 to 1.25 mm (0.0335 to 0.0492 in.)
Return spring free length		26.74 mm (1.0528 in.)
Flange thickness	Mark 0	2.85 mm (0.1122 in.)
	Mark 1	3.00 mm (0.1181 in.)
	Mark 2	3.15 mm (0.1240 in.)
	Mark 3	3.30 mm (0.1299 in.)
	Mark 4	3.45 mm (0.1358 in.)
	Mark 5	3.60 mm (0.1417 in.)
	Mark 6	3.75 mm (0.1476 in.)
Reverse clutch		
Pack clearance		0.60 to 0.82 mm (0.02362 to 0.03228 in.)

Flange thickness	Mark 0	2.9 mm (0.114 in.)
	Mark 1	3.0 mm (0.118 in.)
	Mark 2	3.1 mm (0.122 in.)
	Mark 3	3.2 mm (0.126 in.)
	Mark 4	3.3 mm (0.130 in.)
	Mark 5	3.4 mm (0.134 in.)
	Mark 6	3.5 mm (0.138 in.)
	Mark 7	3.6 mm (0.142 in.)
Direct clutch and O/D clutch		
Pack clearance		0.52 mm (0.02047 in.)
Return spring free length		25.91 mm (1.0201 in.)
Flange thickness	Mark 0	2.5 mm (0.098 in.)
	Mark 1	2.6 mm (0.102 in.)
	Mark 2	2.7 mm (0.106 in.)
	Mark 3	2.8 mm (0.110 in.)
	Mark 4	2.9 mm (0.114 in.)
	Mark 5	3.0 mm (0.118 in.)
	Mark 6	3.1 mm (0.122 in.)
2nd brake		
Pack clearance		0.53 to 0.91 mm (0.0209 to 0.0358 in.)
Return spring free length		16.61 mm (0.6539 in.)
Flange thickness	Mark 0	2.9 mm (0.114 in.)
	Mark 1	3.0 mm (0.118 in.)
	Mark 2	3.1 mm (0.122 in.)
	Mark 3	3.2 mm (0.126 in.)
	Mark 4	3.3 mm (0.130 in.)
	Mark 5	3.4 mm (0.134 in.)
	Mark 6	3.5 mm (0.138 in.)
	Mark 7	3.6 mm (0.142 in.)
	Mark 8	3.7 mm (0.146 in.)
2nd brake piston		
Inside diameter		More than 167 mm (6.57 in.)
U/D clutch		
Pack clearance		1.42 to 1.71 mm (0.0559 to 0.0673 in.)
U/D clutch drum bushing inside diameter	STD	32.56 to 32.58 mm (1.2818 to 1.2826 in.)
	Max.	32.63 mm (1.2846 in.)
Return spring free length		17.14 mm (0.6748 in.)
Flange thickness	Mark K	2.9 mm (0.114 in.)
	Mark A	3.0 mm (0.118 in.)
	Mark G	3.1 mm (0.122 in.)
	Mark B	3.2 mm (0.126 in.)
	Mark H	3.3 mm (0.130 in.)
	Mark C	3.4 mm (0.134 in.)
	Mark J	3.5 mm (0.138 in.)
U/D clutch No. 2		
Pack clearance		1.645 to 2.20 mm (0.0648 to 0.0866 in.)
Return spring free length		13.24 mm (0.5213 in.)

Flange thickness	Mark Y	2.8 mm (0.110 in.)
	Mark A	3.0 mm (0.118 in.)
	Mark B	3.2 mm (0.126 in.)
	Mark C	3.4 mm (0.134 in.)
	Mark D	3.6 mm (0.142 in.)
1st & reverse brake		
Pack clearance		0.745 to 1.21 mm (0.0293 to 0.0476 in.)
Return spring free length		17.63 mm (0.6941 in.)
Flange thickness	Mark 1	1.8 mm (0.071 in.)
	Mark 2	1.9 mm (0.075 in.)
	Mark 3	2.0 mm (0.079 in.)
	Mark 4	2.1 mm (0.083 in.)
	Mark 5	2.2 mm (0.087 in.)
	Mark 6	2.3 mm (0.091 in.)
	Mark 7	2.4 mm (0.094 in.)
	Mark 8	2.5 mm (0.098 in.)
U/D planetary gear		
Preload (at 60 rpm)		0.28 to 0.89 N*m (2.9 to 9.1 kgf*cm, 2.478 to 7.877 in.*lbf)
Front planetary gear		
Turning torque (at 60 rpm)		0.19 to 0.4 N*m (1.9 to 4.1 kgf*cm, 1.7 to 3.5 in.*lbf)
Input shaft		
End play		0.262 to 1.249 mm (0.0103 to 0.0492 in.)
Direct clutch to transaxle rear cover		
End play		0.199 to 0.970 mm (0.0078 to 0.0382 in.)
U/D planetary gear assembly to U/D cyindrical roller bearing		
End play		0.198 to 0.693 mm (0.00780 to 0.02728 in.)
Race thickness	Less than 7.339 mm (9.2890 in.)	3.5 mm (0.138 in.)
	7.339 mm (0.2890 in.) or more	3.8 mm (0.150 in.)
Transaxle rear cover		
Bearing press fit depth		20.55 to 21.25 mm (0.8091 to 0.8366 in.)
Transmission valve body		
Valve body installation bolt length	A	25 mm (0.984 in.)
	B	57 mm (2.244 in.)
	C	41 mm (1.614 in.)
Manual valve lever shaft oil seal		
Oil seal drive in depth		-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)
Front differential		
Backlash		0.05 to 0.20 mm (0.0020 to 0.0079 in.)
Thrust washer thickness	Mark 1	1.000 mm (0.0394 in.)
	Mark 2	1.100 mm (0.0433 in.)
	Mark 3	1.200 mm (0.0472 in.)
	Mark 4	1.3 mm (0.0512 in.)
Preload (at 60 rpm)	New bearing	0.20 to 1.0 N*m (2.0 to 10.2 kgf*cm, 1.8 to 8.9 in.*lbf)
	Used bearing	0.10 to 0.35 N*m (1.0 to 3.6 kgf*cm, 0.9 to 3.1 in.*lbf)

Flange thickness	Mark 0	1.90 mm (0.0748 in.)
	Mark 1	1.95 mm (0.0768 in.)
	Mark 2	2.00 mm (0.0787 in.)
	Mark 3	2.05 mm (0.0807 in.)
	Mark 4	2.10 mm (0.0827 in.)
	Mark 5	2.15 mm (0.0846 in.)
	Mark 6	2.20 mm (0.0866 in.)
	Mark 7	2.25 mm (0.0886 in.)
	Mark 8	2.30 mm (0.0906 in.)
	Mark 9	2.35 mm (0.0925 in.)
	Mark A	2.40 mm (0.0945 in.)
	Mark B	2.45 mm (0.0965 in.)
	Mark C	2.50 mm (0.0984 in.)
	Mark D	2.55 mm (0.1004 in.)
	Mark E	2.60 mm (0.1024 in.)
	Mark F	2.65 mm (0.1043 in.)
	Mark G	2.70 mm (0.1063 in.)
	Mark H	2.75 mm (0.1083 in.)
	Mark J	2.80 mm (0.1102 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Park/neutral position switch	Bolt	5.4	55	48 in.*lbf
	Nut	6.9	70	61 in.*lbf
Control shaft lever x Control shaft		13	130	9
Shift control cable x Control shaft lever		15	150	11
Transaxle housing x Engine block	Bolt A	64	653	47
	Bolt B	46	470	34
	Bolt C	46	470	34
	Bolt D	44	449	32
Torque converter clutch x Drive plate		41	418	30
Engine mounting bracket FR x Transaxle		64	653	47
Oil filler tube x Transaxle		5.5	56	49 in.*lbf
No. 1 transmission control cable bracket x Transaxle		12	122	9
No. 2 transmission control cable bracket x Transaxle		12	122	9
Oil cooler tube clamp x Control cable bracket		5.4	55	48 in.*lbf
Oil cooler inlet tube x Transaxle		34	350	25
Oil cooler outlet tube x Transaxle		34	350	25
Wire harness x Transaxle		12	130	9
Wire harness clamp x Transaxle		8.4	85	74 in.*lbf
Revolution sensor NC sensor x Transaxle		5.4	55	49 in.*lbf
Revolution sensor NT sensor x Transaxle		5.4	55	49
Drain plug x Oil pan		49	500	36
Transmission wire x Transaxle		5.4	55	48 in.*lbf
ATF temperature sensor x Valve body		6.6	67	58 in.*lbf
Oil pan x Transaxle		7.8	80	69 in.*lbf
Solenoid valve x Valve body	Bolt A, B	11	110	8
	Bolt C, D	6.6	67	58 in.*lbf
Valve body x Transaxle		11	110	8
Oil strainer x Valve body		11	110	8
Floor shift assembly x Body		12	122	9
Control cable x Body		5.0	51	43 in.*lbf
Front planetary gear lock nut		185 to 350	1,886 to 3,569	136 to 258
Brake apply tube clamp x Transaxle case		5.4	55	48 in.*lbf
Transaxle case No.1 plug x Transaxle rear cover		7.4	75	65 in.*lbf
Transaxle case No.1 plug x Transaxle housing		7.4	75	65 in.*lbf
Transaxle case No.1 plug x Transaxle case		7.4	75	65 in.*lbf
Transaxle rear cover x Transaxle case	Bolt A	19	190	14
	Other bolt	25	250	18
Pawl shaft clamp x Transaxle case		9.8	100	87 in.*lbf
Oil pump assembly x Transaxle case		22	225	16
Transaxle housing x Transaxle case	Bolt A	22	225	16
	Bolt B	29	296	21
	Bolt C	29	296	21
Parking lock pawl bracket x Transaxle case		20	205	15
Manual detent spring x Transaxle case	Bolt A	20	205	15
	Bolt B	12	120	9
Transmission wire x Transaxle housing		5.4	55	48 in.*lbf
Transmission valve body x Transaxle case		11	110	8
ATF temperature sensor clamp x Transmission valve body		6.6	67	58 in.*lbf

Part Tightened	N*m	kgf*cm	ft.*lbf
Valve body oil strainer assembly x Transmission valve body	11	110	8
Speed sensor x Transaxle case	8.8	90	79 in.*lbf
Oil cooler tube union (Outlet oil cooler union) x Transaxle case	27	276	20
Oil cooler tube union (Inlet oil cooler union) x Transaxle case	25	255	18
Oil pump body x Stator shaft assembly	9.8	100	87 in.*lbf
Line pressure control solenoid assembly x Transmission valve body assembly	6.6	67	58 in.*lbf
Shift solenoid valve SL1 x Transmission valve body assembly	6.6	67	58 in.*lbf
Shift solenoid valve SL2 x Transmission valve body assembly	11	110	8
Shift solenoid valve SL3 x Transmission valve body assembly	6.6	67	58 in.*lbf
Shift solenoid valve S4 x Transmission valve body assembly	11	110	8
Shift solenoid valve DSL x Transmission valve body assembly	11	110	8
Front differential case x Front differential ring gear	95	970	70
Front planetary gear nut	280	2,855	207

U660E AUTOMATIC TRANSAXLE

SERVICE DATA

Line pressure (Wheel locked)		
Engine idling	D position	372 to 412 kPa (3.8 to 4.2 kgf*cm^2, 54 to 60 psi)
	R position	672 to 742 kPa (6.8 to 7.5 kgf*cm^2, 97 to 108 psi)
AT stall (Throttle valve fully open)	D position	1,160 to 1,350 kPa (11.8 to 13.8 kgf*cm^2, 168 to 196 psi)
	R position	1,900 to 2,200 kPa (19.4 to 22.4 kgf*cm^2, 276 to 319 psi)
Engine stall revolution	D position	2,370 to 2,670 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (A/C OFF)	N position	600 to 700 rpm
Drive plate runout	Maximum	0.20 mm (0.0079 in.)
Torque converter runout	Maximum	0.30 mm (0.0118 in.)
Differential oil seal drive in depth	LH side	-0.5 to 0.5 mm (-0.020 to 0.020 in.)
	RH side	-0.5 to 0.5 mm (-0.020 to 0.020 in.)
Shift schedule		
D position		
Throttle valve fully open (Normal)	1 → 2	50 to 56 km/h (31 to 35 mph)
	2 → 3	93 to 103 km/h (58 to 64 mph)
	3 → 4	128 to 141 km/h (80 to 88 mph)
	4 → 5	174 to 193 km/h (108 to 120 mph)
	5 → 6	258 to 285 km/h (160 to 177 mph
	6 → 5	252 to 278 km/h (157 to 173 mph
	5 → 4	169 to 187 km/h (105 to 116 mph))
	4 → 3	121 to 134 km/h (75 to 83 mph))
	3 → 2	87 to 96km/h (54 to 60 mph)
	2 → 1	33 to 37 km/h (21 to 23 mph)
Throttle valve fully open (Cold)	1 → 2	37 to 41 km/h (23 to 25 mph)
	2 → 3	72 to 79 km/h (45 to 47 mph)
	3 → 4	110 to 122 km/h (68 to 76 mph)
	4 → 5	174 to 192 km/h (108 to 119 mph)
	5 → 6	258 to 285 km/h (160 to 177 mph
	6 → 5	252 to 278 km/h (157 to 173 mph
	5 → 4	169 to 187 km/h (105 to 116 mph))
	4 → 3	104 to 115 km/h (65 to 71 mph))
	3 → 2	65 to 72km/h (40 to 45 mph)
	2 → 1	33 to 37 km/h (21 to 23 mph)
Throttle valve fully open (Failure)	1 → 3	27 to 30 km/h (17 to 19 mph)
	3 → 1	6 to 8 km/h (4 to 5 mph)
Throttle valve fully closed (Normal)	4 → 5	48 to 54 km/h (30 to 34 mph)
	5 → 6	65 to 72 km/h (40 to 45 mph)
	6 → 5	58 to 65 km/h (36 to 40 mph)
	5 → 4	46 to 51 km/h (29 to 32 mph)
5, 4, 3, 2, 1 position		

Manual down shift speed	→ 5	252 to 278 km/h (156 to 172 mph)
	→ 4	169 to 187 km/h (105 to 116 mph)
	→ 3	121 to 134 km/h (75 to 83 mph)
	→ 2	87 to 96km/h (54 to 60 mph)
	→ 1	38 to 42 km/h (23 to 26 mph)
Lock-up schedule (Throttle valve opening 5%) D position		
6th gear	Lock-up ON	69 to 76 km/h (43 to 47 mph)
	Lock-up OFF	67 to 74 km/h (42 to 46 mph)
5th gear	Lock-up ON	59 to 66 km/h (37 to 41 mph)
	Lock-up OFF	57 to 63 km/h (35 to 39 mph)
4th gear	Lock-up ON	43 to 47 km/h (27 to 29 mph)
	Lock-up OFF	41 to 45 km/h (25 to 28 mph)
3rd gear	Lock-up ON	30 to 33 km/h (19 to 21 mph)
	Lock-up OFF	28 to 31 km/h (17 to 19 mph)
2nd gear	Lock-up ON	23 to 25 km/h (14 to 16 mph)
	Lock-up OFF	22 to 24 km/h (14 to 15 mph)
Flex lock-up schedule (Throttle valve opening 5%) D position		
6th gear	Lock-up ON	62 to 68 km/h (39 to 42 mph)
	Lock-up OFF	60 to 67 km/h (38 to 42 mph)
5th gear	Lock-up ON	50 to 55 km/h (31 to 34 mph)
	Lock-up OFF	50 to 55 km/h (31 to 34 mph)
4th gear	Lock-up ON	37 to 41 km/h (23 to 25 mph)
	Lock-up OFF	35 to 39 km/h (22 to 24 mph)
3rd gear	Lock-up ON	27 to 30 km/h (17 to 19 mph)
	Lock-up OFF	25 to 28 km/h (16 to 17 mph)
2nd gear	Lock-up ON	20 to 22 km/h (12 to 14 mph)
	Lock-up OFF	18 to 20 km/h (11 to 12 mph)
Oil pump		
Body clearance	STD	0.08 to 0.15 mm (0.0031 to 0.0059 in.)
	Maximum	0.15 mm (0.0059 in.)
Side clearance	STD	0.025 to 0.04 mm (0.0010 to 0.0016 in.)
	Maximum	0.04 mm (0.0016 in.)
Drive gear thickness		11.547 to 11.555 mm (0.4546 to 0.4549 in.)
		11.555 to 11.563 mm (0.4549 to 0.4552 in.)
		11.564 to 11.571 mm (0.4553 to 0.4556 in.)
		11.572 to 11.579 mm (0.4556 to 0.4559 in.)
		11.580 to 11.587 mm (0.4559 to 0.4562 in.)
Driven gear thickness		11.547 to 11.555 mm (0.4546 to 0.4549 in.)
		11.555 to 11.563 mm (0.4549 to 0.4552 in.)
		11.564 to 11.571 mm (0.4553 to 0.4556 in.)
		11.572 to 11.579 mm (0.4556 to 0.4559 in.)
		11.580 to 11.587 mm (0.4559 to 0.4562 in.)
Pump body bushing inside diameter	STD	43.113 to 43.138 mm (1.6974 to 1.6983 in.)
	Maximum	43.188 mm (1.7003 in.)
Stator shaft bushing inside diameter	STD	22.500 to 22.526 mm (0.8858 to 0.8868 in.)
	Maximum	22.57 mm (0.8886 in.)
Rear planetary sun gear		
Inside diameter	STD	25.580 to 25.601 mm (1.0071 to 1.0079 in.)
	Maximum	25.601 mm (1.0079 in.)

Under drive planetary gear		
Clearance		0.18 to 0.54 mm (0.0071 to 0.0213 in.)
Planetary sun gear		
Inside diameter	STD	25.525 to 25.546 mm (1.0049 to 1.0058 in.)
	Maximum	25.546 mm (1.0058 in.)
2nd brake piston return spring		
Return spring free length		23.85 mm (0.9390 in.)
Planetary gear		
Clearance	A point	0.23 to 0.59 mm (0.0091 to 0.0232 in.)
	B point	0.16 to 0.66 mm (0.0063 to 0.0260 in.)
1st and reverse brake return spring		
Return spring free length		15.79 mm (0.6217 in.)
No. 2 brake		
Piston stroke		0.884 to 1.196 mm (0.0348 to 0.0471 in.)
Flange thickness	Mark 40	4.0 mm (0.157 in.)
	Mark 41	4.1 mm (0.161 in.)
	Mark 42	4.2 mm (0.165 in.)
	Mark 43	4.3 mm (0.169 in.)
	Mark 44	4.4 mm (0.173 in.)
No. 1 brake		
Piston stroke		0.807 to 0.974 mm (0.0318 to 0.0383 in.)
Flange thickness	Mark 30	3.0 mm (0.118 in.)
	Mark 31	3.1 mm (0.122 in.)
	Mark 32	3.2 mm (0.126 in.)
	Mark 33	3.3 mm (0.130 in.)
	Mark 34	3.4 mm (0.134 in.)
	Mark 35	3.5 mm (0.138 in.)
No. 3 brake		
Clearance		0.599 to 0.761 mm (0.0024 to 0.0300 in.)
Flange thickness	Mark 38	3.8 mm (0.150 in.)
	Mark 39	3.9 mm (0.154 in.)
	Mark 40	4.0 mm (0.157 in.)
	Mark 41	4.1 mm (0.161 in.)
	Mark 42	4.2 mm (0.165 in.)
	Mark 43	4.3 mm (0.169 in.)
No. 1 clutch disc		
Piston stroke		0.806 to 0.974 mm (0.0317 to 0.0383 in.)
Flange thickness	Mark 30	3.0 mm (0.118 in.)
	Mark 31	3.1 mm (0.122 in.)
	Mark 32	3.2 mm (0.126 in.)
	Mark 33	3.3 mm (0.130 in.)
	Mark 34	3.4 mm (0.134 in.)
	Mark 35	3.5 mm (0.138 in.)
No. 2 clutch disc		
Pack clearance		0.544 to 0.744 mm (0.0214 to 0.0293 in.)

Flange thickness	Mark 30	3.0 mm (0.118 in.)
	Mark 31	3.1 mm (0.122 in.)
	Mark 32	3.2 mm (0.126 in.)
	Mark 33	3.3 mm (0.130 in.)
	Mark 34	3.4 mm (0.134 in.)
	Mark 35	3.5 mm (0.138 in.)
Input shaft		
End play		0.012 to 1.250 mm (0.0005 to 0.0492 in.)
Intermediate shaft		
End play		0.007 to 1.113 mm (0.0003 to 0.0438 in.)
Transaxle rear cover		
Bearing press fit depth		21.5 to 21.9 mm (0.8464 to 0.8622 in.)
Transmission valve body		
Valve body installation bolt length	A	25 mm (0.98 in.)
	B	30 mm (1.18 in.)
	C	35 mm (1.38 in.)
	D	45 mm (1.77 in.)
	E	55 mm (2.17 in.)
Manual valve lever shaft oil seal		
Oil seal drive in depth		-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)
Front differential		
Backlash		0 to 0.15 mm (0 to 0.0059 in.)
Thrust washer thickness		1.50 mm (0.0591 in.)
		1.55 mm (0.0610 in.)
		1.60 mm (0..0630 in.)
		1.65 mm (0.0650 in.)
		1.70 mm (0.0669 in.)
		1.75 mm (0.0689 in.)
		1.80 mm (0.0709 in.)
		1.85 mm (0.0728 in.)
		1.90 mm (0.0748 in.)
Preload (at 10 rpm)		1.05 to 1.93 N*m (10.7 to 19.67 kgf*cm, 9.29 to 17.08 in.*lbf)

Shim thickness	2.000 mm (0.0787 in.)
	2.025 mm (0.0797 in.)
	2.050 mm (0.0807 in.)
	2.075 mm (0.0817 in.)
	2.100 mm (0.0827 in.)
	2.125 mm (0.0837 in.)
	2.150 mm (0.0847 in.)
	2.175 mm (0.0856 in.)
	2.200 mm (0.0866 in.)
	2.225 mm (0.0876 in.)
	2.250 mm (0.0886 in.)
	2.275 mm (0.0896 in.)
	2.300 mm (0.0906 in.)
	2.325 mm (0.0915 in.)
	2.350 mm (0.0925 in.)
	2.375 mm (0.0935 in.)
	2.400 mm (0.0945 in.)
	2.425 mm (0.0935 in.)
	2.450 mm (0.0965 in.)
	2.475 mm (0.0974 in.)
	2.500 mm (0.0984 in.)
	2.525 mm (0.0994 in.)
	2.550 mm (0.1004 in.)
	2.575 mm (0.1014 in.)
	2.600 mm (0.1024 in.)
	2.625 mm (0.1034 in.)
	2.650 mm (0.1043 in.)
	2.675 mm (0.1053 in.)
	2.700 mm (01063 in.)
	2.725 mm (0.1073 in.)
	2.750 mm (0.1083 in.)
	2.775 mm (0.1093 in.)
	2.800 mm (0.1102 in.)
	2.825 mm (0.1112 in.)
	2.850 mm (0.1122 in.)
	2.875 mm (0.1132 in.)
Counter driven gear	
Preload (at 10 rpm)	3.29 to 6.07 N*m (35.35 to 61.86 kgf*cm, 2.42 to 4.46 in.*lbf)

Shim thickness	2.000 mm (0.0787 in.)
	2.025 mm (0.0797 in.)
	2.050 mm (0.0807 in.)
	2.075 mm (0.0817 in.)
	2.100 mm (0.0827 in.)
	2.125 mm (0.0837 in.)
	2.150 mm (0.0847 in.)
	2.175 mm (0.0856 in.)
	2.200 mm (0.0866 in.)
	2.225 mm (0.0876 in.)
	2.250 mm (0.0886 in.)
	2.275 mm (0.0896 in.)
	2.300 mm (0.0906 in.)
	2.325 mm (0.0915 in.)
	2.350 mm (0.0925 in.)
	2.375 mm (0.0935 in.)
	2.400 mm (0.0945 in.)
	2.425 mm (0.0935 in.)
	2.450 mm (0.0965 in.)
	2.475 mm (0.0974 in.)
	2.500 mm (0.0984 in.)
	2.525 mm (0.0994 in.)
	2.550 mm (0.1004 in.)
	2.575 mm (0.1014 in.)
	2.600 mm (0.1024 in.)
	2.625 mm (0.1034 in.)
	2.650 mm (0.1043 in.)
	2.675 mm (0.1053 in.)
	2.700 mm (01063 in.)
	2.725 mm (0.1073 in.)
	2.750 mm (0.1083 in.)
	2.775 mm (0.1093 in.)
	2.800 mm (0.1102 in.)
	2.825 mm (0.1112 in.)
	2.850 mm (0.1122 in.)
	2.875 mm (0.1132 in.)
	2.900 mm (0.1141 in.)
	2.925 mm (0.1152 in.)
	2.950 mm (0.1161 in.)
	2.975 mm (0.1171 in.)
	3.000 mm (0.1181 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Park/neutral position switch		5.4	55	48 in.*lbf
Control shaft lever x Control shaft		13	130	9
Transmission control cable x Control shaft lever		13	130	9
Transaxle housing x Engine block	Bolt A	64	653	47
	Bolt B	64	653	47
	Bolt C	46	469	34
	Bolt D	43	439	32
Torque converter clutch x Drive plate		41	418	30
Engine mounting front bracket x Transaxle case		64	653	47
Refill plug x Transaxle case		49	500	36
Over flow plug x Transaxle case		40	408	30
Control cable bracket No. 1 x Transaxle case		12	122	9
Oil cooler tube union (inlet oil cooler union) x Transaxle case		27	275	20
Oil cooler tube union (outlet oil cooler union) x Transaxle case		27	275	20
Wire harness x Transaxle case		12	122	9
Wire harness clamp bracket x Transaxle case		8.4	86	74 in.*lbf
Transmission revolution sensor x Valve body		11	112	8
No. 1 transmission oil filler tube x Oil pan		1.7	17	15 in.*lbf
Speedometer driven hole cover x Transaxle case		5.5	56	49 in.*lbf
Transmission wire (ATF temperature sensor) x Valve body		11	112	8
Oil pan x Transaxle case		7.5	76	66 in.*lbf
Transmission wire x Valve body		11	112	8
Valve body x Transaxle case		11	112	8
Oil strainer x Valve body		11	112	8
Breather bracket x Camshaft housing sub-assembly LH		5.5	56	49 in.*lbf
Air cleaner bracket x Body		7.8	80	69 in.*lbf
No. 2 shift cable grommet retainer x Body		5.0	51	44 in.*lbf
Flywheel housing under cover x Transaxle housing		7.8	80	69 in.*lbf
TCM x Transaxle case		11	112	8
Shift lock control unit x Body		12	122	9
Differential gear lube apply tube x Transaxle housing		23	234	17
Lock nut x Transaxle case		120	1,223	88
Transaxle case No. 1 plug x Transaxle rear cover		7.4	75	65 in.*lbf
Transaxle case No. 1 plug x Transaxle housing		7.4	75	65 in.*lbf
Transaxle case No. 1 plug x Transaxle case		29	296	20
Transaxle rear cover x Transaxle case	Bolt A	23	234	17
	Bolt B	17	173	12
Transaxle rear cover plate x Transaxle case		7.5	76	66 in.*lbf
Oil pump assembly x Transaxle case		23	234	17
Transaxle housing x Transaxle case	Bolt A	31	316	23
	Bolt B	23	234	17
Pawl shaft clamp x Transaxle case		23	234	17
Pawl stopper plate x Transaxle case		23	234	17
Manual detent spring x Transaxle case		23	234	17
Oil pump body x Stator shaft assembly		9.3	95	82 in.*lbf
Shift solenoid valve SL3 x Transmission valve body assembly		11	110	8
Shift solenoid valve SL4 x Transmission valve body assembly		11	110	8
Front differential case x Front differential ring gear		120	1,223	88

CLUTCH

SERVICE DATA

Pedal height from asphalt sheet		148.0 to 158.0 mm (5.8268 to 6.2205 in.)	
Clutch pedal free play		5.0 to 15.0 mm (0.197 to 0.591 in.)	
Clutch pedal push rod play at pedal top		1.0 to 5.0 mm (0.039 to 0.197 in.)	
Clutch release point from pedal full stroke end position		25 mm (0.98 in.) or more	
Disc rivet head depth	Minimum	0.3 mm (0.012 in.)	
Disc runout	Maximum	0.8 mm (0.031 in.)	
Diaphragm spring finger wear	Maximum depth:	0.5 mm (0.020 in.)	
	Maximum width:	6.0 mm (0.236 in.)	
Flywheel runout	Maximum	0.1 mm (0.004 in.)	
Diaphragm spring tip alignment	Maximum variation:	0.5 mm (0.020 in.)	
Clutch start switch assembly	Specified condition	Switch position ON (pushed)	Below 1 Ω
		Switch position OFF (not pushed)	10 kΩ or higher

SS

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Clutch pedal sub-assembly x Clutch pedal support	37	375	27
Clutch pedal support set bolt x Body	19	195	14
Clutch pedal support set nut x Body	12	120	9
Cylinder push rod clevis lock nut	12	120	9
Clutch master cylinder assembly x Clutch pedal support	12	120	9
Clutch master cylinder assembly x Flexible hose tube	15	155	11
Release cylinder bleeder plug	8.3	85	74 in.*lbf
Clutch release cylinder assembly x Transaxle housing	12	120	9
Clutch accumulator assembly set nut	12	120	9
Clutch release cylinder assembly x Flexible hose tube	15	155	11
Clutch accumulator assembly x Flexible hose tube	15	155	11
Release cylinder heat insulator set bolt	12	120	9
Clutch accumulator bracket set bolt A	12	120	9
Clutch accumulator bracket set bolt B	37	380	28
Clutch cover assembly x Flywheel	19	195	14
Release fork support x Transaxle assembly	47	480	35
Clutch start switch assembly set nut	16	160	12

E351 MANUAL TRANSAXLE

SERVICE DATA

MANUAL TRANSAXLE ASSEMBLY:

Transmission case oil seal driven in depth	3.0 to 4.0 mm (0.1181 to 0.1575 in.)
Front transaxle case cover oil seal drive in depth	-0.5 to 0.5 mm (-0.020 to 0.020 in.)

MANUAL TRANSAXLE UNIT:

5th gear thrust clearance	Standard clearance	0.10 to 0.65 mm (0.0039 to 0.0256 in.)
5th gear radial clearance	Standard clearance	0.009 to 0.050 mm (0.0004 to 0.0020 in.)
Reverse idler gear sub-assembly inside diameter	Standard inside diameter	20.056 to 20.074 mm (0.7896 to 0.7903 in.)
	Maximum inside diameter	20.074 (0.7903 in.)
Reverse idler gear shaft outer diameter	Standard outer diameter	19.984 to 20.000 mm (0.7868 to 0.7874 in.)
	Minimum outer diameter	19.984 mm (0.7868 in.)
No. 3 transmission hub sleeve groove - thickness of the claw part on No. 3 gear shift fork	Standard clearance	0.15 to 0.35 mm (0.0059 to 0.0138 in.)
5th gear inside diameter	Standard inside diameter	34.981 to 34.997 mm (1.3772 to 1.3778 in.)
	Maximum inside diameter	34.997 mm (1.3778 in.)
Front transaxle case cover oil seal driven in depth		-0.5 to 0.5 mm (-0.020 to 0.020 in.)
Transmission case oil seal driven in depth		3.0 to 4.0 mm (0.1181 to 0.1575 in.)
Output shaft rear bearing clearance		3.8 to 4.4 mm (0.150 to 0.173 in.)
Output shaft bearing preload	New bearing	0.8 to 1.6 N*m (8.16 to 16.32 kgf*cm, 7.1 to 14.2 in.*lbf)
	Used bearing	0.5 to 1.0 N*m (5.10 to 10.20 kgf*cm, 4.4 to 8.9 in.*lbf)
Output shaft rear bearing shim thickness	0	1.30 mm (0.0512 in.)
	1	1.35 mm (0.0531 in.)
	2	1.40 mm (0.0551 in.)
	3	1.45 mm (0.0571 in.)
	4	1.50 mm (0.0591 in.)
	5	1.55 mm (0.0610 in.)
	6	1.60 mm (0.0630 in.)
	7	1.65 mm (0.0650 in.)
	8	1.70 mm (0.0669 in.)
	9	1.75 mm (0.0689 in.)
	A	1.80 mm (0.0709 in.)
	B	1.85 mm (0.0728 in.)
	C	1.90 mm (0.0748 in.)
	D	1.95 mm (0.0768 in.)
	E	2.00 mm (0.0787 in.)
	F	2.05 mm (0.0807 in.)
	G	2.10 mm (0.0827 in.)
	H	2.15 mm (0.0846 in.)
	J	2.20 mm (0.0866 in.)
	K	2.25 mm (0.0886 in.)
	L	2.30 mm (0.0906 in.)
	M	2.35 mm (0.0925 in.)
	N	2.40 mm (0.0945 in.)
	P	2.45 mm (0.0965 in.)
	Q	2.50 mm (0.0984 in.)

Front differential case tapered roller bearing preload	New bearing	0.8 to 1.6 N*m (8.16 to 16.32 kgf*cm, 7.1 to 14.2 in.*lbf)
	Used bearing	0.5 to 1.0 N*m (5.10 to 10.20 kgf*cm, 4.4 to 8.9 in.*lbf)
Front differential case shim rear thickness	0	2.00 mm (0.0787 in.)
	1	2.05 mm (0.0807 in.)
	2	2.10 mm (0.0827 in.)
	3	2.15 mm (0.0846 in.)
	4	2.20 mm (0.0866 in.)
	5	2.25 mm (0.0886 in.)
	6	2.30 mm (0.0906 in.)
	7	2.35 mm (0.0925 in.)
	8	2.40 mm (0.0945 in.)
	9	2.45 mm (0.0965 in.)
	A	2.50 mm (0.0984 in.)
	B	2.55 mm (0.1004 in.)
	C	2.60 mm (0.1024 in.)
	D	2.65 mm (0.1043 in.)
	E	2.70 mm (0.1063 in.)
	F	2.75 mm (0.1083 in.)
	G	2.80 mm (0.1102 in.)
	H	2.85 mm (0.1122 in.)
Front differential case oil seal clearance		1.0 to 2.0 mm (0.0394 to 0.0.787 in.)
Input shaft front bearing clearance		4.28 to 4.60 mm (0.1685 to 0.1811 in.)
Reverse restrict pin clearance		12.5 to 13.5 mm (0.492 to 0.531 in.)
No. 3 transmission clutch hub snap ring clearance		0.1 mm or less (0.0039 in. or less)
No. 3 transmission clutch hub snap ring thickness	a	1.75 to 1.80 mm (0.0689 to 0.0709 in.)
	b	1.80 to 1.85 mm (0.0709 to 0.0728 in.)
	c	1.85 to 1.90 mm (0.0728 to 0.0748 in.)
	d	1.90 to 1.95 mm (0.0748 to 0.0768 in.)
	e	1.95 to 2.00 mm (0.0768 to 0.0787 in.)
	f	2.00 to 2.05 mm 0.0787 to 0.0807 in.)
	g	2.05 to 2.10 mm (0.0807 to 0.0827 in.)
	h	2.10 to 2.15 mm (0.0827 to 0.0846 in.)
	j	2.15 to 2.20 mm (0.0846 to 0.0866 in.)

INPUT SHAFT ASSEMBLY:

4th gear thrust clearance	Standard clearance	0.10 to 0.57 mm (0.0039 to 0.0224 in.)
3rd gear thrust clearance	Standard clearance	0.10 to 0.35 mm (0.0039 to 0.0138 in.)
4th gear radial clearance	KOYO made	0.009 to 0.053 mm (0.0004 to 0.0021 in.)
	NSK made	0.009 to 0.051 mm (0.0004 to 0.0020 in.)
3rd gear radial clearance	KOYO made	0.009 to 0.053 mm (0.0004 to 0.0021 in.)
	NSK made	0.009 to 0.051 mm (0.0004 to 0.0020 in.)
Input shaft run out	Maximum run out	0.03 mm (0.0012 in.)
Input shaft standard outer diameter	A	35.984 to 36.000 mm (1.4167 to 1.4173 in.)
	B	35.984 to 36.000 mm (1.4167 to 1.4173 in.)
	C	27.957 to 27.972 mm (1.1007 to 1.1013 in.)
Input shaft minimum outer diameter	A	35.984 mm (1.4167 in.)
	B	35.984 mm (1.4167 in.)
	C	27.957 mm (1.1007 in.)
4th gear inside diameter	Standard inside diameter	42.009 to 42.025 mm (1.6539 to 1.6545 in.)
	Maximum inside diameter	42.025 mm (1.6545 in.)

3rd gear inside diameter	Standard inside diameter	43.009 to 43.025 mm (1.6933 to 1.6939 in.)
	Maximum inside diameter	43.025 mm (1.6939 in.)
Between the 4th gear spline end and synchronizer outer ring back clearance		0.75 to 1.65 mm (0.0295 to 0.0650 in.)
Between the 3rd gear spline end and synchronizer outer ring back clearance		0.65 to 1.75 mm (0.0256 to 0.0689 in.)
No. 2 transmission hub sleeve groove - thickness of the claw part on No.1 gear shift fork	Standard clearance	0.11 to 0.69 mm (0.0043 to 0.0272 in.)
No. 2 transmission clutch hub snap ring clearance	Standard clearance	0.1 mm or less (0.0039 in. or less)
No. 2 transmission clutch hub snap ring thickness	H	2.30 to 2.35 mm (0.0906 to 0.0925 in.)
	J	2.35 to 2.40 mm (0.0925 to 0.0945 in.)
	K	2.40 to 2.45 mm (0.0945 to 0.0965 in.)
	L	2.45 to 2.50 mm (0.0965 to 0.0984 in.)
	M	2.50 to 2.55 mm (0.0984 to 0.1004 in.)
	N	2.55 to 2.60 mm (0.1004 to 0.1024 in.)
	P	2.60 to 2.65 mm (0.1024 to 0.1043 in.)
Input shaft rear radial ball bearing snap ring clearance	Standard clearance	0.1 mm or less (0.0039 in. or less)
Input shaft rear radial ball bearing snap ring thickness	1	2.35 to 2.40 mm (0.0925 to 0.0945 in.)
	2	2.40 to 2.45 mm (0.0945 to 0.0965 in.)
	3	2.45 to 2.50 mm (0.0965 to 0.0984 in.)
	4	2.50 to 2.55 mm (0.0984 to 0.1004 in.)
	5	2.55 to 2.60 mm (0.1004 to 0.1024 in.)
	6	2.60 to 2.65 mm (0.1024 to 0.1043 in.)
	7	2.65 to 2.70 mm (0.1043 to 0.1063 in.)
	8	2.70 to 2.75 mm (0.1063 to 0.1083 in.)

OUTPUT SHAFT ASSEMBLY:

1st gear thrust clearance	Standard clearance	0.25 to 0.40 mm (0.0098 to 0.0157 in.)
2nd gear thrust clearance	Standard clearance	0.10 to 0.35 mm (0.0039 to 0.0138 in.)
1st gear radial clearance	KOYO made	0.009 to 0.053 mm (0.0004 to 0.0021 in.)
	NSK made	0.009 to 0.051mm (0.0004 to 0.0020in.)
2nd gear radial clearance	KOYO made	0.009 to 0.053 mm (0.0004 to 0.0021 in.)
	NSK made	0.009 to 0.051mm (0.0004 to 0.0020in.)
Output shaft run out	Maximum run out	0.03 mm (0.0012 in.)
Output shaft standard outer diameter	A	37.610 to 37.626 mm (1.4807 to 1.4813 in.)
	B	34.502 to 34.512 mm (1.3583 to 1.3587 in.)
Output shaft minimum outer diameter	A	37.610 mm (1.4807 in.)
	B	34.502 mm (1.3583 in.)
2nd gear inside diameter	Standard inside diameter	50.009 to 50.025 mm (1.9689 to 1.9695 in.)
	Maximum inside diameter	50.025 mm (1.9695 in.)
1st gear inside diameter	Standard inside diameter	51.009 to 51.025 mm (2.0082 to 2.0089 in.)
	Maximum inside diameter	51.025 mm (2.0089 in.)
Between the 2nd gear while and No. 2 synchronizer ring back clearance		0.70 to 1.45 mm (0.0276 to 0.0571 in.)
Between the 1st gear while and No. 1 synchronizer ring set back clearance		0.70 to 1.45 mm (0.0276 to 0.0571 in.)
Reverse gear groove - thickness of the claw part on No .1 gear shift fork clearance	Standard clearance	0.15 to 0.35 mm (0.0059 to 0.0138 in.)
2nd gear radial clearance	KOYO made	0.009 to 0.053 mm (0.0004 to 0.0021 in.)
	NSK made	0.009 to 0.051 mm (0.0004 to 0.0020 in.)
1st gear radial clearance	KOYO made	0.009 to 0.053 mm (0.0004 to 0.0021 in.)
	NSK made	0.009 to 0.051 mm (0.0004 to 0.0020 in.)
2nd gear thrust clearance	Standard clearance	0.10 to 0.35 mm (0.0039 to 0.0138 in.)

1st gear thrust clearance	Standard clearance	0.25 to 0.40 mm (0.0098 to 0.0157 in.)

SHIFT AND SELECT LEVER SHAFT ASSEMBLY:

Control shaft cover oil seal drive in depth	28.0 to 29.0 mm (1.1022 to 1.142 in.)
Shift lever slotted pin clearance to the No. 1 shift lever inner assembly	0.4 to 0.5 mm (-0.0157 to 0.0197 in.)
Shift lever slotted pin clearance to the No. 2 shift lever inner	5.8 to 6.8 mm (0.228 to 0.268 in.)

DIFFERENTIAL CASE ASSEMBLY:

Front differential side gear backlash	Standard backlash	0.05 to 0.20 mm (0.0020 to 0.0079 in.)
Front differential pinion thrust washer thickness	Minimum thickness	0.9 mm (0.035 in.)
Front differential No. 1 pinion shaft thickness	Minimum diameter	17.975 mm (0.70768 in.)
Front differential side gear backlash	Standard backlash	0.05 to 0.20 mm (0.0020 to 0.0079 in.)
Front differential side gear thrust washer thickness	1	1.00 mm (0.0394 in.)
	2	1.10 mm (0.0433 in.)
	3	1.20 mm (0.0472 in.)
	4	1.30 mm (0.0512 in.)

TORQUE SPECIFICATIONS

Part Tightened		N*m	kgf*cm	ft.*lbf
Floor shift lever assembly x Body		12	122	9
Floor shift cable transmission control shift retainer x Body		5.0	51	44 in.*lbf
Clutch tube bracket set bolt		17	173	13
Reverse idler gear shaft bolt		30	306	22
Gear shift fork No. 3 shift fork bolt		24	244	17
Manual transmission output shaft rear set nut		123	1,250	90
Control shaft cover set bolt		20	204	15
Control shift lever x Shift and select lever shaft		6.4	65	57 in.*lbf
Selecting bellcrank assembly x Manual transmission case		20	200	14
Release fork support x manual transaxle case		47	480	35
Manual transaxle x Engine	Bolt A	64	653	47
	Bolt B	46	470	34
	Bolt C	44	449	32
Engine mounting insulator LH x Manual transaxle		64	653	47
Manual transmission case protector x Manual transaxle		18	184	13
Engine mounting bracket FR x Manual transaxle		64	653	47
Clutch line x Manual transaxle	Bolt A	12	122	9
	Bolt B	7.0	71	62 in.*lbf
Wire harness clamp bracket x Manual transaxle		8.4	86	74 in.*lbf
Ground cable x Manual transaxle		12	122	9
Transmission case x Manual transaxle case		29	296	21
Manual transaxle case x Transmission case		29	296	21
Bearing retainer rear x Transmission case		43	438	32
Manual transaxle case receiver x Manual transaxle case		7	71	62 in.*lbf
No. 1 gear shift head x No. 2 gear shift fork shaft		24	245	18
No. 1 gear shift fork x No. 1 gear shift fork shaft		24	245	18
Reverse shift arm bracket x Manual transaxle case		17	173	13
Reverse restrict pin plug x Transmission case		13	133	9.6
No. 1 oil receiver pipe x Transmission case		17	173	13
No. 2 oil receiver pipe x Transmission case		17	173	13
Clutch tube bracket x Transmission case		17	173	13
Reverse idler gear shaft bolt x Transmission case		30	306	22
No. 3 transmission clutch hub gear shift fork shaft x input shaft		24	245	18
Manual transmission output rear set nut x Output shaft		123	1,254	91
Drain plug sub-assembly x Transmission case		49	500	36
Manual transmission filler plug x Transmission case		49	500	36
Back up light switch assembly x Transmission case		40	408	30
Manual Transmission breather plug x Transmission case		49	500	36
No. 1 lock ball assembly x Transmission case		29	296	21
Speedometer driven hole cover sub-assembly set bolt		5.5	56	48 in.*lbf
Selecting bellcrank support x Selecting bellcrank No. 2 plate washer		12	122	9
Front differential ring gear x Front differential case		106	1,081	78

DRIVE SHAFT

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel set nut	103	1,050	76
Lower ball joint x Front suspension lower No. 1 arm	75	765	55
Tie rod end x Steering knuckle	49	500	36
Axle hub x Front drive shaft	294	3,000	217
Front drive shaft center bearing set bolt	32	330	24
Front speed sensor set bolt	8.0	82	71 in.*lbf
Front flexible hose and speed sensor wire harness x Shock absorber	19	192	14
Front stabilizer link x Front shock absorber	74	755	55

AXLE

SERVICE DATA

Front axle hub bearing for looseness	Maximum: 0.05 mm (0.0020 in.)
Front axle hub for runout	Maximum: 0.05 mm (0.0020 in.)
Rear axle hub bearing for looseness	Maximum: 0.05 mm (0.0020 in.)
Rear axle hub for runout	Maximum: 0.07 mm (0.0027 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front wheel set nut	103	1,050	76
Front disc brake caliper x Steering knuckle	107	1,090	79
Front axle assembly x Front shock absorber	210	2,140	155
Axle hub x Front drive shaft	294	3,000	217
Front disc brake dust cover x Steering knuckle	8.3	85	73 in.*lbf
Rear wheel set nut	103	1,050	76
Rear axle carrier x Rear disc brake caliper	62	630	46
Rear flexible hose x Rear shock absorber	19	192	14
Rear shock absorber x Rear axle carrier	180	1,836	133
Rear axle hub and bearing set bolt	80	816	59
Rear strut rod x Rear axle carrier	113	1,150	83
Rear No. 2 suspension arm x Rear axle carrier	100	1,020	74
Rear No. 1 suspension arm x Rear axle carrier	100	1,020	74

SUSPENSION

SERVICE DATA

Front wheel alignment	Toe-in (total)	
	A - B	0 +- 2 mm (0 - 0.08 in.)
	Rack end length difference	1.5 mm (0.06 in.) or less

for USA and Canada:

Front wheel alignment	Vehicle height		
	ACV40L-CEAGKA	Front A - B	125 mm (4.92 in.)
		Rear C - D	54 mm (2.13 in.)
	GSV40L-CETGKA	Front A - B	126 mm (4.96 in.)
		Rear C - D	55 mm (2.17 in.)
	ACV40L-AEAGKA	Front A - B	125 mm (4.92 in.)
		Rear C - D	53 mm (2.09 in.)
	GSV40L-AETGKA	Front A - B	126 mm (4.96 in.)
		Rear C - D	54 mm (2.13 in.)
	ACV40L-CEANKA	Front A - B	125 mm (4.92 in.)
		Rear C - D	54 mm (2.13 in.)
	ACV40L-CEMNKA	Front A - B	125 mm (4.92 in.)
		Rear C - D	53 mm (2.09 in.)
	GSV40L-CETNKA	Front A - B	126 mm (4.96 in.)
		Rear C - D	55 mm (2.17 in.)
	ACV40L-AEANKA	Front A - B	125 mm (4.92 in.)
		Rear C - D	53 mm (2.09 in.)
	ACV40L-AEMNKA	Front A - B	125 mm (4.92 in.)
		Rear C - D	52 mm (2.05 in.)
	GSV40L-AETNKA	Front A - B	126 mm (4.96 in.)
		Rear C - D	54 mm (2.13 in.)
	ACV40L-CEASKA	Front A - B	128 mm (5.04 in.)
		Rear C - D	57 mm (2.24 in.)
	ACV40L-CEMSKA	Front A - B	127 mm (5.00 in.)
		Rear C - D	55 mm (2.17 in.)
	GSV40L-CETSKA	Front A - B	129 mm (5.08 in.)
		Rear C - D	58 mm (2.28 in.)

for Mexico:

Front wheel alignment	Vehicle height		
	ACV40L-CEAGKA	Front A - B	115 mm (4.53 in.)
		Rear C - D	40 mm (1.57 in.)
	GSV40L-CETGKA	Front A - B	116 mm (4.57 in.)
		Rear C - D	41mm (1.61 in.)
	ACV40L-CEANKA	Front A - B	115 mm (4.53 in.)
		Rear C - D	40 mm (1.57 in.)

SS

for USA and Canada:

Front wheel alignment	Wheel turning angle		
	ACV40L-CEAGKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	GSV40L-CETGKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	ACV40L-AEAGKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	GSV40L-AETGKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	ACV40L-CEANKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	ACV40L-CEMNKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	GSV40L-CETNKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	ACV40L-AEANKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	ACV40L-AEMNKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	GSV40L-AETNKA	Inside wheel	38°22'+-2° (38.37°+-2°)
		Outside wheel reference	33°33' (33.55°)
	ACV40L-CEASKA	Inside wheel	38°42'+-2° (38.70°+-2°)
		Outside wheel reference	33°46' (33.77°)
	ACV40L-CEMSKA	Inside wheel	38°42'+-2° (38.70°+-2°)
		Outside wheel reference	33°46' (33.77°)
	GSV40L-CETSKA	Inside wheel	38°18'+-2° (38.30°+-2°)
		Outside wheel reference	33°32' (33.53°)

for Mexico:

Front wheel alignment	Wheel turning angle		
	ACV40L-CEAGKA	Inside wheel	38°18'+-2° (38.30°+-2°)
		Outside wheel reference	33°41' (33.68°)
	GSV40L-CETGKA	Inside wheel	38°18'+-2° (38.30°+-2°)
		Outside wheel reference	33°41' (33.68°)
	ACV40L-CEANKA	Inside wheel	38°18'+-2° (38.30°+-2°)
		Outside wheel reference	33°41' (33.68°)

for USA and Canada:

Front wheel alignment	Camber		
	ACV40L-CEAGKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEAGKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETGKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMNKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETNKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEANKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEMNKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETNKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEASKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMSKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETSKA	Camber	-0°40'+-45' (-0.67°+-0.75°)
		Right-left difference	45' (0.75°) or less

for Mexico:

Front wheel alignment	Camber		
	ACV40L-CEAGKA	Camber	-0°35'+-45' (-0.58°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Camber	-0°35'+-45' (-0.58°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Camber	-0°35'+-45' (-0.58°+-0.75°)
		Right-left difference	45' (0.75°) or less

SS

for USA and Canada:

Front wheel alignment	Caster		
	ACV40L-CEAGKA	Caster	3°00'+-45' (3.00°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEAGKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETGKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Caster	3°00'+-45' (3.00°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMNKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETNKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEANKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEMNKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETNKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEASKA	Caster	3°00'+-45' (3.00°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMSKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETSKA	Caster	2°55'+-45' (2.92°+-0.75°)
		Right-left difference	45' (0.75°) or less

for Mexico:

Front wheel alignment	Caster		
	ACV40L-CEAGKA	Caster	2°45'+-45' (2.75°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Caster	2°40'+-45' (2.67°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Caster	2°45'+-45' (2.75°+-0.75°)
		Right-left difference	45' (0.75°) or less

for USA and Canada:

Front wheel alignment	Steering axis inclination		
	ACV40L-CEAGKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEAGKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETGKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMNKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETNKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEANKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEMNKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETNKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEASKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMSKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETSKA	Steering axis inclination	12°15'+-45' (12.25°+-0.75°)
		Right-left difference	45' (0.75°) or less

for Mexico:

Front wheel alignment	Steering axis inclination		
	ACV40L-CEAGKA	Steering axis inclination	12°00'+-45' (12.00°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Steering axis inclination	12°00'+-45' (12.00°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Steering axis inclination	12°00'+-45' (12.00°+-0.75°)
		Right-left difference	45' (0.75°) or less

front lower ball joint	Lower ball joint turning torque	1.0 to 3.4 N*m (10 to 35 kgf*cm, 9 to 30 in.*lbf)
front stabilizer link assembly	Stabilizer link ball joint turning torque	0.05 to 2.0 N*m (0.5 to 20 kgf*cm, 0.4 to 18 in.*lbf)

Rear wheel alignment	Toe-in (total)	
	A +B	0 +- 24mm (0 +- 0.4 in.)
	C - D	4 +- 2mm (0.16 +- 0.08 in.)
	Rack end length difference	1.5 mm (0.06 in.) or less

SS

for USA and Canada:

Rear wheel alignment	Camber		
	ACV40L-CEAGKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEAGKA	Camber	-1°15'+-45' (-1.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETGKA	Camber	-1°15'+-45' (-1.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMNKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETNKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEANKA	Camber	-1°15'+-45' (-1.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-AEMNKA	Camber	-1°15'+-45' (-1.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-AETNKA	Camber	-1°15'+-45' (-1.25°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEASKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEMSKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETSKA	Camber	-1°18'+-45' (-1.30°+-0.75°)
		Right-left difference	45' (0.75°) or less

for Mexico:

Rear wheel alignment	Camber		
	ACV40L-CEAGKA	Camber	-1°06'+-45' (-1.10°+-0.75°)
		Right-left difference	45' (0.75°) or less
	GSV40L-CETGKA	Camber	-1°06'+-45' (-1.10°+-0.75°)
		Right-left difference	45' (0.75°) or less
	ACV40L-CEANKA	Camber	-1°06'+-45' (-1.10°+-0.75°)
		Right-left difference	45' (0.75°) or less

Rear stabilizer link assembly	Stabilizer link ball joint turning torque	0.05 to 1.0 N*m (0.5 to 10 kgf*cm, 0.4 to 8.9 in.*lbf)

TORQUE SPECIFICATIONS

FRONT:

Part tighten	N*m	kgf*cm	ft.*lbf
Suspension support x Body	85	867	63
Shock absorber x Axle	210	2,141	155
Speed sensor wire harness x Shock absorber	19	194	14
Piston rod x Suspension support	70	714	52
Stabilizer link x Shock absorber	74	755	55
Suspension lower No. 1 arm x Member	A 200 B 206	A 2,040 B 2,100	A 148 B 152
Engine mounting insulator x Member	87	887	64
Lower ball joint x Steering knuckle	123	1,250	91
Stabilizer bracket x Member	27	275	20
Stabilizer link x Stabilizer bar	74	755	55
Front wheel set nut	103	1,050	76
Tie rod end lock nut	74	755	55

REAR:

Part tighten	N*m	kgf*cm	ft.*lbf
Suspension support x Body	39	398	29
Shock absorber x Axle carrier	180	1,840	133
Piston rod x Suspension support	55	561	41
Speed sensor wire harness x Shock absorber	5.0	51	44 in.*lbf
Flexible hose x Shock absorber	19	194	14
Stabilizer link x Shock absorber	39	398	29
Strut rod x Axle carrier	113	1,152	83
Strut rod x Body	113	1,152	83
Parking brake No. 3 cable x Body	6.0	61	53 in.*lbf
Suspension No. 1 arm x Suspension member	100	1,020	74
Suspension No. 1 arm x Axle carrier	100	1,020	74
Suspension No. 2 arm x Suspension member	100	1,020	74
Suspension No. 2 arm x Axle carrier	100	1,020	74
Stabilizer bracket x Suspension member	31	316	23
Stabilizer link x Stabilizer bar	39	398	29
Suspension member x Suspension member lower stopper	A 55 B 38	A 561 B 388	A 41 B 28
Suspension member x Body	56	571	41
Rear wheel set nut	103	1,050	76
No. 2 Suspension arm lock nut	56	571	41

TIRE AND WHEEL

SERVICE DATA

Cold tire inflation pressure

Tire size	Front	Rear
P215/60R16 94V	210 kPa (2.1 kgf/cm^2, 31 psi)	210 kPa (2.1 kgf/cm^2, 31 psi)
P215/55R17 93V	220 kPa (2.2 kgf/cm^2, 32 psi)	220 kPa (2.2 kgf/cm^2, 32 psi)

When driving under the above vehicle conditions at sustained high speeds above 160 km/h (100 mph), in countries where such speeds are permitted bylaw, inflate the front and rear tires to 240 kPa (2.4 kgf*cm^2, 35 psi) provided that it does not exceed the maximum cold tire inflation pressure molded on the tire sidewall.

Tire runout	1.4 mm (0.055 in.) or less
Imbalance after adjustment	8.0 g (0.018 lb) or less

TORQUE SPECIFICATIONS

TIRE PRESSURE WARNING RECEIVER

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning receiver set bolt	7.5	77	66 in.*lbf

TIRE PRESSURE WARNING VALVE AND TRANSMITTER

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning valve and transmitter set nut	4.0	41	35 in.*lbf
Front wheel set nuts	103	1,050	76
Rear wheel set nuts	103	1,050	76

TIRE PRESSURE WARNING ECU

Part tightened	N*m	kgf*cm	ft.*lbf
Tire pressure warning ECU set nut	7.5	77	66 in.*lbf

BRAKE CONTROL

SERVICE DATA

Front speed sensor	for BOSCH	LH	1 (FL+) - 2 (FL-)	Always	0.92 to 1.22 kΩ at 20 °C(68°F)
			1 (FL+) - Body ground	Always	10 kΩ or higher
			2 (FL-) - Body ground	Always	10 kΩ or higher
		RH	1 (FR+) - 2 (FR-)	Always	0.92 to 1.22 kΩ at 20 °C(68°F)
			1 (FR+) - Body ground	Always	10 kΩ or higher
			2 (FR-) - Body ground	Always	10 kΩ or higher
	for ADVICS	LH	1 (FL+) - 2 (FL-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
			1 (FL+) - Body ground	Always	10 kΩ or higher
			2 (FL-) - Body ground	Always	10 kΩ or higher
		RH	1 (FR+) - 2 (FR-)	Always	1.4 to 1.8 kΩ at 20°C (68 °F)
			1 (FR+) - Body ground	Always	10 kΩ or higher
			2 (FR-) - Body ground	Always	10 kΩ or higher
Skid control sensor	for BOSCH	LH	1 (RR+) - 2 (RR-)	Always	Below 2.2 kΩ
			1 (RR+) - Body ground	Always	10 kΩ or higher
			2 (RR-) - Body ground	Always	10 kΩ or higher
		RH	1 (RL+) - 2 (RL-) Below	Always	Below 2.2 kΩ
			1 (RL+) - Body ground 10	Always	10 kΩ or higher
			2 (RL-) - Body ground	Always	10 kΩ or higher
	for ADVICS	LH	2 (RL+) - 1 (RL-)	Always	0.9 to 2.1 kΩ
			2 (RL+) - Body ground	Always	10 kΩ or higher
			1 (RL-) - Body ground	Always	10 kΩ or higher
		RH	2 (RR+) - 1 (RR-)	Always	0.9 to 2.1 kΩ
			2 (RR+) - Body ground	Always	10 kΩ or higher
			1 (RR-) - Body ground	Always	10 kΩ or higher
VSC NO. 1 (Fail Safe) relay			Resistance 3 - 5	Always	10 kΩ or higher
			Resistance 3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω
VSC NO. 1 relay			Resistance 3 - 5	Always	10 kΩ or higher
			Resistance 3 - 5	Apply B+ between terminals 1 and 2	Below 1 Ω

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TORQUE SPECIFICATIONS

Part tightened			N*m	kgf*cm	ft.*lbf
Brake actuator x Brake actuator bracket	BOSCH		8	82	71 in.*lbf
	ADVICS		5.4	55	48 in.*lbf
Brake actuator bracket x Body			19	195	14
Brake actuator x Brake tube	BOSCH with VSC	Bolt A	15 (14)	155 (143)	11 (10)
		Bolt B	19 (17)	194 (173)	14 (13)
	BOSH without VSC		15 (14)	155 (143)	11 (10)
	ADVICS		15 (14)	155 (143)	11 (10)
Front speed sensor x Knuckle			8	82	71 in.*lbf
Front speed sensor x Body			5	51	44 in.*lbf
Front speed sensor x Absorber			19	194	14
Yaw rate and acceleration sensor			13	133	10

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BRAKE

SERVICE DATA

Brake pedal height	Automatic transaxle	129.9 to 139.9 mm(5.114 to 5.508 in.9
	Manual transaxle	131.9 to 141.9 mm (5.193 to 5.587 in.)
Standard stop light switch clearance		1.5 to 2.5 mm (0.059 to 0.098 in.)
Brake pedal free play		1.0 to 6.0 mm (0.039 to 0.236 in.)
Brake pedal reserve distance from dash panel at 500 N (51 kgf, 112 lbf)	Automatic transaxle	61 mm (2.502 in.)
	Manual transaxle	63 mm (2.480 in.)
Brake booster push rod to piston clearance (for TMMK made)	Standard clearance	0 mm (0 in.)
Front brake pad lining thickness	Standard	12.0 mm (0472 in.)
	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	Standard	28.0 mm (1.102 in.)
	Minimum	25.0 mm (0.983 in.)
Front brake disc runout	Maximum	0.05 mm (0.0020in.)
Rear disc brake pad lining thickness	Standard	11.0 mm (0.433 in.)
	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	Standard	10.0 mm (0.390 in.)
	Minimum	8.5 mm (0.334 in.)
Rear brake disc runout	Maximum	0.15 mm (0.0059 in.)

TORQUE SPECIFICATIONS

Parts tightened			N*m	kgf*cm	ft.*lbf
Brake master cylinder x Brake tube	for TMC made		15 (14)	155 (143)	11 (11)
	for TMMK made without VSC		15 (14)	155 (143)	11 (11)
	for TMMK made with VSC	Nut (A)	15 (14)	155 (143)	11 (11)
		Nut (B)	19 (17)	194 (173)	14 (13)
Brake booster clevis lock nut			26	265	19
Brake light switch			1.5	15	13 in.*lbf
Brake pedal sub-assembly set bolt			37	377	27
Brake pedal support assembly x Body			19	194	14
Brake pedal support assembly x No. 1 brake pedal support plate			13	133	10
No. 1 brake pedal support x Body			19	194	14
Brake master cylinder x Brake booster			13	133	10
Cowl top outer front panel sub-assembly x Body		Nut	85	867	63
		Bolt	5.0	51	44 in.*lbf
Brake booster assembly x Brake pedal support assembly			13	133	10
Front brake cylinder mounting x Steering knuckle			107	1,090	79
Bleeder plug			8.3	85	73 in.*lbf
Front disc brake cylinder mounting x Front disc brake cylinder assembly			34	350	25
Front disc brake cylinder assembly x Flexible hose			29	300	21
Flexible hose x Tube			15 (14)	155 (143)	11 (10)
Front flexible hose x Absorber			19	194	14
Rear disc brake cylinder mounting set bolt			62	632	46
Rear disc brake cylinder mounting x Rear disc brake cylinder assembly			27	275	20
Rear disc brake cylinder assembly x Flexible hose			33	337	24
Rear flexible hose x Absorber			19	194	14

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PARKING BRAKE

SERVICE DATA

Parking brake pedal travel at 300 N (31 kgf, 68 lbf)		7 to 10 notches
Parking brake lever travel at 200 N (20 kgf, 45 lbf)		7 to 9 notches
Rear brake disc inside diameter	Standard	170 mm (6.69 in.)
	Maximum	171 mm (6.73 in.)
Parking brake shoe lining thickness	Standard	2.0 mm (0.079 in.)
	Maximum	1.0 mm (0.039 in.)
Clearance between parking brake shoe and parking brake she lever		Less than 0.35 mm (0.014 in.)

TORQUE SPECIFICATIONS

Parts tightened		N*m	kgf*cm	ft.*lbf
Wheel nut		103	1050	76
Wire adjusting No. 1 nut (for Automatic Transaxle)		5.4	55	48 in.*lbf
Wire adjusting No. 1 nut (for Manual Transaxle)		5.0	51	44 in.*lbf
Parking brake switch assembly		1.0	10	9.0 in.*lbf
Parking brake lever sub-assembly x Body	for TMC made	21	214	15
	for TMMK made	22	224	16
Parking brake pedal assembly x Body		39	398	29
No. 1 parking brake cable assembly x Body	Bolt	15	153	11
	Nut	5.4	55	48 in.*lbf
No. 1 parking brake cable assembly x No. 4 parking brake cable assembly		5.4	55	48 in.*lbf
Floor shift lever assembly x Body		12	122	9
No. 3 parking brake cable assembly x Body	Bolt (A)	8.5	87	75 in.*lbf
	Bolt (B)	6.0	61	53 in.*lbf
	Nut (C)	6.0	61	53 in.*lbf
No. 3 parking brake assembly x Backing plate		8.0	82	71 in.*lbf
No. 2 front floor heat lower insulator x Body		4.9	50	43 in.*lbf
Rear disc brake caliper set bolt		62	632	46
Parking brake shoe guide plate set bolt		18	184	13

STEERING COLUMN

SERVICE DATA

Steering free play (Maximum)	30 mm (1.18 in.)

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Steering intermediate shaft assembly x Steering column assembly (for TMC made)	35	360	26
Steering column assembly set nuts (for TMC made)	25	255	18
Steering column assembly set bolt (for TMC made)	25	255	18
Steering intermediate shaft assembly x Power steering link assembly (for TMC made)	35	360	26
Steering post assembly set nuts (for TMMK made)	21	214	16
Steering post assembly set bolt (for TMMK made)	21	214	16
Steering post assembly x Power steering link assembly (for TMMK made)	35	360	26
Steering wheel assembly set nut	50	510	37

POWER STEERING

SERVICE DATA

POWER STEERING FLUID

Fluid level rise (Maximum)	5 mm (0.20 in.)
Fluid pressure at idle speed with valve closed	7,800 to 8,300 kPa (79.5 to 84.6 kgf/cm2, 1,131 to 1,204 psi)
Fluid pressure at idle speed with valve fully open and turn the steering wheel to the full lock position	7,800 to 8,300 kPa (79.5 to 84.6 kgf/cm2, 1,131 to 1,204 psi)

STEERING WHEEL

Steering effort at idle speed (Reference)	LE Grade, XLE Grade	6.0 N*m (61 kgf*cm, 53 in.*lbf)
	SE Grade	6.8 N*m (69 kgf*cm, 60 in.*lbf)

VANE PUMP (for 2AZ-FE)

Vane pump shaft and vane pump housing oil clearance (Maximum)	0.07 mm (0.0028 in.)
Vane plate thickness (Standard)	1.405 to 1.411 mm (0.05531 to 0.05555 in.)
Clearance between the rotor groove and plate (Maximum)	0.03 mm (0.0012 in.)
Compression spring free length (Minimum)	29.2 mm (1.150 in.)
Vane pump rotating torque	0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf)

VANE PUMP (for 2GR-FE)

Vane pump shaft and vane pump housing oil clearance (Maximum)	0.07 mm (0.0028 in.)
Vane plate thickness (Standard)	1.405 to 1.411 mm (0.05531 to 0.05555 in.)
Clearance between the rotor groove and plate (Maximum)	0.03 mm (0.0012 in.)
Compression spring free length (Minimum)	29.2 mm (1.150 in.)
Vane pump rotating torque	0.27 N*m (2.8 kgf*cm, 2.4 in.*lbf)

POWER STEERING LINK

Steering rack runout (Maximum)	0.3 mm (0.0118 in.)
Tie rod end sub-assembly stud bolt turning torque	0.98 to 3.92 N*m (10 to 40 kgf*cm, 8.7 to 34.7 in.*lbf)
Total preload (Control valve rotating torque)	1.5 N*m (15.3 kgf*cm, 13.3 in.*lbf) or less

TORQUE SPECIFICATIONS

VANE PUMP (for 2AZ-FE)

Part tightened	N*m	kgf*cm	ft.*lbf
Vane pump rear housing x Vane pump front housing	22	224	16
Pressure port union x Vane pump front housing	69	704	51
Power steering fluid pressure switch x Vane pump assembly	21	214	16
Power steering suction port union x Vane pump assembly	12	122	9
Vane pump assembly set bolts	29 (43)	294 (439)	21 (32)
Pressure feed tube assembly x Vane pump assembly (union bolt)	50	510	37
Front wheel RH set nuts	103	1,050	76

( ): For use without SST

VANE PUMP (for 2GR-FE)

Part tightened	N*m	kgf*cm	ft.*lbf
Vane pump rear housing x Vane pump front housing	22	224	16
Pressure port union x Vane pump front housing	69	704	51
Power steering fluid pressure switch x Vane pump assembly	21	214	16
Power steering suction port union x Vane pump assembly	12	122	9
Vane pump assembly set bolts	29 (43)	294 (439)	21 (32)
Pressure feed tube assembly clamp set bolt	9.8	100	87 in.*lbf
Pressure feed tube assembly x Vane pump assembly (union bolt)	50	510	37
Front wheel RH set nuts	103	1,050	76

( ): For use without SST

POWER STEERING LINK

Part tightened	N*m	kgf*cm	ft.*lbf
Power steering control valve housing x Rack housing	21	214	16
Control valve lock nut	25	250	18
Rack housing cap	54	546	40
Steering rack end sub-assembly	60 (84)	613 (852)	44 (62)
Right turn pressure tube x Power steering link assembly (union nut)	11 (13)	114 (128)	8 (9)
Left turn pressure tube x Power steering link assembly (union nut)	11 (13)	114 (128)	8 (9)
Power steering link assembly set bolts	70	714	52
Pressure feed tube assembly clamp set bolts	9.8	100	87 in.*lbf
Pressure feed tube assembly x Power steering link assembly (union nut)	22 (25)	227 (250)	16 (18)
Tie rod assembly x Steering knuckle	49	500	36
Steering sliding yoke x Power steering link assembly	35	360	26
Front wheels set nuts	103	1,050	76

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AIR CONDITIONING

SERVICE DATA

Refrigerant charge volume (Standard:)	450 to 550g (15.9 to 19.4 oz.)

Magnetic clutch clearance	0.26 to 0.60 mm (0.010 to 0.024 in.)

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
AIR CONDITIONING UNIT			
Air conditioning unit assembly x Body	9.8	100	87 in.*lbf
Instrument panel reinforcement assembly x Body (Collar)	6.0	61	53 in.*lbf
Instrument panel reinforcement assembly x Body (Passenger seat)	20	204	15
Instrument panel reinforcement assembly x Body (Driver seat)	17	175	13
Air conditioning tube assembly x Cooler expansion valve	3.5	35	30 in.*lbf
Suction pipe sub-assembly x Air conditioning tube assembly	9.8	100	7
BLOWER UNIT			
Blower assembly x Instrument panel reinforcement assembly	9.8	100	7
COMPRESSOR AND MAGNETIC CLUTCH (for 2GR-FE)			
Compressor and magnetic clutch x Engine	25	255	18
No. 1 cooler refrigerant discharge hose x Compressor and magnetic clutch	9.8	100	7
No. 1 cooler refrigerant suction hose x Compressor and magnetic clutch	9.8	100	7
Magnet clutch hub x Cooler compressor assembly	18	184	13
COMPRESSOR AND PULLEY (for 2AZ-FE)			
Compressor and pulley x Engine	25	255	18
No. 1 cooler refrigerant discharge hose x Compressor and pulley	9.8	100	7
No. 1 cooler refrigerant suction hose x Compressor and pulley	9.8	100	7
CONDENSER			
Cooler condenser assembly x Radiator assembly	5.0	51	44 in.*lbf
Cooler refrigerant discharge pipe x Cooler condenser assembly	9.8	100	87 in.*lbf
Air conditioner tube and accessory x Cooler condenser assembly	9.8	100	87 in.*lbf
Cap x cooler condenser assembly	2.9	30	26 in.*lbf

SUPPLEMENTAL RESTRAINT SYSTEM

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Steering pad x Steering wheel assembly	8.8	90	78 in.*lbf
Driver side knee airbag assembly x Instrument panel reinforcement	10	102	7
Curtain shield airbag assembly x Body	11	112	8
Center airbag sensor assembly x Body	17.5	179	13
Front airbag sensor x Body	17.5	179	13
Side airbag sensor x Body	9.0	92	80 in.*lbf
Rear airbag sensor x Body	9.0	92	80 in.*lbf
Seat position sensor x Front seat assembly	8.0	82	71 in.*lbf

SEAT BELT

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
FRONT SEAT INNER BELT ASSEMBLY			
Front seat inner belt assembly x Front seat assembly	42	428	31
FRONT SEAT OUTER BELT ASSEMBLY			
Front seat outer belt assembly (Floor anchor) x Body	42	428	31
Front seat outer belt assembly (Shoulder anchor) x Front shoulder belt anchor adjuster assembly	42	428	31
Front shoulder belt anchor adjuster assembly x Body	42	428	31
Front seat outer belt assembly (For upper bolt) x Body	7.5	77	66 in.*lbf
Front seat outer belt assembly (For lower bolt) x Body	42	428	31
REAR SEAT INNER BELT ASSEMBLY			
Rear seat inner with center belt assembly RH (For TMC Made) x Body	42	428	31
Rear seat inner with center belt assembly RH (For TMMK Made) x Body	42	428	31
Rear seat inner with center belt assembly LH floor anchor (For TMC Made) x Body	42	428	31
Rear seat inner with center belt assembly LH floor anchor (For TMMK Made) x Body	42	428	31
Rear seat outer belt assembly floor anchor (For LH side) x Body	42	428	31
Rear seat outer belt assembly floor anchor (For RH side) x Body	42	428	31
Rear seat inner with center belt assembly LH x Body	42	428	31
REAR SEAT OUTER BELT ASSEMBLY			
Rear seat outer belt assembly floor anchor (For LH side) x Body	42	428	31
Rear seat outer belt assembly floor anchor (For RH side) x Body	42	428	31
Rear seat outer belt assembly x Body	42	428	31
CHILD RESTRAINT SEAT TETHER ANCHOR			
Child restraint seat tether anchor bracket x Body	21	214	16
CHILD RESTRAINT SEAT ANCHOR BRACKET			
Child restraint seat anchor bracket subassembly x Body	18	184	13

THEFT DETERRENT SYSTEM

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Security horn assembly x Body	31	316	23

CRUISE CONTROL

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Cruise control main switch x Steering wheel	2.4	24	21 in.*lbf
Clutch switch x Clutch Pedal	15.7	160	12 ft.*lbf
Main body ECU (Cowl side junction block) x Instrument panel reinforcement	8.0	82	71 in.*lbf

LIGHTING

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
HEADLIGHT ASSEMBLY			
Headlight assembly x Body	3.6	37	32 in.*lbf
FOG LIGHT ASSEMBLY			
Fog light assembly x Front bumper assembly	1.6	16	14 in.*lbf
REAR COMBINATION LIGHT ASSEMBLY			
Rear combination assembly x Body	3.6	37	32 in.*lbf
Rear light assembly x Body	3.6	37	32 in.*lbf
HIGH MOUNTED STOP LIGHT ASSEMBLY			
High mounted stop light assembly x Package tray trim panel assembly	1.6	16	14 in.*lbf
FRONT DOOR COURTESY SWITCH			
Front door courtesy switch assembly x Body	12	122	8.9
REAR DOOR COURTESY SWITCH			
Rear door courtesy switch assembly x Body	12	122	8.9
BACK DOOR COURTESY SWITCH			
Luggage compartment door lock assembly x Body	5.5	56	49 in.*lbf

WIPER AND WASHER

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
FRONT WIPER MOTOR			
Front wiper arm and blade assembly LH x Windshield wiper motor and link assembly	20	204	15
Front wiper arm and blade assembly RH x Windshield wiper motor and link assembly	20	204	15
Windshield wiper motor and link assembly x Body	7.5	77	66 in.*lbf
Windshield wiper link assembly x Windshield wiper motor assembly	5.4	55	48 in.*lbf

DOOR LOCK

TORQUE SPECIFICATIONS

FRONT DOOR LOCK

Part Tightened	N*m	kgf*cm	ft*lbf
Front door lock assembly x Door panel	5.0	51	44 in.*lbf

REAR DOOR LOCK

Part Tightened	N*m	kgf*cm	ft*lbf
Rear door lock assembly x Door panel	5.0	51	44 in.*lbf

METER

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Steering pad switch x Steering wheel	2.4	24	21 in.*lbf
Upper steering column cover x Lower steering column cover	2.0	20	18 in.*lbf

AUDIO / VISUAL

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Steering pad switch x Steering wheel	2.4	24	21 in.*lbf

HORN

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Low pitched horn x Body	20	204	15
High pitched horn x Body	20	204	15

WINDSHIELD / WINDOWGLASS

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
POWER WINDOW REGULATOR MOTOR			
Front power window regulator motor assembly x Front door window regulator sub-assembly	5.4	55	48 in.*lbf
Front door window regulator sub-assembly x Front door	8.0	82	71 in.*lbf
Front door glass sub-assembly x Front door window regulator sub-assembly	5.5	56	49 in.*lbf
Rear power window regulator motor assembly x Rear door window regulator sub-assembly	5.4	55	48 in.*lbf
Rear door window regulator sub-assembly x Rear door	8.0	82	71 in.*lbf
WINDSHIELD GLASS			
Inner rear view mirror assembly x Windshield glass	1.8	18	16 in.*lbf
Front wiper arm and blade assembly x Windshield wiper motor and link assembly	20	204	15
BACK WINDOW GLASS			
Rear seat inner with center belt assembly LH x Body	42	428	31
Child restraint seat anchor bracket sub-assembly LH x Body	18	184	13
Rear seat outer belt assembly x Body	42	428	31
Rear seat back assembly x Body	18	184	13
Rear side seat back assembly x Body	18	184	13
Separate type rear seat back assembly x Body	18	184	13
Reclining remote control lever sub-assembly x Body	18	184	13
Center seat back assembly x Body	18	184	13

MIRROR

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Inner rear view mirror x Windshield glass	1.8	18	16 in.*lbf
Outer rear view mirror assembly x Door panel	5.5	56	49 in.*lbf

INSTRUMENT PANEL

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Instrument Panel Reinforcement x Passenger Airbag	20	204	15
Upper Steering Column Cover x Lower Steering Column Cover	2.0	20	18 in.*lbf

SEAT

TORQUE SPECIFICATIONS

FRONT SEAT

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat back cover bracket x Front seat frame	5.5	56	48 in.*lbf
Front seat x Body	37	377	27

REAR SEAT (for Fixed Type)

Part Tightened	N*m	kgf*cm	ft.*lbf
Rear seat back assembly x Body	18	184	13

REAR SEAT (for Fold Down Seat Type)

Part Tightened	N*m	kgf*cm	ft.*lbf
Separate type rear seat back assembly x Body	18	184	13
Rear side seat back assembly x Body	18	184	13

REAR SEAT (for Reclining Seat Type)

Part Tightened	N*m	kgf*cm	ft.*lbf
Separate type rear seat back assembly x Body	18	184	13
Center seat back assembly x Body	18	184	13
Rear seat reclining adjuster assembly x Body	18	184	13
Reclining remote control lever sub- assembly x Body	18	184	13

ENGINE HOOD / DOOR

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
HOOD			
Hood hinge x Hood panel	13	133	10
Hood lock x Body	7.5	77	66 in.*lbf
FRONT DOOR			
Door check x Body	26	265	19
Door check x Door panel	8.0	82	71 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	26	265	19
Door lock x Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator x Door panel	8.0	82	71 in.*lbf
Door glass x Window regulator	5.5	56	49 in.*lbf
Outer rear view mirror x Door panel	5.5	56	49 in.*lbf
Door outside handle frame x Door panel	4.0	41	35 in.*lbf
REAR DOOR			
Door check x Body	26	265	19
Door check x Door panel	8.0	82	71 in.*lbf
Door hinge x Body	26	265	19
Door hinge x Door panel	26	265	19
Door lock x Door panel	5.0	51	44 in.*lbf
Door lock striker x Body	23	235	17
Power window regulator motor x Window regulator	5.4	55	48 in.*lbf
Window regulator x Door panel	8.0	82	71 in.*lbf
Door outside handle frame x Door panel	4.0	41	35 in.*lbf
LUGGAGE DOOR			
Luggage door hinge x Door panel	7.5	77	66 in.*lbf
Luggage lock striker x Body	5.5	56	49 in.*lbf
Luggage lock x Door panel	5.5	56	49 in.*lbf
Luggage lock cylinder x Door panel	5.5	56	49 in.*lbf

EXTERIOR

TORQUE SPECIFICATIONS

Part tightened	N*m	kgf*cm	ft.*lbf
Front bumper reinforcement sub-assembly set bolt	34	347	25
Rear bumper reinforcement sub-assembly set nut	68	693	50

INTERIOR

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Front seat outer belt assembly LH floor anchor x Body	42	428	31
Front seat outer belt assembly RH floor anchor x Body	42	428	31

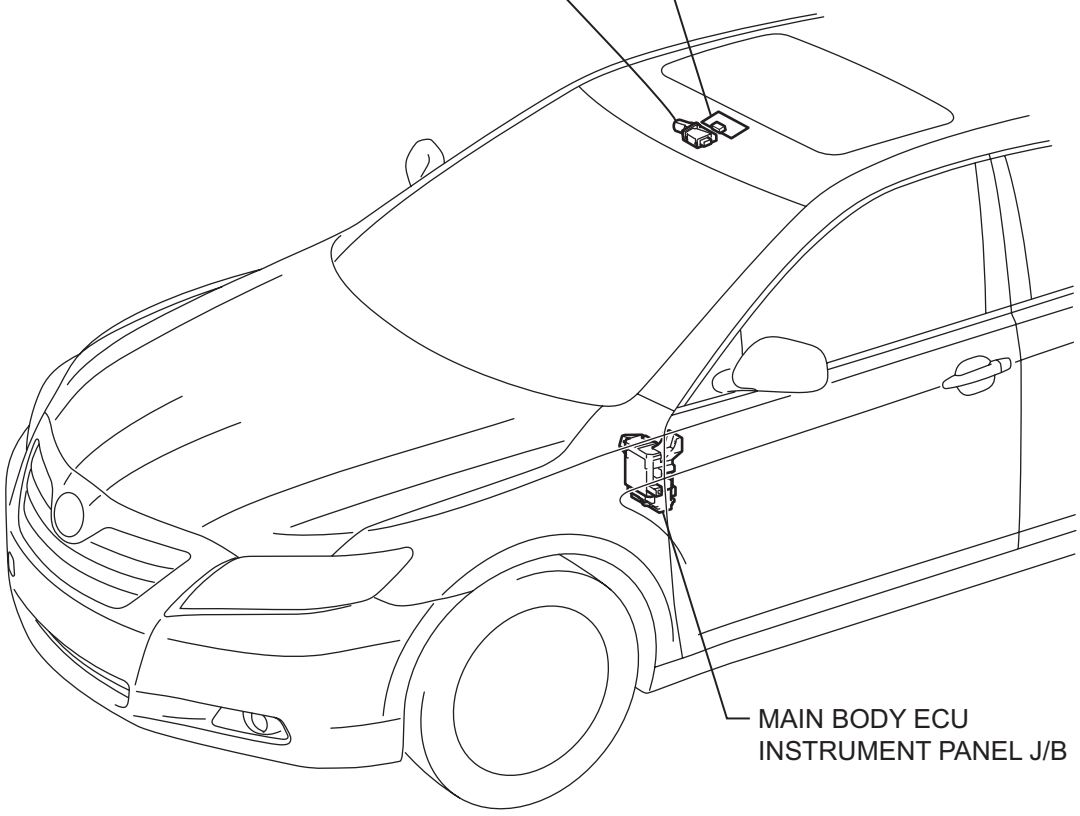
SLIDING ROOF

TORQUE SPECIFICATIONS

Part Tightened	N*m	kgf*cm	ft.*lbf
Sliding roof glass sub-assembly x Sliding roof housing sub-assembly	4.0	41	35 in.*lbf
Sliding roof housing sub-assembly (Bolt) x Body	5.5	56	49 in.*lbf
Sliding roof housing sub-assembly (Nut) x Body	5.5	56	49 in.*lbf
Sliding roof drive gear sub-assembly x Sliding roof housing sub-assembly	5.4	55	48 in.*lbf
Sliding roof piece sub-assembly LH x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf
Sliding roof piece sub-assembly RH x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf
Sliding roof side stopper x Sliding roof housing sub-assembly	2.0	20	18 in.*lbf

SLIDING ROOF SYSTEM

PARTS LOCATION



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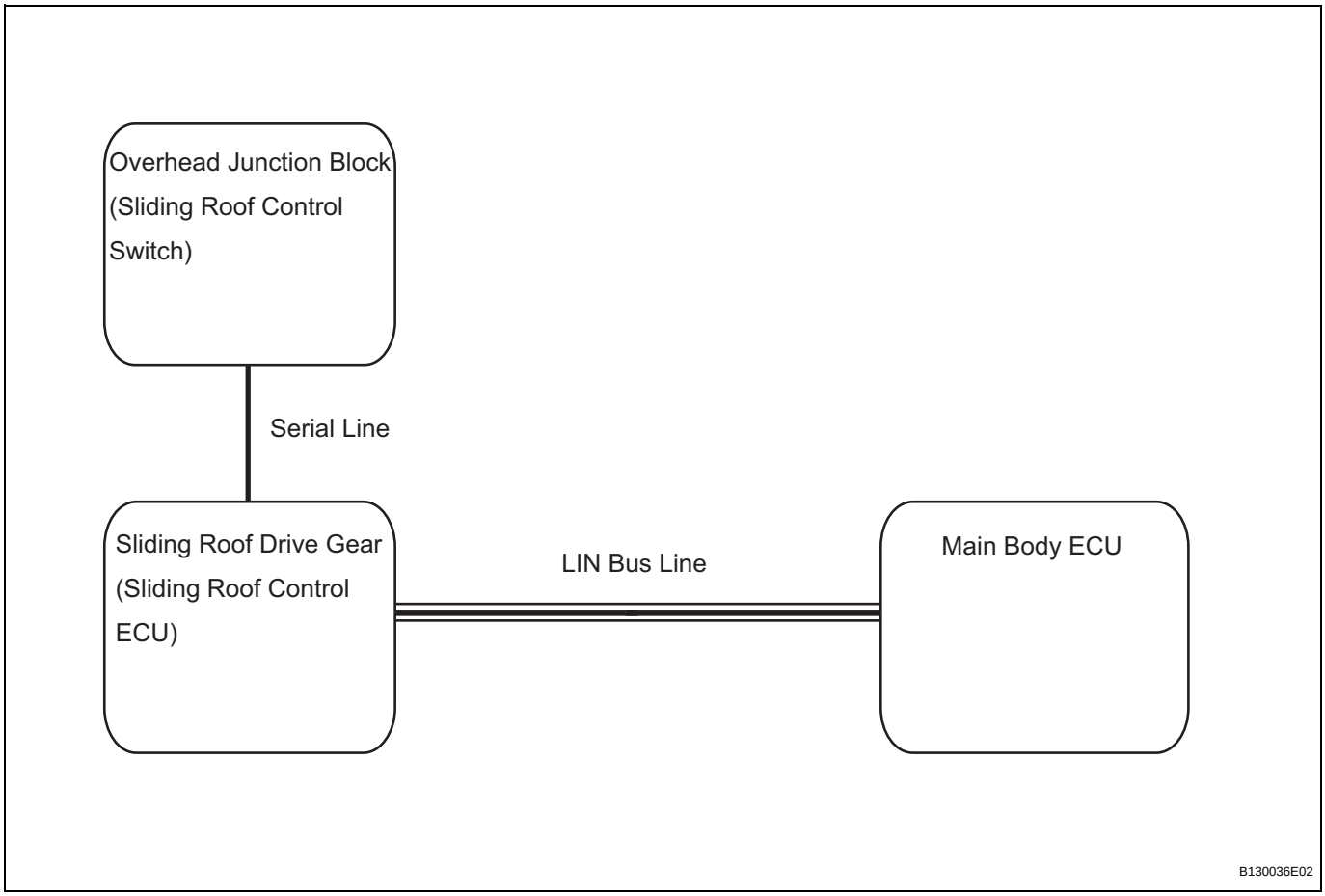
SYSTEM DIAGRAM



Communication table

Sender	Receiver	Signal	Line
Main Body ECU	Sliding Roof Control ECU	Key-off operation signal	LIN

SYSTEM DESCRIPTION

1. GENERAL

This system has the following functions: manual slide open and close; auto slide open and close; manual tilt up and down; auto tilt up and down; jam protection; and key off operation.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
Sliding Roof Drive Gear Sub-assembly (Sliding roof ECU)	Sliding roof ECU controls sliding roof motor to rotate forward and backward, which tilts or slides sliding roof glass.
Overhead Junction Block	Output of operation signals from built-in sliding roof switch to sliding roof ECU is handled by overhead junction block.

3. SYSTEM OPERATION

The sliding roof has the following features:

Function	Outline
Manual slide open and close	This function causes sliding roof to open (or close) when OPEN/CLOSE switch is pressed for a maximum of 0.3 seconds. Sliding roof stops as soon as the switch is released.
Auto slide open and close	This function causes sliding roof to fully open (or close) when OPEN/CLOSE switch is pressed for a minimum of 0.3 seconds.
Manual tilt up and down	This function causes sliding roof to tilt up (or tilt down) when UP/DOWN switch is pressed for a maximum of 0.3 seconds.
Auto tilt up and down	This function enables sliding roof to tilt up (or down) when UP/DOWN switch is pressed for a minimum of 0.3 seconds.
Jam protection	The jam protection function automatically stops sliding roof, or stops sliding roof and makes it open halfway (or fully tilted up) if a foreign object gets jammed in sliding roof during auto close operation (or auto tilt down operation).
Key off operation	Key off operation function makes it possible to operate sliding roof for approximately 43 seconds after ignition switch is turned off, if front doors are not opened.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the sliding roof system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

3 INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM*

(a) Using the intelligent tester, check if the CAN communication system is functioning normally.

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → **Go to CAN COMMUNICATION SYSTEM**

A

4 PROBLEM SYMPTOMS TABLE

Result

Result	Proceed to
Fault is not listed in problem symptoms table	A
Fault is listed in problem symptoms table	B

B → **Go to step 6**

A

5 OVERALL ANALYSIS AND TROUBLESHOOTING*

1. Data List / Active Test (See page RF-9)
2. Terminals of ECU (See page RF-5)
3. On-vehicle Inspection (See page RF-11)

NEXT

6	**ADJUST, REPAIR OR REPLACE**

NEXT

7	**CONFIRMATION TEST**

NEXT

END

INITIALIZATION

1. INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY

NOTICE:

When replacing the sliding roof drive gear, the sliding roof drive gear requires initialization. If a reset is not executed, the following functions do not operate: auto operation and key off operation.

(a) Turn the ignition switch on (IG).

(b) Make sure that the sliding roof is fully closed.

(c) Push and hold the CLOSE switch or the UP switch until the following movement finishes: Tilt up → approximately 1 second → tilt down → slide open → slide closed.

(d) Check that the sliding roof stops at the fully closed position.

(e) Finish the initialization.

(f) Check that the AUTO operation works normally.

NOTICE:

If the following conditions occur during initialization procedure, initialization will fail.

- **Ignition switch is turned off.**
- **Sliding roof control switch is released while sliding roof is operating.**
- **Vehicle speed is 5 km/h (3 mph) or more.**
- **Communication is cut off.**
- **Another switch is turned on during initialization.**
- **The vehicle experiences a strong vibration during initialization, such as the slamming of a door.**

HINT:

- If the sliding roof cannot be fully closed or its position has become misaligned, perform initialization again.
- If the roof glass stops moving or starts moving in the opposite direction while the CLOSE or UP switch is held down, continue to hold the switch for another 10 seconds or more to return the sliding roof control ECU to an uninitialized condition. Then perform the initialization procedure again.
- If the AUTO operation function and jam protection function do not operate after the drive gear has been reset, replace the sliding roof drive gear (sliding roof ECU).

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PROBLEM SYMPTOMS TABLE

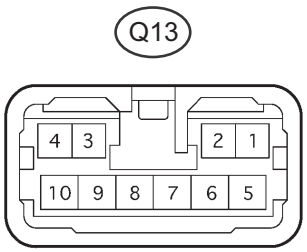
HINT:
Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
Inspect the fuses and relays related to this system before inspecting the suspected areas below.

Sliding Roof System

Symptom	Suspected area	See page
Sliding function and tilt function do not operate	Sliding roof ECU power source circuit	RF-28
Either sliding function or tilt function does not operate	Sliding roof control switch circuit	RF-25

TERMINALS OF ECU

1. CHECK SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU) (TMC MADE)



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(a) Disconnect the Q13 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

RF

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (Q13-1) - E (Q13-2)	B - W-B	+B power supply	Always	10 to 14 V
IG (Q13-5) - E (Q13-2)	Y - W-B	Ignition switch power supply	Ignition switch off	Below 1 V
IG (Q13-5) - E (Q13-2)	Y - W-B	Ignition switch power supply	Ignition switch on (IG)	10 to 14 V
OPN (Q13-7) - E (Q13-2)	BR - W-B	Sliding roof motor open	OPEN switch OFF	10 kΩ or higher
OPN (Q13-7) - E (Q13-2)	BR - W-B	Sliding roof motor open	OPEN switch ON	Below 1 Ω
CLS (Q13-9) - E (Q13-2)	L - W-B	Sliding roof motor closed	CLOSE switch OFF	10 kΩ or higher
CLS (Q13-9) - E (Q13-2)	L - W-B	Sliding roof motor closed	CLOSE switch ON	Below 1 Ω
UP (Q13-10) - E (Q13-2)	W - W-B	Sliding roof motor up	UP switch OFF	10 kΩ or higher
UP (Q13-10) - E (Q13-2)	W - W-B	Sliding roof motor up	UP switch ON	Below 1 Ω
DWN (Q13-8) - E (Q13-2)	G - W-B	Sliding roof motor down	DOWN switch OFF	10 kΩ or higher
DWN (Q13-8) - E (Q13-2)	G - W-B	Sliding roof motor down	DOWN switch ON	Below 1 Ω
E (Q13-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

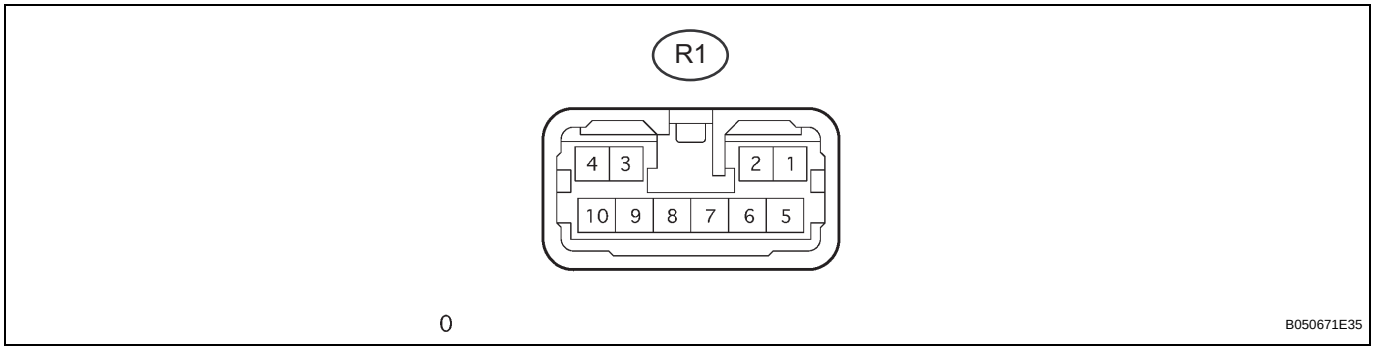
If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the Q13 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
OPN (Q13-7) - E (Q13-2)	BR - W-B	Sliding roof motor open	Ignition switch on (IG), sliding roof closed, OPEN switch OFF	Below 1 V
OPN (Q13-7) - E (Q13-2)	BR - W-B	Sliding roof motor open	Ignition switch on (IG), sliding roof closed, OPEN switch ON	10 to 14 V
CLS (Q13-9) - E (Q13-2)	L - W-B	Sliding roof motor closed	Ignition switch on (IG), sliding roof open, CLOSE switch OFF	Below 1 V
CLS (Q13-9) - E (Q13-2)	L - W-B	Sliding roof motor closed	Ignition switch on (IG), sliding roof open, CLOSE switch ON	10 to 14 V
UP (Q13-10) - E (Q13-2)	W - W-B	Sliding roof motor up	Ignition switch on (IG), sliding roof tilted downward, UP switch OFF	Below 1 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
UP (Q13-10) - E (Q13-2)	W - W-B	Sliding roof motor up	Ignition switch on (IG), sliding roof tilted downward, UP switch ON	10 to 14 V
DWN (Q13-8) - E (Q13-2)	G - W-B	Sliding roof motor down	Ignition switch on (IG), sliding roof tilted upward, DOWN switch OFF	Below 1 V
DWN (Q13-8) - E (Q13-2)	G - W-B	Sliding roof motor down	Ignition switch on (IG), sliding roof tilted upward, DOWN switch ON	10 to 14 V

If the result is not as specified, the ECU may have a malfunction.

2. CHECK SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU) (TMMK MADE)



(a) Disconnect the R1 ECU connector.
(b) Measure the resistance and voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (R1-1) - E (R1-2)	B - W-B	+B power supply	Always	10 to 14 V
IG (R1-5) - E (R1-2)	Y - W-B	Ignition switch power supply	Ignition switch off	Below 1 V
IG (R1-5) - E (R1-2)	Y - W-B	Ignition switch power supply	Ignition switch on (IG)	10 to 14 V
OPN (R1-10) - E (R1-2)	BR - W-B	Sliding roof motor open	OPEN switch OFF	10 kΩ or higher
OPN (R1-10) - E (R1-2)	BR - W-B	Sliding roof motor open	OPEN switch ON	Below 1 Ω
CLS (R1-8) - E (R1-2)	L - W-B	Sliding roof motor closed	CLOSE switch OFF	10 kΩ or higher
CLS (R1-8) - E (R1-2)	L - W-B	Sliding roof motor closed	CLOSE switch ON	Below 1 Ω
UP (R1-9) - E (R1-2)	W - W-B	Sliding roof motor up	UP switch OFF	10 kΩ or higher
UP (R1-9) - E (R1-2)	W - W-B	Sliding roof motor up	UP switch ON	Below 1 Ω
DWN (R1-7) - E (R1-2)	G - W-B	Sliding roof motor down	DOWN switch OFF	10 kΩ or higher
DWN (R1-7) - E (R1-2)	G - W-B	Sliding roof motor down	DOWN switch ON	Below 1 Ω
E (R1-2) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.
(c) Reconnect the R1 ECU connector.
(d) Measure the voltage according to the value(s) in the table below.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
OPN (R1-10) - E (R1-2)	BR - W-B	Sliding roof motor open	Ignition switch on (IG), sliding roof closed, OPEN switch OFF	Below 1 V

RF

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
OPN (R1-10) - E (R1-2)	BR - W-B	Sliding roof motor open	Ignition switch on (IG), sliding roof closed, OPEN switch ON	10 to 14 V
CLS (R1-8) - E (R1-2)	L - W-B	Sliding roof motor closed	Ignition switch on (IG), sliding roof open, CLOSE switch OFF	Below 1 V
CLS (R1-8) - E (R1-2)	L - W-B	Sliding roof motor closed	Ignition switch on (IG), sliding roof open, CLOSE switch ON	10 to 14 V
UP (R1-9) - E (R1-2)	W - W-B	Sliding roof motor up	Ignition switch on (IG), sliding roof tilted downward, UP switch OFF	Below 1 V
UP (R1-9) - E (R1-2)	W - W-B	Sliding roof motor up	Ignition switch on (IG), sliding roof tilted downward, UP switch ON	10 to 14 V
DWN (R1-7) - E (R1-2)	G - W-B	Sliding roof motor down	Ignition switch on (IG), sliding roof tilted upward, DOWN switch OFF	Below 1 V
DWN (R1-7) - E (R1-2)	G - W-B	Sliding roof motor down	Ignition switch on (IG), sliding roof tilted upward, DOWN switch ON	10 to 14 V

RF

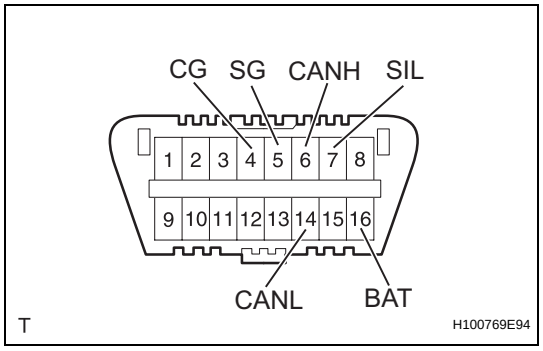
If the result is not as specified, the ECU may have a malfunction.

DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Sliding roof system data and Diagnostic Trouble Codes (DTCs) can be read through the vehicle's Data Link Connector 3 (DLC3). When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



HINT:

The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format. If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

RF

Symbols (Terminals No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off*	54 to 69 Ω
CANH (6) - CG (4)	CAN bus line	Ignition switch off*	200 Ω or higher
CANL (14) - CG (4)	CAN bus line	Ignition switch off*	200 Ω or higher
CANH (6) - BAT (16)	CAN bus line	Ignition switch off*	6 kΩ or higher
CANL (14) - BAT (16)	CAN bus line	Ignition switch off*	6 kΩ or higer

NOTICE:

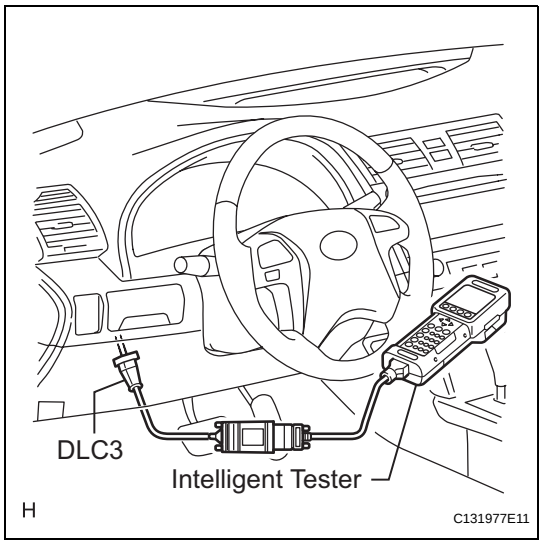
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's Data List allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the Data List early in troubleshooting is one way to save time.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Read the Data List according to the display on the tester.

SLIDE ROOF:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
OPEN SW	Slide switch open signal/ON or OFF	ON: OPEN switch is pressed. OFF: OPEN switch is not pressed.	-
CLOSE SW	Slide switch close signal/ON or OFF	ON: CLOSE switch is pressed. OFF: CLOSE switch is not pressed.	-
UP SW	Tilt switch up signal/ON or OFF	ON: UP switch is pressed. OFF: UP switch is not pressed.	-
DOWN SW	Tilt switch down signal/ON or OFF	ON: DOWN switch is pressed. OFF: DOWN switch is not pressed.	-
HALL IC1 STATUS	Sliding roof operation signal/ NORMAL or LOCK	NORMAL: Sliding roof motor is operating. LOCK: Sliding roof motor is not operating.	-
HALL IC1 PULSE	Sliding roof operation signal/LO or HI	LO: Sliding roof motor is not operating. HI: Sliding roof motor is operating.	-
HALL IC2 STATUS	Sliding roof operation signal/ NORMAL or LOCK	NORMAL: Sliding roof motor is operating. LOCK: Sliding roof motor is not operating.	-
HALL IC2 PULSE	Sliding roof operation signal/LO or HI	LO: Sliding roof motor is not operating. HI: Sliding roof motor is operating.	-
D-DOOR WARN SW	Driver's door courtesy light switch signal/ON or OFF	ON: Driver's door is open. OFF: Driver's door is closed.	-
IG (MPX)	Ignition switch signal (MPX signal)/ON or OFF	ON: Ignition switch on (IG) OFF: Ignition switch off	-
IG (DIRCT SIG)	Ignition switch signal/ON or OFF	ON: Ignition switch on (IG) OFF: Ignition switch off	-
KEY OFF PERMS	Key-OFF sliding roof operation permit signal (Current)/ON or OFF	ON: Driver's side door is not closed within 45 sec. after ignition switch is turned off. OFF: Any status except "ON" status	-
CURRENT DOWN SW	Down switch failure signal (Current)/Fail or Not Fail	Fail: Sliding roof tilt down signal failure (Current) Not Fail: Sliding roof tilt down signal not fail (Current)	-
CURRENT UP SW	Up switch failure signal (Current)/ Fail or Not Fail	Fail: Sliding roof tilt up signal failure (Current) Not Fail: Sliding roof tilt up signal not fail (Current)	-

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
CURRENT CLS SW	Close switch failure signal (Current)/Fail or Not Fail	Fail: Sliding roof close signal failure (Current) Not Fail: Sliding roof close signal not fail (Current)	-
CURRENT OPN SW	Open switch failure signal (Current)/Fail or Not Fail	Fail: Sliding roof open signal failure (Current) Not Fail: Sliding roof open signal not fail (Current)	-
PAST DOWN SW	Down switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof tilt down signal failure (Past) Not Fail: Sliding roof tilt down signal not fail (Past)	-
PAST UP SW	Up switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof tilt up signal failure (Past) Not Fail: Sliding roof tilt up signal not fail (Past)	-
PAST CLS SW	Close switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof close signal failure (Past) Not Fail: Sliding roof close signal not fail (Past)	-
PAST OPN SW	Open switch failure signal (Past)/ Fail or Not Fail	Fail: Sliding roof open signal failure (Past) Not Fail: Sliding roof open signal not fail (Past)	-
#CODE	Number of trouble code	Number of trouble code	-

RF

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's Active Test allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the Active Test early in troubleshooting is one way to save time. The Data List can be displayed during the Active Test.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Perform the Active Test according to the display on the tester.

SLIDE ROOF:

Item	Test Details	Diagnostic Note
SLIDE ROOF	Operate sliding roof SLIDE CLOSE/TILT UP CLOS/UP: Sliding roof SLIDE CLOSE or TILT UP operation occurs. OFF: Sliding roof is not operating	-
SLIDE ROOF	Operate sliding roof SLIDE OPEN/TILT DOWN OPEN/DWN: Sliding roof SLIDE OPEN or TILT DOWN operation occurs OFF: Sliding roof is not operating	-

DIAGNOSTIC TROUBLE CODE CHART

If any trouble code is displayed during DTC check, check the circuit corresponding to the code in the table below. Proceed to the page given for the circuit.

Sliding Roof System

DTC No.	Detection Item	Trouble Area	See page
B2341	Sensor (Motor) Failure	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-14
B2342	Switch Failure	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-18
B2343	Position Initialization Incomplete	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-22
B2344	Position Failure	1. Sliding roof drive gear sub-assembly (Sliding roof control ECU) 2. Roof console box assembly (Sliding roof control switch) 3. Wire harness	RF-14

ON-VEHICLE INSPECTION

1. CHECK AUTO OPERATION

(a) Turn the ignition switch on (IG).

(b) When the roof glass is fully closed, press the OPEN switch for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully opened.

(c) When the roof glass is fully open, press the CLOSE switch for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully closed.

(d) When the roof glass is fully closed, press the UP switch for 0.3 seconds or more. Check that the roof glass automatically tilts until it is fully tilted upward.

(e) When the roof glass is fully open, press the DOWN switch for 0.3 seconds or more. Check that the roof glass automatically tilts until it is fully tilted downward.

(f) When the auto operation is operating, check that pressing any personal light switch stops the roof glass operation.

HINT:

When pressing the switch for 0.3 seconds or less, the roof glass moves but auto operation does not operate.

2. CHECK SLIDING ROOF OPERATION AFTER IGNITION SWITCH IS TURNED OFF

(a) Turn the ignition switch from on (IG) to off, and check that the sliding roof operates. Then open and close the driver's side door once, and check that the sliding roof does not operate.

(b) Turn the ignition switch from on (IG) to off and wait for approximately 43 seconds. Check that the sliding roof does not operate.

(c) Operate the auto (SLIDE OPEN/CLOSE or TILT UP/DOWN) operation. While the roof glass is in motion, turn the ignition switch from on (IG) to off. Check that the auto operation continues until the roof glass opens or closes fully.

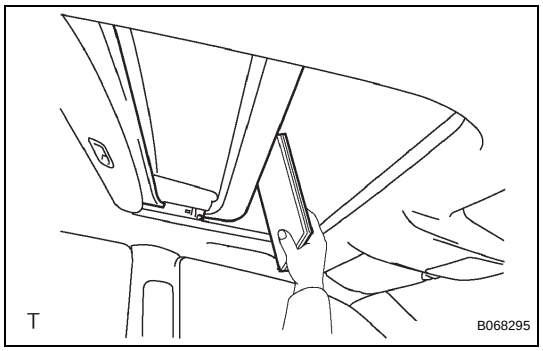
3. CHECK JAM PROTECTION FUNCTION

CAUTION:

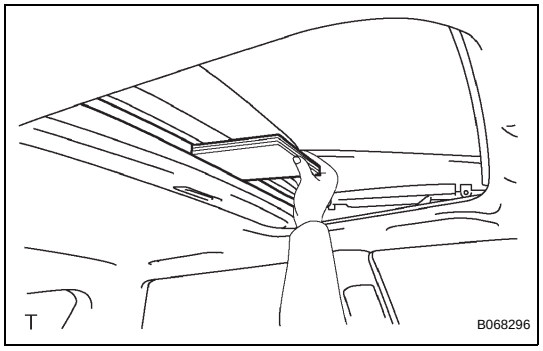
- **Do not use a part of your body, for example, your hand, to check the jam protection.**
- **Do not allow anything to become caught in the sliding roof by accident in this procedure.**
- **Perform the inspection from the inside of the vehicle.**

NOTICE:

- **Do not use hard objects such as a hammer, to avoid damage to the roof.**
- **If the jam protection does not operate, reset the sliding roof drive gear (motor).**



(a) When the sliding roof auto operation is operating and an object is caught between the vehicle body and glass, check that the roof glass opens 218 mm (8.58 in.) from the point of contact with the object, or opens fully if there is not an opening distance of 218 mm (8.58 in.).



(b) When the TILT UP/DOWN function is operating, and an object is caught between the vehicle body and the roof glass, check that the sliding roof tilts up fully.

DTC	B2341	Sensor (Motor) Failure

DTC	B2344	Position Failure

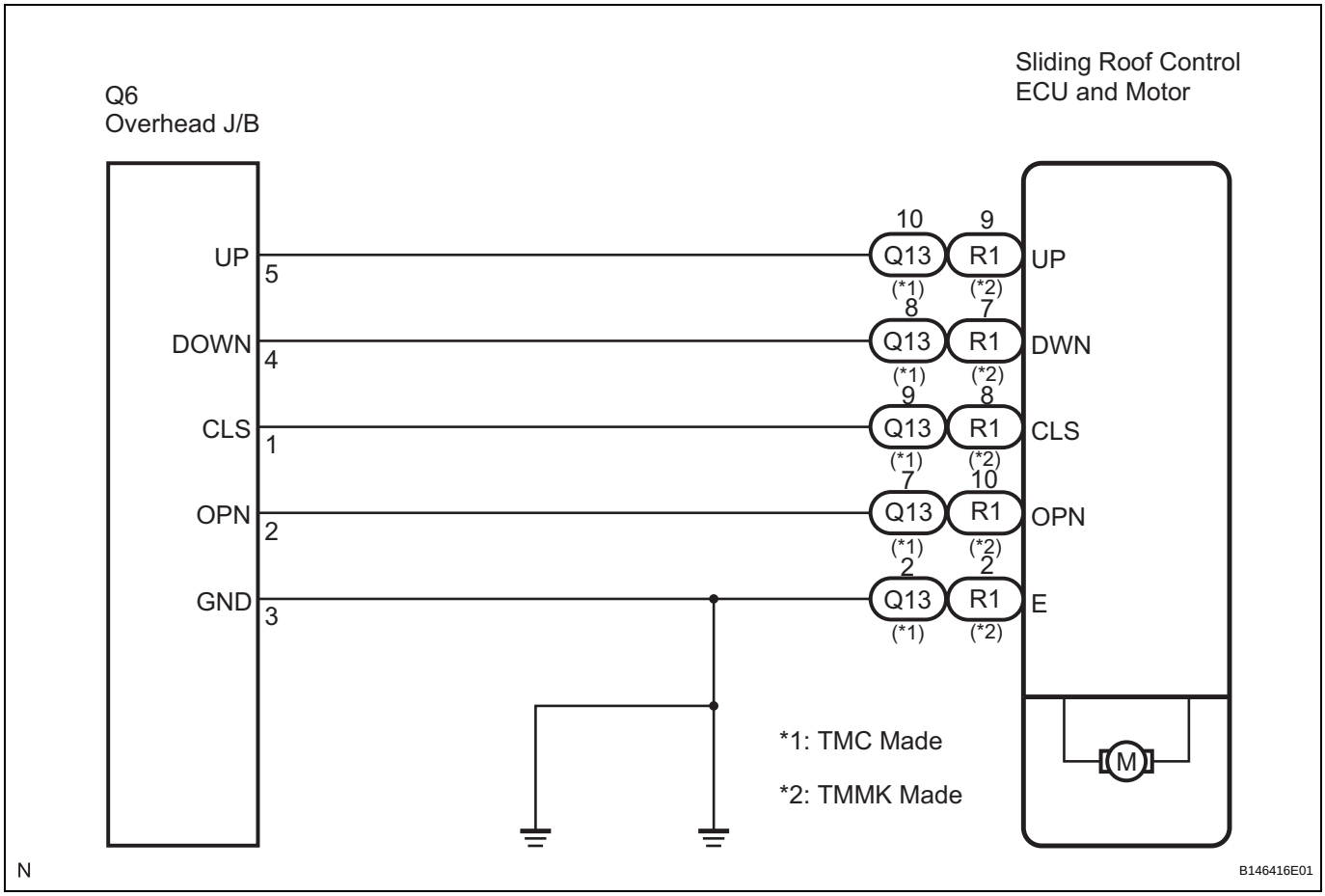
DESCRIPTION

When the sliding roof drive gear sub-assembly (sliding roof control ECU) detects malfunctions in the motor, and the sliding roof operation is stopped, DTC B2341 is output. When the sliding roof drive gear sub-assembly (sliding roof control ECU) detects malfunctions in the gear, and the sliding roof operation is stopped, DTC B2344 is output.

DTC No.	DTC Detection Condition	Trouble Area
B2341	Sensor (motor) Failure	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness
B2344	Position Failure	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness

RF

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, DOWN, CLOSE and UP switches (See page RF-11).
OK:
Auto operation operates normally with OPEN, DOWN, CLOSE and UP switches.

NG → **Go to step 3**

OK

2	DELETE DTC

(a) Delete the DTCs (See page RF-8).

NEXT

END

3	INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

(a) Check that the sliding roof drive gear sub-assembly can be initialized (See page RF-4).
OK:
Sliding roof drive gear sub-assembly can be initialized.

NG → **Go to step 6**

OK

4	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, DOWN, CLOSE and UP switches (See page RF-11).
OK:
Auto operation operates normally with OPEN, DOWN, CLOSE and UP switches.

NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

OK

5	DELETE DTC

(a) Delete the DTCs (See page RF-8).

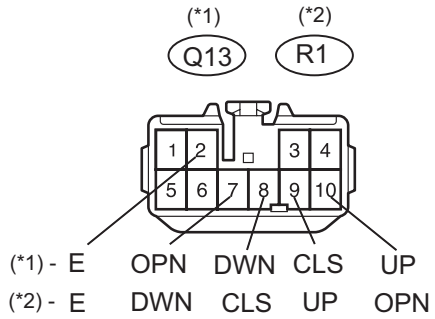
RF

NEXT

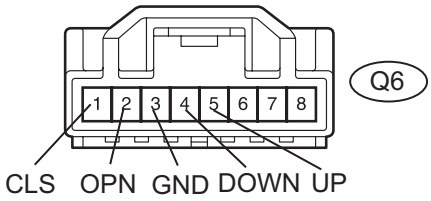
END

6 CHECK WIRE HARNESS (SLIDING ROOF CONTROL ECU - ROOF CONSOLE BOX ASSEMBLY)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N B131169E02

(a) Disconnect the Q13 (*1) or R1 (*2) and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Q13-2 (E) - Q6-3 (GND) (*1)	Always	Below 1 Ω
Q13-7 (OPN) - Q6-2 (OPN) (*1)	Always	Below 1 Ω
Q13-8 (DWN) - Q6-4 (DOWN) (*1)	Always	Below 1 Ω
Q13-9 (CLS) - Q6-1 (CLS) (*1)	Always	Below 1 Ω
Q13-10 (UP) - Q6-5 (UP) (*1)	Always	Below 1 Ω
R1-2 (E) - Q6-3 (GND) (*2)	Always	Below 1 Ω
R1-7 (DWN) - Q6-4 (DOWN) (*2)	Always	Below 1 Ω
R1-8 (CLS) - Q6-1 (CLS) (*2)	Always	Below 1 Ω
R1-9 (UP) - Q6-5 (UP) (*2)	Always	Below 1 Ω
R1-10 (OPN) - Q6-2 (OPN) (*2)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

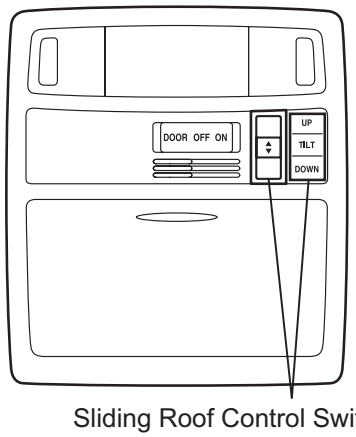
HINT:
- *1: TMC made
- *2: TMMK made

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

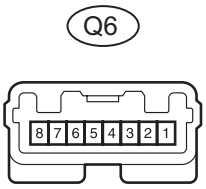
OK

7	INSPECT ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

Roof Console Box Assembly Connector:



Sliding Roof Control Switch



N B131165E02

(a) Remove the roof console box assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
Q6-1 (CLS) - Q6-3 (GND)	CLOSE	Below 100 Ω
Q6-2 (OPN) - Q6-3 (GND)	OPEN	Below 100 Ω
Q6-4 (DOWN) - Q6-3 (GND)	DOWN	Below 100 Ω
Q6-5 (UP) - Q6-3 (GND)	UP	Below 100 Ω
Q6-1 (CLS) - Q6-3 (GND)	OPEN	1 kΩ or higher
Q6-2 (OPN) - Q6-3 (GND)	CLOSE	1 kΩ or higher
Q6-4 (DOWN) - Q6-3 (GND)	UP	1 kΩ or higher
Q6-5 (UP) - Q6-3 (GND)	DOWN	1 kΩ or higher

RF

NG → **REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

DTC	B2342	Switch Failure

DESCRIPTION

This DTC is output when the sliding roof drive gear sub-assembly (sliding roof control ECU) detects that the OPEN, CLOSE, UP or DOWN switch in the roof console box assembly (sliding roof control switch) is stuck for 30 seconds or more.

DTC No.	DTC Detection Condition	Trouble Area
B2342	Sliding roof drive gear sub-assembly (sliding roof control ECU) detects OPEN, CLOSE, UP or DOWN switch in overhead junction block is stuck for 30 seconds or more	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness

WIRING DIAGRAM

Refer to DTC B2341 (See page RF-14).

RF

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (SLIDE OPEN AND TILT UP SWITCH)

(a) Use the DATA LIST to check if the sliding roof switch is functioning properly.

Sliding roof ECU

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
OPEN SW	Slide switch open signal/ON or OFF	ON: OPEN switch is pressed. OFF: OPEN switch is not pressed.	-
CLOSE SW	Slide switch close signal/ON or OFF	ON: CLOSE switch is pressed. OFF: CLOSE switch is not pressed.	-
UP SW	Tilt switch up signal/ON or OFF	ON: UP switch is pressed. OFF: UP switch is not pressed.	-
DOWN SW	Tilt switch down signal/ON or OFF	ON: DOWN switch is pressed. OFF: DOWN switch is not pressed.	-

OK:

The intelligent tester displays as shown in the table according to the operation of each switch.

NG → **Go to step 4**

OK

2	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, CLOSE, UP and DOWN switches (See page RF-11).

OK:

Auto operation operates normally with OPEN, CLOSE, UP and DOWN switches.

NG → **Go to step 7**

OK

3	DELETE DTC

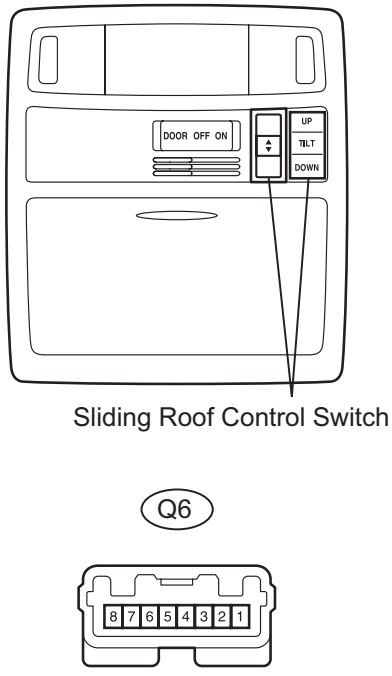
(a) Delete the DTCs (See page RF-8).

NEXT

END

4	INSPECT ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

Roof Console Box Assembly Connector:



Sliding Roof Control Switch

(a) Remove the roof console box assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
Q6-1 (CLS) - Q6-3 (GND)	CLOSE	Below 100 Ω
Q6-2 (OPN) - Q6-3 (GND)	OPEN	Below 100 Ω
Q6-4 (DOWN) - Q6-3 (GND)	DOWN	Below 100 Ω
Q6-5 (UP) - Q6-3 (GND)	UP	Below 100 Ω
Q6-1 (CLS) - Q6-3 (GND)	OPEN	1 kΩ or higher
Q6-2 (OPN) - Q6-3 (GND)	CLOSE	1 kΩ or higher
Q6-4 (DOWN) - Q6-3 (GND)	UP	1 kΩ or higher
Q6-5 (UP) - Q6-3 (GND)	DOWN	1 kΩ or higher

OK → Go to step 10

NG

5	REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

(a) Temporarily replace the roof console box assembly (sliding roof control switch) with a new one or normally functioning one (See page LI-105).

NEXT

RF

6	DELETE DTC

(a) Delete the DTCs (See page RF-8).

NEXT

END

7	INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

(a) Check that the sliding roof drive gear sub-assembly can be initialized (See page RF-4).

OK:

Sliding roof drive gear sub-assembly can be initialized.

NG → **Go to step 10**

OK

8	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, CLOSE, UP and DOWN switches (See page RF-11).

OK:

Auto operation operates normally with OPEN, CLOSE, UP and DOWN switches.

NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

OK

9	DELETE DTC

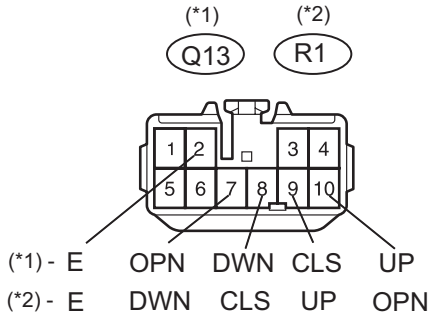
(a) Delete the DTCs (See page RF-8).

NEXT

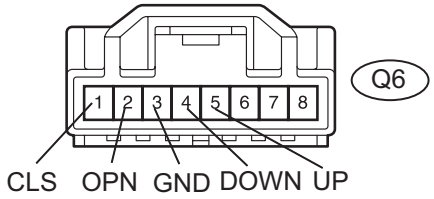
END

10	CHECK WIRE HARNESS (SLIDING ROOF CONTROL ECU - ROOF CONSOLE BOX ASSEMBLY)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N B131169E02

(a) Disconnect the Q13 (*1) or R1 (*2) and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Q13-2 (E) - Q6-3 (GND) (*1)	Always	Below 1 Ω
Q13-7 (OPN) - Q6-2 (OPN) (*1)	Always	Below 1 Ω
Q13-8 (DWN) - Q6-4 (DOWN) (*1)	Always	Below 1 Ω
Q13-9 (CLS) - Q6-1 (CLS) (*1)	Always	Below 1 Ω
Q13-10 (UP) - Q6-5 (UP) (*1)	Always	Below 1 Ω
R1-2 (E) - Q6-3 (GND) (*2)	Always	Below 1 Ω
R1-7 (DWN) - Q6-4 (DOWN) (*2)	Always	Below 1 Ω
R1-8 (CLS) - Q6-1 (CLS) (*2)	Always	Below 1 Ω
R1-9 (UP) - Q6-5 (UP) (*2)	Always	Below 1 Ω
R1-10 (OPN) - Q6-2 (OPN) (*2)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

HINT:
- *1: TMC made
- *2: TMMK made

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

RF

DTC	B2343	Position Initialization Incomplete

DESCRIPTION

This DTC is output when the sliding roof drive gear sub-assembly (sliding roof control ECU) has not been initialized.

DTC No.	DTC Detection Condition	Trouble Area
B2343	Sliding roof drive gear sub-assembly (sliding roof control ECU) has not been initialized	• Sliding roof drive gear sub-assembly (sliding roof control ECU) • Roof console box assembly (sliding roof control switch) • Wire harness

WIRING DIAGRAM

Refer to DTC B2341 (See page RF-14).

INSPECTION PROCEDURE

RF

1	INITIALIZE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

(a) Check that the sliding roof drive gear sub-assembly can be initialized (See page RF-4).

OK:

Sliding roof drive gear sub-assembly can be initialized.

NG → **Go to step 3**

OK

2	CHECK SLIDING ROOF FUNCTION

(a) Check the auto operation with the OPEN, CLOSE, UP and DOWN switches (See page RF-11).

OK:

Auto operation operates normally with OPEN, CLOSE, UP and DOWN switches.

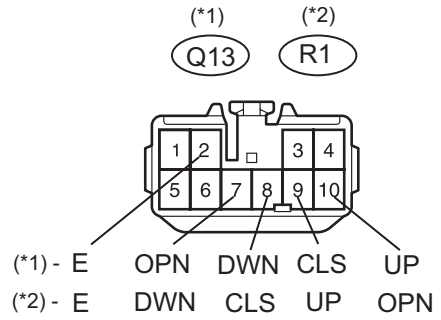
NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

OK

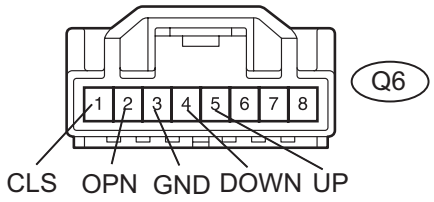
END

3 CHECK WIRE HARNESS (SLIDING ROOF DRIVE GEAR - OVERHEAD JUNCTION BLOCK)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N B131169E02

(a) Disconnect the Q13 (*1) or R1 (*2) and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Q13-2 (E) - Q6-3 (GND) (*1)	Always	Below 1 Ω
Q13-7 (OPN) - Q6-2 (OPN) (*1)	Always	Below 1 Ω
Q13-8 (DWN) - Q6-4 (DOWN) (*1)	Always	Below 1 Ω
Q13-9 (CLS) - Q6-1 (CLS) (*1)	Always	Below 1 Ω
Q13-10 (UP) - Q6-5 (UP) (*1)	Always	Below 1 Ω
R1-2 (E) - Q6-3 (GND) (*2)	Always	Below 1 Ω
R1-7 (DWN) - Q6-4 (DOWN) (*2)	Always	Below 1 Ω
R1-8 (CLS) - Q6-1 (CLS) (*2)	Always	Below 1 Ω
R1-9 (UP) - Q6-5 (UP) (*2)	Always	Below 1 Ω
R1-10 (OPN) - Q6-2 (OPN) (*2)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

HINT:
- *1: TMC made
- *2: TMMK made

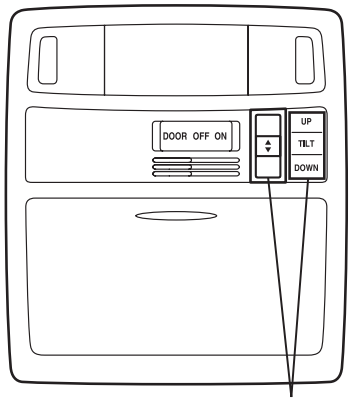
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

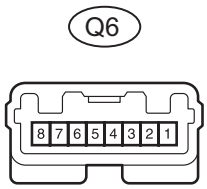
RF

4	INSPECT ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

Roof Console Box Assembly Connector:



Sliding Roof Control Switch



N B131165E02

(a) Remove the roof console box assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
Q6-1 (CLS) - Q6-3 (GND)	CLOSE	Below 100 Ω
Q6-2 (OPN) - Q6-3 (GND)	OPEN	Below 100 Ω
Q6-4 (DOWN) - Q6-3 (GND)	DOWN	Below 100 Ω
Q6-5 (UP) - Q6-3 (GND)	UP	Below 100 Ω
Q6-1 (CLS) - Q6-3 (GND)	OPEN	1 kΩ or higher
Q6-2 (OPN) - Q6-3 (GND)	CLOSE	1 kΩ or higher
Q6-4 (DOWN) - Q6-3 (GND)	UP	1 kΩ or higher
Q6-5 (UP) - Q6-3 (GND)	DOWN	1 kΩ or higher

NG → **REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)**

OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

RF

Sliding Roof Control Switch Circuit

DESCRIPTION

The sliding roof drive gear sub-assembly (sliding roof control ECU) receives slide switch and tilt switch signals and drives its built-in motor.

WIRING DIAGRAM

Refer to DTC B2341 (See page RF-14).

INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SLIDING ROOF OPERATION)

(a) Select the ACTIVE TEST, use the intelligent tester to generate a control command, and then check that the sliding roof slides open/close and tilts up/down.

Sliding roof ECU

Item	Test Details	Diagnostic Note
SLIDING ROOF	Operate sliding roof SLIDE CLOSE/TILT UP CLOS/UP: Sliding roof SLIDE CLOSE or TILT UP operation occurs OFF: Sliding roof is not operating	-
SLIDING ROOF	Operate sliding roof SLIDE OPEN/TILT DOWN OPEN/DOWN: Sliding roof SLIDE OPEN or TILT DOWN operation occurs OFF: Sliding roof is not operating	-

OK:

Sliding roof operates normally.

NG → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

OK

2	READ VALUE OF INTELLIGENT TESTER (SLIDING ROOF SWITCH)

(a) Use the DATA LIST to check if the sliding roof switch is functioning properly.

Sliding roof ECU

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
OPEN SW	Slide switch open signal/ON or OFF	ON: OPEN switch is pressed. OFF: OPEN switch is not pressed.	-
CLOSE SW	Slide switch close signal/ON or OFF	ON: CLOSE switch is pressed. OFF: CLOSE switch is not pressed.	-
UP SW	Tilt switch up signal/ON or OFF	ON: UP switch is pressed. OFF: UP switch is not pressed.	-
DOWN SW	Tilt switch down signal/ON or OFF	ON: DOWN switch is pressed. OFF: DOWN switch is not pressed.	-

OK:

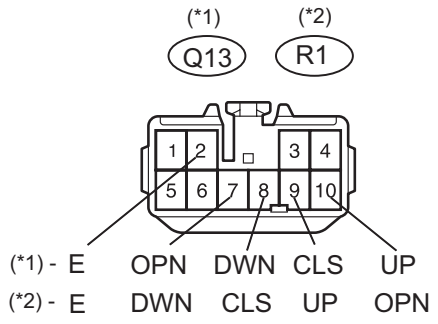
The intelligent tester displays as shown in the table according to the operation of each switch.

OK → **REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)**

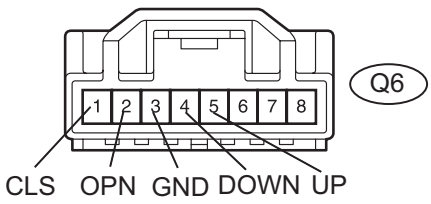
NG

3	CHECK WIRE HARNESS (SLIDING ROOF CONTROL ECU - ROOF CONSOLE BOX ASSEMBLY)

Sliding Roof Control ECU Connector:



Roof Console Box Assembly Connector:



N B131169E02

(a) Disconnect the Q13 (*1) or R1 (*2) and Q6 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Q13-2 (E) - Q6-3 (GND) (*1)	Always	Below 1 Ω
Q13-7 (OPN) - Q6-2 (OPN) (*1)	Always	Below 1 Ω
Q13-8 (DWN) - Q6-4 (DOWN) (*1)	Always	Below 1 Ω
Q13-9 (CLS) - Q6-1 (CLS) (*1)	Always	Below 1 Ω
Q13-10 (UP) - Q6-5 (UP) (*1)	Always	Below 1 Ω
R1-2 (E) - Q6-3 (GND) (*2)	Always	Below 1 Ω
R1-7 (DWN) - Q6-4 (DOWN) (*2)	Always	Below 1 Ω
R1-8 (CLS) - Q6-1 (CLS) (*2)	Always	Below 1 Ω
R1-9 (UP) - Q6-5 (UP) (*2)	Always	Below 1 Ω
R1-10 (OPN) - Q6-2 (OPN) (*2)	Always	Below 1 Ω
Q6-1 (CLS) - Body ground	Always	10 kΩ or higher
Q6-2 (OPN) - Body ground	Always	10 kΩ or higher
Q6-3 (GND) - Body ground	Always	Below 1 Ω
Q6-4 (DOWN) - Body ground	Always	10 kΩ or higher
Q6-5 (UP) - Body ground	Always	10 kΩ or higher

HINT:
- *1: TMC made
- *2: TMMK made

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

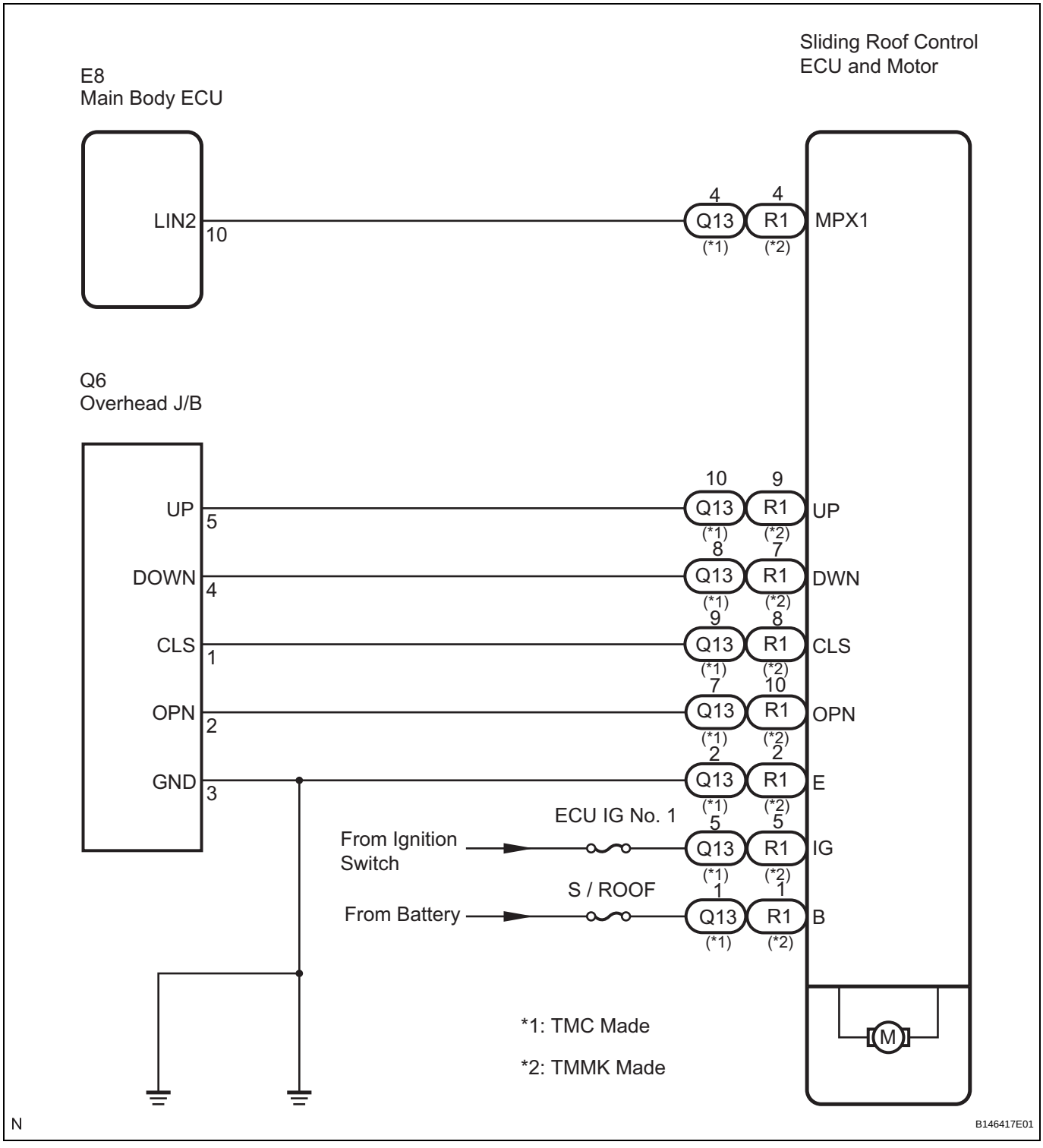
REPLACE ROOF CONSOLE BOX ASSEMBLY (SLIDING ROOF CONTROL SWITCH)

Sliding Roof ECU Power Source Circuit

DESCRIPTION

The sliding roof drive gear sub-assembly (sliding roof control ECU) receives signals from the sliding roof switch and activates the sliding roof. However, malfunctions in the fuse, wire harness or sliding roof drive gear sub-assembly (sliding roof control ECU) may cause the sliding roof system to stop operating.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SLIDING ROOF OPERATION)

(a) Select the ACTIVE TEST, use the intelligent tester to generate a control command, and then check that the sliding roof slides open/close and tilts up/down.

Sliding roof ECU

Item	Test Details	Diagnostic Note
SLIDING ROOF	Operate sliding roof SLIDE CLOSE/TILT UP CLOS/UP: Sliding roof SLIDE CLOSE or TILT UP operation occurs OFF: Sliding roof is not operating	-
SLIDING ROOF	Operate sliding roof SLIDE OPEN/TILT DOWN OPEN/DOWN: Sliding roof SLIDE OPEN or TILT DOWN operation occurs OFF: Sliding roof is not operating	-

OK:
Sliding roof operates normally.

NG → **Go to step 2**

OK →

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

2	INSPECT FUSE (S/ROOF, ECU-IG NO. 1)

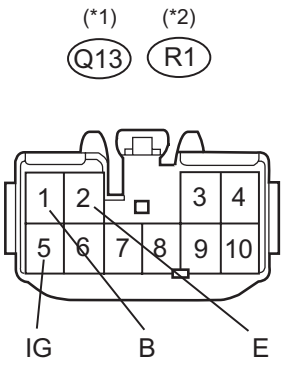
(a) Remove the S/ROOF and ECU-IG No. 1 fuses from the instrument panel J/B.
(b) Measure the resistance of the fuses.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK →

3	CHECK WIRE HARNESS (SLIDING ROOF CONTROL ECU - BATTERY AND BODY GROUND)

Sliding Roof Control ECU Connector:



(a) Disconnect the Q13 (*1) or R1 (*2) connectors.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
B (Q13-1) - Body ground (*1)	Always	10 to 14 V
IG (Q13-5) - Body ground (*1)	Ignition switch on (IG)	10 to 14 V
IG (Q13-5) - Body ground (*1)	Ignition switch off	Below 1 V
B (R1-1) - Body ground (*2)	Always	10 to 14 V
IG (R1-5) - Body ground (*2)	Ignition switch on (IG)	10 to 14 V
IG (R1-5) - Body ground (*2)	Ignition switch off	Below 1 V

HINT:
- *1: TMC made
- *2: TMMK made

Standard resistance

Tester Connection	Specified Condition
E (Q13-2) - Body ground (*1)	Below 1 Ω
E (R1-2) - Body ground (*2)	Below 1 Ω

HINT:
- *1: TMC made
- *2: TMMK made

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

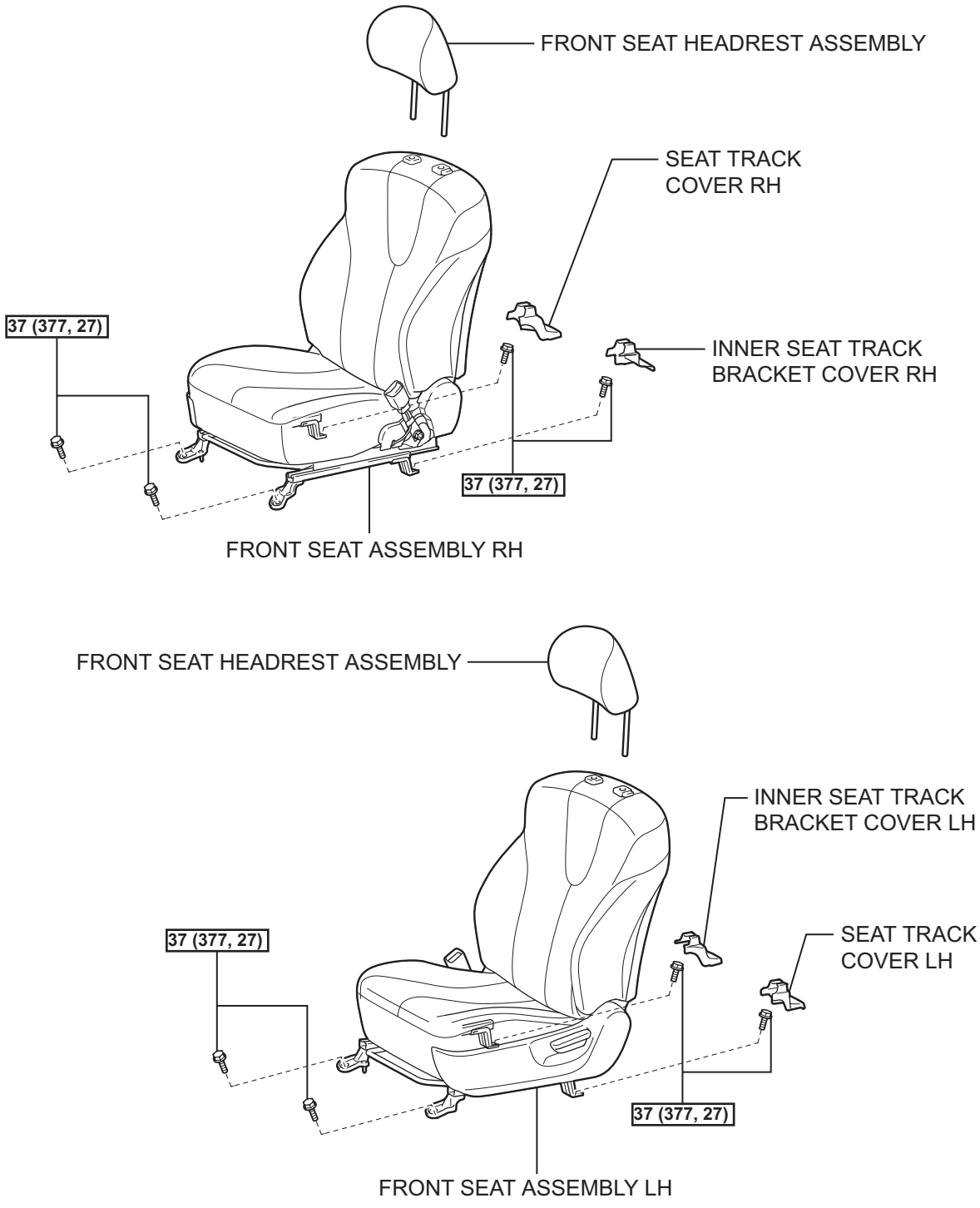
OK

REPLACE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY (SLIDING ROOF CONTROL ECU)

SLIDING ROOF HOUSING

COMPONENTS

for Manual Seat:



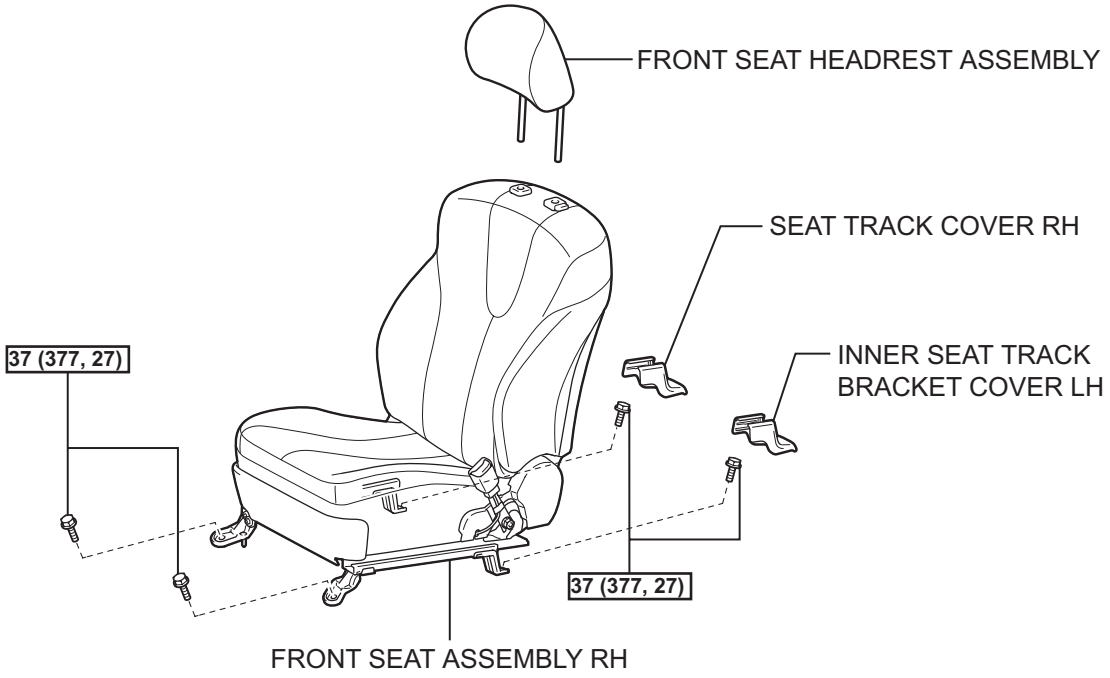
N*m (kgf*cm, ft.*lbf) : Specified torque

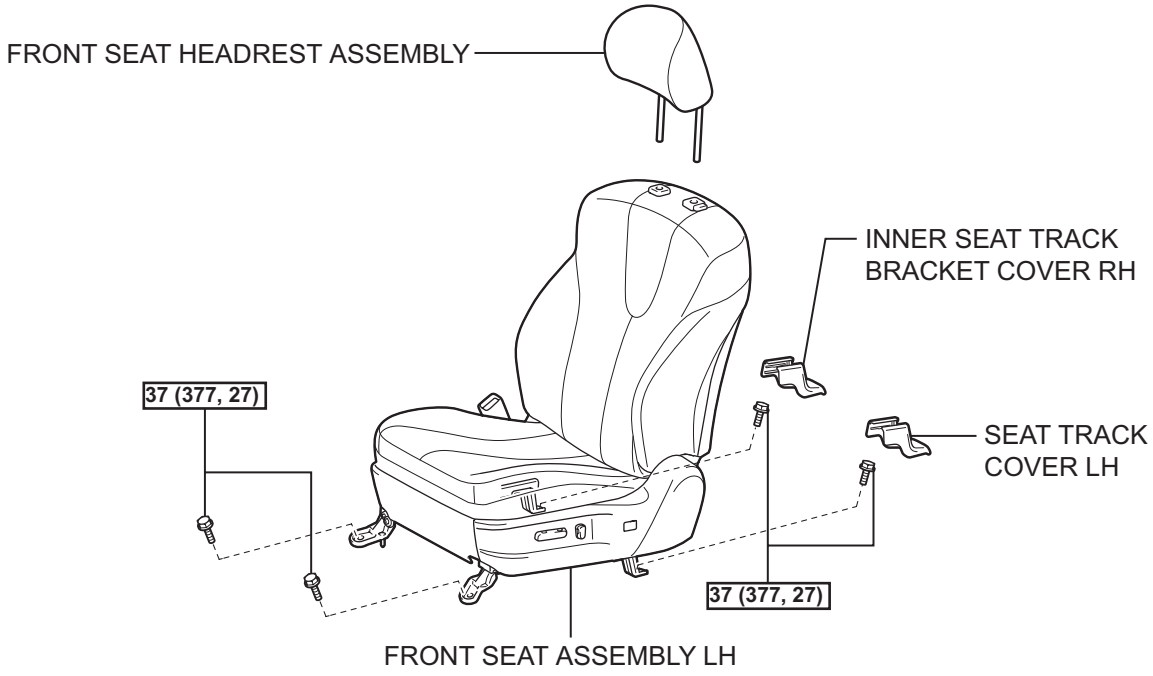
P

B132048E01

RF

for Power Seat:



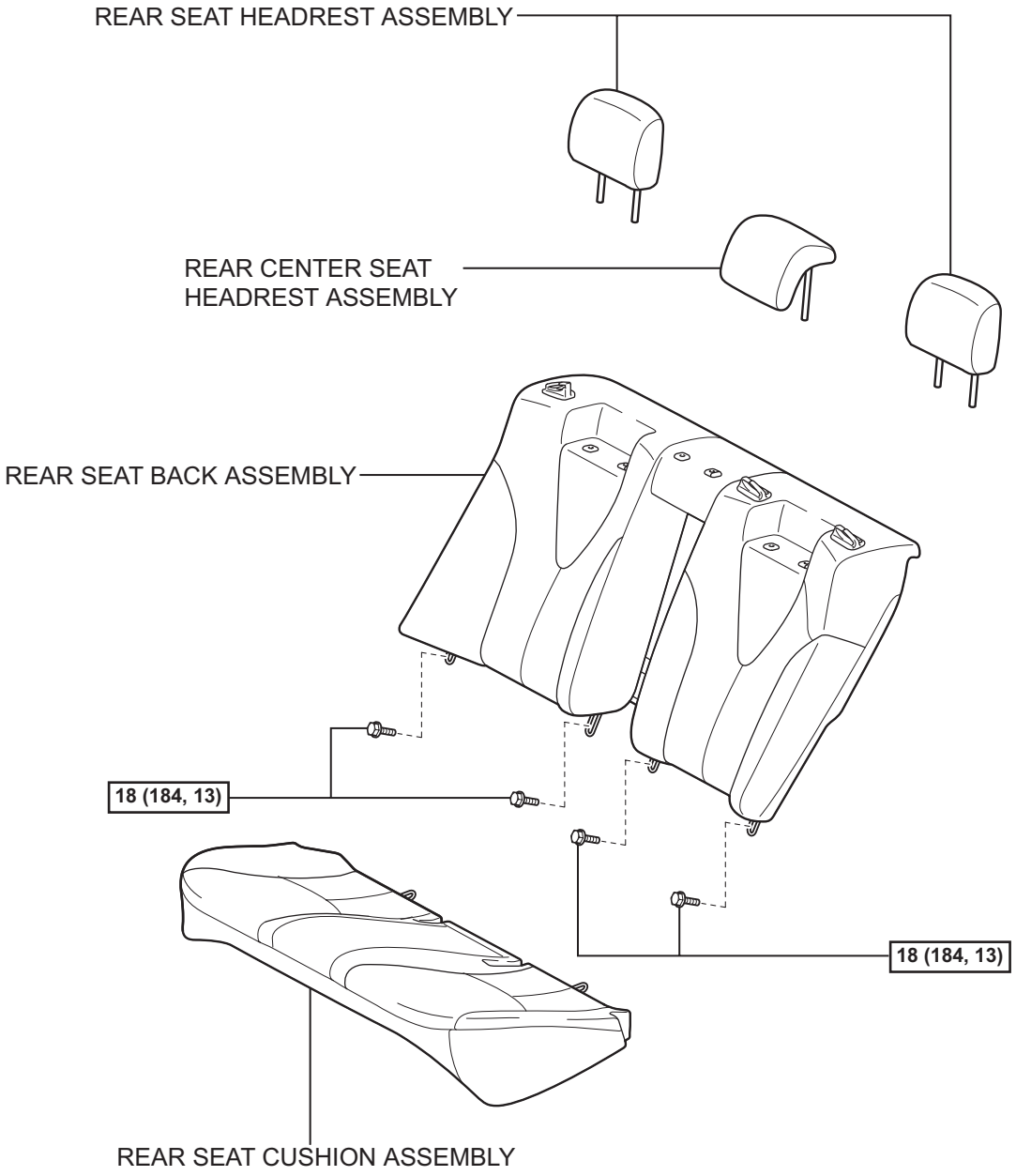


N*m (kgf*cm, ft.*lbf): Specified torque

P

B132047E01

for Fixed Seat Type:



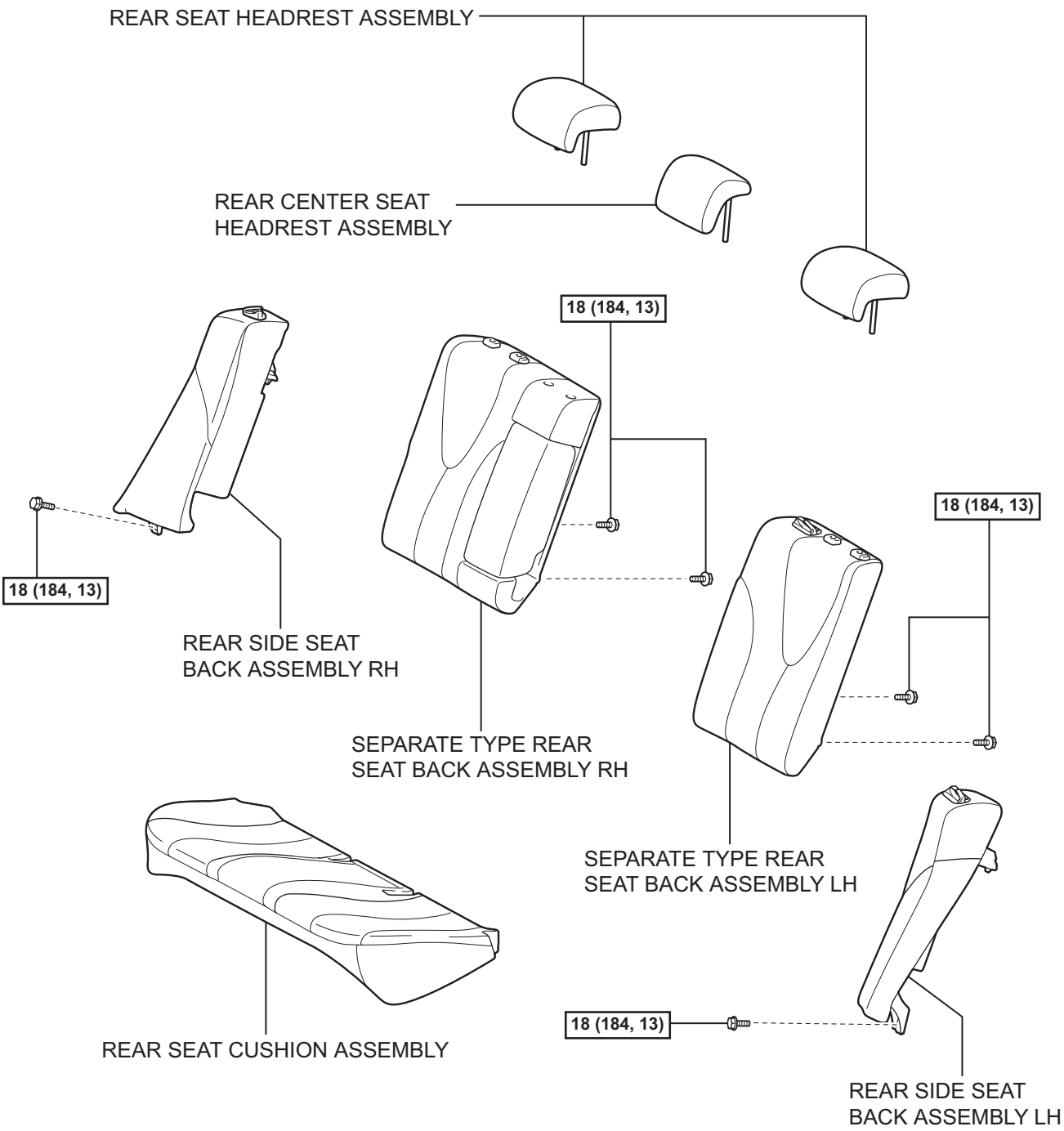
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

RF

for Fold Down Seat Type:

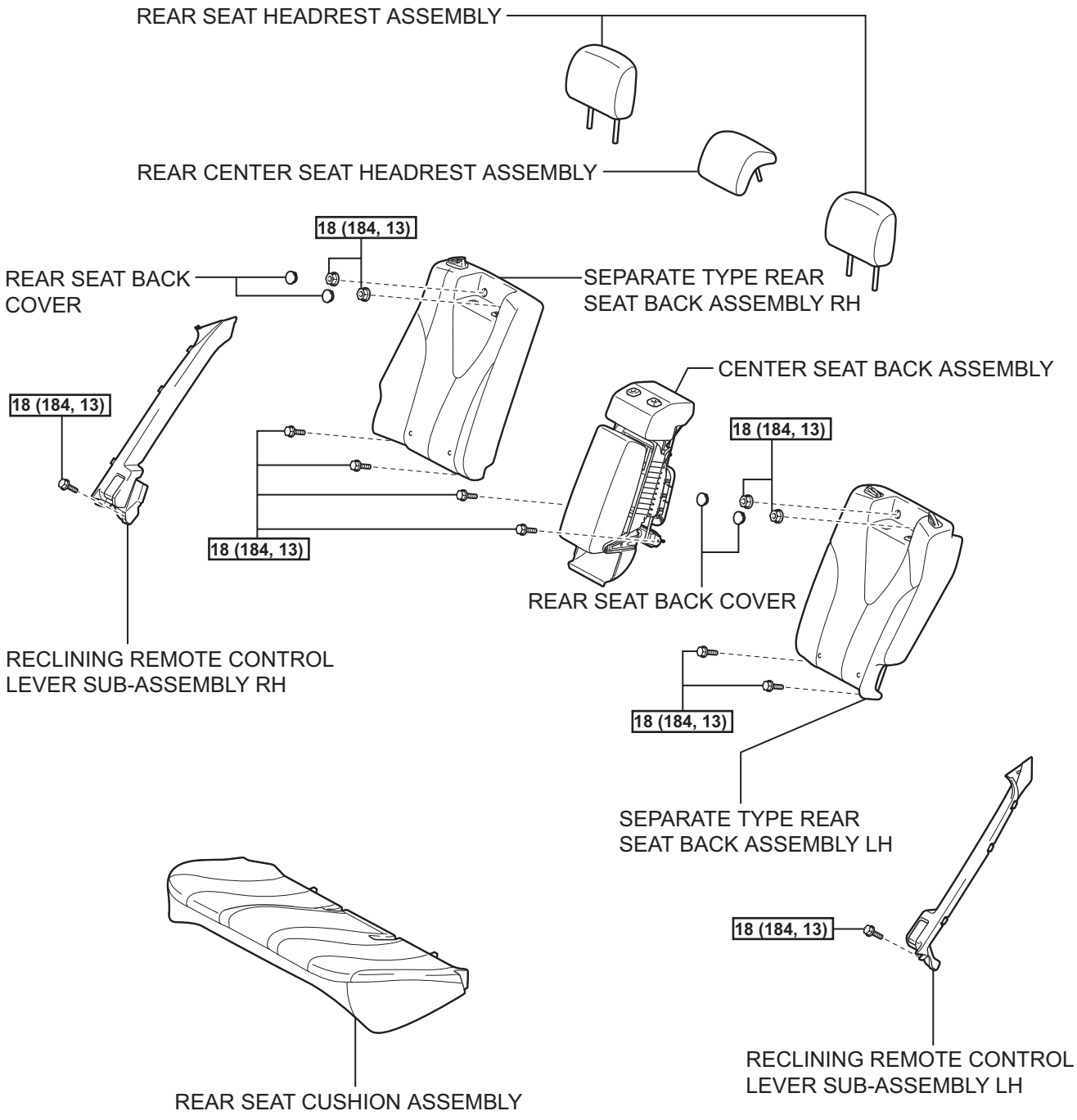


N*m (kgf*cm, ft.*lbf) : Specified torque

P

B136564E02

for Reclining Seat Type:

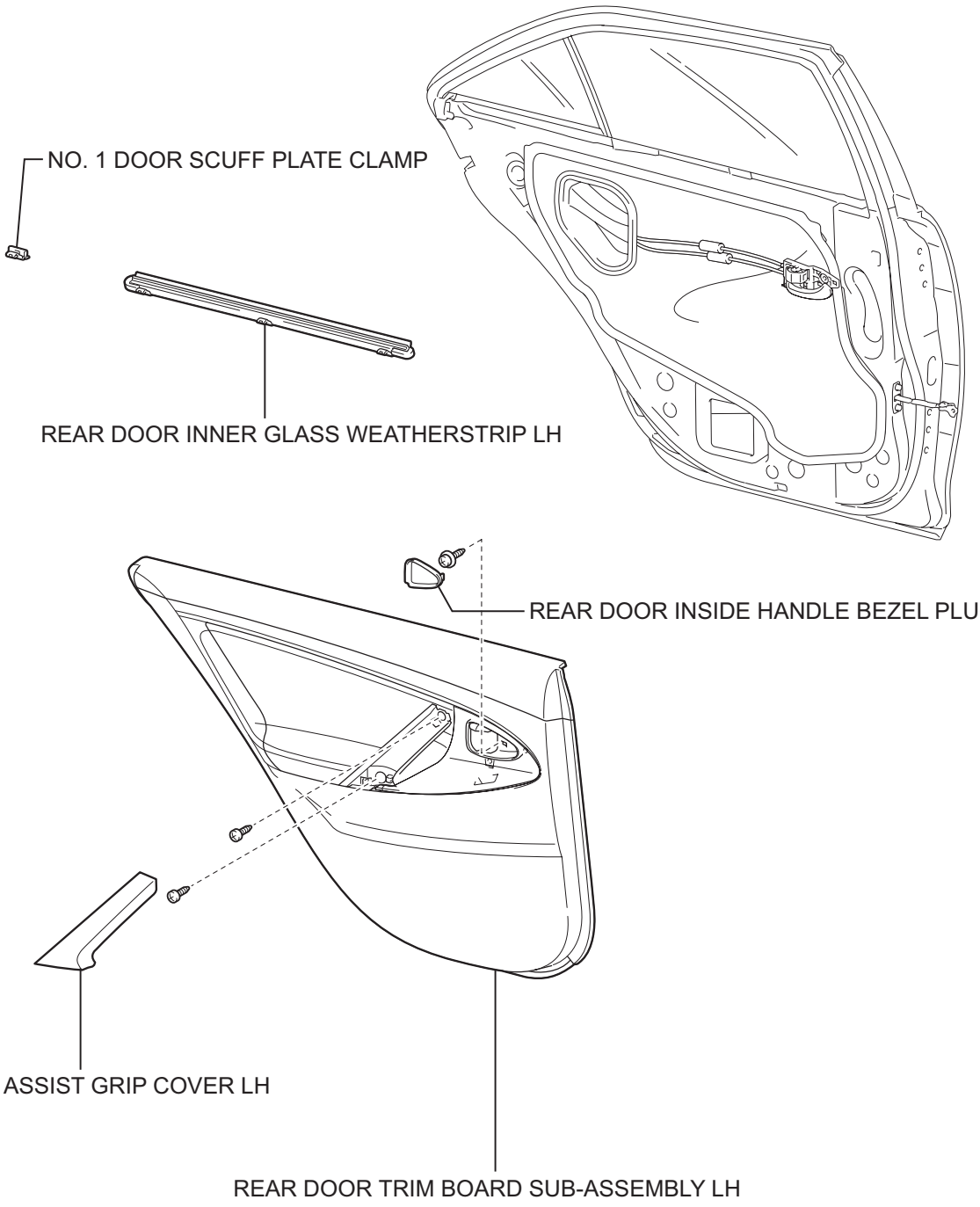


N*m (kgf*cm, ft.*lbf): Specified torque

P

B139577E01

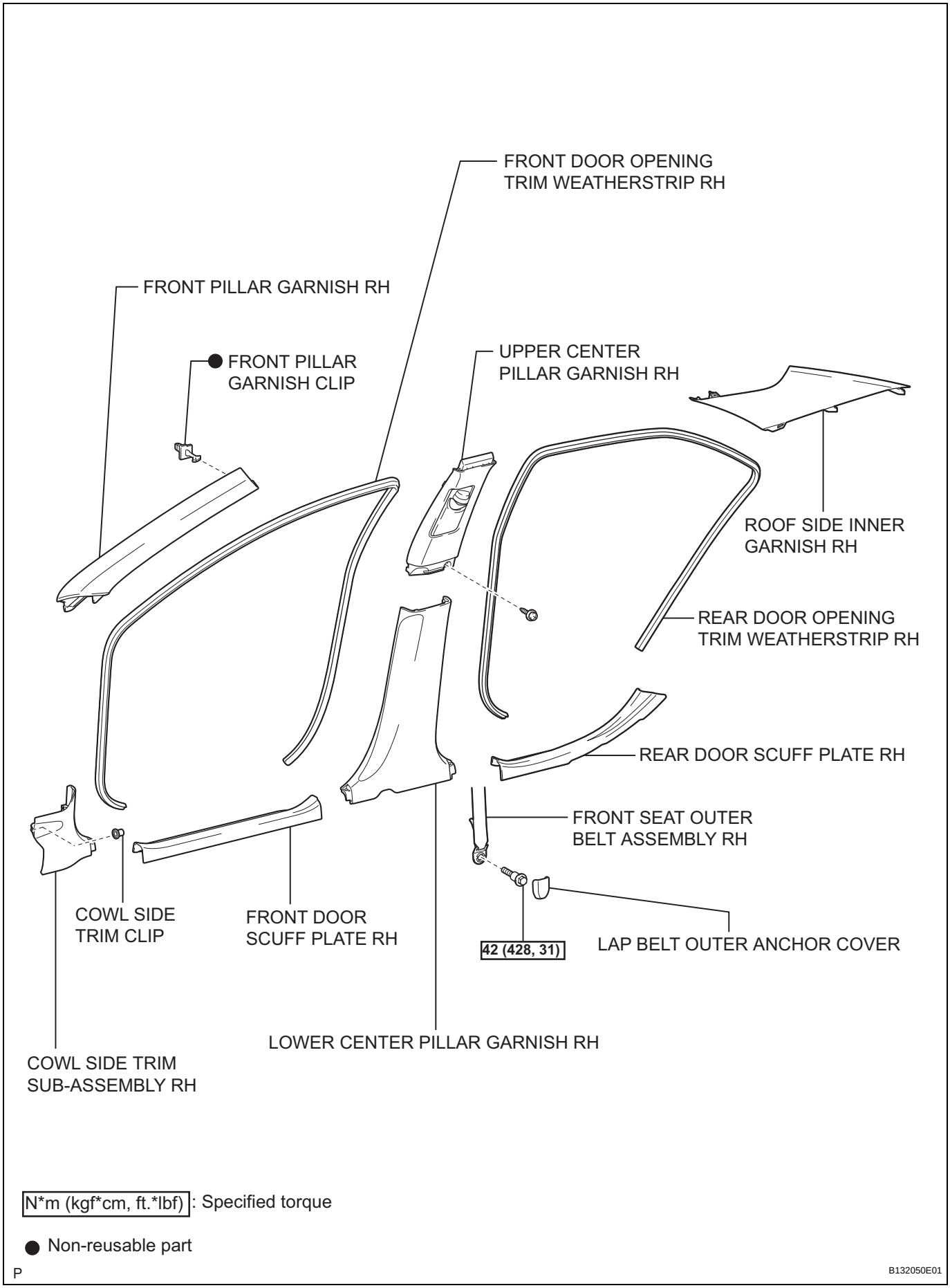
RF



RF

P

B139576E01



N*m (kgf*cm, ft.*lbf): Specified torque

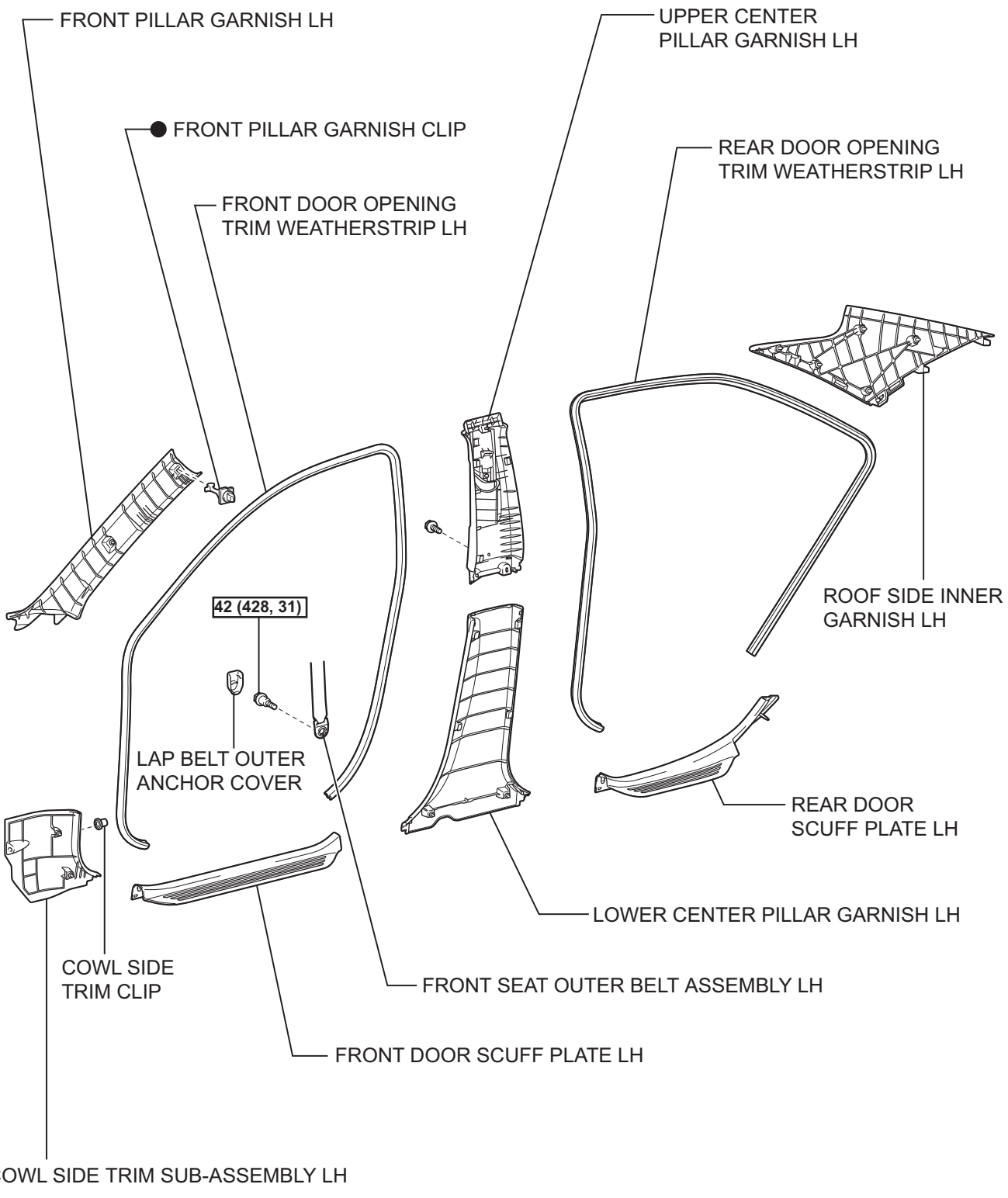
● Non-reusable part

P

B132050E01

RF

RF

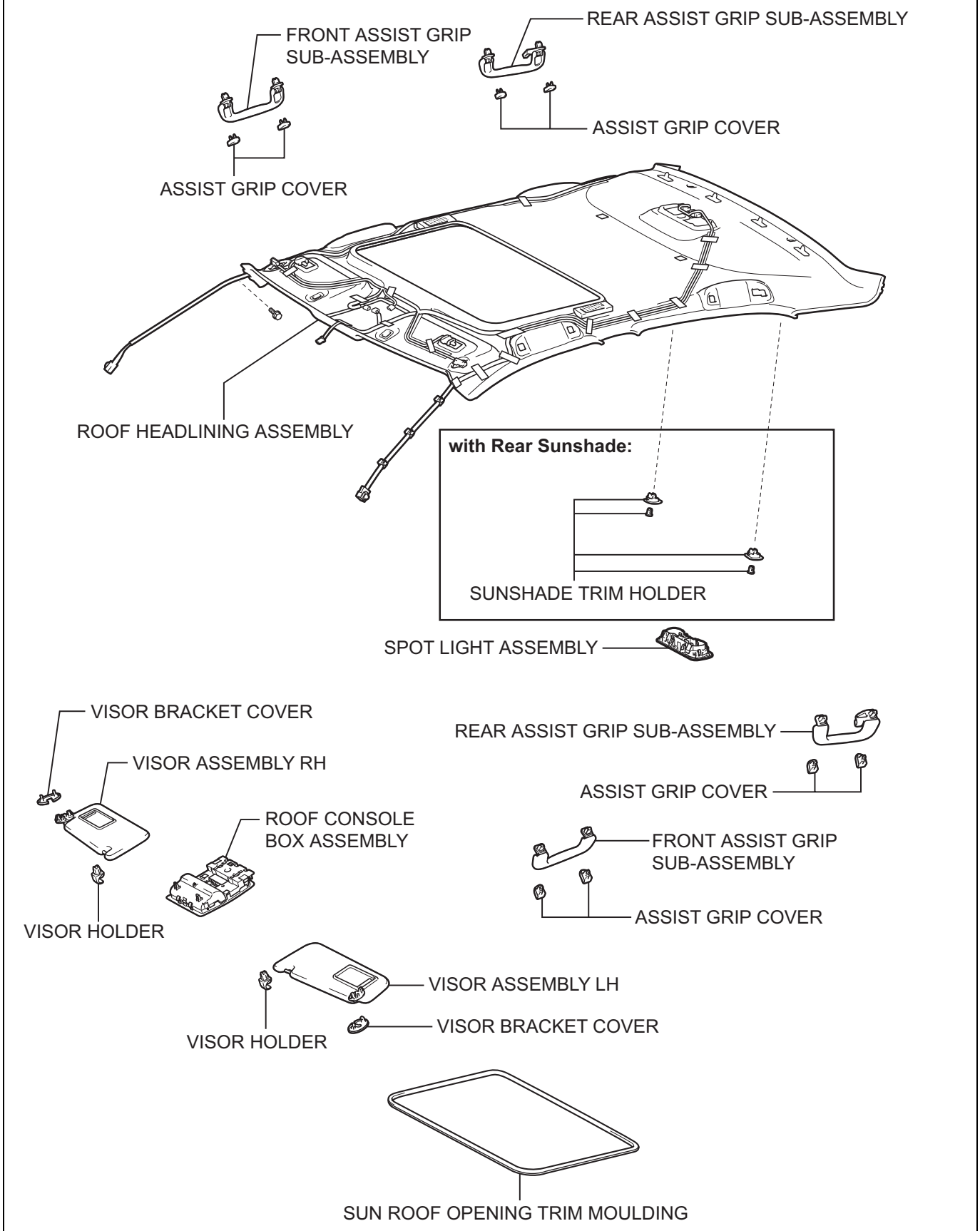


N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

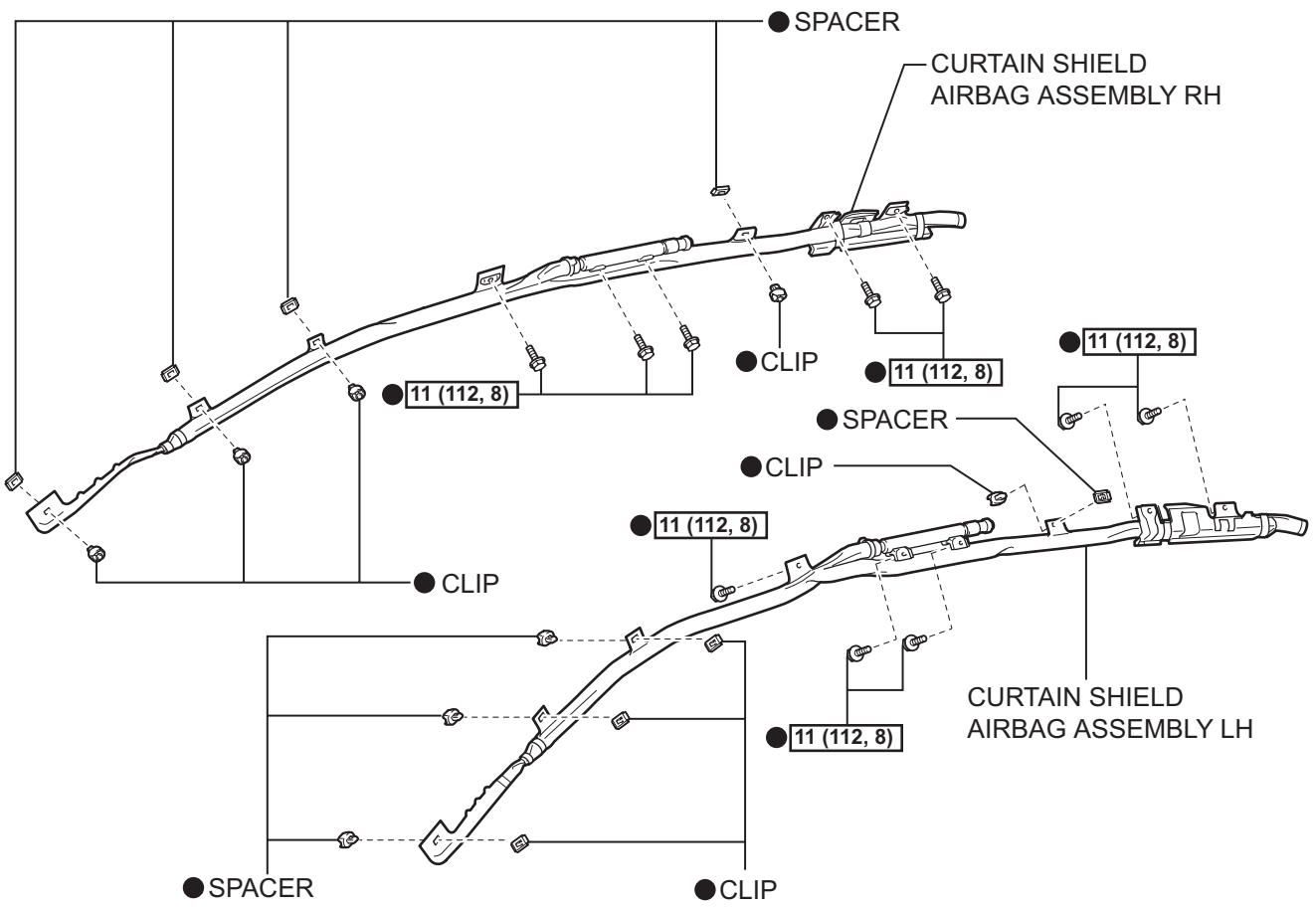
B132049E01



RF

P

B132052E02



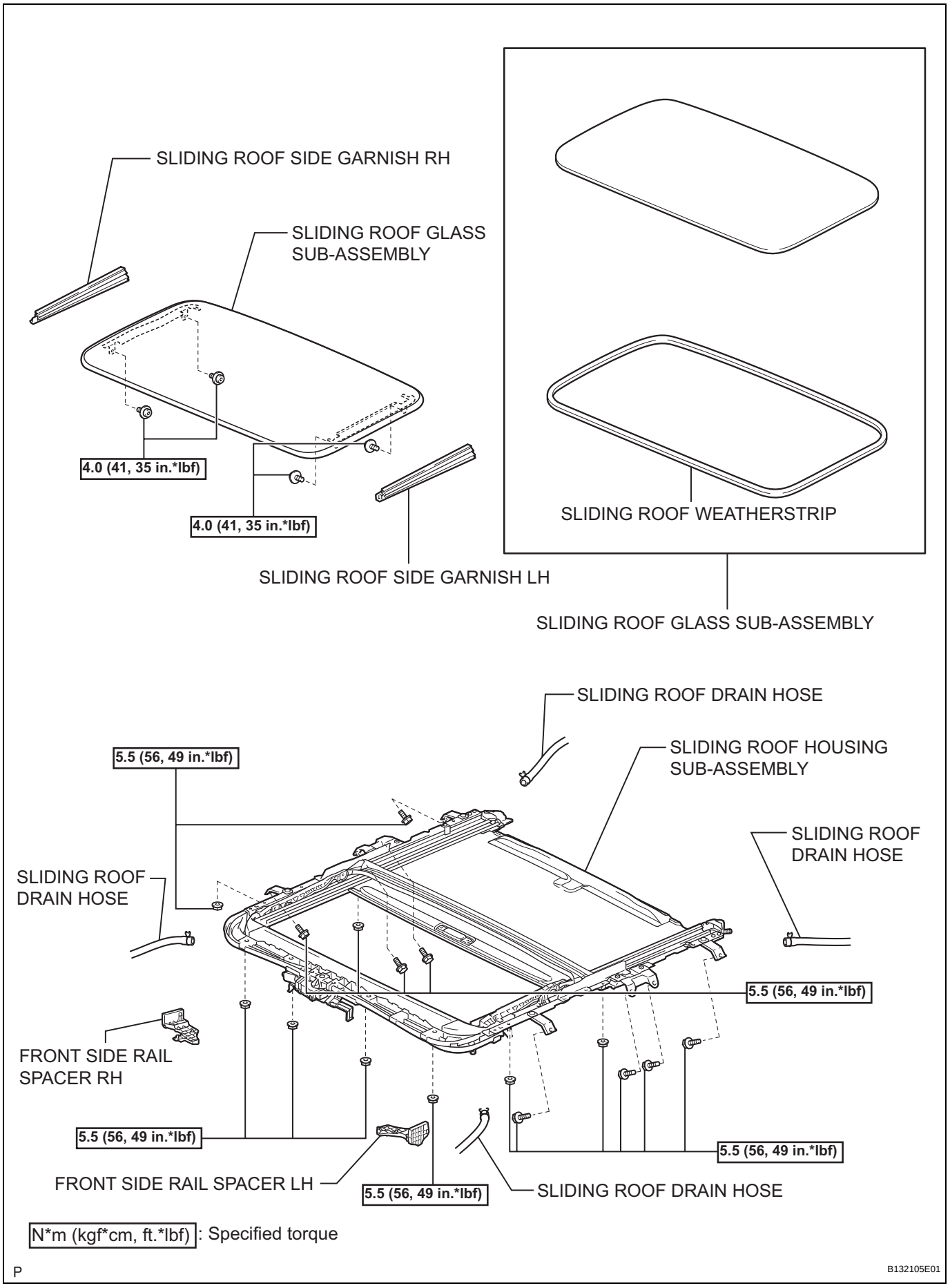
N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

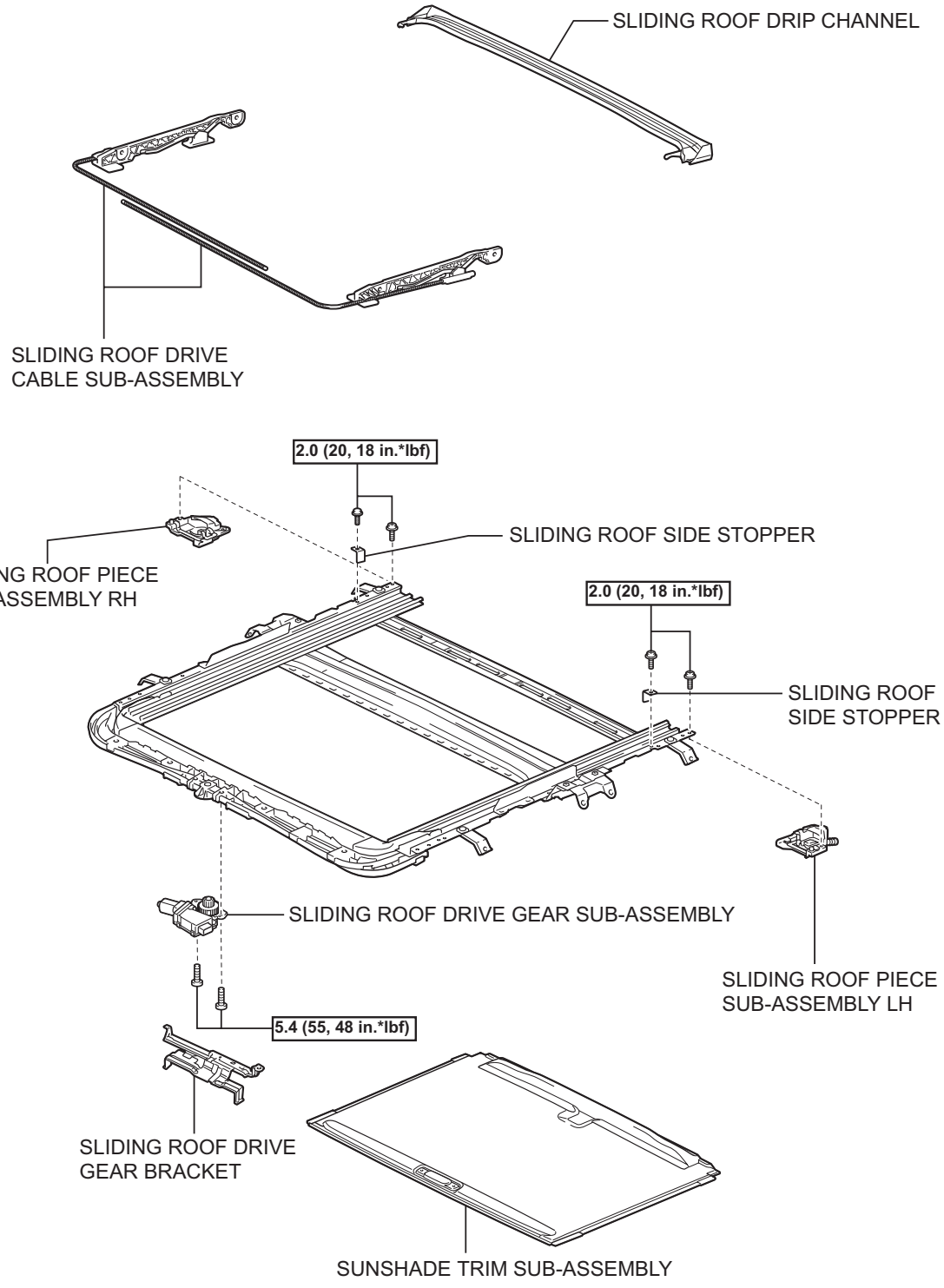
P

B132107E01

RF


SLIDING ROOF SIDE GARNISH RH
SLIDING ROOF GLASS SUB-ASSEMBLY
4.0 (41, 35 in.*lbf)
4.0 (41, 35 in.*lbf)
SLIDING ROOF SIDE GARNISH LH
SLIDING ROOF WEATHERSTRIP
SLIDING ROOF GLASS SUB-ASSEMBLY
SLIDING ROOF DRAIN HOSE
5.5 (56, 49 in.*lbf)
SLIDING ROOF HOUSING SUB-ASSEMBLY
SLIDING ROOF DRAIN HOSE
SLIDING ROOF DRAIN HOSE
5.5 (56, 49 in.*lbf)
FRONT SIDE RAIL SPACER RH
5.5 (56, 49 in.*lbf)
5.5 (56, 49 in.*lbf)
FRONT SIDE RAIL SPACER LH
5.5 (56, 49 in.*lbf)
SLIDING ROOF DRAIN HOSE
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132105E01

RF



N*m (kgf*cm, ft.*lbf) : Specified torque

P

B132106E01

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment (See page RS-1).
2. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
3. **REMOVE SEAT TRACK COVER LH (for Manual Seat) (See page SE-16)**
4. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-16)**
5. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-16)**
6. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
7. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-30)**
8. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Power Seat) (See page SE-30)**
9. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-30)**
10. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
11. **REMOVE SEAT TRACK COVER RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
12. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
13. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
14. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
15. **REMOVE SEAT TRACK COVER RH (for Power Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.

16. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

17. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

18. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)**

19. **REMOVE REAR SEAT HEADREST ASSEMBLY**

20. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**

21. **REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**

22. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)**

23. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)**

24. **REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)**

25. **REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)**

26. **REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)**

27. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)**

28. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)**

29. **REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)**

30. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)**

31. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**

32. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)**

33. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**

34. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)
35. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
36. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-38)
37. REMOVE DOOR ASSIST GRIP COVER LH (See page ED-38)
38. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-39)
39. REMOVE REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-40)
40. REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)
41. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)
42. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH
43. REMOVE LAP BELT OUTER ANCHOR COVER (See page IR-25)
44. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-25)
45. REMOVE LOWER CENTER PILLAR GARNISH LH (See page IR-26)
46. REMOVE UPPER CENTER PILLAR GARNISH LH (See page IR-26)
47. REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)
48. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)
49. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH
50. REMOVE LAP BELT OUTER ANCHOR COVER (See page IR-26)
51. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-26)
52. REMOVE LOWER CENTER PILLAR GARNISH RH (See page IR-26)
53. REMOVE UPPER CENTER PILLAR GARNISH RH (See page IR-26)
54. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)
55. REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)

56. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**

57. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**

58. **REMOVE ROOF CONSOLE BOX ASSEMBLY (See page IR-28)**

59. **REMOVE VISOR ASSEMBLY LH (See page IR-28)**

60. **REMOVE VISOR ASSEMBLY RH (See page IR-29)**

61. **REMOVE VISOR HOLDER (See page IR-29)**

62. **REMOVE FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**

63. **REMOVE REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**

64. **REMOVE SPOT LIGHT ASSEMBLY (See page IR-30)**

65. **REMOVE SUN ROOF OPENING TRIM MOULDING (See page IR-31)**

66. **REMOVE SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-31)**

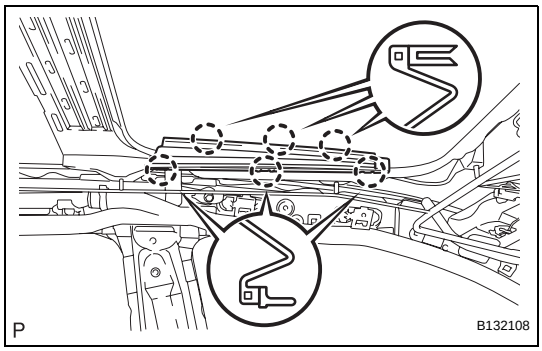
67. **REMOVE ROOF HEADLINING ASSEMBLY (See page IR-32)**

68. **REMOVE FRONT SIDE RAIL SPACER LH**
    (a) Disengage the 2 claws and remove the front side rail spacer LH.

69. **REMOVE FRONT SIDE RAIL SPACER RH**
    HINT:
    Use the same procedures for the RH side and the LH side.

70. **REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY LH**

71. **REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY RH**
    HINT:
    Use the same procedures for the RH side and the LH side.

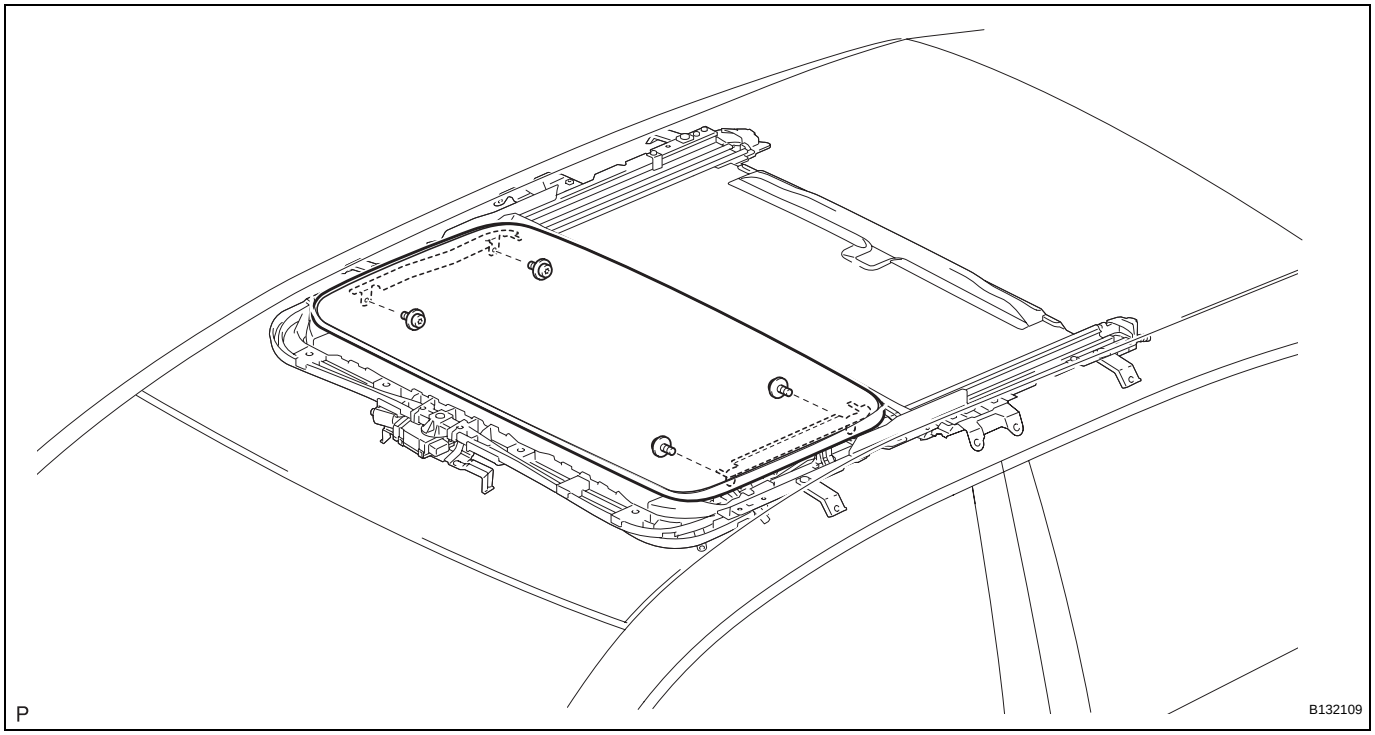


72. **REMOVE SLIDING ROOF SIDE GARNISH LH**
    (a) Disengage the 5 claws and remove the sliding roof side garnish LH.

73. **REMOVE SLIDING ROOF SIDE GARNISH RH**
    HINT:
    Use the same procedures for the RH side and the LH side.

74. REMOVE SLIDING ROOF GLASS SUB-ASSEMBLY

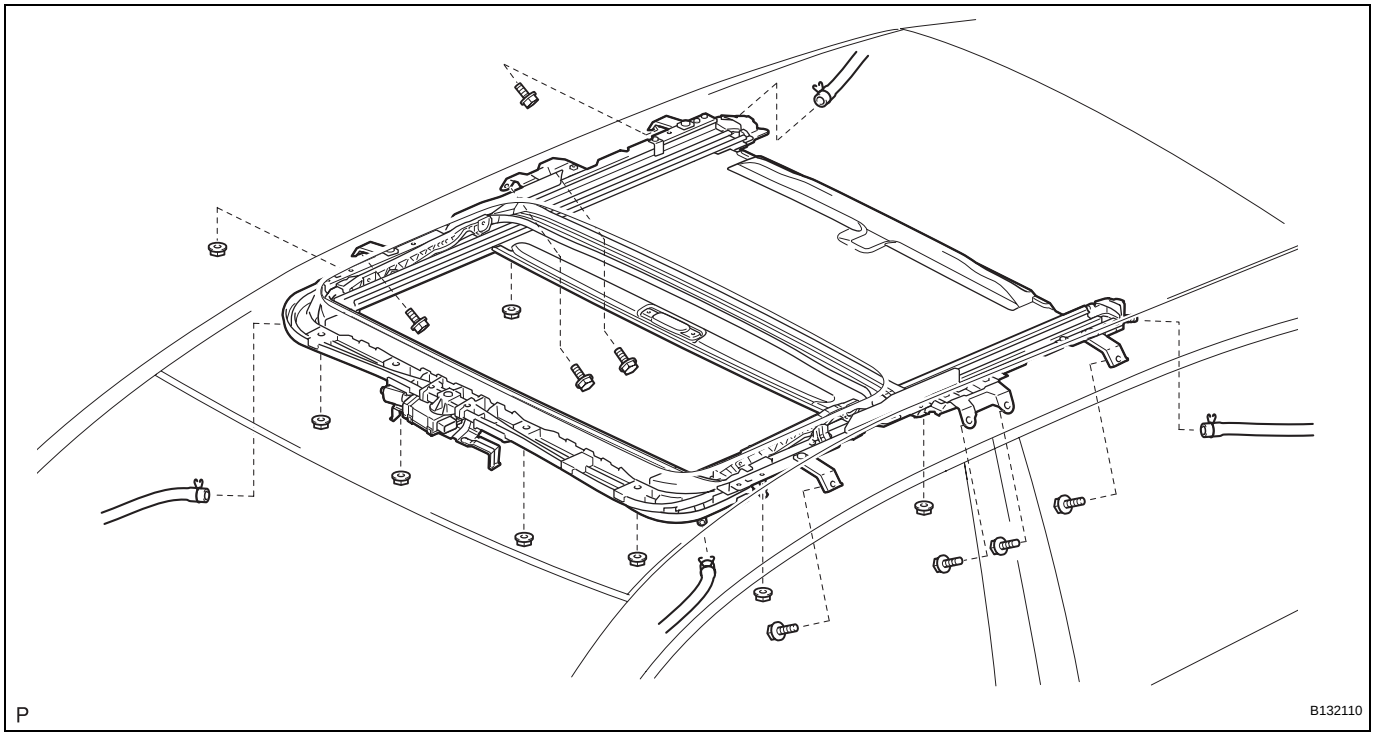
(a) Using a T25 "TORX" driver, remove the 4 screws and sliding roof glass sub-assembly.



75. REMOVE SLIDING ROOF HOUSING SUB-ASSEMBLY

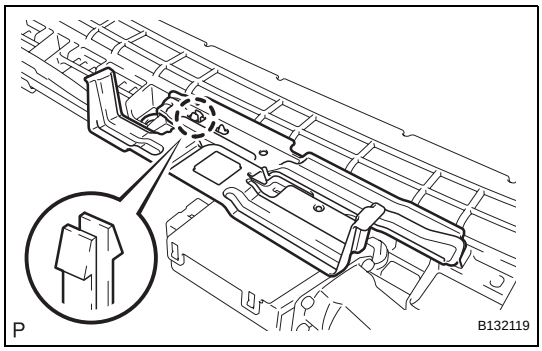
(a) Disconnect the 4 sliding roof drain hoses.

(b) Remove the 8 bolts, 8 nuts, and sliding roof housing sub-assembly.



76. REMOVE SLIDING ROOF WEATHERSTRIP

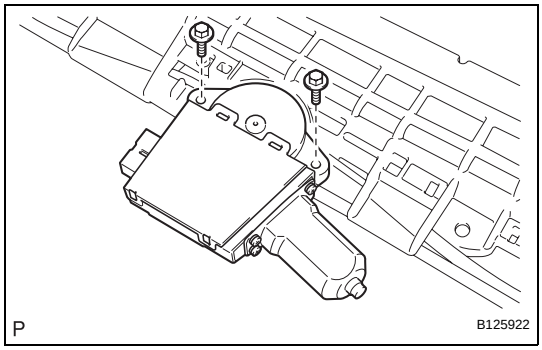
(a) Remove the sliding roof weatherstrip from the sliding roof housing sub-assembly.



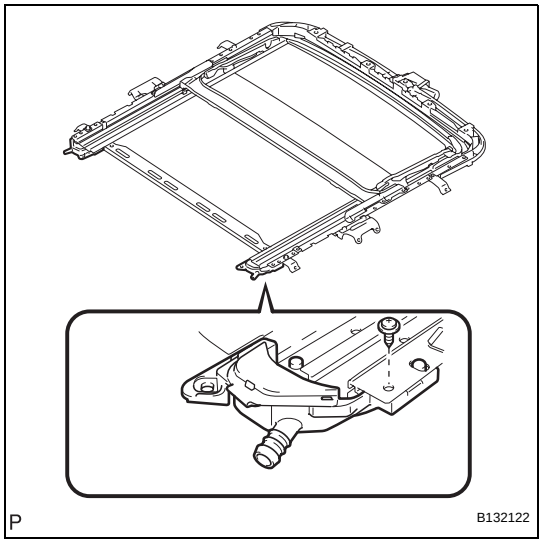
DISASSEMBLY

1. REMOVE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY

(a) Disengage the claw and remove the sliding roof drive gear bracket.



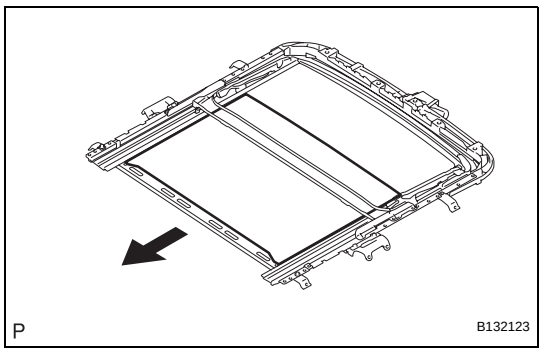
(b) Remove the 2 bolts and sliding roof drive gear sub-assembly.



2. REMOVE SUNSHADE TRIM SUB-ASSEMBLY

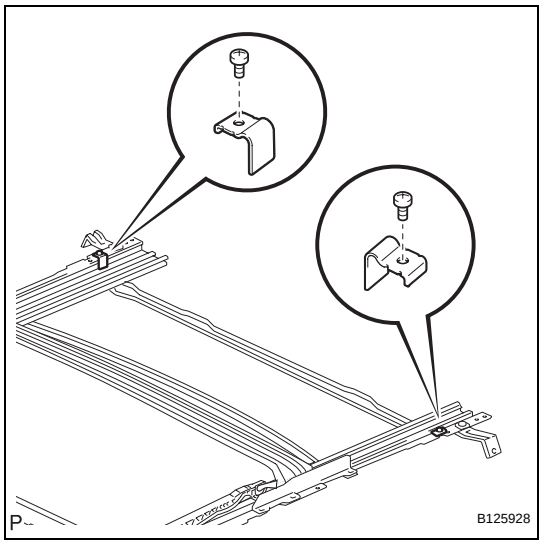
(a) Remove the screw and sliding roof piece sub-assembly LH.
HINT:
Use the same procedures for the RH side and the LH side.

(b) Slide and remove the sunshade trim sub-assembly.

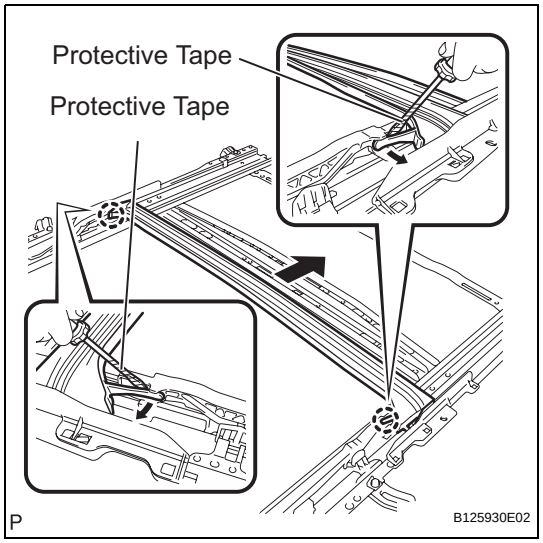


3. REMOVE SLIDING ROOF DRIVE CABLE SUB-ASSEMBLY

NOTICE:
Do not disassemble the sliding roof drive cable sub-assembly except when replacing it.

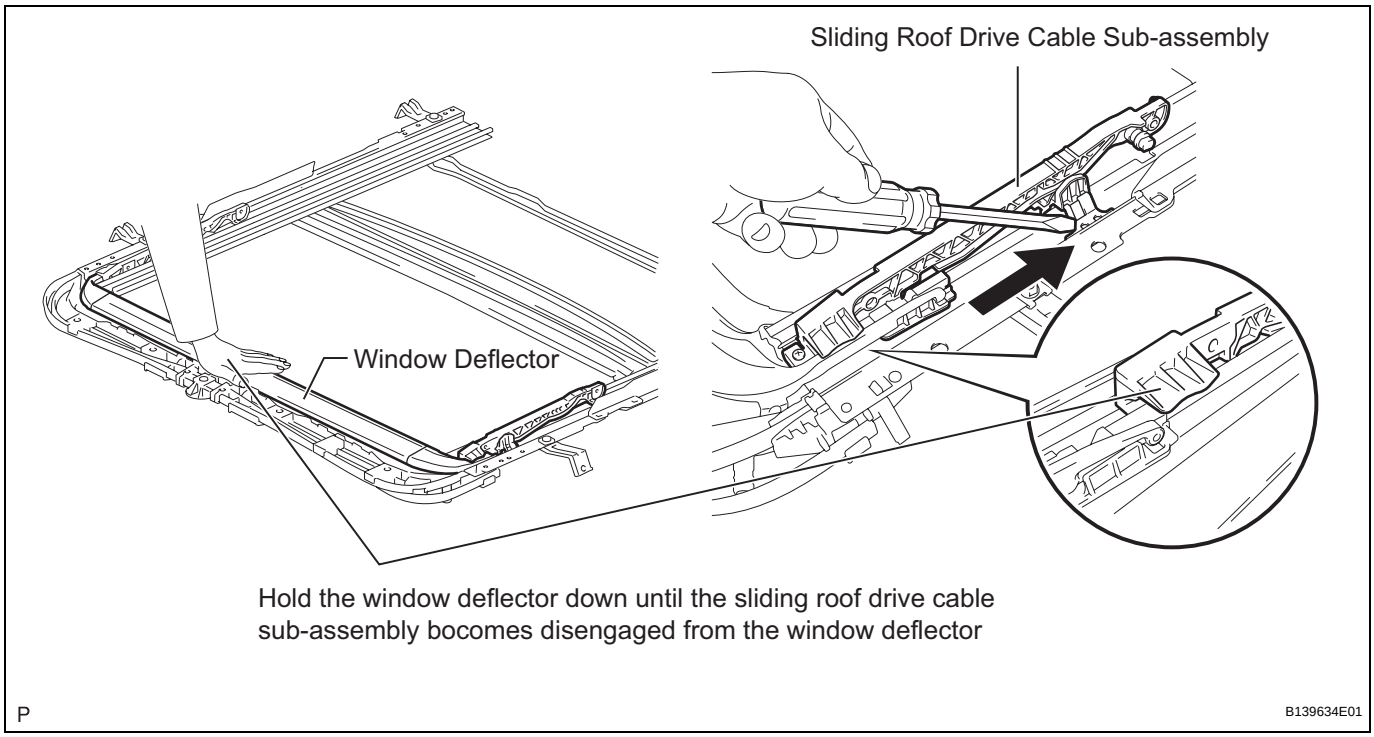


(a) Remove the 2 screws and sliding roof side stoppers.



(b) Using a screwdriver, disengage the 2 claws. Then slide the sliding roof drip channel rearward to remove it.
HINT:
Tape the screwdriver tip before use.

(c) Using a screwdriver, slide the sliding roof drive cable sub-assembly in the direction indicated by the arrow in the illustration to remove it.

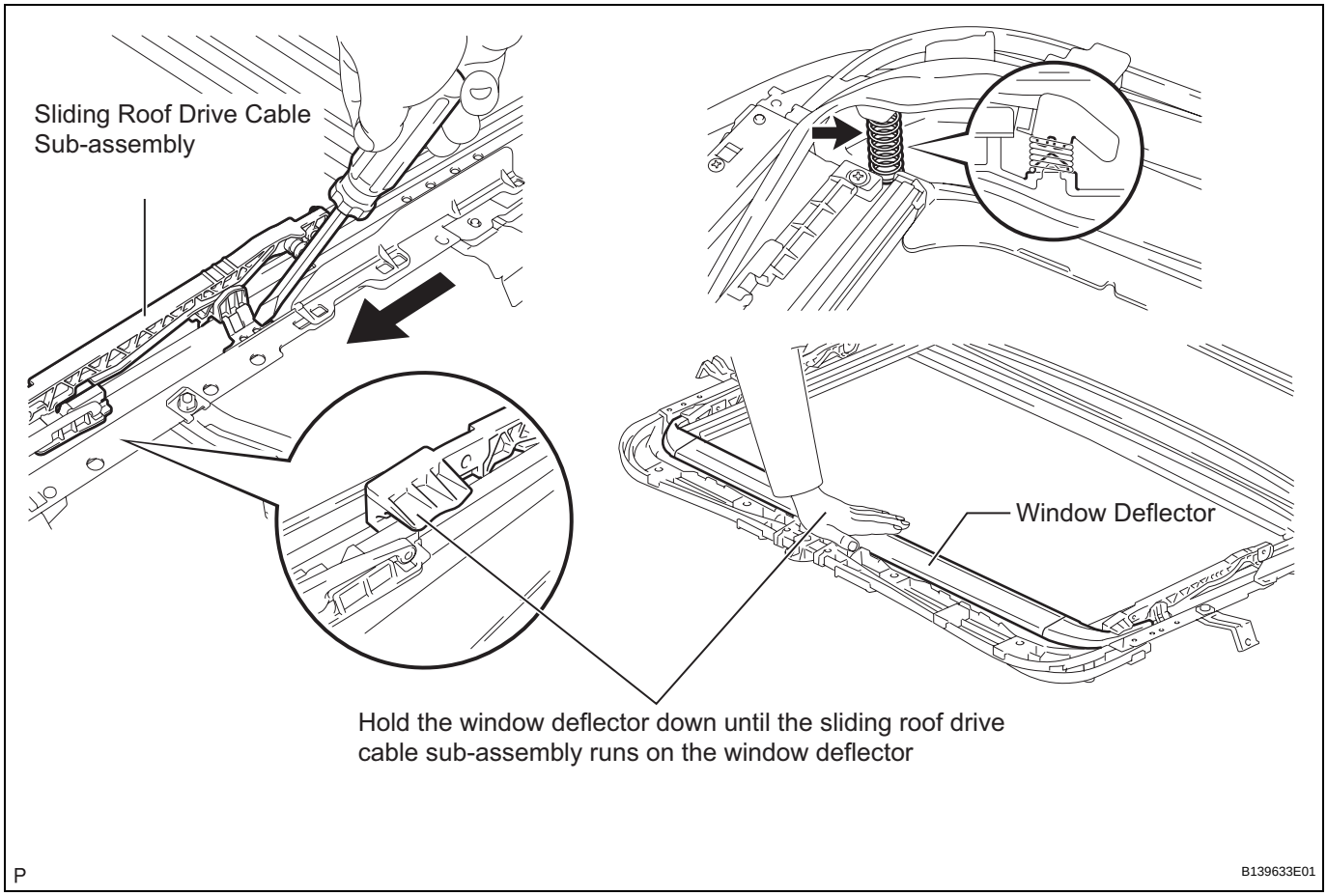


HINT:
Hold the window deflector down, as shown in the illustration, until the sliding roof drive cable sub-assembly becomes disengaged from the window deflector.

REASSEMBLY

1. INSTALL SLIDING ROOF DRIVE CABLE SUB-ASSEMBLY

(a) Using a screwdriver, slide the sliding roof drive cable sub-assembly in the direction indicated by the arrow in the illustration to install it.



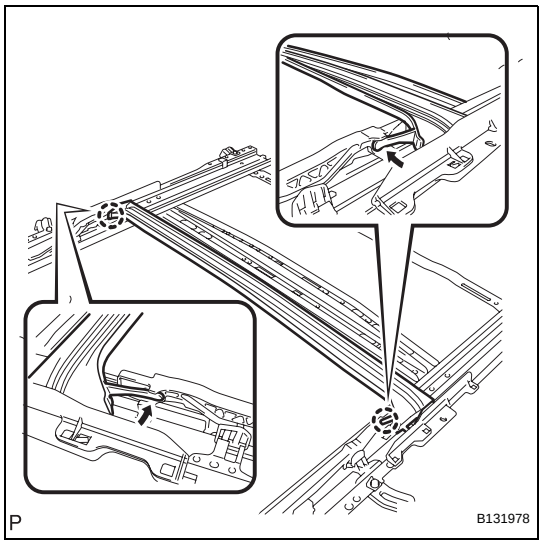
NOTICE:

Make sure that the spring indicated by the arrow in the illustration is securely installed.

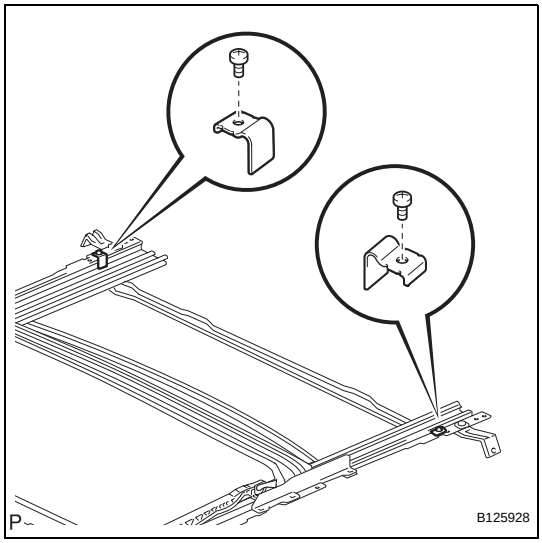
HINT:

Hold the window deflector down, as shown in the illustration, until the sliding roof drive cable sub-assembly runs on the window deflector.

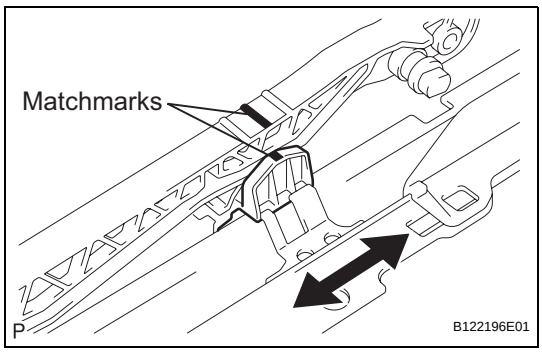
RF



(b) Engage the 2 claws and install the sliding roof drip channel.

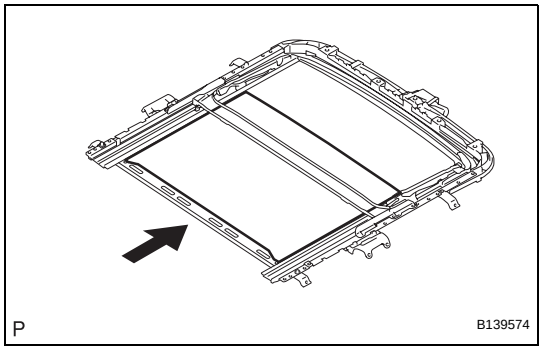


(c) Install the 2 sliding roof side stoppers with the 2 screws.
Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)



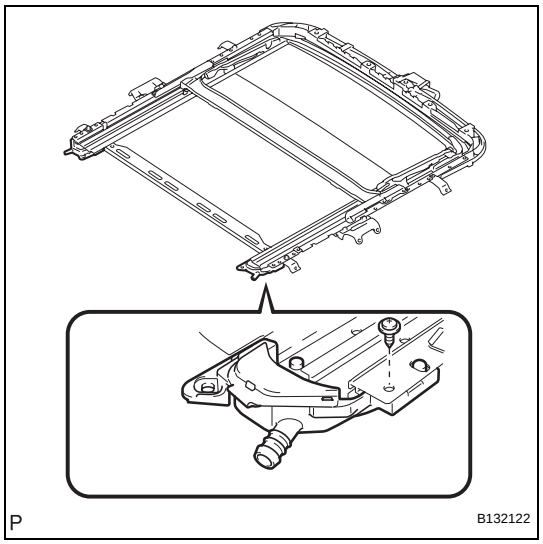
2. ADJUST FULLY CLOSED POSITION

(a) Using a screwdriver, slide the sliding roof drive cable sub-assembly in either direction as indicated by the arrows in the illustration and align the matchmarks.
HINT:
Tape the screwdriver tip before use.

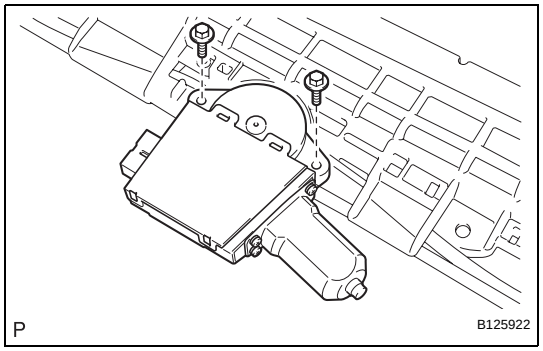


3. INSTALL SUNSHADE TRIM SUB-ASSEMBLY

(a) Insert the sunshade trim into the sliding roof housing sub-assembly.

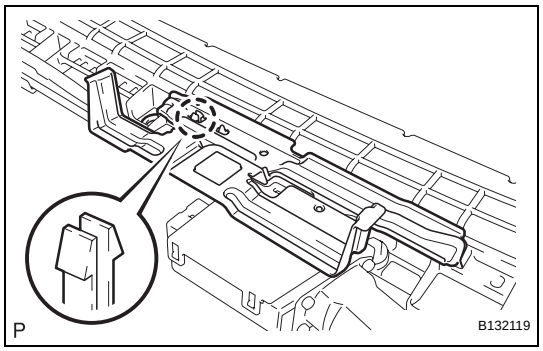


(b) Install the sliding roof piece sub-assemblies LH and RH with the 2 screws.
Torque: 2.0 N*m (20 kgf*cm, 18 in.*lbf)



4. INSTALL SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY

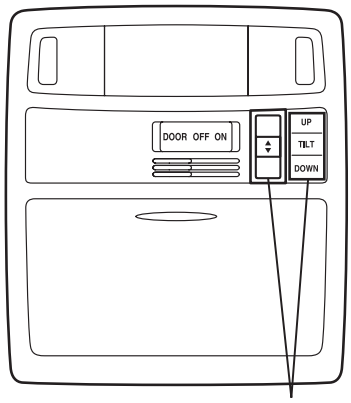
(a) Install the sliding roof drive gear sub-assembly with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



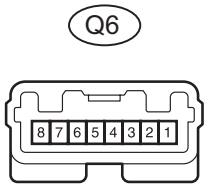
(b) Engage the claw and install the sliding roof drive gear bracket.

RF

Roof Console Box Assembly Connector:



Sliding Roof Control Switch



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SLIDING ROOF SWITCH ASSEMBLY

ON-VEHICLE INSPECTION

1. INSPECT ROOF CONSOLE BOX ASSEMBLY

(a) Remove the roof console box assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
Q6-1 (CLS) - Q6-3 (GND)	CLOSE	Below 100 Ω
Q6-2 (OPN) - Q6-3 (GND)	OPEN	Below 100 Ω
Q6-4 (DOWN) - Q6-3 (GND)	DOWN	Below 100 Ω
Q6-5 (UP) - Q6-3 (GND)	UP	Below 100 Ω
Q6-1 (CLS) - Q6-3 (GND)	OPEN	1 kΩ or higher
Q6-2 (OPN) - Q6-3 (GND)	CLOSE	1 kΩ or higher
Q6-4 (DOWN) - Q6-3 (GND)	UP	1 kΩ or higher
Q6-5 (UP) - Q6-3 (GND)	DOWN	1 kΩ or higher

If the result is not as specified, replace the roof console box assembly.

INSTALLATION

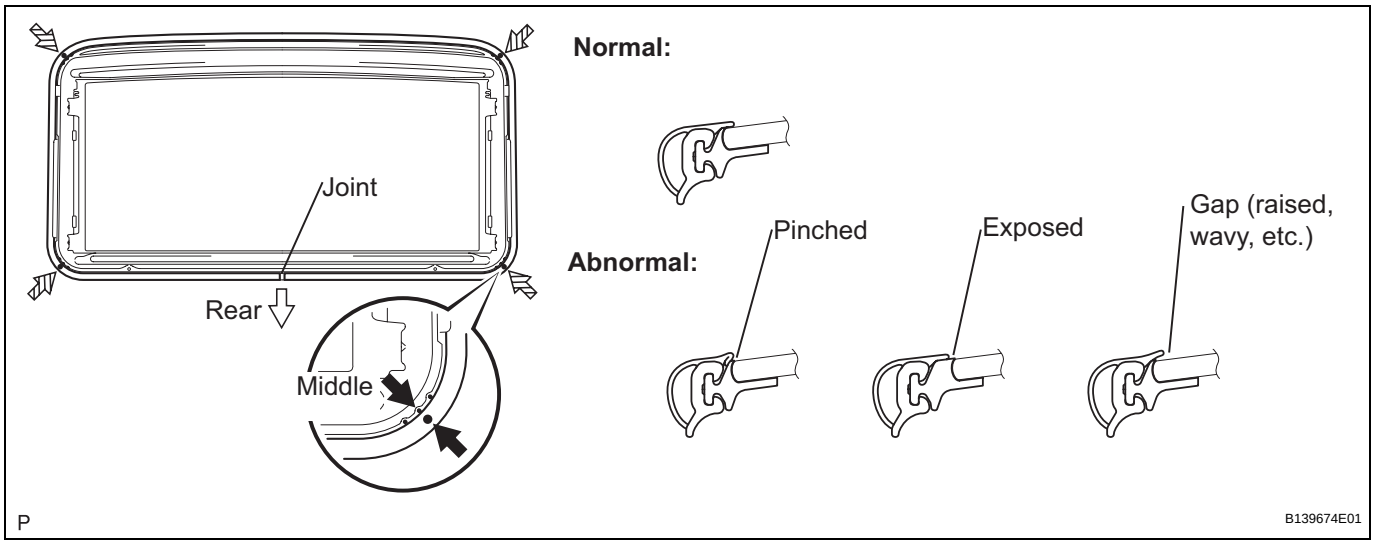
1. INSTALL SLIDING ROOF WEATHERSTRIP

(a) Install the sliding roof weatherstrip as follows:

(1) Position the joint of the weatherstrip at the rear center.

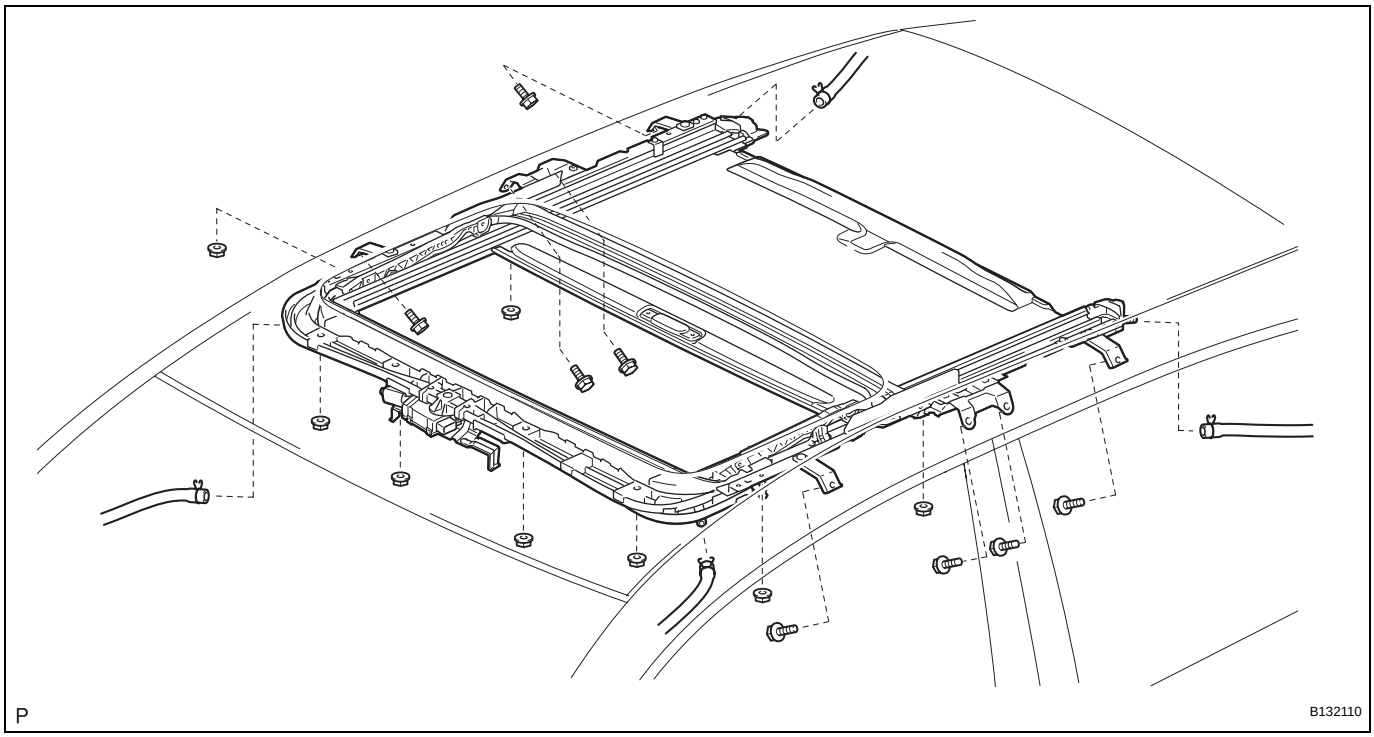
(2) Align the marks on the weatherstrip with the middle marks at the corners of the sliding roof panel and install the weatherstrip.

(3) Install the lip of the weatherstrip firmly.

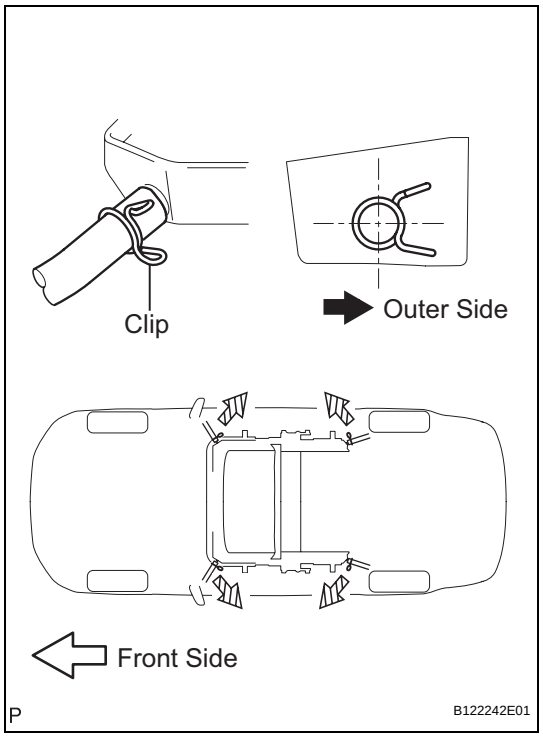


2. INSTALL SLIDING ROOF HOUSING SUB-ASSEMBLY

(a) Install the sliding roof housing sub-assembly with the 8 bolts and 8 nuts.



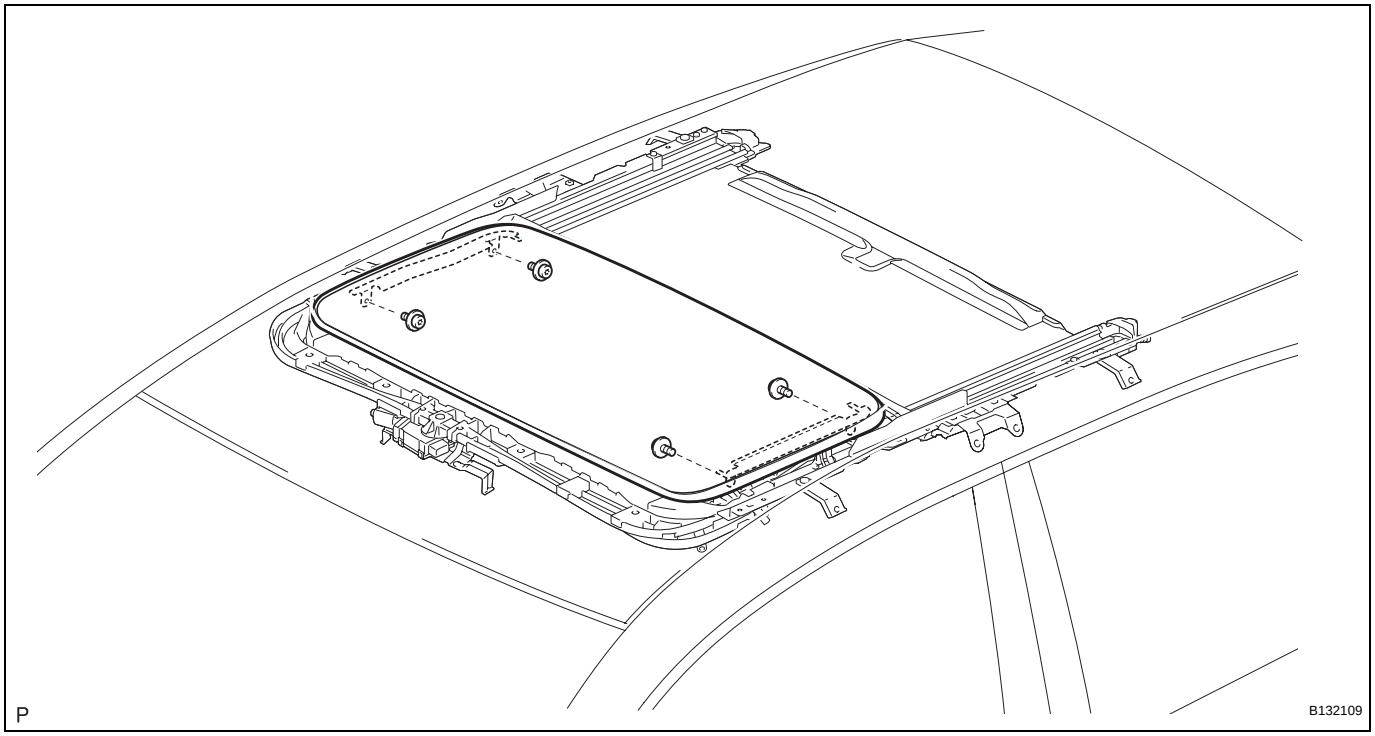
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

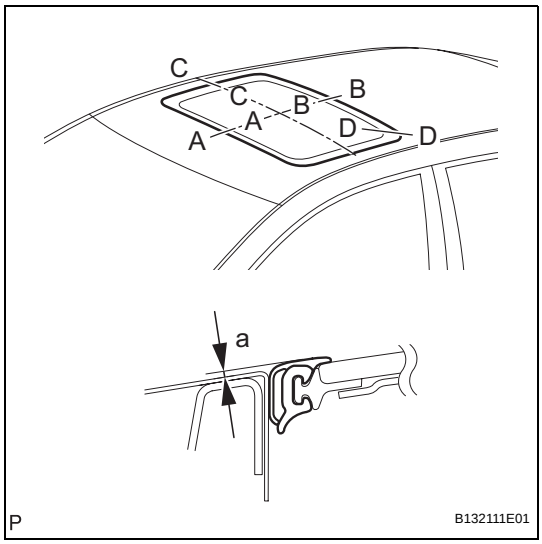


(b) Connect the 4 sliding roof drain hoses.
NOTICE:
The clip must face toward the outside of the vehicle and also be above the lower surface of the sliding roof housing when installing the drain hoses.

3. INSTALL SLIDING ROOF GLASS SUB-ASSEMBLY

(a) Using a T25 "TORX" driver, temporarily install the sliding roof glass sub-assembly with the 4 screws.

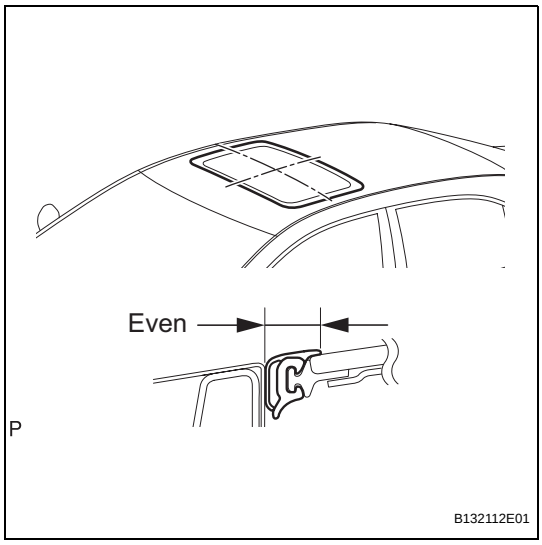




(b) Perform a level check.
(1) Check the difference in level for "a" between the roof panel and the upper surface of the weatherstrip when the sliding roof glass is fully closed.
Standard

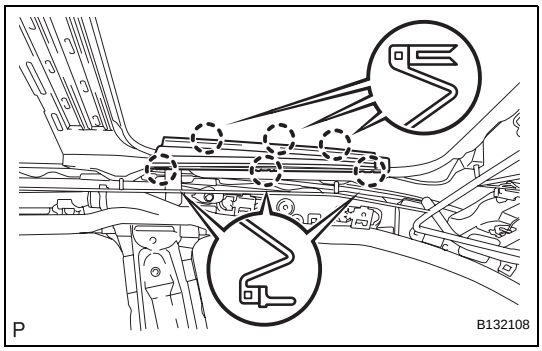
Area	Measurement
A - A	0 + 1.0 mm (0 + 0.039 in.) 0 - 2.0 mm (0 - 0.079 in.)
B - B	0 + 2.0 mm (0 + 0.079 in.) 0 - 1.0 mm (0 - 0.039 in.)
C - C	0 + 1.5 mm (0 + 0.059 in.) 0 - 1.5 mm (0 - 0.059 in.)
D - D	0 + 1.5 mm (0 + 0.059 in.) 0 - 1.0 mm (0 - 0.039 in.)

HINT:
"+" represents the condition that the glass is above the panel level. "-" represents the condition that the glass is below the panel level.



(c) Perform a gap check.
(1) Check the gap between the roof panel and roof glass.
NOTICE:
The gap must be even all around.
(d) After adjusting the sliding roof glass, using a T25 "TORX" driver, install the sliding roof glass sub-assembly with the 4 screws.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

4. CHECK FOR WATER LEAKS
(a) After adjusting the sliding roof glass sub-assembly, check for water leaks.
(b) If there are any leaks, readjust the sliding roof glass sub-assembly.



5. INSTALL SLIDING ROOF SIDE GARNISH LH
(a) Engage the 6 claws and install the sliding roof side garnish LH.

6. INSTALL SLIDING ROOF SIDE GARNISH RH
HINT:
Use the same procedures for the RH side and the LH side.

7. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY LH
(See page RS-421)

8. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY RH
HINT:
Use the same procedures for the RH side and the LH side.

9. INSTALL FRONT SIDE RAIL SPACER LH
(a) Engage the 2 claws and install the front side rail spacer LH.

10. **INSTALL FRONT SIDE RAIL SPACER RH**
HINT:
Use the same procedures for the RH side and the LH side.
11. **INSTALL ROOF HEADLINING ASSEMBLY (See page IR-46)**
12. **INSTALL SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-47)**
13. **INSTALL SUN ROOF OPENING TRIM MOULDING (See page IR-47)**
14. **INSTALL SPOT LIGHT ASSEMBLY (See page IR-48)**
15. **INSTALL FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-49)**
16. **INSTALL REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-49)**
17. **INSTALL VISOR HOLDER (See page IR-49)**
18. **INSTALL VISOR ASSEMBLY LH (See page IR-50)**
19. **INSTALL VISOR ASSEMBLY RH (See page IR-50)**
20. **INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-50)**
21. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**
22. **INSTALL FRONT PILLAR GARNISH RH (See page IR-52)**
23. **INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)**
24. **INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)**
25. **INSTALL UPPER CENTER PILLAR GARNISH LH (See page IR-53)**
26. **INSTALL LOWER CENTER PILLAR GARNISH LH (See page IR-53)**
27. **CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-53)**
28. **INSTALL LAP BELT OUTER ANCHOR COVER (See page IR-53)**
29. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-54)**
30. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
31. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
32. **INSTALL UPPER CENTER PILLAR GARNISH RH (See page IR-54)**

33. **INSTALL LOWER CENTER PILLAR GARNISH RH (See page IR-54)**
34. **CONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-54)**
35. **INSTALL LAP BELT OUTER ANCHOR COVER (See page IR-54)**
36. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-55)**
37. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
38. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
39. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-54)**
40. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-55)**
41. **INSTALL DOOR ASSIST GRIP COVER LH (See page ED-56)**
42. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-56)**
43. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)**
44. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
45. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**
46. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**
47. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)**
48. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**
49. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**
50. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**
51. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
52. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**

53. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**

54. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**
HINT:
Use the same procedures for the RH side and the LH side.

55. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**

56. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**

57. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**

58. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**

59. **INSTALL REAR SEAT HEADREST ASSEMBLY**

60. **INSTALL REAR SEAT CUSHION ASSEMBLY (See page SE-84)**

61. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-41)**

62. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Power Seat) (See page SE-42)**

63. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-42)**

64. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

65. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-24)**

66. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-25)**

67. **INSTALL SEAT TRACK COVER LH (for Manual Seat) (See page SE-25)**

68. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

69. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

70. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

71. **INSTALL SEAT TRACK COVER RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

72. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

73. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

74. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

75. **INSTALL SEAT TRACK COVER RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

76. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

77. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

78. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)**
(See page RS-242)

79. **INSPECT SRS WARNING LIGHT**
(See page RS-32)

80. **RESET SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY**
(See page RF-4)

81. **CHECK SLIDING ROOF SYSTEM**
(See page RF-11)

82. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat)**
(See page SE-42)

83. **INSPECT FRONT SEAT ADJUSTER ASSEMBLY (for Manual Seat)**

AIRBAG SYSTEM

PRECAUTION

CAUTION:

- **The vehicle is equipped with a Supplemental Restraint System (SRS). It consists of a driver airbag, front passenger airbag, driver side knee airbag, side airbag, curtain shield airbag, and front seat belt pretensioner. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Further, if a mistake is made in servicing the SRS, it is possible that the SRS may fail to operate when required. Before performing servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedures indicated in the repair manual.**
- **Wait at least 90 seconds after the ignition switch is turned off and the negative (-) terminal cable is disconnected from the battery before starting the operation.**
  (The SRS is equipped with a backup power source, so if work is started within 90 seconds after disconnecting the negative (-) terminal cable from the battery, the SRS may be deployed.)
- **Do not expose the steering pad, front passenger airbag assembly, driver side knee airbag assembly, center airbag sensor assembly, front airbag sensor, front seat inner belt assembly, seat position airbag sensor, occupant classification ECU, front seat side airbag assembly, side airbag sensor, curtain shield airbag assembly, rear airbag sensor, or front seat outer belt assembly directly to hot air or flames.**

NOTICE:

- **Malfunction symptoms of the SRS are difficult to confirm, so DTCs are the most important source of information when troubleshooting. When troubleshooting the SRS, always inspect DTCs before disconnecting the battery.**
- **Even in the case of a minor collision when the SRS does not deploy, the steering pad, front passenger airbag assembly, driver side knee airbag assembly, center airbag sensor assembly, front airbag sensor, front seat inner belt assembly, seat position airbag sensor, occupant classification ECU, front seat side airbag assembly, side airbag sensor, curtain shield airbag assembly, rear airbag sensor, or front seat outer belt assembly should be inspected.**
- **Before repair work, remove the airbag sensor if any kind of shock is likely to occur to the airbag sensor during the operation.**
- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**

- **Never disassemble or repair any of the following parts in order to reuse them. If any of these parts have been dropped, or a defect is found (e.g. cracks, dents or any other defects) in any of the housings, brackets or connectors, then replace the part with a new one.**
  (a) Steering Pad
  (b) Front Passenger Airbag Assembly
  (c) Driver Side Knee Airbag Assembly
  (d) Front Seat Side Airbag Assembly
  (e) Curtain Shield Airbag Assembly
  (f) Center Airbag Sensor Assembly
  (g) Front Airbag Sensor
  (h) Front Seat Inner Belt Assembly
  (i) Seat Position Airbag Sensor
  (j) Occupant Classification ECU
  (k) Side Airbag Sensor
  (l) Rear Airbag Sensor
  (m) Front Seat Outer Belt Assembly
- **Use an volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting the electrical circuits.**
- **Information labels are attached near the SRS components. Follow the instructions in the caution.**
- **After work on the SRS is completed, perform the SRS warning light check (See page RS-32).**
- **When the negative (-) terminal cable is disconnected from the battery, the memory will be cleared. Because of this, be sure to make a record of the contents memorized in each system before starting work. When work is finished, adjust each system as it was before. Never attempt to avoid erasing vehicle system memories by using a backup power supply from outside the vehicle.**
- **If the vehicle is equipped with a mobile communication system, refer to the precaution in the INTRODUCTION section.**

HINT:
In the airbag system, the center airbag sensor assembly, front airbag sensor LH and RH, side airbag sensor LH and RH, and rear airbag sensor LH and RH are collectively referred to as the airbag sensors.

1. HANDLING PRECAUTIONS FOR AIRBAG SENSORS

(a) Before starting the following operations, wait for at least 90 seconds after disconnecting the negative (-) terminal cable from the battery:
  (1) Replacement of the airbag sensors.
  (2) Adjustment of the front/rear doors of the vehicle equipped with the side airbag and curtain shield airbag (fitting adjustment).

(b) When connecting or disconnecting the airbag sensor connectors, ensure that each sensor is installed in the vehicle.

(c) Do not use the airbag sensors which have been dropped during the operation or transportation.

(d) Do not disassemble the airbag sensors.

RS

2. INSPECTION PROCEDURE FOR VEHICLE INVOLVED IN ACCIDENT

(a) When the airbag has not deployed, confirm the DTCs by checking the SRS warning light. If there is any malfunction in the SRS airbag system, perform troubleshooting.

(b) When any of the airbags have deployed, replace the airbag sensors and check the installation condition.

3. EXPRESSIONS OF IGNITION SWITCH

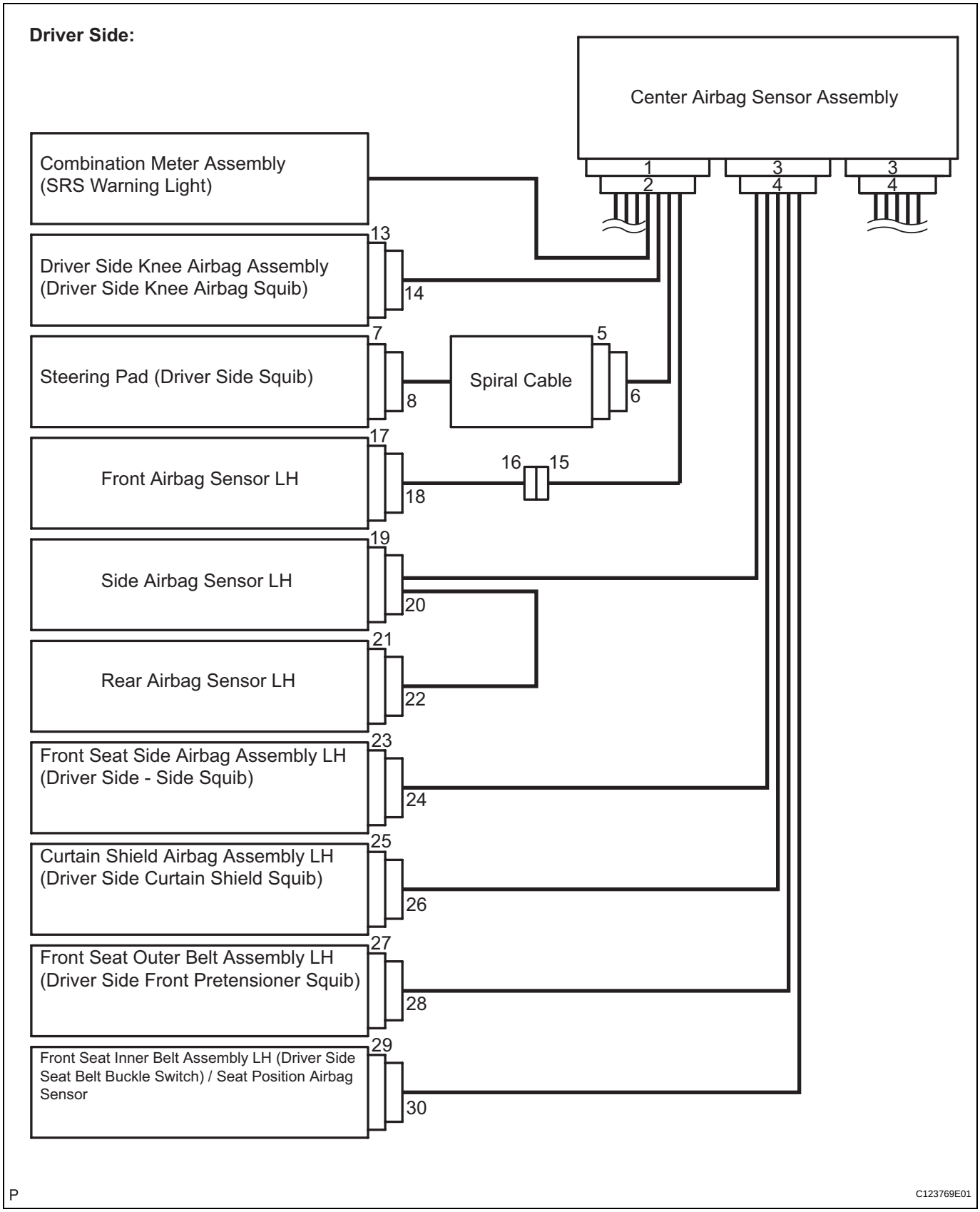
The type of ignition switch used on this model differs according to the specifications of the vehicle.

The expressions listed in the table below are used in this section.

Expression	Switch Type	
	Ignition Switch (position)	Engine Switch (condition)
Ignition Switch off	LOCK	Off
Ignition Switch on (IG)	ON	On (IG)
Ignition Switch on (ACC)	ACC	On (ACC)
Engine Start	START	Start

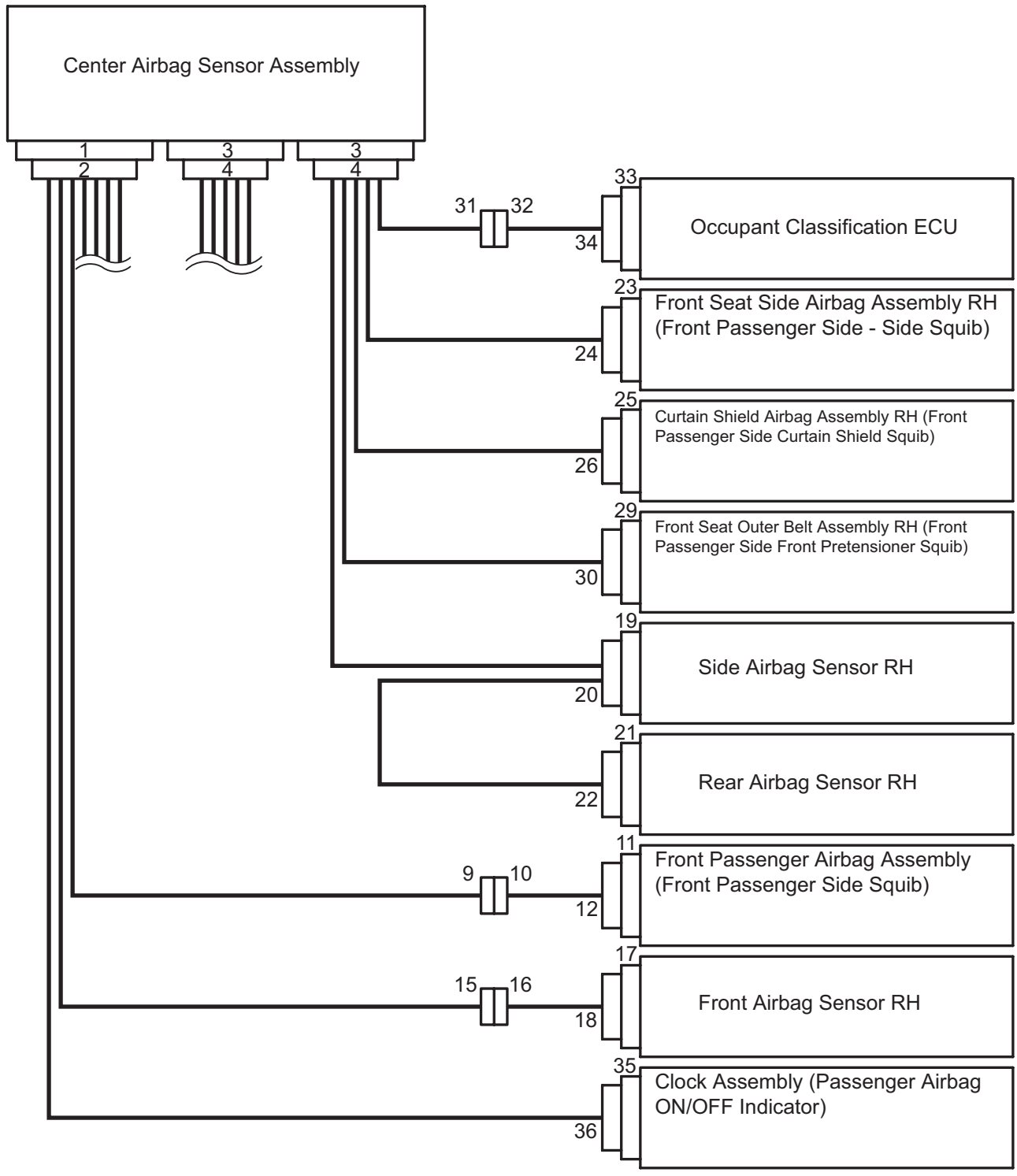
4. SRS CONNECTORS

(a) SRS connectors are located as shown in the following illustration.



RS

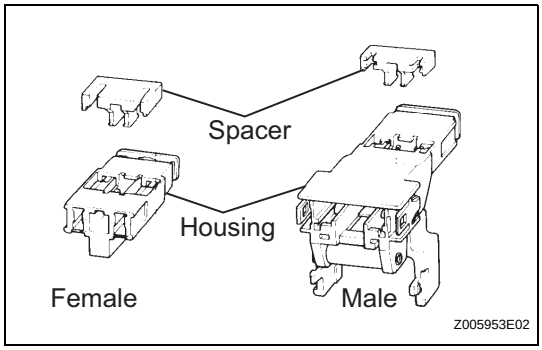
Passenger Side:



No.	Item	Application
(1)	Terminal Twin-Lock Mechanism	Connectors 5, 6, 9, 10, 15, 16, 20, 22, 23, 24, 31, 32
(2)	Activation Prevention Mechanism	Connectors 2, 4, 5, 10, 11, 13, 23, 25, 27
(3)	Half Connection Prevention Mechanism	Connectors 5, 6, 9, 16, 20, 22, 24

RS

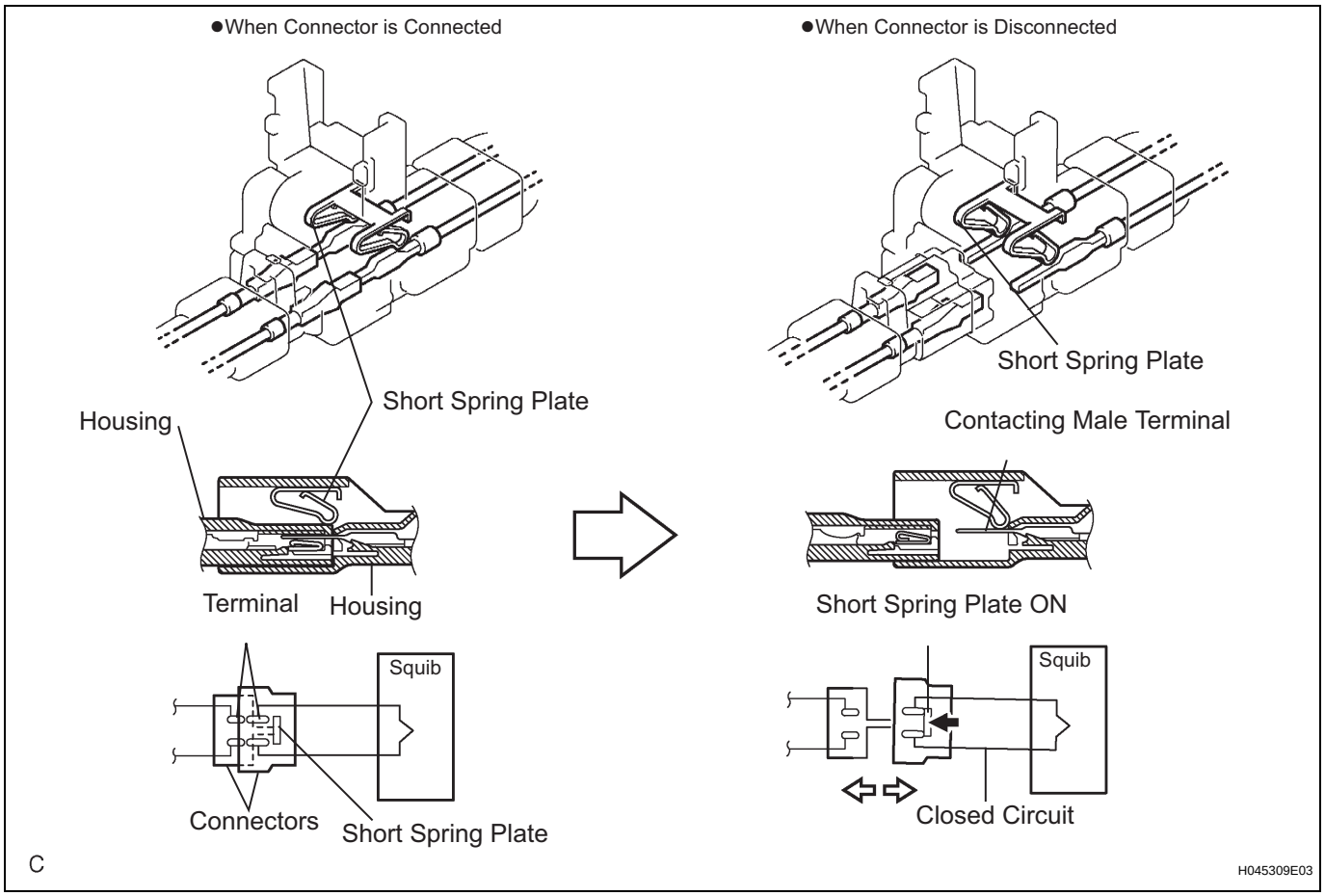
No.	Item	Application
(4)	Connector Position Assurance Mechanism	Connector 18
(5)	Connector Lock Mechanism (1)	Connectors 8, 12, 14, 26, 28
(6)	Connector Lock Mechanism (2)	Connector 2, 4
(7)	Improper Connection Prevention Lock Mechanism	Connector 1, 3



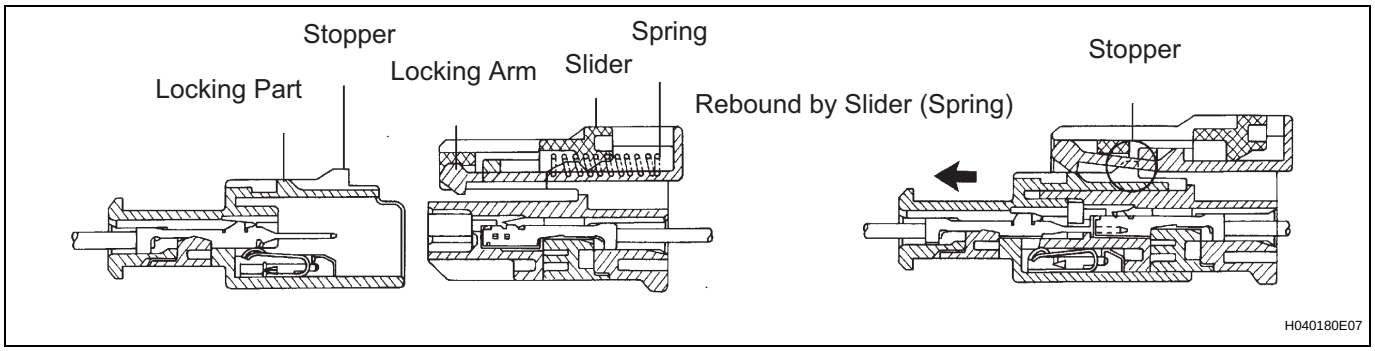
(b) All connectors in the SRS, except the seat position airbag sensor connector, are colored yellow to distinguish them from other connectors. These connectors have special functions, and are specially designed for the SRS. All SRS connectors use durable gold-plated terminals, and are placed in the locations shown on the previous page to ensure high reliability.

(1) Terminal twin-lock mechanism:
All connectors with a terminal twin-lock mechanism have a two-piece component consisting of a housing and a spacer. This design enables the terminal to be locked securely by two locking devices (the retainer and the lance) to prevent terminals from coming out.

(2) Activation prevention mechanism:
All connectors with an activation prevention mechanism contain a short spring plate. When these connectors are disconnected, the short spring plate creates a short circuit by automatically connecting the positive (+) and negative (-) terminals of the squib.

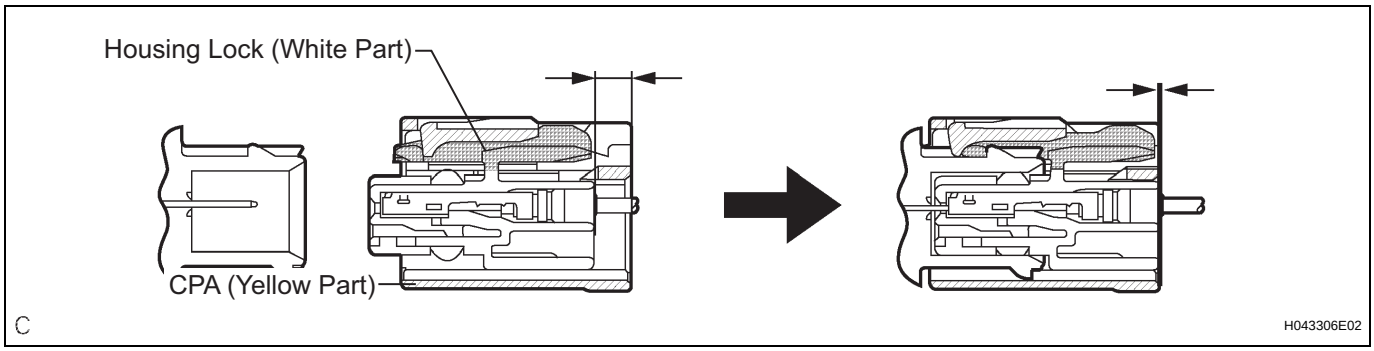


(3) Half connection prevention mechanism:
If the connector is not completely connected, the connector is disconnected due to the spring operation so that no continuity exists.

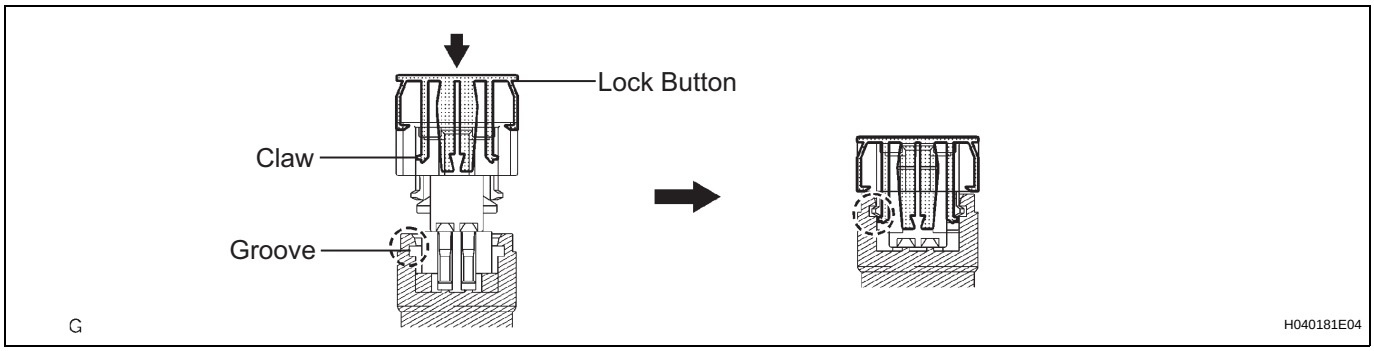


RS

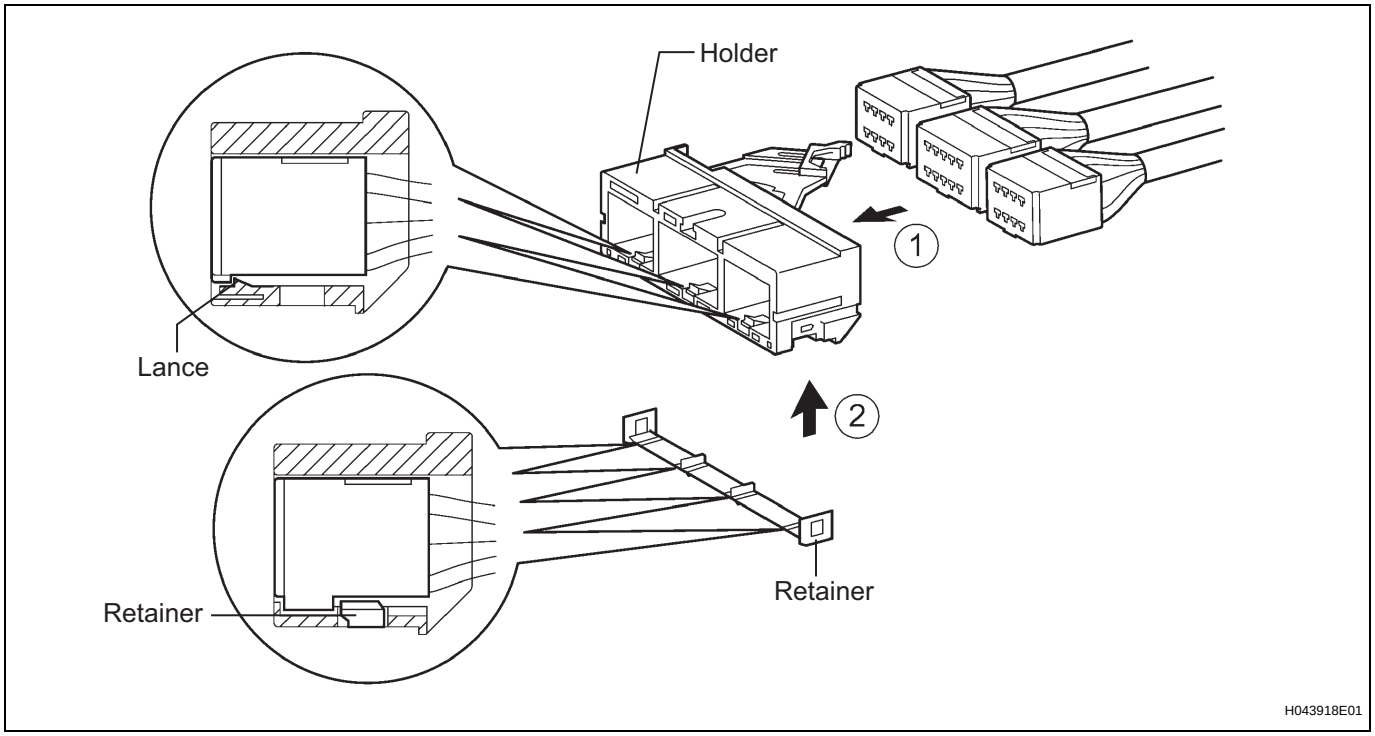
(4) Connector position assurance mechanism:
Only when the housing lock (white part) is completely engaged, the CPA (yellow part) slides, which completes the connector engagement.



(5) Connector lock mechanism (1):
Locking the connector lock button connects the connector securely.

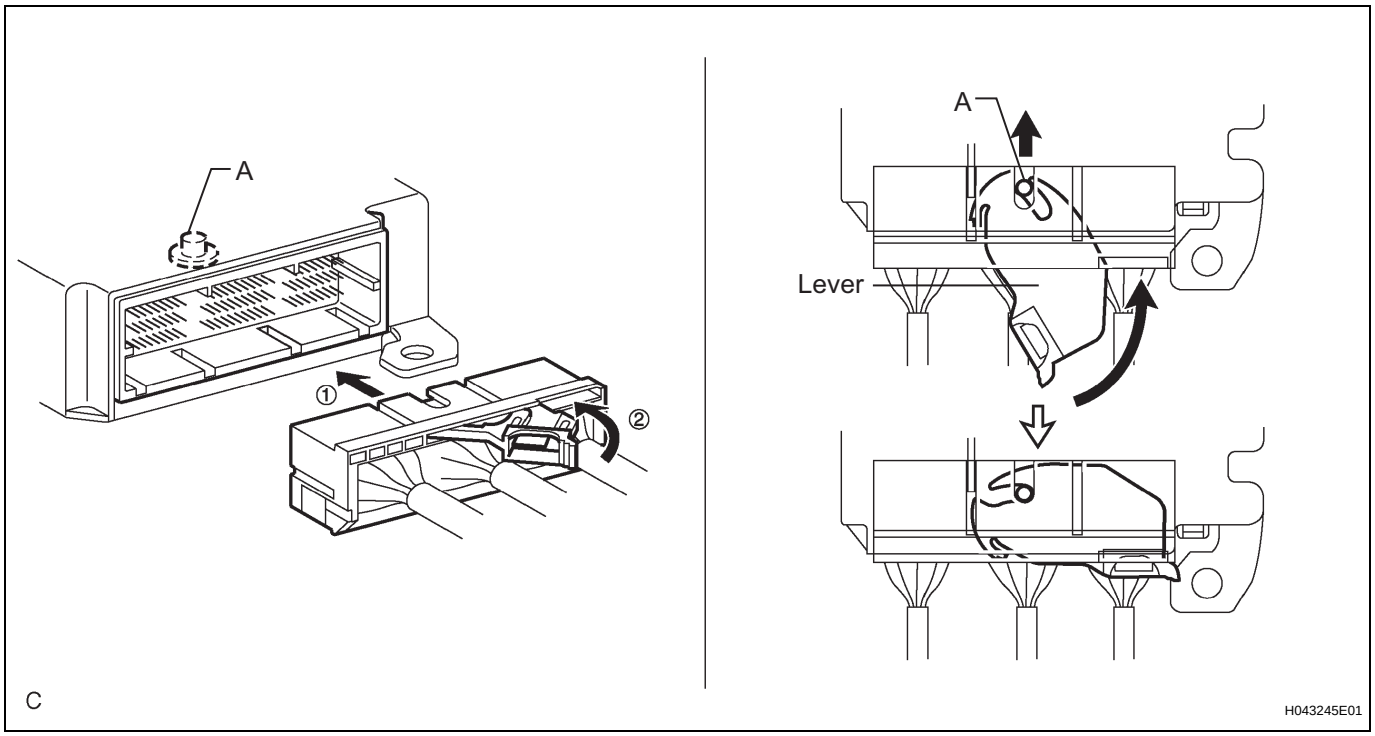


(6) Connector lock mechanism (2):
Both the primary lock with holder lances and the secondary lock with retainer prevent the connectors from becoming disconnected.



(7) Improper connection prevention lock mechanism:
When connecting the holder, the lever is pushed into the end by rotating around the A axis to lock the holder securely.

RS



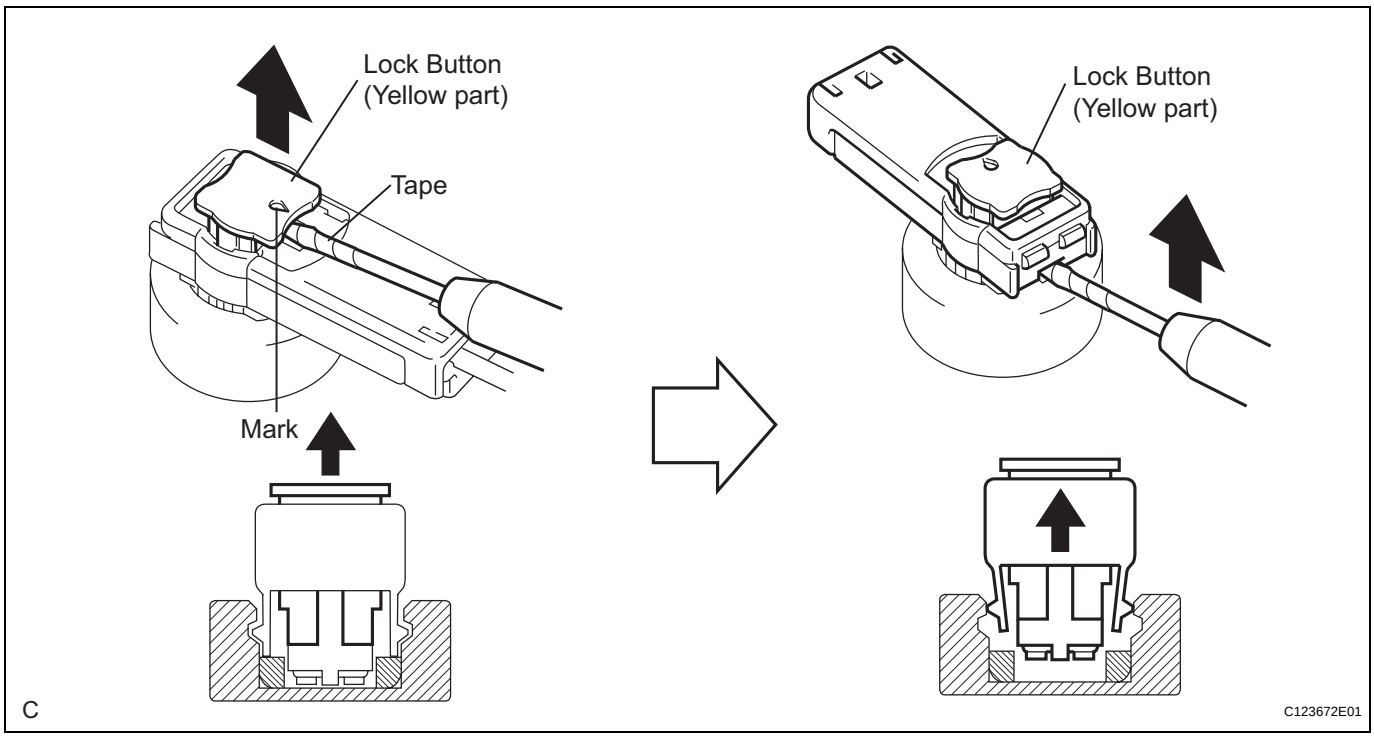
5. DISCONNECTION OF CONNECTORS FOR STEERING PAD, FRONT PASSENGER AIRBAG ASSEMBLY (SQUIB SIDE), DRIVER SIDE KNEE AIRBAG ASSEMBLY, CURTAIN SHIELD AIRBAG ASSEMBLY, AND FRONT SEAT OUTER BELT ASSEMBLY

HINT:

Tape up the screwdriver tip before use.

(a) Release the lock button (yellow part) of the connector using a screwdriver.

(b) Insert the screwdriver tip between the connector and the base, and then raise the connector.

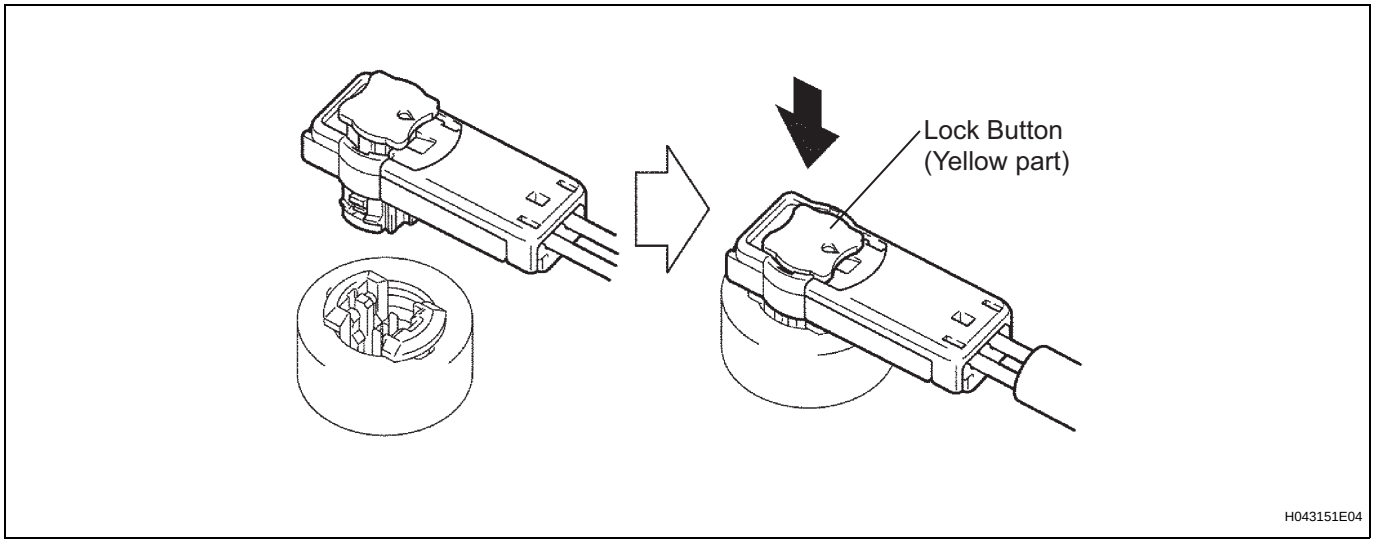


6. CONNECTION OF CONNECTORS FOR STEERING PAD, FRONT PASSENGER AIRBAG ASSEMBLY (SQUIB SIDE), DRIVER SIDE KNEE AIRBAG ASSEMBLY, CURTAIN SHIELD AIRBAG ASSEMBLY, AND FRONT SEAT OUTER BELT ASSEMBLY

(a) Connect the connector.

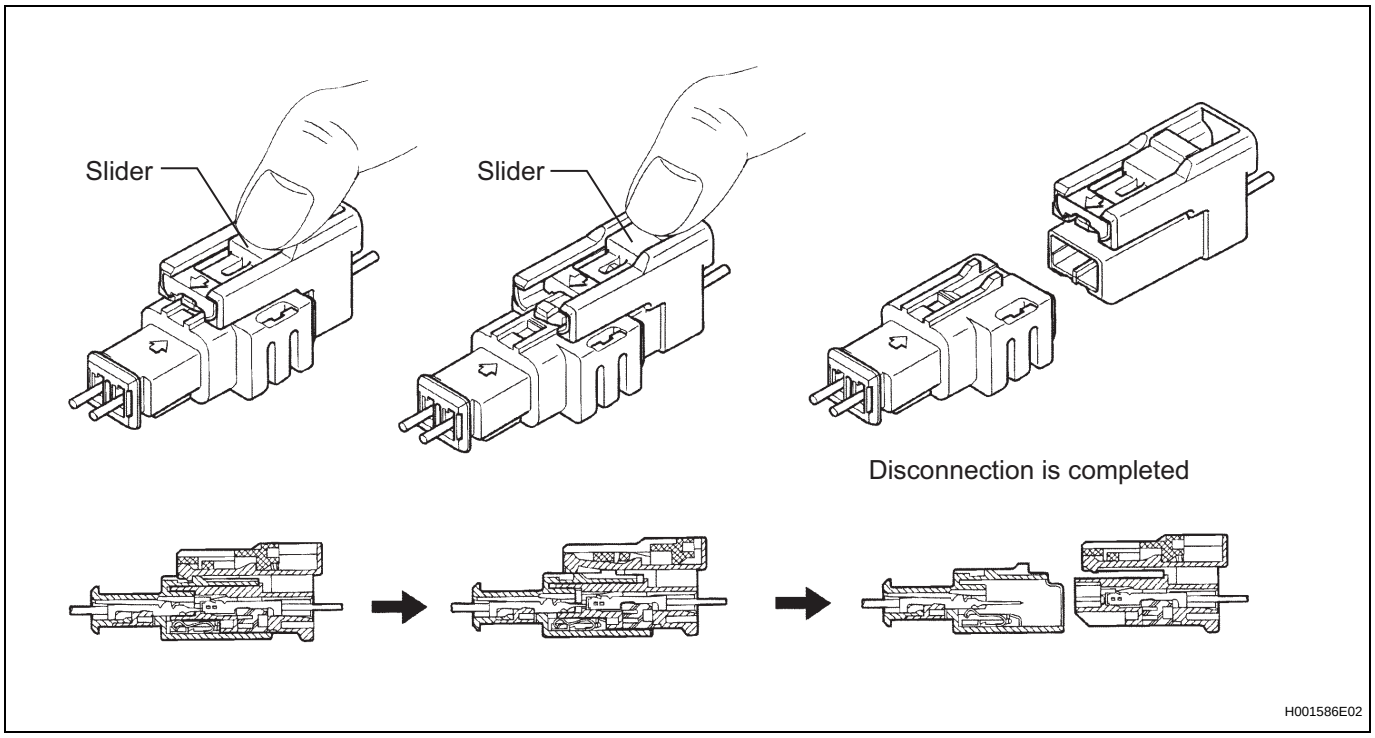
RS

(b) Push down securely on the lock button (yellow part) of the connector. (When locking, a click sound can be heard.)



7. DISCONNECTION OF CONNECTOR FOR SPIRAL CABLE (INSTRUMENT PANEL WIRE SIDE) AND FRONT PASSENGER AIRBAG ASSEMBLY (INSTRUMENT PANEL WIRE SIDE)

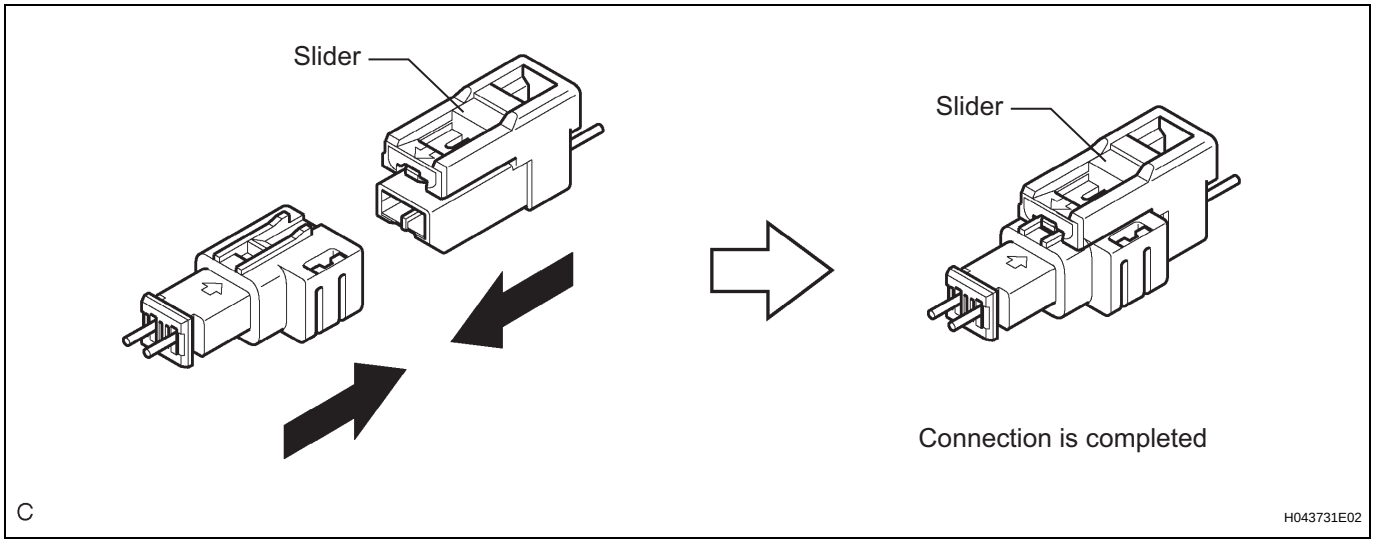
(a) Place a finger on the slider, slide the slider to release the lock, and then disconnect the connector.



RS

8. CONNECTION OF CONNECTOR FOR SPIRAL CABLE (INSTRUMENT PANEL WIRE SIDE) AND FRONT PASSENGER AIRBAG ASSEMBLY (INSTRUMENT PANEL WIRE SIDE)

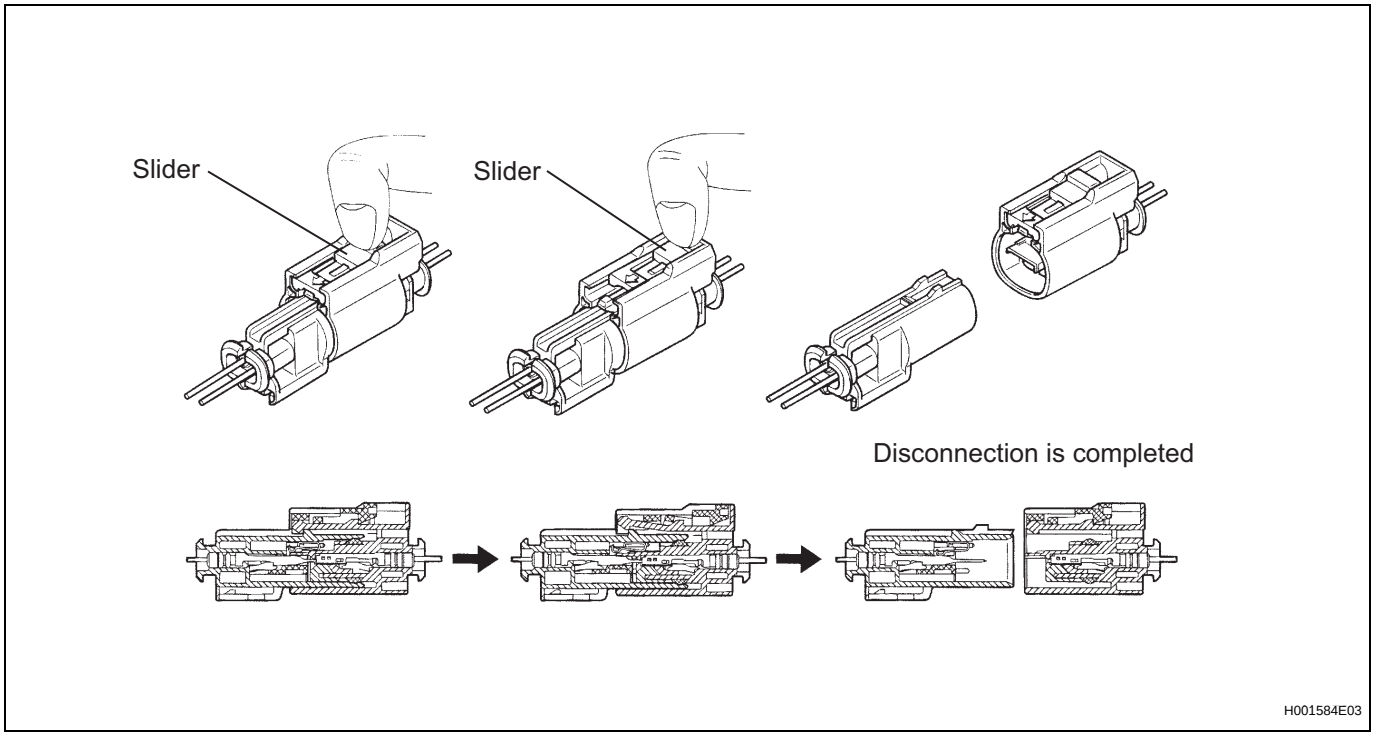
(a) Connect the connector as shown in the illustration. (When locking, make sure that the slider returns to its original position and a click sound can be heard.)
HINT:
When connecting, the slider will slide. Be sure not to touch the slider while connecting, as it may result in an insecure fit.



RS

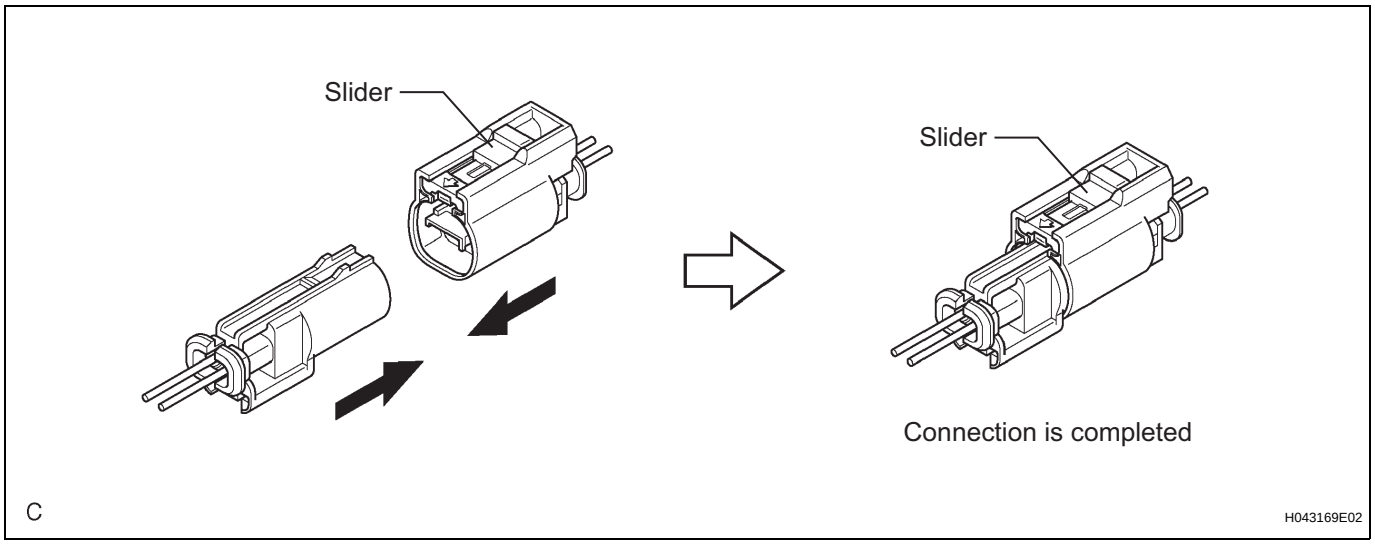
9. DISCONNECTION OF CONNECTORS FOR FRONT SEAT SIDE AIRBAG ASSEMBLY

(a) Place a finger on the slider, slide the slider to release the lock, and then disconnect the connector.



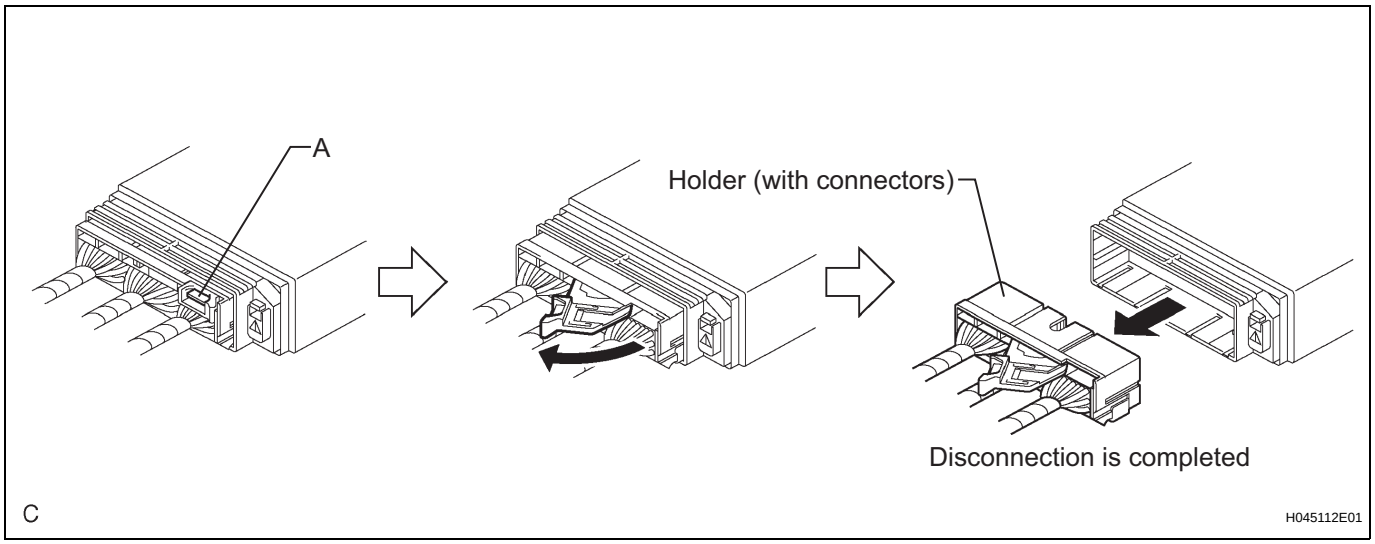
10. CONNECTION OF CONNECTORS FOR FRONT SEAT SIDE AIRBAG ASSEMBLY

(a) Connect the connector as shown in the illustration. (When locking, make sure that the slider returns to its original position and a click sound can be heard.)
HINT:
When connecting, the slider will slide. Be sure not to touch the slider while connecting, as it may result in an insecure fit.



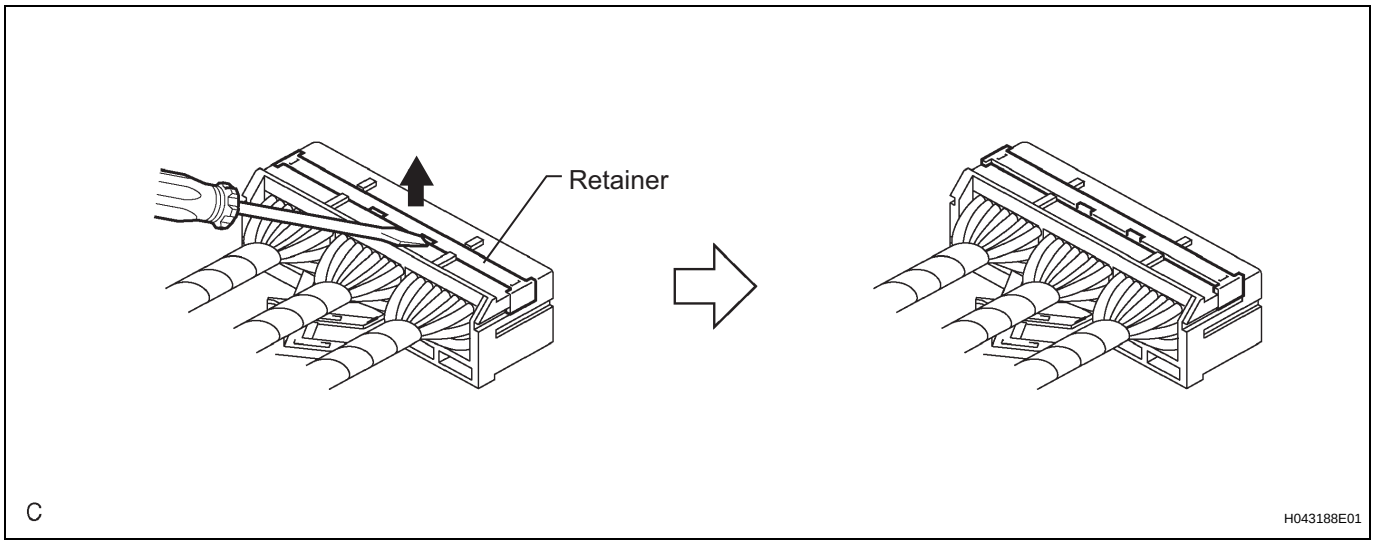
11. DISCONNECTION OF CONNECTOR FOR CENTER AIRBAG SENSOR ASSEMBLY

(a) Pull the lever by pushing part A as shown in the illustration and disconnect the holder (with connectors).

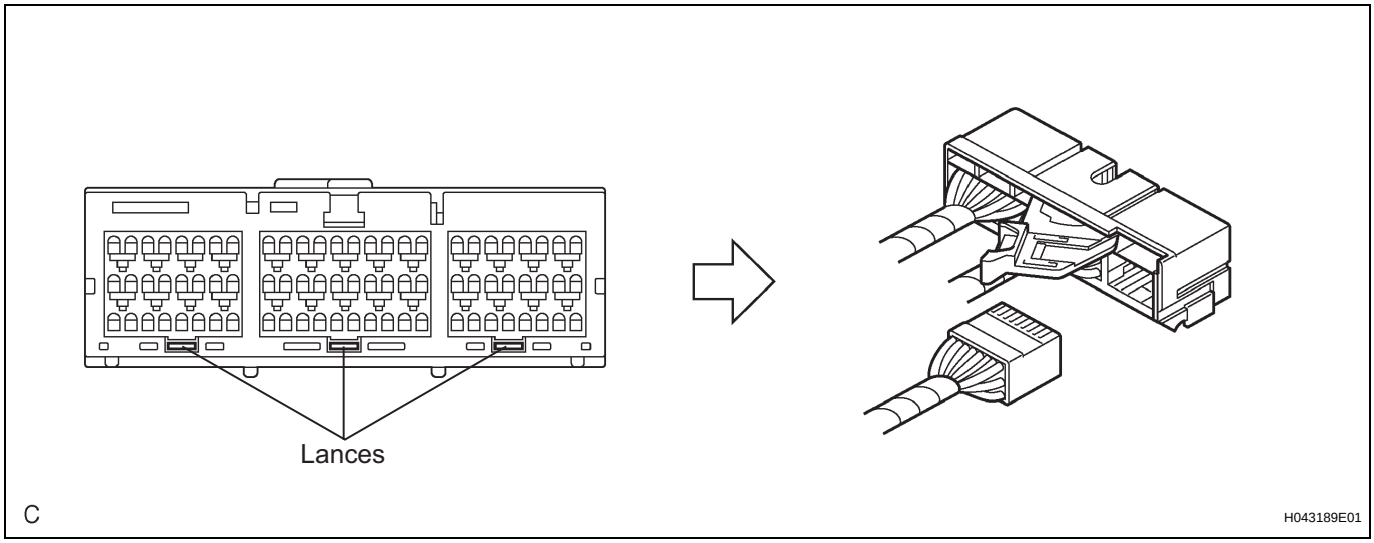


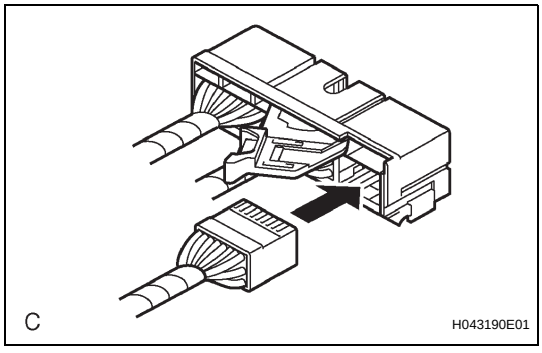
HINT:
Perform the following procedures when replacing the holder.

(b) Remove the holder.
(1) Using a screwdriver, unlock the retainer.



(2) Release the fitting lance and remove the holder.





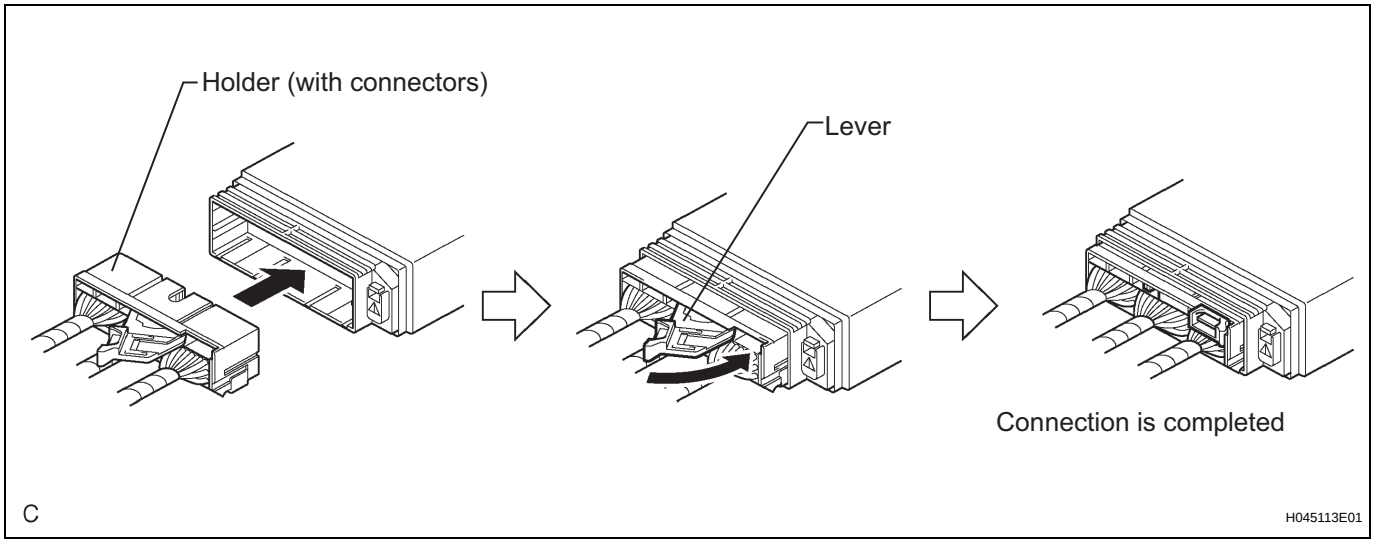
(c) Install the holder.
(1) Install the connectors to the holder. (When locking, a click sound can be heard.)
HINT:
The retainer is locked when the holder is connected.

12. CONNECTION OF CONNECTOR FOR CENTER AIRBAG SENSOR ASSEMBLY

(a) Firmly insert the holder (with connectors) into the center airbag sensor assembly until it cannot be pushed any further.

RS

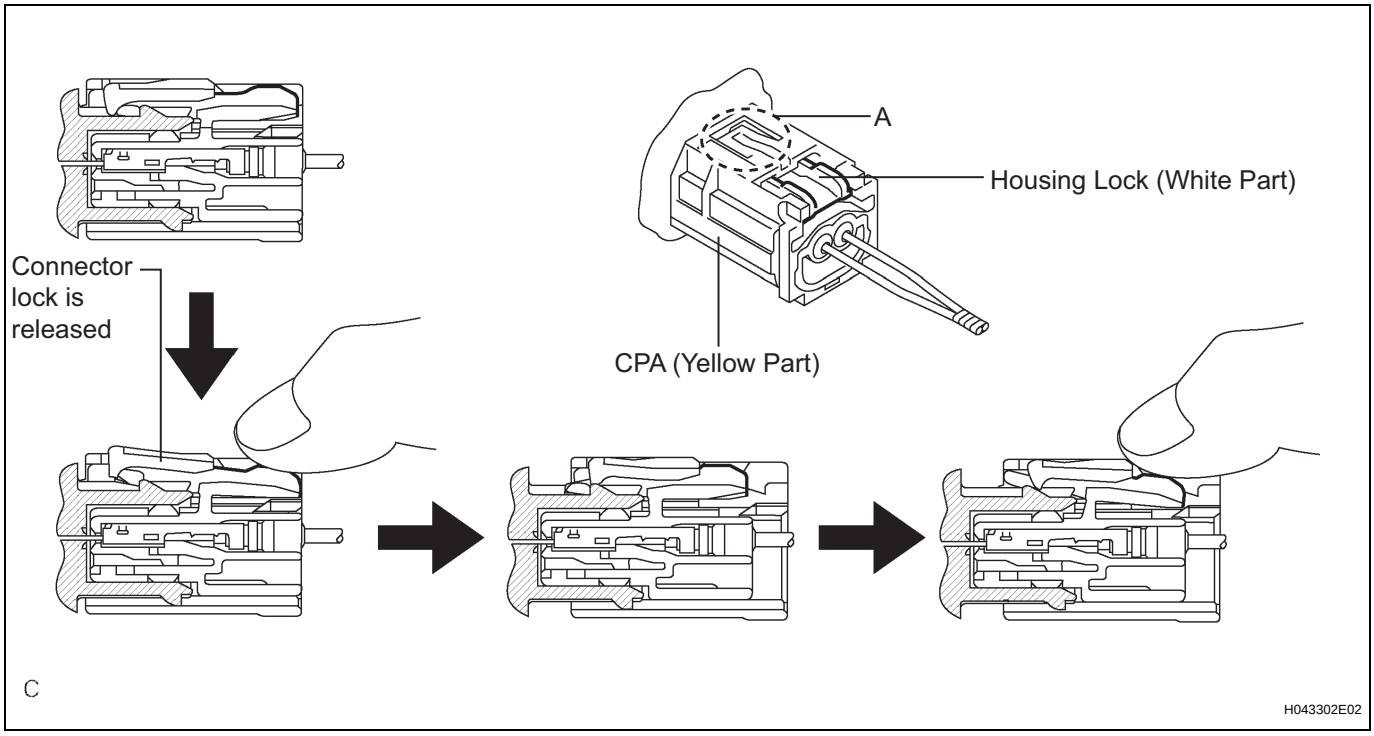
(b) Push the lever to connect the holder (with connectors). (When locking, a click sound can be heard.)
HINT:
The holder slides into the center airbag sensor assembly when it is being connected. Be sure not to hold the holder while connecting, as it may result in an insecure fit.



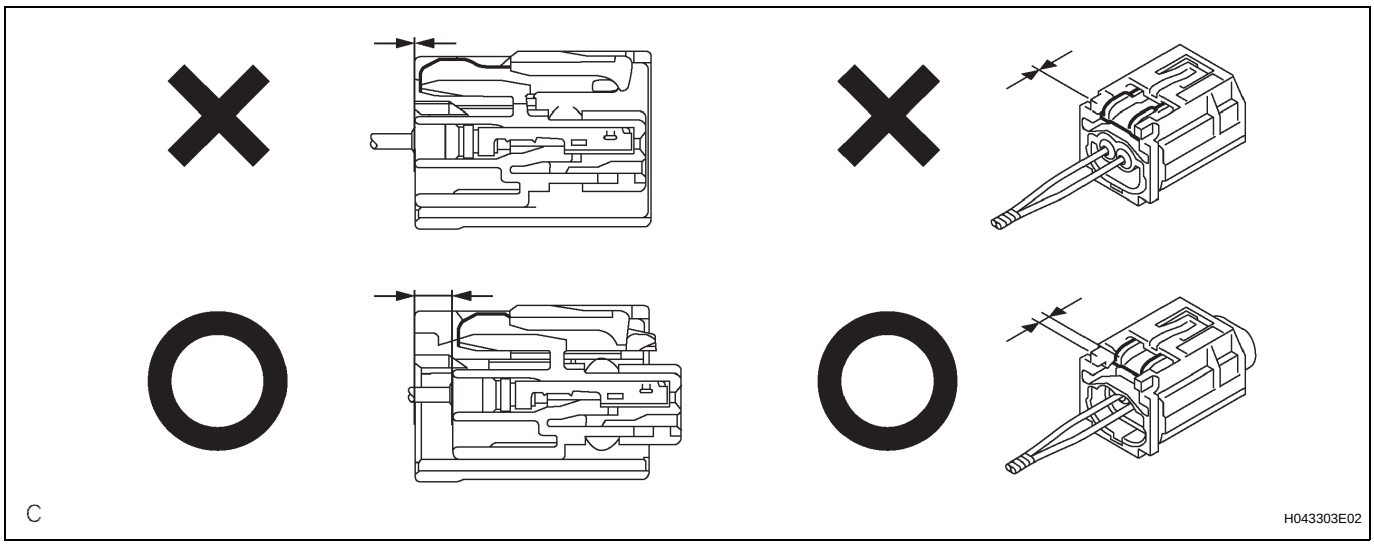
13. DISCONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

(a) Push down the housing lock (white part) and slide the CPA (yellow part). (At this time, the connector cannot be disconnected yet.)

(b) Push down the housing lock (white part) again and disconnect the connector.
HINT:
Do not push down the A part shown in the illustration when disconnecting.

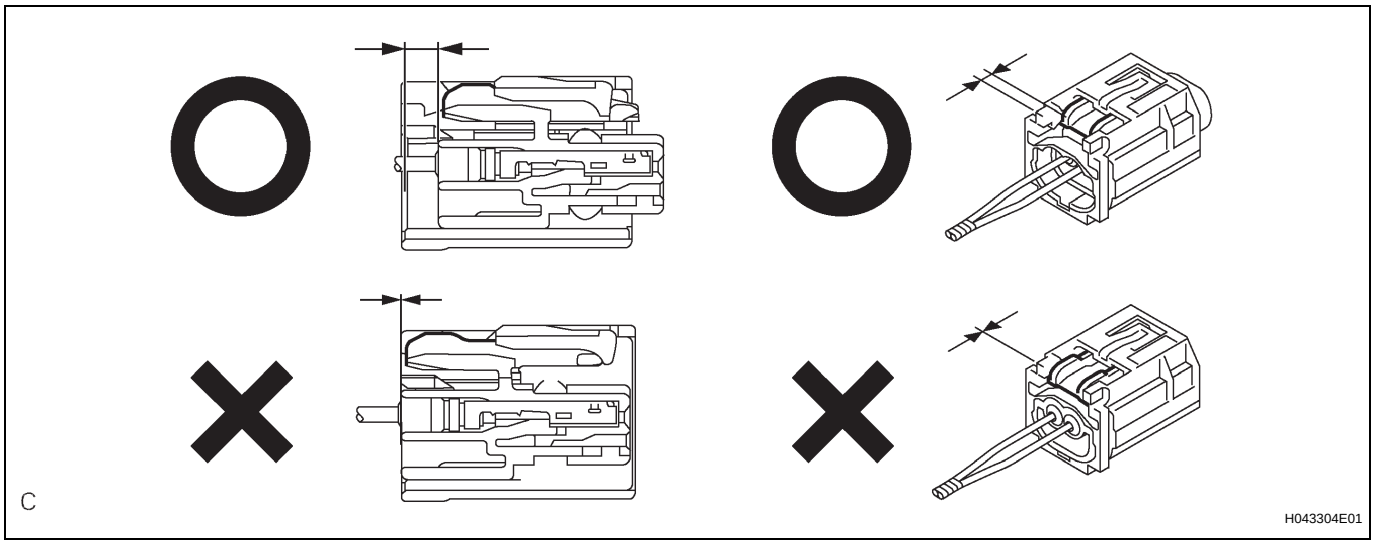


(c) After disconnecting the connector, check that the position of the housing lock (white part) is as shown in the illustration.



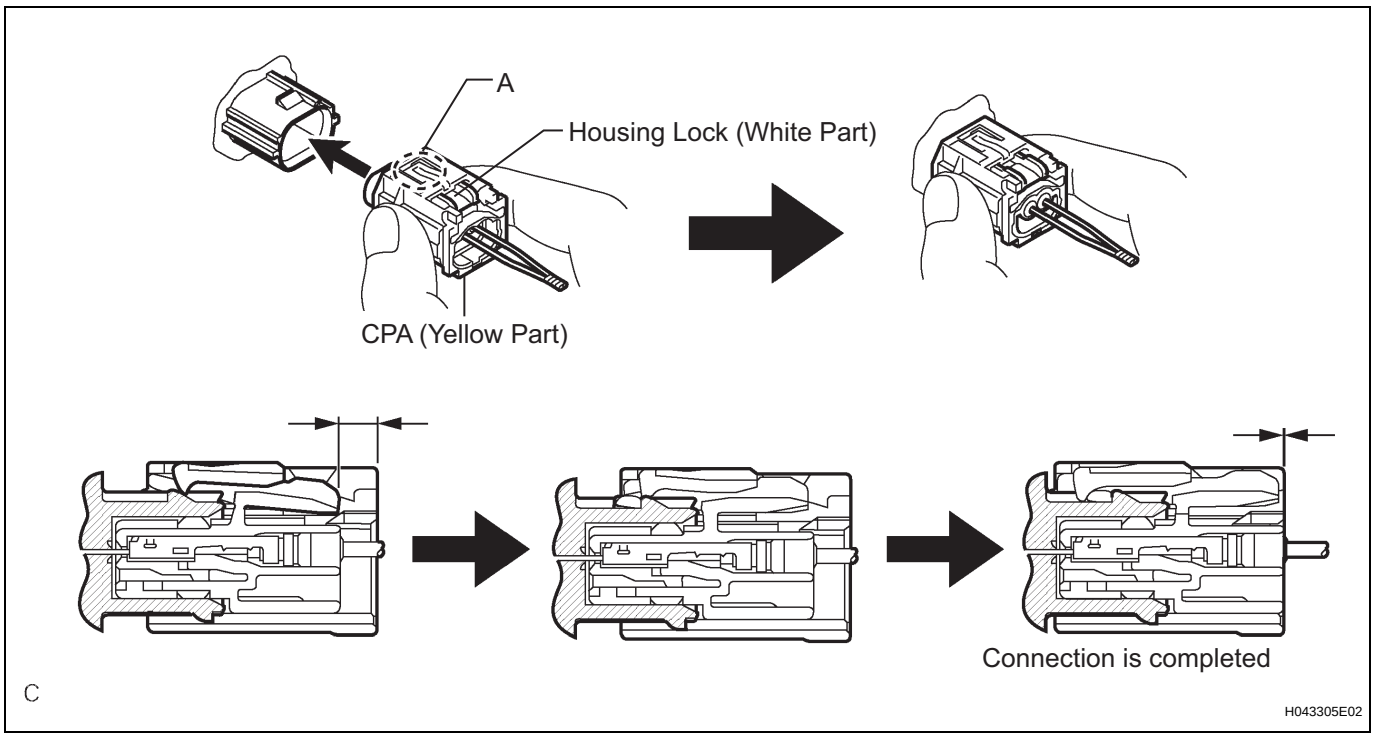
14. CONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

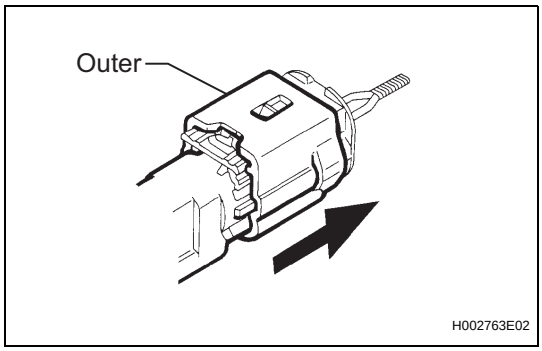
(a) Before connecting the connectors, check that the position of the housing lock (white part) is as shown in the illustration.



(b) Be sure to engage the connectors until they are locked. (When locking, make sure that a click sound can be heard.)
HINT:
When connecting them, the housing lock (white part) slides. Be sure not to hold the housing lock (white part) and A part, as it may result in an insecure fit.

RS

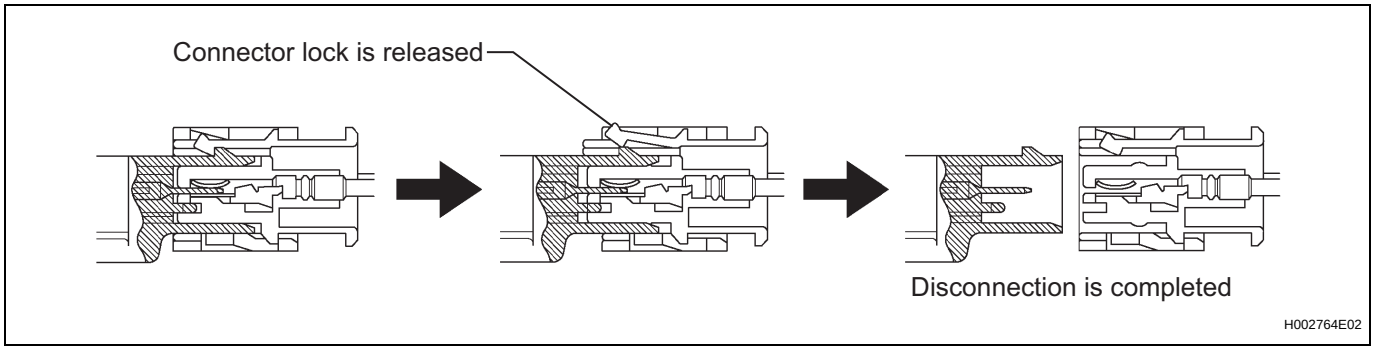




15. DISCONNECTION OF CONNECTORS FOR SIDE AIRBAG SENSOR AND REAR AIRBAG SENSOR

(a) While holding the sides of the outer connector locking sleeve, slide the outer in the direction shown by the arrow.

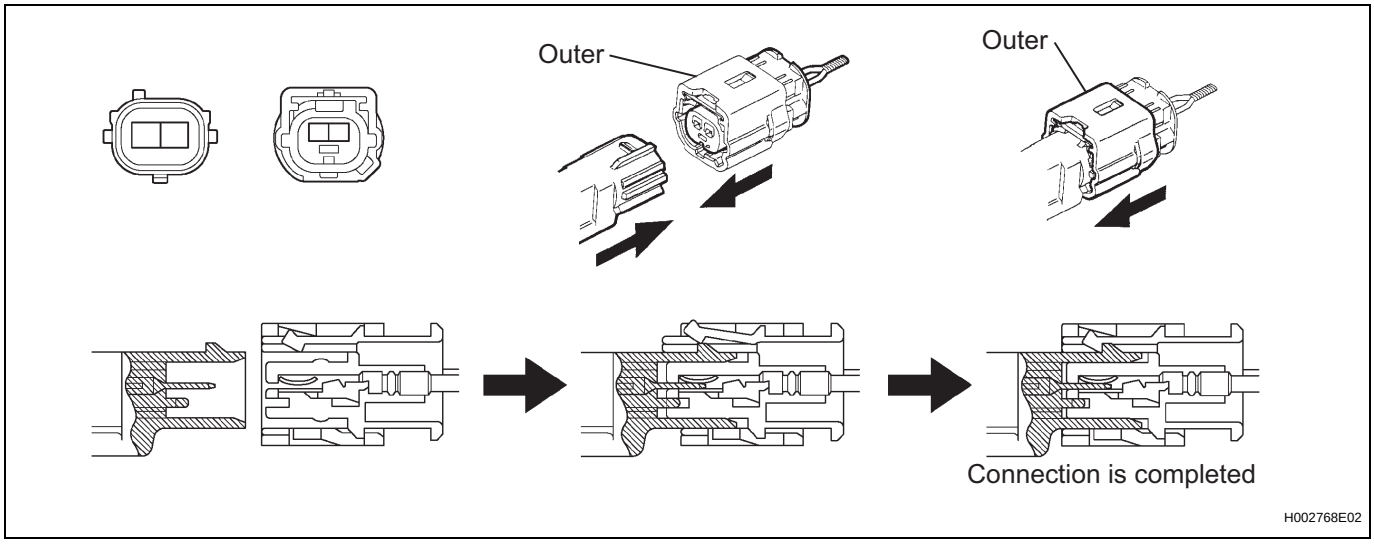
(b) When the connector lock is released, the connectors are disconnected.
HINT:
Be sure to hold both outer flank sides. Holding the top and bottom will make disconnection difficult.



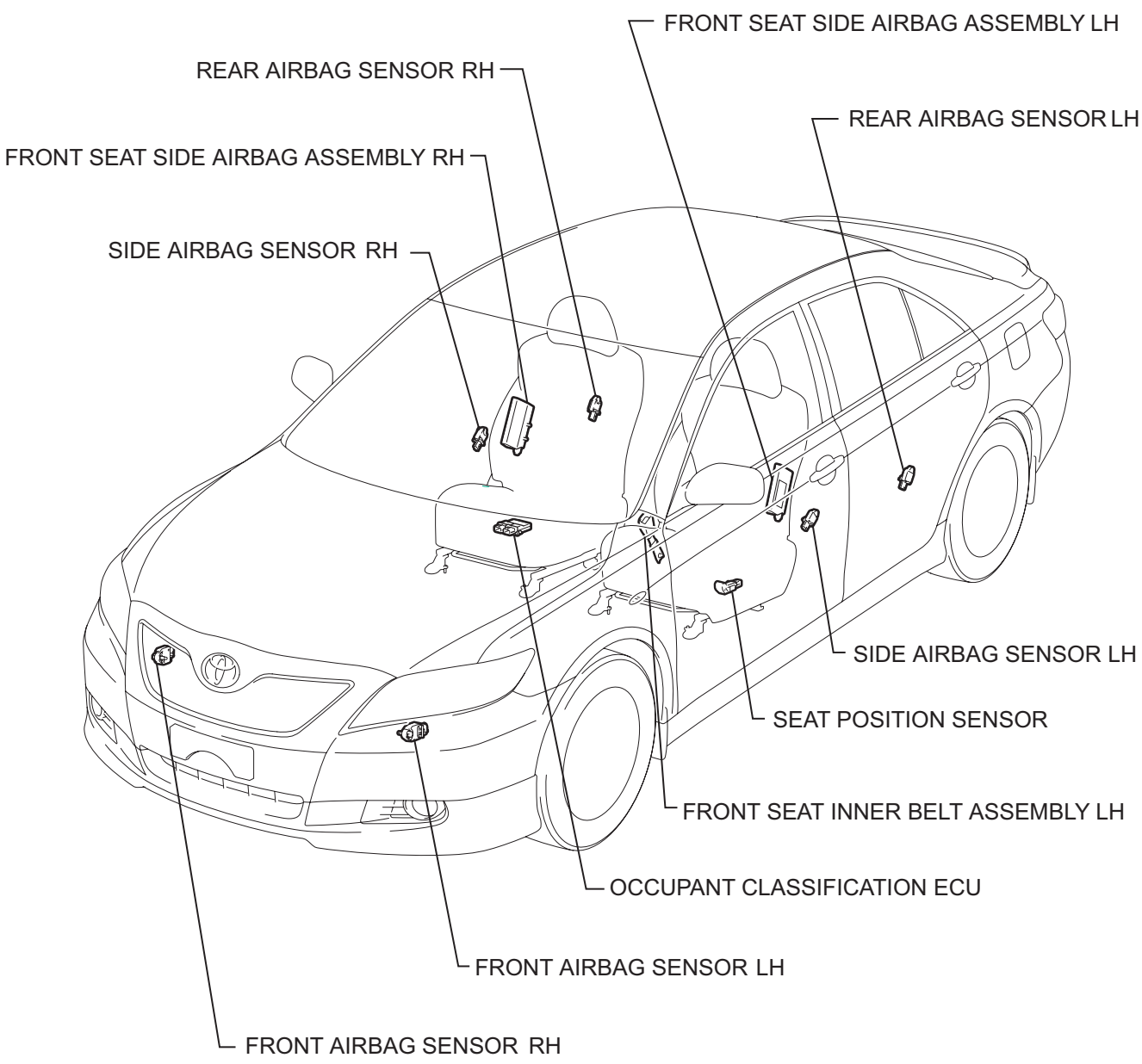
16. CONNECTION OF CONNECTORS FOR SIDE AIRBAG SENSOR AND REAR AIRBAG SENSOR

(a) Connect the connector as shown in the illustration (When locking, make sure that the outer returns to its original position and a click sound can be heard).
HINT:
When connecting, the outer will slide. Be sure not to hold the outer while connecting, as it may result in an insecure fit.

RS



PARTS LOCATION



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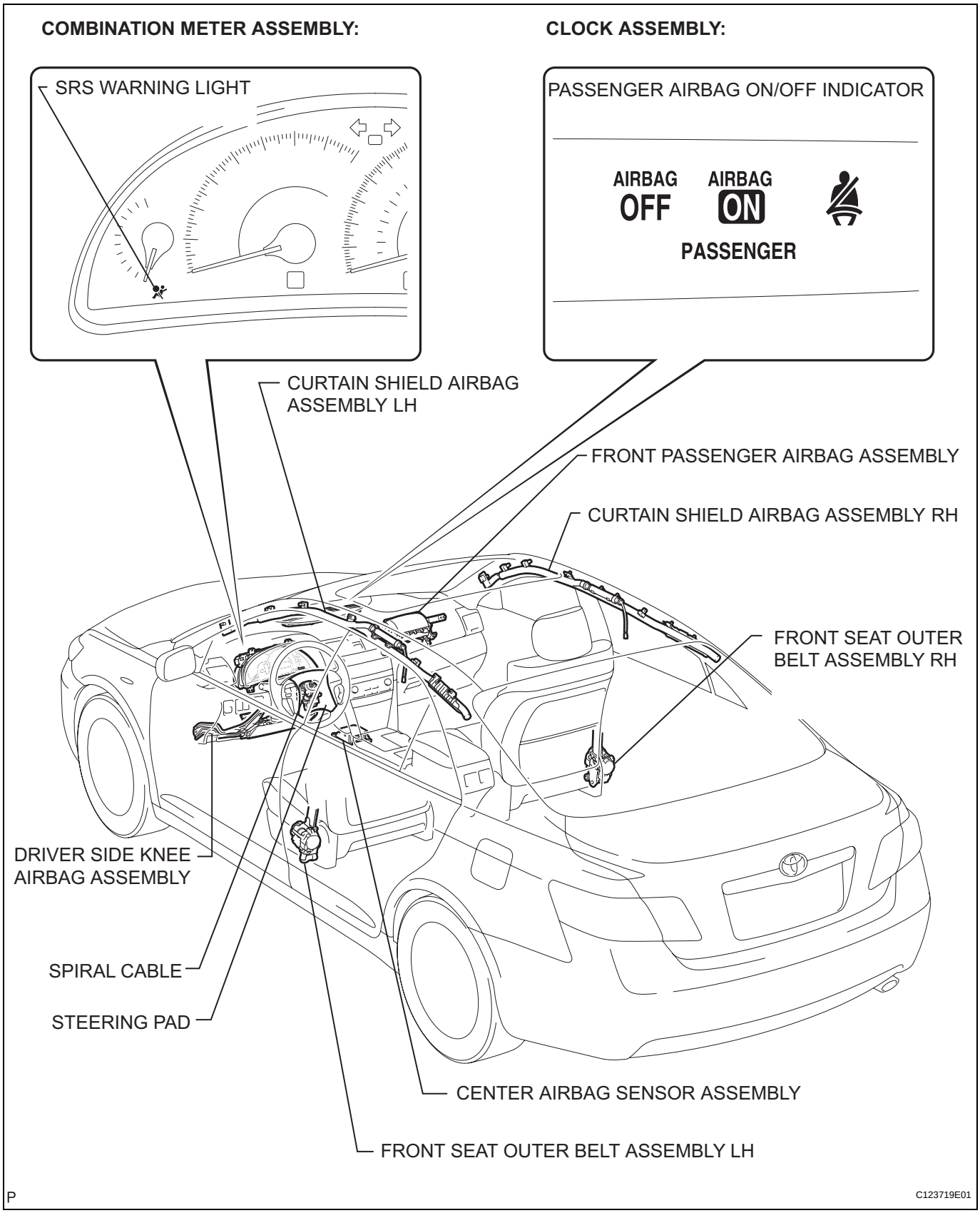
COMBINATION METER ASSEMBLY:
CLOCK ASSEMBLY:
SRS WARNING LIGHT
PASSENGER AIRBAG ON/OFF INDICATOR
AIRBAG OFF
AIRBAG ON
PASSENGER
CURTAIN SHIELD AIRBAG ASSEMBLY LH
FRONT PASSENGER AIRBAG ASSEMBLY
CURTAIN SHIELD AIRBAG ASSEMBLY RH
FRONT SEAT OUTER BELT ASSEMBLY RH
DRIVER SIDE KNEE AIRBAG ASSEMBLY
SPIRAL CABLE
STEERING PAD
CENTER AIRBAG SENSOR ASSEMBLY
FRONT SEAT OUTER BELT ASSEMBLY LH
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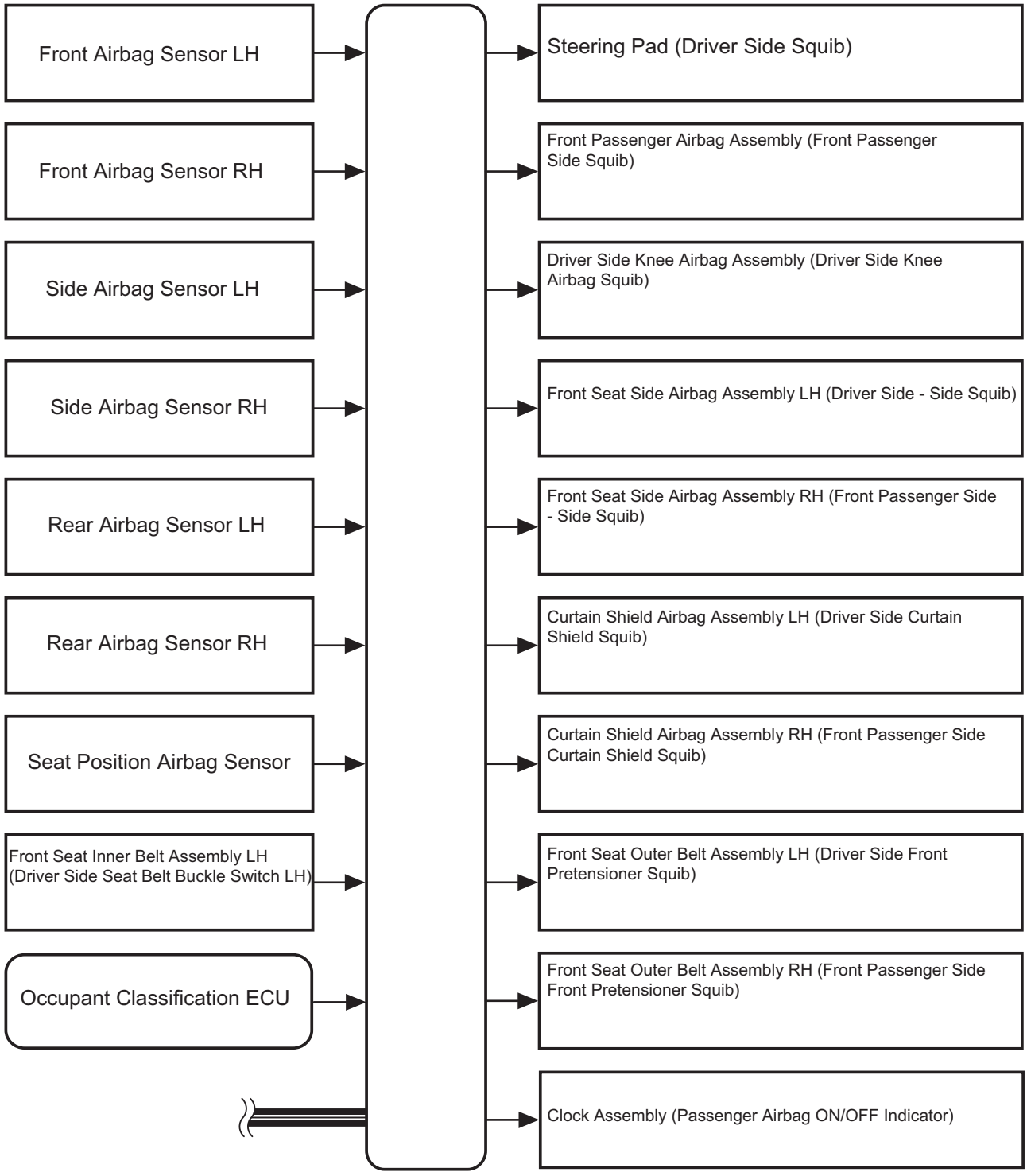
SYSTEM DIAGRAM



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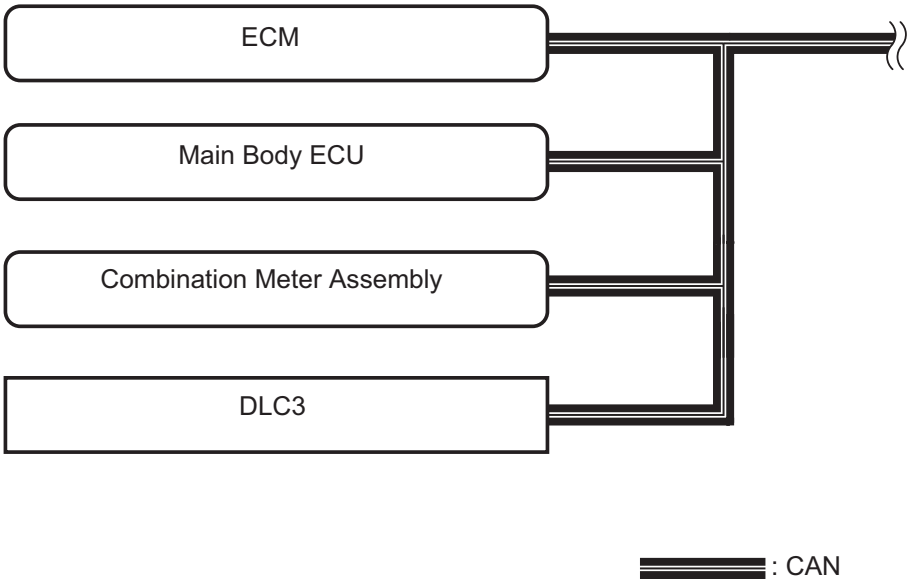

Transmitting ECU (Transmitter)	Receiving ECU	Signals	Communication method
Center Airbag Sensor Assembly	ECM	Crash detection signal	CAN
Center Airbag Sensor Assembly	Main Body ECU	Driver seat buckle switch signal	
Center Airbag Sensor Assembly	Combination Meter Assembly	• SRS warning light ON demand signal • SRS warning light blink demand signal • Passenger seat occupant detection signal • Passenger seat buckle switch signal • Diagnosis signal (DTC)	
Combination Meter Assembly	Center Airbag Sensor Assembly	• Vehicle speed signal • Meter diagnoses polling signal	
ECM	Center Airbag Sensor Assembly	• Engine speed signal • Accelerator opening angle information • Accelerator opening angle signal • Shift position signal • Test mode signal • Stop signal	

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SYSTEM DESCRIPTION

1. GENERAL

(a) In conjunction with impact absorbing structure for a front collision, the SRS (Supplemental Restraint System) driver airbag, front passenger airbag, and driver side knee airbag were designed to supplement seat belts in the event of a front collision in order to help reduce shock to the head and chest of the driver and front passenger and knee of the driver. This system is a 3-sensor type airbag system to detect the impact during a front collision using the center airbag sensor assembly and front airbag sensors. It also operates the airbag system and seat belt pretensioner.

(b) In order to detect the extent of the collision during the initial stages of the collision in further details, the front airbag sensors have been changed from mechanical type to electrical type deceleration sensors. Accordingly, the deployment of the driver airbag and front passenger airbag is controlled in two stages according to the severity of the impact.

(c) In conjunction with impact absorbing structure for a side collision, the side airbag and curtain shield airbag were designed to help reduce shock to the driver, front passenger, and rear outer passengers in the event of a side collision.

(d) The curtain shield airbag that helps reduce shock to the front and rear seat occupants with a single curtain shield airbag has been adopted. In conjunction with this system, the side airbag sensors have been installed at the bottom of the center pillars and the rear airbag sensors have been installed at the bottom of the rear pillars.

(e) In this system, a front side collision is detected by the side airbag sensor in order to simultaneously deploy the side and curtain shield airbags. A rear side collision is detected by the rear airbag sensor and the center airbag sensor assembly in order to deploy the curtain shield airbag.

(f) The center airbag sensor assembly sends the airbag deployment signal to the ECM through CAN (Controller Area Network) to operate the fuel pump control.

2. CONSTRUCTION AND OPERATION

(a) FRONT AIRBAG SENSOR

(1) The front airbag sensors are installed on the right and left radiator supports respectively.

(2) The front airbag sensor consists of the deceleration sensor.

(3) The deceleration sensor is built into the front airbag sensor, and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a frontal collision. Accordingly, the extent of the initial collision can be detected in detail.

(b) SIDE AIRBAG SENSOR

(1) The side airbag sensors are installed on the bottom of the right and left center pillars respectively.

(2) The side airbag sensor consists of the deceleration sensor and ignition control circuit.

(3) The deceleration sensor is built into the side airbag sensor, and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a front side collision. Accordingly, the extent of the initial collision can be detected in detail.

(c) REAR AIRBAG SENSOR

(1) The rear airbag sensors are installed on the right and left rear pillars respectively.

(2) The rear airbag sensor consists of the deceleration sensor and ignition control circuit.

(3) The deceleration sensor is built into the rear airbag sensor, and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a rear side collision. Accordingly, the extent of the initial collision can be detected in detail.

(d) CENTER AIRBAG SENSOR ASSEMBLY

(1) General

- The center airbag sensor assembly is installed on the center floor under the instrument panel.
- The center airbag sensor assembly consists of the deceleration sensor, safing sensor, electronic safing sensor, ignition control circuit, and diagnostic circuit.
- The center airbag sensor assembly receives signals from the deceleration sensor and safing sensor built into the center airbag sensor assembly and front airbag sensor. Then the center airbag sensor assembly determines whether the driver airbag, front passenger airbag, driver side knee airbag, and front seat belt pretensioners should be activated, and diagnoses system malfunctions.
- The center airbag sensor assembly causes the front seat side airbag assembly and the curtain shield airbag assembly to deploy when receiving signals from the side airbag sensor.

- The center airbag sensor assembly receives signals from the deceleration sensor and the electronic safing sensor built into the center airbag sensor assembly and the rear airbag sensor, and determines whether the curtain shield airbag should be activated, and diagnoses system malfunctions.
- The center airbag sensor assembly sends the airbag deployment signal to the ECM through CAN to operate the fuel pump control.

(2) Deceleration sensor and ignition control circuit
- The deceleration sensor is built into the center airbag sensor assembly.
- The ignition control circuit performs calculations based on the signal output from the deceleration sensors of the center airbag sensor assembly and front airbag sensor. If the calculated values are greater than the specified values, it activates ignition operation.

(3) Safing sensor
- The safing sensor is built into the center airbag sensor assembly. During a front collision, the sensor turns on and outputs an ON signal to the center airbag sensor assembly if a deceleration rate sent to the safing sensor is greater than the specified value.

(4) Electronic safing sensor
- The electronic safing sensor is built into the center airbag sensor assembly. During a side collision, the sensor turns on and outputs an ON signal to the center airbag sensor assembly if a deceleration rate sent to the electronic safing sensor is greater than the specified value.

(5) Backup power source
- The backup power source consists of a power supply capacitor and a DC-DC converter. When the power system does not function during a collision, the power supply capacitor discharges and supplies electric power to the system. The DC-DC converter operates as a boosting transformer when the battery voltage falls below a predetermined level.

(6) Diagnostic circuit
- This circuit constantly diagnoses system malfunctions. When a malfunction is detected, it turns on the SRS warning light on the combination meter assembly to inform the driver.

(7) Memory circuit
- When a malfunction is detected in the diagnostic circuit, it is coded and stored in the memory circuit.

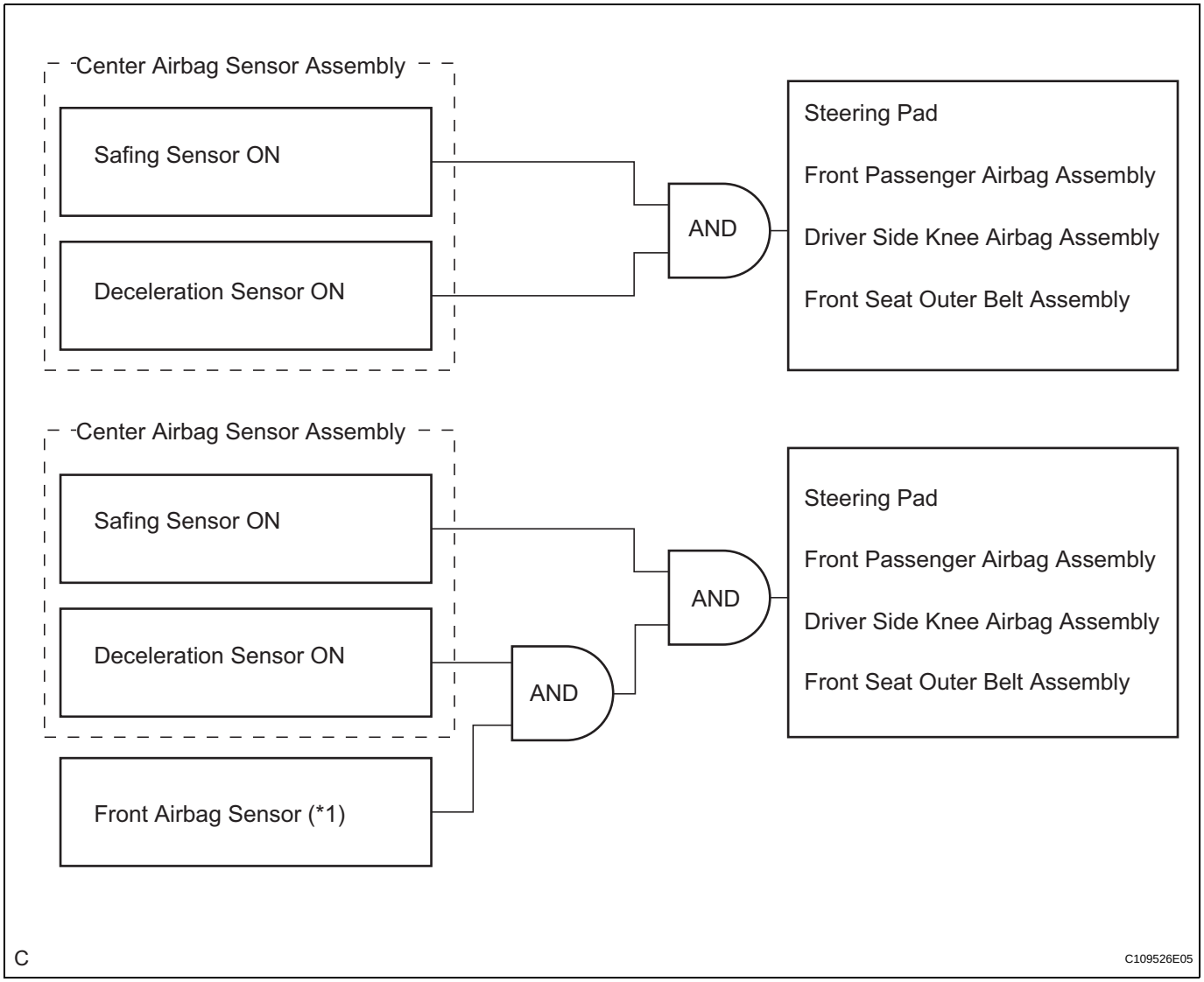
(e) SRS WARNING LIGHT

(1) The SRS warning light is located on the combination meter assembly. It comes on to inform the driver of system trouble when a malfunction is detected in self-diagnosis of the center airbag sensor assembly. Under normal operating conditions when the ignition switch is turned on (IG), it comes on for approximately 6 seconds and then goes off.

3. DEPLOYMENT CONDITION

When the vehicle collides and the shock is greater than the specified value, the SRS is activated automatically. The center airbag sensor assembly includes the safing sensor and deceleration sensor. The safing sensor is designed to turn on at a smaller deceleration rate than the deceleration sensor.

(a) The center airbag sensor assembly determines whether ignition is necessary based on signals from the deceleration sensor and the front airbag sensor (*1). If the safing sensor turns on simultaneously, current flows to the squibs to deploy the SRS as shown in the illustration below.

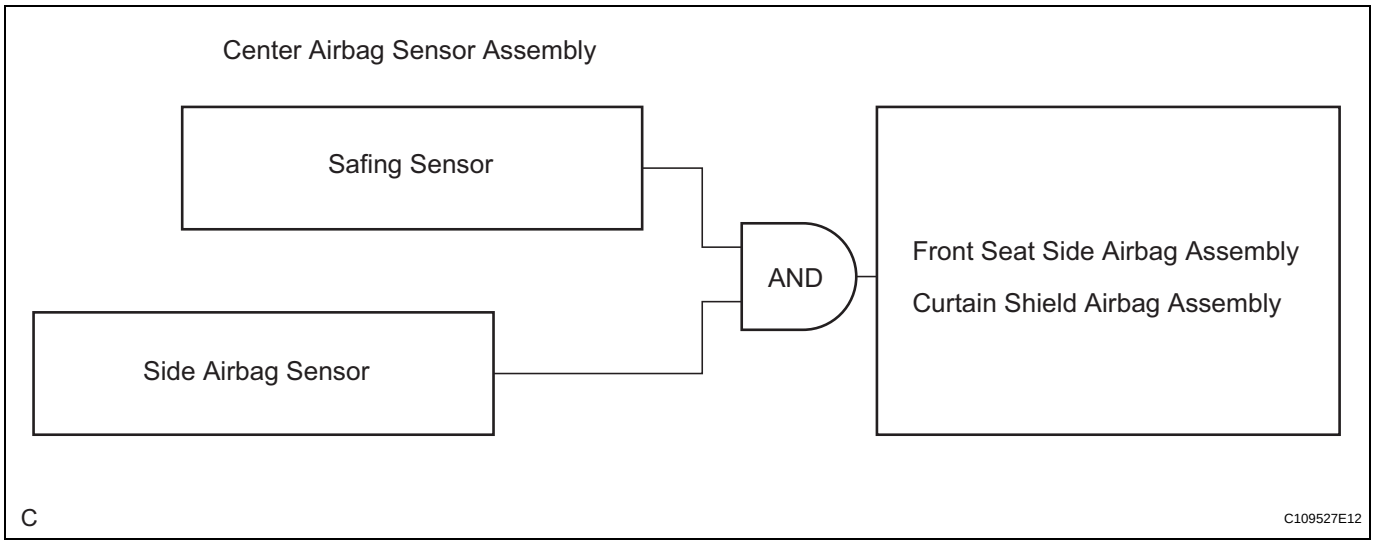


HINT:

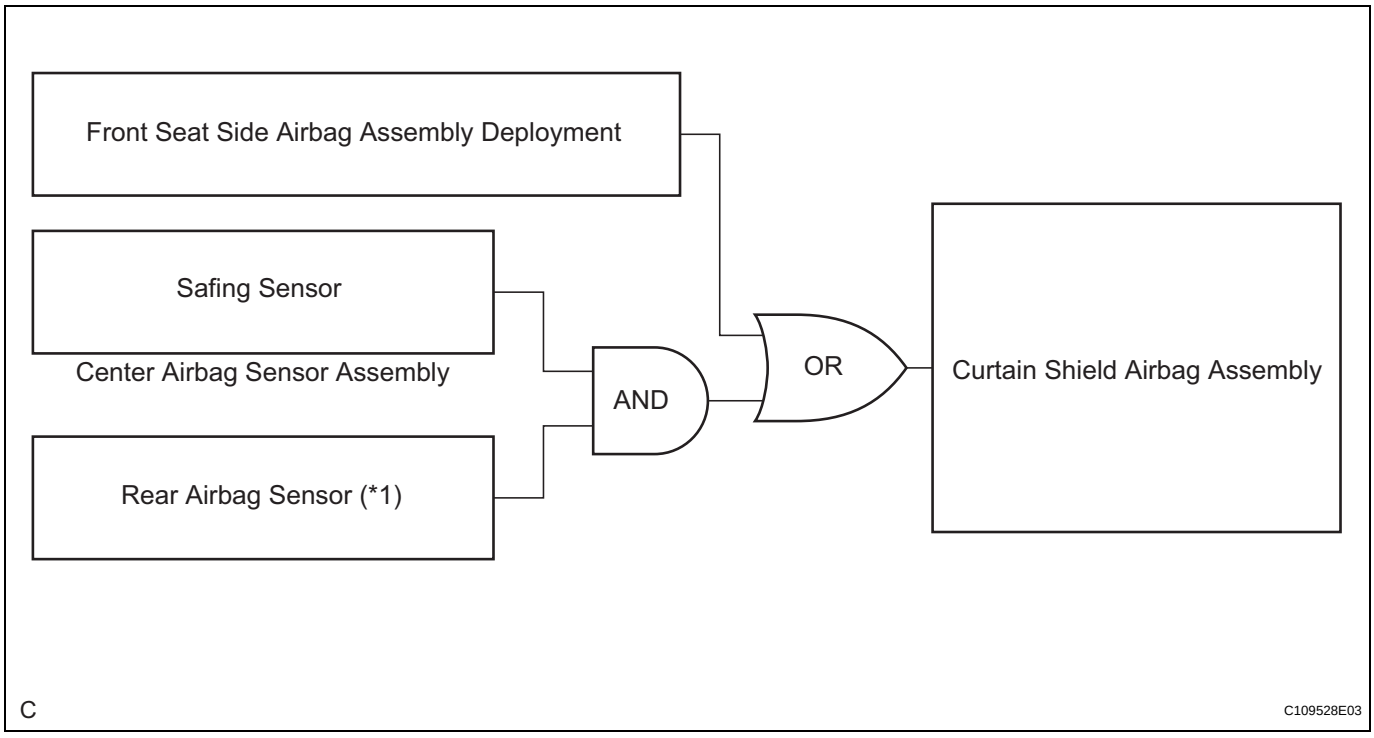
*1: In case of front collision, the ignition signal could be output with the deceleration sensor ON signal even without a signal from the front airbag sensor.

RS

(b) The center airbag sensor assembly determines whether ignition is necessary based on signals from the side airbag sensor. If the safing sensor turns on simultaneously, current flows to the squib to deploy the SRS as shown in the illustration below.



(c) The center airbag sensor assembly determines whether ignition is necessary based on signals from the rear airbag sensor. If the safing sensor turns on simultaneously, current flows to the squib to deploy the SRS as shown in the illustration below (*1).



HINT:
*1: If the front seat side airbag assembly deploys, the curtain shield airbag assembly will also deploy, regardless of whether the signal is output from the rear airbag sensor.

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester can be used in steps 3, 5, 7, 9, and 10.

1 **VEHICLE BROUGHT TO WORKSHOP**

NEXT

2 **CUSTOMER PROBLEM ANALYSIS**

(a) Confirm problem symptoms (See page IN-45).

NEXT

3 **CHECK CAN COMMUNICATION SYSTEM**

(a) Check for DTC outputs.
HINT:
The center airbag sensor assembly is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.

Result

Result	Proceed To
CAN communication DTC is not output.	A
CAN communication DTC is output.	B

B → **INSPECT CAN COMMUNICATION CIRCUIT**

A

4 **WARNING LIGHT CHECK**

NEXT

5 **CHECK DTC (Present and Past DTCs)**

(a) Check for DTC outputs.

Result

Result	Proceed To
DTC is output.	A
DTC is not output.	B

B → **PROBLEM SYMPTOMS TABLE**

A

RS

6	DTC CHART

NEXT

7	CIRCUIT INSPECTION

NEXT

8	REPAIR

NEXT

9	CLEAR DTC (Present and Past DTCs)

NEXT

10	CHECK DTC (Present and Past DTCs)

(a) Check for DTC outputs.

Result

Result	Proceed To
DTC is not output.	A
DTC is output.	B

B → Go to step 6

A

11	CONFIRMATION TEST

NEXT

END

PROBLEM SYMPTOMS TABLE

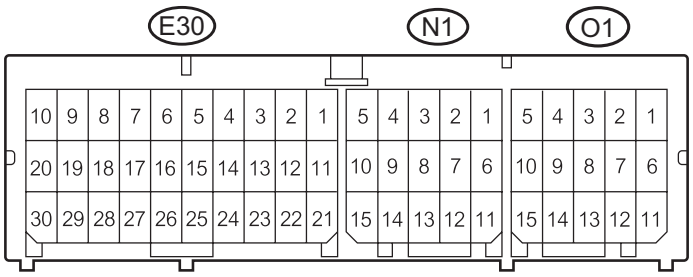
HINT:
Proceed to the troubleshooting for each circuit in the table below.

AIRBAG SYSTEM:

Symptom	Suspected area	See page
The SRS warning light goes off after the primary check, but then comes on.	SRS Warning Light Remains ON	RS-222
With the ignition switch on (IG), the SRS warning light sometimes comes on after approximately 6 seconds.	SRS Warning Light Remains ON	RS-222
The SRS warning light always comes on even when DTC is not output.	SRS Warning Light Remains ON	RS-222
With the ignition switch on (IG), the SRS warning light does not come on.	SRS Warning Light does not Come On	RS-228
Although an SRS warning light operates normally, DTC or a normal system code is not displayed.	Diagnosis Circuit	RS-231
Although terminals TC and CG of DLC3 are not connected, DTC or a normal system code is displayed.	Diagnosis Circuit	RS-231

TERMINALS OF ECU

1. CENTER AIRBAG SENSOR ASSEMBLY



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Terminal No.	Terminal Symbol	Destination
E30-1	P2+	Front passenger airbag assembly (Front passenger side squib 2nd step)
E30-2	P2-	Front passenger airbag assembly (Front passenger side squib 2nd step)
E30-3	P-	Front passenger airbag assembly (Front passenger side squib)
E30-4	P+	Front passenger airbag assembly (Front passenger side squib)
E30-5	D+	Steering pad (Driver side squib)
E30-6	D-	Steering pad (Driver side squib)
E30-7	D2-	Steering pad (Driver side squib 2nd step)
E30-8	D2+	Steering pad (Driver side squib 2nd step)
E30-9	DK+	Driver side knee airbag assembly (Driver side knee airbag squib)
E30-10	DK-	Driver side knee airbag assembly (Driver side knee airbag squib)
E30-13	CANH	CAN Communication line
E30-16	SIL	DLC3
E30-17	P-AB	Clock assembly (Passenger airbag ON/OFF indicator)
E30-21	IG2	IGN fuse
E30-22	CANL	CAN Communication line
E30-23	PAON	Clock assembly (Passenger airbag ON/OFF indicator)
E30-25	E1	Ground
E30-26	E2	Ground
E30-27	-SR	Front airbag sensor RH
E30-28	-SL	Front airbag sensor LH
E30-29	+SR	Front airbag sensor RH
E30-30	+SL	Front airbag sensor LH
N1-1	PD-	Front seat outer belt assembly LH (Driver side front pretensioner squib)
N1-2	PD+	Front seat outer belt assembly LH (Driver side front pretensioner squib)
N1-6	ICD-	Curtain shield airbag assembly LH (Driver side curtain shield squib)

Terminal No.	Terminal Symbol	Destination
N1-7	ICD+	Curtain shield airbag assembly LH (Driver side curtain shield squib)
N1-8	BBD+	Side airbag sensor LH
N1-9	SFD+	Front seat side airbag assembly LH (Driver side - side squib)
N1-10	SFD-	Front seat side airbag assembly LH (Driver side - side squib)
N1-11	DBE+	Front seat inner belt assembly LH (Driver side seat belt buckle switch)
N1-12	DBE-	Front seat inner belt assembly LH (Driver side seat belt buckle switch)
N1-13	DSP-	Seat position airbag sensor
N1-14	DSP+	Seat position airbag sensor
N1-15	BBD-	Side airbag sensor LH
O1-4	PP+	Front seat outer belt assembly RH (Front passenger side front pretensioner squib)
O1-5	PP-	Front seat outer belt assembly RH (Front passenger side front pretensioner squib)
O1-6	SFP-	Front seat side airbag assembly RH (Front passenger side - side squib)
O1-7	SFP+	Front seat side airbag assembly RH (Front passenger side - side squib)
O1-8	BBP+	Side airbag sensor RH
O1-9	ICP+	Curtain shield airbag assembly RH (Front passenger side curtain shield squib)
O1-10	ICP-	Curtain shield airbag assembly RH (Front passenger side curtain shield squib)
O1-11	BBP-	Side airbag sensor RH
O1-12	FSP+	Occupant classification ECU
O1-13	FSP-	Occupant classification ECU

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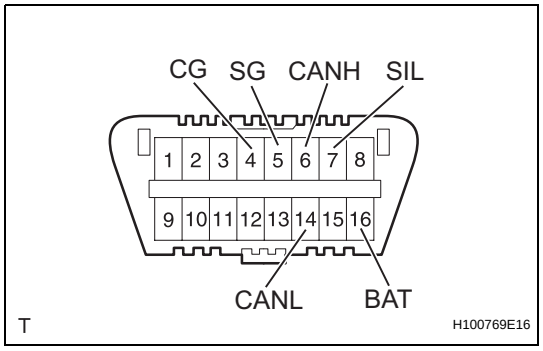


DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

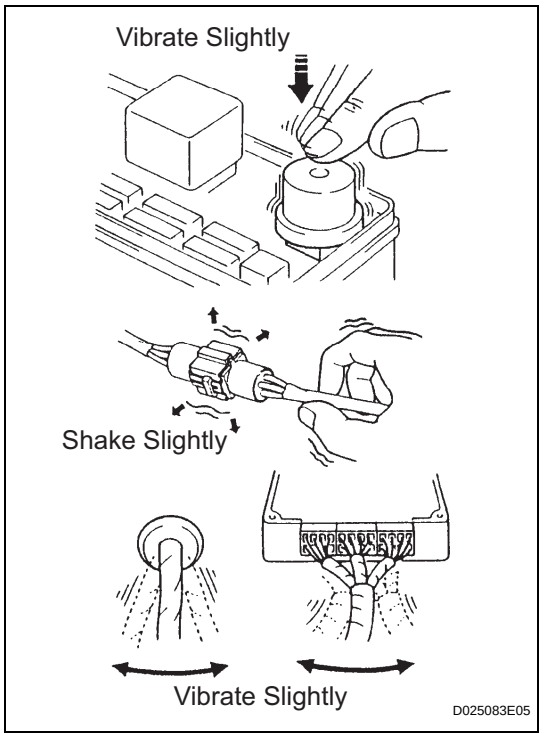
Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off (*)	54 to 69 Ω
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off (*)	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off (*)	200 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch off (*)	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off (*)	200 Ω or higher

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches, or the doors.**
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.
HINT:
If the display shows a communication error message when connecting the cable of the intelligent tester to the DLC3, turning the ignition switch on (IG) and operating the intelligent tester, there is a problem on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

2. SYMPTOM SIMULATION

HINT:
The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be reproduced. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation.
This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.
HINT:
Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is turned on (IG)).
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.
HINT:
Shaking the relays too strongly may result in open relays.
(2) Slightly shake the connector vertically and horizontally.
(3) Slightly shake the wire harness vertically and horizontally.
The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

3. FUNCTION OF SRS WARNING LIGHT

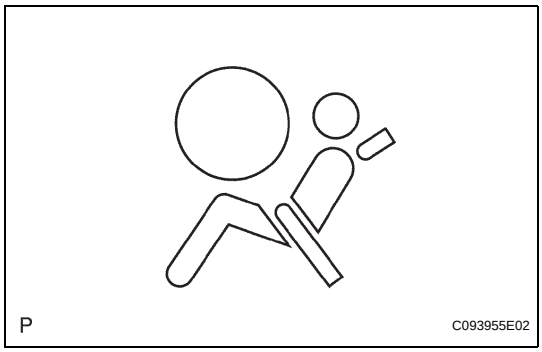
(a) Primary check.
(1) Turn the ignition switch off. Wait for at least 2 seconds, then turn the ignition switch on (IG). The SRS warning light comes on for approximately 6 seconds and the diagnosis of the airbag system (including the seat belt pretensioners) is performed.
HINT:
If trouble is detected during the primary check, the SRS warning light remains on even after the primary check period (for approximately 6 seconds) has elapsed.

(b) Constant check.
(1) After the primary check, the center airbag sensor assembly constantly monitors the airbag system for trouble.
HINT:
If trouble is detected during the constant check, the center airbag sensor assembly functions as follows:
- The SRS warning light comes on.
- The SRS warning light goes off, and then comes on. This blinking pattern indicates a source voltage drop. The SRS warning light goes off 10 seconds after the source voltage returns to normal.

(c) Review.
(1) When the airbag system is normal:
The SRS warning light comes on only during the primary check period (for approximately 6 seconds after the ignition switch is turned on (IG)).
(2) When the airbag system has trouble:
- The SRS warning light remains on even after the primary check period has elapsed.

- The SRS warning light goes off after the primary check, but comes on again during the constant check.
- The SRS warning light does not come on when turning the ignition switch from off to on (IG).

HINT:
The center airbag sensor assembly keeps the SRS warning light on if the airbag has been deployed.



4. SRS WARNING LIGHT CHECK

(a) Turn the ignition switch on (IG), and check that the SRS warning light comes on for approximately 6 seconds (primary check).

(b) Check that the SRS warning light goes off approximately 6 seconds after the ignition switch is turned on (IG) (constant check).
HINT:
When any of the following symptoms occur, refer to "Problem Symptoms Table" (See page RS-30).
- The SRS warning light comes on occasionally, after the primary check period has elapsed.
- The SRS warning light comes on, but a DTC is not output.
- The ignition switch is turned from off to on (IG), but the SRS warning light does not come on.

5. FUNCTION OF PASSENGER AIRBAG ON/OFF INDICATOR

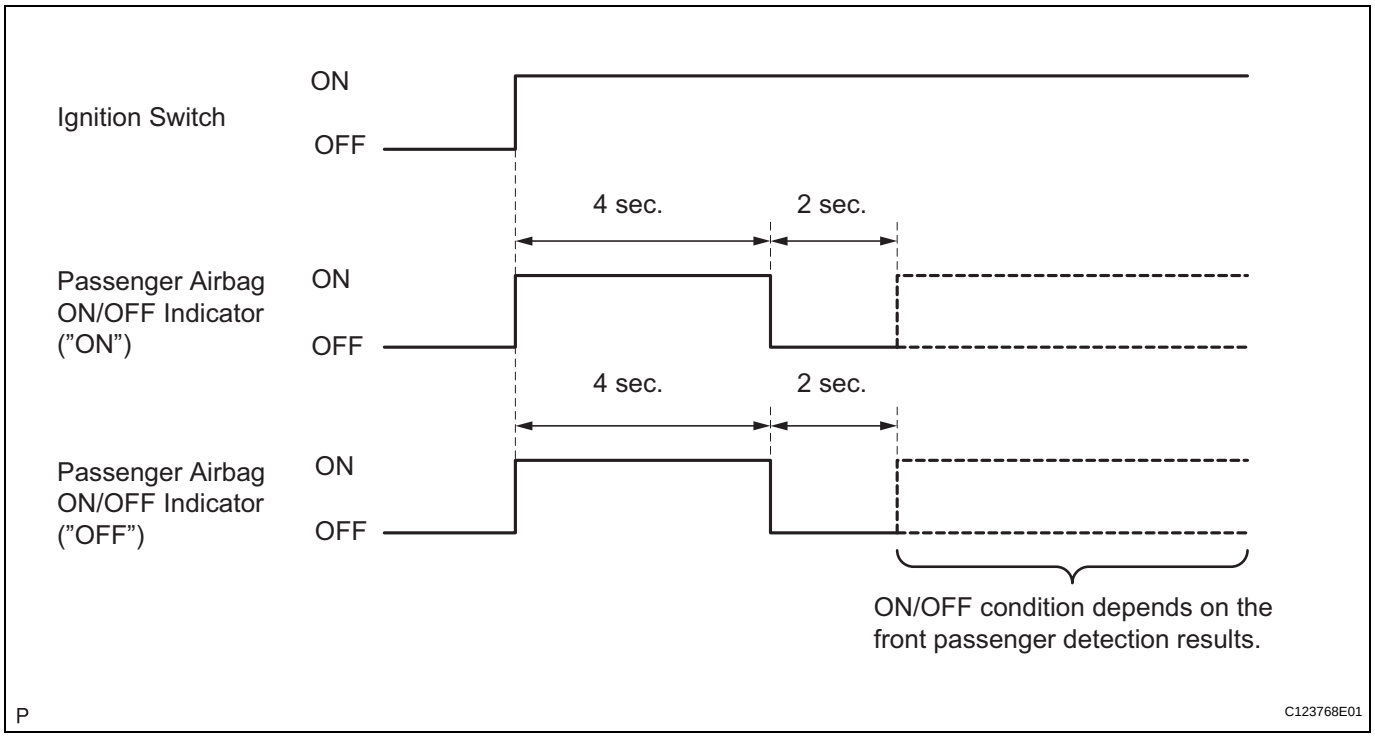
(a) Initial check
(1) Turn the ignition switch on (IG).
(2) The passenger airbag ON/OFF indicator comes on for approximately 4 seconds, then goes off for approximately 2 seconds.
(3) Approximately 6 seconds after the ignition switch is turned on (IG), the passenger airbag ON/OFF indicator will be ON/OFF depending on the conditions listed below.

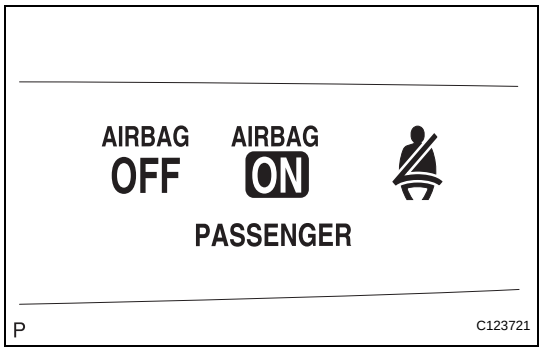
Condition	"ON" indicator	"OFF" indicator
Vacant	OFF	OFF
Adult is seated. (Above 36 kg (79.37 lb))	ON	OFF
Child is seated. (Less than 36 kg (79.37 lb))	OFF	ON
Child restraint system is set. (*)	OFF	ON
Front passenger occupant classification failure	OFF	ON

*: Child restraint system (less than 7 kg (15.43 lb)) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb) is set.
HINT:
- The passenger airbag ON/OFF indicator is based on the timing chart below in order to check the indicator light circuit.

RS

- When the front passenger occupant classification system has trouble, both the SRS warning light and the passenger airbag ON/OFF indicator ("OFF") come on. In this case, check the DTCs in "AIRBAG SYSTEM" first. Then troubleshoot the occupant classification system if DTC B1650/32 is detected, and troubleshoot the passenger airbag ON/OFF indicator if DTC B1660/43 is detected.





6. PASSENGER AIRBAG ON/OFF INDICATOR CHECK

(a) Turn the ignition switch on (IG).

(b) Check that the passenger airbag ON/OFF indicator ("ON" and "OFF") comes on for approximately 4 seconds, then goes off for approximately 2 seconds.
HINT:
Refer to the table in the previous step regarding the passenger airbag ON/OFF indicator when the ignition switch is turned on (IG) and approximately 6 seconds pass.

7. ACTIVATION PREVENTION MECHANISM

(a) FUNCTION OF ACTIVATION PREVENTION MECHANISM

(1) An activation prevention mechanism is built into the connector (on the center airbag sensor assembly side) of the airbag system squib circuit to prevent accidental airbag activation.

(2) This mechanism closes the circuit when the connector is disconnected by bringing the short spring into contact with the terminals and shutting off external electricity to prevent accidental airbag activation.

RS

(b) RELEASE METHOD OF ACTIVATION PREVENTION MECHANISM

(1) To release the activation prevention mechanism, insert a piece of paper with the same thickness as the male terminal (approximately 0.5 mm (0.020 in.)) between the terminals and the short spring to break the connection.

(2) Refer to the following illustrations concerning connectors utilizing the activation prevention mechanism and its release method.

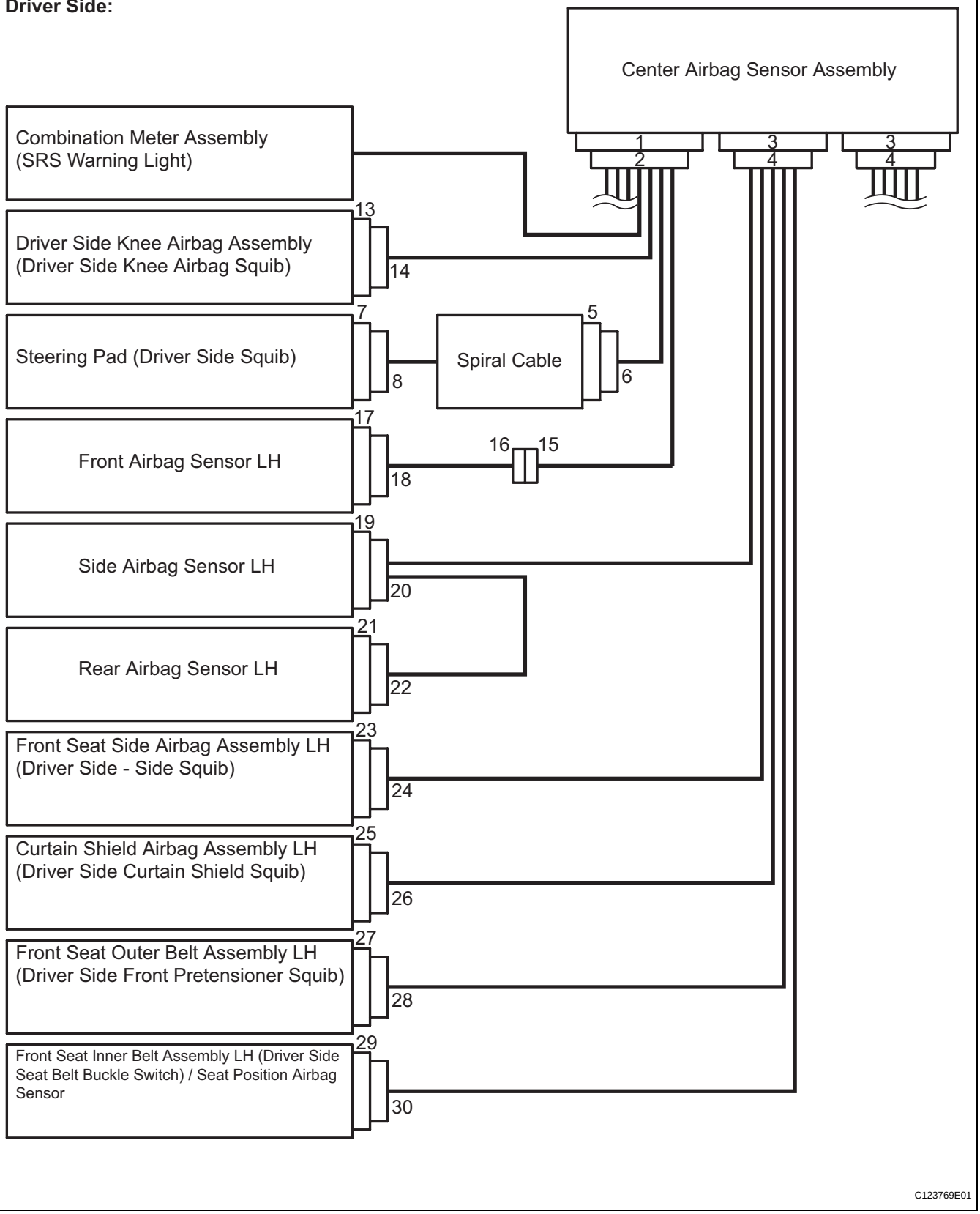
CAUTION:

Never release the activation prevention mechanism on the squib connector even when inspecting with the squib disconnected.

NOTICE:

- **Do not release the activation prevention mechanism unless specially directed by the troubleshooting procedure.**
- **To prevent the terminal and the short spring from being damaged, always use a piece of paper with the same thickness as the male terminal.**

Driver Side:



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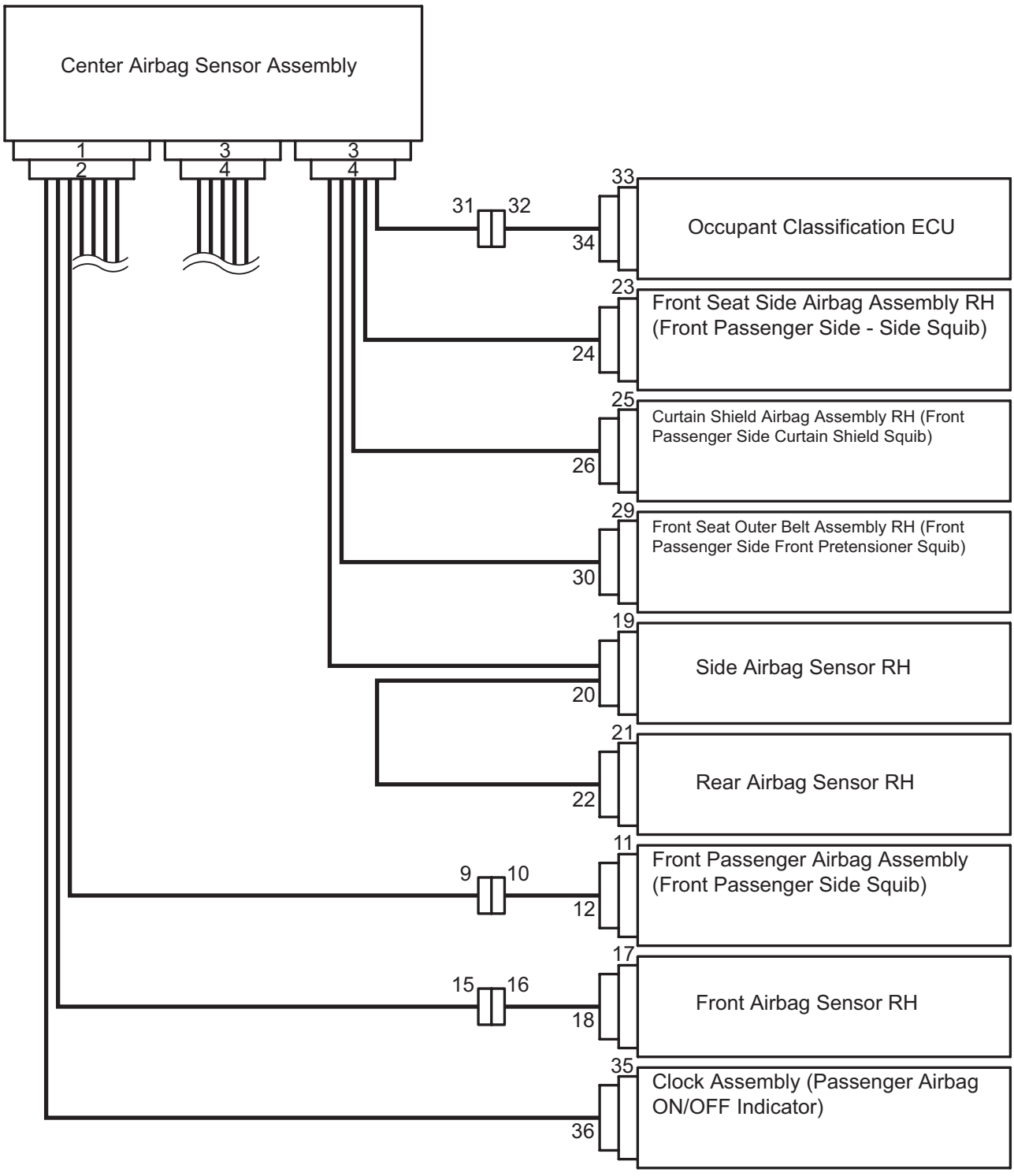
Passenger Side:



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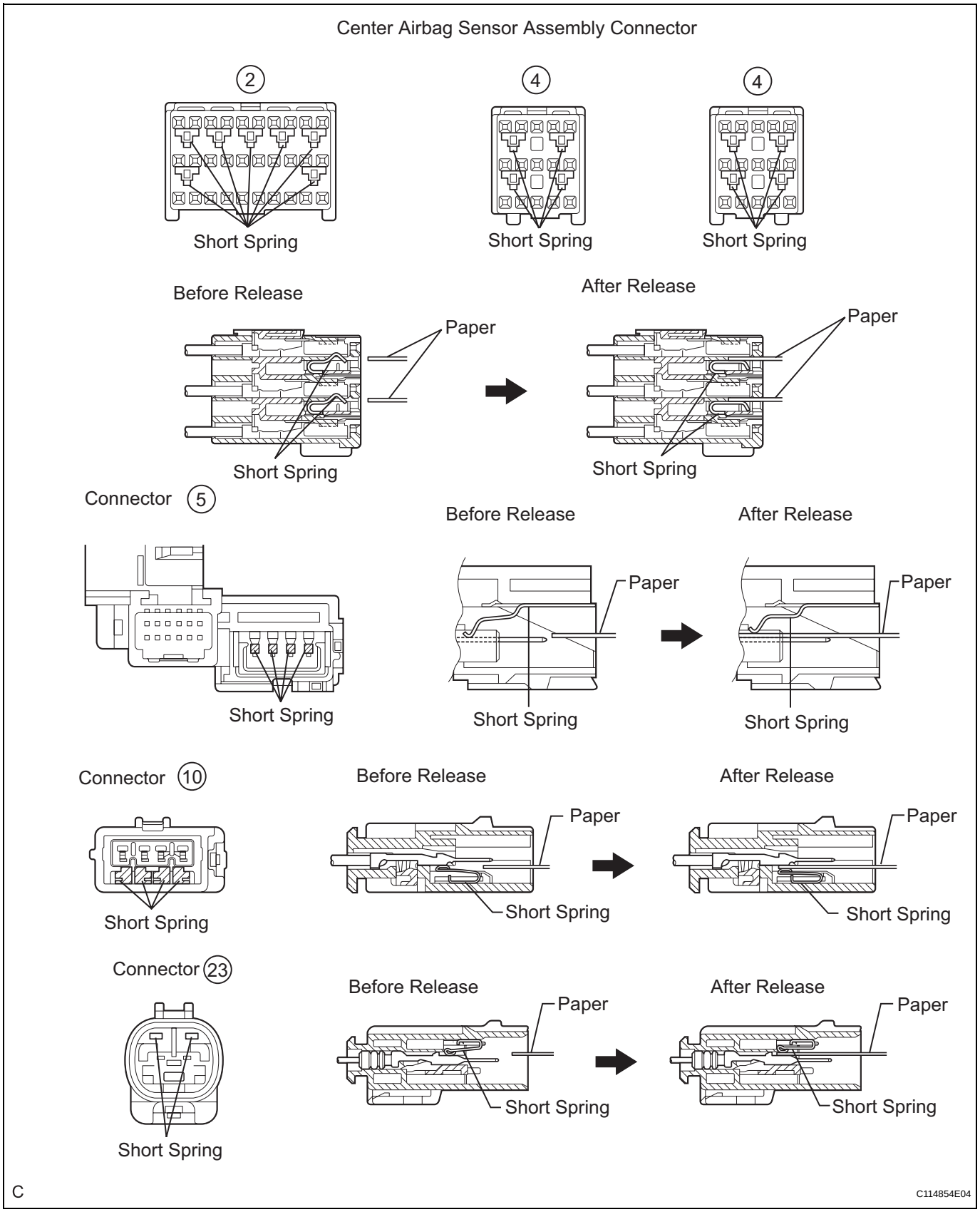
Center Airbag Sensor Assembly Connector
2
Short Spring
4
Short Spring
4
Short Spring
Before Release
After Release
Paper
Short Spring
Paper
Short Spring
Connector 5
Short Spring
Before Release
After Release
Paper
Short Spring
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Short Spring
Connector 10
Short Spring
Before Release
After Release
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Connector 23
Short Spring
Before Release
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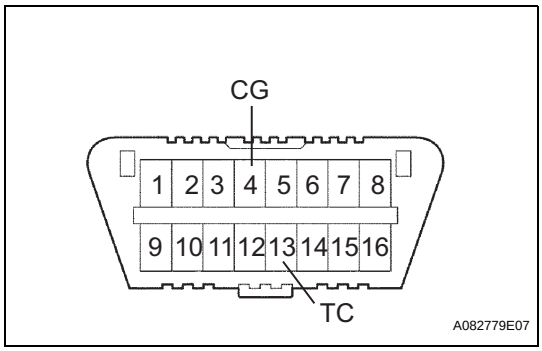
RS



DTC CHECK / CLEAR

1. DTC CHECK (USING SST CHECK WIRE)

(a) Check the DTCs (Present trouble code).

(1) Turn the ignition switch on (IG), and wait for approximately 60 seconds.

(2) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(b) Check the DTCs (Past trouble code).

(1) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

NOTICE:

Connect the terminals to the correct positions to avoid a malfunction.

(2) Turn the ignition switch on (IG), and wait for approximately 60 seconds.

(c) Read the DTCs.

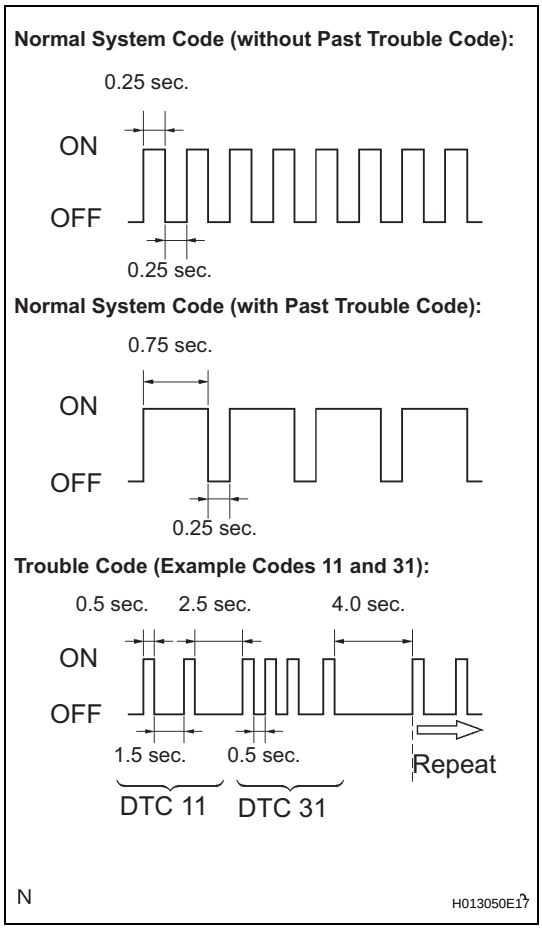
(1) Read the blinking patterns of the DTCs. As examples, the blinking patterns for the normal system code and trouble codes 11 and 31 are shown in the illustration.

- Normal system code indication (without past trouble code)
  The light blinks twice per second.
- Normal system code indication (with past trouble code)
  When the past trouble code is stored in the center airbag sensor assembly, the light blinks only once per second.
- Trouble code indication
  The first blinks indicates the first DTC. The second blinks occurs after a 1.5-second pause.

If there are more than 1 code, there will be a 2.5-second pause between each code. After all codes are shown, there will be a 4.0-second pause, and then they will all be repeated.

HINT:

- If 2 or more malfunctions are found, the indication begins with the smaller numbered code.
- If DTCs are indicated without connecting the terminals, proceed to "Diagnosis Circuit" (See page RS-231).



RS

2. DTC CLEAR (USING SST CHECK WIRE)

(a) Clear the DTCs.

(1) When the ignition switch is turned off, the DTCs are cleared.
HINT:
Depending on the DTC, the code may not be cleared by turning off the ignition switch. In this case, proceed to the next procedure.

(2) Using SST, connect terminals TC and CG of the DLC3, and then turn the ignition switch on (IG).
SST 09843-18040

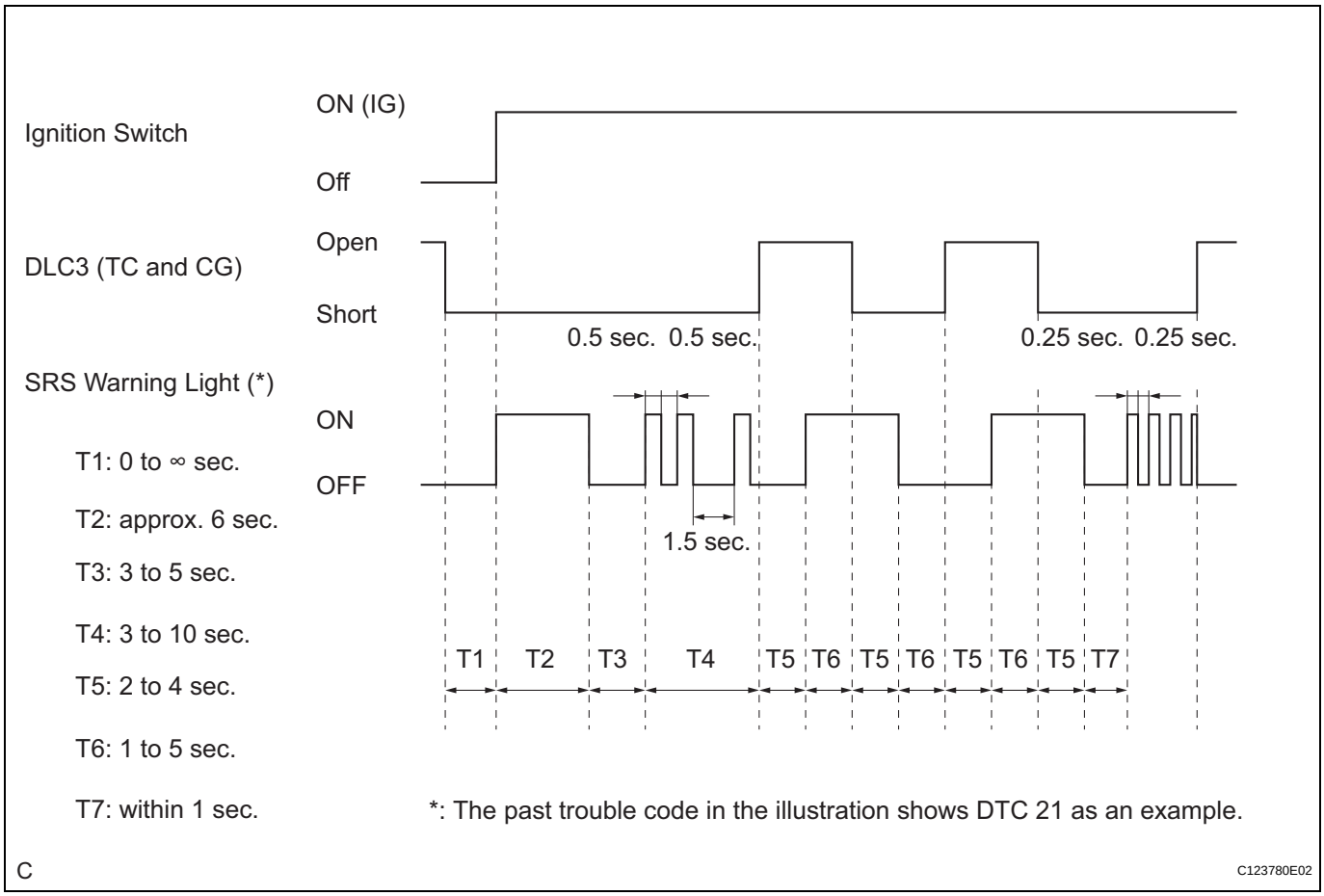
(3) Disconnect terminal TC of the DLC3 within 3 to 10 seconds after the DTCs are output, and check if the SRS warning light comes on after 3 seconds.

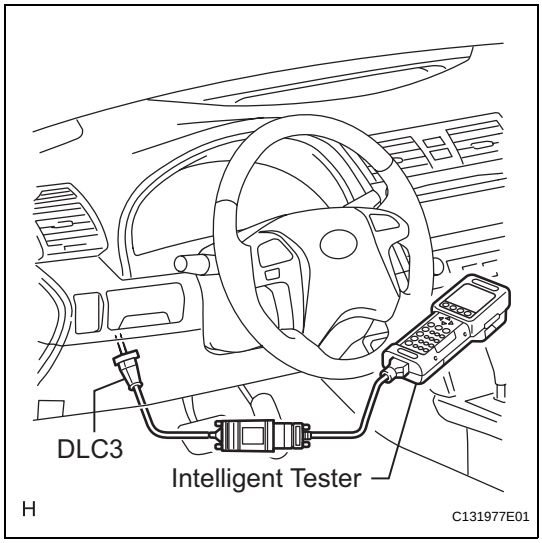
(4) Within 2 to 4 seconds after the SRS warning light comes on, connect terminals TC and CG of the DLC3.

(5) The SRS warning light should go off within 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Then, disconnect terminal TC within 2 to 4 seconds after the SRS warning light goes off.

(6) The SRS warning light comes on again within 2 to 4 seconds after disconnecting terminal TC. Then, reconnect terminals TC and CG within 2 to 4 seconds after the SRS warning light comes on.

(7) Check if the SRS warning light goes off within 2 to 4 seconds after connecting terminals TC and CG of the DLC3. Also check if the normal system code is output within 1 second after the SRS warning light goes off.
If DTCs are not cleared, repeat this procedure until the codes are cleared.



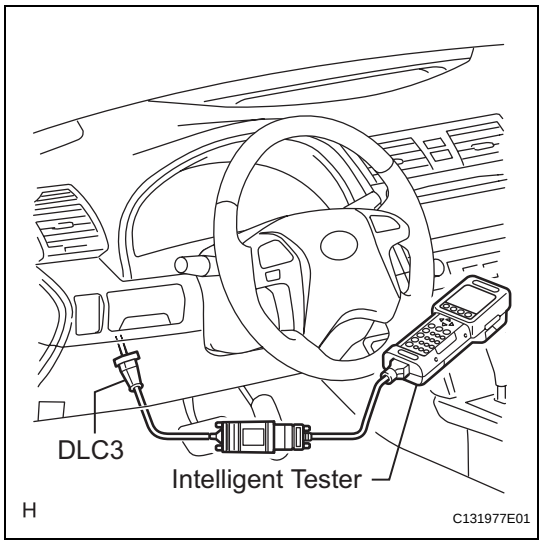


3. DTC CHECK

(a) Check the DTCs.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Check the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

(b) Clear the DTCs.
(1) Connect the intelligent tester to the DLC3.
(2) Turn the ignition switch on (IG).
(3) Clear the DTCs by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

RS



CHECK MODE PROCEDURE

1. CHECK MODE (SIGNAL CHECK): DTC CHECK

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Select "SIGNAL CHECK", and proceed with checking using the intelligent tester.

NOTICE:

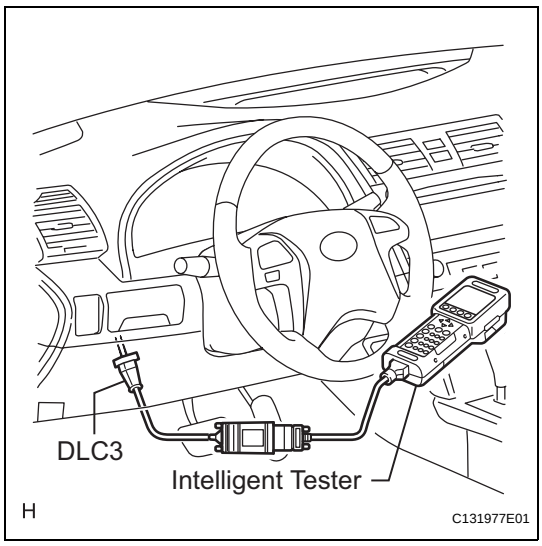
Select "SIGNAL CHECK" from the "DTC CHECK" screen displayed on the intelligent tester to clear the output DTCs (both present and past).

HINT:

- DTCs can be detected more sensitively in check mode than in normal diagnosis mode.
- Perform check mode inspection when a malfunction in each squib circuit is suspected even after the normal system code is output through normal diagnosis mode inspection.

DATA LIST / ACTIVE TEST

HINT:
By accessing the DATA LIST displayed on the intelligent tester, you can perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.



1. DATA LIST FOR CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / SRS AIRBAG / DATA LIST.
(e) Check the values by referring to the table below.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
D SEAT POSITION	Driver Seat Position/ FORWARD: Seat position is forward BKWARD: Seat position is backward FAIL: Failure detected	FORWARD/BKWARD	-
PASSENGER CLASS	Passenger Classification/ NG: Data is not determined OFF: Vacant CHILD: Child (less than 36 kg (79.37 lb)) is seated AF05: Adult (36 to 54 kg (79.37 to 119.05 lb) is seated AM50: Adult (more than 54 kg (119.05 lb)) is seated FAIL: A failure is detected	OFF/CHILD/AF05/AM50	-
PASSENGER DETECT	Passenger Detection/ NG: Data is not determined NONE: No passenger DETECT: A passenger is seated FAIL: Failure detected	NONE/DETECT	-
D BUCKLE SW	Driver Buckle SW/ UNSET: The seat belt is not fastened SET: The seat belt is fastened NG: Data is not determined	UNSET/SET	-
P BUCKLE SW	Passenger Buckle SW/ UNSET: The seat belt is not fastened SET: The seat belt is fastened NG: Data is not determined	UNSET/SET	-

RS

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
DISPLAY TYPE	Display Type Information/ LR: The display is indicated by LH/RH DP: The display is indicated by Driver/Passenger	DP	-
PAST CODES	Number of Past DTC/ Min.: 0, Max.: 255	0	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (refer to the appropriate page).

HINT:

- When the SRS warning light remains on and the DTC output is the normal system code, a voltage source drop is likely to occur. This malfunction is not stored in the memory by the center airbag sensor assembly. If the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more codes are indicated, the code with the lower number appears first.
- If a code is not listed on the display chart, the center airbag sensor assembly may have failed.
- In the case of any malfunction concerning an open circuit, short to ground, or short to B+ due to a squib, other trouble codes may not be detected. In this case, repair the malfunction currently indicated and then perform malfunction diagnosis again.
- Mark in the check mode column:
  *1: DTC is not corresponding to the check mode.
  *2: DTC is corresponding to the check mode.

AIRBAG SYSTEM:

DTC No.	Detection Item	Trouble Area	Check Mode	See page
B1000/31	Center Airbag Sensor Assembly Malfunction	Center airbag sensor assembly	*1	RS-51
B1603/83	Front Satellite Sensor Bus RH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor RH 4. Center airbag sensor assembly	*1	RS-52
B1608/84	Front Satellite Sensor Bus LH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor LH 4. Center airbag sensor assembly	*1	RS-62
B1610/13	Front Airbag Sensor RH Malfunction	1. Front airbag sensor RH 2. Center airbag sensor assembly	*1	RS-72
B1612/83	Lost Communication with Front Airbag Sensor RH	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor RH 4. Center airbag sensor assembly	*1	RS-52
B1613/83	Front Airbag Sensor RH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor RH 4. Center airbag sensor assembly	*1	RS-52
B1615/14	Front Airbag Sensor LH Malfunction	1. Front airbag sensor LH 2. Center airbag sensor assembly	*1	RS-74
B1617/84	Lost Communication with Front Airbag Sensor LH	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor LH 4. Center airbag sensor assembly	*1	RS-62

DTC No.	Detection Item	Trouble Area	Check Mode	See page
B1618/84	Front Airbag Sensor LH Initialization Incomplete	1. Instrument panel wire 2. Engine room main wire 3. Front airbag sensor LH 4. Center airbag sensor assembly	*1	RS-62
B1620/21	Driver Side - Side Airbag Sensor Malfunction	1. Side airbag sensor LH 2. Center airbag sensor assembly	*1	RS-76
B1622/81	Lost Communication with Driver Side - Side Airbag Sensor Assembly	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1623/81	Driver Side - Side Airbag Sensor Assembly Initialization Incomplete	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1625/22	Front Passenger Side - Side Airbag Sensor Malfunction	1. Side airbag sensor RH 2. Center airbag sensor assembly	*1	RS-96
B1627/82	Lost Communication with Front Passenger Side - Side Airbag Sensor Assembly	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1628/82	Front Passenger Side - Side Airbag Sensor Assembly Initialization Incomplete	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1630/23	Driver Side Rear Airbag Sensor Malfunction	1. Rear airbag sensor LH 2. Center airbag sensor assembly	*1	RS-116
B1632/81	Lost Communication with Driver Side Rear Airbag Sensor	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1633/81	Driver Side Rear Airbag Sensor Initialization Incomplete	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1635/24	Front Passenger Side Rear Airbag Sensor Malfunction	1. Rear airbag sensor RH 2. Center airbag sensor assembly	*1	RS-120
B1637/82	Lost Communication with Passenger Side Rear Airbag Sensor	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1638/82	Passenger Side Rear Airbag Sensor Initialization Incomplete	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1642/81	Lost Communication with Driver Side Satellite Sensor Bus	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80

DTC No.	Detection Item	Trouble Area	Check Mode	See page
B1643/81	Driver Side Satellite Sensor Bus Initialization Incomplete	1. Floor wire 2. Side airbag sensor LH 3. Rear airbag sensor LH 4. Center airbag sensor assembly	*1	RS-80
B1647/82	Lost Communication with Front Passenger Side Satellite Sensor Bus	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1648/82	Front Passenger Side Satellite Sensor Bus Initialization Incomplete	1. Floor wire No. 2 2. Side airbag sensor RH 3. Rear airbag sensor RH 4. Center airbag sensor assembly	*1	RS-100
B1650/32	Occupant Classification System Malfunction	1. Floor wire No. 2 2. Occupant classification system 3. Front seat wire RH 4. Center airbag sensor assembly	*1	RS-124
B1653/35	Seat Position Airbag Sensor Circuit Malfunction	1. Floor wire 2. Seat position airbag sensor 3. Center airbag sensor assembly	*1	RS-136
B1655/37	Driver Side Seat Belt Buckle Switch Circuit Malfunction	1. Floor wire 2. Front seat inner belt assembly LH 3. Center airbag sensor assembly	*1	RS-142
B1660/43	Passenger Airbag ON / OFF Indicator Circuit Malfunction	1. Instrument panel wire 2. Instrument panel wire No. 2 3. Clock assembly 4. Center airbag sensor assembly	*1	RS-148
B1800/51	Short in Driver Side Squib Circuit	1. Instrument panel wire 2. Spiral cable 3. Steering pad 4. Center airbag sensor assembly	*2	RS-159
B1801/51	Open in Driver Side Squib Circuit	Same as DTC B1800/51	*2	RS-159
B1802/51	Short to GND in Driver Side Squib Circuit	Same as DTC B1800/51	*2	RS-159
B1803/51	Short to B+ in Driver Side Squib Circuit	Same as DTC B1800/51	*2	RS-159
B1805/52	Short in Front Passenger Side Squib Circuit	1. Instrument panel wire 2. Instrument panel wire assembly 3. Front passenger airbag assembly 4. Center airbag sensor assembly	*2	RS-166
B1806/52	Open in Front Passenger Side Squib Circuit	Same as DTC B1805/52	*2	RS-166
B1807/52	Short to GND in Front Passenger Side Squib Circuit	Same as DTC B1805/52	*2	RS-166
B1808/52	Short to B+ in Front Passenger Side Squib Circuit	Same as DTC B1805/52	*2	RS-166

DTC No.	Detection Item	Trouble Area	Check Mode	See page
B1810/53	Short in Driver Side Squib 2nd Step Circuit	1. Instrument panel wire 2. Spiral cable 3. Steering pad 4. Center airbag sensor assembly	*2	RS-173
B1811/53	Open in Driver Side Squib 2nd Step Circuit	Same as DTC B1810/53	*2	RS-173
B1812/53	Short to GND in Driver Side Squib 2nd Step Circuit	Same as DTC B1810/53	*2	RS-173
B1813/53	Short to B+ in Driver Side Squib 2nd Step Circuit	Same as DTC B1810/53	*2	RS-173
B1815/54	Short in Front Passenger Side Squib 2nd Step Circuit	1. Instrument panel wire 2. Instrument panel wire assembly 3. Front passenger airbag assembly 4. Center airbag sensor assembly	*2	RS-180
B1816/54	Open in Front Passenger Side Squib 2nd Step Circuit	Same as DTC B1815/54	*2	RS-180
B1817/54	Short to GND in Front Passenger Side Squib 2nd Step Circuit	Same as DTC B1815/54	*2	RS-180
B1818/54	Short to B+ in Front Passenger Side Squib 2nd Step Circuit	Same as DTC B1815/54	*2	RS-180
B1820/55	Short in Driver Side - Side Squib Circuit	1. Floor wire 2. Front seat side airbag assembly LH 3. Center airbag sensor assembly	*2	RS-187
B1821/55	Open in Driver Side - Side Squib Circuit	Same as DTC B1820/55	*2	RS-187
B1822/55	Short to GND in Driver Side - Side Squib Circuit	Same as DTC B1820/55	*2	RS-187
B1823/55	Short to B+ in Driver Side - Side Squib Circuit	Same as DTC B1820/55	*2	RS-187
B1825/56	Short in Front Passenger Side - Side Squib Circuit	1. Floor wire No. 2 2. Front seat side airbag assembly RH 3. Center airbag sensor assembly	*2	RS-192
B1826/56	Open in Front Passenger Side - Side Squib Circuit	Same as DTC B1825/56	*2	RS-192
B1827/56	Short to GND in Front Passenger Side - Side Squib Circuit	Same as DTC B1825/56	*2	RS-192
B1828/56	Short to B+ in Front Passenger Side - Side Squib Circuit	Same as DTC B1825/56	*2	RS-192
B1830/57	Short in Driver Side Curtain Shield Squib Circuit	1. Floor wire 2. Curtain shield airbag assembly LH 3. Center airbag sensor assembly	*2	RS-197
B1831/57	Open in Driver Side Curtain Shield Squib Circuit	Same as DTC B1830/57	*2	RS-197

DTC No.	Detection Item	Trouble Area	Check Mode	See page
B1832/57	Short to GND in Driver Side Curtain Shield Squib Circuit	Same as DTC B1830/57	*2	RS-197
B1833/57	Short to B+ in Driver Side Curtain Shield Squib Circuit	Same as DTC B1830/57	*2	RS-197
B1835/58	Short in Front Passenger Side Curtain Shield Squib Circuit	1. Floor wire No. 2 2. Curtain shield airbag assembly RH 3. Center airbag sensor assembly	*2	RS-202
B1836/58	Open in Front Passenger Side Curtain Shield Squib Circuit	Same as DTC B1835/58	*2	RS-202
B1837/58	Short to GND in Front Passenger Side Curtain Shield Squib Circuit	Same as DTC B1835/58	*2	RS-202
B1838/58	Short to B+ in Front Passenger Side Curtain Shield Squib Circuit	Same as DTC B1835/58	*2	RS-202
B1860/64	Short in Driver Side Knee Airbag Squib Circuit	1. Instrument panel wire 2. Driver side knee airbag assembly 3. Center airbag sensor assembly	*2	RS-207
B1861/64	Open in Driver Side Knee Airbag Squib Circuit	Same as DTC B1860/64	*2	RS-207
B1862/64	Short to GND in Driver Side Knee Airbag Squib Circuit	Same as DTC B1860/64	*2	RS-207
B1863/64	Short to B+ in Driver Side Knee Airbag Squib Circuit	Same as DTC B1860/64	*2	RS-207
B1900/73	Short in Driver Side Front Pretensioner Squib Circuit	1. Floor wire 2. Front seat outer belt assembly LH 3. Center airbag sensor assembly	*2	RS-212
B1901/73	Open in Driver Side Front Pretensioner Squib Circuit	Same as DTC B1900/73	*2	RS-212
B1902/73	Short to GND in Driver Side Front Pretensioner Squib Circuit	Same as DTC B1900/73	*2	RS-212
B1903/73	Short to B+ in Driver Side Front Pretensioner Squib Circuit	Same as DTC B1900/73	*2	RS-212
B1905/74	Short in Front Passenger Side Front Pretensioner Squib Circuit	1. Floor wire No. 2 2. Front seat outer belt assembly RH 3. Center airbag sensor assembly	*2	RS-217
B1906/74	Open in Front Passenger Side Front Pretensioner Squib Circuit	Same as DTC B1905/74	*2	RS-217
B1907/74	Short to GND in Front Passenger Side Front Pretensioner Squib Circuit	Same as DTC B1905/74	*2	RS-217
B1908/74	Short to B+ in Front Passenger Side Front Pretensioner Squib Circuit	Same as DTC B1905/74	*2	RS-217

DTC	B1000/31	Center Airbag Sensor Assembly Malfunction

DESCRIPTION

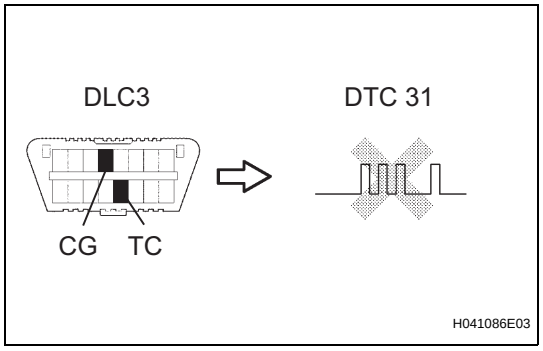
The center airbag sensor assembly consists of the airbag sensor, the safing sensor, the drive circuit, the diagnosis circuit, the ignition control, etc.
If the center airbag sensor assembly receives signals from the airbag sensor, it determines whether the SRS should be activated.
DTC B1000/31 is recorded when a malfunction is detected in the center airbag sensor assembly.

DTC No.	DTC Detecting Condition	Trouble Area
B1000/31	Center airbag sensor assembly malfunction	Center airbag sensor assembly

HINT:
When a trouble code is displayed simultaneously with B1000/31, repair the malfunction indicated by this code (except B1000/31) first.

INSPECTION PROCEDURE

1	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).
OK:
DTC B1000/31 is not output.

RS

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1603/83	Front Satellite Sensor Bus RH Initialization Incomplete

DTC	B1612/83	Lost Communication with Front Airbag Sensor RH

DTC	B1613/83	Front Airbag Sensor RH Initialization Incomplete

DESCRIPTION

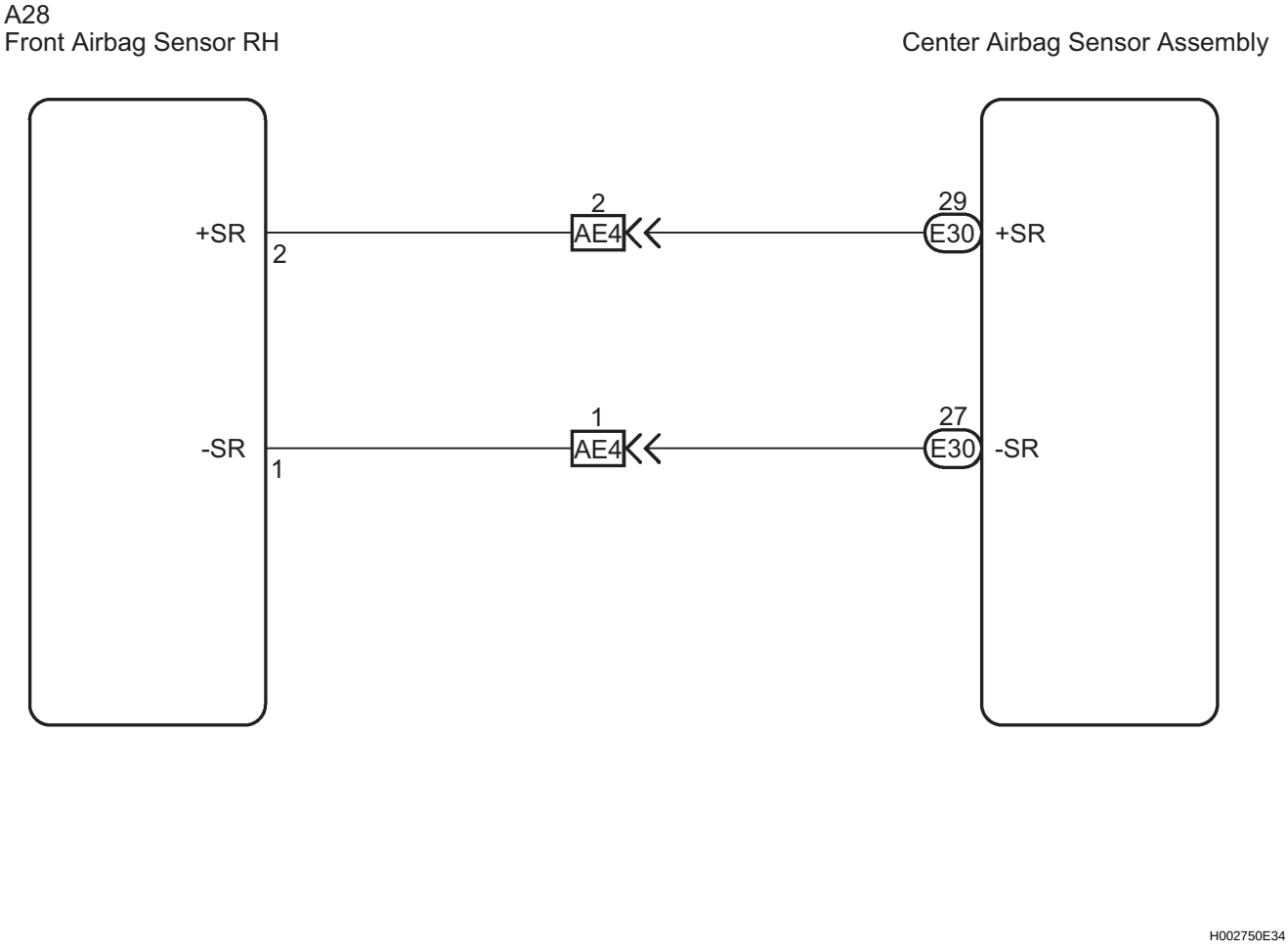
The front airbag sensor RH circuit consists of the center airbag sensor assembly and front airbag sensor RH.

The front airbag sensor RH detect impacts to the vehicle and send signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1603/83, B1612/83, or B1613/83 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1603/83 B1612/83 B1613/83	• The airbag sensor assembly center receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front airbag sensor RH circuit for 2 seconds. • Front airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Engine room main wire • Front airbag sensor RH • Center airbag sensor assembly

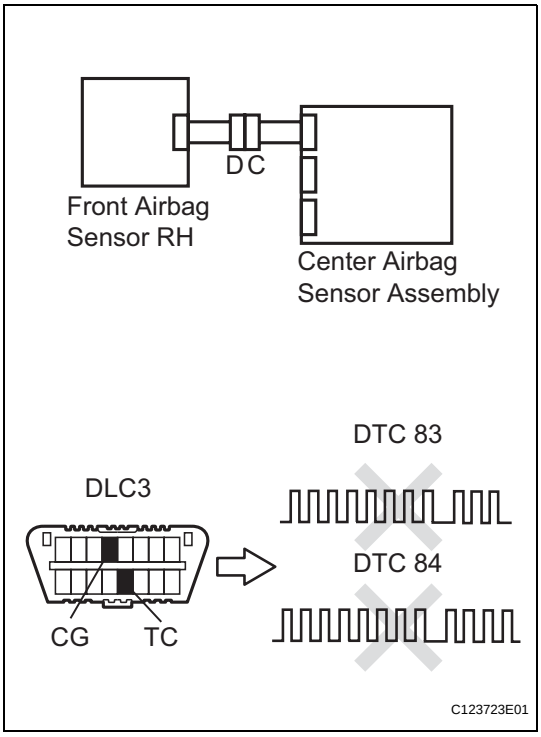
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Turn the ignition switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the ignition switch off and then on (IG) again.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1603, B1613, or 83 is output.	A
DTC B1618/84 is output.	B
DTC B1603, B1613, or 83 and B1618/84 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the ignition switch off and then on (IG) again.
- Codes other than DTC B1603, B1613, or 83 and B1618/84 may be output at this time, but they are not related to this check.

RS

B → **GO TO DTC B1618/84**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the front airbag sensor RH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

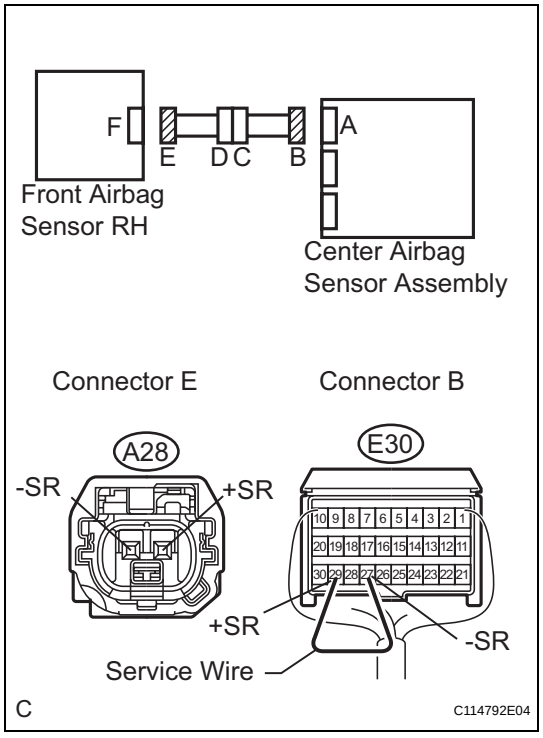
3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and front airbag sensor RH.
(b) Check that the connectors (on the center airbag sensor assembly side and front airbag sensor RH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4	CHECK FRONT AIRBAG SENSOR RH CIRCUIT (OPEN)



(a) Using a service wire, connect terminals 29 (+SR) and 27 (-SR) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

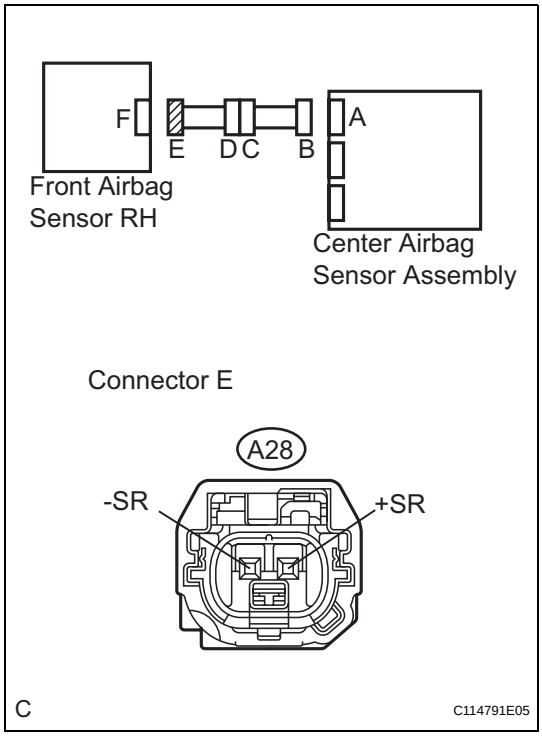
Tester Connection	Condition	Specified Condition
A28-2 (+SR) - A28-1 (-SR)	Always	Below 1 Ω

NG → **Go to step 9**

OK

RS

5 CHECK FRONT AIRBAG SENSOR RH CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

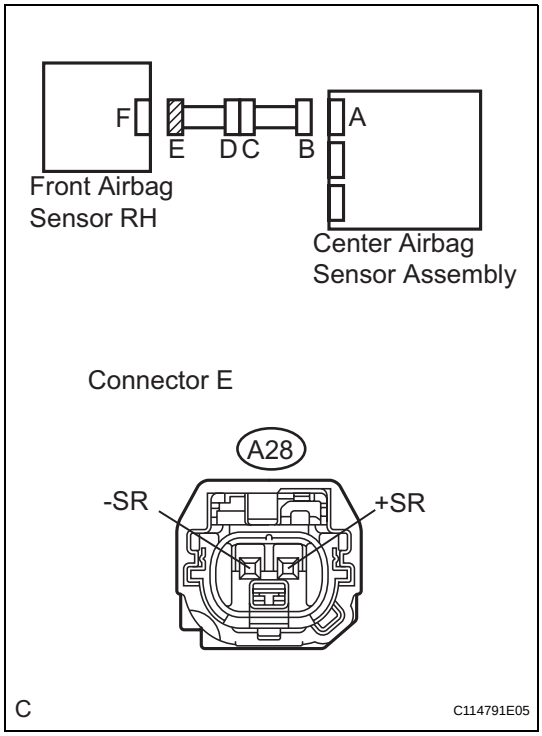
Tester Connection	Condition	Specified Condition
A28-2 (+SR) - A28-1 (-SR)	Always	1 MΩ or higher

NG → **Go to step 10**

OK

RS

6 CHECK FRONT AIRBAG SENSOR RH CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

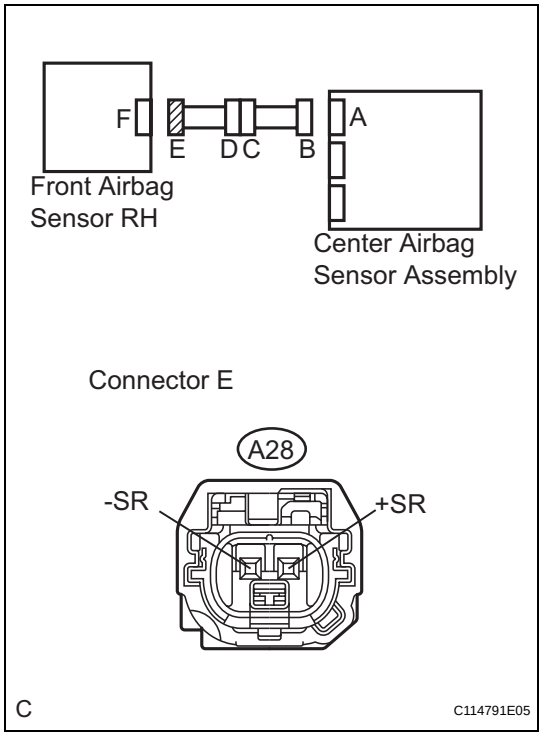
Standard voltage

Tester Connection	Condition	Specified Condition
A28-2 (+SR) - Body ground	Ignition switch on (IG)	Below 1 V
A28-1 (-SR) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **Go to step 11**

OK

7 CHECK FRONT AIRBAG SENSOR RH CIRCUIT (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

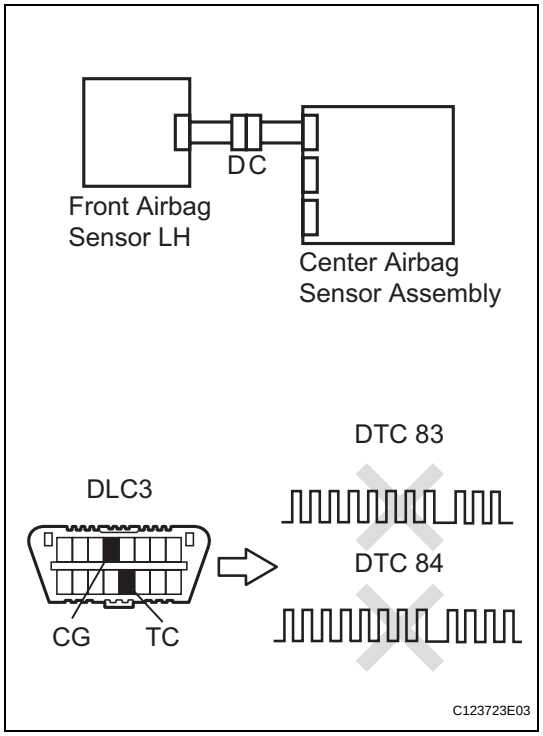
Tester Connection	Condition	Specified Condition
A28-2 (+SR) - Body ground	Always	1 MΩ or higher
A28-1 (-SR) - Body ground	Always	1 MΩ or higher

NG → **Go to step 12**

OK

8 CHECK FRONT AIRBAG SENSOR RH

RS



(a) Connect the connectors to the center airbag sensor assembly.
(b) Interchange the front airbag sensor LH with RH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1603, B1612, B1613, or 83 is output.	A
DTC B1608, B1617, B1618, or 84 is output.	B
DTC B1603, B1612, B1613, or 83 and B1608, B1617, B1618, or 84 are not output.	C

HINT:
Codes other than DTC B1603, B1612, B1613, or 83 and B1608, B1617, B1618, or 84 may be output at this time, but they are not related to this check.

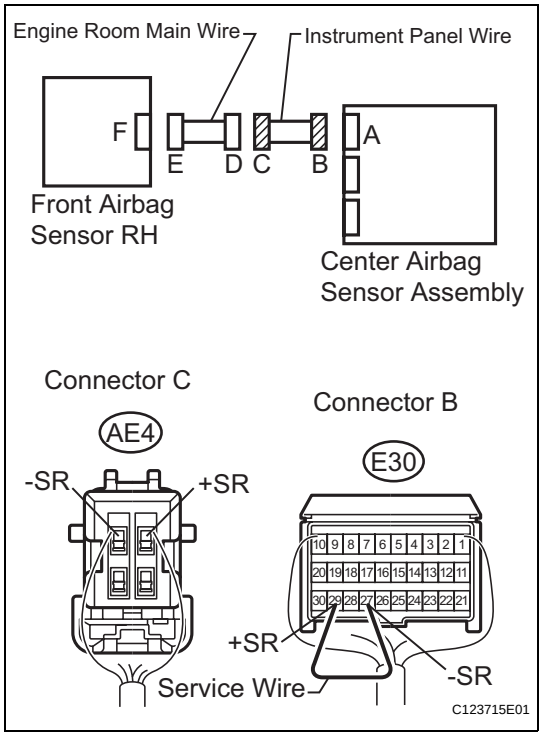
A → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

B → **REPLACE FRONT AIRBAG SENSOR RH (See page RS-446)**

C

USE SIMULATION METHOD TO CHECK (See page RS-32)

9 CHECK INSTRUMENT PANEL WIRE (OPEN)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - AE4-1 (-SR)	Always	Below 1 Ω

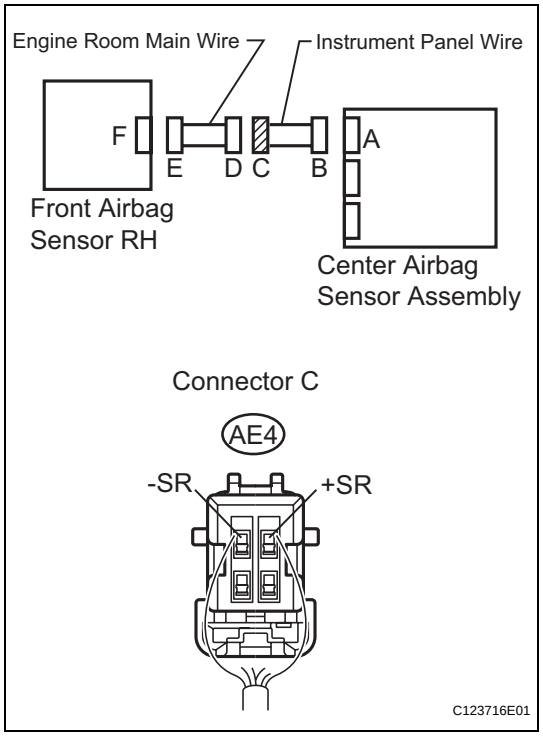
NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

RS

10 CHECK INSTRUMENT PANEL WIRE (SHORT)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - AE4-1 (-SR)	Always	1 MΩ or higher

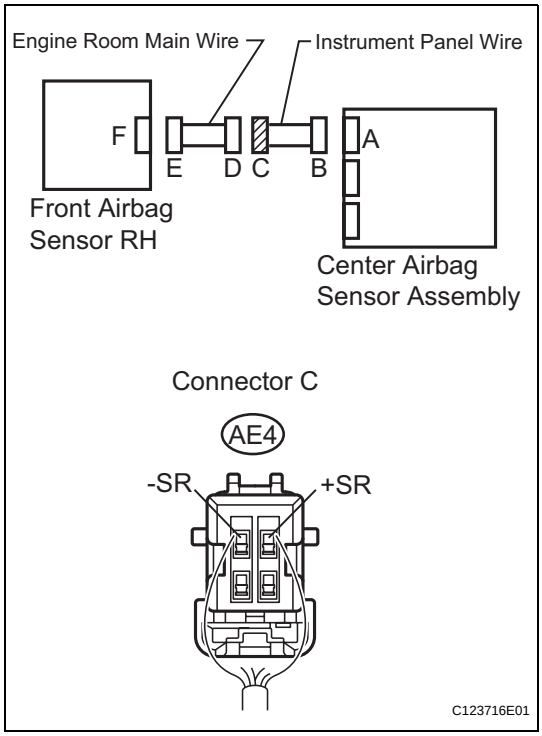
NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

RS

11	CHECK INSTRUMENT PANEL WIRE (SHORT TO B+)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the engine room main wire.
(d) Connect the negative (-) terminal cable to battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

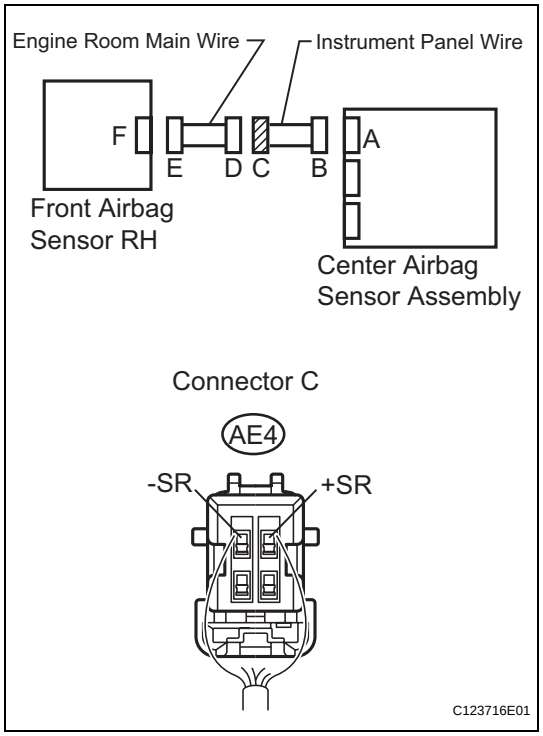
Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - Body ground	Ignition switch on (IG)	Below 1 V
AE4-1 (-SR) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

12 CHECK INSTRUMENT PANEL WIRE (SHORT TO GROUND)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
AE4-2 (+SR) - Body ground	Always	1 MΩ or higher
AE4-1 (-SR) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

RS

DTC	**B1608/84**	**Front Satellite Sensor Bus LH Initialization Incomplete**

DTC	**B1617/84**	**Lost Communication with Front Airbag Sensor LH**

DTC	**B1618/84**	**Front Airbag Sensor LH Initialization Incomplete**

DESCRIPTION

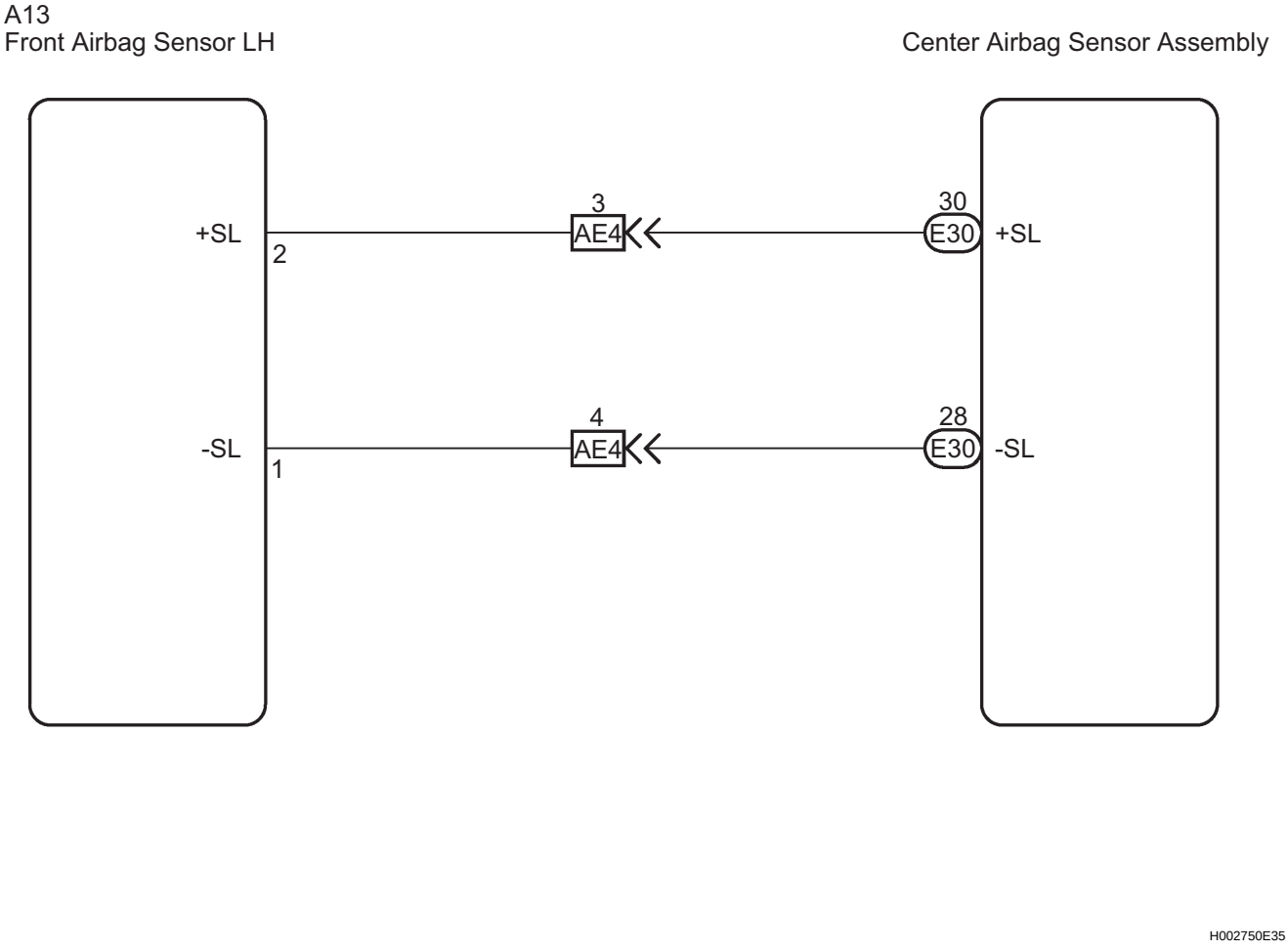
The front airbag sensor LH circuit consists of the center airbag sensor assembly and front airbag sensor LH.

The front airbag sensor LH detects impacts to the vehicle and sends signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1608/84, B1617/84, or B1618/84 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1608/84 B1617/84 B1618/84	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front airbag sensor LH circuit for 2 seconds. • Front airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Engine room main wire • Front airbag sensor LH • Center airbag sensor assembly

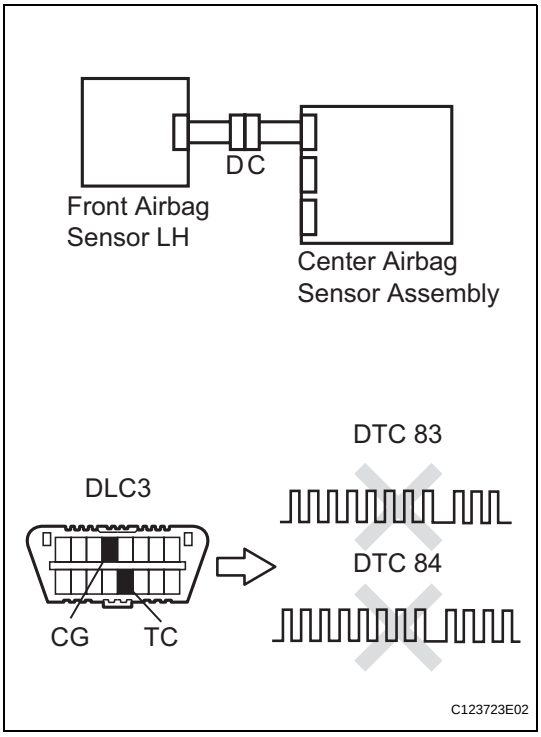
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Turn the ignition switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the ignition switch off and then on (IG) again.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1608, B1618, or 84 is output.	A
DTC B1613/83 is output.	B
DTC B1608, B1618, or 84 and B1613/83 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the ignition switch off and then on (IG) again.
- Codes other than DTC B1608, B1618, or 84 and B1613/83 may be output at this time, but they are not related to this check.

RS

B → **GO TO DTC B1613/83**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the front airbag sensor LH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

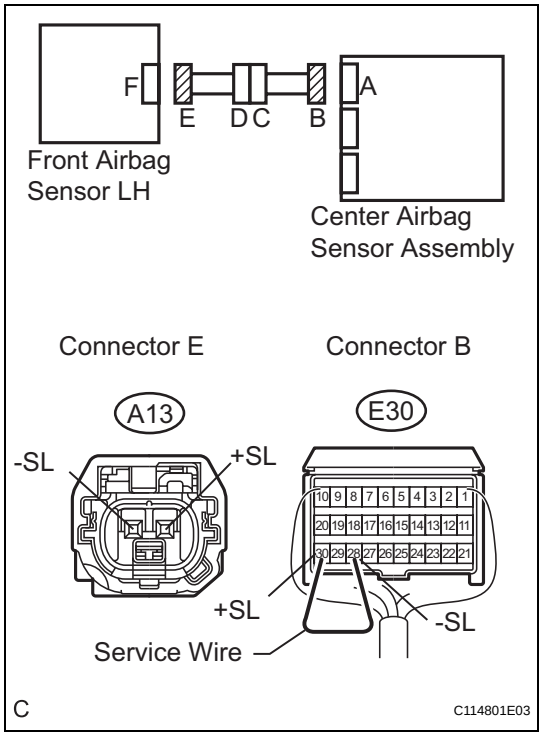
3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and front airbag sensor LH.
(b) Check that the connectors (on the center airbag sensor assembly side and front airbag sensor LH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4	CHECK FRONT AIRBAG SENSOR LH (OPEN)



(a) Using a service wire, connect terminals 30 (+SL) and 28 (-SL) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

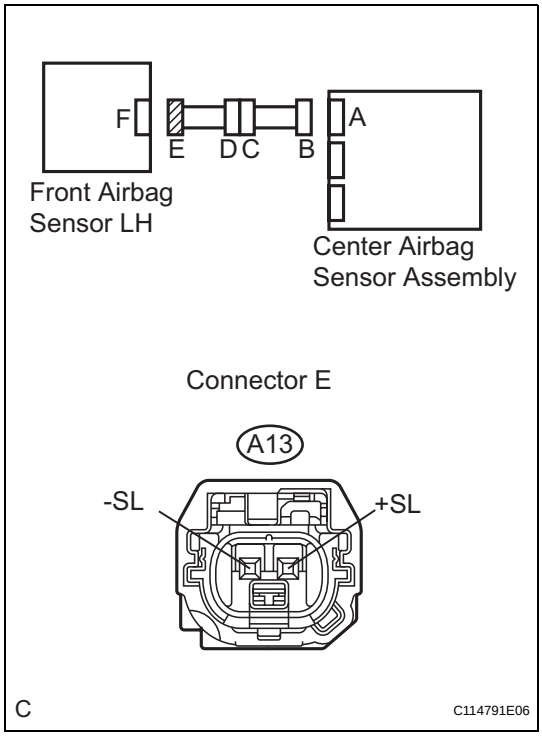
Tester Connection	Condition	Specified Condition
A13-2 (+SL) - A13-1 (-SL)	Always	Below 1 Ω

NG → **Go to step 9**

OK

RS

5 CHECK FRONT AIRBAG SENSOR LH (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

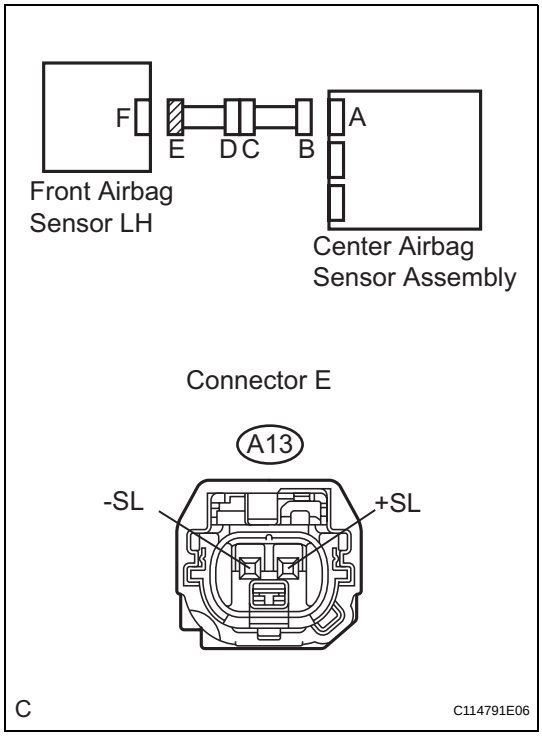
Tester Connection	Condition	Specified Condition
A13-2 (+SL) - A13-1 (-SL)	Always	1 MΩ or higher

NG → **Go to step 10**

OK

RS

6 CHECK FRONT AIRBAG SENSOR LH (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

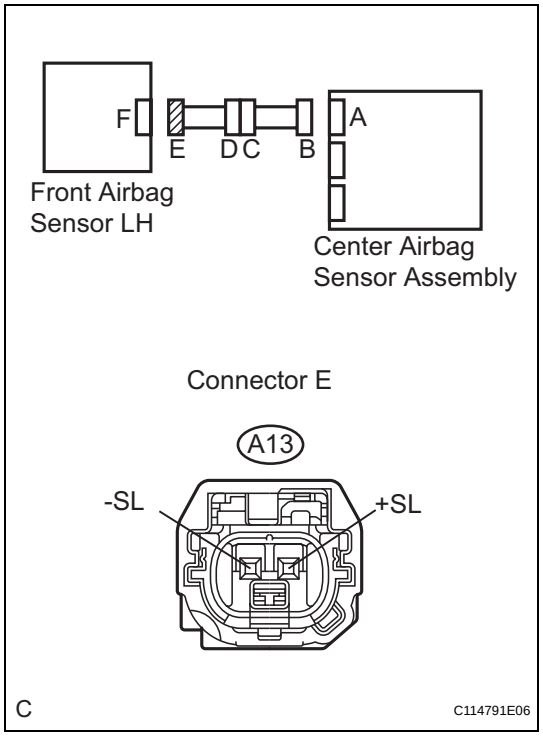
Standard voltage

Tester Connection	Condition	Specified Condition
A13-2 (+SL) - Body ground	Ignition switch on (IG)	Below 1 V
A13-1 (-SL) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **Go to step 11**

OK

7 CHECK FRONT AIRBAG SENSOR LH (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

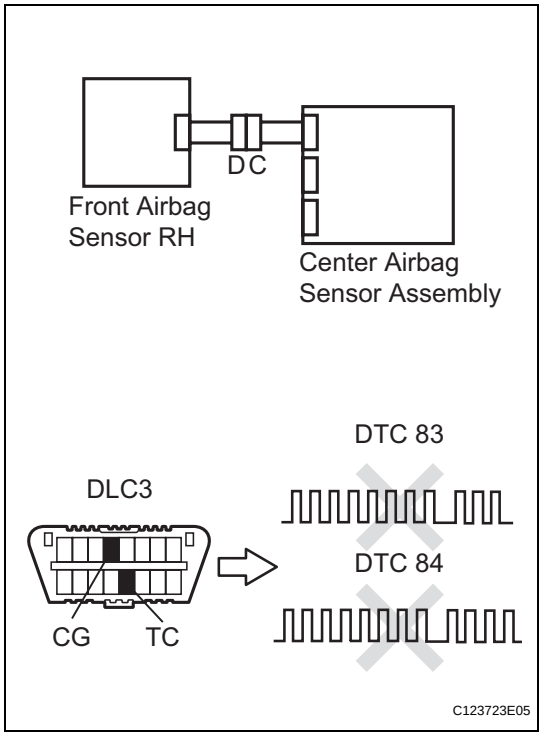
Standard resistance

Tester Connection	Condition	Specified Condition
A13-2 (+SL) - Body ground	Always	1 MΩ or higher
A13-1 (-SL) - Body ground	Always	1 MΩ or higher

NG → **Go to step 12**

OK

8 CHECK FRONT AIRBAG SENSOR LH



(a) Connect the connectors to the center airbag sensor assembly.
(b) Interchange the front airbag sensor RH with LH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1608, B1617, B1618, or 84 is output.	A
DTC B1603, B1612, B1613, or 83 is output.	B
DTC B1603, B1612, B1613, or 83 and B1608, B1617, B1618, or 84 are not output.	C

HINT:
Codes other than DTC B1608, B1617, B1618, or 84 and B1603, B1612, B1613, or 83 may be output at this time, but they are not related to this check.

RS

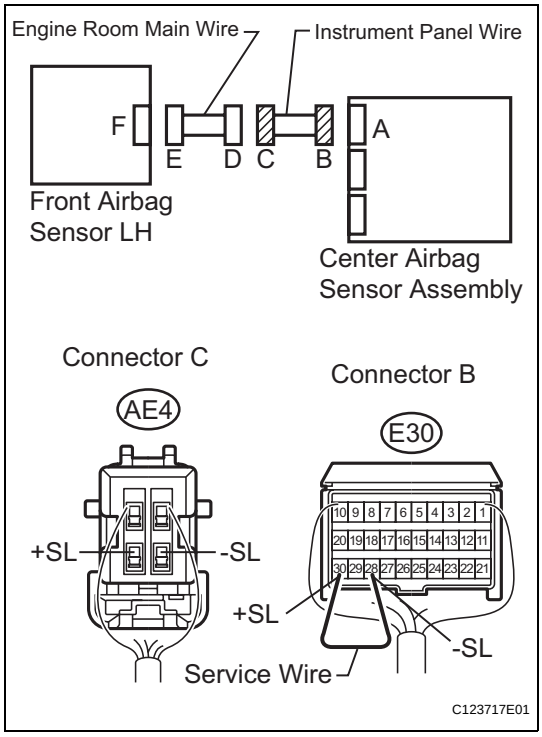
A → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

B → **REPLACE FRONT AIRBAG SENSOR LH (See page RS-446)**

C

USE SIMULATION METHOD TO CHECK (See page RS-32)

9 CHECK INSTRUMENT PANEL WIRE (OPEN)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - AE4-4 (-SL)	Always	Below 1 Ω

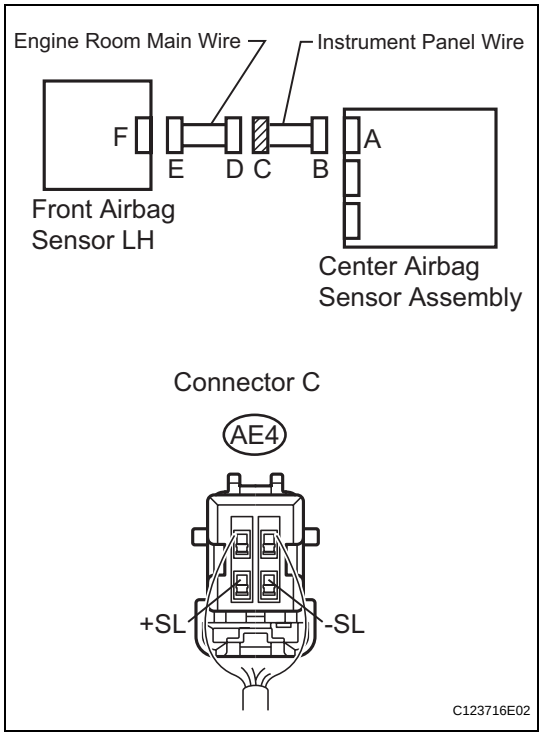
NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

RS

10 CHECK INSTRUMENT PANEL WIRE (SHORT)



(a) Disconnect the instrument panel wire connector from the engine room main wire.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

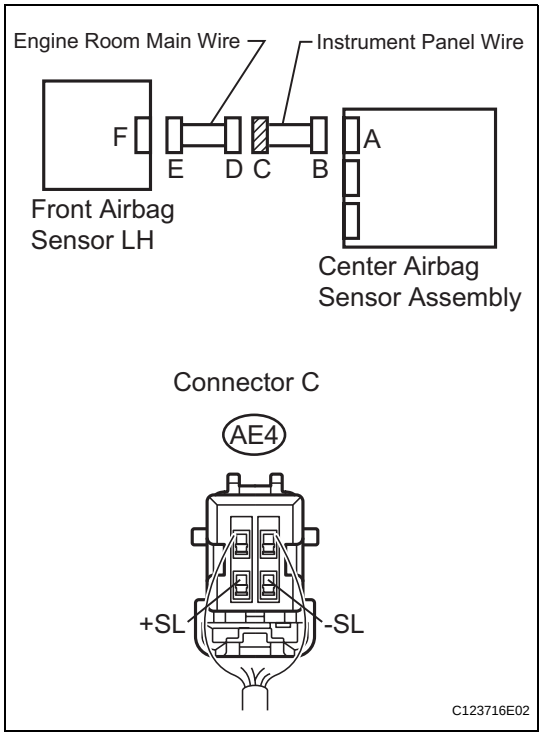
Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - AE4-4 (-SL)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

11	CHECK INSTRUMENT PANEL WIRE (SHORT TO B+)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the instrument panel wire connector from the engine room main wire.
(d) Connect the negative (-) terminal cable to battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

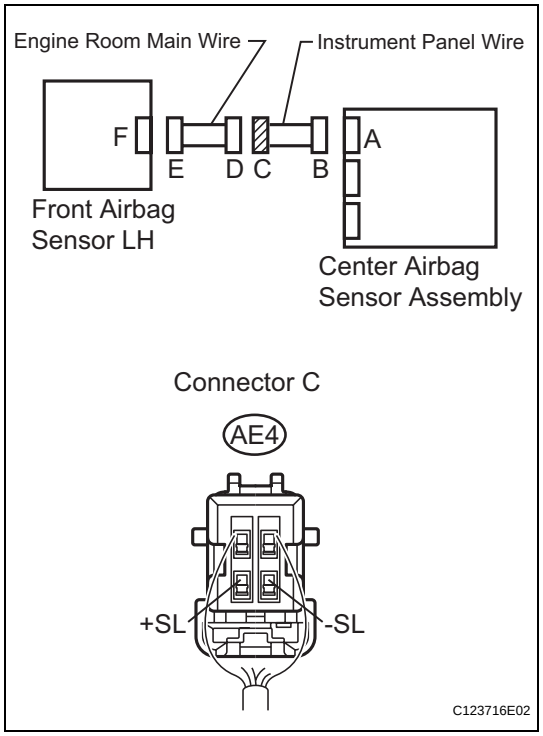
Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - Body ground	Ignition switch on (IG)	Below 1 V
AE4-4 (-SL) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

12 CHECK INSTRUMENT PANEL WIRE (SHORT TO GROUND)



(a) Disconnect the instrument panel wire connector from the engine room main wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
AE4-3 (+SL) - Body ground	Always	1 MΩ or higher
AE4-4 (-SL) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

REPAIR OR REPLACE ENGINE ROOM MAIN WIRE

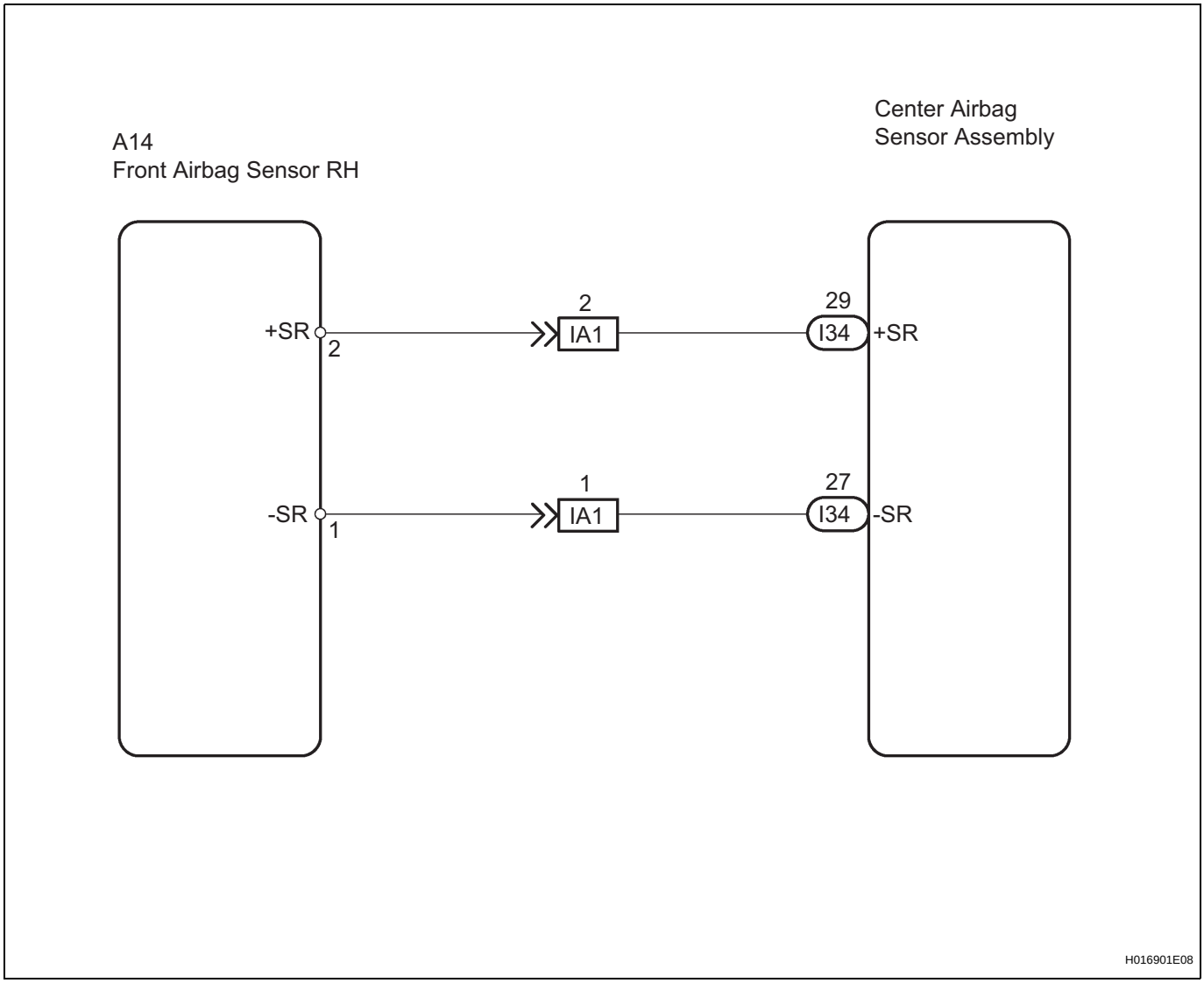
DTC	B1610/13	Front Airbag Sensor RH Malfunction

DESCRIPTION

The front airbag sensor RH consists of the diagnostic circuit, the frontal deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the frontal deceleration sensor, it determines whether the SRS should be activated.
DTC B1610/13 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1610/13	• Front airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Front airbag sensor RH • Center airbag sensor assembly

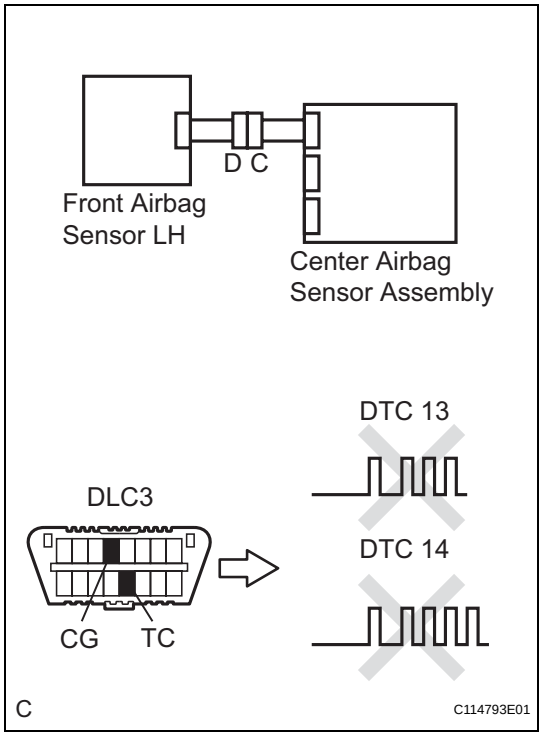
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK FRONT AIRBAG SENSOR RH



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Interchange the front airbag sensor LH with RH and connect the connectors to them.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in the memory (See page RS-41).
(g) Turn the ignition switch off.
(h) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1610/13 is output.	A
DTC B1615/14 is output.	B
DTC B1610/13 and B1615/14 are not output.	C

HINT:
Codes other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.

A → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

B → **REPLACE FRONT AIRBAG SENSOR RH (See page RS-446)**

C

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

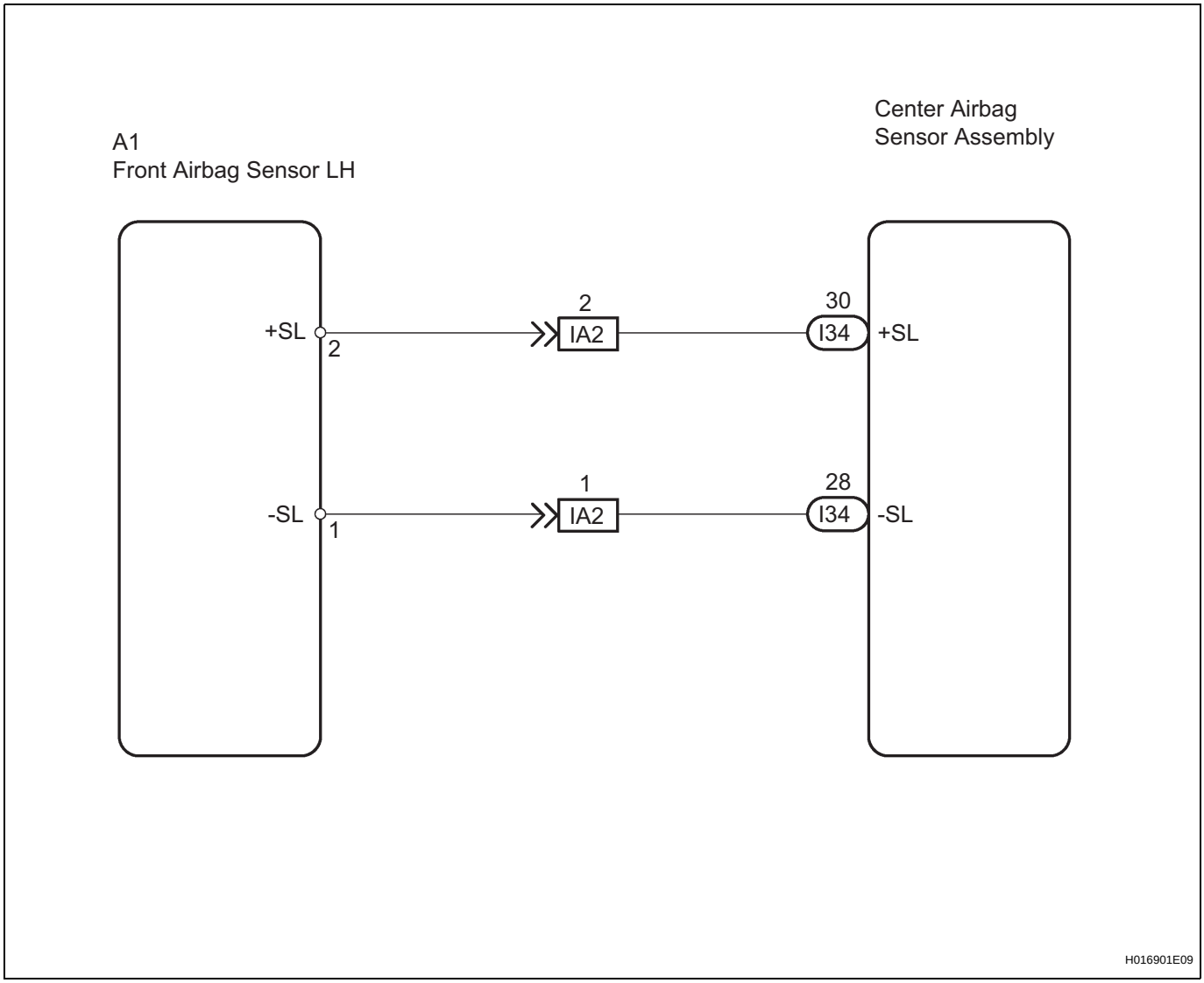
DTC	B1615/14	Front Airbag Sensor LH Malfunction

DESCRIPTION

The front airbag sensor LH consists of the diagnostic circuit and the frontal deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the frontal deceleration sensor, it determines whether the SRS should be activated.
DTC B1615/14 is recorded when a malfunction is detected in the front airbag sensor LH circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1615/14	• Front airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Front airbag sensor LH • Center airbag sensor assembly

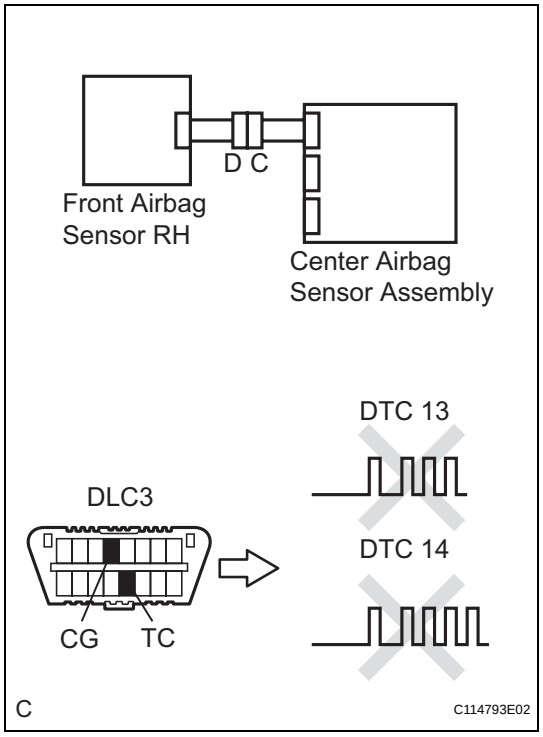
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK FRONT AIRBAG SENSOR LH



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Interchange the front airbag sensor RH with LH and connect the connectors to them.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in the memory (See page RS-41).
(g) Turn the ignition switch off.
(h) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(i) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1615/14 is output.	A
DTC B1610/13 is output.	B
DTC B1610/13 and B1615/14 are not output.	C

HINT:
Codes other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.

A → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

B → **REPLACE FRONT AIRBAG SENSOR LH (See page RS-446)**

C

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

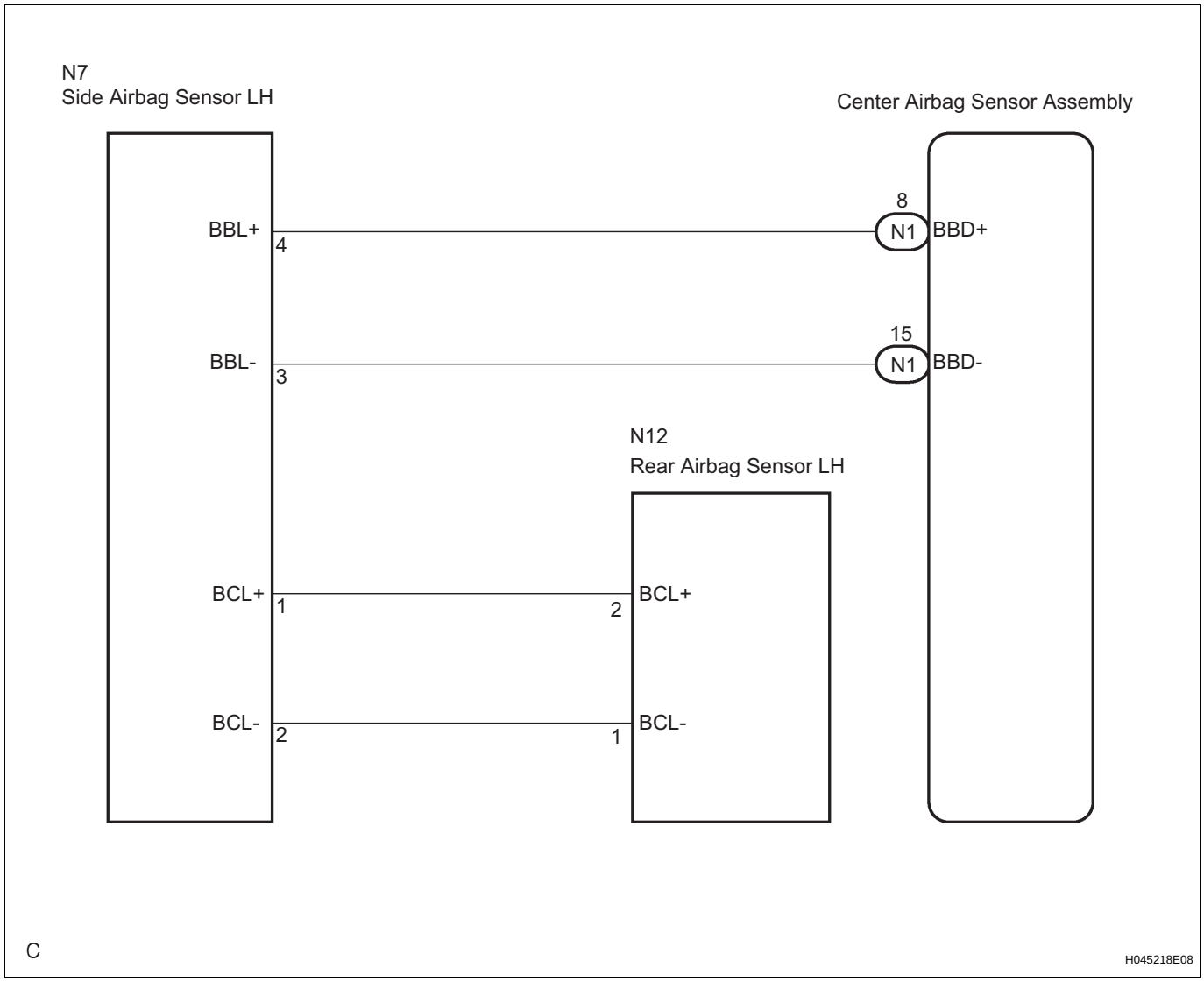
DTC	B1620/21	Driver Side - Side Airbag Sensor Malfunction

DESCRIPTION

The side airbag sensor LH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1620/21 is recorded when a malfunction is detected in the driver side - side airbag sensor circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1620/21	• Side airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Side airbag sensor LH • Center airbag sensor assembly

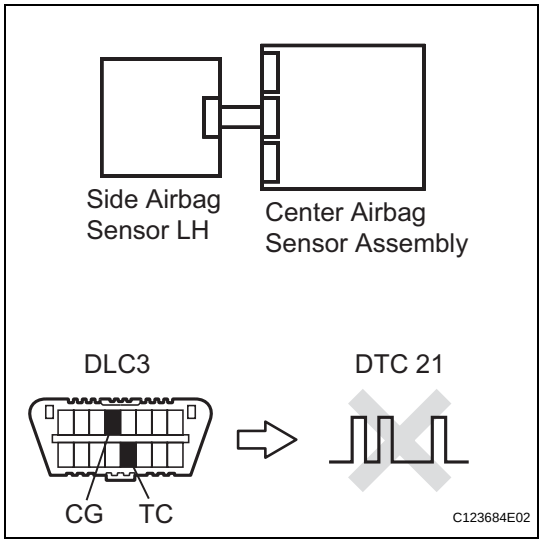
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1 CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the ignition switch off.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).
OK:
DTC B1620/21 is not output.
HINT:
Codes other than DTC B1620/21 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

2 CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

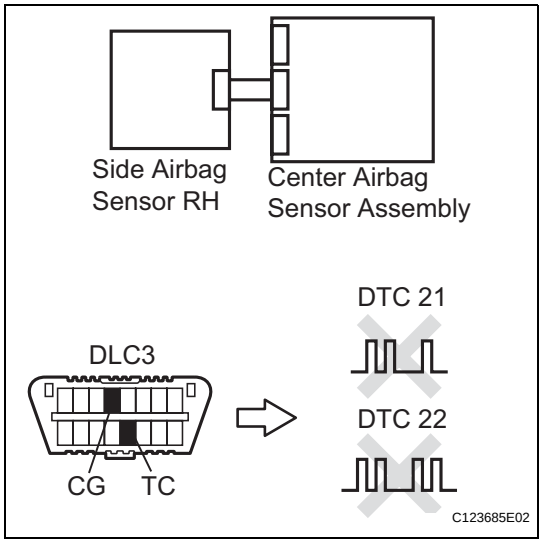
(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the side airbag sensor LH is equal to the number of the other side.
OK:
Those numbers are the same.

NG → **Go to step 4**

OK

RS

3 CHECK SIDE AIRBAG SENSOR LH



(a) Interchange the side airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1620/21 is output.	A
DTC B1625/22 is output.	B
DTC B1620/21 and B1625/22 are not output.	C

HINT:
Codes other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor RH and LH to their original positions and connect the connectors to them.

RS

A → **Go to step 5**

B → **REPLACE SIDE AIRBAG SENSOR LH (See page RS-449)**

C

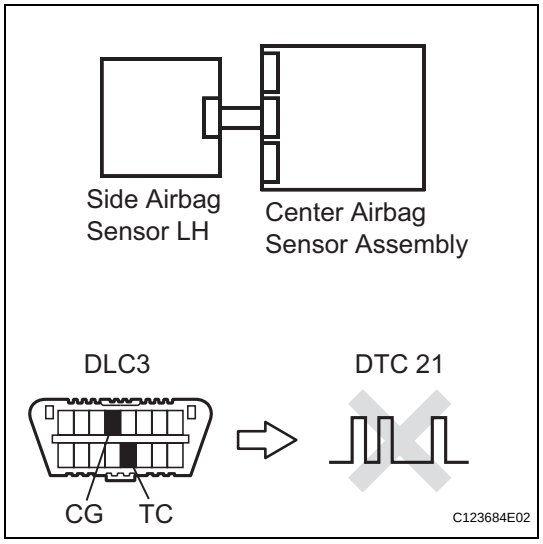
USE SIMULATION METHOD TO CHECK (See page RS-32)

4 REPLACE SIDE AIRBAG SENSOR LH

(a) Replace the side airbag sensor LH (See page RS-449).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1620/21 is not output.

HINT:

Codes other than DTC B1620/21 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

DTC	B1622/81	Lost Communication with Driver Side - Side Airbag Sensor Assembly
DTC	B1623/81	Driver Side - Side Airbag Sensor Assembly Initialization Incomplete
DTC	B1632/81	Lost Communication with Driver Side Rear Airbag Sensor
DTC	B1633/81	Driver Side Rear Airbag Sensor Initialization Incomplete
DTC	B1642/81	Lost Communication with Driver Side Satellite Sensor Bus
DTC	B1643/81	Driver Side Satellite Sensor Bus Initialization Incomplete

DESCRIPTION

The circuit for the side collision sensor LH (to determine deployment of the front seat side airbag assembly LH and curtain shield airbag assembly LH) is composed of the center airbag sensor assembly, side airbag sensor LH, and rear airbag sensor LH.

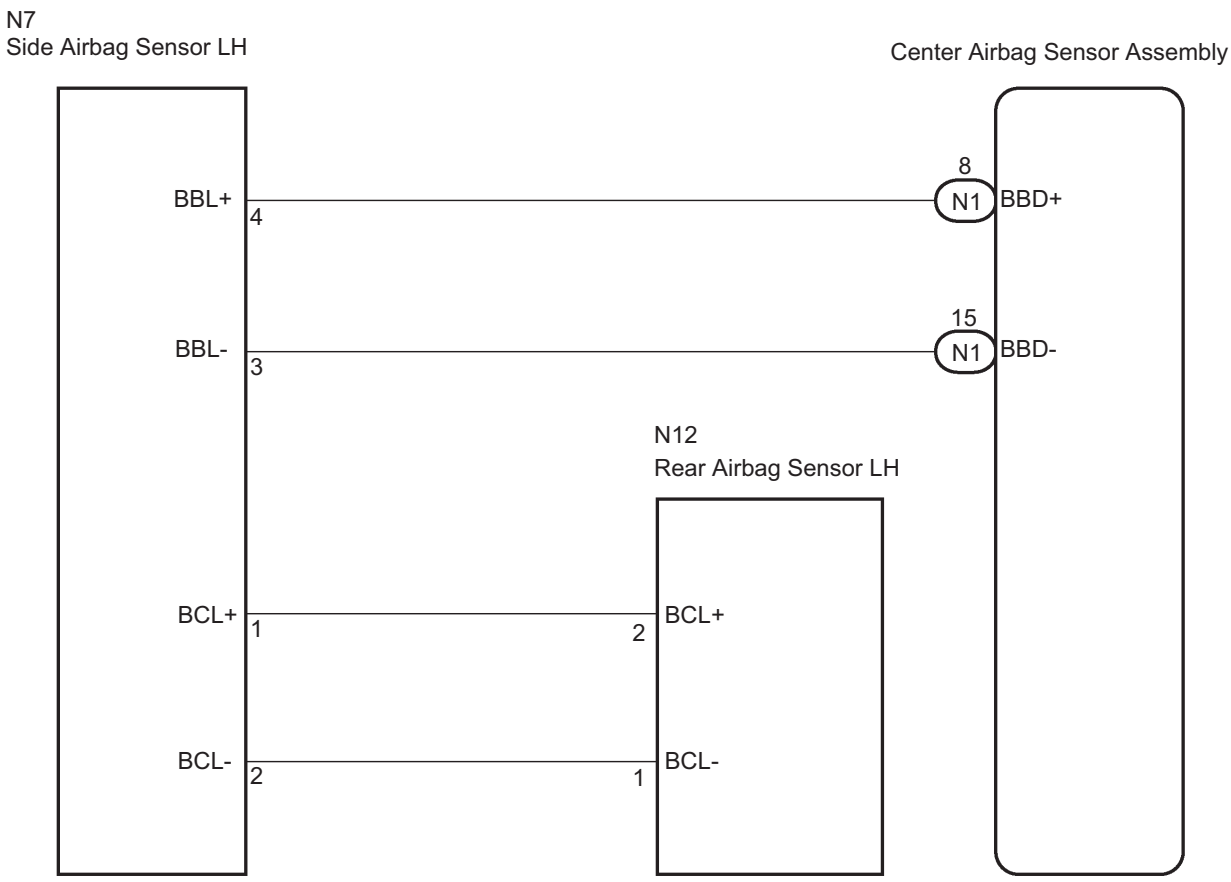
RS

The side airbag sensor LH and rear airbag sensor LH detect impacts to the vehicle and send signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1622/81, B1623/81, B1632/81, B1633/81, B1642/81, or B1643/81 is recorded when a malfunction is detected in the circuit for the side collision sensor LH (to determine deployment of the front seat side airbag assembly LH and curtain shield airbag assembly LH).

DTC No.	DTC Detecting Condition	Trouble Area
1622/81 1623/81 1632/81 1633/81 1642/81 1643/81	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the circuit for the side collision sensor LH (to determine deployment of the front seat side airbag assembly LH and curtain shield airbag assembly LH) for 2 seconds. • Side airbag sensor LH malfunction • Rear airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Floor wire • Side airbag sensor LH • Rear airbag sensor LH • Center airbag sensor assembly

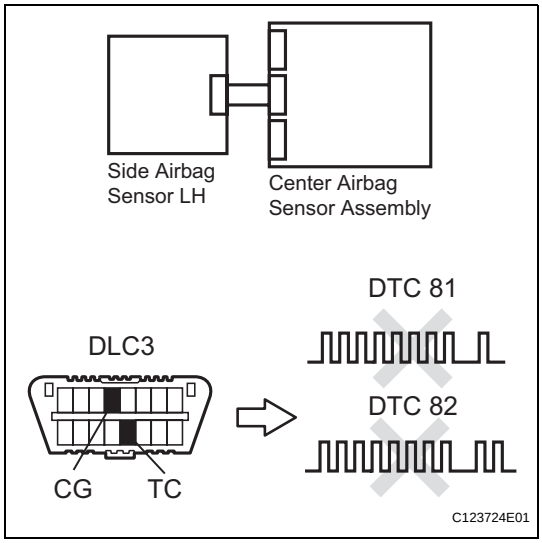
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK PRESENT DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Turn the ignition switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the ignition switch off and then on (IG) again.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Check the present DTCs (See page RS-41).
Result

Result	Proceed to
Present DTC B1623, B1633, B1643, or 81 is output.	A
Present DTC B1628, B1638, B1648, or 82 is output.	B
Present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the ignition switch off and then on (IG) again.
- Codes other than present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

RS

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

2	CHECK PAST DTC

(a) Check the past DTCs (See page RS-41).
Result

Result	Proceed to
• Past DTC B1632, B1642, or 81 is output. • Past DTC B1622, B1632, B1642, or 81 is not output.	A
Past DTC B1622 is output.	B

HINT:
Codes other than past DTC B1622, B1632, B1642, or 81 may be output at this time, but they are not related to this check.

B → Go to step 20

A

3	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor LH.

OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

4	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor LH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor LH side) are not damaged.

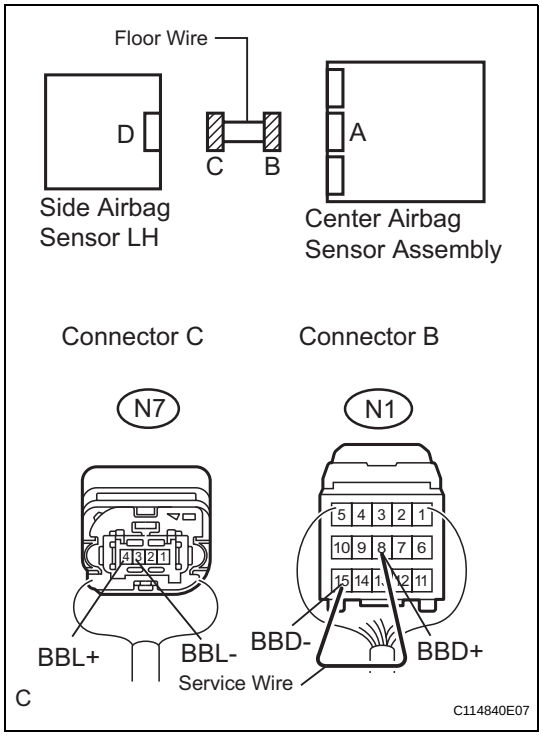
OK:

The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

5 CHECK FLOOR WIRE (OPEN)



(a) Using a service wire, connect terminals 8 (BBD+) and 15 (BBD-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

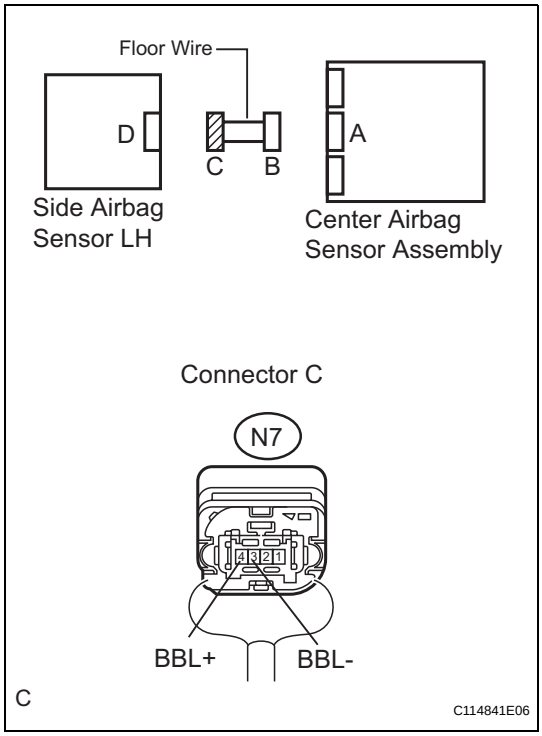
Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

6 CHECK FLOOR WIRE (SHORT)



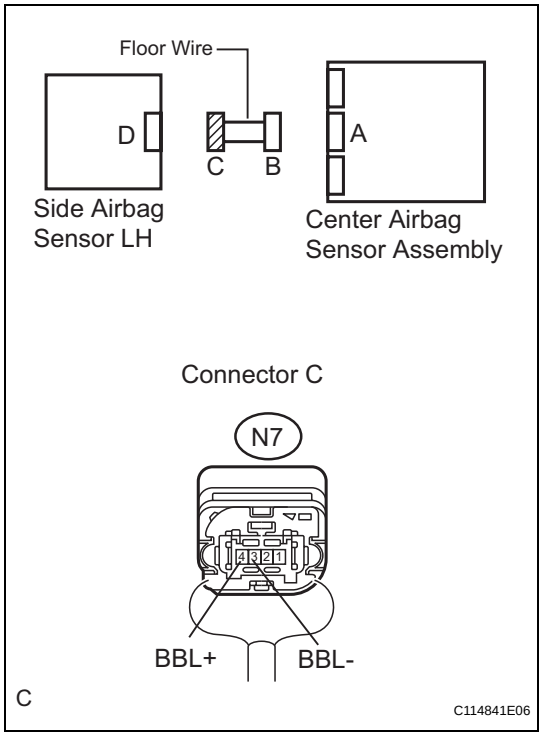
(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

7 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

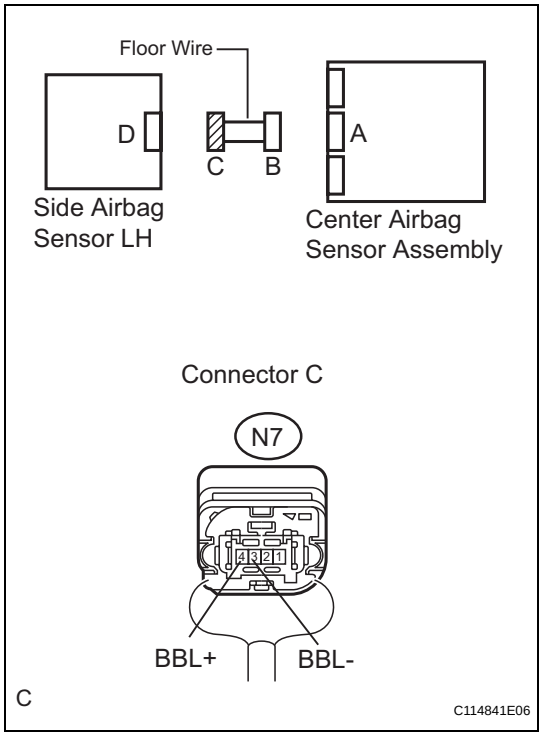
Standard voltage

Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Ignition switch on (IG)	Below 1 V
N7-3 (BBL-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

8 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Always	1 MΩ or higher
N7-3 (BBL-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

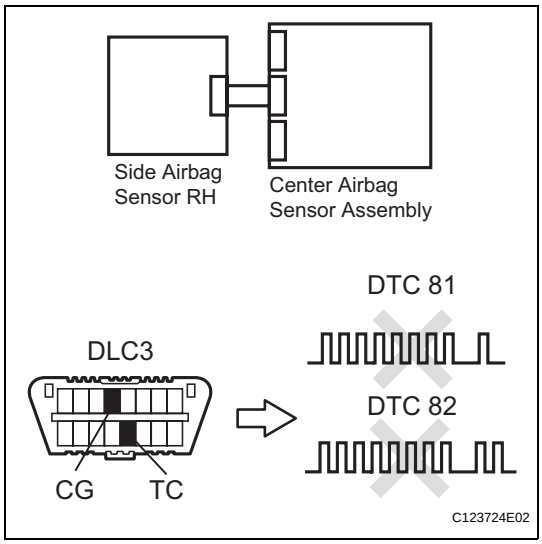
9	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor LH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor LH.

NG → **Go to step 11**

OK

10	CHECK SIDE AIRBAG SENSOR LH



(a) Interchange the side airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1623, B1633, B1643, or 81 is output.	A
DTC B1628, B1638, B1648, or 82 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor RH and LH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR LH (See page RS-449)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

11	CHECK CONNECTION OF CONNECTOR

(a) Check that the connector is properly connected to the rear airbag sensor LH.

RS

OK:
The connector is properly connected.

NG → **CONNECT CONNECTOR PROPERLY**

OK

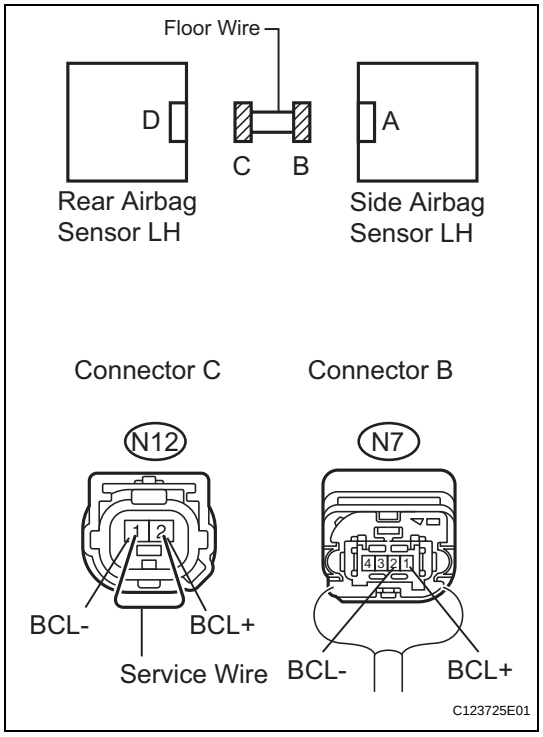
12 CHECK CONNECTOR

(a) Disconnect the connectors from the side airbag sensor LH and rear airbag sensor LH.
(b) Check that the connector (on the rear airbag sensor LH side) is not damaged.
OK:
The connector is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

13 CHECK FLOOR WIRE (OPEN)



(a) Using a service wire, connect terminals 2 (BCL+) and 1 (BCL-) of connector C.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

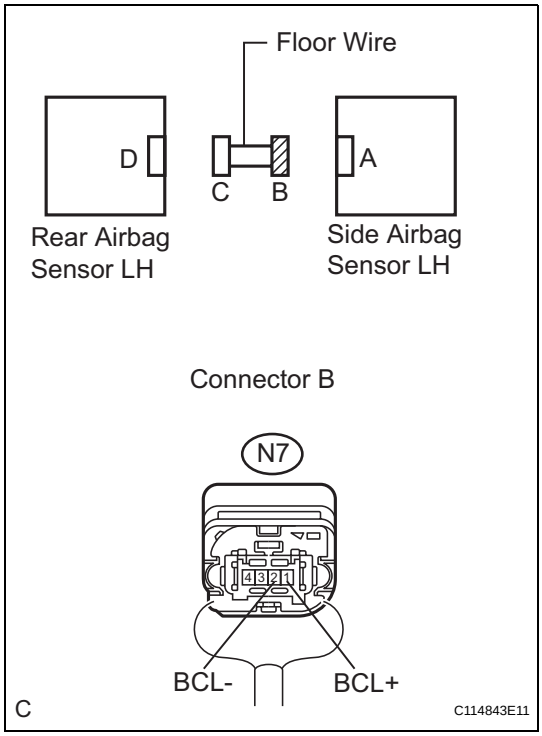
Tester connection	Condition	Specified condition
N7-1 (BCL+) - N7-2 (BCL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

14 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

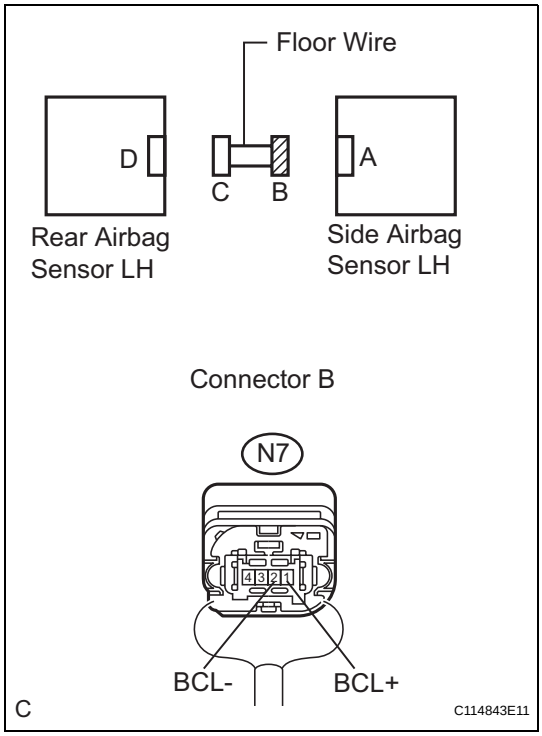
Tester connection	Condition	Specified condition
N7-1 (BCL+) - N7-2 (BCL-)	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

15 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

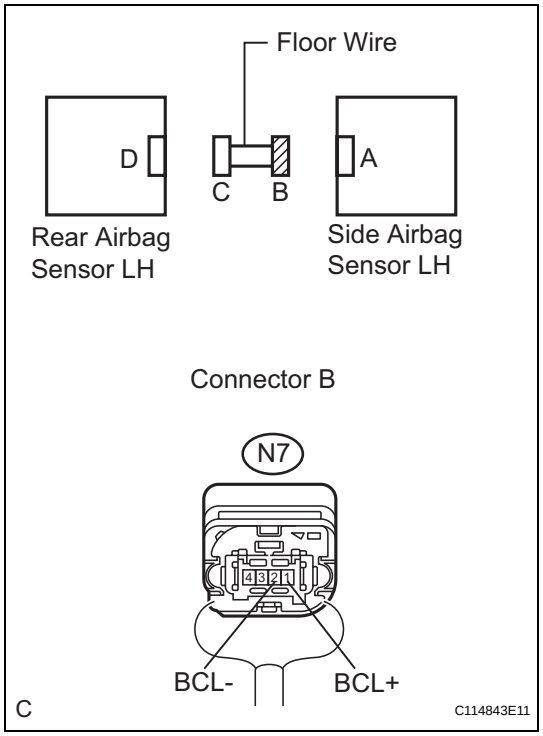
Standard voltage

Tester connection	Condition	Specified condition
N7-1 (BCL+) - Body ground	Ignition switch on (IG)	Below 1 V
N7-2 (BCL-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

16 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
N7-1 (BCL+) - Body ground	Always	1 MΩ or higher
N7-2 (BCL-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

17 CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

(a) Check that the part number of the rear airbag sensor LH is equal to the number of the other side.

OK:

Those numbers are the same.

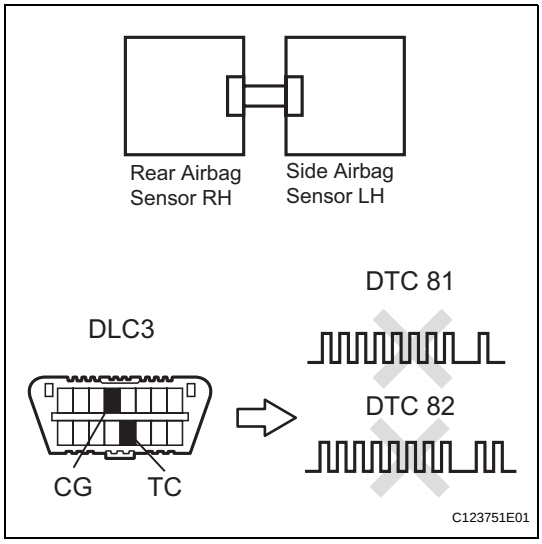
(b) Connect the connectors to the side airbag sensor LH and the rear airbag sensor LH.

NG → **Go to step 19**

OK

RS

18 CHECK REAR AIRBAG SENSOR LH



(a) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1623, B1633, B1643, or 81 is output.	A
DTC B1628, B1638, B1648, or 82 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor RH and LH to their original positions and connect the connectors to them.

B → **REPLACE REAR AIRBAG SENSOR LH (See page RS-455)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

19 CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1623, B1633, B1643, or 81 is not output.

RS

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

20	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor LH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

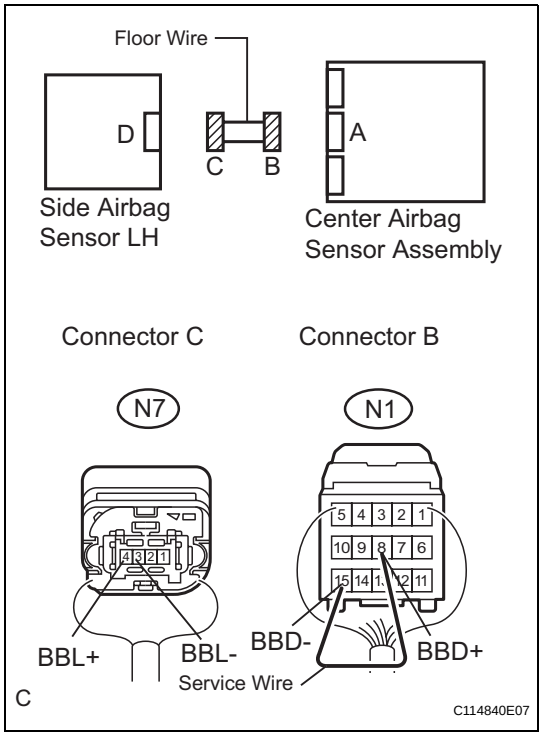
21	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor LH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor LH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

22 CHECK FLOOR WIRE (OPEN)



(a) Using a service wire, connect terminals 8 (BBD+) and 15 (BBD-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

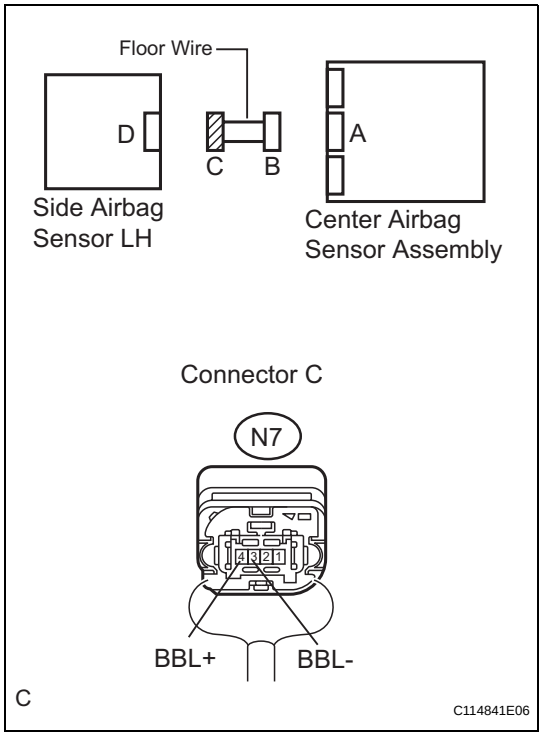
Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

23 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector B.

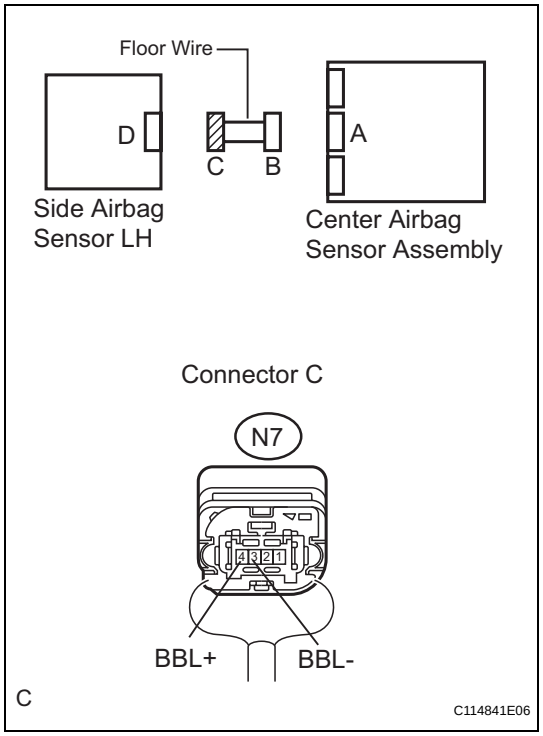
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - N7-3 (BBL-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

24 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

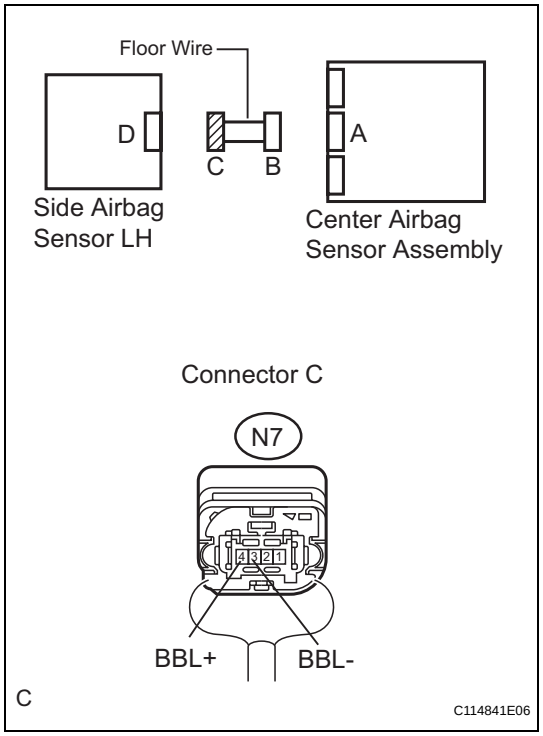
Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Ignition switch on (IG)	Below 1 V
N7-3 (BBL-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

25 CHECK FLOOR WIRE (SHORT TO GROUND)

RS



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
N7-4 (BBL+) - Body ground	Always	1 MΩ or higher
N7-3 (BBL-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

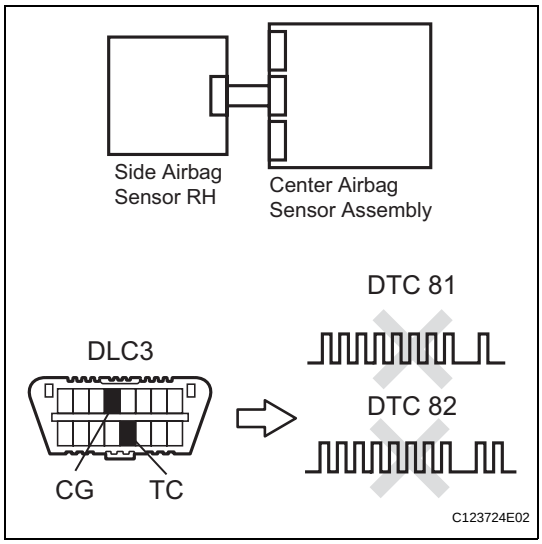
26	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor LH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor LH.

NG → **Go to step 28**

OK

27	CHECK SIDE AIRBAG SENSOR LH



(a) Interchange the side airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1623, B1633, B1643, or 81 is output.	A
DTC B1628, B1638, B1648, or 82 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor RH and LH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR LH (See page RS-449)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

28	CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.

RS

(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).
OK:
DTC B1623, B1633, B1643, or 81 is not output.
HINT:
Codes other than DTC B1623, B1633, B1643, or 81 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

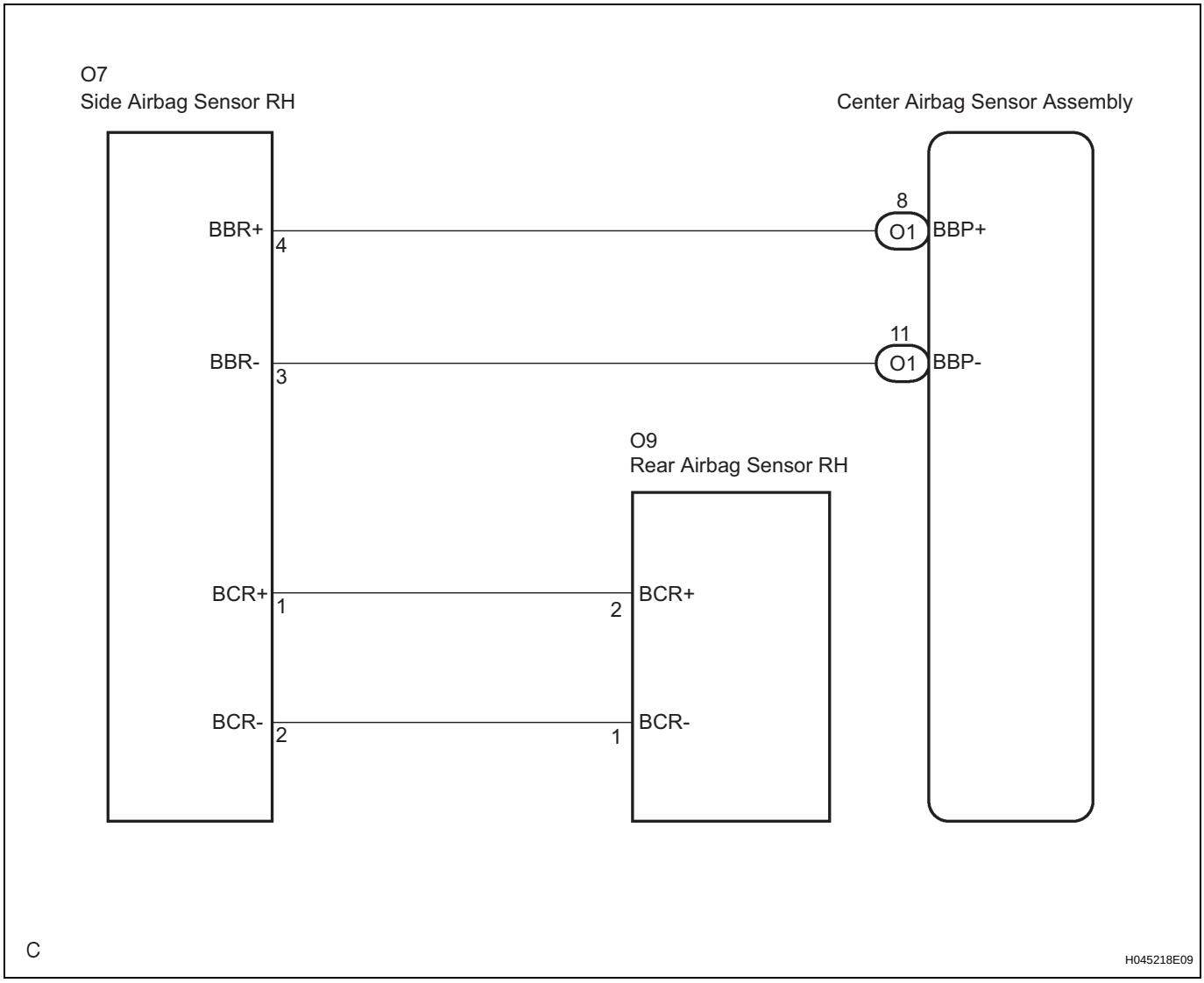
DTC	B1625/22	Front Passenger Side - Side Airbag Sensor Malfunction

DESCRIPTION

The side airbag sensor RH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1625/22 is recorded when a malfunction is detected in the front passenger side - side airbag sensor circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1625/22	• Side airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Side airbag sensor RH • Center airbag sensor assembly

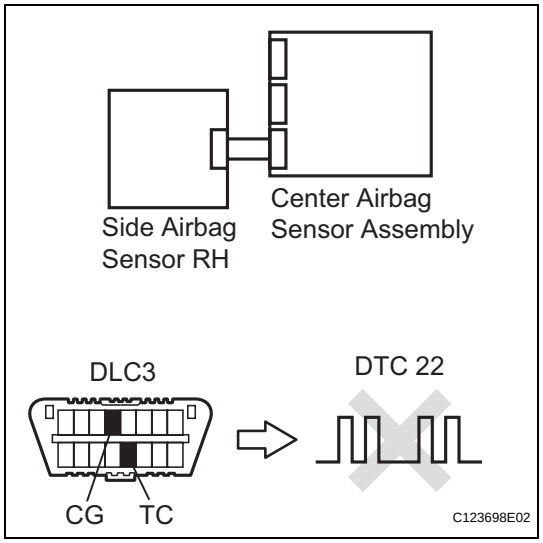
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the ignition switch off.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).

OK:

DTC B1625/22 is not output.

HINT:

Codes other than DTC B1625/22 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

2	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the side airbag sensor RH is equal to the number of the other side.

OK:

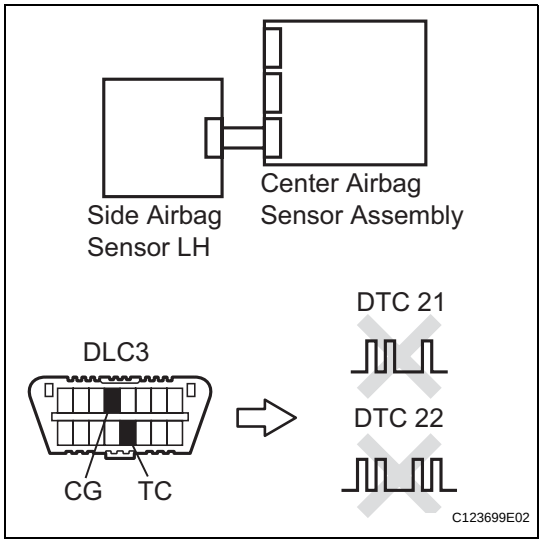
Those numbers are the same.

NG → **Go to step 4**

OK

RS

3 CHECK SIDE AIRBAG SENSOR RH



(a) Connect the connectors to the center airbag sensor assembly.
(b) Interchange the side airbag sensor LH with RH and connect the connectors to them.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Clear the DTCs stored in the memory (See page RS-41).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1625/22 is output.	A
DTC B1620/21 is output.	B
DTC B1620/21 and B1625/22 are not output.	C

HINT:
Codes other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.

(i) Turn the ignition switch off.
(j) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(k) Return the side airbag sensor LH and RH to their original positions and connect the connectors to them.

RS

A → **Go to step 5**

B → **REPLACE SIDE AIRBAG SENSOR RH (See page RS-449)**

C

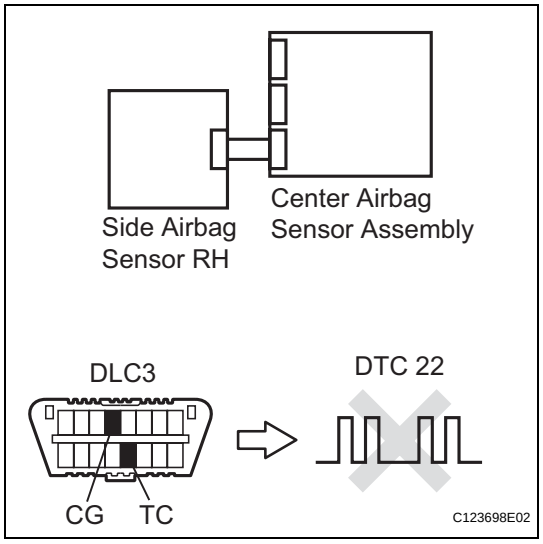
USE SIMULATION METHOD TO CHECK (See page RS-32)

4 REPLACE SIDE AIRBAG SENSOR RH

(a) Replace the side airbag sensor RH (See page RS-449).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1625/22 is not output.

HINT:

Codes other than DTC B1625/22 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	**B1627/82**	**Lost Communication with Front Passenger Side - Side Airbag Sensor Assembly**

DTC	**B1628/82**	**Front Passenger Side - Side Airbag Sensor Assembly Initialization Incomplete**

DTC	**B1637/82**	**Lost Communication with Passenger Side Rear Airbag Sensor**

DTC	**B1638/82**	**Passenger Side Rear Airbag Sensor Initialization Incomplete**

DTC	**B1647/82**	**Lost Communication with Front Passenger Side Satellite Sensor Bus**

DTC	**B1648/82**	**Front Passenger Side Satellite Sensor Bus Initialization Incomplete**

DESCRIPTION

The circuit for the side collision sensor RH (to determine deployment of the front seat side airbag assembly RH and curtain shield airbag assembly RH) is composed of the center airbag sensor assembly, side airbag sensor RH, and rear airbag sensor RH.

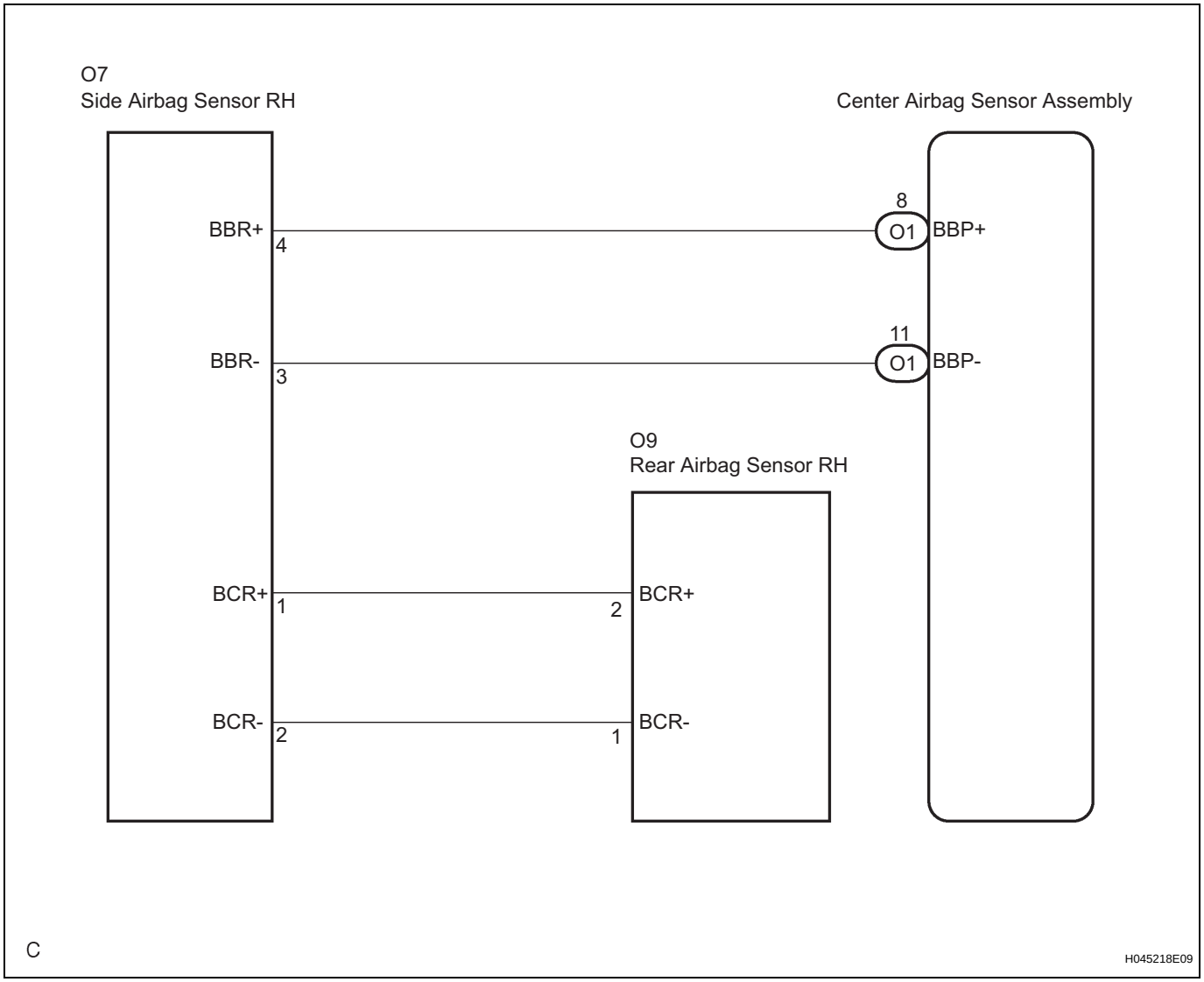
RS

The side airbag sensor RH and rear airbag sensor RH detect impacts to the vehicle and send signals to the center airbag sensor assembly to determine if the airbag should be deployed.

DTC B1627/82, B1628/82, B1637/82, B1638/82, B1647/82, or B1648/82 is recorded when a malfunction is detected in the circuit for the side collision sensor RH.

DTC No.	DTC Detecting Condition	Trouble Area
B1627/82 B1628/82 B1637/82 B1638/82 B1647/82 B1648/82	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the circuit for the side collision sensor RH (to determine deployment of the front seat side airbag assembly RH and curtain shield airbag assembly RH) for 2 seconds. • Side airbag sensor RH malfunction • Rear airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Side airbag sensor RH • Rear airbag sensor RH • Center airbag sensor assembly

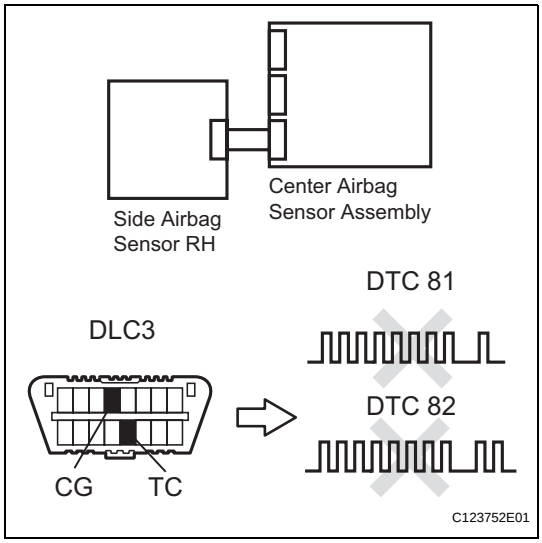
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Turn the ignition switch off.
HINT:
If a communication error occurs, DTCs for both the LH and RH sides will be stored simultaneously. To identify the malfunctioning area, turn the ignition switch off and then on (IG) again.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Check the present DTCs (See page RS-41).
Result

Result	Proceed to
Present DTC B1628, B1638, B1648, or 82 is output.	A
Present DTC B1623, B1633 B1643, or 81 is output.	B
Present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
- DTCs indicating communication errors will be changed to DTCs indicating errors in initialization by turning the ignition switch off and then on (IG) again.
- Codes other than present DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

2	CHECK PAST DTC

(a) Check the past DTCs (See page RS-41).
Result

Result	Proceed to
• Past DTC B1637, B1647, or 82 is output. • Past DTC B1627, B1637, B1647, or 82 is not output.	A
Past DTC B1627 is output.	B

HINT:
Codes other than past DTC B1627, B1637, B1647, or 82 may be output at this time, but they are not related to this check.

RS

B → Go to step 20

A

3	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor RH.

OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

4	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor RH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor RH side) are not damaged.

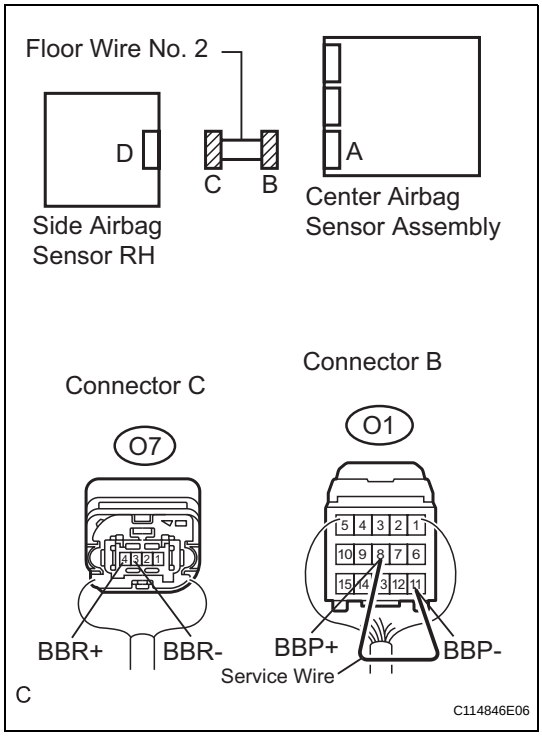
OK:

The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

5 CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Using a service wire, connect terminals 8 (BBP+) and 11 (BBP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

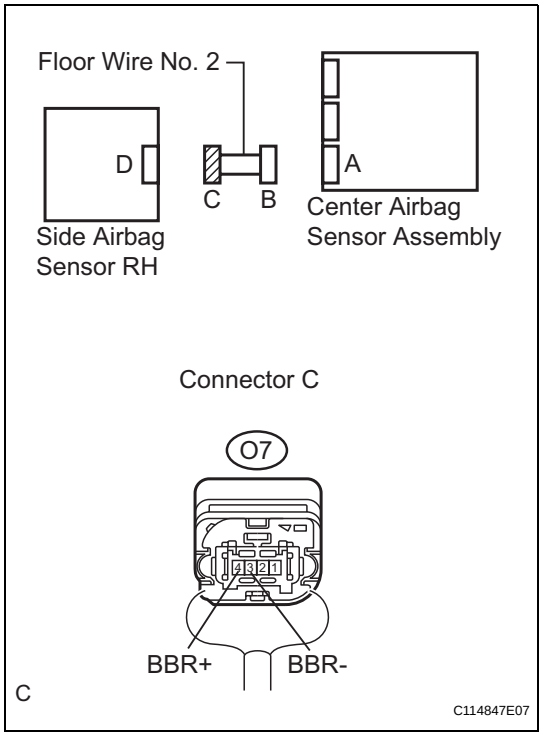
Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

6 CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector B.

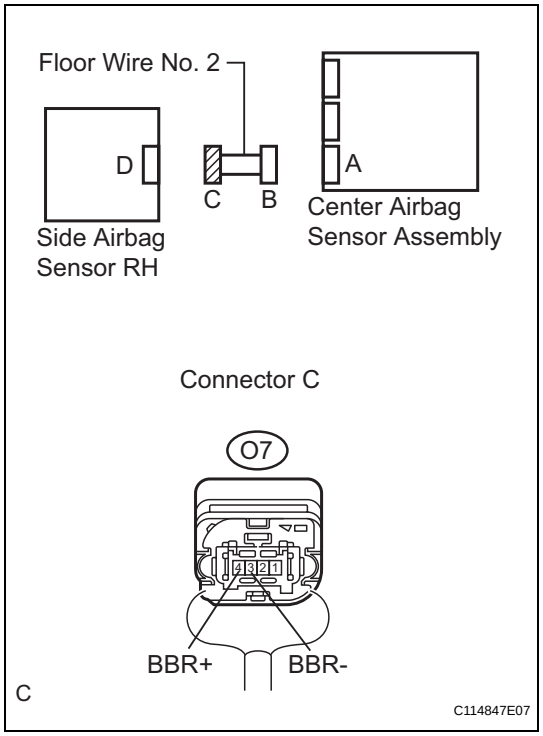
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

7 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

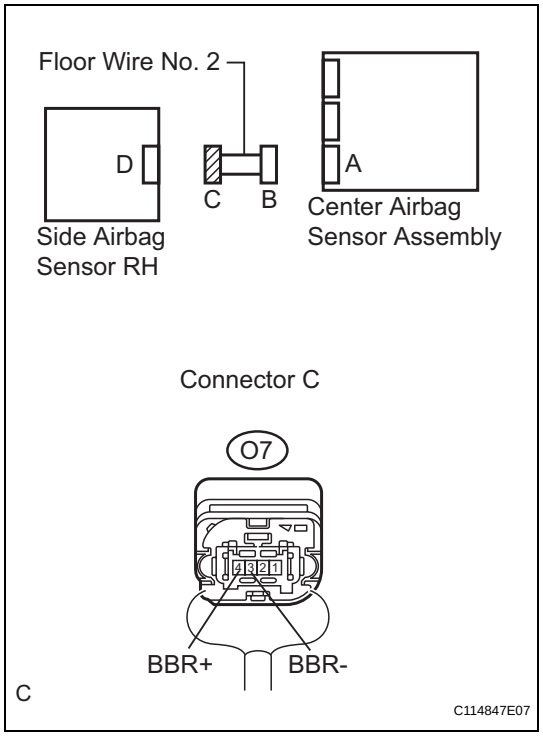
Standard voltage

Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Ignition switch on (IG)	Below 1 V
O7-3 (BBR-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

8 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Always	1 MΩ or higher
O7-3 (BBR-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

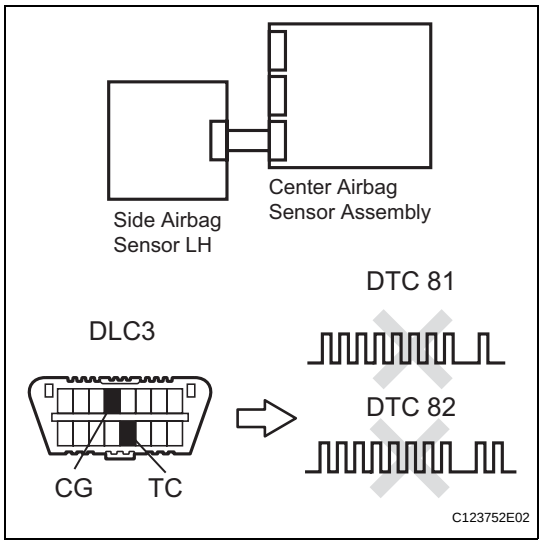
9	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor RH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor RH.

NG → **Go to step 11**

OK

10	CHECK SIDE AIRBAG SENSOR RH



(a) Interchange the side airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1628, B1638, B1648, or 82 is output.	A
DTC B1623, B1633, B1643, or 81 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor LH and RH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR RH (See page RS-449)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

11	CHECK CONNECTION OF CONNECTOR

(a) Check that the connector is properly connected to the rear airbag sensor RH.
OK:
The connector is properly connected.

RS

NG → CONNECT CONNECTOR PROPERLY

OK

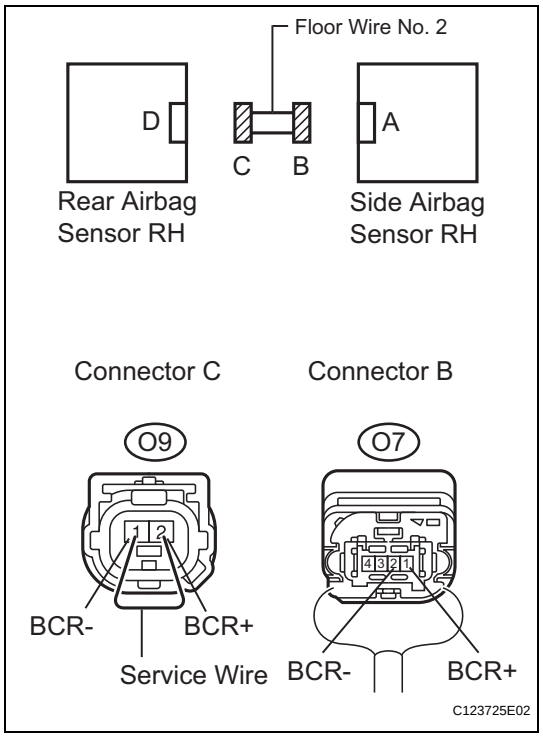
12 CHECK CONNECTOR

(a) Disconnect the connectors from the side airbag sensor RH and rear airbag sensor RH.
(b) Check that the connector (on the rear airbag sensor RH side) is not damaged.
OK:
The connector is not deformed or damaged.

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

13 CHECK FLOOR WIRE NO. 2 (OPEN)



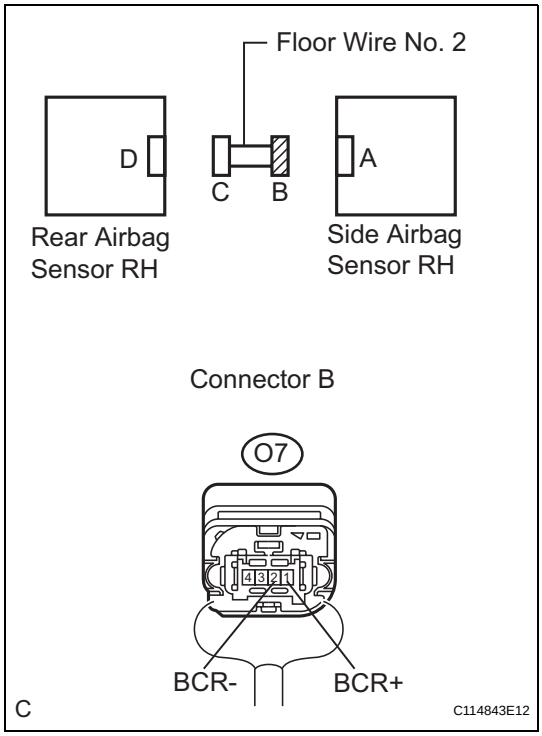
(a) Using a service wire, connect terminals 2 (BCR+) and 1 (BCR-) of connector C.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O7-2 (BCR-) - O7-1 (BCR+)	Always	Below 1 Ω

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

14 CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

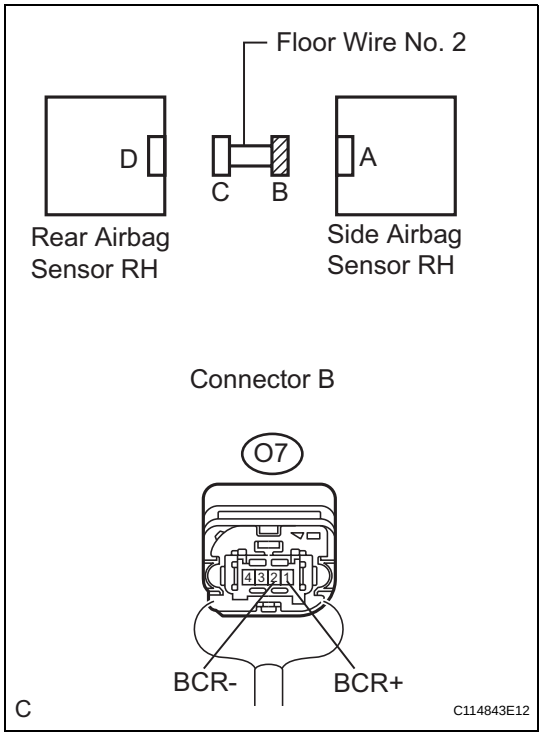
Tester connection	Condition	Specified condition
O7-1 (BCR+) - O7-2 (BCR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

15 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

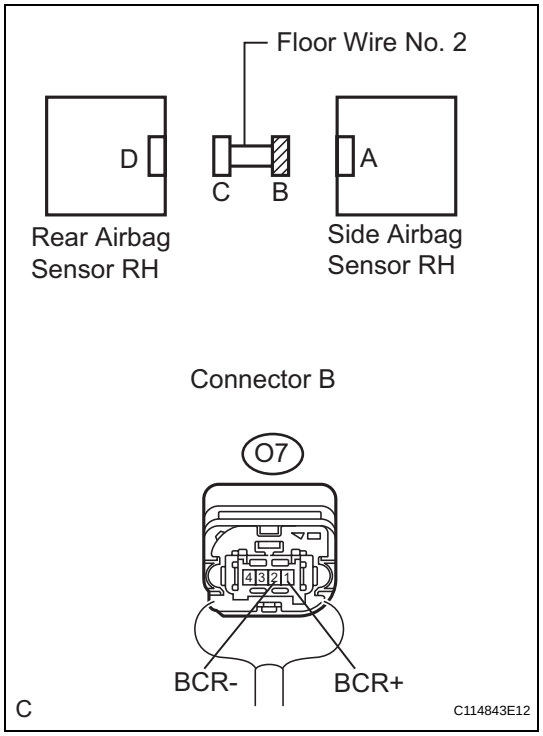
Standard voltage

Tester connection	Condition	Specified condition
O7-1 (BCR+) - Body ground	Ignition switch on (IG)	Below 1 V
O7-2 (BCR-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

16 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O7-1 (BCR+) - Body ground	Always	1 MΩ or higher
O7-2 (BCR-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

17 CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

(a) Check that the part number of the rear airbag sensor RH is equal to the number of the other side.

OK:

Those numbers are the same.

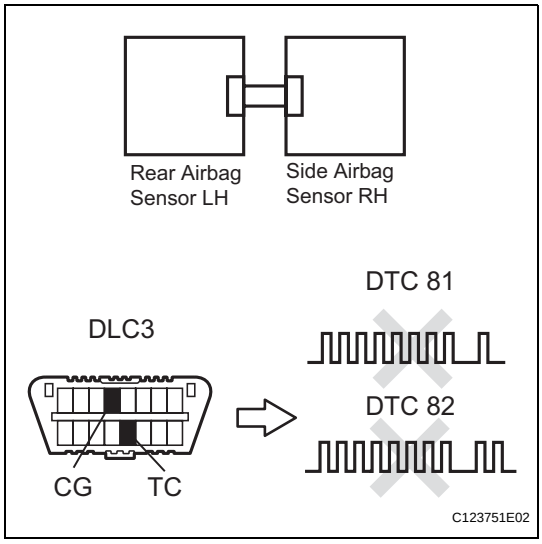
(b) Connect the connectors to the side airbag sensor RH and the rear airbag sensor RH.

NG → **Go to step 19**

OK

RS

18 CHECK REAR AIRBAG SENSOR RH



(a) Interchange the side airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1628, B1638, B1648, or 82 is output.	A
DTC B1623, B1633, B1643, or 81 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

HINT:
Codes other than DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor LH and RH to their original positions and connect the connectors to them.

B → **REPLACE REAR AIRBAG SENSOR RH (See page RS-455)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

19 CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1628, B1638, B1648, or 82 is not output.

RS

HINT:
Codes other than DTC B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

20	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the side airbag sensor RH.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

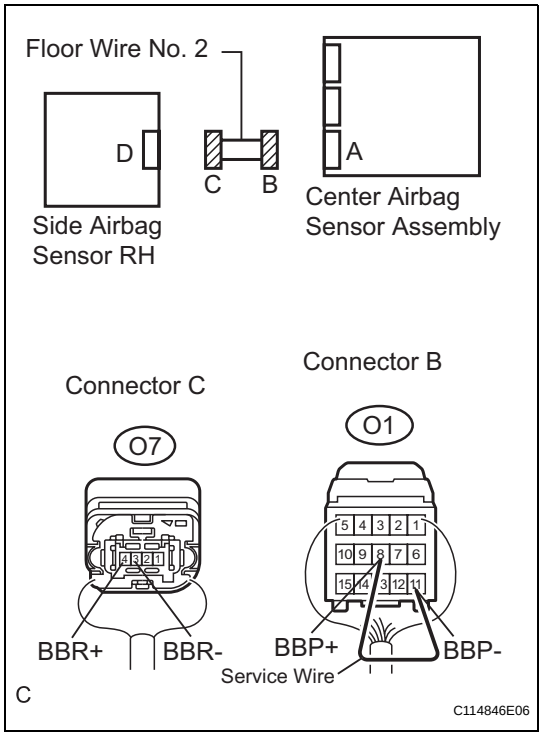
21	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and side airbag sensor RH.
(b) Check that the connectors (on the center airbag sensor assembly side and side airbag sensor RH side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

22 CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Using a service wire, connect terminals 8 (BBP+) and 11 (BBP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

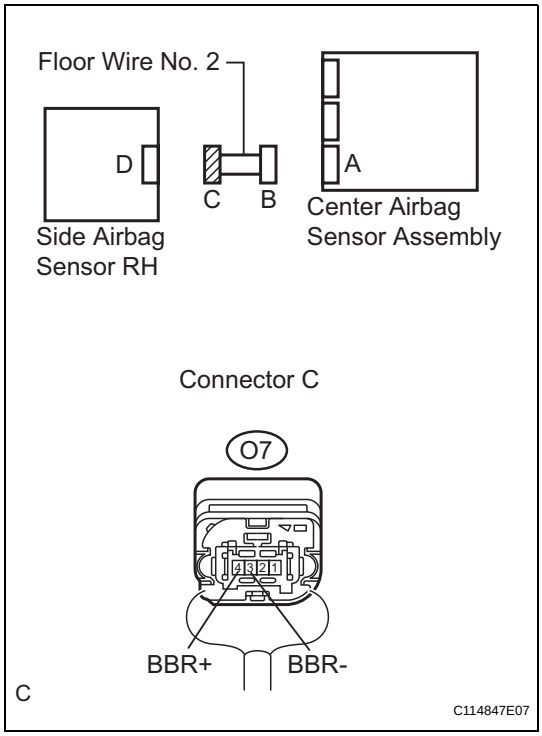
Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

23 CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector B.

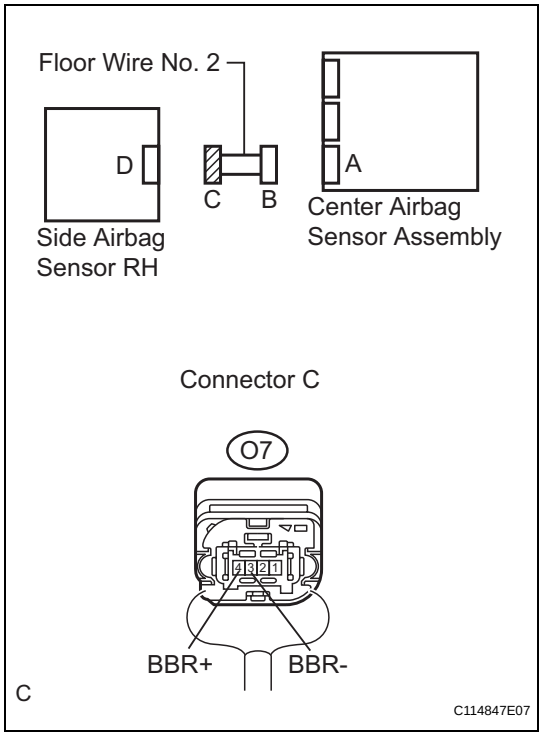
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - O7-3 (BBR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

24 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

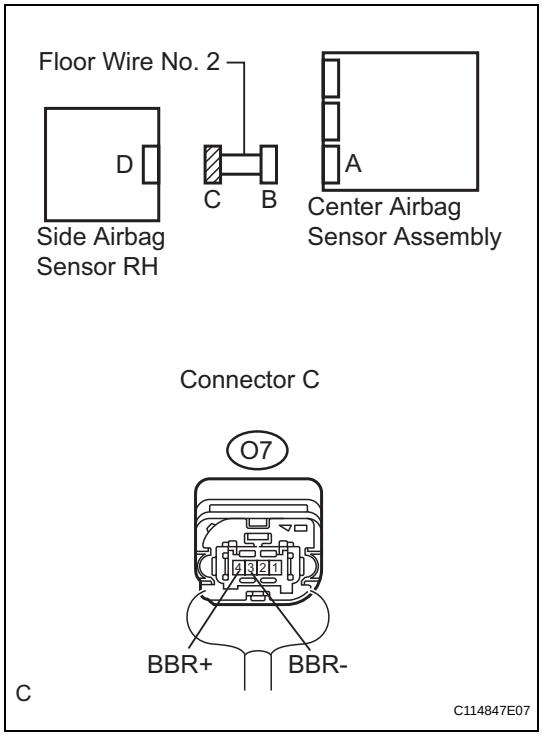
Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Ignition switch on (IG)	Below 1 V
O7-3 (BBR-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

25 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)

RS



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O7-4 (BBR+) - Body ground	Always	1 MΩ or higher
O7-3 (BBR-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

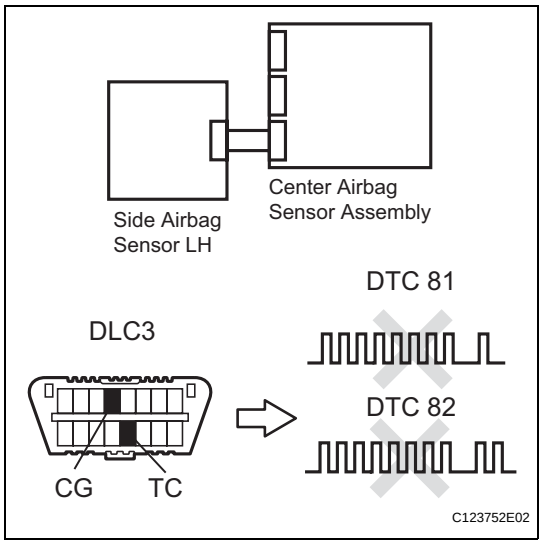
26	CONFIRM PART NUMBER OF SIDE AIRBAG SENSOR

(a) Check that the part number of the side airbag sensor RH is equal to the number of the other side.
OK:
Those numbers are the same.
(b) Connect the connectors to the center airbag sensor assembly and the side airbag sensor RH.

NG → **Go to step 28**

OK

27	CHECK SIDE AIRBAG SENSOR RH



(a) Interchange the side airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
Result

Result	Proceed to
DTC B1628, B1638, B1648, or 82 is output.	A
DTC B1623, B1633, B1643, or 81 is output.	B
DTC B1623, B1633, B1643, or 81 and B1628, B1638, B1648, or 82 are not output.	C

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the side airbag sensor LH and RH to their original positions and connect the connectors to them.

B → **REPLACE SIDE AIRBAG SENSOR RH (See page RS-449)**

C → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

A

28	CHECK CENTER AIRBAG SENSOR ASSEMBLY

(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.

(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).
OK:
DTC B1628, B1638, B1648, or 82 is not output.
HINT:
Codes other than DTC B1628, B1638, B1648, or 82 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

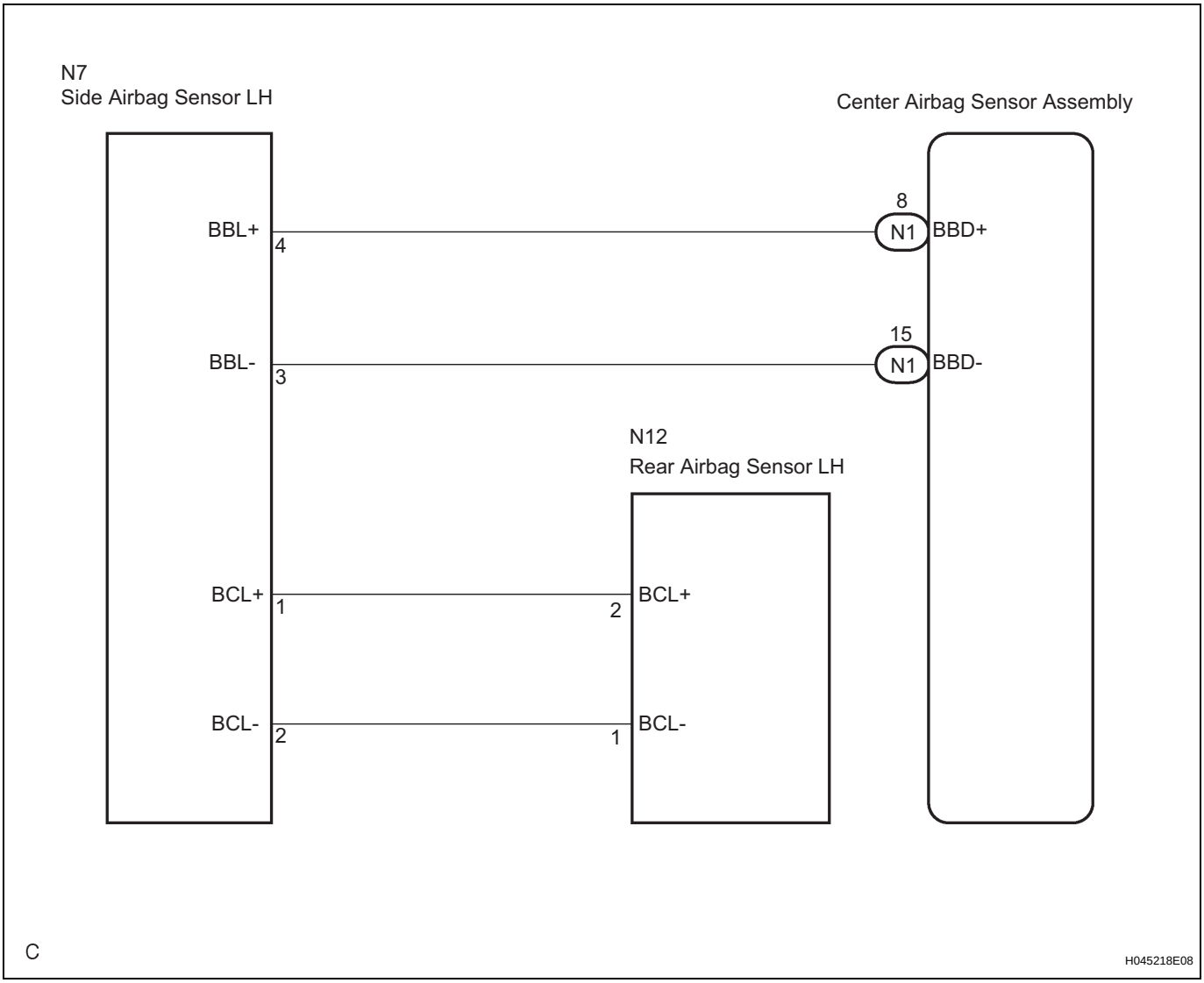
DTC	B1630/23	Driver Side Rear Airbag Sensor Malfunction

DESCRIPTION

The rear airbag sensor LH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1630/23 is recorded when a malfunction is detected in the driver side rear airbag sensor circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1630/23	• Rear airbag sensor LH malfunction • Center airbag sensor assembly malfunction	• Rear airbag sensor LH • Center airbag sensor assembly

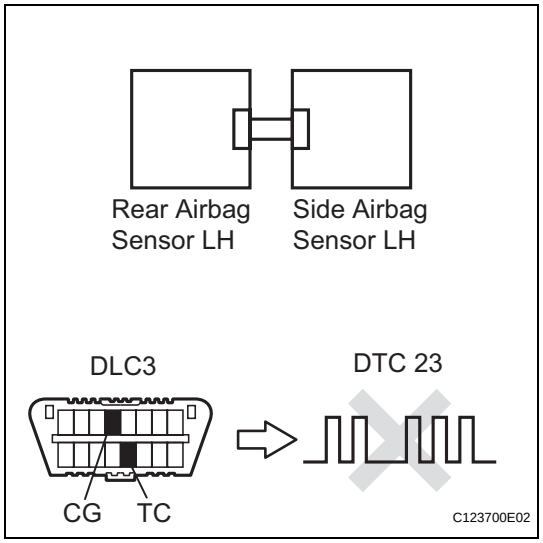
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the ignition switch off.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).
OK:
DTC B1630/23 is not output.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

2	CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

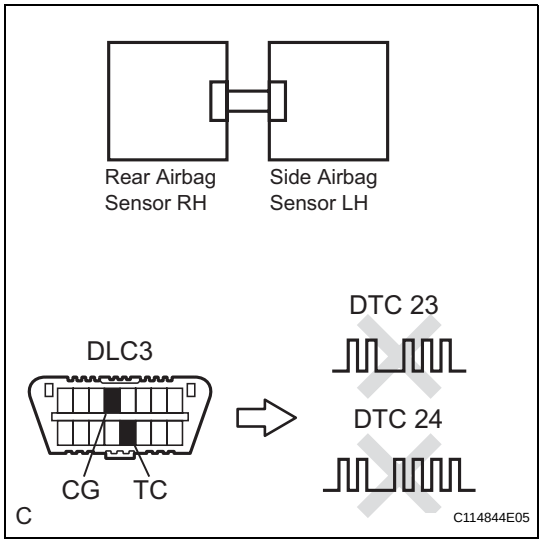
(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the rear airbag sensor LH is equal to the number of the other side.
OK:
Those numbers are the same.

NG → **Go to step 4**

OK

RS

3 CHECK REAR AIRBAG SENSOR LH



(a) Interchange the rear airbag sensor RH with LH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1630/23 is output.	A
DTC B1635/24 is output.	B
DTC B1630/23 and B1635/24 are not output.	C

HINT:
Codes other than DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor RH and LH to their original positions and connect the connectors to them.

RS

A → **Go to step 5**

B → **REPLACE REAR AIRBAG SENSOR LH (See page RS-455)**

C

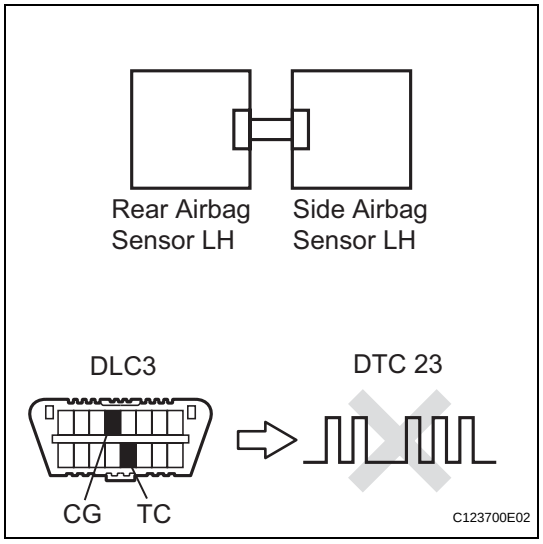
USE SIMULATION METHOD TO CHECK (See page RS-32)

4 REPLACE REAR AIRBAG SENSOR LH

(a) Replace the rear airbag sensor LH (See page RS-455).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1630/23 is not output.

HINT:

Codes other than DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

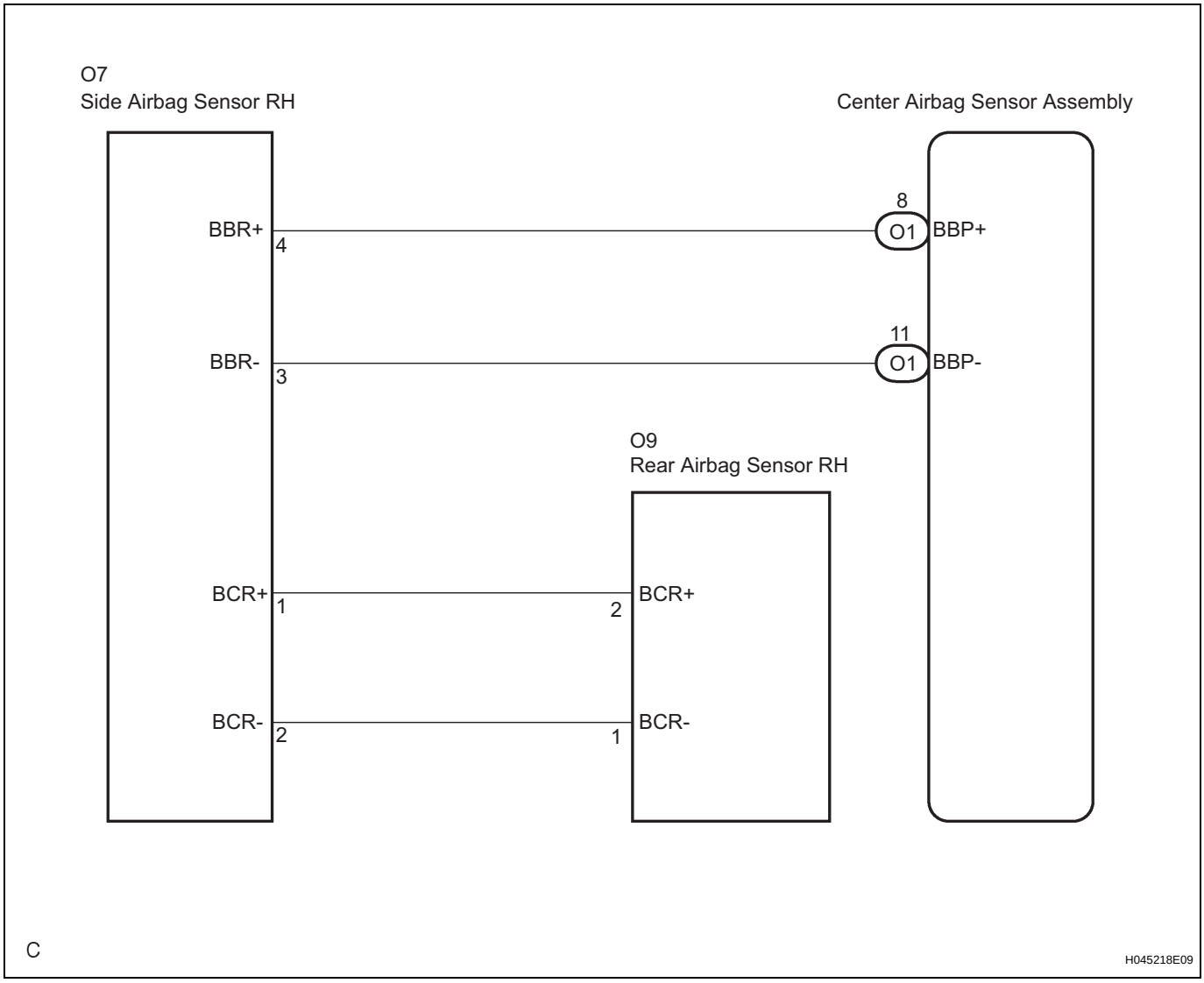
DTC	B1635/24	Front Passenger Side Rear Airbag Sensor Malfunction

DESCRIPTION

The rear airbag sensor RH consists of the safing sensor, the diagnostic circuit, the lateral deceleration sensor, etc.
If the center airbag sensor assembly receives signals from the lateral deceleration sensor, it determines whether the SRS should be activated.
DTC B1635/24 is recorded when a malfunction is detected in the front passenger side rear airbag sensor circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1635/24	• Rear airbag sensor RH malfunction • Center airbag sensor assembly malfunction	• Rear airbag sensor RH • Center airbag sensor assembly

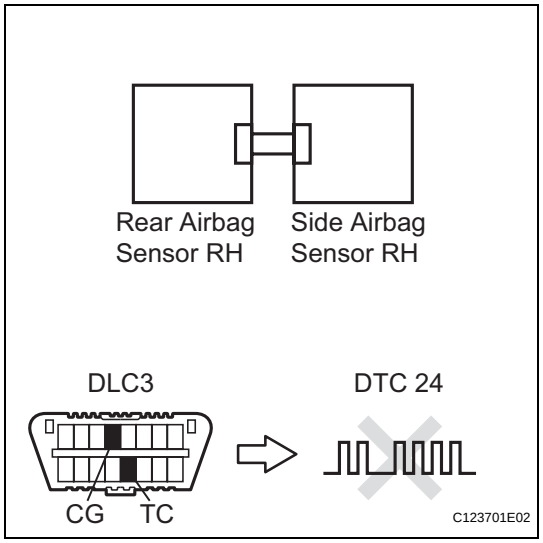
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the ignition switch off.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).
OK:
DTC B1635/24 is not output.
HINT:
Codes other than DTC B1635/24 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

2	CONFIRM PART NUMBER OF REAR AIRBAG SENSOR

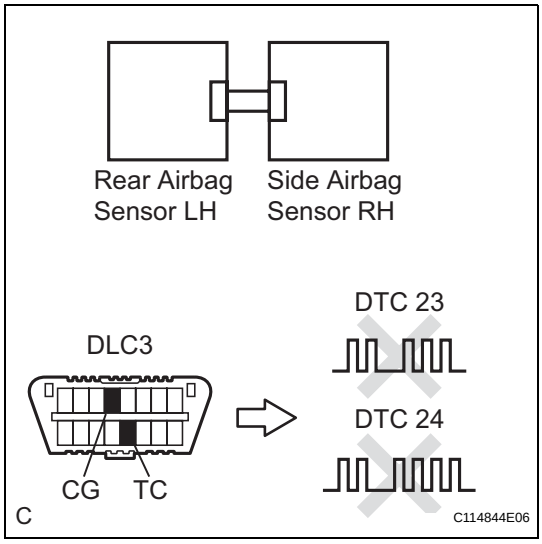
(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the part number of the rear airbag sensor RH is equal to the number of the other side.
OK:
Those numbers are the same.

NG → **Go to step 4**

OK

RS

3 CHECK REAR AIRBAG SENSOR RH



(a) Interchange the rear airbag sensor LH with RH and connect the connectors to them.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

Result

Result	Proceed to
DTC B1635/24 is output.	A
DTC B1630/23 is output.	B
DTC B1630/23 and B1635/24 are not output.	C

HINT:
Codes other than DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.

(h) Turn the ignition switch off.
(i) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(j) Return the rear airbag sensor LH and RH to their original positions and connect the connectors to them.

RS

A → **Go to step 5**

B → **REPLACE REAR AIRBAG SENSOR RH (See page RS-455)**

C

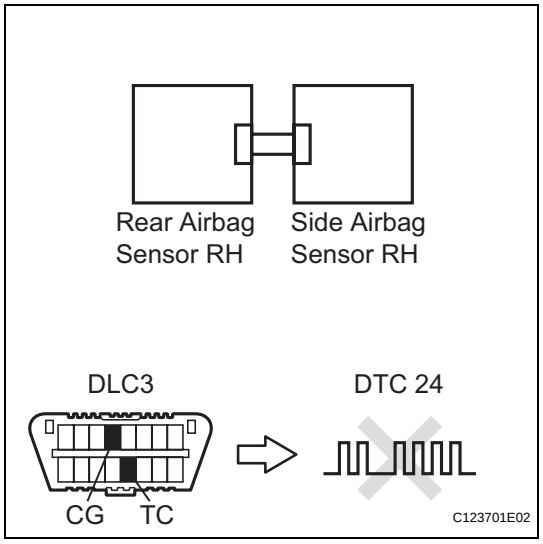
USE SIMULATION METHOD TO CHECK (See page RS-32)

4 REPLACE REAR AIRBAG SENSOR RH

(a) Replace the rear airbag sensor RH (See page RS-455).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1635/24 is not output.

HINT:

Codes other than DTC B1635/24 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1650/32	Occupant Classification System Malfunction

DESCRIPTION

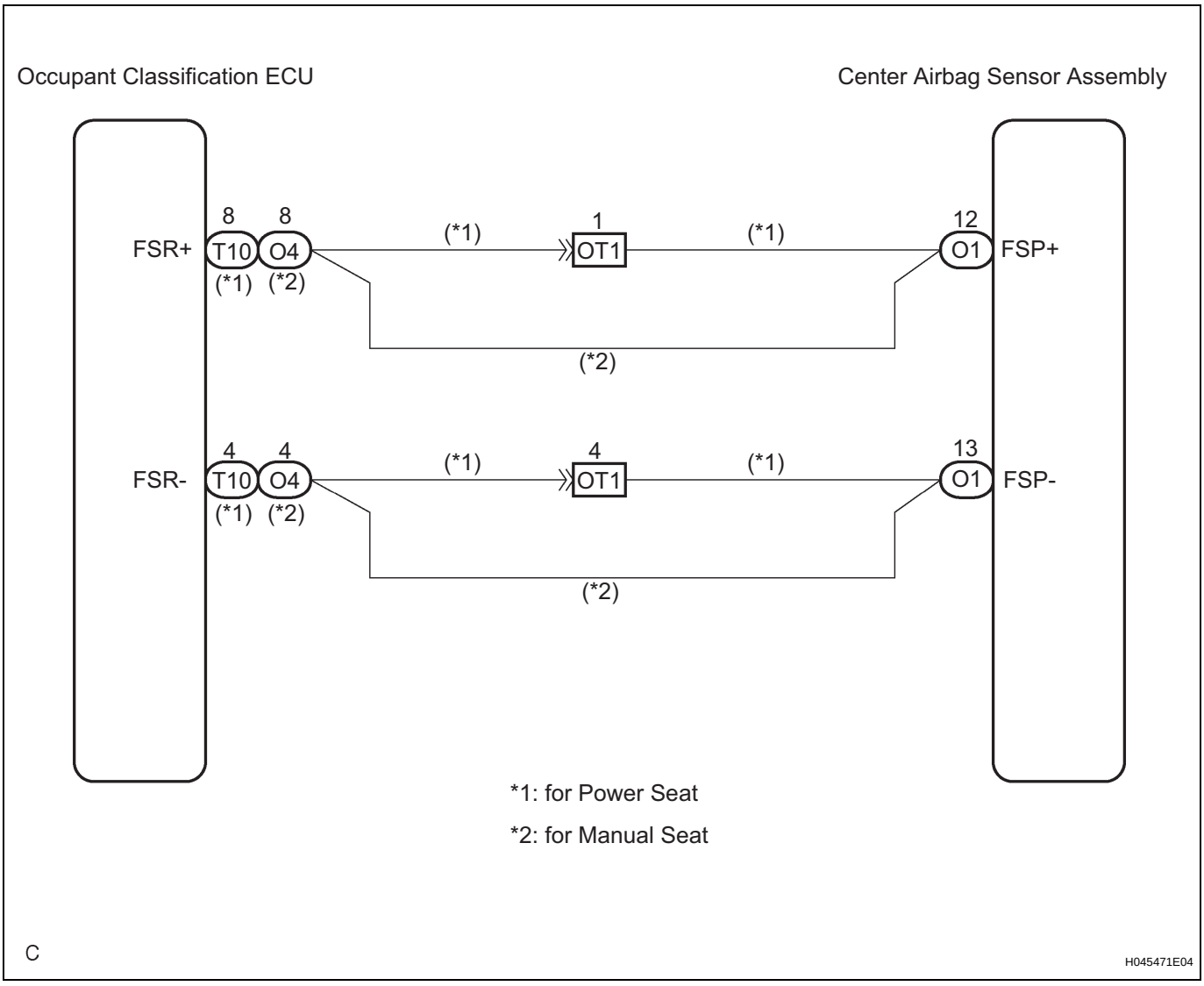
The occupant classification system circuit consists of the center airbag sensor assembly and the occupant classification system.

If the center airbag sensor assembly receives signals from the occupant classification ECU, it determines whether the front passenger airbag assembly, the front seat side airbag assembly RH and front seat outer belt assembly should be operated.

DTC B1650/32 is recorded when a malfunction is detected in the occupant classification system circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1650/32	• Occupant classification system malfunction • The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification system circuit for 2 seconds. • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Occupant classification system • Front seat wire RH (for Power Seat) • Center airbag sensor assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

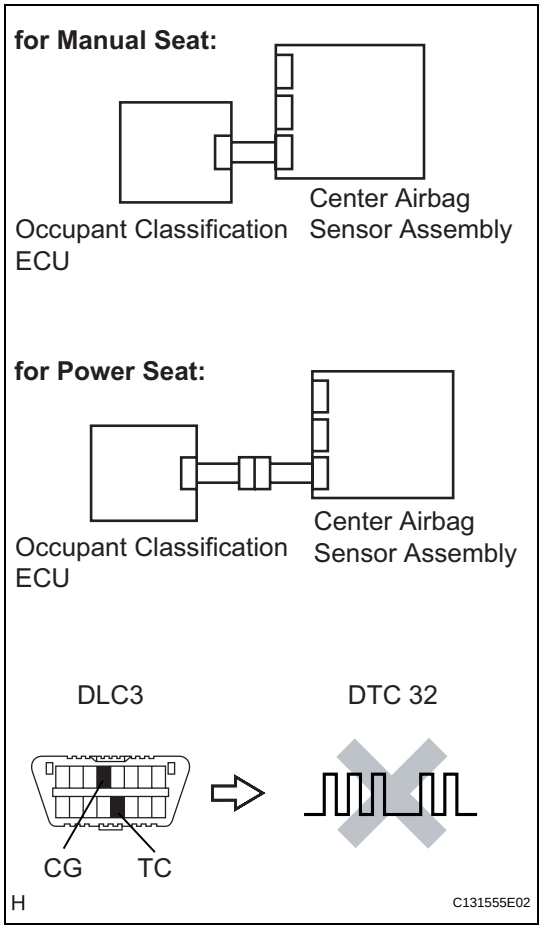
1	CHECK DTC (OCCUPANT CLASSIFICATION ECU)

(a) Turn the ignition switch on (IG), and wait for at least 10 seconds.
(b) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-251).
OK:
DTC is not output.

NG → **GO TO OCCUPANT CLASSIFICATION SYSTEM**

OK

2	CHECK DTC (CENTER AIRBAG SENSOR ASSEMBLY)



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the ignition switch off.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).
OK:
DTC B1650/32 is not output.
HINT:
Codes other than DTC B1650/32 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

3	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

RS

(c) Check that the connectors are properly connected to the center airbag sensor assembly and the occupant classification ECU.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK ↓

4	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the occupant classification ECU.
(b) Check that the connectors (on the center airbag sensor assembly side and occupant classification ECU side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK ↓

5	CHECK VEHICLE TYPE

(a) Check the front passenger side seat type.
Result

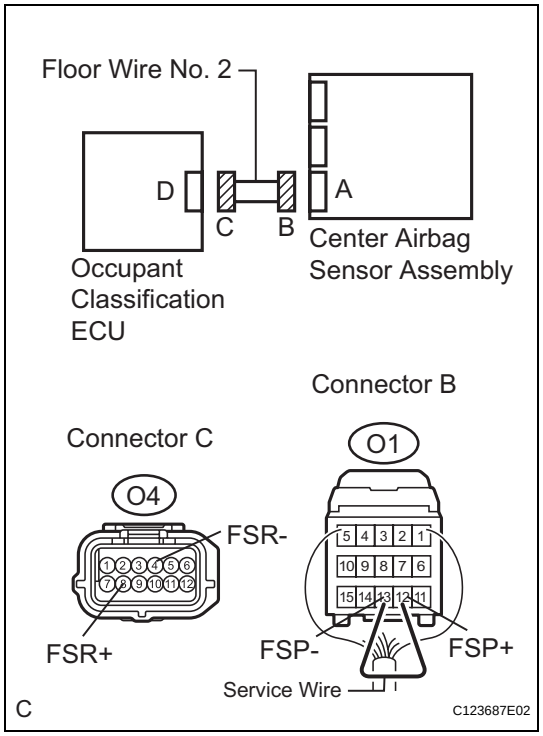
Result	Proceed to
for Manual seat	A
for Power seat	B

B → **Go to step 10**

A ↓

RS

6 CHECK FLOOR WIRE NO. 2 (OPEN)



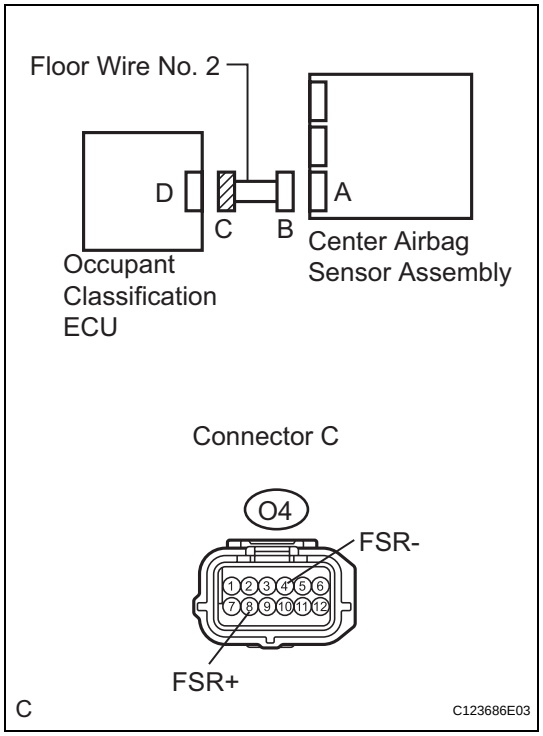
(a) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Terminal Connection	Condition	Specified Condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

7 CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

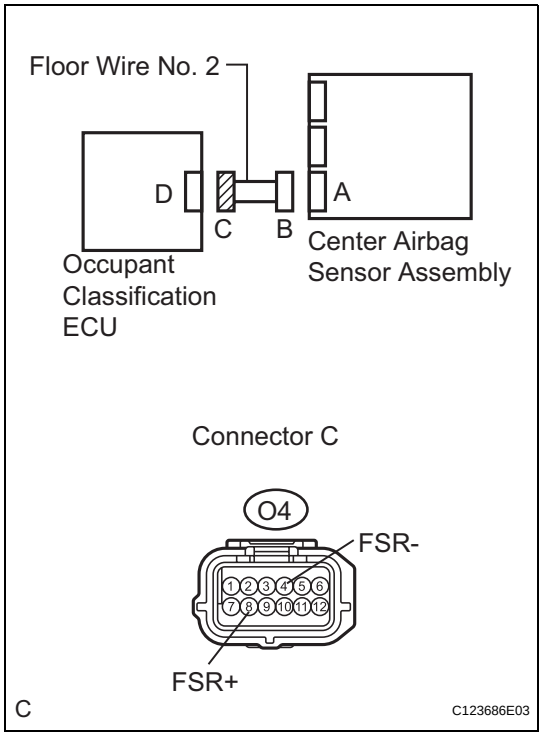
Terminal Connection	Condition	Specified Condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

8 CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

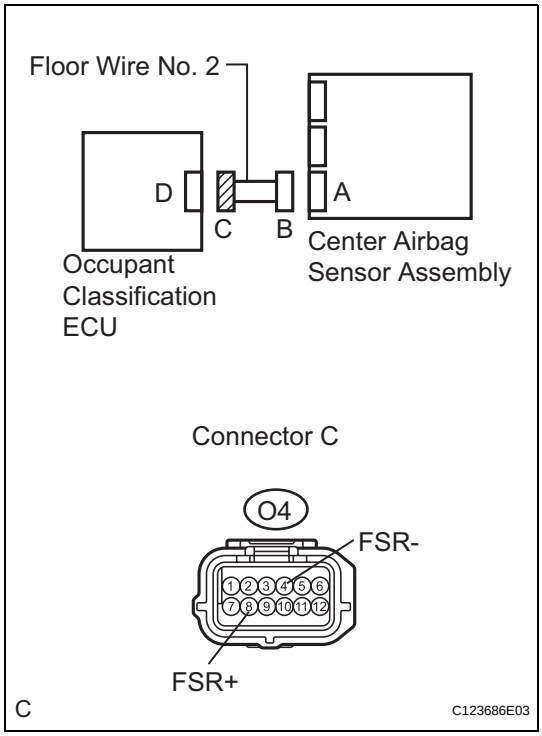
Tester Connection	Condition	Specified Condition
O4-8 (FSR+) - Body ground	Ignition switch ON	Below 1 V
O4-4 (FSR-) - Body ground	Ignition switch ON	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

9 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O4-8 (FSR+) - Body ground	Always	1 MΩ or higher
O4-4 (FSR-) - Body ground	Always	1 MΩ or higher

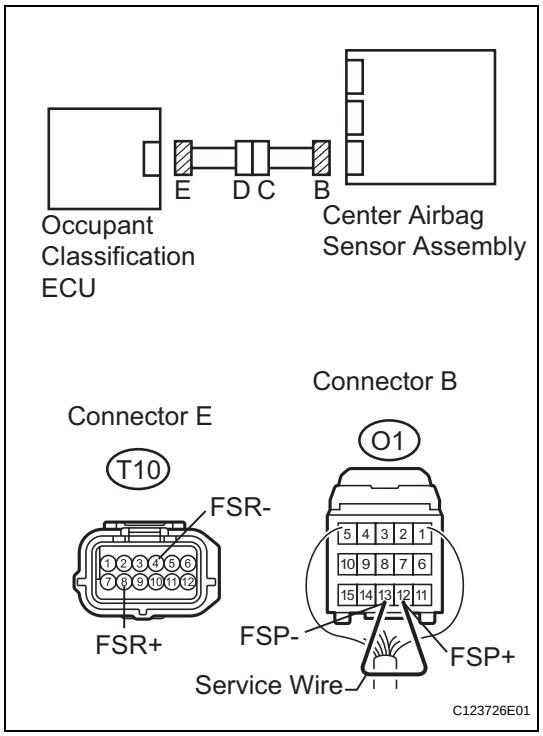
HINT:
After replacing the center airbag sensor assembly, check for DTCs of the center airbag sensor assembly. If the DTC B1650/32 is detected, replace the occupant classification ECU (See page RS-469) and perform "zero point calibration" and "sensitivity check" of the occupant classification system (See page RS-242).

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)

10 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (OPEN)



(a) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminal of the connector when connecting.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

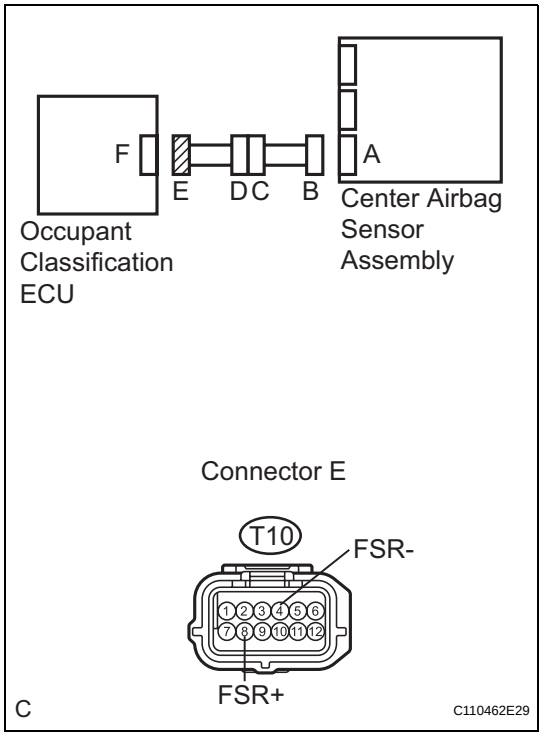
Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	Below 1 Ω

NG → **Go to step 14**

OK

RS

11 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

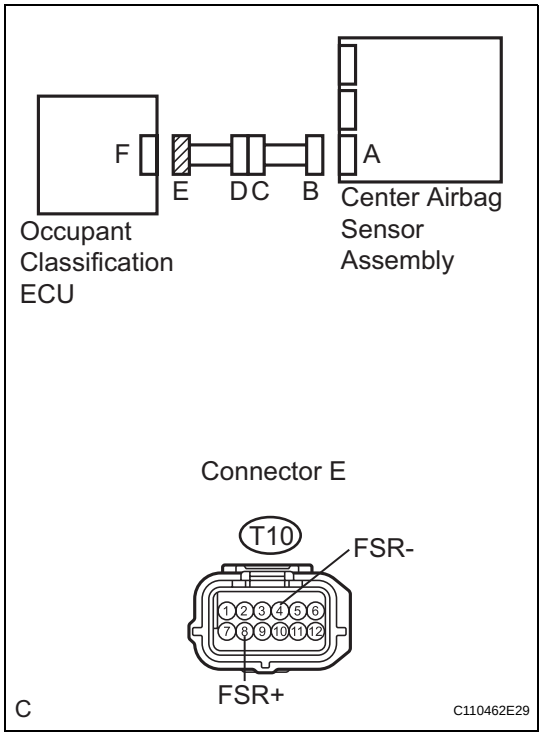
Standard resistance

Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	1 MΩ or higher

NG → **Go to step 15**

OK

12 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

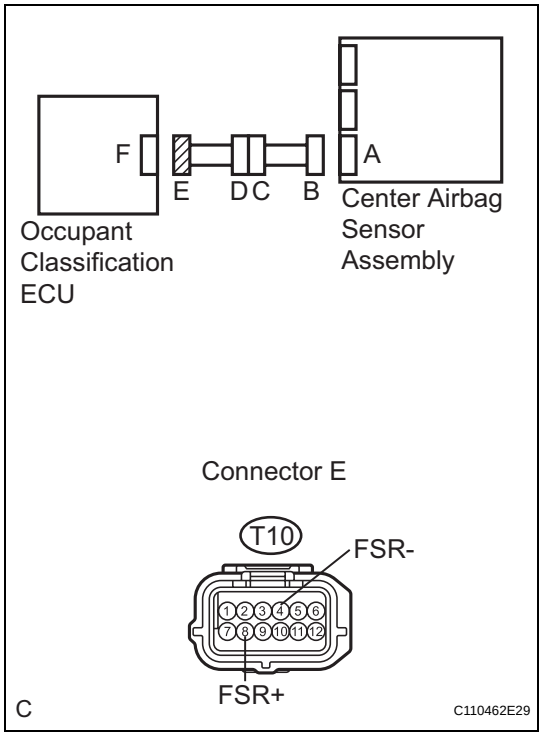
Standard voltage

Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - Body ground	Ignition switch on (IG)	Below 1 V
T10-4 (FSR-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **Go to step 16**

OK

13	CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
T10-8 (FSR+) - Body ground	Always	1 MΩ or higher
T10-4 (FSR-) - Body ground	Always	1 MΩ or higher

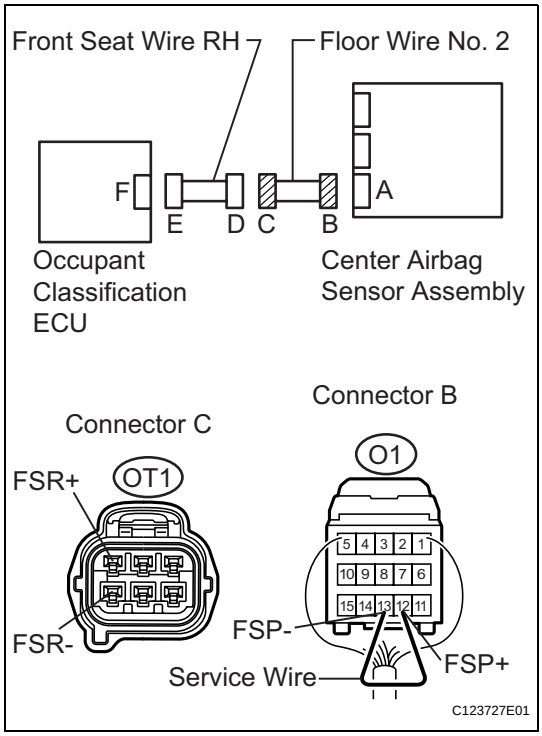
HINT:
After replacing the center airbag sensor assembly, check for DTCs of the center airbag sensor assembly. If the DTC B1650/32 is detected, replace the occupant classification ECU (See page RS-469) and perform "zero point calibration" and "sensitivity check" of the occupant classification system (See page RS-242).

NG → **Go to step 17**

OK →

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)

14	CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

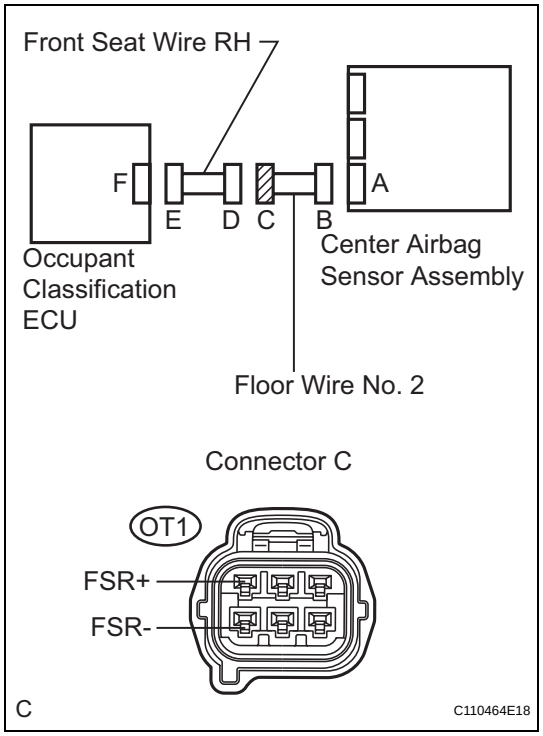
Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS **REPAIR OR REPLACE FRONT SEAT WIRE RH**

15	CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

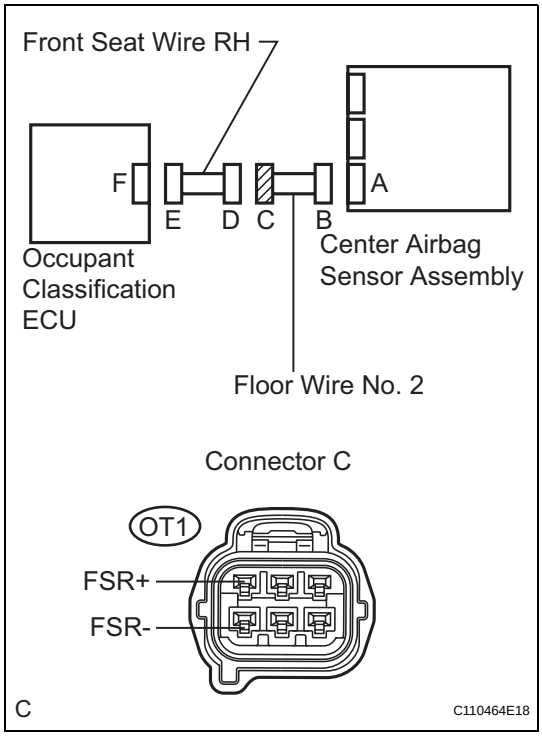
Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

16	CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the front seat wire RH connector from the floor wire No. 2.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

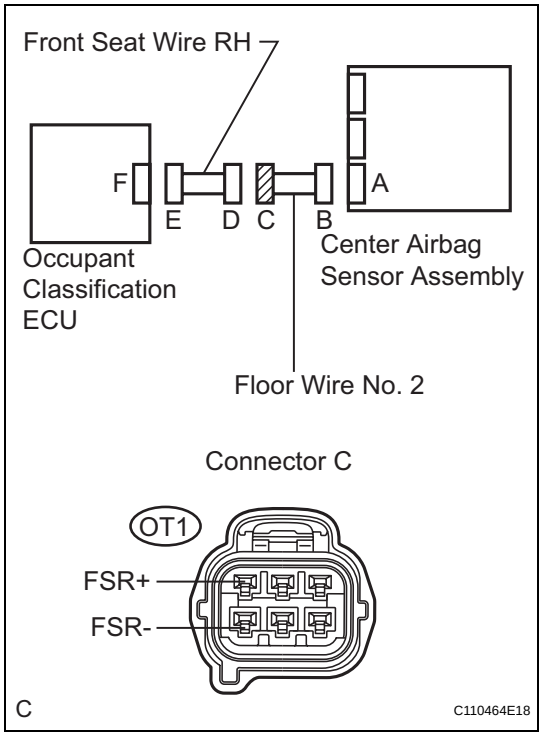
Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - Body ground	Ignition switch on (IG)	Below 1 V
OT1-4 (FSR-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS **REPAIR OR REPLACE FRONT SEAT WIRE RH**

17	CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
OT1-1 (FSR+) - Body ground	Always	1 MΩ or higher
OT1-4 (FSR-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

RS

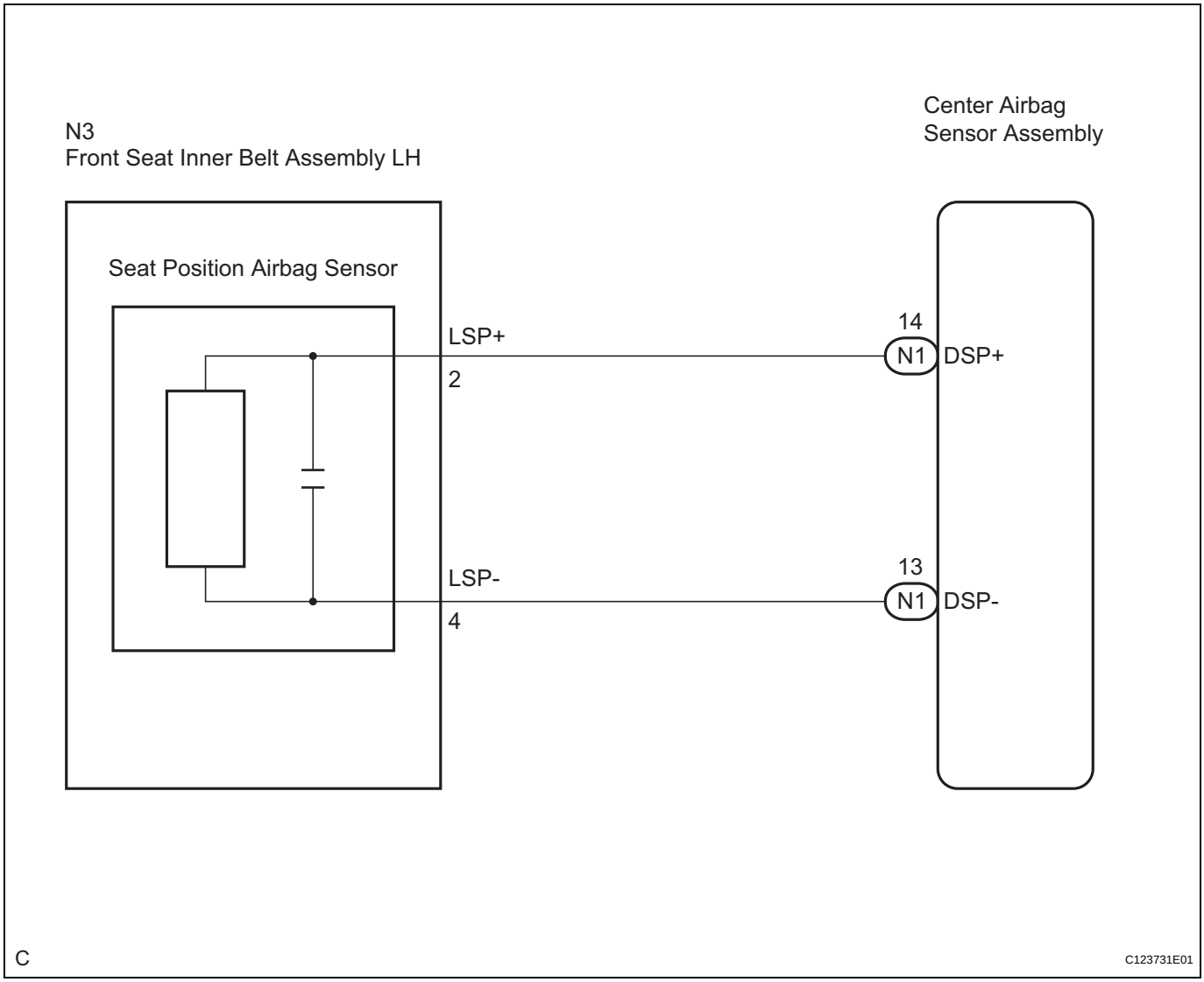
DTC	B1653/35	Seat Position Airbag Sensor Circuit Malfunction

DESCRIPTION

The seat position airbag sensor circuit consists of the center airbag sensor assembly and the seat position airbag sensor.
DTC B1653/35 is recorded when a malfunction is detected in the seat position airbag sensor circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1653/35	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the seat position airbag sensor circuit for 2 seconds. • Seat position airbag sensor malfunction • Center airbag sensor assembly malfunction	• Floor wire • Seat position airbag sensor • Center airbag sensor assembly

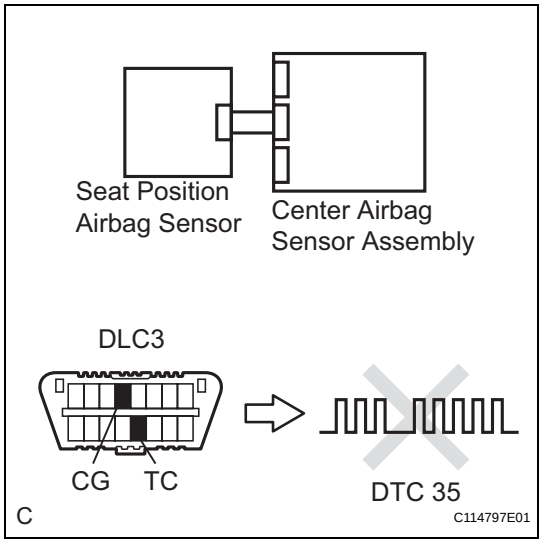
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1	CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the ignition switch off.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-41).

OK:

DTC B1653/35 is not output.

HINT:

Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the seat position airbag sensor.

OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the seat position airbag sensor.
(b) Check that the connectors (on the center airbag sensor assembly side and seat position airbag sensor side) are not damaged.

OK:

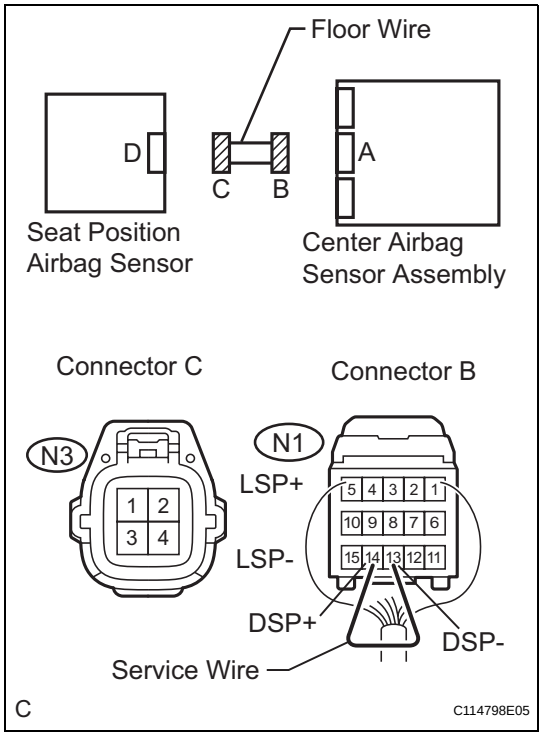
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

4 CHECK FLOOR WIRE (OPEN)



(a) Using a service wire, connect terminals 14 (DSP+) and 13 (DSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

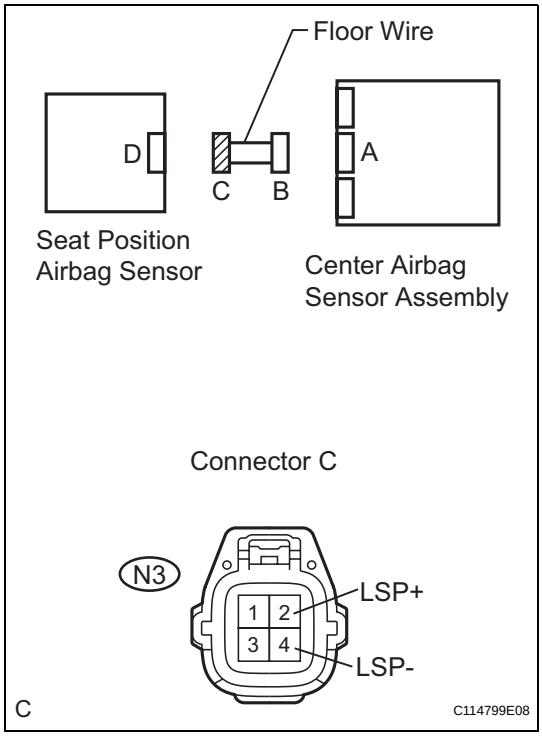
Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - N3-4 (LSP-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

5 CHECK FLOOR WIRE (SHORT)



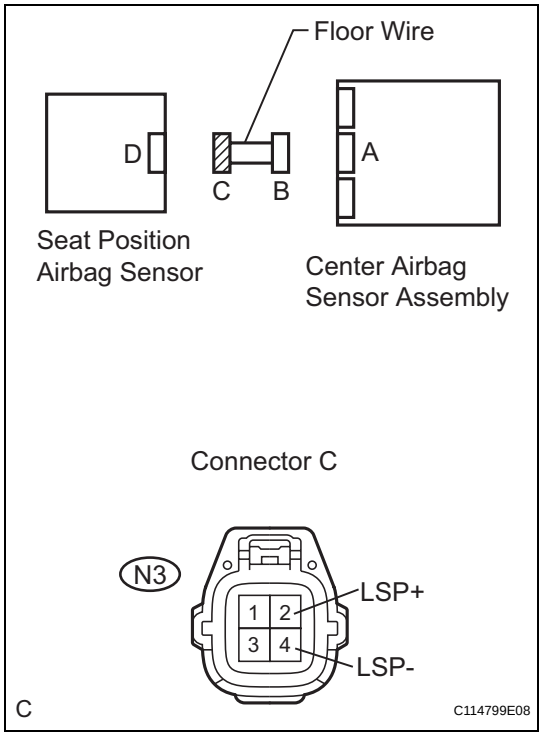
(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - N3-4 (LSP-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

6 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

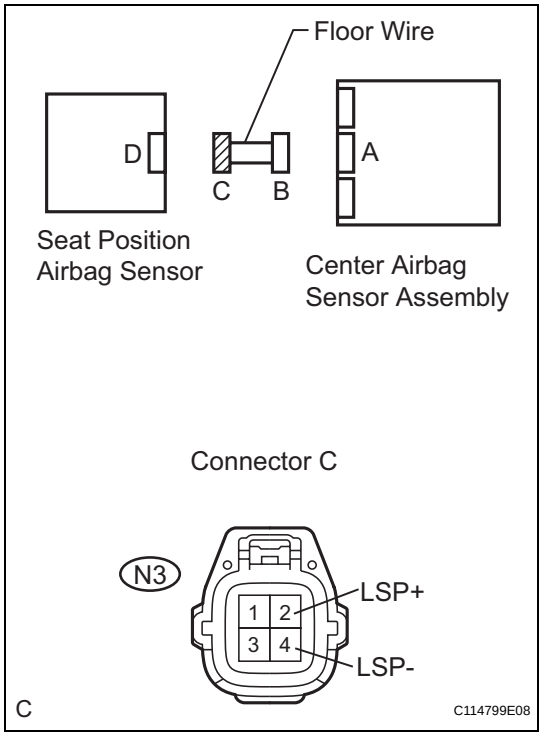
Standard voltage

Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - Body ground	Ignition switch on (IG)	Below 1 V
N3-4 (LSP-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE

OK

7 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

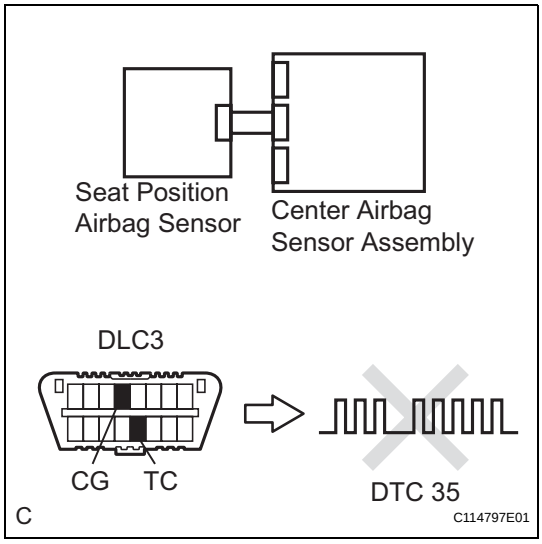
Tester Connection	Condition	Specified Condition
N3-2 (LSP+) - Body ground	Always	1 MΩ or higher
N3-4 (LSP-) - Body ground	Always	1 MΩ or higher

NG → REPAIR OR REPLACE FLOOR WIRE

OK

RS

8	CHECK SEAT POSITION AIRBAG SENSOR



(a) Connect the connectors to the center airbag sensor assembly and the seat position airbag sensor.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1653/35 is not output.

HINT:
Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

9	REPLACE SEAT POSITION AIRBAG SENSOR

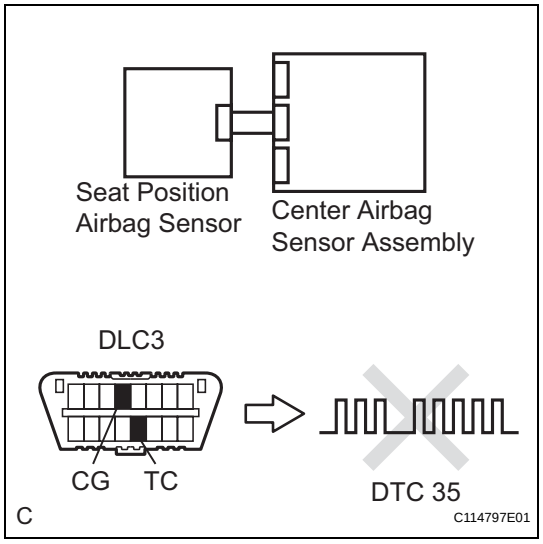
(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the seat position airbag sensor (See page RS-460).

HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

RS

10	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1653/35 is not output.

HINT:

Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

END

RS

DTC	B1655/37	Driver Side Seat Belt Buckle Switch Circuit Malfunction

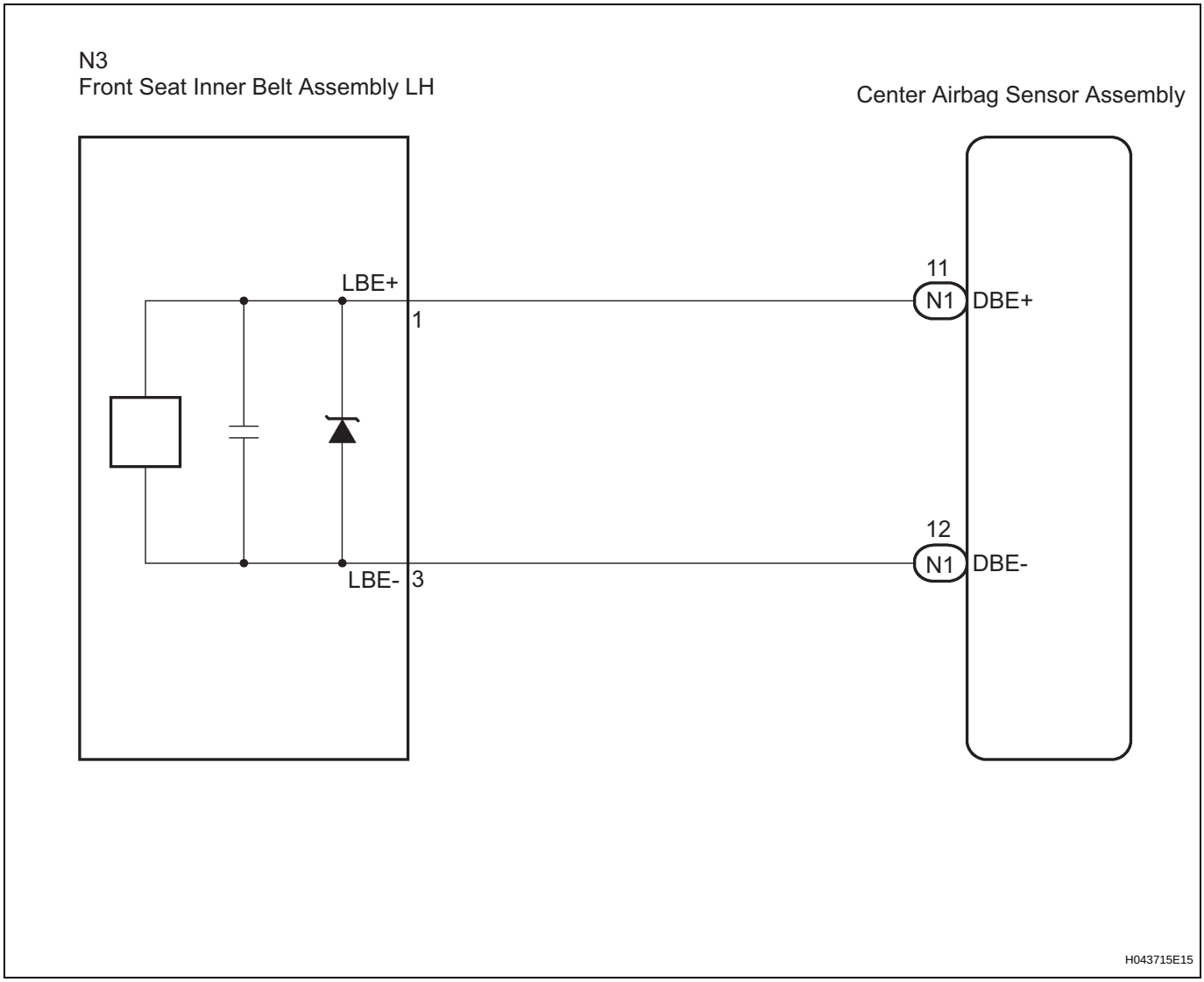
DESCRIPTION

The driver side seat belt buckle switch circuit consists of the center airbag sensor assembly and the front seat inner belt assembly LH.

DTC B1655/37 is recorded when a malfunction is detected in the driver side seat belt buckle switch circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1655/37	• The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the driver side seat belt buckle switch circuit for 2 seconds. • Front seat inner belt assembly LH malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat inner belt assembly LH (Driver side seat belt buckle switch) • Center airbag sensor assembly

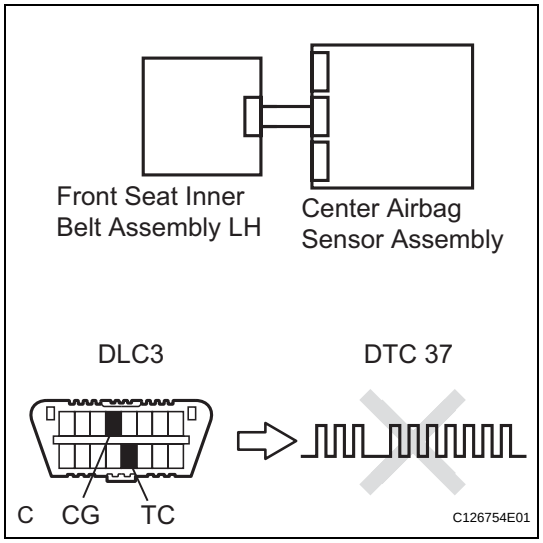
WIRING DIAGRAM



RS

INSPECTION PROCEDURE

1 CHECK DTC



(a) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(b) Clear the DTCs stored in the memory (See page RS-41).
(c) Turn the ignition switch off.
(d) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(e) Check the DTCs (See page RS-44).

OK:

DTC B1655/37 is not output.

HINT:

Codes other than DTC B1655/37 may be output at this time, but they are not related to this check.

Ok → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

2 CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and front seat inner belt assembly LH.

OK:

The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

3 CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the front seat inner belt assembly LH.
(b) Check that the connectors (on the center airbag sensor assembly side and front seat inner belt assembly LH side) are not damaged.

OK:

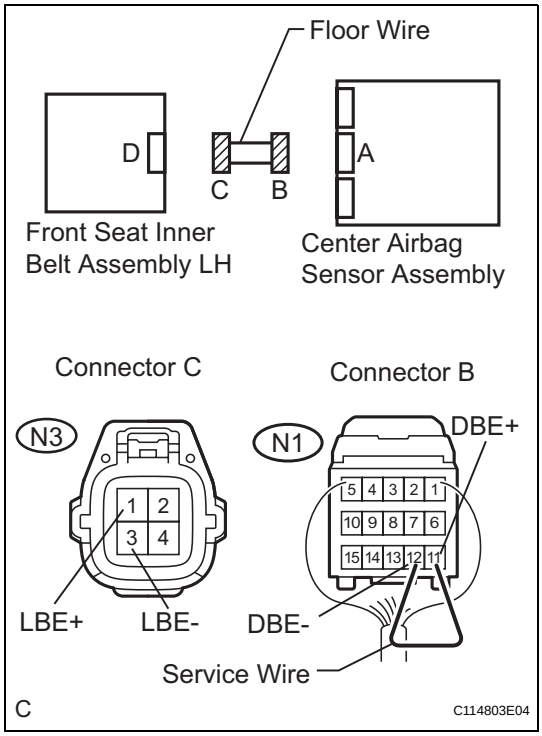
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

4 CHECK FLOOR WIRE (OPEN)



(a) Using a service wire, connect terminals 11 (DBE+) and 12 (DBE-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

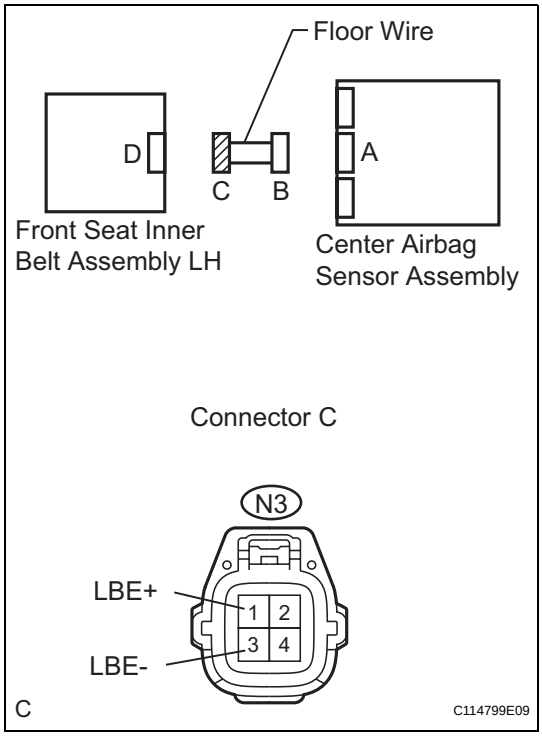
Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - N3-3 (LBE-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

5 CHECK FLOOR WIRE (SHORT)



(a) Disconnect the service wire from connector B.

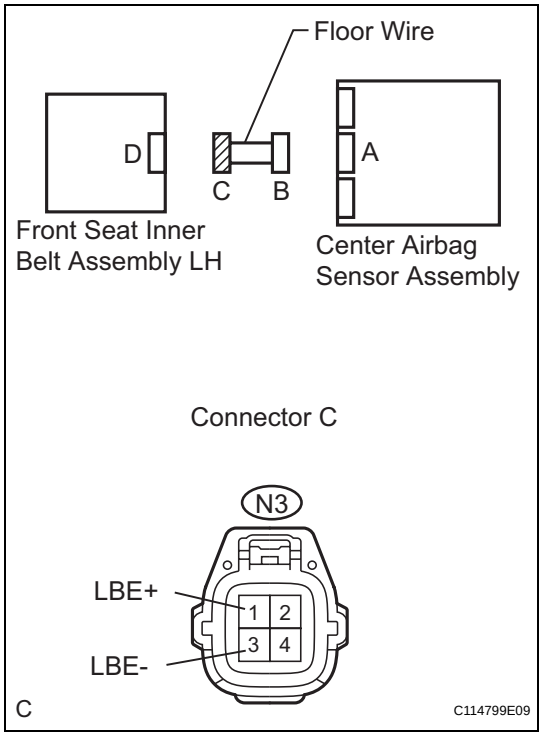
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - N3-3 (LBE-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

6 CHECK FLOOR WIRE (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

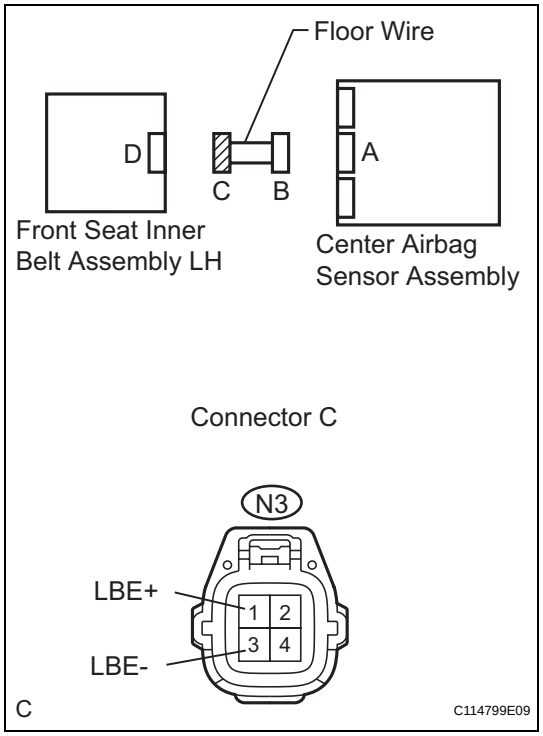
Standard voltage

Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - Body ground	Ignition switch on (IG)	Below 1 V
N3-3 (LBE-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

7 CHECK FLOOR WIRE (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

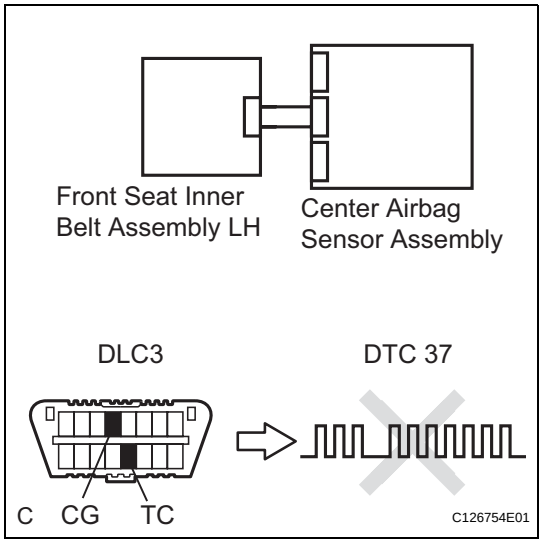
Tester Connection	Condition	Specified Condition
N3-1 (LBE+) - Body ground	Always	1 MΩ or higher
N3-3 (LBE-) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

RS

8	CHECK FRONT SEAT INNER BELT ASSEMBLY LH



(a) Connect the connector to the center airbag sensor assembly and the front seat inner belt assembly LH.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).
OK:
DTC B1655/37 is not output.
HINT:
Codes other than DTC B1655/37 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-32)**

NG

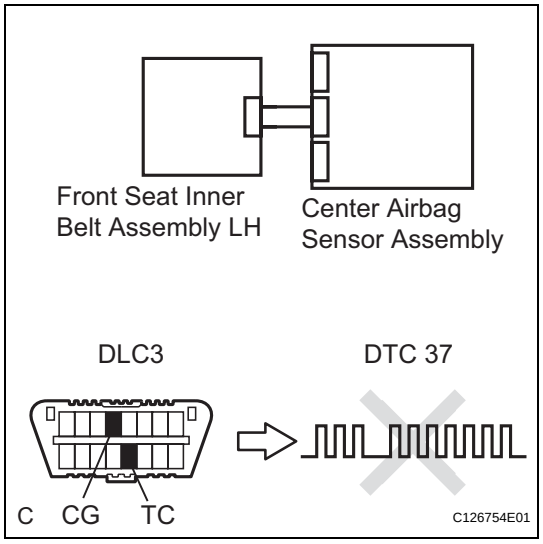
9	REPLACE FRONT SEAT INNER BELT ASSEMBLY LH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the front seat inner belt assembly LH (See page SB-15).
HINT:
Perform inspection using parts from a normal vehicle if possible.

NEXT

RS

10	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(c) Clear the DTCs stored in the memory (See page RS-41).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Check the DTCs (See page RS-41).

OK:

DTC B1655/37 is not output.

HINT:

Codes other than DTC B1655/37 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

END

RS

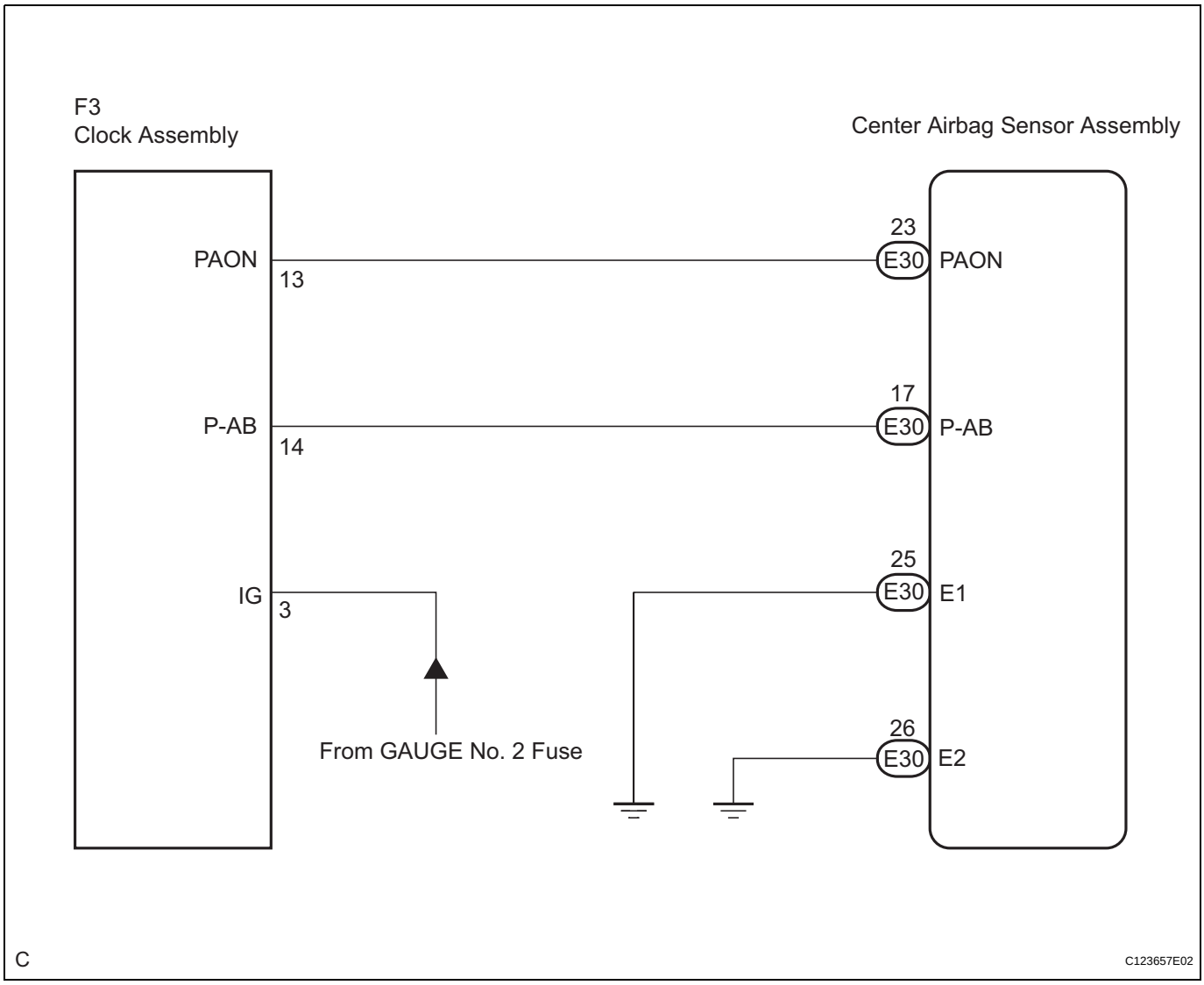
DTC	B1660/43	Passenger Airbag ON / OFF Indicator Circuit Malfunction

DESCRIPTION

The passenger airbag ON/OFF indicator circuit consists of the center airbag sensor assembly and the clock assembly.
The passenger airbag ON/OFF indicator indicates the operation condition of the front passenger airbag assembly and the front seat side airbag assembly RH.
DTC B1660/43 is recorded when a malfunction is detected in the passenger airbag ON/OFF indicator circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1660/43	• The center airbag sensor assembly receives an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the passenger airbag ON/OFF indicator circuit for 2 seconds. • Passenger airbag ON/OFF indicator malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire No. 2 • Clock assembly • Center airbag sensor assembly

WIRING DIAGRAM

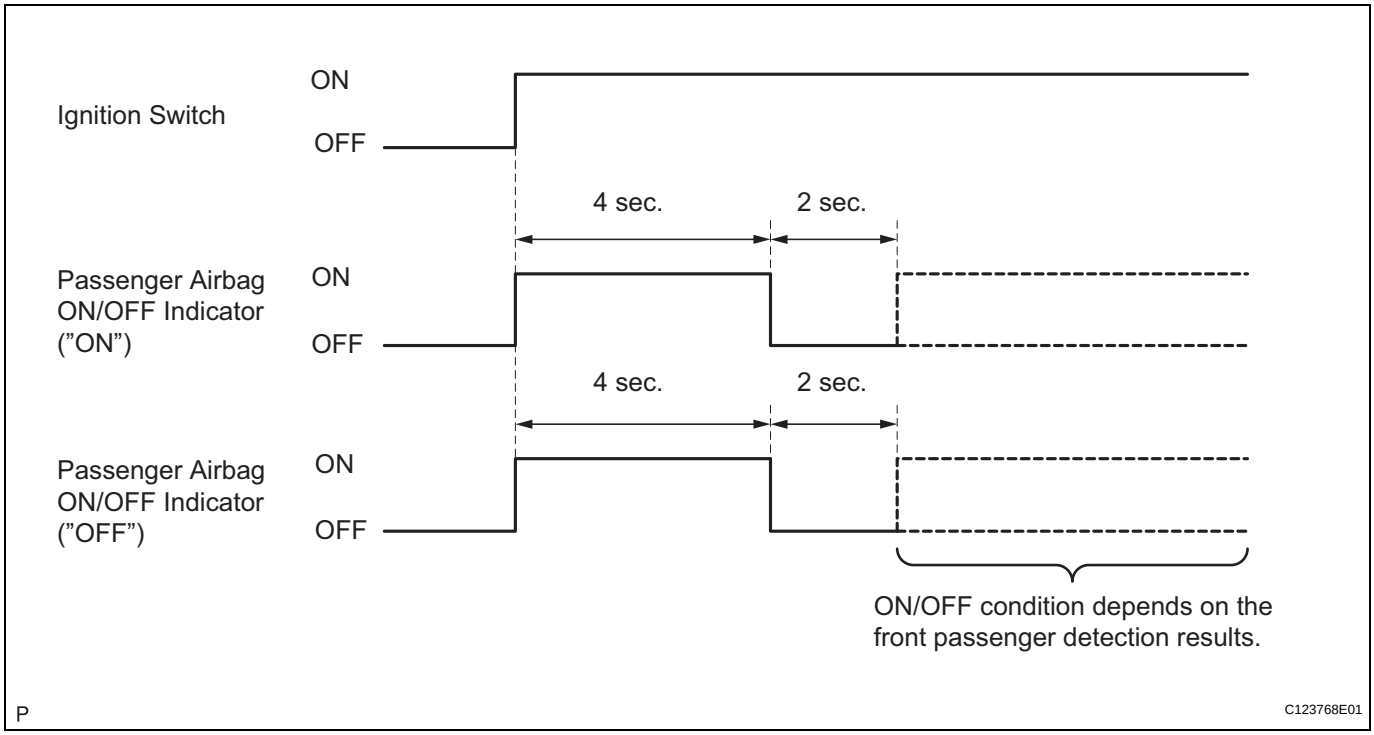


RS

INSPECTION PROCEDURE

1	CHECK PASSENGER AIRBAG ON/OFF INDICATOR CONDITION

(a) Turn the ignition switch on (IG).
(b) Check the passenger airbag ON/OFF indicator operation.
HINT:
Refer to the normal condition of the passenger airbag ON/OFF indicator (See page RS-32).



Result

ON/OFF Indicator Illumination	Proceed to
Always ON	A
OFF	B

B → **Go to step 10**

A

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the clock assembly.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

RS

OK

3	CHECK CONNECTORS

(a) Disconnect the connectors from the center airbag sensor assembly and the clock assembly.
(b) Check that the connectors (on the center airbag sensor assembly side and clock assembly side) are not damaged.
OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

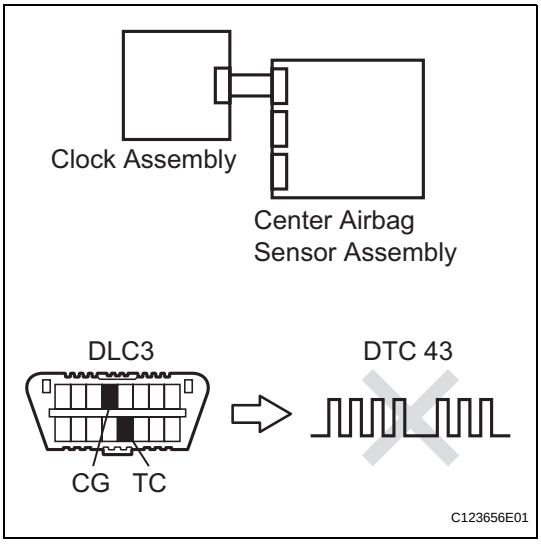
4	CHECK PASSENGER AIRBAG ON/OFF INDICATOR

(a) Connect the connector to the clock assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG).
(d) Check the passenger airbag ON/OFF indicator operation.
OK:
The passenger airbag ON/OFF indicator does not come on.

NG → **Go to step 6**

OK

5	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connector to the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check for DTCs (See page RS-41).
OK:
DTC B1660/43 is not output.
HINT:
Codes other than DTC B1660/43 may be output at this time, but they are not related to this check.

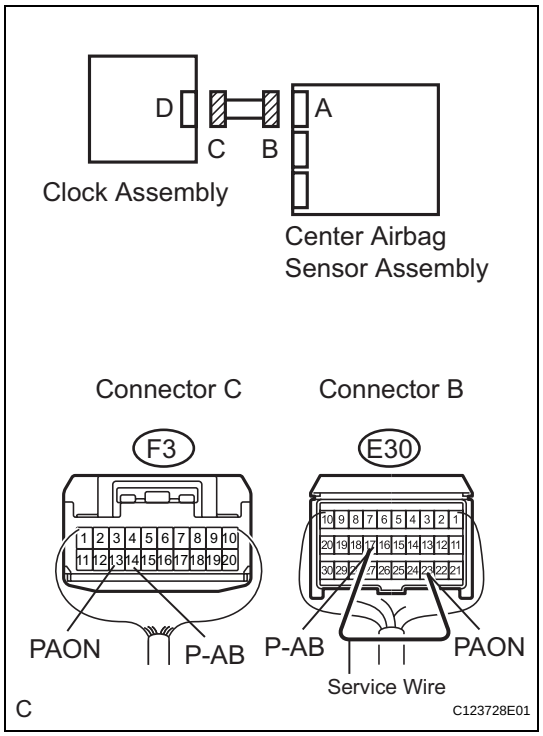
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

RS

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

6	CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (OPEN)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the clock assembly.
(d) Using a service wire, connect terminals 23 (PAON) and 17 (P-AB) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(e) Measure the resistance according to the value(s) in the table below.
Standard resistance

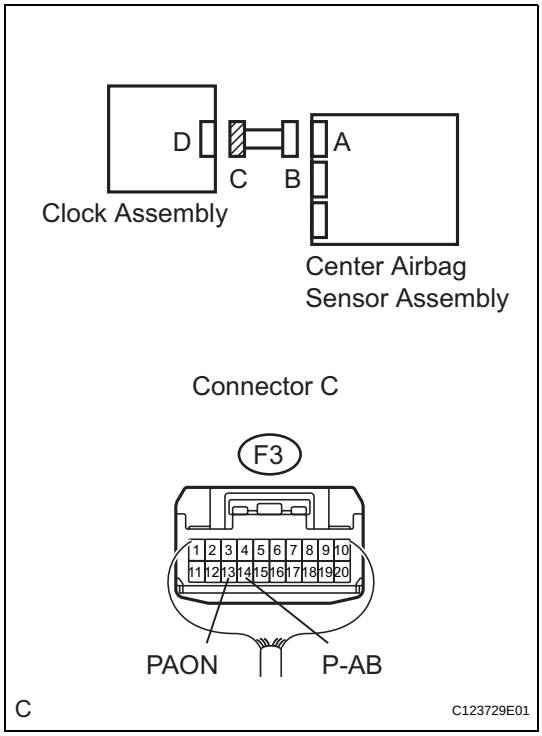
Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS

OK

RS

7 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

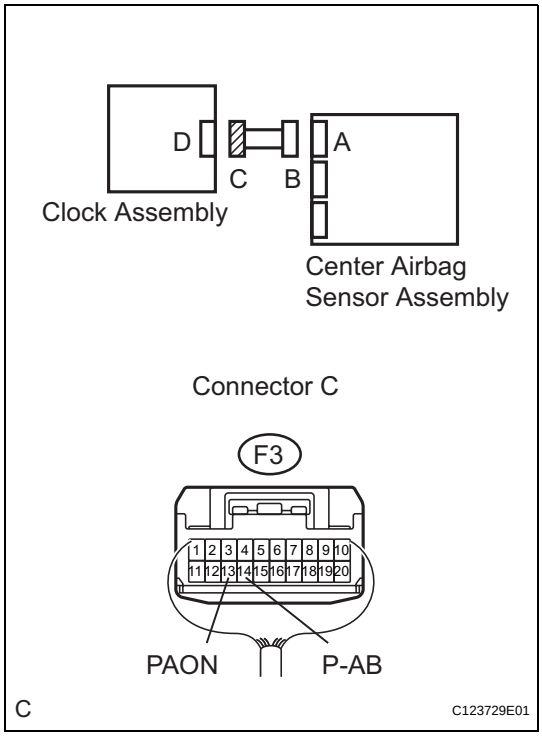
Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

RS

8 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

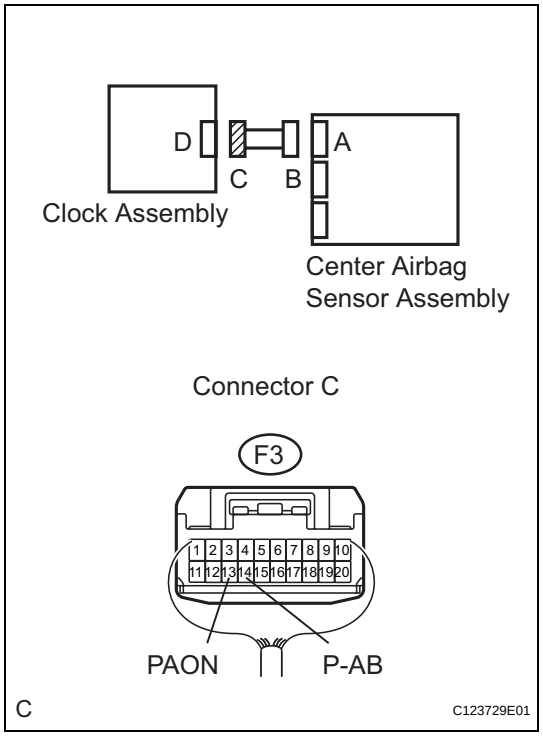
Standard resistance

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Always	1 MΩ or higher
F3-14 (P-AB) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

9	CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Ignition switch on (IG)	Below 1 V
F3-14 (P-AB) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

REPLACE CLOCK ASSEMBLY (See page OT-4)

RS

10	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and the clock assembly.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

11	CHECK CONNECTORS

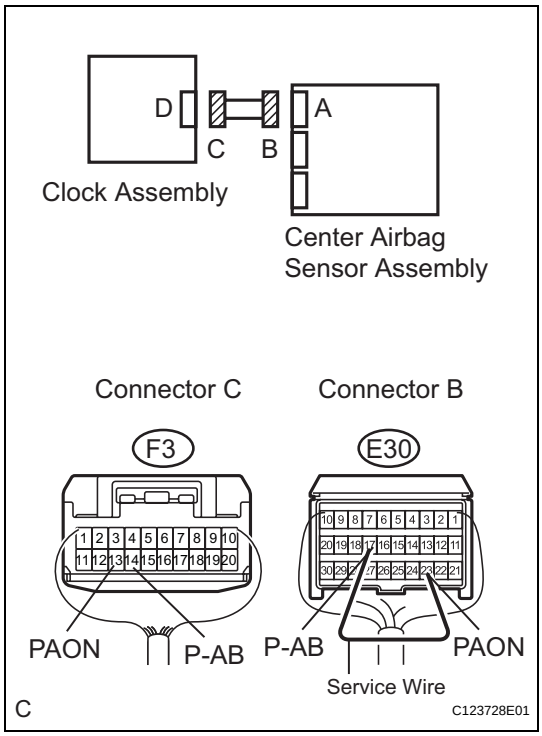
(a) Disconnect the connectors from the center airbag sensor assembly and the clock assembly.
(b) Check that the connectors (on the center airbag sensor assembly side and clock assembly side) are not damaged.

OK:
The connectors are not deformed or damaged.

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

12 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (OPEN)



(a) Using a service wire, connect terminals 23 (PAON) and 17 (P-AB) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

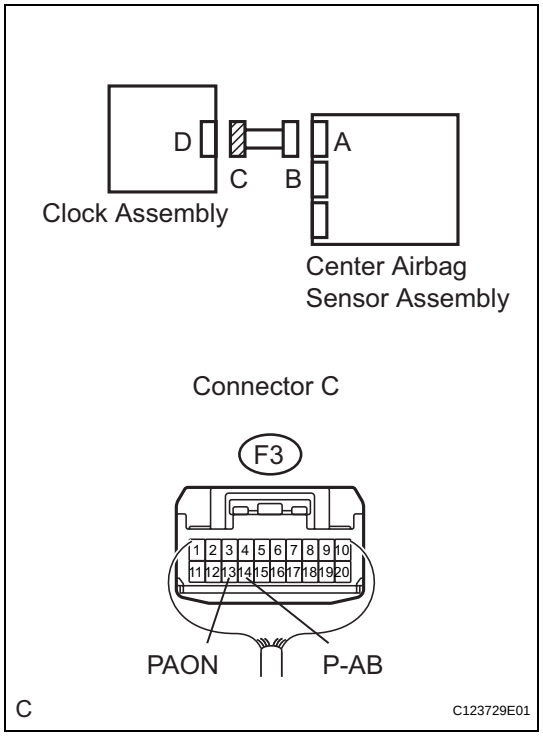
Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

RS

13 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT)



(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

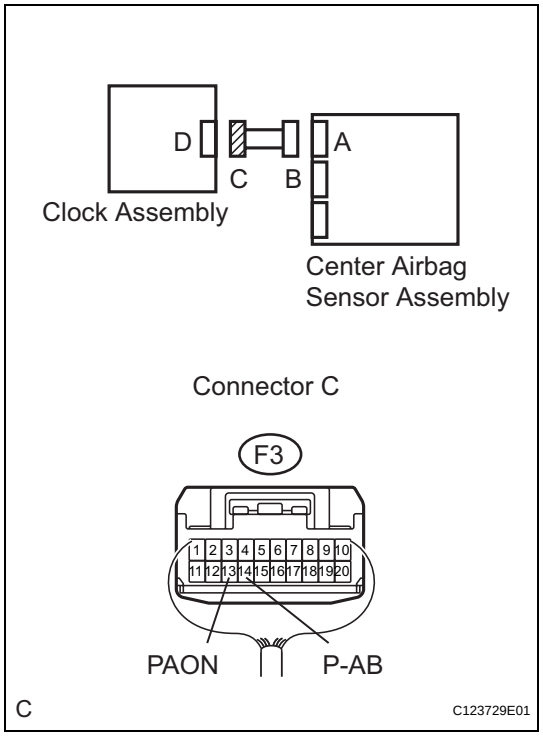
Tester Connection	Condition	Specified Condition
F3-13 (PAON) - F3-14 (P-AB)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

14 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO GROUND)

RS



(a) Measure the resistance according to the value(s) in the table below.

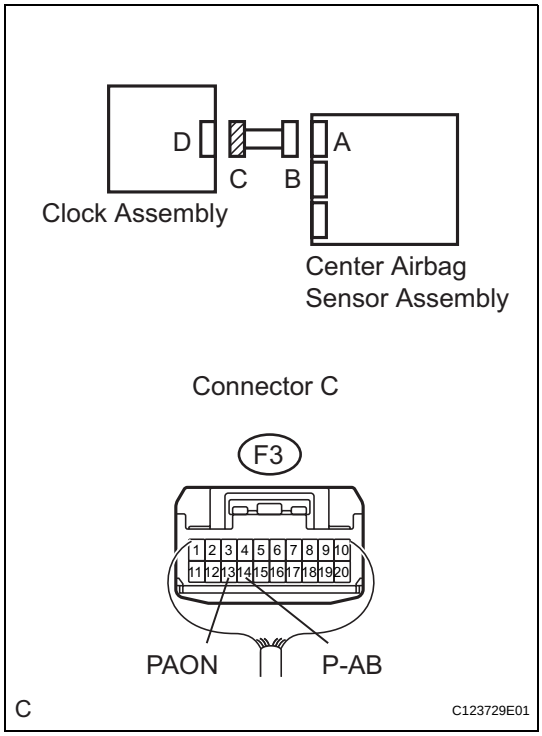
Standard resistance

Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Always	1 MΩ or higher
F3-14 (P-AB) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

15 CHECK PASSENGER AIRBAG ON/OFF INDICATOR CIRCUIT (SHORT TO B+)



(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

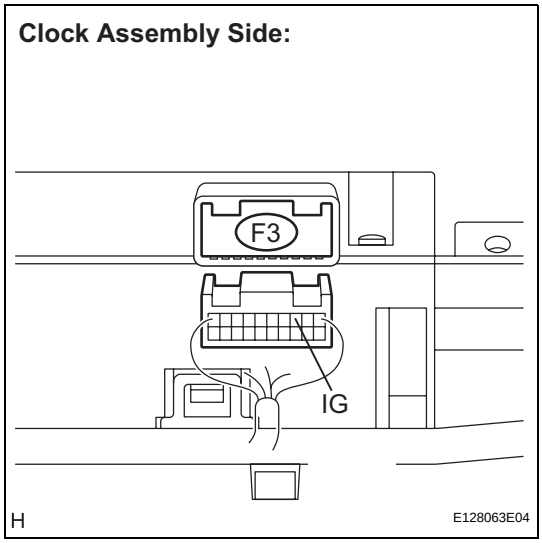
Tester Connection	Condition	Specified Condition
F3-13 (PAON) - Body ground	Ignition switch on (IG)	Below 1 V
F3-14 (P-AB) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

RS

16 CHECK CLOCK ASSEMBLY (SOURCE VOLTAGE)



(a) Connect the connectors to the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

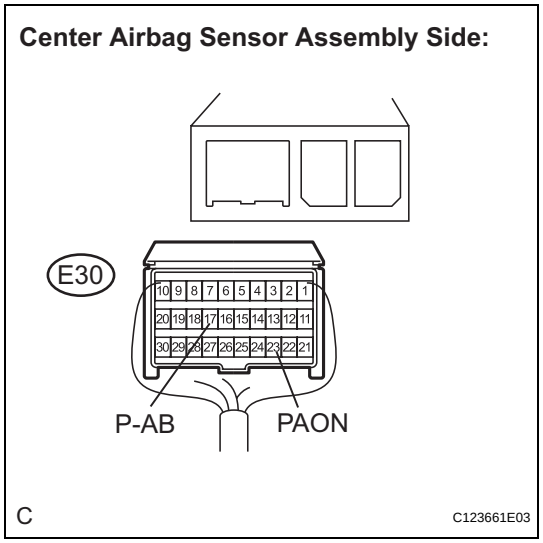
Standard voltage

Tester Connection	Condition	Specified Condition
F3-3 (IG) -Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE WIRE HARNESS (CLOCK ASSEMBLY - BATTERY) OR BATTERY**

OK

17 CHECK PASSENGER AIRBAG ON / OFF INDICATOR



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the clock assembly.
(d) Disconnect the connectors from the center airbag sensor assembly.
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG).
(g) Check the indicator according to the conditions in the table below.

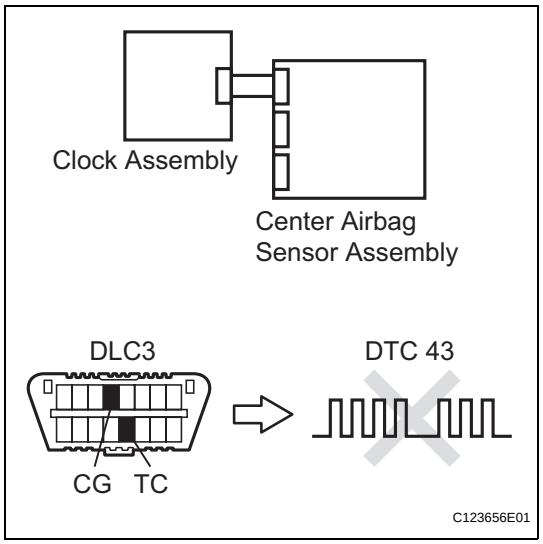
Result

Tester Connection	Condition	Passenger airbag ON/ OFF indicator
E30-23 (PAON) - Body ground	Ignition switch on (IG)	"ON" comes on
E30-17 (P-AB) - Body ground	Ignition switch on (IG)	"OFF" comes on

NG → **REPLACE CLOCK ASSEMBLY (See page OT-4)**

OK

18 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connectors to the center airbag sensor assembly.
(d) Connect the negative (-) terminal cable to the battery and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(f) Clear the DTCs stored in the memory (See page RS-41).
(g) Turn the ignition switch off.
(h) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(i) Check for DTCs (See page RS-41).

OK:

DTC B1660/43 is not output.

HINT:

Codes other than DTC B1660/43 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

RS

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1800/51	Short in Driver Side Squib Circuit

DTC	B1801/51	Open in Driver Side Squib Circuit

DTC	B1802/51	Short to GND in Driver Side Squib Circuit

DTC	B1803/51	Short to B+ in Driver Side Squib Circuit

DESCRIPTION

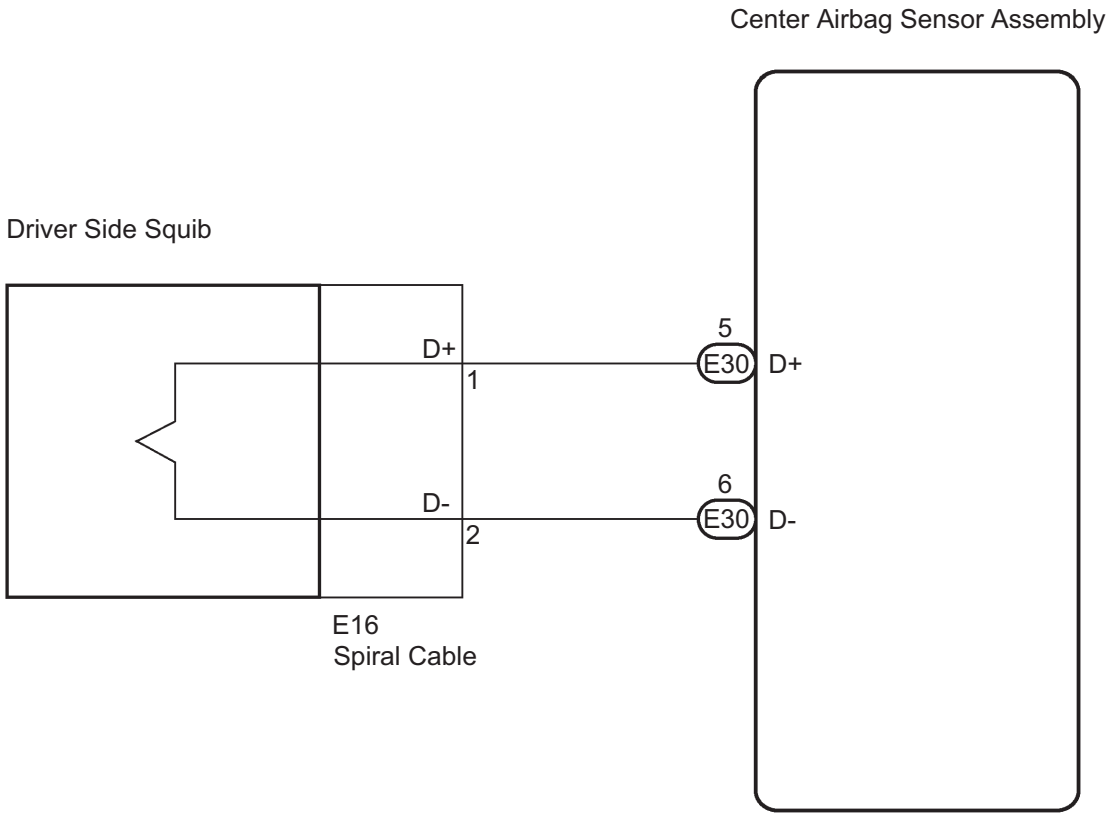
The driver side squib circuit consists of the center airbag sensor assembly, the spiral cable and the steering pad.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the driver side squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1800/51	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side squib circuit during primary check. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly
B1801/51	• The center airbag sensor assembly receives an open circuit signal in the driver side squib circuit for 2 seconds. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly
B1802/51	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side squib circuit for 0.5 seconds. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly
B1803/51	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side squib circuit for 0.5 seconds. • Driver side squib malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib) • Center airbag sensor assembly

WIRING DIAGRAM



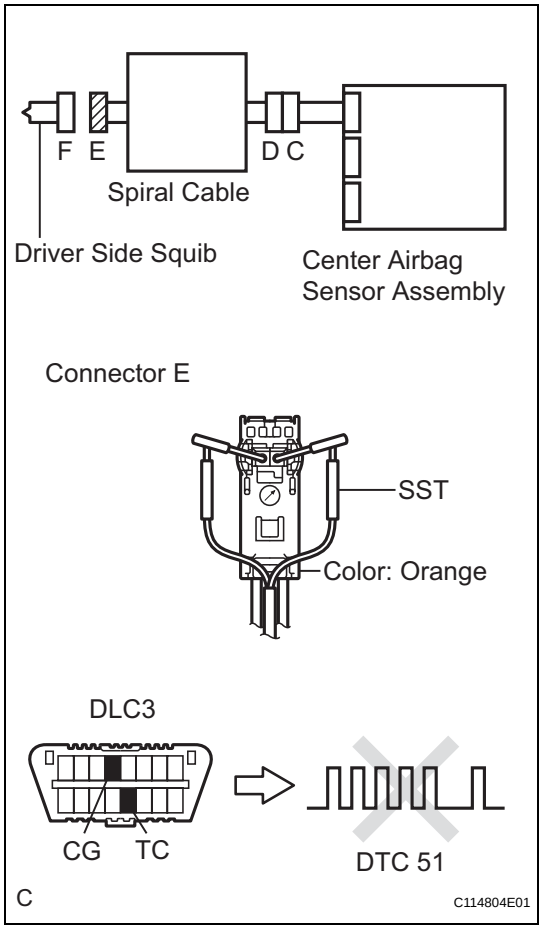
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting the "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting the "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK STEERING PAD (DRIVER SIDE SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the steering pad.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (orange connector).
CAUTION:
Never connect the tester to the steering pad (driver side squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1800, B1801, B1802, B1803, or 51 is not output.
HINT:
Codes other than DTC B1800, B1801, B1802, B1803, and 51 may be output at this time, but they are not related to this check.

OK → **REPLACE STEERING PAD**

NG

2	CHECK CONNECTOR

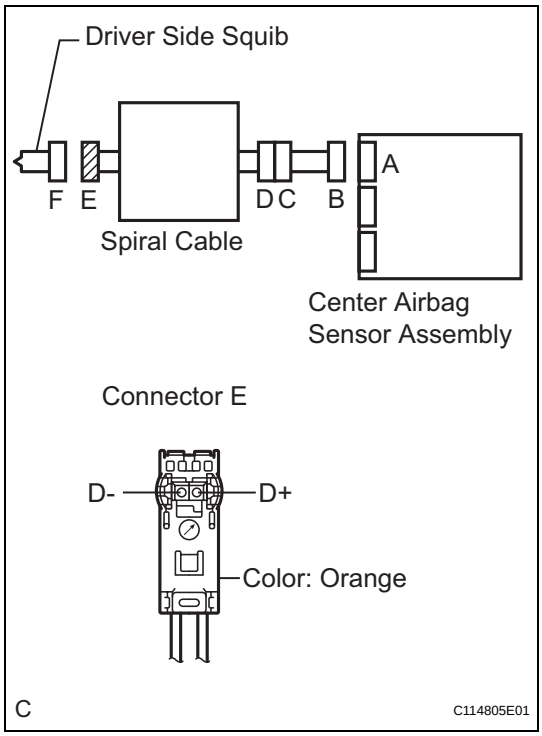
(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the spiral cable connectors (on the steering pad side) are not damaged.
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPLACE SPIRAL CABLE (See page RS-363)**

RS

OK

3	CHECK DRIVER SIDE SQUIB CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester Connection	Condition	Specified Condition
D+ - Body ground	Ignition switch on (IG)	Below 1 V
D- - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
D+ - D-	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
D+ - Body ground	Always	1 MΩ or higher
D- - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

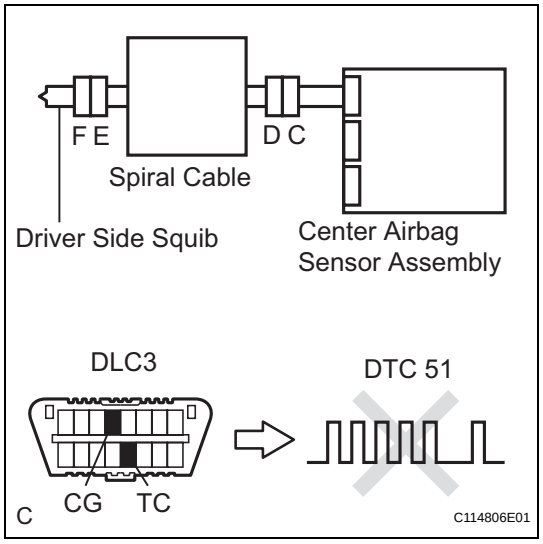
Tester Connection	Condition	Specified Condition
D+ - D-	Always	1 MΩ or higher

NG → Go to step 5

OK

RS

4 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the steering pad and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1800, B1801, B1802, B1803, or 51 is not output.

HINT:

Codes other than DTC B1800, B1801, B1802, B1803, and 51 may be output at this time, but they are not related to this check.

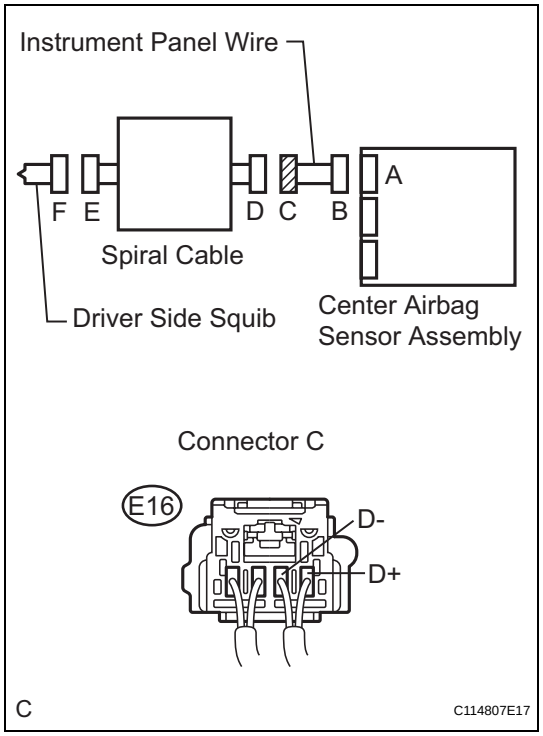
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

5 CHECK INSTRUMENT PANEL WIRE



(a) Restore the released activation prevention mechanism of connector B to the original condition.
(b) Disconnect the instrument panel wire connector from the spiral cable.
(c) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E16-1 (D+) - Body ground	Ignition switch on (IG)	Below 1 V
E16-2 (D-) - Body ground	Ignition switch on (IG)	Below 1 V

(d) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-1 (D+) - E16-2 (D-)	Always	Below 1 Ω

(e) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-1 (D+) - Body ground	Always	1 MΩ or higher
E16-2 (D-) - Body ground	Always	1 MΩ or higher

(f) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-32).

(2) Measure the resistance according to the value(s) in the table below.

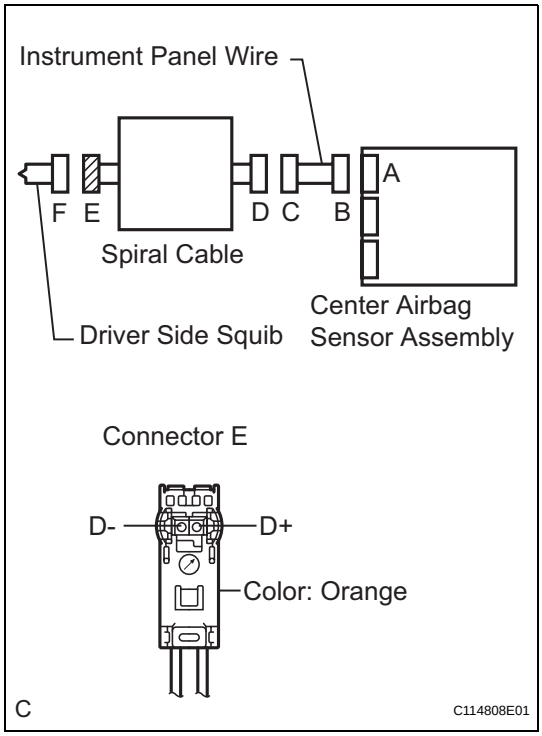
Standard resistance

Tester Connection	Condition	Specified Condition
E16-1 (D+) - E16-2 (D-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

6 CHECK SPIRAL CABLE



(a) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the ignition switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
D+ - Body ground	Ignition switch on (IG)	Below 1 V
D- - Body ground	Ignition switch on (IG)	Below 1 V

(b) Check for an open in the circuit.

(1) Turn the ignition switch off.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - D-	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - Body ground	Always	1 MΩ or higher
D- - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector D (See page RS-32).

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D+ - D-	Always	1 MΩ or higher

NG → **REPLACE SPIRAL CABLE (See page RS-363)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1805/52	Short in Front Passenger Side Squib Circuit

DTC	B1806/52	Open in Front Passenger Side Squib Circuit

DTC	B1807/52	Short to GND in Front Passenger Side Squib Circuit

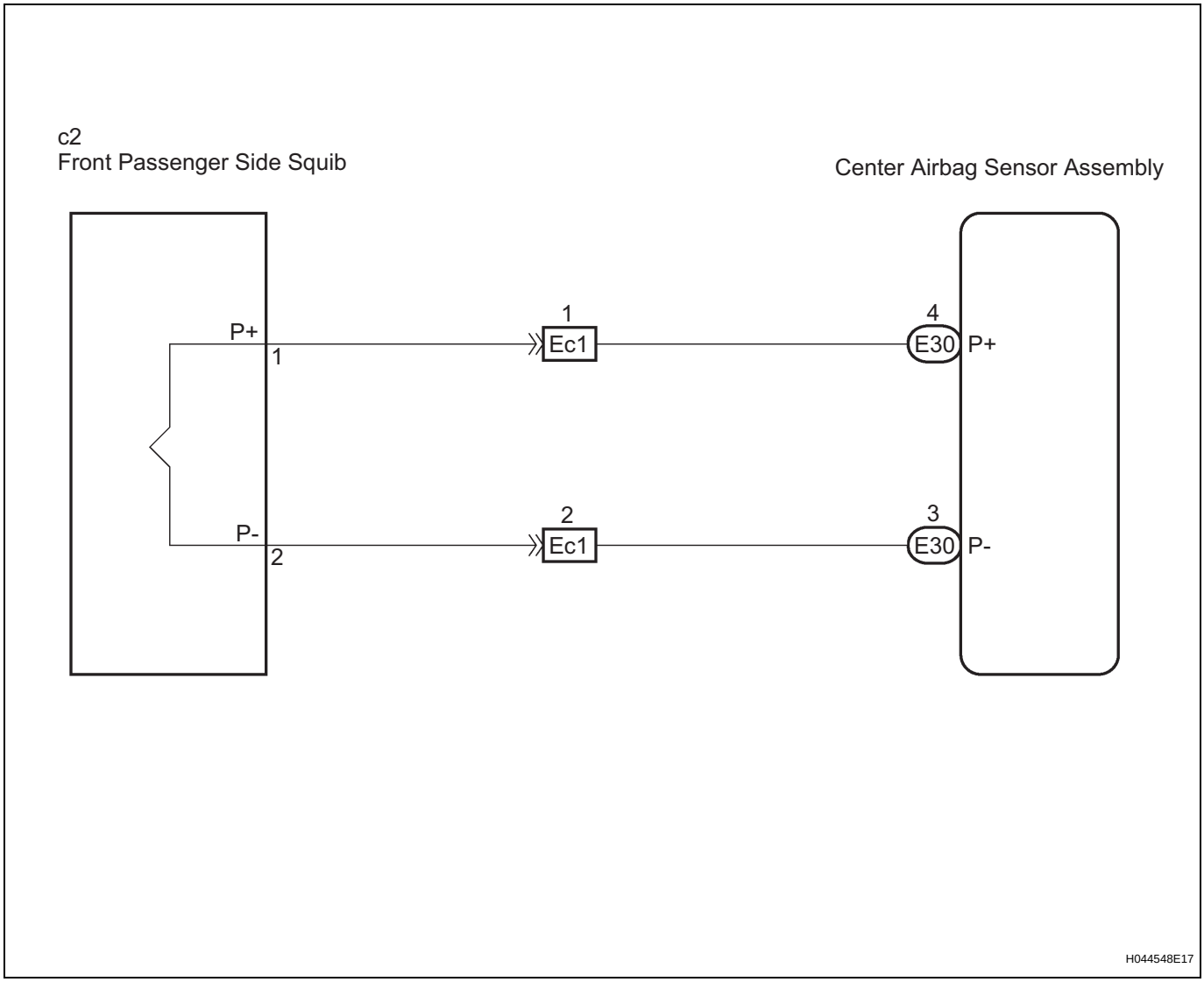
DTC	B1808/52	Short to B+ in Front Passenger Side Squib Circuit

DESCRIPTION

The front passenger side squib circuit consists of the center airbag sensor assembly and the front passenger airbag assembly.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front passenger side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1805/52	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side squib circuit during primary check. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly
B1806/52	• The center airbag sensor assembly receives an open circuit signal in the front passenger side squib circuit for 2 seconds. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly
B1807/52	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side squib circuit for 0.5 seconds. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly
B1808/52	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side squib circuit for 0.5 seconds. • Front passenger side squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib) • Center airbag sensor assembly

WIRING DIAGRAM



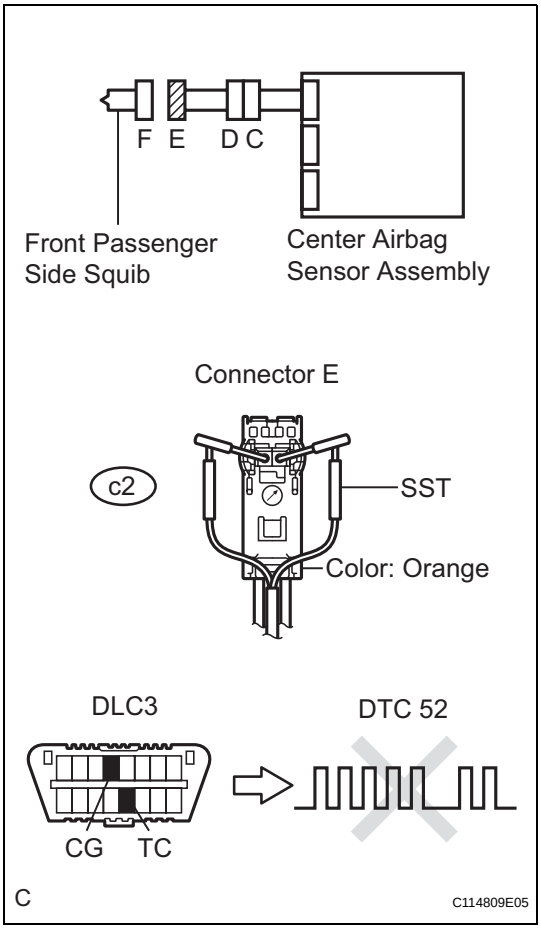
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front passenger airbag assembly.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (orange connector).
CAUTION:
Never connect the tester to the front passenger airbag assembly (front passenger side squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1805, B1806, B1807, B1808, or 52 is not output.
HINT:
Codes other than DTC B1805, B1806, B1807, B1808, and 52 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-392)**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the instrument panel wire assembly connectors (on the front passenger airbag assembly side) are not damaged.

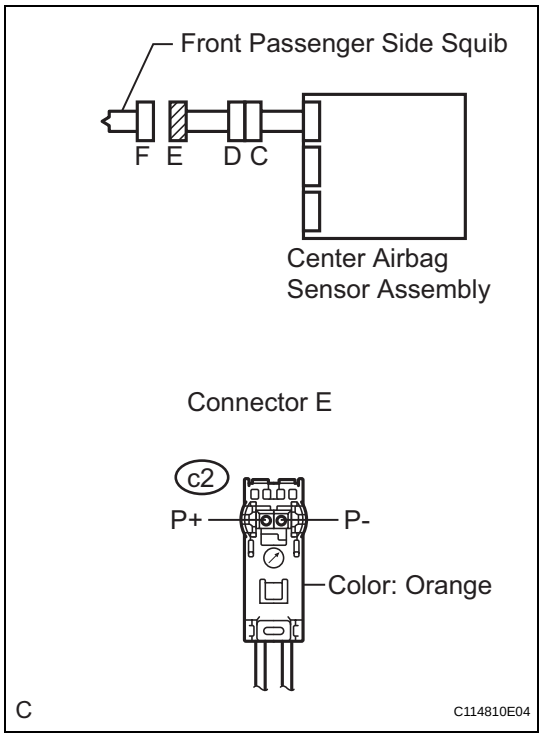
RS

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

3 CHECK FRONT PASSENGER SIDE SQUIB CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.
(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the ignition switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Ignition switch on (IG)	Below 1 V
c2-2 (P-) - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
(1) Turn the ignition switch off.
(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Always	1 MΩ or higher
c2-2 (P-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
(1) Release the activation prevention mechanism built into connector B (See page RS-32).
(2) Measure the resistance according to the value(s) in the table below.
Standard resistance

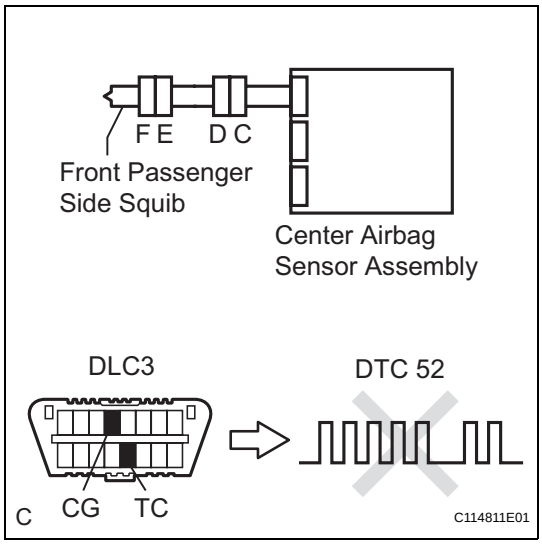
Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	1 MΩ or higher

NG → **Go to step 5**

RS

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front passenger airbag assembly and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1805, B1806, B1807, B1808, or 52 is not output.

HINT:

Codes other than DTC B1805, B1806, B1807, B1808, and 52 may be output at this time, but they are not related to this check.

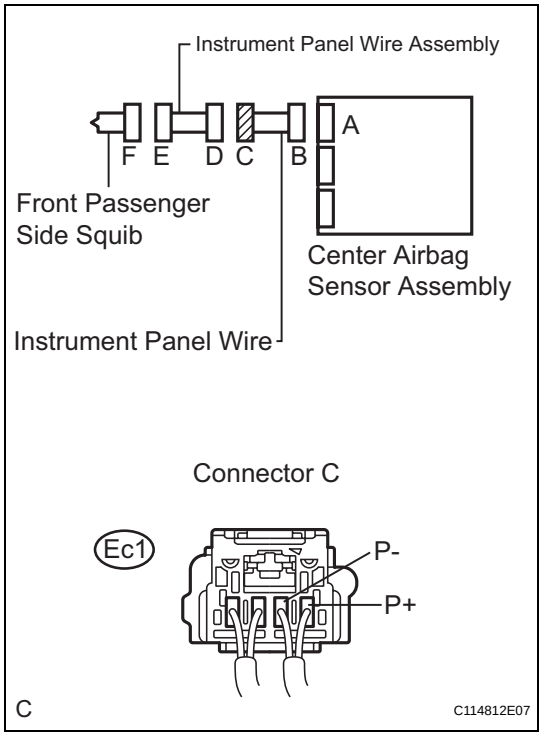
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

RS

USE SIMULATION METHOD TO CHECK (See page RS-32)

5 CHECK INSTRUMENT PANEL WIRE



(a) Restore the released activation prevention mechanism of connector B to the original condition.

(b) Disconnect the instrument panel wire connector from the instrument panel wire assembly.

(c) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the ignition switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Body ground	Ignition switch on (IG)	Below 1 V
Ec1-2 (P-) - Body ground	Ignition switch on (IG)	Below 1 V

(d) Check for an open in the circuit.

(1) Turn the ignition switch off.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Ec1-2 (P-)	Always	Below 1 Ω

(e) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Body ground	Always	1 MΩ or higher
Ec1-2 (P-) - Body ground	Always	1 MΩ or higher

(f) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-32).

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

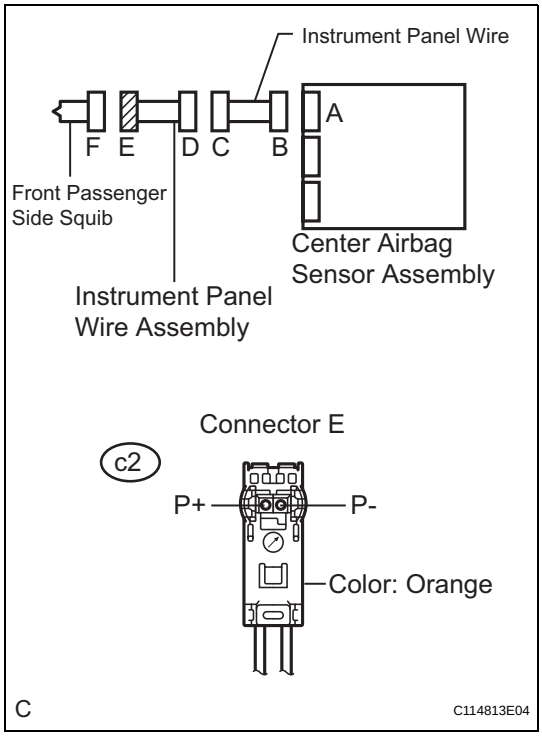
Tester Connection	Condition	Specified Condition
Ec1-1 (P+) - Ec1-2 (P-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

6 CHECK INSTRUMENT PANEL WIRE ASSEMBLY



(a) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Ignition switch on (IG)	Below 1 V
c2-2 (P-) - Body ground	Ignition switch on (IG)	Below 1 V

(b) Check for a open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - Body ground	Always	1 MΩ or higher
c2-2 (P-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector D (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
c2-1 (P+) - c2-2 (P-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

DTC	B1810/53	Short in Driver Side Squib 2nd Step Circuit

DTC	B1811/53	Open in Driver Side Squib 2nd Step Circuit

DTC	B1812/53	Short to GND in Driver Side Squib 2nd Step Circuit

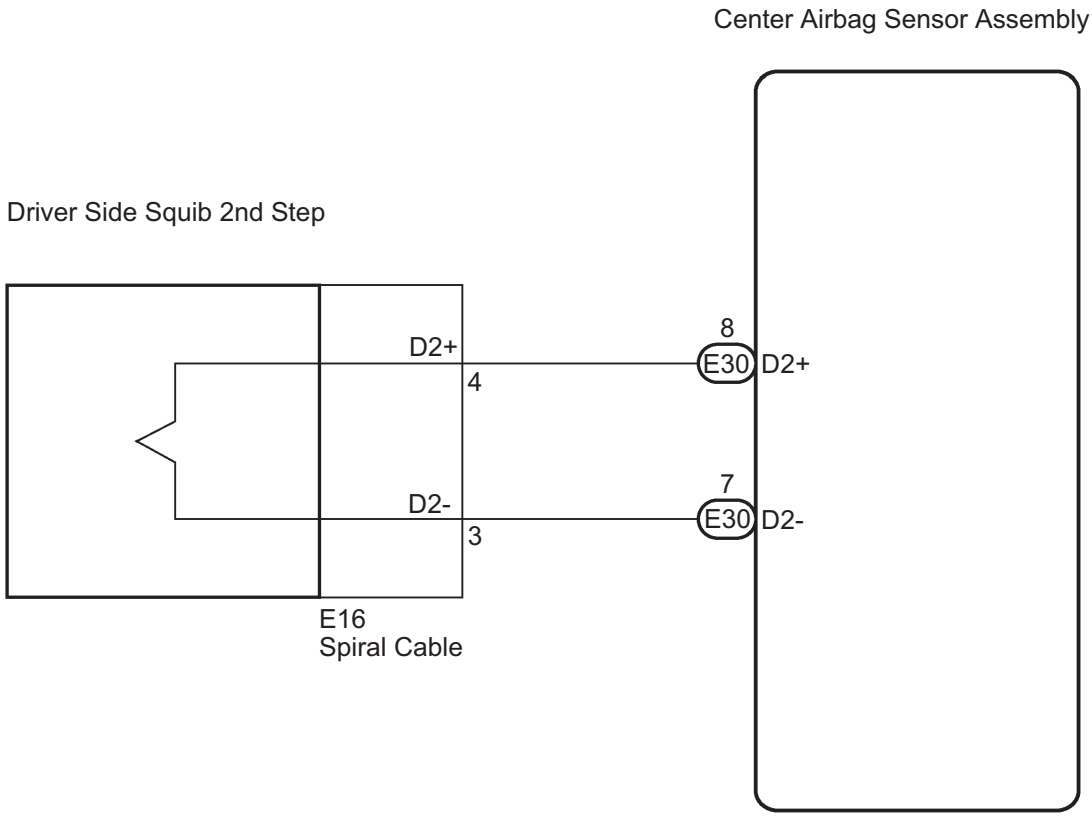
DTC	B1813/53	Short to B+ in Driver Side Squib 2nd Step Circuit

DESCRIPTION

The driver side squib 2nd step circuit consists of the center airbag sensor assembly, the spiral cable, and the steering pad.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side squib 2nd step circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1810/53	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side squib 2nd step circuit during primary check. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly
B1811/53	• The center airbag sensor assembly receives an open circuit signal in the driver side squib 2nd step circuit for 2 seconds. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly
B1812/53	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side 2nd step circuit for 0.5 seconds. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly
B1813/53	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side squib 2nd step circuit for 0.5 seconds. • Driver side squib 2nd step malfunction • Spiral cable malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Spiral cable • Steering pad (Driver side squib 2nd step) • Center airbag sensor assembly

WIRING DIAGRAM



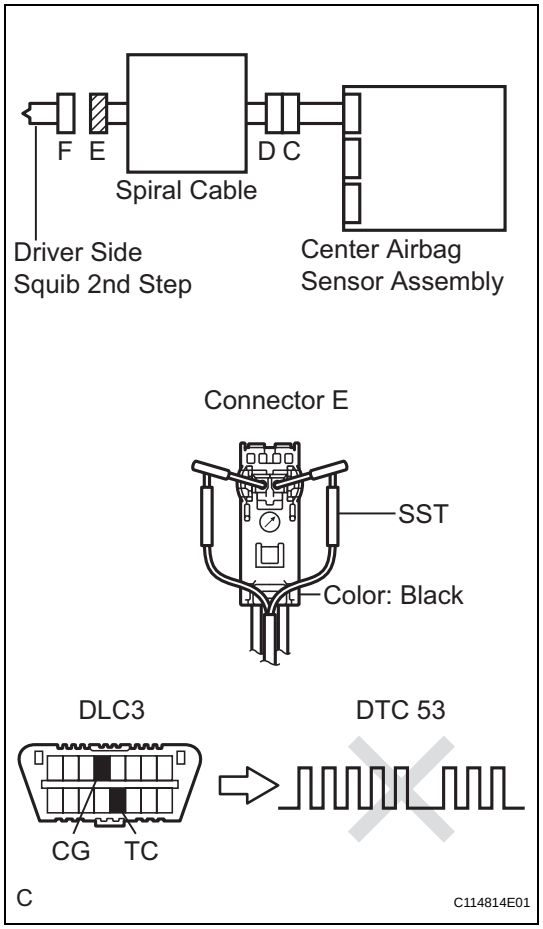
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK STEERING PAD (DRIVER SIDE SQUIB 2ND STEP)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the steering pad.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (black connector).

CAUTION:
Never connect the tester to the steering pad (driver side squib 2nd step) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1810, B1811, B1812, B1813, or 53 is not output.

HINT:
Codes other than DTC B1810, B1811, B1812, B1813, and 53 may be output at this time, but they are not related to this check.

OK → **REPLACE STEERING PAD (See page RS-349)**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the spiral cable connectors (on the steering pad side) are not damaged.

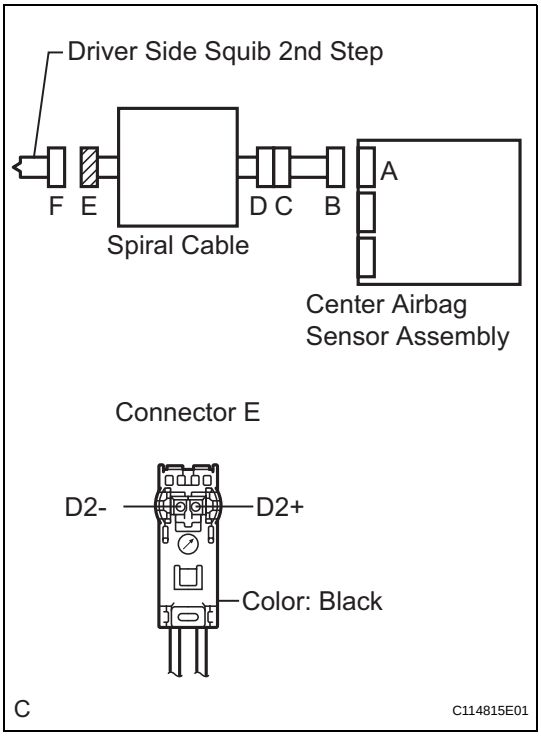
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

RS

NG → REPLACE SPIRAL CABLE (See page RS-363)

OK

3 CHECK DRIVER SIDE SQUIB 2ND STEP CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Ignition switch on (IG)	Below 1 V
D2- - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Always	1 MΩ or higher
D2- - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

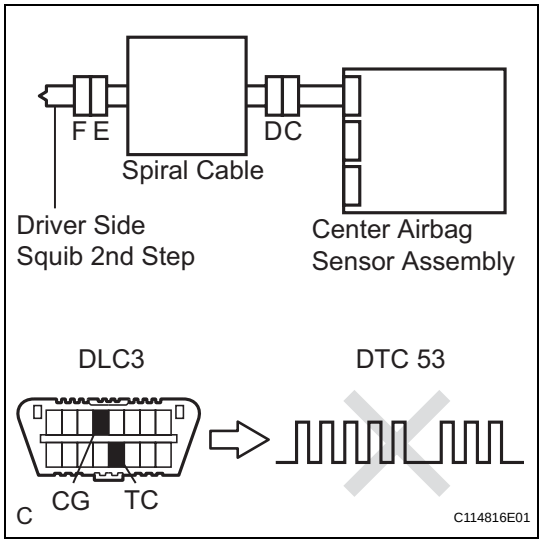
Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	1 MΩ or higher

NG → Go to step 5

OK

RS

4 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the steering pad and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1810, B1811, B1812, B1813, or 53 is not output.

HINT:

Codes other than DTC B1810, B1811, B1812, B1813, and 53 may be output at this time, but they are not related to this check.

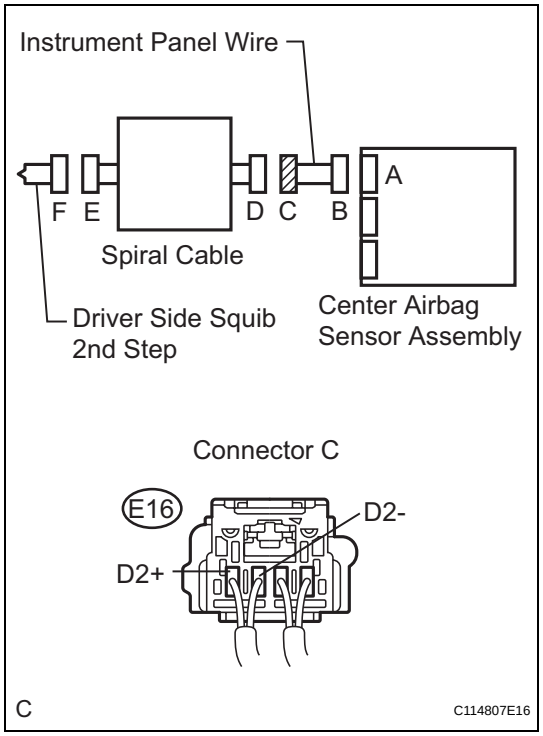
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

5 CHECK INSTRUMENT PANEL WIRE



(a) Check for a short to B+ in the circuit.
  (1) Restore the released activation prevention mechanism of connector B to the original condition.
  (2) Disconnect the instrument panel wire connector from the spiral cable.
  (3) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (4) Turn the ignition switch on (IG).
  (5) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E16-4 (D2+) - Body ground	Ignition switch on (IG)	Below 1 V
E16-3 (D2-) - Body ground	Ignition switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-4 (D2+) - E16-3 (D2-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E16-4 (D2+) - Body ground	Always	1 MΩ or higher
E16-3 (D2-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-32).

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

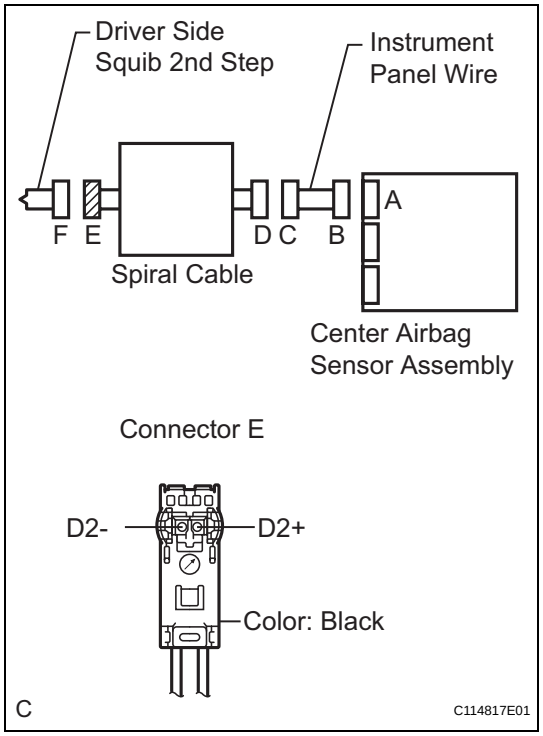
Tester Connection	Condition	Specified Condition
E16-4 (D2+) - E16-3 (D2-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

RS

6 CHECK SPIRAL CABLE



(a) Check for a short to B+ in the circuit.
(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the ignition switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Ignition switch on (IG)	Below 1 V
D2- - Body ground	Ignition switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
(1) Turn the ignition switch off.
(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - Body ground	Always	1 MΩ or higher
D2- - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
(1) Release the activation prevention mechanism built into connector D (See page RS-32).
(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
D2+ - D2-	Always	1 MΩ or higher

NG → **REPLACE SPIRAL CABLE (See page RS-363)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

DTC	B1815/54	Short in Front Passenger Side Squib 2nd Step Circuit

DTC	B1816/54	Open in Front Passenger Side Squib 2nd Step Circuit

DTC	B1817/54	Short to GND in Front Passenger Side Squib 2nd Step Circuit

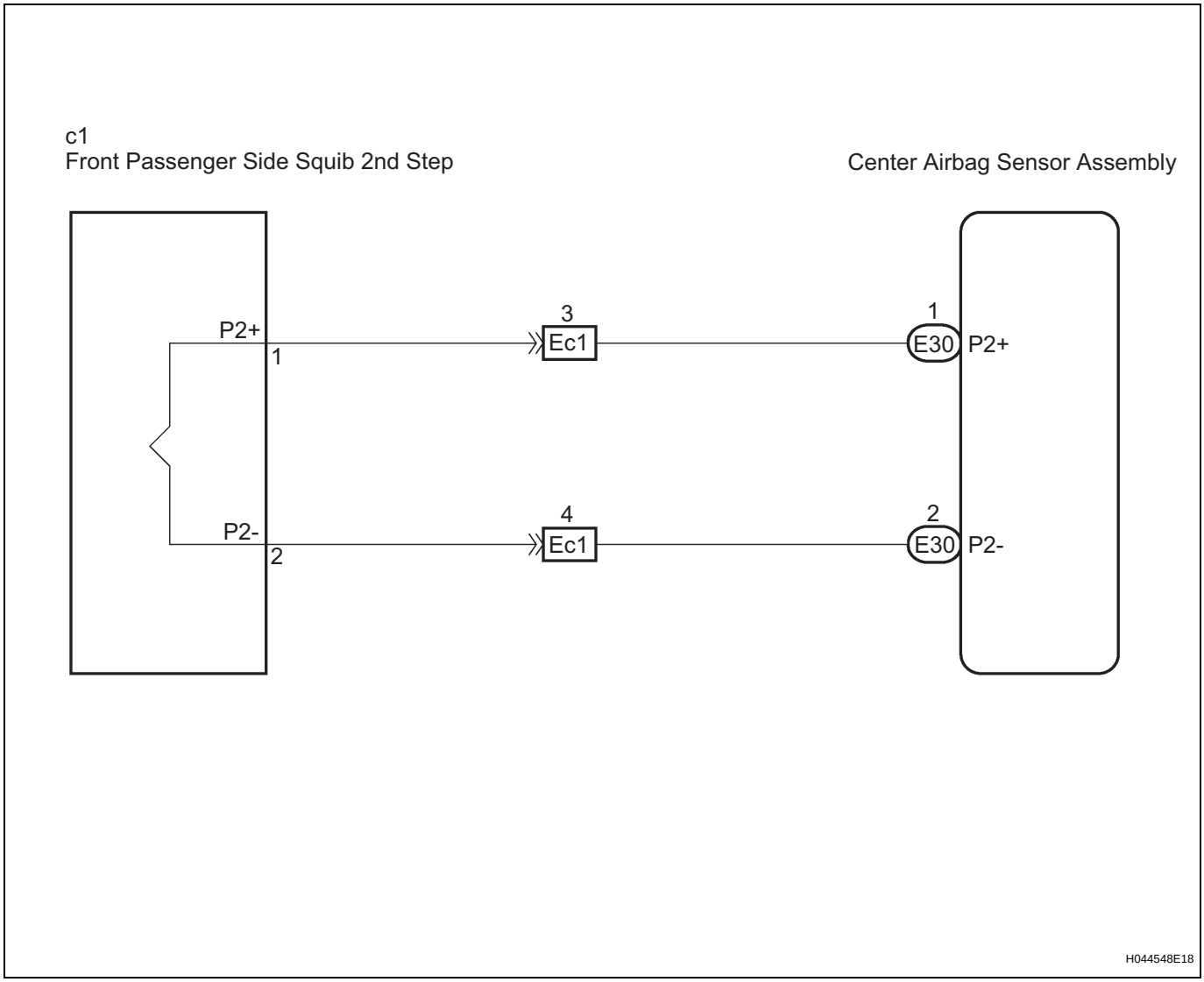
DTC	B1818/54	Short to B+ in Front Passenger Side Squib 2nd Step Circuit

DESCRIPTION

The front passenger side squib 2nd step circuit consists of the center airbag sensor assembly and the front passenger airbag assembly.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front passenger side squib 2nd step circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1815/54	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side squib 2nd step circuit during primary check. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly
B1816/54	• The center airbag sensor assembly receives an open circuit signal in the front passenger side squib 2nd step circuit for 2 seconds. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly
B1817/54	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side squib 2nd step circuit for 0.5 seconds. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly
B1818/54	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side squib 2nd step circuit for 0.5 seconds. • Front passenger side squib 2nd step malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Instrument panel wire assembly • Front passenger airbag assembly (Front passenger side squib 2nd step) • Center airbag sensor assembly

WIRING DIAGRAM



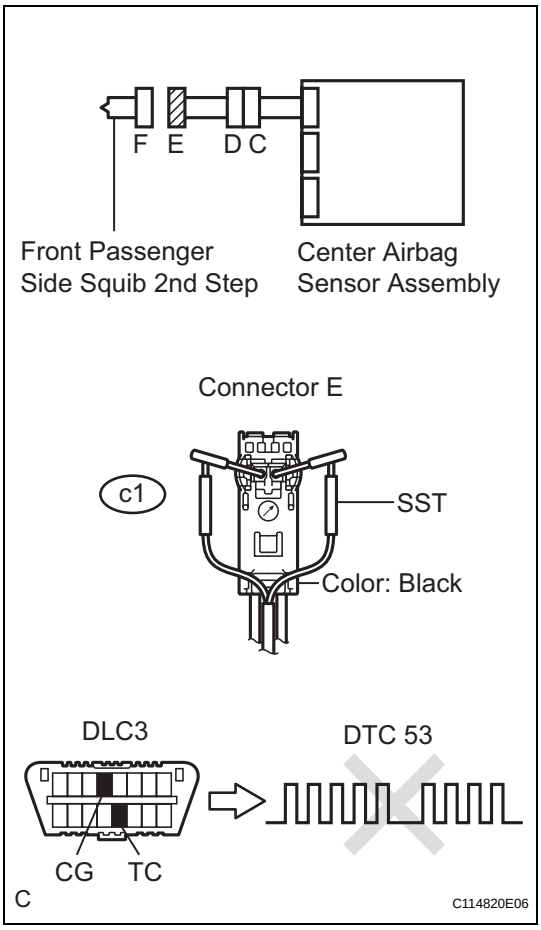
INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

RS

1	CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB 2ND STEP)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front passenger airbag assembly.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector E (black connector).
CAUTION:
Never connect the tester to the front passenger airbag assembly (front passenger side squib 2nd step) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1815, B1816, B1817, B1818, or 54 is not output.
HINT:
Codes other than DTC B1815, B1816, B1817, B1818, and 54 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY (See page RS-392)**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector E.
(d) Check that the instrument panel wire assembly connectors (on the front passenger airbag assembly side) are not damaged.

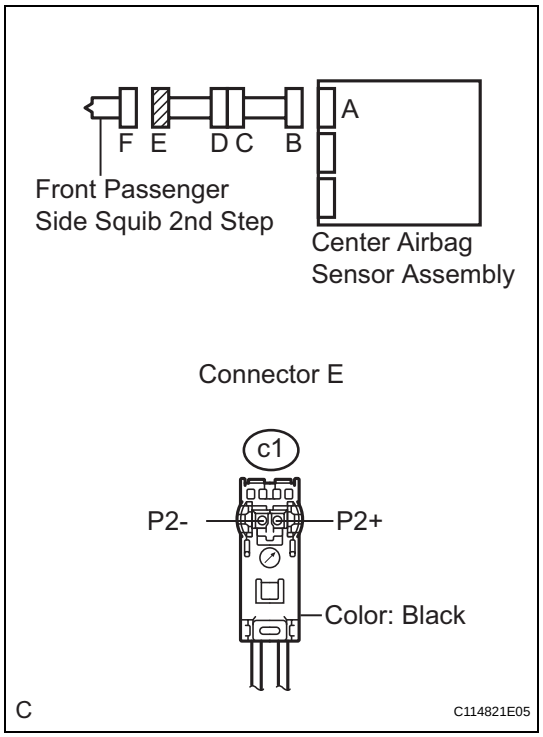
RS

OK:
The lock button is not disengaged, or the claw of the lock is not damaged or deformed.

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

3 CHECK FRONT PASSENGER SIDE SQUIB 2ND STEP CIRCUIT



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.
(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(2) Turn the ignition switch on (IG).
(3) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Ignition switch on (IG)	Below 1 V
c1-2 (P2-) - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
(1) Turn the ignition switch off.
(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(3) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Always	1 MΩ or higher
c1-2 (P2-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
(1) Release the activation prevention mechanism built into connector B (See page RS-32).
(2) Measure the resistance according to the value(s) in the table below.
Standard resistance

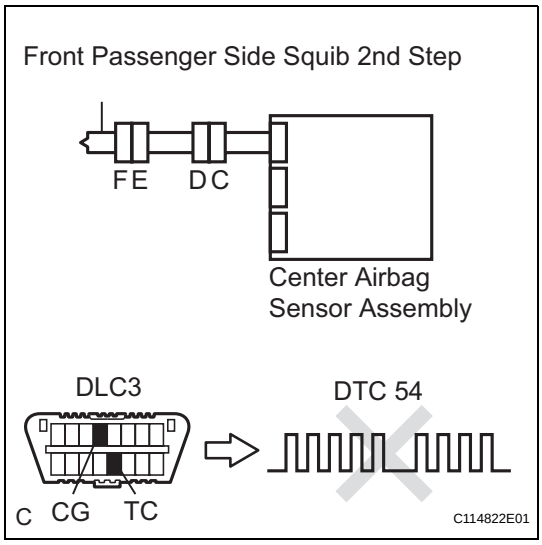
Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	1 MΩ or higher

RS

NG → Go to step 5

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front passenger airbag assembly and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1815, B1816, B1817, B1818, or 54 is not output.

HINT:

Codes other than DTC B1815, B1816, B1817, B1818, and 54 may be output at this time, but they are not related to this check.

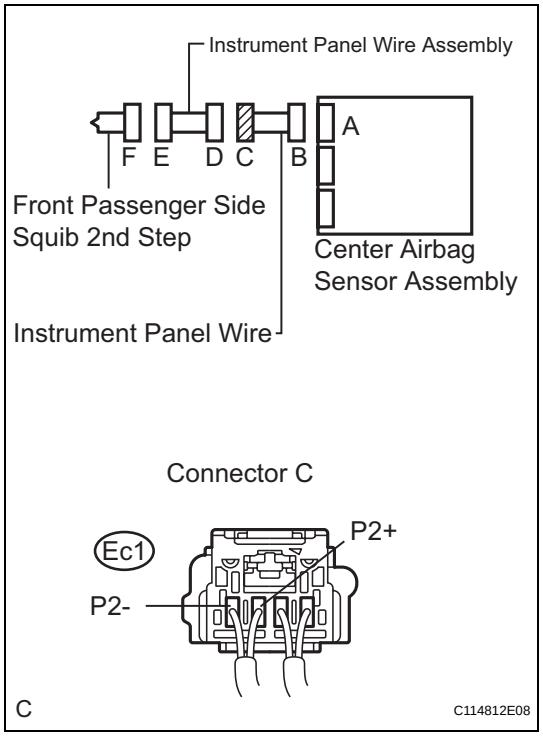
NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

RS

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

5 CHECK INSTRUMENT PANEL WIRE



(a) Check for a short to B+ in the circuit.
  (1) Restore the released activation prevention mechanism of connector B to the original condition.
  (2) Disconnect the instrument panel wire connector from the instrument panel wire assembly.
  (3) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (4) Turn the ignition switch on (IG).
  (5) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
Ec1-3 (P2+) - Body ground	Ignition switch on (IG)	Below 1 V
Ec1-4 (P2-) - Body ground	Ignition switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-3 (P2+) - Ec1-4 (P2-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
Ec1-3 (P2+) - Body ground	Always	1 MΩ or higher
Ec1-4 (P2-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

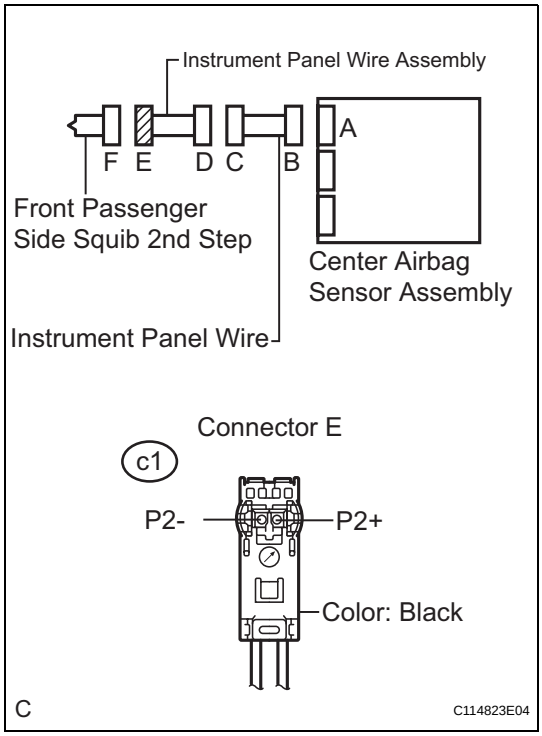
Tester Connection	Condition	Specified Condition
Ec1-3 (P2+) - Ec1-4 (P2-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

RS

6	CHECK INSTRUMENT PANEL WIRE ASSEMBLY



(a) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Ignition switch on (IG)	Below 1 V
c1-2 (P2-) - Body ground	Ignition switch on (IG)	Below 1 V

(b) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	Below 1 Ω

(c) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - Body ground	Always	1 MΩ or higher
c1-2 (P2-) - Body ground	Always	1 MΩ or higher

(d) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector D (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
c1-1 (P2+) - c1-2 (P2-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

DTC	B1820/55	Short in Front Driver Side - Side Squib Circuit

DTC	B1821/55	Open in Front Driver Side - Side Squib Circuit

DTC	B1822/55	Short to GND in Front Driver Side - Side Squib Circuit

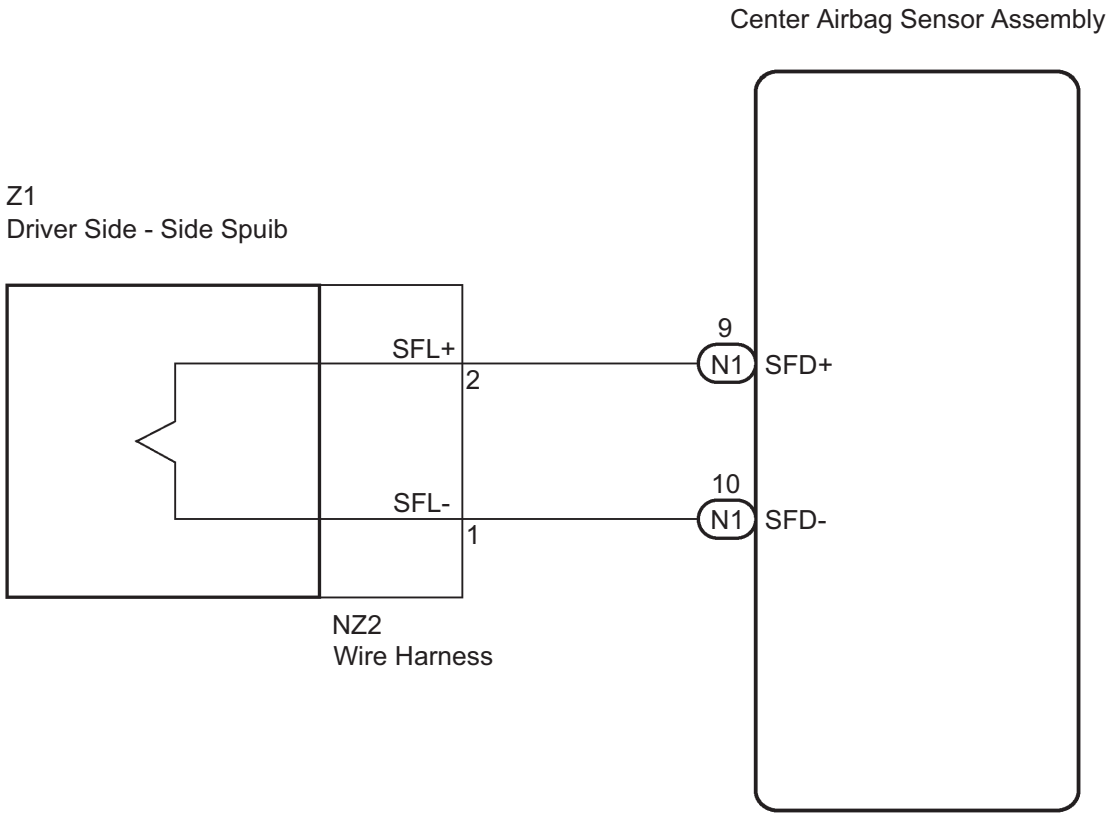
DTC	B1823/55	Short to B+ in Front Driver Side - Side Squib Circuit

DESCRIPTION

The driver side - side squib circuit consists of the center airbag sensor assembly and the front seat side airbag assembly LH.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side - side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1820/55	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side - side squib circuit during primary check. • Driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Driver side - side squib) • Center airbag sensor assembly
B1821/55	• The center airbag sensor assembly receives an open circuit signal in the driver side - side squib circuit for 2 seconds. • Driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Driver side - side squib) • Center airbag sensor assembly
B1822/55	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side - side squib circuit for 0.5 seconds. • Driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Driver side - side squib) • Center airbag sensor assembly
B1823/55	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side - side squib circuit for 0.5 seconds. • Driver side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat side airbag assembly LH (Driver side - side squib) • Center airbag sensor assembly

WIRING DIAGRAM



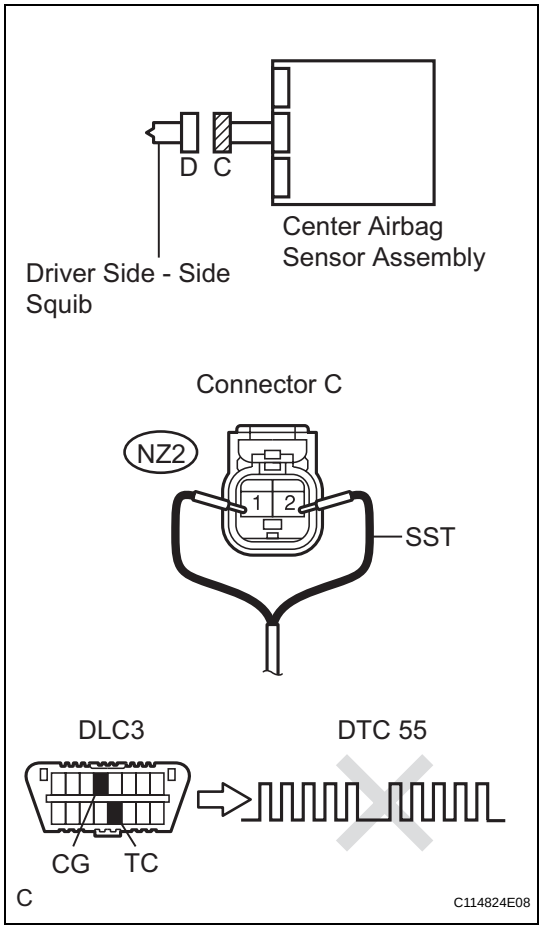
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY LH (DRIVER SIDE - SIDE SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the front seat side airbag assembly LH.
(d) Connect the black wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the front seat side airbag assembly LH (driver side - side squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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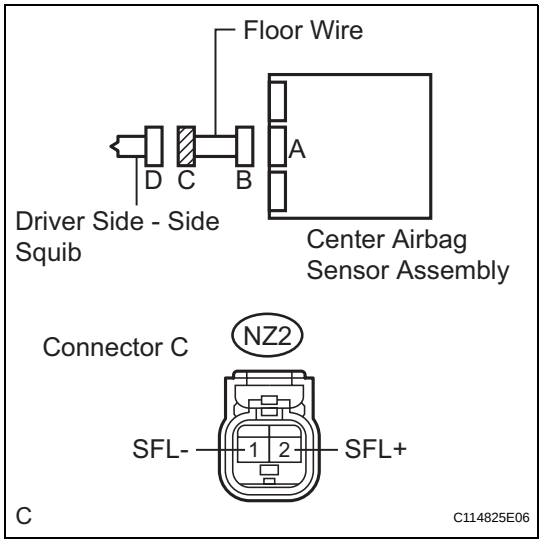
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1820, B1821, B1822, B1823, or 55 is not output.
HINT:
Codes other than DTC B1820, B1821, B1822, B1823, and 55 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT ASSEMBLY LH**

NG

RS

2	CHECK FLOOR WIRE (DRIVER SIDE - SIDE SQUIB CIRCUIT)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Disconnect the connectors from the center airbag sensor assembly.
(e) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - Body ground	Ignition switch on (IG)	Below 1 V
NZ2-1 (SFL-) - Body ground	Ignition switch on (IG)	Below 1 V

(f) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - NZ2-1 (SFL-)	Always	Below 1 Ω

(g) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - Body ground	Always	1 MΩ or higher
NZ2-1 (SFL-) - Body ground	Always	1 MΩ or higher

(h) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

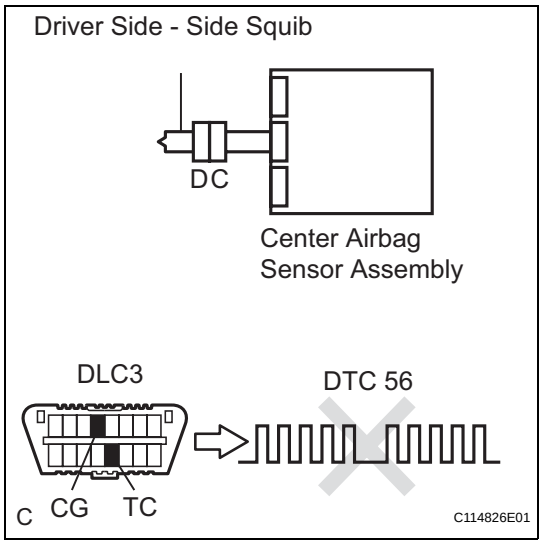
Tester Connection	Condition	Specified Condition
NZ2-2 (SFL+) - NZ2-1 (SFL-)	Always	1 MΩ or higher

NG	REPAIR OR REPLACE FLOOR WIRE

RS

OK

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat side airbag assembly LH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1820, B1821, B1822, B1823, or 55 is not output.

HINT:

Codes other than DTC B1820, B1821, B1822, B1823, and 55 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

DTC	B1825/56	Short in Front Passenger Side - Side Squib Circuit

DTC	B1826/56	Open in Front Passenger Side - Side Squib Circuit

DTC	B1827/56	Short to GND in Front Passenger Side - Side Squib Circuit

DTC	B1828/56	Short to B+ in Front Passenger Side - Side Squib Circuit

DESCRIPTION

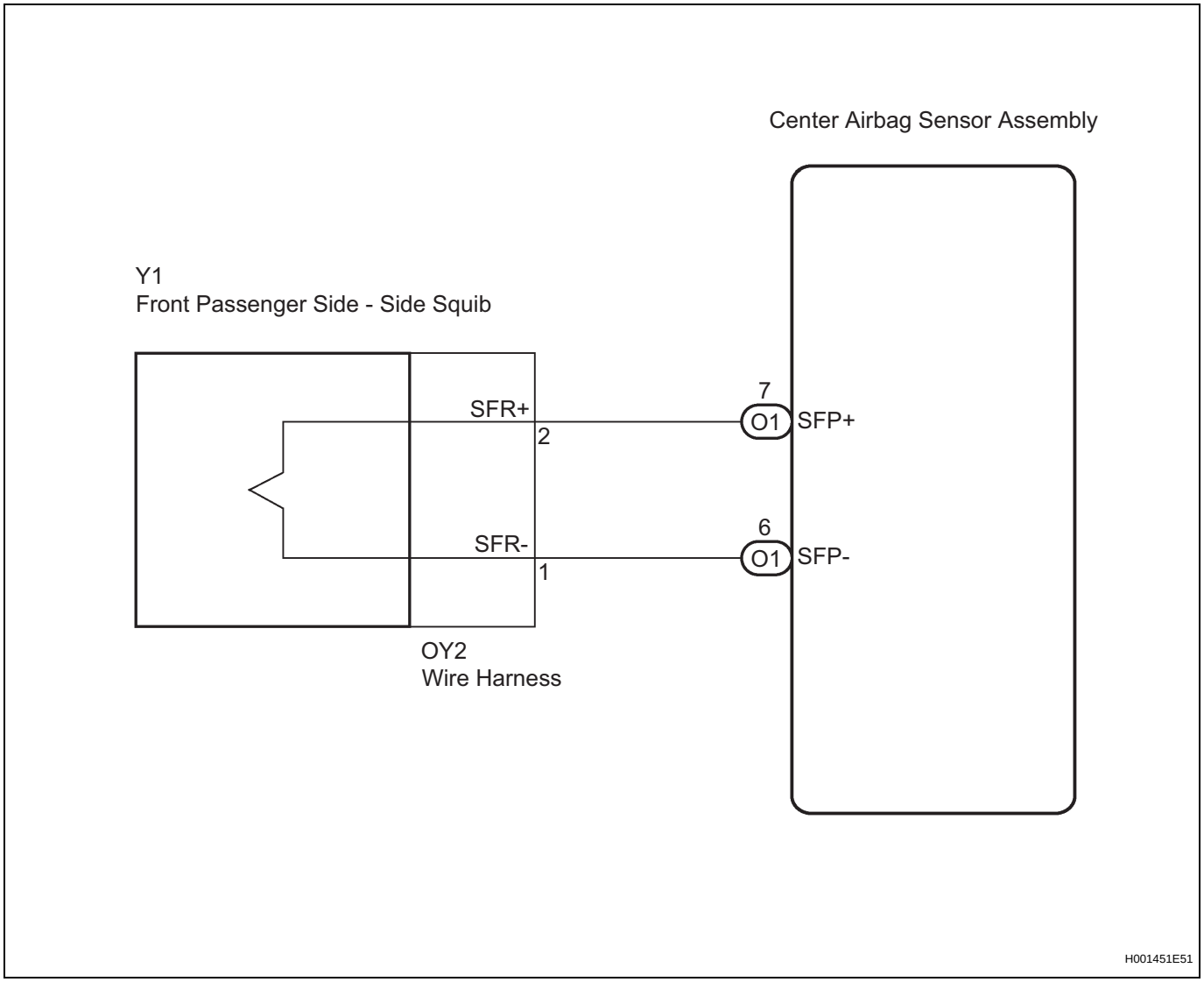
The front passenger side - side squib circuit consists of the center airbag sensor assembly and the front seat side airbag assembly RH.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side - side squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1825/56	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side - side squib circuit during primary check. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly
B1826/56	• The center airbag sensor assembly receives an open circuit signal in the front passenger side - side squib circuit for 2 seconds. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly
B1827/56	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side - side squib circuit for 0.5 seconds. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly
B1828/56	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side - side squib circuit for 0.5 seconds. • Front passenger side - side squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat side airbag assembly RH (Front passenger side - side squib) • Center airbag sensor assembly

WIRING DIAGRAM



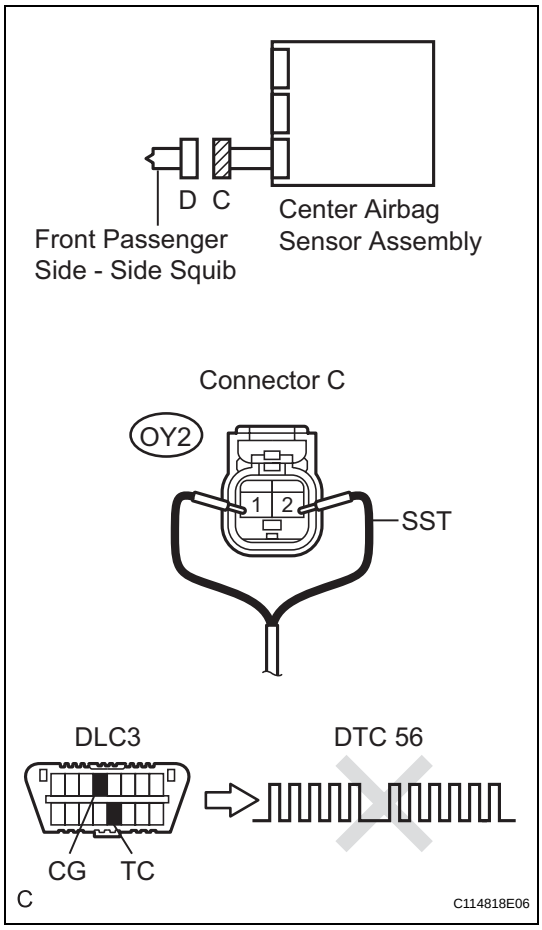
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY RH (FRONT PASSENGER SIDE - SIDE SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the front seat side airbag assembly RH.
(d) Connect the black wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the front seat side airbag assembly RH (front passenger side - side squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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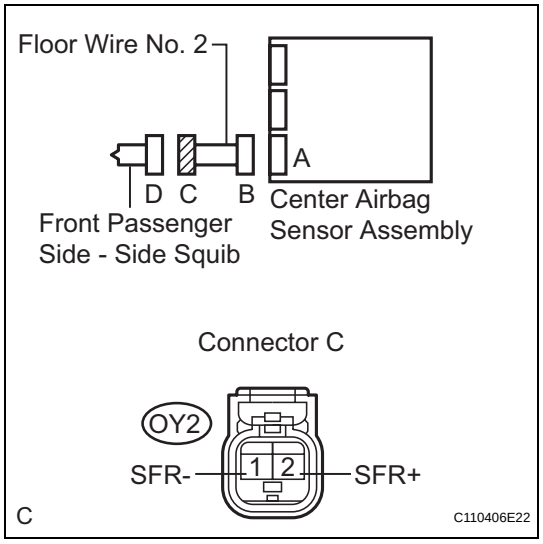
(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1825, B1826, B1827, B1828, or 56 is not output.
HINT:
Codes other than DTC B1825, B1826, B1827, B1828, and 56 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT ASSEMBLY RH**

NG

RS

2 CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE - SIDE SQUIB CIRCUIT)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Disconnect the connectors from the center airbag sensor assembly.
(e) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
OY2-2 (SFR+) - Body ground	Ignition switch on (IG)	Below 1 V
OY2-1 (SFR-) - Body ground	Ignition switch on (IG)	Below 1 V

(f) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
OY2-2 (SFR+) - OY2-1 (SFR-)	Always	Below 1 Ω

(g) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
OY2-2 (SFR+) - Body ground	Always	1 MΩ or higher
OY2-1 (SFR-) - Body ground	Always	1 MΩ or higher

(h) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.

Standard resistance

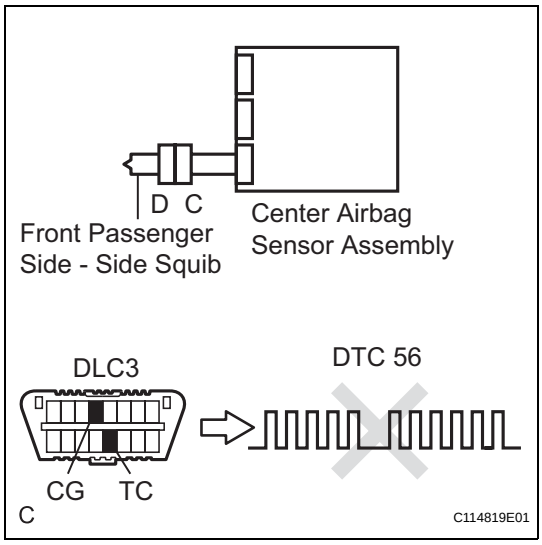
Tester Connection	Condition	Specified Condition
OY2-2 (SFR+) - OY2-1 (SFR-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

RS

OK

3	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat side airbag assembly RH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1825, B1826, B1827, B1828, or 56 is not output.

HINT:

Codes other than DTC B1825, B1826, B1827, B1828, and 56 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

RS

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1830/57	Short in Driver Side Curtain Shield Squib Circuit

DTC	B1831/57	Open in Driver Side Curtain Shield Squib Circuit

DTC	B1832/57	Short to GND in Driver Side Curtain Shield Squib Circuit

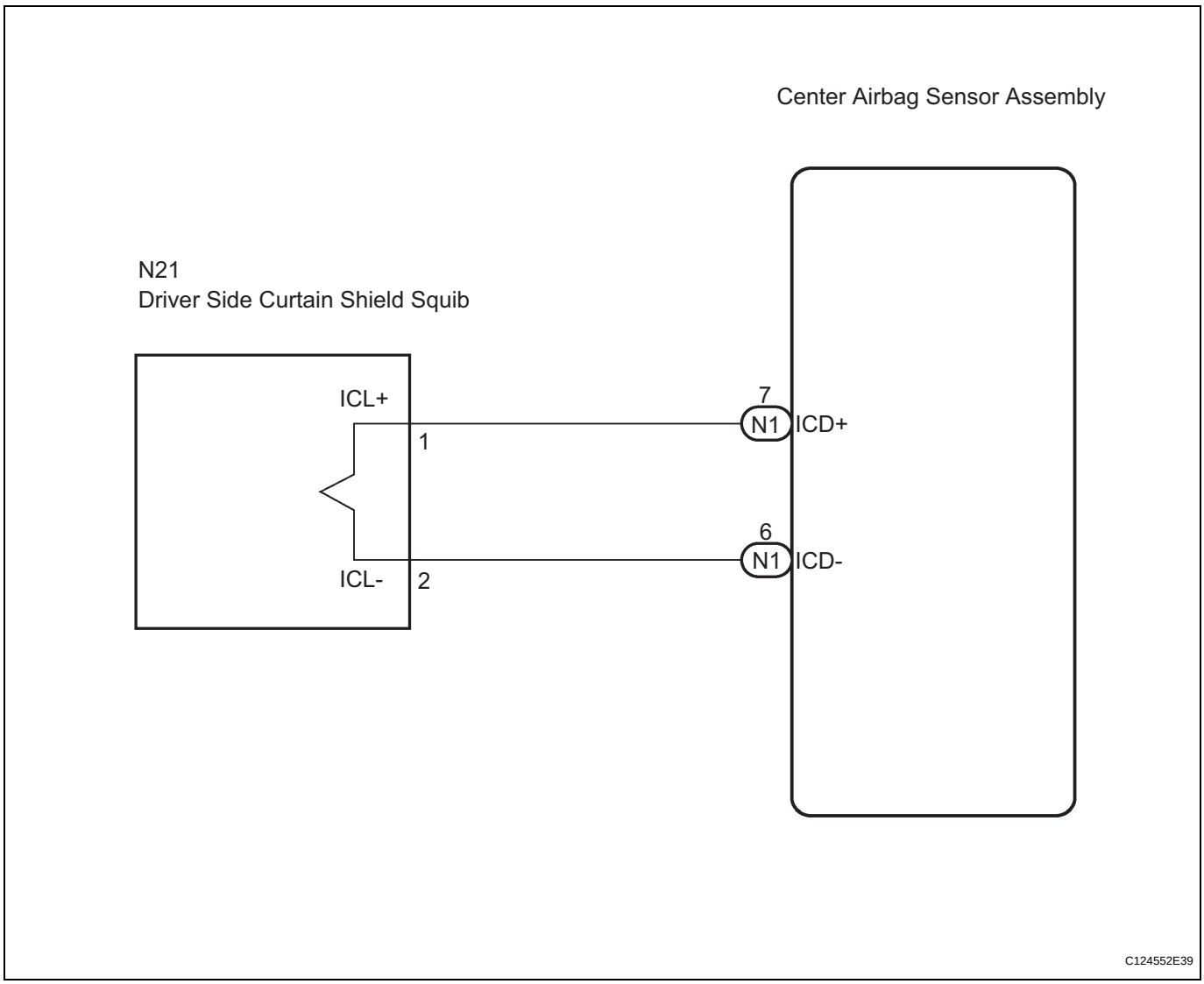
DTC	B1833/57	Short to B+ in Driver Side Curtain Shield Squib Circuit

DESCRIPTION

The driver side curtain shield squib circuit consists of the center airbag sensor assembly and the curtain shield airbag assembly LH.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side curtain shield squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1830/57	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side curtain shield squib circuit during primary check. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly
B1831/57	• The center airbag sensor assembly receives an open circuit signal in the driver side curtain shield squib circuit for 2 seconds. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly
B1832/57	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side curtain shield squib circuit for 0.5 seconds. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly
B1833/57	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side curtain shield squib circuit for 0.5 seconds. • Driver side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Curtain shield airbag assembly LH (Driver side curtain shield squib) • Center airbag sensor assembly

WIRING DIAGRAM



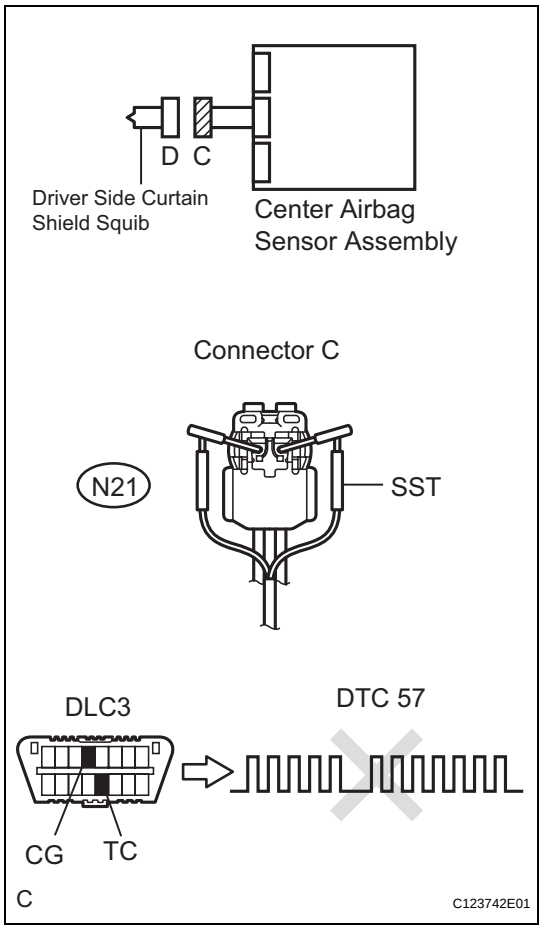
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY LH (DRIVER SIDE CURTAIN SHIELD SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the curtain shield airbag assembly LH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the curtain shield airbag assembly LH (driver side curtain shield squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1830, B1831, B1832, B1833, or 57 is not output.
HINT:
Codes other than DTC B1830, B1831, B1832, B1833, and 57 may be output at this time, but they are not related to this check.

OK → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY LH (See page RS-416)**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire connector (on the curtain shield airbag assembly LH side) is not damaged.

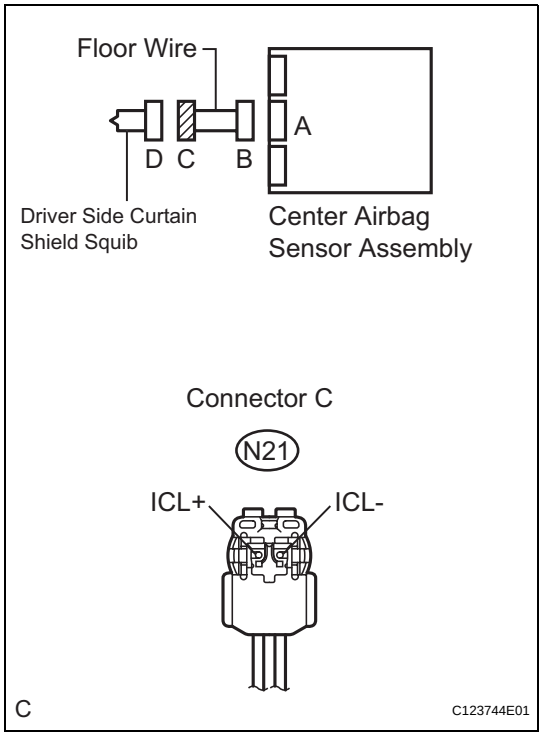
RS

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3 CHECK FLOOR WIRE (DRIVER SIDE CURTAIN SHIELD SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
  (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
  (2) Turn the ignition switch on (IG).
  (3) Measure the voltage according to the value(s) in the table below.
  Standard voltage

Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - Body ground	Ignition switch on (IG)	Below 1 V
N21-2 (ICL-) - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
  (1) Turn the ignition switch off.
  (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
  (3) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - N21-2 (ICL-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
  (1) Measure the resistance according to the value(s) in the table below.
  Standard resistance

Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - Body ground	Always	1 MΩ or higher
N21-2 (ICL-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
  (1) Release the activation prevention mechanism built into connector B (See page RS-32).
  (2) Measure the resistance according to the value(s) in the table below.
  Standard resistance

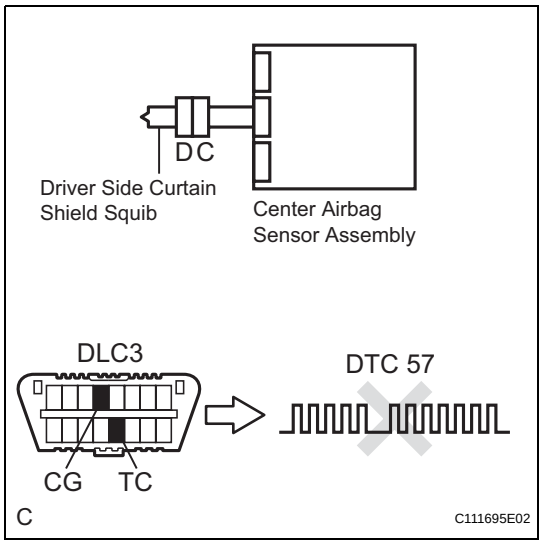
Tester Connection	Condition	Specified Condition
N21-1 (ICL+) - N21-2 (ICL-)	Always	1 MΩ or higher

RS

NG → REPAIR OR REPLACE FLOOR WIRE

OK

4 CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the curtain shield airbag assembly LH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1830, B1831, B1832, B1833, or 57 is not output.

HINT:

Codes other than DTC B1830, B1831, B1832, B1833, and 57 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1835/58	Short in Front Passenger Side Curtain Shield Squib Circuit

DTC	B1836/58	Open in Front Passenger Side Curtain Shield Squib Circuit

DTC	B1837/58	Short to GND in Front Passenger Side Curtain Shield Squib Circuit

DTC	B1838/58	Short to B+ in Front Passenger Side Curtain Shield Squib Circuit

DESCRIPTION

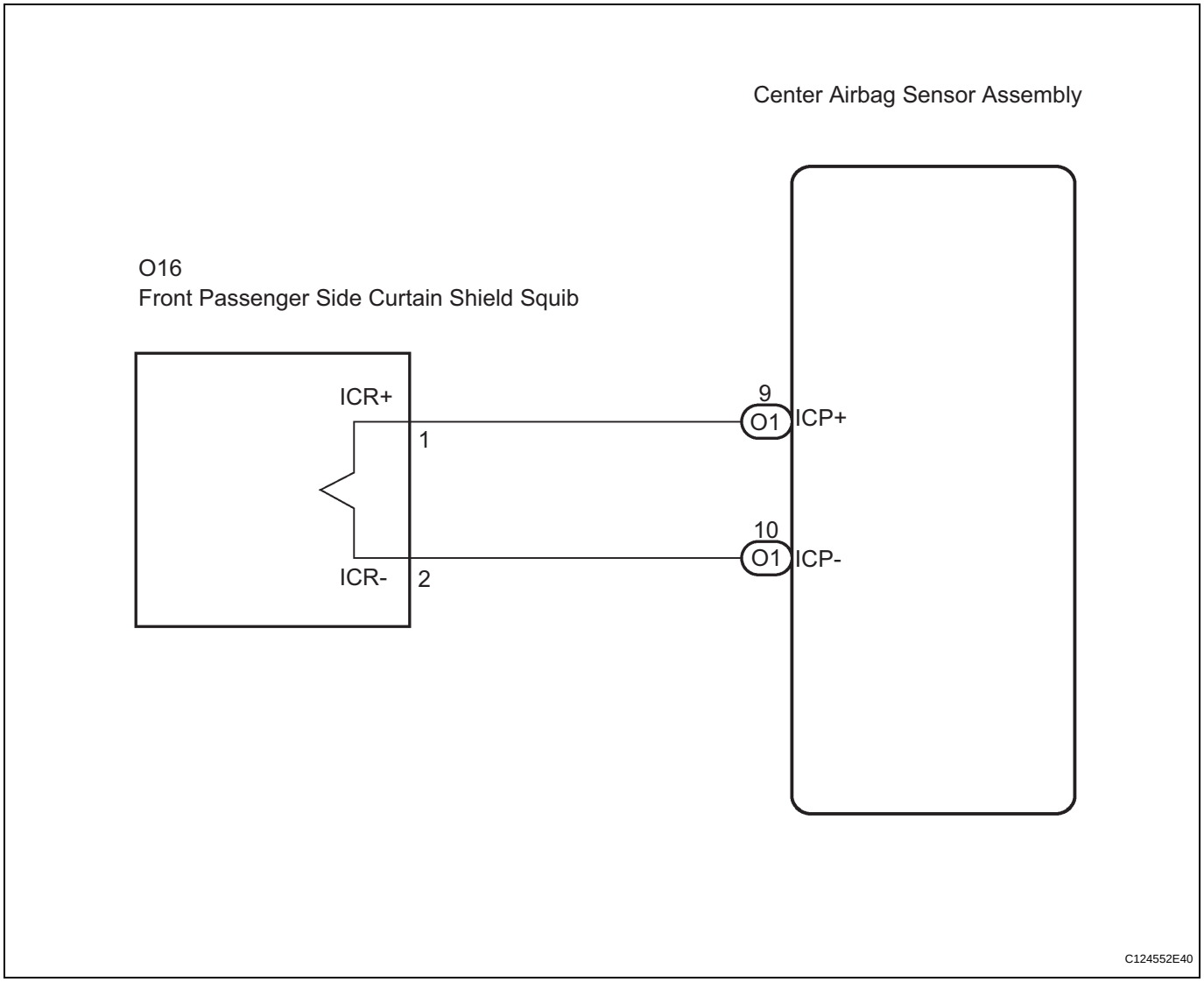
The front passenger side curtain shield squib circuit consists of the center airbag sensor assembly and the curtain shield airbag assembly RH.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side curtain shield squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1835/58	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side curtain shield squib circuit during primary check. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly
B1836/58	• The center airbag sensor assembly receives an open circuit signal in the front passenger side curtain shield squib circuit for 2 seconds. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly
B1837/58	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side curtain shield squib circuit for 0.5 seconds. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly
B1838/58	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side curtain shield squib circuit for 0.5 seconds. • Front passenger side curtain shield squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Curtain shield airbag assembly RH (Front passenger side curtain shield squib) • Center airbag sensor assembly

WIRING DIAGRAM



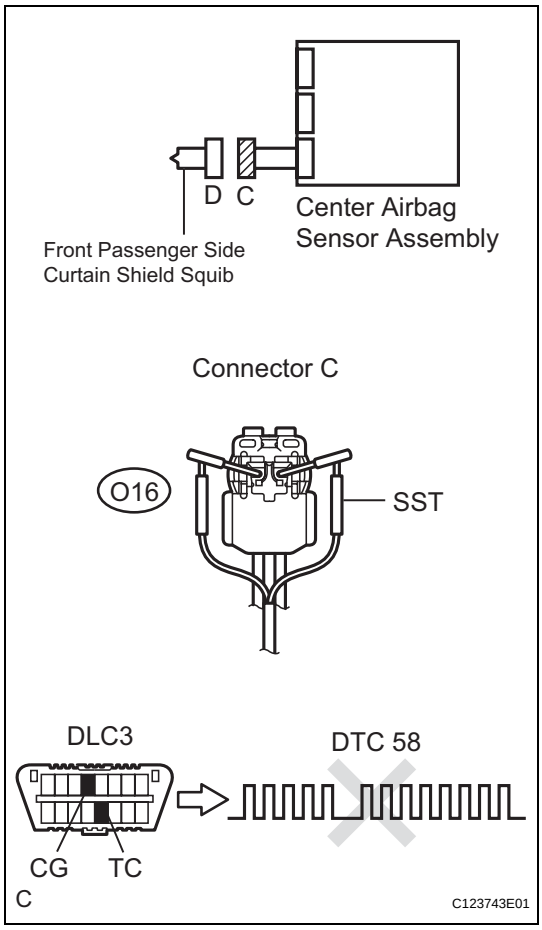
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK CURTAIN SHIELD AIRBAG ASSEMBLY RH (FRONT PASSENGER SIDE CURTAIN SHIELD SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the curtain shield airbag assembly RH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the curtain shield airbag assembly RH (front passenger side curtain shield squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1835, B1836, B1837, B1838, or 58 is not output.
HINT:
Codes other than DTC B1835, B1836, B1837, B1838, and 58 may be output at this time, but they are not related to this check.

OK → **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY RH (See page RS-416)**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire No. 2 connectors (on the curtain shield airbag assembly RH side) are not damaged.

RS

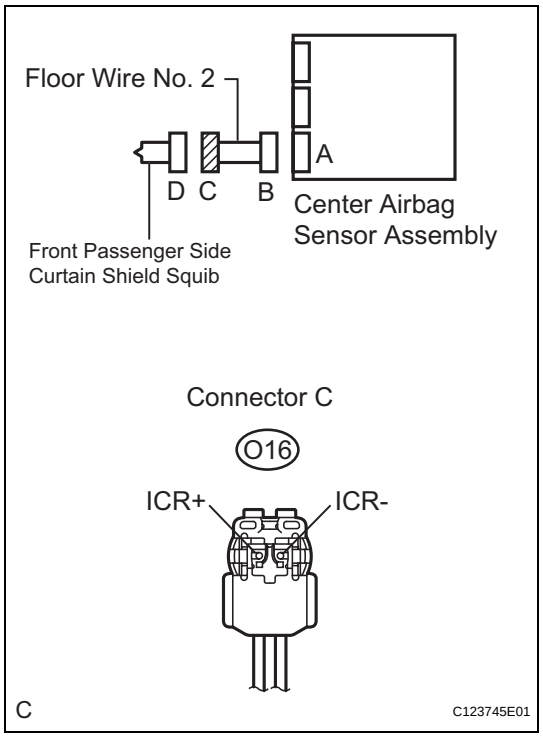
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

3	CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE CURTAIN SHIELD SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the ignition switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - Body ground	Ignition switch on (IG)	Below 1 V
O16-2 (ICR-) - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.

(1) Turn the ignition switch off.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - O16-2 (ICR-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - Body ground	Always	1 MΩ or higher
O16-2 (ICR-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-32).

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

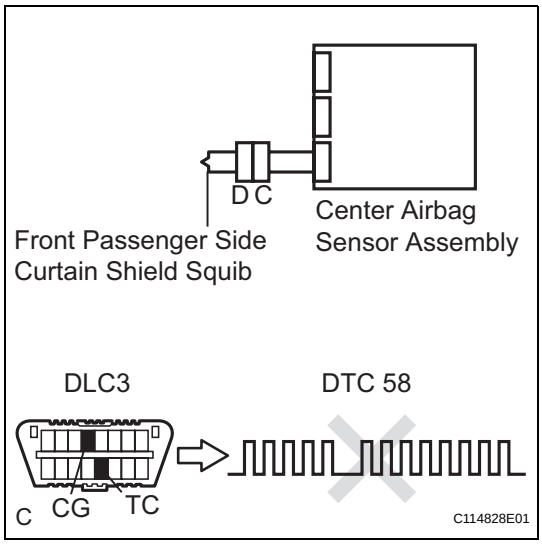
Tester Connection	Condition	Specified Condition
O16-1 (ICR+) - O16-2 (ICR-)	Always	1 MΩ or higher

RS

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the curtain shield airbag assembly RH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1835, B1836, B1837, B1838, or 58 is not output.

HINT:

Codes other than DTC B1835, B1836, B1837, B1838, and 58 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

RS

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1860/64	Short in Driver Side Knee Airbag Squib Circuit

DTC	B1861/64	Open in Driver Side Knee Airbag Squib Circuit

DTC	B1862/64	Short to GND in Driver Side Knee Airbag Squib Circuit

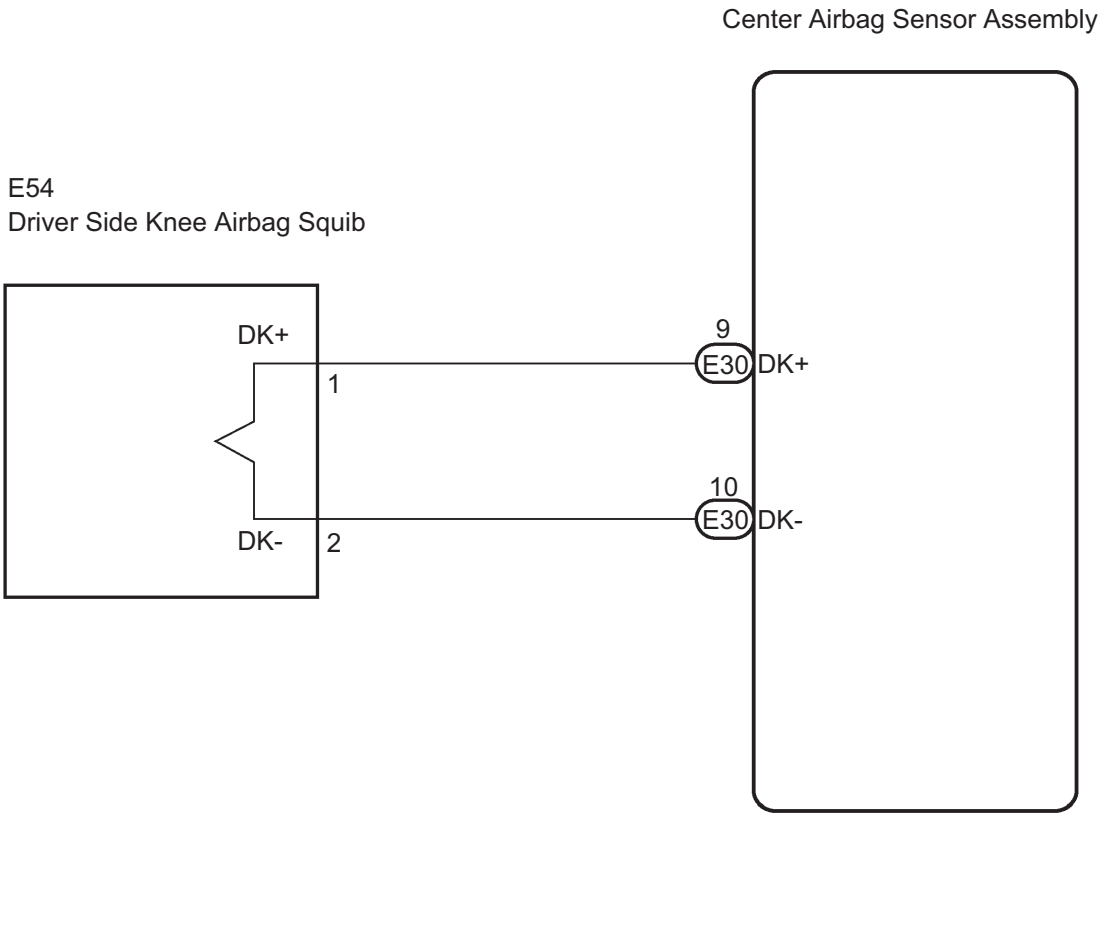
DTC	B1863/64	Short to B+ in Driver Side Knee Airbag Squib Circuit

DESCRIPTION

The driver side knee airbag squib circuit consists of the center airbag sensor assembly and the driver side knee airbag assembly.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side knee airbag squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1860/64	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side knee airbag squib circuit during primary check. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly
B1861/64	• The center airbag sensor assembly receives an open circuit signal in the driver side knee airbag squib circuit for 2 seconds. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly
B1862/64	• he airbag sensor assembly center receives a short circuit to ground signal in the knee airbag (D side) squib circuit for 0.5 seconds. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly
B1863/64	• The airbag sensor assembly center receives a short circuit to B+ signal in the knee airbag (D side) squib circuit for 0.5 seconds. • Driver side knee airbag squib malfunction • Center airbag sensor assembly malfunction	• Instrument panel wire • Driver side knee airbag assembly (Driver side knee airbag squib) • Center airbag sensor assembly

WIRING DIAGRAM



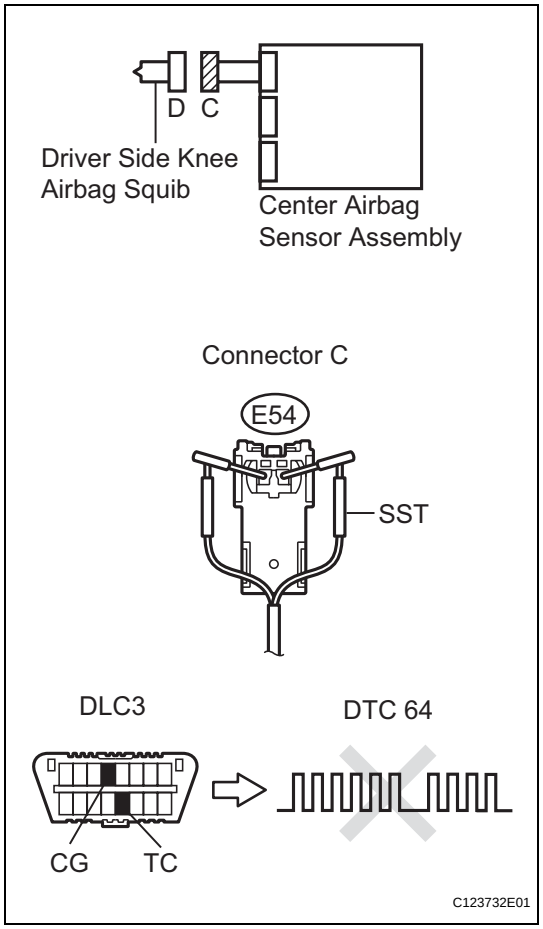
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK DRIVER SIDE KNEE AIRBAG ASSEMBLY (DRIVER SIDE KNEE AIRBAG SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the driver side knee airbag assembly.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.

CAUTION:
Never connect the tester to the driver side knee airbag assembly (driver side knee airbag squib) for measurement, as this may lead to a serious injury due to airbag deployment.

NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1860, B1861, B1862, B1863, or 64 is not output.

HINT:
Codes other than DTC B1860, B1861, B1862, B1863, and 64 may be output at this time, but they are not related to this check.

OK → **REPLACE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-369)**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the instrument panel wire connector (on the driver side knee airbag assembly side) is not damaged.

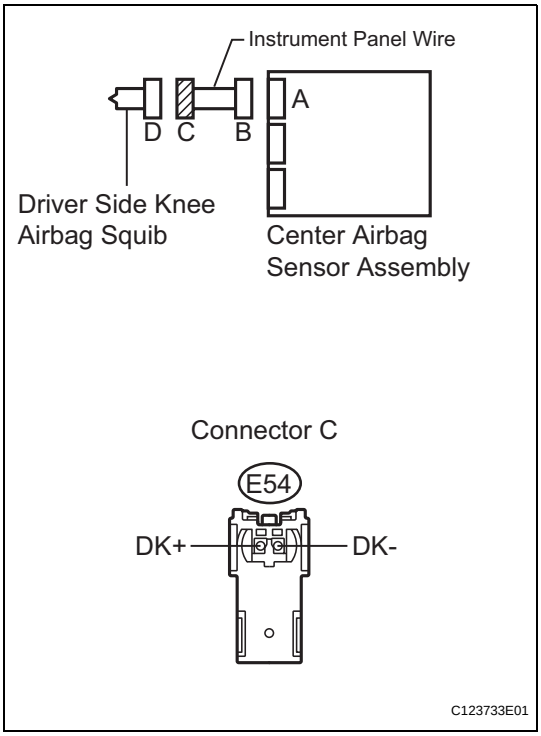
OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

RS

NG → REPAIR OR REPLACE INSTRUMENT PANEL WIRE

OK

3 CHECK INSTRUMENT PANEL WIRE (DRIVER SIDE KNEE AIRBAG SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the ignition switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E54-1 (DK+) - Body ground	Ignition switch on (IG)	Below 1 V
E54-2 (DK-) - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.

(1) Turn the ignition switch off.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E54-1 (DK+) - E54-2 (DK-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
E54-1 (DK+) - Body ground	Always	1 MΩ or higher
E54-2 (DK-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-32).

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

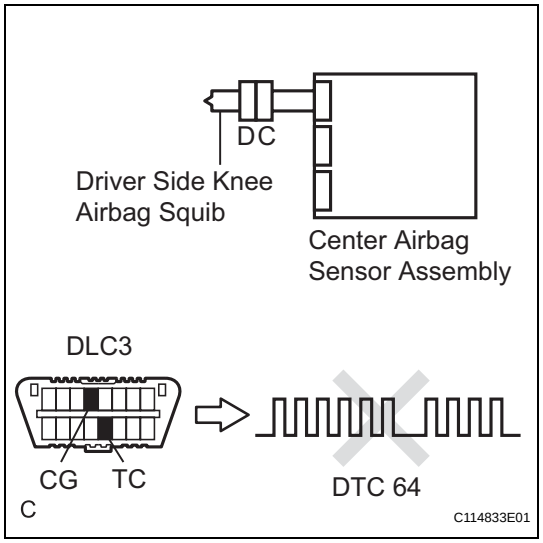
Tester Connection	Condition	Specified Condition
E54-1 (DK+) - E54-2 (DK-)	Always	1 MΩ or higher

RS

NG → **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the driver side knee airbag assembly and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the stored DTCs in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1860, B1861, B1862, B1863, or 64 is not output.

HINT:

Codes other than DTC B1860, B1861, B1862, B1863, and 64 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

USE SIMULATION METHOD TO CHECK (See page RS-32)

RS

DTC	B1900/73	Short in Driver Side Front Pretensioner Squib Circuit

DTC	B1901/73	Open in Driver Side Front Pretensioner Squib Circuit

DTC	B1902/73	Short to GND in Driver Side Front Pretensioner Squib Circuit

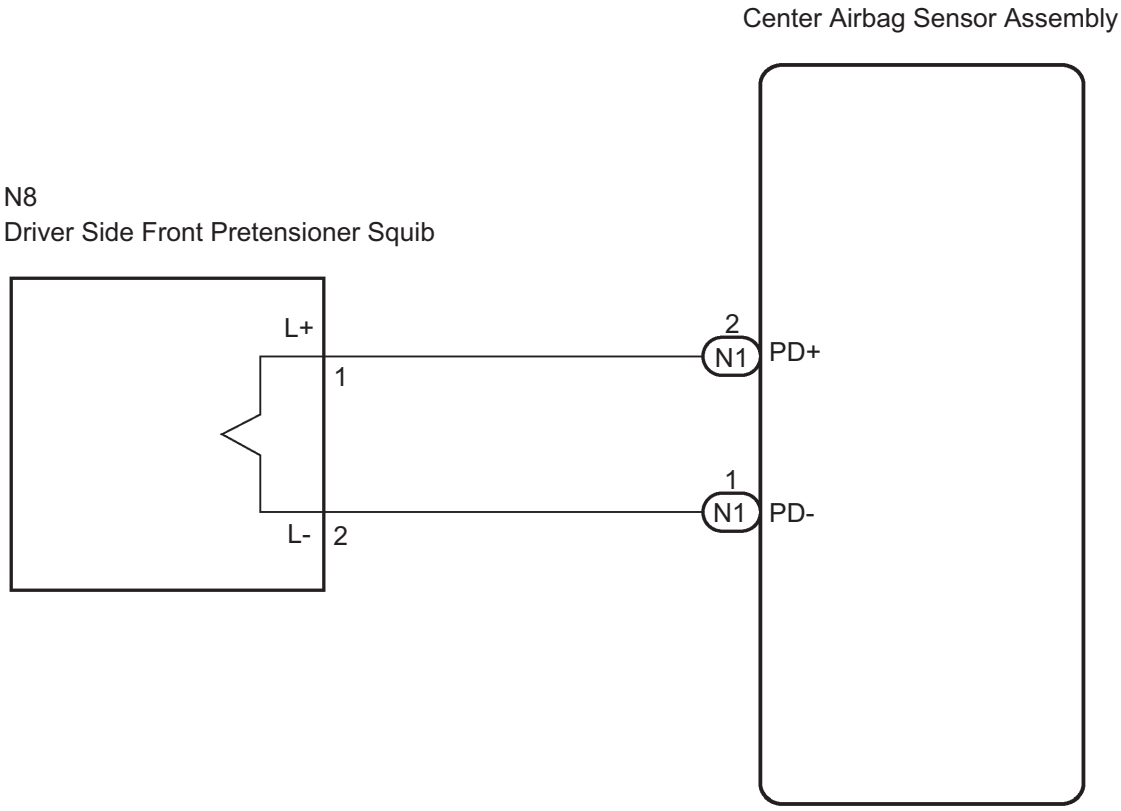
DTC	B1903/73	Short to B+ in Driver Side Front Pretensioner Squib Circuit

DESCRIPTION

The driver side front pretensioner squib circuit consists of the center airbag sensor assembly and the front seat outer belt assembly LH.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front pretensioner squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1900/73	• The center airbag sensor assembly receives a line short circuit signal 5 times in the driver side front pretensioner squib circuit during primary check. • Driver side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Driver side front pretensioner squib) • Center airbag sensor assembly
B1901/73	• The center airbag sensor assembly receives an open circuit signal in the driver side front pretensioner squib circuit for 2 seconds. • Driver side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Driver side front pretensioner squib) • Center airbag sensor assembly
B1902/73	• The center airbag sensor assembly receives a short circuit to ground signal in the driver side front pretensioner squib circuit for 0.5 seconds. • Driver side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Driver side front pretensioner squib) • Center airbag sensor assembly
B1903/73	• The center airbag sensor assembly receives a short circuit to B+ signal in the driver side front pretensioner squib circuit for 0.5 seconds. • Driver side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire • Front seat outer belt assembly LH (Driver side front pretensioner squib) • Center airbag sensor assembly

WIRING DIAGRAM



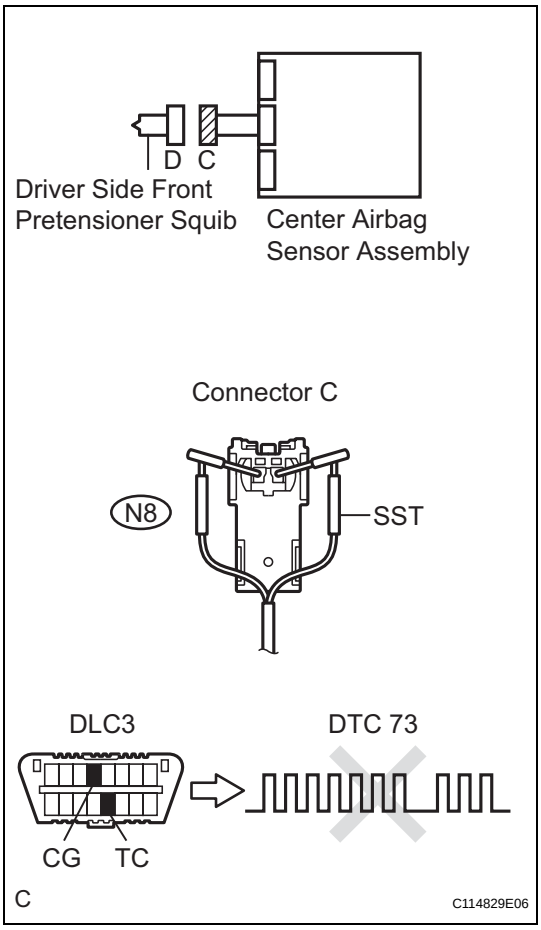
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT OUTER BELT ASSEMBLY LH (DRIVER SIDE FRONT PRETENSIONER SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front seat outer belt assembly LH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.
CAUTION:
Never connect the tester to the front seat outer belt assembly LH (driver side front pretensioner squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).
OK:
DTC B1900, B1901, B1902, B1903, or 73 is not output.
HINT:
Codes other than DTC B1900, B1901, B1902, B1903, and 73 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY LH (See page SB-20)**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire connector (on the front seat outer belt assembly LH side) is not damaged.

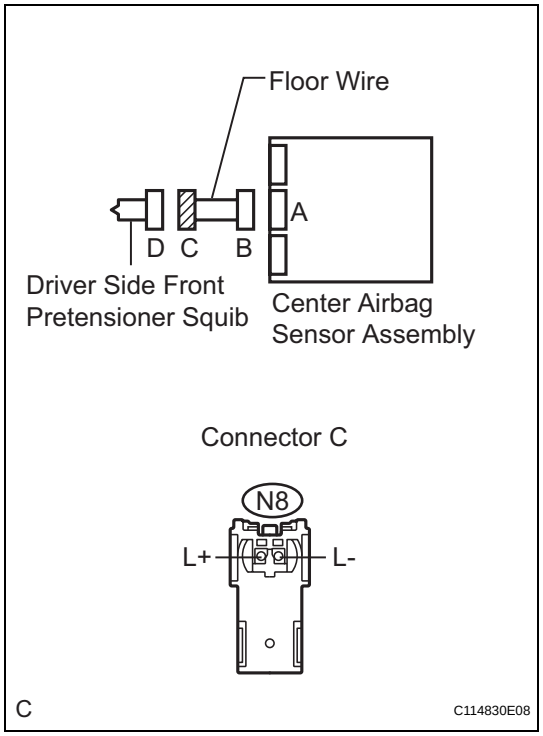
RS

OK:
The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE**

OK

3 CHECK FLOOR WIRE (DRIVER SIDE FRONT PRETENSIONER SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Check for a short to B+ in the circuit.
 (1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
 (2) Turn the ignition switch on (IG).
 (3) Measure the voltage according to the value(s) in the table below.
 Standard voltage

Tester connection	Condition	Specified condition
N8-1 (L+) - Body ground	Ignition switch on (IG)	Below 1 V
N8-2 (L-) - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.
 (1) Turn the ignition switch off.
 (2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
 (3) Measure the resistance according to the value(s) in the table below.
 Standard resistance

Tester Connection	Condition	Specified Condition
N8-1 (L+) - N8-2 (L-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.
 (1) Measure the resistance according to the value(s) in the table below.
 Standard resistance

Tester Connection	Condition	Specified Condition
N8-1 (L+) - Body ground	Always	1 MΩ or higher
N8-2 (L-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.
 (1) Release the activation prevention mechanism built into connector B (See page RS-32).
 (2) Measure the resistance according to the value(s) in the table below.
 Standard resistance

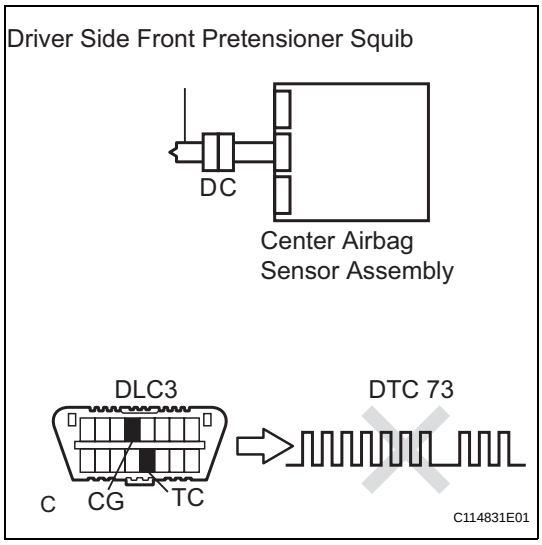
Tester Connection	Condition	Specified Condition
N8-1 (L+) - N8-2 (L-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE**

RS

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat outer belt assembly LH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1900, B1901, B1902, B1903, or 73 is not output.

HINT:

Codes other than DTC B1900, B1901, B1902, B1903, or 73 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

RS

USE SIMULATION METHOD TO CHECK (See page RS-32)

DTC	B1905/74	Short in Front Passenger Side Pretensioner Squib Circuit

DTC	B1906/74	Open in Front Passenger Side Pretensioner Squib Circuit

DTC	B1907/74	Short to GND in Front Passenger Side Pretensioner Squib Circuit

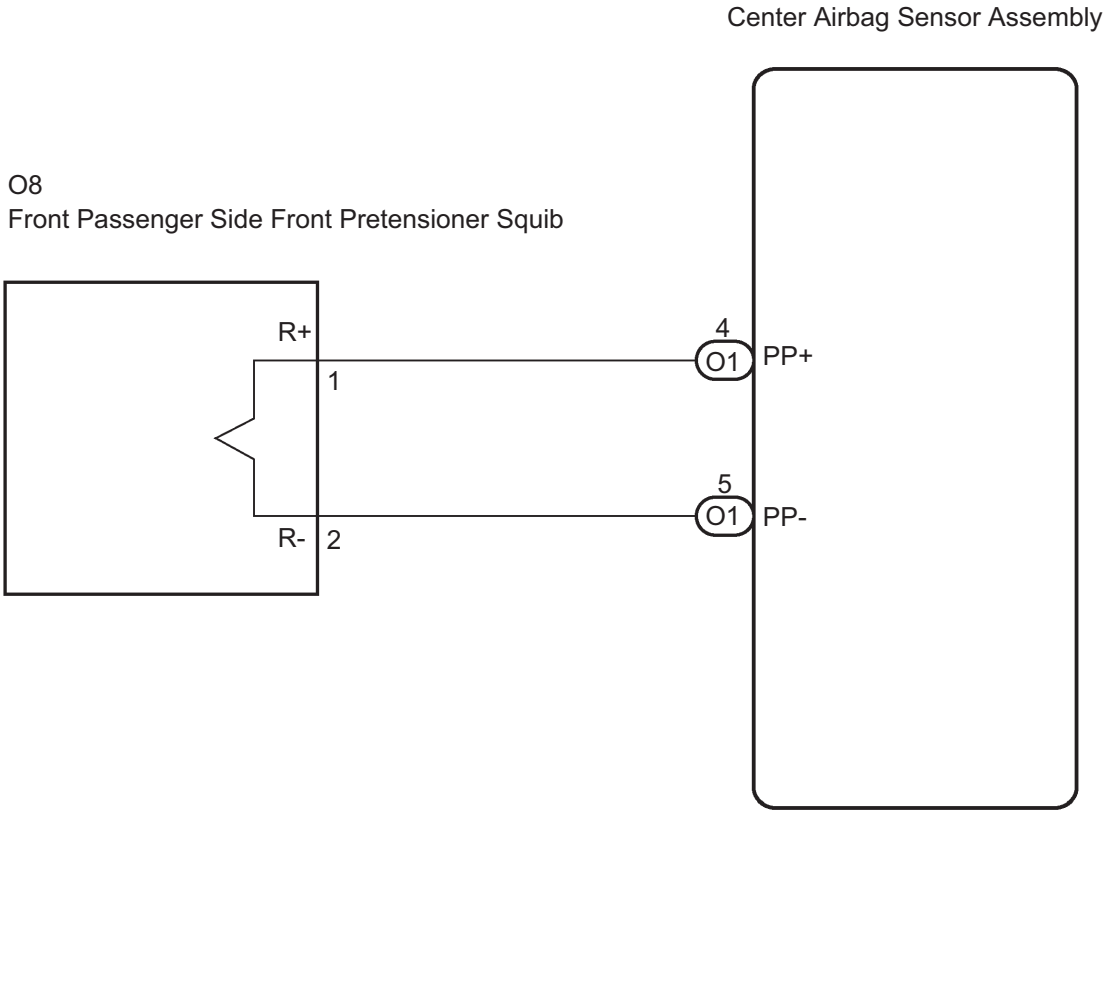
DTC	B1908/74	Short to B+ in Front Passenger Side Front Pretensioner Squib Circuit

DESCRIPTION

The front passenger side front pretensioner squib circuit consists of the center airbag sensor assembly and the front seat outer belt assembly RH.
This circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the front passenger side front pretensioner squib circuit.

DTC No.	DTC Detection Condition	Trouble Area
B1905/74	• The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side front pretensioner squib circuit during primary check. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side front pretensioner squib) • Center airbag sensor assembly
B1906/74	• The center airbag sensor assembly receives an open circuit signal in the front passenger side front pretensioner squib circuit for 2 seconds. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side front pretensioner squib) • Center airbag sensor assembly
B1907/74	• The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side front pretensioner squib circuit for 0.5 seconds. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side front pretensioner squib) • Center airbag sensor assembly
B1908/74	• The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side front pretensioner squib circuit for 0.5 seconds. • Front passenger side front pretensioner squib malfunction • Center airbag sensor assembly malfunction	• Floor wire No. 2 • Front seat outer belt assembly RH (Front passenger side front pretensioner squib) • Center airbag sensor assembly

WIRING DIAGRAM



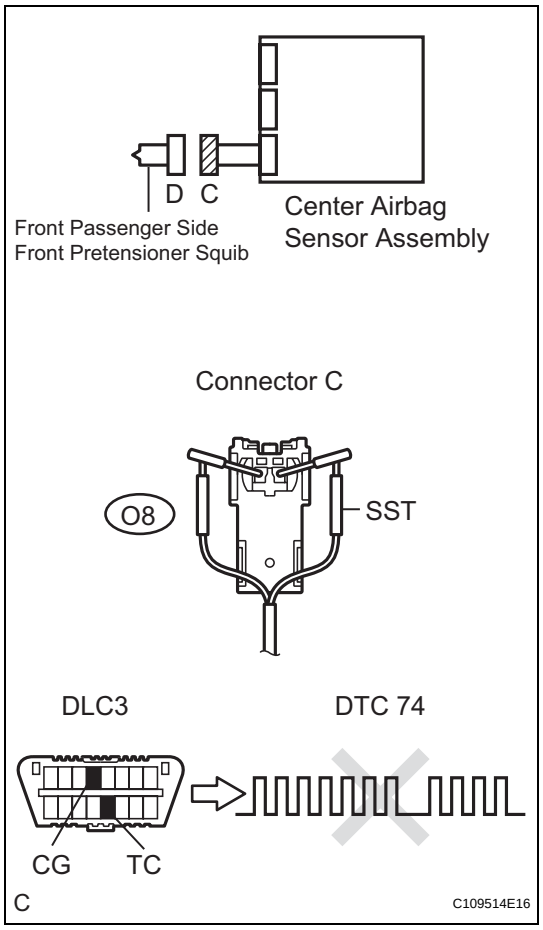
RS

INSPECTION PROCEDURE

HINT:

- Perform the simulation method by selecting "check mode" (signal check) with the intelligent tester (See page RS-44).
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road (See page RS-44).

1	CHECK FRONT SEAT OUTER BELT ASSEMBLY RH (FRONT PASSENGER SIDE FRONT PRETENSIONER SQUIB)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connectors from the front seat outer belt assembly RH.
(d) Connect the white wire side of SST (resistance 2.1 Ω) to connector C.

CAUTION:
Never connect the tester to the front seat outer belt assembly RH (front passenger side front pretensioner squib) for measurement, as this may lead to a serious injury due to airbag deployment.
NOTICE:
- **Do not forcibly insert the SST into the terminals of the connector when connecting.**
- **Insert straight the SST into the terminals of the connector.**

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(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Clear the DTCs stored in the memory (See page RS-41).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(j) Check the DTCs (See page RS-41).

OK:
DTC B1905, B1906, B1907, B1908, or 74 is not output.

HINT:
Codes other than DTC B1905, B1906, B1907, B1908, and 74 may be output at this time, but they are not related to this check.

OK → **REPLACE FRONT SEAT OUTER BELT ASSEMBLY RH**

NG

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the SST from connector C.
(d) Check that the floor wire No. 2 connector (on the front seat outer belt assembly RH side) is not damaged.

RS

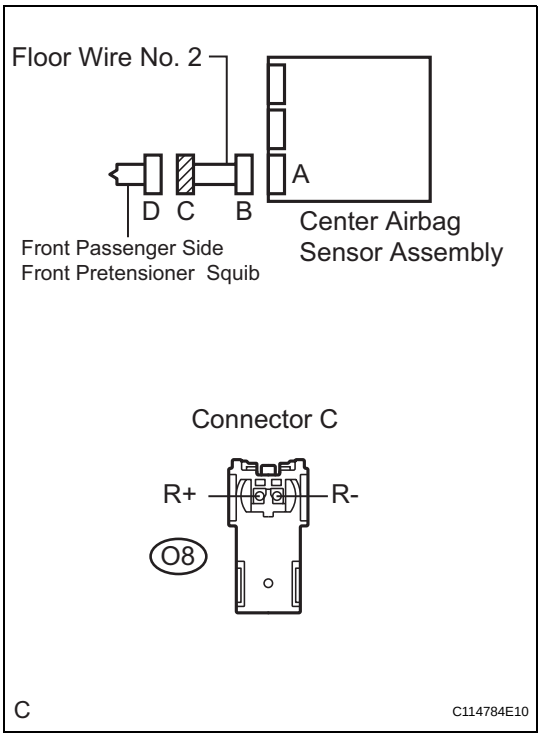
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

3	CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE FRONT PRETENSIONER SQUIB CIRCUIT)



(a) Disconnect the connectors from the center airbag sensor assembly.

(b) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the ignition switch on (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
O8-1 (R+) - Body ground	Ignition switch on (IG)	Below 1 V
O8-2 (R-) - Body ground	Ignition switch on (IG)	Below 1 V

(c) Check for an open in the circuit.

(1) Turn the ignition switch off.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O8-1 (R+) - O8-2 (R-)	Always	Below 1 Ω

(d) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
O8-1 (R+) - Body ground	Always	1 MΩ or higher
O8-2 (R-) - Body ground	Always	1 MΩ or higher

(e) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B (See page RS-32).

(2) Measure the resistance according to the value(s) in the table below.

Standard resistance

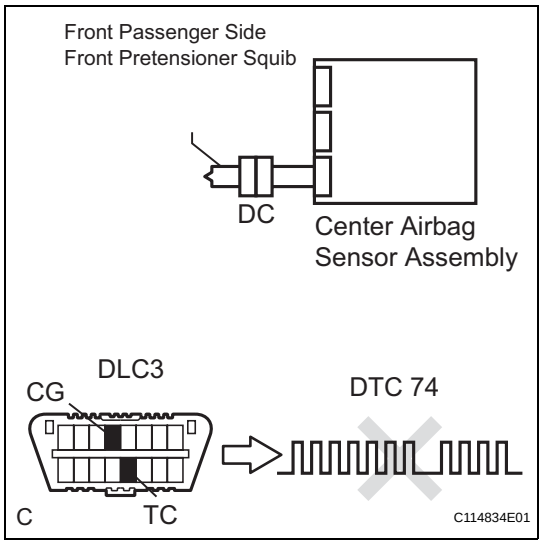
Tester Connection	Condition	Specified Condition
O8-1 (R+) - O8-2 (R-)	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

RS

OK

4	CHECK CENTER AIRBAG SENSOR ASSEMBLY



(a) Connect the connectors to the front seat outer belt assembly RH and the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the memory (See page RS-41).
(e) Turn the ignition switch off.
(f) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(g) Check the DTCs (See page RS-41).

OK:

DTC B1905, B1906, B1907, B1908, or 74 is not output.

HINT:

Codes other than DTC B1905, B1906, B1907, B1908, and 74 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

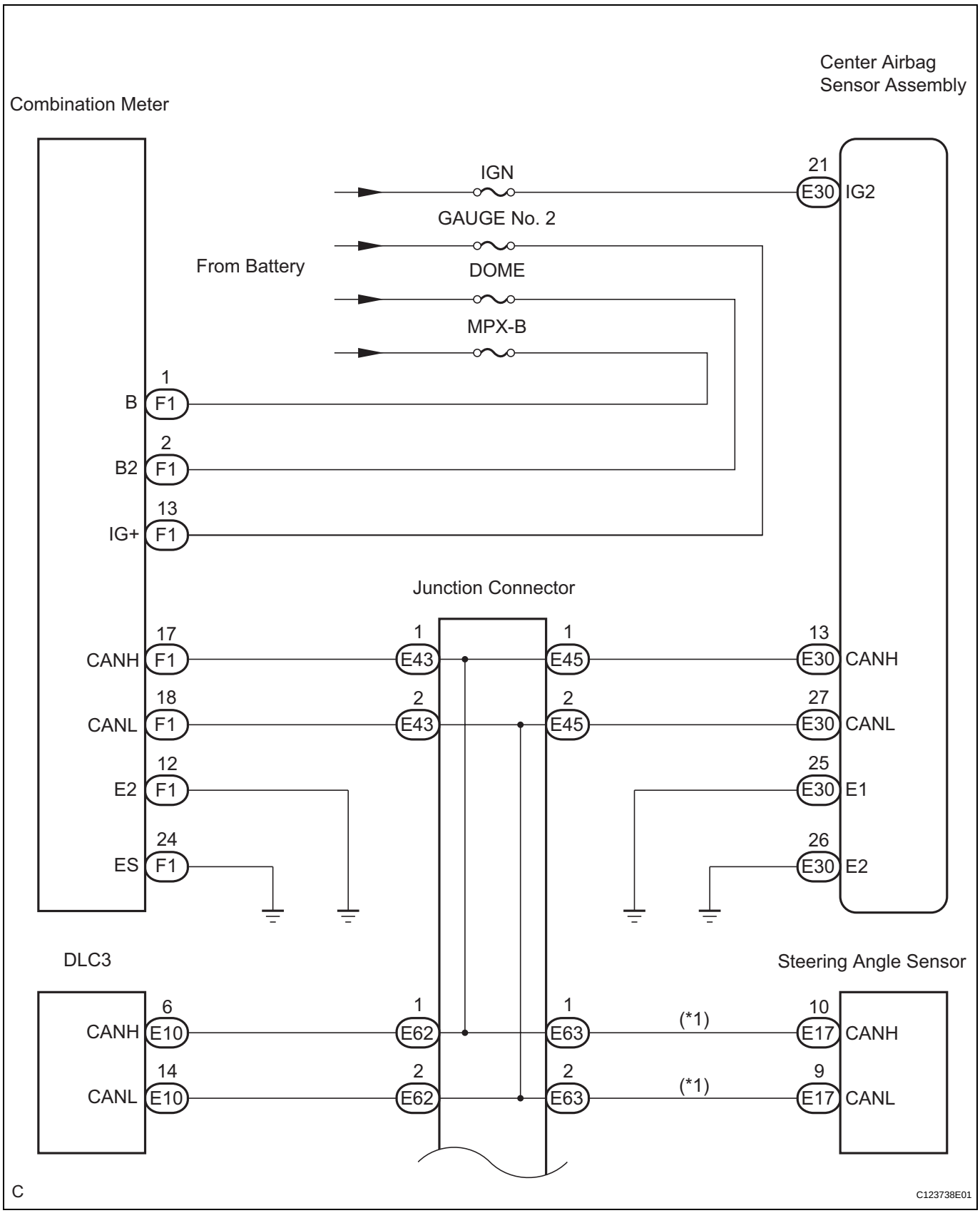
USE SIMULATION METHOD TO CHECK (See page RS-32)

SRS Warning Light Remains ON

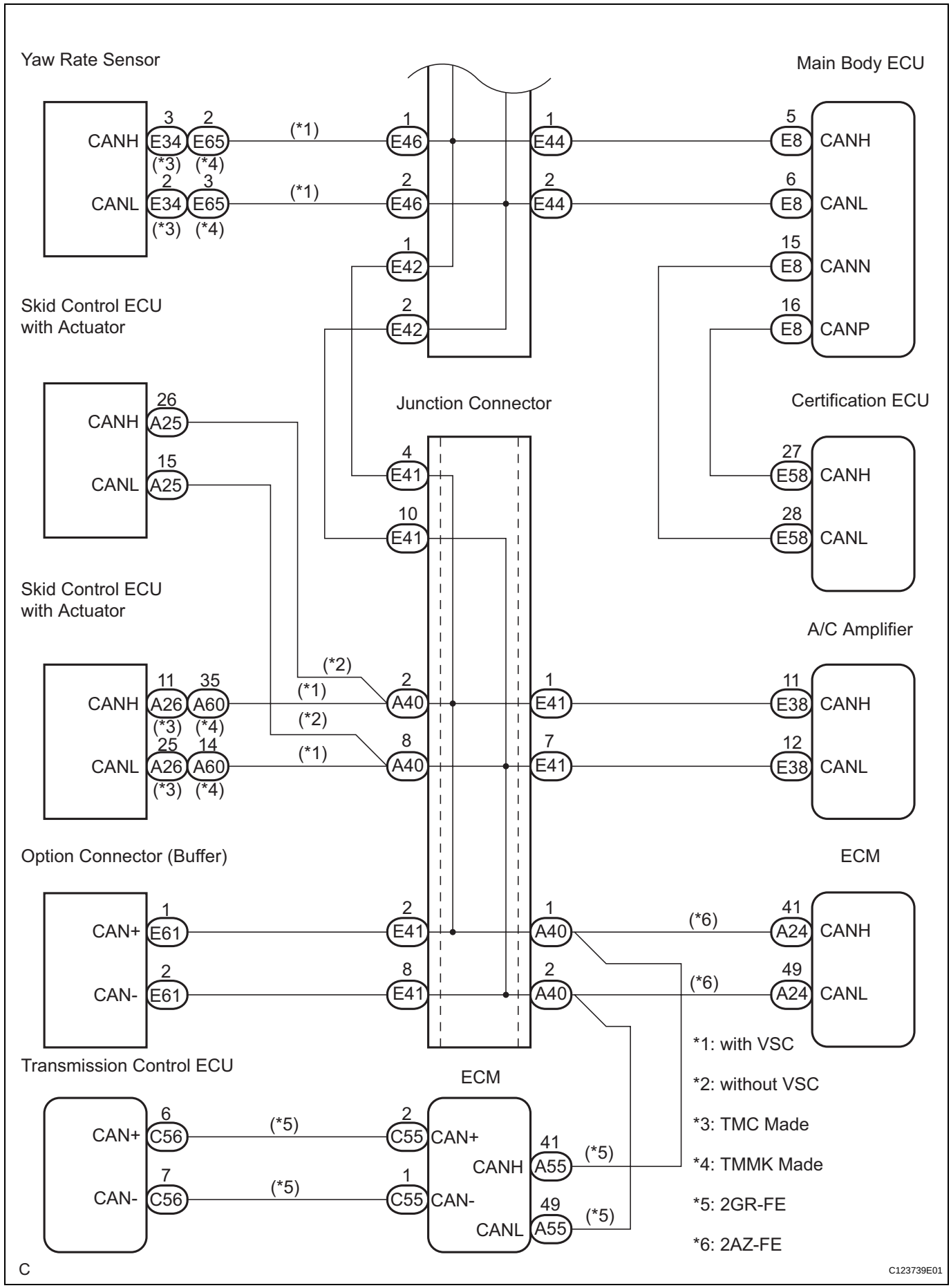
DESCRIPTION

The SRS warning light is located on the combination meter assembly.
When the SRS is normal, the SRS warning light comes on for approximately 6 seconds after the ignition switch is turned from off to on (IG), and then goes off automatically.
If there is a malfunction in the SRS, the SRS warning light comes on to inform the driver of a problem.
When terminals TC and CG of the DLC3 are connected, the DTC is displayed by blinking of the SRS warning light.
The SRS is equipped with a voltage-increase circuit (DC-DC converter) in the center airbag sensor assembly in case the source voltage drops.
When the battery voltage drops, the voltage-increase circuit (DC-DC converter) functions to increase the voltage of the SRS to normal voltage.
A malfunction in this circuit is not recorded in the center airbag sensor assembly. The SRS warning light automatically goes off when the source voltage returns to normal.
The signal to illuminate the SRS warning light is transmitted from the center airbag sensor assembly to the combination meter assembly through the CAN communication system.

WIRING DIAGRAM



RS


Yaw Rate Sensor
Main Body ECU
CANH
CANL
3
2
E34
E65
(*3)
(*4)
(*1)
1
E46
1
E44
5
E8
CANH
2
E46
2
E44
6
E8
CANL
1
E42
15
E8
CANN
Skid Control ECU
with Actuator
2
E42
16
E8
CANP
Junction Connector
Certification ECU
26
A25
4
E41
27
E58
CANH
15
A25
10
E41
28
E58
CANL
Skid Control ECU
with Actuator
A/C Amplifier
(*2)
11
35
2
1
11
E38
CANH
A26
A60
A40
E41
(*3)
(*4)
(*1)
(*2)
25
14
8
7
12
E38
CANL
A26
A60
A40
E41
(*1)
Option Connector (Buffer)
ECM
CAN+
CAN-
1
E61
2
E61
2
E41
8
E41
1
A40
2
A40
(*6)
41
A24
CANH
49
A24
CANL
*1: with VSC
*2: without VSC
*3: TMC Made
*4: TMMK Made
*5: 2GR-FE
*6: 2AZ-FE
Transmission Control ECU
ECM
6
C56
(*5)
2
C55
CAN+
41
A55
(*5)
CANH
7
C56
(*5)
1
C55
CAN-
49
A55
(*5)
CANL
C
C123739E01

INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication DTC is output (See page CA-25).

Result

Condition	Proceed To
DTC is not output	A
DTC is output	B

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

A

2	CHECK BATTERY

(a) Measure the voltage of the battery.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE BATTERY OR CHARGING SYSTEM**

OK

3	CHECK CONNECTORS

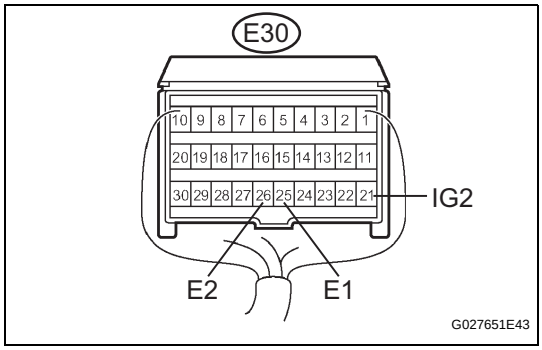
(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the center airbag sensor assembly and combination meter assembly.
OK:
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY**

OK

RS

4 CHECK WIRE HARNESS (SOURCE VOLTAGE OF CENTER AIRBAG SENSOR ASSEMBLY)



(a) Disconnect the connectors from the center airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(c) Turn the ignition switch on (IG).
(d) Operate all components of the electrical system (defogger, wipers, headlight, heater blower, etc.).
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
E30-21 (IG2) - Body ground	Ignition switch on (IG)	10 to 14 V

(f) Turn the ignition switch off.
(g) Measure the resistance according to the value(s) in the table below.

Standard resistance

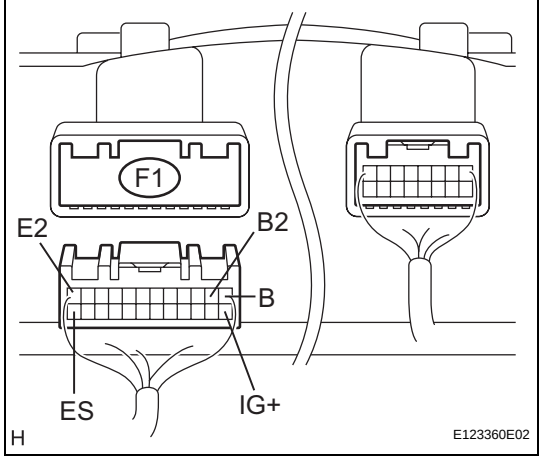
Tester Connection	Condition	Specified Condition
E30-25 (E1) - Body ground	Always	Below 1 Ω
E30-26 (E2) - Body ground	Always	Below 1 Ω

NG → REPAIR OR REPLACE WIRE HARNESS

OK

5 CHECK WIRE HARNESS (SOURCE VOLTAGE OF COMBINATION METER)

Combination Meter Assembly Side:



(a) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(b) Disconnect the F1 connector from the combination meter assembly.
(c) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(d) Turn the ignition switch on (IG).
(e) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F1-1 (B) - Body ground	Always	10 to 14 V
F1-2 (B2) - Body ground	Ignition switch on (IG)	10 to 14 V
F1-13 (IG+) - Body ground	Ignition switch on (IG)	10 to 14 V

(f) Turn the ignition switch off.
(g) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-12 (E2) - Body ground	Always	Below 1 Ω
F1-24 (ES) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

6 CHECK SRS WARNING LIGHT

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the combination meter assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG).
(f) Check the SRS warning light condition.

OK:

After the primary check period, SRS warning light goes off for approximately 10 seconds, and remains on.

HINT:
The primary check period shows approximately 6 seconds after the ignition switch is turned on (IG).

NG → **GO TO COMBINATION METER SYSTEM**

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)

SRS Warning Light does not Come ON

DESCRIPTION

See page RS-222.

WIRING DIAGRAM

See page RS-223.

INSPECTION PROCEDURE

1	CHECK BATTERY

(a) Measure the voltage of the battery.
Standard voltage:
11 to 14 V

NG → **CHECK AND REPLACE BATTERY OR CHARGING SYSTEM**

OK

2	CHECK CONNECTOR

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the combination meter assembly.
OK:
The connectors are properly connected.

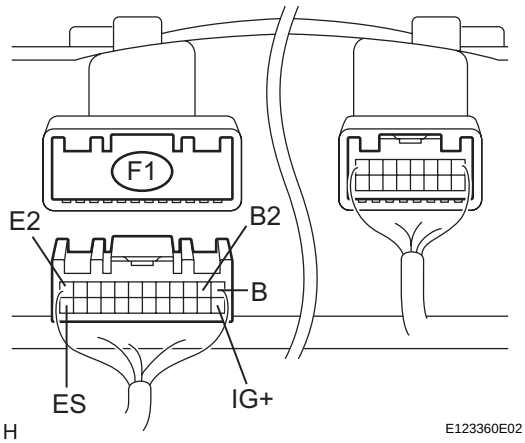
NG → **CONNECT CONNECTOR PROPERLY**

OK

RS

3	CHECK WIRE HARNESS (SOURCE VOLTAGE OF COMBINATION METER)

Combination Meter Assembly Side:



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the F1 connector from the combination meter assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
F1-1 (B) - Body ground	Always	10 to 14 V
F1-2 (B2) - Body ground	Always	10 to 14 V
F1-13 (IG+) - Body ground	Ignition switch on (IG)	10 to 14 V

(g) Turn the ignition switch off.
(h) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
F1-12 (E2) - Body ground	Always	Below 1 Ω
F1-24 (ES) - Body ground	Always	Below 1 Ω

RS

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4	CHECK SRS WARNING LIGHT

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Connect the connector to the combination meter assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG).
(f) Check the SRS warning light condition.

OK:

After the primary check period, SRS warning light goes off for approximately 10 seconds, and remains on.

HINT:
The primary check period is approximately 6 seconds after the ignition switch is turned on (IG).

NG → GO TO COMBINATION METER SYSTEM

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)

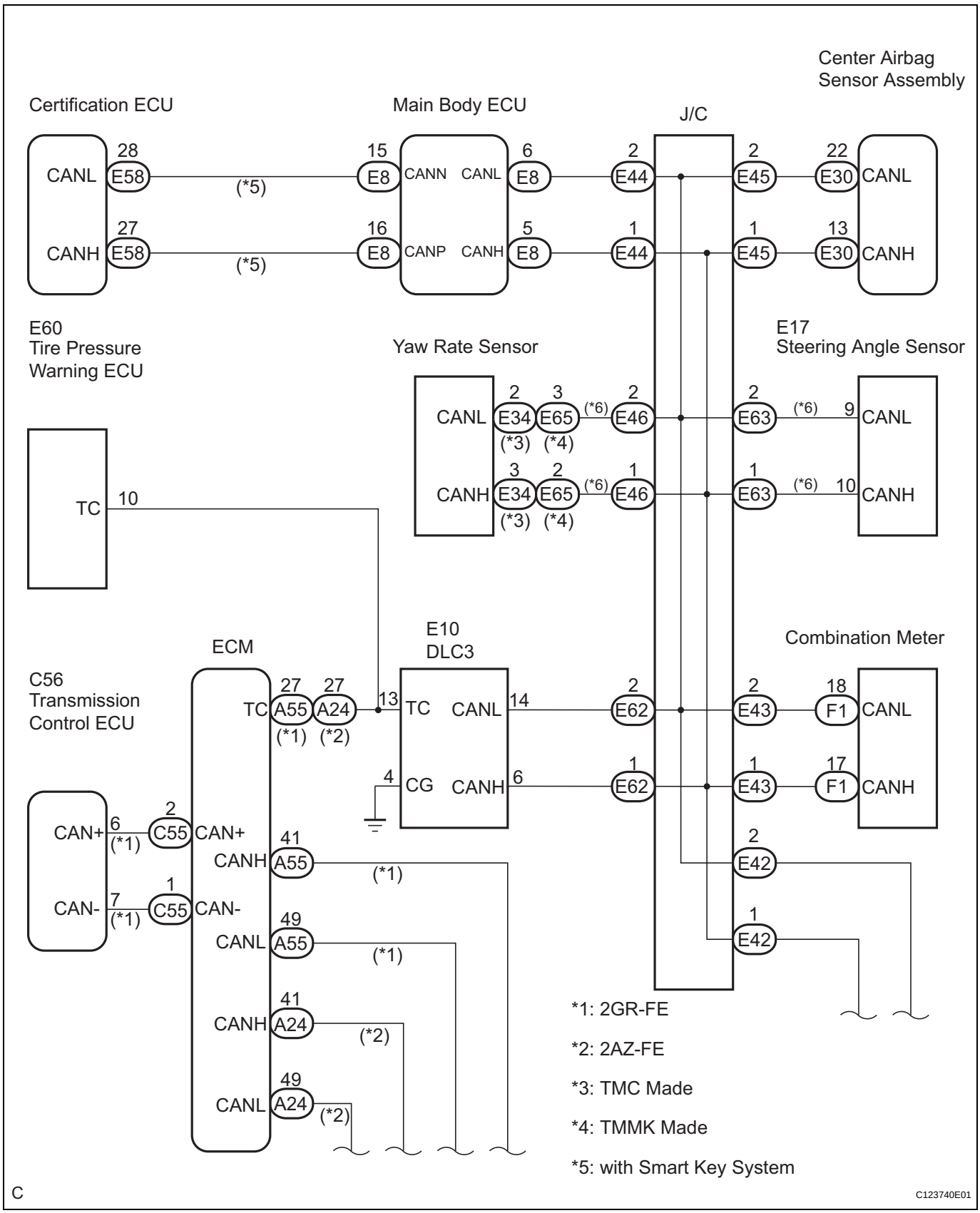
Diagnosis Circuit

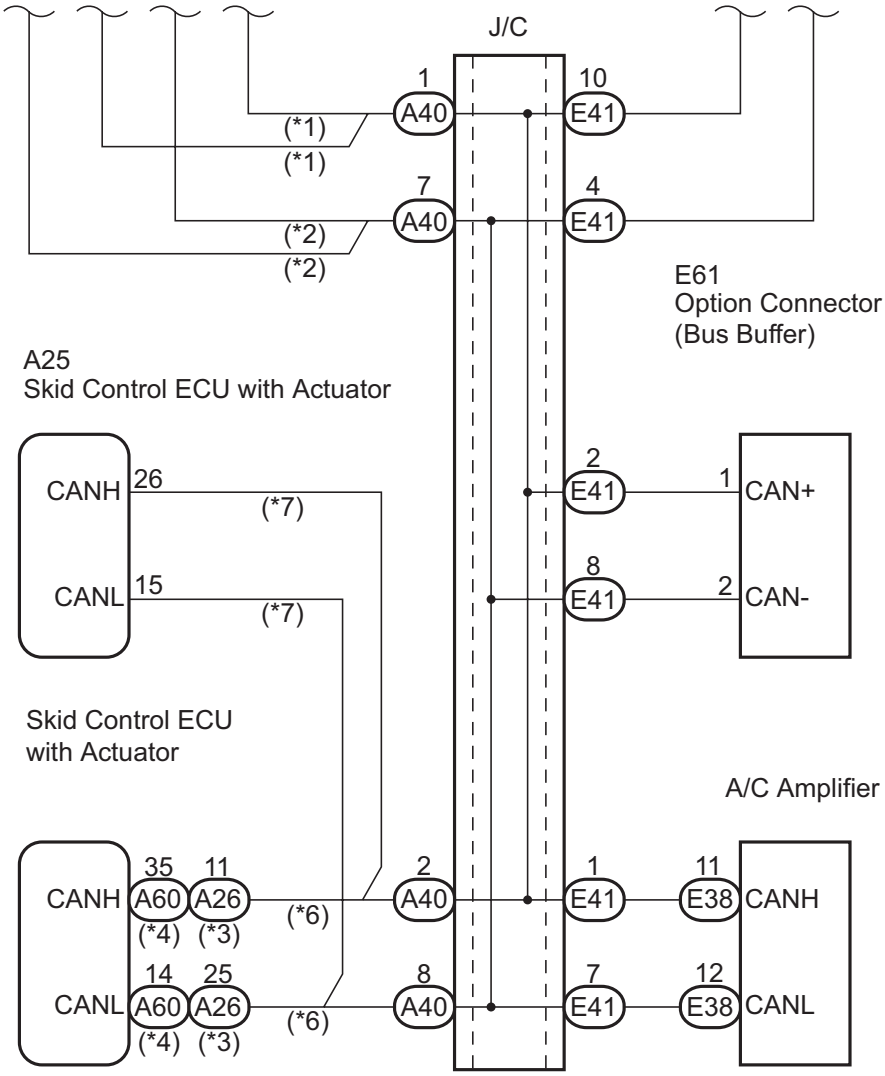
DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3.
DTCs are displayed by blinking of the SRS warning light.
HINT:

- When each warning light stays blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in each ECU is suspected.
- A DTC output mode signal is transmitted through CAN communication system to each ECU including the center airbag sensor assembly. Thus when all systems do not enter DTC output mode, there may be an ECM malfunction.

WIRING DIAGRAM





*6: with VSC

*7: without VSC

RS

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INSPECTION PROCEDURE

1	CHECK CAN COMMUNICATION SYSTEM

(a) Check if a CAN communication system DTC is output (See page CA-25).

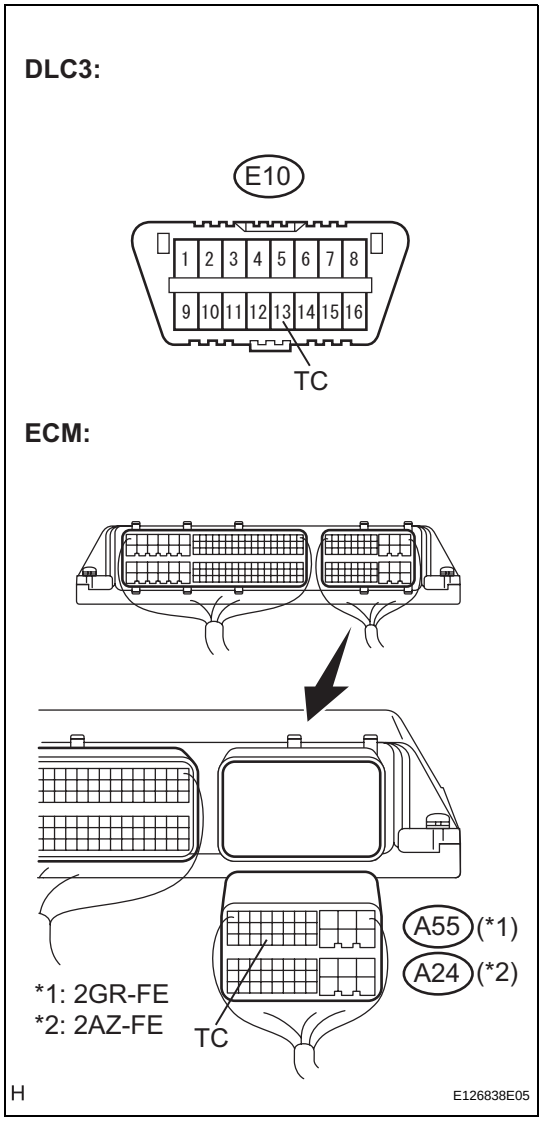
Result

Condition	Proceed to
DTC is not output	A
DTC is output	B

B → **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

A

2	CHECK WIRE HARNESS (DLC3 - ECM)



(a) Turn the ignition switch off.
(b) Disconnect the connector from ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for 2GR-FE

Tester Connection	Condition	Specified Condition
E10-13 (TC) - A55-27 (TC)	Always	Below 1 Ω

for 2AZ-FE

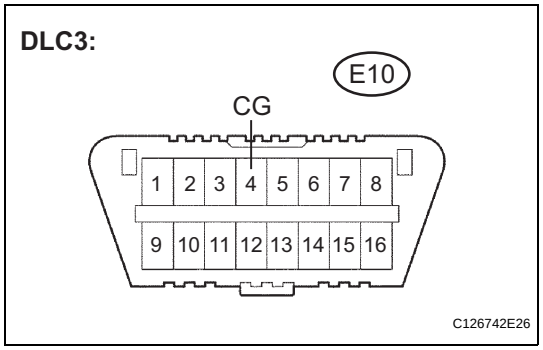
Tester Connection	Condition	Specified Condition
E10-13 (TC) - A24-27 (TC)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (TC OF DLC3 - TC OF ECM)**

RS

OK

3 CHECK WIRE HARNESS (CG OF DLC3 - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

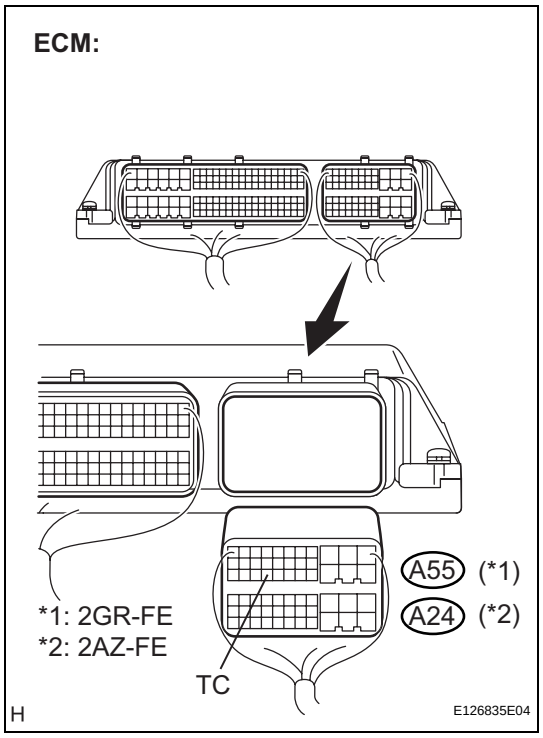
Standard resistance

Tester Connection	Condition	Specified Condition
E10-4 (CG) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS (CG OF DLC3 - BODY GROUND)**

OK

4 CHECK WIRE HARNESS (TC OF ECM - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for 2GR-FE

Tester Connection	Condition	Specified Condition
A55-27 (TC) - Body ground	Always	1 MΩ or higher

for 2AZ-FE

Tester Connection	Condition	Specified Condition
A24-27 (TC) - Body ground	Always	1 MΩ or higher

NG → **REPAIR OR REPLACE WIRE HARNESS OR EACH ECU**

OK

REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)

RS

OCCUPANT CLASSIFICATION SYSTEM

PRECAUTION

1. INSPECTION PROCEDURE FOR VEHICLE INVOLVED IN ACCIDENT

(a) Perform zero point calibration and sensitivity check if any of the following conditions occur:
- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The front passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator ("OFF") comes on when the front passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

NOTICE:
When an accident vehicle is brought into the workshop for repair, check the flatness of the body side that is equipped with the passenger seat. If the flatness is not within +- 3.0 mm (0.118 in.), adjust it to the specified range.

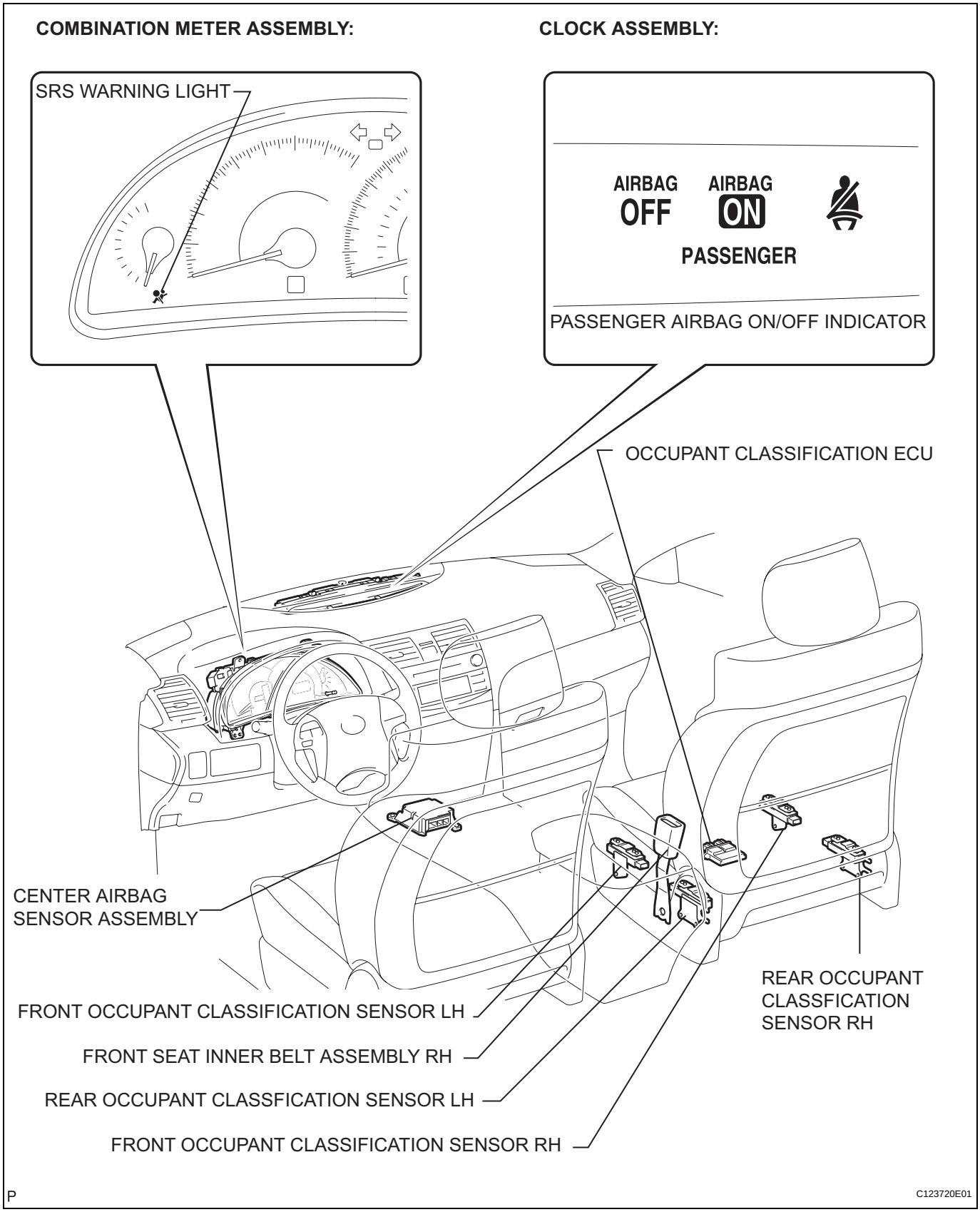
2. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

RS

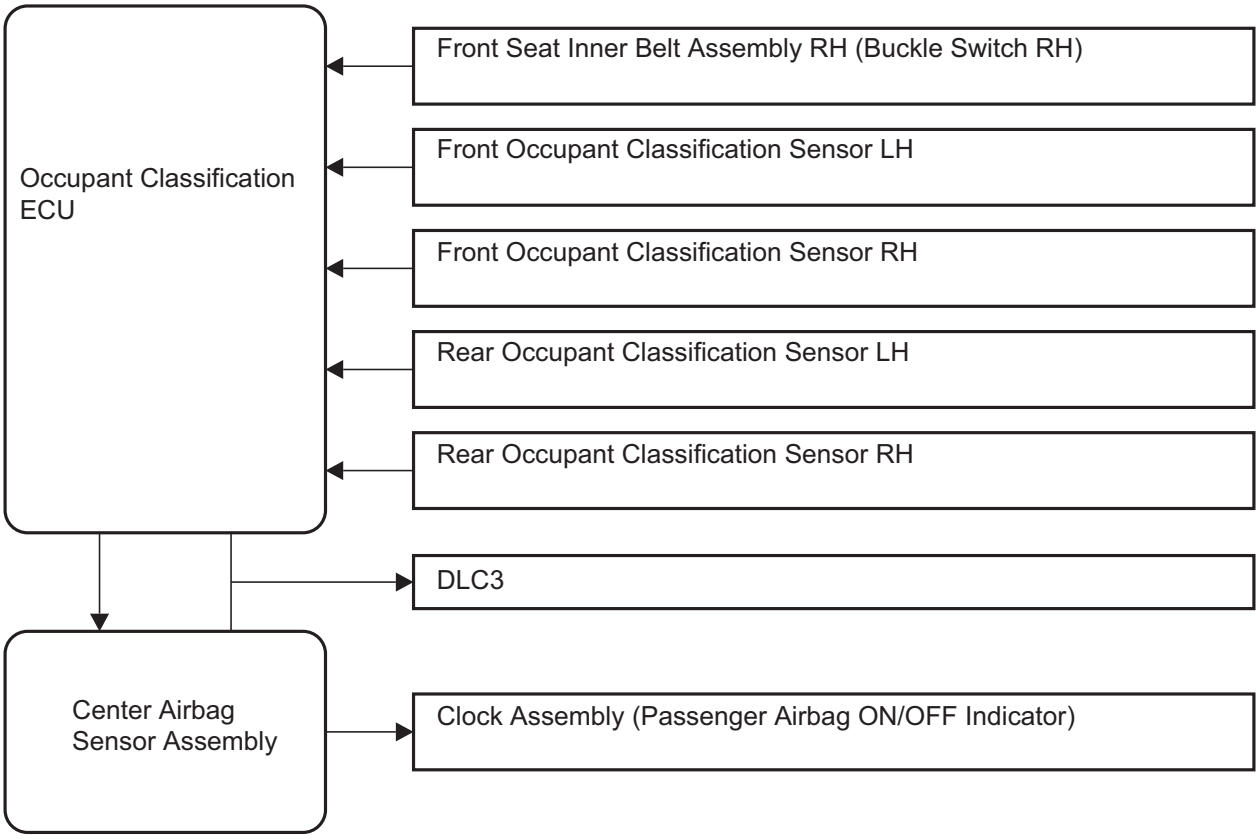
Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition Switch off	LOCK	Off
	Ignition Switch on (IG)	ON	On (IG)
	Ignition Switch on (ACC)	ACC	On (ACC)
	Engine Start	START	Start

PARTS LOCATION



RS

SYSTEM DIAGRAM



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SYSTEM DESCRIPTION

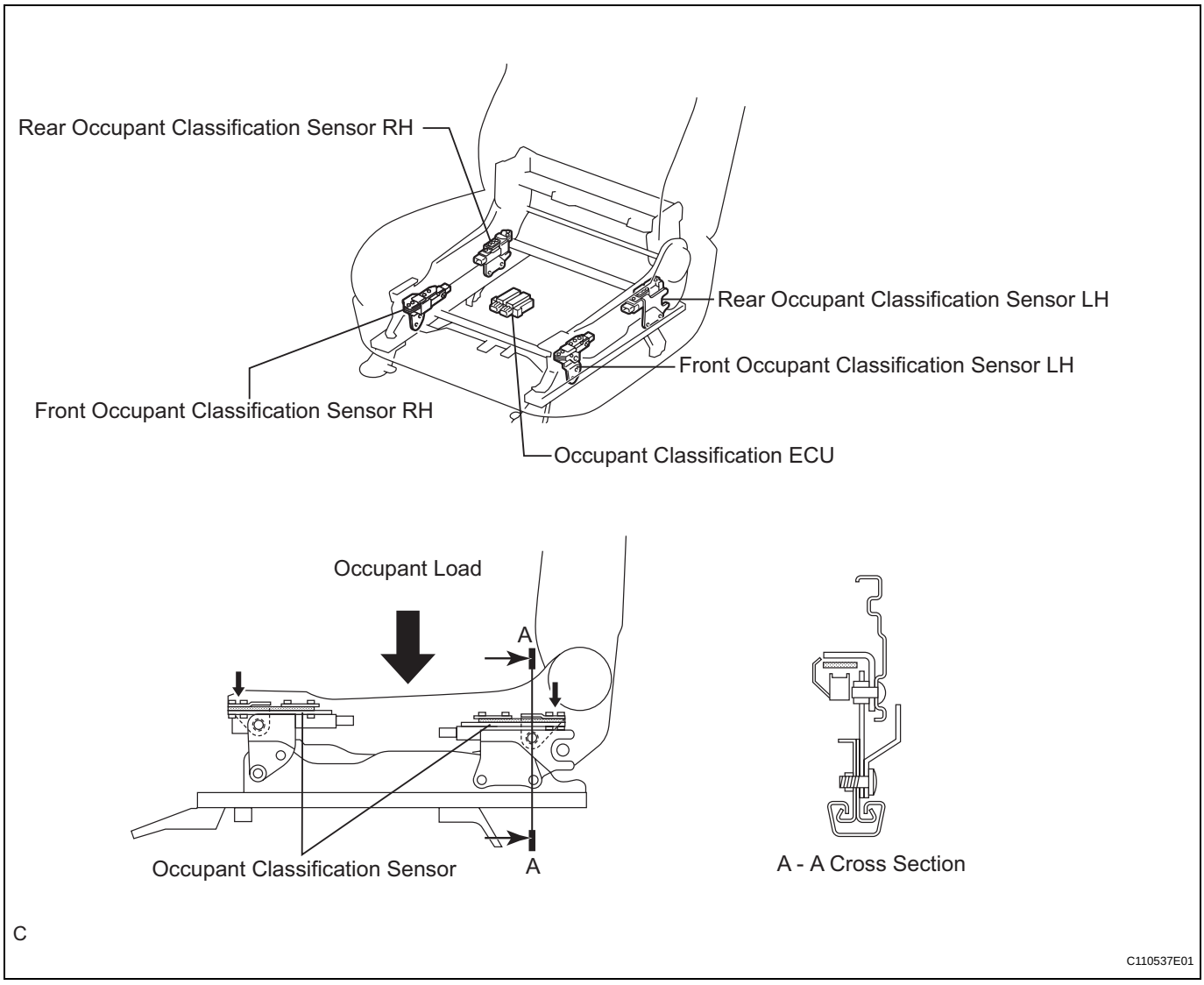
1. DESCRIPTION OF OCCUPANT CLASSIFICATION SYSTEM

(a) GENERAL DESCRIPTION.

(1) In the occupant classification system, the occupant classification ECU calculates the weight of the occupant based on a signal from the occupant classification sensors. This system recognizes the occupant as a child if it detects a weight of less than 36 kg (79.37 lb), and disables the front passenger airbag and front passenger side-side airbag.

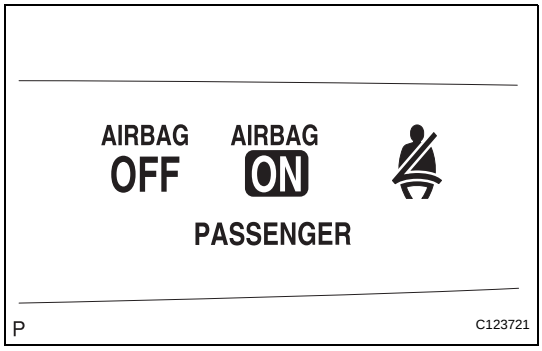
(2) This system is mainly comprised of 4 occupant classification sensors that detect the load on the front passenger seat. The occupant classification ECU controls the system, and the passenger airbag ON/OFF indicator indicates the ON/OFF condition of the front passenger airbag and front passenger side-side airbag.

(b) OCCUPANT CLASSIFICATION SENSOR.



RS

(1) The occupant classification sensors are installed on 4 brackets connecting the seat rail and seat frame. Accordingly, when load is applied to the front passenger seat by an occupant sitting in it, the occupant classification sensors register a distortion.



(c) DESCRIPTION FOR PASSENGER AIRBAG ON/OFF INDICATOR.

(1) The passenger airbag ON/OFF indicator is installed on the clock assembly. This indicator informs the driver whether the occupant classification ECU puts the front passenger airbag assembly into an active state or inactive state.

(2) If a malfunction occurs in the occupant classification system, "OFF" indication of the passenger airbag ON/OFF indicator and the SRS warning light come on.

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester can be used in steps 4, 6, 8, and 9.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

(a) Confirm problem symptoms (See page IN-28).

NEXT

3 PASSENGER AIRBAG ON/OFF INDICATOR CHECK

NEXT

4 DTCS CHECK (Present and Past DTCs)

(a) Check for DTCs.
Result

Result	Proceed to
DTC is output.	A
DTC is not output.	B

B → GO TO PROBLEM SYMPTOMS TABLE

A

5 DTCS CHART

NEXT

6 CIRCUIT INSPECTION

NEXT

7 REPAIR

NEXT

RS

8	CLEAR DTCS (Present and Past DTCs)

(a) Clear DTCs.

NEXT

9	DTCS CHECK (Present and Past DTCs)

(a) Check for DTCs.
Result

Result	Proceed to
DTC is not output.	A
DTC is output.	B

B → Go to step 5

A

10	SYMPTOM SIMULATION

(a) Check the passenger airbag ON/OFF indicator condition.
Result

Result	Proceed to
Passenger airbag ON/OFF indicator operates normally.	A
Passenger airbag ON/OFF indicator ("OFF") and SRS warning light come on.	B

B → Go to step 5

A

11	CONFIRMATION TEST

NEXT

END

RS

PROBLEM SYMPTOMS TABLE

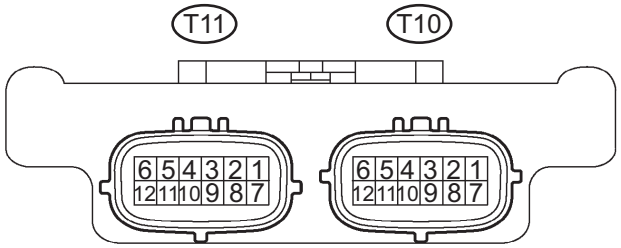
HINT:
Proceed to the troubleshooting for each circuit in the table below.

OCCUPANT CLASSIFICATION SYSTEM:

Symptom	Suspected area	See page
The front passenger seat condition differs from the indication by the passenger airbag ON/OFF indicator (DTC is not output).	Trouble in Passenger Airbag ON/OFF Indicator	RS-342

TERMINALS OF ECU

1. OCCUPANT CLASSIFICATION ECU (for Power seat)



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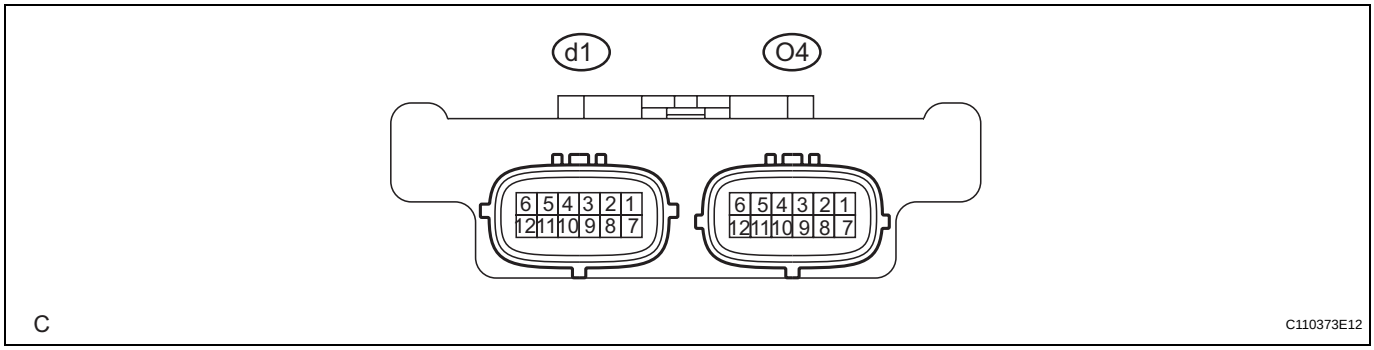
Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
T10-1 (+B) - T10-3 (GND)	W - W-B	Battery	Always	10 to 14 V
T10-2 (DIA) - T10-3 (GND)	GR - W-B	Diagnosis (DLC3)	Ignition switch on (IG)	Pulse generation
T10-3 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
T10-4 (FSR-) - T10-3 (GND)	Y - W-B	Center airbag sensor assembly communication line (-)	Always	Below 1 V
T10-5 (BGND) - T10-3 (GND)	GR - W-B	Passenger side buckle switch ground line	Always	Below 1 V
T10-7 (IG) - T10-3 (GND)	BR - W-B	Power source (ECU-B Fuse)	Ignition switch on (IG)	10 to 14 V
T10-8 (FSR+) - T10-4 (FSR-)	L - Y	Center airbag sensor assembly communication line	Ignition switch on (IG)	Pulse generation
T10-9 (BSW) - T10-5 (BGND)	B - GR	Passenger side buckle switch line	Always	Below 1 V
T11-1 (SGD1) - T10-3 (GND)	G - W-B	Front occupant classification sensor LH ground line	Always	Below 1 V
T11-2 (SGD2) - T10-3 (GND)	O - W-B	Front occupant classification sensor RH ground line	Always	Below 1 V
T11-3 (SGD3) - T10-3 (GND)	W - W-B	Rear occupant classification sensor LH ground line	Always	Below 1 V
T11-4 (SGD4) - T10-3 (GND)	BR - W-B	Rear occupant classification sensor RH ground line	Always	Below 1 V
T11-5 (SVC3) - T11-3 (SGD3)	GR - W	Rear occupant classification sensor LH power supply line	Ignition switch on (IG), a load is applied to rear occupant classification sensor LH	4.5 to 5.1 V
T11-6 (SVC4) - T11-4 (SGD4)	V - BR	Rear occupant classification sensor RH power supply line	Ignition switch on (IG), a load is applied to rear occupant classification sensor RH	4.5 to 5.1 V
T11-7 (SIG1) - T11-1 (SGD1)	P - G	Front occupant classification sensor LH signal line	Ignition switch on (IG), a load is applied to front occupant classification sensor LH	0.2 to 4.9 V
T11-8 (SIG2) - T11-2 (SGD2)	L - O	Front occupant classification sensor RH signal line	Ignition switch on (IG), a load is applied to front occupant classification sensor RH	0.2 to 4.9 V

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
T11-9 (SIG3) - T11-3 (SGD3)	Y - W	Rear occupant classification sensor LH signal line	Ignition switch on (IG), a load is applied to rear occupant classification sensor LH	0.2 to 4.9 V
T11-10 (SIG4) - T11-4 (SGD4)	B - BR	Rear occupant classification sensor RH signal line	Ignition switch on (IG), a load is applied to rear occupant classification sensor RH	0.2 to 4.9 V
T11-11 (SVC1) - T11-1 (SGD1)	R - G	Front occupant classification sensor LH power supply line	Ignition switch on (IG), a load is applied to front occupant classification sensor LH	4.5 to 5.1 V
T11-12 (SVC2) - T11-2 (SGD2)	W - O	Front occupant classification sensor RH power supply line	Ignition switch on (IG), a load is applied to front occupant classification sensor RH	4.5 to 5.1 V

2. OCCUPANT CLASSIFICATION ECU (for Manual seat)



Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
O4-1 (+B) - O4-3 (GND)	LG - W-B	Battery	Always	10 to 14 V
O4-2 (DIA) - O4-3 (GND)	O - W-B	Diagnosis (DLC3)	Ignition switch on (IG)	Pulse generation
O4-3 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
O4-4 (FSR-) - O4-3 (GND)	B - W	Center airbag sensor assembly communication line (-)	Always	Below 1 V
O4-5 (BGND) - O4-3 (GND)	GR - W-B	Passenger side buckle switch ground line	Always	Below 1 V
O4-7 (IG) - O4-3 (GND)	BR - W-B	Power source (ECU-B Fuse)	Ignition switch on (IG)	10 to 14 V
O4-8 (FSR+) - O4-4 (FSR-)	W - B	Center airbag sensor assembly communication line	Ignition switch on (IG)	Pulse generation
O4-9 (BSW) - O4-5 (BGND)	P - GR	Passenger side buckle switch line	Always	Below 1 V
d1-1 (SGD1) - O4-3 (GND)	G - W-B	Front occupant classification sensor LH ground line	Always	Below 1 V
d1-2 (SGD2) - O4-3 (GND)	O - W-B	Front occupant classification sensor RH ground line	Always	Below 1 V
d1-3 (SGD3) - O4-3 (GND)	W - W-B	Rear occupant classification sensor LH ground line	Always	Below 1 V
d1-4 (SGD4) - O4-3 (GND)	BR - W-B	Rear occupant classification sensor RH ground line	Always	Below 1 V

INITIALIZATION

1. ZERO POINT CALIBRATION

NOTICE:

Make sure that the front passenger seat is not occupied before performing the operation:

HINT:

Perform zero point calibration and sensitivity check if any of the following conditions occur.

- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The front passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator ("OFF") comes on when the front passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

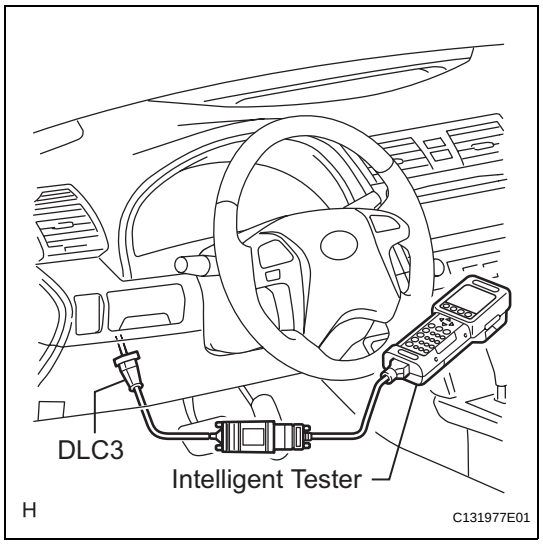
(a) Zero point calibration and sensitivity check procedures.

HINT:

Make sure that zero point calibration has finished normally, and then perform the sensitivity check.

(1) Adjust the seat position according to the table below.

Adjustment Component	Position
Slide Direction	Rearmost position
Reclining Angle	Upright position
Headrest Height	Lowest position
Lifter Height	Lowest position



(2) Connect the intelligent tester to the DLC3.

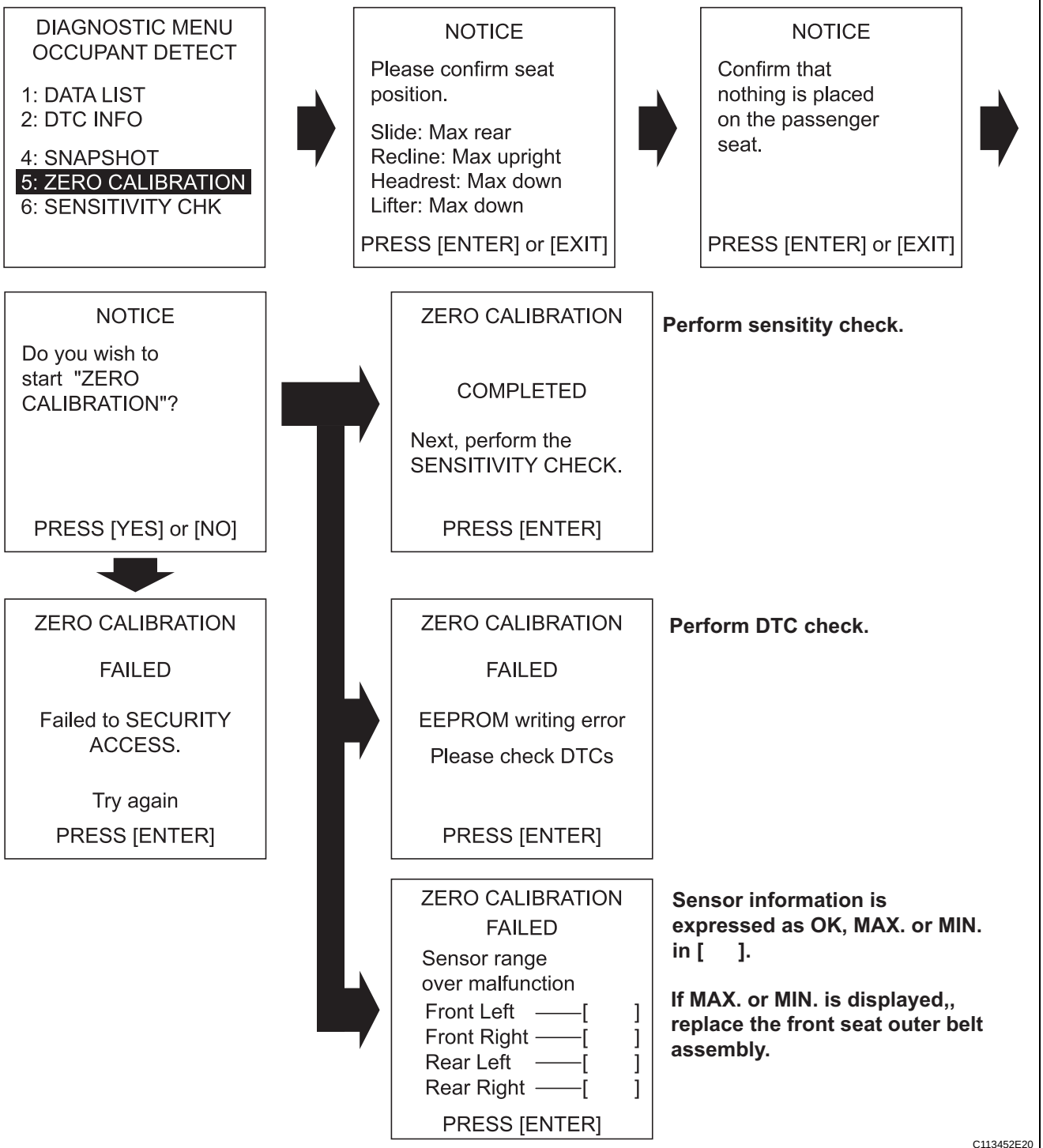
(3) Turn the ignition switch on (IG).

RS

(4) Perform the zero point calibration by following the prompts on the tester screen.

ZERO POINT CALIBRATION PROCEDURE

"1: DIAGNOSIS" - "1: OBD/MOBD" - "MODEL YEAR" - "MODEL SELECTION" - "CAMRY" - Select the option parts" - "9: OCCUPANT DETECT"
Refer to the following screen flow.



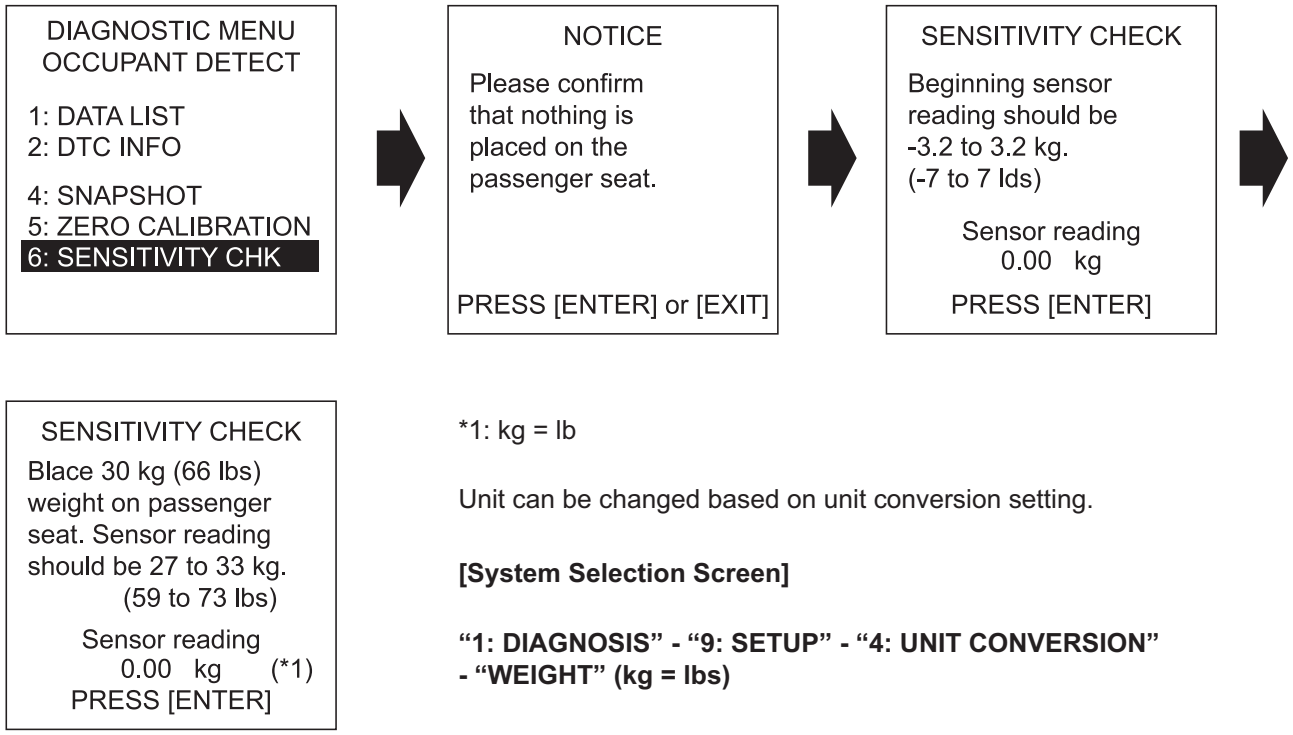
HINT:
Refer to the intelligent tester operator's manual for further details.

OK:
"COMPLETE" is displayed.

(5) Perform the sensitivity check by following the prompts on the tester screen.
(6) Confirm that the beginning sensor reading within standard value.
Standard value:
-3.2 to 3.2 kg (-7 to 7 lb)
(7) Place a 30 kg (66.14 lb) weight (eg. a 30 kg (66.14 lb) of lead mass) onto the front passenger seat.
(8) Confirm that the sensitivity is within the standard value.

SENSITIVITY CHECK PROCEDURE

"1: DIAGNOSIS" - "1: OBD/MOBD" - "MODEL YEAR" - "MODEL SELECTION = CAMRY" - Select the option parts - "9: OCCUPANT DETECT" - Refer to the following screen flow.



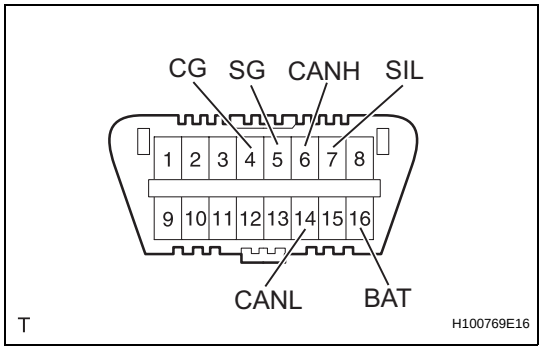
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

HINT:

- When performing the sensitivity check, use a solid metal weight (the check result may not appear properly if the weight made from liquid is used).

- When the sensitivity deviates from the standard value, retighten the bolts of the front passenger seat without deforming the seat rail. After performing this procedure, if the sensitivity is not within the standard value, replace the front seat assembly RH.
- When zero point calibration has not finished normally, replace the front seat assembly RH.

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specification
d1-5 (SVC3) - d1-3 (SGD3)	GR - W	Rear occupant classification sensor LH power supply line	Ignition switch on (IG), a load is applied to rear occupant classification sensor LH	4.5 to 5.1 V
d1-6 (SVC4) - d1-4 (SGD4)	V - BR	Rear occupant classification sensor RH power supply line	Ignition switch on (IG), a load is applied to rear occupant classification sensor RH	4.5 to 5.1 V
d1-7 (SIG1) - d1-1 (SGD1)	SB - G	Front occupant classification sensor LH signal line	Ignition switch on (IG), a load is applied to front occupant classification sensor LH	0.2 to 4.9 V
d1-8 (SIG2) - d1-2 (SGD2)	L - O	Front occupant classification sensor RH signal line	Ignition switch on (IG), a load is applied to front occupant classification sensor RH	0.2 to 4.9 V
d1-9 (SIG3) - d1-3 (SGD3)	Y - W	Rear occupant classification sensor LH signal line	Ignition switch on (IG), a load is applied to rear occupant classification sensor LH	0.2 to 4.9 V
d1-10 (SIG4) - d1-4 (SGD4)	R - BR	Rear occupant classification sensor RH signal line	Ignition switch on (IG), a load is applied to rear occupant classification sensor RH	0.2 to 4.9 V
d1-11 (SVC1) - d1-1 (SGD1)	R - G	Front occupant classification sensor LH power supply line	Ignition switch on (IG), a load is applied to front occupant classification sensor LH	4.5 to 5.1 V
d1-12 (SVC2) - d1-2 (SGD2)	W - O	Front occupant classification sensor RH power supply line	Ignition switch on (IG), a load is applied to front occupant classification sensor RH	4.5 to 5.1 V



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

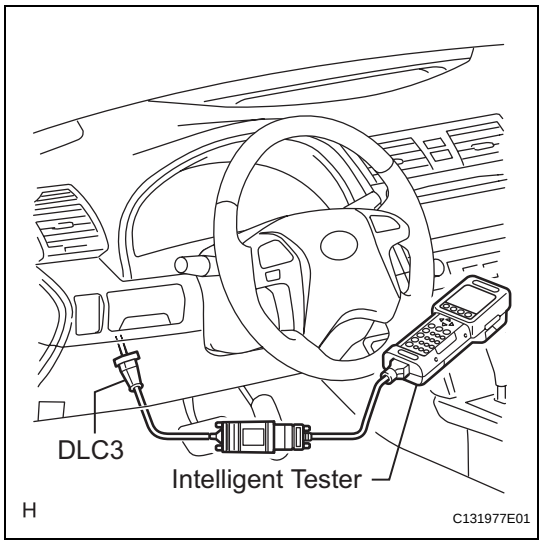
RS

Symbols (Terminal No.)	Terminal Description	Condition	Pulse condition
SIL (7) - SG (5)	Bus "+" Line	During transmission	Pulse generation
CG (4) - Body ground	Chassis Ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off (*)	54 to 69 Ω
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off (*)	6 kΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off (*)	200 Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch off (*)	6 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off (*)	200 Ω or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches, or the door.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

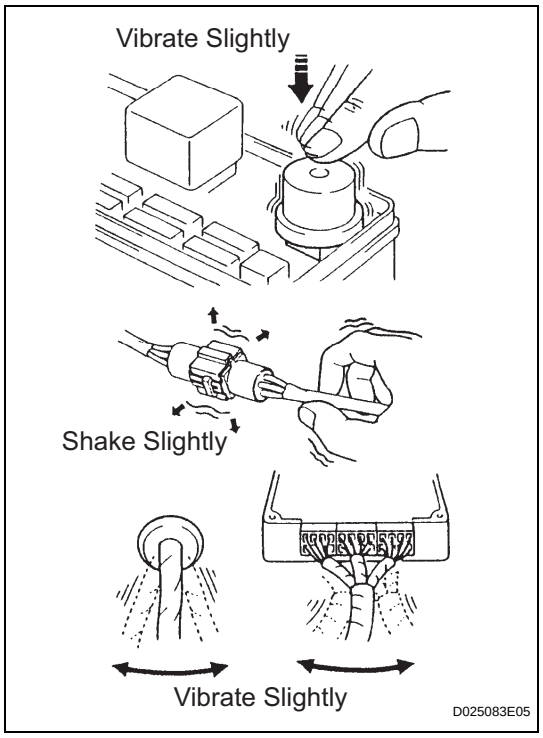


HINT:
If the display shows a communication error message when connecting the cable of the intelligent tester to the DLC3, turning the ignition switch on (IG) and operating the intelligent tester, there is a problem on the vehicle side or tester side.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

2. SYMPTOM SIMULATION

HINT:
The most difficult case in troubleshooting is when no symptoms occur. In such cases, a thorough customer problem analysis must be carried out. Then the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be simulated. No matter how experienced or skilled a technician may be, if he proceeds to troubleshoot without confirming the problem symptoms, he will likely overlook something important and make a wrong guess at some points in the repair operation.
This leads to a standstill in troubleshooting.



(a) Vibration method: When vibration seems to be the major cause.
HINT:
Perform the simulation method only during the primary check period (for approximately 6 seconds after the ignition switch is turned on (IG)).
(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.
HINT:
Shaking the relays too strongly may result in open relays.
(2) Slightly shake the connector vertically and horizontally.
(3) Slightly shake the wire harness vertically and horizontally.
The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

RS

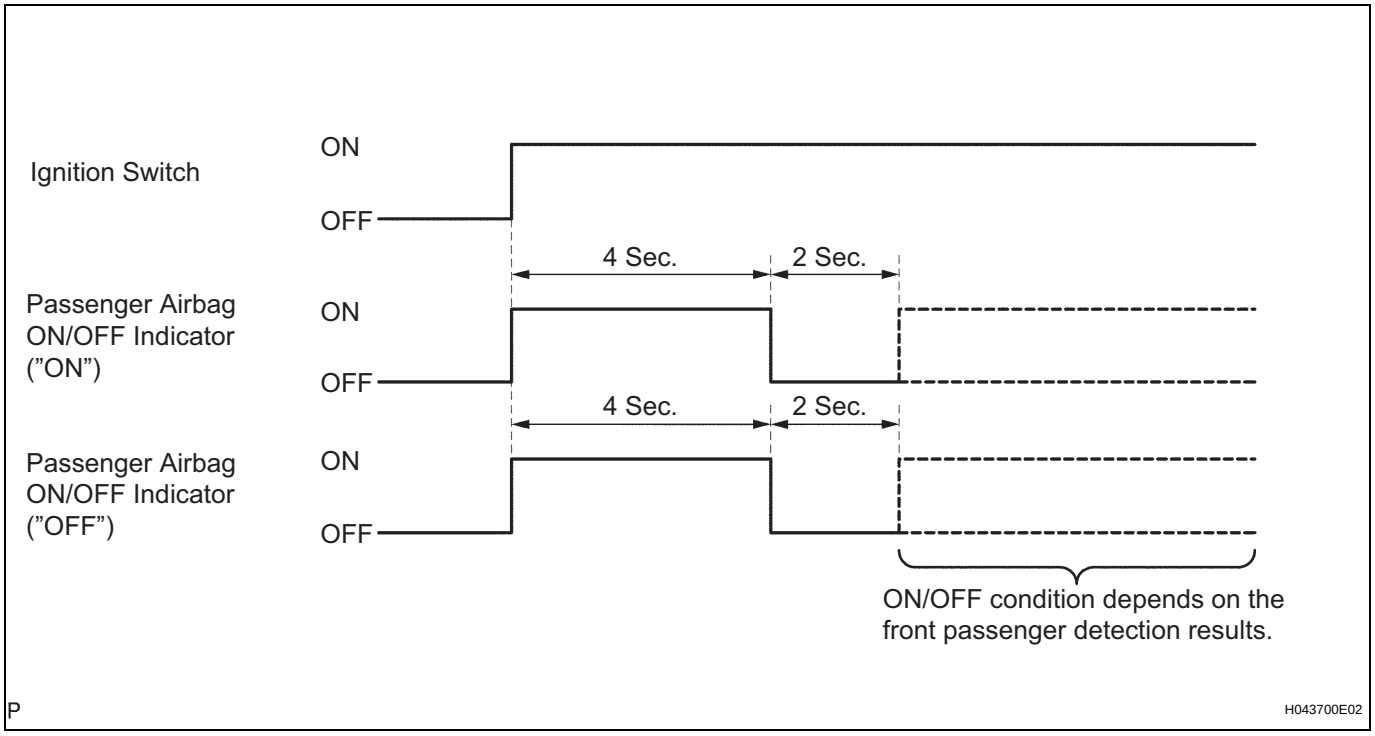
(b) Simulation method for DTC B1794:
Turn the ignition switch from the off to on (IG), hold it for 10 seconds, and back to off again 50 times in a row.
HINT:
DTC B1794 is output if the occupant classification ECU receives the ignition switch off-on (IG)-off signal 50 times in a row when a malfunction occurs in the power circuit for the occupant classification system.

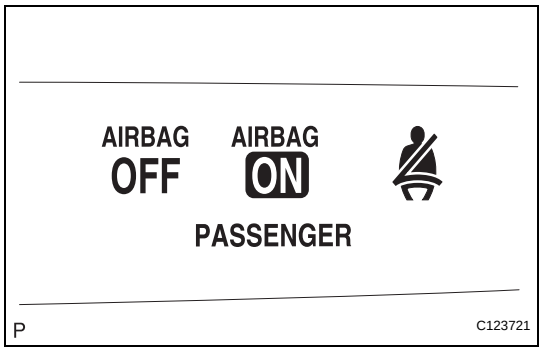
3. FUNCTION OF PASSENGER AIRBAG ON/OFF INDICATOR

(a) Initial check.
(1) Turn the ignition switch on (IG).
(2) The passenger airbag ON/OFF indicator ("ON" and "OFF") comes on for approximately 4 seconds, then goes off for approximately 2 seconds.
(3) Approximately 6 seconds after the ignition switch is turned to on (IG), the passenger airbag ON/OFF indicator will show ON or OFF depending on the conditions listed below.

Condition	ON Indicator	OFF Indicator
Vacant	OFF	OFF
Adult is seated. (Above 36 kg (79.37 lb))	ON	OFF
Child is seated. (Less than 36 kg (79.37 lb))	OFF	ON
Child restraint system is set. (*)	OFF	ON
Front passenger occupant classification system failure	OFF	ON

*: Child restraint system less than 7 kg (15.43 lb) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb) is set.
HINT:
- The passenger airbag ON/OFF indicator is based on the timing chart below in order to check the indicator light circuit.
- When the occupant classification system has trouble, both the SRS warning light and the passenger airbag ON/OFF indicator ("OFF") come on. In this case, check the DTCs in "AIRBAG SYSTEM" first.





4. CHECK PASSENGER AIRBAG ON/OFF INDICATOR

(a) Turn the ignition switch on (IG).

(b) Check that the passenger airbag ON/OFF indicator ("ON" and "OFF") come on for approximately 4 seconds, then goes off for approximately 2 seconds.

HINT:

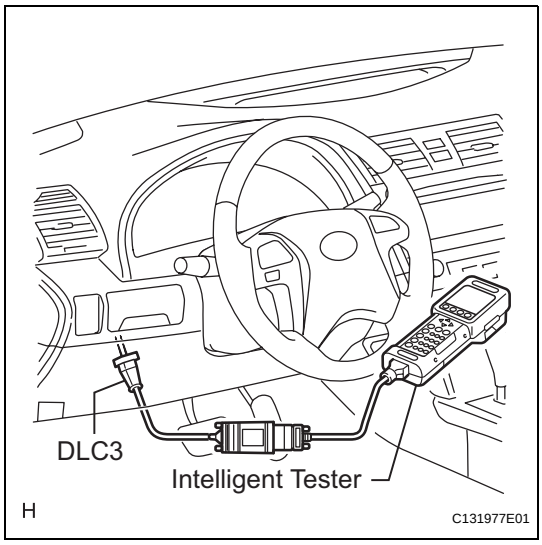
Refer to the table in step 3 regarding the passenger airbag ON/OFF indicator when the ignition switch is turned on (IG) and approximately 6 seconds pass.

RS

DTC CHECK / CLEAR

1. DTC CHECK

HINT:
When DTC B1650/32 is detected as a result of troubleshooting for "AIRBAG SYSTEM", perform troubleshooting for the occupant classification system.

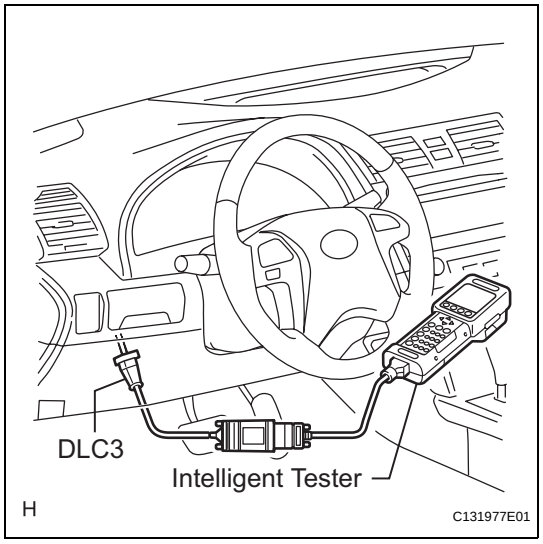


(a) Check for DTCs.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch on (IG).
  (3) Check the DTCs by following the prompts on the tester screen.
    HINT:
    Refer to the intelligent tester operator's manual for further details.

(b) Clear DTCs.
  (1) Connect the intelligent tester to the DLC3.
  (2) Turn the ignition switch on (IG).
  (3) Clear the DTCs by following the prompts on the tester screen.
    HINT:
    Refer to the intelligent tester operator's manual for further details.

DATA LIST / ACTIVE TEST

HINT:
By accessing the DATA LIST displayed on the intelligent tester, you can perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST is the first step in troubleshooting is one method to save labor time.



1. DATA LIST FOR OCCUPANT CLASSIFICATION ECU

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Turn the tester ON.
(d) Enter the following menus: DIAGNOSIS / OBD/ MOBD / OCCUPANT DETECT / DATA LIST.
(e) Check the values by referring to the table below.

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
IG SW	Ignition switch condition/ ON: Ignition switch on (IG) OFF: Ignition switch off	ON/OFF	-
P BUCKLE SW	Buckle switch (Passenger side)/ SET: The seat belt is fastened UNSET: The seat belt is not fastened NG: Data is not determined	SET/UNSET	-
PASSENGER CLASS	Passenger classification/ AM50: Adult (more than 54 kg (119.05 lb)) is seated AF05: Adult (36 to 54 kg (79.37 to 119.05 lb)) is seated CHILD: Child (less than 36 kg (79.37 lb)) is seated CRS: Child restraint system (less than 7 kg (15.43 lb)) and passenger side buckle switch is ON, then 7 to 36 kg (15.43 to 79.37 lb) is set OFF: Vacant	AM50/AF05/CHILD/CRS/OFF	-
SENS RANGE INF	Sensor range information/ OK: The value of a sensor is within the range NG: The value of a sensor is over the range	OK	-
FL SENS RANGE	Front left sensor range information/ OK: Sensor range is -17 to 27 kg (-37.48 to 59.52 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	-

Item	Measurement Item/ Range (Display)	Normal Condition	Diagnostic Note
FR SENS RANGE	Front right sensor range information/ OK: Sensor range is -17 to 27 kg (-37.48 to 59.52 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 27 kg (59.52 lb)	OK	-
RL SENS RANGE	Rear left sensor range information/ OK: Sensor range is -17 to 37 kg (-37.48 to 81.57 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	-
RR SENS RANGE	Rear right sensor range information/ OK: Sensor range is -17 to 37 kg (-37.48 to 81.57 lb) Min.: Less than -17 kg (-37.48 lb) Max.: More than 37 kg (81.57 lb)	OK	-
FL SENS VOL	Front left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
FR SENS VOL	Front right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
RL SENS VOL	Rear left sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
RR SENS VOL	Rear right sensor voltage/ Min.: 0 V Max.: 19.8 V	0 to 4.7 V	-
FL SENS WEIGHT	Front left sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 27 kg (59.52 lb)	-17 to 27 kg (-37.48 to 59.52 lb)	-
FR SENS WEIGHT	Front right sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 27 kg (59.52 lb)	-17 to 27 kg (-37.48 to 59.52 lb)	-
RL SENS WEIGHT	Rear left sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 37 kg (81.57 lb)	-17 to 37 kg (-37.48 to 81.57 lb)	-
RR SENS WEIGHT	Rear right sensor weight information/ Min.: -17 kg (-37.48 lb) Max.: 37 kg (81.57 lb)	-17 to 37 kg (-37.48 to 81.57 lb)	-
TOTAL WEIGHT	Total weight information/ Min.: -68 kg (-149.91 lb) Max.: 128 kg (282.19 lb)	-68 to 128 kg (-149.91 to 282.19 lb)	-
#PRESENT CODES	Number of present DTC recorded/ Min.: 0, Max.: 255	0	-
#PAST CODES	Number of past DTC recorded/ Min.: 0, Max.: 255	0	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (Proceed to the page listed for that circuit).

OCCUPANT CLASSIFICATION SYSTEM:

DTC No.	Detection Item	Trouble Area	See page
B1771	Passenger Side Buckle Switch Circuit Malfunction	1. Front seat inner belt assembly RH 2. Occupant classification ECU 3. Floor wire No. 2 4. Front seat wire RH (for Power seat)	RS-255
B1780	Front Occupant Classification Sensor LH Circuit Malfunction	1. Front seat assembly RH (Front occupant classification sensor LH) 2. Occupant classification ECU 3. Front seat wire RH	RS-263
B1781	Front Occupant Classification Sensor RH Circuit Malfunction	1. Front seat assembly RH (Front occupant classification sensor RH) 2. Occupant classification ECU 3. Front seat wire RH	RS-271
B1782	Rear Occupant Classification Sensor LH Circuit Malfunction	1. Front seat assembly RH (Rear occupant classification sensor LH) 2. Occupant classification ECU 3. Front seat wire RH	RS-279
B1783	Rear Occupant Classification Sensor RH Circuit Malfunction	1. Front seat assembly RH (Rear occupant classification sensor RH) 2. Occupant classification ECU 3. Front seat wire RH	RS-287
B1785	Front Occupant Classification Sensor LH Collision Detection	1. Front seat assembly RH (Front occupant classification sensor LH) 2. Occupant classification ECU	RS-295
B1786	Front Occupant Classification Sensor RH Collision Detection	1. Front seat assembly RH (Front occupant classification sensor RH) 2. Occupant classification ECU	RS-299
B1787	Rear Occupant Classification Sensor LH Collision Detection	1. Front seat assembly RH (Rear occupant classification sensor LH) 2. Occupant classification ECU	RS-303
B1788	Rear Occupant Classification Sensor RH Collision Detection	1. Front seat assembly RH (Rear occupant classification sensor RH) 2. Occupant classification ECU	RS-307
B1790	Center Airbag Sensor Assembly Communication Circuit Malfunction	1. Occupant classification ECU 2. Center airbag sensor assembly 3. Floor wire No. 2 4. Front seat wire RH (for Power seat)	RS-311
B1793	Occupant Classification Sensor Power Supply Circuit Malfunction	1. Front seat assembly RH (Occupant classification sensors) 2. Front seat wire RH 3. Occupant classification ECU	RS-325
B1794	Open in Occupant Classification ECU Battery Positive Line	1. Battery 2. ECU-B fuse 3. Floor wire No. 2 4. Front seat wire RH (for Power seat) 5. Occupant classification ECU	RS-332

DTC No.	Detection Item	Trouble Area	See page
B1795	Occupant Classification ECU Malfunction	1. Occupant classification ECU 2. Floor wire No. 2 3. Front seat wire RH (for Power seat) 4. Front seat inner belt assembly RH	RS-337
B1796	Sleep Operation Failure of Occupant Classification ECU	Occupant classification ECU	RS-340

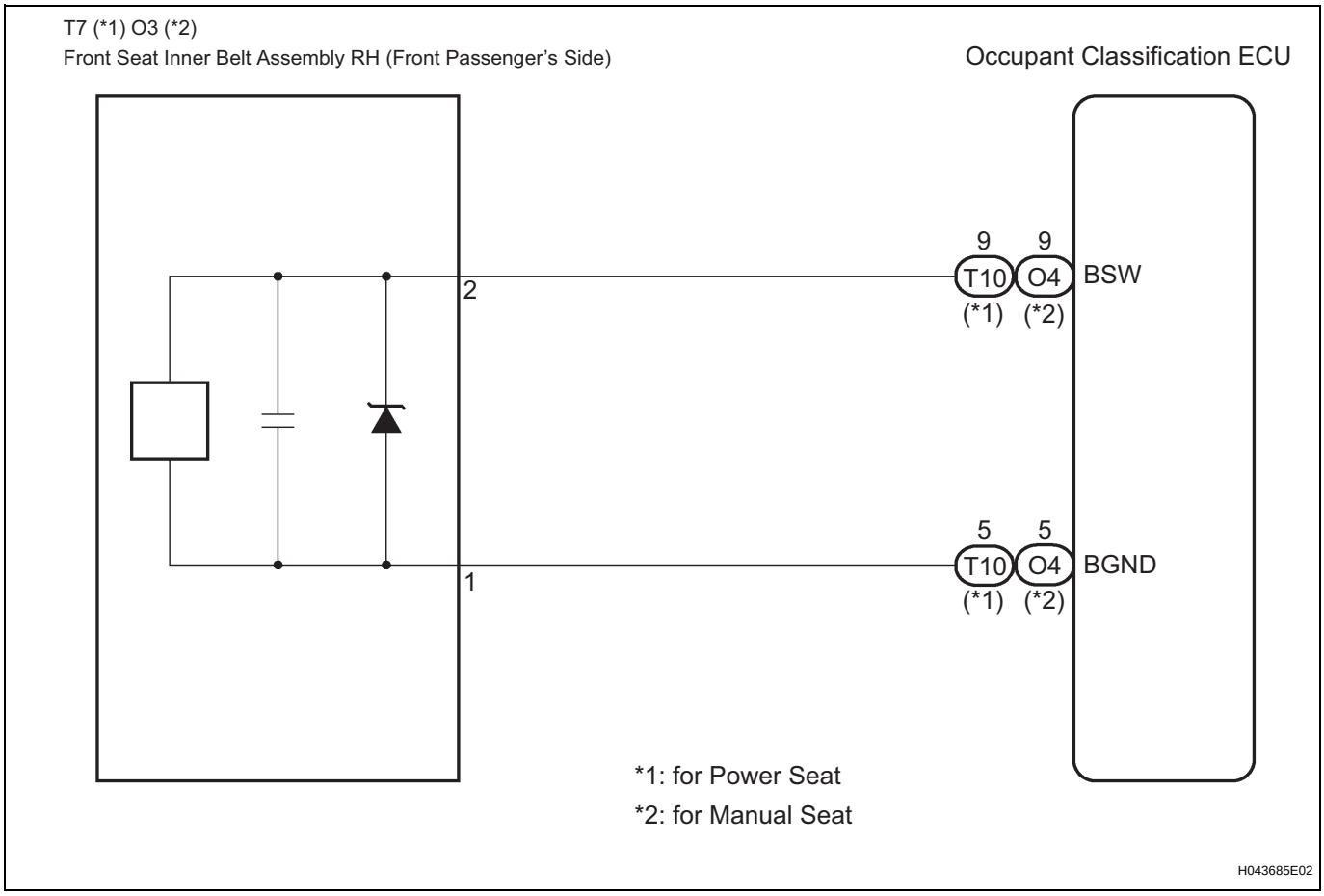
DTC	B1771	Passenger Side Buckle Switch Circuit Malfunction

DESCRIPTION

The passenger side buckle switch circuit consists of the occupant classification ECU and the front seat inner belt assembly RH.
DTC B1771 is recorded when a malfunction is detected in the passenger side buckle switch circuit.
Troubleshoot DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1771	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the passenger side buckle switch circuit for 2 seconds. • Passenger side buckle switch malfunction • Occupant classification ECU malfunction	• Front seat inner belt assembly RH • Floor wire No. 2 • Front seat wire RH (for Power seat) • Occupant classification ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).

OK:

DTC B1771 is not output.

HINT:
Codes other than DTC B1771 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

NG

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the front seat inner belt assembly RH.

OK:

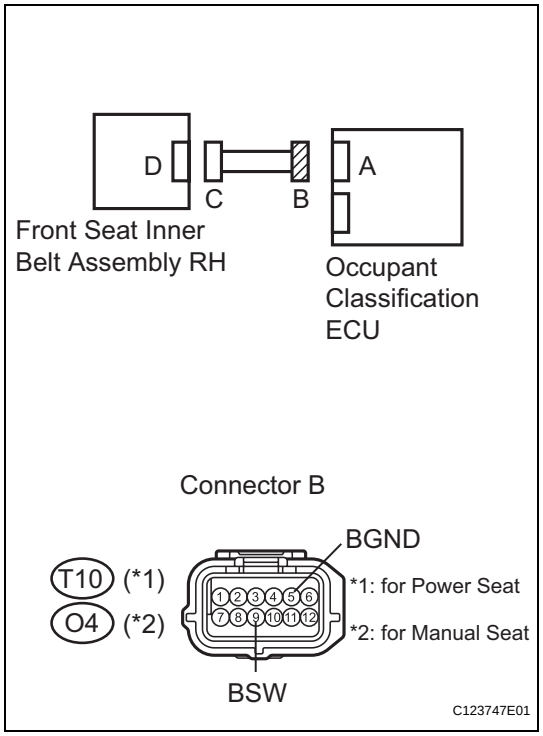
The connectors are properly connected.

NG → **CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1**

OK

RS

3	CHECK WIRE HARNESS (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the front seat inner belt assembly RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - Body ground	Ignition switch on (IG)	Below 1 V
T10-5 (BGND) - Body ground	Ignition switch on (IG)	Below 1 V

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - Body ground)	Ignition switch on (IG)	Below 1 V
O4-5 (BGND) - Body ground	Ignition switch on (IG)	Below 1 V

Result

Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

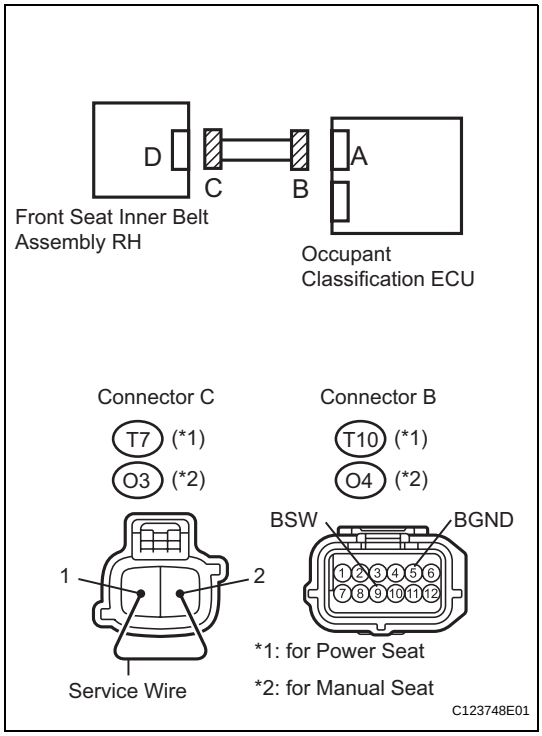
RS

A → REPAIR OR REPLACE FRONT SEAT WIRE RH

B → REPAIR OR REPLACE FLOOR WIRE NO. 2

C

4	CHECK WIRE HARNESS (OPEN)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Using a service wire, connect terminals 2 and 1 of connector C.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - T10-5 (BGND)	Always	Below 1 Ω

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - O4-5 (BGND)	Always	Below 1 Ω

Result

Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

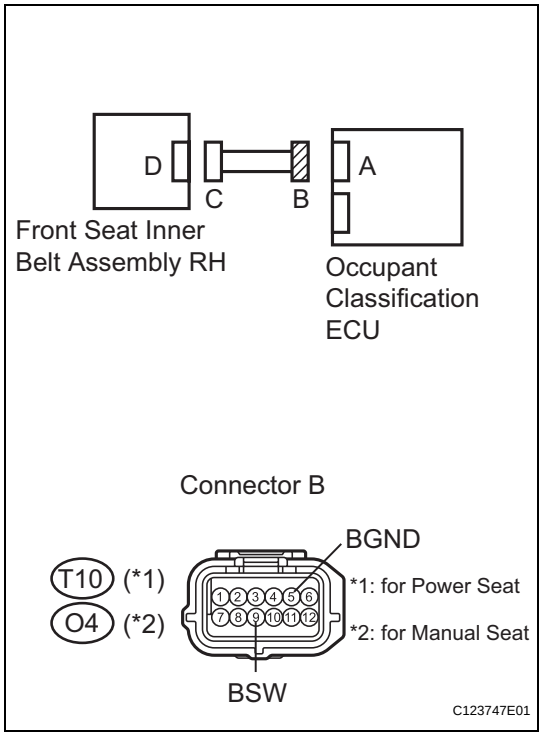
A → REPAIR OR REPLACE FRONT SEAT WIRE RH

B → REPAIR OR REPLACE FLOOR WIRE NO. 2

C

RS

5	CHECK WIRE HARNESS (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - T10-5 (BGND)	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - O4-5 (BGND)	Always	1 MΩ or Higher

Result

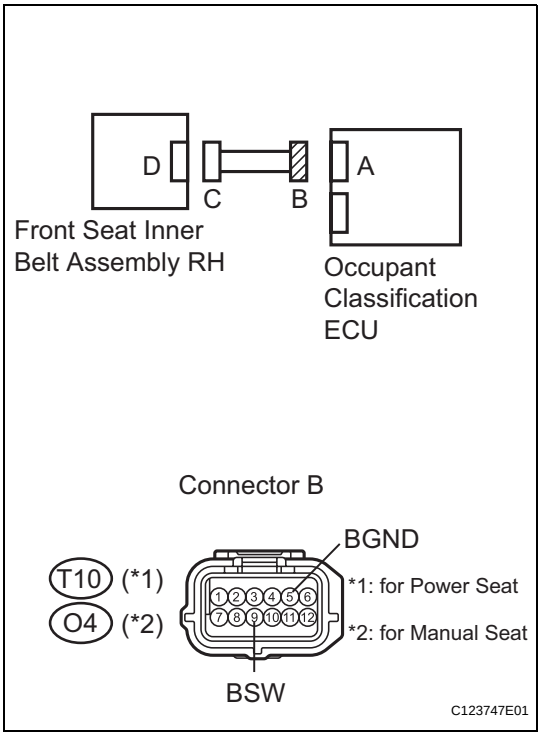
Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

A	REPAIR OR REPLACE FRONT SEAT WIRE RH
B	REPAIR OR REPLACE FLOOR WIRE NO. 2

C

RS

6 CHECK WIRE HARNESS (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T10-9 (BSW) - Body ground	Always	1 MΩ or Higher
T10-5 (BGND) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
O4-9 (BSW) - Body ground	Always	1 MΩ or Higher
O4-5 (BGND) - Body ground	Always	1 MΩ or Higher

Result

Result	Proceed to
NG (for Power seat)	A
NG (for Manual seat)	B
OK	C

A → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

B → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

C

7 CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the front seat inner belt assembly RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG).
(h) Check the DTCs (See page RS-251).

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

RS

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

NG

8	REPLACE FRONT SEAT INNER BELT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat inner belt assembly RH (See page SB-15).
HINT:
Perform the inspection using parts from a normal vehicle if possible.
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the ignition switch on (IG).
(f) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(g) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(h) Turn the ignition switch off.
(i) Turn the ignition switch on (IG).
(j) Check the DTCs (See page RS-251).
OK:
DTC B1771 is not output.
HINT:
Codes other than DTC B1771 may be output at this time, but they are not related to this check.

OK → **END**

NG

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).

NEXT

10	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

11	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

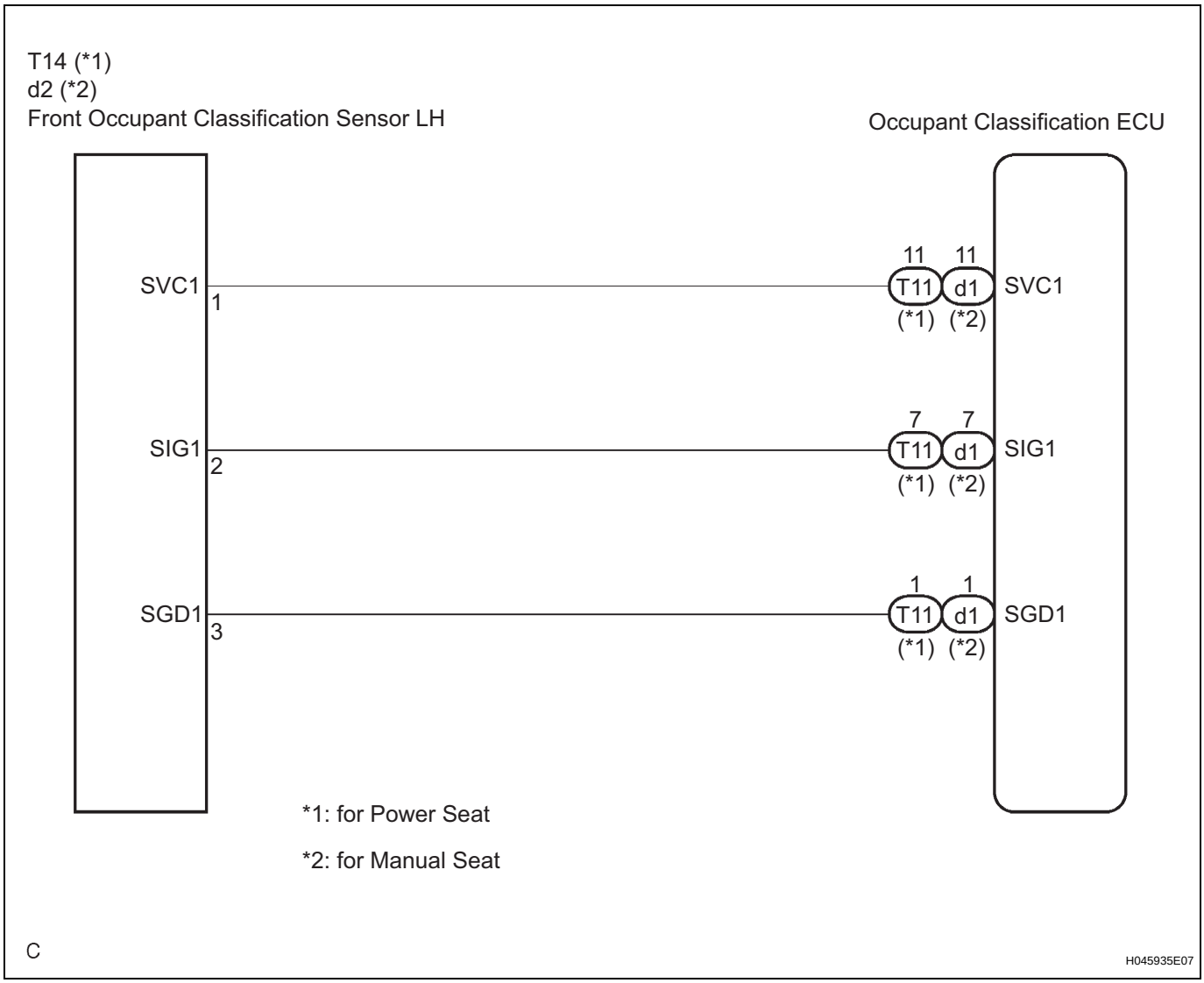
DTC	B1780	Front Occupant Classification Sensor LH Circuit Malfunction

DESCRIPTION

The front occupant classification sensor LH circuit consists of the occupant classification ECU and the front occupant classification sensor LH.
DTC B1780 is recorded when a malfunction is detected in the front occupant classification sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1780	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front occupant classification sensor LH circuit for 2 seconds. • Front occupant classification sensor LH malfunction • Occupant classification ECU malfunction	• Front seat assembly RH (Front occupant classification sensor LH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



RS

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1780 is not output.
HINT:
Codes other than DTC B1780 may be output at this time, but they are not related to this check.

OK	USE SIMULATION METHOD TO CHECK (See page RS-248)

NG

RS

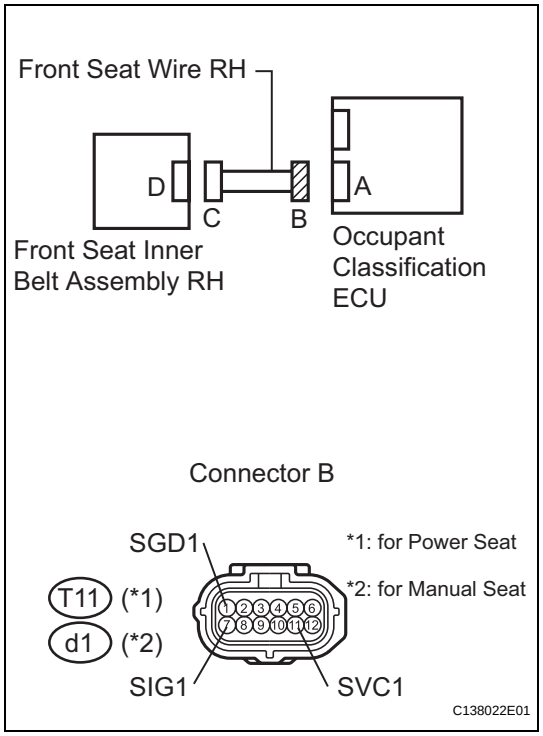
2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the front occupant classification sensor LH.
OK:
The connectors are properly connected.

NG	CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the front occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-1 (SGD1) - Body ground	Ignition switch on (IG)	Below 1 V
T11-7 (SIG1) - Body ground	Ignition switch on (IG)	Below 1 V
T11-11 (SVC1) - Body ground	Ignition switch on (IG)	Below 1 V

for Manual seat

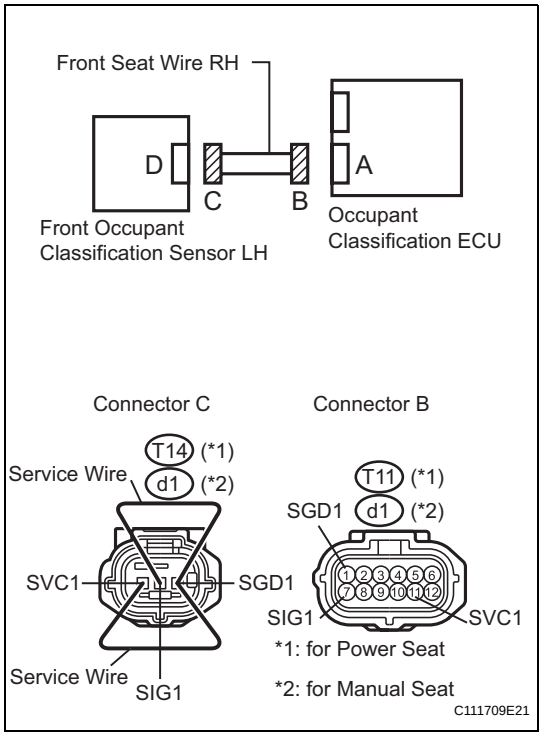
Tester connection	Condition	Specified condition
d1-1 (SGD1) - Body ground	Ignition switch on (IG)	Below 1 V
d1-7 (SIG1) - Body ground	Ignition switch on (IG)	Below 1 V
d1-11 (SVC1) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

RS

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch off.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) Using a service wire, connect terminals 1 (SVC1) and 3 (SGD1), and connect terminals 2 (SIG1) and 3 (SGD1) of connector C.

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-7 (SIG1) - T11-1 (SGD1)	Always	Below 1 Ω
T11-11 (SVC1) - T11-1 (SGD1)	Always	Below 1 Ω

for Manual seat

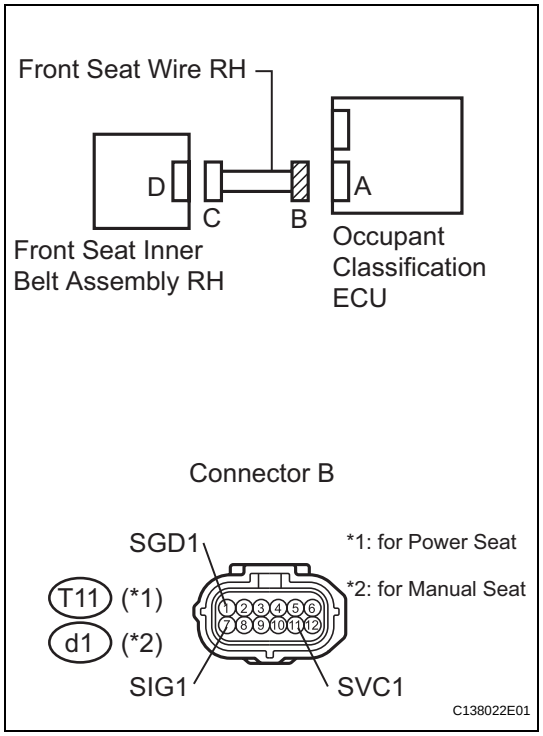
Tester connection	Condition	Specified condition
d1-7 (SIG1) - d1-1 (SGD1)	Always	Below 1 Ω
d1-11 (SVC1) - d1-1 (SGD1)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

RS

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T11-7 (SIG1) - T11-1 (SGD1)	Always	1 MΩ or Higher
T11-11 (SVC1) - T11-1 (SGD1)	Always	1 MΩ or Higher
T11-7 (SIG1) - T11-11 (SVC1)	Always	1 MΩ or Higher

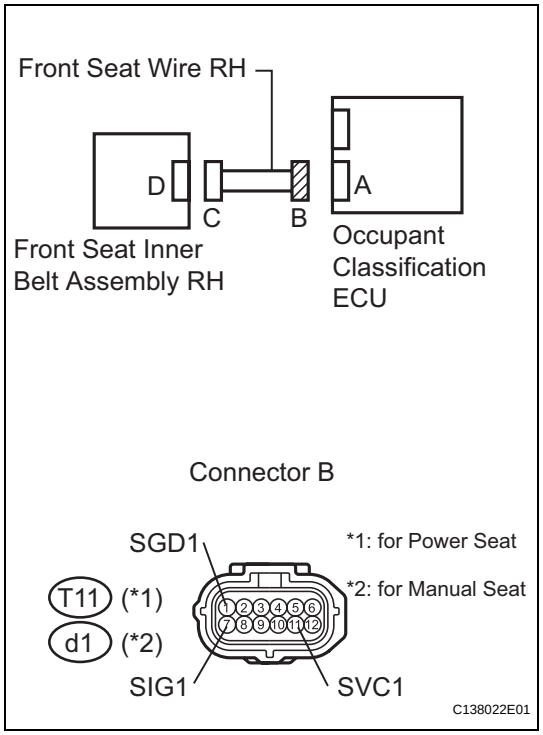
for Manual seat

Tester connection	Condition	Specified condition
d1-7 (SIG1) - d1-1 (SGD1)	Always	1 MΩ or Higher
d1-11 (SVC1) - d1-1 (SGD1)	Always	1 MΩ or Higher
d1-7 (SIG1) - d1-11 (SVC1)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:
for Power seat

Tester connection	Condition	Specified condition
T11-1 (SGD1) - Body ground	Always	1 MΩ or Higher
T11-7 (SIG1) - Body ground	Always	1 MΩ or Higher
T11-11 (SVC1) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-1 (SGD1) - Body ground	Always	1 MΩ or Higher
d1-7 (SIG1) - Body ground	Always	1 MΩ or Higher
d1-11 (SVC1) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the front occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG).
(h) Check the DTCs (See page RS-251).
OK:
DTC B1780 is not output.
HINT:
Codes other than DTC B1780 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

NG

RS

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1780 is not output.
HINT:
Codes other than DTC B1780 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

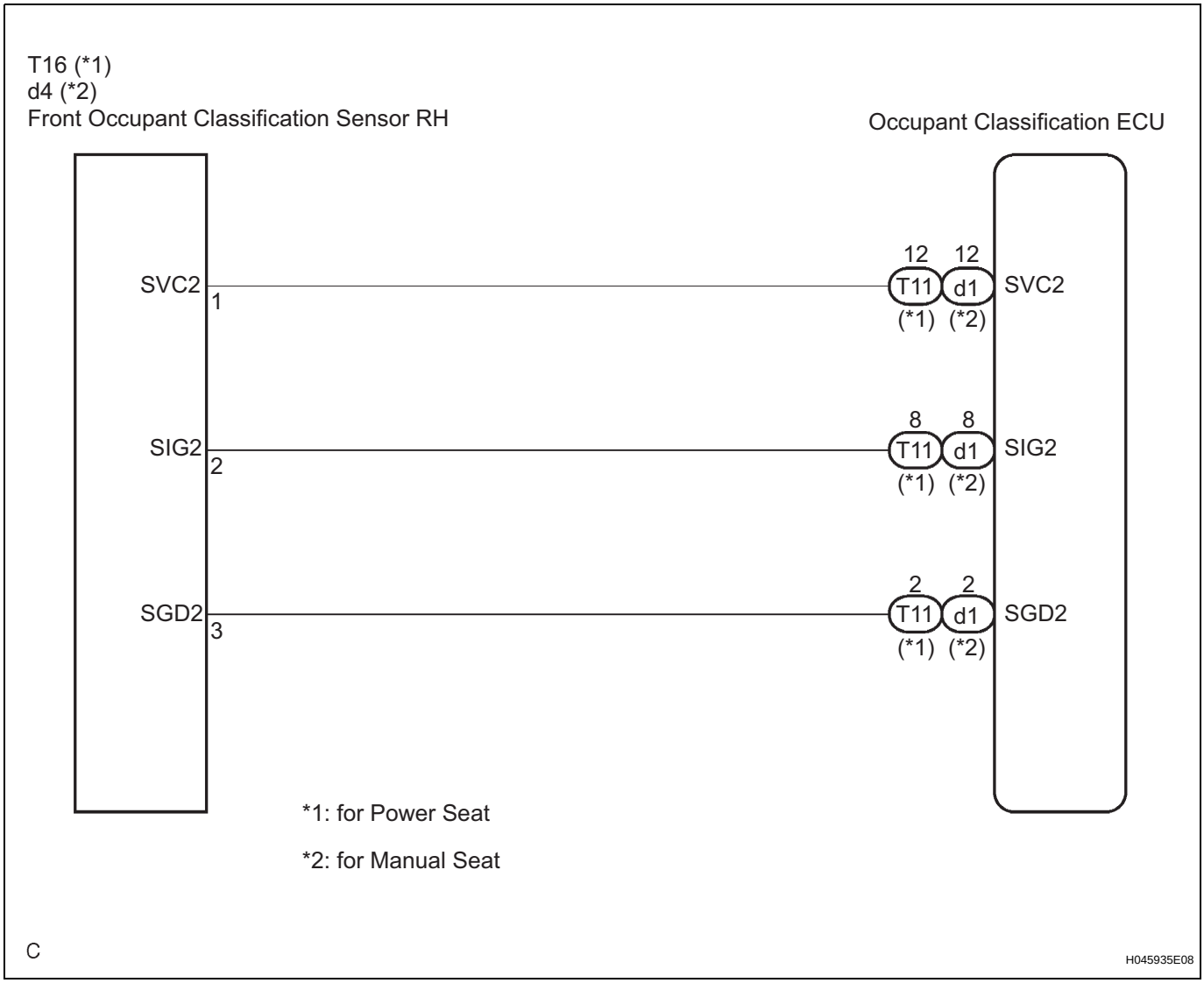
DTC	B1781	Front Occupant Classification Sensor RH Circuit Malfunction

DESCRIPTION

The front occupant classification sensor RH circuit consists of the occupant classification ECU and the front occupant classification sensor RH.
DTC B1781 is recorded when a malfunction is detected in the front occupant classification sensor RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1781	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front occupant classification sensor RH circuit for 2 seconds. • Front occupant classification sensor RH malfunction • Occupant classification ECU malfunction	• Front seat assembly RH (Front occupant classification sensor RH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



RS

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-41).

OK:

DTC B1781 is not output.

HINT:

Codes other than DTC B1781 may be output at this time, but they are not related to this check.

OK	USE SIMULATION METHOD TO CHECK (See page RS-248)

NG

RS

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the front occupant classification sensor RH.

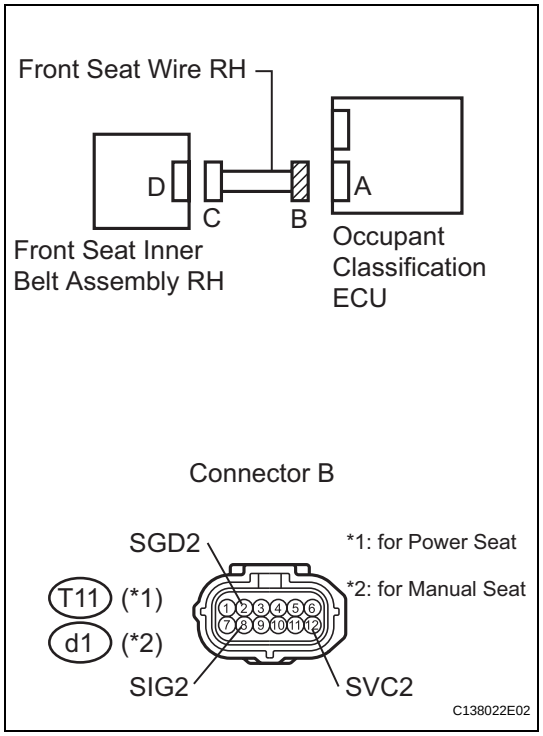
OK:

The connectors are properly connected.

NG	CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the front occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-2 (SGD2) - Body ground	Ignition switch on (IG)	Below 1 V
T11-8 (SIG2) - Body ground	Ignition switch on (IG)	Below 1 V
T11-12 (SVC2) - Body ground	Ignition switch on (IG)	Below 1 V

for Manual seat

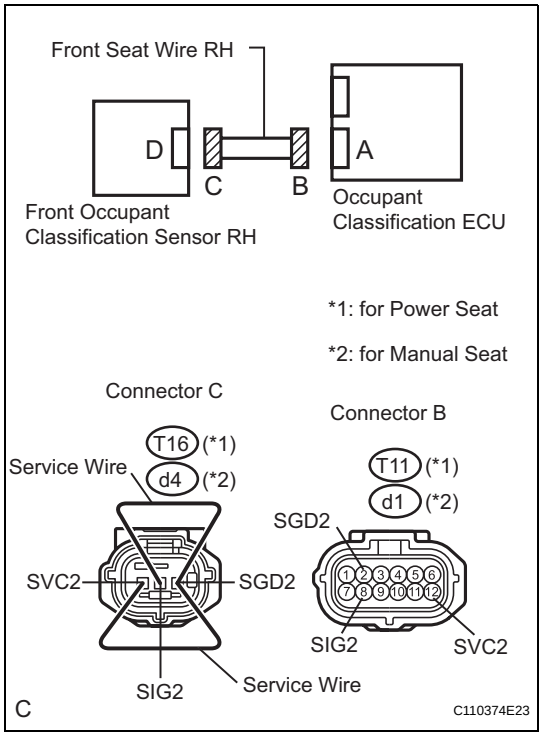
Tester connection	Condition	Specified condition
d1-2 (SGD2) - Body ground	Ignition switch on (IG)	Below 1 V
d1-8 (SIG2) - Body ground	Ignition switch on (IG)	Below 1 V
d1-12 (SVC2) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

RS

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch off.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) Using a service wire, connect terminals 1 (SVC2) and 3 (SGD2), and connect terminals 2 (SIG2) and 3 (SGD2) of connector C.

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-8 (SIG2) - T11-2 (SGD2)	Always	Below 1 Ω
T11-12 (SVC2) - T11-2 (SGD2)	Always	Below 1 Ω

for Manual seat

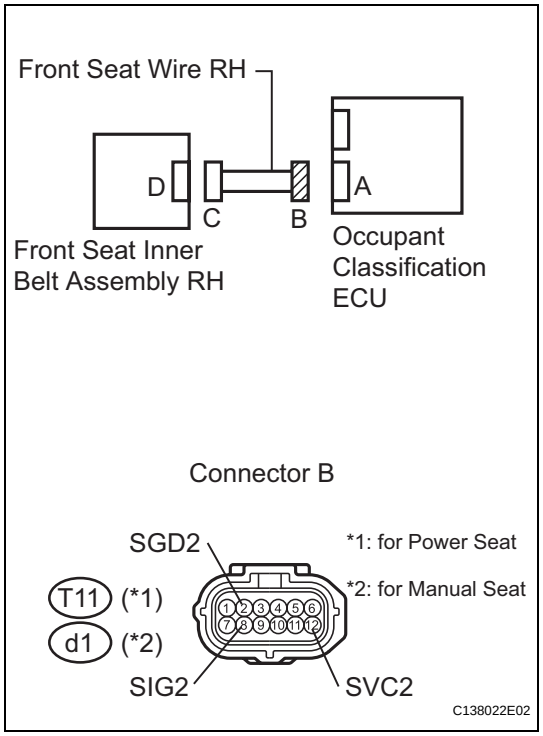
Tester connection	Condition	Specified condition
d1-8 (SIG2) - d1-2 (SGD2)	Always	Below 1 Ω
d1-12 (SVC2) - d1-2 (SGD2)	Always	Below 1 Ω

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-8 (SIG2) - T11-2 (SGD2)	Always	1 MΩ or Higher
T11-12 (SVC2) - T11-2 (SGD2)	Always	1 MΩ or Higher
T11-8 (SIG2) - T11-12 (SVC2)	Always	1 MΩ or Higher

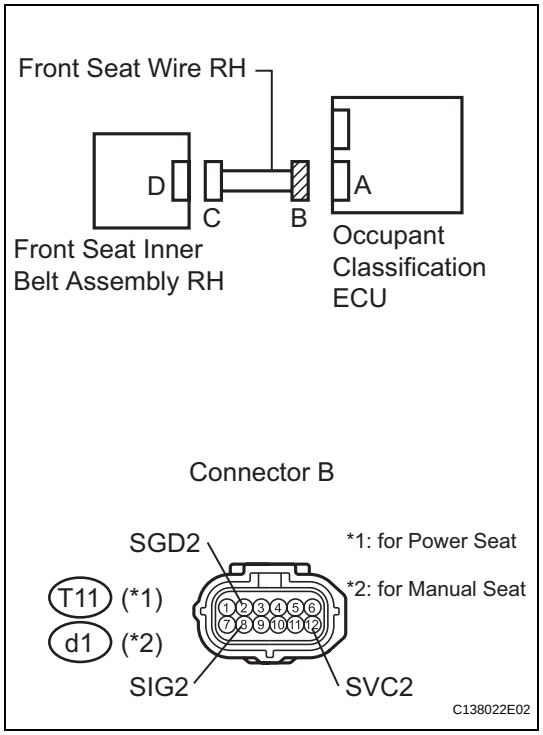
for Manual seat

Tester connection	Condition	Specified condition
d1-8 (SIG2) - d1-2 (SGD2)	Always	1 MΩ or Higher
d1-12 (SVC2) - d1-2 (SGD2)	Always	1 MΩ or Higher
d1-8 (SIG2) - d1-12 (SVC2)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-2 (SGD2) - Body ground	Always	1 MΩ or Higher
T11-8 (SIG2) - Body ground	Always	1 MΩ or Higher
T11-12 (SVC2) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-2 (SGD2) - Body ground	Always	1 MΩ or Higher
d1-8 (SIG2) - Body ground	Always	1 MΩ or Higher
d1-12 (SVC2) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the front occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG).
(h) Check the DTCs (See page RS-251).
OK:
DTC B1781 is not output.
HINT:
Codes other than DTC B1781 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

NG

RS

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1781 is not output.
HINT:
Codes other than DTC B1781 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

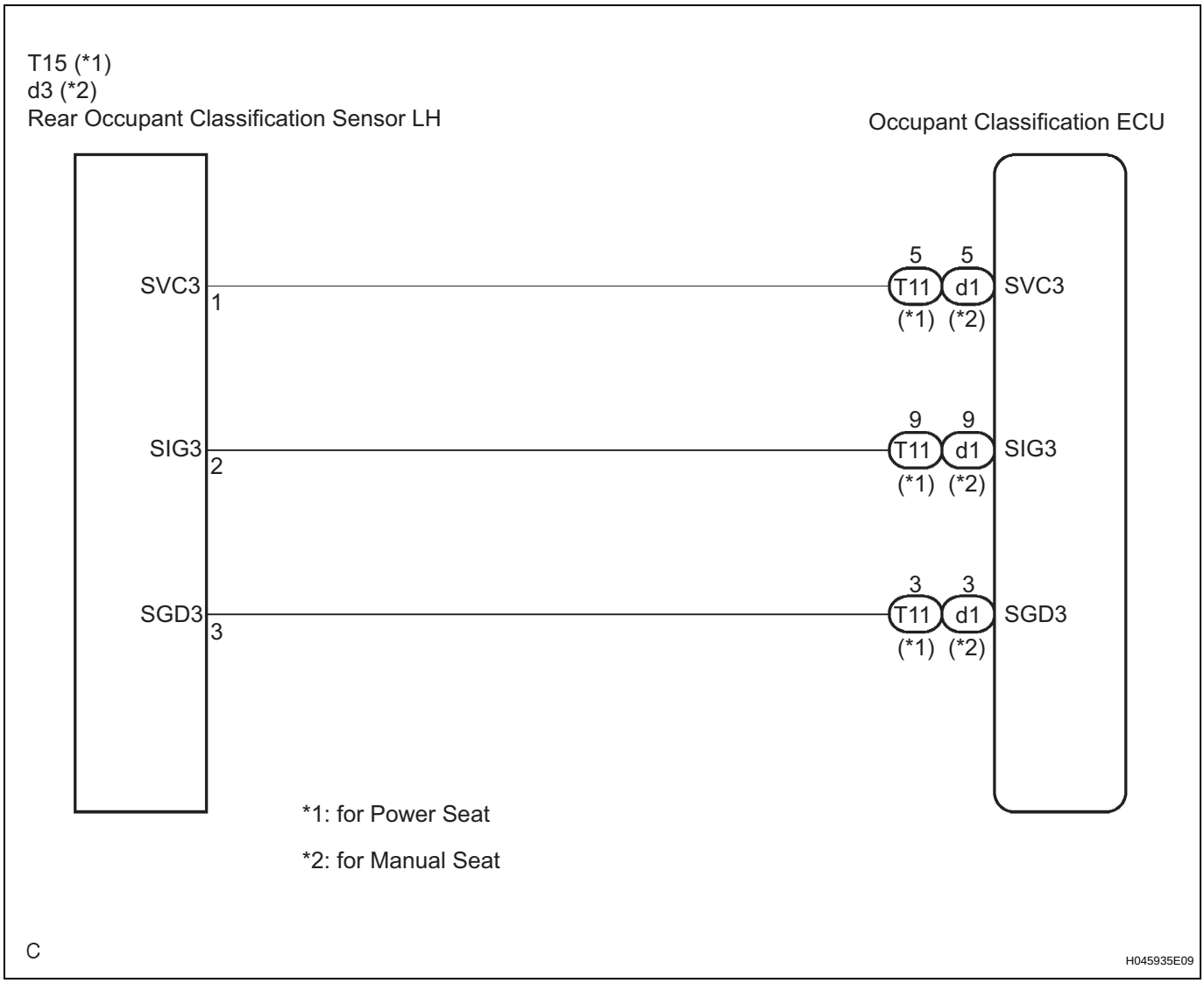
DTC	B1782	Rear Occupant Classification Sensor LH Circuit Malfunction

DESCRIPTION

The rear occupant classification sensor LH circuit consists of the occupant classification ECU and the rear occupant classification sensor LH.
DTC B1782 is recorded when a malfunction is detected in the rear occupant classification sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1782	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the rear occupant classification sensor LH circuit for 2 seconds. • Rear occupant classification sensor LH malfunction • Occupant classification ECU malfunction	• Front seat assembly RH (Rear occupant classification sensor LH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



RS

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).

OK:

DTC B1782 is not output.

HINT:

Codes other than DTC B1782 may be output at this time, but they are not related to this check.

OK	USE SIMULATION METHOD TO CHECK (See page RS-248)

NG

RS

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the rear occupant classification sensor LH.

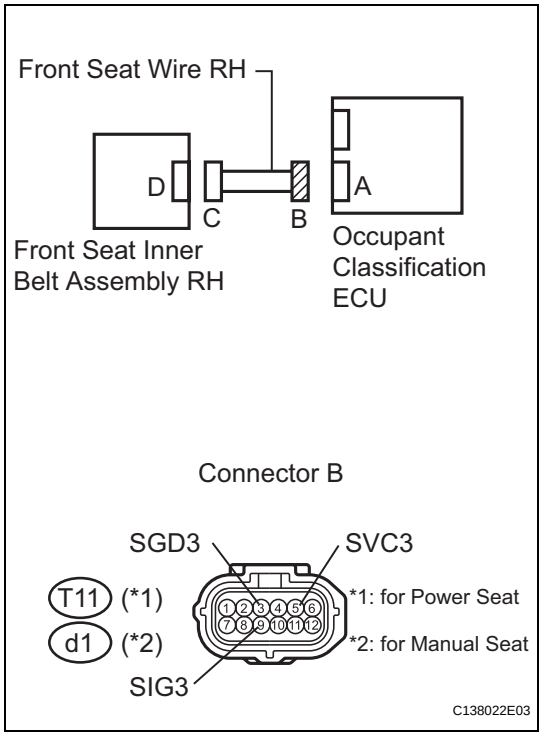
OK:

The connectors are properly connected.

NG	CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the rear occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-3 (SGD3) - Body ground	Ignition switch on (IG)	Below 1 V
T11-5 (SVC3) - Body ground	Ignition switch on (IG)	Below 1 V
T11-9 (SIG3) - Body ground	Ignition switch on (IG)	Below 1 V

for Manual seat

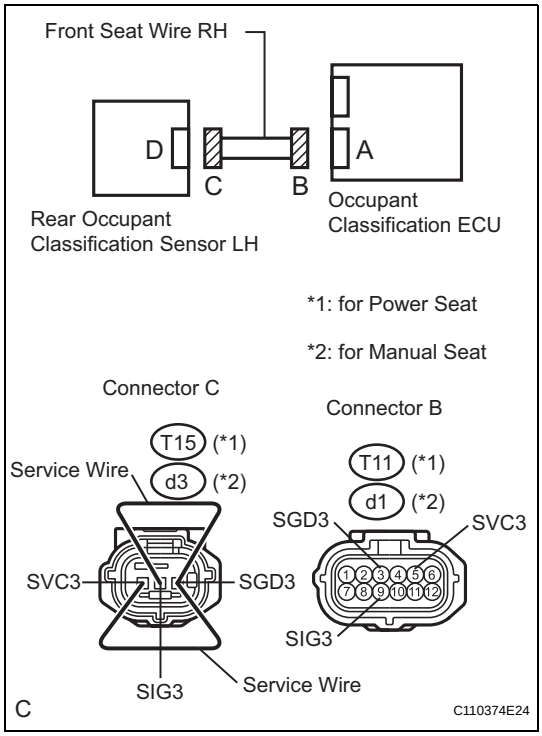
Tester connection	Condition	Specified condition
d1-3 (SGD3) - Body ground	Ignition switch on (IG)	Below 1 V
d1-9 (SIG3) - Body ground	Ignition switch on (IG)	Below 1 V
d1-5 (SVC3) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

RS

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch off.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) Using a service wire, connect terminals 1 (SVC3) and 3 (SGD3), and connect terminals 2 (SIG3) and 3 (SGD3) of connector C.

NOTICE:

Do not forcibly insert a service wire into the terminals of the connector when connecting.

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T11-3 (SGD3)	Always	Below 1 Ω
T11-9 (SIG3) - T11-3 (SGD3)	Always	Below 1 Ω

for Manual seat

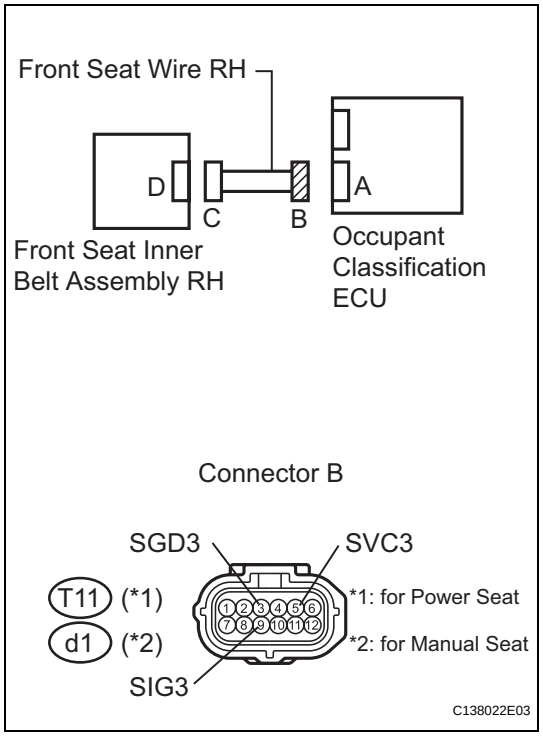
Tester connection	Condition	Specified condition
d1-9 (SIG3) - d1-3 (SGD3)	Always	Below 1 Ω
d1-5 (SVC3) - d1-3 (SGD3)	Always	Below 1 Ω

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T11-3 (SGD3)	Always	1 MΩ or Higher
T11-9 (SIG3) - T11-3 (SGD3)	Always	1 MΩ or Higher
T11-5 (SVC3) - T11-9 (SIG3)	Always	1 MΩ or Higher

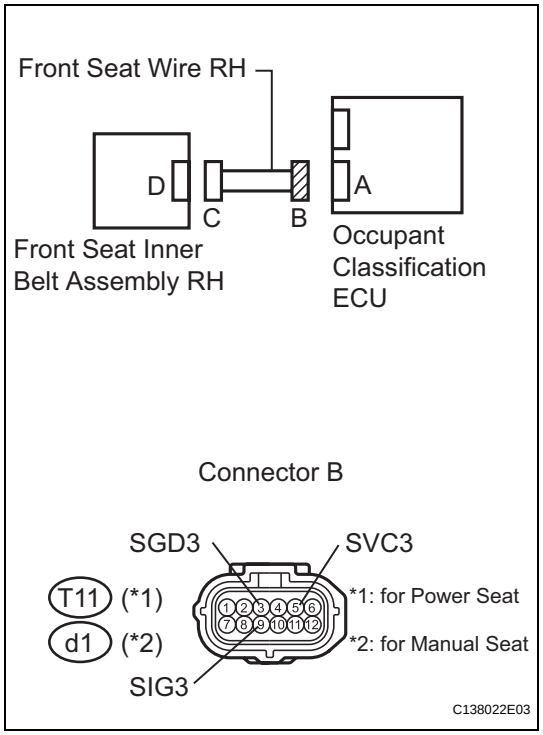
for Manual seat

Tester connection	Condition	Specified condition
d1-9 (SIG3) - d1-3 (SGD3)	Always	1 MΩ or Higher
d1-5 (SVC3) - d1-3 (SGD3)	Always	1 MΩ or Higher
d1-9 (SIG3) - d1-5 (SVC3)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-3 (SGD3) - Body ground	Always	1 MΩ or Higher
T11-5 (SVC3) - Body ground	Always	1 MΩ or Higher
T11-9 (SIG3) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-3 (SGD3) - Body ground	Always	1 MΩ or Higher
d1-9 (SIG3) - Body ground	Always	1 MΩ or Higher
d1-5 (SVC3) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the rear occupant classification sensor LH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG).
(h) Check the DTCs (See page RS-251).
OK:
DTC B1782 is not output.
HINT:
Codes other than DTC B1782 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

NG

RS

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1782 is not output.
HINT:
Codes other than DTC B1782 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

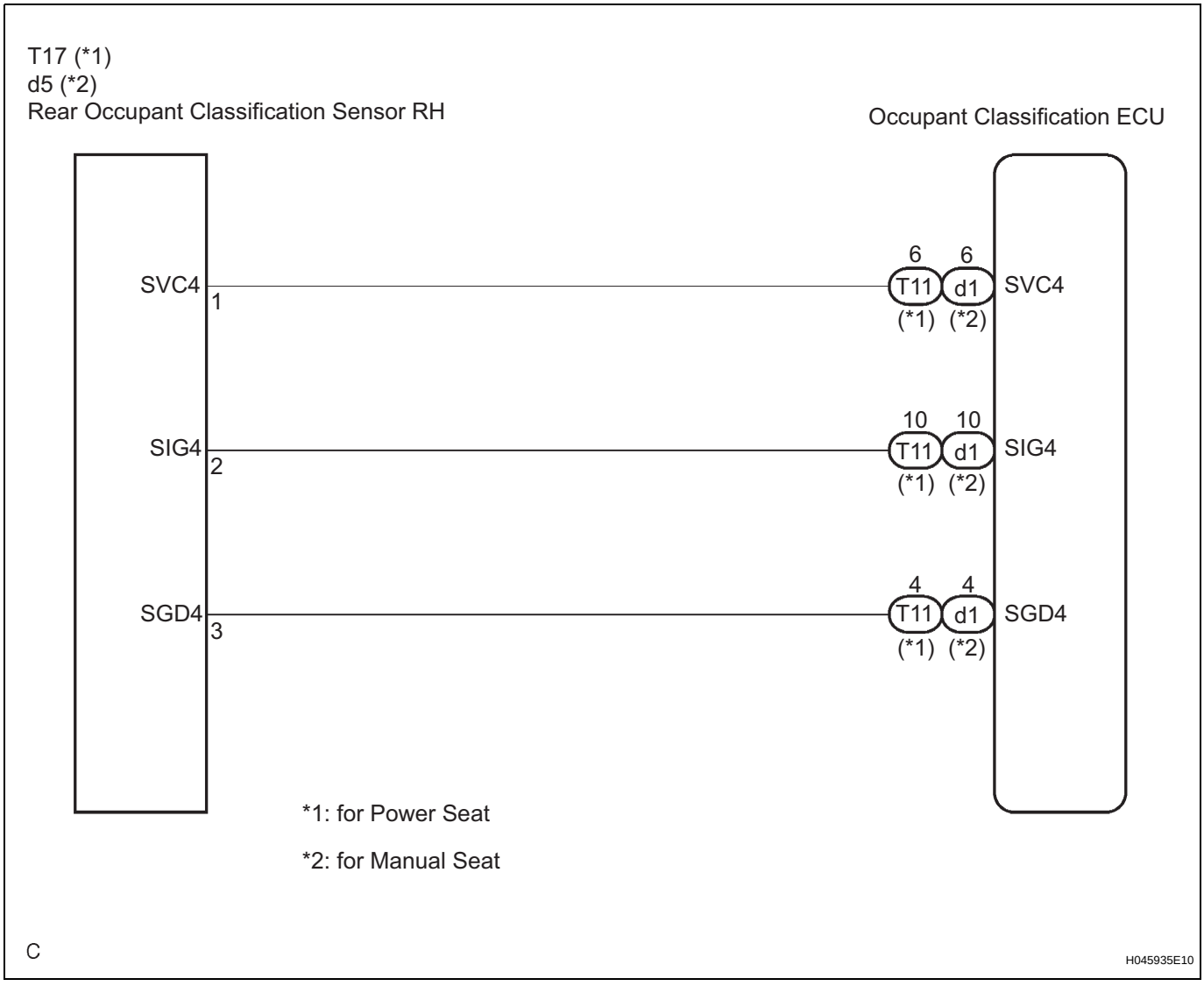
DTC	B1783	Rear Occupant Classification Sensor RH Circuit Malfunction

DESCRIPTION

The rear occupant classification sensor RH circuit consists of the occupant classification ECU and the rear occupant classification sensor RH.
DTC B1783 is recorded when a malfunction is detected in the rear occupant classification sensor RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1783	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the rear occupant classification sensor RH circuit for 2 seconds. • Rear occupant classification sensor RH malfunction. • Occupant classification ECU malfunction.	• Front seat assembly RH (Rear occupant classification sensor RH) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



RS

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).

OK:

DTC B1783 is not output.

HINT:

Codes other than DTC B1783 may be output at this time, but they are not related to this check.

OK	USE SIMULATION METHOD TO CHECK (See page RS-248)

NG

RS

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the rear occupant classification sensor RH.

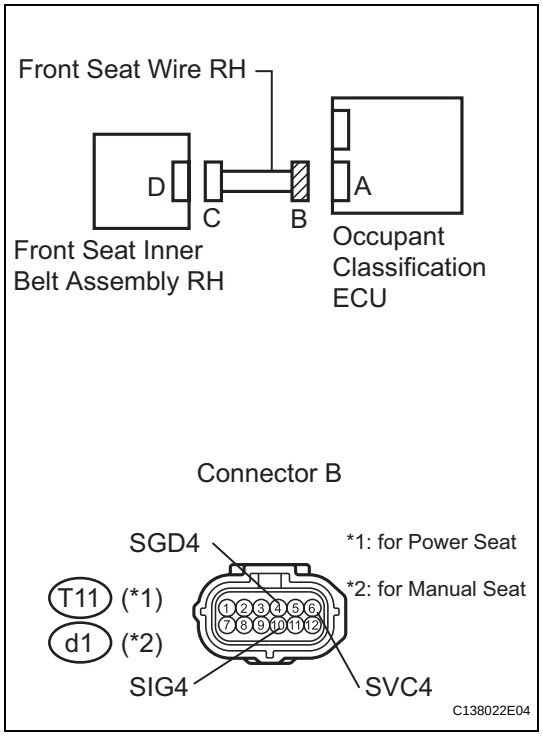
OK:

The connectors are properly connected.

NG	CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1

OK

3	CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the rear occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-4 (SGD4) - Body ground	Ignition switch on (IG)	Below 1 V
T11-6 (SVC4) - Body ground	Ignition switch on (IG)	Below 1 V
T11-10 (SIG4) - Body ground	Ignition switch on (IG)	Below 1 V

for Manual seat

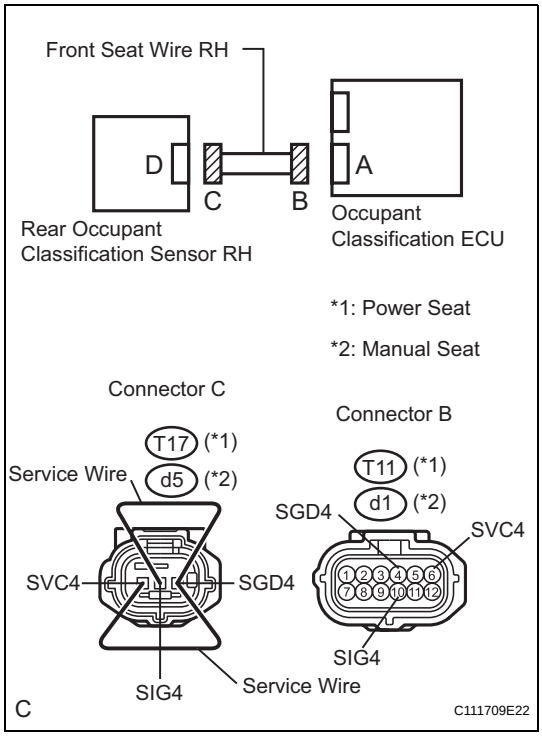
Tester connection	Condition	Specified condition
d1-4 (SGD4) - Body ground	Ignition switch on (IG)	Below 1 V
d1-10 (SIG4) - Body ground	Ignition switch on (IG)	Below 1 V
d1-6 (SVC4) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

RS

4	CHECK FRONT SEAT WIRE RH (OPEN)



(a) Turn the ignition switch off.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) for Power seat:
Using a service wire, connect T17-1 (SVC4) and T17-3 (SGD4), and connect T17-2 (SIG4) and T17-3 (SGD4) of connector C.

(d) for Manual seat:
Using a service wire, connect d5-1 (SVC4) and d5-3 (SGD4), and connect d5-2 (SIG4) and d5-3 (SGD4) of connector C.

NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.

(e) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-6 (SVC4) - T11-4 (SGD4)	Always	Below 1 Ω
T11-10 (SIG4) - T11-4 (SGD4)	Always	Below 1 Ω

for Manual seat

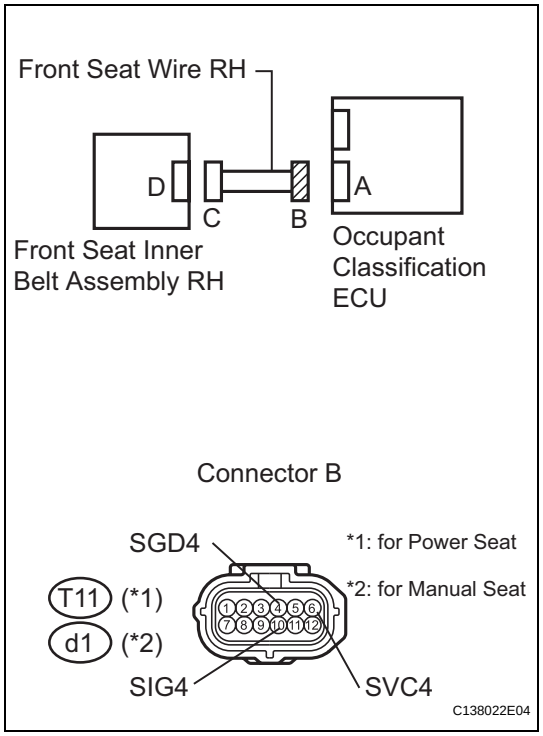
Tester connection	Condition	Specified condition
d1-10 (SIG4) - d1-4 (SGD4)	Always	Below 1 Ω
d1-6 (SVC4) - d1-4 (SGD4)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

RS

5 CHECK FRONT SEAT WIRE RH (SHORT)



(a) Disconnect the service wire from connector C.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-6 (SVC4) - T11-4 (SGD4)	Always	1 MΩ or Higher
T11-10 (SIG4) - T11-4 (SGD4)	Always	1 MΩ or Higher
T11-6 (SVC4) - T11-10 (SIG4)	Always	1 MΩ or Higher

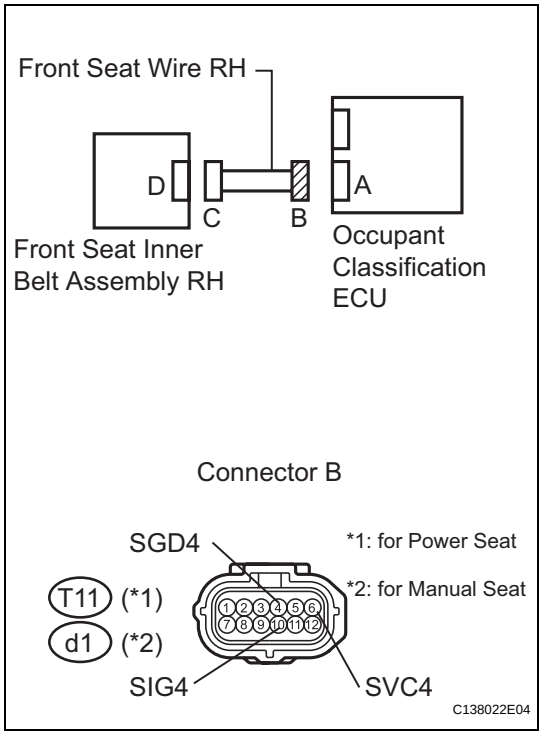
for Manual seat

Tester connection	Condition	Specified condition
d1-10 (SIG4) - d1-4 (SGD4)	Always	1 MΩ or Higher
d1-6 (SVC4) - d1-4 (SGD4)	Always	1 MΩ or Higher
d1-10 (SIG4) - d1-6 (SVC4)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

6 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-4 (SGD4) - Body ground	Always	1 MΩ or Higher
T11-6 (SVC4) - Body ground	Always	1 MΩ or Higher
T11-10 (SIG4) - Body ground	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-4 (SGD4) - Body ground	Always	1 MΩ or Higher
d1-10 (SIG4) - Body ground	Always	1 MΩ or Higher
d1-6 (SVC4) - Body ground	Always	1 MΩ or Higher

RS

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the rear occupant classification sensor RH.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG).
(h) Check the DTCs (See page RS-251).
OK:
DTC B1783 is not output.
HINT:
Codes other than DTC B1783 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

NG

RS

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1783 is not output.
HINT:
Codes other than DTC B1783 may be output at this time, but they are not related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1785	Front Occupant Classification Sensor LH Collision Detection

DESCRIPTION

DTC B1785 is output when the occupant classification ECU receives a collision detection signal sent by the front occupant classification sensor LH if an accident occurs.
DTC B1785 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1785 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1785 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detecting Condition	Trouble Area
B1785	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Front occupant classification sensor LH sensed large load	• Occupant classification ECU • Front seat assembly RH (Front occupant classification sensor LH)

WIRING DIAGRAM

See page RS-263.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).

RS

(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1785 is not output.
HINT:
Codes other than DTC B1785 may be output at this time, but they are not related to this check.

OK → **END**

NG

4	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-16 for power seat or SE-30 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

RS

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1785 is not output.
HINT:
Codes other than DTC B1785 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1786	Front Occupant Classification Sensor RH Collision Detection

DESCRIPTION

DTC B1786 is output when the occupant classification ECU receives a collision detection signal sent by the front occupant classification sensor RH if an accident occurs.
DTC B1786 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1786 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1786 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detection Condition	Trouble Area
B1786	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Front occupant classification sensor RH sensed large load	• Occupant classification ECU • Front seat assembly RH (Front occupant classification sensor RH)

WIRING DIAGRAM

See page RS-271.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).

RS

(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1786 is not output.
HINT:
Codes other than DTC B1786 may be output at this time, but they are not related to this check.

OK → **END**

NG

4 REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

RS

5 PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 8**

OK

6 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1786 is not output.
HINT:
Codes other than DTC B1786 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1787	Rear Occupant Classification Sensor LH Collision Detection

DESCRIPTION

DTC B1787 is output when the occupant classification ECU receives a collision detection signal sent by the rear occupant classification sensor LH if an accident occurs.
DTC B1787 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1787 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1787 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detecting Condition	Trouble Area
B1787	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Rear occupant classification sensor LH sensed large load	• Occupant classification ECU • Front seat assembly RH (Rear occupant classification sensor LH)

WIRING DIAGRAM

See page RS-279.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).

RS

(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1787 is not output.
HINT:
Codes other than DTC B1787 may be output at this time, but they are not related to this check.

OK → **END**

NG

4	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

RS

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1787 is not output.
HINT:
Codes other than DTC B1787 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1788	Rear Occupant Classification Sensor RH Collision Detection

DESCRIPTION

DTC B1788 is output when the occupant classification ECU receives a collision detection signal sent by the rear occupant classification sensor RH if an accident occurs.
DTC B1788 is also output when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.
However, when the occupant classification ECU outputs a collision detection signal, even if the vehicle is not in a collision, DTC B1788 can be cleared by "zero point calibration" and "sensitivity check".
Therefore, if DTC B1788 is output, first perform "zero point calibration" and "sensitivity check".

DTC No.	DTC Detection Condition	Trouble Area
B1788	• Front seat assembly RH malfunction • Occupant classification ECU malfunction • Rear occupant classification sensor RH sensed large load	• Occupant classification ECU • Front seat assembly RH (Rear occupant classification sensor RH)

WIRING DIAGRAM

See page RS-287.

INSPECTION PROCEDURE

1 PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 4**

OK

2 PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 4**

OK

3 CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).

RS

(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1788 is not output.
HINT:
Codes other than DTC B1788 may be output at this time, but they are not related to this check.

OK → **END**

NG

4	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

RS

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 8**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 8**

OK

7	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1788 is not output.
HINT:
Codes other than DTC B1788 may be output at this time, but they are not related to this check.

OK → END

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

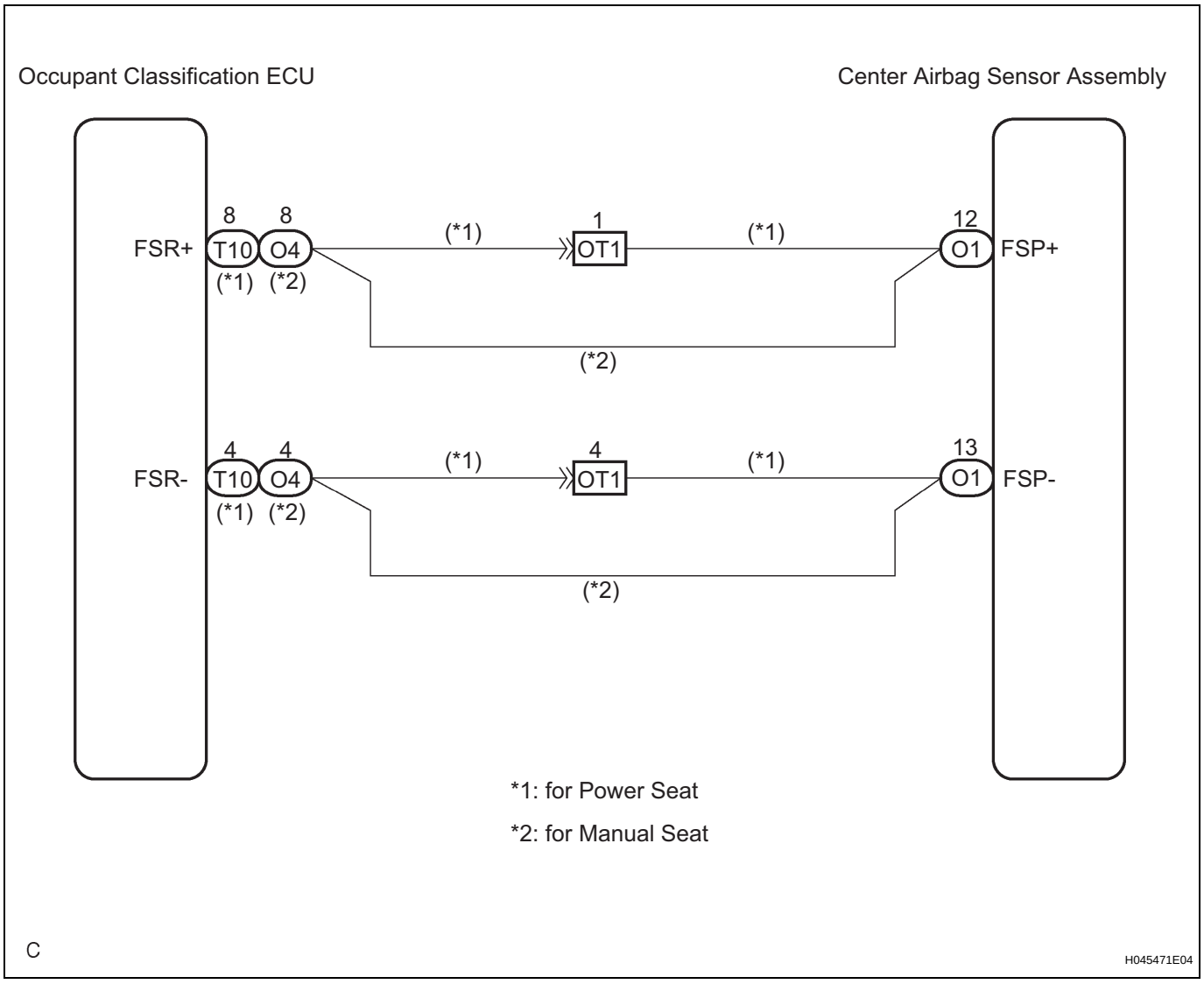
DTC	B1790	Center Airbag Sensor Assembly Communication Circuit Malfunction

DESCRIPTION

The center airbag sensor assembly communication circuit consists of the occupant classification ECU and the center airbag sensor assembly.
DTC B1790 is recorded when a malfunction is detected in the center airbag sensor assembly communication circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1790	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the center airbag sensor assembly communication circuit for 2 seconds. • Center airbag sensor assembly malfunction • Occupant classification ECU malfunction	• Occupant classification ECU • Center airbag sensor assembly • Floor wire No. 2 • Front seat wire RH (for Power seat)

WIRING DIAGRAM



RS

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

OK	USE SIMULATION METHOD TO CHECK (See page RS-248)

NG

RS

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Check that the connectors are properly connected to the occupant classification ECU and the center airbag sensor assembly.

OK:

The connectors are properly connected.

NG	CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1

OK

3	CHECK VEHICLE CONDITION

(a) Check the passenger seat type.

Result:

A:

for Manual seat

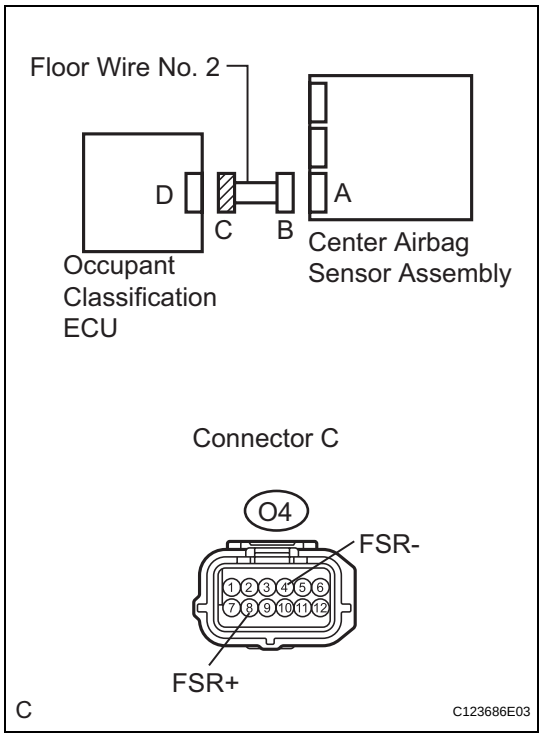
B:

for Power seat

B → Go to step 13

A

4	CHECK FLOOR WIRE NO. 2 (SHORT TO B+)



(a) Disconnect the connector from the center airbag sensor assembly and occupant classification ECU.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value (s) in the table below.

Standard voltage

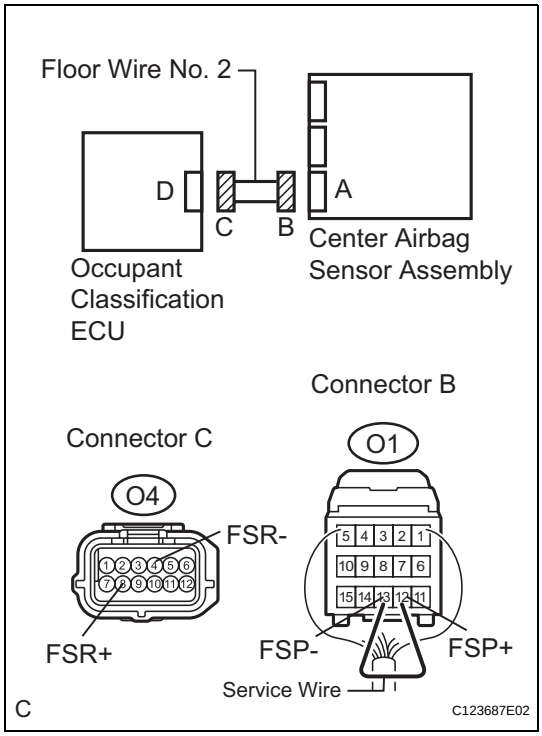
Tester connection	Condition	Specified condition
O4-8 (FSR+) - Body ground	Ignition switch on (IG)	Below 1 V
O4-4 (FSR-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

RS

5 CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance

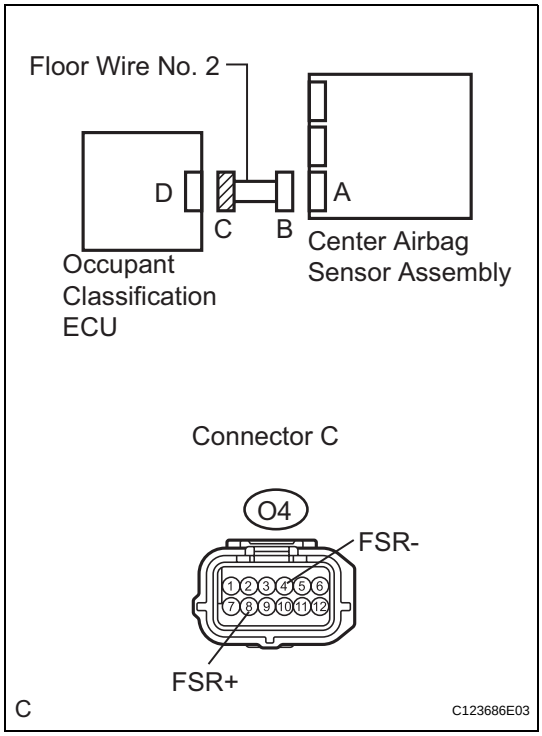
Tester connection	Condition	Specified condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS

6 CHECK FLOOR WIRE NO. 2 (SHORT)



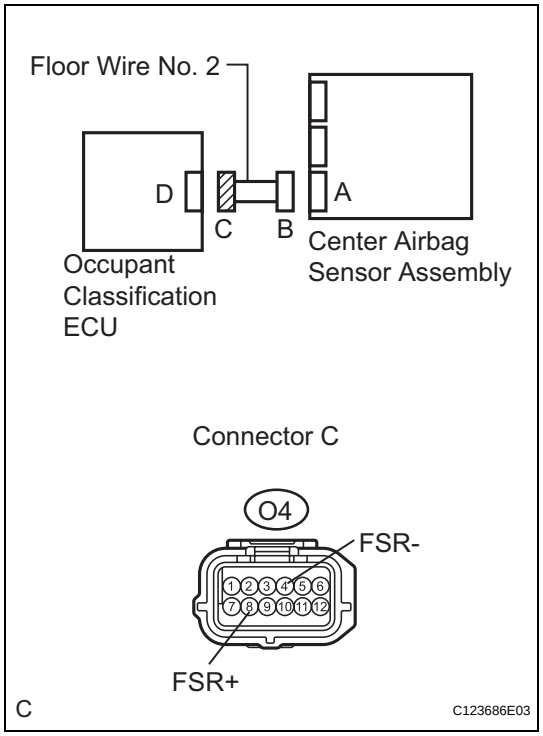
(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
O4-8 (FSR+) - O4-4 (FSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

7 CHECK FLOOR WIRE NO. 2 (SHORT TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
O4-8 (FSR+) - Body ground	Always	1 MΩ or Higher
O4-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

8 RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the center airbag sensor assembly.
(b) Connect the intelligent tester to the DLC3.
(c) Connect the negative (-) terminal cable to the battery.
(d) Turn the ignition switch on (IG).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-251).
(f) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
HINT:
First clear DTCs stored in the occupant classification ECU and then in the center airbag sensor assembly.
(g) Turn the ignition switch off.
(h) Turn the ignition switch on (IG).
(i) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).
OK:
DTC B1790 is not output.
HINT:
Codes other than DTC B1790 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

RS

NG

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

10	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

RS

11	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

12	RECHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-251).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
HINT:
First clear DTCs stored in the occupant classification ECU and then in the center airbag sensor assembly.
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).
OK:
DTC B1790 is not output.

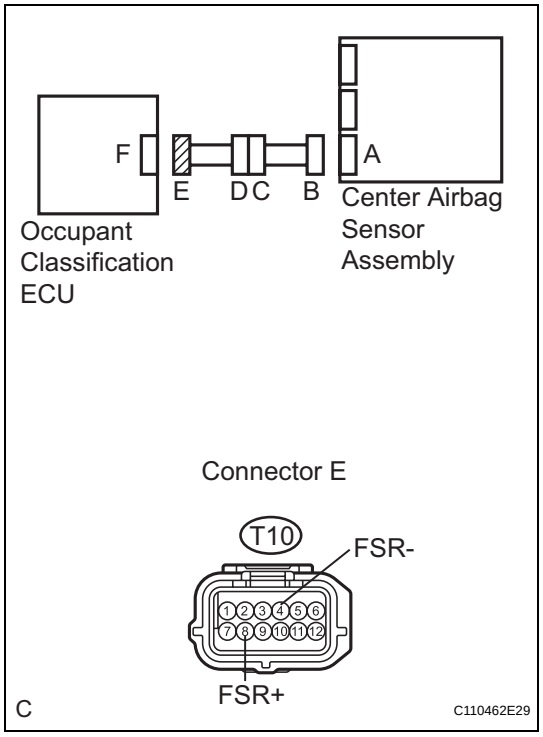
HINT:
Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

END

13 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (TO B+)



(a) Disconnect the connector from the center airbag sensor assembly and occupant classification ECU.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

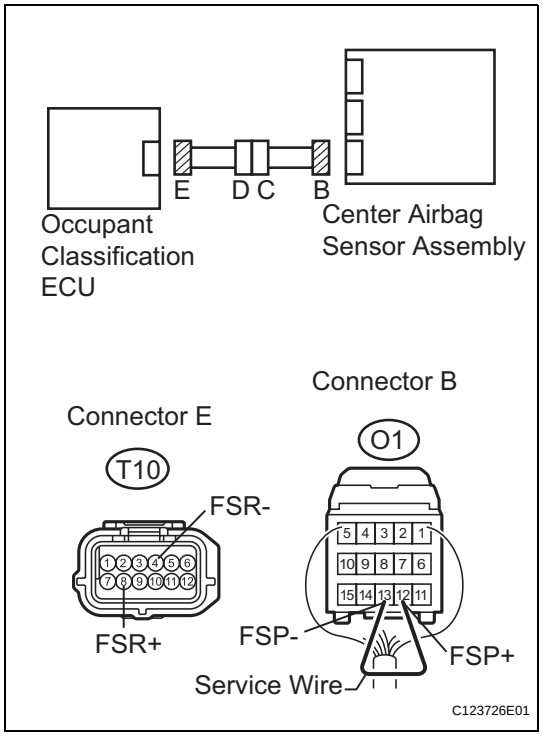
Tester connection	Condition	Specified condition
T10-8 (FSR+) - Body ground	Ignition switch on (IG)	Below 1 V
T10-4 (FSR-) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **Go to step 22**

OK

RS

14 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (OPEN)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Using a service wire, connect terminals 12 (FSP+) and 13 (FSP-) of connector B.
NOTICE:
Do not forcibly insert a service wire into the terminals of the connector when connecting.
(d) Measure the resistance according to the value(s) in the table below.
Standard resistance

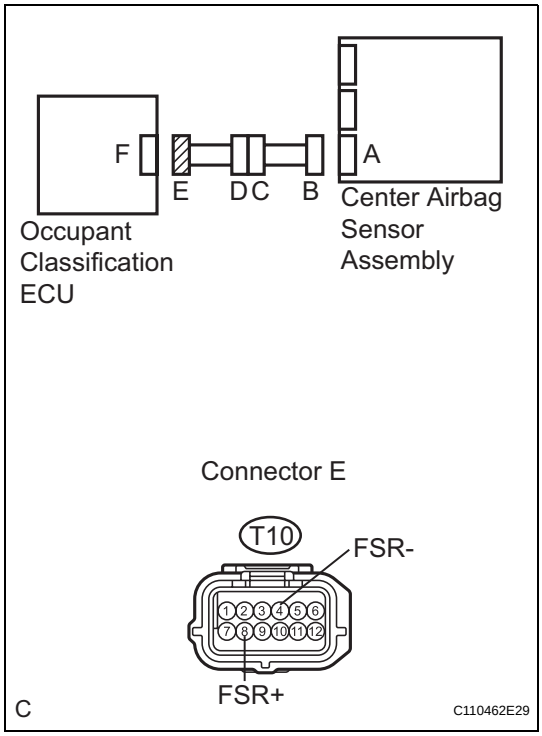
Tester connection	Condition	Specified condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	Below 1 Ω

NG → **Go to step 23**

OK

RS

15 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT)



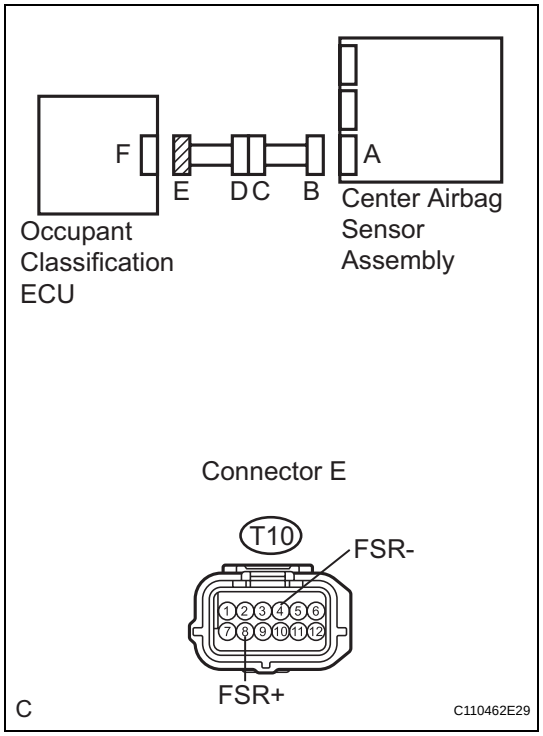
(a) Disconnect the service wire from connector B.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester connection	Condition	Specified condition
T10-8 (FSR+) - T10-4 (FSR-)	Always	1 MΩ or Higher

NG → **Go to step 24**

OK

16 CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (TO GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
T10-8 (FSR+) - Body ground	Always	1 MΩ or Higher
T10-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **Go to step 25**

OK

17 RECHECK DTC

(a) Connect the connectors to the occupant classification ECU and the center airbag sensor assembly.
(b) Connect the intelligent tester to the DLC3.
(c) Connect the negative (-) terminal cable to the battery.
(d) Turn the ignition switch on (IG).
(e) Clear the DTCs stored in the center airbag sensor assembly (See page RS-251).
(f) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(g) Turn the ignition switch off.
(h) Turn the ignition switch on (IG).
(i) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

OK

RS

18	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

19	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

20	PERFORM SENSITIVITY CHECK

RS

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

21	RECHECK DTC

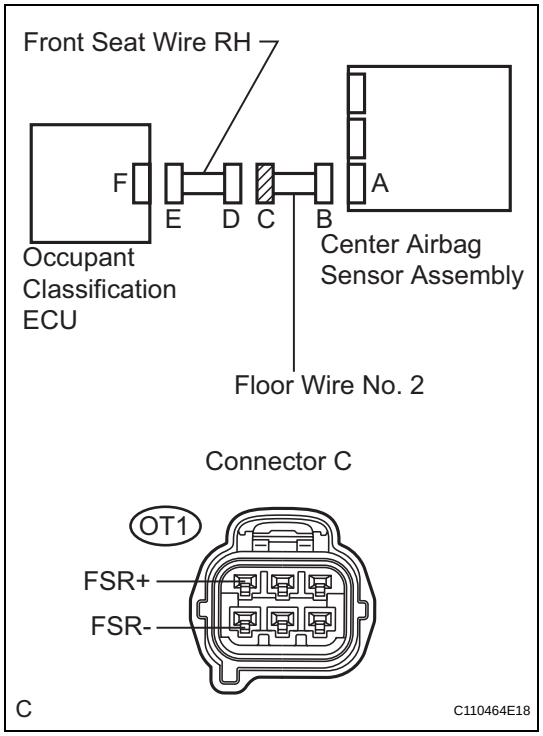
(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-251).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-41).
OK:
DTC B1790 is not output.
HINT:
Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG → REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)

OK

END

22 CHECK FLOOR WIRE NO. 2 (TO B+)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the front seat wire RH connector from the floor wire No. 2.
(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.
(e) Turn the ignition switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection	Condition	Specified condition
OT1-1 (FSR+) - Body ground	Ignition switch on (IG)	Below 1 V
OT1-4 (FSR-) - Body ground	Ignition switch on (IG)	Below 1 V

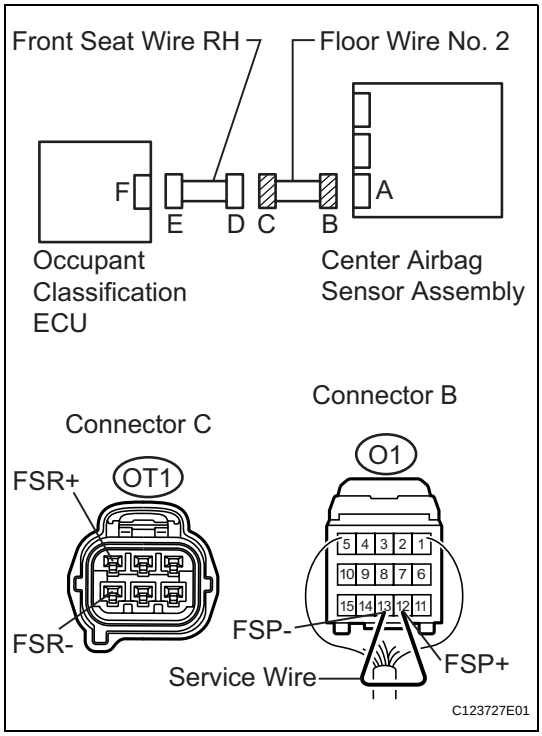
NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

RS

23	CHECK FLOOR WIRE NO. 2 (OPEN)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
HINT:
The service wire has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

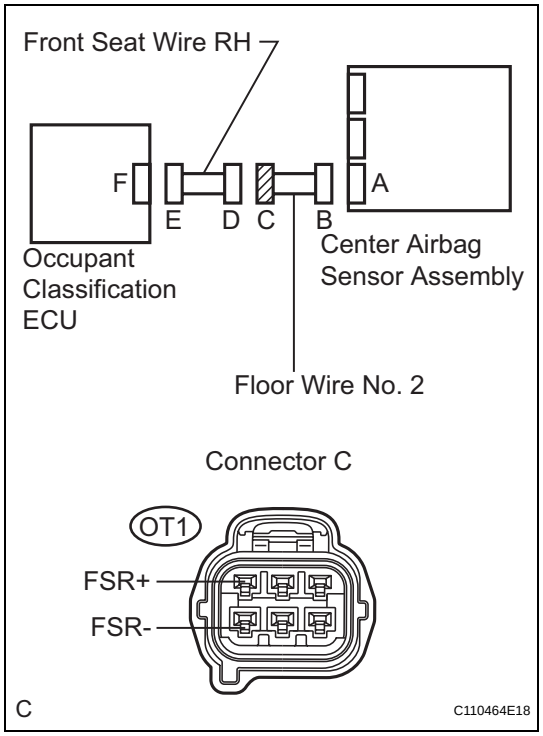
Tester connection	Condition	Specified condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS **REPAIR OR REPLACE FRONT SEAT WIRE RH**

24	CHECK FLOOR WIRE NO. 2 (SHORT)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

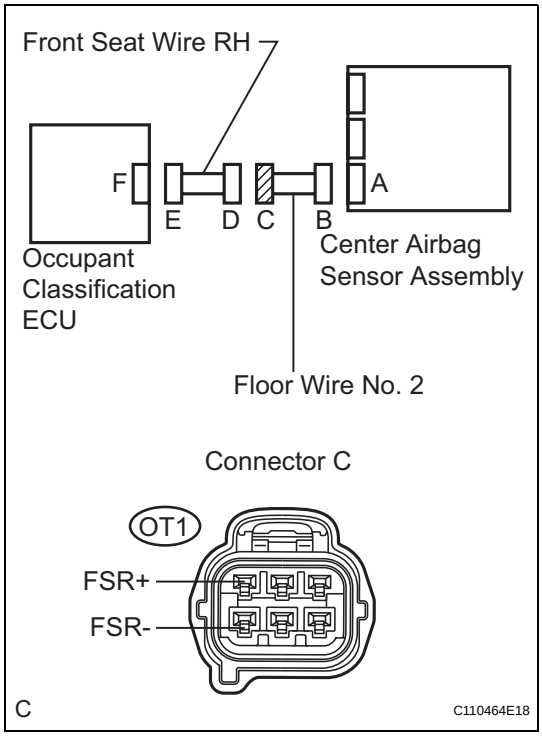
Tester connection	Condition	Specified condition
OT1-1 (FSR+) - OT1-4 (FSR-)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

REPAIR OR REPLACE FRONT SEAT WIRE RH

25	CHECK FLOOR WIRE NO. 2 (TO GROUND)



(a) Disconnect the front seat wire RH connector from the floor wire No. 2.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection	Condition	Specified condition
OT1-1 (FSR+) - Body ground	Always	1 MΩ or Higher
OT1-4 (FSR-) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FLOOR WIRE NO. 2**

OK

RS **REPAIR OR REPLACE FRONT SEAT WIRE RH**

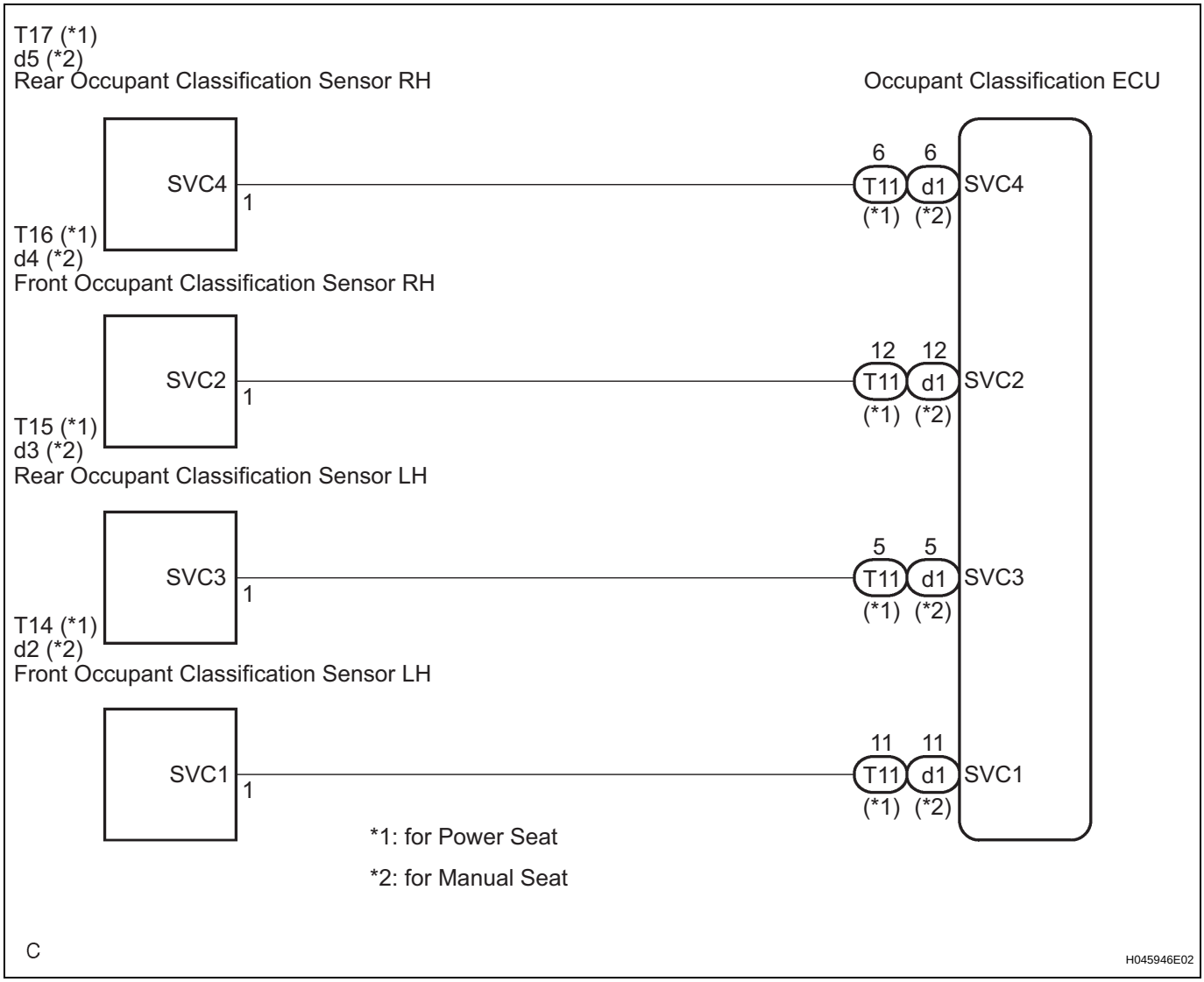
DTC	B1793	Occupant Classification Sensor Power Supply Circuit Malfunction

DESCRIPTION

The occupant classification sensor power supply circuit consists of the occupant classification ECU and the occupant classification sensors.
DTC B1793 is recorded when a malfunction is detected in the occupant classification sensor power supply circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1793	• The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification sensor power supply circuit for 2 seconds. • Occupant classification ECU malfunction	• Front seat assembly RH (Occupant classification sensors) • Front seat wire RH • Occupant classification ECU

WIRING DIAGRAM



RS

INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see the under surface of seat cushion.
- In the above case, hold the seat so that it does not fall down. Holding the seat for a long period of time may cause a problem, such as seat rail deformation. Hold the seat only as necessary.

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).

OK:

DTC B1793 is not output.

HINT:

Codes other than DTC B1793 may be output at this time, but they are not related to this check.

OK	USE SIMULATION METHOD TO CHECK (See page RS-248)

NG

RS

2	CHECK CONNECTION OF CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Check that the connectors are properly connected to the occupant classification ECU and the occupant classification sensors.

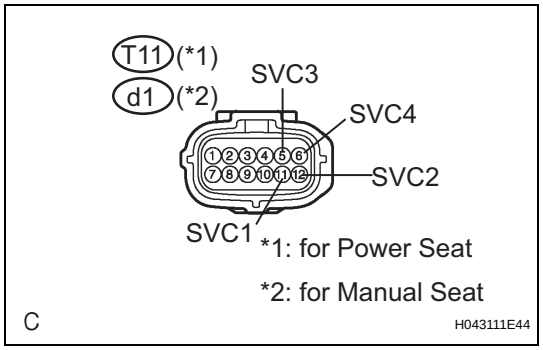
OK:

The connectors are properly connected.

NG	CONNECT CONNECTORS PROPERLY, THEN GO TO STEP 1

OK

3 CHECK FRONT SEAT WIRE RH (SHORT TO B+)



(a) Disconnect the connectors from the occupant classification ECU and the 4 occupant classification sensors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - Body ground	Ignition switch on (IG)	Below 1 V
T11-6 (SVC4) - Body ground	Ignition switch on (IG)	Below 1 V
T11-11 (SVC1) - Body ground	Ignition switch on (IG)	Below 1 V
T11-12 (SVC2) - Body ground	Ignition switch on (IG)	Below 1 V

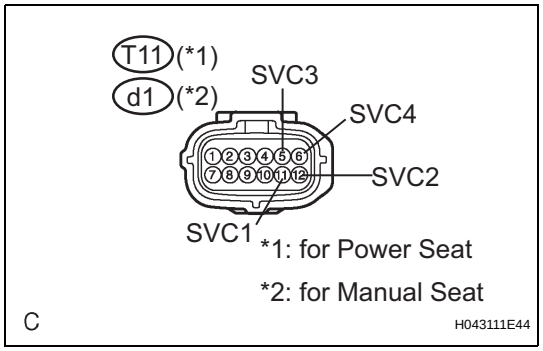
for Manual seat

Tester connection	Condition	Specified condition
d1-5 (SVC3) - Body ground	Ignition switch on (IG)	Below 1 V
d1-6 (SVC4) - Body ground	Ignition switch on (IG)	Below 1 V
d1-11 (SVC1) - Body ground	Ignition switch on (IG)	Below 1 V
d1-12 (SVC2) - Body ground	Ignition switch on (IG)	Below 1 V

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

4 CHECK FRONT SEAT WIRE RH (SHORT TO GROUND)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - Body ground	Always	1 MΩ or Higher
T11-6 (SVC4) - Body ground	Always	1 MΩ or Higher
T11-11 (SVC1) - Body ground	Always	1 MΩ or Higher

RS

Tester connection	Condition	Specified condition
T11-12 (SVC2) - Body ground	Always	1 MΩ or Higher

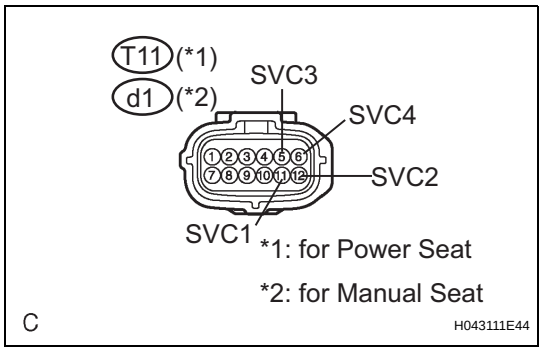
for Manual seat

Tester connection	Condition	Specified condition
d1-5 (SVC3) - Body ground	Always	1 MΩ or Higher
d1-6 (SVC4) - Body ground	Always	1 MΩ or Higher
d1-11 (SVC1) - Body ground	Always	1 MΩ or Higher
d1-12 (SVC2) - Body ground	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

5 CHECK FRONT SEAT WIRE RH (OPEN)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T15-1 (SVC3)	Always	Below 1 Ω
T11-6 (SVC4) - T17-1 (SVC4)	Always	Below 1 Ω
T11-11 (SVC1) - T14-1 (SVC1)	Always	Below 1 Ω
T11-12 (SVC2) - T16-1 (SVC2)	Always	Below 1 Ω

for Manual seat

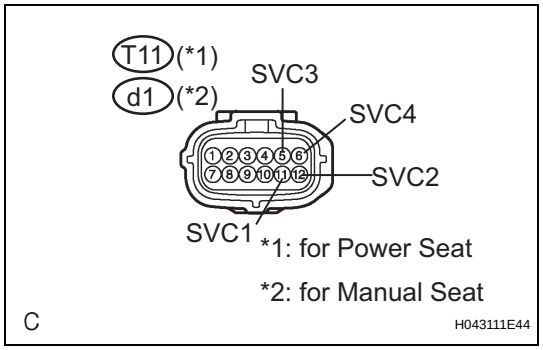
Tester connection	Condition	Specified condition
d1-5 (SVC3) - d3-1 (SVC3)	Always	Below 1 Ω
d1-6 (SVC4) - d5-1 (SVC4)	Always	Below 1 Ω
d1-11 (SVC1) - d2-1 (SVC1)	Always	Below 1 Ω
d1-12 (SVC2) - d4-1 (SVC2)	Always	Below 1 Ω

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

RS

6	CHECK FRONT SEAT WIRE RH (SHORT)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T11-5 (SVC3) - T11-6 (SVC4)	Always	1 MΩ or Higher
T11-5 (SVC3) - T11-11 (SVC1)	Always	1 MΩ or Higher
T11-5 (SVC3) - T11-12 (SVC2)	Always	1 MΩ or Higher
T11-6 (SVC4) - T11-11 (SVC1)	Always	1 MΩ or Higher
T11-6 (SVC4) - T11-12 (SVC2)	Always	1 MΩ or Higher
T11-11 (SVC1) - T11-12 (SVC2)	Always	1 MΩ or Higher

for Manual seat

Tester connection	Condition	Specified condition
d1-5 (SVC3) - d1-6 (SVC4)	Always	1 MΩ or Higher
d1-5 (SVC3) - d1-11 (SVC1)	Always	1 MΩ or Higher
d1-5 (SVC3) - d1-12 (SVC2)	Always	1 MΩ or Higher
d1-6 (SVC4) - d1-11 (SVC1)	Always	1 MΩ or Higher
d1-6 (SVC4) - d1-12 (SVC2)	Always	1 MΩ or Higher
d1-11 (SVC1) - d1-12 (SVC2)	Always	1 MΩ or Higher

NG → **REPAIR OR REPLACE FRONT SEAT WIRE RH**

OK

7	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the 4 occupant classification sensors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG).
(d) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG).
(h) Check the DTCs (See page RS-251).

OK:
DTC B1793 is not output.
HINT:
Codes other than DTC B1793 may be output at this time, but they are not related to this check.

OK → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

NG

8	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-251).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

9	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NG → **Go to step 12**

OK

10	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NG → **Go to step 12**

OK

11	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).

RS

(c) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(d) Turn the ignition switch off.
(e) Turn the ignition switch on (IG).
(f) Check the DTCs (See page RS-251).
OK:
DTC B1793 is not output.
HINT:
Codes other than DTC B1793 may be output at this time, but they are related to this check.

OK → **END**

NG

12	REPLACE FRONT SEAT ASSEMBLY RH

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the front seat assembly RH (See page SE-30 for power seat or SE-16 for manual seat).

NEXT

13	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

14	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

RS

DTC	B1794	Open in Occupant Classification ECU Battery Positive Line

DESCRIPTION

This circuit consists of the occupant classification ECU and the power source circuit (battery, fuse, and wire harness).

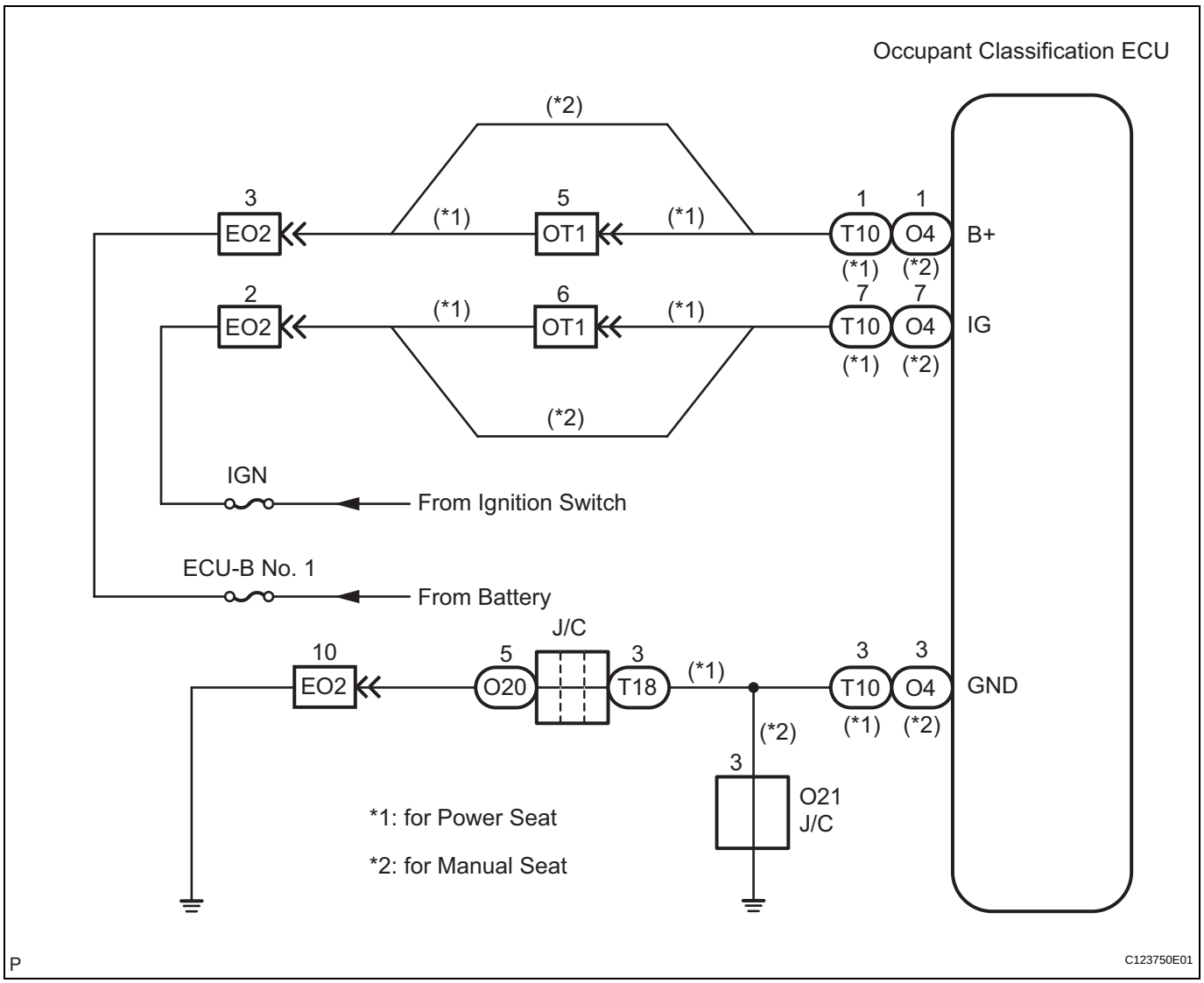
DTC B1794 is recorded when a malfunction is detected in the occupant classification ECU or the power source circuit.

HINT:

If DTC B1794 is output after switching the ignition switch off-on (IG)-off 50 times in a row when a malfunction occurs in the power circuit for the occupant classification system, the DTC is output again. This DTC is output when a malfunction is detected even after being cleared unless the normal system code is input.

DTC No.	DTC Detecting Condition	Trouble Area
B1794	• The ignition switch is turned from off to on (IG), hold if for 10 seconds or more, and back to off again 50 times in a row when a malfunction occurs in the circuit for the occupant classification system. • Occupant classification ECU malfunction	• Battery • ECU-B Fuse • Floor wire No. 2 • Front seat wire RH (for Power seat) • Occupant classification ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK BATTERY

(a) Measure the voltage of the battery.
Standard voltage:
11 to 14 V

NG → **REPLACE BATTERY**

OK

2	CHECK FUSE

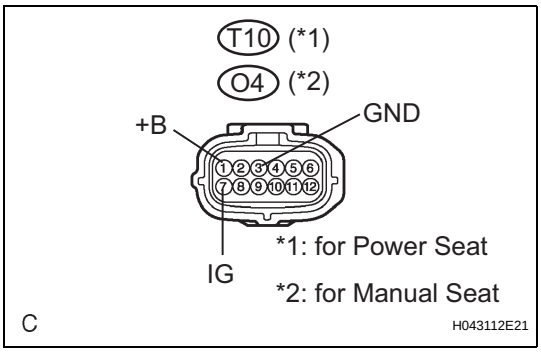
(a) Check the ECU-B fuse.
Standard resistance:
Below 1 Ω

RS

NG → REPLACE FUSE

OK

3 CHECK WIRE HARNESS (SOURCE VOLTAGE)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Disconnect the connector from the occupant classification ECU.
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the ignition switch on (IG).
(f) Measure the voltage and resistance according to the value(s) in the table below.

Standard voltage and resistance:

for Power seat

Tester connection	Condition	Specified condition
T10-1 (+B) - Body ground	Always	10 to 14 V
T10-3 (GND) - Body ground	Always	Below 1 Ω
T10-7 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

for Manual seat

Tester connection	Condition	Specified condition
O4-1 (+B) - Body ground	Always	10 to 14 V
O4-3 (GND) - Body ground	Always	Below 1 Ω
O4-7 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → REPAIR OR REPLACE WIRE HARNESS

OK

4 CHECK DTC

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Connect the connector to the occupant classification ECU.
(d) Connect the intelligent tester to the DLC3.
(e) Connect the negative (-) terminal cable to the battery.
(f) Turn the ignition switch on (IG).
(g) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(h) Clear the DTCs stored in the occupant classification ECU (See page RS-251).

RS

HINT:
First clear DTCs stored in the occupant classification ECU and then in the center airbag sensor assembly.

(i) Turn the ignition switch off.
(j) Turn the ignition switch on (IG), and wait for at least 10 seconds.
(k) Using the intelligent tester, check the DTCs of the occupant classification ECU (See page RS-251).
OK:
B1794 is not output.
HINT:
Codes other than DTC B1794 may be output at this time, but they are not related to this check.

NG → **USE SIMULATION METHOD TO CHECK (See page RS-248)**

OK

5	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

6	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform the "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

7	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform the "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1795	Occupant Classification ECU Malfunction

DESCRIPTION

DTC B1795 is recorded when a malfunction is detected in the occupant classification ECU.
Troubleshoot the DTC B1771 first when the DTC B1771 and B1795 are output simultaneously.

DTC No.	DTC Detecting Condition	Trouble Area
B1795	• Occupant classification ECU circuit malfunction • The occupant classification ECU receives a short circuit to ground signal in the passenger side buckle switch circuit for 2 seconds. • Occupant classification ECU malfunction	• Front seat wire RH (for Power seat) • Floor wire No. 2 • Front seat inner belt assembly RH • Occupant classification ECU

INSPECTION PROCEDURE

1 CHECK DTC

(a) Turn the ignition switch on (IG), and wait for at least 10 seconds.
(b) Check the DTCs (See page RS-251).
Result:
A:
DTC B1771 and B1795 are output.
B:
DTC B1795 is output.
HINT:
Codes other than DTC B1771 and B1795 may be output at this time, but they are not related to this check.

A → **GO TO DTC B1771**

B

2 CHECK FUSE

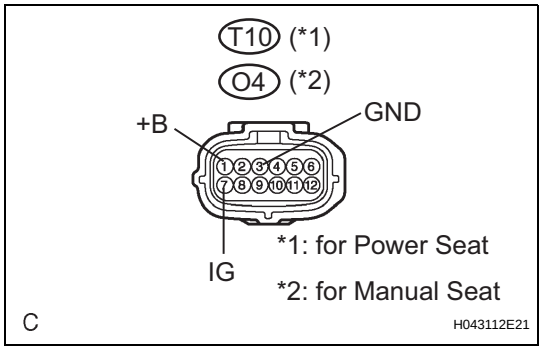
(a) Check the ECU-B fuse.
Resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

RS

3 CHECK WIRE HARNESS (SOURCE VOLTAGE)



(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Disconnect the connector from the occupant classification ECU.
(d) Connect the negative (-) terminal cable to the battery.
(e) Turn the ignition switch on (IG).
(f) Measure the voltage according to the value(s) in the table below.

Standard voltage:

for Power seat

Tester connection	Condition	Specified condition
T10-1 (+B) - Body ground	Always	10 to 14 V
T10-7 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

for Manual seat

Tester connection	Condition	Specified condition
O4-1 (+B) - Body ground	Always	10 to 14 V
O4-7 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V

(g) Turn the ignition switch off.
(h) Measure the resistance according to the value(s) in the table below.

Standard resistance:

for Power seat

Tester connection	Condition	Specified condition
T10-3 (GND) - Body ground	Always	Below 1 Ω

for Manual seat

Tester connection	Condition	Specified condition
O4-3 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE WIRE HARNESS**

OK

4 REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-251).

HINT:
Perform the inspection using parts from a normal vehicle if possible.

RS

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

DTC	B1796	Sleep Operation Failure of Occupant Classification ECU

DESCRIPTION

During sleep mode, the occupant classification ECU reads the condition of each sensor while the ignition switch is off.
In this mode, if occupant classification ECU detects an internal malfunction, DTC B1796 is output.

DTC No.	DTC Detecting Condition	Trouble Area
B1796	• Occupant classification ECU malfunction	• Occupant classification ECU

INSPECTION PROCEDURE

1	CHECK DTC

(a) Turn the ignition switch on (IG).
(b) Clear the DTCs stored in the memory (See page RS-251).
HINT:
First clear DTCs stored in the occupant classification ECU and then in the center airbag sensor assembly.
(c) Turn the ignition switch off, and wait for at least 10 seconds.
(d) Turn the ignition switch on (IG).
(e) Check the DTCs (See page RS-251).
OK:
DTC B1796 is not output.
HINT:
Codes other than DTC B1796 may be output at this time, but they are not related to this check.

OK → USE SIMULATION METHOD TO CHECK

NG

2	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

3	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.

RS

(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETED" is displayed.

NEXT

4	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

Trouble in Passenger Airbag ON / OFF Indicator

DESCRIPTION

The occupant classification system detects the front passenger seat condition. It then informs a passenger of the front passenger airbag assembly and front seat side airbag assembly condition (activated/not activated) by the passenger airbag ON/OFF indicator.
HINT:
Approximately 6 seconds after the ignition switch is turned to the on (IG), the passenger airbag ON/OFF indicator will be ON/OFF depending on the conditions listed below.

Front passenger seat condition	ON Indicator	OFF Indicator
Adult is seated.	ON	OFF
Child is seated.	OFF	ON
Vacant	OFF	OFF
Occupant classification system failure	OFF	ON

INSPECTION PROCEDURE

1 CHECK SRS WARNING LIGHT

(a) Turn the ignition switch on (IG), and check the SRS warning light condition.
HINT:
If this trouble occurs, the SRS warning light is off. If the light is on, a DTC is output. Troubleshoot for the output DTC.
OK:
After the primary check period, SRS warning light goes off.
HINT:
The primary check period is approximately 6 seconds after the ignition switch is turned on (IG).

NG → **GO TO DTC CHART (See page RS-45)**

OK

2 PERFORM ZERO POINT CALIBRATION

(a) Turn the ignition switch off.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETE" is displayed.

NG → **Go to step 4**

OK

3	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

OK → **END**

NG

4	RETIGHTEN FRONT SEAT ASSEMBLY RH BOLT

(a) Turn the ignition switch off.
(b) Loosen the 4 installation bolts of the front seat assembly RH.
(c) Tighten the 4 installation bolts of the front seat assembly RH to the specified torque.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

NEXT

5	PERFORM ZERO POINT CALIBRATION

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETE" is displayed.

NG → **Go to step 7**

OK

6	PERFORM SENSITIVITY CHECK

(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

OK → **END**

NG

7	CHECK CONNECTORS

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.

(c) Check that the connectors are properly connected to the occupant classification ECU and the 4 occupant classification sensors.
OK:
The connectors are properly connected.
(d) Disconnect the connectors from the occupant classification ECU and the 4 occupant classification sensors.
(e) Check that the connectors are not damaged or deformed.
OK:
The connectors are normal.

NG → **REPAIR OR REPLACE CONNECTOR, THEN GO TO STEP 1**

OK

8	CHECK DTC

(a) Connect the connectors to the occupant classification ECU and the 4 occupant classification sensors.
(b) Connect the negative (-) terminal cable to the battery.
(c) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(d) Clear the DTCs stored in the center airbag sensor assembly (See page RS-41).
(e) Clear the DTCs stored in the occupant classification ECU (See page RS-251).
(f) Turn the ignition switch off.
(g) Turn the ignition switch on (IG), and wait for at least 60 seconds.
(h) Check the DTCs (See page RS-251).
OK:
DTC is not output.

NG → **REPLACE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-441)**

OK

9	REPLACE OCCUPANT CLASSIFICATION ECU

(a) Turn the ignition switch off.
(b) Disconnect the negative (-) terminal cable from the battery.
(c) Replace the occupant classification ECU (See page RS-469).
HINT:
Perform the inspection using parts from a normal vehicle if possible.

NEXT

RS

10	PERFORM ZERO POINT CALIBRATION

(a) Connect the negative (-) terminal cable to the battery.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Using the intelligent tester, perform "zero point calibration" (See page RS-242).
OK:
"COMPLETE" is displayed.

NEXT

11	PERFORM SENSITIVITY CHECK

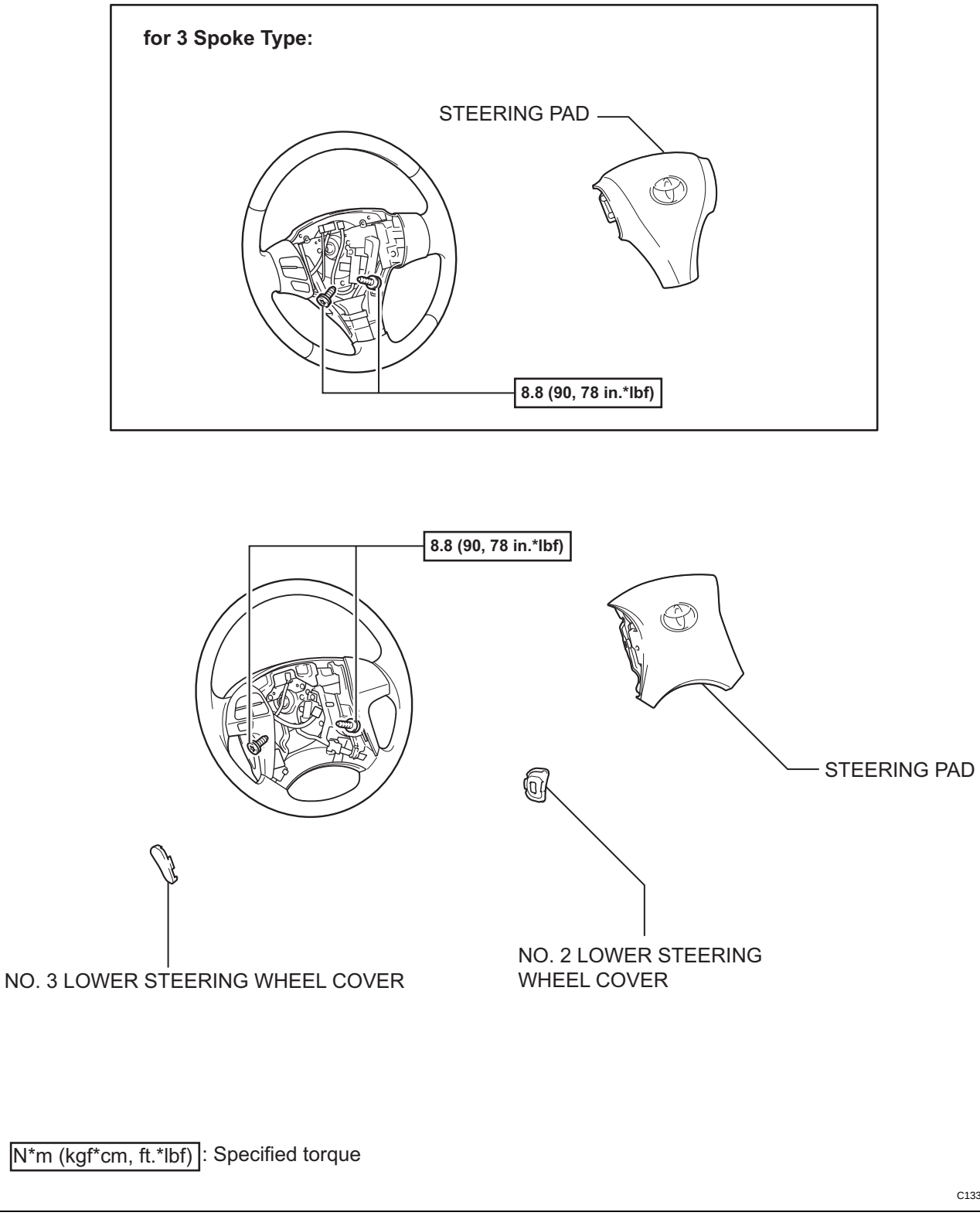
(a) Using the intelligent tester, perform "sensitivity check" (See page RS-242).
Standard value:
27 to 33 kg (59.52 to 72.75 lb)

NEXT

END

STEERING PAD

COMPONENTS



RS

N*m (kgf*cm, ft.*lbf): Specified torque

P

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ON-VEHICLE INSPECTION

1. INSPECT STEERING PAD (VEHICLE NOT INVOLVED IN COLLISION)

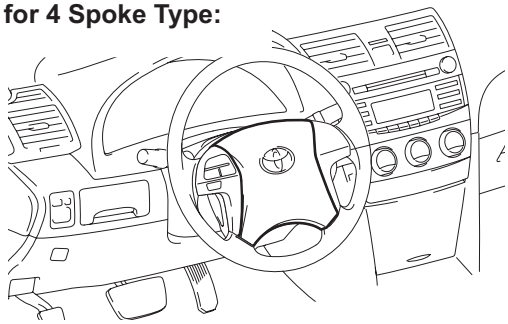
(a) Perform a diagnostic system check (See page RS-32).

(b) With the steering pad installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the steering pad with a new one:
Cuts, minute cracks or marked discoloration on the steering pad top surface or in the grooved portion.

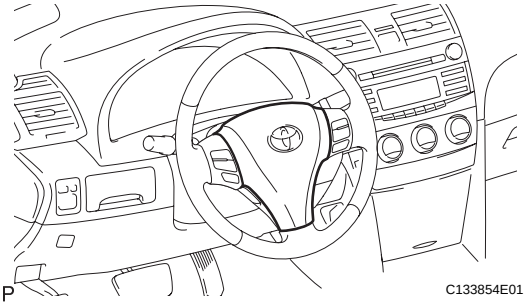
2. INSPECT STEERING PAD (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)

(a) Perform a diagnostic system check (See page RS-32).

for 4 Spoke Type:



for 3 Spoke Type:



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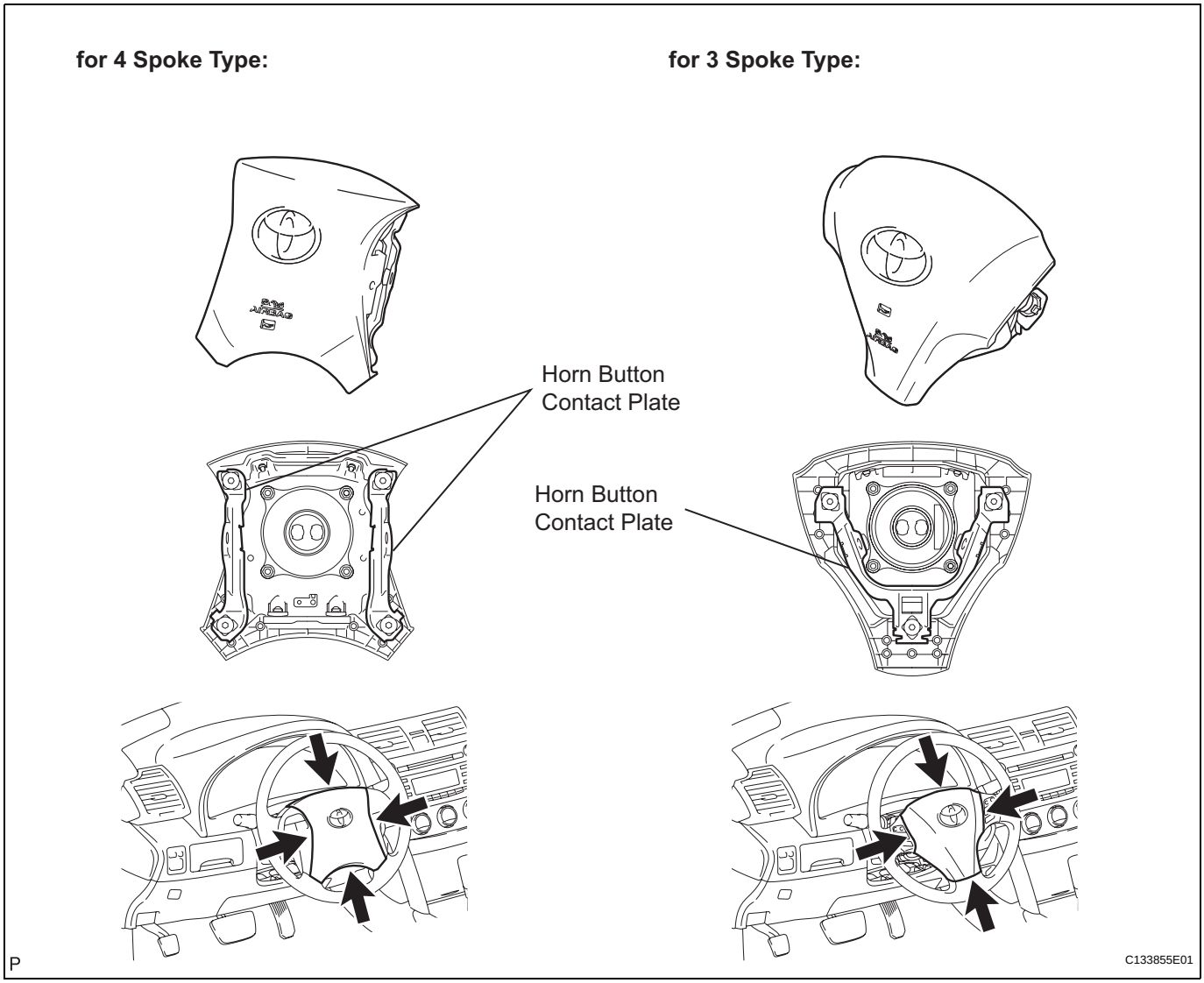
RS

(b) With the steering pad removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the steering pad or steering wheel assembly with a new one:



- Cuts, minute cracks or marked discoloration on the steering pad top surface or in the grooved portion.
- Cracks or other damage to the connectors.
- Deformation of the steering wheel assembly.
- Deformation of the horn button contact plate of the steering pad.
- There should be no interference between the steering pad and steering wheel assembly, and the clearance should be uniform all the way around when the new steering pad is installed on the steering wheel assembly.

CAUTION:
Be sure to follow the correct removal and installation procedures.

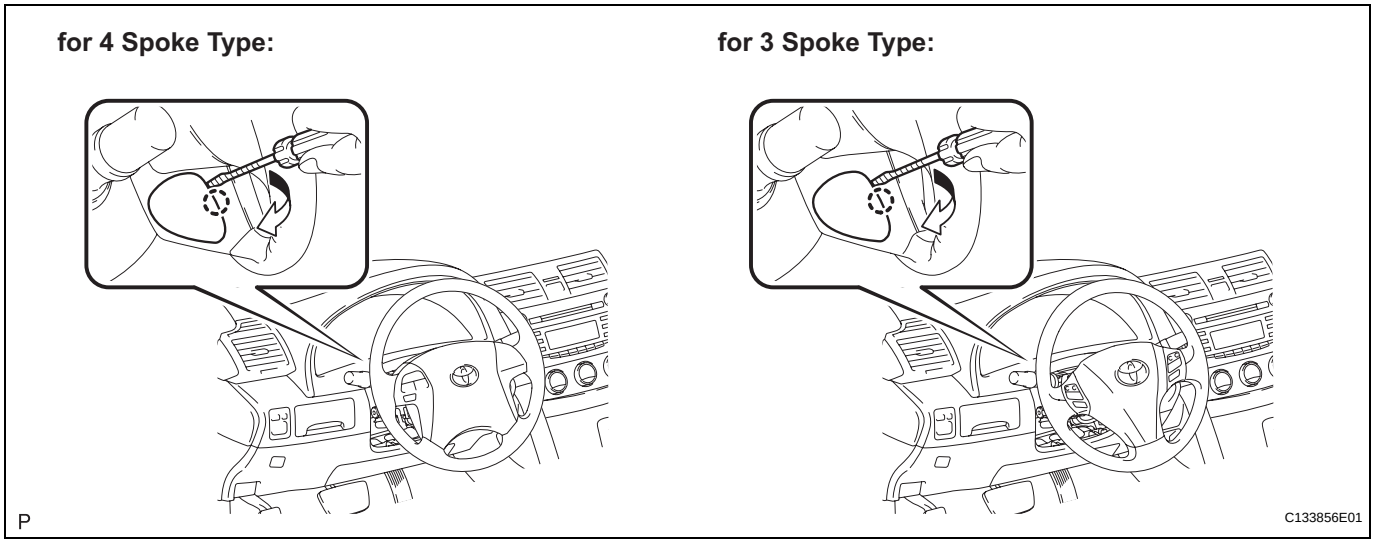
RS

REMOVAL

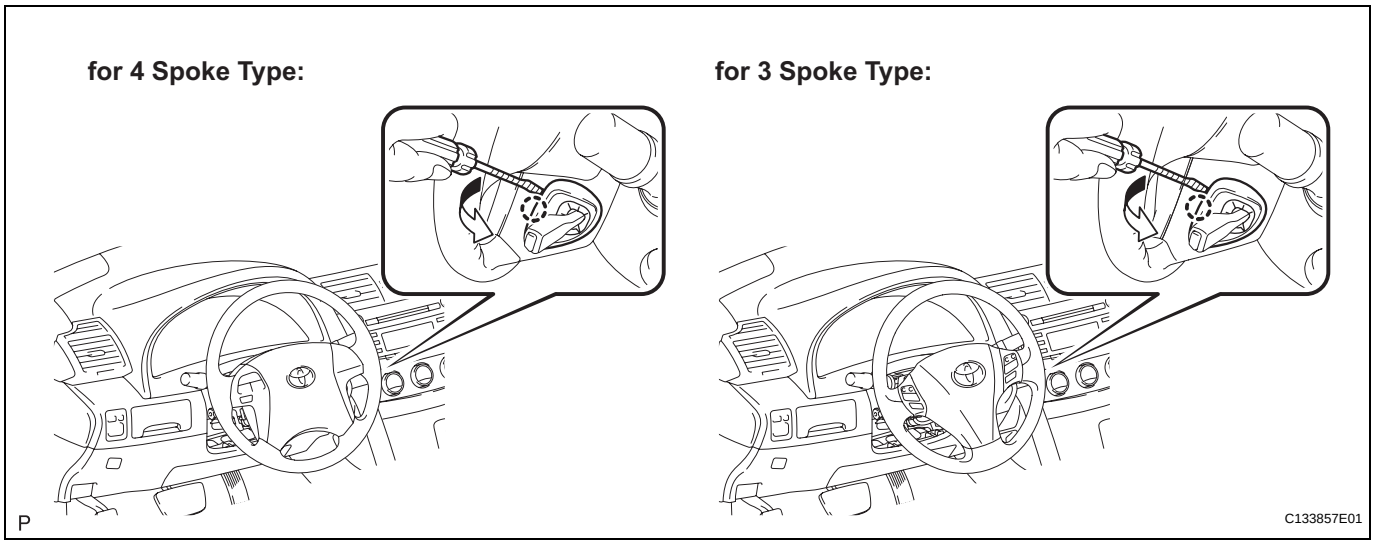
1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).

2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

3. **REMOVE NO. 3 LOWER STEERING WHEEL COVER**
   (a) Using a screwdriver, remove the No. 3 lower steering wheel cover.
   HINT:
   Tape up the screwdriver tip before use.



4. **REMOVE NO. 2 LOWER STEERING WHEEL COVER**
   (a) Using a screwdriver, remove the No. 2 lower steering wheel cover.

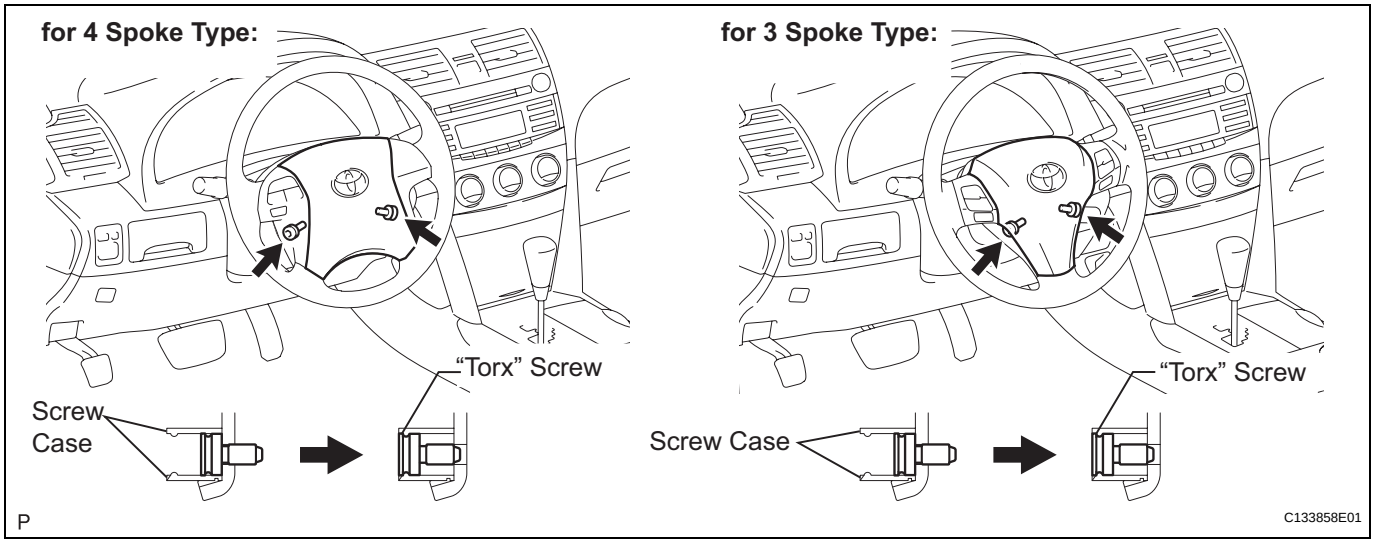


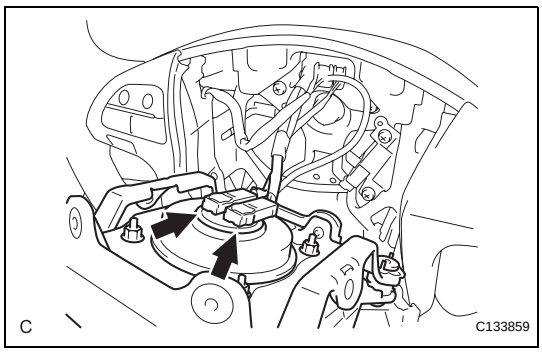
HINT:
Tape up the screwdriver tip before use.

RS

5. REMOVE STEERING PAD

(a) Using a "torx" socket wrench (T30), loosen the 2 "torx" screws until the groove along the screw circumference catches on the screw case.





(b) Pull out the steering pad from the steering wheel assembly and support the steering pad with one hand as shown in the illustration.

NOTICE:

When removing the steering pad, do not pull the airbag wire harness.

(c) Disconnect the horn connector from the steering pad.

(d) Disconnect the 2 airbag connectors and remove the steering pad.

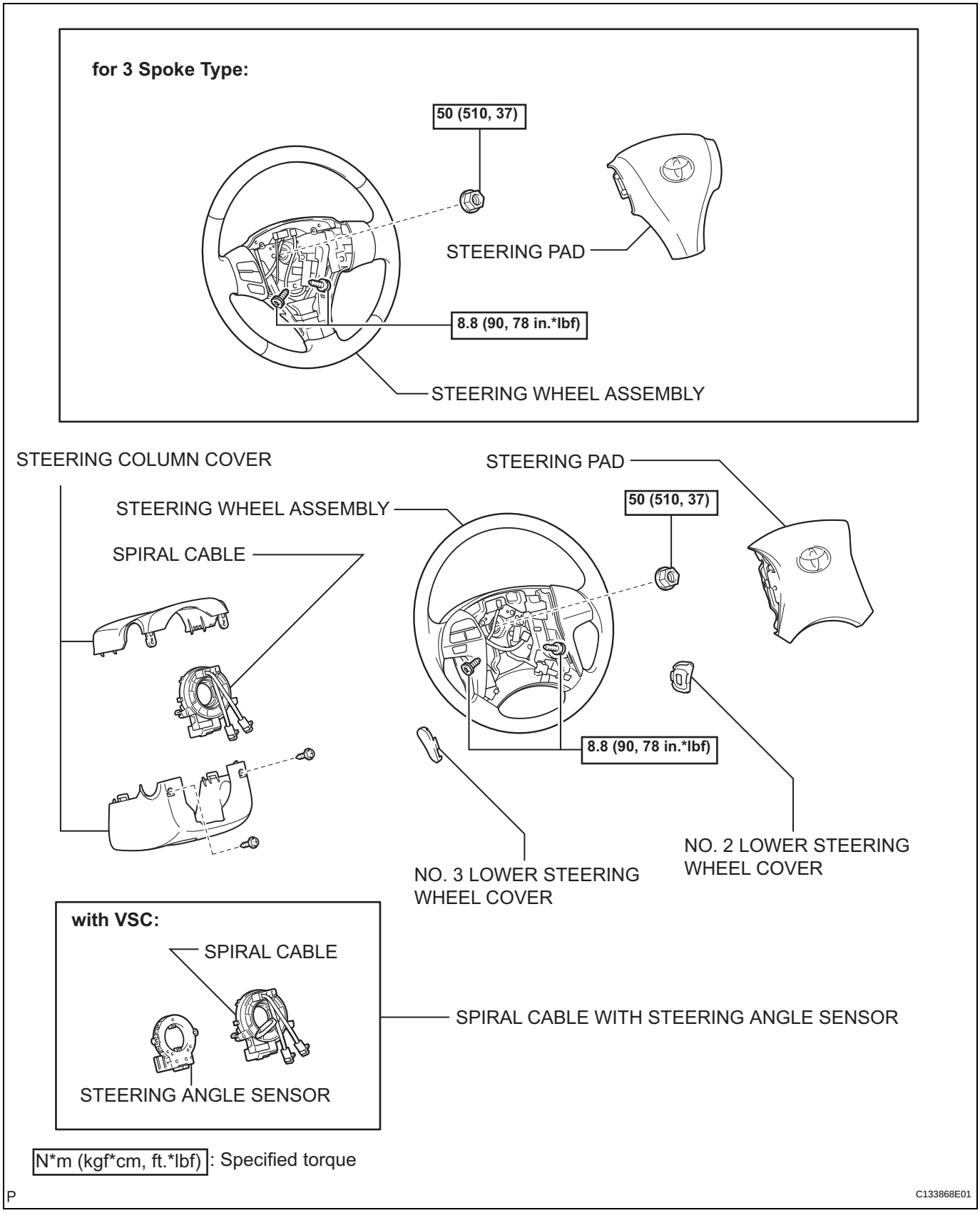
NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

RS

SPIRAL CABLE

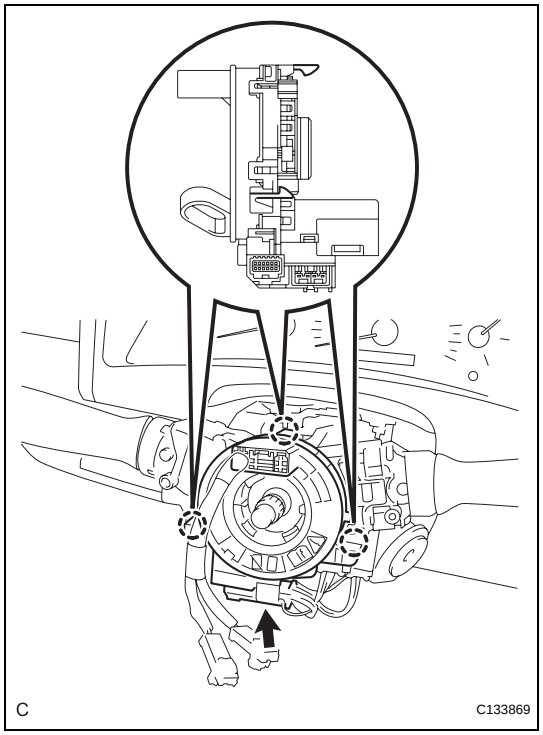
COMPONENTS



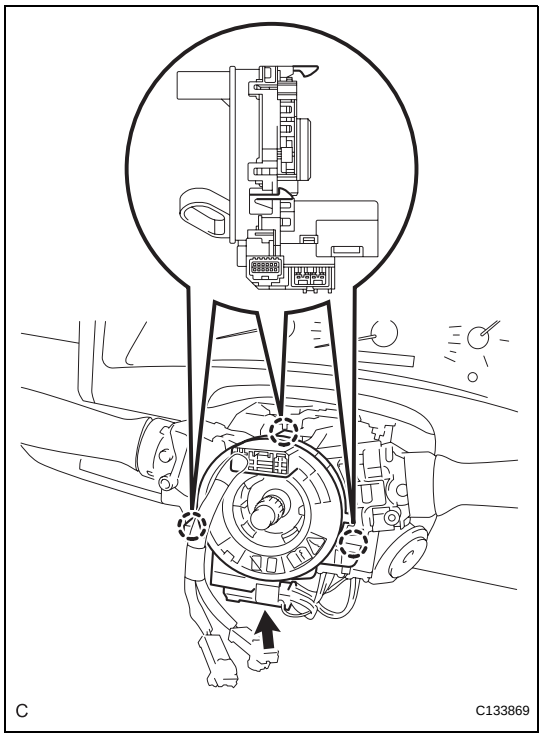
RS

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **REMOVE NO. 3 LOWER STEERING WHEEL COVER (See page RS-349)**
4. **REMOVE NO. 2 LOWER STEERING WHEEL COVER (See page RS-349)**
5. **REMOVE STEERING PAD (See page RS-350)**
6. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
7. **REMOVE STEERING COLUMN COVER (See page SR-39)**
8. **REMOVE SPIRAL CABLE (w/o VSC)**
   (a) Disconnect the connectors from the spiral cable.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.
   (b) Disengage the 3 claws and remove the spiral cable.



RS



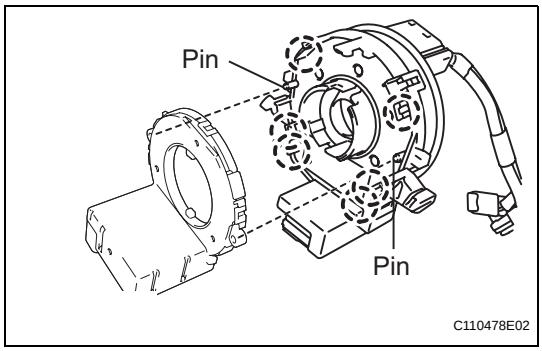
9. REMOVE SPIRAL CABLE WITH STEERING ANGLE SENSOR (w/ VSC)

(a) Disconnect the connectors from the spiral cable with steering angle sensor.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

(b) Disengage the 3 claws and remove the spiral cable with steering angle sensor.



10. REMOVE SPIRAL CABLE (w/ VSC)

(a) Disengage the 6 claws and remove the spiral cable from the steering angle sensor.

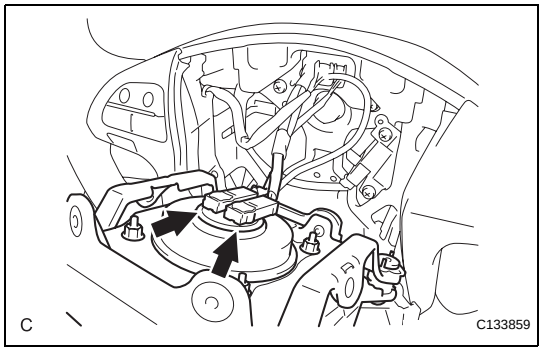
INSTALLATION

1. INSTALL STEERING PAD

(a) Check that the ignition switch is off.

(b) Check that the battery negative (-) terminal is disconnected.

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



(c) Support the steering pad with one hand as shown in the illustration.

(d) Connect the 2 airbag connectors to the steering pad.

NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

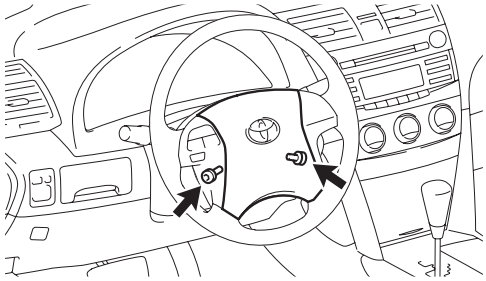
(e) Connect the horn connector to the steering pad.

(f) Confirm that the circumference groove of the "torx" screw fits in the screw case, and place the steering pad onto the steering wheel assembly.

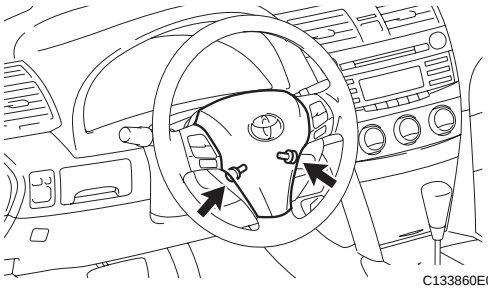
(g) Using a "torx" socket wrench (T30), tighten the 2 "torx" screws.

Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

for 4 Spoke Type:



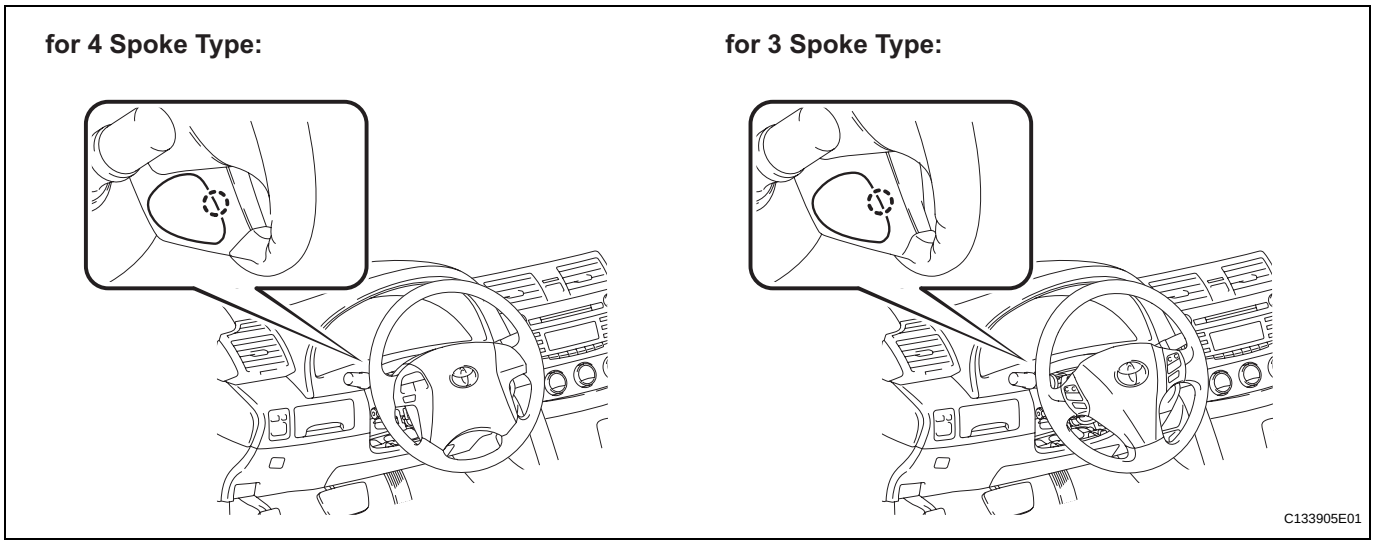
for 3 Spoke Type:



RS

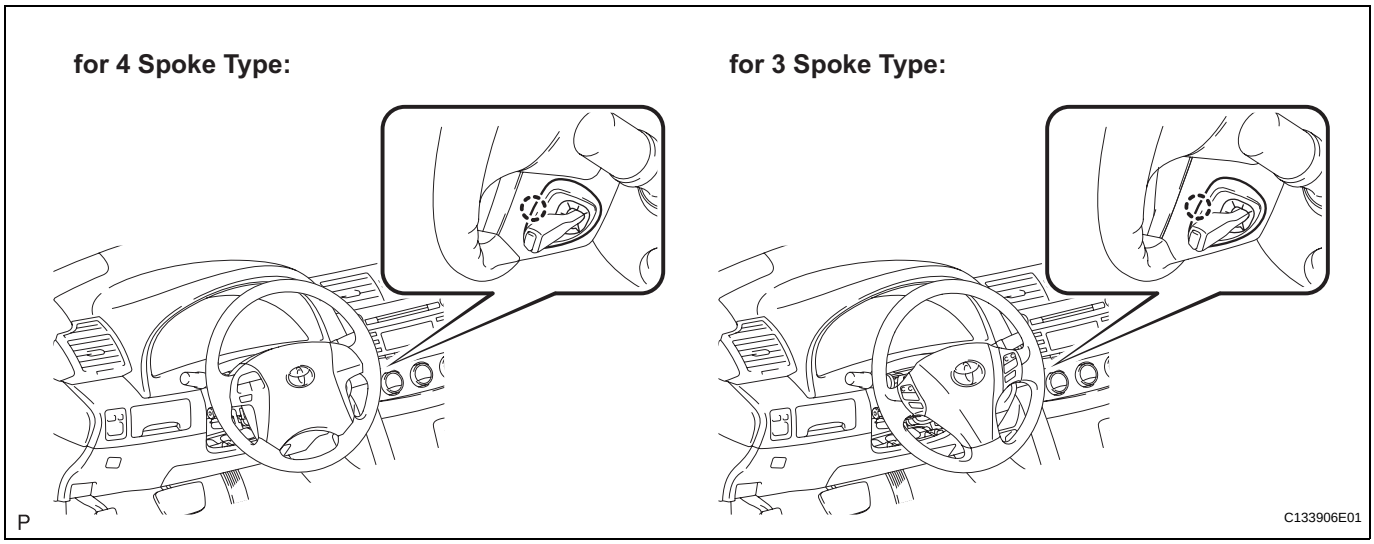
2. INSTALL NO. 3 LOWER STEERING WHEEL COVER

(a) Install the No. 3 lower steering wheel cover.



3. INSTALL NO. 2 LOWER STEERING WHEEL COVER

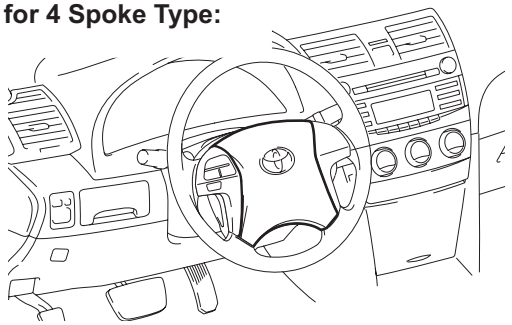
(a) Install the No. 2 lower steering wheel cover.



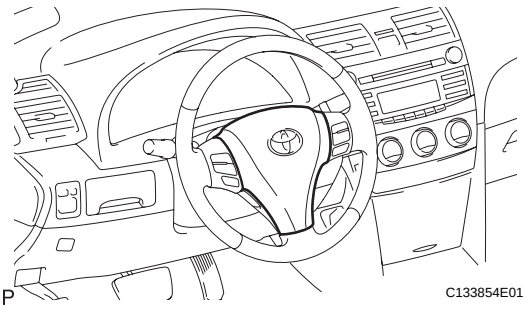
4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

RS

for 4 Spoke Type:



for 3 Spoke Type:



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5. INSPECT STEERING PAD

(a) With the steering pad installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the steering pad with a new one:
Cuts, minute cracks or marked discoloration on the steering pad top surface or in the grooved portion.

(b) Make sure that the horn sounds.
HINT:
If the horn does not sound, inspect the horn system (See page HO-2).

6. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-32).

DISPOSAL

HINT:
When scrapping a vehicle equipped with the SRS or disposing of the steering pad, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

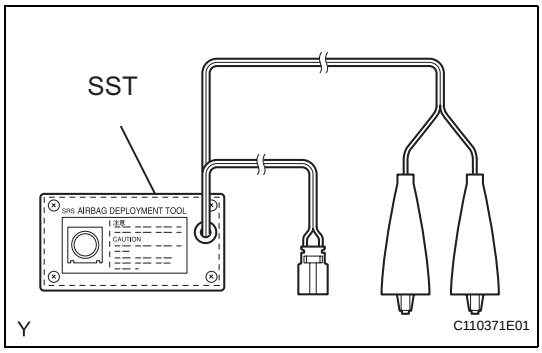
- **Never dispose of a steering pad that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the steering pad.**
- **The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water, etc. to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

RS

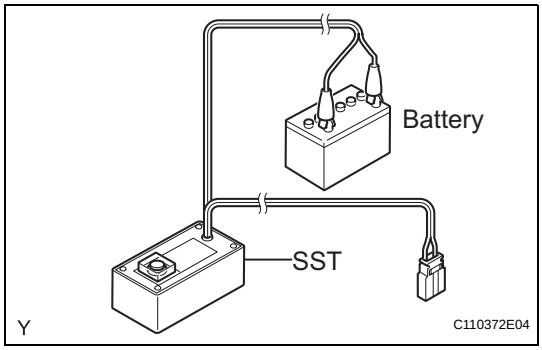
1. DISPOSE OF STEERING PAD (WHEN INSTALLED IN VEHICLE)

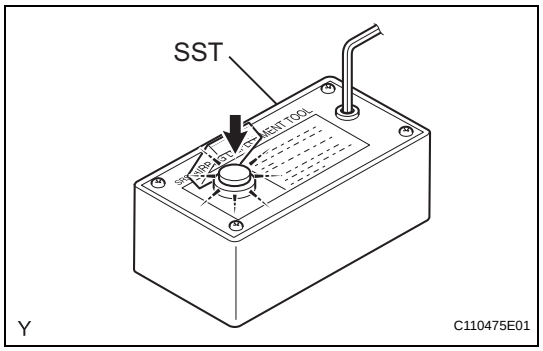
HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check the function of the SST.
SST 09082-00700
CAUTION:
When deploying the airbag, always use the specified SST:
SRS Airbag Deployment Tool



(1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.



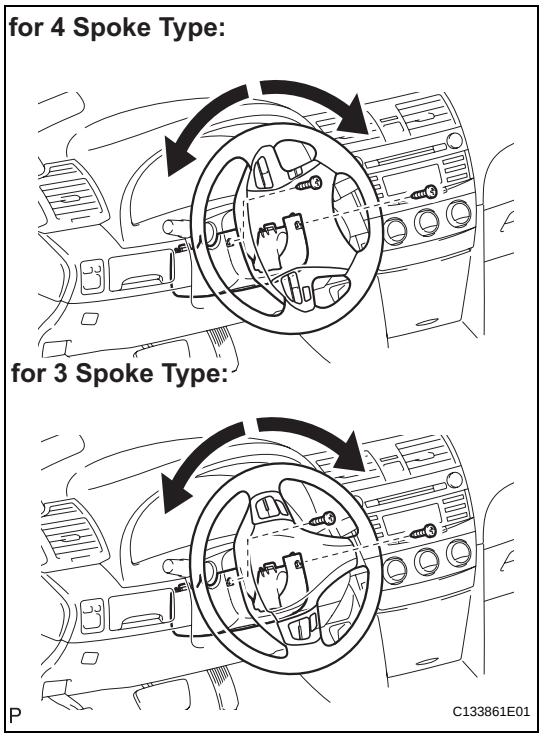


(2) Check the function of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch comes on.
CAUTION:
- **Do not connect the SST connector (yellow colored one) to the airbag.**
- **If the LED comes on when the activation switch is not being pressed, SST malfunction is possible, so replace the SST with a new one.**

(3) Disconnect the SST from the battery.

(b) Precaution (See page RS-1).

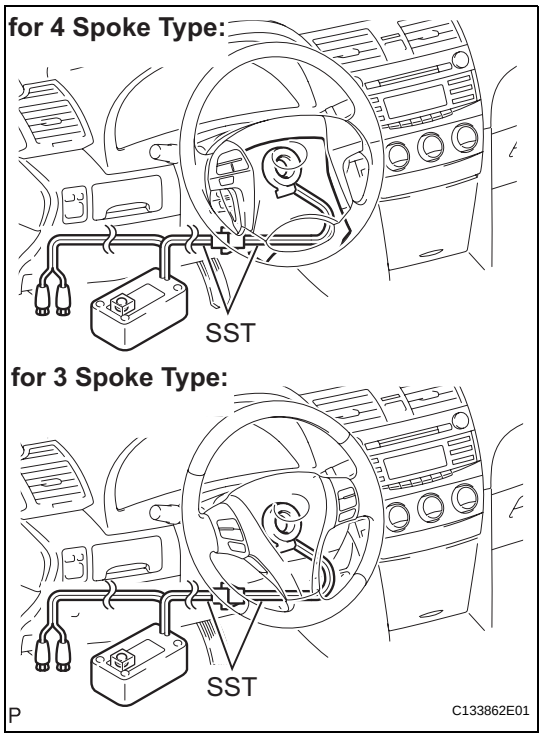
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



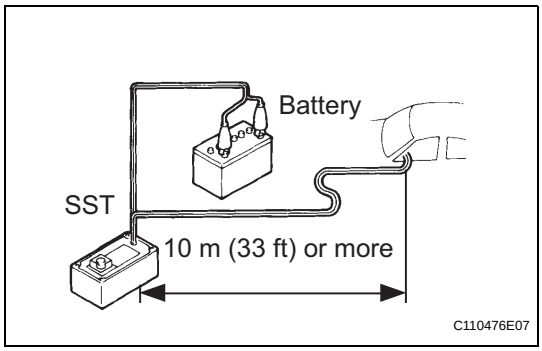
(d) Remove the steering column cover (lower).
(1) While turning the steering wheel assembly to the right and left, remove the 2 screws and steering column cover (lower).

(e) Install the SST.
CAUTION:
Check that there is no looseness in the steering wheel assembly and steering pad.
(1) Disconnect the airbag connector (yellow colored one) from the spiral cable.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

RS



(2) Connect the SST connector to the airbag connector of the spiral cable.
SST 09082-00700, 09082-00780
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move the SST at least 10 m (33 ft) away from the vehicle front side window.
(4) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.
(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.

(f) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water, etc. to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

RS

HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

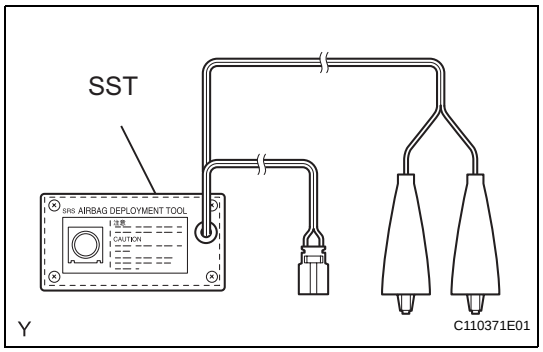
2. DISPOSE OF STEERING PAD (WHEN NOT INSTALLED IN VEHICLE)

NOTICE:

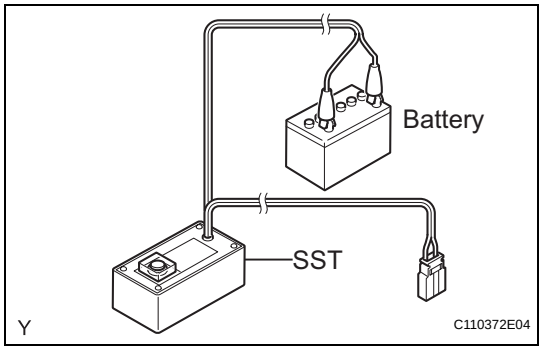
- **When disposing of the steering pad, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

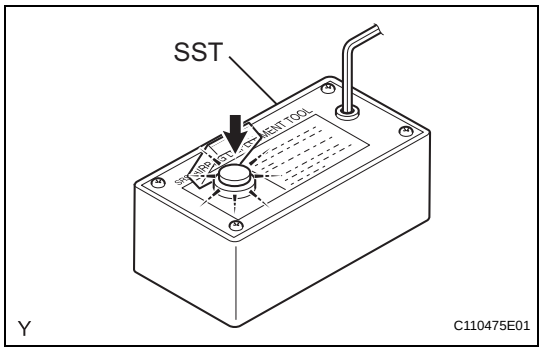
(a) Check the function of the SST.
SST 09082-00700
CAUTION:
When deploying the airbag, always use the specified SST:
SRS Airbag Deployment Tool



(1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.



(2) Check the function of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch comes on.
CAUTION:
- **Do not connect the SST connector (yellow colored one) to the airbag.**
- **If the LED comes on when the activation switch is not being pressed, SST malfunction is possible, so replace the SST with a new one.**

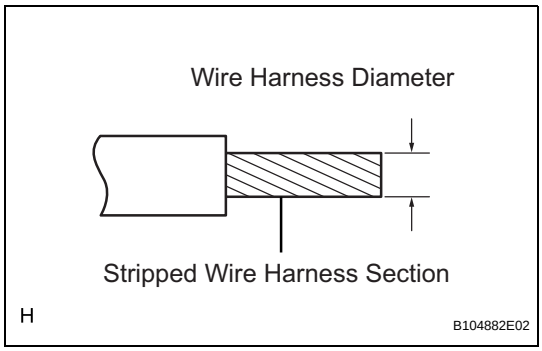


(3) Disconnect the SST from the battery.

(b) Remove the steering pad (See page RS-349).
CAUTION:
- **When removing the steering pad, work must be started 90 seconds after the ignition switch is turned off and the negative (-) terminal cable is disconnected from the battery.**

RS

- **When storing the steering pad, keep the airbag deployment side facing upward.**



(c) Using a service-purpose wire harness for the vehicle, tie down the steering pad to the disc wheel.

Wire harness:

Stripped wire harness section

1.25 mm^2 or more (0.0019 in.^{2} or more)

CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the steering pad, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 in.^{2}).

HINT:

To calculate the area of the stripped wire harness section:

Area = 3.14 x (Diameter)^2 divided by 4

(1) Install the 2 bolts with washers into the 2 bolt holes on the steering pad.

Bolt:

L:

35.0 mm (1.378 in.)

M:

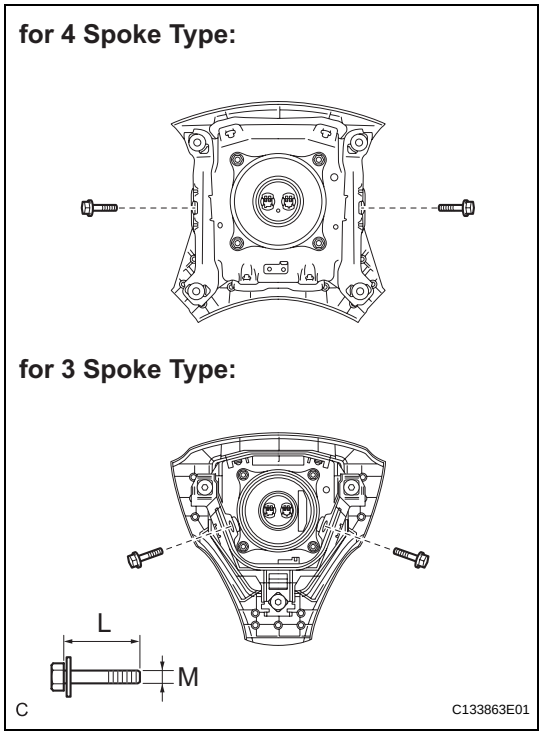
6.0 mm (0.236 in.)

Pitch:

1.0 mm (0.039 in.)

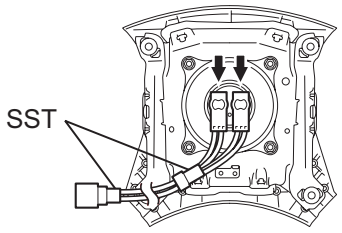
NOTICE:

- **Tighten the bolts by hand until they become difficult to turn.**
- **Do not tighten the bolts excessively.**

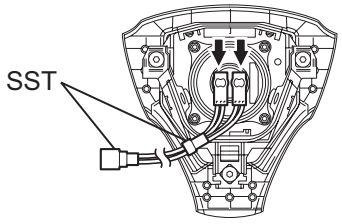


RS

for 4 Spoke Type:



for 3 Spoke Type:



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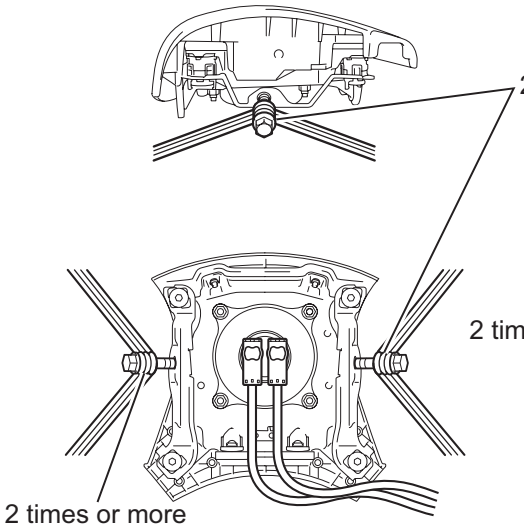
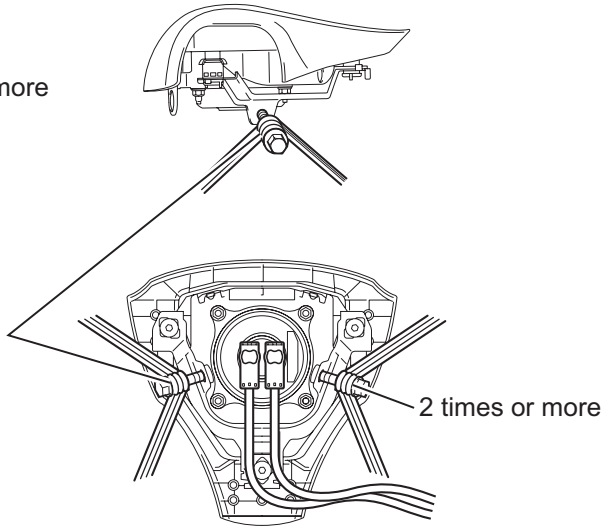
(2) After connecting the SST below to each other, connect them to the steering pad.
SST 09082-00802 (09082-10801, 09082-30801)

(3) Using 3 wire harnesses, wind wire harness at least 2 times each around each of the bolts installed on the left and right sides of the steering pad.

for 4 Spoke Type:



for 3 Spoke Type:



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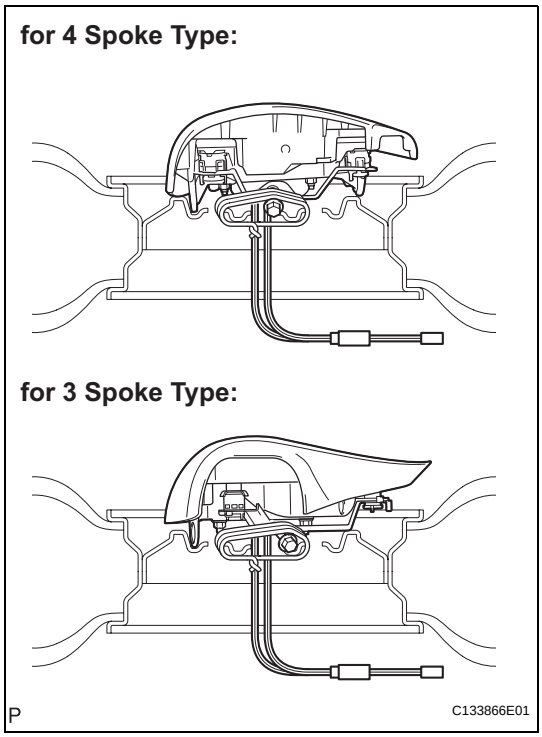
CAUTION:
- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **Make sure that the wire harness is tight. If there is slack in the wire harness, the steering pad may become loose due to the shock when the airbag is deployed.**

RS



(4) Face the airbag deployment side of the steering pad upward on top of a tire and wheel set. Separately tie the left and right sides of the steering pad to the disc wheel through the hub nut holes. Position the SST connector so that it hangs downward through the hub hole of the disc wheel.

CAUTION:

- **Make sure that the wire harness is tight. If there is slack in the wire harness, the steering pad may become loose due to the shock when the airbag is deployed.**
- **Always tie down the steering pad with the airbag deployment side facing upward.**

NOTICE:

The disc wheel will be damaged by the airbag deployment, so use an extra disc wheel.

(d) Install the SST.

CAUTION:

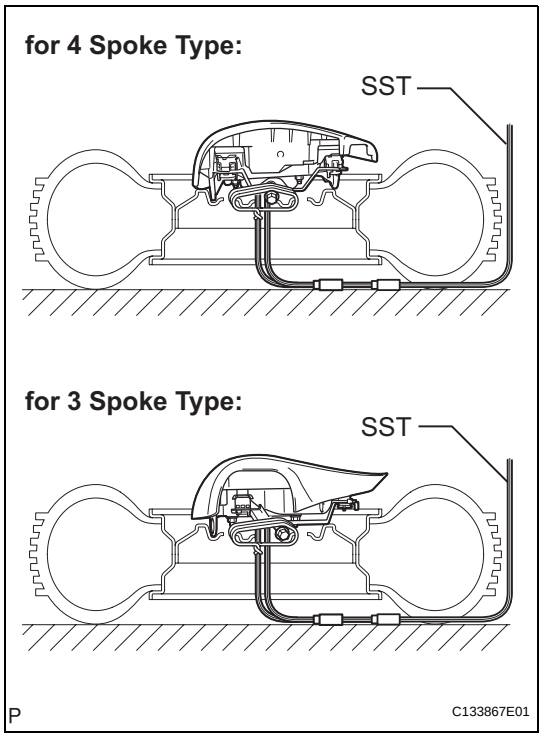
Place the disc wheel on level ground.

(1) Connect the SST connector.

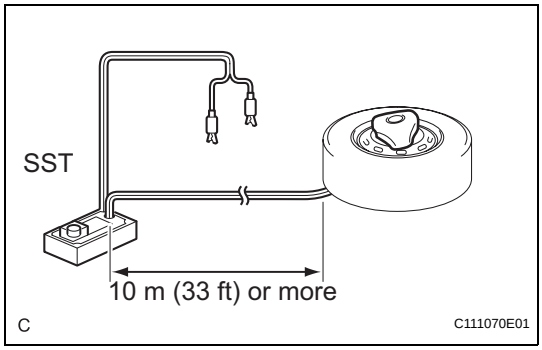
SST 09082-00700

NOTICE:

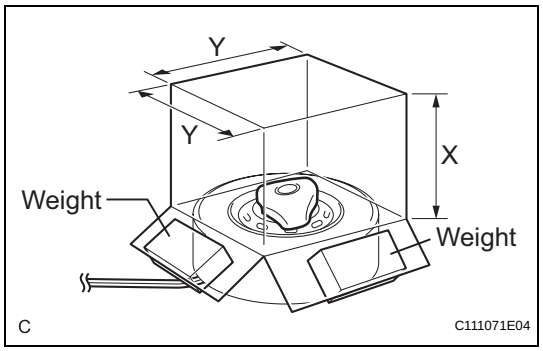
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.



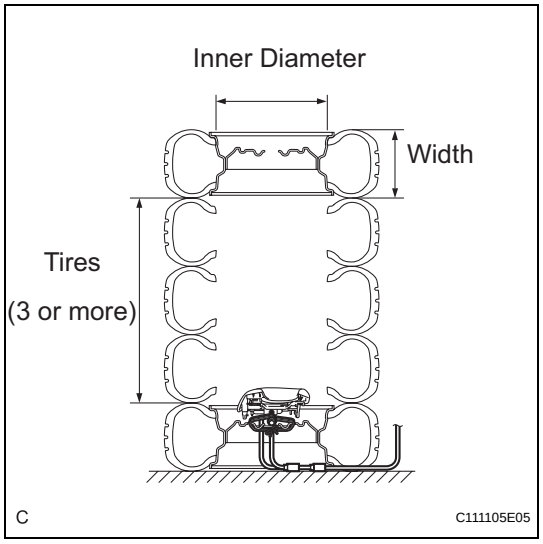
(2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the disc wheel.



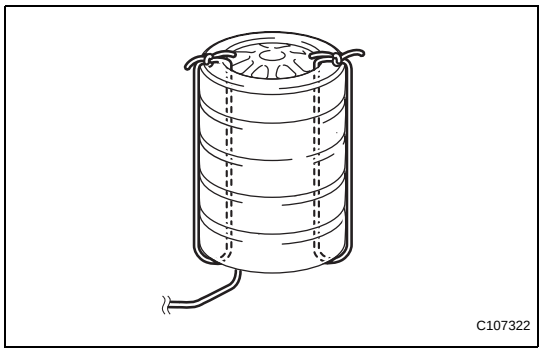
RS



(e) Cover the steering pad (Using a cardboard box).
(1) Cover the steering pad with the cardboard box.
(2) Place weights on the cardboard box in 4 places totalling at least 190 N (19 kg, 43 lb).
Cardboard box size:
Must exceed the following dimensions
X:
460 mm (18.11 in.)
Y:
650 mm (25.59 in.)
NOTICE:
- **When dimension Y of the cardboard box exceeds the diameter of the disc wheel with tire which the steering pad is tied to, X should be the following size.**
X = 460 mm (18.11 in.) + width of tire
- **If a cardboard box which is smaller than the specified size is used, the cardboard box will be broken by the shock from the airbag deployment.**

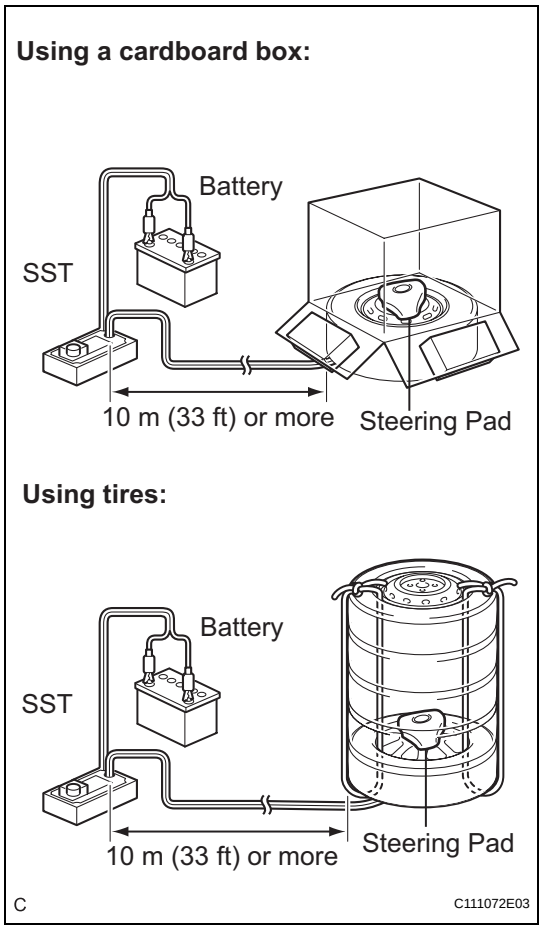


(f) Cover the steering pad (Using tires).
(1) Place at least 3 tires without disc wheels on the tire with disc wheel which the steering pad is tied to.
(2) Place the tire with a disc wheel on top of them.
Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)
CAUTION:
Do not use tires with disc wheels except for on the top and bottom.
NOTICE:
- **The tires may be damaged by the airbag deployment, so use an extra tire.**
- **Do not place the SST connector under the tire because it could be damaged.**



(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.

RS



(g) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.
(2) Check that no one is within a 10 m (33 ft) radius of the disc wheel which the steering pad is tied to.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tire.
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

(h) Dispose of the steering pad.
CAUTION:
- **The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering pad with a deployed airbag.**
- **Do not apply water, etc. to a steering pad with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the steering pad from the disc wheel.
(2) Place the steering pad in a plastic bag, tie it tightly and dispose of it as other general part disposal.

RS

INSPECTION

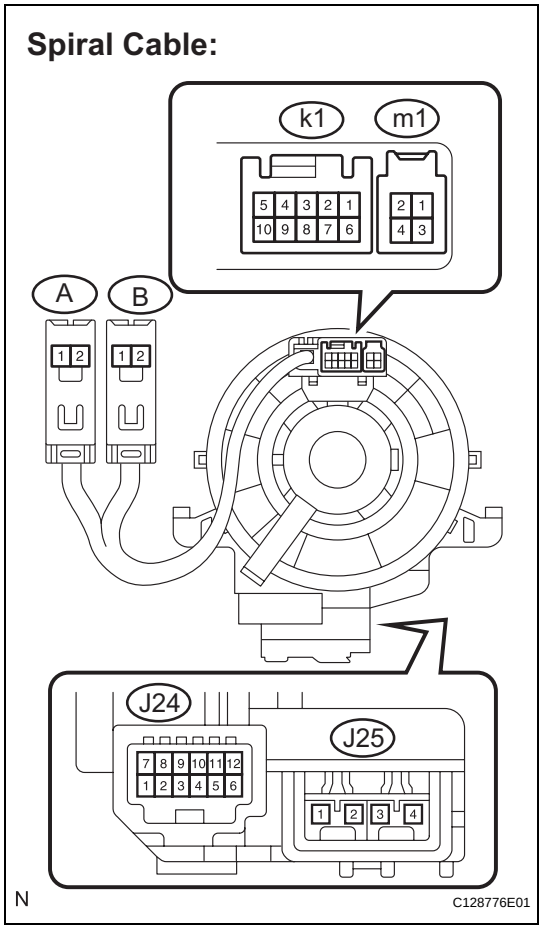
1. INSPECT SPIRAL CABLE

(a) If there are any defects as mentioned below, replace the spiral cable with a new one:
Scratches, cracks, dents or chips on the connector or the spiral cable.

(b) Inspect the spiral cable.

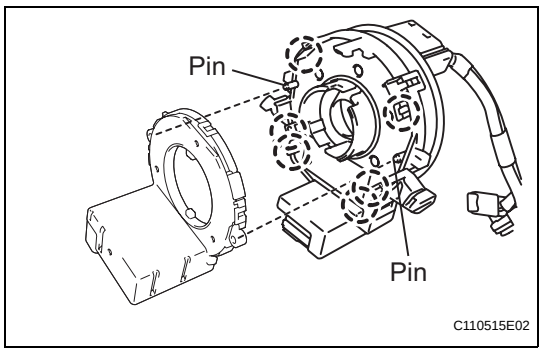
(1) Measure the resistance according to the value(s) in the table below.

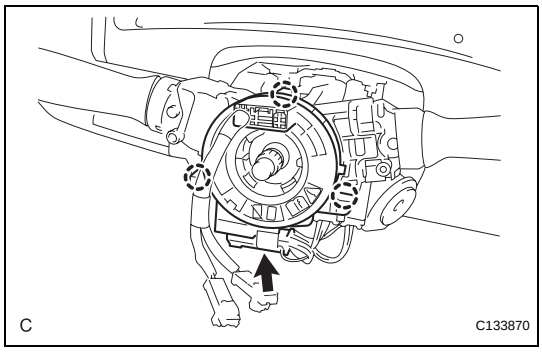
Standard resistance



Tester connection	Condition	Specified condition
k1-1- m1-2	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-1- J24-8 (HO)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-2- J24-9 (SUP)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-3- J24-10 (SDN)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-4- J24-11 (DIST)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-5- J24-12 (IL+2)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-6- m1-4	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-6- J24-2 (ECC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-7- J24-3 (DISP)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-8- J24-4 (EAU)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-9- J24-5 (AU2)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
k1-10- J24-6 (AU1)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
m1-1- J24-7 (R/N)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	

Tester connection	Condition	Specified condition
m1-2- J24-8 (HO)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
m1-3- J24-1 (CCS)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
m1-4- J24-2 (ECC)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
A-1 (D-) - J25-2 (D-)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
A-2 (D+) - J25-1 (D+)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
B-1 (D2-) - J25-3 (D2-)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	
B-2 (D2+) - J25-4 (D2+)	Center	Below 1 Ω
	2.5 rotations to the left	
	2.5 rotations to the right	





INSTALLATION

1. INSTALL SPIRAL CABLE (w/ VSC)

(a) Engage the 6 claws and install the spiral cable to the steering angle sensor.

2. INSTALL SPIRAL CABLE WITH STEERING ANGLE SENSOR (w/ VSC)

(a) Check that the front wheels are facing straight ahead.

(b) Set the turn signal switch to the neutral position.
NOTICE:
If it is not in the neutral position, the pin of the turn signal switch may be snapped.

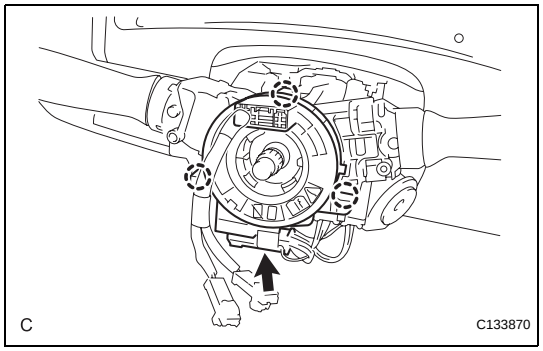
(c) Engage the 3 claws and install the spiral cable with steering angle sensor.
NOTICE:
When replacing the spiral cable with a new one, remove the lock pin before installing the steering wheel assembly.

(d) Connect the connectors to the spiral cable with steering angle sensor.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

3. INSTALL SPIRAL CABLE (w/o VSC)

(a) Check that the front wheels are facing straight ahead.

(b) Set the turn signal switch to the neutral position.
NOTICE:
If it is not in the neutral position, the pin of the turn signal switch may be snapped.

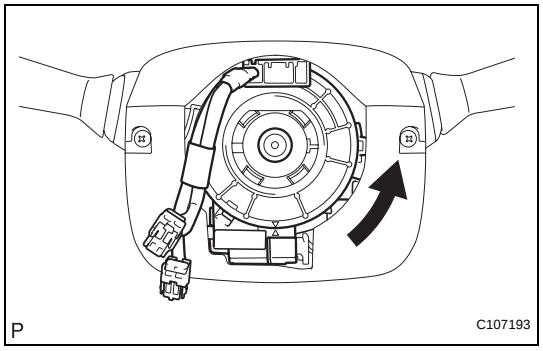


(c) Engage the 3 claws and install the spiral cable.
NOTICE:
When replacing the spiral cable with a new one, remove the lock pin before installing the steering wheel assembly.

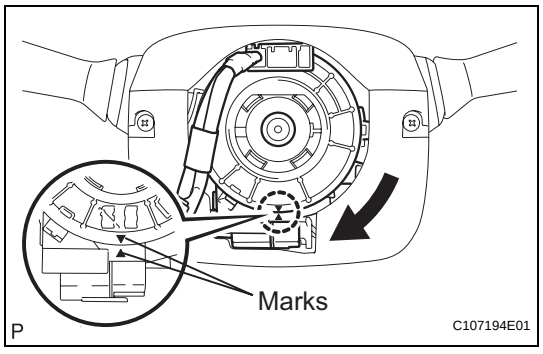
(d) Connect the connectors to the spiral cable.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

4. **INSTALL STEERING COLUMN COVER (See page SR-50)**

5. **ADJUST SPIRAL CABLE**
(a) Check that the ignition switch is off.
(b) Check that the battery negative (-) cable is disconnected.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



(c) Rotate the spiral cable counterclockwise slowly by hand until it feels firm.
NOTICE:
Do not turn the spiral cable by the airbag wire harness.



(d) Rotate the spiral cable clockwise approximately 2.5 turns to align the marks.
NOTICE:
Do not turn the spiral cable by the airbag wire harness.
HINT:
The spiral cable will rotate approximately 2.5 turns to both the left and right from the center.

6. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)**

7. **INSPECT STEERING WHEEL CENTER POINT**

8. **INSTALL STEERING PAD (See page RS-350)**

9. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-351)**

10. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-352)**

RS

11. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

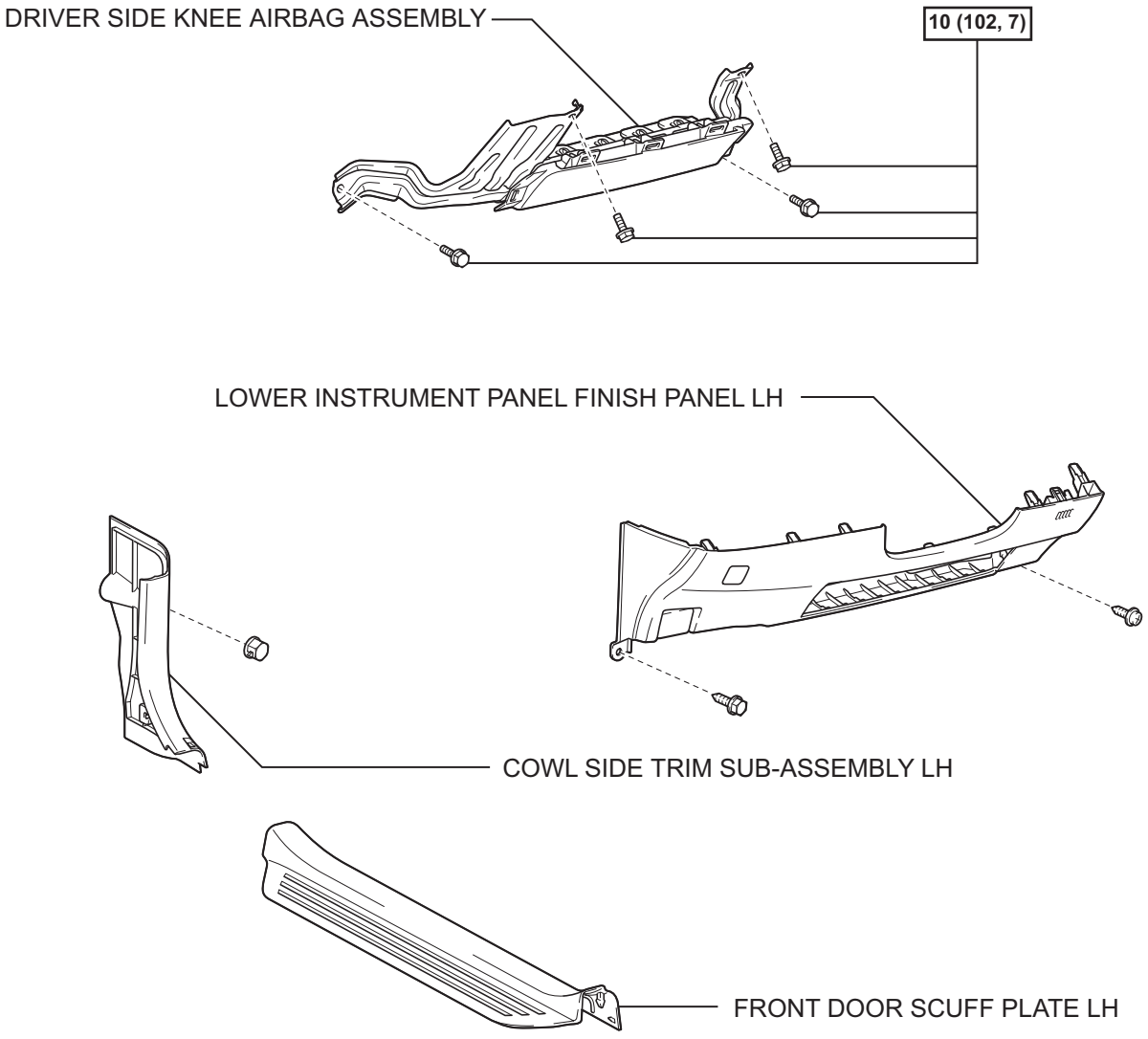
12. INSPECT STEERING PAD (See page RS-352)

13. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-32).

DRIVER SIDE KNEE AIRBAG ASSEMBLY

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

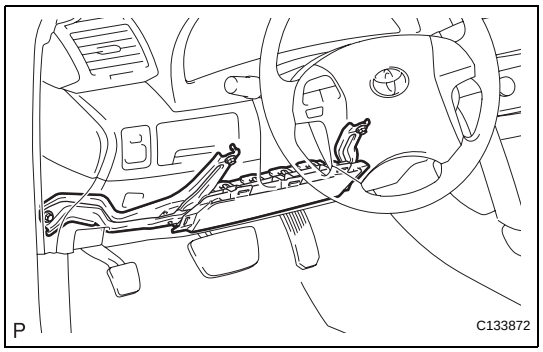
P

C133871E01

ON-VEHICLE INSPECTION

1. INSPECT DRIVER SIDE KNEE AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)

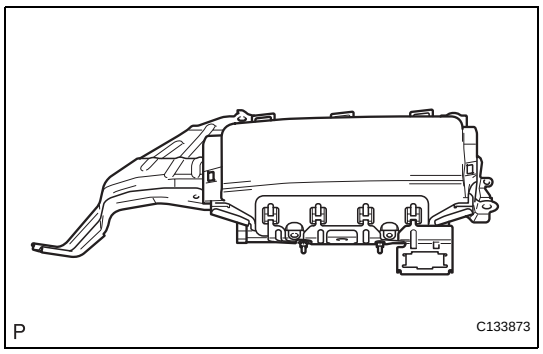
(a) Perform a diagnostic system check (See page RS-32).



(b) With the driver side knee airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the driver side knee airbag assembly with a new one:
Cuts, minute cracks or marked discoloration on the driver side knee airbag assembly.

2. INSPECT DRIVER SIDE KNEE AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)

(a) Perform a diagnostic system check (See page RS-32).



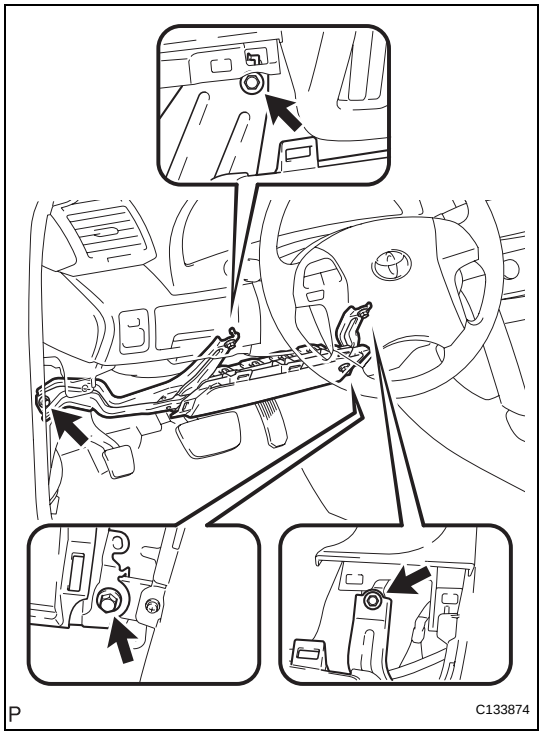
(b) With the driver side knee airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the driver side knee airbag assembly with a new one:
- Cuts, minute cracks or marked discoloration on the driver side knee airbag assembly.
- Cracks or other damage to the connector.
- Deformation or cracks on the instrument panel reinforcement.

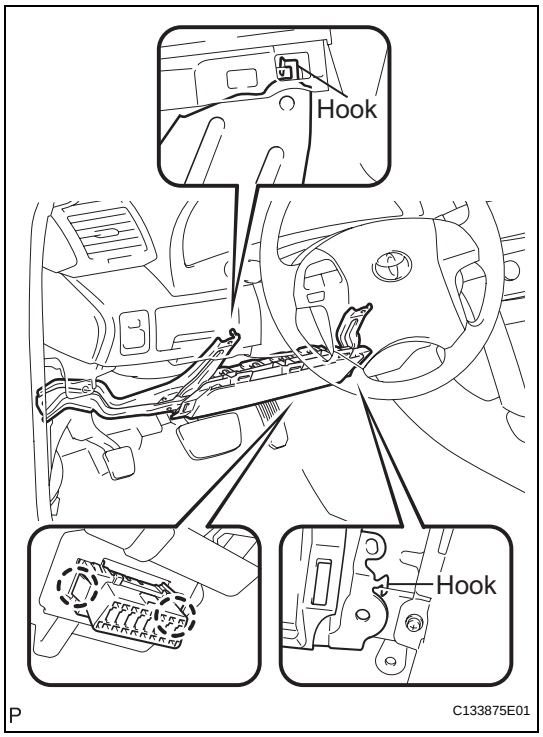
CAUTION:
Be sure to follow the correct removal and installation procedures.

RS

REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
4. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-20)**
6. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY**
   (a) Remove the 4 bolts.
   (b) Disconnect the airbag connector.
   NOTICE:
   When handling the airbag connector, take care not to damage the airbag wire harness.





(c) Disengage the 2 claws and remove the DLC3 connector.
(d) Disengage the 2 hooks and remove the driver side knee airbag assembly.

INSTALLATION

1. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY

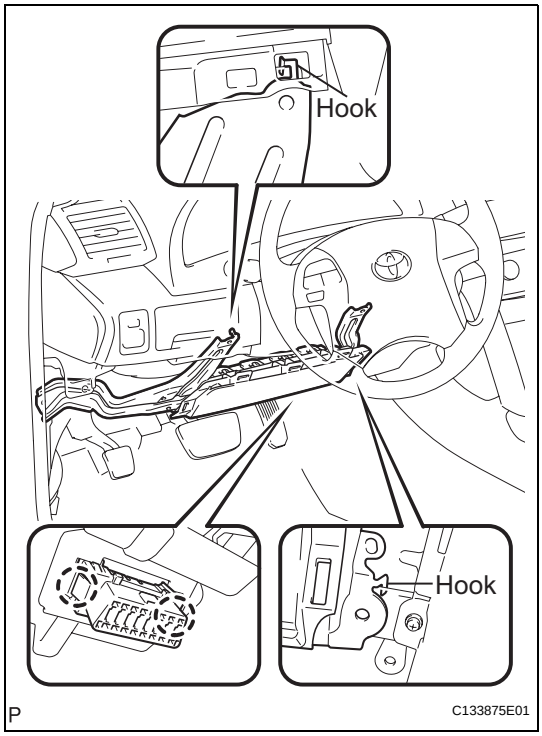
(a) Check that the ignition switch is off.

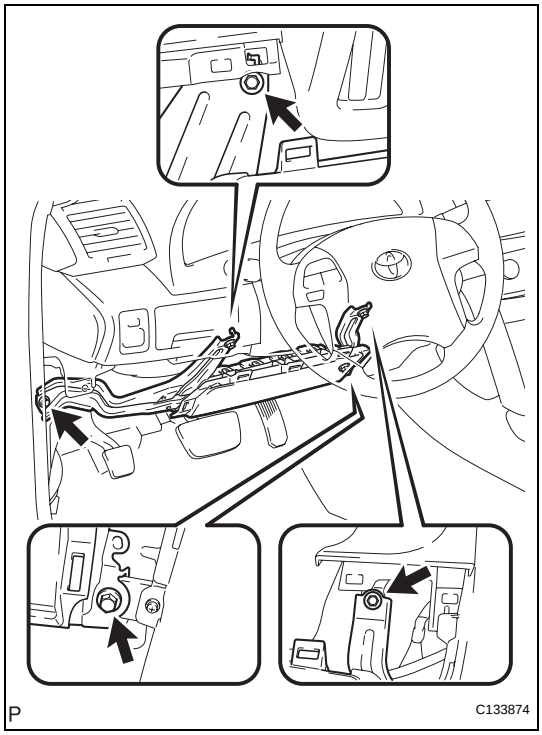
(b) Check that the battery negative (-) cable is disconnected.

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

(c) Temporarily install the driver side knee airbag assembly with the 2 hooks.

(d) Engage the 2 claws and install the DLC 3 connector.





(e) Install the driver side knee airbag assembly with the 4 bolts.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

(f) Connect the driver side knee airbag connector.

NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

2. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-58)

3. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)

4. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

6. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-32).

RS

DISPOSAL

HINT:
When scrapping a vehicle equipped with the SRS or disposing of the driver side knee airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

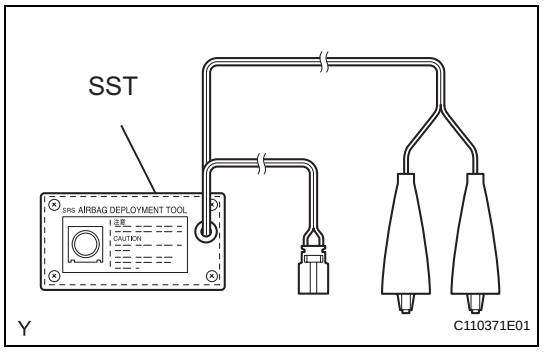
CAUTION:

- **Never dispose of a driver side knee airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the driver side knee airbag assembly.**
- **The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a driver side knee airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

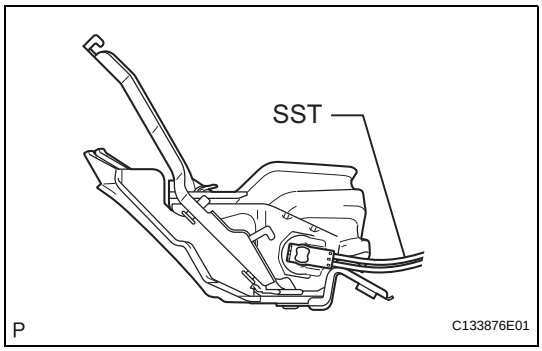
RS

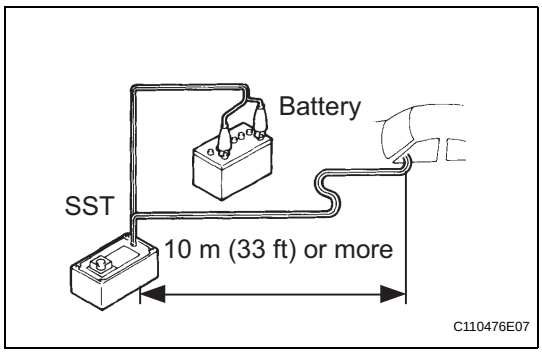
1. DISPOSE OF DRIVER SIDE KNEE AIRBAG ASSEMBLY (WHEN INSTALLED IN VEHICLE)

HINT:
Prepare a battery as the power source to deploy the airbag.



(a) Check the function of the SST (See page RS-353).
(b) Precaution (See page RS-1).
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
(d) Remove the driver side knee airbag assembly (See page RS-369).





(e) Install the SST.

(1) Connect the SST connector to the driver side knee airbag assembly.

SST 09082-00700, 09082-00770

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

(2) Install the driver side knee airbag assembly (See page RS-370).

NOTICE:

Take care not to damage the SST wire harness.

(3) Move the SST at least 10 m (33 ft) away from the vehicle front side window.

(4) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a driver side knee airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:

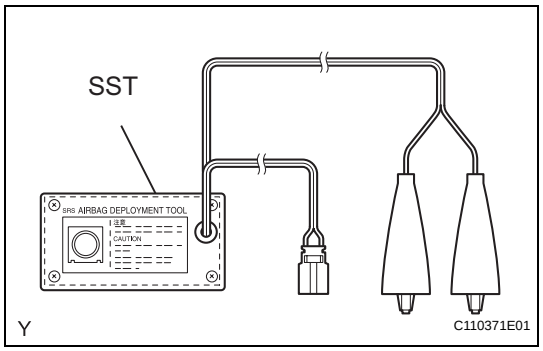
The airbag is deployed as the LED of the SST activation switch comes on.

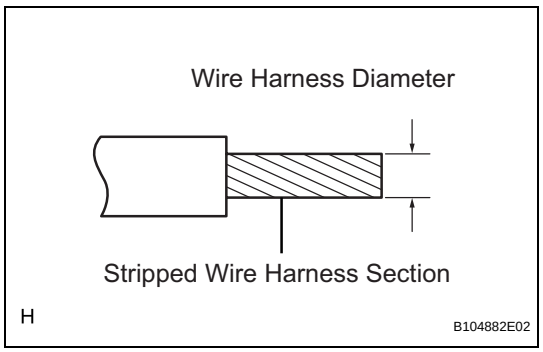
2. DISPOSE OF DRIVER SIDE KNEE AIRBAG ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)

NOTICE:

- **When disposing of the driver side knee airbag assembly, never use the customer's vehicle to deploy the airbag.**

RS





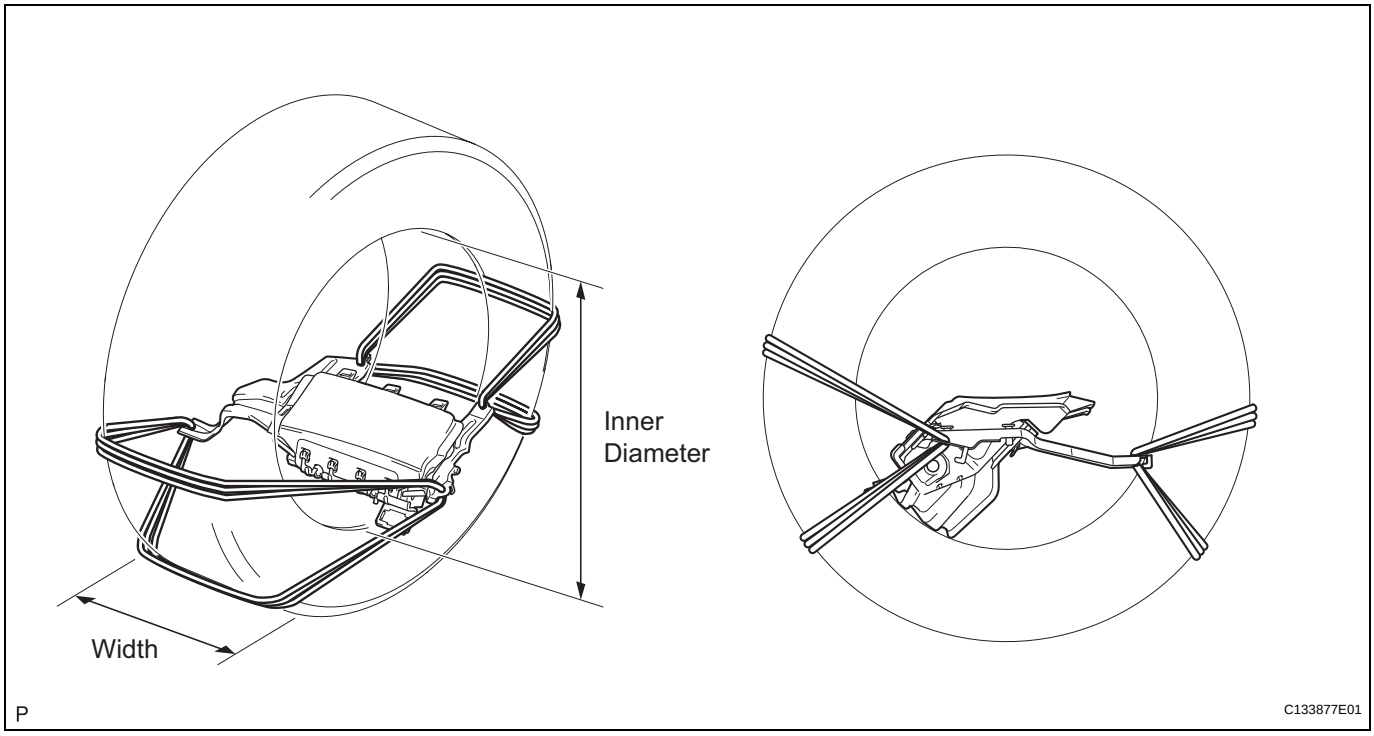
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check the function of the SST (See page RS-355).
(b) Remove the driver side knee airbag assembly (See page RS-369).
CAUTION:
- **When removing the driver side knee airbag assembly, work must be started 90 seconds after the ignition switch is turned off and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the driver side knee airbag assembly, keep the airbag deployment side facing upward.**

(c) Using a service-purpose wire harness for the vehicle, tie down the driver side knee airbag assembly to the tire.
Wire harness:
Stripped wire harness section
1.25 mm^2 or more (0.0019 $in.^2$ or more)
CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the driver side knee airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).
HINT:
To calculate the area of the stripped wire harness section:
Area = 3.14 x $(Diameter)^2$ divided by 4
(1) Position the driver side knee airbag assembly inside the tire with the airbag deployment side facing inside.
Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)

RS

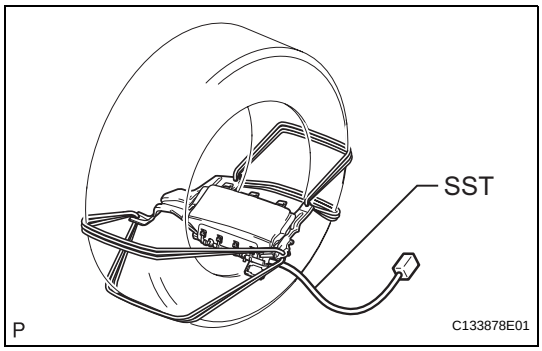


CAUTION:

- **Make sure that the wire harness is tight. If there is slack in the wire harness, the driver side knee airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the driver side knee airbag assembly with the airbag deployment side facing inside the tire.**

NOTICE:

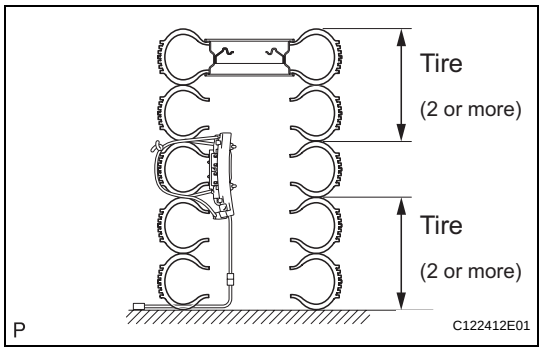
The tire may be damaged by the airbag deployment, so use an extra tire.

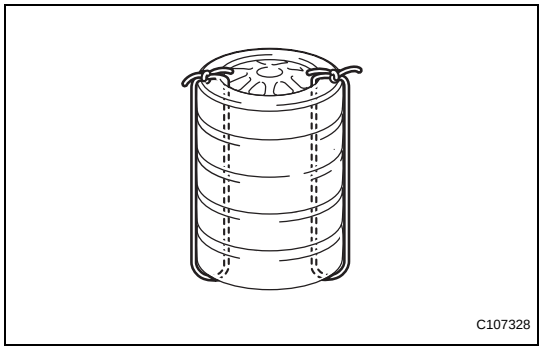


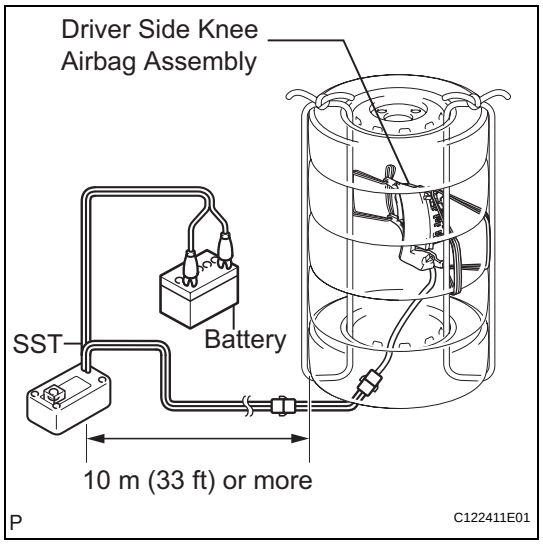
(d) Install the SST.

(1) Connect the SST connector to the driver side knee airbag assembly.

SST 09082-00770



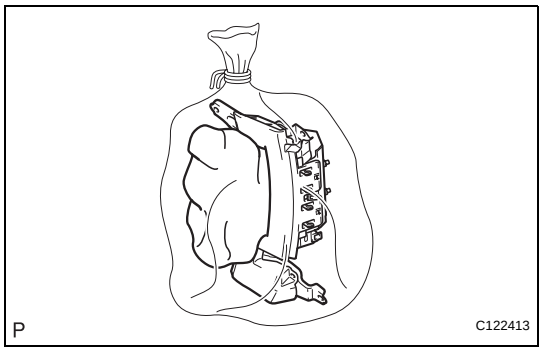




(e) Place the tires.
  (1) Place at least 2 tires under the tire which the driver side knee airbag assembly is tied to.
  (2) Place at least 2 tires over the tire which the driver side knee airbag assembly is tied to. The top tire should have the disc wheel installed.
  NOTICE:
  - **The tire may be damaged by the airbag deployment, so use an extra tire.**
  - **Do not place the SST connector under the tire because it could be damaged.**
  (3) Tie the tires together with 2 wire harnesses.
  CAUTION:
  Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.

(f) Install the SST.
  (1) Connect the SST connector.
  SST 09082-00700
  NOTICE:
  To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.
  (2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the tire.
(g) Deploy the airbag.
  (1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
  (2) Check that no one is within a 10 m (33 ft) radius of the tire which the driver side knee airbag assembly is tied to.
  (3) Press the SST activation switch and deploy the airbag.
  CAUTION:
  When deploying the airbag, make sure that no one is near the tire.
  HINT:
  The airbag is deployed as the LED of the SST activation switch comes on.

RS



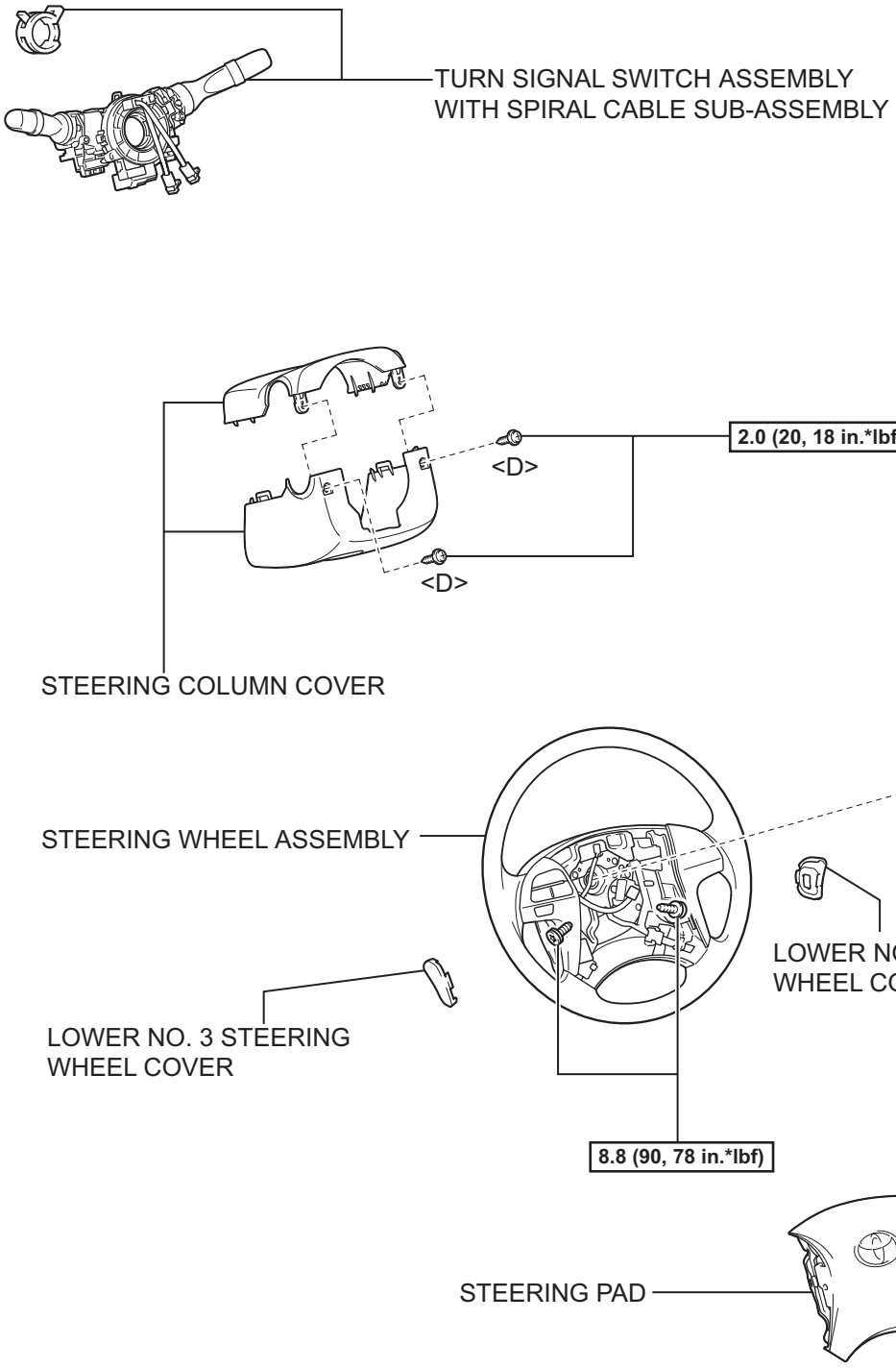
(h) Dispose of the driver side knee airbag assembly.
CAUTION:
- **The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a driver side knee airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the driver side knee airbag assembly from the tire.
(2) Place the driver side knee airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

FRONT PASSENGER AIRBAG ASSEMBLY

COMPONENTS

for TMC Made:



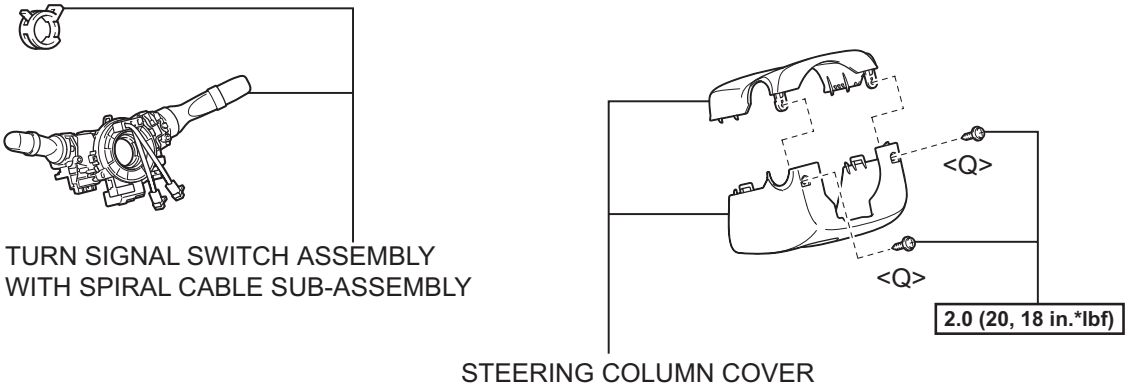
RS

N*m (kgf*cm, ft.*lbf) : Specified torque

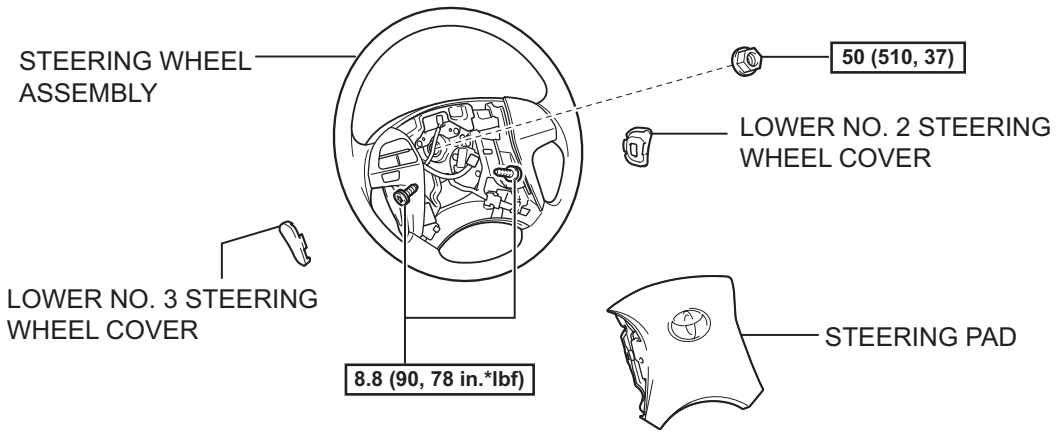
P

B137279E01

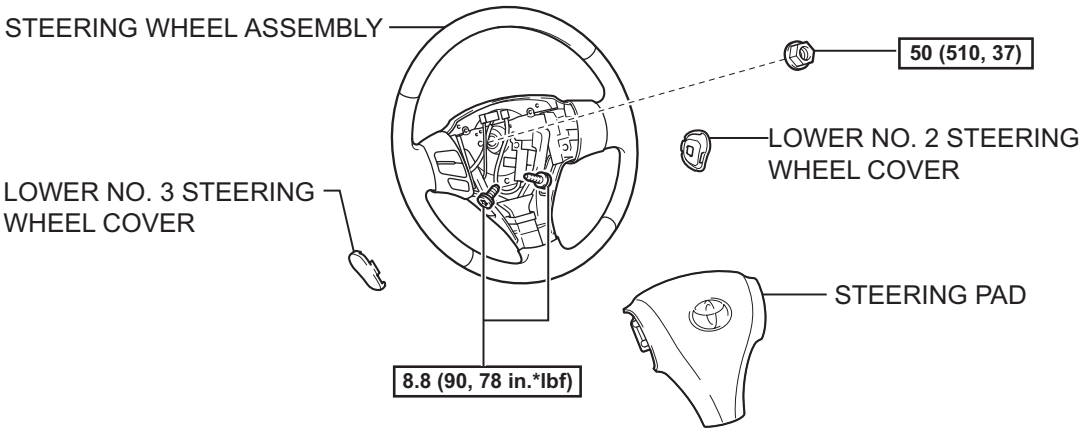
for TMMK Made:



for 4 Spoke Type:



for 3 Spoke Type:



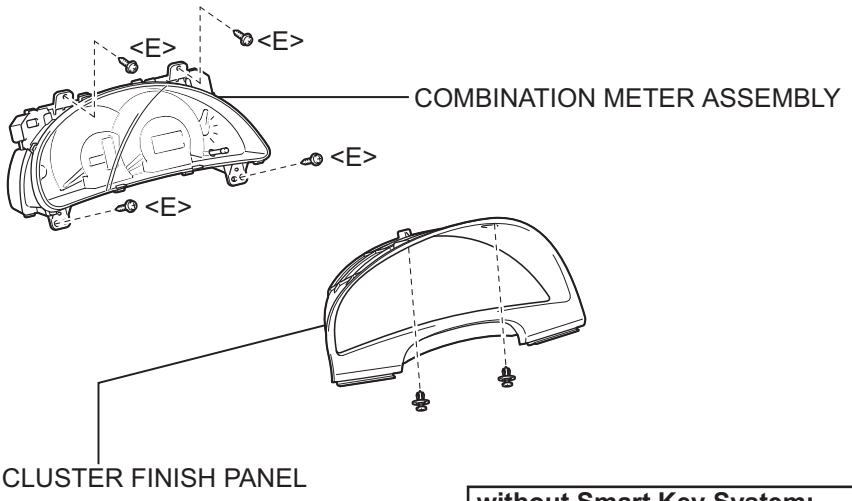
RS

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137280E03

for TMC Made:



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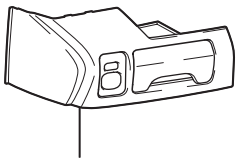

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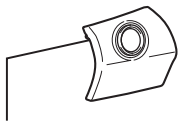

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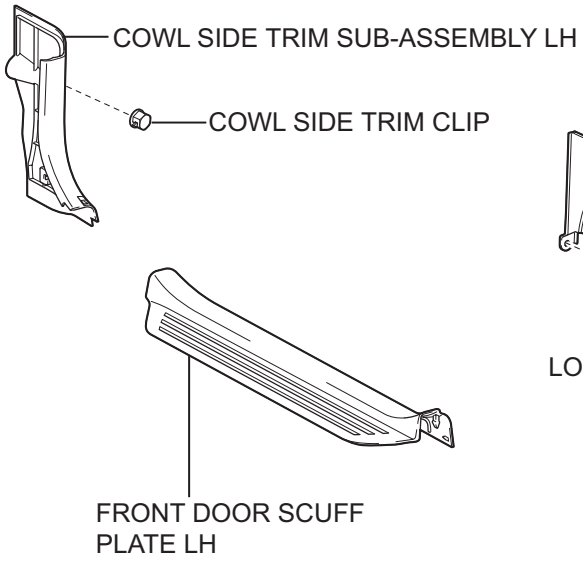

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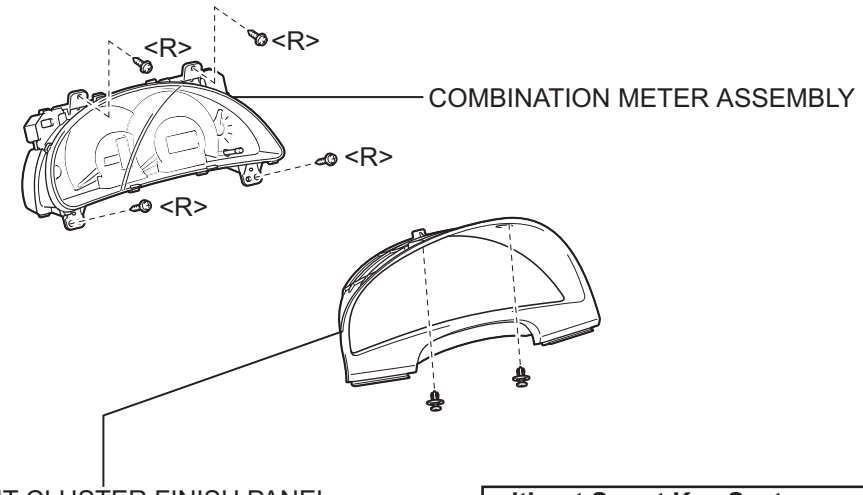

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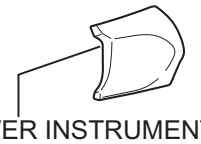
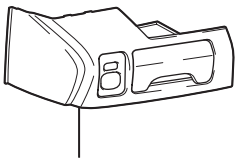
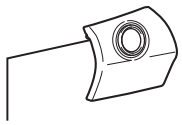
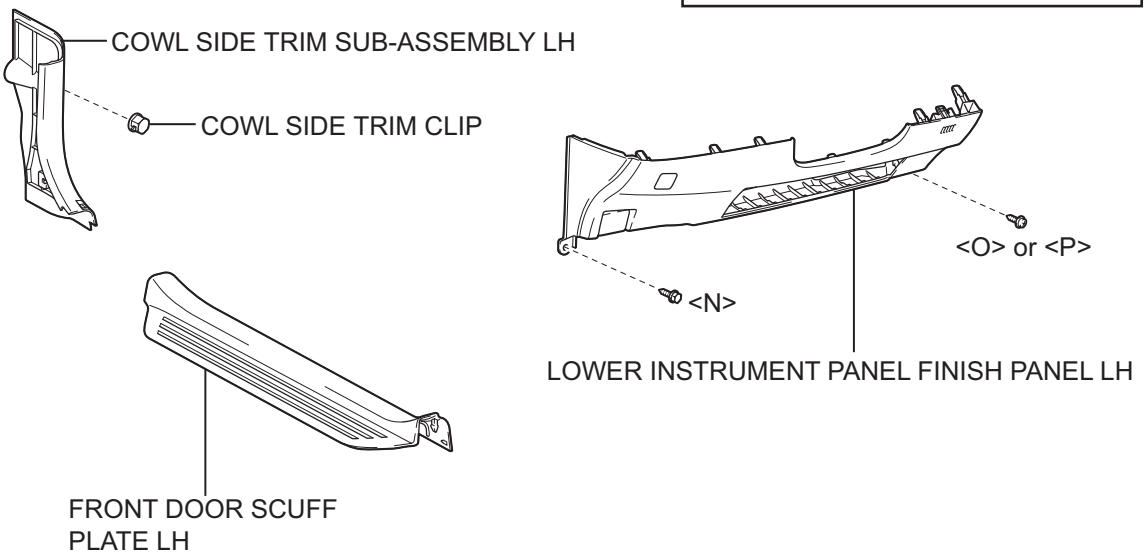




with Smart Key System:





RS

P

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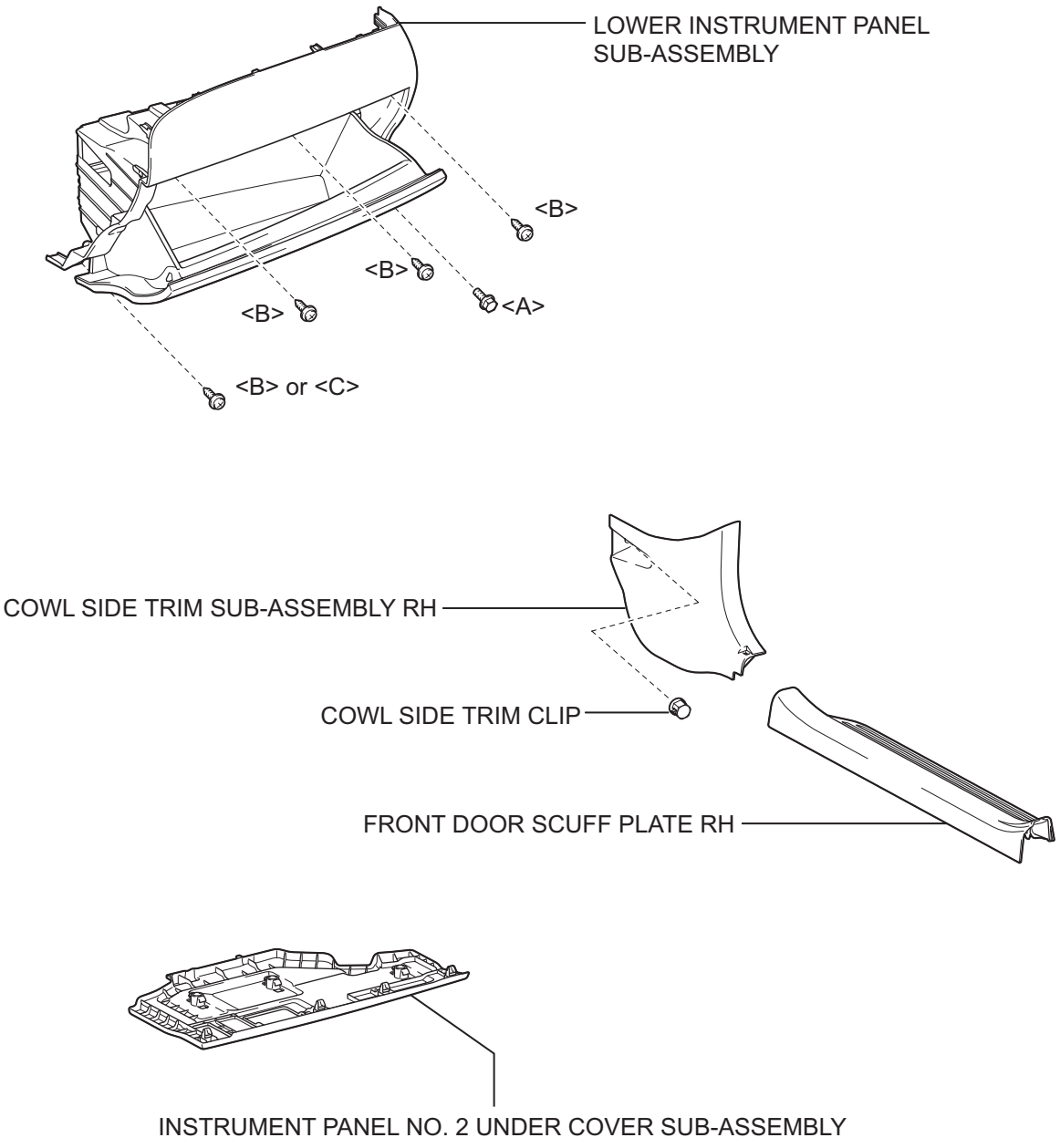

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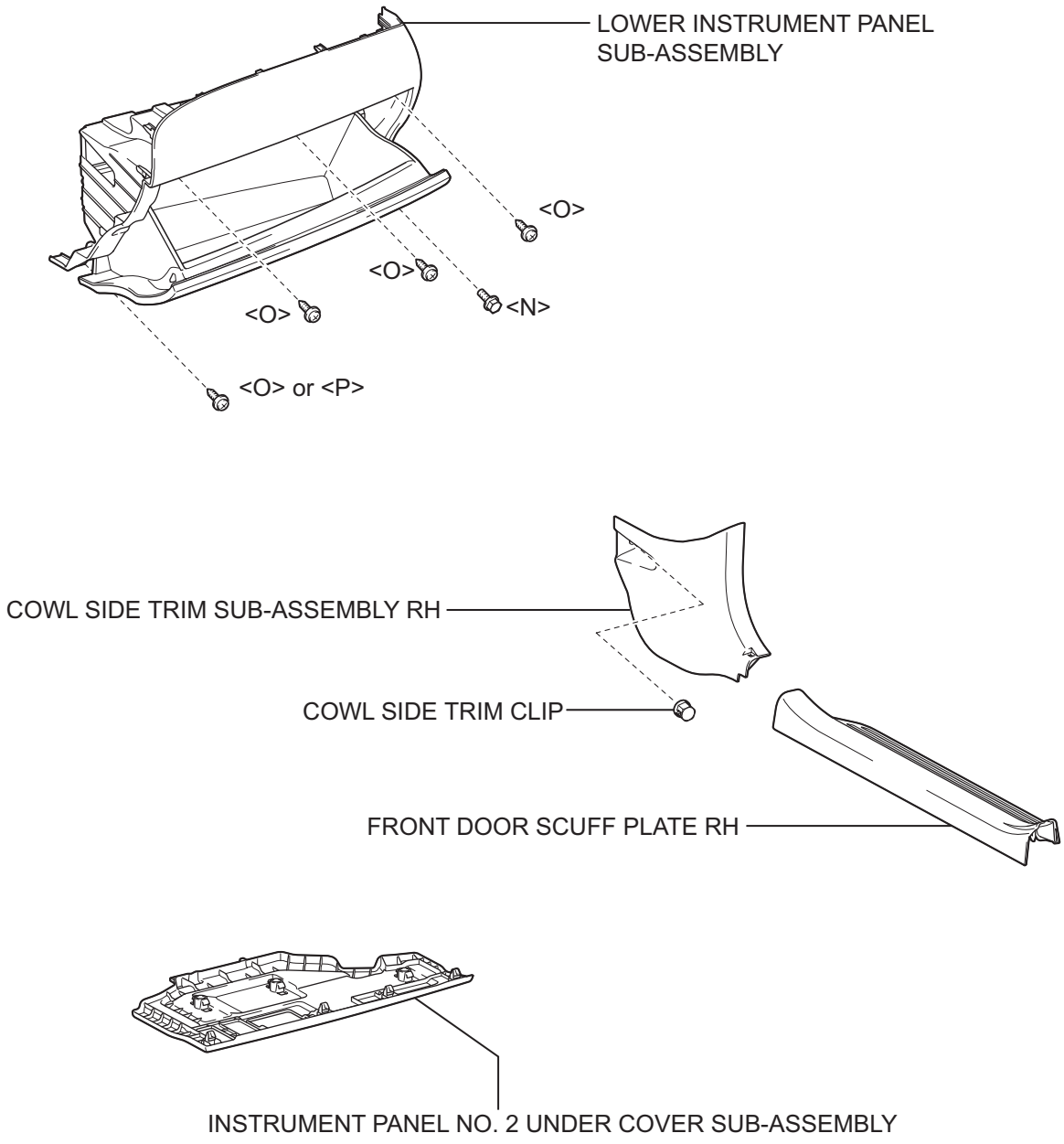

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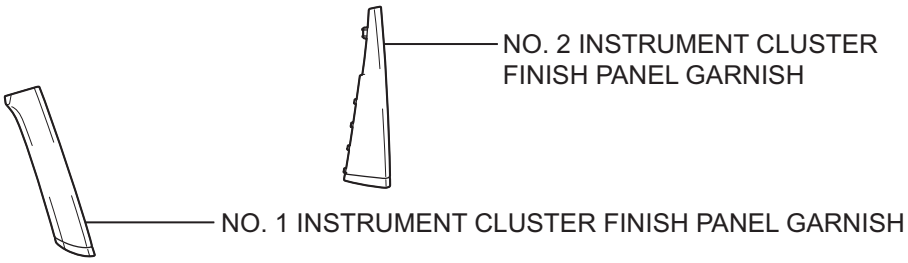

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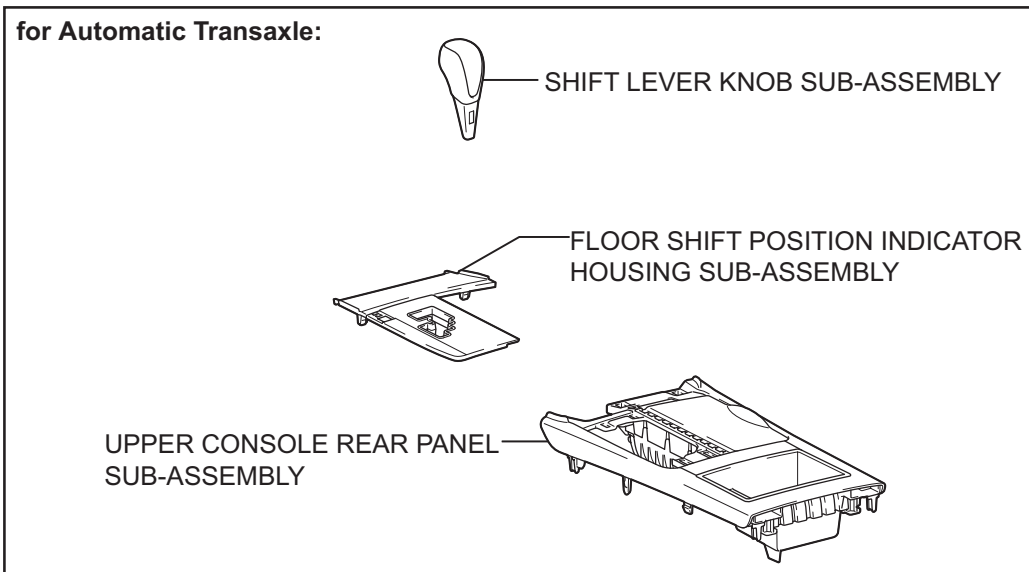

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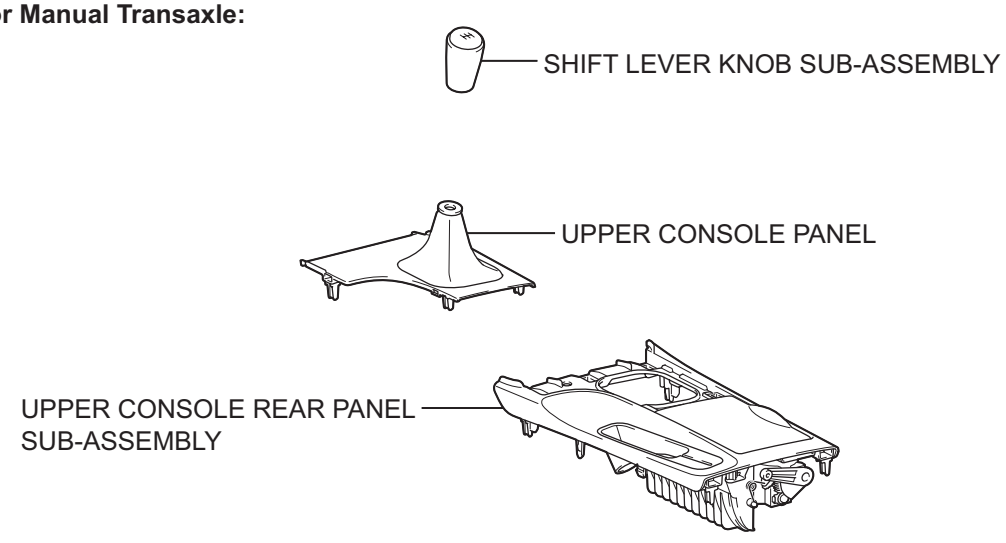

RS

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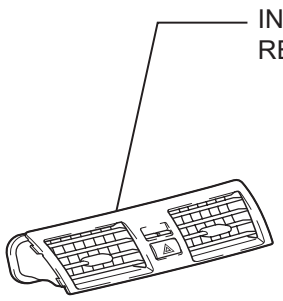

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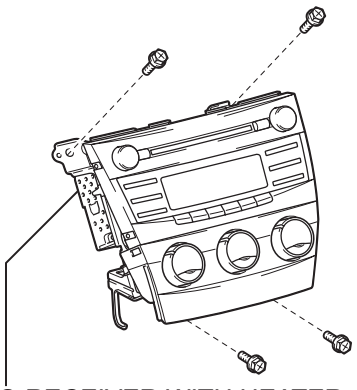

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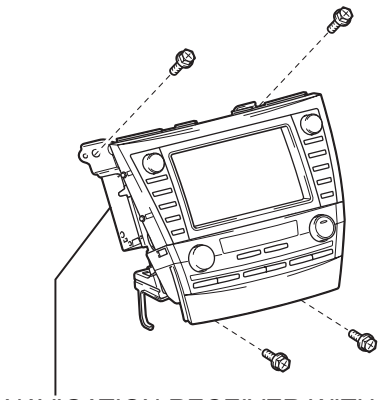

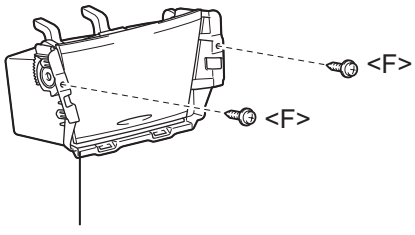

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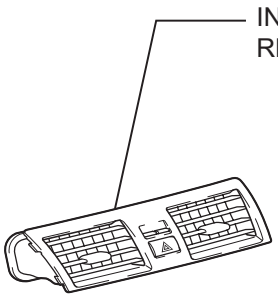

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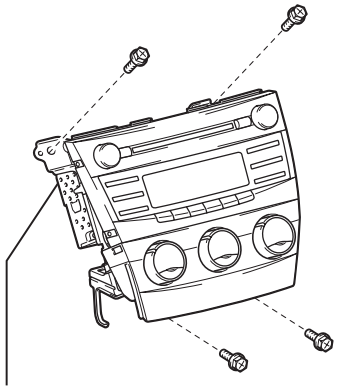

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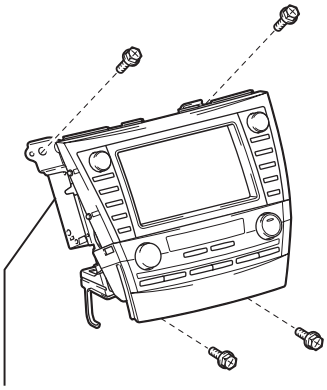

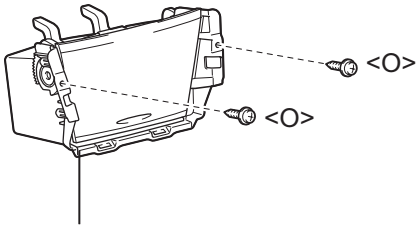

RS

P

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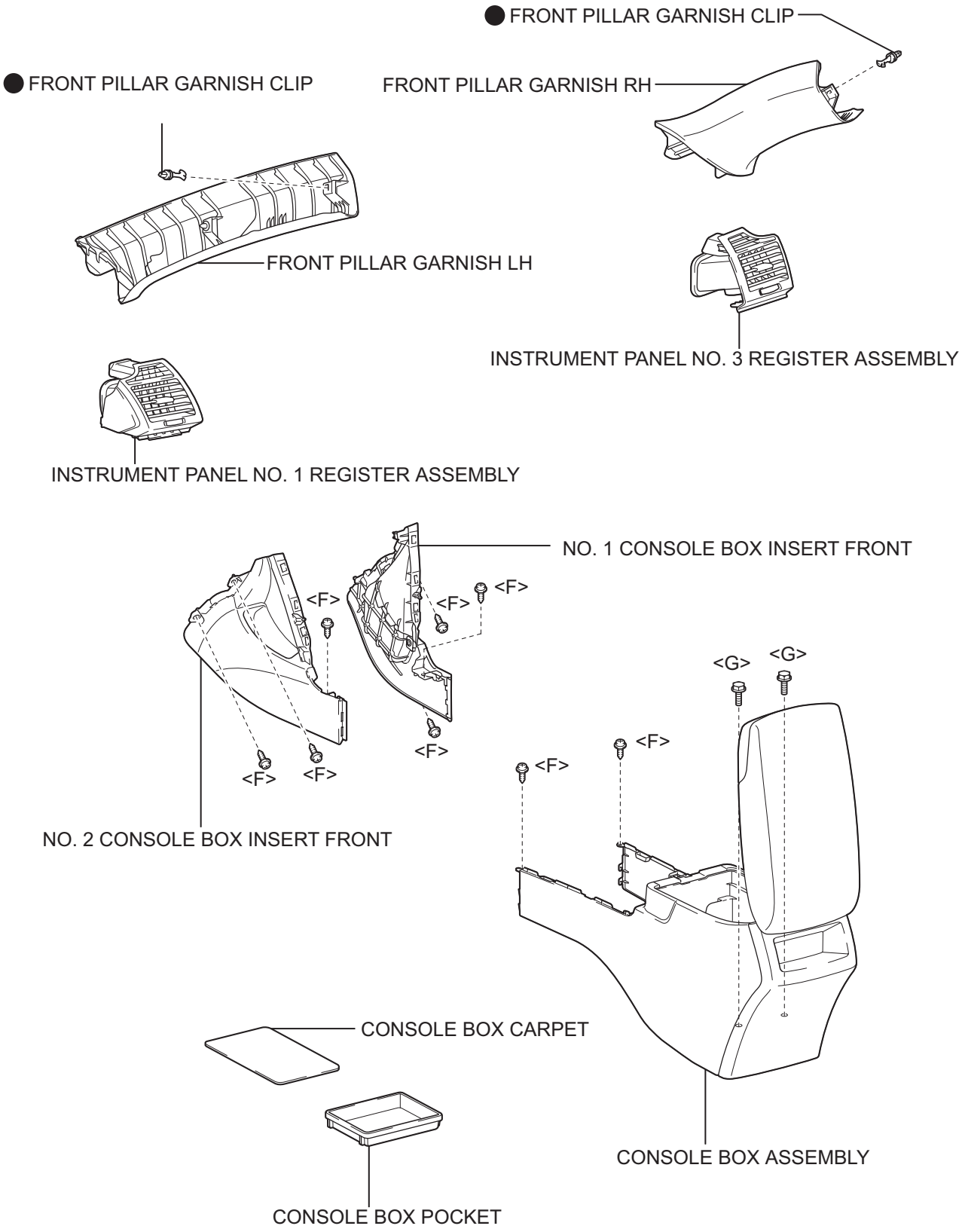

● Non-reusable part

P

B137285E01

RS

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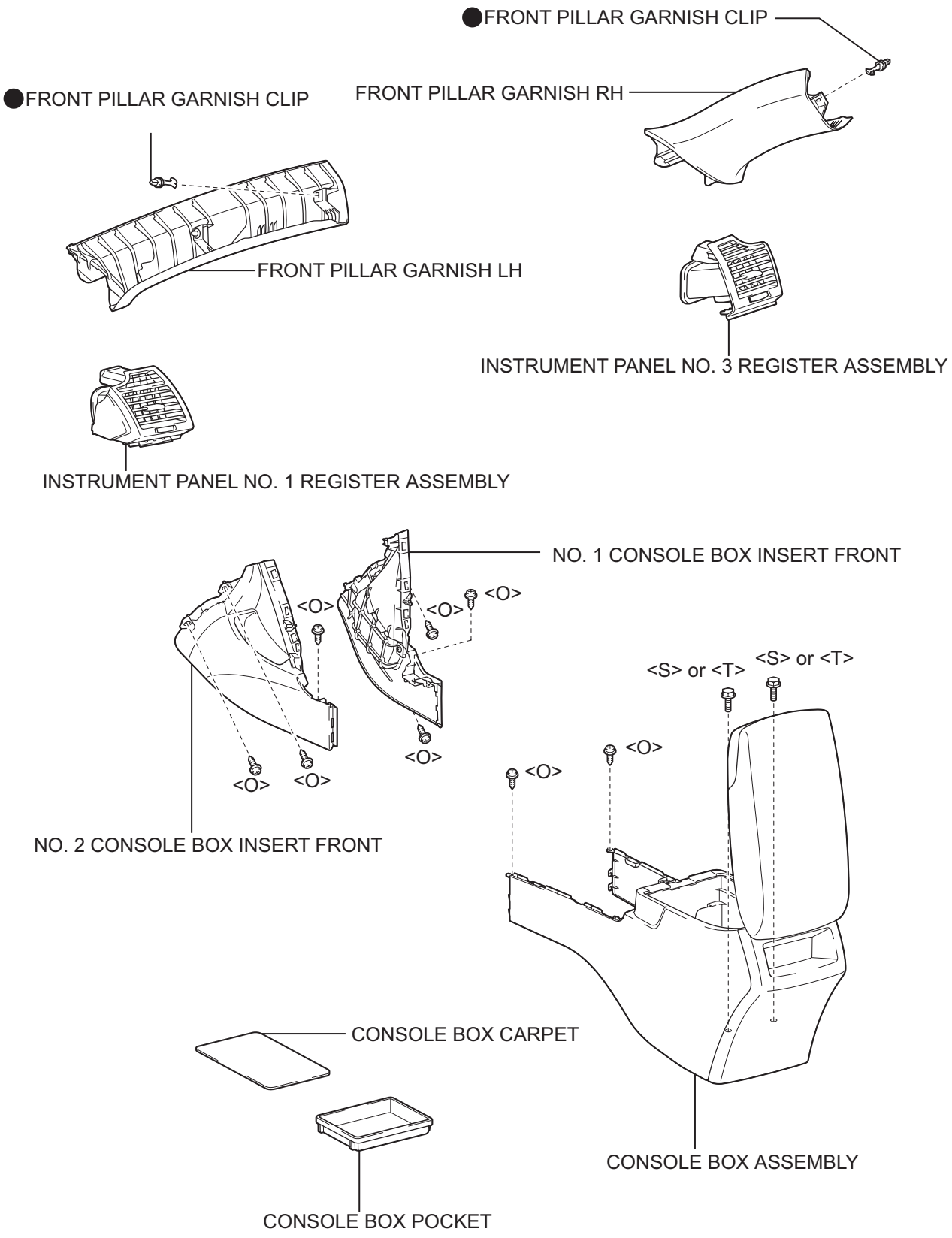

● Non-reusable part

P

B137285E03

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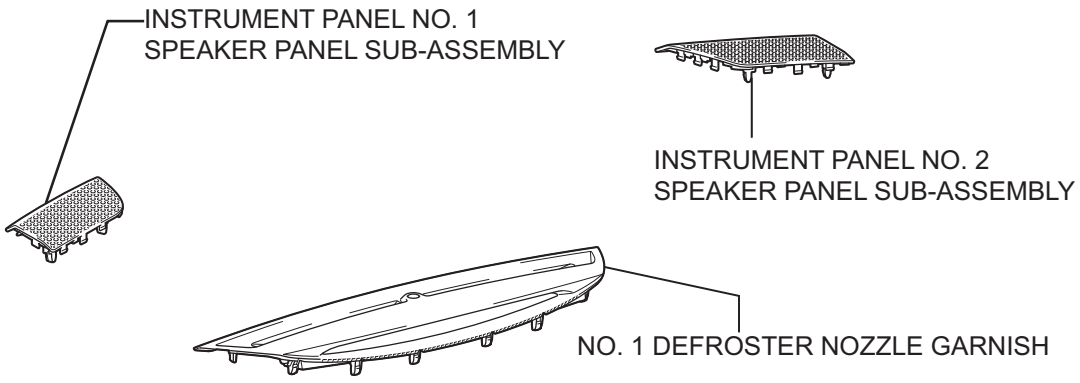
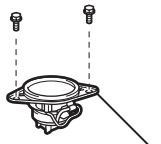
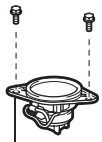
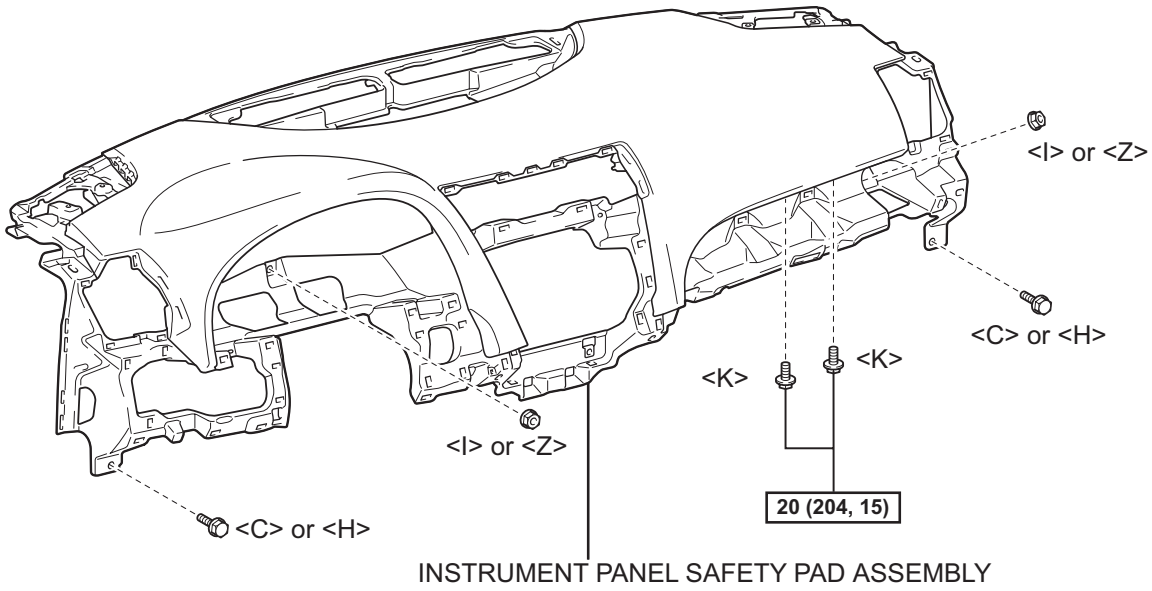


for LH Side:



for RH Side:





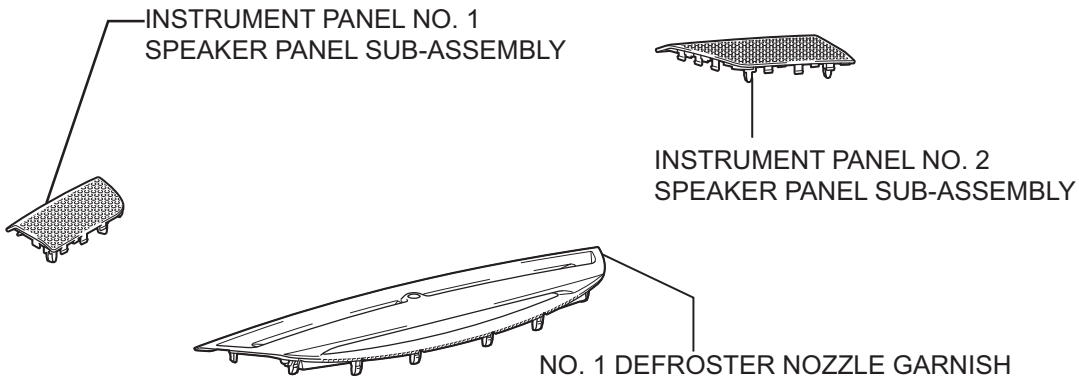
RS

N*m (kgf*cm, ft.*lbf) : Specified torque

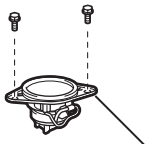
P

B137286E01

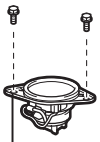
for TMMK Made:

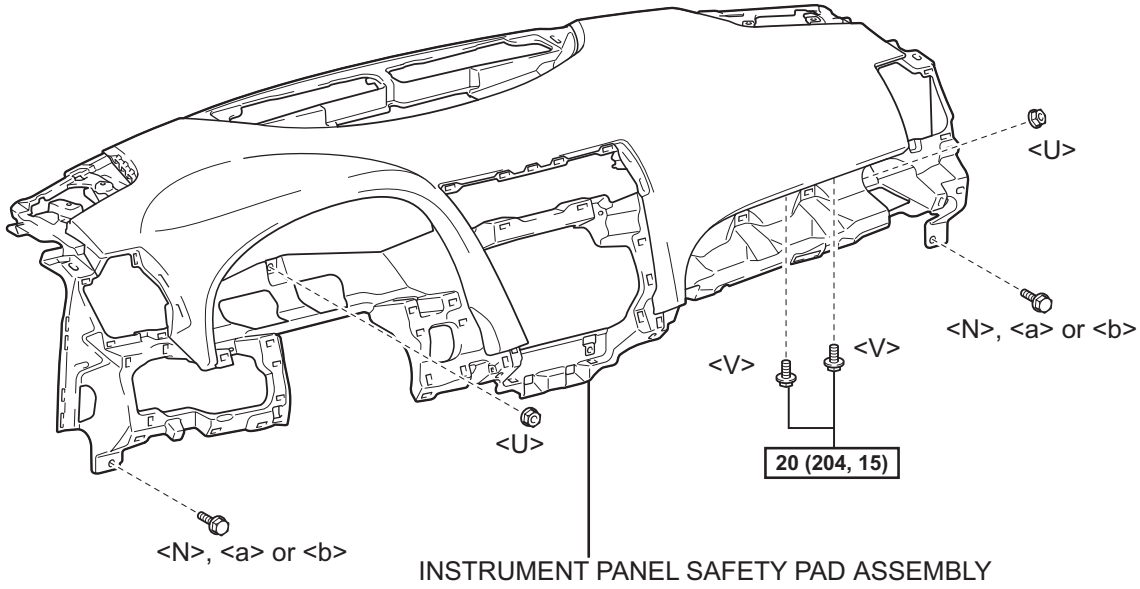


for LH Side:



for RH Side:

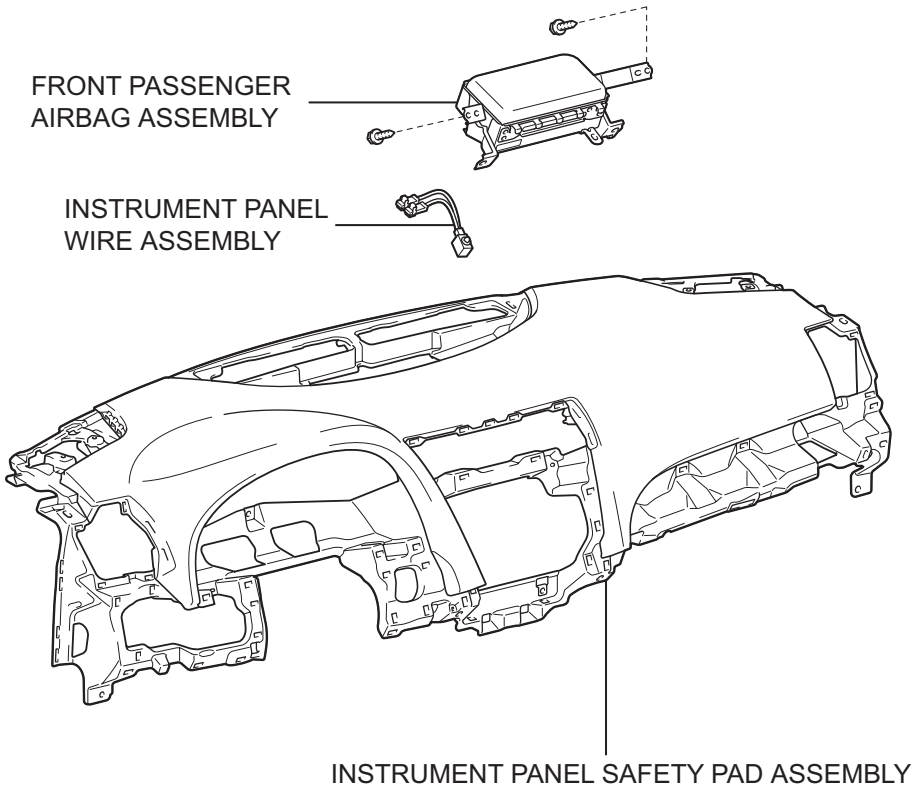




N*m (kgf*cm, ft.*lbf) : Specified torque

P

B137286E03



P

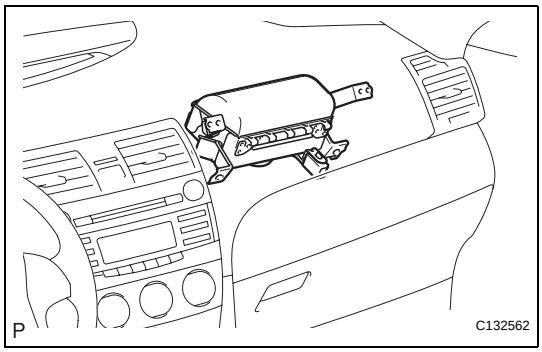
C132561E07

RS

ON-VEHICLE INSPECTION

1. INSPECT FRONT PASSENGER AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)

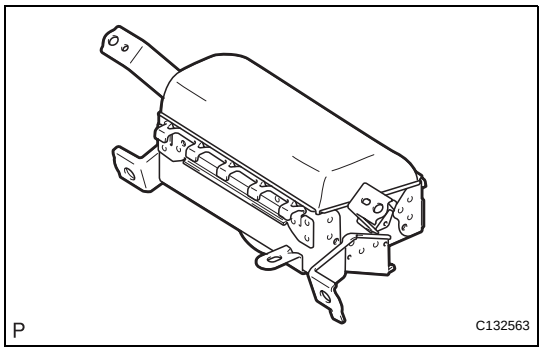
(a) Perform a diagnostic system check (See page RS-32).



(b) With the front passenger airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the instrument panel with a new one:
Cuts, minute cracks or marked discoloration on the instrument panel around the front passenger airbag assembly.

2. INSPECT FRONT PASSENGER AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)

(a) Perform a diagnostic system check (See page RS-32).



(b) With the front passenger airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement with a new one:
- Cuts, minute cracks or marked discoloration on the front passenger airbag assembly.
- Cracks or other damage to the connectors.
- Deformation or cracks on the instrument panel or instrument panel reinforcement.

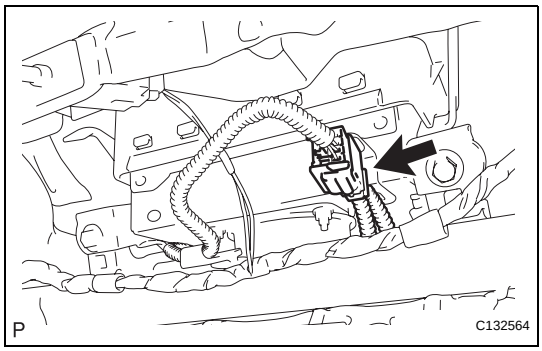
CAUTION:
Be sure to follow the correct removal and installation procedures.

RS

REMOVAL

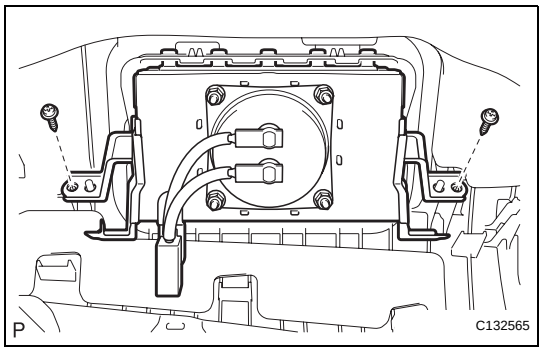
1. **TABLE OF BOLT, SCREW AND NUT**
   HINT:
   See page IP-1
2. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
3. **ALIGN FRONT WHEELS FACING STRAIGHT AHEAD**
4. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
5. **REMOVE LOWER NO. 3 STEERING WHEEL COVER (See page RS-349)**
6. **REMOVE LOWER NO. 2 STEERING WHEEL COVER (See page RS-349)**
7. **REMOVE STEERING PAD (See page RS-350)**
8. **REMOVE STEERING WHEEL ASSEMBLY (See page SR-38)**
9. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
10. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
11. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
12. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
13. **REMOVE STEERING COLUMN COVER (for TMC Made) (See page IP-21)**
14. **REMOVE STEERING COLUMN COVER (for TMMK Made) (See page IP-21)**
15. **REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-39)**
16. **REMOVE NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-22)**
17. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-22)**
18. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-22)**
19. **REMOVE INSTRUMENT CLUSTER FINISH PANEL (See page IP-22)**
20. **REMOVE COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-23)**

21. **REMOVE COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-23)**
22. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
23. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
24. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**
25. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**
26. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**
27. **DISCONNECT INSTRUMENT PANEL WIRE ASSEMBLY**
    (a) Disconnect the connector.



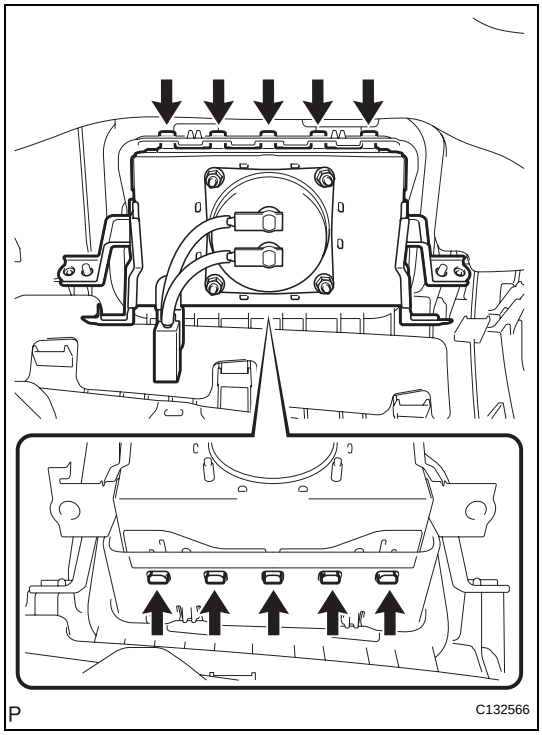
28. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
29. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
30. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
31. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
32. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
33. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
34. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
35. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
36. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)**
37. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)**
38. **REMOVE INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-27)**
39. **REMOVE RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-146)**
40. **REMOVE NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-195)**

41. REMOVE CONSOLE BOX POCKET (See page NS-195)
42. REMOVE CONSOLE BOX CARPET (See page IP-28)
43. REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)
44. REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)
45. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)
46. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
47. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-30)
48. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)
49. REMOVE FRONT PILLAR GARNISH LH (See page IR-27)
50. REMOVE INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-31)
51. REMOVE INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-31)
52. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-155)
53. REMOVE FRONT PILLAR GARNISH RH (See page IR-27)
54. REMOVE INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-31)
55. REMOVE INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-32)
56. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page AV-156)
57. REMOVE NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-32)
58. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-32)
59. REMOVE INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-34)

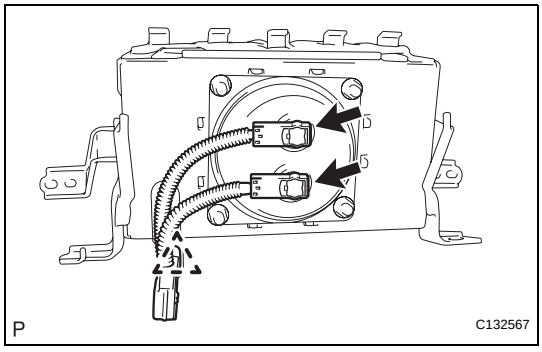


60. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

(a) Remove the 2 screws.



(b) Disengage the 10 hooks and remove the front passenger airbag assembly from the instrument panel.



61. REMOVE INSTRUMENT PANEL WIRE ASSEMBLY

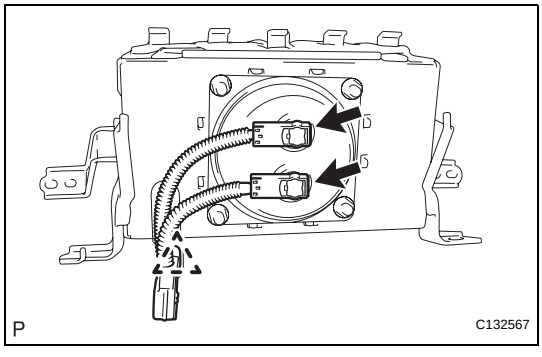
(a) Disconnect the 2 connectors.

(b) Remove the clamp and the instrument panel wire assembly from the front passenger airbag assembly.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

INSTALLATION



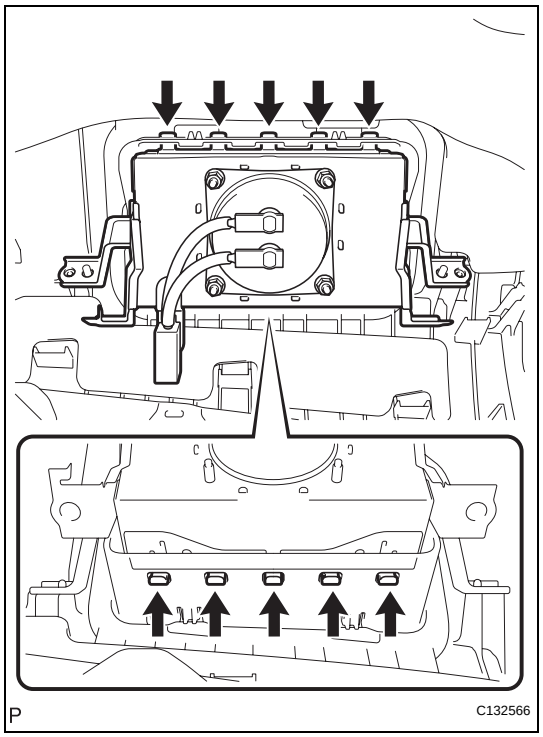
1. INSTALL INSTRUMENT PANEL WIRE ASSEMBLY

(a) Connect the 2 connectors.

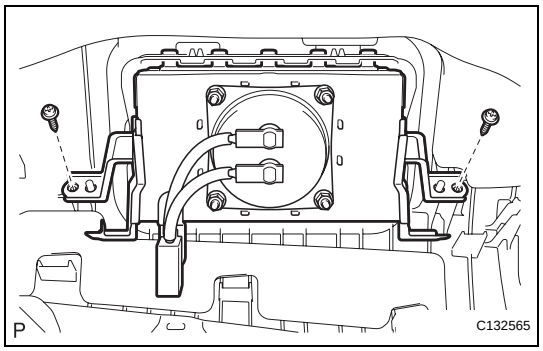
(b) Install the clamp and the instrument panel wire assembly on the front passenger airbag assembly.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



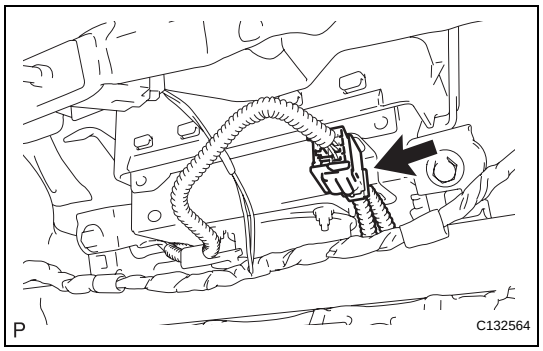
2. **INSTALL FRONT PASSENGER AIRBAG ASSEMBLY**
   (a) Engage the 10 hooks and install the front passenger airbag assembly on the instrument panel.



   (b) Install the 2 screws.

3. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMC Made) (See page IP-44)**
4. **INSTALL INSTRUMENT PANEL SAFETY PAD ASSEMBLY (for TMMK Made) (See page IP-45)**
5. **INSTALL NO. 1 DEFROSTER NOZZLE GARNISH (See page IP-48)**
6. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for LH Side) (See page AV-156)**
7. **INSTALL INSTRUMENT PANEL NO. 1 SPEAKER PANEL SUB-ASSEMBLY (See page IP-48)**
8. **INSTALL INSTRUMENT PANEL NO. 1 REGISTER ASSEMBLY (See page IP-48)**
9. **INSTALL FRONT PILLAR GARNISH LH (See page IR-51)**
10. **INSTALL FRONT NO. 2 SPEAKER ASSEMBLY (for RH Side) (See page AV-157)**
11. **INSTALL INSTRUMENT PANEL NO. 2 SPEAKER PANEL SUB-ASSEMBLY (See page IP-49)**
12. **INSTALL INSTRUMENT PANEL NO. 3 REGISTER ASSEMBLY (See page IP-49)**
13. **INSTALL FRONT PILLAR GARNISH RH (See page IR-52)**
14. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-49)**

15. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
16. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
17. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
18. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**
19. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
20. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
21. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
22. **INSTALL RADIO RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/o Navigation System) (See page AV-147)**
23. **INSTALL NAVIGATION RECEIVER WITH HEATER CONTROL PANEL ASSEMBLY (w/ Navigation System) (See page NS-196)**
24. **INSTALL INSTRUMENT PANEL NO. 2 REGISTER ASSEMBLY (See page IP-52)**
25. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)**
26. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
27. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
28. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
29. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
30. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
31. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
32. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
33. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
34. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**



35. **CONNECT INSTRUMENT PANEL WIRE ASSEMBLY**
    (a) Connect the connector.
36. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
37. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
38. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
39. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
40. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
41. **INSTALL COMBINATION METER ASSEMBLY (for TMC Made) (See page IP-56)**
42. **INSTALL COMBINATION METER ASSEMBLY (for TMMK Made) (See page IP-56)**
43. **INSTALL INSTRUMENT CLUSTER FINISH PANEL (See page IP-57)**
44. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/o Smart Key System) (See page IP-57)**
45. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (w/ Smart Key System) (See page IP-57)**
46. **INSTALL NO. 1 INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-57)**
47. **INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY (See page SR-50)**
48. **ADJUST SPIRAL CABLE SUB-ASSEMBLY (See page RS-367)**
49. **INSTALL STEERING COLUMN COVER (for TMC Made) (See page IP-58)**
50. **INSTALL STEERING COLUMN COVER (for TMMK Made) (See page IP-58)**
51. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
52. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
53. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
54. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
55. **INSTALL STEERING WHEEL ASSEMBLY (See page SR-51)**
56. **INSTALL STEERING PAD (See page RS-350)**

57. **INSTALL LOWER NO. 3 STEERING WHEEL COVER (See page RS-351)**

58. **INSTALL LOWER NO. 2 STEERING WHEEL COVER (See page RS-352)**

59. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

60. **INSPECT STEERING PAD (See page RS-352)**

61. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (See page RS-352).

DISPOSAL

HINT:
When scrapping a vehicle equipped with the SRS or disposing of the front passenger airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of the TOYOTA MOTOR SALES, U.S.A., INC.

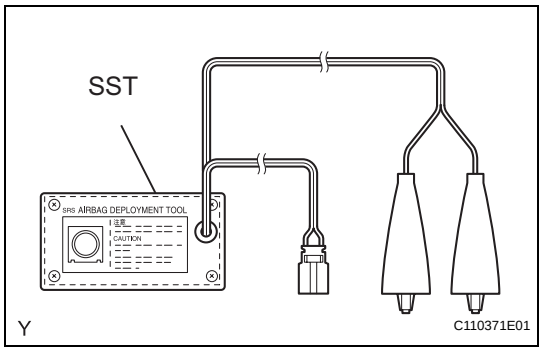
CAUTION:

- **Never dispose of a front passenger airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the front passenger airbag assembly.**
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

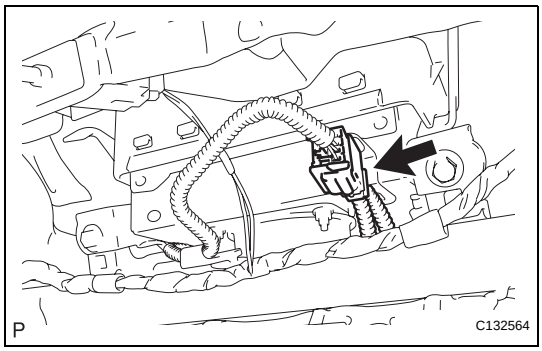
RS

1. DISPOSE OF FRONT PASSENGER AIRBAG ASSEMBLY (WHEN INSTALLED IN VEHICLE)

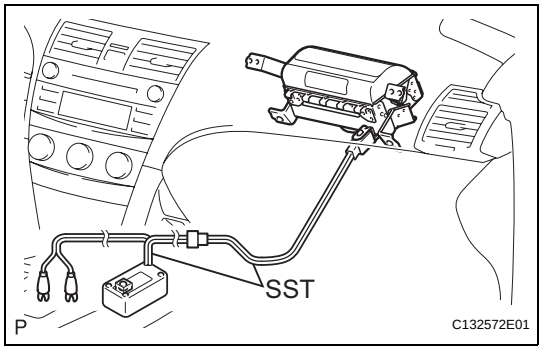
HINT:
Prepare a battery as the power source to deploy the airbag.



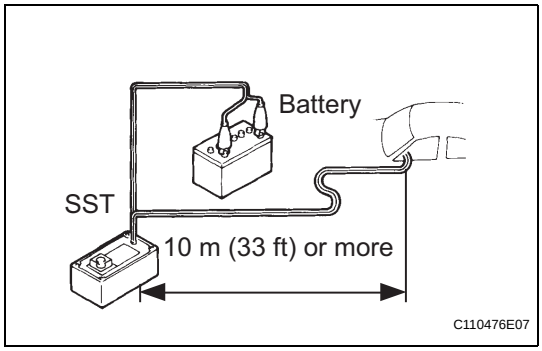
(a) Check the function of the SST (See page RS-353).
(b) Precaution (See page RS-1).
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
(d) Install the SST.
(1) Remove the lower instrument panel sub-assembly (See page IP-23).



(2) Disconnect the connector.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.



(3) Connect the SST connector to the instrument panel wire assembly.
SST 09082-00700, 09082-00780
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(4) Move the SST at least 10 m (33 ft) away from the vehicle front side window.
(5) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.
(6) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the negative (-) terminal.

(e) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

RS

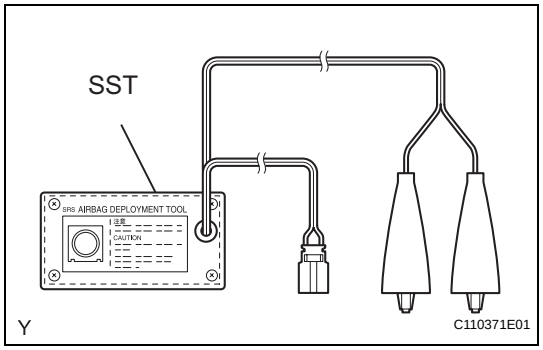
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

2. DISPOSE OF FRONT PASSENGER AIRBAG ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)

NOTICE:

- **When disposing of the front passenger airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

HINT:
Prepare a battery as the power source to deploy the airbag.

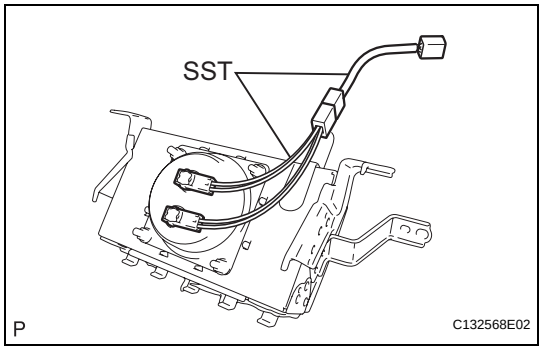


(a) Check the function of the SST (See page RS-355).

(b) Remove the front passenger airbag assembly (See page RS-392).

CAUTION:

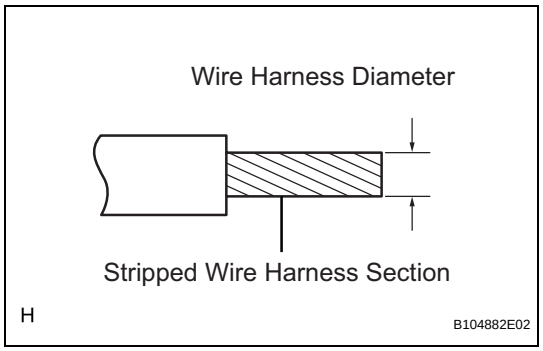
- **When removing the front passenger airbag assembly, work must be started 90 seconds after the ignition switch is turned off and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the front passenger airbag assembly, keep the airbag deployment side facing upward.**



(c) Install the SST.

(1) After connecting the SST below to each other, connect them to the front passenger airbag assembly.

SST 09082-00700, 09082-00802 (09082-10801, 09082-30801)



(d) Using a service-purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.

Wire harness:

Stripped wire harness section

1.25 mm^2 or more (0.0019 $in.^2$ or more)

CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the front passenger airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).

HINT:
To calculate the area of the stripped wire harness section:

RS

Area = 3.14 x (Diameter)^2 divided by 4

(1) Position the front passenger airbag assembly inside the tire with the airbag deployment side facing inside.

Tire size:

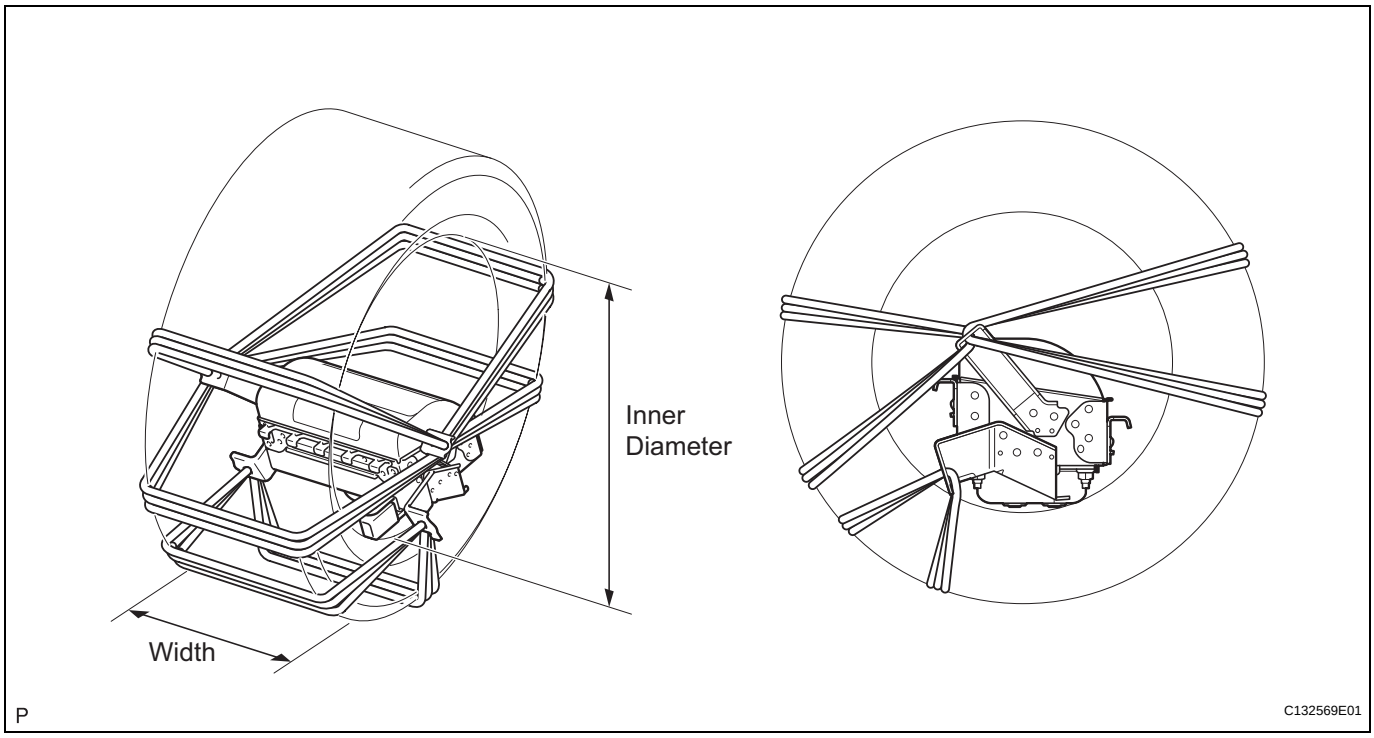
Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

360 mm (14.17 in.)

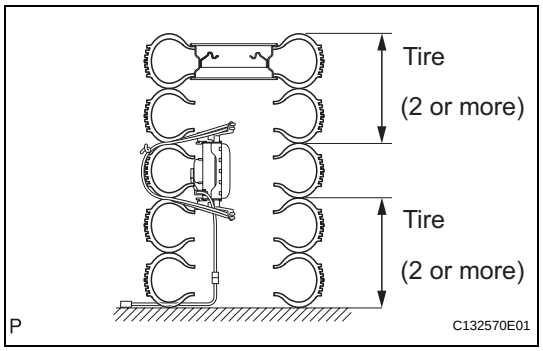


CAUTION:

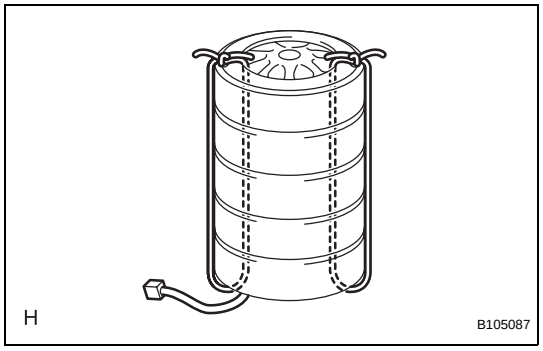
- **Make sure that the wire harness is tight. If there is slack in the wire harness, the front passenger airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the front passenger airbag assembly with the airbag deployment side facing inside the tire.**

NOTICE:

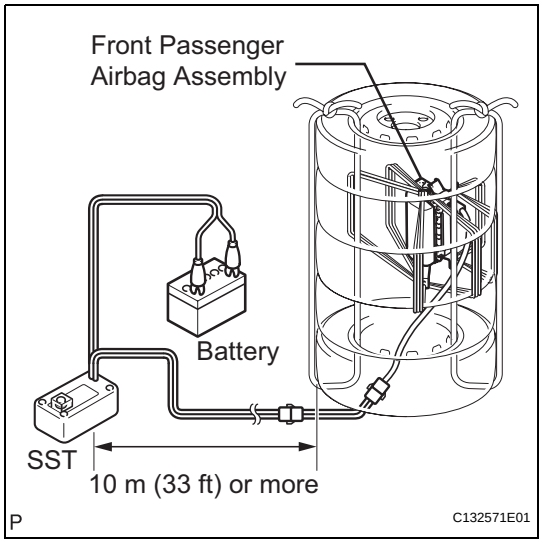
The tire will be marked by the airbag deployment, so use an extra tire.



(e) Place the tires.
(1) Place at least 2 tires under the tire which the front passenger airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the front passenger airbag assembly is tied to. The top tire should have a disc wheel installed.
NOTICE:
Do not place the SST connector under the tire because it could be damaged.



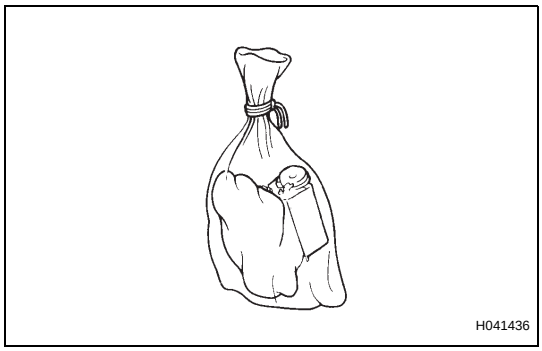
(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(f) Install the SST.
(1) Connect the SST connector.
SST 09082-00700
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.
(2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the tire.

(g) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
(2) Check that no one is within a 10 m (33 ft) radius of the tire which the front passenger airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tire.
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

RS



(h) Dispose of the front passenger airbag assembly.
CAUTION:
- **The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front passenger airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

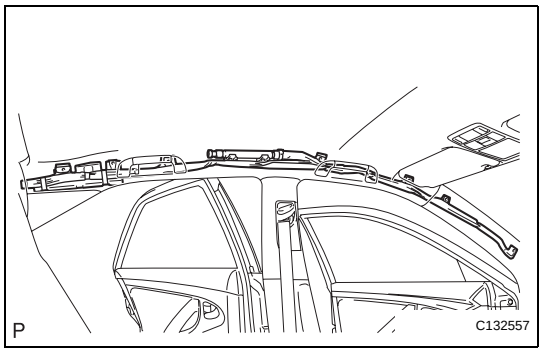
(1) Remove the front passenger airbag assembly from the tire.
(2) Place the front passenger airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

ON-VEHICLE INSPECTION

1. INSPECT CURTAIN SHIELD AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (See page RS-32).

(b) With the curtain shield airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front pillar garnish or roof headlining assembly with a new one:
Cuts, minute cracks or marked discoloration on the front pillar garnish or roof headlining assembly around the curtain shield airbag assembly.

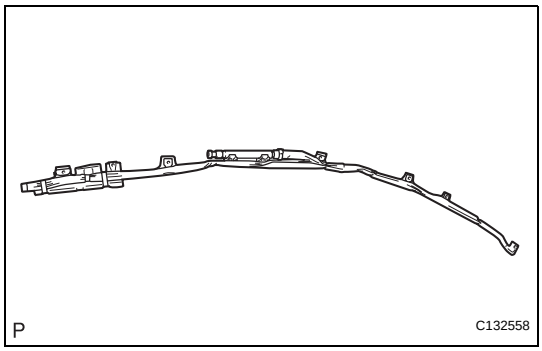


2. INSPECT CURTAIN SHIELD AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)

(a) Perform a diagnostic system check (See page RS-32).

(b) With the curtain shield airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the curtain shield airbag assembly with a new one:
- Cuts, minute cracks or marked discoloration on the curtain shield airbag assembly.
- Cracks or other damage to the connectors.

CAUTION:
Be sure to follow the correct removal and installation procedures.



RS

REMOVAL

HINT:
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
4. **REMOVE SEAT TRACK COVER LH (for Manual Seat) (See page SE-16)**
5. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-16)**
6. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-16)**
7. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
8. **REMOVE SEAT TRACK COVER RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side.
9. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat)**
   HINT:
   Use the same procedures for the RH side and the LH side.
10. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat)**
    HINT:
    Use the same procedures for the RH side and the LH side.
11. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
12. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-30)**
13. **REMOVE SEAT TRACK COVER RH (for Power Seat) (See page SE-30)**
14. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-30)**
15. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

16. **REMOVE SEAT TRACK COVER RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

17. **REMOVE SEAT TRACK COVER LH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

18. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

19. **REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)**

20. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH**

21. **REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)**

22. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH**

23. **REMOVE REAR SEAT CUSHION ASSEMBLY (See page SE-77)**

24. **REMOVE REAR SEAT HEADREST ASSEMBLY**

25. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY**

26. **REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**

27. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)**

28. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)**

29. **REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)**

30. **REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)**

31. **REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)**

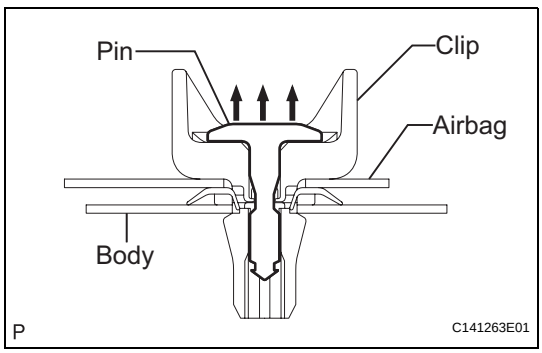
32. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)**

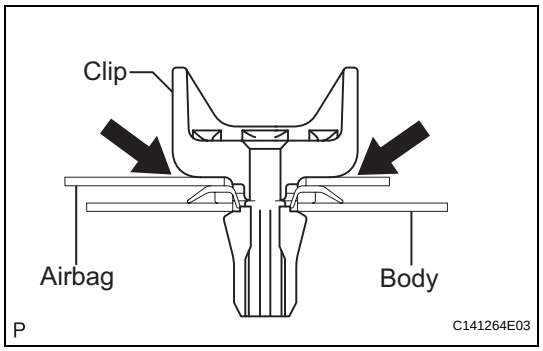
33. **REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)**

RS

34. **REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)**
35. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)**
36. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
37. **REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-38)**
38. **REMOVE DOOR ASSIST GRIP COVER LH (See page ED-38)**
39. **REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-39)**
40. **REMOVE REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-40)**
41. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
42. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
43. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
44. **REMOVE LAP BELT OUTER ANCHOR COVER (See page IR-25)**
45. **DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-25)**
46. **REMOVE LOWER CENTER PILLAR GARNISH LH (See page IR-25)**
47. **REMOVE UPPER CENTER PILLAR GARNISH LH (See page IR-26)**
48. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
49. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
50. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
51. **REMOVE LAP BELT OUTER ANCHOR COVER (See page IR-26)**
52. **DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-26)**
53. **REMOVE LOWER CENTER PILLAR GARNISH RH (See page IR-26)**

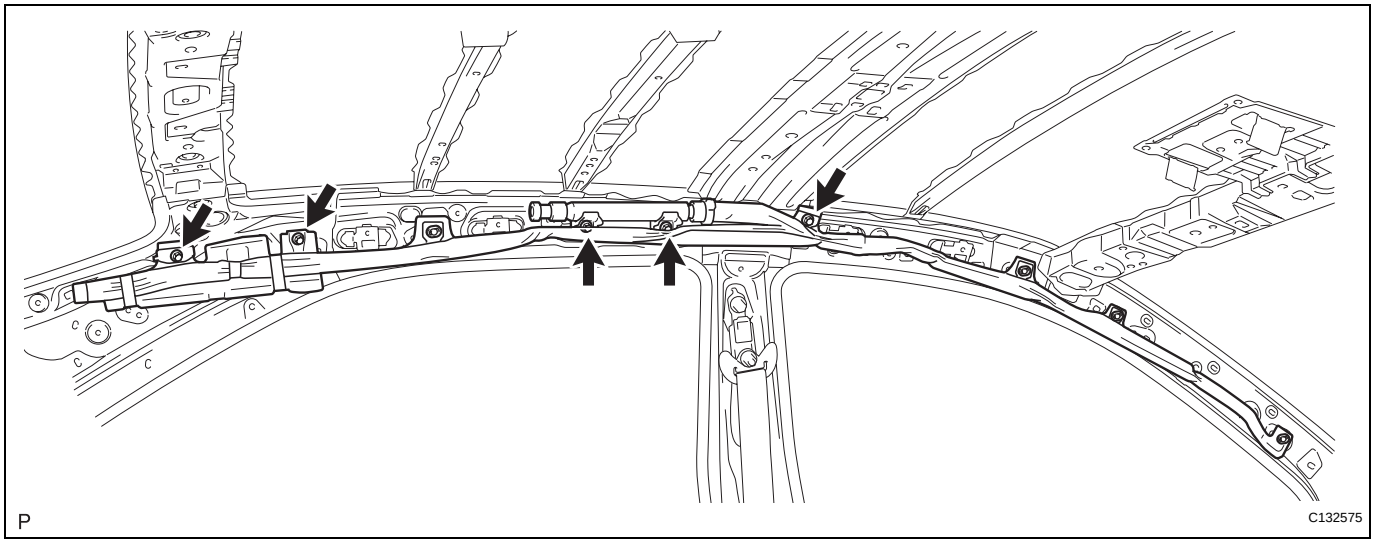
54. **REMOVE UPPER CENTER PILLAR GARNISH RH (See page IR-26)**
55. **REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)**
56. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)**
57. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**
58. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**
59. **REMOVE ROOF CONSOLE BOX ASSEMBLY (See page IR-28)**
60. **REMOVE VISOR ASSEMBLY LH (See page IR-28)**
61. **REMOVE VISOR ASSEMBLY RH (See page IR-29)**
62. **REMOVE VISOR HOLDER (See page IR-29)**
63. **REMOVE FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**
64. **REMOVE REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**
65. **REMOVE NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-30)**
66. **REMOVE SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-30)**
67. **REMOVE SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof) (See page IR-31)**
68. **REMOVE SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-31)**
69. **REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-31)**
70. **REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-32)**
71. **REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY**
    (a) Disconnect the connector.
    NOTICE:
    When handling the airbag connector, take care not to damage the airbag wire harness.
    (b) Remove the 4 clips.
    (1) Using a clip remover, remove the pin.





(2) Using needle-nose pliers, remove the clip and curtain shield airbag from the body as shown in the illustration.

(c) Remove the 5 bolts and curtain shield airbag assembly.



(d) Remove the 4 clips and 4 spacers from the curtain shield airbag assembly.

NOTICE:

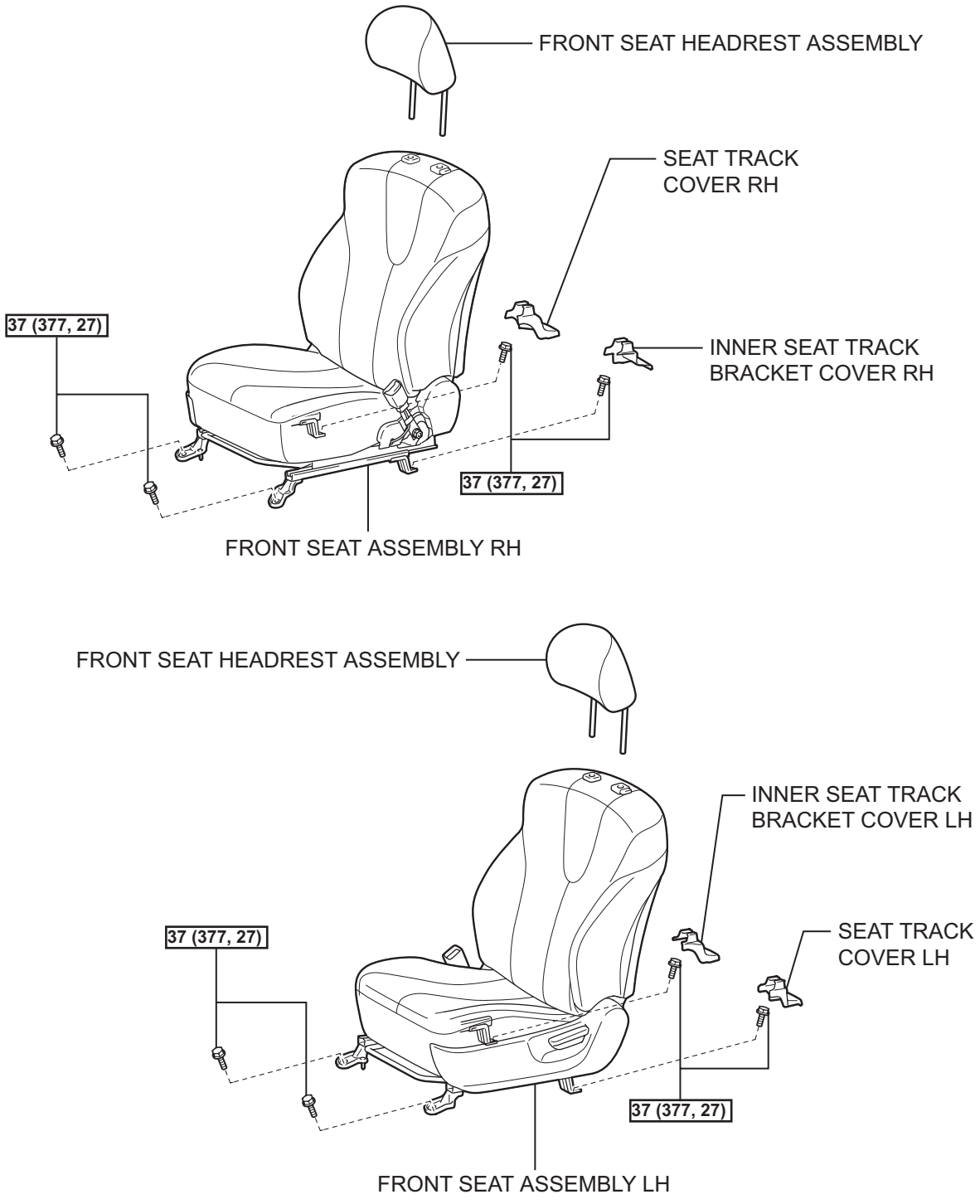
If clips and spacers are removed, always replace them with new ones even though they may not appear to be damaged.

RS

CURTAIN SHIELD AIRBAG ASSEMBLY

COMPONENTS

for Manual Seat:



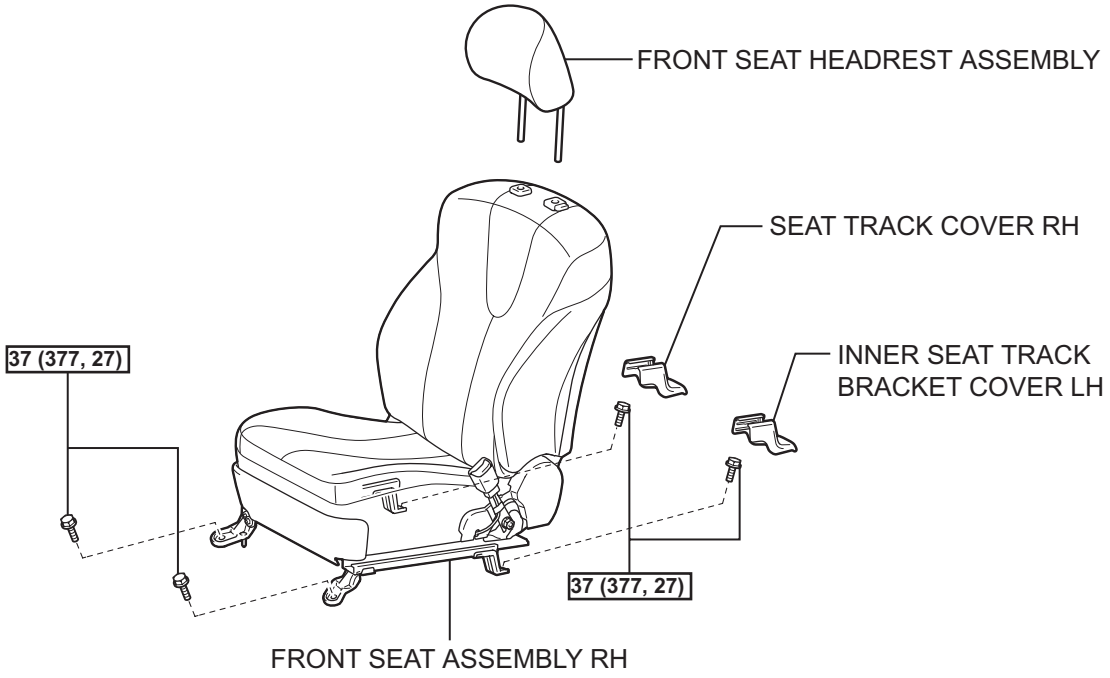
N*m (kgf*cm, ft.*lbf) : Specified torque

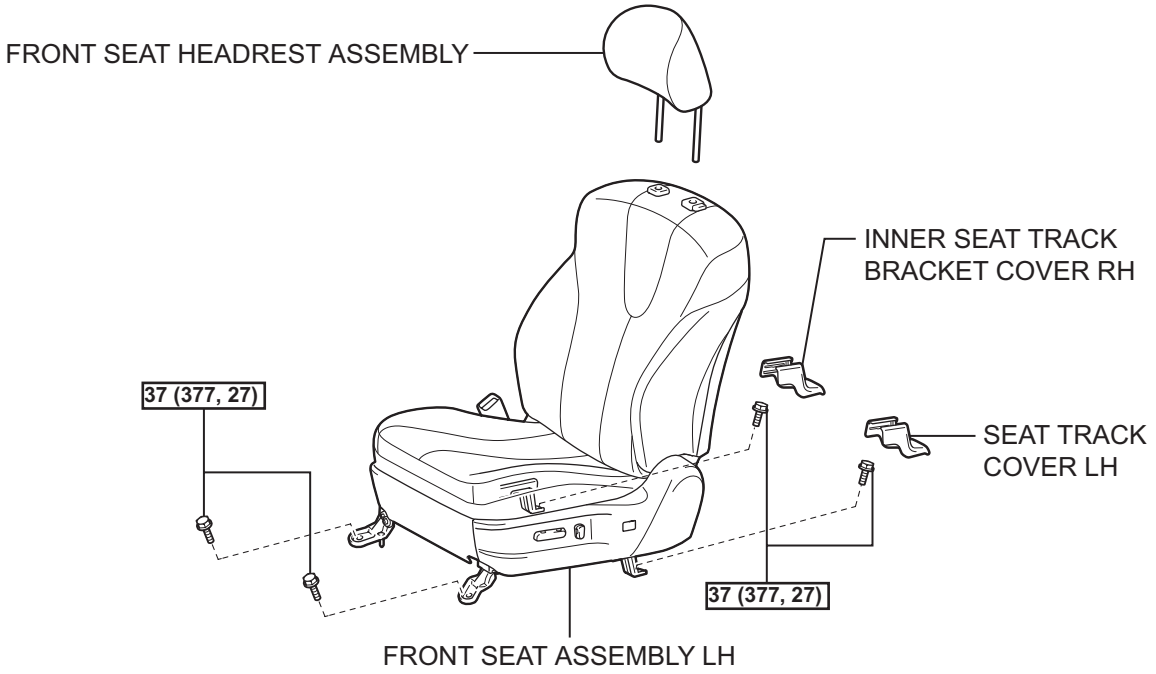
P

B132048E01

RS

for Power Seat:





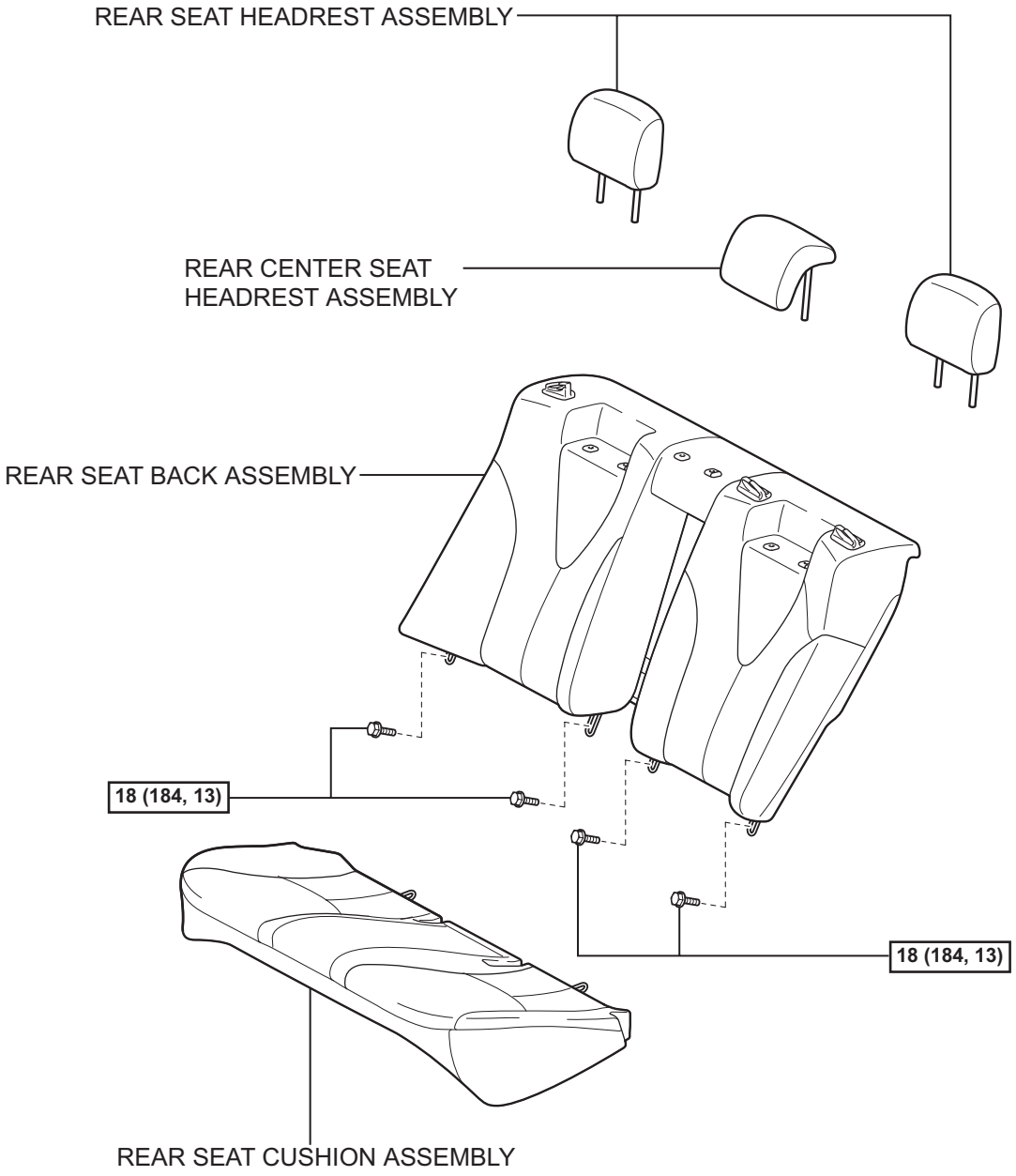
RS

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B132047E01

for Fixed Seat Type:



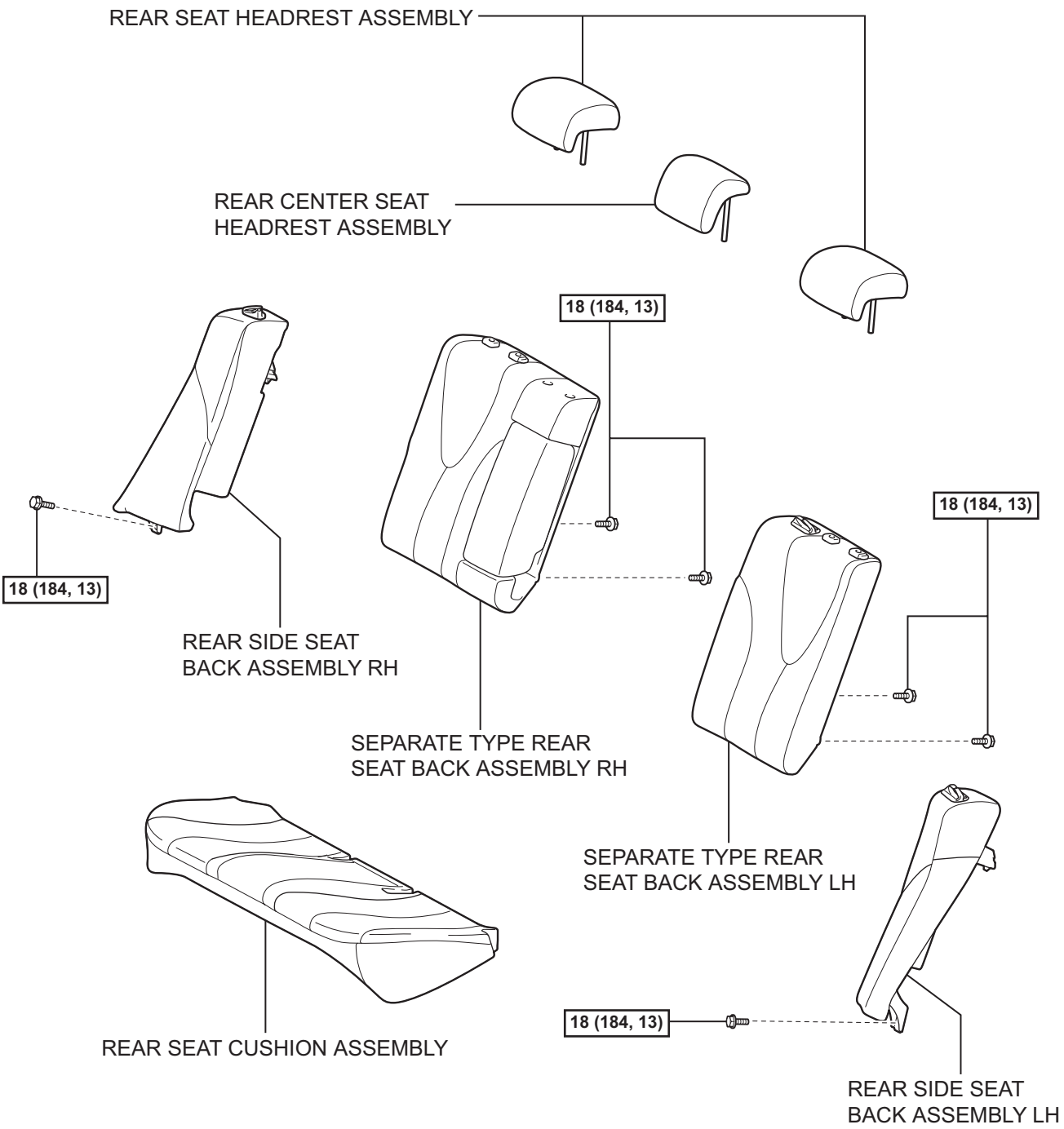
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E02

RS

for Fold Down Seat Type:



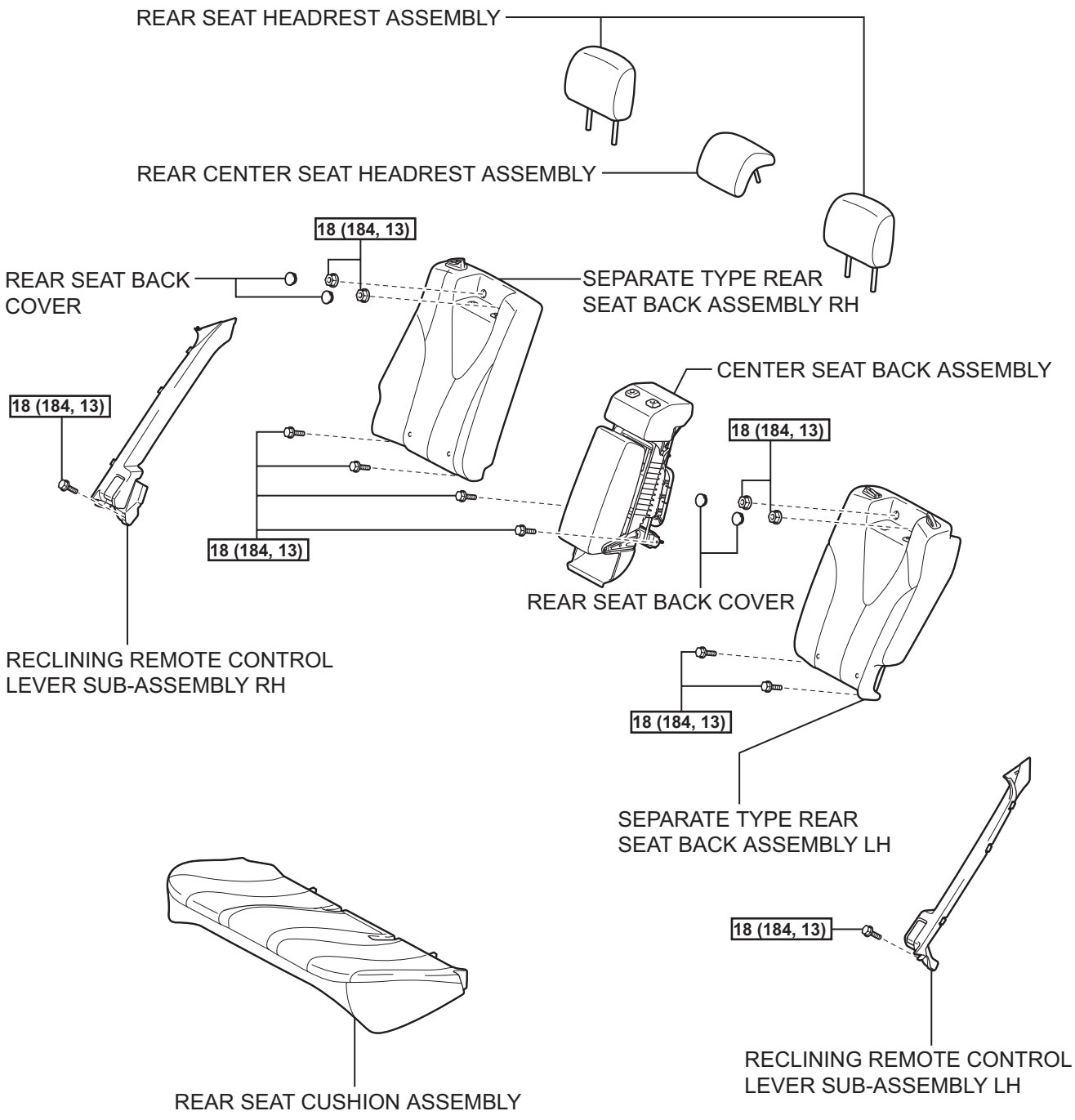
RS

N*m (kgf*cm, ft.*lbf) : Specified torque

P

B136564E02

for Reclining Seat Type:

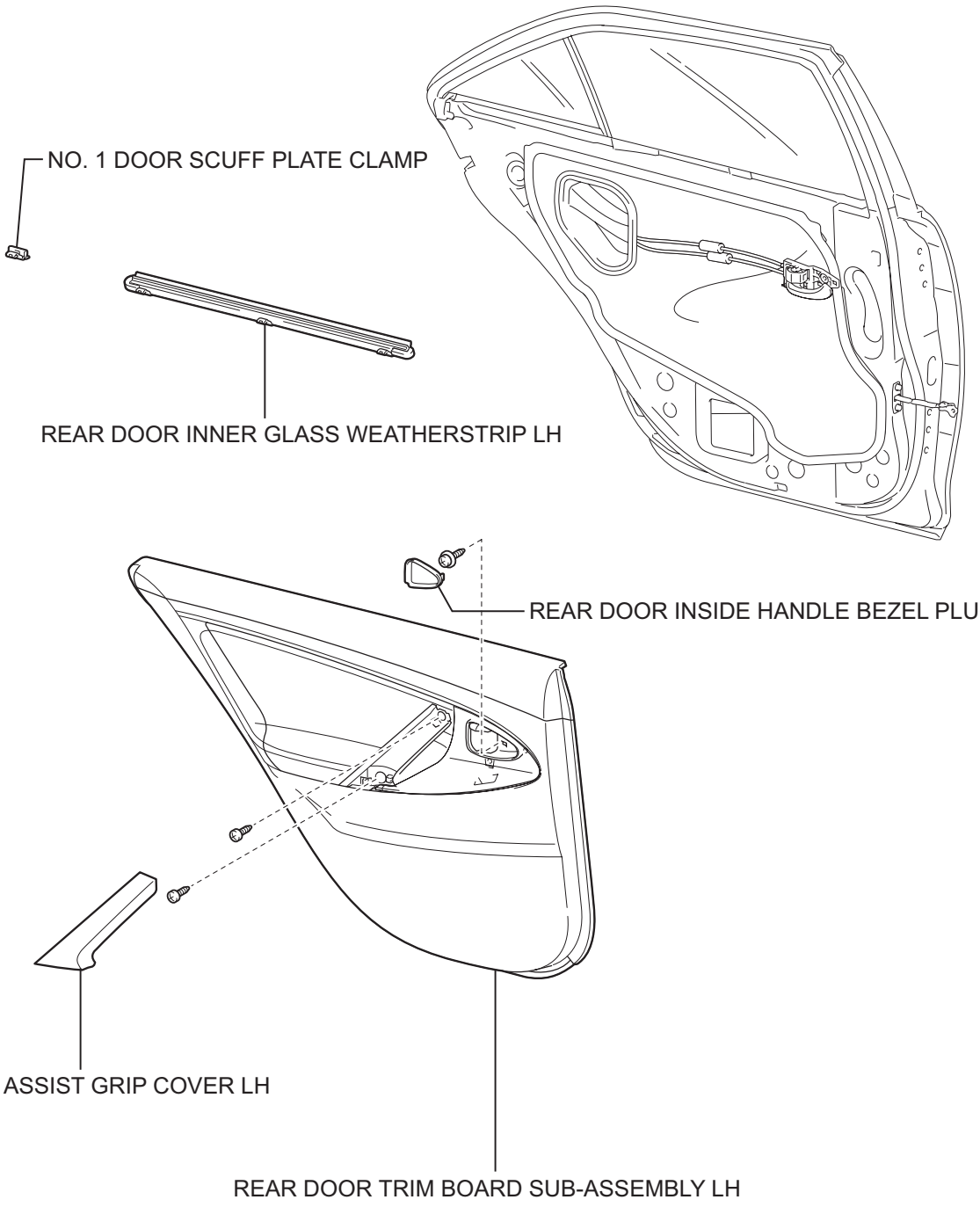


N*m (kgf*cm, ft.*lbf): Specified torque

P

B139577E01

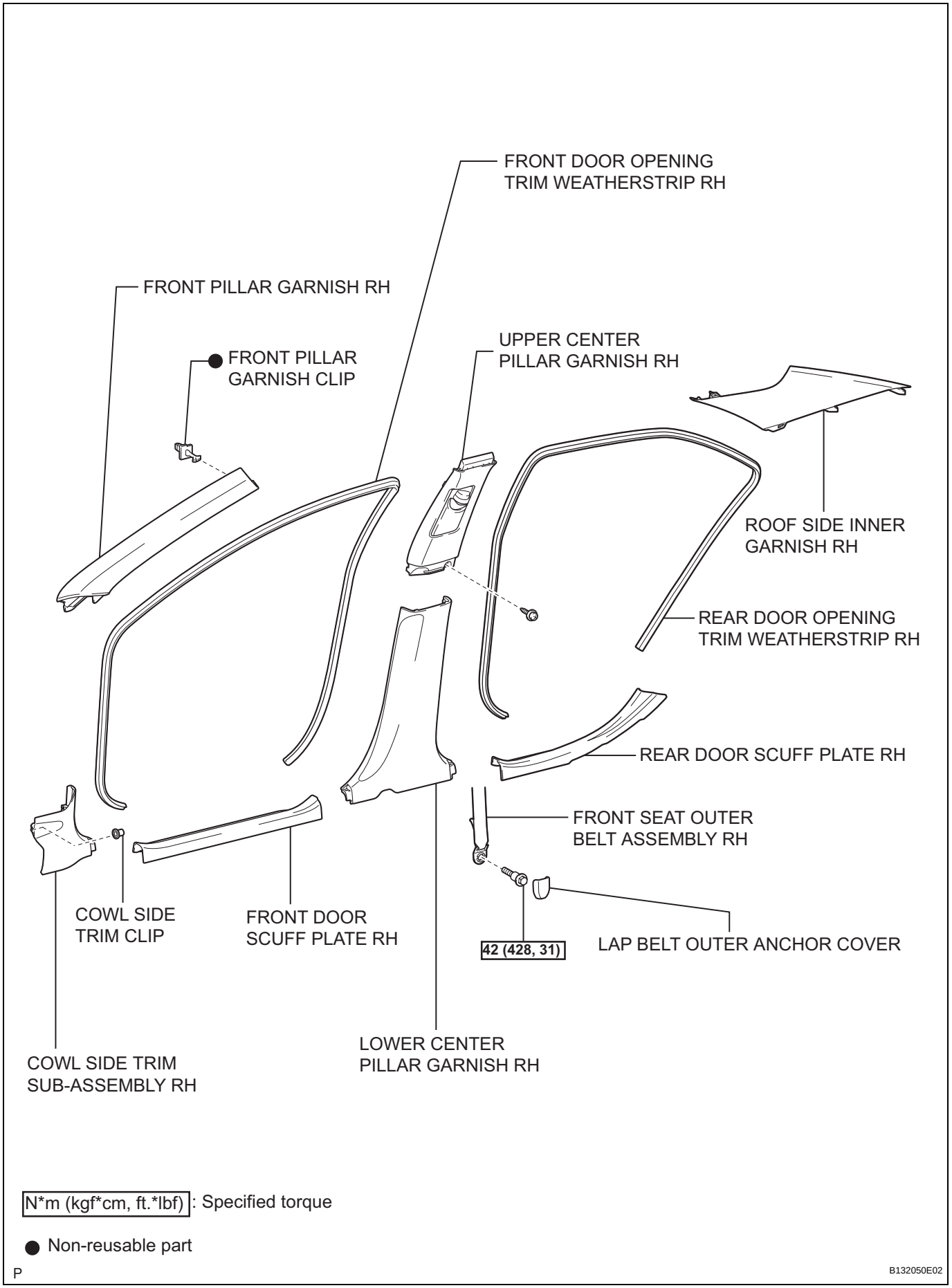
RS



RS

P

B139576E01



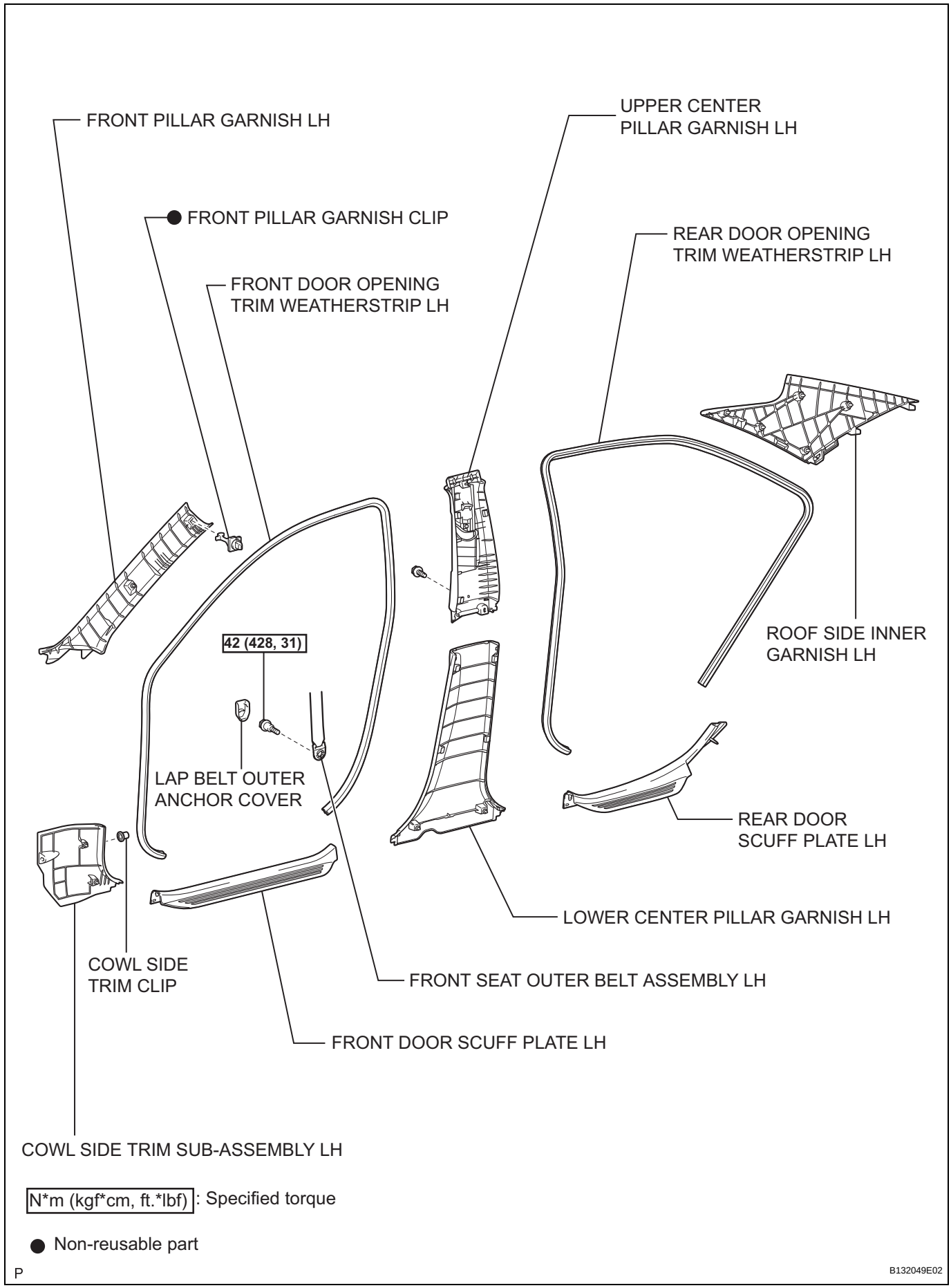
N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

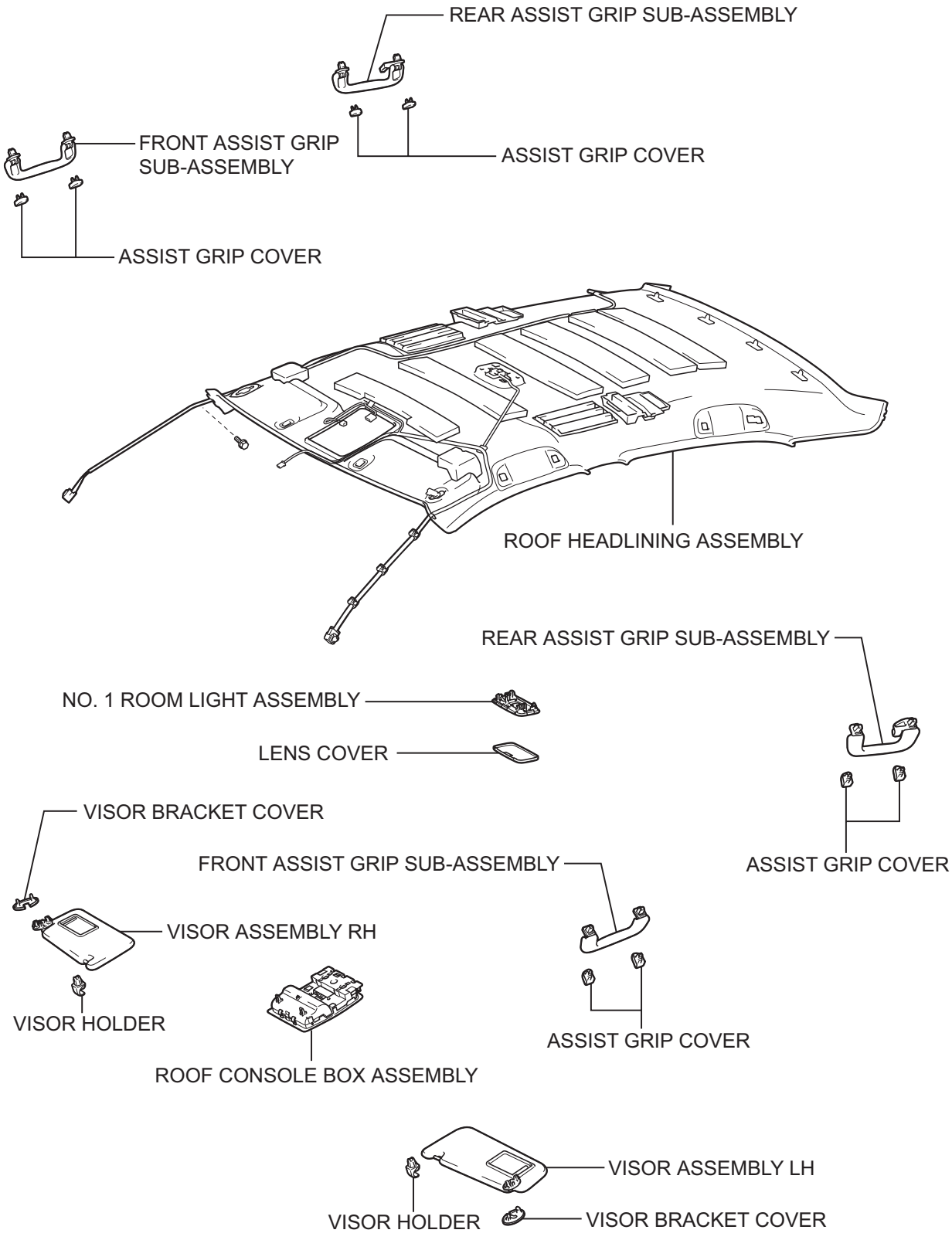
B132050E02

RS


FRONT PILLAR GARNISH LH
UPPER CENTER PILLAR GARNISH LH
FRONT PILLAR GARNISH CLIP
REAR DOOR OPENING TRIM WEATHERSTRIP LH
FRONT DOOR OPENING TRIM WEATHERSTRIP LH
ROOF SIDE INNER GARNISH LH
42 (428, 31)
LAP BELT OUTER ANCHOR COVER
REAR DOOR SCUFF PLATE LH
LOWER CENTER PILLAR GARNISH LH
COWL SIDE TRIM CLIP
FRONT SEAT OUTER BELT ASSEMBLY LH
FRONT DOOR SCUFF PLATE LH
COWL SIDE TRIM SUB-ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
P
B132049E02

RS

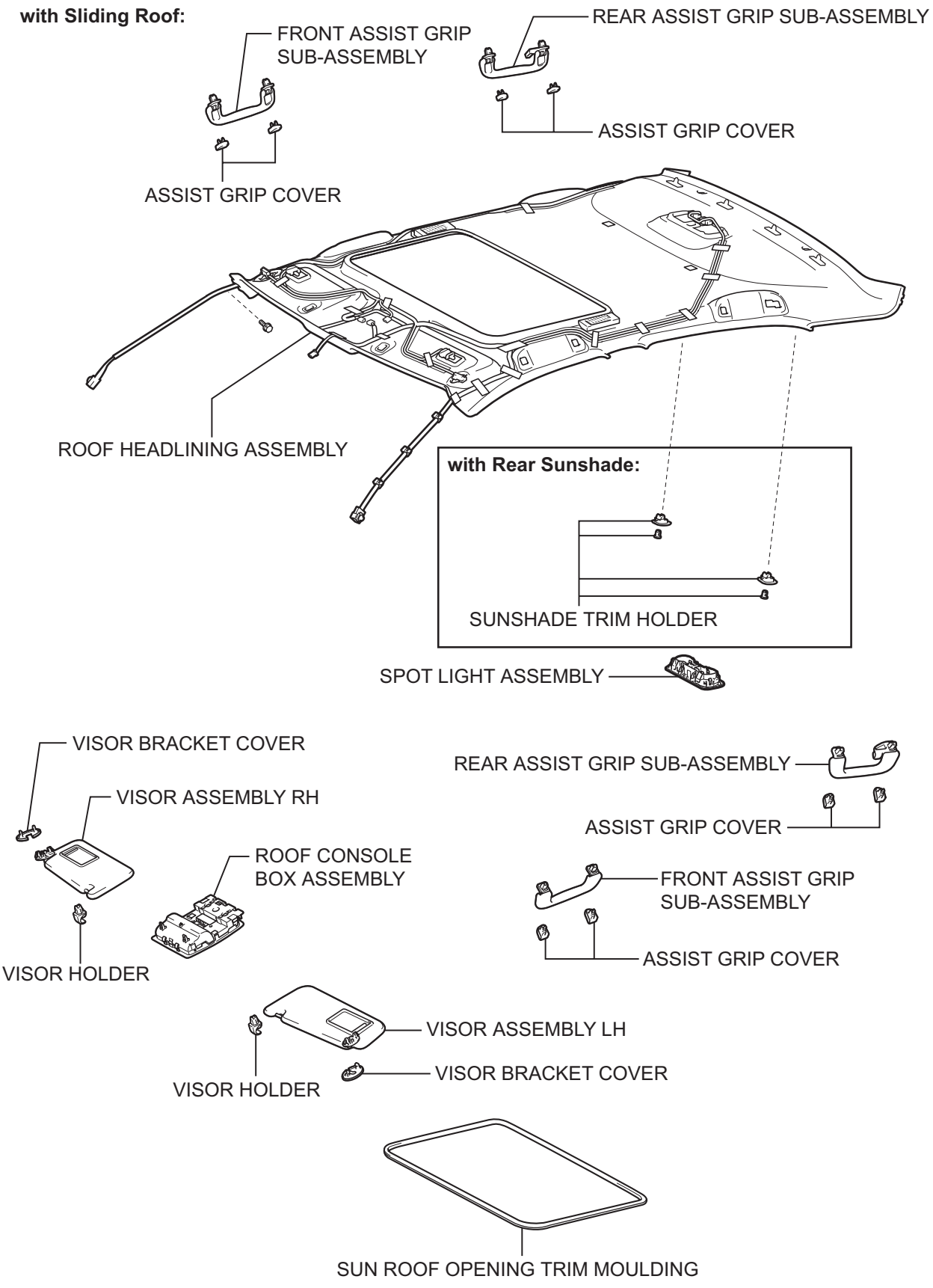
without Sliding Roof:



RS

P

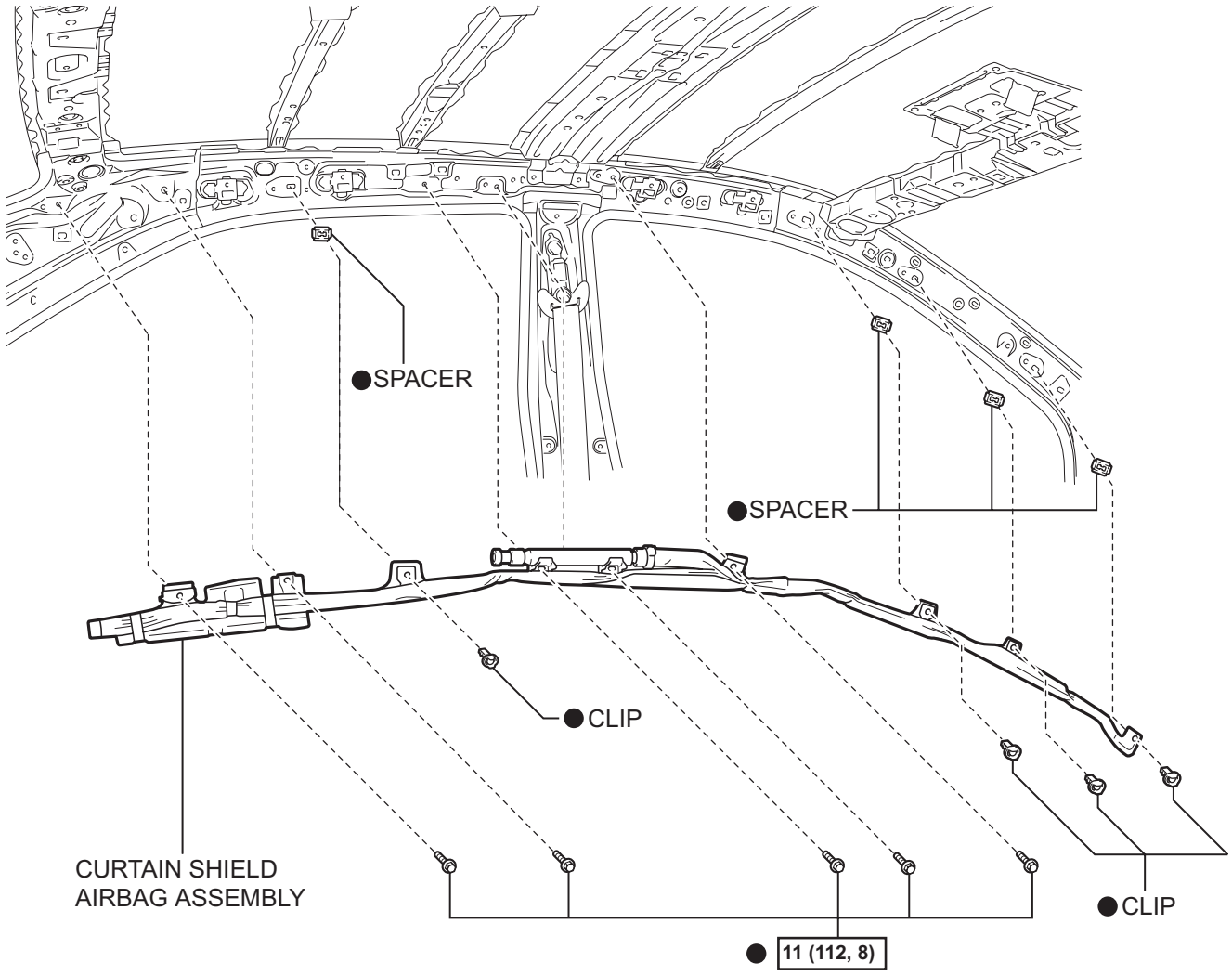
B132051E01



RS

P

B132052E01



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

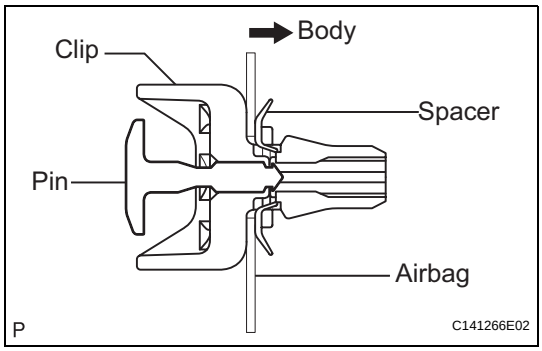
P

C140572E02

RS

INSTALLATION

HINT:
- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.



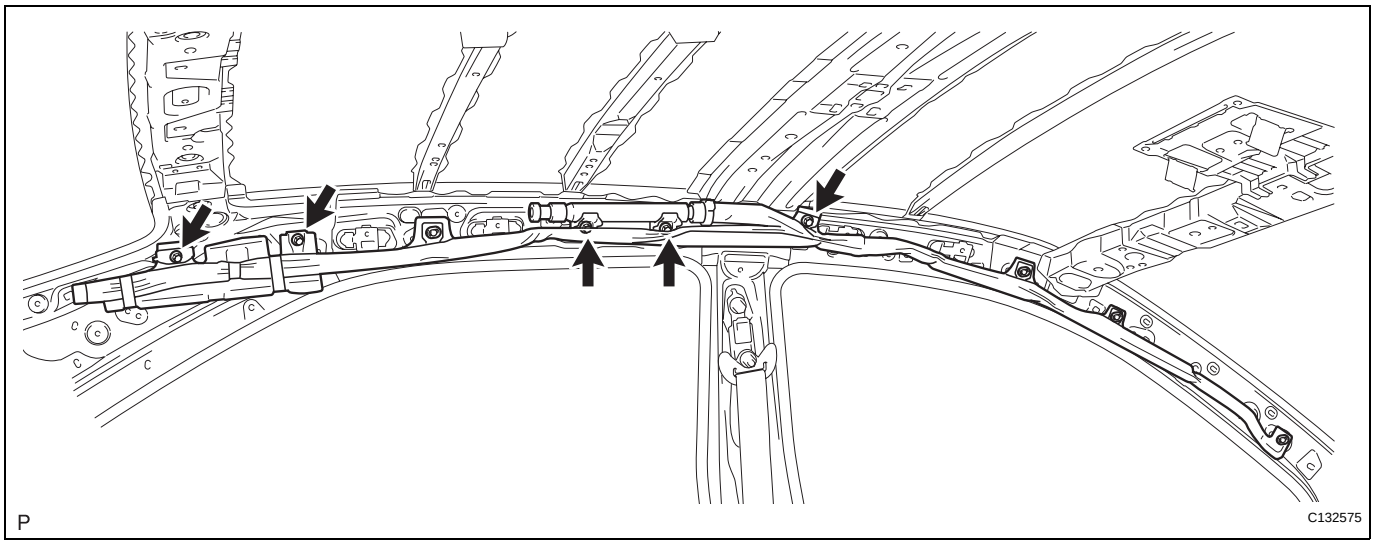
1. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Install a 4 new clips and 4 new spacers to the curtain shield airbag assembly as shown in the illustration.

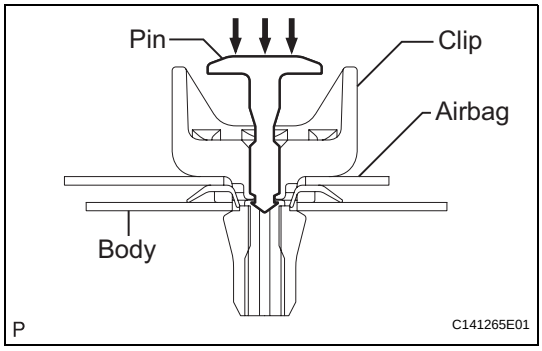
NOTICE:
- **Do not push in the pin.**
- **Make sure that the clips are installed in the correct direction.**
- **Make sure that the spacers are installed properly, in the correct direction, and that they are not damaged.**

(b) Install the curtain shield airbag assembly with the 5 new bolts.

Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



NOTICE:
Do not twist the curtain shield airbag assembly when installing it.



(c) Install the 4 clips with the curtain shield airbag assembly to the body panel as shown in the illustration.

NOTICE:
Make sure that the pins of the clips are pushed in firmly.

(d) Mark the clips.

HINT:
Mark the clips to make sure that they are not reused.

(e) Connect the connector.

NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

2. INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-45)
3. INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-46)
4. INSTALL SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-47)
5. INSTALL SUN ROOF OPENING TRIM MOULDING (w/ Sliding Roof) (See page IR-47)
6. INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-48)
7. INSTALL NO. 1 ROOM LIGHT ASSEMBLY (w/o Sliding Roof) (See page IR-48)
8. INSTALL FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-49)
9. INSTALL REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-49)
10. INSTALL VISOR HOLDER (See page IR-49)
11. INSTALL VISOR ASSEMBLY LH (See page IR-50)
12. INSTALL VISOR ASSEMBLY RH (See page IR-50)
13. INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-50)
14. INSTALL FRONT PILLAR GARNISH LH (See page IR-51)
15. INSTALL FRONT PILLAR GARNISH RH (See page IR-52)
16. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)
17. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)
18. INSTALL UPPER CENTER PILLAR GARNISH LH (See page IR-53)
19. INSTALL LOWER CENTER PILLAR GARNISH LH (See page IR-53)
20. CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH (See page IR-53)
21. INSTALL LAP BELT OUTER ANCHOR COVER (See page IR-53)
22. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-54)
23. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)
24. INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)

25. **INSTALL UPPER CENTER PILLAR GARNISH RH (See page IR-54)**
26. **INSTALL LOWER CENTER PILLAR GARNISH RH (See page IR-54)**
27. **CONNECT FRONT SEAT OUTER BELT ASSEMBLY RH (See page IR-54)**
28. **INSTALL LAP BELT OUTER ANCHOR COVER (See page IR-54)**
29. **INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-55)**
30. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
31. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
32. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP LH (See page ED-54)**
33. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY LH (See page ED-55)**
34. **INSTALL DOOR ASSIST GRIP COVER LH (See page ED-56)**
35. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG LH (See page ED-56)**
36. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)**
37. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)**
    HINT:
    Use the same procedures for the RH side and the LH side.
38. **INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)**
39. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**
40. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
41. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
42. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
43. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)**

44. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**

45. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**

46. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**

47. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**

48. **INSTALL REAR SEAT HEADREST ASSEMBLY**

49. **INSTALL REAR SEAT CUSHION ASSEMBLY**

50. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)**

51. **INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)**

52. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)**

53. **INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)**

54. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-41)**

55. **INSTALL SEAT TRACK COVER RH (for Power Seat) (See page SE-42)**

56. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-42)**

57. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

58. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

59. **INSTALL SEAT TRACK COVER LH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

60. **INSTALL SEAT TRACK COVER RH (for Power Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

61. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**

62. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-24)**

63. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-25)**

64. **INSTALL SEAT TRACK COVER LH (for Manual Seat) (See page SE-25)**

65. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

66. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

67. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

68. **INSTALL SEAT TRACK COVER RH (for Manual Seat)**
HINT:
Use the same procedures for the RH side and the LH side.

69. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**

70. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

71. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
HINT:
(See page RS-242)

72. **INSPECT SRS WARNING LIGHT**
(a) Inspect the SRS warning light (See page RS-222).

73. **INSPECT FRONT SEAT ASSEMBLY (for Power Seat) (See page SE-42)**

74. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

DISPOSAL

HINT:
When scrapping a vehicle equipped with the SRS or disposing of the curtain shield airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

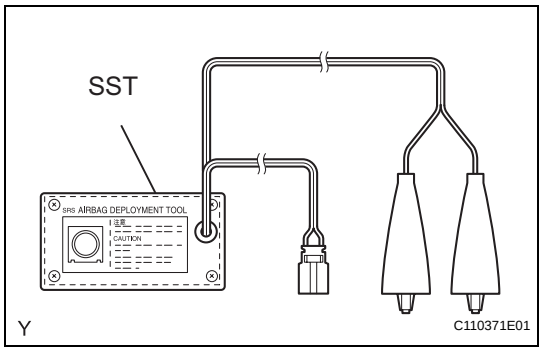
CAUTION:

- **Never dispose of a curtain shield airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the curtain shield airbag assembly.**
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

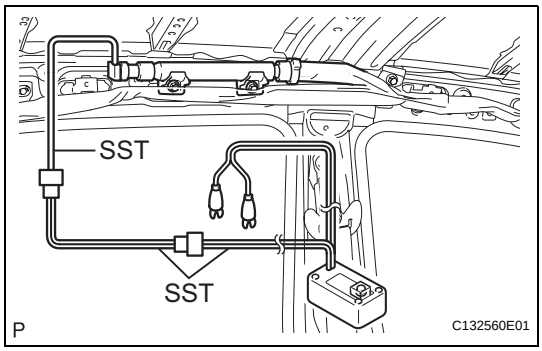
RS

1. DISPOSE OF CURTAIN SHIELD AIRBAG ASSEMBLY (WHEN INSTALLED IN VEHICLE)

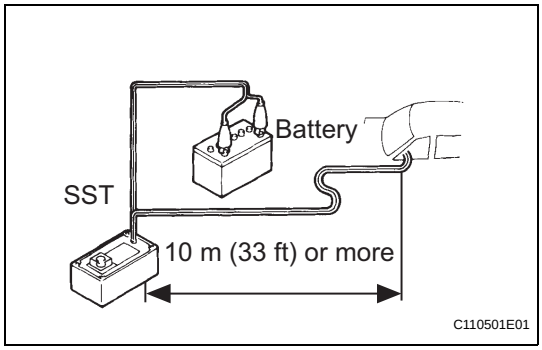
HINT:
Prepare a battery as the power source to deploy the airbag.



(a) Check the function of the SST (See page RS-353).
(b) Precaution (See page RS-1).
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
(d) Remove the roof headlining assembly (See page IR-22).
(e) Install the SST.
(1) Disconnect the connector from the curtain shield airbag assembly.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.



(2) After connecting the SST below to each other, connect them to the curtain shield airbag assembly.
SST 09082-00700, 09082-00802 (09082-10801, 09082-20801)
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(3) Move the SST at least 10 m (33 ft) away from the vehicle rear side window.
(4) Maintaining enough clearance for the SST wire harness in the rear side window, close all doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.
(5) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.

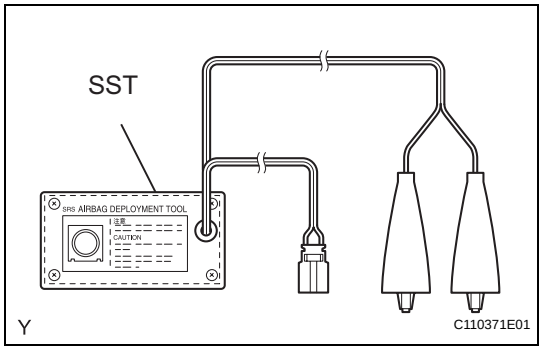
(f) Deploy the airbag.
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.
(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

2. DISPOSE OF CURTAIN SHIELD AIRBAG ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)
NOTICE:
- **When disposing of the curtain shield airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

RS

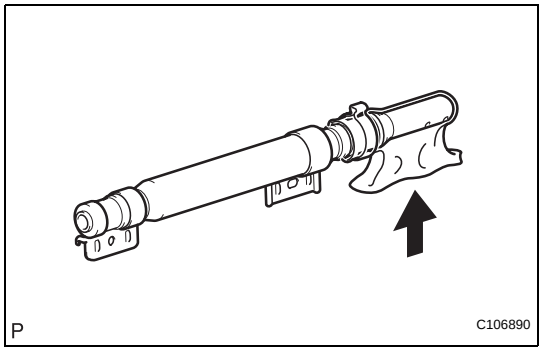
HINT:
Prepare a battery as the power source to deploy the airbag.



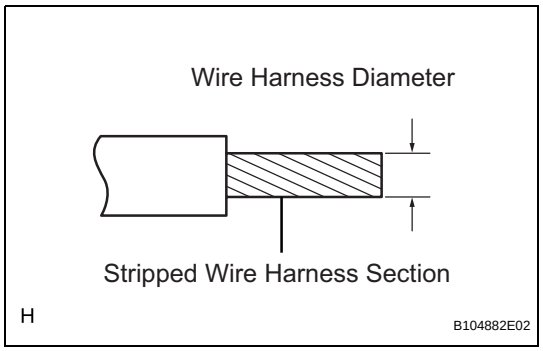
(a) Check the function of the SST (See page RS-353).

(b) Remove the curtain shield airbag assembly (See page RS-416).

CAUTION:
When removing the curtain shield airbag assembly, work must be started 90 seconds after the ignition switch is turned off and the negative (-) terminal cable is disconnected from the battery.



(c) Cut off the deployment section of the curtain shield airbag assembly.

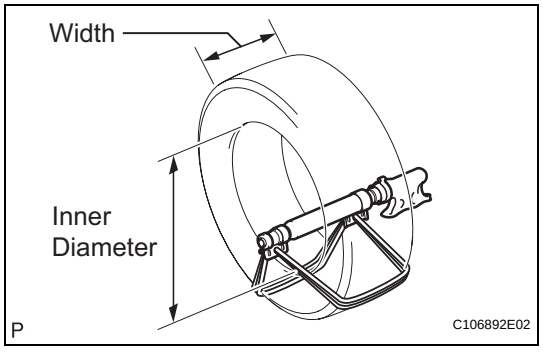


(d) Using a service-purpose wire harness for the vehicle, tie down the curtain shield airbag assembly to the tire.

Wire harness:
Stripped wire harness section
1.25 mm^2 or more (0.0019 in.^{2} or more)

CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the curtain shield airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 in.^{2}).

HINT:
To calculate the area of the stripped wire harness section:
Area = 3.14 x (Diameter)^2 divided by 4

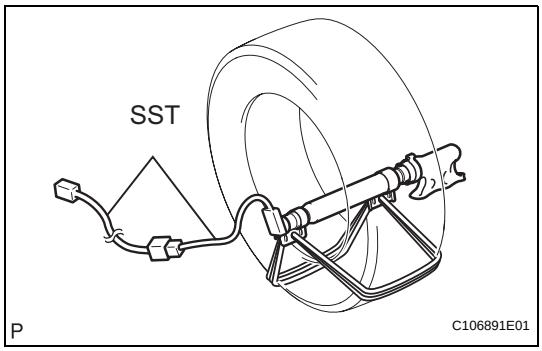


(1) Position the curtain shield airbag assembly inside the tire as shown in the illustration.

Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)

RS

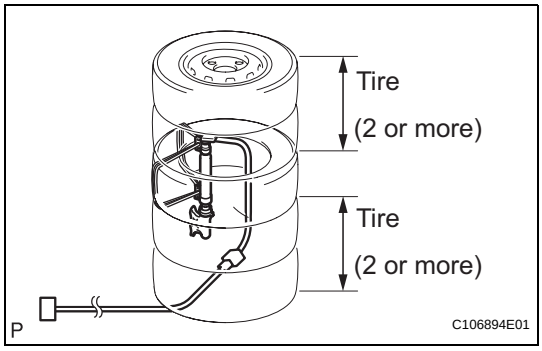
CAUTION:
Make sure that the wire harness is tight. If there is slack in the wire harness, the curtain shield airbag assembly may become loose due to the shock when the airbag is deployed.
NOTICE:
The tire will be marked by the airbag deployment, so use an extra tire.

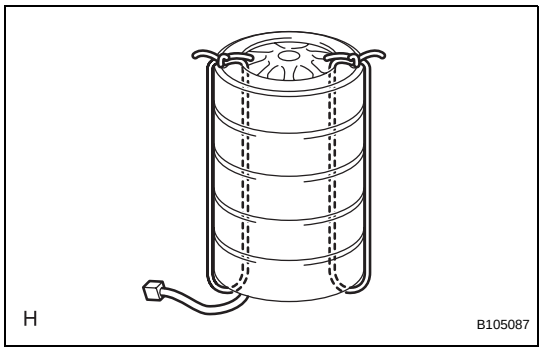


(e) Install the SST.
(1) After connecting the SST below to each other, connect them to the curtain shield airbag assembly.
SST 09082-00802 (09082-10801, 09082-20801)

(f) Place the tires.
CAUTION:
Do not place the deployment direction of the curtain shield airbag assembly facing toward the ground.

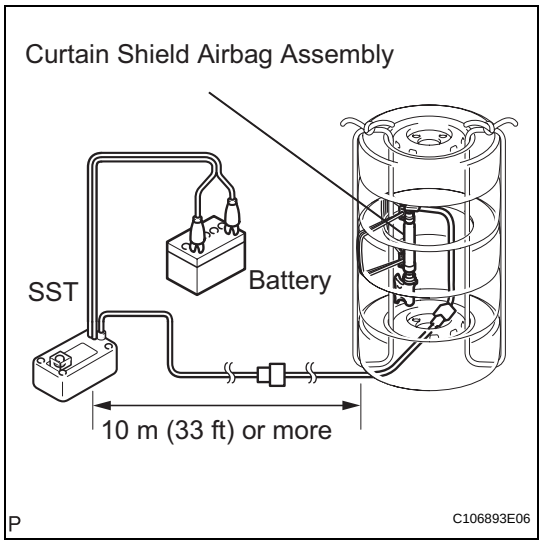
(1) Place at least 2 tires under the tire which the curtain shield airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the curtain shield airbag assembly is tied to. The top tire should have the disc wheel installed.
NOTICE:
Do not place the SST connector under the tire because it could be damaged.





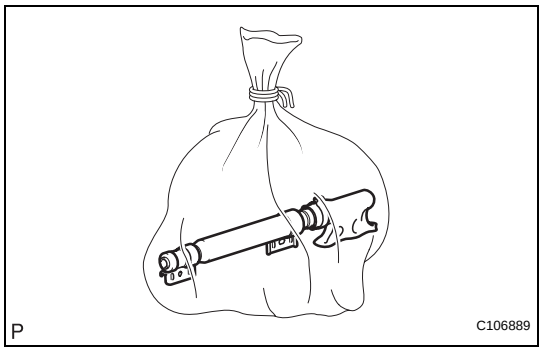
(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.

RS



(g) Install the SST.
  (1) Connect the SST connector.
  SST 09082-00700
  NOTICE:
  To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.
  (2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the tire.

(h) Deploy the airbag.
  (1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
  (2) Check that no one is within a 10 m (33 ft) radius of the tire which the curtain shield airbag assembly is tied to.
  (3) Press the SST activation switch and deploy the airbag.
  CAUTION:
  When deploying the airbag, make sure that no one is near the tire.
  HINT:
  The airbag is deployed as the LED of the SST activation switch comes on.



(i) Dispose of the curtain shield airbag assembly.
CAUTION:
- **The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a curtain shield airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

  (1) Remove the curtain shield airbag assembly from the tire.
  (2) Place the curtain shield airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

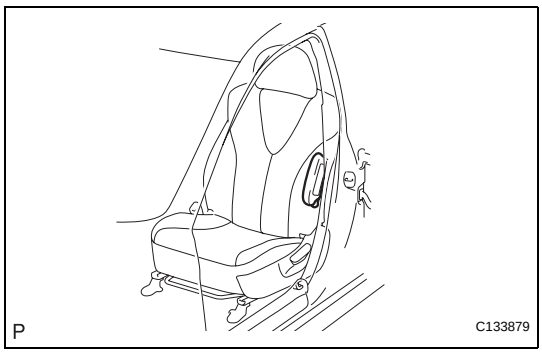
FRONT SEAT SIDE AIRBAG ASSEMBLY

ON-VEHICLE INSPECTION

1. FRONT SEAT SIDE AIRBAG ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (See page RS-32).

(b) With the front seat side airbag assembly installed on the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front seat assembly with a new one:
Cuts, minute cracks or marked discoloration on the front seatback assembly around the front seat side airbag assembly.

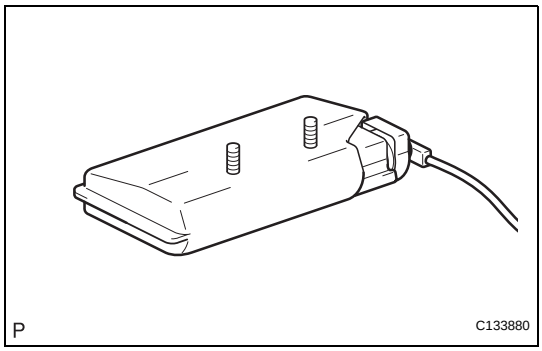


2. FRONT SEAT SIDE AIRBAG ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)

(a) Perform a diagnostic system check (See page RS-32).

(b) With the front seat side airbag assembly removed from the vehicle, perform a visual check. If there are any defects as mentioned below, replace the front seat side airbag assembly with a new one:
- Cuts, minute cracks or marked discoloration on the front seat side airbag assembly.
- Cracks or other damage to the wire harness or connector.

CAUTION:
Be sure to follow the correct removal and installation procedures.



RS

DISPOSAL

HINT:
When scrapping a vehicle equipped with the SRS or disposing of the front seat side airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

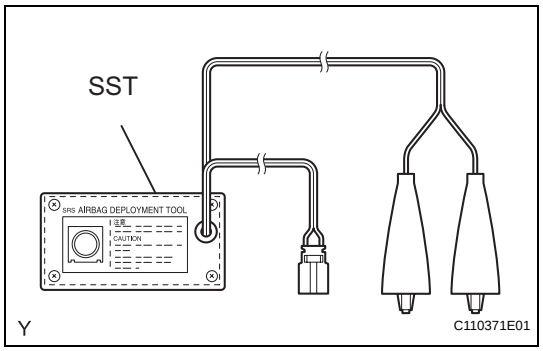
CAUTION:

- **Never dispose of a front seat side airbag assembly that has an undeployed airbag.**
- **The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
- **When deploying the airbag, perform the operation at least 10 m (33 ft) away from the front seat side airbag assembly.**
- **The front seat side airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front seat side airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front seat side airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

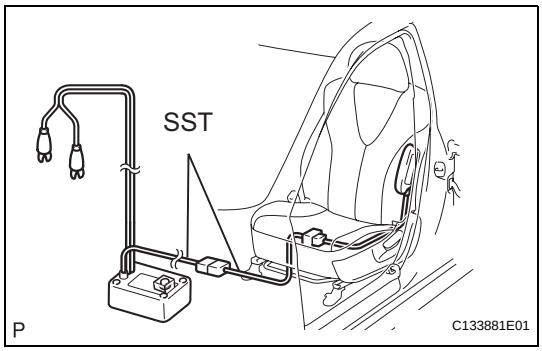
RS

1. DISPOSE OF FRONT SEAT SIDE AIRBAG ASSEMBLY (WHEN INSTALLED IN VEHICLE)

HINT:
Prepare a battery as the power source to deploy the airbag.

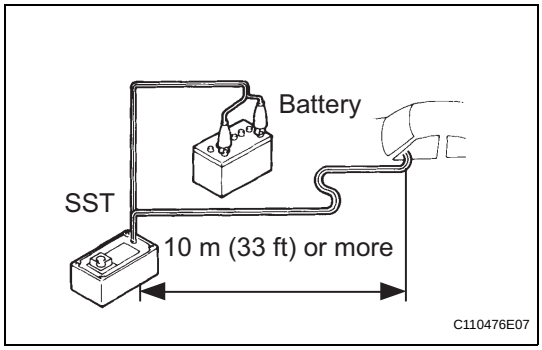


(a) Check the function of the SST (See page RS-353).
(b) Precaution (See page RS-1).
(c) Disconnect the cable from the negative battery terminal.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
(d) Remove the front seat assembly (See page SE-16 for Manual Seat, SE-30 for Power Seat).
(e) Install the SST.
(1) Disconnect the connector (yellow colored one) from the front seat side airbag assembly.
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.



(2) Connect the SST connector to the front seat side airbag assembly connector.
SST 09082-00700, 09082-00750
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

(3) Install the front seat assembly (See page SE-24 for Manual Seat, SE-41 for Power Seat).



(4) Move the SST at least 10 m (33 ft) away from the vehicle front side window.

(5) Maintaining enough clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.
NOTICE:
Take care not to damage the SST wire harness.

(6) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.

(f) Deploy the airbag.

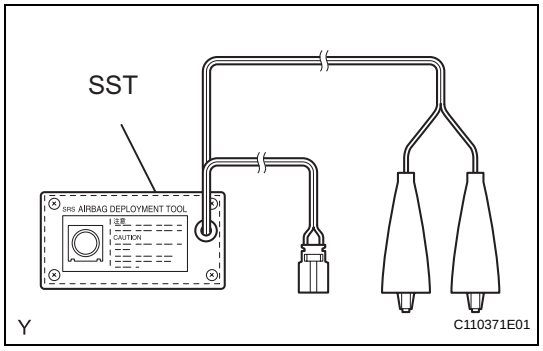
(1) Check that no one is inside the vehicle or within a 10 m (33 ft) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.
CAUTION:
- **When deploying the airbag, make sure that no one is near the vehicle.**
- **The front seat side airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front seat side airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front seat side airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

HINT:
The airbag is deployed as the LED of the SST activation switch comes on.

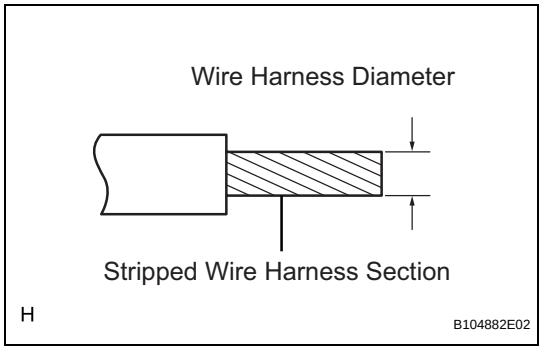
2. DISPOSE OF FRONT SEAT SIDE AIRBAG ASSEMBLY (WHEN NOT INSTALLED IN VEHICLE)
NOTICE:
- **When disposing of the front seat side airbag assembly, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure detailed below when deploying the airbag.**

RS

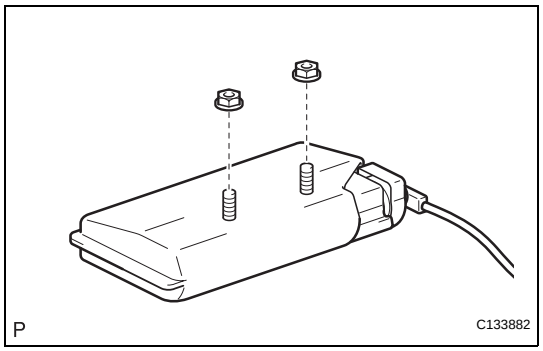


HINT:
Prepare a battery as the power source to deploy the airbag.

(a) Check the function of the SST (See page RS-355).
(b) Remove the front seat side airbag assembly.
  (1) Remove the front seat assembly (See page SE-16 for Manual Seat, SE-30 for Power Seat).
  (2) Remove the 2 nuts and the front seat side airbag assembly from the seatback assembly (See page SE-17 for Manual Seat, SE-31 for Power Seat).
  CAUTION:
  - **When removing the front seat side airbag assembly, work must be started 90 seconds after the ignition switch is turned off and the negative (-) terminal cable is disconnected from the battery.**
  - **When storing the front seat side airbag assembly, keep the airbag deployment side facing upward.**

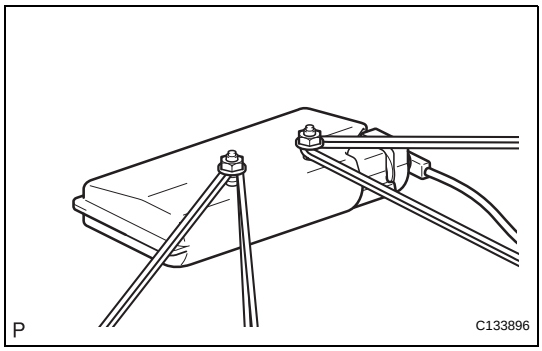


(c) Using a service-purpose wire harness for the vehicle, tie down the front seat side airbag assembly to the tire.
Wire harness:
Stripped wire harness section
1.25 mm^2 or more (0.0019 $in.^2$ or more)
HINT:
To calculate the area of the stripped wire harness section:
Area = 3.14 x $(Diameter)^2$ divided by 4
CAUTION:
If the wire harness is too thin or an alternative object is used to tie down the front seat side airbag assembly, it may be snapped by the shock when the airbag is deployed. Always use a wire harness for vehicle use with an area of at least 1.25 mm^2 (0.0019 $in.^2$).

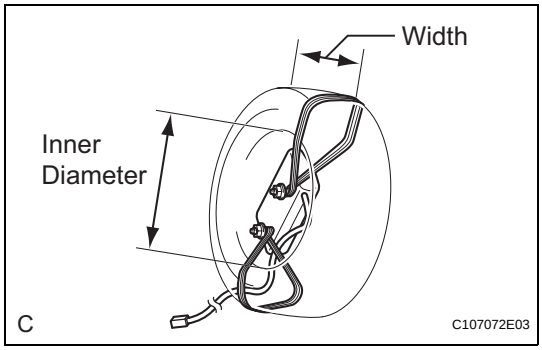


  (1) Install the 2 nuts to the front seat side airbag assembly.

RS

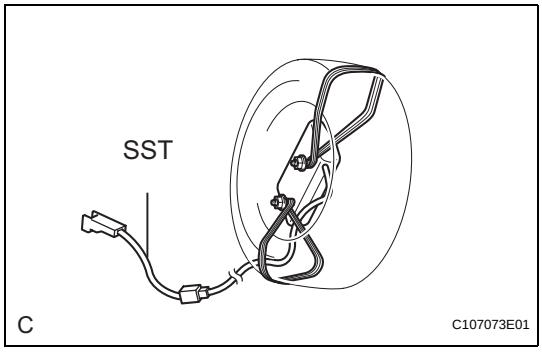


(2) Wind the wire harness around the stud bolts of the front seat side airbag assembly as shown in the illustration.

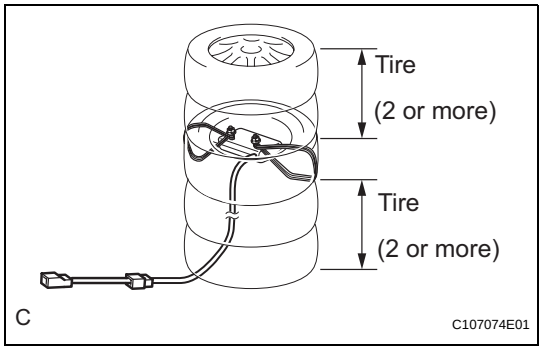


(3) Position the front seat side airbag assembly inside the tire .
Tire size:
Must exceed the following dimensions
Width:
185 mm (7.28 in.)
Inner diameter:
360 mm (14.17 in.)
CAUTION:
- **Make sure that the wire harness is tight. If there is slack in wire harness, the front seat side airbag assembly may become loose due to the shock when the airbag is deployed.**
- **Always tie down the front seat side airbag assembly with the airbag deployment direction facing inside the tire.**

NOTICE:
The tire will be marked by the airbag deployment, so use an extra tire.

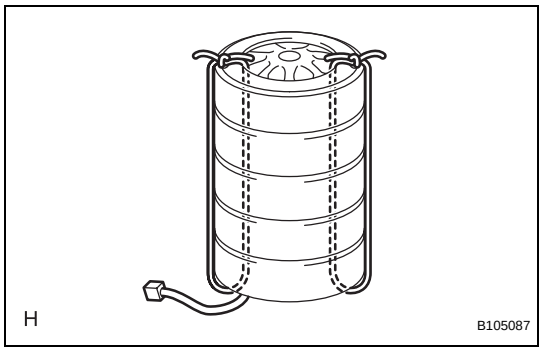


(d) Install the SST.
(1) Connect the SST connector to the front seat side airbag assembly connector.
SST 09082-00750

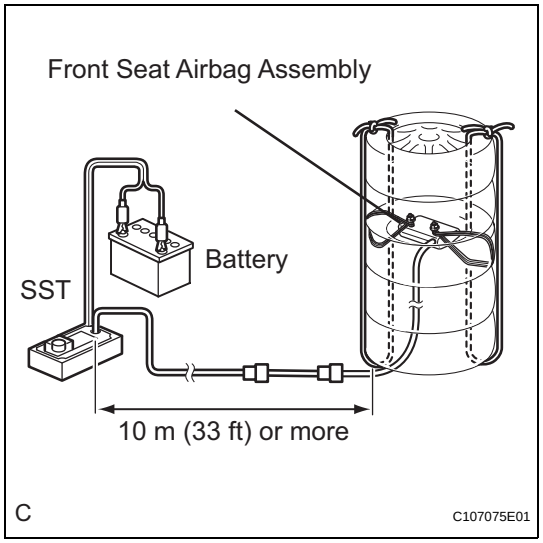


(e) Place the tires.
(1) Place at least 2 tires under the tire which the front seat side airbag assembly is tied to.
(2) Place at least 2 tires over the tire which the front seat side airbag assembly is tied to. The top tire should have the disc wheel installed.
NOTICE:
Do not place the SST connector under the tire because it could be damaged.

RS

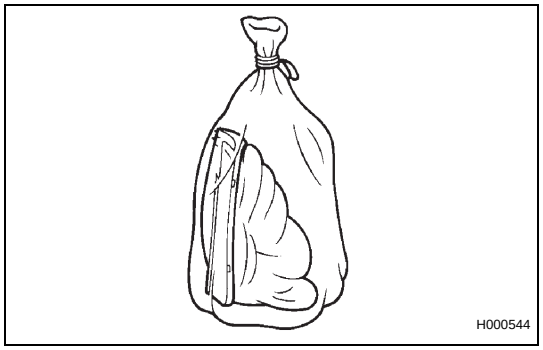


(3) Tie the tires together with 2 wire harnesses.
CAUTION:
Make sure that the wire harness is tight. Looseness in the wire harness results in the tires coming free due to the shock when the airbag is deployed.



(f) Install the SST.
(1) Connect the SST connector.
SST 09082-00700
NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.
(2) Move the SST at least 10 m (33 ft) away from the airbag tied down to the tire.

(g) Deploy the airbag.
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip of the SST to the battery negative (-) terminal.
(2) Check that no one is within a 10 m (33 ft) radius of the tire which the front seat side airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.
CAUTION:
When deploying the airbag, make sure that no one is near the tire.
HINT:
The airbag is deployed as the LED of the SST activation switch comes on.



(h) Dispose of the front seat side airbag assembly.
CAUTION:
- **The front seat side airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front seat side airbag assembly with a deployed airbag.**
- **Do not apply water, etc. to a front seat side airbag assembly with a deployed airbag.**
- **Always wash your hands with water after completing the operation.**

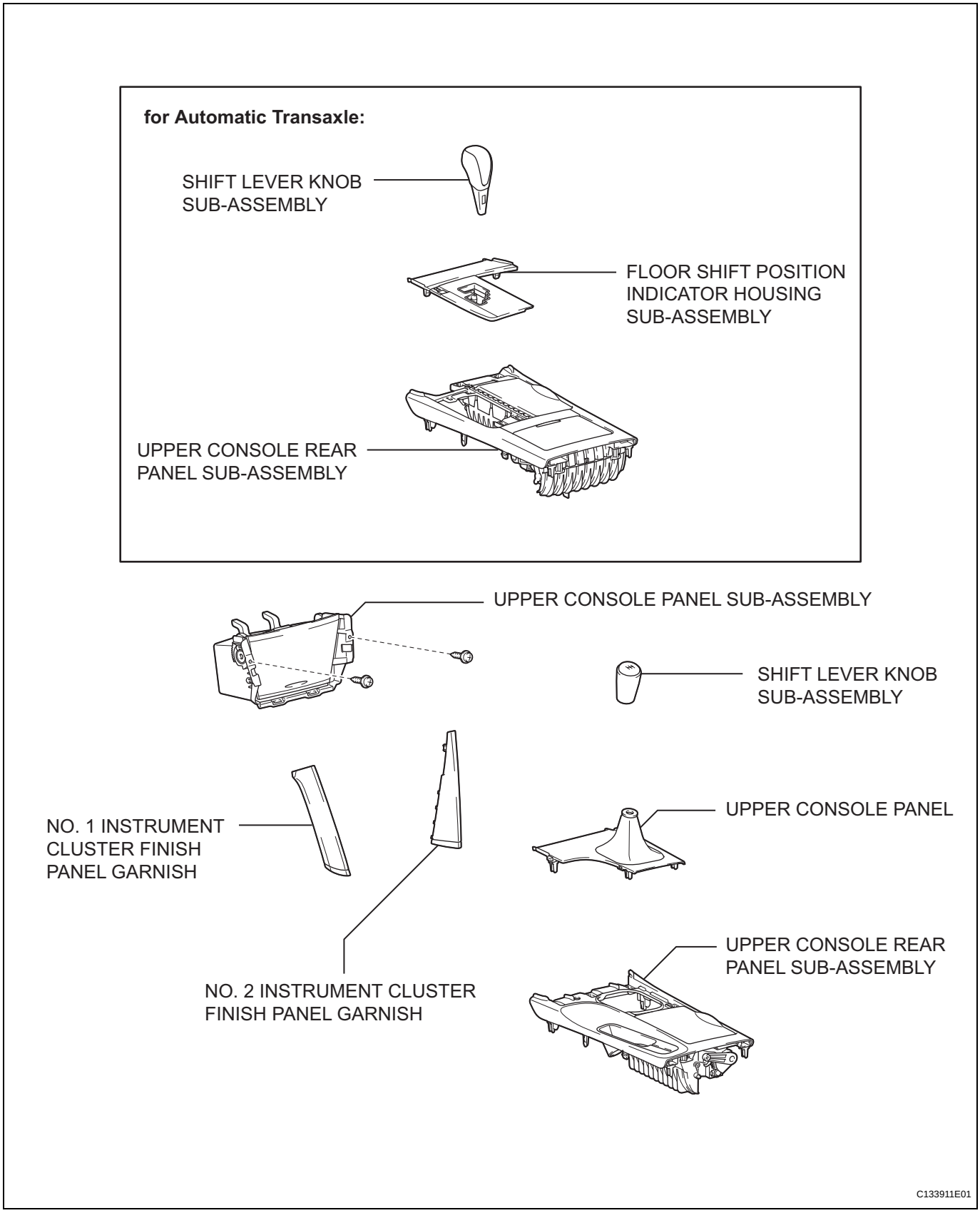
(1) Remove the front seat side airbag assembly from the tire.

RS

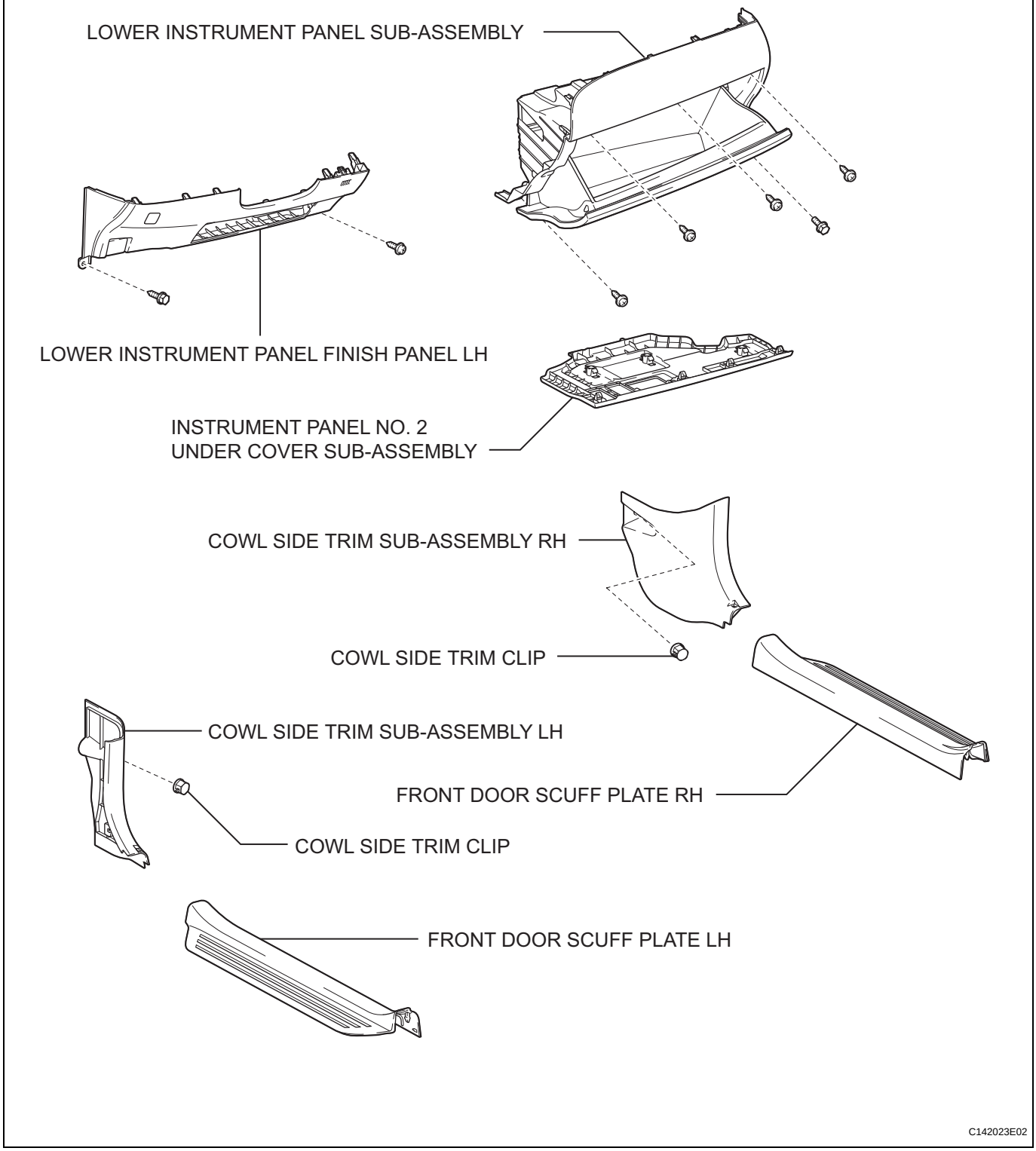
(2) Place the front seat side airbag assembly in a plastic bag, tie it tightly and dispose of it as other general part disposal.

CENTER AIRBAG SENSOR ASSEMBLY

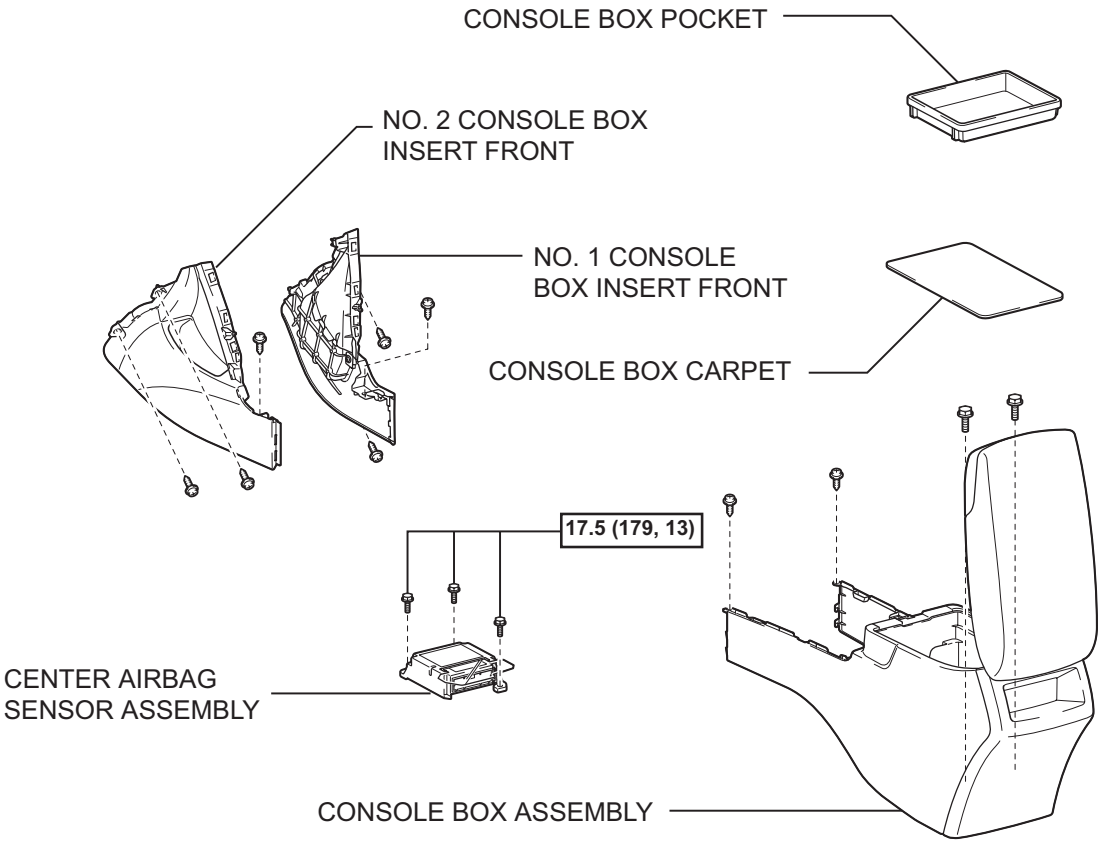
COMPONENTS



RS

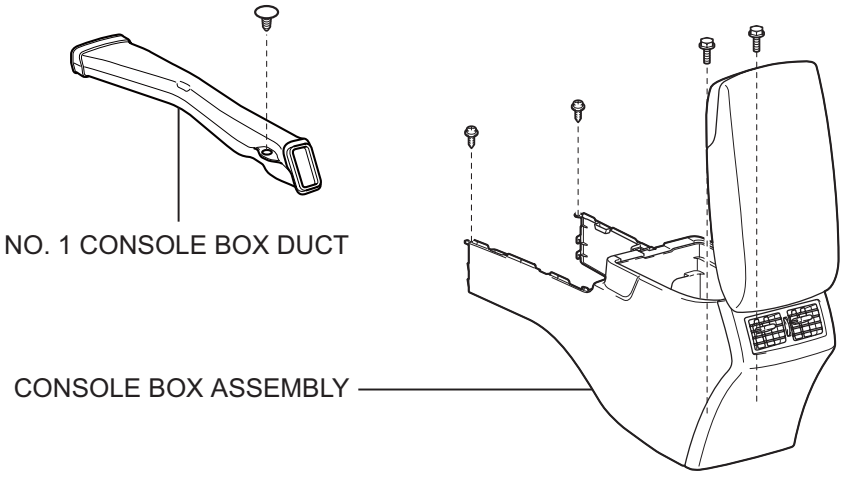

LOWER INSTRUMENT PANEL SUB-ASSEMBLY
LOWER INSTRUMENT PANEL FINISH PANEL LH
INSTRUMENT PANEL NO. 2
UNDER COVER SUB-ASSEMBLY
COWL SIDE TRIM SUB-ASSEMBLY RH
COWL SIDE TRIM CLIP
COWL SIDE TRIM SUB-ASSEMBLY LH
FRONT DOOR SCUFF PLATE RH
COWL SIDE TRIM CLIP
FRONT DOOR SCUFF PLATE LH
C142023E02

RS



RS

for Automatic Air Conditioning System:



N*m (kgf*cm, ft.*lbf) : Specified torque

C133912E01

ON-VEHICLE INSPECTION

1. **INSPECT CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (See page RS-32).

2. **INSPECT CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)**
   (a) Perform a diagnostic system check (See page RS-32).

3. **INSPECT CENTER AIRBAG SENSOR ASSEMBLY (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)**
   (a) Replace the center airbag sensor assembly.
   CAUTION:
   Be sure to follow the correct removal and installation procedures.
   HINT:
   The center airbag sensor assembly should be replaced after any of the airbags has deployed, as it has been subjected to the impact.

REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-24)**
4. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-24)**
5. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
6. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
7. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-25)**
8. **REMOVE UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-25)**
9. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-26)**
10. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-26)**
11. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-27)**
12. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
13. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
14. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-20)**
15. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
16. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
17. **REMOVE INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-23)**
18. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-23)**
19. **REMOVE CONSOLE BOX POCKET (See page IP-28)**

20. REMOVE CONSOLE BOX CARPET (See page IP-28)

21. REMOVE CONSOLE BOX ASSEMBLY (See page IP-28)

22. REMOVE NO. 1 CONSOLE BOX INSERT FRONT (See page IP-30)

23. REMOVE NO. 2 CONSOLE BOX INSERT FRONT (See page IP-29)

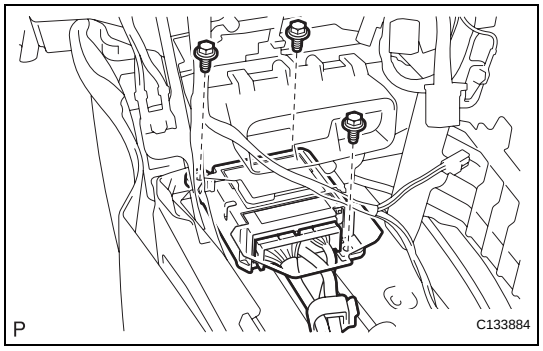
24. REMOVE NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-154)

25. REMOVE CENTER AIRBAG SENSOR ASSEMBLY

(a) Turn back the carpet.

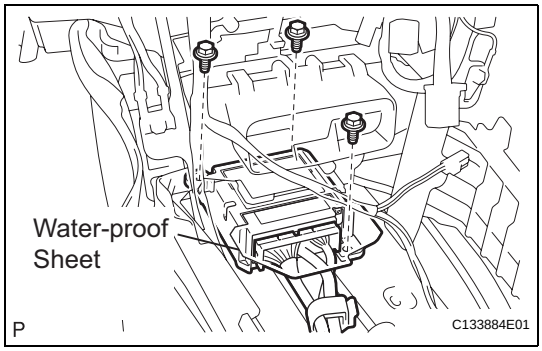
(b) Disconnect the holder (with connectors).

(c) Remove the 3 bolts and center airbag sensor assembly.



INSTALLATION

1. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY**
   (a) Check that the ignition switch is off.
   (b) Check that the battery negative (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



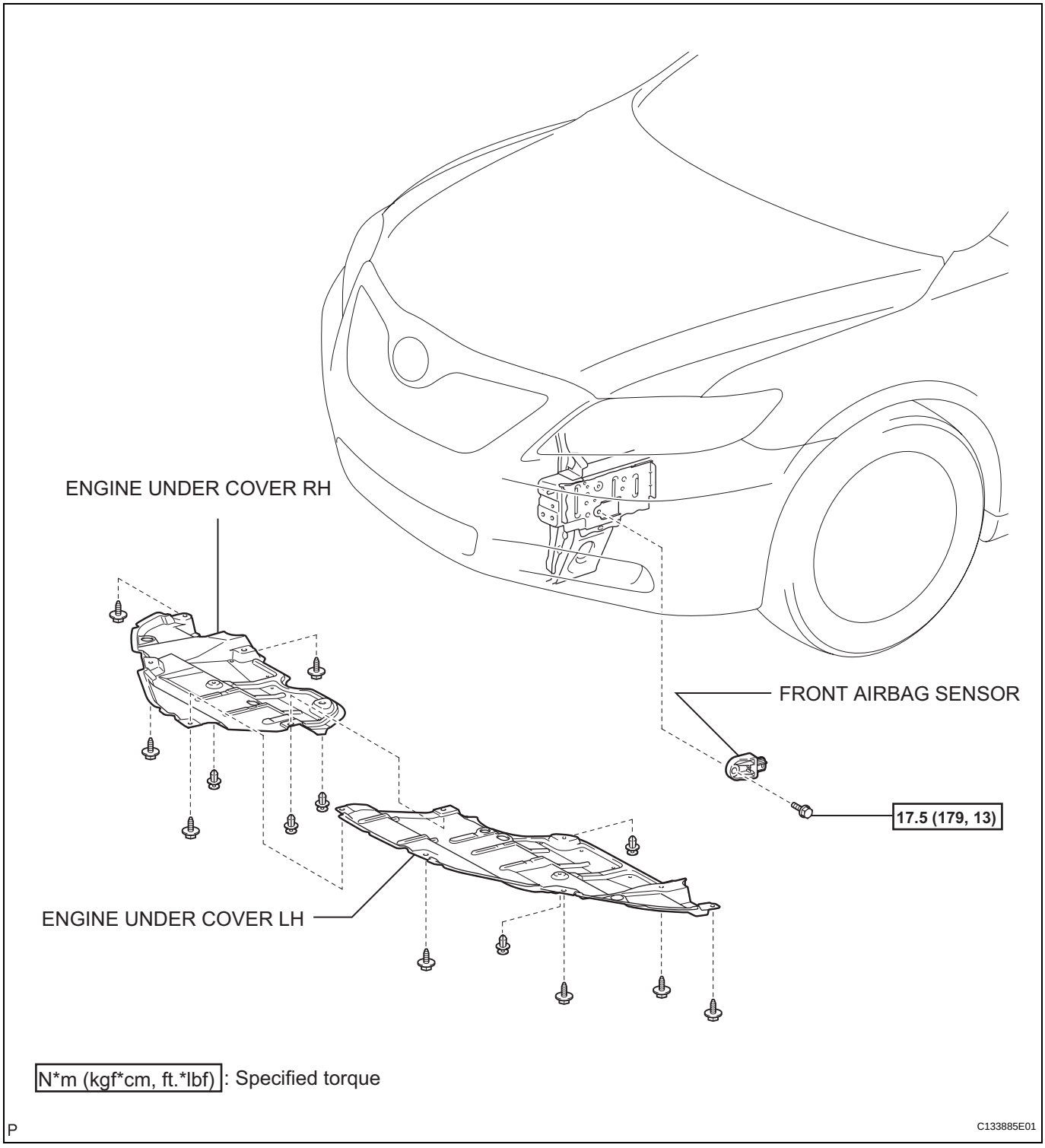
   (c) Install the center airbag sensor assembly with the 3 bolts.
   Torque: 17.5 N*m (179 kgf*cm, 13 ft.*lbf)
   NOTICE:
   - **If the center airbag sensor assembly has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the center airbag sensor assembly, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

   (d) Check that there is no looseness in the installation parts of the center airbag sensor assembly.
   (e) Connect the holder (with connectors).
   (f) Check that the water-proof sheet is properly set.
2. **INSTALL NO. 1 CONSOLE BOX DUCT (for Automatic Air Conditioning System) (See page AC-177)**
3. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (See page IP-50)**
4. **INSTALL NO. 1 CONSOLE BOX INSERT FRONT (See page IP-49)**
5. **INSTALL CONSOLE BOX ASSEMBLY (See page IP-51)**
6. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
7. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
8. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (See page IP-55)**
9. **INSTALL INSTRUMENT PANEL NO. 2 UNDER COVER SUB-ASSEMBLY (See page IP-56)**
10. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
11. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
12. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (See page IP-58)**
13. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**

14. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
15. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (See page IP-52)**
16. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Manual Transaxle) (See page IP-53)**
17. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
18. **INSTALL UPPER CONSOLE PANEL (for Manual Transaxle) (See page IP-54)**
19. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-53)**
20. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
21. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
22. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Manual Transaxle) (See page IP-55)**
23. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY (for Automatic Transaxle) (See page IP-55)**
24. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
25. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (See page RS-32).

FRONT AIRBAG SENSOR

COMPONENTS



RS

ON-VEHICLE INSPECTION

1. **INSPECT FRONT AIRBAG SENSOR (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (See page RS-32).

2. **INSPECT FRONT AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)**
   (a) Perform a diagnostic system check (See page RS-32).
   (b) When the front bumper of the vehicle or its area is damaged, check if there is any damage to the front airbag sensor. If there are any defects as mentioned below, replace the front airbag sensor with a new one:
   - Cracks, dents or chips on the sensor housing.
   - Cracks or other damage to the connector.
   - Peeling off of the label or damage to the serial number.

   CAUTION:
   Be sure to follow the correct removal and installation procedures.

3. **INSPECT FRONT AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)**
   (a) Replace the front airbag sensor.
   CAUTION:
   Be sure to follow the correct removal and installation procedures.
   HINT:
   The front airbag sensor on the impacted side should be replaced after the steering pad, front passenger airbag assembly or driver side knee airbag assembly has deployed.

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. PRECAUTION

CAUTION:

Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

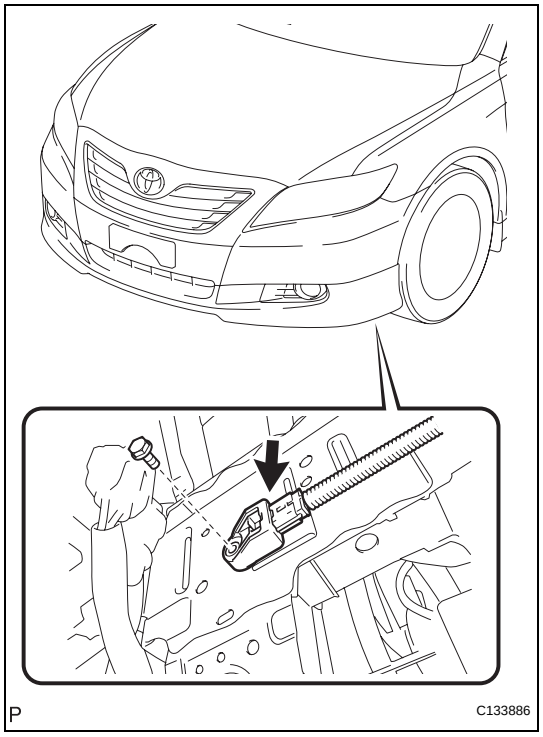
3. REMOVE ENGINE UNDER COVER RH

4. REMOVE ENGINE UNDER COVER LH

5. REMOVE FRONT AIRBAG SENSOR

(a) Remove the bolt and front airbag sensor from the body.

(b) Disconnect the connector from the front airbag sensor.



RS

INSTALLATION

HINT:

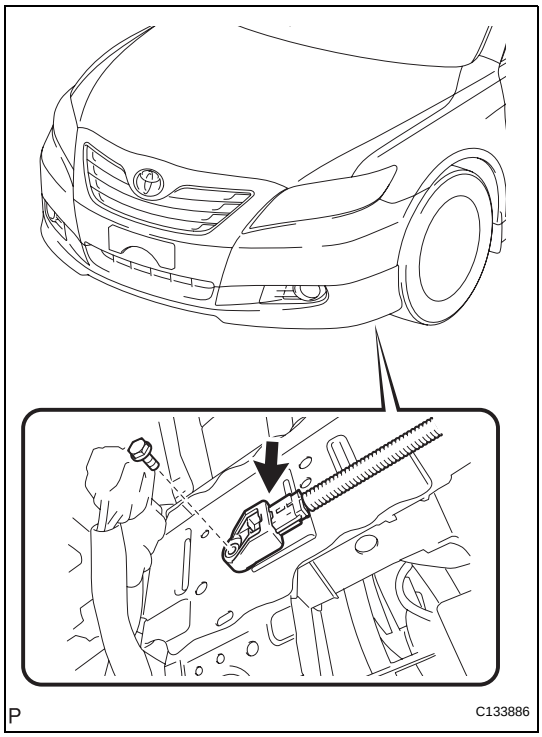
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL FRONT AIRBAG SENSOR

(a) Check that the ignition switch is off.

(b) Check that the battery negative (-) cable is disconnected.

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



(c) Connect the connector.

(d) Install the front airbag sensor with the bolt.
Torque: 17.5 N*m (179 kgf*cm, 13 ft.*lbf)
NOTICE:
- **If the front airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the front airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

(e) Check that there is no looseness in the installation parts of the front airbag sensor.

2. INSTALL ENGINE UNDER COVER LH

3. INSTALL ENGINE UNDER COVER RH

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

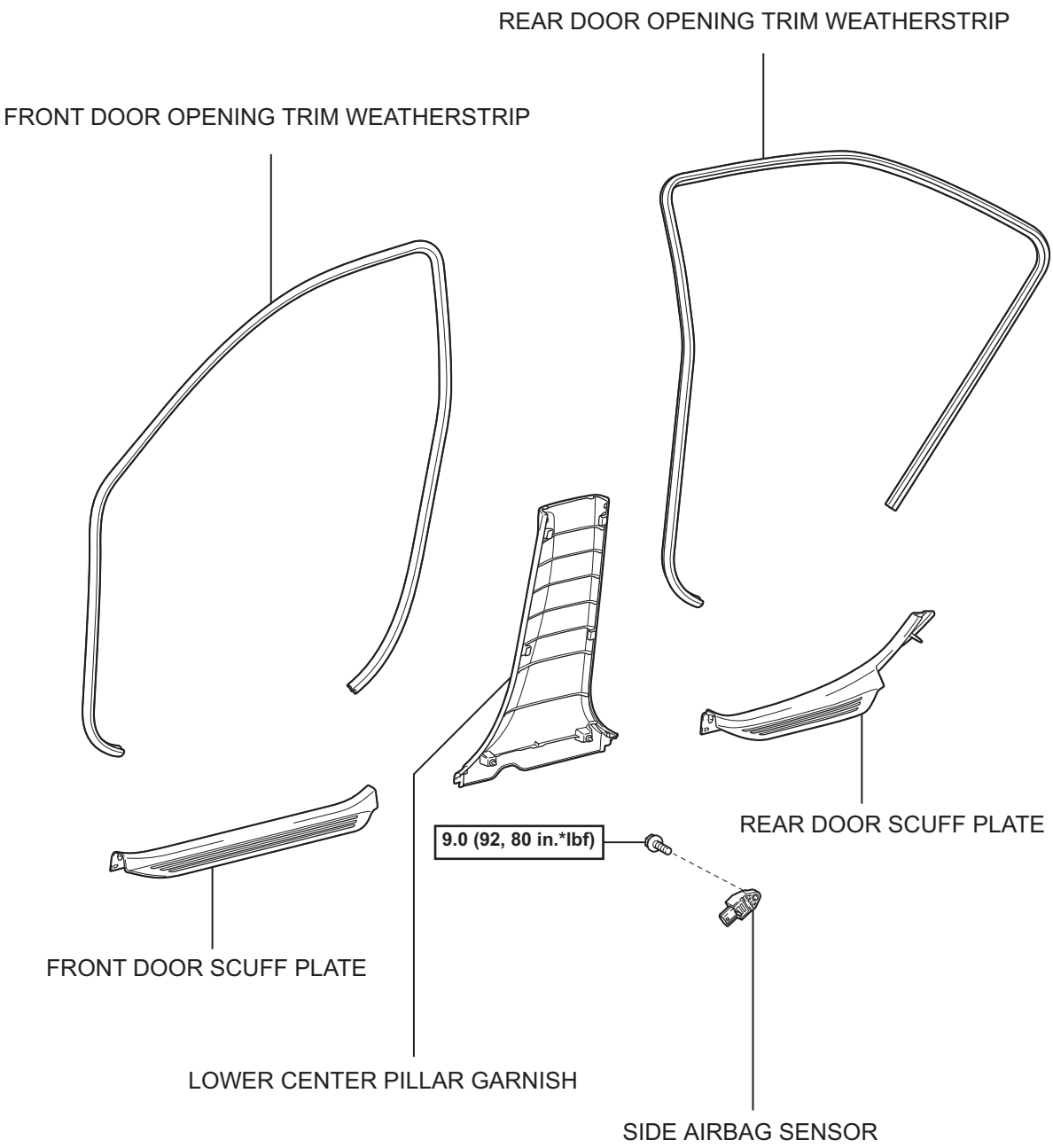
5. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-32).

RS

SIDE AIRBAG SENSOR

COMPONENTS



RS

N*m (kgf*cm, ft.*lbf): Specified torque

P

C133887E01

ON-VEHICLE INSPECTION

1. **INSPECT SIDE AIRBAG SENSOR (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (See page RS-32).

2. **INSPECT SIDE AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)**
   (a) Perform a diagnostic system check (See page RS-32).
   (b) When the center pillar of the vehicle or its area is damaged, check if there is any damage to the side airbag sensor. If there are any defects as mentioned below, replace the side airbag sensor with a new one:
   - Cracks, dents or chips on the sensor housing.
   - Cracks or other damage to the connector.
   - Peeling off of the label or damage to the serial number.

   CAUTION:
   Be sure to follow the correct removal and installation procedures.

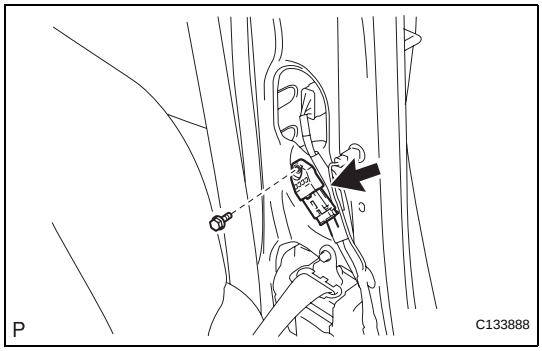
3. **INSPECT SIDE AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)**
   (a) Replace the side airbag sensor.
   CAUTION:
   Be sure to follow the correct removal and installation procedures.
   HINT:
   The side airbag sensor on the impacted side should be replaced after the front seat side airbag assembly and curtain shield airbag assembly have deployed.

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT DOOR SCUFF PLATE (See page IR-24)**
4. **REMOVE REAR DOOR SCUFF PLATE (See page IR-24)**
5. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP**
6. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP**
7. **REMOVE LOWER CENTER PILLAR GARNISH (See page IR-25)**
8. **REMOVE SIDE AIRBAG SENSOR**
   (a) Remove the bolt and side airbag sensor from the body.
   (b) Disconnect the connector from the side airbag sensor.



RS

INSTALLATION

HINT:

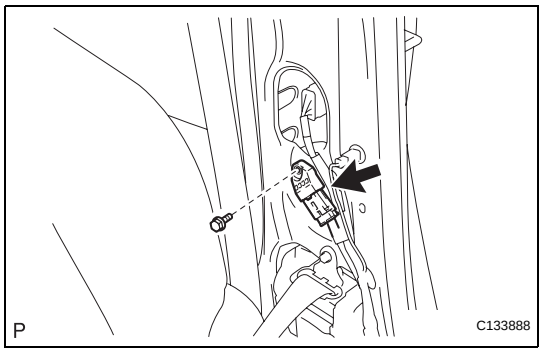
- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. INSTALL SIDE AIRBAG SENSOR

(a) Check that the ignition switch is off.

(b) Check that the battery negative (-) cable is disconnected.

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



(c) Install the side airbag sensor with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
NOTICE:
- **If the side airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
- **When installing the side airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

(d) Check that there is no looseness in the installation parts of the side airbag sensor.

(e) Connect the connector.

2. INSTALL LOWER CENTER PILLAR GARNISH (See page IR-53)

3. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP

4. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP

5. INSTALL REAR DOOR SCUFF PLATE (See page IR-56)

6. INSTALL FRONT DOOR SCUFF PLATE (See page IR-54)

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

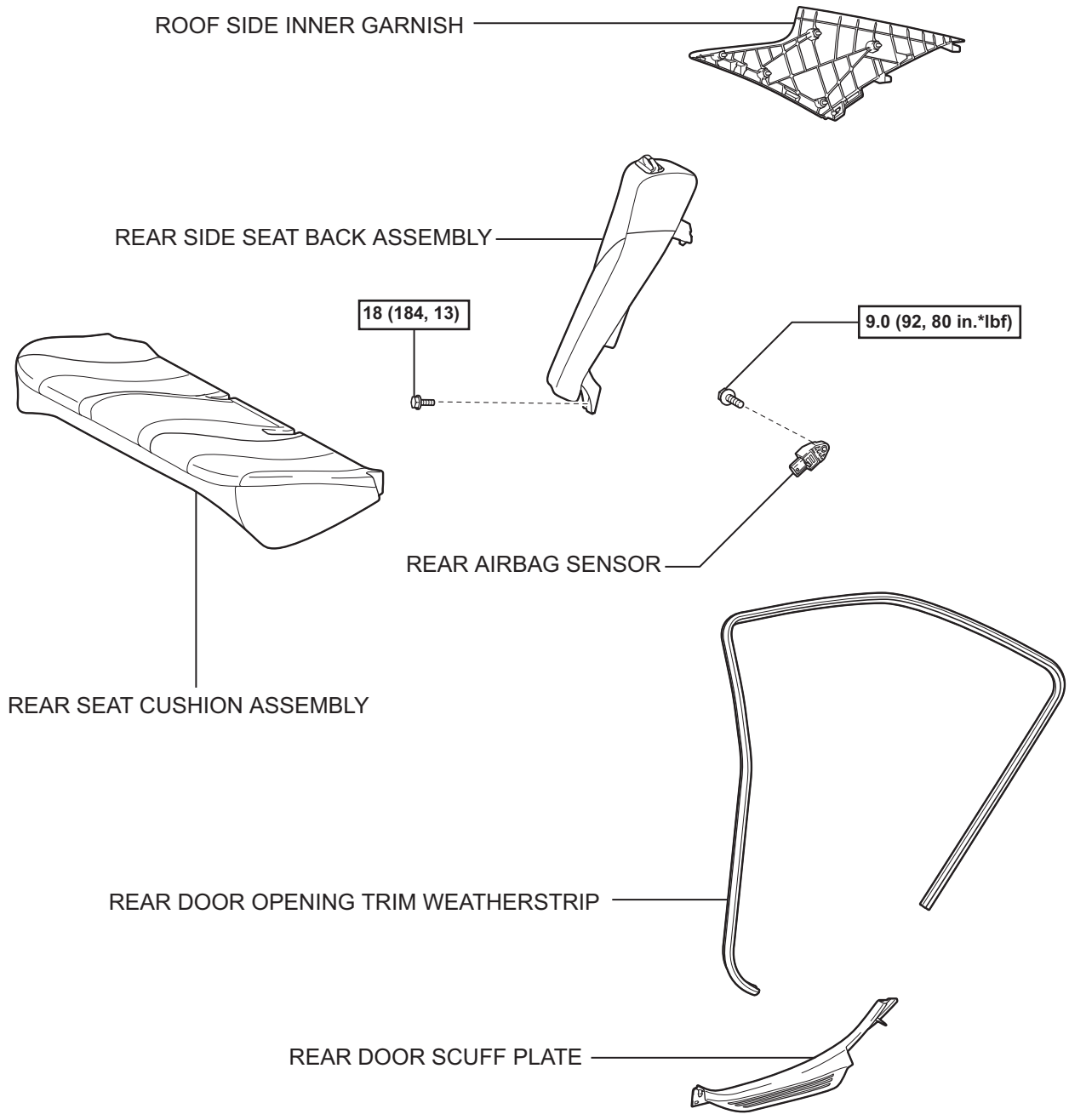
8. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-32).

REAR AIRBAG SENSOR

COMPONENTS

for Fold Down Seat Type:

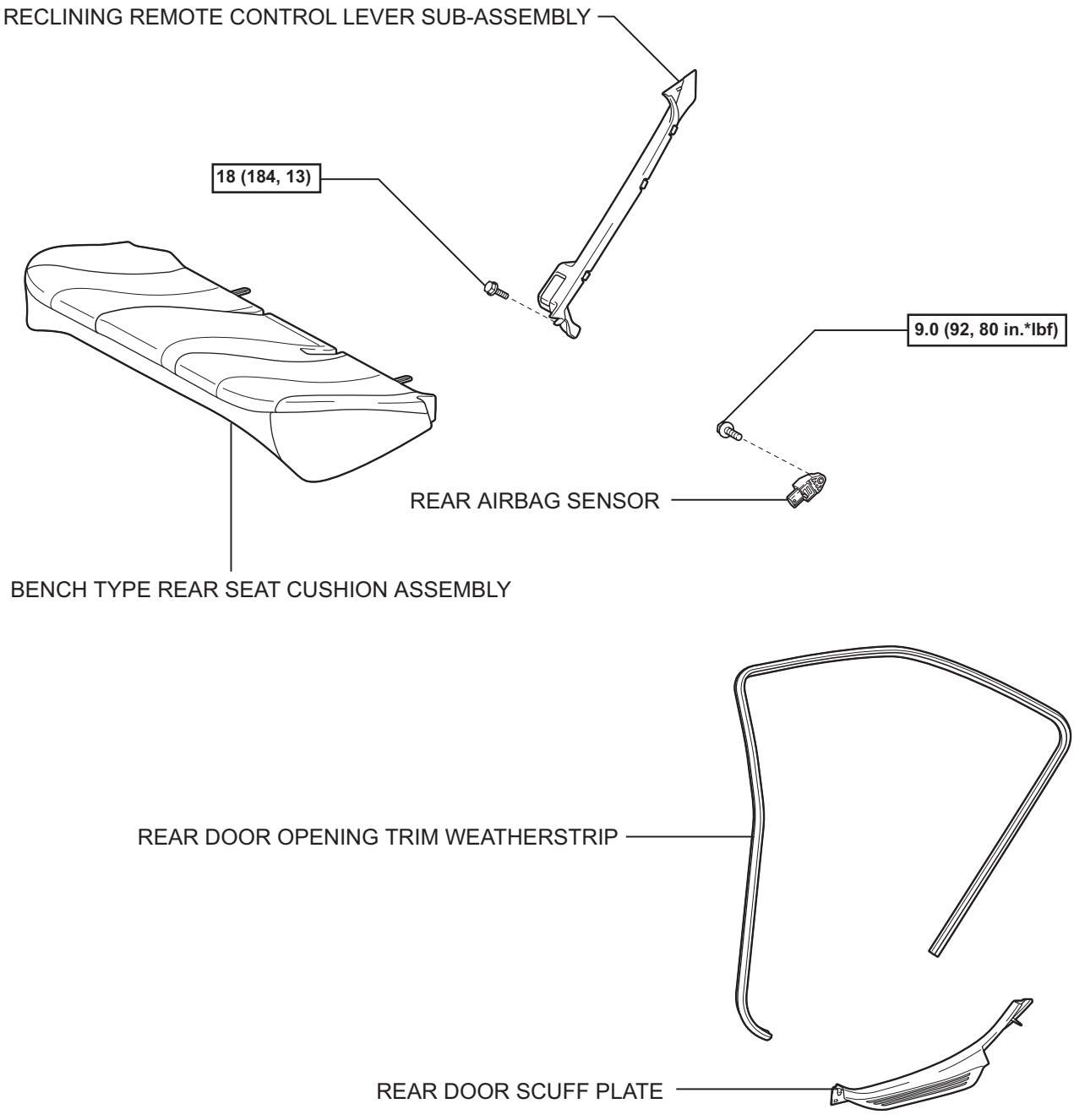


RS

N*m (kgf*cm, ft.*lbf): Specified torque

C133907E01

for Reclining Seat Type:

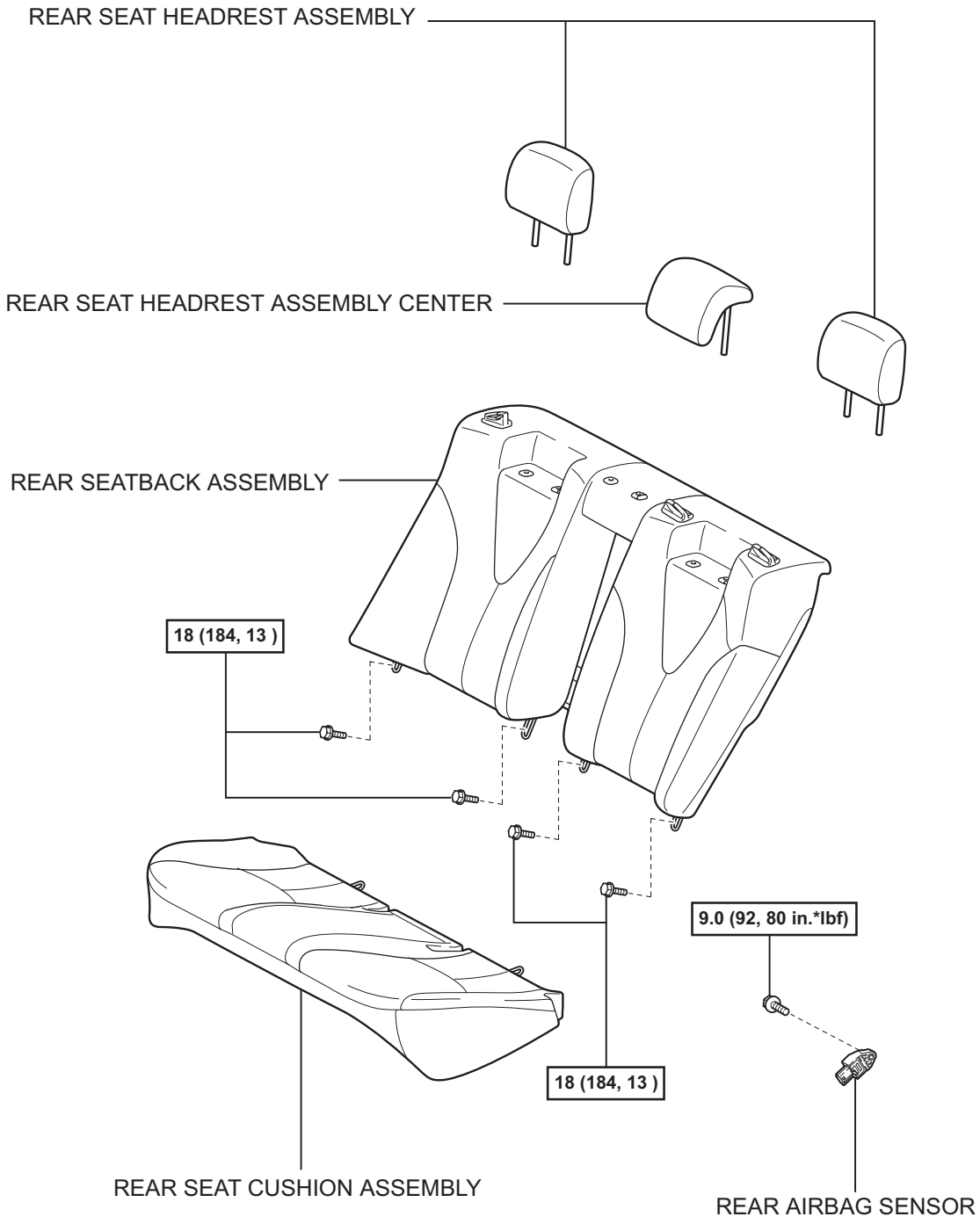


N*m (kgf*cm, ft.*lbf) : Specified torque

C133909E01

RS

for Fixed Seat Type:



N*m (kgf*cm, ft.*lbf) : Specified torque

C133908E01

RS

ON-VEHICLE INSPECTION

1. **INSPECT REAR AIRBAG SENSOR (VEHICLE NOT INVOLVED IN COLLISION)**
   (a) Perform a diagnostic system check (See page RS-32).

2. **INSPECT REAR AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG HAS NOT DEPLOYED)**
   (a) Perform a diagnostic system check (See page RS-32).
   (b) When the quarter panel of the vehicle or its area is damaged, check if there is any damage to the rear airbag sensor. If there are any defects as mentioned below, replace the rear airbag sensor with a new one:
   - Cracks, dents or chips on the sensor housing.
   - Cracks or other damage to the connector.
   - Peeling off of the label or damage to the serial number.

   CAUTION:
   Be sure to follow the correct removal and installation procedures.

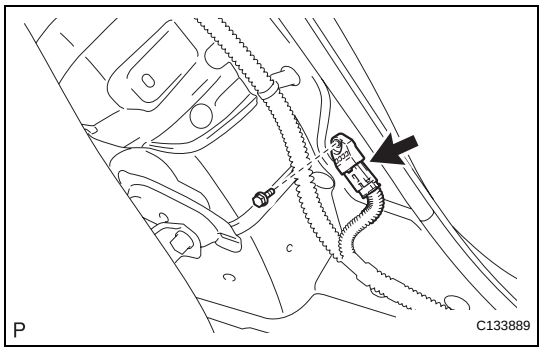
3. **INSPECT REAR AIRBAG SENSOR (VEHICLE INVOLVED IN COLLISION AND AIRBAG IS DEPLOYED)**
   (a) Replace the rear airbag sensor.
   CAUTION:
   Be sure to follow the correct removal and installation procedures.
   HINT:
   The rear airbag sensor on the impacted side should be replaced after the curtain shield airbag assembly has deployed.

REMOVAL

HINT:

- Use the same procedures for the RH side and LH side.
- The procedures listed below are for the LH side.

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   NOTICE:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
4. **REMOVE BENCH TYPE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
5. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
6. **REMOVE REAR DOOR SCUFF PLATE (for Fold Down Seat Type) (See page IR-24)**
7. **REMOVE REAR DOOR SCUFF PLATE (for Reclining Seat Type) (See page IR-24)**
8. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP (for Fold Down Seat Type)**
9. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP (for Reclining Seat Type)**
10. **REMOVE ROOF SIDE INNER GARNISH (for Fold Down Seat Type) (See page IR-26)**
11. **REMOVE REAR SIDE SEAT BACK ASSEMBLY (for Fold Down Seat Type) (See page SE-48)**
12. **REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY (for Reclining Seat Type) (See page SE-68)**
13. **REMOVE REAR SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
14. **REMOVE REAR SEAT HEADREST ASSEMBLY CENTER (for Fixed Seat Type)**
15. **REMOVE REAR SEATBACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**

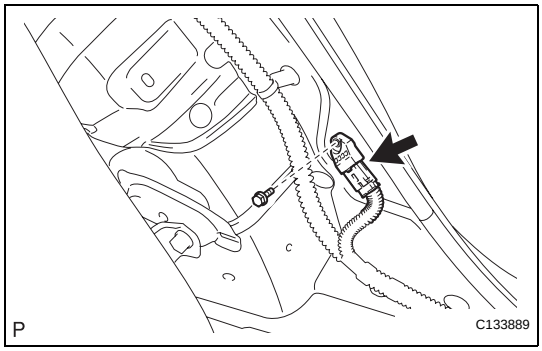


16. REMOVE REAR AIRBAG SENSOR

(a) Disconnect the connector.

(b) Remove the bolt and rear airbag sensor.

INSTALLATION



1. **INSTALL REAR AIRBAG SENSOR**
   (a) Check that the ignition switch is off.
   (b) Check that the battery negative (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
   (c) Install the rear airbag sensor with the bolt.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
   NOTICE:
   - **If the rear airbag sensor has been dropped, or there are any cracks, dents or other defects in the case, bracket or connector, replace it with a new one.**
   - **When installing the rear airbag sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
   (d) Check that there is no looseness in the installation parts of the rear airbag sensor.
   (e) Connect the connector.
2. **INSTALL REAR SEATBACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
3. **INSTALL REAR SEAT HEADREST ASSEMBLY CENTER (for Fixed Seat Type)**
4. **INSTALL REAR SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
5. **INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY (for Reclining Seat Type) (See page SE-69)**
6. **INSTALL REAR SIDE SEAT BACK ASSEMBLY (for Fold Down Seat Type) (See page SE-57)**
7. **INSTALL ROOF SIDE INNER GARNISH (for Fold Down Seat Type) (See page IR-52)**
8. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP (for Reclining Seat Type)**
9. **INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP (for Fold Down Seat Type)**
10. **INSTALL REAR DOOR SCUFF PLATE (for Reclining Seat Type) (See page IR-56)**
11. **INSTALL REAR DOOR SCUFF PLATE (for Fold Down Seat Type) (See page IR-56)**
12. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
13. **INSTALL BENCH TYPE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**

RS

14. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**

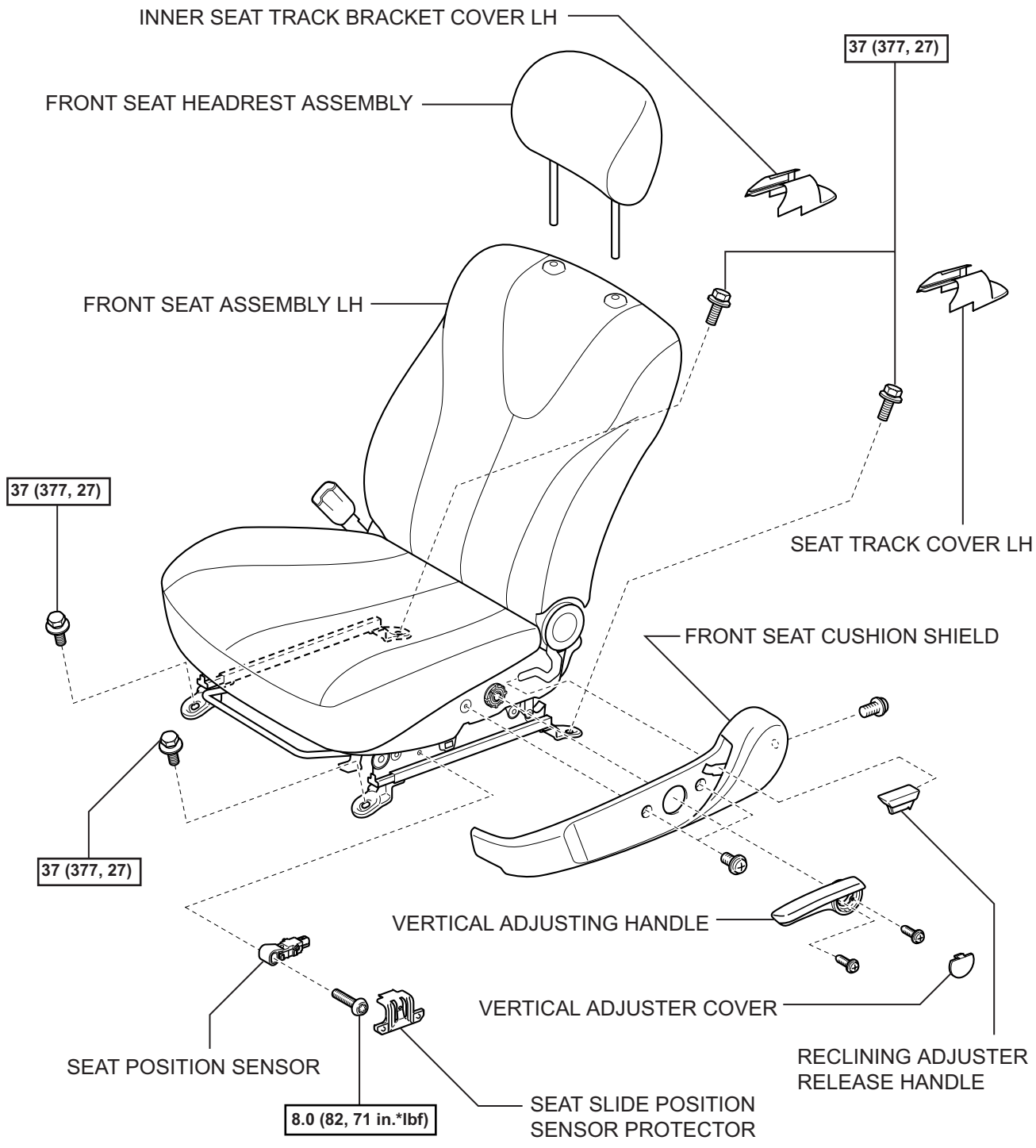
15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

16. **INSPECT SRS WARNING LIGHT**
    (a) Inspect the SRS warning light (See page RS-32).

SEAT POSITION SENSOR

COMPONENTS

for Manual Seat:



N*m (kgf*cm, ft.*lbf) : Specified torque

C

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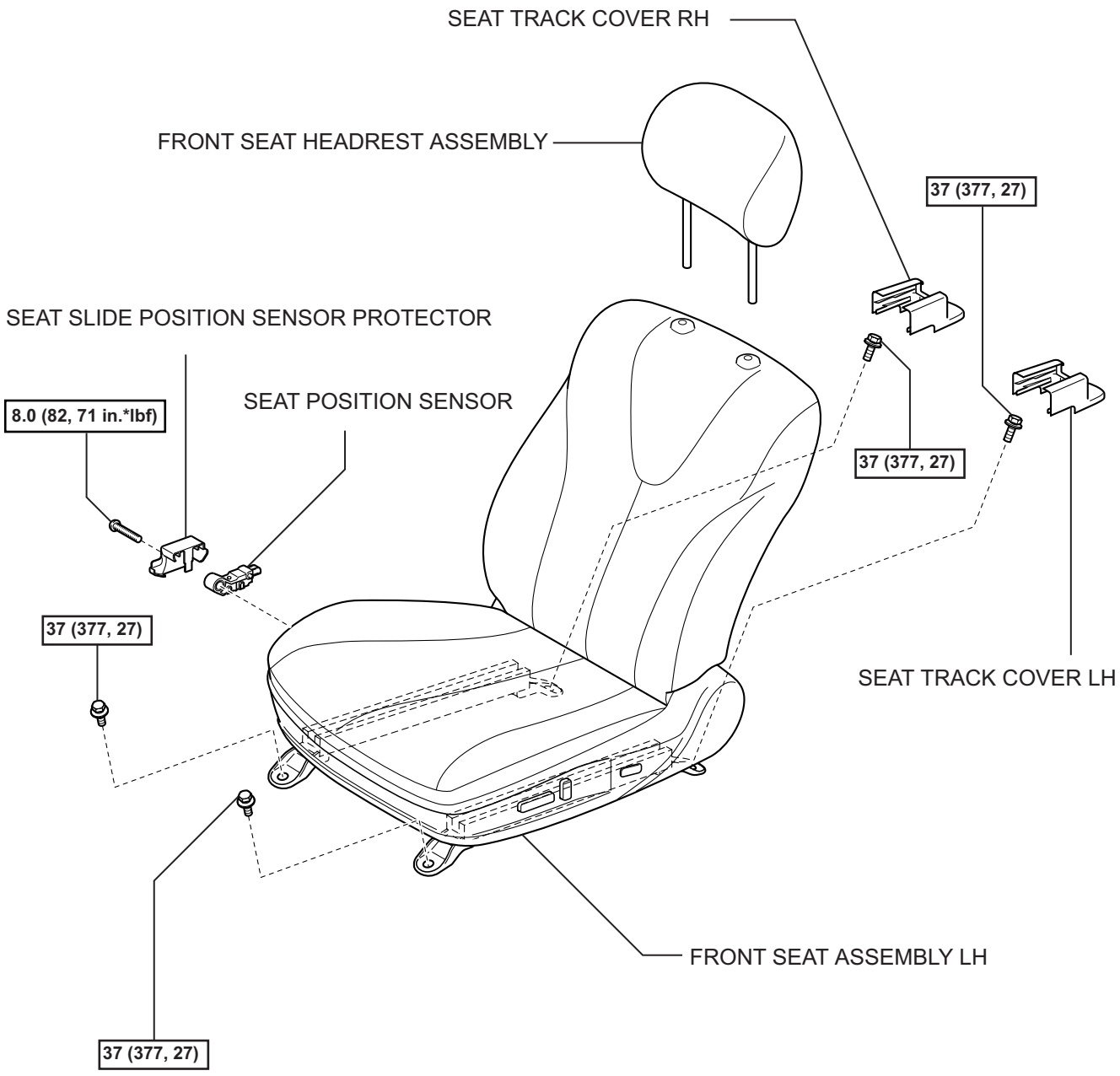
RS

for Power Seat:



N*m (kgf*cm, ft.*lbf): Specified torque

C

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RS

ON-VEHICLE INSPECTION

1. INSPECT SEAT POSITION SENSOR (VEHICLE NOT INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (See page RS-32).

2. INSPECT SEAT POSITION SENSOR (VEHICLE INVOLVED IN COLLISION)

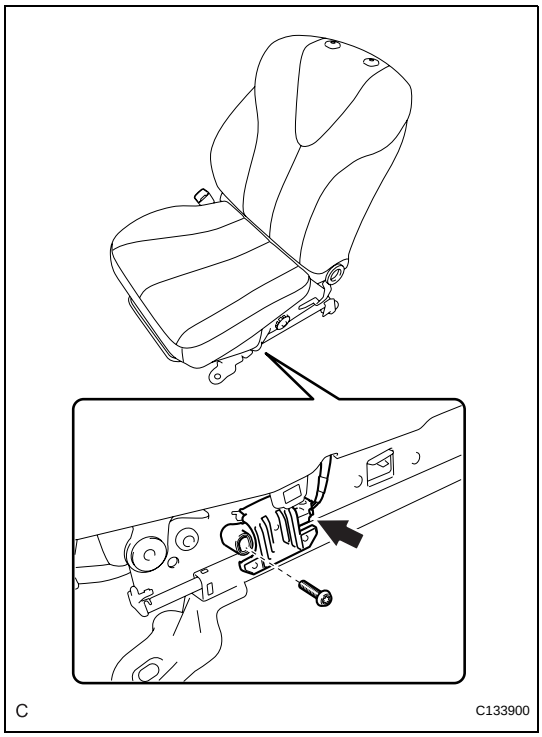
(a) Perform a diagnostic system check (See page RS-32).

(b) Even if the airbag was not deployed, check if there is any damage to the seat position sensor.
If there are any defects as mentioned below, replace the seat position sensor with a new one:
- Cracks, dents or chips on the sensor housing.
- Cracks or other damage to the connector.

CAUTION:
Be sure to follow the correct removal and installation procedures.

REMOVAL

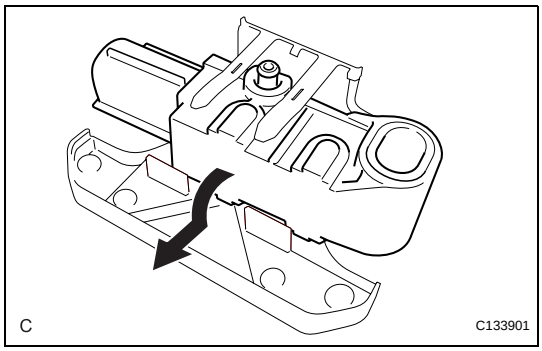
1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   NOTICE:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
4. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
5. **REMOVE SEAT TRACK COVER LH (for Manual Seat) (See page SE-16)**
6. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-30)**
7. **REMOVE INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-16)**
8. **REMOVE SEAT TRACK COVER RH (for Power Seat) (See page SE-30)**
9. **REMOVE FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-16)**
10. **REMOVE FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-30)**
11. **REMOVE VERTICAL ADJUSTER COVER (for Manual Seat) (See page SE-17)**
12. **REMOVE VERTICAL ADJUSTING HANDLE (for Manual Seat) (See page SE-17)**
13. **REMOVE RECLINING ADJUSTER RELEASE HANDLE (for Manual Seat) (See page SE-18)**
14. **REMOVE FRONT SEAT CUSHION SHIELD (for Manual Seat) (See page SE-18)**



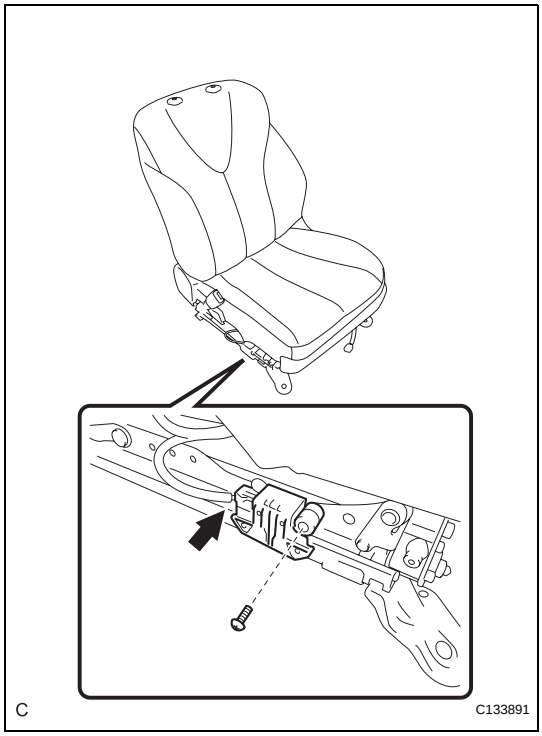
15. REMOVE SEAT POSITION SENSOR (for Manual Seat)

(a) Disconnect the connector.

(b) Using a "torx" socket wrench (T30), remove the "torx" screw and seat position sensor with the seat slide position sensor protector.



(c) Remove the seat position sensor from the seat slide position sensor protector as shown in the illustration.

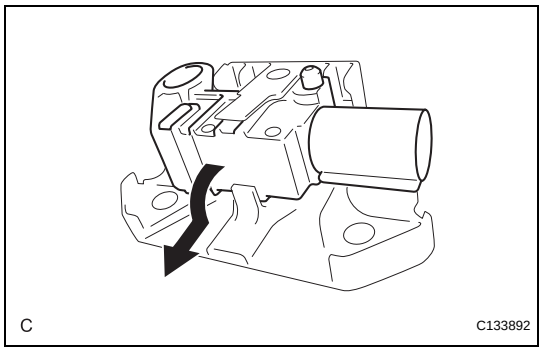


16. REMOVE SEAT POSITION SENSOR (for Power Seat)

(a) Disconnect the connector.

(b) Using a "torx" socket wrench (T30), separate the "torx" screw and seat position sensor with the seat slide position sensor protector.

RS



(c) Remove the seat position sensor from the seat slide position sensor protector as shown in the illustration.

INSTALLATION

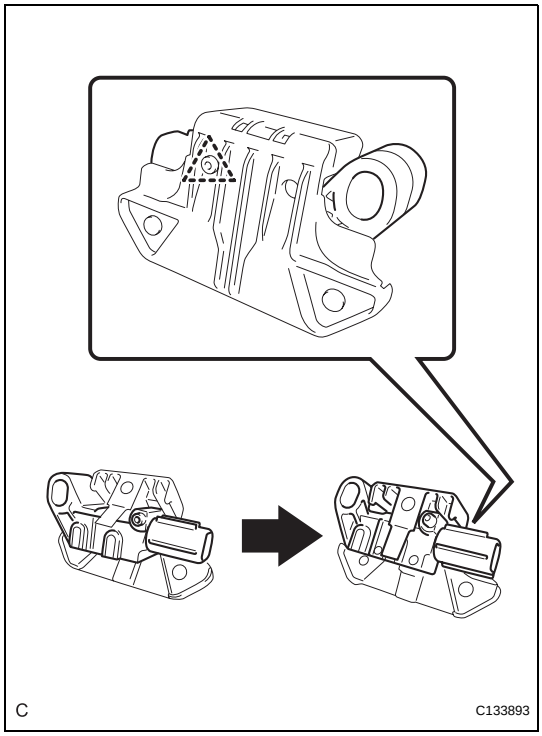
1. INSTALL SEAT POSITION SENSOR (for Power Seat)

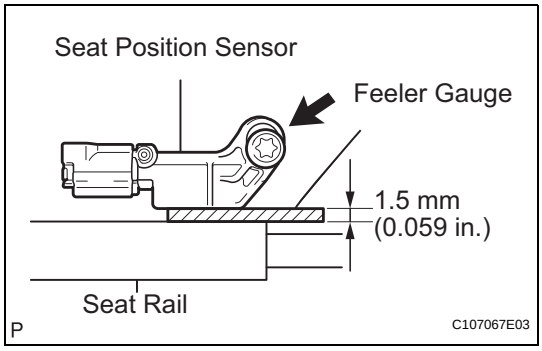
(a) Check that the ignition switch is off.

(b) Check that the negative battery (-) cable is disconnected.

CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.

(c) Engage the pin and install the seat position sensor to the seat slide position sensor protector as shown in the illustration.





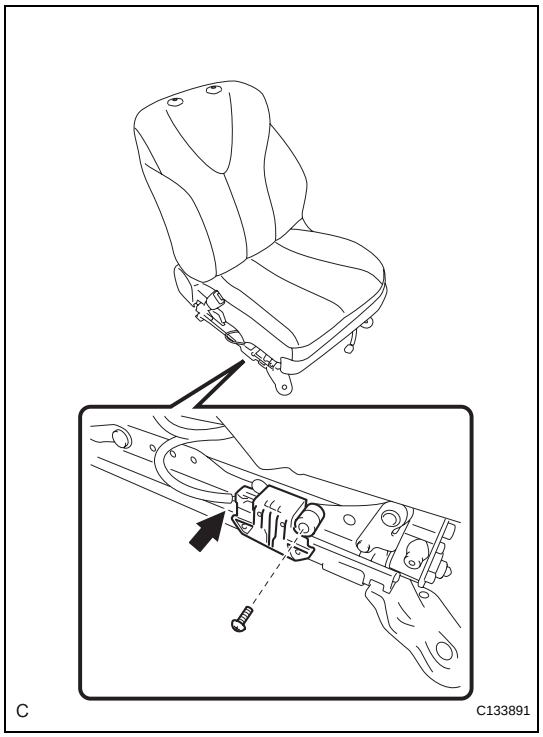
(d) Using a feeler gauge 1.5 mm (0.059 in.), temporarily install the seat position sensor.

NOTICE:

- **If the seat position sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the seat position sensor with a new one.**
- **When installing the seat position sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

HINT:

Be sure that a clearance between the seat position sensor and the seat rail is within 1.1 mm (0.043 in.) to 1.9 mm (0.075 in.).



(e) Using a "torx" socket wrench (T30), tighten the "torx" screw to install the seat position sensor.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

(f) Make sure that a clearance between the seat position sensor and the seat rail is within 1.1 mm (0.043 in.) to 1.9 mm (0.075 in.).

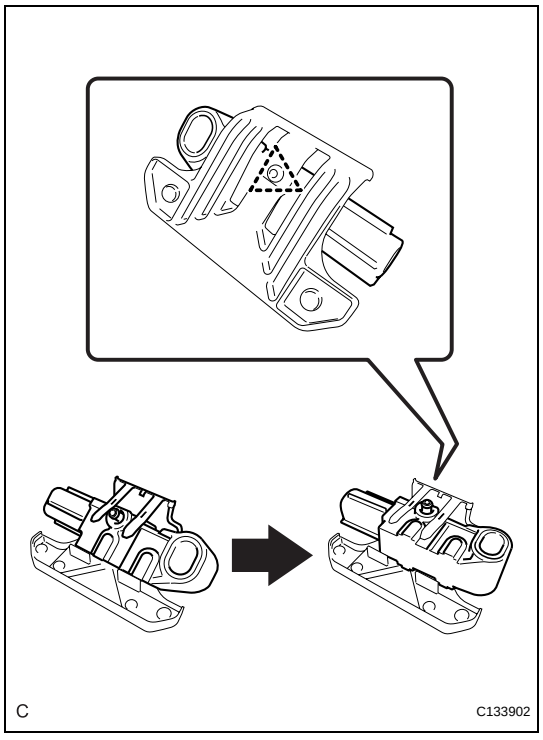
(g) Check that there is no looseness in the installation parts of the seat position sensor.

(h) Connect the connector.

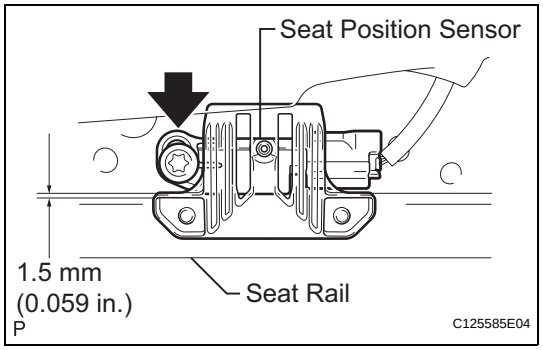
2. INSTALL SEAT POSITION SENSOR (for Manual Seat)

(a) Check that the ignition switch is off.

(b) Check that the negative battery (-) cable is disconnected.
CAUTION:
Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.



(c) Engage the pin and install the seat position sensor to the seat slide position sensor protector as shown in the illustration.

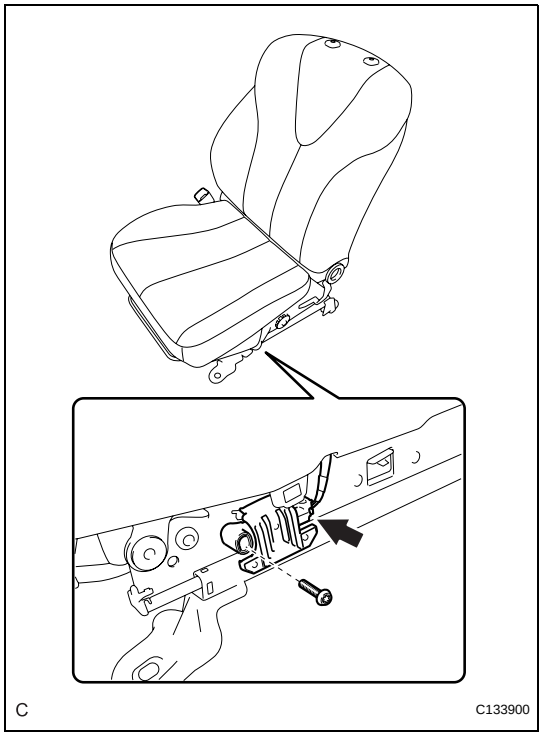


(d) Using a feeler gauge 1.5 mm (0.059 in.), temporarily install the seat position sensor.
NOTICE:
- **If the seat position sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the seat position sensor with a new one.**

RS

- **When installing the seat position sensor, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**

HINT:
Be sure that a clearance between the seat position sensor and the seat rail is within 1.1 mm (0.043 in.) to 1.9 mm (0.075 in.).



(e) Using a "torx" socket wrench (T30), tighten the "torx" screw to install the seat position sensor.
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

(f) Make sure that a clearance between the seat position sensor and the seat rail is within 1.1 mm (0.043 in.) to 1.9 mm (0.075 in.).

(g) Check that there is no looseness in the installation parts of the seat position sensor.

(h) Connect the connector.

3. **INSTALL FRONT SEAT CUSHION SHIELD (for Manual Seat)**
4. **INSTALL RECLINING ADJUSTER RELEASE HANDLE (for Manual Seat)**
5. **INSTALL VERTICAL ADJUSTING HANDLE (for Manual Seat)**
6. **INSTALL VERTICAL ADJUSTER COVER (for Manual Seat)**
7. **INSTALL FRONT SEAT ASSEMBLY LH (for Power Seat) (See page SE-41)**
8. **INSTALL FRONT SEAT ASSEMBLY LH (for Manual Seat) (See page SE-24)**
9. **INSTALL SEAT TRACK COVER RH (for Power Seat) (See page SE-42)**
10. **INSTALL INNER SEAT TRACK BRACKET COVER LH (for Manual Seat) (See page SE-25)**
11. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-42)**
12. **INSTALL SEAT TRACK COVER LH (for Manual Seat) (See page SE-25)**
13. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
14. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
15. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
16. **INSPECT POWER SEAT OPERATION (for Power Seat)**
17. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

18. INSPECT SEAT HEATER OPERATION (w/ Seat Heater System) (See page SE-42)

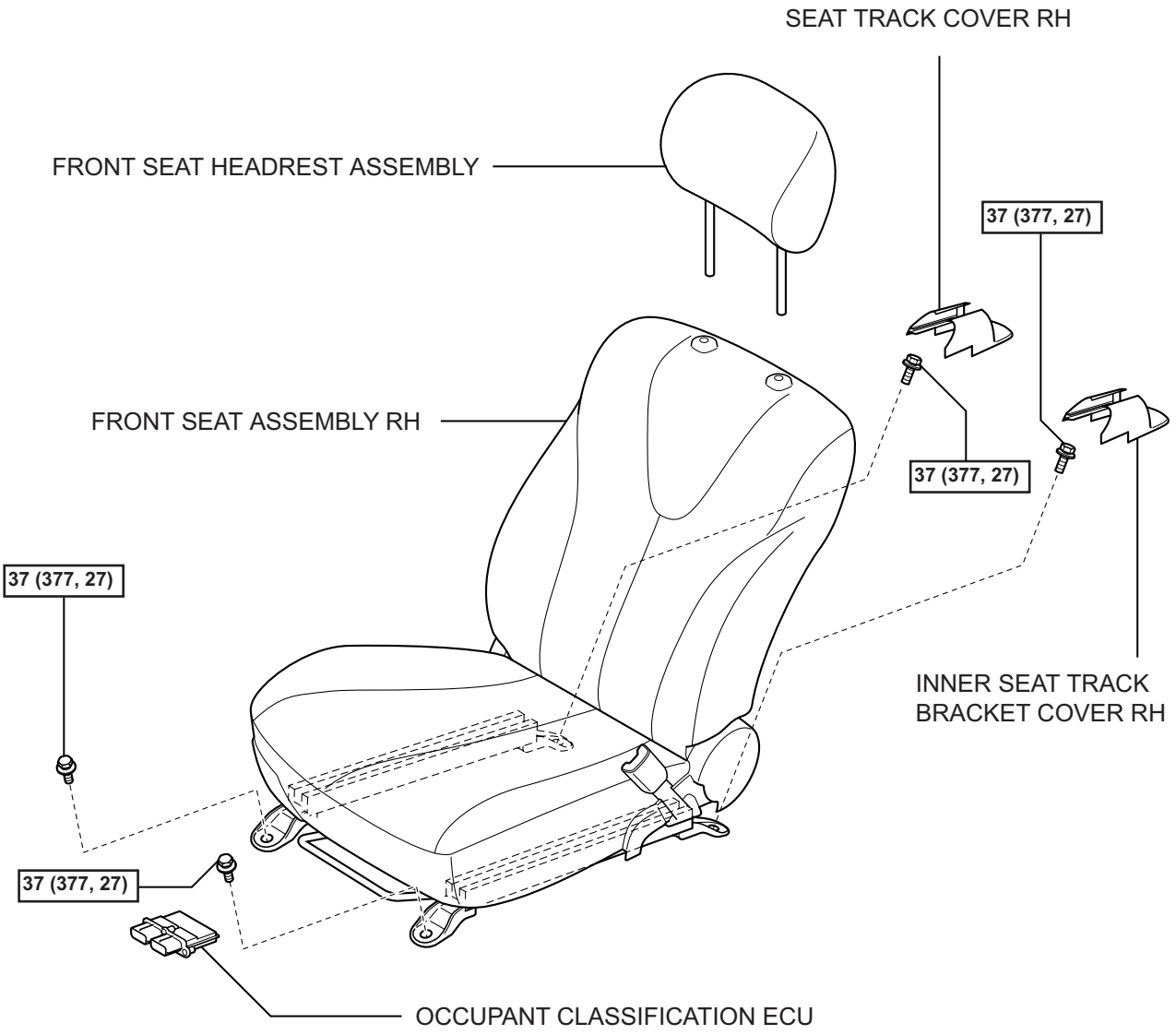
19. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-32).

OCCUPANT CLASSIFICATION ECU

COMPONENTS

for Manual Seat:



N*m (kgf*cm, ft.*lbf): Specified torque

C

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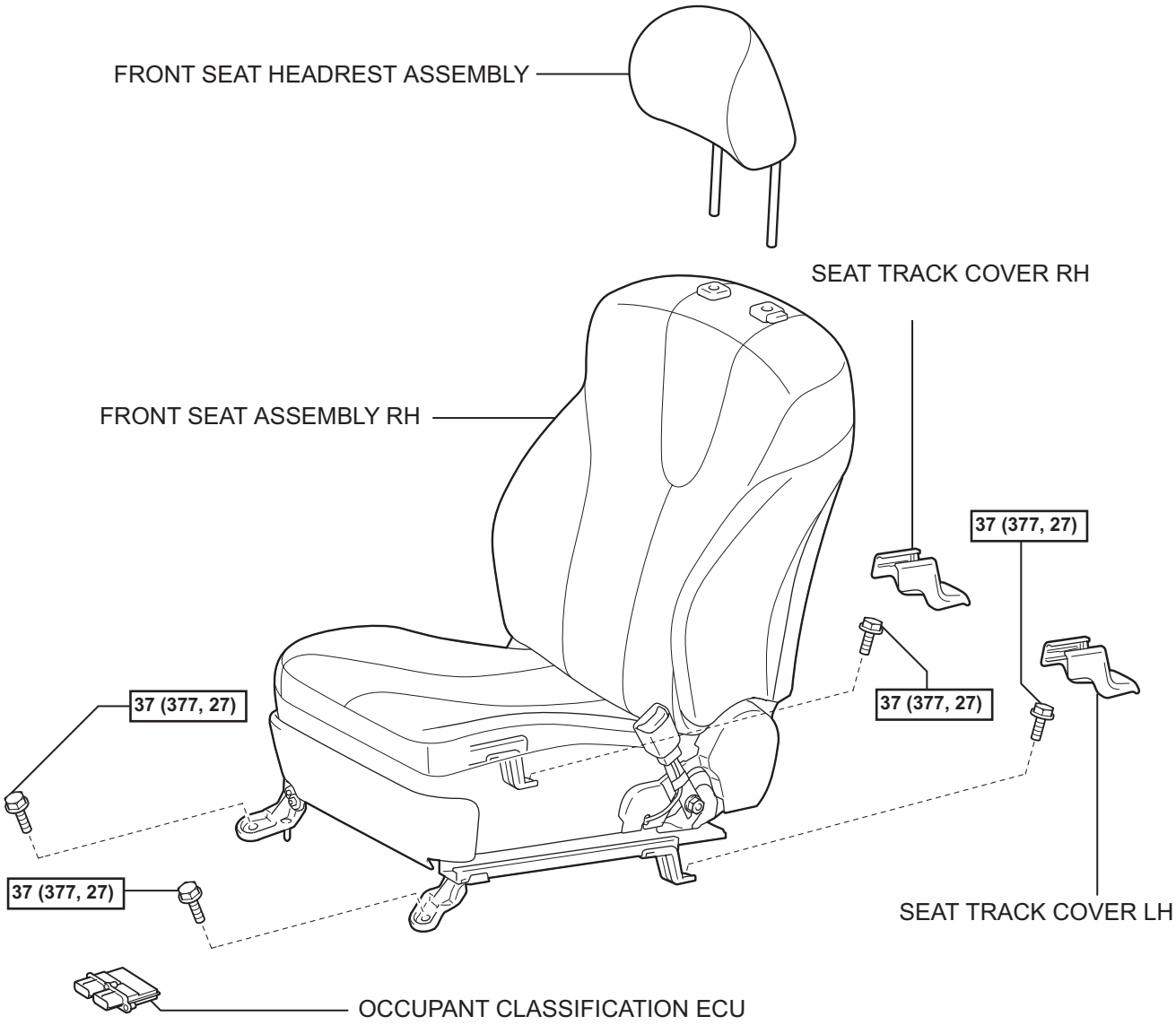
RS

for Power Seat:



N*m (kgf*cm, ft.*lbf): Specified torque

C138924E01

ON-VEHICLE INSPECTION

1. INSPECT OCCUPANT CLASSIFICATION ECU (VEHICLE NOT INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (See page RS-248).

2. INSPECT OCCUPANT CLASSIFICATION ECU (VEHICLE INVOLVED IN COLLISION)

(a) Perform a diagnostic system check (See page RS-248).

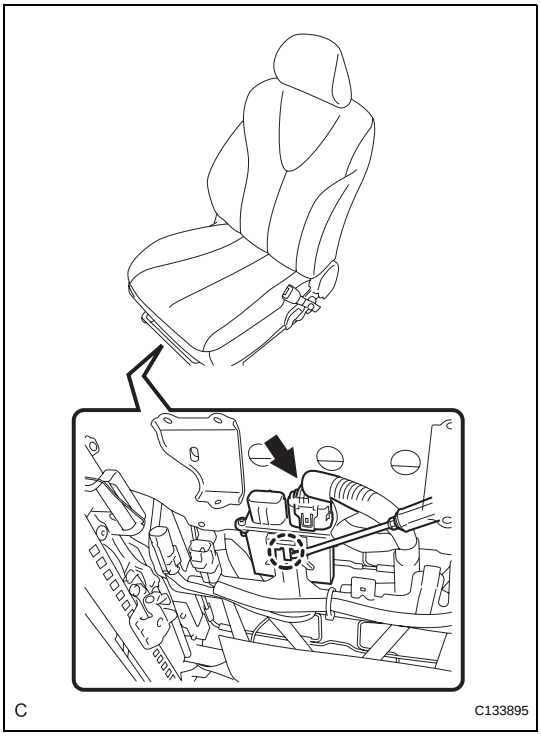
(b) Even if the airbag was not deployed, check if there is any damage to the occupant classification ECU. If there are any defects as mentioned below, replace the occupant classification ECU with a new one:

- Cracks, dents or chips on the case.
- Cracks or other damage to the connector.

CAUTION:
Be sure to follow the correct removal and installation procedures.

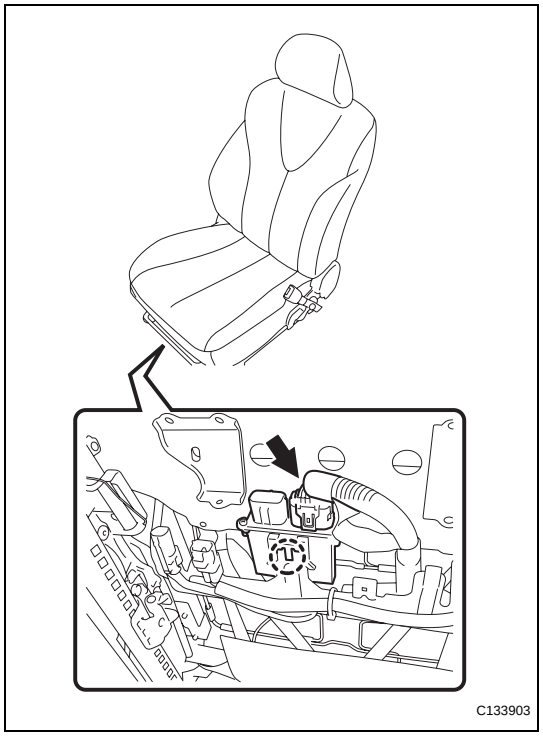
REMOVAL

1. **PRECAUTION**
   CAUTION:
   Be sure to read "PRECAUTION" thoroughly before servicing (See page RS-1).
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for Manual Seat)**
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
3. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
4. **REMOVE FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
5. **REMOVE SEAT TRACK COVER RH (for Manual Seat) (See page SE-16)**
6. **REMOVE SEAT TRACK COVER RH (for Power Seat) (See page SE-30)**
7. **REMOVE INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-16)**
8. **REMOVE SEAT TRACK COVER LH (for Power Seat) (See page SE-30)**
9. **REMOVE FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-16)**
10. **REMOVE FRONT SEAT ASSEMBLY RH (for Power Seat) (See page SE-30)**
11. **REMOVE OCCUPANT CLASSIFICATION ECU**
    (a) Disconnect the connector from the occupant classification ECU.
    (b) Using a screwdriver, disengage the claw and remove the occupant classification ECU.



RS

INSTALLATION



1. **INSTALL OCCUPANT CLASSIFICATION ECU**
   (a) Check that the ignition switch is off.
   (b) Check that the negative battery (-) cable is disconnected.
   CAUTION:
   Wait for 90 seconds after disconnecting the cable to prevent airbag deployment.
   (c) Engage the claw.
   (d) Connect the connector and install the occupant classification ECU.
   NOTICE:
   - **If the occupant classification ECU has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the occupant classification ECU with a new one.**
   - **When installing the occupant classification ECU, be careful that the SRS wiring does not interfere with other parts and that it is not pinched between other parts.**
2. **INSTALL FRONT SEAT ASSEMBLY RH (for Power Seat) (See page SE-41)**
3. **INSTALL FRONT SEAT ASSEMBLY RH (for Manual Seat) (See page SE-24)**
4. **INSTALL SEAT TRACK COVER LH (for Power Seat) (See page SE-25)**
5. **INSTALL INNER SEAT TRACK BRACKET COVER RH (for Manual Seat) (See page SE-25)**
6. **INSTALL SEAT TRACK COVER RH (for Power Seat) (See page SE-42)**
7. **INSTALL SEAT TRACK COVER RH (for Manual Seat) (See page SE-25)**
8. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Power Seat)**
9. **INSTALL FRONT SEAT HEADREST ASSEMBLY (for Manual Seat)**
10. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (for Manual Seat)**
11. **PERFORM ZERO POINT CALIBRATION AND SENSITIVITY CHECK**
    HINT:
    (See page RS-242)
12. **INSPECT POWER SEAT OPERATION (for Power Seat)**
13. **INSPECT SLIDE ADJUSTER LOCK (for Manual Seat)**

14. INSPECT SEAT HEATER OPERATION (w/ Seat Heater System) (See page SE-42)

15. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light (See page RS-32).

STEERING SYSTEM

PRECAUTION

1. HANDLING PRECAUTIONS FOR STEERING SYSTEM

(a) Care must be taken when replacing parts. Incorrect replacement may affect the performance of the steering system and result in driving hazards.

2. HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

(a) The vehicle is equipped with SRS (Supplemental Restraint System) such as airbags. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident. Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System (See page RS-1).

PROBLEM SYMPTOMS TABLE

HINT:
Use the table below to help determine the cause of the problem. The numbers indicate likely causes of the problem in descending order. Check each part in order. If necessary, repair or replace the faulty parts.

STEERING SYSTEM

Symptom	Suspected area	See page
Hard steering	1. Tires (Improperly inflated)	TW-3
	2. Front wheel alignment (Incorrect)	SP-4
	3. Steering system joints (Worn)	-
	4. Suspension arm ball joints (Worn)	SP-28
	5. Steering column (Binding)	SR-38
	6. Power steering gear	PS-40
Poor return	1. Tires (Improperly inflated)	TW-3
	2. Front wheel alignment (Incorrect)	SP-4
	3. Steering column (Binding)	SR-38
	4. Power steering gear	PS-40
Excessive free play	1. Steering system joints (Worn)	-
	2. Suspension arm ball joints (Worn)	SP-28
	3. Intermediate shaft, universal joint, sliding yoke (Worn)	-
	4. Front wheel bearing (Worn)	AH-5
	5. Power steering gear	PS-40
Abnormal noise	1. Steering system joints (Worn)	-
	2. Power steering gear	PS-40

ON-VEHICLE INSPECTION

1. INSPECT STEERING WHEEL FREE PLAY

(a) Stop the vehicle and align the tires facing straight ahead.

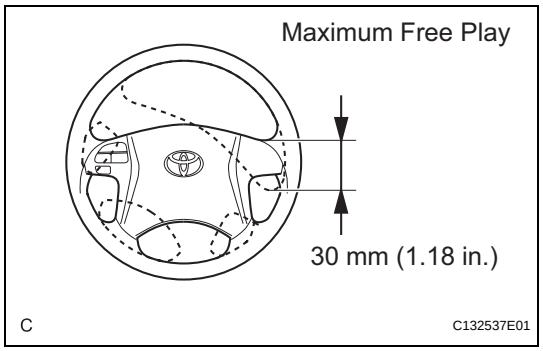
(b) Gently turn the steering wheel right and left by hand, and check the steering wheel free play.

Maximum free play:

30 mm (1.18 in.)

HINT:

If the free play exceeds the maximum, check the steering column, steering intermediate shaft, steering sliding yoke, or steering gear.

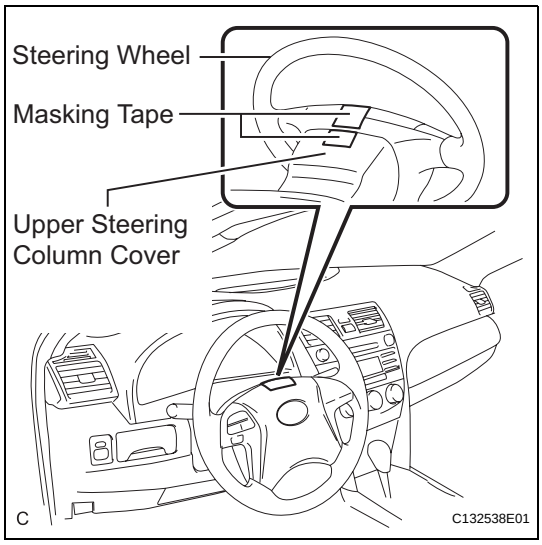


ADJUSTMENT

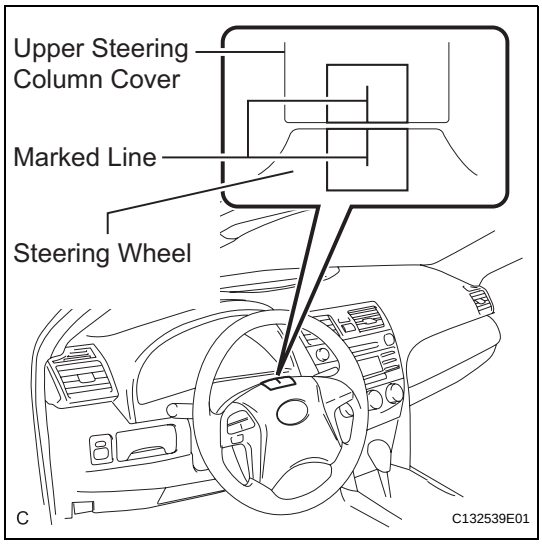
1. STEERING OFF CENTER ADJUSTMENT PROCEDURE

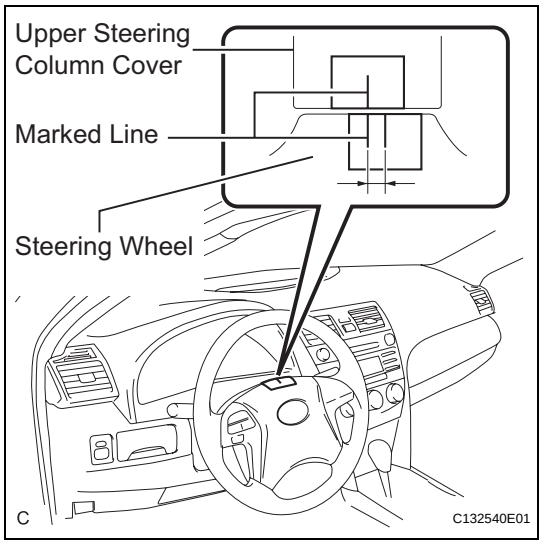
HINT:
This is the adjustment procedure for steering off center.

(a) Inspect steering wheel off center.
  (1) Apply masking tape on the top center of the steering wheel and steering column upper cover.
  (2) Drive the vehicle in a straight line for 100 meters at a constant speed of 35 mph (56 km/h), and hold the steering wheel to maintain the course.

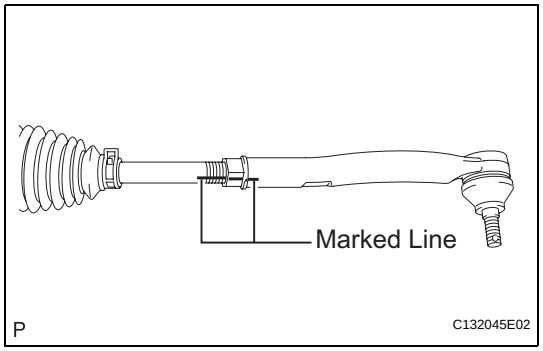


  (3) Draw a line on the masking tape as shown in the illustration.
  (4) Turn the steering wheel to the center position.
  HINT:
  Look at the upper surface of the steering wheel, steering spoke, and SRS airbag line to find the center position.

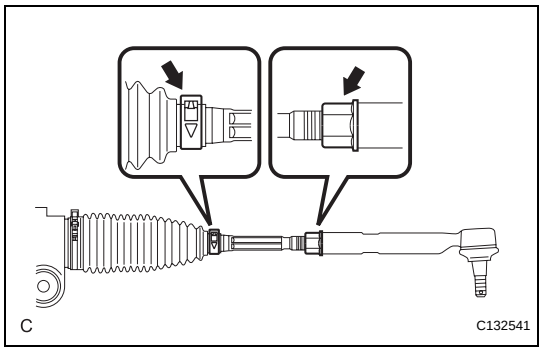




(5) Draw a new line on the masking tape on the steering wheel as shown in the illustration.
(6) Measure the distance between the 2 lines on the masking tape on the steering wheel.
(7) Convert the measured distance to steering angle.
HINT:
- Measured distance 1 mm (0.04 in.) = Steering angle of approximately 1 degree.
- Make a note of the steering angle.



(b) Adjust steering angle.
(1) Draw a line on the RH and LH tie rod ends and rack ends respectively where it can be easily seen.
(2) Using a paper gauge, measure the distance from the RH and LH tie rod ends to the rack end screws.
HINT:
- Measure both the RH and LH sides.
- Make a note of the measured values.



(3) Remove the RH and LH boot clips from the rack boots.
(4) Loosen the RH and LH lock nuts.
(5) Turn the RH and LH rack ends by the same amount (but in different directions) according to the steering angle.
HINT:
One 360 degree turn of the rack end (1.5 mm (0.059 in.) horizontal movement) equals to 12 degrees of steering angle.
(6) Tighten the RH and LH lock nuts to the specified torque.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
NOTICE:
Make sure that the difference in length between the RH and LH tie rod ends and rack end screws is within 1.5 mm (0.059 in.).
(7) Install the RH and LH boot clips.

SR

ELECTRIC STEERING LOCK

PRECAUTION

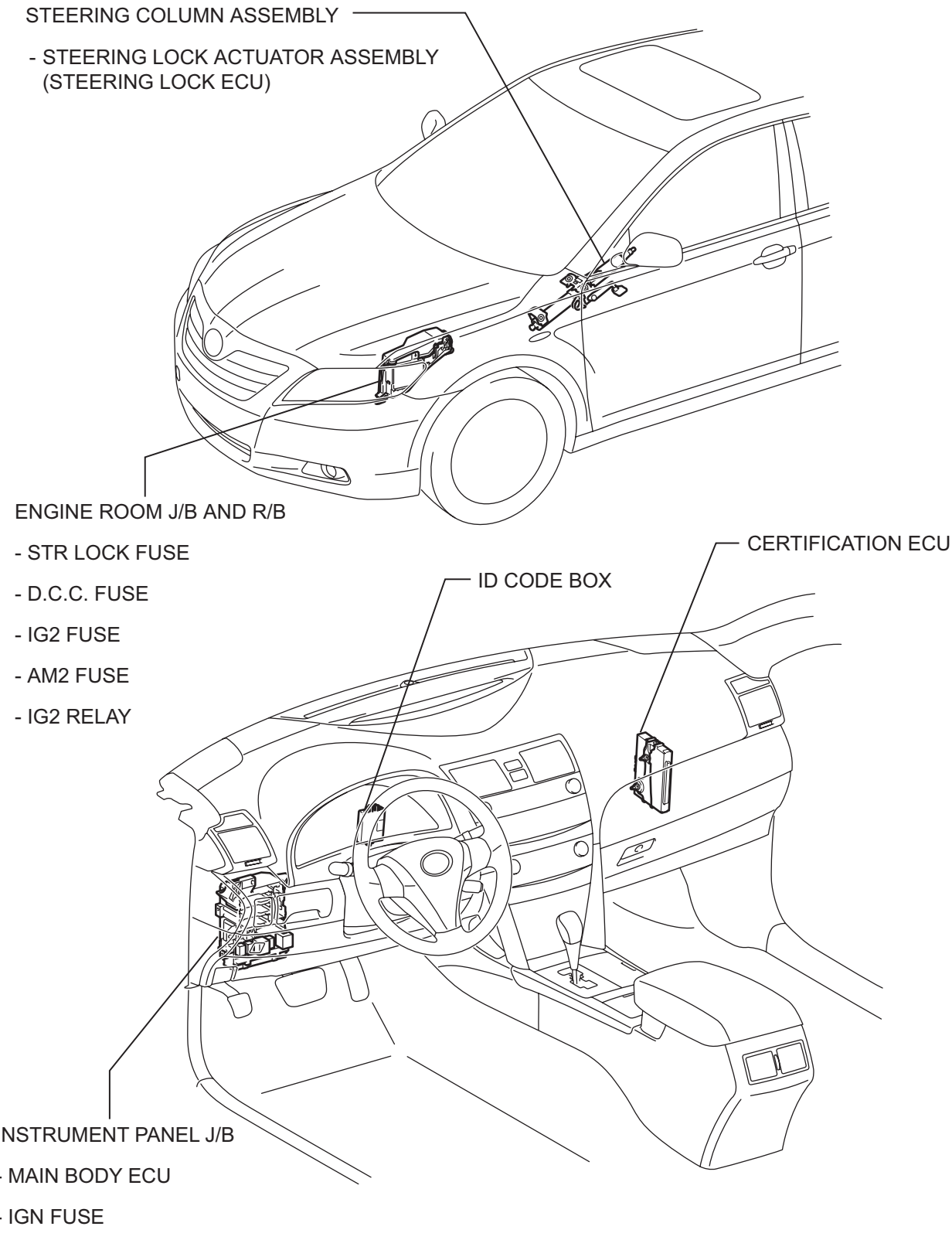
1. PRECAUTIONS WHEN WORKING ON ELECTRIC STEERING LOCK

(a) After replacing the steering lock actuator assembly (steering lock ECU), perform the key ID code registration.

(b) If the steering lock actuator assembly is replaced, open and close the driver's door. The engine may not start until the driver's door is opened or closed.
HINT:
Opening and closing the driver's door causes the steering lock actuator assembly (steering lock ECU) to memorize the correct steering lock bar position.

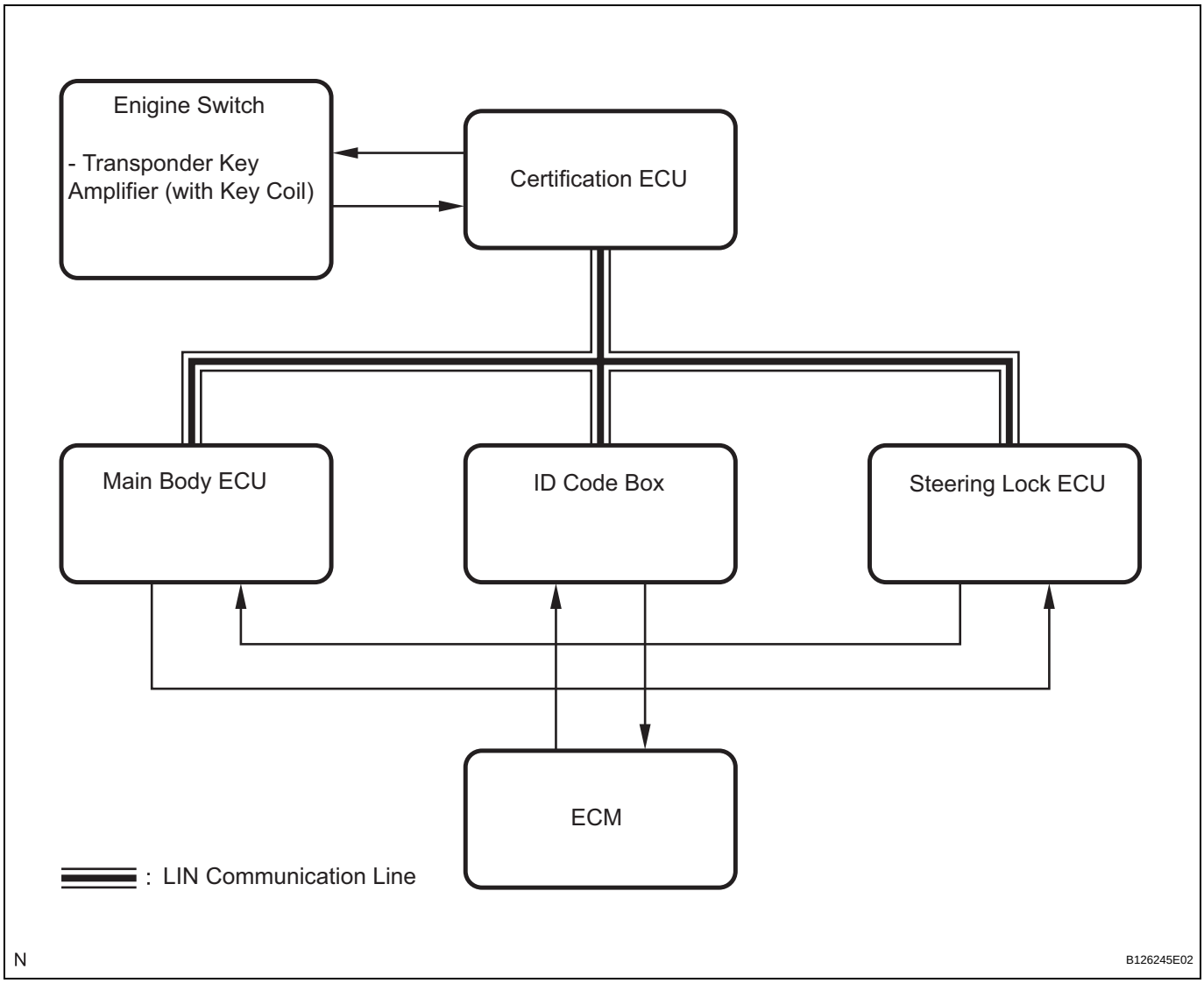
(c) If checking for DTCs of the smart access system with push-button start function or if checking the DATA LIST with the engine switch off, make sure that the driver's door is open.
HINT:
When the engine switch is off, the main body ECU may be in a sleep mode. If the main body ECU is in this sleep mode, it will not be possible for the intelligent tester to communicate with it. Opening and closing the driver's door will cause the ECU to exit the sleep mode.

PARTS LOCATION



SR

SYSTEM DIAGRAM



Input and output signals of each ECU:

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication Method
Main Body ECU	Steering Lock ECU	Power supply status (to steering lock motor)	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Sleep available status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock / Unlock sensor status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Steering lock status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Motor control status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Diagnostic response status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock / Unlock sensor malfunction	LIN

Transmitting ECU (transmitter)	Receiving ECU	Signals	Communication Method
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Power supply malfunction (to steering lock motor)	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Motor driver malfunction	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock bar (stuck) status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Push start status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Lock / Unlock relay drive status	LIN
Steering Lock ECU	• Certification ECU • Main Body ECU • ID Code Box	Engine start control status	LIN

SYSTEM DESCRIPTION

1. DESCRIPTION

(a) The steering lock system locks or unlocks the steering lock by activating the steering lock bar with a motor. The steering lock ECU activates the motor based on signals from the certification ECU and main body ECU.

(b) A LIN (Local Interconnect Network) is used for communication between different ECUs in this system.

2. FUNCTIONS OF COMPONENTS

(a) The steering lock ECU controls the system based on information from the following components.

Item	Function
Steering lock actuator assembly	Consists of a motor, lock bar, lock and unlock position sensors, etc. Activated by the steering lock ECU.
Steering lock ECU	Included in the steering lock actuator assembly. This ECU activates the steering lock motor based on permission signals from the main body ECU and certification ECU. Detects steering lock or unlock state and transmits this status to other ECUs.
Main body ECU	Permits the steering lock ECU to supply power to activate the motor. The main body ECU and certification ECU permit engine start after receiving an unlock signal from the steering lock ECU.
Certification ECU	Orders the steering lock ECU to lock / unlock the steering. The main body ECU and certification ECU permit engine start after receiving an unlock signal from the steering lock ECU.
IG2 relay	Controlled by the main body ECU. This ECU sends IG signals to the steering lock ECU.

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester can be used at steps 2, 6, 9 and 12.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CHECK AND CLEAR DTCS

NEXT

3	PROBLEM SYMPTOM CONFIRMATION

- SYMPTOM DOES NOT OCCUR (Go to step 4)
- SYMPTOM OCCURS (Go to step 5)

4	SYMPTOM SIMULATION

NEXT

5	CHECK CAN COMMUNICATION SYSTEM

HINT:
Check that there are no problems in the CAN communication system before troubleshooting the steering lock system.

NEXT

6	DTC CHECK

- DTC IS NOT OUTPUT (Go to step 7)
- DTC IS OUTPUT (Go to step 8)

7	PROBLEM SYMPTOMS TABLE

- Go to step 9

SR

8	DTC CHART

NEXT

9	CIRCUIT INSPECTION

NEXT

10	PROBLEM IDENTIFICATION

NEXT

11	REPAIR OR REPLACEMENT

NEXT

SR

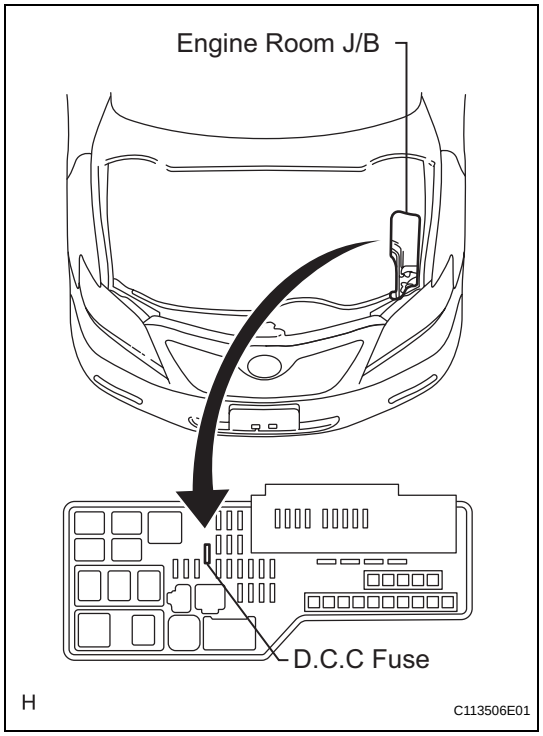
12	CONFIRMATION TEST

NEXT

END

INITIALIZATION

HINT:
In vehicles equipped with the smart access system with push-button start function, the starting function may not operate after recharging or while jump-starting a discharged battery. This condition is most common if the battery voltage drops below 9 V. The following procedure has been developed to address this condition.



1. INITIALIZATION PROCEDURE

(a) Confirm that the D.C.C. fuse is installed.
HINT:
If the D.C.C. fuse is not installed, install it at this time.
(b) Move the shift lever to the P position.
(c) Turn the engine switch off.
(d) Open the driver's door.
HINT:
Opening the driver's door will start an initialization process between the steering lock ECU and the engine room J/B.
(e) Depress the brake pedal.
(f) Press the "START STOP" switch.

SR

PROBLEM SYMPTOMS TABLE

Inspect the suspected areas in numerical order by referring to the corresponding pages when any of the following symptoms occurs:

ELECTRIC STEERING LOCK FUNCTION:

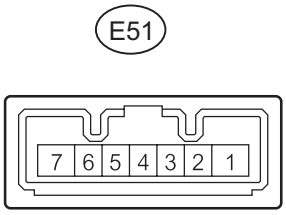
Symptom	Suspected area	See page
Steering wheel cannot be unlocked (the engine cannot be started).	1. Initialization	SR-9
	2. Check for DTCs in the smart access system with push-button start.	ST-26
	3. Check for DTCs in the engine immobiliser system.	EI-24
	4. Check that the LCK/UNLCK REC item in the DATA LIST of the certification ECU displays YES within 10 seconds after starting the engine. (If it displays NO, see "No steering unlock" command in this table.)	SR-14
	5. Check the input signal from the IGE terminal of the steering lock ECU.	SR-24
	6. Steering lock ECU power source circuit.	SR-30
	7. Replace the steering lock ECU.	SR-42
Steering wheel cannot be unlocked (no steering unlock command).	1. Check that the S CODE MACH item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	2. Check that the L CODE MACH item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	3. Replace the certification ECU.	-
Steering wheel cannot be locked.	1. Check for DTCs in the smart access system with push-button start.	ST-26
	2. Check for DTCs in the engine immobiliser system.	EI-24
	3. With the engine switch off and the shift in the P position, open and close the driver's door. After that, check that the LCK/UNLCK REC item in the DATA LIST of the certification ECU displays YES within 10 seconds. (If it displays NO, see "No steering lock" command in this table.)	SR-14
	4. Check the input signal from the IGE terminal of the steering lock ECU.	SR-24
	5. Steering lock ECU power source circuit.	SR-30
	6. Replace the steering lock ECU.	SR-42
Steering wheel cannot be locked (no steering lock command).	1. Courtesy light switch circuit	LI-52
	2. Check that the S CODE MACH item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	3. Check that the L CODE MACH item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	4. Replace the certification ECU.	-

SR

SMART ACCESS SYSTEM WITH PUSH-BUTTON START FUNCTION:

Symptom	Suspected area	See page
Engine does not start.	1. Initialization	SR-9
	2. Check for DTCs in the smart access system with push-button start.	ST-26
	3. Check for DTCs in the engine immobiliser system.	EI-24
	4. Check that the engine switch is turned on (IG).	-
	5. Check cranking operation. (If cranking operation is possible, see "Engine does not start due to the engine immobiliser" in this table.)	-
	6. Check SHIFT P SIG in the DATA LIST of the power source control ECU and confirm that the shift signal is normal.	-
	7. Check whether the steering wheel is locked or unlocked. (If it is locked, see "Steering wheel cannot be unlocked" in the steering lock function table.)	-
	8. Check the output from the SLP terminal of the steering lock ECU.	SR-28
	9. Check the output signal from the ST SW of the certification ECU (DTC B2275).	ST-48
	10. Replace the main body ECU.	-
Engine does not start due to the engine immobiliser.	1. Check that the L CODE MACH item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	2. Check that the ENG START REQ item in the DATA LIST of the certification ECU displays YES. (If it displays NO, replace the certification ECU.)	-
	3. Check that the S CODE MACH item in the DATA LIST of the certification ECU displays OK. (If it displays NG, replace the ID code box.)	-
	4. Replace the ID code box.	-

TERMINALS OF ECU



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C106482E05

1. STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Terminal No. (Symbols)	Wiring Color	Terminal Description	Condition	Specified Condition
E51-1 (GND) - Body ground	W-B - Body ground	Ground	Always	Below 1 V
E51-2 (SGND) - Body ground	W-B - Body ground	Signal ground	Always	Below 1 V
E51-3 (IGE) - E51-1 (GND)	BR - W-B	Power source for driving motor	• Motor is in operation • Motor is not in operation	• Below 1 V • 10 to 12 V
E51-4 (SLP1) - E51-2 (SGND)	P - W-B	Unlock position sensor output signal	• Steering is locked • Steering lock is released	• 10 to 14 V • Below 1 V
E51-5 (LIN) - E51-2 (SGND)	O - W-B	LIN communication bus	Engine switch on (IG)	Pulse generation
E51-6 (IG2) - E51-1 (GND)	B - W-B	IG signal input	Engine switch on (IG)	10 to 14 V
E51-7 (B) - E51-1 (GND)	P - W-B	Power source	Always	10 to 14 V

SR

DIAGNOSIS SYSTEM

1. DESCRIPTION

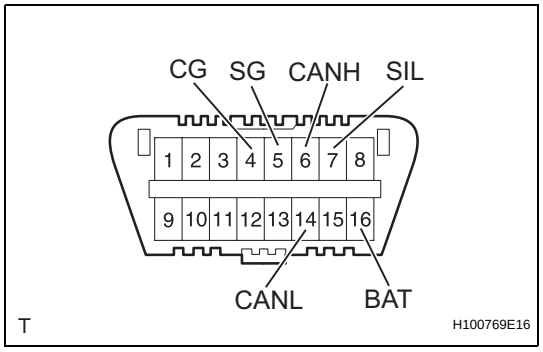
(a) DIAGNOSTIC SYSTEM

When troubleshooting a vehicle with a diagnostic system, the only difference from the usual troubleshooting procedure is connecting the intelligent tester to the vehicle and reading various data output from the vehicle's steering lock ECU. The steering lock ECU records DTCs when the computer detects a malfunction in the computer itself or in system circuits.

To check the DTCs, connect the intelligent tester to the DLC3 on the vehicle. The intelligent tester enables the DTCs to be cleared, the indicators to be activated, and the DATA LIST to be checked.

(b) The steering lock ECU diagnosis information cannot be read directly from the steering lock ECU by the tester. The diagnosis information from the steering lock ECU is transmitted to the tester via the certification ECU to the tester using the controller area network (CAN).

2. CHECK DLC3



(a) The certification ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

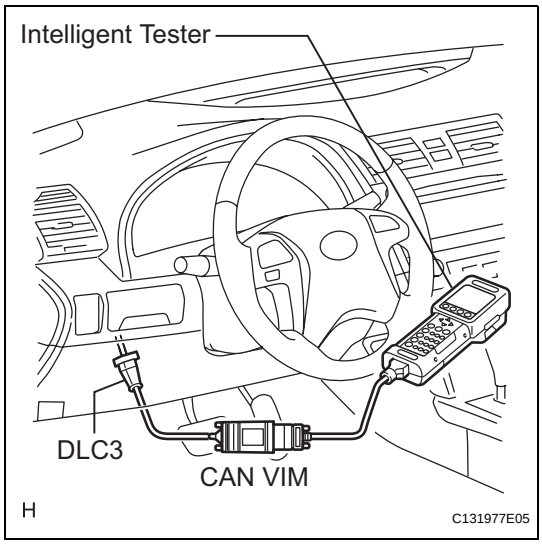
SR

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine Switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine Switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine Switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine Switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine Switch off*	6 kΩ or higher

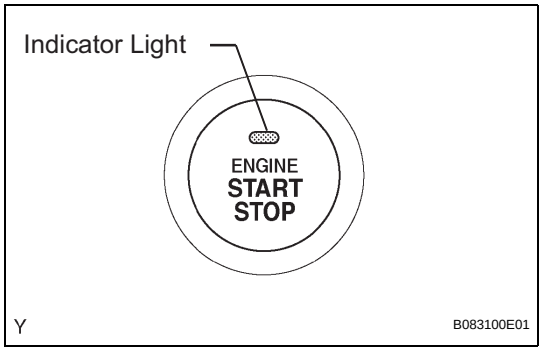
NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, and other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester to the DLC3, turn the engine switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. WARNING FUNCTION OF ENGINE SWITCH INDICATOR

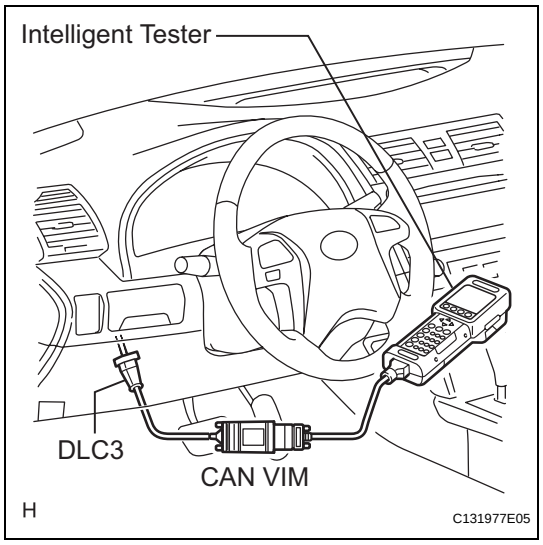
(a) The steering lock ECU blinks the LED indicator of the engine switch when any of the following problems occurs in the system:

Detection Item	Indicator Light Blink Pattern	Indication Status	Countermeasure
Steering lock is still not released	• Blinks green at 1-second intervals • Goes off 15 seconds after blinking starts	The motor operates to release the steering lock, but the steering lock cannot be released (e.g. the lock bar is stuck in the steering column).	Push the engine switch while turning the steering wheel left or right.
Malfunction in smart access system with push-button start	• Blinks amber at 2-second intervals • Goes off 15 seconds after the engine switch is turned off while blinking	• There is a short in the devices activating the motor. • There is a problem in the steering lock ECU or power source control ECU.	Troubleshoot by following "HOW TO PROCEED WITH TROUBLESHOOTING" (See page SR-7).

4. WARNING FUNCTION OF COMBINATION METER

(a) The steering lock ECU displays a warning on the combination meter when any of the following problems occurs in the system.

Detection Item	Display	Indication Status	Countermeasure
Steering lock is still not released	"S/T is not Unlocked" • Goes off 15 seconds after blinking starts	The motor operates to release the steering lock, but the steering lock cannot be released (e.g. the lock bar is stuck in the steering column).	Push the engine switch while turning the steering wheel left or right.
Malfunction in push start system	"Check S/T Lock" • Goes off 15 seconds after the engine switch is turned off while blinking	• There is a short in the devices activating the motor. • There is a problem in the steering lock ECU or power source control ECU.	Troubleshoot by following "HOW TO PROCEED WITH TROUBLESHOOTING" (See page SR-7).



DTC CHECK / CLEAR

1. CHECK FOR DTCS

(a) Prepare the intelligent tester.

(b) Connect the intelligent tester to the DLC3 at the lower part of the instrument panel.

(c) Turn the engine switch on (IG) and turn the intelligent tester on.

(d) Use the intelligent tester to check for DTCs, and note or print the result (see the operator's manual for operating instructions).

(e) Confirm the details of the DTCs (See page SR-15).

2. CLEAR DTCS

(a) Operate the intelligent tester to clear the DTCs (see the operator's manual for operating instructions).

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

By accessing the DATA LIST displayed on the intelligent tester, it is possible to perform such functions as reading the values of switches and sensors without removing any parts. Reading the DATA LIST is the first step in troubleshooting and is one method to save labor time.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the engine switch on (IG) and turn the intelligent tester on.

(c) Operate the intelligent tester according to the steps on the display and select DATA LIST.

SMART ACCESS:

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
SLCK SLEEP COND	Steering lock ECU sleep condition / YES or NO	YES: Steering lock ECU sleep mode can be entered NO: Steering lock ECU sleep mode cannot be entered	-
SLCK START COND	Steering lock ECU start signal / YES or NO	YES: Steering lock ECU sent a start signal NO: Steering lock ECU did not send a start signal	-
ENG START COND	Engine start condition / OK or NG	OK: Engine is allowed to start NG: Engine is not allowed to start	-
SENSOR VALUE	Sensor malfunction / NG (PAST) or OK	NG (PAST): Sensor malfunction OK: No malfunction	-
PWR SUPPLY SHRT	Short in ECU / NG (PAST) or OK	NG (PAST): Short in ECU OK: No malfunction	-
PWR SUPPLY OPEN	Open in ECU / NG (PAST) or OK	NG (PAST): Open in ECU OK: No malfunction	-
MTR DRIVER SHRT	Short in driver ECU / NG (PAST) or OK	NG (PAST): Short in driver ECU OK: No malfunction	-
MTR DRIVER OPEN	Open in driver ECU / NG (PAST) or OK	NG (PAST): Open in driver ECU OK: No malfunction	-
LCK/UNLCK REC	Steering lock command reception record / YES or NO	YES: Steering lock / unlock signal received NO: Steering lock / unlock signal no received	-
LCK BAR STUCK	Lock bar stuck malfunction / NG (PAST) or OK	NG (PAST): Lock bar stuck malfunction OK: No malfunction	-
PUSH START ERR	Push button start function malfunction / NG (PAST) or OK	NG (PAST): Malfunction in push button start OK: No malfunction	-
IG2	IG2 voltage / ON or OFF	ON: 10 to 14 V OFF: Below 1 V	-
IG (LIN)	LIN bus IG status / ON or OFF	ON: LIN bus IG ON status OFF: LIN bus IG OFF status	-
STEERING LOCK	Steering lock condition / Set or Unset	Set: Steering lock is set Unset: Steering lock is not set	This status changes depending on the state of some sensors.
STEERING UNLOCK	Steering unlock condition / Set or Unset	Set: Steering unlock is set Unset: Steering unlock is not set	This status changes depending on the state of some sensors.

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST is one of the methods to save labor time. It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the engine switch on (IG) and turn the intelligent tester on.

(c) Following the display on the intelligent tester, perform the ACTIVE TEST.

BODY:

Item	Test Details	Diagnostic Note
SECURITY INDIC	Security Indicator / ON or OFF	-

DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the parts listed for that code in the table below and proceed to the appropriate page.
HINT:
The steering lock ECU does not store DTCs regarding the past problems.

ELECTRIC STEERING LOCK:

DTC No.	Detection Item	Trouble Area	See page
B2781	Open / Short in Steering Lock ECU	Steering lock actuator assembly (Steering lock ECU)	SR-17
B2782	Power Source Control ECU Malfunction	1. Wire harness 2. Steering lock actuator assembly (Steering lock ECU) 3. Main body ECU	SR-18
B2788	IG2 Signal Malfunction	1. IG2 relay 2. Wire harness 3. Main body ECU 4. Steering lock actuator assembly (Steering lock ECU)	SR-21

DTC	B2781	Open / Short in Steering Lock ECU

DESCRIPTION

If the steering lock ECU determines that there is a malfunction inside the ECU, it outputs this DTC. The steering lock ECU diagnosis information cannot be read directly from the steering lock ECU by the tester. The diagnosis information from the steering lock ECU is transmitted to the tester via the certification ECU to the tester using the controller area network (CAN).

DTC No.	DTC Detecting Condition	Trouble Area
B2781	• Steering lock motor drive circuit is defective. • Both lock and unlock position sensors detect "ON".	Steering lock actuator assembly (Steering lock ECU)

INSPECTION PROCEDURE

1	REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

HINT:
The steering lock ECU and steering lock actuator assembly are supplied as a unit.

(a) Replace the steering lock actuator assembly (See page SR-42).

NEXT

SR

END

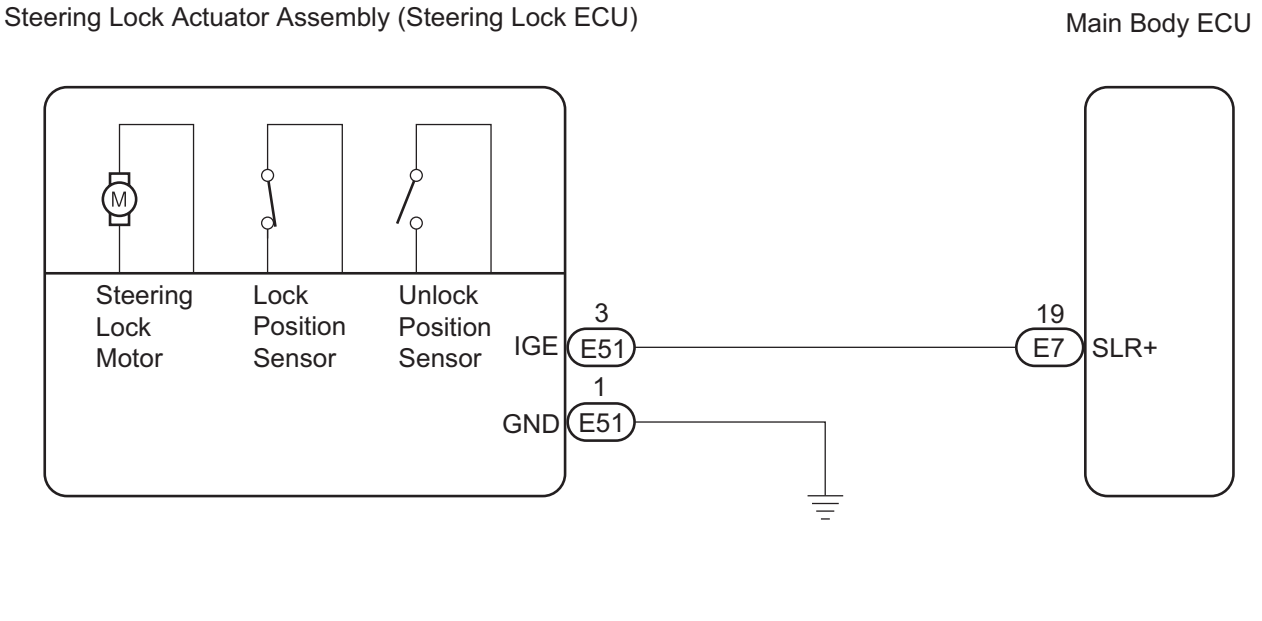
DTC	B2782	Power Source Control ECU Malfunction

DESCRIPTION

The main body ECU (*) controls the power supply to activate the steering lock motor. This prevents the steering from being locked while the vehicle is moving.
HINT:
*: The power source control ECU is not a physical part. This code refers to the power source control function performed by the main body ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B2782	Steering lock motor drive control circuit is defective.	• Wire harness • Steering lock actuator assembly (Steering lock ECU) • Main body ECU

WIRING DIAGRAM

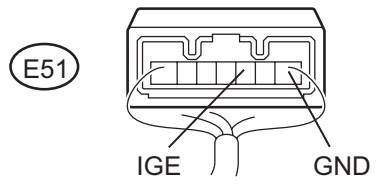


SR

INSPECTION PROCEDURE

1	INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Steering Lock Actuator Assembly:



(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester connection (Symbols)	Condition	Specified condition
E51-3 (IGE) - E51-1 (GND)	The specified condition should be checked after performing the following: 1. Engine switch off 2. Turn the engine switch on (ACC or IG)	• Motor activated: Below 1 V • Motor not activated: 10 to 12 V

Tester connection (Symbols)	Condition	Specified condition
E51-3 (IGE) - E51-1 (GND)	The specified condition should be checked after performing the following: 1. Move the shift lever to the P position 2. Turn the engine switch off 3. Open the driver's door	• Motor activated: Below 1 V • Motor not activated: 10 to 12 V

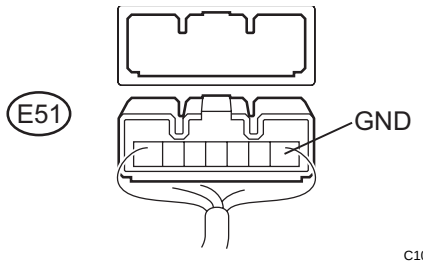
HINT:
The steering lock ECU and steering lock actuator assembly are supplied as a unit.

OK → **REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)**

NG

2 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)

Steering Lock Actuator Assembly:



(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
E51-1 (GND) - Body ground	Always	Below 1 Ω

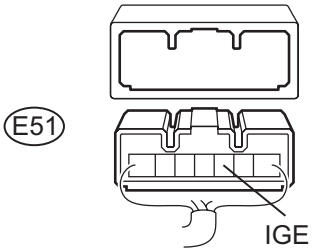
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

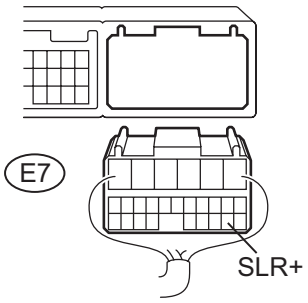
SR

3	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)

Steering Lock Actuator Assembly:



Main Body ECU:



H C113502E01

(a) Disconnect the E7 connector from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
E51-3 (IGE) - E7-19 (SLR+)	Always	Below 1 Ω
E51-3 (IGE) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

SR

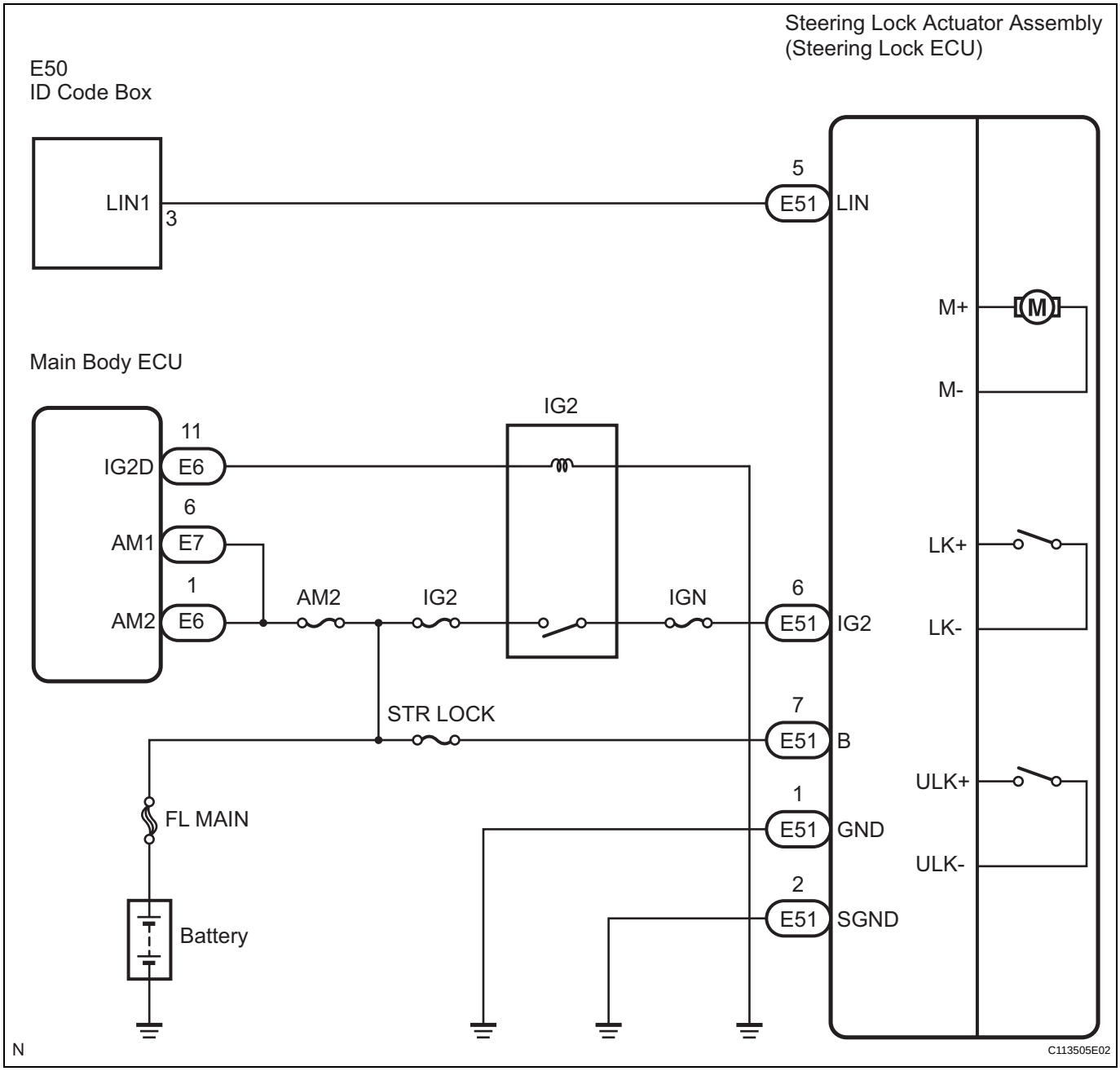
DTC	B2788	IG2 Signal Malfunction

DESCRIPTION

The steering lock ECU receives power from the IG2 relay. When the digital signal from the certification ECU and the voltage from the IG2 relay are received by the steering lock ECU, the steering will be unlocked. The steering lock ECU will not lock the steering when power from the IG2 relay is present (this prevents the steering from being locked while the vehicle is moving).

DTC No.	DTC Detecting Condition	Trouble Area
B2788	Different information is obtained from IG2 signals received directly from the IG2 circuit, and from IG2 signals sent via LIN communication for a period of 1 second.	• IG2 relay • Wire harness • Main body ECU • Steering lock actuator assembly (Steering lock ECU)

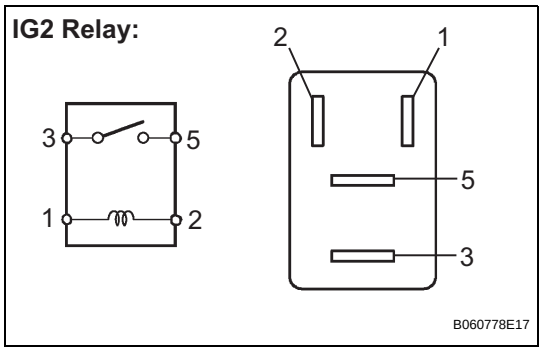
WIRING DIAGRAM



SR

INSPECTION PROCEDURE

1 **INSPECT IG2 RELAY**



(a) Remove the IG2 relay from the engine room R/B.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

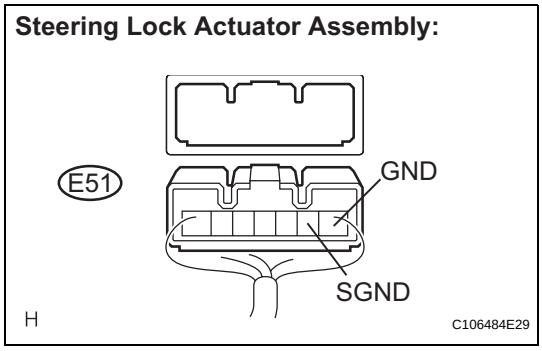
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → **REPLACE IG2 RELAY**

OK

2 **CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)**

SR



(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Measure the resistance according to the value(s) in the table below.

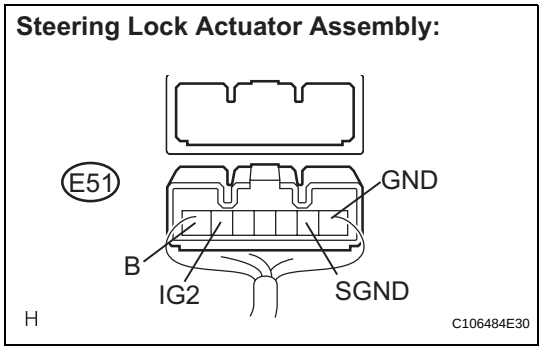
Standard resistance

Tester connection (Symbols)	Condition	Specified condition
E51-1 (GND) - Body ground	Always	Below 1 Ω
E51-2 (SGND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 **CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)**



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection (Symbols)	Condition	Specified condition
E51-6 (IG2) - E51-1 (GND)	Engine switch on (IG)	10 to 14 V
E51-6 (IG2) - E51-2 (SGND)	Engine switch on (IG)	10 to 14 V

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
*E51-6 (IG2) - E51-7 (B)	Engine switch off	10 kΩ or higher

*: This measurement is performed with the engine switch off to check for a short between IG2 and battery voltage.

OK → **REPLACE STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)**

NG

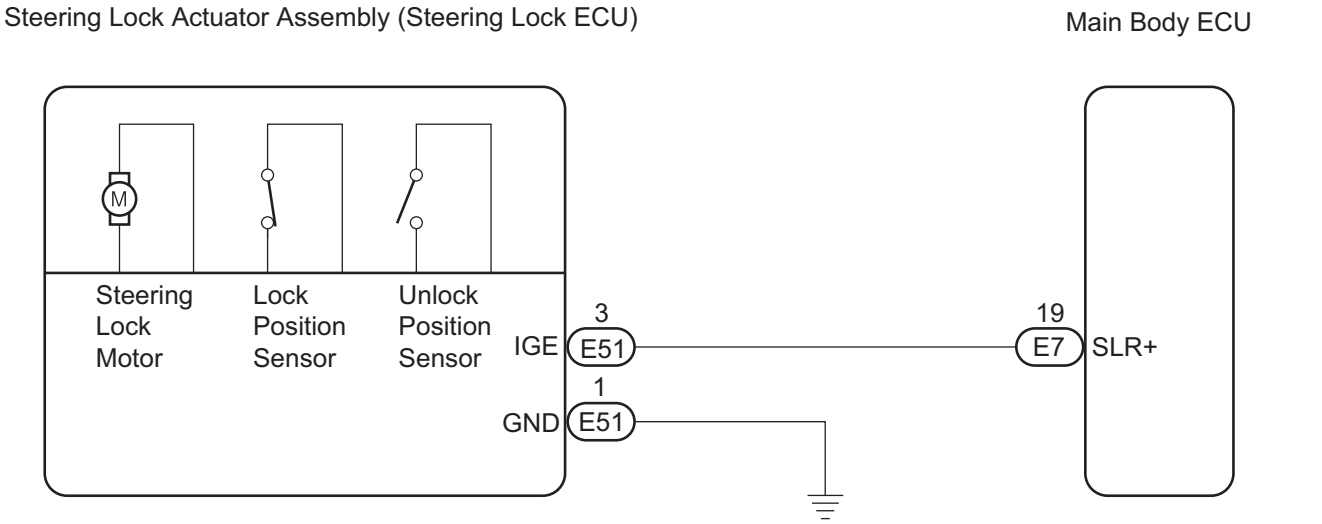
REPAIR OR REPLACE HARNESS OR CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)

Steering Lock Motor Drive Power Circuit

DESCRIPTION

The steering lock ECU is connected to the main body ECU and certification ECU. The steering lock ECU cannot activate the motor unless it receives permission signals from both ECUs. (The main body ECU permits the steering lock ECU to supply power to activate the motor.)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK VEHICLE CONDITION

(a) Check the problem symptom of the steering lock system.

Result

Condition	Proceed to
Steering lock cannot be released	A
Steering cannot be locked	B

B → Go to step 6

A

2	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.
(b) Turn the engine switch on (IG), and turn the intelligent tester on.

(c) Select the item below in the DATA LIST, and read its value displayed on the intelligent tester.

SMART ACCESS

Item	Measurement Item / Range (Display)	Normal Condition
LCK/UNLCK REC	Steering lock command reception record / YES or NO	YES: Steering lock / unlock signal received NO: Steering lock / unlock signal not received

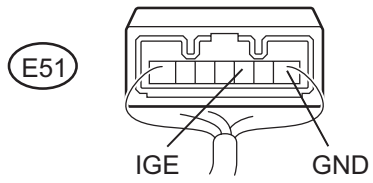
(d) Check if steering unlock command signal has been received.
OK:
"YES" is displayed on the tester display.

NG → **CHECK SMART ACCESS SYSTEM WITH PUSH-BUTTON START**

OK

3 INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Steering Lock Actuator Assembly:



(a) Measure the voltage according to the value(s) in the table below.
Standard voltage

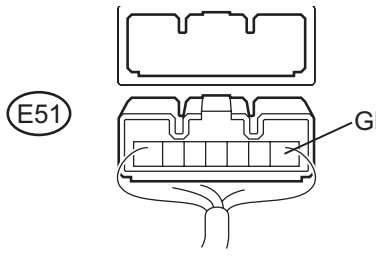
Tester connection (Symbols)	Condition	Specified condition
E51-3 (IGE) - E51-1 (GND)	1. Engine switch off 2. Turn the engine switch on (ACC or IG)	• Motor activated: Below 1 V • Motor not activated: 10 to 12 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

4 CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)

Steering Lock Actuator Assembly:



(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

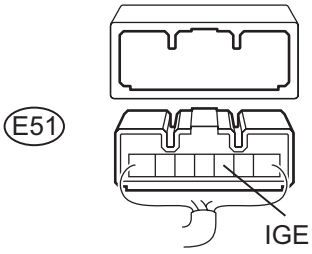
Tester connection (Symbols)	Condition	Specified condition
E51-1 (GND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

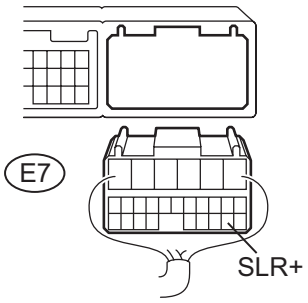
OK

5	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)

Steering Lock Actuator Assembly:



Main Body ECU:



H C113502E01

(a) Disconnect the E7 connector from the main body ECU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
E51-3 (IGE) - E7-19 (SLR+)	Always	Below 1 Ω
E51-3 (IGE) - Body ground	Always	10 kΩ or higher

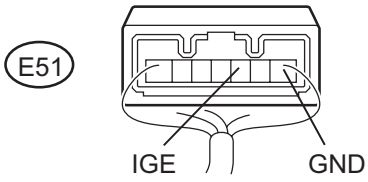
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

6	INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Steering Lock Actuator Assembly:



H C106483E22

(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

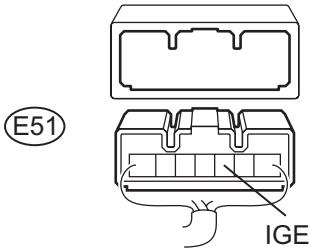
Tester connection (Symbols)	Condition	Specified condition
E51-3 (IGE) - E51-1 (GND)	The specified condition should be checked after performing the following: 1. Move the shift lever to the P position 2. Turn the engine switch off 3. Open the driver's door	• Motor activated: Below 1 V • Motor not activated: 10 to 12 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

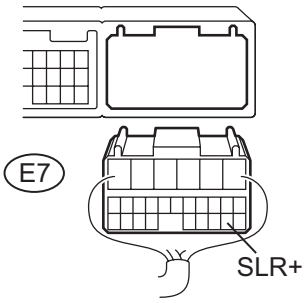
NG

7	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)

Steering Lock Actuator Assembly:



Main Body ECU:



H C113502E01

(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Disconnect the E7 connector from the main body ECU.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
E51-3 (IGE) - E7-19 (SLR+)	Always	Below 1 Ω
E51-3 (IGE) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE MAIN BODY ECU

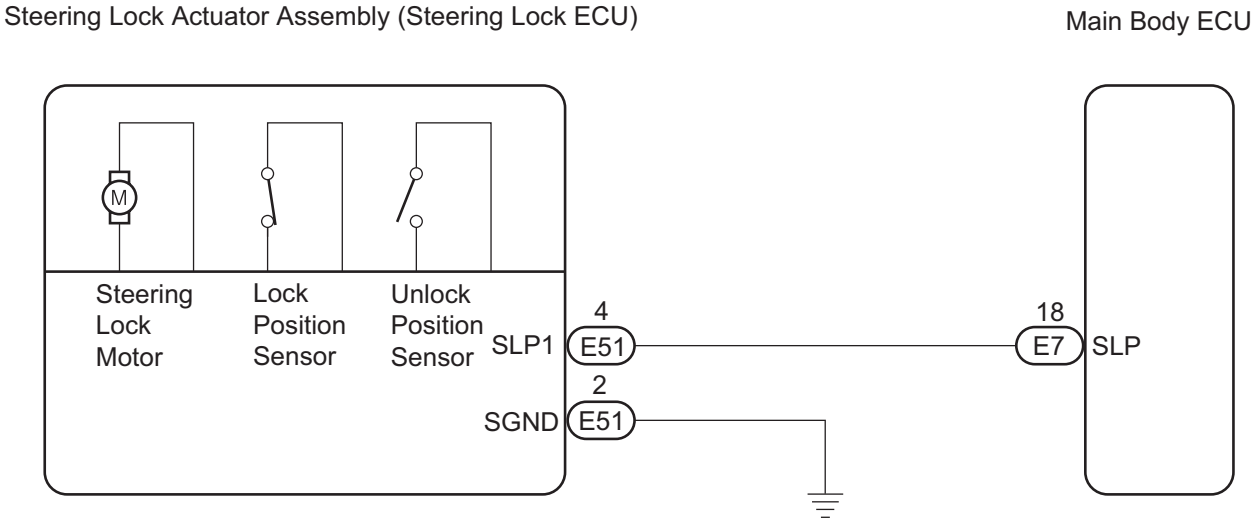
SR

Unlock Position Sensor Signal Circuit

DESCRIPTION

The unlock position sensor is one of the components in the steering lock actuator. The sensor switch contact closes when the steering lock is released. The steering lock release signal is then sent to the main body ECU. Receiving the signal, the ECU permits engine start. (This prevents the engine from being started with the steering locked.)

WIRING DIAGRAM

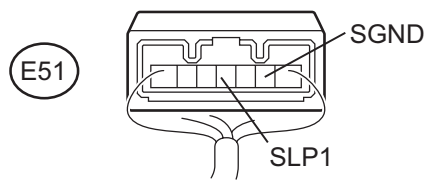


SR

INSPECTION PROCEDURE

1	INSPECT STEERING LOCK ACTUATOR ASSEMBLY (STEERING LOCK ECU)

Steering Lock Actuator Assembly:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

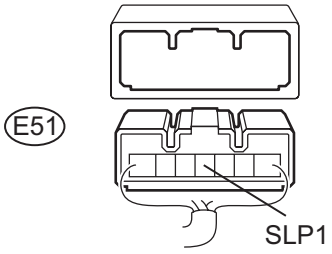
Tester connection (Symbols)	Condition	Specified condition
E51-4 (SLP1) - E51-2 (SGND)	1. Engine switch off 2. Turn the engine switch on (ACC or IG)	Below 1 V

OK → **CHECK PUSH BUTTON START FUNCTION**

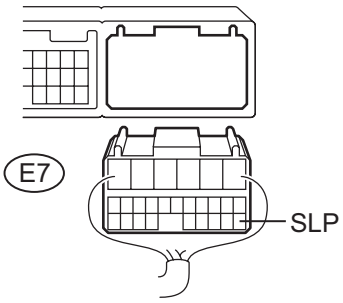
NG

2	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - MAIN BODY ECU)

Steering Lock Actuator Assembly:



Main Body ECU:



H C113502E02

(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Disconnect the E7 connector from the main body ECU.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester connection (Symbols)	Condition	Specified condition
E51-4 (SLP1) - E7-18 (SLP)	Always	Below 1 Ω
E51-4 (SLP1) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

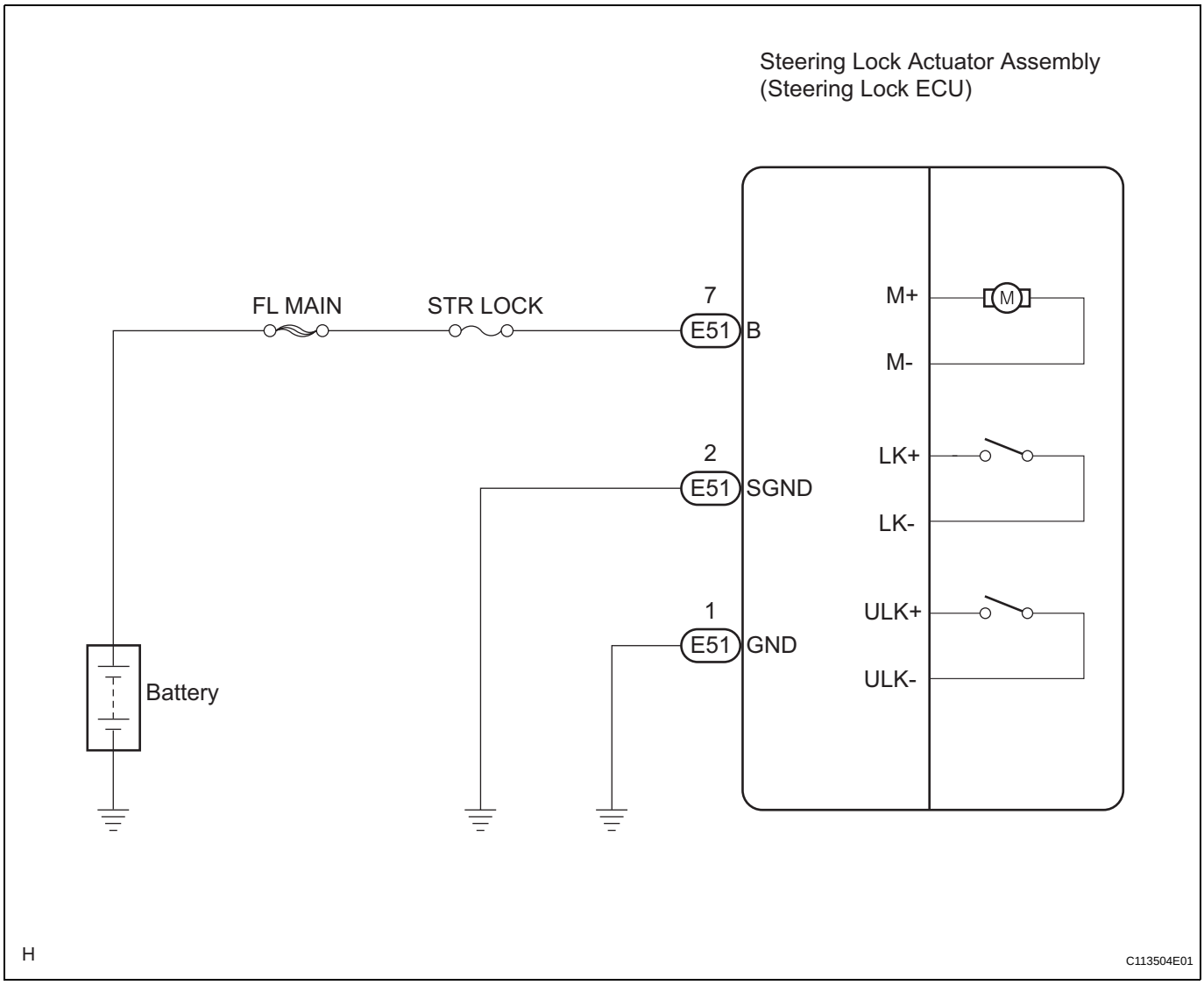
SR

Power Source Circuit

DESCRIPTION

This circuit supplies voltage from the battery to terminal B of the steering lock ECU. This circuit is used as power source for the steering lock CPU, motor, communication, and peripheral circuits.

WIRING DIAGRAM

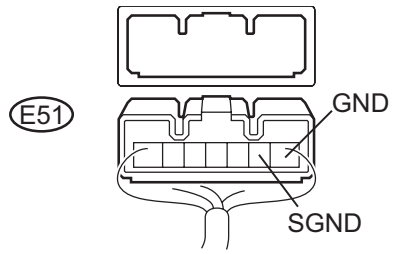


SR

INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BODY GROUND)

Steering Lock Actuator Assembly:



(a) Disconnect the E51 connector from the steering lock actuator assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

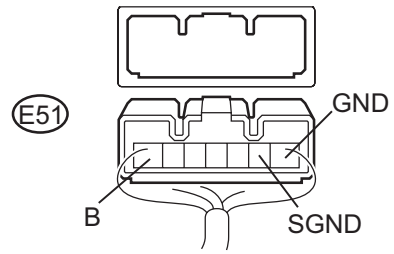
Tester connection (Symbols)	Condition	Specified condition
E51-1 (GND) - Body ground	Always	Below 1 Ω
E51-2 (SGND) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)

Steering Lock Actuator Assembly:



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester connection (Symbols)	Condition	Specified condition
E51-7 (B) - E51-1 (GND)	Always	10 to 14 V
E51-7 (B) - E51-2 (SGND)	Always	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

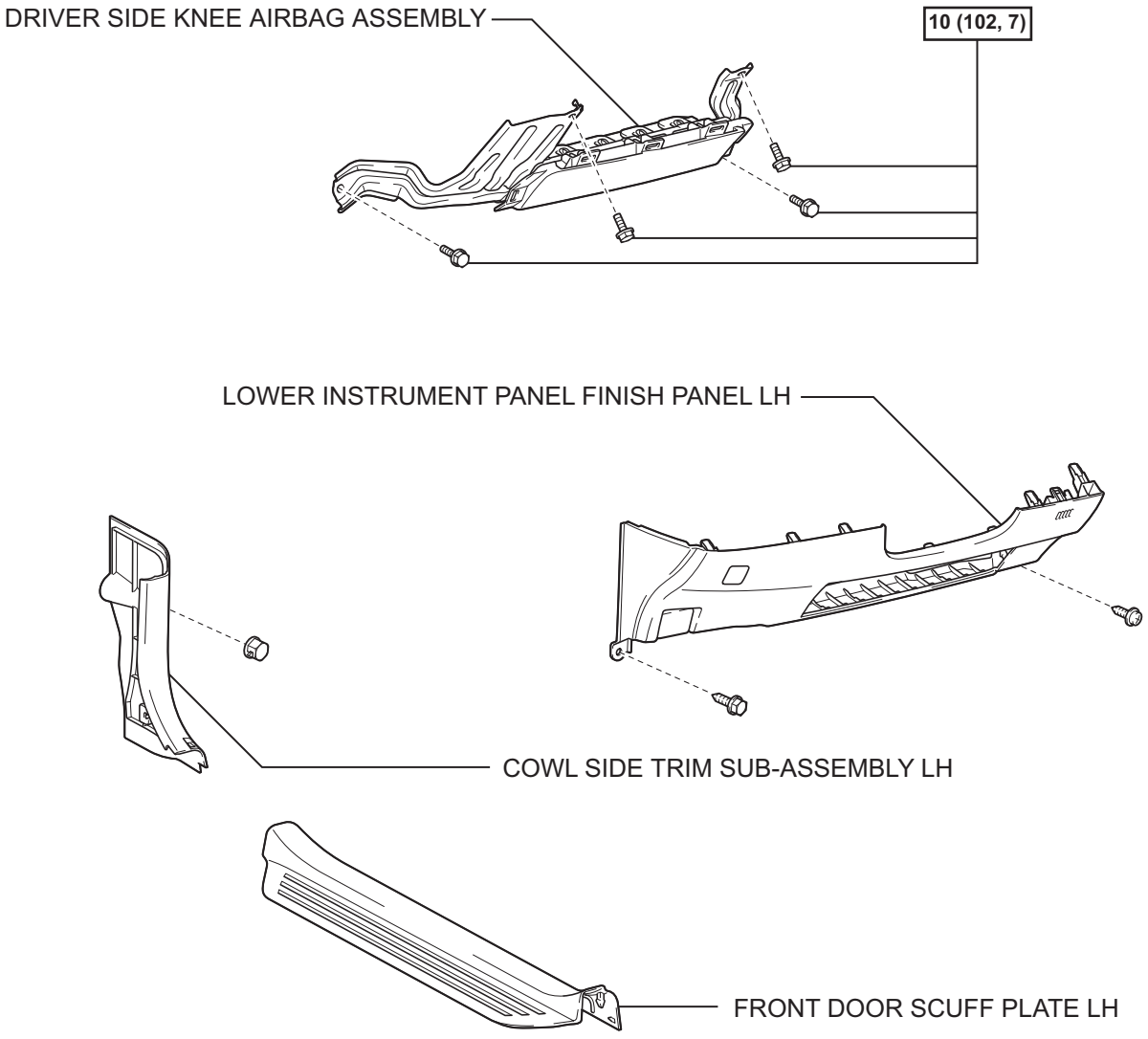
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (STEERING LOCK ACTUATOR ASSEMBLY - BATTERY)

SR

STEERING COLUMN ASSEMBLY

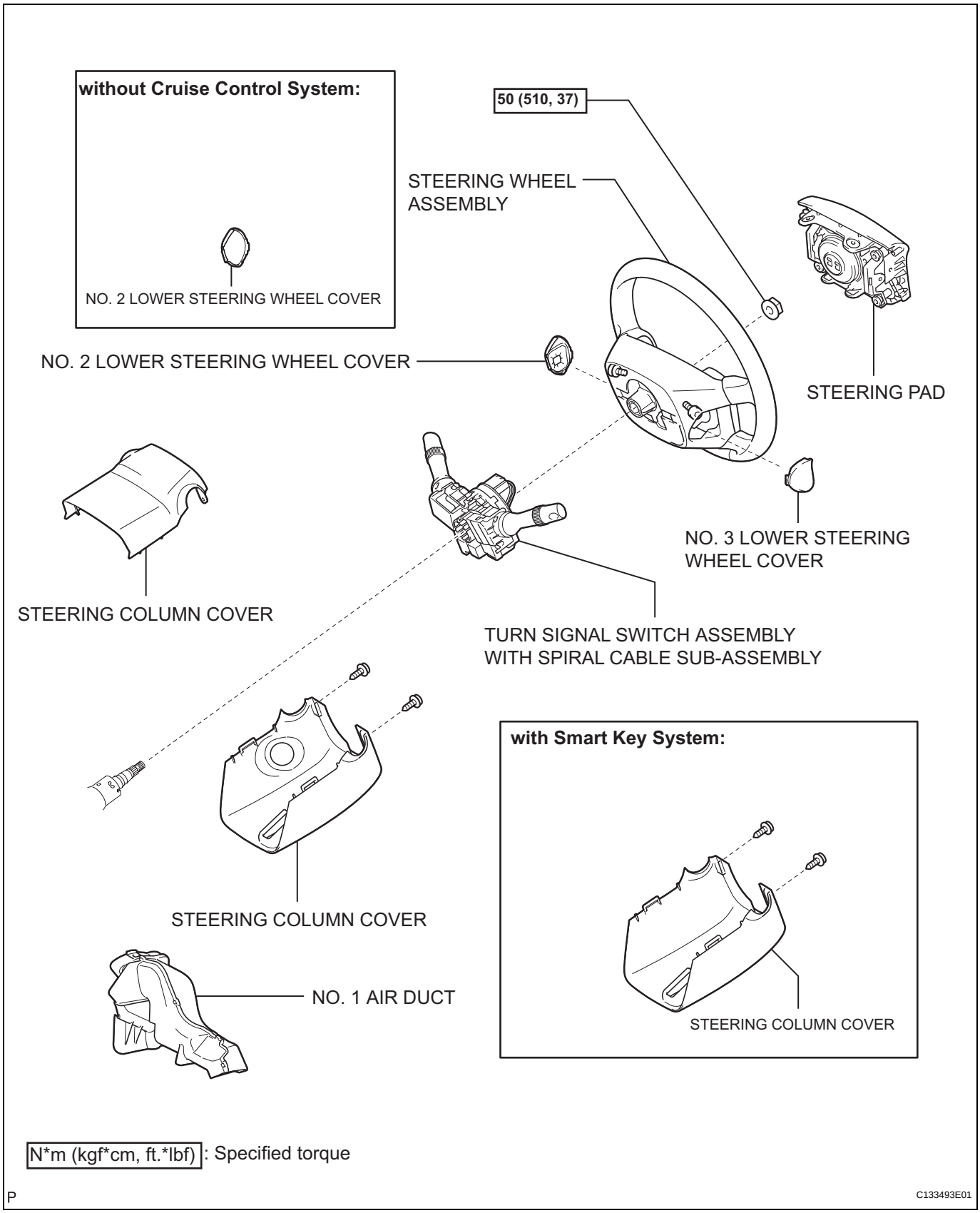
COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

P

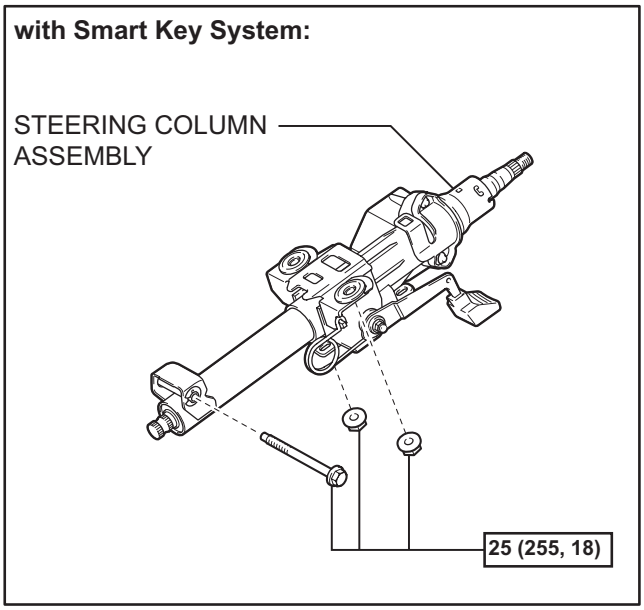
C133871E03

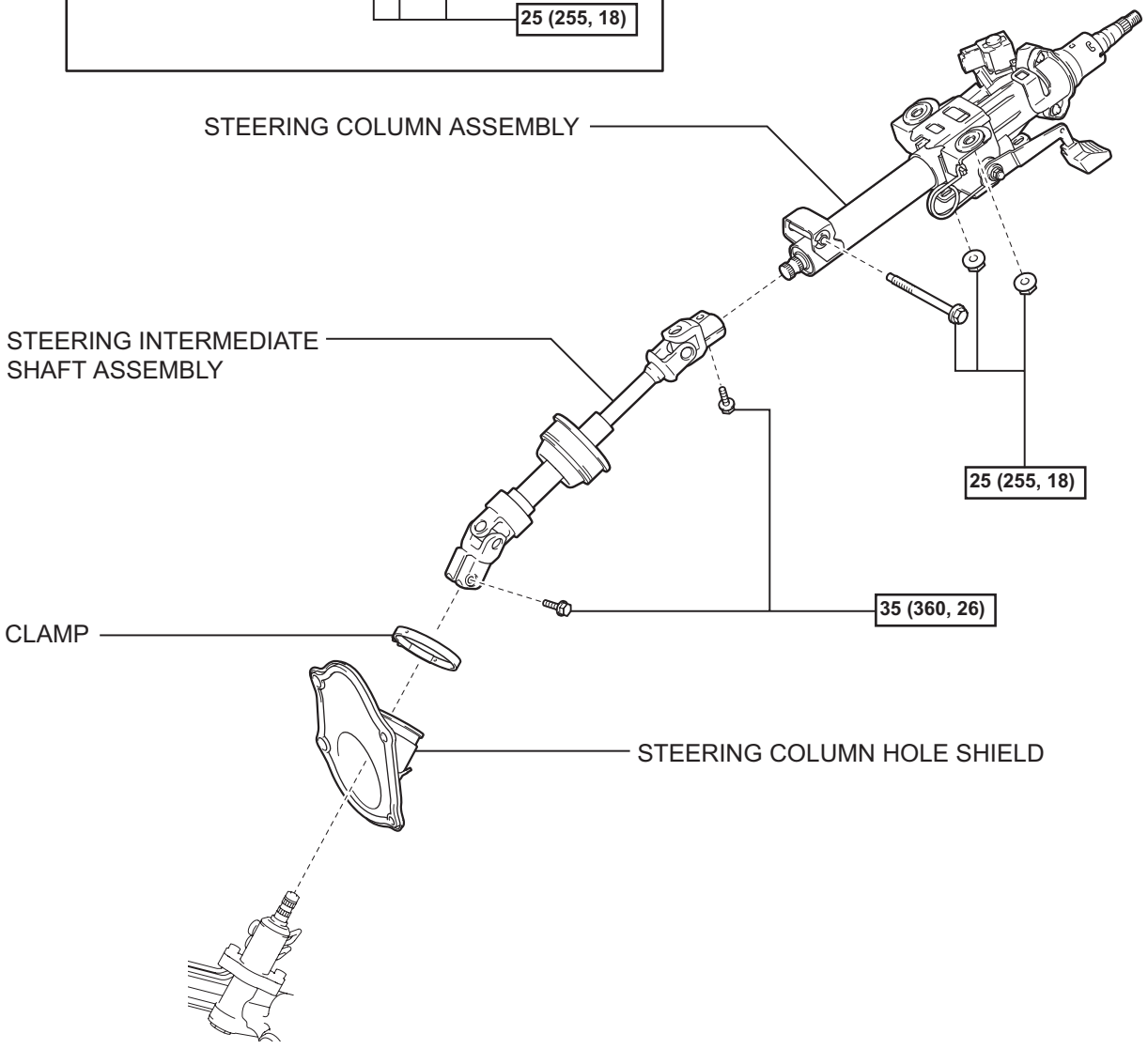

without Cruise Control System:
NO. 2 LOWER STEERING WHEEL COVER
50 (510, 37)
STEERING WHEEL ASSEMBLY
STEERING PAD
NO. 2 LOWER STEERING WHEEL COVER
NO. 3 LOWER STEERING WHEEL COVER
STEERING COLUMN COVER
TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY
with Smart Key System:
STEERING COLUMN COVER
STEERING COLUMN COVER
NO. 1 AIR DUCT
N*m (kgf*cm, ft.*lbf) : Specified torque
P
C133493E01

SR

TMC Made:

with Smart Key System:





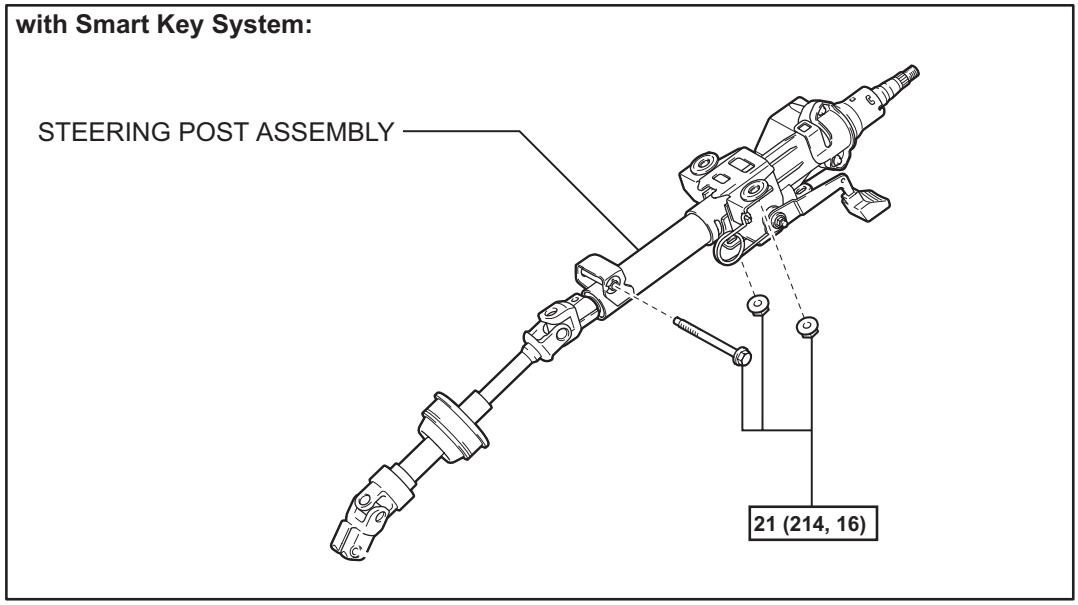
N*m (kgf*cm, ft.*lbf): Specified torque

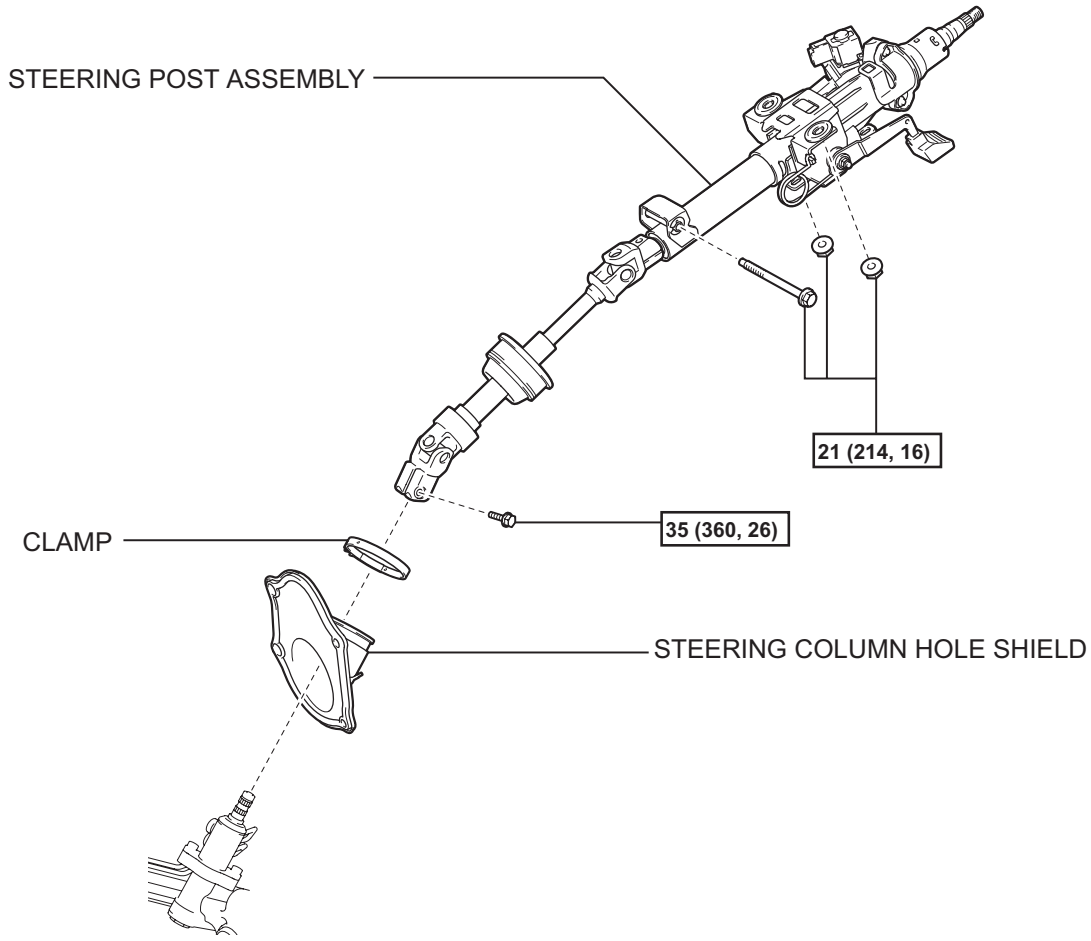
P

C133496E01

TMMK Made:

with Smart Key System:





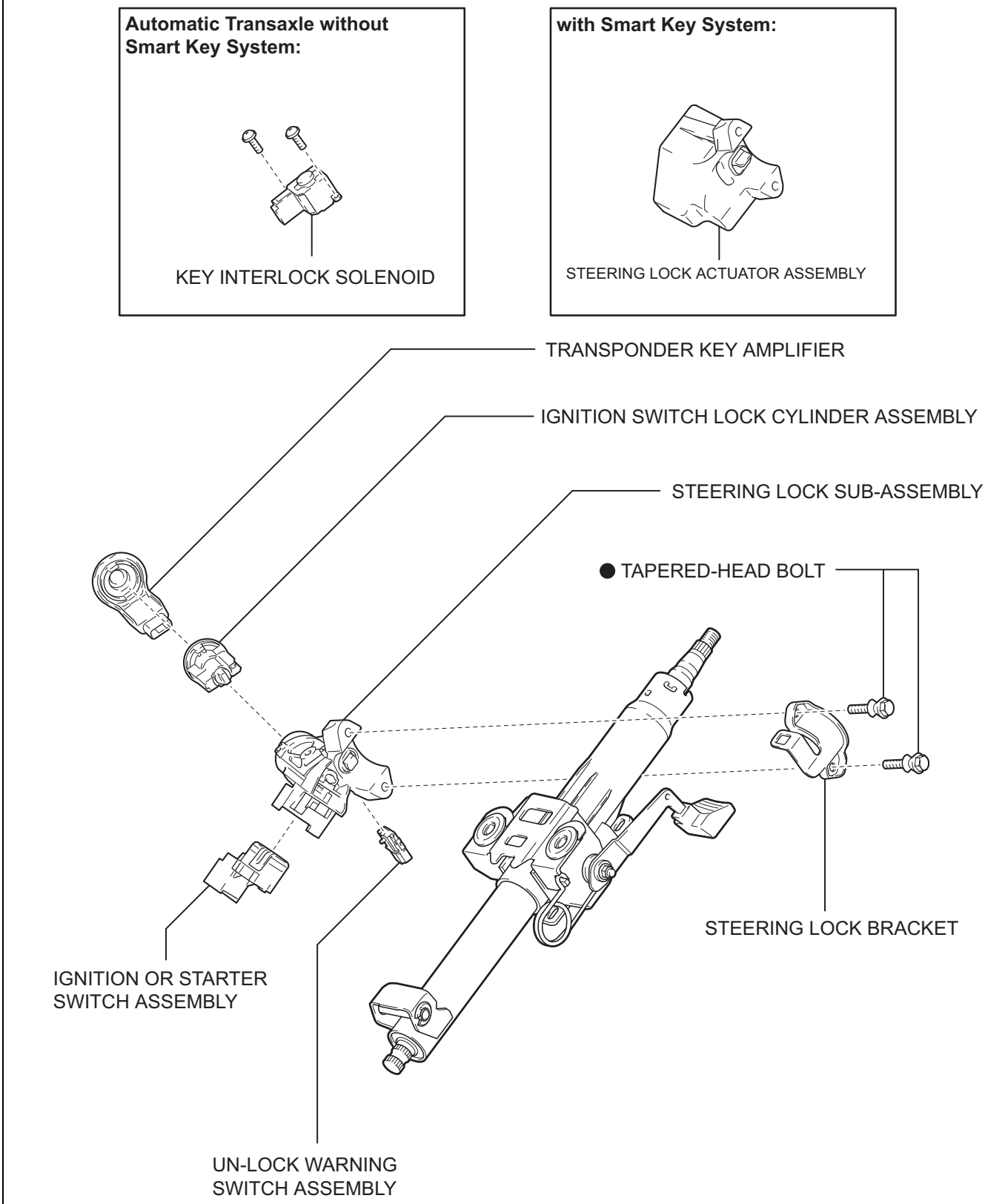
SR

N*m (kgf*cm, ft.*lbf): Specified torque

P

C133497E01

TMC Made:



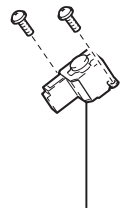
● Non-reusable part

P

C133494E01

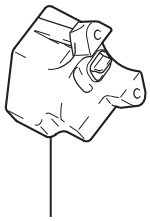
TMMK Made:

Automatic Transaxle without Smart Key System:

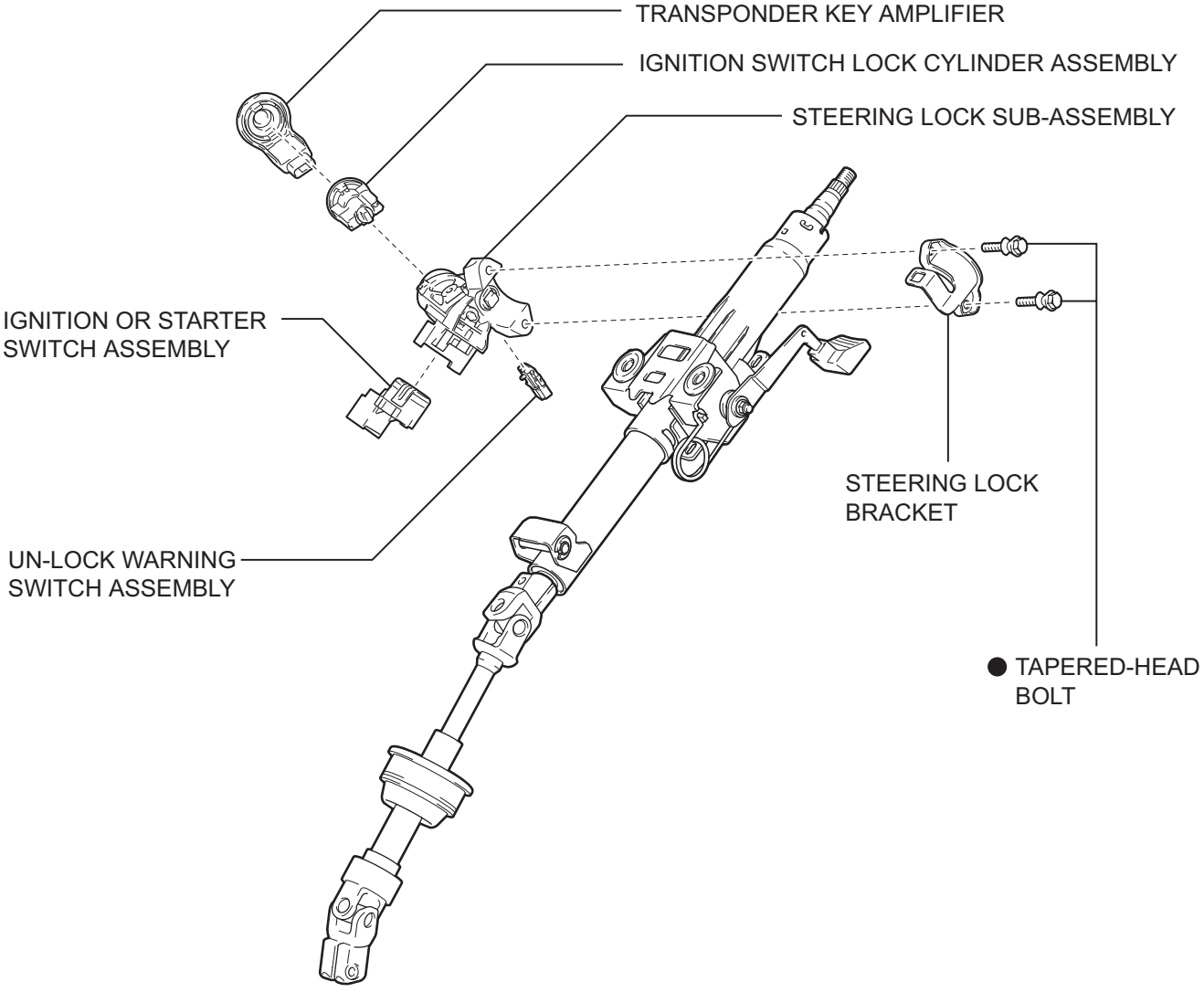


KEY INTERLOCK SOLENOID

with Smart Key System:



STEERING LOCK ACTUATOR ASSEMBLY



● Non-reusable part

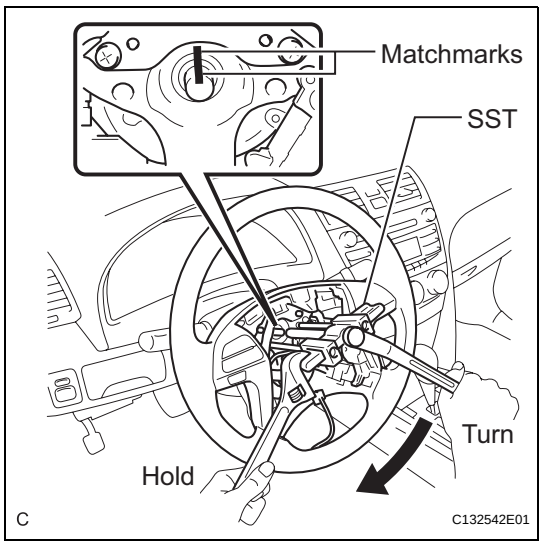
P

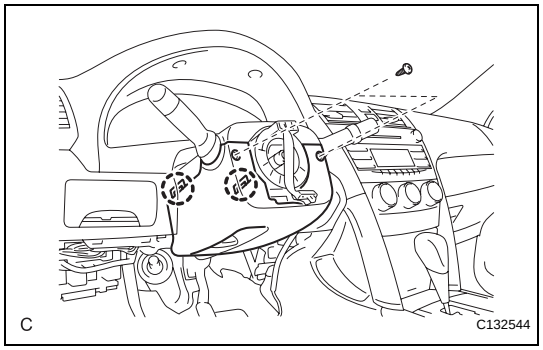
C133495E01

SR

REMOVAL

1. **PRECAUTION**
   HINT:
   (See page RS-1)
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
   HINT:
   (See page RS-1)
4. **REMOVE FRONT WHEEL LH**
5. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
6. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
8. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
9. **REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**
10. **REMOVE NO. 2 LOWER STEERING WHEEL COVER (See page RS-349)**
11. **REMOVE NO. 3 LOWER STEERING WHEEL COVER (See page RS-349)**
12. **REMOVE STEERING PAD (See page RS-350)**
13. **REMOVE STEERING WHEEL ASSEMBLY**
    (a) Remove the steering wheel assembly set nut.
    (b) Put matchmarks on the steering wheel assembly and the steering main shaft.
    (c) Disconnect the connectors from the spiral cable.
    (d) Using SST, remove the steering wheel assembly.
    SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05031)

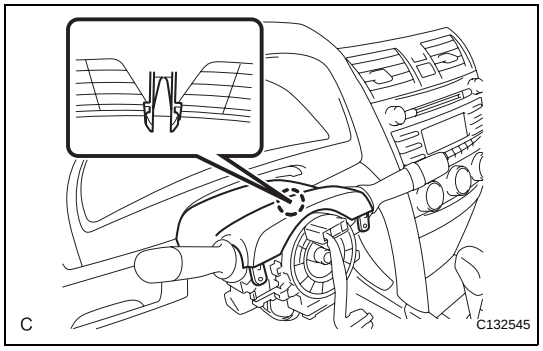




14. REMOVE STEERING COLUMN COVER

(a) Remove the 2 screws.

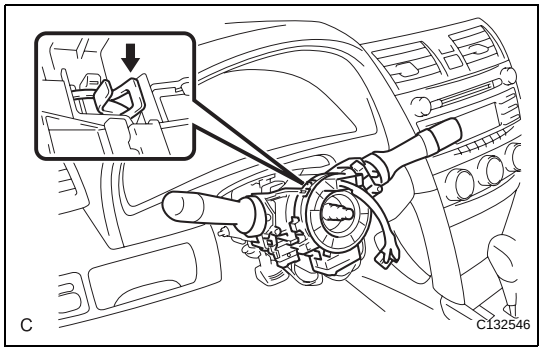
(b) Disengage the 2 claws to remove the steering column cover lower.



(c) Disengage the claw to remove the steering column cover upper.

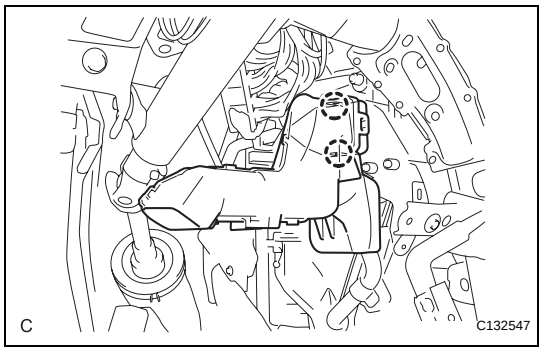
15. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

(a) Disconnect the connectors from the turn signal switch assembly with spiral cable sub-assembly.



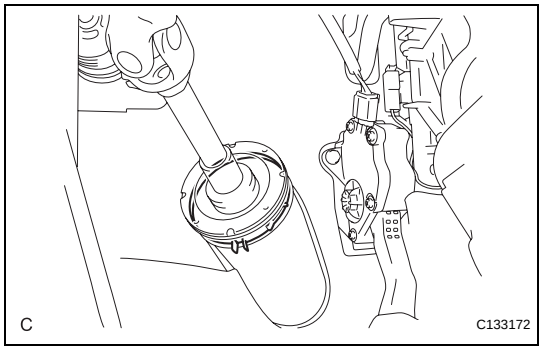
(b) Using pliers, grip the claws of the clip and remove the turn signal switch assembly with spiral cable sub-assembly.

SR



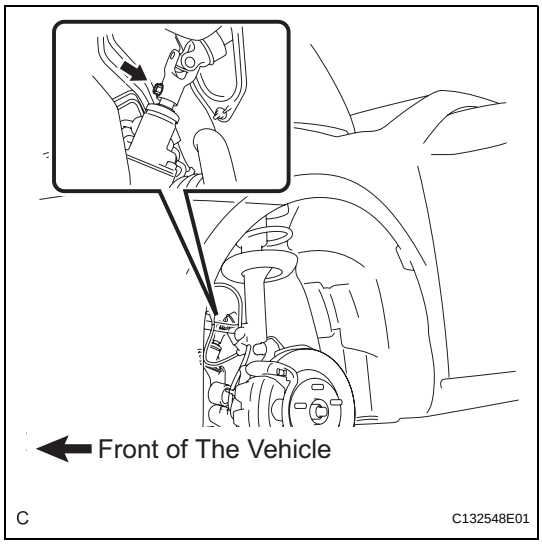
16. REMOVE NO. 1 AIR DUCT

(a) Disengage the 2 claws and remove the No. 1 air duct.

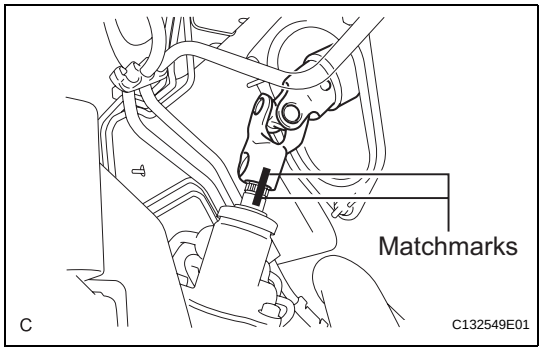


17. REMOVE STEERING COLUMN ASSEMBLY (for TMC Made)

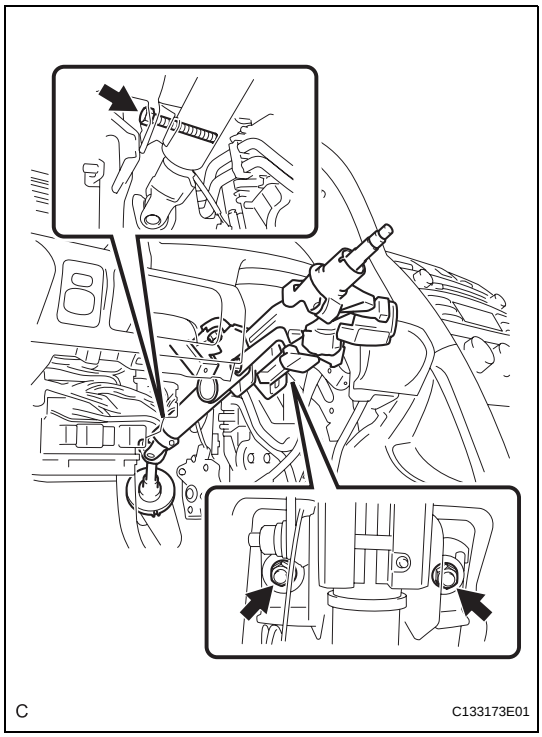
(a) Remove the clamp from the steering column hole shield.



(b) Remove the bolt and slide the steering intermediate shaft assembly.
NOTICE:
Do not separate the steering intermediate shaft assembly from the power steering link assembly.

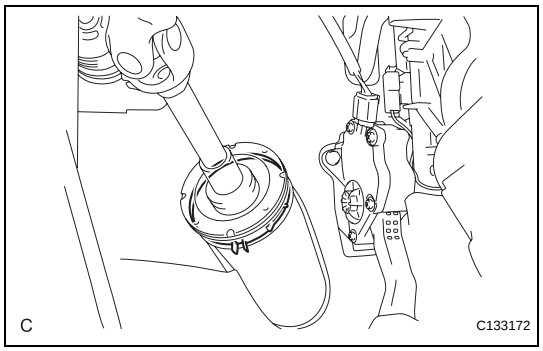


(c) Put matchmarks on the steering intermediate shaft assembly and the power steering link assembly.
(d) Separate the steering intermediate shaft assembly from the power steering link assembly.
(e) Disconnect the connectors and wire harness clamps from the steering column assembly.



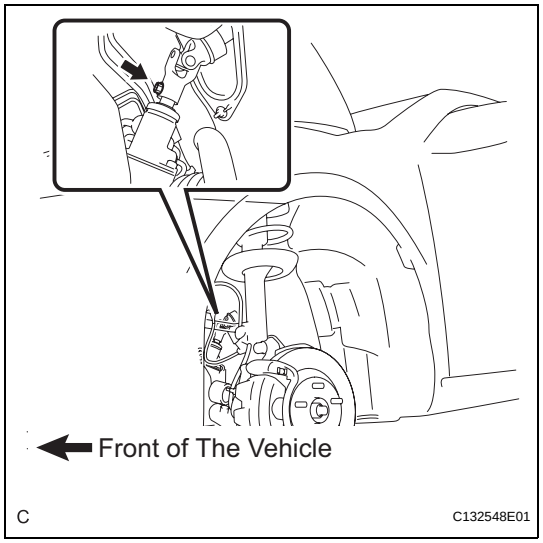
(f) Remove the bolt, 2 nuts, and the steering column assembly.

SR

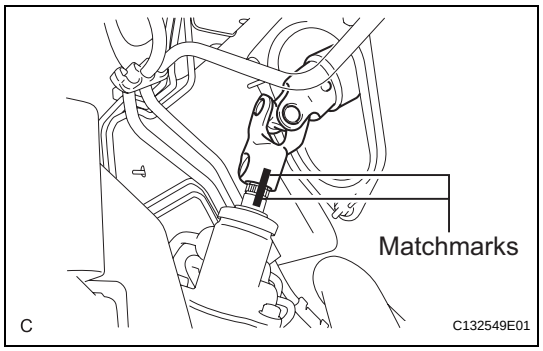


18. REMOVE STEERING POST ASSEMBLY (for TMMK Made)

(a) Remove the clamp from the steering column hole shield.

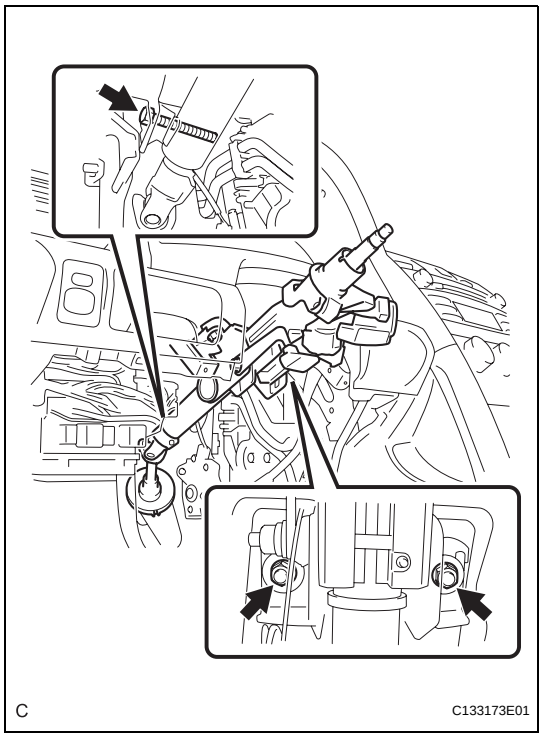


(b) Remove the bolt and slide the steering sliding yoke.
NOTICE:
Do not separate the steering sliding yoke from the power steering link assembly.

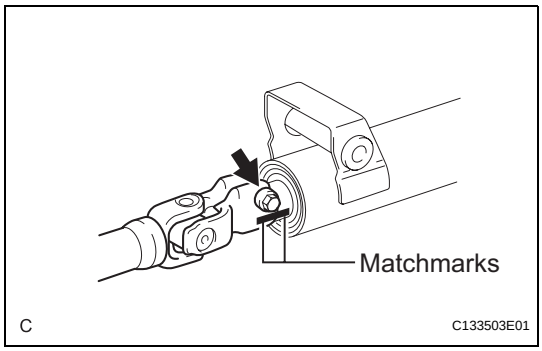


(c) Put matchmarks on the steering sliding yoke and the power steering link assembly.
(d) Separate the steering sliding yoke from the power steering link assembly.
(e) Disconnect the connectors and wire harness clamps from the steering column assembly.

SR



(f) Remove the bolt, 2 nuts, and the steering post assembly.



19. REMOVE STEERING INTERMEDIATE SHAFT ASSEMBLY (for TMC Made)

(a) Put matchmarks on the steering intermediate shaft assembly and the steering column assembly.

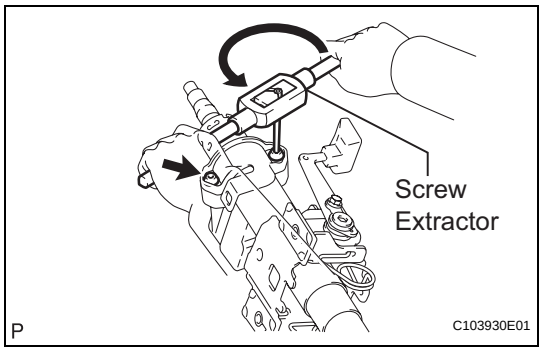
(b) Remove the bolt and the steering intermediate shaft assembly from the steering column assembly.

DISASSEMBLY

NOTICE:
When using a vise, do not overtighten it.

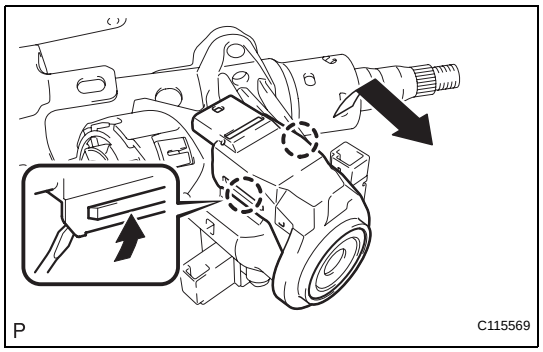
1. REMOVE STEERING LOCK ACTUATOR ASSEMBLY (w/ Smart Key System)

(a) Secure the steering column assembly in a vise.
(b) Using a center punch, mark the center of the 2 tapered-head bolts.
(c) Using a 3 to 4 mm (0.12 to 0.16 in.) drill, drill a hole in the 2 tapered-head bolts.
(d) Using a screw extractor, remove the 2 tapered-head bolts, and then remove the steering lock actuator assembly and the steering lock bracket from the steering column assembly.



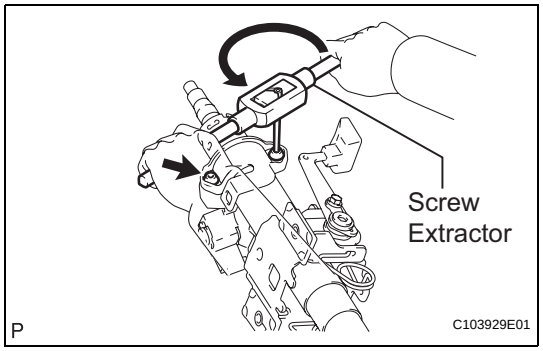
2. REMOVE TRANSPONDER KEY AMPLIFIER (w/o Smart Key System)

(a) Using a screwdriver, widen the claws hanging onto the upper bracket by approximately 1.0 mm (0.039 in.).
(b) Pull out the transponder key amplifier with the claw open.
NOTICE:
Using excessive force may damage the case.



3. REMOVE STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY (w/o Smart Key System)

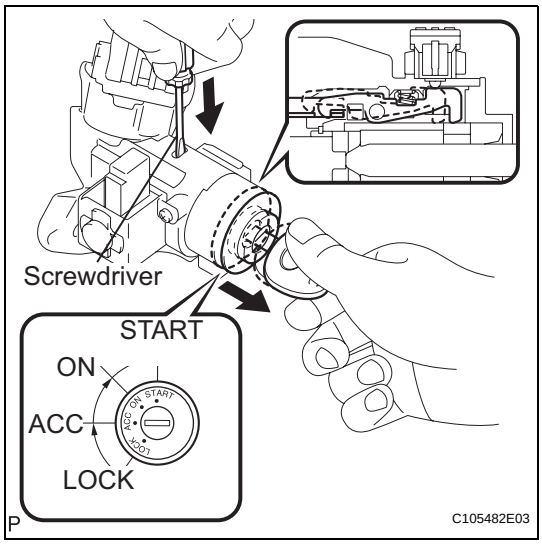
(a) Secure the steering column assembly in a vise.
(b) Using a center punch, mark the center of the 2 tapered-head bolts.
(c) Using a 3 to 4 mm (0.12 to 0.16 in.) drill, drill a hole in the 2 tapered-head bolts.
(d) Using a screw extractor, remove the 2 tapered-head bolts, and then remove the steering column upper with switch bracket assembly and the steering lock bracket from the steering column assembly.



4. REMOVE IGNITION SWITCH LOCK CYLINDER ASSEMBLY (w/o Smart Key System)

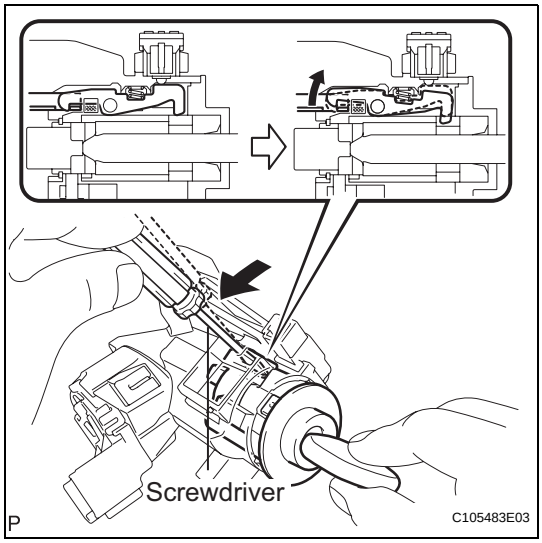
(a) Turn the ignition switch lock cylinder assembly to the ACC position.

SR



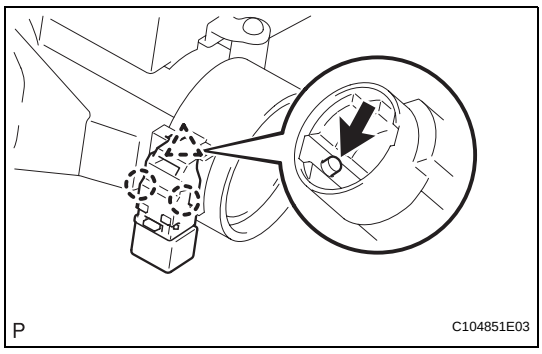
(b) Push a screwdriver into the hole of the steering column upper with switch bracket assembly shown in the illustration and pull the ignition switch lock cylinder assembly until its claw contacts the stopper of the steering column upper with switch bracket assembly.

NOTICE:
Make sure to pull the ignition switch lock cylinder assembly until its claw contacts the stopper of the steering column bracket assembly upper. Failure to do so will affect later work operations.



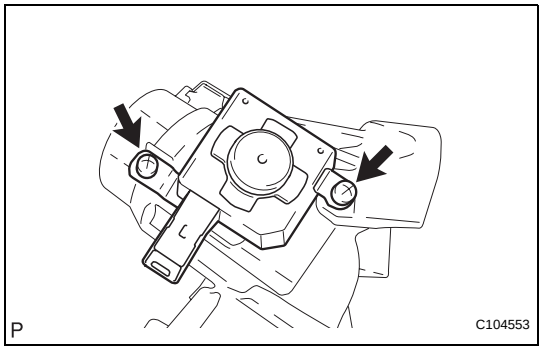
(c) Insert a screwdriver into the hole of the steering column upper with switch bracket assembly. Push the screwdriver downward as shown in the illustration to disengage the claw of the ignition switch lock cylinder assembly. Pull out the ignition switch lock cylinder assembly.

SR



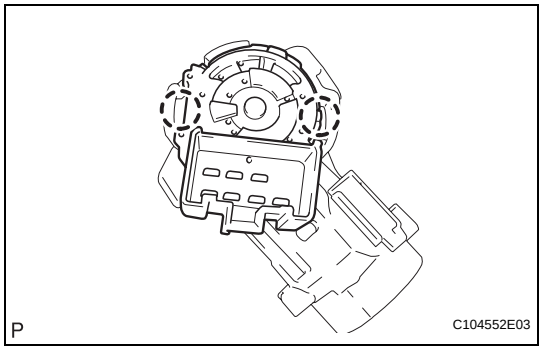
5. REMOVE UN-LOCK WARNING SWITCH ASSEMBLY (w/o Smart Key System)

(a) Remove the un-lock warning switch assembly by pushing up the center part and releasing the 2 claws.



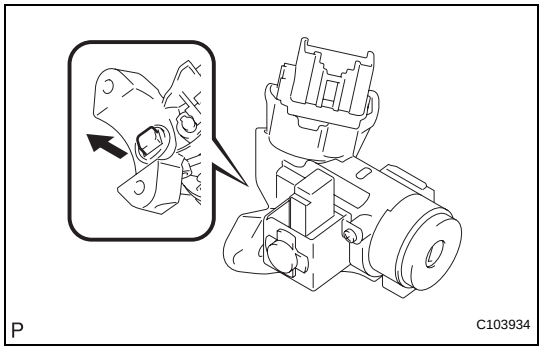
6. REMOVE KEY INTERLOCK SOLENOID (for Automatic Transaxle without Smart Key System)

(a) Remove the 2 screws and the key interlock solenoid from the steering lock sub-assembly.



7. REMOVE IGNITION OR STARTER SWITCH ASSEMBLY (w/o Smart Key System)

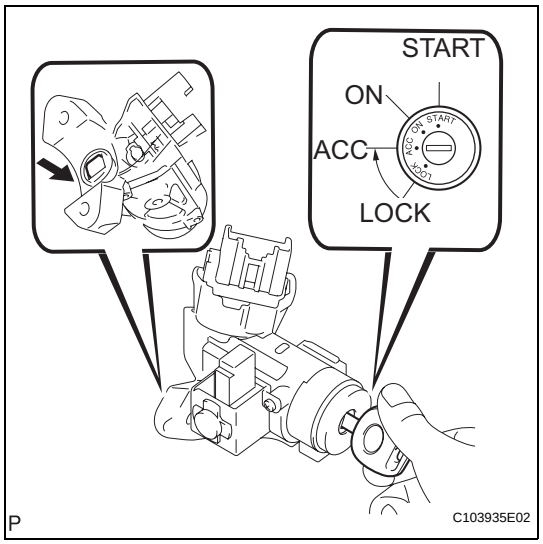
(a) Disengage the 2 claws and remove the ignition or starter switch assembly from the steering lock sub-assembly.



INSPECTION

1. INSPECT STEERING LOCK OPERATION (w/o Smart Key System)

(a) Check that the steering lock mechanism is activated when the key is removed.



(b) Check that the steering lock mechanism is deactivated when the key is inserted and turned to the ACC position.
HINT:
If there is any abnormality, replace the ignition switch lock cylinder assembly.

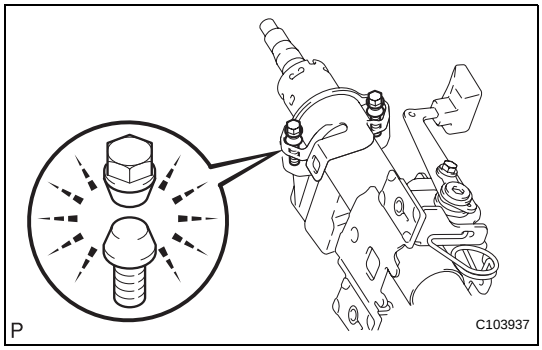
SR

REASSEMBLY

1. INSTALL STEERING LOCK ACTUATOR ASSEMBLY (w/ Smart Key System)

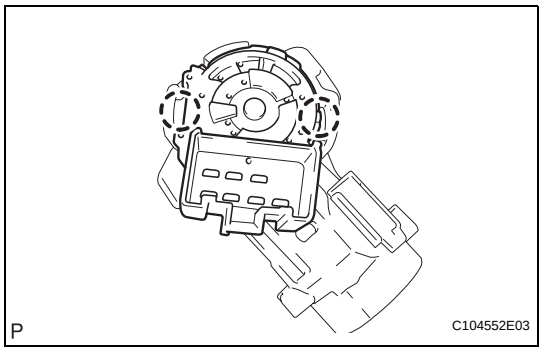
(a) Temporarily install the steering lock actuator assembly and the steering lock bracket with 2 new tapered-head bolts.

(b) Tighten the 2 tapered-head bolts until the bolt heads break off.



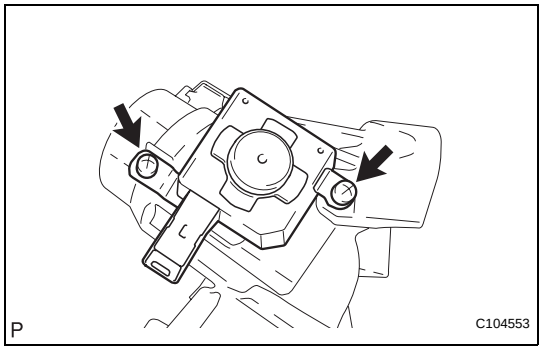
2. INSTALL IGNITION OR STARTER SWITCH ASSEMBLY (w/o Smart Key System)

(a) Engage the 2 claws to install the ignition or starter switch assembly to the steering lock sub-assembly.



3. INSTALL KEY INTERLOCK SOLENOID (for Automatic Transaxle without Smart Key System)

(a) Install the key interlock solenoid to the steering lock sub-assembly with the 2 screws.

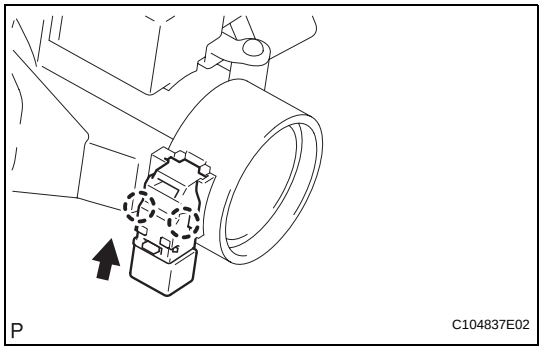


4. INSTALL UN-LOCK WARNING SWITCH ASSEMBLY (w/o Smart Key System)

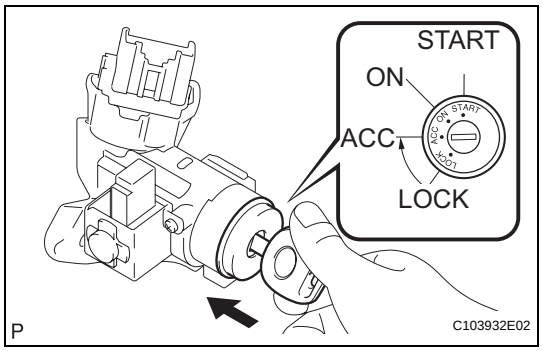
(a) Engage the 2 claws to install the un-lock warning switch assembly to the steering lock sub-assembly.

5. INSTALL IGNITION SWITCH LOCK CYLINDER ASSEMBLY (w/o Smart Key System)

(a) Make sure that the ignition switch lock cylinder assembly is in the ACC position.



SR



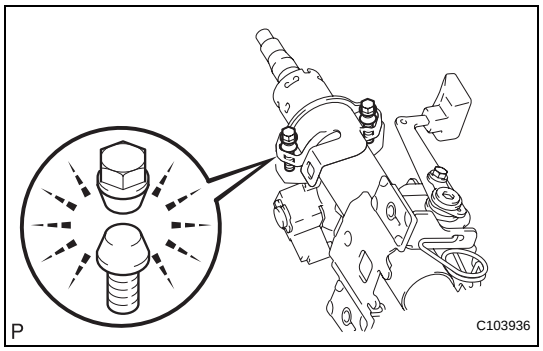
(b) Install the ignition switch lock cylinder assembly to the steering lock sub-assembly.
(c) Make sure that the ignition switch lock cylinder assembly is securely installed.

6. INSPECT STEERING LOCK OPERATION (w/o Smart Key System)

7. INSTALL STEERING COLUMN UPPER WITH SWITCH BRACKET ASSEMBLY (w/o Smart Key System)

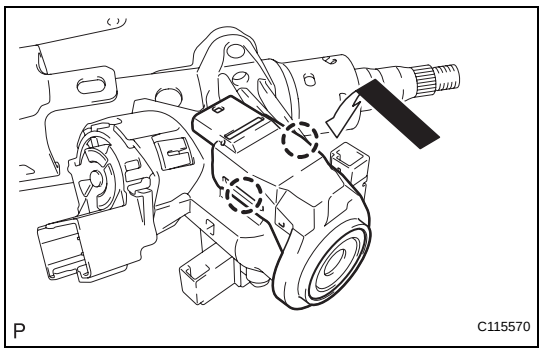
(a) Temporarily install the steering column upper with switch bracket assembly and the steering lock bracket with 2 new tapered-head bolts.

(b) Tighten the 2 tapered-head bolts until the bolt heads break off.



8. INSTALL TRANSPONDER KEY AMPLIFIER (w/o Smart Key System)

(a) Align the transponder key amplifier with the installation position of the upper bracket with the amplifier inclined.



(b) Push the transponder key amplifier up and install it to the upper bracket.
NOTICE:
Do not push the amplifier up with excessive force.

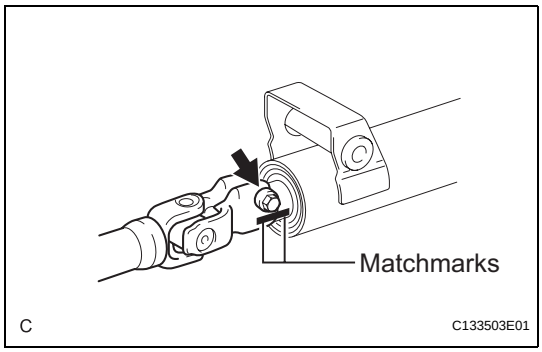
SR

INSTALLATION

1. INSTALL STEERING INTERMEDIATE SHAFT ASSEMBLY (for TMC Made)

(a) Align the matchmarks on the steering intermediate shaft assembly and the steering column assembly.

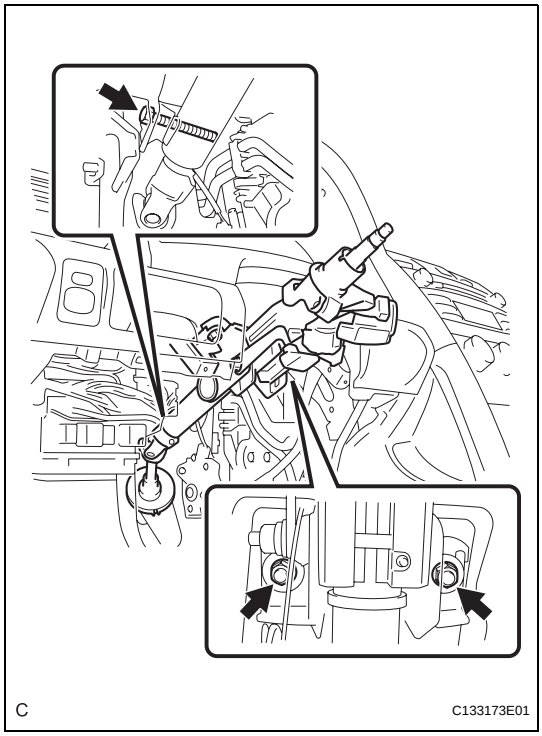
(b) Install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)



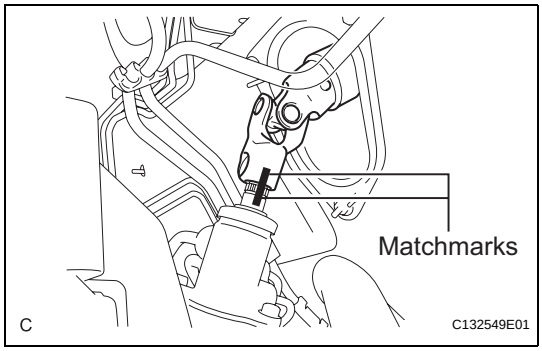
2. INSTALL STEERING COLUMN ASSEMBLY (for TMC Made)

(a) Install the steering column assembly with the bolt and 2 nuts.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

(b) Connect the connectors and wire harness clamps to the steering column assembly.



(c) Align the matchmarks on the steering intermediate shaft assembly and the power steering link assembly.



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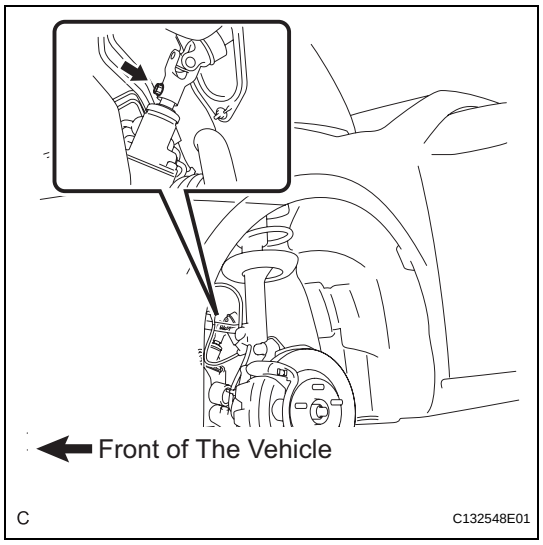
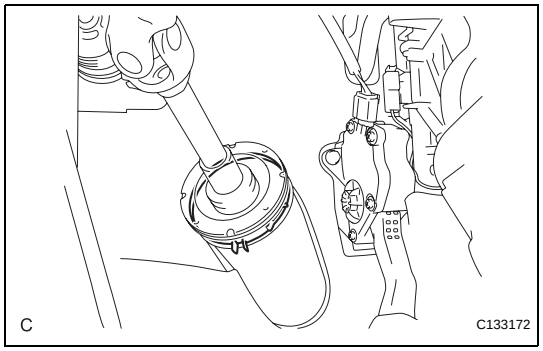
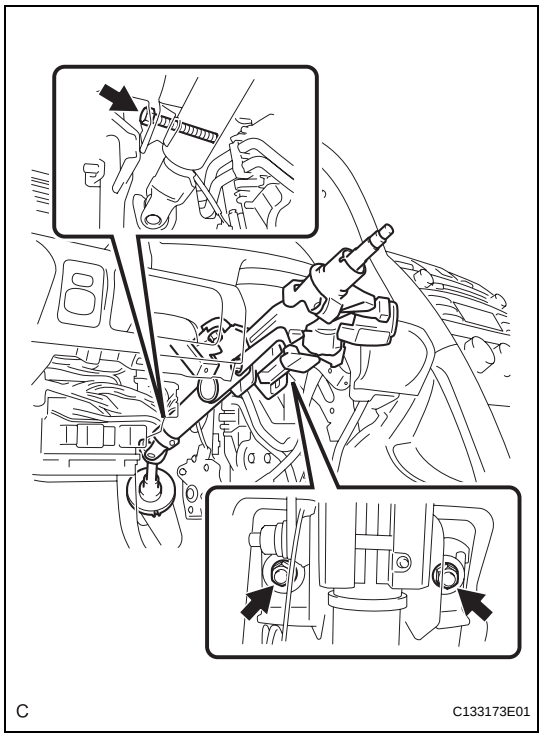


(d) Install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)



(e) Install the clamp to the steering column hole shield.

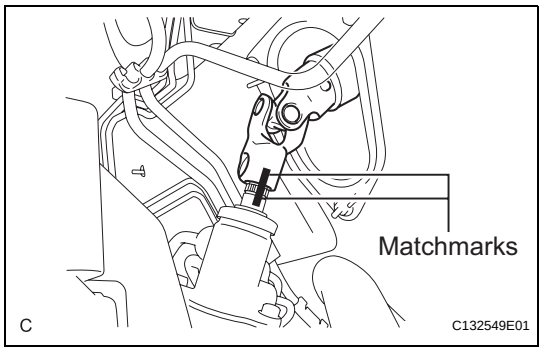


3. INSTALL STEERING POST ASSEMBLY (for TMMK Made)

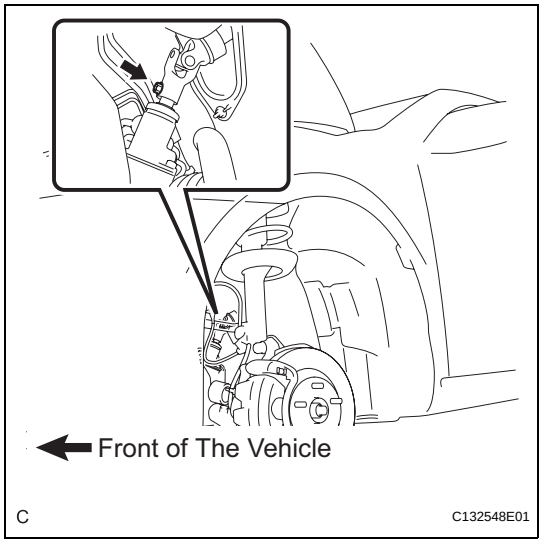
(a) Install the steering post assembly with the bolt and 2 nuts.
Torque: 21 N*m (214 kgf*cm, 16 ft.*lbf)

(b) Connect the connectors and wire harness clamps to the steering post assembly.

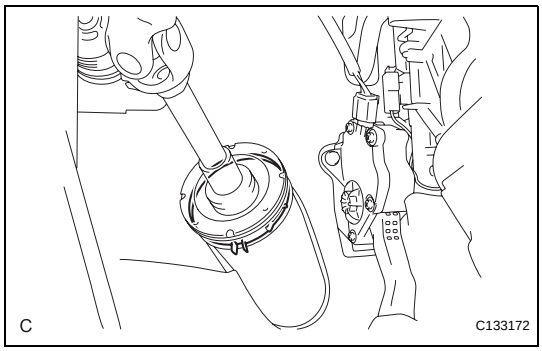
SR



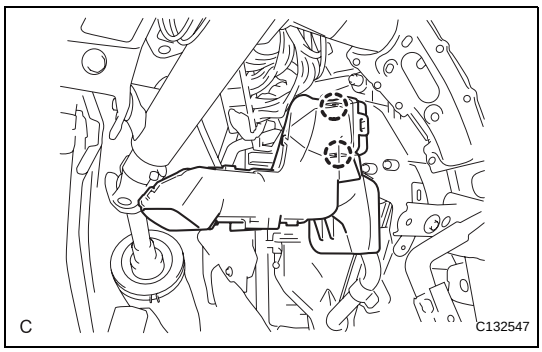
(c) Align the matchmarks on the steering sliding yoke and the power steering link assembly.



(d) Install the bolt.
Torque: 35 N*m (360 kgf*cm, 26 ft.*lbf)



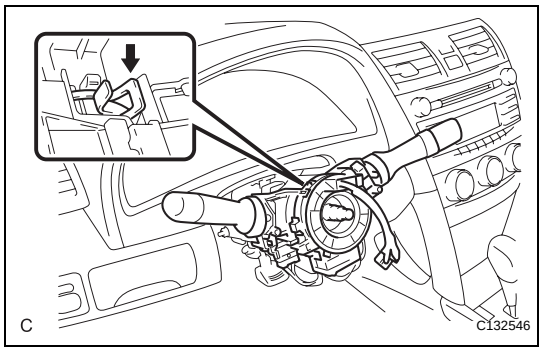
(e) Install the clamp to the steering column hole shield.



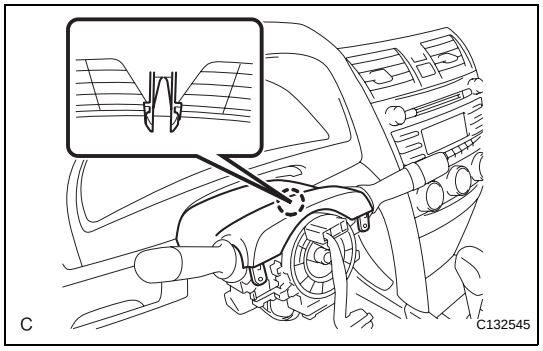
4. INSTALL NO. 1 AIR DUCT

(a) Engage the 2 claws to install the No. 1 air duct.

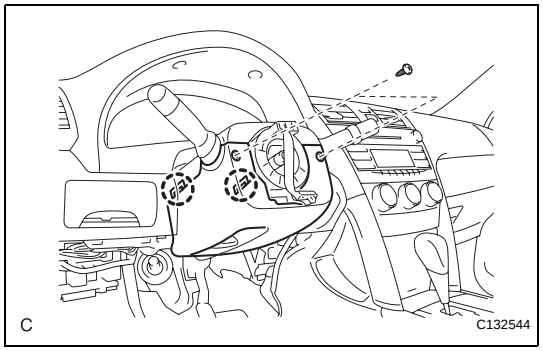
5. PLACE FRONT WHEELS FACING STRAIGHT AHEAD



6. **INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY**
   (a) Install the turn signal switch assembly with spiral cable sub-assembly to the steering column assembly with the clamp.
   (b) Connect the connectors to the turn signal switch assembly with spiral cable sub-assembly.

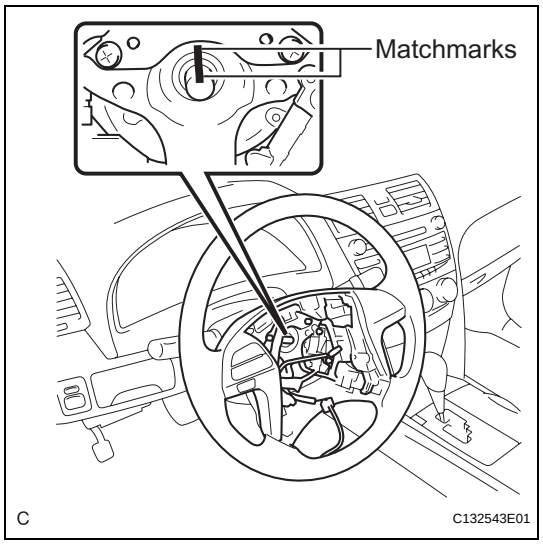


7. **INSTALL STEERING COLUMN COVER**
   (a) Engage the claw to install the steering column cover upper.



   (b) Engage the 2 claws to install the steering column cover lower.
   (c) Install the 2 screws.

8. **ADJUST SPIRAL CABLE SUB- ASSEMBLY (See page RS-367)**



9. **INSTALL STEERING WHEEL ASSEMBLY**
   (a) Align the matchmarks on the steering wheel assembly and steering main shaft.
   (b) Install the steering wheel assembly set nut.
   Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)
   (c) Connect the connectors to the spiral cable sub-assembly.

10. **INSPECT STEERING WHEEL CENTER POINT**

11. **INSTALL STEERING PAD (See page RS-350)**

12. **INSPECT STEERING PAD (See page RS-352)**

13. **INSTALL NO. 2 LOWER STEERING WHEEL COVER (See page RS-352)**

14. **INSTALL NO. 3 LOWER STEERING WHEEL COVER (See page RS-351)**

15. **INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY (See page RS-370)**

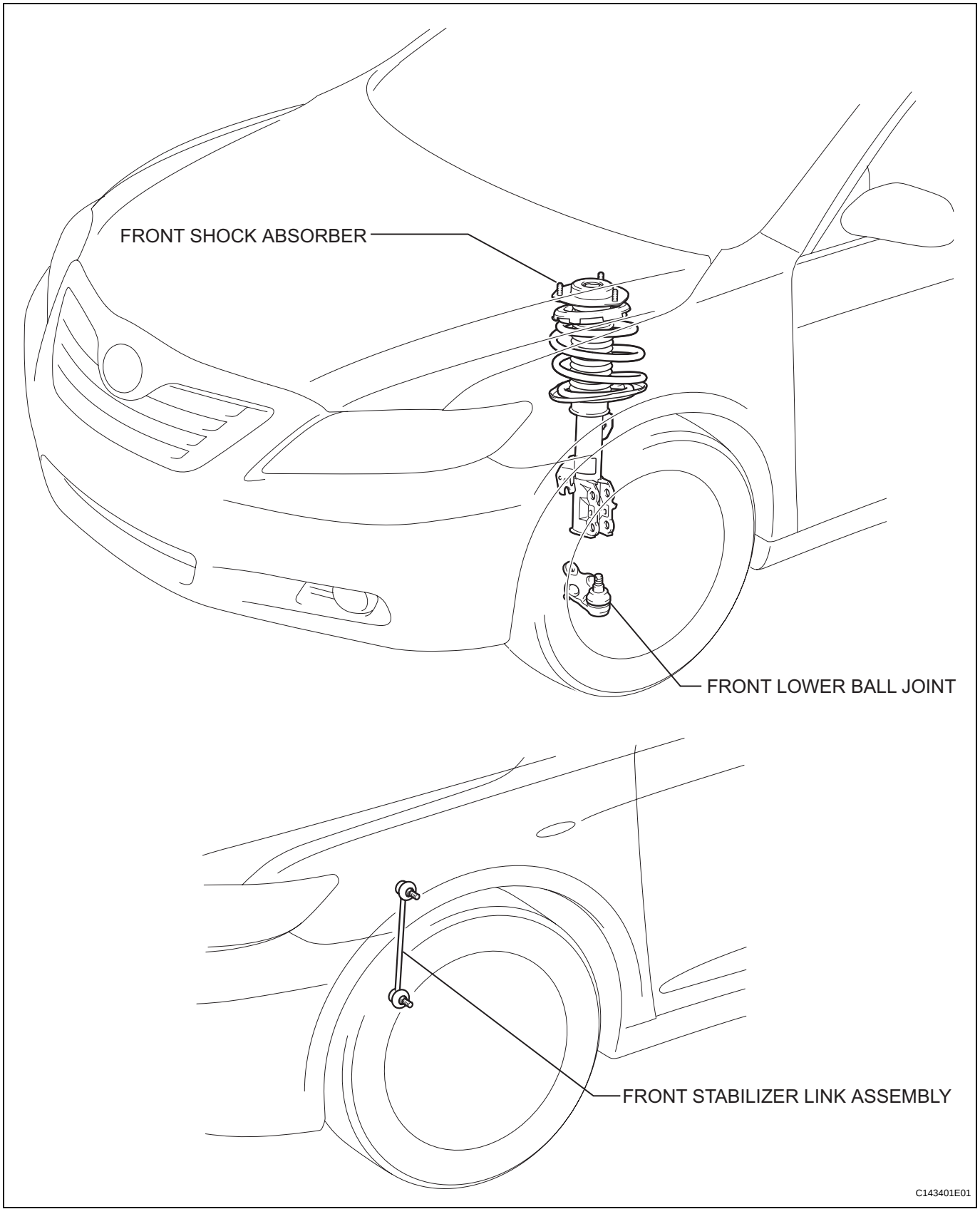
16. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**

SR

17. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
18. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
19. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
20. **INSTALL FRONT WHEEL LH**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
21. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
22. **INSPECT SRS WARNING LIGHT**
    HINT:
    (See page RS-32)

SUSPENSION SYSTEM

PARTS LOCATION



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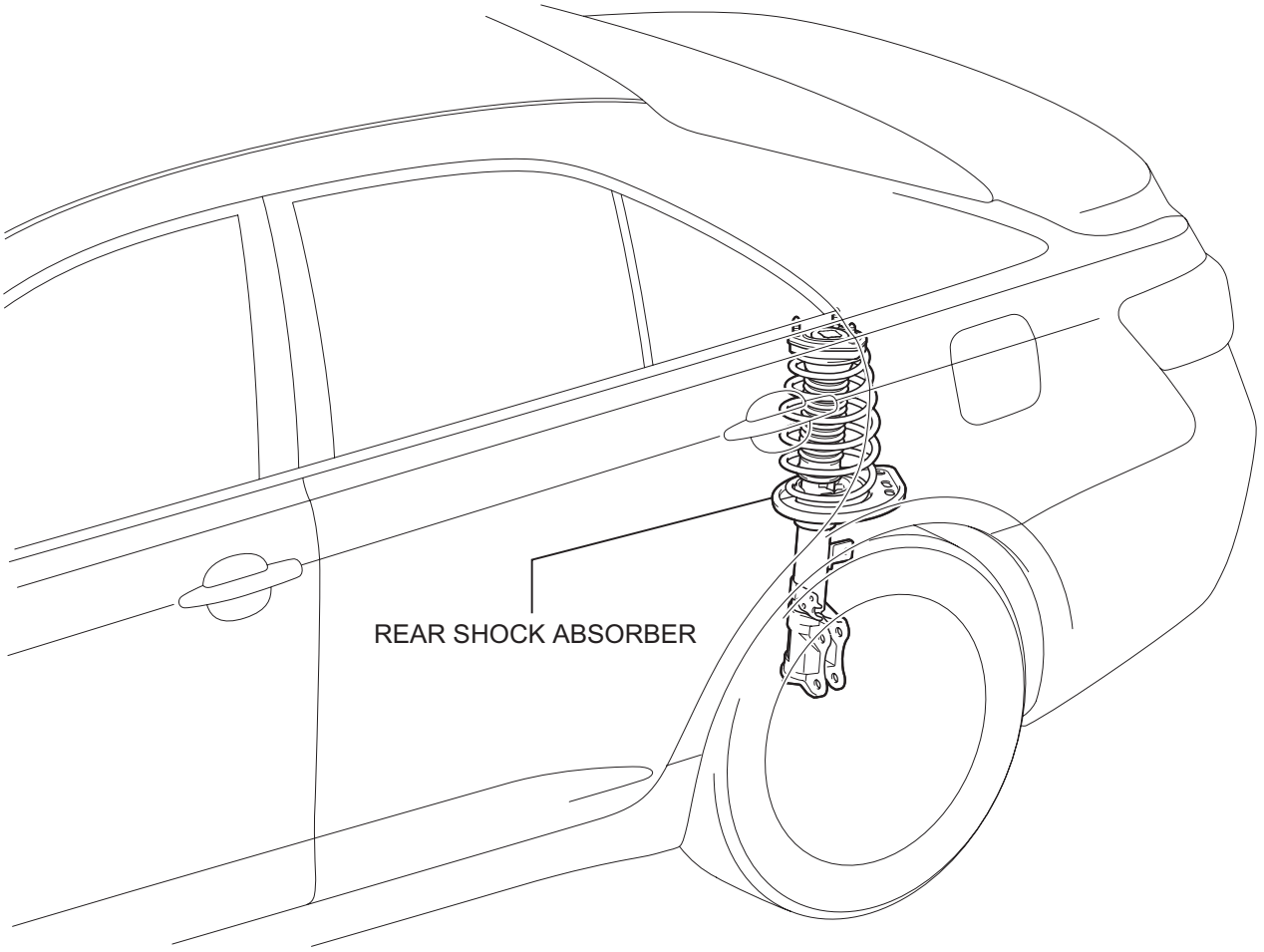

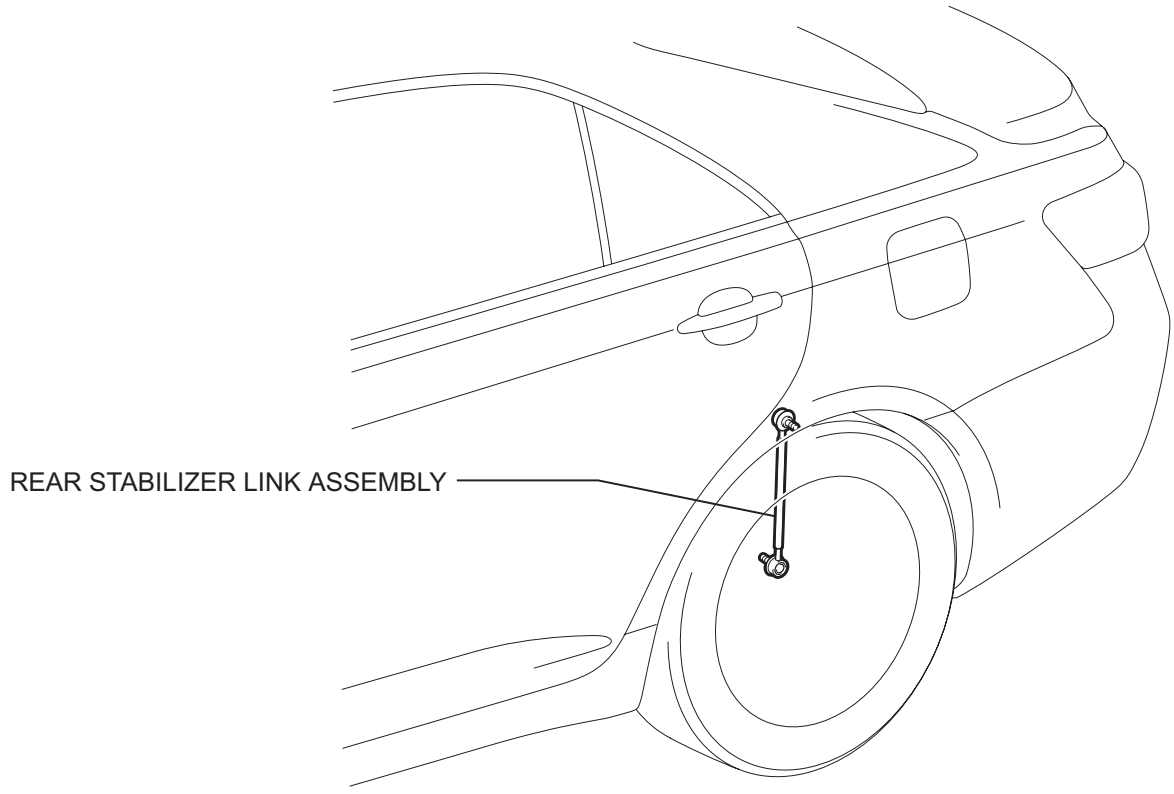

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PROBLEM SYMPTOMS TABLE

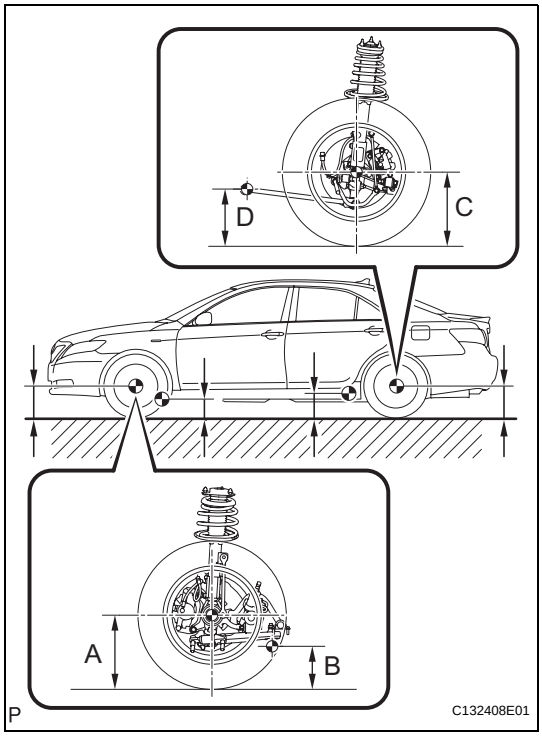
SUSPENSION SYSTEM

Symptom	Suspected area	See page
Bottoming	1. Vehicle (Overloaded)	-
	2. Spring (Weak)	SP-18
	3. Shock absorber (Worn)	SP-18
Sways/pitches	1. Tire (Worn or improperly inflated)	TW-3
	2. Stabilizer bar (Bent or broken)	SP-32
	3. Shock absorber (Worn)	SP-18
Front wheel shimmy	1. Tire (Worn or improperly inflated)	TW-3
	2. Wheel (Out of balance)	TW-3
	3. Shock absorber (Worn)	SP-18
	4. Wheel alignment (Incorrect)	SP-4
	5. Lower ball joint (Worn)	SP-27
	6. Hub bearing (Worn)	AH-5
	7. Steering gear (Out of adjustment or broken)	PS-49
Rear wheel shimmy	1. Tire (Worn or improperly inflated)	TW-3
	2. Wheel (Out of balance)	TW-3
	3. Shock absorber (Worn)	SP-41
	4. Wheel alignment (Incorrect)	SP-13
	5. Hub bearing (Worn)	AH-14
Abnormal tire wear	1. Tire (Worn or improperly inflated)	TW-3
	2. Wheel alignment (Incorrect)	TW-3
	3. Shock absorber (Worn)	SP-18
	4. Suspension parts (Worn)	-

FRONT WHEEL ALIGNMENT

ADJUSTMENT

1. INSPECT TIRES (See page TW-3)



2. MEASURE VEHICLE HEIGHT

(a) Bounce the vehicle up and down at the corners to stabilize the suspension. Inspect the vehicle height.

Vehicle height
for USA and Canada:

Model	Front A - B	Rear C - D
ACV40L-CEAGKA	125 mm (4.92 in.)	54 mm (2.13 in.)
GSV40L-CETGKA	126 mm (4.96 in.)	55 mm (2.17 in.)
ACV40L-AEAGKA	125 mm (4.92 in.)	53 mm (2.09 in.)
GSV40L-AETGKA	126 mm (4.96 in.)	54 mm (2.13 in.)
ACV40L-CEANKA	125 mm (4.92 in.)	54 mm (2.13 in.)
ACV40L-CEMNKA	125 mm (4.92 in.)	53 mm (2.09 in.)
GSV40L-CETNKA	126 mm (4.96 in.)	55 mm (2.17 in.)
ACV40L-AEANKA	125 mm (4.92 in.)	53 mm (2.09 in.)
ACV40L-AEMNKA	125 mm (4.92 in.)	52 mm (2.05 in.)
GSV40L-AETNKA	126 mm (4.96 in.)	54 mm (2.13 in.)
ACV40L-CEASKA	128 mm (5.04 in.)	57 mm (2.24 in.)
ACV40L-CEMSKA	127 mm (5.00 in.)	55 mm (2.17 in.)
GSV40L-CETSKA	129 mm (5.08 in.)	58 mm (2.28 in.)

for Mexico:

Model	Front A - B	Rear C - D
ACV40L-CEAGKA	115 mm (4.53 in.)	40 mm (1.57 in.)
GSV40L-CETGKA	116 mm (4.57 in.)	41 mm (1.61 in.)
ACV40L-CEANKA	115 mm (4.53 in.)	40 mm (1.57 in.)

Measuring points:

A:
Ground clearance of front wheel center

B:
Ground clearance of lower suspension arm No. 2 bushing set bolt center

C:
Ground clearance of rear wheel center

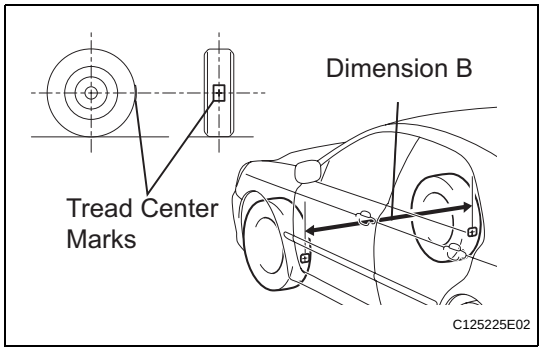
D:
Ground clearance of strut rod set bolt center

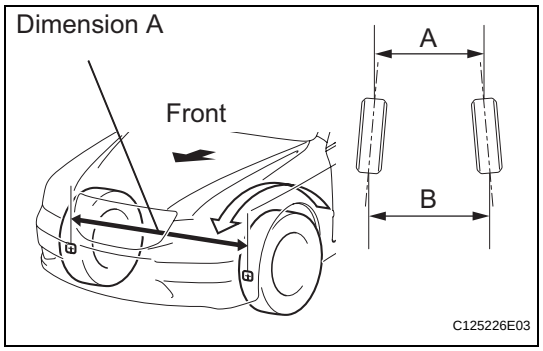
NOTICE:

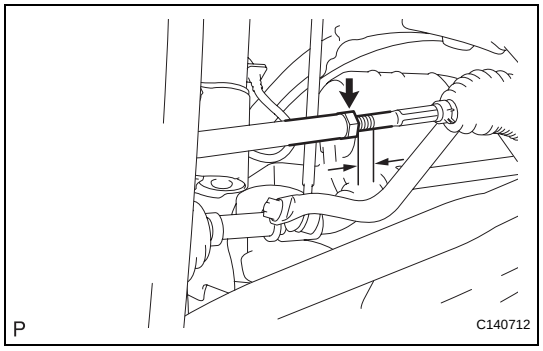
- **Before inspecting the wheel alignment, adjust the vehicle height to the specified value.**
- **Be sure to perform measurement on a level surface.**
- **If it is necessary to go under the vehicle for measurement, confirm that the parking brake is applied and the vehicle is secured with chocks.**

3. INSPECT TOE-IN

(a) Bounce the vehicle up and down at the corners to stabilize the suspension.







(b) Release the parking brake and move the shift lever to the neutral position.

(c) Push the vehicle straight ahead approximately 5 m (16.4 ft). (*1)

(d) Put tread center marks on the rearmost points of the front wheels and measure the distance between the marks (dimension B).

(e) Slowly push the vehicle straight ahead to cause the front wheels to rotate 180° using the front tire valve as a reference point.
HINT:
Do not allow the wheels to rotate more than 180°. If the wheels rotate more than 180°, perform the procedure from *1 again.

(f) Measure the distance between the tread center marks on the front side of the wheels.
Toe-in

Toe-in (total)	**-**
A - B:	**0 +- 2 mm (0 +- 0.08 in.)**

HINT:
If toe-in is not within the specified range, adjust it at the rack ends.

4. ADJUST TOE-IN

(a) Measure the thread lengths of the right and left rack ends.
Standard:
Difference in thread length between the right and left rack ends is 1.5 mm (0.06 in.) or less.

(b) Remove the rack boot set clips.

(c) Loosen the tie rod end lock nuts.

(d) Adjust the rack ends if the difference in thread length between the right and left rack ends is not within the specified range.
(1) Extend the shorter rack end if the measured toe-in deviates toward the outside.
(2) Shorten the longer rack end if the measured toe-in deviates toward the inside.

(e) Turn the right and left rack ends by equal amounts to adjust the toe-in.
HINT:
Try to adjust the toe-in to the center of the specified range.

(f) Make sure that the lengths of the right and left rack ends are the same.

(g) Tighten the tie rod end lock nuts.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)

SP

NOTICE:
Temporarily tighten the lock nut while holding the hexagonal part of the steering rack end so that the lock nut and the steering rack end do not turn together. Hold the flats on the tie rod end and tighten the lock nut.

(h) Place the boots on the seats and install the clips.
HINT:
Make sure that the boots are not twisted.

5. INSPECT WHEEL ANGLE

(a) Put tread center marks on the rearmost points of the turning radius gauge.

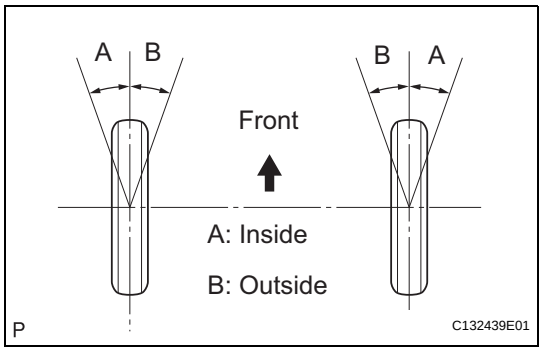
(b) Turn the steering wheel fully to the left and right and measure the turning angle.
Wheel turning angle
for USA and Canada:

Model	Inside wheel	Outside wheel reference
ACV40L-CEAGKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
GSV40L-CETGKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
ACV40L-AEAGKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
GSV40L-AETGKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
ACV40L-CEANKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
ACV40L-CEMNKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
GSV40L-CETNKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
ACV40L-AEANKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
ACV40L-AEMNKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
GSV40L-AETNKA	38°22' +-2° (38.37° +-2°)	33°33' (33.55°)
ACV40L-CEASKA	38°42' +-2° (38.70° +-2°)	33°46' (33.77°)
ACV40L-CEMSKA	38°42' +-2° (38.70° +-2°)	33°46' (33.77°)
GSV40L-CETSKA	38°18' +-2° (38.30° +-2°)	33°32' (33.53°)

for Mexico:

Model	Inside wheel	Outside wheel reference
ACV40L-CEAGKA	38°18' +-2° (38.30° +-2°)	33°41' (33.68°)
GSV40L-CETGKA	38°18' +-2° (38.30° +-2°)	33°41' (33.68°)
ACV40L-CEANKA	38°18' +-2° (38.30° +-2°)	33°41' (33.68°)

If the right and left inside wheel angles differ from the specified value, check the right and left rack end lengths.

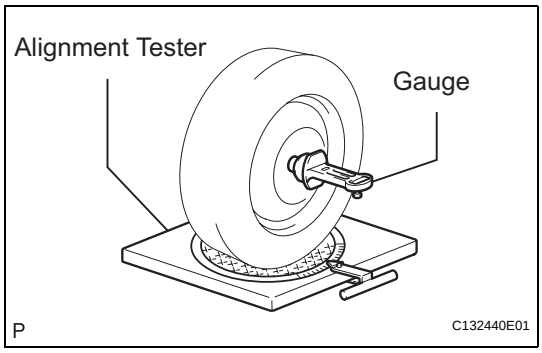


6. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

(a) Put the front wheel on the center of the alignment tester.

(b) Remove the center ornament.

(c) Set the camber-caster-king pin gauge and attachment at the center of the axle hub or drive shaft.



(d) Inspect the camber, caster, and steering axis inclination.

Camber

for USA and Canada:

Model	Camber	Right-left difference
ACV40L-CEAGKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
ACV40L-AEAGKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
GSV40L-AETGKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
ACV40L-CEMNKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
GSV40L-CETNKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
ACV40L-AEANKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
ACV40L-AEMNKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
GSV40L-AETNKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
ACV40L-CEASKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
ACV40L-CEMSKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less
GSV40L-CETSKA	-0°40' +-45' (-0.67° +-0.75°)	45' (0.75°) or less

for Mexico:

Model	Camber	Right-left difference
ACV40L-CEAGKA	-0°35' +-45' (-0.58° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	-0°35' +-45' (-0.58° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	-0°35' +-45' (-0.58° +-0.75°)	45' (0.75°) or less

Caster

for USA and Canada:

Model	Caster	Right-left difference
ACV40L-CEAGKA	3°00' +-45' (3.00° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
ACV40L-AEAGKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
GSV40L-AETGKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	3°00' +-45' (3.00° +-0.75°)	45' (0.75°) or less
ACV40L-CEMNKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
GSV40L-CETNKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
ACV40L-AEANKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
ACV40L-AEMNKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
GSV40L-AETNKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
ACV40L-CEASKA	3°00' +-45' (3.00° +-0.75°)	45' (0.75°) or less
ACV40L-CEMSKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less
GSV40L-CETSKA	2°55' +-45' (2.92° +-0.75°)	45' (0.75°) or less

for Mexico:

Model	Caster	Right-left difference
ACV40L-CEAGKA	2°45' +-45' (2.75° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	2°40' +-45' (2.67° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	2°45' +-45' (2.75° +-0.75°)	45' (0.75°) or less

Steering axis inclination

for USA and Canada:

Model	Steering axis inclination	Right-left difference
ACV40L-CEAGKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less

Model	Steering axis inclination	Right-left difference
ACV40L-AEAGKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
GSV40L-AETGKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
ACV40L-CEMNKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
GSV40L-CETNKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
ACV40L-AEANKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
ACV40L-AEMNKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
GSV40L-AETNKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
ACV40L-CEASKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
ACV40L-CEMSKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less
GSV40L-CETSKA	12°15' +-45' (12.25° +-0.75°)	45' (0.75°) or less

for Mexico:

Model	Steering axis inclination	Right-left difference
ACV40L-CEAGKA	12°00' +-45' (12.00° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	12°00' +-45' (12.00° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	12°00' +-45' (12.00° +-0.75°)	45' (0.75°) or less

NOTICE:
- **Perform the inspection while the vehicle is unloaded.**
- **The maximum tolerance of the right and left difference for the camber and caster is 45' (0.75°) or less.**

(e) Remove the camber-caster-king pin gauge and attachment.
(f) Install the center ornament.
(g) If the caster and steering axis inclination are not within the specified range after the camber has been correctly adjusted, recheck the suspension parts for damage and/or wear.

7. ADJUST CAMBER

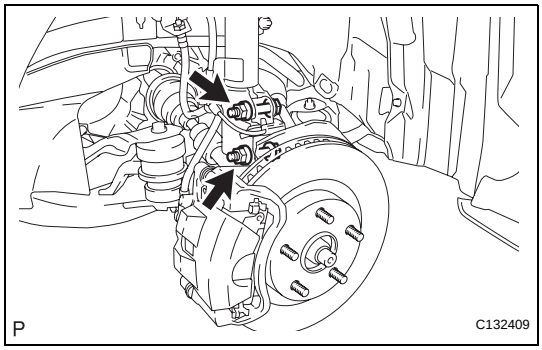
NOTICE:
Inspect toe-in after the camber has been adjusted.

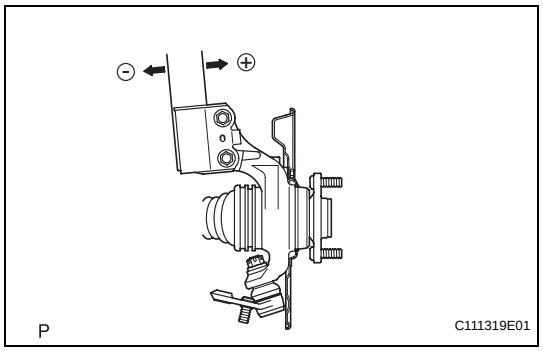
(a) Remove the front wheel.

(b) Remove the 2 nuts on the lower side of the front shock absorber.

NOTICE:
Keep the bolts inserted.

(c) Clean the installation surfaces of the front shock absorber and the steering knuckle.
(d) Temporarily install the 2 nuts (Step A).

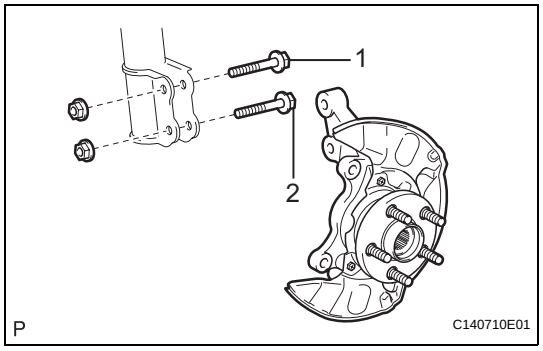




(e) Fully push or pull the front axle hub in the direction of the required adjustment (Step B).

(f) Tighten the nuts.
Torque: 210 N*m (2,141 kgf*cm, 155 ft.*lbf)
NOTICE:
Keep the bolts from rotating when tightening the nuts.

(g) Install the front wheel.
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)



(h) Check the camber.
If the measured value is not within the specification, calculate the required adjustment amount using the formula below.
Camber adjustment amount = center of the specified range center - measured value
Check the combination of installed bolts. Select appropriate bolts from the table below to adjust the camber to the specified values.
HINT:
Try to adjust the camber to the center of the specified values.

Move the axle toward (+) in step (B)	Move the axle toward (-) in step (B)
Refer to table (1) (Move the axle toward the positive side)	Refer to table (2) (Move the axle toward the negative side)

SP

Table (1) (Move the axle toward the positive side)

Installed Bolt / Adjusting Value								
	1	90105-17012	90105-17012	90105-17012	90105-17012	90105-17013	90105-17014	90105-17015
	2	90105-17012	90105-17013	90105-17014	90105-17015	90105-17015	90105-17015	90105-17015
-1°30' to -1°15' (-1.50° to -1.25°)								G
-1°15' to -1°00' (-1.25° to -1°)							G	A
-1°00' to -0°45' (-1° to -0.75°)						G	A	B
-0°45' to -0°30' (-0.75° to -0.5°)					G	A	B	C
-0°30' to -0°15' (-0.5° to -0.25°)				G	A	B	C	D
-0°15' to 0° (-0.25° to 0°)			G	A	B	C	D	E
0° to 0°15' (0° to 0.25°)		A	B	C	D	E	F	
0°15' to 0°30' (0.25° to 0.5°)		B	C	D	E	F		
0°30' to 0°45' (0.50° to 0.75°)		C	D	E	F			
0°45' to 1°00' (0.75° to 1°)		D	E	F				
1°00' to 1°15' (1° to 1.25°)		E	F					
1°15' to 1°30' (1.25° to 1.5°)		F						

Selected Bolt Combination

	A	B	C	D	E	F	G
1	90105-17012	90105-17012	90105-17012	90105-17013	90105-17014	90105-17015	90105-17012
2	90105-17013	90105-17014	90105-17015	90105-17015	90105-17015	90105-17015	90105-17012

C138332E01

SP

Table (2) (Move the axle toward the negative side)

Installed Bolt / Adjusting Value								
	1	90105-17012	90105-17012	90105-17012	90105-17012	90105-17013	90105-17014	90105-17015
	2	90105-17012	90105-17013	90105-17014	90105-17015	90105-17015	90105-17015	90105-17015
-1°30' to -1°15' (-1.50° to -1.25°)		F						
-1°15' to -1°00' (-1.25° to -1°)		E	F					
-1°00' to -0°45' (-1° to -0.75°)		D	E	F				
-0°45' to -0°30' (-0.75° to -0.5°)		C	D	E	F			
-0°30' to -0°15' (-0.5° to -0.25°)		B	C	D	E	F		
-0°15' to 0° (-0.25° to 0°)		A	B	C	D	E	F	
0° to 0°15' (0° to 0.25°)			G	A	B	C	D	E
0°15' to 0°30' (0.25° to 0.5°)				G	A	B	C	D
0°30' to 0°45' (0.50° to 0.75°)					G	A	B	C
0°45' to 1°00' (0.75° to 1°)						G	A	B
1°00' to 1°15' (1° to 1.25°)							G	A
1°15' to 1°30' (1.25° to 1.5°)								G

Selected Bolt Combination

	A	B	C	D	E	F	G
1	90105-17012	90105-17012	90105-17012	90105-17013	90105-17014	90105-17015	90105-17012
2	90105-17013	90105-17014	90105-17015	90105-17015	90105-17015	90105-17015	90105-17012

C138332E02

SP

The body and suspension may be damaged if the camber is not correctly adjusted according to the above table.

NOTICE:

Replace the nut with a new one when replacing the bolt.

(i) Repeat the steps mentioned above. In step (A), replace 1 or 2 selected bolts.

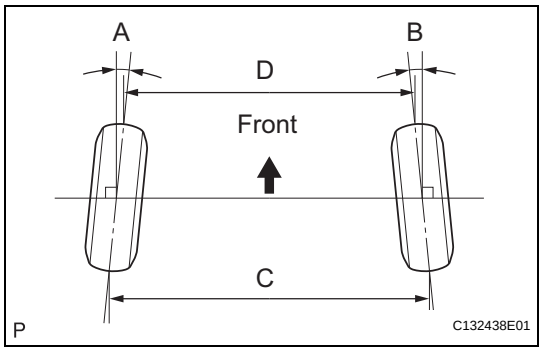
HINT:

Replace one bolt at a time when replacing 2 bolts.

REAR WHEEL ALIGNMENT

ADJUSTMENT

1. **INSPECT TIRES (See page TW-3)**
2. **MEASURE VEHICLE HEIGHT (See page SP-4)**
3. **INSPECT TOE-IN**



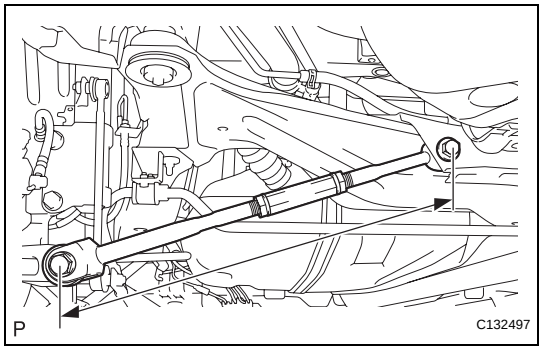
(a) Bounce the vehicle up and down at the corners to stabilize the suspension. Inspect the toe-in.

Toe-in

Toe-in (total)	-
A + B: C - D:	0° +- 24' (0° +- 0.4°) 4 +- 2 mm (0.16 +- 0.08 in.)

If the toe-in is not within the specified range, inspect the suspension parts and replace them if necessary.

4. **ADJUST TOE-IN**

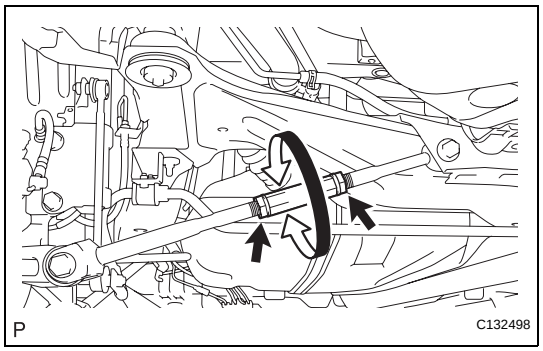


(a) Measure the lengths of the right and left rear No. 2 suspension arms.

Difference in the length between the right and left rear No. 2 suspension arms:

1.5 mm (0.06 in.) or less

If the left-right difference is larger than 1.5 mm (0.06 in.), adjust it by following the procedures below.



(b) Loosen the lock nuts.

(c) Turn the right and left adjusting tubes by an equal amount to adjust toe-in.

HINT:

- Try to adjust toe-in to the center of the specified range.
- One turn of each adjusting tube will adjust toe-in by approximately 10.8 mm (0.425 in.).

(d) Tighten the lock nuts.

Torque: 56 N*m (571 kgf*cm, 41 ft.*lbf)

5. **INSPECT CAMBER**

Camber

for USA and Canada:

Model	Camber	Right-left difference
ACV40L-CEAGKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less
ACV40L-AEAGKA	-1°15' +-45' (-1.25° +-0.75°)	45' (0.75°) or less
GSV40L-AETGKA	-1°15' +-45' (-1.25° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less
ACV40L-CEMNKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less
GSV40L-CETNKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less
ACV40L-AEANKA	-1°15' +-45' (-1.25° +-0.75°)	45' (0.75°) or less
ACV40L-AEMNKA	-1°15' +-45' (-1.25° +-0.75°)	45' (0.75°) or less
GSV40L-AETNKA	-1°15' +-45' (-1.25° +-0.75°)	45' (0.75°) or less

SP

Model	Camber	Right-left difference
ACV40L-CEASKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less
ACV40L-CEMSKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less
GSV40L-CETSKA	-1°18' +-45' (-1.30° +-0.75°)	45' (0.75°) or less

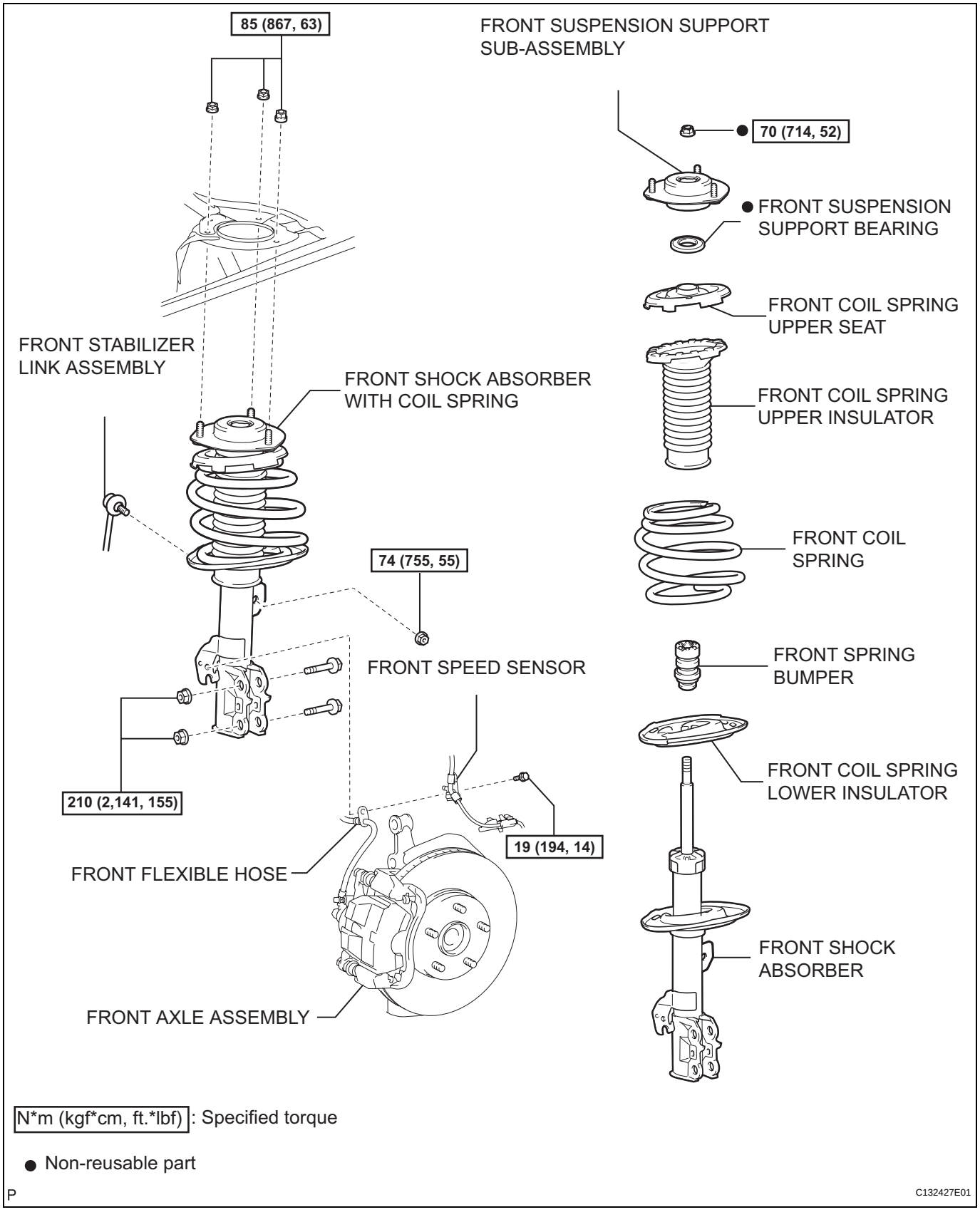
for Mexico:

Model	Camber	Right-left difference
ACV40L-CEAGKA	-1°06' +-45' (-1.10° +-0.75°)	45' (0.75°) or less
GSV40L-CETGKA	-1°06' +-45' (-1.10° +-0.75°)	45' (0.75°) or less
ACV40L-CEANKA	-1°06' +-45' (-1.10° +-0.75°)	45' (0.75°) or less

HINT:
Camber is not adjustable. If the measurement is not within the specification range, inspect the suspension parts for damage and/or wear, and replace them if necessary.

FRONT SHOCK ABSORBER

COMPONENTS



SP

REMOVAL

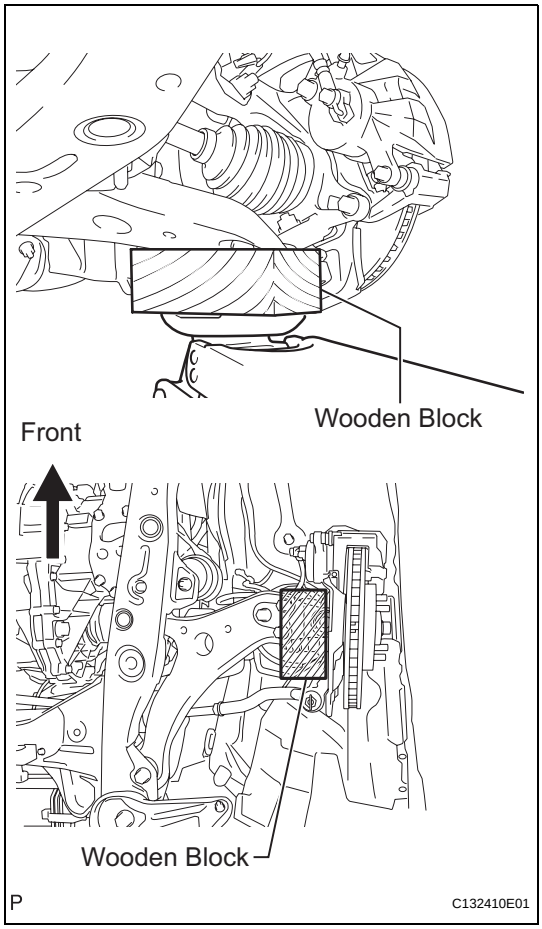
HINT:

- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.

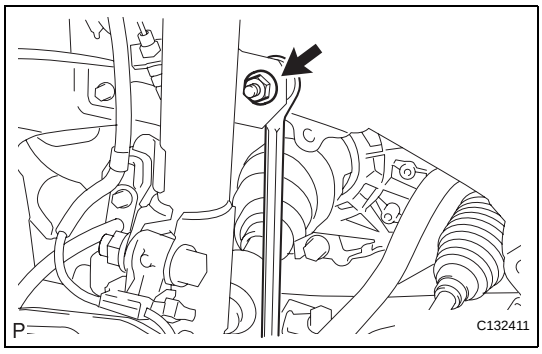
1. REMOVE FRONT WHEEL

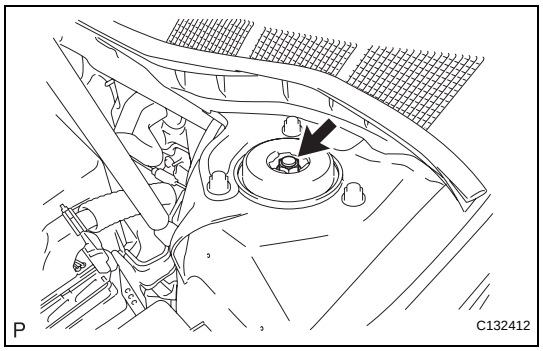
2. SEPARATE FRONT STABILIZER LINK ASSEMBLY

(a) Support the front No. 1 suspension lower arm with a jack using a wooden block to avoid damage.



(b) Remove the nut and separate the front stabilizer link assembly from the front shock absorber.
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.



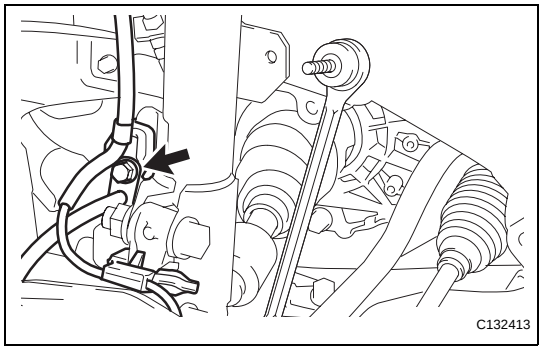


3. REMOVE FRONT SHOCK ABSORBER WITH COIL SPRING

(a) Loosen the lock nut of the front shock absorber with coil spring.

NOTICE:

- **Do not remove the lock nut.**
- **Only loosen the nut when disassembling the front shock absorber with coil spring.**

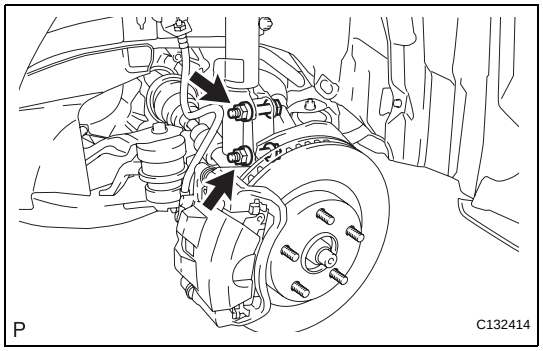


(b) Remove the bolt and disconnect the front flexible hose and front speed sensor wire harness from the front shock absorber with coil spring.

NOTICE:

Be sure to remove the front speed sensor from the front shock absorber with coil spring.

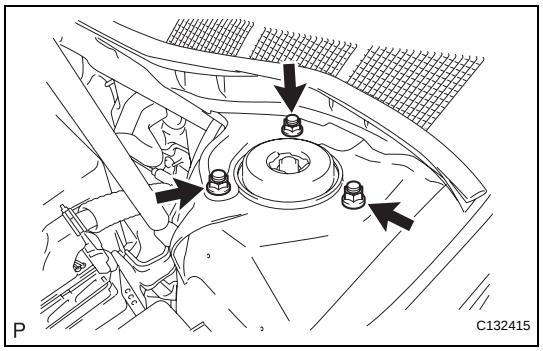
SP



(c) Remove the 2 nuts on the lower side of the front shock absorber with coil spring.

NOTICE:

- **When removing the nuts, keep the bolts from rotating.**
- **Keep the bolts inserted to secure the front axle assembly.**



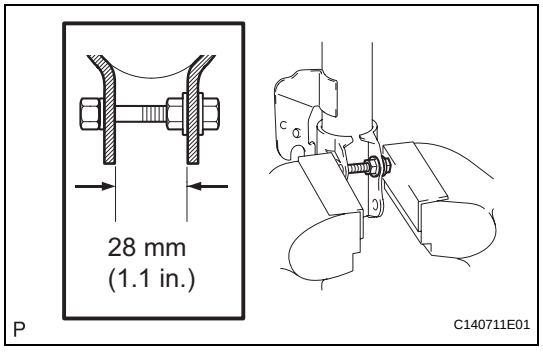
(d) Remove the 3 nuts on the upper side of the front shock absorber with coil spring.

(e) Lower the front axle assembly, and remove the 2 bolts on the lower side of the front shock absorber.

(f) Remove the front shock absorber with coil spring.

NOTICE:

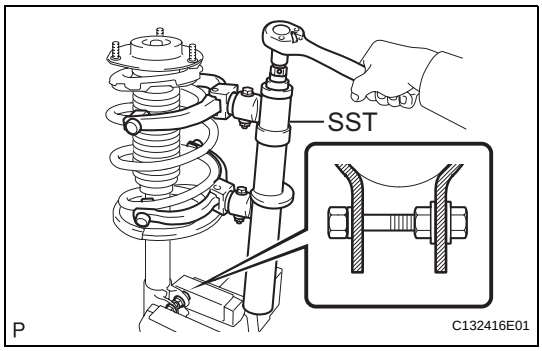
Make sure that the front speed sensor is disconnected from the front shock absorber with coil spring.



DISASSEMBLY

1. FIX FRONT SHOCK ABSORBER WITH COIL SPRING

(a) As shown in the illustration, secure the front shock absorber with coil spring in a vise using aluminum plates by clamping onto a double nutted bolt affixed to the bracket at the bottom of the absorber.



2. REMOVE FRONT SHOCK ABSORBER

(a) Using SST, compress the front coil spring.

SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

NOTICE:

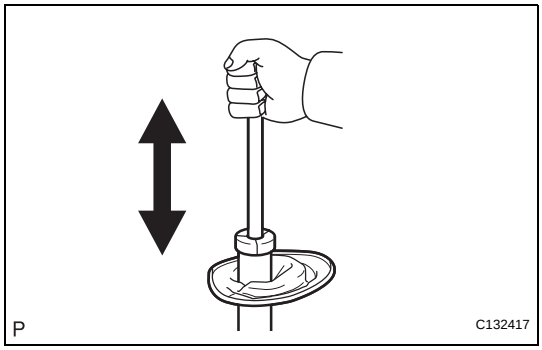
Do not use an impact wrench.

HINT:

If the front coil spring is compressed at an angle, using 2 SST will make the work easier.

(b) Remove the front suspension support sub-assembly, front suspension support bearing, front coil spring upper seat, front coil spring upper insulator, front coil spring, front spring bumper, and front coil spring lower insulator from the front shock absorber.

SP



INSPECTION

1. INSPECT FRONT SHOCK ABSORBER

(a) Compress and extend the shock absorber rod 4 or more times.

Standard:

There is no abnormal resistance or sound and operation resistance is normal.

HINT:

If there is any abnormality, replace the front shock absorber with a new one.

REASSEMBLY

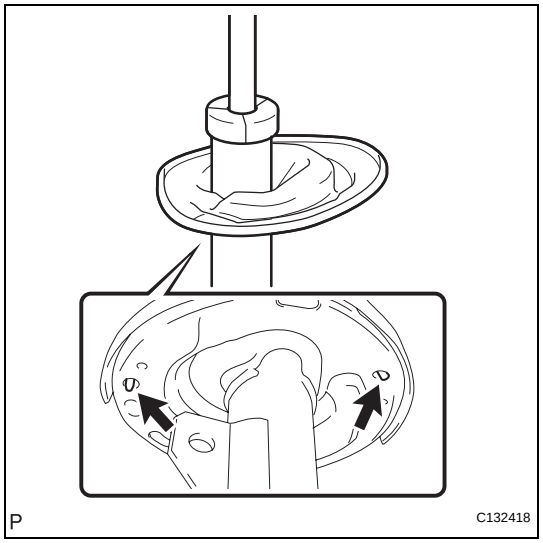
1. INSTALL FRONT SHOCK ABSORBER

(a) Install the front spring bumper to the piston rod.

(b) Install the front coil spring lower insulator onto the front shock absorber.

NOTICE:

Align the 2 protrusions of the front coil spring lower insulator and the 2 holes in the front shock absorber.



(c) Using SST, compress the front coil spring.

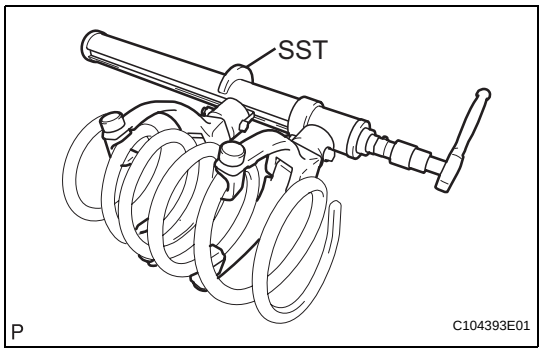
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

NOTICE:

Do not use an impact wrench.

HINT:

If the front coil spring is compressed at an angle, using 2 SST will make the work easier.



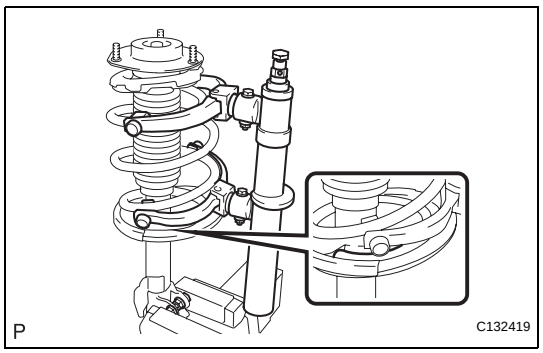
(d) Install the front coil spring to the front shock absorber.

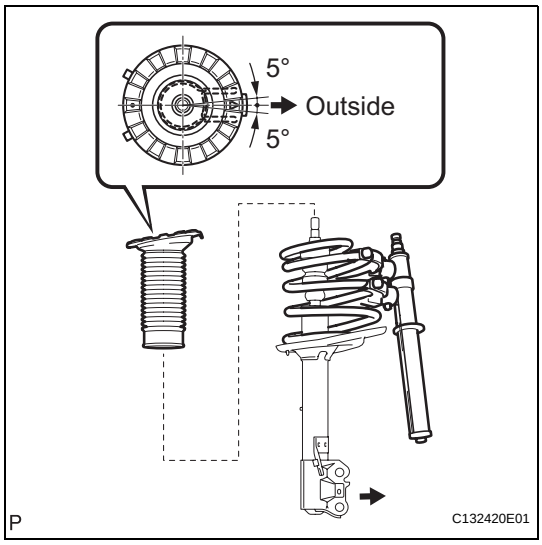
NOTICE:

The smaller diameter end of the front coil spring must face upward.

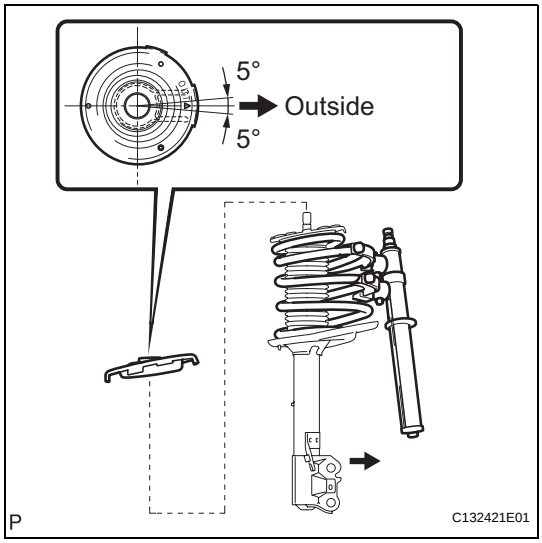
HINT:

Fit the lower end of the front coil spring into the gap of the insulator.

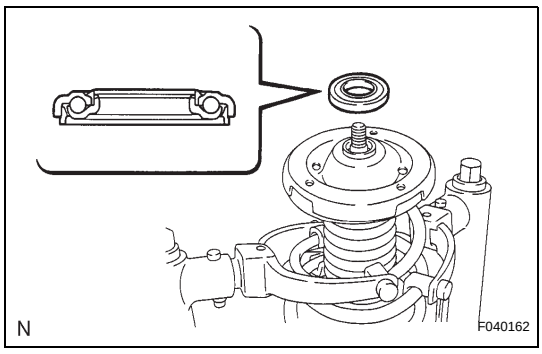




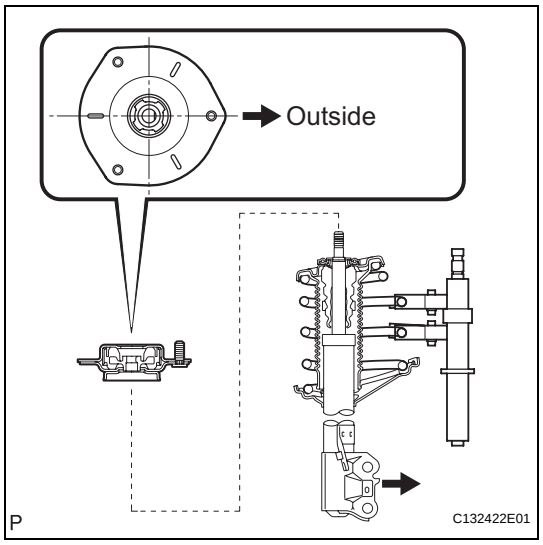
(e) Install the front coil spring upper insulator as shown in the illustration.
HINT:
Any misalignment between the front shock absorber lower bracket and the matchmark must be +-5°.



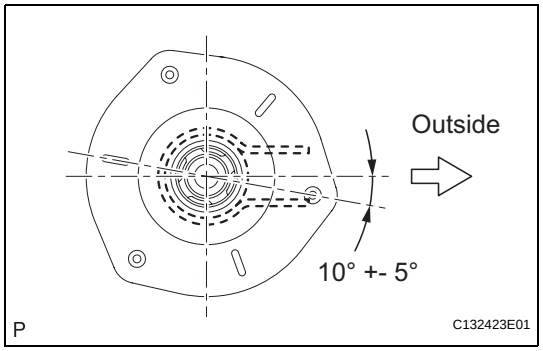
(f) Install the front coil spring upper seat with the mark facing to the outside of the vehicle.
HINT:
Any misalignment between the front shock absorber lower bracket and the matchmark must be +-5°.



(g) Install a new front suspension support bearing as shown in the illustration.
HINT:
If there is foreign matter inside the front suspension support bearing, replace it with a new one.



(h) Install the front suspension support sub-assembly. Temporarily tighten a new lock nut.
NOTICE:
Check that the flats on the piston rod and the flats on the front suspension support sub-assembly are aligned.



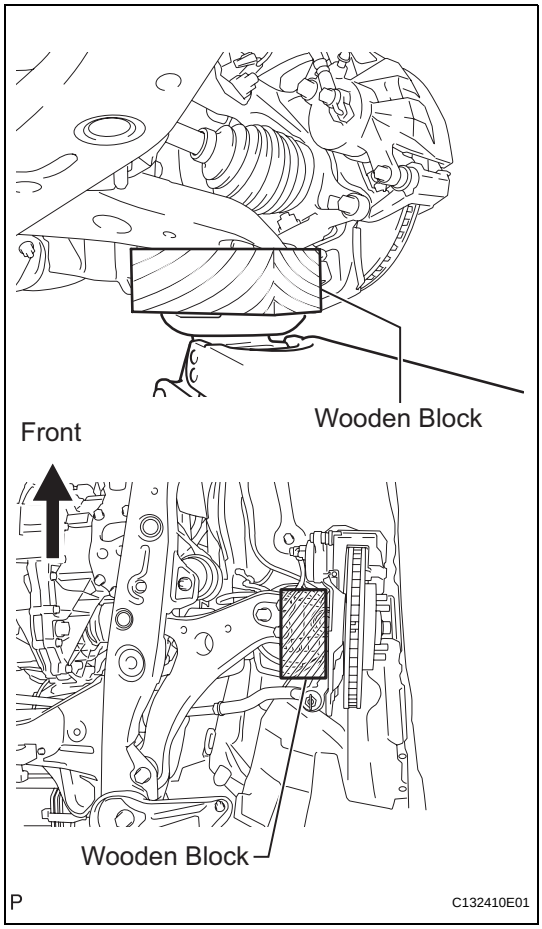
(i) Remove the SST slowly in order to release the coil spring.
NOTICE:
Do not use an impact wrench.
HINT:
Any misalignment between the front shock absorber lower bracket and the arrows must be +-5°.

INSTALLATION

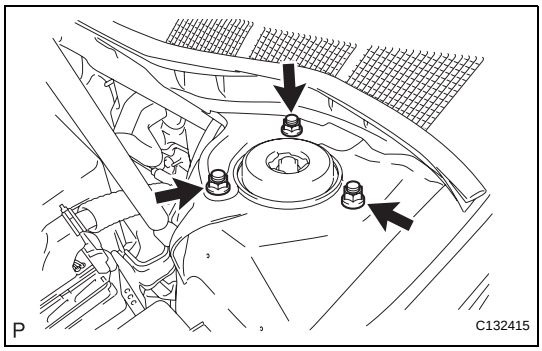
1. INSTALL FRONT SHOCK ABSORBER WITH COIL SPRING

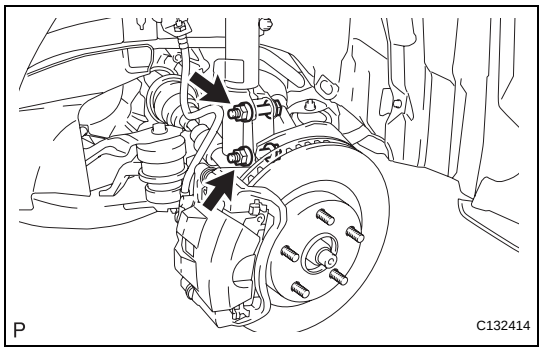
(a) Install the front shock absorber with coil spring to the front axle assembly and insert the 2 bolts from the front side of the vehicle.

(b) Slowly jack up the vehicle using a wooden block and install the front shock absorber with coil spring (upper side) to the vehicle.

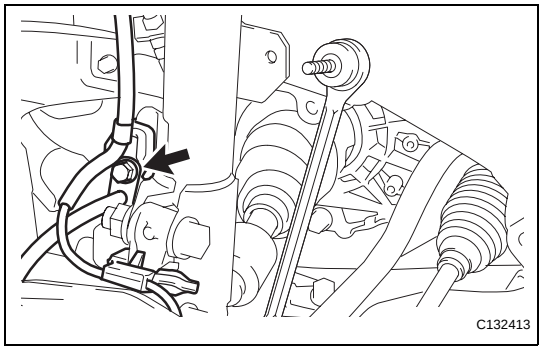


(c) Install the 3 nuts to the upper side of the front shock absorber with coil spring.
Torque: 85 N*m (867 kgf*cm, 63 ft.*lbf)

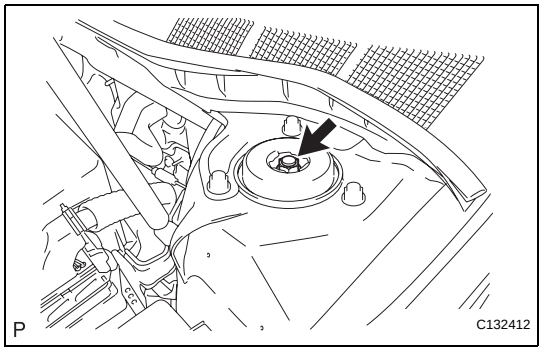




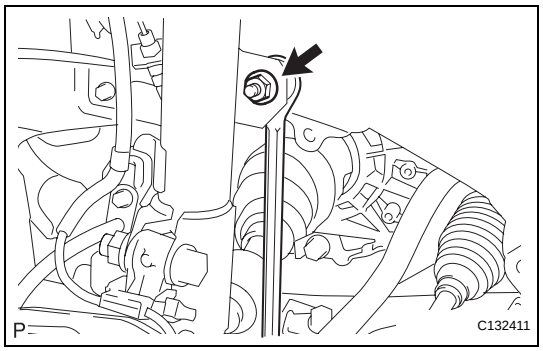
(d) Install the 2 nuts to the lower side of the front shock absorber with coil spring.
Torque: 210 N*m (2,140 kgf*cm, 155 ft.*lbf)
NOTICE:
When installing the nuts, keep the bolts from rotating.



(e) Install the front flexible hose and front speed sensor wire harness with the bolt.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
NOTICE:
Do not twist the front speed sensor wire harness when installing it.



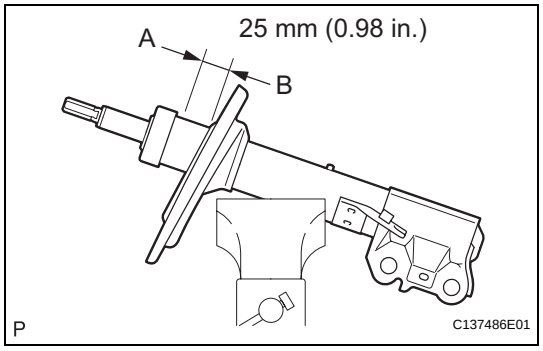
(f) Fully tighten the lock nut.
Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)



2. INSTALL FRONT STABILIZER LINK ASSEMBLY
(a) Install the front stabilizer link assembly with the nut.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.

3. INSTALL FRONT WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

4. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT
(See page SP-4)



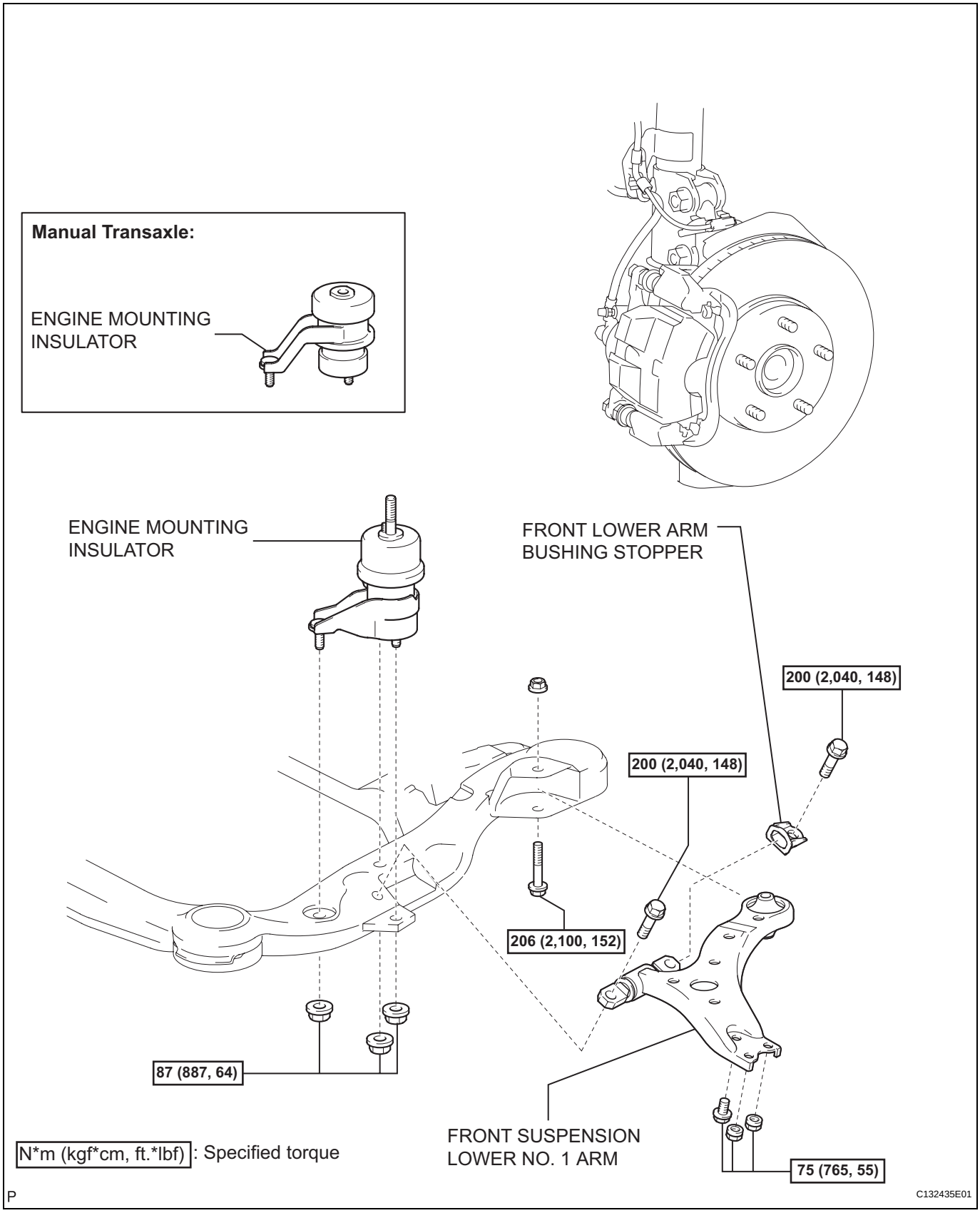
DISPOSAL

1. DISPOSE OF FRONT SHOCK ABSORBER
(a) Fully extend the shock absorber rod.
(b) Using a drill, make a hole in the cylinder between A and B as shown in the illustration to discharge the gas inside.
CAUTION:
- **Be careful when drilling because shards of metal may fly about. Always use the proper safety equipment.**

- **The gas is colorless, odorless and non-poisonous.**

FRONT SUSPENSION LOWER NO. 1 ARM

COMPONENTS



REMOVAL

HINT:

- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

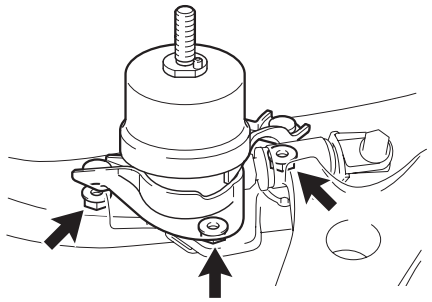
HINT:

Refer to the instructions for installation of the engine assembly (See page EM-94 for 2AZ-FE, EM-23 for 2GR-FE).

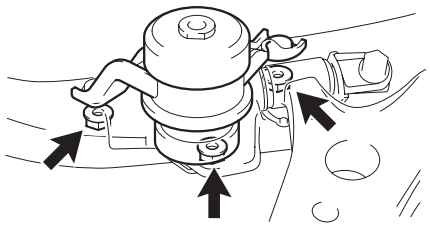
2. REMOVE ENGINE MOUNTING INSULATOR

(a) Remove the 3 nuts and the engine mounting insulator.

Automatic Transaxle:



Manual Transaxle:



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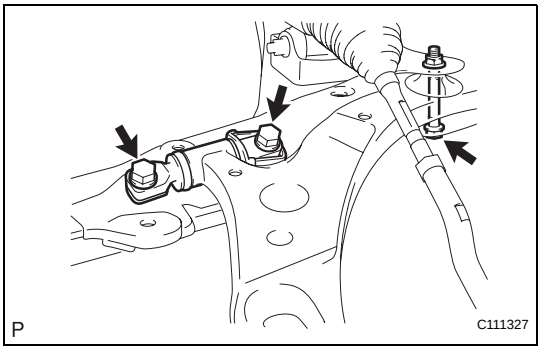

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3. REMOVE FRONT SUSPENSION LOWER NO. 1 ARM

(a) Remove the 3 bolts and the nut on the front suspension lower No. 1 arm and remove it from the front frame assembly.

(b) Remove the front lower arm bushing stopper.

INSTALLATION

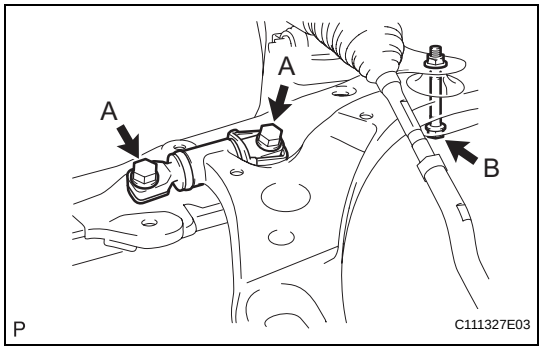
1. INSTALL FRONT SUSPENSION LOWER NO. 1 ARM

(a) Install the front lower arm bushing stopper.

(b) Install the front suspension lower No. 1 arm to the front frame assembly with the 3 bolts and the nut, but do not tighten them yet.

(c) Tighten the 3 bolts in numerical order shown in the illustration.

Torque: 200 N*m (2,040 kgf*cm, 148 ft.*lbf) (bolt A)
206 N*m (2,100 kgf*cm, 152 ft.*lbf) (bolt B)



2. INSTALL ENGINE MOUNTING INSULATOR

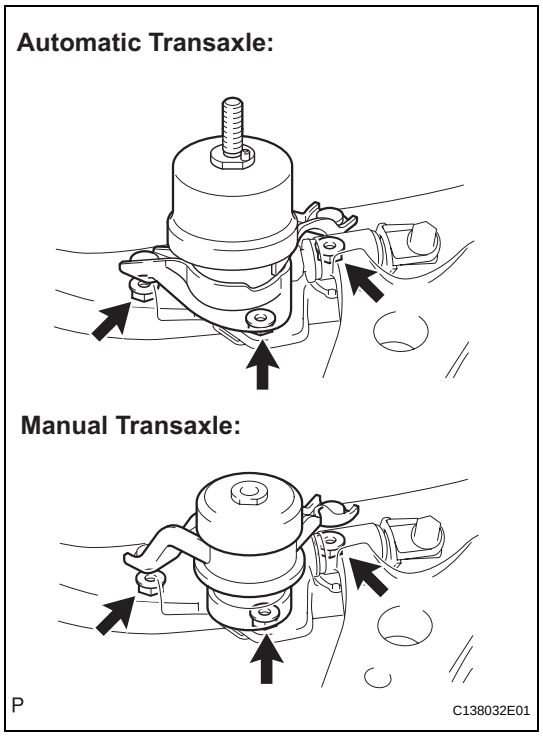
(a) Install the engine mounting insulator with the 3 nuts.

Torque: 87 N*m (887 kgf*cm, 64 ft.*lbf)

3. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

HINT:

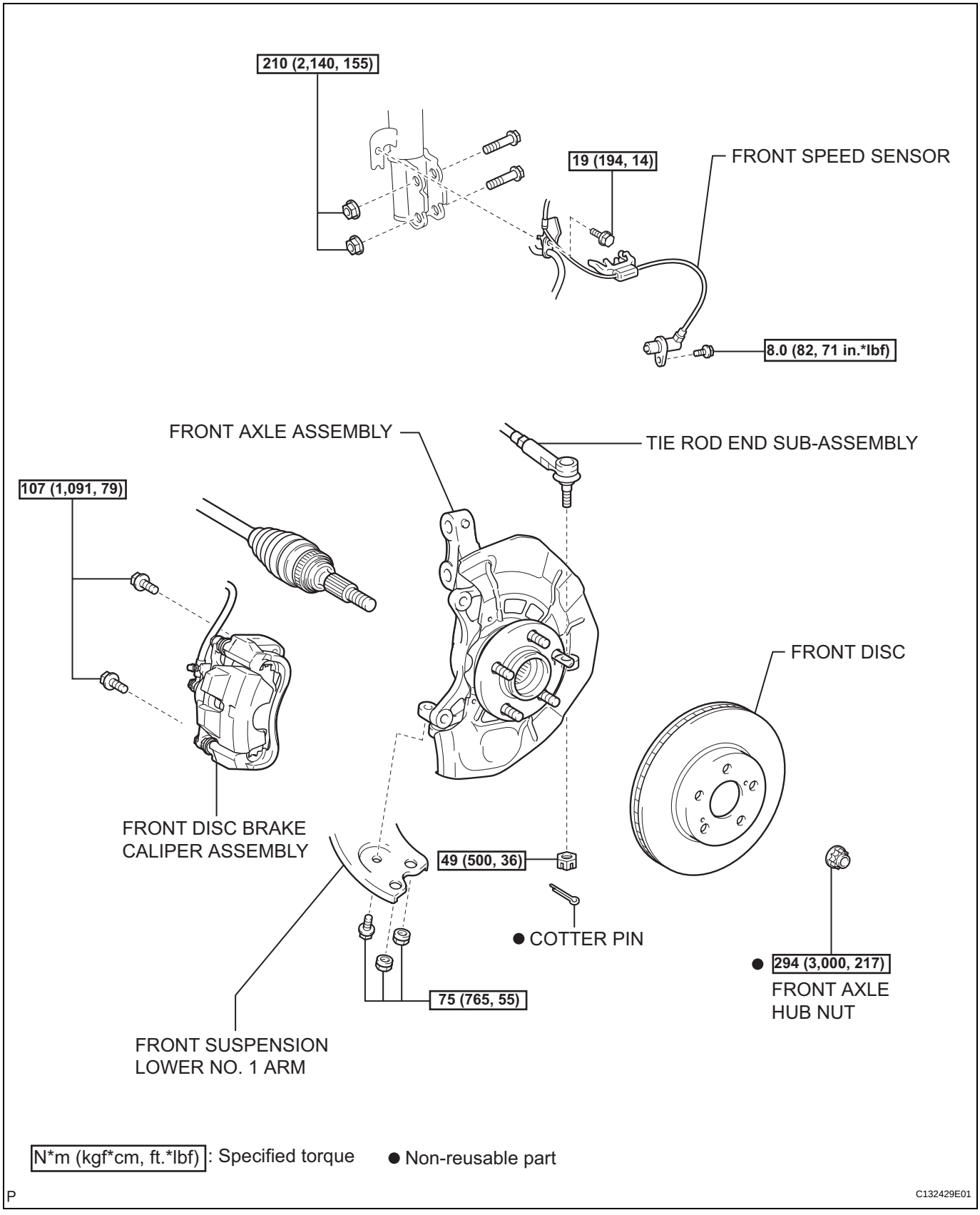
Refer to the instructions for removal of the engine assembly (See page EM-107 for 2AZ-FE, EM-37 for 2GR-FE).

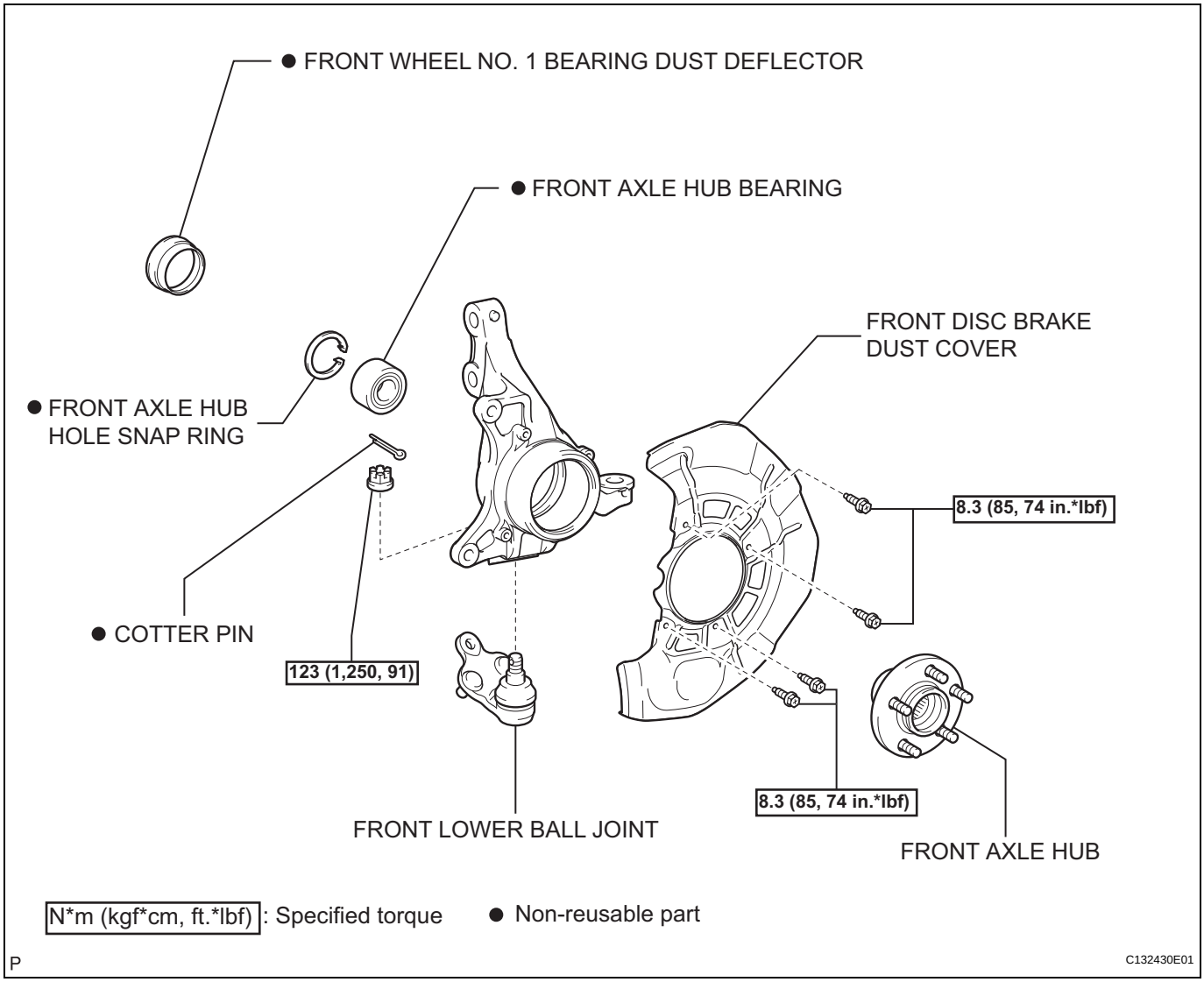


SP

FRONT LOWER BALL JOINT

COMPONENTS




● FRONT WHEEL NO. 1 BEARING DUST DEFLECTOR
● FRONT AXLE HUB BEARING
FRONT DISC BRAKE DUST COVER
● FRONT AXLE HUB HOLE SNAP RING
8.3 (85, 74 in.*lbf)
● COTTER PIN
123 (1,250, 91)
8.3 (85, 74 in.*lbf)
FRONT LOWER BALL JOINT
FRONT AXLE HUB
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
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SP

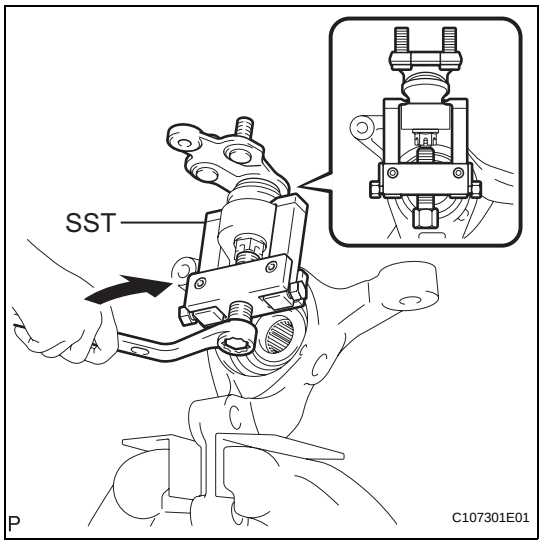
SP

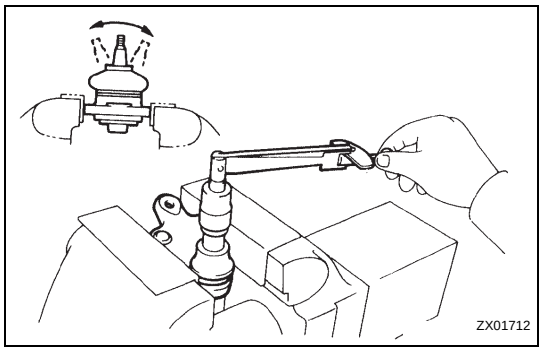
REMOVAL

HINT:

- Use the same procedures for the RH side and the LH side.
- The procedures listed below are for the LH side.

1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT AXLE HUB NUT (See page DS-7)**
3. **SEPARATE FRONT SPEED SENSOR (See page DS-7)**
4. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-6)**
5. **REMOVE FRONT DISC (See page BR-49)**
6. **SEPARATE TIE ROD END SUB-ASSEMBLY (See page DS-8)**
7. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-8)**
8. **REMOVE FRONT AXLE ASSEMBLY (See page DS-8)**
9. **REMOVE FRONT WHEEL NO. 1 BEARING DUST DEFLECTOR (See page AH-7)**
10. **REMOVE FRONT AXLE HUB HOLE SNAP RING (See page AH-7)**
11. **REMOVE FRONT AXLE HUB (See page AH-7)**
12. **REMOVE FRONT DISC BRAKE DUST COVER (See page AH-8)**
13. **REMOVE FRONT AXLE HUB BEARING (See page AH-8)**
14. **REMOVE FRONT LOWER BALL JOINT**
    (a) Secure the steering knuckle in a vise using aluminum plates.
    (b) Remove the cotter pin and nut.
    (c) Using SST, remove the front lower ball joint.
    SST 09628-62011
    NOTICE:
    - **Do not damage the dust cover of the ball joint.**
    - **Do not damage the steering knuckle.**





INSPECTION

1. INSPECT FRONT LOWER BALL JOINT

(a) Inspect the turning of the ball joint.

(1) Secure the front lower ball joint assembly in a vise using aluminum plates.

(2) Install the nut to the front lower ball joint assembly stud.

(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: 1.0 to 3.4 N*m (10 to 35 kgf*cm, 9 to 30 in.*lbf)

HINT:

If the turning torque is not within the specified range, replace the front lower ball joint assembly with a new one.

(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.

SP

INSTALLATION

1. **INSTALL FRONT LOWER BALL JOINT**
   (a) Install the front lower ball joint to the steering knuckle with the nut.
   Torque: 123 N*m (1,250 kgf*cm, 91 ft.*lbf)
   NOTICE:
   Prevent oil from adhering to the screw and tapered parts.
   (b) Install a new cotter pin.
   NOTICE:
   If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.
2. **INSTALL FRONT AXLE HUB BEARING (See page AH-9)**
3. **INSTALL FRONT DISC BRAKE DUST COVER (See page AH-9)**
4. **INSTALL FRONT AXLE HUB (See page AH-9)**
5. **INSTALL FRONT AXLE HUB HOLE SNAP RING (See page AH-9)**
6. **INSTALL FRONT WHEEL NO. 1 BEARING DUST DEFLECTOR (See page AH-10)**
7. **INSTALL FRONT AXLE ASSEMBLY (See page DS-21)**
8. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM (See page DS-21)**
9. **CONNECT TIE ROD END SUB-ASSEMBLY (See page DS-21)**
10. **INSTALL FRONT DISC (See page BR-51)**
11. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-10)**
12. **INSTALL FRONT SPEED SENSOR (See page DS-21)**
13. **INSTALL FRONT AXLE HUB NUT (See page AH-11)**
14. **SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-11)**
15. **REMOVE FRONT DISC (See page BR-49)**
16. **INSPECT FRONT AXLE HUB BEARING LOOSENESS (See page AH-5)**
17. **INSPECT FRONT AXLE HUB RUNOUT (See page AH-6)**
18. **INSTALL FRONT DISC (See page BR-51)**
19. **INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY (See page AH-10)**
20. **INSTALL FRONT AXLE HUB NUT (See page AH-11)**
21. **CHECK ABS SPEED SENSOR SIGNAL**
    HINT:
    - ABS: See page BC-11

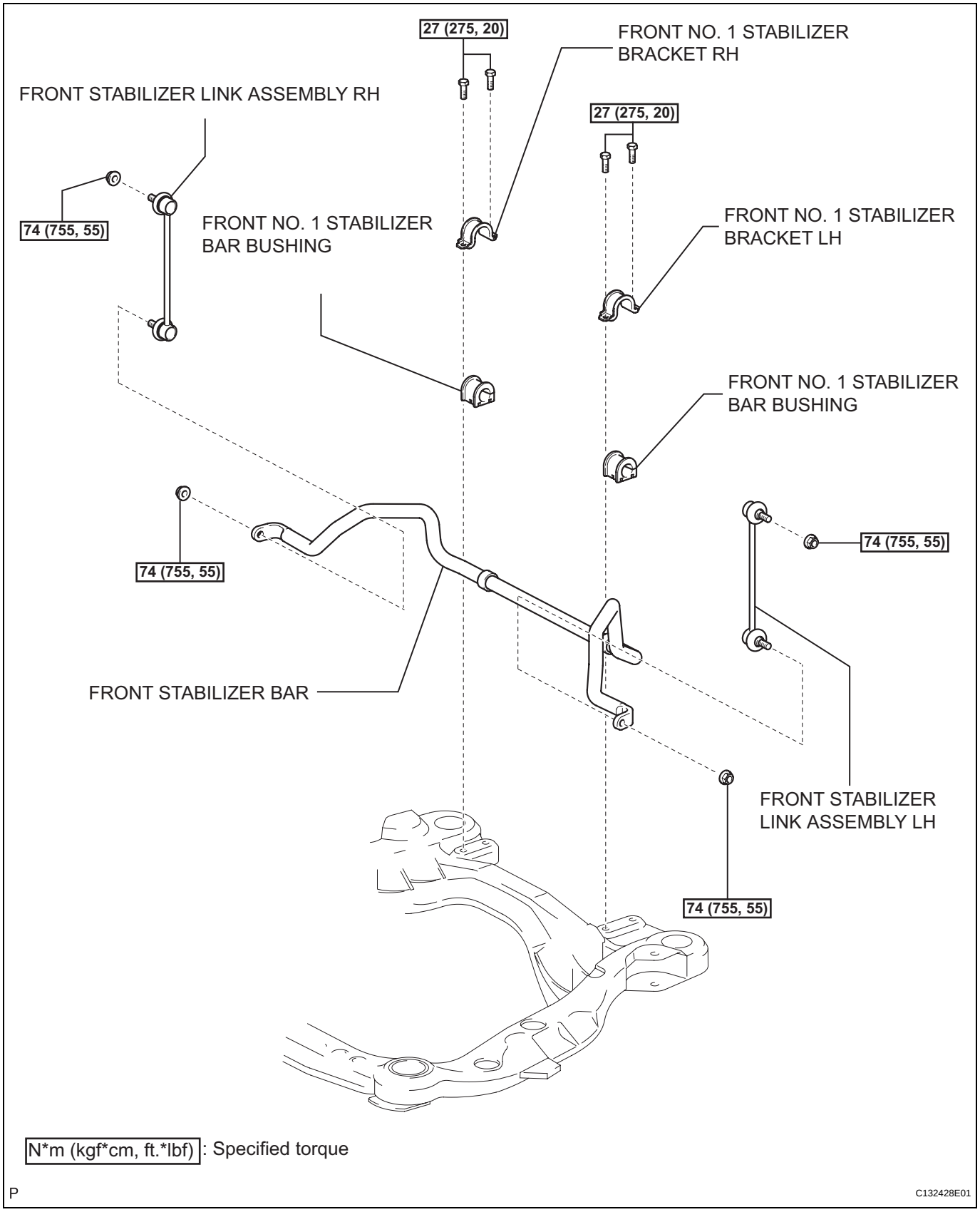
- VSC (for BOSCH): See page BC-290
- VSC (for ADVICS): See page BC-123

22. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

23. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
(See page SP-4)

FRONT STABILIZER BAR

COMPONENTS



SP

N*m (kgf*cm, ft.*lbf): Specified torque

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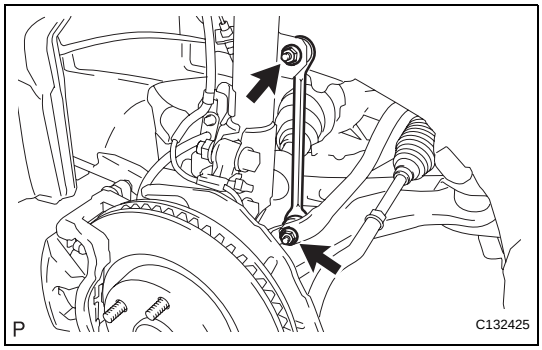
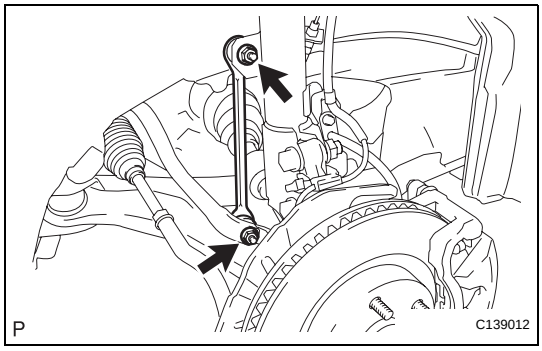
SP

REMOVAL

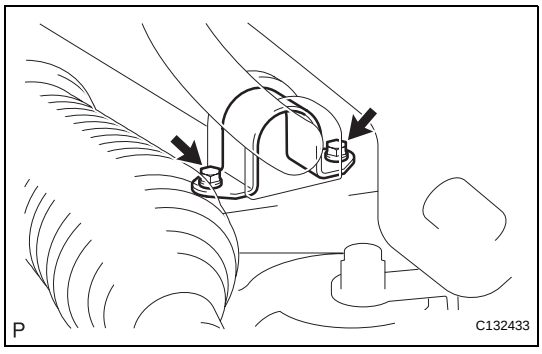
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
3. **REMOVE FRONT WHEELS**
4. **SEPARATE STEERING INTERMEDIATE SHAFT ASSEMBLY (See page SR-42)**
5. **SEPARATE TIE ROD END SUB-ASSEMBLY (See page PS-40)**
6. **REMOVE FRONT STABILIZER LINK ASSEMBLY LH**
   (a) Remove the 2 nuts and the front stabilizer link assembly LH.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.

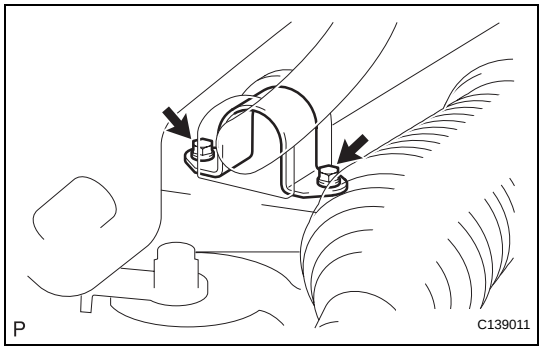


7. **REMOVE FRONT STABILIZER LINK ASSEMBLY RH**
   (a) Remove the 2 nuts and the front stabilizer link assembly RH.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud.



8. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE**
   HINT:
   Refer to the instructions for removal of the engine assembly (See page EM-100 for 2AZ-FE, EM-29 for 2GR-FE).
9. **REMOVE FRONT NO. 1 STABILIZER BRACKET LH**
   (a) Remove the 2 bolts and the front No. 1 stabilizer bracket LH from the front frame assembly.





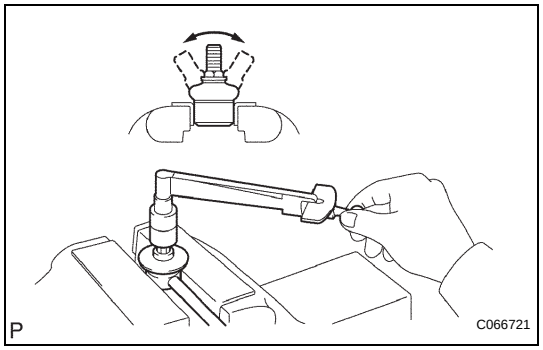
10. REMOVE FRONT NO. 1 STABILIZER BRACKET RH

(a) Remove the 2 bolts and the front No. 1 stabilizer bracket RH from the front frame assembly.

11. REMOVE FRONT NO. 1 STABILIZER BAR BUSHING

(a) Remove the 2 front No. 1 stabilizer bar bushings from the front stabilizer bar.

12. REMOVE FRONT STABILIZER BAR



INSPECTION

1. INSPECT FRONT STABILIZER LINK ASSEMBLY

(a) Inspect the turning of the ball joint.

(1) Secure the front stabilizer link assembly in a vise using aluminum plates.

(2) Install the nut to the front stabilizer link assembly stud.

(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

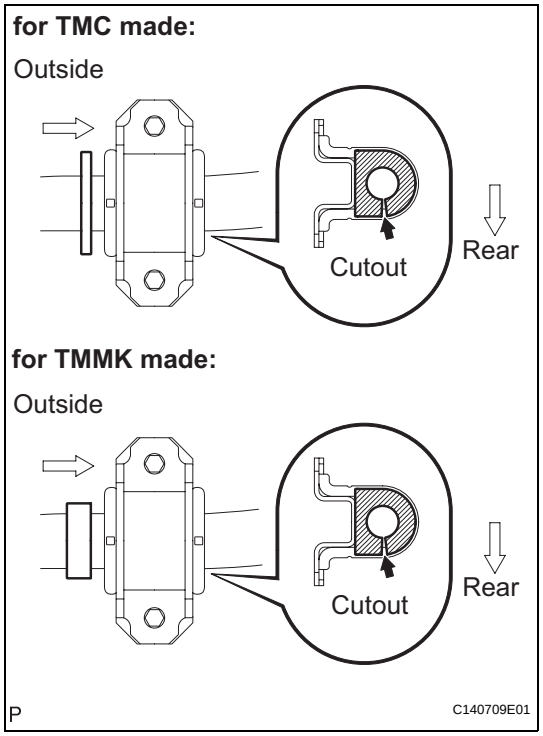
Torque: 0.05 to 2.0 N*m (0.5 to 20 kgf*cm, 0.4 to 18 in.*lbf)

HINT:

If the turning torque is not within the specified range, replace the front stabilizer link assembly with a new one.

(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.



INSTALLATION

1. INSTALL FRONT NO. 1 STABILIZER BAR BUSHING

(a) Install the 2 front stabilizer bar bushings No. 1 to the outside of the bushing stopper on the front stabilizer bar.

NOTICE:

Make sure that the cutout of the front stabilizer bar bushing No. 1 faces the rear side as shown in the illustration.

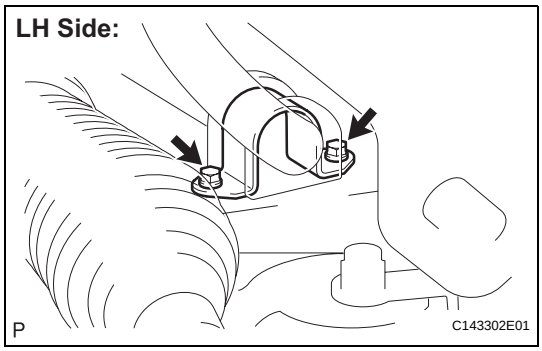
2. INSTALL FRONT NO. 1 STABILIZER BRACKET LH

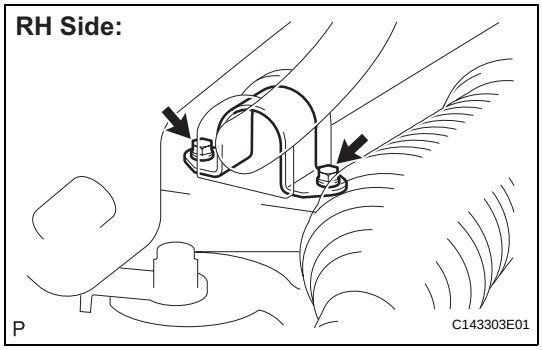
(a) Install the front No. 1 stabilizer bracket LH.

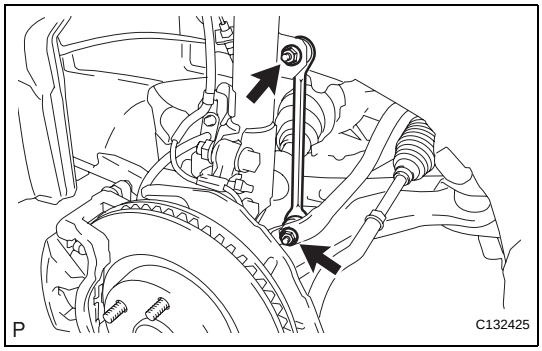
3. INSTALL FRONT NO. 1 STABILIZER BRACKET RH

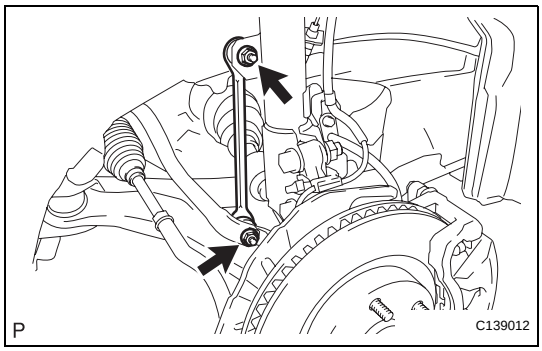
(a) Install the front No. 1 stabilizer bracket RH.

SP









4. **INSTALL FRONT STABILIZER BAR**
   (a) Install the front stabilizer bar with the 2 bolts. (LH Side)
   Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

   (b) Install the front stabilizer bar with the 2 bolts. (RH Side)
   Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)

5. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
   HINT:
   Refer to the instructions for installation of the engine assembly (See page EM-107 for 2AZ-FE, EM-37 for 2GR-FE)

6. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH**
   (a) Install the front stabilizer link assembly LH with the 2 nuts.
   Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
   HINT:
   If the ball joint turns together with the nut, use a hexagon (6 mm) wrench to hold the stud.

7. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
   (a) Install the front stabilizer link assembly RH with the 2 nuts.
   Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)
   HINT:
   If the ball joint turns together with the nut, use a hexagon (6 mm) wrench to hold the stud.

8. **CONNECT TIE ROD END SUB-ASSEMBLY (See page PS-64)**

9. **CONNECT STEERING INTERMEDIATE SHAFT ASSEMBLY (See page SR-47)**

10. **PLACE FRONT WHEELS FACING STRAIGHT**

11. **INSTALL FRONT WHEELS**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

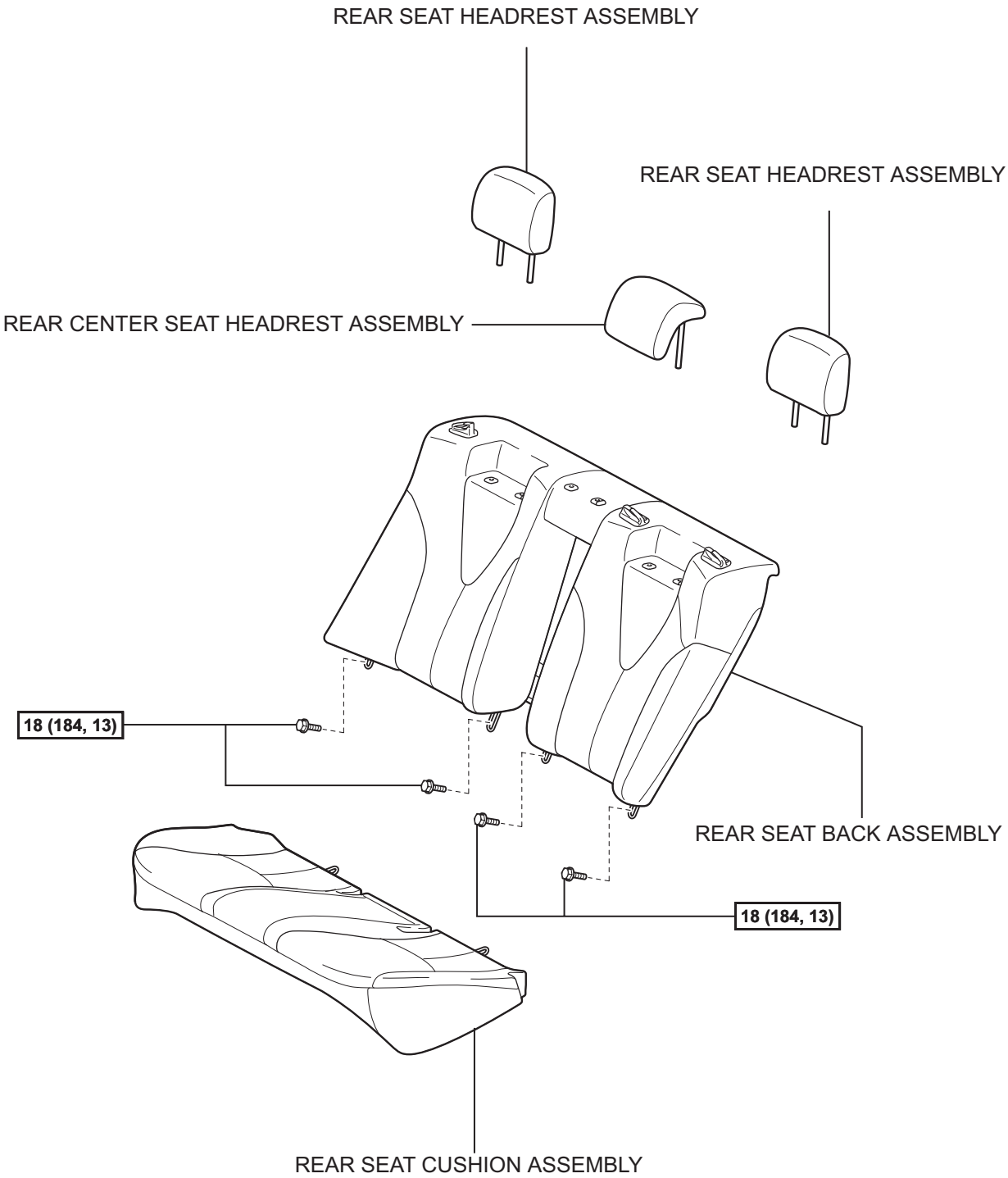
12. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

13. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT** (See page SP-4)

REAR SHOCK ABSORBER

COMPONENTS

for Fixed Type:



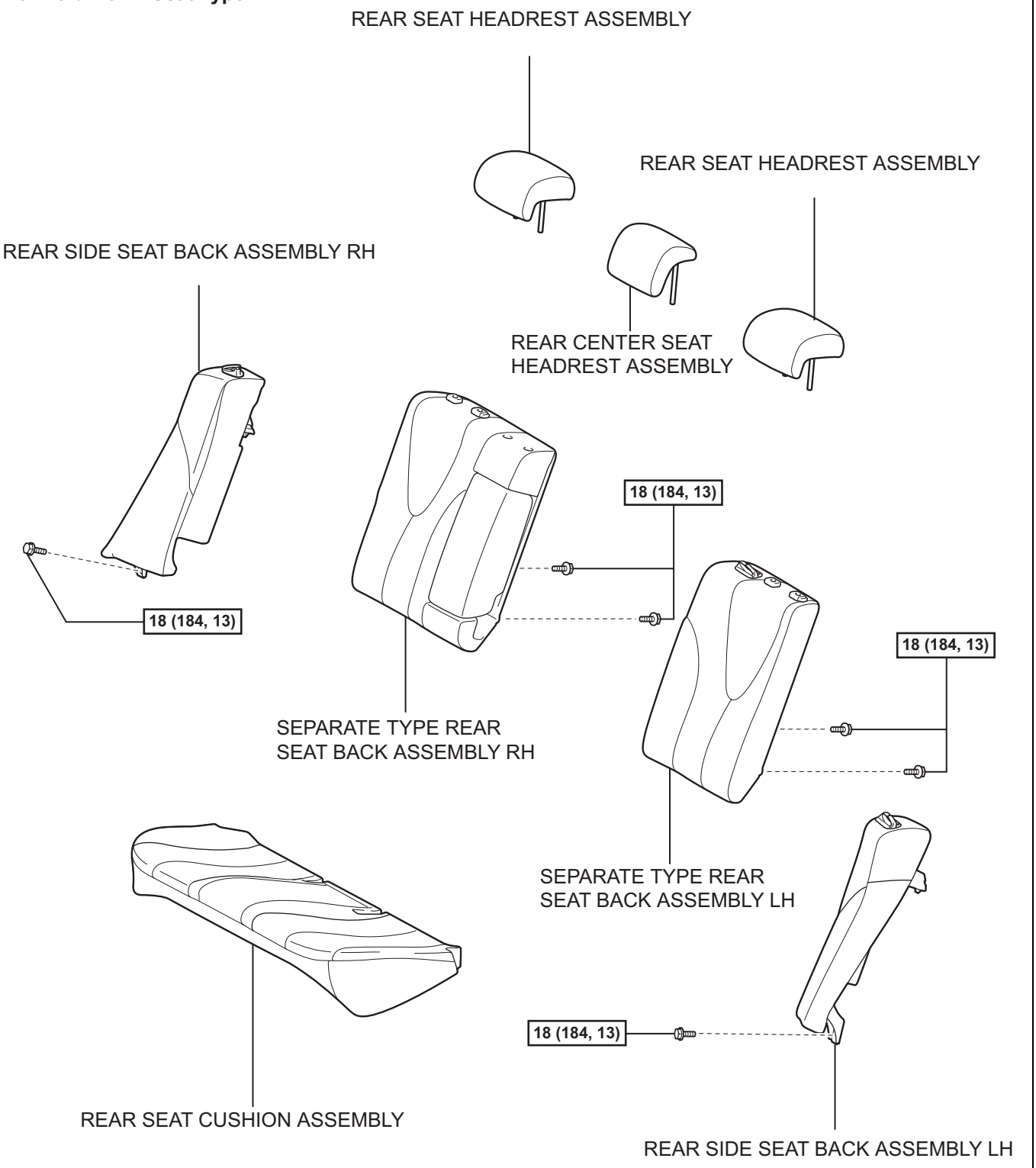
N*m (kgf*cm, ft.*lbf) : Specified torque

P

C138582E01

SP

for Fold Down Seat Type:

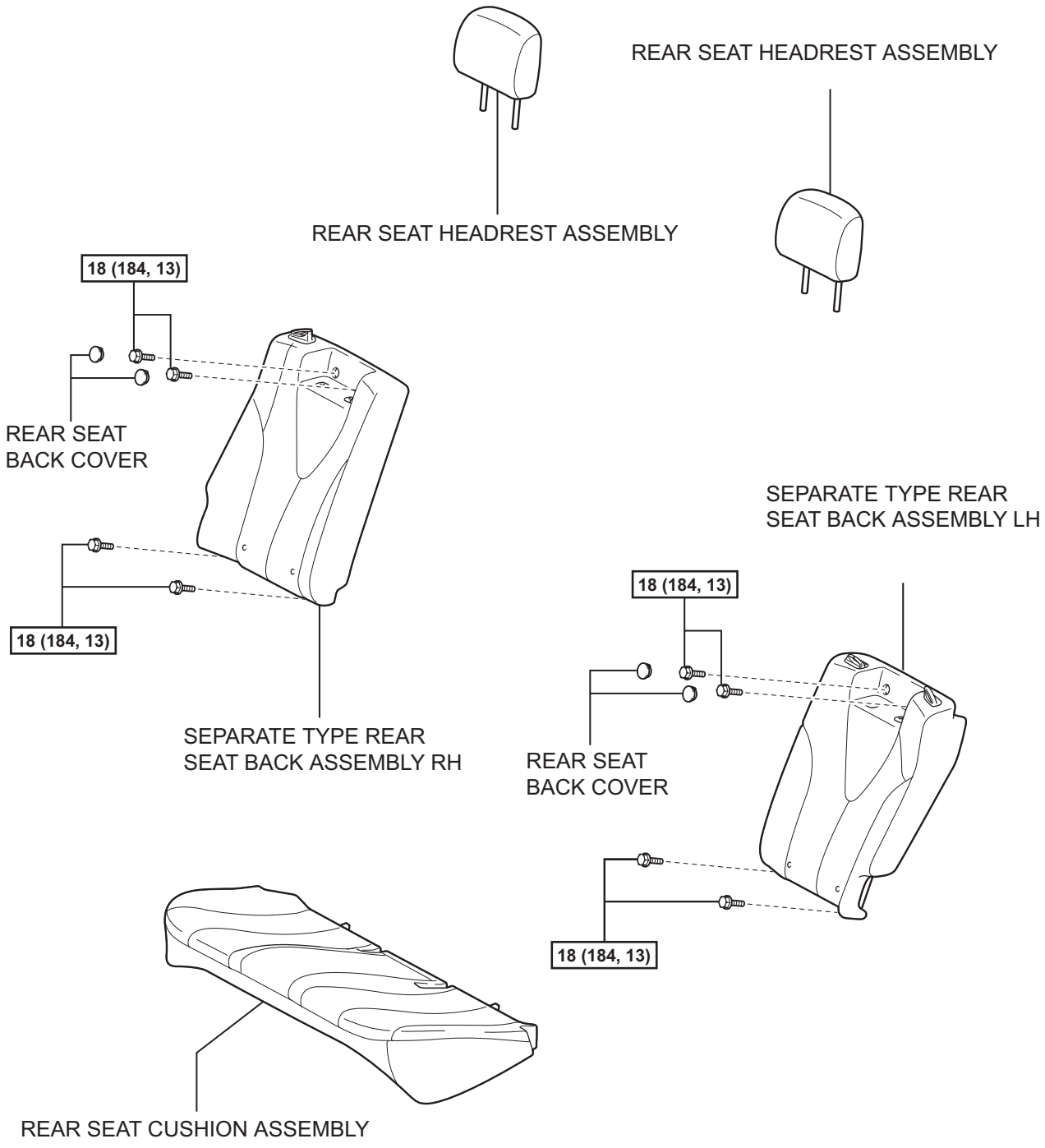


N*m (kgf*cm, ft.*lbf): Specified torque

P

C138583E01

for Reclining Seat Type:

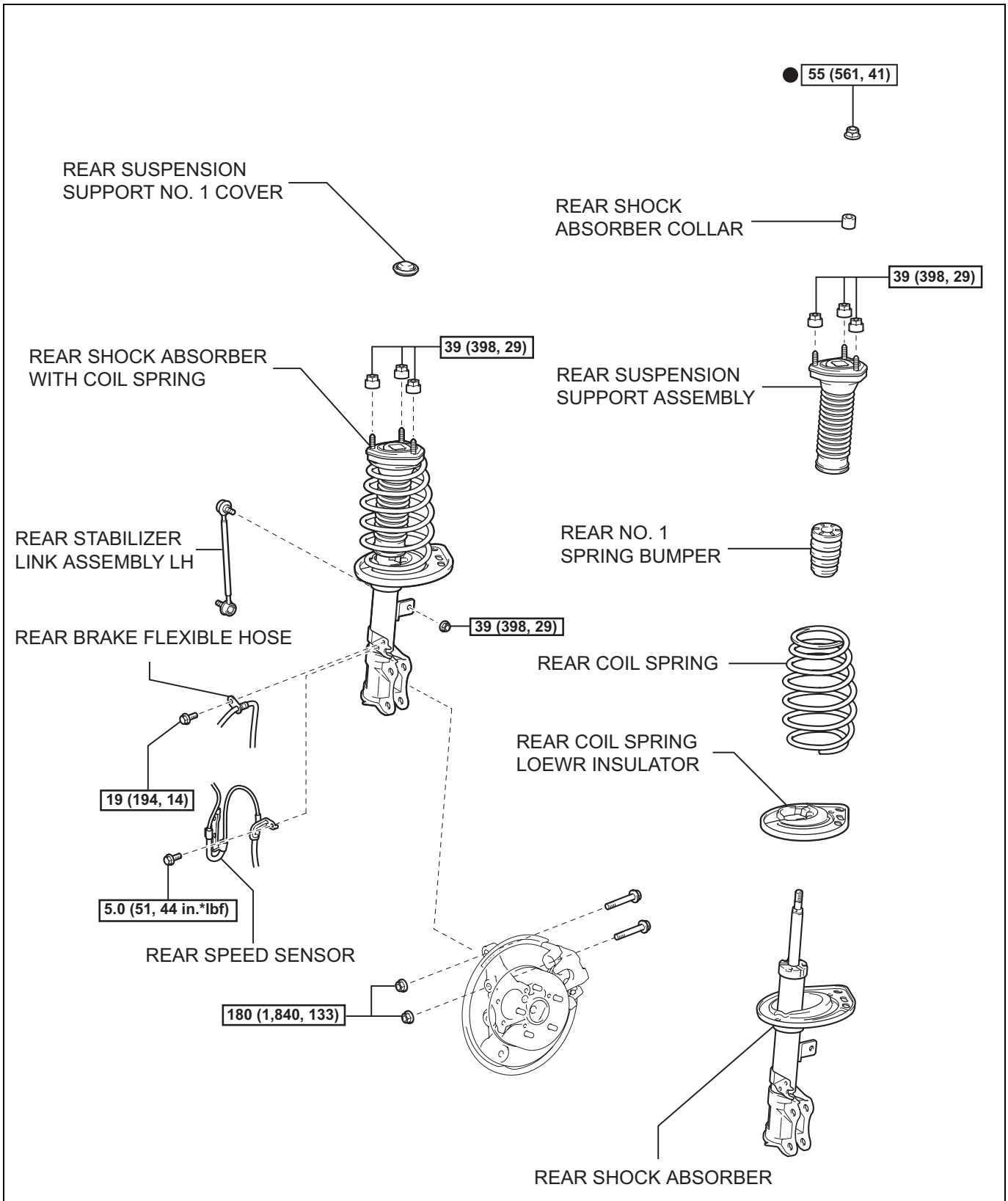


18 (184, 13): Specified torque

P

C138584E01

SP



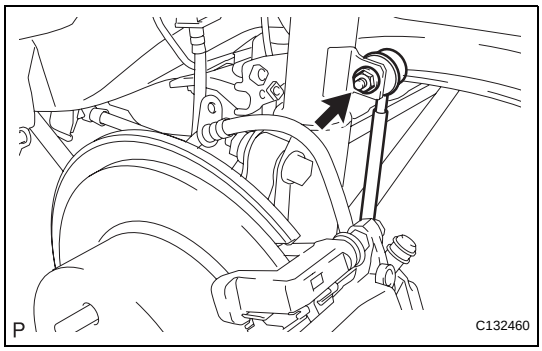
N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

P

C132485E02

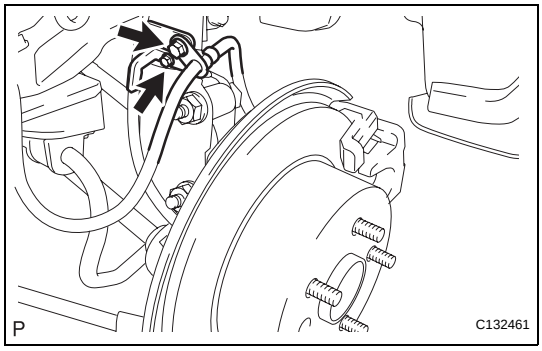
REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Type) (See page SE-77)
2. REMOVE REAR SEAT HEADREST ASSEMBLY (for Fixed Type)
3. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY (for Fixed Type)
4. REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Type) (See page SE-77)
5. REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)
6. REMOVE REAR SEAT HEADREST ASSEMBLY (for Fold Down Seat Type)
7. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY (for Fold Down Seat Type)
8. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)
9. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)
10. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)
11. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)
12. REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)
13. REMOVE REAR SEAT HEADREST ASSEMBLY (for Reclining Seat Type)
14. REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)
15. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)
16. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)
17. REMOVE REAR WHEEL



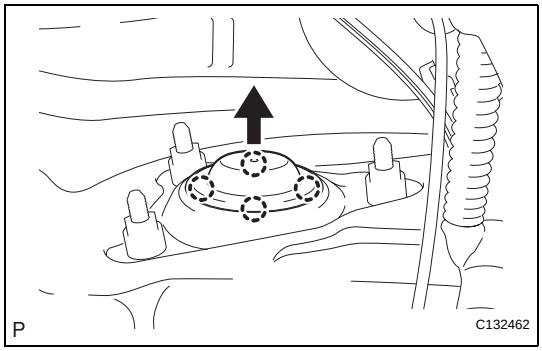
18. SEPARATE REAR STABILIZER LINK ASSEMBLY LH

(a) Remove the nut and separate the rear stabilizer link assembly from the front shock absorber LH.
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



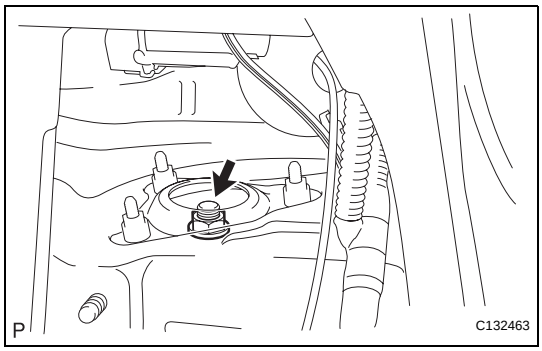
19. SEPARATE REAR SPEED SENSOR

(a) Remove the 2 bolts, and disconnect the rear brake flexible hose and rear speed sensor from the rear shock absorber with coil spring and rear axle carrier.
NOTICE:
Be sure to remove the rear speed sensor from the rear shock absorber with coil spring.



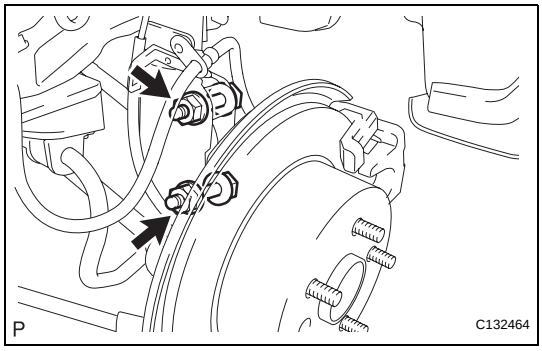
20. REMOVE REAR SUSPENSION SUPPORT NO. 1 COVER

(a) Remove the 4 claws and the rear suspension support No. 1 cover.

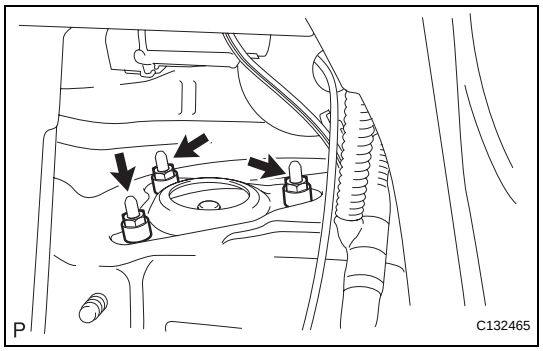


21. REMOVE REAR SHOCK ABSORBER WITH COIL SPRING

(a) Loosen the lock nut of the rear shock absorber with coil spring.
NOTICE:
- **Do not remove the lock nut.**
- **Only loosen the nut when disassembling the rear shock absorber with coil spring.**



(b) Remove the 2 nuts and 2 bolts on the lower side of the rear shock absorber with coil spring.
NOTICE:
- **When removing the nuts, keep the bolts from rotating.**
- **Keep one bolt inserted to secure the hub and disc rotor.**



(c) Remove the 3 nuts on the upper side of the rear shock absorber with coil spring.

(d) Lower the rear axle carrier, and remove the 2 bolts on the lower side of the rear shock absorber with coil spring.

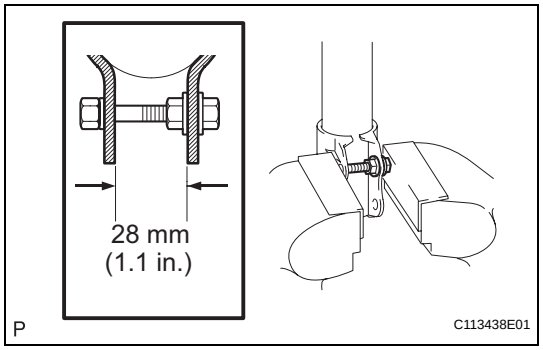
NOTICE:

Make sure that the rear speed sensor is disconnected from the rear shock absorber with coil spring.

DISASSEMBLY

1. FIX REAR SHOCK ABSORBER WITH COIL SPRING

(a) As shown in the illustration, secure the rear shock absorber with coil spring in a vise using aluminum plates by closing the vise onto the double nutted bolt affixed to the bracket at the bottom of the absorber.



2. REMOVE REAR SHOCK ABSORBER

(a) Using SST, compress the rear coil spring.

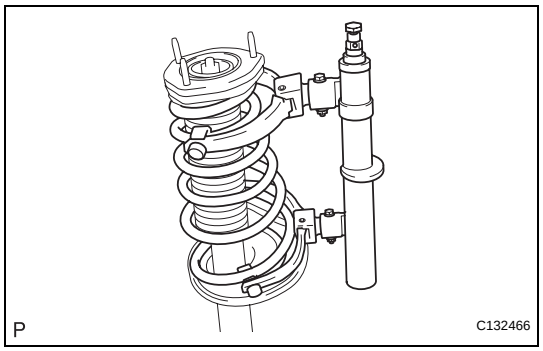
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

NOTICE:

Do not use an impact wrench.

HINT:

If the front coil spring is compressed at an angle, using 2 SST will make the work easier.



(b) Remove the nut, rear shock absorber collar and rear suspension support assembly.

(c) Remove the rear coil spring, rear No. 1 spring bumper, and rear coil spring lower insulator.

INSPECTION

1. INSPECT REAR SHOCK ABSORBER

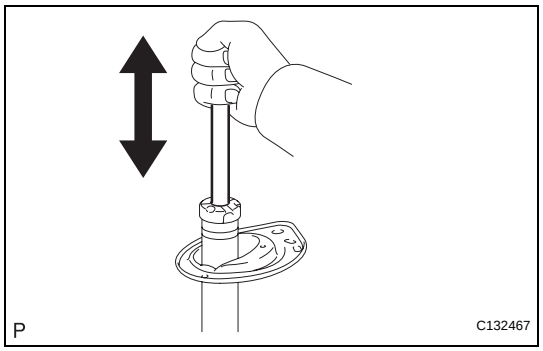
(a) Compress and extend the shock absorber rod 4 or more times.

Standard:

There is no abnormal resistance or sound and operation resistance is normal.

HINT:

If there is any abnormality, replace the rear shock absorber with a new one.

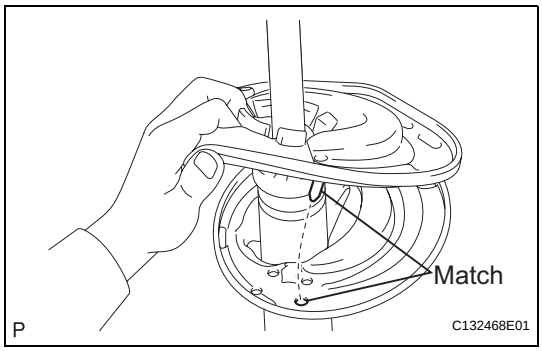


REASSEMBLY

1. INSTALL REAR SHOCK ABSORBER

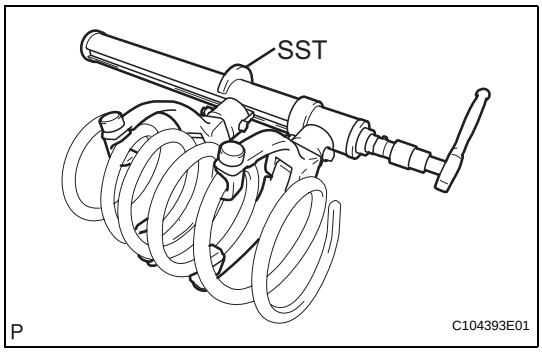
(a) Install the rear No. 1 spring bumper to the piston rod.

(b) Install the rear coil spring lower insulator onto the rear shock absorber.

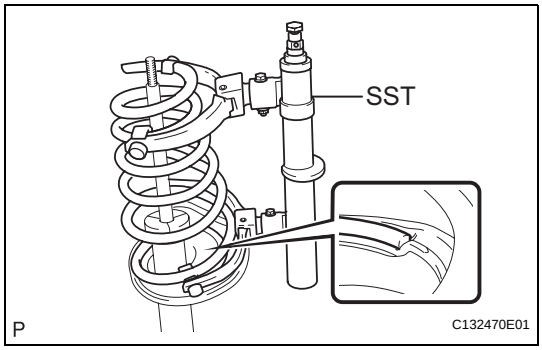


SP

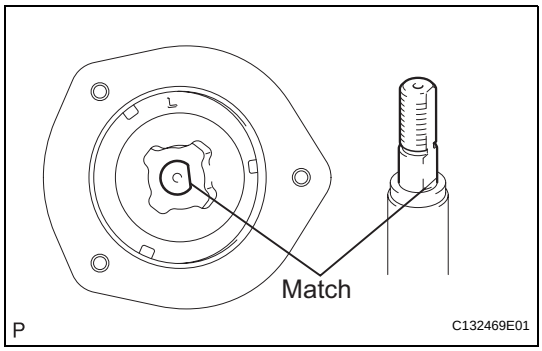
(c) Using SST, compress the rear coil spring.
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)
NOTICE:
Do not use an impact wrench.

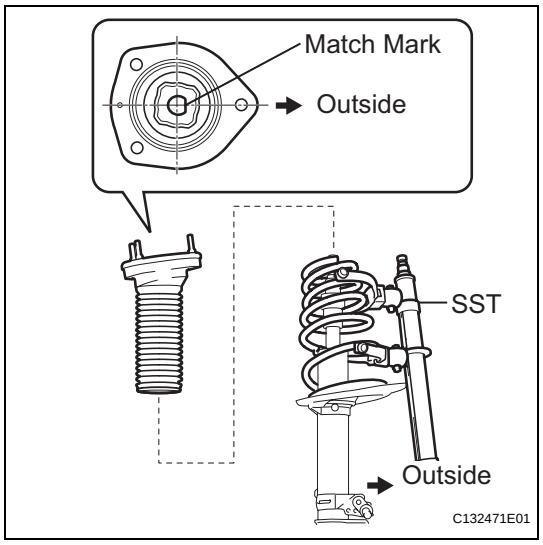


(d) Install the rear coil spring to the rear shock absorber.
NOTICE:
The smaller diameter end must face upward.
HINT:
- Fit the lower end of the rear coil spring into the gap of the lower seat.
- If the front coil spring is compressed at an angle, using 2 SST will make the work easier.

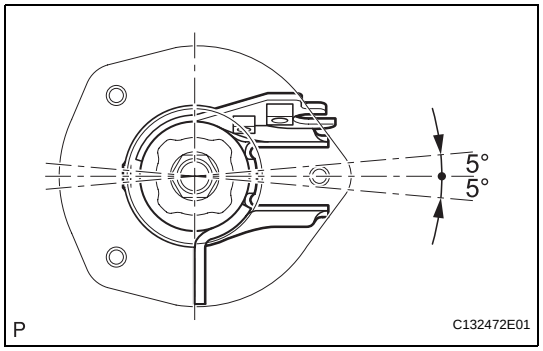


(e) Install the rear suspension support assembly.
NOTICE:
Align the notches of the piston rod and the rear suspension support assembly as shown in the illustration before installing the rear suspension support assembly.





(f) Align the notches of the shock absorber with the notch of the rear suspension support assembly so that the notches face the outside of the vehicle.
(g) Install the rear shock absorber collar.
(h) Loosely tighten a new lock nut to the rear suspension piston rod.



(i) Release the spring while adjusting the rear suspension support assembly to the position shown in the illustration, and remove the SST from the rear coil spring.
NOTICE:
Do not use an impact wrench.
HINT:
When lining up the rear suspension support assembly's stud bolts at the middle point between the two sides of the bracket, the maximum permissible degree of error is plus or minus 5°.

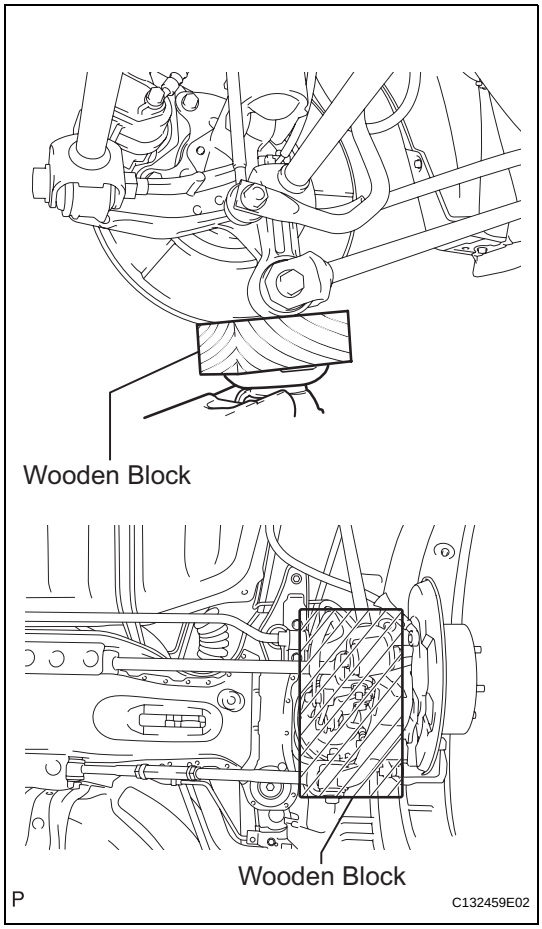
SP

INSTALLATION

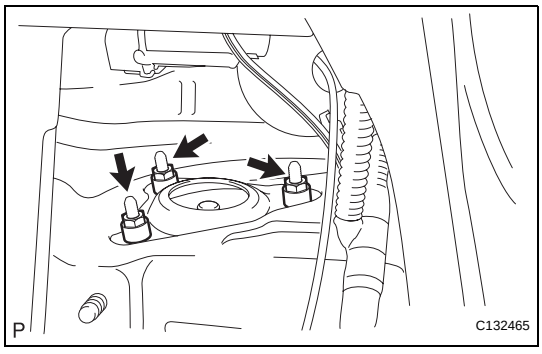
1. INSTALL REAR SHOCK ABSORBER WITH COIL SPRING

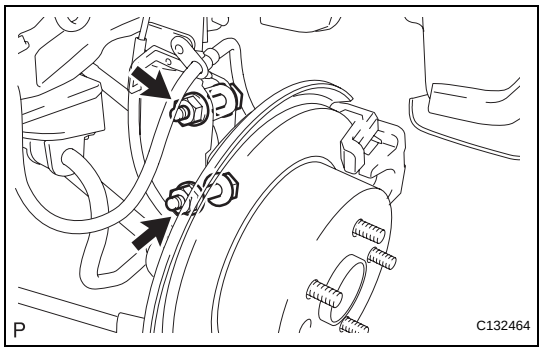
(a) Install the rear shock absorber with coil spring to the rear axle carrier assembly and insert the 2 bolts from the rear of the vehicle.

(b) Slowly jack up the vehicle using a wooden block and install the rear shock absorber with coil spring (upper side) to the vehicle.

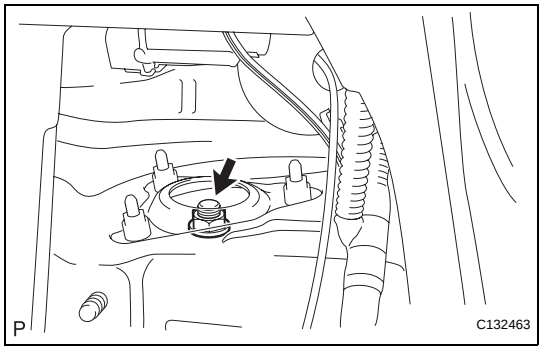


(c) Install the 3 nuts to the upper side of the rear shock absorber with coil spring.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)



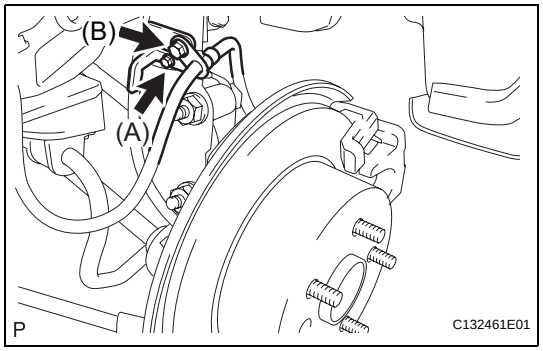


(d) Install the 2 nuts and 2 bolts to the lower side of the rear shock absorber with coil spring.
Torque: 180 N*m (1,840 kgf*cm, 133 ft.*lbf)
NOTICE:
When installing the nuts, keep the bolts from rotating.



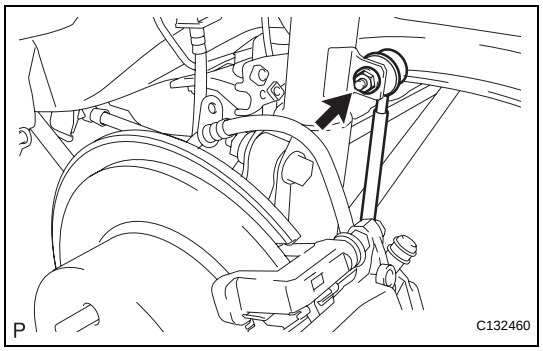
(e) Fully tighten the lock nut.
Torque: 55 N*m (561 kgf*cm, 41 ft.*lbf)

SP



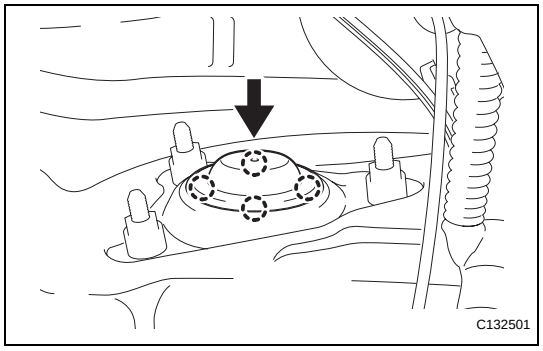
2. CONNECT REAR SPEED SENSOR

(a) Install the rear brake flexible hose and rear speed sensor wire harness with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf) (bolt A)
19 N*m (194 kgf*cm, 14 ft.*lbf) (bolt B)



3. INSTALL REAR STABILIZER LINK ASSEMBLY LH

(a) Install the rear stabilizer link assembly LH to the rear shock absorber with the nut.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



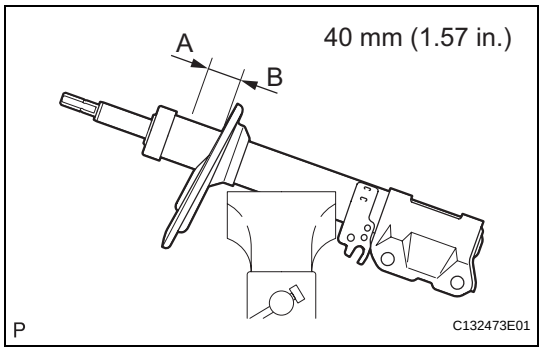
4. INSTALL REAR SUSPENSION SUPPORT NO. 1 COVER

(a) Engage the 4 claws and install the rear suspension support No. 1 cover.

5. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

6. INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Type) (See page SE-84)

7. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Type) (See page SE-84)**
8. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY (for Fixed Type)**
9. **INSTALL REAR SEAT HEADREST ASSEMBLY (for Fixed Type)**
10. **INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
11. **INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
12. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
13. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
14. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**
15. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY (for Fold Down Seat Type)**
16. **INSTALL REAR SEAT HEADREST ASSEMBLY (for Fold Down Seat Type)**
17. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)**
18. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-71)**
19. **INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)**
20. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**
21. **INSTALL REAR SEAT HEADREST ASSEMBLY (for Reclining Seat Type)**
22. **CHECK ABS SPEED SENSOR SIGNAL**
    ABS: See page BC-19
    VSC (for BOSCH): BC-290
    VSC (for ADVICS): BC-123
23. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT**
    (See page SP-13)



DISPOSAL

1. DISPOSE OF REAR SHOCK ABSORBER

(a) Fully extend the shock absorber piston rod.

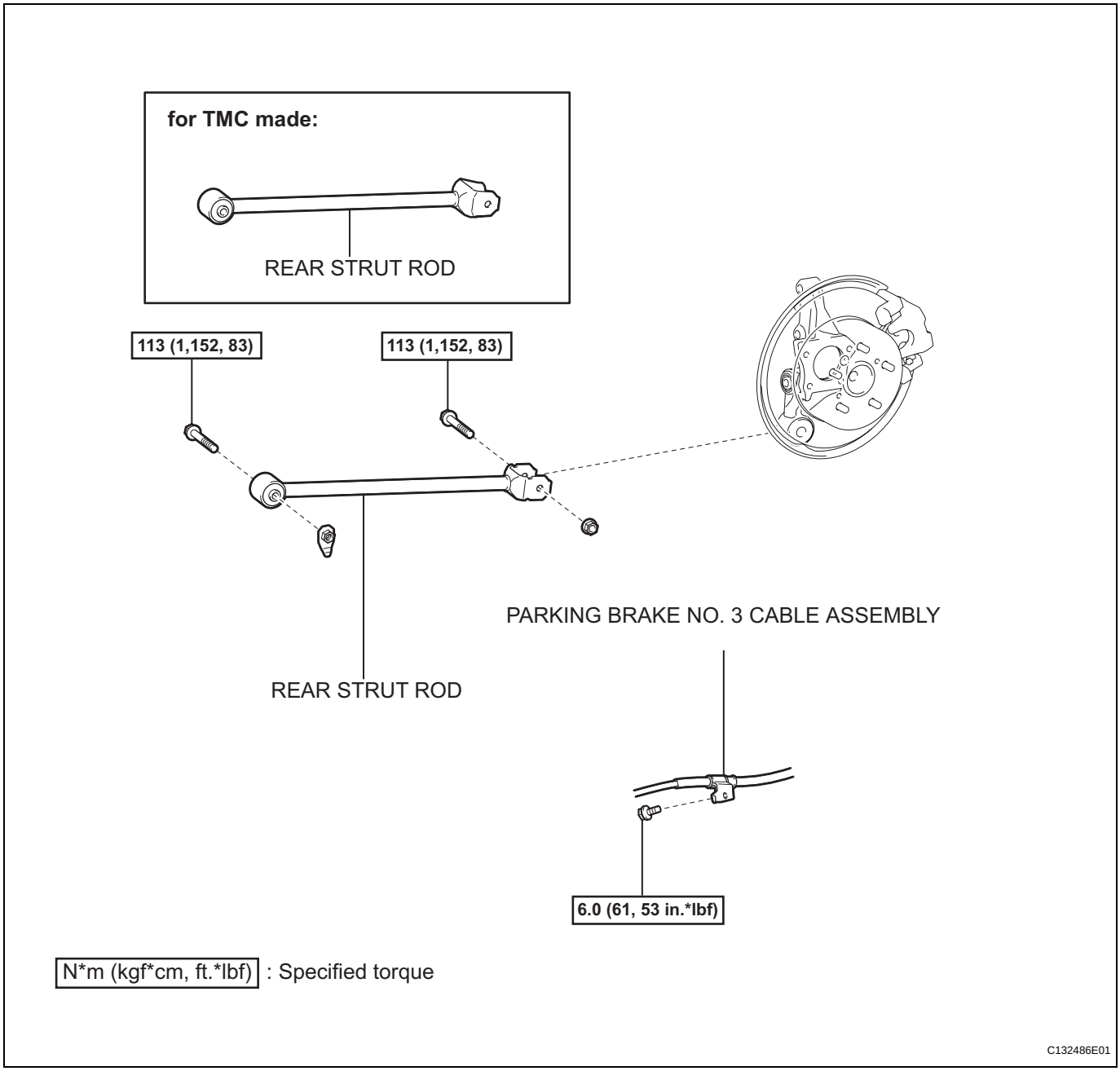
(b) Using a drill, make a hole in the cylinder between A and B as shown in the illustration to discharge the gas inside.

CAUTION:

- **Be careful when drilling because shards of metal may fly about. Always use the proper safety equipment.**
- **The gas is colorless, odorless and non-poisonous.**

REAR STRUT ROD

COMPONENTS



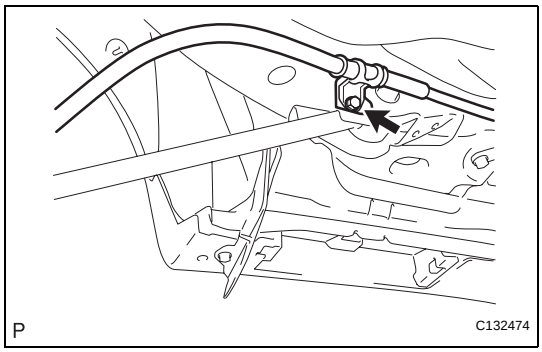
SP

REMOVAL

1. REMOVE REAR WHEEL

2. SEPARATE PARKING BRAKE NO. 3 CABLE ASSEMBLY

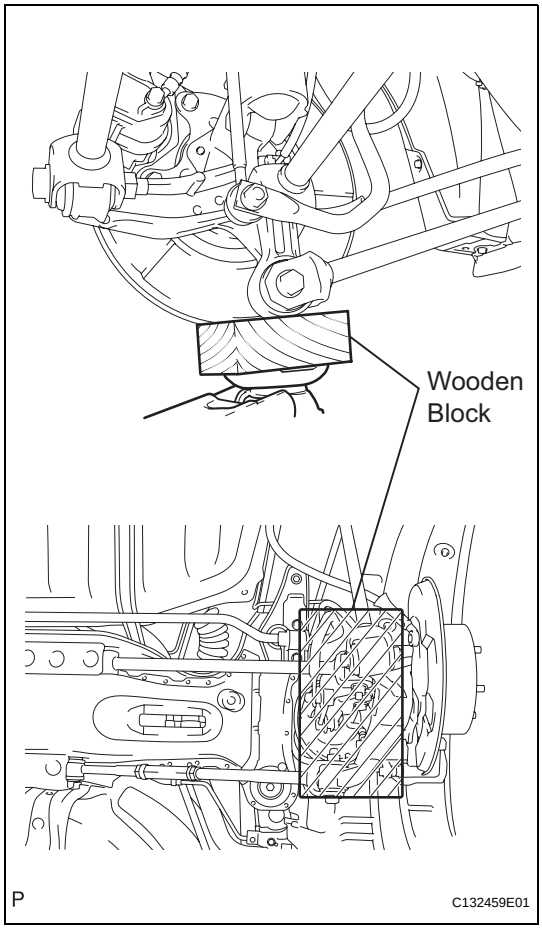
(a) Remove the bolt, and separate the parking brake No. 3 cable assembly.



SP

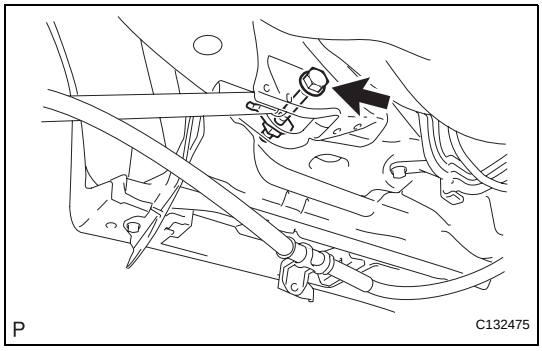
3. REMOVE REAR STRUT ROD

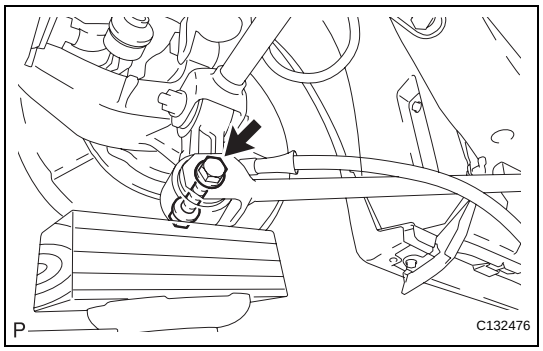
(a) Support the rear axle carrier with a jack.



(b) Remove the bolt and nut, and disconnect the strut rod (front side).

NOTICE:
When removing the bolt, keep the nut from rotating.

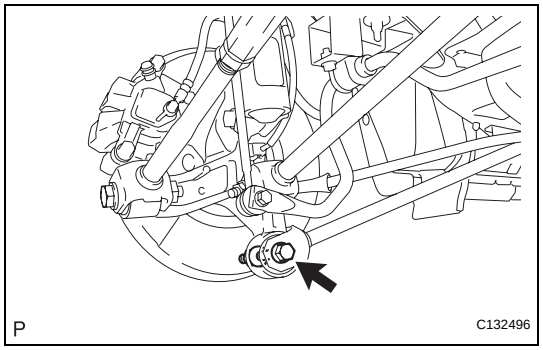




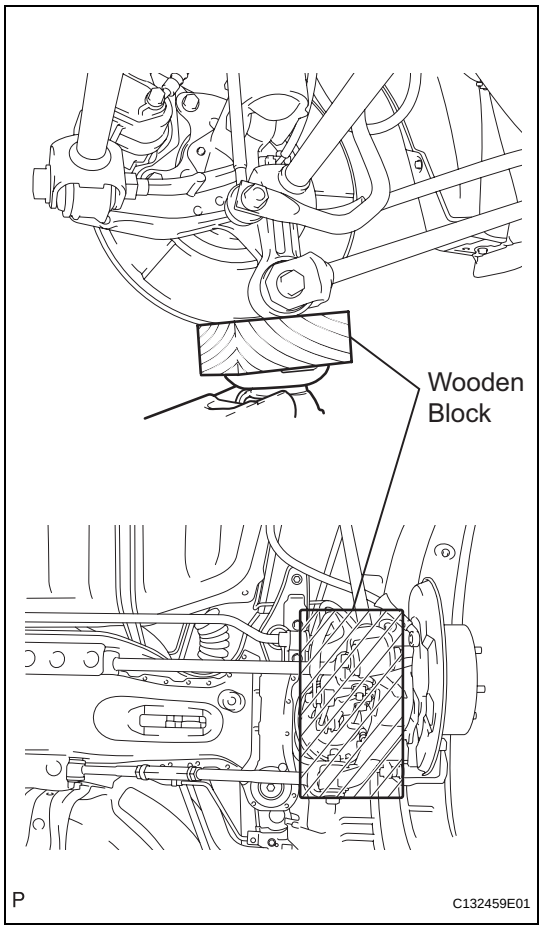
(c) Remove the bolt, nut and strut rod from the rear axle carrier.
NOTICE:
When removing the bolt, keep the nut from rotating.

INSTALLATION

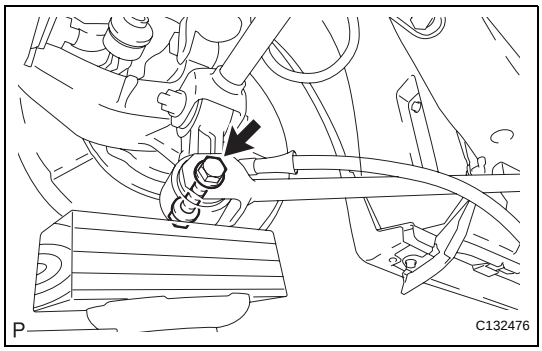
1. TEMPORARILY TIGHTEN REAR STRUT ROD



(a) Install the rear strut rod (rear side), bolt and nut, and temporarily tighten the bolt.
NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.



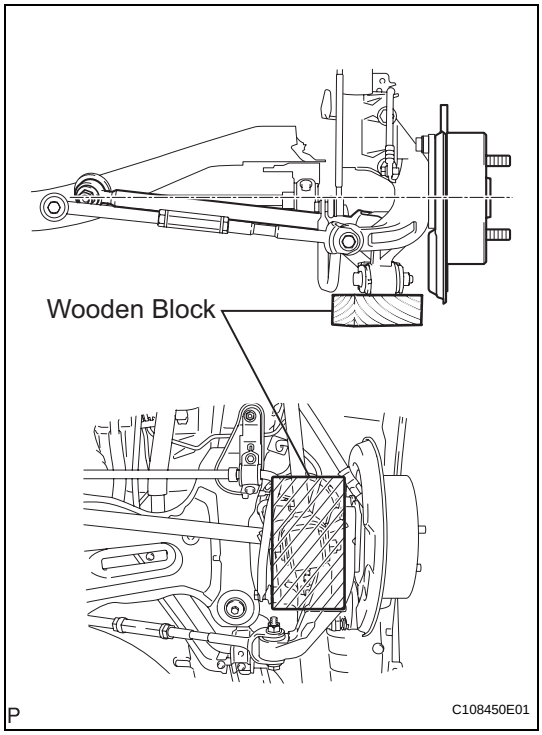
(b) Support the rear axle carrier.



(c) Connect the rear strut rod (inner side) with the bolt and nut.
NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.

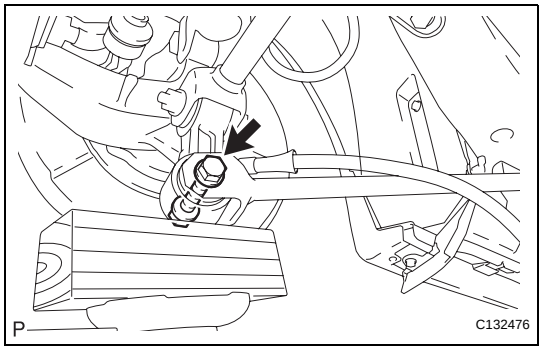
2. STABILIZE SUSPENSION

(a) Jack up the rear axle carrier, placing a wooden block to avoid damage. Apply load to the suspension so that the installed bolt of the rear suspension No. 1 arm (inner side of vehicle) is horizontally aligned with the center of the rear axle hub.

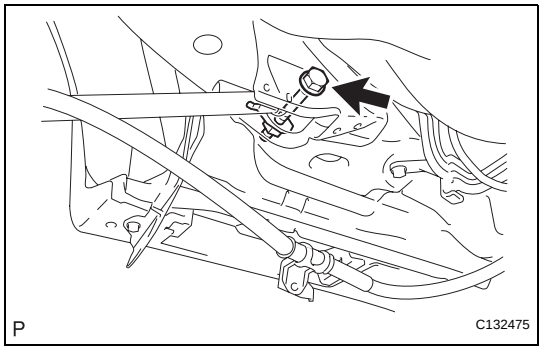


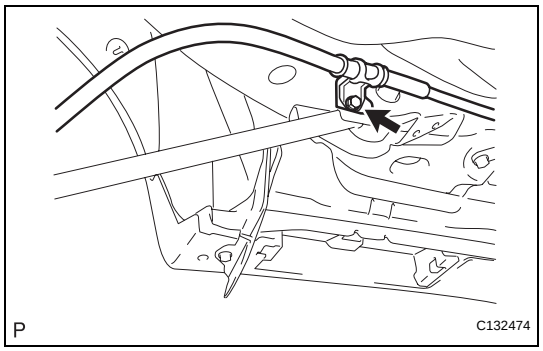
3. FULLY TIGHTEN REAR STRUT ROD

(a) Fully tighten the bolt.
Torque: 113 N*m (1,152 kgf*cm, 83 ft.*lbf)



(b) Fully tighten the bolt.
Torque: 113 N*m (1,152 kgf*cm, 83 ft.*lbf)





4. CONNECT PARKING BRAKE NO. 3 CABLE ASSEMBLY

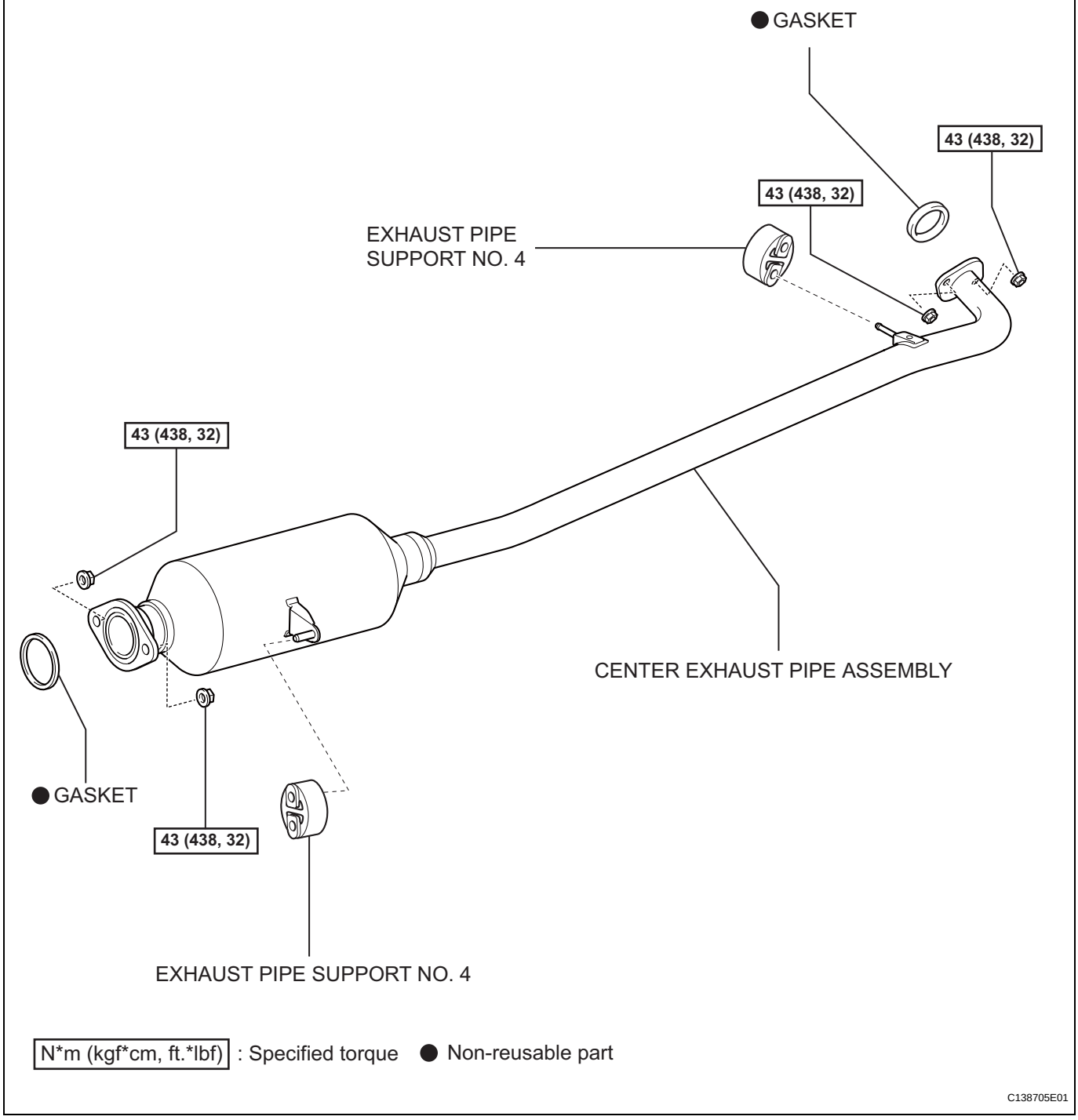
(a) Install the parking brake No. 3 cable assembly with the bolt.
Torque: 6.0 N*m (61 kgf*cm, 53 in.*lbf)

5. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

REAR NO. 1 SUSPENSION ARM

COMPONENTS

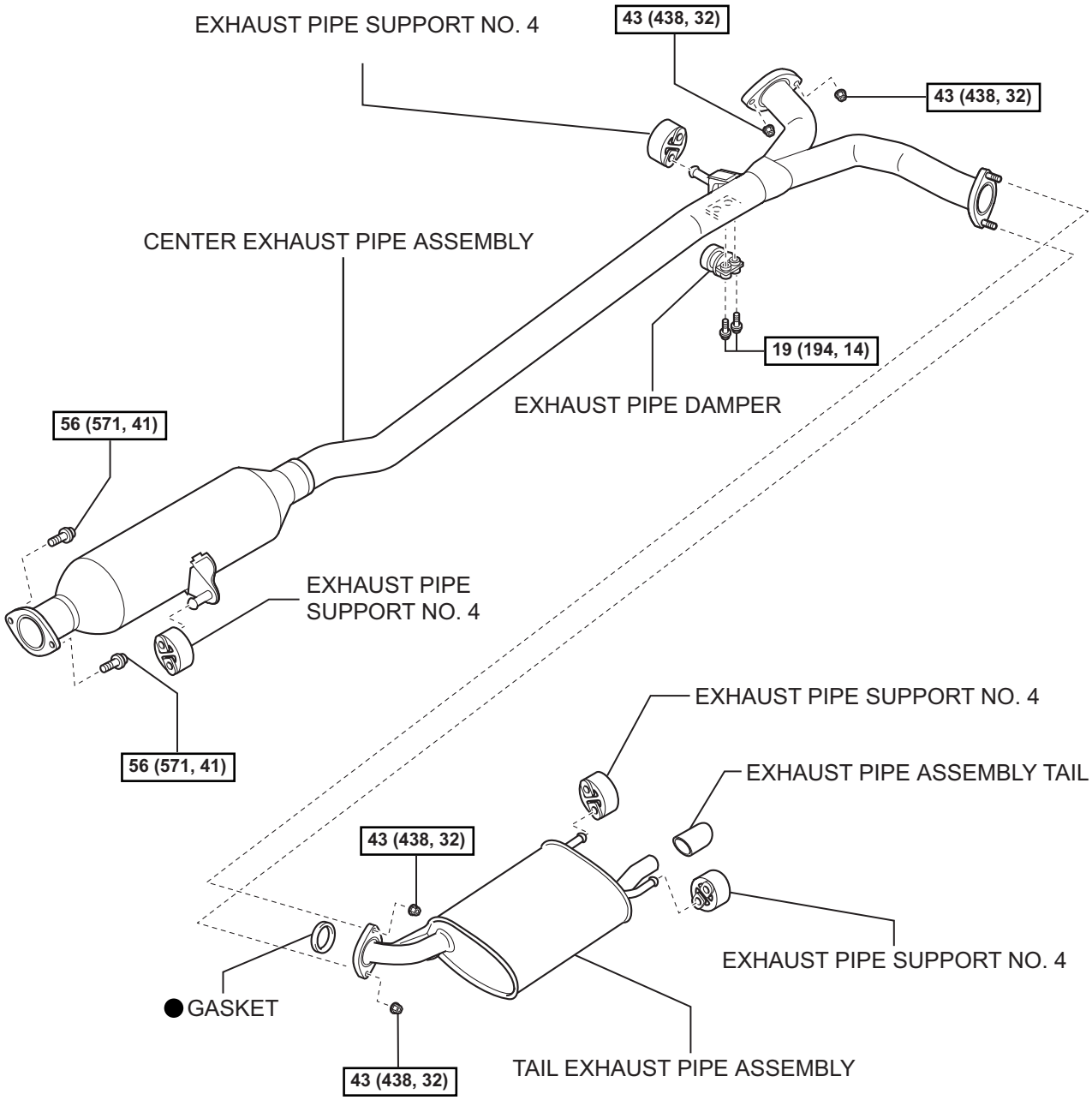
for 2AZ-FE:



N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

C138705E01

for 2GR-FE:

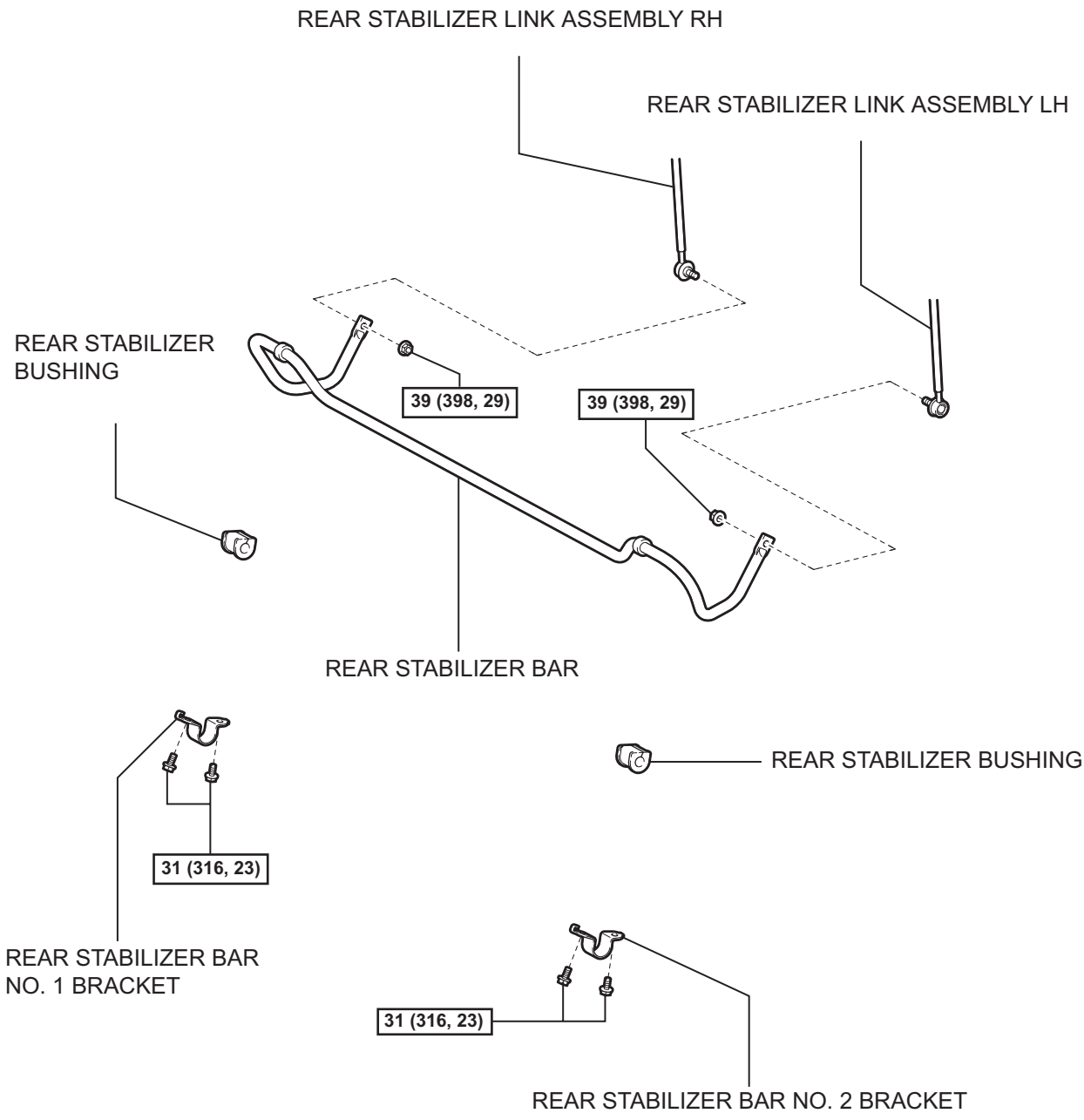


N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

C138704E02

SP

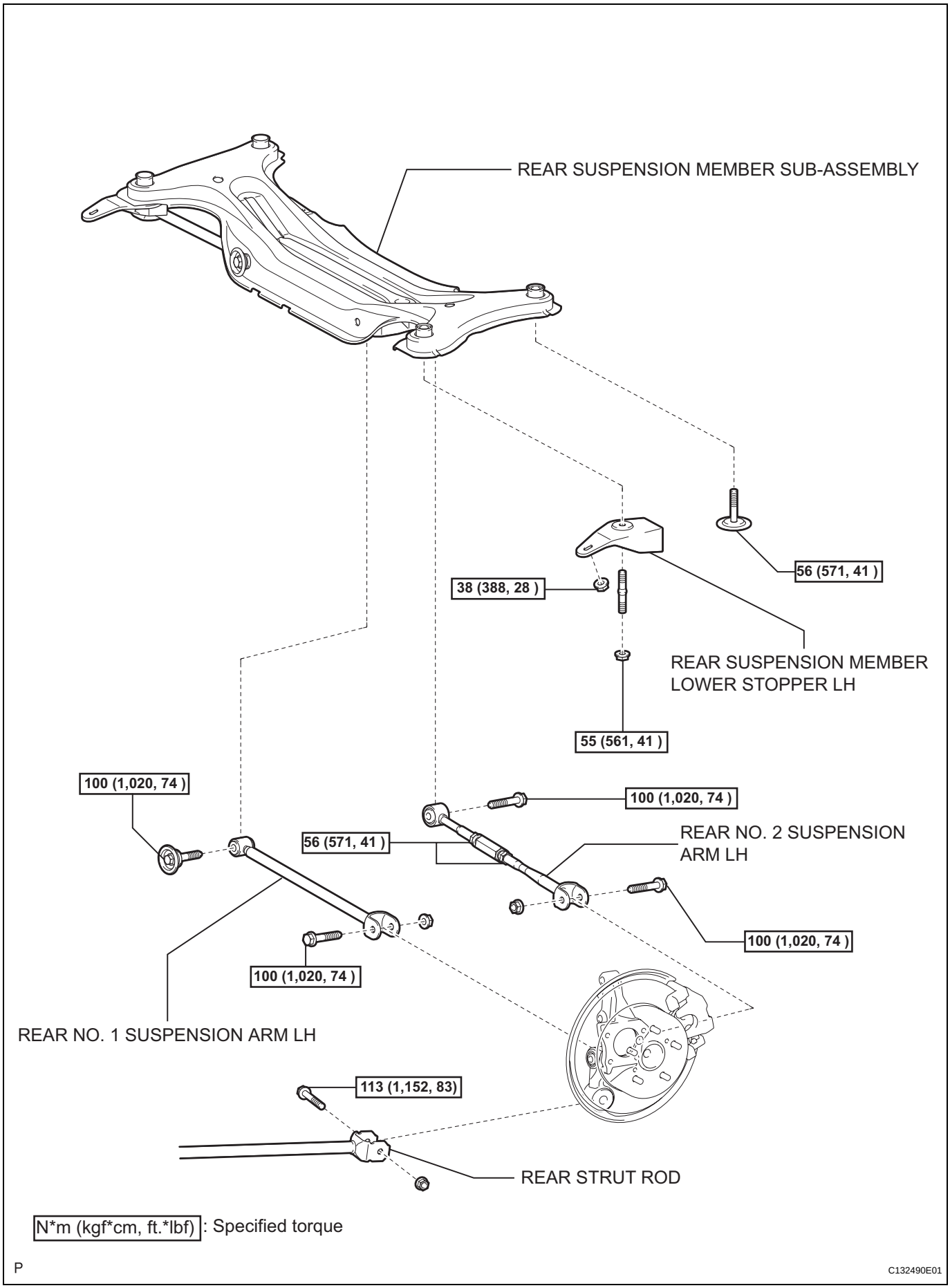
SP



N*m (kgf*cm, ft.*lbf) : Specified torque

P

C132488E01

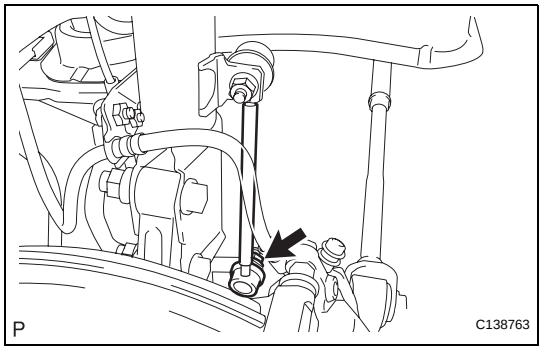

REAR SUSPENSION MEMBER SUB-ASSEMBLY
56 (571, 41)
38 (388, 28)
REAR SUSPENSION MEMBER LOWER STOPPER LH
55 (561, 41)
100 (1,020, 74)
100 (1,020, 74)
56 (571, 41)
REAR NO. 2 SUSPENSION ARM LH
100 (1,020, 74)
100 (1,020, 74)
REAR NO. 1 SUSPENSION ARM LH
113 (1,152, 83)
REAR STRUT ROD
N*m (kgf*cm, ft.*lbf): Specified torque
P
C132490E01

SP

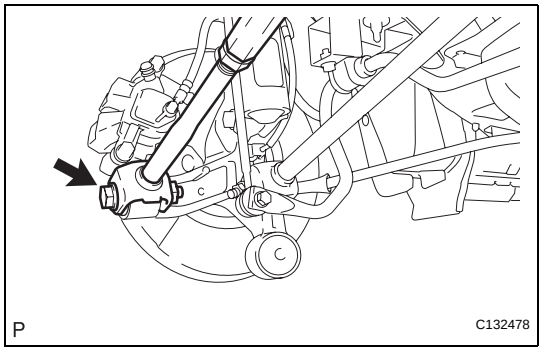
REMOVAL

NOTICE:
Check if an old gasket still remains on the pipe. If so, remove it. Also, check if any bolts or nuts are rusted. If so, replace them.

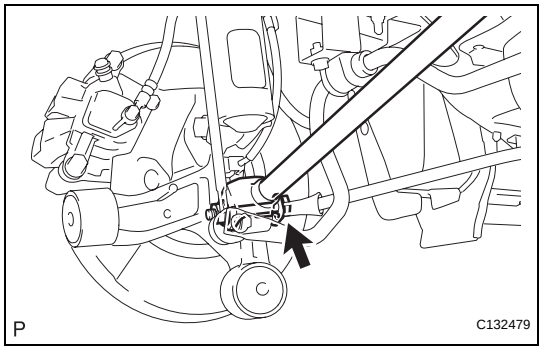
1. **REMOVE REAR WHEEL**
2. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-2)**
3. **REMOVE TAIL EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**
4. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**
5. **SEPARATE REAR STABILIZER LINK ASSEMBLY LH**
   (a) Remove the nut and separate the rear stabilizer link assembly LH (lower side) from the rear stabilizer bar.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



6. **SEPARATE REAR STABILIZER LINK ASSEMBLY RH**
   HINT:
   Separate the RH side using the same procedures as for the LH side.
7. **REMOVE REAR STABILIZER BAR NO. 2 BRACKET (See page SP-68)**
8. **REMOVE REAR STABILIZER BAR NO. 1 BRACKET (See page SP-68)**
9. **REMOVE REAR STABILIZER BAR**
10. **REMOVE REAR STABILIZER BUSHING (See page SP-68)**
11. **SEPARATE REAR STRUT ROD (See page SP-48)**
12. **SEPARATE REAR NO. 2 SUSPENSION ARM LH**
    (a) Remove the bolt, nut and separate the rear suspension No. 2 arm (outer side) from the rear axle carrier.
    NOTICE:
    When removing the bolt, keep the nut from rotating.



13. **SEPARATE REAR NO. 2 SUSPENSION ARM RH**
    HINT:
    Separate the RH side using the same procedures as for the LH side.



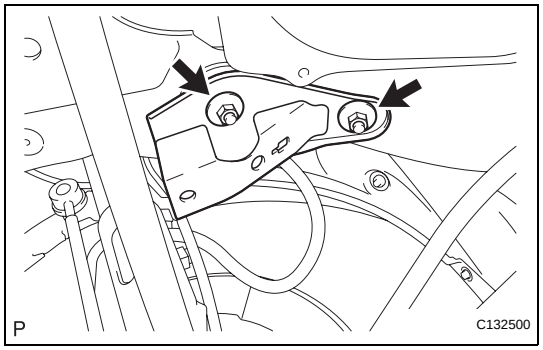
14. SEPARATE REAR NO. 1 SUSPENSION ARM LH

(a) Remove the bolt, nut and the rear No. 1 suspension arm (outer side) from the rear axle carrier.

NOTICE:
When removing the bolt, keep the nut from rotating.

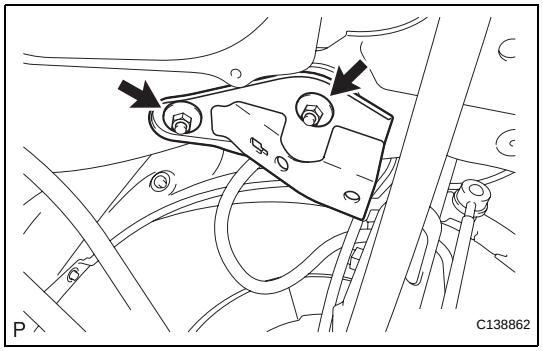
15. SEPARATE REAR NO. 1 SUSPENSION ARM RH

HINT:
Separate the RH side using the same procedures as for the LH side.



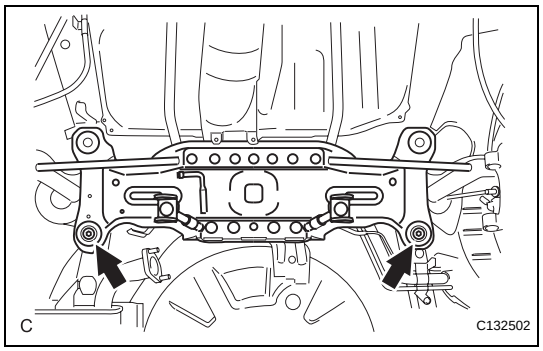
16. REMOVE REAR SUSPENSION MEMBER LOWER STOPPER LH

(a) Remove the 2 nuts and the rear suspension member lower stopper LH.



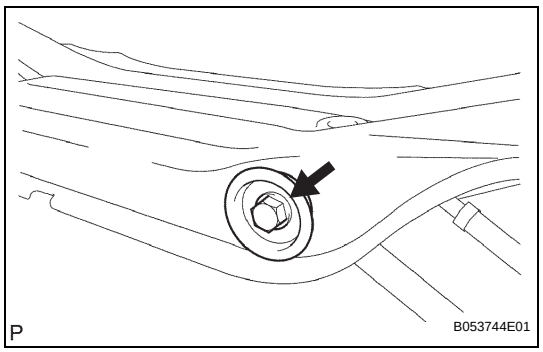
17. REMOVE REAR SUSPENSION MEMBER LOWER STOPPER RH

(a) Remove the 2 nuts and the rear suspension member lower stopper RH.



18. REMOVE REAR SUSPENSION MEMBER SUB-ASSEMBLY

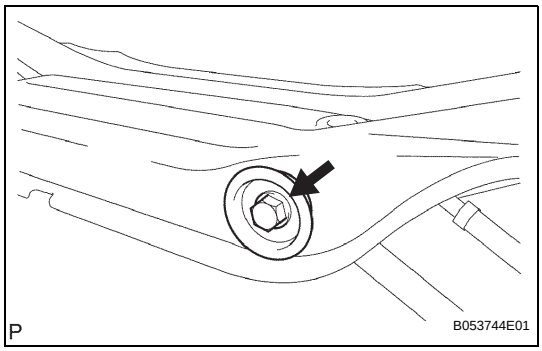
(a) Support the rear suspension member with a jack.
(b) Remove the 2 bolts, and the rear suspension member sub-assembly.



19. REMOVE REAR NO. 1 SUSPENSION ARM LH

(a) Remove the bolt and rear No. 1 suspension arm assembly LH.

SP

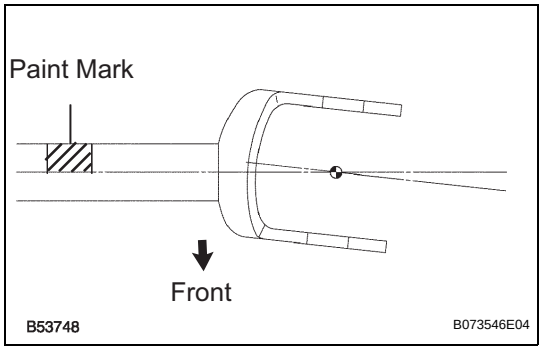


INSTALLATION

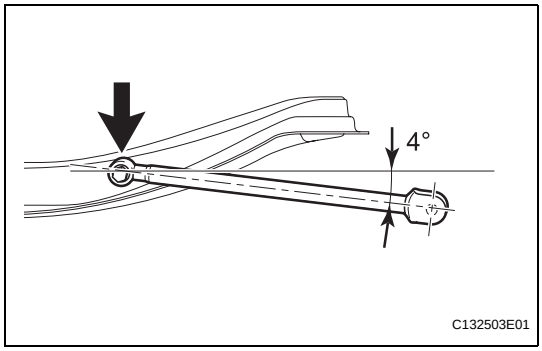
1. INSTALL REAR NO. 1 SUSPENSION ARM LH

(a) Install the rear No. 1 suspension arm (inner side) with the bolt, and temporarily tighten the bolt.

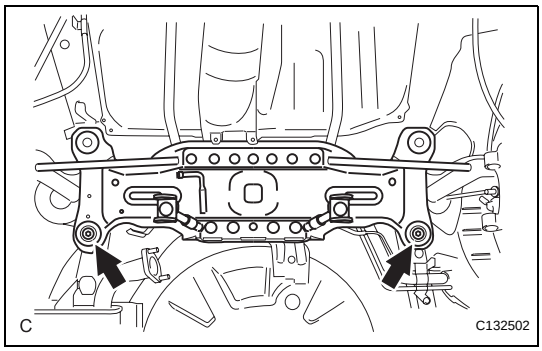
(1) Install the rear No. 1 suspension arm so that the bracket leans toward the front side of the vehicle as shown in the illustration.



(2) Ensure that the paint mark faces the rear side of the vehicle.



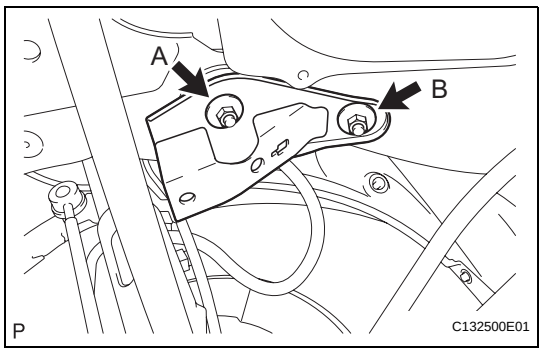
(b) Set the rear No.1 suspension arm in the position shown in the illustration, and fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)



2. INSTALL REAR SUSPENSION MEMBER SUB-ASSEMBLY

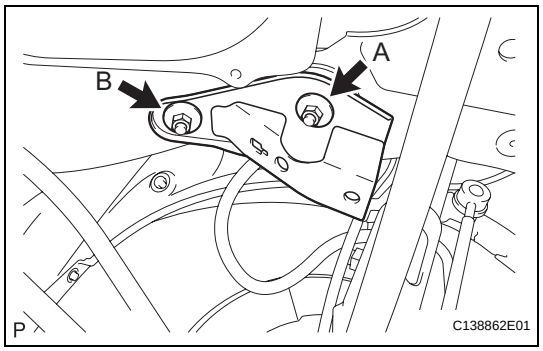
(a) Raise the rear suspension member with a jack.

(b) Install the rear suspension member with the 2 bolts.
Torque: 56 N*m (571 kgf*cm, 41 ft.*lbf)



3. INSTALL REAR SUSPENSION MEMBER LOWER STOPPER LH

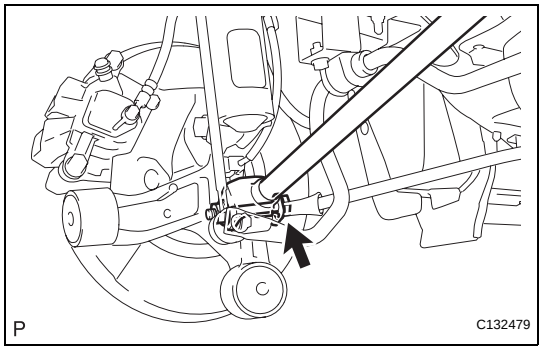
(a) Install the rear suspension member lower stopper LH with the 2 nuts.
Torque: Nut A
55 N*m (561 kgf*cm, 41 ft.*lbf)
Nut B
38 N*m (388 kgf*cm, 28 ft.*lbf)



4. INSTALL REAR SUSPENSION MEMBER LOWER STOPPER RH

(a) Install the rear suspension member lower stopper RH with the 2 nuts.

Torque: Nut A
55 N*m (561 kgf*cm, 41 ft.*lbf)
Nut B
38 N*m (388 kgf*cm, 28 ft.*lbf)



5. TEMPORARILY TIGHTEN REAR NO. 1 SUSPENSION ARM LH

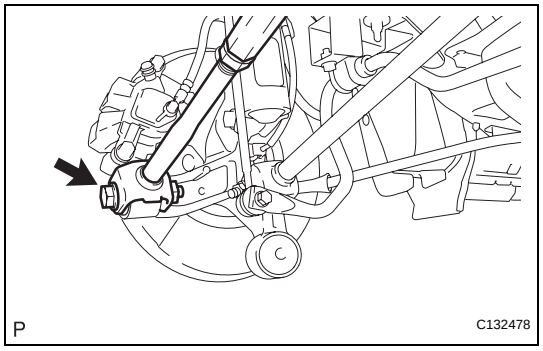
(a) Connect the rear No.1 suspension arm (outer side) to the rear axle carrier with the bolt and nut and temporarily tighten the bolt and nut.

NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.

HINT:
Insert the bolt from the front of the vehicle and temporarily install the bolt.

6. TEMPORARILY TIGHTEN REAR NO. 1 SUSPENSION ARM RH

HINT:
Temporarily tighten the RH side using the same procedures as for the LH side.



7. TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM LH

(a) Connect the rear No. 2 suspension arm (outer side) to the rear axle carrier with the bolt and nut and temporarily tighten the bolt.

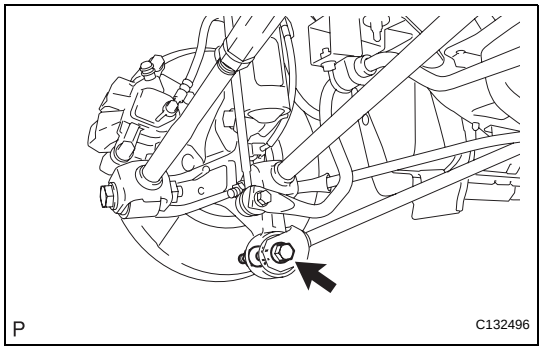
NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.

HINT:
Insert the bolt from the rear of the vehicle and temporarily install the bolt.

8. TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM RH

HINT:
Temporarily tighten the RH side using the same procedures as for the LH side.

SP



9. TEMPORARILY TIGHTEN REAR STRUT ROD

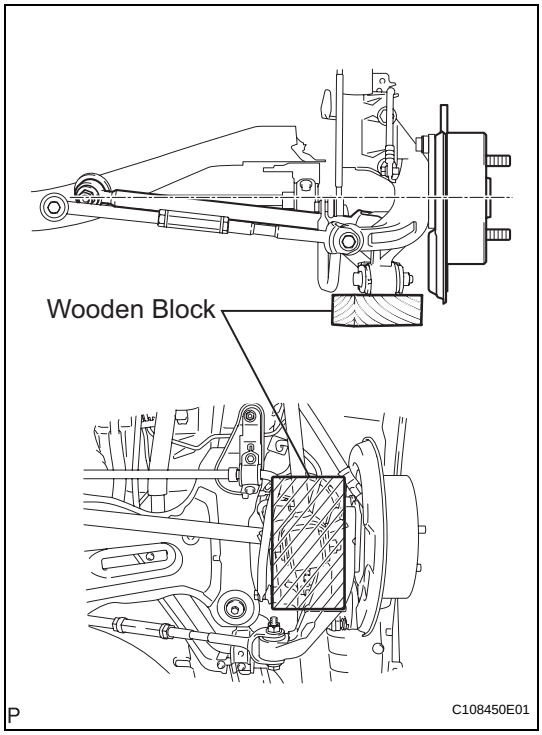
(a) Connect the strut rod assembly rear to the axle carrier with the bolt and nut and temporarily tighten the bolt.

NOTICE:

When temporarily tightening the bolt, keep the nut from rotating.

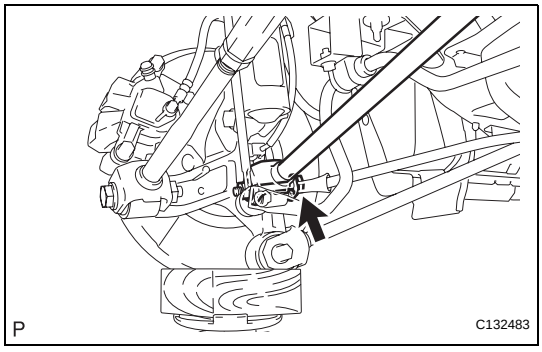
HINT:

Insert the bolt from the inside of the vehicle and temporarily install the bolt.



10. STABILIZE SUSPENSION

(a) Jack up the rear axle carrier, placing a wooden block to avoid damage. Apply load to the suspension so that the installed bolt of the rear No. 1 suspension arm (inner side) is horizontally aligned with the center of the rear axle hub.



11. FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM LH

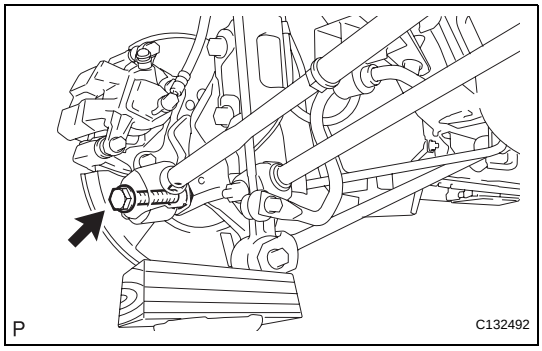
(a) Fully tighten the bolt.

Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

12. FULLY TIGHTEN REAR NO. 1 SUSPENSION ARM RH

HINT:

Fully tighten the RH side using the same procedures as for the LH side.



13. FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM LH

(a) Fully tighten the bolt.

Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

14. FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM RH

HINT:

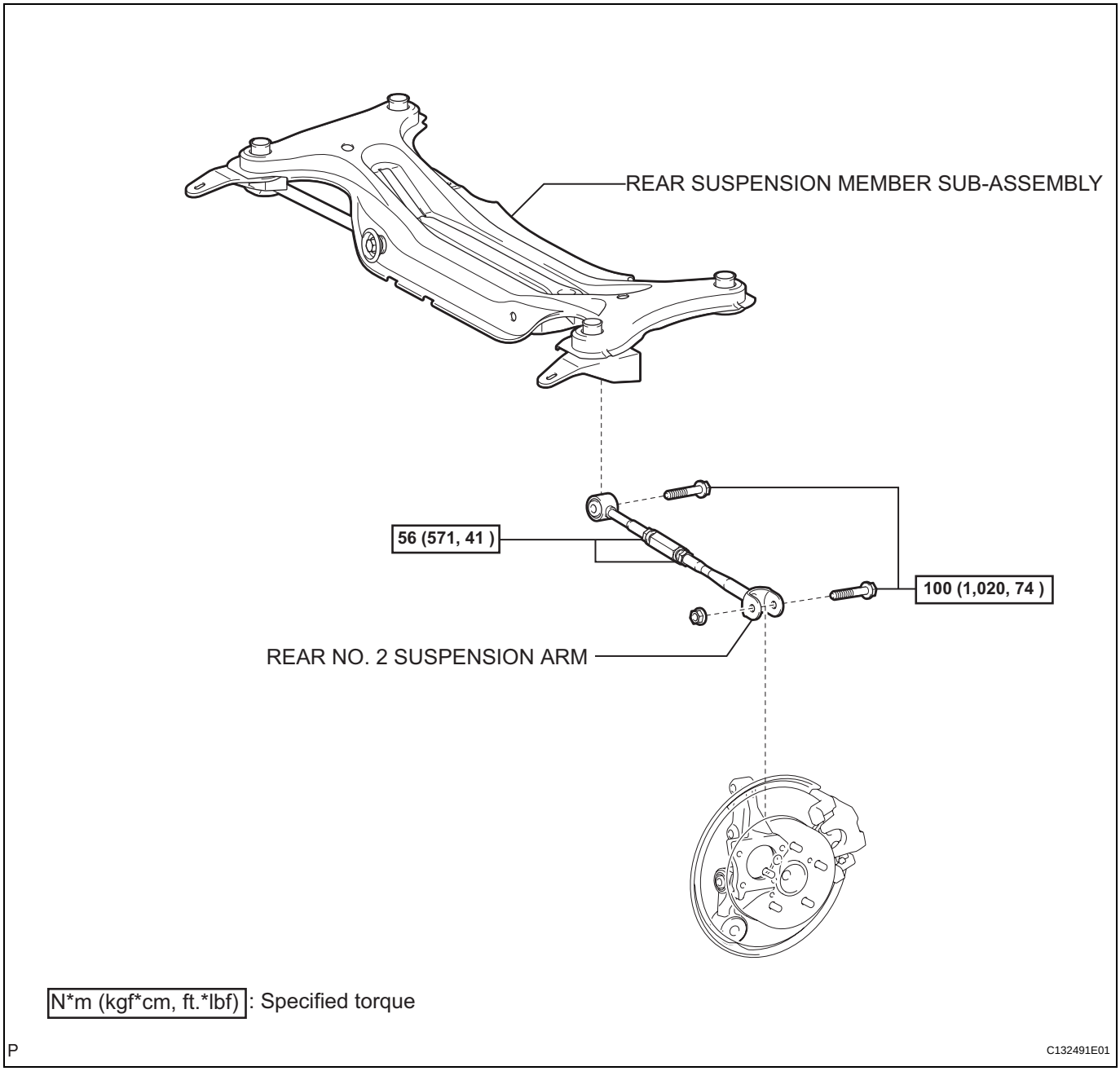
Fully tighten the RH side using the same procedures as for the LH side.

15. FULLY TIGHTEN REAR STRUT ROD (See page SP-50)

16. **INSTALL REAR STABILIZER BUSHING (See page SP-69)**
17. **INSTALL REAR STABILIZER BAR NO. 2 BRACKET (See page SP-69)**
18. **INSTALL REAR STABILIZER BAR NO. 1 BRACKET (See page SP-69)**
19. **INSTALL REAR STABILIZER BAR**
20. **INSTALL REAR STABILIZER LINK ASSEMBLY LH (See page SP-70)**
21. **INSTALL REAR STABILIZER LINK ASSEMBLY RH (See page SP-70)**
22. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-4)**
23. **INSTALL CENTER EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-4)**
24. **INSTALL TAIL EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-5)**
25. **INSTALL REAR WHEEL**
    Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)
26. **CHECK FOR EXHAUST GAS LEAKAGE (See page EX-5)**
27. **INSPECT AND ADJUST REAR WHEEL ALIGNMENT** (See page SP-13)

REAR NO. 2 SUSPENSION ARM

COMPONENTS

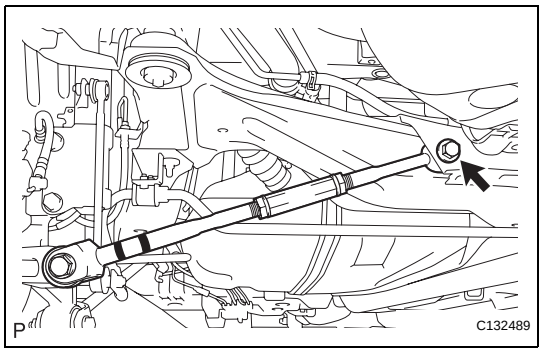


REMOVAL

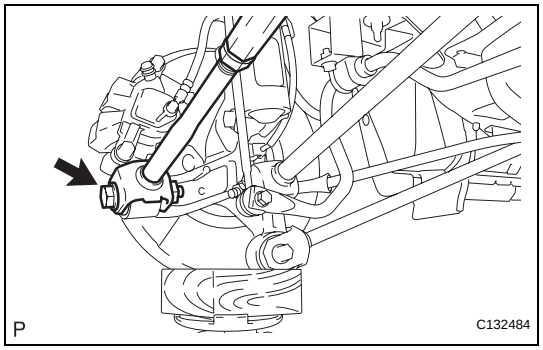
1. REMOVE REAR WHEEL

2. REMOVE REAR NO. 2 SUSPENSION ARM

(a) Remove the bolt, and disconnect the rear No. 2 suspension arm (inner side).



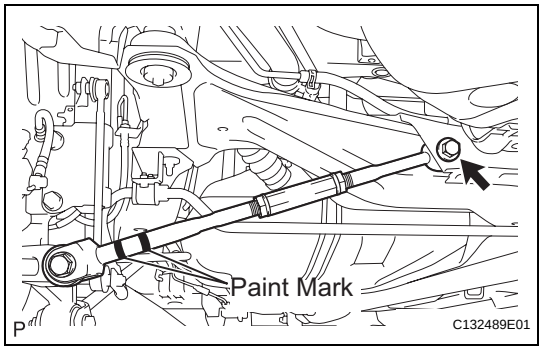
(b) Remove the bolt, nut and the rear No. 2 suspension arm (outer side) from the rear axle carrier.
NOTICE:
When removing the bolt, keep the nut from rotating.



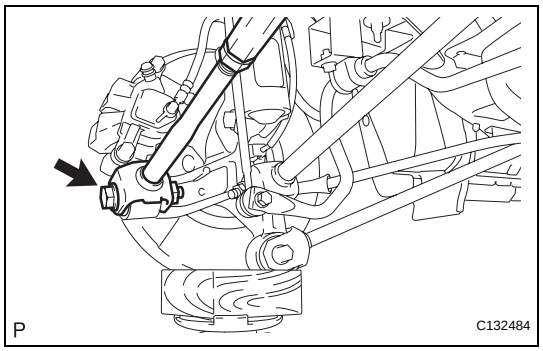
INSTALLATION

1. TEMPORARILY TIGHTEN REAR NO. 2 SUSPENSION ARM

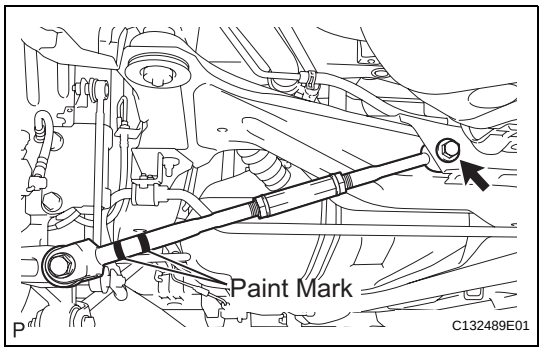
(a) Install the rear No. 2 suspension arm (inner side) with the bolt, and temporarily tighten the bolt.
HINT:
Ensure that the paint mark faces to the rear of the vehicle.



(b) Connect the rear No. 2 suspension arm (outer side) to the rear axle carrier with the bolt and nut, and temporarily tighten the bolt.
NOTICE:
When temporarily tightening the bolt, keep the nut from rotating.

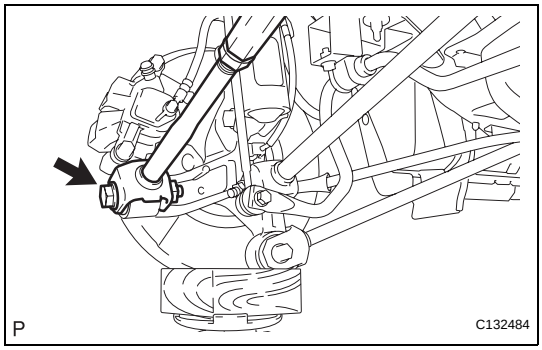


2. STABILIZE SUSPENSION (See page SP-50)



3. FULLY TIGHTEN REAR NO. 2 SUSPENSION ARM

(a) Fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)



(b) Fully tighten the bolt.
Torque: 100 N*m (1,020 kgf*cm, 74 ft.*lbf)

4. INSTALL REAR WHEEL
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

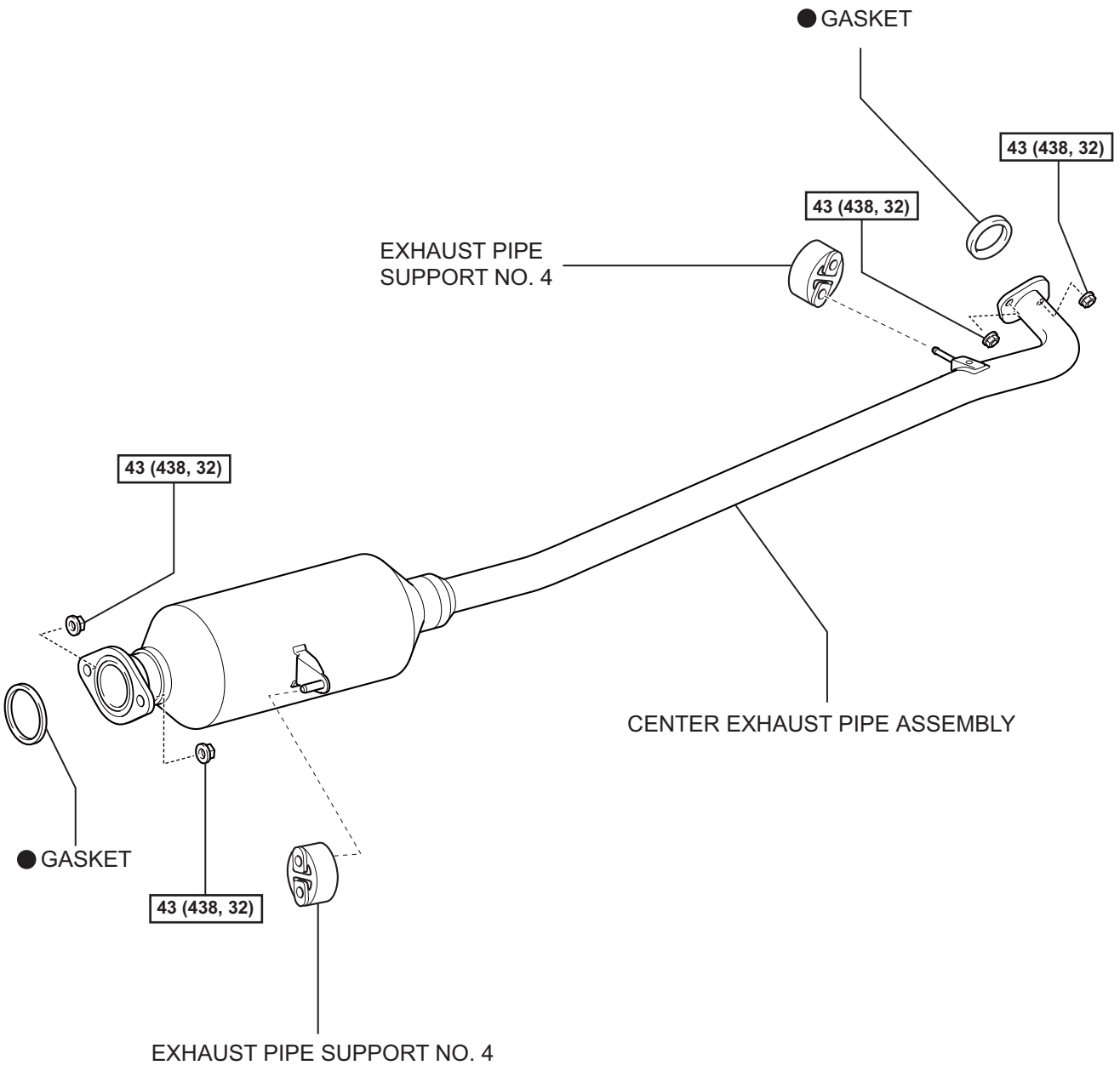
5. INSPECT AND ADJUST REAR WHEEL ALIGNMENT
(See page SP-13)

SP

REAR STABILIZER BAR

COMPONENTS

for 2AZ-FE:

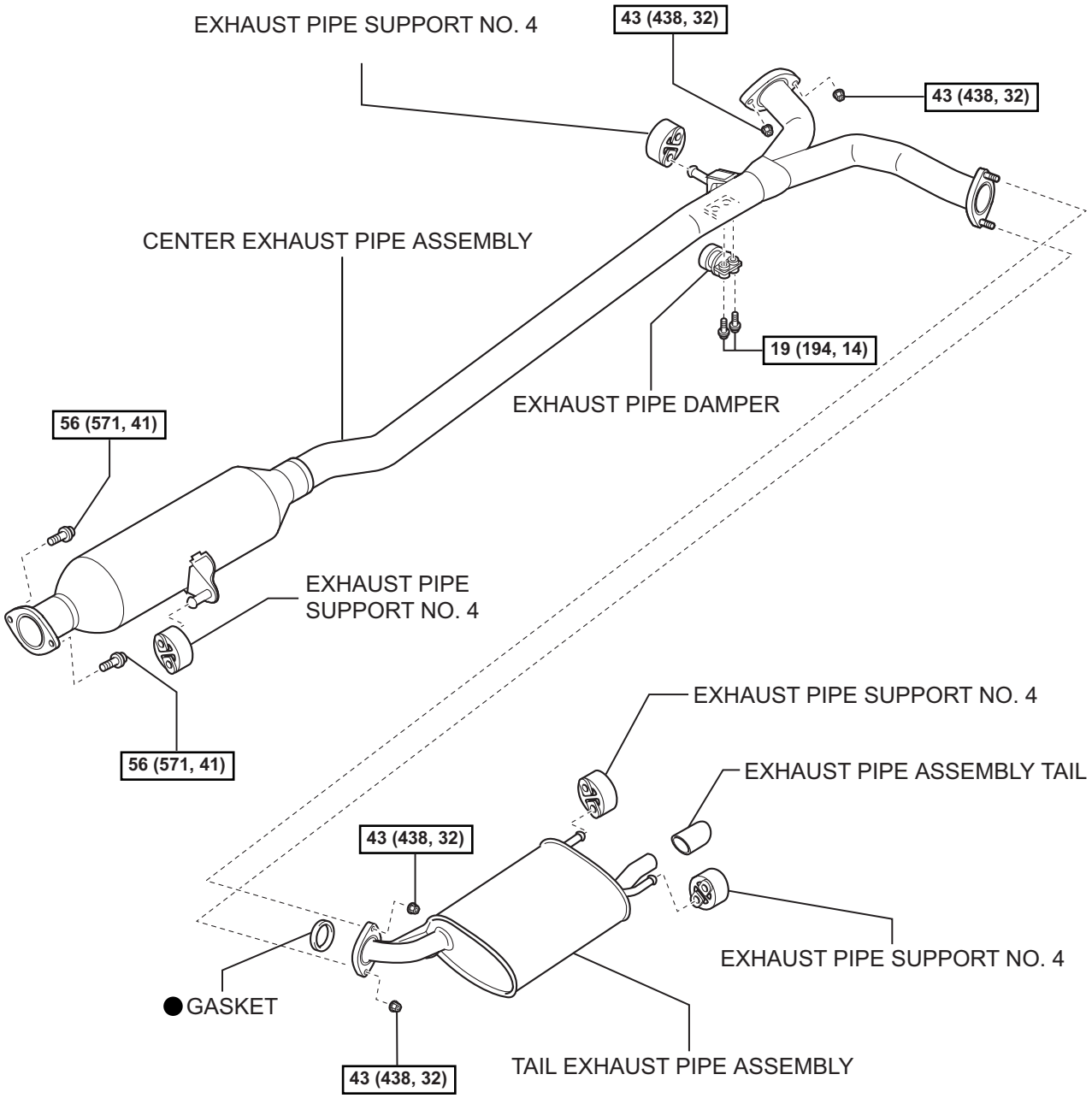


N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

C138705E01

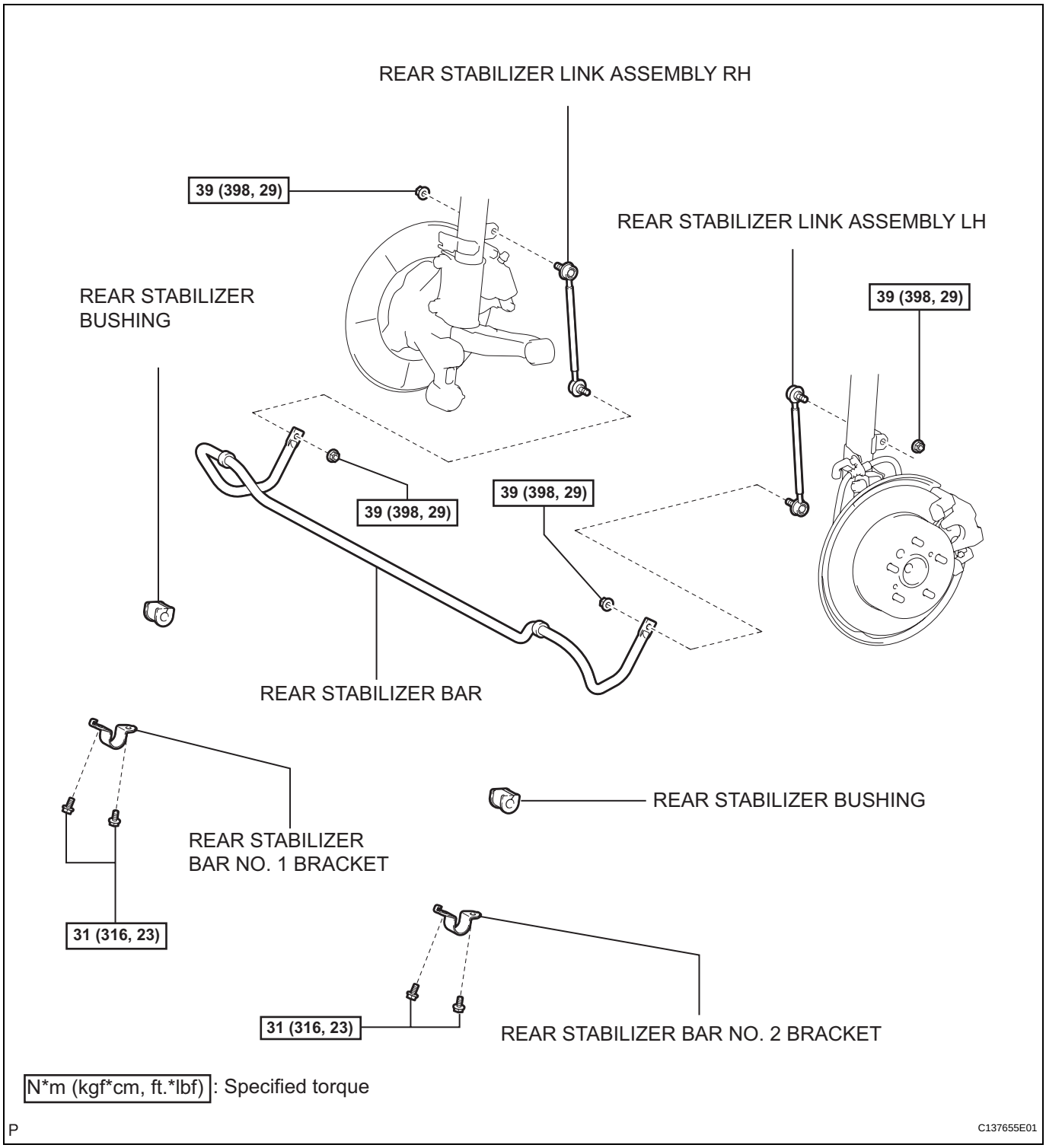
SP

for 2GR-FE:



N*m (kgf*cm, ft.*lbf) : Specified torque ● Non-reusable part

C138704E02

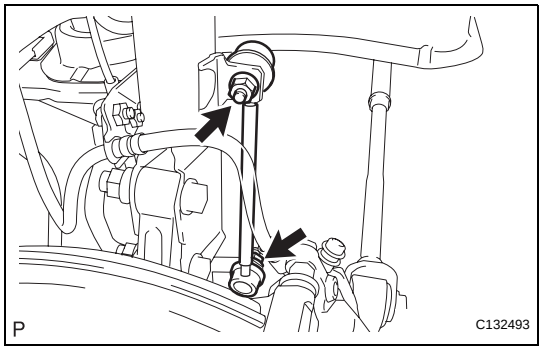

REAR STABILIZER LINK ASSEMBLY RH
39 (398, 29)
REAR STABILIZER LINK ASSEMBLY LH
REAR STABILIZER BUSHING
39 (398, 29)
39 (398, 29)
39 (398, 29)
REAR STABILIZER BAR
REAR STABILIZER BUSHING
REAR STABILIZER BAR NO. 1 BRACKET
31 (316, 23)
31 (316, 23)
REAR STABILIZER BAR NO. 2 BRACKET
N*m (kgf*cm, ft.*lbf): Specified torque
P
C137655E01

SP

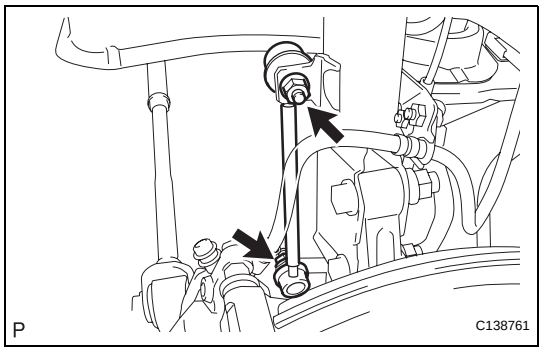
REMOVAL

NOTICE:
Check if an old gasket still remains on the pipe. If so, remove it. Also, check if any bolts or nuts are rusted. If so, replace them.

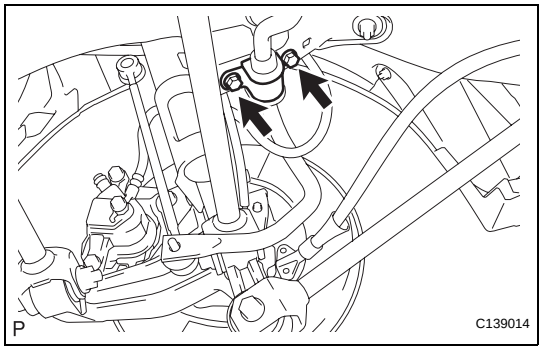
1. **REMOVE REAR WHEELS**
2. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-2)**
3. **REMOVE TAIL EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**
4. **REMOVE CENTER EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-2)**



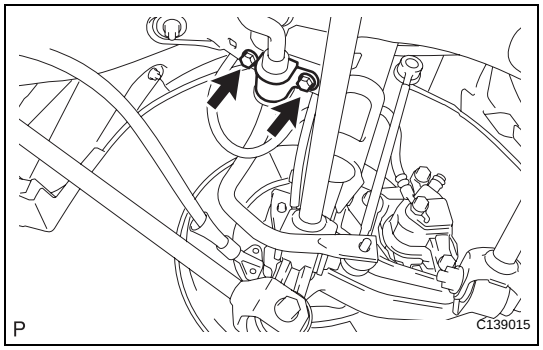
5. **REMOVE REAR STABILIZER LINK ASSEMBLY LH**
   (a) Remove the 2 nuts and rear stabilizer link assembly LH.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



6. **REMOVE REAR STABILIZER LINK ASSEMBLY RH**
   (a) Remove the 2 nuts and rear stabilizer link assembly RH.
   HINT:
   If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



7. **REMOVE REAR STABILIZER BAR NO. 2 BRACKET**
   (a) Remove the 2 bolts and rear stabilizer bar No. 2 bracket.



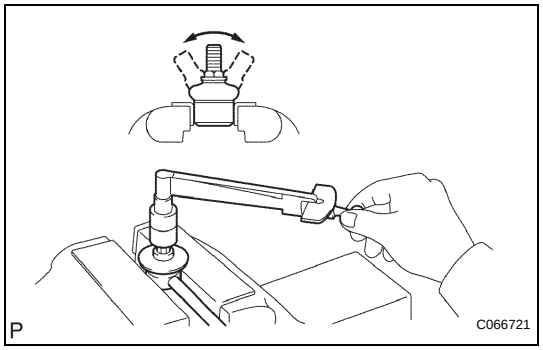
8. REMOVE REAR STABILIZER BAR NO. 1 BRACKET

(a) Remove the 2 bolts and rear stabilizer bar No. 1 bracket.

9. REMOVE REAR STABILIZER BUSHING

(a) Remove the 2 rear stabilizer bushings from the rear stabilizer bar.

10. REMOVE REAR STABILIZER BAR



INSPECTION

1. INSPECT REAR STABILIZER LINK ASSEMBLY

(a) Inspect the turning of the ball joint.

(1) Secure the rear stabilizer link assembly in a vise using aluminum plates.

(2) Install the nut to the rear stabilizer link assembly stud.

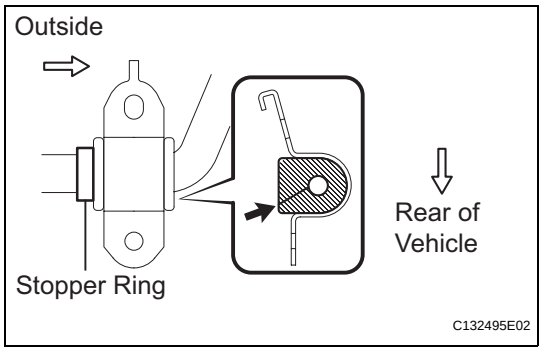
(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: Turning torque
0.05 to 1.0 N*m (0.5 to 10 kgf*cm, 0.4 to 8.9 in.*lbf)

HINT:
If the turning torque is not within the specified range, replace the rear stabilizer link assembly with a new one.

(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.



INSTALLATION

1. INSTALL REAR STABILIZER BUSHING

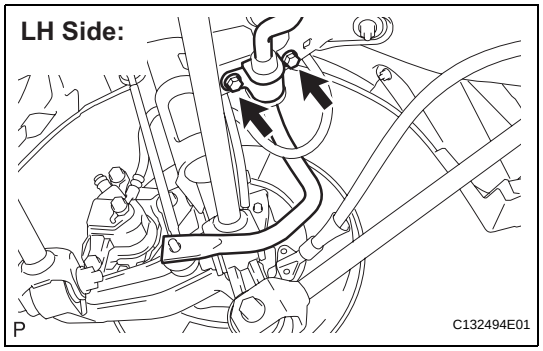
(a) Install the 2 rear stabilizer bushings to the outside of the stopper ring on the stabilizer bar.

2. INSTALL REAR STABILIZER BAR NO. 2 BRACKET

(a) Install the rear stabilizer bar No. 2 bracket.

3. INSTALL REAR STABILIZER BAR NO. 1 BRACKET

(a) Install the rear stabilizer bar No. 1 bracket.

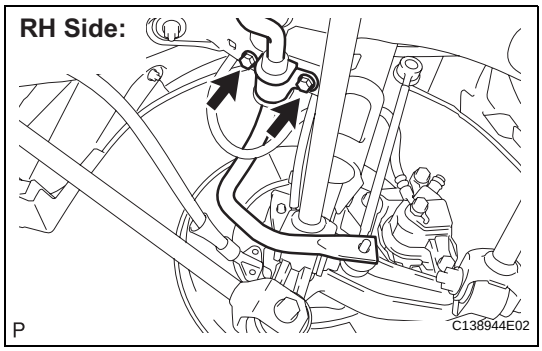


4. INSTALL REAR STABILIZER BAR

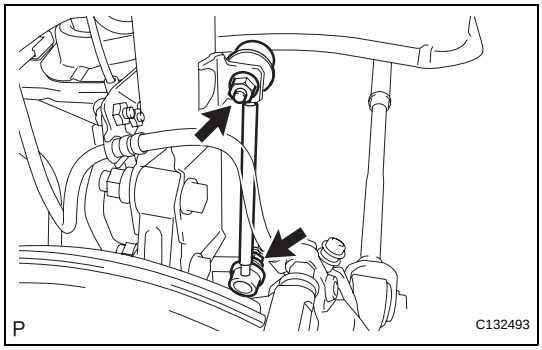
(a) Install the rear stabilizer bar with the 2 bolts. (LH Side)

Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)

SP

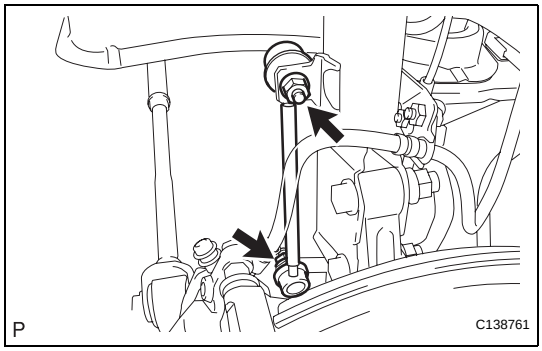


(b) Install the rear stabilizer bar with the 2 bolts. (RH Side)
Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)



5. INSTALL REAR STABILIZER LINK ASSEMBLY LH

(a) Install the rear stabilizer link assembly LH with the 2 nuts.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



6. INSTALL REAR STABILIZER LINK ASSEMBLY RH

(a) Install the rear stabilizer link assembly RH with the 2 nuts.
Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)
HINT:
If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.

7. INSTALL CENTER EXHAUST PIPE ASSEMBLY (for 2AZ-FE) (See page EX-4)

8. INSTALL CENTER EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-4)

9. INSTALL TAIL EXHAUST PIPE ASSEMBLY (for 2GR-FE) (See page EX-5)

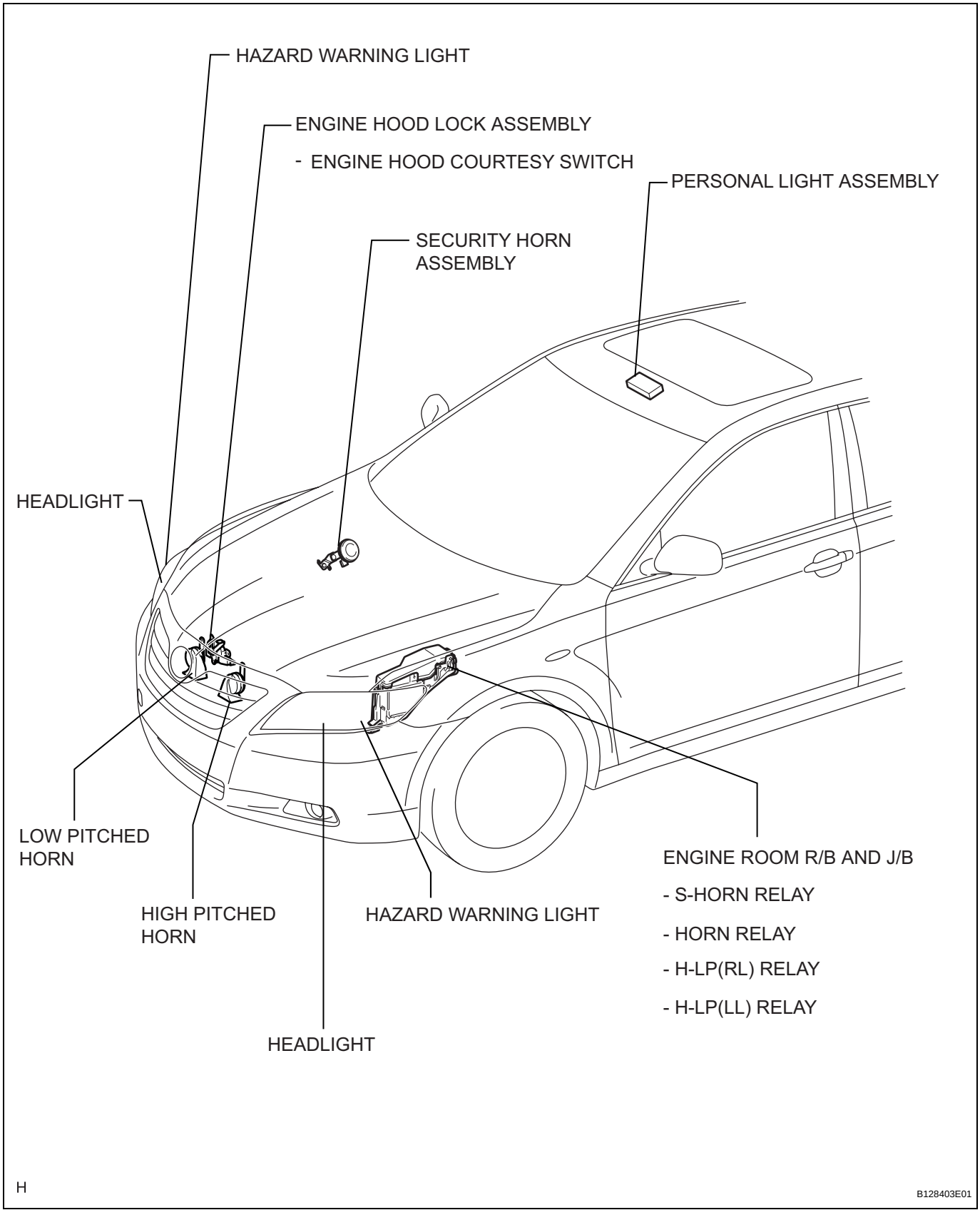
10. INSTALL REAR WHEELS
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

11. INSPECT EXHAUST GAS LEAKAGE (See page EX-5)

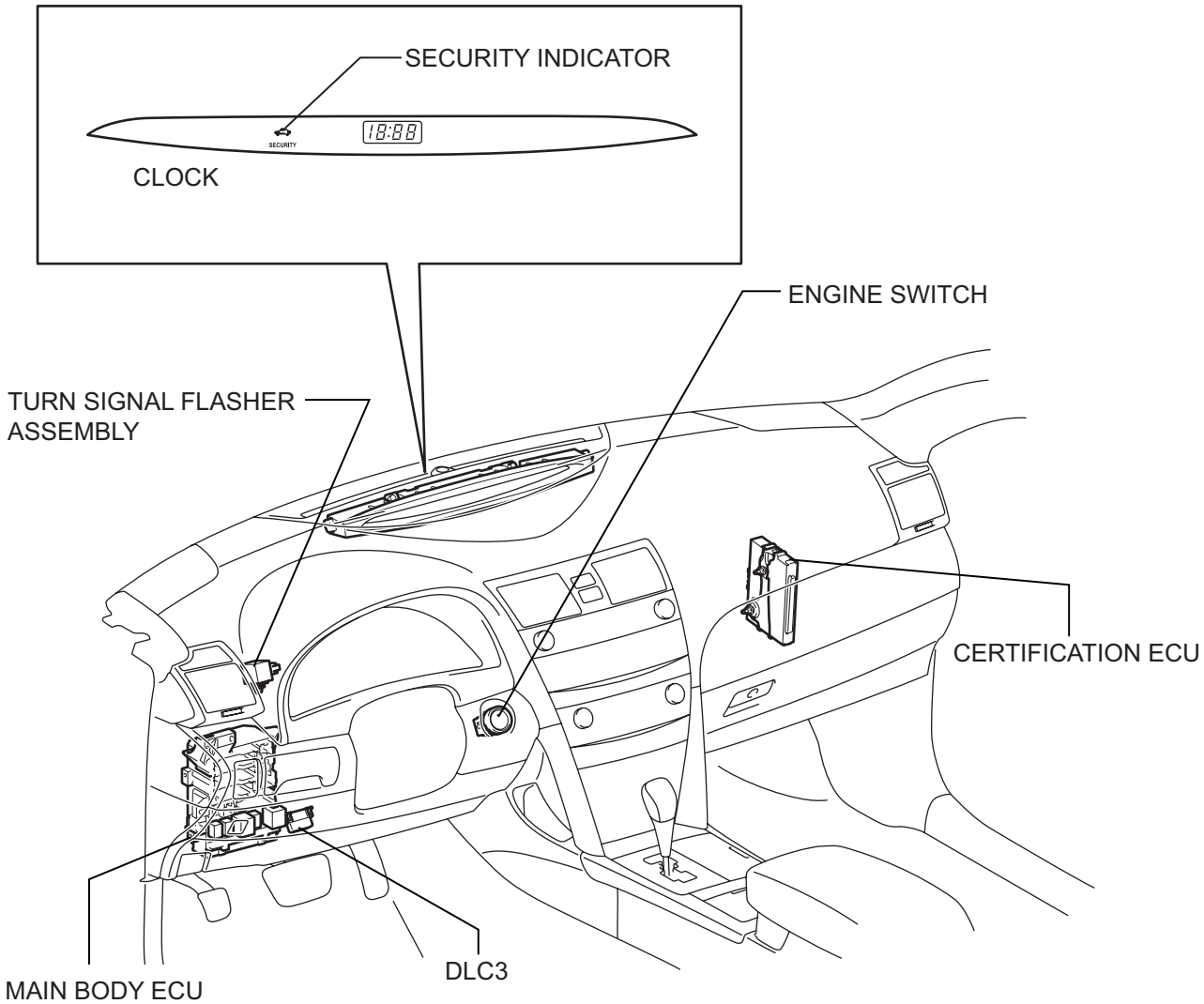
SP

THEFT DETERRENT SYSTEM (w/ Smart Key System)

PARTS LOCATION



TD


SECURITY INDICATOR
SECURITY
18:88
CLOCK
ENGINE SWITCH
TURN SIGNAL FLASHER ASSEMBLY
CERTIFICATION ECU
DLC3
MAIN BODY ECU (INSTRUMENT PANEL J/B)
- TAIL RELAY
H
B128406E01

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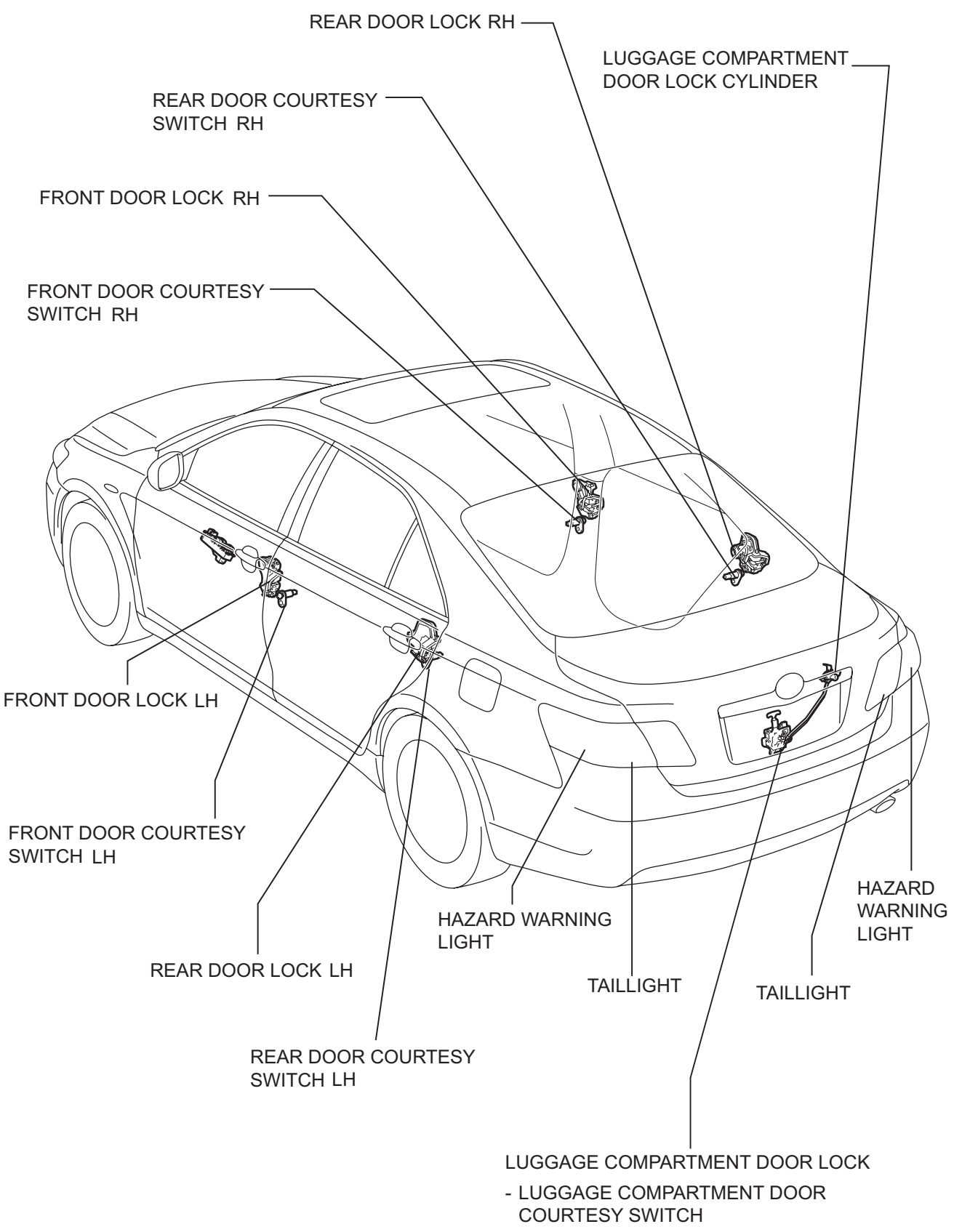
REAR DOOR LOCK RH
LUGGAGE COMPARTMENT DOOR LOCK CYLINDER
REAR DOOR COURTESY SWITCH RH
FRONT DOOR LOCK RH
FRONT DOOR COURTESY SWITCH RH
FRONT DOOR LOCK LH
FRONT DOOR COURTESY SWITCH LH
REAR DOOR LOCK LH
HAZARD WARNING LIGHT
TAILLIGHT
HAZARD WARNING LIGHT
TAILLIGHT
REAR DOOR COURTESY SWITCH LH
LUGGAGE COMPARTMENT DOOR LOCK
- LUGGAGE COMPARTMENT DOOR COURTESY SWITCH
H
B128405E01

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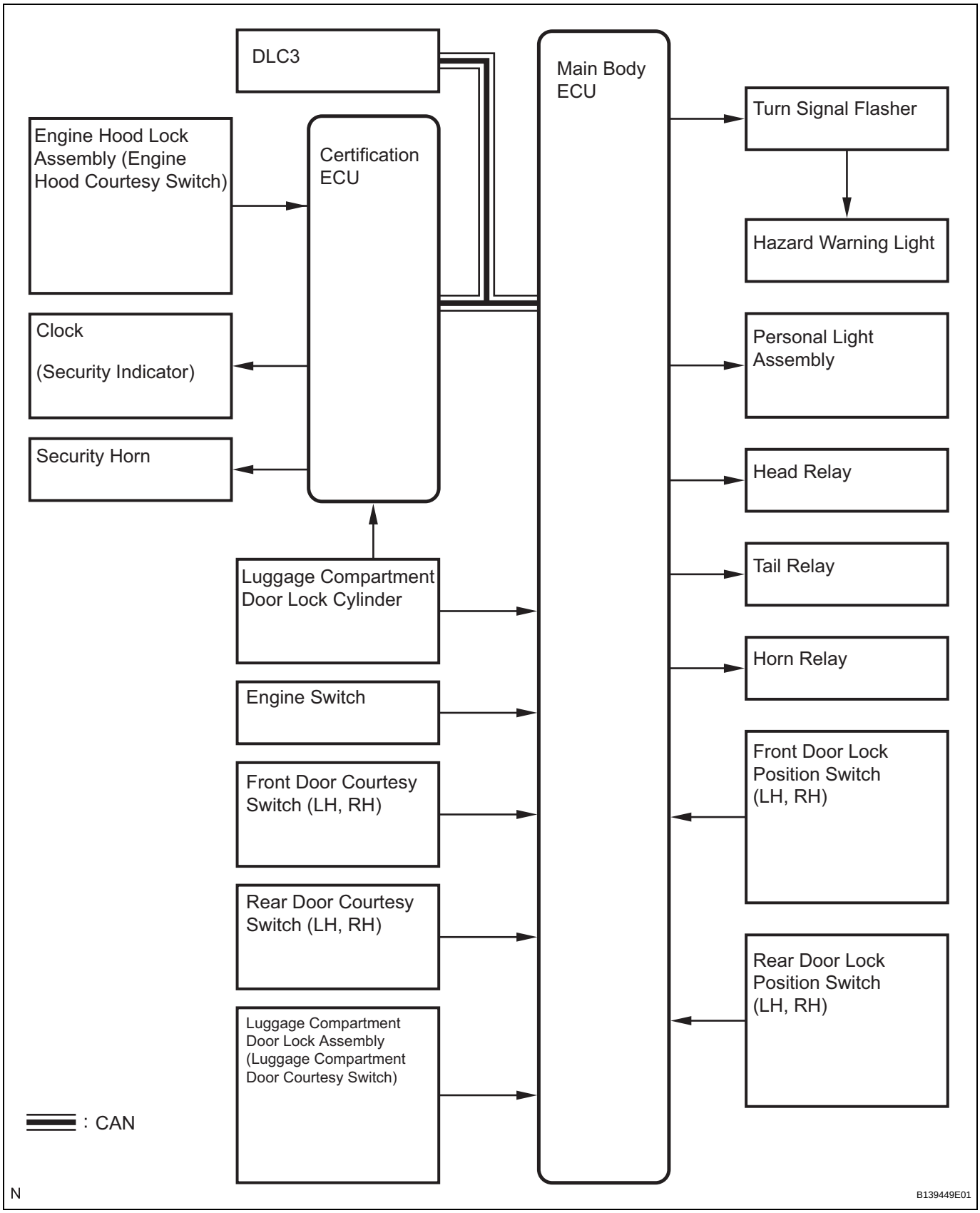
SYSTEM DIAGRAM



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SYSTEM DESCRIPTION

1. OUTLINE OF THEFT DETERRENT SYSTEM

- The theft deterrent system will operate when somebody attempts to forcibly enter the vehicle, unlock any door or luggage compartment door, or open the engine hood or the luggage compartment door without using the key.
  This system causes the lights to light up or blink and the horns to sound in order to deter break-in and theft.
- The theft deterrent system has 2 modes; one is the active arming mode (see ACTIVE ARMING MODE) and the other is passive arming mode (see PASSIVE ARMING MODE). The passive arming mode can be switched ON/OFF using the specified method.
- Each mode has 4 states; a disarmed state, an arming preparation state, an armed state and an alarm sounding state.

(a) Disarmed state:
- The alarm function is not operating.
- The theft deterrent system is not operating.

(b) Arming preparation state:
- The time until the system goes into the armed state.
- The theft deterrent system is not operating.

(c) Armed state:
- The theft deterrent system is operating.

(d) Alarm sounding state:
- Alarm function is operating.

Alarm time:
Approx. 60 sec.

Refer to table below for alarm method and time:

Alarm Method	Headlight	Blinking
	Taillight	Blinking
	Hazard Warning Light	Blinking
	Interior Light	Illuminating
	Vehicle Horn	Sounding (approx. 0.4 second cycles)
	Security Horn	Sounding (approx. 0.4 second cycles)
Alarm Time	Approx. 60 sec.	

HINT:
If any of the doors are unlocked when the key is not in the actuation area during the armed state, a forced door lock signal will be output (see FORCED DOOR LOCK CONTROL).

2. FUNCTION OF MAIN COMPONENT

Component	Function
Security indicator	Informs driver of theft deterrent system status.
Security horn	Sounds when attempted brake-in or theft is detected.
Headlights	Blink when attempted break-in or theft is detected.
Taillights	Blink when attempted break-in or theft is detected.
Hazard warning lights	Blinking when attempted break-in or theft is detected.

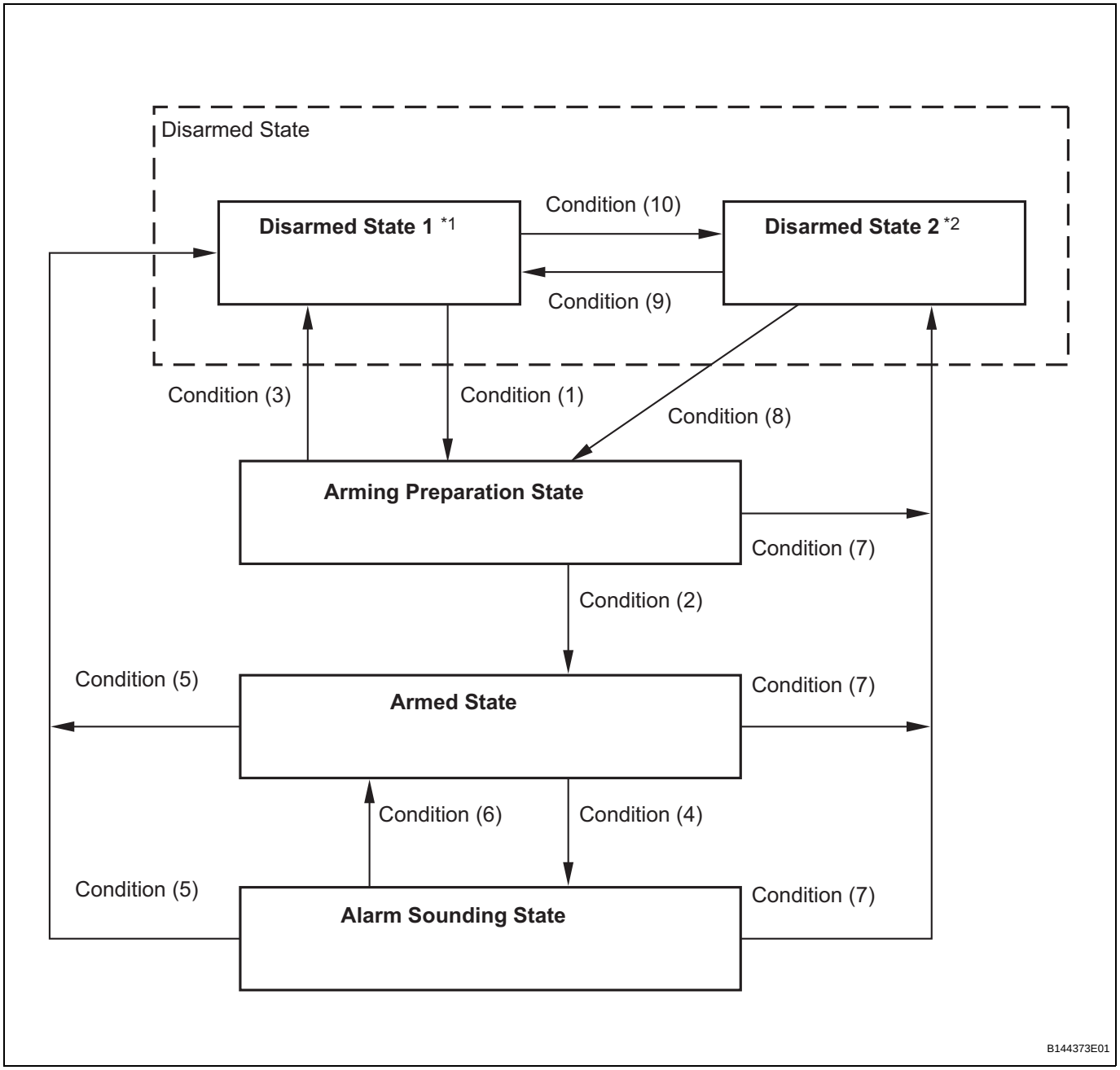
Component	Function
Interior light	Lights up when attempted break-in or theft is detected.
Vehicle horns	Sounds when attempted break-in or theft is detected.
Door courtesy light switch	Detects door status (open or closed).
Door lock position switch	Detects door status (locked or unlocked).
Engine hood courtesy switch	Detects engine hood status (open or closed).
Luggage compartment door courtesy switch	Detects luggage compartment door status (open or closed).
Luggage compartment door lock cylinder	Detects luggage compartment door status (locked or unlocked).
Certification ECU	• Receives engine hood courtesy switch status. • Sends operation signal to security indicator and security horn.

3. ACTIVE ARMING MODE

HINT:

Active arming mode starts the alarm control immediately after the doors are locked.

(a) Active arming mode:
This system activates as described in the diagram below when one of items for each condition is met.



HINT:
- *1: Disarmed state 1 is the normal disarmed state.
- *2: Disarmed state 2 is set from either the disarmed state 1 or the arming preparation state.

Condition	Item
Condition (1)	In the disarmed state 1, when the key is not in the actuation area, the system state is switched if one of the following conditions is met. 1. With all doors, engine hood and luggage compartment door closed, lock all doors by key operation. 2. With all doors, engine hood and luggage compartment door closed, lock all doors by wireless operation. 3. With engine hood and luggage compartment door closed and all doors locked with any door still opened, close the open door.

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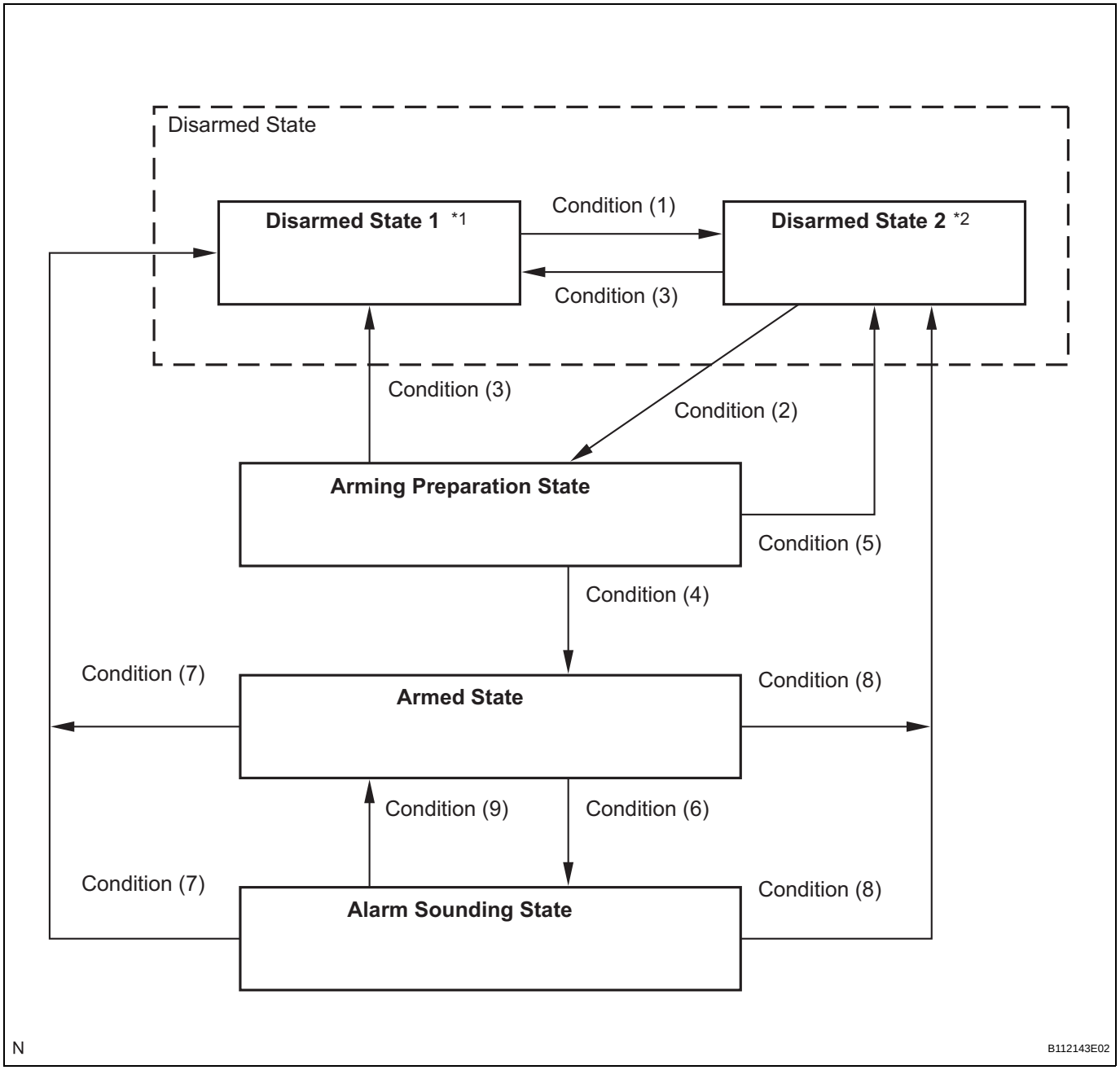
Condition	Item
Condition (2)	After condition (1) is met, allow approx. 30 seconds to elapse.
Condition (3)	1. Unlock any door. 2. Open any door, engine hood, or luggage compartment door. 3. Turn the engine switch on (IG or ACC). 4. Reconnect battery.
Condition (4)	1. Open engine hood. 2. Open luggage compartment door. 3. Reconnect battery. 4. Open any door. 5. Unlock any door when all doors are locked without wireless operation.
Condition (5)	1. Unlock only driver's door or all doors by wireless operation. 2. Unlock only driver's door or all doors by key operation. 3. Turn the engine switch on (IG) and run the engine more than 2 seconds.
Condition (6)	After approx. 60 seconds, alarm stops and system returns to armed state.
Condition (7)	1. Open the luggage compartment door by wireless operation. 2. Unlock the luggage compartment door by key operation.
Condition (8)	1. Close the engine hood when the luggage compartment door is closed. 2. Close the luggage compartment door when the engine hood is closed.
Condition (9)	1. Unlock any door. 2. Open any door. 3. Turn the engine switch from off to on (IG or ACC). 4. Reconnect the battery.
Condition (10)	In the disarmed state 1, when the key is not in the actuation area, the system state is switched if one of the following conditions is met. 1. With all doors closed, and the engine hood or luggage compartment door is opened, lock all doors by wireless operation. 2. With all doors closed, and the engine hood or luggage compartment door is opened, lock all doors by key operation. 3. With the engine hood or luggage compartment door is opened and all doors locked with any door still opened, close the open door.

4. PASSIVE ARMING MODE

HINT:

- Passive arming mode starts the alarm control after the key is out of the actuation area and doors are closed.
- Passive arming mode can be switched ON/OFF by the specified method.
- The alarm is initially set (when shipped from factory) to active arming mode (not passive arming mode).
- During passive arming mode, the theft deterrent system goes into the armed state even if the doors are not locked.
- Detecting that the doors are unlocked does not set off the alarm during passive arming mode.
- A forced door lock signal is not output during passive arming mode (see FORCED DOOR LOCK CONTROL).
- Although the theft deterrent system detects that the doors are opened during passive arming mode, the alarm will not go off immediately because an entry delay time is set.
- If the condition (1) of active arming mode is met during passive arming mode, the theft deterrent system will switch to active arming mode.

(a) Passive arming mode:
This system activates as described in the diagram below when one of items for each condition is met.



HINT:

- *1: Disarmed state 1 is the normal disarmed state.
- *2: Disarmed state 2 is set from either the disarmed state 1 or the arming preparation state.

Condition	Item
Condition (1)	1. With any door open, turn the engine switch off. 2. With the engine switch off, open any door.
Condition (2)	All doors, engine hood and luggage compartment door are closed.
Condition (3)	1. Unlock only driver's door or all doors by wireless operation. 2. Unlock only driver's door or all doors by key operation. 3. Reconnect battery. 4. Turn the engine switch on (IG or ACC).

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Condition	Item
Condition (4)	After condition (1) is met, allow approx. 30 seconds to elapse.
Condition (5)	1. Open any door. 2. Open engine hood. 3. Open luggage compartment door. 4. Unlock luggage compartment door.
Condition (6)	1. Open any door and allow entry delay time*1 to elapse. 2. Open engine hood. 3. Open luggage compartment door. 4. Reconnect battery. 5. Turn the engine switch off. After 5 seconds or more elapsed, turn the engine switch on (IG).
Condition (7)	1. Unlock only driver's door or all doors by wireless operation. 2. Unlock only driver's door or all doors by key operation. 3. Turn the engine switch on (IG) and run the engine more than 2 seconds.
Condition (8)	1. Open luggage compartment door by wireless operation. 2. Unlock luggage compartment door by key operation.
Condition (9)	After approx. 60 sec., alarm stops and system returns to armed state.

HINT:

*1: When any door is opened while all the doors are closed during passive arming mode, the entry delay time starts. If the switch condition (armed state → disarmed state 1 or 2) is met during the entry delay time, the theft deterrent system will return to disarmed state 1 or 2. However, if the switch condition for disarmed state 1 or 2 is not met, the theft deterrent system will recognize it as a theft and set off the alarm. Entry delay time of 0, 14 or 30 sec. can be selected by the customizing function.

5. FORCED DOOR LOCK CONTROL

(a) The forced door lock control prevents the vehicle from being tampered with. Immediately after a door is unlocked (alarm starts), the door is forced to lock by a forced door lock signal.

(1) Conditions that force the doors to lock:
When the key is not in the actuation area and both of the following conditions are met.

- The theft deterrent system is in the alarm sounding state of active arming mode.
- Any door is unlocked.

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6. ALARM MEMORY FUNCTION

(a) If the alarm is set off (tampering is detected) while the theft deterrent system is armed, it will be recorded by the alarm memory function. Whenever the theft deterrent system is cancelled, the alarm memory function causes the taillights to light up for 2 seconds in order to inform you that the alarm has been set off.

(1) Conditions of the alarm memory function that cause the taillights to light up:
When the theft deterrent system has entered into the alarm sounding state (tampering has been detected) even once, the taillights will light up for 2 seconds if any of the following conditions is met.
- Switched to the disarmed state from the armed state during active arming mode.
- Switched to the disarmed state 1 from the armed state during passive arming mode.

HINT:
Active arming mode: See ACTIVE ARMING MODE.
Passive arming mode: See PASSIVE ARMING MODE.

7. PANIC ALARM CONTROL

(a) The panic alarm control makes it possible to voluntarily set off the panic alarm by pressing the PANIC switch on the wireless transmitter.

(1) Conditions that cause the panic alarm control to set off the panic alarm:
The panic alarm control sets off the panic alarm by pressing the PANIC switch on the wireless transmitter under the following conditions:
- The engine switch off.
- The theft deterrent system is not in the alarm sounding state. (This condition is common both to active arming mode and to passive arming mode.)

(2) Conditions that cause the panic alarm control to shut off the alarm:
The panic alarm control shuts off the panic alarm when any of the following conditions is met during panic alarm operation:
- The engine switch on (IG).
- The panic alarm switch is turned on again.
- Any of the switches on the wireless transmitter (LOCK/UNLOCK or LUGGAGE OPEN) is pressed.
- The panic alarm ends (approx. 60 sec. have passed).

- The theft deterrent system switches to the alarm sounding state. Under this condition, the theft deterrent system is controlling the alarm rather than the panic alarm control. In order to cancel this alarm, refer to the theft deterrent system alarm sounding state cancellation procedure. (This condition is common both to active arming mode to passive arming mode.)

HINT:
Active arming mode: See ACTIVE ARMING MODE.
Passive arming mode: See PASSIVE ARMING MODE.

8. SECURITY INDICATOR OUTPUT

(a) The certification ECU outputs a signal to light up the security indicator, according to the state of the theft deterrent system. However, some of the actual lighting conditions of the security indicator are different from the output signals of the certification ECU.

Output:

State of Theft Deterrent System*	Security Indicator	
	Output Signals from certification ECU	Actual Lighting Condition
Disarmed state 1, 2	OFF	OFF (Immobiliser system unset) BLINKING (Immobiliser system set)
Arming preparation state	ON	ON
Armed state	OFF	BLINKING
Alarm sounding state	ON	ON

Blinking cycle:

Time	Security Indicator
0.2 sec.	ON
1.8 sec.	OFF

HINT:

- *: The above condition is common both to active arming mode and to passive arming mode.
- When the immobiliser system is set, the security indicator blinks during both the disarmed state and the armed state, due to the output signals from the immobiliser system.

TD

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the theft deterrent system.
- The intelligent tester should be used in step 3.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble (See page IN-45).

NEXT

3	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check for normal function of the multiplex communication system.
   (1) (ECU unconnected, communication line malfunctioning) If no code is output, proceed to A.
   (2) (ECU unconnected, communication line malfunctioning) If any code is output, proceed to B.

B → Go To CAN COMMUNICATION SECTION

A

4	SYMPTOM SIMULATION

NEXT

5	PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → Go to step 7

A

6	PERFORM TROUBLESHOOTING ACCORDING TO MALFUNCTION SYMPTOM

(a) System description (See page TD-5)

(b) Terminals of ECU (See page TD-17)

7	ADJUST, REPAIR OR REPLACE

NEXT

8	CONFIRMATION TEST

NEXT

END

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.
NOTICE:

- **After confirming whether the items requested by the customer are applicable or not for customization, perform customizing operations.**
- **Be sure to record the current settings before customization.**
- **When troubleshooting, make sure that the item in question is not set to "OFF" as a result of customization (Example: For the system, "the wireless function does not operate", first check that the wireless function is not set to "OFF", then perform troubleshooting).**

THEFT DETERRENT SYSTEM

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
PASSIVE MODE (Passive Arming Mode)	OFF	PASSIVE MODE is a function that switches theft deterrent system from arming preparation state to armed state 30 seconds after key is not in the actuation area and all doors, engine hood and luggage compartment door are closed, even if doors are not locked by wireless or door key lock operation In PASSIVE MODE, if you do not perform following operations within 14 seconds after door is opened during armed state, theft deterrent system will judge that condition as a theft and switch to alarm sounding state – Unlock any door by key or wireless operation – Turn the engine switch on (IG) – Open luggage compartment door by key or wireless operation	ON/OFF
WARN BY HORN (Warning by horn)	ON	Function that makes vehicle horn and theft deterrent horn be able to be used as a warning device	ON/OFF
ENTRY DELAY (Entry delay time)	14 s	Function that changes entry delay time (time before warning starts) for PASSIVE MODE	0 s/14 s/30 s

PROBLEM SYMPTOMS TABLE

HINT:

- Troubleshooting of the theft deterrent system is based on the premise that the door lock control system and the wireless door lock control system are operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system and the wireless door lock control system are operating normally.
- The following is the troubleshooting procedure for the theft deterrent system of a vehicle with the smart key system.
- Inspect the fuse and relay before investigating the suspected areas shown in the table below.

Theft deterrent system:

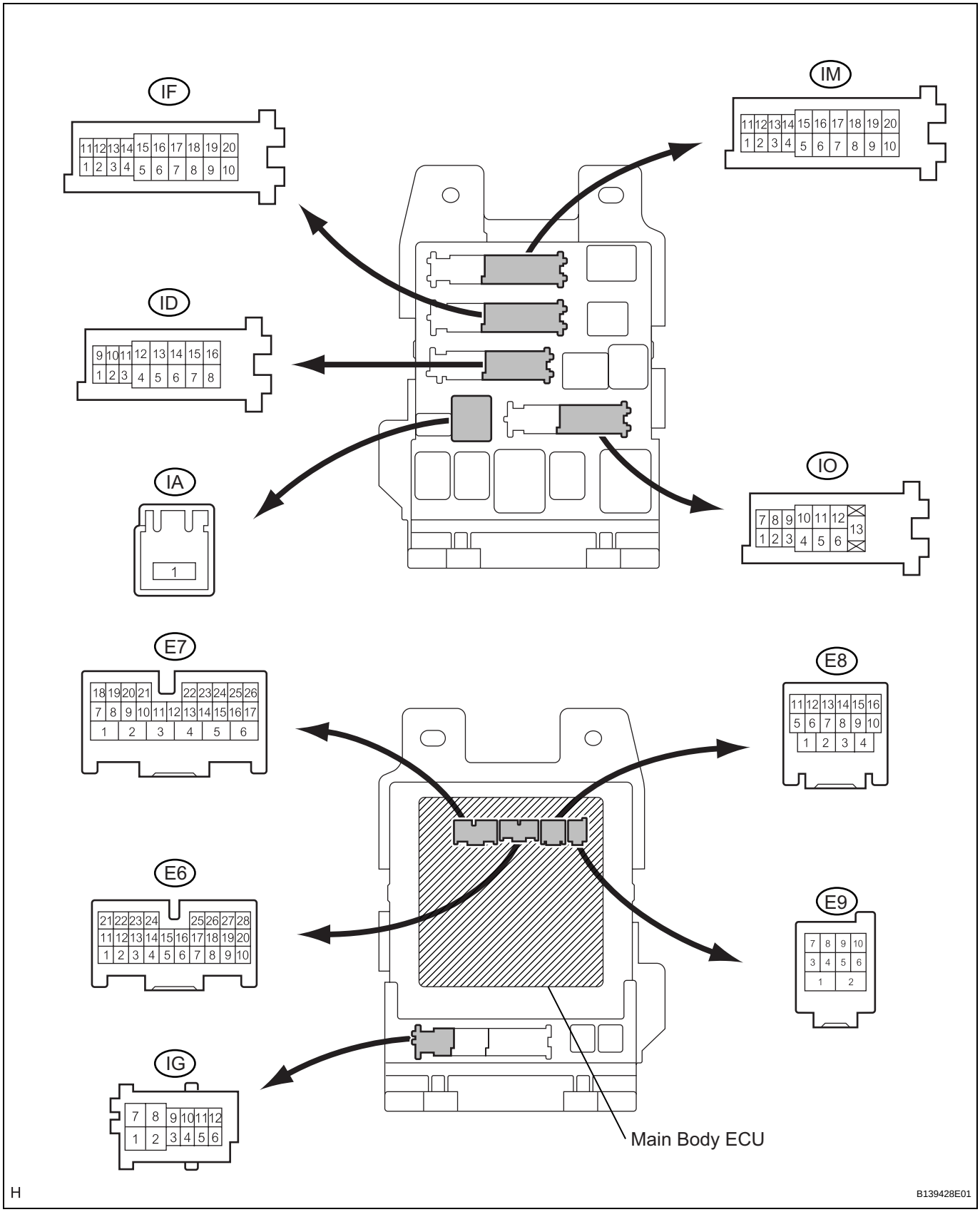
Symptom	Suspected area	See page
Theft deterrent system cannot be set	1. Security indicator light circuit	TD-34
	2. ECU power source circuit	TD-37
	3. Door key lock / unlock switch circuit	DL-53
	4. Door courtesy switch circuit	LI-52
	5. Luggage compartment door courtesy switch circuit	DL-44
	6. Engine hood courtesy switch circuit	TD-22
	7. Replace certification ECU	-
	8. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Security indicator does not blink when theft deterrent system is set	1. Security indicator light circuit	TD-34
	2. Replace certification ECU	-
	3. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Alarm sounding state cannot be canceled when engine switch turned on (IG)	1. Ignition switch circuit	TD-30
	2. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Theft deterrent system can be set even when a door is open	1. Door courtesy switch circuit	LI-52
	2. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Vehicle horns (low pitched, high pitched) do not sound while theft deterrent system is in warning operation	1. Horn circuit	TD-25
	2. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Hazard warning lights do not flash while theft deterrent system is in warning operation	1. Wire harness	-
	2. Turn signal flasher	LI-138
	3. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Interior light does not light up while theft deterrent system is in warning operation	1. Interior light circuit	LI-57
	2. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Security horn does not sound while theft deterrent system is in warning operation	1. Security horn circuit	TD-27
	2. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

Symptom	Suspected area	See page
Hazard warning lights flash even when theft deterrent system is not set	1. Wire harness	-
	2. Turn signal flasher	LI-138
	3. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Interior light comes on even when theft deterrent system is not set	1. Interior light circuit	LI-57
	2. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the main body ECU (instrument panel J/B) connectors.



(b) Measure the resistance and voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RCTY (E6-5) - Body ground	GR - Body ground	Rear courtesy light switch RH input	Rear door RH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
PCTY (E6-21) - Body ground	Y - Body ground	Passenger side courtesy light switch input	Passenger side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
LGCY (E6-25) - Body ground	W - Body ground	Luggage compartment door courtesy light switch input	Luggage compartment door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
DCTY (E7-24) - Body ground	L - Body ground	Driver side door courtesy light switch input	Driver side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
ACC (IA-1) - Body ground	B - Body ground	Ignition power supply (ACC signal)	Ignition switch on (ACC) → off	10 to 14 V → Below 1 V
IG (IA-1) - Body ground	B - Body ground	Ignition power supply (IG signal)	Ignition switch on (IG) → off	10 to 14 V → Below 1 V
BATB (IA-1) - Body ground	B - Body ground	+B (power battery system) power supply	Always	10 to 14 V
ALTB (ID-16) - Body ground	W - Body ground	+B (power system alternator system) power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LCTY (IO-7) - Body ground	LG - Body ground	Rear courtesy light switch LH input	Rear door LH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the main body ECU (instrument panel J/B) connectors.

(d) Measure the voltage between each terminal of the wire harness side connectors and body ground.

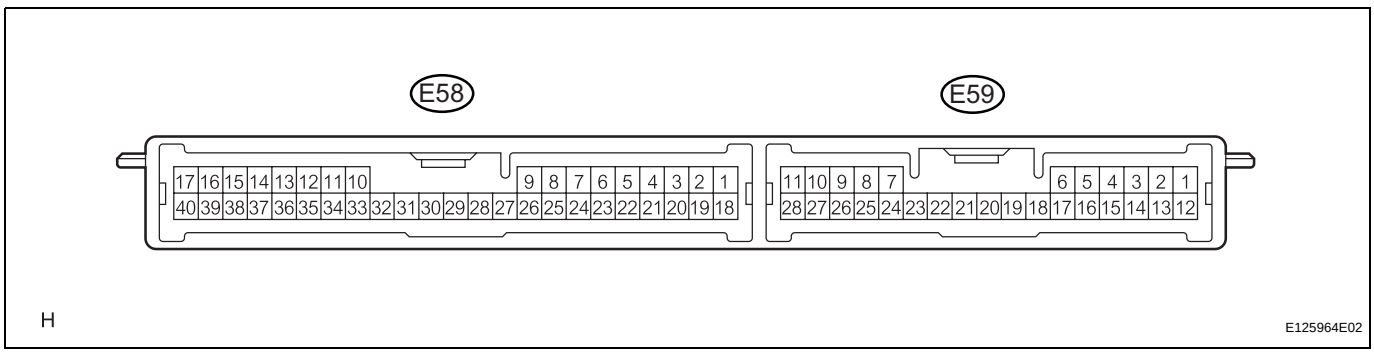
TD

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
HAZ (E8-4) - Body ground	W - Body ground	Turn signal flasher relay signal	System is in alarm sounding state	Below 1 V
HORN (ID-11) - Body ground	B - Body ground	Vehicle horn drive	Vehicle horn is sounding (Theft deterrent system is in alarm sounding state)	Pulse generation (0 V ← → 12 V)

If the result is not as specified, the ECU may have a malfunction.

2. CHECK CERTIFICATION ECU ASSEMBLY

(a) Disconnect the E58 and E59 ECU connectors.



(b) Measure the voltage and resistance of the wire harness side connector.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (E58-1) - E (E58-17)	W - W-B	Battery power supply	Always	10 to 14 V
E (E58-17) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
HSW (E59-24) - Body ground	R - Body ground	Engine hood courtesy switch	Engine hood OPEN (OFF) → CLOSED (ON)	10 kΩ or higher → Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the E58 and E59 ECU connectors.

(d) Measure the voltage of the connector.

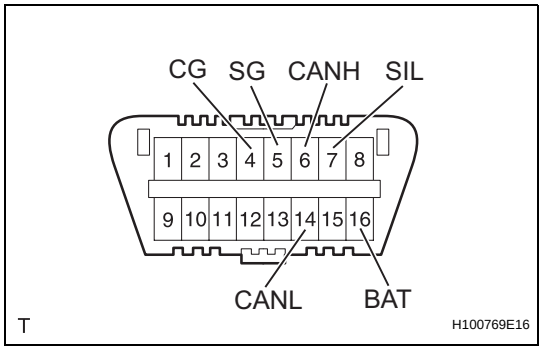
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IND (E58-2) - Body ground	Y - Body ground	Security indicator output	Security indicator light up (It lights up only in arming preparation state or alarm sounding state. It flashes when immobiliser is operating.)	3 to 6 V
SH (E59-20) - Body ground	P - Body ground	Security horn drive	Security horn is sounding (Theft deterrent system is in alarm sounding state)	Pulse generation (0 V ← → 12 V)

If the result is not as specified, the ECU may have a malfunction.

DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The main body ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



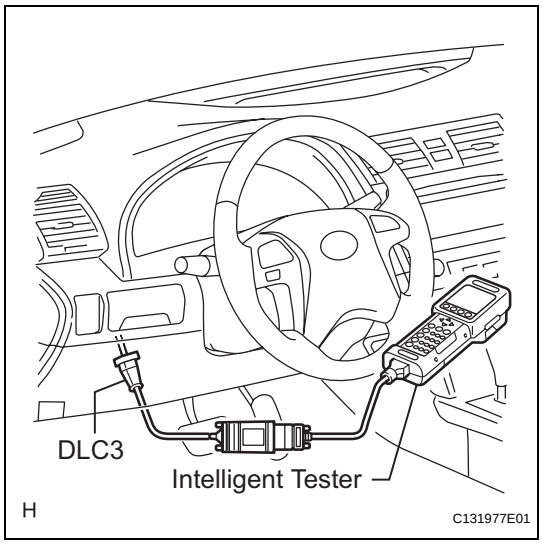
TD

Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine switch off*	54 to 67 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine switch off*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the engine switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle or in the tester.
- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch on ON.

(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / MAIN BODY or SMART / DATA LIST.

(d) Read the DATA LIST according to the display on the tester.

MAIN BODY (Main body ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ACC SW	Engine switch signal / ON or OFF	ON: Engine switch is on (ACC) OFF: Engine switch is off	-
IG SW	Engine switch signal / ON or OFF	ON: Engine switch is on (IG) OFF: Engine switch is off	-
D DOOR CTY SW	D door courtesy switch / ON or OFF	ON: Driver side door is OPEN OFF: Driver side door is CLOSED	-
P DOOR CTY SW	P door courtesy switch / ON or OFF	ON: Front passenger side door is OPEN OFF: Front passenger side door is CLOSED	-
RR DOR CTY SW	Rear right door courtesy switch / ON or OFF	ON: Rear right door is OPEN OFF: Rear right door is CLOSED	-
RL DOR CTY SW	Rear left door courtesy switch / ON or OFF	ON: Rear left door is OPEN OFF: Rear left door is CLOSED	-
LUGG COURTSY SW	Luggage compartment door courtesy switch / ON or OFF	ON: Luggage compartment door is OPEN OFF: Luggage compartment door is CLOSED	-
D LOCK POS SW	Driver's door lock position switch / ON or OFF	ON: Driver's door is UNLOCKED OFF: Driver's door is LOCKED	-
P LOCK POS SW	Passenger door lock position switch / ON or OFF	ON: Passenger door is UNLOCKED OFF: Passenger door is LOCKED	-
RR LOCK POS SW	Rear right door lock position switch / ON or OFF	ON: Rear right door is UNLOCKED OFF: Rear right door is LOCKED	-
RL LOCK POS SW	Rear left door lock position switch / ON or OFF	ON: Rear left door is UNLOCKED OFF: Rear left door is LOCKED	-

SMART (Certification ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
PASSIVE MODE	Passive mode/ON or OFF	ON: Passive mode ON OFF: Passive mode OFF	-
WARN BY HORN	Warning by horn/ON or OFF	ON: Vehicle horns sound during alarm sounding state OFF: Vehicle horns do not sound during alarm sounding state	-
ENTRY DELAY	Entry delay time during passive mode	0s: Entry delay time is 0 sec. 14s: Entry delay time is 14 sec. 30s: Entry delay time is 30 sec.	-

TD

2. ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten the labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch on ON.
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / MAIN BODY or SMART / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY (Main body ECU):

Item	Tester Detail	Diagnostic Note
HAZARD	Hazard warning light ON/OFF	-
VEHICLE HORN	Vehicle horn ON/OFF	-

SMART (Certification ECU):

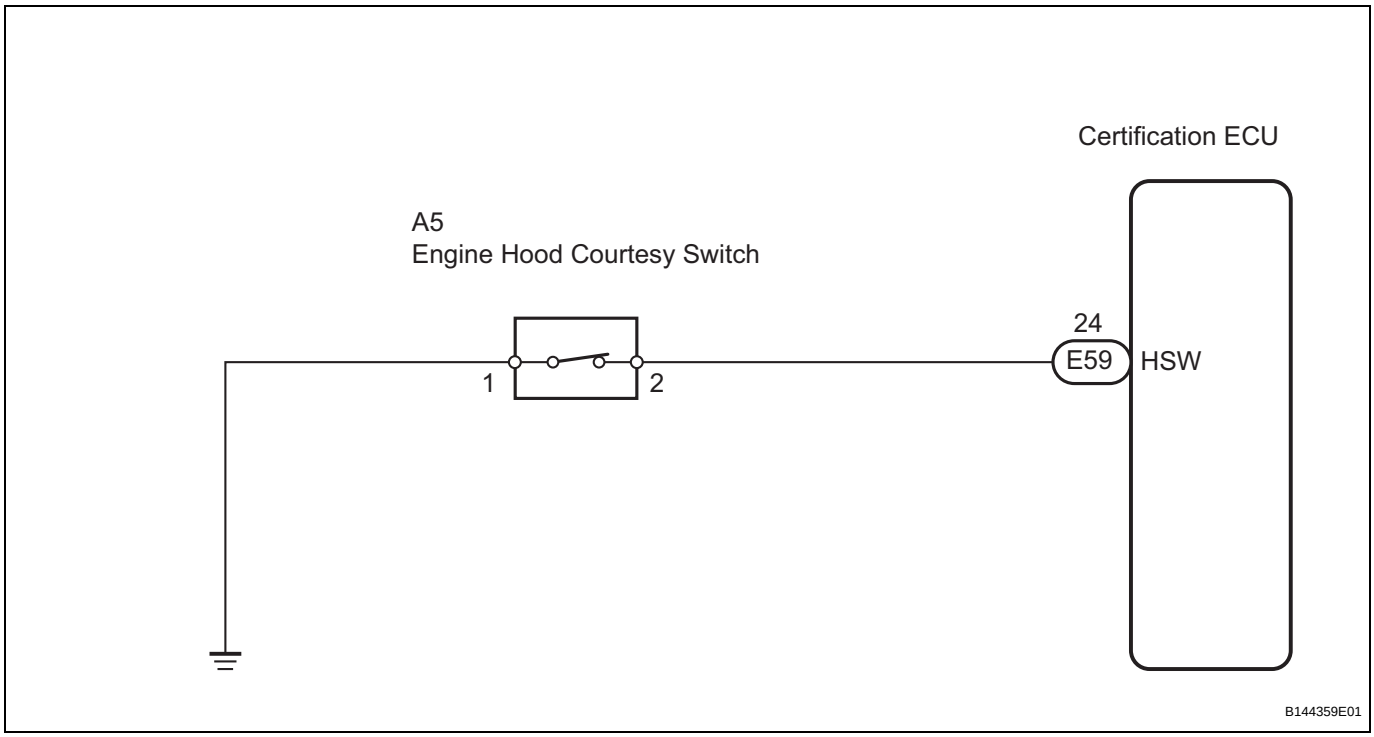
Item	Tester Detail	Diagnostic Note
SECURITY INDIC	Security indicator ON/OFF	-
SECURITY HORN	Security horn ON/OFF	-

Engine Hood Courtesy Switch Circuit

DESCRIPTION

The engine hood courtesy switch is installed together with the hood lock. This switch turns off when the engine hood is opened and turns on when the engine hood is closed.

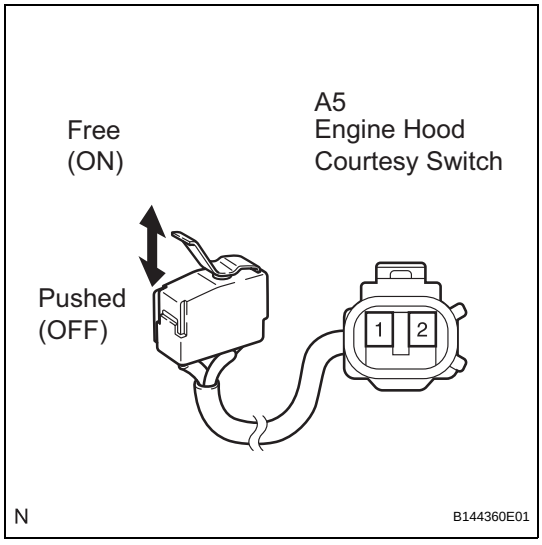
WIRING DIAGRAM



INSPECTION PROCEDURE

TD

1	INSPECT ENGINE HOOD COURTESY SWITCH



(a) Remove the courtesy switch from the hood lock.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
1 - 2	Free (ON)	Below 1 Ω
	Pushed (OFF)	10 kΩ or higher

Result

Result	Proceed to
NG (TMC made)	A
NG (TMMK made)	B
OK	C

A → **REPLACE HOOD LOCK ASSEMBLY**

B → **REPLACE ENGINE HOOD COURTESY SWITCH**

C

2 CHECK HARNESS AND CONNECTOR (ENGINE HOOD COURTESY SWITCH - BODY GROUND)

Wire Harness Side Connector Front View:

N B144361E01

(a) Disconnect the A5 switch connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
A5-1 - Body ground	Below 1 Ω

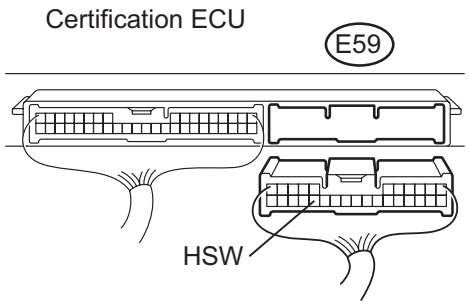
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

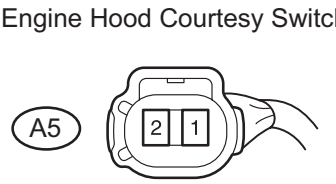
TD

3	CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ENGINE HOOD COURTESY SWITCH)

Connector Wire Harness View:



Wire Harness Side Connector Front View:



N

B144362E01

(a) Disconnect the E59 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

(Symbol) Tester Connection	Specified Condition
HSW (E59-24) - (A5-2)	Below 1 Ω
HSW (E59-24) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

TD

OK

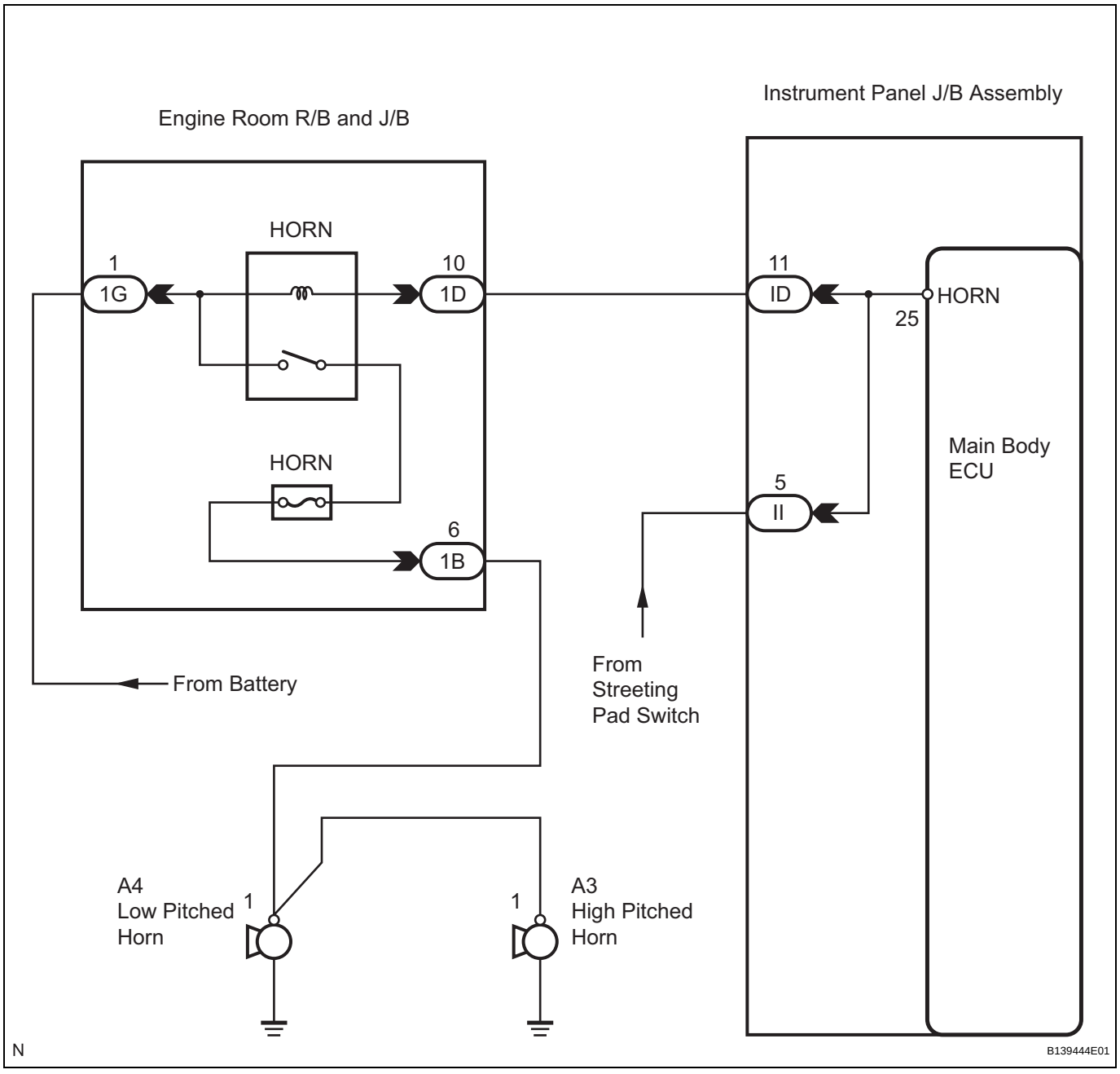
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Horn Circuit

DESCRIPTION

When the theft deterrent system is switched from the armed state to the alarm sounding state, the main body ECU transmits a signal to cause the horn to sound at intervals of 0.4 seconds.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT HORNS**

(a) Press the horn switch and check if the horns sound.

Result

Result	Go to
Horns sound	A
Horns do not sound	B

B → **GO TO HORN SYSTEM**

A

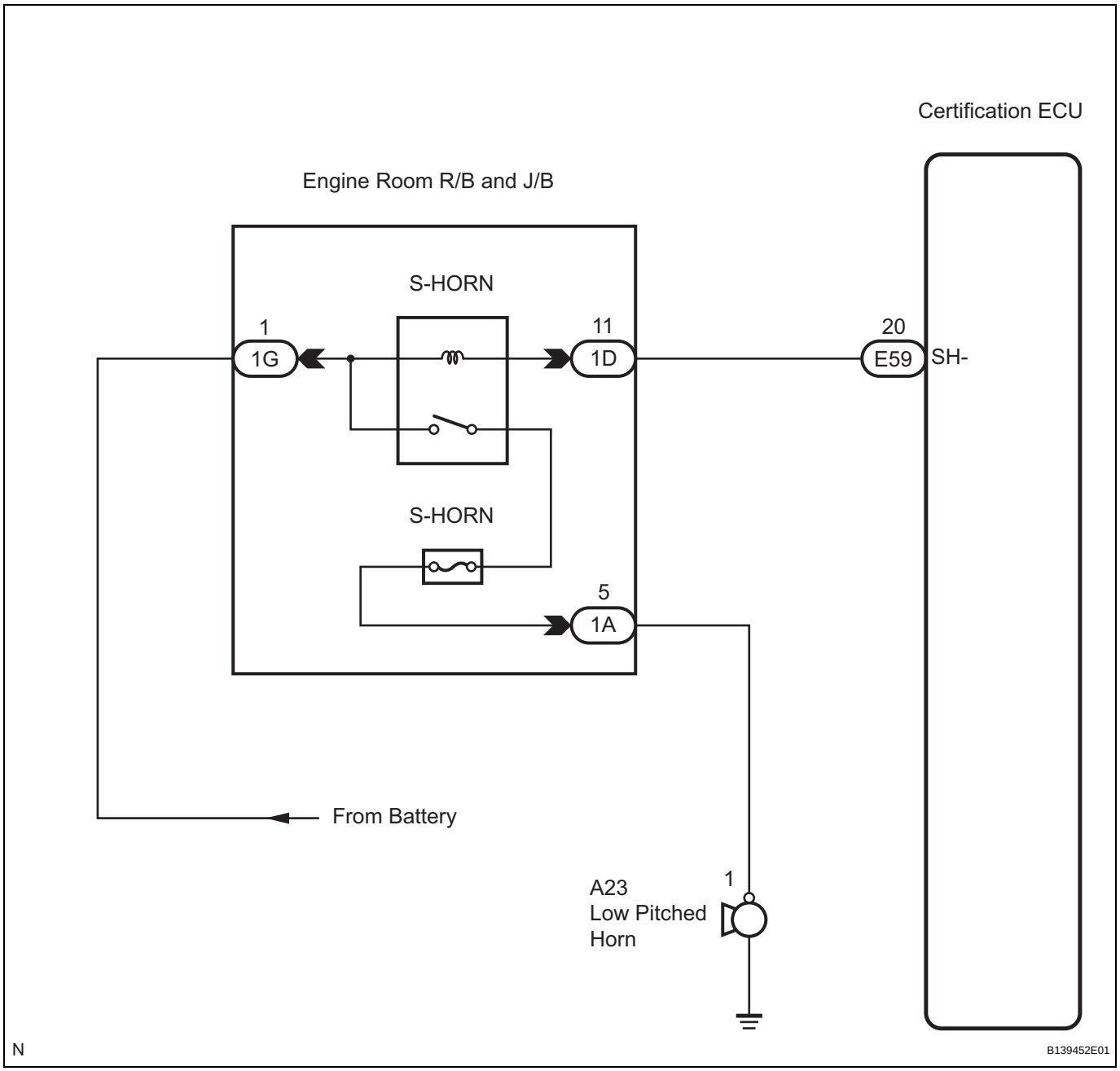
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Security Horn Circuit

DESCRIPTION

When the theft deterrent system is changed from the armed state to the alarm sounding state, the certification ECU can control the security horn.

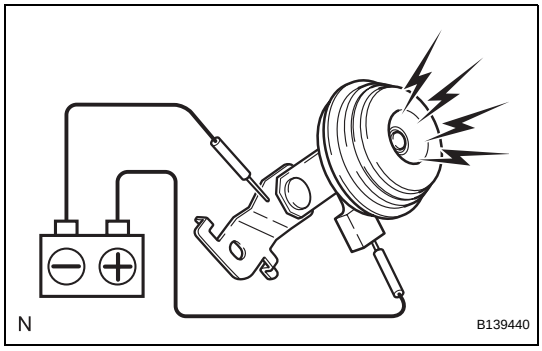
WIRING DIAGRAM



TD

INSPECTION PROCEDURE

1 **INSPECT SECURITY HORN ASSEMBLY**



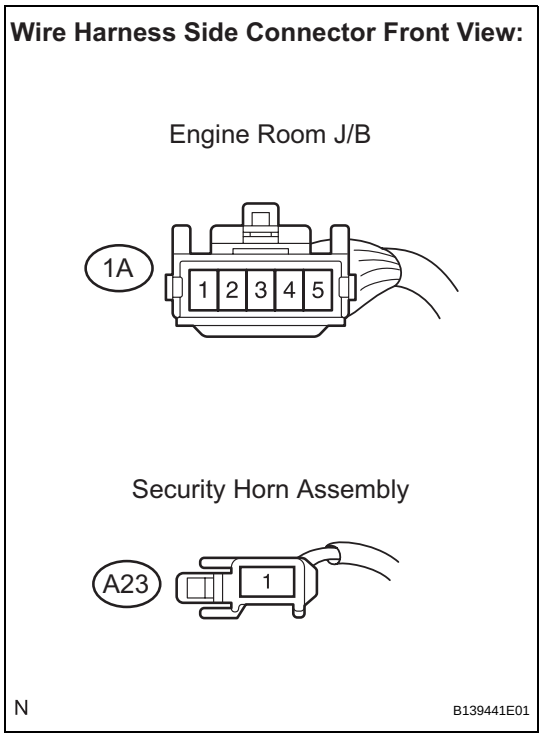
(a) Remove the security horn assembly.
(b) Check operation of the horn.
Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1	Horn sounds
Battery negative (-) → Horn body	

NG → **REPAIR OR REPLACE SECURITY HORN ASSEMBLY**

OK

2 **CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B - SECURITY HORN ASSEMBLY)**



(a) Disconnect the 1A J/B connector and the A23 horn connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Terminal Connection	Specified Condition
1A-5 - A23-1	Below 1 Ω
1A-5 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

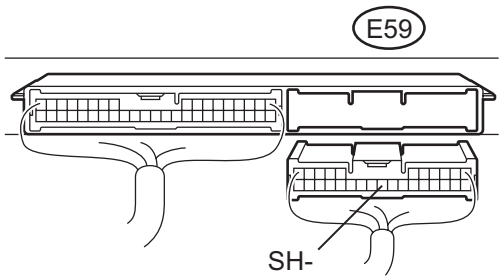
OK

TD

3 CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ENGINE ROOM J/B)

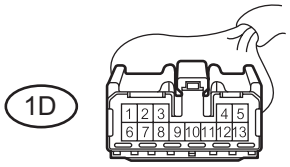
Connector Wire Harness View:

Certification ECU



Wire Harness Side Connector Front View:

Engine Room J/B



H B139453E01

(a) Disconnect the E59 ECU connector and 1D J/B connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

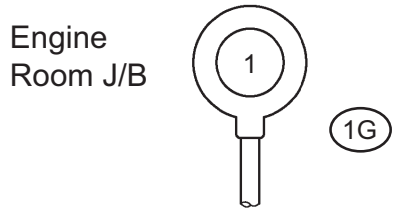
Symbol (Terminal Connection)	Specified Condition
SH- (E59-20) - (1D-11)	Below 1 Ω
SH- (E59-20) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4 CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B - BATTERY)

Wire Harness Side:



Y B074501E16

(a) Disconnect the 1G J/B connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal Connection	Specified Condition
1G-1 - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

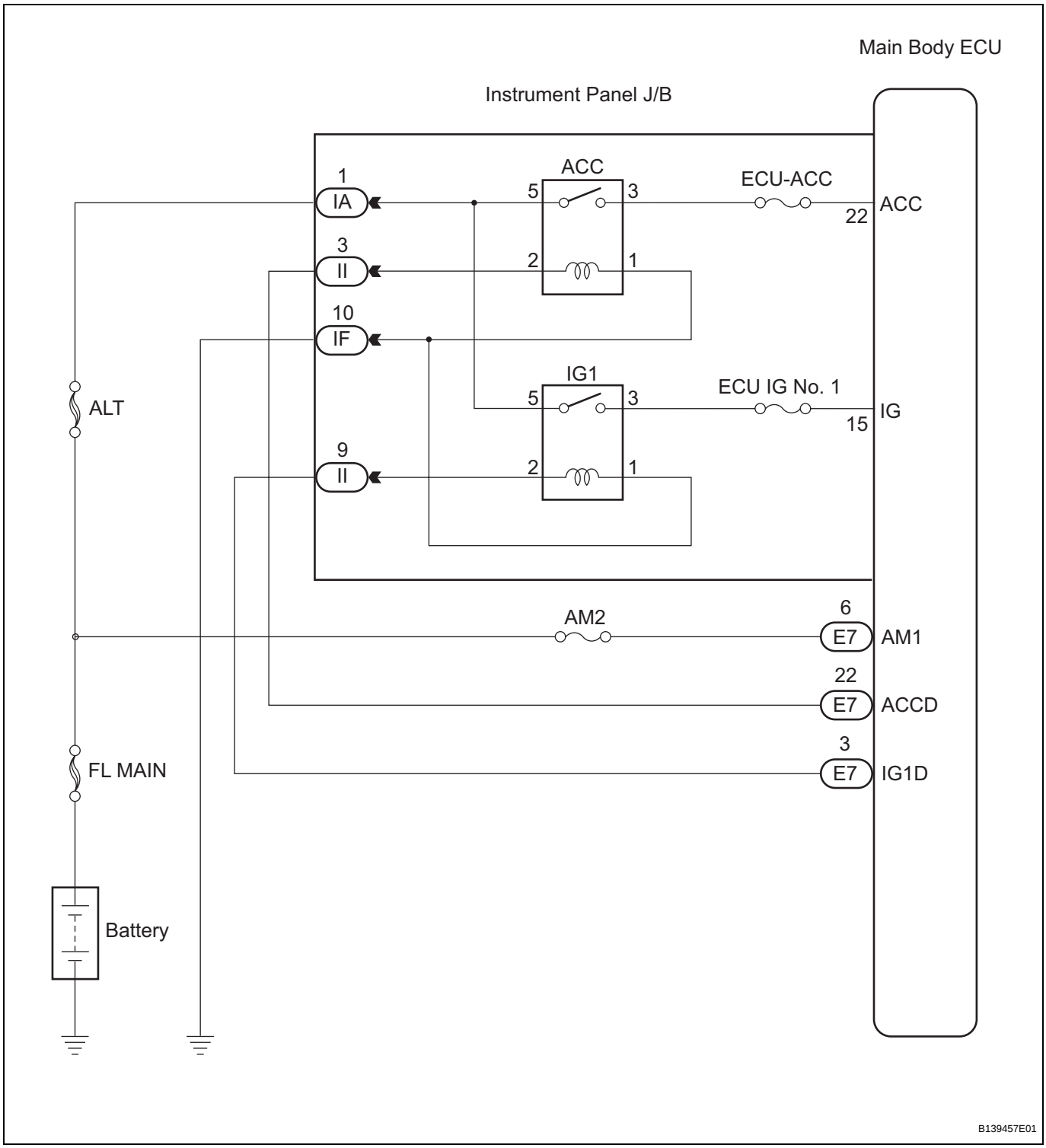
TD

Ignition Switch Circuit

DESCRIPTION

The main body ECU determines the ignition position (OFF, ACC, ON) based on signals from the IG or ACC circuit.

WIRING DIAGRAM



TD

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.
(b) Turn the ignition switch ON.
(c) Turn the intelligent tester main switch on.
(d) Select the item below in the DATA LIST and read the display on the intelligent tester.

MAIN BODY (Main Body ECU):

Item	Test Details	Diagnostic Note
IG SW	ignition switch ON signal ON/OFF	-
ACC SW	ignition switch ACC signal ON/OFF	-

OK:
When the ignition switch is operated, the display changes as shown in the table.

NG → **Go to step 2**

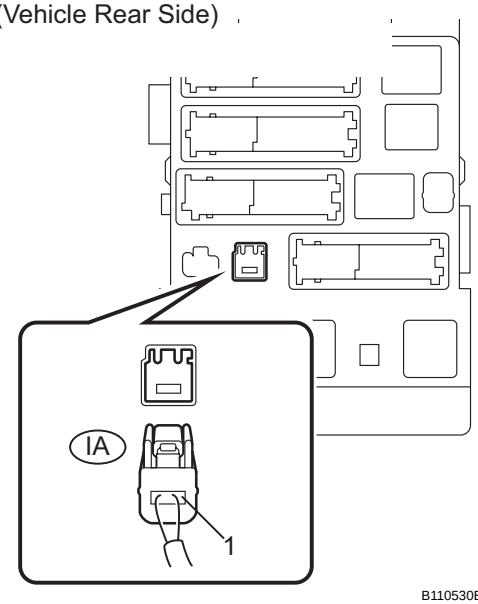
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2	CHECK HARNESS AND CONNECTOR (BATTERY - INSTRUMENT PANEL J/B)

Connector Wire Harness View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



(a) Disconnect the IA J/B connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
IA-1 - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

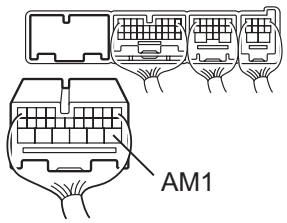
OK

TD

3	CHECK HARNESS AND CONNECTOR (BATTERY - MAIN BODY ECU)

Connector Wire Harness View:

E7
Main Body ECU



B139448E01

(a) Disconnect the E7 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbol (Tester Connection)	Specified Condition
AM1 (E7-6) - Body ground	10 to 14 V

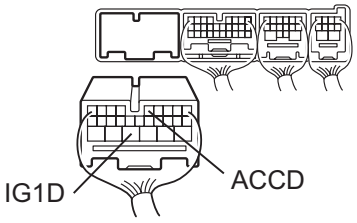
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

4	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - MAIN BODY ECU)

Connector Wire Harness View:

E7
Main Body ECU



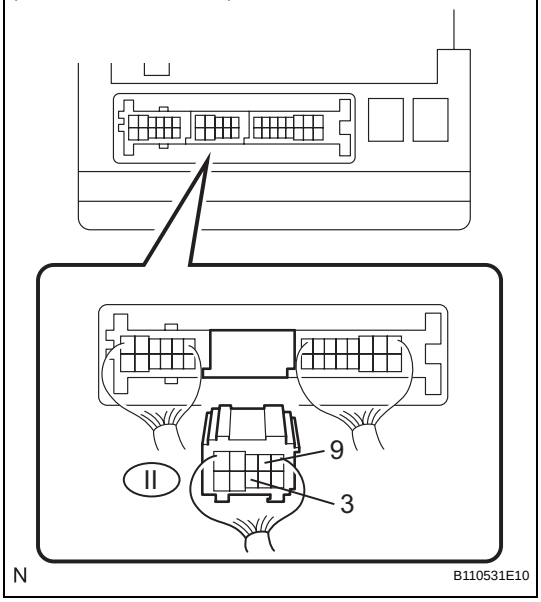
B139448E02

(a) Remain the E7 ECU connector still disconnected.

TD

Connector Wire Harness View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



(b) Disconnect the II J/B connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Specified Condition
(II-3) - ACCD (E7-22)	Below 1 Ω
(II-9) - IG1D (E7-3)	Below 1 Ω

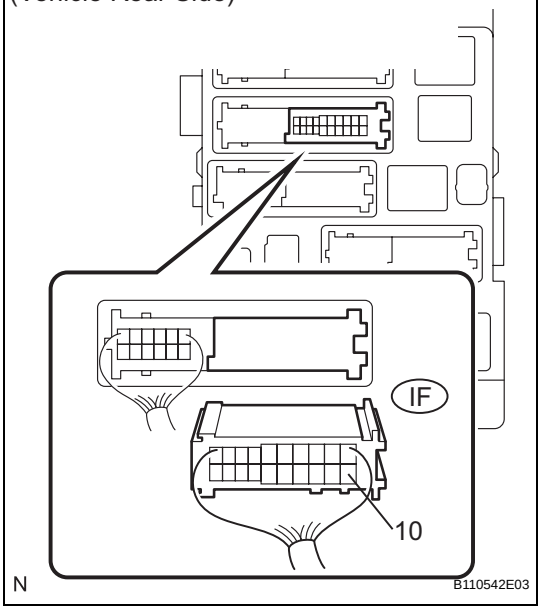
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5 CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - BODY GROUND)

Connector Wire Harness Side View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



(a) Disconnect the IF J/B connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
IF-10 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

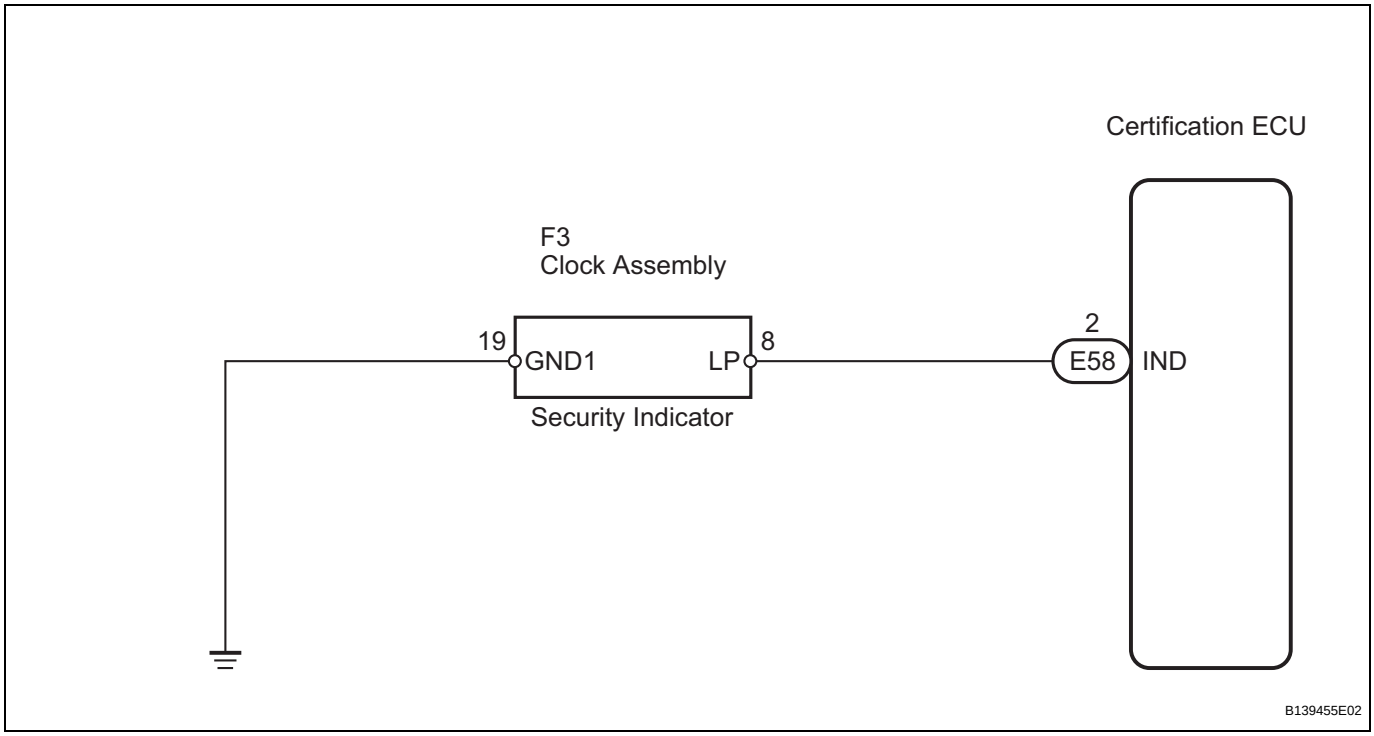
TD

Security Indicator Light Circuit

DESCRIPTION

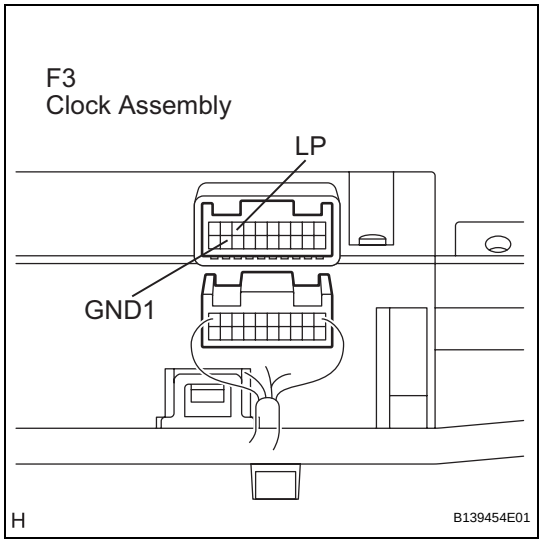
Even when the theft deterrent system is in the disarmed state, the security indicator blinks due to a signal output from the immobiliser system. The security indicator blinks continuously due to a continuous signal received from the immobiliser system while in the armed state.
The certification ECU causes the security indicator to light up or blink only during the arming preparation state and alarm sounding states.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT CLOCK ASSEMBLY



(a) Disconnect the F3 clock connector.
(b) Apply battery voltage between the terminals of the indicator, and check the lighting condition of the security indicator.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal F3-8 (LP) Battery negative (-) → Terminal F3-19 (GND1)	Lights up

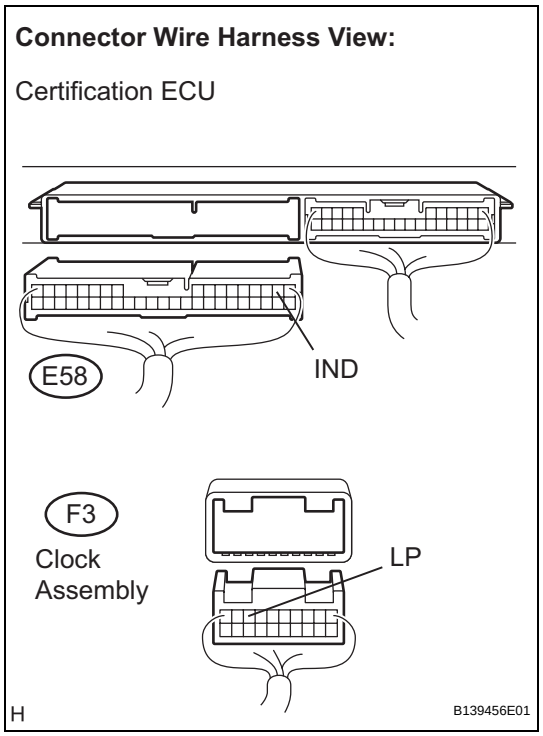
NOTICE:

- **If the positive (+) lead and the negative (-) lead are incorrectly connected, the security indicator will not light up.**
- **Voltage of more than 12 V will damage the security indicator.**
- **If the voltage is too low, the security indicator will not light up.**

NG → **REPLACE CLOCK ASSEMBLY**

OK

2 CHECK HARNESS AND CONNECTOR (CLOCK ASSEMBLY - CERTIFICATION ECU)



(a) Disconnect the E58 ECU connector.
(b) Disconnect the F3 clock connector.
(c) Measure the resistance according to the value(s) table below.

Standard resistance

Symbol (Tester Connection)	Specified Condition
IND (E58-2) - LP (F3-8)	Below 1 Ω
IND (E58-2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

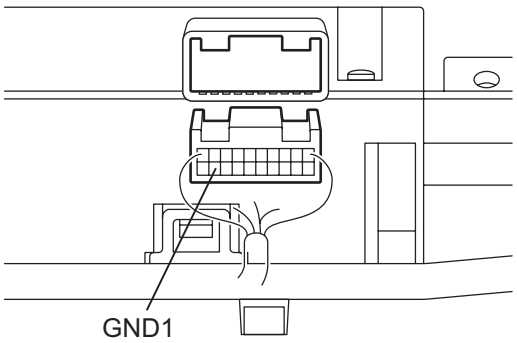
OK

TD

3	CHECK HARNESS AND CONNECTOR (CLOCK ASSEMBLY - BODY GROUND)

Connector Wire Harness View:

F3
Clock Assembly



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Specified Condition
GND1 (F3-19) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

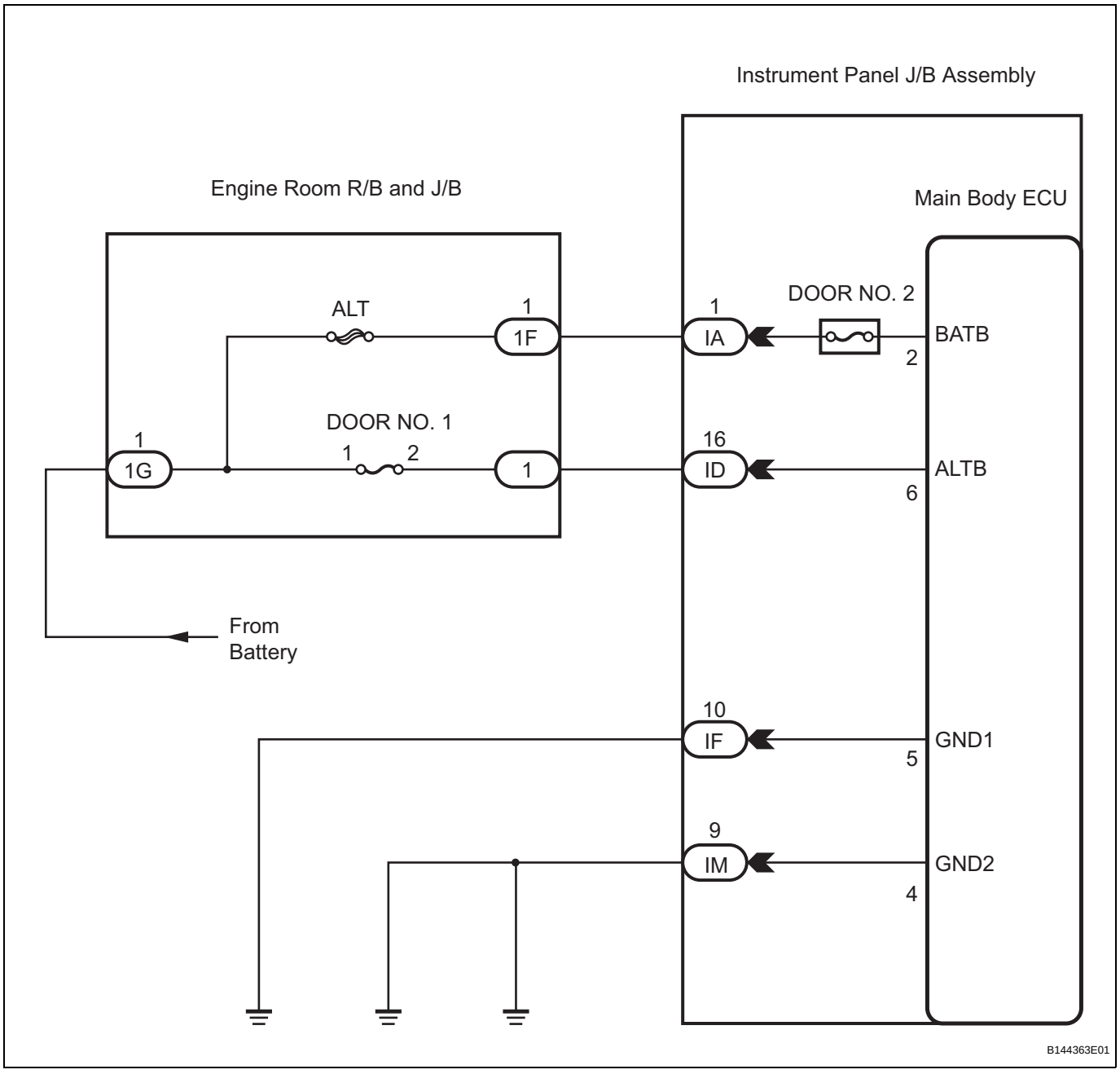
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

ECU Power Source Circuit

DESCRIPTION

This circuit provides power for main body ECU operation.

WIRING DIAGRAM



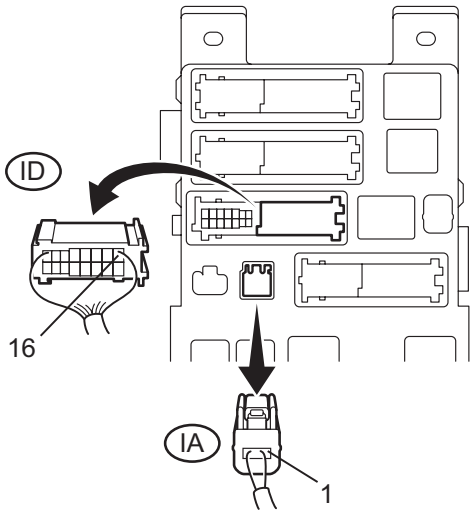
TD

INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY (MAIN BODY ECU) (POWER SOURCE)

Connector Wire Harness Side:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



(a) Disconnect the ID and IA J/B connectors.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
ID-16 - Body ground	10 to 14 V
IA-1 - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

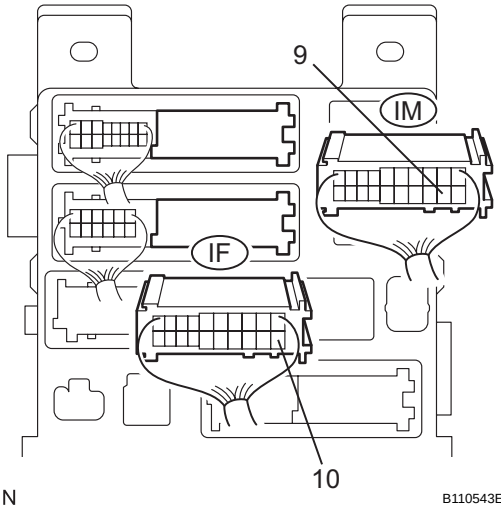
OK

TD

2	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - BODY GROUND)

Connector Wire Harness View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



(a) Disconnect the IF and IM J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Specified Condition
IF-10 - Body ground	Below 1 Ω
IM-9 - Body ground	

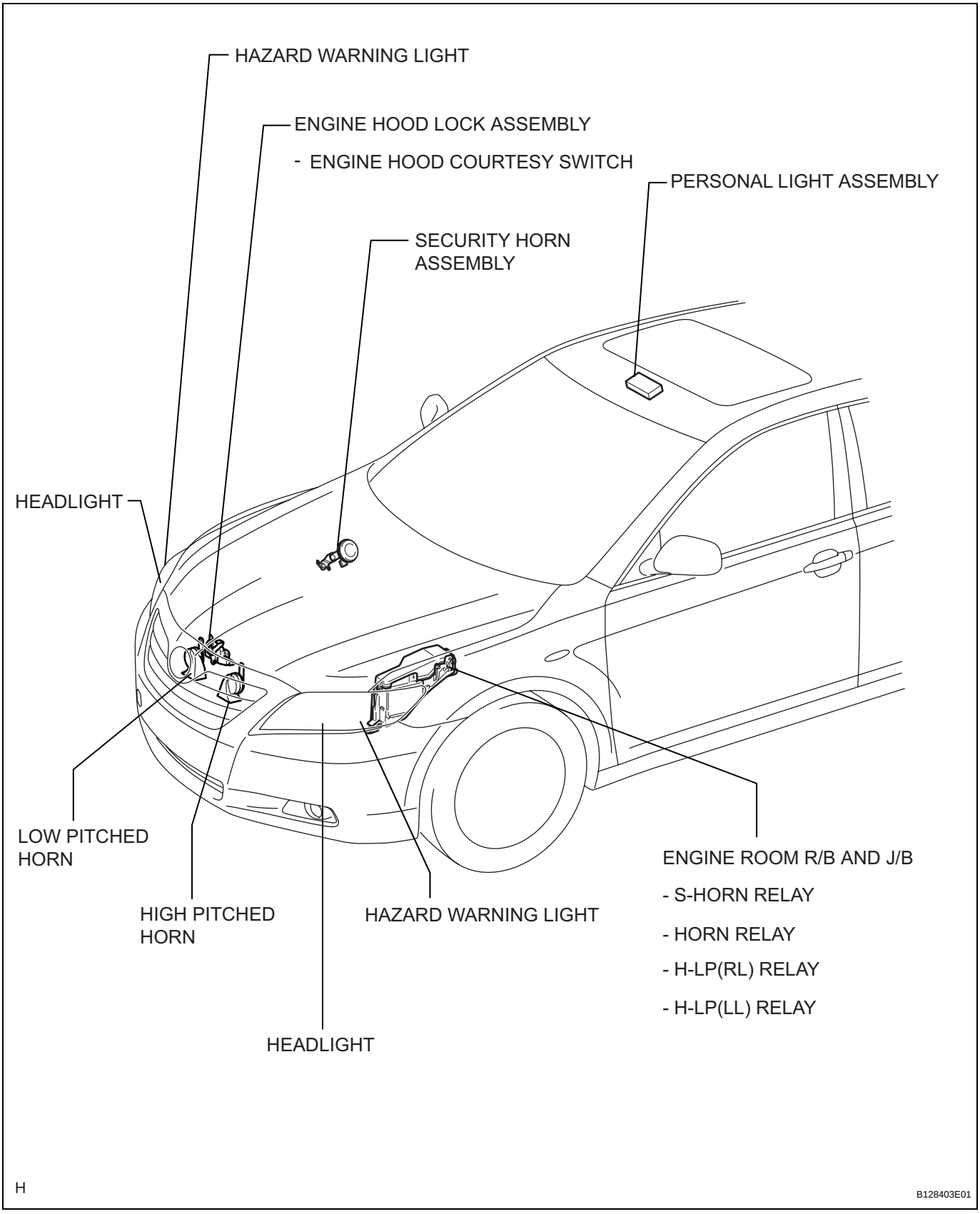
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

THEFT DETERRENT SYSTEM (w/o Smart Key System)

PARTS LOCATION



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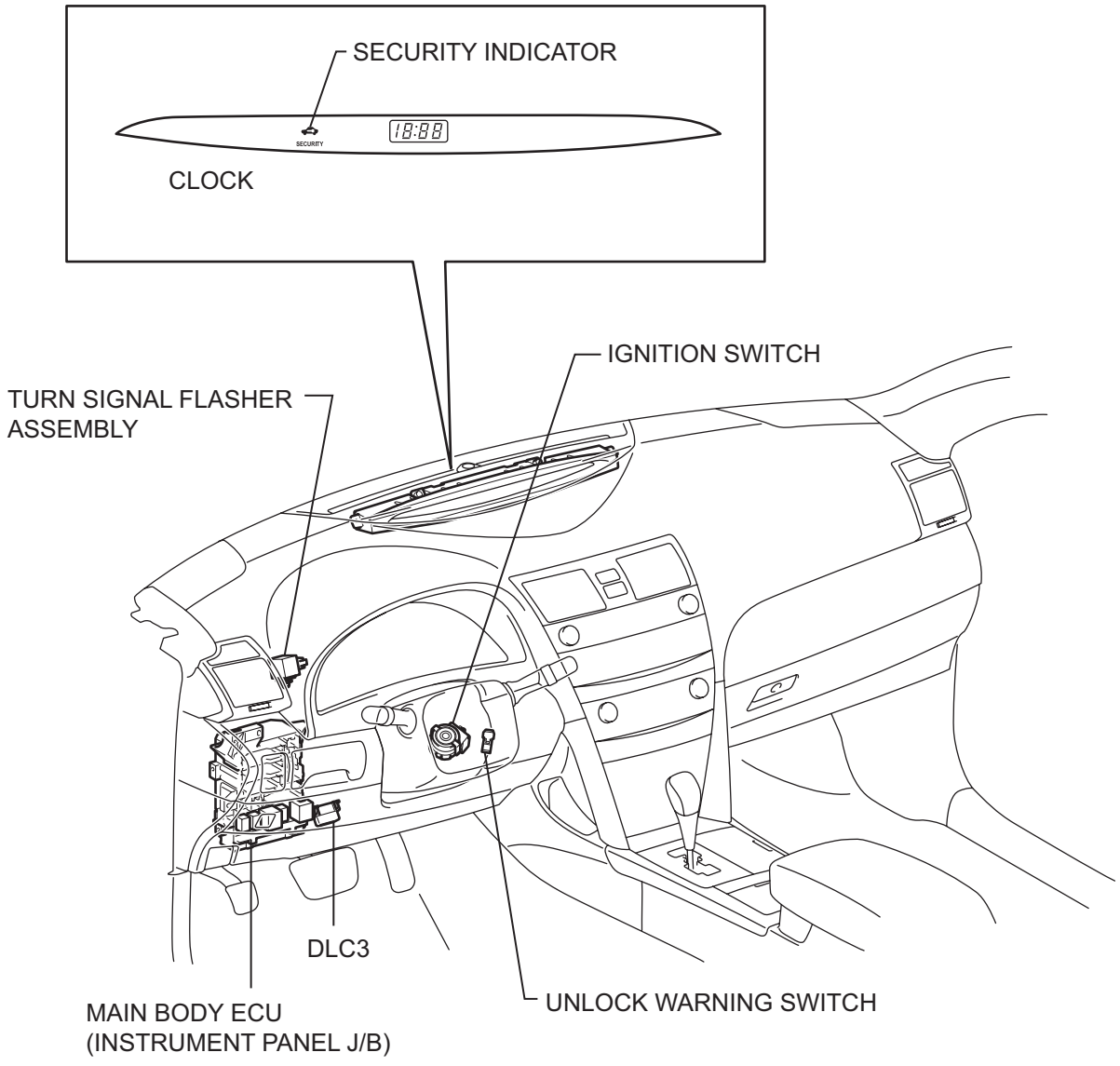
SECURITY INDICATOR
SECURITY
18:88
CLOCK
IGNITION SWITCH
TURN SIGNAL FLASHER ASSEMBLY
DLC3
MAIN BODY ECU (INSTRUMENT PANEL J/B)
UNLOCK WARNING SWITCH
- TAIL RELAY
H
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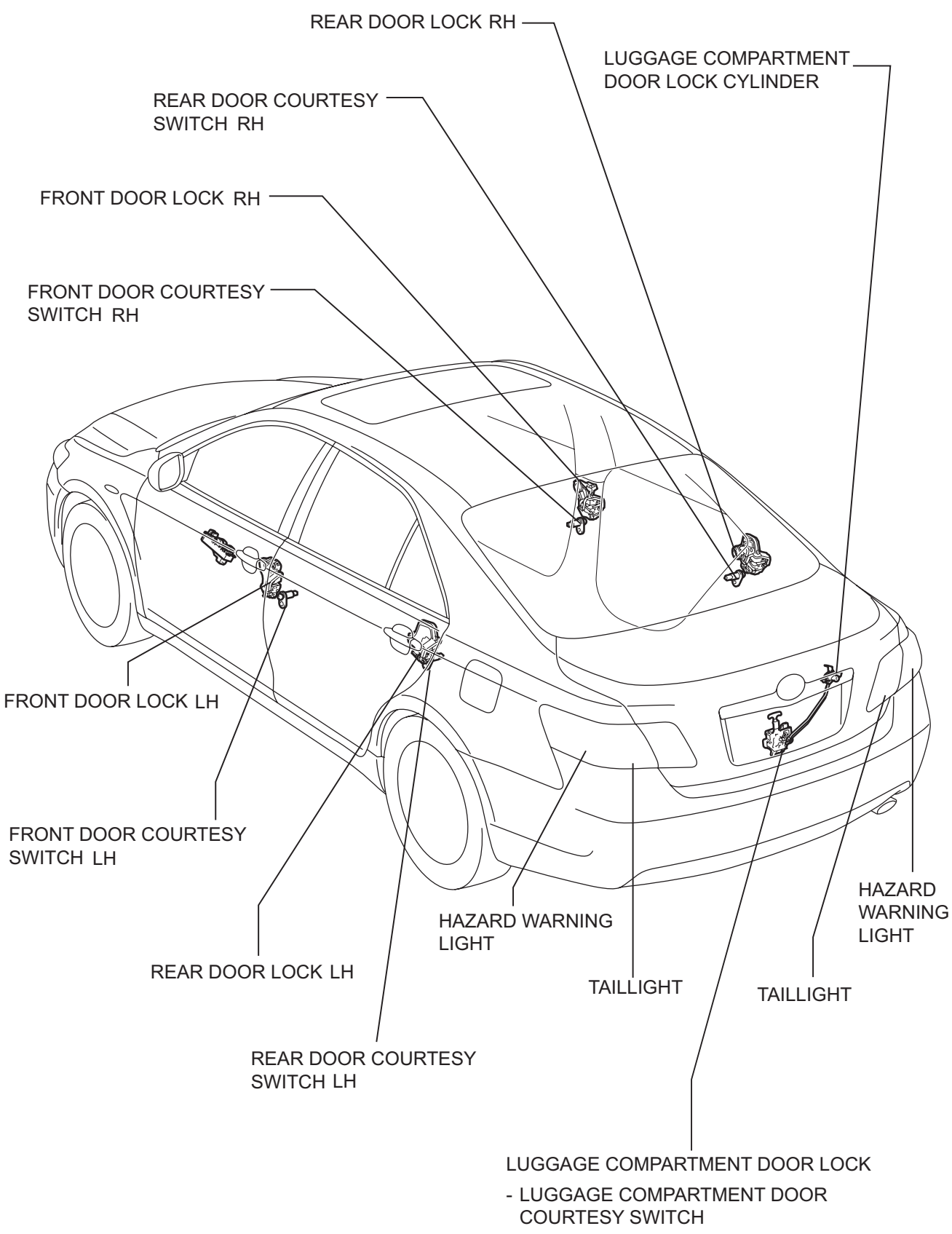

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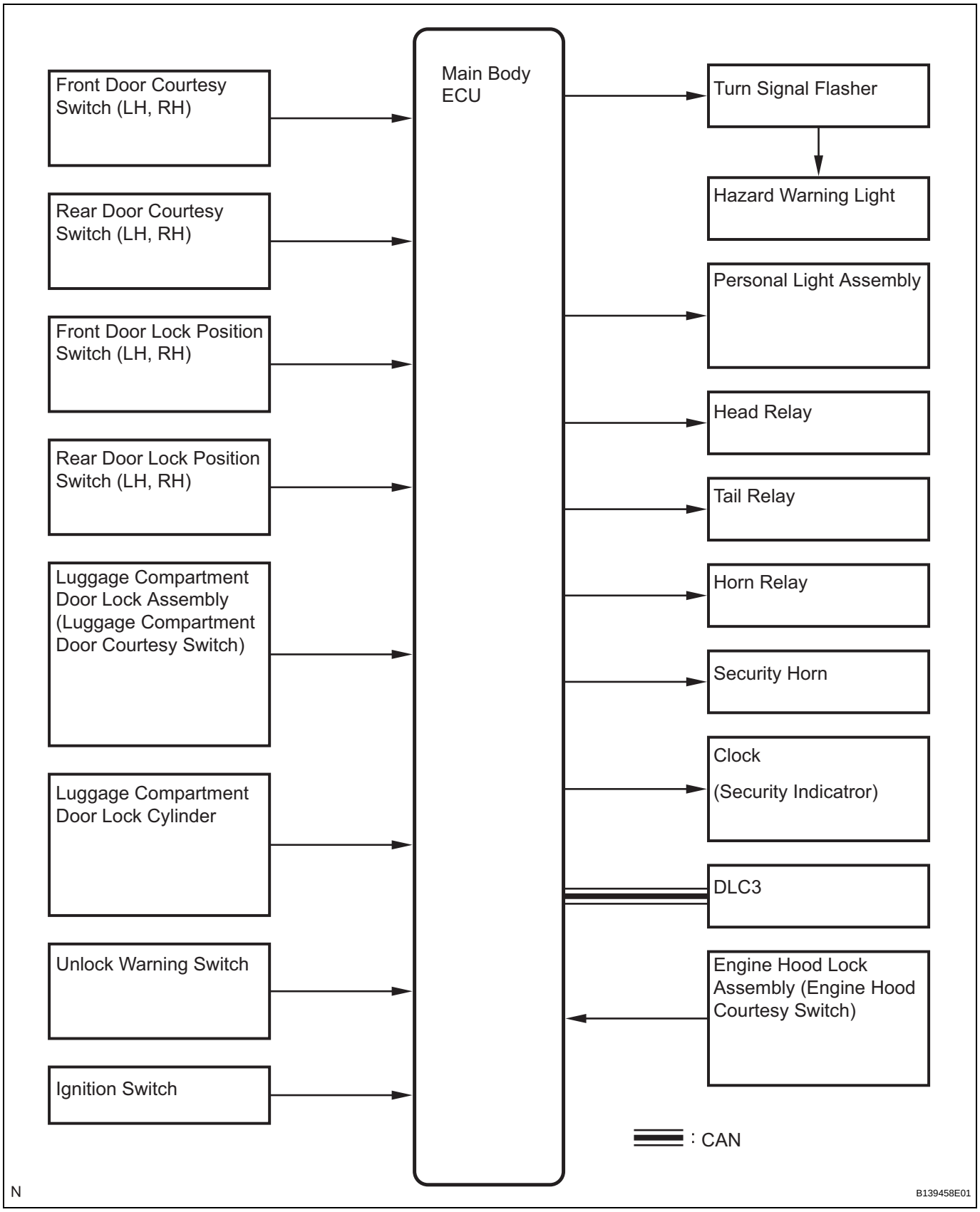
SYSTEM DIAGRAM



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SYSTEM DESCRIPTION

1. OUTLINE OF THEFT DETERRENT SYSTEM

- The theft deterrent system will operate when somebody attempts to forcibly enter the vehicle, unlock any door or luggage compartment door or open the engine hood or the luggage compartment door without using the key.
  This system causes the lights to light up or blink and the horns to sound in order to deter break-in and theft.
- The theft deterrent system has 2 modes; one is the active arming mode (see ACTIVE ARMING MODE) and the other is passive arming mode (see PASSIVE ARMING MODE). The passive arming mode can be switched ON/OFF using the specified method.
- Each mode has 4 states; a disarmed state, an arming preparation state, an armed state and an alarm sounding state.

(a) Disarmed state:
- The alarm function is not operating.
- The theft deterrent system is not operating.

(b) Arming preparation state:
- The time until the system goes into the armed state.
- The theft deterrent system is not operating.

(c) Armed state:
- The theft deterrent system is operating.

(d) Alarm sounding state:
- Alarm function is operating.

Alarm time:
Approx. 60 sec.

Refer to table below for alarm method and time:

TD

Alarm Method	Headlight	Blinking
	Taillight	Blinking
	Hazard Warning Light	Blinking
	Interior Light	Illuminating
	Vehicle Horn	Sounding (approx. 0.4 second cycles)
	Security Horn	Sounding (approx. 0.4 second cycles)
Alarm Time	Approx. 60 sec.	

HINT:
If any of the doors are unlocked when the key is not in the key cylinder during the armed state, a forced door lock signal will be output (see FORCED DOOR LOCK CONTROL).

2. FUNCTION OF MAIN COMPONENT

Component	Function
Security indicator	Informs driver of theft deterrent system status.
Security horn	Sounds when attempted brake-in or theft is detected.
Headlights	Blink when attempted break-in or theft is detected.
Taillights	Blink when attempted break-in or theft is detected.
Hazard warning lights	Blinking when attempted break-in or theft is detected.

Component	Function
Interior light	Lights up when attempted break-in or theft is detected.
Vehicle horns	Sounds when attempted break-in or theft is detected.
Door courtesy light switch	Detects door status (open or closed).
Door lock position switch	Detects door status (locked or unlocked).
Engine hood courtesy switch	Detects engine hood status (open or closed).
Luggage compartment door courtesy switch	Detects luggage compartment door status (open or closed).
Luggage compartment door lock cylinder	Detects luggage compartment door status (locked or unlocked).

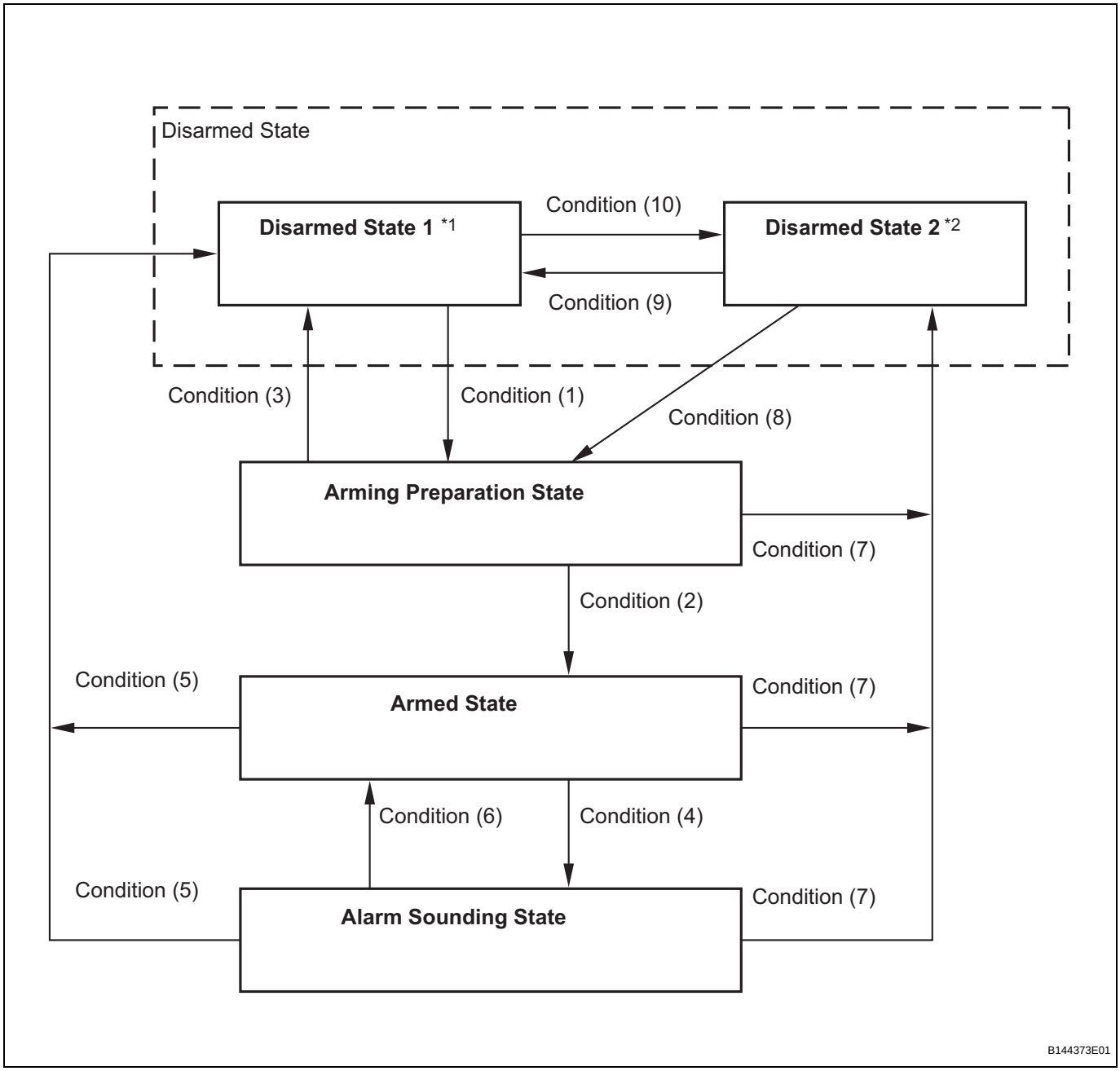
3. ACTIVE ARMING MODE

HINT:

Active arming mode starts the alarm control immediately after the doors are locked.

(a) Active arming mode:

This system activates as described in the diagram below when one of items for each condition is met.



TD

HINT:

- *1: Disarmed state 1 is the normal disarmed state.
- *2: Disarmed state 2 is set from either the disarmed state 1 or the arming preparation state.

Condition	Item
Condition (1)	In the disarmed state 1, when the key is not in the key cylinder, the system state is switched if one of the following conditions is met. 1. With all doors, engine hood and luggage compartment door closed, lock all doors by key operation. 2. With all doors, engine hood and luggage compartment door closed, lock all doors by wireless operation. 3. With engine hood and luggage compartment door closed, close and lock the open door without using key.
Condition (2)	After condition (1) is met, allow approx. 30 seconds to elapse.
Condition (3)	1. Unlock any door. 2. Open any door, engine hood, and luggage compartment door. 3. Insert key into ignition key cylinder. 4. Turn the ignition switch ON or ACC. 5. Reconnect battery.
Condition (4)	1. Open engine hood. 2. Open luggage compartment door. 3. Reconnect battery. 4. Open any door. 5. Unlock any door when all doors are locked. 6. Turn the ignition switch ON without using key.
Condition (5)	1. Unlock only driver's door or all doors by wireless operation. 2. Unlock only driver's door or all doors by key operation. 3. Turn the ignition switch ON and run the engine for more than 2 seconds.
Condition (6)	After approx. 60 seconds, alarm stops and system returns to armed state.
Condition (7)	1. Open the luggage compartment door by wireless operation. 2. Unlock the luggage compartment door by key operation.
Condition (8)	1. Close the engine hood when the luggage compartment door is closed. 2. Close the luggage compartment door when the engine hood is closed.
Condition (9)	1. Unlock any door. 2. Open any door. 3. Insert key into ignition key cylinder. 4. Turn the ignition switch ON or ACC. 5. Reconnect the battery.
Condition (10)	In the disarmed state 1, when the key is not in the key cylinder, the system state is switched if one of the following conditions is met. 1. With all doors closed, and the engine hood or luggage compartment door is opened, lock all doors by wireless operation. 2. With all doors closed, and the engine hood or luggage compartment door is opened, lock all doors by key operation. 3. With the engine hood or luggage compartment door is opened and all doors locked with any door still opened, close the open door.

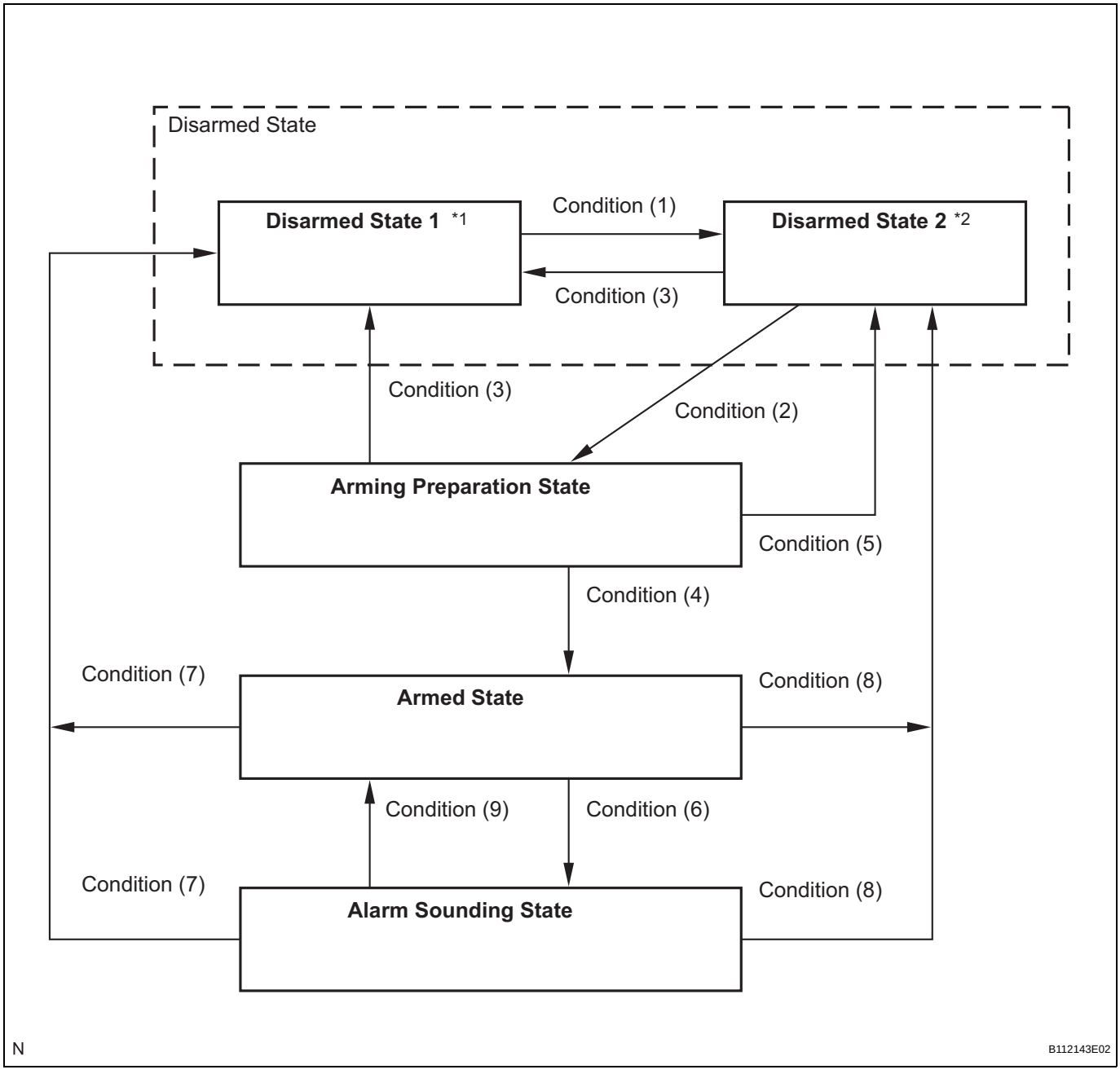
4. PASSIVE ARMING MODE

HINT:

- Passive arming mode starts the alarm control after the key is out of the actuation area and doors are closed.
- Passive arming mode can be switched ON/OFF by the specified method.
- The alarm is initially set (when shipped from factory) to active arming mode (not passive arming mode).
- During passive arming mode, the theft deterrent system goes into the armed state even if the doors are not locked.

- Detecting that the doors are unlocked does not set off the alarm during passive arming mode.
- A forced door lock signal is not output during passive arming mode (see FORCED DOOR LOCK CONTROL).
- Although the theft deterrent system detects that the doors are opened during passive arming mode, the alarm will not go off immediately because an entry delay time is set.
- If the condition (1) of active arming mode is met during passive arming mode, the theft deterrent system will switch to active arming mode.

(a) Passive arming mode:
This system activates as described in the diagram below when one of items for each condition is met.



TD

HINT:
- *1: Disarmed state 1 is the normal disarmed state.
- *2: Disarmed state 2 is set from either the disarmed state 1 or the arming preparation state.

Condition	Item
Condition (1)	1. With ignition switch OFF, open any door and pull the key out of the ignition key cylinder. 2. With ignition switch OFF, pull the key out of the ignition key cylinder and open any door.
Condition (2)	All doors, engine hood and luggage compartment door are closed.
Condition (3)	1. Unlock only driver's door or all doors by wireless operation. 2. Unlock only driver's door or all doors by key operation. 3. Reconnect battery. 4. Insert key into ignition key cylinder. 5. Turn the ignition switch ON or ACC.
Condition (4)	After condition (1) is met, allow approx. 30 seconds to elapse.
Condition (5)	1. Open any door. 2. Open engine hood. 3. Open luggage compartment door. 4. Unlock luggage compartment door.
Condition (6)	1. Open any door and allow entry delay time*1 to elapse. 2. Open engine hood. 3. Open luggage compartment door. 4. Reconnect battery. 5. Turn the ignition switch ON without using key.
Condition (7)	1. Unlock only driver's door or all doors by wireless operation. 2. Unlock only driver's door or all doors by key operation. 3. Turn the ignition switch ON and run the engine more than 2 seconds. 4. Turn the ignition switch ON with key operation.
Condition (8)	1. Open luggage compartment door by wireless operation. 2. Unlock luggage compartment door by key operation.
Condition (9)	After approx. 60 sec., alarm stops and system returns to armed state.

HINT:
*1: When any door is opened while all the doors are closed during passive arming mode, the entry delay time starts. If the switch condition (armed state → disarmed state 1 or 2) is met during the entry delay time, the theft deterrent system will return to disarmed state 1 or 2. However, if the switch condition for disarmed state 1 or 2 is not met, the theft deterrent system will recognize it as a theft and set off the alarm. Entry delay time of 0, 14 or 30 sec. can be selected by the customizing function.

5. FORCED DOOR LOCK CONTROL

(a) The forced door lock control prevents the vehicle from being tampered with. Immediately after a door is unlocked (alarm starts), the door is forced to lock by a forced door lock signal.

(1) Conditions that force the doors to lock:
When the key is not in the key cylinder and both of the following conditions are met.
- The theft deterrent system is in the alarm sounding state of active arming mode.
- Any door is unlocked.

6. ALARM MEMORY FUNCTION

(a) If the alarm is set off (tampering is detected) while the theft deterrent system is armed, it will be recorded by the alarm memory function. Whenever the theft deterrent system is cancelled, the alarm memory function causes the taillights to light up for 2 seconds in order to inform you that the alarm has been set off.

(1) Conditions of the alarm memory function that cause the taillights to light up:
When the theft deterrent system has entered into the alarm sounding state (tampering has been detected) even once, the taillights will light up for 2 seconds if any of the following conditions is met.
- Switched to the disarmed state from the armed state during active arming mode.
- Switched to the disarmed state 1 from the armed state during passive arming mode.

HINT:
Active arming mode: See ACTIVE ARMING MODE.
Passive arming mode: See PASSIVE ARMING MODE.

7. PANIC ALARM CONTROL

(a) The panic alarm control makes it possible to voluntarily set off the panic alarm by pressing the PANIC switch on the wireless transmitter.

(1) Conditions that cause the panic alarm control to set off the panic alarm:
The panic alarm control sets off the panic alarm by pressing the PANIC switch on the wireless transmitter under the following conditions:
- The ignition switch is OFF.
- The theft deterrent system is not in the alarm sounding state. (This condition is common both to active arming mode and to passive arming mode.)

(2) Conditions that cause the panic alarm control to shut off the alarm:
The panic alarm control shuts off the panic alarm when any of the following conditions is met during panic alarm operation:
- The ignition switch is ON.
- The panic alarm switch is turned on again.
- Any of the switches on the wireless transmitter (LOCK/UNLOCK or LUGGAGE OPEN) is pressed.
- The panic alarm ends (approx. 60 sec. have passed).

- The theft deterrent system switches to the alarm sounding state. Under this condition, the theft deterrent system is controlling the alarm rather than the panic alarm control. In order to cancel this alarm, refer to the theft deterrent system alarm sounding state cancellation procedure. (This condition is common both to active arming mode to passive arming mode.)

HINT:
Active arming mode: See ACTIVE ARMING MODE.
Passive arming mode: See PASSIVE ARMING MODE.

8. SECURITY INDICATOR OUTPUT

(a) The main body ECU outputs a signal to light up the security indicator, according to the state of the theft deterrent system. However, some of the actual lighting conditions of the security indicator are different from the output signals of the main body ECU.

Output:

State of Theft Deterrent System*	Security Indicator	
	Output Signals from Main Body ECU	Actual Lighting Condition
Disarmed state 1, 2	OFF	OFF (Immobiliser system unset) BLINKING (Immobiliser system set)
Arming preparation state	ON	ON
Armed state	OFF	BLINKING
Alarm sounding state	ON	ON

Blinking cycle:

Time	Security Indicator
0.2 sec.	ON
1.8 sec.	OFF

HINT:

- *: The above condition is common both to active arming mode and to passive arming mode.
- When the immobiliser system is set, the security indicator blinks during both the disarmed state and the armed state, due to the output signals from the immobiliser system.

TD

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the theft deterrent system.
- The intelligent tester should be used in step 3.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Interview the customer to confirm the trouble (See page IN-45).

NEXT

3	INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM

(a) Use the intelligent tester to check for normal function of the multiplex communication system.
  (1) (ECU unconnected, communication line malfunctioning) If no code is output, proceed to A.
  (2) (ECU unconnected, communication line malfunctioning) If any code is output, proceed to B.

B → Go To CAN COMMUNICATION SECTION

A

4	SYMPTOM SIMULATION

NEXT

5	PROBLEM SYMPTOMS TABLE

(a) If the fault is not listed in the problem symptoms table, proceed to A.
(b) If the fault is listed in the problem symptoms table, proceed to B.

B → Go to step 7

A

6	PERFORM TROUBLESHOOTING ACCORDING TO MALFUNCTION SYMPTOM

(a) System description (See page TD-44)

(b) Terminals of ECU (See page TD-55)

7	ADJUST, REPAIR OR REPLACE

NEXT

8	CONFIRMATION TEST

NEXT

END

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.
NOTICE:

- **After confirming whether the items requested by the customer are applicable or not for customization, perform customizing operations.**
- **Be sure to record the current settings before customization.**
- **When troubleshooting, make sure that the item in question is not set to "OFF" as a result of customization (Example: For the system, "the wireless function does not operate", first check that the wireless function is not set to "OFF", then perform troubleshooting).**

THEFT DETERRENT SYSTEM

DISPLAY (ITEM)	DEFAULT	CONTENTS	SETTING
PASSIVE MODE (Passive Arming Mode)	OFF	PASSIVE MODE is a function that switches theft deterrent system from arming preparation state to armed state 30 seconds after key is not in the key cylinder and all doors, engine hood and luggage compartment door are closed, even if doors are not locked by wireless or door key lock operation In PASSIVE MODE, if you do not perform following operations within 14 seconds after door is opened during armed state, theft deterrent system will judge that condition as a theft and switch to alarm sounding state – Unlock any door by key or wireless operation – Turn the ignition switch ON – Open luggage compartment door by key or wireless operation	ON/OFF
WARN BY HORN (Warning by horn)	ON	Function that makes vehicle horn and theft deterrent horn be able to be used as a warning device	ON/OFF
ENTRY DELAY (Entry delay time)	14 s	Function that changes entry delay time (time before warning starts) for PASSIVE MODE	0 s/14 s/30 s

PROBLEM SYMPTOMS TABLE

HINT:

- Troubleshooting of the theft deterrent system is based on the premise that the door lock control system and the wireless door lock control system are operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system and the wireless door lock control system are operating normally.
- The following is the troubleshooting procedure for the theft deterrent system of a vehicle without the smart key system.
- Inspect the fuse and relay before investigating the suspected areas shown in the table below.

Theft deterrent system:

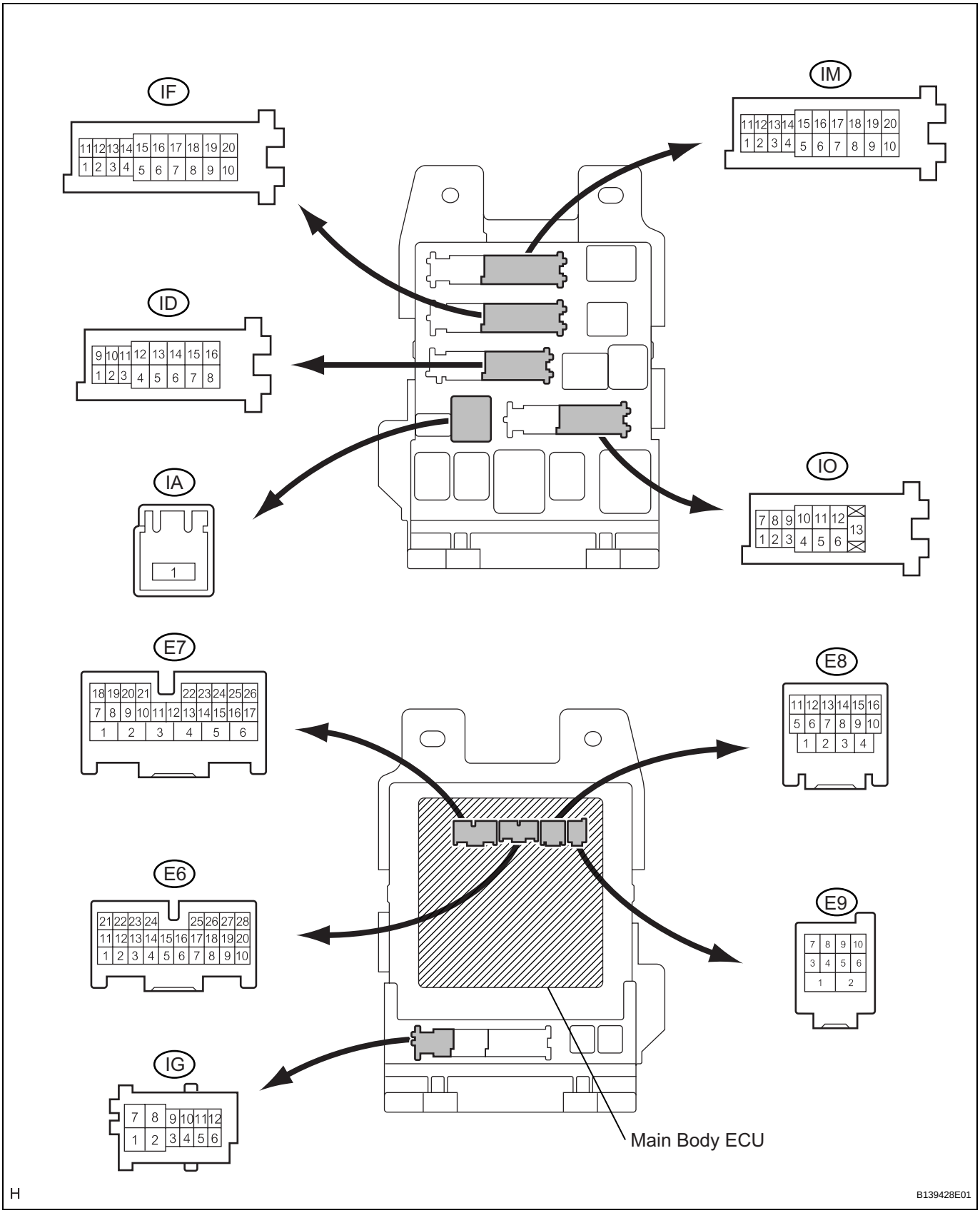
Symptom	Suspected area	See page
Theft deterrent system cannot be set	1. Security indicator light circuit	TD-72
	2. ECU power source circuit	TD-75
	3. Unlock warning switch circuit	DL-205
	4. Door key lock / unlock switch	DL-53
	5. Door courtesy switch circuit	LI-52
	6. Luggage compartment door courtesy switch circuit	DL-44
	7. Engine hood courtesy switch circuit	TD-60
	8. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Security indicator does not blink when theft deterrent system is set	1. Security indicator light circuit	TD-72
	2. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU RH (Instrument Panel J/B)	-
Alarm sounding state cannot be canceled when ignition switch turned ON	1. Ignition switch circuit	TD-68
	2. Unlock warning switch circuit	DL-205
	3. If the symptom(s) still occur after the above areas are inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Theft deterrent system can be set even when a door is open	1. Door courtesy switch circuit	LI-52
	2. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Vehicle horns (low pitched, high pitched) do not sound while theft deterrent system is in warning operation	1. Horn circuit	TD-62
	2. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Hazard warning lights do not flash while theft deterrent system is in warning operation	1. Wire harness	-
	2. Turn signal flasher	LI-138
	3. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Interior light does not light up while theft deterrent system is in warning operation	1. Interior light circuit	LI-57
	2. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Security horn does not sound while theft deterrent system is in warning operation	1. Security horn circuit	TD-64
	2. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

Symptom	Suspected area	See page
Hazard warning lights flash even when theft deterrent system is not set	1. Wire harness	-
	2. Turn signal flasher	LI-138
	3. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-
Interior light comes on even when theft deterrent system is not set	1. Interior light circuit	LI-57
	2. If the symptom(s) still occur after the above area is inspected and proved to be normal, replace the main body ECU (Instrument panel J/B)	-

TERMINALS OF ECU

1. CHECK MAIN BODY ECU (INSTRUMENT PANEL J/B)

(a) Disconnect the main body ECU (instrument panel J/B) connectors.



TD

(b) Measure the resistance and voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RCTY (E6-5) - Body ground	GR - Body ground	Rear courtesy light switch RH input	Rear door RH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
PCTY (E6-21) - Body ground	Y - Body ground	Passenger side courtesy light switch input	Passenger side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
LGCY (E6-25) - Body ground	W - Body ground	Luggage compartment door courtesy light switch input	Luggage compartment door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
HCTY (E7-16) - Body ground	R - Body ground	Engine hood courtesy switch	Engine hood CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
DCTY (E7-24) - Body ground	L - Body ground	Driver side door courtesy light switch input	Driver side door CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω
KSW (E9-5) - Body ground	L - Body ground	Unlock warning switch input	No key in ignition key cylinder (OFF) → Key inserted (ON)	10 kΩ or higher → Below 1 Ω
ACC (IA-1) - Body ground	B - Body ground	Ignition power supply (ACC signal)	Ignition switch on (ACC) → off	10 to 14 V → Below 1 V
IG (IA-1) - Body ground	B - Body ground	Ignition power supply (IG signal)	Ignition switch on (IG) → off	10 to 14 V → Below 1 V
ALTB (ID-16) - Body ground	W - Body ground	+B (power system alternator system) power supply	Always	10 to 14 V
GND1 (IF-10) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
BECU (ID-10) - Body ground	O - Body ground	+B power supply	Always	10 to 14 V
GND2 (IM-9) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω
LCTY (IO-7) - Body ground	LG - Body ground	Rear courtesy light switch LH input	Rear door LH CLOSED (OFF) → OPEN (ON)	10 kΩ or higher → Below 1 Ω

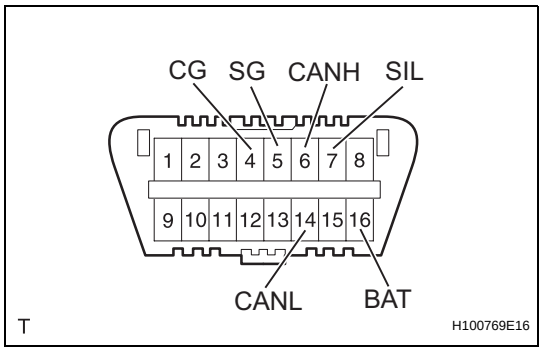
If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the main body ECU (instrument panel J/B) connectors.

(d) Measure the voltage between each terminal of the wire harness side connectors and body ground.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
HAZ (E8-4) - Body ground	W - Body ground	Turn signal flasher relay signal	System is in alarm sounding state	Below 1 V
IND (E9-4) - Body ground	Y - Body ground	Security indicator output	Security indicator light up (It lights up only in arming preparation state or alarm sounding state. It flashes when immobiliser is operating.)	3 to 6 V
SH (E9-6) - Body ground	P - Body ground	Security horn drive	Security horn is sounding (Theft deterrent system is in alarm sounding state)	Pulse generation (0 V ← → 12 V)
HORN (ID-11) - Body ground	B - Body ground	Vehicle horn drive	Vehicle horn is sounding (Theft deterrent system is in alarm sounding state)	Pulse generation (0 V ← → 12 V)

If the result is not as specified, the main body ECU (instrument panel J/B) may have a malfunction.



DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) The main body ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

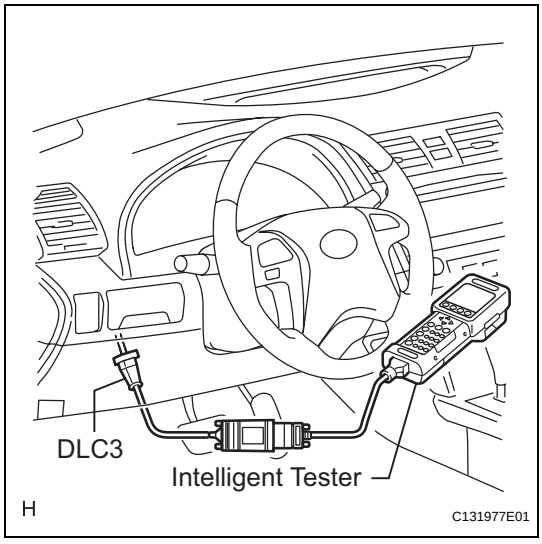
Symbols (Terminal No.)	Terminal Description	Condition	Specified condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 67 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

TD



(b) Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the ignition switch ON and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle or in the tester.

- If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself. Consult the Service Department listed in the tool's instruction manual.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the intelligent tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch on ON.

(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / MAIN BODY / DATA LIST.

(d) Read the DATA LIST according to the display on the tester.

MAIN BODY (Main body ECU):

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
KEY UNLK WRN SW	Unlock warning switch signal / ON or OFF	ON: Key is inserted in the ignition key cylinder OFF: Key is removed from the ignition key cylinder	-
ACC SW	Ignition switch signal / ON or OFF	ON: Ignition switch is ACC OFF: Ignition switch is OFF	-
IG SW	Ignition switch signal / ON or OFF	ON: Ignition switch is ON OFF: Ignition switch is OFF	-
D DOOR CTY SW	D door courtesy switch / ON or OFF	ON: Driver side door is OPEN OFF: Driver side door is CLOSED	-
P DOOR CTY SW	P door courtesy switch / ON or OFF	ON: Front passenger side door is OPEN OFF: Front passenger side door is CLOSED	-
RR DOR CTY SW	Rear right door courtesy switch / ON or OFF	ON: Rear right door is OPEN OFF: Rear right door is CLOSED	-
RL DOR CTY SW	Rear left door courtesy switch / ON or OFF	ON: Rear left door is OPEN OFF: Rear left door is CLOSED	-
LUGG COURTSY SW	Luggage compartment door courtesy switch / ON or OFF	ON: Luggage compartment door is OPEN OFF: Luggage compartment door is CLOSED	-
D LOCK POS SW	Driver's door lock position switch / ON or OFF	ON: Driver's door is UNLOCKED OFF: Driver's door is LOCKED	-
P LOCK POS SW	Passenger door lock position switch / ON or OFF	ON: Passenger door is UNLOCKED OFF: Passenger door is LOCKED	-
HOOD COURTESY SW	Engine hood courtesy switch signal / ON or OFF	ON: Engine hood is OPEN OFF: Engine hood is CLOSED	-
PASSIVE MODE	Passive mode/ON or OFF	ON: Passive mode ON OFF: Passive mode OFF	-
WARN BY HORN	Warning by horn/ON or OFF	ON: Vehicle horns sound during alarm sounding state OFF: Vehicle horns do not sound during alarm sounding state	-
ENTRY DELAY	Entry delay time during passive mode	0s: Entry delay time is 0 sec. 14s: Entry delay time is 14 sec. 30s: Entry delay time is 30 sec.	-

2. ACTIVE TEST

HINT:

Performing the intelligent tester ACTIVE TEST allows relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to shorten the labor time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch on ON.
(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / MAIN BODY / ACTIVE TEST.
(d) Perform the ACTIVE TEST according to the display on the tester.

MAIN BODY (Main body ECU):

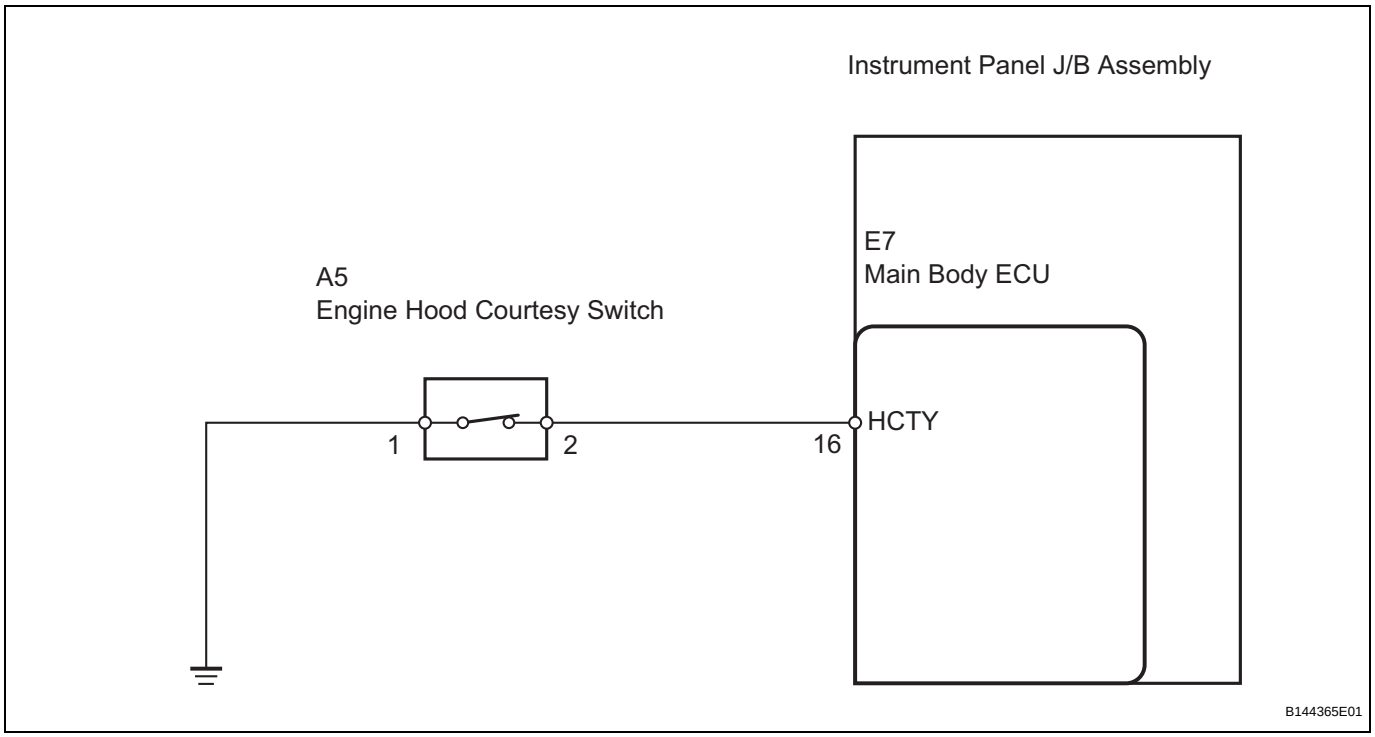
Item	Tester Detail	Diagnostic Note
SECURITY INDIC	Security indicator ON/OFF	-
SECURITY HORN	Security horn ON/OFF	-
HAZARD	Hazard warning light ON/OFF	-
VEHICLE HORN	Vehicle horn ON/OFF	-

Engine Hood Courtesy Switch Circuit

DESCRIPTION

The engine hood courtesy switch is installed together with the hood lock. This switch turns off when the engine hood is opened and turns on when the engine hood is closed.

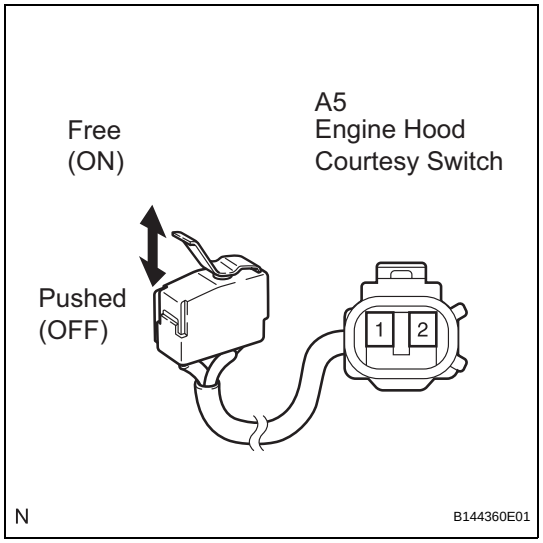
WIRING DIAGRAM



INSPECTION PROCEDURE

TD

1	INSPECT ENGINE HOOD COURTESY SWITCH



(a) Remove the courtesy switch from the hood lock.
(b) Measure the resistance according to the value(s) in the table below.

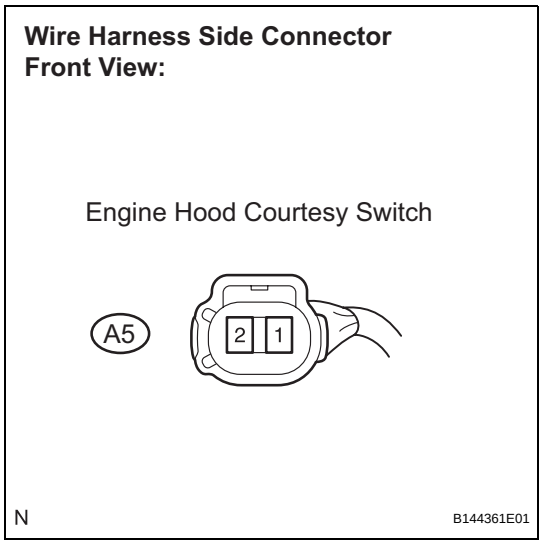
Standard resistance

Tester Connection	Switch Position	Specified Condition
1 - 2	Free (ON)	Below 1 Ω
	Pushed (OFF)	10 kΩ or higher

NG → **REPLACE HOOD LOCK ASSEMBLY**

OK

2	CHECK HARNESS AND CONNECTOR (ENGINE HOOD COURTESY SWITCH - BODY GROUND)



(a) Disconnect the A5 switch connector.
(b) Measure the resistance according to the value(s) in the table below.

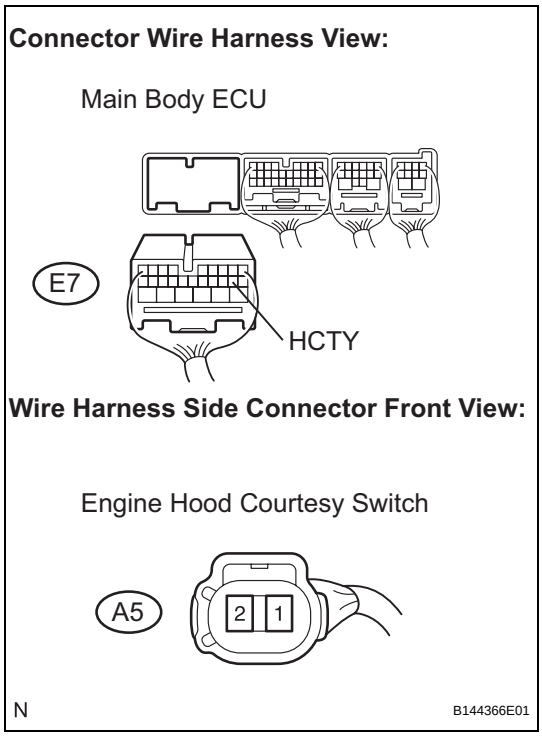
Standard resistance

Tester Connection	Specified Condition
A5-1 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3	CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - ENGINE HOOD COURTESY SWITCH)



(a) Disconnect the E7 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

(Symbol) Tester Connection	Specified Condition
HCTY (E7-16) - (A5-2)	Below 1 Ω
HCTY (E7-16) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

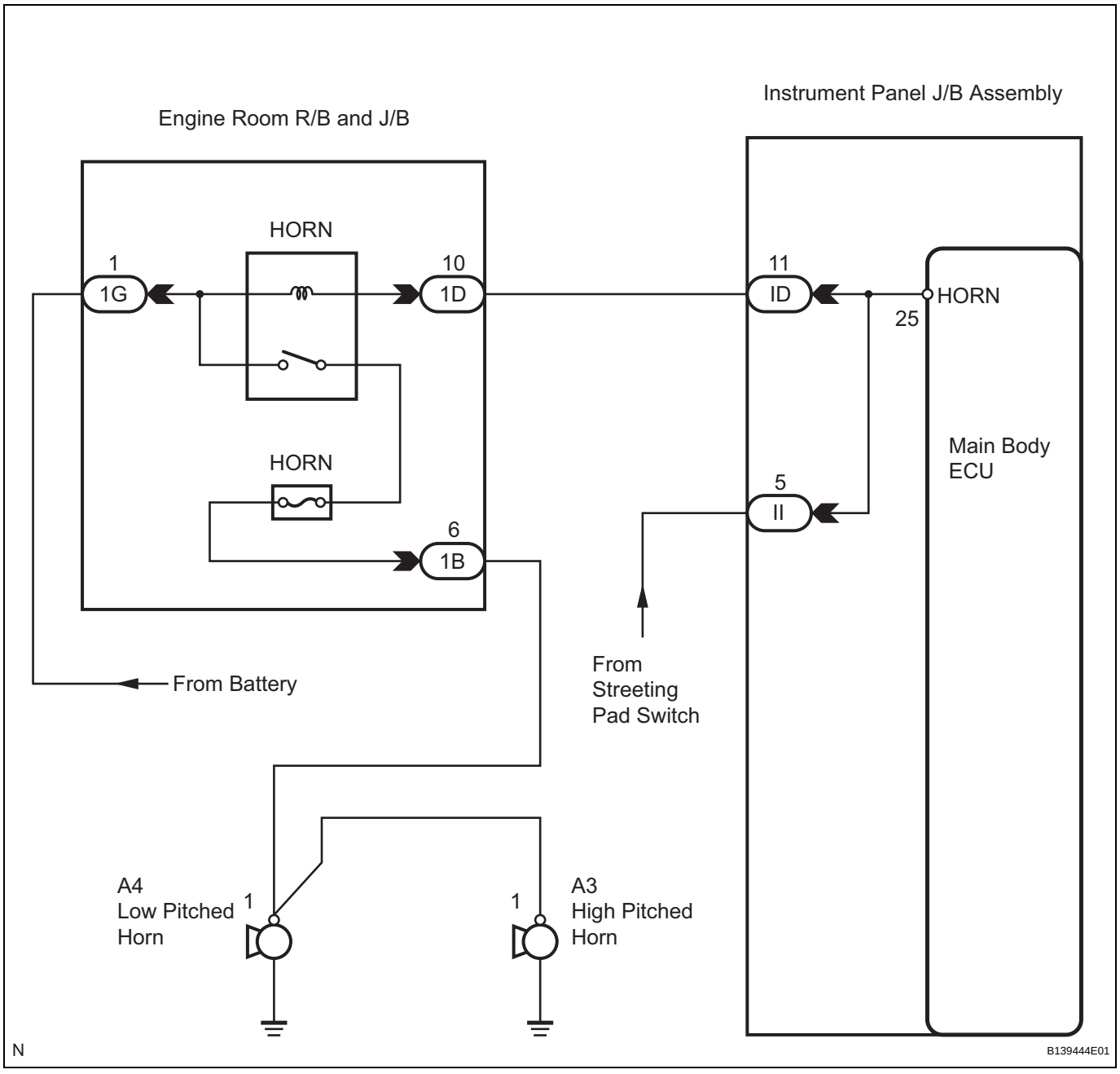
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Horn Circuit

DESCRIPTION

When the theft deterrent system is switched from the armed state to the alarm sounding state, the main body ECU transmits a signal to cause the horn to sound at intervals of 0.4 seconds.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**INSPECT HORNS**

(a) Press the horn switch and check if the horns sound.

Result

Result	Go to
Horns sound	A
Horns do not sound	B

B → **GO TO HORN SYSTEM**

A

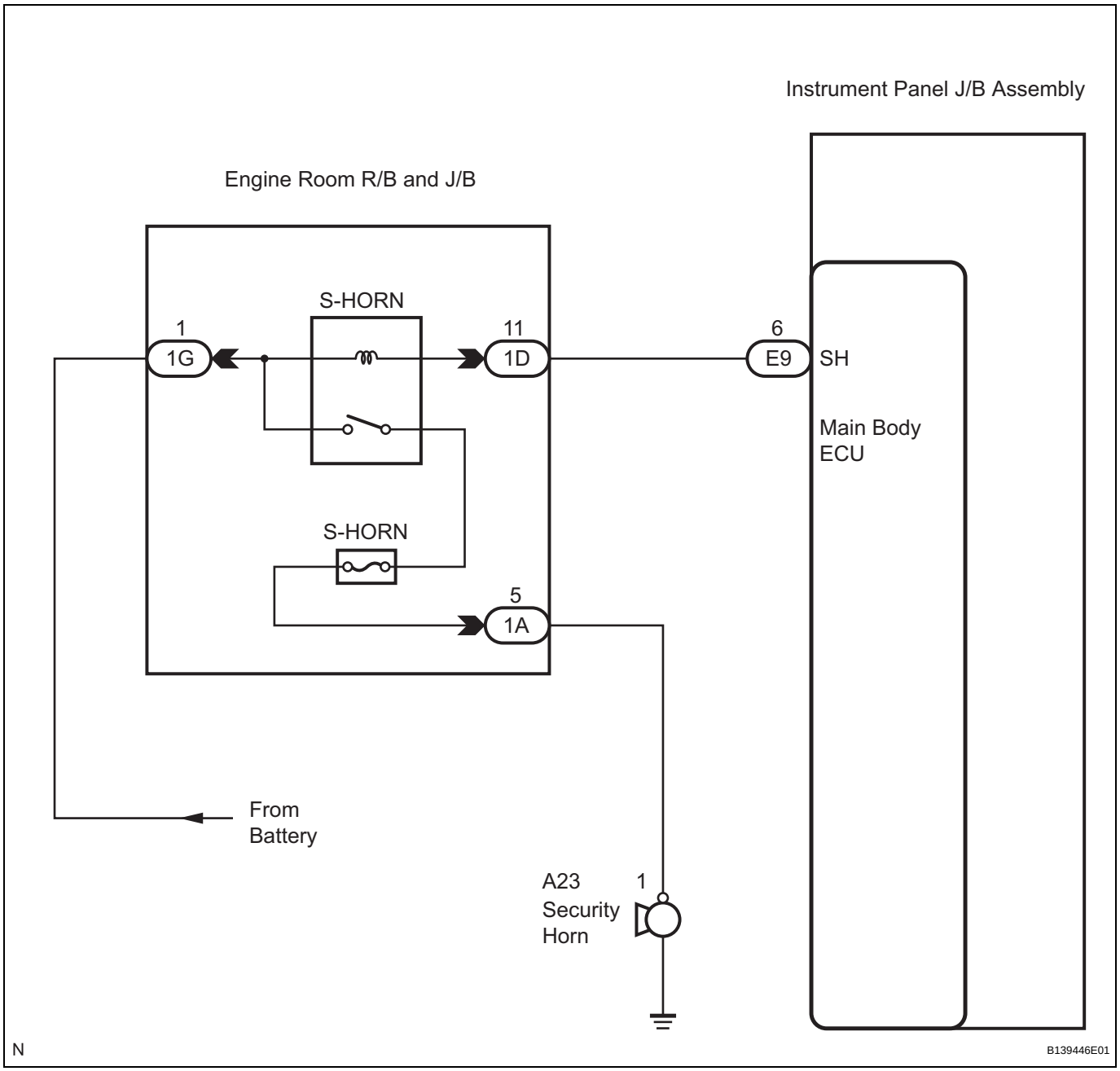
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Security Horn Circuit

DESCRIPTION

When the theft deterrent system is changed from the armed state to the alarm sounding state, the main body ECU can control the security horn.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

TD

(b) Turn the ignition switch ON.
(c) Turn the intelligent tester main switch on.
(d) Select the item below in the ACTIVE TEST and then check that the horn sounds.

MAIN BODY (Main Body ECU):

Item	Test Details	Diagnostic Note
SECURITY HORN	Security horn ON/OFF	-

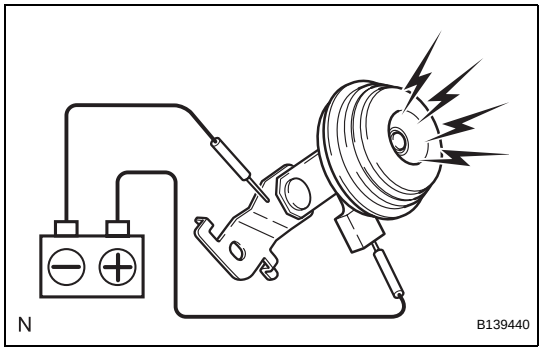
OK:
The security horn sounds or stops correctly when operating it through the intelligent tester.

NG → **Go to step 2**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 INSPECT SECURITY HORN ASSEMBLY



(a) Remove the security horn assembly.
(b) Check operation of the horn.
Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1	Horn sounds
Battery negative (-) → Horn body	

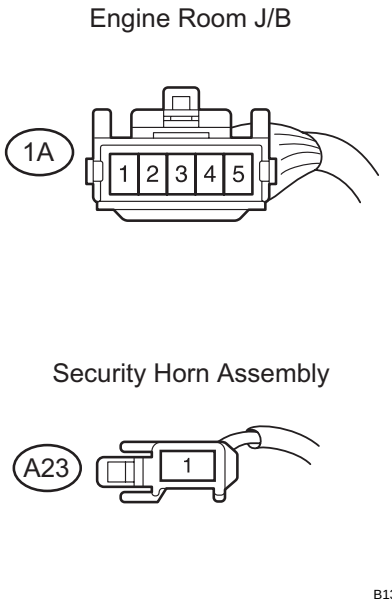
NG → **REPAIR OR REPLACE SECURITY HORN ASSEMBLY**

OK

TD

3 CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B - SECURITY HORN ASSEMBLY)

Wire Harness Side Connector Front View:



(a) Disconnect the 1A J/B connector and the A23 horn connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

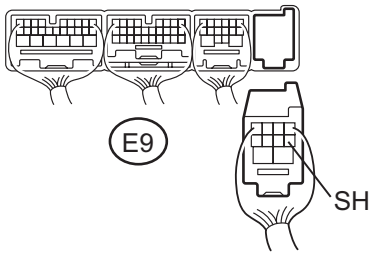
Terminal Connection	Specified Condition
1A-5 - A23-1	Below 1 Ω
1A-5 - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

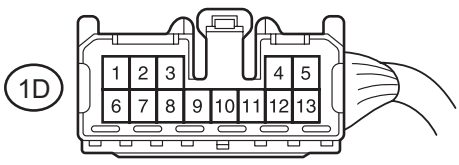
OK

4 CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - ENGINE ROOM J/B)

Connector Wire Harness View:



Wire Harness Side Connector Front View:



(a) Disconnect the E9 ECU connector and 1D J/B connector connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

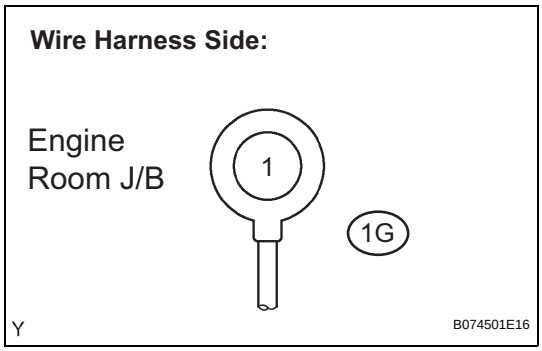
Symbol (Terminal Connection)	Specified Condition
SH (E9-6) - (1D-11)	Below 1 Ω
SH (E9-6) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

TD

OK

5	CHECK HARNESS AND CONNECTOR (ENGINE ROOM J/B - BATTERY)



(a) Disconnect the 1G J/B connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Terminal Connection	Specified Condition
1G-1 - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

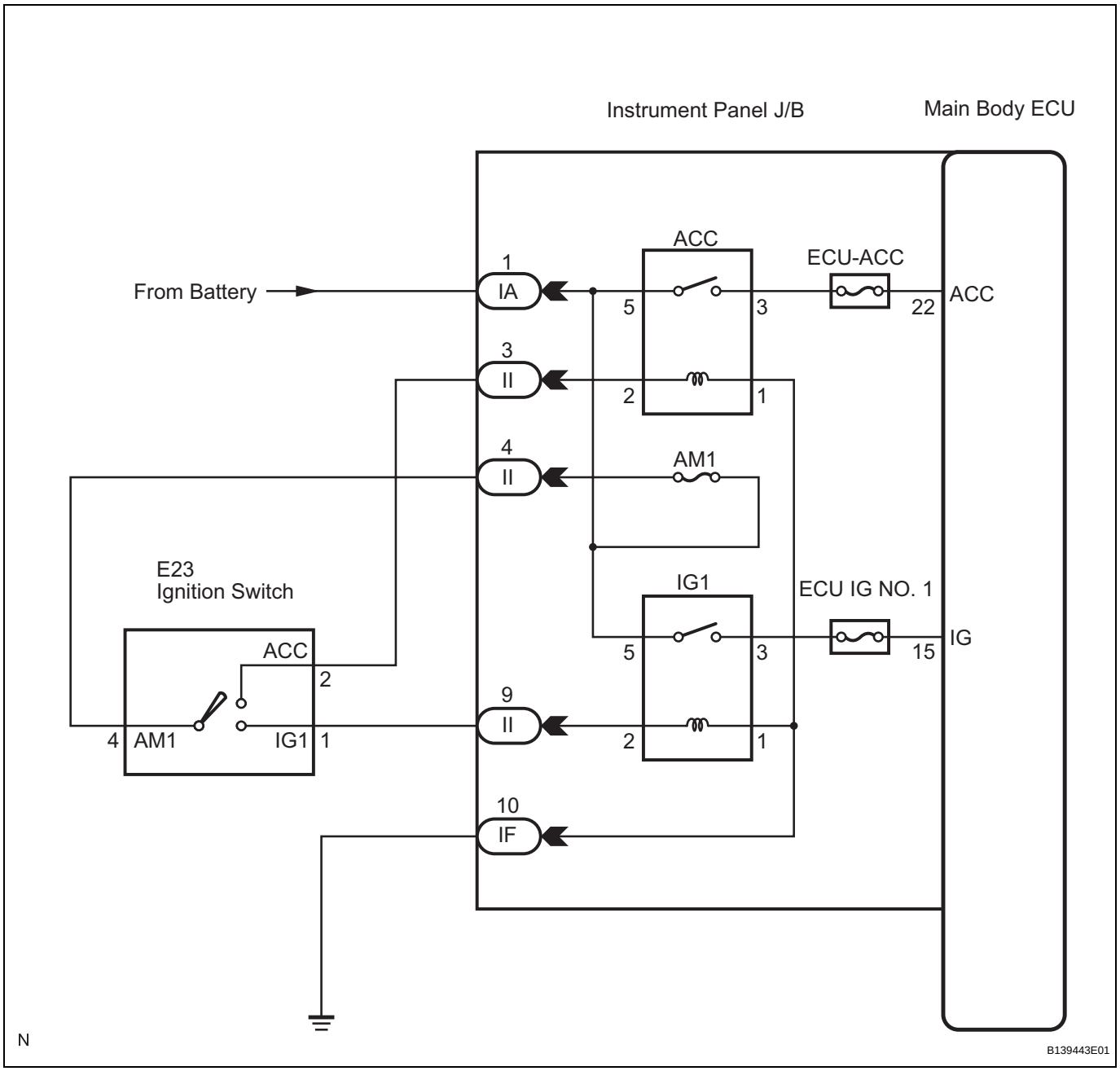
REPLACE ENGINE ROOM JUNCTION BLOCK ASSEMBLY

Ignition Switch Circuit

DESCRIPTION

The main body ECU determines the ignition position (OFF, ACC, ON) based on signals from the IG or ACC circuit.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

TD

(b) Turn the ignition switch ON.
(c) Turn the intelligent tester main switch on.
(d) Select the item below in the DATA LIST and read the display on the intelligent tester.

MAIN BODY (Main Body ECU):

Item	Test Details	Diagnostic Note
IG SW	ignition switch ON signal ON/OFF	-
ACC SW	ignition switch ACC signal ON/OFF	-

OK:
When the ignition switch is operated, the display changes as shown in the table.

NG → **Go to step 2**

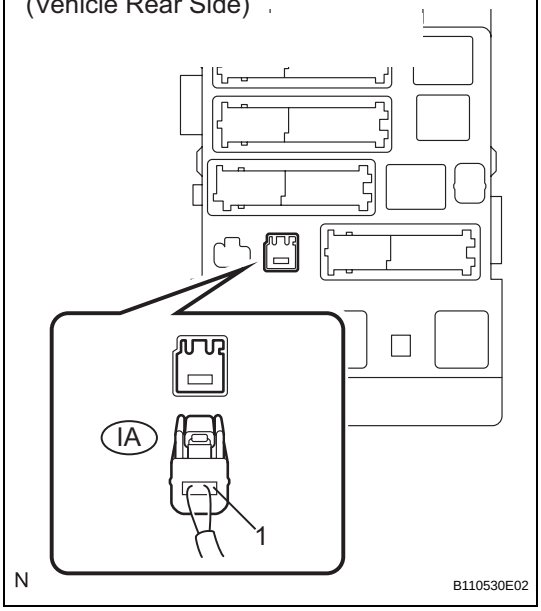
OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

2 CHECK HARNESS AND CONNECTOR (BATTERY - INSTRUMENT PANEL J/B)

Connector Wire Harness View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



(a) Disconnect the IA J/B connector.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage

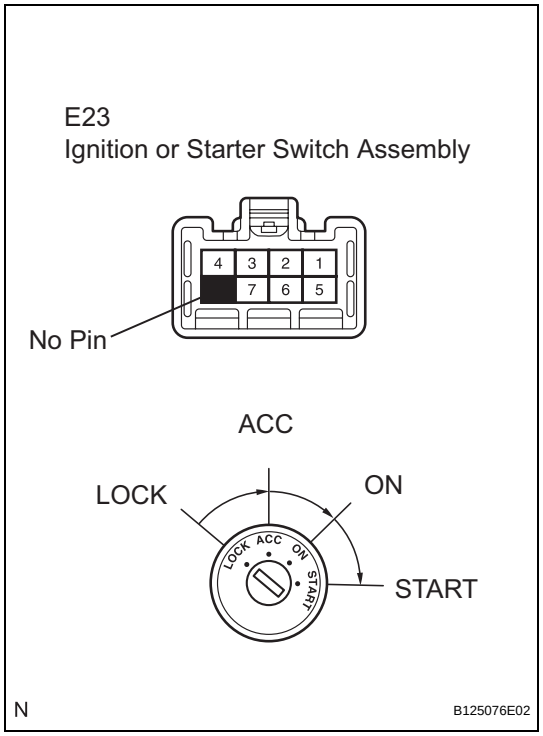
Tester Connection	Condition	Specified Condition
IA-1 - Body ground	Ignition switch ON	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

TD

3 INSPECT IGNITION OR STARTER SWITCH ASSEMBLY



(a) Disconnect the E23 switch connector from the ignition switch.
(b) Measure the resistance according to the value(s) in the table below.

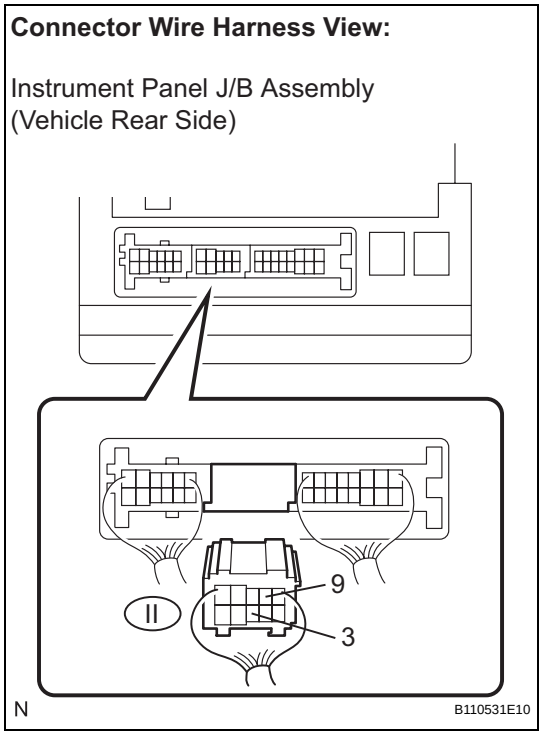
Standard resistance

Tester Connection	Condition	Specified Condition
1 - 4	Ignition switch ON	Below 1 Ω
2 - 4	Ignition switch ACC	Below 1 Ω

NG → **REPLACE IGNITION OR STARTER SWITCH ASSEMBLY**

OK

4 CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - INSTRUMENT PANEL J/B)



(a) Disconnect the II J/B connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
II-4 - II-9	Ignition switch ON	Below 1 Ω
II-4 - II-3	Ignition switch ACC	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

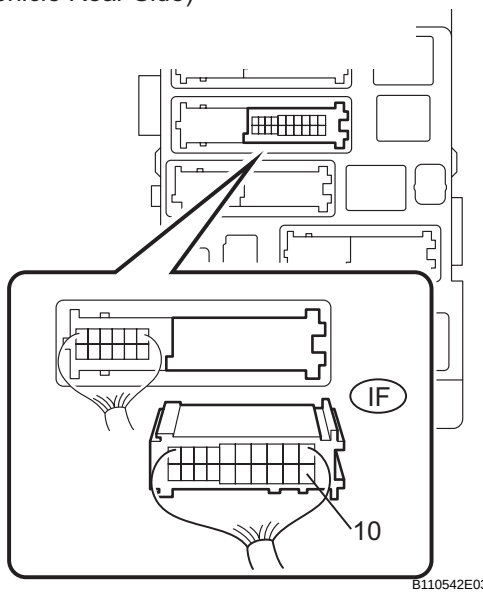
TD

OK

5	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - BODY GROUND)

Connector Wire Harness Side View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



(a) Disconnect the IF J/B connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
IF-10 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

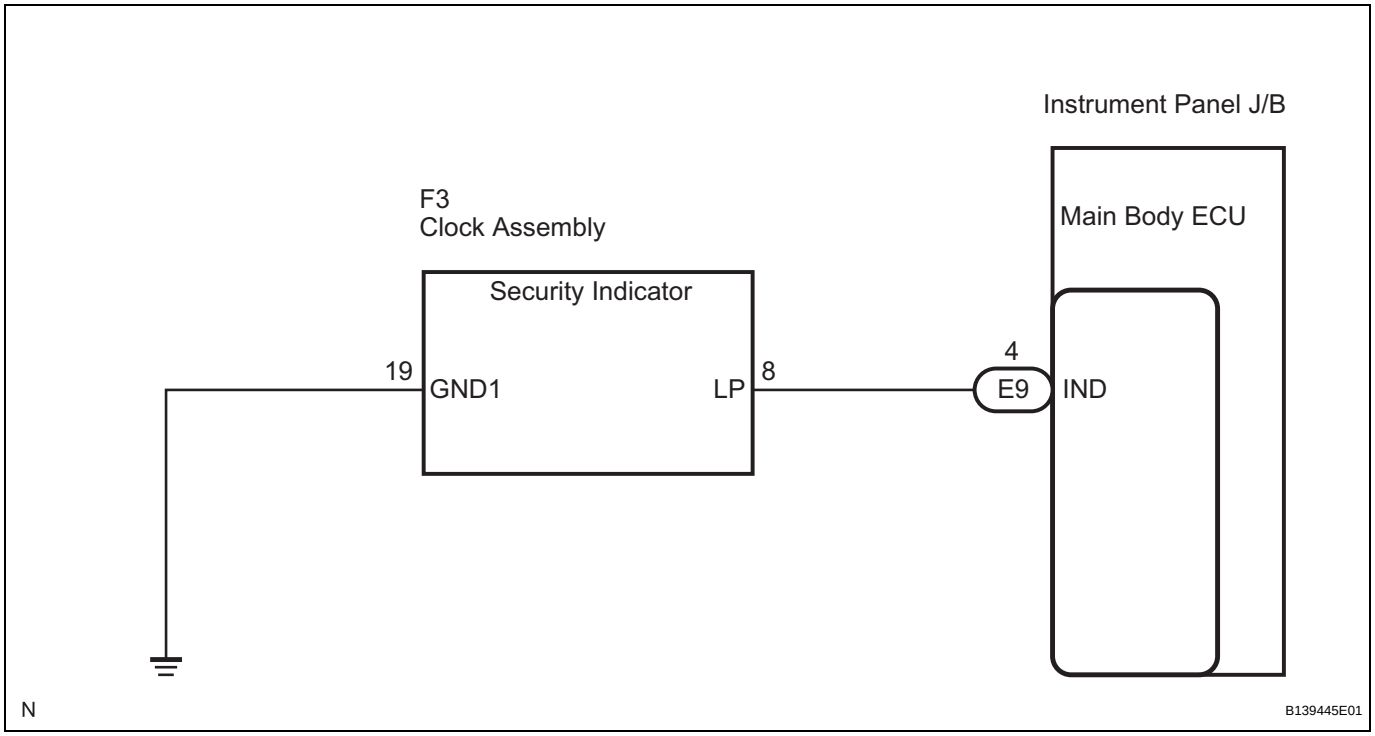
REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

Security Indicator Light Circuit

DESCRIPTION

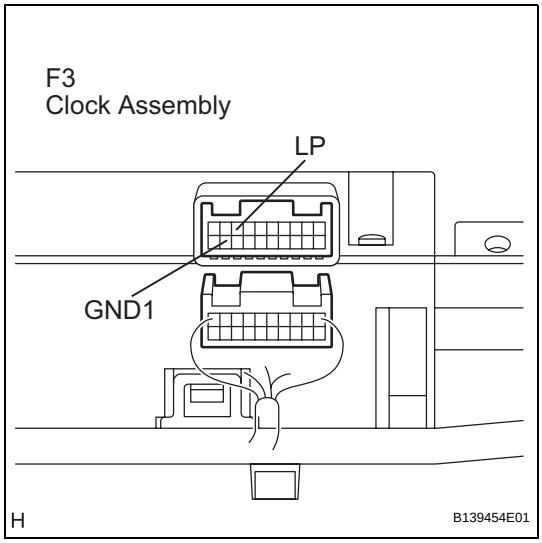
Even when the theft deterrent system is in the disarmed state, the security indicator blinks due to a signal output from the immobiliser system. The security indicator blinks continuously due to a continuous signal received from the immobiliser system while in the armed state.
The main body ECU causes the security indicator to light up or blink only during the arming preparation state and alarm sounding states.

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT CLOCK ASSEMBLY



(a) Disconnect the F3 clock connector.
(b) Apply battery voltage between the terminals of the indicator, and check the lighting condition of the security indicator.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal F3-8 (LP) Battery negative (-) → Terminal F3-19 (GND1)	Lights up

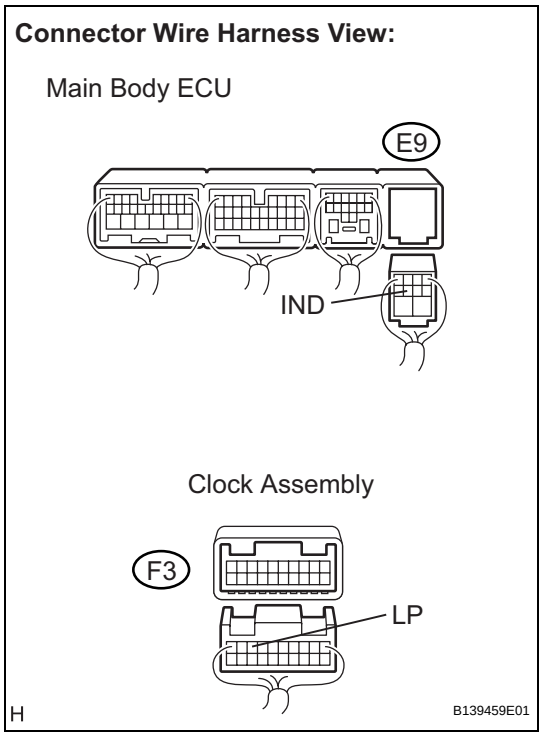
NOTICE:

- **If the positive (+) lead and the negative (-) lead are incorrectly connected, the security indicator will not light up.**
- **Voltage of more than 12 V will damage the security indicator.**
- **If the voltage is too low, the security indicator will not light up.**

NG → **REPLACE CLOCK ASSEMBLY**

OK

2 CHECK HARNESS AND CONNECTOR (CLOCK ASSEMBLY - MAIN BODY ECU)



(a) Disconnect the E9 ECU connector.
(b) Disconnect the F3 clock connector.
(c) Measure the resistance according to the value(s) table below.

Standard resistance

Symbol (Tester Connection)	Specified Condition
IND (E9-4) - LP (F3-8)	Below 1 Ω
IND (E9-4) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

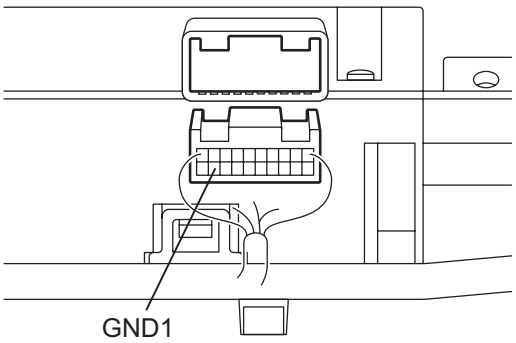
OK

TD

3	CHECK HARNESS AND CONNECTOR (CLOCK ASSEMBLY - BODY GROUND)

Connector Wire Harness View:

F3
Clock Assembly



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Specified Condition
GND1 (F3-19) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

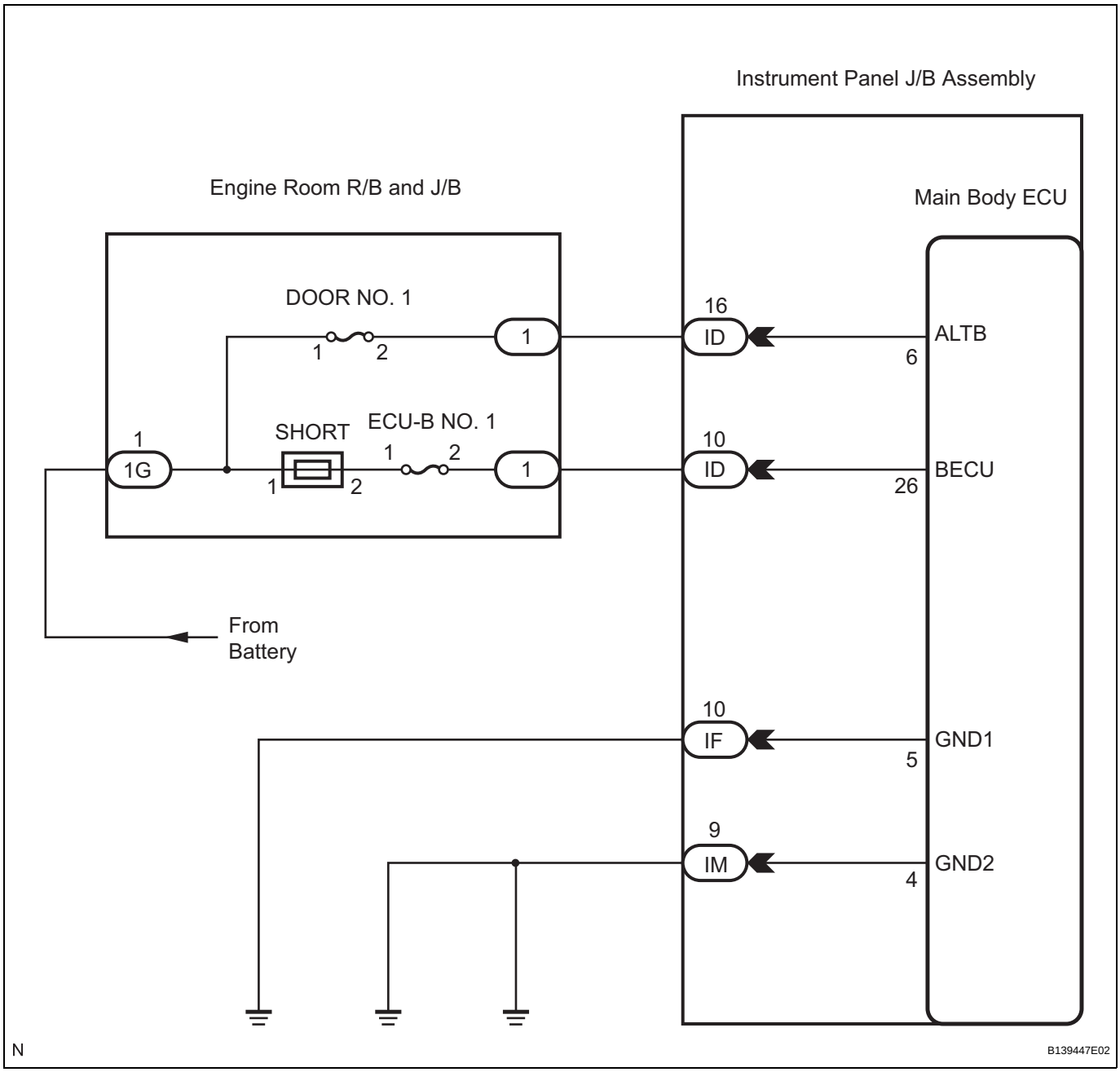
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

ECU Power Source Circuit

DESCRIPTION

This circuit provides power for main body ECU operation.

WIRING DIAGRAM



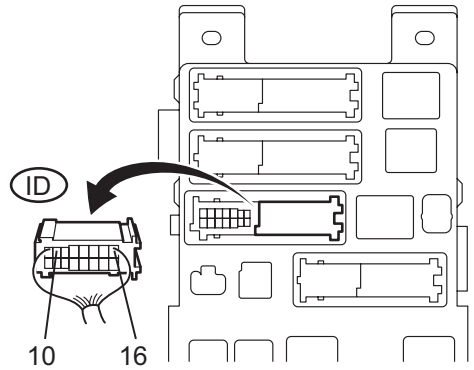
TD

INSPECTION PROCEDURE

1	CHECK INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY (MAIN BODY ECU) (POWER SOURCE)

Connector Wire Harness View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



N B110545E04

(a) Disconnect the ID J/B connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
ID-10 - Body ground	10 to 14 V
ID-16 - Body ground	10 to 14 V

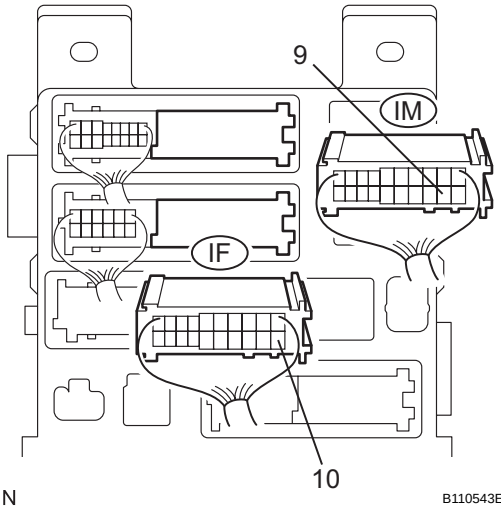
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - BODY GROUND)

Connector Wire Harness View:

Instrument Panel J/B Assembly
(Vehicle Rear Side)



N B110543E02

(a) Disconnect the IF and IM J/B connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Symbol (Tester Connection)	Specified Condition
IF-10 - Body ground	Below 1 Ω
IM-9 - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

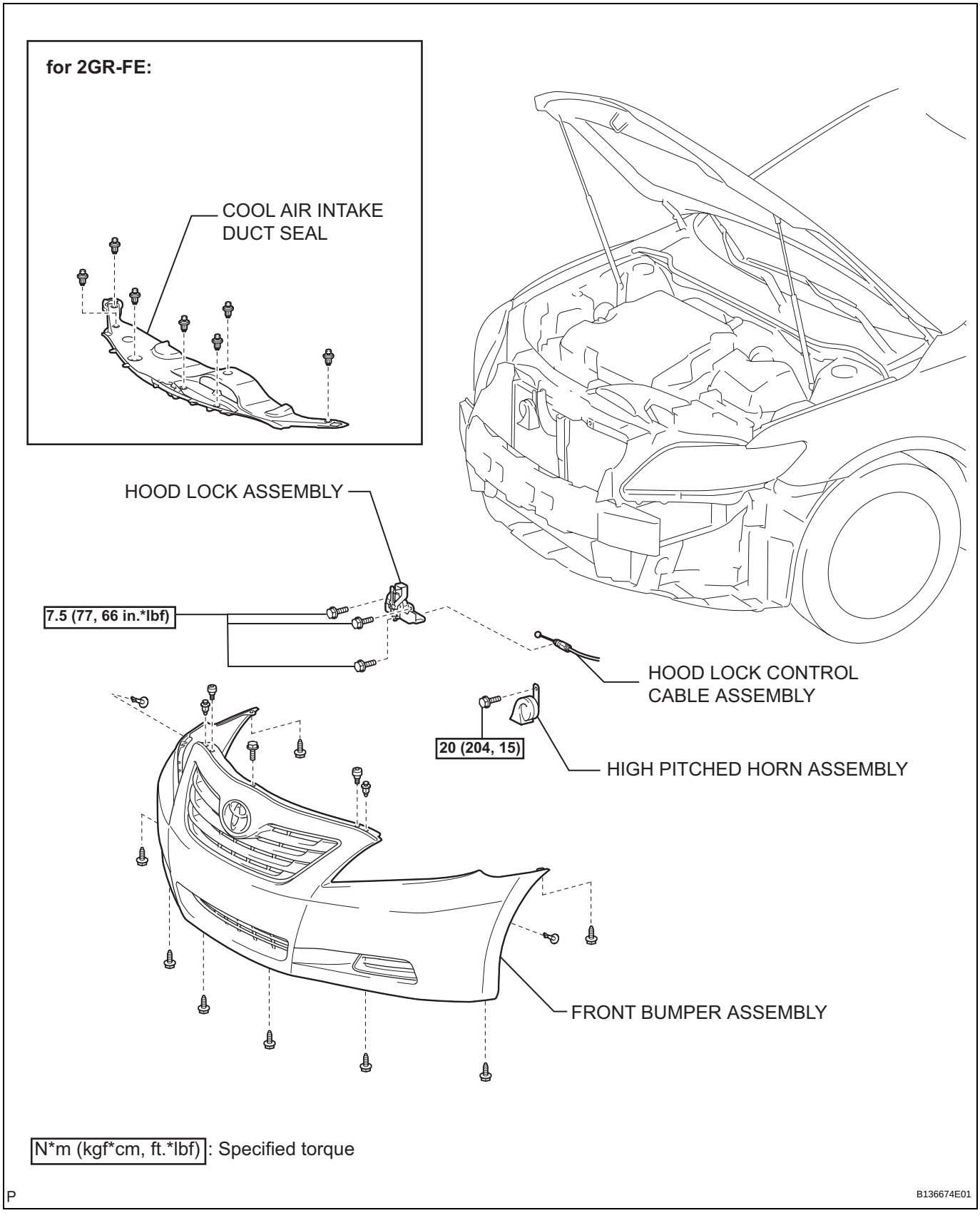
TD

OK

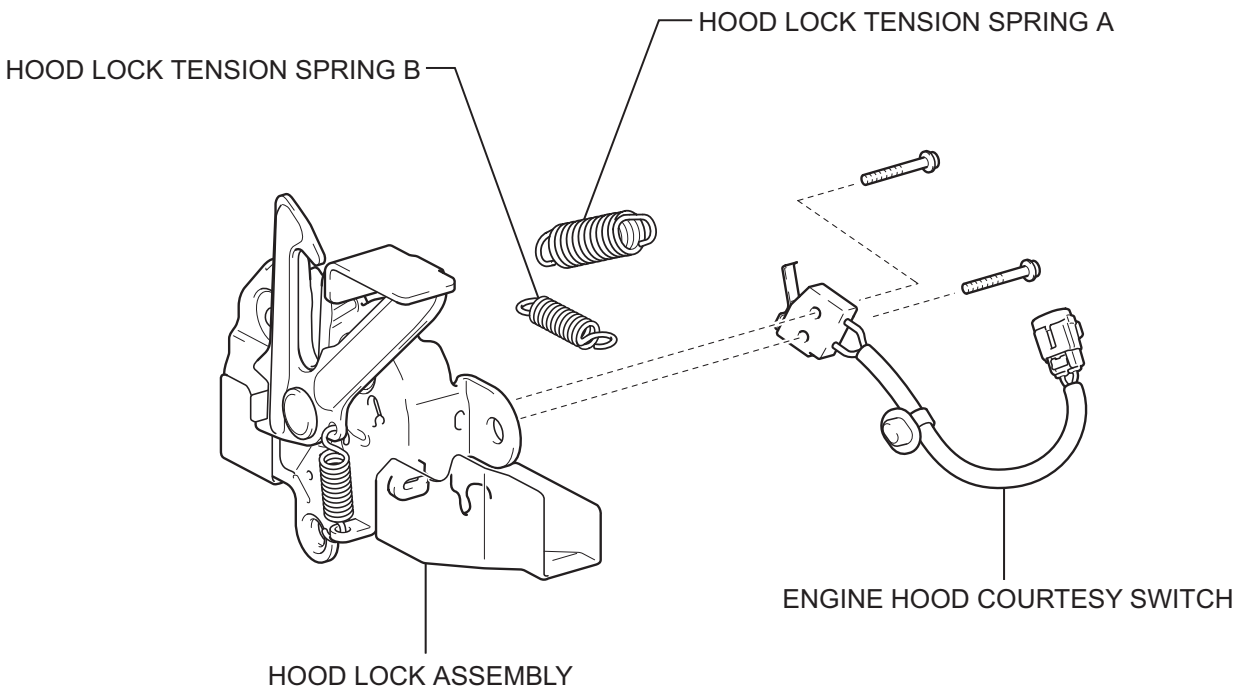
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

ENGINE HOOD COURTESY SWITCH

COMPONENTS



TMMK Made:

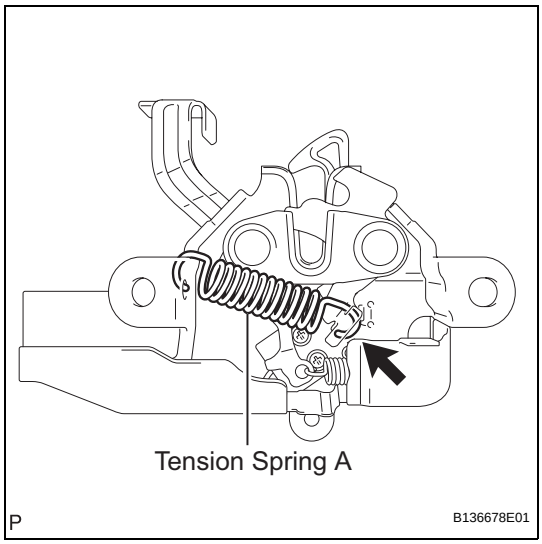


P B136692E01

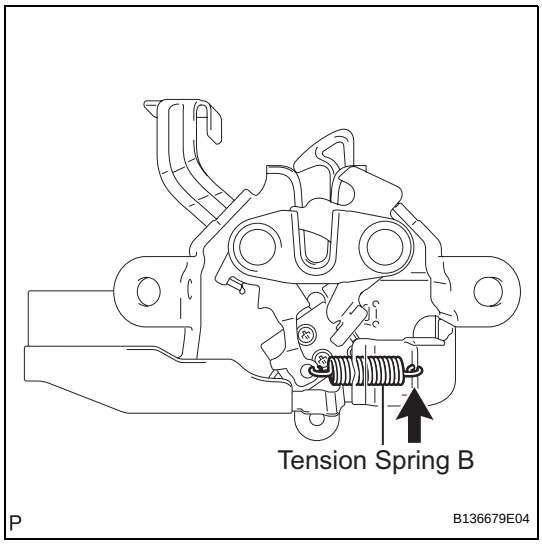
TD

REMOVAL

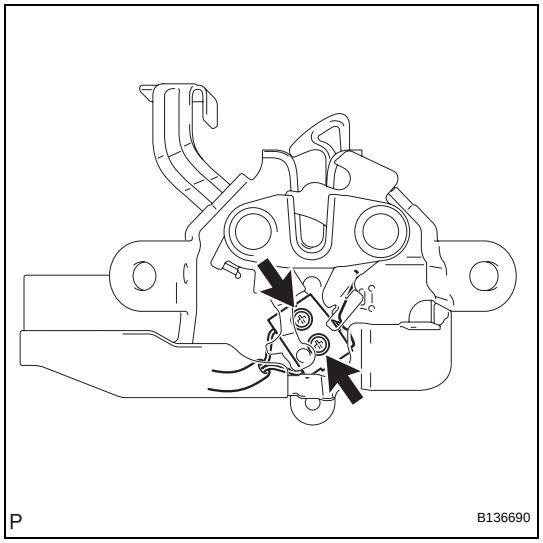
1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**
3. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
4. **REMOVE HIGH PITCHED HORN ASSEMBLY (See page HO-7)**
5. **REMOVE HOOD LOCK ASSEMBLY (See page ED-7)**
6. **REMOVE HOOD LOCK TENSION SPRING A (for TMMK Made)**
   (a) Remove tension spring A.



7. **REMOVE HOOD LOCK TENSION SPRING B (for TMMK Made)**
   (a) Remove tension spring B.

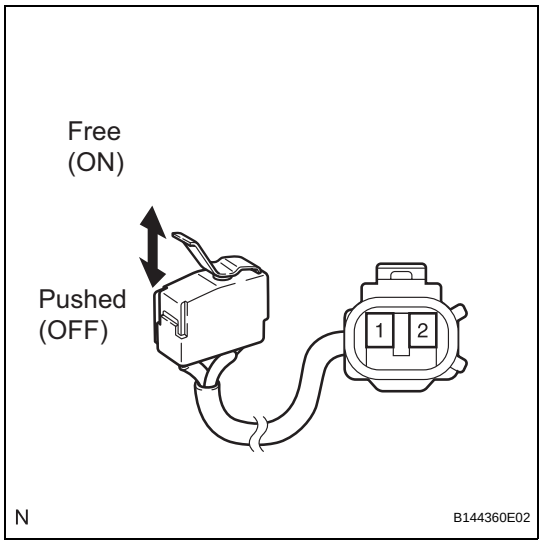


TD



8. REMOVE ENGINE HOOD COURTESY SWITCH (for TMMK Made)

(a) Remove the 2 screws and the engine hood courtesy switch.



INSPECTION

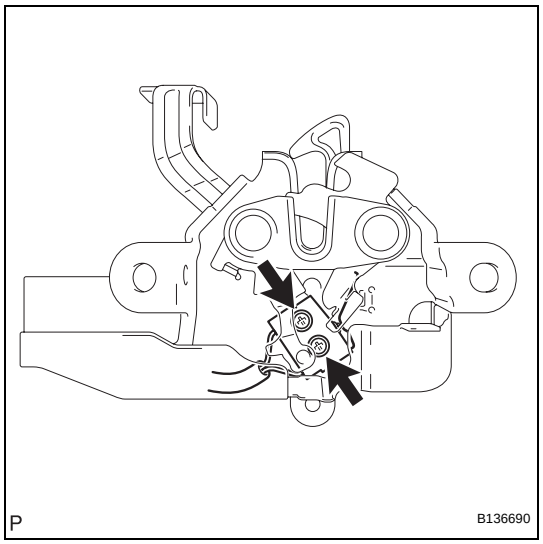
1. INSPECT ENGINE HOOD COURTESY SWITCH

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Position	Specified Condition
1 - 2	Free (ON)	Below 1 Ω
	Pushed (OFF)	10 kΩ or higher

If the result is not as specified, replace the hood lock assembly.

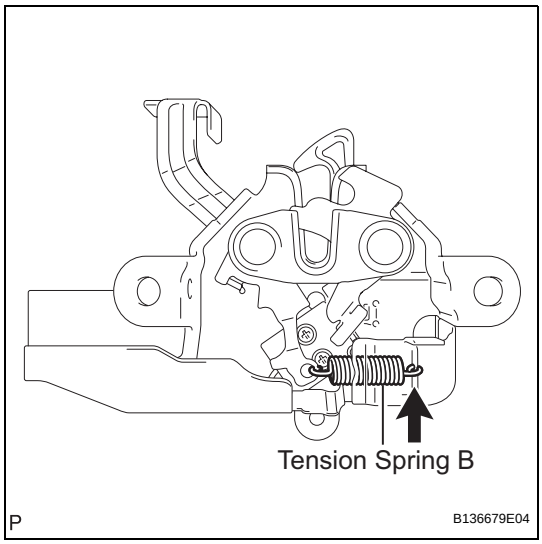


INSTALLATION

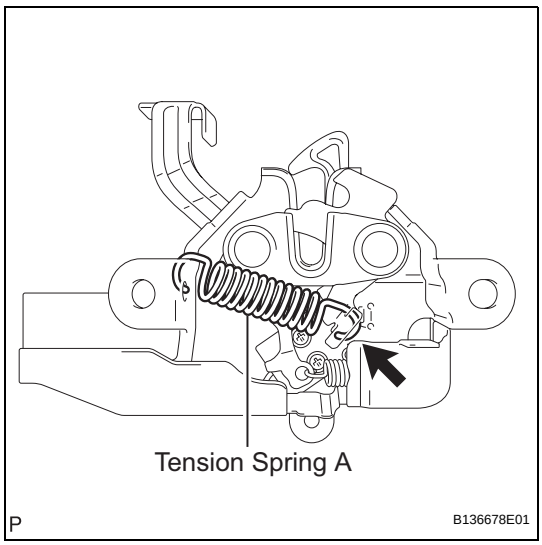
1. INSTALL ENGINE HOOD COURTESY SWITCH (for TMMK Made)

(a) Install the engine hood courtesy switch with the 2 screws.

TD



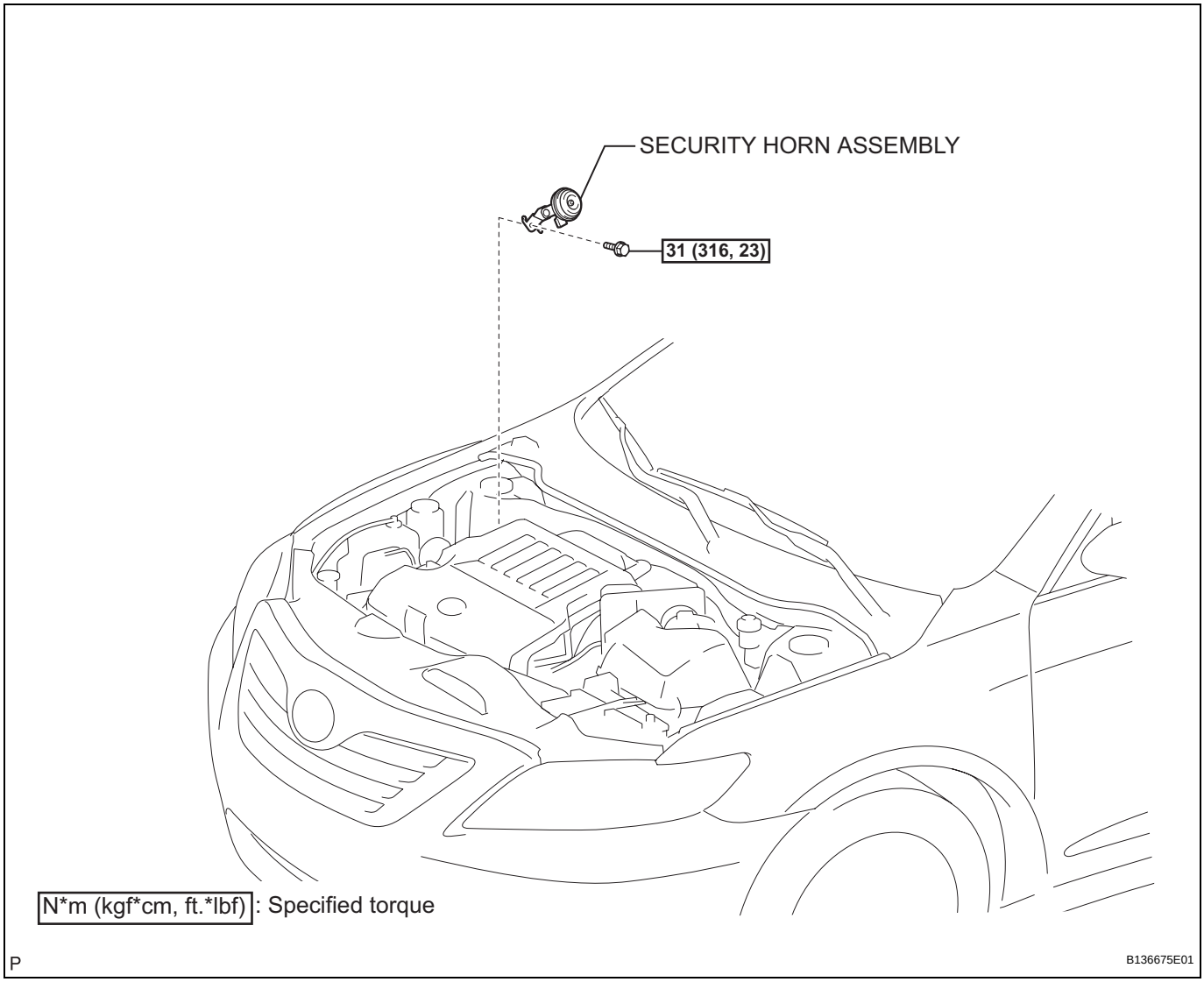
2. **INSTALL HOOD LOCK TENSION SPRING B (for TMMK Made)**
   (a) Install tension spring B.

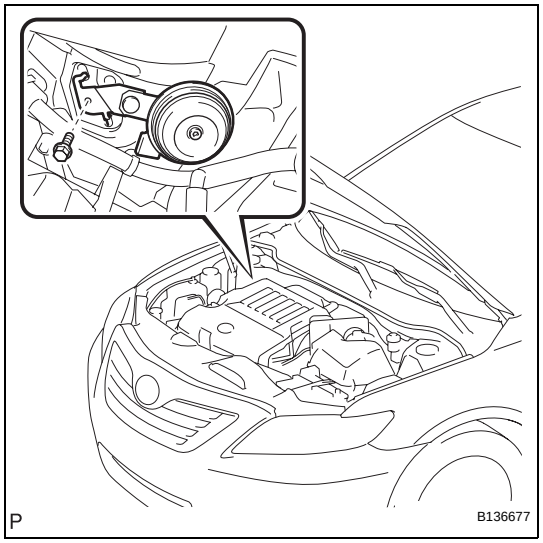


3. **INSTALL HOOD LOCK TENSION SPRING A (for TMMK Made)**
   (a) Install tension spring A.
4. **INSTALL HOOD LOCK ASSEMBLY (See page ED-9)**
5. **INSTALL HIGH PITCHED HORN ASSEMBLY (See page HO-7)**
6. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**
7. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**
8. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**

SECURITY HORN ASSEMBLY

COMPONENTS

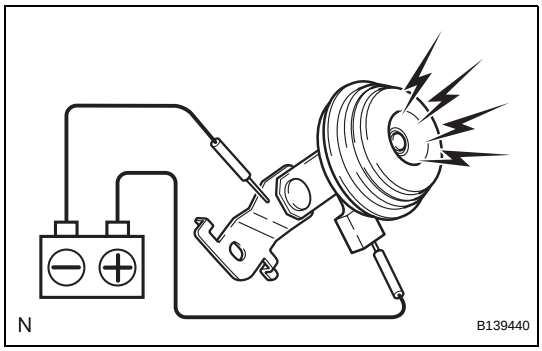




REMOVAL

1. **REMOVE SECURITY HORN ASSEMBLY**
   (a) Remove the bolt.
   (b) Disconnect the connector and remove the security horn assembly.

TD



INSPECTION

1. INSPECT SECURITY HORN ASSEMBLY

(a) Check operation of the horn.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1	Horn sounds
Battery negative (-) → Horn body	

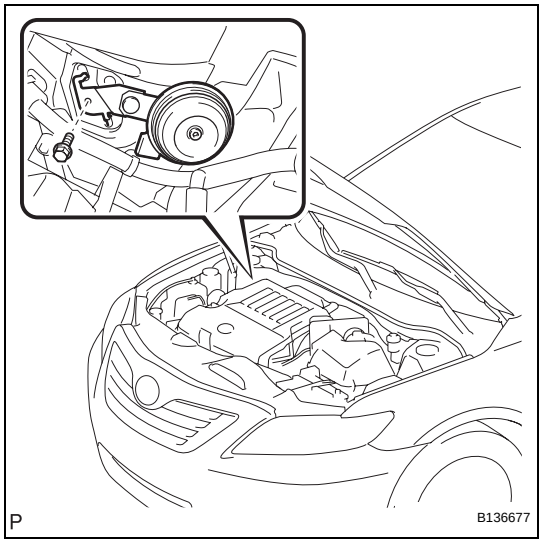
If the result is not as specified, replace the security horn assembly.

INSTALLATION

1. INSTALL SECURITY HORN ASSEMBLY

(a) Connect the connector.

(b) Install the security horn assembly with the bolt.
Torque: 31 N*m (316 kgf*cm, 23 ft.*lbf)



TIRE AND WHEEL SYSTEM

PRECAUTION

1. REMOVAL AND INSTALLATION OF THE TIRE PRESSURE WARNING VALVE SUB-ASSEMBLY

(a) When installing a tire, make sure that the tire pressure warning valve sub-assembly does not interfere with the tire bead in order to prevent damage to the tire pressure warning valve sub-assembly.

(b) After completing the operation, remove the valve core to rapidly release the air in the tire and check that the warning light comes on. If the warning light does not come on, the system may be defective.

(c) If there is air leakage, tighten the nut to a torque of 4.0 N*m (41 kgf*cm, 35 in.*lbf) and push the valve core 2 or 3 times to remove any dirt attached to the valve core. If air continues to leak, replace the grommet, washer, and nut.

(d) When installing the tire pressure warning valve sub-assembly, check whether the rim, grommet, washer, and nut are clean. Use a manufacturer-specified cap.

(e) When putting air into the tire, first install the tire pressure valve straight onto the stem of the tire pressure warning valve sub-assembly.

2. TIRE AND WHEEL REPLACEMENT

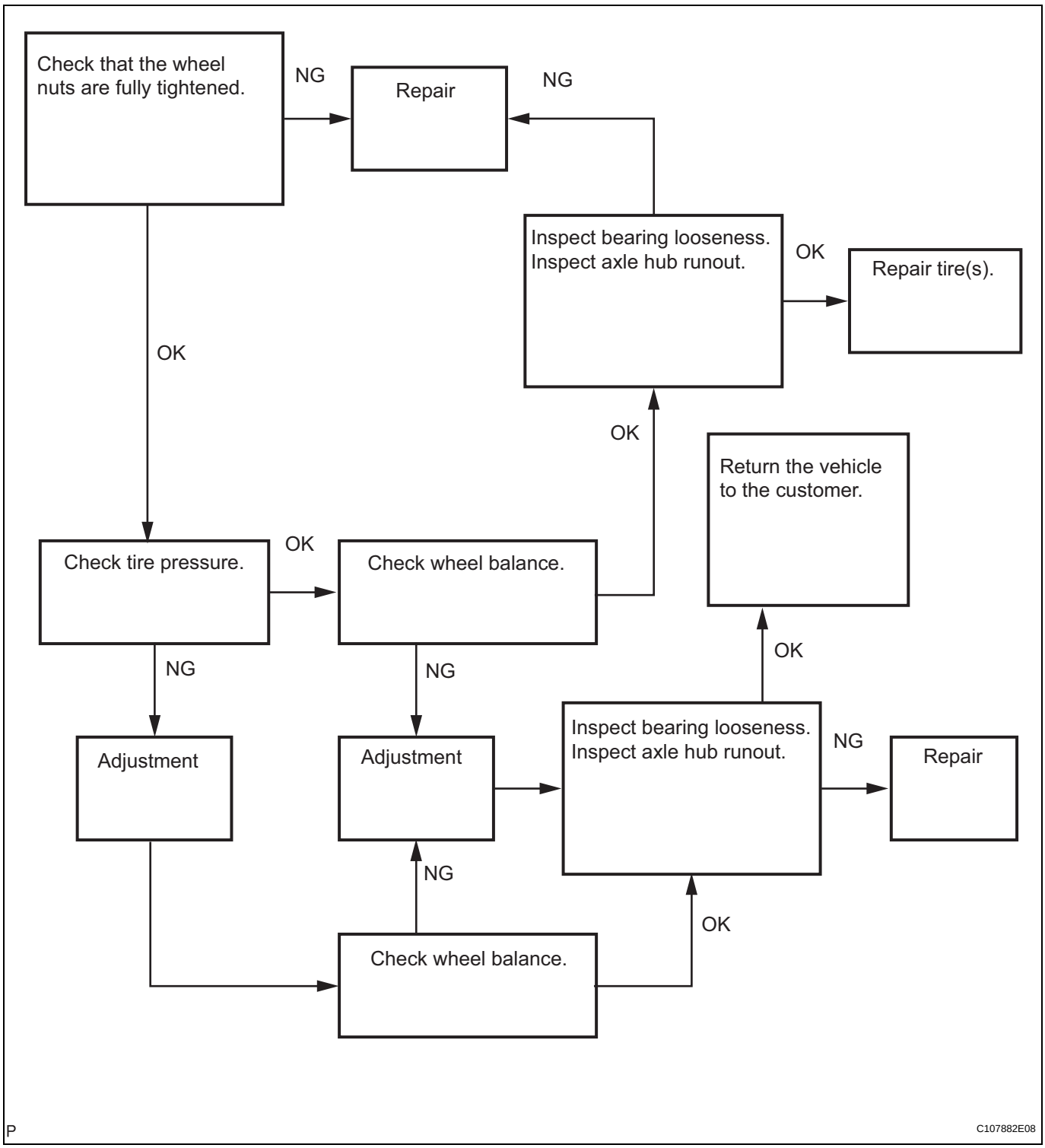
(a) If replacing a tire, be sure to check the grommet of the tire valve for damage. If the grommet is damaged, replace the grommet, washer, and the nut.

(b) If tires and wheels are replaced, register the transmitter ID (see page TW-15).

HOW TO PROCEED WITH TROUBLESHOOTING

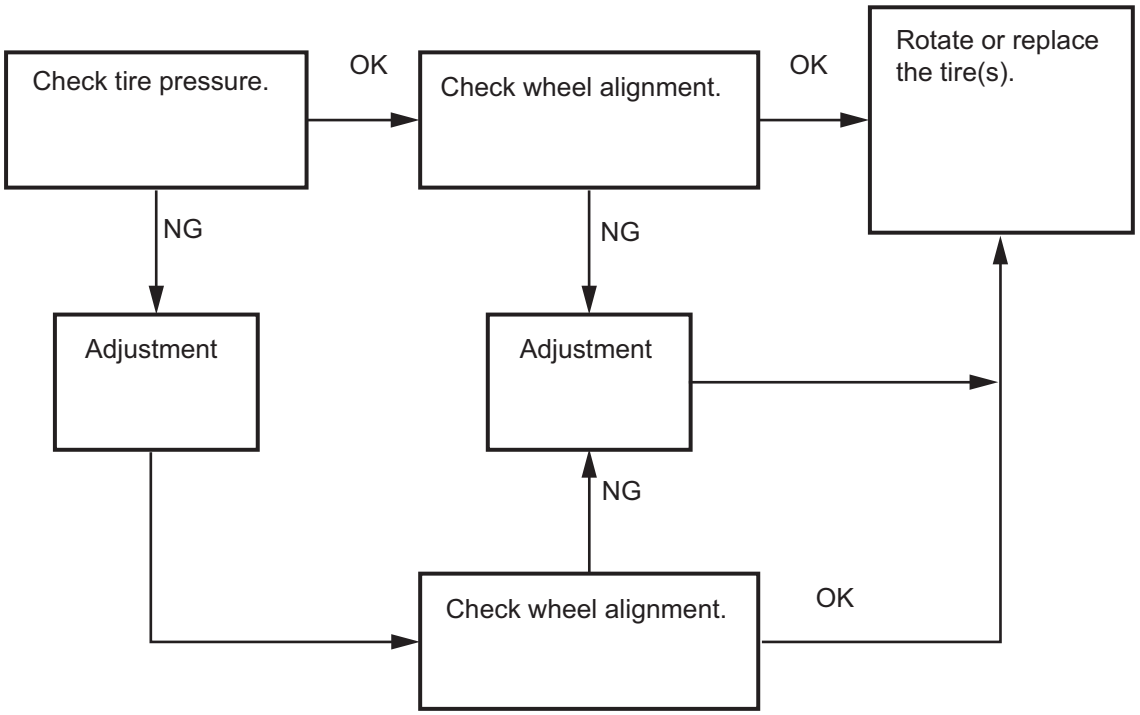
1. DIAGNOSIS OF TIRE VIBRATION

(a) Inspection procedure



2. DIAGNOSIS OF IRREGULAR TIRE WEAR

(a) Inspection procedure


Check tire pressure.
OK
Check wheel alignment.
OK
Rotate or replace the tire(s).
NG
NG
Adjustment
Adjustment
NG
Check wheel alignment.
OK
P
C107883E01

INSPECTION

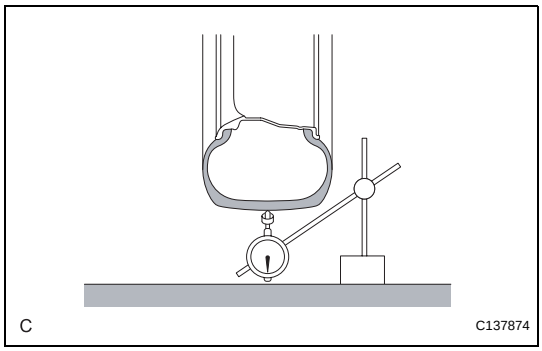
1. INSPECT TIRE

(a) Check the tires for wear and proper inflation pressure.

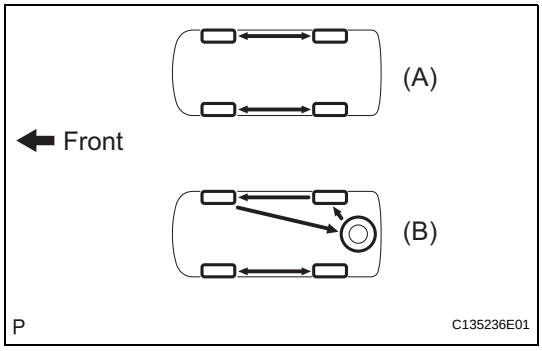
Cold tire inflation pressure

Tire size	Front kPa (kgf*cm^2, psi)	Rear kPa (kgf*cm^2, psi)
P215/60R16 94V	210 (2.1, 31)	210 (2.1, 31)
P215/55R17 93V	220 (2.2, 32)	220 (2.2, 32)

When driving under the above vehicle conditions at sustained high speeds above 160 km/h (100 mph), in countries where such speeds are permitted by-law, inflate the front and rear tires to 240 kPa (2.4 kgf*cm^2, 35 psi) provided that it does not exceed the maximum cold tire inflation pressure molded on the tire sidewall.

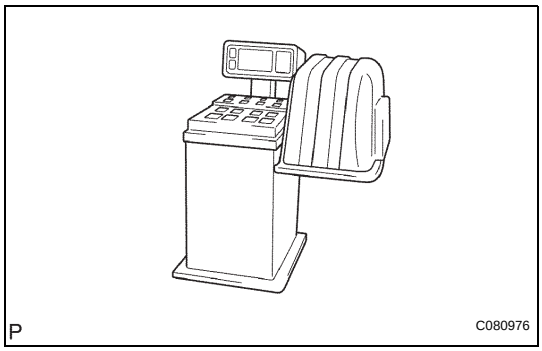


(b) Using a dial indicator, check the runout of the tires.
Tire runout:
1.4 mm (0.055 in.) or less



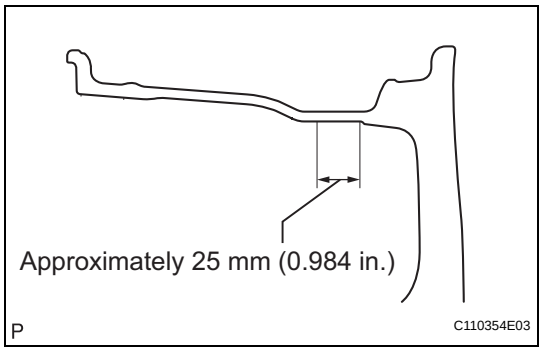
2. ROTATE TIRE

(a) Rotate the tires as shown in illustration (A). If the vehicle is equipped with a grand spare tire, rotate the tires as shown in illustration (B).



3. INSPECT WHEEL BALANCE

(a) Check and adjust the off-the-car balance.
(b) Steel wheel
(1) If necessary, check and adjust the on-the-car balance.
Imbalance after adjustment:
8.0 g (0.018 lb.) or less.



(c) Except for steel wheel

(1) If necessary, check and adjust the on-the-car balance.

Imbalance after adjustment:
8.0 g (0.018 lb.) or less.

NOTICE:

- **Remove dirt, oil and water from the surface where the balance weight is to be adhered with a cleaning detergent.**
- **Do not touch the sticking surface of the tape.**
- **Adhere the sticking type balance weight to the flat position shown in the illustration.**
- **Push the balance weight securely with a finger to adhere it to the position.**
- **Do not reuse the balance weight.**

HINT:

The inner side balance weight should be installed by clipping it to the rim.

4. INSPECT BEARING LOOSENESS

(See page AH-5 for FRONT AXLE, AH-15 for REAR AXLE)

5. INSPECT AXLE HUB RUNOUT

(See page AH-6 for FRONT AXLE, AH-15 for REAR AXLE)

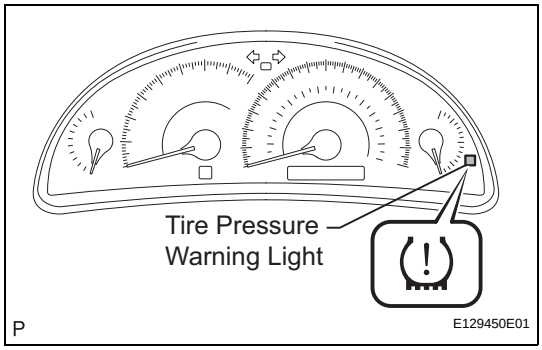
TIRE PRESSURE WARNING SYSTEM

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specification of the valves

Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start



2. TIRE PRESSURE WARNING SYSTEM PRECAUTION

(a) When the tire pressure warning light comes on, immediately check the tire pressure of the tire and adjust it to the specified value. (The tire pressure warning light will blink (come on after blinking for 1 minute) if there is an open in the tire pressure warning light circuit.)

NOTICE:

Check the ground spare tire as well since this system monitors pressure of all tires including the ground spare tire.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94W	210 (2.1, 31) *1 240 (2.4, 35)*2	210 (2.1, 31) *1 240 (2.4, 35)*2
P215/55R17 93V	220 (2.2, 32) *1 240 (2.4, 35)*2	220 (2.2, 32) *1 240 (2.4, 35)*2

*1: For driving under 100 mph (160 km/h)

*2: For driving at 100 mph (160 km/h) or over

(b) When the tire pressure warning light blinks (comes on after blinking for 1 minute), there is a malfunction in the system. Check for DTCs.

(c) It is necessary to register the transmitter ID in the tire pressure warning ECU after replacing the tire pressure warning valve and transmitter and/or tire pressure warning ECU (See page TW-15).

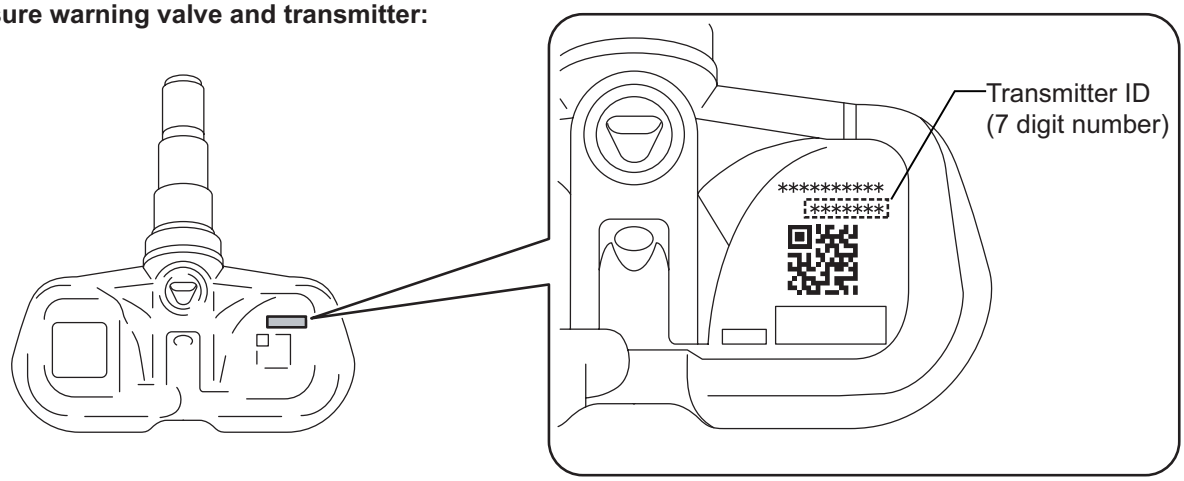
(d) When replacing the tire pressure warning ECU;

(1) Using the DATA LIST, read the transmitter IDs registered in the ECU and make a note of them before removing the tire pressure warning ECU.

(2) Register the transmitter IDs after installing a new tire pressure warning ECU.

(e) When replacing the tire pressure warning valve and transmitter;
(1) Take a note of the 7 digit number (transmitter ID) written on the tire pressure warning valve and transmitter when replacing it. Register the transmitter IDs in the tire pressure warning ECU after replacing the tire pressure warning valve and transmitter and installing the tires and wheels on the vehicle.

Tire pressure warning valve and transmitter:



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NOTICE:
The transmitter ID is written on the tire pressure warning valve and transmitter. It will be unable to be read after installing the tire pressure warning valve and transmitter on the tire and wheel. Therefore, take a note of the transmitter ID before installing the tire pressure warning valve and transmitter.

(f) When replacing the tire pressure warning ECU and the tire pressure warning valves and transmitters; It is necessary to perform the initialization (See page TW-18) after the registration (See page TW-15).

(g) Precautions about the tire pressure;
- The tire pressures decrease naturally.
- In winter, tire pressure may decrease due to low ambient temperatures (tire pressure decreases by approximately 10 kPa (0.2 kgf/cm^2, 1.45 psi) for every 10°C (50°F) drop in the ambient temperature). Therefore, the tire pressure warning is more likely to operate if the tire pressures are not adjusted appropriately. If the daily temperature variation is large, pressurize the tires high so that the tire pressures are suitable under cold conditions. Incorrect tire pressure warning operation becomes less likely.

3. IN CASE OF TIRE AND WHEEL REPLACEMENT

(a) When tires and wheels are replaced, always ensure that each transmitter ID is correctly registered.

TW

4. IN CASE OF REPLACEMENT OF TIRE PRESSURE WARNING ECU, TIRE PRESSURE WARNING VALVE AND TRANSMITTER, OR TIRE(S) WITH DIFFERENT TIRE PRESSURE

(a) Initialize the tire pressure warning system after any of the following is performed:

- Replacing the tire pressure warning ECU or the tire pressure warning valve and transmitter
- Installing tire(s) which require different tire pressure

HINT:

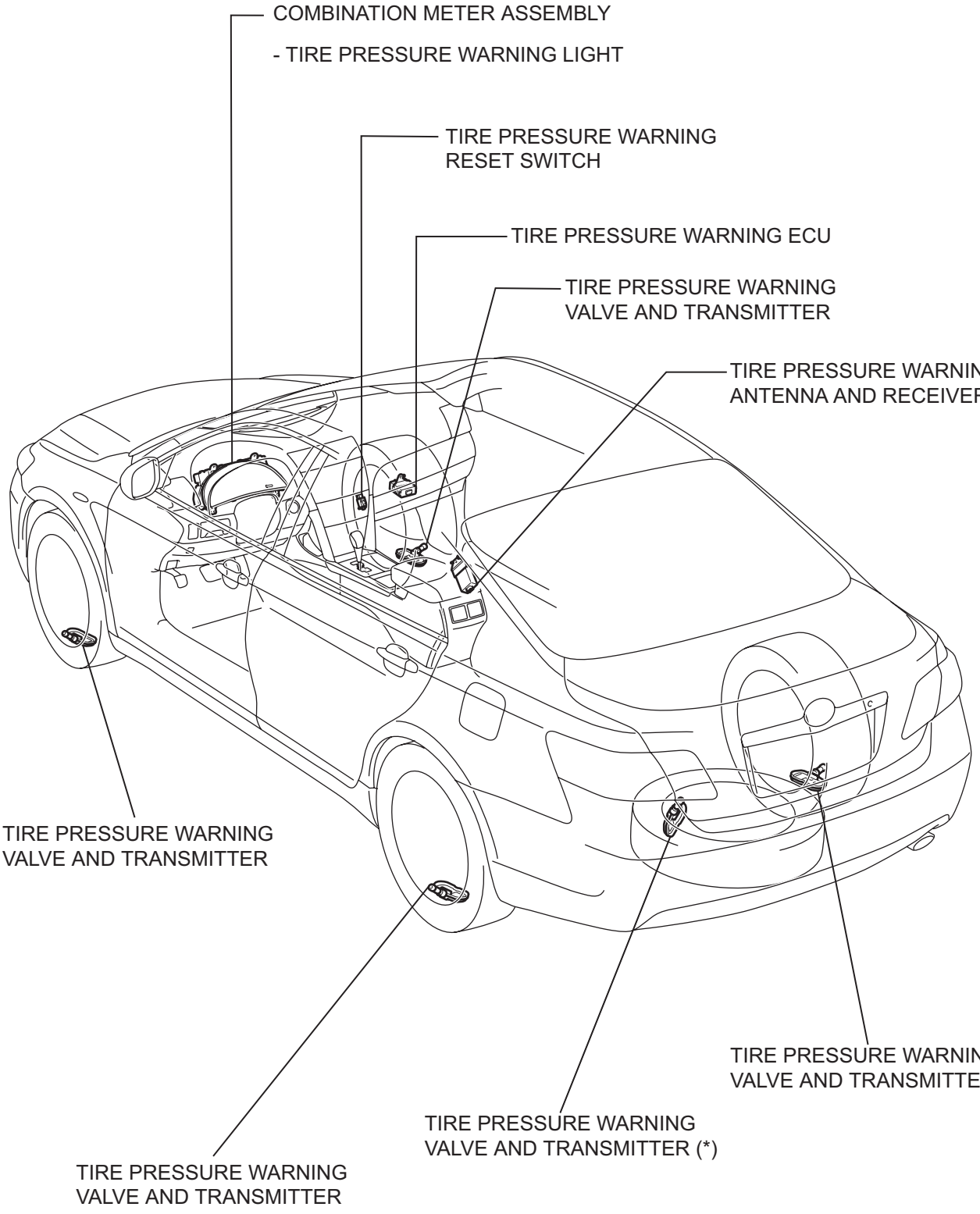
The tire pressure warning system will not operate properly if it is not initialized (See page TW-18).

5. FAIL-SAFE FUNCTION

(a) When a system malfunction occurs in the tire pressure warning system, the tire pressure warning light blinks (comes on after blinking for 1 minute) and informs the driver of the system failure.

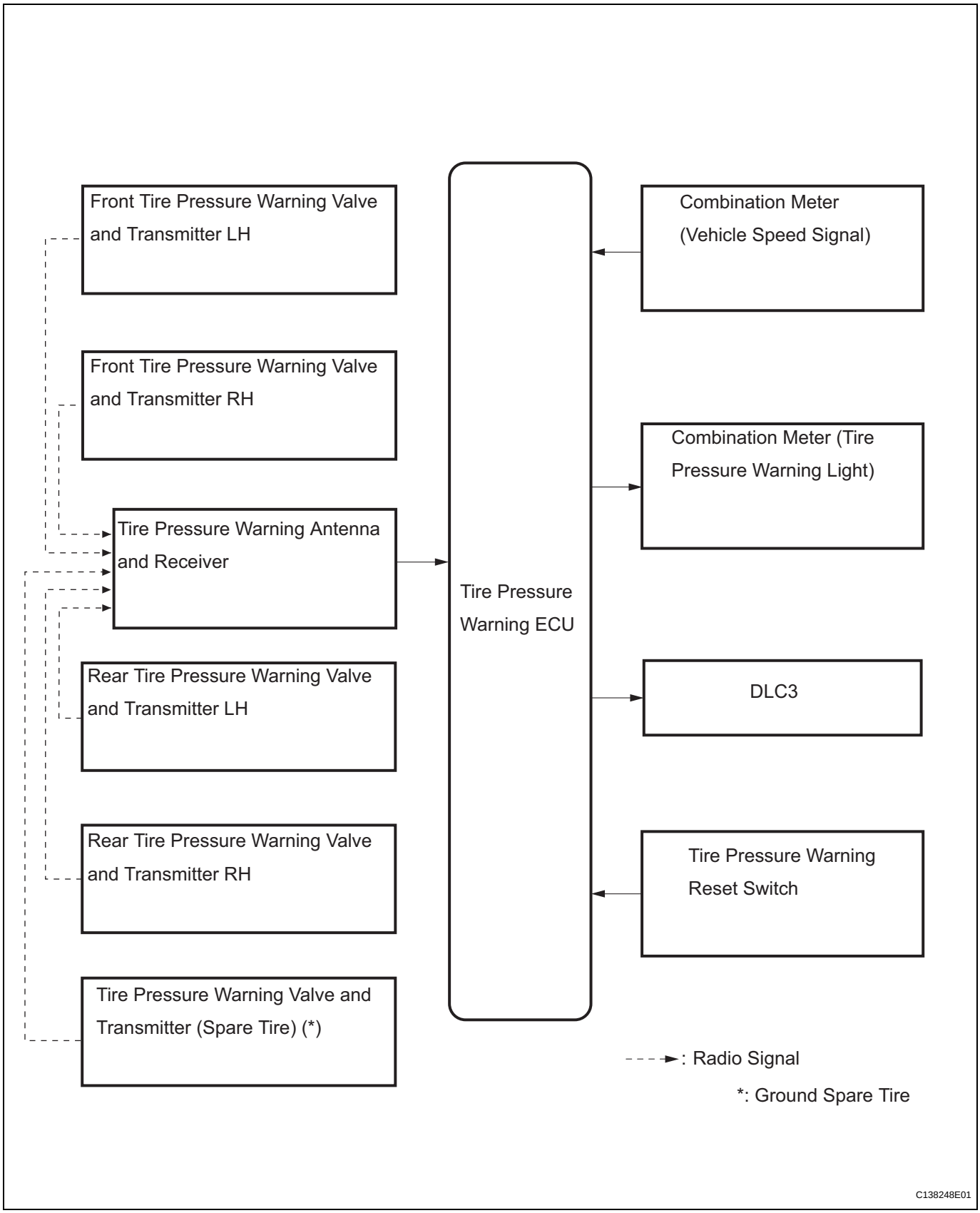
(b) The result of this diagnosis is stored in the tire pressure warning ECU.

PARTS LOCATION



TW

SYSTEM DIAGRAM

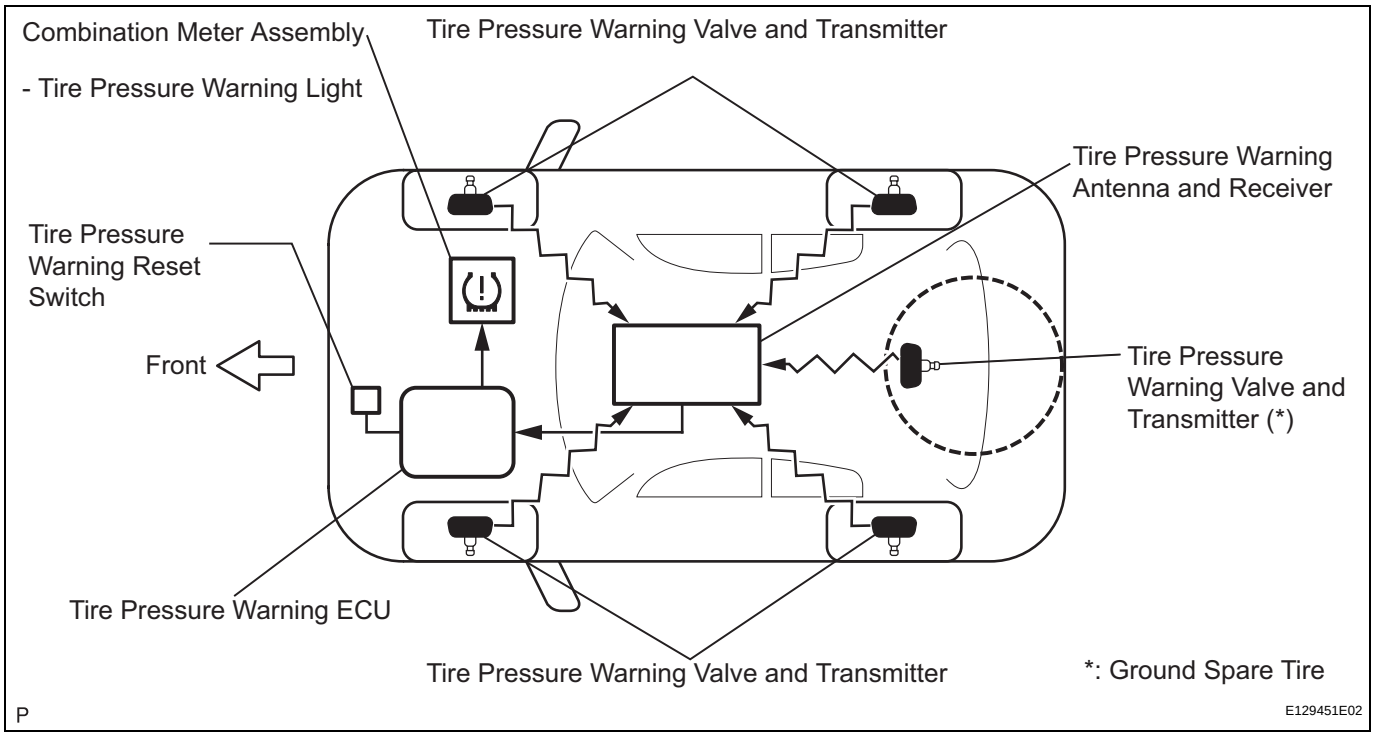


SYSTEM DESCRIPTION

1. DESCRIPTION OF SYSTEM

(a) A tire pressure warning valve and transmitter is equipped with a tire pressure sensor and a transmitter and is installed in a tire wheel assembly. The sensor measures the tire pressure. The measured value and transmitter ID are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU from the tire pressure warning antenna and receiver. If the transmitter ID has already been registered, the ECU compares the measured air pressure value with the standard value. When the value is less than the standard value registered in the tire pressure monitor ECU, the warning light on the combination meter comes on.

- For the differences in the air pressure settings by the type of tires, a tire pressure warning reset switch has been adopted.



2. WHEN TIRE PRESSURE WARNING LIGHT IS LIT

(a) When the tire pressure warning light does not go off, or when it comes on during driving, check tire pressure. If the tire pressure warning light comes on within several hours after adjusting the tire pressure, the tire may have a slow air leak.

(b) Under the following conditions, the system may not function properly.

- Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.

- A radio device of similar frequency is used in the vehicle.
- A large amount of snow or ice is stuck to the vehicle, especially onto the wheels and around the wheel houses.
- The battery of the sensor has been depleted.
- The tires without tire pressure warning valve and transmitter are used.
- Tire chains are used.
- When the ground spare tire is not within the receivable range of the electric wave, a signal may not be received because the ground spare tire is fixed. Accordingly, the system may not function properly. If there is a possibility that the tire pressure warning system does not receive a signal from the grounde spare tire, rotate the tire 90°.
- If any wheels other than the specified ones are used, the system may not function properly because interference may prevent the radio waves from being correctly transmitted from the tire pressure sensor.
- Depending on the tire type, the system may not function properly even though the specified wheels are used.

(c) The average usage life of the grommet of the tire pressure warning valve and transmitter is approximately 5 years, at which time it must be replaced.
Re-tighten the valve nut if the valve is leaking air, although it is less than 5 years old and there is no problem with grommets.

(d) After removing and installing the ECU or a sensor, check for a diagnostic code and verify that it is a normal code.

3. FUNCTION OF COMPONENTS

Components	Function
Tire pressure warning valve and transmitter	Combined as a single unit with a disc wheel air valve, it measures tire pressure and temperature and transmits an ID number for measurement value and identification. Built-in the battery.
Tire pressure warning antenna and receiver	Receives and transmits a necessary signal from the transmitter to the tire pressure warning ECU.
Tire pressure warning ECU	Receives the signal from the receiver and identifies it as vehicle's own signal. If the measured value is equal to or lower than the specified value, it transmits a signal so that the air pressure warning light on the combination meter comes on.
Tire pressure warning light	Located in the combination meter, it informs the driver of lowered tire air pressure and system failure.
Tire pressure warning reset switch	Enters the initialization mode for tire or wheel replacement.

4. TIRE PRESSURE WARNING RESET SWITCH

- By operating the tire pressure warning reset switch, the tire pressure warning ECU can be set to issue a warning at an inflation pressure that corresponds to the type of tires.
  Therefore, the dealer must set the warning threshold to the proper value in order to comply with the local regulations.
- Operate the tire pressure warning reset switch only after the inflation pressures of all tires (including the full-size spare tire) have been adjusted on the vehicle.
- To initialize the system, press and hold the tire pressure warning reset switch for 3 seconds or longer with the ignition switch on (IG). After the initialization process has started, the warning light blinks 3 times (1 second on, 1 second off).
- During initialization, the tire pressure warning valve and transmitter measures the inflation pressure of the tires, and registers the signals that are transmitted into the tire pressure warning ECU at a frequency of once per minute. The initialization process is completed when signals from the all tires (including the ground spare tire) have been received.

HOW TO PROCEED WITH TROUBLESHOOTING

The intelligent tester can be used at steps 3, 7 and 9.

1	Vehicle Brought to Workshop

NEXT

2	Customer Problem Analysis

NEXT

TW

3	Check Tire Pressure Warning Light and Indicator Condition

(a) Turn the ignition switch on (IG).
(b) Record the condition of the tire pressure warning light on the combination meter assembly.
(c) Refer to the "TIRE PRESSURE WARNING LIGHT AND INDICATOR CHART" section of the DIAGNOSIS SYSTEM for checking the condition of the tire pressure warning light (See page TW-24).

NEXT

4	DTC Check and Clear

→ DTC is output: Go to step 5
→ DTC is not output: Go to step 6

5	DTC Chart

→ Go to step 8

6	Problem Symptom Confirmation

→ Symptom does not occur: Symptom simulation
→ Symptom occurs: Go to step 7

7	Problem Symptoms Table

→ Go to step 9

8	Circuit Inspection

(a) Refer to PRECAUTION (See page TW-6).
(b) Refer to SYSTEM DESCRIPTION (See page TW-11).
(c) Set the tire pressures to the appropriate specified values.
(d) Perform initialization (See page TW-18).
(e) Perform test mode procedure (See page TW-20).
  (1) Check for a DTC (See page TW-28).
  (2) Clear the DTC.
  (3) Identify the transmitter corresponding to a DTC.
(f) Perform registration of the transmitter ID (See page TW-15).
(g) Check the terminals of ECU (See page TW-23).
(h) Refer to DATA LIST / ACTIVE TEST (See page TW-29).

NEXT

9	Repair

NEXT

10	Confirmation Test

(a) Check for a DTC (See page TW-28).
(b) Perform initialization (See page TW-18).
(c) Confirm that the initialization has been completed.

NEXT

End

REGISTRATION

1. READ TRANSMITTER ID

Prepare the all transmitter ID data before starting registration.

HINT:

- Read the registered transmitter IDs that are stored in the ECU using the intelligent tester and note them down.
- If reading stored transmitter IDs is impossible due to malfunctions of components such as the tire pressure warning antenna and receiver, remove the tires from the wheels and check the IDs located on the tire pressure warning valves and transmitters (See page TW-6).
- When replacing the tire pressure warning ECU, read the IDs stored in the old ECU using the intelligent tester.
- When replacing the tire pressure warning valves and transmitters, note down the IDs written on the tire pressure warning valves and transmitters.

2. REGISTER TRANSMITTER ID

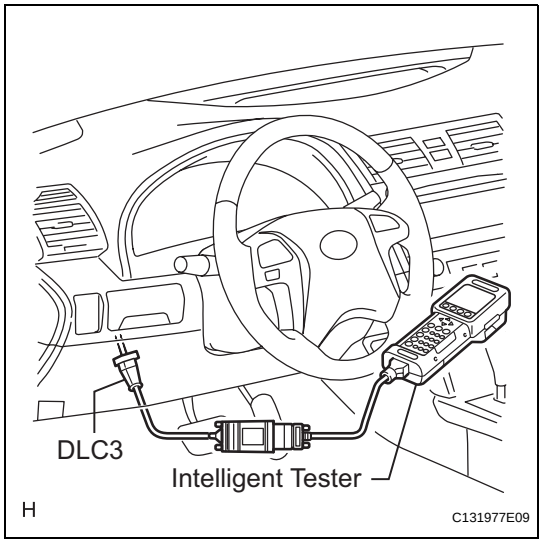
NOTICE:

It is necessary to register the transmitter ID in the tire pressure warning ECU when replacing the tire pressure warning valve and transmitter and/or tire pressure warning ECU.

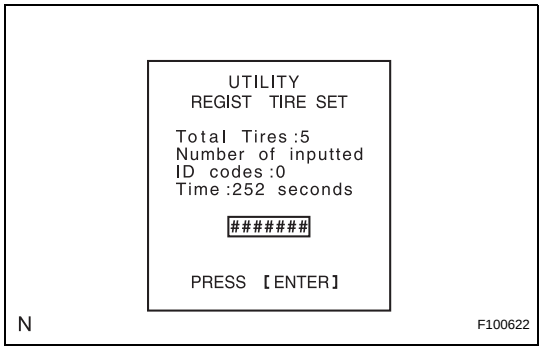
(a) Connect the intelligent tester to DLC3 (Procedure "A").

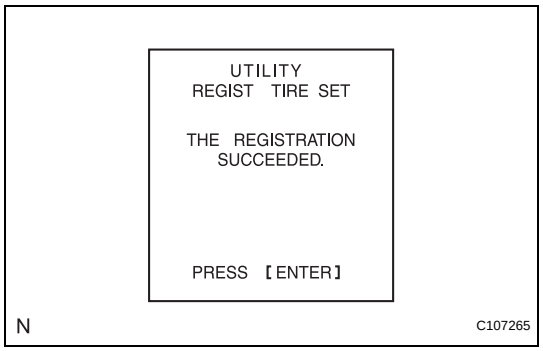
(b) Turn the ignition switch on (IG) (Procedure "B").

(c) Select the REGIST TIRE following the intelligent tester screen (UTILITY - REGIST TIRE) (Procedure "C").



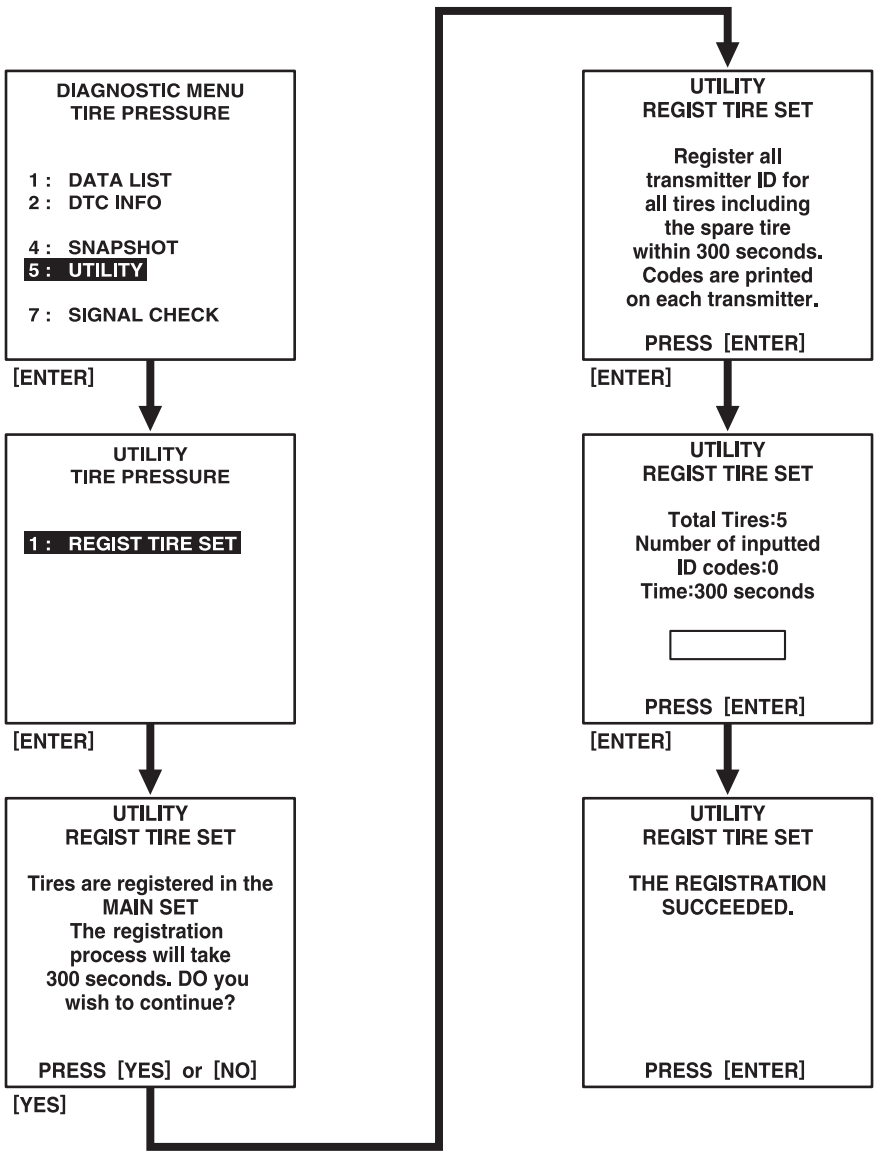
(d) Input the IDs (ID1 to ID4 or ID5) using the intelligent tester and transmit them to the tire pressure warning ECU (Procedure "D").





(e) Set the ID transmission condition to "ID Registration is complete" (Procedure "E").
HINT:
- The previously registered IDs will be deleted from the memory when the registration is completed.
- If the procedures "C" to "D" are not completed within 5 min. , the mode will return to the normal operation mode.
- When the system is in initialization mode after the tire pressure warning reset switch has been operated, the registration is disabled until the initialization process is canceled or completed.

Registration Procedure



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3. CONFIRMATION OF TRANSMITTER ID REGISTRATION

(a) Connect the intelligent tester to DLC3 (ignition switch is off).
(b) Turn the ignition switch on (IG).
(c) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.

(d) Confirm that the data of tire pressure of all tires (including the ground spare tire) are displayed on the intelligent tester screen.
NOTICE:
- **It may take up to 1 minute or more to update the tire pressure data.**
- **If the IDs have not been registered, some of DTC C2171/71 is set in the tire pressure warning ECU after 51 minutes or more.**

INITIALIZATION

1. INITIALIZATION

NOTICE:

- **Perform initialization after the transmitter ID registration is completed.**
- **Initialization is necessary after replacing any of the ECU, tires with different tire pressure, or tire pressure warning valve and transmitter, or when a new vehicle is delivered.**
- **Perform the tire pressure adjustment after the vehicle has sufficiently cooled down. If the vehicle is not sufficiently cooled down, increase the air pressure by 20 to 30 kPa (0.2 to 0.3 kgf/cm^2, 2.9 to 4.3 psi) above the specified value.**

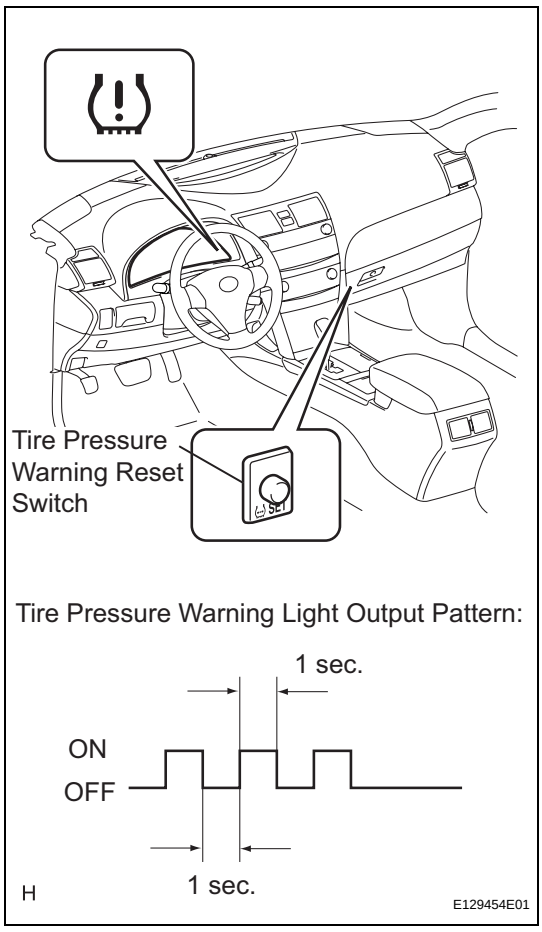
(a) Set the air pressure of all wheels, including the ground spare tire, to the specified value.

TW

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94W	210 (2.1, 31) *1 240 (2.4, 35)*2	210 (2.1, 31) *1 240 (2.4, 35)*2
P215/55R17 93V	220 (2.2, 32) *1 240 (2.4, 35)*2	220 (2.2, 32) *1 240 (2.4, 35)*2

*1: For driving under 100 mph (160 km/h)
*2: For driving at 100 mph (160 km/h) or over

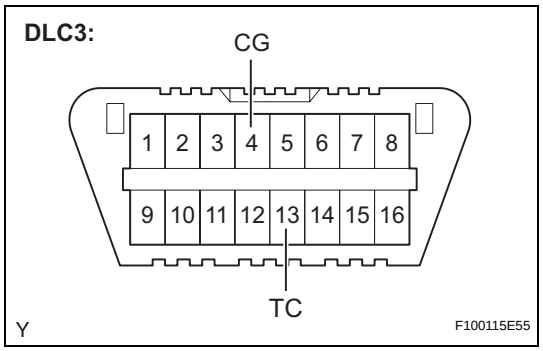


(b) Keep the tire pressure warning reset switch pressed for 3 seconds or more with the ignition switch on (IG).

(c) Check that the tire pressure warning light blinks 3 times (1 second ON, 1 second OFF).

HINT:

- Initialization will be completed if signals are received from all the wheels. Initialization will be canceled if the ignition switch is turned off during initialization.



(d) Wait for 2 or 3 minutes with the ignition switch on (IG).

NOTICE:

- **The initialization is normally completed within 2 to 3 minutes.**
- **If the initialization has not been completed successfully, DTC C2177/77 is set approximately 20 minutes.**
- **The initialization can be terminated by making a short circuit between terminals TC and CG of the DLC3 connector.**

(e) Confirm that the initialization has been completed using the intelligent tester.

(1) Change the mode to test mode using intelligent tester and check that test DTCs have been stored.

- The test DTCs will not be indicated until the system initialization is complete.
- After the initialization has been completed successfully, the test DTCs (C2181/81 to C2191/91) are indicated.

NOTICE:

The following operations can be used instead of above procedure

1. **Turn the ignition switch from off to on (IG).**
2. **Monitor the tire pressure values of all the wheels using intelligent tester.**
3. **If the tire pressure values cannot be displayed on the intelligent tester screen, the initialization has failed.**
4. **It takes 2 to 3 minutes to display the tire pressure data.**

HINT:

- In winter, as the tire pressure may decrease depending on the ambient temperature, increase the tire pressure by 20 to 30 kPa (0.2 to 0.3 kgf/cm^2, 2.9 to 4.3 psi) above the specified value after confirmation that the initialization has been completed.

TW

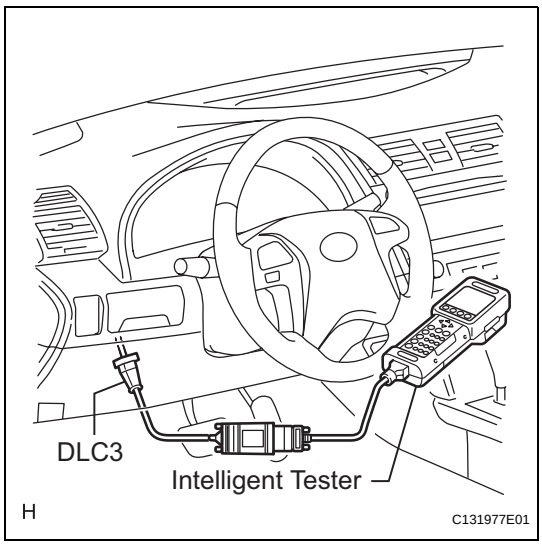
TEST MODE PROCEDURE

1. ENTER TEST MODE

HINT:

- Operation of the tire pressure warning reset switch can be checked in TEST MODE.
- During TEST MODE, the system is not initialized by pushing the tire pressure warning reset switch. The circuit of the tire pressure warning reset switch can be inspected during this mode.

(a) Make sure that the ignition switch is off.
(b) Connect the intelligent tester to DLC3.
(c) Turn the ignition switch on (IG).
(d) Select the TEST MODE on intelligent tester.
(e) Confirm that the tire pressure warning light in the combination meter blinks at 0.125 second intervals.

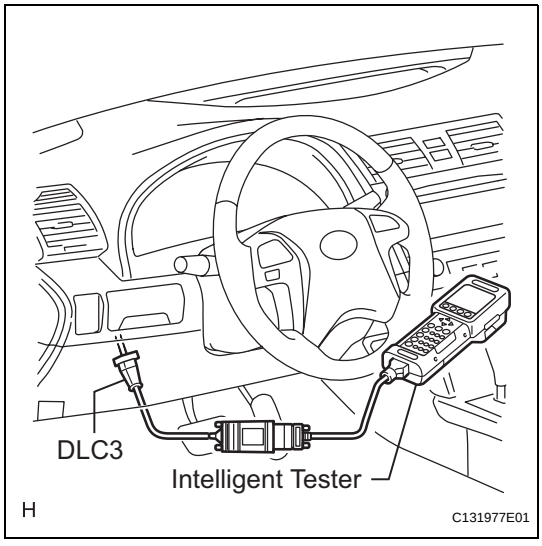


2. PERFORM SIGNAL CHECK

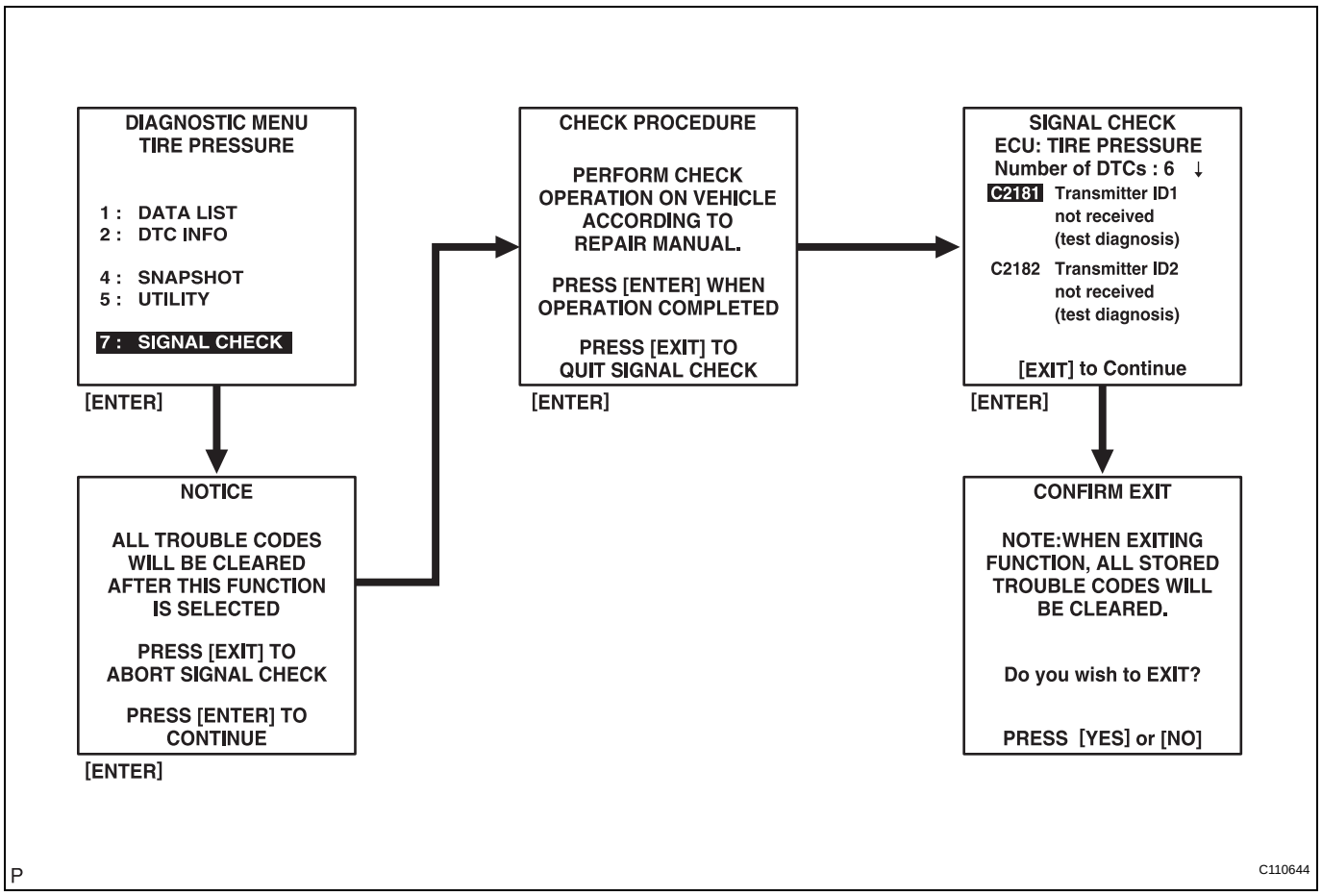
HINT:

- When entering signal check mode, the tire pressure warning ECU sets all the signal check DTCs first. After completing signal check for each inspection item, the DTCs for systems that are determined to be normal by the tire pressure warning ECU will be erased.
  The DTCs for other inspection items may not be erased when only a certain signal is inspected.
- When signal check returns to normal mode, all the signal check DTCs will be erased.

(a) Make sure that the ignition switch is off.
(b) Connect the intelligent tester to DLC3.
(c) Turn the ignition switch on (IG).



(d) Select the SIGNAL CHECK on intelligent tester.



(e) Drive the vehicle at 12 mph (20 km/h) or more for 10 seconds or more. For checking the vehicle speed signal (C2191/91).

(f) Loosen the valve core and rapidly reduce the pressure (at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds or more). For checking the transmitter data (C2181/81 to C2185/85).
HINT:
The transmitter ID can be transmitted by rapidly reducing the tire pressure.

(g) Check that the tire pressure warning system test mode DTCs are erased.

SIGNAL CHECK DTC	Test Signal	Signal Check DTC Clear Condition
C2181/81 to C2185/85	Transmitter Data	Receive data from the transmitter which has a registered ID in the tire pressure warning ECU
C2191/91	Vehicle Speed Signal	Vehicle speed of 12 mph (20 km/h) or more is detected for 3 seconds or more

(h) Check the tire pressure warning reset switch.
(1) Press the tire pressure warning reset switch.
(2) Check the tire pressure warning indicator light.

Test Signal	Normal Condition
Tire Pressure Warning Reset Switch	• Switch ON: TPWS indicator comes on • Switch OFF: TPWS indicator blinks

(i) Result
HINT:
After the signal check is completed, check for a DTC and signal check DTC to confirm the system status.

Condition	Procedure
SIGNAL CHECK DTC is output	Repair the faulty part and enter SIGNAL CHECK again
SIGNAL CHECK DTCs are cleared	No problem

(j) End of SIGNAL CHECK
After completing the test mode (SIGNAL CHECK), turn the ignition switch off and disconnect the tester.

DTC of SIGNAL CHECK (TEST DIAGNOSIS) function:
If a trouble code is displayed during the test mode DTC check, check the circuit listed for that code. For details of each code, refer to the relevant page listed under respective "DTC No." in the chart.

DTC No.	Detection Item	Trouble Area
C2181/81 (TW-38)	Transmitter ID1 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2182/82 (TW-38)	Transmitter ID2 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2183/83 (TW-38)	Transmitter ID3 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2184/84 (TW-38)	Transmitter ID4 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2185/85 (TW-38)	Transmitter ID5 not received	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2191/91 (TW-61)	Vehicle speed signal error	• Vehicle speed sensor • Combination meter assembly • Wire harness or connector • Tire pressure warning ECU

PROBLEM SYMPTOMS TABLE

HINT:

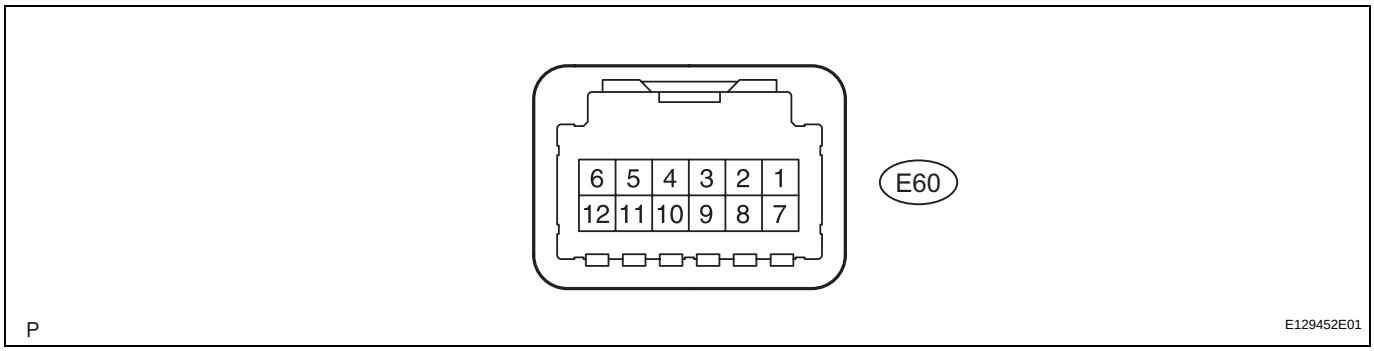
- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

TIRE PRESSURE WARNING SYSTEM:

Symptom	Suspected area	See page
Tire pressure warning system does not operate.	1. Tire pressure warning valve and transmitter	TW-77
	2. Tire pressure warning antenna and receiver	TW-73
	3. Power source circuit	TW-67
	4. TC and CG terminal circuit	TW-69
	5. Combination meter assembly	ME-15
	6. Tire pressure warning ECU	TW-82
DTC check cannot be done.	1. Power source circuit	TW-82
	2. TC and CG terminal circuit	TW-69
	3. Tire pressure warning ECU	TW-82
Tire pressure warning light malfunctions (Remains on).	1. Tire pressure check	TW-3
	2. Initialization	TW-18
	3. Tire pressure warning ECU connector poorly connected	TW-24
	4. Tire pressure warning light circuit	TW-65
	5. Tire pressure warning ECU	TW-82
Tire pressure warning light malfunctions (Blinking).	1. Check DTC	TW-28
	2. Tc and CG terminal circuit	TW-69
	3. Test mode (SIGNAL CHECK)	TW-20
	4. Tire pressure warning ECU	TW-82
Initialization cannot be done.	1. Test mode (SIGNAL CHECK)	TW-20
	2. Tire pressure reset switch	TW-85
	3. Tire pressure warning ECU	TW-82

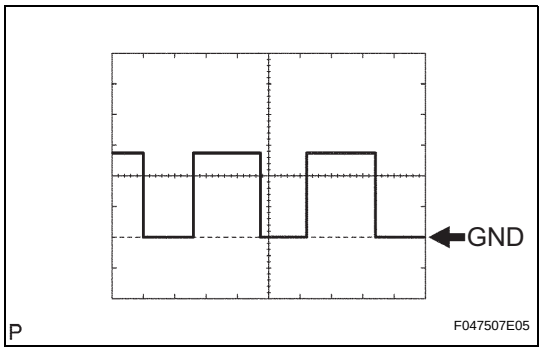
TERMINALS OF ECU

HINT:
Inspect the connectors from the back side while the connectors are connected.



TW

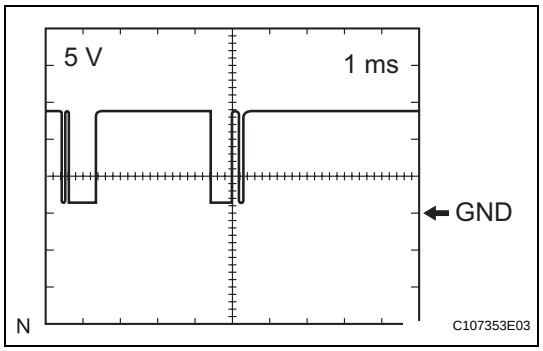
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (E60-7) - GND (E60-9)	B - W-B	IG power source	Ignition switch on (IG)	10 to 16 V
SPD (E60-2) - GND (E60-9)	V - W-B	Vehicle speed signal	Ignition switch on (IG)	Pulse generation (See waveform 1)
SIL (E60-10) - GND (E60-9)	GR - W-B	Diagnostic communication terminal	• Ignition switch on (IG) • Intelligent tester is connected to DLC3	Pulse generation (See waveform 2)
IND (E60-5) - GND (E60-9)	L - W-B	Tire pressure warning light signal	Ignition switch on (IG)	10 to 16 V
RF5V (E60-6) - GND (E60-9)	LC - W-B	Tire pressure warning antenna and receiver power source	Ignition switch on (IG)	4.5 to 5.5 V
CLSW (E60-1) - GND (E60-9)	O - W-B	Tire pressure warning reset switch	• Ignition switch on (IG) • Tire pressure warning reset switch on	8 to 15V
RDA (E60-12) - GND (E60-9)	G - W-B	Tire pressure warning antenna and receiver signal	• Ignition switch on (IG) • The Tire pressure warning antenna and receiver is not connected	9 to 16 V
GND2 (E60-11) - GND (E60-9)	BR - W-B	Tire pressure warning antenna and receiver ground	Always	Below 1 Ω



1. Waveform 1 (Reference)

(a) Waveform

Item	Contents
Terminal	SPD - GND
Tool setting	5V/DIV, 200ms/DIV.
Vehicle condition	While driving at approximately 12 mph (20 km/h).



2. Waveform 2 (Reference)

(a) Waveform

Item	Contents
Terminal	SIL - Body ground
Tool setting	5 V/DIV., 1 ms/DIV.
Vehicle condition	Communicating using intelligent tester

DIAGNOSIS SYSTEM

1. CHECK BATTERY VOLTAGE

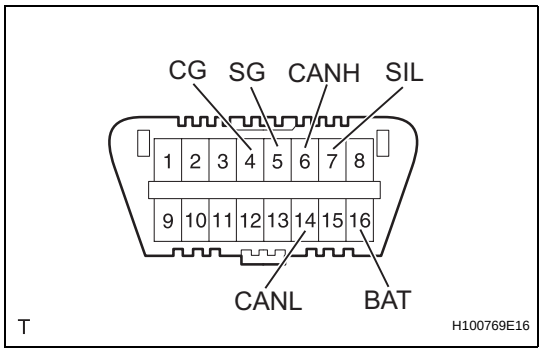
Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding.

2. CHECK DLC3

(a) The ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



TW

Symbols (Terminal NO.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch off*	200 Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch off*	200 Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch off*	6 kΩ or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch off*	6 kΩ or higher

NOTICE:

***Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, or any other switches or the doors.**

(b) If the result is not as specified, DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

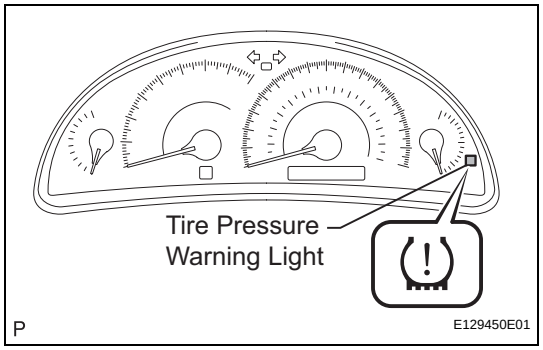
3. DIAGNOSIS SYSTEM

(a) DTCs (Normal mode)

(1) DTCs are memorized in the tire pressure warning ECU and read by the blinks of the tire pressure warning light or by using the intelligent tester (See page TW-28).

(b) Test mode

(1) By switching from normal mode into test mode (input signal check), you can inspect the tire pressure warning antenna and receiver, each tire pressure warning valve and transmitter, and vehicle speed sensor (See page TW-20).



4. CHECK WARNING LIGHT

(a) Turn the ignition switch on (IG).

(b) Check that the tire pressure warning light comes on for 3 seconds.

If the warning check result is not normal, proceed to the troubleshooting for the tire pressure warning light circuit.

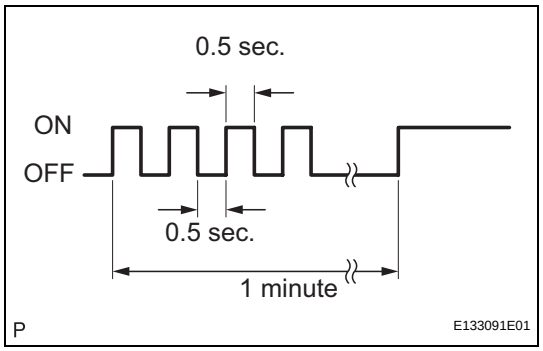
Trouble Area	See procedure
Tire pressure warning light circuit	TW-65

5. TIRE PRESSURE WARNING LIGHT AND INDICATOR CHART

HINT:

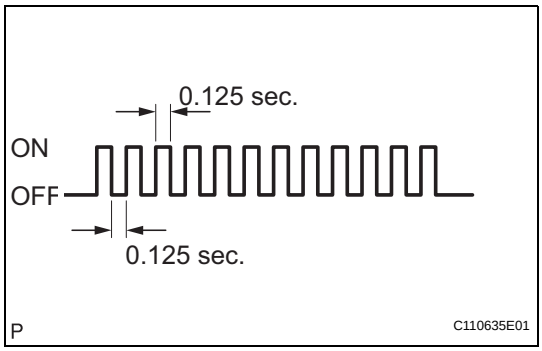
The table below indicates the state of the tire pressure warning light and indicator after the ignition switch is turned on (IG).

	Immediately after turning the ignition switch on (IG)	Always					
		Warning light output pattern					
	Comes on for 3 sec.	Goes off	Comes on	Blinks (*1)	Blinks (*2)	Blinks (*3)	Outputs DTC
Normal	○	○	-	-	-	-	-
Low tire pressure	○	-	○	-	-	-	-
System fail	○	-	-	○	-	-	-
Test mode	○	-	-	-	○	-	-
Initialization	○	-	-	-	-	○	-
ECU connector poorly connected	-	-	-	○	-	-	-
TC ground	○	-	-	-	-	-	○

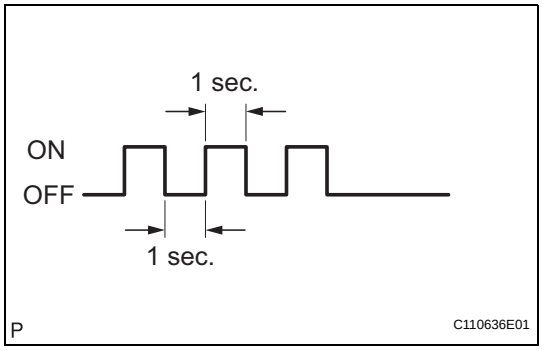


*1: Comes on and goes off repeatedly at 0.5 second intervals, and comes on after 1 minute.

TW



*2: Comes on and goes off repeatedly at 0.125 second intervals.



*3: Blinks 3 times (1 second on, 1 second off).

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- If no abnormality is found when the parts are inspected, inspect the tire pressure warning ECU.
- If a malfunction code is displayed during the DTC check, inspect the circuit listed for that code. For details of each code, refer to the relevant page listed under respective "DTC No." in the DTC chart.

TIRE PRESSURE WARNING SYSTEM

DTC No.	Detection Item	Trouble Area	See page
C2111/11	Transmitter ID1 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2112/12	Transmitter ID2 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2113/13	Transmitter ID3 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2114/14	Transmitter ID4 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2115/15	Transmitter ID5 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2121/21	No Signal from Transmitter ID1 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2122/22	No Signal from Transmitter ID2 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2123/23	No Signal from Transmitter ID3 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2124/24	No Signal from Transmitter ID4 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2125/25	No Signal from Transmitter ID5 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2141/41	Transmitter ID1 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46
C2142/42	Transmitter ID2 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46

DTC No.	Detection Item	Trouble Area	See page
C2143/43	Transmitter ID3 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure waning ECU	TW-46
C2144/44	Transmitter ID4 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46
C2145/45	Transmitter ID5 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46
C2165/65	Abnormal Temperature Inside ID1 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2166/66	Abnormal Temperature Inside ID2 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2167/67	Abnormal Temperature Inside ID3 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2168/68	Abnormal Temperature Inside ID4 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2169/69	Abnormal Temperature Inside ID5 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2176/76	Receiver Error	1. Tire pressure warning antenna and receiver 2. Wire harness or connector 3. Tire pressure warning ECU	TW-55
C2171/71	Transmitter ID not Registered	Tire pressure warning ECU	TW-53
C2177/77	Initialization not Completed	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU 3. Tire pressure warning antenna and receiver 4. Tire pressure warning reset switch 5. Wire harness or connector	TW-58
C2181/81	Transmitter ID1 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2182/82	Transmitter ID2 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2183/83	Transmitter ID3 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38

DTC No.	Detection Item	Trouble Area	See page
C2184/84	Transmitter ID4 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2185/85	Transmitter ID5 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2191/91	Vehicle Speed Signal Error (Test Mode DTC)	1. Vehicle speed sensor 2. Tire pressure warning ECU 3. Combination meter 4. Wire harness or connector	TW-61

DATA LIST / ACTIVE TEST

1. DATA LIST

(a) Connect the intelligent tester to DLC3.
(b) Turn the ignition switch on (IG).
(c) Following the display on the intelligent tester, read "DATA LIST".

Item	Measurement item/ Range (Display)	Normal Condition	Diagnostic Note
MODE STATUS	Tire pressure warning system mode/NORMAL or REG 2nd or REG M or TEST	NORMAL: Normal mode TEST: Test mode	-
MAIN TIRE	Number of main tire ID to be registered/ 0 or 1 or 2 or 3 or 4 or 5	0 to 5 should be displayed	-
INITIAL SW	Tire pressure warning reset switch/ON, OFF	ON: Switch on OFF: Switch off	-
VEHICLE SPEED	Vehicle speed reading/ min.: 0 km/h (0 mph), max.: 255 km/h (158 mph)	Actual vehicle speed	Speed indicated on the combination meter
REGIT ID1 CODE	Registered ID1 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID1 is displayed	-
REGIT ID2 CODE	Registered ID2 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID2 is displayed	-
REGIT ID3 CODE	Registered ID3 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID3 is displayed	-
REGIT ID4 CODE	Registered ID4 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID4 is displayed	-
REGIT ID5 CODE	Registered ID5 code/min.: 0, max.: FFFFFFF	The ID No. registered in the transmitter ID5 is displayed	-
TRANS STATUS	ID code transmission status/ FINISH or NOW	FINISH or NOW	-
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS5	ID5 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIRE TEMP1	ID1 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
TIRE TEMP2	ID2 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
TIRE TEMP3	ID3 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
TIRE TEMP4	ID4 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-

Item	Measurement item/ Range (Display)	Normal Condition	Diagnostic Note
TIRE TEMP5	ID5 temperature in tire/ min.: -40°C (-40°F), max.: 215°C (419°F)	Actual tire temperature	-
BATT VOLT1	ID1 battery voltage/ OVER or LESS	OVER	-
BATT VOLT2	ID2 battery voltage/ OVER or LESS	OVER	-
BATT VOLT3	ID3 battery voltage/ OVER or LESS	OVER	-
BATT VOLT4	ID4 battery voltage/ OVER or LESS	OVER	-
BATT VOLT5	ID5 battery voltage/ OVER or LESS	OVER	-
SELECT SW INFO	Select switch setting information/ WITH or WITHOUT	WITH or WITHOUT	-
INITIAL SW INFO	Tire pressure warning reset switch setting information/ WITH or WITHOUT	WITH or WITHOUT	-
INIT THRESHOLD1	ID1 initial threshold of low-pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kpa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
INIT THRESHOLD2	ID2 initial threshold of low-pressure/ min.: 0 kpa (0 kgf/cm^2, 0 psi), max.: 637.5 kpa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
INIT THRESHOLD3	ID3 initial threshold of low-pressure/ min.: 0 kpa (0 kgf/cm^2, 0 psi), max.: 637.5 kpa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
INIT THRESHOLD4	ID4 initial threshold of low-pressure/ min.: 0 kpa (0 kgf/cm^2, 0 psi), max.: 637.5 kpa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
INIT THRESHOLD5	ID5 initial threshold of low-pressure/ min.: 0 kpa (0 kgf/cm^2, 0 psi), max.: 637.5 kpa (6.48 kgf/cm^2, 92.2 psi)	Tire pressure after initialization	-
# CODES	Number of DTC recorded/ min.: 0, max.: 255	Min.: 0, Max.: -	-

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- If no abnormality is found when the parts are inspected, inspect the tire pressure warning ECU.
- If a malfunction code is displayed during the DTC check, inspect the circuit listed for that code. For details of each code, refer to the relevant page listed under respective "DTC No." in the DTC chart.

TIRE PRESSURE WARNING SYSTEM

DTC No.	Detection Item	Trouble Area	See page
C2111/11	Transmitter ID1 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2112/12	Transmitter ID2 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2113/13	Transmitter ID3 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2114/14	Transmitter ID4 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2115/15	Transmitter ID5 Operation Stop	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-34
C2121/21	No Signal from Transmitter ID1 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2122/22	No Signal from Transmitter ID2 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2123/23	No Signal from Transmitter ID3 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2124/24	No Signal from Transmitter ID4 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2125/25	No Signal from Transmitter ID5 in Main Mode	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2141/41	Transmitter ID1 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46
C2142/42	Transmitter ID2 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46

DTC No.	Detection Item	Trouble Area	See page
C2143/43	Transmitter ID3 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure waning ECU	TW-46
C2144/44	Transmitter ID4 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46
C2145/45	Transmitter ID5 Error	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU	TW-46
C2165/65	Abnormal Temperature Inside ID1 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2166/66	Abnormal Temperature Inside ID2 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2167/67	Abnormal Temperature Inside ID3 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2168/68	Abnormal Temperature Inside ID4 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2169/69	Abnormal Temperature Inside ID5 Tire	1. Tires 2. Tire pressure warning valve and transmitter 3. Tire pressure warning ECU	TW-49
C2176/76	Receiver Error	1. Tire pressure warning antenna and receiver 2. Wire harness or connector 3. Tire pressure warning ECU	TW-55
C2171/71	Transmitter ID not Registered	Tire pressure warning ECU	TW-53
C2177/77	Initialization not Completed	1. Tire pressure warning valve and transmitter 2. Tire pressure warning ECU 3. Tire pressure warning antenna and receiver 4. Tire pressure warning reset switch 5. Wire harness or connector	TW-58
C2181/81	Transmitter ID1 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2182/82	Transmitter ID2 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2183/83	Transmitter ID3 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38

DTC No.	Detection Item	Trouble Area	See page
C2184/84	Transmitter ID4 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2185/85	Transmitter ID5 not Received (Test Mode DTC)	1. Tire pressure warning valve and transmitter 2. Tire pressure warning antenna and receiver 3. Wire harness or connector 4. Tire pressure warning ECU	TW-38
C2191/91	Vehicle Speed Signal Error (Test Mode DTC)	1. Vehicle speed sensor 2. Tire pressure warning ECU 3. Combination meter 4. Wire harness or connector	TW-61

DTC	C2111/11	Transmitter ID1 Operation Stop

DTC	C2112/12	Transmitter ID2 Operation Stop

DTC	C2113/13	Transmitter ID3 Operation Stop

DTC	C2114/14	Transmitter ID4 Operation Stop

DTC	C2115/15	Transmitter ID5 Operation Stop

DESCRIPTION

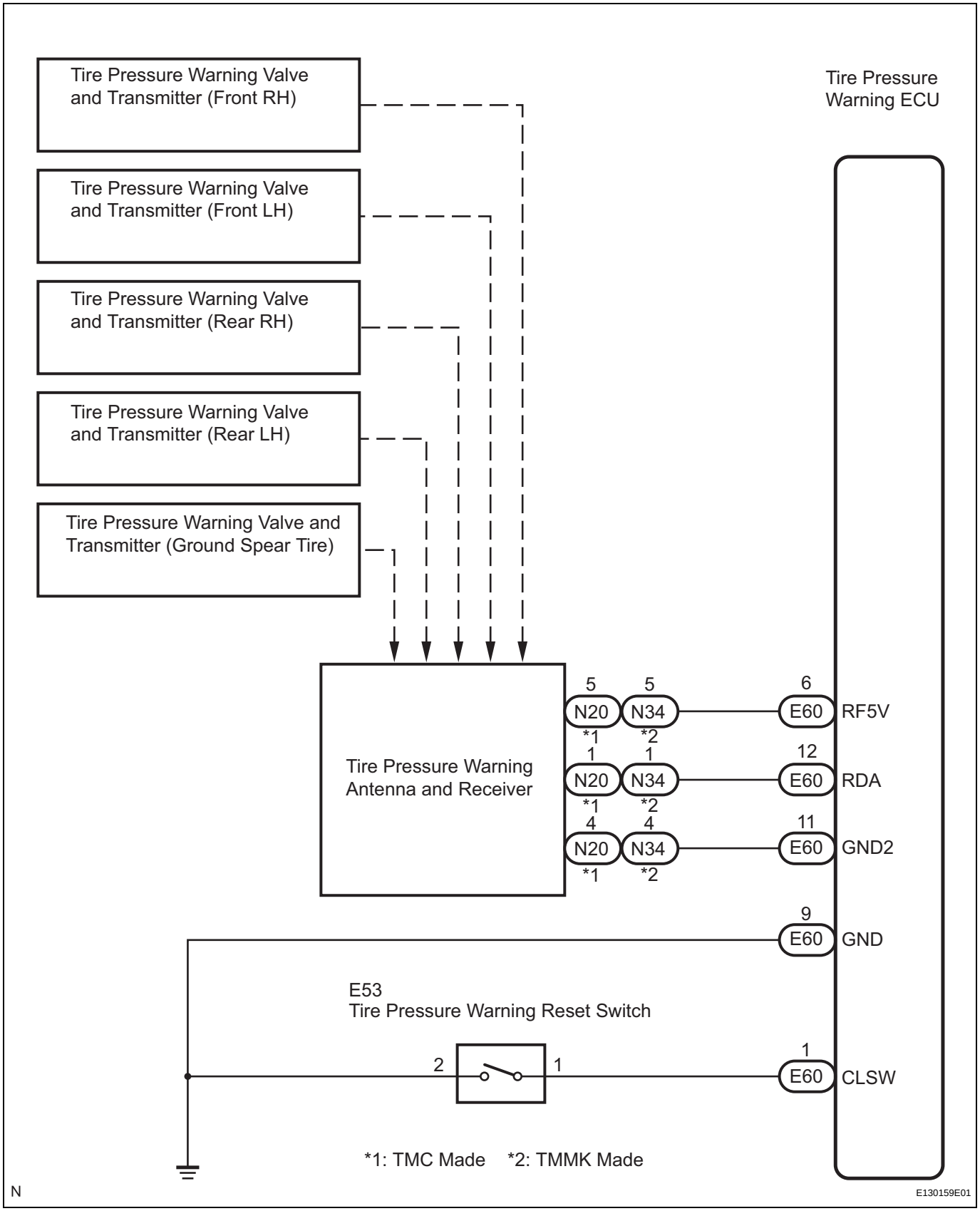
The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the air pressures of the tires. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on. The tire pressure warning ECU stores a DTC when the tire pressure warning valve and transmitter stops transmitting signals. At this time, forcibly transmit the signals by releasing the tire pressure rapidly. The stored DTC is cleared when the signal transmission is resumed.

DTC No.	DTC Detecting Condition	Trouble Area
C2111/11 C2112/12 C2113/13 C2114/14 C2115/15	Tire pressure warning valve and transmitters stop transmitting signals	• Tire pressure warning valve and transmitter • Tire pressure warning ECU

HINT:

- It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.
- DTC C2115/15 are used only when the vehicle is equipped with a ground spare tire.

WIRING DIAGRAM



TW

INSPECTION PROCEDURE

NOTICE:

- **It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

HINT:

Set the tire pressure to the specified value.

1	PERFORM FORCED TRANSMISSION OF TRANSMITTER ID OF ALL WHEELS

(a) Set the tire pressure to the specified value.

Cold tire Inflation Pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf / cm^2, psi)
P215/60R16 94 V	210 (2.1, 31)	210 (2.1, 31)
P215/55R17 93 V	220 (2.2, 32)	220 (2.2, 32)

TW

(b) Connect the intelligent tester to the DLC3.

(c) Turn the ignition switch on (IG) and turn the tester ON.

(d) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.

Item	Measurement Item/Range (display)	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS5	ID5 tire inflation pressure / min.:0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf / cm^2, 92.2 psi)	Actual tire inflation pressure	-

(e) Rapidly release the pressures from each wheel by approximately 40 kPa (0.4 kgf / cm^2, 5.8 psi) /30 seconds or more.

(1) Check that each tire pressure data displayed on the intelligent tester screen has changed.

OK:

Each tire pressure data displayed on the intelligent tester screen will change to the value of the tire pressure.

NOTICE:

- **It takes about 1 minute or more to display the updated tire pressure data.**

- **When the "TIREPRESS" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees (including the ground spare tire). Then rapidly release the tire pressure and recheck it.**

(2) After confirming that all of the tire pressure data displayed on the intelligent tester screen have changed, set the tire pressure to the appropriate specified values.
HINT:
If the tire pressure data displayed on the intelligent tester screen has not changed after rechecking, go to other problem procedure (For malfunction in transmission or reception function (See page TW-23)

NG → **INSPECT OTHER PROBLEM (MALFUNCTION IN TRANSMISSION OR RECEPTION FUNCTION)**

OK

END

DTC	C2121/21	No Signal from Transmitter ID1 in Main Mode
DTC	C2122/22	No Signal from Transmitter ID2 in Main Mode
DTC	C2123/23	No Signal from Transmitter ID3 in Main Mode
DTC	C2124/24	No Signal from Transmitter ID4 in Main Mode
DTC	C2125/25	No Signal from Transmitter ID5 in Main Mode
DTC	C2181/81	Transmitter ID1 not Received (Test Mode DTC)
DTC	C2182/82	Transmitter ID2 not Received (Test Mode DTC)
DTC	C2183/83	Transmitter ID3 not Received (Test Mode DTC)
DTC	C2184/84	Transmitter ID4 not Received (Test Mode DTC)
DTC	C2185/85	Transmitter ID5 not Received (Test Mode DTC)

DESCRIPTION

The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the air pressure of the tires. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on.

The tire pressure warning valve and transmitters constantly send radio waves to the tire pressure warning antenna and receiver.

Under the following conditions below, the tire pressure warning antenna and receiver is unable to receive the signals from the tire pressure warning valves and transmitters, and a DTC is stored.

- Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.
- Devices using similar radio frequencies are used in the vehicle.

HINT:

When no signals are received for 51 minutes or more, a DTC is output.

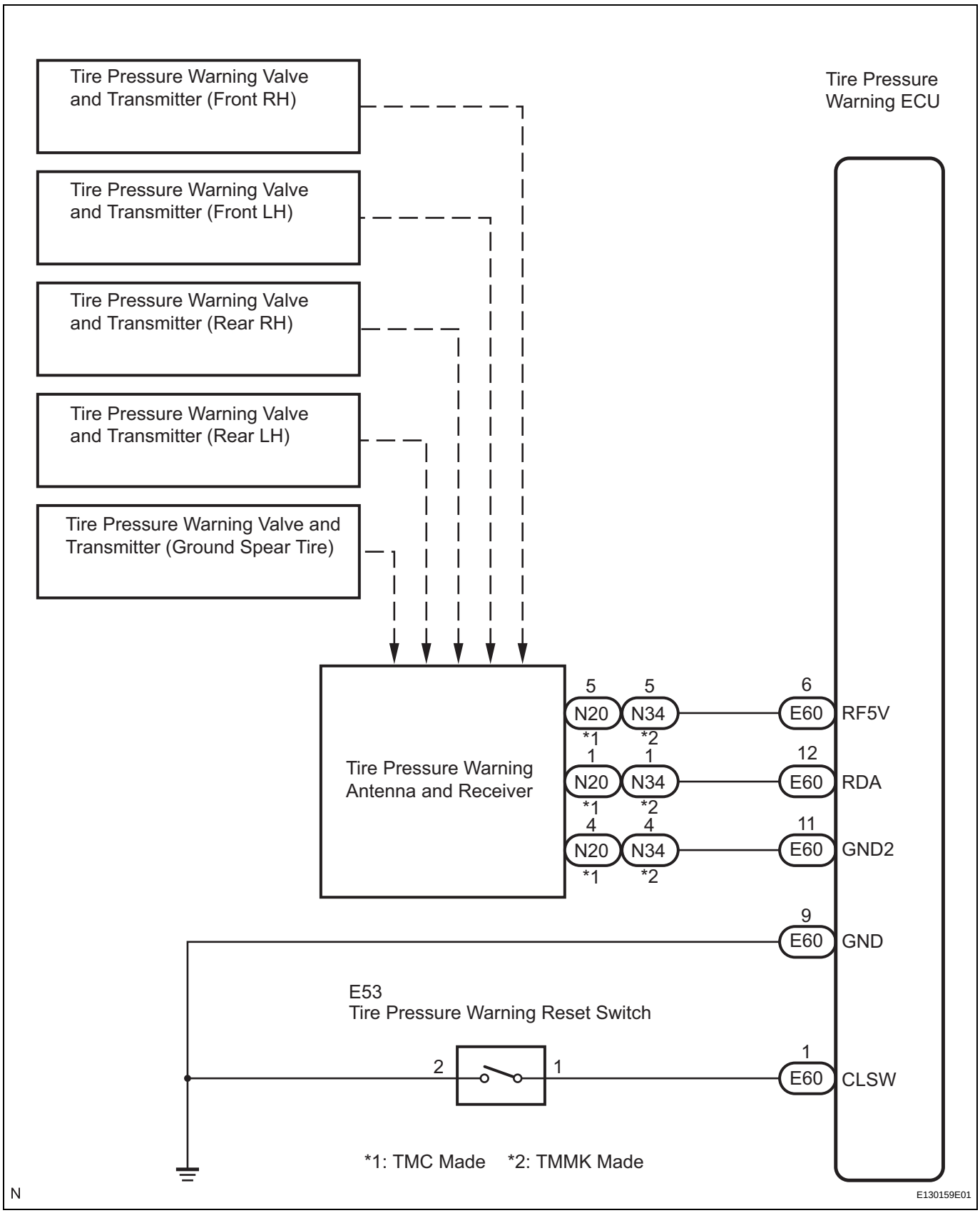
DTCs from C2121/21 to C2125/25 can only be cleared by using the tester. DTCs from C2181/81 to C2184/84 or C2185/85 can be cleared when the transmitter in the tire pressure warning valve and transmitter sends a forced transmission signal or test mode ends. DTCs from C2181/81 to C2184/84 or C2185/85 are output only in test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C2121/21 C2122/22 C2123/23 C2124/24 C2125/25	These DTCs are detected when no signals are received for 51 minutes or more.	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU
C2181/81 C2182/82 C2183/83 C2184/84 C2185/85	Malfunction in the transmitting/receiving circuit	• Tire pressure warning valve and transmitter • Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU

HINT:

- It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.
- DTCs C2125/25 and C2185/85 are used only when the vehicle is equipped with a ground spare tire.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

HINT:

Set the tire pressure to the specified value.

1	CHECK FREQUENCY RECEIVING CONDITION

(a) Check if the vehicle is not located in areas such as described below:

(1) Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.

HINT:

If the vehicle is located in areas described above, the tire pressure warning light may come on only in a particular area.

(2) Devices using similar radio frequencies are used in the vehicle.

OK:

Facilities, or devices that use similar radio frequencies are not located in the vicinity of the vehicle.

HINT:

Radio frequency may be interrupted due to surroundings or devices installed by user.

NG → **CHECK IF ANY DEVICE IS INSTALLED BY USER**

OK

2	IDENTIFY TRANSMITTER CORRESPONDING TO DTC

(a) Set the tire pressure to the appropriate specified values.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94V	210 (2.1, 31)	210 (2.1, 31)
P215/55R17 93V	220 (2.2, 32)	220 (2.2, 32)

(b) Select "Tire inflation Pressure" by following the prompts displayed on the intelligent tester.

Item	Measurement Item/Range (display)	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

Item	Measurement Item/Range (display)	Normal Condition	Diagnostic Note
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS5	ID5 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

(c) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds.

(d) Check the DATA LIST.

NOTICE:

- **It takes about 1 minute or more to display the updated tire pressure data.**
- **When no "Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.**
- **Record the transmitter ID of which "Tire Inflation Pressure" data corresponds to each tire.**

(e) After confirming that one of "Tire Inflation Pressure" data for one tire (ID1 to ID4 or ID5) has changed, repeat this procedure one by one. Identify the transmitter that corresponds to DTC.

Result

Condition	Proceed to
One or more of transmitters abnormal	A
All normal	B
All abnormal	C

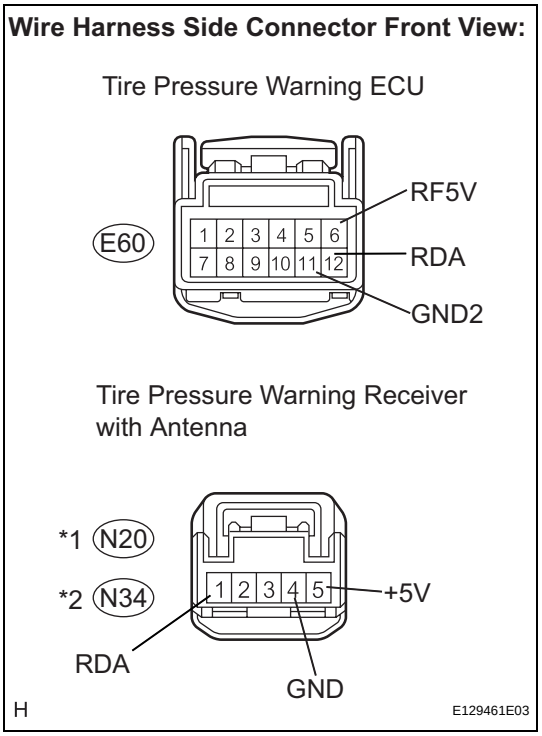
A → **Go to step 4**

B → **END**

C

3 CHECK HARNESS AND CONNECTOR (ECU - RECEIVER)

Wire Harness Side Connector Front View:



(a) Disconnect the E60 ECU connector.

(b) Disconnect the N20 receiver connector.*1

(c) Disconnect the N34 receiver connector.*2

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-12 (RDA) - N20-1 (RDA)*1 E60-12 (RDA) - N34-1 (RDA)*2	Below 1 Ω
E60-11 (GND2) - N20-4 (GND)*1 E60-11 (GND2) - N34-4 (GND)*2	
E60-6 (RF5V) - N20-5 (+5V)*1 E60-6 (RF5V) - N34-5 (+5V)	

HINT:
- *1: TMC Made
- *2: TMMK Made

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

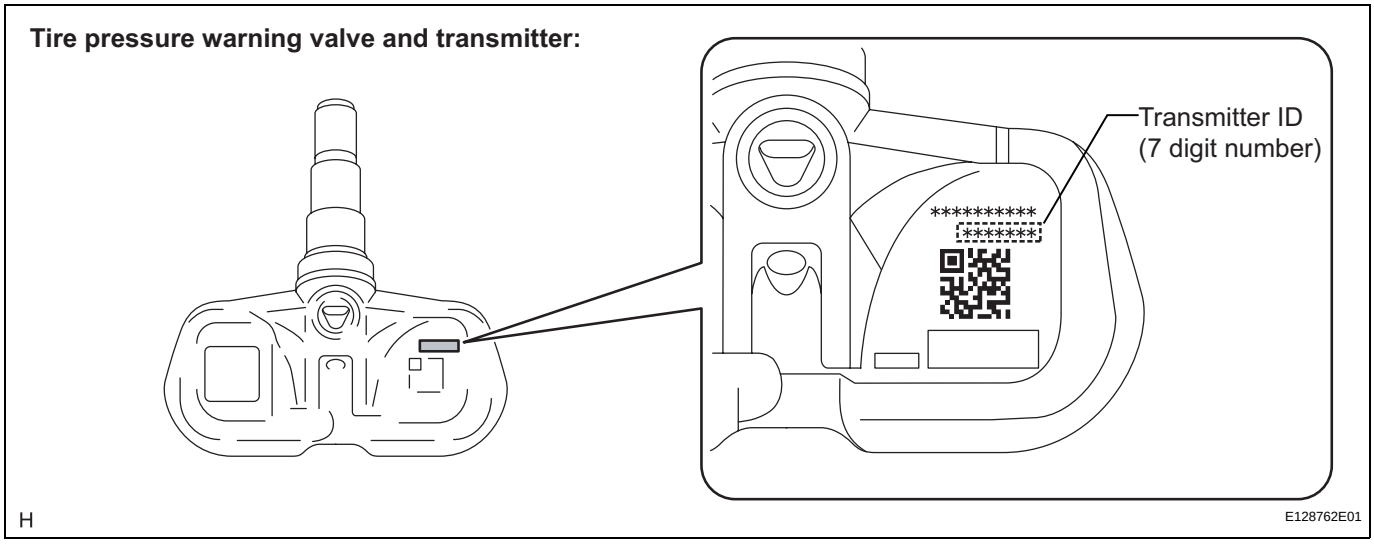
4 INSPECT TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Select REGIT ID CODE by following the prompts displayed on the intelligent tester.

Item	Measurement Item/Range (Display)	Normal Condition	Diagnostic Note
REGIT ID1 CODE	Registered ID1 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID1 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID2 CODE	Registered ID2 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID2 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID3 CODE	Registered ID3 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID3 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID4 CODE	Registered ID4 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID4 is displayed	*: Displayed only when the ID No. is not registered.
REGIT ID5 CODE	Registered ID5 code/ min.: 0, max.: FFFFFF*	The ID No. registered in the transmitter ID5 is displayed	*: Displayed only when the ID No. is not registered.

(b) Check the ID number on the identified transmitter by removing it from the tire and wheel.

TW



TW

(c) Confirm that the ID number on the transmitter and recorded transmitter ID match.
Result

Result	Proceed to
Match	A
Do nor match	B

B → **Go to step 6**

A

5	REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

HINT:
(See page TW-77)

NEXT

6	REGISTRATION OF TRANSMITTER ID

(a) Perform registration (See page TW-15).
(b) Set the tire air pressure of all wheels to the specified value (For the specified value, See step 2).

NEXT

7	PERFORM INITIALIZATION

(a) Perform initialization (See page TW-18).

NEXT

8	READ VALUE OF DATA LIST

(a) Turn the ignition switch off, and then turn it on (IG).

(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.
HINT:
It may take up to 1 minute or more to display the tire pressure data.

Result

Condition	Proceed to
All tire pressure readings are equal to specified values.	A
Tire pressure values are not displayed.	B

B → REPLACE TIRE PRESSURE WARNING ECU

A

END

DTC	C2141/41	Transmitter ID1 Error

DTC	C2142/42	Transmitter ID2 Error

DTC	C2143/43	Transmitter ID3 Error

DTC	C2144/44	Transmitter ID4 Error

DTC	C2145/45	Transmitter ID5 Error

DESCRIPTION

The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the air pressure of the tires. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on.
When the internal circuit of the tire pressure warning valve and transmitter is malfunctioning, this DTC is output.

DTC No.	DTC Detecting Condition	Trouble Area
C2141/41 C2142/42 C2143/43 C2144/44 C2145/45	If an "ERROR" signal is received 3 times consecutively, the tire pressure warning valve and transmitter will be judged as defective and a DTC will be output. This will happen in situations where the inflation pressure is outside the range 0 to 637.5 kPa (0 to 6.48 kgf/cm^2, 0 psi to 92.2 psi), the temperature inside the tire is outside the specified range -40 to 120°C (-40 to 253°F), or an error occurs in the tire pressure warning valve and transmitter or the surrounding area.	• Tire pressure warning valve and transmitter • Tire pressure warning ECU

HINT:
- It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.
- DTC 2145/45 is used only when the vehicle is equipped with ground spare tire.

INSPECTION PROCEDURE

NOTICE:
- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

1	IDENTIFY TRANSMITTER CORRESPONDING TO DTC

(a) Set the tire pressure to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94W	210 (2.1, 31) *1 240 (2.4, 35)*2	210 (2.1, 31) *1 240 (2.4, 35)*2
P215/55R17 93V	220 (2.2, 32) *1 240 (2.4, 35)*2	220 (2.2, 32) *1 240 (2.4, 35)*2

*1: For driving under 100 mph (160 km/h)
*2: For driving at 100 mph (160 km/h) or over

(b) Display the "Tire Inflation Pressure" data for each wheel using the intelligent tester.

(c) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds. If "Tire Inflation Pressure" displayed on the tester (ID1 to ID4 or ID5) does not change, the tire pressure monitor valve corresponds to the DTC that was detected.
HINT:
- Identify the malfunctioning tire pressure monitor valve by repeatedly decreasing the tire pressure for each tire.
- Record which "TIREPRESS" data (ID1 to ID4 or ID5) corresponds to each tire.

Item	Measurement Item/Range (display)	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS5	ID5 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

(d) Check the DATA LIST.

Result

Condition	Detection Condition
One of "Tire Inflation Pressure" data (ID1 to ID4 or ID5) changed.	**Normal**
"Tire Inflation Pressure" data did not change.	**Transmitter corresponding to DTC**

NOTICE:
- **When "TIREPRESS" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then forcibly transmit the transmitter ID and recheck.**
- **Record the transmitter ID and position of transmitters that are normal.**

(e) When the "TIREPRESS" data (ID1 to ID4 or ID5) has changed, repeat this procedure to identify the tire pressure warning valve and transmitter that corresponds to a DTC.

(f) When all of the "TIREPRESS" data (ID1 to ID4 or ID5) have changed, identify the malfunctioning tire pressure warning valve and transmitter using recorded ID numbers and output DTC.

(g) Set the tire pressures to the appropriate specified values.

NEXT

2	REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Replace the identified tire pressure warning valve and transmitter with a new one.
HINT:
- Before installing a new tire pressure warning valve and transmitter, read and write down its transmitter ID.
- The IDs for the tire pressure warning valve and transmitter not be replaced should be checked using the tester and recorded.

NEXT

3	REGISTRATION OF TRANSMITTER ID

(a) Register the transmitter ID for all wheels (See page TW-15).
(b) Set the tire air pressure of all wheels to the specified value (For the specified value, see step 1).

NEXT

4	CHECK DTC

(a) Check for a DTC (See page TW-28).

Result

Condition	Proceed to
Any of the DTCs from C2141/41 to C2144/44 or C2145/45 are output.	A
Any of the DTCs from C2141/41 to C2144/44 or C2145/45 are not output.	B

B → END

A

REPLACE TIRE PRESSURE WARNING ECU

DTC	C2165/65	Abnormal Temperature Inside ID1 Tire

DTC	C2166/66	Abnormal Temperature Inside ID2 Tire

DTC	C2167/67	Abnormal Temperature Inside ID3 Tire

DTC	C2168/68	Abnormal Temperature Inside ID4 Tire

DTC	C2169/69	Abnormal Temperature Inside ID5 Tire

DESCRIPTION

Each tire pressure warning valve and transmitter measures the internal temperature of its tire as well as tire pressure, and transmits the information to the tire pressure warning ECU along with the transmitter ID. If the measured temperature is out of the specified range, the tire pressure warning ECU recognizes it as a malfunction, outputs DTCs, and blinks the tire pressure warning light.

DTC No.	DTC Detecting Condition	Trouble Area
C2165/65 C2166/66 C2167/67 C2168/68 C2169/69	Temperature inside the tire exceeds 119°C (246.2°F) more than once.	• Tires • Tire pressure warning valve and transmitter • Tire pressure warning ECU

HINT:

- It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.
- DTC 2169/69 is used only when the vehicle is equipped with ground spare tire.

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and note them down before removal.**
- **It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.**

HINT:

Set the tire pressure to the specified value.

1	CHECK TIRES

(a) Check the tire is not flat, and there is no indication of air pressure drop.

OK:

Tire is normal.

HINT:

If a tire is damaged, the tire pressure warning valve and transmitter may also have been damaged at the same time.

NG → **REPLACE TIRE AND TIRE PRESSURE WARNING VALVE AND TRANSMITTER**

OK

2	IDENTIFY TRANSMITTER CORRESPONDING TO DTC

(a) Set the tire pressure to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94W	210 (2.1, 31) *1 240 (2.4, 35)*2	210 (2.1, 31) *1 240 (2.4, 35)*2
P215/55R17 93V	220 (2.2, 32) *1 240 (2.4, 35)*2	220 (2.2, 32) *1 240 (2.4, 35)*2

*1: For driving under 100 mph (160 km/h)
*2: For driving at 100 mph (160 km/h) or over

(b) Display the "TIREPRESS" data for each wheel using the intelligent tester.

(c) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.41 kg/cm^2, 5.8 psi) within 30 seconds.

(d) Check the DATA LIST

Item	Measurement Item/Range (display)	Normal Condition	Diagnostic Note
TIREPRESS1	ID1 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS2	ID2 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS3	ID3 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS4	ID4 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-
TIREPRESS5	ID5 tire inflation pressure/ min.: 0 kPa (0 kgf/cm^2, 0 psi), max.: 637.5 kPa (6.48 kgf/cm^2, 92.2 psi)	Actual tire inflation pressure	-

Result

Condition	Detection Condition
One of "Tire Inflation Pressure" data (ID1 to ID4 or ID5) changed.	Normal
No "Tire Inflation Pressure" data changed.	Transmitter corresponding to DTC

NOTICE:

- **It takes about 1 minute or more to display the updated data.**
- **When no "TIREPRESS" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then forcibly transmit the transmitter ID and recheck it.**
- **Record the transmitter ID and position that is normal condition.**

(e) When the "TIREPRESS" data (ID1 to ID4 or ID5) has changed, repeat this procedure to identify the tire pressure warning valve and transmitter that corresponds to a DTC.

(f) When all of the "TIREPRESS" data (ID1 to ID4 or ID5) has changed, identify the malfunctioning tire pressure warning valve and transmitter based on the recorded ID numbers and output DTC.

NEXT

3	REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Replace the identified tire pressure warning valve and transmitter with a new one.

HINT:

- Before installing a new tire pressure warning valve and transmitter, read and write down its transmitter ID.
- The IDs for the tire pressure warning valve and transmitter not be replaced should be checked using tester and recorded.

NEXT

4	CHECK REGISTRATION OF TRANSMITTER ID

(a) Register the transmitter ID for 4 or 5 wheels (See page TW-15).

(b) Set the tire pressure of all wheels to the specified value.

Cold tire inflation pressure

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P215/60R16 94W	210 (2.1, 31) *1 240 (2.4, 35)*2	210 (2.1, 31) *1 240 (2.4, 35)*2
P215/55R17 93V	220 (2.2, 32) *1 240 (2.4, 35)*2	220 (2.2, 32) *1 240 (2.4, 35)*2

*1: For driving under 100 mph (160 km/h)

*2: For driving at 100 mph (160 km/h) or over

NEXT

5	PERFORM INITIALIZATION

(a) Perform initialization (See page TW-18).

NEXT

6	CHECK DTC

(a) Check for a DTC (See page TW-18).

Result

Condition	Proceed to
Any of the DTCs from C2165/65 to C2168/68 or C2169/69 are output.	A
Any of the DTCs from C2165/65 to C2168/68 or C2169/69 are not output.	B

B → END

TW

A

REPLACE TIRE PRESSURE WARNING ECU

DTC	C2171/71	Transmitter ID not Registered

DESCRIPTION

The IDs of each tire pressure warning valve and transmitters are registered to the tire pressure warning ECU.
When the ECU detects that an ID is not the one of registered IDs, or cannot receive an ID signal, a DTC is output.

DTC No.	DTC Detection Condition	Trouble Area
C2171/71	Transmitter ID code is not registered. (When an ID code is unregistered for 51 minutes or more)	Tire pressure warning ECU

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and note them down before removal.**
- **It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) the transmitter IDs into the tire pressure warning ECU after the ECU have been replaced.**

1	CONFIRM REGISTRATION CONDITION (REGISTERED ID CODES)

(a) Connect the intelligent tester to the DLC3 connector.
(b) Turn the ignition switch ON (IG) and turn the tester ON.
(c) Select REGIT ID CODE by following the prompts displayed on the intelligent tester.

OK:

The registered transmitter ID codes are displayed on the intelligent tester screen.

OK → **REPLACE TIRE PRESSURE WARNING ECU**

NG

2	PERFORM REGISTRATION (TRANSMITTER ID)

(a) Register the transmitter IDs for all the wheels (See page TW-15).
(b) Set the tire pressure of all the wheels to the appropriate specified values.

NEXT

3	READ VALUE ON DATA LIST

(a) Check the DATA LIST (See page TW-29).
(b) Select "TIREPRESS" by following the prompts displayed on the intelligent tester.
HINT:
It may take up to 1 minute or more to display the tire pressure data.

Result

Condition	Proceed to
All tire pressure readings are equal to specified values.	A
Tire pressure values not display	B

B → REPLACE TIRE PRESSURE WARNING ECU

A

END

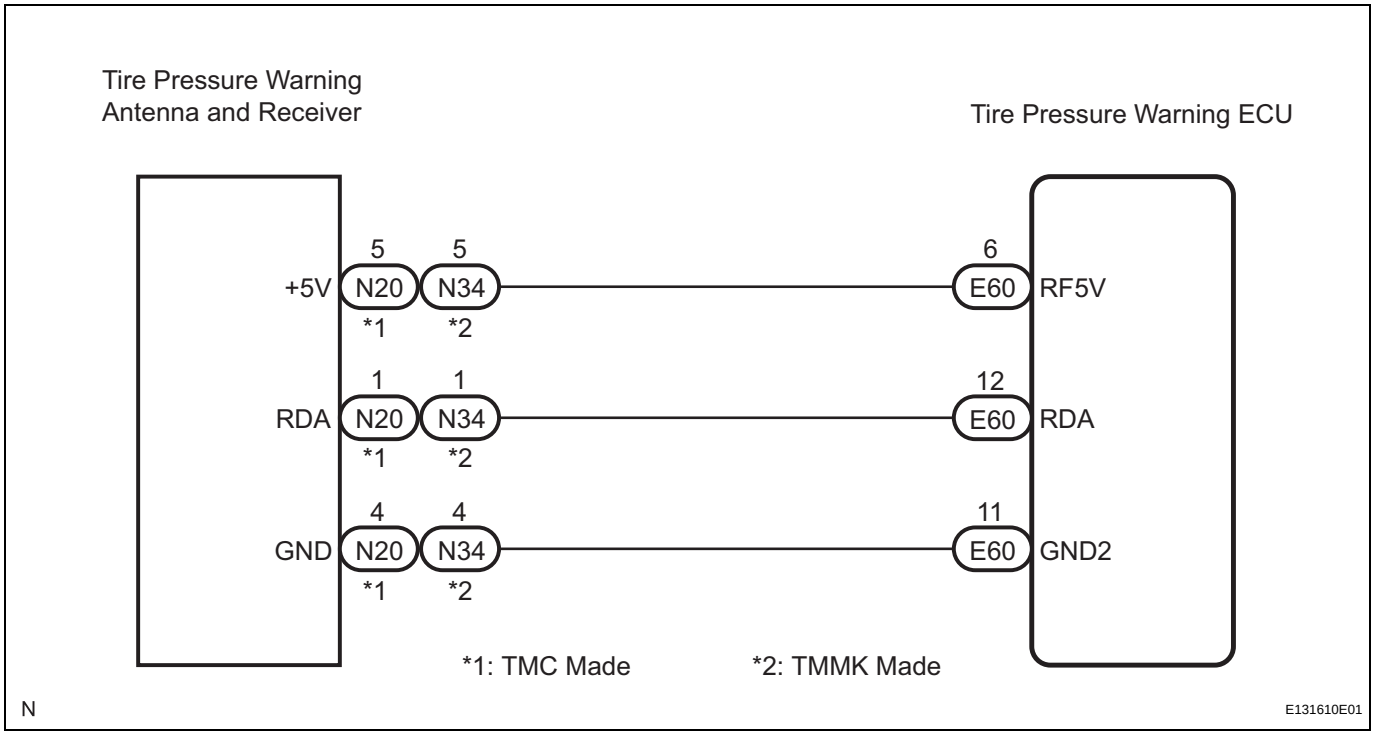
DTC	C2176/76	Receiver Error

DESCRIPTION

The signals are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU.

DTC No.	DTC Detection Condition	Trouble Area
C2176/76	DTC is stored when any of the following is detected: • Malfunction in the tire pressure warning ECU internal circuit. • Terminal RF5V is shorted to ground. • Malfunction in the tire pressure warning antenna and receiver internal circuit.	• Tire pressure warning antenna and receiver • Wire harness or connector • Tire pressure warning ECU

WIRING DIAGRAM



TW

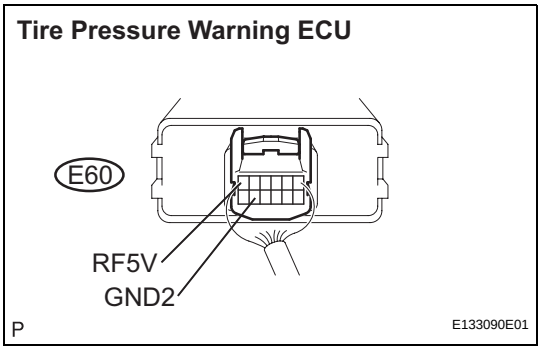
INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) of the transmitter IDs into the tire pressure warning ECU after the ECU have been replaced.**

1 CHECK TIRE PRESSURE WARNING ECU

Tire Pressure Warning ECU



(a) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Switch Condition	Specified Condition
E60-6 (RF5V) - E60-11 (GND2)	Ignition switch ON (IG)	4.5 to 5.5 V

NG → **Go to step 5**

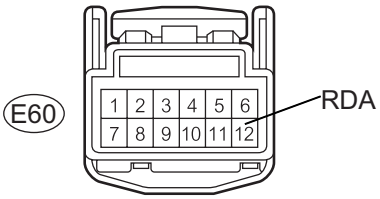
OK

TW

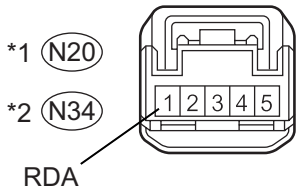
2 CHECK WIRE HARNESS (ECU - RECEIVER)

Wire Harness Side Connector Front View:

Tire Pressure Warning ECU



Tire Pressure Warning Antenna and Receiver



(a) Disconnect the E60 ECU connector.
(b) Disconnect the N20 receiver connector.*1
(c) Disconnect the N34 receiver connector.*2
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-12 (RDA) - N20-1 (RDA)*1 E60-12 (RDA) - N34-1 (RDA)*2	Below 1 Ω

HINT:
- *1: TMC Made
- *2: TMMK Made

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 REPLACE TIRE PRESSURE WARNING ANTENNA AND RECEIVER

NEXT

4 CHECK DTC

(a) Check for DTC (See page TW-28).

OK:

DTC is not output.

HINT:
- It is necessary to register IDs when replacing the tire pressure warning ECU (See page TW-15).
- Read the IDs on the DATA LIST before removing the tire pressure warning ECU. Register the ID in the new tire pressure warning ECU.

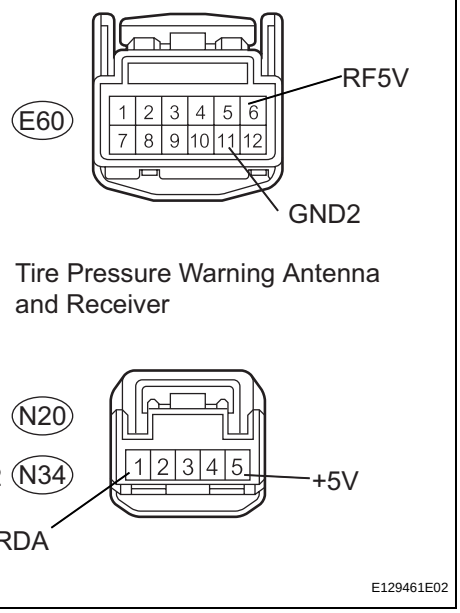
NG → REPLACE TIRE PRESSURE WARNING ECU

OK

END

5 CHECK HARNESS AND CONNECTOR (ECU - RECEIVER)

Wire Harness Side Connector Front View:



(a) Disconnect the E60 ECU connector.
(b) Disconnect the N20 receiver connector.*1
(c) Disconnect the N34 receiver connector.*2
(d) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-11 (GND2) - N20-4 (GND)*1 E60-11 (GND2) - N34-4 (GND)*2	Below 1 Ω
E60-6 (RF5V) - N20-5 (+5V)*1 E60-6 (RF5V) - N34-5 (+5V)*2	

HINT:
- *1: TMC Made
- *2: TMMK Made

Result

Result	Proceed to
OK	A
OK (When troubleshooting accordance with PROBLEM SYMPTOMS TABLE)	B
NG	C

A → REPLACE TIRE PRESSURE WARNING ECU

C → REPAIR OR REPLACE HARNESS OR CONNECTOR AND REPLACE TIRE PRESSURE WARNING ECU

B

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

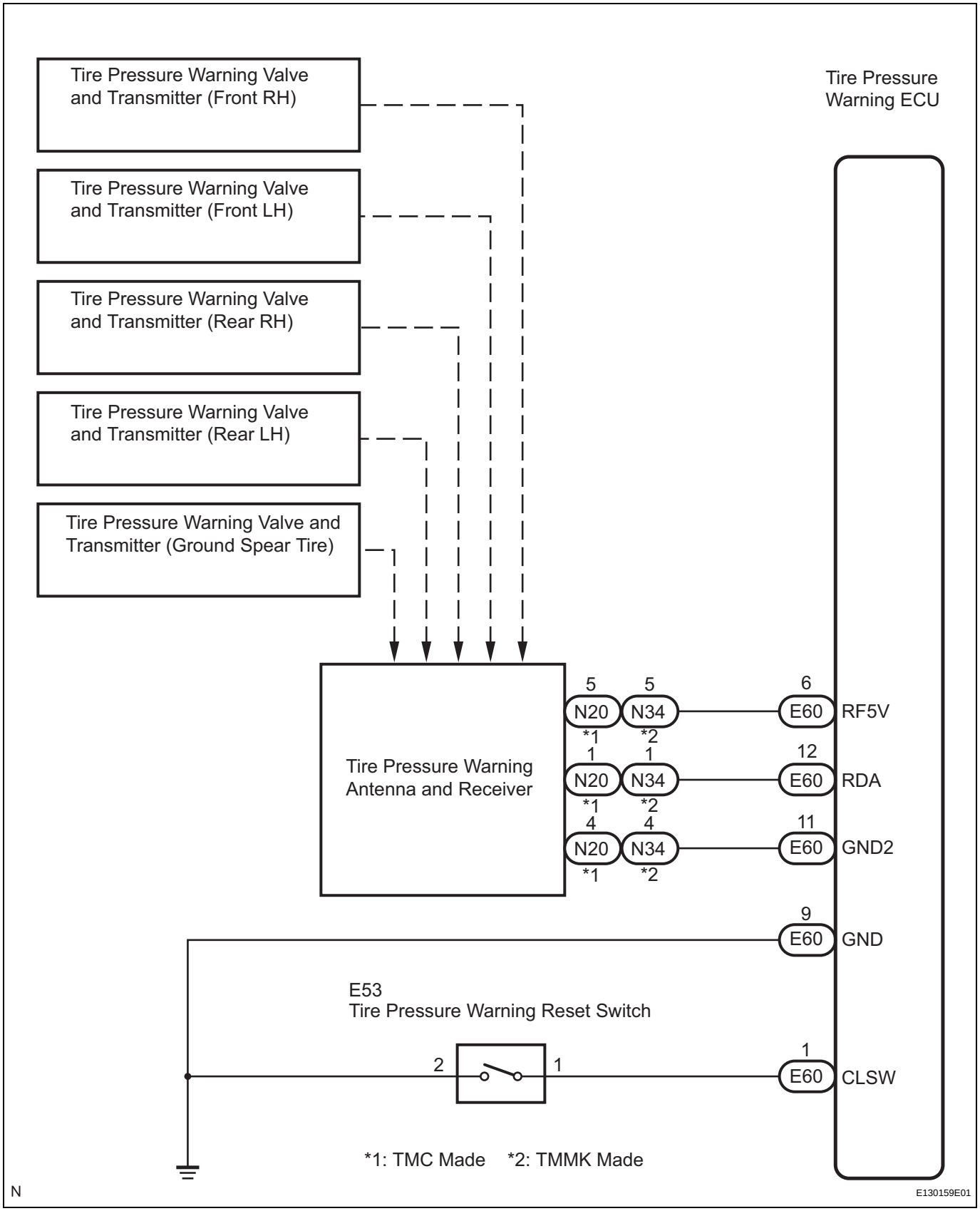
DTC	C2177/77	Initialization not Completed

DESCRIPTION

Initialization is necessary after replacing any of the ECU, tires with different tire pressure, or tire pressure warning valve and transmitter, after rotating the tires or when a new vehicle is delivered.

DTC No.	DTC Detection Condition	Trouble Area
C2177/77	Initialization is not completed after vehicle speed of 5 mph (8 km/h) or more continues for 20 minutes or more (total).	• Tire pressure warning valve and transmitter • Tire pressure warning ECU • Tire pressure warning antenna and receiver • Tire pressure warning reset switch • Wire harness or connector

WIRING DIAGRAM



TW

INSPECTION PROCEDURE

1	CHECK DTC

(a) Check for a DTC.

Result

Condition	Proceed to
Only DTC C2177/77 is output.	A
DTC C2177/77 and any of the DTCs from C2121/21 to C2125/25 are output.	B (See page TW-38)

B → REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A

TW

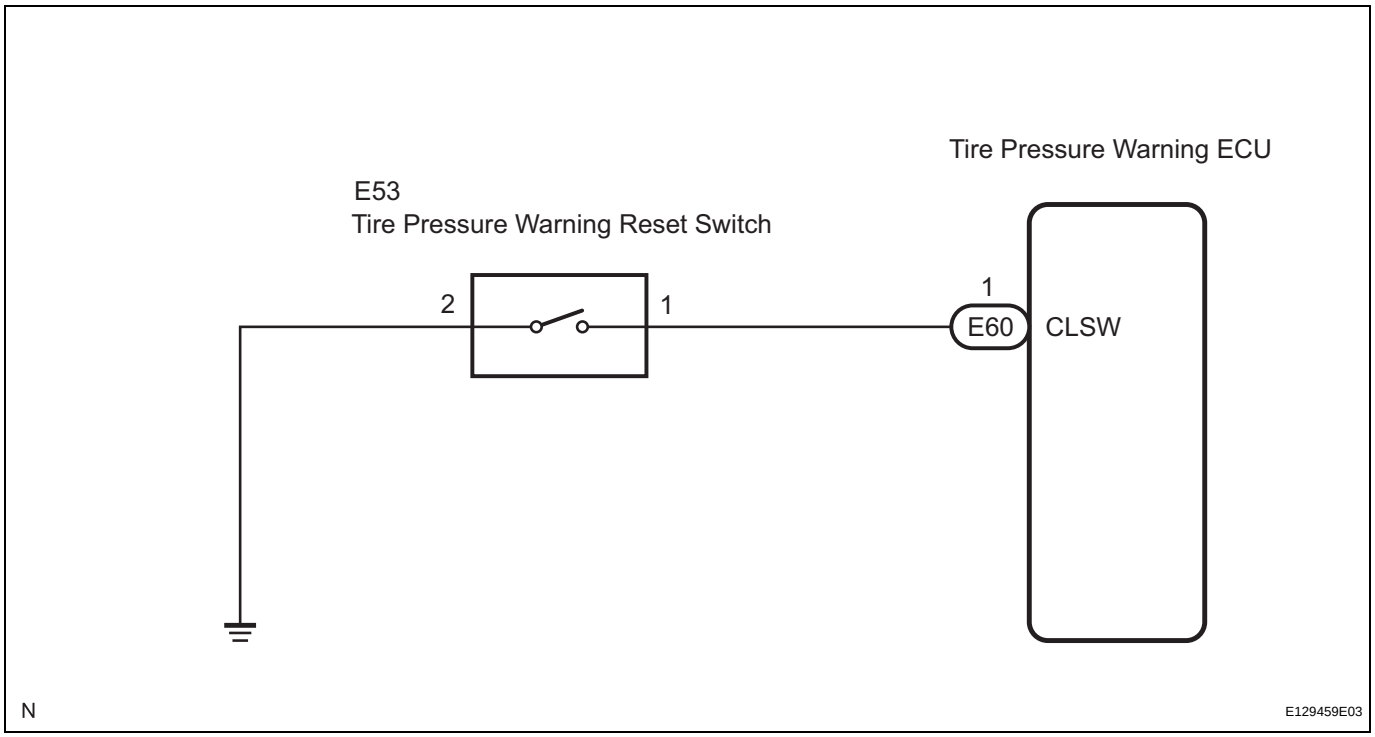
REPLACE TIRE PRESSURE WARNING ECU

Tire Pressure Warning Reset Switch Circuit

DESCRIPTION

Receiving a signal from the tire pressure warning reset switch, the tire pressure warning ECU and receiver indicates the initialization of the pressure warning system.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK TIRE PRESSURE WARNING RESET SWITCH FUNCTION

(a) Perform the tire pressure warning reset switch test in TEST MODE PROCEDURE (See page TW-20).

OK:

Reset switch ON:

Tire pressure warning light comes on.

Reset switch OFF:

Tire pressure warning light blinks.

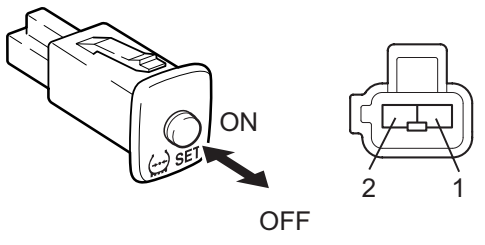
NG → **Go to step 2**

OK

END

2	INSPECT TIRE PRESSURE WARNING RESET SWITCH

Tire Pressure Warning Reset Switch:



P C107260E01

(a) Disconnect the tire pressure warning reset switch connector.
(b) Measure the resistance between terminals 1 and 2 of the tire pressure warning reset switch when the tire pressure warning switch is ON and OFF.
Standard resistance

Switch Condition	Specified Condition
ON	Below 1 Ω
OFF	10 kΩ or higher

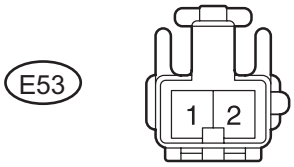
NG → **REPLACE TIRE PRESSURE WARNING RESET SWITCH**

TW

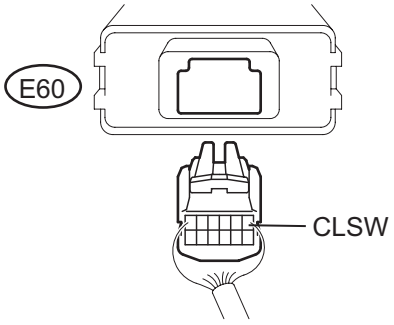
OK

3	CHECK HARNESS AND CONNECTOR (TIRE PRESSURE WARNING RESET SW - TIRE PRESSURE WARNING ECU)

Tire Pressure Warning Reset Switch: (harness side connector)



Tire Pressure Warning ECU:



P C111010E06

(a) Disconnect the tire pressure warning reset switch E53 connector and tire pressure warning ECU E60 connector.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Switch Condition	Specified Condition
E60-1 (CLSW) - E53-1	Below 1 Ω
E60-1 (CLSW) - Body ground	10 kΩ or higher
E53-2 - Body ground	Below 1Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TIRE PRESSURE WARNING ECU

DTC	C2191/91	Vehicle Speed Signal Error (Test Mode DTC)

DESCRIPTION

The tire pressure warning ECU receives a speed signal from the combination meter. This DTC is stored upon entering test mode, and cleared when a vehicle speed signal of 12 mph (20 km/h) is detected for 3 seconds or more. This DTC is output only in test mode.

DTC No.	DTC Detecting Condition	Trouble Area
C2191/91	Speed sensor circuit malfunction	• Vehicle speed sensor • Tire pressure warning ECU • Combination meter • Wire harness or connector

WIRING DIAGRAM

TW

INSPECTION PROCEDURE

NOTICE:

- **When replacing the tire pressure warning ECU, read the IDs stored in the ECU using the intelligent tester and write them down before removal.**
- **It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) of the transmitter IDs into the tire pressure warning ECU after the ECU have been replaced.**

1	READ VALUE ON INTELLIGENT TESTER

(a) Connect the intelligent tester to DLC3.
(b) Turn the ignition switch on (IG), and turn the intelligent tester on.
(c) Select the item below in the Data List, and read the value displayed on the intelligent tester.

HINT:
Enter the following menus: DIAGNOSIS / OBD/MOBD / METER / DATA LIST.

METER

Item	Normal Condition
VEHICLE SPD	Almost same as actual vehicle speed

(d) Check that the values indicated on the tester and on the combination meter are the same.
OK:
Vehicle speed indicated on the intelligent tester indicates the actual speed.

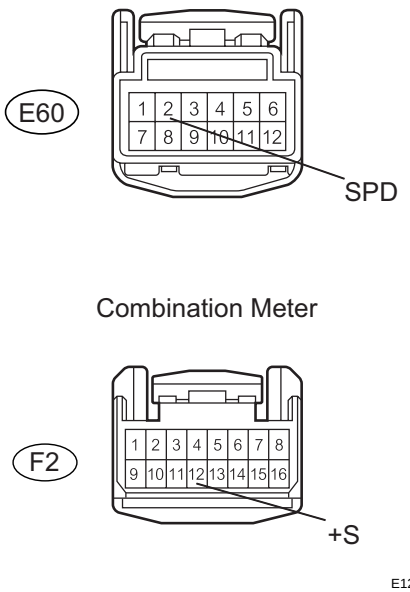
NG → **GO TO METER / GAUGE SYSTEM**

OK

TW

2 CHECK HARNESS AND CONNECTOR (ECU - COMBINATION METER)

Wire Harness Side Connector Front View:



(a) Disconnect the E60 ECU connector.
(b) Disconnect the F2 meter connector.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition
E60-2 (SPD) - F2-12 (+S)	Below 1 Ω
E60-2 (SPD) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

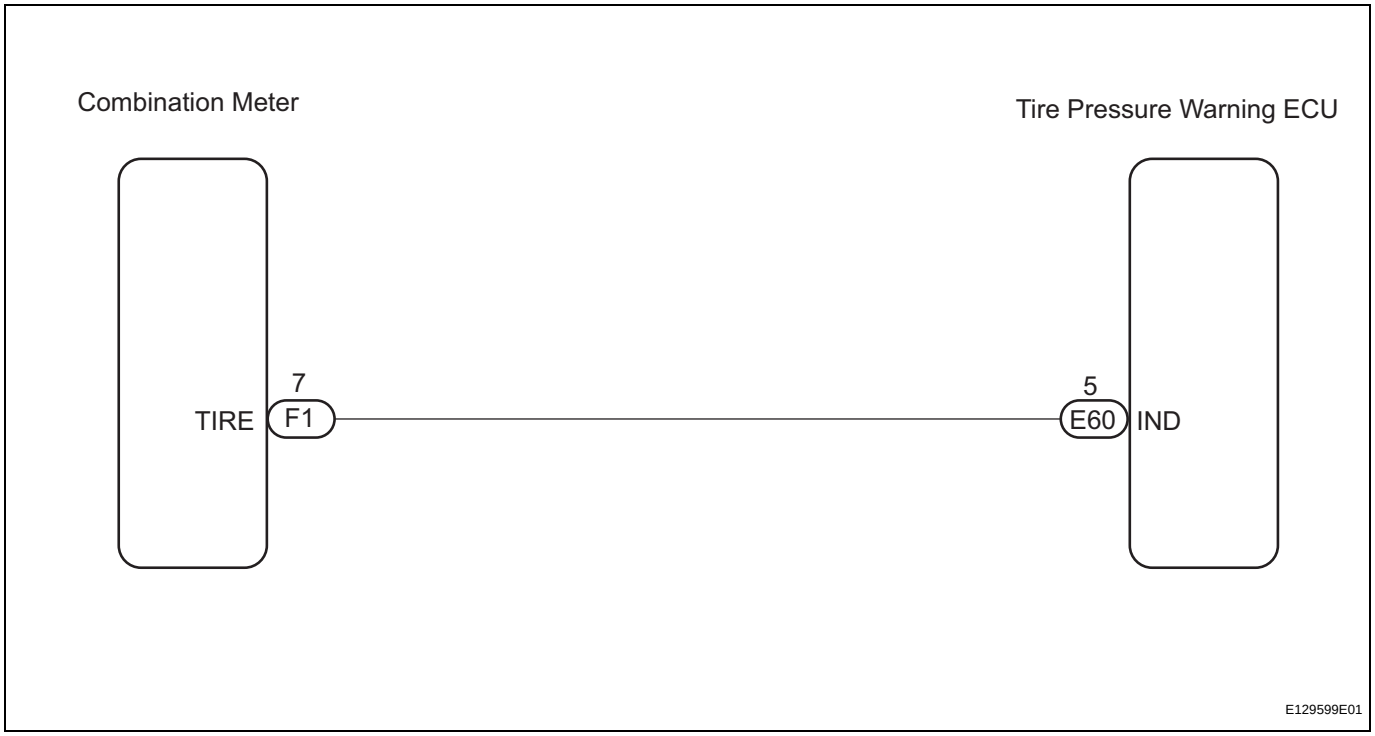
REPLACE TIRE PRESSURE WARNING ECU

Tire Pressure Warning Light Circuit

DESCRIPTION

If the ECU detects trouble, the tire pressure warning light blinks (comes on after blinking for 1 minute) and tire pressure monitor is cancelled at the same time. At this time, the ECU records a DTC in the memory. Connect terminals TC and CG of DLC3 to make the tire pressure warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

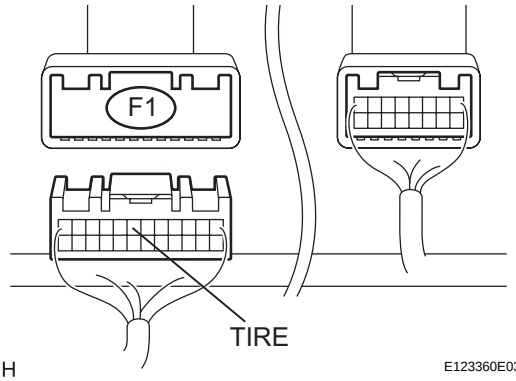
It is necessary to perform initialization (See page TW-18) after registration (See page TW-15) of the transmitter IDs into the tire pressure warning ECU, after the ECU have been replaced.

HINT:

This procedure must be performed according to the PROBLEM SYMPTOMS TABLE.

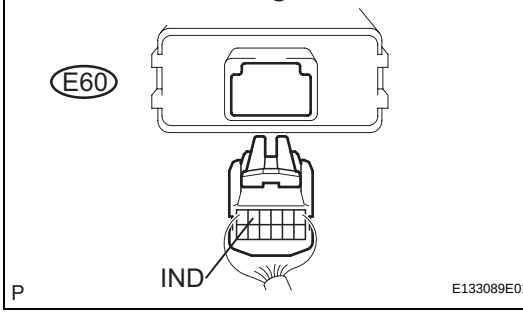
1	CHECK HARNESS AND CONNECTOR (COMBINATION METER - TIRE PRESSURE WARNING ECU)

Combination Meter Assembly Wire Harness View:



(a) Disconnect the F1 combination meter connector.

Tire Pressure Warning ECU



(b) Disconnect the E60 tire pressure warning ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

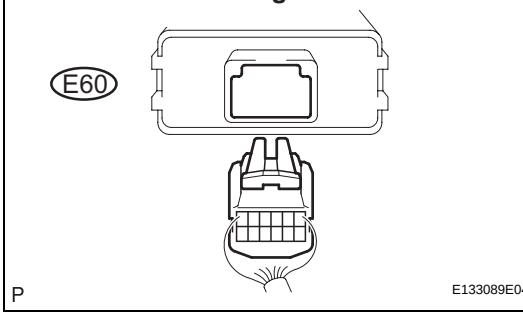
Tester Connection	Specified Condition
F1-7 (TIRE) - E60-5 (IND)	Below 1 Ω
F1-7 (TIRE) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	INSPECT COMBINATION METER

Tire Pressure Warning ECU



(a) Disconnect the connector from the tire pressure warning ECU.

(b) Turn the ignition switch on (IG), check the condition of the tire pressure warning light illumination.

Result

Condition	Proceed to
Illuminates	A
Does not illuminate	B

B → **REPLACE COMBINATION METER**

A

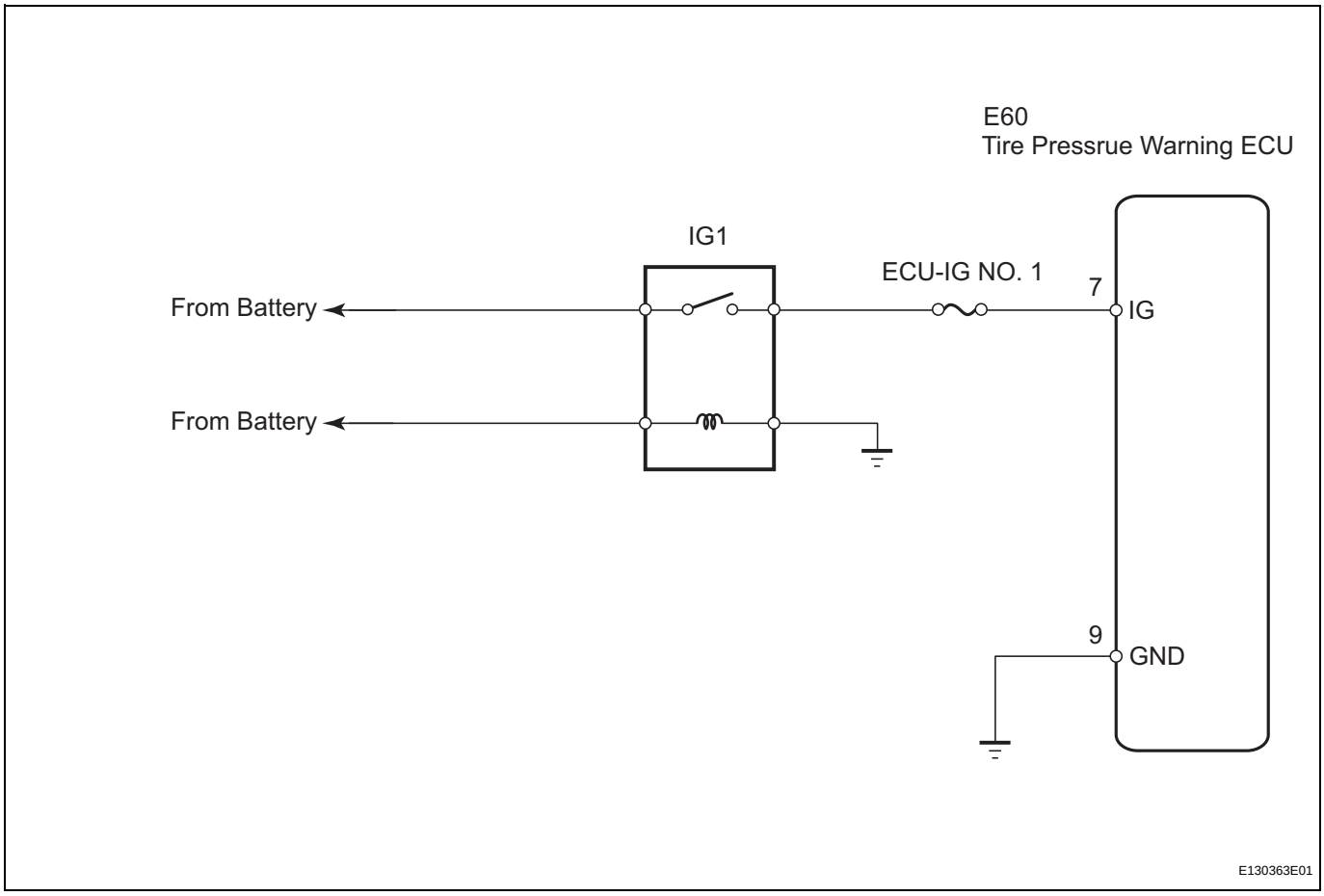
REPLACE TIRE PRESSURE WARNING ECU

ECU Power Source Circuit

DESCRIPTION

This is the power source for the tire pressure warning ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

It is necessary to register an ID code after replacing the tire pressure warning valve and transmitter and/or the tire pressure warning ECU (See page TW-15).

1	INSPECT FUSE (ECU-IG NO. 1)

(a) Remove the ECU-IG NO. 1 fuse from the instrument panel junction block.

(b) Measure the resistance of the fuse.

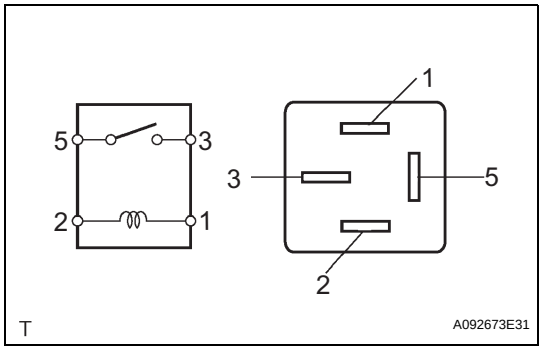
Standard resistance:

Below 1 Ω

NG → **REPLACE FUSE**

OK

2	INSPECT IG1 RELAY



(a) Remove the IG1 relay from the instrument panel junction block.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

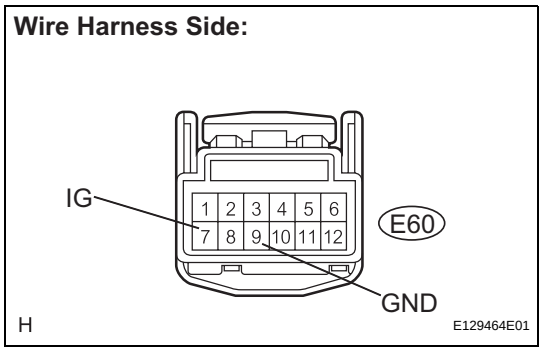
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
	Below 1 Ω (When battery voltage is applied to terminals 1 and 2)

NG → REPLACE IG1 RELAY

TW

OK

3	CHECK HARNESS AND CONNECTOR (ECU - BATTERY AND BODY GROUND)



(a) Disconnect the E60 ECU connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Switch Condition	Specified Condition
E60-7 (IG) - Body ground	Ignition switch on (IG)	10 to 14 V
	Ignition switch off	Below 1 V

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-9 (GND) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

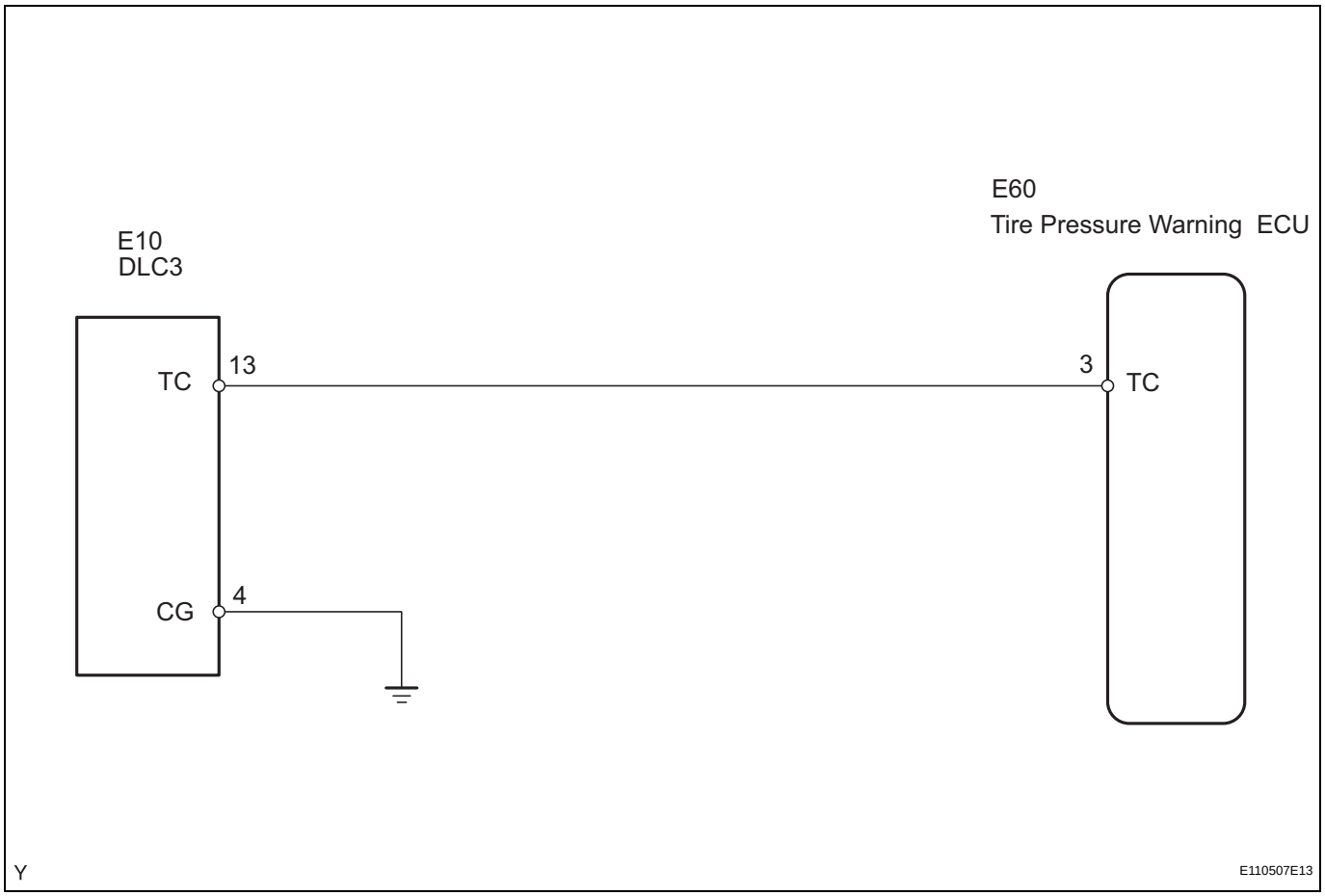
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

TC and CG Terminal Circuit

DESCRIPTION

DTC output mode is set by connecting terminals 13 (TC) and 4 (CG) of the DLC3. The DTCs are indicated by the blinking of the tire pressure warning light.

WIRING DIAGRAM



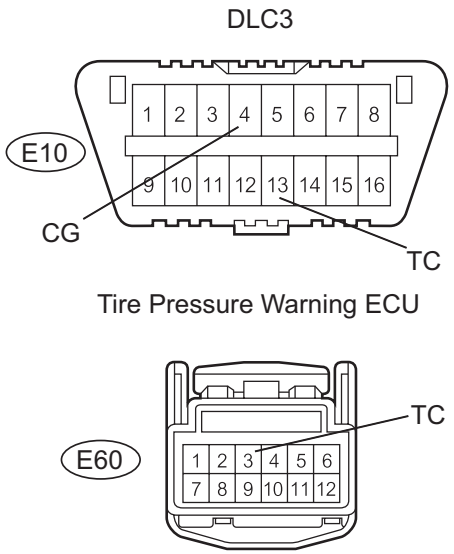
HINT:
When each warning light blinks continuously, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in an ECU connected to this circuit may have occurred.

INSPECTION PROCEDURE

NOTICE:
It is necessary to register an ID code after replacing the tire pressure warning valve and transmitter and/or the tire pressure warning ECU (See page TW-15).

1	CHECK HARNESS AND CONNECTOR (DLC3 - TIRE PRESSURE WARNING ECU)

Wire Harness Side:



(a) Disconnect the E60 ECU connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E60-3 (TC) - E10-13 (TC)	Below 1 Ω
E10-4 (CG) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

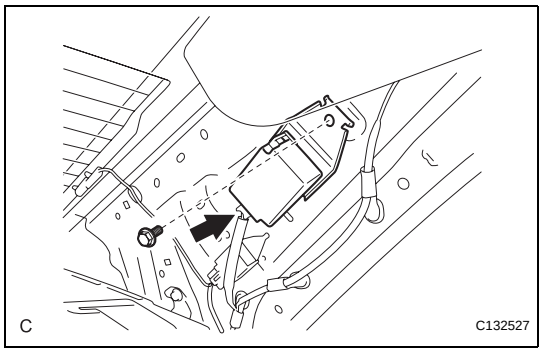
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

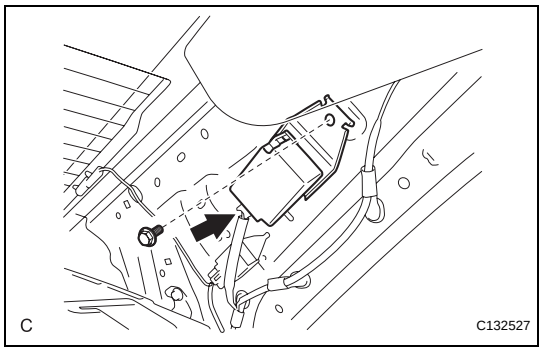
TW

TW

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
3. **REMOVE REAR SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
4. **REMOVE REAR CENTER SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
5. **REMOVE REAR SEATBACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)**
6. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-47)**
7. **REMOVE REAR SIDE SEATBACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)**
8. **REMOVE REAR SEAT HEADREST ASSEMBLY (for Reclining Seat Type)**
9. **REMOVE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-62)**
10. **REMOVE REAR SEATBACK COVER (for Reclining Seat Type) (See page SE-63)**
11. **REMOVE SEPARATE TYPE REAR SEATBACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)**
12. **REMOVE INNER ROOF SIDE GARNISH LH (See page IR-26)**
13. **REMOVE TIRE PRESSURE WARNING RECEIVER ASSEMBLY**
    (a) Remove the bolt.
    (b) Disconnect the connector and remove the tire pressure warning receiver assembly.





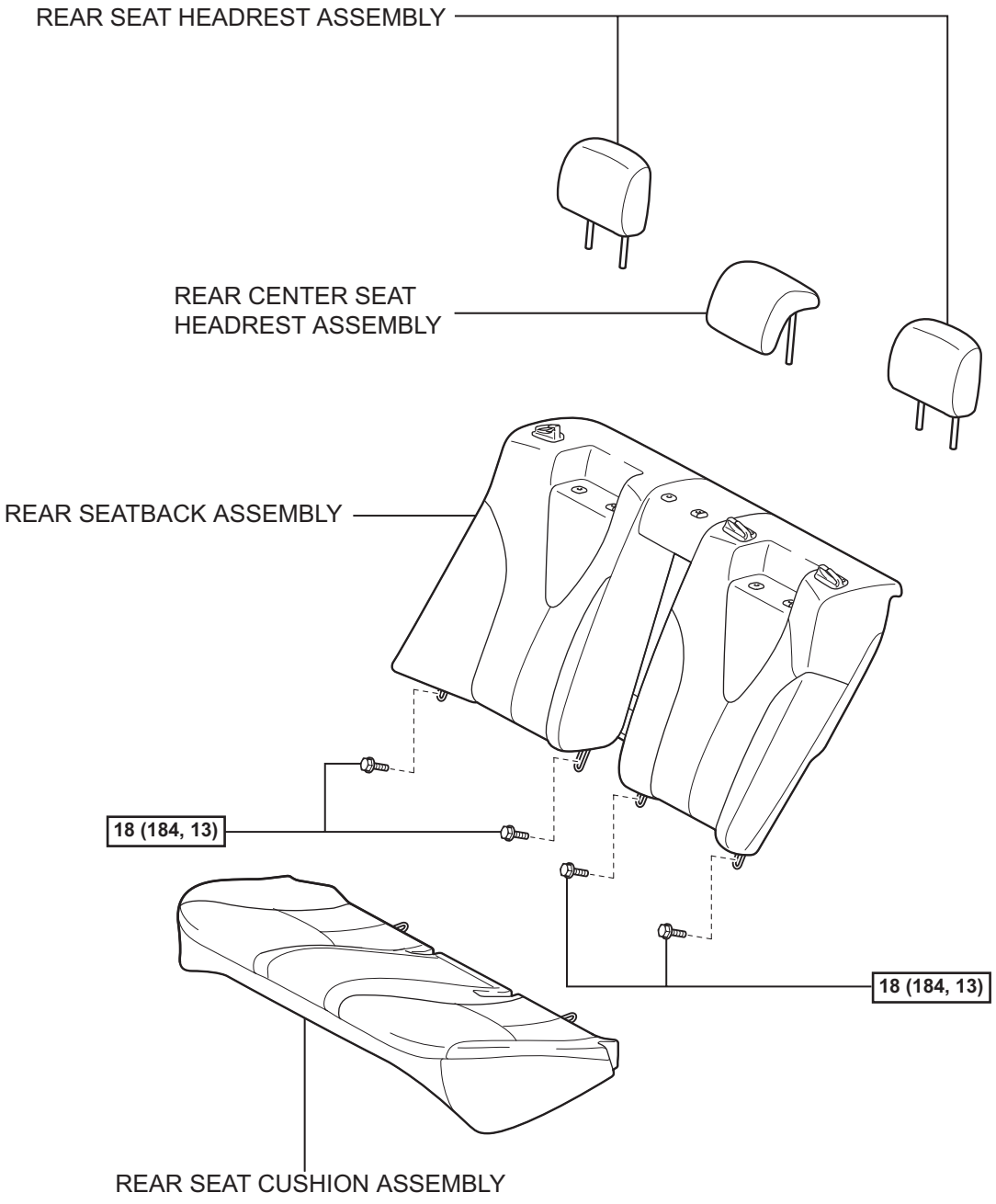
INSTALLATION

1. **INSTALL TIRE PRESSURE WARNING RECEIVER ASSEMBLY**
   (a) Connect the connector to the tire pressure warning receiver assembly.
   (b) Install the tire pressure warning receiver assembly with the bolt
   Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
2. **INSTALL INNER ROOF SIDE GARNISH LH (See page IR-52)**
3. **INSTALL REAR SEATBACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
4. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
5. **INSTALL REAR SEAT HEADREST ASSEMBLY (for Fixed Seat Type)**
6. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
7. **INSTALL REAR SIDE SEATBACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
8. **INSTALL REAR SEAT CUSHION ASSEMBLY (for Fold Down Seat Type) (See page SE-58)**
9. **INSTALL REAR SEATBACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)**
10. **INSTALL REAR SEATBACK COVER (for Reclining Seat Type)**
11. **INSTALL REAR SEAT HEADREST ASSEMBLY (for Reclining Seat Type)**
12. **INSTALL BENCH TYPE REAR SEAT CUSHION ASSEMBLY (for Reclining Seat Type) (See page SE-73)**
13. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
14. **INSPECT TIRE PRESSURE WARNING SYSTEM**
    HINT:
    (See page TW-20)

TIRE PRESSURE WARNING RECEIVER (w/ Antenna)

COMPONENTS

for Fixed Type:



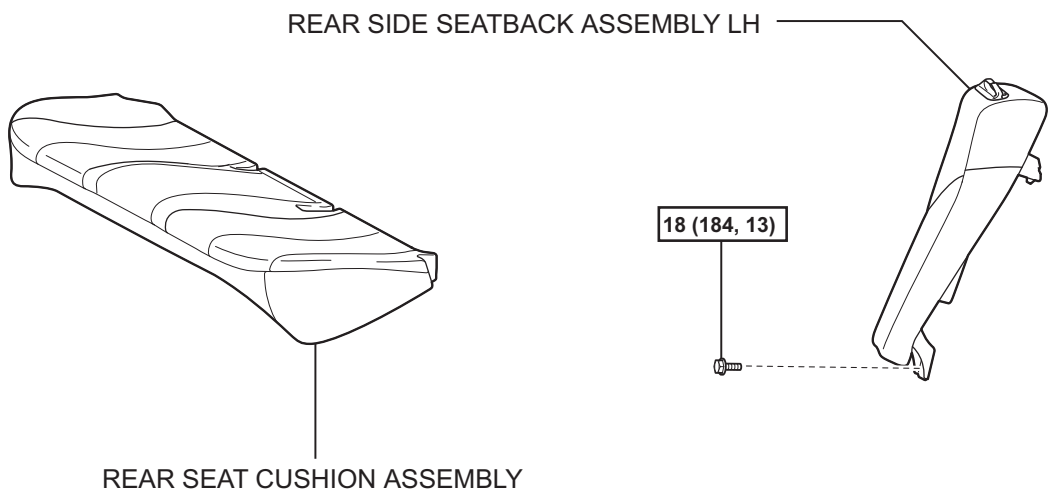
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136589E05

TW

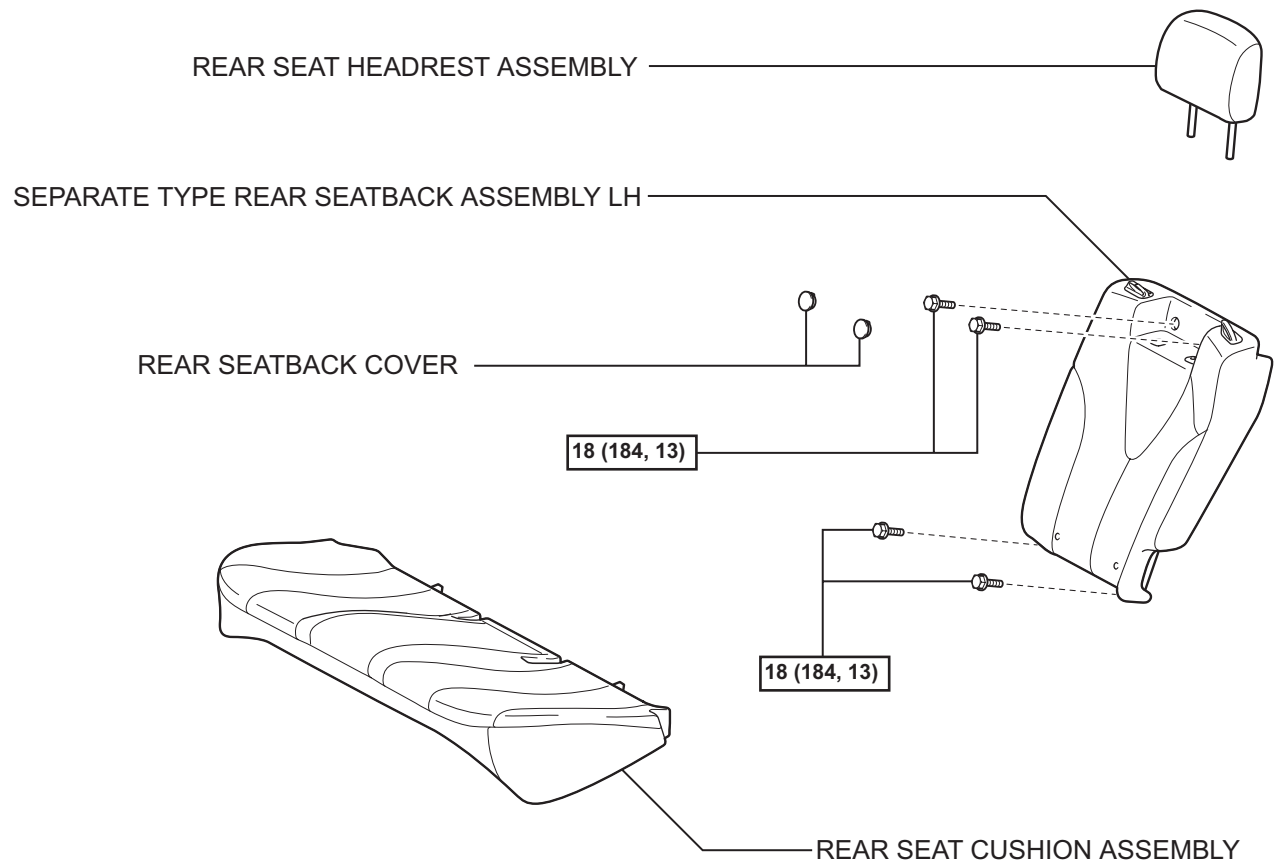
for Fold Down Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

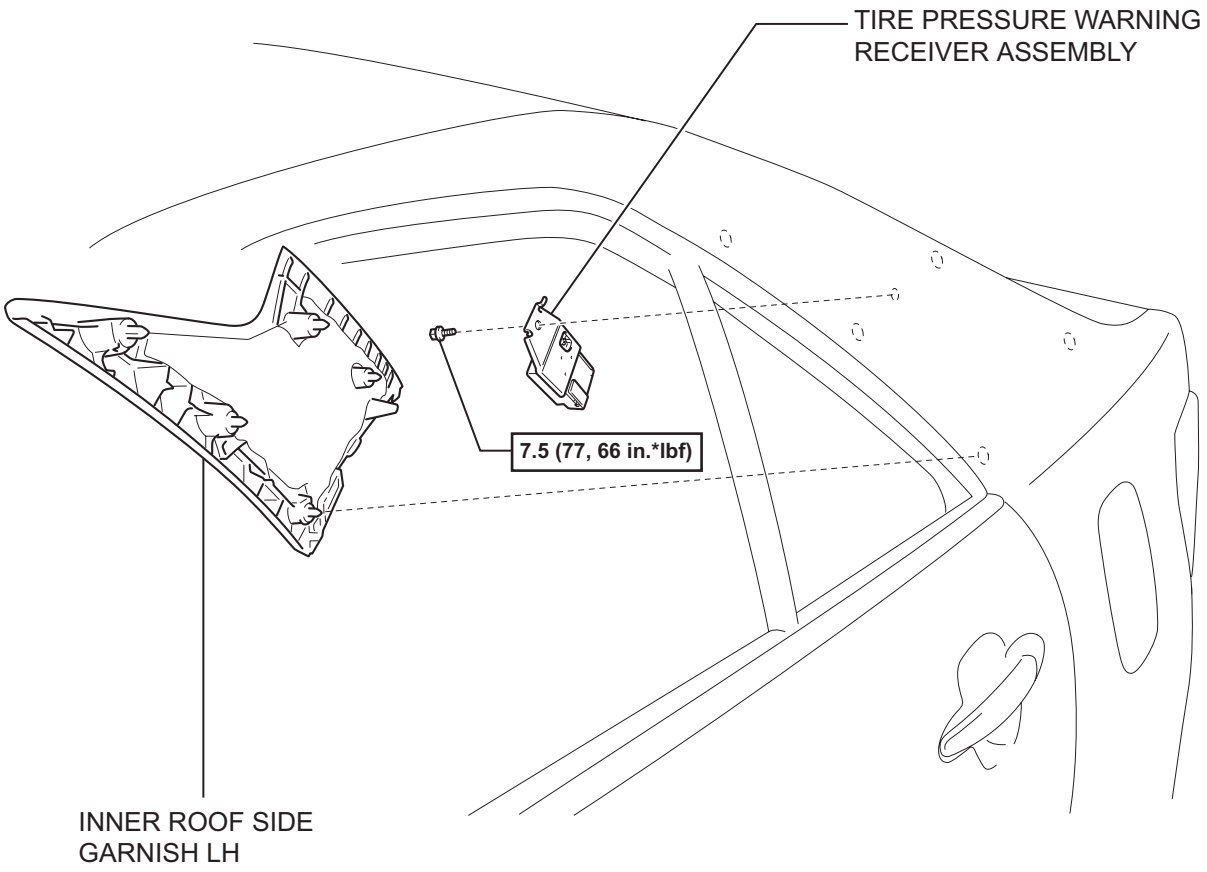
C139029E01

for Reclining Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

C135237E01



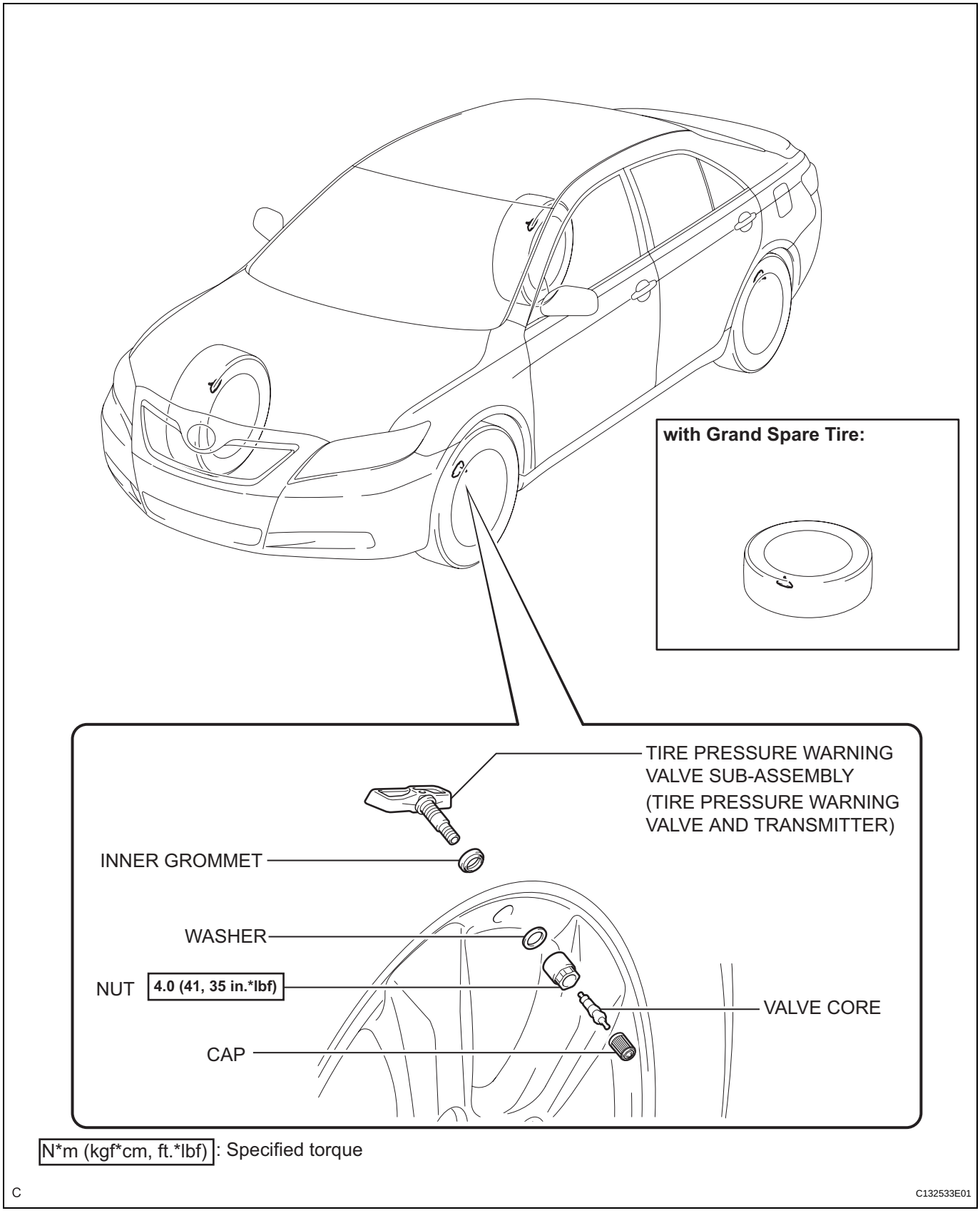
N*m (kgf*cm, ft.*lbf): Specified torque

C

C132530E01

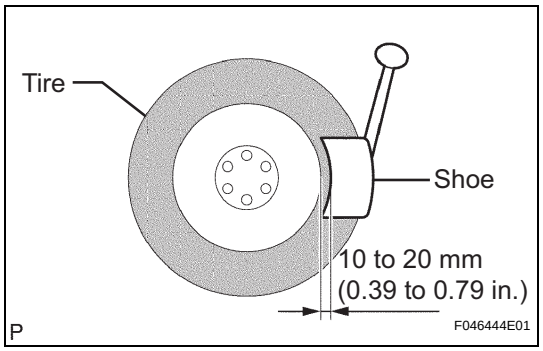
TIRE PRESSURE WARNING VALVE AND TRANSMITTER

COMPONENTS



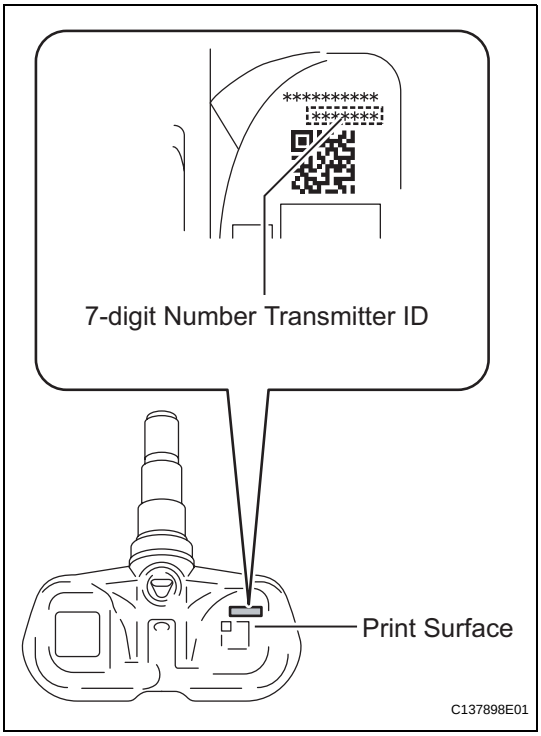
REMOVAL

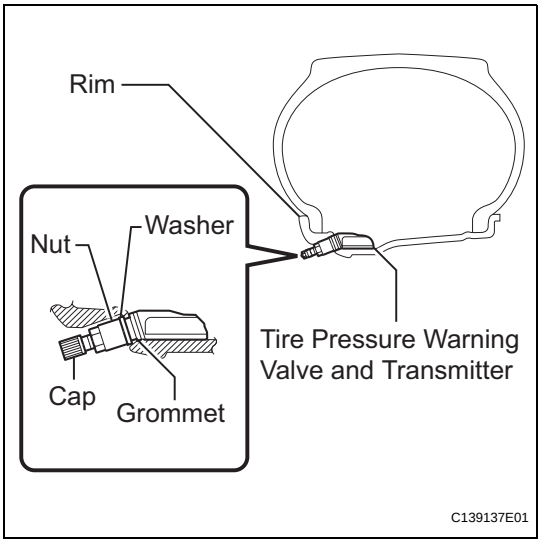
1. **REMOVE FRONT WHEEL**
2. **REMOVE REAR WHEEL**
3. **REMOVE GRAND SPARE TIRE (w/ Grand Spare Tire)**
4. **REMOVE TIRE PRESSURE WARNING VALVE SUB-ASSEMBLY**
   (a) Remove the valve core and cap, and release the air from the tire.
   (b) After ensuring that a sufficient amount of air has been released, remove the nut and washer that are used to secure the tire pressure warning valve and transmitter. Drop the tire pressure warning valve and transmitter inside the tire.
   HINT:
   Keep the removed cap, valve core, nut, and washer.



   (c) After dropping the tire pressure warning valve and transmitter into the tire, disengage the bead using the shoe of the tire remover.
   NOTICE:
   Be careful not to damage the tire pressure warning valve and transmitter due to interference between the tire pressure warning valve and transmitter and the tire bead.
   (d) Remove the bead on the upper side in the usual way.
   (e) Take out the tire pressure warning valve and transmitter from the tire and remove the bead on the lower side in the usual way.
   HINT:
   Check that no cracks or damage are identified on the grommet. If any damage is found, replace the grommet, washer, and nut.

TW





INSTALLATION

1. INSTALL TIRE PRESSURE WARNING VALVE SUB-ASSEMBLY

(a) Insert the tire pressure warning valve and transmitter into the valve installation hole. Insert it from the inside of the rim so that the print surface can be seen.

NOTICE:

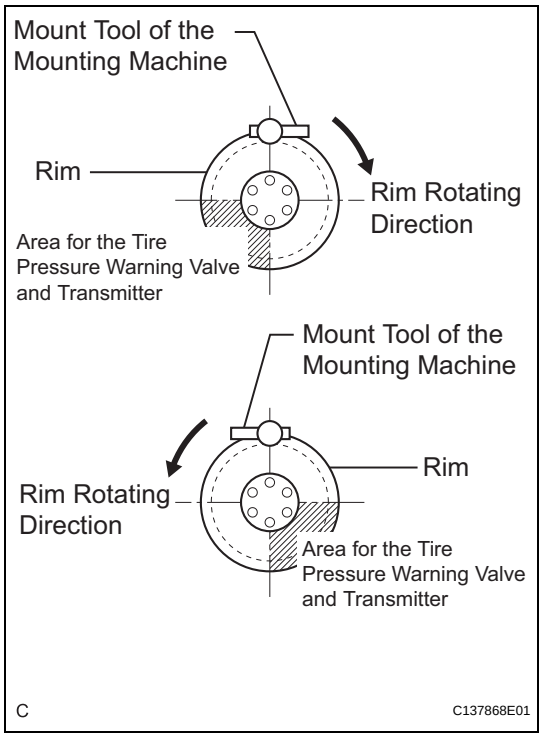
- **Check that there is no visible deformation, damage, or other abnormalities on the tire pressure warning valve and transmitter.**
- **Check that there is no foreign matter on the inner grommet and around the rim hole.**
- **If the tire pressure warning valve and transmitter is installed in the reverse direction, it may be damaged or fail to transmit signals when running at high speeds.**
- **If installing a new tire pressure warning valve and transmitter, write down the ID number before installation.**
- **It is necessary to register the ID in the ECU after installation (See page TW-15).**

(b) Install the washer on the tire pressure warning valve and transmitter from the rim side and tighten the nut.

Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)

NOTICE:

- **Do not tighten the nut further after tightening it to the specified torque.**
- **Check that there is no foreign matter on the washer and nut.**
- **If the tire and tire pressure warning valve and transmitter have been removed, check that there is no damage or cuts visible, and no foreign matter, such as mud, dirt, or sand attached to the grommet. Replace the grommet with a new one if any of the defects mentioned above are found.**
- **Check that there is no oil, water, or lubricant around the rim hole, tire pressure warning valve and transmitter, washer, and nut. Failing to do so may result in improper installation.**



(c) Set the wheel disc to the mounting machine and install the lower tire bead. Position the main body of the tire pressure warning valve and transmitter in the shaded area as shown in the illustration.
NOTICE:
- **If the tire pressure warning valve and transmitter is positioned outside this area, it will be interfered with the tire bead, and may cause damage to the tire pressure warning valve and transmitter.**
- **If the use of lubricant is required when installing the bead, do not apply the lubricant directly to the tire pressure warning valve and transmitter.**

(d) Install the upper bead.
NOTICE:
Make sure that the tire bead and tool do not interfere with the main body of the tire pressure warning valve and transmitter and that it is not clamped by the bead.

(e) After the tire is inflated, the valve nut may be loose. Retighten the nut to the specified torque and then check for air leaks with soapy water.
Torque: 4.0 N*m (41 kgf*cm, 35 in.*lbf)
NOTICE:
Do not tighten the nut further after tightening it to the specified torque.

2. **INSTALL FRONT WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

3. **INSTALL REAR WHEEL**
Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

4. **INSTALL GRAND SPARE TIRE (w/ Grand Spare Tire)**

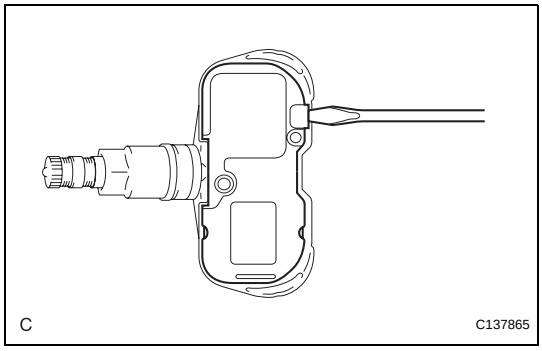
5. **INSPECT TIRE**
HINT:
(See page TW-3)

6. **REGISTER TRANSMITTER ID**
HINT:
(See page TW-15)

7. **INSPECT TIRE PRESSURE WARNING SYSTEM**
HINT:
(See page TW-20)

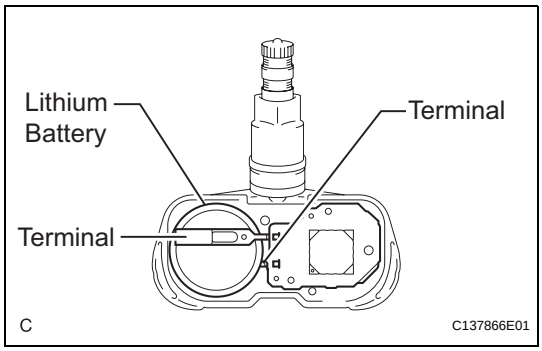
DISPOSAL

HINT:
The tire pressure warning valve sub-assembly is powered by a lithium battery. When disposing of the tire pressure warning valve sub-assembly, remove the battery and dispose of it correctly.



1. DISPOSE OF TIRE PRESSURE WARNING VALVE SUB-ASSEMBLY

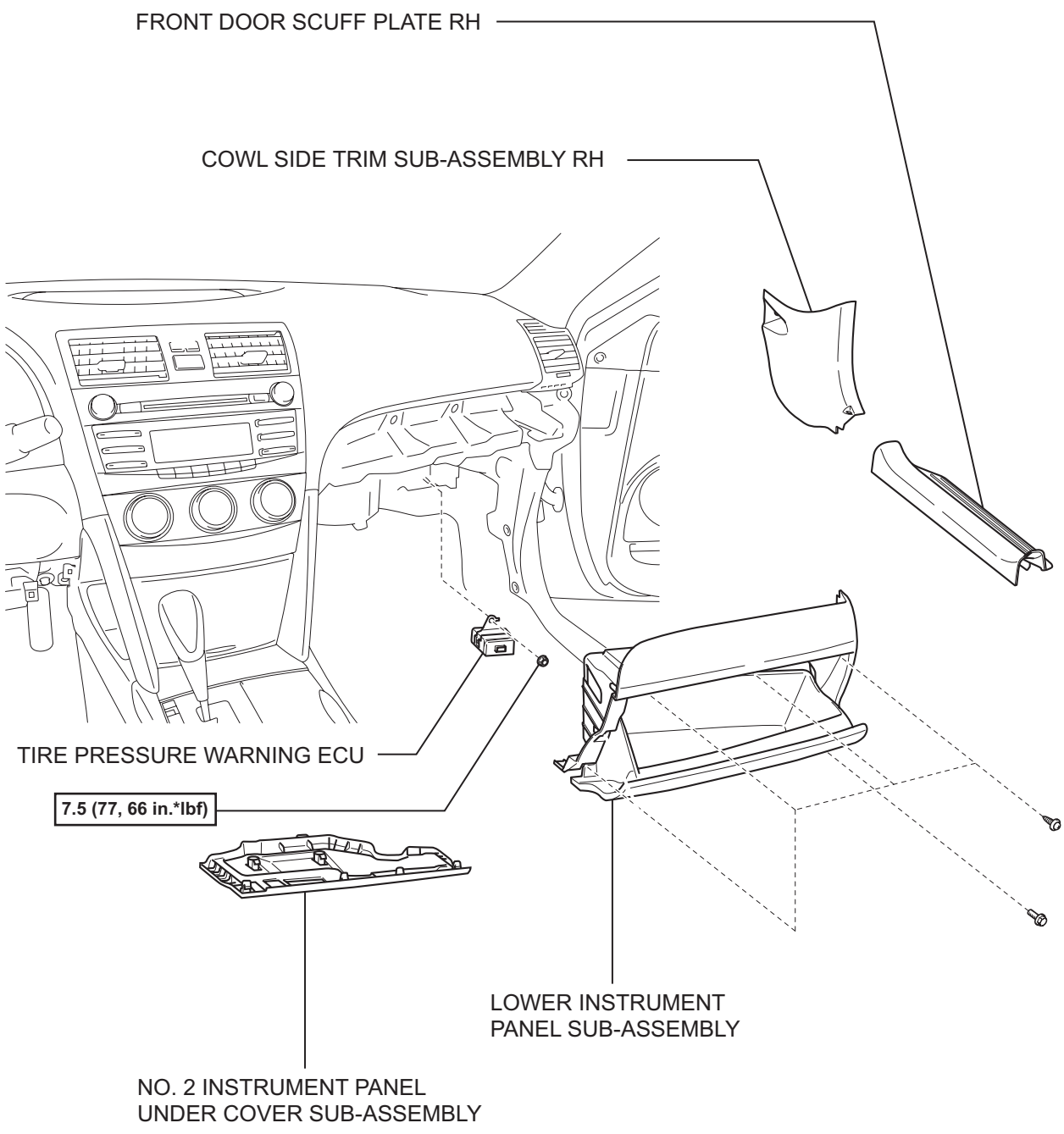
(a) Use the tip of a screwdriver to pry off the back cover.



(b) The battery and base board covered with resin are exposed. While taking out the battery, cut the 2 terminals that connect the battery to the base board.

TIRE PRESSURE WARNING ECU

COMPONENTS



N*m (kgf*cm, ft.*lbf) : Specified torque

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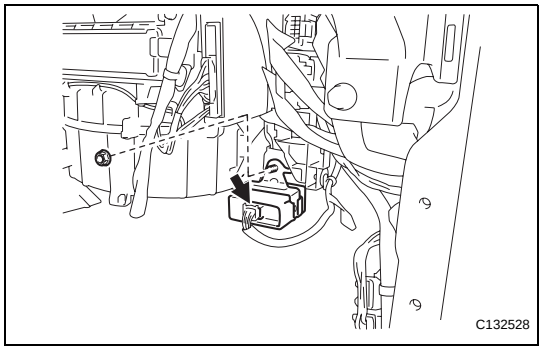
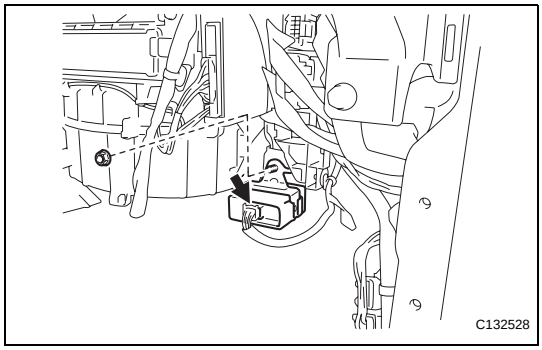
TW

REMOVAL

NOTICE:
Before removing the tire pressure warning ECU, read the registered transmitter IDs of all wheels and write them down to use for re-registration of transmitter IDs (See page TW-15).

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
4. **REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (See page IP-23)**
5. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**
6. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**
7. **REMOVE TIRE PRESSURE WARNING ECU**
   (a) Remove the nut.
   (b) Disconnect the connector and remove the tire pressure warning ECU.





INSTALLATION

1. **INSTALL TIRE PRESSURE WARNING ECU**
   (a) Connect the connector to the tire pressure warning ECU.
   (b) Install the tire pressure warning ECU with the nut.
   Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
2. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
3. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
4. **INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (See page IP-56)**
5. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
6. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
7. **CONNECT CABLE TO BATTERY NEGATIVE TERMINAL**

8. **REGISTER TRANSMITTER ID**
HINT:
(See page TW-15)

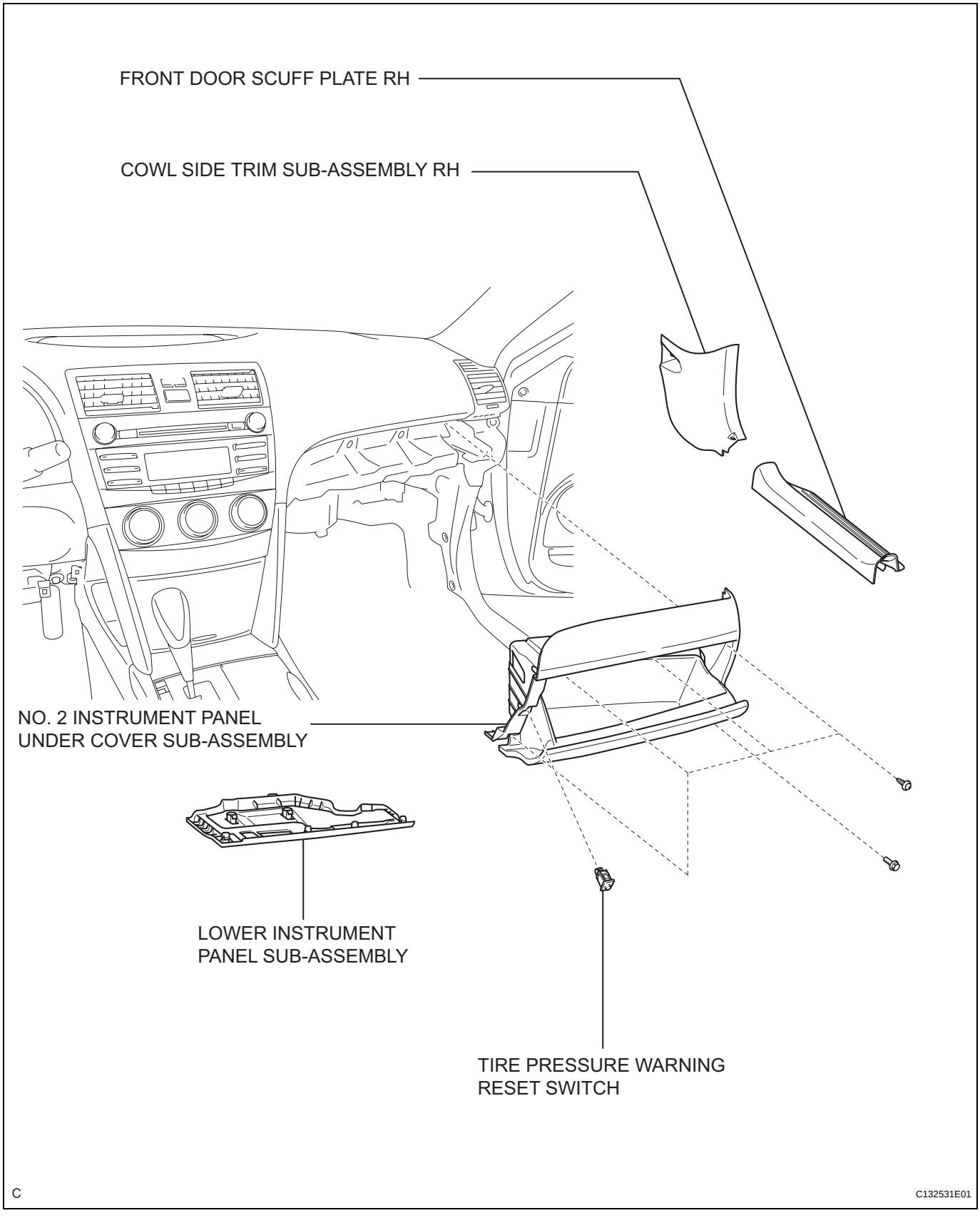
9. **INITIALIZE SYSTEM**
NOTICE:
- **Be sure to register the transmitter IDs of all tires including the grand spare tire in the ECU before initialization.**
- **Be sure to inflate all tires including the grand spare tire to the proper inflation pressure before initialization.**

HINT:
(See page TW-18)

10. **INSPECT TIRE PRESSURE WARNING SYSTEM**
HINT:
(See page TW-20)

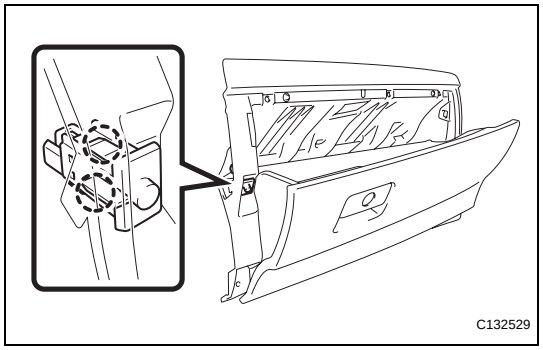
TIRE PRESSURE WARNING RESET SWITCH

COMPONENTS



REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT DOOR SCUFF PLATE RH (See page IR-26)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-26)**
4. **REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (See page IP-23)**
5. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-23)**
6. **REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-24)**
7. **REMOVE TIRE PRESSURE WARNING RESET SWITCH**
   (a) Disengage the 2 claws and remove the tire pressure warning reset switch from the lower instrument panel sub-assembly.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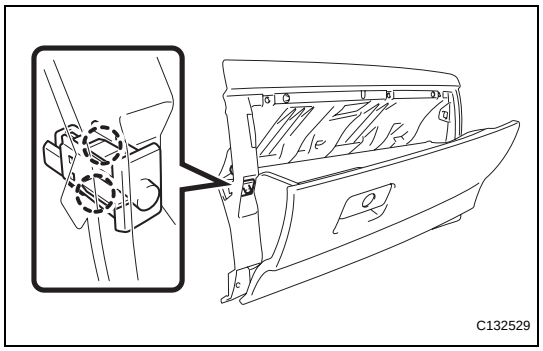
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INSTALLATION

1. **INSTALL TIRE PRESSURE WARNING RESET SWITCH**
   (a) Engage the 2 claws to install the tire pressure warning reset switch.
2. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-55)**
3. **INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-56)**
4. **INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (See page IP-56)**
5. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH (See page IR-55)**
6. **INSTALL FRONT DOOR SCUFF PLATE RH (See page IR-55)**
7. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
8. **INITIALIZE SYSTEM**
   NOTICE:
   Be sure to inflate all tires including the grand spare tire to the proper inflation pressure before initialization.
   HINT:
   (See page TW-18)

9. INSPECT TIRE PRESSURE WARNING SYSTEM

HINT:

(See page TW-20)

AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assembly, engine assembly or ECM (See page AX-16).**
- **Perform the REGISTRATION (VIN registration) when replacing the ECM (See page ES-16).**

HINT:
RESET MEMORY can not be completed by only disconnecting the battery cable.

1. EXPRESSION OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

Switch Type / Expression	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	Off
Ignition switch on (IG)	ON	On (IG)
Ignition switch on (ACC)	ACC	On (ACC)
Engine start	START	Start

H

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2. The automatic transaxle is composed of highly precision-finished parts which need careful inspection before reassembly. Even a small nick could cause fluid leakage or affect the performance. The instructions here are organized so that you work on only one component group at a time. This will help avoid confusion caused by similar-looking parts of different sub-assemblies being on your workbench at the same time. The component groups are inspected and repaired from the converter housing side. Complete the inspection, repair and

reassembly before proceeding to the next component group as much as possible. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because some parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups. Recommended: ATF WS

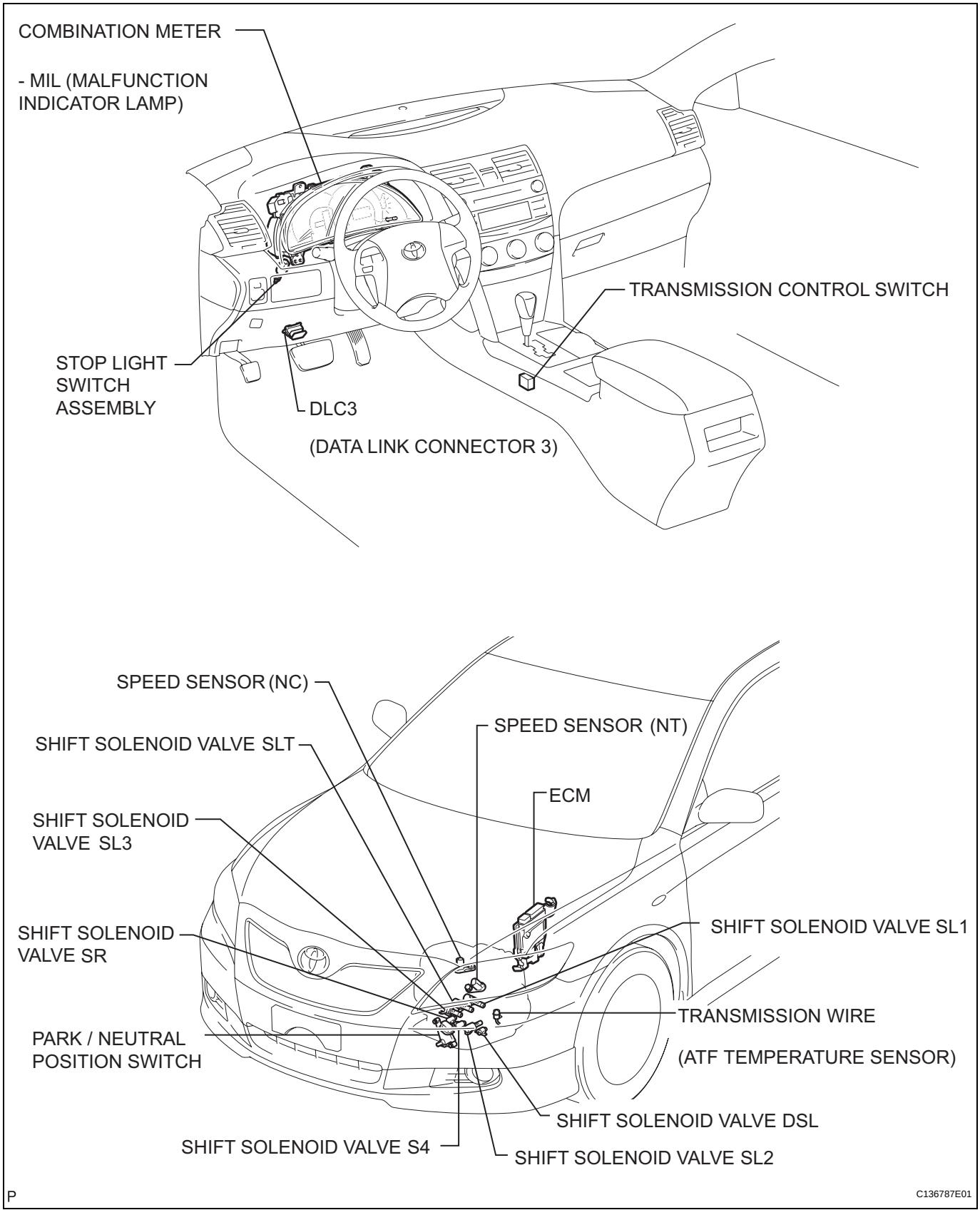
3. **All disassembled parts should be washed clean and any fluid passages and holes should be blown through with compressed air.**
4. **Dry all parts with compressed air. Never use a shop rag or a piece of cloth to dry them.**
5. **When using compressed air, always aim away from yourself to prevent accidentally spraying ATF or kerosene in your face.**
6. **Only recommended automatic transaxle fluid or kerosene should be used for cleaning.**
7. **After cleaning, the parts should be arranged in the correct order for efficient inspection, repair, and reassembly.**
8. **When disassembling a valve body, be sure to match each valve together with the corresponding spring.**
9. **New discs for the brakes and clutches that are to be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.**
10. **All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.**
11. **All gaskets and rubber O-rings should be replaced with new ones.**
12. **Do not apply adhesive cements to gaskets and similar parts.**
13. **Make sure that the ends of a snap ring are not aligned with one of the cutouts and are installed in the groove correctly.**
14. **When replacing a worn bushing, the sub-assembly containing the bushing must also be replaced.**
15. **Check thrust bearings and races for wear or damage. Replace them as necessary.**
16. **When working with FIPG material, you must observe the following:**
    - Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surface.
    - Thoroughly clean all components to remove any loose material.
    - Clean both sealing surfaces with a non-residue solvent.

- Parts must be reassembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.

DEFINITION OF TERMS

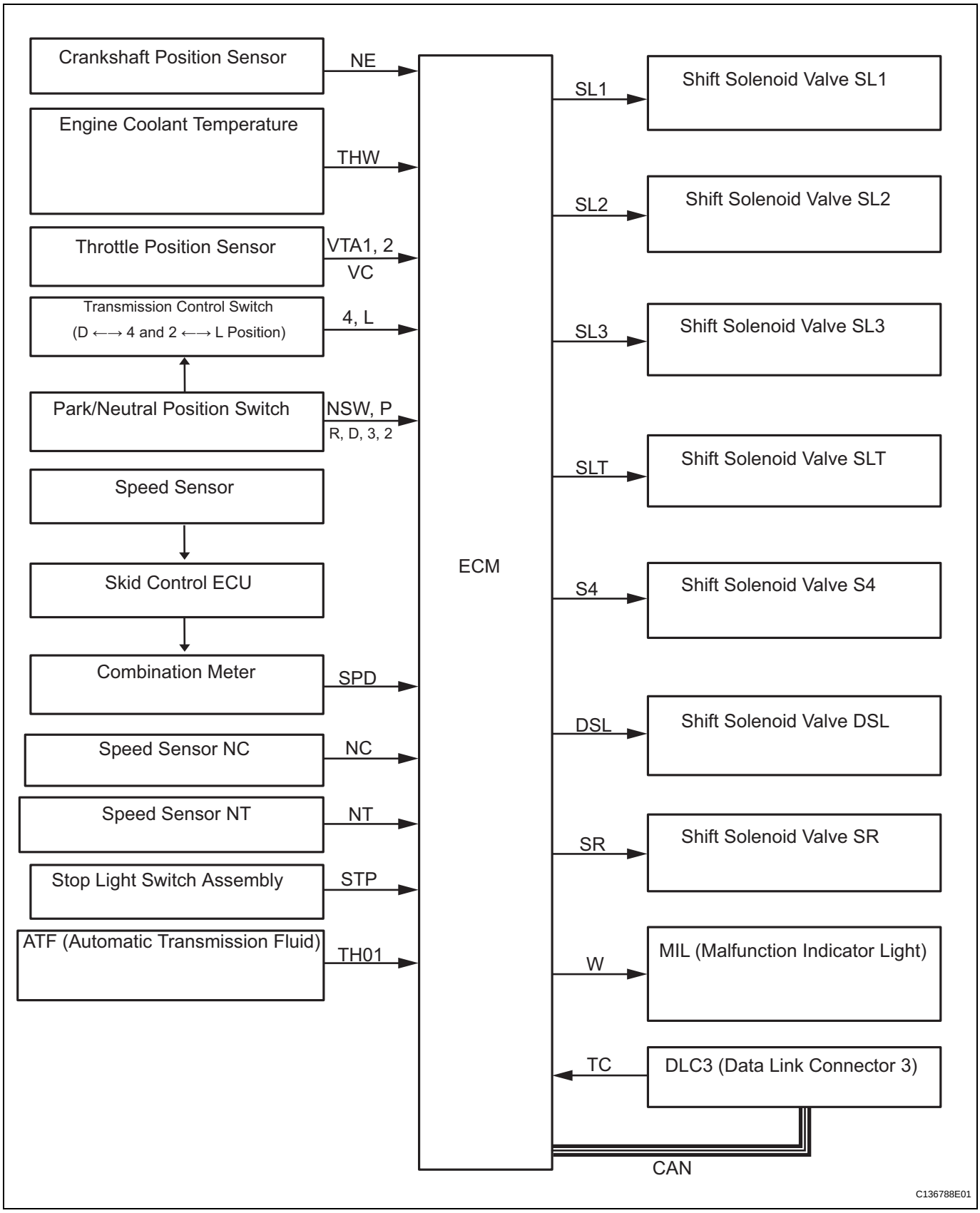
Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects malfunction only one time during a single driving cycle. "Continuous" means that the ECM detects malfunction every time when enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.
Component operating range	Normal operation range of sensors and solenoids under normal driving conditions. Use these ranges as a reference. They cannot be used to judge if a sensor or solenoid is defective or not.

PARTS LOCATION



SYSTEM DIAGRAM

The configuration of the electronic control system in the U250E automatic transaxles is as shown in the following chart.



SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

(a) The ECT (Electronic controlled automatic transmission/transaxle) is an automatic transmission/transaxle that electronically controls shift timing using the ECM. The ECM detects electrical signals that indicate engine and driving conditions, and controls the shift point, based on driver habits and road conditions. As a result, fuel efficiency and power transmission performance are improved.

Shift shock has been reduced by controlling the engine and transmission simultaneously.

In addition, the ECT has features such as follows:

- Diagnostic function.
- Fail-safe function when a malfunction occurs.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The ECM of this system is connected to the CAN and multiplex communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN and multiplex communication systems.
- The intelligent tester can be used at steps 3, 4, 6, and 9.

1	**Vehicle Brought to Workshop**

NEXT

2	**Customer Problem Analysis**

NEXT

3	**Connect the OBD II scan tool or intelligent tester to DLC3**

NEXT

4	**Check and Clear DTCs and Freeze Frame Data**

HINT:
(See page AX-28).

NEXT

5	**Visual Inspection**

NEXT

6	**Setting the Check Mode Diagnosis**

HINT:
(See page AX-29).

NEXT

7	**Problem Symptom Confirmation**

HINT:
(See page AX-9).

Symptom does not occur: Go to step 8

Symptom occurs: Go to step 9

8	Symptom Simulation

HINT:
(See page IN-45).

NEXT

9	DTC Check

HINT:
(See page AX-28).

DTC is not output: Go to step 10

DTC is output: Go to step 17

10	Basic Inspection

HINT:
(See page AX-123, AX-129 and AX-182).

NG → Go to step 19

OK

11	Mechanical System Test

HINT:
(See page AX-12).

NG → Go to step 16

OK

12	Hydraulic Test

HINT:
(See page AX-14).

NG → Go to step 16

OK

13	Manual Shifting Test

HINT:
(See page AX-15).

NG → Go to step 15

OK

14	Problem Symptoms Table Chapter 1

HINT:
(See page AX-19).

NG → Go to step 18

OK

15	Problem Symptoms Table Chapter 2

HINT:
(See page AX-19).

NEXT

16	Part Inspection

→ Go to step 19

17	DTC Chart

HINT:
(See page AX-35).

NEXT

18	Circuit Inspection

NEXT

19	Repair or Replace

NEXT

20	Confirmation Test

NEXT

End

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

(a) Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transaxle does not shift up, shift down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and simulate the problem symptoms.

2. ROAD TEST

NOTICE:

Perform the test at the ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F) in the normal operation.

(a) D position test:

Shift into the D position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-40).

HINT:

5th Gear Up-shift Prohibition Control

- Engine coolant temperature is 55°C (131°F) or less and vehicle speed is at 70 km/h (43 mph) or less.
- ATF temperature is -2°C (28°F) or less.

5th and 4th Gear Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60°C (140°F) or less.

(2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts.

(3) Check for abnormal noise and vibration.

Check for abnormal noise and vibration when up-shifting from 1 → 2, 2 → 3, 3 → 4, and 4 → 5 while driving with the shift lever in the D position, and also check while driving in the lock-up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.

Check vehicle speeds when the 2nd to 1st, 3rd to 2nd, 4th to 3rd, and 5th to 4th kick-downs take place while driving with the shift lever in the D position. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (See page SS-40).

(5) Check abnormal shock and slip at kick-down.
(6) Check the lock-up mechanism.
- Drive in D position (5th gear), at a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:
- There is no lock-up in the 1st and 2nd gear.
- 4th lock-up operates while uphill-downhill is active in the D position.
- If there is a big jump in engine speed, there is no lock-up.

(b) 4 (O/D OFF) position test:
Shift into the 4 position and fully depress the accelerator pedal and check the following points.
(1) Check up-shift operation.
Check that the 1 → 2, 2 → 3 and 3 → 4 up-shift take place and that the shift point conforms to the automatic shift schedule (See page SS-40).
HINT:
There is no 5th up-shift in the 4 position.
(2) Check engine braking.
While driving in the 4 position and 4th gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noise during acceleration and deceleration, and for shock at up-shift and down-shift.

(c) 3 position test:
Shift into the 3 position and fully depress the accelerator pedal and check the following points.
(1) Check up-shift operation.
Check that the 1 → 2 and 2 → 3 up-shift take place and that the shift point conforms to the automatic shift schedule (See page SS-40).
HINT:
There is no 4th up-shift and lock-up in the 3 position.
(2) Check engine braking.
While running in the 3 position and 3rd gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noise during acceleration and deceleration, and for shock at up-shift and down-shift.

(d) 2 position test:
Shift into the 2 position and fully depress the accelerator pedal and check the following points.
(1) Check up-shift operation.
Check that the 1 →2 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-40).
HINT:
There is no 3rd up-shift and lock-up in the 2 position.
(2) Check engine braking.
While running in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noise during acceleration and deceleration, and for shock at up-shift and down-shift.

(e) L position test:
Shift into the L position and fully depress the accelerator pedal and check the following points.
(1) Check no up-shift.
While running in the L position, check that there is no up-shift to 2nd gear.
HINT:
There is no lock-up in the L position.
(2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noise during acceleration and deceleration.

(f) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.
CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(g) P position test:
Stop the vehicle on the grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

(h) Uphill/downhill control function test:
(1) Check that the gear does not up-shift to the 4th or 5th gear while the vehicle is driving uphill.
(2) Check that the gear automatically down-shifts from 5th to 4th or from the 4th to 3rd gear when brake is applied while the vehicle is driving downhill.

MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D position.

NOTICE:

- **Driving test should be done on a paved road (a nonskid road).**
- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F).**
- **Do not continuously run this test for longer than 10 seconds.**
- **To ensure safety, do this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.

(2) Connect the intelligent tester to the DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressed firmly on the brake pedal.

(5) Start the engine.

(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot.

(7) Quickly read the stall speed at this time.

Stall speed:

2,310 +- 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D position	• Engine power output may be insufficient • Stator one-way clutch not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	• Line pressure is too low • Forward clutch slipping • U/D (Underdrive) brake slipping • U/D (Underdrive) one-way clutch is not operating properly • No.1 one-way clutch not operating properly • Improper fluid level

(b) Measure the time lag.

(1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the clutch and brake.

NOTICE:

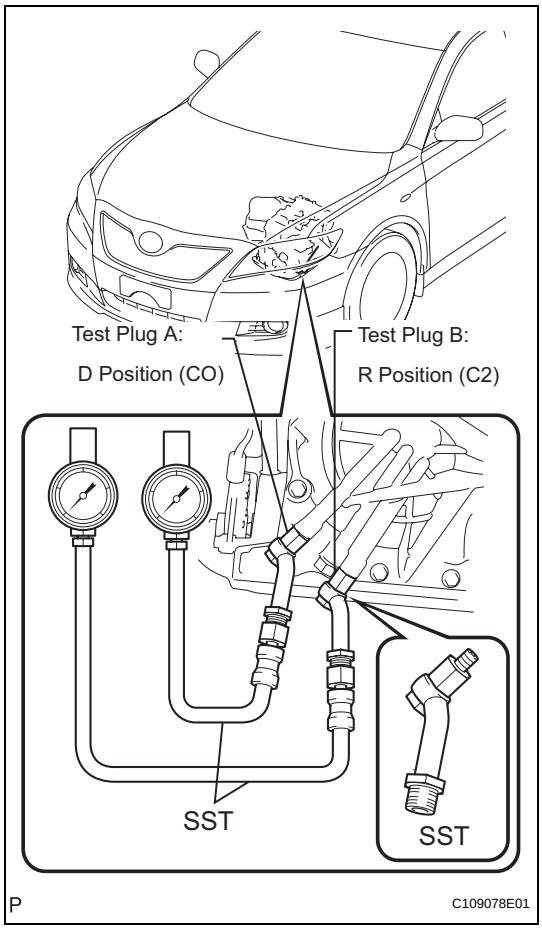
- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**

- **Be sure to allow 1 minute interval between tests.**
- **Perform the test three times, and measure the time lags. Calculate the average value of the three time lags.**

(2) Connect the intelligent tester to the DLC3.
(3) Fully apply the parking brake.
(4) Start and warm up the engine and check idle speed.
Idle speed:
approx. 700 rpm (In N position and A/C OFF)
(5) Shift the lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.
Time lag:
N → D less than 1.2 seconds
(6) In the same way, measure the time lag for N → R.
Time lag:
N → R less than 1.5 seconds

Evaluation (If N → D or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	• Line pressure is too low • Forward clutch worn • No.1 one-way clutch is not operating properly • U/D (Underdrive) one-way clutch is not operating • U/D (Underdrive) brake worn
N → R time lag is longer	• Line pressure is too low • Reverse clutch worn • 1st and reverse brake worn • U/D (Underdrive) brake worn



HYDRAULIC TEST

1. PERFORM HYDRAULIC TEST

(a) Measure the line pressure.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**
- **Be careful to prevent SST hose from interfering with the exhaust pipe.**
- **This Check must be conducted after checking and adjusting engine.**
- **Perform under condition that A/C is OFF.**
- **When conducting stall test, do not continue more than 10 seconds.**

(1) Warm up the ATF (Automatic Transmission Fluid).

(2) Lift the vehicle up.

(3) Remove the engine under cover.

(4) Connect intelligent tester to DLC3.

(5) Remove the test plug A on the transaxle case front left side and install the SST.

SST 09992-00095 (09992-00231, 09992-00271)

NOTICE:

There is a difference in installation point between D position and R position.

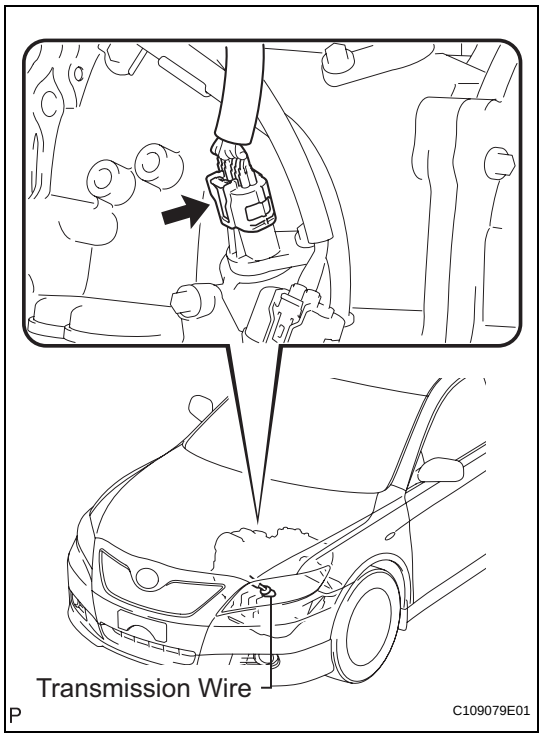
(6) Start the engine.

(7) Using intelligent tester, shift to D position and hold 3rd gear by active test, and measure the line pressure in idling.

Specified line pressure:

Condition	D position kPa (kgf / cm^2, psi)
Idling	372 to 412 kPa (3.8 to 4.2 kgf/cm^2, 54 to 60 psi)

(8) Turn the ignition switch off.



(9) Disconnect the connector of the transmission wire.
HINT:
Disconnect the connector only when performing the D position stall test.
(10) Start the engine.
(11) Firmly depress the brake pedal, shift to the D position, depress the accelerator pedal all the way down and check the line pressure while the stall test is performed.
Specified line pressure:

Condition	D position kPa (kgf / cm^2, psi)
Stall test	931 to 1,031 kPa (9.5 to 10.5 kgf/cm^2, 135 to 150 psi)

(12) Turn the ignition switch off.
(13) Remove the SST, install the test plug A.
(14) Remove the test plug B, install the SST and start engine.
SST 09992-00095 (09992-00231, 09992-00271)
(15) Connect the transmission wire connector, depress the brake pedal firmly, shift to the R position and check that the line pressure while the engine is idling and during the stall test.
Specified line pressure:

Condition	R position kPa (kgf / cm^2, psi)
Idling	672 to 742 kPa (6.9 to 7.6 kgf/cm^2, 97 to 108 psi)
Stall test	1,768 to 1,968 kPa (18.0 to 20.1 kgf/cm^2, 256 to 285 psi)

(16) Remove the SST, install the test plug B.
(17) Clear the DTC.

Evaluation:

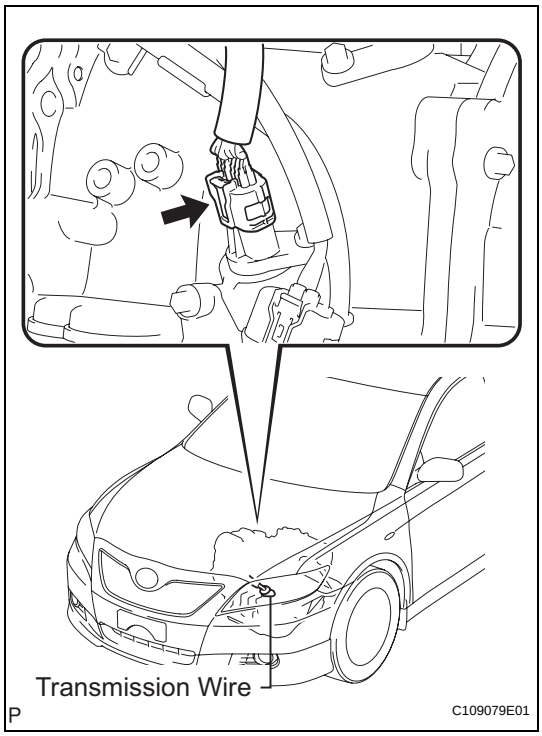
Problem	Possible cause
Measured values are higher than specified in all positions	• Shift solenoid valve (SLT) defective • Regulator valve defective
Measured values are lower than specified in all positions	• Shift solenoid valve (SLT) defective • Regulator valve defective • Oil pump defective • U/D (Underdrive) direct clutch defective
Pressure is low in the D position only	• D position circuit fluid leak • Forward clutch defective
Pressure is low in the R position only	• R position circuit fluid leak • Reverse clutch defective • 1st and reverse brake defective

MANUAL SHIFTING TEST

1. PERFORM MANUAL SHIFTING TEST

HINT:

- With this test, it can be determined whether the trouble occurs in the electrical circuit or is a mechanical problem in the transaxle.
- If any abnormalities are found in the following test, the problem is in the transaxle itself.



(a) Disconnect the connector of the transmission wire.

(b) Drive with the transmission wire disconnected. Shifting the shift lever in the order of L, 2, 3, 4 and D position to check whether the shifting condition changes the table below.

Shift Position	Shifting Condition
L ⟷ 2	No Shift (Not Change)
2 ⟷ 3	Down Shift ⟷ Up Shift
3 ⟷ 4 ⟷ D	No Shift (Not Change)

HINT:

When driving with the transmission wire disconnected, the shift lever position is in L or 2, the gear position is held in 3rd and the shift lever position is in 3, 4 or D, the gear position is held in 4th. However, when the shift position is in R or P, the operation is same as usual.

(c) Connect the connector of the transmission wire.

(d) Clear the DTC.

INITIALIZATION

1. RESET MEMORY

NOTICE:

- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assembly, engine assembly or ECM.**
- **The RESET MEMORY can be performed only with the Intelligent tester.**

HINT:

The ECM memorizes the condition that the ECT controls the automatic transaxle assembly and engine assembly according to those characteristics. Therefore, when the automatic transaxle assembly, engine assembly, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

Reset procedure is as follows.

(a) Turn the ignition switch off.

(b) Connect the intelligent tester to the DLC3.

(c) Turn the ignition switch on (IG) position and push the intelligent tester main switch on.

(d) Select the item "DIAGNOSIS / ENHANCED OBD II".

(e) Perform the reset memory procedure from the ENGINE menu.

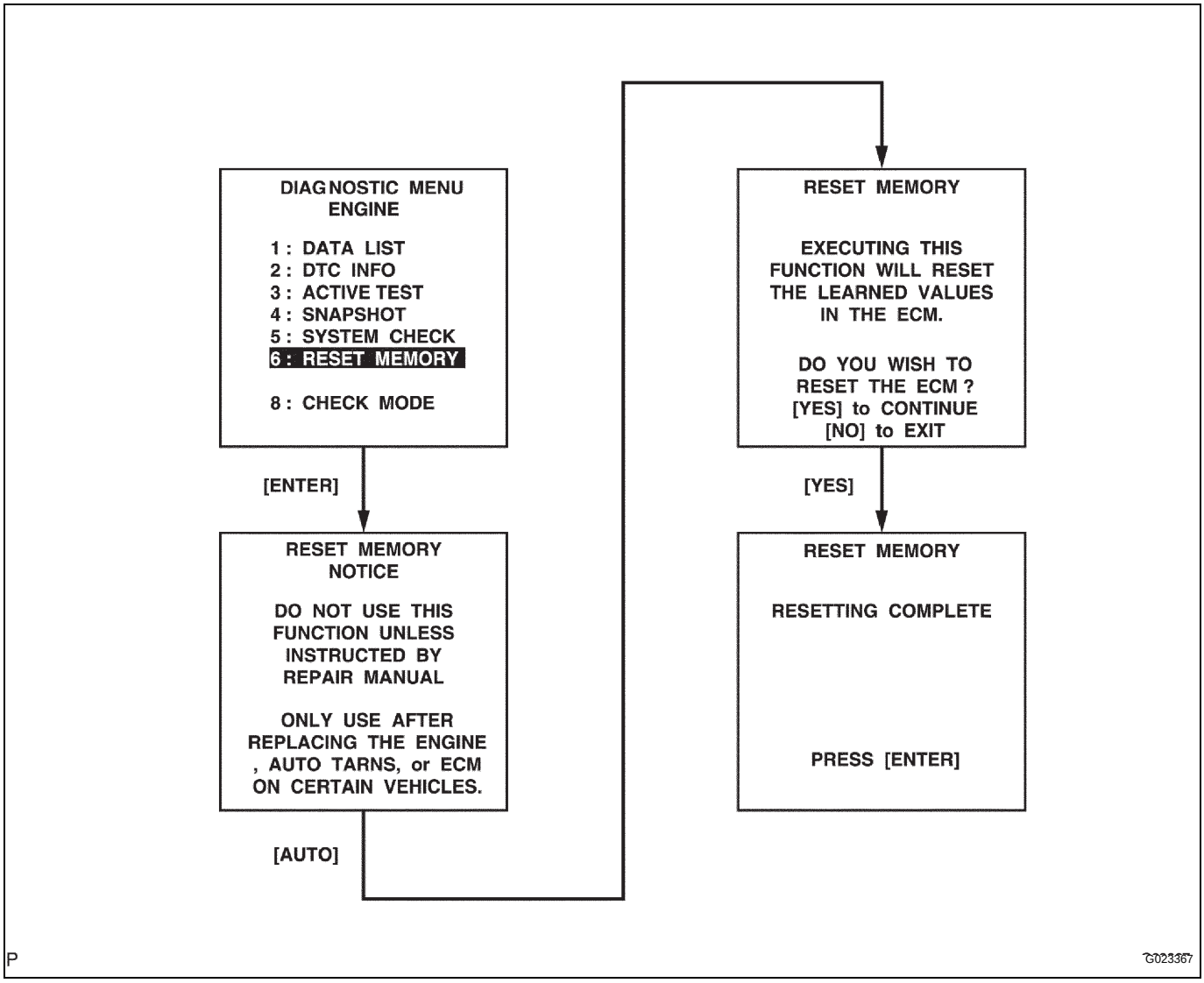
CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (See page AX-9) described earlier.

HINT:

The ECM is learned by performing the ROAD TEST.

(1) Tester menu flow:


DIAGNOSTIC MENU
ENGINE
1 : DATA LIST
2 : DTC INFO
3 : ACTIVE TEST
4 : SNAPSHOT
5 : SYSTEM CHECK
6 : RESET MEMORY
8 : CHECK MODE
[ENTER]
RESET MEMORY
NOTICE
DO NOT USE THIS FUNCTION UNLESS INSTRUCTED BY REPAIR MANUAL
ONLY USE AFTER REPLACING THE ENGINE , AUTO TARNS, or ECM ON CERTAIN VEHICLES.
[AUTO]
RESET MEMORY
EXECUTING THIS FUNCTION WILL RESET THE LEARNED VALUES IN THE ECM.
DO YOU WISH TO RESET THE ECM ?
[YES] to CONTINUE
[NO] to EXIT
[YES]
RESET MEMORY
RESETTING COMPLETE
PRESS [ENTER]
P
G023367

MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

(a) Perform this drive pattern as one method to simulate the detection conditions of the ECT malfunctions. (The DTCs may not be detected due the actual driving conditions. And some codes may not be detected through this drive pattern.)

HINT:

Preparation for driving

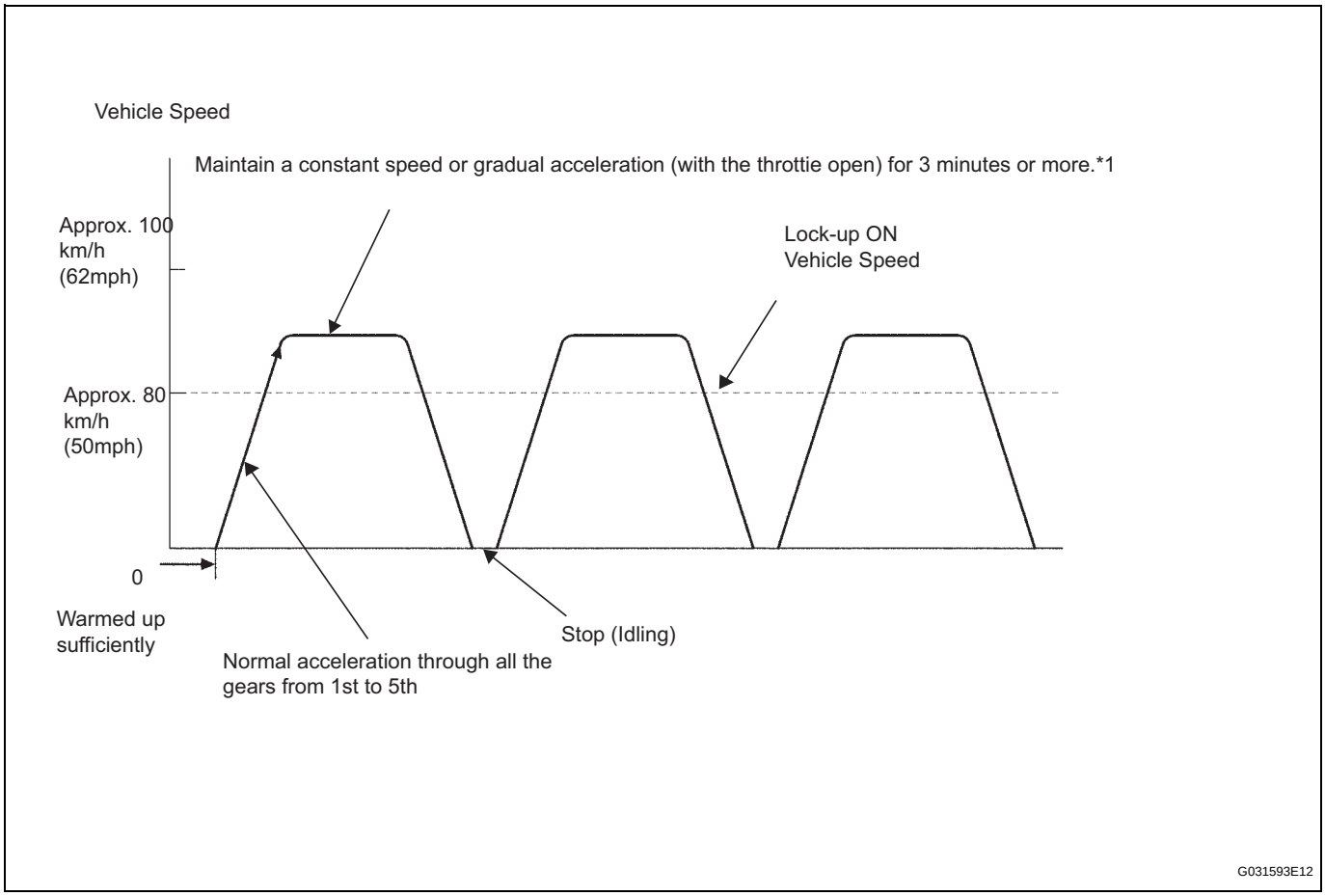
- Warm up the engine sufficiently. (Engine coolant temperature is 60°C (140°F) or higher)
- Drive the vehicle when the atmospheric temperature is -10°C (14°F) or higher. (Malfunction is not detected when the atmospheric temperature is less than -10°C (14°F))

Driving note

- Drive the vehicle through all gears. Stop → 1st → 2nd → 3rd → 4th → 5th → 5th (lock-up ON).
- Repeat the above driving pattern three times or more.

NOTICE:

- **The monitor status can be checked using the OBD II scan tool or intelligent tester. When using the intelligent tester, monitor status can be found in the "ENHANCED OBD II / DATA LIST" or under "CARB OBD II".**
- **In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.**
- **Perform this drive pattern on a level road as much as possible and strictly observe the posted speed limits and traffic laws while driving.**



HINT:
*1: Drive at such a speed in the uppermost gear, to engage lock-up. The vehicle can be driven at a speed lower than that in the above diagram under the lock-up condition.

NOTICE:
If necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

PROBLEM SYMPTOMS TABLE

HINT:

- If a normal code is displayed during the diagnostic trouble code check although the trouble still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.
- The Matrix Chart is divided into 2 chapters.
- When the circuit on which mark *1 is attached is a malfunction, DTC could be output.

Chapter 1:

Refer to the table below when the trouble cause is considered to be electrical the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart of each circuit, proceed to the circuit with the next highest number in the table to continue the check. If the trouble still occurs even though there are no abnormalities in any of the other circuits, check and replace the ECM.

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected area	See page
No down-shift (A particular gear, from 1st to 4th gear, is not down-shifted)	ECM	IN-40
No down-shift (5th -> 4th)	1. Transmission control switch (4 <--> D position) circuit *1	AX-39
	2. Shift solenoid valve (S4) circuit *1	AX-106
	3. ECM	IN-40
No up-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	ECM	IN-40
No up-shift (4th -> 5th)	1. Transmission control switch (4 <--> D position) circuit *1	AX-39
	2. Shift solenoid valve (S4) circuit *1	AX-106
	3. ECM	IN-40
No lock-up	1. Stop light switch circuit *1	AX-60
	2. Engine coolant temp. sensor circuit *1	ES-53
	3. ECM	IN-40
No lock-up off	ECM	IN-40
Shift point too high or too low	1. Throttle position sensor circuit *1	ES-53
	2. ECM	IN-40
Up-shift to 5th from 4th while shift lever is in 4 position	1. Transmission control switch (4 <--> D position) circuit *1	AX-39
	2. ECM	IN-40
Up-shift to 5th from 4th while engine is cold	1. Engine coolant temp. sensor circuit *1	ES-53
	2. ECM	IN-40
Up-shift to 2nd from 1st while shift lever is in L position	1. Transmission control switch (2 <--> L position) circuit *1	AX-39
	2. ECM	IN-40
Harsh engagement (N -> D)	1. Shift solenoid valve (SL1) circuit *1	AX-73
	2. ECM	IN-40
Harsh engagement (Lock-up)	ECM	IN-40
Harsh engagement (Any driving position)	ECM	IN-40
Poor acceleration	ECM	IN-40
No kick-down	ECM	IN-40
Engine stalls when starting off or stopping	ECM	IN-40
Malfunction in shifting	1. Park/neutral position switch circuit *1	AX-39
	2. ECM	IN-40

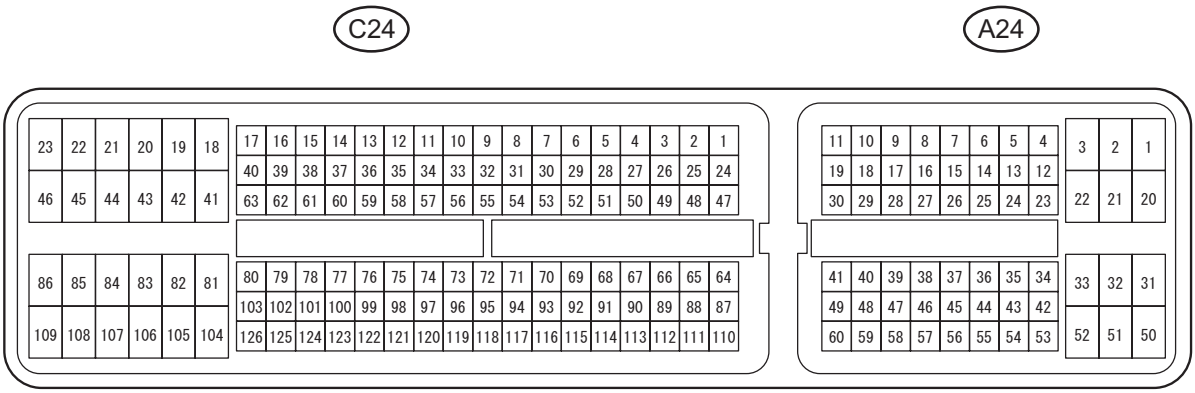
2. Chapter 2: On-Vehicle Repair and Off-Vehicle Repair

Symptom	Suspected area	See page
Vehicle does not move in any forward position and in reverse positions	1. Valve body assembly	AX-138
	2. U/D brake (B3)	AX-204
	3. Torque converter clutch	AX-193
Vehicle does not move in R position	1. Valve body assembly	AX-138
	2. Reverse clutch (C2)	AX-204
	3. 1st and reverse brake (B2)	AX-204
No up-shift (1st -> 2nd)	1. Valve body assembly	AX-138
	2. 2nd and O/D brake (B1)	AX-204
No up-shift (2nd -> 3rd)	1. Valve body assembly	AX-138
	2. Direct and O/D clutch (C0)	AX-204
No up-shift (3rd -> 4th)	1. Valve body assembly	AX-138
	2. 2nd and O/D brake (B1)	AX-204
No up-shift (4th -> 5th)	1. Shift solenoid valve (S4)	AX-295
	2. Valve body assembly	AX-138
	3. U/D clutch (C3)	AX-204
No down-shift (5th -> 4th)	1. Shift solenoid (S4)	AX-295
	2. Valve body assembly	AX-138
No down-shift (4th -> 3rd)	Valve body assembly	AX-138
No down-shift (3rd -> 2nd)	Valve body assembly	AX-138
No down-shift (2nd -> 1st)	Valve body assembly	AX-138
No lock-up or No lock-up off	1. Shift solenoid valve (DSL)	AX-295
	2. Valve body assembly	AX-138
	3. Torque converter clutch	AX-193
Harsh engagement (N -> D)	1. Shift solenoid valve (SL1)	AX-295
	2. Valve body assembly	AX-138
	3. C1 accumulator	AX-204
	4. Forward clutch (C1)	AX-204
	5. One-way clutch No.1 (F1)	AX-204
	6. U/D one-way clutch (F2)	AX-204
Harsh engagement (Lock-up)	1.Shift solenoid valve (SL2)	AX-295
	2. Valve body assembly	AX-138
	3. Torque converter clutch	AX-193
Harsh engagement (N -> R)	1. Valve body assembly	AX-138
	2. C2 accumulator	AX-204
	3. Reverse clutch (C2)	AX-204
	4. 1st and reverse brake (B2)	AX-204
Harsh engagement (1st -> 2nd -> 3rd -> 4th -> 5th)	1. Shift solenoid valve (SLT)	AX-295
	2. Valve body assembly	AX-138
Harsh engagement (1st -> 2nd)	1. Valve body assembly	AX-138
	2. 2nd and O/D brake (B1)	AX-204
Harsh engagement (2nd -> 3rd)	1. Valve body assembly	AX-138
	2. C0 accumulator	AX-204
	3. Direct and O/D clutch (C0)	AX-204
Harsh engagement (3rd -> 4th)	1. Valve body assembly	AX-138
	2. 2nd and O/D brake (B1)	AX-204
Harsh engagement (4th -> 5th)	1. Valve body assembly	AX-138
	2. C3 accumulator	AX-204
	3. U/D clutch (B3)	AX-204

Symptom	Suspected area	See page
Harsh engagement (5th -> 4th)	1. Valve body assembly	AX-138
	2. B3 accumulator	AX-204
Slip or shudder (Forward and reverse: After warm-up)	1. Valve body assembly	AX-138
	2. Oil strainer	AX-138
	3. Direct and O/D clutch (C0)	AX-204
	4. Forward clutch (C1)	AX-204
	5. U/D clutch (C3)	AX-204
	6. 2nd and brake (B1)	AX-204
	7. U/D brake (B3)	AX-204
	8. One-way clutch No.1 (F1)	AX-204
	9. U/D one-way clutch (F2)	AX-204
	10. Torque converter clutch	AX-193
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	AX-193
Slip or shudder (R position)	1. Reverse clutch (C2)	AX-204
	2. 1st and reverse brake (B2)	AX-204
Slip or shudder (1st)	1. Forward clutch (C1)	AX-204
	2. One-way clutch No. 1 (F1)	AX-204
	3. U/D one-way clutch (F2)	AX-204
Slip or shudder (2nd)	2nd and O/D brake (B1)	AX-204
Slip or shudder (3rd)	Direct and O/D clutch (C0)	AX-204
Slip or shudder (4th)	2nd and O/D brake (B1)	AX-204
Slip or shudder (5th)	U/D clutch (C3)	AX-204
Shift position too high or too low	Shift solenoid valve (SLT)	AX-295
No engine braking (1st +- 4th: D position)	U/D brake (B3)	AX-204
No engine braking (1st: L (1) position)	1. Valve body assembly	AX-138
	2. 1st and reverse brake (B2)	AX-204
No engine braking (2nd: 2 position)	1. Valve body assembly	AX-138
	2. 2nd and O/D brake (B1)	AX-204
No engine braking (3rd: 3 position)	U/D brake (B3)	AX-204
No kick-down	Valve body assembly	AX-138
Poor acceleration (All positions)	1. Shift solenoid valve (SLT)	AX-295
	2. Torque converter clutch	AX-193
Poor acceleration (5th)	1. U/D clutch (C3)	AX-204
	2. U/D planetary gear unit	AX-204
Engine stalls when starting off or stopping	1. Shift solenoid valve (DSL)	AX-295
	2. Torque converter clutch	AX-193

TERMINALS OF ECM

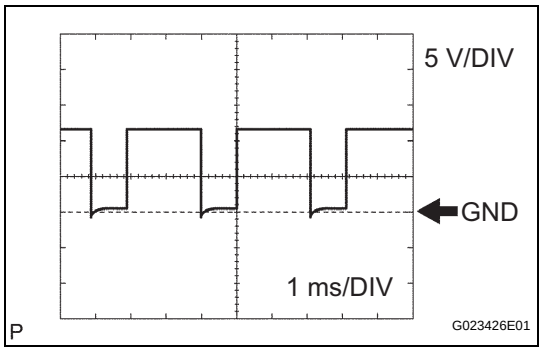
1. ECM



HINT:
Each ECM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Look under "Symbols (Terminal No.)" for the terminals to inspected. The standard voltage between the terminals is shown under "Specific Condition".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
D (C24-56) - E1 (C24-104)	G - W-B	D shift position switch signal	Ignition switch on (IG) and shift lever D and 4 position	10 to 14 V
			Ignition switch on (IG) and shift lever except D and 4 position	Below 1 V
R (C24-53) - E1 (C24-104)	P - W-B	R shift position switch signal	Ignition switch on (IG) and shift lever R position	10 to 14 V
			Ignition switch on (IG) and shift lever except R position	Below 1 V
SPD (A24-8) - E1 (C24-104)	L - W-B	Speed signal	Vehicle speed 20 km/h (12mph)	Pulse generation (See waveform 8)
STP (A24-36) - E1 (C24-104)	W - W-B	Stop light switch signal	Brake pedal is depressed	7.5 to 14 V
			Brake pedal is released	Below 1.5 V
4 (A24-25) - E1 (C24-104)	G - W-B	4 shift position switch signal	Ignition switch on (IG) and shift lever 4 position	10 to 14 V
			Ignition switch on (IG) and shift lever except 4 position	Below 1 V
3 (A24-26) - E1 (C24-104)	G - W-B	3 shift position switch signal	Ignition switch on (IG) and shift lever 3 position	10 to 14 V
			Ignition switch on (IG) and shift lever except 3 position	Below 1 V
2 (C24-55) - E1 (C24-104)	V - W-B	2 shift position switch signal	Ignition switch on (IG) and shift lever 2 and L position	10 to 14 V
			Ignition switch on (IG) and shift lever except 2 and L position	Below 1 V

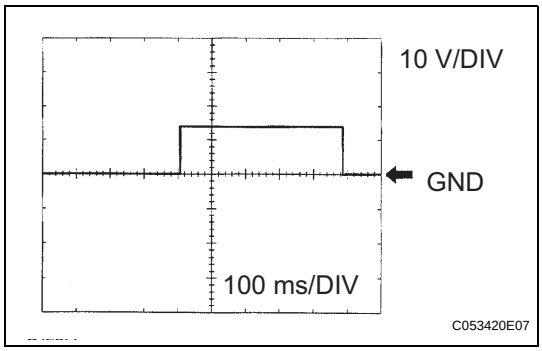
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
L (C24-74) - E1 (C24-104)	BR - W-B	L shift position switch signal	Ignition switch on (IG) and shift lever L position	10 to 14 V
			Ignition switch on (IG) and shift lever except L position	Below 1 V
P (C24-73) - E1 (C24-104)	GR - W-B	Park position switch signal	Ignition switch on (IG) and shift lever P position	10 to 14 V
			Ignition switch on (IG) and shift lever except P position	Below 1 V
N (C24-54) - E1 (C24-104)	SB - W-B	Neutral position switch signal	Ignition switch on (IG) and shift lever N position	10 to 14 V
			Ignition switch on (IG) and shift lever except N position	Below 1 V
NSW (C24-52) - E1 (C24-104)	SB - W-B	Park neutral switch signal	Ignition switch on (IG) and shift lever P and N position	Below 2 V
			Ignition switch on (IG) and shift lever except P and N position	10 to 14 V
DSL (C24-79) - E1 (C24-104)	BR - W-B	DSL solenoid signal	Vehicle speed 65 km/h (40mph), lock-up (ON to OFF)	Pulse generation (See waveform 2)
SR (C24-80) - E1 (C24-104)	G - W-B	SR solenoid signal	Ignition switch on (IG)	Below 1 V
			3rd, 4th or 5th gear	10 to 14 V
			1st or 2nd gear	Below 1 V
S4 (C24-78) - E1 (C24-104)	GR - W-B	S4 solenoid signal	Ignition switch on (IG)	Below 1 V
			5th gear	10 to 14 V
			Except 5th gear	Below 1 V
SL3+ (C24-60) - SL3- (C24-61)	O - Y	SL3 solenoid signal	Engine idle speed	Pulse generation (See waveform 3)
SL2+ (C24-58) - SL2- (C24-59)	G - R	SL2 solenoid signal	Engine idle speed	Pulse generation (See waveform 4)
SL1+ (C24-57) - SL1- (C24-77)	L - L-G	SL1 solenoid signal	Engine idle speed	Pulse generation (See waveform 5)
NC+ (C24-101) - NC- (C24-102)	LG - P	Speed sensor (NC) signal	Vehicle speed 30 km/h (19mph): (3rd gear) Engine speed 1,400 rpm	Pulse generation (See waveform 6)
NT+ (C24-125) - NT- (C24-124)	G - W	Speed sensor (NT) signal	Vehicle speed 20 km/h (12mph)	Pulse generation (See waveform 7)
SLT+ (C24-76) - SLT- (C24-75)	L - W	SLT solenoid signal	Engine idle speed	Pulse generation (See waveform 1)
THO1 (C24-72) - ETHO (C24-95)	Y - BR	ATF temperature sensor signal	ATF temperature: 115°C (239°F) or more	Below 1.5 V



(a) Waveform 1

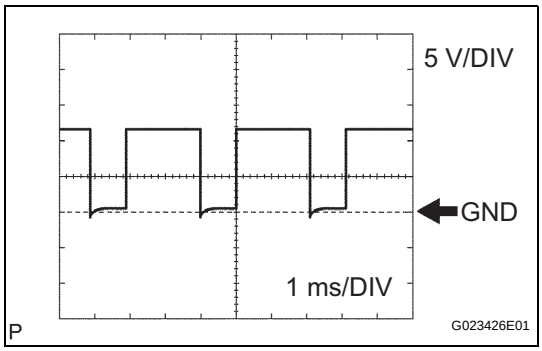
Reference:

Terminal	SLT+ - SLT-
Tool setting	5 V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



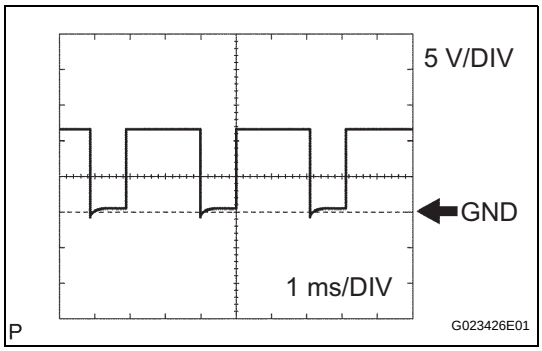
(b) Waveform 2
Reference:

Terminal	DSL - E1
Tool setting	10 V/DIV, 100ms/DIV
Vehicle condition	Vehicle speed 65 km/h (40 mph), lock-up (ON to OFF)



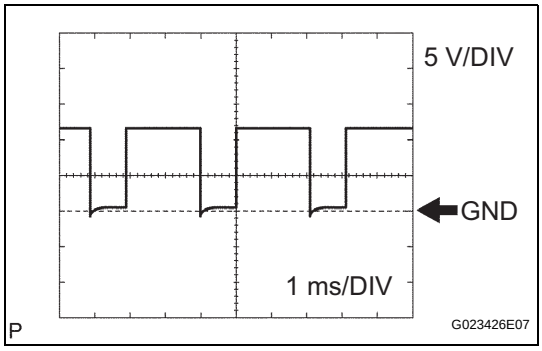
(c) Waveform 3
Reference:

Terminal	SL3+ - SL3-
Tool setting	5 V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



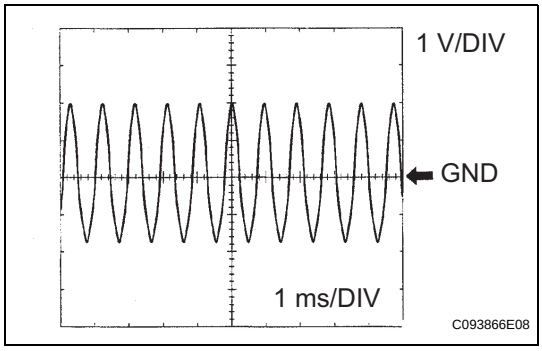
(d) Waveform 4
Reference:

Terminal	SL2+ - SL2-
Tool setting	5 V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



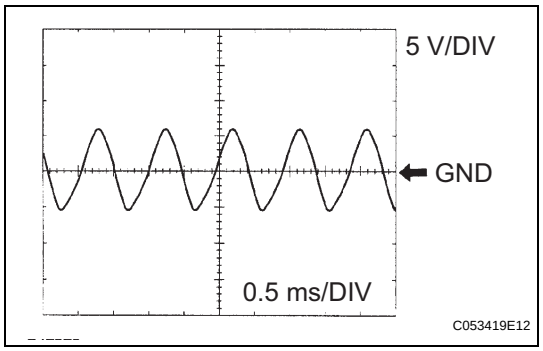
(e) Waveform 5
Reference:

Terminal	SL1+ - SL1-
Tool setting	5 V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



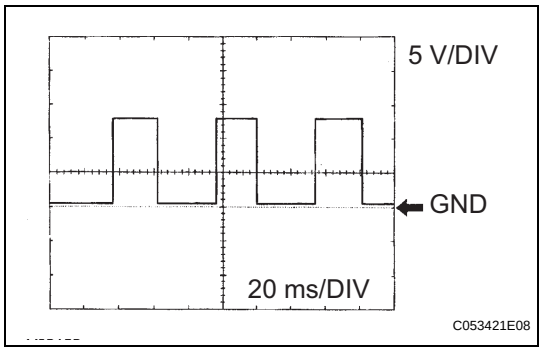
(f) Waveform 6
Reference:

Terminal	NC+ - NC-
Tool setting	1 V/DIV, 1ms/DIV
Vehicle condition	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1.400 rpm



(g) Waveform 7
Reference:

Terminal	NT+ - NT-
Tool setting	5 V/DIV, 0.5ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)



(h) Waveform 8
Reference:

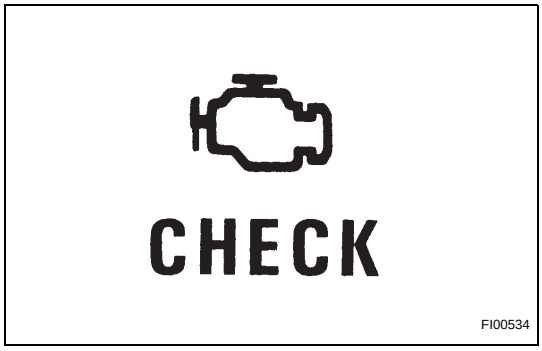
Terminal	SPD - E1
Tool setting	5 V/DIV, 20ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

HINT:
Depending on the vehicle, the output waveform voltage, influenced by optionally installed systems, may become 5V.

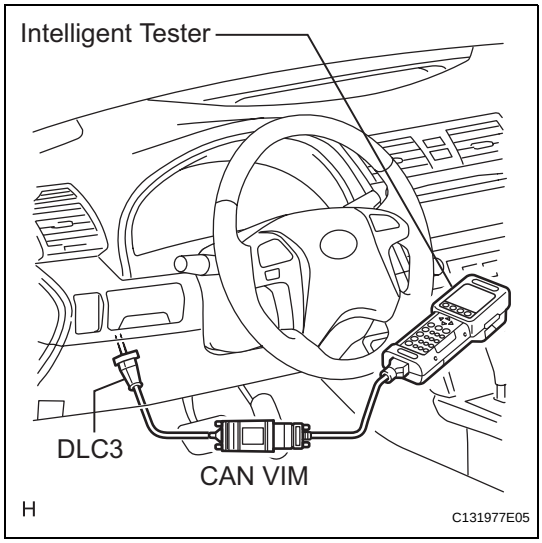
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is to connect an OBD II scan tool complying with SAE J1987 or a intelligent tester to the vehicle, and read off various data output from the vehicle's ECM.



(b) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in the drive system components which affect the vehicle emissions. In addition to illuminating the MIL when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page AX-35).
If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.



(c) To check the DTCs, connect the OBD II scan tool or intelligent tester to the DLC3 of the vehicle. The OBD II scan tool or intelligent tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For operating instructions, see the instruction book).

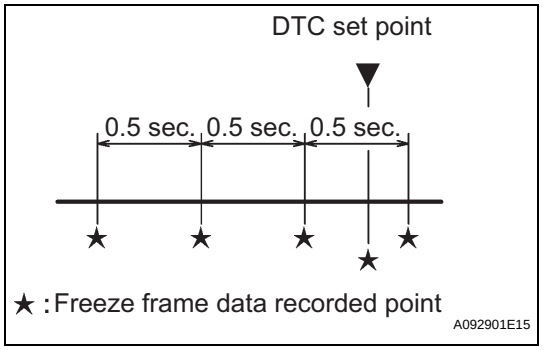
(d) The DTCs include SAE controlled codes and Manufacturer controlled codes. SAE controlled codes must be set as prescribed by the SAE, while Manufacturer controlled codes can be set freely by a manufacturer within the prescribed limits (See page AX-35).

(e) The diagnosis system operates in "normal mode" during the normal vehicle use. In normal mode, "2-trip detection logic" is used to ensure accurate detection of malfunction. "Check mode" is also available to technicians as an option. In check mode, "1-trip detection logic" is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunction.

(f) *2 trip detection logic: When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). IF the ignition switch is turned off and then turned on (IG) again, and same malfunction is detected again, the MIL will illuminate.

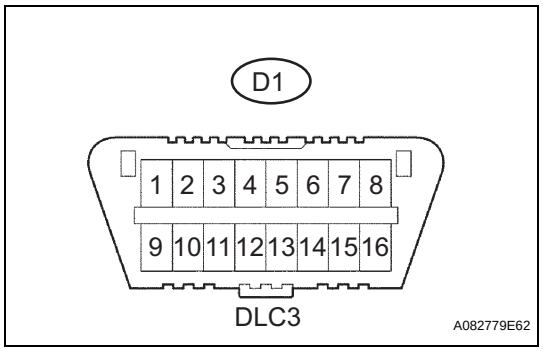
(g) The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

(h) The intelligent tester displays freeze frame data recorded at five different points: 1) 3 times before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. The data can be used to simulate the vehicle's condition around the time of the malfunction. The data may be helpful in determining the cause of a malfunction. It may also be helpful in determining whether a DTC is being caused by a temporary malfunction.



2. INSPECT THE DLC3

(a) The vehicle's ECM uses ISO 15765-4for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4format.



Terminals of DLC 3

Symbol	Terminal No.	Name	Reference Terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	Below 1 Ω	Always
SG	5	Signal ground	Body ground	Below 1 Ω	Always
BAT	16	Battery positive	Body ground	11 to 14 V	Always
CANH	6	CAN bus line	CANL	54 to 69 Ω	IG switch OFF*
CANH	6	HIGH-level CAN bus line	Battery positive	6 kΩ or higher	IG switch OFF*
CANH	6	HIGH-level CAN bus lineCG	CG	200 Ω or higher	IG switch OFF*
CANL	14	LOW-level CAN bus line	Battery positive	6 kΩ or higher	IG switch OFF*
CANL	14	LOW-level CAN bus line	CG	200 Ω or higher	IG switch OFF*

CAUTION:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

The DLC3 is the interface prepared for reading various data from the vehicle's ECM. After connecting the cable of the intelligent tester to the CAN VIM, turn the ignition switch ON and turn the tester ON. If a communication failure message is displayed on the tester screen (on the tester: UNABLE TO CONNECT TO VEHICLE), a problem exists in either the vehicle or tester. In order to identify the location of the problem, connect the tester to another vehicle.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

3. CHECK BATTERY VOLTAGE

(a) Measure the battery voltage.

Battery voltage:

11 to 14 V

If voltage is below 11 V, replace the battery before proceeding.

4. CHECK MIL

(a) Check that the MIL illuminates when turning the ignition switch on (IG).

HINT:

If the MIL does not light up, troubleshoot the combination meter.

(b) When the engine is started, the MIL should go off. If the lamp remains on, it means that the diagnosis system has detected a malfunction or abnormality in the system.

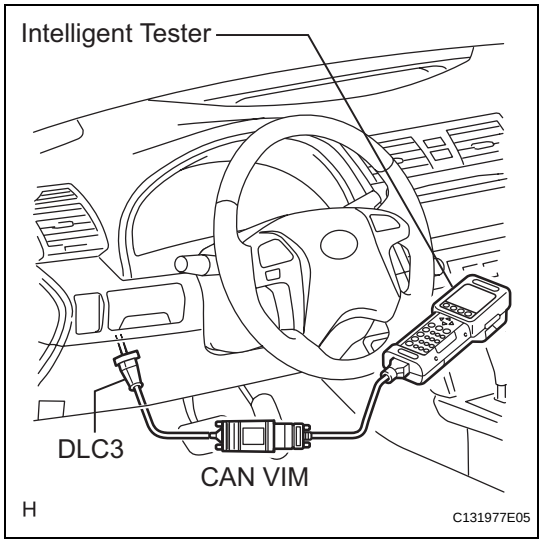
DTC CHECK / CLEAR

1. DTC CHECK (NORMAL MODE)

NOTICE:

When the diagnostic system is switched from the normal mode to the check mode, all the DTCs and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.

DTCs which are stored in the ECM can be displayed with the intelligent tester or generic OBD II scan tool. These scan tools can display pending DTCs and current DTCs. Some DTC aren't stored if the ECM doesn't detect a malfunction during consecutive driving. However, the detected malfunction during once driving is stored as pending DTC.



(a) Checking DTCs using the OBD II scan tool or intelligent tester.

(1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(2) Turn the ignition switch on (IG).

(3) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES (or PENDING CODE).

(4) Use the OBD II scan tool or intelligent tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).

NOTICE:

When simulating symptoms with an OBD II scan tool (excluding intelligent tester) to check the DTCs, use the normal mode. For codes on the DTCs chart which are subject to "2 trip detection logic",

Turn the engine switch off after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL illuminates and the DTCs are recorded in the ECM.

2. DTC CLEAR

(a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES and press YES.

CHECK MODE PROCEDURE

HINT:
Check mode has a higher sensitivity to malfunctions and can detect malfunction that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are detected with 1-trip detection logic.

1. DTC CHECK (CHECK MODE)

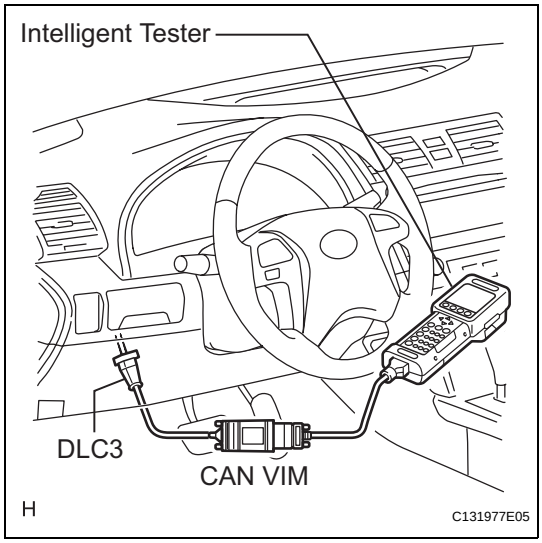
HINT:
Intelligent tester only: Compared to the normal mode, the check mode is more sensitive for detecting malfunctions. Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.

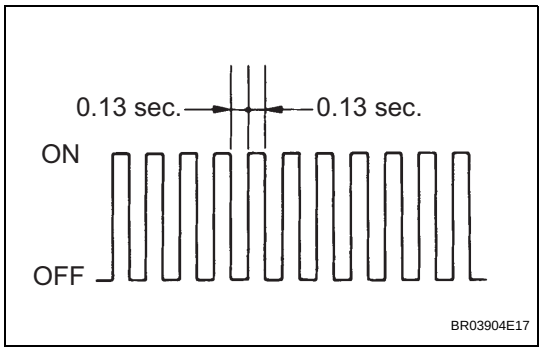
(a) Procedure for Check Mode using the intelligent tester.

(1) Check the initial conditions.
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transaxle in the P or N position
- A/C switch is off

(2) Turn the ignition switch off.

(3) Connect the intelligent tester together with the Controller Area Network Vehicle Interface Module (CAN VIM) to the DLC3.





(4) Turn the ignition switch on (IG) and turn the intelligent tester main switch on.

(5) Select the item "DIAGNOSIS/ENHANCED OBD II/CHECK MODE" (Check that the MIL flashes).
NOTICE:
All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from the on (IG) to ACC position or turned OFF.

(6) Start the engine (the MIL goes off after the engine starts).

(7) Perform "MONITOR DRIVE PATTERN" for the ECT test (See page AX-17). (Or, simulate the conditions of the malfunction described by the customer).
NOTICE:
Leave the ignition switch on (IG) until you have checked the DTCs, etc.

(8) After simulating malfunction conditions, use the intelligent tester diagnosis selector to check the DTCs and freeze frame data, etc.

(9) When you use intelligent tester: Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".

(10) After checking the DTC, inspect the applicable circuit.

(11) (See page AX-35) to confirm the details of the DTCs.

2. DTC CLEAR

(a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES and press YES.

FAIL-SAFE CHART

1. FAIL-SAFE

This function minimizes the loss of the ECT functions when any malfunction occurs in a sensor or solenoid.

(a) ATF (Automatic Transmission Fluid) temperature sensor:
When the ATF temperature sensor has a malfunction, 5th upshift is prohibited.

(b) Counter gear speed sensor NC (Speed sensor NC):
When the counter gear speed sensor has a malfunction, 5th upshift is prohibited.

(c) Shift solenoid valve DSL:
When the solenoid valve DSL has a malfunction, the current to the solenoid valve is stopped.
This stops lock-up control, then fuel economy decreases.

(d) Shift solenoid valve SL1, SL2, SL3 and S4:
Fail safe function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid "ON" and "OFF" in order to shift into the gear positions shown in the table below.
Manual shifting as shown in the following table must be done (In case of a short circuit, the ECM stops sending the current to the short circuited solenoid).
Even if starting the engine in the fail-safe mode, the gear position remains in the same position.
HINT:
FL: Flex Lock-up

Normal	Solenoid Valve	SL1	ON	OFF	ON	OFF	OFF
		SL2	ON	ON	OFF	FL	FL
		SL3	OFF	OFF	OFF	ON	ON
		S4	OFF	OFF	OFF	OFF	ON
	Gear Position		1st	2nd	3rd	4th	5th
SL1 Malfunction (During driving at 1st or 2nd)	Solenoid Valve	SL1	OFF				
		SL2	ON	ON	OFF to ON	FL to ON	FL to ON
		SL3	OFF	OFF	OFF	ON to OFF	ON to OFF
		S4	OFF	OFF	OFF	OFF	ON to OFF
	Gear Position		1st to 2nd	2nd	3rd to 2nd	4th to 2nd	5th to 2nd
SL1 Malfunction (During driving at 3rd)	Solenoid Valve	SL1	OFF				
		SL2	ON to FL	ON to FL	OFF to FL	FL	FL
		SL3	OFF	OFF	OFF	ON to FL	ON to FL
		S4	OFF to ON	OFF to ON	OFF to ON	OFF to ON	ON
	Gear Position		1st to 4th	2nd to 4th	3rd to 4th	4th	5th to 4th
SL1 Malfunction (During driving at 4th or 5th)	Solenoid Valve	SL1	OFF				
		SL2	ON to FL	ON to FL	OFF to FL	FL	FL
		SL3	OFF to ON	OFF to ON	OFF to ON	ON	ON
		S4	OFF	OFF	OFF	OFF	ON
	Gear Position		1st to 4th	2nd to 4th	3rd to 4th	4th	5th to 4th

SL2 Malfunction	Solenoid Valve	SL1	ON	OFF to ON	ON	OFF to ON	OFF to ON
		SL2	OFF				
		SL3	OFF	OFF	OFF	ON to OFF	ON to OFF
		S4	OFF to ON	OFF to ON	OFF to ON	OFF to ON	ON
	Gear Position		1st to 4th	2nd to 4th	3rd to 4th	4th	5th to 4th
SL3 Malfunction	Solenoid Valve	SL1	ON	OFF	ON	OFF to ON	OFF to ON
		SL2	ON	ON	OFF	FL	FL
		SL3	OFF				
		S4	OFF	OFF	OFF	OFF to ON	ON
	Gear Position		1st	2nd	3rd	4th	5th to 4th
S4 Malfunction	Solenoid Valve	SL1	ON	OFF	ON	OFF	OFF
		SL2	ON	ON	OFF	FL	FL
		SL3	OFF	OFF	OFF	ON	ON
		S4	OFF				
	Gear Position		1st	2nd	3rd	4th	5th to 4th
SL1, SL2, SL3, and S4 Malfunction	Solenoid Valve	SL1	OFF				
		SL2	OFF				
		SL3	OFF				
		S4	OFF				
	Gear Position		1st to 4th	2nd to 4th	3rd to 4th	4th	5th to 4th

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

According to the DATA LIST displayed by the intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.

(d) Turn the ignition switch to the on position.

(e) Turn on the tester.

(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".

(g) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light switch Status/ ON or OFF	• Brake Pedal is depressed: ON • Brake Pedal is released: OFF	-
PNP SW [NSW]	PNP switch Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the Intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, See page AX-39.
REVERSE	PNP switch Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	↑
DRIVE	PNP switch Status/ ON or OFF	Shift lever position is; D and 4 : ON Except D and 4: OFF	↑
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2 and L : ON Except 2 and L: OFF	↑
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L : ON Except L: OFF	↑
4TH/DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; 4 : ON Except 4: OFF	↑
3RD	PNP SW Status/ ON or OFF	Shift lever position is; 3 : ON Except 3: OFF	↑

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th or 5th (O/D)	Shift Lever Position is; • L: 1st • 2: 1st or 2nd • 3: 1st, 2nd or 3rd • 4: 1st, 2nd, 3rd or 4th • D (O/D ON): 1st, 2nd, 3rd, 4th or 5th	-
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	• Lock Up: ON • Except Lock Up: OFF	-
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	• Accelerator pedal is depressed: OFF • Accelerator pedal is released: ON	-
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	• After Stall Test; Approx. 80°C (176°F) • Equal to ambient temperature when cold soak	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor circuit is opened or shorted.
SPD (NC)	Counter Gear Speed/ display: 50 r/min	HINT: 3rd when shift lever position is D position (After warming up the engine); • Intermediate shaft speed (NC) becomes close to the engine speed.	-

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the intelligent tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] • IDL: ON • Less than 50 km/h (31 mph) [Others] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid DSL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] • Vehicle Speed: 60 km/h (37 mph) or more	Possible to check the DSL operation.
SOLENOID (SL1)	[Test Details] Operate the shift solenoid SL1 [Vehicle Condition] • Vehicle Stopped. • Shift lever P or N position	-
SOLENOID (SL2)	[Test Details] Operate the shift solenoid SL2 [Vehicle Condition] • Vehicle Stopped. • Shift lever P or N position	-
SOLENOID (SL3)	[Test Details] Operate the shift solenoid SL3 [Vehicle Condition] • Vehicle Stopped. • Shift lever P or N position	-
SOLENOID (S4)	[Test Details] Operate the shift solenoid S4 [Vehicle Condition] • Vehicle Stopped. • Shift lever P or N position	-
SOLENOID (SR)	[Test Details] Operate the shift solenoid SR [Vehicle Condition] • Vehicle Stopped. • Shift lever P or N position	-
SOLENOID (DSL)	[Test Details] Operate the shift solenoid DSL [Vehicle Condition] • Vehicle Stopped. • Shift lever P or N position	-
SOLENOID (SLT)*	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] • Vehicle Stopped. • IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLT)" is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	-

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle, which is used in the HYDRAULIC TEST (See page AX-14) as well.
HINT:
The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the parts listed in the table below and proceed to the page given.
HINT:

- *1: Comes on MIL (Malfunction Indicator Lamp) light up
- *2: "DTC stored" mark means ECM memorizes the malfunction code if the ECM detects the DTC detection condition.
- This DTC may be output when the clutch, brake and gear components etc. inside the automatic transmission are damaged.

AUTOMATIC TRANSMISSION SYSTEM

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	1. Open or short in park/neutral position switch circuit 2. Park/neutral position switch 3. ECM	Comes on	DTC stored	AX-39
P0710	Transmission Fluid Temperature Sensor "A" Circuit	1. Open or short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. ECM	Comes on	DTC stored	AX-48
P0711	Transmission Fluid Temperature Sensor "A" Performance	1. Transmission wire (ATF temperature sensor)	Comes on	DTC stored	AX-53
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	1. Short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. ECM	Comes on	DTC stored	AX-48
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	1. Open in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. ECM	Comes on	DTC stored	AX-48
P0717	Turbine Speed Sensor Circuit No Signal	1. Open or short in transmission revolution sensor NT (speed sensor NT) circuit 2. Transmission revolution sensor NT (speed sensor NT) 3. ECM 4. Automatic transaxle assembly	Comes on	DTC stored	AX-57
P0724	Brake Switch "B" Circuit High	1. Short in stop light switch circuit 2. Stop light switch 3. ECM	Comes on	DTC stored	AX-60

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve DSL)	1. Shift solenoid valve DSL remains open or closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear etc.) 5. Line pressure is too low	Comes on	DTC stored	AX-63
P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)	1. Shift solenoid valve SL1 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-69
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	1. Open or short in shift solenoid valve SL1 circuit 2. Shift solenoid valve SL1 3. ECM	Comes on	DTC stored	AX-73
P0766	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)	1. Shift solenoid valve S4 remains open or closed 2. Valve body is blocked (Brake control valve) 3. Automatic transmission (clutch, brake or gear, etc.)	Comes on	DTC stored	AX-77
P0771	Shift Solenoid "E" Performance (Shift Solenoid Valve SR)	1. Shift solenoid valve SR remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-81
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	1. Shift solenoid valve SL2 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-85
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	1. Open or short in shift solenoid valve SL2 circuit 2. Shift solenoid valve SL2 3. ECM	Comes on	DTC stored	AX-90
P0793	Intermediate Shaft Speed Sensor "A"	1. Open or short in transmission revolution sensor NC (speed sensor NC) circuit 2. Transmission revolution sensor NC (speed sensor NC) 3. ECM	Comes on	DTC stored	AX-94

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)	1. Shift solenoid valve SL3 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-98
P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)	1. Open or short in shift solenoid valve SL3 circuit 2. Shift solenoid valve SL3 3. ECM	Comes on	DTC stored	AX-102
P0982	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	1. Short in shift solenoid valve S4 circuit 2. Shift solenoid valve S4 3. ECM	Comes on	DTC stored	AX-106
P0983	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)	1. Open in shift solenoid valve S4 circuit 2. Shift solenoid valve S4 3. ECM	Comes on	DTC stored	AX-106
P0985	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)	1. Short in shift solenoid valve SR circuit 2. Shift solenoid valve SR 3. ECM	Comes on	DTC stored	AX-109
P0986	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)	1. Open in shift solenoid valve SR circuit 2. Shift solenoid valve SR 3. ECM	Comes on	DTC stored	AX-109
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	1. Shift solenoid valve SLT remains closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-112
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	1. Open or short in shift solenoid valve SLT circuit 2. Shift solenoid valve SLT 3. ECM	Comes on	DTC stored	AX-116
P2769	Torque Converter Clutch Solenoid Circuit Low (Shift Solenoid Valve DSL)	1. Short in shift solenoid valve DSL circuit 2. Shift solenoid valve DSL 3. ECM	Comes on	DTC stored	AX-120
P2770	Torque Converter Clutch Solenoid Circuit High (Shift Solenoid Valve DSL)	1. Open in shift solenoid valve DSL circuit 2. Shift solenoid valve DSL 3. ECM	Comes on	DTC stored	AX-120

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(A) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) • P input signal is ON. • N input signal is ON. • R input signal is ON. • D input signal is ON. • 3 input signal is ON. • 2 input signal is ON. (B) Any 2 or more signals of the following are ON simultaneously (2-trip detection logic) • NSW input signal is ON. • R input signal is ON. • D input signal is ON. • 3 input signal is ON. • 2 input signal is ON. (C) All switches are OFF simultaneously for NSW, P, R, N, D, 3 and 2 positions (2-trip detection logic). (D) Both 1 and 2 are met (2-trip detection logic) 1. One of the following is met (a) NSW input signal is ON. (b) P input signal is ON. (c) N input signal is ON. (d) R input signal is ON 2. One of the following is met (a) 4 input signal is ON. (b) L input signal is ON.	• Open or short in park / neutral position switch circuit • Park / neutral position switch • ECM

MONITOR DESCRIPTION

These DTCs indicate a problem with the park/neutral position switch and the wire harness in the park/neutral position switch circuit.
The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that engine can be started only when the shift lever is in the P or N position
The park/neutral position switch sends a signal to the ECM according to the shift position (P, R, N or D). The ECM determines that there is a problem with the switch or related parts if in receives more than 1 position signal simultaneously. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705: Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch
Frequency of operation	Continuous
Duration	2 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	None
Ignition switch	ON
Battery voltage	10.5 V or more

TYPICAL MALFUNCTION THRESHOLDS

1. One of the following conditions is met: Condition (A), (B), (C) and (D)

Condition (A)

If 2 or more of the following signal outputs exist at the same time

P switch	ON
N switch	ON
R switch	ON
D switch	ON
3 switch	ON
2 switch	ON

Condition (B)

If 2 or more of the following signal outputs exist at the same time

NSW switch	ON
R switch	ON
D switch	ON
3 switch	ON
2 switch	ON

Condition (C)

All of following conditions are met

NSW switch	OFF
P switch	OFF
N switch	OFF
R switch	OFF
D switch	OFF
3 switch	OFF
2 switch	OFF

Condition (D)

Both (i) and (ii) are met

(i) One of the following is met

NSW switch	ON
P switch	ON
N switch	ON
R switch	ON

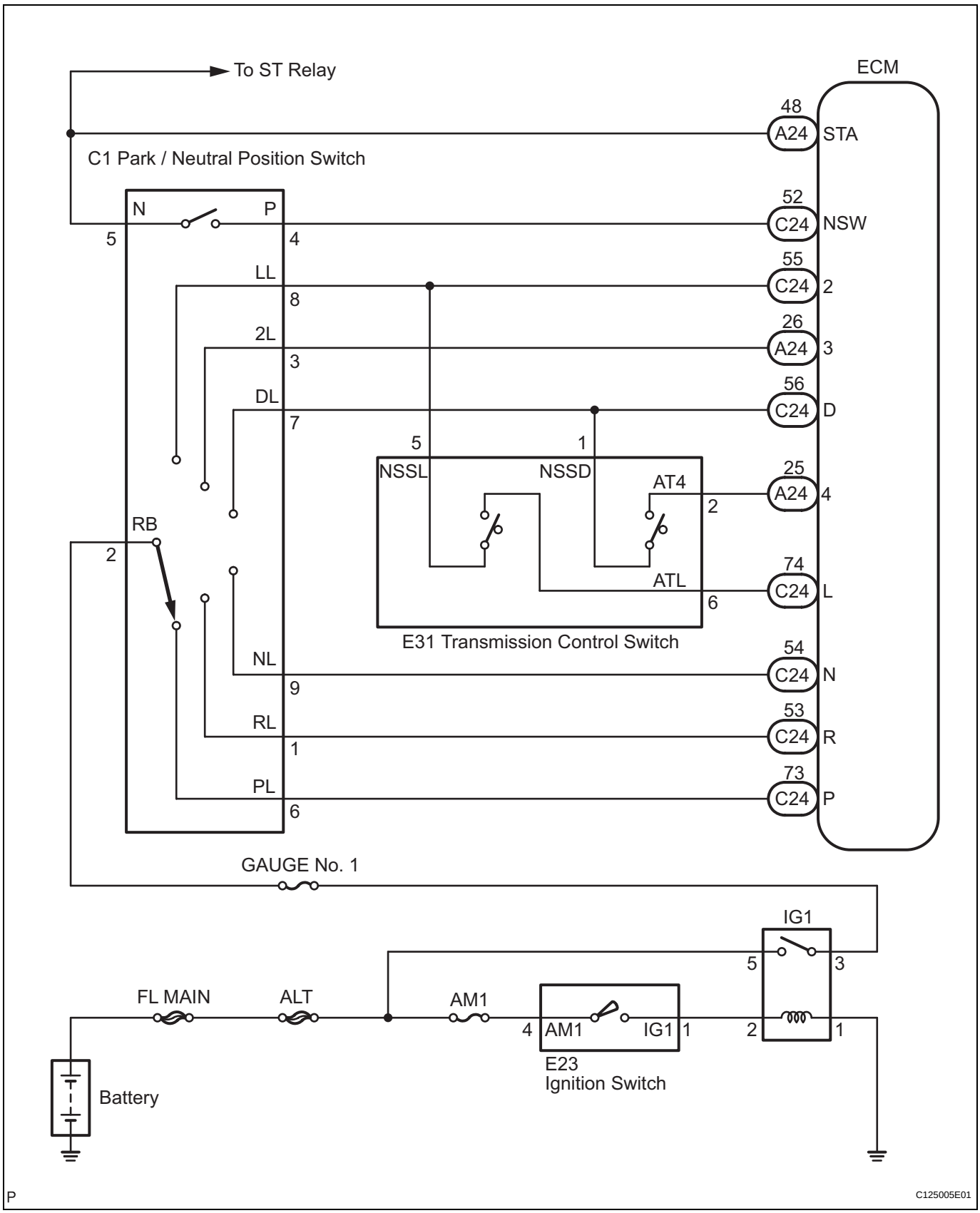
(ii) One of the following is met

4 switch	ON
L switch	ON

COMPONENT OPERATING RANGE

Park/neutral Position switch	The park/neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

1. READ DATA LIST

(a) Turn the ignition switch off.

(b) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.

(c) Turn the ignition switch on (IG).

(d) Turn on the tester.

(e) Select the item "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".

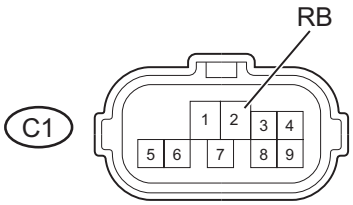
(f) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item / Range (Display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status / ON or OFF	Shift lever position is; P and N: ON Except P or N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
REVERSE	PNP SW Status / ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
DRIVE	PNP SW Status / ON or OFF	Shift lever position is; D and 4: ON Except D and 4: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
2ND	PNP SW Status / ON or OFF	Shift lever position is; 2 and L: ON Except 2 and L: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
LOW	PNP SW Status / ON or OFF	Shift lever position is; L: ON Except L: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
4TH/DRIVE	PNP SW Status / ON or OFF	Shift lever position is; 4: ON Except 4: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
3RD	PNP SW Status / ON or OFF	Shift lever position is; 3: ON Except 3: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.

1	CHECK HARNESS AND CONNECTOR (BATTERY - PARK/NEUTRAL POSITION)

Wire Harness Side:

(Connector Front View):



Y C117645E06

(a) Disconnect the park/neutral position switch connector.
(b) Turn the ignition switch on (IG).
(c) Measure voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
2 - Body ground	10 to 14 V

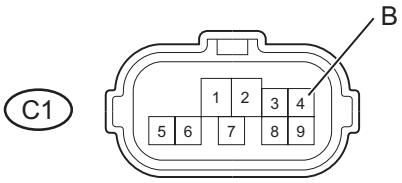
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (OUTPUT SIGNAL)

Wire Harness Side:

(Connector Front View):



Y C117645E07

(a) Turn the ignition switch on (IG).
(b) Measure voltage according to the value(s) in the table below.

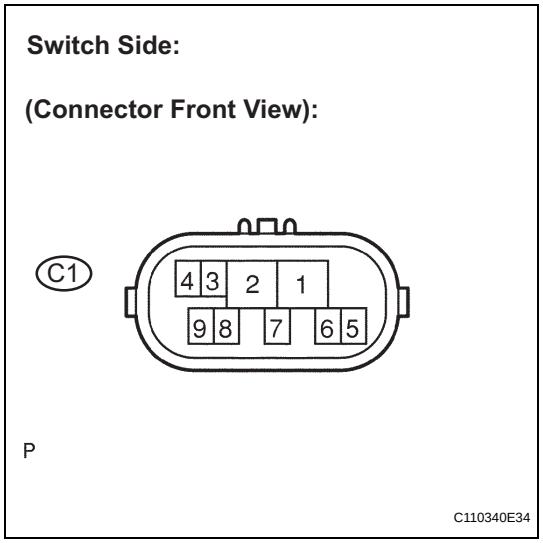
Standard voltage

Tester Connection	Specified Condition
4 - Body ground	10 to 14 V

NG → **Go to step 8**

OK

3 INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY



(a) Measure resistance according to the value(s) in the table below when the shift lever is moved to each position.

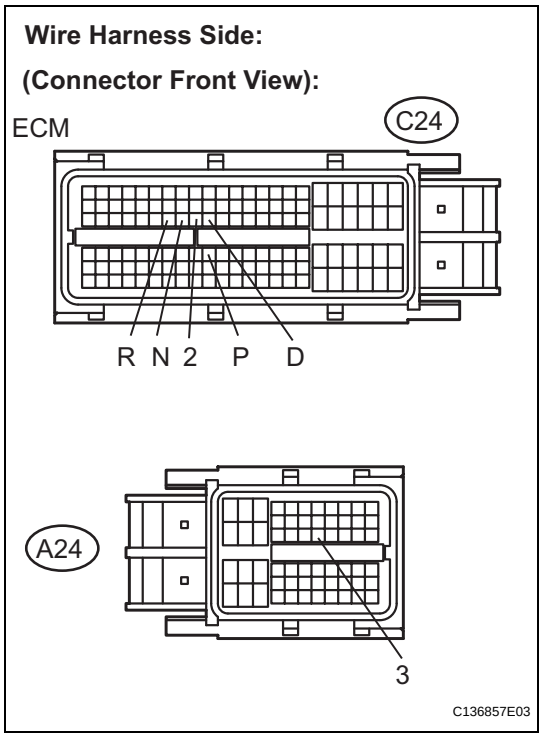
Standard resistance

Shift Position	Tester Connection	Specified Condition
P	2 - 6 and 4 - 5	Below 1 Ω
Except P		10 kΩ or higher
R	2 - 1	Below 1 Ω
Except R		10 kΩ or higher
N	2 - 9 and 4 - 5	Below 1 Ω
Except N		10 kΩ or higher
D and 4	2 - 7	Below 1 Ω
Except D and 4		10 kΩ or higher
3	2 - 3	Below 1 Ω
Except 3		10 kΩ or higher
2 and L	2 - 8	Below 1 Ω
Except 2 and L		10 kΩ or higher

NG → **REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY**

OK

4 CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)



(a) Connect the park/neutral position switch connector.
(b) Disconnect the ECM connectors.
(c) Turn the ignition switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
P	C24-73 (P) - Body ground	10 to 14 V
Except P		Below 1 V
N	C24-54 (N) - Body ground	10 to 14 V
Except N		Below 1 V
R	C24-53 (R) - Body ground	10 to 14 V*
Except R		Below 1 V
D and 4	C24-56 (D) - Body ground	10 to 14 V
Except D and 4		Below 1 V
3	A24-26 (3) - Body ground	10 to 14 V
Except 3		Below 1 V
2 and L	C24-55 (2) - Body ground	10 to 14 V
Except 2 and L		Below 1 V

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

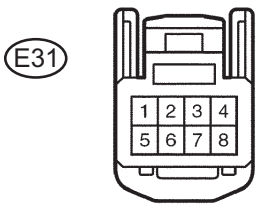
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

5	CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - TRANSMISSION CONTROL SWITCH)

Wire Harness Side:

(Connector Front View):



C110345E17

(a) Disconnect the transmission control switch connector of shift lock control unit assembly.

(b) Measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

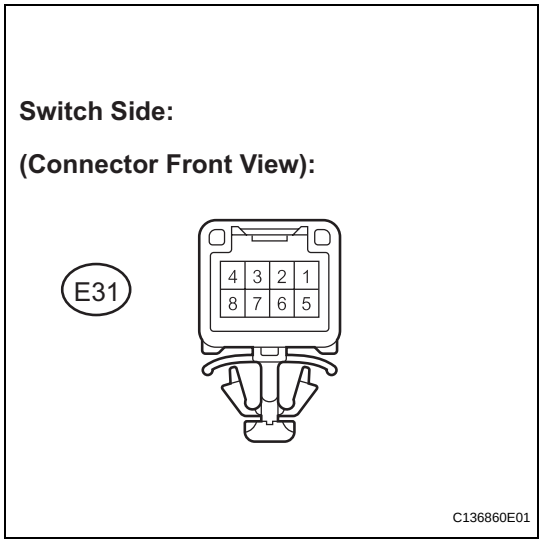
Standard voltage

Shift Position	Tester Connection	Specified Condition
D and 4	1 - Body ground	10 to 14 V
Except D and 4		Below 1 V
2 and L	5 - Body ground	10 to 14 V
Except 2 and L		Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6 INSPECT TRANSMISSION CONTROL SWITCH



(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

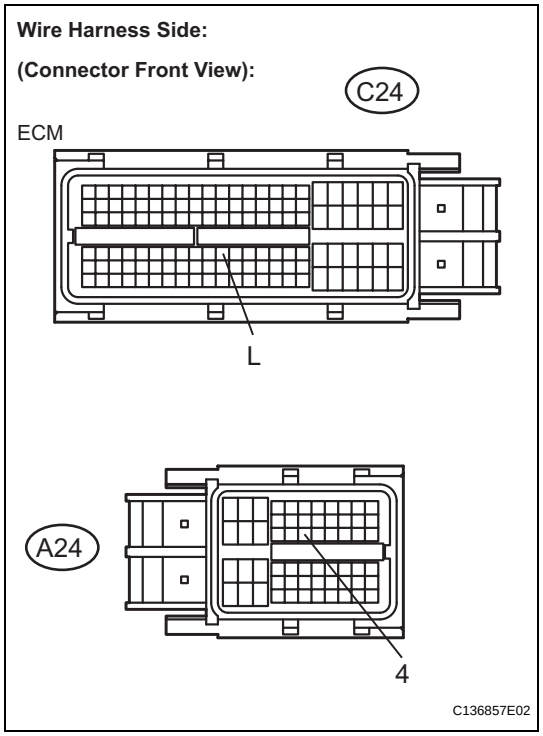
Standard resistance

Shift Position	Tester Connection	Specified Condition
4 and 3	1 - 2	Below 1 Ω
Except 4 and 3		10 kΩ or higher
L	5 - 6	Below 1 Ω
Except L		10 kΩ or higher

NG → REPLACE TRANSMISSION CONTROL SWITCH

OK

7 CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)



(a) Connect the transmission control switch connector of shift lock control unit assembly.

(b) Turn the ignition switch to the ON position, and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

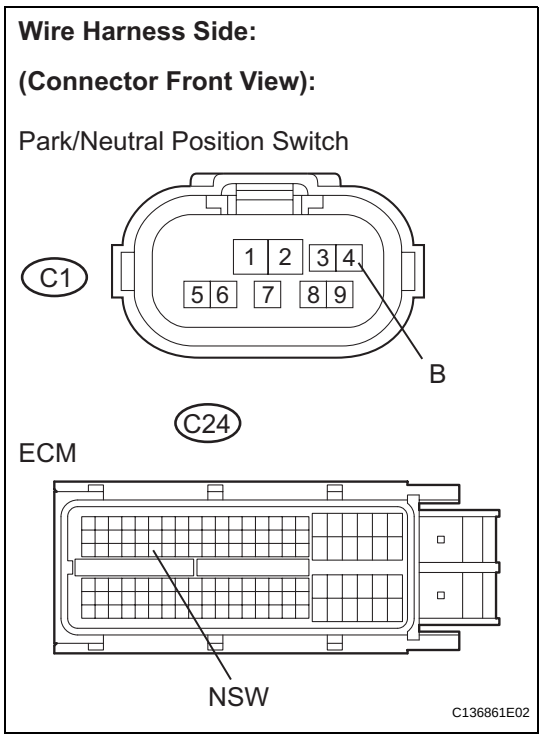
Shift Position	Tester Connection	Specified Condition
4	A24-25 (4) - Body ground	10 to 14 V
Except 4		Below 1 V
L	C24-74 (L) - Body ground	10 to 14 V
Except L		Below 1 V

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM

8	CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - ECM)



(a) Disconnect the ECM connectors.
(b) Turn the ignition switch off.
(c) Measure resistance according to the value(s) in the table below.

Standard resistance (Check for open)

Tester Connection	Specified Condition
B (C1-4) - NSW (C24-52)	Below 1 Ω

Standard resistance (Check for short)

Tester Connection	Specified Condition
B (C1-4) or NSW (C24-52) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM

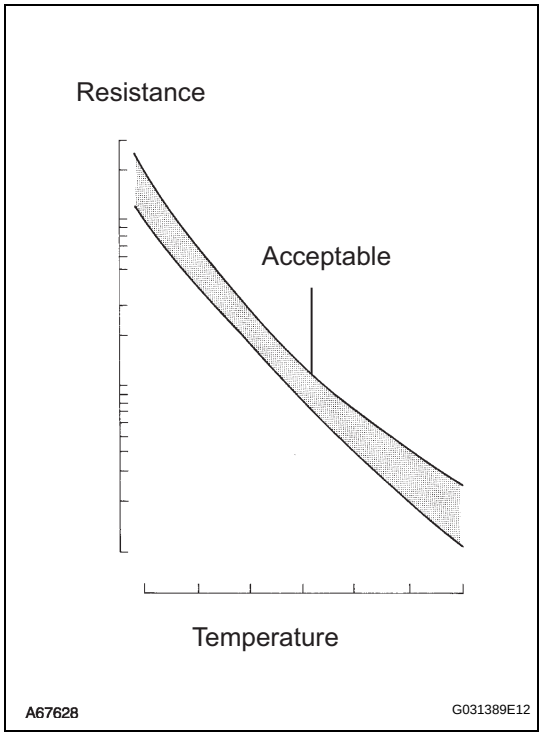
DTC	P0710	Transmission Fluid Temperature Sensor "A" Circuit

DTC	P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC	P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input

DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.
The ECM applies a voltage to the temperature sensor through ECM terminal THO1.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The ECM calculates the fluid temperature based on the voltage signal.



DTC No.	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily within 0.5 sec. when neither P0712 nor P0713 is detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a)	• Open or short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • ECM
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1-trip detection logic)	• Short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • ECM

DTC No.	DTC Detection Condition	Trouble Area
P0713	ATF temperature sensor resistance is more than 156 kΩ when 15 minutes or more have elapsed after the engine start DTC is detected for 0.5 sec. or more (1-trip detection logic)	• Open in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • ECM

MONITOR DESCRIPTION

These DTCs indicate an open or short in the automatic transmission fluid (ATF) temperature sensor (TFT sensor) circuit. The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω *1or more than 156 kΩ *2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.
*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.
*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.
HINT:
The ATF temperature can be checked on the intelligent tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Chattering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710: Range check (Chattering)
P0712: Range check (Low resistance)

The monitor will run whenever these DTCs are not present.	None
The typical enabling condition is not available.	-

P0713: Range check (High resistance)

The monitor will run whenever this DTC is not present.	None
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710: Range check (Chattering)

TFT (Transmission fluid temperature) sensor resistance	Less than 79 Ω or More than 156 kΩ

P0712: Range check (Low resistance)

TFT sensor resistance	Less than 79 Ω

P0713: Range check (High resistance)

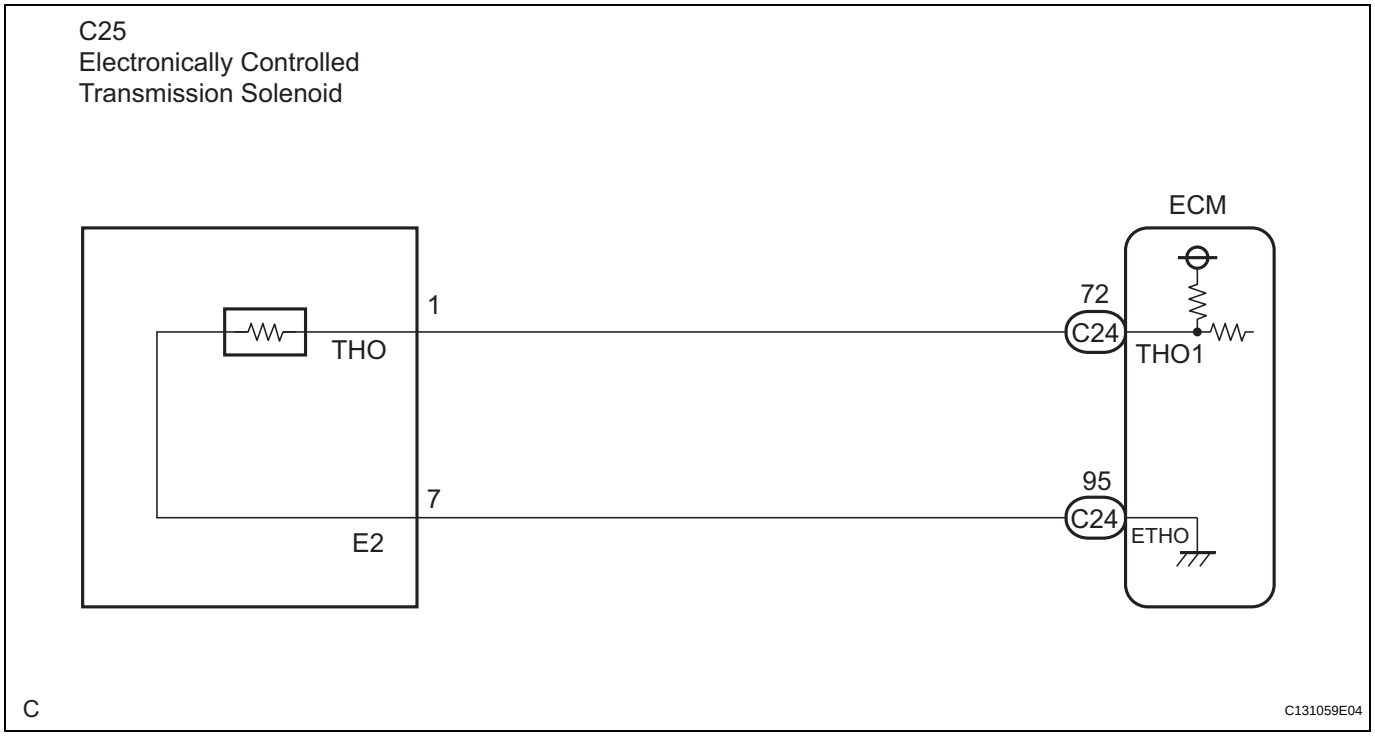
TFT sensor resistance	More than 156 kΩ

AX

COMPONENT OPERATING RANGE

TFT sensor.	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

NOTICE:

In the table below, the value listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether apart is faulty or not.

1. READ DATA LIST

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	Approx. 80°C (176°F) (After Stall Test)

HINT:

When DTC P0712 is output and OBD II scan tool or intelligent tester output is 150°C (302°F), there is a short circuit.

When DTC P0713 is output and OBD II scan tool or intelligent tester output is -40°C (-40°F), there is an open circuit.

Measure the resistance between terminal THO1 (THO) and body ground.

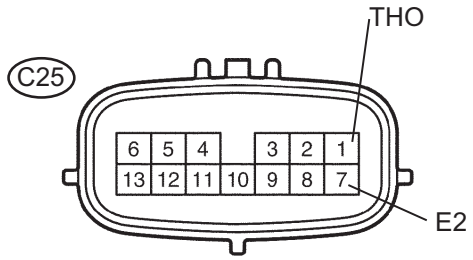
Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:
If a circuit related to the ATF temperature sensor become open, P0713 is immediately set (in 0.5 second).
When P0713 is set, P0711 cannot be detected.
It is not necessary to inspect the circuit when P0711 is set.

1 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)

Transmission Wire Side:

(Connector Front View):



C113969E24

(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
1 (THO) - 7 (E2)	79 Ω to 156 kΩ
1 (THO) - Body ground	10 kΩ or higher
7 (E2) - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range with either the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

ATF Temperature	Specified Condition
20°C (68°F)	3 to 5 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

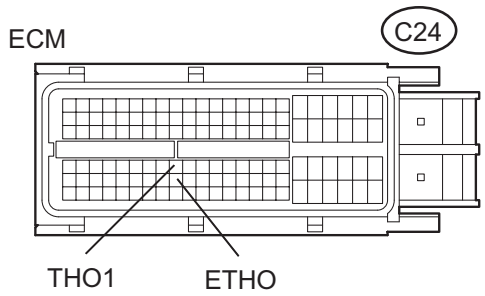
NG → **REPAIR OR REPLACE TRANSMISSION WIRE**

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



A136781E01

(a) Connect the transmission wire connector to the transaxle.
(b) Disconnect the ECM connectors.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
C24-72 (THO1) - C24-95 (ETHO)	79 Ω to 156 kΩ

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
C24-72 (THO1) - Body ground	10 kΩ or higher
C24-95 (ETHO) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance

DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detection Condition	Trouble Area
P0711	(A) Both (a) and (b) are detected: (2-trip detection logic) (a) Intake air and engine coolant temperatures are more than -10°C (14°F) at engine start (b) After normal driving for over 19 min. and 9 km (6 mile) or more, ATF temp. is less than 20°C (68°F) (B) When engine coolant temp. is less that 35°C (95°F) at engine start, the ATF temp. is 110°C (230°F) or more after 17 min. of engine start (2-trip detection logic).	Transmission wire (ATF temperature sensor)

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an open or short in the ATF temperature circuit or a fault in the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.
When the ATF temperature is 110°C (230°F) or more after 17 minutes of engine cold start, the ECM also determines this as a fault, turns on the MIL, and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	3 sec.: Condition (A) 10 sec.: Condition (B)
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	None
Time after engine start	16 min. and 40 sec. or more
ECT (Engine coolant temperature)	-15°C (5°F) or more
ATF sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
IAT sensor circuit	Not circuit malfunction
ETCS	Not circuit malfunction

Condition (A):

Time After engine start	18 min. and 20 sec.
Driving distance after engine start	9 km (5.6 mile) or more
IAT (Intake air temperature) (12 sec. after starting engine)	-10°C (14°F) or more
ECT (12 sec. after starting engine)	-10°C (14°F) or more

Condition (B):

ECT (Current temperature)	60°C (140°F) or more
ECT (12 sec. after engine start)	Less than 35°C (95°F)

TYPICAL MALFUNCTION THRESHOLDS

Condition (A):

ATF temperature sensor	Less than 20°C (68°F)

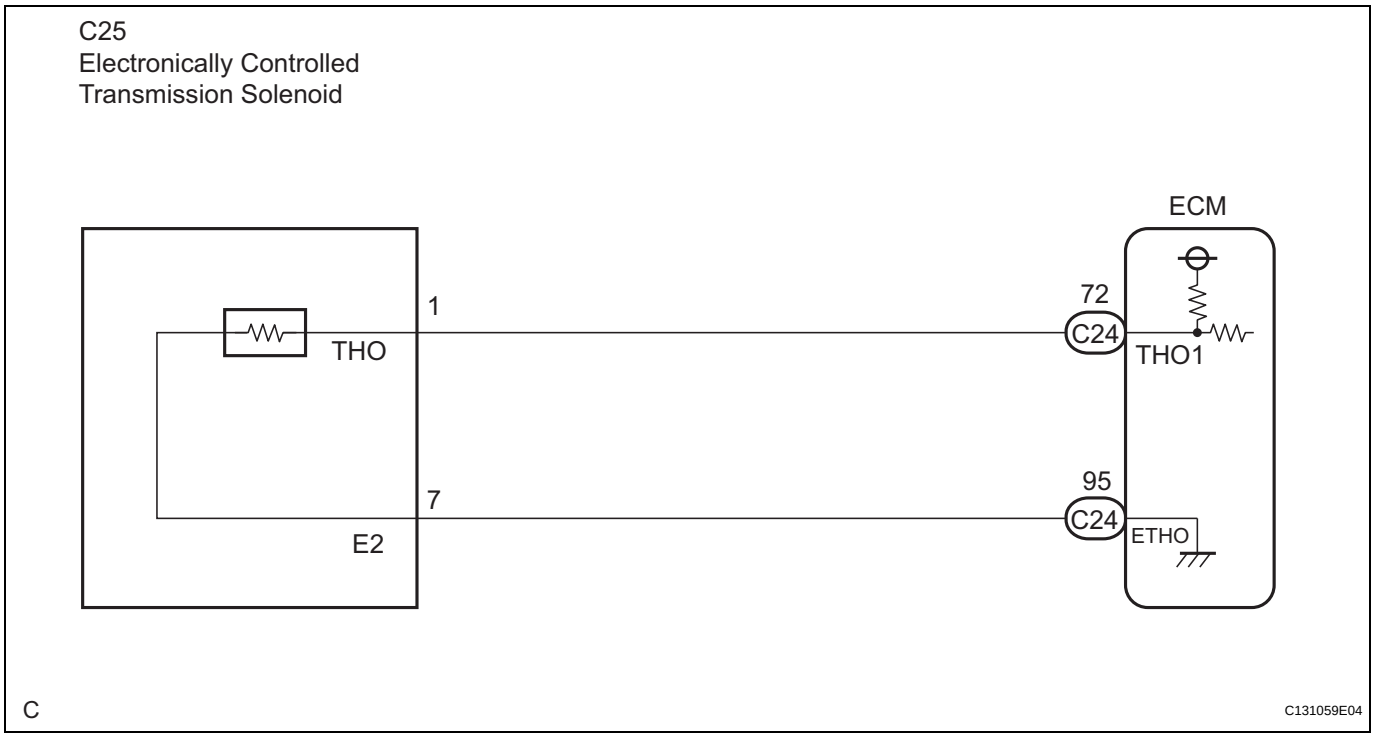
Condition (B):

ATF temperature sensor	110°C (230°F) or more

COMPONENT OPERATING RANGE

ATF temperature sensor	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

NOTICE:

In the table below, the value listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether apart is faulty or not.

1. READ DATA LIST

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.

(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	Approx. 80°C (176°F) (After Stall Test)

HINT:
When DTC P0712 is output and OBD II scan tool or intelligent tester output is 150°C (302°F), there is a short circuit.
When DTC P0713 is output and OBD II scan tool or intelligent tester output is -40°C (-40°F), there is an open circuit.
Measure the resistance between terminal THO1 (THO) and body ground.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:
If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 second).
When P0713 is set, P0711 cannot be detected.
It is not necessary to inspect the circuit when P0711 is set.

1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0711)

(a) Connect the OBD II scan tool or the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and push the OBD II scan tool or the intelligent tester main switch ON.
(c) When you use intelligent tester:
Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0711" is output	**A**
"P0711" and other DTCs	**B**

HINT:
If any other codes besides "P0711" are output, perform troubleshooting for those DTCs first.

B → **GO TO DTC CHART**

A

2 CHECK TRANSMISSION FLUID LEVEL

OK:
Automatic transmission fluid level is correct.

AX

NG → **ADD FLUID**

OK

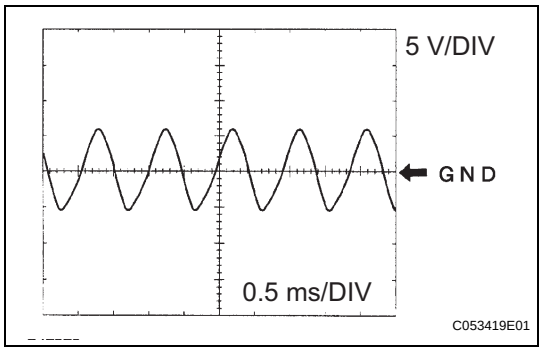
REPLACE TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)

DTC	P0717	Turbine Speed Sensor Circuit No Signal

DESCRIPTION

This sensor detects the rotation speed of the input turbine. By comparing the input turbine speed signal (NT) with the counter gear speed sensor signal (NC), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. Thus, providing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0717	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 50 km/h (31 mph) or more (b) Park/neutral position switch (STAR and R) is OFF (c) Speed sensor (NT): less than 300 rpm	• Open or short in transmission revolution sensor NT (speed sensor NT) circuit • Transmission revolution sensor NT (speed sensor NT) • ECM • Automatic transaxle assembly



Reference (Using an oscilloscope):
Check the waveform between terminals NT+ and NT- of the ECM connector.
Standard: Refer to the illustration.

Terminal	Tool setting	Vehicle condition
NT+ - NT-	5 V/DIV, 0.5ms/DIV	Vehicle speed 20 km/h (12 mph)

MONITOR DESCRIPTION

The NT terminal of the ECM detects a revolution signal from the speed sensor (NT) (input RPM). The ECM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).
While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm *1although the output shaft revolution is more than 1,000 rpm *2, the ECM detects the trouble, illuminates the MIL and stores the DTC.
*1: Pulse is not output or is irregularly output.
*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT) / Verify pulse input
Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

AX

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))

Shift change	Shift change is completed and before starting next shift change operation
ECM selected gear	2nd, 3rd, 4th or 5th
Output shaft rpm	1,000 rpm or more
NSW switch	OFF
R switch	OFF
L switch	OFF
Engine	Running
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

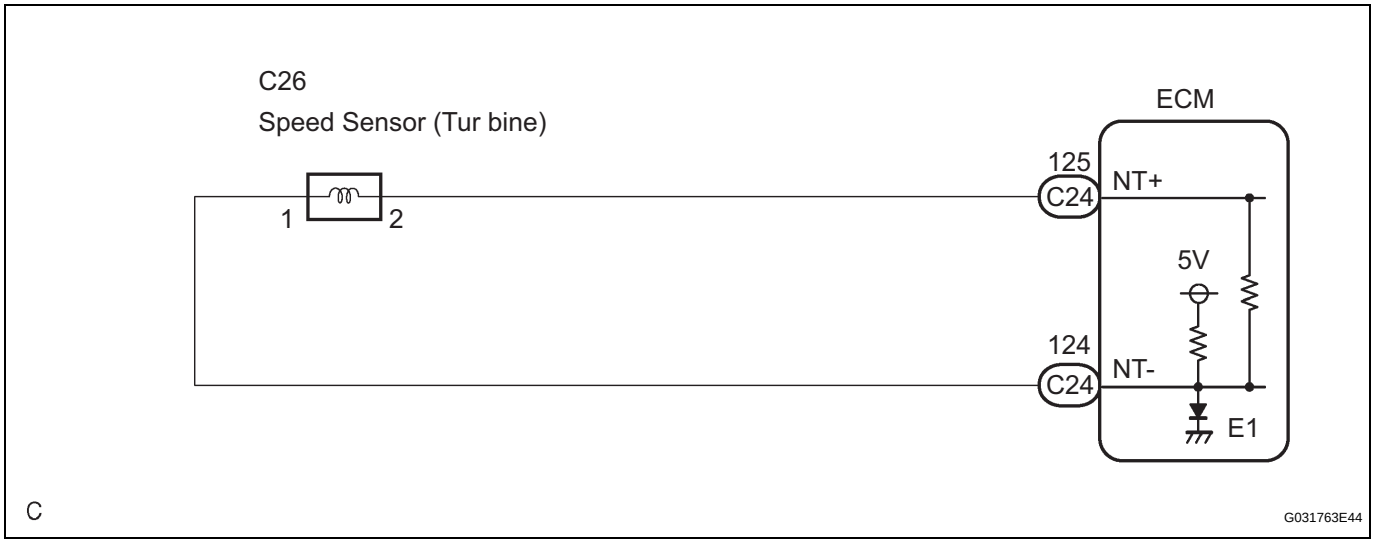
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

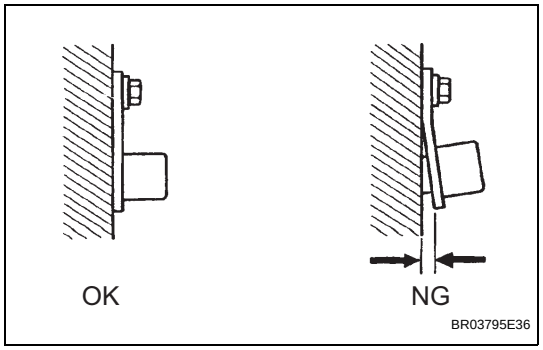
Speed sensor (NT)	Turbine speed is equal to engine speed with lock-up ON

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SPEED SENSOR INSTALLATION



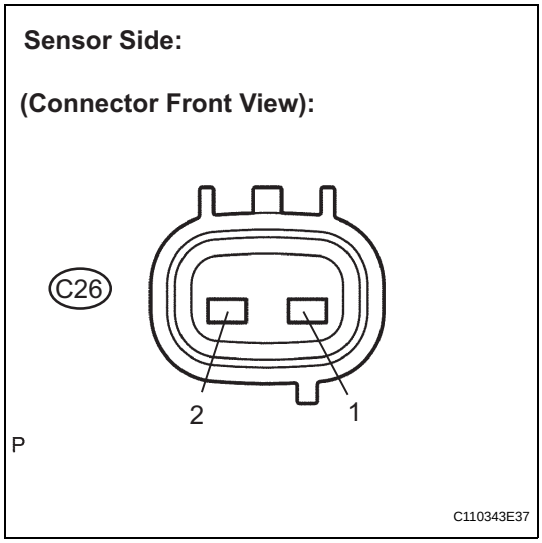
(a) Check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG	REPLACE SPEED SENSOR (NT)

AX

OK

2	INSPECT SPEED SENSOR (NT)



(a) Disconnect the speed sensor connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

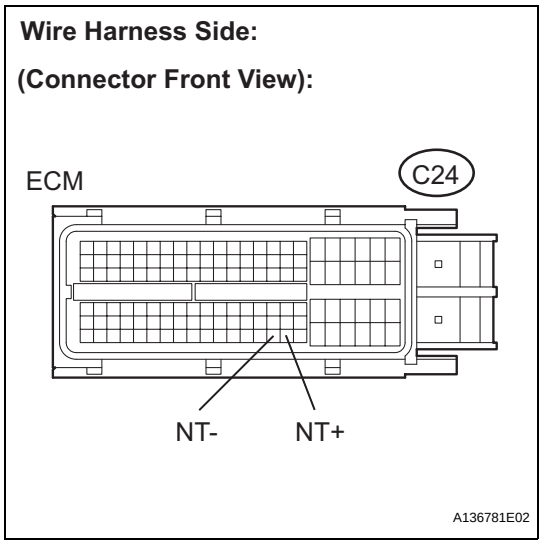
Standard resistance

Tester Connection	Specified Condition 20 °C (68 °F)
1 - 2	560 to 680 Ω

NG → REPLACE SPEED SENSOR (NT)

OK

3	CHECK HARNESS AND CONNECTOR (SPEED SENSOR - ECM)



(a) Connect the speed sensor connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-125 (NT+) - C24-124 (NT-)	560 to 680 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
C24-125 (NT+) - Body ground	10 kΩ or higher
C24-124 (NT-) - Body ground	

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM

DTC	P0724	Brake Switch "B" Circuit High

DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in lock-up condition when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signals to the ECM. Then the ECM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P0724	The stop light switch remains ON even when the vehicle is driven in a STOP (less than 3 km/h (2 mph) and GO (30 km/h (19 mph) or more) fashion 5 times. (2-trip detection logic).	• Short in stop light switch circuit • Stop light switch • ECM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains on. When the stop light switch remains ON during "stop and go" driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop (less than 3 km/h (2 mph)) and go (30 km/h (19 mph) or more) 5 times for two driving cycles in order to detect a malfunction.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Ignition switch	ON
Starter	OFF
Battery voltage	8 V or more
GO (Vehicle speed is 30 km/h (18.63 mph) or more)	Once
STOP (Vehicle speed is less than 3 km/h (1.86 mph))	Once

TYPICAL MALFUNCTION THRESHOLDS

Brake switch	Remain ON during GO and STOP 5 times

WIRING DIAGRAM

See page ES-234.

INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST

HINT:
According to the DATA LIST displayed by the OBD II scan tool or intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester..
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read the "DATA LIST".

DATA LIST

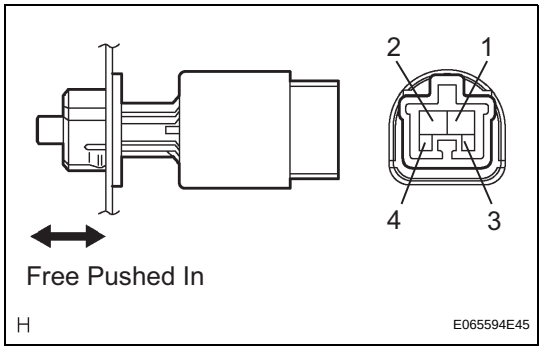
Item	Measurement Item/ Range (display)	Normal Condition
STOP LIGHT SW	Stop light SW Status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF

NOTICE:
In the table below, the value listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether apart is faulty or not.

OK → **Go to step 3**

NG

2	INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Remove the stop light switch assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Switch position	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in		10 kΩ or higher
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in		Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

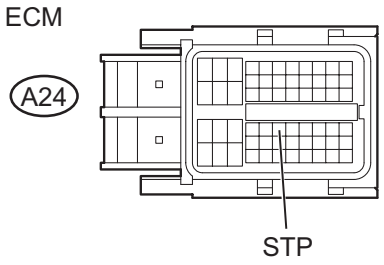
OK

AX

3	CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - ECM)

Wire Harness Side:

(Connector Front View):



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(a) Install the stop light switch assembly.
(b) Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.

Standard voltage

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	A24-36 (STP) - Body ground	10 to 14 V
Brake pedal is released		Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

DTC	P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve DSL)

SYSTEM DESCRIPTION

The ECM uses the signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, intermediate (counter) shaft speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.
Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect a mechanical problems of the shift solenoid valve DSL, valve body and torque converter clutch.

DTC No.	DTC Detection CondS1ition	Trouble Area
P0741	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h [50 mph]), or lock up remains ON in the lock-up OFF range. (2-trip detection logic)	• Shift solenoid valve DSL remains open or closed • Valve body is blocked • Torque converter clutch • Automatic transaxle (clutch, brake or gear etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on the speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and gear selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to counter gear rpm (NC). When conditions are appropriate, the ECM requests "lock-up" by applying control voltage to the shift solenoid DSL. When the DSL is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the ECM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the ECM interprets this as a fault in the shift solenoid valve DSL or lock-up system performance. The ECM will turn on the MIL and store the DTC.
HINT:
Example:
When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up.
  (Engine speed is at least 75 rpm greater than input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the ECM commands lock-up off.
  (The difference between engine speed and input turbine speed is less than 35 rpm.)

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve DSL/OFF malfunction Shift solenoid valve DSL/ON malfunction
Required sensors/Components	Shift solenoid valve DSL, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec. ON malfunction 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	10°C (50°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction

ECM lock-up command	ON
ECM selected gear	3rd, 4th or 5th
Vehicle speed	25 km/h (15.5 mph) or more

ON malfunction

ECM lock-up command	OFF
ECM selected gear	3rd, 4th or 5th
Throttle valve opening angle	8.5% or more
Vehicle speed	25 to 60 km/h (15.5 to 37.3 mph)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction OFF malfunction:

Engine Speed - Input (turbine) speed	100 rpm or more

ON malfunction:

Difference between engine speed and input (turbine) speed	Less than 35 rpm

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

1. PERFORM ACTIVE TEST

(a) Warm up the engine.

(b) Turn the ignition switch off.

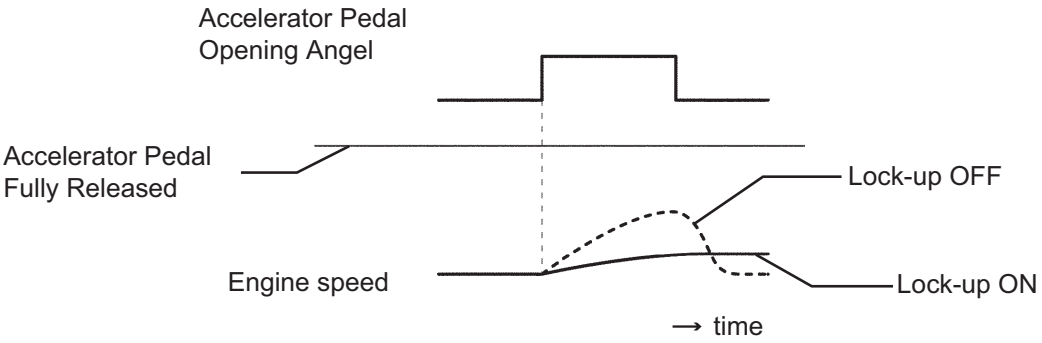
(c) Connect the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.

(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
(g) According to the display on the tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid DSL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 60 km/h (37 mph) or more	Possible to check the DSL operation.

HINT:
- This test can be conducted when the vehicle speed is 60 km/h (37 mph) or more.
- This test can be conducted in the 5th gear.

(h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.
HINT:
- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off.)



1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0741)

(a) Connect the OBD II scan tool or the intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the OBD II scan tool or the intelligent tester main switch ON.
(c) When you use intelligent tester:
Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

AX

Display (DTC output)	Proceed to
Only "P0741" is output	A
"P0741" and other DTCs	B

HINT:
If any other codes besides "P0741" are output, perform the troubleshooting for those DTCs first.

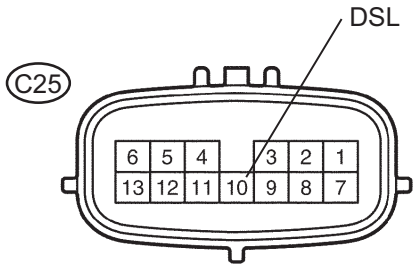
B → GO TO DTC CHART

A

2 INSPECT TRANSMISSION WIRE (DSL)

Transmission Wire Side:

(Connector Front View):



C113969E25

(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
10 - Body ground	11 to 13 Ω

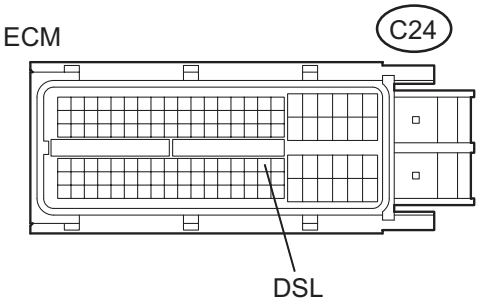
NG → Go to step 4

OK

3 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



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(a) Connect the transmission wire connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

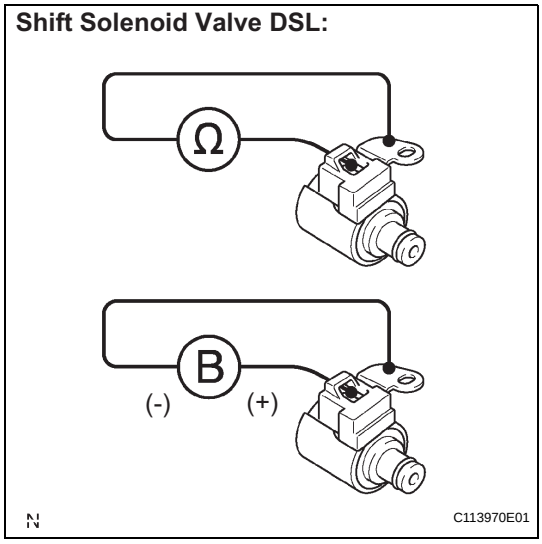
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-79 (DSL) - Body ground	11 to 13 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4	INSPECT SHIFT SOLENOID VALVE (DSL)



(a) Remove the shift solenoid valve DSL.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (DSL) - Solenoid Body (DSL)	11 to 13 Ω

(c) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (DSL)**

OK

5	CHECK TRANSMISSION WIRE

OK:

The connectors and pins are securely installed.
There is no open or short on the wire harness.

NG → **REPAIR OR REPLACE TRANSMISSION WIRE**

OK

6	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

7	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0746	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	• Shift solenoid valve SL1 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL.
HINT:
Example:
When either condition (a) or (b) is met, the ECM detects a malfunction.
(a) The ECM commands the 1st gear, but the actual gear is 2nd.
(b) The ECM commands the 2nd gear, but the actual gear is 1st.

MONITOR STRATEGY

Related DTCs	P0746: Shift solenoid valve SL1/OFF malfunction Shift solenoid valve SL1/ON malfunction
Required sensors/Components	Shift solenoid valve SL1, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	10°C (50°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction

Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction:

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction:

ECM selected gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction or ON malfunction

OFF malfunction:

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

Input (turbine) speed/Intermediate shaft speed	1.49 to 1.63

ON malfunction:

Input (turbine) speed/Intermediate shaft speed	2.72 to 2.86

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

1. PERFORM ACTIVE TEST

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.

(d) Turn the ignition switch on (IG).

(e) Turn on the tester.

(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".

(g) According to the display on the tester, perform the "ACTIVE TEST".

HINT:

While driving, the shift position can be forcibly changed with the intelligent tester.

Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-30).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:
- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the intelligent tester.

1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0746)

(a) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the OBD II scan tool or the intelligent tester main switch ON.
(c) When you use intelligent tester:
Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

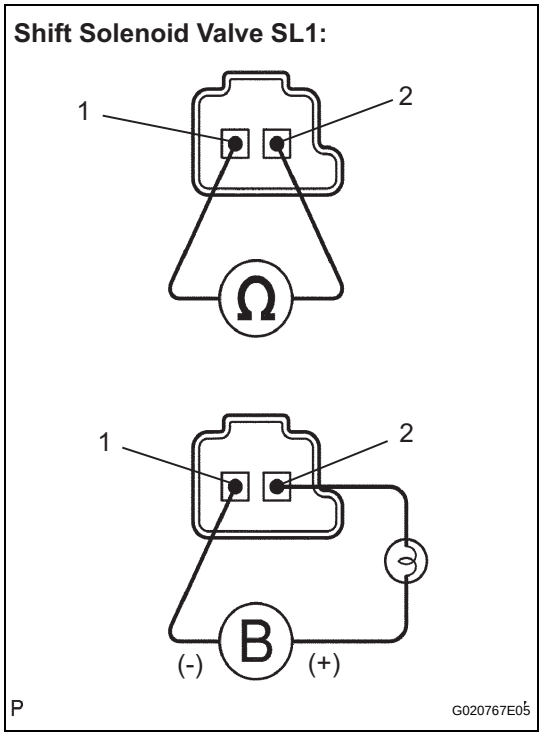
Display (DTC output)	Proceed to
Only "P0746" is output	A
"P0746" and other DTCs	B

HINT:
If any other codes besides "P0746" are output, perform the troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2 INSPECT SHIFT SOLENOID VALVE (SL1)



(a) Remove the shift solenoid valve SL1.

(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (SL1)**

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

4 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)

DESCRIPTION

Shifting from 1st to 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0748	The ECM checks for an open or short in the shift solenoid valve SL1 circuit while driving and shift gears. (1-trip detection logic) • Output signal duty equals to 100 %. (NOTE: SL1 output signal duty is less than 100 % under normal condition.)	• Open or short in shift solenoid valve SL1 circuit • Shift solenoid valve SL1 • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other normal shift solenoid valves "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.)
(See page AX-30).

MONITOR STRATEGY

Related DTCs	P0748: Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Battery voltage	11 V or more
Ignition switch	ON
Starter	OFF

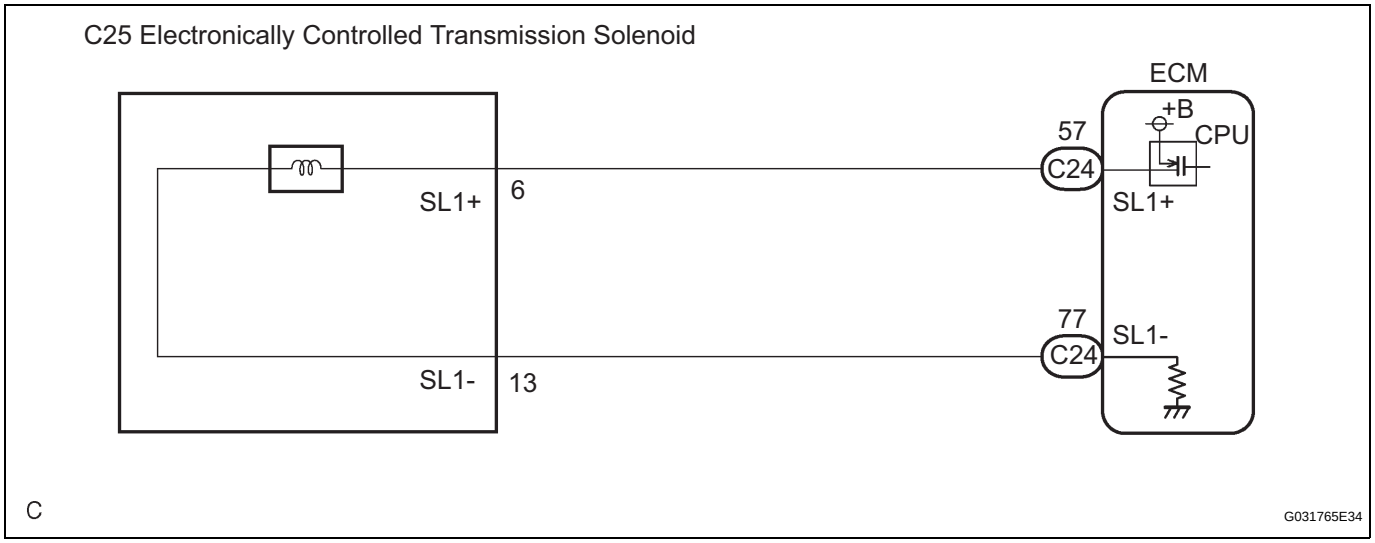
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from MIC	Fail (Open or Short)

COMPONENT OPERATING RANGE

Output signal duty	Less than 100%

WIRING DIAGRAM

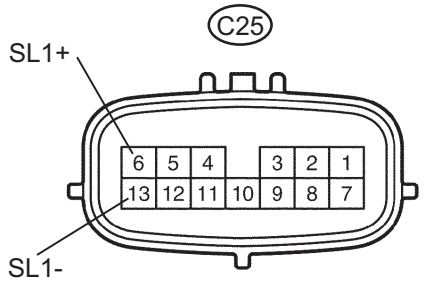


INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SL1)

Transmission Wire Side:

(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
6 (SL1+) - 13 (SL1-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
SL1+ - Body ground	10 kΩ or higher
SL1- - Body ground	10 kΩ or higher

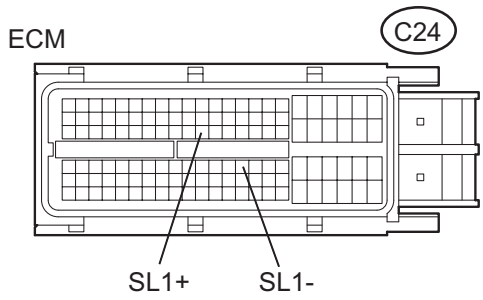
NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



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(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-57 (SL1+) - C24-77 (SL1-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
C24-57 (SL1+) - Body ground	10 kΩ or higher
C24-77 (SL1-) - Body ground	

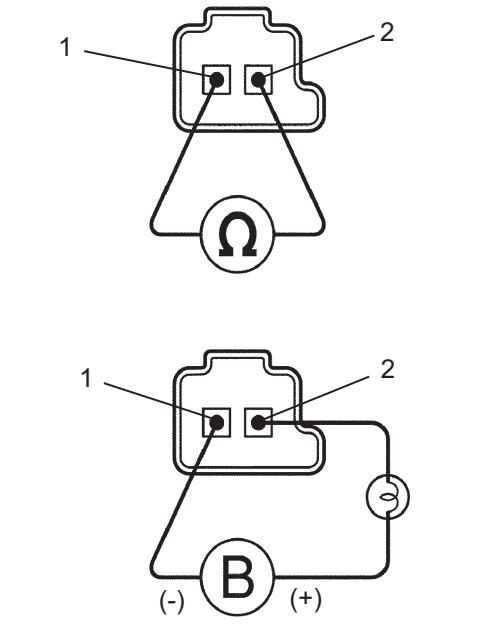
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

3 INSPECT SHIFT SOLENOID VALVE (SL1)

Shift Solenoid Valve SL1:



P

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(a) Remove the shift solenoid valve SL1.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (SL1)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC	P0766	Shift Solenoid "D" Performance (Shift Solenoid Valve S4)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0766	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	• Shift solenoid valve S4 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0766: Shift solenoid valve S4/OFF malfunction Shift solenoid valve S4/ON malfunction
Required sensors/Components	Shift solenoid valve S4, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) and ON malfunction (B) 1 sec. OFF malfunction (B) 1.2 sec. ON malfunction (A) 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	10°C (50°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction

Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction (A):

ECM selected gear	5th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

OFF malfunction (B):

ECM lock-up command	ON
ECM selected gear	3rd, 4th or 5th
Throttle valve opening angle	10% or more
Vehicle speed	25 to 100 km/h (15.5 to 62.1 mph)

ON malfunction (A):

ECM selected gear	4th or 5th
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (B):

ECM selected gear	4th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction (A) and (B), or ON malfunction (A) and (B)

2 detections are necessary per driving cycle:
1st detection; temporary flag ON
2nd detection; pending fault code ON

OFF malfunction (A):

Intermediate shaft speed/Output speed	1.34 to 1.48

OFF malfunction (B):

Difference between engine speed and input (turbine) speed	Less than 35 rpm

ON malfunction (A):

Input (turbine) speed/Intermediate shaft speed	0.64 to 0.74

ON malfunction (B):

Intermediate shaft speed/Output speed	0.95 to 1.09

INSPECTION PROCEDURE

HINT:
Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.

1. PERFORM ACTIVE TEST

(a) Warm up the engine.
(b) Turn the ignition switch off.

(c) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
(g) According to the display on the tester, perform the "ACTIVE TEST".

HINT:
While driving, the shift position can be forcibly changed with the intelligent tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-30).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:
- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the intelligent tester.

1 CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0766)

(a) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the OBD II scan tool or the intelligent tester main switch ON.
(c) Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0766" is output	A
"P0766" and other DTCs	B

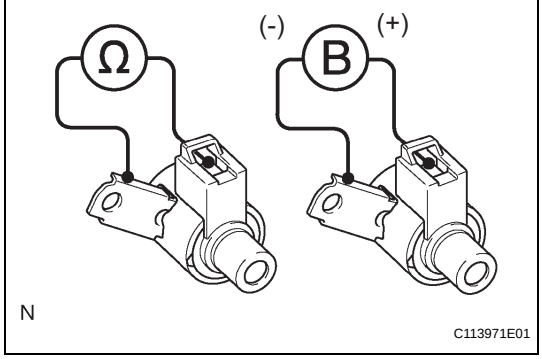
HINT:
If any other codes besides "P0766" are output, perform the troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2	INSPECT SHIFT SOLENOID VALVE S4

Shift Solenoid Valve S4:



(a) Remove the shift solenoid valve S4.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S4) - Solenoid Body (S4)	11 to 15 Ω

(c) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (S4)**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0771	Shift Solenoid "E" Performance (Shift Solenoid Valve SR)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0771	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	• Shift solenoid valve SR remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0771: Shift solenoid valve SR/Rationality check
Required sensors/Components	Shift solenoid valve SR, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) 1 sec. OFF malfunction (B) 3.5 sec. ON malfunction (A) Continuous ON malfunction (B) and (C) 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	10°C (50°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction

Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction (A):

ECM selected gear	5th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

OFF malfunction (B):

ECM lock-up command	ON
ECM selected gear	3rd, 4th or 5th
Vehicle speed	25 km/h (15.5 mph) or more

ON malfunction (A):

ECM lock-up command	OFF

ON malfunction (B):

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (C):

ECM selected gear	3rd
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (D):

Duration time from shift command of ECM	15 sec. or more
ECM selected gear	4th or 5th

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction (A) and (B), or ON malfunction (A), (B), (C) and (D)

OFF malfunction (A):

Intermediate shaft speed/Output speed	1.34 to 1.48

OFF malfunction (B):

Engine speed - Input (turbine) speed	75 rpm or more

ON malfunction (A):

Difference between engine speed and input (turbine) speed	150 rpm or more

ON malfunction (B):

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

ON malfunction (C):

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

ON malfunction (D):

Input (turbine) speed/Intermediate shaft speed	0.64 to 0.74

INSPECTION PROCEDURE

HINT:
Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.

1. PERFORM ACTIVE TEST

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
(g) According to the display on the tester, perform the "ACTIVE TEST".

HINT:
While driving, the shift position can be forcibly changed with the intelligent tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-30).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:
- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the intelligent tester.

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0771)

(a) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the OBD II scan tool or the intelligent tester main switch ON.
(c) When you use intelligent tester:
Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

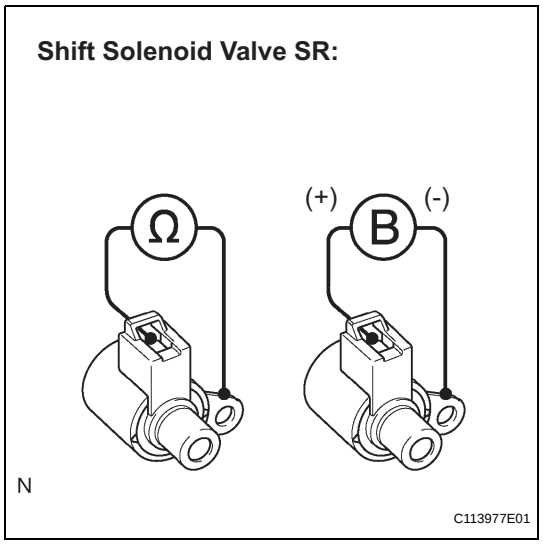
Display (DTC output)	Proceed to
Only "P0771" is output	A
"P0771" and other DTCs	B

HINT:
If any other codes besides "P0771" are output, perform the troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2 INSPECT SHIFT SOLENOID VALVE (SR)



(a) Remove the shift solenoid valve SR.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (SR) - Solenoid Body (SR)	11 to 15 Ω

(c) Connect positive (+) lead to the terminal of solenoid connector, negative (-) lead to the solenoid body.
OK:
The solenoid makes an operating sound.

NG → REPLACE SHIFT SOLENOID VALVE (SR)

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:
There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

4 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:
The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical problems of the shift solenoid valves, valve body or automatic transaxle (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	• Shift solenoid valve SL2 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776: Shift solenoid valve SL2/OFF malfunction Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Shift solenoid valve SL2, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) 1.8 sec. OFF malfunction (B) and (C) 0.8 sec. ON malfunction (A) and (B) 0.8 sec. ON malfunction (C) 0.4 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	10°C (50°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction

Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction (A):

ECM lock-up command	OFF
Vehicle speed	Less than 60 km/h (37.3 mph)
Throttle valve opening angle	8.5% or more

OFF malfunction (B):

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

OFF malfunction (C):

ECM selected gear	3rd
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

OFF malfunction (D):

Duration time from shift command of ECM	15 sec. or more
ECM selected gear	4th or 5th

ON malfunction (A):

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (B):

ECM selected gear	3rd
Throttle valve opening angle	7.0% or more at output speed 1,400 rpm (Varies with engine speed)
Malfunction of pressure control solenoid "B" (SL2) and "C" (SL3)	Not detected

ON malfunction (C):

Throttle valve opening angle	7.0% or more at output speed 1,050 rpm (Varies with engine speed)
Malfunction of pressure control solenoid "B" (SL2)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction (A), (B), (C) and (D), or ON malfunction (A), (B) and (C)

OFF malfunction (A):

Difference between engine speed and input (turbine) speed	Less than 35 rpm

OFF malfunction (B) and (C):

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

OFF malfunction (D):

Input (turbine) speed/Intermediate shaft speed	0.64 to 0.74

ON malfunction (A):

Input (turbine) speed/Intermediate shaft speed	2.72 to 2.86

ON malfunction (B):

Input (turbine) speed - Intermediate shaft speed	700 rpm or more

ON malfunction (C):

Input (turbine) speed - Intermediate shaft speed	Less than -500 rpm or 700 rpm or more

INSPECTION PROCEDURE

HINT:
Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.

1. PERFORM ACTIVE TEST

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
(g) According to the display on the tester, perform the "ACTIVE TEST".

HINT:
While driving, the shift position can be forcibly changed with the intelligent tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-30).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:
- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the intelligent tester.

1	**CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0776)**

(a) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the OBD II scan tool or the intelligent tester main switch ON.
(c) When you use intelligent tester:
Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".

(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

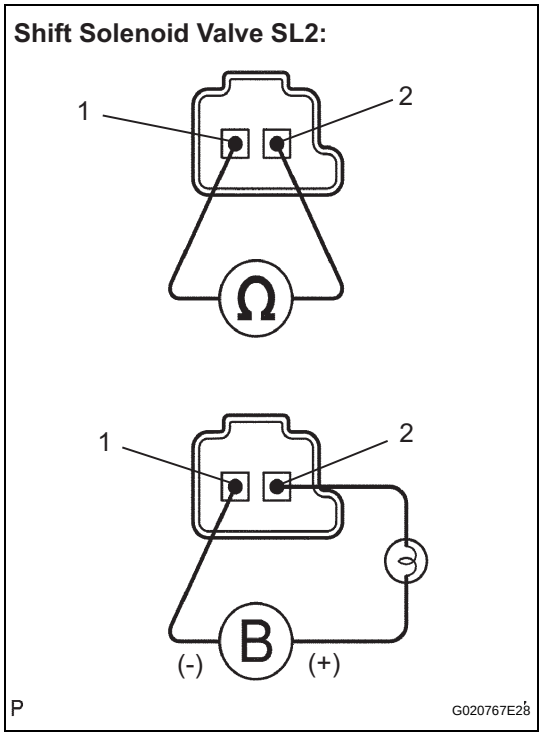
Display (DTC output)	Proceed to
Only "P0776" is output	A
"P0776" and other DTCs	B

HINT:
If any other codes besides "P0776" are output, perform the troubleshooting for those DTCs first.

B → **GO TO DTC CHART**

A

2 INSPECT SHIFT SOLENOID VALVE (SL2)



(a) Remove the shift solenoid valve SL2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:
The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (SL2)**

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:
There are no foreign objects on each valve.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

AX

4	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)

DESCRIPTION

Shifting from 1st to 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0778	ECM checks for an open or short circuit in shift solenoid valves SL2 (1-trip detection logic) Hybrid IC for solenoid indicates fail.	• Open or short in shift solenoid valve SL2 circuit • Shift solenoid valve SL2 • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other normal shift solenoid valves "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.)
(See page AX-30).

MONITOR STRATEGY

Related DTCs	P0778: Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Solenoid current cut status	Not cut
Battery voltage	11 V or more
Ignition switch	ON
Starter	OFF
CPU commanded duty ratio to SL2	19% or more

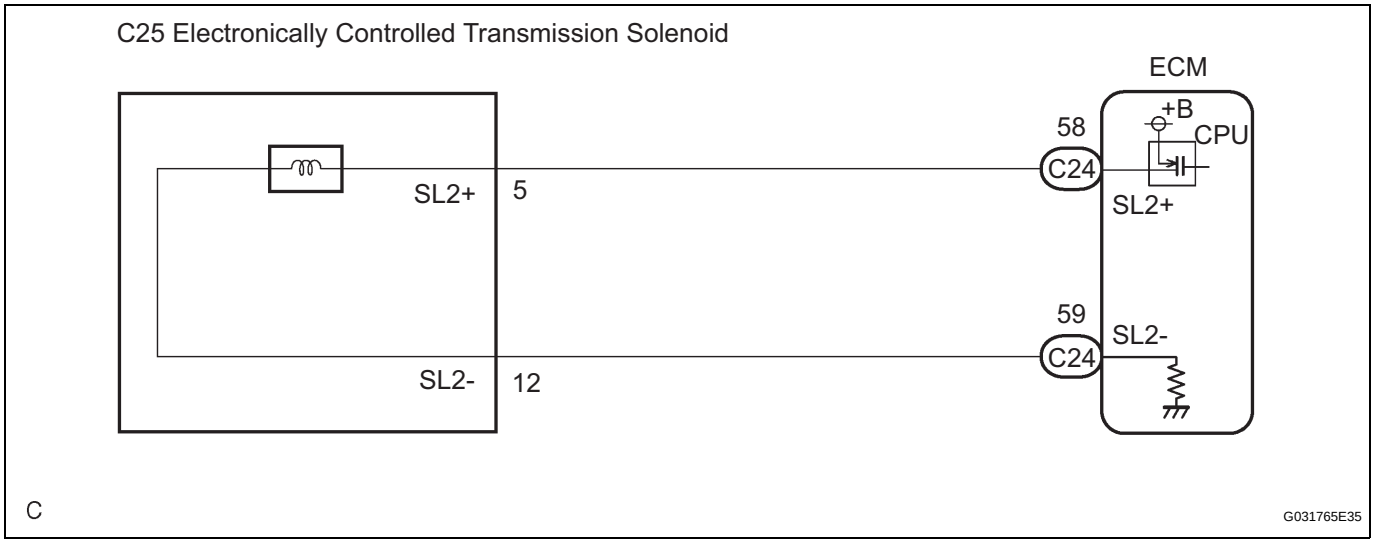
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from MIC	Fail (Open or short)

COMPONENT OPERATING RANGE

Output signal duty	Less than 100%

WIRING DIAGRAM

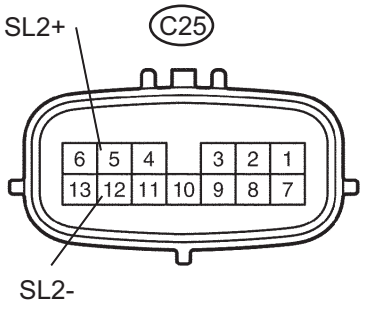


INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SL2)

Transmission Wire Side:

(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
5 (SL2+) - 12 (SL2-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
5 (SL2+) - Body ground	10 kΩ or higher
12 (SL2-) - Body ground	10 kΩ or higher

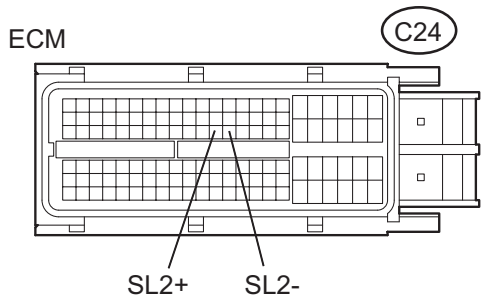
NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



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(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-58 (SL2+) - C24-59 (SL2-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
C24-58 (SL2+) - Body ground	10 kΩ or higher
C24-59 (SL2-) - Body ground	

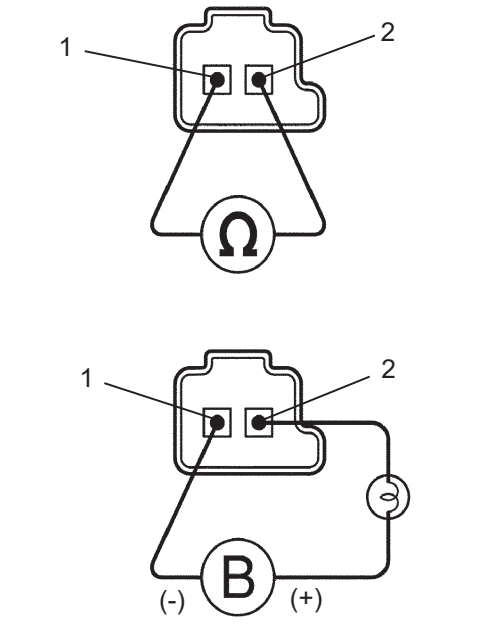
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

3 INSPECT SHIFT SOLENOID VALVE (SL2)

Shift Solenoid Valve SL2:



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(a) Remove the shift solenoid valve SL2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (SL2)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

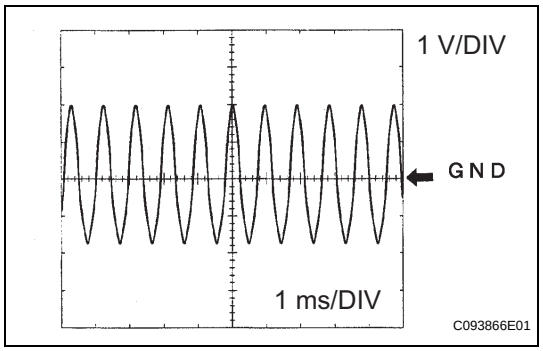
DTC	P0793	Intermediate Shaft Speed Sensor "A"

DESCRIPTION

This sensor detects the rotation speed of the counter gear. By comparing the counter gear speed signal (NC) with the direct clutch speed sensor signal (NT), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions. Thus smooth gear shifting is performed.

DTC No.	DTC Detection Condition	Trouble Area
P0793	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 50 km/h (31 mph) or more (b) Park/neutral position switch (STAR) is OFF (c) Speed sensor (NC): less than 300 rpm	• Open or short in transmission revolution sensor NC (speed sensor NC) circuit • Transmission revolution sensor NC (speed sensor NC) • ECM

Reference (Using an oscilloscope):
Check the waveform between terminals NC+ and NC- of the ECM connector.



Standard: Refer to the illustration.

Terminal	NC+ - NC-
Tool setting	1 V/DIV, 1ms/DIV
Vehicle condition	Vehicle speed 30 km/h (19 mph): (3rd gear) Engine speed 1,400 rpm

MONITOR DESCRIPTION

The NC terminal of the ECM detects a revolution signal from the speed sensor (NC) (counter gear rpm). The ECM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).
While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the counter gear revolution is less than 300 rpm *1although the output shaft revolution is more than 1,000 rpm *2, the ECM detects the trouble, illuminates the MIL and stores the DTC.
*1: Pulse is not output or is irregularly output.
*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0793: Speed sensor (NC)/Verify pulse input
Required sensors/Components	Speed sensor (NC), Speed sensor (NT), Park/neutral position switch
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve(range))
Engine	Running
NSW switch	OFF
Output shaft rpm	1,000 rpm or more
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

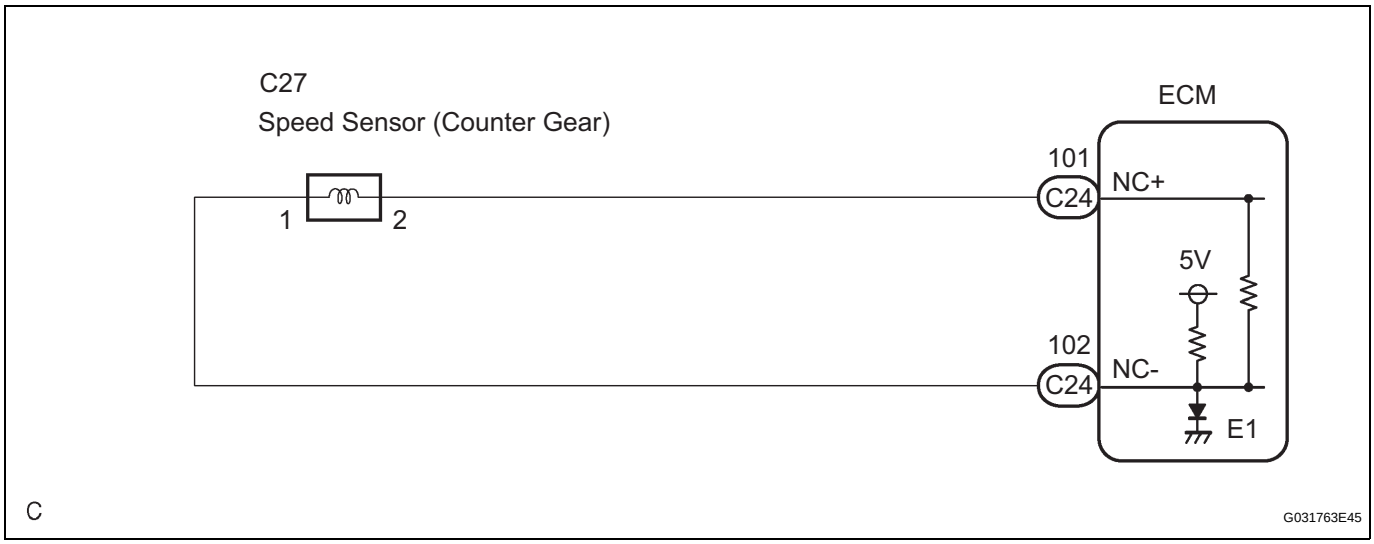
TYPICAL MALFUNCTION THRESHOLDS

Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

Counter gear speed sensor (NC)	HINT: 3rd when shift lever position is D position (After warming up the engine); • Intermediate shaft speed (NC) becomes close to the engine speed.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD II scan tool or intelligent tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one method to shorten labor time.

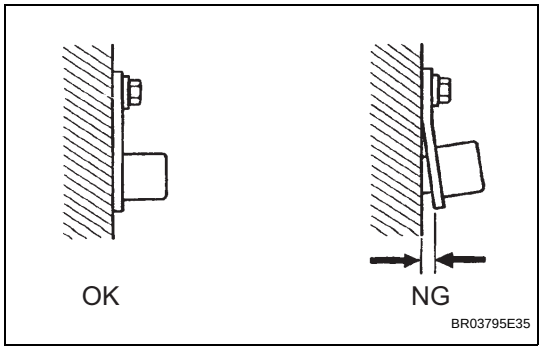
1. READ DATA LIST

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NC)	Counter Gear Speed/ display: 50 r/min	[HINT] 3rd when shift lever position is D position (After warming up the engine); • Intermediate shaft speed (NC) becomes close to the engine speed.

HINT:
- SPD (NC) is always 0 while driving:
  Open or short in the sensor or circuit.
- SPD (NC) is always more than 0 and less than 300 rpm while driving the vehicle at 50 km/h (31 mph) or more:
  Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1 INSPECT SPEED SENSOR INSTALLATION

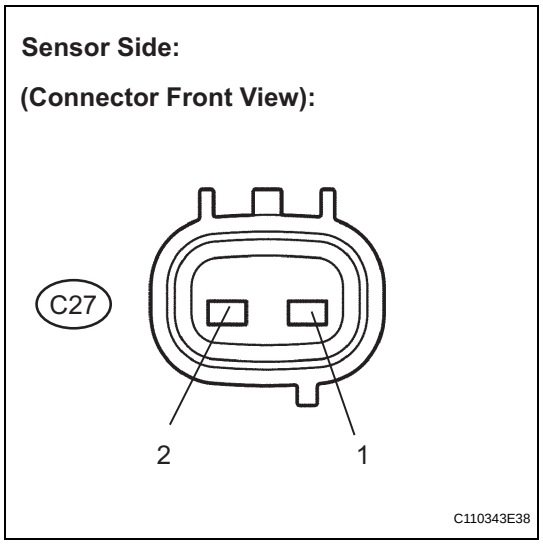


(a) Check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPLACE SPEED SENSOR (NC)**

OK

2 INSPECT SPEED SENSOR (NC)



(a) Disconnect the speed sensor connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20 °C (68 °F)
1 - 2	560 to 680 Ω

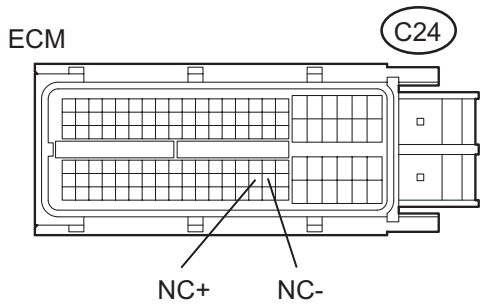
NG → **REPLACE SPEED SENSOR (NC)**

OK

3	CHECK HARNESS AND CONNECTOR (SPEED SENSOR - ECM)

Wire Harness Side:

(Connector Front View):



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(a) Connect the speed sensor connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20 °C (68 °F)
C24-101 (NC+) - C24-102 (NC-)	560 to 680 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
C24-101 (NC+) - Body ground	10 kΩ or higher
C24-102 (NC-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

DTC	P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear).
Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical troubles of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0796	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	• Shift solenoid valve SL3 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0796: Shift solenoid valve SL3/OFF malfunction Shift solenoid valve SL3/ON malfunction
Required sensors/Components	Shift solenoid valve SL3, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) 0.8 sec. OFF malfunction (B) 1 sec. ON malfunction (A) and (B) 0.8 sec. ON malfunction (C) 0.4 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	10°C (50°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction

Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

OFF malfunction (A):

ECM selected gear	4th or 5th
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

OFF malfunction (B):

ECM selected gear	4th
Throttle valve opening angle	5% or more
Vehicle speed	10 km/h (6.2 mph) or more

ON malfunction (A):

ECM selected gear	1st
Vehicle speed	Less than 40 km/h (24.9 mph)
Throttle valve opening angle	4.5% or more at engine speed 1,900 rpm (Varies with engine speed)

ON malfunction (B):

ECM selected gear	3rd
Throttle valve opening angle	7.0% or more at output speed 1,400 rpm (Varies with engine speed)
Malfunction of pressure control solenoid "B" (SL2) and "C" (SL3)	Not detected

ON malfunction (C):

Throttle valve opening angle	7.0% or more at output speed 1,050 rpm (Varies with engine speed)
Malfunction of pressure control solenoid "B" (SL2)	Not detected

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction (A) and (B), or ON malfunctions (A), (B) and (C)

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction (A):

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

OFF malfunction (B):

Intermediate shaft speed/Output speed	0.95 to 1.09

ON malfunction (A):

Input (turbine) speed/Intermediate shaft speed	0.93 to 1.07

ON malfunction (B):

Input (turbine) speed - Intermediate shaft speed	700 rpm or more

ON malfunction (C):

Input (turbine) speed - Intermediate shaft speed	Less than -500 rpm or 700 rpm or more

INSPECTION PROCEDURE

HINT:
Performing the ACTIVE TEST using the intelligent tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one method to shorten labor time.
It is possible to display the DATA LIST during the ACTIVE TEST.

1. PERFORM ACTIVE TEST

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Select the item "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
(g) According to the display on the tester, perform the "ACTIVE TEST".

HINT:
While driving, the shift position can be forcibly changed with the intelligent tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-30).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves.

HINT:
- This test can be conducted when the vehicle speed is 50 km/h (31 mph) or less.
- The shift position commanded by the ECM is shown in the DATA LIST/SHIFT display on the intelligent tester.

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0796)

(a) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the OBD II scan tool or the intelligent tester main switch ON.
(c) When you use intelligent tester:
Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0796" is output	A
"P0796" and other DTCs	B

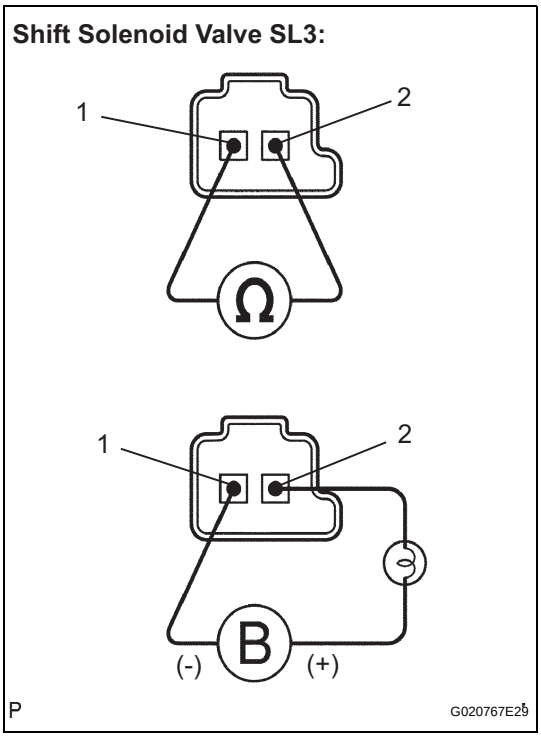
HINT:
If any other codes besides "P0796" are output, perform the troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2 INSPECT SHIFT SOLENOID VALVE (SL3)

Shift Solenoid Valve SL3:



(a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → REPLACE SHIFT SOLENOID VALVE (SL3)

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

4 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

AX

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)

DESCRIPTION

Shifting from 1st to 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0798	The ECM checks for an open or short in the shift solenoid valve SL3 circuit while driving and shifting gears. (1-trip detection logic) – Output signal duty equals to 100 %. (NOTE: SL3 output signal duty is less than 100 % under normal condition.)	• Open or short in shift solenoid valve SL3 circuit • Shift solenoid valve SL3 • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other normal shift solenoid valves "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.)
(See page AX-30).

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Battery voltage	11 V or more
Ignition switch	ON
Starter	OFF

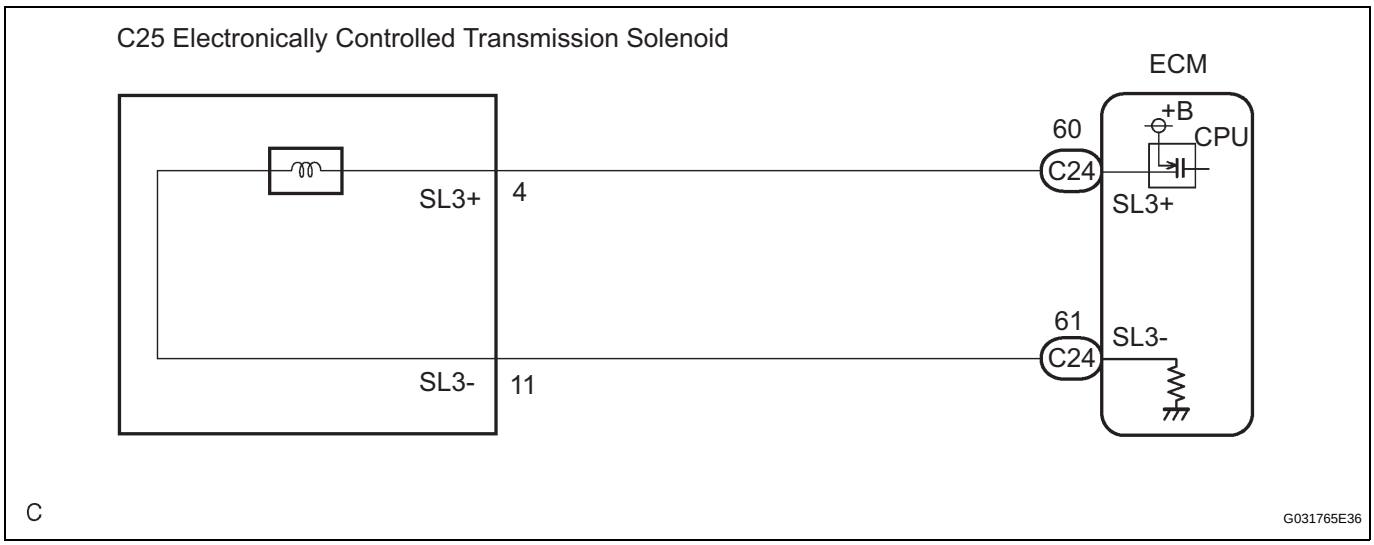
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from MIC	Fail (Open or short)

COMPONENT OPERATING RANGE

Output signal duty	Less than 100%

WIRING DIAGRAM

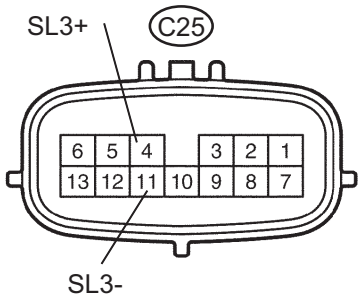


INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SL3)

Transmission Wire Side:

(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
4 (SL3+) - 11 (SL3-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
4 (SL3+) - Body ground	10 kΩ or higher
11 (SL3-) - Body ground	

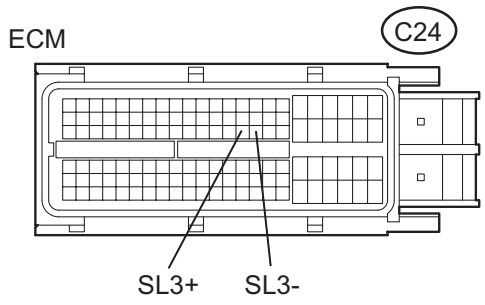
NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



A136781E07

(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-60 (SL3+) - C24-61 (SL3-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
C24-60 (SL3+) - Body ground	10 kΩ or higher
C24-61 (SL3-) - Body ground	

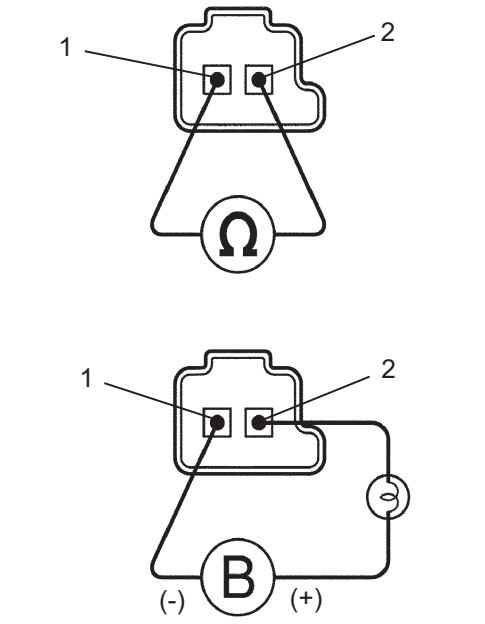
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

3 INSPECT SHIFT SOLENOID VALVE (SL3)

Shift Solenoid Valve SL3:



P

G020767E29

(a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (SL3)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC	P0982	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)

DTC	P0983	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)

DESCRIPTION

Shifting from 1st to 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0982	ECM detects short in solenoid valve S4 circuit 2 times when solenoid valve S4 is operated (1-trip detection logic)	• Short in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM
P0983	ECM detects open in solenoid valve S4 circuit 2 times when solenoid valve S4 is not operated (1-trip detection logic)	• Open in shift solenoid valve S4 circuit • Shift solenoid valve S4 • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other normal shift solenoid valves "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.) (See page AX-30).

MONITOR STRATEGY

Related DTCs	P0982: Shift solenoid valve S4/Range check (Low resistance) P0983: Shift solenoid valve S4/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S4
Frequency of operation	Continuous
Duration	0.064 sec. or more
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0982: Range check (Low resistance):

The monitor will run whenever this DTC is not present.	None
Shift solenoid valve S4	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0983: Range check (High resistance):

The monitor will run whenever this DTC is not present.	None
Shift solenoid valve S4	OFF
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0982: Range check (Low resistance):

Shift solenoid valve S4 resistance	8 Ω or less

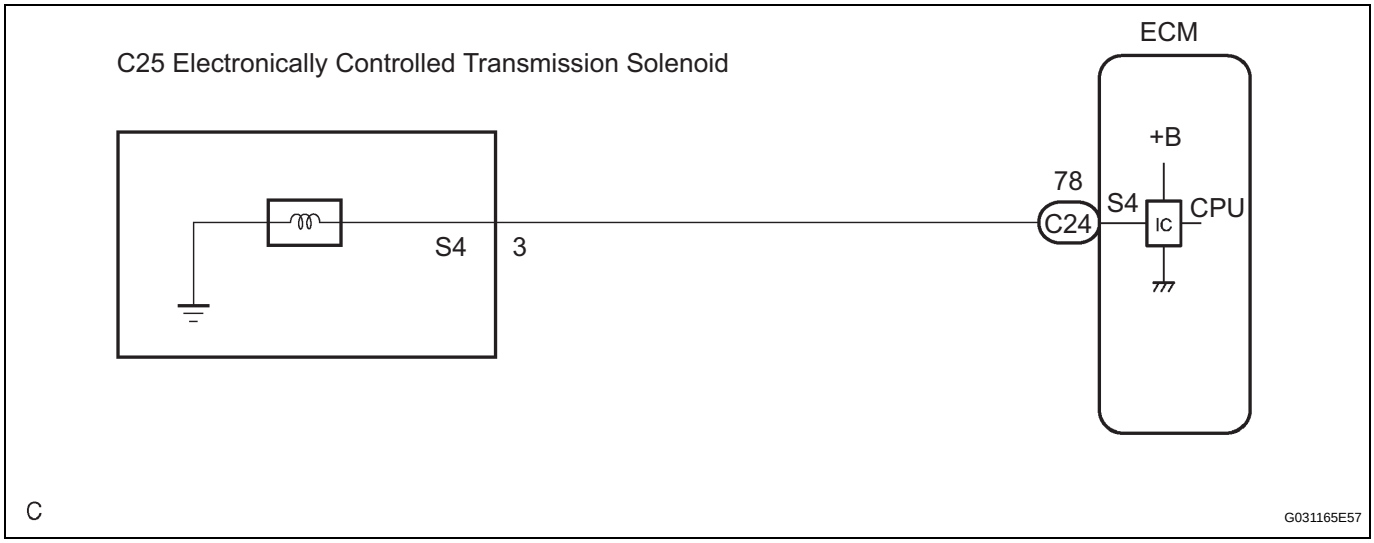
P0983: Range check (High resistance):

Shift solenoid valve S4 resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve S4	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM

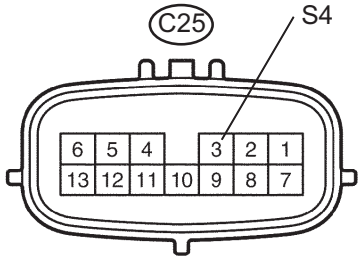


INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (S4)

Transmission Wire Side:

(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
3 - Body ground	11 to 15 Ω

NG → **Go to step 3**

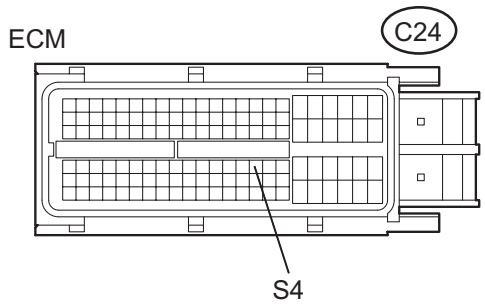
OK

AX

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



A136781E08

(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-78 (S4) - Body ground	11 to 15 Ω

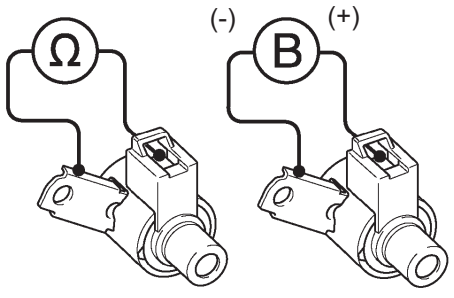
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

3 INSPECT SHIFT SOLENOID VALVE (S4)

Shift Solenoid Valve S4:



C113971E01

(a) Remove the shift solenoid valve S4.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S4) - Solenoid Body (S4)	11 to 15 Ω

(c) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (S4)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC	P0985	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)

DTC	P0986	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)

DESCRIPTION

Shifting from 1st to 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, S4 and SR which are controlled by the ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detection Condition	Trouble Area
P0985	ECM detects short in solenoid valve SR circuit 2 times when solenoid valve SR is operated (1-trip detection logic)	• Short in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM
P0986	ECM detects open in solenoid valve SR circuit 2 times when solenoid valve SR is not operated (1-trip detection logic)	• Open in shift solenoid valve SR circuit • Shift solenoid valve SR • ECM

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other normal shift solenoid valves "ON/OFF" (In case of an open or short circuit, the ECM stops sending current to the circuit.)
(See page AX-30).

MONITOR STRATEGY

Related DTCs	P0985: Shift solenoid valve SR/Range check (Low resistance) P0986: Shift solenoid valve SR/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SR
Frequency of operation	Continuous
Duration	0.064 sec. or more
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0985: Range check (Low resistance):

The monitor will run whenever this DTC is not present.	None
Shift solenoid valve SR	ON
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0986: Range check (High resistance):

The monitor will run whenever this DTC is not present.	None
Shift solenoid valve SR	OFF
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0985: Range check (Low resistance):

Shift solenoid valve SR resistance	8 Ω or less

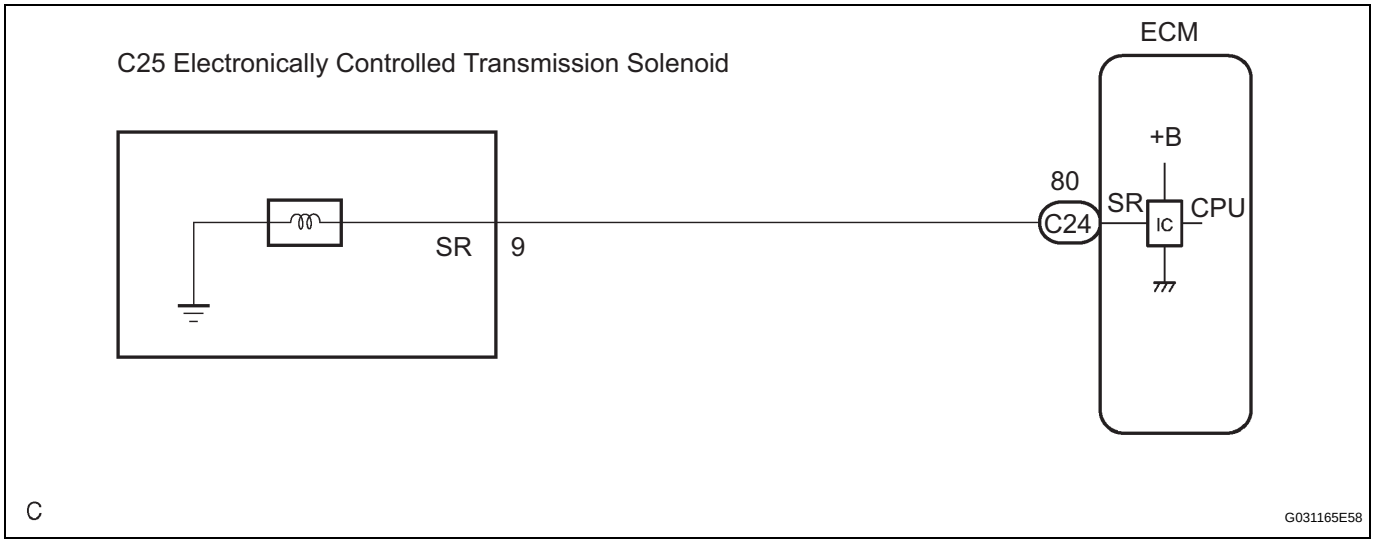
P0986: Range check (High resistance):

Shift solenoid valve SR resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve SR	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM

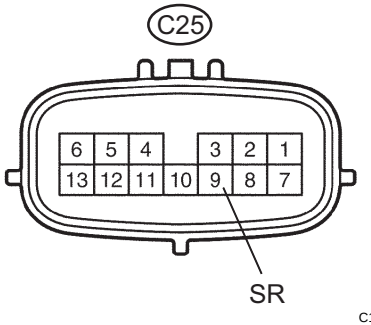


INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SR)

Transmission Wire Side:

(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
9 - Body ground	11 to 15 Ω

NG → **Go to step 3**

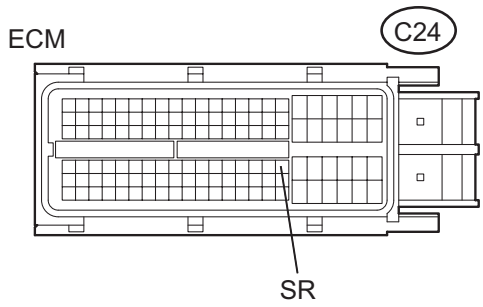
OK

AX

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



A136781E09

(a) Connect the transmission connector to the transaxle.
(b) Disconnect the connector from the ECM.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-80 (SR) - Body ground	11 to 15 Ω

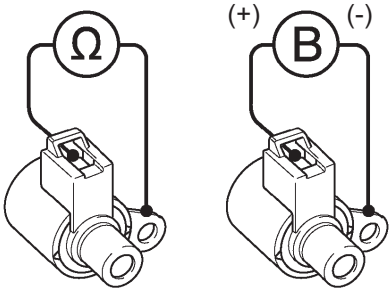
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

3 INSPECT SHIFT SOLENOID VALVE (SR)

Shift Solenoid Valve SR:



C113977E01

(a) Remove the shift solenoid valve SR.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (SR) - Solenoid Body (SR)	11 to 15 Ω

(c) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (SR)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC	P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

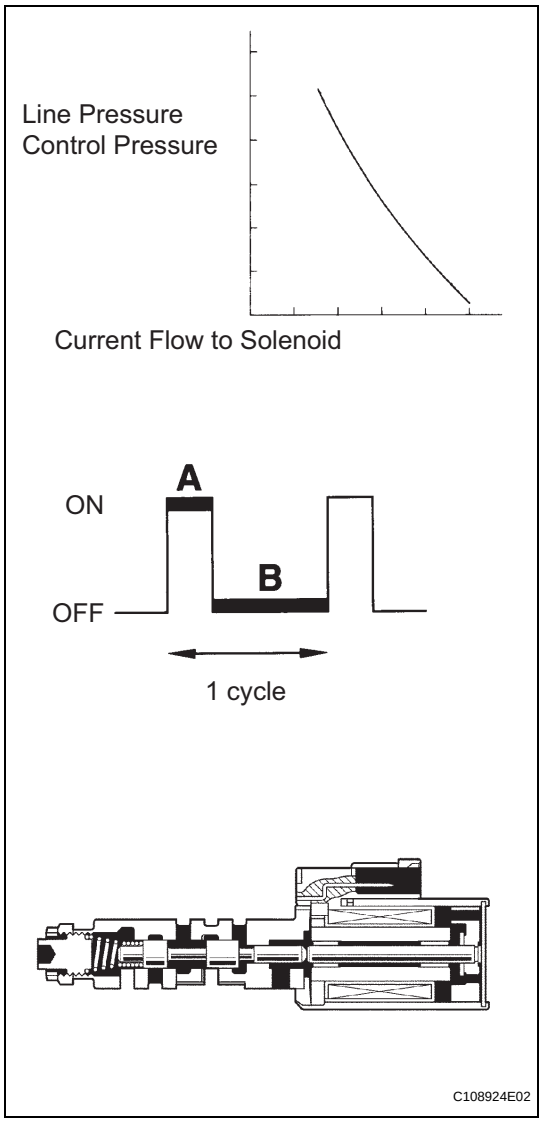
SYSTEM DESCRIPTION

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The ECM adjusts the duty ratio (*) of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

Duty Ratio= A/(A+B) x 100(%)



DTC No.	DTC Detection Condition	Trouble Area
P2714	ECM detects a malfunction on SLT (ON side) according to the revolution difference of the turbine, intermediate and the output shaft, and also by the oil pressure. (2-trip detection logic)	• Shift solenoid valve SLT remains closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

In any forward position, when the difference between the revolutions of the turbine, Intermediate and output shaft exceeds the specified value (varies with Intermediate, output speed) determined by the ECM, the ECM illuminates the MIL and outputs the DTC.
When shift solenoid valve SLT remains on, the oil pressure goes down and the clutch engagement force decreases.
NOTICE:
If you continue driving under these conditions, the clutch will burn out and the vehicle will no longer be drivable.

MONITOR STRATEGY

Related DTCs	P2714: Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Shift solenoid valve SLT, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ON malfunction:

The monitor will run whenever this DTC is not present.	None
Transmission range	"D"
TFT (Transmission fluid temperature)	-20°C (-4°F) or more
TFT sensor circuit	Not circuit malfunction
ECT sensor circuit	Not circuit malfunction
Turbine speed sensor circuit	Not circuit malfunction
Intermediate shaft speed sensor circuit	Not circuit malfunction
Output speed sensor circuit	Not circuit malfunction
Shift solenoid valve SL1 circuit	Not circuit malfunction
Shift solenoid valve SL2 circuit	Not circuit malfunction
Shift solenoid valve SL3 circuit	Not circuit malfunction
Shift solenoid valve S4 circuit	Not circuit malfunction
Shift solenoid valve SR circuit	Not circuit malfunction
Shift solenoid valve DSL circuit	Not circuit malfunction
Electronic throttle system	Not circuit malfunction

ON malfunction (a):

ECM selected gear	4th
Temporary MAIN gear	1st or 2nd or 3rd or 4th
NT - NC x Temporary MAIN gear ratio NT: Input (turbine) speed NC: Intermediate shaft speed	100 rpm or more at Intermediate shaft speed 1,000 rpm
Temporary U/D gear	Low or High
NC - NO x Temporary U/D gear ratio NO: Output speed	300 rpm or more at Output speed 1,000 rpm
TT TT: Turbine Torque	142 Nm or more
NT	250 rpm or more
NC	250 rpm or more
NO	250 rpm or more

ON malfunction (b):

ECM selected gear	5th
Temporary MAIN gear	1st or 2nd or 3rd or 4th
NT - NC x Temporary MAIN gear ratio NT: Input (turbine) speed NC: Intermediate shaft speed	100 rpm or more at Intermediate shaft speed 1,000 rpm
Temporary U/D gear	Low or High
NC - NO x Temporary U/D gear ratio NO: Output speed	300 rpm or more at Output speed 1,000 rpm
TT TT: Turbine Torque	142 Nm or more
NT	250 rpm or more
NC	250 rpm or more
NO	250 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

[ON malfunction]
Detection condition: Total accumulated time of ON malfunctions (a) and (b) is 1 second or more

ON malfunction (a):

NT - NC x 4th gear ratio	100 rpm or more at Intermediate shaft speed 1,000 rpm
NC - NO x Low gear ratio	300 rpm or more at Output speed 1,000 rpm
Duration	0.85 sec. or more
Shift Solenoid valve SL1 Performance	Not performance malfunction

ON malfunction (b):

NT - NC x 4th gear ratio	100 rpm or more at Intermediate shaft speed 1,000 rpm
NC - NO x High gear ratio	300 rpm or more at Output speed 1,000 rpm
Duration	0.85 sec. or more
Shift Solenoid valve SL1 Performance	Not performance malfunction

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2714)

(a) Connect the OBD II scan tool or intelligent tester together with the CAN VIM (controller area network vehicle interface module) to the DLC3.
(b) Turn the ignition switch on (IG) and turn the OBD II scan tool or the intelligent tester main switch ON.
(c) When you use intelligent tester:
Select the item "DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES"
(d) Read the DTCs using the OBD II scan tool or the intelligent tester.

Result

Display (DTC output)	Proceed to
Only P2714 is output	**A**
P2714 and other DTCs	**B**

HINT:
If any other codes besides "P2714" are output, perform the troubleshooting for those DTCs first.

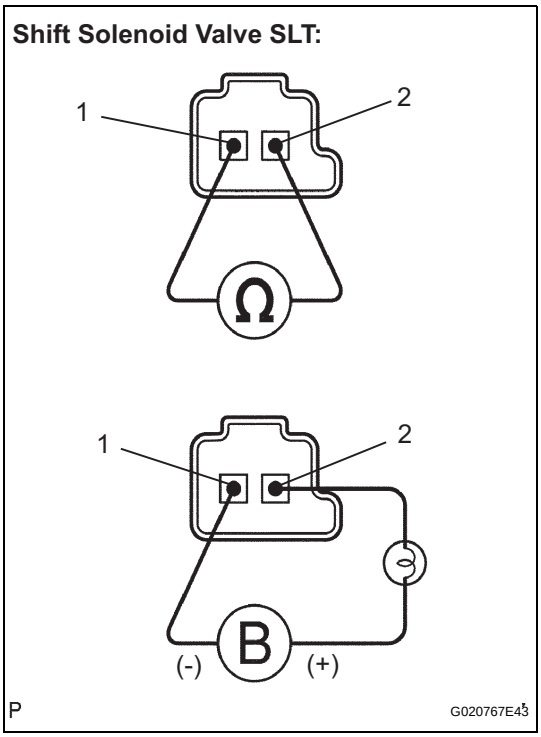
AX

B → GO TO DTC CHART

A

2 INSPECT SHIFT SOLENOID VALVE SLT

Shift Solenoid Valve SLT:



(a) Remove the shift solenoid valve SLT.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1-2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → REPLACE SHIFT SOLENOID VALVE SLT

OK

3 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

4 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY

OK

AX

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)

DESCRIPTION

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The ECM adjusts the duty cycle of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

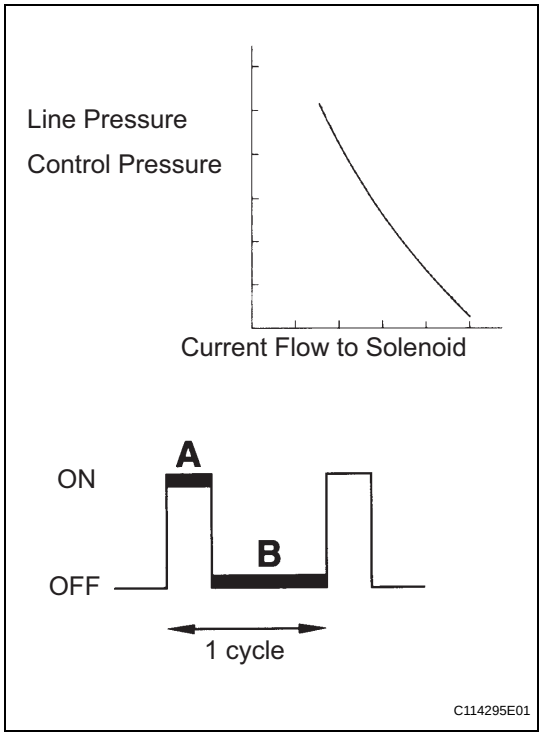
(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle.

For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

Duty Ratio=A/(A + B) x 100(%)

DTC No.	DTC Detection Condition	Trouble Area
P2716	Open or short is detected in shift solenoid valve SLT circuit for 1 second or more while driving (1-trip detecting logic).	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • ECM



MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	None
Solenoid current cut status	Not cut
Battery voltage	11 V or more
Ignition switch	ON
Starter	OFF
CPU commanded duty ratio to SLT	19% or more

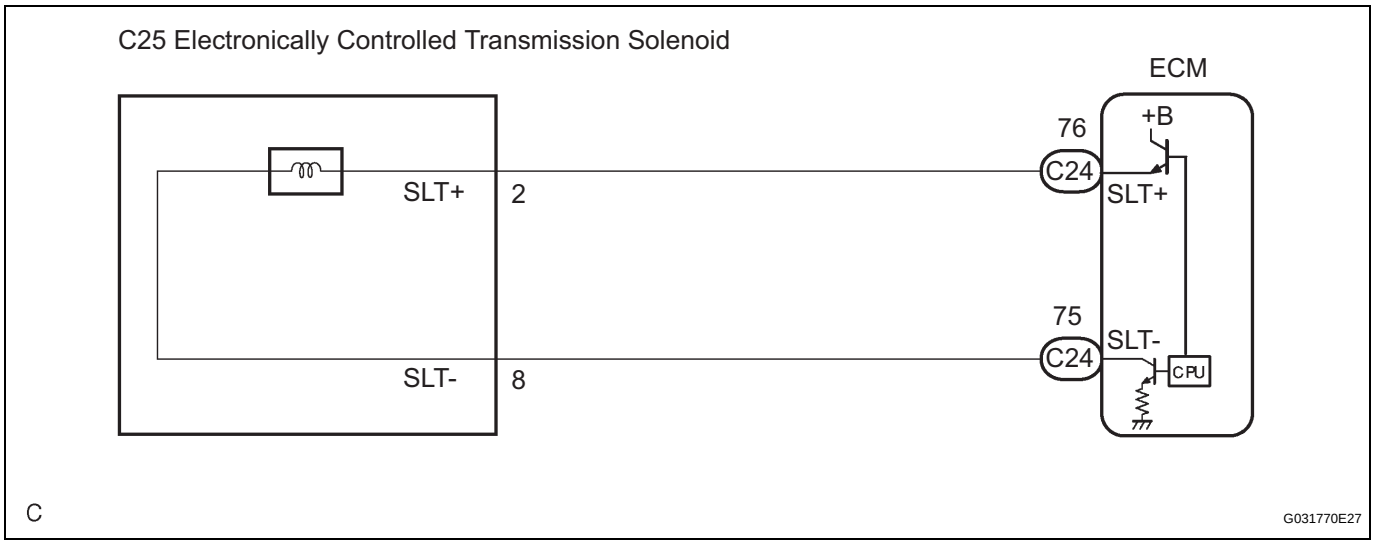
TYPICAL MALFUNCTION THRESHOLDS

Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

Shift solenoid valve SLT	Resistance: 5.0 to 5.6 Ω at 20°C (68°F)

WIRING DIAGRAM

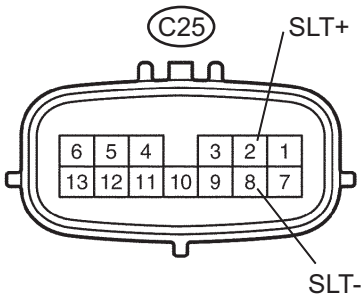


INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SLT)

Transmission Wire Side:

(Connector Front View):



C113969E31

(a) Disconnect the transmission wire connector from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
2 (SLT+) - 8 (SLT-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

Tester Connection	Specified Condition
2 (SLT+) - Body ground	10 kΩ or higher
8 (SLT-) - Body ground	

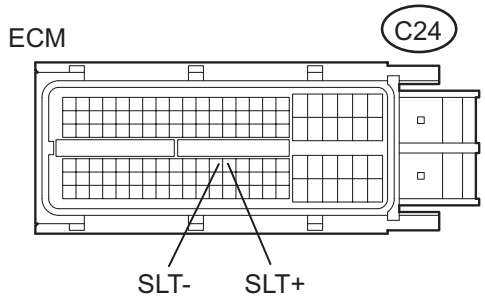
NG → **Go to step 3**

OK

2 CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)

Wire Harness Side:

(Connector Front View):



A136781E10

(a) Connect the transmission wire connector to the transaxle.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
C24-76 (SLT+) - C24-75 (SLT-)	5.0 to 5.6 Ω

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for short)

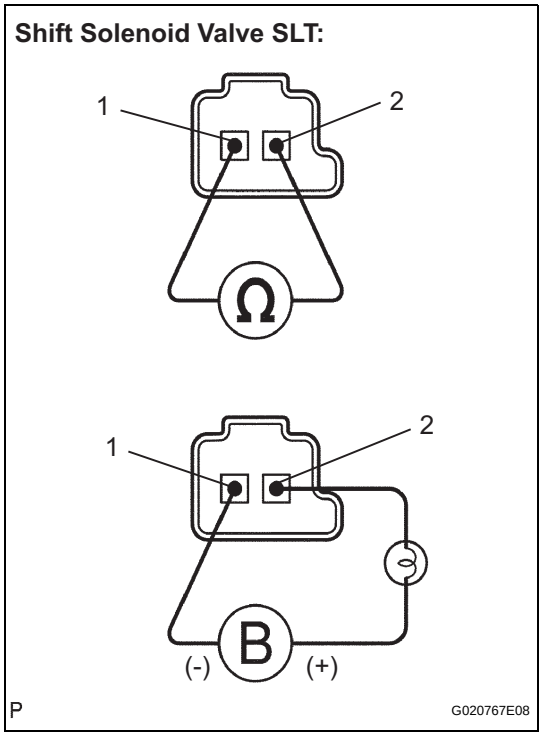
Tester Connection	Specified Condition
C24-76 (SLT+) - Body ground	10 kΩ or higher
C24-75 (SLT-) - Body ground	

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE (SLT)



(a) Remove the shift solenoid valve (SLT).

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (SLT)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

DTC	P2769	Torque Converter Clutch Solenoid Circuit Low (Shift Solenoid Valve DSL)

DTC	P2770	Torque Converter Clutch Solenoid Circuit High (Shift Solenoid Valve DSL)

DESCRIPTION

The shift solenoid valve DSL is turned "ON" and "OFF" by signals from the ECM in order to control the hydraulic pressure operation, the lock-up relay valve, which then controls operation of the lock-up clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2769	ECM detects short in solenoid valve DSL circuit (0.1 sec.) when solenoid valve DSL is operated (2-trip detection logic)	• Short in shift solenoid valve DSL circuit • Shift solenoid valve DSL • ECM
P2770	ECM detects open in solenoid valve DSL circuit (0.1 sec.) when solenoid valve DSL is not operated (2-trip detection logic)	• Open in shift solenoid valve DSL circuit • Shift solenoid valve DSL • ECM

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the ECM based on engine rpm, engine load, engine temperature, vehicle speed, transmission temperature, and shift range selection. The ECM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The ECM calculates the actual transmission gear by comparing input turbine rpm (NT) to counter gear rpm (NC). When conditions are appropriate, the ECM requests "lock-up" by applying control voltage to the shift solenoid DSL. When the DSL is opened, it applies pressure to the lock-up relay valve and locks the torque converter clutch. If the ECM detects an open or short in the DSL solenoid circuit, the ECM interprets this as a fault in the DSL solenoid or circuit. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve DSL/Range check (Low resistance) P2770: Shift solenoid valve DSL/Range check (High resistance)
Required sensors/Components	Shift solenoid valve DSL
Frequency of operation	Continuous
Duration	0.064 sec. or more
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P2769: Range check (Low resistance):

The monitor will run whenever this DTC is not present.	None
Shift solenoid valve DSL	ON
Solenoid current cut status	Not cut
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P2770: Range check (High resistance):

The monitor will run whenever this DTC is not present.	None
Shift solenoid valve DSL	ON
Battery voltage	8 V or more
Ignition switch	ON

Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance):

Shift solenoid valve DSL resistance	8 Ω or less

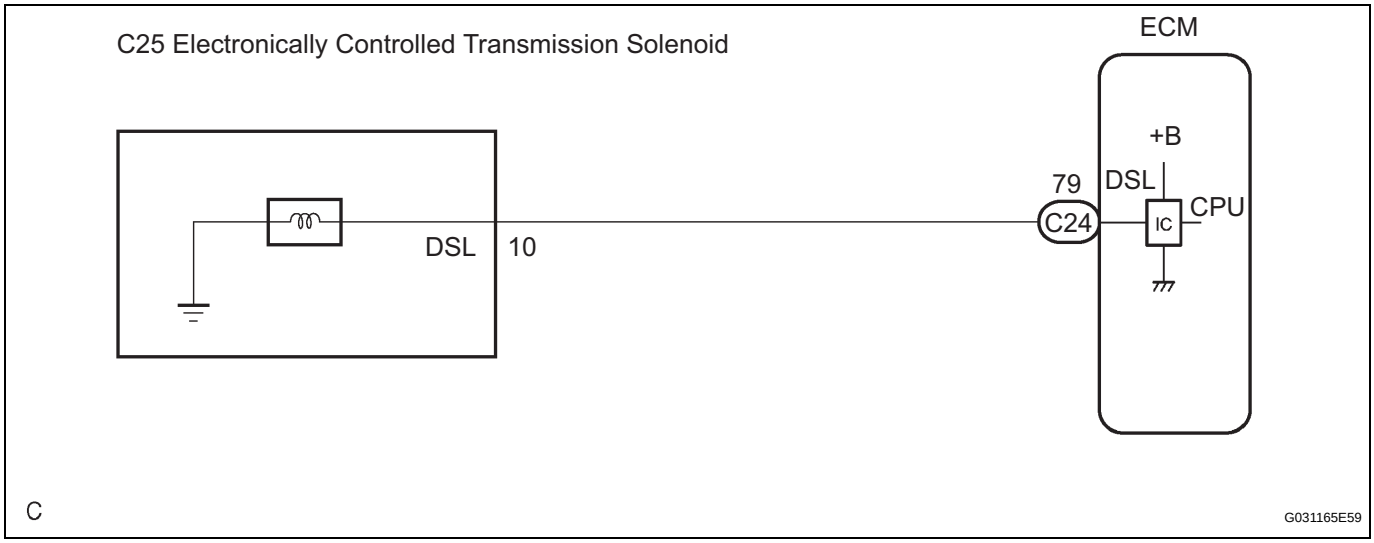
P2770: Range check (High resistance):

Shift solenoid valve DSL resistance	100 kΩ or more

COMPONENT OPERATING RANGE

Shift solenoid valve DSL	Resistance: 11 to 13 Ω at 20°C (68°F)

WIRING DIAGRAM

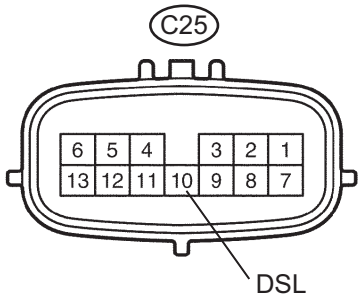


INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (DSL)

Transmission Wire Side:

(Connector Front View):



(a) Disconnect the transmission wire connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

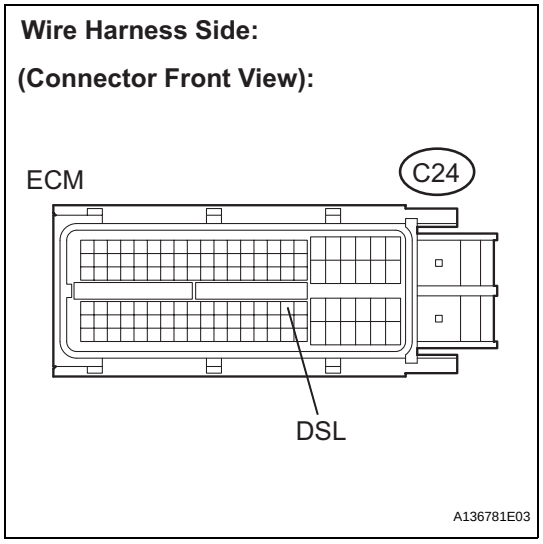
Tester Connection	Specified Condition 20°C (68°F)
10 - Body ground	11 to 13 Ω

NG → **Go to step 3**

AX

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION WIRE - ECM)



(a) Connect the transmission wire connector.
(b) Disconnect the ECM connector.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

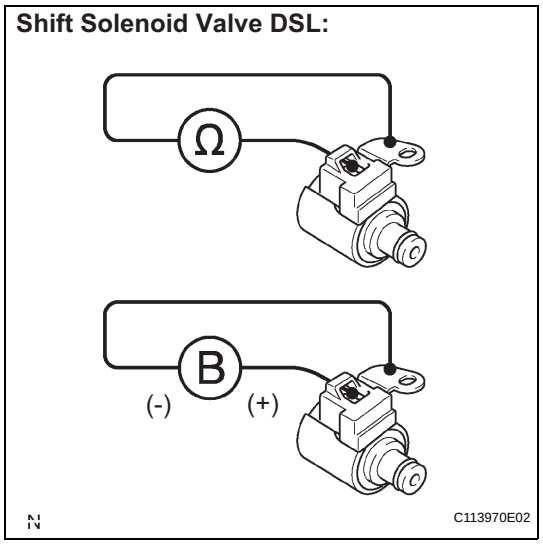
Tester Connection	Specified Condition 20°C (68°F)
C24-79 (DSL) - Body ground	11 to 13 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE ECM

3	INSPECT SHIFT SOLENOID VALVE (DSL)



(a) Remove the shift solenoid valve DSL.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (DSL) - Solenoid Body (DSL)	11 to 13 Ω

(c) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE (DSL)**

OK

REPAIR OR REPLACE TRANSMISSION WIRE

AUTOMATIC TRANSAXLE FLUID

ON-VEHICLE INSPECTION

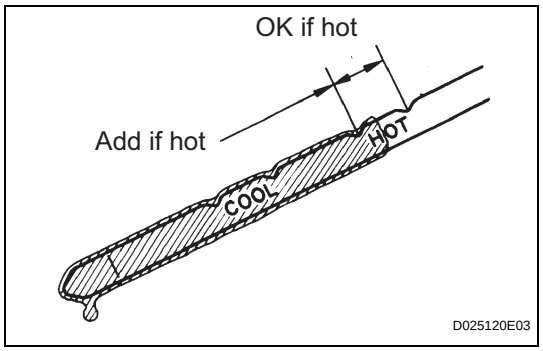
1. CHECK FLUID LEVEL

HINT:

Drive the vehicle so that the engine and transaxle are at normal operating temperature.

Fluid temperature:

70 to 80°C (158 to 176°F)



(a) Park the vehicle on a level surface and set the parking brake.

(b) With the engine idling and the brake pedal depressed, move the shift lever to all positions from P to L. Then return it to P.

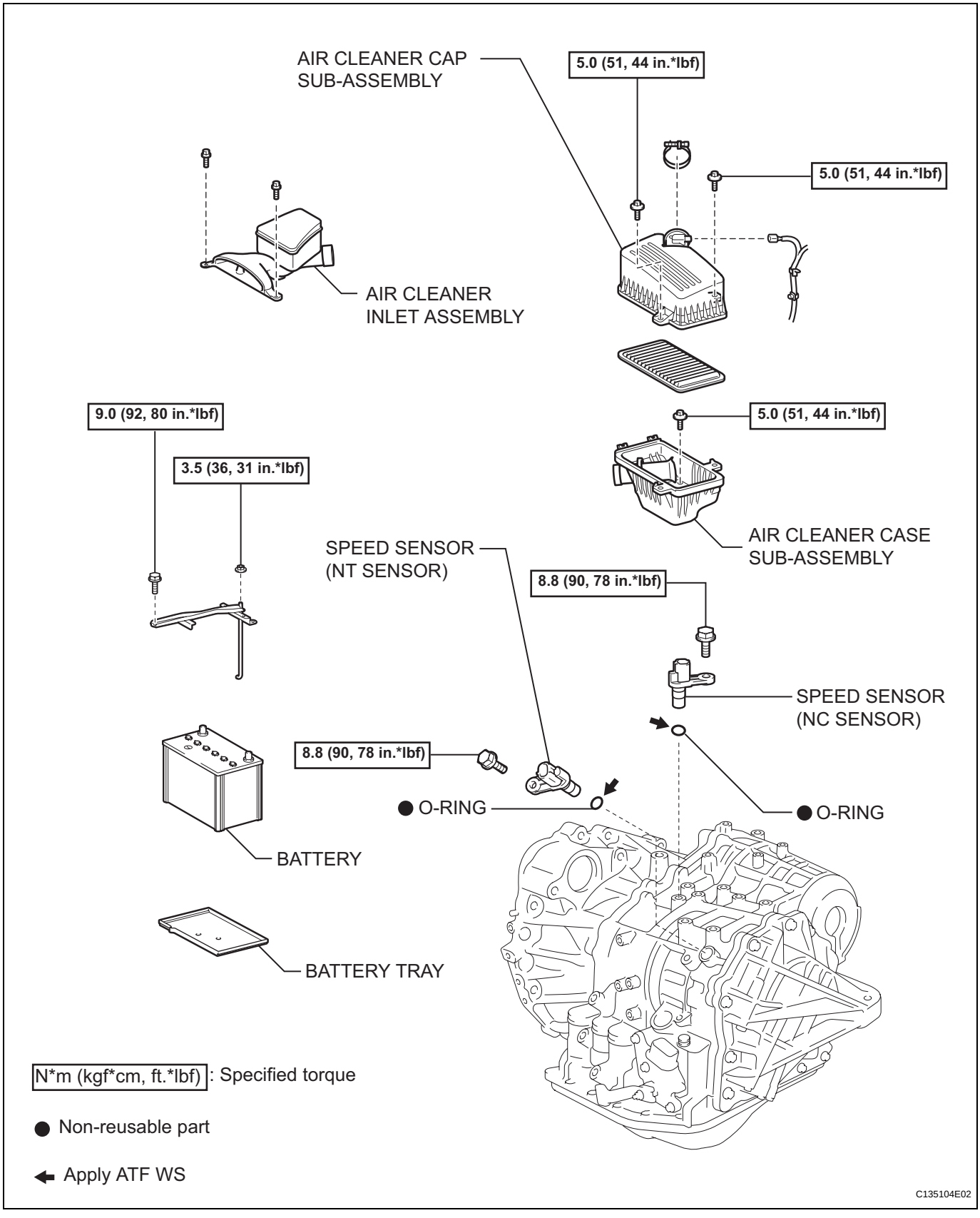
(c) Pull out the dipstick and wipe it clean.

(d) Push it back fully into the pipe.

(e) Pull it out again and check that the fluid level is within the HOT range. If the fluid level is below the HOT range, add new fluid and recheck the fluid level. If the fluid level exceeds the HOT range, drain the fluid once, add proper amount of new fluid and recheck the fluid level.

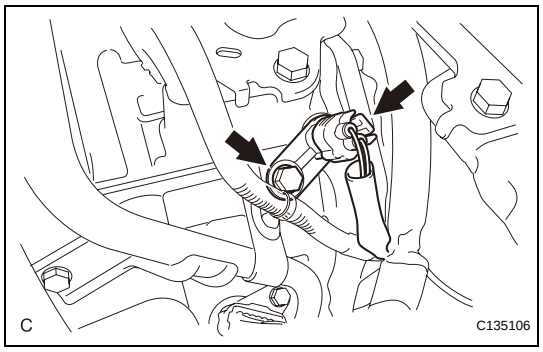
SPEED SENSOR

COMPONENTS

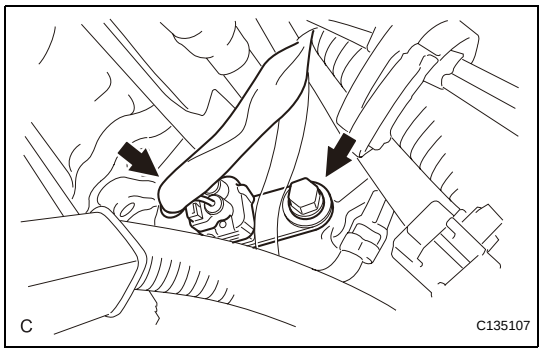


REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE BATTERY (See page EM-95)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
6. **REMOVE SPEED SENSOR (NT SENSOR)**
   (a) Disconnect the speed sensor connector.
   (b) Remove the bolt and speed sensor.
   (c) Remove the O-ring from the speed sensor.



7. **REMOVE SPEED SENSOR (NC SENSOR)**
   (a) Disconnect the speed sensor connector.
   (b) Remove the bolt and speed sensor.
   (c) Remove the O-ring from the speed sensor.



INSPECTION

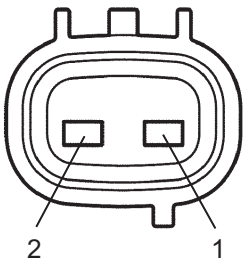
1. **INSPECT SPEED SENSOR (NT SENSOR)**
   (a) Disconnect the speed sensor connector from the transaxle.
   (b) Measure the resistance according to the value(s) in the table below.
   Standard resistance

Tester Connection	Specified Condition (20°C (68°F))
1 - 2	560 to 680 Ω

If the resistance value is not as specified, replace the speed sensor.

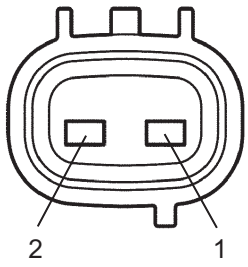
Sensor Side:

(Connector Front View)



Sensor Side:

(Connector Front View)



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2. INSPECT SPEED SENSOR (NC SENSOR)

(a) Disconnect the speed sensor connector from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

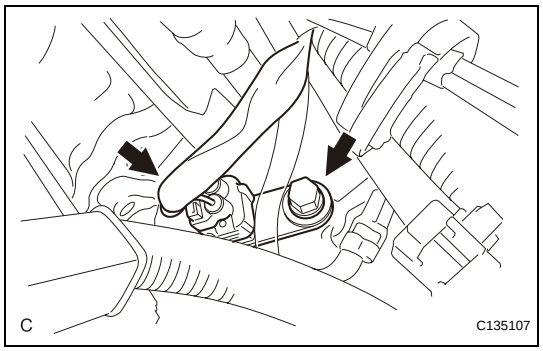
Tester Connection	Specified Condition (20°C (68°F))
1 - 2	560 to 680 Ω

If the resistance value is not as specified, replace the speed sensor.

INSTALLATION

1. INSTALL SPEED SENSOR (NC SENSOR)

(a) Coat a new O-ring with ATF WS and install it to the speed sensor.

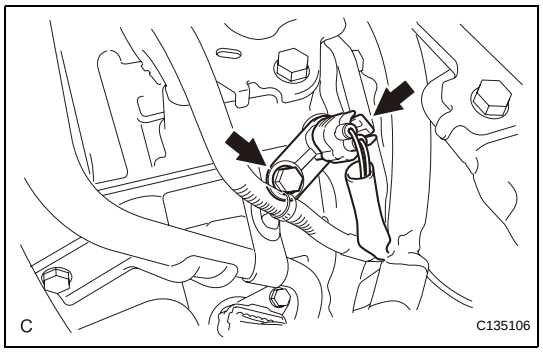


(b) Install the speed sensor with the bolt.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

(c) Connect the speed sensor connector.

2. INSTALL SPEED SENSOR (NT SENSOR)

(a) Coat a new O-ring with ATF WS and install it to the speed sensor.



(b) Install the speed sensor with the bolt.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

(c) Connect the speed sensor connector.

3. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)

4. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)

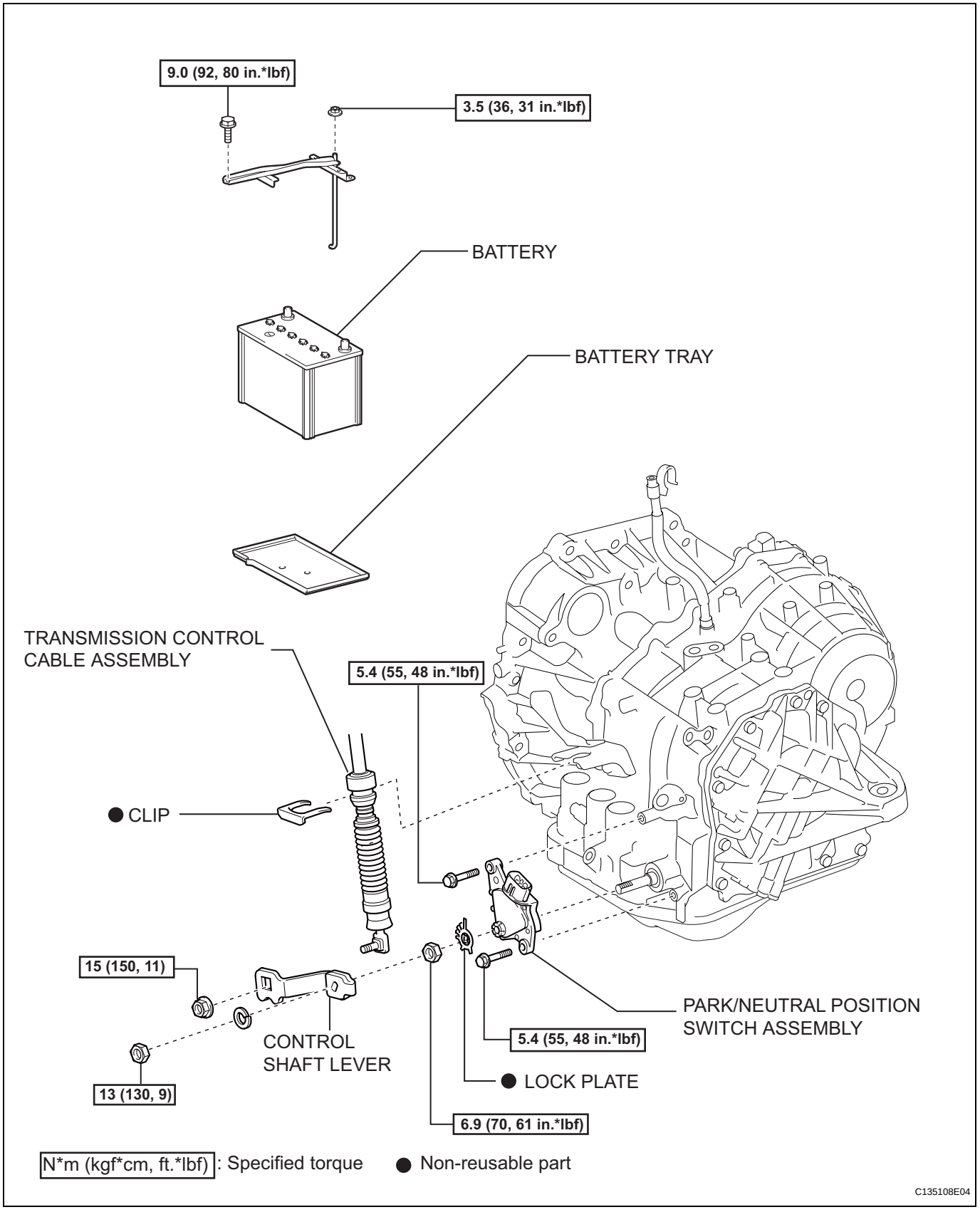
5. INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)

6. INSTALL BATTERY (See page EM-119)

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

PARK / NEUTRAL POSITION SWITCH

COMPONENTS



REMOVAL

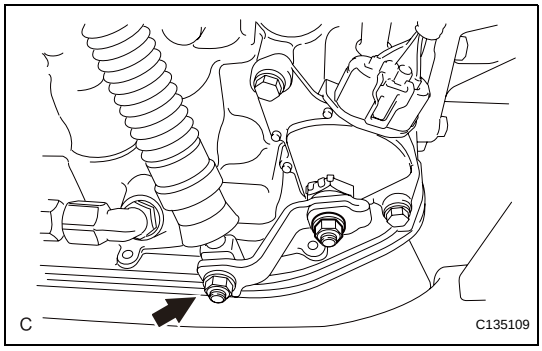
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE BATTERY (See page EM-95)

3. SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY

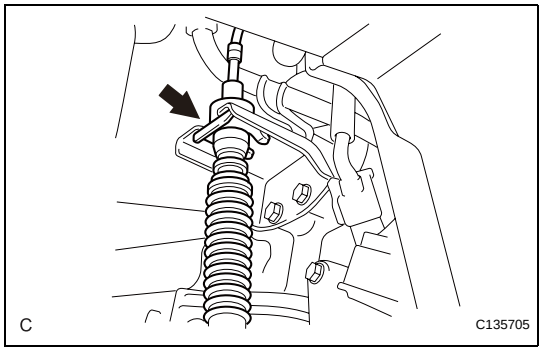
(a) Remove the nut from the control shaft lever.

(b) Disconnect the transmission control cable assembly from the control shaft lever.



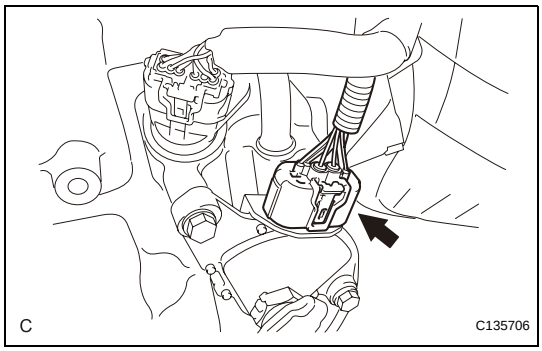
(c) Remove the clip and disconnect the transmission control cable assembly from the No. 1 control cable bracket.

NOTICE:
Do not hold the resin guide pipe.

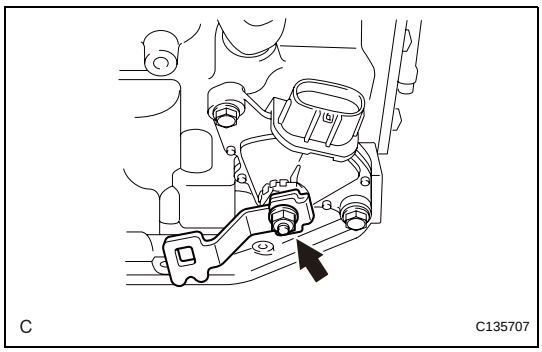


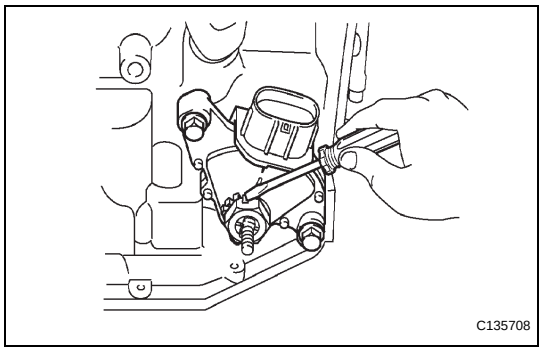
4. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Disconnect the park/neutral position switch connector.

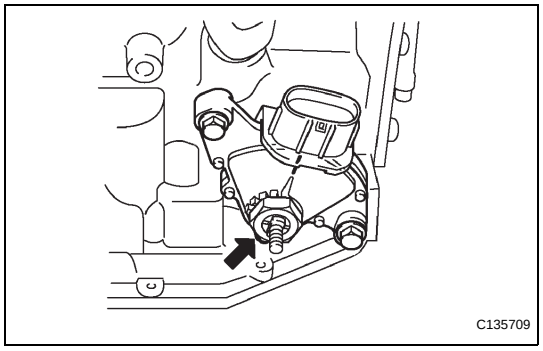


(b) Remove the nut, washer and control shaft lever.

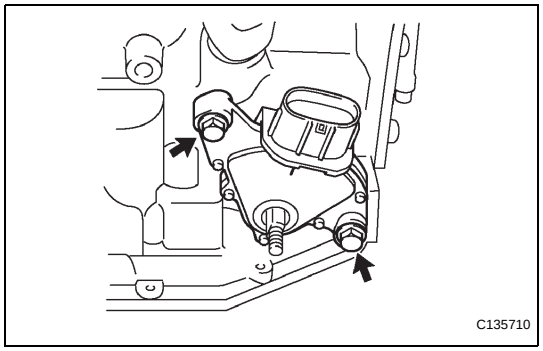




(c) Using a screwdriver, pry up the lock plate.



(d) Remove the lock nut and the lock plate.



(e) Remove the 2 bolts and pull out the park/neutral position switch.

INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY OPERATION

(a) Apply the parking brake and turn the ignition switch to the ON position.

(b) Depress the brake pedal and check that the engine starts only when the shift lever is set in the N or P position.

(c) Check that the back-up light comes on and the reverse warning buzzer sounds only when the shift lever is set in the R position and the light and buzzer do not operate when the shift lever is in other positions.

If a failure is found, check the park/neutral position switch.

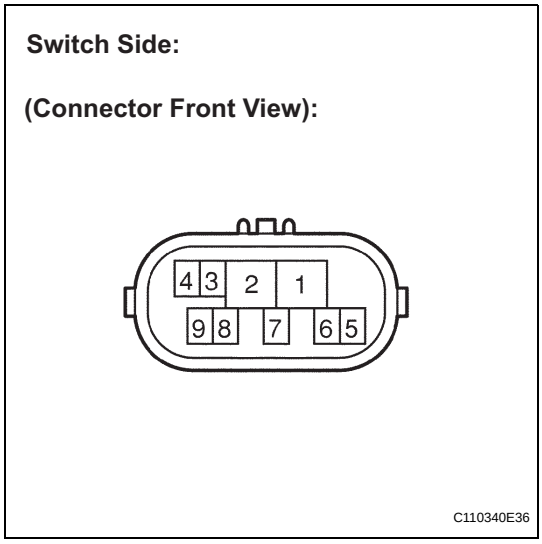
2. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Jack up the vehicle.

(b) Disconnect the park/neutral position switch connector.

(c) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance



Shift Position	Tester Connection	Specified Condition
P	2 - 6 and 4 - 5	Below 1 Ω
Except P		10 kΩ or higher
R	2 - 1	Below 1 Ω
Except R		10 kΩ or higher
N	2 - 9 and 4 - 5	Below 1 Ω
Except N		10 kΩ or higher
D and 4	2 - 7	Below 1 Ω
Except D and 4		10 kΩ or higher
3	2 - 3	Below 1 Ω
Except 3		10 kΩ or higher
2 and L	2 - 8	Below 1 Ω
Except 2 and L		10 kΩ or higher

If operation cannot be done as specified, replace the park/neutral position switch.

ADJUSTMENT

1. ADJUST PARK/NEUTRAL POSITION SWITCH ASSEMBLY

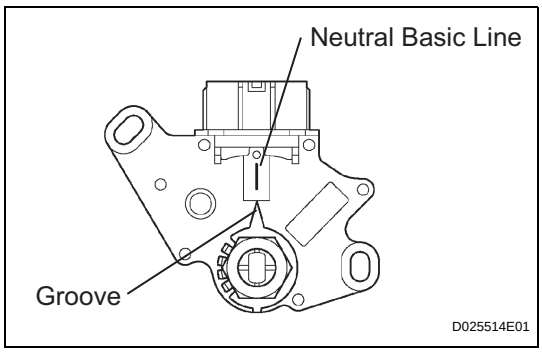
(a) Loosen the 2 bolts of the park/neutral position switch and move the shift lever to the N position.

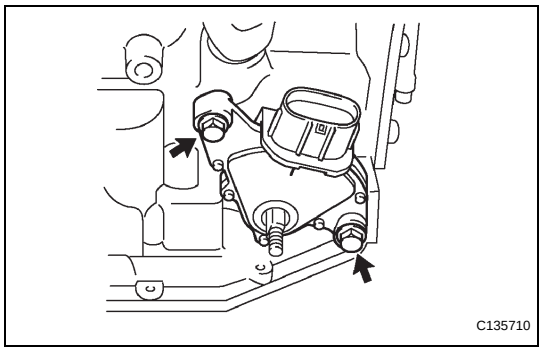
(b) Align the groove with the neutral basic line.

(c) Hold the switch in position and tighten the 2 bolts.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

(d) After adjustment, perform the inspection (See page AX-129).



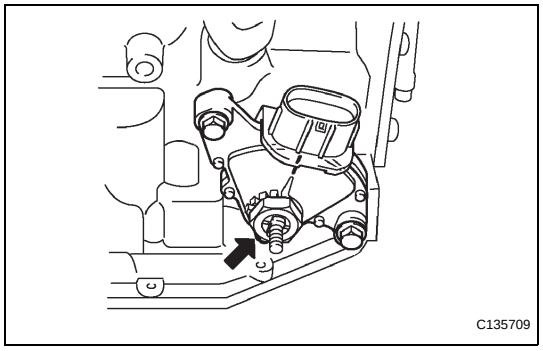


INSTALLATION

1. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

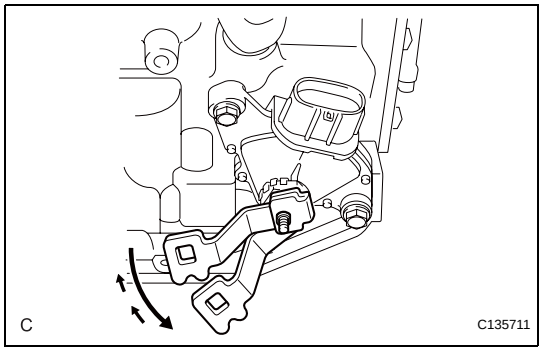
(a) Install the park/neutral position switch to the manual valve shaft.

(b) Temporarily install the 2 bolts.



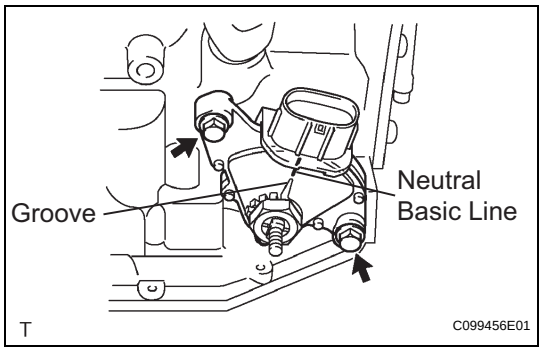
(c) Place a new lock plate and tighten the nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

(d) Temporarily install the control shaft lever.



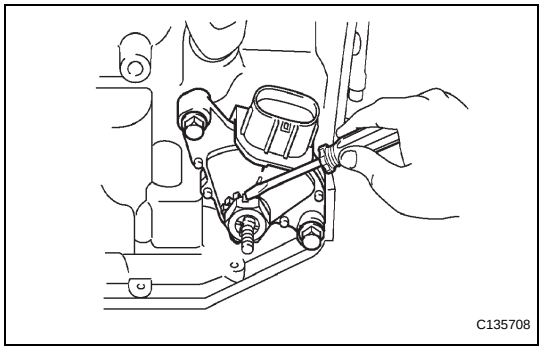
(e) Turn the lever counterclockwise until it stops, then turn it clockwise 2 notches.

(f) Remove the control shaft lever.

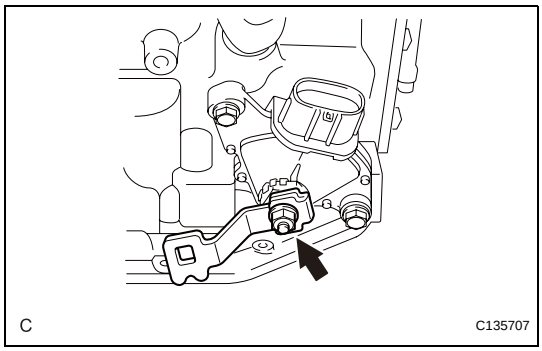


(g) Align the groove with the neutral basic line.

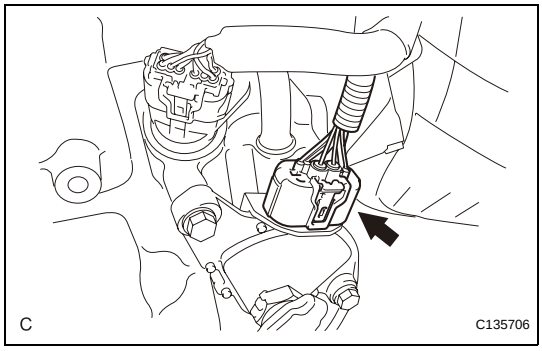
(h) Hold the switch in position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



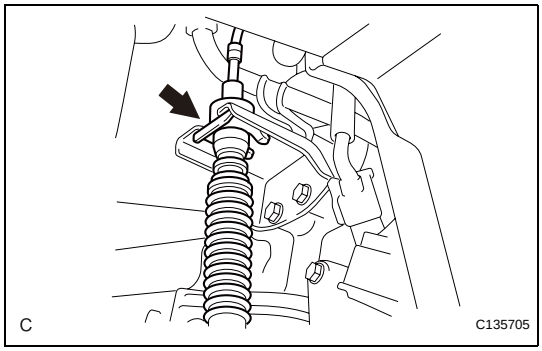
(i) Using a screwdriver, stake the nut with the lock plate.



(j) Install the control shaft lever, washer and nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

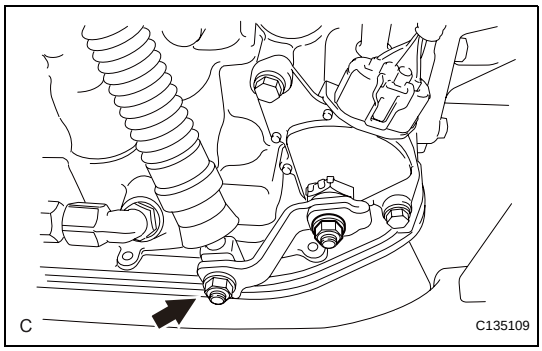


(k) Connect the park/neutral position switch connector.



2. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Connect the transmission control cable to the bracket with a new clip.



(b) Connect the transmission control cable assembly to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)

3. INSTALL BATTERY (See page EM-119)

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

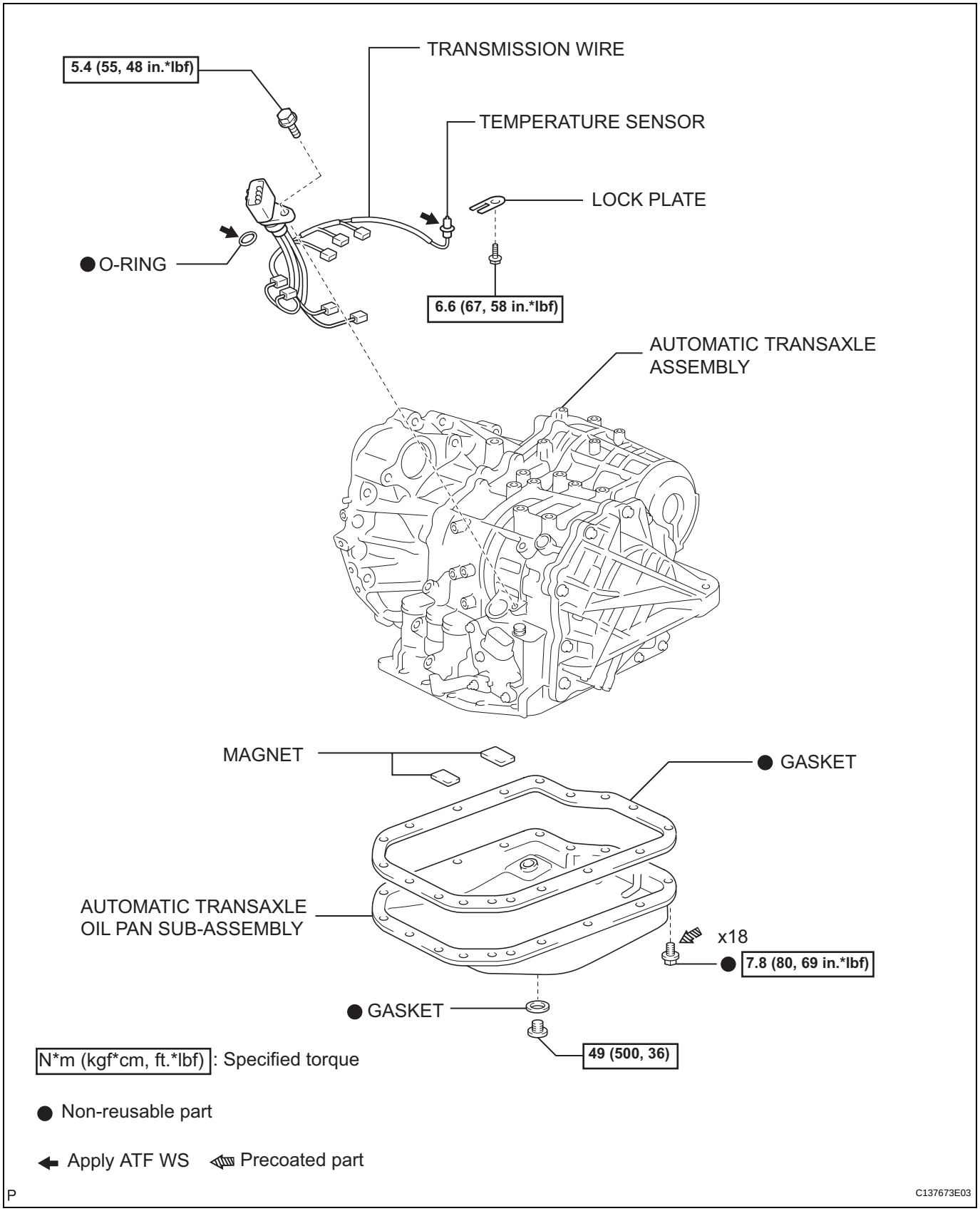
5. INSPECT SHIFT LEVER POSITION (See page AX-146)

6. ADJUST SHIFT LEVER POSITION (See page AX-146)

7. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY
HINT:
See page AX-129.

TRANSMISSION WIRE

COMPONENTS

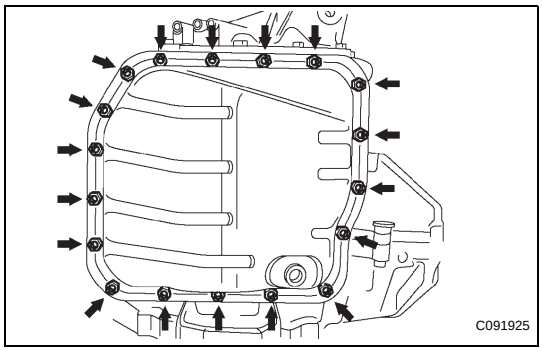


REMOVAL

1. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

HINT:

See page AX-162.

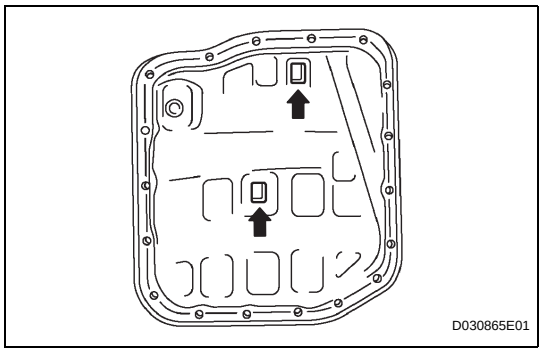


2. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

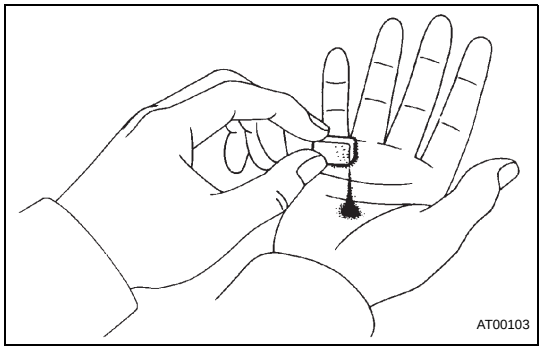
(a) Remove the 18 bolts, oil pan and gasket.

NOTICE:

Some fluid will remain in the oil pan. Remove all the pan bolts, and carefully remove the oil pan assembly.



(b) Remove the 2 magnets from the oil pan.



(c) Examine particles in the pan.

(1) Collect any steel chips with the removed magnets. Look carefully at the chips and particles in the pan and on the magnets to see the type of wear which might be found in the transaxle.

Steel (magnetic): bearing, gear and plate wear

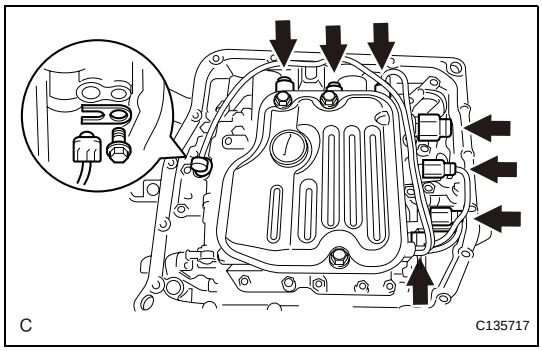
Brass (non-magnetic): bearing wear

Result:

Steel (magnetic):
bearing, gear and plate wear

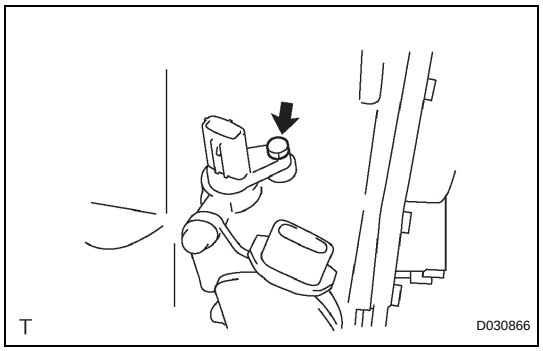
Brass (non-magnetic):
bearing wear

3. DISCONNECT TRANSMISSION WIRE



(a) Disconnect the 7 shift solenoid valve connectors.

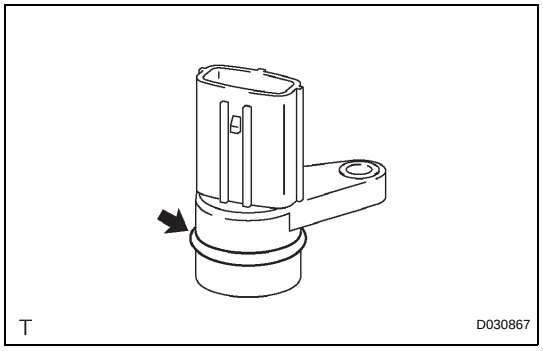
(b) Remove the bolt and lock plate, and disconnect the ATF temperature sensor.



4. REMOVE TRANSMISSION WIRE

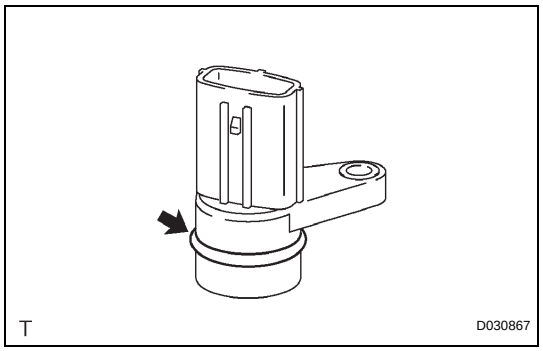
(a) Disconnect the transmission wire connector.

(b) Remove the bolt and transmission wire.



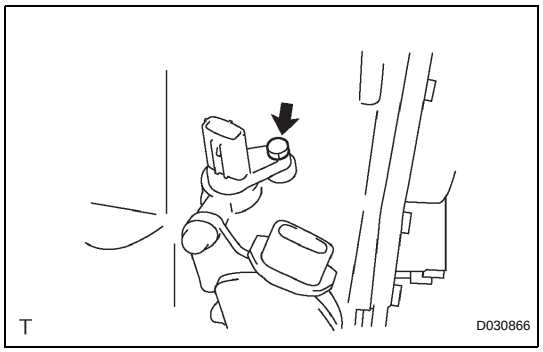
(c) Remove the O-ring from the transmission wire.

INSTALLATION



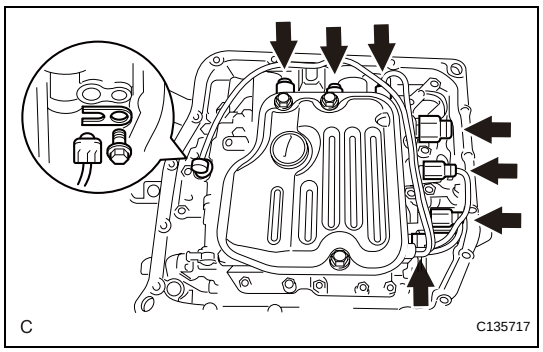
1. INSTALL TRANSMISSION WIRE

(a) Coat a new O-ring of the transmission wire connector with ATF WS and install it to the transmission wire.



(b) Install the transmission wire with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

(c) Connect the transmission wire connector.

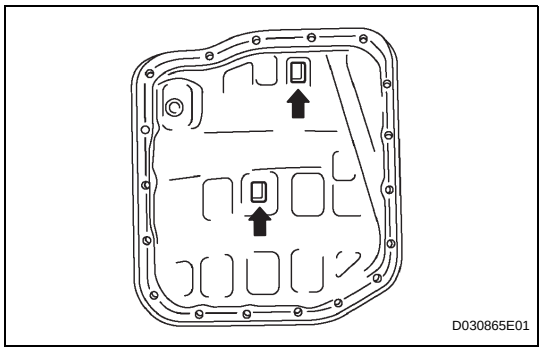


2. CONNECT TRANSMISSION WIRE

(a) Coat the O-ring of the ATF WS temperature sensor with ATF.

(b) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

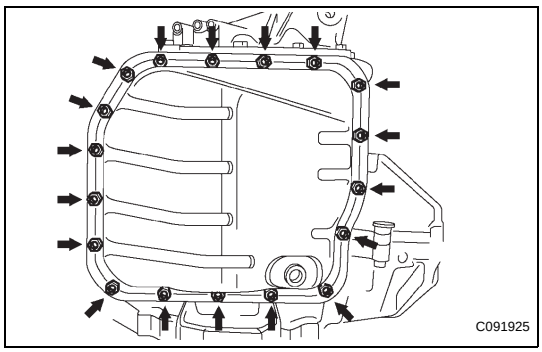
(c) Connect the 7 shift solenoid valve connectors.



3. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the oil pan.

(b) Apply adhesive or equivalent to new 18 bolts.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent



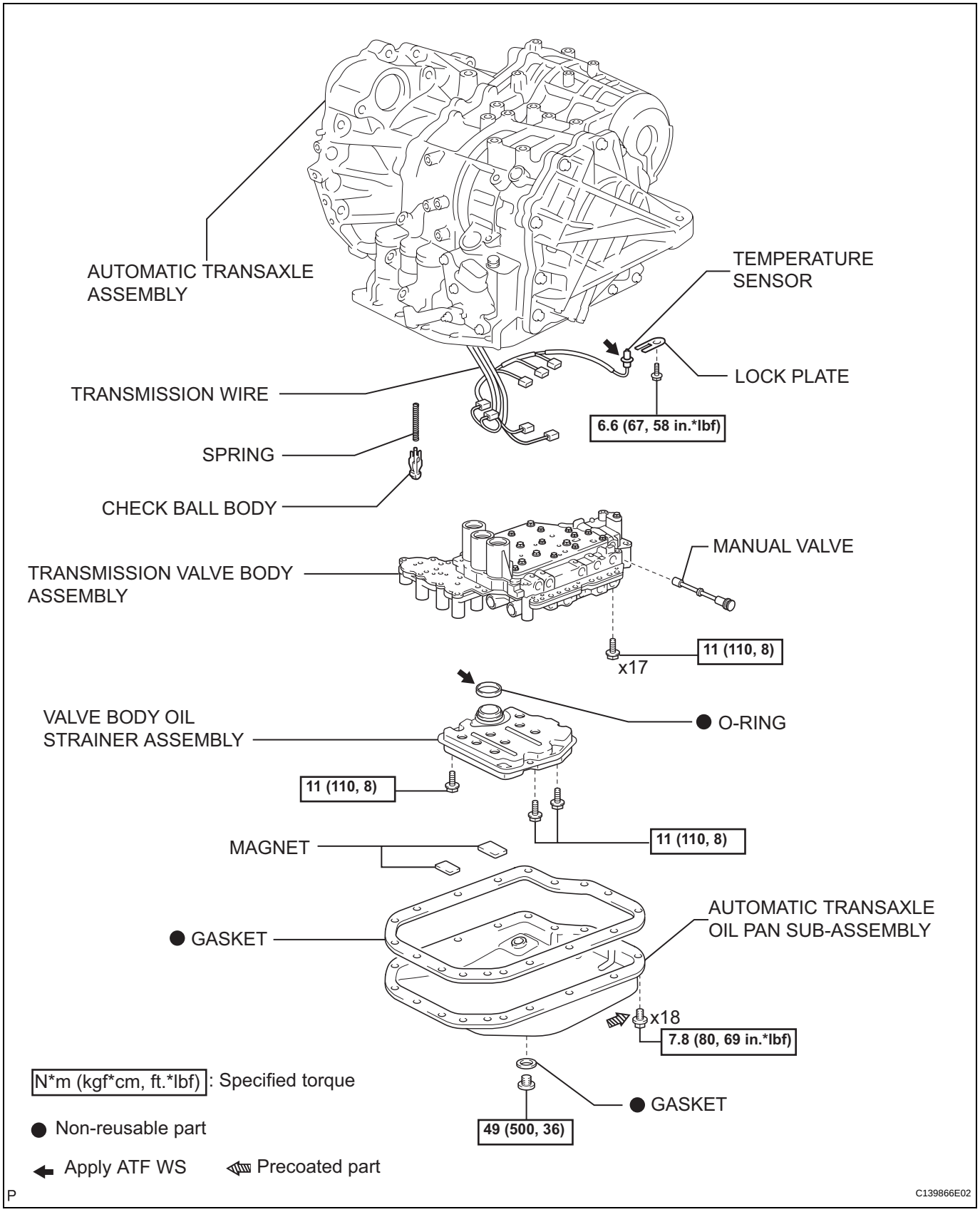
(c) Using a new gasket, install the oil pan to the transaxle case with the 18 bolts.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
NOTICE:
Since the bolts should be seal bolts, apply adhesive to the bolts and tighten them within 10 minutes of application.

4. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

HINT:
See page AX-168.

VALVE BODY ASSEMBLY

COMPONENTS



REMOVAL

1. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

HINT:

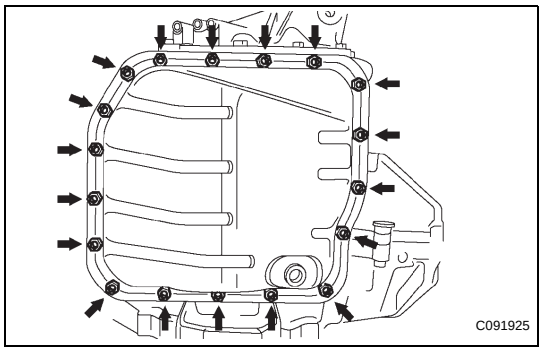
See page AX-162.

2. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

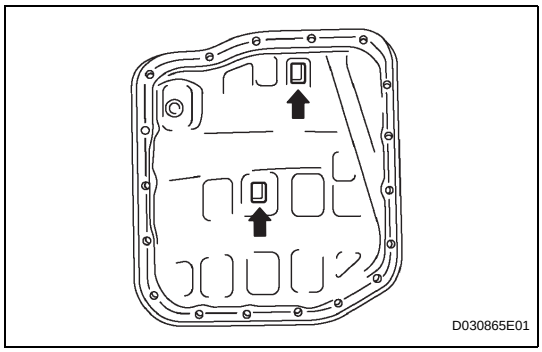
(a) Remove the 18 bolts, oil pan and gasket.

NOTICE:

Some fluid will remain in the oil pan. Remove all the pan bolts, and carefully remove the oil pan assembly.



(b) Remove the 2 magnets from the oil pan.

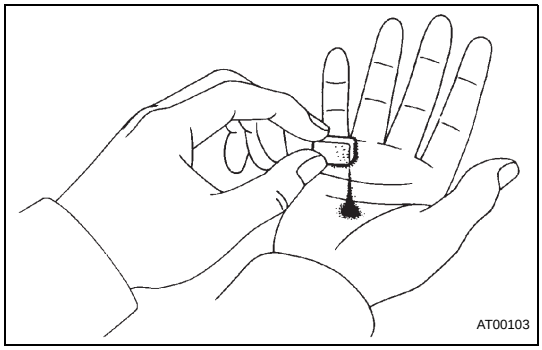


(c) Examine particles in the pan.

(1) Collect any steel chips with the removed magnets. Look carefully at the chips and particles in the pan and on the magnets to see the type of wear which might be found in the transaxle.

Result:

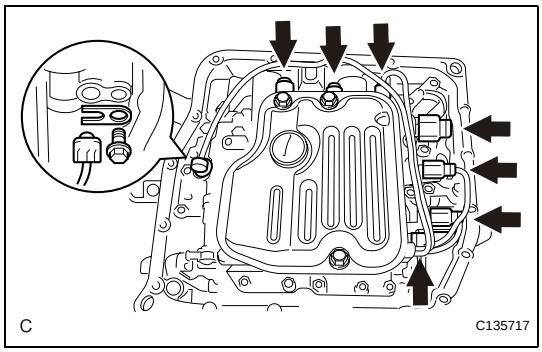
Steel (magnetic):
bearing, gear and plate wear
Brass (non-magnetic):
bearing wear

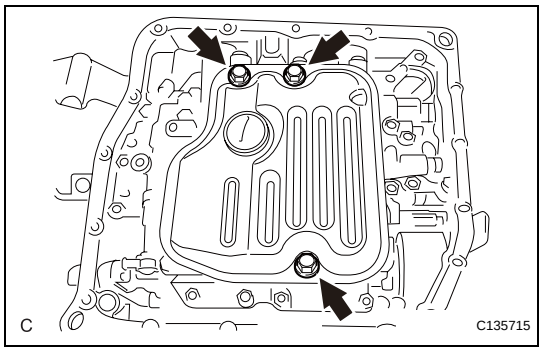


3. DISCONNECT TRANSMISSION WIRE

(a) Disconnect the 7 shift solenoid valve connectors.

(b) Remove the bolt and lock plate, and disconnect the ATF temperature sensor.



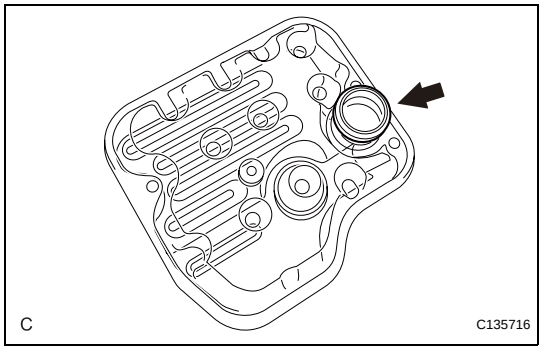


4. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

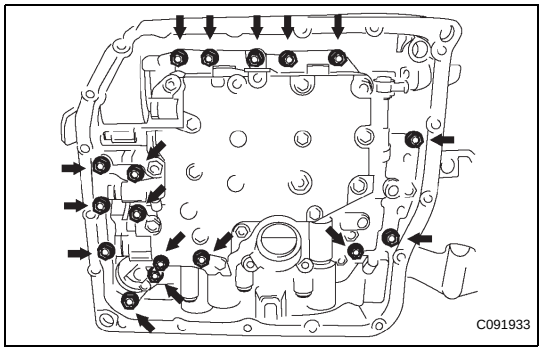
(a) Remove the 3 bolts and oil strainer.

NOTICE:

Be careful that some fluid will come out of the oil strainer.



(b) Remove the O-ring from the oil strainer.

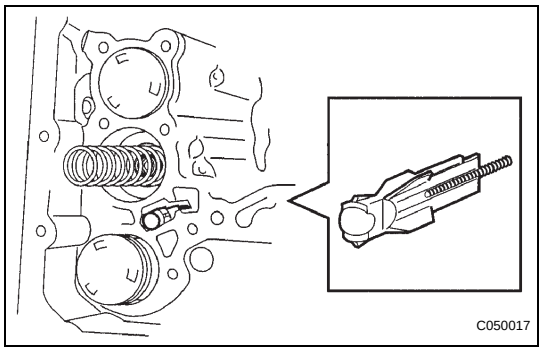


5. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Support the valve body assembly and remove the 17 bolts and the valve body assembly.

NOTICE:

Be careful not to drop the check ball, spring and accumulator piston.



(b) Remove the check ball body and spring.

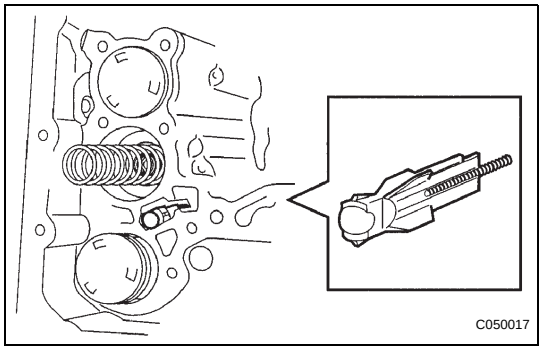
6. REMOVE MANUAL VALVE

(a) Remove the manual valve from the valve body assembly.

INSTALLATION

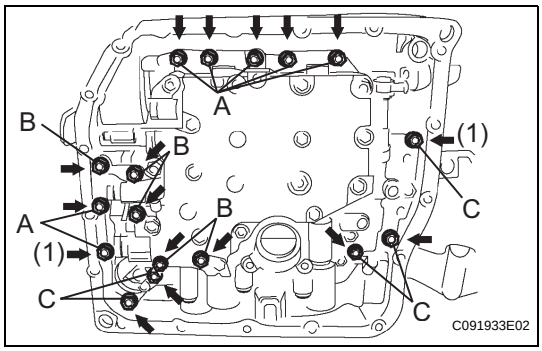
1. INSTALL MANUAL VALVE

(a) Install the manual valve to the valve body assembly.



2. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Install the spring and check ball body.



(b) Align the groove of the manual valve with the pin of the lever.

(c) Install the valve body with the 17 bolts.

Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

NOTICE:

- **Push the valve body against the accumulator piston spring and the check ball body to install it.**
- **First, temporarily tighten the bolts marked by (1) in the illustration because they are positioning bolts.**

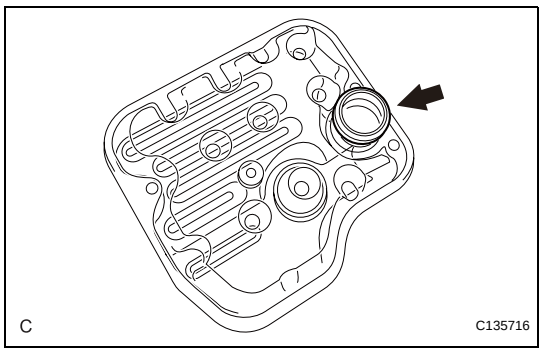
Bolt length:

Bolt A: 25 mm (0.984 in.)
Bolt B: 57 mm (2.244 in.)
Bolt C: 41 mm (1.614 in.)

3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

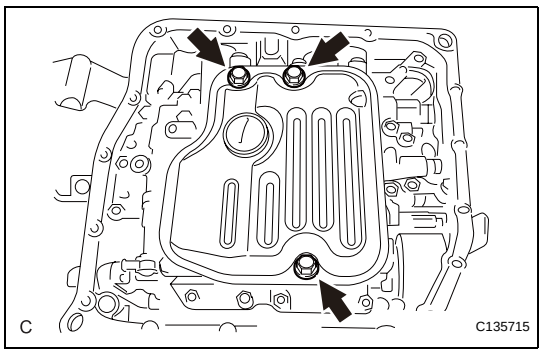
(a) Coat a new O-ring with ATF WS.

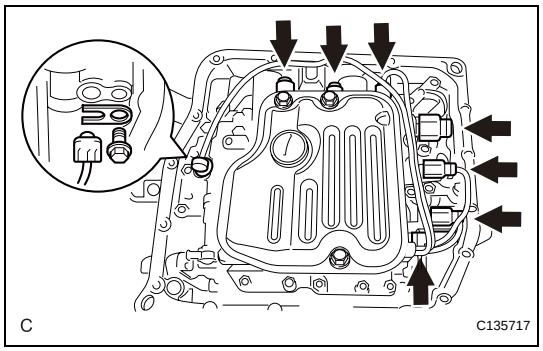
(b) Install the O-ring to the oil strainer.



(c) Install the oil strainer with the 3 bolts.

Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)



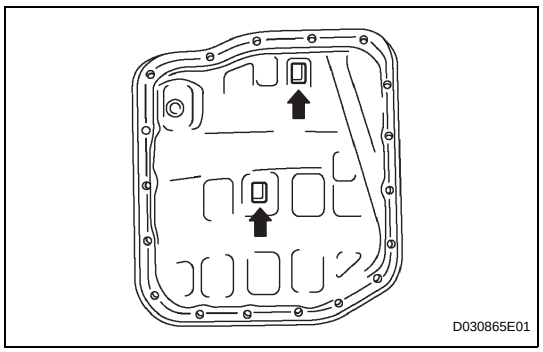


4. INSTALL TRANSMISSION WIRE

(a) Coat the O-ring with ATF WS.

(b) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

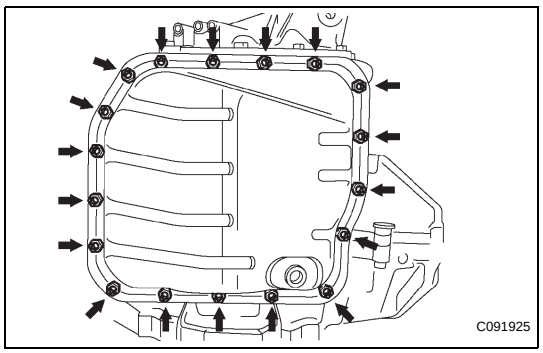
(c) Connect the 7 shift solenoid valve connectors.



5. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the oil pan.

(b) Apply adhesive or equivalent to new 18 bolts.
Adhesive:
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent



(c) Using a new gasket, install the oil pan to the transaxle case with the 18 bolts.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
NOTICE:
Since the bolts should be seal bolts, apply adhesive to the bolts and tighten them within 10 minutes of application.

6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

7. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY
HINT:
See page AX-168.

SHIFT LOCK SYSTEM

ON-VEHICLE INSPECTION

1. CHECK SHIFT LOCK OPERATION

(a) Move the shift lever to the P position.
(b) Turn the ignition switch to the LOCK position.
(c) Check that the shift lever cannot be moved to any position other than P.
(d) Turn the ignition switch to the on position, depress the brake pedal and check that the shift lever can be moved to another position. If operation cannot be done as specified, inspect the shift lock control unit.

2. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

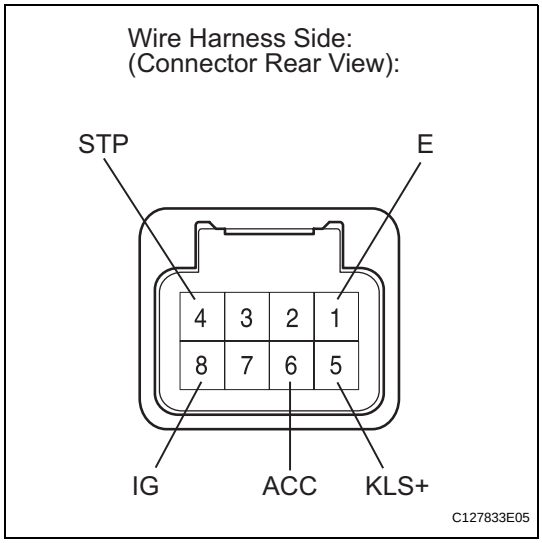
(a) Using a screwdriver, remove the shift lock release cover.
(b) When operating the shift lever with the shift lock release button pressed, check that the lever can be moved to any position other than P.
If operation cannot be done as specified, check the shift lever assembly installation condition.

3. CHECK KEY INTERLOCK OPERATION

(a) Turn the ignition switch to the ON position.
(b) Depress the brake pedal and move the shift lever to any position other than P.
(c) Check that the ignition key cannot be turned to the LOCK position.
(d) Move the shift lever to the P position, turn the ignition key to the LOCK position and check that the ignition key can be removed.
If operation cannot be done as specified, inspect the shift lock control unit.

4. INSPECT SHIFT LOCK CONTROL ECU

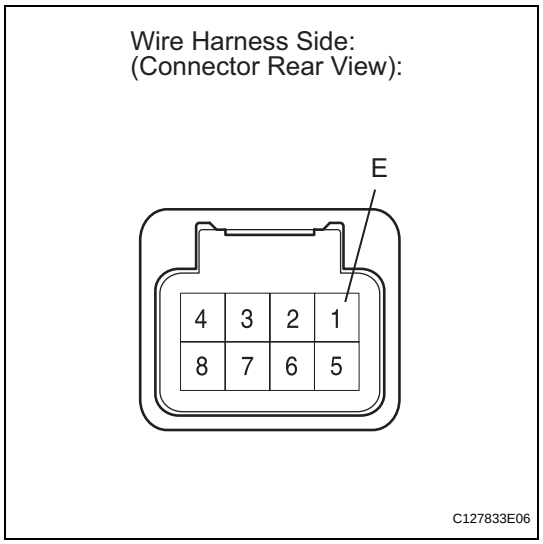
(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control ECU connector.



Standard voltage

Terminal	Measuring Condition	Voltage (V)
6 (ACC) - 1 (E)	Ignition switch ON	10 to 14
6 (ACC) - 1 (E)	Ignition switch ACC	10 to 14

Terminal	Measuring Condition	Voltage (V)
6 (ACC) - 1 (E)	Ignition switch OFF	Below 1
4 (STP) - 1 (E)	Depress brake pedal	10 to 14
4 (STP) - 1 (E)	Release brake pedal	Below 1
5 (KLS+) - 1 (E)	1. Ignition switch ACC and shift lever P position 2. Ignition switch ACC and shift lever except P position 3. Ignition switch ACC and shift lever P position (After approx. 1 second)	7.5 to 11 Below 1 6 to 9
8 (IG) - 1 (E)	Ignition switch ON	10 to 14
8 (IG) - 1 (E)	Ignition switch OFF	Below 1



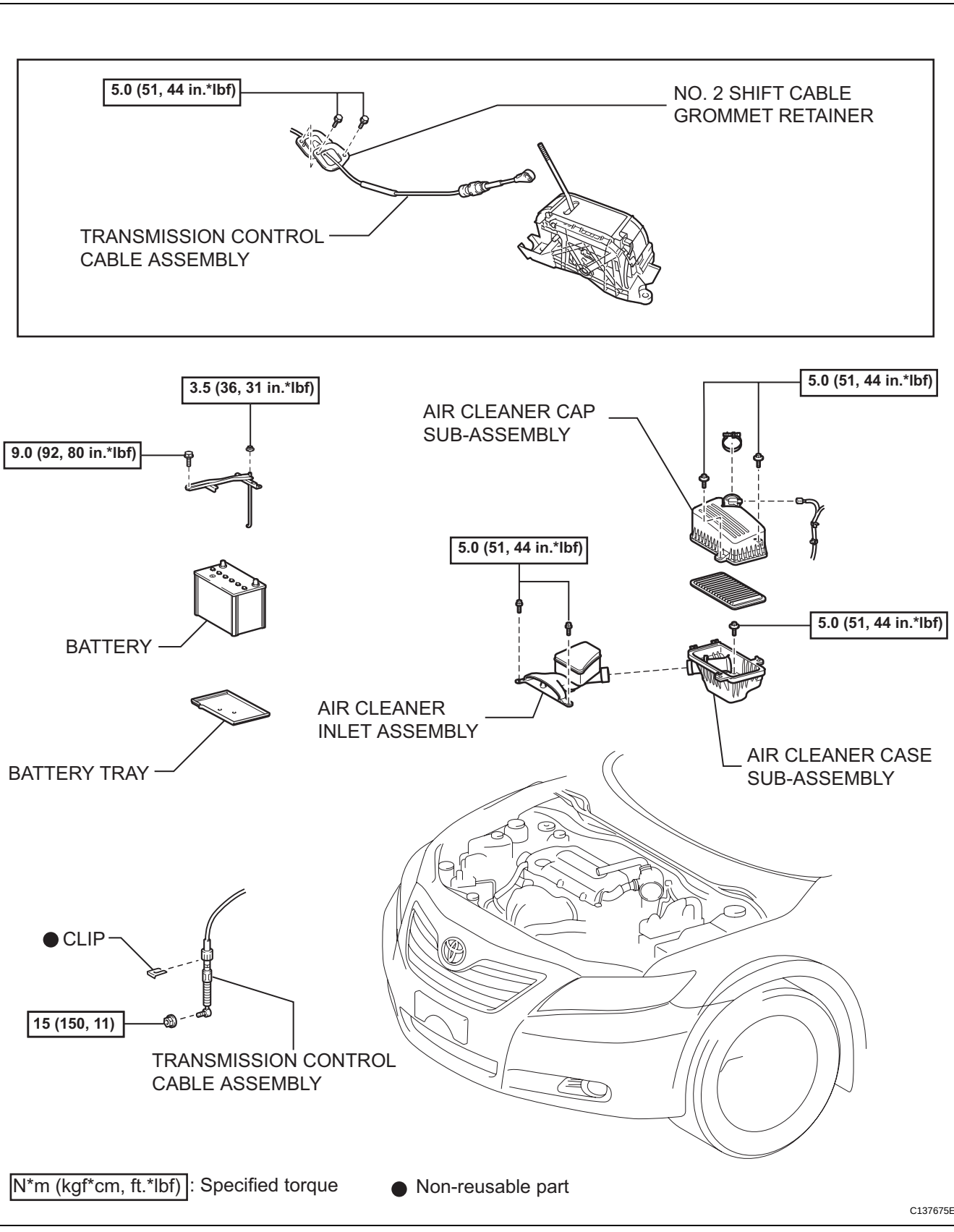
(b) Measure the resistance according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control ECU connector.
If the result is not as specified, replace the shift lock control ECU.

Standard resistance

Terminal	Measuring Condition	Specified Value
1 (E) - Body ground	Always	Below 1 Ω

TRANSMISSION CONTROL CABLE ASSEMBLY

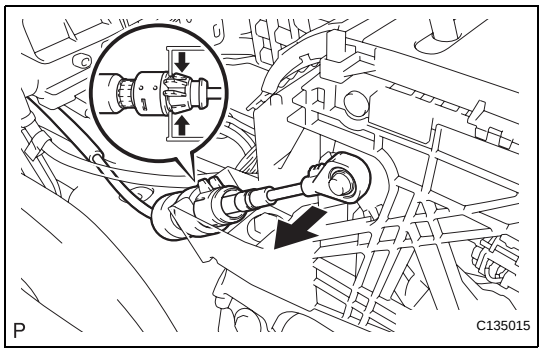
COMPONENTS

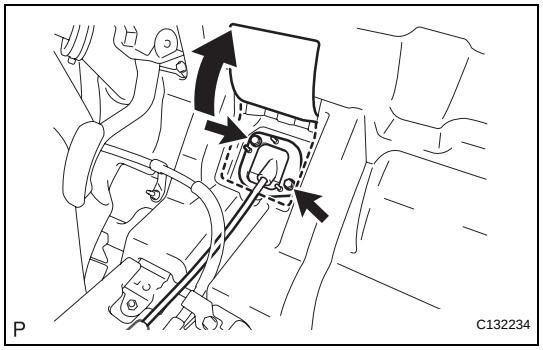


AX

REMOVAL

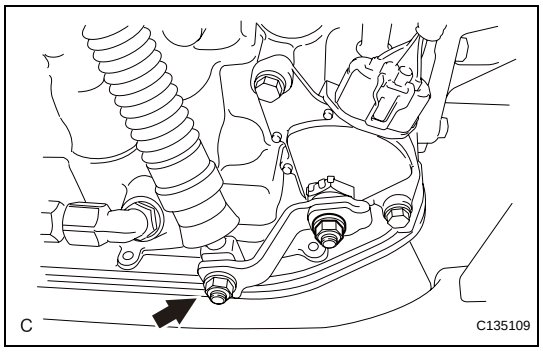
1. **REMOVE AIR CONDITIONING UNIT**
   HINT:
   See page AC-151.
2. **REMOVE BATTERY (See page EM-95)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
6. **DISCONNECT NO. 2 SHIFT CABLE GROMMET RETAINER**
   (a) Disconnect the transmission control cable assembly from the transmission floor shift assembly while pushing the 2 claws of the floor shift cable.
   (b) Turn back the carpet.

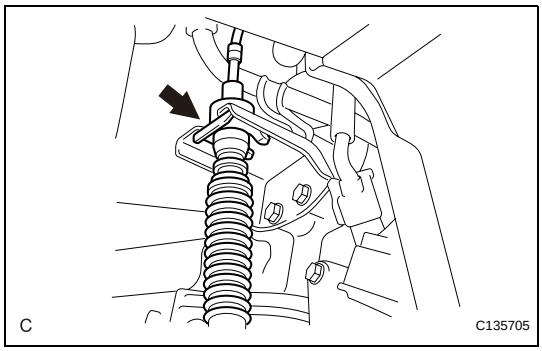




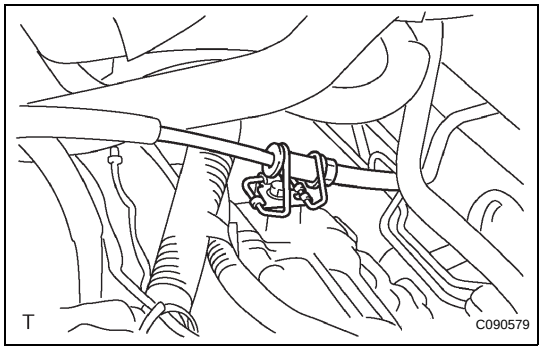
   (c) Remove the 2 bolts and disconnect the No. 2 shift cable grommet retainer.
   (d) Remove the No. 2 shift cable grommet retainer.

7. **REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Remove the nut from the control shaft lever.
   (b) Disconnect the transmission control cable assembly from the control shaft lever.





(c) Remove the clip and disconnect the transmission control cable assembly from the No. 1 control cable bracket.



(d) Disconnect the transmission control cable assembly from the control cable clamp.
(e) Pull out the transmission control cable assembly from the body.

ADJUSTMENT

1. INSPECT SHIFT LEVER POSITION

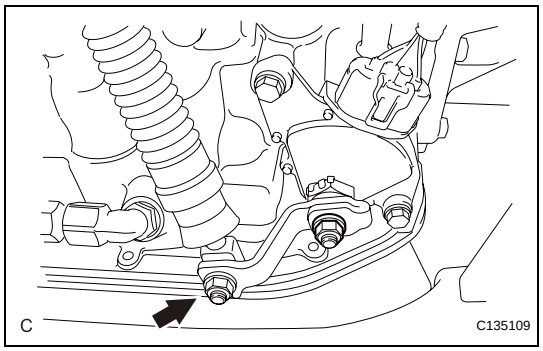
(a) When shifting from the P to the R position with the ignition switch on and brake pedal depressed, make sure that the shift lever moves smoothly and moves correctly into position.

(b) Start the engine and make sure that the vehicle moves forward when shifting from the N to the D position and moves rearward when shifting to the R position.

If operation cannot be done as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

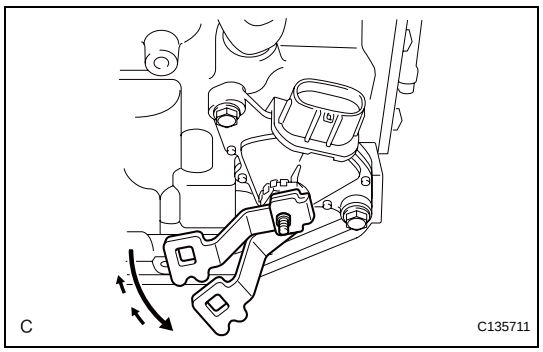
2. ADJUST SHIFT LEVER POSITION

(a) Move the shift lever to the N position.



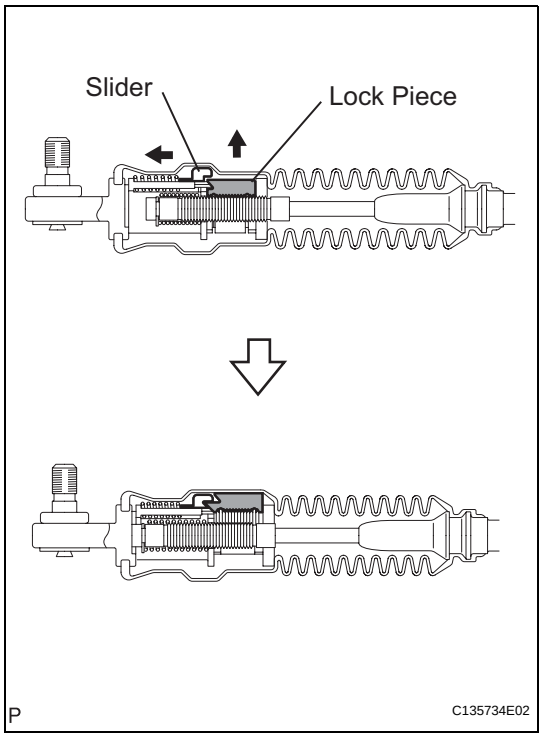
(b) Remove the nut from the control shaft lever.

(c) Disconnect the transmission control cable assembly from the control shaft lever.

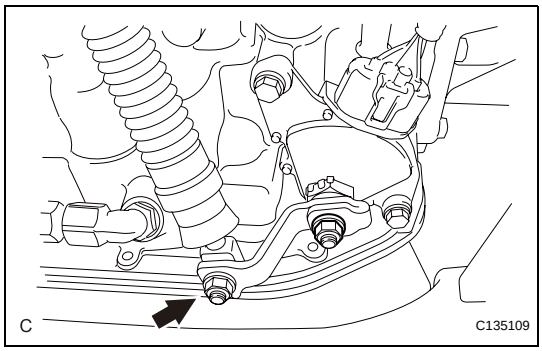


(d) Push the control shaft fully downward.

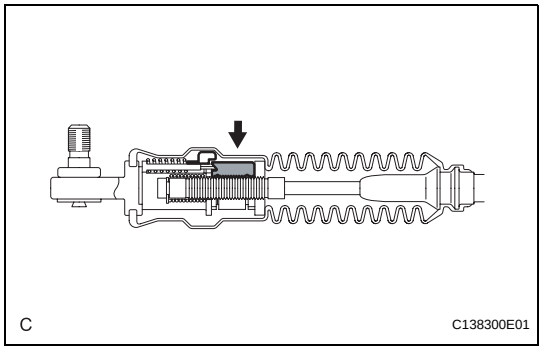
(e) Return the control shaft lever 2 notches to the N position.



(f) Move the slider in the directions indicated by the arrows and pull up the lock piece.
NOTICE:
Do not damage the boot.



(g) Install the transmission control cable to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)
NOTICE:
- **If the control cable end is excessively pushed up, the shift lever cannot be adjusted.**
- **When tightening the nut, confirm that the control cable is properly stretched.**



(h) Push in the lock piece.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.

(i) Start the engine and make sure that the vehicle moves forward when moving the lever from the N to the D position and moves rearward when moving it to the R position.
If it becomes hard to move the shift lever, readjust the shift lever position.

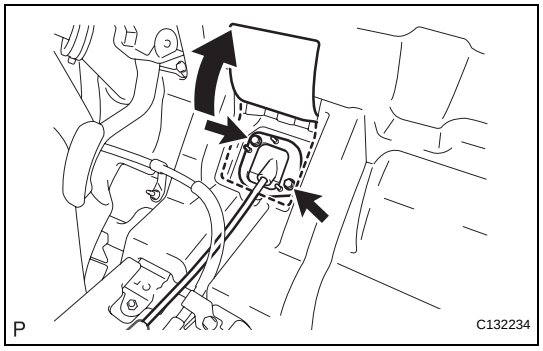
INSTALLATION

1. INSTALL NO. 2 SHIFT CABLE GROMMET RETAINER

(a) Pass the transmission control cable assembly from the cabin to the engine compartment.

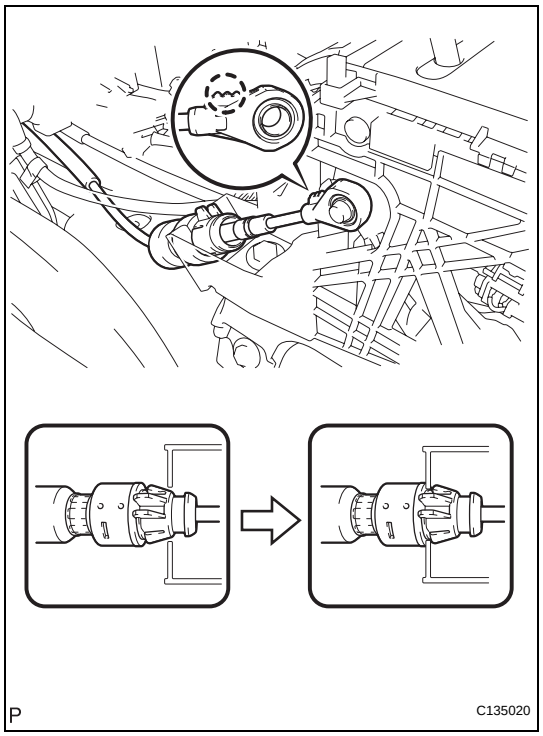
(b) Install the No. 2 shift cable grommet retainer to the transmission control cable assembly.

(c) Install the No. 2 shift cable grommet retainer with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

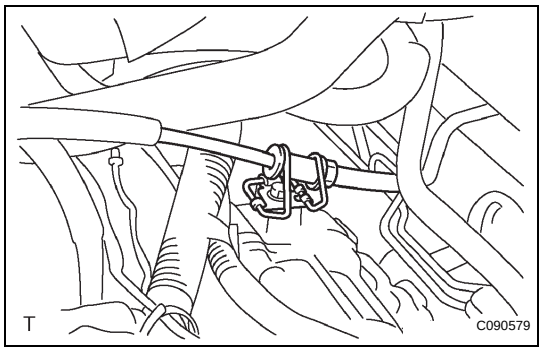


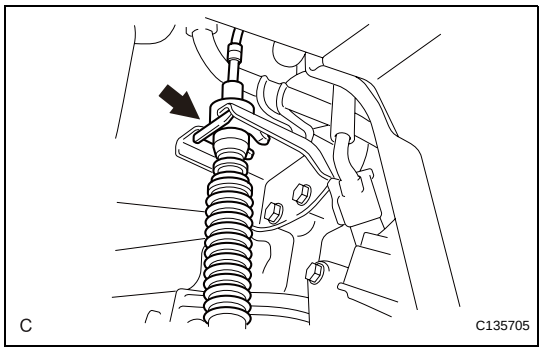
2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

(a) Install the transmission control cable assembly as shown in the illustration.
HINT:
- Install the floor shift cable with the uneven surface facing up.
- Securely engage the claws of the floor shift cable.

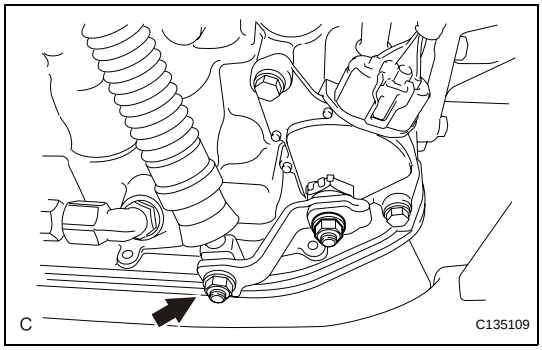


(b) Connect the control cable to the control cable clamp.

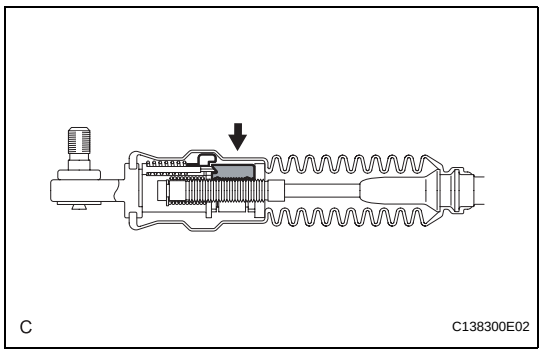




(c) Connect the control cable to the bracket with a new clip.



(d) Install the transmission control cable to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)

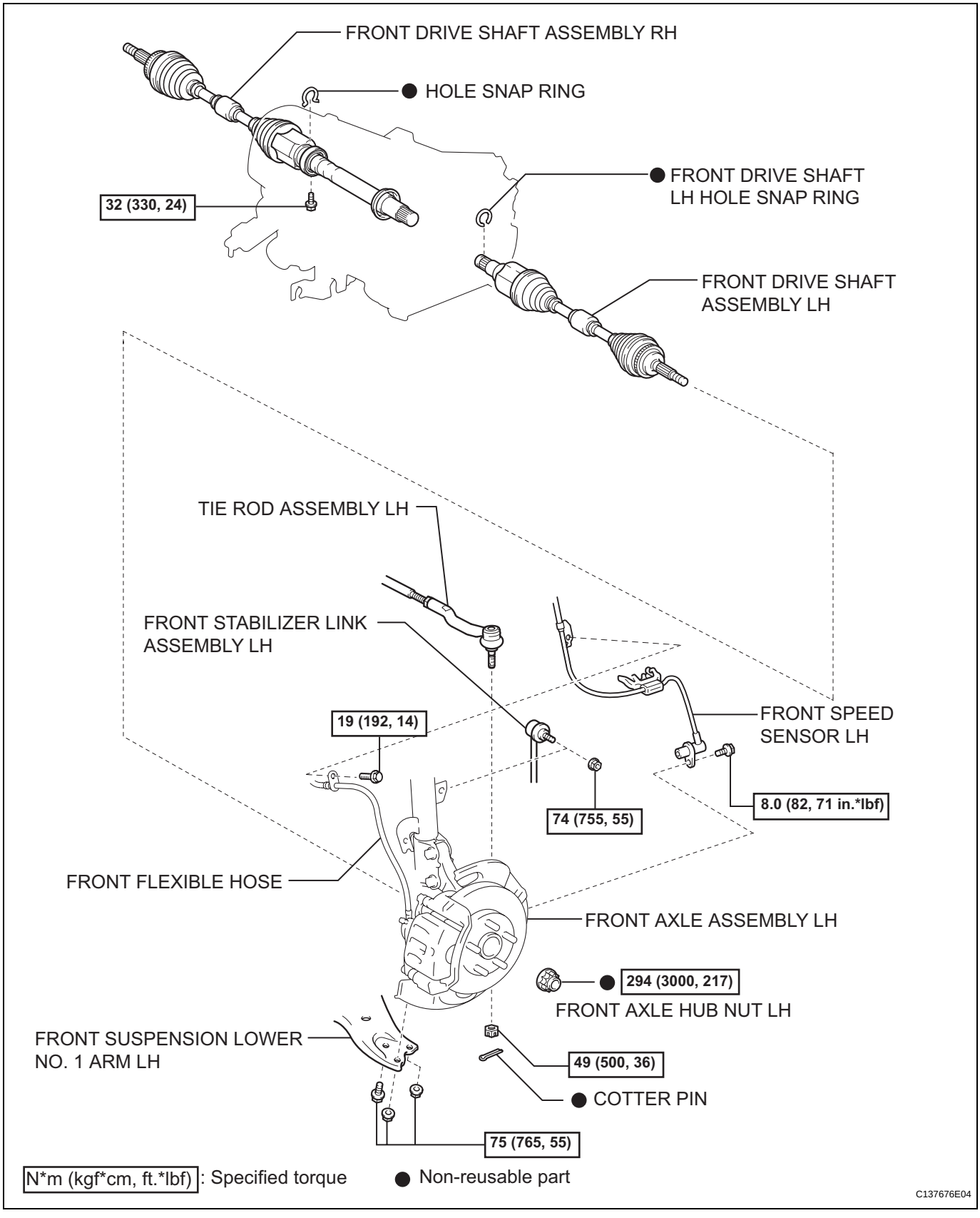


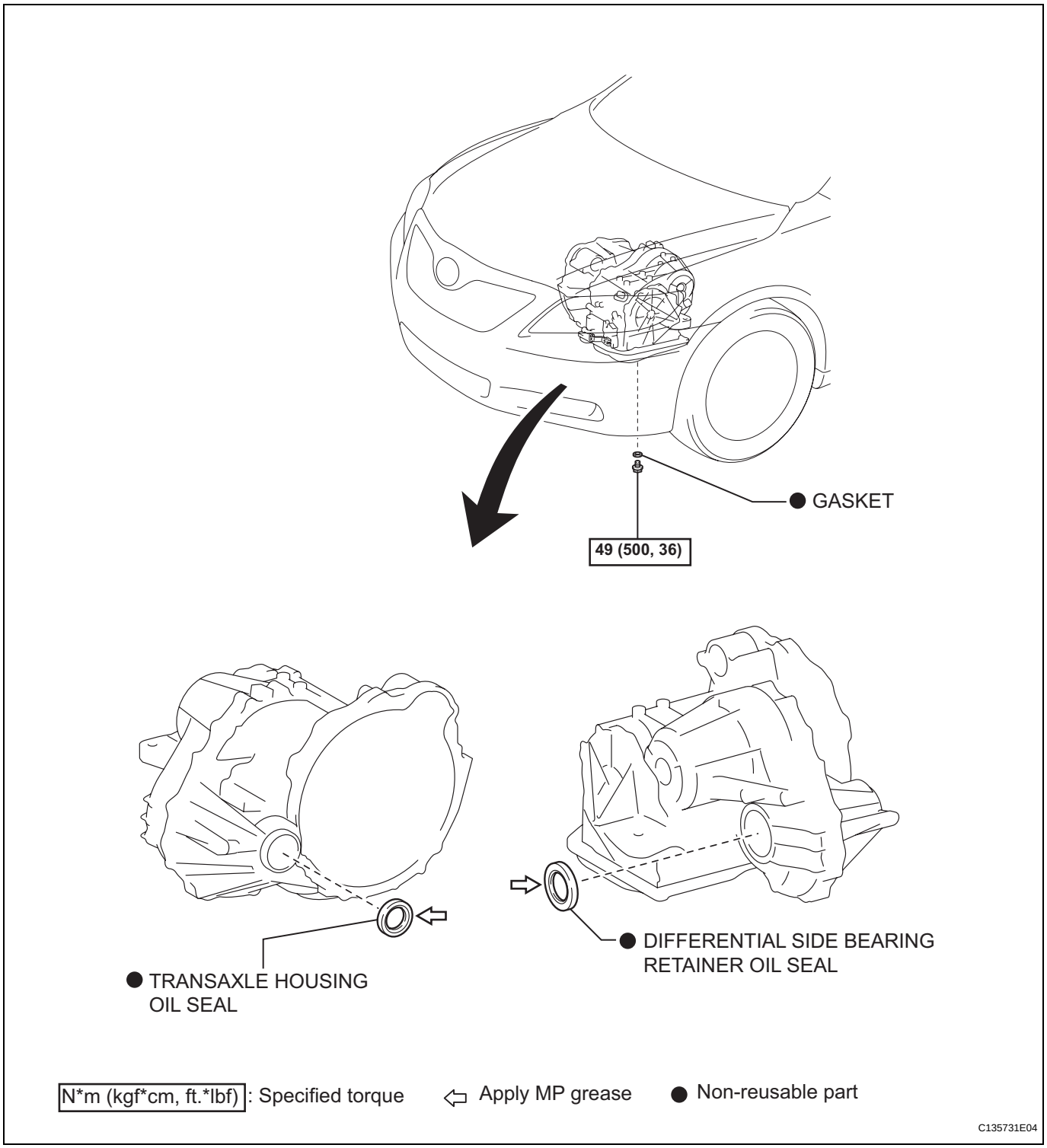
(e) Push in the lock piece of the transmission control cable.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.
HINT:
After pushing in the lock piece, make sure that the boot is not deformed.

3. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
4. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
5. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
6. **INSTALL BATTERY (See page EM-119)**
7. **INSTALL AIR CONDITIONING UNIT**
HINT:
See page AC-173.
8. **INSPECT SHIFT LEVER POSITION (See page AX-146)**
9. **ADJUST SHIFT LEVER POSITION (See page AX-146)**

DIFFERENTIAL OIL SEAL

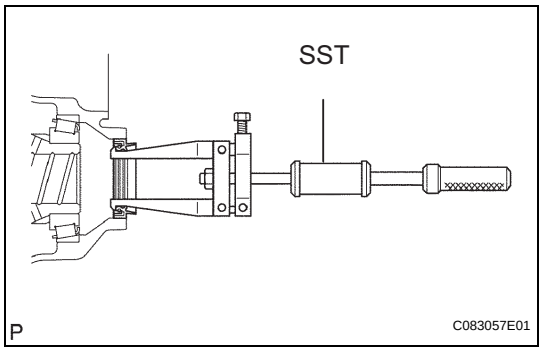
COMPONENTS




● GASKET
49 (500, 36)
● TRANSAXLE HOUSING OIL SEAL
● DIFFERENTIAL SIDE BEARING RETAINER OIL SEAL
N*m (kgf*cm, ft.*lbf): Specified torque
⇦ Apply MP grease
● Non-reusable part
C135731E04

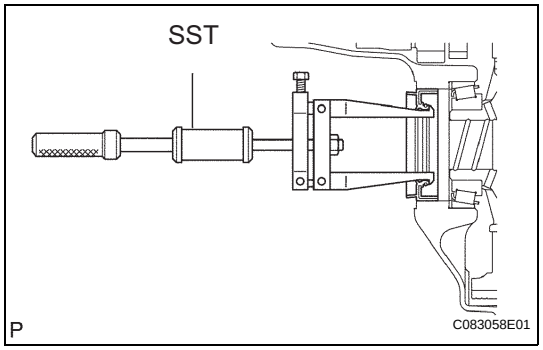
REMOVAL

1. **DRAIN AUTOMATIC TRANSAXLE FLUID (See page AX-162)**
2. **REMOVE FRONT WHEEL**
3. **REMOVE FRONT AXLE HUB NUT LH (See page DS-7)**
4. **REMOVE FRONT AXLE HUB NUT RH**
   HINT:
   Use the same procedures described for the LH side.
5. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)**
6. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**
   HINT:
   Use the same procedures described for the LH side.
7. **SEPARATE FRONT SPEED SENSOR LH (See page DS-7)**
8. **SEPARATE FRONT SPEED SENSOR RH**
9. **SEPARATE TIE ROD ASSEMBLY LH (See page DS-8)**
10. **SEPARATE TIE ROD ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
11. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)**
12. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM RH**
    HINT:
    Use the same procedures described for the LH side.
13. **SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)**
14. **SEPARATE FRONT AXLE ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
15. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)**
16. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)**
17. **FIX FRONT AXLE ASSEMBLY LH (See page DS-9)**
18. **FIX FRONT AXLE ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.



19. REMOVE TRANSAXLE HOUSING OIL SEAL

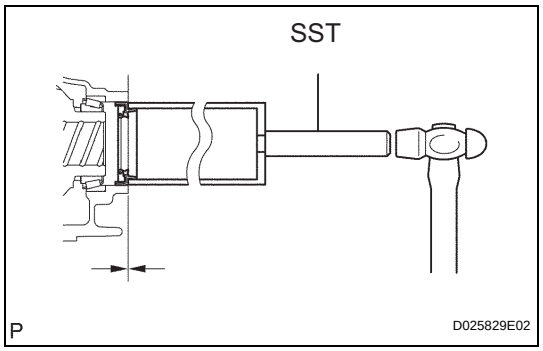
(a) Using SST, pull out the oil seal.
SST 09308-00010



20. REMOVE DIFFERENTIAL SIDE BEARING RETAINER OIL SEAL

(a) Using SST, pull out the oil seal.
SST 09308-00010

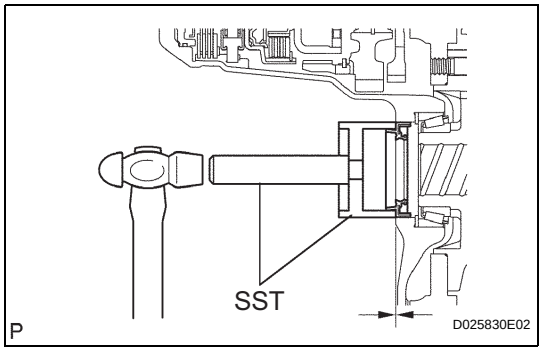
INSTALLATION



1. INSTALL TRANSAXLE HOUSING OIL SEAL

(a) Using SST and a hammer, install a new oil seal.
SST 09316-60011 (09316-00011)
Oil seal installation depth:
-0.5 to 0.5 mm (-0.020 to 0.020 in.)

(b) Coat the lip of the oil seal with MP grease.



2. INSTALL DIFFERENTIAL SIDE BEARING RETAINER OIL SEAL

(a) Using SST and a hammer, install a new oil seal.
SST 09649-17010, 09950-70010 (09951-07150)
Oil seal installation depth:
-0.5 to 0.5 mm (-0.020 to 0.020 in.)

(b) Coat the lip of the oil seal with MP grease.

3. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)

4. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)

5. INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)

6. INSTALL FRONT AXLE ASSEMBLY RH

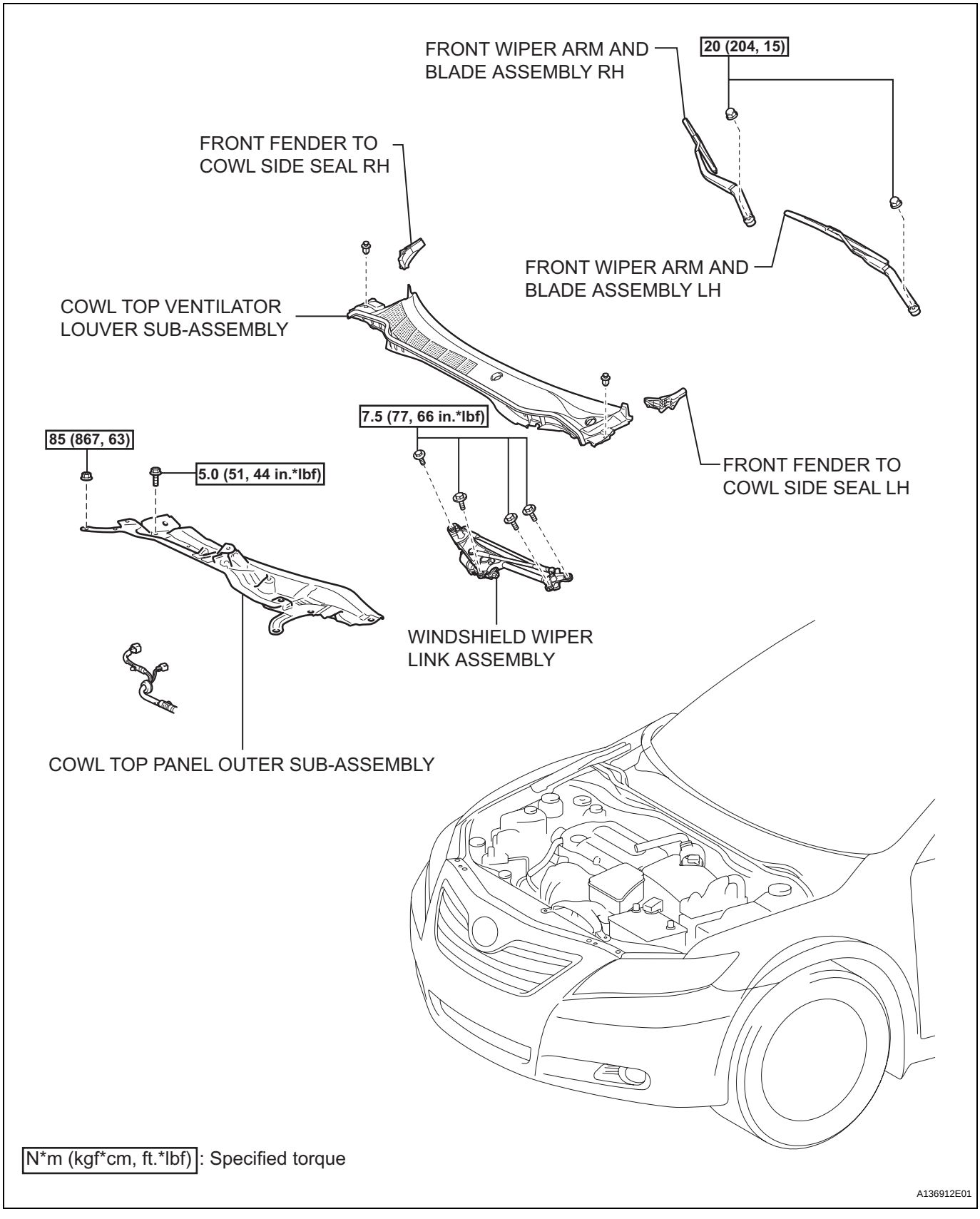
HINT:
Use the same procedures described for the LH side.

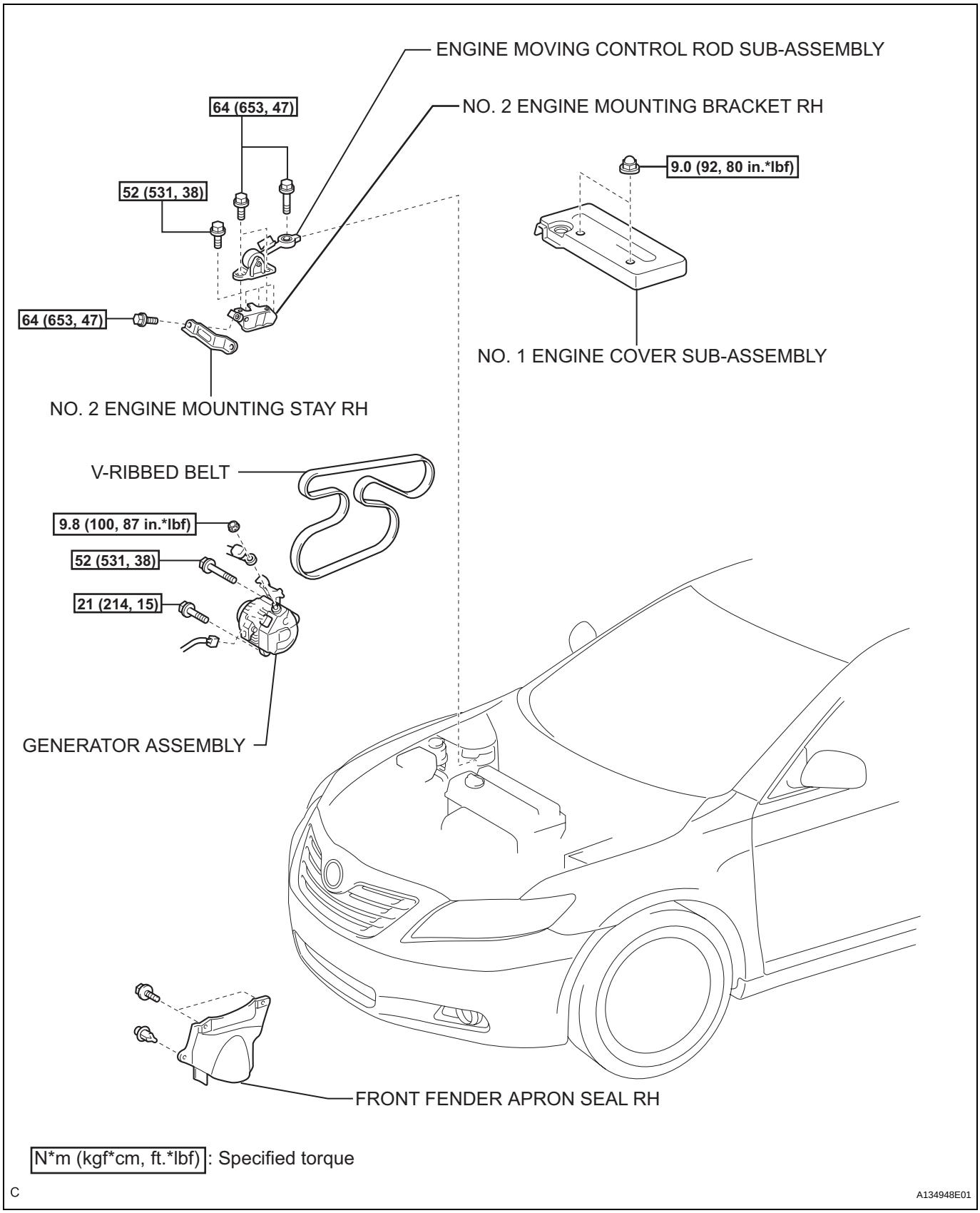
7. INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)

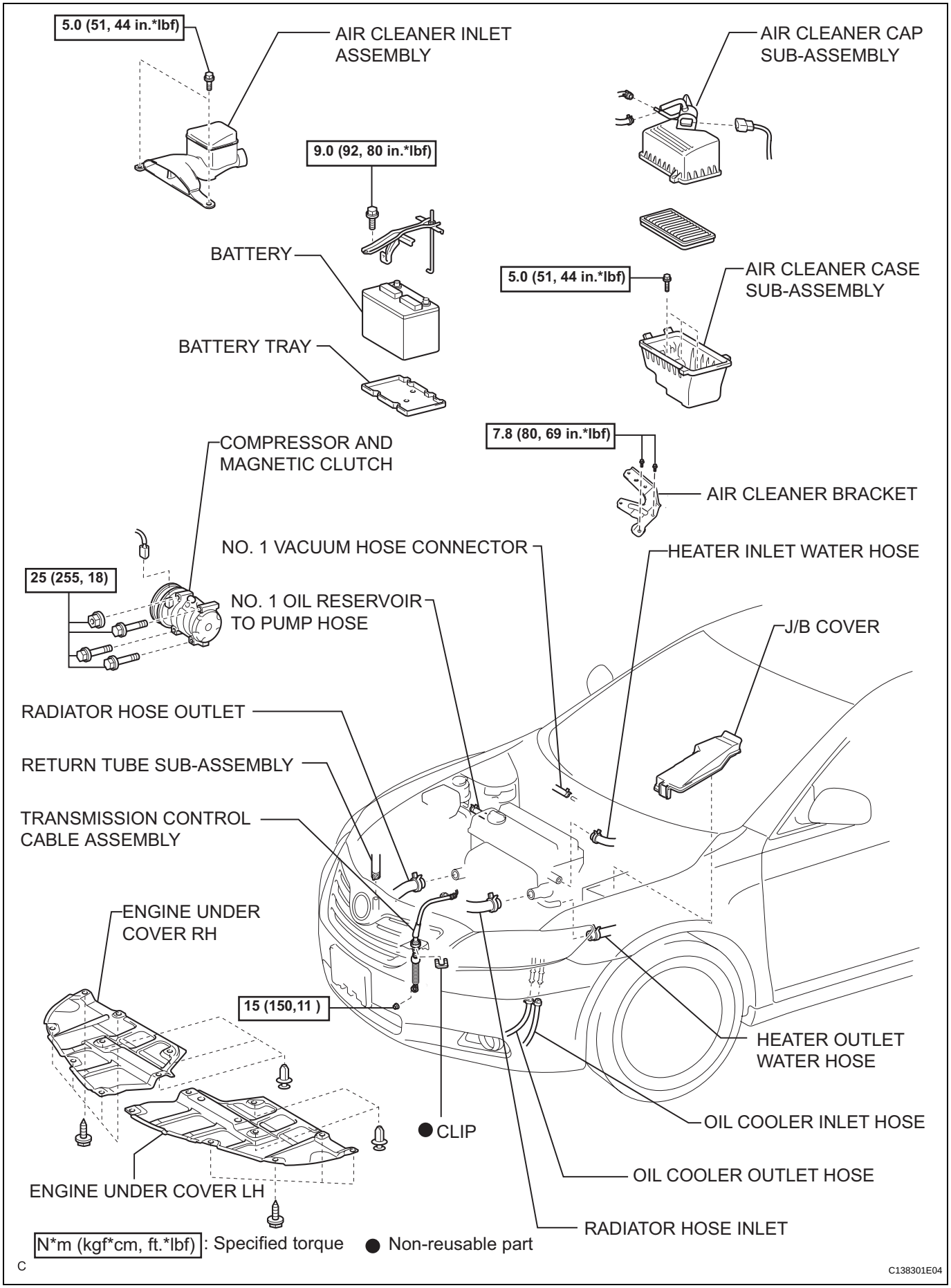
8. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH**
   HINT:
   Use the same procedures described for the LH side.
9. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**
10. **INSTALL TIE ROD ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
11. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**
12. **INSTALL FRONT SPEED SENSOR RH**
    HINT:
    Use the same procedures described for the LH side.
13. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**
14. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
    HINT:
    Use the same procedures described for the LH side.
15. **INSTALL FRONT AXLE HUB NUT LH (See page DS-22)**
16. **INSTALL FRONT AXLE HUB NUT RH**
    HINT:
    Use the same procedures described for the LH side.
17. **INSTALL FRONT WHEEL (See page DS-22)**
18. **ADD AUTOMATIC TRANSAXLE FLUID (See page AX-175)**
19. **INSPECT AUTOMATIC TRANSAXLE FLUID (See page AX-123)**
20. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    See page SP-4.
21. **CHECK ABS SPEED SENSOR SIGNAL**
    HINT:
    See page BC-11.

AUTOMATIC TRANSAXLE ASSEMBLY

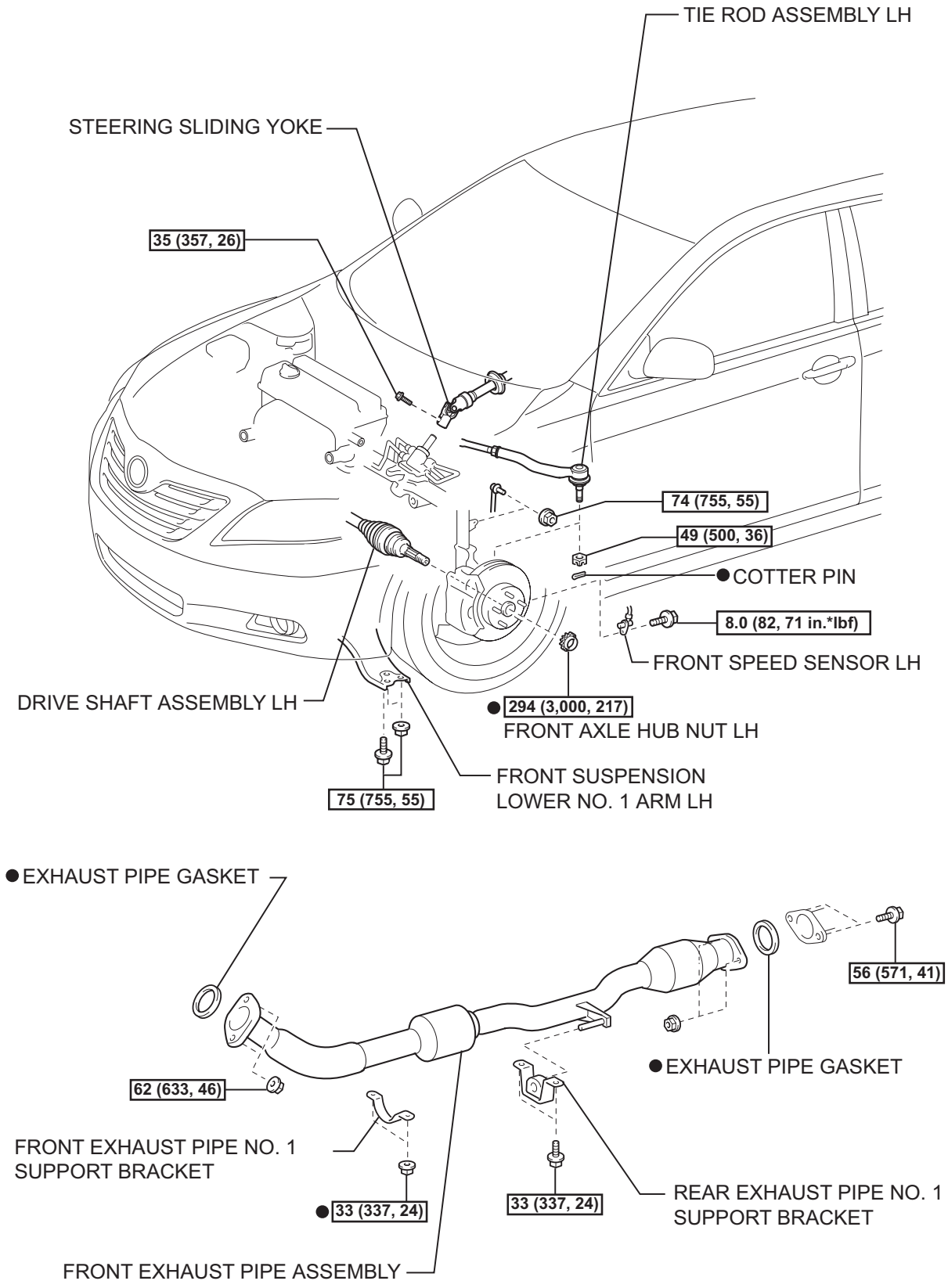
COMPONENTS




ENGINE MOVING CONTROL ROD SUB-ASSEMBLY
NO. 2 ENGINE MOUNTING BRACKET RH
64 (653, 47)
52 (531, 38)
64 (653, 47)
9.0 (92, 80 in.*lbf)
NO. 1 ENGINE COVER SUB-ASSEMBLY
NO. 2 ENGINE MOUNTING STAY RH
V-RIBBED BELT
9.8 (100, 87 in.*lbf)
52 (531, 38)
21 (214, 15)
GENERATOR ASSEMBLY
FRONT FENDER APRON SEAL RH
N*m (kgf*cm, ft.*lbf): Specified torque
C
A134948E01


5.0 (51, 44 in.*lbf)
AIR CLEANER INLET ASSEMBLY
AIR CLEANER CAP SUB-ASSEMBLY
9.0 (92, 80 in.*lbf)
BATTERY
BATTERY TRAY
5.0 (51, 44 in.*lbf)
AIR CLEANER CASE SUB-ASSEMBLY
7.8 (80, 69 in.*lbf)
COMPRESSOR AND MAGNETIC CLUTCH
AIR CLEANER BRACKET
NO. 1 VACUUM HOSE CONNECTOR
HEATER INLET WATER HOSE
25 (255, 18)
NO. 1 OIL RESERVOIR TO PUMP HOSE
J/B COVER
RADIATOR HOSE OUTLET
RETURN TUBE SUB-ASSEMBLY
TRANSMISSION CONTROL CABLE ASSEMBLY
ENGINE UNDER COVER RH
15 (150,11)
HEATER OUTLET WATER HOSE
OIL COOLER INLET HOSE
CLIP
OIL COOLER OUTLET HOSE
ENGINE UNDER COVER LH
RADIATOR HOSE INLET
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
C
C138301E04

AX

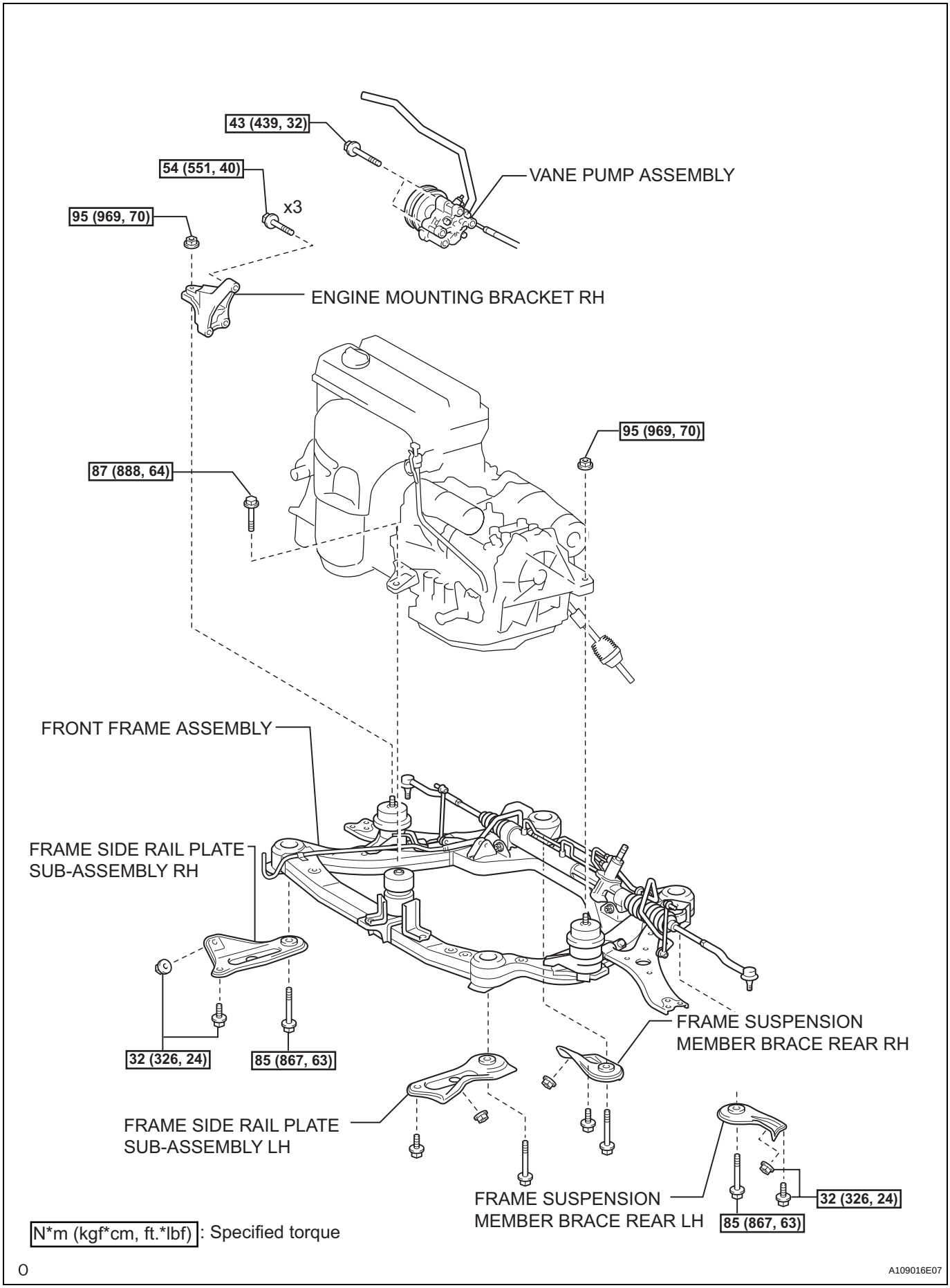


AX

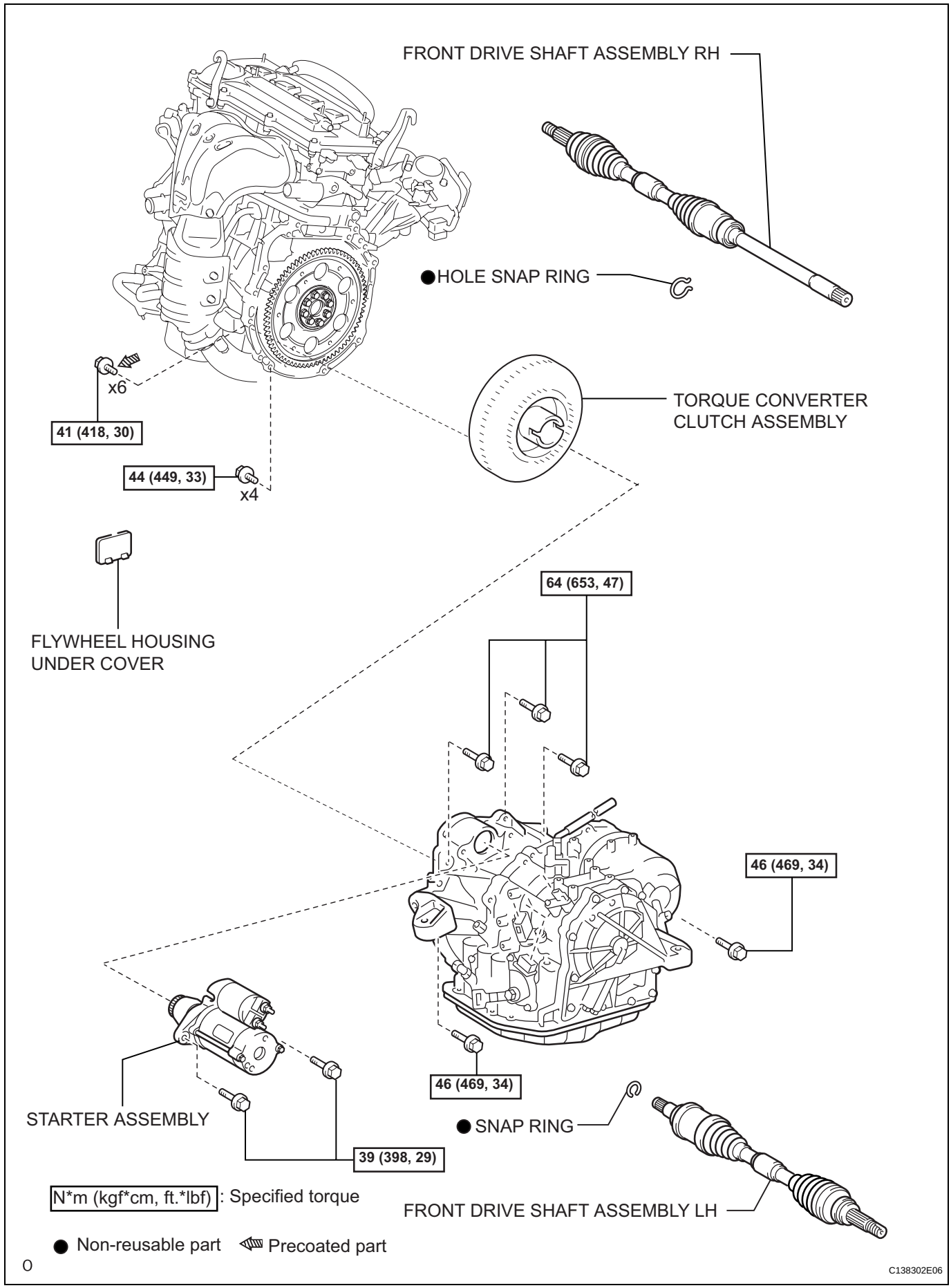
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

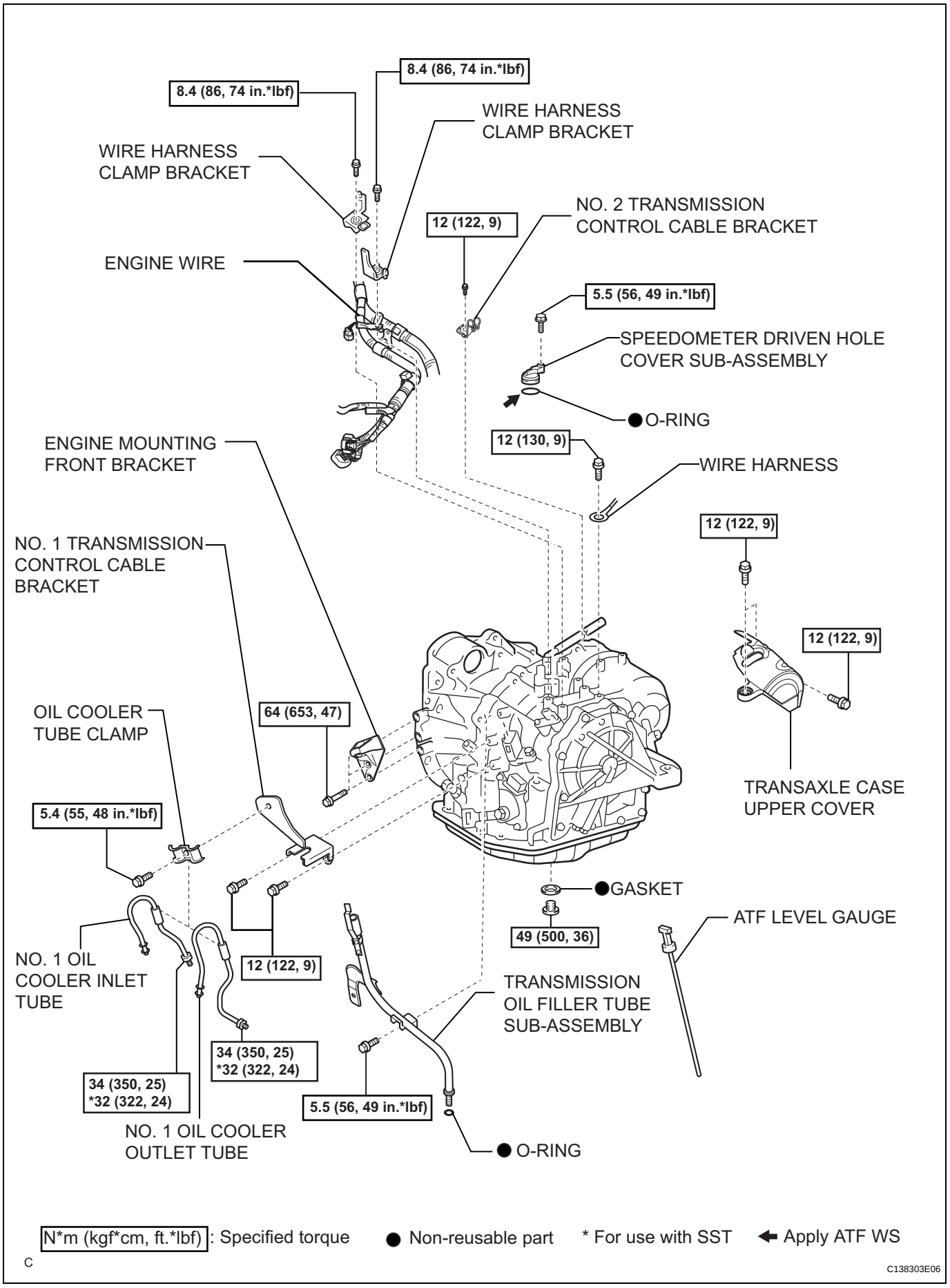
C

C143322E01


43 (439, 32)
54 (551, 40)
x3
95 (969, 70)
VANE PUMP ASSEMBLY
ENGINE MOUNTING BRACKET RH
87 (888, 64)
95 (969, 70)
FRONT FRAME ASSEMBLY
FRAME SIDE RAIL PLATE SUB-ASSEMBLY RH
32 (326, 24)
85 (867, 63)
FRAME SUSPENSION MEMBER BRACE REAR RH
FRAME SIDE RAIL PLATE SUB-ASSEMBLY LH
FRAME SUSPENSION MEMBER BRACE REAR LH
32 (326, 24)
85 (867, 63)
N*m (kgf*cm, ft.*lbf): Specified torque
A109016E07

AX


FRONT DRIVE SHAFT ASSEMBLY RH
●HOLE SNAP RING
x6
41 (418, 30)
44 (449, 33)
x4
TORQUE CONVERTER CLUTCH ASSEMBLY
FLYWHEEL HOUSING UNDER COVER
64 (653, 47)
46 (469, 34)
46 (469, 34)
STARTER ASSEMBLY
39 (398, 29)
● SNAP RING
FRONT DRIVE SHAFT ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
C138302E06


8.4 (86, 74 in.*lbf)
8.4 (86, 74 in.*lbf)
WIRE HARNESS CLAMP BRACKET
WIRE HARNESS CLAMP BRACKET
12 (122, 9)
NO. 2 TRANSMISSION CONTROL CABLE BRACKET
ENGINE WIRE
5.5 (56, 49 in.*lbf)
SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY
O-RING
ENGINE MOUNTING FRONT BRACKET
12 (130, 9)
WIRE HARNESS
12 (122, 9)
NO. 1 TRANSMISSION CONTROL CABLE BRACKET
12 (122, 9)
OIL COOLER TUBE CLAMP
64 (653, 47)
TRANSAXLE CASE UPPER COVER
5.4 (55, 48 in.*lbf)
GASKET
ATF LEVEL GAUGE
49 (500, 36)
NO. 1 OIL COOLER INLET TUBE
12 (122, 9)
TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY
34 (350, 25) *32 (322, 24)
34 (350, 25) *32 (322, 24)
5.5 (56, 49 in.*lbf)
NO. 1 OIL COOLER OUTLET TUBE
O-RING
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
* For use with SST
Apply ATF WS
C
C138303E06

AX

REMOVAL

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   See page FU-1.
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **DRAIN ENGINE OIL (See page LU-4)**
9. **DRAIN ENGINE COOLANT (See page CO-5)**
10. **DRAIN AUTOMATIC TRANSAXLE FLUID**
    (a) Using a 6 mm socket hexagon wrench, remove the drain plug and gasket, and drain ATF.
    (b) Install a new gasket and the drain plug.
    Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
11. **REMOVE WINDSHIELD WIPER LINK ASSEMBLY**
    HINT:
    See page WW-9.
12. **REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-424)**
13. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-94)**
14. **REMOVE V-RIBBED BELT (See page EM-6)**
15. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-94)**
16. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-416)**
17. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-95)**
18. **REMOVE BATTERY (See page EM-95)**
19. **REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-95)**
20. **REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-95)**
21. **REMOVE NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-96)**
22. **DISCONNECT NO. 1 VACUUM HOSE CONNECTOR (See page EM-96)**
23. **DISCONNECT RADIATOR HOSE INLET (See page EM-96)**

24. **DISCONNECT RADIATOR HOSE OUTLET (See page EM-96)**

25. **DISCONNECT OIL COOLER INLET HOSE (See page CO-22)**

26. **DISCONNECT OIL COOLER OUTLET HOSE (See page CO-23)**

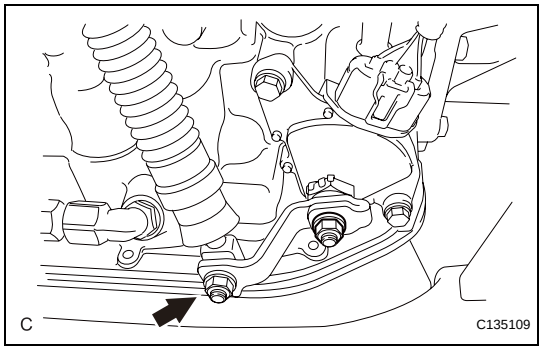
27. **DISCONNECT HEATER INLET WATER HOSE (See page EM-97)**

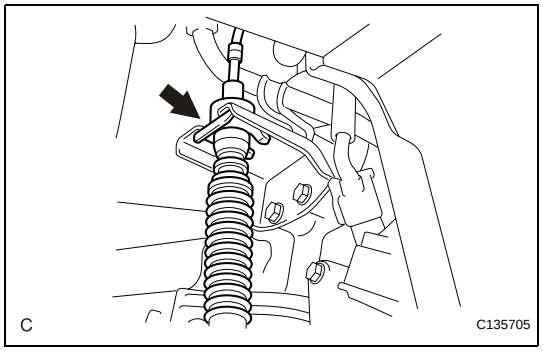
28. **DISCONNECT HEATER OUTLET WATER HOSE (See page EM-97)**

29. **REMOVE ECM (See page EM-97)**

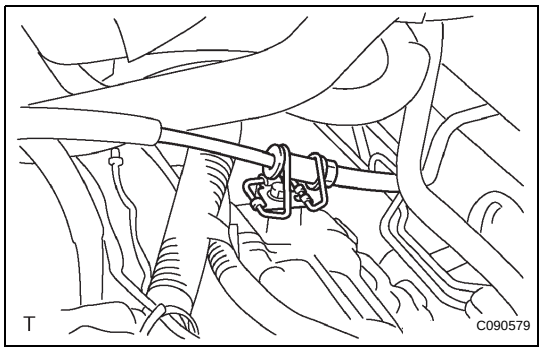
30. **DISCONNECT ENGINE WIRE (See page EM-97)**

31. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**
    (a) Remove the nut from the control shaft lever.
    (b) Disconnect the transmission control cable assembly from the control shaft lever.





    (c) Remove the clip and disconnect the transmission control cable assembly from the No. 1 control cable bracket.



    (d) Disconnect the transmission control cable assembly from the control cable clamp.

32. **DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-98)**

33. **DISCONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-99)**

34. **DISCONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-99)**

35. **REMOVE GENERATOR ASSEMBLY (See page CH-11)**

36. **SEPARATE COMPRESSOR AND MAGNETIC CLUTCH (See page EM-99)**

37. **REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page EX-3)**

38. **REMOVE FRONT AXLE HUB NUT LH (See page DS-7)**

39. **REMOVE FRONT AXLE HUB NUT RH**
HINT:
Use the same procedures described for the LH side.

40. **REMOVE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)**

41. **REMOVE FRONT STABILIZER LINK ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.

42. **REMOVE FRONT SPEED SENSOR LH (See page DS-7)**

43. **REMOVE FRONT SPEED SENSOR RH**
HINT:
Use the same procedures described for the LH side.

44. **DISCONNECT TIE ROD ASSEMBLY LH (See page DS-8)**

45. **DISCONNECT TIE ROD ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.

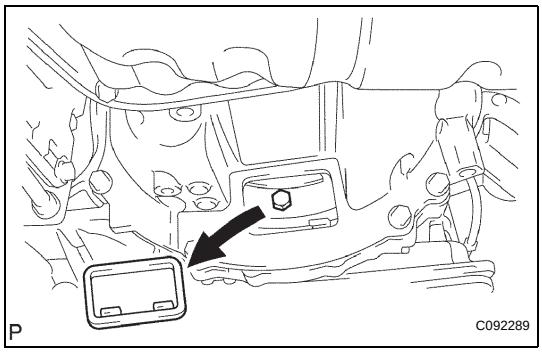
46. **DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)**

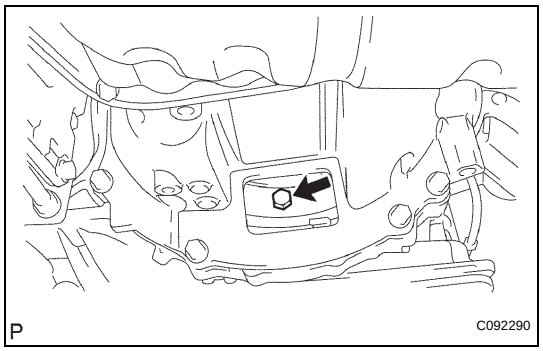
47. **DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM RH**
HINT:
Use the same procedures described for the LH side.

48. **SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)**

49. **SEPARATE FRONT AXLE ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.

50. **REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT**
(a) Remove the flywheel housing under cover.





(b) Turn the crankshaft to gain access and remove the 6 bolts while holding the crankshaft pulley bolt with a wrench.
HINT:
There will be one green colored bolt.

51. SEPARATE STEERING SLIDING YOKE (See page PS-40)

52. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-100)

53. REMOVE VANE PUMP ASSEMBLY (See page EM-101)

54. REMOVE FRONT FRAME ASSEMBLY (See page EM-101)

55. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)

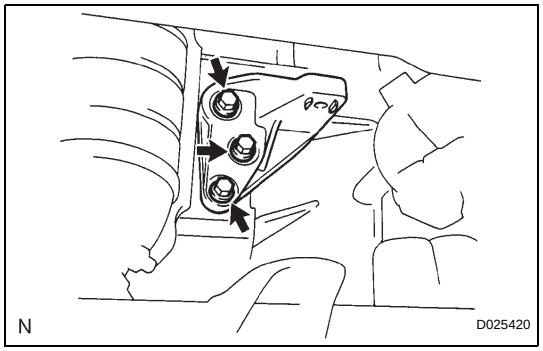
56. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)

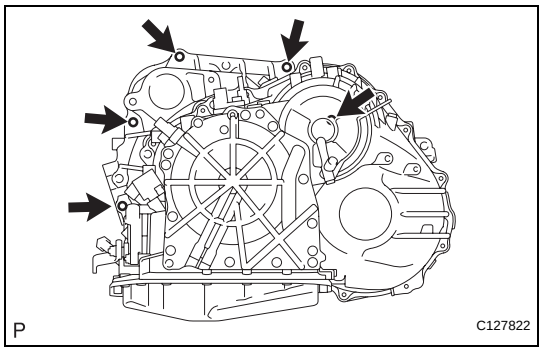
57. REMOVE ENGINE WIRE

58. REMOVE STARTER ASSEMBLY (See page ST-5)

59. REMOVE ENGINE MOUNTING FRONT BRACKET

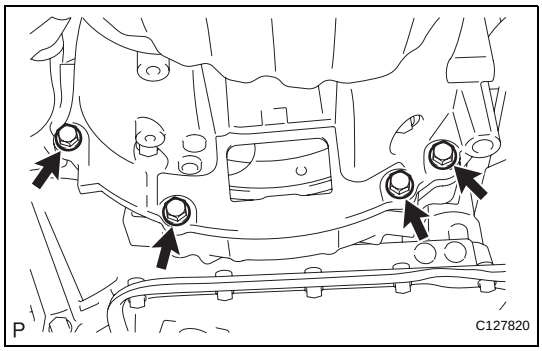
(a) Remove the 3 bolts and engine mounting front bracket.





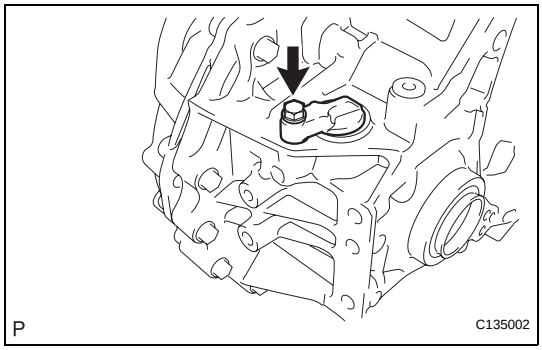
60. SEPARATE AUTOMATIC TRANSAXLE ASSEMBLY

(a) Remove the 5 bolts.

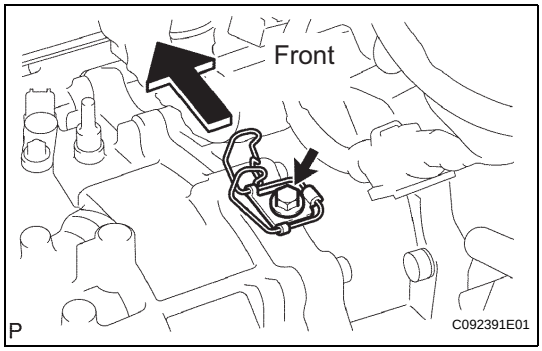


(b) Remove the 4 lower side mounting bolts.
(c) Separate and remove the automatic transaxle.

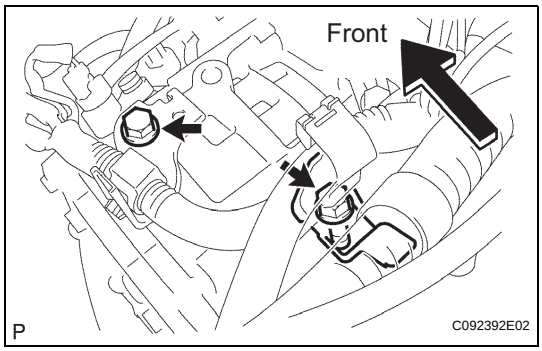
61. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY



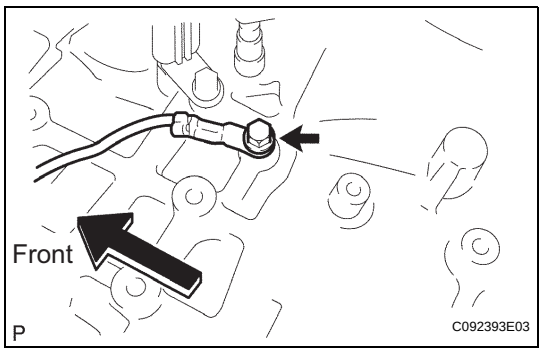
62. REMOVE SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY
(a) Remove the bolt and hole cover from the transaxle case.
(b) Remove the O-ring from the hole cover.



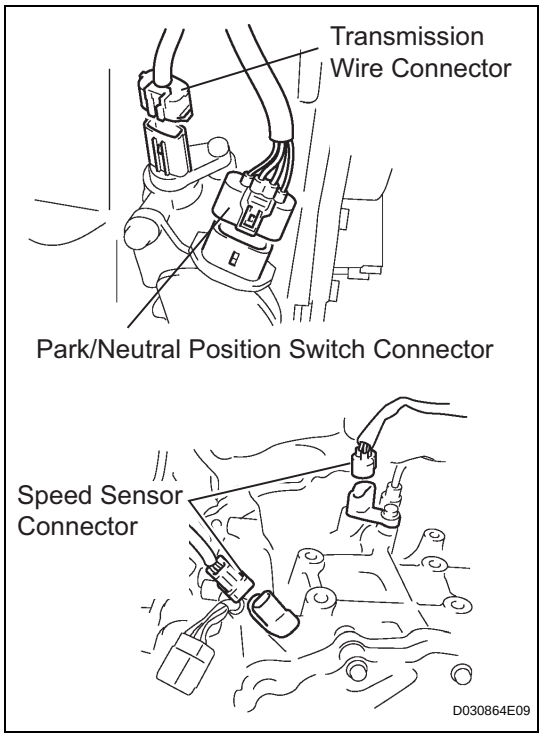
63. REMOVE NO. 2 TRANSMISSION CONTROL CABLE BRACKET
(a) Remove the bolt and No. 2 transmission control cable bracket.



64. REMOVE WIRE HARNESS CLAMP BRACKET
(a) Disconnect the wire harnesses from the 2 brackets.
(b) Remove the 2 bolts and 2 clamps.

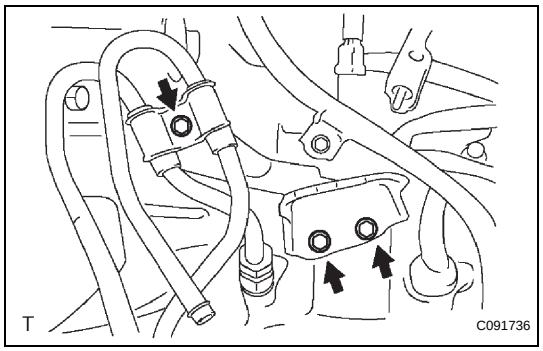


65. DISCONNECT WIRE HARNESS
(a) Remove the bolt and disconnect the wire harness.



66. DISCONNECT CONNECTORS

(a) Disconnect the transmission wire connector.
(b) Disconnect the park/neutral position switch connector.
(c) Disconnect the 2 speed sensor connectors.

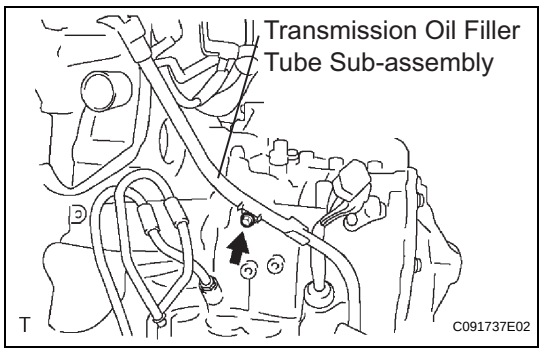


67. REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET

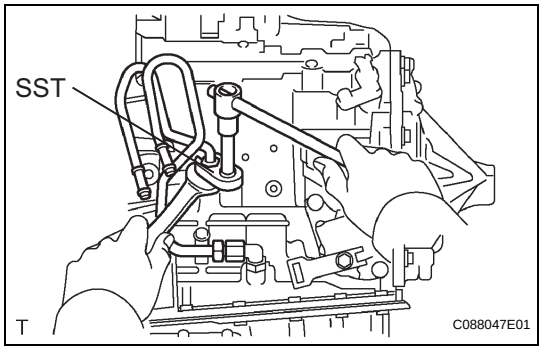
(a) Remove the bolt and oil cooler tube clamp.
(b) Remove the 2 bolts and No. 1 transmission control cable bracket.

68. REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

(a) Remove the ATF level gauge.



(b) Remove the bolt and transmission oil filler tube sub-assembly.
(c) Remove the O-ring from the oil filler tube sub-assembly.

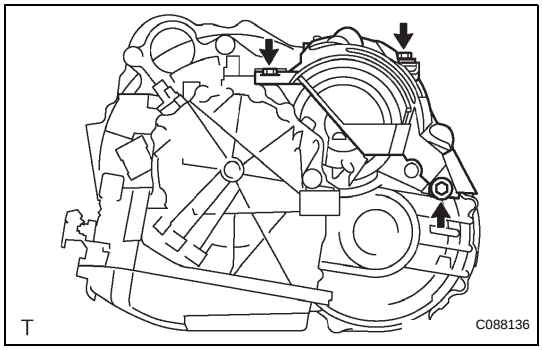


69. REMOVE NO. 1 OIL COOLER INLET TUBE

(a) Using SST and a wrench, disconnect the No. 1 oil cooler inlet tube.
SST 09023-12701

70. REMOVE NO. 1 OIL COOLER OUTLET TUBE

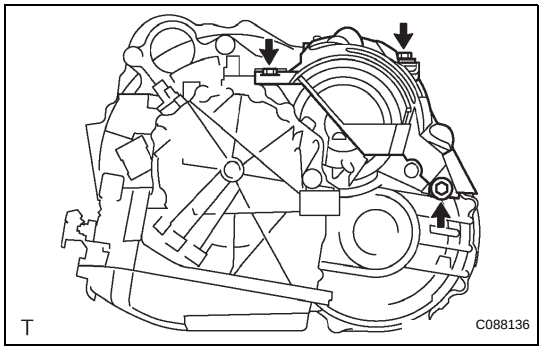
(a) Using SST and a wrench, disconnect the No. 1 oil cooler outlet tube.
SST 09023-12701



71. REMOVE TRANSAXLE CASE UPPER COVER

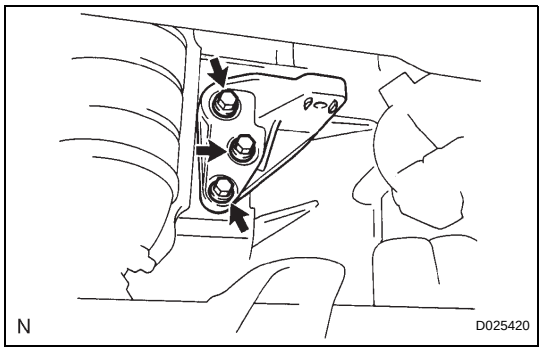
(a) Remove the 3 bolts and transaxle case upper cover.

INSTALLATION



1. INSTALL TRANSAXLE CASE UPPER COVER

(a) Install the transmission case upper cover with the 3 bolts.
Torque: 12 N*m (117 kgf*cm, 8 ft.*lbf)

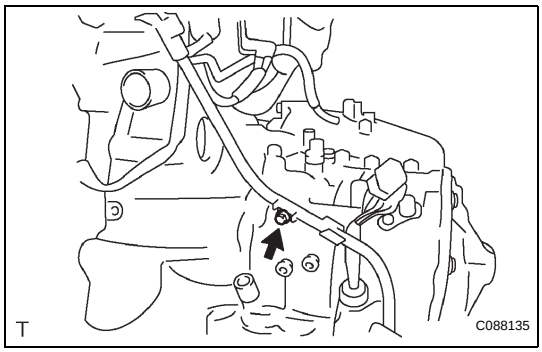


2. INSTALL ENGINE MOUNTING FRONT BRACKET

(a) Install the engine mounting front bracket to the automatic transaxle with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

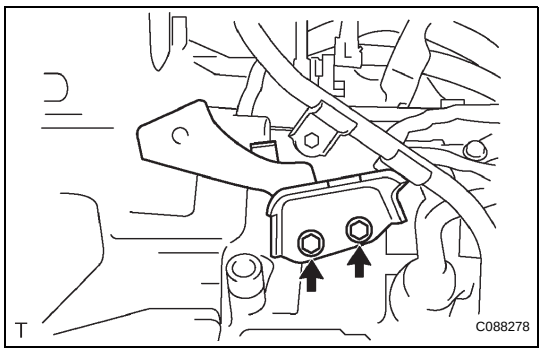
3. INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSEMBLY

(a) Coat a new O-ring with ATF, and install it to the oil filler tube.



(b) Install the oil filler tube to the automatic transaxle with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

(c) Install the ATF level gauge.



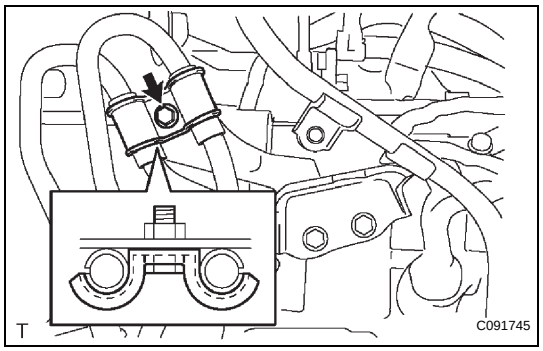
4. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

(a) Install the No. 1 control cable bracket with the 2 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

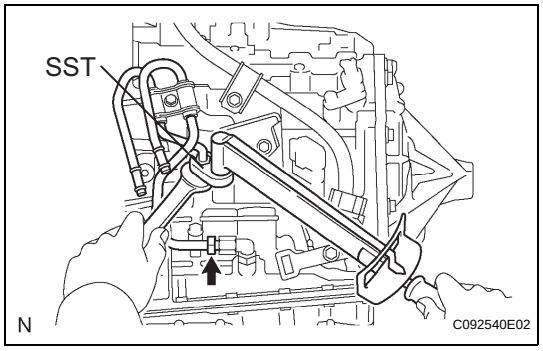
5. INSTALL NO. 1 OIL COOLER INLET TUBE

(a) Temporarily install the No. 1 oil cooler outlet tube.

(b) Temporarily install the No. 1 oil cooler inlet tube.



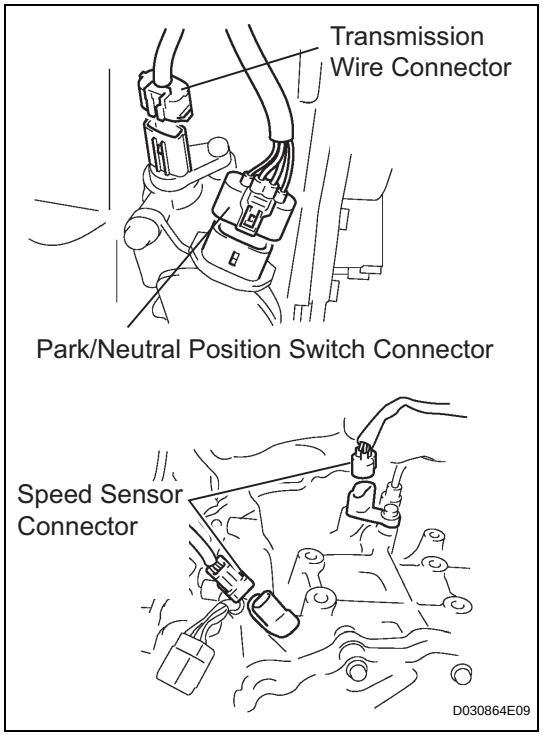
(c) Install the oil cooler tube clamp with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
HINT:
Install the oil cooler tube clamp so that the oil cooler tube cushions are positioned as shown in the illustration.



(d) Using SST and a wrench, tighten the No. 1 oil cooler inlet tube.
SST 09023-12701
Torque: For use without SST
34 N*m (350 kgf*cm, 25 ft.*lbf)
For use with SST
32 N*m (322 kgf*cm, 24 ft.*lbf)
HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

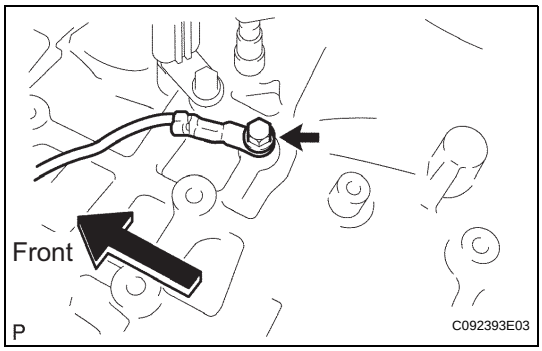
6. INSTALL NO. 1 OIL COOLER OUTLET TUBE

(a) Using SST and a wrench, tighten the No. 1 oil cooler outlet tube.
SST 09023-12701
Torque: For use without SST
34 N*m (350 kgf*cm, 25 ft.*lbf)
For use with SST
32 N*m (322 kgf*cm, 24 ft.*lbf)
HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).



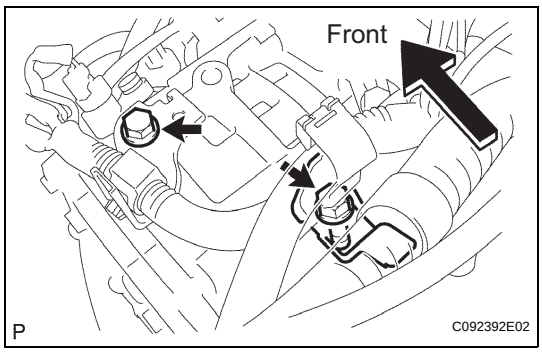
7. CONNECT CONNECTORS

(a) Connect the transmission wire connector.
(b) Connect the park/neutral position switch connector.
(c) Connect the 2 speed sensor connectors.



8. CONNECT WIRE HARNESS

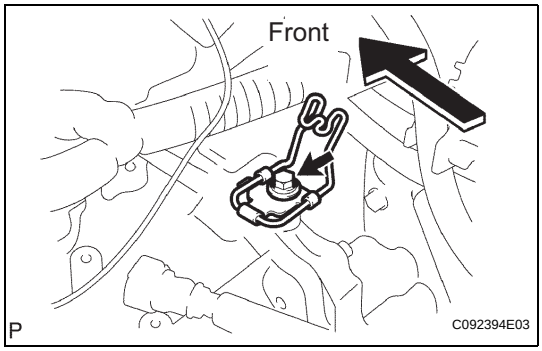
(a) Connect the wire harness with the bolt.
Torque: 12 N*m (130 kgf*cm, 9 ft.*lbf)



9. INSTALL WIRE HARNESS CLAMP BRACKET

(a) Install the 2 brackets with the 2 bolts.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

(b) Connect the wire harnesses to the clamps.

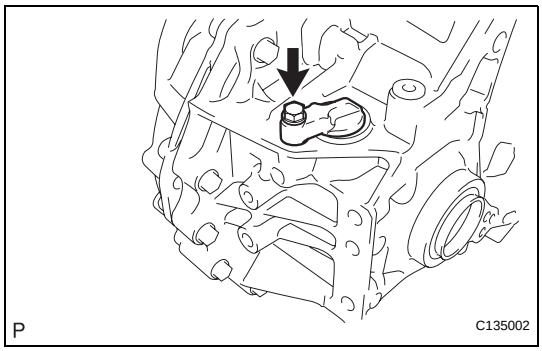


10. INSTALL NO. 2 TRANSMISSION CONTROL CABLE BRACKET

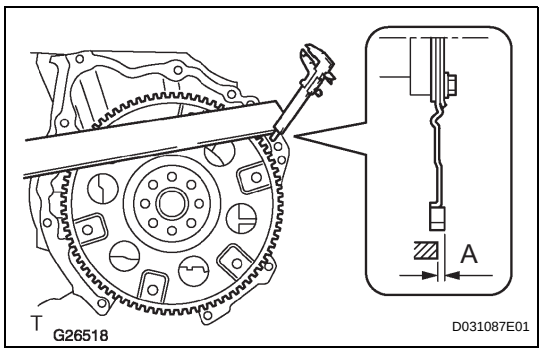
(a) Install the No. 2 transmission control cable bracket with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

11. INSTALL SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

(a) Coat a new O-ring with ATF WS, and install it to the hole cover.

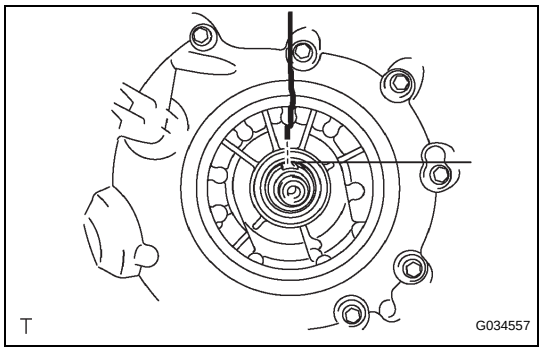


(b) Install the hole cover to the transaxle case with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 47 in.*lbf)

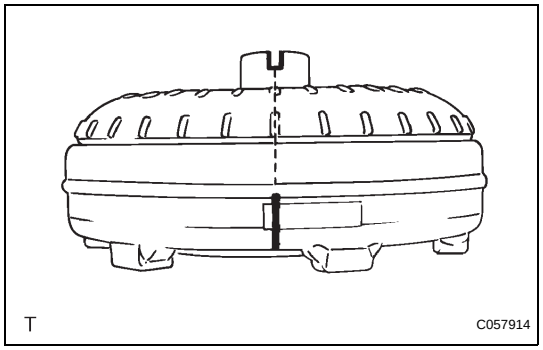


12. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

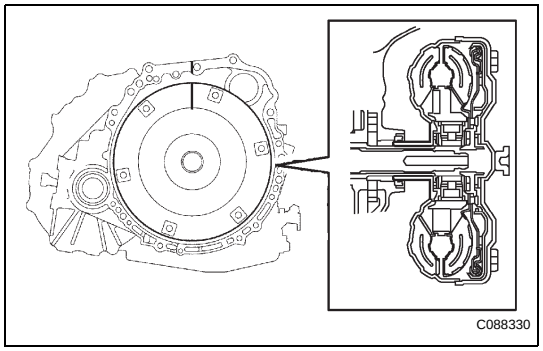
(a) Using vernier calipers and a straight edge, measure dimension "A" between the transaxle fitting part of the engine and the converter fitting part of the drive plate (#1).



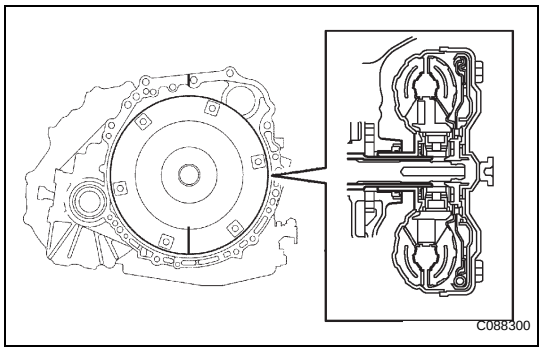
(b) Set the key of the front oil pump drive gear to the top and put a mark on the housing.



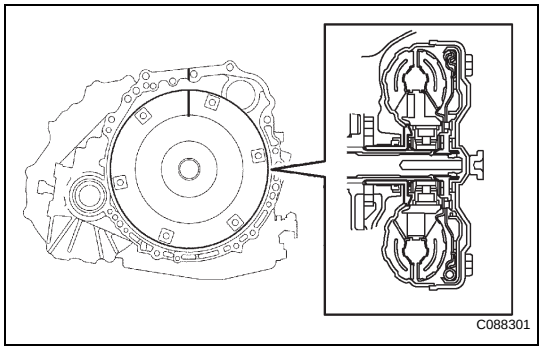
(c) Put a mark on the torque converter clutch so that its groove can be clearly indicated.



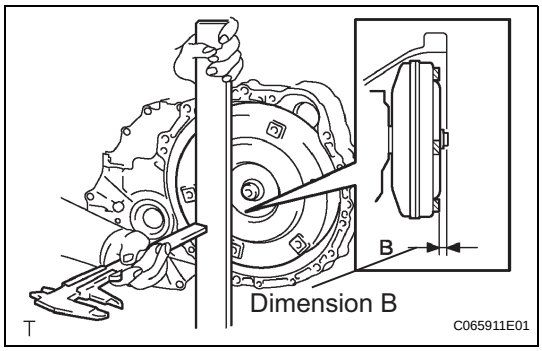
(d) Align the 2 marks on the transaxle case and torque converter clutch and fit the splined part of the input shaft to the spline part of the turbine runner.



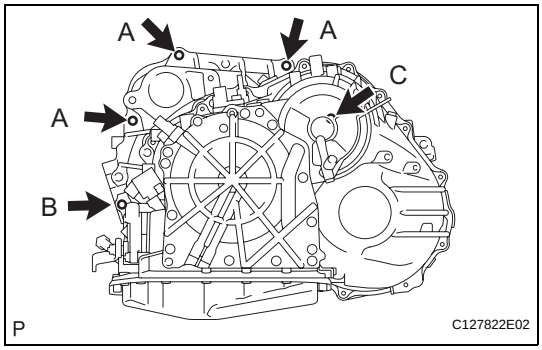
(e) Rotating the torque converter clutch, fit the spline part of the stator shaft to the spline part of the stator.
HINT:
Rotate it about 180 degrees.



(f) Rotating the torque converter clutch, align the 2 marks on the case and the torque converter clutch again and fit the key of the oil pump drive gear into the key way of the torque converter clutch.
CAUTION:
When rotating the torque converter clutch, do not push it with excessive force.

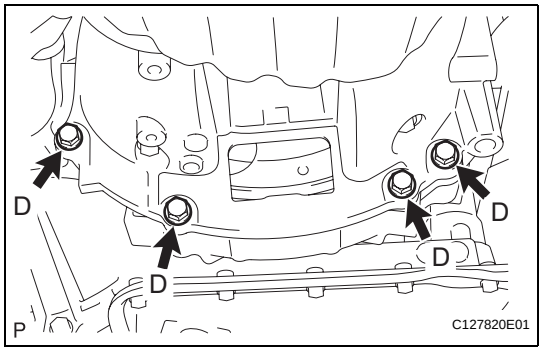


(g) Using vernier calipers and a straight edge, measure dimension "B" shown in the illustration and check that "B" is greater than "A" (measured in step (#1)).
Standard:
A + 1 (0.04 in.) mm or more
NOTICE:
Remember to minus the thickness of the straight edge.



13. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

(a) Install the automatic transaxle to the engine with the 5 bolts.
Torque: Bolt A
64 N*m (653 kgf*cm, 47 ft.*lbf)
Bolt B
46 N*m (469 kgf*cm, 34 ft.*lbf)
Bolt C
46 N*m (469 kgf*cm, 34 ft.*lbf)



(b) Install the 4 lower side mounting bolts.
Torque: Bolt D
44 N*m (449 kgf*cm, 32 ft.*lbf)

14. INSTALL STARTER ASSEMBLY (See page ST-13)

15. INSTALL ENGINE WIRE

16. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)

17. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)

18. INSTALL FRONT FRAME ASSEMBLY (See page EM-112)

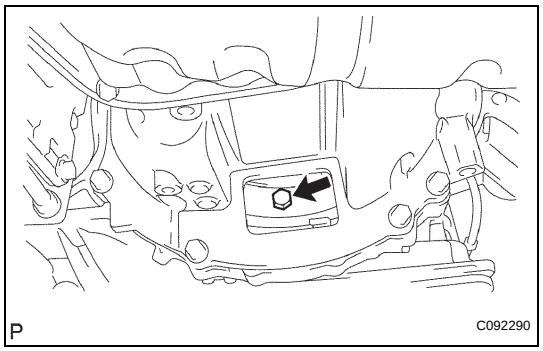
19. INSTALL VANE PUMP ASSEMBLY (See page EM-113)

20. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-114)

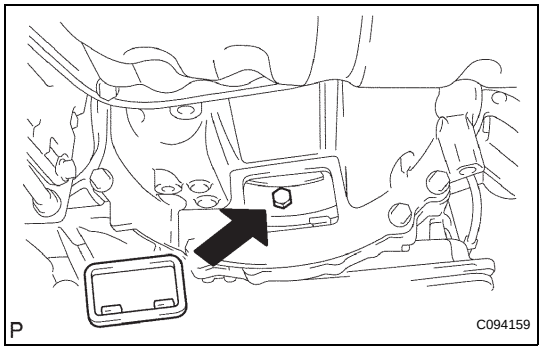
21. INSTALL STEERING SLIDING YOKE (See page PS-65)

22. INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT

(a) Apply a few drops of adhesive to 2 threads on the tip of the 6 torque converter clutch mounting bolts.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent.



(b) Install the 6 torque converter clutch mounting bolts.
Torque: 41 N*m (418 kgf*cm, 30 ft.*lbf)
NOTICE:
First install the black colored bolt, and then the remaining 5 bolts.



(c) Install the flywheel housing under cover.

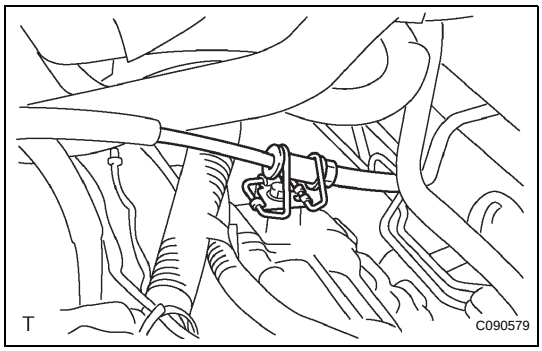
23. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)**
24. **INSTALL FRONT AXLE ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.
25. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)**
26. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH**
HINT:
Use the same procedures described for the LH side.
27. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**
28. **INSTALL TIE ROD ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.
29. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**
30. **INSTALL FRONT SPEED SENSOR RH**
HINT:
Use the same procedures described for the LH side.
31. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**
32. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**
HINT:
Use the same procedures described for the LH side.
33. **INSTALL FRONT AXLE HUB NUT LH (See page DS-22)**
34. **INSTALL FRONT AXLE HUB NUT RH**
HINT:
Use the same procedures described for the LH side.
35. **INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-3)**
36. **CONNECT COMPRESSOR AND MAGNETIC CLUTCH (See page EM-115)**
37. **INSTALL GENERATOR ASSEMBLY (See page CH-19)**

38. **CONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-115)**

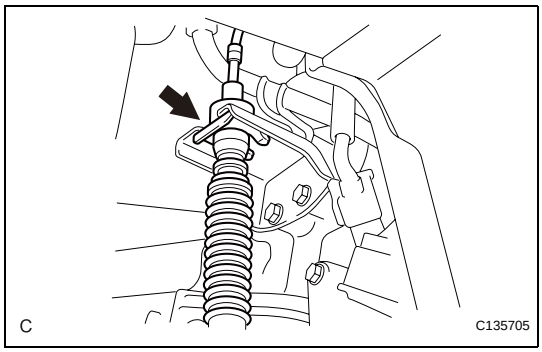
39. **CONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-116)**

40. **CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-116)**

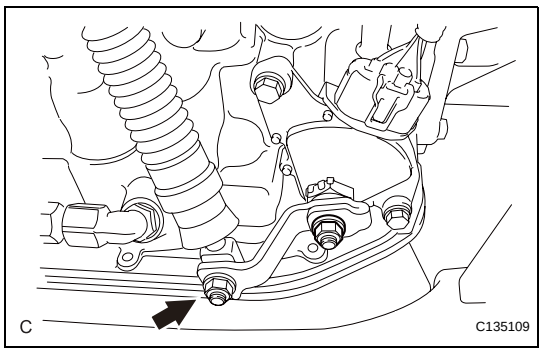
41. **CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY**



(a) Connect the transmission control cable assembly to the control cable clamp.



(b) Connect the transmission control cable to the bracket with a new clip.



(c) Connect the transmission control cable assembly to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)

42. **CONNECT ENGINE WIRE (See page EM-117)**

43. **INSTALL ECM (See page EM-117)**

44. **CONNECT HEATER INLET WATER HOSE (See page EM-117)**

45. **CONNECT HEATER OUTLET WATER HOSE (See page EM-118)**

46. **CONNECT OIL COOLER INLET HOSE (See page CO-30)**

47. **CONNECT OIL COOLER OUTLET HOSE (See page CO-30)**

48. **CONNECT RADIATOR HOSE INLET (See page EM-118)**

49. **CONNECT RADIATOR HOSE OUTLET (See page EM-118)**

50. **CONNECT NO. 1 VACUUM HOSE CONNECTOR (See page EM-118)**

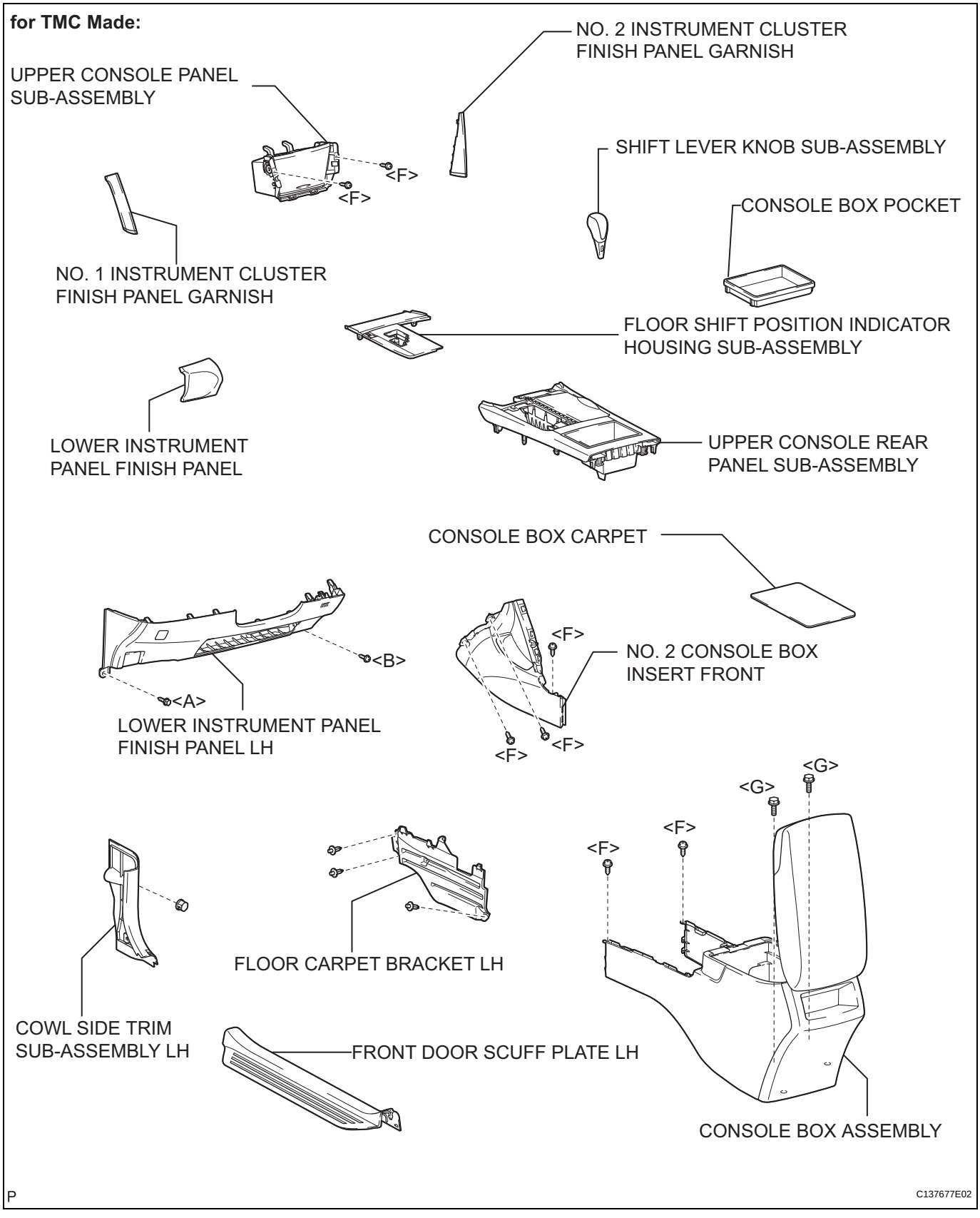
51. **INSTALL NO. 2 ENGINE MOUNTING BRACKET RH (See page EM-118)**

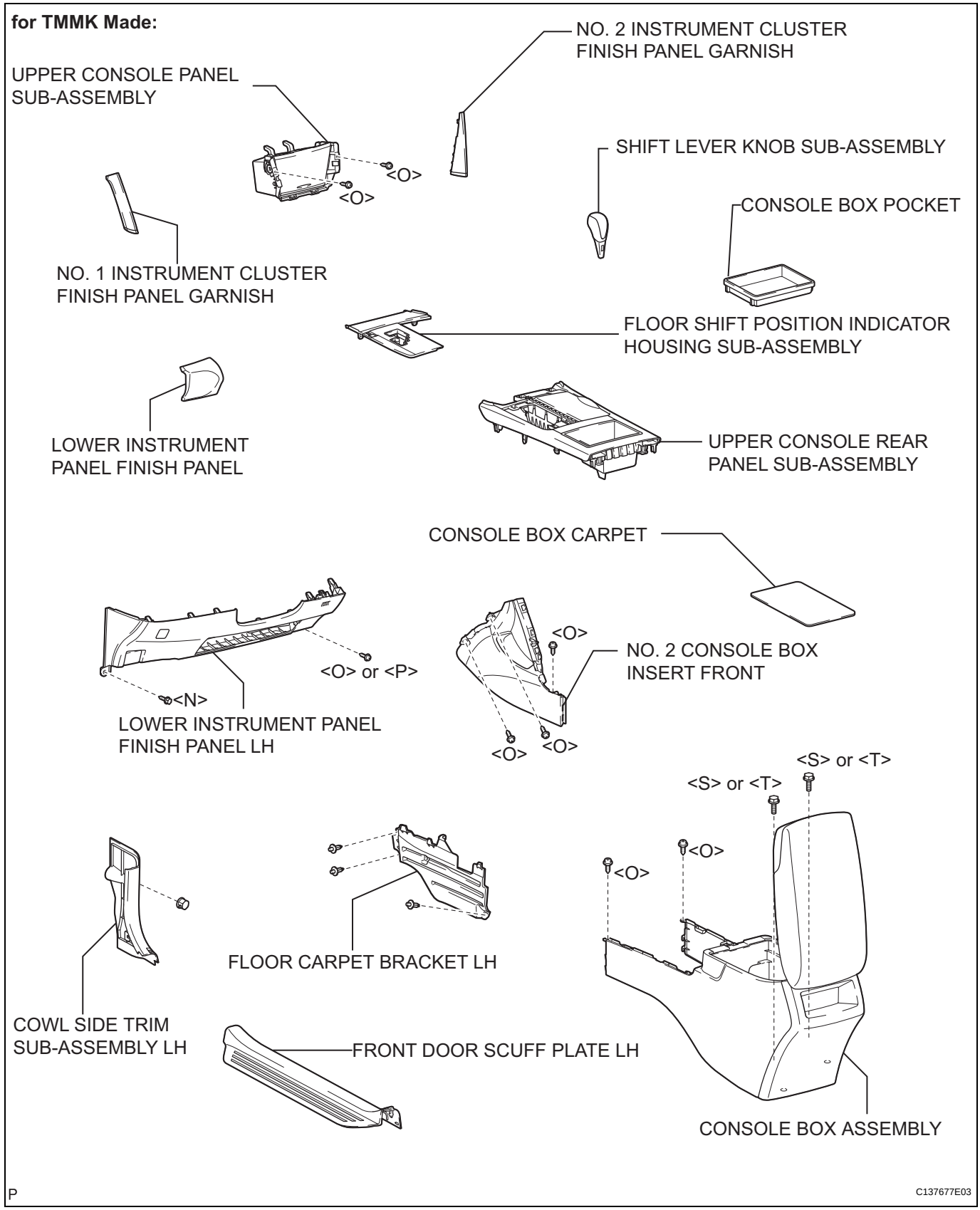
52. **INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-119)**
53. **INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-119)**
54. **INSTALL BATTERY (See page EM-119)**
55. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-120)**
56. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-419)**
57. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-120)**
58. **INSTALL V-RIBBED BELT (See page EM-6)**
59. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-426)**
60. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY**
    HINT:
    See page WW-13.
61. **INSTALL FRONT WHEEL (See page EM-120)**
62. **ADD ENGINE OIL**
63. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-120)**
64. **ADD ENGINE COOLANT (See page CO-5)**
65. **ADD AUTOMATIC TRANSAXLE FLUID**
    Fluid type:
    Toyota Genuine ATF WS
66. **ADD POWER STEERING FLUID**
67. **BLEED POWER STEERING FLUID (See page PS-7)**
68. **INSPECT AUTOMATIC TRANSAXLE FLUID (See page AX-123)**
69. **CHECK FOR FUEL LEAKS (See page FU-9)**
70. **CHECK FOR ENGINE OIL LEAKS**
71. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
72. **CHECK FOR EXHAUST GAS LEAKS**
73. **CHECK FOR SHIFT LEVER POSITION (See page AX-179)**
74. **ADJUST SHIFT LEVER POSITION (See page AX-182)**
75. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    See page SP-4.
76. **CHECK IGNITION TIMING (See page EM-1)**
77. **CHECK ENGINE IDLE SPEED (See page EM-2)**

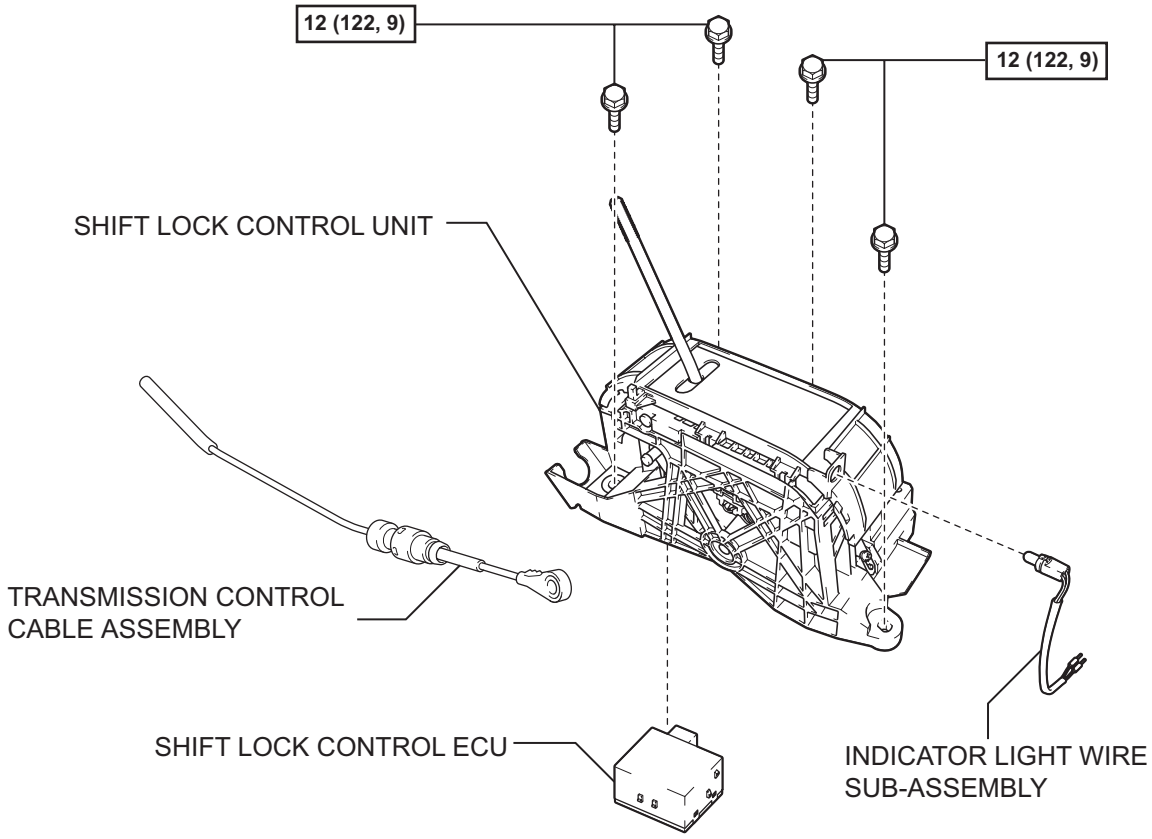
78. **INSPECT CO/HC (See page EM-3)**
79. **INSTALL FRONT FENDER APRON SEAL RH**
80. **INSTALL ENGINE UNDER COVER LH**
81. **INSTALL ENGINE UNDER COVER RH**
82. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY (See page EM-121)**
83. **CHECK ABS SPEED SENSOR SIGNAL**
    HINT:
    See page BC-11.

SHIFT LEVER

COMPONENTS




for TMMK Made:
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
UPPER CONSOLE PANEL SUB-ASSEMBLY
<O>
<O>
SHIFT LEVER KNOB SUB-ASSEMBLY
CONSOLE BOX POCKET
NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY
LOWER INSTRUMENT PANEL FINISH PANEL
UPPER CONSOLE REAR PANEL SUB-ASSEMBLY
CONSOLE BOX CARPET
<O> or <P>
<N>
LOWER INSTRUMENT PANEL FINISH PANEL LH
<O>
NO. 2 CONSOLE BOX INSERT FRONT
<O>
<O>
<S> or <T>
<S> or <T>
<O>
<O>
FLOOR CARPET BRACKET LH
COWL SIDE TRIM SUB-ASSEMBLY LH
FRONT DOOR SCUFF PLATE LH
CONSOLE BOX ASSEMBLY
P
C137677E03



N*m (kgf*cm, ft.*lbf): Specified torque

C135729E04

ON-VEHICLE INSPECTION

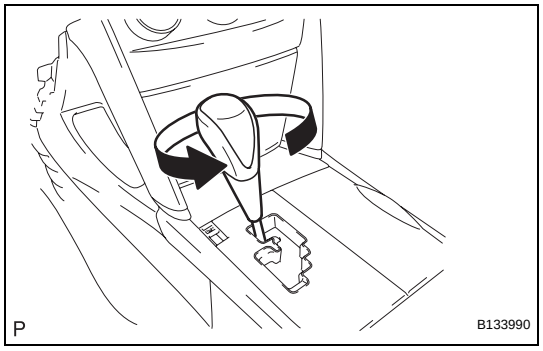
1. INSPECT SHIFT LEVER POSITION

(a) When shifting from the P to the R position with the ignition switch on and the brake pedal depressed, make sure that the shift lever moves smoothly and moves correctly into the position.

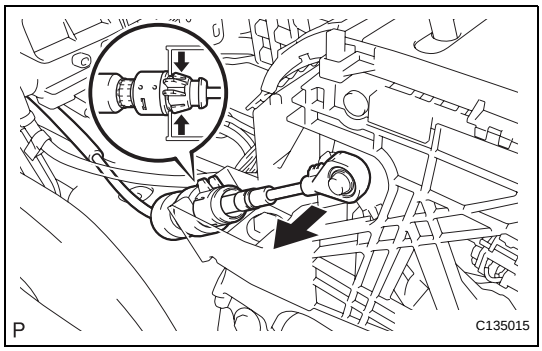
(b) Start the engine and make sure that the vehicle moves forward when shifting from the N to the D position and moves rearward when shifting to the R position. If operation cannot be done as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

REMOVAL

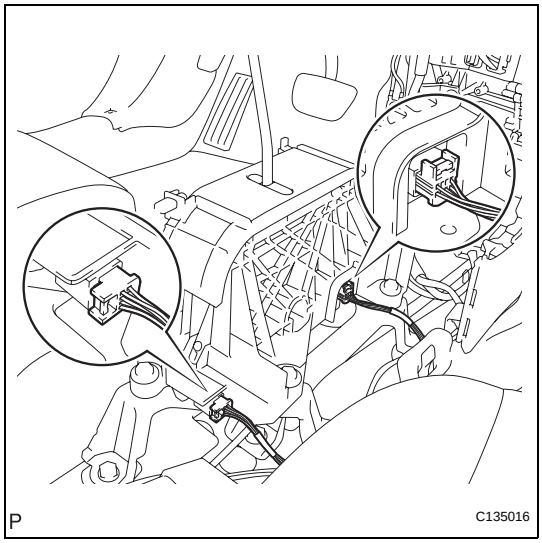
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-22)**
7. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
   (a) Turn the shift lever knob counterclockwise and remove the shift lever knob sub-assembly.



8. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
9. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
10. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-25)**
11. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)**
12. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)**
13. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)**
14. **REMOVE CONSOLE BOX POCKET (See page IP-28)**
15. **REMOVE CONSOLE BOX CARPET (See page IP-28)**
16. **REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)**
17. **REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)**
18. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)**
19. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**
20. **REMOVE FLOOR CARPET BRACKET LH (See page AC-155)**
21. **REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY**
    (a) Disconnect the end of the transmission control cable assembly from the shift lock control unit.

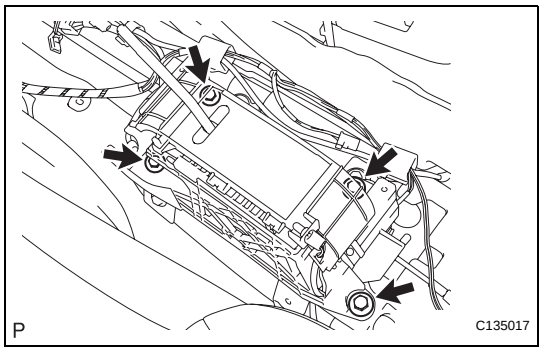


(b) Disconnect the transmission control cable assembly from the shift lock control unit.



22. REMOVE SHIFT LOCK CONTROL UNIT

(a) Disconnect the shift lock control ECU connector and transmission control switch wire connector.



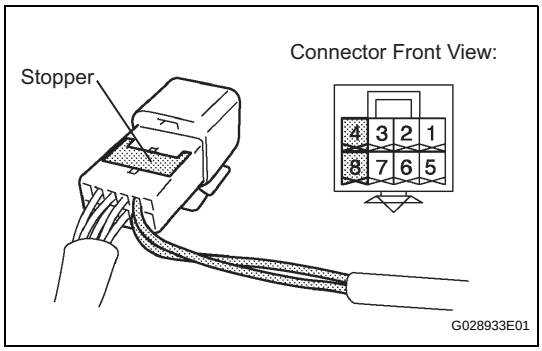
(b) Remove the 4 bolts and shift lever.

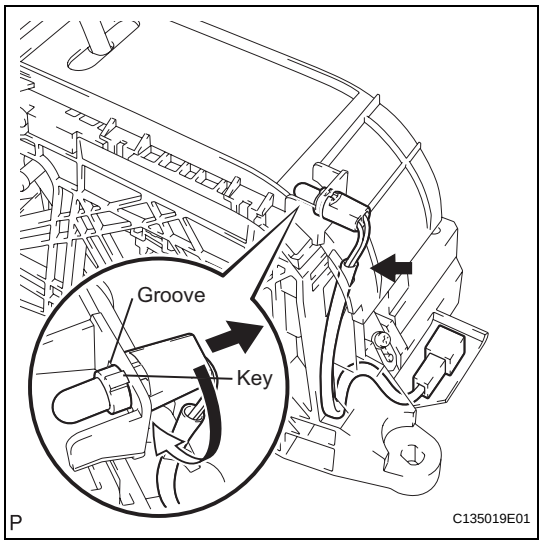
DISASSEMBLY

1. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

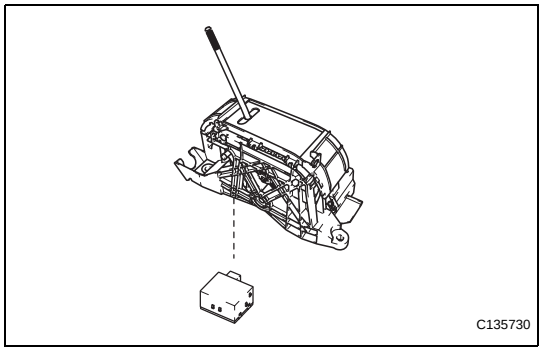
(a) Using a screwdriver, release the stopper.

(b) Using a screwdriver, disengage the locking lug of terminals (4) and (8), and pull the terminals out from the rear of the connector.



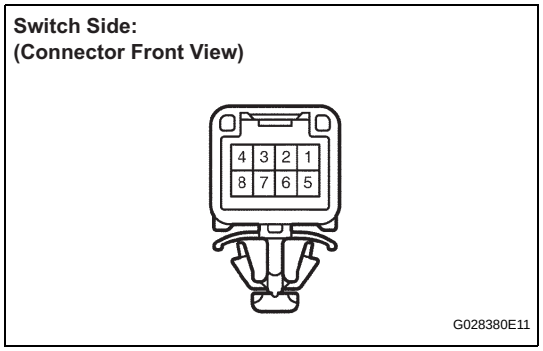


(c) Release the indicator light wire from the clamp on the shift lock control unit.
(d) Turn the indicator light guide counterclockwise.
(e) Align the indicator light guide key with the groove on the shift lock control unit to remove the indicator light wire.



2. REMOVE SHIFT LOCK CONTROL ECU

(a) Remove the shift lock control ECU from the shift lock control unit.



INSPECTION

1. INSPECT TRANSMISSION CONTROL SWITCH

(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
4 and 3	1 - 2	Below 1 Ω
Except 4 and 3		10 kΩ or higher
L	5 - 6	Below 1 Ω
Except L		10 kΩ or higher

If the resistance value is not as specified, replace the transmission control switch.

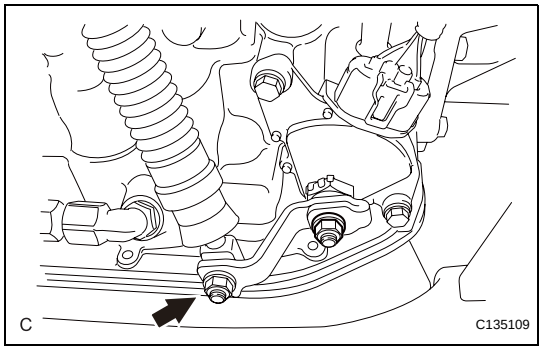
ADJUSTMENT

1. ADJUST SHIFT LEVER POSITION

(a) Move the shift lever to the N position.

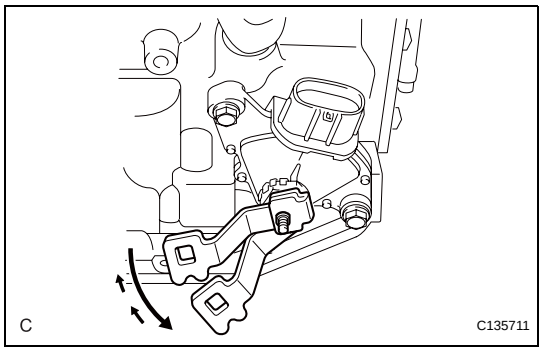
(b) Remove the nut from the control shaft lever.

(c) Disconnect the transmission control cable assembly from the control shaft lever.

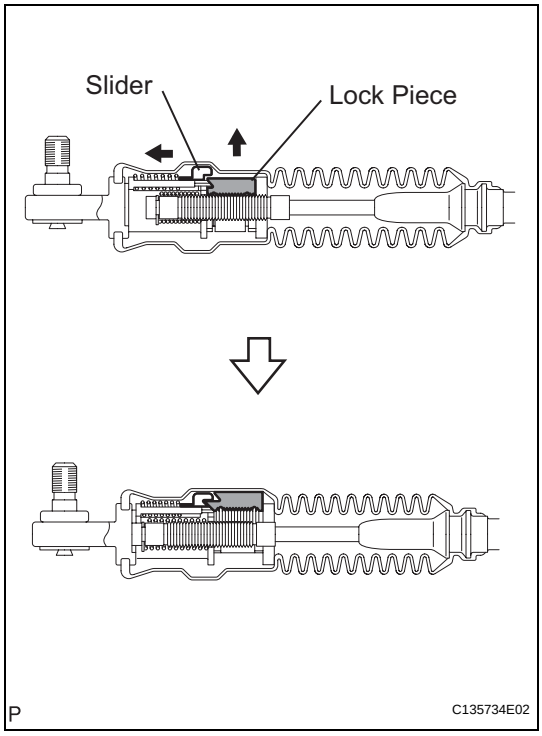


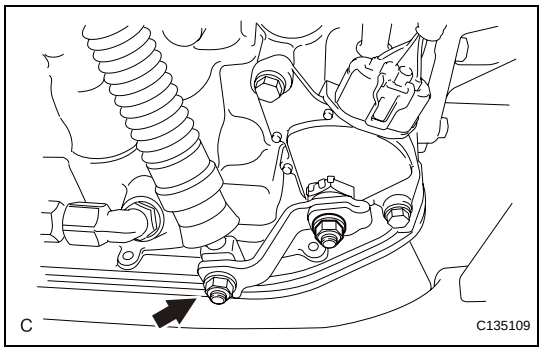
(d) Push the control shaft fully downward.

(e) Return the control shaft lever 2 notches to the N position.

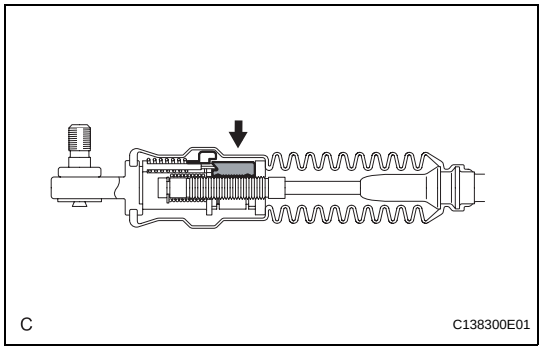


(f) Move the slider in the directions indicated by the arrows and pull up the lock piece.
NOTICE:
Do not damage the boot.





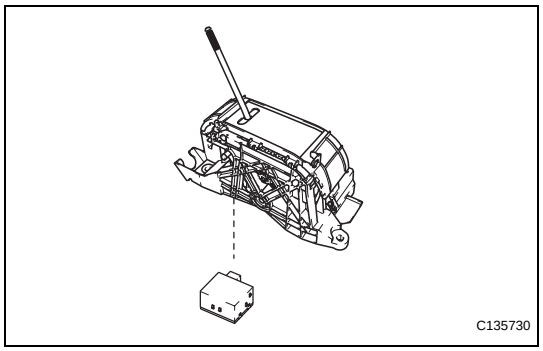
(g) Connect the transmission control cable assembly to the control shaft lever with the nut.
Torque: 15 N*m (150 kgf*cm, 11 ft.*lbf)



(h) Push in the lock piece.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.

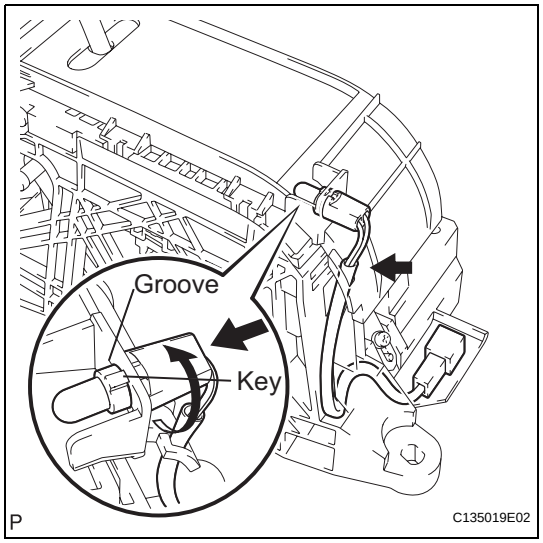
(i) Start the engine and make sure that the vehicle moves forward when moving the lever from the N to the D position and moves rearward when moving it to the R position.
If it becomes hard to move the shift lever, readjust the shift lever position.

REASSEMBLY



1. INSTALL SHIFT LOCK CONTROL ECU

(a) Install the shift lock control ECU to the shift lever.

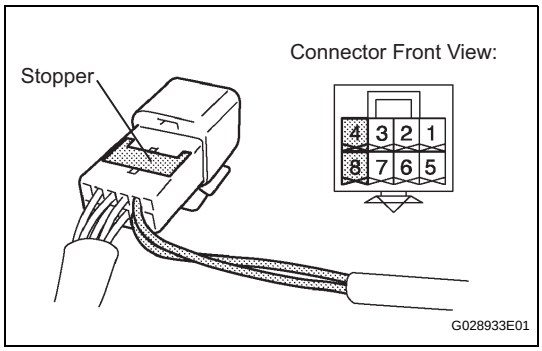


2. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Insert the indicator light wire into the shift lock control unit while aligning the groove on the unit with the indicator light guide key.

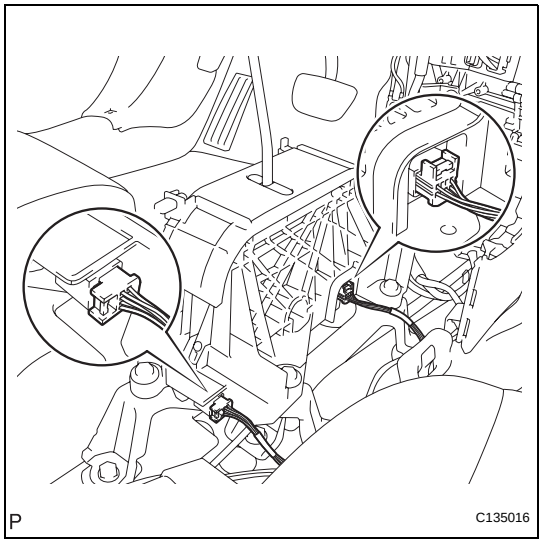
(b) Install the indicator light guide by turning it clockwise until it securely locks.

(c) Install the indicator light wire to the clamp on the shift lock control unit.

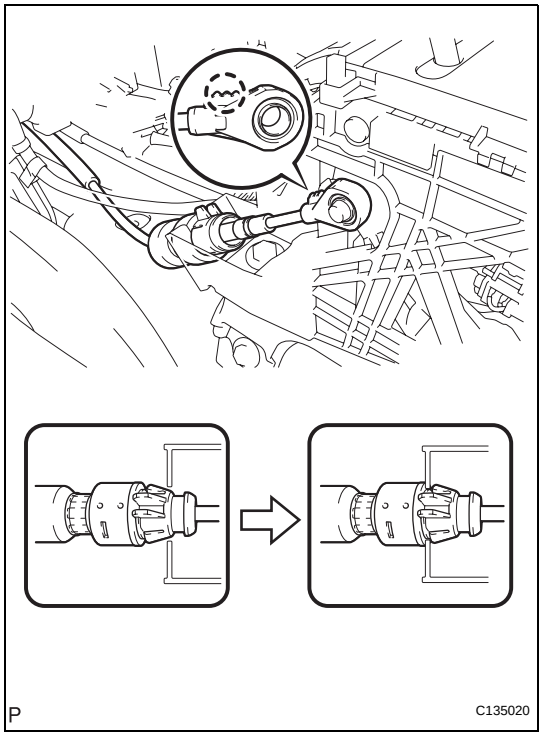


(d) Connect terminals (4) and (8) of the indicator light wire.
(e) Push the stopper.

INSTALLATION



1. INSTALL SHIFT LOCK CONTROL UNIT
(a) Connect the shift lock ECU connector and transmission control switch wire connector.
(b) Install the 4 bolts and shift lock control unit.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY
(a) Install the transmission control cable assembly as shown in the illustration.
HINT:
- Install the floor shift cable with the uneven surface facing up.
- Securely engage the claws of the floor shift cable.

3. INSTALL FLOOR CARPET BRACKET LH

4. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)

5. INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)

6. INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)

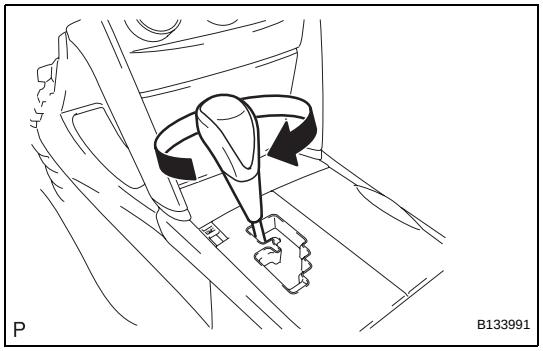
7. INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)

8. INSTALL CONSOLE BOX CARPET (See page IP-51)

9. INSTALL CONSOLE BOX POCKET (See page IP-51)

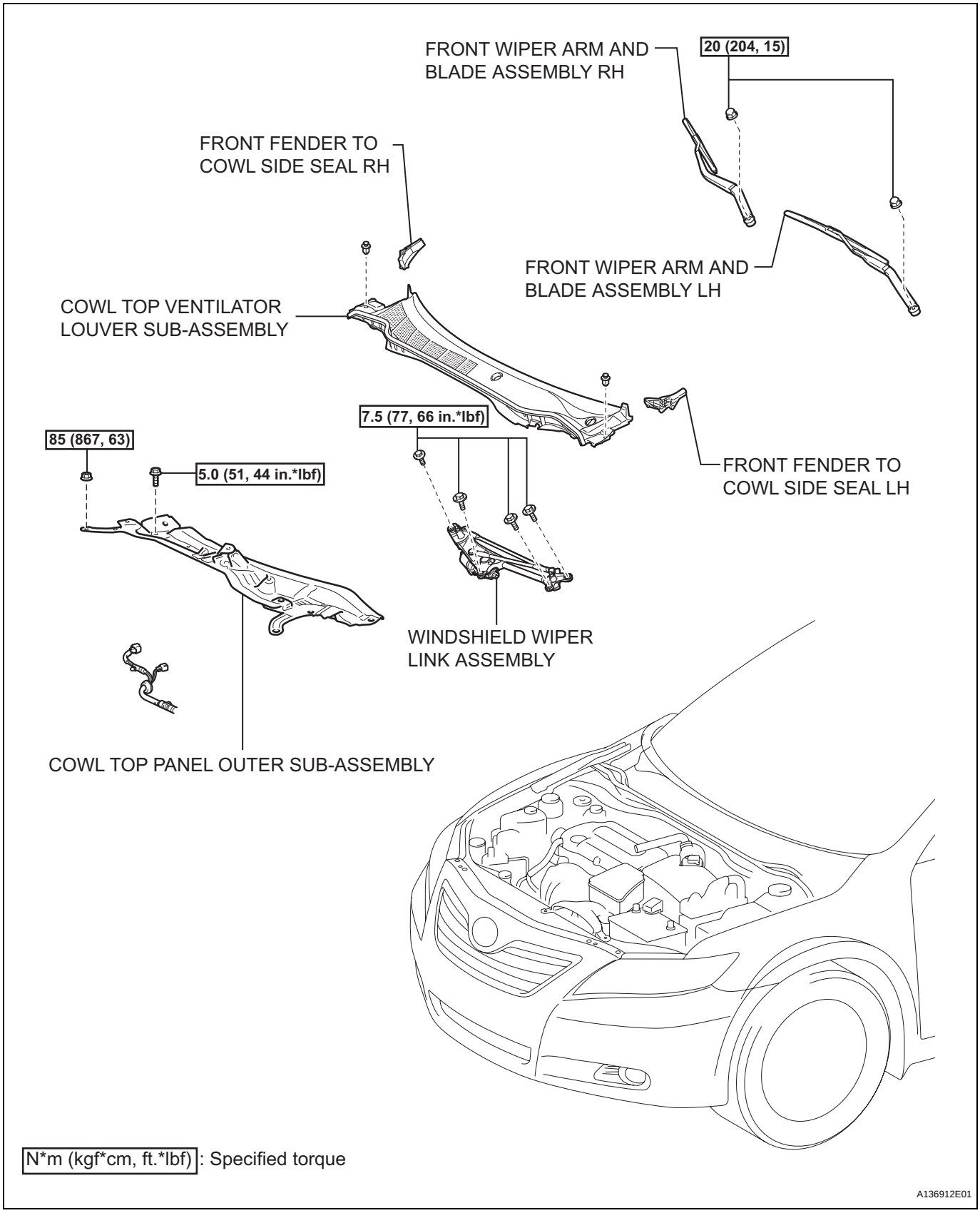
10. INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)

11. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
12. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
13. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
14. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
15. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**
16. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY**
    (a) Install the shift lever knob sub-assembly.
17. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (See page IP-57)**
18. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
19. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
20. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**
21. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
22. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
    Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)
23. **INSPECT SHIFT LEVER POSITION (See page AX-146)**
24. **ADJUST SHIFT LEVER POSITION (See page AX-146)**

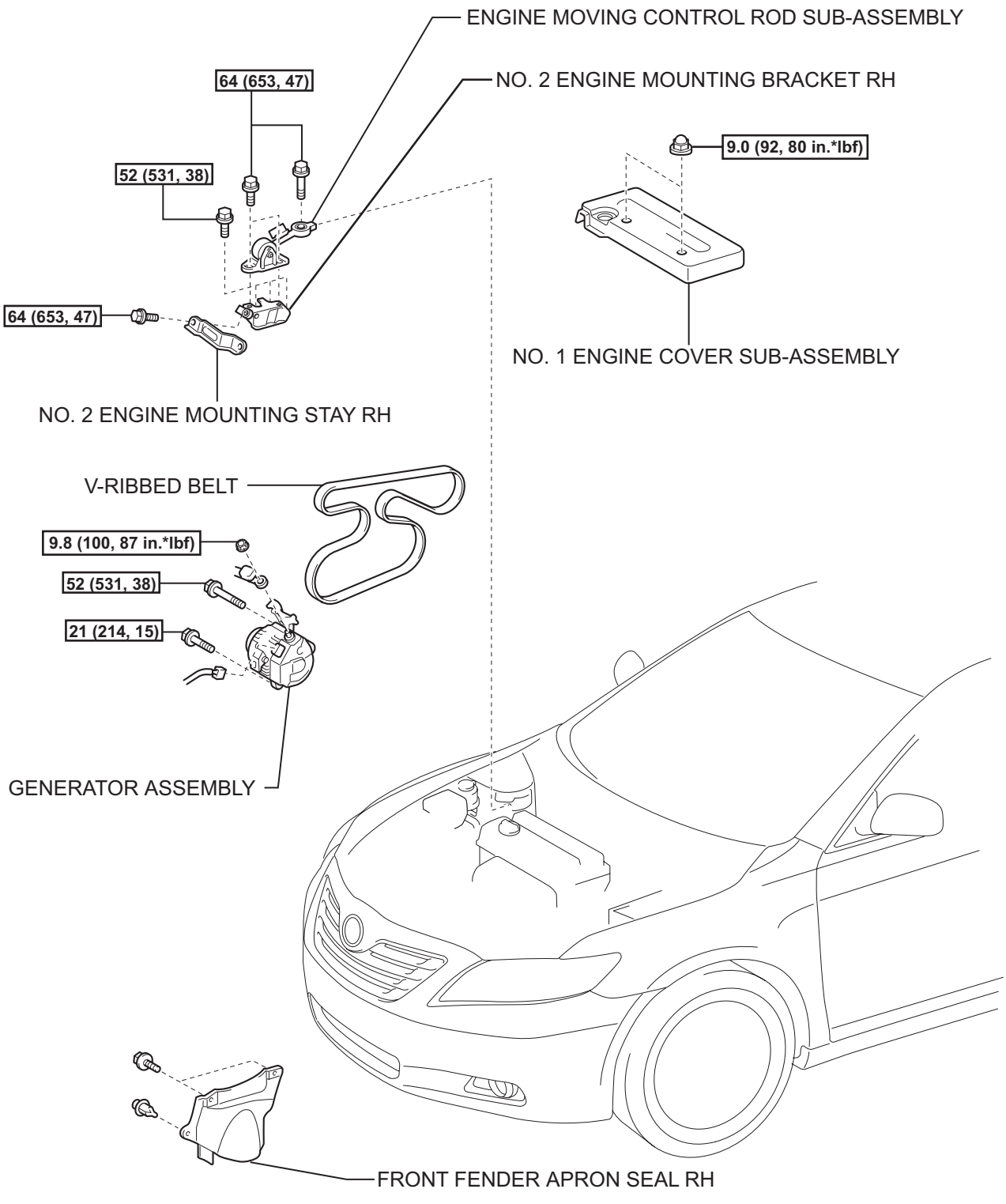


TORQUE CONVERTER CLUTCH AND DRIVE PLATE

COMPONENTS



AX

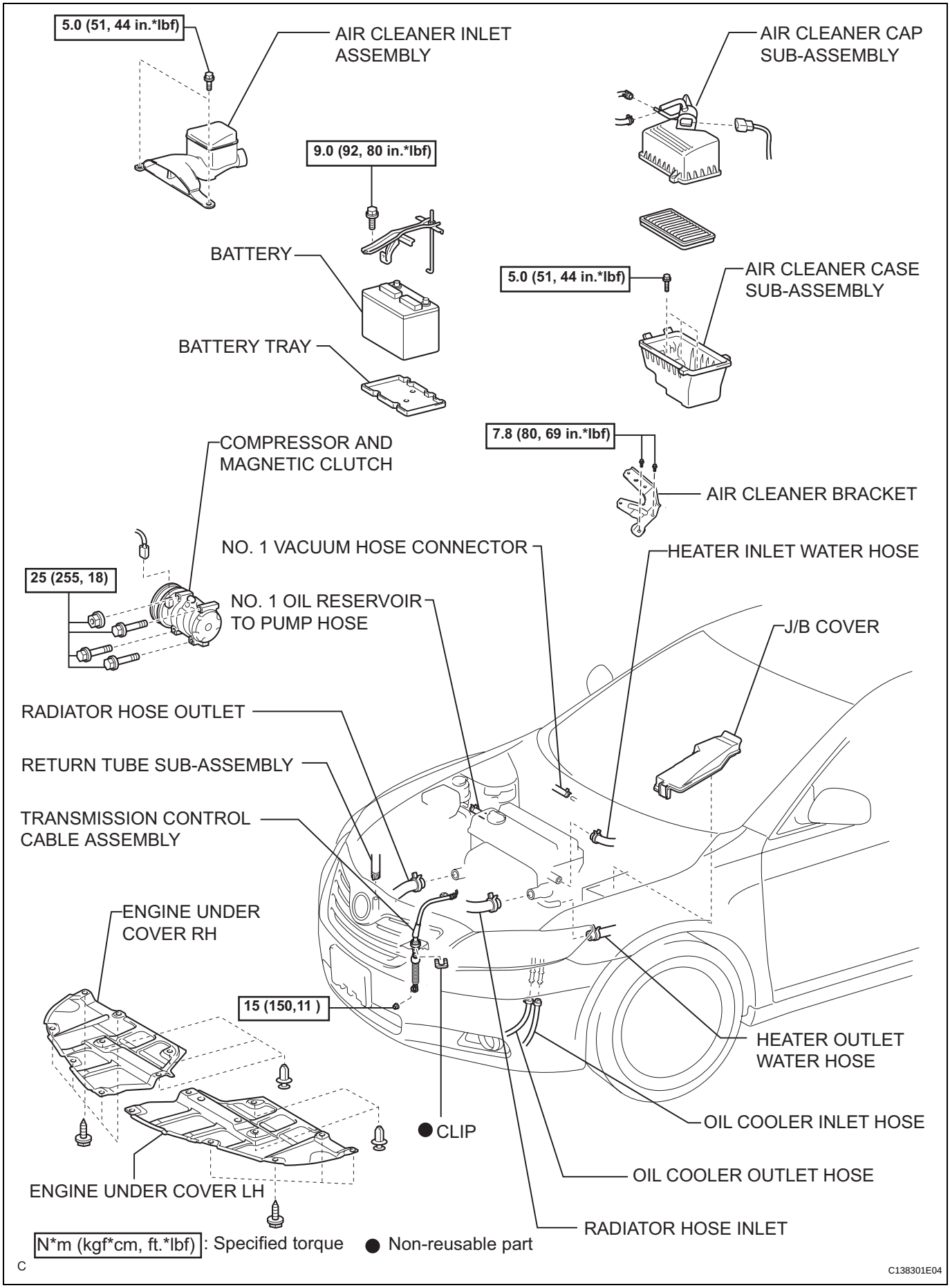


N*m (kgf*cm, ft.*lbf): Specified torque

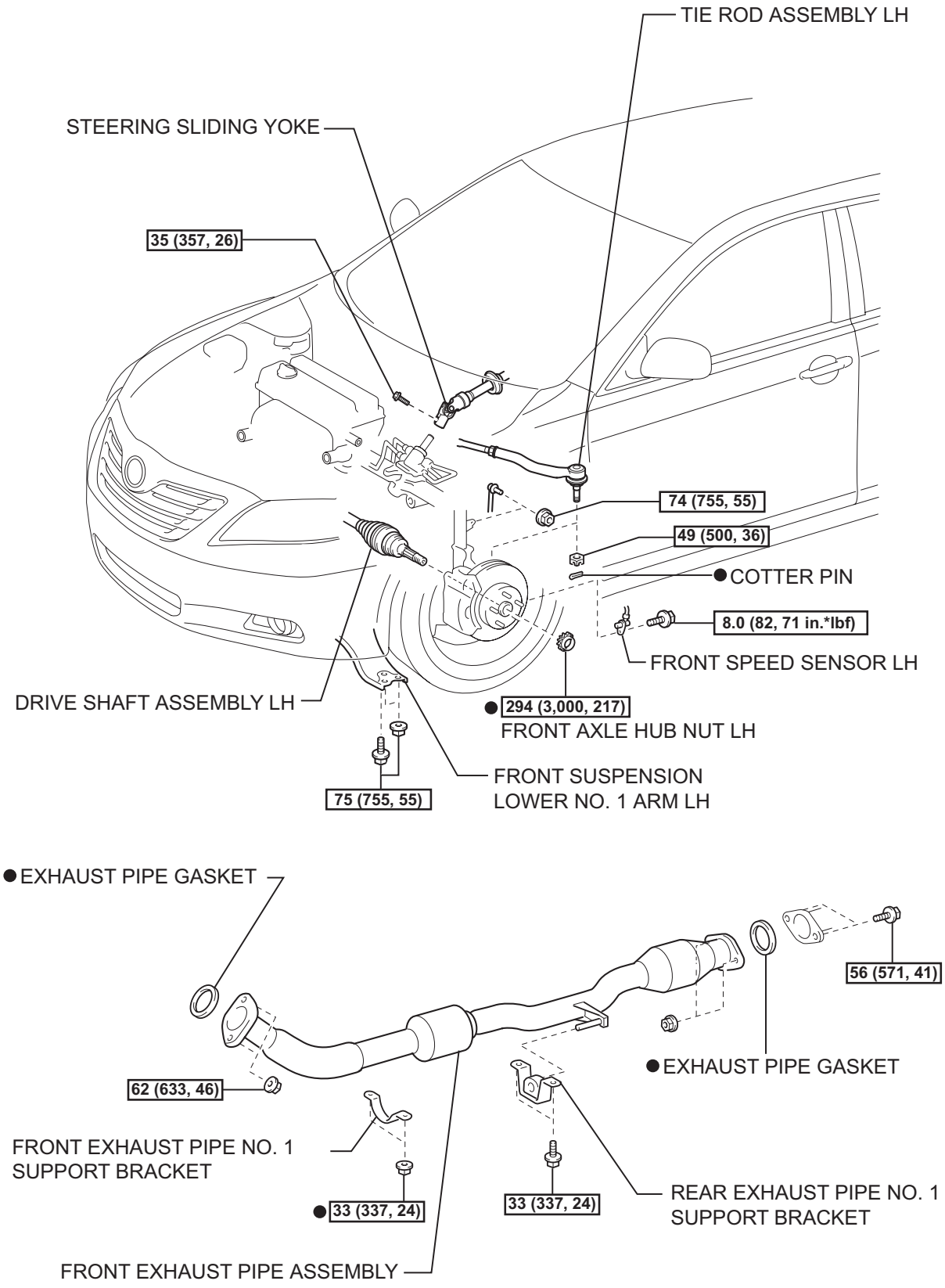
C

AX

A134948E01


5.0 (51, 44 in.*lbf)
AIR CLEANER INLET ASSEMBLY
AIR CLEANER CAP SUB-ASSEMBLY
9.0 (92, 80 in.*lbf)
BATTERY
BATTERY TRAY
5.0 (51, 44 in.*lbf)
AIR CLEANER CASE SUB-ASSEMBLY
7.8 (80, 69 in.*lbf)
COMPRESSOR AND MAGNETIC CLUTCH
AIR CLEANER BRACKET
NO. 1 VACUUM HOSE CONNECTOR
HEATER INLET WATER HOSE
25 (255, 18)
NO. 1 OIL RESERVOIR TO PUMP HOSE
J/B COVER
RADIATOR HOSE OUTLET
RETURN TUBE SUB-ASSEMBLY
TRANSMISSION CONTROL CABLE ASSEMBLY
ENGINE UNDER COVER RH
15 (150,11)
HEATER OUTLET WATER HOSE
OIL COOLER INLET HOSE
CLIP
OIL COOLER OUTLET HOSE
ENGINE UNDER COVER LH
RADIATOR HOSE INLET
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
C
C138301E04

AX

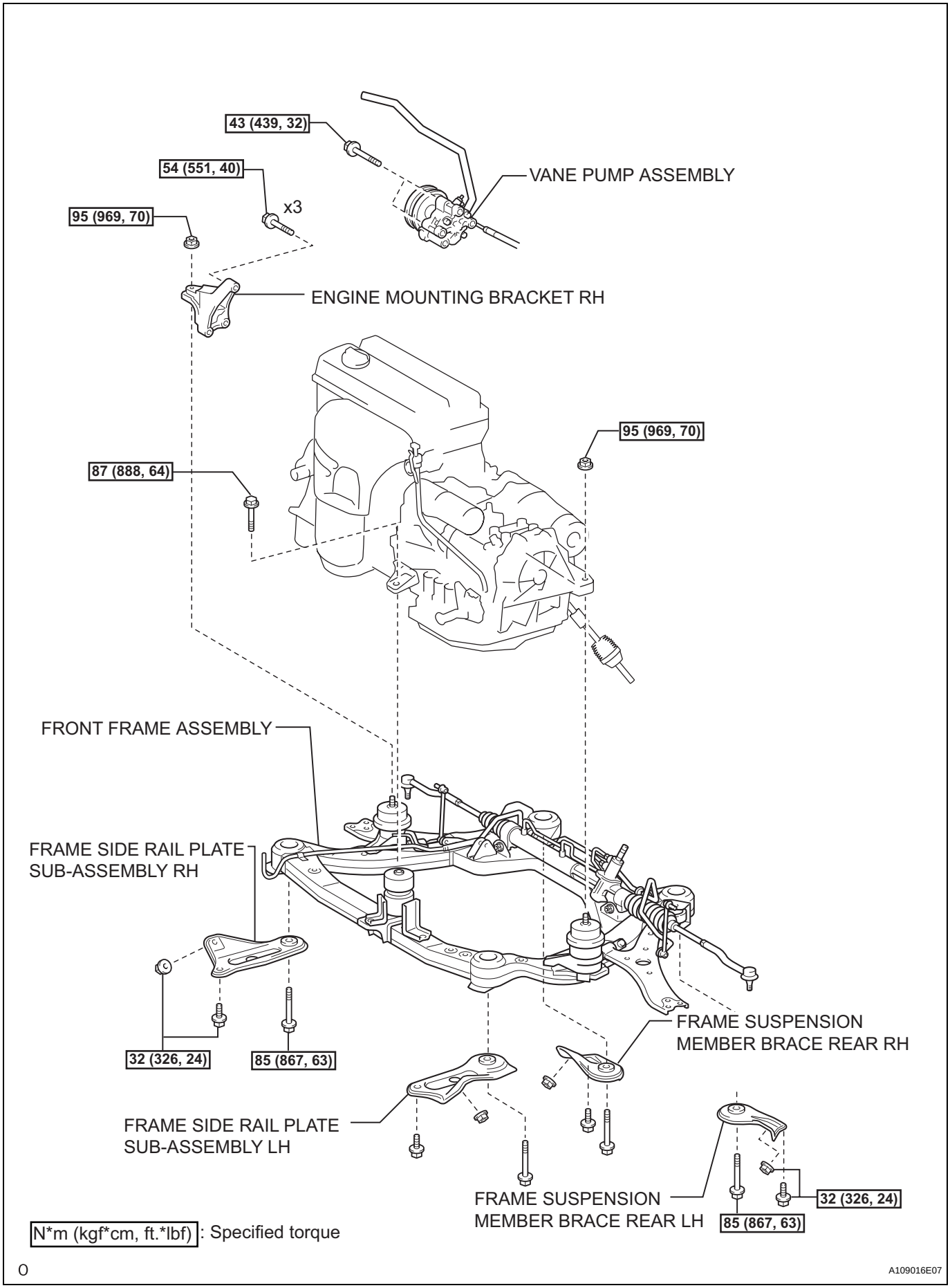


AX

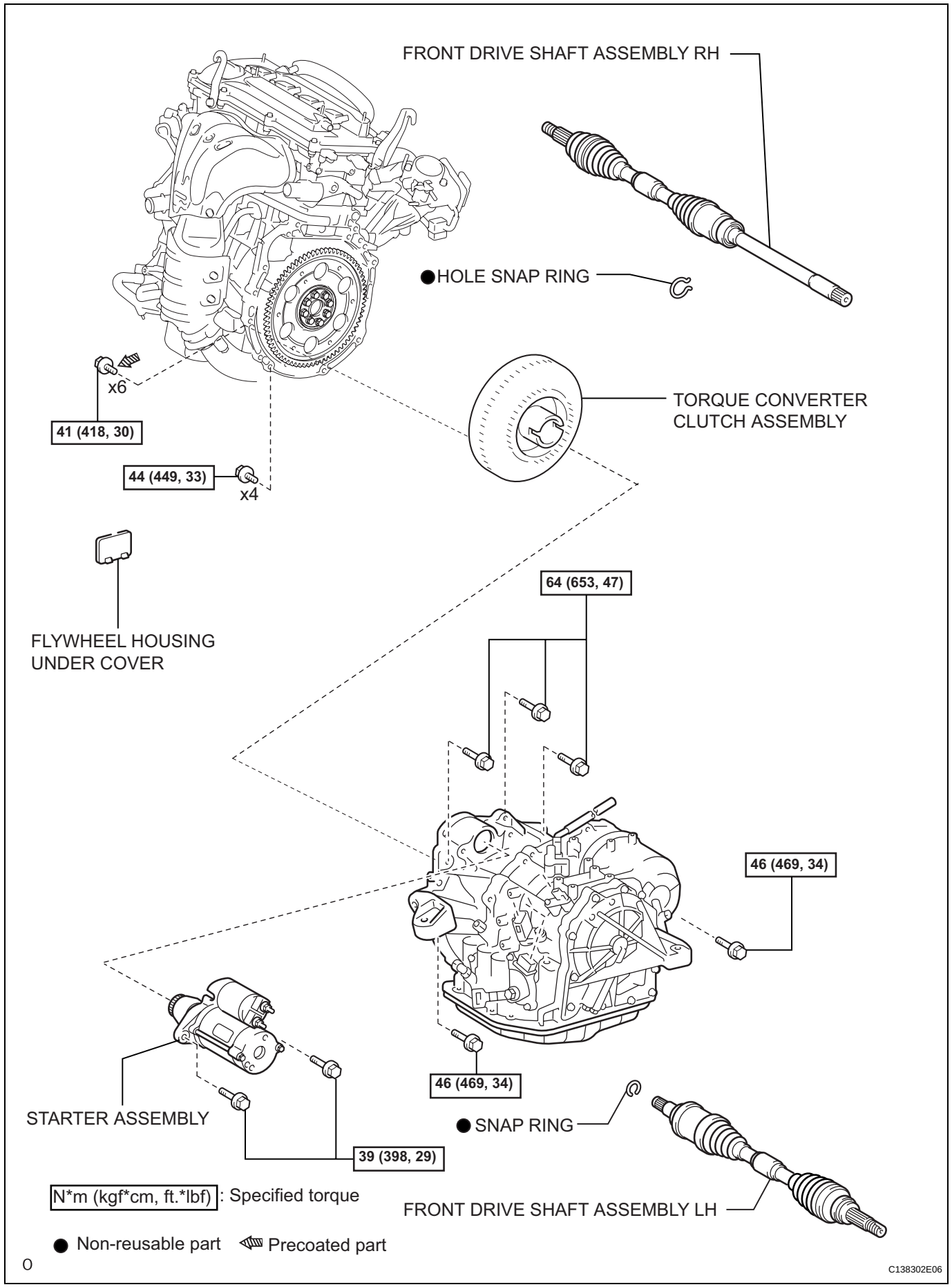
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

C143322E01


43 (439, 32)
54 (551, 40)
x3
95 (969, 70)
VANE PUMP ASSEMBLY
ENGINE MOUNTING BRACKET RH
87 (888, 64)
95 (969, 70)
FRONT FRAME ASSEMBLY
FRAME SIDE RAIL PLATE
SUB-ASSEMBLY RH
32 (326, 24)
85 (867, 63)
FRAME SUSPENSION
MEMBER BRACE REAR RH
FRAME SIDE RAIL PLATE
SUB-ASSEMBLY LH
FRAME SUSPENSION
MEMBER BRACE REAR LH
32 (326, 24)
85 (867, 63)
N*m (kgf*cm, ft.*lbf): Specified torque
A109016E07

AX


FRONT DRIVE SHAFT ASSEMBLY RH
●HOLE SNAP RING
x6
41 (418, 30)
44 (449, 33)
x4
TORQUE CONVERTER CLUTCH ASSEMBLY
FLYWHEEL HOUSING UNDER COVER
64 (653, 47)
46 (469, 34)
46 (469, 34)
STARTER ASSEMBLY
39 (398, 29)
● SNAP RING
FRONT DRIVE SHAFT ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
C138302E06

REMOVAL

1. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

HINT:

See page AX-162.

INSPECTION

1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

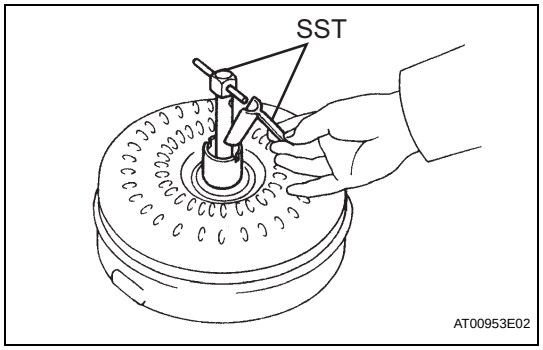
(a) Inspect the one-way clutch.

(1) Set SST into the inner race of the one-way clutch.

SST 09350-32014 (09351-32010)

(2) Install SST so that it fits in the notch of the converter hub and outer race of the one-way clutch.

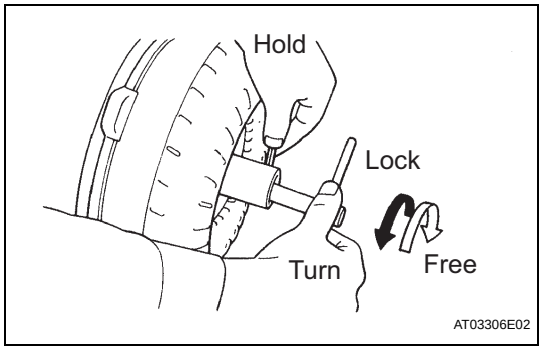
SST 09350-32014 (09351-32010, 09351-32020)



(3) Stand the torque converter up and turn the SST.

Standard:

If the one-way clutch is turned clockwise, it rotates freely and if turned counterclockwise, it locks.



(b) Determine the condition of the torque converter clutch assembly.

(1) If the inspection result of the torque converter clutch assembly satisfies the following conditions, replace the torque converter clutch assembly.

Malfunction item:

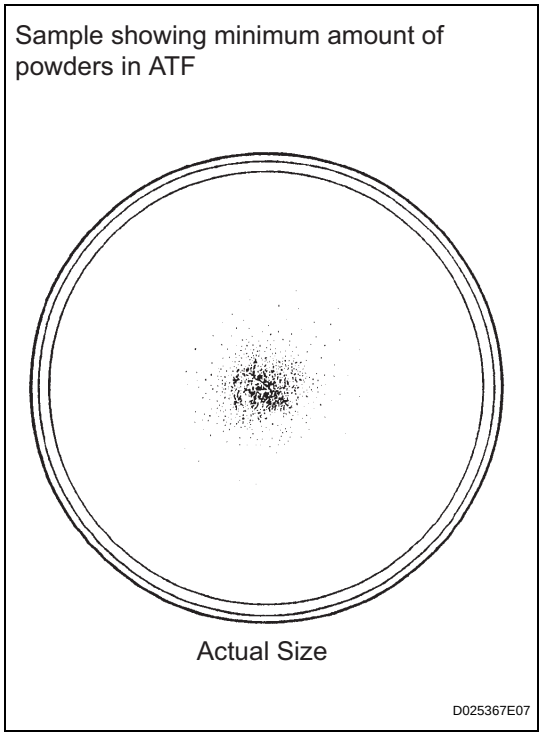
A metallic sound is emitted from the torque converter clutch assembly during the stall test or when the shift lever is moved to the N position.

The one-way clutch is free or locked in both directions.

The amount of powder in the ATF is greater than the sample shown in the illustration (see the sample).

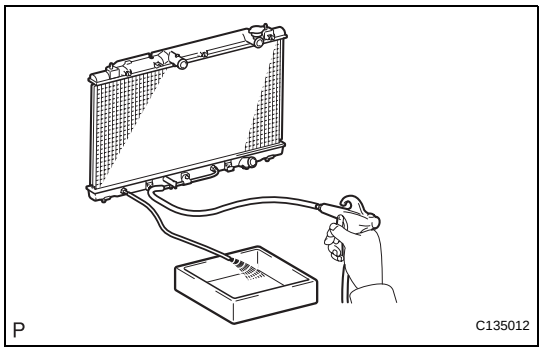
HINT:

The sample shows the auto fluid of approximately 0.25 liters (0.26 US qts, 0.22 Imp. qts) that is taken out from the removed torque converter clutch.



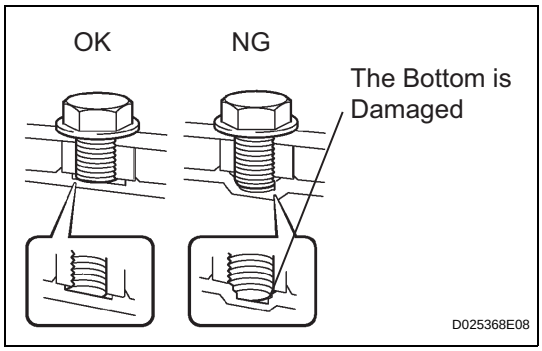
(c) Exchange the ATF in the torque converter clutch.

(1) If the ATF is discolored and/or has a foul odor, completely stir the ATF in the torque converter clutch and drain it.

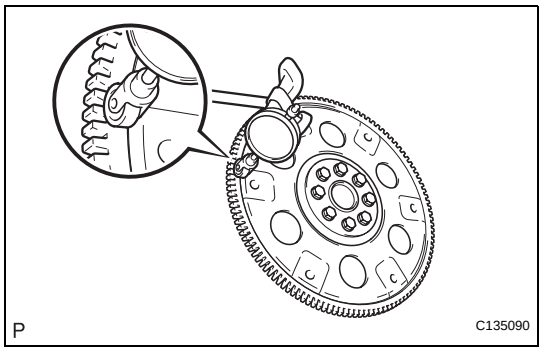


(d) Clean and check the oil cooler and oil pipe line.
  (1) If the torque converter clutch is inspected or the ATF is exchanged, clean the oil cooler and oil pipe line.
  HINT:
  - Spray compressed air of 196 kPa (2 kgf/cm^2, 28 psi) from the inlet hose.
  - If plenty of fine powders are identified in the ATF, add new ATF using a bucket pump and clean it again.

  (2) If the ATF is cloudy, inspect the oil cooler (radiator).



(e) Prevent deformation of the torque converter clutch and damage to the oil pump gear.
  (1) When there is any damage to the end of the bolt for the torque converter clutch and to the bottom of the bolt hole, replace the bolt and the torque converter clutch.
  (2) All of the bolts must be the same length.
  (3) Bolts with washers must be used.



2. INSPECT DRIVE PLATE & RING GEAR SUB-ASSEMBLY

(a) Set up a dial indicator with a roller instrument and measure the drive plate runout.

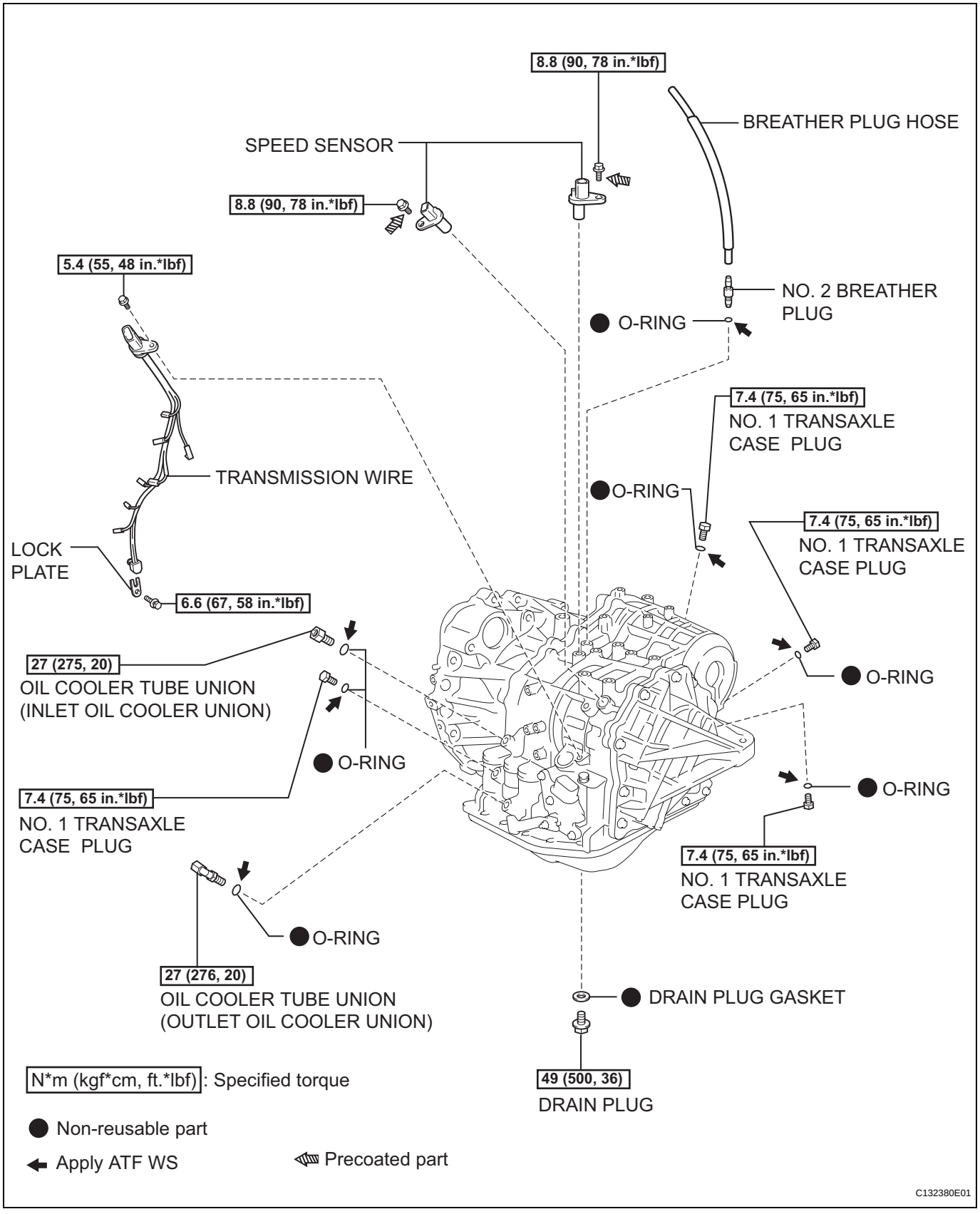
(b) Check for damage of the ring gear.
  Maximum runout:
  0.20 mm (0.0079 in.)
  If runout is not within specification or the ring gear is damaged, replace the drive plate.

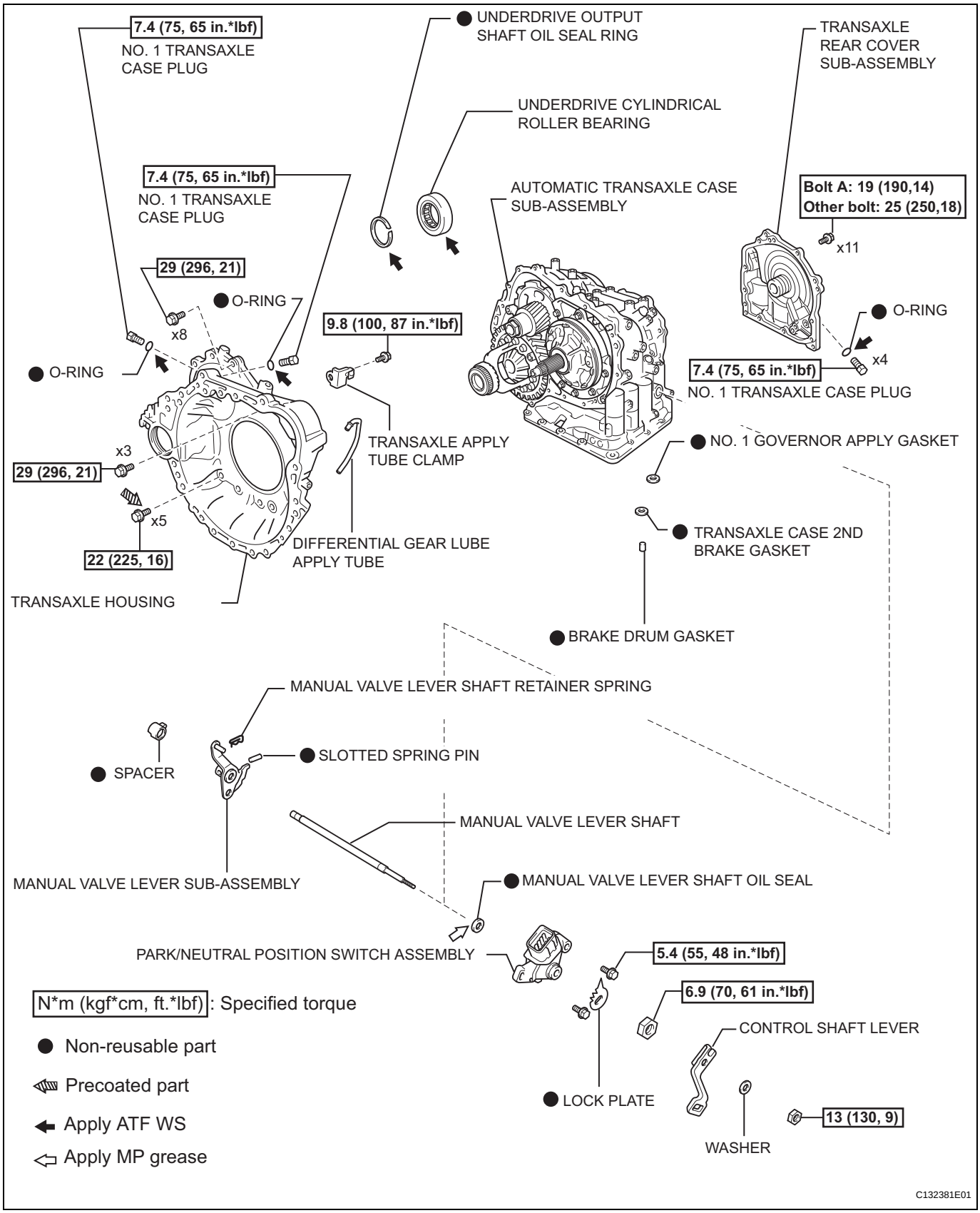
INSTALLATION

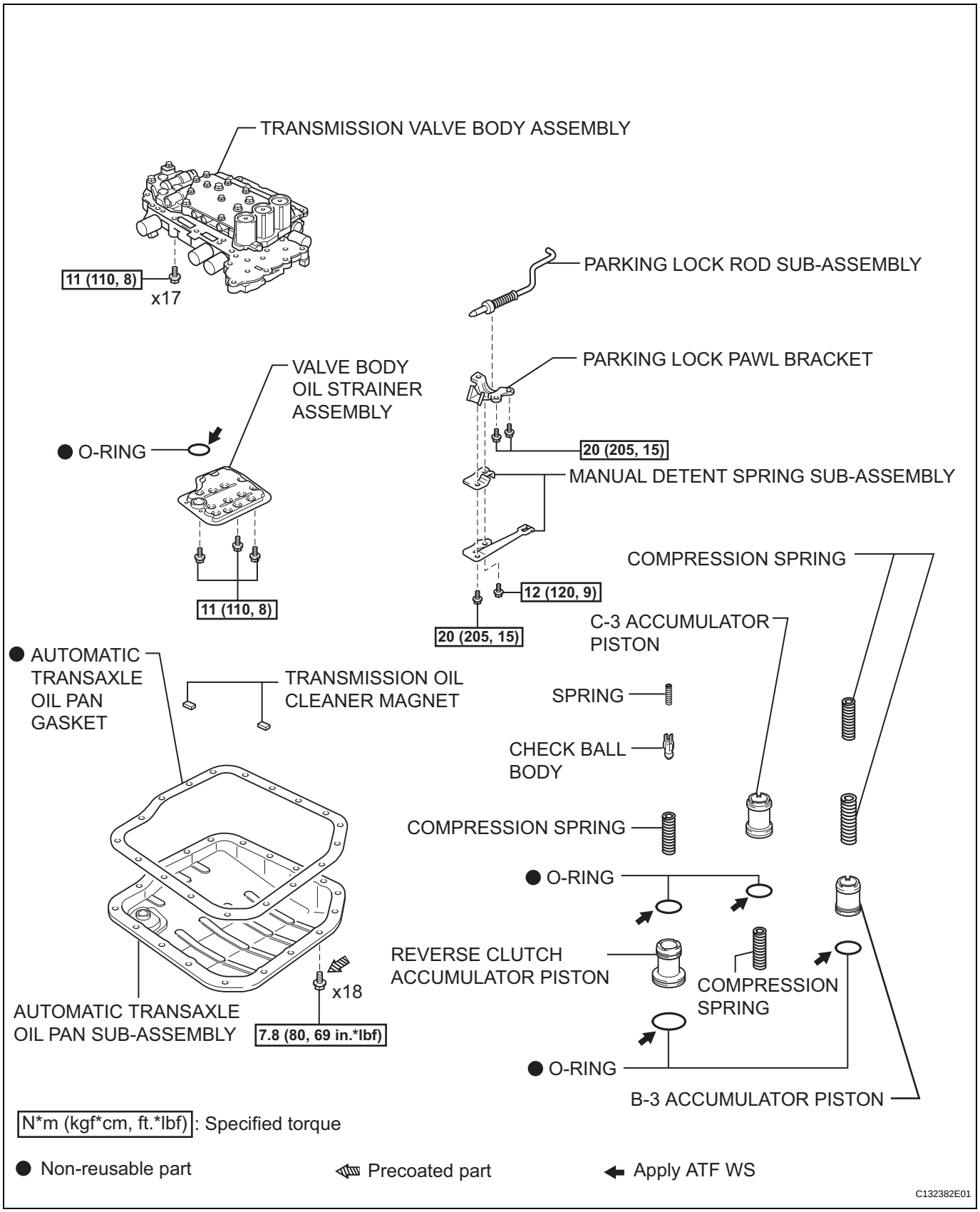
1. **INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY**
   HINT:
   See page AX-168.

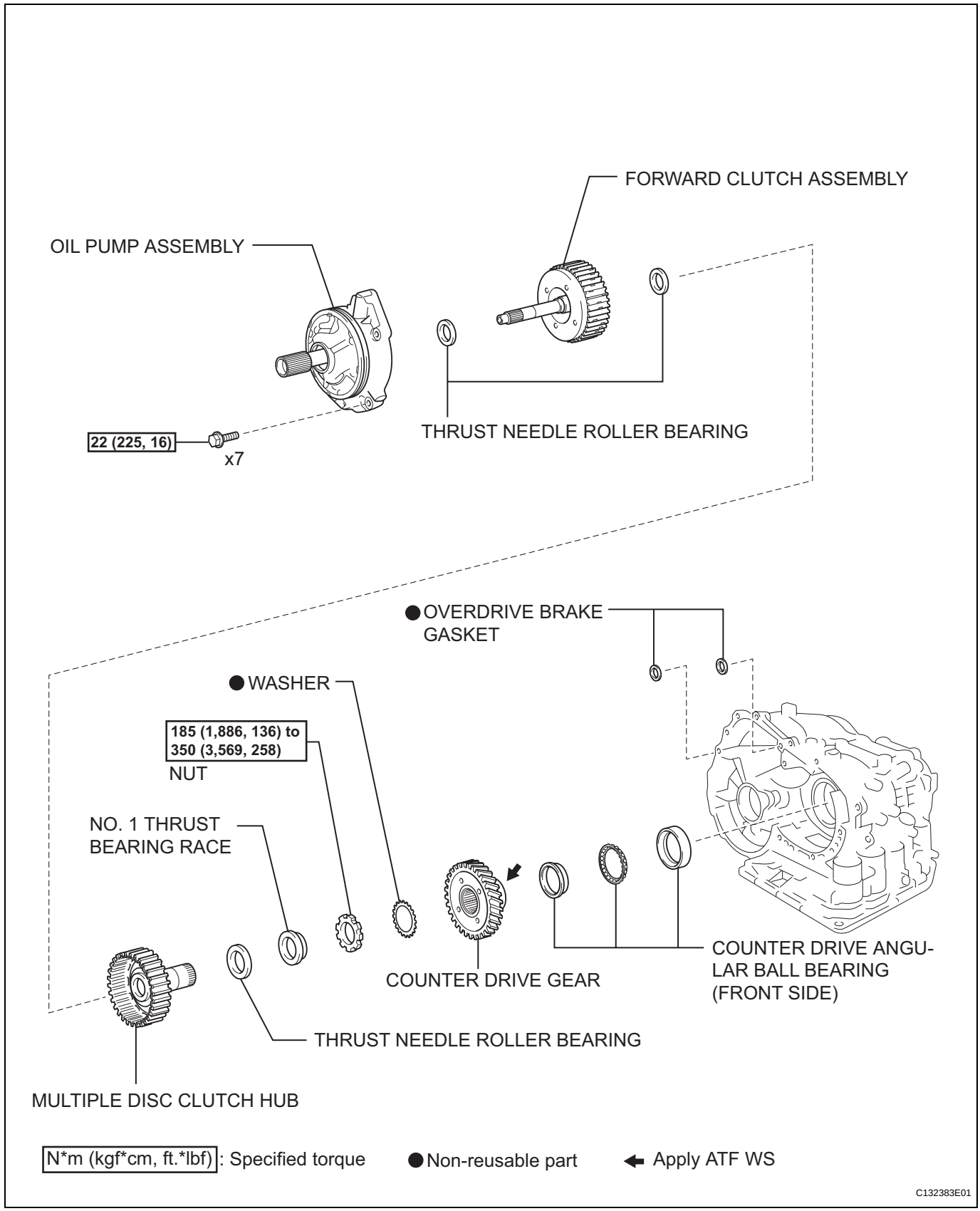
AUTOMATIC TRANSAXLE UNIT

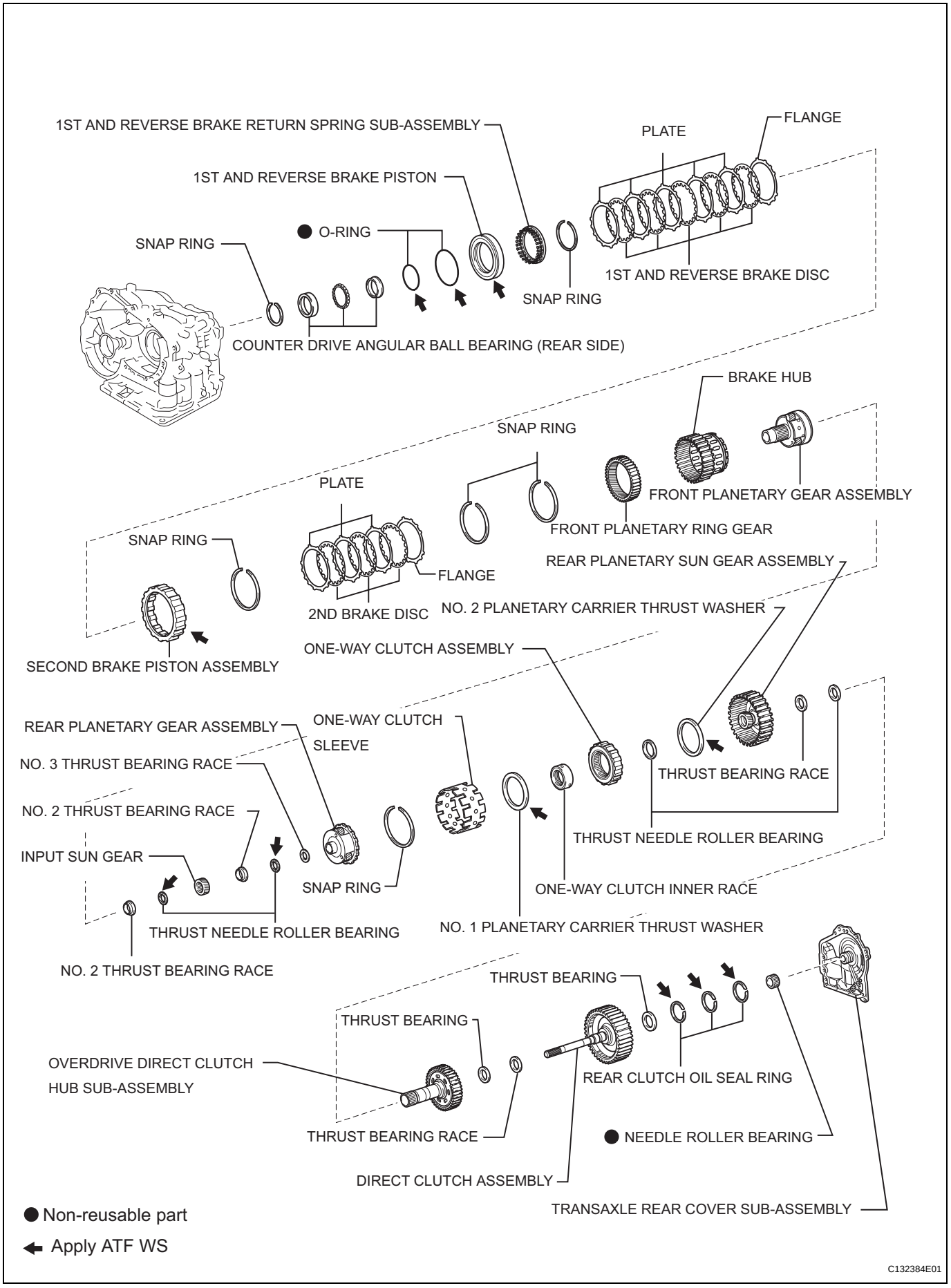
COMPONENTS



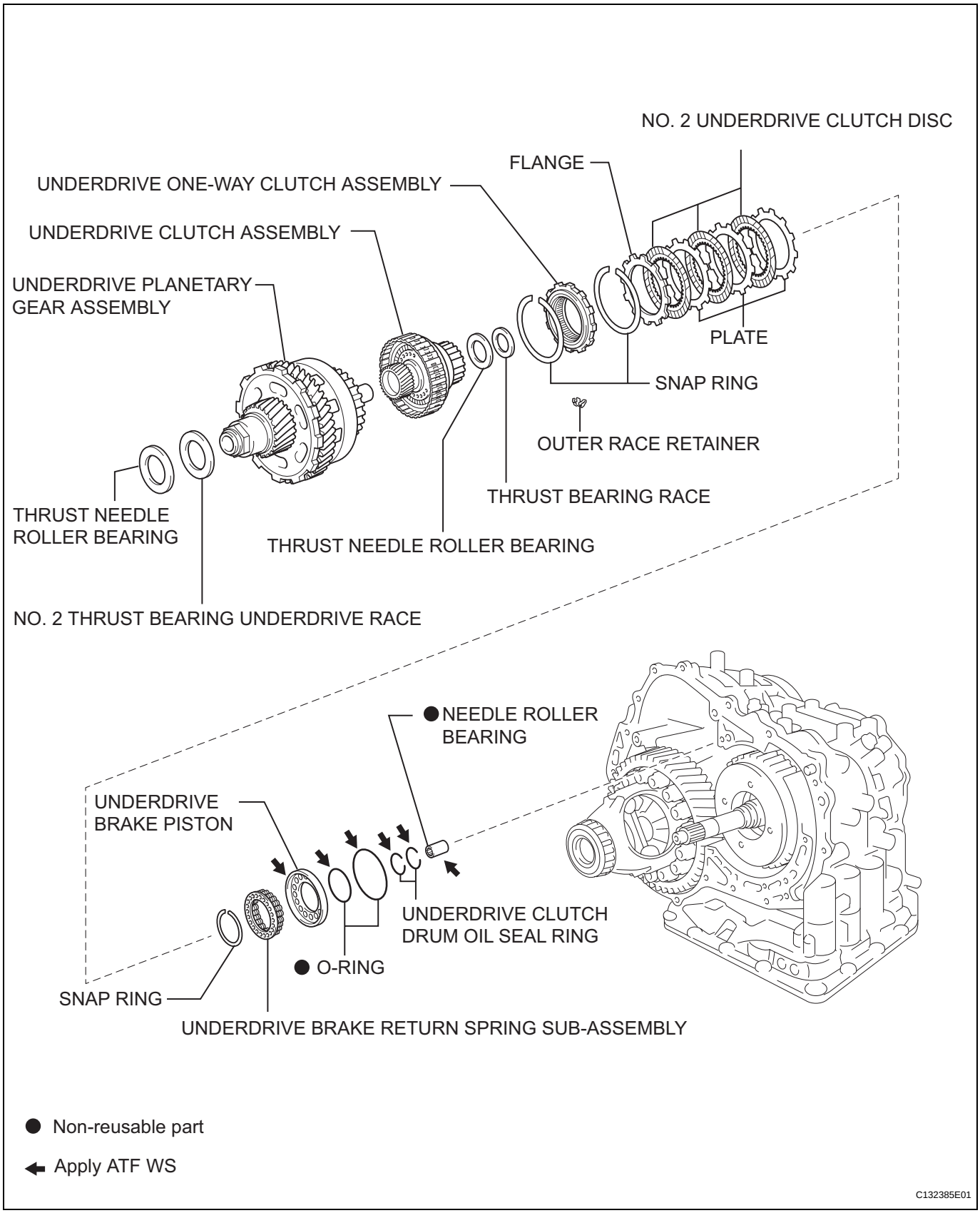

7.4 (75, 65 in.*lbf)
NO. 1 TRANSAXLE CASE PLUG
UNDERDRIVE OUTPUT SHAFT OIL SEAL RING
TRANSAXLE REAR COVER SUB-ASSEMBLY
UNDERDRIVE CYLINDRICAL ROLLER BEARING
7.4 (75, 65 in.*lbf)
NO. 1 TRANSAXLE CASE PLUG
AUTOMATIC TRANSAXLE CASE SUB-ASSEMBLY
Bolt A: 19 (190,14)
Other bolt: 25 (250,18)
x11
29 (296, 21)
O-RING
x8
9.8 (100, 87 in.*lbf)
O-RING
O-RING
x4
7.4 (75, 65 in.*lbf)
NO. 1 TRANSAXLE CASE PLUG
NO. 1 GOVERNOR APPLY GASKET
x3
29 (296, 21)
TRANSAXLE APPLY TUBE CLAMP
x5
22 (225, 16)
DIFFERENTIAL GEAR LUBE APPLY TUBE
TRANSAXLE CASE 2ND BRAKE GASKET
TRANSAXLE HOUSING
BRAKE DRUM GASKET
MANUAL VALVE LEVER SHAFT RETAINER SPRING
SPACER
SLOTTED SPRING PIN
MANUAL VALVE LEVER SHAFT
MANUAL VALVE LEVER SUB-ASSEMBLY
MANUAL VALVE LEVER SHAFT OIL SEAL
PARK/NEUTRAL POSITION SWITCH ASSEMBLY
5.4 (55, 48 in.*lbf)
6.9 (70, 61 in.*lbf)
CONTROL SHAFT LEVER
LOCK PLATE
13 (130, 9)
WASHER
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
Precoated part
Apply ATF WS
Apply MP grease
C132381E01

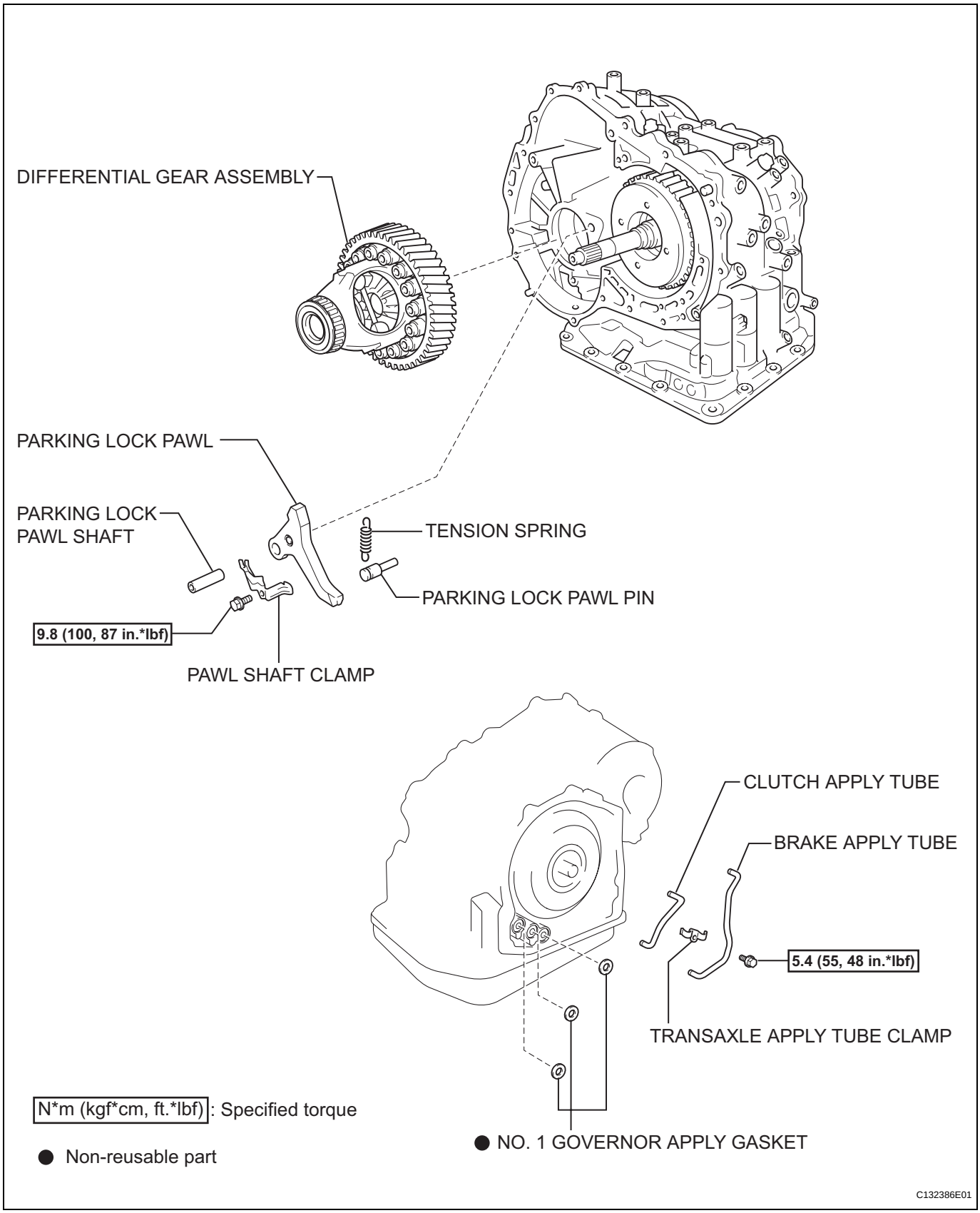

TRANSMISSION VALVE BODY ASSEMBLY
11 (110, 8)
x17
PARKING LOCK ROD SUB-ASSEMBLY
PARKING LOCK PAWL BRACKET
20 (205, 15)
MANUAL DETENT SPRING SUB-ASSEMBLY
VALVE BODY OIL STRAINER ASSEMBLY
O-RING
11 (110, 8)
12 (120, 9)
20 (205, 15)
COMPRESSION SPRING
C-3 ACCUMULATOR PISTON
AUTOMATIC TRANSAXLE OIL PAN GASKET
TRANSMISSION OIL CLEANER MAGNET
SPRING
CHECK BALL BODY
COMPRESSION SPRING
O-RING
REVERSE CLUTCH ACCUMULATOR PISTON
COMPRESSION SPRING
O-RING
B-3 ACCUMULATOR PISTON
x18
AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY
7.8 (80, 69 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
Precoated part
Apply ATF WS
C132382E01

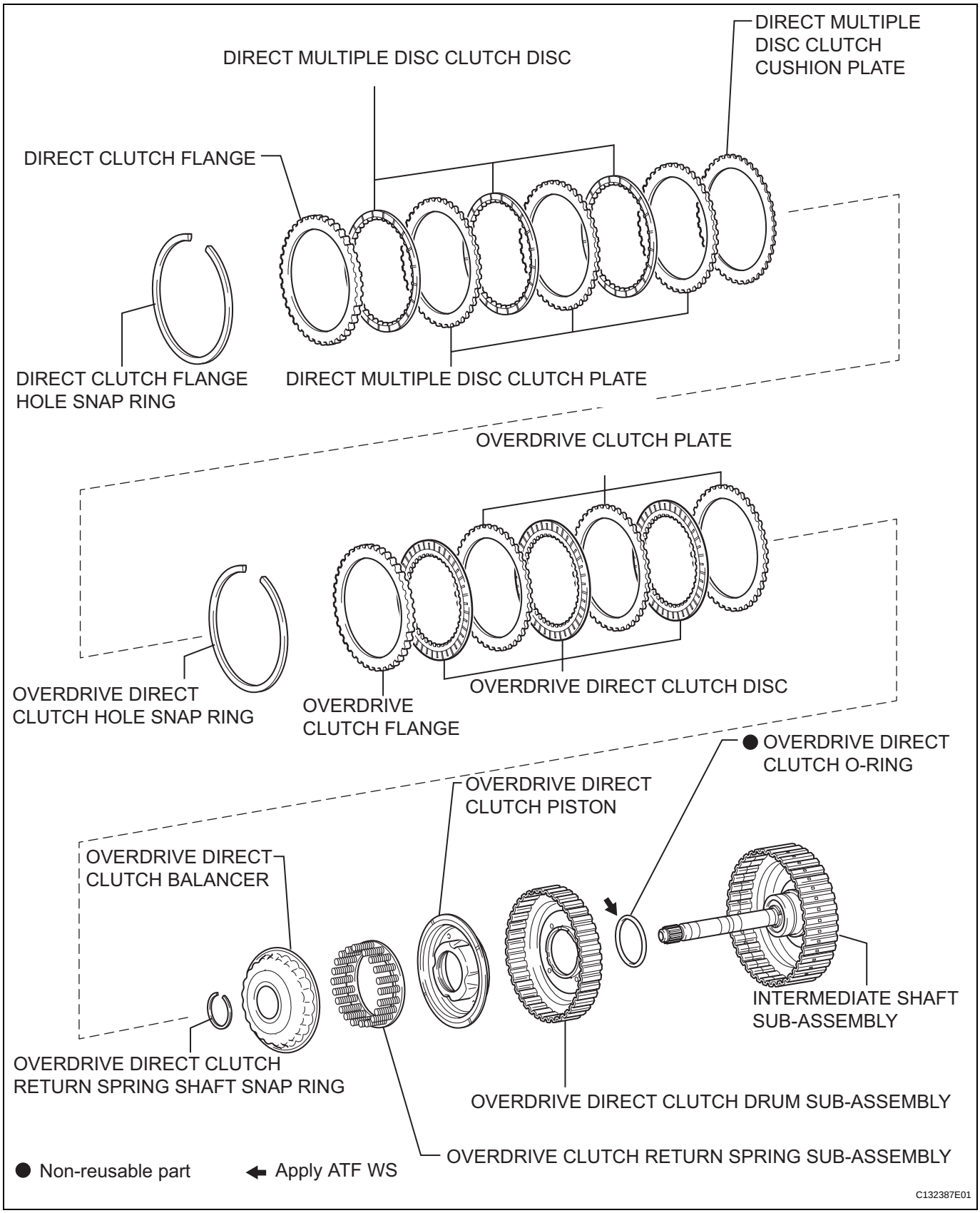

FORWARD CLUTCH ASSEMBLY
OIL PUMP ASSEMBLY
22 (225, 16)
x7
THRUST NEEDLE ROLLER BEARING
● OVERDRIVE BRAKE GASKET
● WASHER
185 (1,886, 136) to 350 (3,569, 258)
NUT
NO. 1 THRUST BEARING RACE
COUNTER DRIVE GEAR
COUNTER DRIVE ANGULAR BALL BEARING (FRONT SIDE)
THRUST NEEDLE ROLLER BEARING
MULTIPLE DISC CLUTCH HUB
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Apply ATF WS
C132383E01

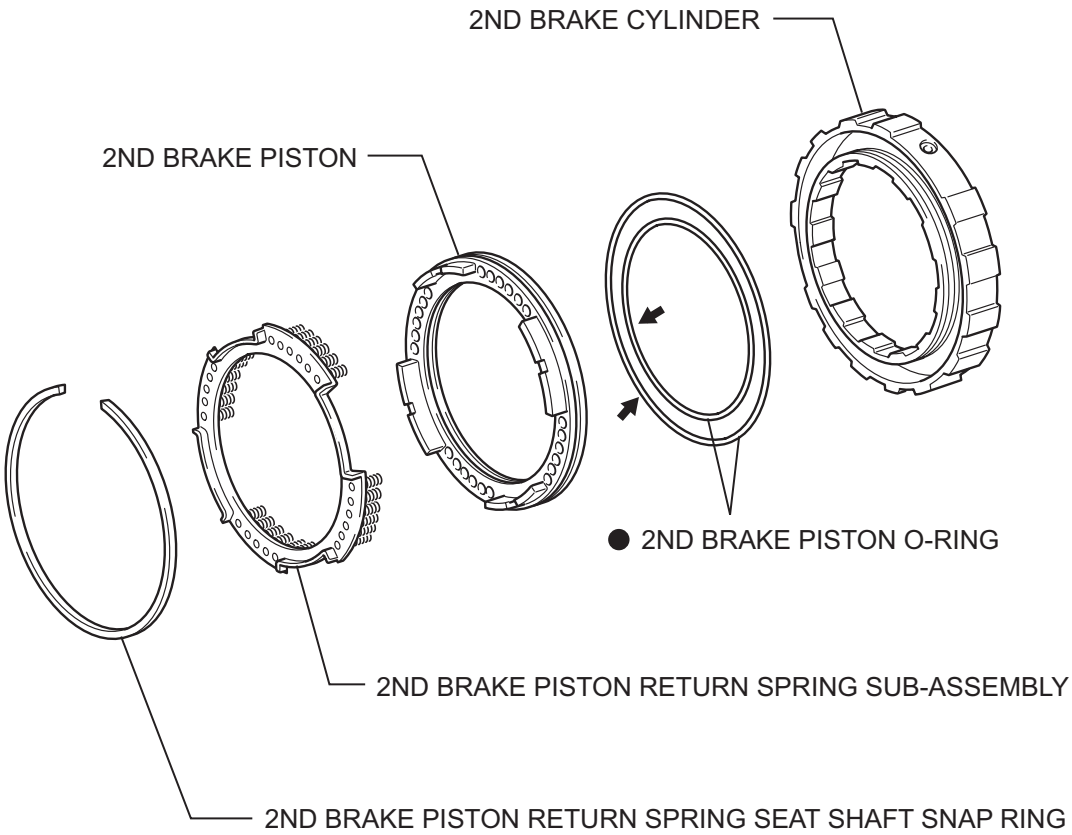

1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY
PLATE
FLANGE
1ST AND REVERSE BRAKE PISTON
O-RING
SNAP RING
1ST AND REVERSE BRAKE DISC
SNAP RING
COUNTER DRIVE ANGULAR BALL BEARING (REAR SIDE)
BRAKE HUB
SNAP RING
PLATE
FRONT PLANETARY GEAR ASSEMBLY
FRONT PLANETARY RING GEAR
SNAP RING
REAR PLANETARY SUN GEAR ASSEMBLY
FLANGE
2ND BRAKE DISC
NO. 2 PLANETARY CARRIER THRUST WASHER
SECOND BRAKE PISTON ASSEMBLY
ONE-WAY CLUTCH ASSEMBLY
REAR PLANETARY GEAR ASSEMBLY
ONE-WAY CLUTCH
SLEEVE
NO. 3 THRUST BEARING RACE
THRUST BEARING RACE
NO. 2 THRUST BEARING RACE
THRUST NEEDLE ROLLER BEARING
INPUT SUN GEAR
SNAP RING
ONE-WAY CLUTCH INNER RACE
THRUST NEEDLE ROLLER BEARING
NO. 1 PLANETARY CARRIER THRUST WASHER
NO. 2 THRUST BEARING RACE
THRUST BEARING
THRUST BEARING
OVERDRIVE DIRECT CLUTCH
HUB SUB-ASSEMBLY
REAR CLUTCH OIL SEAL RING
NEEDLE ROLLER BEARING
THRUST BEARING RACE
DIRECT CLUTCH ASSEMBLY
TRANSAXLE REAR COVER SUB-ASSEMBLY
● Non-reusable part
← Apply ATF WS
C132384E01

AX


NO. 2 UNDERDRIVE CLUTCH DISC
FLANGE
UNDERDRIVE ONE-WAY CLUTCH ASSEMBLY
UNDERDRIVE CLUTCH ASSEMBLY
UNDERDRIVE PLANETARY GEAR ASSEMBLY
PLATE
SNAP RING
OUTER RACE RETAINER
THRUST BEARING RACE
THRUST NEEDLE ROLLER BEARING
THRUST NEEDLE ROLLER BEARING
NO. 2 THRUST BEARING UNDERDRIVE RACE
● NEEDLE ROLLER BEARING
UNDERDRIVE BRAKE PISTON
UNDERDRIVE CLUTCH DRUM OIL SEAL RING
● O-RING
SNAP RING
UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY
● Non-reusable part
Apply ATF WS
C132385E01


DIFFERENTIAL GEAR ASSEMBLY
PARKING LOCK PAWL
PARKING LOCK PAWL SHAFT
TENSION SPRING
PARKING LOCK PAWL PIN
9.8 (100, 87 in.*lbf)
PAWL SHAFT CLAMP
CLUTCH APPLY TUBE
BRAKE APPLY TUBE
5.4 (55, 48 in.*lbf)
TRANSAXLE APPLY TUBE CLAMP
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
● NO. 1 GOVERNOR APPLY GASKET
C132386E01


DIRECT MULTIPLE DISC CLUTCH DISC
DIRECT MULTIPLE DISC CLUTCH CUSHION PLATE
DIRECT CLUTCH FLANGE
DIRECT CLUTCH FLANGE HOLE SNAP RING
DIRECT MULTIPLE DISC CLUTCH PLATE
OVERDRIVE CLUTCH PLATE
OVERDRIVE DIRECT CLUTCH HOLE SNAP RING
OVERDRIVE CLUTCH FLANGE
OVERDRIVE DIRECT CLUTCH DISC
● OVERDRIVE DIRECT CLUTCH O-RING
OVERDRIVE DIRECT CLUTCH PISTON
OVERDRIVE DIRECT CLUTCH BALANCER
INTERMEDIATE SHAFT SUB-ASSEMBLY
OVERDRIVE DIRECT CLUTCH RETURN SPRING SHAFT SNAP RING
OVERDRIVE DIRECT CLUTCH DRUM SUB-ASSEMBLY
OVERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY
● Non-reusable part
Apply ATF WS
C132387E01

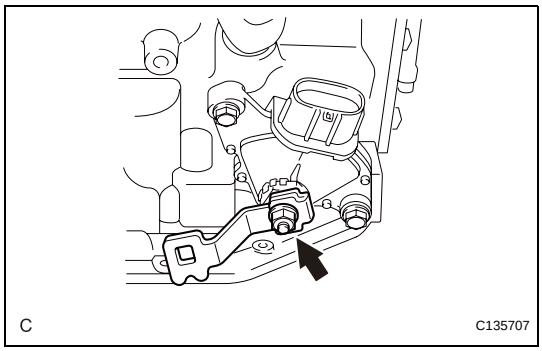


● Non-reusable part

⬅ Apply ATF WS

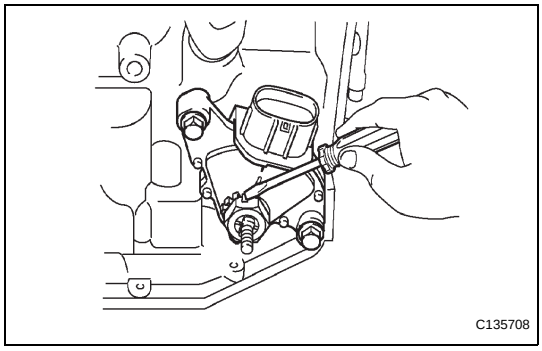
C132388E01

DISASSEMBLY

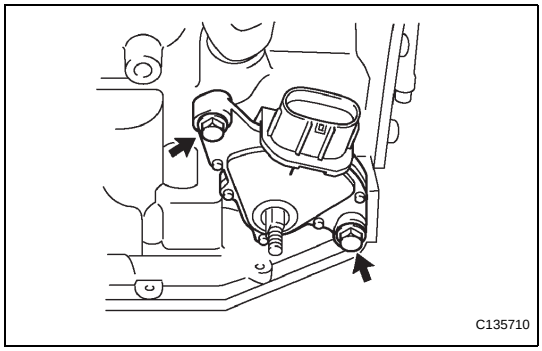


1. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

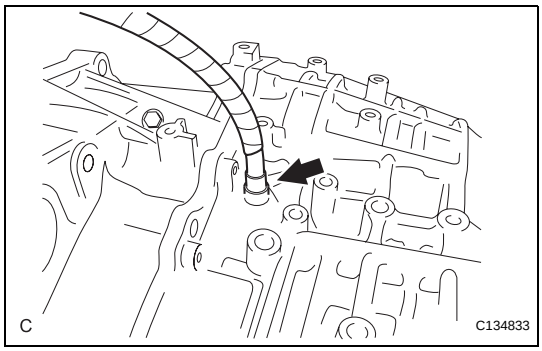
(a) Remove the nut, washer, and control shaft lever.



(b) Using a screwdriver, unstake the lock plate, and remove the lock nut and nut stopper.

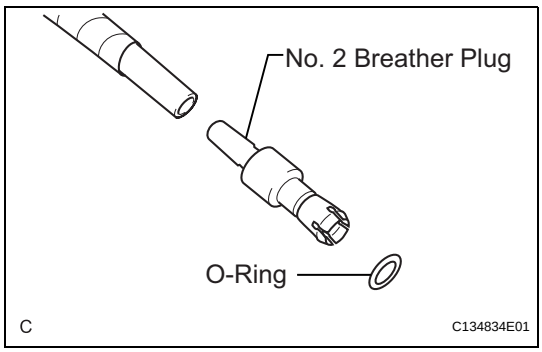


(c) Remove the 2 bolts and pull out the park/neutral position switch.

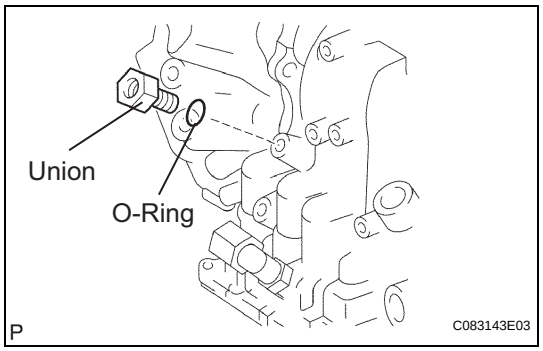


2. REMOVE NO. 2 BREATHER PLUG

(a) Remove the No. 2 breather plug from the transaxle case.

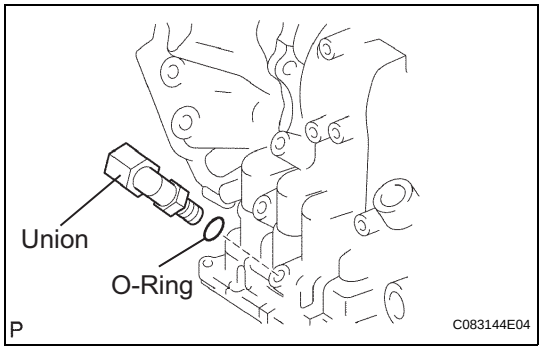


(b) Remove the hose and O-ring from the No. 2 breather plug.



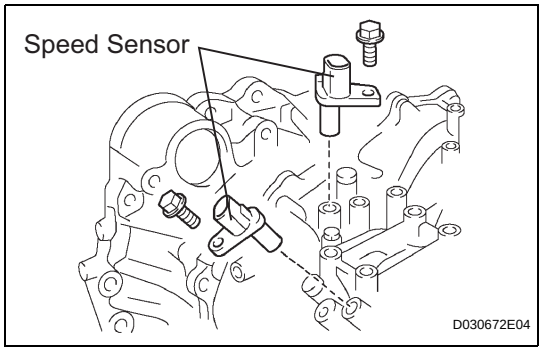
3. REMOVE OIL COOLER TUBE UNION (INLET OIL COOLER UNION)

(a) Remove the union.
(b) Remove the O-ring from the union.



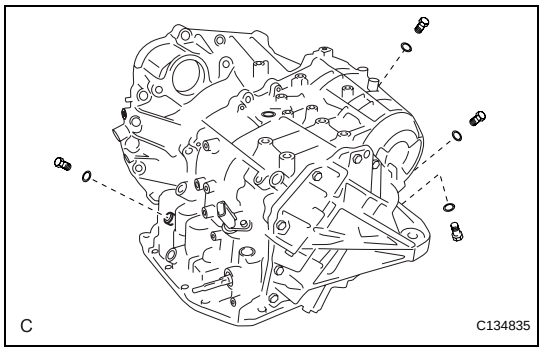
4. REMOVE OIL COOLER TUBE UNION (OUTLET OIL COOLER UNION)

(a) Remove the union.
(b) Remove the O-ring from the union.



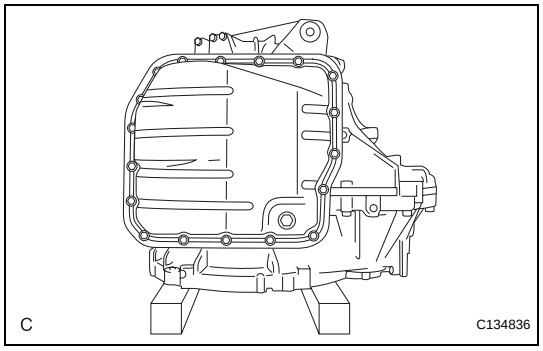
5. REMOVE SPEED SENSOR

(a) Remove the 2 bolts and the 2 speed sensors from the transaxle assembly.



6. REMOVE NO. 1 TRANSAXLE CASE PLUG

(a) Remove the 4 No. 1 transaxle case plugs from the transaxle case.
(b) Remove the 4 O-rings from the 4 No. 1 transaxle case plugs.

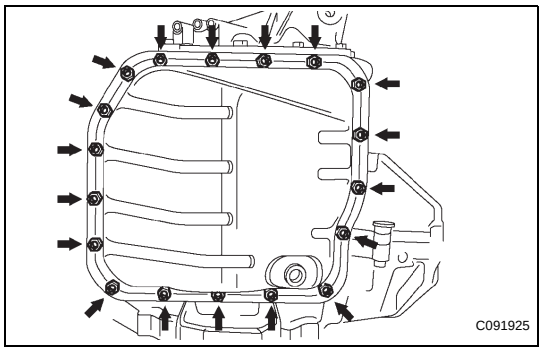


7. FIX AUTOMATIC TRANSAXLE ASSEMBLY

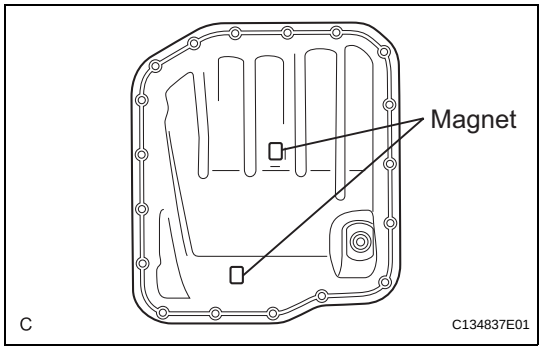
(a) Fix the transaxle assembly.

8. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

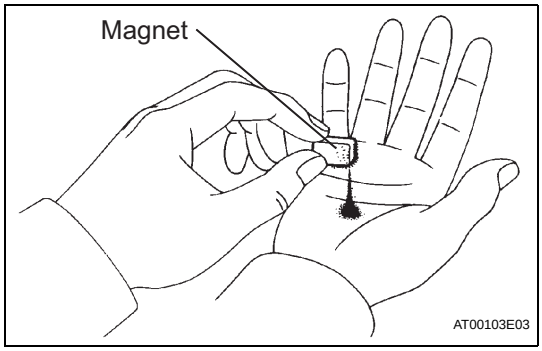
(a) Remove the drain plug and drain plug gasket from the oil pan.



(b) Remove the 18 bolts, oil pan, and gasket.



(c) Remove the 2 transmission oil cleaner magnets from the oil pan.

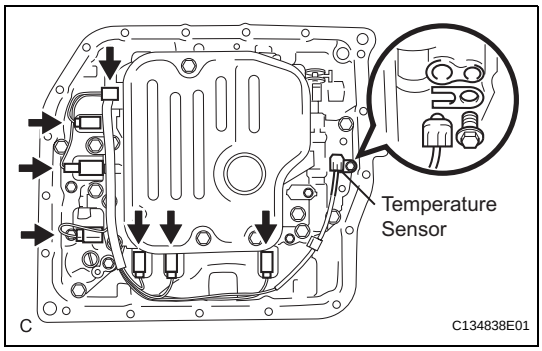


9. INSPECT TRANSMISSION OIL CLEANER MAGNET

(a) Remove the magnets and use them to collect any steel chips. Examine the chips and particles in the pan and on the magnet to determine what type of wear has occurred in the transaxle:

Result:

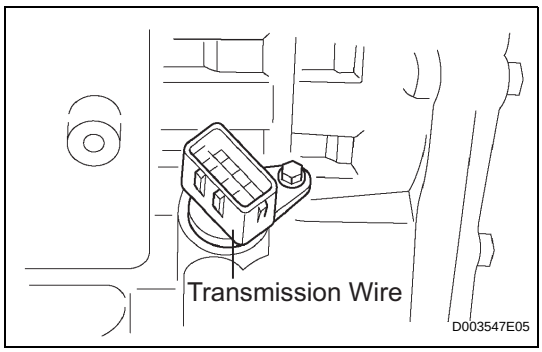
Steel (magnetic):
bearing, gear, and plate wear
Brass (non-magnetic):
bushing wear



10. DISCONNECT TRANSMISSION WIRE

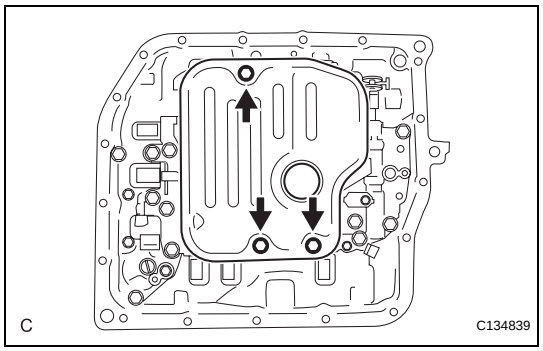
(a) Disconnect the 7 connectors from the shift solenoid valves.

(b) Remove the bolt, lock plate, and ATF temperature sensor.



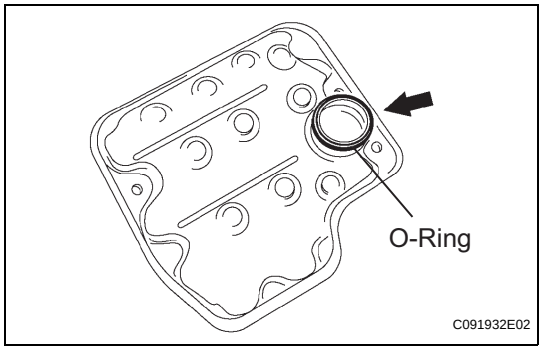
11. REMOVE TRANSMISSION WIRE

(a) Remove the bolt and transmission wire from the transaxle case.

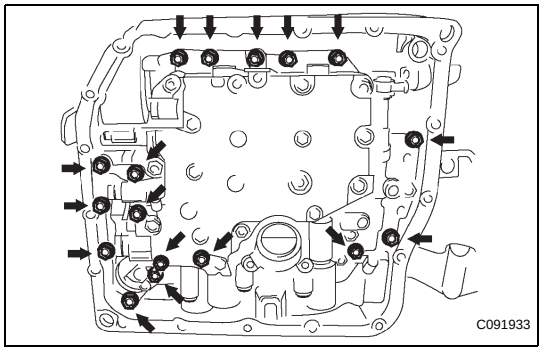


12. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

(a) Remove the 3 bolts and oil strainer.

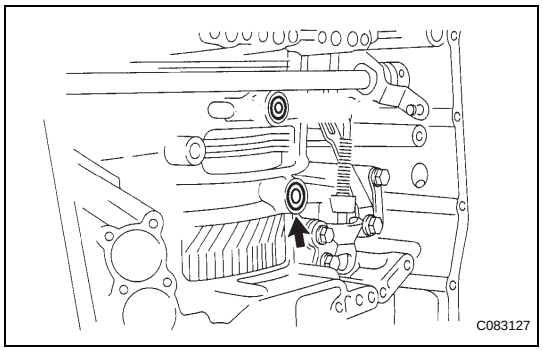


(b) Remove the O-ring from the oil strainer.



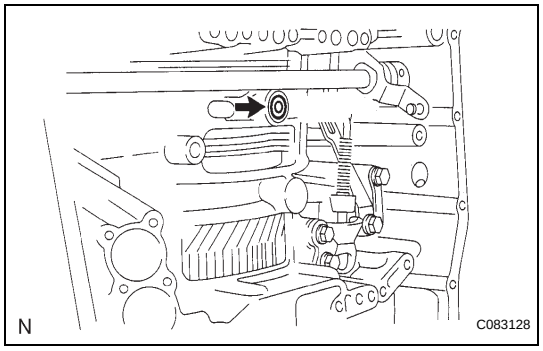
13. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Support the valve body assembly and remove the 17 bolts and valve body assembly.



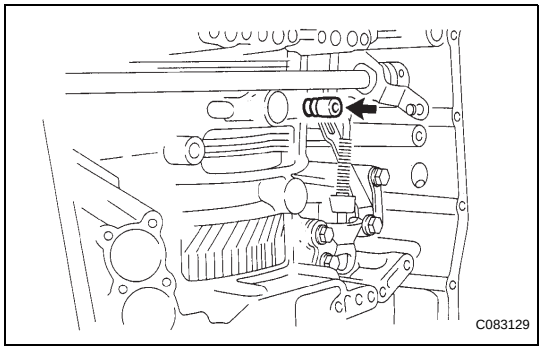
14. REMOVE NO. 1 GOVERNOR APPLY GASKET

(a) Remove the No. 1 governor apply gasket from the transaxle case.



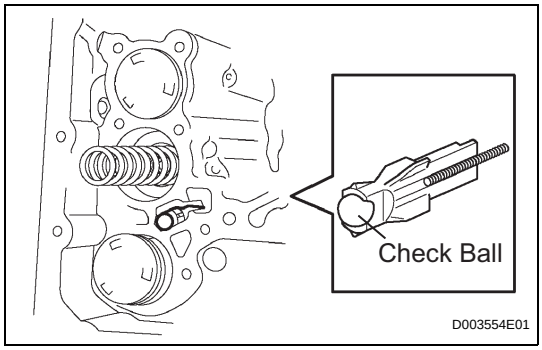
15. REMOVE TRANSAXLE CASE 2ND BRAKE GASKET

(a) Remove the transaxle case 2nd brake gasket from the transaxle case.



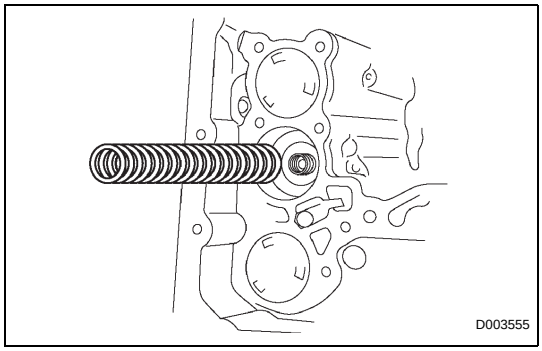
16. REMOVE BRAKE DRUM GASKET

(a) Remove the brake drum gasket from the transaxle case.



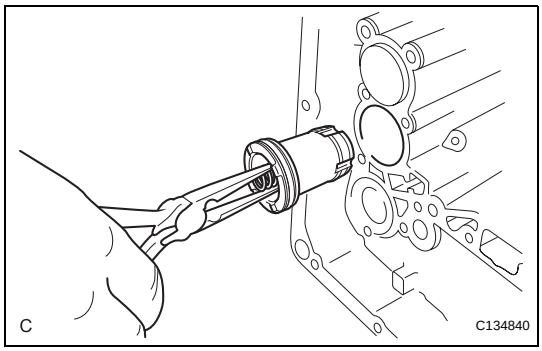
17. REMOVE CHECK BALL BODY

(a) Remove the check ball body and spring from the transaxle case.

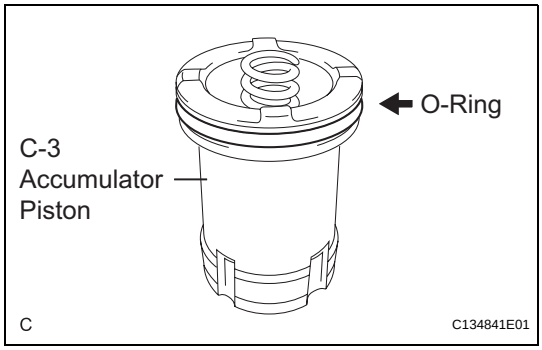


18. REMOVE C-3 ACCUMULATOR PISTON

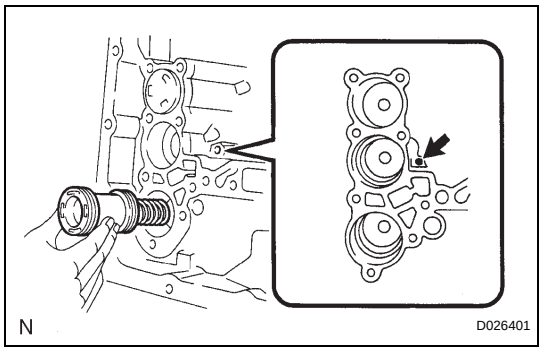
(a) Remove the spring from the C-3 accumulator piston.



(b) Using needle-nose pliers, remove the the C-3 accumulator piston from the transaxle case.



(c) Remove the O-ring from the C-3 accumulator piston.



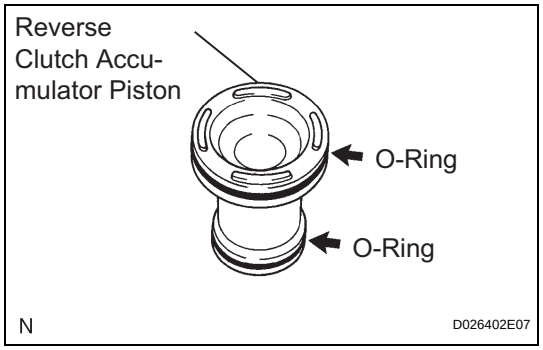
19. REMOVE REVERSE CLUTCH ACCUMULATOR PISTON

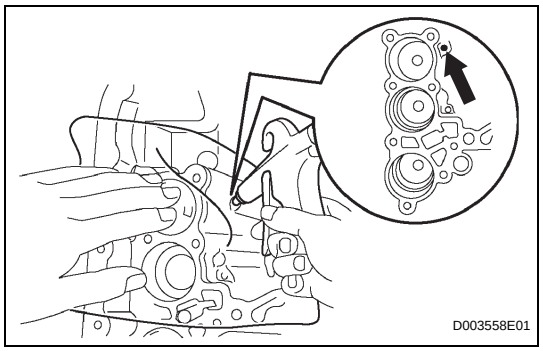
(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the reverse accumulator piston and spring.

NOTICE:

- **Applying compressed air may cause the piston to jump-out. When removing the piston, hold it by hand using a waste cloth.**
- **Take care not to splash ATF when applying the air.**

(b) Remove the 2 O-rings from the reverse clutch accumulator piston.





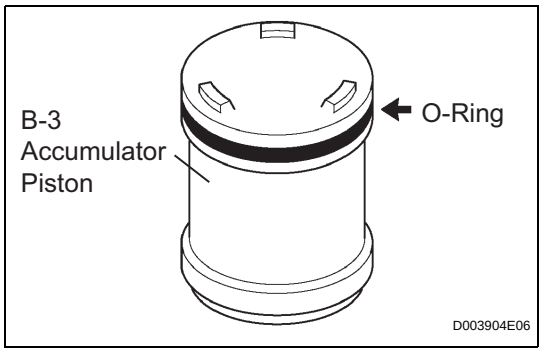
20. REMOVE B-3 ACCUMULATOR PISTON

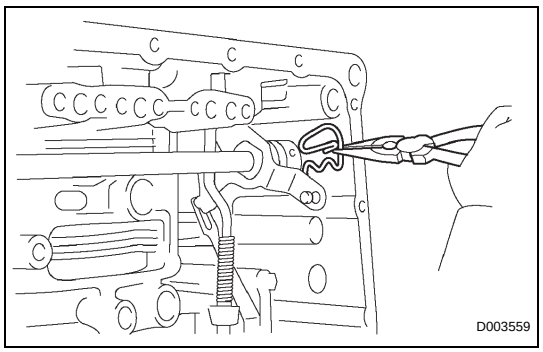
(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the B-3 accumulator piston and 2 springs.

NOTICE:

- **Applying compressed air may cause the piston to jump-out. When removing the piston, hold it by hand using a waste cloth.**
- **Take care not to splash ATF when applying the air.**

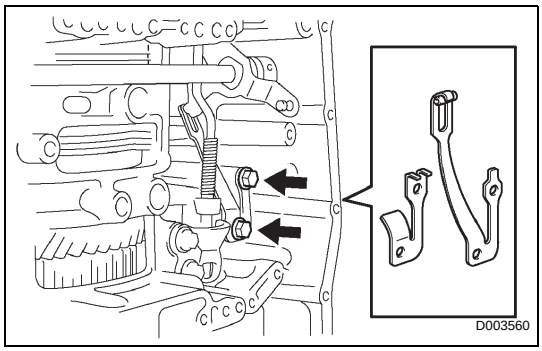
(b) Remove the O-ring from the B-3 accumulator piston.





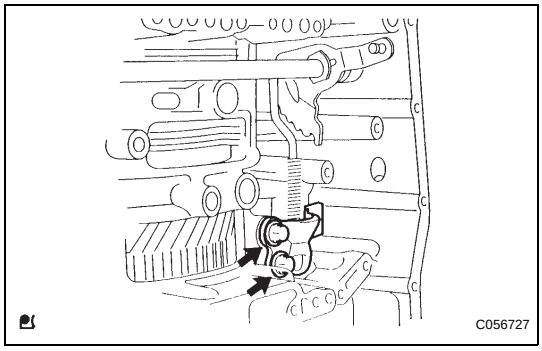
21. REMOVE MANUAL VALVE LEVER SHAFT RETAINER SPRING

(a) Using needle-nose pliers, remove the manual valve lever shaft retainer spring.



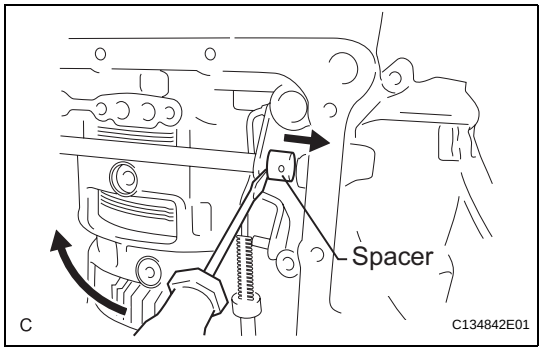
22. REMOVE MANUAL DETENT SPRING SUB-ASSEMBLY

(a) Remove the 2 bolts and manual detent spring sub-assembly.



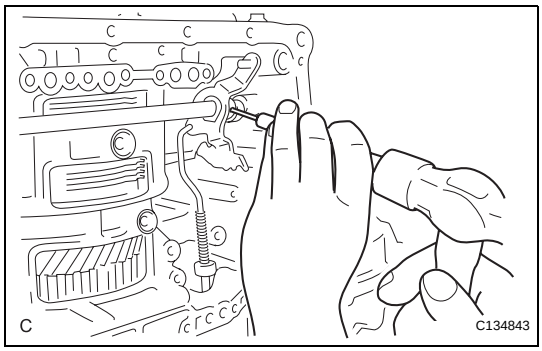
23. REMOVE PARKING LOCK PAWL BRACKET

(a) Remove the 2 bolts and parking lock pawl bracket.

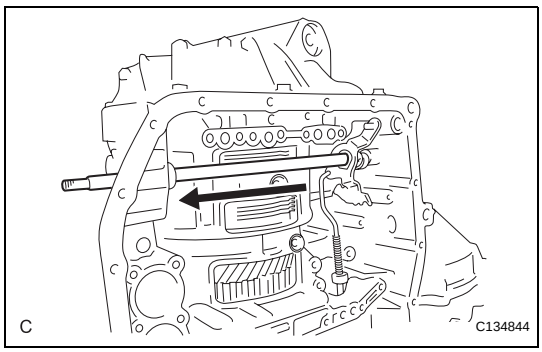


24. REMOVE MANUAL VALVE LEVER SUB-ASSEMBLY

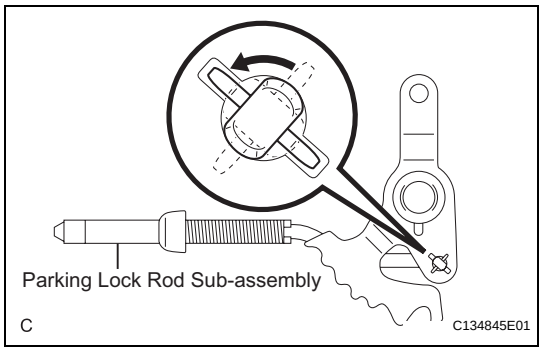
(a) Using a screwdriver, slide the spacer.



(b) Using a pin punch (ϕ3 mm) and hammer, drive out the pin.
HINT:
Slowly drive out the pin so that it will not fall into the transaxle case.

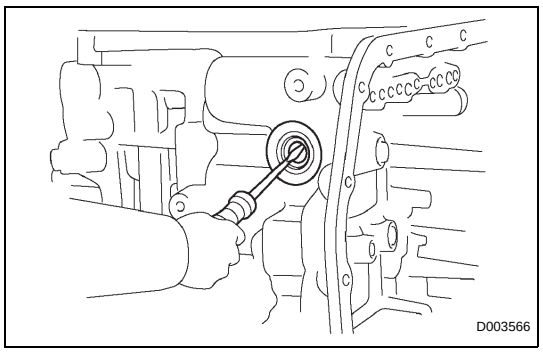


(c) Remove the manual valve lever shaft, manual valve lever, and spacer.



25. REMOVE PARKING LOCK ROD SUB-ASSEMBLY

(a) Remove the parking lock rod sub-assembly from the manual valve lever sub-assembly.
HINT:
Align the dial with the notches on the manual valve lever sub-assembly to remove the parking lock rod sub-assembly.



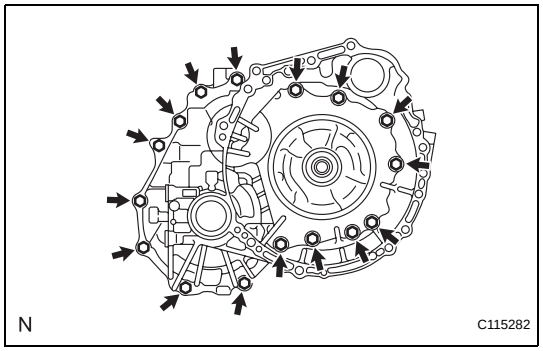
26. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

(a) Using a screwdriver, remove the oil seal from the transaxle case.

27. FIX AUTOMATIC TRANSAXLE ASSEMBLY

(a) Fix the transaxle case with the oil pump side facing up.

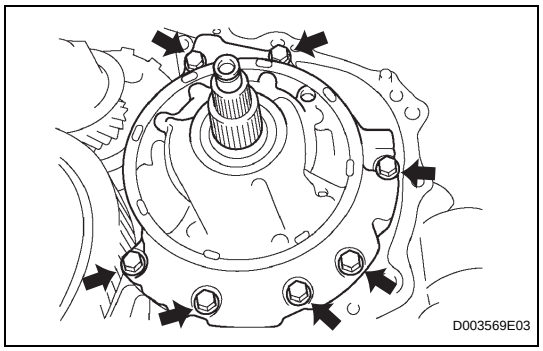
28. INSPECT INPUT SHAFT END PLAY (See page AX-231)



29. REMOVE TRANSAXLE HOUSING

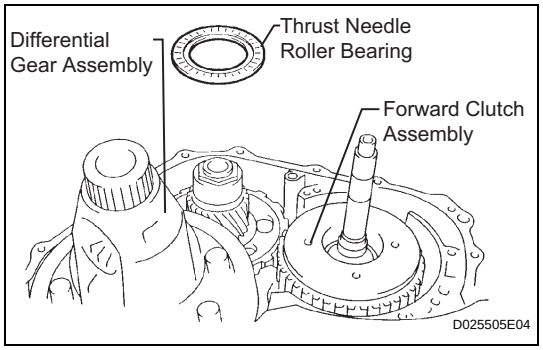
(a) Remove the 16 bolts.

(b) Tap on the circumference of the transaxle housing with a plastic hammer to remove the transaxle housing from the transaxle case.
NOTICE:
The differential may be accidentally removed when the transaxle housing is removed.



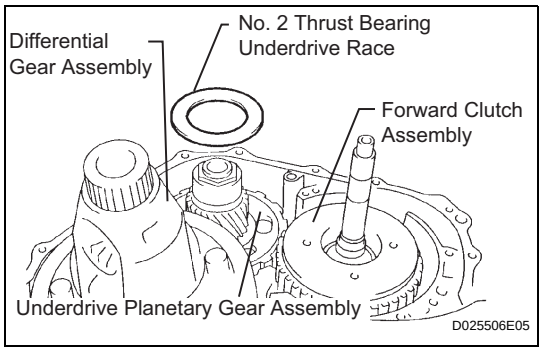
30. REMOVE OIL PUMP ASSEMBLY

(a) Remove the 7 bolts and oil pump from the transaxle case.



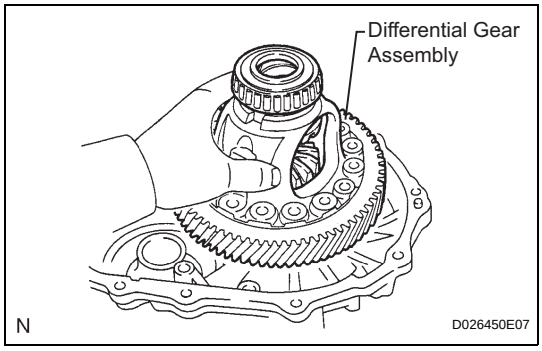
31. REMOVE THRUST NEEDLE ROLLER BEARING

(a) Remove the thrust needle roller bearing from the underdrive planetary gear assembly.



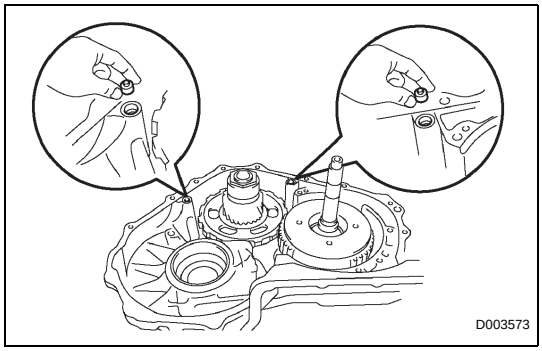
32. REMOVE NO. 2 THRUST BEARING UNDERDRIVE RACE

(a) Remove the No. 2 thrust bearing underdrive race from the underdrive planetary gear assembly.



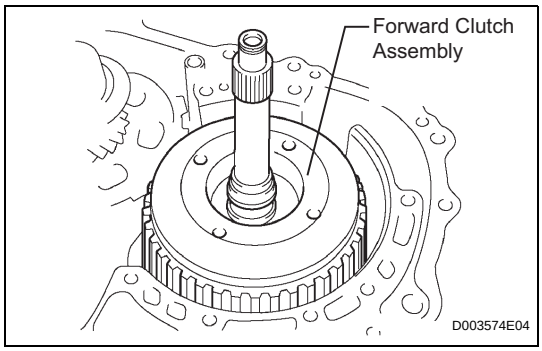
33. REMOVE DIFFERENTIAL GEAR ASSEMBLY

(a) Remove the differential gear assembly from the transaxle case.



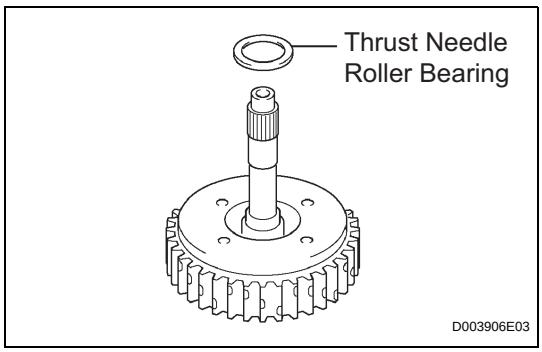
34. REMOVE OVERDRIVE BRAKE GASKET

(a) Remove the 2 overdrive brake gaskets from the transaxle case.

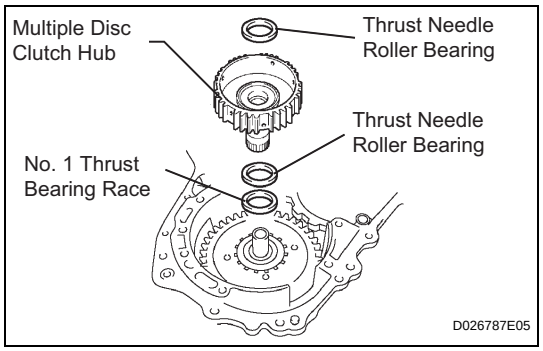


35. REMOVE FORWARD CLUTCH ASSEMBLY

(a) Remove the forward clutch assembly from the transaxle case.



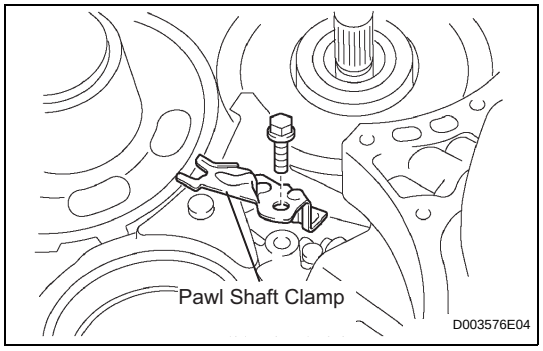
(b) Remove the thrust needle roller bearing from the forward clutch.



36. REMOVE MULTIPLE DISC CLUTCH HUB

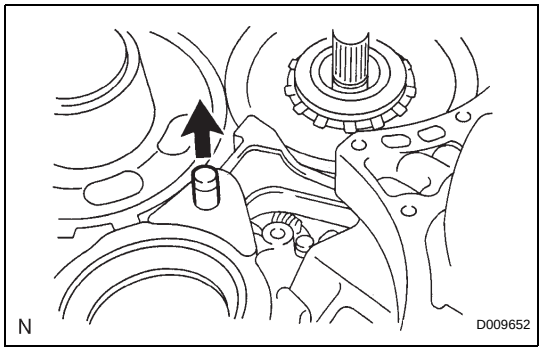
(a) Remove the thrust needle roller bearing, multiple disc clutch hub, thrust needle roller bearing and No. 1 thrust bearing race from the transaxle case.

37. INSPECT MULTIPLE DISC CLUTCH HUB (See page AX-228)

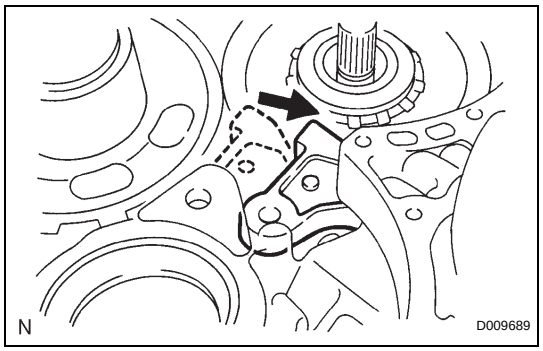


38. REMOVE UNDERDRIVE PLANETARY GEAR ASSEMBLY

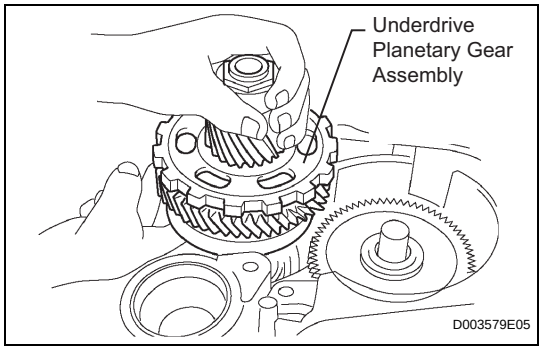
(a) Remove the bolt and pawl shaft clamp from the transaxle case.



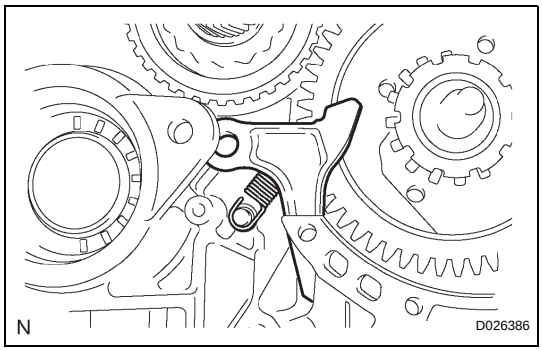
(b) Remove the parking lock pawl shaft from the transaxle case.



(c) Push the parking lock pawl.
HINT:
Failure to do so will cause interference when the underdrive planetary gear is removed.

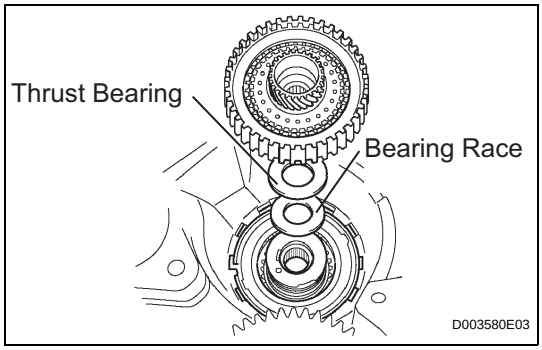


(d) Remove the underdrive planetary gear assembly from the transaxle case.
NOTICE:
Do not drop the underdrive planetary gear assembly.



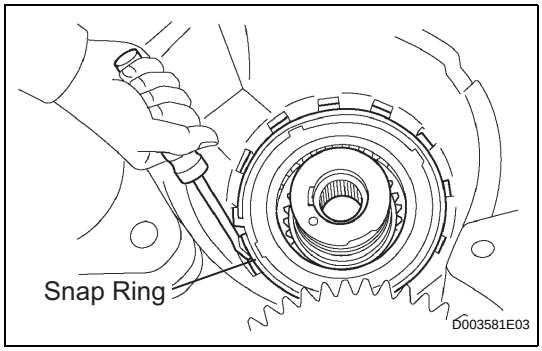
39. REMOVE PARKING LOCK PAWL

(a) Remove the spring, pawl pin and parking lock pawl.



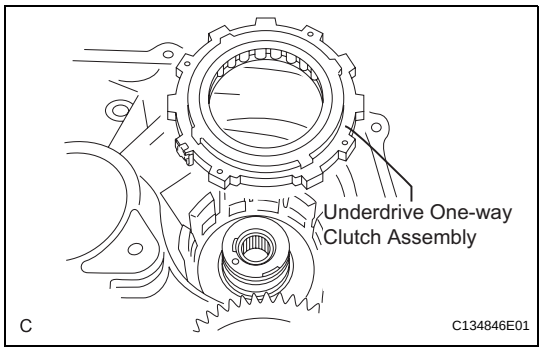
40. REMOVE UNDERDRIVE CLUTCH ASSEMBLY

(a) Remove the underdrive clutch assembly, thrust bearing, and bearing race from the transaxle case.

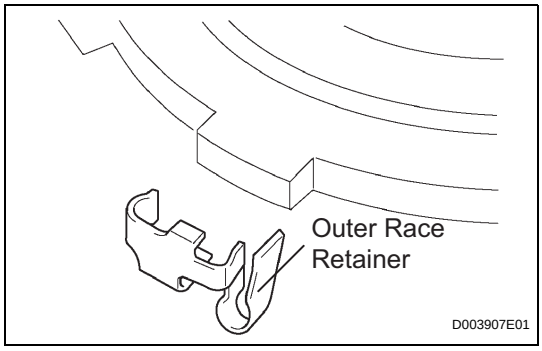


41. REMOVE UNDERDRIVE ONE-WAY CLUTCH ASSEMBLY

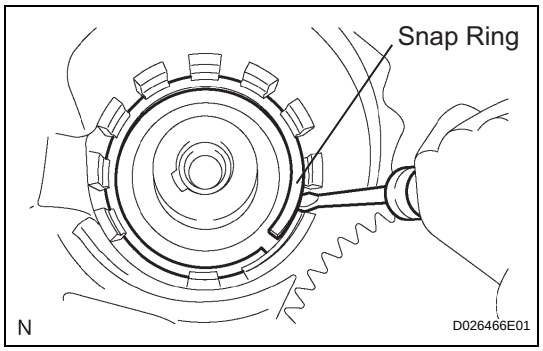
(a) Using a screwdriver, remove the snap ring from the transaxle case.



(b) Remove the underdrive one-way clutch from the transaxle case.

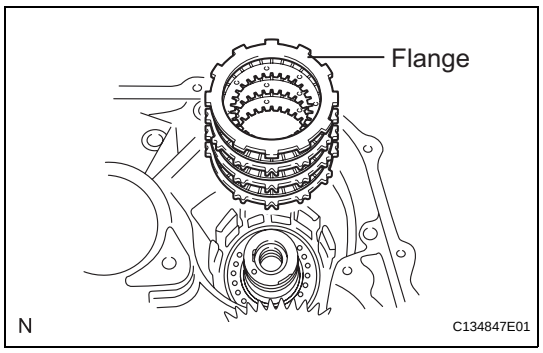


(c) Remove the outer race retainer from the one-way clutch.



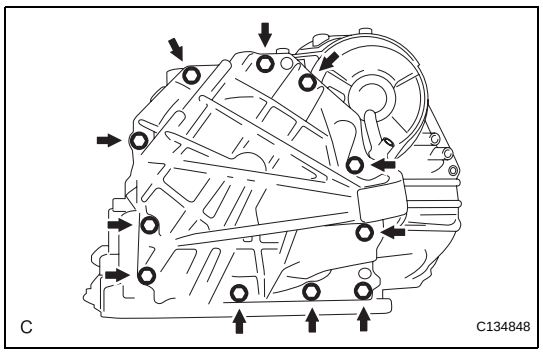
42. REMOVE NO. 2 UNDERDRIVE CLUTCH DISC

(a) Using a screwdriver, remove the snap ring.



(b) Remove the flange, 3 discs and 3 plates from the transaxle case.

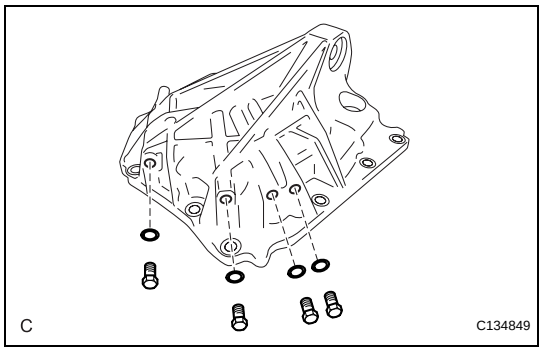
43. INSPECT NO. 2 UNDERDRIVE CLUTCH DISC (See page AX-228)



44. REMOVE TRANSAXLE REAR COVER SUB-ASSEMBLY

(a) Remove the 11 bolts.

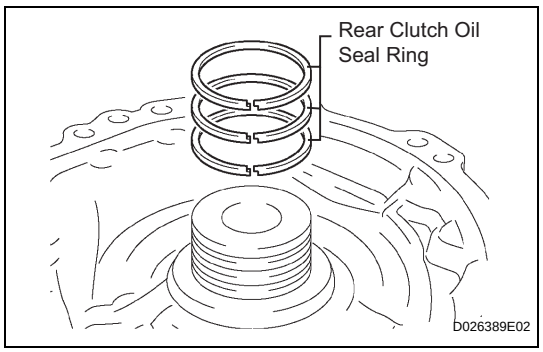
(b) Tap on the circumference of the rear cover with a plastic hammer to remove the transaxle rear cover from the transaxle case.



45. REMOVE NO. 1 TRANSAXLE CASE PLUG

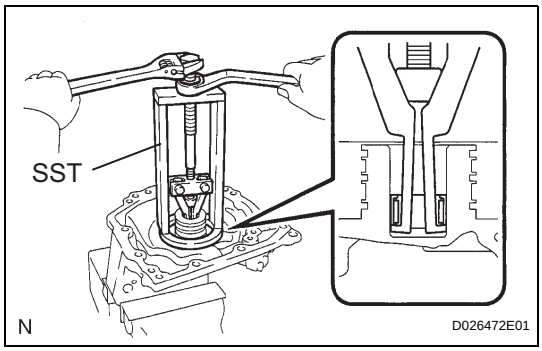
(a) Remove the 4 No. 1 transaxle case plugs from the transaxle rear cover.

(b) Remove the 4 O-rings from the 4 No. 1 transaxle case plugs.



46. REMOVE REAR CLUTCH OIL SEAL RING

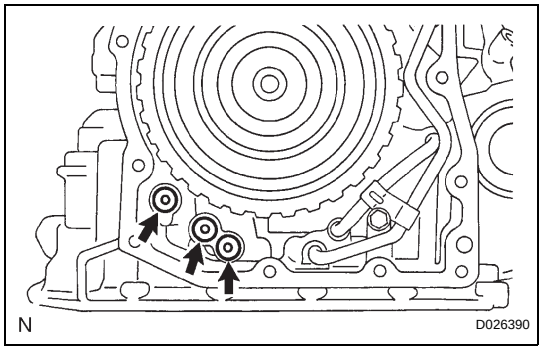
(a) Remove the 3 rear clutch oil seal rings from the transaxle rear cover.



47. REMOVE NEEDLE ROLLER BEARING

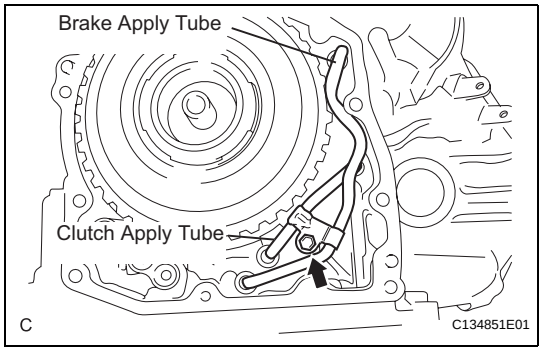
(a) Using SST, remove the needle roller bearing from the transaxle rear cover.

SST 09387-00041 (09387-01021, 09387-01030, 09387-01040)



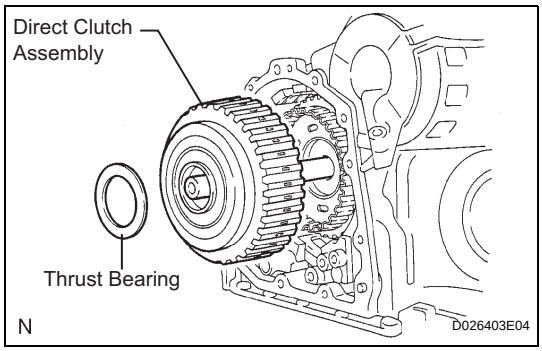
48. REMOVE NO. 1 GOVERNOR APPLY GASKET

(a) Using a screwdriver, remove the 3 apply gaskets.



49. REMOVE BRAKE APPLY TUBE

(a) Remove the bolt, clamp and brake apply tube.
(b) Remove the clutch apply tube.
(c) Remove the brake apply tube from the clamp.

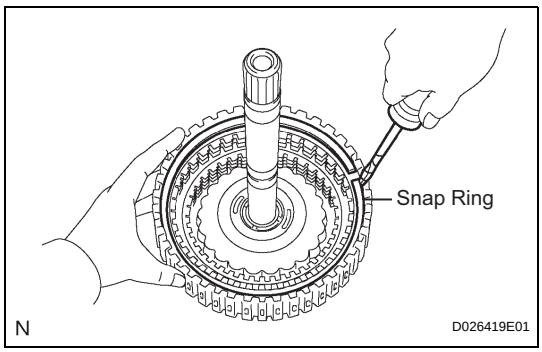


50. REMOVE DIRECT CLUTCH ASSEMBLY

(a) Remove the thrust bearing and the direct clutch assembly from the transaxle case.

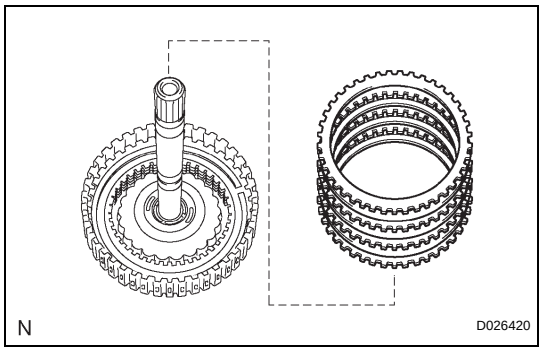
51. INSPECT PACK CLEARANCE OF DIRECT CLUTCH (See page AX-232)

52. INSPECT PACK CLEARANCE OF OVERDRIVE CLUTCH (See page AX-232)



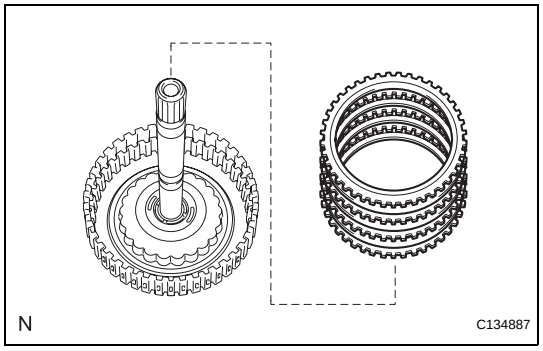
53. REMOVE DIRECT MULTIPLE DISC CLUTCH DISC

(a) Using a screwdriver, remove the snap ring from the intermediate shaft.



(b) Remove the flange, 3 discs, 3 plates and cushion plate from the intermediate shaft.

54. INSPECT DIRECT MULTIPLE DISC CLUTCH DISC (See page AX-231)

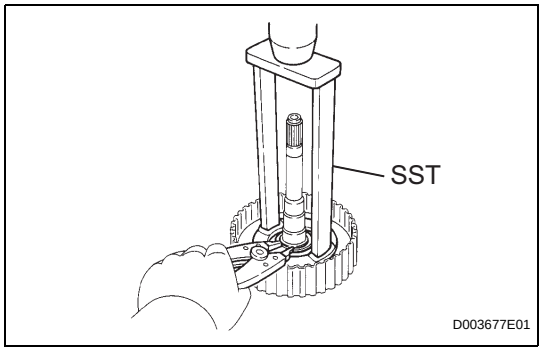


55. REMOVE OVERDRIVE DIRECT CLUTCH DISC

(a) Using a screwdriver, remove the snap ring from the intermediate shaft.

(b) Remove the flange, 3 discs and 3 plates from the intermediate shaft.

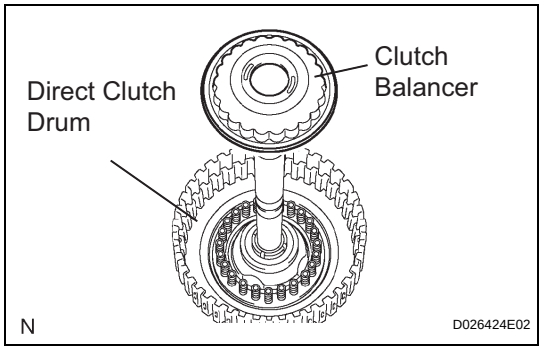
56. INSPECT OVERDRIVE DIRECT CLUTCH DISC (See page AX-231)



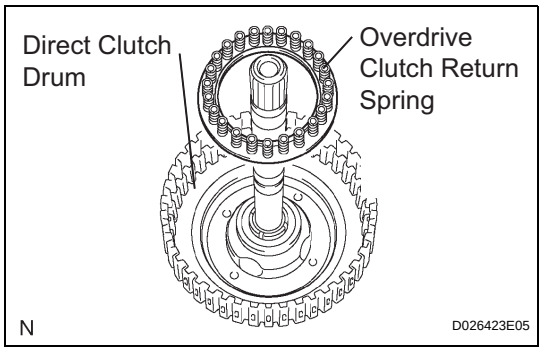
57. REMOVE OVERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Place SST on the clutch balancer and compress the spring with a press.
SST 09387-00020

(b) Using a snap ring expander, remove the snap ring from the direct clutch drum.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove. This prevents the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**

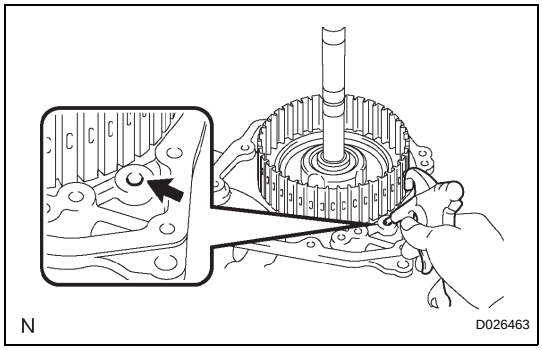


(c) Remove the clutch balancer from the overdrive direct clutch drum.



(d) Remove the overdrive clutch return spring from the overdrive direct clutch drum.

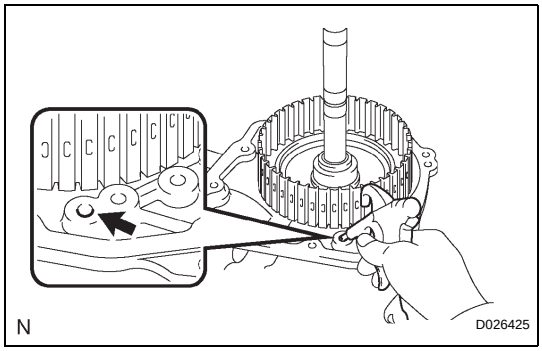
58. INSPECT OVERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY (See page AX-231)



59. REMOVE OVERDRIVE DIRECT CLUTCH PISTON

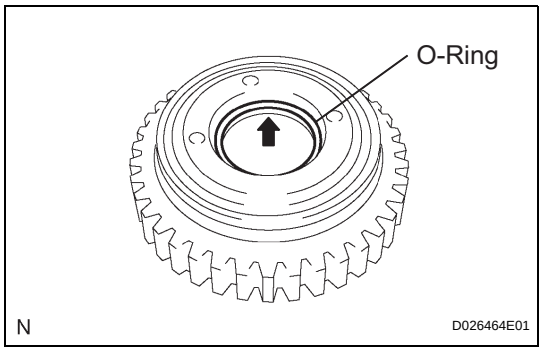
(a) Install the intermediate shaft on the transaxle rear cover.

(b) Holding the direct clutch piston by hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle rear cover to remove the direct clutch piston.



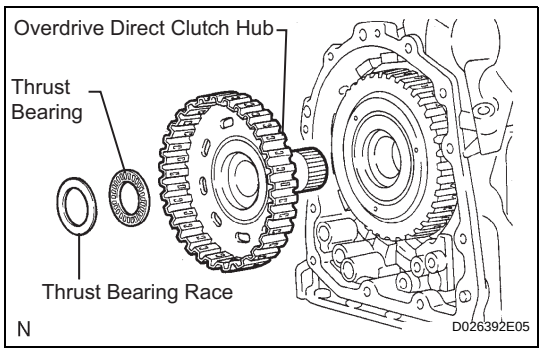
60. REMOVE OVERDRIVE DIRECT CLUTCH DRUM SUB-ASSEMBLY

(a) Holding the direct clutch drum by hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle rear cover to remove the direct clutch drum.



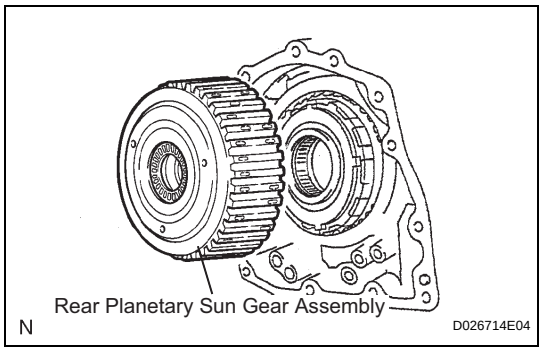
61. REMOVE OVERDRIVE DIRECT CLUTCH O-RING

(a) Using a screwdriver, remove the O-ring from the direct clutch drum.



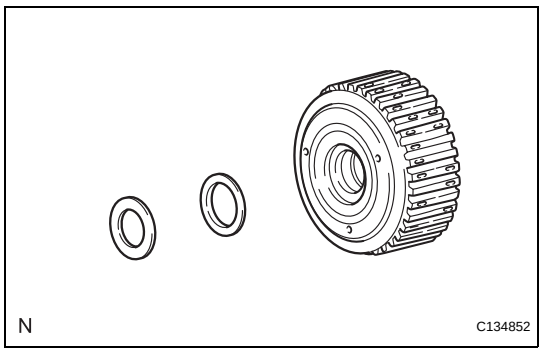
62. REMOVE OVERDREVE DIRECT CLUTCH HUB SUB-ASSEMBLY

(a) Remove the thrust bearing race, thrust bearing, and overdrive direct clutch hub from the planetary gear assembly.

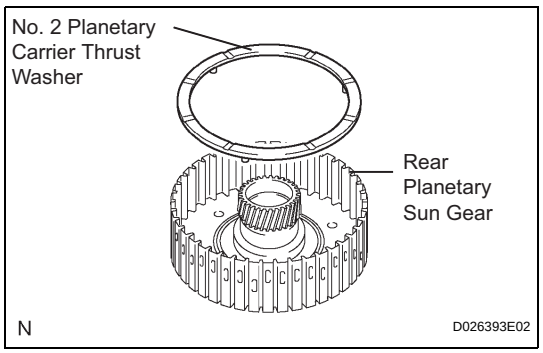


63. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

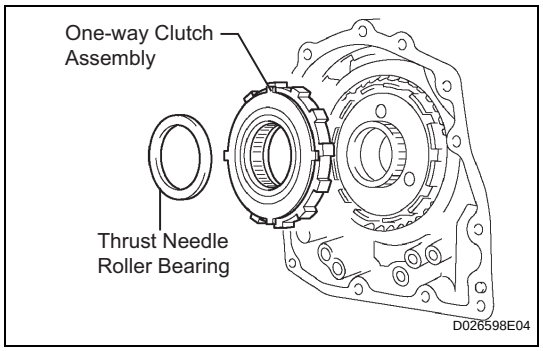
(a) Remove the rear planetary sun gear assembly from the transaxle case.



(b) Remove the thrust needle roller bearing and thrust bearing race from the rear planetary sun gear assembly.

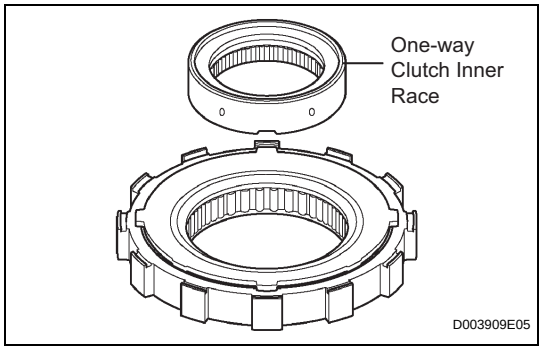


(c) Remove the No. 2 planetary carrier thrust washer from the rear planetary sun gear assembly.

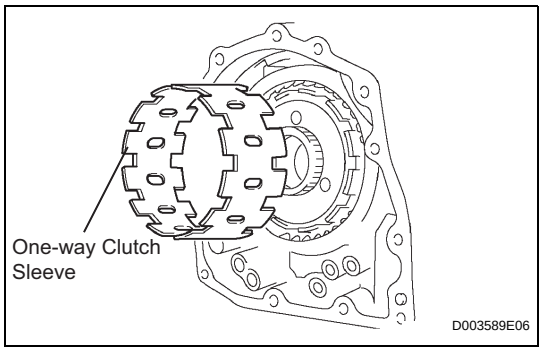


64. REMOVE ONE-WAY CLUTCH ASSEMBLY

(a) Remove the one-way clutch assembly and the thrust needle roller bearing from the transaxle case.

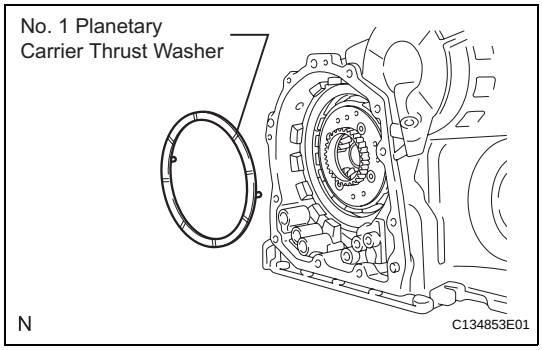


(b) Remove the one-way clutch inner race from the one-way clutch assembly.



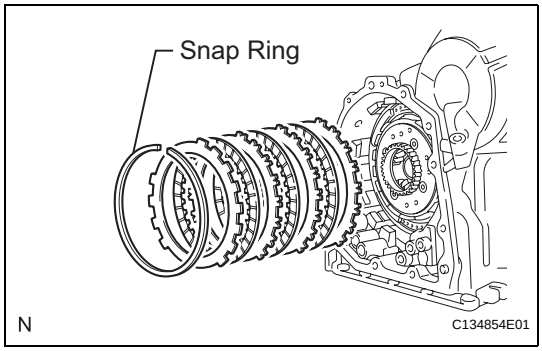
65. REMOVE ONE-WAY CLUTCH SLEEVE

(a) Remove the one-way clutch sleeve from the transaxle case.



66. REMOVE NO. 1 PLANETARY CARRIER THRUST WASHER

(a) Remove the No. 1 planetary carrier thrust washer from the planetary gear assembly.

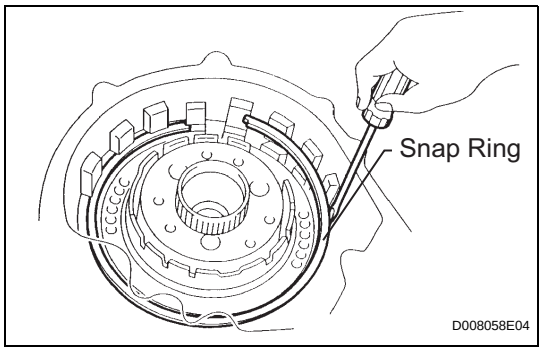


67. REMOVE 2ND BRAKE DISC

(a) Using a screwdriver, remove the snap ring.

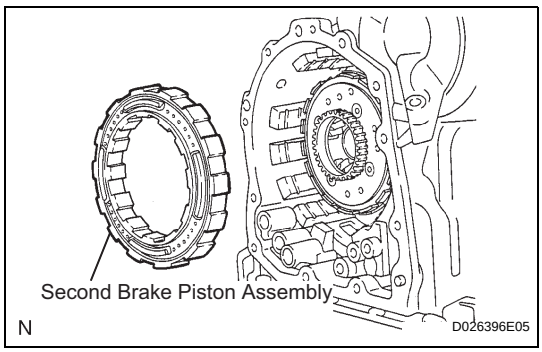
(b) Remove the flange, 3 discs and 3 plates from the transaxle case.

68. INSPECT 2ND BRAKE DISC (See page AX-228)

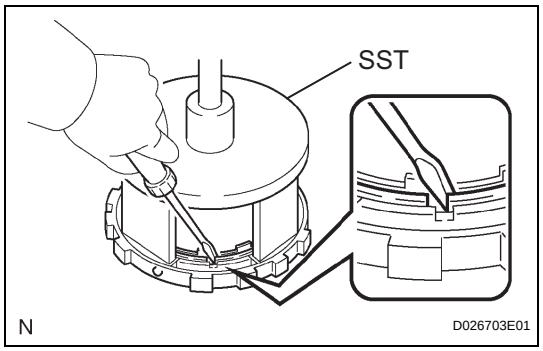


69. REMOVE SECOND BRAKE PISTON ASSEMBLY

(a) Using a screwdriver, remove the snap ring.



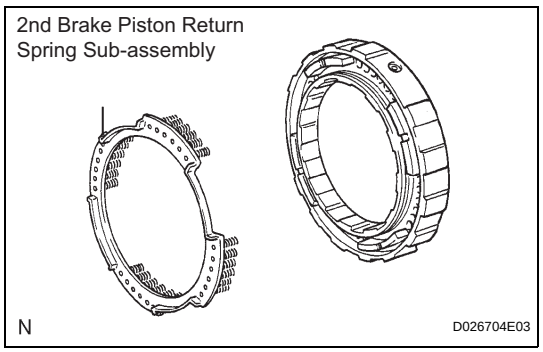
(b) Remove the second brake piston assembly from the transaxle case.



70. REMOVE 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

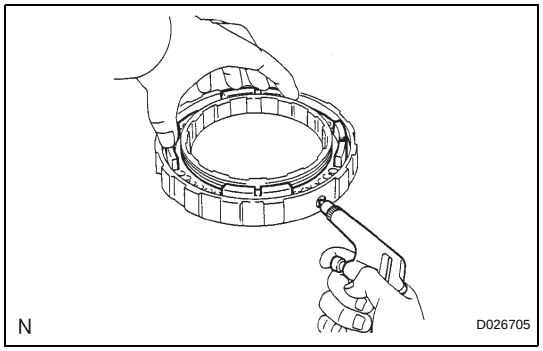
(a) Place SST on the return spring and compress it with a press.
SST 09387-00060

(b) Using a screwdriver, remove the snap ring.



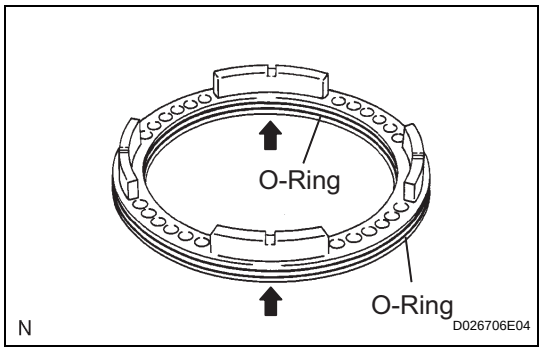
(c) Remove the 2nd brake piston return spring sub-assembly.

71. INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY (See page AX-234)



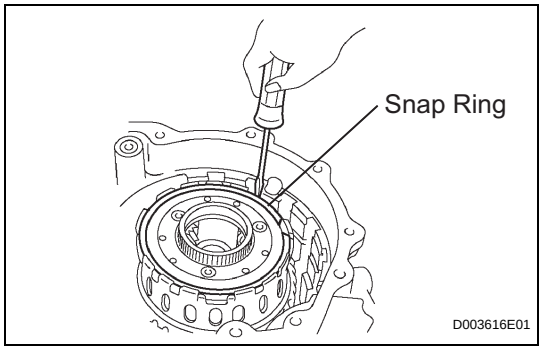
72. REMOVE 2ND BRAKE PISTON

(a) Hold the 2nd brake piston and apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the 2nd brake cylinder to remove the 2nd brake piston.



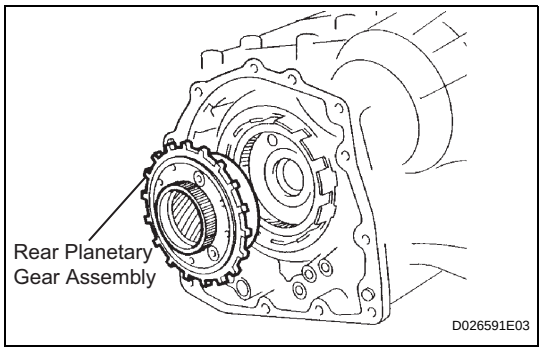
73. REMOVE 2ND BRAKE PISTON O-RING

(a) Remove the 2 O-rings from the 2nd brake piston.

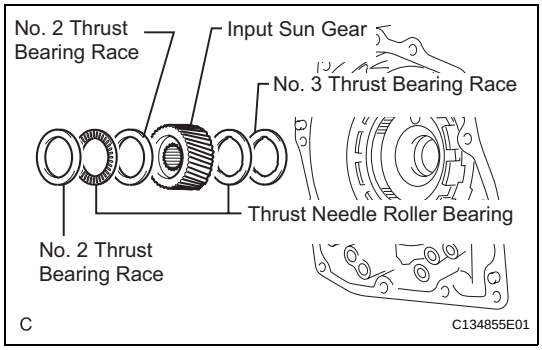


74. REMOVE REAR PLANETARY GEAR ASSEMBLY

(a) Using a screwdriver, remove the snap ring.

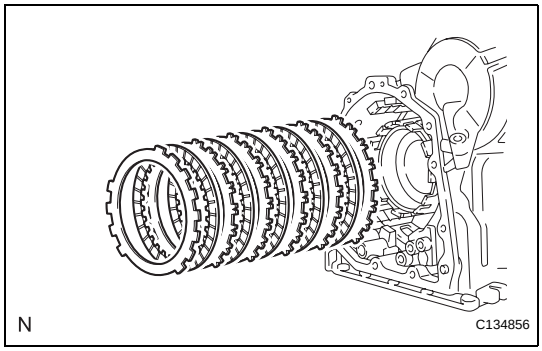


(b) Remove the rear planetary gear assembly from the transaxle case.



75. REMOVE INPUT SUN GEAR

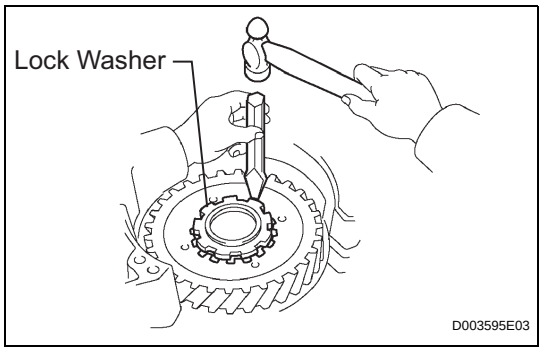
(a) Remove the 2 thrust needle roller bearings, No. 2 thrust bearing races, No. 3 thrust bearing race, and input sun gear from the transaxle case.



76. REMOVE 1ST AND REVERSE BRAKE DISC

(a) Remove the flange, 5 discs and 5 plates from the transaxle case.

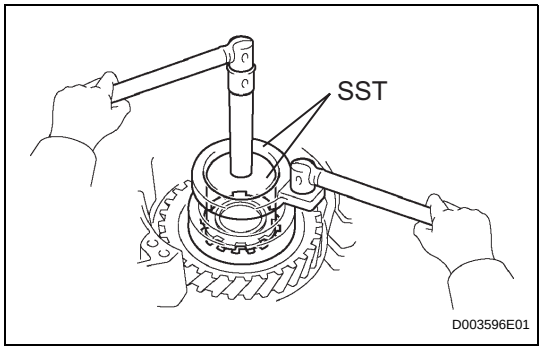
77. INSPECT 1ST AND REVERSE BRAKE DISC (See page AX-229)



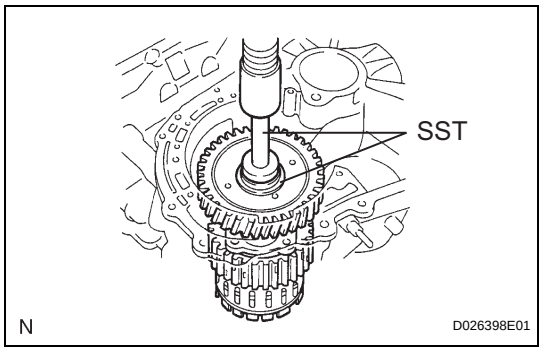
78. REMOVE FRONT PLANETARY GEAR ASSEMBLY

(a) Using a chisel and hammer, unstake the lock washer.

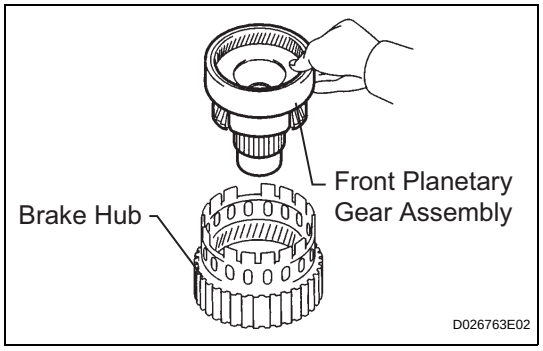
NOTICE:
Push down all claws of the washer. Otherwise SST cannot be fully pressed against the nut, and the nut cannot be loosened.



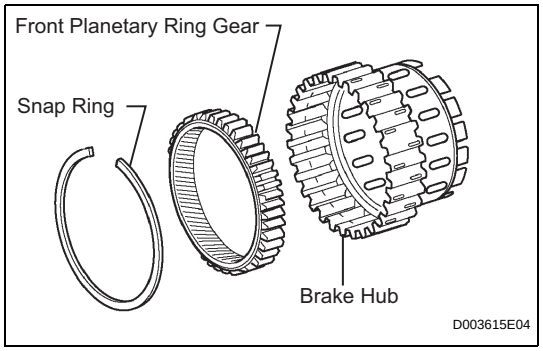
(b) Using SST, remove the nut and washer.
SST 09387-00030, 09387-00080



(c) Using SST and a press, remove the front planetary gear assembly from the counter drive gear.
SST 09950-60010 (09951-00450), 09950-70010 (09951-07100)

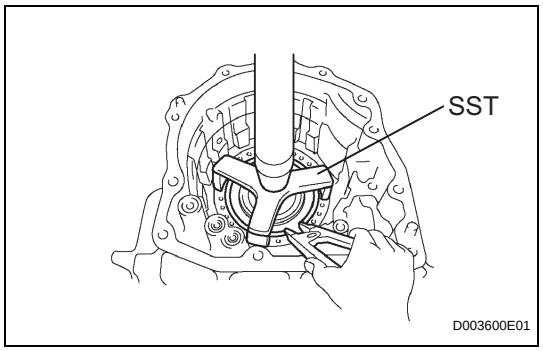


(d) Remove the front planetary gear assembly from the brake hub.



79. REMOVE FRONT PLANETARY RING GEAR

(a) Using a screwdriver, remove the snap ring and front planetary ring gear from the brake hub.



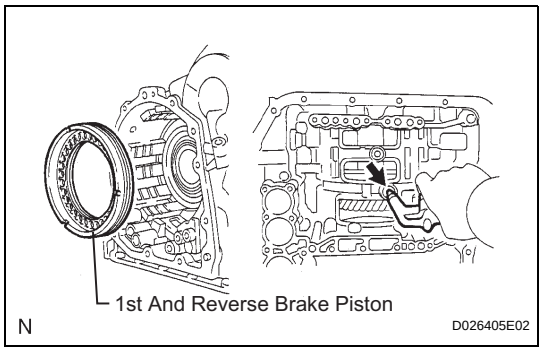
80. REMOVE 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Place SST on the return spring, and compress the return spring with a press.
SST 09387-00070

(b) Using a snap ring expander, remove the snap ring.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove to prevent the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**

(c) Remove the return spring.

81. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-229)

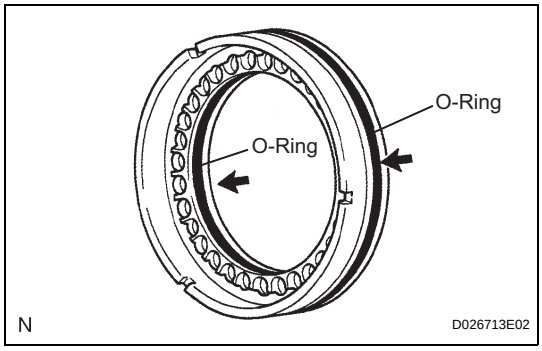


82. REMOVE 1ST AND REVERSE BRAKE PISTON

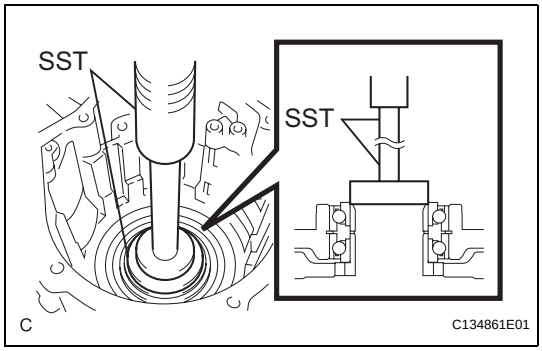
(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove the 1st and reverse brake piston.

NOTICE:

- **Applying compressed air may cause the piston to jump-out. When removing the piston, hold it by hand using a waste cloth.**
- **Take care not to splash ATF when applying the air.**



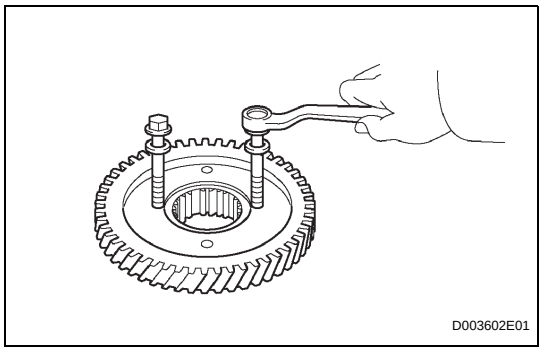
(b) Remove the 2 O-rings from the 1st and reverse brake piston.



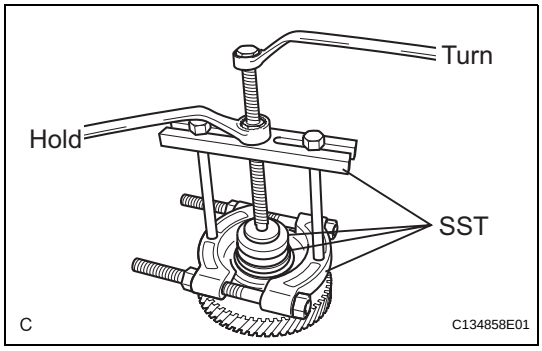
83. REMOVE COUNTER DRIVE GEAR

(a) Using SST and a press, remove the counter drive gear from the transaxle case.

SST 09950-60010 (09951-00590), 09950-70010 (09951-07100)

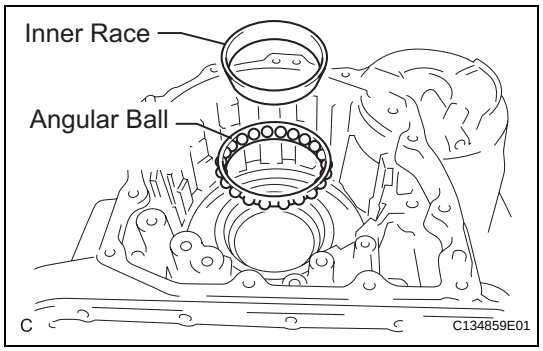


(b) Tighten the 2 bolts evenly and make clearance of approx. 20.0 mm (0.797 in.) between the counter drive gear and the inner race.



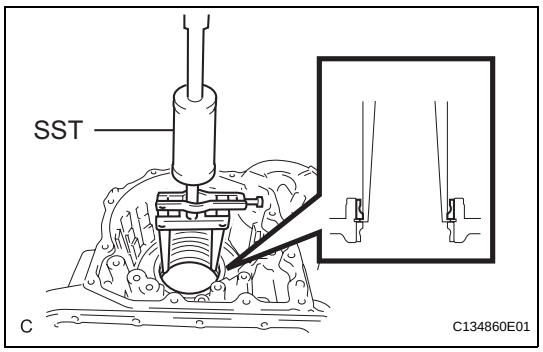
(c) Using SST, remove the tapered roller bearing inner race.

SST 09950-00020, 09950-00030, 09950-60010 (09951-00590)

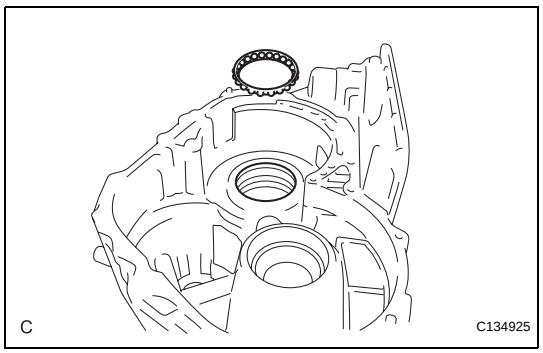


84. REMOVE COUNTER DRIVE ANGULAR BALL BEARING

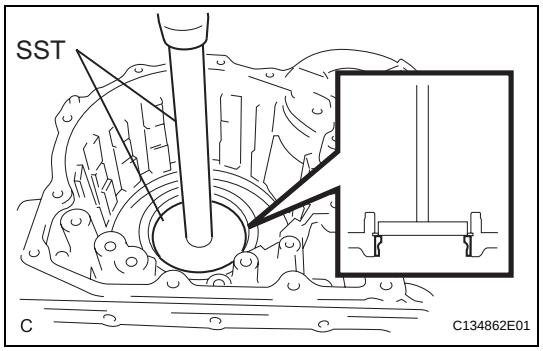
(a) Remove the bearing inner race (rear side) and angular ball (rear side).



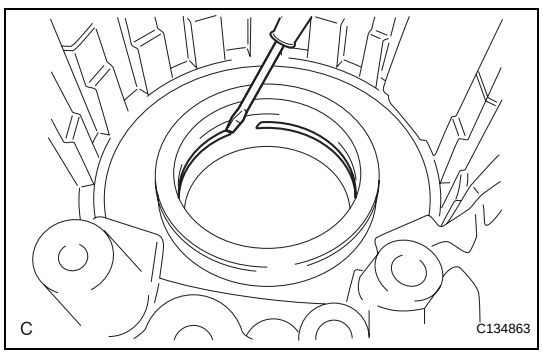
(b) Using SST, remove the bearing outer race (rear side) from the transaxle case.
SST 09308-00010



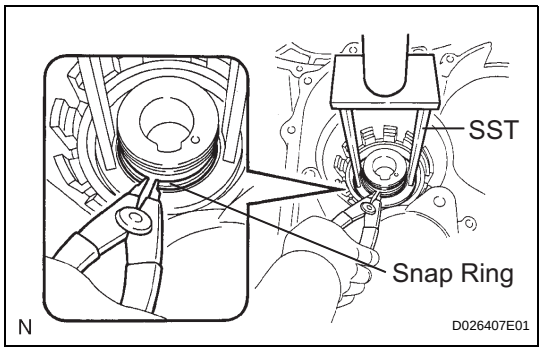
(c) Remove the angular ball (front side).



(d) Using SST and a press, remove the bearing outer race (front side) from the transaxle case.
SST 09950-60020 (09951-00810), 09950-70010 (09951-07200)



(e) Using a screwdriver, remove the snap ring from the transaxle case.



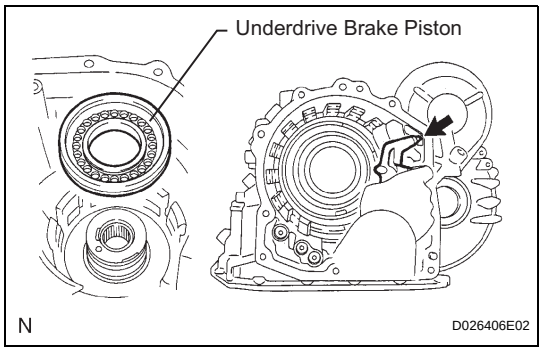
85. REMOVE UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Place SST on the return spring, and compress the return spring with a press.
SST 09387-00020

(b) Using a snap ring expander, remove the snap ring.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove to prevent the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**

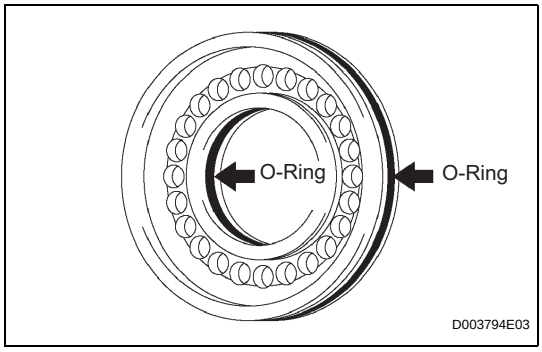
(c) Remove the return spring.

86. INSPECT UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-229)

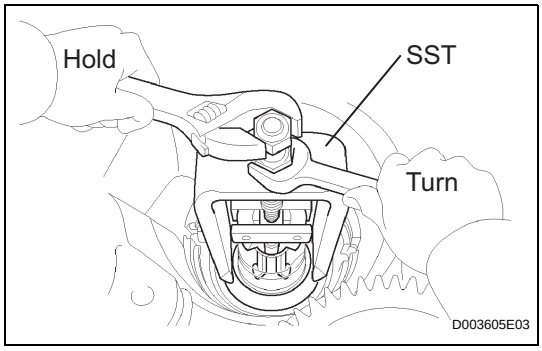


87. REMOVE UNDERDRIVE BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove the underdrive brake piston.

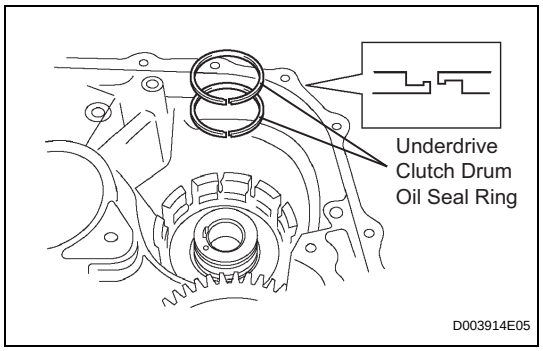


(b) Remove the 2 O-rings from the underdrive brake piston.



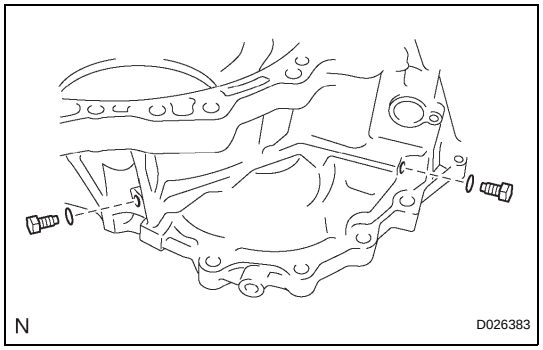
88. REMOVE NEEDLE ROLLER BEARING

(a) Using SST, remove the needle roller bearing from the transaxle case.
SST 09387-00041 (09387-01010, 09387-01030, 09387-01040)



89. REMOVE UNDERDRIVE CLUTCH DRUM OIL SEAL RING

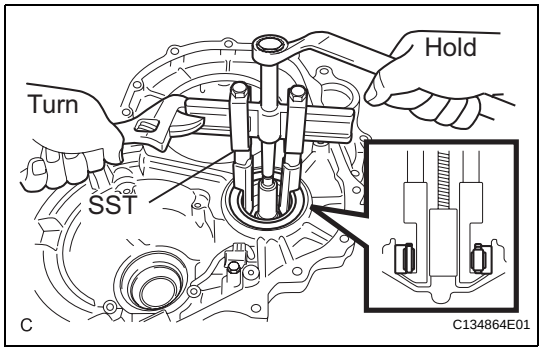
(a) Remove the 2 oil seal rings from the transaxle case.



90. REMOVE NO. 1 TRANSAXLE CASE PLUG

(a) Remove the 2 No. 1 transaxle case plugs.

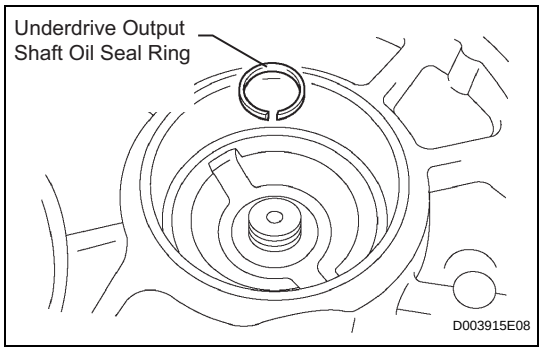
(b) Remove the 2 O-rings from the 2 No. 1 transaxle case plugs.



91. REMOVE UNDERDRIVE CYLINDRICAL ROLLER BEARING

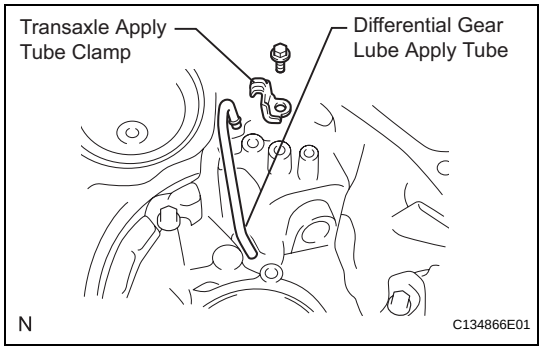
(a) Using SST, remove the underdrive cylindrical roller bearing from the transaxle case.

SST 09820-00031, 09950-40011 (09952-04010, 09954-04010, 09955-04061, 09957-04010), 09950-50013 (09951-05010, 09953-05020)



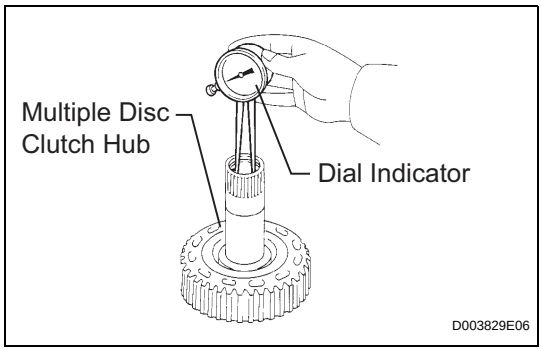
92. REMOVE UNDERDRIVE OUTPUT SHAFT OIL SEAL RING

(a) Remove the oil seal ring from the transaxle housing.



93. REMOVE DIFFERENTIAL GEAR LUBE APPLY TUBE

(a) Remove the bolt, transaxle apply tube clamp and differential gear lube apply tube from the transaxle housing.



INSPECTION

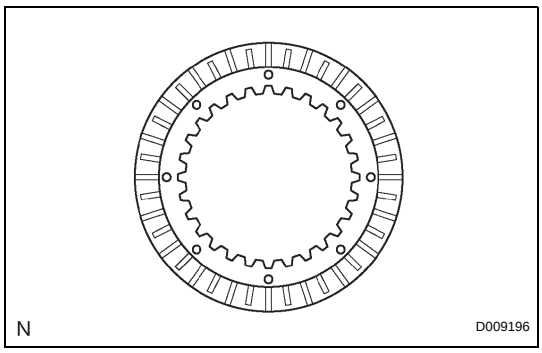
1. INSPECT MULTIPLE DISC CLUTCH HUB

(a) Using a dial indicator, measure the inside diameter of the multiple disc clutch hub bushing.

Standard inside diameter:
23.025 to 23.046 mm (0.9065 to 0.9073 in.)
Maximum inside diameter:
23.09 mm (0.9091 in.)

If the diameter is greather than the maximum, replace the multiple disc clutch hub with a new one.

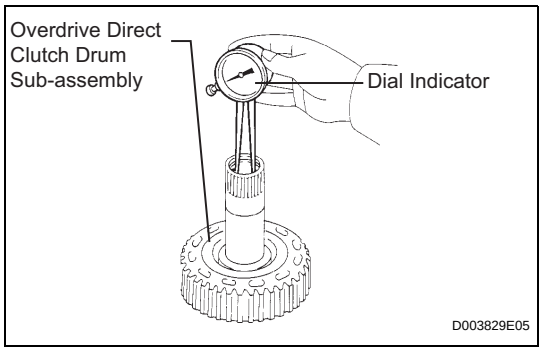
NOTICE:
Check the contact surface of the bushing in the direct clutch shaft. If any scratch or discolor is identified, replace the direct clutch sub-assembly with a new one.



2. INSPECT NO. 2 UNDERDRIVE CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates and flange are worn or burnt.
If necessary, replace them.

NOTICE:
- **If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**



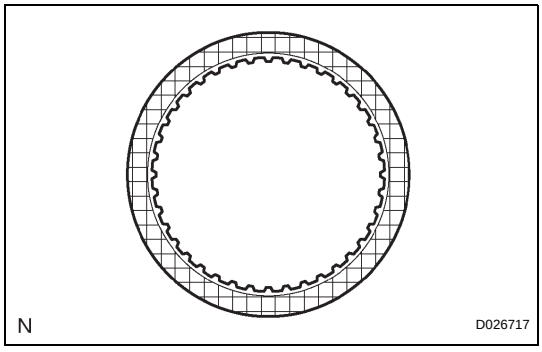
3. INSPECT OVERDRIVE DIRECT CLUTCH DRUM SUB-ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the overdrive direct clutch drum sub-assembly bushing.

Standard inside diameter:
23.025 to 23.046 mm (0.9065 to 0.9073 in.)
Maximum inside diameter:
23.09 mm (0.9091 in.)

If the diameter is greather than the maximum, replace the overdrive direct clutch drum sub-assembly.

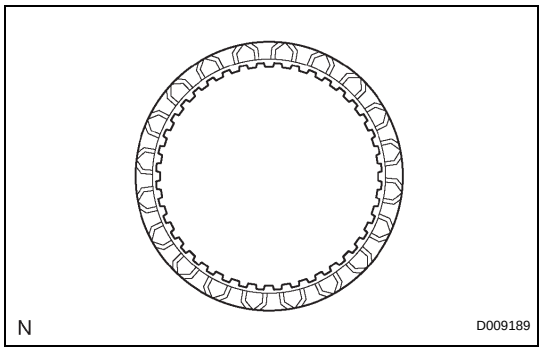
NOTICE:
Check the contact surface of the bushing in the direct clutch shaft. If any scratch or discolor is identified, replace the direct clutch sub-assembly with a new one.



4. INSPECT 2ND BRAKE DISC

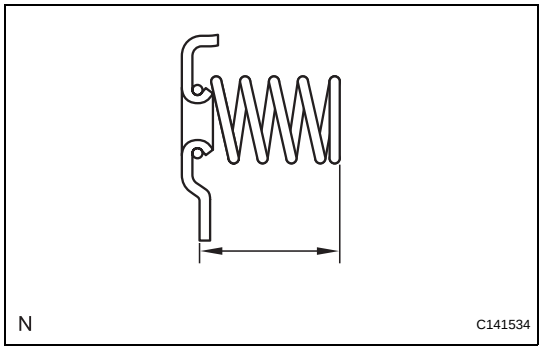
(a) Check if the sliding surfaces of the discs, plates and flange are worn or burnt.
If necessary, replace them.

NOTICE:
- **If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**



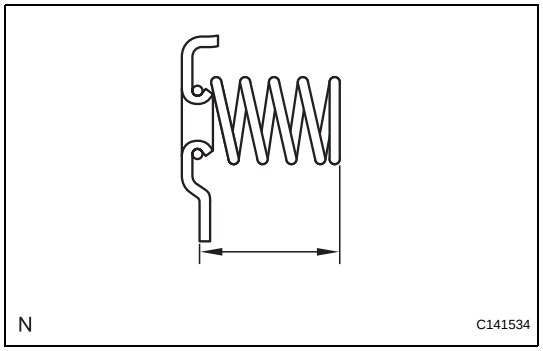
5. INSPECT 1ST AND REVERSE BRAKE DISC

(a) Check if the sliding surfaces of the discs, plates and flange are worn or burnt.
If necessary, replace them.
NOTICE:
- **If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**



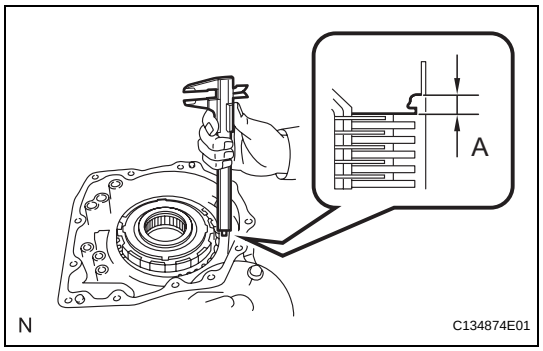
6. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
17.63 mm (0.6941 in.)
If the free length is shorter than the standard free length, replace the 1st and reverse brake return spring sub-assembly.



7. INSPECT UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
13.24 mm (0.5213 in.)
If the free length is shorter than the standard free length, replace the under drive brake return spring sub-assembly.



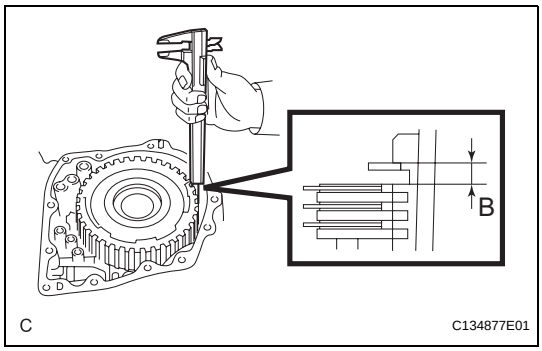
8. INSPECT PACK CLEARANCE OF FIRST AND REVERSE BRAKE

(a) Using vernier calipers, measure the distance between the disc surface and the contact surface of the 2nd brake cylinder and transaxle case (Dimension A).

(b) Select an appropriate flange so that the pack clearance will be within the specified range.
Pack clearance:
0.745 to 1.21 mm (0.0293 to 0.0476 in.)
HINT:
Piston stroke = Dimension A - Flange thickness
Flange thickness: mm (in.)

Mark	Thickness	Mark	Thickness
1	1.8 (0.071)	5	2.2 (0.087)
2	1.9 (0.075)	6	2.3 (0.091)
3	2.0 (0.079)	7	2.4 (0.094)
4	2.1 (0.083)	8	2.5 (0.098)

(c) Install the flange.



9. INSPECT PACK CLEARANCE OF SECOND BRAKE

(a) Using vernier calipers, measure the distance between the disc surface and snap ring surface (Dimension B).

(b) Select an appropriate flange so that the pack clearance will be within the specified range.

Pack clearance:

0.53 to 0.91 mm (0.0209 to 0.0358 in.)

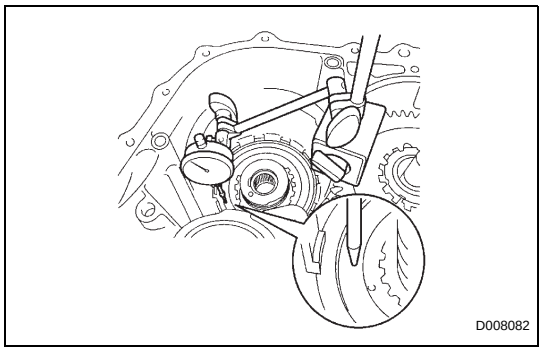
HINT:

Piston stroke = Dimension B - Flange thickness - Snap ring thickness 1.6 mm (0.063 in.)

Flange thickness: mm (in.)

Mark	Thickness	Mark	Thickness
0	2.9 (0.114)	5	3.4 (0.134)
1	3.0 (0.118)	6	3.5 (0.138)
2	3.1 (0.122)	7	3.6 (0.142)
3	3.2 (0.126)	8	3.7 (0.146)
4	3.3 (0.130)	-	-

(c) Install the flange.



10. INSPECT PACK CLEARANCE OF NO. 2 UNDERDRIVE CLUTCH

(a) Using a dial indicator, measure the underdrive clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Pack clearance:

1.645 to 2.20 mm (0.0648 to 0.0866 in.)

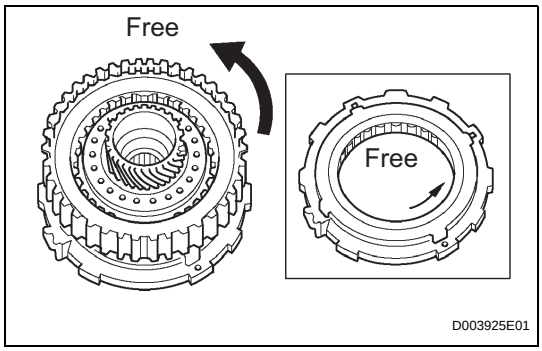
(b) Select an appropriate flange from the table below so that the pack clearance will be within the specified range.

Flange thickness: mm (in.)

Mark	Thickness	Mark	Thickness
Y	2.8 (0.110)	C	3.4 (0.134)
A	3.0 (0.118)	D	3.6 (0.142)
B	3.2 (0.126)	-	-

(c) Temporarily remove the snap ring and attach the flange to the transaxle case.

(d) Reinstall the snap ring to the transaxle case.

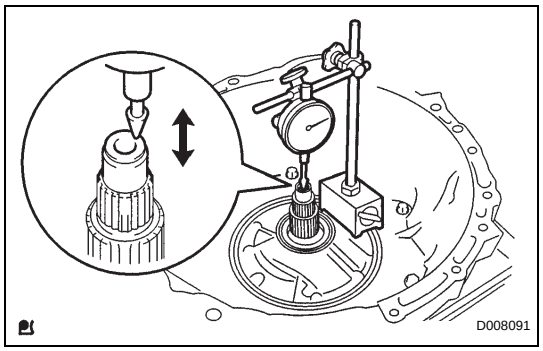


11. INSPECT UNDERDRIVE ONE-WAY CLUTCH ASSEMBLY

(a) Install the underdrive clutch assembly to the one-way clutch.

(b) Rotate the underdrive clutch assembly to check the rotating direction for the lock or free operation.

(c) Remove the underdrive clutch assembly from the one-way clutch.

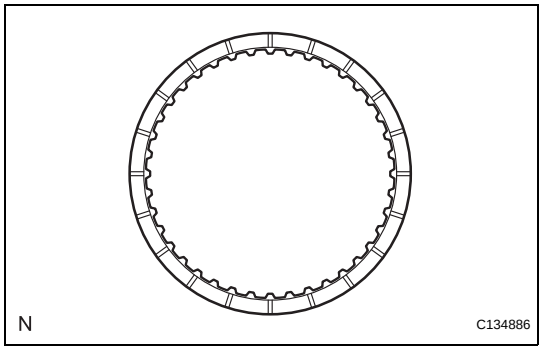


12. INSPECT INPUT SHAFT END PLAY

(a) Using a dial indicator, measure the input shaft end play.

End play:

0.262 to 1.244 mm (0.01 to 0.049 in.)

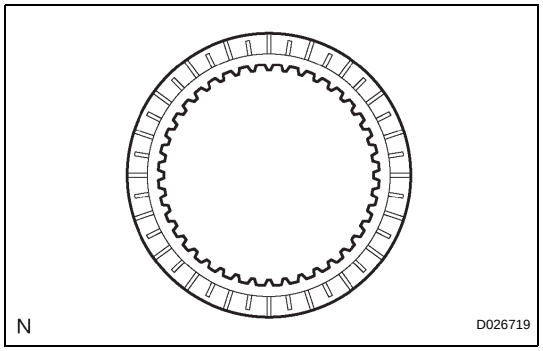


13. INSPECT DIRECT MULTIPLE DISC CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:

- **If the lining of a disc comes off or discolors, or a groove is damaged, replace all discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**

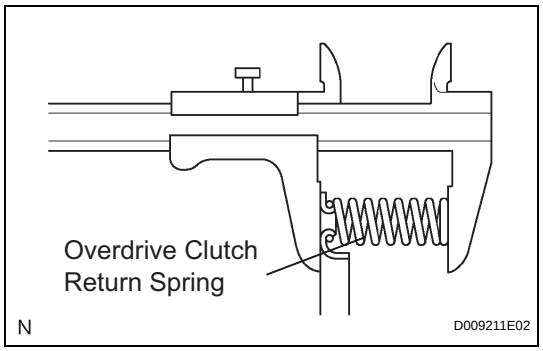


14. INSPECT OVERDRIVE DIRECT CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:

- **If the lining of a disc comes off or discolors, or a groove is damaged, replace all discs.**
- **Before assembling new discs, soak them in ATF for at least 15 minutes.**



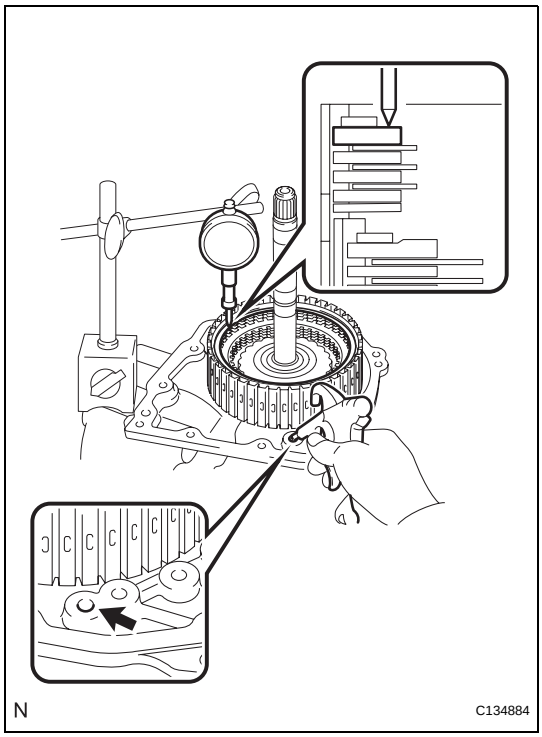
15. INSPECT OVERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the spring together with the spring seat.

Standard free length:

25.91 mm (1.0201 in.)

If the free length is shorter than the standard free length, replace the overdrive clutch return spring sub-assembly.



16. INSPECT PACK CLEARANCE OF DIRECT CLUTCH

(a) Install the intermediate shaft and needle roller bearing on the transaxle rear cover.

NOTICE:

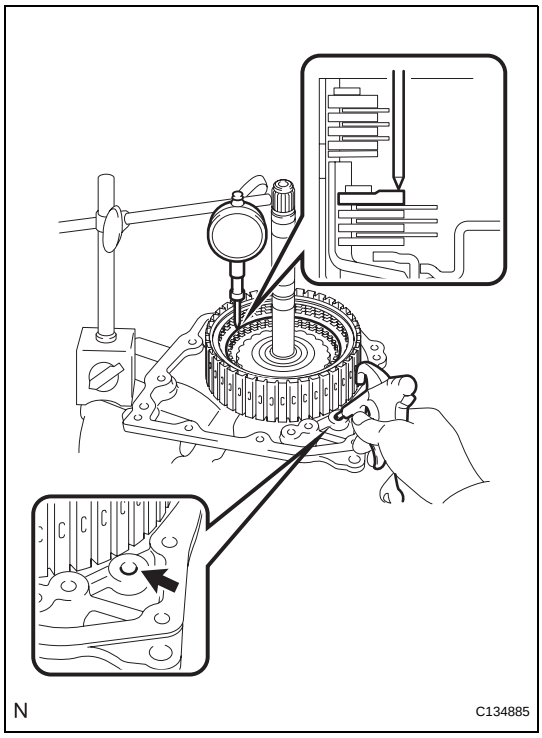
Be careful not to damage the oil seal ring outers.

(b) Using a dial indicator, measure the direct clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Pack clearance:

0.60 to 0.82 mm (0.02362 to 0.03228 in.)

If the pack clearance is not as specified, inspect the discs, plates and flange.



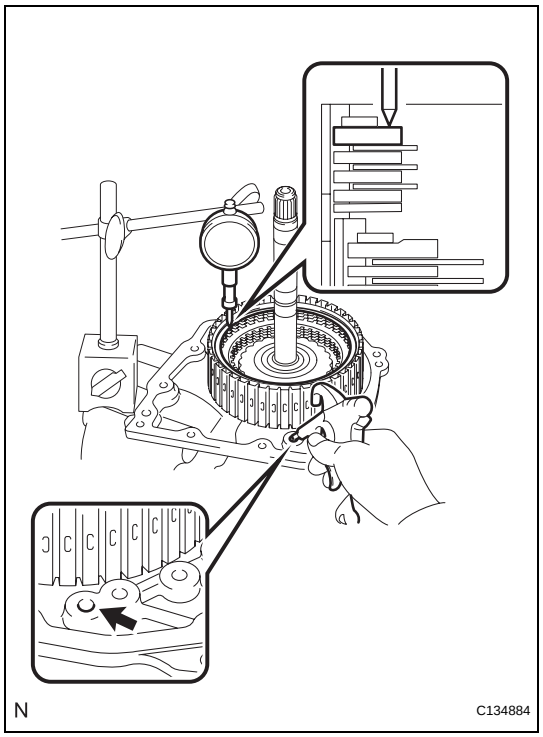
17. INSPECT PACK CLEARANCE OF OVERDRIVE CLUTCH

(a) Using a dial indicator, measure the overdrive clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Pack clearance:

0.52 to 0.83 mm (0.02047 to 0.03268 in.)

If the pack clearance is not as specified, inspect the discs, plates and flange.



18. INSPECT PACK CLEARANCE OF DIRECT CLUTCH

(a) Install the intermediate shaft on the transaxle rear cover.

(b) Using a dial indicator, measure the direct clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Pack clearance:

0.60 to 0.82 mm (0.02362 to 0.03228 in.)

If the pack clearance is less than the minimum, parts may have been assembled incorrectly, so check and reassemble.

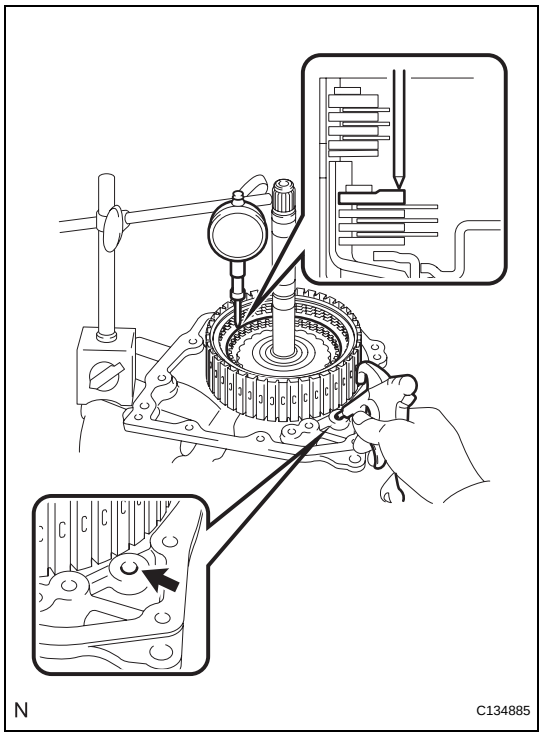
If the clearance is not as specified, select another flange.

HINT:

There are 8 different thicknesses of flanges available.

Flange thickness: mm (in.)

Mark	Thickness	Mark	Thickness
0	2.9 (0.114)	4	3.3 (0.130)
1	3.0 (0.118)	5	3.4 (0.134)
2	3.1 (0.122)	6	3.5 (0.138)
3	3.2 (0.126)	7	3.6 (0.142)



19. INSPECT PACK CLEARANCE OF OVERDRIVE CLUTCH

(a) Using a dial indicator, measure the overdrive clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Pack clearance:

0.52 to 0.83 mm (0.02047 to 0.03268 in.)

If the pack clearance is less than the minimum, parts may have been assembled incorrectly, so check and reassemble.

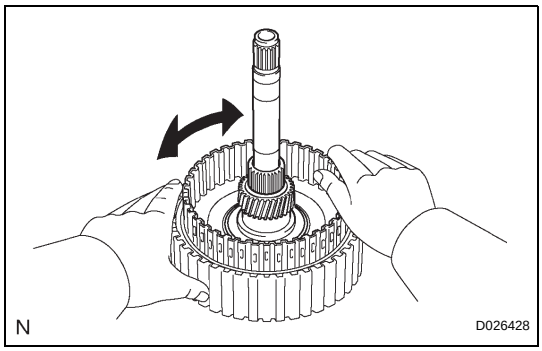
If the clearance is not as specified, select another flange.

HINT:

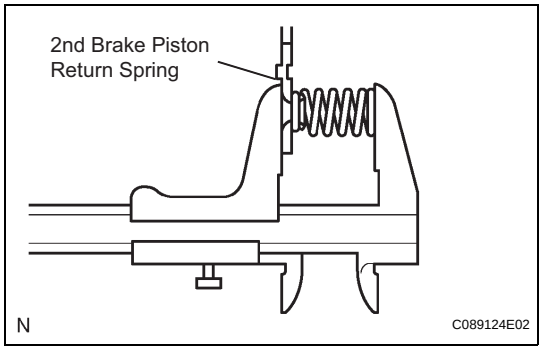
There are 7 different thicknesses of flanges available.

Flange thickness: mm (in.)

Mark	Thickness	Mark	Thickness
0	2.5 (0.098)	4	2.9 (0.114)
1	2.6 (0.102)	5	3.0 (0.118)
2	2.7 (0.106)	6	3.1 (0.122)
3	2.8 (0.110)	-	-



(b) Check that the disc rotates when rotating the disc after inserting the rear planetary sun gear.
NOTICE:
Do not place the rear planetary sun gear in a vise.

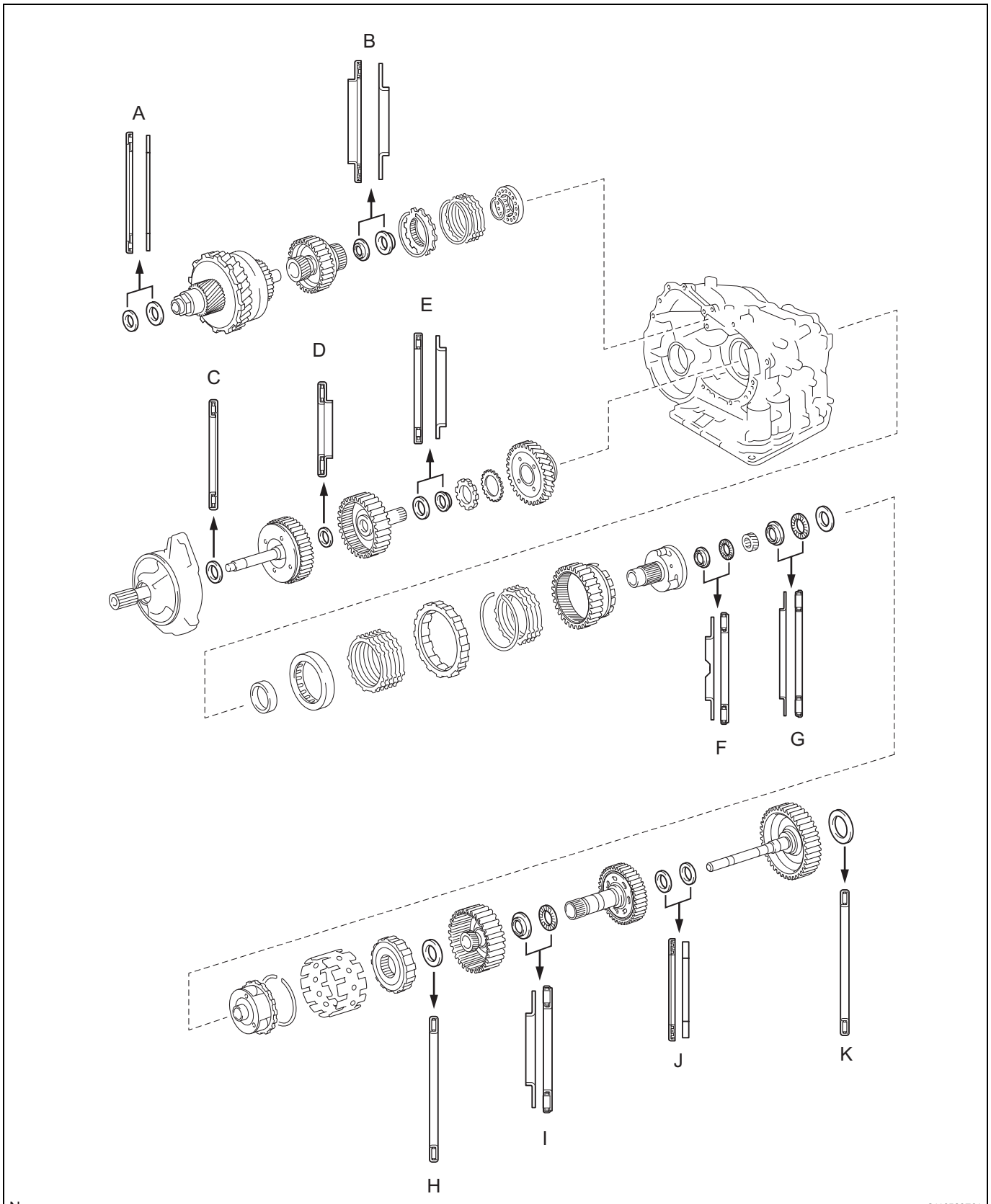


20. INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

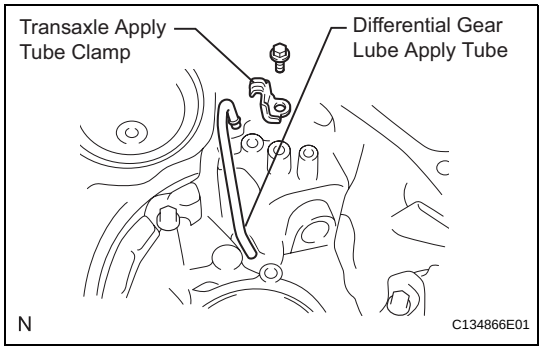
(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
16.61 mm (0.6539 in.)
If the free length is shorter than the standard free length, replace the 2nd brake piston return spring sub-assembly.

REASSEMBLY

1. BEARING POSITION

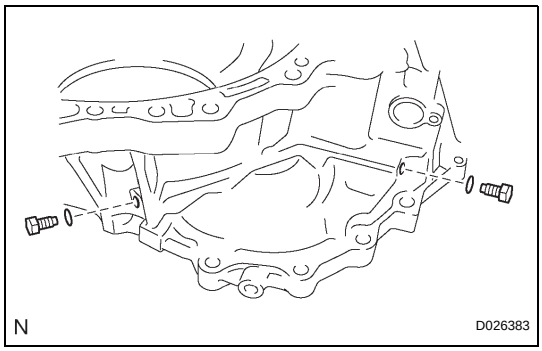


Mark	Front Race Diameter Inside / Outside (mm (in.))	Thrust Bearing Diameter Inside / Outside (mm (in.))	Rear Race Diameter Inside / Outside (mm (in.))
A	-	53.0 (2.087) / 78.2 (3.079)	52.1 (2.051) / 75.5 (2.972)
B	-	37.73 (1.4854) / 58.0 (2.284)	29.9 (1.177) / 55.5 (2.185)
C	-	33.85 (1.3327) / 52.2 (2.055)	-
D	-	23.5 (0.925) / 44.0 (1.732)	-
E	-	36.3 (1.429) / 52.2 (2.055)	34.5 (1.358) / 48.5 (1.909)
F	34.5 (1.358) / 56.82 (2.2370)	32.4 (1.276) / 56.62 (2.2291)	-
G	40.3 (1.587) / 58.0 (2.284)	38.6 (1.520) / 60.0 (2.362)	38.6 (1.520) / 58.0 (2.284)
H	-	53.6 (2.110) / 69.6 (2.740)	-
I	33.1 (1.303) / 45.4 (1.787)	31.85 (1.2539) / 45.2 (1.780)	-
J	-	25.0 (0.984) / 39.5 (1.555)	23.6 (0.929) / 36.6 (1.441)
K	-	55.9 (2.201) / 76.0 (2.992) or 76.6 (3.016)	-



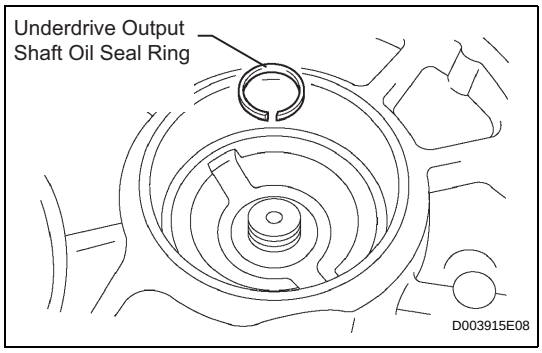
2. INSTALL DIFFERENTIAL GEAR LUBE APPLY TUBE

(a) Install the differential gear lube apply tube and transaxle apply tube clamp to the transaxle housing with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
NOTICE:
Make sure to insert the pipe to the stopper.



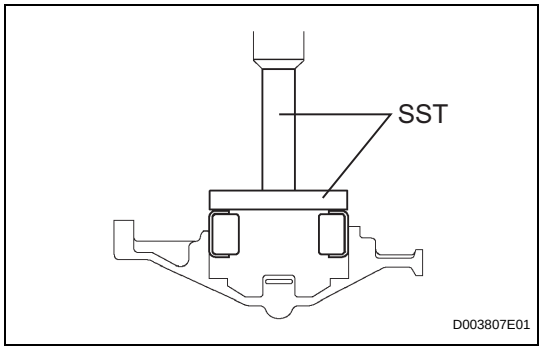
3. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Install 2 new O-rings to the 2 No. 1 transaxle case plugs.
(b) Install the 2 No. 1 transaxle case plugs to the transaxle rear housing.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



4. INSTALL UNDERDRIVE OUTPUT SHAFT OIL SEAL RING

(a) Coat a new oil seal ring with ATF and install it to the transaxle housing.



5. INSTALL UNDERDRIVE CYLINDRICAL ROLLER BEARING

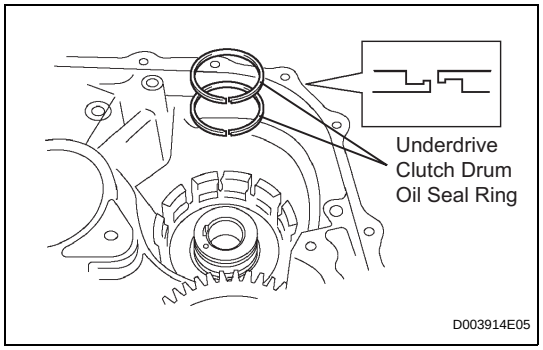
(a) Coat the underdrive cylindrical roller bearing with ATF.

(b) Using SST and a press, install the underdrive cylindrical roller bearing.

SST 09950-60020, 09950-70010 (09951-00780, 09951-07100)

NOTICE:

Do not apply excessive pressure to it.

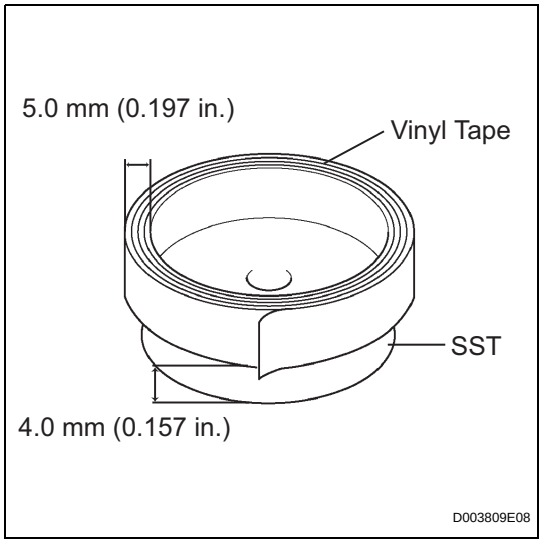


6. INSTALL UNDERDRIVE CLUTCH DRUM OIL SEAL RING

(a) Coat 2 new oil seal rings with ATF, and install them to the transaxle rear cover.

NOTICE:

- **Do not expand the gap of the oil seal ring excessively.**
- **Securely engage the hooks. Confirm the smooth rotation.**



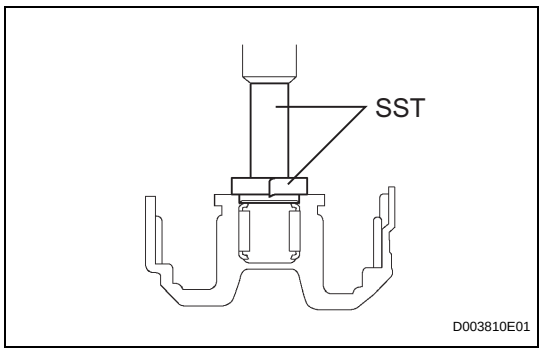
7. INSTALL NEEDLE ROLLER BEARING

(a) Wind vinyl tape around SST at the place 4.0 mm (0.157 in.) above the bottom end until the thickness of the wound tape is about 5.0 mm (0.197 in.).

NOTICE:

Clean SST to remove deposited oil before winding vinyl tape.

(b) Coat a new needle roller bearing with ATF.

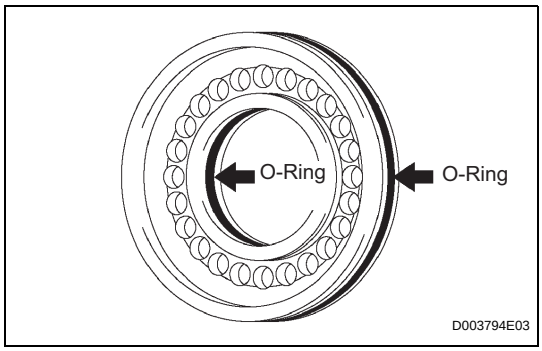


(c) Using SST and a press, install the needle roller bearing to the transaxle case.

SST 09950-60010 (09951-00320), 09950-70010 (09951-07100)

NOTICE:

When the wound vinyl tape contacts the transaxle case, stop press-fitting.



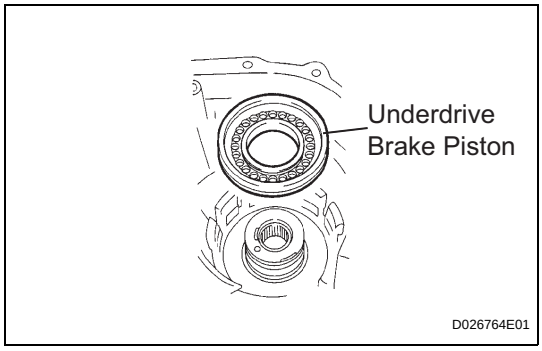
8. INSTALL UNDERDRIVE BRAKE PISTON

(a) Coat 2 new O-rings with ATF, and install them to the underdrive brake piston.

NOTICE:

- **Install the the O-rings carefully not to have a twist or a pinching.**
- **Apply enough ATF to the O-rings prior to installation.**

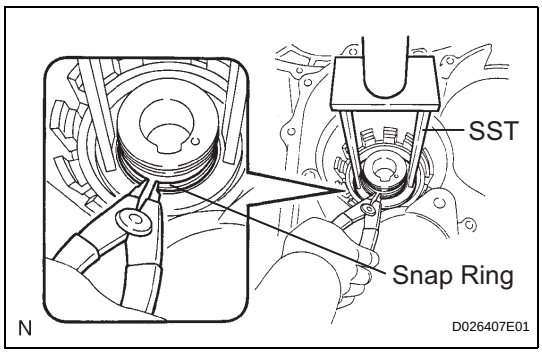
(b) Coat the underdrive brake piston with ATF.



(c) Install the underdrive brake piston to the transaxle case.

NOTICE:

Be careful not to damage the O-rings.



9. INSTALL UNDERDRIVE BRAKE RETURN SPRING SUB-ASSEMBLY

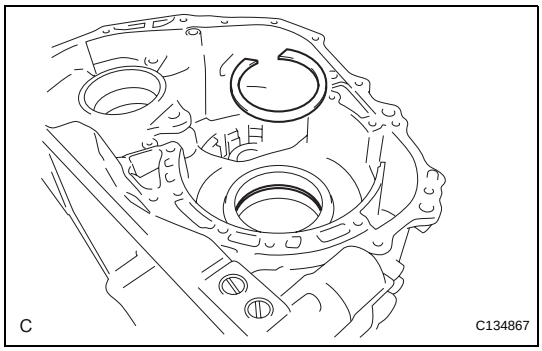
(a) Place SST on the return spring and compress the return spring with a press.

SST 09387-00020

(b) Using a snap ring expander, install the snap ring to the transaxle case.

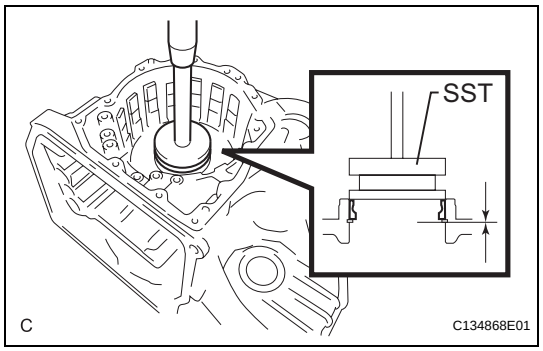
NOTICE:

- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove to prevent the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**
- **After installing the spring sub-assembly, check all of the springs are fitted in the piston correctly.**
- **The snap ring should be securely engaged in the groove of the transaxle case.**



10. INSTALL COUNTER DRIVE GEAR BEARING

(a) Install the snap ring to the transaxle case.

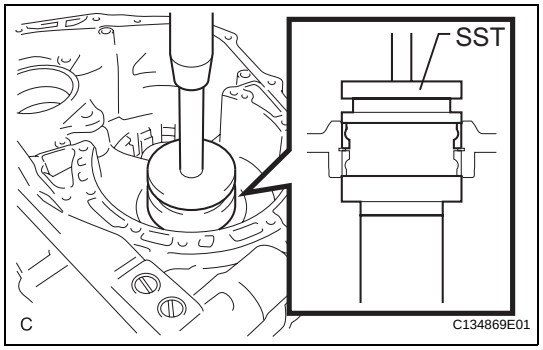


(b) Using SST and a press, install the bearing outer race (rear side) to the transaxle case.

SST 09316-12010, 09950-60020 (09951-00810), 09950-70010 (09951-07150)

NOTICE:

- **Ensure that the snap ring is securely installed.**
- **Do not apply excessive pressure to the bearing outer race.**



(c) Using SST and a press, install the bearing outer race (front side) to the transaxle case.

SST 09316-12010, 09502-24010, 09523-36010, 09950-60020 (09951-00810), 09950-70010 (09951-07150)

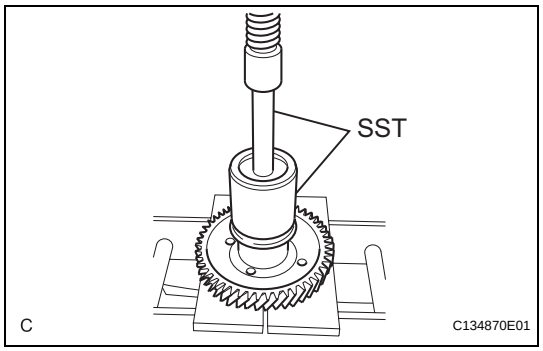
NOTICE:

- **Do not apply excessive pressure to the bearing outer race.**
- **Install the bearing outer race with a press while holding the bearing outer race with SST (09502-24010, 09523-36010).**

(d) Install the 2 angular balls to the transaxle case.

11. INSTALL COUNTER DRIVE GEAR

(a) Coat the counter drive gear with ATF.

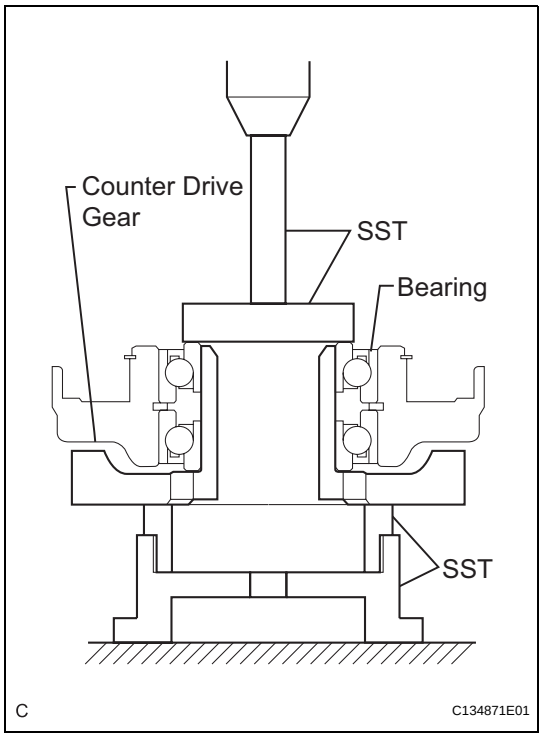


(b) Using SST and a press, install the tapered roller bearing inner race (front side) to the counter drive gear.

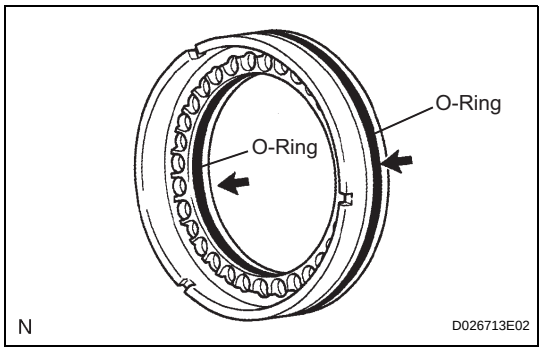
SST 09649-17010, 09950-70010 (09951-07150)

NOTICE:

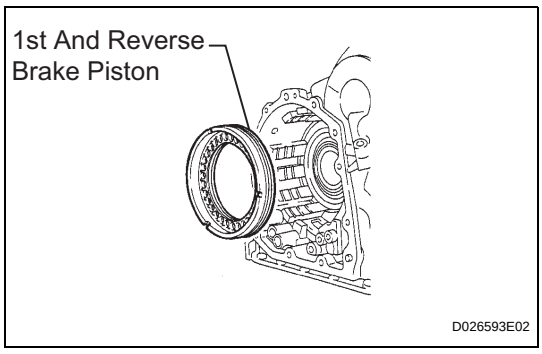
Do not apply excessive pressure to the bearing inner race.



(c) Using SST and a press, install the counter drive gear and bearing inner race (rear side) to the transaxle case.
SST 09223-15030, 09527-17011, 09950-60020 (09951-00720), 09950-70010 (09951-07150)
NOTICE:
Do not apply excessive pressure to the counter drive gear and bearing inner race.

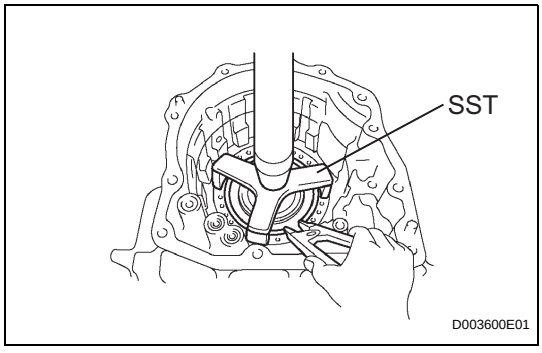


12. INSTALL 1ST AND REVERSE BRAKE PISTON
(a) Coat 2 new O-rings with ATF.
(b) Install the 2 O-rings to the 1st and reverse brake piston.
NOTICE:
- **Install the O-rings carefully not to have a twist or a pinching.**
- **Apply enough ATF to the O-rings prior to installation.**



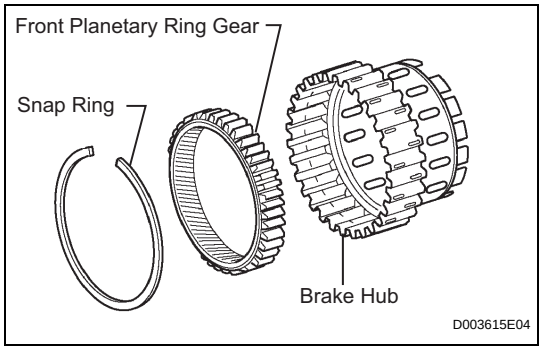
(c) Coat the 1st and reverse brake piston with ATF, and install it to the transaxle case.
NOTICE:
Be careful not to damage the O-rings.

13. INSTALL 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY
(a) Install the return spring.



(b) Place SST on the return spring and compress the return spring with a press.
SST 09387-00070
(c) Using a snap ring expander, install the snap ring to the transaxle case.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove to prevent the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**

- **After installing the spring sub-assembly, check all of the springs are fitted in the piston correctly.**
- **The snap ring should be securely engaged in the groove of the cylinder.**

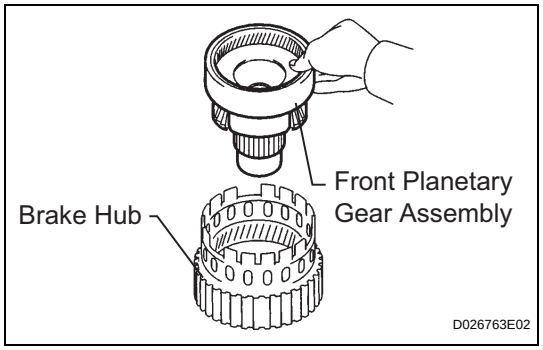


14. INSTALL FRONT PLANETARY RING GEAR

(a) Using a screwdriver, install the front planetary ring gear and snap ring to the brake hub.

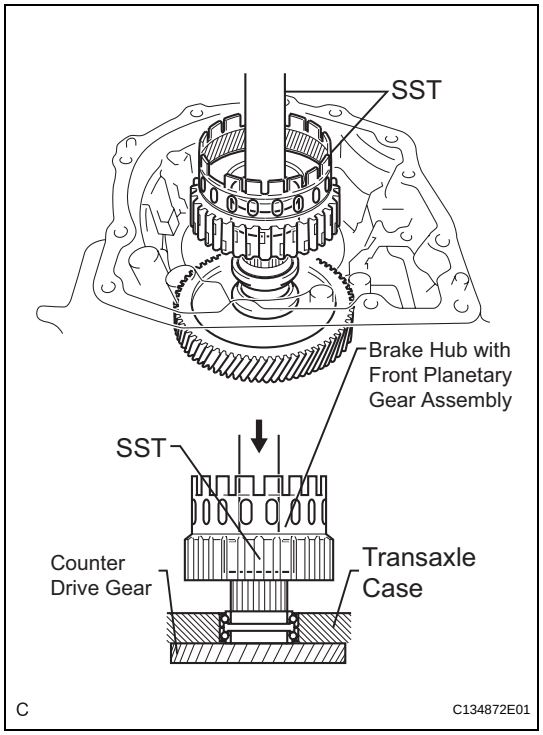
NOTICE:

Confirm that the snap ring is engaged in the groove of the brake hub correctly.



15. INSTALL FRONT PLANETARY GEAR ASSEMBLY

(a) Install the front planetary gear assembly to the brake hub.

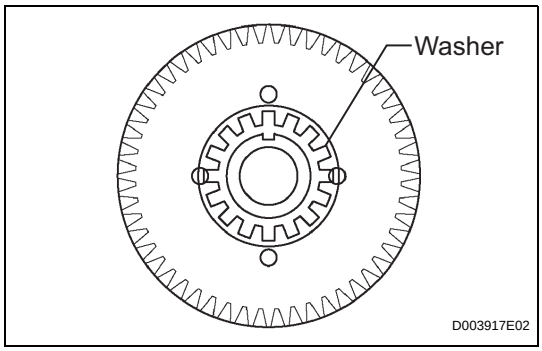


(b) Using SST and a press, press-fit the front planetary gear assembly.

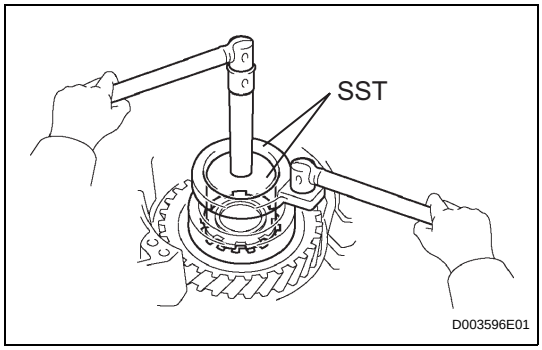
SST 09950-60010 (09951-00500), 09950-70010 (09951-07100)

NOTICE:

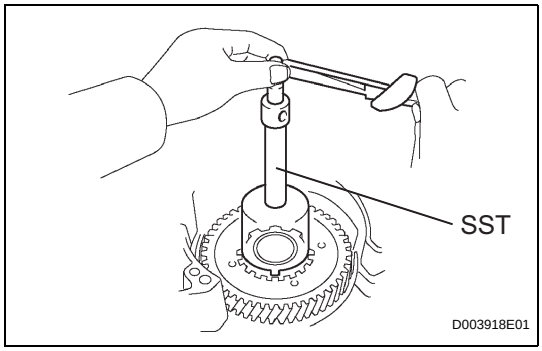
- **Do not apply excessive pressure to the front planetary gear assembly.**
- **Press the inner race of the LH tapered roller bearing, counter gear, and front planetary gear assembly to the position where no pre-load is applied to one pair of tapered roller bearings (left and right).**



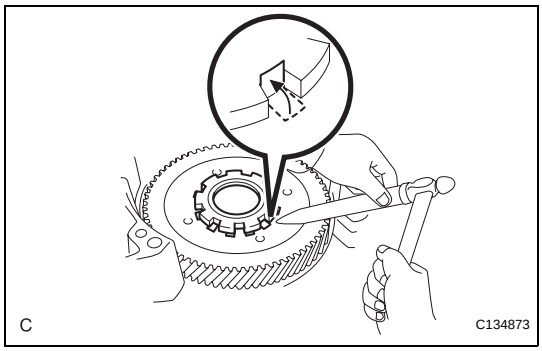
(c) Install a new washer as shown in the illustration.



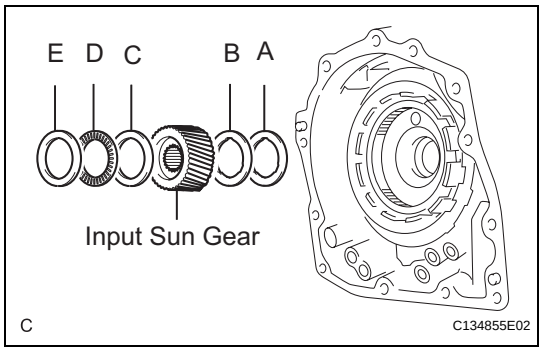
(d) Using SST, install the nut.
SST 09387-00030, 09387-00080
Torque: 185 N*m (1,886 kgf*cm, 136 ft.*lbf)



(e) Using SST and a torque wrench, measure the turning torque of the bearing while rotating SST at 60 rpm. If the measured value is not within the specified range, gradually tighten the nut until the turning torque falls within the specified range.
SST 09387-00080
Torque: 350 N*m (3,569 kgf*cm, 258 ft.*lbf) (a limit)
Bearing Turning Torque:
0.19 to 0.4 N*m (1.9 to 4.1 kgf*cm, 1.7 to 3.5 in.*lbf)
HINT:
Use a torque wrench with a fulcrum length of 160 mm (6.3 in.) to measure the turning torque.



(f) Using a chisel and hammer, stake the front lock washer.



16. INSTALL INPUT SUN GEAR

(a) Coat the 2 thrust bearings with ATF.

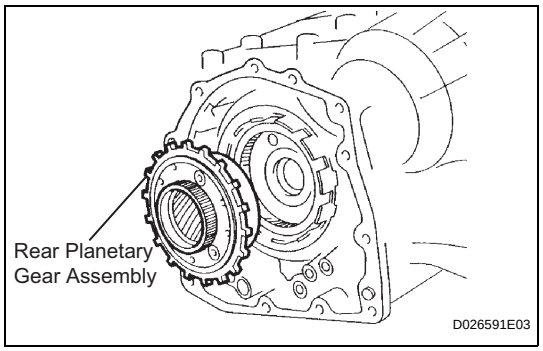
(b) Install the input sun gear, 2 thrust needle roller bearings, 2 No. 2 thrust bearing races, and No. 3 thrust bearings to the transaxle case.

NOTICE:

Ensure that the parts are installed in the correct order and direction.

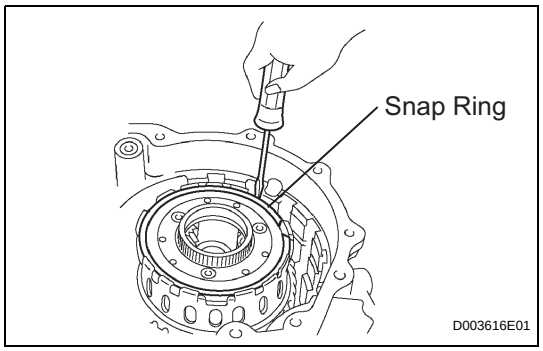
Thrust bearing and bearing race diameter: mm (in.)

	Inside	Outside
Bearing Race, A	34.5 (1.358)	56.82 (2.2370)
Thrust Bearing, B	32.4 (1.276)	56.62 (2.2291)
Bearing Race, C	40.3 (1.587)	58.0 (2.284)
Thrust Bearing, D	38.6 (1.520)	60.0 (2.362)
Bearing Race, E	38.6 (1.520)	58.0 (2.284)



17. INSTALL REAR PLANETARY GEAR ASSEMBLY

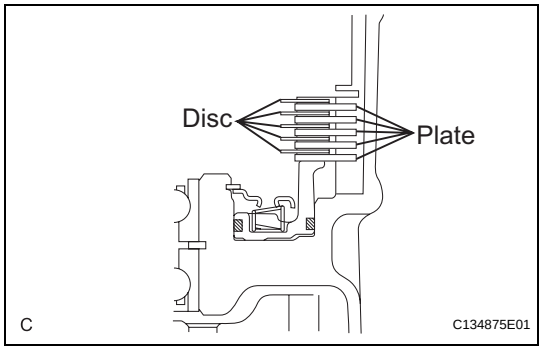
(a) Install the rear planetary gear assembly to the brake hub.



(b) Using a screwdriver, install the snap ring.

NOTICE:

Confirm that the snap ring is engaged in the groove of the 1st and reverse brake hub correctly.



18. INSTALL 1ST AND REVERSE BRAKE DISC

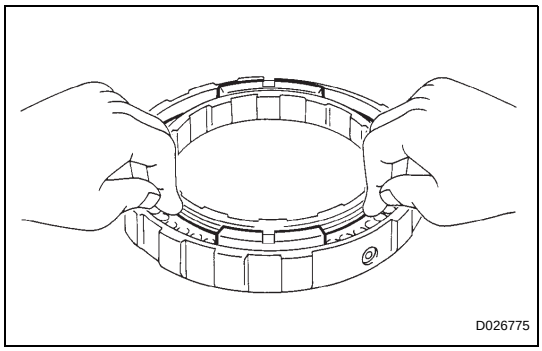
(a) Coat the 5 discs with ATF.

(b) Install the 5 plates and 5 discs.

NOTICE:

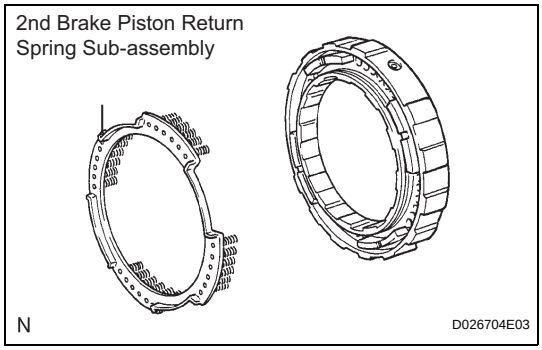
Be careful about the order of discs and plates.

19. INSPECT PACK CLEARANCE OF FIRST AND REVERSE BRAKE (See page AX-229)



20. INSTALL 2ND BRAKE PISTON

(a) Coat the 2nd brake piston with ATF, and install it to the 2nd brake cylinder.

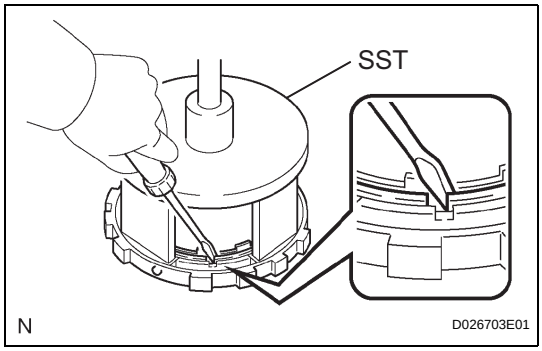


21. INSTALL 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Install the 2nd brake piston return spring sub-assembly.

NOTICE:

Ensure that all springs are fitted in the piston correctly.



(b) Place SST on the piston return spring, and compress it with a press.

SST 09387-00060

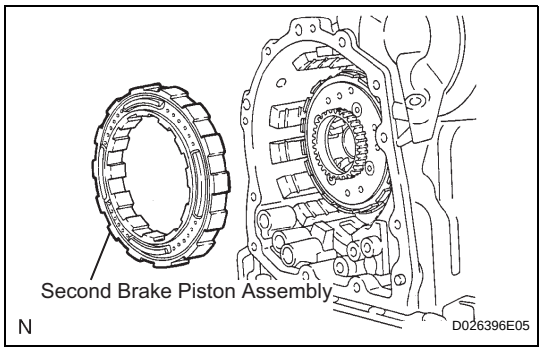
(c) Using a screwdriver, install the snap ring.

NOTICE:

Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove. This prevents the spring seat from being deformed.

22. INSTALL SECOND BRAKE PISTON ASSEMBLY

(a) Install the second brake piston assembly to the transaxle case.



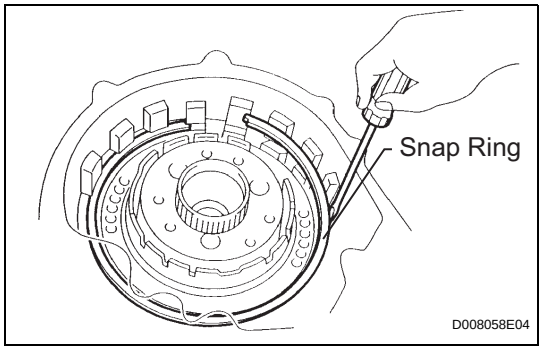
(b) Install the snap ring and measure the inside diameter.

Inside diameter:

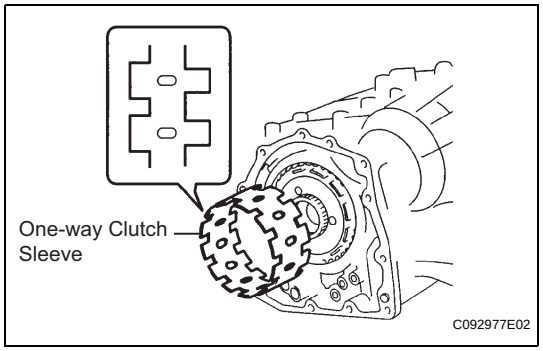
More than 167 mm (6.57 in.)

NOTICE:

- **Make sure to install the tapered snap ring in the correct direction.**
- **When the diameter does not meet the specified value, replace the snap ring with a new one.**



- **After installing the snap ring, confirm that there is no clearance between the second brake cylinder and the fitting surface of the cylinder in the transaxle case.**

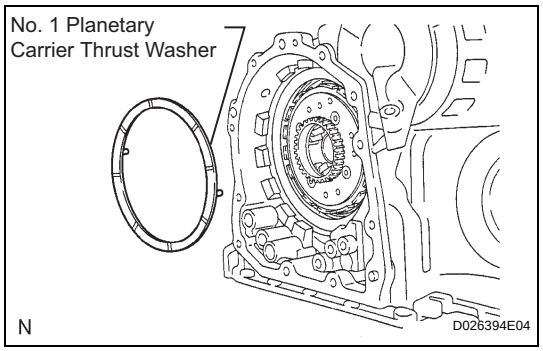


23. INSTALL ONE-WAY CLUTCH SLEEVE

(a) Install the one-way clutch sleeve to the 2nd brake cylinder assembly.

NOTICE:

Check the positioning direction of the outer sleeve.

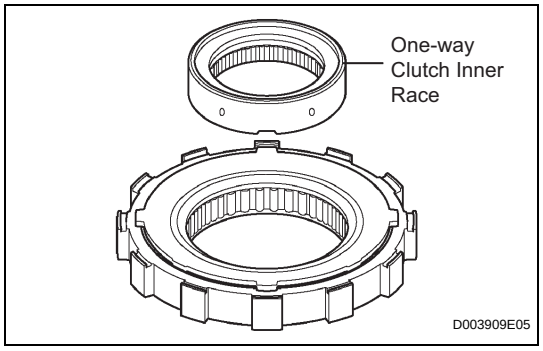


24. INSTALL NO. 1 PLANETARY CARRIER THRUST WASHER

(a) Coat the No. 1 planetary carrier thrust washer with ATF, and install it onto the planetary sun gear assembly.

NOTICE:

After installing the washer, confirm that the projections on the washer are securely fitted in the holes of the planetary sun gear assembly.

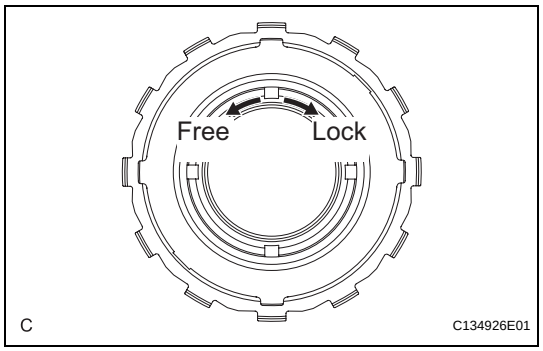


25. INSTALL ONE-WAY CLUTCH ASSEMBLY

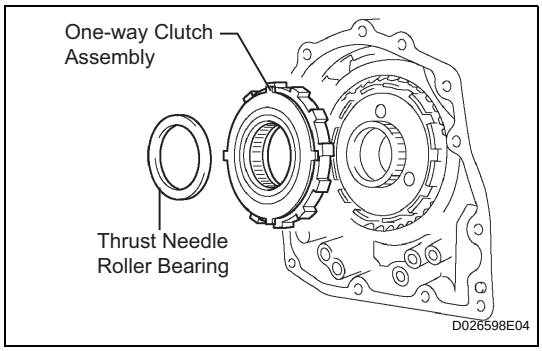
(a) Install the one-way clutch inner race to the one-way clutch.

NOTICE:

- **Check the direction of the inner race.**
- **Confirm that the discrimination mark can be seen.**



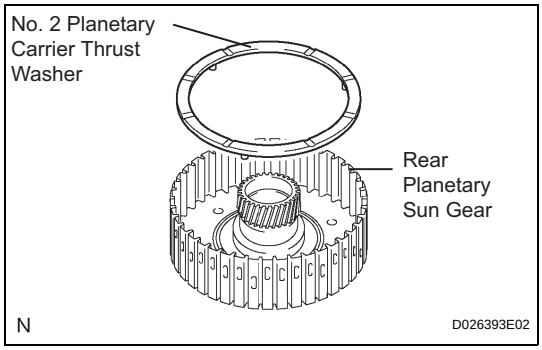
(b) Check the rotating direction of the one-way clutch inner race for the lock or free operation, as shown in the illustration.



(c) Install the one-way clutch and thrust needle roller bearing to the one-way clutch sleeve outer.
Bearing diameter: mm (in.)

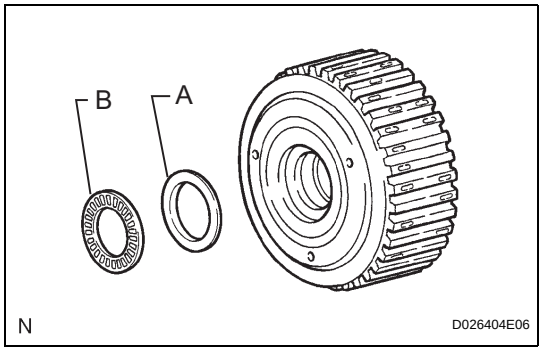
	Inside	Outside
Bearing	53.6 (2.110)	69.4 (2.732)

NOTICE:
Install the thrust bearing properly so that non-colored race will be visible.



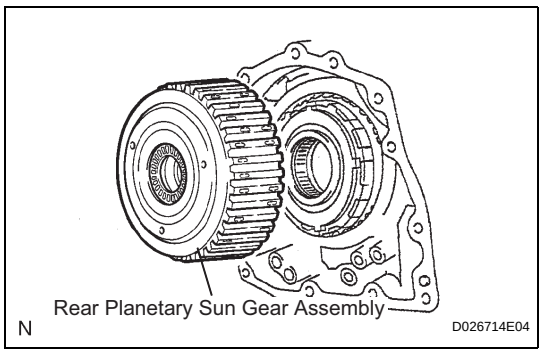
26. INSTALL REAR PLANETARY SUN GEAR ASSEMBLY

(a) Coat the No. 2 planetary carrier thrust washer with ATF, and install it onto the rear planetary sun gear.

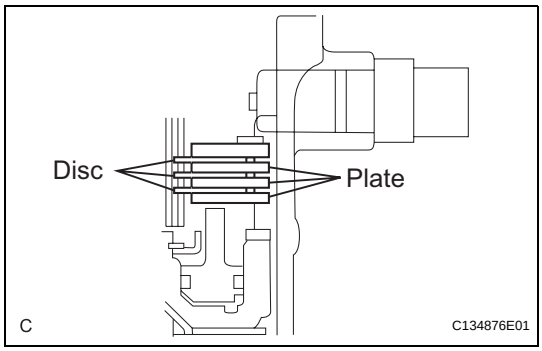


(b) Coat the bearing with yellow petrolatum, and install it onto the rear planetary sun gear.
Bearing diameter: mm (in.)

	Inside	Outside
Race, A	33.1 (1.303)	45.4 (1.787)
Bearing, B	31.85 (1.254)	45.2 (1.78)



(c) Install the rear planetary sun gear assembly to the rear planetary gear.
NOTICE:
After installing the rear planetary sun gear assembly, confirm that the B1 discs engage.

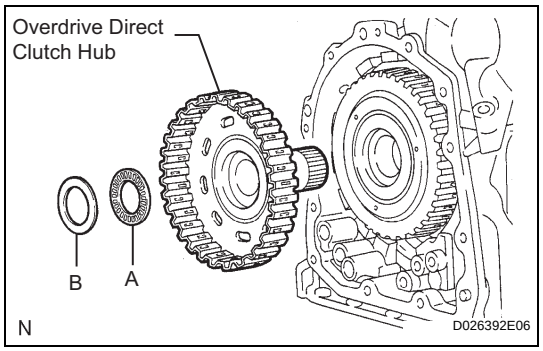


27. INSTALL 2ND BRAKE CLUTCH DISC

(a) Coat the 3 discs with ATF.
(b) Install the 3 discs and 3 plates to the transaxle case.
(c) Install the snap ring.

28. INSPECT PACK CLEARANCE OF SECOND BRAKE

HINT:
See page



29. INSTALL OVERDRIVE DIRECT CLUTCH HUB SUB-ASSEMBLY

(a) Install the direct clutch hub to the planetary gear assembly.

NOTICE:

Be careful not to damage the bushing inside the overdrive clutch hub during installation.

(b) Coat the thrust bearing with ATF.

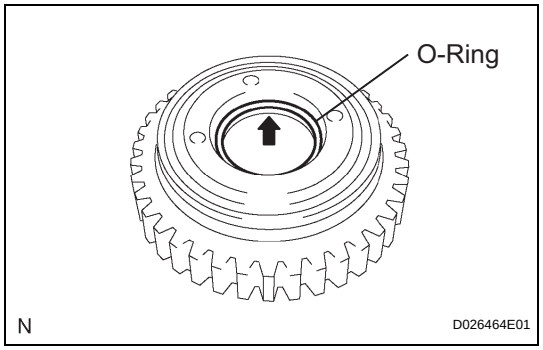
(c) Install the bearing race and the thrust bearing to the direct clutch hub.

NOTICE:

When installing the bearing, hold the side of the overdrive clutch hub.

Bearing and race diameter: mm (in.)

	Inside	Outside
Bearing, A	25.0 (0.984)	39.5 (1.555)
Race, B	23.6 (0.929)	36.6 (1.441)

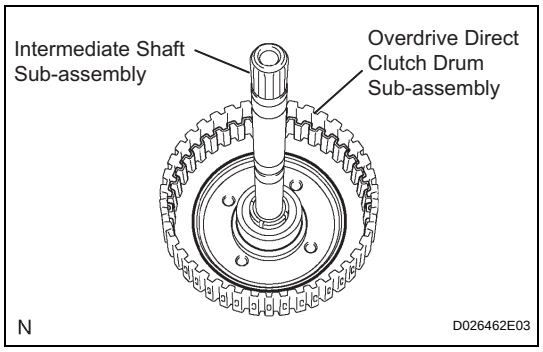


30. INSTALL OVERDRIVE DIRECT CLUTCH O-RING

(a) Coat a new O-ring with ATF, and install it to the direct clutch drum.

NOTICE:

Ensure that the O-ring is not twisted or pinched.

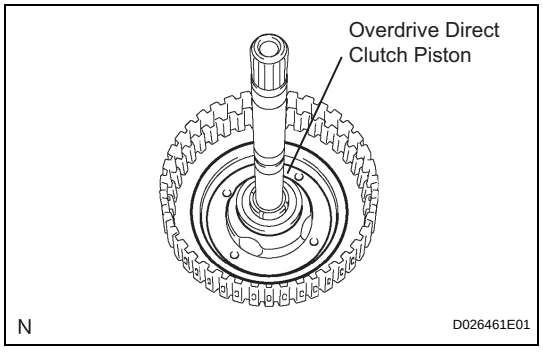


31. INSTALL OVERDRIVE DIRECT CLUTCH DRUM SUB-ASSEMBLY

(a) Coat the direct clutch drum with ATF, and install it to the intermediate shaft.

NOTICE:

- **Be careful not to damage the O-ring.**
- **Be careful not to damage the lip seal of the direct clutch drum.**

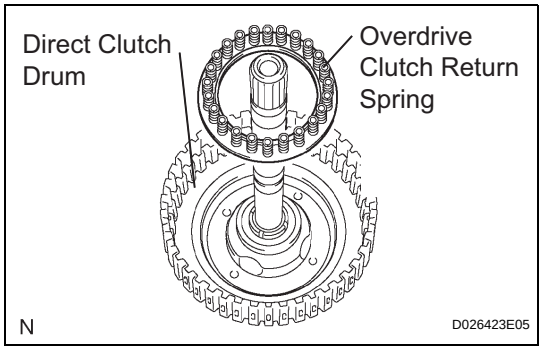


32. INSTALL OVERDRIVE DIRECT CLUTCH PISTON

(a) Coat the overdrive direct clutch piston with ATF, and install it to the overdrive direct clutch drum sub-assembly.

NOTICE:

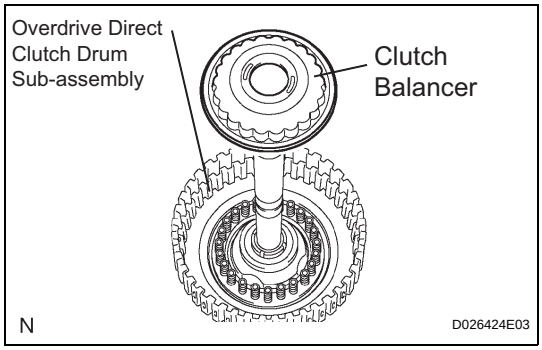
Be careful not to damage the lip seal of the direct clutch piston.



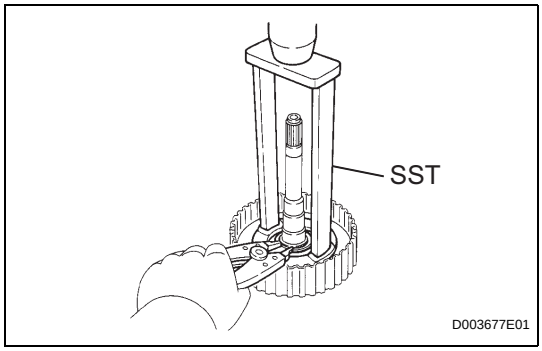
33. INSTALL OVERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Install the overdrive clutch return spring sub-assembly to the overdrive direct clutch drum sub-assembly.
NOTICE:
When installing the spring sub-assembly, ensure that all springs are fitted in the piston correctly.

(b) Coat the clutch balancer with ATF.

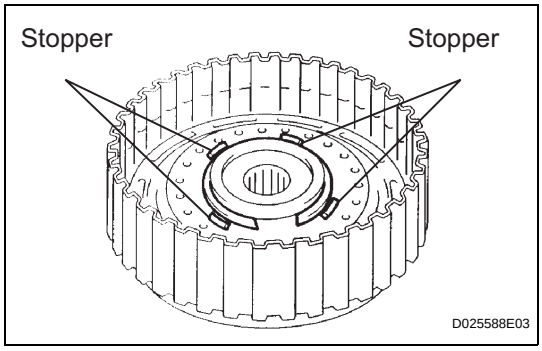


(c) Install the clutch balancer to the overdrive direct clutch drum sub-assembly.
NOTICE:
- **Be careful not to damage the lip seal of the direct clutch balancer.**
- **Ensure that the clutch balancer is not pinched and there are no other defects at the sealing lip.**
- **Apply enough ATF to the sealing lip prior to installation.**

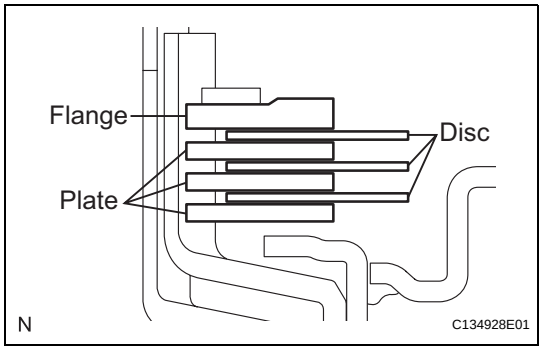


(d) Place SST on the clutch balancer and compress the piston return spring with a press.
SST 09387-00020

(e) Using a snap ring expander, install the snap ring to the direct clutch drum.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove. This prevents the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**



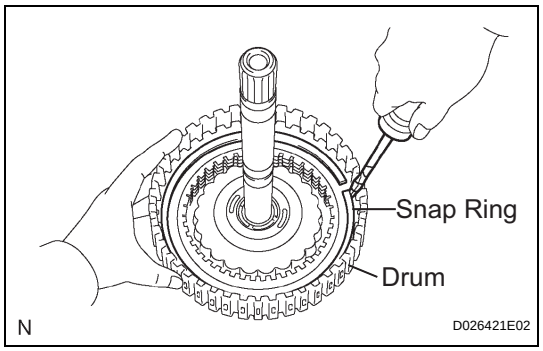
(f) Position the end gap of the snap ring in the piston as shown in the illustration.
NOTICE:
Ensure that the end gap of the snap ring is not aligned with any of the stoppers.



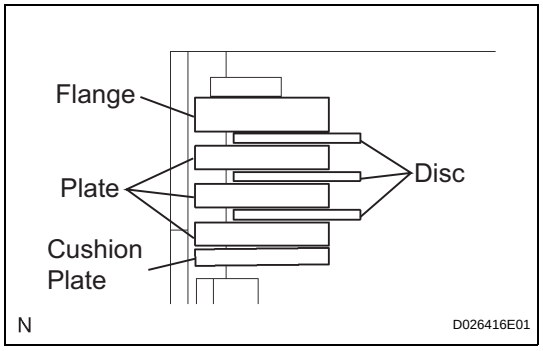
34. INSTALL OVERDRIVE DIRECT CLUTCH DISC

(a) Coat the 3 discs with ATF.

(b) Install the 3 plates, 3 discs and flange to the intermediate shaft.
NOTICE:
Be careful about the order of the discs, plates and flange.



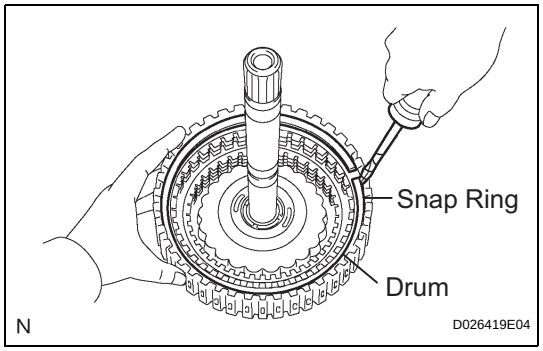
(c) Using a screwdriver, install the snap ring.
NOTICE:
The snap ring should be securely engaged in the groove of the drum.



35. INSTALL DIRECT MULTIPLE DISC CLUTCH DISC

(a) Coat the 3 discs with ATF.

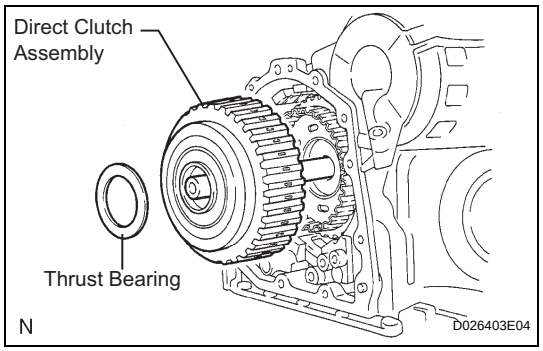
(b) Install the cushion plate, 3 plates, 3 discs and flange to the intermediate shaft.
NOTICE:
- **Install the cushion plate with the mark on the white surface facing the plate.**
- **Be careful about the order of discs, plates and flange.**



(c) Using a screwdriver, install the snap ring.
NOTICE:
The snap ring should be securely engaged in the groove of the drum.

36. INSPECT PACK CLEARANCE OF DIRECT CLUTCH (See page AX-232)

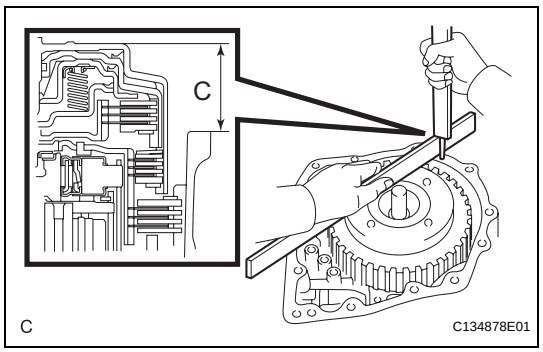
37. INSPECT PACK CLEARANCE OF OVERDRIVE CLUTCH (See page AX-232)



38. INSTALL DIRECT CLUTCH ASSEMBLY

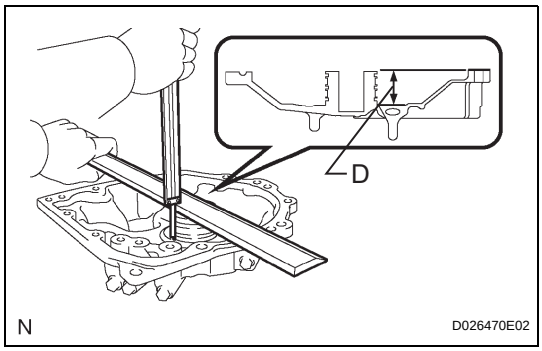
(a) Coat the thrust bearing with ATF.

(b) Install the direct clutch assembly and thrust bearing to the rear planetary sun gear assembly.
NOTICE:
The disc in the direct clutch should completely match with the hub attached outside the rear planetary sun gear. Otherwise, the rear cover cannot be installed.



(c) Clean the contact surfaces of the transaxle case and the rear cover.

(d) As shown in the illustration, place a straight edge on the direct clutch drum and measure the distance between the transaxle case and the straight edge using vernier calipers (Dimension C).



(e) Using vernier calipers and a simple straight edge, measure the dimension shown in the illustration.

(f) Calculate the end play value using the following formula. Select a thrust bearing which satisfies the specified end play value and install it.

End play:

0.199 to 0.970 mm (0.0078 to 0.0382 in.)

NOTICE:

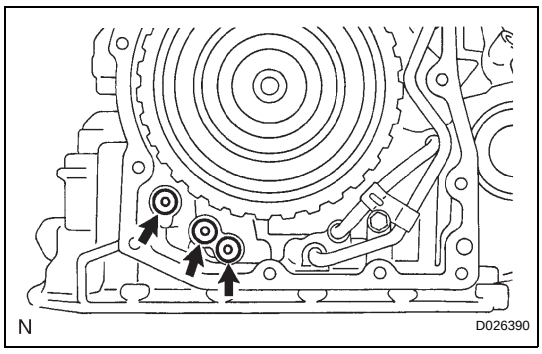
Make sure that the non-colored race side is facing the direct clutch assembly.

HINT:

End play = Dimension D - Dimension C

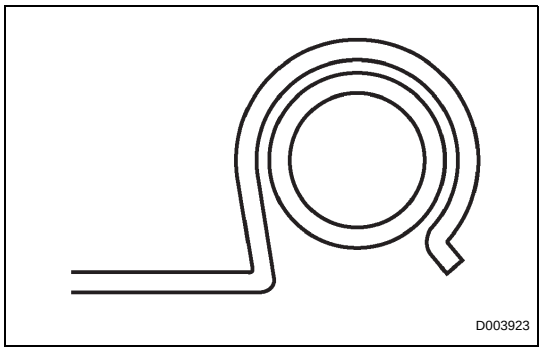
Bearing thickness and diameter: mm (in.)

Thickness	Inside	Outside
3.6 (0.1417)	55.9 (2.201)	76.0 (2.992)
3.8 (0.150)	55.9 (2.201)	76.6 (3.016)



39. INSTALL NO. 1 GOVERNOR APPLY GASKET

(a) Install 3 new No. 1 governor apply gaskets to the transaxle case.



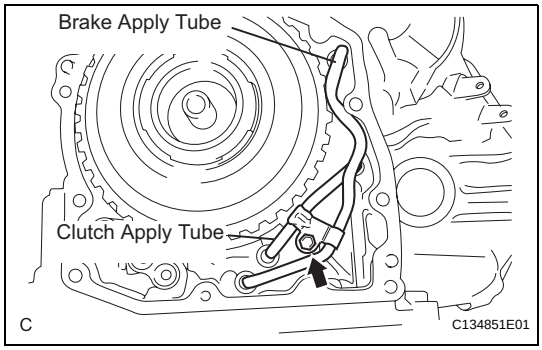
40. INSTALL BRAKE APPLY TUBE

(a) Install the clamp to the brake apply tube.

NOTICE:

Make sure to install the clamp to the apply tube before installing the apply tube to the transaxle case. This prevents the apply tube from being deformed or damaged.

(b) Install the clutch apply tube.

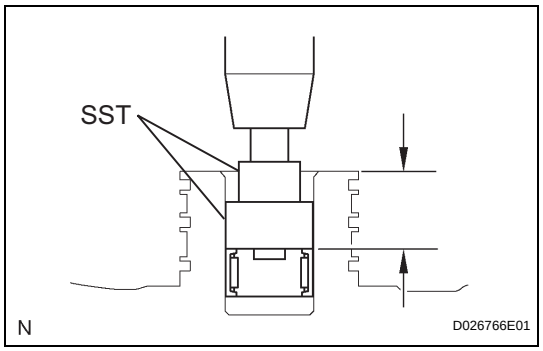


(c) Install the brake apply tube to the transaxle case with the bolt.

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

NOTICE:

Each pipe should be securely inserted until it reaches the stopper.



41. INSTALL NEEDLE ROLLER BEARING

(a) Using SST and a press, install the needle roller bearing to the transaxle rear cover.

SST 09950-60010 (09951-00230, 09952-06010, 09951-00360)

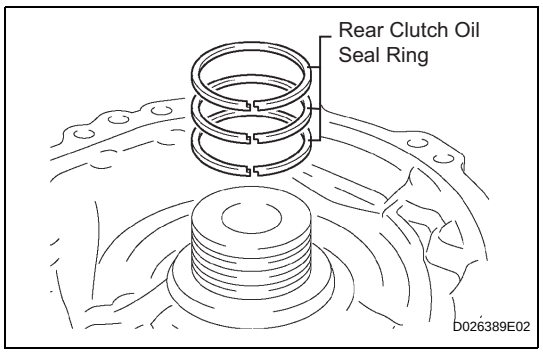
Press fit depth:

20.55 to 21.25 mm (0.8091 to 0.8366 in.)

NOTICE:

- **Face the inscribed mark side of the bearing race up.**
- **Keep pressing until the specified value is obtained.**

(b) Coat the needle roller bearing with ATF.

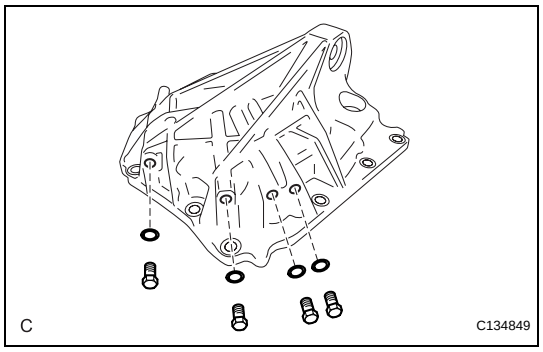


42. INSTALL REAR CLUTCH OIL SEAL RING OUTER

(a) Coat 3 new rear clutch oil seal rings with ATF, and install them to the transaxle rear cover.

NOTICE:

The rear clutch oil seal rings should be securely engaged in the grooves of the drum.

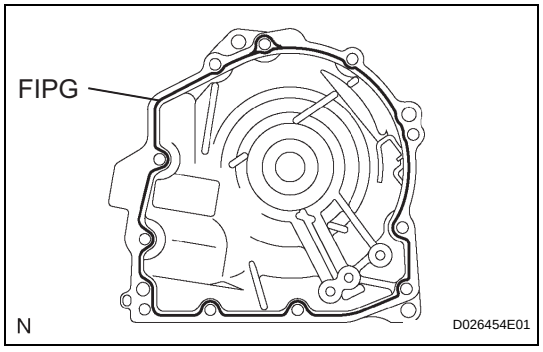


43. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Install 4 new O-rings to the 4 No. 1 transaxle case plugs.

(b) Install the 4 No. 1 transaxle case plugs to the transaxle rear cover.

Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



44. INSTALL TRANSAXLE REAR COVER SUB-ASSEMBLY

(a) Remove any packing material and keep the contact surfaces of the transaxle rear cover and the transaxle case away from oil.

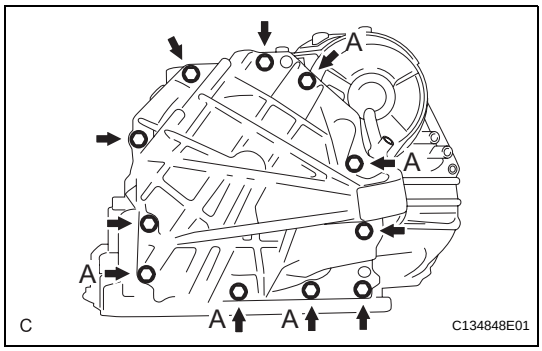
(b) Apply FIPG to the cover.

FIPG:

Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent

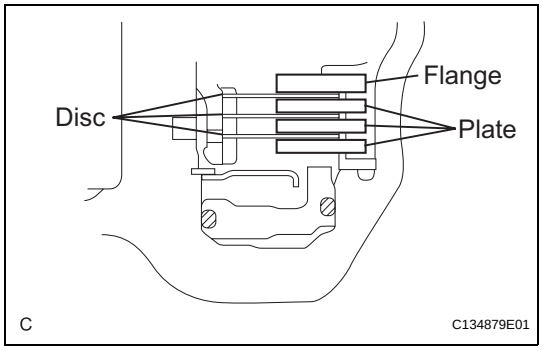
NOTICE:

Apply FIPG in a continuous line (width 1.2 mm (0.047 in.)) along the sealing surface.



(c) Apply liquid sealer to the threads of bolt A.
Sealant:
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent

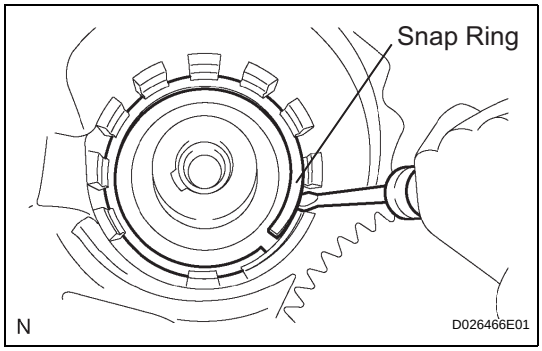
(d) Install the 11 bolts.
Torque: Bolt A
19 N*m (190 kgf*cm, 14 ft.*lbf)
Other bolts
25 N*m (250 kgf*cm, 18 ft.*lbf)



45. INSTALL NO. 2 UNDERDRIVE CLUTCH DISC

(a) Coat the 3 discs with ATF.

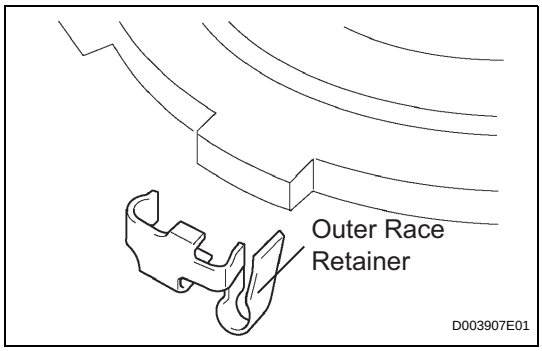
(b) Install the 3 discs, 3 plates and flange to the transaxle case.
NOTICE:
Be careful about the order of discs, plates and flange.



(c) Using a screwdriver, install the snap ring.
NOTICE:
The snap ring should be securely engaged in the groove of the drum.

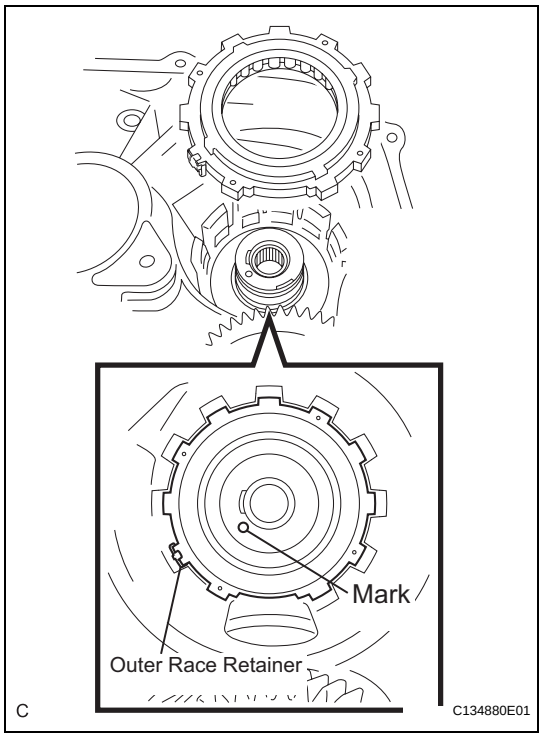
46. INSPECT PACK CLEARANCE OF NO. 2 UNDERDRIVE CLUTCH (See page AX-230)

47. INSPECT UNDERDRIVE ONE-WAY CLUTCH ASSEMBLY (See page AX-230)

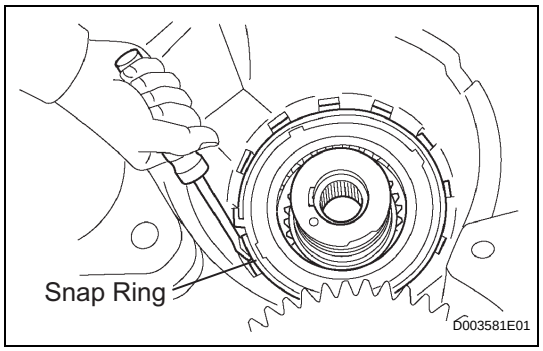


48. INSTALL UNDERDRIVE ONE-WAY CLUTCH ASSEMBLY

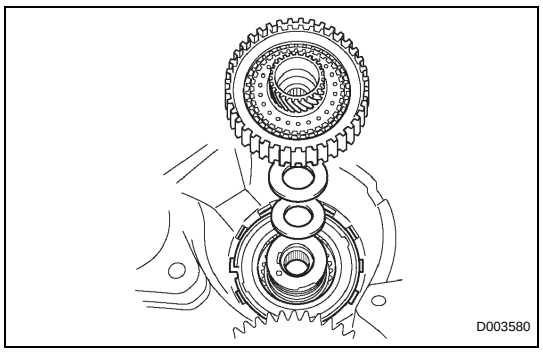
(a) Install the outer race retainer to the one-way clutch.
NOTICE:
Securely install the outer race retainer onto the external tooth of the one-way clutch.



(b) Install the one-way clutch to the transaxle case.
NOTICE:
Ensure that the outer race retainer and the mark on the transaxle case are aligned.



(c) Using a screwdriver, install the snap ring to the transaxle case.
NOTICE:
The snap ring should be securely engaged in the groove of the transaxle case.

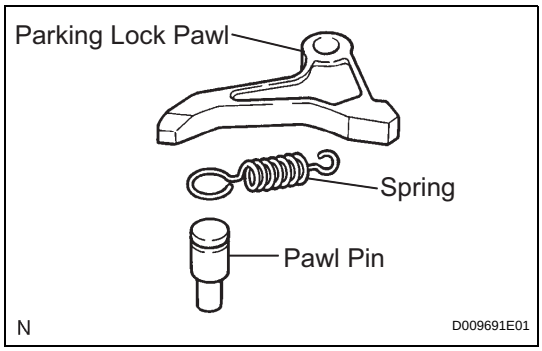


49. INSTALL UNDERDRIVE CLUTCH ASSEMBLY

(a) Coat the bearing and bearing race with ATF, and install them onto the underdrive clutch.
Bearing and bearing race diameter: mm (in.)

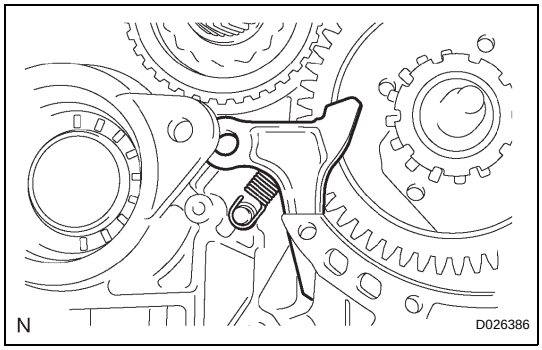
	Inside	Outside
Bearing	37.73 (1.4854)	58.0 (2.284)
Race	29.9 (1.177)	55.5 (2.185)

(b) Install the underdrive clutch assembly to the transaxle case.
NOTICE:
When installing the underdrive clutch drum sub-assembly, do not damage the oil seal ring.

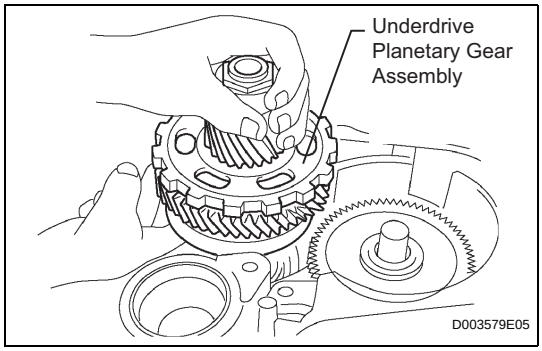


50. INSTALL PARKING LOCK PAWL

(a) Install the pawl pin and spring to the parking lock pawl.



(b) Temporarily install the parking lock pawl, pin and spring to the transaxle case as shown in the illustration.

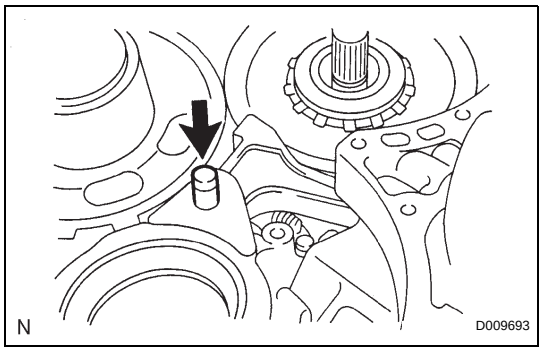


51. INSTALL UNDERDRIVE PLANETARY GEAR ASSEMBLY

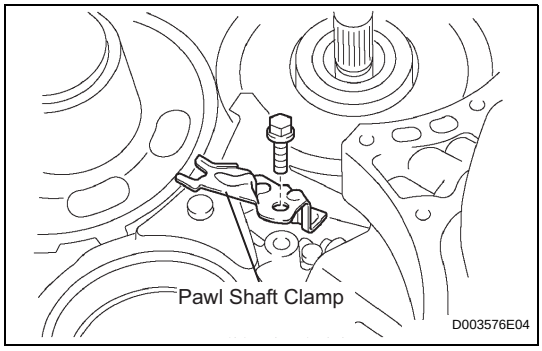
(a) Install the underdrive planetary gear assembly to the transaxle case.

NOTICE:

Firmly engage all the discs of the underdrive clutch with the hub splines of the underdrive planetary gear assembly and securely assemble them.

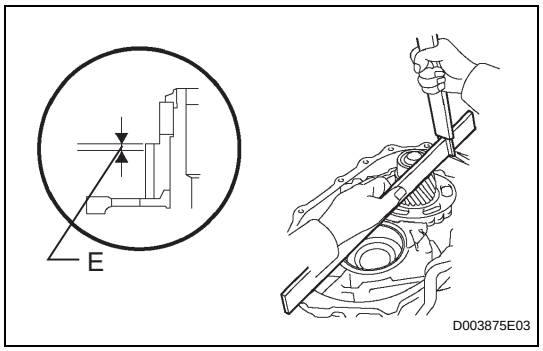


(b) Install the parking lock pawl shaft.

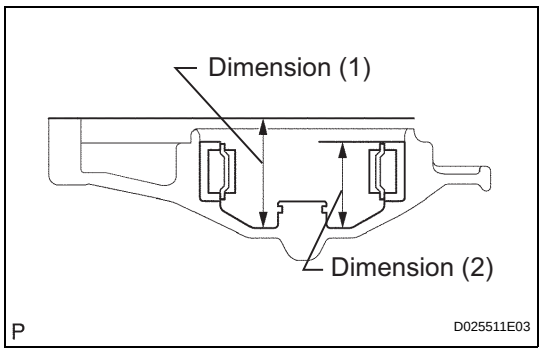


(c) Install the pawl shaft clamp with the bolt.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

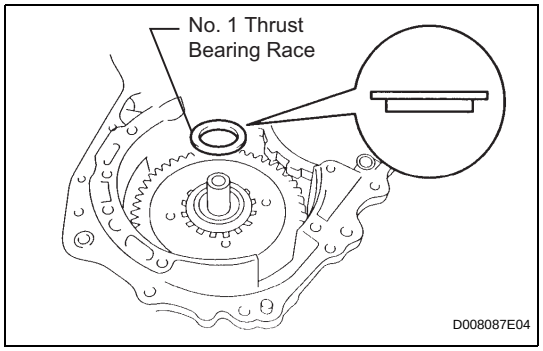


(d) Using a straight edge and vernier calipers as shown in the illustration, measure the gap between the top of the differential drive pinion in the underdrive planetary gear and contact surface of the transaxle case and housing (Dimension E).
NOTICE:
Note down dimension E because it is necessary for the following process.



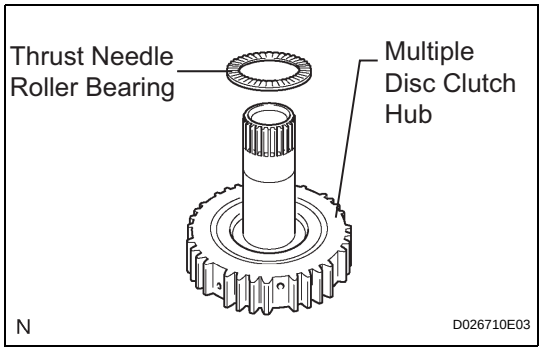
(e) As shown in the illustration, measure the 2 places of the transaxle housing, and calculate dimension F using the following formula.
NOTICE:
Note down dimension F because it is necessary for the following process.
HINT:
Dimension F = Dimension (1) - Dimension (2)

52. INSTALL MULTIPLE DISC CLUTCH HUB



(a) Install the No. 1 thrust bearing race to the transaxle case while checking its direction.
Bearing race diameter: mm (in.)

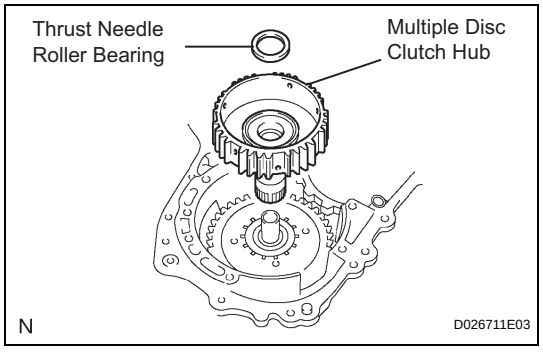
	Inside	Outside
Bearing Race	34.5 (1.359)	48.5 (1.909)



(b) Coat the thrust needle roller bearing and race with ATF, and install them onto the multiple disc clutch hub.
Thrust bearing and race diameter: mm (in.)

	Inside	Outside
Thrust Bearing	36.4 (1.433)	52.2 (2.055)

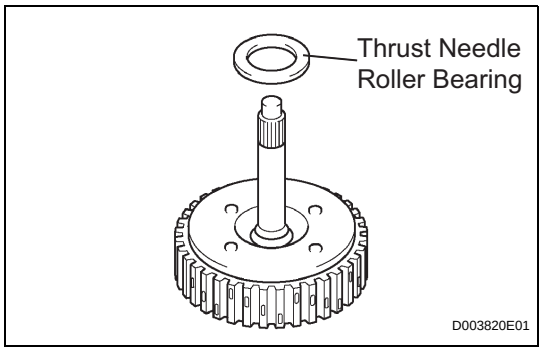
(c) Coat the needle roller bearing with ATF.



(d) Install the needle roller bearing to the multiple disc clutch hub.
Bearing diameter: mm (in.)

	Inside	Outside
Bearing	23.5 (0.925)	44.0 (1.732)

(e) Install the multiple disc clutch hub to the transaxle case.



53. INSTALL FORWARD CLUTCH ASSEMBLY

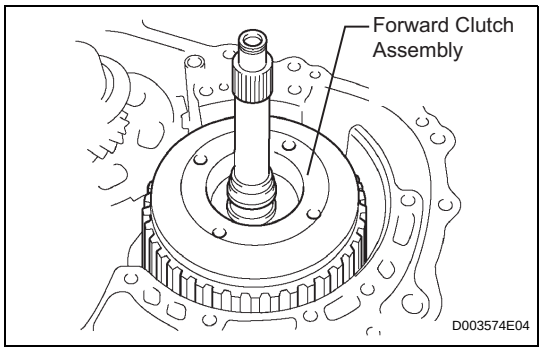
(a) Coat the thrust needle roller bearing with ATF.

(b) Install the thrust needle roller bearing to the forward clutch.

Thrust bearing diameter: mm (in.)

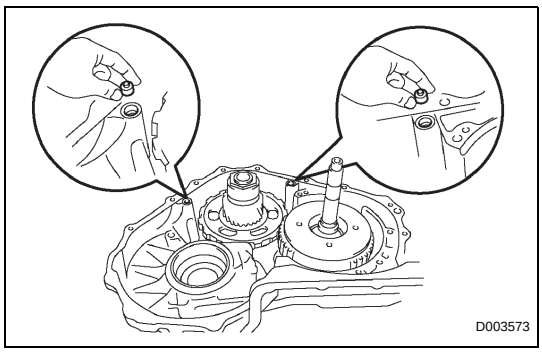
	Inside	Outside
Thrust Bearing	33.85 (1.3327)	52.2 (2.0551)

NOTICE:
Install the thrust bearing properly so that the temper colored side of the race will be visible.



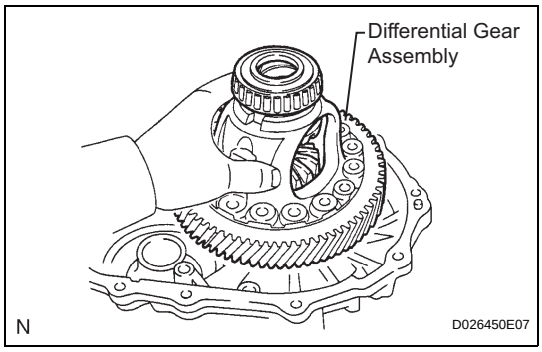
(c) Install the forward clutch to the forward clutch assembly.

NOTICE:
- **Align the splines of all discs in the forward clutch with those of the multiple clutch hub to assemble them securely.**
- **Be careful not to damage the bush inside the forward clutch hub during installation.**



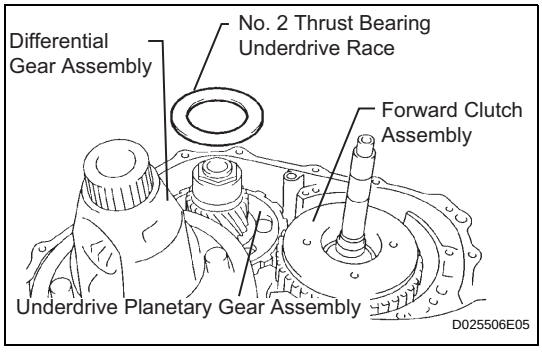
54. INSTALL OVERDRIVE BRAKE GASKET

(a) Install 2 new overdrive brake gaskets.



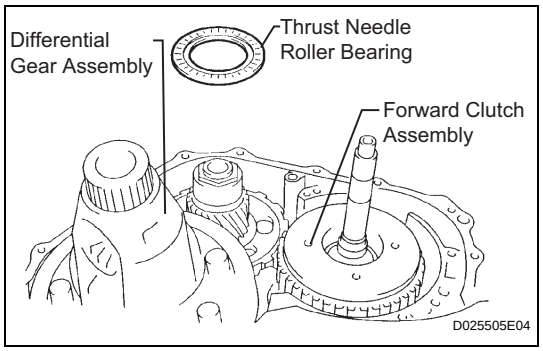
55. INSTALL DIFFERENTIAL GEAR ASSEMBLY

(a) Install the differential gear assembly to the transaxle case.



56. INSTALL NO. 2 THRUST BEARING UNDERDRIVE RACE

(a) Install the No. 2 thrust bearing underdrive race to the underdrive planetary gear assembly.



57. INSTALL THRUST NEEDLE ROLLER BEARING

(a) Coat the thrust needle roller bearing with ATF.

(b) Calculate the end play value using the following formula and values of Dimensions E and F that ware measured when installing the cylindrical roller bearing and underdrive planetary gear. Select an appropriate underdrive planetary gear thrust bearing race No. 2 which satisfies the specified end play value, and install it.

End play:

0.198 to 0.693 mm (0.00779 to 0.02728 in.)

HINT:

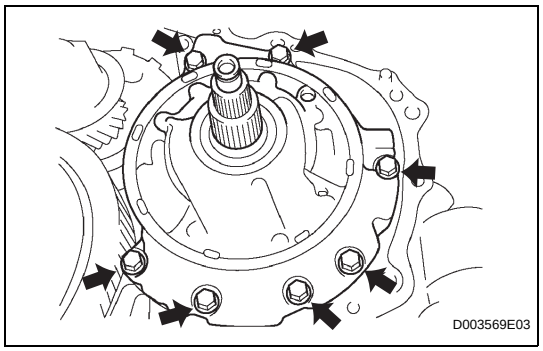
End play = Dimension F - Dimension E - Thrust bearing thickness 2.5 mm (0.0984 in.) - Underdrive thrust bearing race No. 2 thickness.

Race thickness: mm (in.)

F - E	Thickness
Less than 7.339 (0.28894)	3.5 (0.138)
7.339 (0.28894) or more	3.8 (0.150)

Bearing and bearing race diameter: mm (in.)

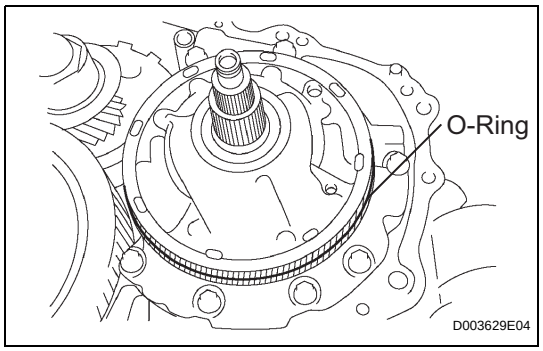
	Inside	Outside
Bearing	53.0 (2.087)	78.2 (3.079)
Bearing race	52.1 (2.051)	75.5 (2.972)



58. INSTALL OIL PUMP ASSEMBLY

(a) Install the oil pump to the transaxle case with the 7 bolts.

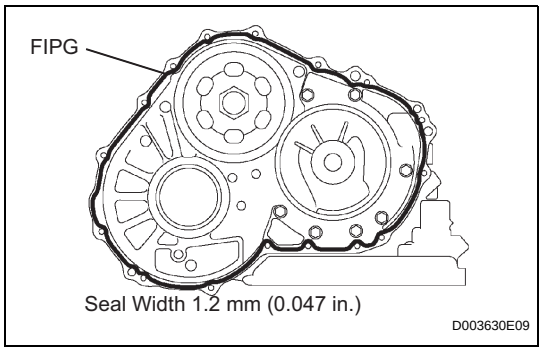
Torque: 22 N*m (225 kgf*cm, 16 ft.*lbf)



(b) Coat the O-ring of the oil pump with ATF.

NOTICE:

Confirm the input shaft rotates smoothly with the manual operation after installing the oil pump.



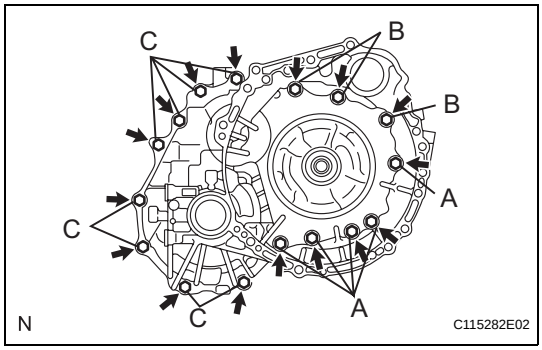
59. INSTALL TRANSAXLE HOUSING

(a) Remove any parking material and keep the contact surfaces of the transaxle case and transaxle housing away from oil.

(b) Apply FIPG to the transaxle case.

FIPG:

Toyota Genuine Seal Packing 1281, Three Bond 1281 or Equivalent



(c) Install the transaxle housing to the transaxle case with the 16 bolts.

Torque: Bolt A

22 N*m (225 kgf*cm, 16 ft.*lbf)

Bolt B

29 N*m (296 kgf*cm, 21 ft.*lbf)

Bolt C

29 N*m (296 kgf*cm, 21 ft.*lbf)

HINT:

Apply seal packing or equivalent to bolts A and C.

Seal packing:

Toyota Genuine Seal Packing 1344, Three Bond 1344 or Equivalent

Bolt length

Bolt A:

50 mm (1.969 in.)

Bolt B:

50 mm (1.969 in.)

Bolt C:

42 mm (1.654 in.)

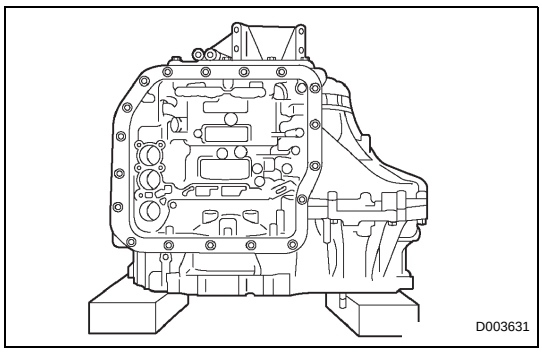
NOTICE:

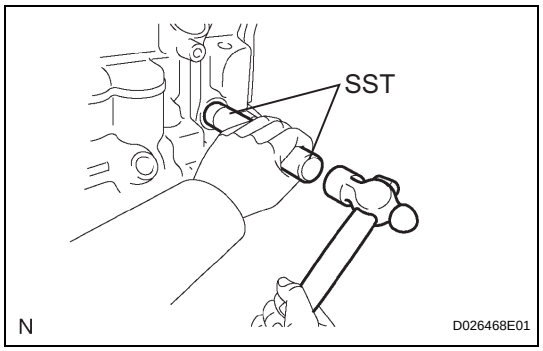
Apply seal packing to new bolts and tighten them within 10 minutes of application.

60. INSPECT INPUT SHAFT END PLAY (See page AX-231)

61. FIX AUTOMATIC TRANSAXLE ASSEMBLY

(a) Fix the transaxle assembly.





62. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL

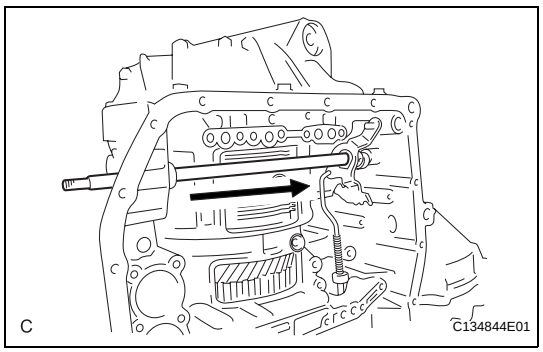
(a) Coat a new oil seal with MP grease.

(b) Using SST, install the oil seal to the transaxle case.

SST 09950-60010 (09951-00230), 09950-70010 (09951-07100)

Oil seal drive in depth:

-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

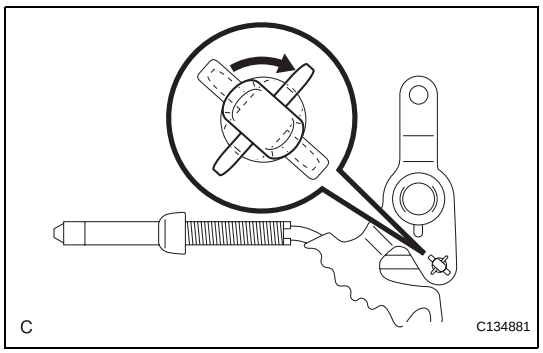


63. INSTALL PARKING LOCK ROD SUB-ASSEMBLY

(a) Install the parking lock rod to the manual valve lever.

HINT:

Align the dial with the notches on the manual valve lever and turn the dial 90° to install the parking lock rod.

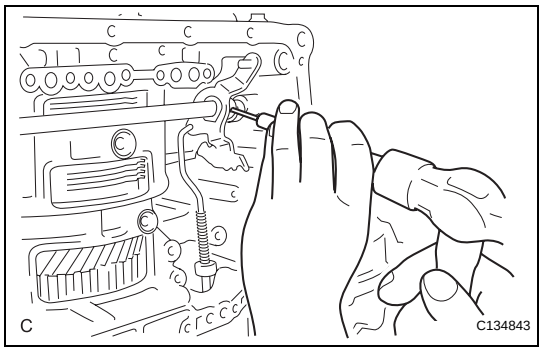


64. INSTALL MANUAL VALVE LEVER SUB-ASSEMBLY

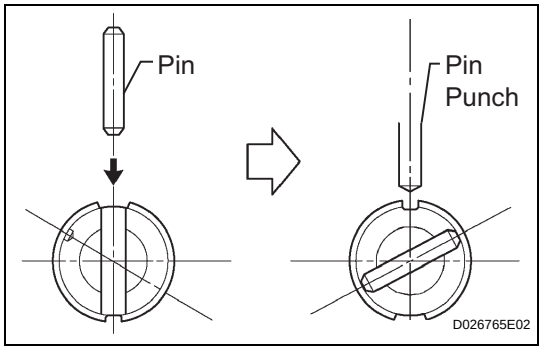
(a) Install a new spacer and the manual valve lever shaft to the transaxle case.

NOTICE:

Do not damage the oil seal while installing the shaft to the transaxle case.



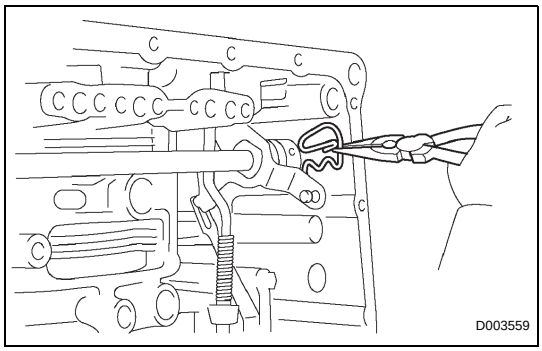
(b) Using a pin punch and hammer, drive in a new pin.



(c) Turn the spacer and the lever shaft to align the smaller hole of the spacer with the staking position mark on the lever shaft.

(d) Using a pin punch, stake the spacer through the small hole.

(e) Check that the spacer does not turn.

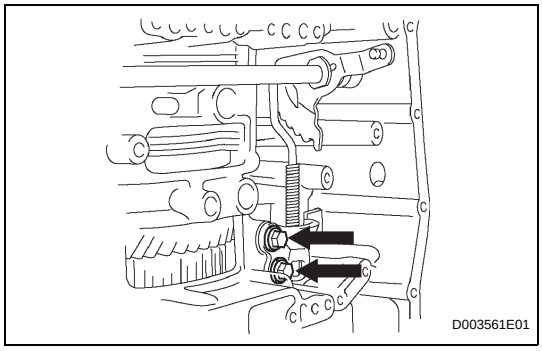


65. INSTALL MANUAL VALVE LEVER SHAFT RETAINER SPRING

(a) Using needle-nose pliers, install the retainer spring.

NOTICE:

Hang the spring on the shaft securely.



66. INSTALL PARKING LOCK PAWL BRACKET

(a) Install the parking lock pawl bracket with the 2 bolts.

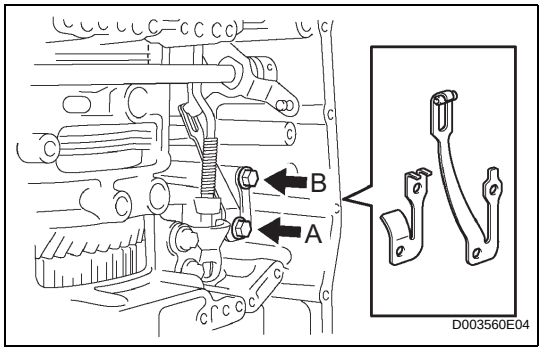
Torque: 20 N*m (205 kgf*cm, 15 ft.*lbf)

Bolt length:

25 mm (0.98 in.)

NOTICE:

Be sure the parking rod is placed between the parking pawl and the guide of the parking bracket after the parking bracket is installed.



67. INSTALL MANUAL DETENT SPRING SUB-ASSEMBLY

(a) Install the manual detent spring sub-assembly with the 2 bolts.

NOTICE:

Make sure to install the manual detent spring and cover in this order.

HINT:

Tighten the bolts in the order of A and B.

Torque: Bolt A

20 N*m (205 kgf*cm, 15 ft.*lbf)

Bolt B

12 N*m (120 kgf*cm, 9 ft.*lbf)

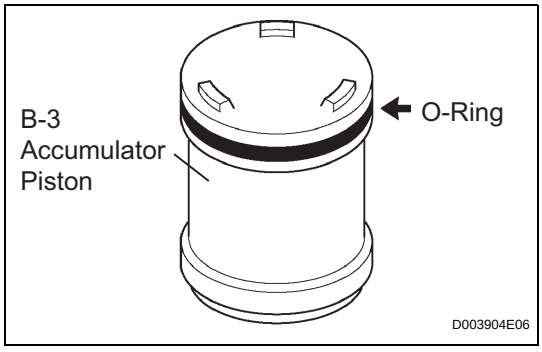
Bolt length:

Bolt A:

27 mm (1.06 in.)

Bolt B:

16 mm (0.63 in.)

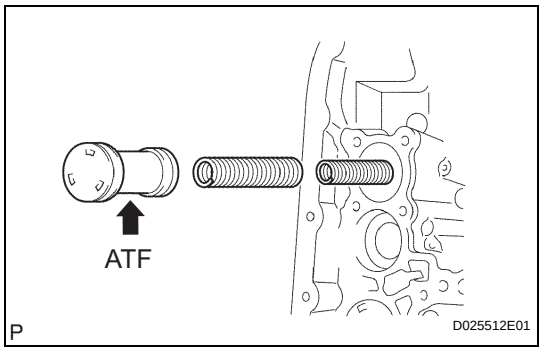


68. INSTALL B-3 ACCUMULATOR PISTON

(a) Coat a new O-ring with ATF, and install it to the B-3 accumulator piston.

NOTICE:

Install the O-ring to the accumulator piston not to have a twist or a pinching. Apply enough ATF to the O-ring prior to installation. Be sure about the installation position.



(b) Coat the piston and springs with ATF, and install them to the transaxle case.

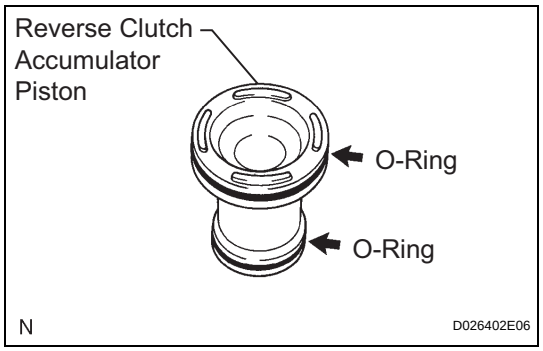
NOTICE:

Install the correct springs to the B-3 accumulator piston by checking the color or dimension of the springs.

Accumulator spring:

Free length / Outer diameter (mm (in.))	Color
Inner: 62.00 (2.4409) / 15.50 (0.610)	Purple
Outer: 74.23 (2.9224) / 21.70 (0.854)	Purple

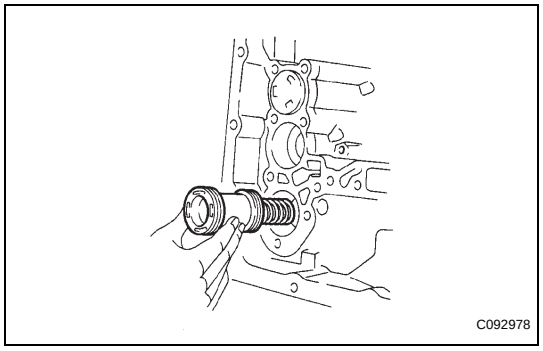
69. INSTALL REVERSE CLUTCH ACCUMULATOR PISTON



(a) Coat 2 new O-rings with ATF, and install them to the reverse clutch accumulator piston.

NOTICE:

Install the O-rings to the accumulator piston not to have a twist or a pinching. Apply enough ATF to the O-rings prior to installation. Be sure about the installation positions.



(b) Coat the piston and spring with ATF, and install them to the transaxle case.

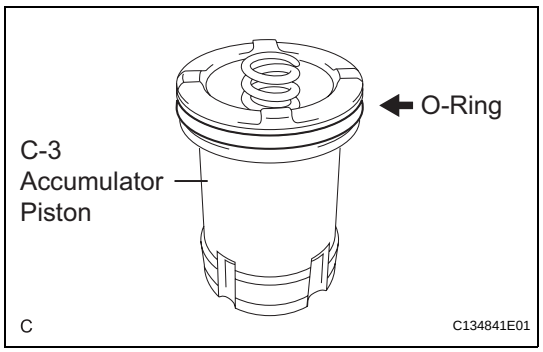
NOTICE:

Install the correct spring to the reverse clutch accumulator piston by checking the color or dimension of the spring.

Accumulator spring:

Free length / Outer diameter (mm (in.))	Color
60.96 (2.3999) / 14.10 (0.555)	Yellow

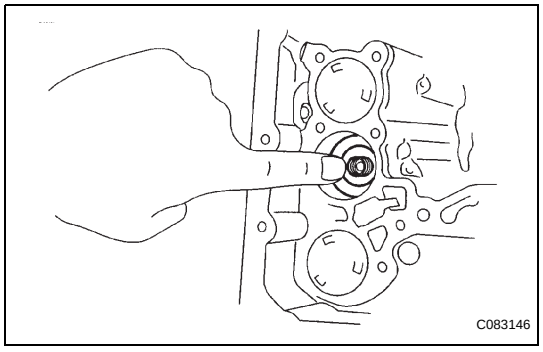
70. INSTALL C-3 ACCUMULATOR PISTON



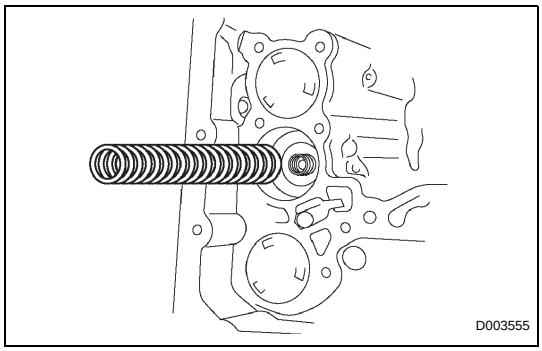
(a) Coat a new O-ring with ATF, and install it to the C-3 accumulator piston.

NOTICE:

Install the O-ring to the accumulator piston not to have a twist or a pinching. Apply enough ATF to the O-ring prior to installation. Be sure about the installation position.

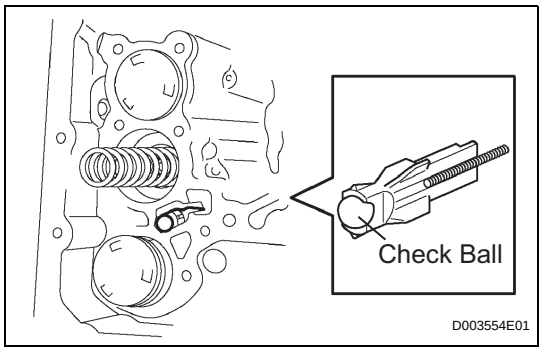


(b) Coat the piston with ATF, and install it to the transaxle case.

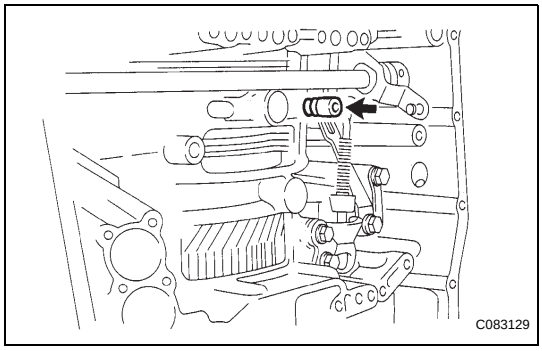


(c) Install the spring to the C-3 accumulator piston.
NOTICE:
Install the correct spring to the C-3 accumulator piston by checking the color or dimension of the spring.
Accumulator spring:

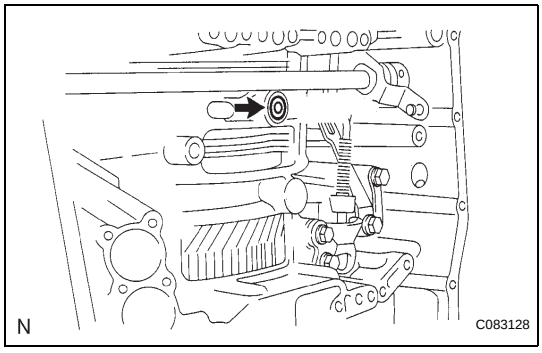
Free length / Outer diameter (mm (in.))	Color
72.20 (2.8425) / 19.0 (0.748)	Colorless



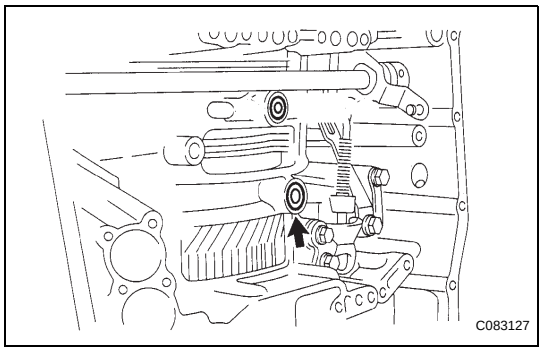
71. INSTALL CHECK BALL BODY
(a) Coat the check ball body with ATF.
(b) Install the check ball body and spring.
NOTICE:
Regarding the installation of the spring for the check ball body, be sure to place the spring in the hole in the ball body. Be careful about the orientation of the parts.



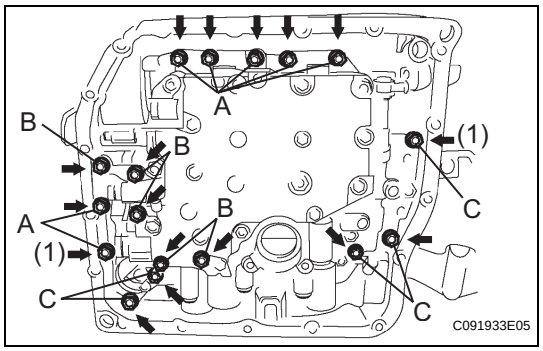
72. INSTALL BRAKE DRUM GASKET
(a) Coat a new brake drum gasket with ATF, and install it to the transaxle case.
NOTICE:
Do not damage the lip portion of the brake drum gasket when inserting the gasket to the case. Apply enough ATF to the gasket prior to installation. Be careful about the orientation of the parts.



73. INSTALL TRANSAXLE CASE 2ND BRAKE GASKET
(a) Coat a new transaxle case 2nd brake gasket with ATF, and install it to the transaxle case.
NOTICE:
Do not damage the lip portion of the transaxle case 2nd brake gasket when inserting the gasket to the case. Apply enough ATF to the gasket prior to installation. Be careful about the orientation of the parts.



74. INSTALL NO. 1 GOVERNOR APPLY GASKET
(a) Coat a new No. 1 governor apply gasket with ATF, and install it to the transaxle case.
NOTICE:
Do not damage the lip portion of the No. 1 governor apply gasket when inserting the gasket to the case. Apply enough ATF to the gasket prior to installation. Be careful about the orientation of the parts.



75. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Check the manual valve lever position. Install the valve body to the transaxle case with the 17 bolts.

Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

Bolt length:

Bolt A:

25 mm (0.984 in.)

Bolt B:

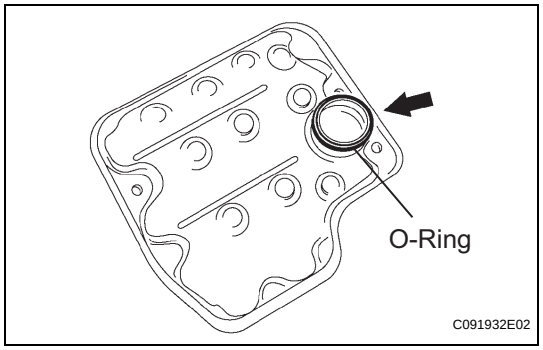
57 mm (2.244 in.)

Bolt C:

41 mm (1.614 in.)

NOTICE:

- **Push the valve body against the accumulator piston spring and the check ball body to install it.**
- **When installing the valve body to the transaxle case, do not hold the solenoids.**
- **Temporarily tighten the bolts marked by (1) in the illustration first because they are positioning bolts.**

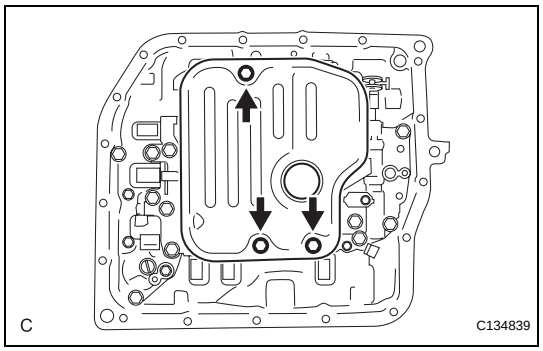


76. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

(a) Coat a new O-ring with ATF, and install it to the oil strainer.

NOTICE:

Install the O-ring carefully not to have a twist or a pinching. Apply enough ATF to the O-ring prior to installation.

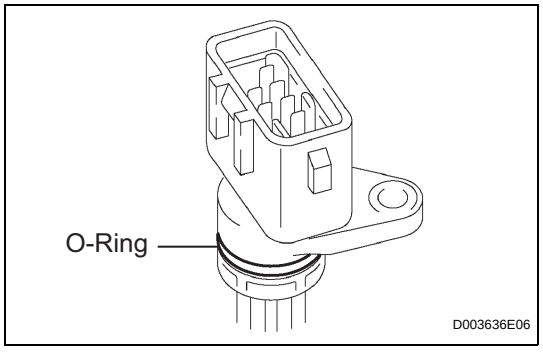


(b) Install the oil strainer to the valve body with the 3 bolts.

Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

NOTICE:

Apply ATF to the bolts prior to installation.

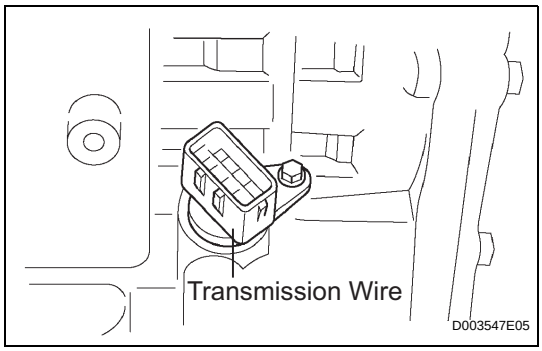


77. INSTALL TRANSMISSION WIRE

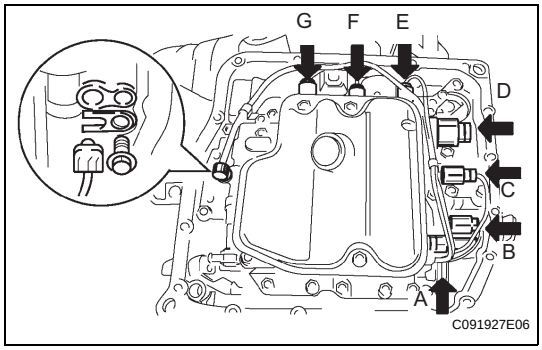
(a) Coat a new O-ring with ATF, and install it to the transmission wire.

NOTICE:

Install the O-ring not to have a twist or pinching. Apply enough ATF to the O-ring prior to installation.



(b) Install the transmission wire retaining bolt.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

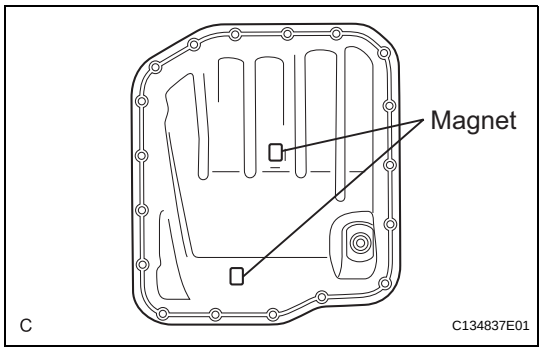


78. CONNECT TRANSMISSION WIRE

(a) Coat an O-ring of the ATF temperature sensor with ATF.

(b) Install the ATF temperature sensor with the lock plate and bolt.
Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

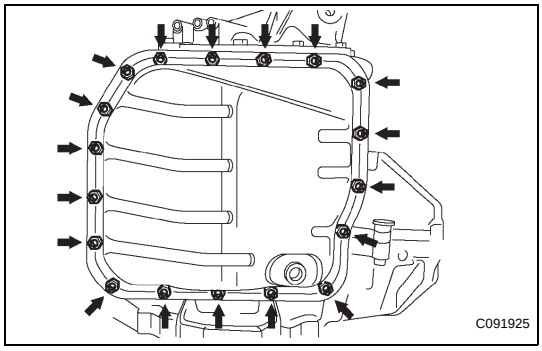
(c) Connect the 7 solenoid connectors.
NOTICE:
- **Connect the connectors to A, B, C, D, E, F and G, starting with the shorter ones.**
- **Apply ATF to the bolt prior to installation.**



79. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the oil pan.

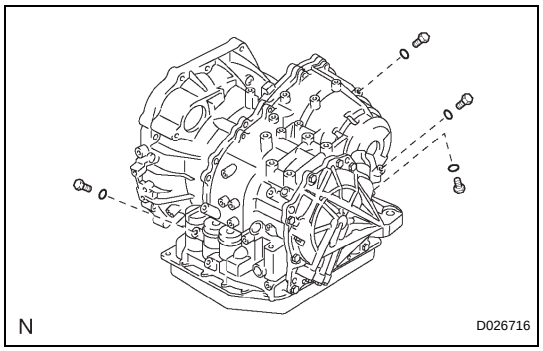
(b) Apply seal packing or equivalent to the 18 bolts.
Seal packing:
Toyota Genuine Seal Packing 1344, Three Bond 1344 or Equivalent



(c) Install a new oil pan gasket and the oil pan to the transaxle case with the 18 bolts.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
NOTICE:
- **Apply seal packing to new bolts and tighten them within 10 minutes of application.**
- **Remove any oil or grease from the contact surface of the transaxle case and the oil pan with the gasket completely before installing the oil pan to the case.**

(d) Install a new gasket to the drain plug.

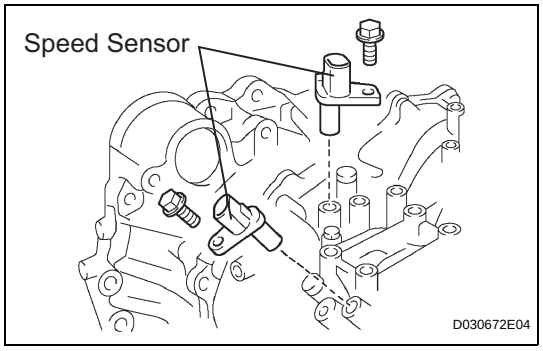
(e) Install the drain plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



80. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Coat 4 new O-rings with ATF, and install them to the 4 No. 1 transaxle case plugs.

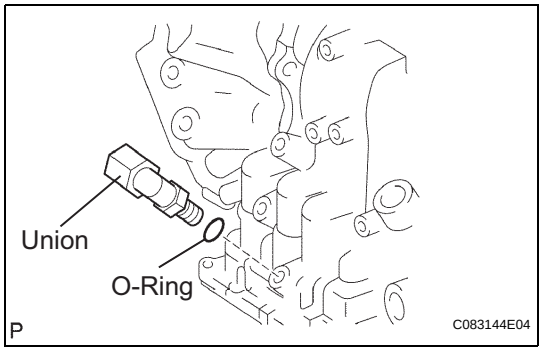
(b) Install the 4 No. 1 transaxle case plugs to the transaxle case.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



81. INSTALL SPEED SENSOR

(a) Apply liquid sealer to the "A" bolt threads.
Sealant:
Toyota Genuine Adhesive 1344, Three Bond 1344 or Equivalent

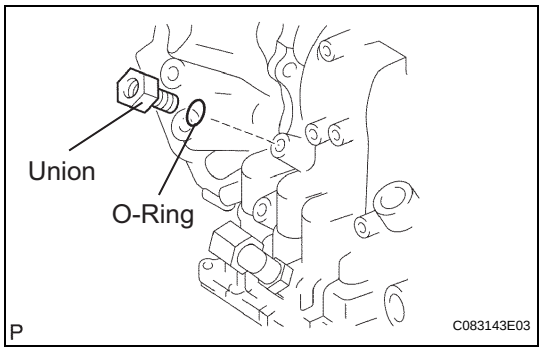
(b) Install the 2 sensors to the transaxle case with the 2 bolts.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)



82. INSTALL OIL COOLER TUBE UNION (OUTLET OIL COOLER UNION)

(a) Coat a new O-ring with ATF, and install it to the union.

(b) Install the union to the transaxle case.
Torque: 27 N*m (276 kgf*cm, 20 ft.*lbf)



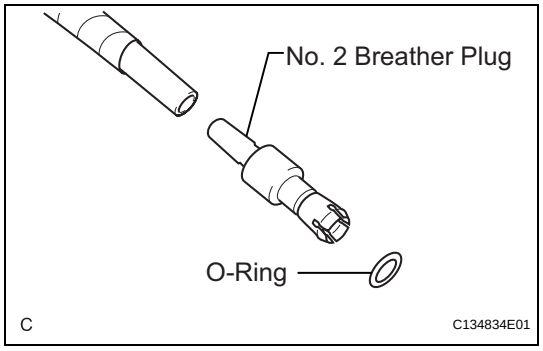
83. INSTALL OIL COOLER TUBE UNION (INLET OIL COOLER UNION)

(a) Coat a new O-ring with ATF, and install it to the union.

(b) Install the union to the transaxle case.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

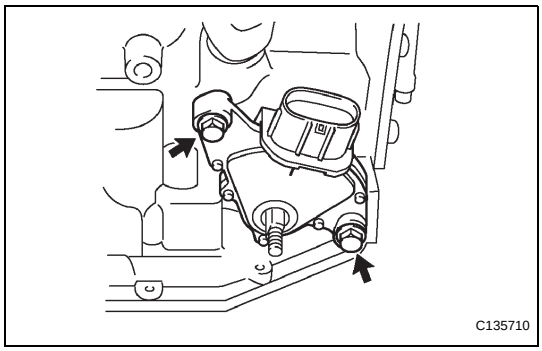
84. INSTALL NO. 2 BREATHER PLUG

(a) Coat a new O-ring with ATF.



(b) Install the hose and a new O-ring to the breather plug.

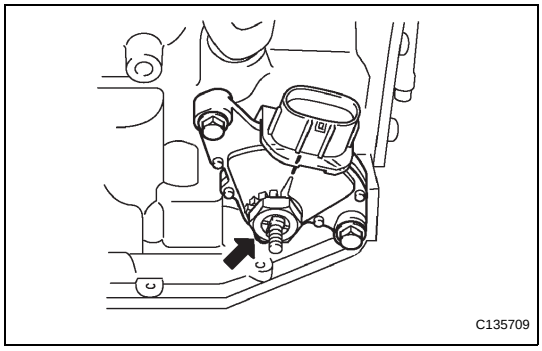
(c) Install the No. 2 breather plug hose to the transaxle case.



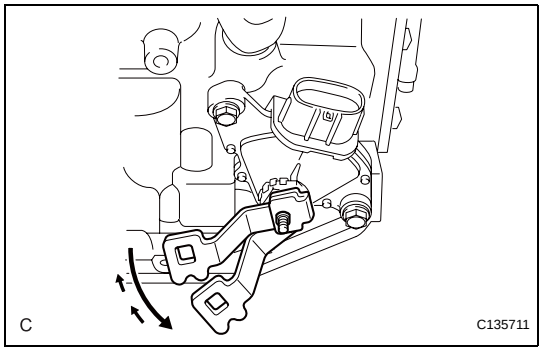
85. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Install the park/neutral position switch onto the manual valve lever shaft and temporarily install the 2 adjusting bolts.

(b) Install a new nut stopper and nut.
Torque: 6.9 N*m (70 kgf*cm, 61 in.*lbf)

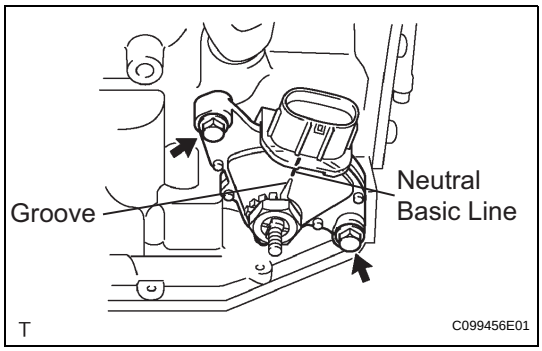


(c) Temporarily install the control shaft lever.



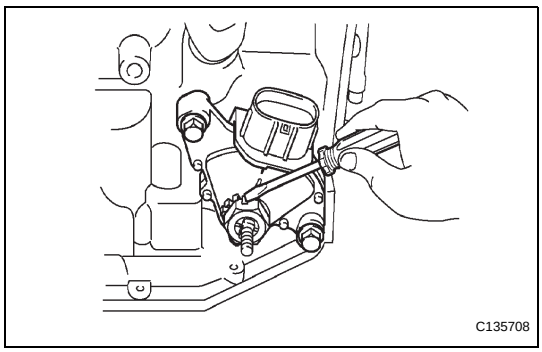
(d) Turn the lever counterclockwise until it stops, and then turn it clockwise 2 notches.

(e) Remove the control shaft lever.

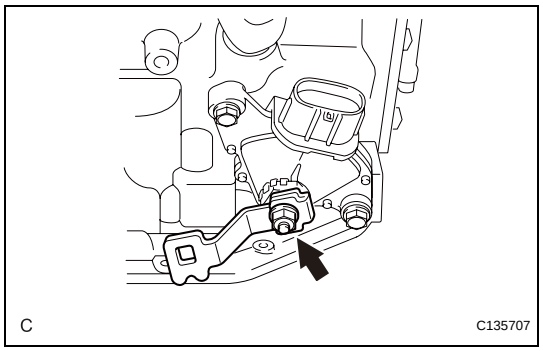


(f) Align the groove with the neutral basic line.

(g) Hold the switch in position and tighten the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



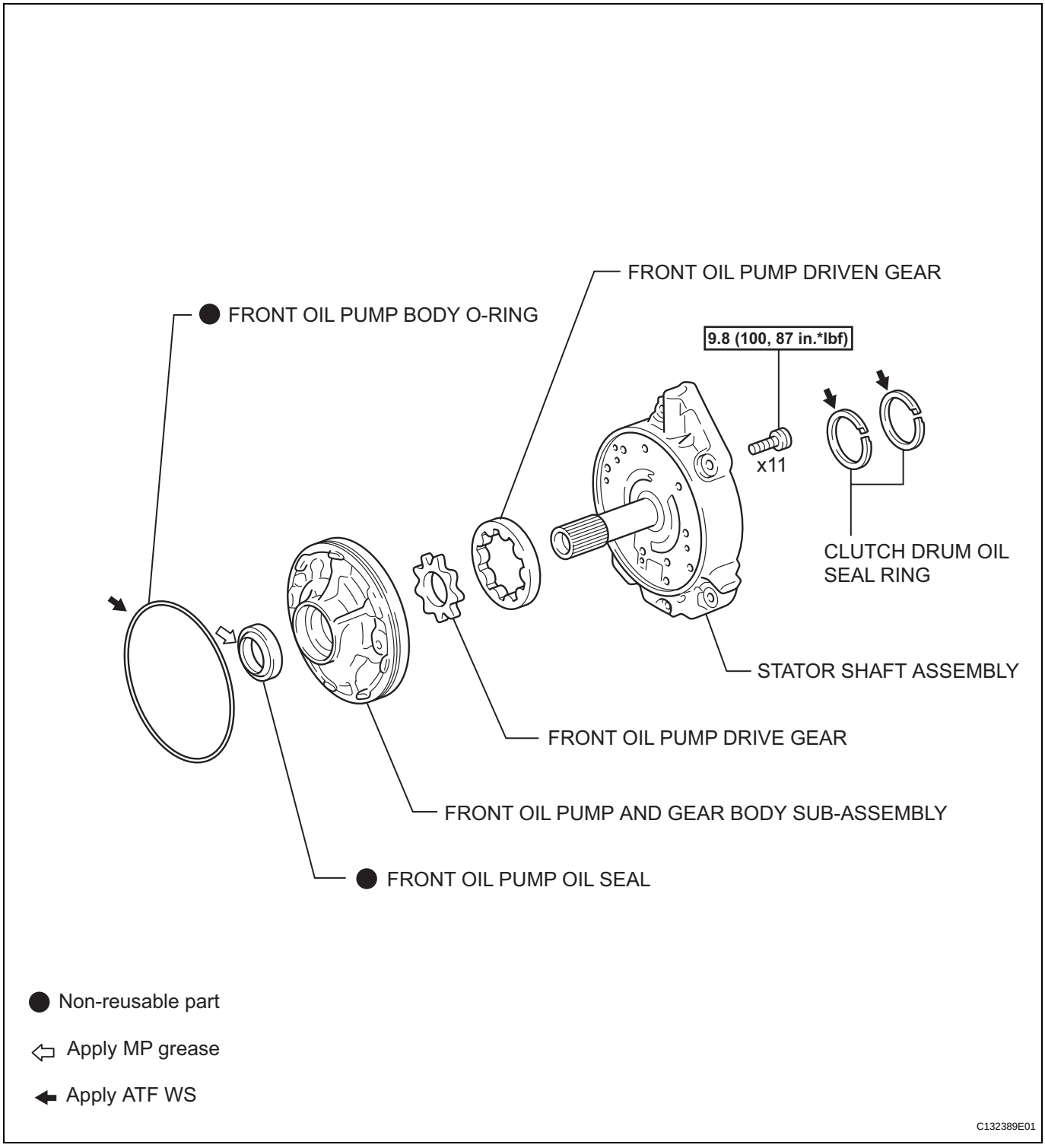
(h) Using a screwdriver, stake the nut with the nut stopper.



(i) Install the control shaft lever, washer and nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

OIL PUMP

COMPONENTS



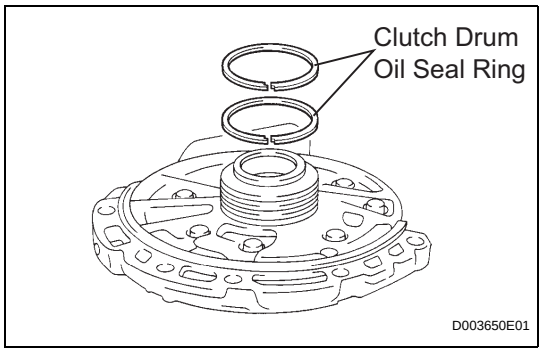
REMOVAL

1. **REMOVE OIL PUMP ASSEMBLY (See page AX-211)**

DISASSEMBLY

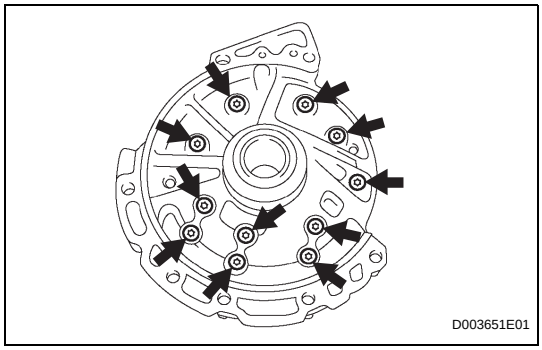
1. **INSPECT OIL PUMP ASSEMBLY (See page AX-270)**

2. **REMOVE CLUTCH DRUM OIL SEAL RING**
   (a) Remove the 2 clutch drum oil seal rings.

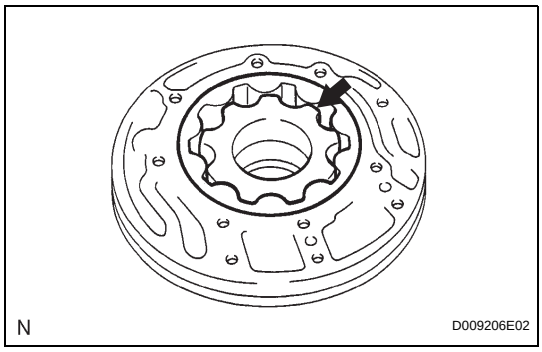


3. **REMOVE STATOR SHAFT ASSEMBLY**
   (a) Using a torx socket (T30), remove the 11 bolts and stator shaft.
   (b) Keep the gears in assembling order.

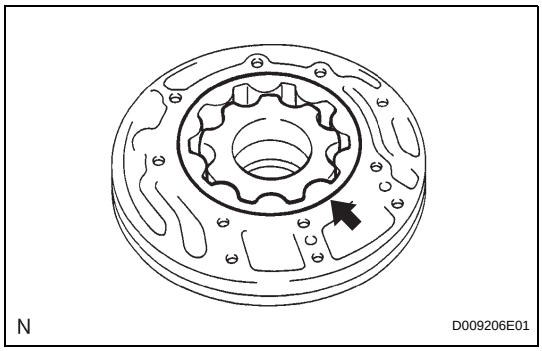
4. **INSPECT CLEARANCE OF OIL PUMP ASSEMBLY (See page AX-270)**

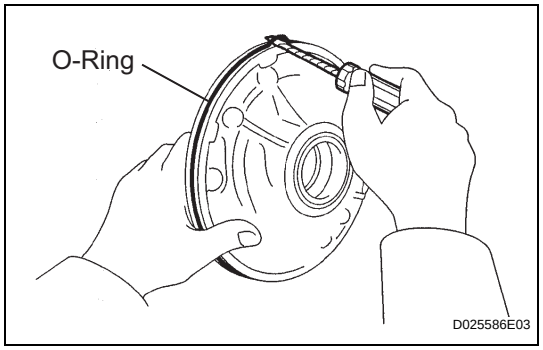


5. **REMOVE FRONT OIL PUMP DRIVE GEAR**
   (a) Remove the front oil pump drive gear.



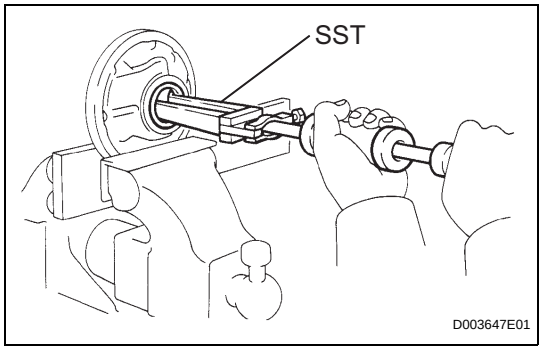
6. **REMOVE FRONT OIL PUMP DRIVEN GEAR**
   (a) Remove the front oil pump driven gear.





7. REMOVE FRONT OIL PUMP BODY O-RING

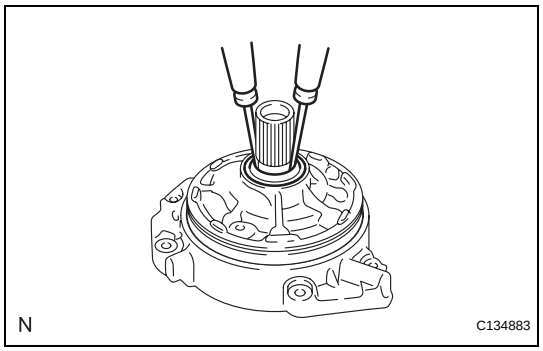
(a) Using a screwdriver, remove the O-ring.
HINT:
Tape the screwdriver tip before use.



8. REMOVE FRONT OIL PUMP OIL SEAL

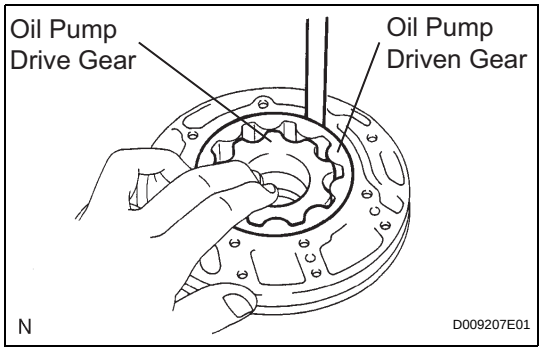
(a) Mount the oil pump in a soft jaw vise.
(b) Using SST, remove the oil seal from the oil pump body.
SST 09308-00010

INSPECTION



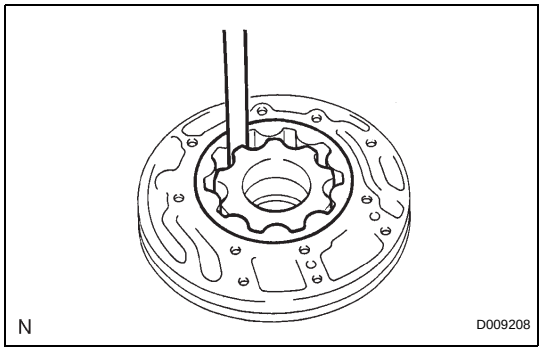
1. INSPECT OIL PUMP ASSEMBLY

(a) Turn the drive gear with 2 screwdrivers and make sure that it rotates smoothly.
NOTICE:
Be careful not to damage the oil seal lip.

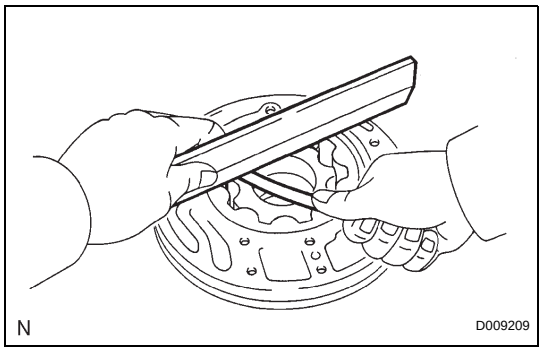


2. INSPECT CLEARANCE OF OIL PUMP ASSEMBLY

(a) Push the driven gear to one side of the body.
(b) Using a feeler gauge, measure the clearance.
Standard body clearance:
0.10 to 0.17 mm (0.0039 to 0.0067 in.)
Side clearance:
0.02 to 0.05 mm (0.001 to 0.002 in.)
Maximum body clearance:
0.17 mm (0.0067 in.)
If the body clearance is greater than the maximum, replace the oil pump body sub-assembly.



(c) Using a feeler gauge, measure the tip clearance between the driven gear teeth and drive gear teeth.
Standard tip clearance:
0.07 to 0.15 mm (0.0028 to 0.0059 in.)
Maximum tip clearance:
0.15 mm (0.0059 in.)
If the tip clearance is greater than the maximum, replace the oil pump body sub-assembly.



(d) Using a straight edge and feeler gauge, measure the side clearance of both gears.

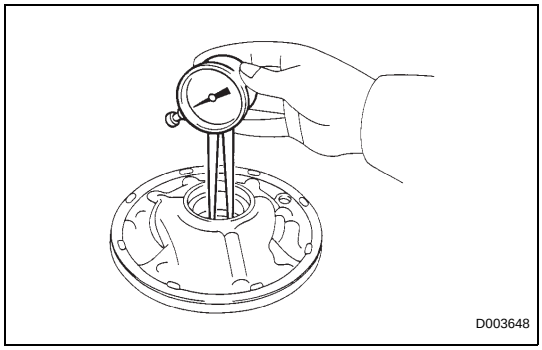
Standard side clearance:
0.02 to 0.05 mm (0.0008 to 0.0020 in.)
Maximum side clearance:
0.05 mm (0.0020 in.)

Drive gear thickness: mm (in.)

Mark	Thickness
A	11.690 to 11.699 (0.4602 to 0.4606)
B	11.700 to 11.709 (0.4606 to 0.4610)
C	11.710 to 11.720 (0.4610 to 0.4614)
D	11.721 to 11.730 (0.4615 to 0.4618)
E	11.731 to 11.740 (0.4619 to 0.4622)

Driven gear thickness: mm (in.)

Mark	Thickness
A	11.690 to 11.699 (0.4602 to 0.4606)
B	11.700 to 11.709 (0.4606 to 0.4610)
C	11.710 to 11.720 (0.4610 to 0.4614)
D	11.721 to 11.730 (0.4615 to 0.4618)
E	11.731 to 11.740 (0.4619 to 0.4622)

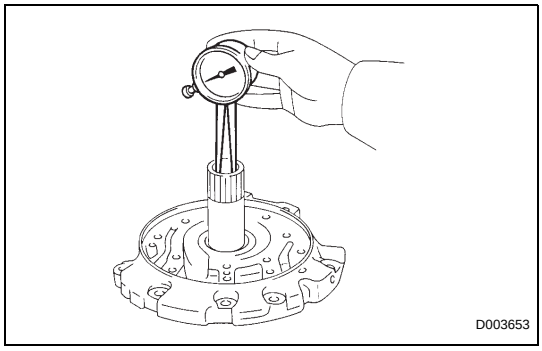


3. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the oil pump body bushing.

Standard inside diameter:
38.113 to 38.138 mm (1.50051 to 1.50149 in.)
Maximum inside diameter:
38.188 mm (1.50346 in.)

If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.

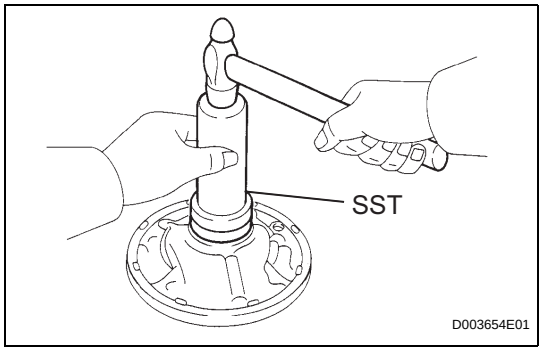


4. INSPECT STATOR SHAFT ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the stator shaft.

Standard inside diameter:
21.500 to 21.526 mm (0.84646 to 0.84748 in.)
Maximum inside diameter:
21.57 mm (0.8492 in.)

If the inside diameter is greater than the maximum, replace the stator shaft.



REASSEMBLY

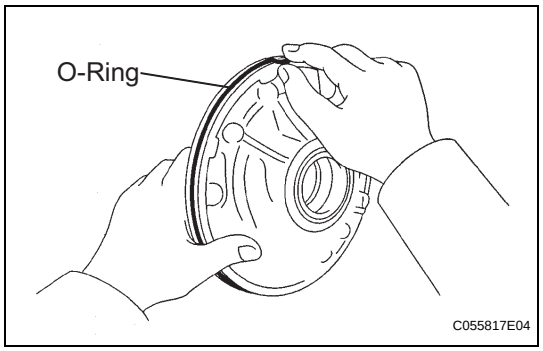
1. INSTALL FRONT OIL PUMP OIL SEAL

(a) Using SST and a hammer, install a new oil seal to the oil pump body.

SST 09350-32014 (09351-32140)

HINT:
The seal end should be flush with the outer edge of the oil pump.

(b) Coat the lip of the oil seal with MP grease.

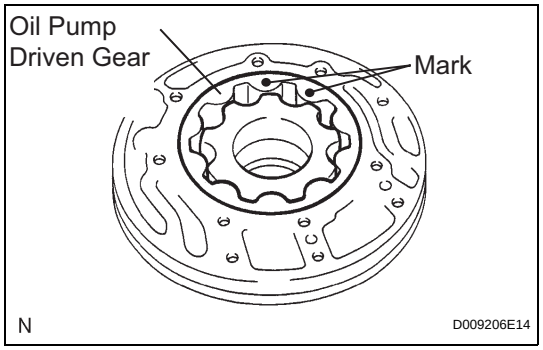


2. INSTALL FRONT OIL PUMP BODY O-RING

(a) Coat a new O-ring with ATF, and install it to the oil pump body.

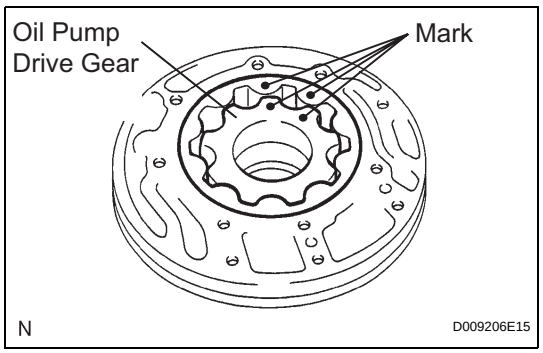
NOTICE:

- **Install the O-ring carefully not to have a twist or a pinching.**
- **Apply enough ATF to the O-ring prior to installation.**



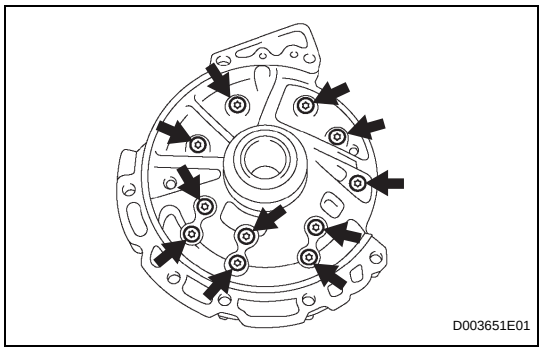
3. INSTALL FRONT OIL PUMP DRIVEN GEAR

(a) Coat the front oil pump driven gear with ATF, and install it to the oil pump body with the marked side up.



4. INSTALL FRONT OIL PUMP DRIVE GEAR

(a) Coat the front oil pump drive gear with ATF, and install it to the oil pump body with the marked side up.

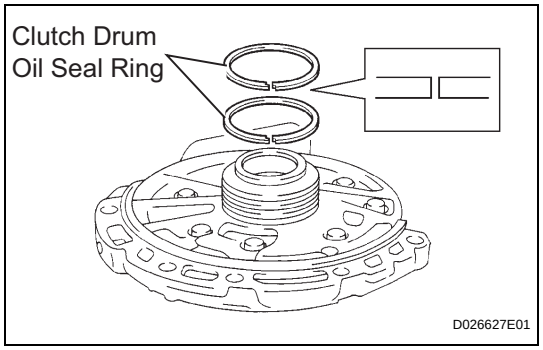


5. INSTALL STATOR SHAFT ASSEMBLY

(a) Align the bolt holes in the stator shaft assembly with those in the front oil pump and gear body sub-assembly.

(b) Using a torx socket (T30), install the 11 bolts.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)



6. INSTALL CLUTCH DRUM OIL SEAL RING

(a) Coat 2 new clutch drum oil seal rings with ATF.

(b) Install the 2 clutch drum oil seal rings.

NOTICE:

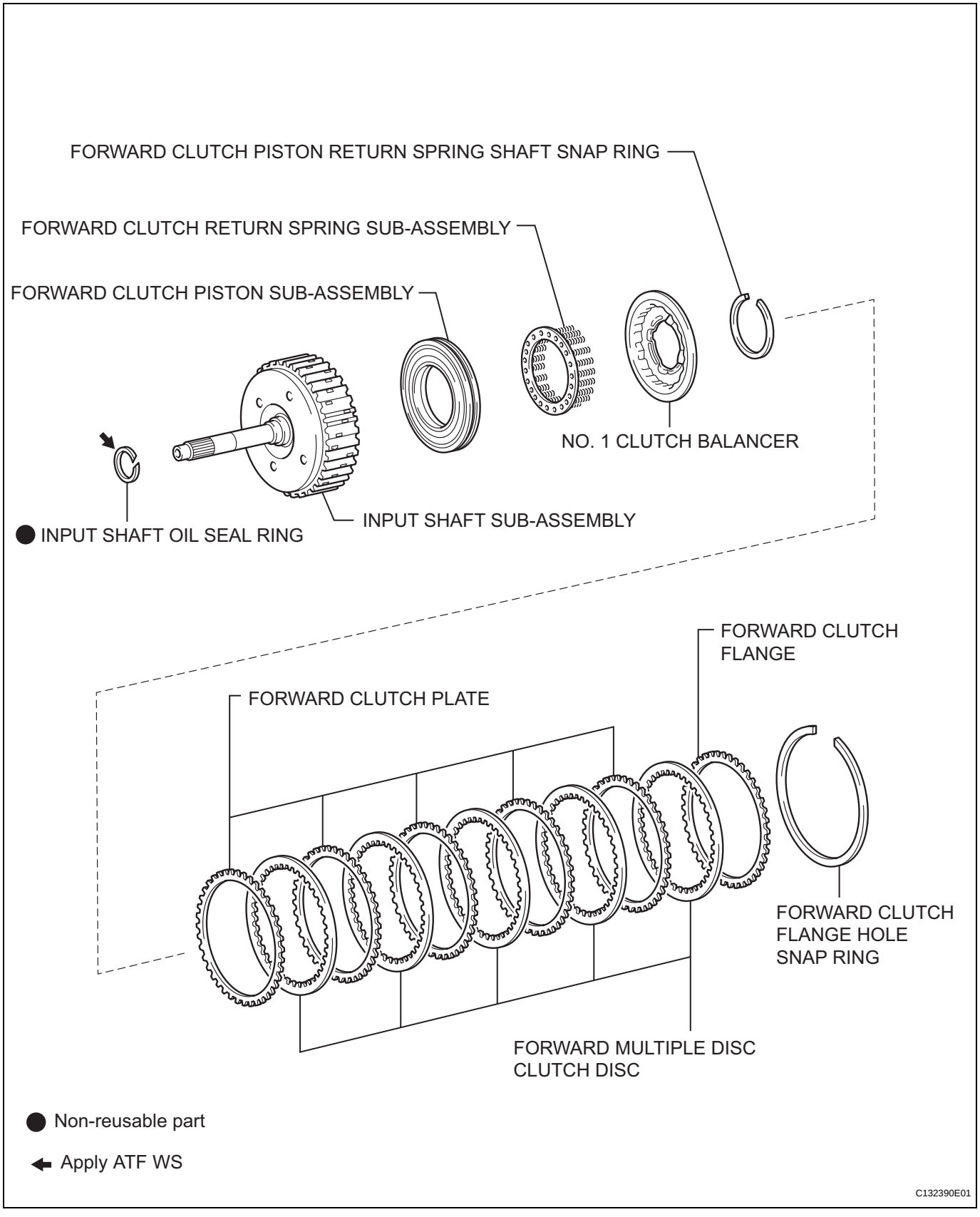
Do not expand the ring ends excessively.

INSTALLATION

1. **INSTALL OIL PUMP ASSEMBLY (See page AX-257)**

FORWARD CLUTCH

COMPONENTS



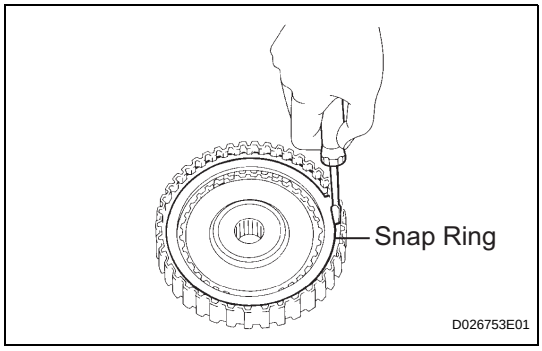
AX

DISASSEMBLY

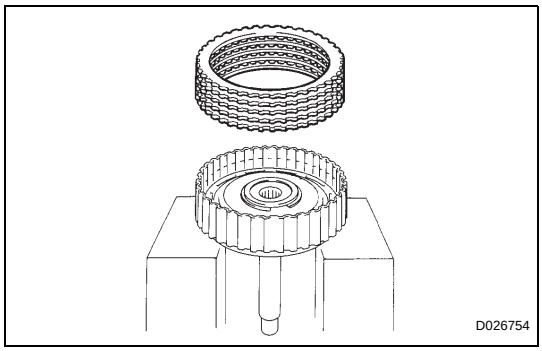
1. INSPECT PACK CLEARANCE OF FORWARD CLUTCH (See page AX-275)

2. REMOVE FORWARD MULTIPLE DISC CLUTCH DISC

(a) Using a screwdriver, remove the snap ring.



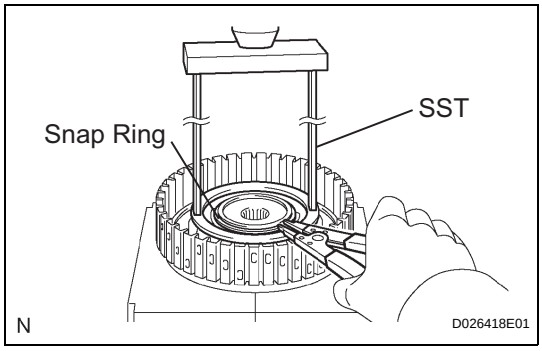
(b) Remove the flange, 5 discs and 5 plates from the input shaft assembly.



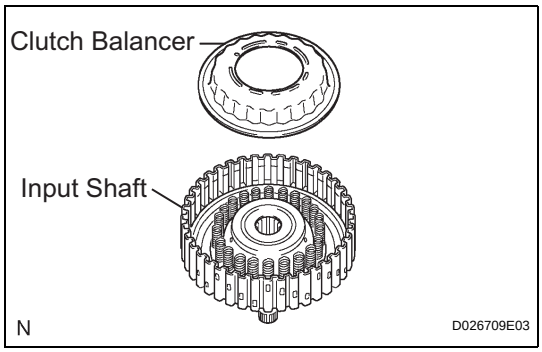
3. REMOVE FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

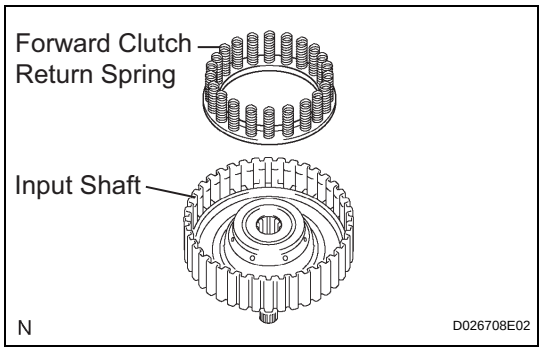
(a) Place SST on the spring retainer and compress the return spring with a press.
SST 09387-00020

(b) Using a snap ring expander, remove the snap ring.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove. This prevents the spring seat from bearing deformed.**
- **Do not expand the snap ring excessively.**

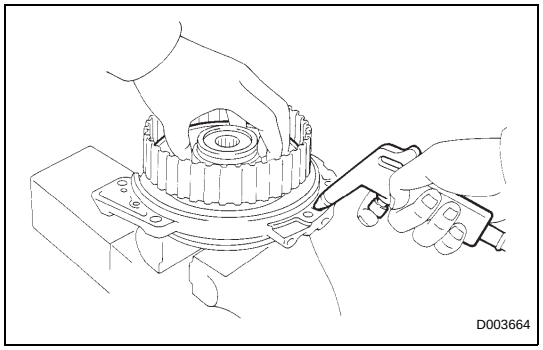


(c) Remove the clutch balancer from the input shaft.





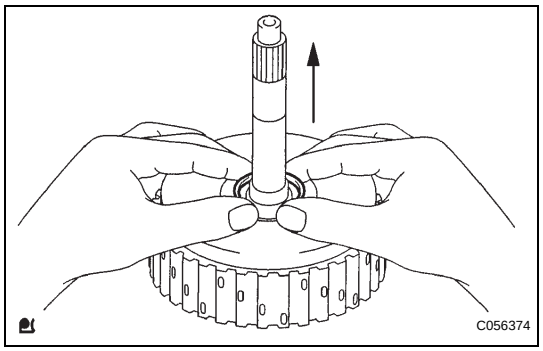
(d) Remove the forward clutch return spring from the input shaft.



4. REMOVE FORWARD CLUTCH PISTON SUB-ASSEMBLY

(a) Place the forward clutch drum onto the oil pump.

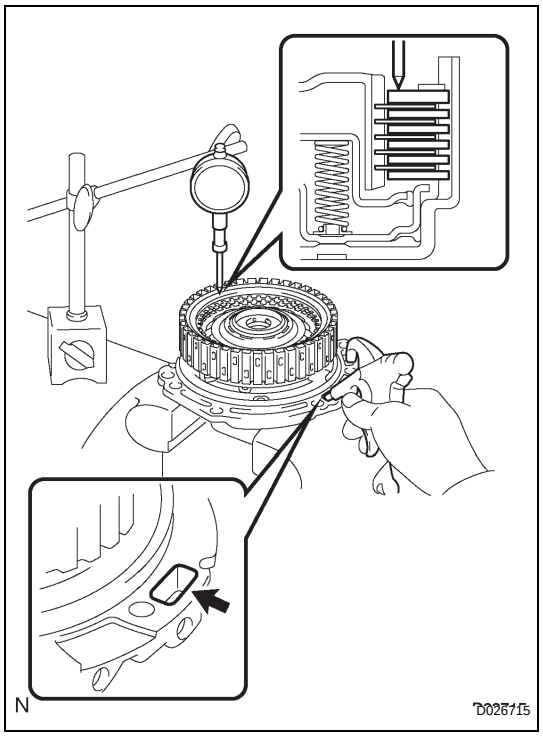
(b) Holding the forward clutch piston by hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil pump to remove the forward clutch piston.
HINT:
When the piston cannot be removed as it is slanted, either blow the air again with the protruding side pushed, or remove the piston using needle nose pliers with the tips taped.



5. REMOVE INPUT SHAFT OIL SEAL RING

(a) Remove the input shaft oil seal ring from the input shaft.

INSPECTION



1. INSPECT PACK CLEARANCE OF FORWARD CLUTCH

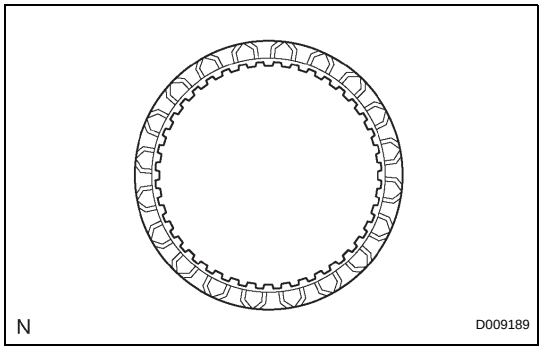
(a) Install the forward clutch on the oil pump.
NOTICE:
Be careful not to damage the oil seal ring of the oil pump.

(b) Using a dial indicator, measure the forward clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).
Pack clearance:
1.00 to 1.25 mm (0.0394 to 0.04921 in.)
If the clearance is not within the standard, inspect the discs, plates and flange.
If the piston stroke is less than the minimum, parts may have been assembled incorrectly. Check and reassemble again.
HINT:
- As the opening is large, cover it with a piece of cloth or shop rag to prevent the compressed air from being released.

- There are 5 different thicknesses of flanges available.

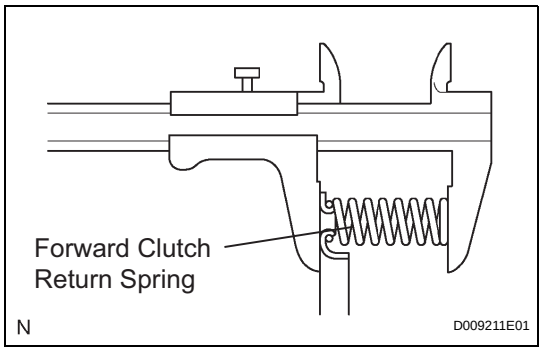
Flange thickness: mm (in.)

No.	Thickness	No.	Thickness
1	3.00 (0.1181)	4	3.45 (0.1358)
2	3.15 (0.1240)	5	3.60 (0.1417)
3	3.30 (0.1299)	-	-



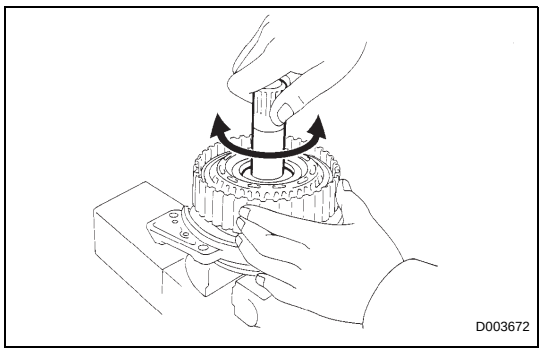
2. INSPECT FORWARD MULTIPLE DISC CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt.
If necessary, replace them.
HINT:
- If the lining of a disc comes off or discolors, or even if a part of the groove is damaged, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



3. INSPECT FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

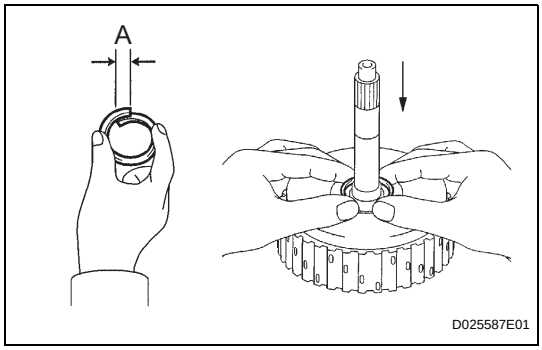
(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
26.74 mm (1.0528 in.)
If the free length is shorter than the standard free length, replace the forward clutch return spring sub-assembly.



4. INSPECT FORWARD MULTIPLE DISC CLUTCH DISC

(a) Check if the disc lightly rotates when rotating the forward clutch assembly after inserting the multiple disc clutch into it.
NOTICE:
Do not place the forward clutch assembly in a vise.

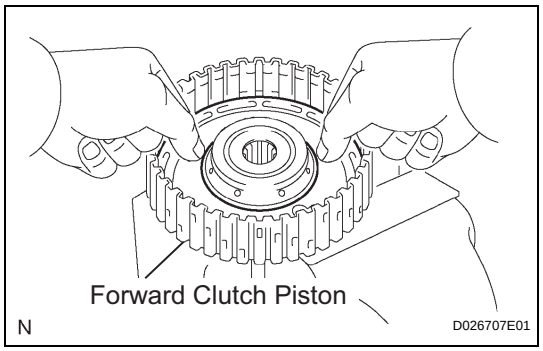
REASSEMBLY



1. INSTALL INPUT SHAFT OIL SEAL RING

(a) Compress a new input shaft oil seal ring from both sides to adjust dimension A.
Dimension A:
5 mm (0.197 in.)

(b) Coat the oil seal ring with ATF and install it to the input shaft.
NOTICE:
Do not expand the gap of the oil seal ring too much. Securely engage the hooks.

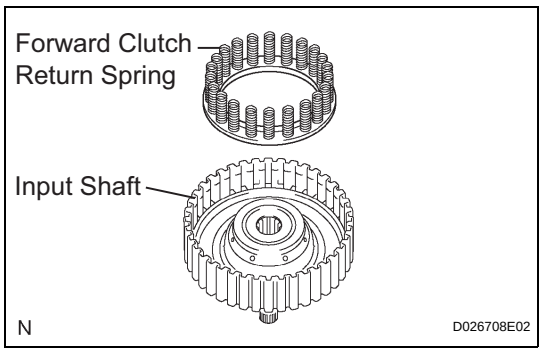


2. INSTALL FORWARD CLUTCH PISTON SUB-ASSEMBLY

(a) Coat the forward clutch piston with ATF, and install it to the input shaft.

NOTICE:

Be careful not to damage the lip seal of the forward clutch piston.



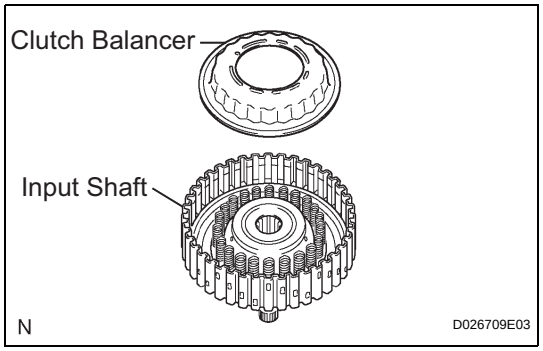
3. INSTALL FORWARD CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Install the return spring to the input shaft.

NOTICE:

After installing the spring sub-assembly, check all of the springs are fitted in the piston correctly.

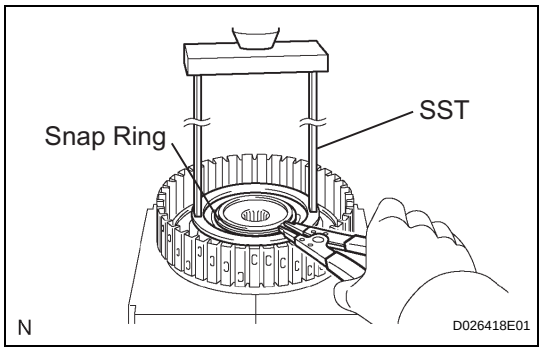
(b) Coat the clutch balancer with ATF.



(c) Install the clutch balancer to the input shaft.

NOTICE:

- **Be careful not to damage the lip seal of the forward clutch balancer.**
- **Install the clutch balancer carefully not to have a pinching or any other defects at the sealing lip.**
- **Apply enough ATF to the sealing lip prior to installation.**



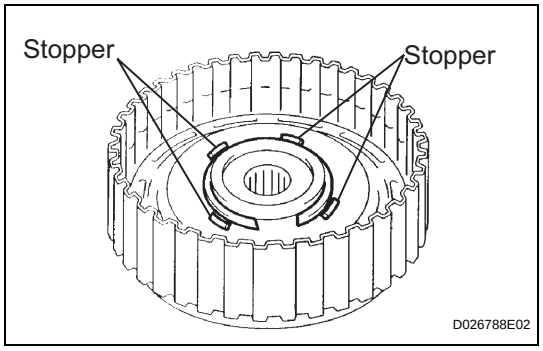
(d) Place SST on the clutch balancer, and compress the clutch balancer with a press.

SST 09387-00020

(e) Install the snap ring with a snap ring expander.

NOTICE:

- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove. This prevents the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**



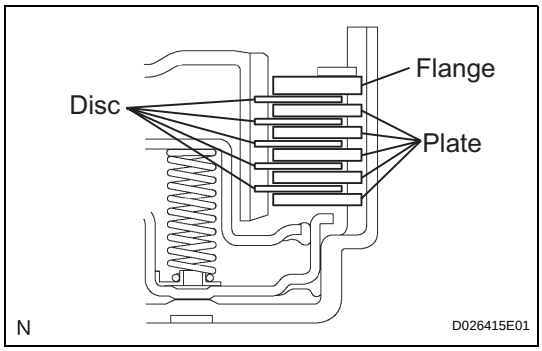
(f) Position the end gap of the snap ring in the piston as shown in the illustration.

NOTICE:

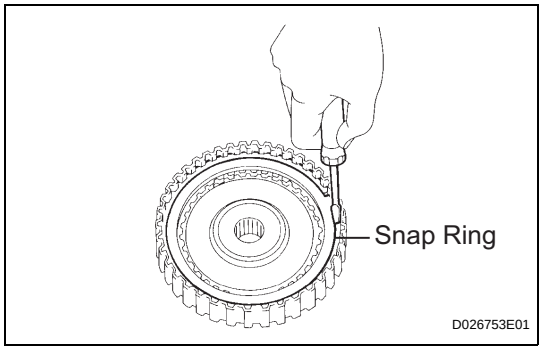
The end gap of the snap ring should not be aligned with any of the stoppers.

4. INSTALL FORWARD MULTIPLE DISC CLUTCH DISC

(a) Coat the 5 discs with ATF.



(b) Install the 5 plates, 5 discs, and flange to the input shaft.
NOTICE:
Be careful about the order of discs, plates, and flange.



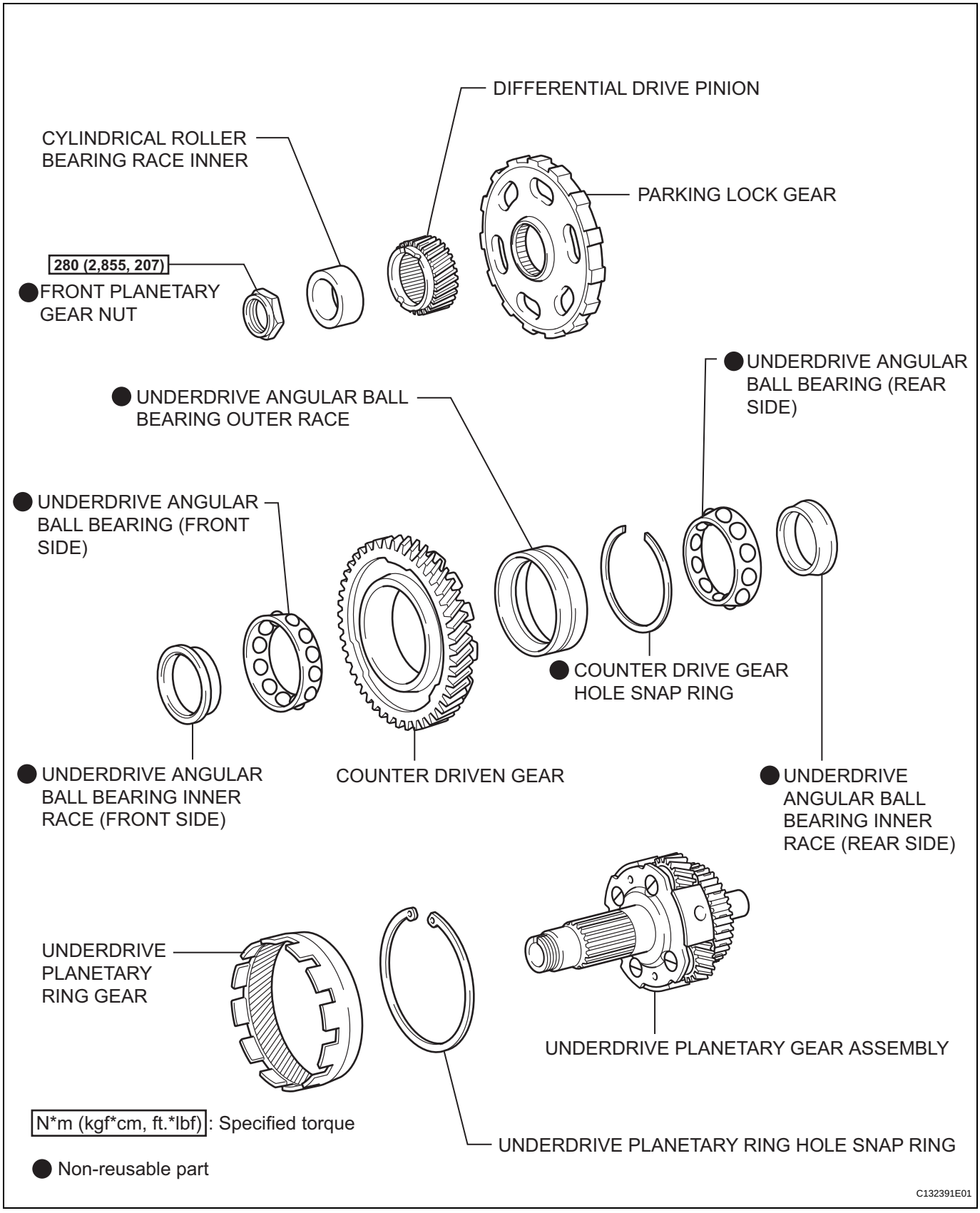
(c) Using a screwdriver, install the snap ring.
(d) Check that the end gap of the snap ring is not aligned with one of the cutouts.
NOTICE:
The snap ring should be securely engaged in the groove of the drum.

5. INSPECT PACK CLEARANCE OF FORWARD CLUTCH (See page AX-275)

6. INSPECT FORWARD MULTIPLE CLUTCH DISC (See page AX-276)

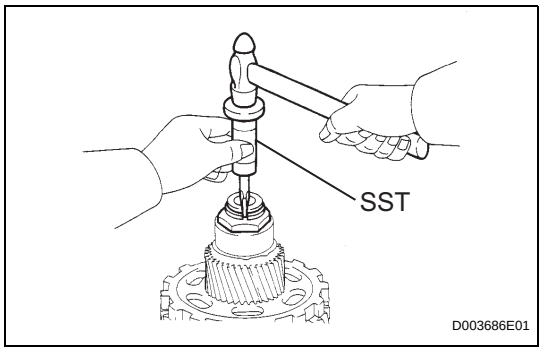
UNDERDRIVE PLANETARY GEAR

COMPONENTS



AX

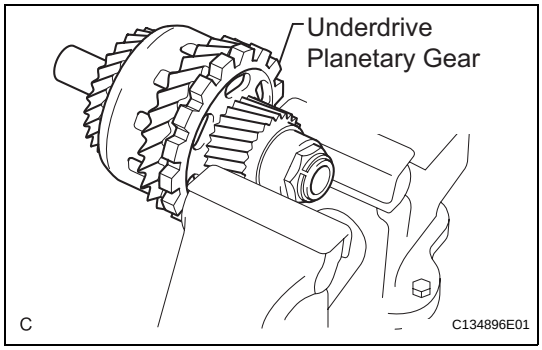
DISASSEMBLY



1. REMOVE FRONT PLANETARY GEAR NUT

(a) Using SST and a hammer, loosen the staked part of the lock nut.

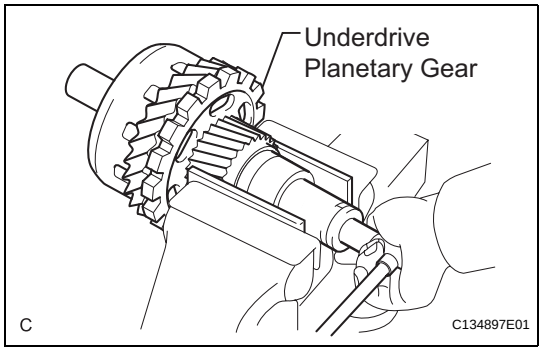
SST 09930-00010 (09931-00010, 09931-00020), 09387-00050, 09495-65040



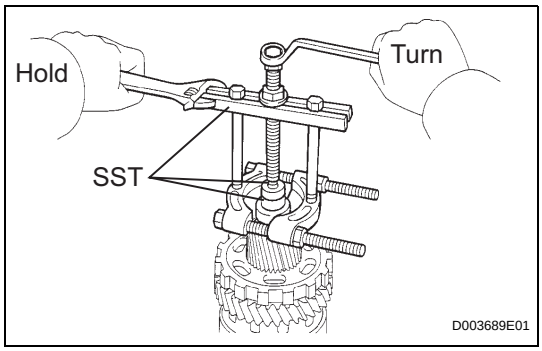
(b) Clamp the underdrive planetary gear in a soft jaw vise.

NOTICE:

Be careful not to damage the differential drive pinion.



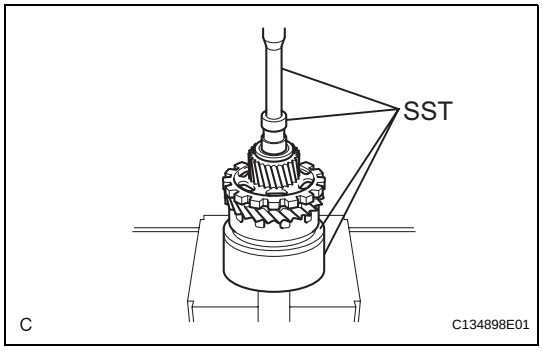
(c) Using a socket wrench, remove the lock nut.



2. REMOVE CYLINDRICAL ROLLER BEARING RACE INNER

(a) Using SST, remove the cylindrical roller bearing race inner.

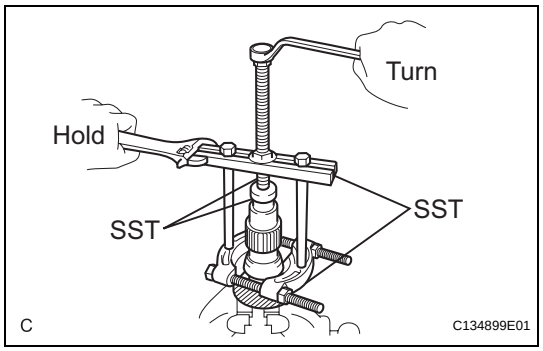
SST 09950-00020, 09950-00030, 09950-40011 (09957-04010), 09950-60010 (09951-00320)



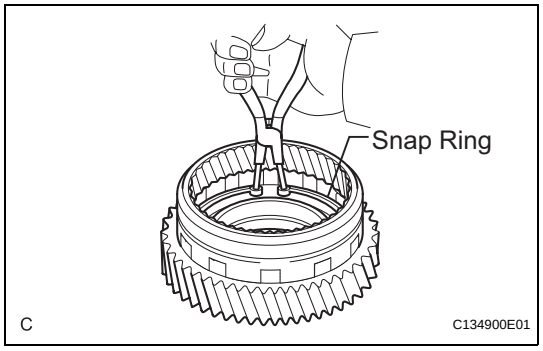
3. REMOVE UNDERDRIVE PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, remove the differential drive pinion, parking lock gear, counter driven gear with underdrive planetary ring gear, and angular ball bearing.

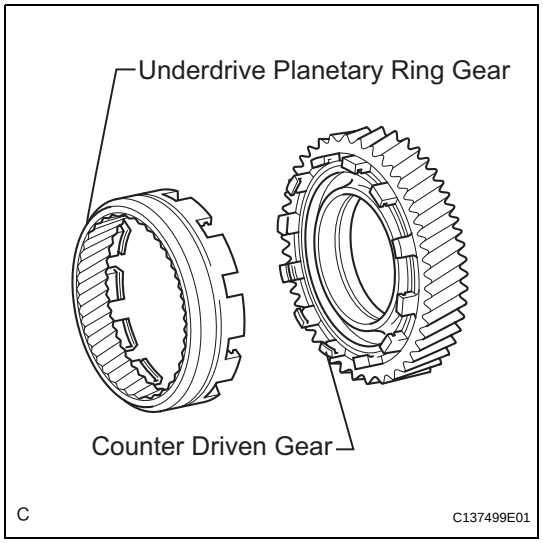
SST 09387-00050, 09495-65040, 09950-60010 (09951-00320), 09950-70010 (09951-07100)



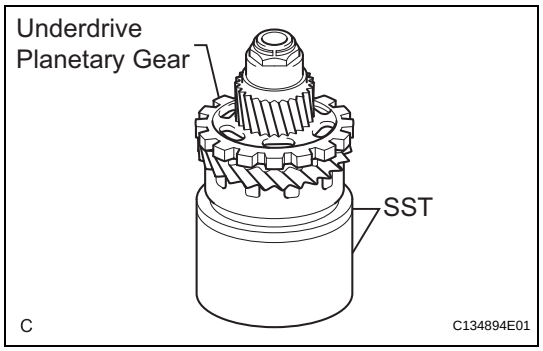
(b) Clamp the underdrive planetary gear in a soft jaw vise.
(c) Using SST, remove the rear angular ball bearing from the underdrive planetary gear.
SST 09950-00020, 09950-00030, 09950-40011 (09957-04010), 09950-60010 (09951-00320)



4. REMOVE UNDERDRIVE PLANETARY RING GEAR
(a) Using snap ring pliers, remove the snap ring.

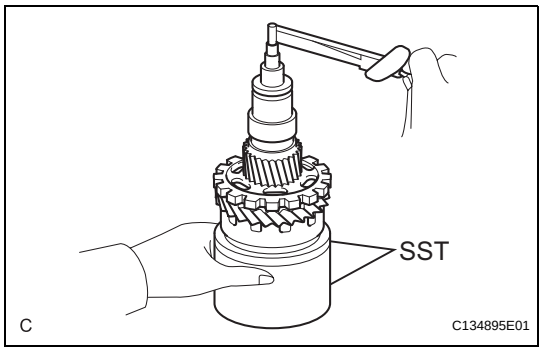


(b) Remove the underdrive planetary ring gear from the counter driven gear.



INSPECTION

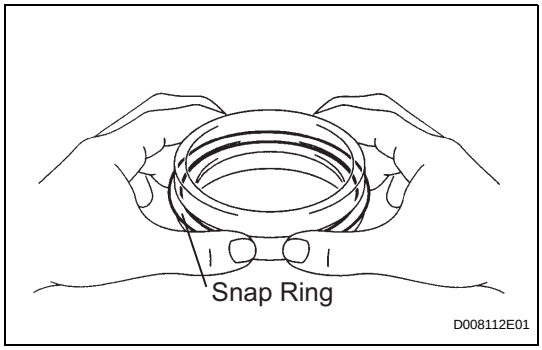
1. INSPECT UNDERDRIVE PLANETARY GEAR PRELOAD
(a) Using SST, fix the underdrive planetary gear assembly.
SST 09387-00050, 09495-65040



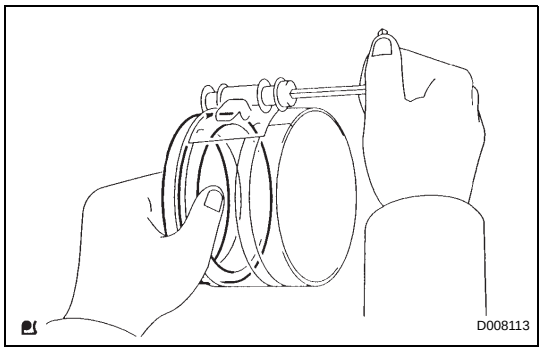
(b) Using SST and a torque wrench, measure the turning torque of the underdrive planetary gear assembly while turning the torque wrench at 60 rpm.
SST 09387-00050, 09495-65040
Turning torque at 60 rpm:
0.28 to 0.89 N*m (2.9 to 9.1 kgf*cm, 2.478 to 7.877 in.*lbf)
HINT:
Use a torque wrench with a fulcrum length of 160 mm (6.3 in.).

REASSEMBLY

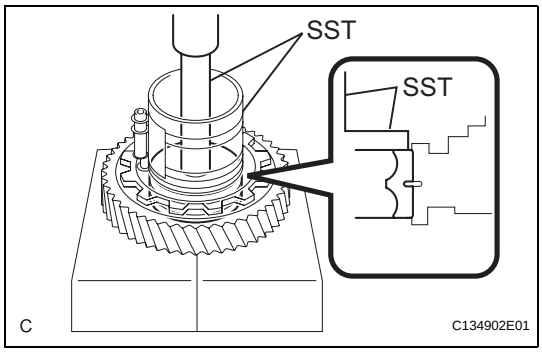
1. INSTALL UNDERDRIVE PLANETARY RING GEAR



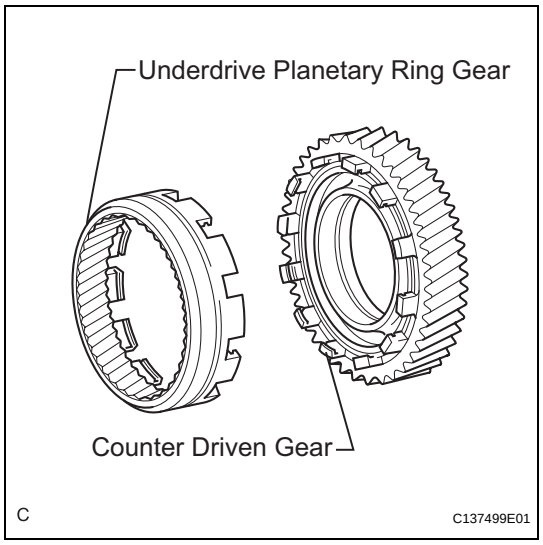
(a) Install a new snap ring to the outer race of the tapered roller bearing.
HINT:
If replacing the bearing, also replace the counter driven gear with a new one.



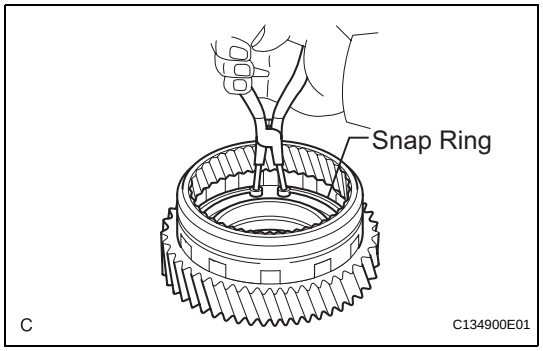
(b) Using a piston ring compressor, squeeze the snap ring.



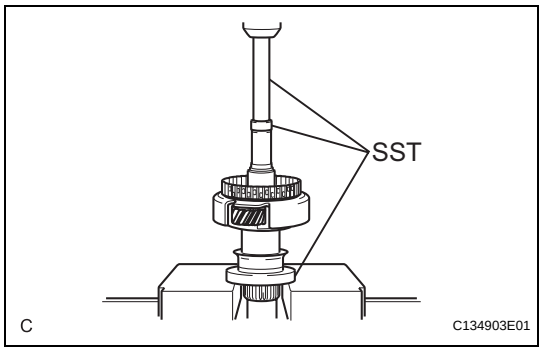
(c) Using SST and a press, press in the outer race of the angular ball bearing.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07100)
NOTICE:
Do not damage the snap ring during installation of the outer race.



(d) Install the underdrive planetary ring gear to the counter driven gear.

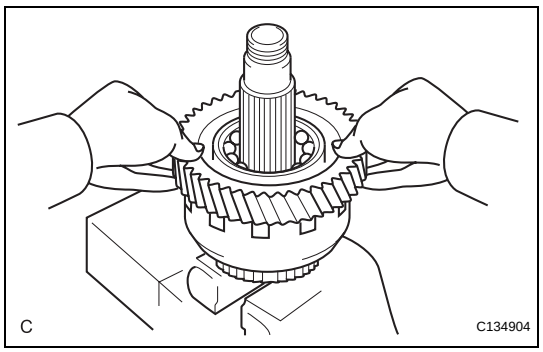


(e) Using snap ring pliers, install the snap ring.

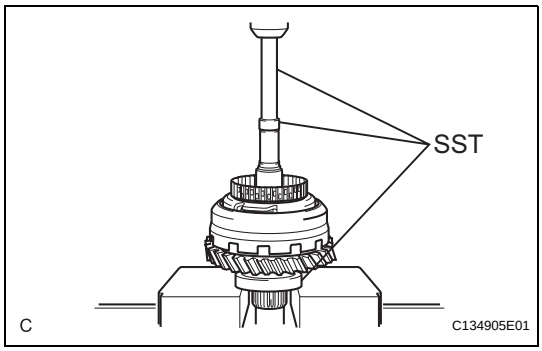


2. INSTALL UNDERDRIVE PLANETARY GEAR ASSEMBLY

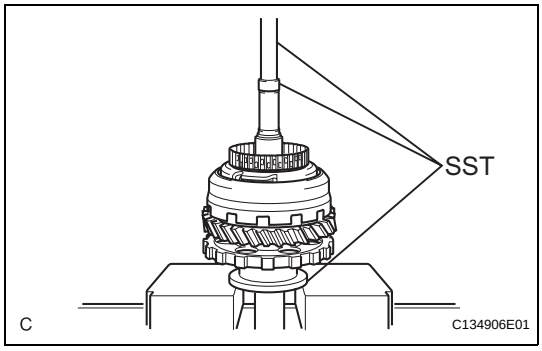
(a) Using a press, press the angular ball bearing inner race (rear side) into the underdrive planetary gear.
SST 09950-60010 (09951-00260), 09950-70010 (09951-07100), 09726-40010



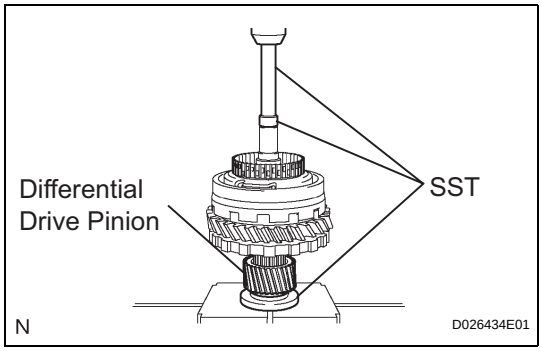
(b) Install the counter driven gear with planetary ring gear to the underdrive planetary gear.



(c) Using SST and a press, press in the angular ball bearing inner race (front side).
SST 09950-60010 (09951-00260), 09950-70010 (09951-07100), 09726-40010
NOTICE:
Press the counter driven gear while rotating it.

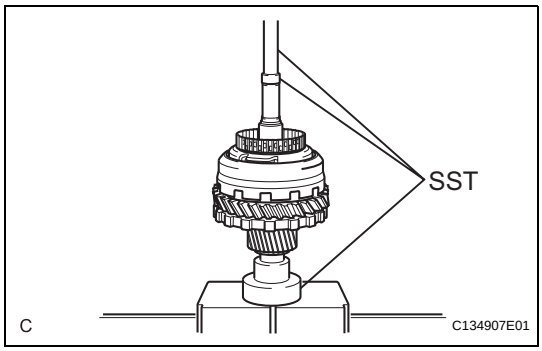


(d) Using a press, press in the parking lock gear.
SST 09950-60010 (09951-00260), 09950-70010 (09951-07100), 09316-20011
NOTICE:
Press the counter driven gear while rotating it.



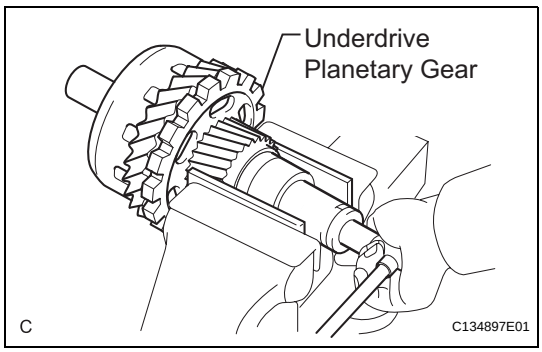
3. INSTALL DIFFERENTIAL DRIVE PINION

(a) Using a press, press in the differential drive pinion.
SST 09726-40010, 09950-60010 (09951-00260), 09950-70010 (09951-07100)
NOTICE:
Press the counter driven gear while rotating it.



4. INSTALL CYLINDRICAL ROLLER BEARING RACE INNER

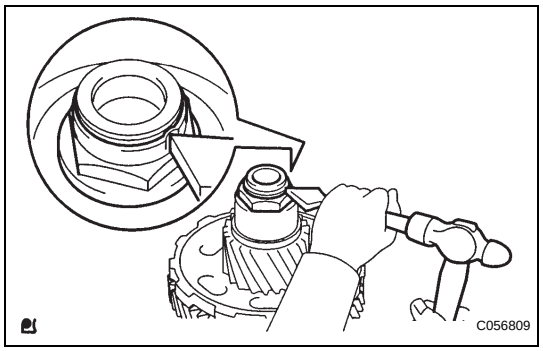
(a) Using a press, press in the cylindrical roller bearing race inner.
SST 09515-21010, 09950-60010 (09951-00260), 09950-70010 (09951-07100)
NOTICE:
Press the counter driven gear while rotating it.



5. INSTALL FRONT PLANETARY GEAR NUT

(a) Clamp the underdrive planetary gear in a soft jaw vise.
NOTICE:
Be careful not to damage the differential drive pinion.

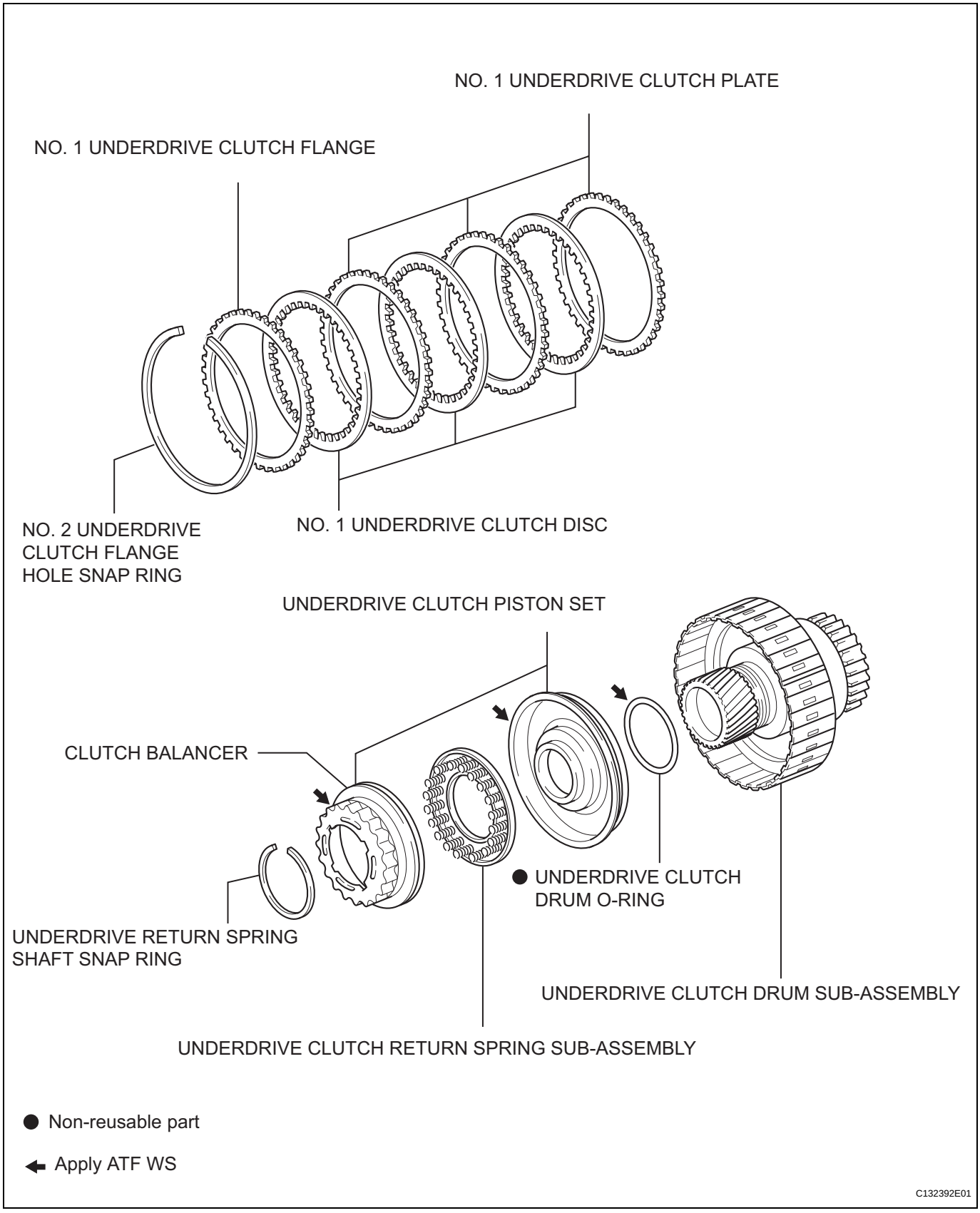
(b) Using a socket wrench, install a new lock nut.
Torque: 280 N*m (2,855 kgf*cm, 207 ft.*lbf)
HINT:
Use a torque wrench with a fulcrum length of 750 mm (29.53 in.).

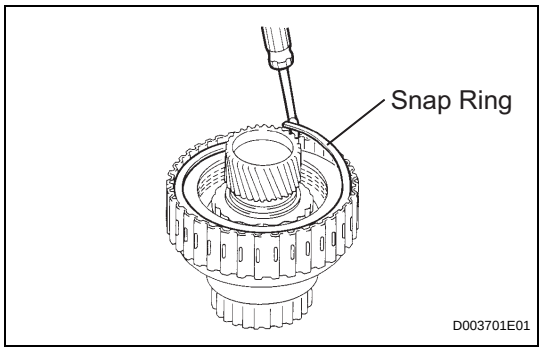


(c) Using a chisel and hammer, stake the lock nut.
CAUTION:
Be sure that there are no cracks on the nut.

UNDERDRIVE CLUTCH

COMPONENTS

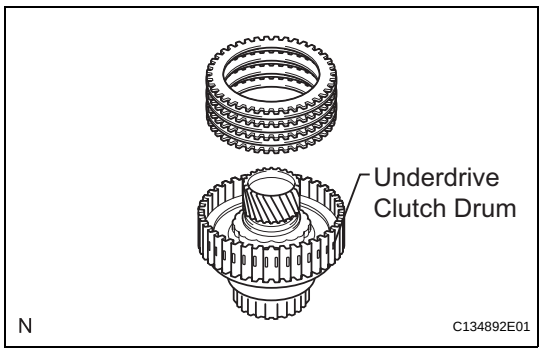




DISASSEMBLY

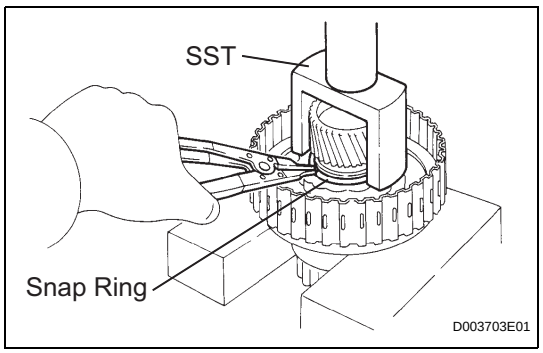
1. REMOVE NO. 2 UNDERDRIVE CLUTCH FLANGE HOLE SNAP RING

(a) Using a screwdriver, remove the No. 2 underdrive clutch flange hole snap ring.



2. REMOVE NO. 1 UNDERDRIVE CLUTCH DISC

(a) Remove the flange, 3 discs, and 3 plates from the underdrive clutch drum.

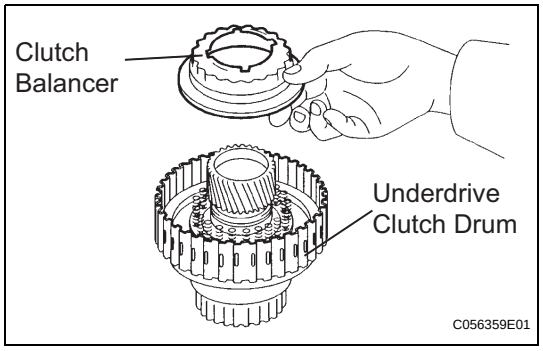


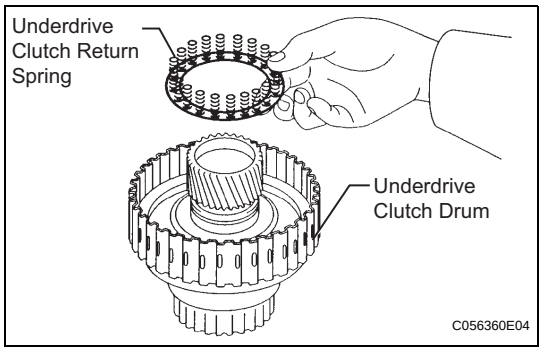
3. REMOVE UNDERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Place SST on the clutch balancer and compress the spring with a press.
SST 09350-32014 (09351-32070)

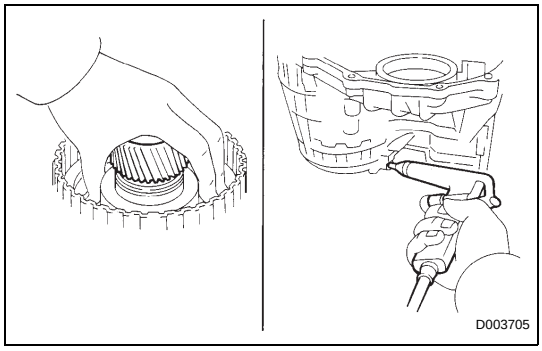
(b) Using a snap ring expander, remove the snap ring.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove. This prevents the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**

(c) Remove the clutch balancer from the underdrive clutch drum.





(d) Remove the return spring from the underdrive clutch drum.



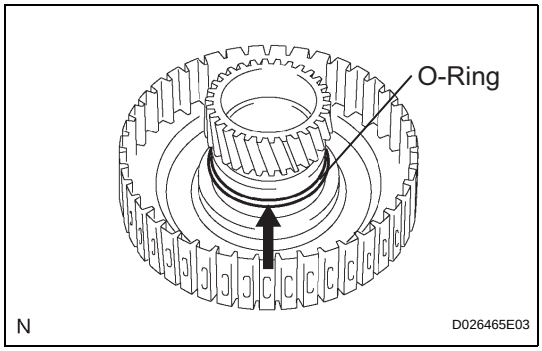
4. REMOVE UNDERDRIVE CLUTCH PISTON SET

(a) Remove the underdrive clutch from the transaxle case.

NOTICE:

Be careful not to damage the oil seal ring.

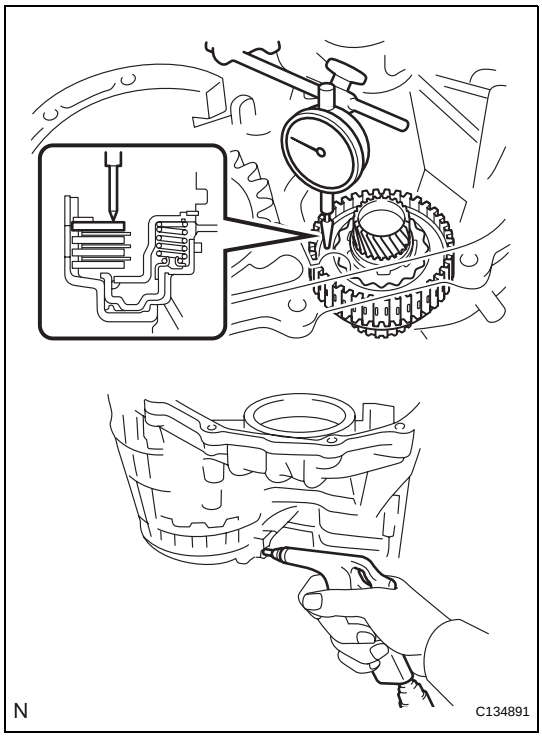
(b) Holding the underdrive clutch piston by hand, apply compressed air (392 kPa, 4.0 kgf/cm ^{2}, 57 psi) to the transaxle case to remove the underdrive clutch piston.



5. REMOVE UNDERDRIVE CLUTCH DRUM O-RING

(a) Using a screwdriver, remove the O-ring from the underdrive clutch drum.

INSPECTION



1. INSPECT UNDERDRIVE PACK CLEARANCE

(a) Install the underdrive clutch to the transaxle case.

NOTICE:

Be careful not to damage the oil seal rings.

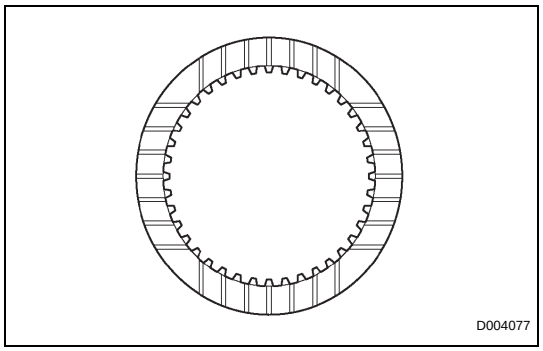
(b) Install a dial indicator as shown in the illustration.

(c) Measure the underdrive clutch pack clearance while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Pack clearance:

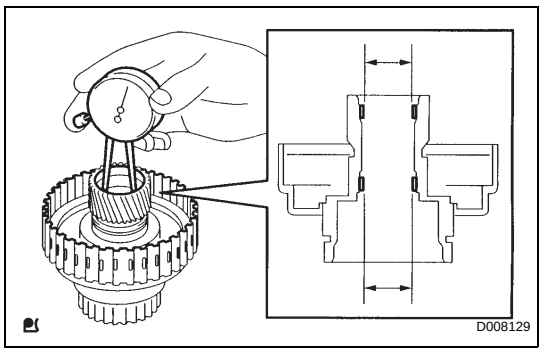
1.51 to 1.71 mm (0.0594 to 0.0673 in.)

If the pack clearance is not within the specified range, inspect the discs, plates, and flange.



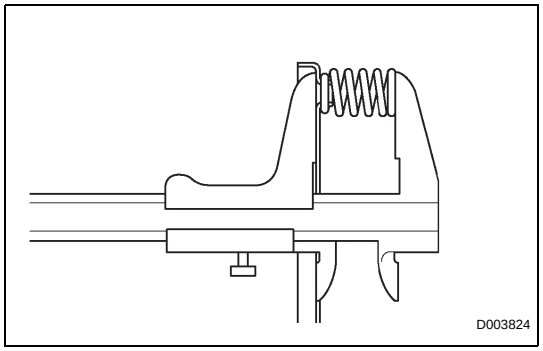
2. INSPECT NO. 1 UNDERDRIVE CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates and flange are worn or burnt. If necessary, replace them.
HINT:
- If the lining of a disc comes off or discolors, or even if a part of the groove is damaged, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



3. INSPECT UNDERDRIVE CLUTCH DRUM SUB-ASSEMBLY

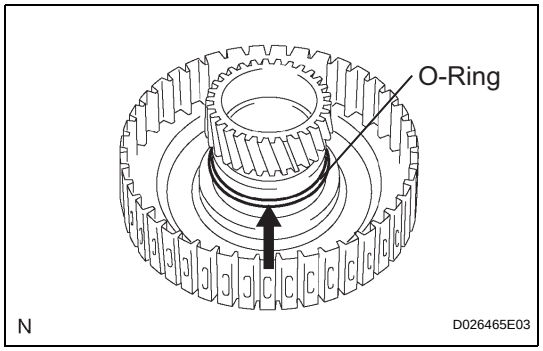
(a) Using a dial indicator, measure the inside diameter of the underdrive clutch drum bushing.
Standard inside diameter:
32.56 to 32.58 mm (1.2818 to 1.2826 in.)
Maximum inside diameter:
32.63 mm (1.2846 in.)
If the inside diameter is greater than the maximum, replace the underdrive clutch drum.



4. INSPECT UNDERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY

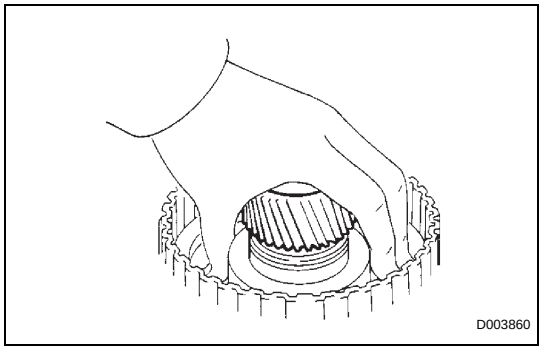
(a) Using vernier calipers, measure the free length of the spring together with the spring seat.
Standard free length:
17.14 mm (0.6748 in.)
If the free length is shorter than the standard free length, replace the underdrive clutch return spring sub-assembly.

REASSEMBLY



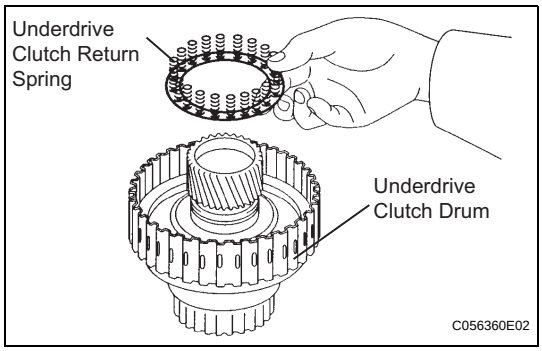
1. INSTALL UNDERDRIVE CLUTCH DRUM O-RING

(a) Coat a new O-ring with ATF, and install it to the underdrive clutch drum.
NOTICE:
Install the O-ring carefully not to have a twist or a pinching.



2. INSTALL UNDERDRIVE CLUTCH PISTON SET

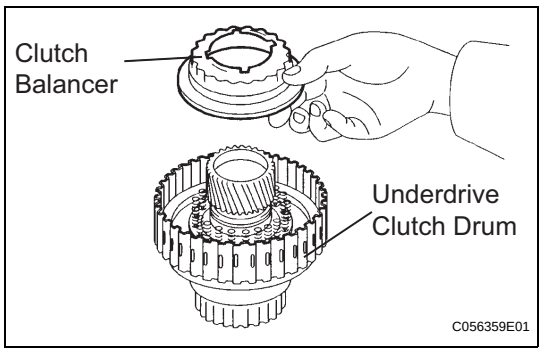
(a) Coat the underdrive clutch piston with ATF, and install it to the underdrive clutch piston drum.
NOTICE:
- **Be careful not to damage the O-ring.**
- **Be careful not to damage the lip seal of the piston.**



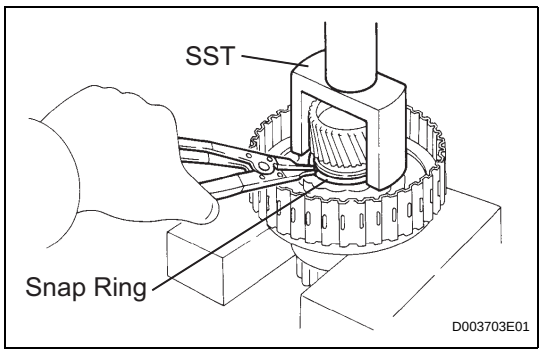
3. INSTALL UNDERDRIVE CLUTCH RETURN SPRING SUB-ASSEMBLY

(a) Install the return spring to the underdrive clutch drum.
NOTICE:
After installing the spring sub-assembly, check all of the springs are fitted in the piston correctly.

(b) Coat the clutch balancer with ATF.

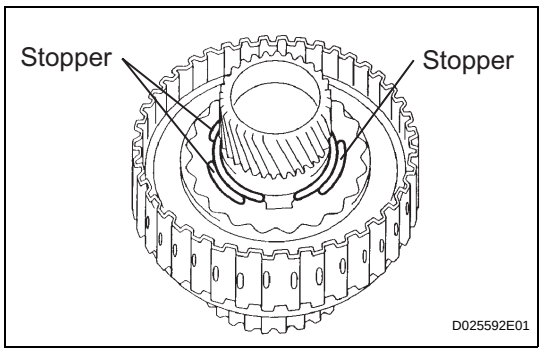


(c) Install the clutch balancer to the underdrive clutch drum.
NOTICE:
Be careful not to damage the lip seal of the clutch balancer.

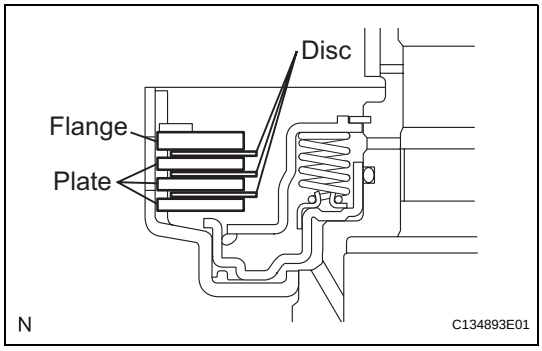


(d) Place SST on the clutch balancer and compress the piston return spring with a press.
SST 09350-32014 (09351-32070)

(e) Using a snap ring expander, install the snap ring to the underdrive clutch drum.
NOTICE:
- **Stop the press when the spring seat is lowered to the place 1 to 2 mm (0.039 to 0.078 in.) from the snap ring groove. This prevents the spring seat from being deformed.**
- **Do not expand the snap ring excessively.**



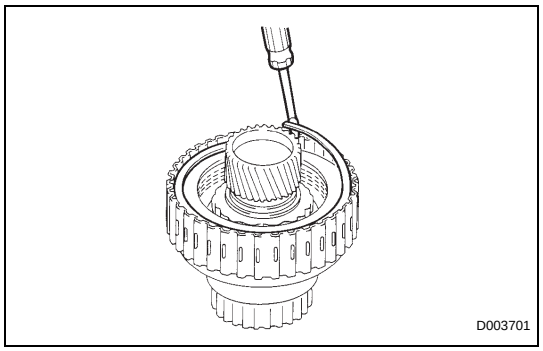
(f) Position the end gap of the snap ring in the underdrive clutch drum as shown in the illustration.
NOTICE:
The end gap of the snap ring should not be aligned with any of the stoppers.



4. INSTALL NO. 1 UNDERDRIVE CLUTCH DISC

(a) Coat the 3 discs with ATF.

(b) Install the 3 plates, 3 discs, and flange to the underdrive clutch drum.
NOTICE:
Be careful about the order of discs, plates, and flange.



5. INSTALL NO. 2 UNDERDRIVE CLUTCH FLANGE HOLE SNAP RING

(a) Using a screwdriver, install the No. 2 underdrive clutch flange hole snap ring.

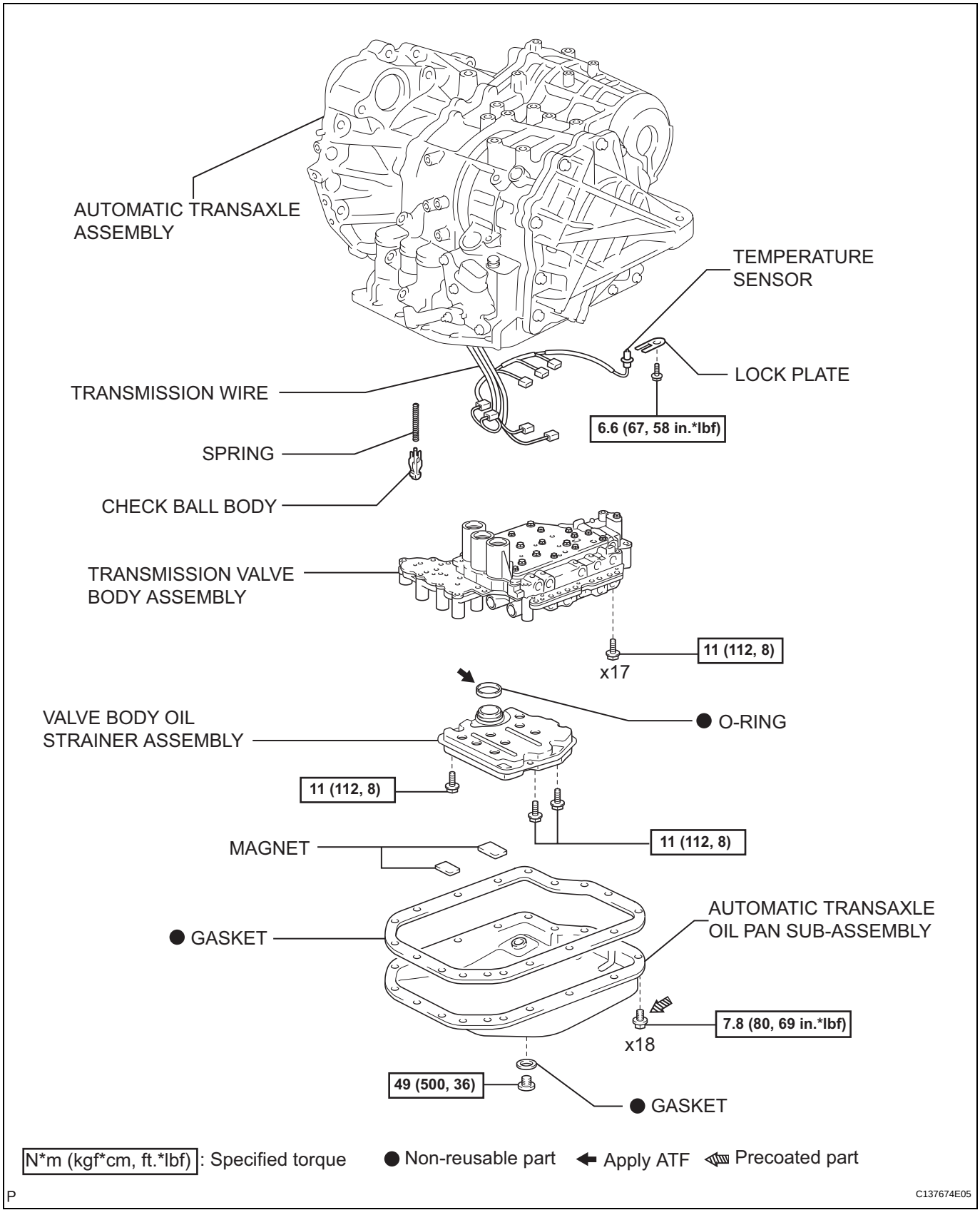
(b) Check that the end gap of the snap ring is not aligned with one of the cutouts.

NOTICE:

The snap ring should be securely engaged in the groove of the drum.

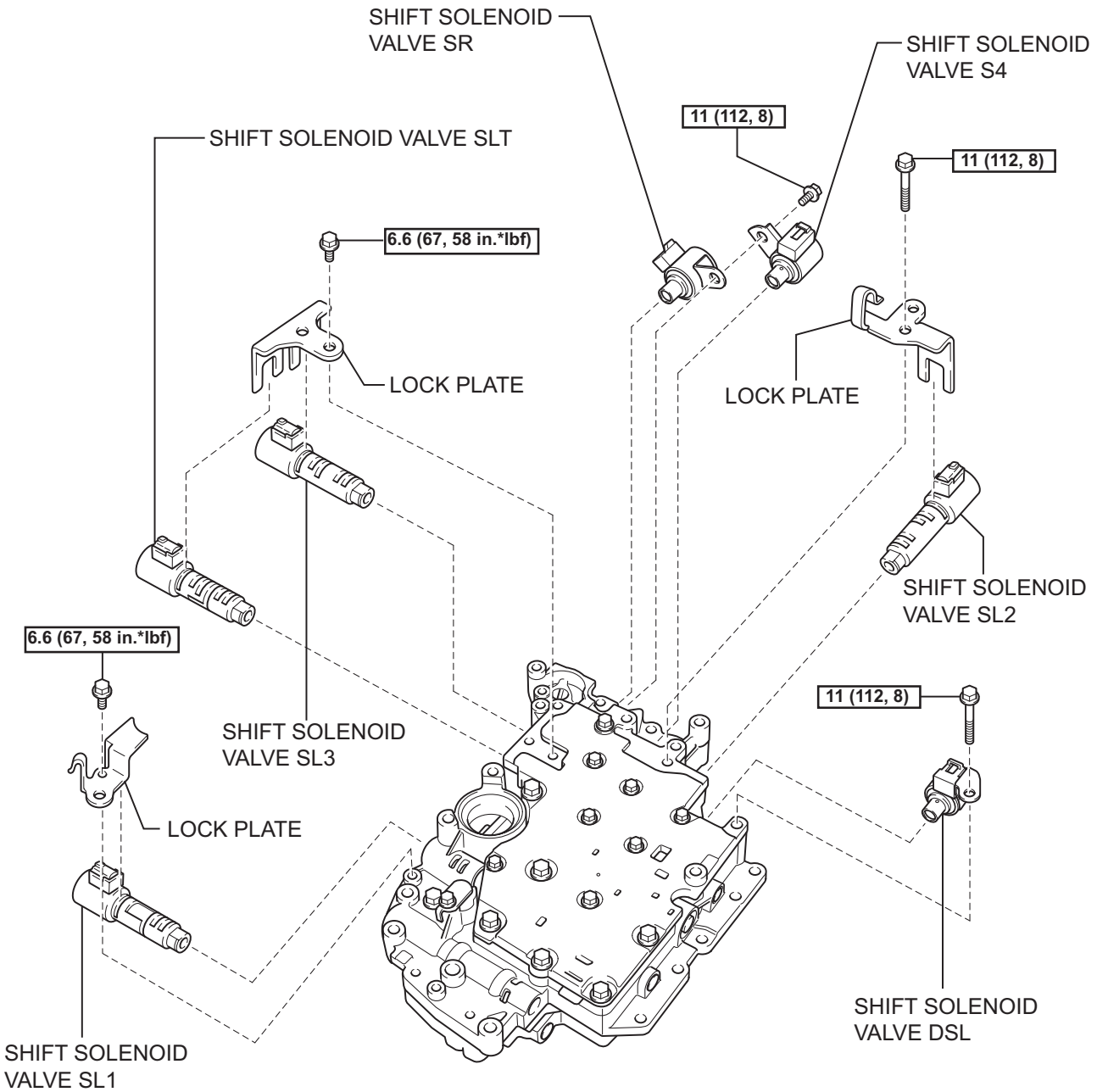
SHIFT SOLENOID VALVE

COMPONENTS



AX

P



N*m (kgf*cm, ft.*lbf): Specified torque

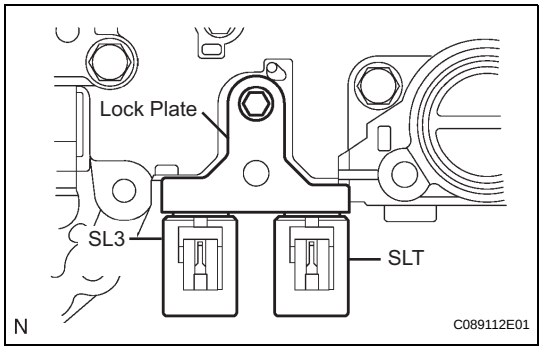
C139867E01

AX

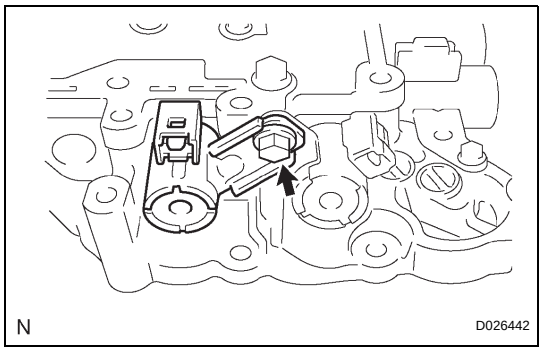
REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   See page AX-162.
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-138)**
3. **DISCONNECT TRANSMISSION WIRE (See page AX-138)**
4. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-139)**
5. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-139)**

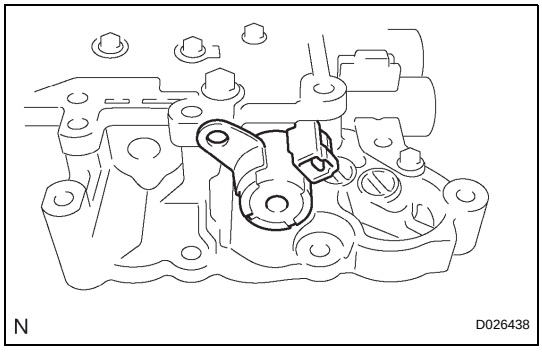
DISASSEMBLY



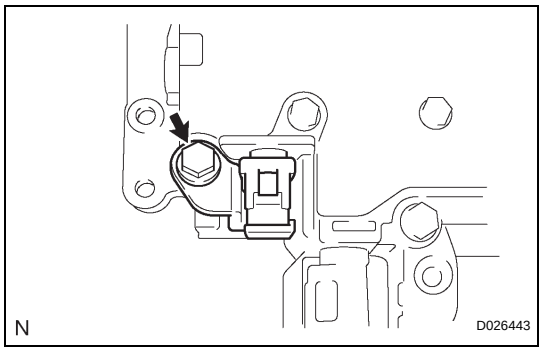
1. **REMOVE SHIFT SOLENOID VALVE SL3**
   (a) Remove the bolt and lock plate from the valve body assembly.
   (b) Remove the shift solenoid valve SL3 from the valve body assembly.
2. **REMOVE SHIFT SOLENOID VALVE SLT**
   (a) Remove the shift solenoid valve SLT from the valve body assembly.



3. **REMOVE SHIFT SOLENOID VALVE S4**
   (a) Remove the bolt and shift solenoid valve S4 from the valve body assembly.

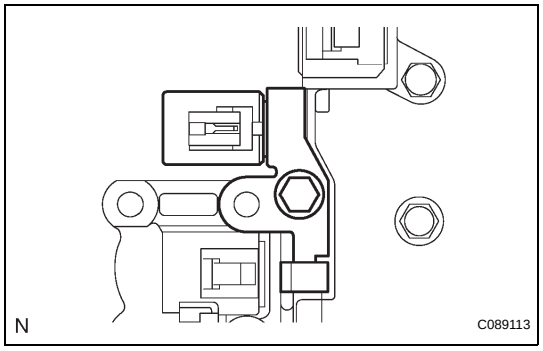


4. **REMOVE SHIFT SOLENOID VALVE SR**
   (a) Remove the shift solenoid valve SR from the valve body assembly.



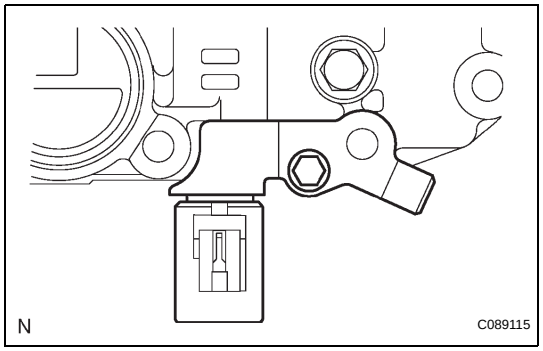
5. REMOVE SHIFT SOLENOID VALVE DSL

(a) Remove the bolt and shift solenoid valve DSL from the valve body assembly.



6. REMOVE SHIFT SOLENOID VALVE SL2

(a) Remove the bolt, lock plate and shift solenoid valve SL2 from the valve body assembly.



7. REMOVE SHIFT SOLENOID VALVE SL1

(a) Remove the bolt, lock plate and shift solenoid valve SL1 from the valve body assembly.

INSPECTION

1. INSPECT SHIFT SOLENOID VALVE SL3

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

If the value is not as specified, replace the shift solenoid valve.

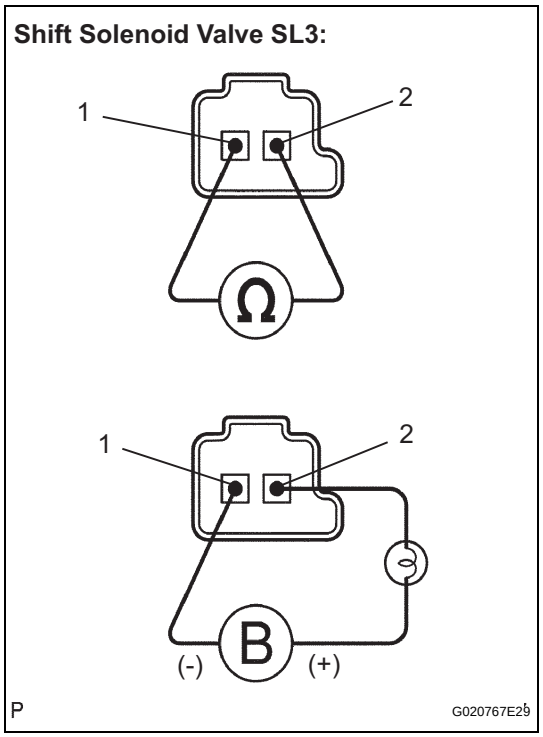
(b) Connect the positive (+) lead to terminal 2 of the solenoid connector, and the negative (-) lead to terminal 1 of the solenoid connector.

OK:

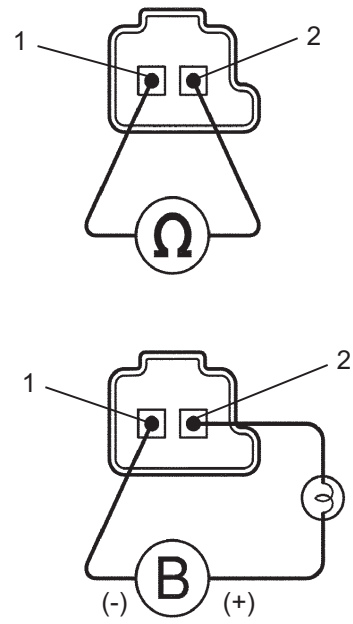
The solenoid valve makes an operating sound.

If the result is not as specified, replace the shift solenoid valve.

Shift Solenoid Valve SL3:



Shift Solenoid Valve SLT:



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2. INSPECT SHIFT SOLENOID VALVE SLT

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

If the value is not as specified, replace the shift solenoid valve.

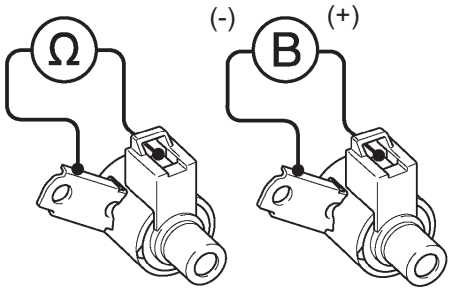
(b) Connect the positive (+) lead to terminal 2 of the solenoid connector, and the negative (-) lead to terminal 1 of the solenoid connector.

OK:

The solenoid valve makes an operating sound.

If the result is not as specified, replace the shift solenoid valve.

Shift Solenoid Valve S4:



N C113971E01

3. INSPECT SHIFT SOLENOID VALVE S4

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (S4) - Solenoid Body (S4)	11 to 15 Ω

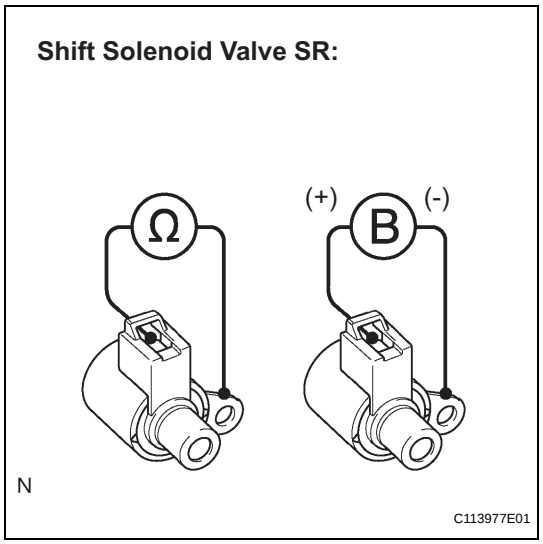
If the value is not as specified, replace the shift solenoid valve.

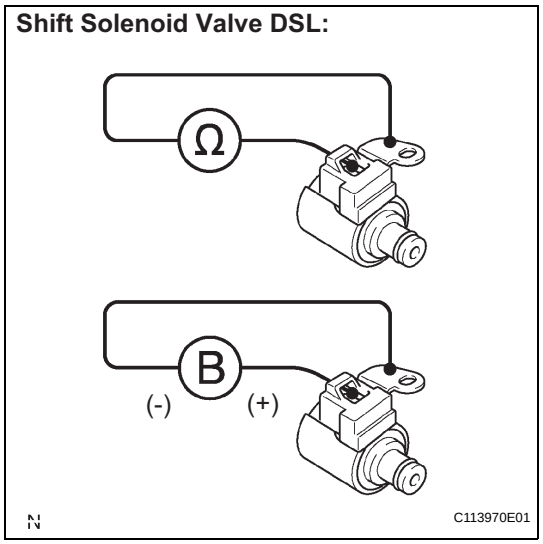
(b) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating sound.

If the result is not as specified, replace the shift solenoid valve.





4. INSPECT SHIFT SOLENOID VALVE SR

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (SR) - Solenoid Body (SR)	11 to 15 Ω

If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating sound.

If the result is not as specified, replace the shift solenoid valve.

5. INSPECT SHIFT SOLENOID VALVE DSL

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (DSL) - Solenoid Body (DSL)	11 to 15 Ω

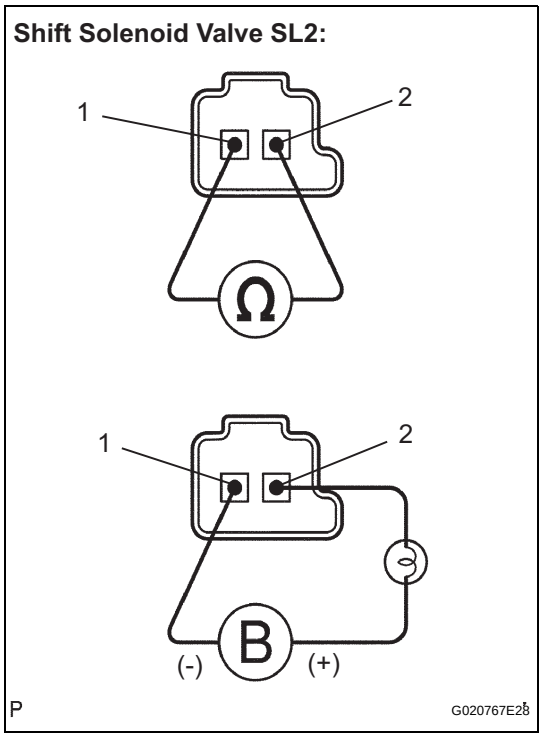
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead to the terminal of the solenoid connector, and the negative (-) lead to the solenoid body.

OK:

The solenoid valve makes an operating sound.

If the result is not as specified, replace the shift solenoid valve.



6. INSPECT SHIFT SOLENOID VALVE SL2

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

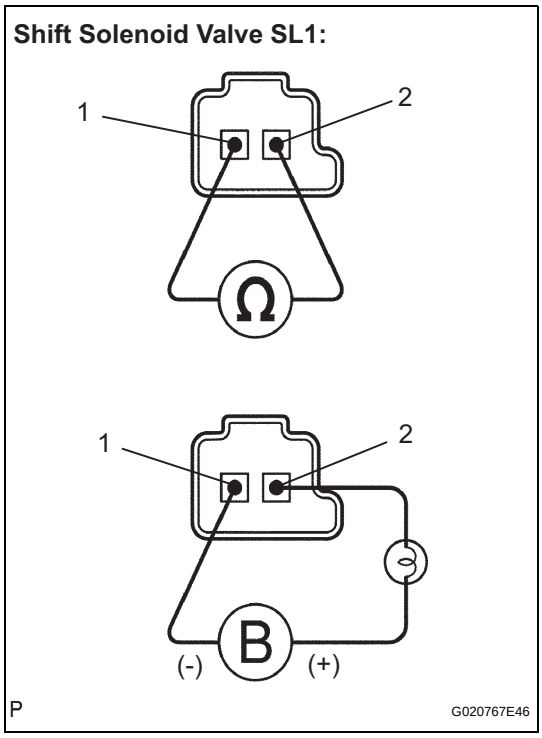
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead to terminal 2 of the solenoid connector, and the negative (-) lead to terminal 1 of the solenoid connector.

OK:

The solenoid valve makes an operating sound.

If the result is not as specified, replace the shift solenoid valve.



7. INSPECT SHIFT SOLENOID VALVE SL1

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

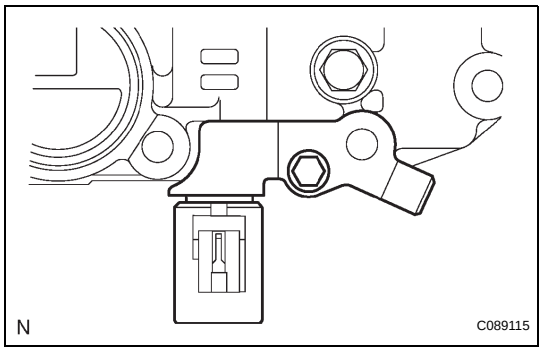
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead to terminal 2 of the solenoid connector, and the negative (-) lead to terminal 1 of the solenoid connector.

OK:

The solenoid valve makes an operating sound.

If the result is not as specified, replace the shift solenoid valve.

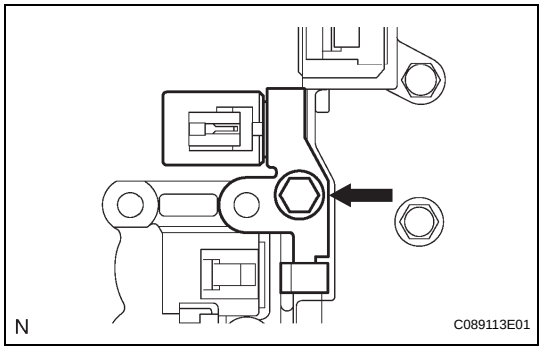


REASSEMBLY

1. INSTALL SHIFT SOLENOID VALVE SL1

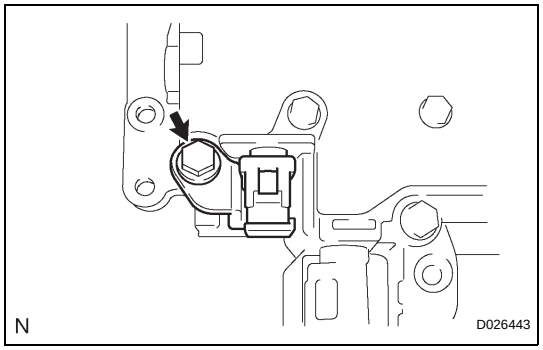
(a) Install the shift solenoid valve SL1 and lock plate to the valve body assembly with the bolt.

Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)



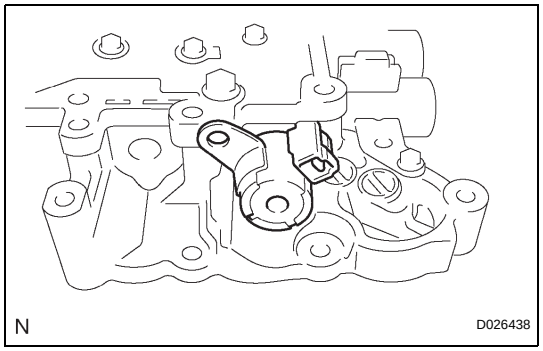
2. INSTALL SHIFT SOLENOID VALVE SL2

(a) Install the shift solenoid valve SL2 and lock plate to the valve body assembly with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



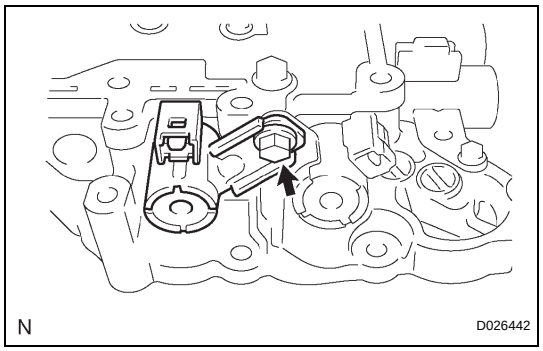
3. INSTALL SHIFT SOLENOID VALVE DSL

(a) Install the shift solenoid valve DSL to the valve body assembly with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



4. INSTALL SHIFT SOLENOID VALVE SR

(a) Install the shift solenoid valve SR to the valve body assembly.

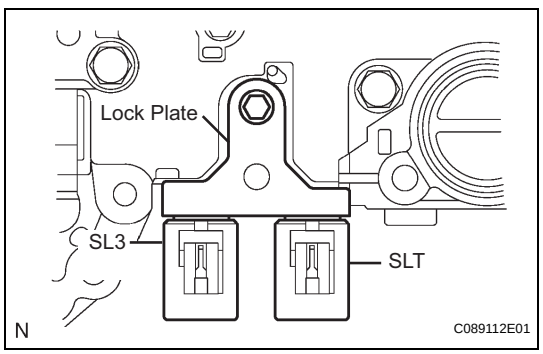


5. INSTALL SHIFT SOLENOID VALVE S4

(a) Install the shift solenoid valve S4 to the valve body assembly with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

6. INSTALL SHIFT SOLENOID VALVE SL3

(a) Install the shift solenoid valve SL3 to the valve body assembly.



7. INSTALL SHIFT SOLENOID VALVE SLT

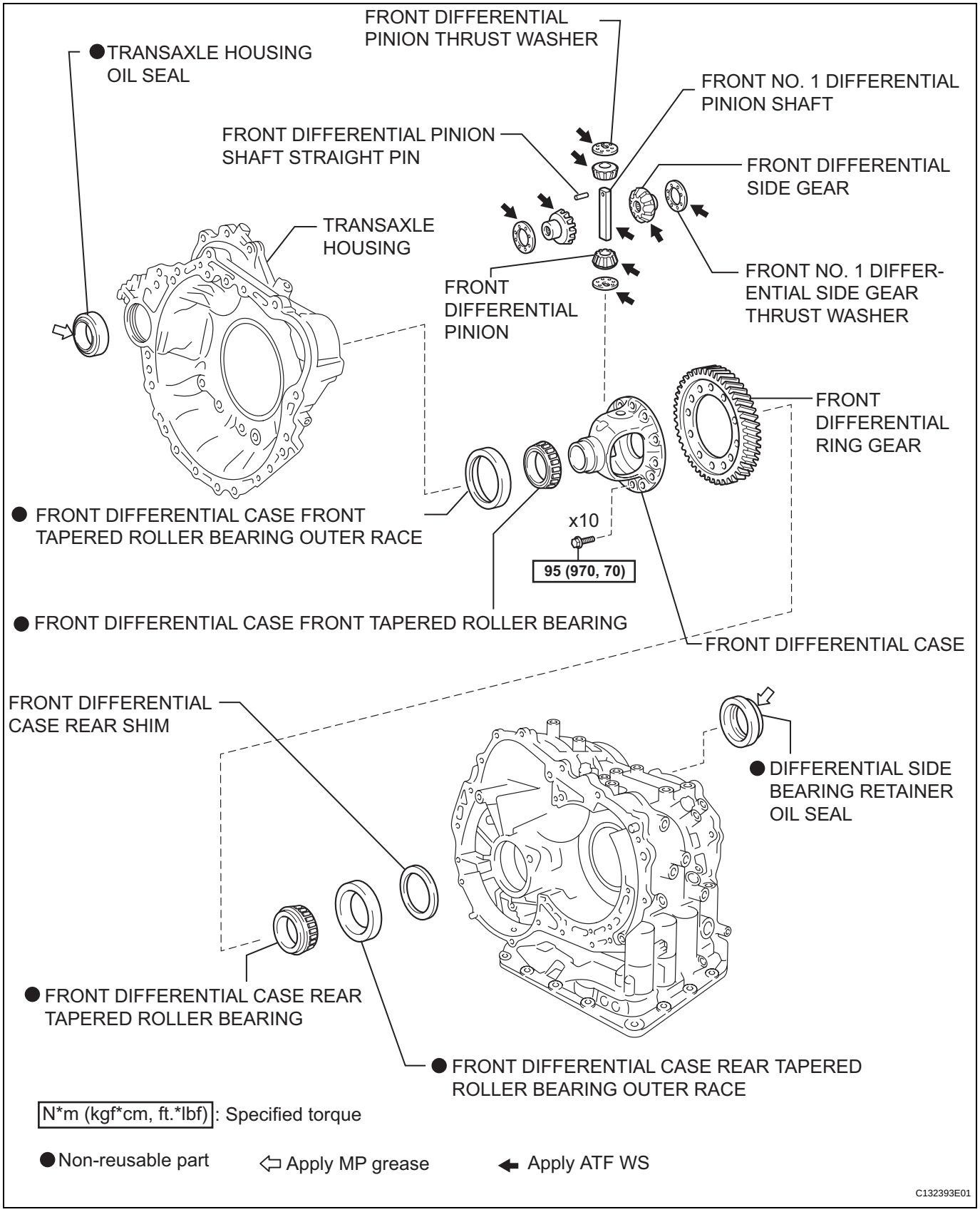
(a) Install the shift solenoid valve SLT and lock plate to the valve body assembly with the bolt.
Torque: 6.6 N*m (67 kgf*cm, 58 in.*lbf)

INSTALLATION

1. **INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-139)**
2. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-140)**
3. **INSTALL TRANSMISSION WIRE (See page AX-140)**
4. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-141)**
5. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page AX-141)**
6. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY** (See page AX-168)

DIFFERENTIAL CASE

COMPONENTS



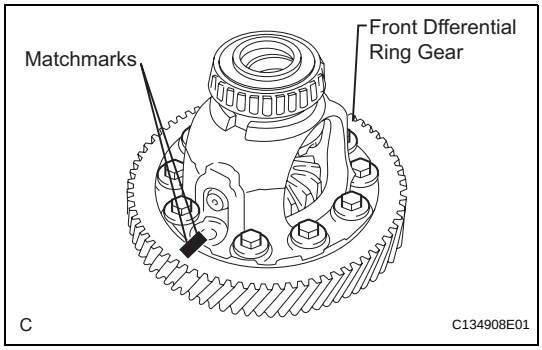
REMOVAL

1. REMOVE DIFFERENTIAL GEAR ASSEMBLY (See page AX-212)

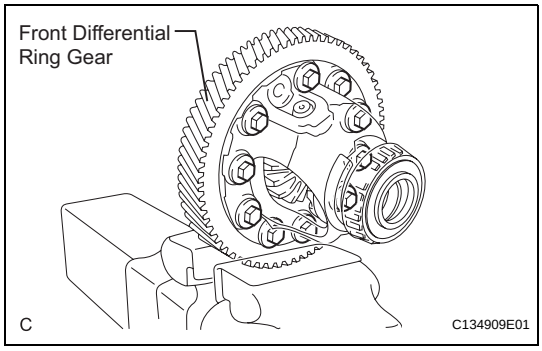
DISASSEMBLY

1. REMOVE FRONT DIFFERENTIAL RING GEAR

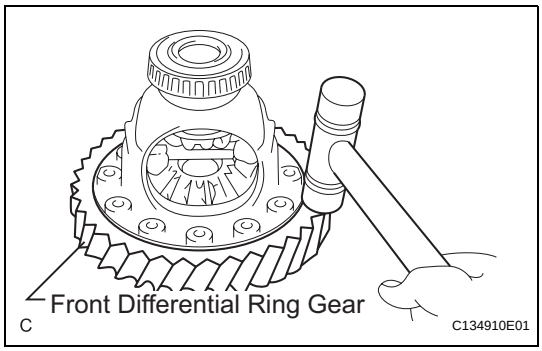
(a) Put matchmarks on the front differential ring gear and differential case.



(b) Remove the 10 bolts.



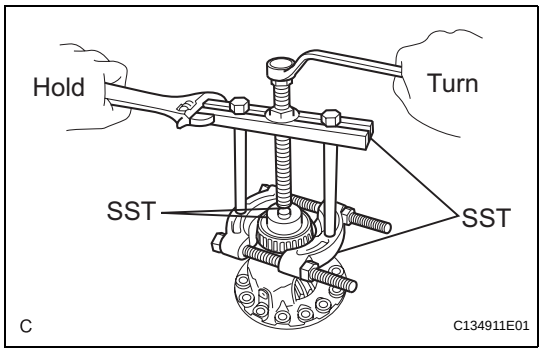
(c) Using a plastic hammer, tap on the front differential ring gear to remove it from the case.

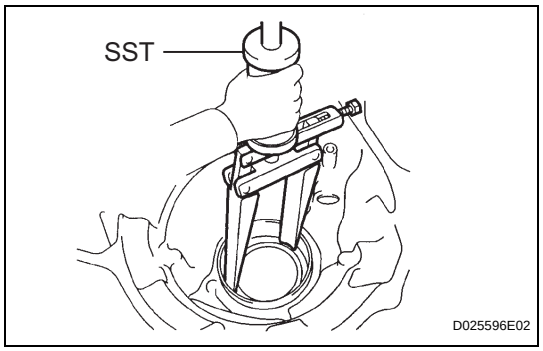


2. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

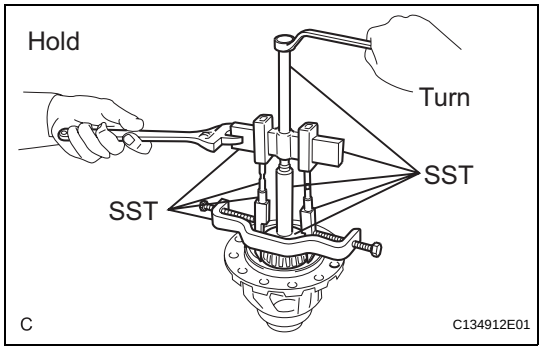
(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.

SST 09950-00020, 09950-00030, 09950-40011 (09957-04010), 09950-60010 (09951-00480)



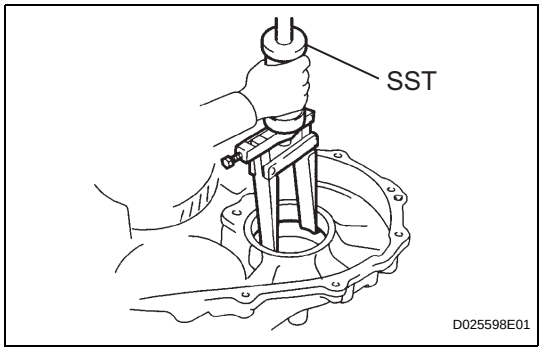


(b) Using SST, remove the front differential case front tapered roller bearing outer race.
SST 09308-00010

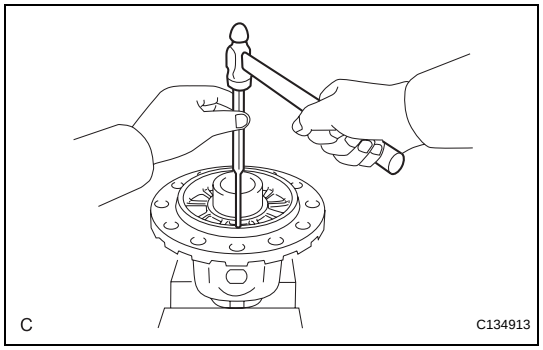


3. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.
SST 09950-00020, 09950-00030, 09950-40011 (09955-04061, 09957-04010, 09958-04011), 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021, 09955-05010), 09950-60010 (09951-00480), 09950-70010 (09951-07100)

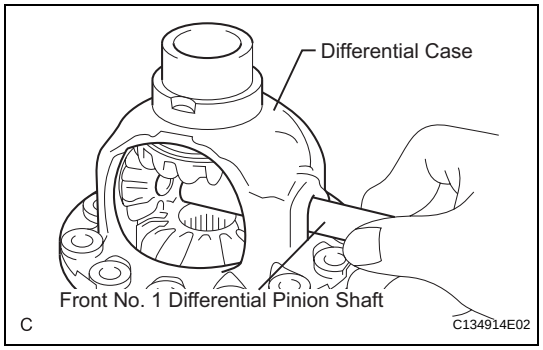


(b) Using SST, remove the front differential case rear tapered roller bearing outer race.
SST 09308-00010



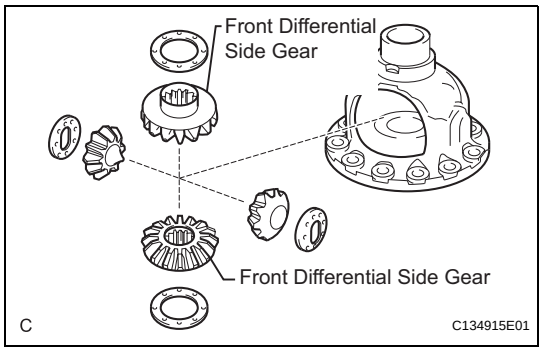
4. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch and hammer, remove the straight pin.
NOTICE:
Before removing the straight pin, unstake it with a pin punch.



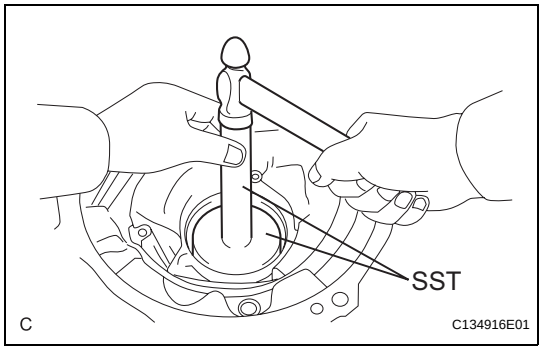
5. REMOVE FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Remove the front No. 1 differential pinion shaft from the differential case.



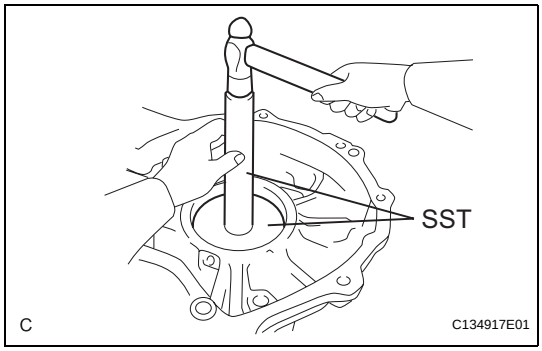
6. REMOVE FRONT DIFFERENTIAL SIDE GEAR

(a) Remove the 2 front differential pinions, 2 pinion thrust washers, 2 front differential side gears and 2 side gear thrust washers from the differential case.



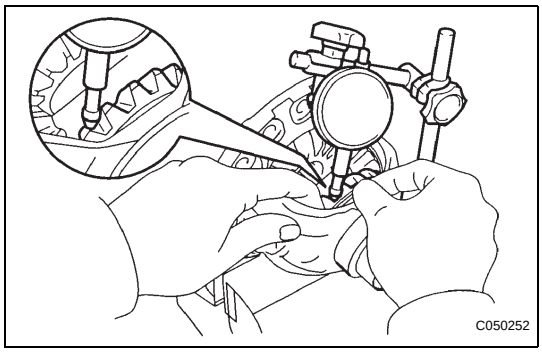
7. REMOVE TRANSAXLE HOUSING OIL SEAL

(a) Using SST and a hammer, remove the oil seal.
SST 09950-70010 (09951-07200), 09950-60010 (09951-00630)



8. REMOVE DIFFERENTIAL SIDE BEARING RETAINER OIL SEAL

(a) Using SST and a hammer, remove the oil seal.
SST 09950-70010 (09951-07100), 09608-10010

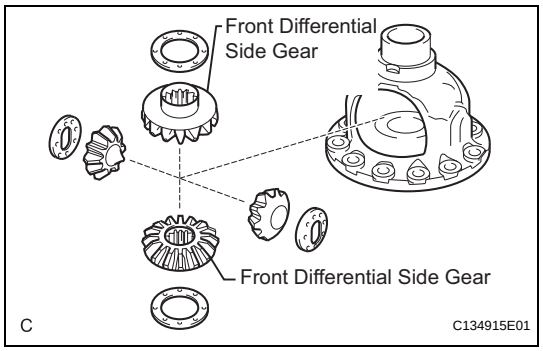


INSPECTION

1. INSPECT BACKLASH

(a) Using a dial indicator, inspect the backlash of the side gear.
Standard backlash:
0.05 to 0.20 mm (0.0020 to 0.0079 in.)
Thrust washer thickness

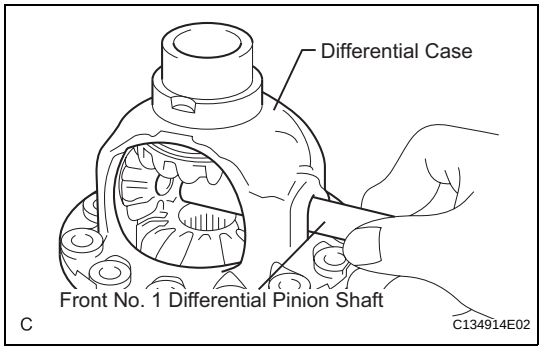
Mark	Thickness
1	1.000 mm (0.0394 in.)
2	1.100 mm (0.0433 in.)
3	1.200 mm (0.0472 in.)
4	1.300 mm (0.0512 in.)



REASSEMBLY

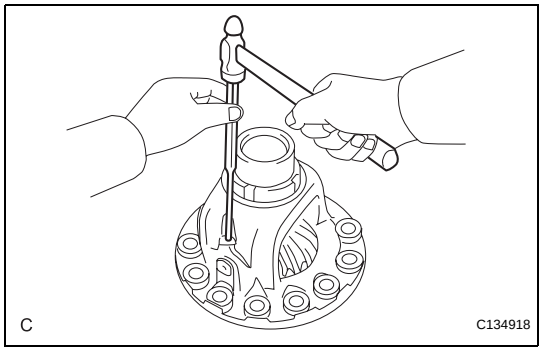
1. INSTALL FRONT DIFFERENTIAL SIDE GEAR

(a) Coat the 2 front differential side gears, 2 side gear thrust washers, 2 front differential pinions and 2 pinion thrust washers with ATF and install them to the differential case.



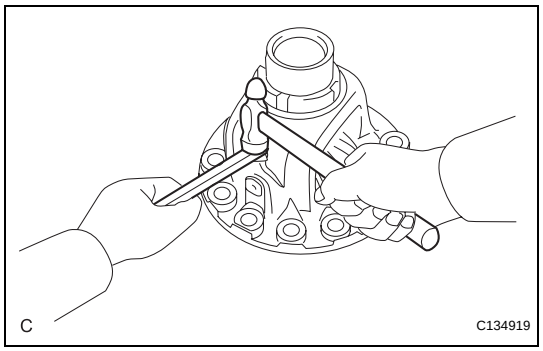
2. INSTALL FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Coat the front No. 1 differential pinion shaft with ATF, and install it to the differential case.



3. INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

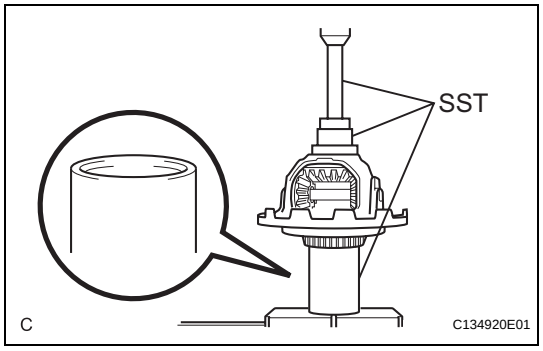
(a) Using a pin punch and hammer, install the pinion shaft straight pin.



(b) Using a chisel and hammer, stake the differential case.

NOTICE:

Stake it after adjusting the backlash.



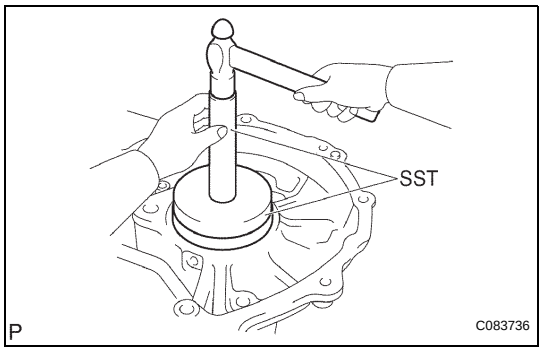
4. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, install the front differential case front tapered roller bearing to the differential case.

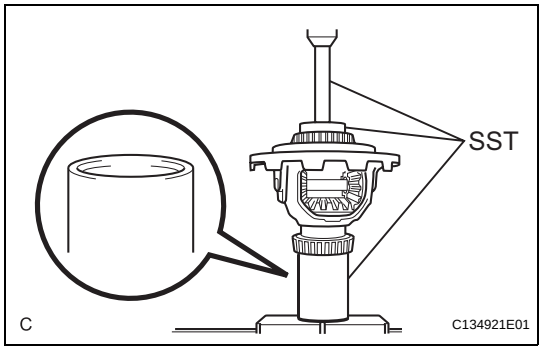
SST 09550-60010 (09951-00480), 09950-70010 (09951-07100), 09710-04081

NOTICE:

Do not damage the bearing cage during installation of the bearing inner race.

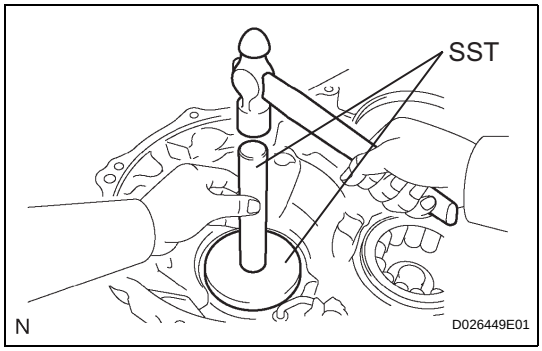


(b) Using SST and a hammer, install the front differential case front tapered roller bearing outer race to the transaxle housing.
SST 09950-60020 (09951-00750), 09950-70010 (09951-07200)

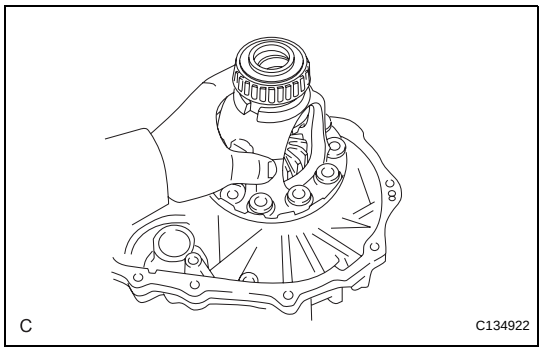


5. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST and a press, install the front differential case rear tapered roller bearing to the differential case.
SST 09710-04081, 09550-60010 (09951-00480), 09950-70010 (09951-07100)
NOTICE:
Do not damage the bearing cage during installation of the bearing inner race.

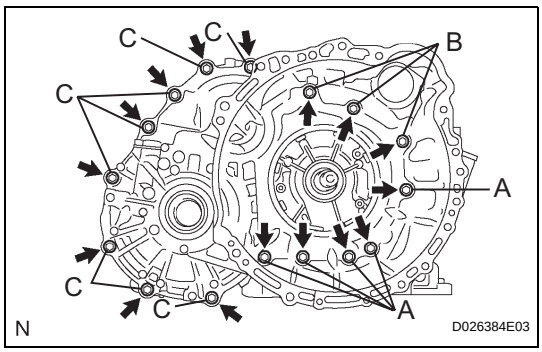


(b) Using SST and a hammer, install the front differential case rear tapered roller bearing outer race to the transaxle housing.
SST 09550-60010 (09951-00790), 09950-70010 (09951-00710)
NOTICE:
Clearance is not allowed between the bearing and transaxle housing.



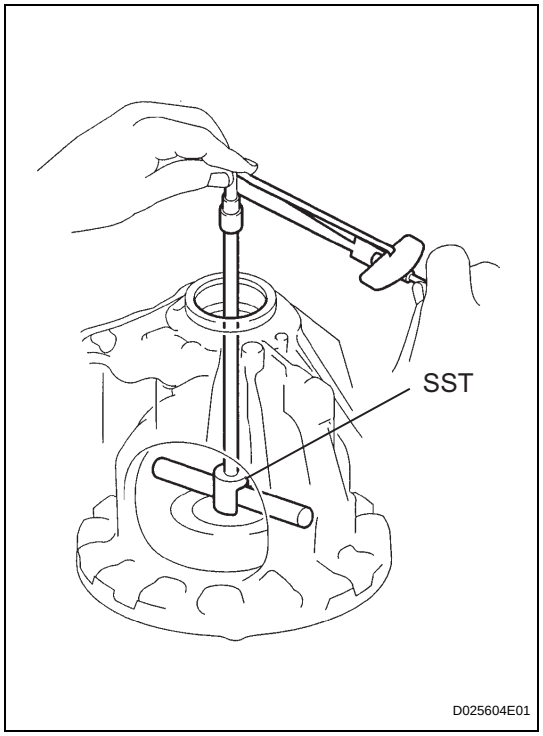
6. ADJUST DIFFERENTIAL SIDE BEARING PRELOAD

(a) Install the differential assembly to the transaxle case.



(b) Clean the matching surfaces of the transaxle case and transaxle housing.
(c) Install the transaxle housing to the transaxle case and tighten them with the 16 bolts.
Torque: Bolt A
22 N*m (225 kgf*cm, 16 ft.*lbf)
Bolt B, C
29 N*m (299 kgf*cm, 22 ft.*lbf)
Bolt length:
Bolt A:
50 mm (1.969 in.)

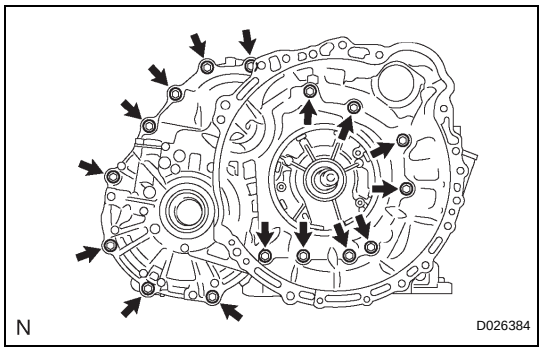
Bolt B:
50 mm (1.969 in.)
Bolt C:
42 mm (1.654 in.)



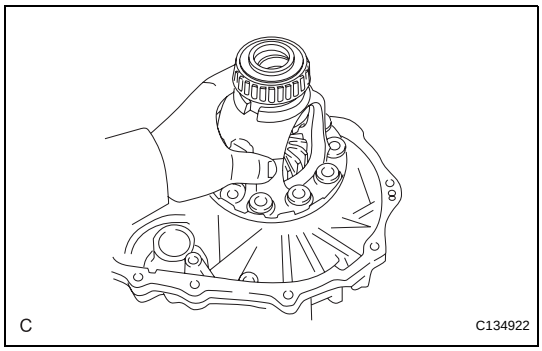
(d) Using SST, turn the differential assembly right and left 2 or 3 times to settle the bearing.
SST 09564-32011

(e) Using SST and a torque wrench, measure the turning torque of the differential.
SST 09564-32011
Turning torque at 60 rpm:
New bearing:
0.20 to 0.69 N*m (2.0 to 7.0 kgf*cm, 1.8 to 6.1 in.*lbf)
Used bearing:
0.10 to 0.35 N*m (1.0 to 3.6 kgf*cm, 0.9 to 3.1 in.*lbf)
HINT:
If the turning torque is not within the specified range, refer to the table below to select a thrust washer so that the turning torque is within the specified range.
Flange thickness: mm (in.)

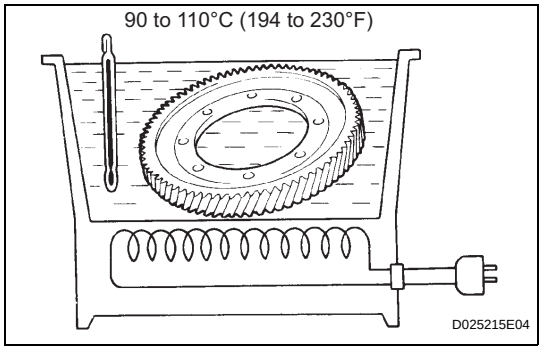
Mark	Thickness	Mark	Thickness
0	1.90 (0.0748)	A	2.40 (0.0945)
1	1.95 (0.0768)	B	2.45 (0.0965)
2	2.00 (0.0787)	C	2.50 (0.0984)
3	2.05 (0.0807)	D	2.55 (0.1004)
4	2.10 (0.0827)	E	2.60 (0.1024)
5	2.15 (0.0846)	F	2.65 (0.1043)
6	2.20 (0.0866)	G	2.70 (0.1063)
7	2.25 (0.0886)	H	2.75 (0.1083)
8	2.30 (0.0906)	J	2.80 (0.1102)
9	2.35 (0.0925)	-	-



(f) Remove the 16 bolts and the transaxle housing.



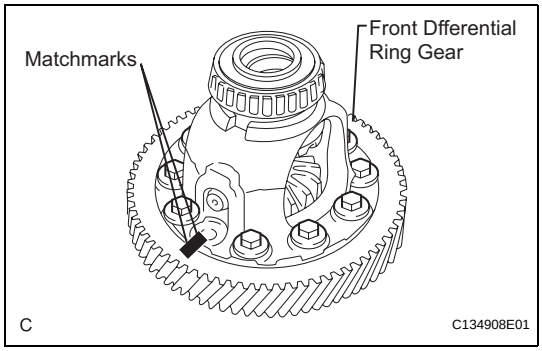
(g) Remove the differential assembly.



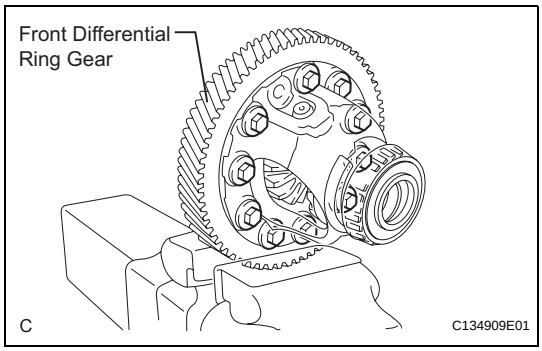
7. INSTALL FRONT DIFFERENTIAL RING GEAR

(a) Using ATF and a heater, heat the front differential ring gear to 90 to 110°C (194.0 to 230.0°F).
NOTICE:
Do not overheat the ring gear over 110°C (230.0°F).

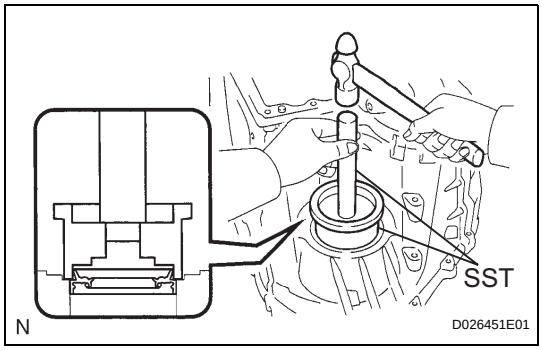
(b) Clean the contact surface of the front differential case.



(c) Align the matchmarks, and install the front differential ring gear case quickly.
NOTICE:
Do not install the bolts while the ring gear is hot.



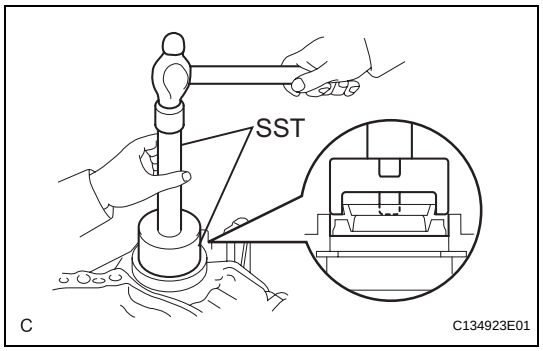
(d) Tighten the 10 bolts.
Torque: 95 N*m (970 kgf*cm, 70 ft.*lbf)
NOTICE:
Tighten the bolts a little at a time in diagonal order.



8. INSTALL TRANSAXLE HOUSING OIL SEAL

(a) Using SST and a hammer, drive in a new oil seal.
SST 09608-32010, 09950-70010 (09951-07150)

(b) Coat the lip of the oil seal with a small amount of MP grease.
Oil seal drive in depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)



9. INSTALL DIFFERENTIAL SIDE BEARING RETAINER OIL SEAL

(a) Using SST and a hammer, drive in a new oil seal.
SST 09726-36010, 09950-70010 (09951-07150)

(b) Coat the lip of the oil seal with a small amount of MP grease.
Oil seal drive in depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

INSTALLATION

1. **INSTALL DIFFERENTIAL GEAR ASSEMBLY (See page AX-256)**

AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

- **If the following parts have been replaced, initialize the TCM and perform a road test to allow the TCM to learn (See page AX-25).**
  - **Valve body assembly**
  - **Shift solenoid SL3**
  - **Shift solenoid SL4**
- **If the following parts have been replaced, perform a road test to allow the TCM to learn (See page AX-25).**
  - **Shift solenoid SL1**
  - **Shift solenoid SL2**
- **If the TCM or transaxle has been replaced, register the transmission compensation code in the TCM (See page AX-19).**
- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assembly, engine assembly or ECM (See page AX-25).**

1. **The automatic transaxle is composed of highly precision-finished parts which need careful inspection before reassembly. Even a small nick could cause fluid leakage or affect transmission performance. The instructions here are organized so that you work on only one component group at a time. This will help avoid confusion caused by similar-looking parts of different sub-assemblies being on your workbench at the same time. The component groups are inspected and repaired from the converter housing side. Complete as much as possible of the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because some parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups. Recommended: ATF WS**
2. **All disassembled parts should be washed clean and any fluid passages and holes should be blown through with compressed air.**
3. **Dry all parts with compressed air. Never use a shop rag or a piece of cloth to dry them.**
4. **When using compressed air, always aim away from yourself to prevent accidentally spraying ATF or kerosene in your face.**
5. **Only recommended automatic transmission fluid or kerosene should be used for cleaning.**

6. **After cleaning, the parts should be arranged in the correct order for efficient inspection, repair, and reassembly.**
7. **When disassembling a valve body, be sure to match each valve together with its corresponding spring.**
8. **New discs for the brakes and clutches must be soaked in ATF for at least 15 minutes before reassembly.**
9. **All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.**
10. **All gaskets, seals, and rubber O-rings should be replaced with new ones.**
11. **Do not apply adhesive cements to gaskets and similar parts.**
12. **Make sure that the ends of a snap ring are not aligned with one of the cutouts and that the snap ring is installed in the groove correctly.**
13. **When replacing a worn bushing, the sub-assembly containing the bushing must also be replaced.**
14. **Check thrust bearings and races for wear or damage. If they are damaged, replace them.**
15. **When working with FIPG material, you must observe the following:**
    - **Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surface.**
    - **Thoroughly clean all components to remove any loose material.**
    - **Clean both sealing surfaces with a non-residue solvent.**
    - **Parts must be reassembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.**

1. EXPRESSIONS OF IGNITION SWITCH

The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

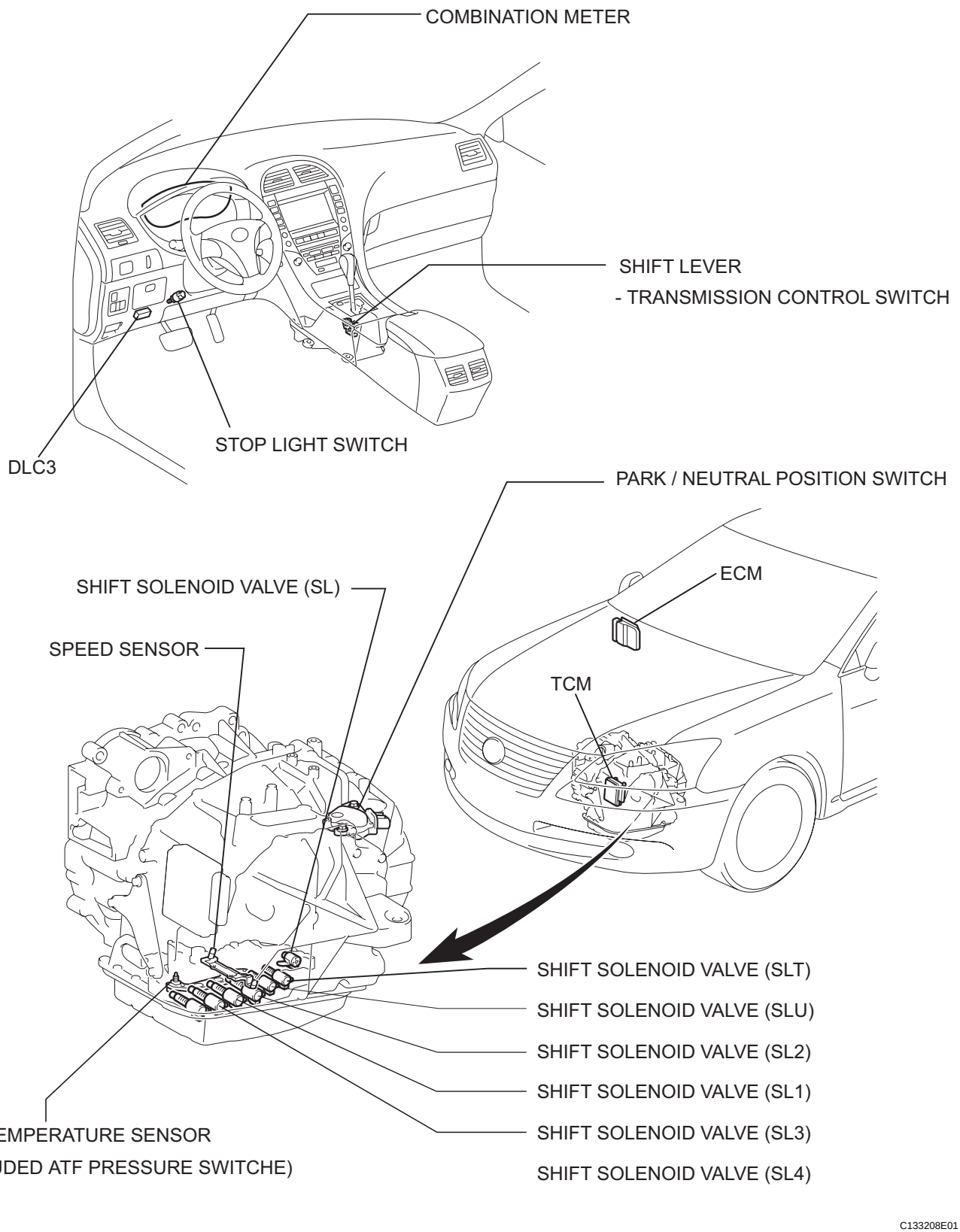
Expression	Switch Type	
	Ignition Switch (Position)	Engine Switch (Condition)
Ignition switch off	LOCK	Off
Ignition switch on (IG)	ON	On (IG)
Ignition switch on (ACC)	ACC	ON (ACC)
Engine start	START	Start

DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the TCM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the TCM to detect malfunctions. With all preconditions satisfied, the TCM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the TCM to detect malfunctions.
Frequency of operation	The number of times that the TCM checks for malfunctions per driving cycle. "Once per driving cycle" means that the TCM detects malfunction only one time during a single driving cycle. "Continuous" means that the TCM detects malfunction every time when the enabling conditions are met.
Duration	The minimum time that the TCM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the TCM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the TCM illuminates MIL the instant the TCM determines that there is a malfunction. "2 driving cycle" means that the TCM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.
Component operating range	Normal operation range of sensors and solenoids under normal driving conditions. Use these ranges as a reference. They cannot be used to judge if a sensor or solenoid is defective.

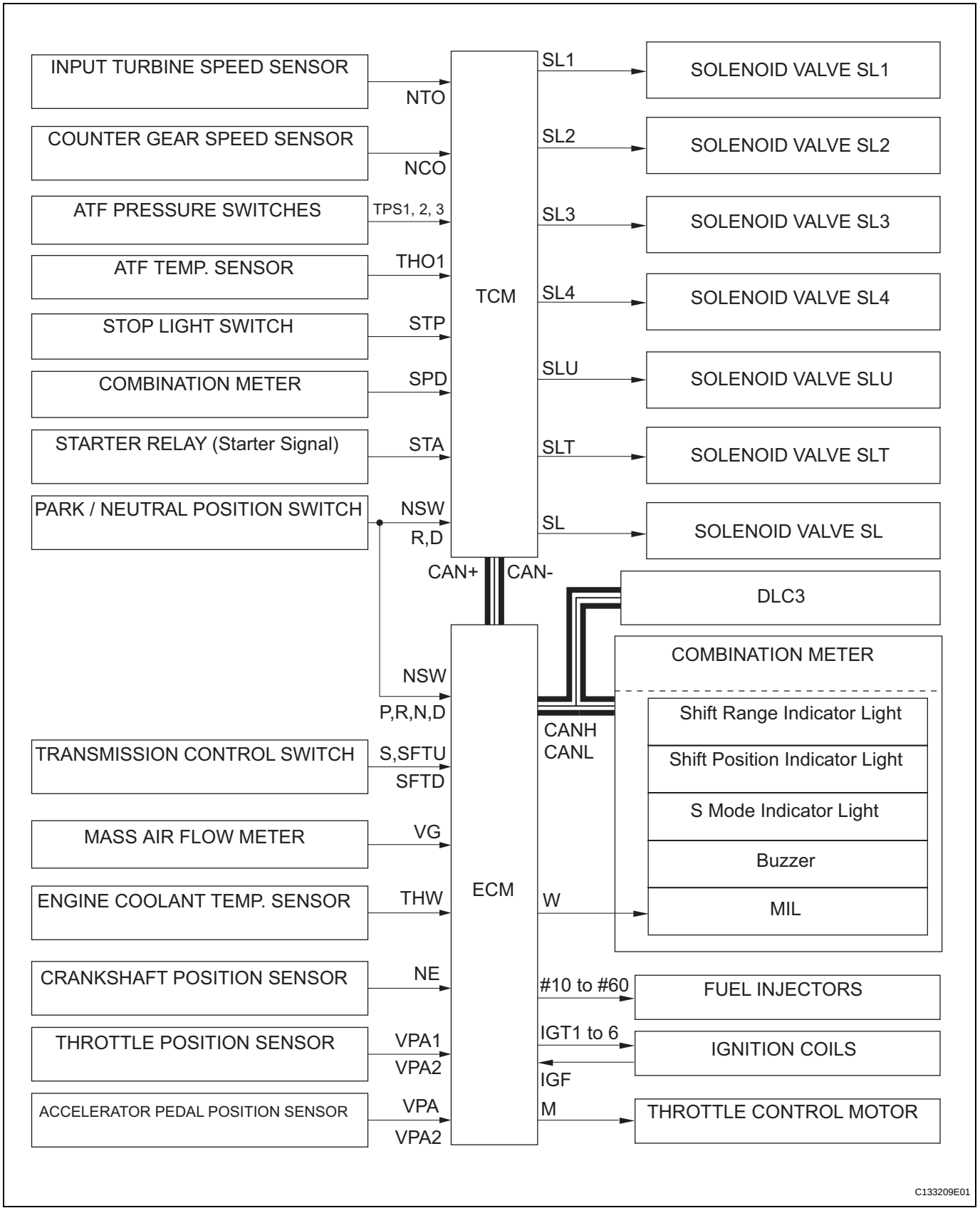
AX

PARTS LOCATION



SYSTEM DIAGRAM

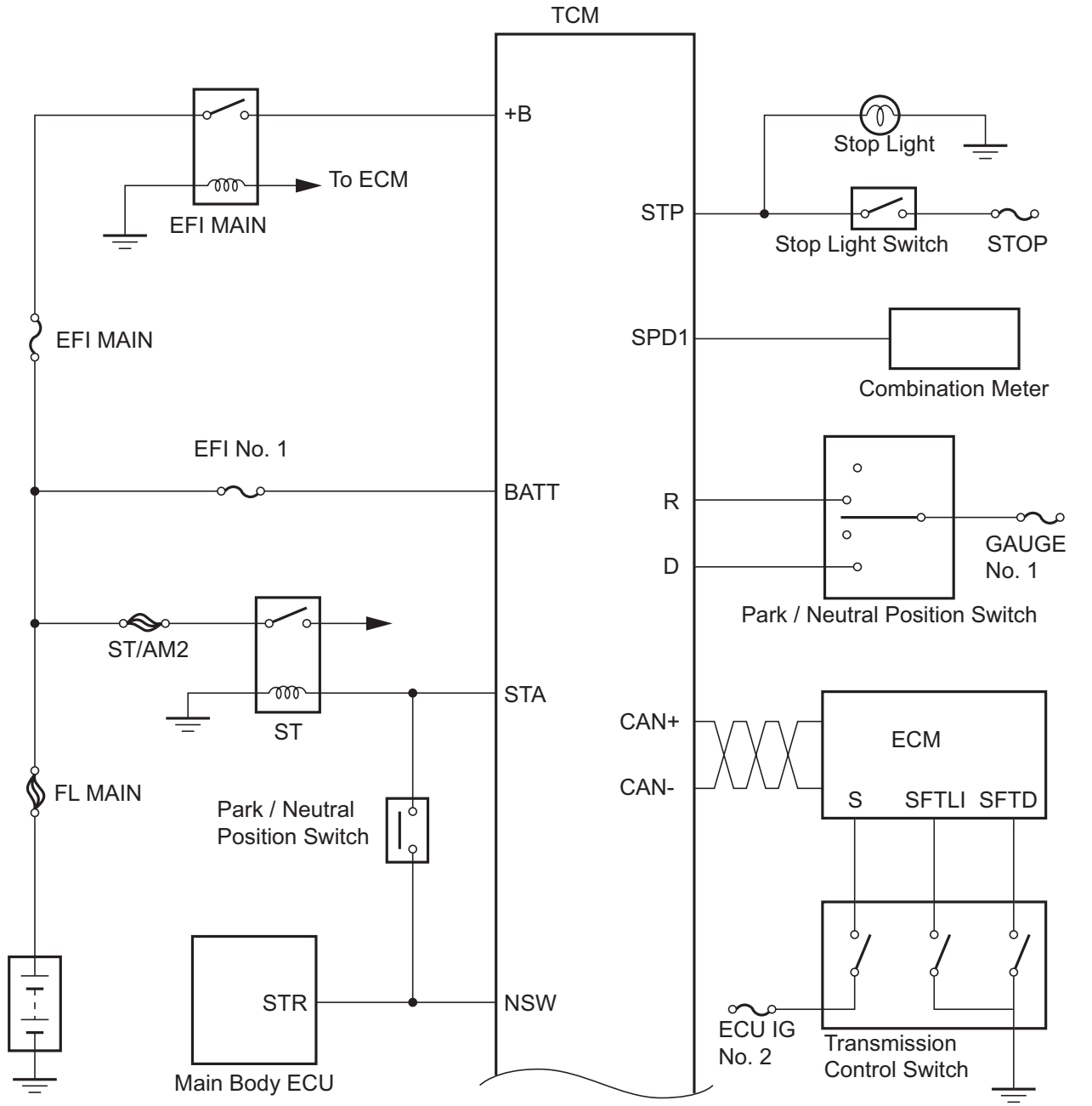
The configuration of the electronic control system in the U660E automatic transaxle is as shown in the following chart.



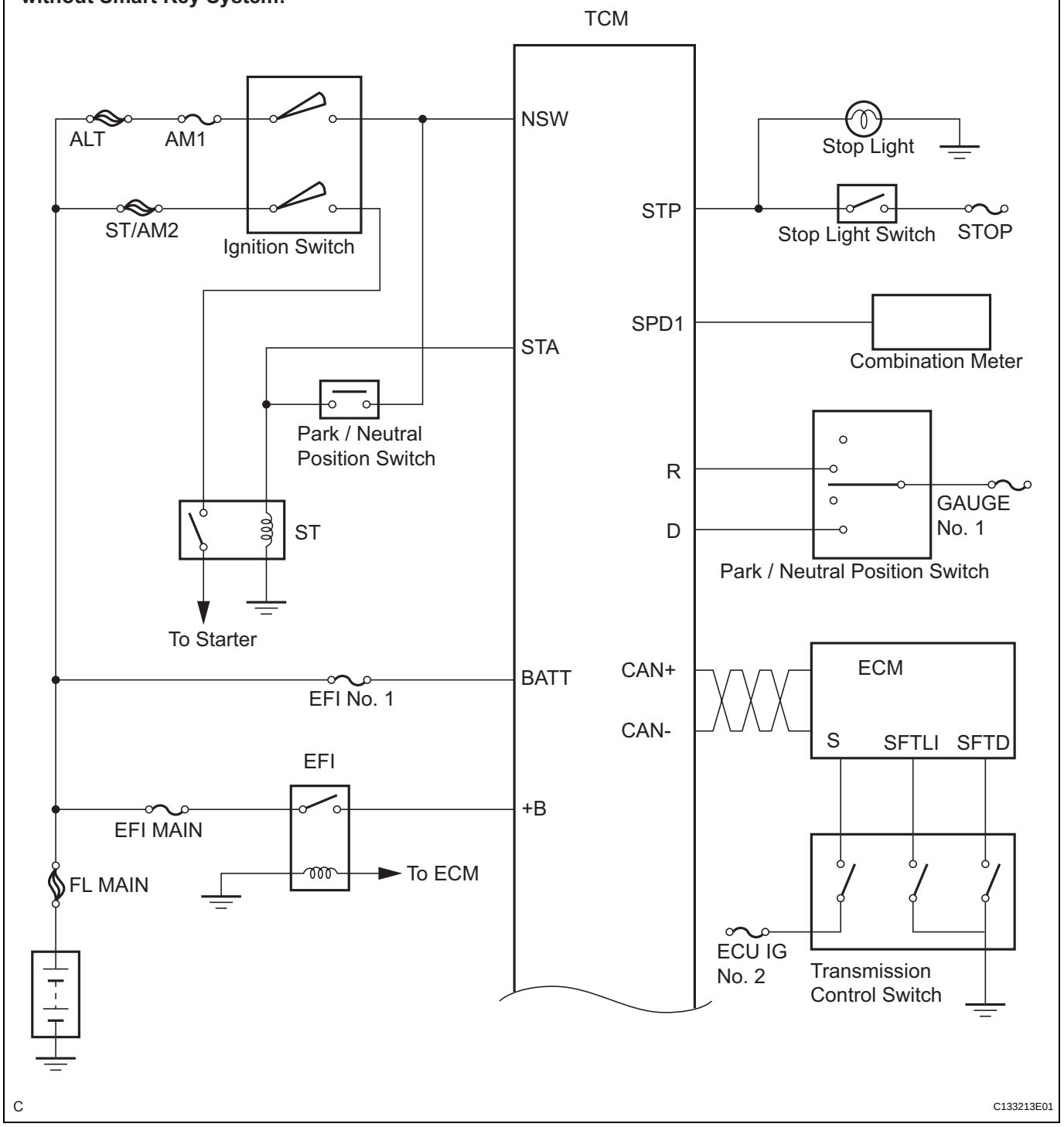
AX

AX

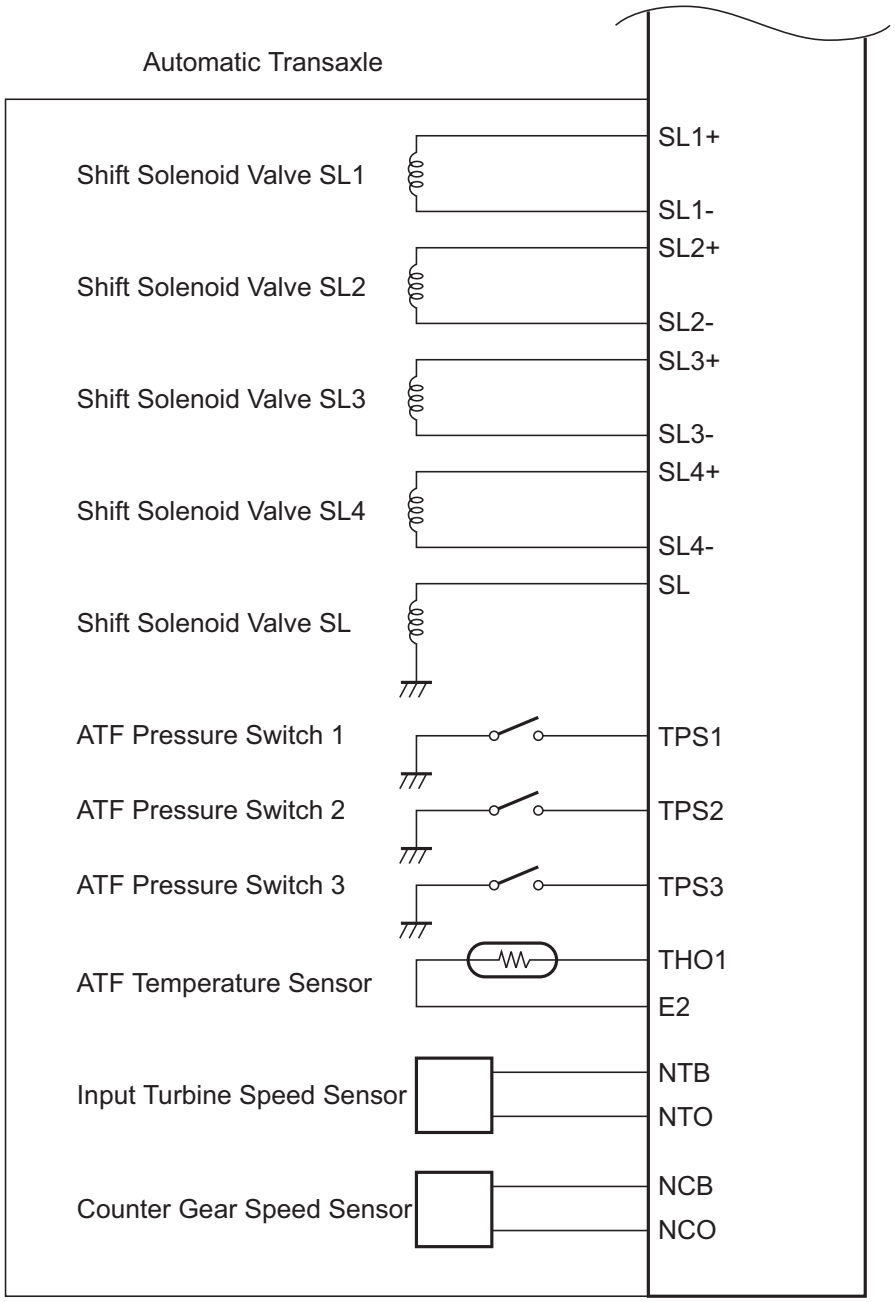
with Smart Key System:



without Smart Key System:



AX



C

C133215E01

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

(a) The ECT (Electronic controlled automatic transaxle) is an automatic transaxle that has its shift timing electronically controlled by the Transmission Control Module (TCM). The TCM detects electrical signals that indicate engine and driving conditions, and controls the shift point, based on driver's habits and road conditions. As a result, fuel efficiency and transaxle performance are improved.
Shift shock has been reduced by controlling the engine and transaxle simultaneously.
In addition, the ECT has features such as:

- Diagnostic function.
- Fail-safe function for use when a malfunction occurs.

AX

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The TCM of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

NEXT

3	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V
If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

4	CONNECT INTELLIGENT TESTER TO DLC3*

NEXT

5	CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

(a) Refer to the DTC CHECK / CLEAR (See page AX-38).

NEXT

6	VISUAL INSPECTION

NEXT

7	SETTING CHECK MODE DIAGNOSIS*

(a) Refer to the CHECK MODE PROCEDURE (See page AX-39).

NEXT

8	PROBLEM SYMPTOM CONFIRMATION

(a) Refer to the ROAD TEST (See page AX-12).

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → GO TO STEP 10

A

9	SYMPTOM SIMULATION

(a) Refer to the ELECTRONIC CIRCUIT INSPECTION PROCEDURE (See page IN-40).

NEXT

10	DTC CHECK*

(a) Refer to the DTC CHECK / CLEAR (See page AX-38).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B → GO TO STEP 18

A

11	BASIC INSPECTION

(a) Refer to the AUTOMATIC TRANSMISSION FLUID (See page AX-164).

(b) Refer to the PARK/NEUTRAL POSITION SWITCH (See page AX-174).

(c) Refer to the SHIFT LEVER ASSEMBLY (See page AX-224).

NG → GO TO STEP 21

OK

12	MECHANICAL SYSTEM TEST

(a) Refer to the MECHANICAL SYSTEM TEST (See page AX-15).

NG → GO TO STEP 17

OK

13	HYDRAULIC TEST

(a) Refer to the HYDRAULIC TEST (See page AX-17).

NG → GO TO STEP 17

OK

14	MANUAL SHIFTING TEST

(a) Refer to the MANUAL SHIFTING TEST (See page AX-18).

NG → GO TO STEP 16

OK

15	PROBLEM SYMPTOMS TABLE CHAPTER 1

(a) Refer to the PROBLEM SYMPTOMS TABLE (See page AX-29).

NG → GO TO STEP 19

OK

16	PROBLEM SYMPTOMS TABLE CHAPTER 2

(a) Refer to the PROBLEM SYMPTOMS TABLE (See page AX-29).

NEXT

17	PART INSPECTION

NEXT → GO TO STEP 21

18	DTC CHART

(a) Refer to the DIAGNOSTIC TROUBLE CODE CHART (See page AX-46).

NEXT

19	CIRCUIT INSPECTION

NEXT

20	IDENTIFICATION OF PROBLEM

NEXT

21	REPAIR OR REPLACE

NEXT

22	CONFIRMATION TEST

NEXT

END

AX

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

(a) Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transaxle does not shift up or down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and attempt to duplicate the problem symptoms.

2. ROAD TEST

NOTICE:

Perform the test at the ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F) in the normal operation.

(a) D position test:

Shift into the D position and fully depress the accelerator pedal and check the following:

(1) Check up-shift operation.

Check that 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6 up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-46).

HINT:

6th Gear Up-shift Prohibition Control

- Engine coolant temperature is 60°C (140°F) or less and vehicle speed is 50 mph (80 km/h) or less.

5th Gear Up-shift Prohibition Control

- Engine coolant temperature is 55°C (131°F) or less and vehicle speed is 32 mph (51 km/h) or less.

4th Gear Up-shift Prohibition Control

- Engine coolant temperature is 47°C (117°F) or less and vehicle speed is 31 mph (49 km/h) or less.

Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60°C (140°F) or less.

(2) Check for shift shock and slip.

Check for shock and slip at the 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6th up-shifts.

(3) Check for abnormal noise and vibration.

Check for abnormal noise and vibration when up-shifting from 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6 while driving with the shift lever in the D position, and also while driving in the lock-up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.
Check vehicle speeds when the 2nd to 1st, 3rd to 2nd, 4th to 3rd, 5th to 4th, and 6th to 5th kick-downs take place while driving with the shift lever in the D position. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (See page SS-46).

(5) Check for abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.
- Drive the vehicle with the shift lever in the D position (2nd, 3rd, 4th, 5th or 6th gear) at a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:
- There is no lock-up function in the 1st gears.
- If there is a jump in engine speed, this indicates that lock-up is not operating.

(b) S position test
Shift to the S position, depress the accelerator pedal and check the following:

(1) Check shift operation.
- With the shift lever in the S position (while the vehicle is stopped), shift into the "+" position to check that the shift position on the combination meter changes as follows: 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6.
- While driving in the 5 (S) position and 5th gear (at a vehicle speed of approximately 34 to 40 mph (55 to 65 km/h), shift into the "-" position and check if the 4th gear down-shift occurs and proper engine braking occurs.
- While driving in the 4 (S) position and 4th gear (at a vehicle speed of approximately 19 to 25 mph (30 to 40 km/h), shift into the "-" position and check if the 3rd gear down-shift occurs and proper engine braking occurs.
- While driving in the 3 (S) position and 3rd gear (at a vehicle speed of approximately 12 to 19 mph (20 to 30 km/h), shift into the "-" position and check if the 2nd gear down-shift occurs and proper engine braking occurs.
- While driving in the 2 (S) position and 2nd gear (at a vehicle speed of approximately 6 to 12 mph (10 to 20 km/h), shift into the "-" position and check if the 1st gear down-shift occurs and proper engine braking occurs.

HINT:
Manual shift (S position) is prohibited under either of the following conditions:
- Down-shifting may cause engine overrun.

- The driver continuously down-shifts. (Down-shifting to 1st gear may not be performed.)

(c) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.
CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(d) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D position.

NOTICE:

- **Driving test should be done on a paved road (a nonskid road).**
- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, perform this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers from a safe location outside the vehicle while the other is doing the test.**

(1) Chock the 4 wheels.

(2) Connect the intelligent tester to the DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressed firmly on the brake pedal.

(5) Start the engine.

(6) Using the intelligent tester, shift into the D position and hold 3rd gear using active test. Press all the way down on the accelerator pedal with your right foot.

(7) Quickly read the stall speed at this time.

Stall speed:

2,520 +- 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D position	• Engine power output may be insufficient • Stator one-way clutch is not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	• Line pressure is too low • Clutch No. 1 (C_1) slipping • One-way clutch (F_1) is not operating properly • Improper fluid level

(b) Measure the time lag.

(1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the clutches and brakes.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**
- **Be sure to allow 1 minute interval between tests.**
- **Perform the test three times and measure the time lags. Calculate the average value of the three time lags.**

(2) Connect the intelligent tester to the DLC3.

(3) Fully apply the parking brake.

(4) Start and warm up the engine and check idle speed.

Idle speed:

approx. 650 rpm (In N position and A/C OFF)

(5) Shift the lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag:

N to D less than 1.2 seconds

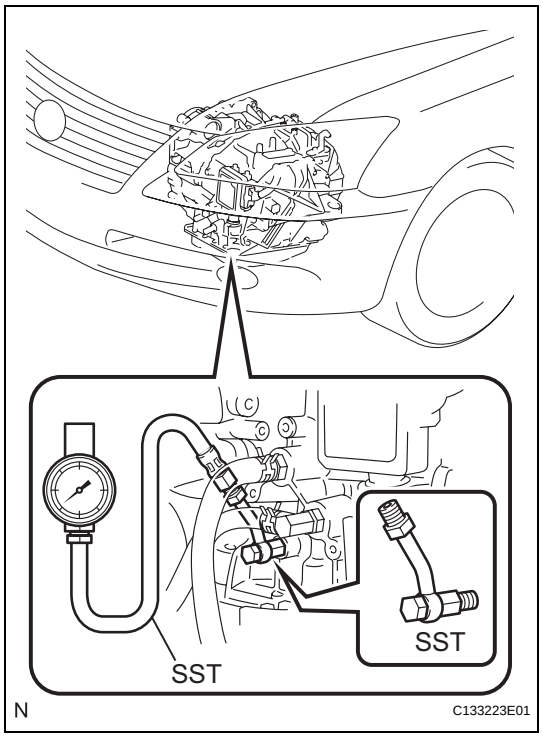
(6) In the same way, measure the time lag for N to R.

Time lag:

N to R less than 1.5 seconds

Evaluation (If N to D or N to R time lag is longer than the specified time):

Problem	Possible cause
N to D time lag is longer	• Line pressure is too low • Clutch No.1 (C_1) is worn • One-way clutch (F_1) is not operating properly
N to R time lag is longer	• Line pressure is too low • Brake No. 2 (B_2) is worn • Brake No. 3 (B_3) is worn



HYDRAULIC TEST

1. PERFORM HYDRAULIC TEST

(a) Measure the line pressure.

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.**
- **Be sure to prevent SST hose from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting engine.**
- **Perform the test with the A/C is OFF.**
- **When conducting stall test, do not continue more than 5 seconds.**

(1) Warm up the ATF (Automatic Transmission Fluid).

(2) Lift the vehicle up.

(3) Remove the engine under cover.

(4) Connect the intelligent tester to the DLC3.

(5) Remove the test plug on the transaxle case front left side and install the SST.

SST 09992-00095 (09992-00231, 09992-00271)

(6) Start the engine.

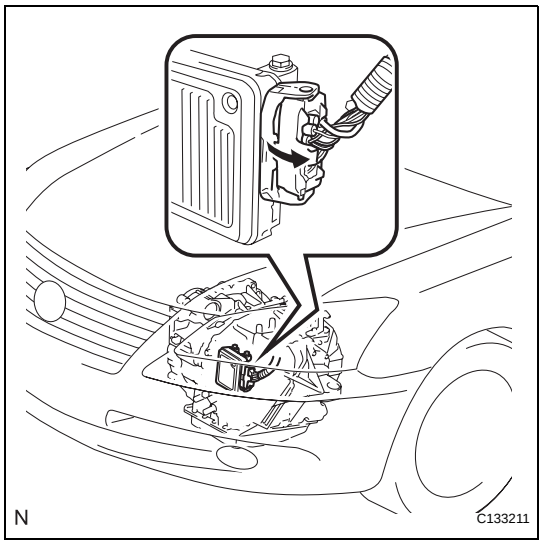
(7) Shift to the D position, and then use the intelligent tester to hold 3rd gear using active test. Measure the line pressure while the engine is idling.

Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)
Idling	362 to 412 kPa (3.7 to 4.2 kgf/cm^2, 52 to 60 psi)

(8) Turn the ignition switch OFF.

AX



(9) Disconnect the connector of the TCM.
HINT:
Disconnect the connector only when performing the D position stall test.
(10) Start the engine.
(11) Firmly depress the brake pedal, shift to the D position, depress the accelerator pedal all the way down, and check the line pressure while the stall test is performed.
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)
Stall test	1,160 to 1,350 kPa (11.8 to 13.8 kgf/cm^2, 168 to 196 psi)

(12) Turn the ignition switch OFF.
(13) Connect the TCM connector, depress the brake pedal firmly, shift to the R position, and check that the line pressure while the engine is idling and during the stall test.
Specified line pressure:

Condition	R position kPa (kgf/cm^2, psi)
Idling	806 to 916 kPa (8.2 to 9.3 kgf/cm^2, 117 to 133 psi)
Stall test	1,890 to 2,000 kPa (19.3 to 20.4 kgf/cm^2, 274 to 290 psi)

(14) Remove the SST, install the test plug.
(15) Clear the DTC.

Evaluation:

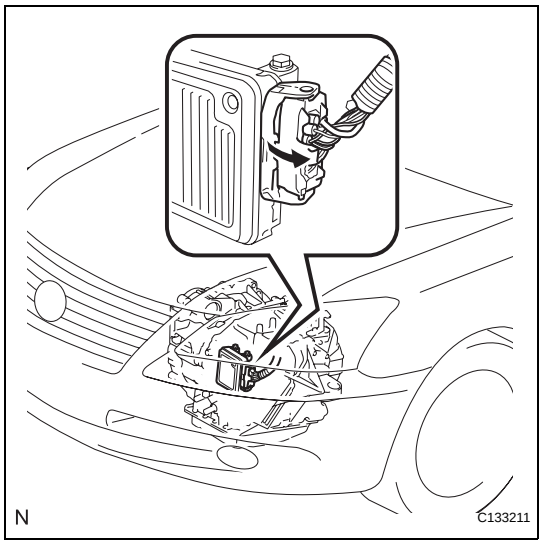
Problem	Possible cause
Measured values are higher than the specified value in all positions	• Shift solenoid valve (SLT) defective • Regulator valve defective
Measured values are lower than the specified value in all positions	• Shift solenoid valve (SLT) defective • Regulator valve defective • Oil pump defective
Pressure is low in the D position only	• D position circuit fluid leak • Clutch No. 1 (C_1) defective
Pressure is low in the R position only	• R position circuit fluid leak • Brake No. 2 (B_2) defective • Brake No. 3 (B_3) defective

MANUAL SHIFTING TEST

1. PERFORM MANUAL SHIFTING TEST

HINT:

- With this test, it can be determined whether trouble occurs in the electrical circuit. Also, trouble can be a mechanical problem in the transaxle.
- If any abnormalities are found in the following test, the problem is in the transaxle itself.



(a) Disconnect the TCM connector.

(b) Drive the vehicle with the TCM disconnected. Shifting the shift lever to the D position to check whether the shifting condition changes as shown in the table below.

Shift Position	Shifting Condition
D	No Shift (No Change)

HINT:

When driving the vehicle with the TCM disconnected, the gear position will be as follows:

- When the shift lever is in the D position, the transmission will stay in 3rd gear.
- When the shift lever is in the R or the P position, the transmission will also be in the R or P position respectively.

(c) Connect the connector of the TCM.

(d) Clear the DTC (See page AX-38).

AX

REGISTRATION

NOTICE:

- **When the automatic transaxle is replaced, the transaxle's compensation code must be input into the TCM (Proceed to step 1).**
- **When the TCM is replaced, the existing transaxle compensation codes must be input into the new TCM (Proceed to step 2).**

1. INPUT COMPENSATION CODE

NOTICE:

Transaxle compensation codes are unique, 60-digit alphanumeric values printed on the QR label. If an incorrect transaxle compensation code is input into the TCM, shift shock may occur.

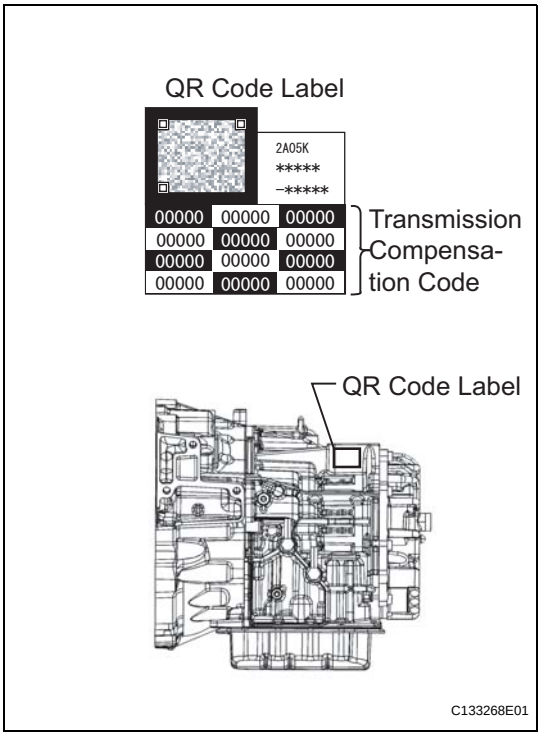
(a) Record the transmission compensation code specified on the QR label.
HINT:
The transaxle compensation code is imprinted on the QR label.

(b) Shift the shift lever to N or P position.

(c) Connect the intelligent tester to the DLC3.

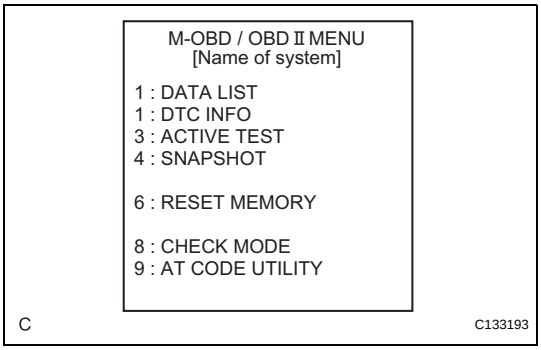
(d) Turn the ignition switch on (IG).

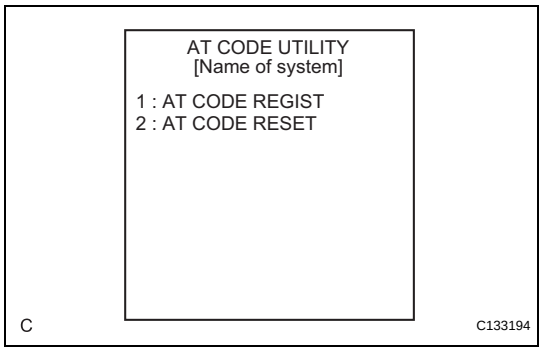
(e) Turn the tester on.
NOTICE:
Do not start the engine.



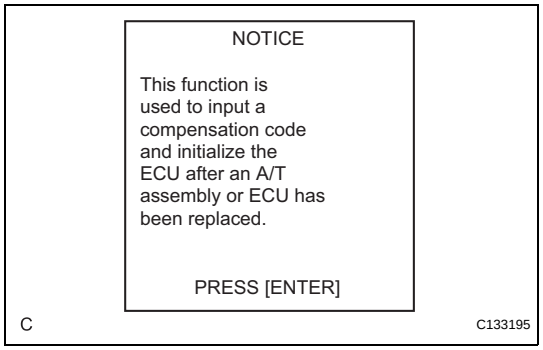
(f) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.

(g) Press "ENTER".

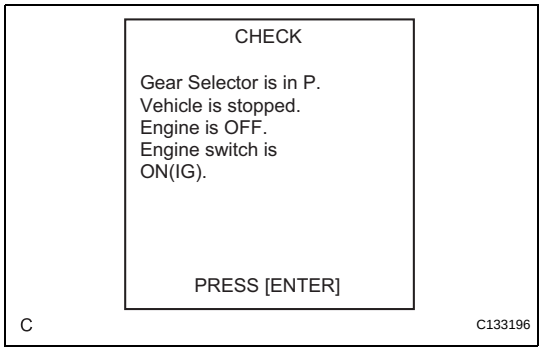




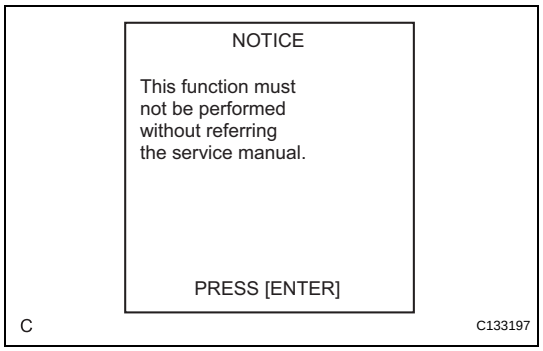
(h) Select "AT CODE REGIST".
(i) Press "ENTER".



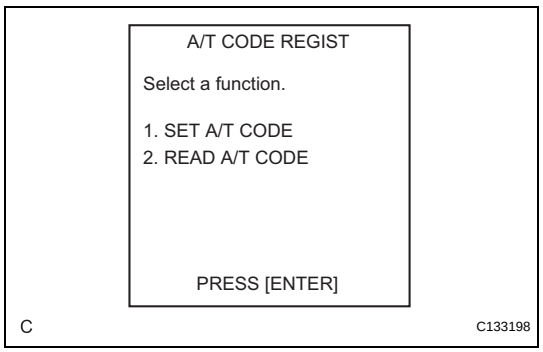
(j) Press "ENTER" again to proceed.



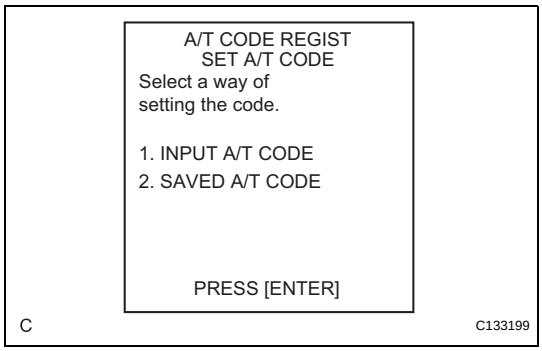
(k) Press "ENTER" again to proceed.



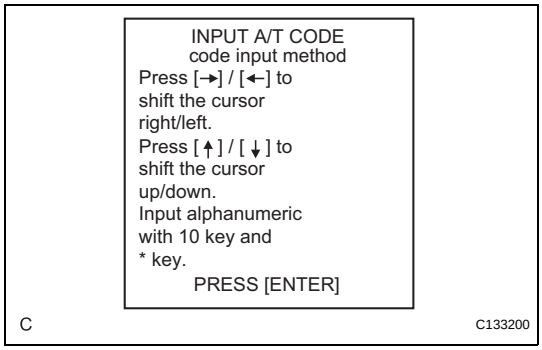
(l) Press "ENTER" again to proceed.



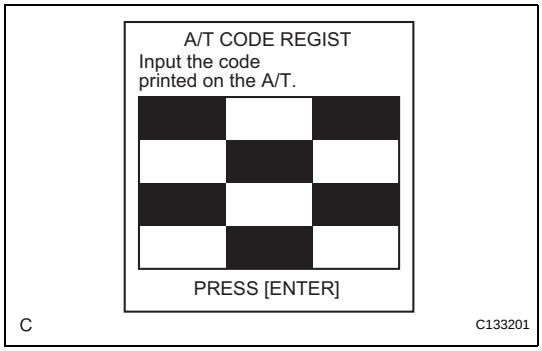
(m) Select "SET A/T CODE".
(n) Press "ENTER".



(o) Select "INPUT A/T CODE".
(p) Press "ENTER".

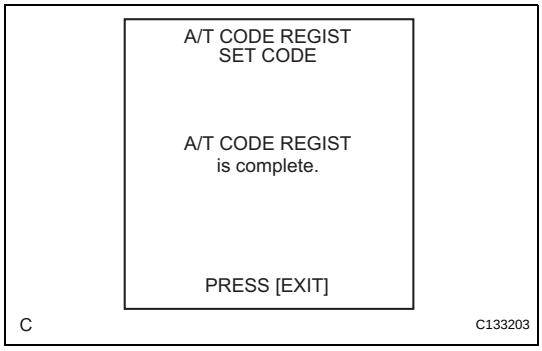


(q) Register the compensation code.
(1) Press "ENTER".



(2) Manually input the transaxle compensation code. The code is a 60-digit alphanumeric value imprinted on the QR label.

(r) Check that the compensation code displayed on the screen is correct by comparing it with the 60-digit alphanumeric value on the QR label.
NOTICE:
If an incorrect transaxle compensation code is input into the TCM, shift shock will occur.
HINT:
Input letters by operating the keys from 0 to 5 while pressing the * key.

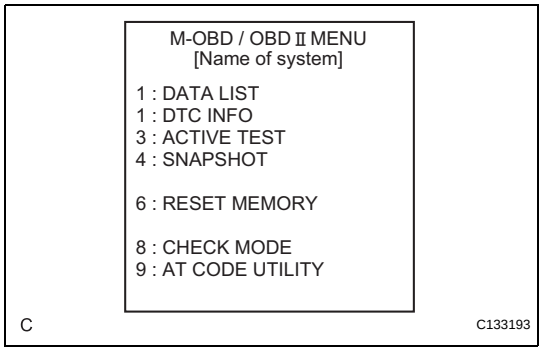


(s) Press "ENTER" to set the compensation code to the TCM.
HINT:
- If the registration process fails, the compensation code may be incorrect. Check the compensation code again.
- If the attempted compensation code is correct, a problem with the wire harness or a bad connection with the DLC3 may cause a registration failure. Check the wire harness and the DLC3 connection. If no problem is found, the TCM may be malfunctioning. Check the TCM and repeat this operation.

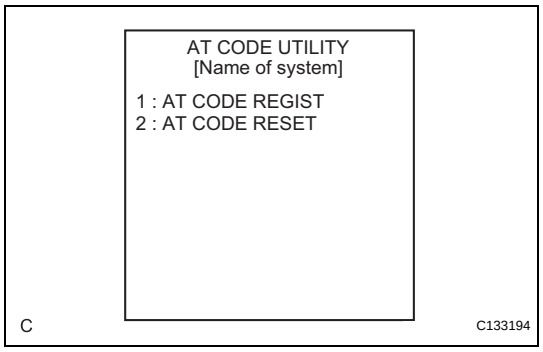
2. TRANSFER COMPENSATION CODE
NOTICE:
Transaxle compensation codes are 60-digit alphanumeric values imprinted on the QR label. If an incorrect transaxle compensation code is input into the TCM, shift shock may occur.

HINT:
The following operation is available for use with TCMs that can transmit the registered transaxle compensation code to the intelligent tester.

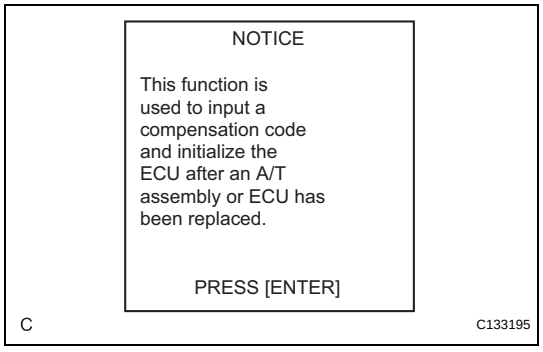
(a) Shift the shift lever to N or P position.
(b) Connect the intelligent tester to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Turn the tester on.
NOTICE:
Do not start the engine.
HINT:
The transaxle compensation code is imprinted on the QR label.



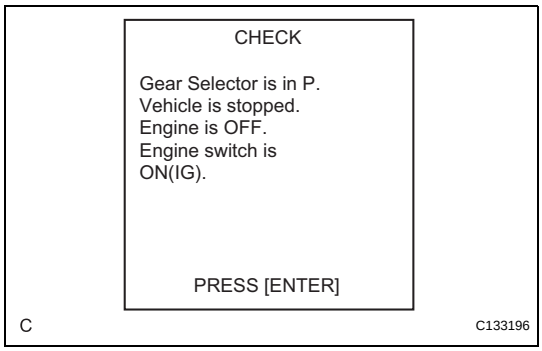
(e) Read the transaxle compensation code.
(1) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.
(2) Press "ENTER".



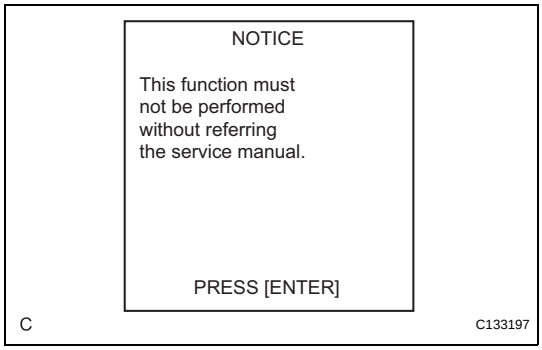
(3) Select "AT CODE REGIST".
(4) Press "ENTER".



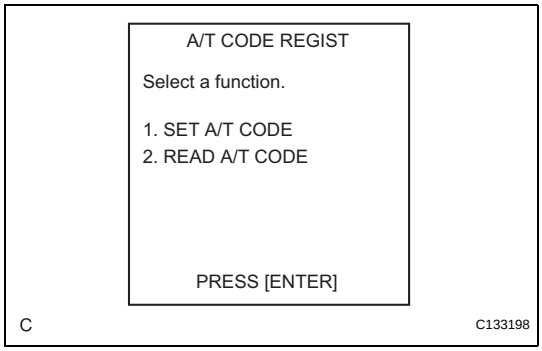
(5) Press "ENTER" again to proceed.



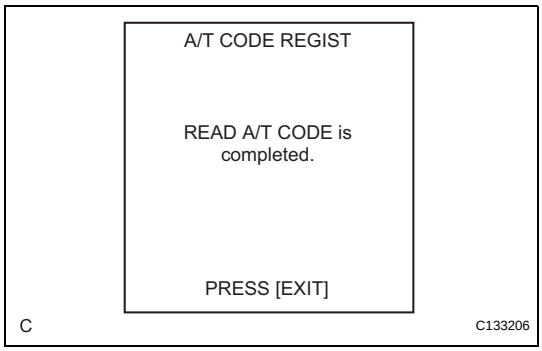
(6) Press "ENTER" again to proceed.



(7) Press "ENTER" again to proceed.



(8) Select "READ A/T CODE".
(9) Press "ENTER".



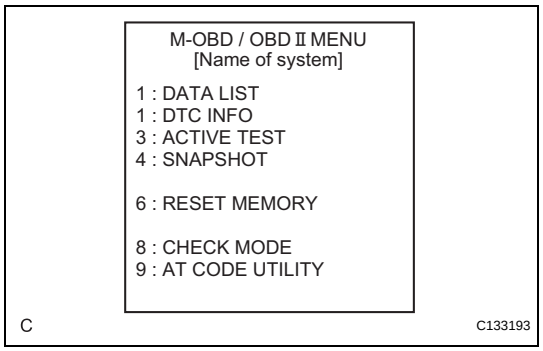
(10) Press "EXIT".

NOTICE:
Do not use the code specified on the transaxle QR label even if the transmission compensation code cannot be read using the intelligent tester. The code printed on an in-service transaxle may not match its current characteristics. Replace the TCM with a new one and perform a road test to allow the TCM to learn.

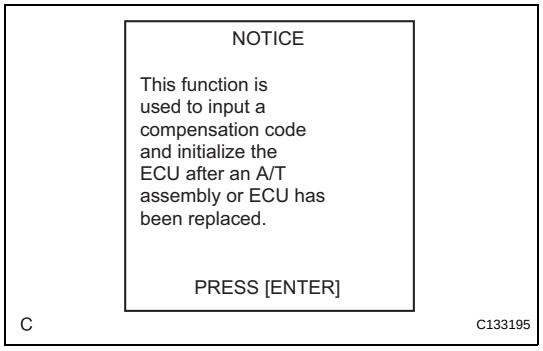
(11) Turn the ignition switch off.

(f) Replace the TCM.

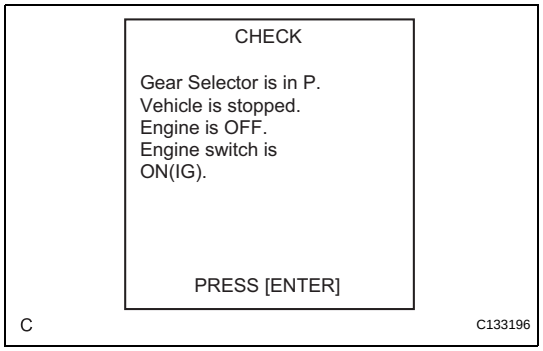
(g) Set the transaxle compensation code.
(1) Turn the ignition switch on (IG).
(2) Turn the tester on.



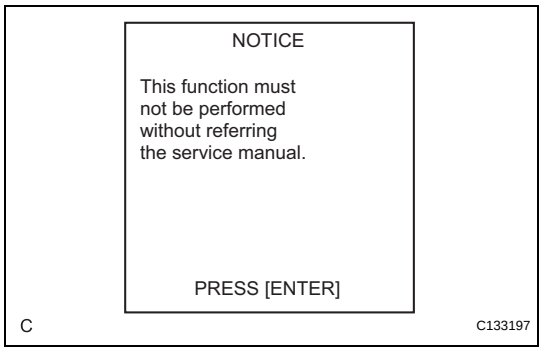
(3) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.
(4) Press "ENTER".



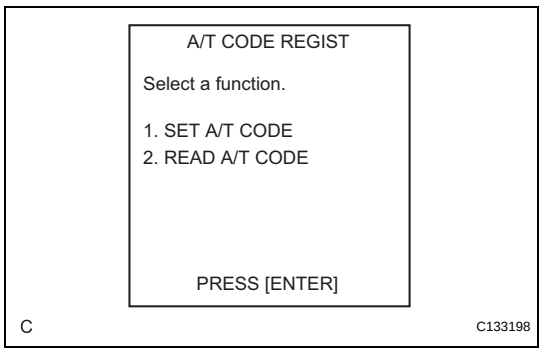
(5) Press "ENTER" again to proceed.



(6) Press "ENTER" again to proceed.

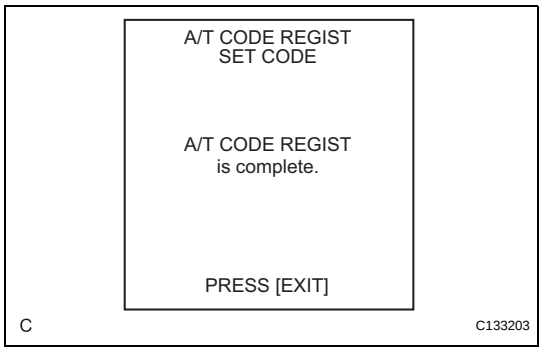


(7) Press "ENTER" again to proceed.

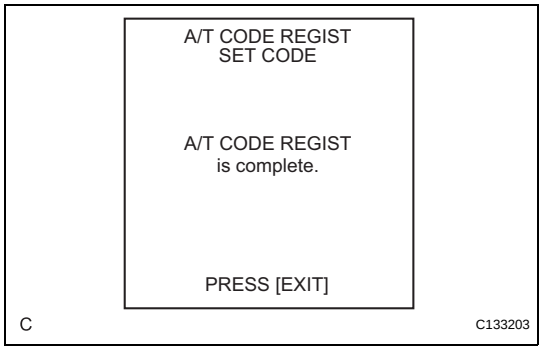


(8) Select "SET A/T CODE".
(9) Press "ENTER".

AX



(10) Select "SAVED A/T CODE".
(11) Press "ENTER".



(12) Press "EXIT".

INITIALIZATION

1. RESET TRANSAXLE COMPENSATION CODE

NOTICE:

The transaxle compensation code can be reset only with the intelligent tester.

HINT:

The TCM memorizes the condition that the ECT controls the automatic transaxle assembly and engine assembly according to those characteristics. Therefore, when the automatic transaxle assembly, engine assembly, or TCM has been replaced, it is necessary to reset the memory so that the TCM can memorize the new information. Reset procedure is as follows.

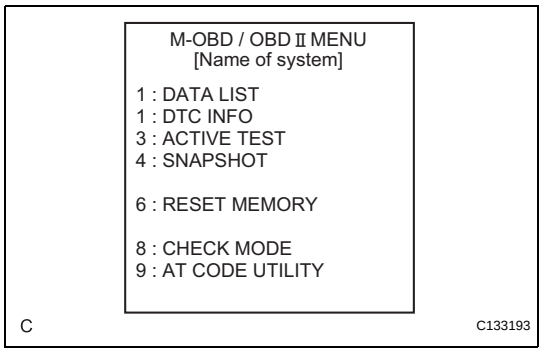
(a) Shift the shift lever to N or P position.

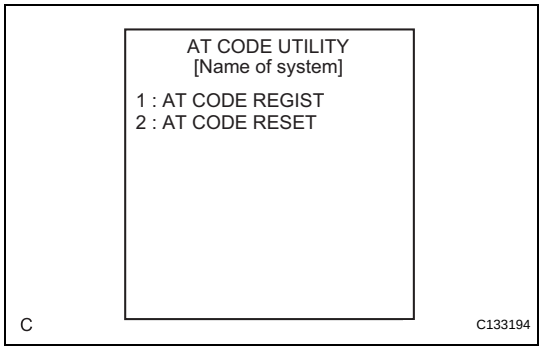
(b) Turn the ignition switch off.

(c) Connect the intelligent tester to the DLC3.

(d) Turn the ignition switch on (IG) and push the intelligent tester main switch on.

(e) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.





(f) Select "AT CODE RESET".

(g) Press the "ENTER"

CAUTION:

After the transaxle compensation code, be sure to perform a road test to allow TCM to learn.

2. PERFORM ROAD TEST TO ALLOW TCM TO LEARN

NOTICE:

Perform the following procedures while strictly observing all traffic laws and speed limits.

(a) From a standstill, achieve highest possible speed with the accelerator pedal opened 15% or less. Keep the accelerator pedal angle steady while driving the vehicle.

(b) Repeat the previous step until shift shock no longer occurs.

(c) From a standstill, achieve highest possible speed with the accelerator pedal opened 25% or more. Keep the accelerator pedal angle steady while driving the vehicle.

(d) Repeat the previous step until shift shock no longer occurs.

AX

3. RESET MEMORY

NOTICE:

- **Perform the RESET MEMORY (AT initialization) when replacing the engine assembly.**
- **The RESET MEMORY can be performed only with the intelligent tester.**

HINT:

The ECM memorizes the condition that the ECT controls the automatic transmission assembly and engine assembly according to those characteristics. Therefore, when the automatic transmission assembly, engine assembly, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

(a) Reset procedure is as follows.

(1) Turn the engine switch off.

(2) Connect the intelligent tester to the DLC3.

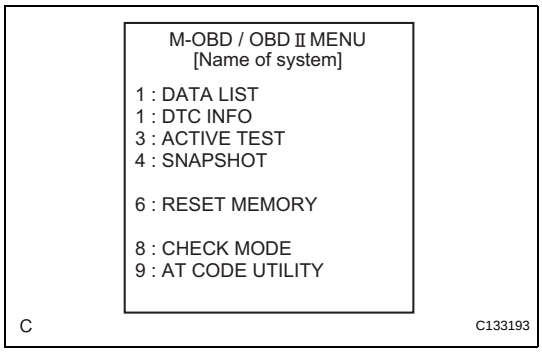
(3) Turn the ignition switch on (IG) position.

(4) Turn the intelligent tester main switch on.

(5) Select the item "DIAGNOSIS / OBD/MOBD / ECT / RESET MEMORY".

NOTICE:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (See page AX-12) described previously.



MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

(a) Perform this drive pattern as one method to simulate the detection conditions of the ECT malfunctions. (The DTCs may not be detected due to differences from the actual driving conditions. Some codes may not be detected using this drive pattern.)

HINT:

Preparation for driving

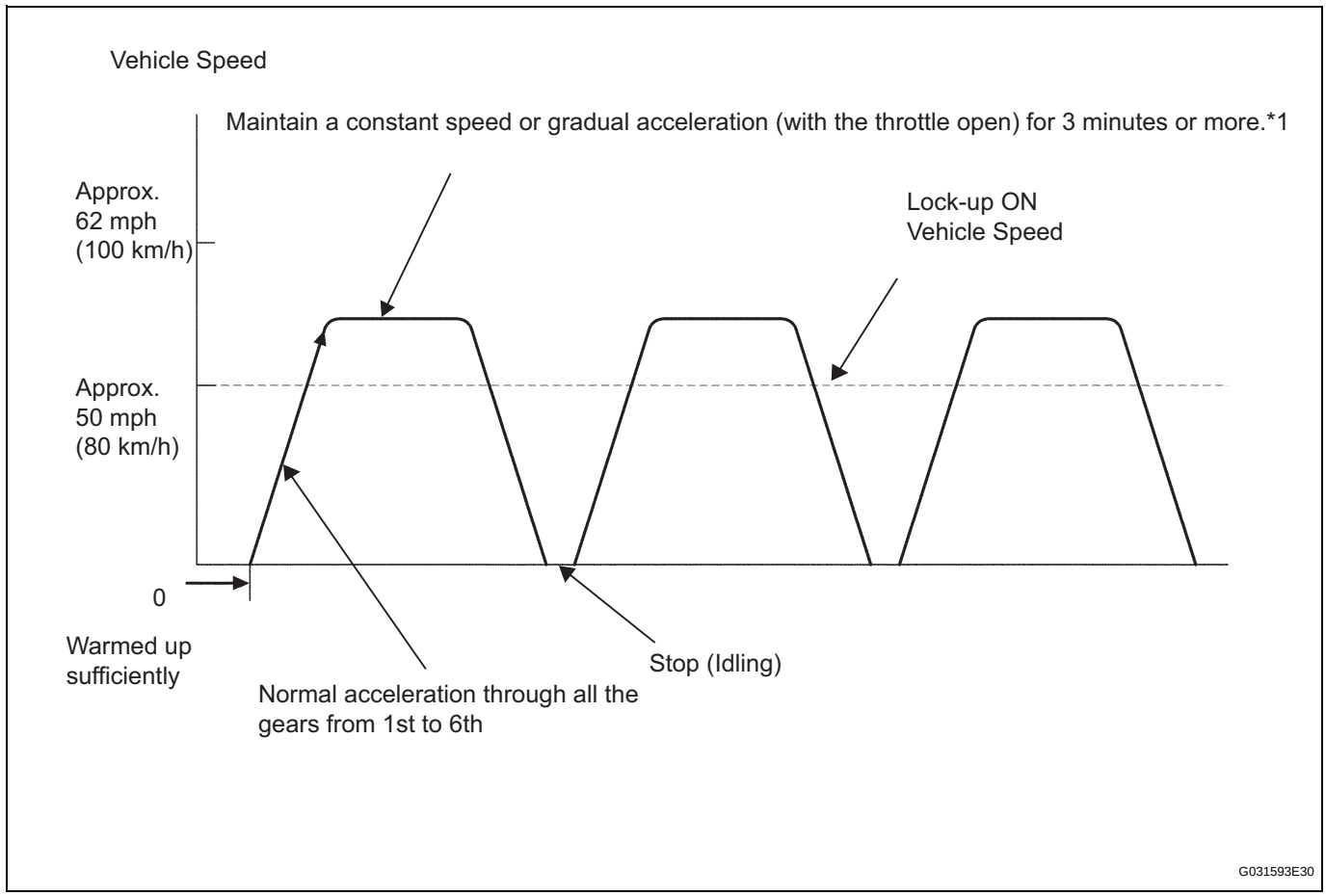
- Warm up the engine sufficiently. (Engine coolant temperature should be 60°C (140°F) or higher)
- Drive the vehicle when the atmospheric temperature is -10°C (14°F) or higher. (Malfunction may not be detected when the atmospheric temperature is less than -10°C (14°F))

Notice on driving

- Drive the vehicle through all gears.
  Stop to 1st to 2nd to 3rd to 4th to 5th to 6th (lock-up ON).
- Confirm engine braking using the S position.
  While driving in the 6 (S) position and 6th gear lock-up, shift to the "-" position to down-shift from 6th to 5th, 5th to 4th, 4th to 3rd, 3rd to 2nd, 2nd to 1st.
  Check that proper engine braking occurs whenever down-shift takes place.
- Repeat the above driving pattern three times or more.

NOTICE:

- **The monitor status can be checked using the intelligent tester. When using the intelligent tester, monitor status can be found in "OBD/ MOBD / ECT / DATA LIST".**
- **In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.**
- **Perform this drive pattern on a road with the fewest hills possible and strictly observe the posted speed limits and traffic laws while driving.**



HINT:
*1: Drive the vehicle at a sufficient speed in the uppermost gear, to allow lock-up to engage. The vehicle can be driven at a speed lower than that in the above diagram under the lock-up condition.
NOTICE:
It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

PROBLEM SYMPTOMS TABLE

HINT:
If a normal code is displayed during the diagnostic trouble code check although the problem or symptom still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages. Proceed to the page given in the chart and perform troubleshooting.
The Matrix Chart is divided into 2 chapters.
Chapter 1:
Refer to the table below when the trouble cause is considered to be electrical.
If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart of each circuit, proceed to the circuit with the next highest number in the table to continue the check.
If the trouble still occurs even though there are no abnormalities in any of the other circuits, check and replace the TCM.
Chapter 2:
Chapter 2 covers on and off vehicle repair of the transaxle. Contents specified in the table below may not match while fail-safe control is operating.

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected area	See page
No up-shift (1st to 2nd)	1. Shift solenoid valve (SL3) circuit *1	AX-105
	2. TCM	IN-40
No up-shift (2nd to 3rd)	1. Shift solenoid valve (SL4) circuit *1	AX-148
	2. TCM	IN-40
No up-shift (3rd to 4th)	1. Shift solenoid valve (SL2) circuit *1	AX-92
	2. Engine coolant temp. sensor circuit *1	ES-145
	3. TCM	IN-40
No up-shift (4th to 5th)	1. Shift solenoid valve (SL1) circuit *1	AX-84
	2. Shift solenoid valve (SL4) circuit *1	AX-148
	3. Engine coolant temp. sensor circuit	ES-145
	4. TCM	IN-40
No up-shift (5th to 6th)	1. Engine coolant temp. sensor circuit *1	ES-145
	2. Shift solenoid valve (SL3) circuit *1	AX-105
	3. Shift solenoid valve (SL4) circuit *1	AX-148
	4. TCM	IN-40
No down-shift (6th to 5th)	1. Shift solenoid valve (SL4) circuit *1	AX-148
	2. TCM	IN-40
No down-shift (5th to 4th)	1. Shift solenoid valve (SL1) circuit *1	AX-84
	2. TCM	IN-40
No down-shift (4th to 3rd)	1. Shift solenoid valve (SL2) circuit *1	AX-92
	2. Shift solenoid valve (SL4) circuit *1	AX-148
	3. TCM	IN-40
No down-shift (3rd to 2nd)	1. Shift solenoid valve (SL4) circuit *1	AX-148
	2. Shift solenoid valve (SL3) circuit *1	AX-105
	3. TCM	IN-40
No down-shift (2nd to 1st)	1. Shift solenoid valve (SL3) circuit *1	AX-100
	2. TCM	IN-40

Symptom	Suspected area	See page
No lock-up	1. Shift solenoid valve (SLU) circuit *1	AX-136
	2. Shift solenoid valve (SL) circuit	AX-139
	3. Engine coolant temp. sensor circuit *1	ES-145
	4. Stop light switch circuit *1	AX-71
	5. Speed sensor NT circuit *1	AX-66
	6. TCM	IN-40
No lock-up off	1. TCM	IN-40
Shift point too high or too low	1. Shift solenoid valve (SLT) circuit *1	AX-128
	2. Speed sensor NT circuit *1	AX-66
	3. Speed sensor NC circuit *1	AX-95
	4. Accelerator pedal position sensor circuit *1	ES-334
	5. ATF temperature sensor circuit *1	AX-55
	6. TCM	IN-40
Up-shift from 3rd to 4th while engine is cold	1. Engine coolant temp. sensor circuit *1	ES-145
	2. TCM	IN-40
Up-shift from 4th to 5th while engine is cold	1. Engine coolant temp. sensor circuit *1	ES-145
	2. TCM	IN-40
No gear change by shifting into "+" or "-" while shifting the lever	1. Transmission control switch circuit	AX-154
	2. TCM	IN-40
Harsh engagement (N to D)	1. Shift solenoid valve (SL1) circuit *1	AX-84
	2. TCM	IN-40
Harsh engagement (Lock-up)	1. Speed sensor NT circuit *1	AX-66
	2. Speed sensor NC circuit *1	AX-95
	3. Shift solenoid valve (SLU) circuit *1	AX-136
	4. TCM	IN-40
Harsh engagement (Any driving position)	1. Accelerator pedal position sensor circuit *1	ES-334
	2. Shift solenoid valve (SLT) circuit *1	AX-128
	3. Speed sensor NC circuit	AX-95
	4. Speed sensor NT circuit *1	AX-66
	5. TCM	IN-40
Poor acceleration	1. Shift solenoid valve (SLT) circuit *1	AX-128
	2. TCM	IN-40
No engine brake	1. TCM	IN-40
No kick-down	1. TCM	IN-40
Engine stalls when starting off or stopping	1. TCM	IN-40
Malfunction in shifting	1. Park/neutral position switch circuit *1	AX-158
	2. Transmission control switch circuit	AX-154
	3. TCM	IN-40
Slip or shudder (5th to 6th and 6th to 5th)	1. Shift solenoid valve (SLT) circuit *1	AX-128
Initial acceleration or subsequent acceleration is improper. Vehicle is stuck in a gear (1st to 6th).	1. Shift solenoid valve (SL1) circuit	AX-84
	2. Shift solenoid valve (SLT) circuit	AX-128
	3. TCM	IN-40
Acceleration is improper when the gear is 4th or higher.	1. Shift solenoid valve (SL2) circuit	AX-92
	2. Shift solenoid valve (SLT) circuit	AX-128
	3. TCM	IN-40
Initial acceleration or subsequent acceleration is improper. Vehicle does not shift down (from 4th to 3rd). Vehicle is stuck in a gear (1st to 4th).	1. Shift solenoid valve (SL2) circuit	AX-92
	2. TCM	IN-40
Acceleration is improper when the gear is 6th.	1. Shift solenoid valve (SL3) circuit	AX-105
	2. TCM	IN-40

Symptom	Suspected area	See page
Acceleration is improper when the gear is 3rd or 5th.	1. Shift solenoid valve (SL4) circuit	AX-148
	2. Shift solenoid valve (SLT) circuit	AX-128
	3. TCM	IN-40
Initial acceleration or subsequent acceleration is improper. Vehicle does not shift down (from 3rd to 2nd). No up-shift (5th to 6th).	1. Shift solenoid valve (SL4) circuit	AX-148
	2. TCM	IN-40

AX

HINT:
*1: When the circuit is defective, a DTC may be output.

2. Chapter 2: On-Vehicle Repair and Off-Vehicle Repair

Symptom	Suspected area	See page
Vehicle does not move in any forward and reverse positions.	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239
Vehicle does not move in R position.	1. Valve body assembly	AX-181
	2. Brake No. 2 (B2)	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
No up-shift (1st to 2nd)	1. Valve body assembly	AX-181
	2. Brake No. 1 (B1)	AX-274
	3. Shift solenoid valve (SL3)*1	AX-100
No up-shift (2nd to 3rd)	1. Valve body assembly	AX-181
	2. Brake No. 3 (B3)	AX-274
	3. Shift solenoid valve (SL4)*1	AX-142
No up-shift (3rd to 4th)	1. Valve body assembly	AX-181
	2. Clutch No. 2 (C2)	AX-274
	3. Shift solenoid valve (SL2)*1	AX-87
No up-shift (4th to 5th)	1. Valve body assembly	AX-181
	2. Brake No. 3 (B3)	AX-274
	3. Shift solenoid valve (SL3)*1	AX-100
No up-shift (5th to 6th)	1.Valve body assembly	AX-181
	2. Brake No. 1 (B1)	AX-274
	3. Shift solenoid valve (SL3)*1	AX-100
No down-shift (6th to 5th)	1. Brake No. 3 (B3)	AX-274
	2. Shift solenid valve (SL4)*1	AX-142
	3. Valve body assembly	AX-181
No down-shift (5th to 4th)	1. Shift solenoid valve (SL1)*1	AX-79
	2. Clutch No. 1 (C1)	AX-274
	3. Valve body assembly	AX-181
No down-shift (4th to 3rd)	1. Brake No. 3 (B3)	AX-274
	2. Shift solenid valve (SL4)*1	AX-142
	3. Valve body assembly	AX-181
No down-shift (3rd to 2nd)	1. Brake No. 1 (B1)	AX-274
	2. Shift solenid valve (SL3)*1	AX-100
	3. Valve body assembly	AX-181
No down-shift (2nd to 1st)	1. Valve body assembly	AX-181
No lock-up or No lock-up off	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239

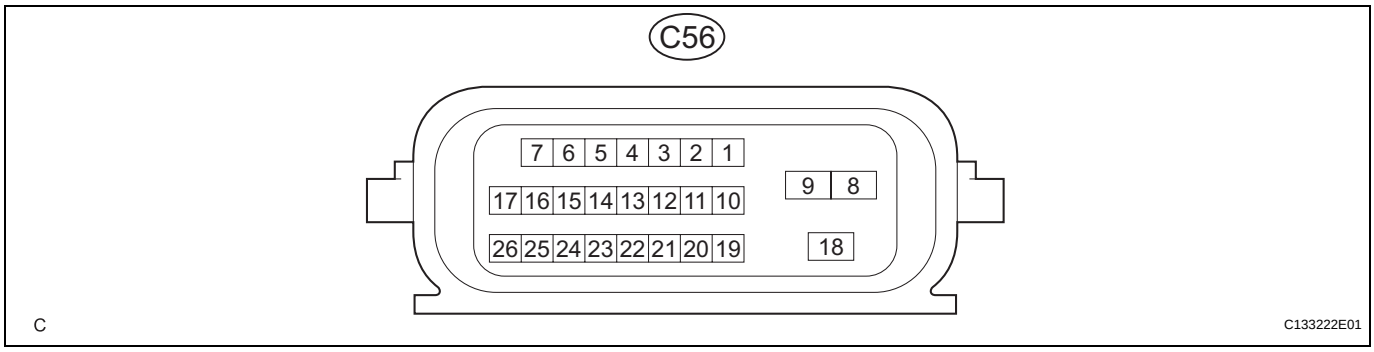
Symptom	Suspected area	See page
Harsh engagement (N to D)	1. Valve body assembly	AX-181
	2. C1 accumulator	AX-274
	3. One-way clutch No. 1 (F1)	AX-274
	4. Clutch No. 1 (C1)	AX-274
	5. Shift solenoid valve (SL1)*1	AX-79
Harsh engagement (Lock-up)	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239
	3. Shift solenoid valve (SLU)*1	AX-131
Harsh engagement (N to R)	1. Valve body assembly	AX-181
	2. Brake No. 2 (B2)	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Harsh engagement (1 to 2 to 3 to 4 to 5 to 6)	1. Valve body assembly	AX-181
	2. Shift solenoid valve (SLT)*1	AX-121
Harsh engagement (1st to 2nd)	1. Valve body assembly	AX-181
	2. B1 accumulator	AX-274
	3. Brake No. 1 (B1)	AX-274
	4. Shift solenoid valve (SL3)*1	AX-100
Harsh engagement (2nd to 3rd)	1. Valve body assembly	AX-181
	2. B3 accumulator	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Harsh engagement (3rd to 4th)	1. Valve body assembly	AX-181
	2. C2 accumulator	AX-274
	3. Clutch No. 2 (C2)	AX-274
	4. Shift solenoid valve (SL2)*1	AX-87
Harsh engagement (4th to 5th)	1. Valve body assembly	AX-181
	2. B3 accumulator	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Harsh engagement (5th to 6th)	1. Valve body assembly	AX-181
	2. B1 accumulator	AX-274
	3. Brake No. 1 (B1)	AX-274
	4. Shift solenoid valve (SL3)*1	AX-100
Harsh engagement (6th to 5th)	1. Valve body assembly	AX-181
	2. B3 accumulator	AX-274
	3. Brake No. 3 (B3)	AX-274
	4. Shift solenoid valve (SL4)*1	AX-142
Slip or shudder (Forward and reverse: After warm-up)	1. Valve body assembly	AX-181
	2. Oil strainer	-
	3. Brake No. 1 (B1)	AX-274
	4. Brake No. 2 (B2)	AX-274
	5. Brake No. 3 (B3)	AX-274
	6. One-way clutch No. 1 (F1)	AX-274
	7. Clutch No. 1 (C1)	AX-274
	8. Clutch No. 2 (C2)	AX-274
Slip or shudder (Particular position: just after engine starts)	1. Torque converter clutch	AX-239
Slip or shudder (R position)	1. Brake No. 2 (B2)	AX-274
	2. Brake No. 3 (B3)	AX-274

Symptom	Suspected area	See page
Slip or shudder (1 position)	1. One-way clutch No. 1 (F1)	AX-274
	2. Clutch No. 1 (C1)	AX-274
Slip or shudder (2 position)	1. Brake No. 1 (B1)	AX-274
	2. Clutch No. 1 (C1)	AX-274
Slip or shudder (3 position)	1. Brake No. 3 (B3)	AX-274
	2. Clutch No. 1 (C1)	AX-274
Slip or shudder (4 position)	1. Clutch No. 1 (C1)	AX-274
	2. Clutch No. 2 (C2)	AX-274
Slip or shudder (5 position)	1. Brake No. 3 (B3)	AX-274
	2. Clutch No. 2 (C2)	AX-274
Slip or shudder (6 position)	1. Brake No. 3 (B3)	AX-274
	2. Clutch No. 2 (C2)	AX-274
No engine braking (1st position)	1. Valve body assembly	AX-181
	2. Brake No. 2 (B2)	AX-274
No engine braking (2nd position)	1. Valve body assembly	AX-181
	2. Brake No. 1 (B1)	AX-274
No engine braking (3rd position)	1. Valve body assembly	AX-181
	2. Brake No. 3 (B3)	AX-274
No engine braking (4th position)	1. Valve body assembly	AX-181
	2. Clutch No. 2 (C2)	AX-274
No kick-down	1. Valve body assembly	AX-181
Shift point too hight or too low	1. Valve body assembly	AX-181
Poor acceleration (All positions)	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239
Poor acceleration (6th)	1. Brake No. 1 (B1)	AX-274
	2. Clutch No. 2 (C2)	AX-274
Engine stalls when starting off or stopping	1. Valve body assembly	AX-181
	2. Torque converter clutch	AX-239

HINT:
*1: When the circuit is defective, a DTC may be output.

TERMINALS OF ECU

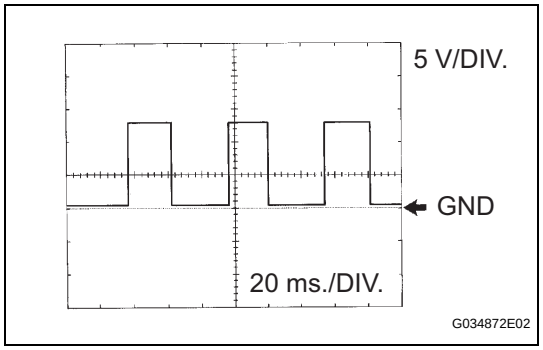
1. TCM



HINT:
Each TCM terminal's standard voltage is shown in the table below.
In the table, first follow the information under "Condition". Look under "Symbols (Terminals No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".
Use the illustration above as a reference for the TCM terminals.

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
R (C56-15) - E1 (C56-8)	W - B-W	R shift position switch signal	IG switch ON (IG) and shift lever in R position	10 to 14 V
			IG switch ON (IG) and shift lever in any position except R position	Below 1 V
D (C56-16) - E1 (C56-8)	R - B-W	D shift position switch signal	IG switch ON (IG) and shift lever in D or 3 position	10 to 14 V
			IG switch ON (IG) and shift lever in any position except D and 3 position	Below 1 V
STP (C56-12) - E1 (C56-8)	B - B-W	Stop light switch signal	Brake pedal is depressed	7.5 to 14 V
			Brake pedal is released	Below 1.5 V
NSW (C56-11) - E1 (C56-8)	L - B-W	Park/neutral switch signal	IG switch ON (IG) and shift lever in P or N position	Below 2 V
			IG switch ON (IG) and shift lever in any position except P or N position	10 to 14 V
STA (C56-10) - E1 (C56-8)	Y - B-W	Starter signal	Cranking (shift lever position in P or N position, ignition switch START)	10 to 14 V
			IG switch ON (IG) and shift lever in any position except P or N position	Below 2 V
SPD1 (C56-3) - E1 (C56-8)	BR - B-W	Speed signal from combination meter	Vehicle speed 12 mph (20 km/h)	Pulse generation (See waveform 1)
BATT (C56-1) - E1 (C56-8)	W-L - B-W	Battery (for measuring battery voltage and for TCM memory)	Always	9 to 14 V
IG2 (C56-13) - E1 (C56-8)	L-B - B-W	Ignition switch	Ignition switch ON (IG)	9 to 14 V
+B (C56-18) - E1 (C56-8)	W-L - B-W	Power source of TCM	Ignition switch ON (IG)	9 to 14 V
CAN+ (C56-6) - E1 (C56-8)	B - B-W	CAN communication line	Ignition switch ON (IG)	Pulse generation (See waveform 2)

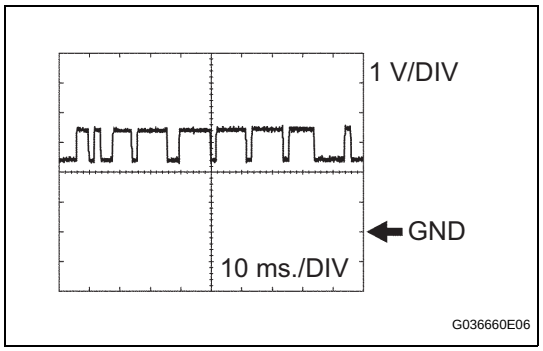
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CAN- (C56-7) - E1 (C56-8)	Y - B-W	CAN communication line	Ignition switch ON (IG)	Pulse generation (See waveform 3)



(a) Waveform 1

Reference:

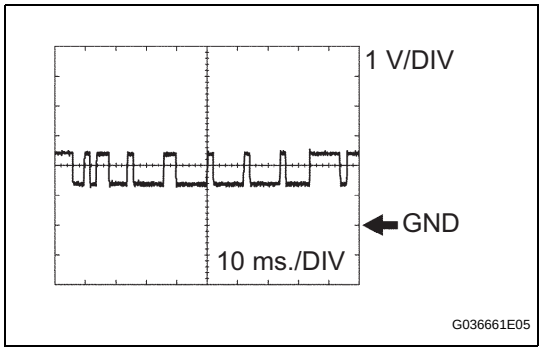
Terminal	SPD1 - E1
Tool setting	2 V/DIV., 20 ms./DIV.
Vehicle condition	Vehicle speed 12 mph (20 km/h)



(b) Waveform 2

Reference:

Terminal	CAN+ - E1
Tool setting	1 V/DIV., 10 ms./DIV.
Vehicle condition	Engine is stopped, ignition ON (IG)



(c) Waveform 3

Reference:

Terminal	CAN- - E1
Tool setting	1 V/DIV., 10 ms./DIV.
Vehicle condition	Engine is stopped, ignition ON (IG)

2. ECM

HINT:

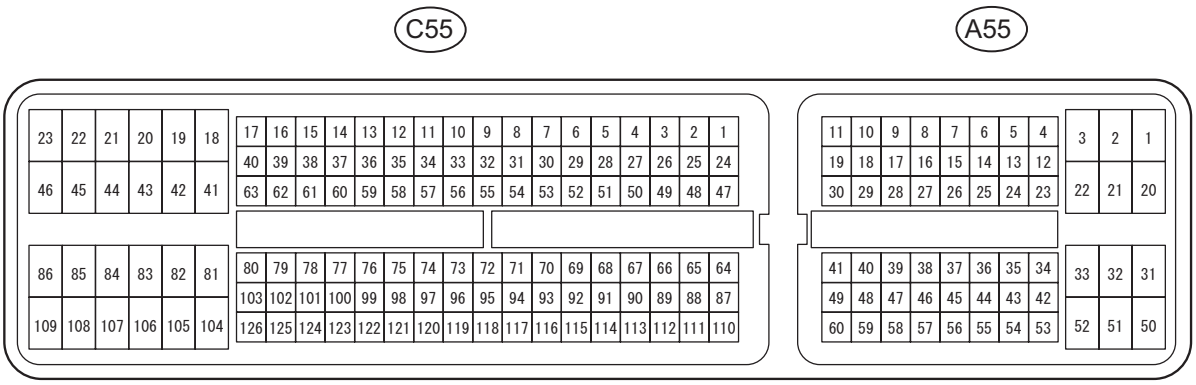
Each ECM terminal's standard voltage is shown in the table below.

In the table, first follow the information under "Condition". Look under "Symbols (Terminals No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".

Use the illustration below as a reference for the ECM terminals.

AX

ECM:



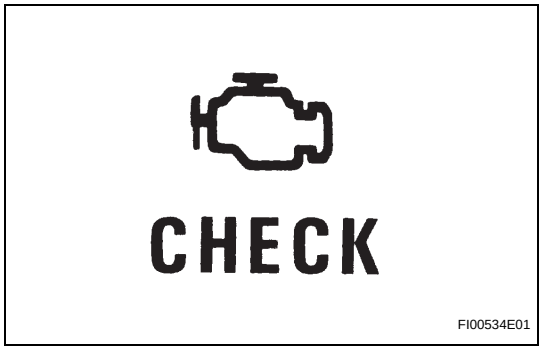
A107881E27

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
S (A55-25) - E1 (C55-81)	Y - W-B	S shift position switch signal	IG switch ON (IG) and shift lever in S position	10 to 14 V
			IG switch ON (IG) and shift lever in any position except S position	Below 1 V
SFTU (A55-16) - E1 (C55-81)	R - W-B	Up shift switch signal	IG switch ON (IG) and shift lever in S position	10 to 14 V
			IG switch ON (IG) and shift lever in "+" position (Up shift)	Below 1 V
SFTD (A55-51) - E1 (C55-81)	L - W-B	Down shift switch signal	IG switch ON (IG) and shift lever in S position	10 to 14 V
			IG switch ON (IG) and shift lever in "-" position (Down shift)	Below 1 V

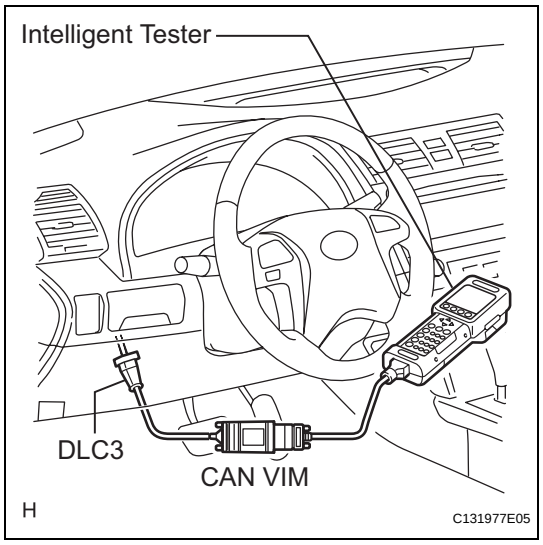
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle's TCM can be read then.



(b) OBD II regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:
(1) The emission control system/components
(2) The power train control components (which affect vehicle emissions)
(3) The computer
In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the TCM memory.
If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the TCM memory.



(c) To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester displays DTCs, the freeze frame data and a variety of the engine data.
The DTCs and freeze frame data can be erased with the intelligent tester (See page AX-38).

2. NORMAL MODE AND CHECK MODE

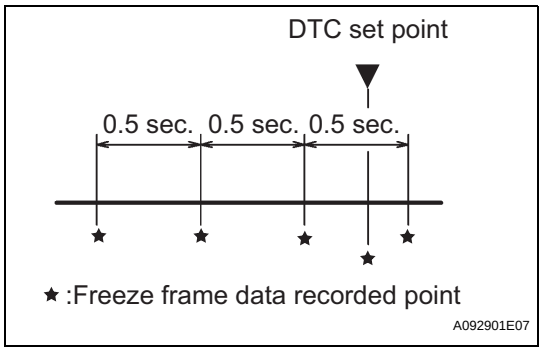
(a) The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1 trip detection logic" is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions.

3. 2 TRIP DETECTION LOGIC

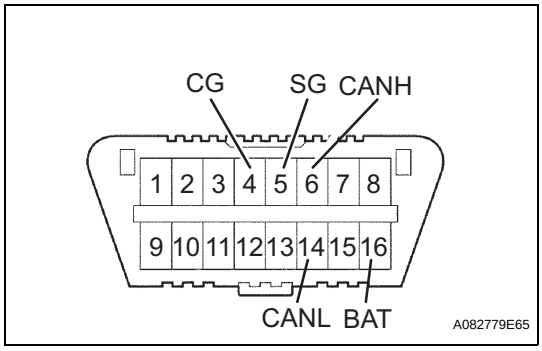
(a) When a malfunction is first detected, the malfunction is temporarily stored in the TCM memory (1st trip). If the ignition switch is turned off and then on (IG) again, and the same malfunction is detected again, the MIL will illuminate.

4. FREEZE FRAME DATA

(a) The TCM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.



(b) The intelligent tester displays freeze frame data recorded at five different points: 1) 3 points before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. The data can be used to simulate the vehicle's condition around the time of the malfunction. The data may be helpful in determining the cause of a malfunction. It may also be helpful in determining whether a DTC is being caused by a temporary malfunction.



5. DLC3 (Data Link Connector 3)

(a) The vehicle's TCM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.
HINT:
Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or the tester side.
If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 kΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 kΩ or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or higher

NOTICE:
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the doors.**

6. CHECK BATTERY VOLTAGE

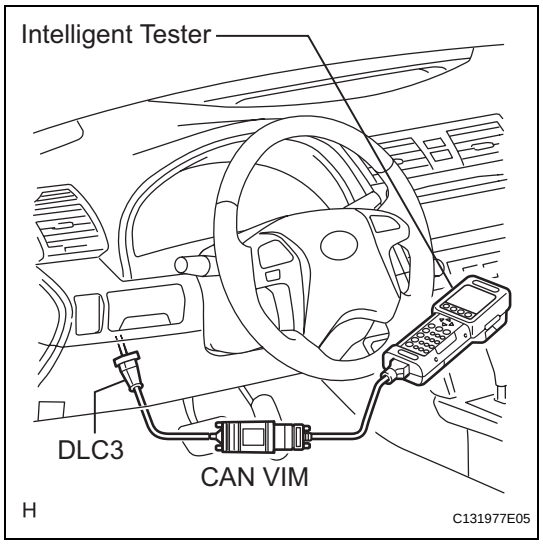
Battery voltage:
11 to 14 V

(a) If the voltage is below 11 V, replace or recharge the battery before proceeding.

7. CHECK MIL

(a) Check that the MIL illuminates when turning the ignition switch on (IG).
If the MIL does not illuminate, there is a problem in the MIL circuit (See page ES-471).

(b) When the engine is started, the MIL should turn off.



DTC CHECK / CLEAR

1. CHECK DTC

(a) DTCs which are stored in the TCM can be displayed with the intelligent tester.
These scan tools can display pending DTCs and current DTCs. Some DTCs are not stored if the TCM doesn't detect a malfunction during consecutive driving. However, the malfunction detected while a driving is stored as a pending DTC.

(1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).

(2) Turn the ignition switch on (IG).

(3) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ECT / DTC INFO / CURRENT CODES (or PENDING CODE).

(4) Confirm the DTCs and freeze frame data and then write them down.

(5) Confirm the details of the DTCs (See page AX-46).

NOTICE:

When a symptom has been duplicated using normal mode, use the intelligent tester to check for DTCs. For DTCs that are subject to "2-trip detection logic", perform the following steps:

Turn the ignition switch OFF after the symptom has occurred once. Repeat the process of attempting to duplicate the symptom. When the problem or symptom happens for the second time and a DTC has been recorded, the MIL will illuminate, and the code will be stored.

2. CLEAR DTC

(a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ECT / DTC INFO / CLEAR CODES and press YES.

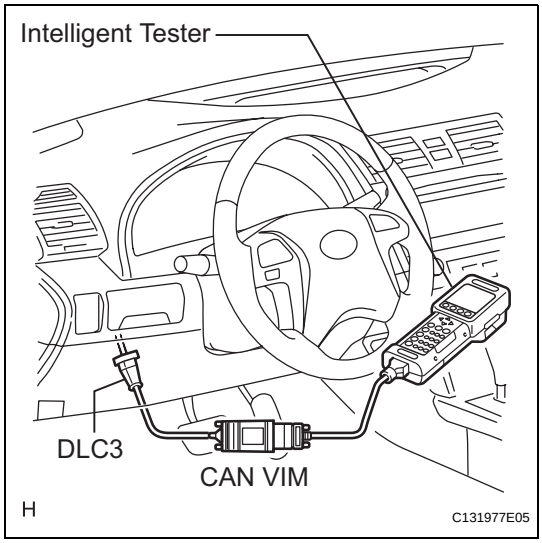
AX

CHECK MODE PROCEDURE

1. DESCRIPTION

(a) Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are detected with 1-trip detection logic.

2. CHECK MODE PROCEDURE



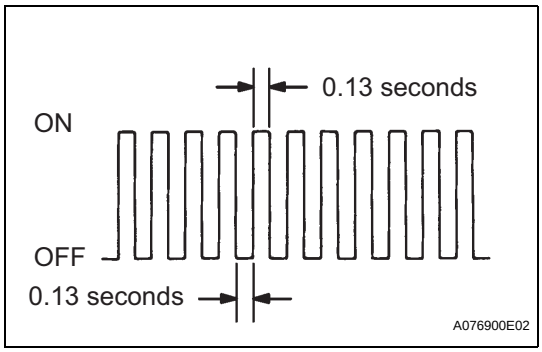
(a) Make sure that the items below are satisfied:
  (1) Battery positive voltage is 11 V or more
  (2) Throttle valve is fully closed
  (3) Transaxle is in the P or N position
  (4) A/C is switched OFF

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the Controller Area Network Vehicle Interface Module (CAN VIM) to the DLC3.

(d) Turn the ignition switch on (IG).

(e) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ECT / CHECK MODE.



(f) Change the TCM to check mode. Make sure that the MIL flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester is used to change the TCM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from on (IG) to on (ACC) or off.

Before entering check mode, make notes of any DTCs and freeze frame data that are present.

(g) Start the engine. The MIL should turn off after the engine starts.

(h) Perform "MONITOR DRIVE PATTERN" for the ECT test (See page AX-27).
(Or, duplicate the conditions of the malfunction described by the customer).

(i) After duplicating the malfunction conditions, use the intelligent tester diagnosis selector to check the DTC and freeze frame data.

FAIL-SAFE CHART

1. Fail-safe

This function minimizes the loss of operation when any abnormality occurs in a sensor or solenoid.

Fail-safe Control List

Malfunction Part	Function
Input Turbine Speed Sensor	Shifting to only either the 1st or 3rd gears is allowed.
Counter Gear Speed Sensor	• The counter gear speed is determined based on the signals from the skid control ECU (speed sensor signals). • Shifting between 1st to 4th gears is allowed.
ATF Temp. Sensor	Shifting between 1st to 4th gears is allowed.
ECT ECU Power Supply (Voltage is Low)	When the vehicle is being driven in 6th gear, the transaxle is fixed in 6th gear. When being driven in any of the 1st to 5th gears, the transaxle is fixed in 5th gear.
CAN communication	Shifting to only either 1st or 3rd gears is allowed.
Knock Sensor	Shifting between 1st to 4th gears is allowed.
Solenoid Valve SL1, SL2, SL3 and SL4	The current to the failed solenoid valve is cut off and operating the other solenoid valves with normal operation performs shift control. (Shift controls in fail-safe mode are described in the table on the next page. For details, refer to Fail-Safe Control Chart)

Solenoid Valve Operation when Normal:

Gear Position		1st	2nd	3rd	4th	5th	6th
Solenoid	SL1	ON	ON	ON	ON	OFF	OFF
	SL2	OFF	OFF	OFF	ON	ON	ON
	SL3	OFF	ON	OFF	OFF	OFF	ON
	SL4	OFF	OFF	ON	OFF	ON	OFF

Fail-safe Control Chart:

	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL1	ON Malfunction (without Fail-safe Control) *1	1st	2nd	3rd	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st to N	2nd to N	3rd to N	4th to N	5th	6th
	Fail-safe Control during OFF Malfunction	Fixed in 3rd or 5th					
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd or 5th					
SL2	ON Malfunction (without Fail-safe Control) *1	1st to 4th	2nd to 4th	3rd to 4th	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd	4th to 1st	5th to N	6th to N
	Fail-safe Control during OFF malfunction	1st	2nd	3rd	3rd	3rd	3rd
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd or 3rd					
SL3	ON Malfunction (without Fail-safe Control) *1	1st to 2nd	2nd	3rd	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd to 1st	3rd	4th	5th	6th to N
	Fail-safe Control during OFF malfunction	1st	3rd	3rd	4th	5th	5th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd					

	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL4	ON Malfunction (without Fail-safe Control)*1	3rd	3rd	3rd	4th	5th	5th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd to 1st	4th	5th to N	6th
	Fail-safe Control during OFF malfunction	1st *2	2nd *2	4th*2	4th*2	6th	6th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd					

*1: Fail-safe control is not actuated when the ON malfunction occurs.

*2: Shifting to 5th and 6th gears is prohibited.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the DATA LIST using the intelligent tester allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.

(d) Turn the ignition switch on (IG).

(e) Turn the tester on.

(f) Enter the following menus: "DIAGNOSIS / OBD/ MOBD / ECT / DATA LIST".

(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
CALC LOAD	Calculated load by ECM: Min.: 0%, Max.: 100%	• 15.0 to 35.0%: Idling • 10.0 to 30.0%: Running without load (2,000 rpm)	-
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	550 to 800 rpm: Idling	-
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle load	-
COOLANT TEMP	Engine coolant temperature: Min.: -40°C (419°F), Max.: 140°C (258°F)	80 to 105°C (176 to 221°F): After warming up	• If value -40°C (-40°F): sensor circuit open • If value 140°C (284°F): sensor circuit shorted
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	10 to 22%: Idling	Calculated value based on VTA1
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	• 0%: Accelerator pedal released • 64 to 96%: Accelerator pedal fully depressed	Recognition valve for throttle opening angle on ECM
SPD (NC)	Min.: 0 rpm, Max.: 12750 rpm	-	-
SPD (NT)	Input turbine speed/ display: 50 r/min	HINT: • Lock-up ON (After warming up the engine): Input turbine speed (NT) equal to the engine speed. • Lock-up OFF (Idling at N position): Input turbine speed (NT) nearly equal to the engine speed.	-
CTP SW	Closed throttle position switch: ON or OFF	• ON: Throttle fully closed • OFF: Throttle open	-

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP switch status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-165.
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF	-
BATTERY VOLTAGE	Battery voltage: Min.: 0, Max.: 65.535 V	9 to 14 V: Idling	-
TC/TE1	TC and TE1 terminals of DLC3: ON or OFF	-	Active Test support data
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operating	FC IDL= "ON" when throttle valve fully closed and engine speed over 2,800 rpm
FC TAU	Fuel cut TAU (Fuel cut during very light load):	ON: Fuel cut operating	Fuel cut being performed under very light load to prevent engine combustion from becoming incomplete
SHIFT	ECM gear shift command/ 1st, 2nd, 3rd, 4th, 5th or 6th	Shift lever position is; • D: 1st, 2nd, 3rd, 4th, 5th or 6th • S: 1st, 2nd, 3rd, 4th, 5th or 6th	-
REVERSE	PNP switch status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158
PARKING	PNP switch status/ ON or OFF	Shift lever position is; P: ON Except P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158
NEUTRAL	PNP switch status/ ON or OFF	Shift lever position is; N: ON Except N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158
DRIVE	PNP switch status/ ON or OFF	Shift lever position is; D and S: ON Except D and S: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-158

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
SPORTS UP SW	Sport shift up switch status/ ON or OFF	• Press continuously "+" (Up shift): ON • Release "+" (Up shift): OFF	-
SPORTS DOWN SW	Sport shift down switch status/ ON or OFF	• Press continuously "-" (Down shift): ON • Release "-" (Down shift): OFF	-
MODE SELECT SW	Sport mode select switch status/ ON or OFF	Shift lever position is; S, "+" and "-": ON Except S, "+" and "-": OFF	-
TPS 1 SW	0: OFF / 1: ON	Gear position 1st, 2nd, 3rd or 4th: ON Gear position 5th or 6th: OFF	-
TPS 2 SW	0: OFF / 1: ON	Gear position 4th, 5th or 6th: ON Gear position 1st, 2nd or 3rd: OFF	-
TPS 3 SW	0: OFF / 1: ON	Shift solenoid valve SLU is ON: ON Shift solenoid valve SLU is OFF: OFF	-
A/T OIL TEMP 1	ATF temp. sensor value/ min.: -40°C (-40°F) max.: 215°C (419°F)	• After stall test; Approx. 80°C (176°F) • Equal to ambient temperature when cold soak	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor circuit is open or shorted.
NT SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
NC SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
ATF	0: OFF / 1: ON		-
LOCK UP	0: OFF / 1: ON	Lock up: ON	-
LOCK UP SOL	Lock up solenoid status/ ON or OFF	• Lock up: ON • Except lock up: OFF	-
SOLENOID (SLU)	Shift Solenoid SLU Status/ ON or OFF	• Lock up: ON • Except lock up: OFF	-
SOLENOID (SLT)	Shift solenoid SLT status/ ON or OFF	• Accelerator pedal is depressed: OFF • Accelerator pedal is released: ON	-
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	550 to 800 rpm: Idling	-
INTAKE AIR TEMP	Intake air temperature Min.: -40°C (-40°F), Max.: 140°C (258°F)	Equivalent to ambient air temperature	• If value -40°C(-40°F): sensor circuit open • If value 140°C(284°F): sensor circuit shorted
COOLANT TEMP	Engine coolant temperature Min.: -40°C (-40°F), Max.: 215°C (419°F)	80 to 105°C (176 to 221°F): After warming up	• If value -40°C (-40°F): sensor circuit open • If value 140°C (284°F): sensor circuit shorted
THROTTLE POS	Throttle sensor position: Min.: 0%, Max.: 100%	• Accelerator pedal released: 0% • Accelerator pedal fully depressed: 64 to 96%	Recognition value for throttle opening angle on ECM
THROTTLE POS	Whether throttle position sensor detecting idle: ON or OFF	ON: Idling	-
ACCEL POS	Min.: 0%, Max.: 100%		-
#CODES	# of Codes: Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode: 0: OFF, 1: ON	ON: Check mode ON	-

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
SPD TEST	Check mode result for vehicle speed sensor: 0: COMPL, 1: INCMPL	-	-
MIL	MIL status: ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance: Min.: 0 mile (65,535 km), Max.: 110,950 mile (65,535 km)	Distance after DTC detected	-
MIL ON RUN TIME	Running time from MIL ON: Min.: 0 minute, Max.:65,535 minutes	Equivalent to running time after MIL ON	-
ENG RUN TIME	Engine run time: Min.: 0 second, Max.: 65,535 seconds	Time after engine start	-
TIME DTC CLEAR	Time after DTC cleared: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared: Min.: 0 km/h, Max.: 65,535 km/h	Equivalent to time after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared: Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
OBD CERT	OBD requirement	OBD2	-
COMP ON	Comprehensive component monitor 0: NOT AVL, 1: AVAIL	-	Comprehensive Component Monitor
CCM ENA	Comprehensive component monitor UNABLE or ENABLE	-	-
CCM CMPL	Comprehensive component monitor COMPL or INCMPL	-	-
FUEL ENA	Fuel system monitor UNABLE or ENABLE	-	-
FUEL CMPL	Fuel system monitor COMPL or INCMPL	-	-
MISFIRE ENA	Misfire monitor UNABLE or ENABLE	-	-
MISFIRE CMPL	Misfire monitor COMPL or INCMPL	-	-
HTR ENA	O2S (A/FS) heater monitor UNABLE or ENABLE	-	-
HTR CMPL	O2S (A/FS) heater monitor COMPL or INCMPL	-	-
O2S(A/FS) ENA	O2S (A/FS) monitor UNABLE or ENABLE	-	-
O2S(A/FS) CMPL	O2S (A/FS) monitor COMPL or INCMPL	-	-
EVAP ENA	EVAP monitor UNABLE or ENABLE	-	-
EVAP CMPL	EVAP monitor COMPL or INCMPL	-	-
CAT ENA	Catalyst monitor: UNABLE or ENABLE	-	-
CAT CMPL	Catalyst monitor COMPL or INCMPL	-	-

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
TRANSMISSION	Transmission type	-	Identifying transmission type: 6 speed
SYSTEM	System identification	-	Identifying engine type: GASOLINE (gasoline engine)

AX

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn the intelligent tester on.
(f) Enter the following items: "DIAGNOSIS / OBD/ MOBD / ECT / ACTIVE TEST".
(g) According to the display on tester, perform "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] • IDL: ON [Others] • Press "→" button: Shift up • Press "←" button: Shift down	Possible to check the operation of the shift solenoid valves. Upshifts and downshifts should be performed consecutively. A 10-second interval is required between gear changes. Do not downshift at high speeds. Doing so will damage the automatic transaxle.
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transaxle to the lock-up condition. [Vehicle Condition] • Throttle valve opening angle: Less than 35% • Vehicle speed: 37 mph (60 km/h) or more, and 6th gear	Possible to check the SLU solenoid operation.
SOLENOID (SL1)	[Test Details] Operate the shift solenoid SL1 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SL2)	[Test Details] Operate the shift solenoid SL2 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SL3)	[Test Details] Operate the shift solenoid SLU [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-

Item	Test Details	Diagnostic Note
SOLENOID (SL4)	[Test Details] Operate the shift solenoid S1 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SL)	[Test Details] Operate the shift solenoid S2 [Vehicle Condition] • Vehicle Stopped • Shift lever in P or N position	-
SOLENOID (SLT)	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] • Vehicle Stopped • IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLT)" is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	-
SOLENOID (SLU)	[Test Details] Operate the shift solenoid SLU and raise the line pressure. [Vehicle Condition] • Vehicle Stopped. • IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLU)" is performed, the ECM commands the SLU solenoid to turn off). ON: No action (normal operation)	-

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle. The same SST is used for the HYDRAULIC TEST (See page AX-17) as well.
HINT:
The pressure values in ACTIVE TEST and HYDRAULIC TEST will be different from each other.

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the parts listed in the table below and proceed to the page given.
HINT:

- *1: MIL (Malfunction Indicator Lamp) comes on
- *2: "DTC stored" mark means TCM memorizes the trouble code if the TCM detects that the DTC detection condition is satisfied.
- A DTC may be output when the clutch, brake and gear components, etc. inside the automatic transaxle are damaged.

AUTOMATIC TRANSAXLE SYSTEM

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0500	Vehicle Speed Sensor "A"	1. Vehicle speed sensor 2. Vehicle speed sensor signal circuit 3. Combination meter 4. TCM	Comes on	DTC stored	AX-50
P0560	System Voltage	1. Open in back-up power source circuit 2. TCM	Comes on	DTC stored	AX-53
P0710	Transmission Fluid Temperature Sensor "A" Circuit	1. Open or short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-55
P0711	Transmission Fluid Temperature Sensor "A" Performance	Transmission wire (ATF temperature sensor)	Comes on	DTC stored	AX-60
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input	1. Short in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-55
P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input	1. Open in ATF temperature sensor circuit 2. Transmission wire (ATF temperature sensor) 3. TCM	Comes on	DTC stored	AX-55
P0715	Input / Turbine Speed Sensor Circuit Malfunction	1. Transmission revolution sensor (speed sensor NT) 2. TCM	Comes on	DTC stored	AX-66
P0717	Input Speed Sensor Circuit No Signal	1. Transmission revolution sensor (speed sensor NT) 2. TCM	Comes on	DTC stored	AX-66
P0724	Brake Switch "B" Circuit High	1. Short in stop light switch signal circuit 2. Stop light switch 3. TCM	Comes on	DTC stored	AX-71
P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)	1. Shift solenoid valve SL remains closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear etc.) 5. Line pressure is too low	Comes on	DTC stored	AX-74
P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)	1. Shift solenoid valve SL1 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-79

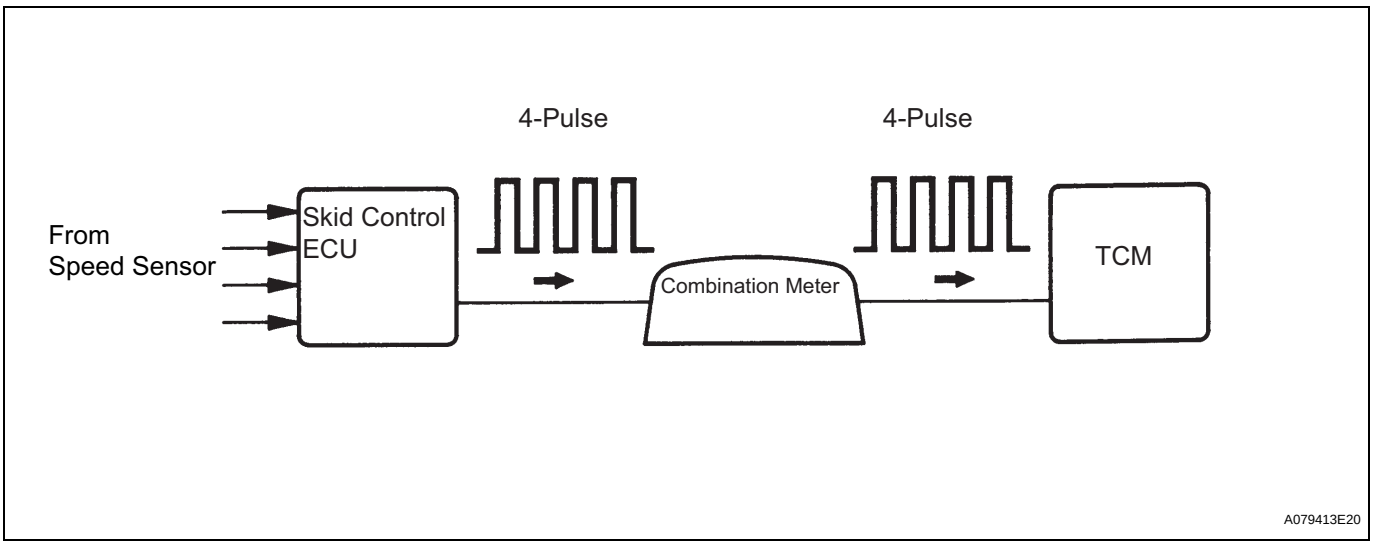
DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	1. Open or short in shift solenoid valve SL1 circuit 2. Shift solenoid valve SL1 3. TCM	Comes on	DTC stored	AX-84
P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	1. Shift solenoid valve SL2 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-87
P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	1. Open or short in shift solenoid valve SL2 circuit 2. Shift solenoid valve SL2 3. TCM	Comes on	DTC stored	AX-92
P0791	Intermediate Shaft Speed Sensor "A" Circuit	1. Transmission revolution sensor (speed sensor NC) 2. TCM	Comes on	DTC stored	AX-95
P0793	Intermediate Shaft Speed Sensor "A"	1. Transmission revolution sensor (speed sensor NC) 2. TCM	Comes on	DTC stored	AX-95
P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)	1. Shift solenoid valve SL3 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-100
P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)	1. Open or short in shift solenoid valve SL3 circuit 2. Shift solenoid valve SL3 3. TCM	Comes on	DTC stored	AX-105
P0872	Transmission Fluid Pressure Switch No.1 Circuit Low	1. ATF temperatuer sensor assembly (ATF pressure switch No. 1) 2. Transmission wire	-	DTC stored	AX-108
P0873	Transmission Fluid Pressure Switch No.1 Circuit High	1. ATF temperatuer sensor assembly (ATF pressure switch No 1) 2. Transmission wire 3. TCM	-	DTC stored	AX-108
P0877	Transmission Fluid Pressure Switch No.2 Circuit Low	1. ATF temperatuer sensor assembly (ATF pressure switch No. 2) 2. Transmission wire	-	DTC stored	AX-112
P0878	Transmission Fluid Pressure Switch No.2 Circuit High	1. ATF temperatuer sensor assembly (ATF pressure switch No. 2) 2. Transmission wire 3. TCM	-	DTC stored	AX-112
P0989	Transmission Fluid Pressure Switch No.3 Circuit Low	1. ATF temperatuer sensor assembly (ATF pressure switch No. 3) 2. Transmission wire	Comes on	DTC stored	AX-116
P0990	Transmission Fluid Pressure Switch No.3 Circuit High	1. ATF temperatuer sensor assembly (ATF pressure switch No. 3) 2. Transmission wire 3. TCM	Comes on	DTC stored	AX-116
P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	1. Shift solenoid valve SLT remains open 2. Shift solenoid valve SL1, SL2, SL3 or SL4 remains open or closed 4. Valve body is blocked 5. Automatic transaxle (clutch, brake or gear, etc.)	Comes on	DTC stored	AX-121

DTC No.	Detection Item	Trouble Area	MIL *1	Memory *2	See page
P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	1. Open or short in shift solenoid valve SLT circuit 2. Shift solenoid valve SLT 3. TCM	Comes on	DTC stored	AX-128
P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	1. Shift solenoid valve SLU remains open or closed 2. Valve body is blocked 3. Torque converter clutch 4. Automatic transaxle (clutch, brake or gear, etc.) 5. Line pressure is too low	Comes on	DTC stored	AX-131
P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	1. Open or short in shift solenoid valve SLU circuit 2. Shift solenoid valve SLU 3. TCM	Comes on	DTC stored	AX-136
P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	1. Short in shift solenoid valve SL circuit 2. Shift solenoid valve SL 3. TCM	Comes on	DTC stored	AX-139
P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)	1. Open in shift solenoid valve SL circuit 2. Shift solenoid valve SL 3. TCM	Comes on	DTC stored	AX-139
P2808	Pressure Control Solenoid "D" Performance or Stuck OFF (Shift Solenoid Valve SL4)	1. Shift solenoid valve SL4 remains open or closed 2. Valve body is blocked 3. Automatic transaxle (clutch, brake or gear etc.)	Comes on	DTC stored	AX-142
P2810	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SL4)	1. Open or short in shift solenoid valve SL4 circuit 2. Shift solenoid valve SL4 3. TCM	Comes on	DTC stored	AX-148
U0100	Lost Communication with ECM/ PCM "A"	TCM	Comes on	DTC stored	AX-151

DTC	P0500	Vehicle Speed Sensor "A"

DESCRIPTION

The speed sensors detect the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4-pulse signal and outputs it to the TCM via the combination meter. The TCM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detection Condition	Trouble Area
P0500	When the ECT sensor is normal and the counter gear speed is 300 rpm or more, the vehicle speed signal is not input for 2 seconds or more.	• Vehicle speed sensor • Vehicle speed sensor signal circuit • Combination meter • TCM

MONITOR DESCRIPTION

The TCM assumes that the vehicle is being driven when the transmission counter gear indicates more than 300 rpm and over 30 seconds have passed since the park/neutral position switch was turned off. If there is no signal from the vehicle speed sensor with these conditions satisfied, the TCM concludes that the vehicle speed sensor is malfunctioning. The TCM will turn on the MIL and a DTC will be set.

MONITOR STRATEGY

Related DTCs	P0500: Vehicle Speed Sensor Circuit
Required sensors/components (Main)	Vehicle speed sensor, Combination meter, ABS ECU
Required sensors/components (Sub)	Counter gear Speed (CS) sensor, ECT sensor
Frequency of operation	Continuous
Duration	2 seconds
MIL operation	Immediately
Sequence operation	None

TYPICAL ENABLING CONDITIONS

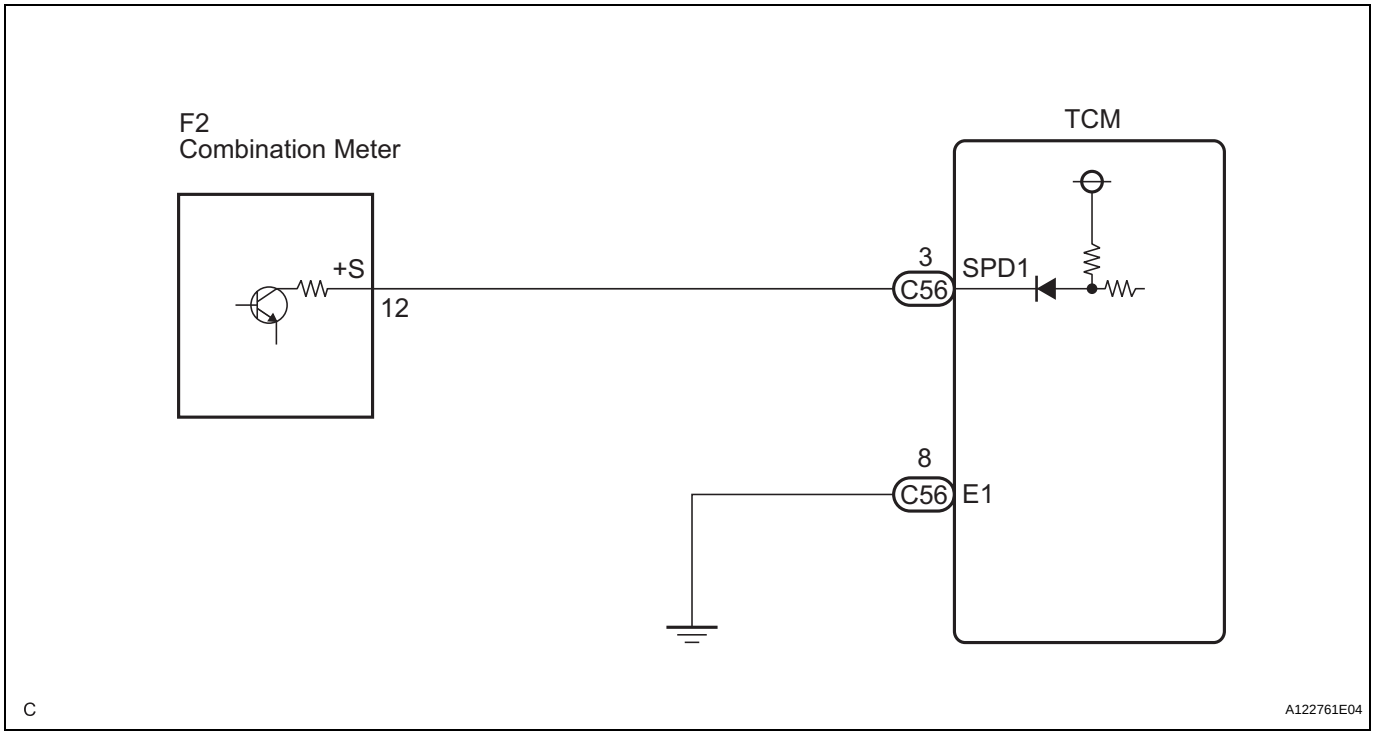
Engine	Running
Transmission counter gear revolution	300 rpm or more
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

Either a or b is met (See below)	
a. All of the following conditions are met	
ECT	20°C (68°F) or more
ECT sensor fail	Not detected
Time after PNP switch ON to OFF	2 sec. or more
b. All of the following conditions are met	
ECT	Less than 20°C (68°F)
ECT sensor fail	Detected
Time after PNP switch ON to OFF	30 sec. or more

TYPICAL MALFUNCTION THRESHOLDS

Vehicle speed sensor signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT SPEEDOMETER (METER OPERATION)

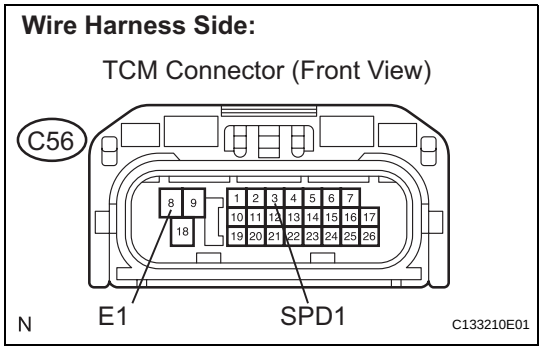
(a) Drive the vehicle and check if operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → CHECK SPEEDOMETER CIRCUIT

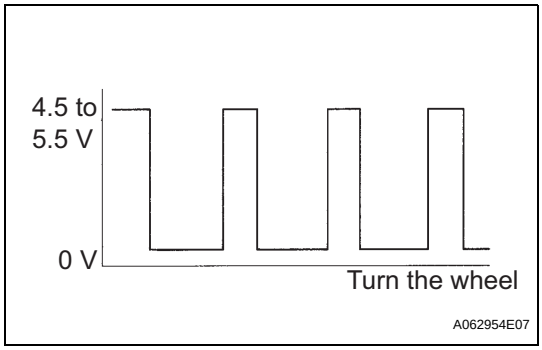
OK

AX

2	INSPECT TCM



(a) Shift the lever to the neutral position.
(b) Jack up the vehicle.
(c) Disconnect the TCM connector.
(d) Turn the ignition switch on (IG).



(e) Measure the voltage according to the value(s) in the table below as the wheel is turned slowly.
Standard

Tester Connection	Specified Condition
C56-3 (SPD1) - C56-8 (E1)	Voltage is generated intermittently

HINT:
The output voltage should fluctuate up and down similarly to the diagram when the wheel is turned slowly.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TCM

DTC	P0560	System Voltage

DESCRIPTION

The battery supplies electricity to the TCM even when the ignition switch is off. This power allows the TCM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, these memories are cleared and the TCM determines that there is a malfunction in the power supply circuit. When the engine is next started, the TCM will illuminate the MIL and set the DTC.

DTC No.	DTC Detection Condition	Trouble Area
P0560	Open in TCM back-up power source circuit (1 trip detection logic)	• Open in back-up power source circuit • TCM

HINT:
If DTC P0560 is set, the TCM does not store other DTCs.

MONITOR STRATEGY

Related DTCs	P0560: TCM system voltage
Required Sensors/Components (Main)	TCM
Required Sensors/Components (Sub)	-
Frequency of Operation	Continuous
Duration	3 seconds
MIL Operation	Immediate (MIL illuminated after next engine start)
Sequence of Operation	None

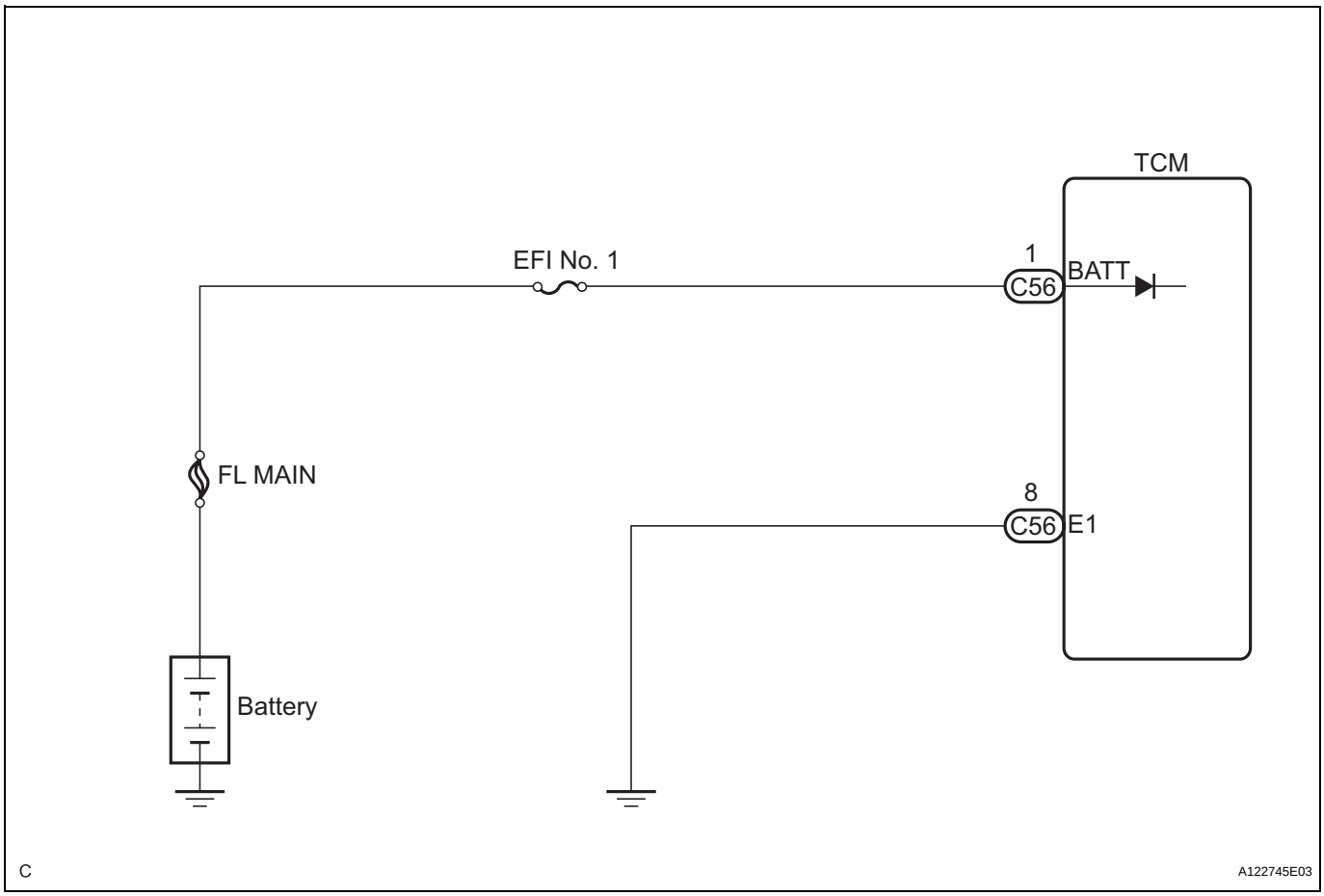
TYPICAL ENABLING CONDITIONS

Monitor runs whenever following DTCs are not present:	None
Stand-by RAM	Initialized

TYPICAL MALFUNCTION THRESHOLDS

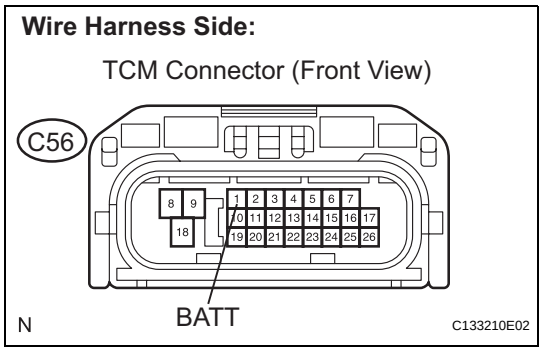
TCM power source	Less than 3.5 V

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TERMINAL VOLTAGE (BATT VOLTAGE OF TCM)



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Specified Condition
BATT (C56-1) - E1 (C56-8)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (EFI NO. 1 FUSE - TCM)**

OK

REPLACE TCM

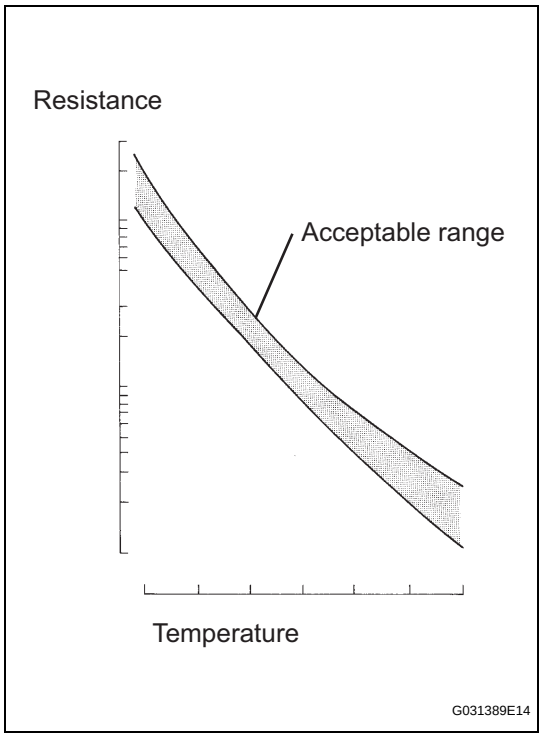
DTC	P0710	Transmission Fluid Temperature Sensor "A" Circuit

DTC	P0712	Transmission Fluid Temperature Sensor "A" Circuit Low Input

DTC	P0713	Transmission Fluid Temperature Sensor "A" Circuit High Input

DESCRIPTION

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value for use by the TCM.



The TCM applies a voltage to the temperature sensor through terminal OIL of the TCM.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The TCM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0710	(a) and (b) are detected momentarily within 0.5 sec. when neither P0712 nor P0713 is detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec., the malfunction switches from (a) to (b) or from (b) to (a)	• Open or short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • TCM

DTC No.	DTC Detection Condition	Trouble Area
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more have (1-trip detection logic)	• Short in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • TCM
P0713	ATF temperature sensor resistance is more than 156 kΩ when 15 minutes or more have elapsed after the engine starts DTC is detected for 0.5 sec. or more (1-trip detection logic)	• Open in ATF temperature sensor circuit • Transmission wire (ATF temperature sensor) • TCM

AX

MONITOR DESCRIPTION

These DTCs indicate an open or short in the automatic transmission fluid (ATF) temperature sensor (TFT sensor) circuit. The automatic transmission fluid (ATF) temperature sensor converts ATF temperature into an electrical resistance value. Based on the resistance, the TCM determines the ATF temperature, and the TCM detects an open or short in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the TCM interprets this as a fault in the ATF sensor or wiring. The TCM will turn on the MIL and store the DTC.
*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.
*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.
HINT:
The ATF temperature can be checked on the intelligent tester display.

MONITOR STRATEGY

Related DTCs	P0710: ATF temperature sensor/Range check (Chattering) P0712: ATF temperature sensor/Range check (Low resistance) P0713: ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	0.5 sec.
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0710:

Range check (Chattering)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0712:

Range check (Low resistance)

The monitor will run whenever this DTC is not present.	None
The typical enabling condition is not available.	-

P0713:

Range check (High resistance)

The monitor will run whenever this DTC is not present.	None
Time after engine start	15 min. or more

TYPICAL MALFUNCTION THRESHOLDS

P0710:

Range check (Chattering)

TFT (transmission fluid temperature) sensor resistance	Less than 79 Ω or more than 156 kΩ

P0712:

Range check (Low resistance)

TFT sensor resistance	Less than 79 Ω

P0713:

Range check (High resistance)

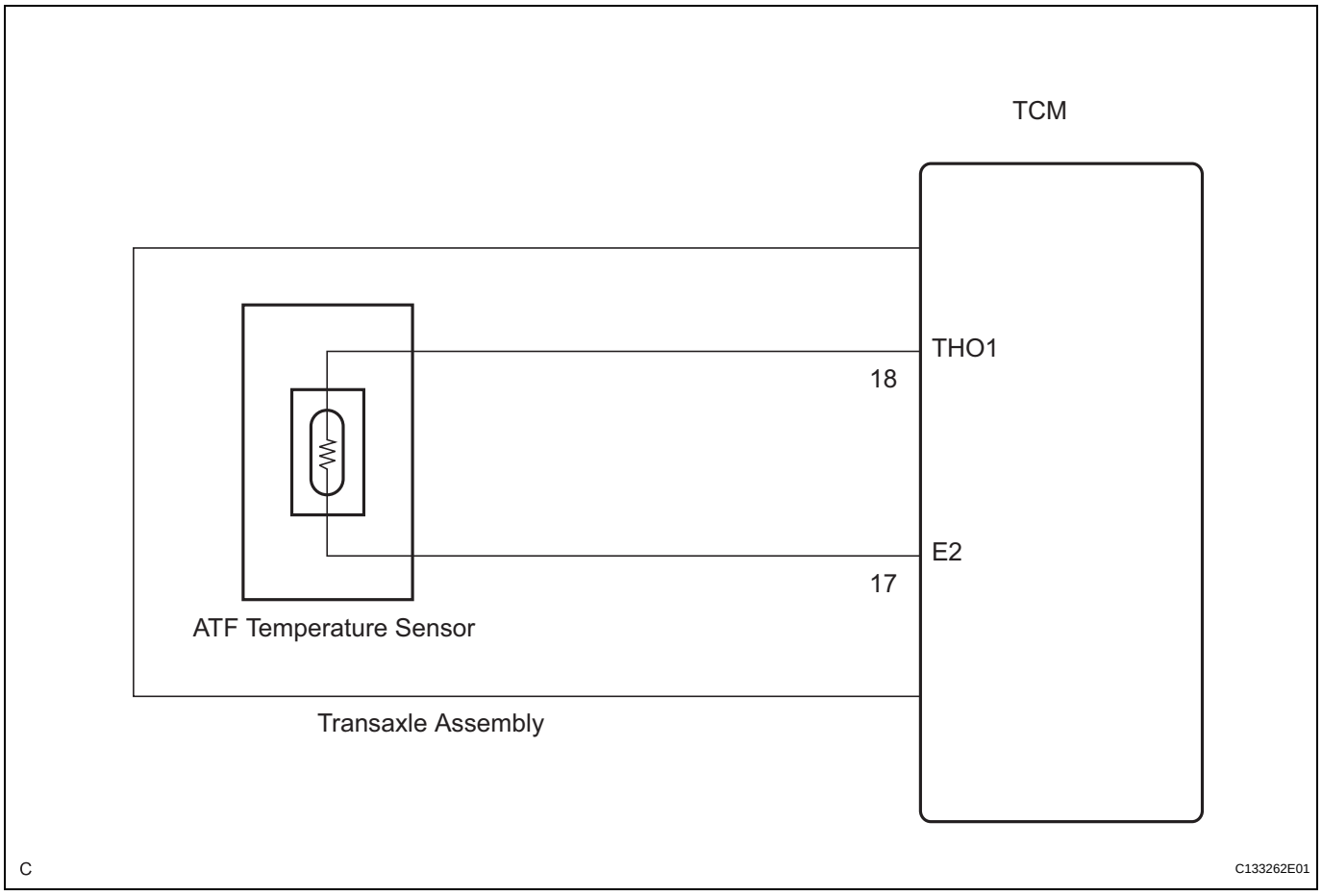
TFT sensor resistance	More than 156 kΩ

AX

COMPONENT OPERATING RANGE

TFT sensor	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

(a) Warm up the engine.

(b) Turn the ignition switch off.

(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on tester, read "DATA LIST".

AX

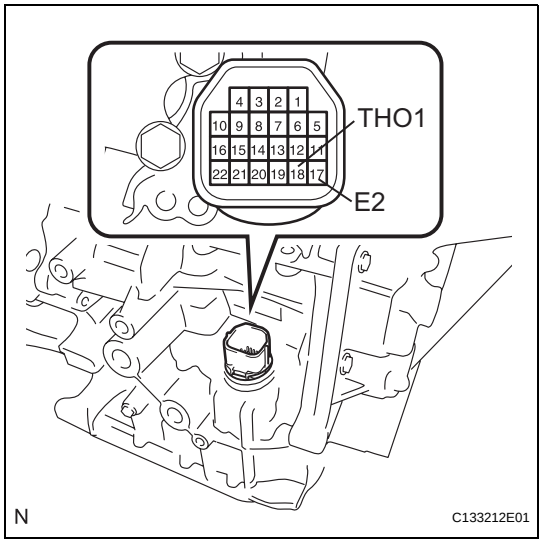
Item	Measurement Item/ Range (display)	Normal Condition
AT OIL TEMP1	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	• After Stall Test; Approx. 80°C (176°F) • Equal to ambient temperature when cold soak

HINT:
When DTC P0712 is output and intelligent tester indicates 150°C (302°F) or more, there is a short circuit.
When DTC P0713 is output and intelligent tester indicates -40°C (-40°F), there is an open circuit.
Measure the resistance between terminal OIL and body ground.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150 °C (302°F) or more	Short circuit

HINT:
If the circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 seconds). When P0713 is set, P0711 cannot be detected.
It is not necessary to inspect the circuit when P0711 is set.

1 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
17 (E2) - 18 (THO1)	90 Ω to 156 kΩ
17 (E2) - Body ground	10 kΩ or higher
18 (THO1) - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

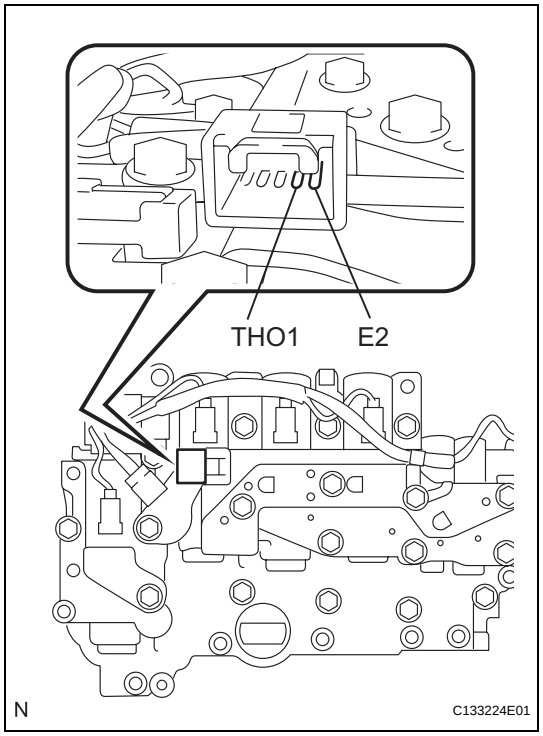
Standard resistance

ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

OK → REPLACE TCM

NG

2	INSPECT ATF TEMPERATURE SENSOR



(a) Disconnect the ATF temperature sensor connector from the transmission wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.22 to 0.28 kΩ

NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK →

REPLACE TRANSMISSION WIRE

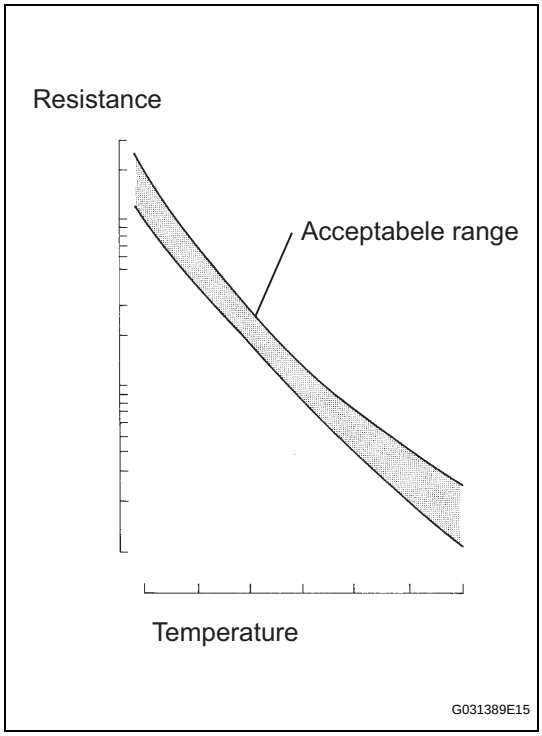
AX

DTC	P0711	Transmission Fluid Temperature Sensor "A" Performance

DESCRIPTION

AX

The ATF (Automatic Transmission Fluid) temperature sensor converts the fluid temperature into a resistance value for use by the TCM.



The TCM applies a voltage to the temperature sensor through terminal OIL of the TCM.
The sensor resistance changes with the transmission fluid temperature. As the temperature becomes higher, the sensor resistance decreases.
One terminal of the sensor is grounded so that the sensor resistance decreases and the voltage goes down as the temperature becomes higher.
The TCM calculates the fluid temperature based on the voltage signal.

DTC No.	DTC Detection Condition	Trouble Area
P0711	Both (a) and (b) are detected: (2-trip detection logic) (a) Intake air and engine coolant temps. are more than -10°C (14°F) at engine start. (b) After normal driving for over 16 min. and 40 sec. and 5 mile (8 km) or more, ATF temp. is less than 20°C (68°F)	Transmission wire (ATF temperature sensor)

MONITOR DESCRIPTION

This DTC indicates that there is a problem with output signals from the automatic transmission fluid (ATF) temperature sensor (TFT sensor) and that the sensor itself is defective. The ATF temperature sensor converts the ATF temperature into an electrical resistance value. Based on the resistance, the TCM determines the ATF temperature and detects an open or short in the ATF temperature circuit or a fault of the ATF temperature sensor.
After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below 20°C (68°F) after running the vehicle for a certain period, the TCM interprets this as a fault, and turns on the MIL.

MONITOR STRATEGY

Related DTCs	P0711: ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor (TFT sensor)
Frequency of operation	Continuous
Duration	3 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
TFT (Transmission fluid temperature) sensor circuit	Circuit is not malfunctioning
ECT (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
IAT (Intake air temperature) sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning
Time after engine start	16 min. and 40 sec. or more
ECT (Engine coolant temperature)	Above -15°C (5°F)

Condition A:

Time after engine start	18 min. and 20 sec.
Driving distance after engine start	5 miles (8 km) or more
IAT (12 sec. after engine start)	Above -10°C (14°F)
ECT (12 sec. after engine start)	Above -10°C (14°F)
Accumulated driving time *1	200 sec. or more
*1: Following conditions are met	
Engine speed - Turbine speed	50 rpm or more
Output speed	400 rpm or more
Throttle valve opening angle	3% or more
TFT (Transmission fluid temperature)	Less than 20°C (68°F)
Shift position	Not "N" or "P"

Condition B:

Time after engine start	30 min.
Driving distance after engine start	9.3 miles (15 km)
IAT (12 sec. after engine start)	-15°C (5°F) or more
ECT (12 sec. after engine start)	-15°C (5°F) or more
TFT (Transmission fluid temperature)	Less than 20°C (68°F)
Accumulated driving time *1	400 sec. or more

Condition C:

Time after engine start	40 min.
Driving distance after engine start	12.4 miles (20 km)
TFT (Transmission fluid temperature)	Less than 20°C (68°F)

Accumulated driving time *1	550 sec. or more

Condition D:

Time after ECT reaches 60°C (140°F)	10 sec. or more
TFT (12 sec. after engine start)	110°C (230°F) or more
ECT (12 sec. after engine start)	35°C (95°F) or less

AX

TYPICAL MALFUNCTION THRESHOLDS

Condition A, B and C:

TFT	Less than 20°C (68°F) (THO = -10°C (14°F) at engine start) (Conditions vary with THO at engine)

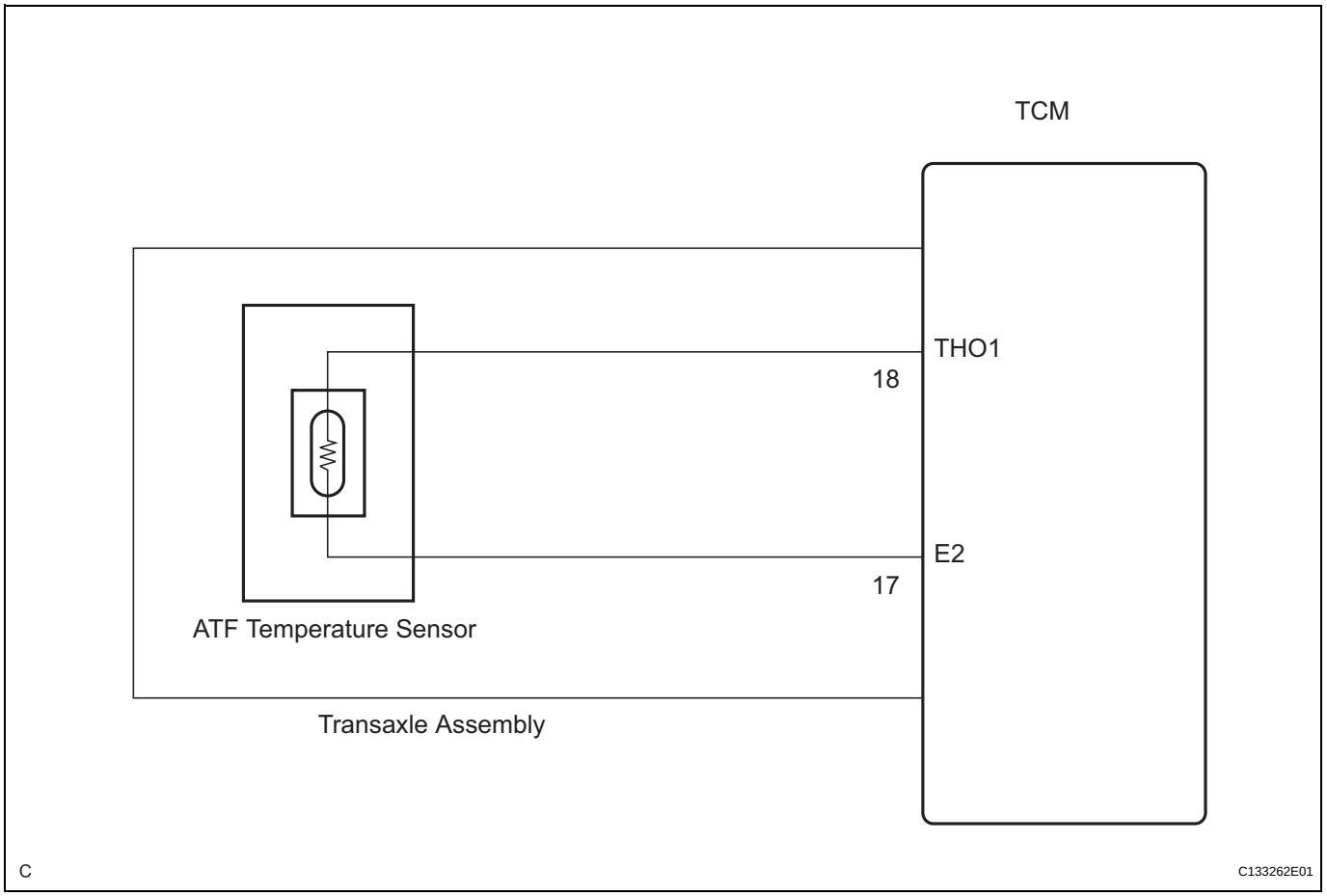
Condition D:

TFT	110°C (230°F) or more

COMPONENT OPERATING RANGE

TFT	Atmospheric temperature - approx. 130°C (266°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
AT OIL TEMP1	ATF Temp. Sensor Value/ min.: -40°C (-40°F) max.: 215°C (419°F)	• After Stall Test; Approx. 80°C (176°F) • Equal to ambient temperature when cold soak

HINT:

When DTC P0712 is output and the intelligent tester indicates 150°C (302°F) or more, there is a short circuit.

When DTC P0713 is output and the intelligent tester indicates -40°C (-40°F), there is an open circuit.

Measure the resistance between terminal THO1 (OT) and body ground.

Temperature Displayed	Malfunction
-40°C (-40°F)	Open circuit
150°C (302°F) or more	Short circuit

HINT:

If a circuit related to the ATF temperature sensor becomes open, P0713 is immediately set (in 0.5 seconds). When P0713 is set, P0711 cannot be detected.

It is not necessary to inspect the circuit when P0711 is set.

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0711)

(a) Connect the the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the the intelligent tester on.
(c) Select the items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0711" is output	**A**
"P0711" and other DTCs	**B**

HINT:
If any other codes besides "P0711" are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

AX

A

2 CHECK TRANSMISSION FLUID LEVEL

(a) Check the transmission fluid level (See page AX-164).

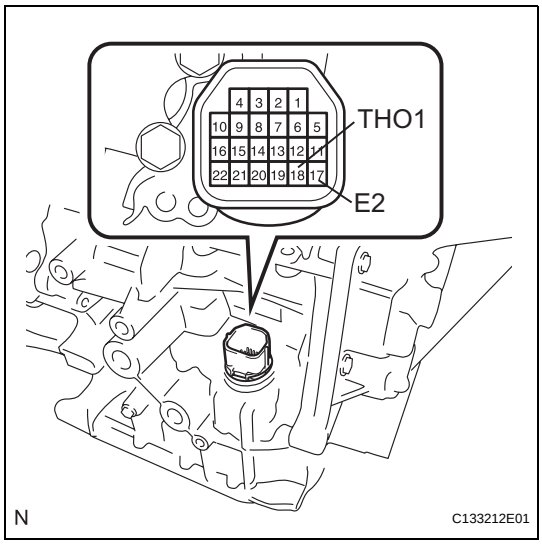
OK:

Automatic transmission fluid level is correct.

NG → ADD FLUID

OK

3 INSPECT TRANSMISSION WIRE (ATF TEMPERATURE SENSOR)



(a) Remove the TCM from the transaxle.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
17 (E2) - 18 (THO1)	90 Ω to 156 kΩ
17 (E2) - Body ground	10 kΩ or higher
18 (THO1) - Body ground	10 kΩ or higher

HINT:
If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

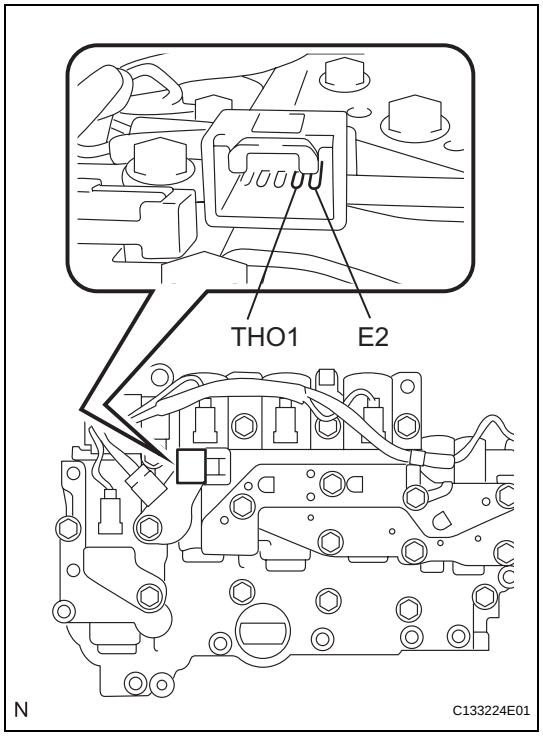
Standard resistance

ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

OK → REPLACE TCM

NG

4	CHECK ATF TEMPERATURE SENSOR



(a) Disconnect the ATF temperature sensor connector from the transmission wire.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

HINT:

If the resistance is out of the specified range with the ATF temperature shown in the table below, the driveability of the vehicle may decrease.

Standard resistance

ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK → **REPLACE TRANSMISSION WIRE**

AX

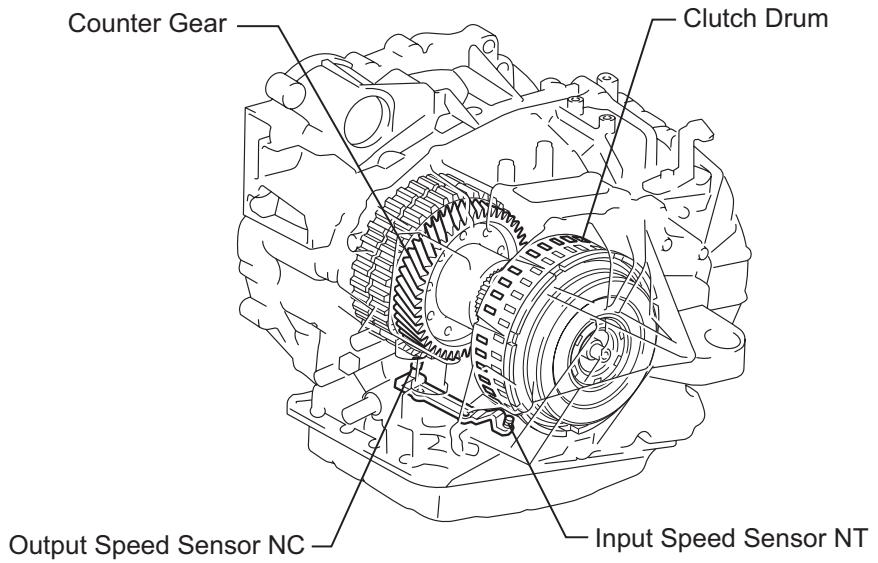
DTC	P0715	Input / Turbine Speed Sensor Circuit Malfunction

DTC	P0717	Input Speed Sensor Circuit No Signal

AX

SYSTEM DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input revolution of transaxle. By comparing the input turbine speed signal (NT) with the counter gear speed sensor signal (NC), the TCM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions, thus, providing smooth gear shift.



N

C133216E01

DTC No.	DTC Detection Condition	Trouble Area
P0715	When the speed sensor input voltage is either more than 1.9 V or less than 0.1 V for 4.5 seconds or more.	• Transmission revolution sensor (speed sensor NT) • TCM
P0717	ECM detects conditions (a), (b) and (c) continuously for 5 sec. or more: (1-trip detection logic) (a) Vehicle speed: 31 mph (50 km/h) or more (b) Park/neutral position switch (STAR and R) is OFF (c) Speed sensor (NT): less than 300 rpm	

MONITOR DESCRIPTION

The NT terminal of the TCM detects a revolution signal from the speed sensor (NT) (input RPM). The TCM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).
While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm *1although the output shaft revolution is more than 1,000 rpm *2, the TCM interprets this as a fault, illuminates the MIL and stores the DTC.
*1: Pulse is not output or is irregularly output.
*2: The vehicle speed is 31 mph (50 km/h) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT)/Verify pulse input

Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous
Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P0715:

Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

P0717:

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Shift change	Shift change is completed before starting next shift change operation
TCM selected gear	2nd, 3rd, 4th, 5th or 6th
Output shaft rpm	1,000 rpm or more
STAR switch	OFF
R switch	OFF
Engine	Running
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

P0715:

Sensor voltage	Less than 0.1 V or more than 1.9 V

P0717:

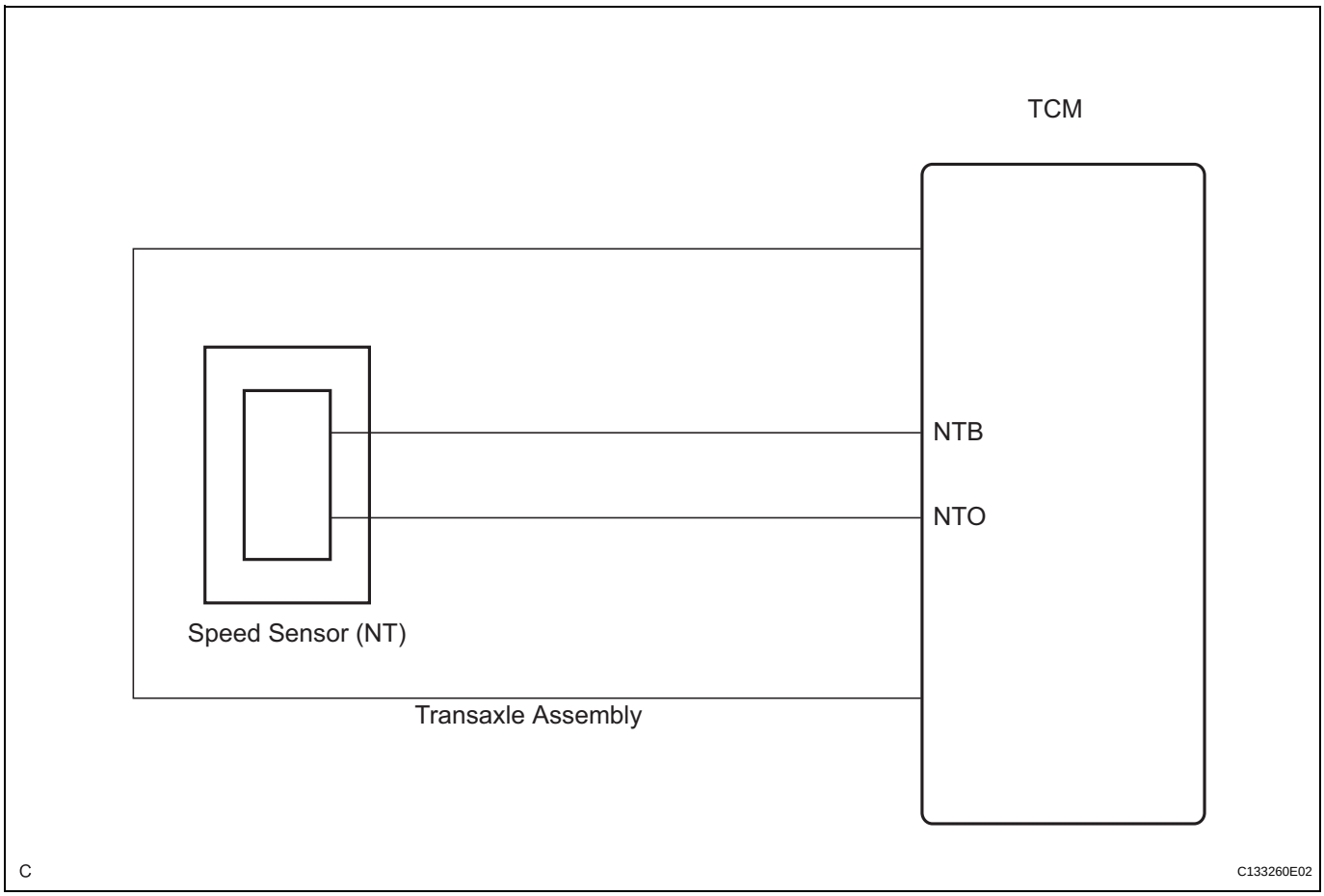
Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

Speed sensor (NT)	Turbine speed is equal to engine speed with lock-up ON

AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

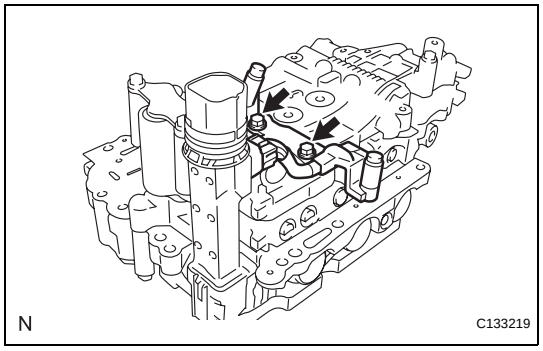
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NT)	Input Turbine Speed/display: 50 r/min	HINT: • Lock-up ON (after warming up the engine); input turbine speed (NT) is equal to the engine speed. • Lock-up OFF (Idling at N position); input turbine speed (NT) is nearly equal to the engine speed.

HINT:
- SPD (NT) is always 0 while driving: Open or short in the sensor or circuit.
- SPD (NT) is always more than 0 and less than 300 rpm while driving the vehicle at 31 mph (50 km/h) or more: Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

AX

1 INSPECT SPEED SENSOR (SENSOR INSTALLATION)

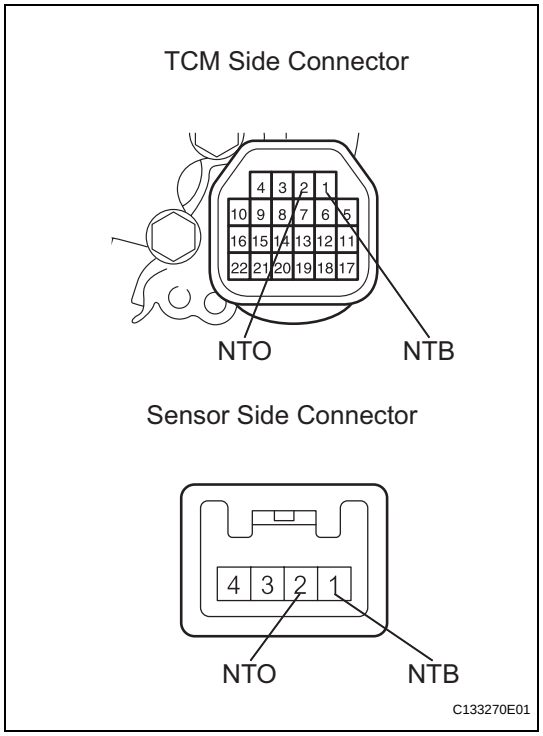


(a) Make sure that the connector is properly connected, and check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPAIR OR REPLACE SPEED SENSOR**

OK

2 CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the speed sensor connector from the transmission wire.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Condition	Specified Condition
NTO - NTO	Below 1 Ω
NTB - NTB	Below 1 Ω
NTO - NTB	10 kΩ or higher

NG → **REPLACE TRANSMISSION WIRE**

OK

3 REPLACE SPEED SENSOR

NEXT

4	CHECK IF DTC OUTPUT RECURS (SEE IF DTC P0715 AND/OR P0717 OUTPUT AGAIN)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester main switch ON.
(c) Perform the monitor drive pattern (See page AX-27)
(d) When you use the intelligent tester:
Select the item "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(e) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0715 or P0717" is output	A
No output	B

B → END

A → REPLACE TCM

DTC	P0724	Brake Switch "B" Circuit High

DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling while driving in lock-up condition when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to the TCM. Then the TCM cancels the operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	The stop light switch remains ON even when the vehicle is driven in a STOP (less than 2 mph (3 km/h)) and GO (19 mph (30 km/h) or more) fashion 5 times. (2-trip detection logic).	• Short in stop light switch signal circuit • Stop light switch • TCM

MONITOR DESCRIPTION

This DTC indicates that the stop light switch remains ON. When the stop light switch remains ON during "stop and go" driving, the TCM interprets this as a fault in the stop light switch, illuminates the MIL, and stores the DTC. The vehicle must stop (less than 2 mph (3 km/h)) and go (19 mph (30 km/h) or more) five times for two consecutive driving cycles in order to set this DTC.

MONITOR STRATEGY

Related DTCs	P0724: Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch
Frequency of operation	Continuous
Duration	GO and STOP 5 times
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The stop light switch remains ON during GO and STOP 10 times.
GO and STOP are defined as follows;

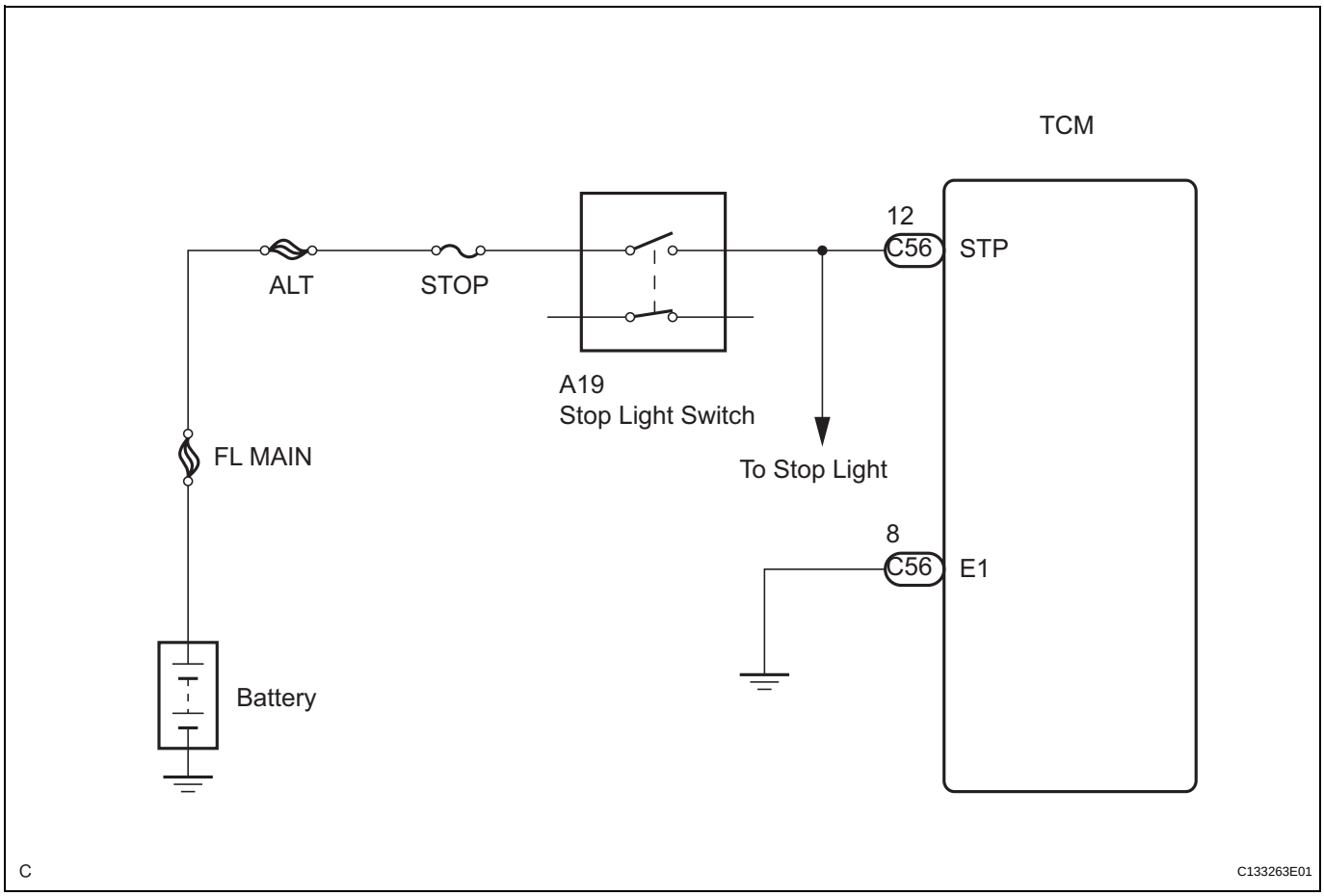
The monitor will run whenever this DTC is not present.	None
GO: (Vehicle speed is 18.63 mph (30 km/h) or more)	18.7 mph (30 km/h) or more
STOP: (Vehicle speed is less than 1.86 mph (3 km/h))	Less than 1.86 mph (3 km/h)
Starter	OFF
Battery voltage	8 V or more
Ignition switch	ON

TYPICAL MALFUNCTION THRESHOLDS

Switch status	ON stuck

AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF DATA LIST (STP SIGNAL)

HINT:
According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

(a) Turn the ignition switch off.
(b) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(c) Turn the ignition switch on (IG).
(d) Turn on the tester.
(e) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".
(f) According to the display on the tester, read "DATA LIST".

Standard

Item	Measurement Item/ Range (display)	Normal Condition
STOP LIGHT SW	Stop light switch status/ ON or OFF	• Brake pedal is depressed: ON • Brake pedal is released: OFF

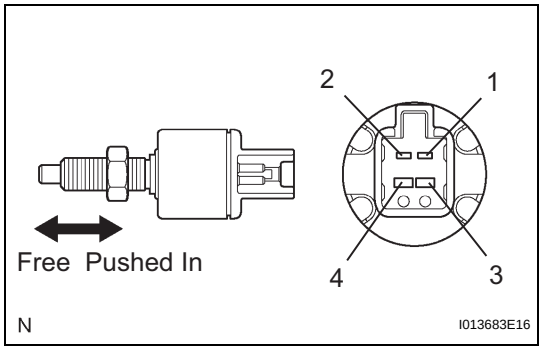
NOTICE:
In the table above, the conditions listed under "Normal Condition" are reference conditions. Do not depend solely on these reference conditions when deciding whether a part is faulty.

OK → **Go to step 3**

AX

NG

2 INSPECT STOP LIGHT SWITCH ASSEMBLY



(a) Remove the stop light switch assembly.
(b) Measure the resistance according to the value(s) in the table below.

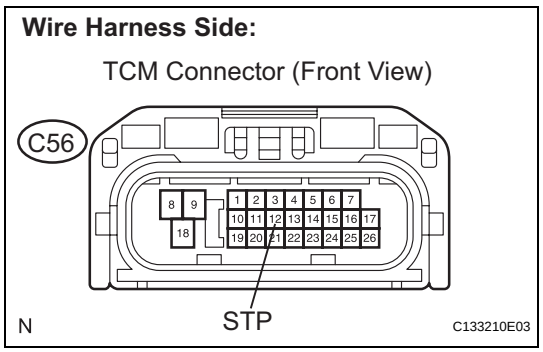
Standard resistance

Switch Position	Tester Connection	Specified Condition
Switch pin free	1 - 2	Below 1 Ω
Switch pin pushed in	1 - 2	10 kΩ or higher
Switch pin free	3 - 4	10 kΩ or higher
Switch pin pushed in	3 - 4	Below 1 Ω

NG → **REPLACE STOP LIGHT SWITCH ASSEMBLY**

OK

3 CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - TCM)



(a) Install the stop light switch assembly.
(b) Disconnect the TCM connector.
(c) Measure the voltage according to the value(s) in the table below when the brake pedal is depressed and released.

Standard voltage

Condition	Tester Connection	Specified Condition
Brake pedal is depressed	C56-12 (STP) - Body ground	10 to 14 V
Brake pedal is released	C56-12 (STP) - Body ground	Below 1 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE TCM

DTC	P0741	Torque Converter Clutch Solenoid Performance (Shift Solenoid Valve SL)

SYSTEM DESCRIPTION

AX

The TCM uses signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, intermediate (counter) speed sensor and crankshaft position sensor to help determine the engagement timing of the lock-up clutch. The TCM monitors the engagement of the clutch using the turbine (input) speed sensor, intermediate (counter) speed sensor and crankshaft position sensor.
Then the TCM compares the engagement condition of the lock-up clutch with the lock-up schedule in the TCM memory to detect shift solenoid valve SL, valve body and torque converter clutch mechanical problems.

DTC No.	DTC Detection Condition	Trouble Area
P0741	When both of the following are detected (2-trip detection logic): • Lock-up does not occur when requested. • Transmission fluid pressure switch No. 3 is ON.	• Shift solenoid valve SL remains closed • Valve body is blocked • Torque converter clutch • Automatic transaxle (clutch, brake or gear etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the TCM based on the speed sensor (NT), speed sensor (NC), engine rpm, engine load, engine temperature, vehicle speed, transmission fluid temperature, and gear selection. The TCM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The TCM calculates the actual transmission gear by comparing the input turbine rpm (NT) to the counter gear rpm (NC). When conditions are appropriate, the TCM requests "lock-up" by applying control voltage to the shift solenoid SL. When the SL is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the TCM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the TCM interprets this as a fault in the shift solenoid valve SL or lock-up system performance. The TCM will turn on the MIL and store the DTC.
HINT:
Example:
When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up.
  (Engine speed is at least 70 rpm greater than the input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up off.
  (The difference between the engine speed and input turbine speed is less than 20 rpm.)

MONITOR STRATEGY

Related DTCs	P0741: Shift solenoid valve SL OFF malfunction Shift solenoid valve SL ON malfunction
Required sensors/Components	Shift solenoid valve SL, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE), Throttle position sensor (VPA1), Mass air flow sensor (MAF), Transmission temperature sensor (THO1), Engine coolant temperature sensor (ECT)
Frequency of operation	Continuous
Duration	OFF malfunction 3.5 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
ECT (Engine coolant temperature)	40°C (104°F) or more
Transmission range	"D"
TFT (Transmission fluid temperature)	-10°C (-14°F) or more
TFT sensor circuit	No circuit malfunction
ECT sensor circuit	No circuit malfunction
Turbine speed sensor circuit	No circuit malfunction
Intermediate shaft speed sensor circuit	No circuit malfunction
Torque converter clutch circuit	No circuit malfunction
Knock control sensor circuit	No circuit malfunction
Shift solenoid valve SL1 circuit	No circuit malfunction
Shift solenoid valve SL2 circuit	No circuit malfunction
Shift solenoid valve SL3 circuit	No circuit malfunction
Shift solenoid valve SL4 circuit	No circuit malfunction
Shift solenoid valve SLU circuit	No circuit malfunction
CAN communication circuit	No circuit malfunction
Electronic throttle system	No circuit malfunction
TCM selected gear	No 1st
Vehicle speed	15.5 miles (25 km)
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Following conditions are met	(a) and (b)
(a) Engine Speed - Turbine speed	70 rpm or more
(b) Transmission fluid pressure switch	ON

INSPECTION PROCEDURE

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and so on to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

1. PERFORM ACTIVE TEST

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn the intelligent tester on.
(f) When using the intelligent tester:
Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".

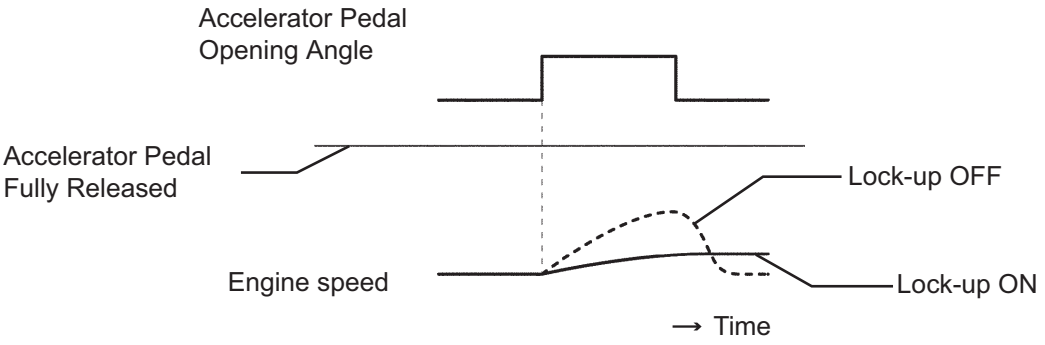
(g) According to the display on the tester, perform "ACTIVE TEST".

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid SL to set the automatic transaxle to the lock-up condition. [Vehicle Condition] Vehicle Speed: 37 mph (60km/h) or more	Possible to check the SL operation.

AX

HINT:
- This test can be conducted when the vehicle speed is 37 mph (60km/h) or more.
- This test can be conducted in the 5th gear.

(h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.
HINT:
- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off.)



1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0741)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

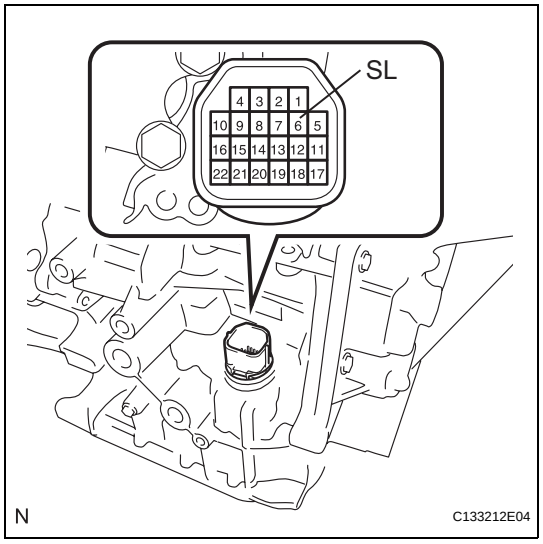
Display (DTC output)	Proceed to
Only "P0741" is output	A
"P0741" and other DTCs	B

HINT:
If any other codes besides "P0741" are output, perform the troubleshooting for those DTCs first.

B	GO TO DTC CHART

A

2 CHECK TRANSMISSION WIRE



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.

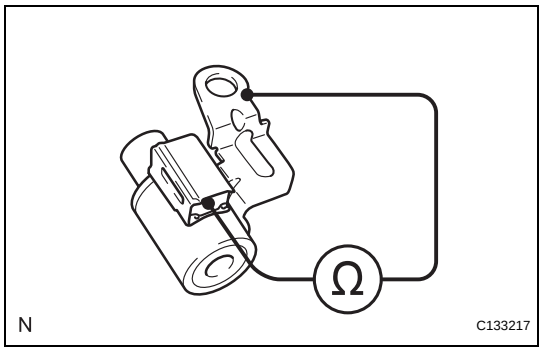
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
6 (SL) - Body ground	11 to 15 Ω

OK → **Go to step 4**

NG

3 CHECK SHIFT SOLENOID VALVE SL (RESISTANCE)



(a) Remove the shift solenoid valve SL.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

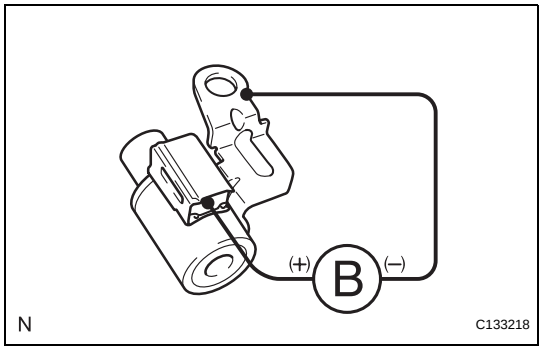
Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (SL) - Solenoid Body (SL)	11 to 15 Ω

NG → **REPLACE SHIFT SOLENOID VALVE SL**

OK

REPLACE TRANSMISSION WIRE

4	CHECK SHIFT SOLENOID VALVE SL (OPERATION)



(a) Remove the shift solenoid valve SL.
(b) Connect a positive (+) lead to the terminal of the solenoid connector, and a negative (-) lead to the solenoid body.
OK:
The solenoid valve makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL**

OK

5	CHECK TRANSMISSION VALVE BODY ASSEMBLY

OK:
There are no foreign objects on each valve and they operate smoothly.

NG → **REPLACE TRANSMISSION WIRE**

OK

6	CHECK TORQUE CONVERTER CLUTCH ASSEMBLY

OK:
The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0746	Pressure Control Solenoid "A" Performance (Shift Solenoid Valve SL1)

SYSTEM DESCRIPTION

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect mechanical problems of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0746	The engine revs freely when 1st, 2nd, 3rd, or 4th gear is requested (2-trip detection logic). When either of the following is detected twice (2-trip detection logic): • When 5th gear is requested, 4th gear is engaged. • When 6th gear is requested, 4th gear is engaged	• Shift solenoid valve SL1 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0746: Shift solenoid valve SL1 OFF malfunction Shift solenoid valve SL1 ON malfunction
Required sensors/Components	Shift solenoid valve SL1, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	ON malfunction: 0.8 sec. OFF malfunction: 0.5 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	Above -10°C (14°F)
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
CAN communication circuit	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning

OFF malfunction:

TCM selected gear	1st, 2nd, 3rd or 4th
TCM indicated pressure value of SL1	1,200 kPa
Throttle valve opening angle	3% or more

ON malfunction:

TCM selected gear	5th or 6th
Vehicle speed	1.2 mph (2 km/h) or more
ETC (Engine coolant temperature)	40°C (104°F) or more
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met:

OFF malfunction:

Turbine speed - Output speed x Gear ratio	1,000 or more

ON malfunction:

Input (turbine) speed/Intermediate shaft speed when output speed less than 1,000 rpm	0.998 to 1.138

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0746)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0746" is output	A
"P0746" and other DTCs	B

HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → **Go to step 3**

B

2	PERFORM ACTIVE TEST BY SHIFT

NOTICE:
This test should always be performed with at least 2 people.

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".

HINT:
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables confirmation of the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.

(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:
- *1: Neutral

AX

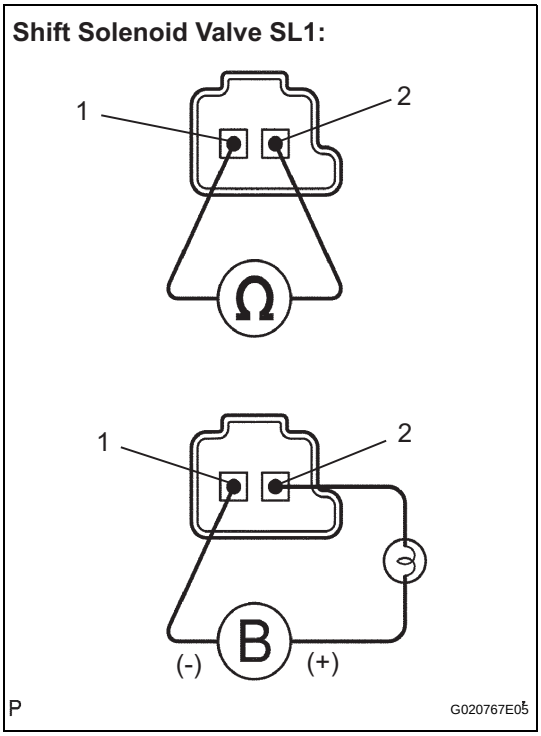
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

B	**GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)**
C	**GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)**
D	**GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)**
E	**GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)**

A

3	INSPECT SHIFT SOLENOID VALVE (SL1)

Shift Solenoid Valve SL1:



(a) Remove the shift solenoid valve SL1.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG	**REPLACE SHIFT SOLENOID VALVE (SL1)**

OK

4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

5	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPAIR OR REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0748	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)

DESCRIPTION

AX

Shifting from 1st to 6th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, SL4 and SL which is controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (See page AX-39).

DTC No.	DTC Detection Condition	Trouble Area
P0748	The TCM checks for an open or short in the shift solenoid valve SL1 circuit while driving and shifting between 4th and 5th gears. (1-trip detection logic) • Output signal duty equals 100%. (NOTE: SL1 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL1 circuit • Shift solenoid valve SL1 • TCM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL1 circuit. The TCM causes gear shifts to occur by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. The TCM also performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)
While driving and shifting between 4th and 5th gears, if the TCM detects an open or short in the shift solenoid valve SL1 circuit, the TCM determines there is a malfunction (See page AX-39).

MONITOR STRATEGY

Related DTCs	P0748: Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

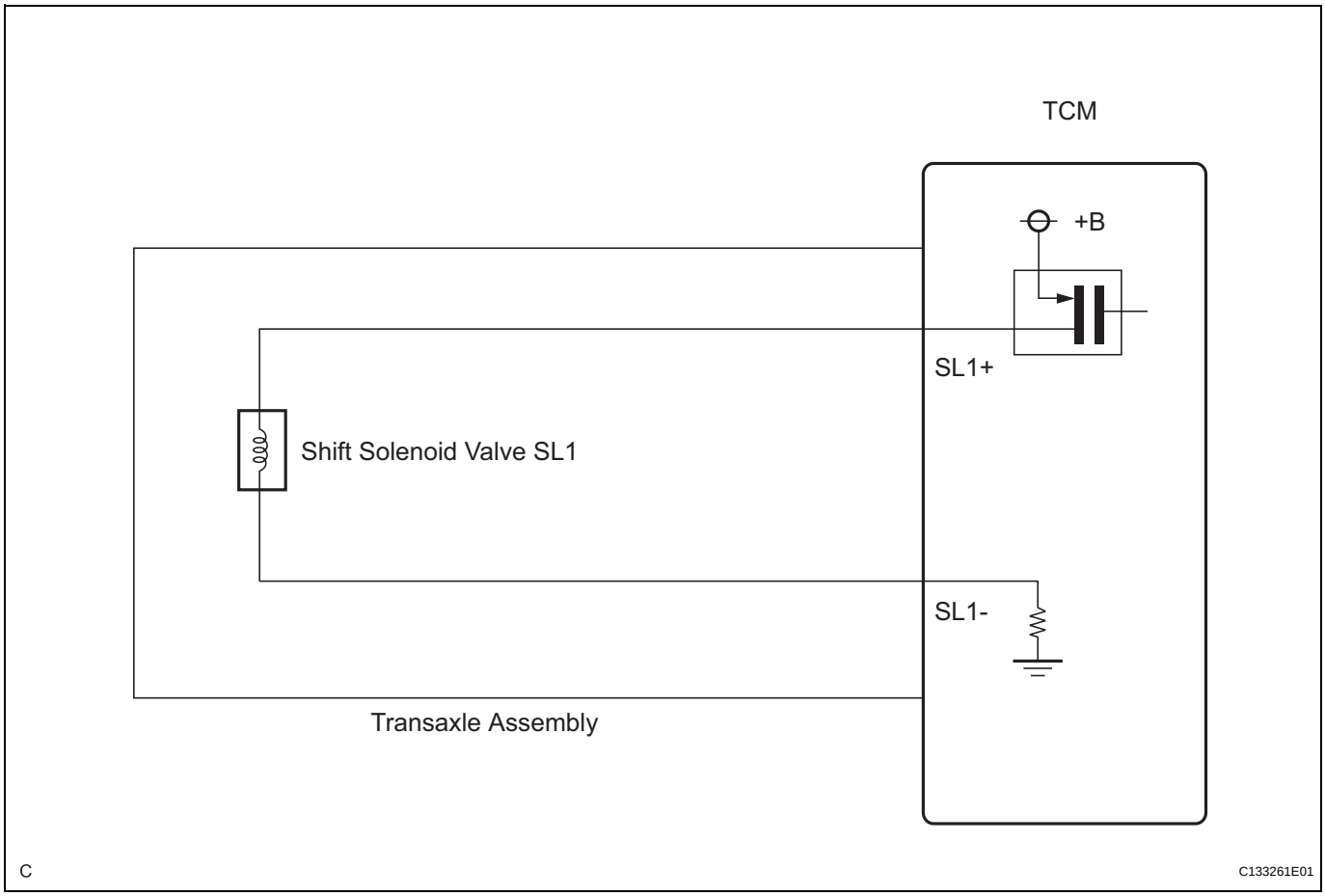
Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more

WIRING DIAGRAM



INSPECTION PROCEDURE

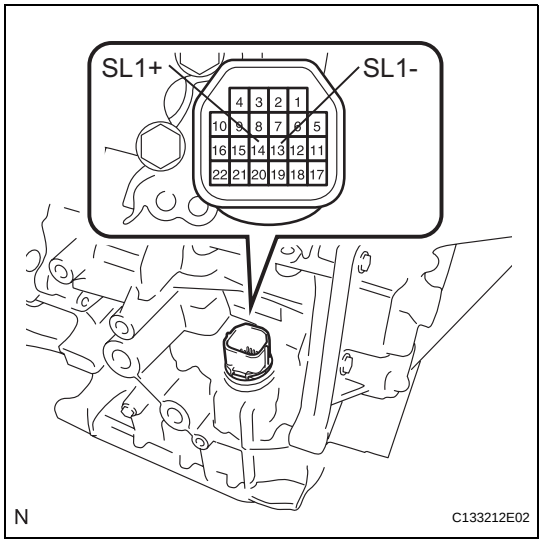
HINT:

The shift solenoid valve SL1 is turned on or off automatically normally when the shift lever is in the D position:

TCM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL1	ON	ON	ON	ON	OFF	OFF

AX

1	INSPECT TRANSMISSION WIRE (SL1)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
14 (SL1+) - 13 (SL1-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

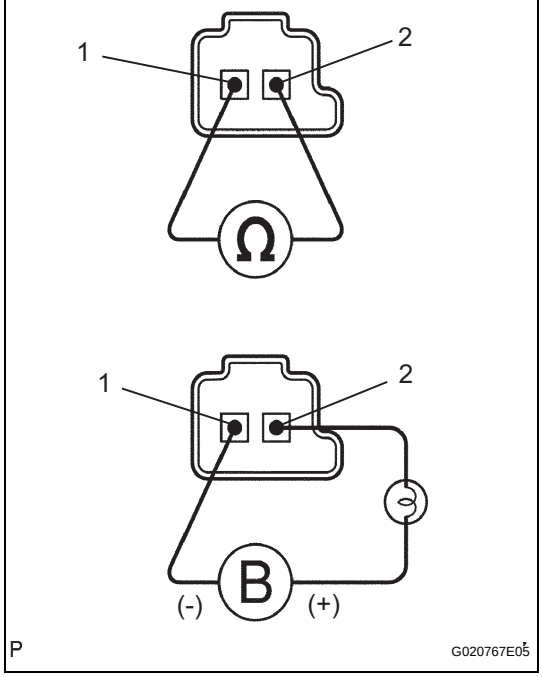
Tester Connection	Specified Condition
14 (SL1+) - Body ground	10 kΩ or higher
13 (SL1-) - Body ground	10 kΩ or higher

OK → REPLACE TCM

NG

2	INSPECT SHIFT SOLENOID VALVE SL1

Shift Solenoid Valve SL1:



(a) Remove the shift solenoid valve SL1.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes an operating sound.

NG → REPLACE SHIFT SOLENOID VALVE SL1

OK

REPLACE TRANSMISSION WIRE

DTC	P0776	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)

SYSTEM DESCRIPTION

The TCM uses the vehicle speed signal to detect the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The engine revs freely when 4th, 5th, or 6th gear is requested (2-trip detection logic). When any of the following is detected twice (2-trip detection logic): • When 1st gear is requested, 4th gear is engaged. • When 2nd gear is requested, 4th gear is engaged. • When 3rd gear is requested, 4th gear is engaged.	• Shift solenoid valve SL2 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776: Shift solenoid valve SL2/OFF malfunction Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Shift solenoid valve SL2, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction 0.5 sec. ON malfunction 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	Above -10°C (-14°F)
Knock control sensor circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning

CAN communication system	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning

OFF malfunction:

TCM selected gear	4th, 5th or 6th
TCM indicated pressure value of SL2	1,200 kPa
Throttle valve opening angle	3% or more

ON malfunction (A):

TCM selected gear	1st
Vehicle speed	1.2 mph (2 km/h) to 25 mph (40 km/h)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	Above 40°C (104°F)
Engine speed - Turbine speed	50 rpm or more

ON malfunction (B):

TCM selected gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	Above 40°C (104°F)

ON malfunction (C):

TCM selected gear	3rd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (Varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	Above 40°C (104°F)
ECT (Engine coolant temperature)	40°C (104°F) or more

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Input (turbine) speed-Intermediate shaft speed x Gear ratio	1,000 rpm or more

ON malfunction:

Input (turbine) speed/Intermediate shaft speed when output speed less than 1,000 rpm	0.998 to 1.138

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0776)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0776" is output	**A**
"P0776" and other DTCs	**B**

HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A	Go to step 3

B

AX

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

NOTICE:
This test should always be performed with at least 2 people.

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
HINT:
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables confirm of the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.

(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.
HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

AX

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:

- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)**

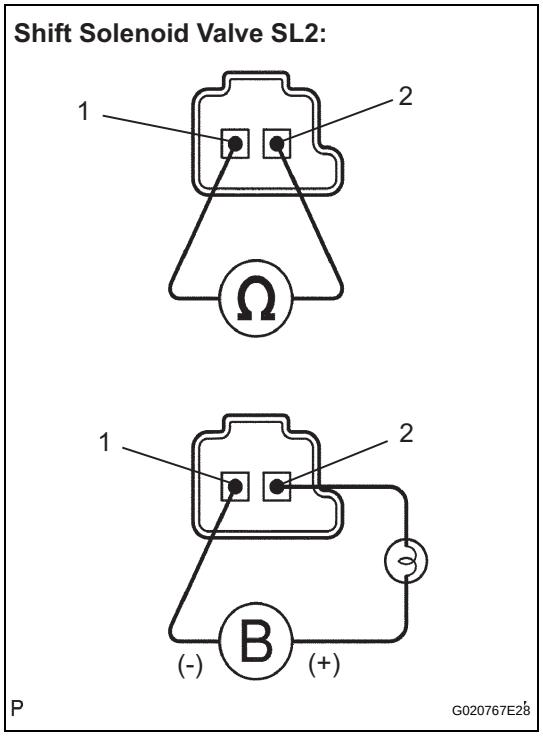
C → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)**

D → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)**

E → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)**

B

3	INSPECT SHIFT SOLENOID VALVE (SL2)



(a) Remove the shift solenoid valve SL2.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE (SL2)**

OK

4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

5	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0778	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)

DESCRIPTION

AX

Shifting from 1st to 6th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3, SL4 and SL which is controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (See page AX-39).

DTC No.	DTC Detection Condition	Trouble Area
P0778	The TCM checks for an open or short in the shift solenoid valve SL2 circuit while driving and shifting gears. (1-trip detection logic) • Output signal duty equals to 100%. (NOTE: SL2 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL2 circuit • Shift solenoid valve SL2 • TCM

MONITOR DESCRIPTION

This DTC indicates an open or short in the shift solenoid valve SL2 circuit. The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any of the shift solenoid valve circuits, the TCM detects the problem and illuminates the MIL and stores the DTC. The TCM also performs the fail-safe function and turns the other normal shift solenoid valves on or off. (In case of an open or short circuit, the TCM stops sending current to the circuit.)
While driving and shifting gears, if the TCM detects an open or short in the shift solenoid valve SL2 circuit, the TCM determines there is a malfunction (See page AX-39).

MONITOR STRATEGY

Related DTCs	P0778: Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

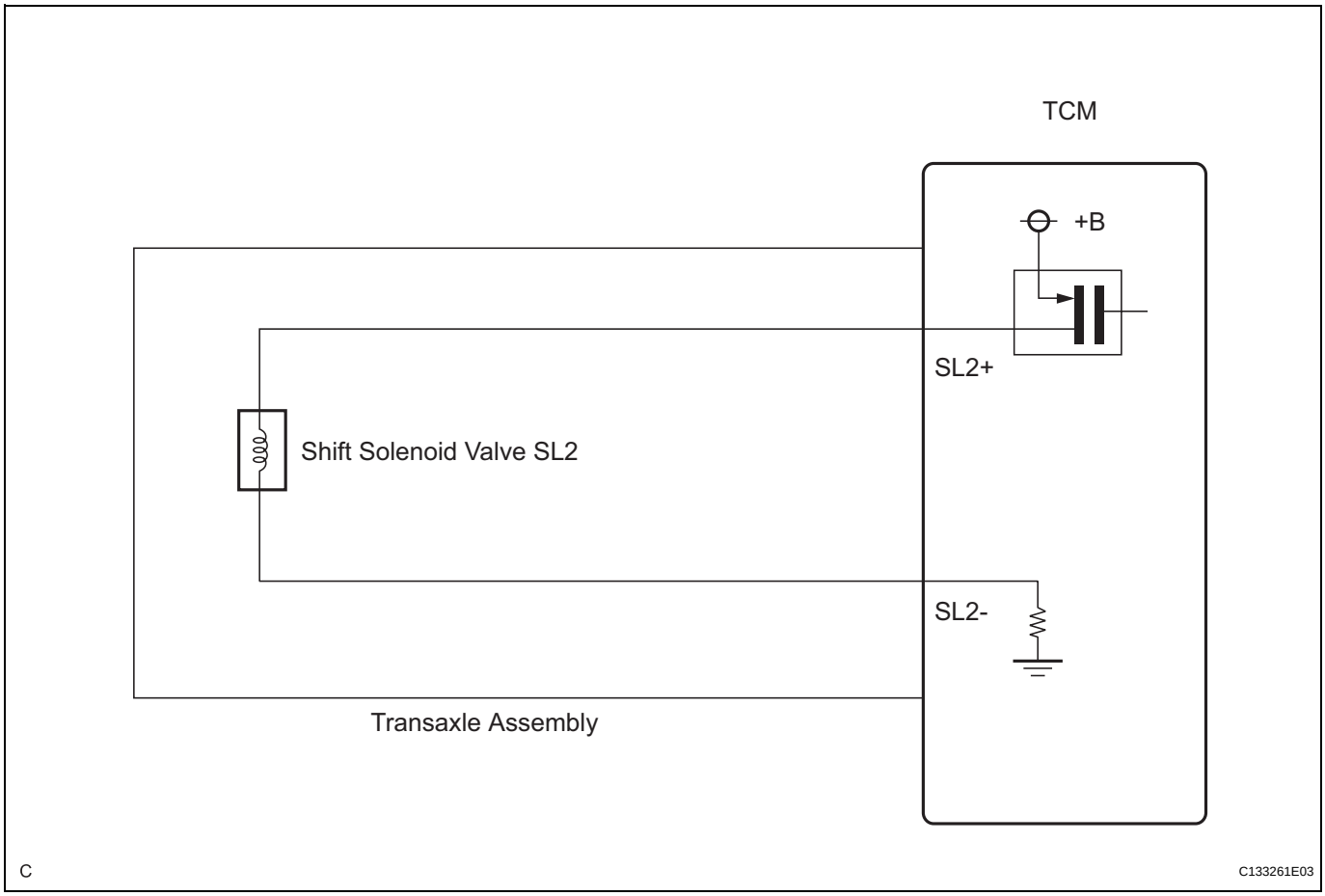
Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more

WIRING DIAGRAM



INSPECTION PROCEDURE

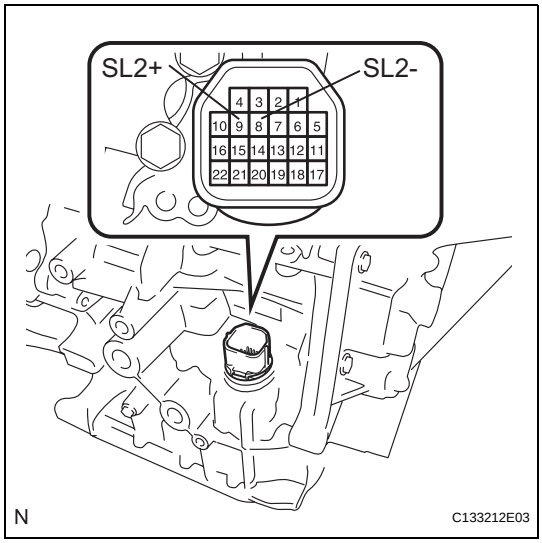
HINT:

The shift solenoid valve SL2 is turned on or off automatically when the shift lever is in the D position:

TCM command gearshift	1st	2nd	3rd	4th	5th	6th
Shift solenoid valve SL2	OFF	OFF	OFF	ON	ON	ON

AX

1	INSPECT TRANSMISSION WIRE (SL2)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
9 (SL2+) - 8 (SL2-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

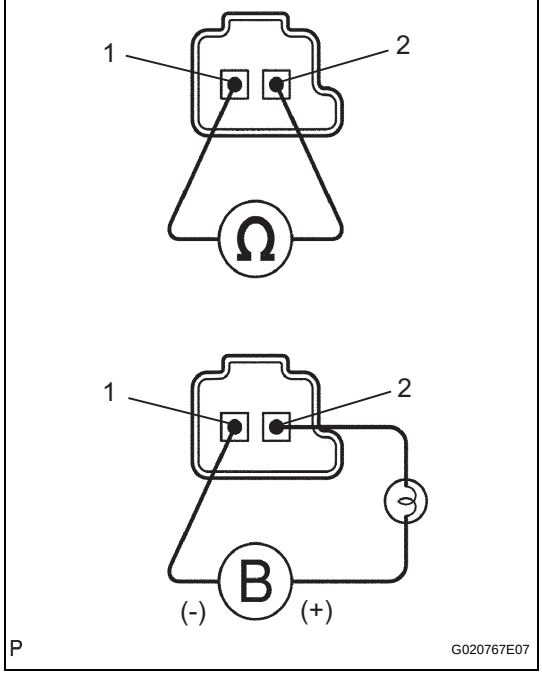
Tester Connection	Specified Condition
9 (SL2+) - Body ground	10 kΩ or higher
8 (SL2-) - Body ground	10 kΩ or higher

OK → REPLACE TCM

NG

2	INSPECT SHIFT SOLENOID SL2

Shift Solenoid Valve SL2:



(a) Remove the shift solenoid valve SL2.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes an operating sound.

NG → REPLACE SHIFT SOLENOID SL2

OK

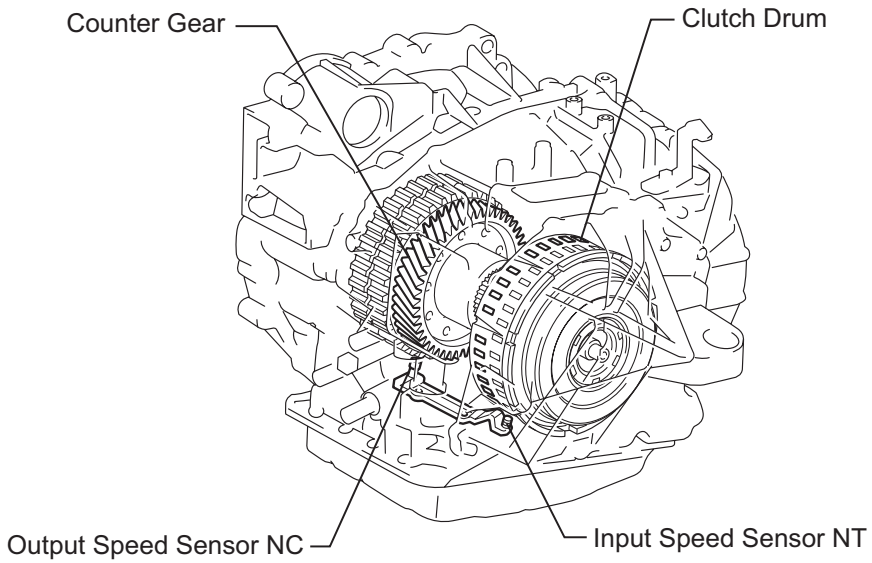
REPAIR OR REPLACE TRANSMISSION WIRE

DTC	P0791	Intermediate Shaft Speed Sensor "A" Circuit

DTC	P0793	Intermediate Shaft Speed Sensor "A"

DESCRIPTION

This sensor detects the rotation speed of the turbine which shows the input speed of transaxle. By comparing the input turbine speed signal (NC) with the counter gear speed sensor signal (NC), the TCM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure according to various conditions, thus, providing smooth gear shift.



N C133216E01

DTC No.	DTC Detection Condition	Trouble Area
P0791	When the speed sensor input voltage is either more than 1.9 V or less than 0.1 V for 2 seconds or more.	• Transmission revolution sensor (speed sensor NC) • TCM
P0793	When the vehicle speed is 15.5 mph (25 km/h) or higher, the counter gear speed is less than 300 rpm for 2 seconds or more.	

MONITOR DESCRIPTION

The NT terminal of the TCM detects a revolution signal from the speed sensor (NT) (input RPM). The TCM calculates a gearshift comparing the speed sensor (NT) with the speed sensor (NC).
While the vehicle is operating in 2nd, 3rd, 4th or 5th gear in the shift position of D, if the input shaft revolution is less than 300 rpm *1although the output shaft revolution is more than 1,000 rpm *2, the TCM interprets this as a fault, illuminates the MIL and stores the DTC.
*1: Pulse is not output or is irregularly output.
*2: The vehicle speed is 31 mph (50 km/h) or more.

MONITOR STRATEGY

Related DTCs	P0717: Speed sensor (NT) /Verify pulse input
Required sensors/Components	Speed sensor (NT), Speed sensor (NC)
Frequency of operation	Continuous

Duration	5 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever this DTC is not present.	P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Vehicle speed	15.5 mph (25 km/h) or more
Battery voltage	8 V or more
Ignition switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

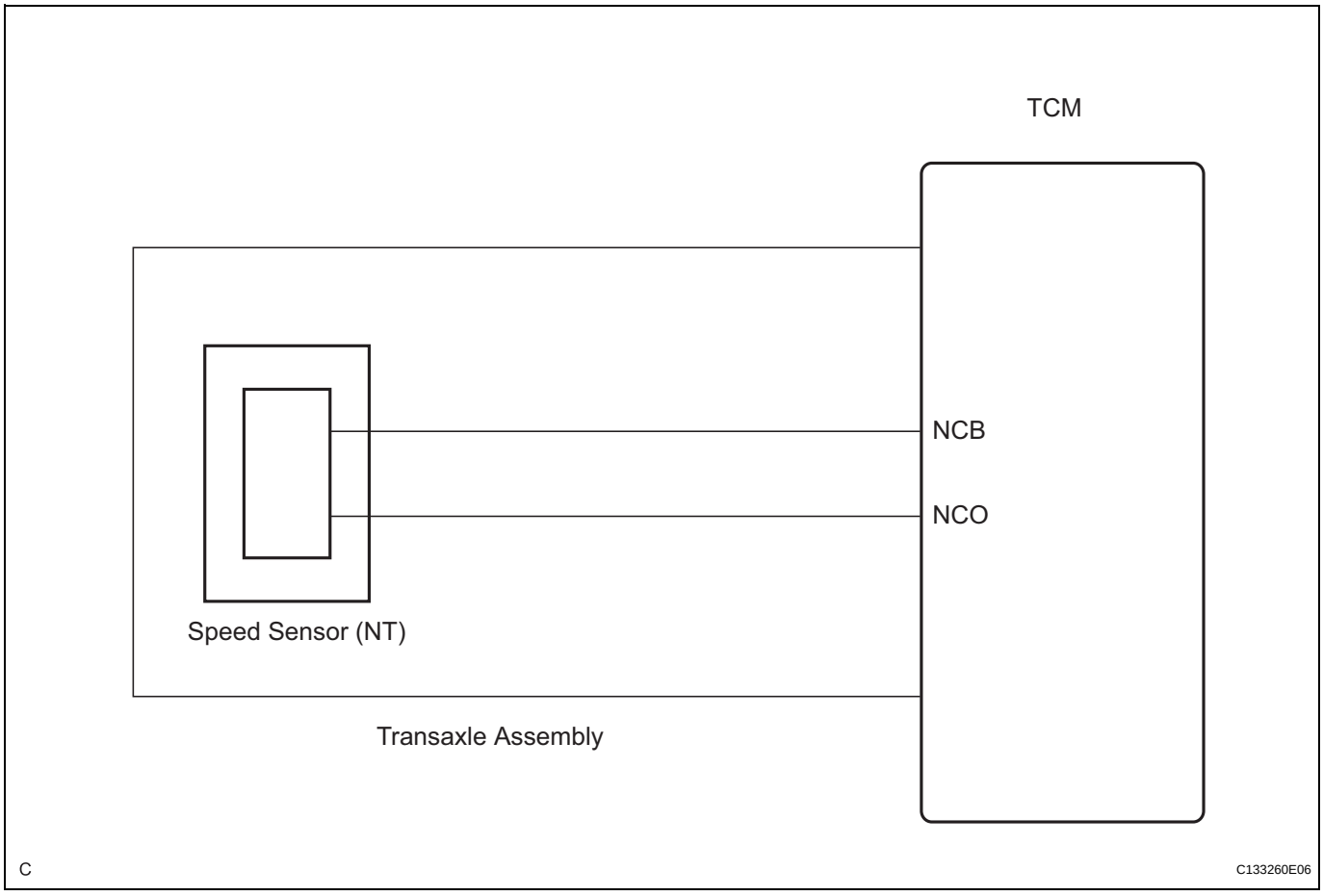
P0791:

Sensor voltage	Less than 0.1 V or more than 1.9 V

P0793:

Sensor signal rpm	Less than 300 rpm

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

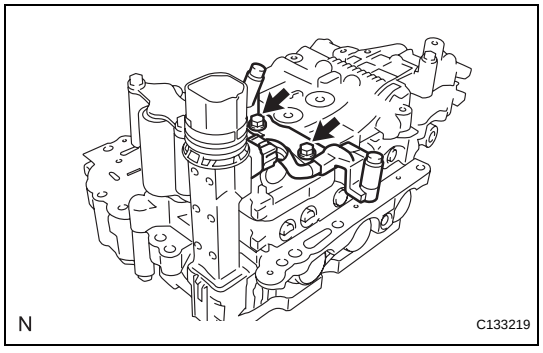
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / ENHANCED OBD / DATA LIST".
(g) According to the display on the tester, read "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition
SPD (NC)	Counter Gear Speed/ display: 50 r/min	HINT: • Lock-up ON (after warming up the engine); input turbine speed (NC) is equal to the engine speed. • Lock-up OFF (Idling at N position); input turbine speed (NC) is nearly equal to the engine speed.

HINT:

- SPD (NC) is always 0 while driving: Open or short in the sensor or circuit.
- SPD (NC) is always more than 0 and less than 300 rpm while driving the vehicle at 31 mph (50 km/h) or more: Sensor trouble, improper installation, or intermittent connection trouble of the circuit.

1	INSPECT SPEED SENSOR (SENSOR INSTALLATION)



(a) Make sure that the connector is properly connected, and check the speed sensor installation.

OK:

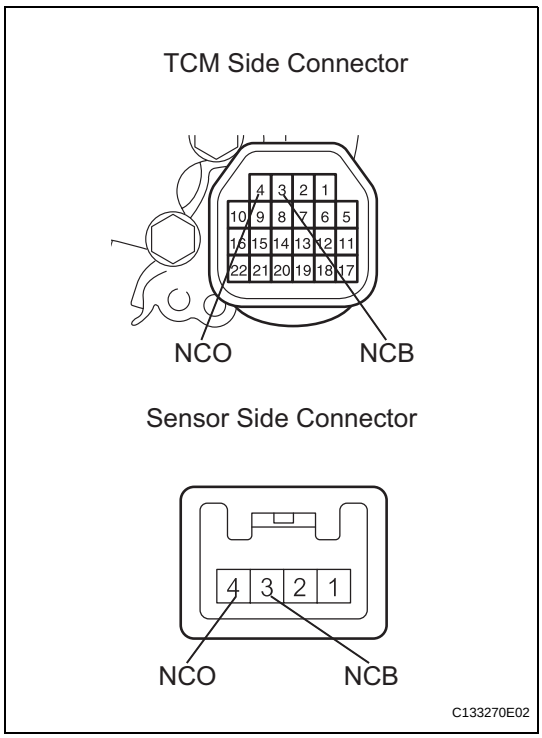
The installation bolts are tightened properly and there is no clearance between the sensor and transaxle case.

NG → **REPAIR OR REPLACE SPEED SENSOR**

OK

AX

2	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the speed sensor connector from the transmission wire.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
NCO - NCO	Below 1 Ω
NCB - NCB	Below 1 Ω
NCO - NCB	10 kΩ or higher

NG → REPLACE TRANSMISSION WIRE

OK

3	REPLACE SPEED SENSOR

NEXT

4	CHECK IF DTC OUTPUT RECURS (SEE IF DTC P0791 AND/OR P0793 IS OUTPUT AGAIN)

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester main switch ON.
(c) Perform the monitor drive pattern (See page AX-27).
(d) When you use the intelligent tester:
Select the item "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(e) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0791 or P0793" is output	A
No outpur	B

B → END

A

REPLACE TCM

DTC	P0796	Pressure Control Solenoid "C" Performance (Shift Solenoid Valve SL3)

SYSTEM DESCRIPTION

AX

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P0796	The engine revs freely when 2nd or 6th gear is requested (2-trip detection logic). When the following is detected twice (2-trip detection logic): • When 1st gear is requested, 2nd gear is engaged.	• Shift solenoid valve SL3 remains open or closed. • Valve body is blocked. • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0796: Shift solenoid valve SL3/OFF malfunction Shift solenoid valve SL3/ON malfunction
Required sensors/Components	Shift solenoid valve SL3, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A) and (B) 0.5 sec. OFF malfunction (C) and (D) 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

The monitor will run whenever this DTC is not present.	P0115 - P0118 (ECT sensor) P0125 (Insufficient ECT for closed loop) P0500 (VSS) P0748, P0778, P0798 (Shift solenoid valve (range))
Transmission range	"D"
TFT (Transmission fluid temperature)	Above -10°C (-14°F)
Knock control sensor circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning

Electronic throttle system	Circuit is not malfunctioning

OFF malfunction (A):

TCM selected gear	2nd
Throttle valve opening angle	3% or more
TCM indicated pressure value of SL1	1,200 kPa
TCM indicated pressure value of SL2	0 kPa
TCM indicated pressure value of SL3	1,200 kPa

OFF malfunction (B):

TCM selected gear	6th
Throttle valve opening angle	3% or more
TCM indicated pressure value of SL1	0 kPa
TCM indicated pressure value of SL2	1,200 kPa
TCM indicated pressure value of SL3	1,200 kPa

OFF malfunction (C):

TCM selected gear	2nd
Throttle valve opening angle:	
(When condition "D" is not detected)	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
(When condition "D" is detected)	0.5% or more at engine speed 500 rpm (condition varies with engine speed)
ECT (engine coolant temperature)	40°C (104°F) or more

OFF malfunction (D):

Throttle valve opening angle	0.5% or more at engine speed 500 rpm (condition varies with engine speed)

ON malfunction:

TCM selected gear	1st
Vehicle speed	1.2 mph (2 km/h) or more
Engine speed - Turbine speed	50 rpm or more
ECT (engine coolant temperature)	Above 40°C (104°F)

TYPICAL MALFUNCTION THRESHOLDS

Either of the following conditions is met: OFF malfunction (A) or (B) or ((C) and (D)), or ON malfunctions

2 detections are necessary per driving cycle:

1st detection; temporary flag ON

2nd detection; pending fault code ON

OFF malfunction (A):

Turbine speed - Output speed x 2nd gear ratio	1,000 rpm or more

OFF malfunction (B):

Turbine speed - Output speed x 6th gear ratio	1,000 rpm or more

OFF malfunction (C):

Input (turbine) speed/Intermediate shaft speed	3.304 to 7.724

OFF malfunction (D):

Input (turbine) speed/Intermediate shaft speed	3.304 to 7.724

ON malfunction:

Input (turbine) speed/Intermediate shaft speed	1.901 to 2.340

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P0796)

AX

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0796" is output	A
"P0796" and other DTCs	B

HINT:
If a solenoid is stuck OFF , DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → **Go to step 3**

B

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

NOTICE:
This test should always be performed with at least 2 people.
(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
HINT:
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	Possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown in the DATA LIST/SHIFT display on the intelligent tester.
(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:
- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)**

B → **GO TO DTC CHART (RELATED SHIFT SOLENOID VAVLE (SL2) PERFORMANCE DTC P0776)**

D → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)**

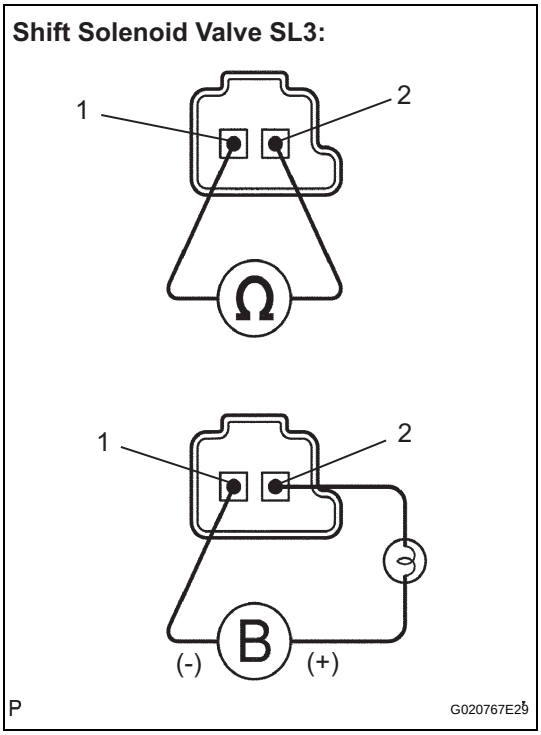
E → **GO TO DTC CHART (RELATED SHIFT SOLENOID VAVLE (SLT) PERFORMANCE DTC P2714)**

C

3	INSPECT SHIFT SOLENOID VALVE (SL3)

AX

Shift Solenoid Valve SL3:



(a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE (SL3)**

OK

4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

5	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P0798	Pressure Control Solenoid "C" Electrical (Shift Solenoid Valve SL3)

DESCRIPTION

Shifting gears from 1st through 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3 and SL4 which are controlled by the TCM. If an open or short circuit occurs in any of the shift solenoid valves, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detecting Condition	Trouble Area
P0798	The TCM checks for an open or short in the shift solenoid valve SL3 circuit while driving and shifting gears. (1-trip detection logic) • Output signal duty equals to 100%. (NOTE: SL3 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL3 circuit • Shift solenoid valve SL3 • TCM

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. And the TCM performs the fail-safe function and turns the other normal shift solenoid valves on or off (In case of an open or short circuit, the TCM stops sending current to the circuit.)
(See page AX-39).

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

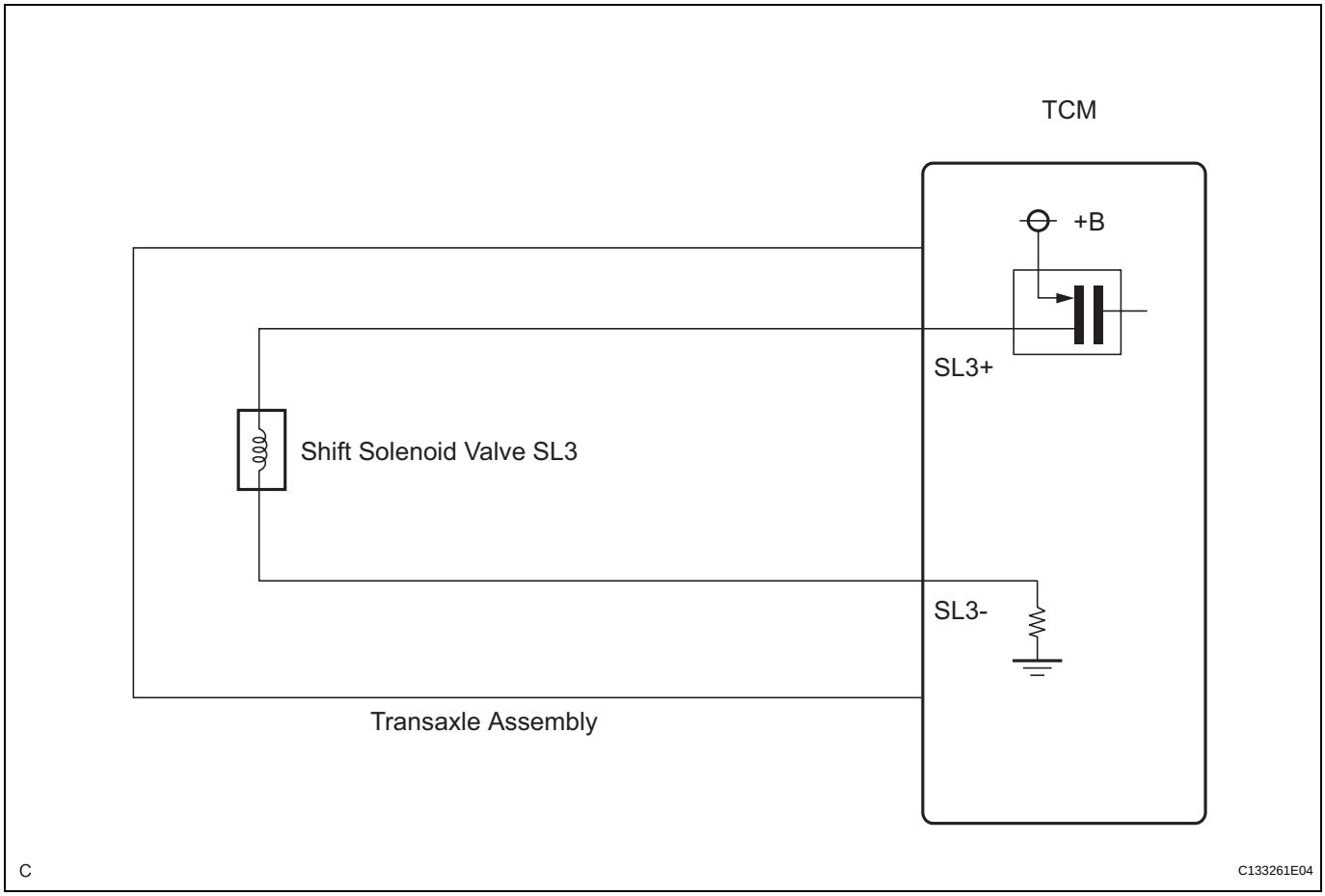
Output signal duty	100%

COMPONENT OPERATING RANGE

Output signal duty	Less than 100%

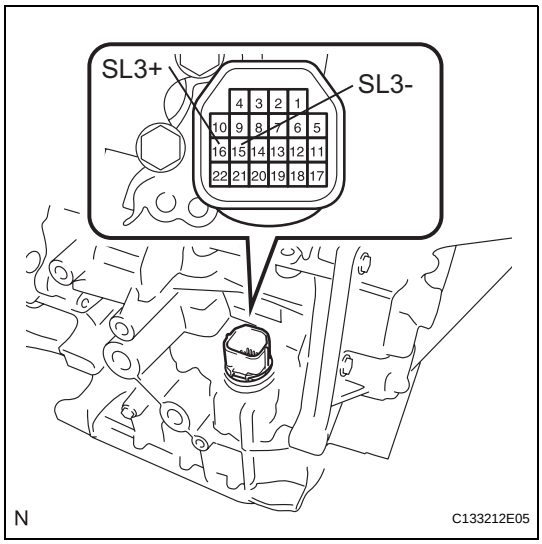
AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SL3)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
16 (SL3+) - 15 (SL3-)	5.0 to 5.6 Ω

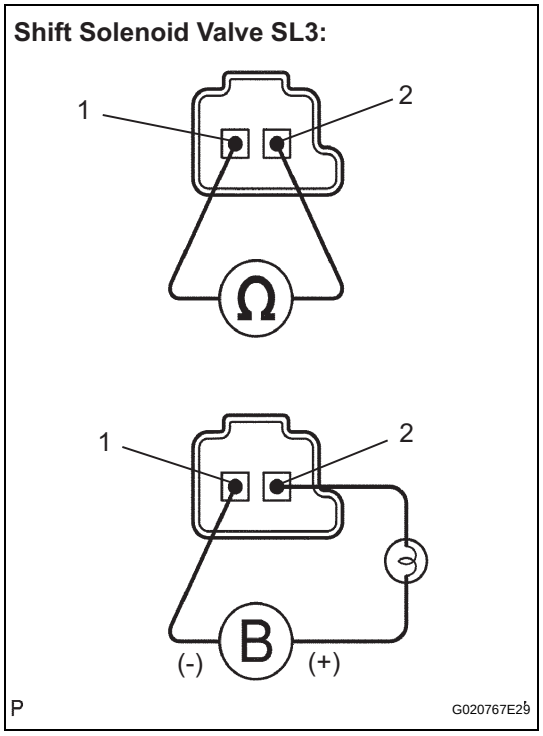
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

Tester Connection	Specified Condition
16 (SL3+) - Body ground	10 kΩ or higher
15 (SL3-) - Body ground	10 kΩ or higher

OK	REPLACE TCM

NG

2	INSPECT SHIFT SOLENOID VALVE (SL3)



(a) Remove the shift solenoid valve SL3.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead throgh a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE (SL3)**

OK

REPLACE TRANSMISSION WIRE

AX

DTC	P0872	Transmission Fluid Pressure Switch No.1 Circuit Low

DTC	P0873	Transmission Fluid Pressure Switch No.1 Circuit High

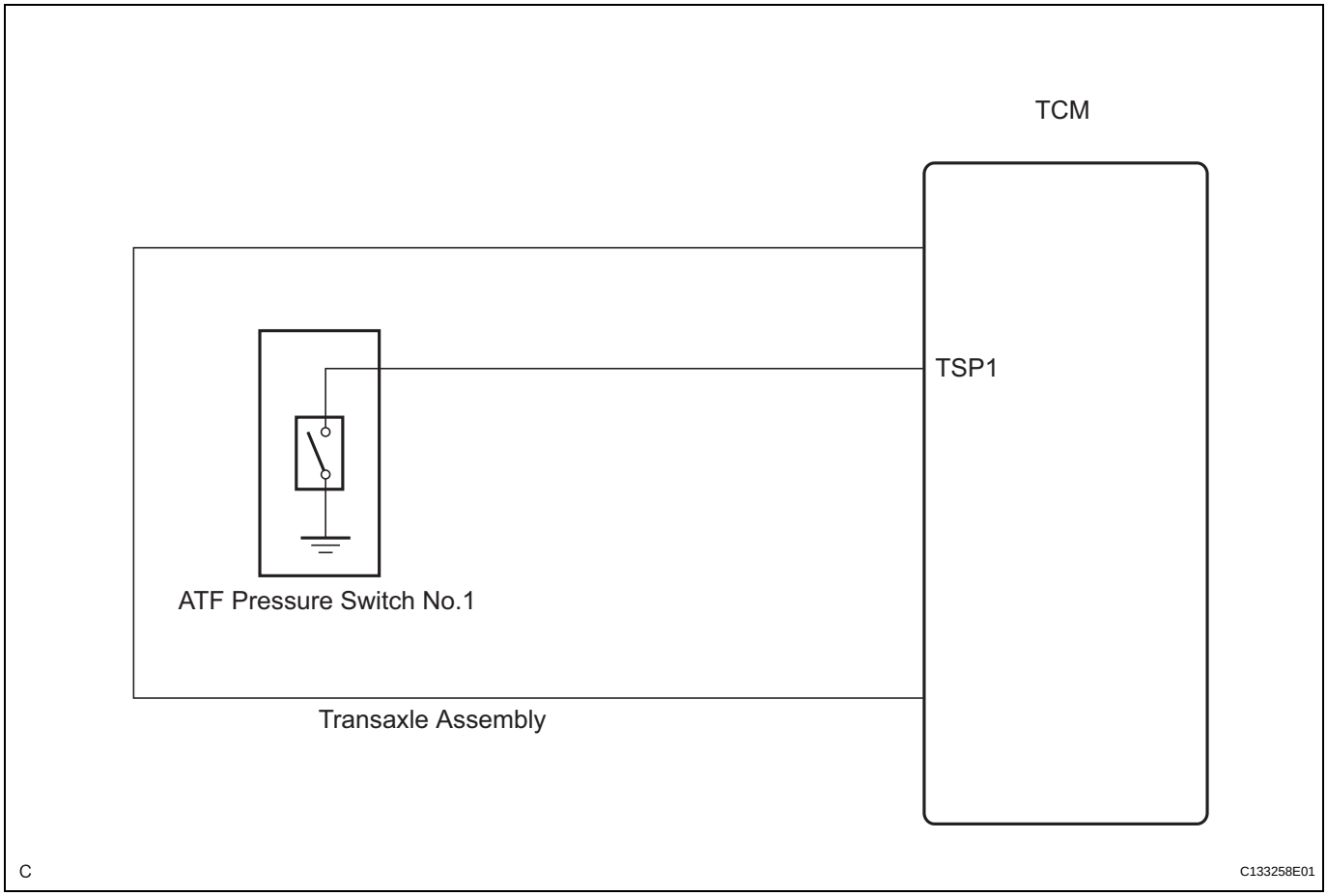
AX

DESCRIPTION

ATF pressure switch No. 1 is installed in the shift solenoid valve ATF output passage. This switch is used to identify the malfunctioning part when a fail-safe operation is performed. If the shift solenoid valve malfunctions when the ATF pressure switch has a malfunction, a fail-safe operation will be performed. This fail-safe operation is different from the fail-safe operation performed when the solenoid valve malfunctions and the ATF pressure switch is normal.

DTC No.	DTC Detecting Condition	Trouble Area
P0872	ATF pressure switch No. 1 OFF is detected twice when any of the gears from 1st to 4th engages normally.	• ATF temperature sensor assembly (ATF pressure switch No. 1) • Transmission wire • TCM
P0873	ATF pressure switch No. 1 ON is detected twice when 5th or 6th gear engages normally.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0872 OR P0873)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0873" is output	A
Only "P0872" is output	B
"P0872 or P0873" and other DTCs	C

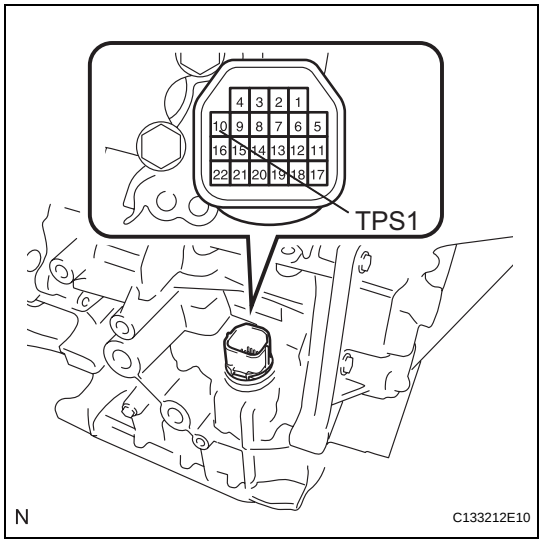
HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B → **Go to step 4**

C → **GO TO DTC CHART**

A

2	CHECK TRANSMISSION WIRE (SHORT TO GROUND)



(a) Remove the TCM.
(b) Measure the resistance according to the value(s) in the table below.

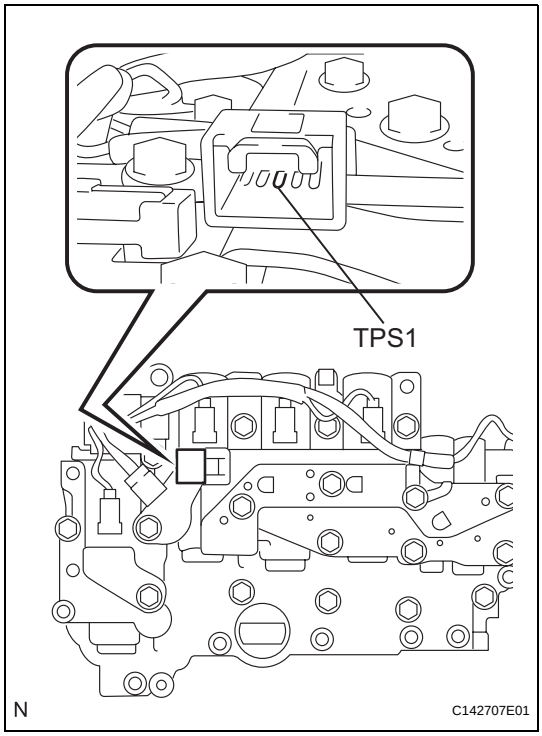
Standard resistance

Tester Condition	Specified Condition
10 (TPS1) - Body ground (Valve body assembly)	10 kΩ or higher

OK → **REPLACE TCM**

NG

3	CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 1)



(a) Disconnect the transmission wire connector from the ATF temperature sensor assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

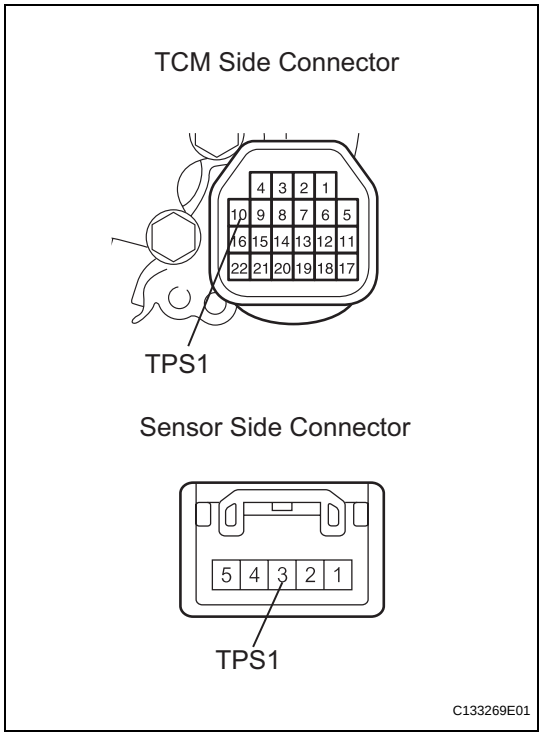
Tester Condition	Specified Condition
3 (TPS1) - Body ground (Valve body assembly)	10 kΩ or higher

NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK

REPLACE TRANSMISSION WIRE

4	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the connector from the ATF temperature sensor assembly.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
10 (TPS1) - 3 (TPS1)	Below 1 Ω
10 (TPS1) or 3 (TPS1) - Body ground (Valve body assembly)	10 kΩ or higher

NG → **REPLACE TRANSMISSION WIRE**

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

AX

DTC	P0877	Transmission Fluid Pressure Switch No.2 Circuit Low

DTC	P0878	Transmission Fluid Pressure Switch No.2 Circuit High

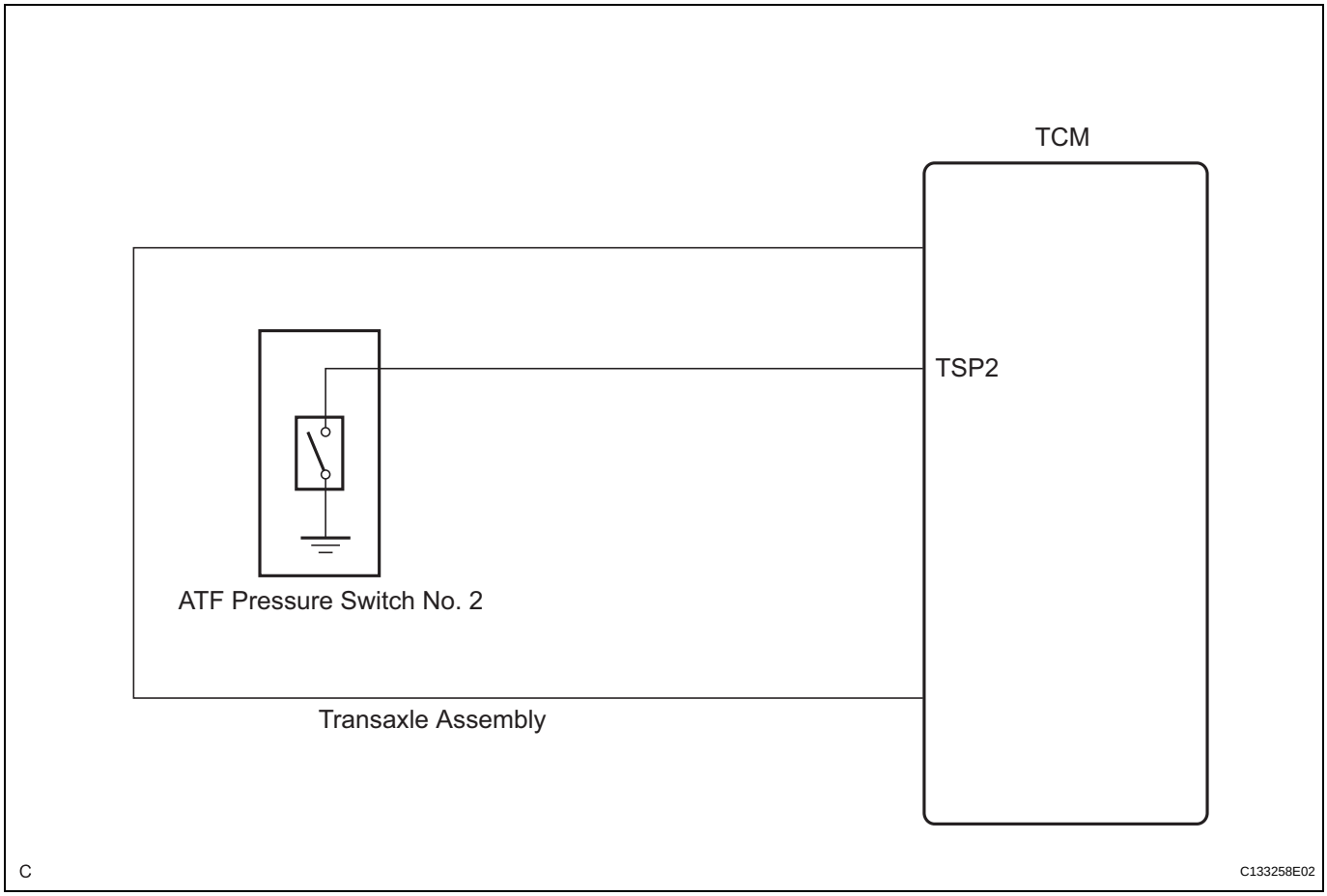
AX

DESCRIPTION

ATF pressure switch No. 2 is installed in the shift solenoid valve ATF output passage. This switch is used to identify the malfunctioning part when a fail-safe operation is performed. If the shift solenoid valve malfunctions when the ATF pressure switch has a malfunction, a fail-safe operation will be performed. This fail-safe operation is different from the fail-safe operation performed when the solenoid valve malfunctions and the ATF pressure switch is normal.

DTC No.	DTC Detecting Condition	Trouble Area
P0877	ATF pressure switch No. 2 OFF is detected twice when any of the gears from 4th to 6th engages normally.	• ATF temperature sensor assembly (ATF pressure switch No. 2) • Transmission wire • TCM
P0878	ATF pressure switch No. 2 ON is detected twice when any of the gears from 1st to 3rd engages normally.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0877 OR P0878)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P0878" is output	A
Only "P0877" is output	B
"P0877 or P0878" and other DTCs	C

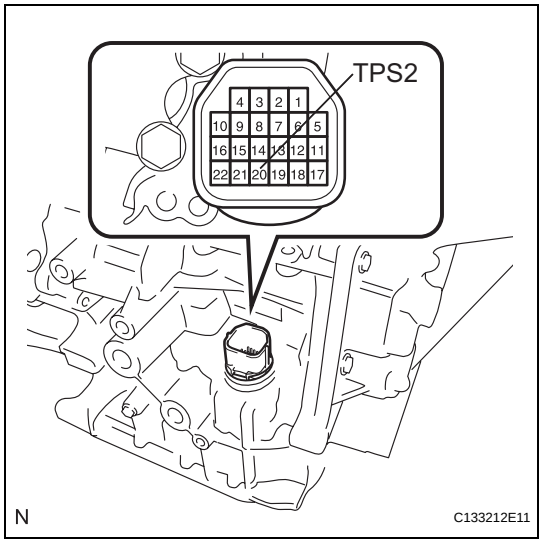
HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B → **Go to step 4**

C → **GO TO DTC CHART**

A

2	CHECK TRANSMISSION WIRE (SHORT TO GROUND)



(a) Remove the TCM.
(b) Measure the resistance according to the value(s) in the table below.

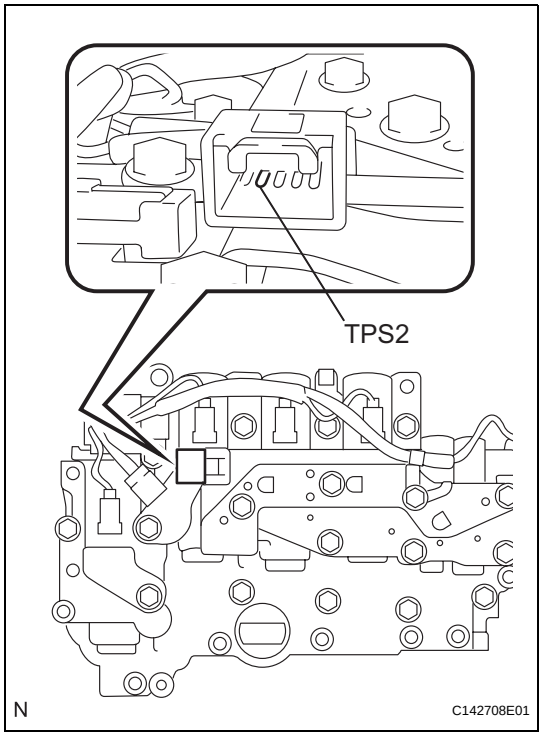
Standard resistance

Tester Condition	Specified Condition
20 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

OK → **REPAIR OR REPLACE TCM**

NG

3	CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 2)



(a) Disconnect the transmission wire connector from the ATF temperature sensor assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

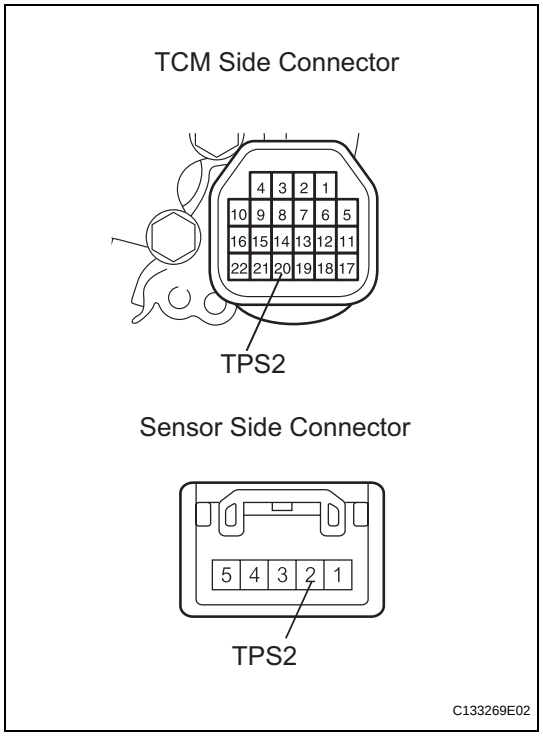
Tester Condition	Specified Condition
4 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK

REPLACE TRANSMISSION WIRE

4	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the connector from the ATF temperature sensor assembly.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
20 (TPS2) - 2 (TPS2)	Below 1 Ω
20 (TPS2) or 2 (TPS2) - Body ground (Valve body assembly)	10 kΩ or higher

NG → **REPLACE TRANSMISSION WIRE**

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

AX

DTC	P0989	Transmission Fluid Pressure Switch No.3 Circuit Low

DTC	P0990	Transmission Fluid Pressure Switch No.3 Circuit High

DESCRIPTION

ATF pressure switch No. 3 is installed in the lock-up solenoid ATF output passage and is used to detect a malfunction in the lock-up solenoid.

DTC No.	DTC Detection Condition	Trouble Area
P0989	Transmission fluid pressure switch No. 3 is OFF when lock-up occurs in response to a lock-up request (2 trip detection logic).	• ATF temperature sensor assembly (ATF pressure switch No. 3) • Transmission wire • TCM
P0990	When both of the following are detected (2 trip detection logic): • Transmission fluid pressure switch No. 3 is ON when lock-up does not occur. • Lock-up does not occur when shift solenoid valve (SLU) is requested to turn off in the lock-up range.	

MONITOR DESCRIPTION

The TCM illuminates the MIL and stores the DTC when the TCM detects that the ATF pressure switch is OFF with the lock-up solenoid ON or when the TCM detects that the ATF pressure switch is ON with the lock-up solenoid OFF.

MONITOR STRATEGY

Related DTCs	P0989: Transmission fluid pressure switch No. 3 OFF malfunction P0990: Transmission fluid pressure switch No. 3 ON malfunction
Required sensors/Components	Transmission fluid pressure switch No. 3
Frequency of operation	Continuous
Duration	4 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever these DTCs are not present	None
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLU circuit	Circuit is not malfunctioning
TFT sensor circuit	Circuit is not malfunctioning
Torque converter clutch circuit	Circuit is not malfunctioning
ECT sensor circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Electric throttle system	Circuit is not malfunctioning
TFT (Transmission fluid temperature)	Above -10°C (14°F)

ECT (Engine coolant temperature)	40°C (104°F) or more
Transmission range	"D"
TCM selected gear	Not 1st
Vehicle speed	15.5 mph (25 km/h) or more

P0989:

TCM lock-up command	ON
Engine speed - Turbine speed	Less than 20 rpm
Throttle valve opening angle	7% or more
Vehicle speed	Less than 62 mph (100 km/h)
Shift solenoid valve SLU	Not ON malfunction

P0990:

TCM indicated pressure valve of SLU	Less than 4 kPa
TCM lock-up command	OFF
Shift solenoid valve SLU	Not malfunction
Shift solenoid valve SL	Not OFF malfunction

TYPICAL MALFUNCTION THRESHOLDS

P0989:

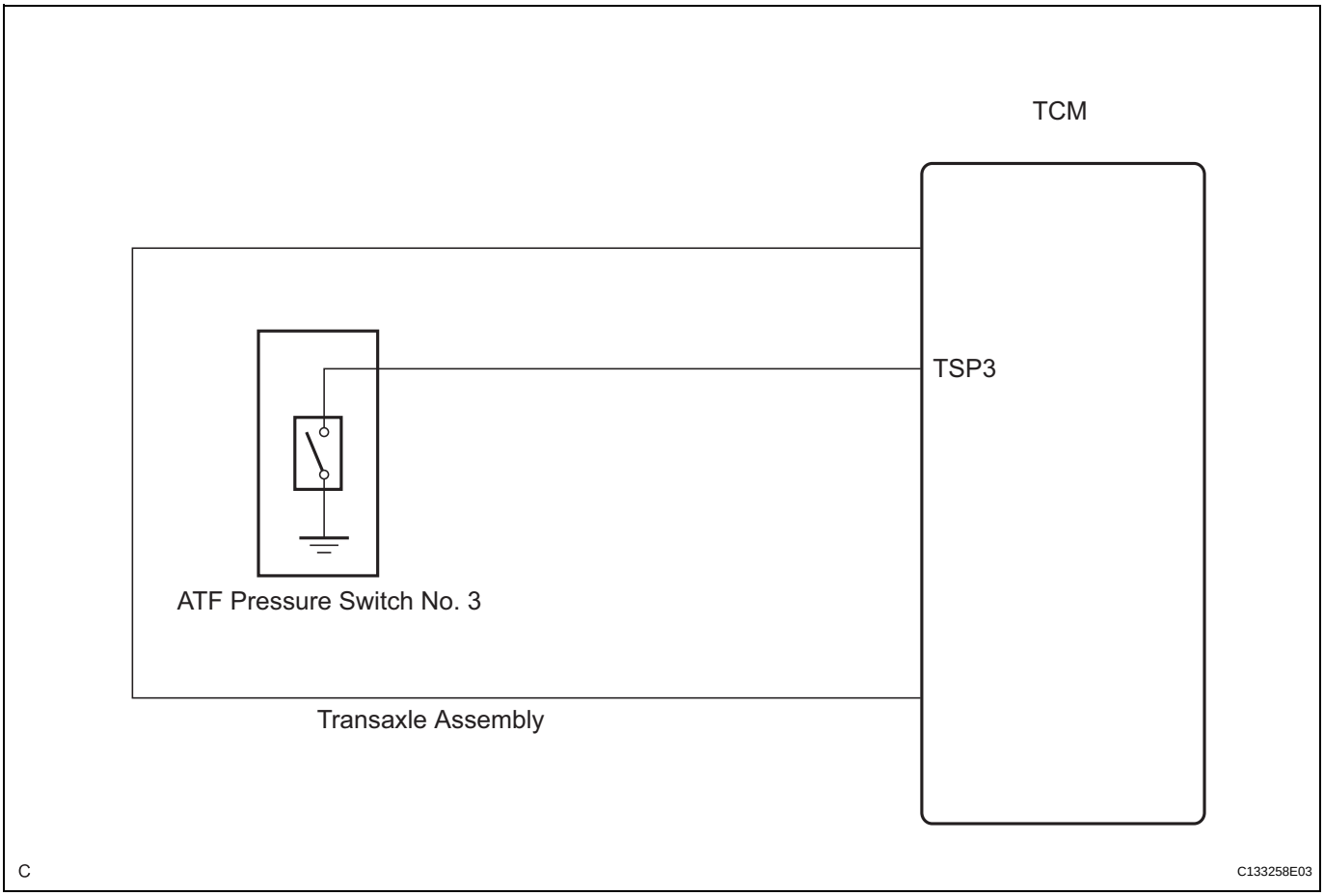
Transmission fluid pressure switch No. 3	OFF

P0990:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	Less than 20 rpm
(b) Transmission fluid pressure switch No. 3	ON

AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK OTHER DTC OUTPUT (IN ADDITION TO DTC P0989 OR P0990)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

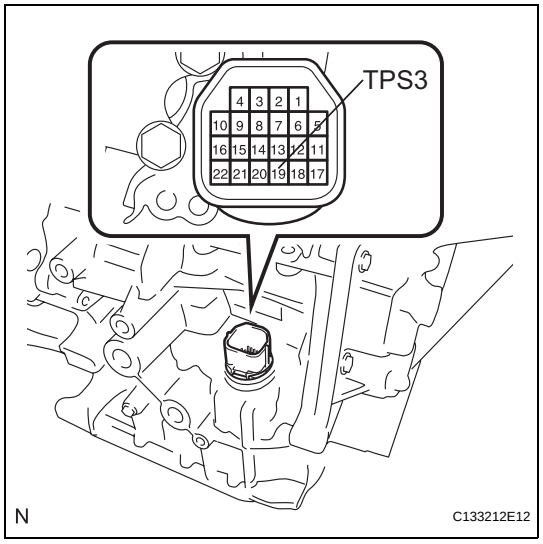
Display (DTC output)	Proceed to
Only "P0990" is output	A
Only "P0989" is output	B
"P0989 or P0990" and other DTCs	C

HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

B	Go to step 4
C	GO TO DTC CHART

A

2 CHECK TRANSMISSION WIRE (SHORT TO GROUND)



(a) Remove the TCM.
(b) Measure the resistance according to the value(s) in the table below.

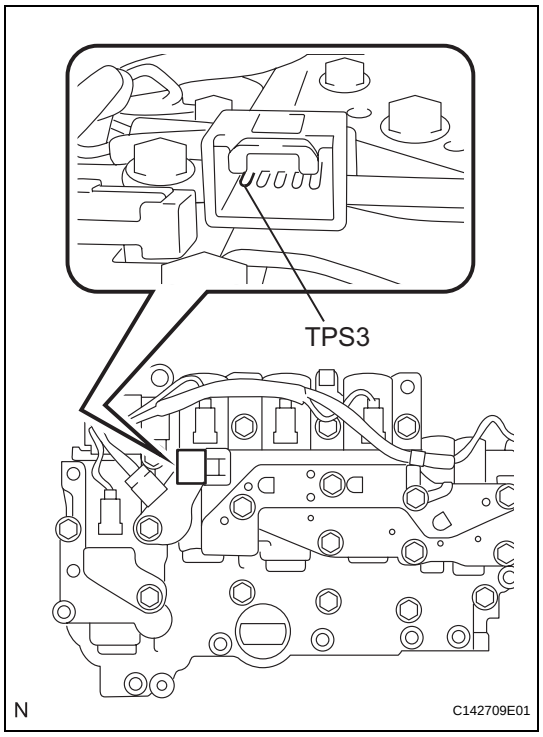
Standard resistance

Tester Condition	Specified Condition
19 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

OK → **REPLACE TCM**

NG

3 CHECK ATF TEMPERATURE SENSOR ASSEMBLY (ATF PRESSURE SWITCH NO. 3)



(a) Disconnect the connector from the ATF temperature sensor assembly.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

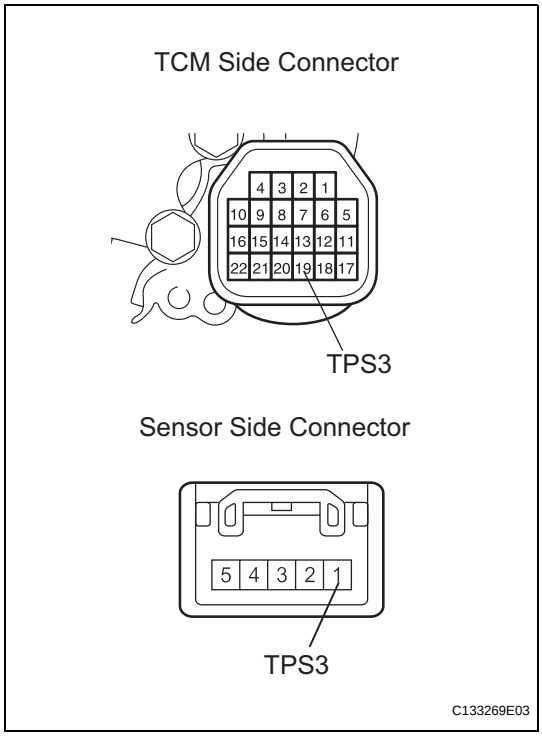
Tester Condition	Specified Condition
5 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

NG → **REPLACE ATF TEMPERATURE SENSOR ASSEMBLY**

OK

REPLACE TRANSMISSION WIRE

4	CHECK TRANSMISSION WIRE



(a) Remove the TCM.
(b) Disconnect the connector from the ATF temperature sensor assembly.
(c) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
19 (TPS3) - 1 (TPS3)	Below 1 Ω
19 (TPS3) or 1 (TPS3) - Body ground (Valve body assembly)	10 kΩ or higher

NG → **REPLACE TRANSMISSION WIRE**

OK

REPLACE ATF TEMPERATURE SENSOR ASSEMBLY

DTC	P2714	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)

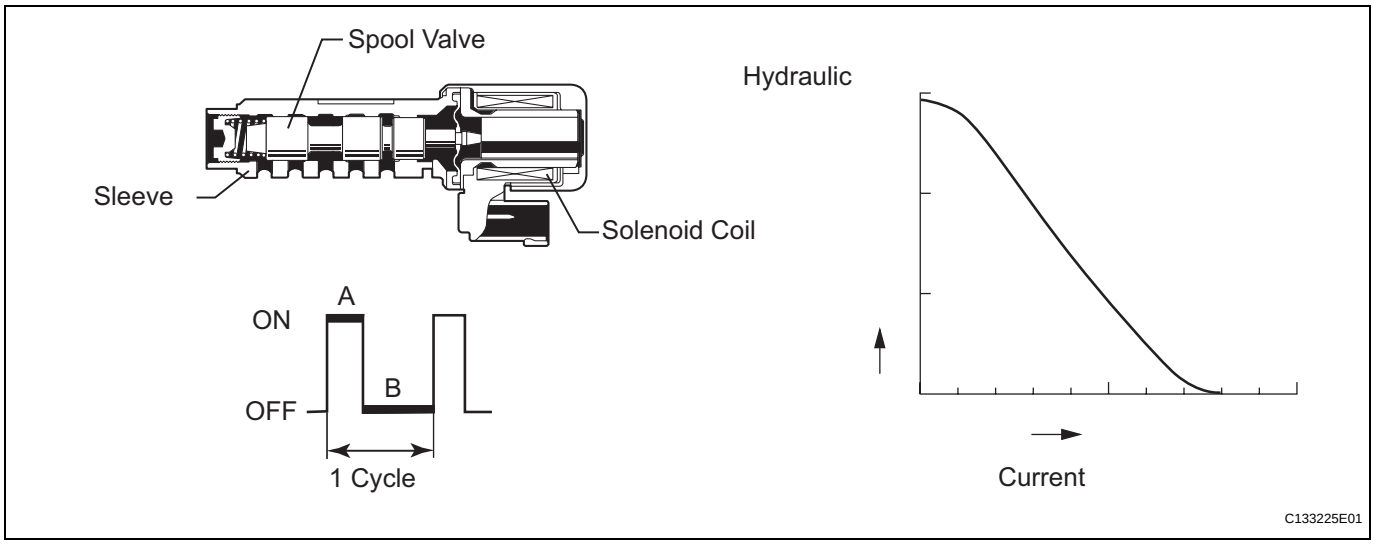
SYSTEM DESCRIPTION

The linear solenoid valve (SLT) controls the transmission line pressure for smooth transmission operation based on signals from the throttle position sensor and the vehicle speed sensor. The TCM adjusts the duty ratio (*) of the SLT solenoid valve to control hydraulic line pressure coming from the primary regulator valve. Appropriate line pressure assures smooth shifting with varying engine outputs.

(*): Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

Duty Ratio= A/(A+B) x 100 (%)



DTC No.	DTC Detection Condition	Trouble Area
P2714	The ECM detects a malfunction in the shift solenoid valve SLT (ON side) according to the difference in the speed between the turbine and the output shaft, and also by the transmission fluid pressure. (2-trip detection logic)	• Shift solenoid valve SLT remains open • Shift solenoid valve SL1, SL2, SL3 or SL4 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear, etc.)

MONITOR DESCRIPTION

The TCM calculates the amount of heat absorbed by the friction material based on the difference in revolution (clutch slippage) between the turbine and output shaft. The TCM turns on the MIL and outputs this DTC when the amount of heat absorption exceeds the specified value.

When the shift solenoid valve SLT remains on, oil pressure goes down and clutch engagement force decreases.

NOTICE:

If driving continues under these conditions, the clutches will burn out and the vehicle will no longer be drivable.

MONITOR STRATEGY

Related DTCs	P2714: Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	Immediate
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ON malfunction:

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor circuit	Circuit is not malfunctioning
TFT sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLT circuit	Circuit is not malfunctioning
ECT (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
ETCS (Electric throttle control system)	System is not down
Transmission range	"D"
Engine	Starting
TFT	-10°C (5°F) or more
Input turbine torque	100 N*m or more
Turbine speed	250 rpm or more
Output speed	250 rpm or more

TYPICAL MALFUNCTION THRESHOLDS

ON malfunction:

Detection criteria	Threshold
Turbine speed - Output speed x Gear ratio at output speed 1,000 rpm (Condition varies with output speed)	75 rpm or more

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2714)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P2714" is output	A
"P2714" and other DTCs	B

HINT:
If a solenoid is stuck ON, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → INSPECT SHIFT SOLENOID VALVE SLT

B

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SHIFT SOLENOID VALVE SLT)

NOTICE:

- **Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F)**
- **Be sure to prevent SST hose from interfering with the exhaust pipe.**
- **This check must be conducted after checking and adjusting the engine.**
- **Perform the test with the A/C OFF.**

HINT:

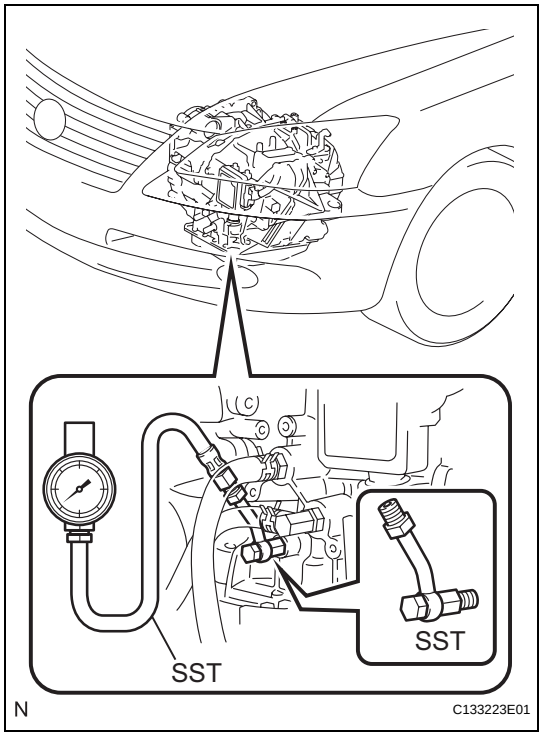
Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to operate without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Turn the ignition switch off.
(b) Lift the vehicle up.
(c) Remove the test plug on the transmission case center right side and connect SST.

SST 09992-00095 (09992-00231, 09992-00271)

(d) Lower the vehicle.
(e) Fully apply the parking brake and chock the 4 wheels.
(f) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(g) Start the engine.
(h) Warm up the ATF (Automatic Transmission Fluid).
(i) Measure the line pressure when the engine is idling.
(j) Turn on the tester.
(k) Enter the following items: DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SOLENOID (SLT)".
(l) Follow the instructions on the tester and perform the ACTIVE TEST.
(m) Measure the line pressure with SST.



Item	Test Details
SOLENOID (SLT)*	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] • Vehicle Stopped. • IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLT)" is performed, the TCM commands the SLT solenoid to turn off). ON: No action (normal operation)

AX

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check that the line pressure changes by connecting the SST to the automatic transaxle. The same SST is used in the HYDRAULIC TEST (See page AX-17) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST are different from each other.

OK:

The line pressure changes as specified when performing the ACTIVE TEST.

NG → **Go to step 5**

OK

3	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (SHIFTING TEST)

NOTICE:

This test should always be performed with at least 2 people.

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

The DATA LIST can be displayed during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Start the engine.
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
(g) Follow the instructions on the tester and read the ACTIVE TEST.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] • IDL: ON [Others] • Press "→" button: Shift up • Press "←" button: Shift down	It is possible to check the operation of the shift solenoid valves.

NOTICE:

- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown on the DATA LIST/SHIFT display on the intelligent tester.

(h) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.

HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(i) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:
- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)**

B → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)**

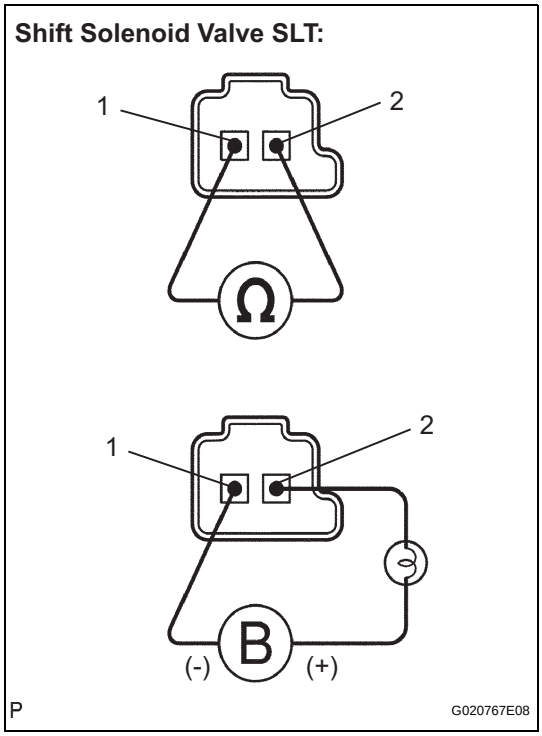
AX

C → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)

D → GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL4) PERFORMANCE DTC P2808)

E

4 INSPECT SHIFT SOLENOID VALVE SLT



(a) Remove the shift solenoid valve SLT.

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → REPLACE SHIFT SOLENOID VALVE SLT

OK

5 INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → REPLACE TRANSMISSION VALVE BODY ASSEMBLY

OK

6 INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Check the torque converter clutch assembly (See page AX-239).

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSMISSION ASSEMBLY

DTC	P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)

DESCRIPTION

Refer to DTC P2714 (See page AX-121).

DTC No.	DTC Detection Condition	Trouble Area
P2716	Open or short is detected in shift solenoid valve SLT circuit for 1 second or more while driving (1-trip detection logic).	• Open or short in shift solenoid valve SLT circuit • Shift solenoid valve SLT • TCM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the TCM interprets this as a fault. The TCM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716: Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Solenoid current cut status	Not cut
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	10 V to 12 V

Malfunction (B):

Battery voltage	10 V or more and less than 12 V
Target current	0.75 A

Malfunction (C):

Battery voltage	8 V or more
Target current	1 A

Malfunction (D):

Battery voltage	11 V or more
Target current	1 A or more

Malfunction (E):

Battery voltage	11 V or more
Target current	0.1 A or more
Commanded voltage - Last commanded voltage	Less than 0.02 V

TYPICAL MALFUNCTION THRESHOLDS

Malfunction (A) and (B):

Output signal duty	100% or more

Malfunction (C):

Output signal duty	0% or less

Malfunction (D):

Output signal monitor	No signal

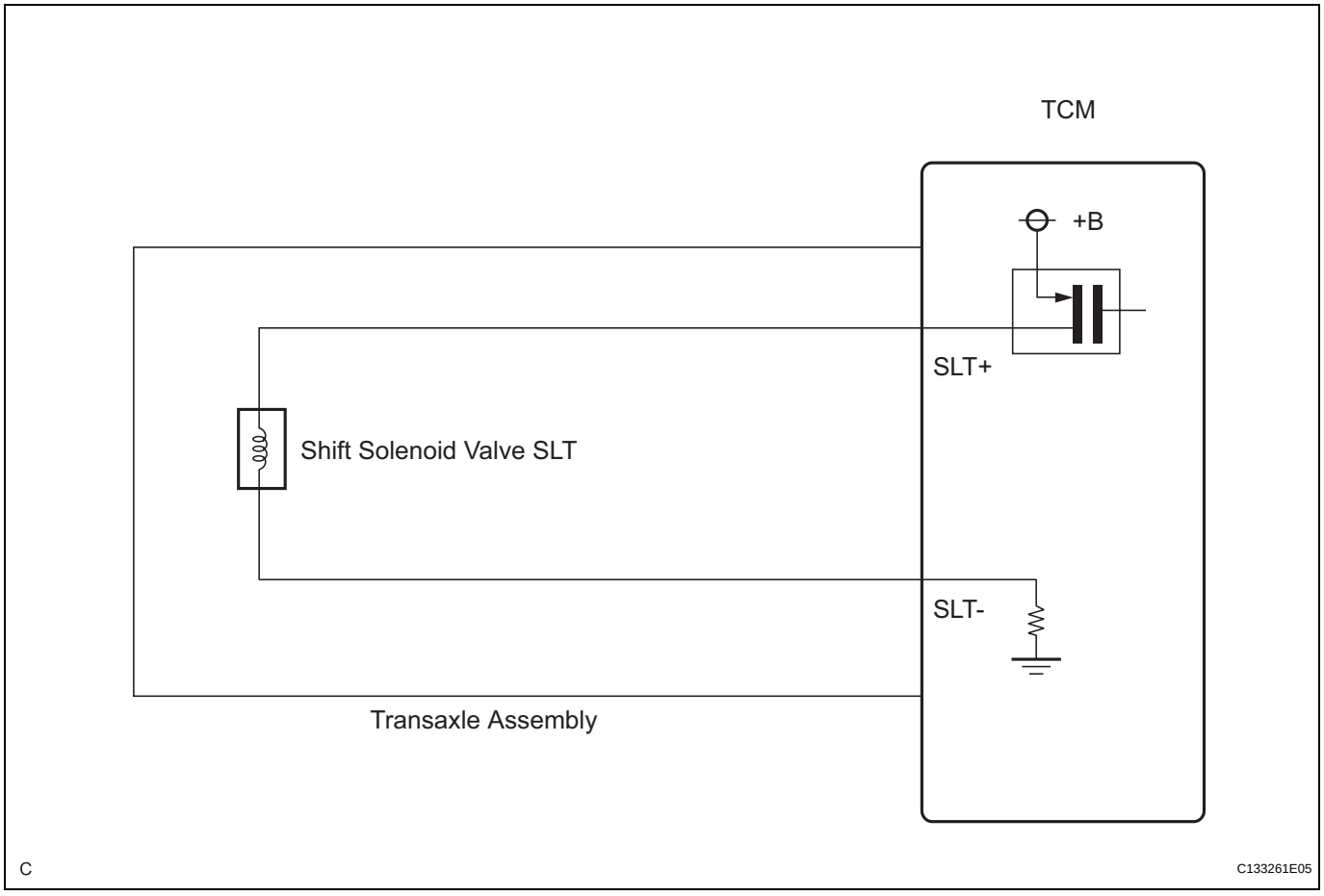
Malfunction (E):

Commanded voltage - Last commanded voltage	0.02 V or more

COMPONENT OPERATING RANGE

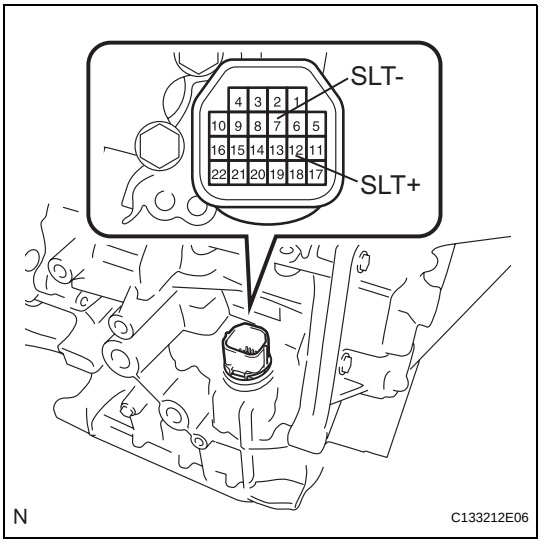
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SLT)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
12 (SLT+) - 7 (SLT-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

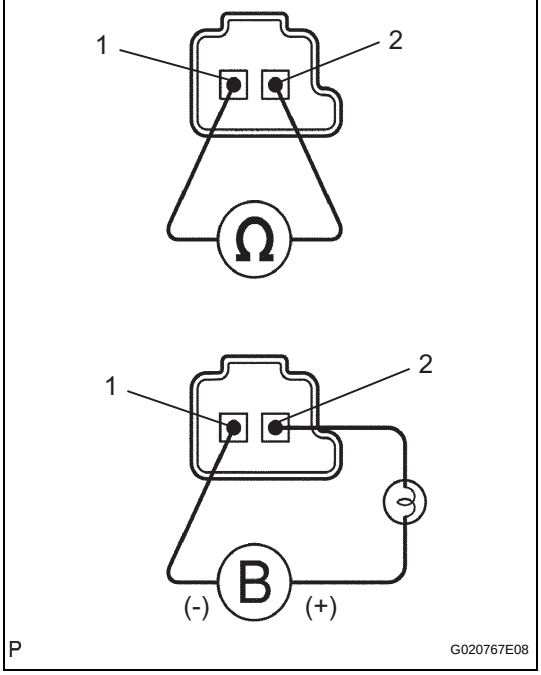
Tester Connection	Specified Condition
12 (SLT+) - Body ground	10 kΩ or higher
7 (SLT-) - Body ground	10 kΩ or higher

OK → **REPLACE TCM**

NG

2 INSPECT SHIFT SOLENOID VALVE SLT

Shift Solenoid Valve SLT:



(a) Remove the shift solenoid valve SLT.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE SLT**

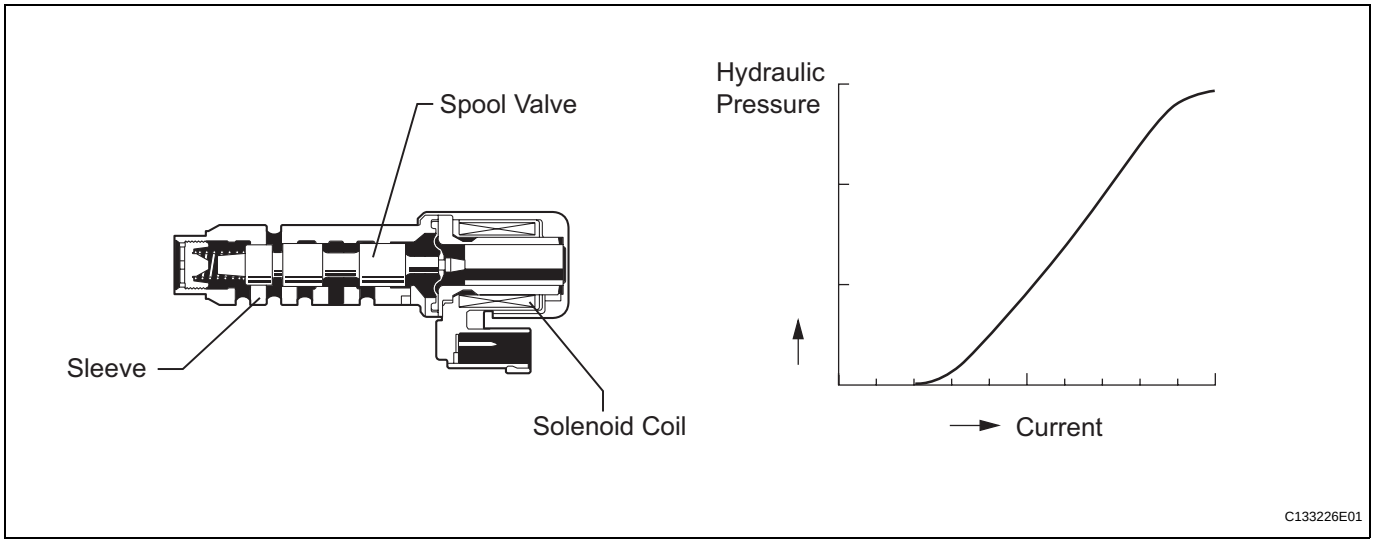
OK

REPLACE TRANSMISSION WIRE

DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)

SYSTEM DESCRIPTION

The TCM uses the signals from the throttle position sensor, air-flow meter, turbine (input) speed sensor, output speed sensor and crankshaft position sensor to monitor the engagement condition of the lock-up clutch.



The TCM compares the engagement condition of the lock-up clutch with the lock-up schedule in the TCM memory to detect shift solenoid valve SLU, valve body and torque converter clutch mechanical problems.

DTC No.	DTC Detection Condition	Trouble Area
P2757	When both of the following are detected (2-trip detection logic): • Lock-up does not occur when requested. • Transmission fluid pressure switch No. 3 is OFF. When both of the following are detected (2-trip detection logic): • Transmission fluid pressure switch No. 3 is ON when lock-up does not occur. • Lock-up occurs when the shift solenoid valve SLU is requested to turn on in the lock-up range.	• Shift solenoid valve SLU remains open or closed • Valve body is blocked • Torque converter clutch • Automatic transaxle (clutch, brake or gear, etc.) • Line pressure is too low

MONITOR DESCRIPTION

Torque converter lock-up is controlled by the TCM based on the turbine (input) speed sensor NT, output speed sensor NC, engine rpm, engine load, engine temperature, vehicle speed, transmission fluid temperature, and gear selection. The TCM determines the lock-up status of the torque converter by comparing the engine rpm (NE) to the input turbine rpm (NT). The TCM calculates the actual transmission gear by comparing input turbine rpm (NT) to output shaft rpm (NC). When conditions are appropriate, the TCM requests "lock-up" by applying control voltage to the shift solenoid SLU. When the SLU is turned on, it applies pressure to the lock-up relay valve and locks the torque converter clutch.
If the TCM detects no lock-up after lock-up has been requested or if it detects lock-up when it is not requested, the TCM interprets this as a fault in the shift solenoid valve SLU or lock-up system performance.
The TCM will turn on the MIL and store the DTC.
Example:
When any of the following is met, the system judges it as a malfunction.

- There is a difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up.
  (Engine speed is at least 70 rpm greater than input turbine speed.)
- There is no difference in rotation between the input side (engine speed) and output side (input turbine speed) of the torque converter when the TCM commands lock-up off.
  (The difference between engine speed and input turbine speed is less than 20 rpm.)

MONITOR STRATEGY

Related DTCs	P2757: Shift solenoid valve SLU OFF malfunction Shift solenoid valve SLU ON malfunction
Required sensors/Components	Shift solenoid valve SLU
Frequency of operation	Continuous
Duration	OFF malfunction (A): 3.5 sec. OFF malfunction (B): 0.05 sec. ON malfunction: 1.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The following items are common to all conditions below.

The monitor will run whenever this DTC is not present.	None
Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
Shift solenoid valve SLU circuit	Circuit is not malfunctioning
Knock sensor circuit	Circuit is not malfunctioning
ETCS (Electric throttle control system)	System is not down
Transmission shift position	"D"
ECT (Engine coolant temperature)	40°C (104°F) or more
Spark advance from Max. retard timing by KCS control	0°CA or more
TFT (Transmission fluid temperature)	Above -10°C (5°F)
TCM selected gear	Not 1st
Vehicle speed	15.5 mph (25 km/h) or more
Torque converter clutch circuit	Circuit is not malfunctioning
ECT circuit	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

OFF malfunction (A):

TCM lock-up command	ON
Duration time from lock-up on command	3 sec. or more
Shift solenoid valve SLU	ON malfunction not occuring

ON malfunction:

TCM lock-up command	OFF (SLU pressure: less than 4 kPa (0.04 kgfcm^2, 0.6 psi)
Duration time from lock-up on command	0.064 sec. or more
Throttle valve opening angle	7% or more
Vehicle speed	Less than 37.3 mph (60 km/h)

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	70 rpm or more
(b) Transmission fluid pressure switch	OFF

ON malfunction:

Following conditions are met	(a) and (b)
(a) Engine speed - Turbine speed	Less than 35 rpm
(b) Transmission fluid pressure switch	ON

COMPONENT OPERATING RANGE

Speed sensor (NT)	Input speed is equal to engine speed when lock-up is ON.

INSPECTION PROCEDURE

1. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

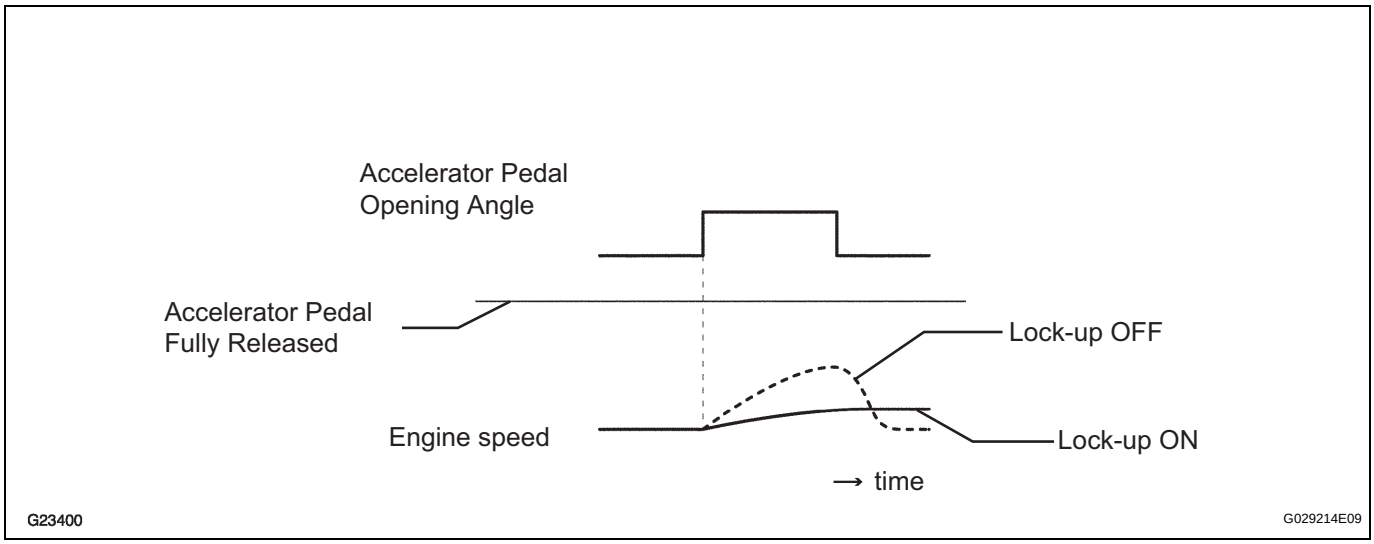
(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST".
(g) According to the display on the tester, perform "ACTIVE TEST".

Item	Test Details	Diagnostic Note
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transaxle to the lock-up condition. [Vehicle Condition] • Throttle valve opening angle: Less than 35% • Vehicle Speed: 37 mph (60 km/h) or more	Possible to check the SLU operation.

HINT:

- This test can be conducted when the vehicle speed is 36 mph (58 km/h) or more.
- This test can be conducted with the 6th gear.

(h) Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.



HINT:

- When changing the accelerator pedal opening angle while driving, if the engine speed does not change, lock-up is on.
- Slowly release, but not fully, the accelerator pedal in order to decelerate. (Fully releasing the pedal will close the throttle valve and lock-up may be turned off automatically.)

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2757)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

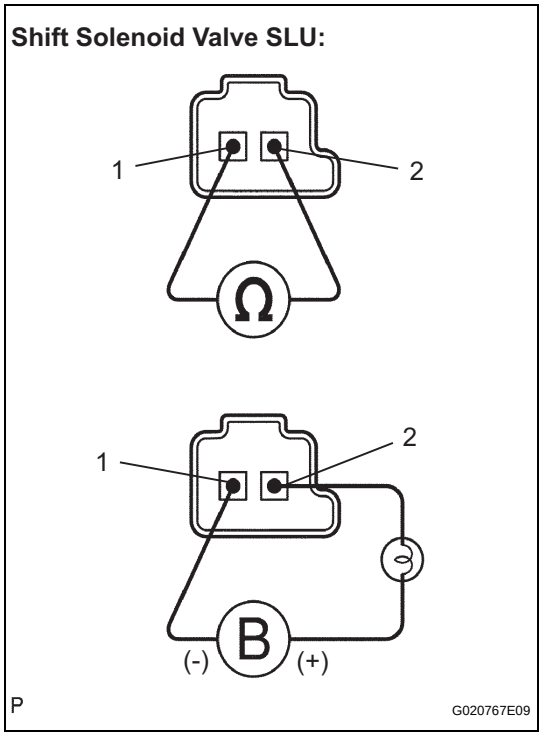
Display (DTC output)	Proceed to
Only "P2757" is output	A
"P2757" and other DTCs	B

HINT:
If any other codes besides "P2757" are output, perform troubleshooting for those DTCs first.

B → GO TO DTC CHART

A

2	INSPECT SHIFT SOLENOID VALVE SLU



(a) Remove the shift solenoid valve SLU.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE SLU**

OK

3	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve.

NG → **REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

4	INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

(a) Check the torque converter clutch assembly (See page AX-239).

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

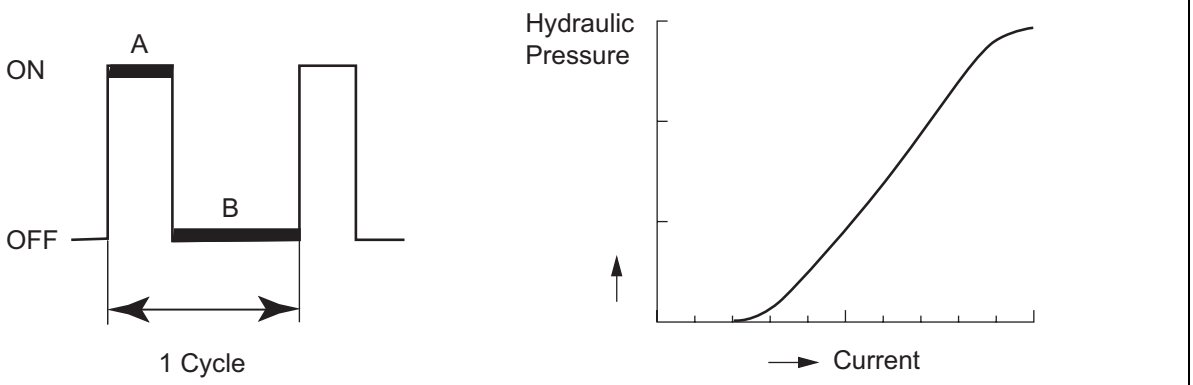
REPLACE AUTOMATIC TRANSMISSION ASSEMBLY

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)

AX

DESCRIPTION

The amount of current flow to the solenoid is controlled by the (*) duty ratio of the TCM output signal. The higher the duty ratio becomes, the higher the lock-up hydraulic pressure becomes during the lock-up operation.



(*) Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then Duty Ratio = A/(A+B) x 100 (%).

DTC No.	DTC Detection Condition	Trouble Area
P2759	Open or short is detected in shift solenoid valve SLU circuit for 1 second or more while driving (1-trip detection logic).	• Open or short in shift solenoid valve SLU circuit • Shift solenoid valve SLU • TCM

MONITOR DESCRIPTION

When an open or short in a shift solenoid valve (SLU) circuit is detected, the TCM determines there is a malfunction. The TCM will turn on the MIL and store this DTC.

MONITOR STRATEGY

Related DTCs	P2759: Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

Malfunction (A):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

AX

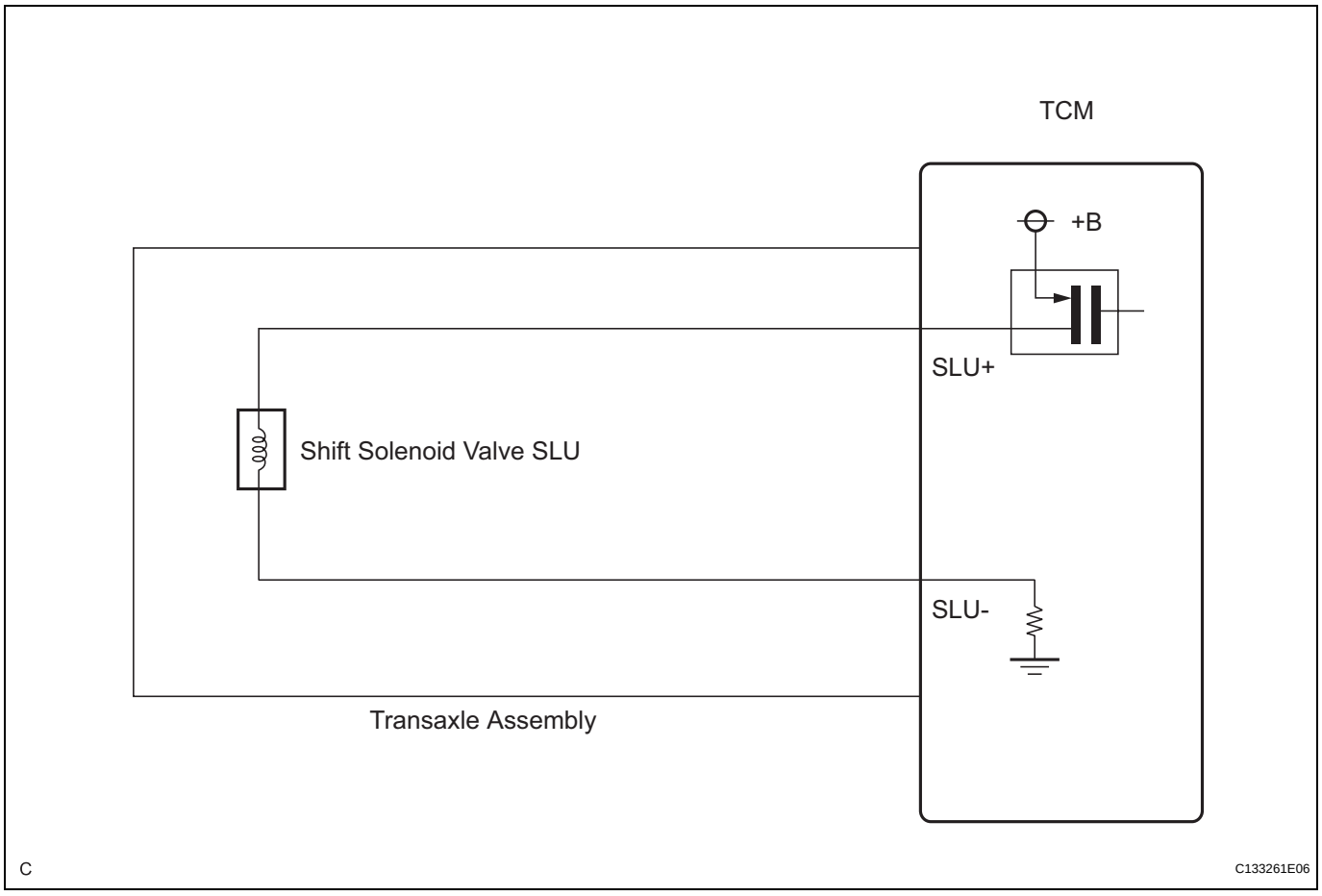
TYPICAL MALFUNCTION THRESHOLDS

Output signal duty	100% or more

COMPONENT OPERATING RANGE

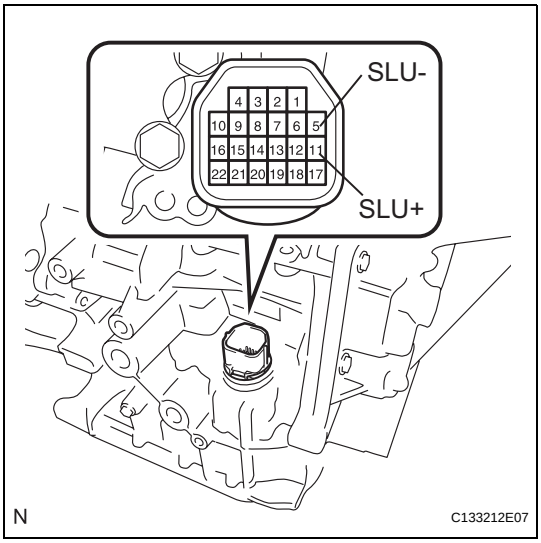
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1 **INSPECT TRANSMISSION WIRE (SLU)**



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
11 (SLU+) - 5 (SLU-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

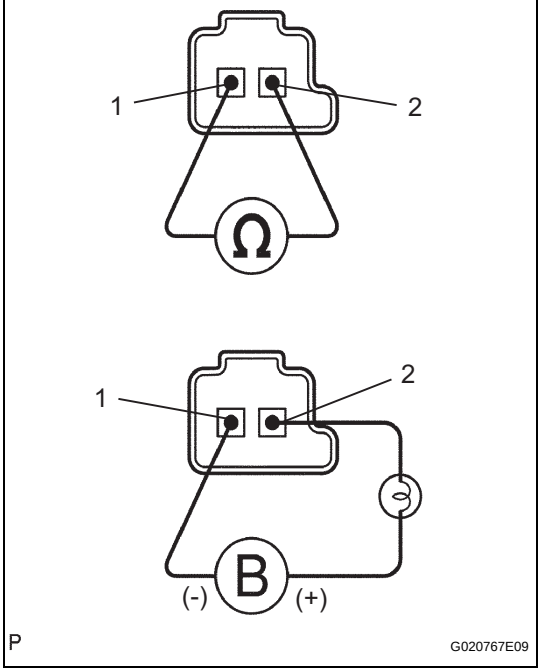
Tester Connection	Specified Condition
11 (SLU+) - Body ground	10 kΩ or higher
5 (SLU-) - Body ground	10 kΩ or higher

OK → **REPLACE TCM**

NG

2 **INSPECT SHIFT SOLENOID VALVE SLU**

Shift Solenoid Valve SLU:



(a) Remove the shift solenoid valve SLU.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes an operating sound.

NG → **REPLACE SHIFT SOLENOID VALVE SLU**

OK

REPLACE TRANSMISSION WIRE

DTC	P2769	Short in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)

DTC	P2770	Open in Torque Converter Clutch Solenoid Circuit (Shift Solenoid Valve SL)

DESCRIPTION

The shift solenoid valve SL is turned ON or OFF by signals from the TCM to control the hydraulic pressure acting on the lock-up relay valve, which then controls operation of the lock-up clutch.

DTC No.	DTC Detection Condition	Trouble Area
P2769	TCM detects a short in the shift solenoid valve SL circuit when the shift solenoid valve SL is operated (2 trip detection logic).	• Short in shift solenoid valve SL circuit • Shift solenoid valve SL • TCM
P2770	TCM detects an open in the shift solenoid valve SL circuit when the shift solenoid valve SL is not operated (2 trip detection logic).	• Open in shift solenoid valve SL circuit • Shift solenoid valve SL • TCM

Fail-safe function:
If the TCM detects a malfunction, it turns the shift solenoid valve SL OFF.

MONITOR DESCRIPTION

Based on the signals from the throttle position sensor, the air flow meter and the crankshaft position sensor, the TCM sends a signal to the solenoid valve SL to regulate the hydraulic pressure and provide smoother torque converter clutch engagement. The shift solenoid valve SL responds to commands from the TCM. The valve controls the lock-up relay valve to perform the torque-converter lock-up function. If the TCM detects an open or short circuit for shift solenoid valve SL, it will illuminate the MIL.

MONITOR STRATEGY

Related DTCs	P2769: Shift solenoid valve SL/Range check (Low resistance) P2770: Shift solenoid valve SL/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SL
Frequency of operation	Continuous
Duration	1 time
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

P2769: Range check (Low resistance):

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid OFF to ON	More than 0.008 sec.

P2770: Range check (High resistance):

The monitor will run whenever the following DTCs are not present	None
Solenoid	ON
Time after solenoid ON to OFF	More than 0.008 sec.

TYPICAL MALFUNCTION THRESHOLDS

P2769: Range check (Low resistance):

Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less

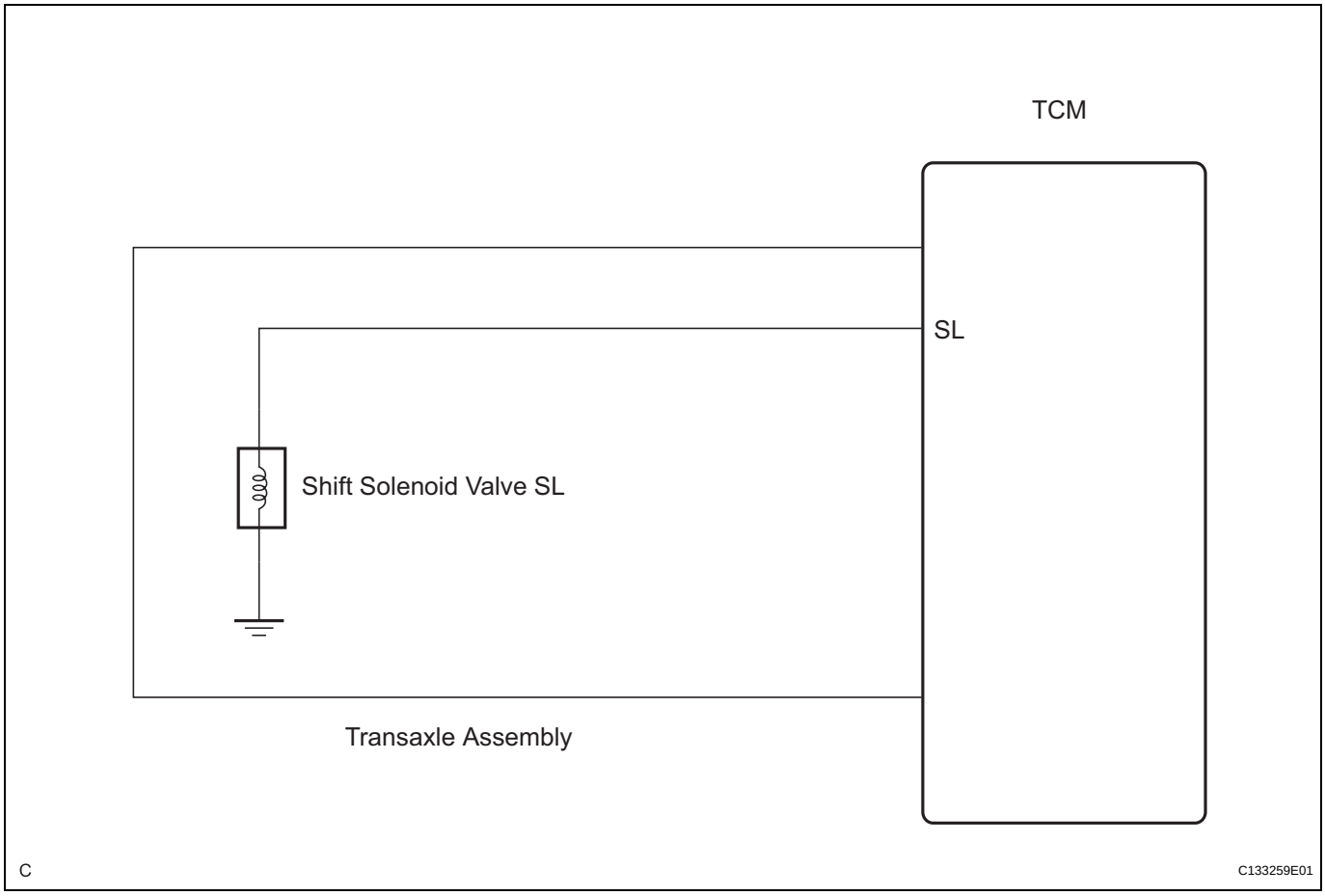
P2770: Range check (High resistance):

Intelligent power MOS diagnosis fail signals detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

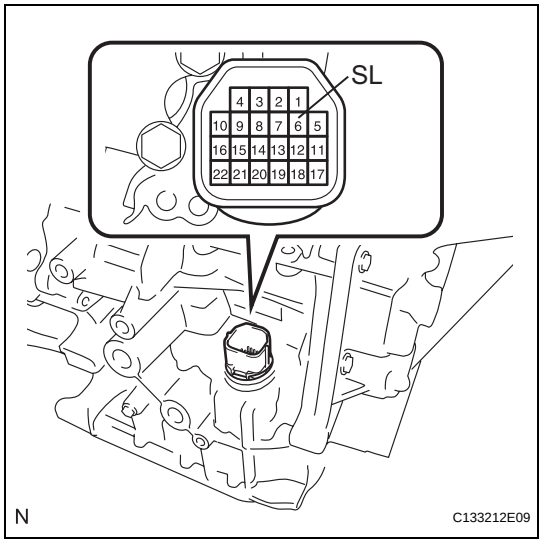
Shift solenoid valve SL	Resistance: 11 to 15 Ω at 20°C (68°F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT TRANSMISSION WIRE (SHIFT SOLENOID VALVE SL)



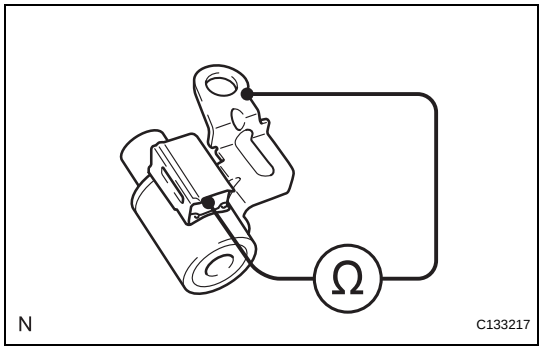
(a) Remove the TCM from the transaxle.
(b) Measure the resistance of the transmission wire.
Standard resistance

Tester Connection	Condition	Specified Condition
6 (SL) - Body ground	20°C (68°F)	11 to 15 Ω

OK → **REPLACE TCM**

NG

2 INSPECT SHIFT SOLENOID VALVE SL (RESISTANCE)



(a) Remove the shift solenoid valve SL.
(b) Measure the resistance between the solenoid valve terminal and solenoid valve body.
Standard resistance:
11 to 15 Ω at 20°C (68°F)

NG → **REPLACE SHIFT SOLENOID VALVE SL**

OK

REPLACE TRANSMISSION WIRE

DTC	P2808	Pressure Control Solenoid "D" Performance or Stuck OFF (Shift Solenoid Valve SL4)

DESCRIPTION

AX

The TCM uses the vehicle speed signal to determine the actual gear position (1st, 2nd, 3rd, 4th, 5th or 6th gear).
Then the TCM compares the actual gear with the shift schedule in the TCM memory to detect shift solenoid valves and valve body mechanical problems.

DTC No.	DTC Detecting Condition	Trouble Area
P2808	The engine revs freely when 3rd or 5th gear is requested. (2-trip detection logic) When any of the following is detected. In addition, the condition that 4th gear is engaged when 4th gear is requested occurs twice. (2-trip detection logic) • When 1st gear is requested, 4th gear is engaged. • When 2nd gear is requested, 4th gear is engaged. • When 6th gear is requested, 4th gear is engaged.	• Shift solenoid valve SL4 remains open or closed • Valve body is blocked • Automatic transaxle (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the TCM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the TCM and the actual gear position are not the same, the TCM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P2808: Shift solenoid valve SL4/OFF malfunction Shift solenoid valve SL4/ON malfunction
Required sensors/Components	Shift solenoid valve SL4, Speed sensor (NT), Speed sensor (NC), Crankshaft position sensor (NE)
Frequency of operation	Continuous
Duration	OFF malfunction (A): 0.5 sec. OFF malfunction (B): 0.8 sec. ON malfunction: 0.8 sec.
MIL operation	2 driving cycles
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

All:

Turbine speed sensor circuit	Circuit is not malfunctioning
Intermediate shaft speed sensor circuit	Circuit is not malfunctioning
Shift solenoid valve SL1 circuit	Circuit is not malfunctioning
Shift solenoid valve SL2 circuit	Circuit is not malfunctioning
Shift solenoid valve SL3 circuit	Circuit is not malfunctioning
Shift solenoid valve SL4 circuit	Circuit is not malfunctioning
ETC (Engine coolant temperature) sensor circuit	Circuit is not malfunctioning
Knock control sensor circuit	Circuit is not malfunctioning
Electronic throttle system	Circuit is not malfunctioning
CAN communication system	Circuit is not malfunctioning
Transmission range	"D"
Transmission fluid temperature	Above -10°C (5°F)

OFF malfunction (A):

TCM select gear	3rd or 5th
Throttle valve opening angle	3% or more

OFF malfunction (B):

TCM select gear	3rd
Throttle valve opening angle	4.5% or more
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (A):

TCM select gear	1st
Time after transmission to 1st gear	0.1 sec. or more
Vehicle speed	1.2 mph (2 km/h) to 25 mph (40 km/h)
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (B):

TCM select gear	2nd
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (C):

TCM select gear	6th
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition varies with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

ON malfunction (D):

TCM select gear	4th
Throttle valve opening angle	4.5% or more at engine speed 2,000 rpm (condition vary with engine speed)
Vehicle speed	1.2 mph (2 km/h) or more
ECT (Engine coolant temperature)	40°C (104°F) or more
Turbine speed/Output speed (NT/NO) with 1st	3.304 to 7.724
Turbine speed/Output speed (NT/NO) with 2nd	1.901 to 2.340
Turbine speed/Output speed (NT/NO) with 3rd	1.399 to 1.649
Turbine speed/Output speed (NT/NO) with 4th	0.998 to 1.138
Turbine speed/Output speed (NT/NO) with 5th	0.705 to 0.836
Turbine speed/Output speed (NT/NO) with 6th	0.568 to 0.695

AX

TYPICAL MALFUNCTION THRESHOLDS

OFF malfunction (A):

Engine speed - Turbine speed x Gear ratio	1,000 rpm or more

OFF malfunction (B):

Turbine speed / Output speed	3.304 to 7.724

ON malfunction (A) and (B):

Turbine speed / Output speed	1.399 to 1.649

ON malfunction (C):

Turbine speed / Output speed	0.705 to 0.836

ON malfunction (D):

Turbine speed / Output speed	0.998 to 1.138

INSPECTION PROCEDURE

1	CHECK OTHER DTCS OUTPUT (IN ADDITION TO DTC P2808)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / DTC INFO / CURRENT CODES".
(d) Read the DTCs using the intelligent tester.

Result

Display (DTC output)	Proceed to
Only "P2808" is output	A
"P2808" and other DTCs	B

HINT:
If a solenoid is stuck OFF, DTCs for several solenoids including the malfunctioning solenoid will be detected.

A → **Go to step 3**

B

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

NOTICE:
This test should always be performed with at least 2 people.

(a) Connect the intelligent tester to the DLC3.
(b) Start the engine and turn the intelligent tester on.
(c) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / ACTIVE TEST / SHIFT".
HINT:
While driving, the shift position can be forcibly changed with the intelligent tester.
Comparing the shift position commanded by the ACTIVE TEST with the actual shift position enables you to confirm the problem (See page AX-39).

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Others] • Press "←" button: Shift up • Press "→" button: Shift down	It is possible to check the operation of the shift solenoid valves.

NOTICE:
- **This test can be conducted when the vehicle is stopped.**
- **When shifting gears using the Active Test function, do not operate the accelerator pedal for 2 seconds before and after shifting gears.**

HINT:
The shift position commanded by the TCM is shown on the DATA LIST/SHIFT display on the intelligent tester.

(d) Check the vehicle speed and the gear position when the engine speed is 1,000 rpm.
HINT:
Because the torque converter clutch has not engaged, it may be difficult to obtain the speeds specified in 4th, 5th, and 6th gear, however a difference of speed should still be evident following each gear change.

Standard

1st	2nd	3rd	4th	5th	6th
5 to 7.5 mph (8 to 12 km/h)	9.3 to 11.8 mph (15 to 19 km/h)	13.0 to 15.5 mph (21 to 25 km/h)	19.3 to 21.7 mph (31 to 35 km/h)	27.3 to 29.8 mph (44 to 48 km/h)	32.3 to 34.8 mph (52 to 56 km/h)

(e) Compare the TCM gear shift command and the actual gear position.

Result

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL1	Stuck ON	1st	2nd	3rd	4th	4th	4th	A
	Stuck OFF	N*1	N*1	N*1	N*1	5th	6th	
Shift solenoid SL2	Stuck ON	4th	4th	4th	4th	5th	6th	B
	Stuck OFF	1st	2nd	3rd	1st	N*1	N*1	

Actuator gear position under malfunction		TCM gear shift command						Proceed to
		1st	2nd	3rd	4th	5th	6th	
Shift solenoid SL3	Stuck ON	2nd	2nd	3rd	4th	5th	6th	C
	Stuck OFF	1st	1st	3rd	4th	5th	N*1	
Shift solenoid SL4	Stuck ON*3	3rd	3rd	3rd	4th	5th	5th	D
	Stuck OFF	1st	2nd	1st	4th	N*1	6th	
Shift solenoid SLT	Stuck ON	N*2	N*2	N*2	N*2	N*2	N*2	E
	Stuck OFF*3	1st	2nd	3rd	4th	5th	6th	

HINT:

- *1: Neutral
- *2: If the shift solenoid SLT is stuck on, the line pressure will be low. Therefore, the amount of torque that can be transmitted by each gear is lower than the normal limit. When the engine power exceeds this lowered limit, the engine speed will increase freely.
- *3: When shift solenoid SLT is stuck OFF, gear shifting is normal.

A → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL1) PERFORMANCE DTC P0746)**

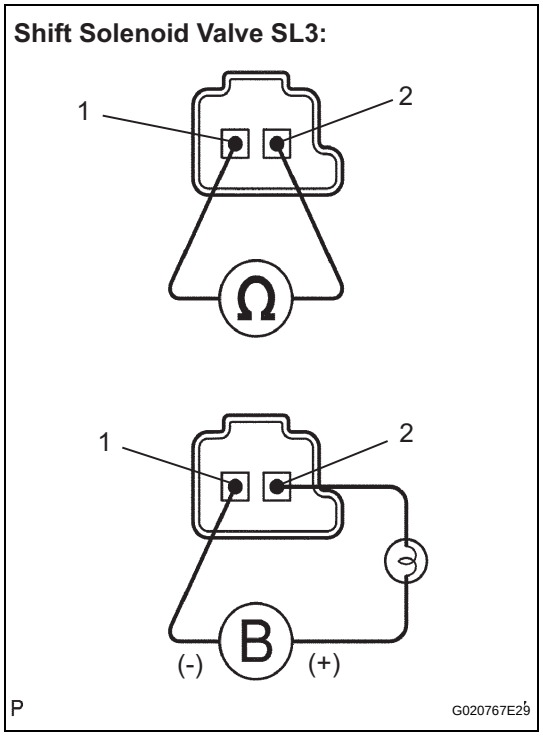
B → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL2) PERFORMANCE DTC P0776)**

C → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SL3) PERFORMANCE DTC P0796)**

E → **GO TO DTC CHART (RELATED SHIFT SOLENOID VALVE (SLT) PERFORMANCE DTC P2714)**

D

3	INSPECT SHIFT SOLENOID VALVE SL4



(a) Remove the shift solenoid valve SL4.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.

OK:

The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL4**

OK

4	INSPECT TRANSMISSION VALVE BODY ASSEMBLY

OK:

There are no foreign objects on each valve and they operate smoothly.

NG → **REPAIR OR REPLACE TRANSMISSION VALVE BODY ASSEMBLY**

OK

5	TORQUE CONVERTER CLUTCH ASSEMBLY

OK:

The torque converter clutch operates normally.

NG → **REPLACE TORQUE CONVERTER CLUTCH ASSEMBLY**

OK

REPLACE AUTOMATIC TRANSAXLE ASSEMBLY

DTC	P2810	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SL4)

DESCRIPTION

AX

Shifting gears from 1st through 5th is performed in combination with "ON" and "OFF" operation of the shift solenoid valves SL1, SL2, SL3 and SL4 which are controlled by the TCM. If an open or short circuit occurs in either of the shift solenoid valve, the TCM controls the remaining normal shift solenoid valves to allow the vehicle to be operated smoothly (Fail safe function).

DTC No.	DTC Detecting Condition	Trouble Area
P2810	The TCM checks for an open or short in the shift solenoid valve SL4 circuit while driving and shifting gears. (1-trip detection logic) • Output signal duty equals to 100%. (NOTE: SL4 output signal duty is less than 100% under normal condition.)	• Open or short in shift solenoid valve SL4 circuit • Shift solenoid valve SL4 • TCM

MONITOR DESCRIPTION

The TCM commands gear shifts by turning the shift solenoid valves on or off. When there is an open or short circuit in any shift solenoid valve circuit, the TCM detects the problem and illuminates the MIL and stores the DTC. And the TCM performs the fail-safe function and turns the other normal shift solenoid valves on or off (In case of an open or short circuit, the TCM stops sending current to the circuit.)
(See page AX-39).

MONITOR STRATEGY

Related DTCs	P0798: Shift solenoid valve SL3/Range check
Required sensors/Components	Shift solenoid valve SL3
Frequency of operation	Continuous
Duration	1 sec.
MIL operation	Immediate
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

ALL:

The monitor will run whenever this DTC is not present	None
Ignition switch	ON
Starter	OFF

Malfunction (A):

Battery voltage	12 V or more

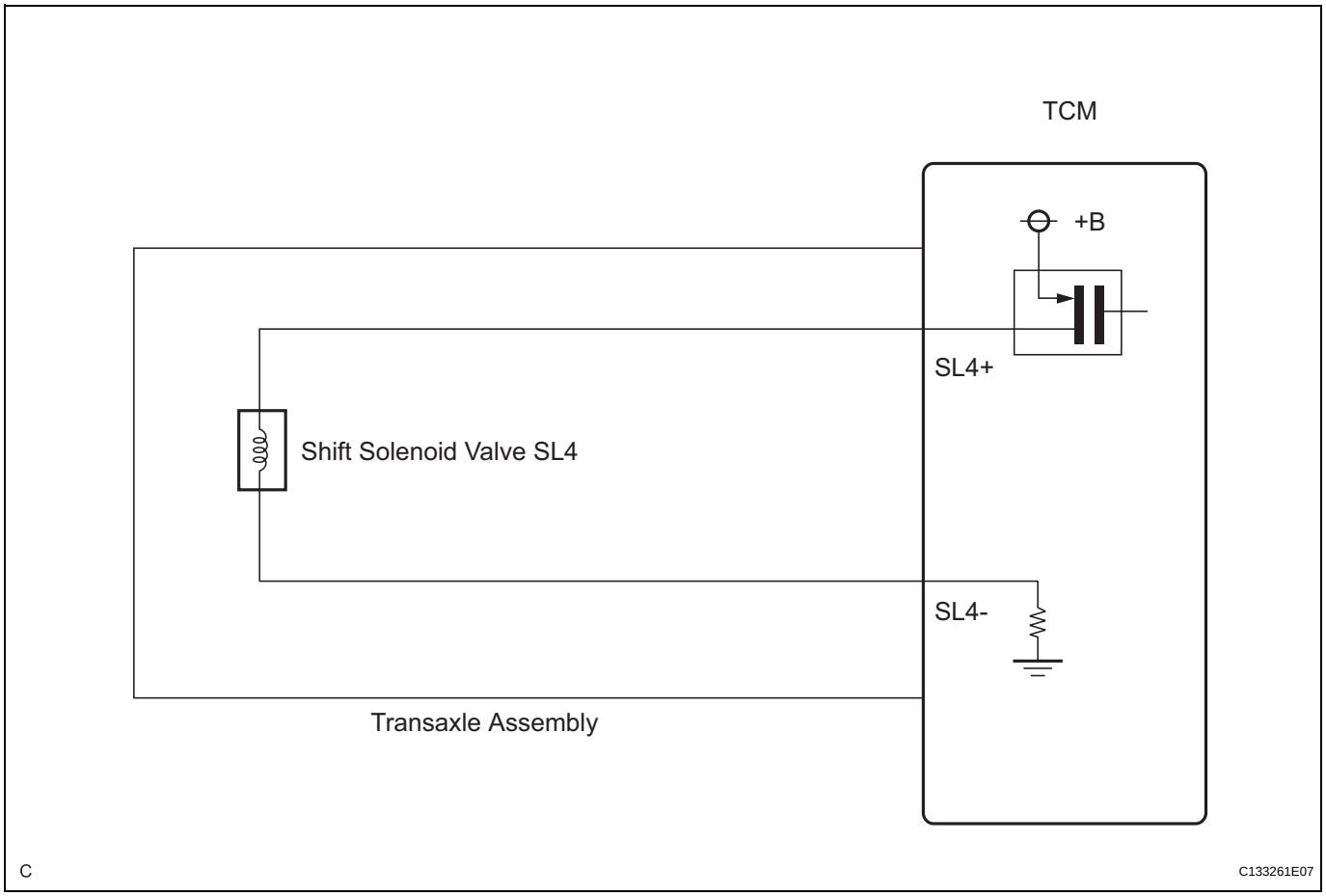
Malfunction (B):

Battery voltage	10 V or more and less than 12 V
CPU commanded duty	Less than 75%

TYPICAL MALFUNCTION THRESHOLDS

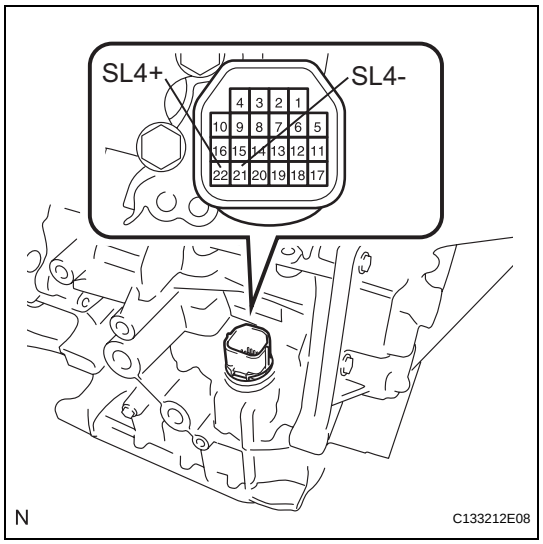
Output signal duty	100% or more

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT TRANSMISSION WIRE (SL4 CIRCUIT)



(a) Remove the TCM from the transaxle.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
22 (SL4+) - 21 (SL4-)	5.0 to 5.6 Ω

(c) Measure the resistance according to the value(s) in the table below.
Standard resistance:
Check for short

Tester Connection	Specified Condition
22 (SL4+) - Body ground	10 kΩ or higher
21 (SL4-) - Body ground	10 kΩ or higher

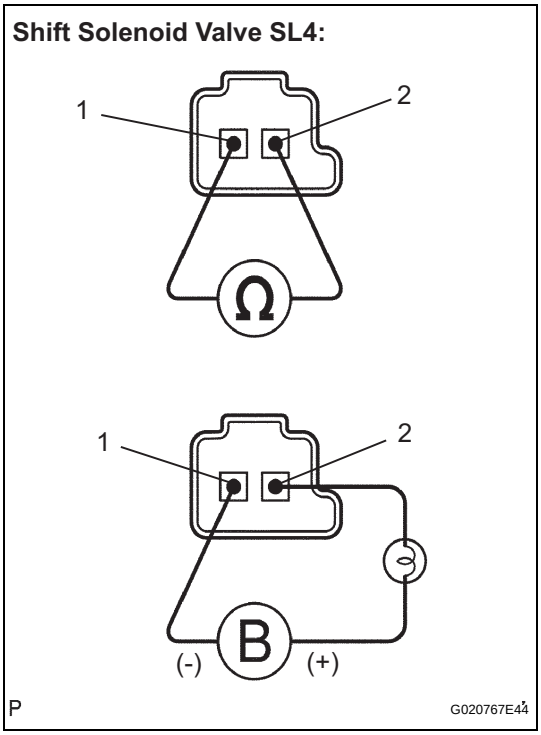
OK	REPLACE TCM

NG

2	INSPECT SHIFT SOLENOID VALVE SL4

AX

Shift Solenoid Valve SL4:



(a) Remove the shift solenoid valve SL4.
(b) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

(c) Connect a positive (+) lead through a 21 W bulb to terminal 2 and a negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
OK:
The solenoid makes an operating noise.

NG → **REPLACE SHIFT SOLENOID VALVE SL4**

OK

REPLACE TRANSMISSION WIRE

DTC	U0100	Lost Communication with ECM/PCM "A"

DESCRIPTION

The engine control unit intercommunicates with the TCM with the Controller Area Network (CAN). If there is a problem in this intercommunication, the TCM sets a DTC.

DTC No.	DTC Detection Condition	Trouble Area
U0100	Following conditions are met for 1.25 seconds (1 trip detection logic): • Ignition switch ON (IG) • Battery voltage is 10.5 V or more • No intercommunication between the engine control ECU and TCM	TCM

MONITOR STRATEGY

Related DTCs	U0100: Verify communication
Required Sensors/Components (Main)	TCM
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	1.25 seconds
MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

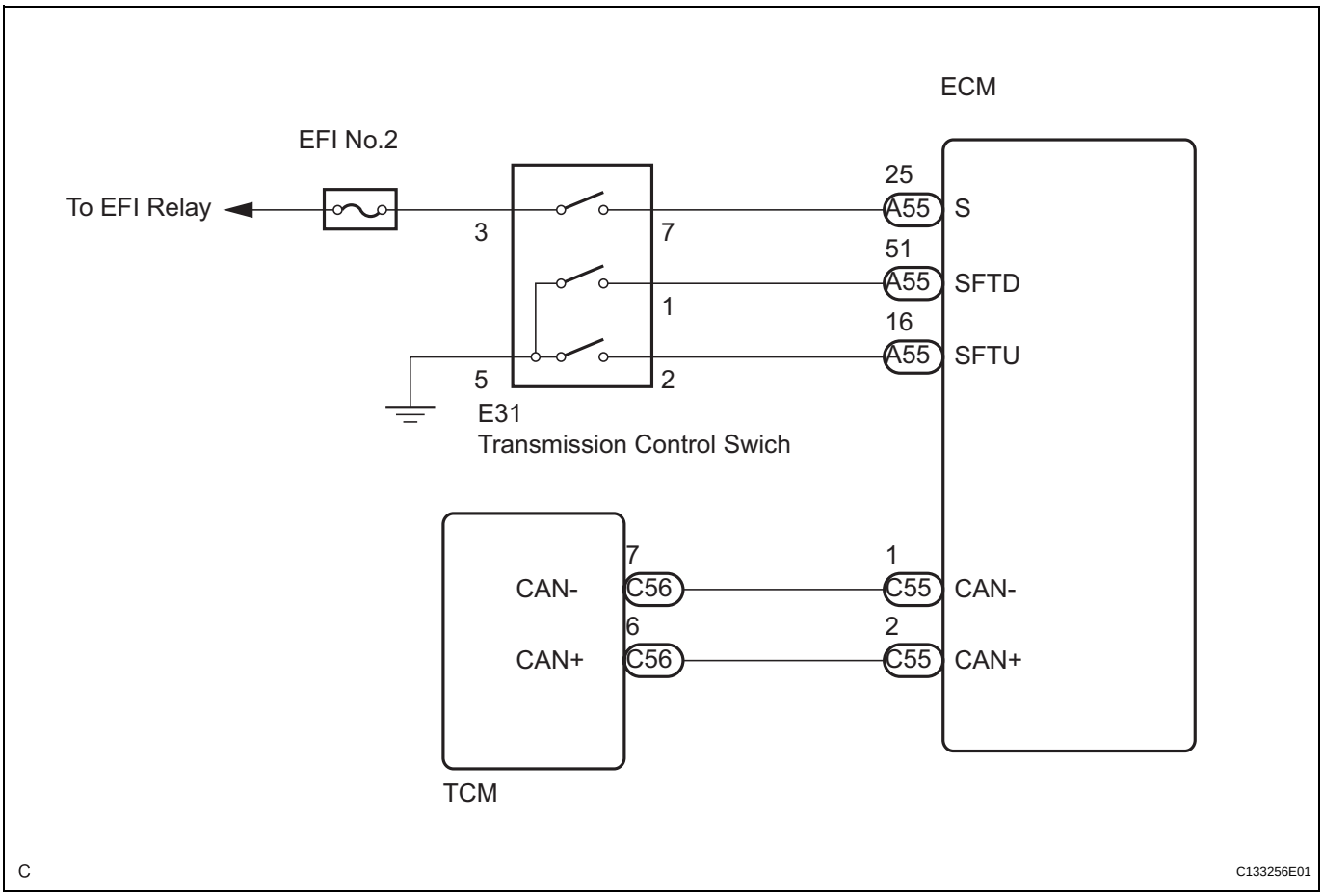
Monitor runs whenever following DTCs not present	None
Battery Voltage	10.5 V or more
Ignition Switch	ON
Starter	OFF

TYPICAL MALFUNCTION THRESHOLDS

Communication between TCM and ECM	No communication

AX

WIRING DIAGRAM

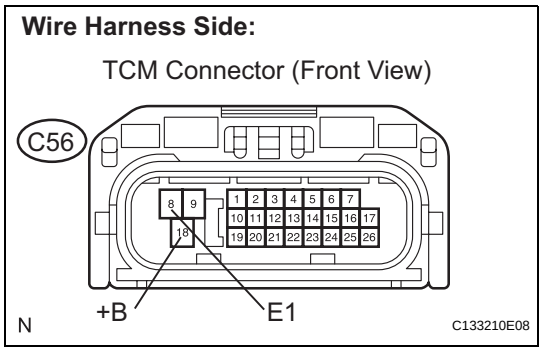


INSPECTION PROCEDURE

HINT:

- Refer to inspection procedure for CAN communication system (See page CA-8).
- If the CAN communication malfunctions, the TCM cannot receive the current data from the ECM. In this case, the freeze frame data output from the TCM has not been updated, so the data will not be useful for the inspection. However, reading the Data List as the first step in troubleshooting is effective to find malfunctions.
- The malfunction area can be checked using the BUS CHECK function on the intelligent tester (See page CA-25).

1	CHECK ECU TERMINAL VOLTAGE (+B AND E1 TERMINALS)



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage of the TCM connectors.

Standard voltage

Tester Connection	Specified Condition
C56-18 (+B) - C56-8 (E1)	9 to 14 V

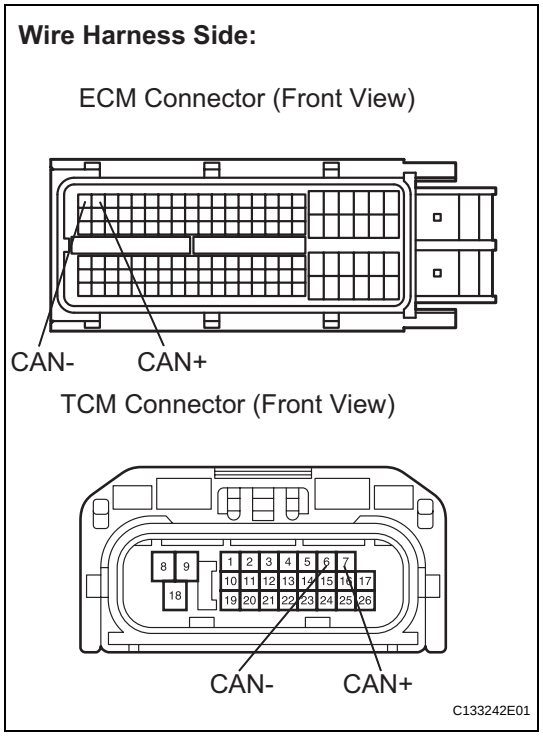
(d) Turn the ignition switch off.
(e) Measure the resistance of the TCM connector.

Tester Connection	Specified Condition
C56-8 (E1) - Body ground	Below 1 Ω

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

2 CHECK HARNESS AND CONNECTOR (TCM - ECM)



(a) Disconnect the C56 TCM connector.
(b) Disconnect the C55 ECM connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
C56-6 (CAN+) - C55-2 (CAN+)	Below 1 Ω
C56-7 (CAN-) - C55-1 (CAN-)	Below 1 Ω
C56-6 (CAN+) or C55-2 (CAN+) - Body ground	1 MΩ or more
C56-7 (CAN-) or C55-1 (CAN-) - Body ground	1 MΩ or more

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

3 CHECK IF DTC OUTPUT RECURS

(a) Connect the intelligent tester to the DLC3.
(b) Clear the DTC.
(c) Replace the TCM.
HINT:
Replace the TCM with a TCM from a normally functioning vehicle of the same model.
(d) Start the engine.
(e) Read the DTCs.

Display (DTC Output)	Proceed to
P0100	A
No DTC	B

B → REPLACE TCM

A

REPLACE ECM

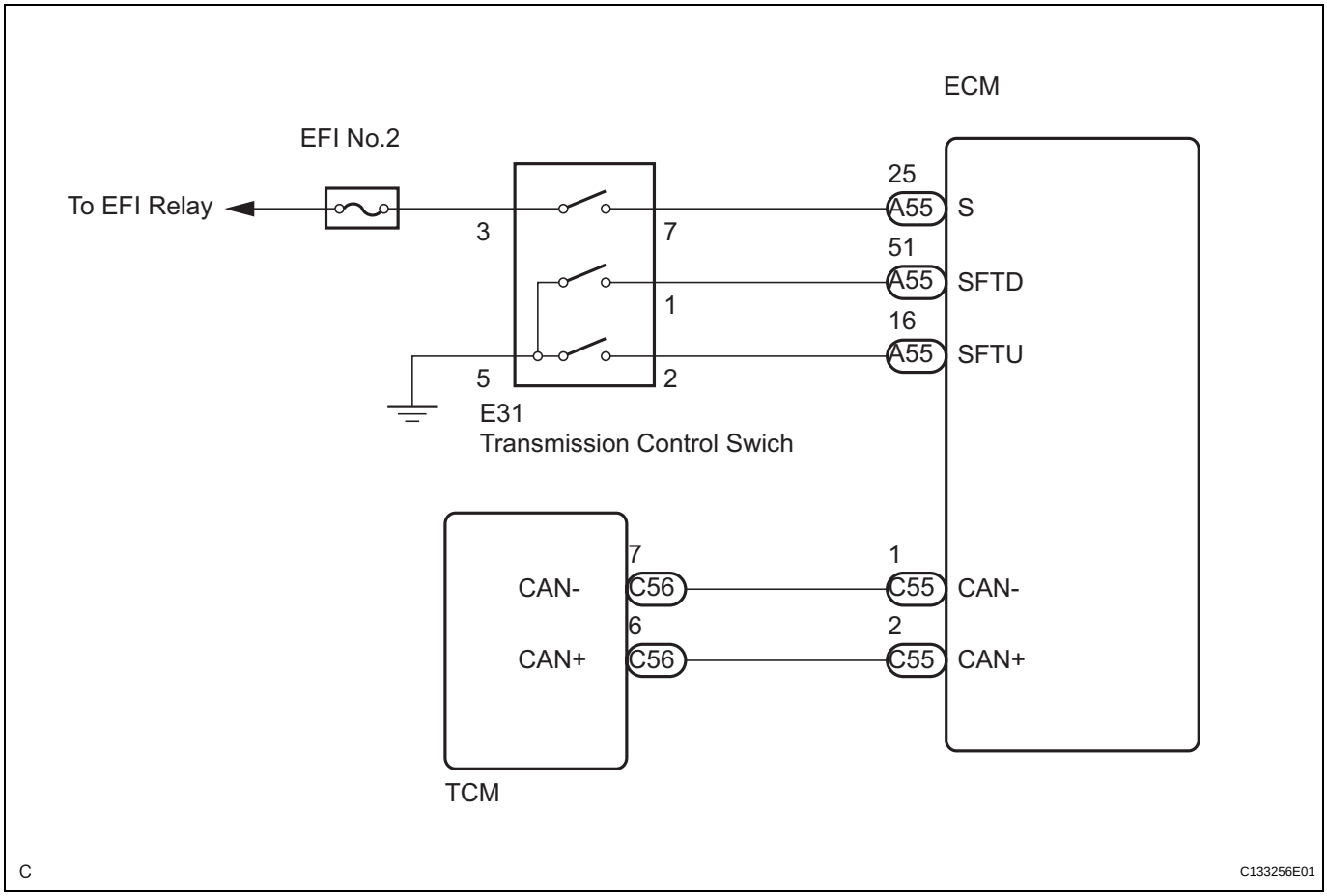
Transmission Control Switch Circuit

DESCRIPTION

When moving the shift lever into the S position using the transmission control switch, it is possible to switch the shift range position between "1" (first range) and "6" (sixth range).
Shifting up "+" once raises one shift range position, and shifting down "-" lowers one shift range position.

AX

WIRING DIAGRAM

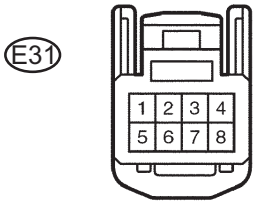


INSPECTION PROCEDURE

1	CHECK HARNESS AND CONNECTOR (BATTERY - TRANSMISSION CONTROL SWITCH)

Wire Harness Side:

(Connector Front View):



C110345E22

(a) Disconnect the transmission control switch connector of shift lock control unit assembly.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Switch Condition	Tester Connection	Specified Condition
Ignition switch ON (IG)	3 - Body ground	10 to 14 V
Ignition switch OFF		Below 1 V

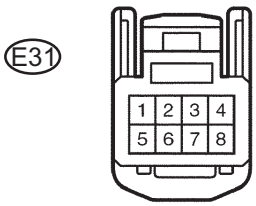
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

2	CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - BODY GROUND)

Wire Harness Side:

(Connector Front View):



C110345E22

(a) Measure the resistance according to the value(s) in the table below.

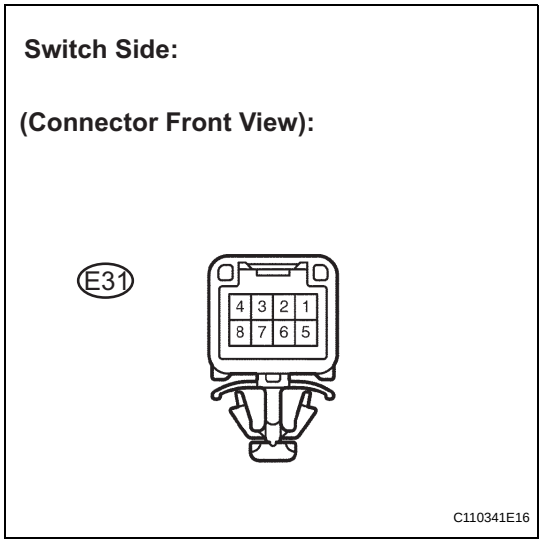
Standard resistance

Tester Connection	Specified Condition
5 - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT TRANSMISSION CONTROL SWITCH



(a) Measure the resistance between each terminal of the shift lock control unit assembly when the shift lever is moved to each position.

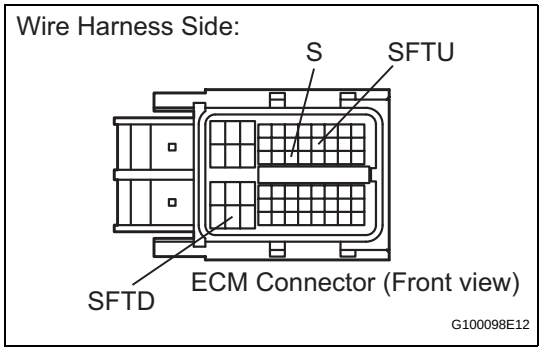
Standard resistance

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	3 - 7	Below 1 Ω
Except S, "+" and "-"		10 kΩ or higher
Press continuously "+" (Up shift)	2 - 5	Below 1 Ω
S		10 kΩ or higher
Press continuously "-" (Down shift)	1 - 5	Below 1 Ω
S		10 kΩ or higher

NG → **REPLACE TRANSMISSION CONTROL SWITCH**

OK

4 CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL SWITCH - ECM)



(a) Connect the transmission control switch connector of the shift lock control unit assembly.
(b) Disconnect the A55 ECM connector.
(c) Turn the ignition switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	A55-25 (S) - Body ground	10 to 14 V
Except S, "+" and "-"		Below 1 V

(d) Turn the ignition switch off.
(e) Disconnect the ECM connector.
(f) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
Press continuously "+" (Up shift)	A55-16 (SFTU) - Body ground	Below 1 Ω
S		10 kΩ or higher
Press continuously "-" (Down shift)	A55-51 (SFTD) - Body ground	Below 1 Ω
S		10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

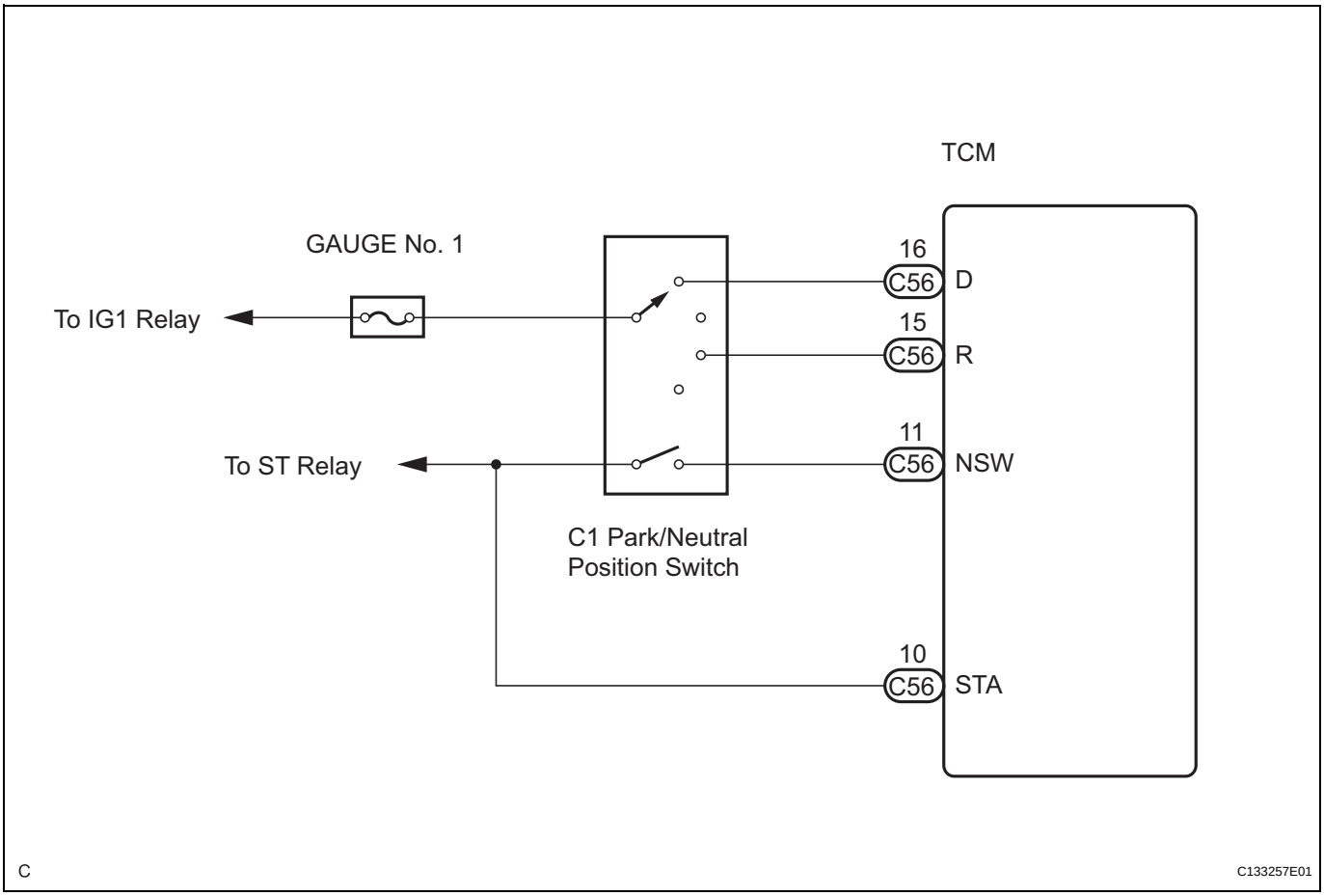
Park / Neutral Position Switch Circuit

DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the TCM.

AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1. DATA LIST

HINT:

According to the DATA LIST displayed on the intelligent tester, you can read the value of switches, sensors, actuators and other items without removing any parts. Reading the DATA LIST as the first step in troubleshooting is one method to save labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
(d) Turn the ignition switch on (IG).
(e) Turn on the tester.
(f) Enter the following items: "DIAGNOSIS / OBD/MOBD / ECT / DATA LIST".

(g) According to the display on the tester, read "DATA LIST".

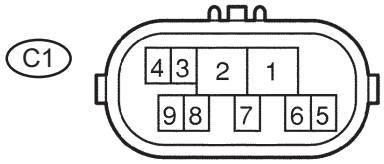
Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP Switch Status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
REVERSE	PNP Switch Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
PARKING	PNP Switch Status/ ON or OFF	Shift lever position is; P: ON Except P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
NEUTRAL	PNP Switch Status/ ON or OFF	Shift lever position is; N: ON Except N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
DRIVE	PNP Switch Status/ ON or OFF	Shift lever position is; D and S: ON Except D and S: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect.
MODE SELECT SW	Sport Mode Select Switch Status/ ON or OFF	Shift lever position is; S, "+" and "-": ON Except S, "+" and "-": OFF	-

AX

1 INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

Switch Side:

(Connector Front View):



P

C110340E42

(a) Disconnect the park/neutral position switch connector.
(b) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
P	1 - 3 and 4 - 9	Below 1 Ω
Except P		10 kΩ or higher
R	1 - 2	Below 1 Ω
Except R		10 kΩ or higher
N	1 - 8 and 4 - 9	Below 1 Ω
Except N		10 kΩ or higher
D, S, "+" and "-"	1 - 7	Below 1 Ω
Except D, S, "+" and "-"		10 kΩ or higher

NG → REPLACE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

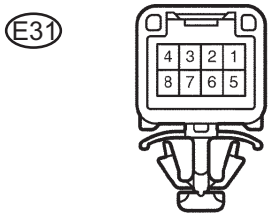
OK

AX

2 INSPECT TRANSMISSION CONTROL SWITCH

Switch Side:

(Connector Front View):



C110341E16

(a) Connect the park/neutral position switch connector.
(b) Disconnect the transmission control switch connector of the shift lock control unit assembly.
(c) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	3 - 7	Below 1 Ω
Except S, "+" and "-"		10 kΩ or higher

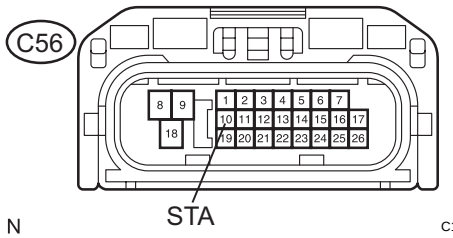
NG → **REPLACE TRANSMISSION CONTROL SWITCH**

OK

3 CHECK ECU TERMINAL VOLTAGE (STA TERMINAL)

Wire Harness Side:

TCM Connector (Front View)



C133210E04

(a) Connect the transmission control switch connector of the shift lock control unit assembly.
(b) Measure the voltage according to the value(s) in the table below while cranking the engine.

Standard voltage

Tester Connection	Specified Condition
STA (C56-10) - Body ground	9 to 14 V

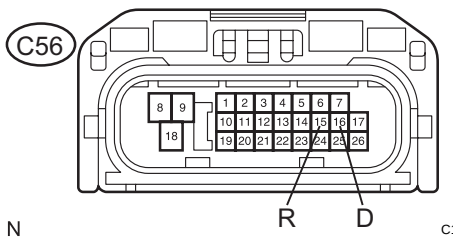
NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TCM - ECM)**

OK

4 CHECK HARNESS AND CONNECTOR (PARK/NEUTRAL POSITION SWITCH - TCM)

Wire Harness Side:

TCM Connector (Front View)



C133210E05

(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG), and measure the voltage according to the value(s) in the table below when the shift lever is moved to each position.

Standard voltage

Shift Position	Tester Connection	Specified Condition
R	R (C56-15) - Body ground	10 to 14 V *
Except R		Below 1 V
D	D (C56-16) - Body ground	10 to 14 V
Except D		Below 1 V

HINT:
*: The voltage will drop slightly because the back up light is turned on.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (PARK/NEUTRAL POSITION SWITCH - TCM)**

OK

REPLACE TCM

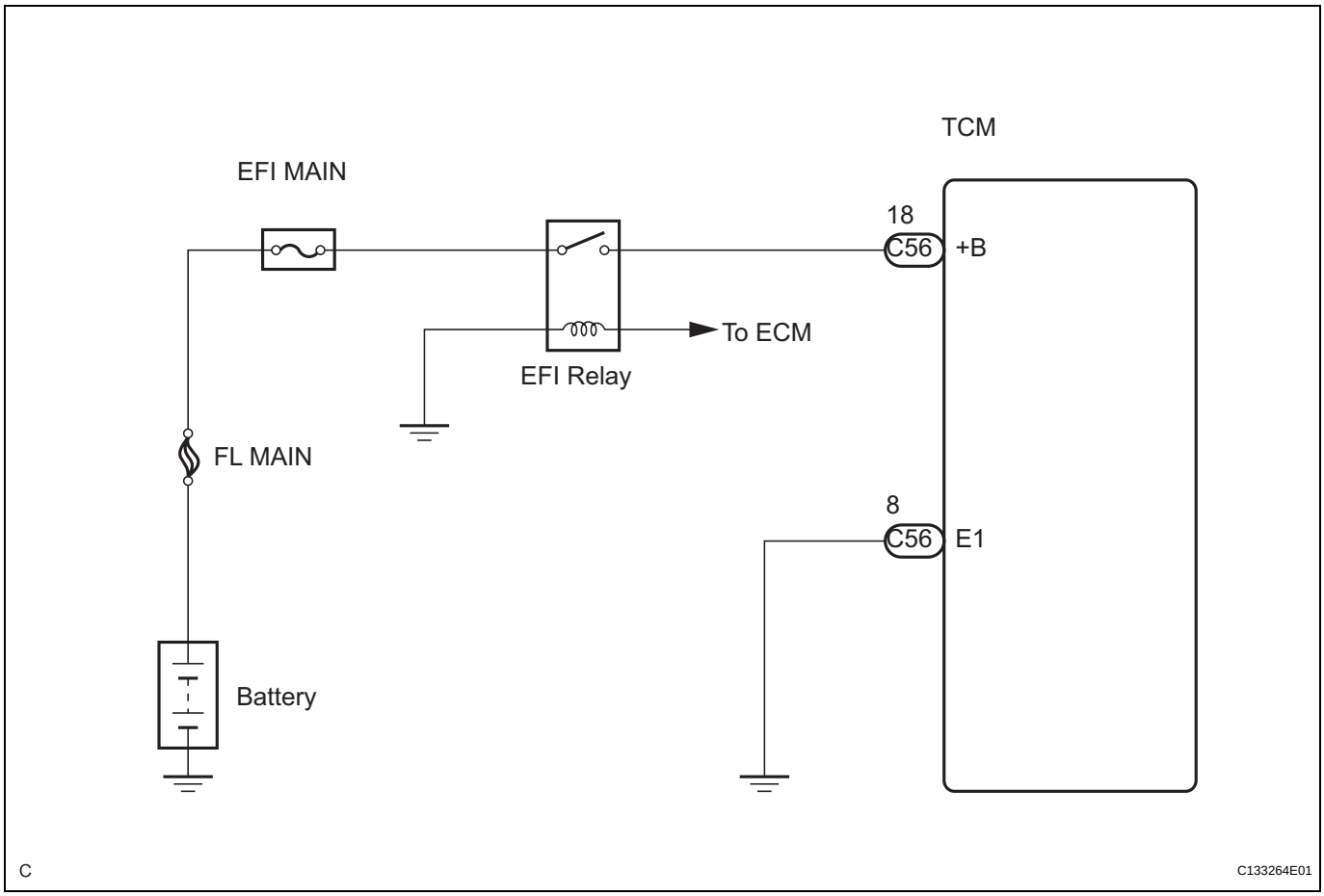
ECU Power Source Circuit

DESCRIPTION

When the ignition switch is turned on (IG), voltage from the ECM's MREL terminal is applied to the EFI relay. This causes the contacts of the EFI relay to close, which supplies power to terminal +B of the TCM.

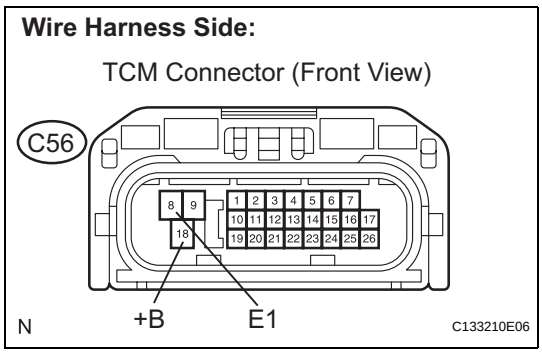
AX

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT ECU TERMINAL VOLTAGE (+B TERMINAL)



(a) Disconnect the TCM connector.
(b) Turn the ignition switch on (IG).
(c) Measure the voltage according to the value(s) in the table below.

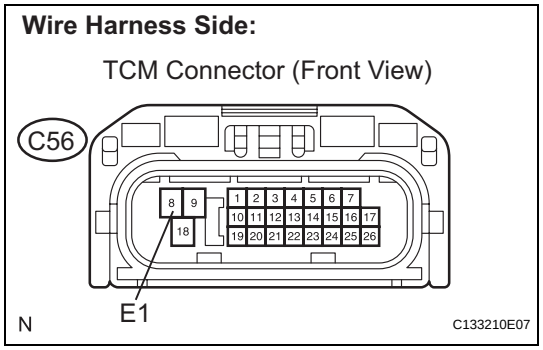
Standard voltage

Tester Connection	Specified Condition
+B (C56-18) - E1 (C56-8)	9 to 14 V

OK → CHECK FOR INTERMITTENT PROBLEMS

NG

2	CHECK HARNESS AND CONNECTOR (TCM - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition
E1 (C56-8) - Body ground	Below 1 Ω

(b) Reconnect the TCM connector.

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR (TCM - BODY GROUND)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (TCM - EFI RELAY)

AX

AX

AUTOMATIC TRANSAXLE FLUID

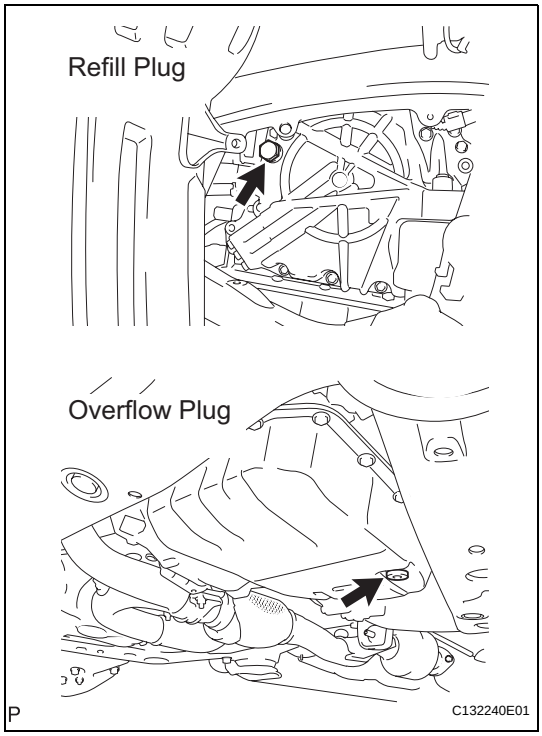
ADJUSTMENT

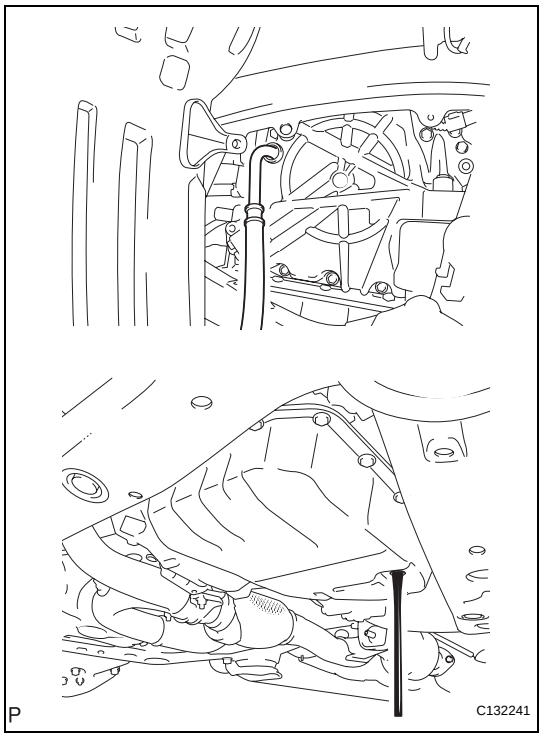
1. BEFORE FILLING TRANSAXLE WITH FLUID

- This transaxle requires Genuine ATF WS transmission fluid.
- After servicing the transaxle, you must refill the transaxle with the correct amount of fluid.
- Maintain the vehicle in a horizontal position while adjusting fluid level.
- Proceed to step 2 if the oil pan, valve body, drive shaft, and/or torque converter has been removed or if the oil seal has been replaced.
- Proceed to step 3 if oil leakage has been repaired and if the oil cooler and cooler hose have been removed.

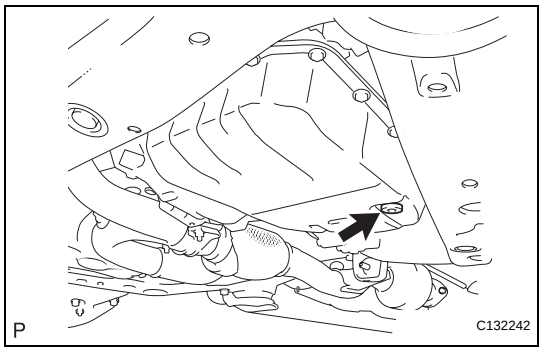
2. FILL TRANSAXLE PAN WITH FLUID

(a) Remove the engine under cover LH.
(b) Remove the engine under cover RH.
(c) Remove the under front fender apron seal RH.
(d) Remove the refill plug and overflow plug.





(e) Fill the transaxle through the refill hole until fluid begins to trickle out of the overflow tube.



(f) Temporarily install the overflow plug.

3. FILL TRANSAXLE WITH FLUID

(a) Fill the transaxle with the correct amount of fluid as listed in the table below.

Standard capacity

Performed Repair	Fill Amount
Replacement of transaxle (a new torque converter is used)	5.3 liters (5.6 US qts, 4.7 Imp. qts)
Replacement of transaxle (the torque converter is reused)	3.4 liters (3.6 US qts, 3.0 Imp. qts)
Removal & installation of oil pan (including oil drain) Removal & installation of drive shaft	2.8 liters (3.0 US qts, 2.5 Imp. qts)
Removal & installation of valve body	3.2 liters (3.4 US qts, 2.8 Imp. qts)
Removal & installation of torque converter	4.8 liters (5.1 US qts, 4.2 Imp. qts)
Repair of oil leakage and removal of oil cooler and cooler hose	0.5 liters (0.5 US qts, 0.4 Imp. qts)

HINT:

If you cannot add the listed amount of fluid, do the following:

(1) Temporarily install the refill plug.
(2) Allow the engine to idle with the air conditioning OFF.
(3) Move the shift lever through entire gear range to circulate fluid.
(4) Move the shift lever to the P position.
(5) Wait for 30 seconds with the engine idling.
(6) Stop the engine.
(7) Remove the refill plug and add fluid.
(8) Reinstall the refill plug.

(b) Temporarily install the refill plug to avoid fluid splash.

4. CIRCULATE AUTOMATIC TRANSAXLE FLUID

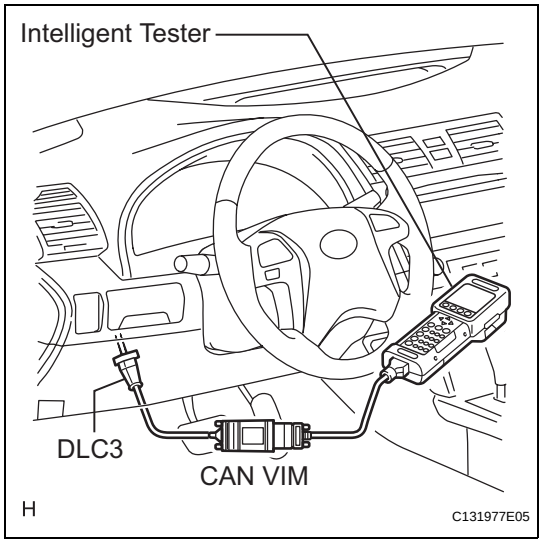
(a) Allow the engine to idle with the air conditioning OFF.

(b) Move the shift lever through entire gear range to circulate the fluid.

5. CHECK FLUID TEMPERATURE

NOTICE:

The fluid temperature should be less than 40°C (104°F) before beginning the fluid temperature check.



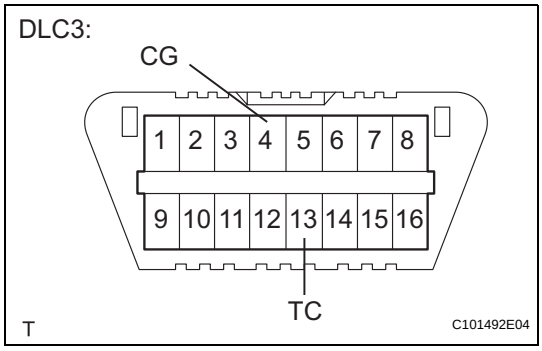
(a) With the intelligent tester:

(1) Connect the intelligent tester to the DLC3.

(2) Select the tester menus: OBD/MOBD, ENGINE, DATA LIST and A/T.

(3) Check A/T OIL TEMP.

(4) Allow the engine to idle until the fluid temperature reaches 39°C (102°F).



(b) Without the intelligent tester (Using D shift indicator):

(1) Connect terminals CG (4) and TC (13) of the DLC3 using SST.

SST 09843-18040

(2) Move the shift lever back and forth between N and D at 1.5 seconds interval for 6 seconds.

(3) The D shift indicator on the combination meter comes on for 2 seconds when the fluid temperature is within the appropriate temperature range.

(4) The D shift indicator will come on again when the fluid temperature reaches 40°C (104°F) and will blink when it exceeds 45°C (113°F).

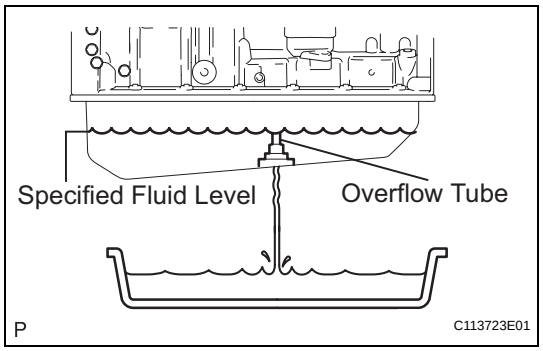
(5) After confirming that the D shift indicator turns off, move the shift lever to the P position and remove the SST from terminals CG and TC.

6. CHECK TRANSAXLE FLUID LEVEL

NOTICE:

The fluid temperature must be between 40°C (104°F) and 45°C (113°F) to accurately check the fluid level.

(a) Remove the overflow plug with the engine idling.



(b) Check that the fluid comes out of the overflow tube.
If fluid does not come out, proceed to step 7.
If fluid comes out, wait until the overflow slows to a trickle and proceed to step 8.

7. ADD FLUID

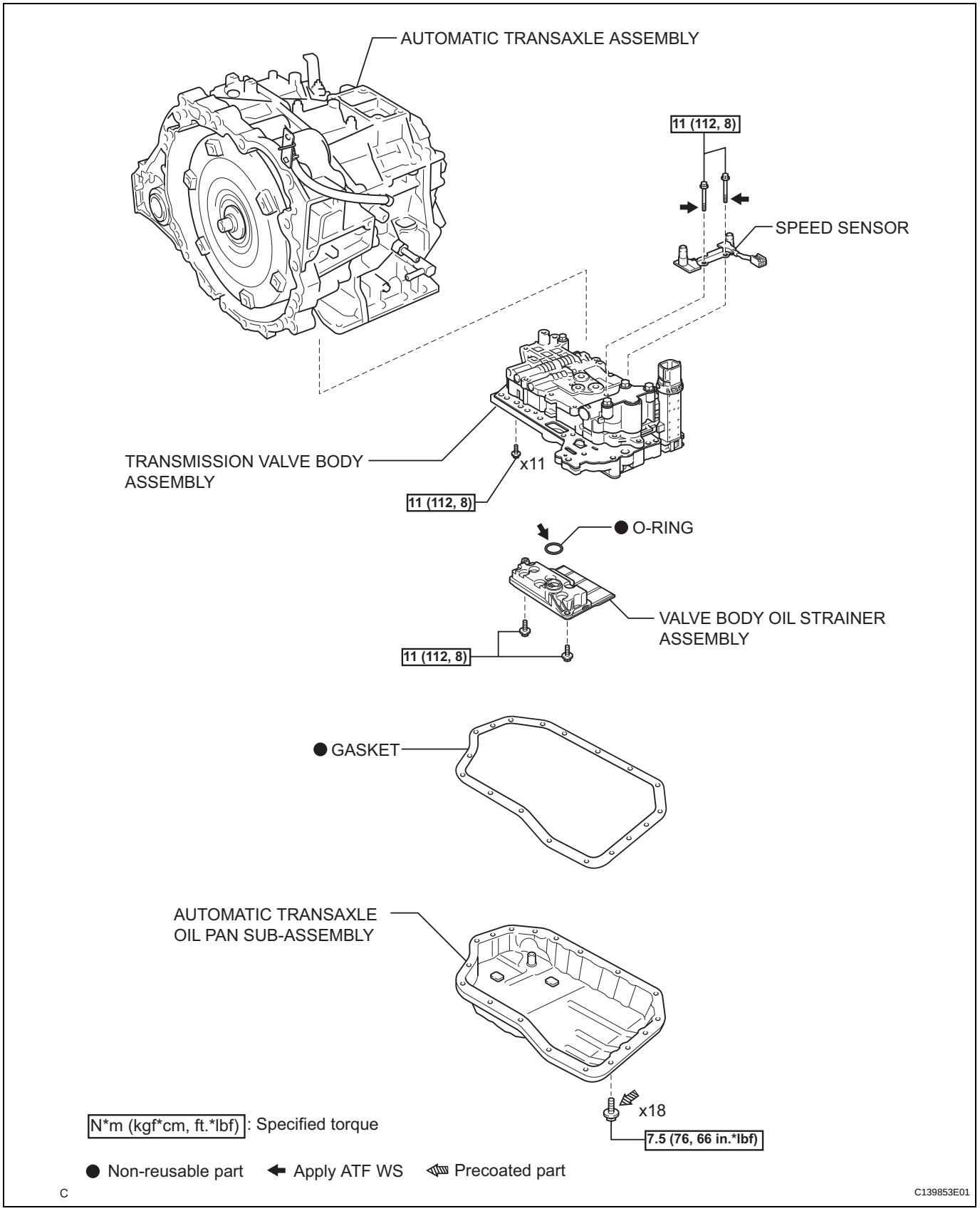
(a) Install the overflow plug.
(b) Remove the refill plug.
(c) Add the fluid until it comes out of the overflow plug.
(d) Wait until the overflow slows to a trickle.
(e) Install the overflow plug with a new gasket.
(f) Install the refill plug with a new gasket.
(g) Stop the engine.

8. AFTER FILLING TRANSMISSION

(a) Install the overflow plug with a new gasket.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)
(b) Install the refill plug with a new gasket.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
(c) Stop the engine.

SPEED SENSOR

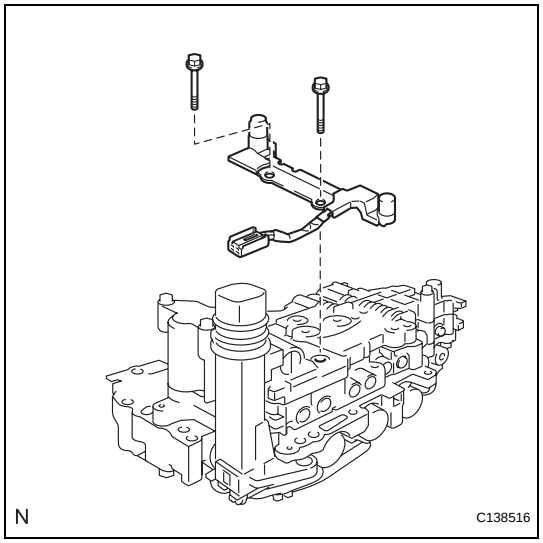
COMPONENTS

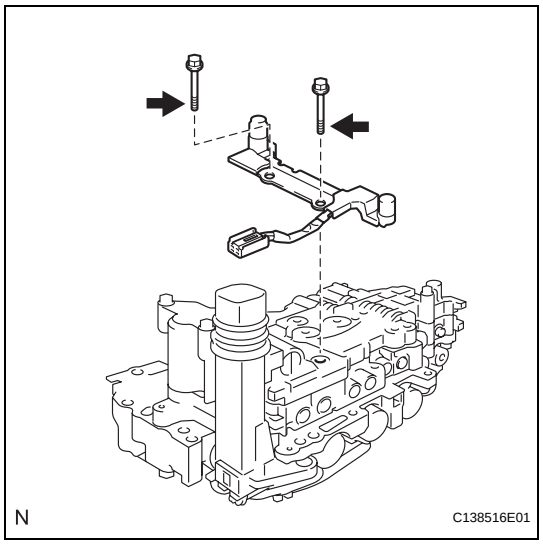


AX

REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
5. **REMOVE SPEED SENSOR**
   (a) Disconnect the connector.
   (b) Remove the 2 bolts and speed sensor from the valve body.





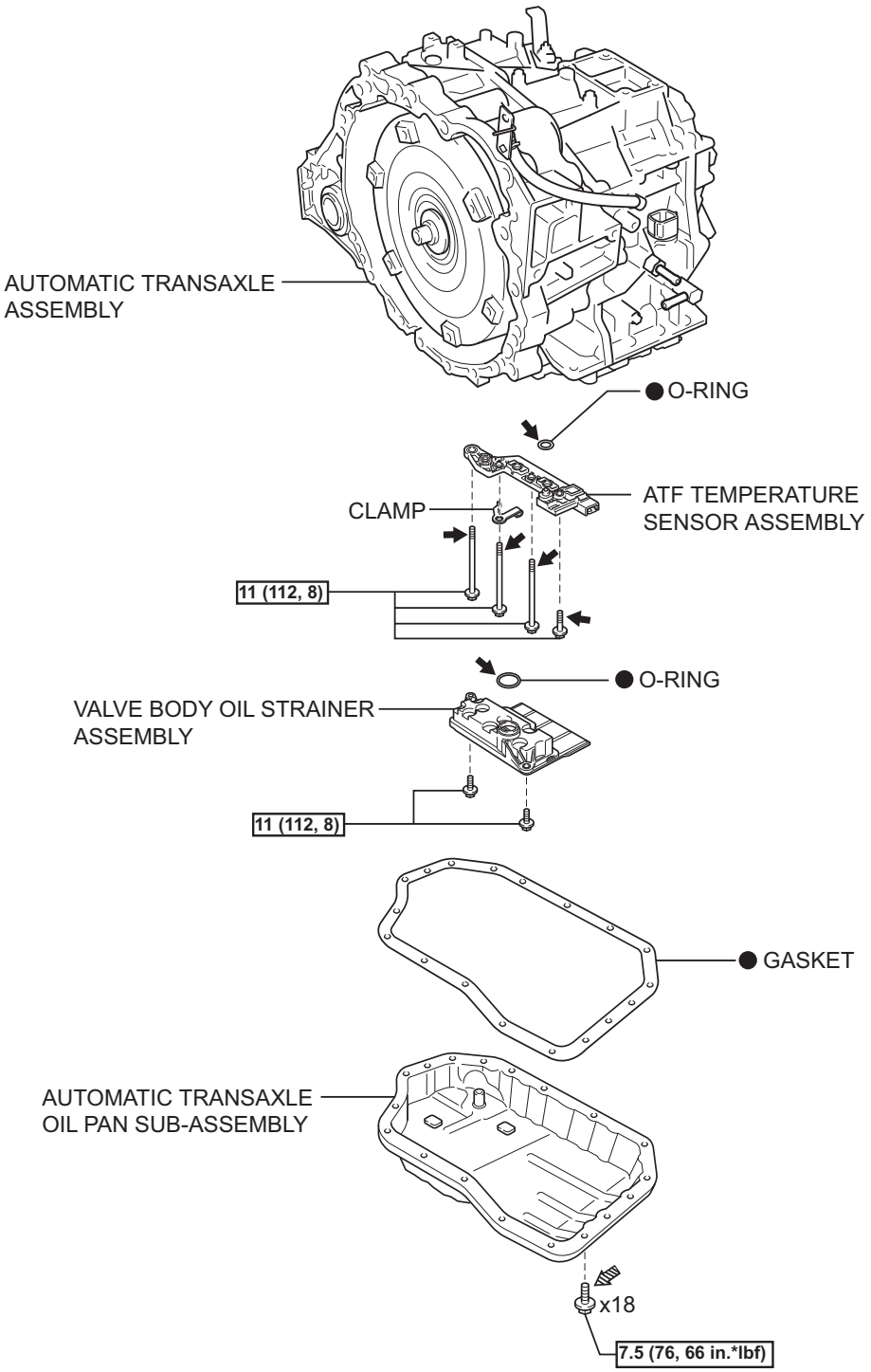
INSTALLATION

1. **INSTALL SPEED SENSOR**
   (a) Coat the 2 bolts with ATF.
   (b) Install the speed sensor to the valve body with the 2 bolts.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
   (c) Connect the connector.
2. **INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
3. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)**
4. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)**
5. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-214)

ATF TEMPERATURE SENSOR

COMPONENTS

AX



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ◄ Apply ATF WS Precoated part

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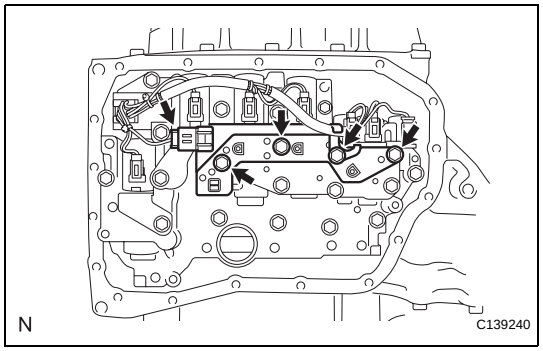
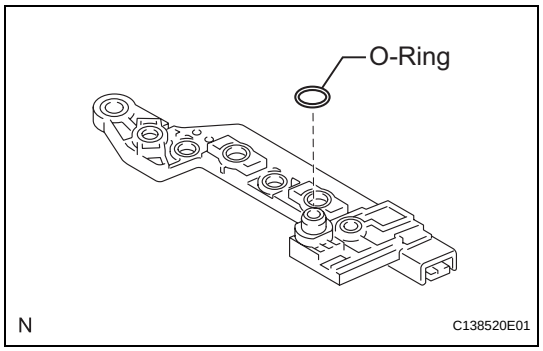
REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 4 bolts, ATF temperature sensor assembly and clamp from the valve body.





   (c) Remove the O-ring from the ATF temperature sensor assembly.

INSPECTION

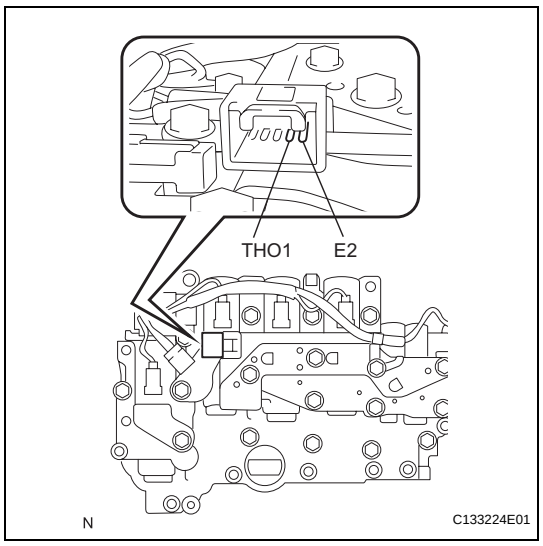
1. **INSPECT ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Measure the resistance according to the value(s) in the table below.
   Standard resistance

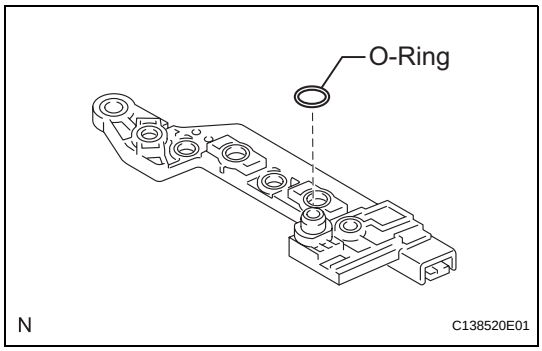
Tester Connection	Specified Condition
E2 - THO1	90 Ω to 156 kΩ
E2 - Body ground	10 kΩ or higher
THO1 - Body ground	10 kΩ or higher

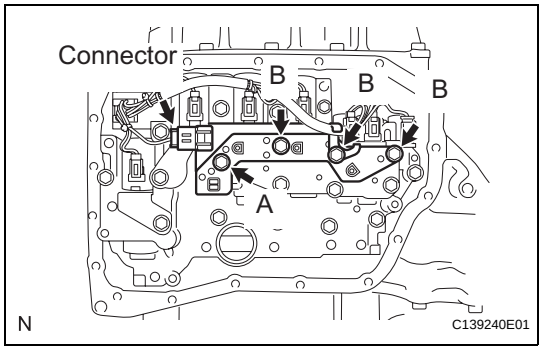
   HINT:
   If the resistance is out of the specified range with the ATF temperature assembly shown in the table below, the driveability of the vehicle may decrease.
   Standard resistance

ATF Temperature	Specified Condition
10 °C (50°F)	5.8 to 7.1 kΩ
110°C (230°F)	0.23 to 0.26 kΩ

   If the result is not specified, replace the ATF temperature sensor assembly.





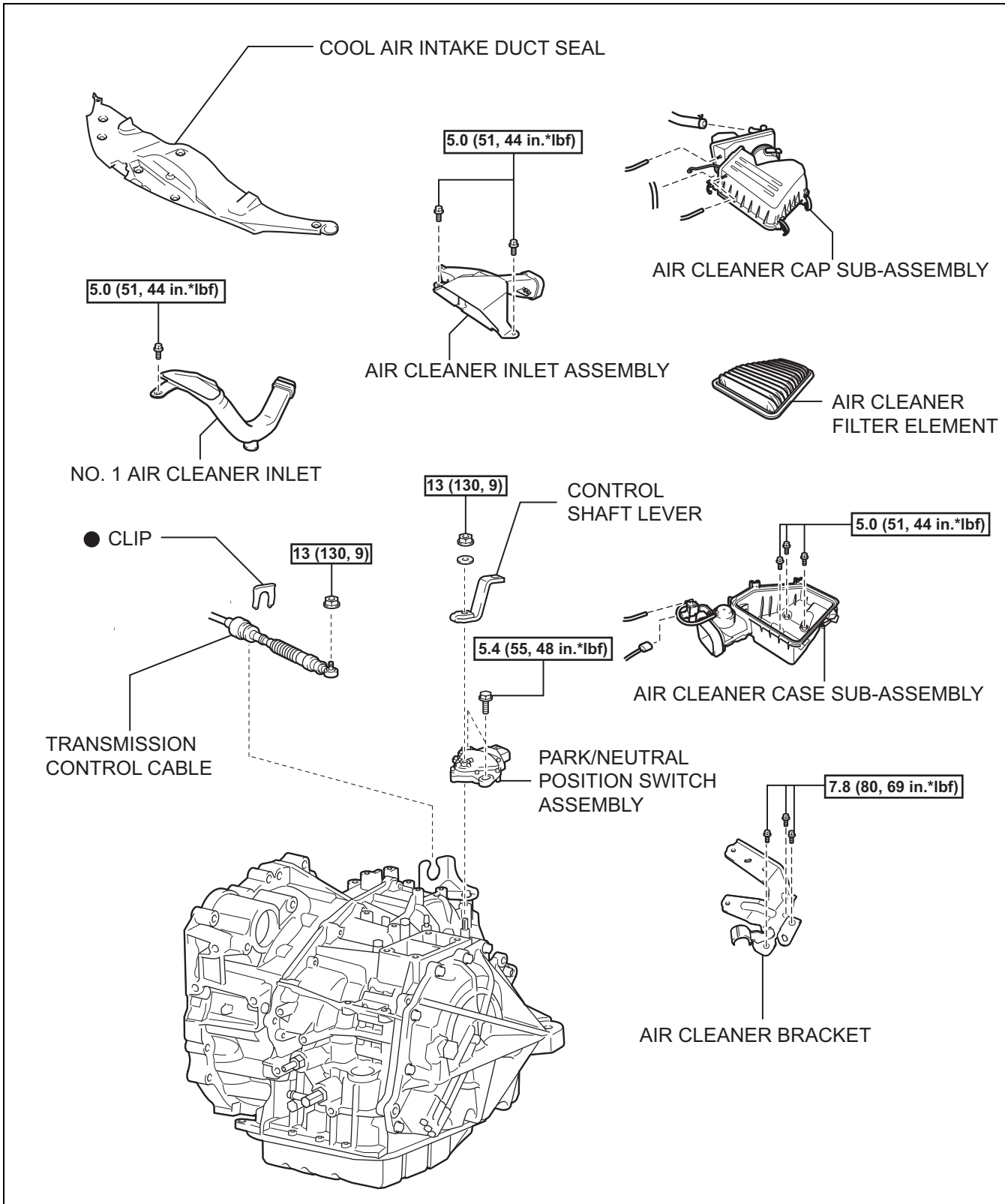


INSTALLATION

1. **INSTALL ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Coat a new O-ring with ATF and install it to the ATF temperature sensor assembly .
   (b) Coat the 4 bolts with ATF.
   (c) Install the ATF temperature sensor assembly and clamp to the valve body with the 4 bolts.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
   Bolt length:
   Bolt A:
   25 mm (0.98 in.)
   Bolt B:
   85 mm (3.35 in.)
   (d) Connect the connector.
2. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)**
3. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)**
4. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-214)

PARK / NEUTRAL POSITION SWITCH

COMPONENTS



ON-VEHICLE INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY OPERATION

(a) Apply the parking brake.

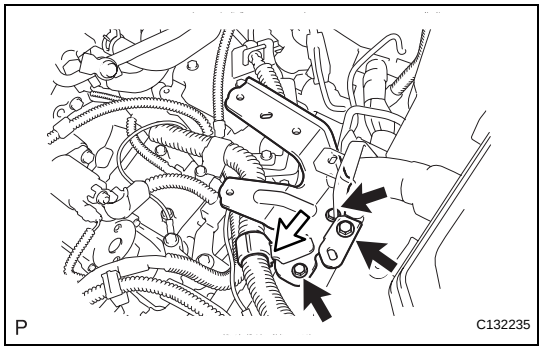
(b) Turn the ignition switch on (IG).

(c) Depress the brake pedal and check that the engine starts when the shift lever is set in the N or P position, but does not start in other positions.

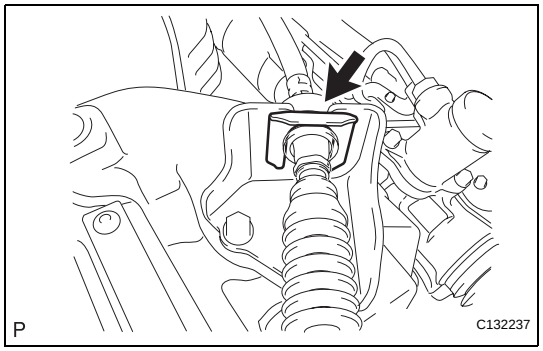
(d) Check that the back-up light comes on and the reverse warning buzzer sounds when the shift lever is set in the R position, but the light and buzzer do not operate in other positions. If a failure is found, check the park/neutral position switch for continuity.

REMOVAL

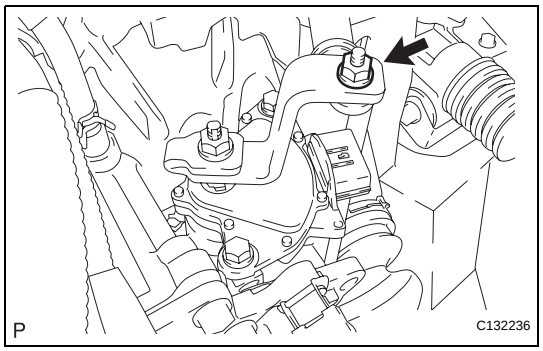
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
4. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
5. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
6. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
7. **REMOVE AIR CLEANER BRACKET**
   (a) Separate the wire harness clamp.
   (b) Remove the 3 bolts and air cleaner bracket.

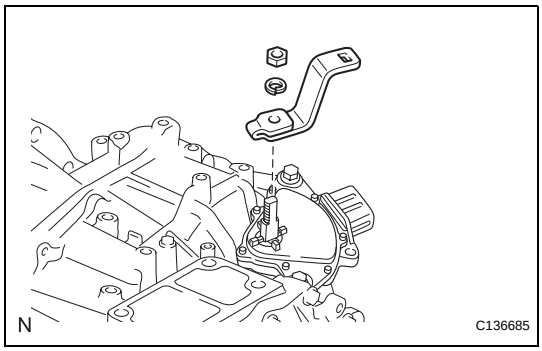


8. **REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY**
   (a) Remove the clip from the transmission cable bracket.

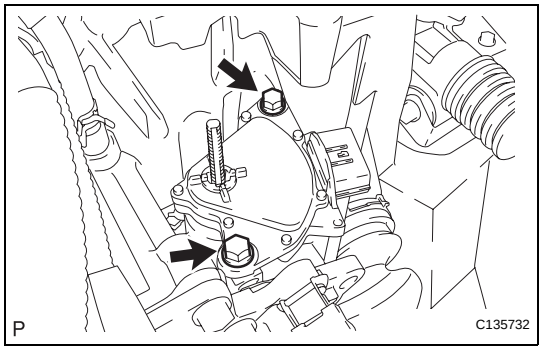


   (b) Remove the nut and transmission control cable from the control shaft lever.
   (c) Disconnect the connector from the park/neutral position switch.





(d) Remove the nut, washer and control shaft lever from the control shaft.



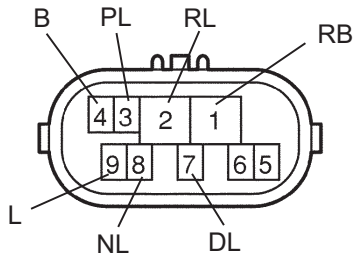
(e) Remove the 2 bolts and park/neutral position switch from the control shaft.

NOTICE:

Before removing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to remove the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.

Switch Side:

(Connector Front View):



INSPECTION

1. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below when the shift lever is moved to each position.

Standard resistance:

Shift Position	Tester Connection	Specified Condition
P	1 (RB) - 3 (PL) and 4 (B) - 9 (L)	Below 1 Ω
Except P	↑	10 kΩ or higher
R	2 (RL) - 1 (RB)	Below 1 Ω
Except R	↑	10 kΩ or higher
N	1 (RB) - 8 (NL) and 4 (B) - 9 (L)	Below 1 Ω
Except N	↑	10 kΩ or higher
D, S, "+" and "-"	1 (RB) - 7 (DL)	Below 1 Ω
Except D, S, "+" and "-"	↑	10 kΩ or higher

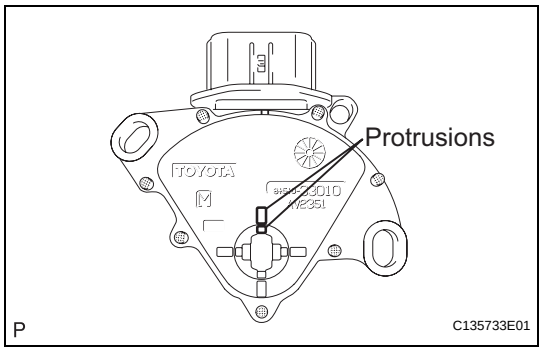
If operation cannot be done as specified, replace the park/neutral position switch.

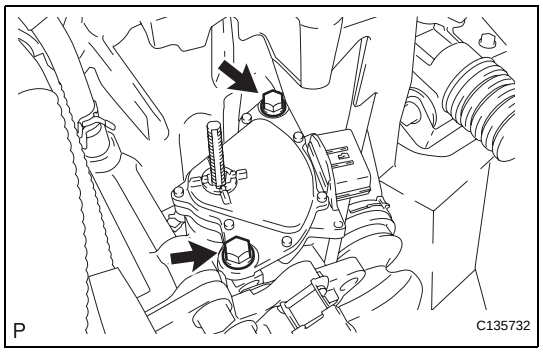
INSTALLATION

1. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY

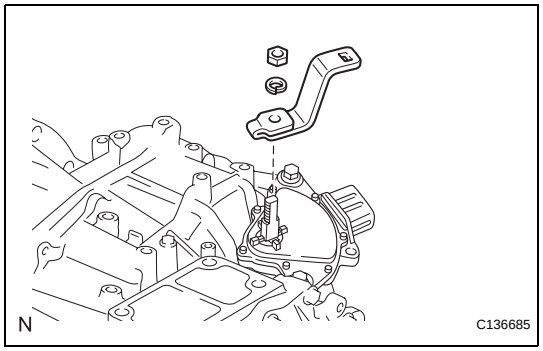
(a) Move the shift lever to the N position.

(b) Align the protrusions of the park/neutral position switch.



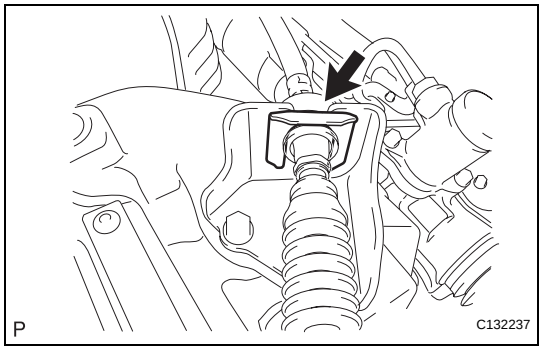


(c) Install the park/neutral position switch to the control shaft with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
NOTICE:
- **Before installing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to install the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.**
- **After installing the park/neutral position switch, confirm that the 2 protrusions on the switch are aligned.**

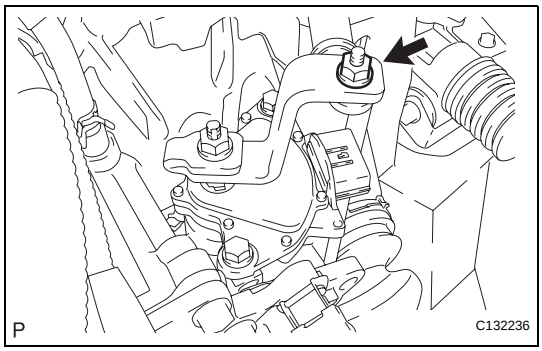


(d) Install the control shaft lever to the control shaft with the nut and washer.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

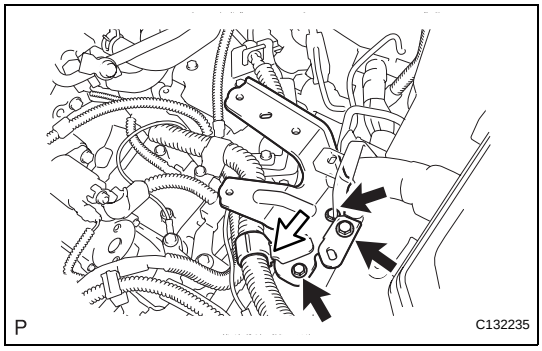
(e) Connect the connector to the park/neutral position switch.



(f) Connect the transmission control cable to the transmission control cable bracket with a new clip.



(g) Connect the transmission control cable to the control shaft lever with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



2. INSTALL AIR CLEANER BRACKET
(a) Install the air cleaner bracket with the 3 bolts.
Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)
(b) Install the wire harness clamp.

3. INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)

4. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)

5. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)

6. INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)

7. INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)

8. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)

9. INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY OPERATION (See page AX-174)

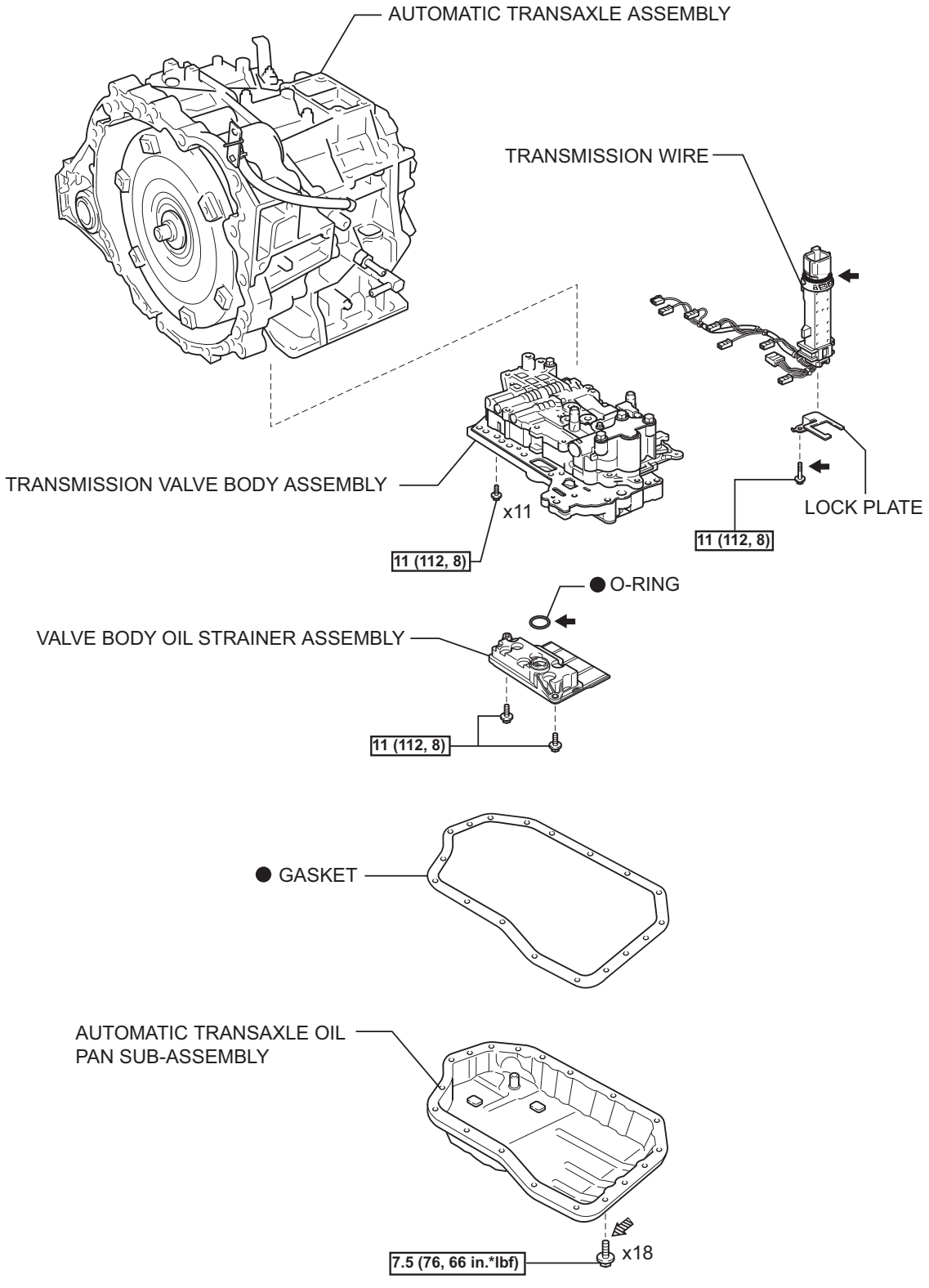
10. INSPECT SHIFT LEVER POSITION (See page AX-191)

11. ADJUST SHIFT LEVER POSITION (See page AX-191)

TRANSMISSION WIRE

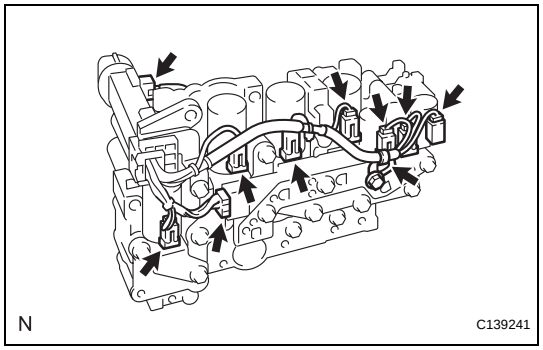
COMPONENTS

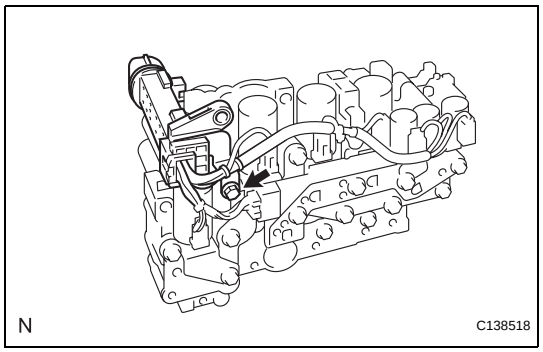
AX



REMOVAL

1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY**
   HINT:
   (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
5. **REMOVE TRANSMISSION WIRE**
   (a) Disconnect the 9 connectors.
   (b) Remove the transmission wire from the clamp.

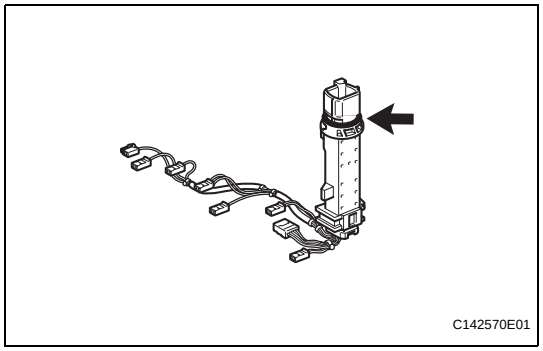


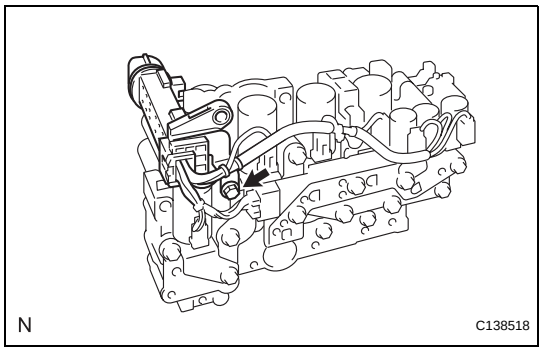


   (c) Remove the bolt, lock plate and transmission wire from the valve body.

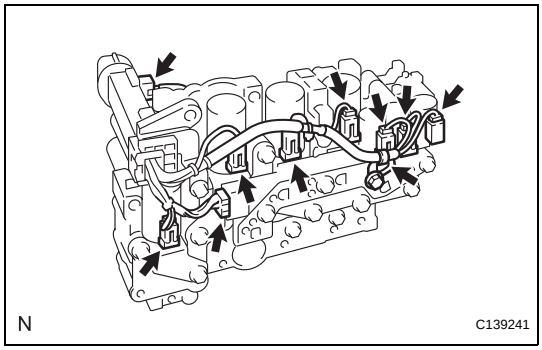
INSTALLATION

1. **INSTALL TRANSMISSION WIRE**
   (a) Coat the O-ring with ATF.
   (b) Coat the bolt with ATF.





(c) Install the transmission wire and lock plate to the valve body with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

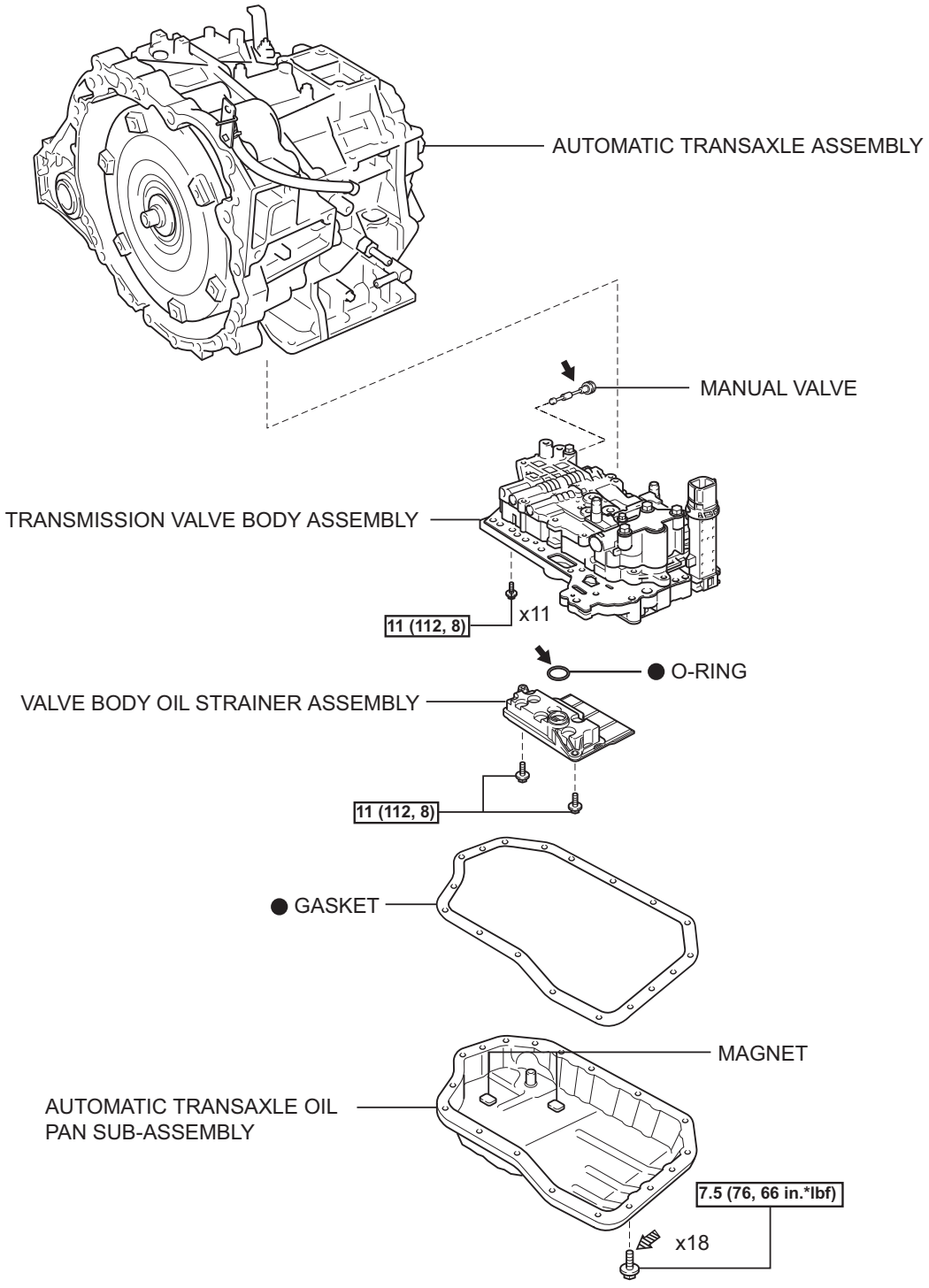


(d) Install the transmission wire to the clamp.
(e) Connect the 9 connectors.

2. **INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
3. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)**
4. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)**
5. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY**
HINT:
(See page AX-214)

VALVE BODY ASSEMBLY

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ⬅ Apply ATF WS Precoated part

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AX

REMOVAL

1. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

HINT:

(See page AX-207)

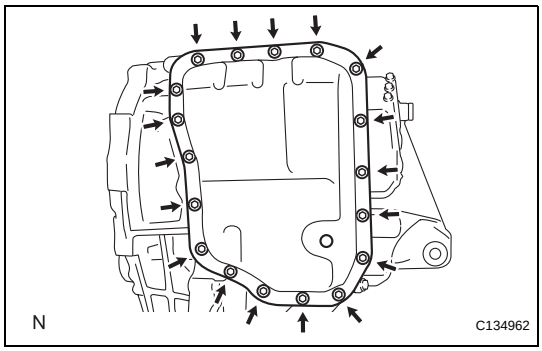
2. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Remove the 18 bolts and oil pan from the transaxle.

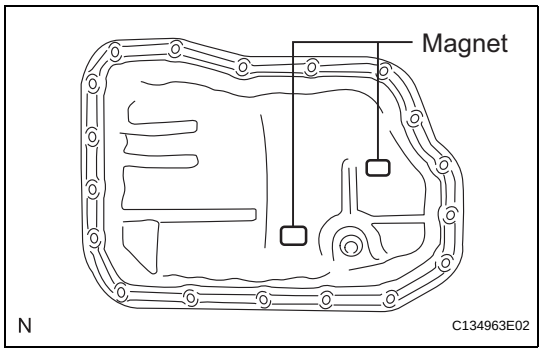
NOTICE:

Some fluid will remain in the oil pan. Remove all the pan bolts, and carefully remove the oil pan assembly.

(b) Remove the gasket from the oil pan.



(c) Remove the 2 magnets from the oil pan.



(d) Examine particles in the oil pan.

(1) Collect any steel chips with the removed magnets. Lock carefully at the chips and particles in the oil pan and on the magnets to see the type of wear which might be found in the transaxle.

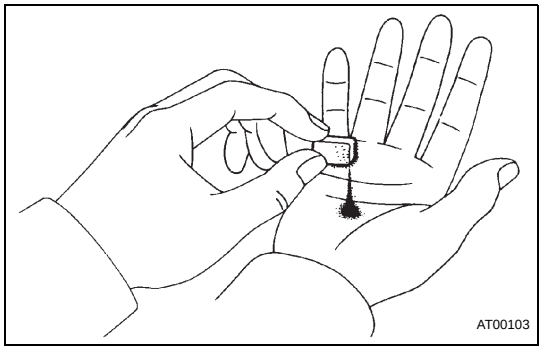
Result:

Steel (magnetic):

Bearing, gear and plate wear

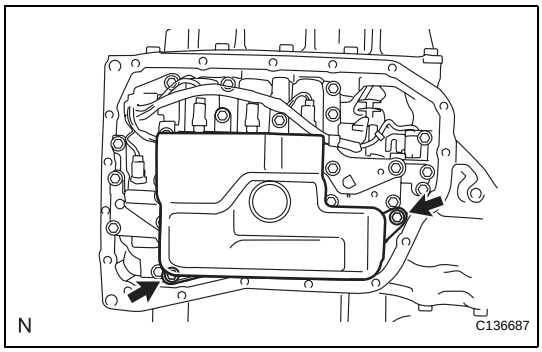
Brass (non-magnetic):

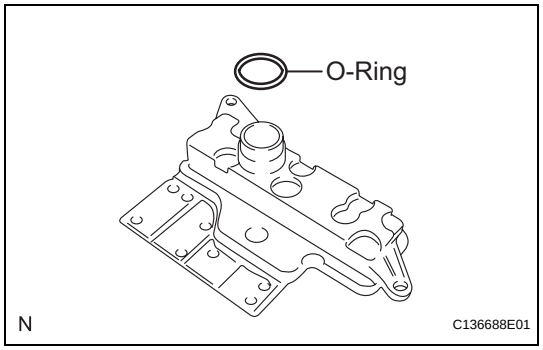
Bearing wear



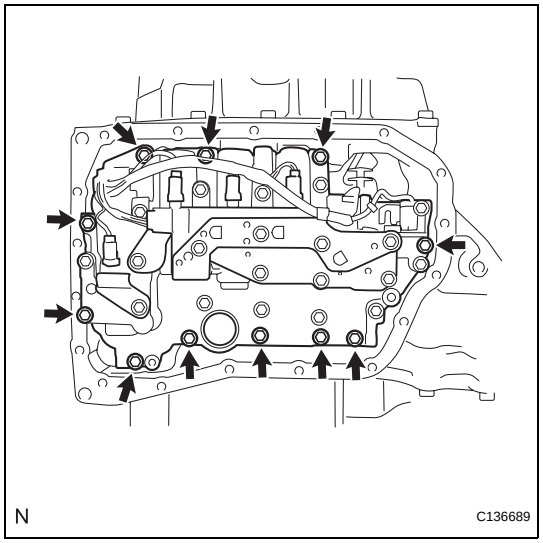
3. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

(a) Remove the 2 bolts and oil strainer from the valve body.





(b) Remove the O-ring from the oil strainer.

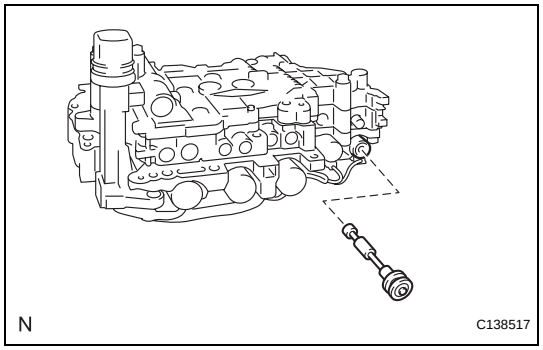


4. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Remove the 11 bolts and valve body from the transaxle.

NOTICE:

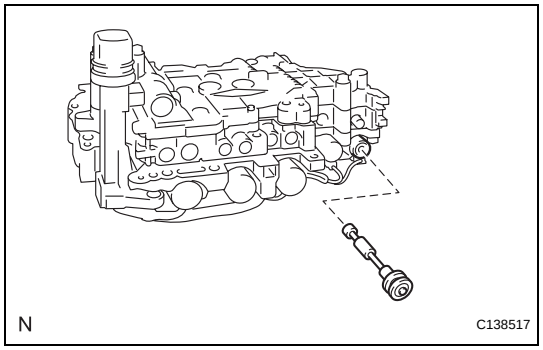
When removing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and the transaxle case to interfere each other.



5. REMOVE MANUAL VALVE

(a) Remove the manual valve from the valve body.

INSTALLATION

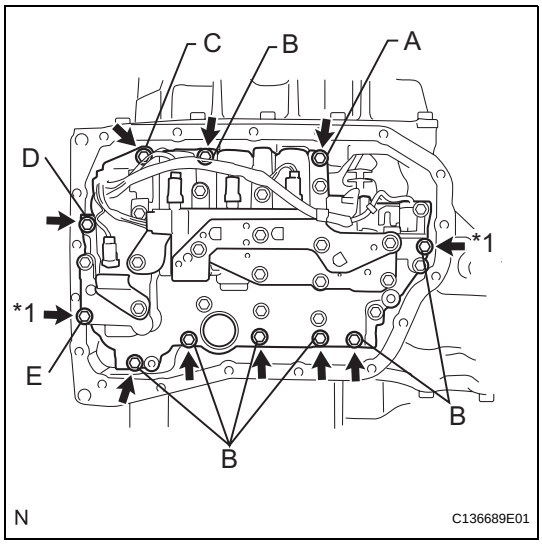


1. INSTALL MANUAL VALVE

(a) Coat the manual valve with ATF and install it to the valve body.

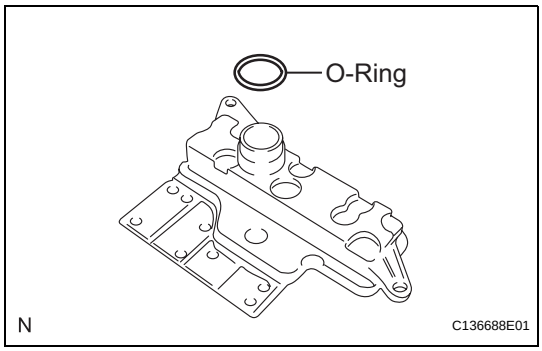
2. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Coat the O-ring of the transmission wire with ATF.

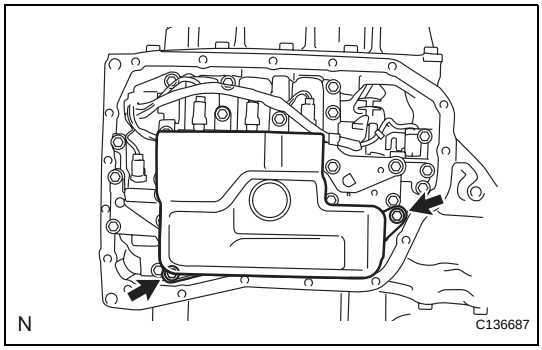


(b) Confirm that the manual valve lever is positioned as shown in the illustration and install the valve body assembly to the transaxle case with the 11 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)
Bolt length:
Bolt A:
25 mm (0.98 in.)
Bolt B:
30 mm (1.18 in.)
Bolt C:
35 mm (1.38 in.)
Bolt D:
45 mm (1.77 in.)
Bolt E:
55 mm (2.17 in.)
NOTICE:
- **When installing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and transaxle case to interfere each other.**
- **Be sure to insert the pin of the manual valve lever into the groove on the end of the manual valve.**
- **First, temporarily tighten the bolts marked by (*1) in the illustration because they are positioning bolts.**

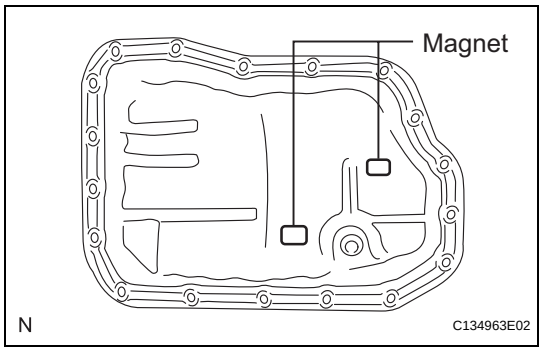
3. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

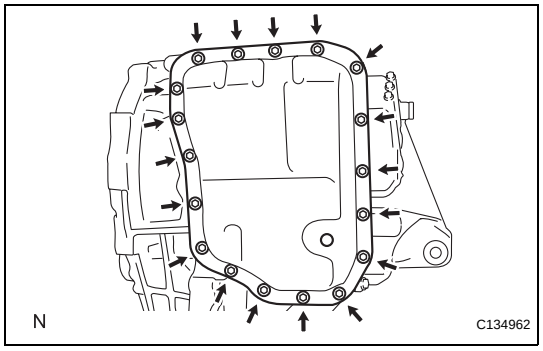


(a) Coat a new O-ring with ATF and install it to the oil strainer.
NOTICE:
Ensure that the O-ring is not twisted or pinched.



(b) Install the oil strainer to the valve body with the 2 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)





4. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets to the oil pan.

(b) Install a new gasket to the oil pan.

(c) Apply sealant to the 18 bolts.

Sealant:

Toyota Genuine Seal Packing 1344, Three Bond 1344 or equivalent.

(d) Install the oil pan from the automatic transaxle with the 18 bolts.

Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

NOTICE:

- **In order to ensure proper sealing of the transmission oil pan bolts, apply sealant to the bolts and install them within 10 minutes of sealant application.**
- **Completely remove any oil or grease from the contact surface of the transaxle case and oil pan sub-assembly with the gasket before installation.**

5. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

HINT:

(See page AX-214)

AX

AX

SHIFT LOCK SYSTEM

ON-VEHICLE INSPECTION

1. CHECK SHIFT LOCK OPERATION

(a) Move the shift lever to the P position.
(b) Turn the ignition switch off.
(c) Check that the shift lever cannot be moved to any position other than P.
(d) Turn the ignition switch on (IG), depress the brake pedal and check that the shift lever can be moved to another position.
If operation cannot be done as specified, inspect the shift lock control unit.

2. CHECK SHIFT LOCK RELEASE BUTTON OPERATION

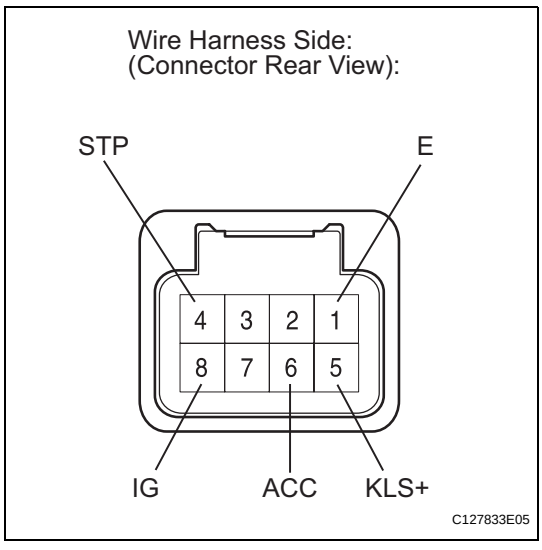
(a) Using a screwdriver, remove the shift lock release cover.
(b) When operating the shift lever with the shift lock release button pressed, check that the lever can be moved to any position other than P.
If operation cannot be done as specified, check the shift lever assembly installation condition.

3. CHECK KEY INTERLOCK OPERATION (w/o Smart Key System)

(a) Turn the ignition switch to the ON position.
(b) Depress the brake pedal and move the shift lever to any position other than P.
(c) Check that the ignition key cannot be turned to the LOCK position.
(d) Move the shift lever to the P position, turn the ignition key to the LOCK position and check that the ignition key can be removed.
If operation cannot be done as specified, inspect the shift lock control unit.

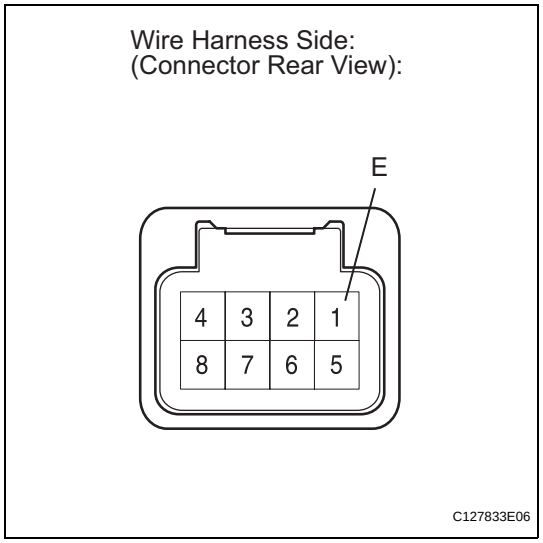
4. INSPECT SHIFT LOCK CONTROL UNIT ASSEMBLY (w/o Smart Key System)

(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.



Standard voltage

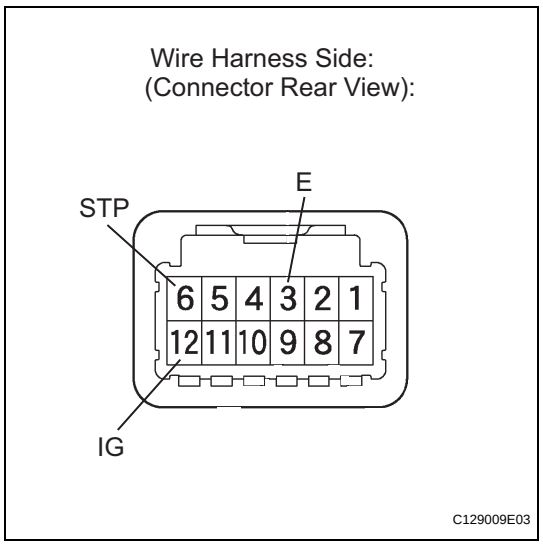
Terminal	Measuring Condition	Voltage (V)
6 (ACC) - 1 (E)	Ignition switch ON	10 to 14
6 (ACC) - 1 (E)	Ignition switch ACC	10 to 14
6 (STP) - 1 (E)	Ignition switch OFF	Below 1
4 (STP) - 1 (E)	Brake pedal depressed	10 to 14
4 (STP) - 1 (E)	Brake pedal released	Below 1
5 (KLS+) - 1 (E)	1. Ignition switch ACC and shift lever P position 2. Ignition switch ACC and shift lever except P position 3. Ignition switch ACC and shift lever P position (After approx. 1 second)	7.5 to 11 Below 1 6 to 9
8 (IG) - 1 (E)	Ignition switch ON	10 to 14
8 (IG) - 1 (E)	Ignition switch OFF	Below 1



(b) Measure the resistance according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.
If the result is not as specified, replace the shift lever assembly.

Standard resistance

Terminal	Measuring Condition	Specified Value
1 (E) - Body ground	Always	Below 1 Ω



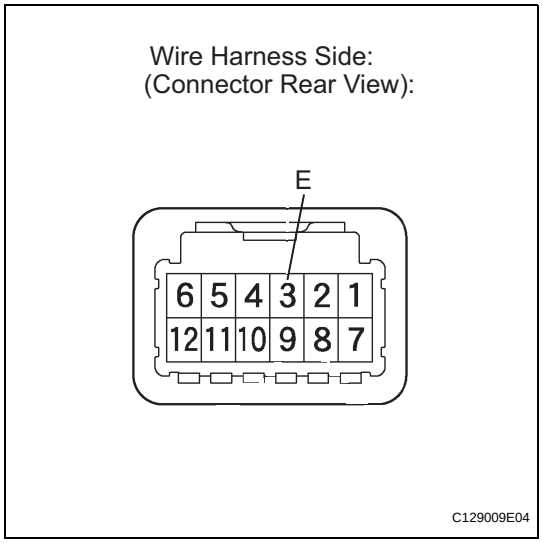
5. INSPECT SHIFT LOCK CONTROL UNIT ASSEMBLY (w/ Smart Key System)

(a) Measure the voltage according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.

Standard voltage

Terminal	Measuring Condition	Voltage (V)
12 (IG) - 3 (E)	Engine switch on (IG)	10 to 14
12 (IG) - 3 (E)	Engine switch off	Below 1
6 (STP) - 3 (E)	Brake pedal depressed	10 to 14

Terminal	Measuring Condition	Voltage (V)
6 (STP) - 3 (E)	Brake pedal released	Below 1



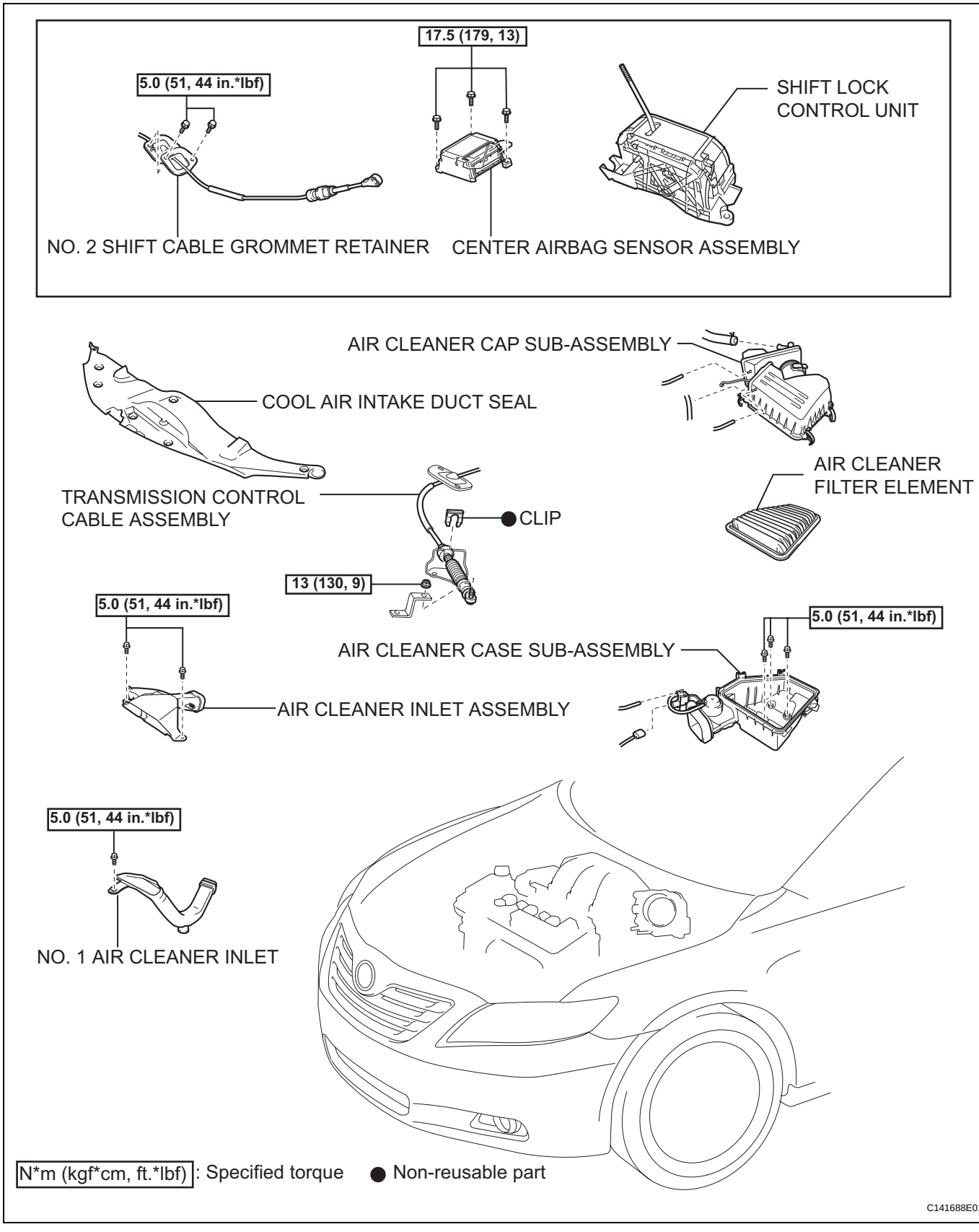
(b) Measure the resistance according to the value(s) in the table below.
HINT:
Do not disconnect the shift lock control unit assembly connector.
If the result is not done as specified, replace the shift lever assembly.

Standard resistance

Terminal	Measuring Condition	Specified Value
3 (E) - Body ground	Always	Below 1 Ω

TRANSMISSION CONTROL CABLE ASSEMBLY

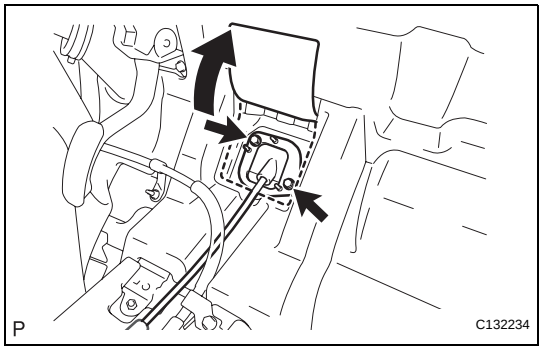
COMPONENTS



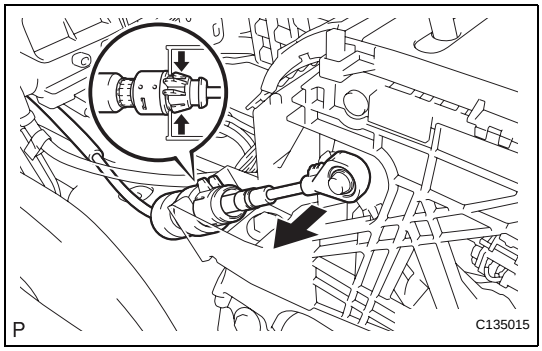
AX

REMOVAL

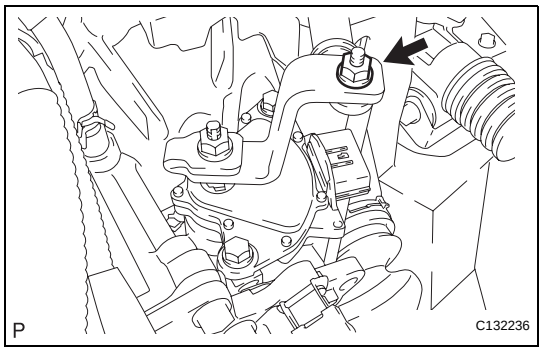
1. **REMOVE AIR CONDITIONING UNIT**
   HINT:
   (See page AC-151)
2. **REMOVE CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**
3. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
4. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
5. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)**
6. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)**
7. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
8. **DISCONNECT NO. 2 SHIFT CABLE GROMMET RETAINER**
   (a) Turn back the carpet.
   (b) Remove the 2 bolts and disconnect the No. 2 shift cable grommet retainer.
   (c) Remove the No. 2 shift cable grommet retainer.

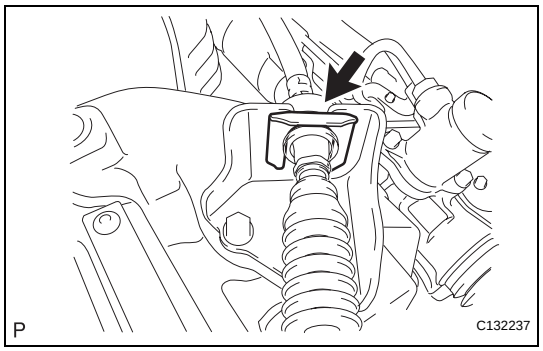


9. **REMOVE TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Disconnect the end of the transmission control cable assembly from the shift lock control unit.
   (b) Disconnect the transmission control cable assembly from the transmission floor shift assembly while pushing the 2 claws of the floor shift cable.



   (c) Remove the nut and transmission control cable from the control shaft lever.





(d) Remove the clip and disconnect the transmission control cable assembly from the No. 1 control cable bracket.

(e) Pull out the transmission control cable assembly from the body.

AX

ADJUSTMENT

1. INSPECT SHIFT LEVER POSITION

(a) When shifting from the P to the R position with the ignition switch on (IG) and brake pedal depressed, make sure that the shift lever moves smoothly and moves correctly into position.

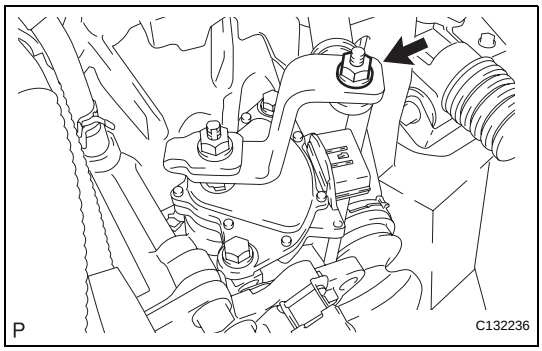
(b) Start the engine and make sure that the vehicle moves forward when shifting from the N to the D position and moves rearward when shifting to the R position.

If operation cannot be done as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

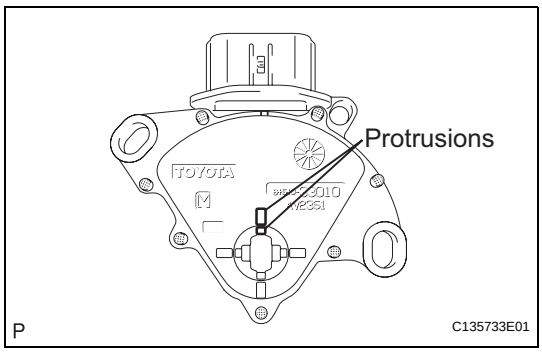
2. ADJUST SHIFT LEVER POSITION

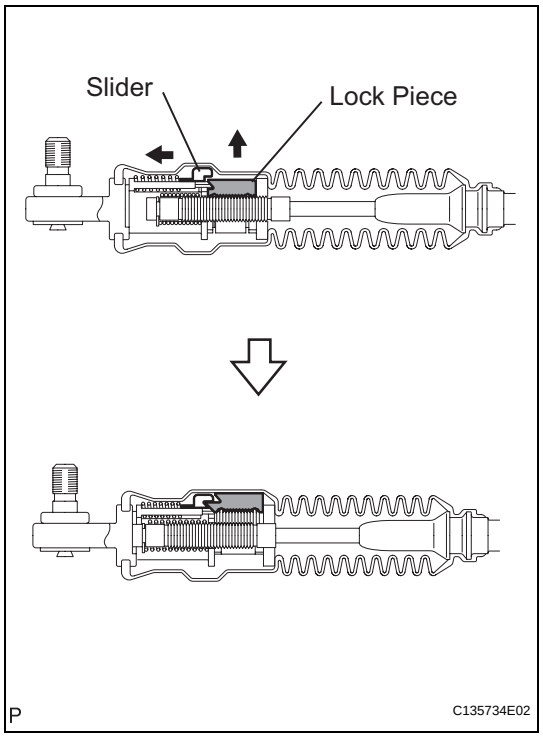
(a) Move the shift lever to the N position.

(b) Remove the nut and transmission control cable from the control shaft lever.

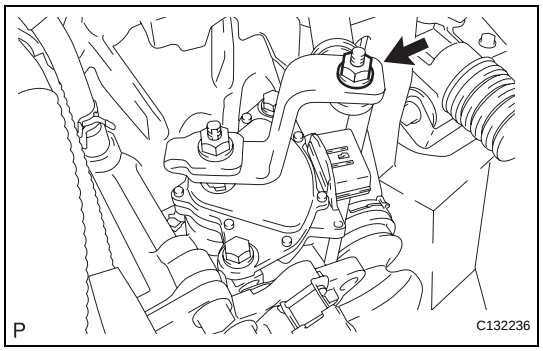


(c) Align the protrusions of the park/neutral position switch.

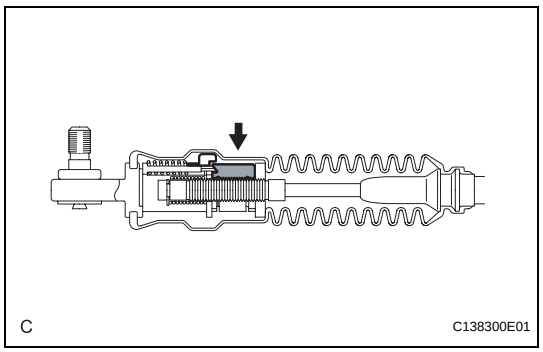




(d) Move the slider in the directions indicated by the arrows and pull up the lock piece.
NOTICE:
Do not damage the boot.



(e) Install the control cable to the control shaft with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)
NOTICE:
- **If the control cable end is excessively pushed up, the shift lever cannot be adjusted.**
- **When tightening the nut, confirm that the control cable is properly stretched.**



(f) Push in the lock piece.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.

(g) Start the engine and make sure that the vehicle moves forward when moving the lever from the N to the D position and moves rearward when moving it to the R position. If it becomes hard to move the shift lever, readjust the shift lever position.

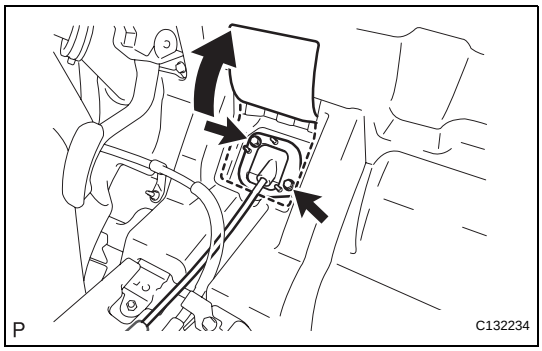
AX

INSTALLATION

1. INSTALL NO. 2 SHIFT CABLE GROMMET RETAINER

(a) Pass the control cable from the cabin to the engine compartment.

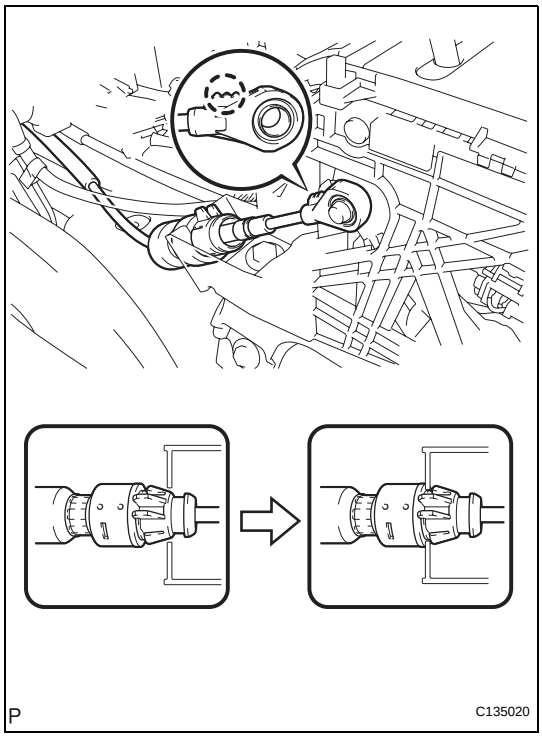
(b) Install the No. 2 shift cable grommet retainer with the 2 bolts.
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)



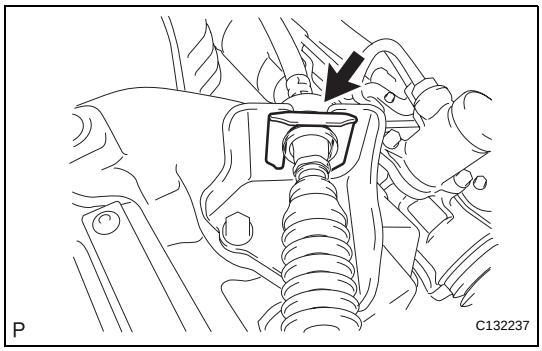
2. INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY

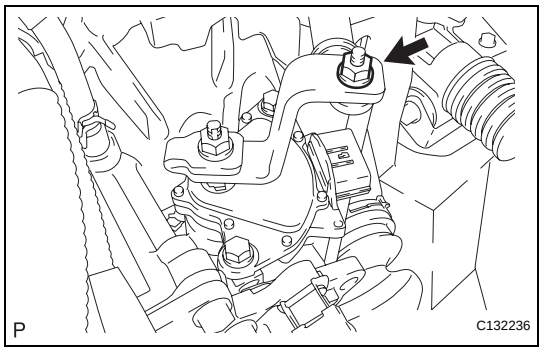
(a) Move the shift lever to the N position.

(b) Install the transmission control cable assembly as shown in the illustration.
HINT:
- Install the floor shift cable with the uneven surface facing up.
- Securely engage the claws of the floor shift cable.

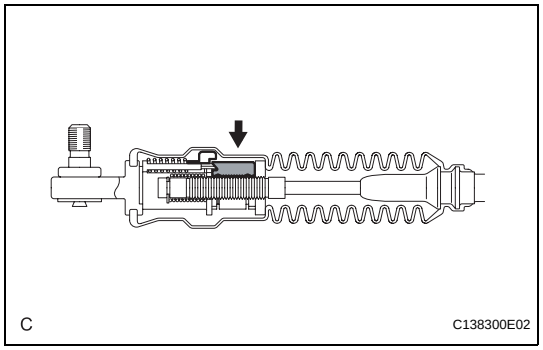


(c) Connect the control cable to the bracket with a new clip.





(d) Install the control cable to the control shaft lever with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)

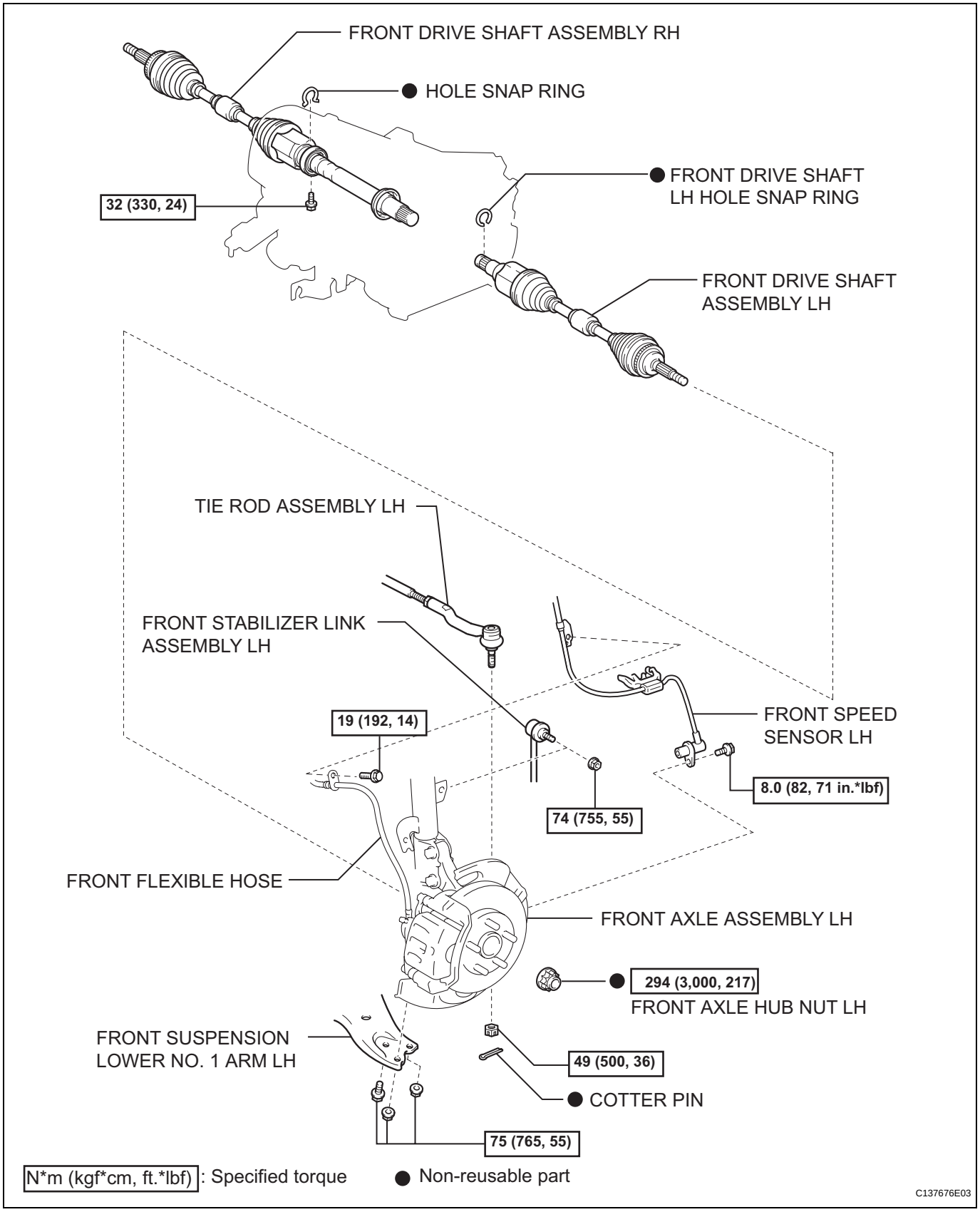


(e) Push in the lock piece of the transmission control cable.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.
HINT:
After pushing in the lock piece, make sure that the boot is not deformed.

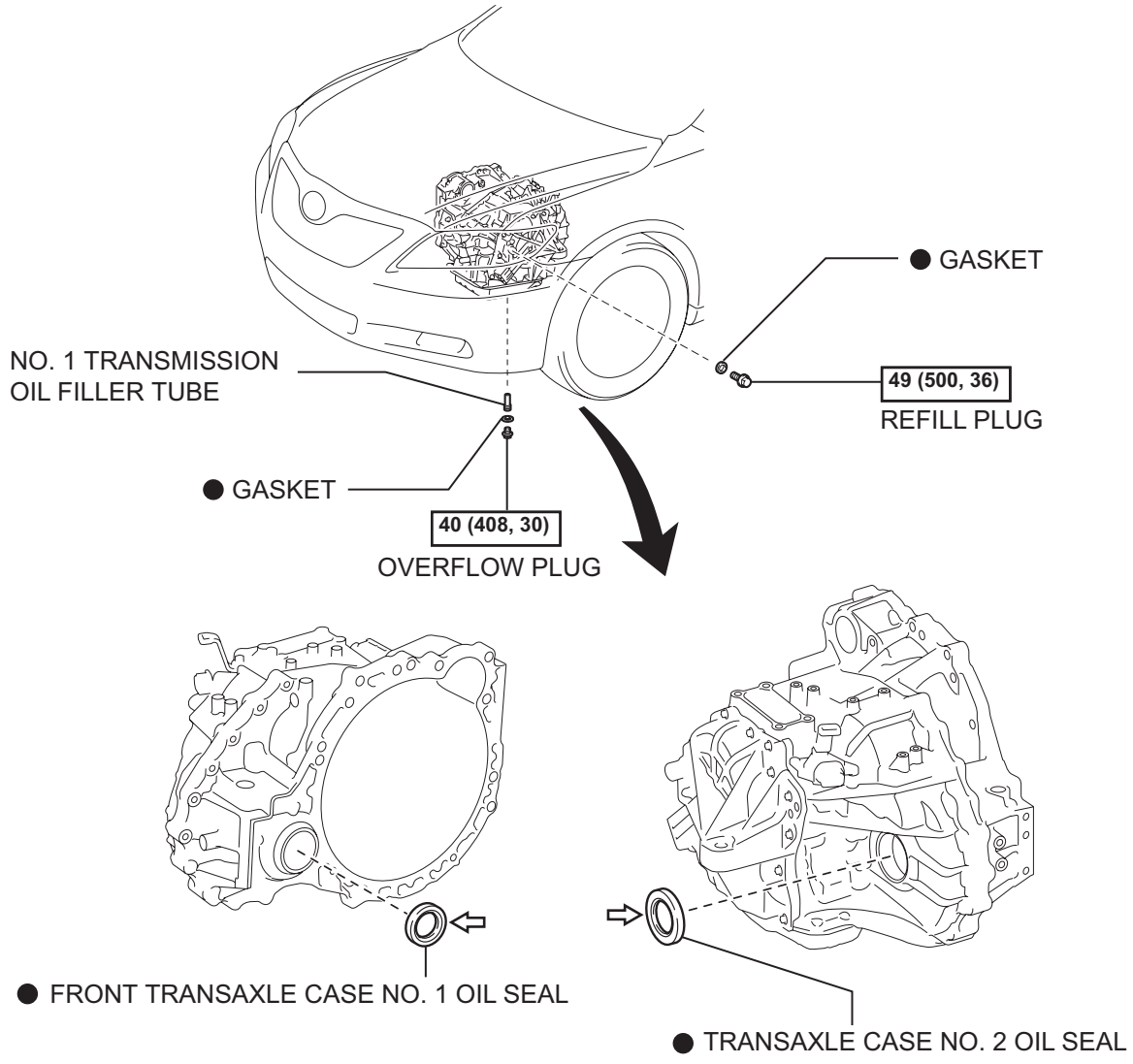
3. **INSTALL CENTER AIRBAG SENSOR ASSEMBLY (See page RS-442)**
4. **INSTALL AIR CONDITIONING UNIT**
HINT:
(See page AC-173)
5. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
6. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)**
7. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)**
8. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
9. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
10. **INSPECT SHIFT LEVER POSITION (See page AX-191)**
11. **ADJUST SHIFT LEVER POSITION (See page AX-191)**

DIFFERENTIAL OIL SEAL

COMPONENTS



AX



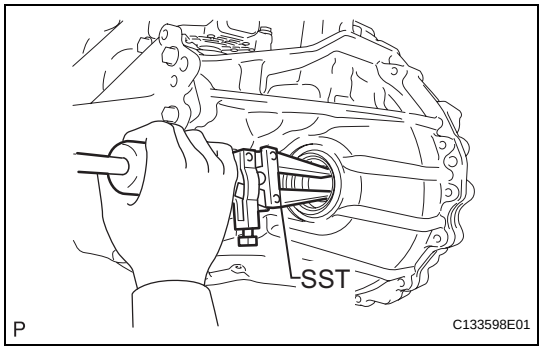
N*m (kgf*cm, ft.*lbf) : Specified torque ⇦ Apply MP grease ● Non-reusable part

C

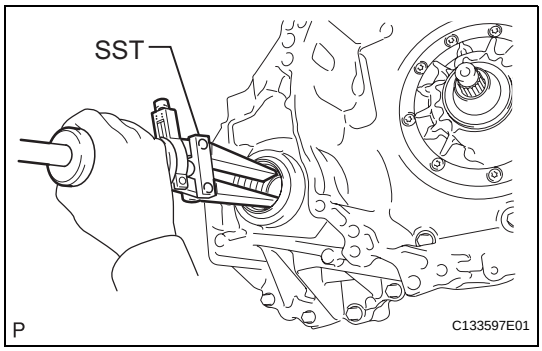
C139876E01

REMOVAL

1. **DRAIN AUTOMATIC TRANSAXLE FLUID (See page AX-207)**
2. **REMOVE FRONT WHEELS**
3. **REMOVE FRONT AXLE HUB NUT LH (See page DS-7)**
4. **REMOVE FRONT AXLE HUB NUT RH (See page EM-28)**
5. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)**
6. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH (See page EM-29)**
7. **SEPARATE FRONT SPEED SENSOR LH (See page DS-7)**
8. **SEPARATE FRONT SPEED SENSOR RH (See page EM-29)**
9. **SEPARATE TIE ROD ASSEMBLY LH (See page DS-8)**
10. **SEPARATE TIE ROD ASSEMBLY RH (See page EM-29)**
11. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)**
12. **SEPARATE FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-29)**
13. **SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)**
14. **SEPARATE FRONT AXLE ASSEMBLY RH (See page EM-29)**
15. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)**
16. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)**
17. **SECURE FRONT AXLE HUB SUB-ASSEMBLY (See page DS-9)**
18. **REMOVE TRANSAXLE CASE NO. 2 OIL SEAL**
    (a) Using SST, remove the oil seal from the transaxle case.
    SST 09308-00010

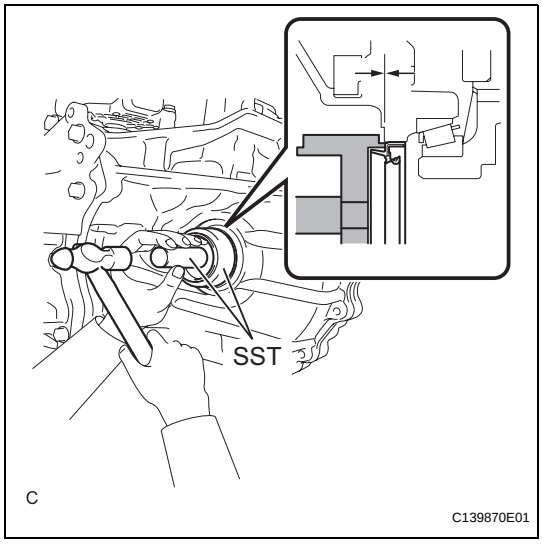


AX

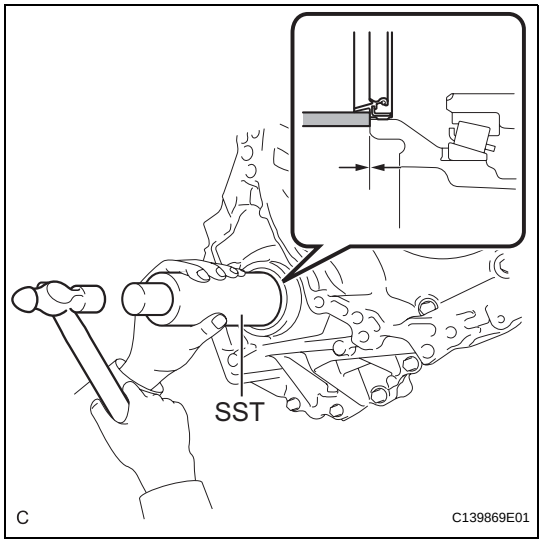


19. **REMOVE FRONT TRANSAXLE CASE NO. 1 OIL SEAL**
    (a) Using SST, remove the oil seal from the transaxle housing.
    SST 09308-00010

INSTALLATION



1. **INSTALL TRANSAXLE CASE NO. 2 OIL SEAL**
    (a) Using SST and a hammer, install a new oil seal to the transaxle case.
    SST 09316-10010, 09950-70010 (09951-07100)
    Oil seal installation depth:
    -0.5 to 0.5 mm (-0.020 to 0.020 in.)
    (b) Coat the lip of the oil seal with MP grease.



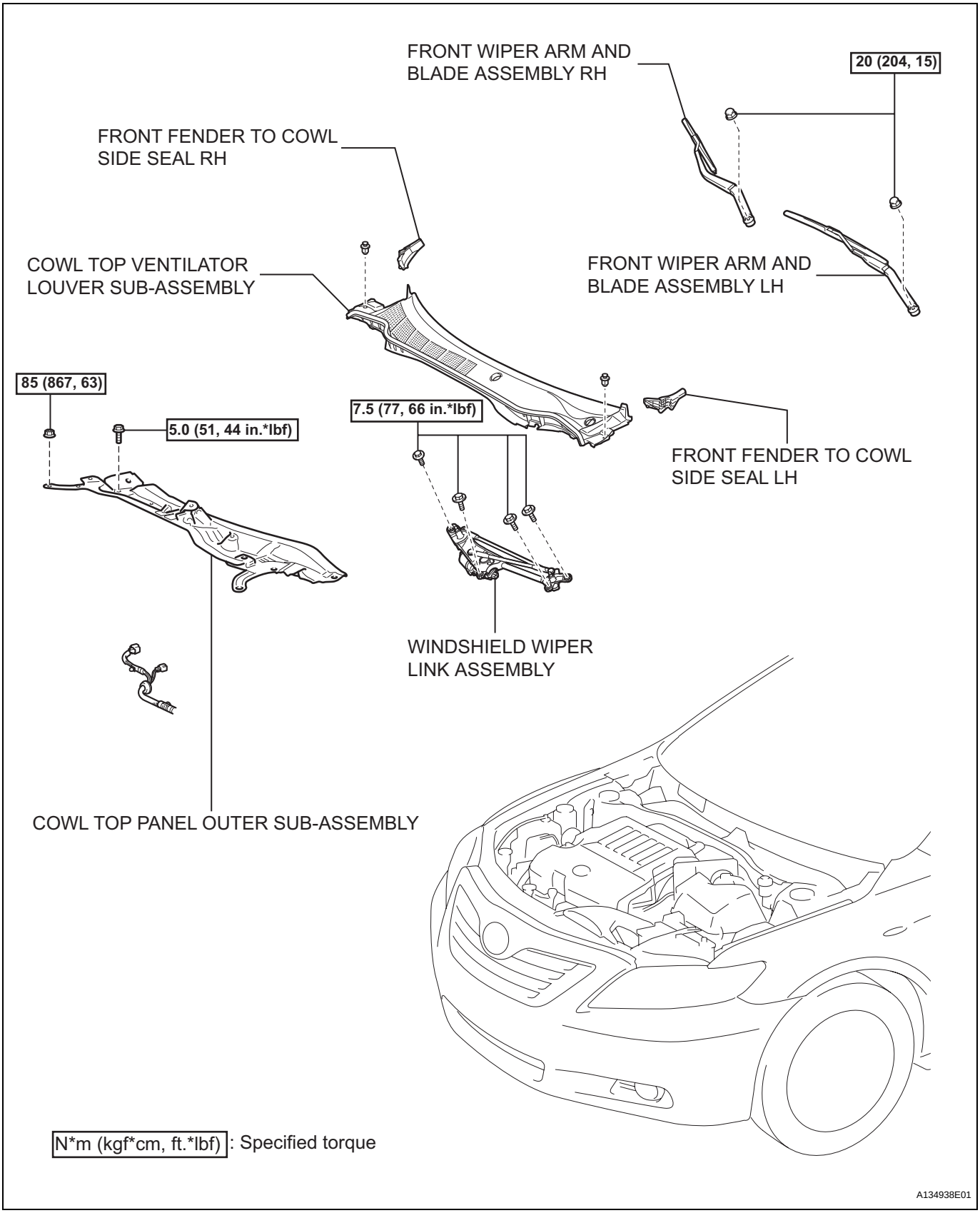
2. **INSTALL FRONT TRANSAXLE CASE NO. 1 OIL SEAL**
    (a) Using SST and a hammer, install a new oil seal to the transaxle housing.
    SST 09308-14010
    Oil seal installation depth:
    -0.5 to 0.5 mm (-0.020 to 0.020 in.)
    (b) Coat the lip of the oil seal with MP grease.
3. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)**
4. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)**
5. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)**
6. **INSTALL FRONT AXLE ASSEMBLY RH (See page EM-45)**
7. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)**
8. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-45)**
9. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**
10. **INSTALL TIE ROD ASSEMBLY RH (See page EM-45)**
11. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**

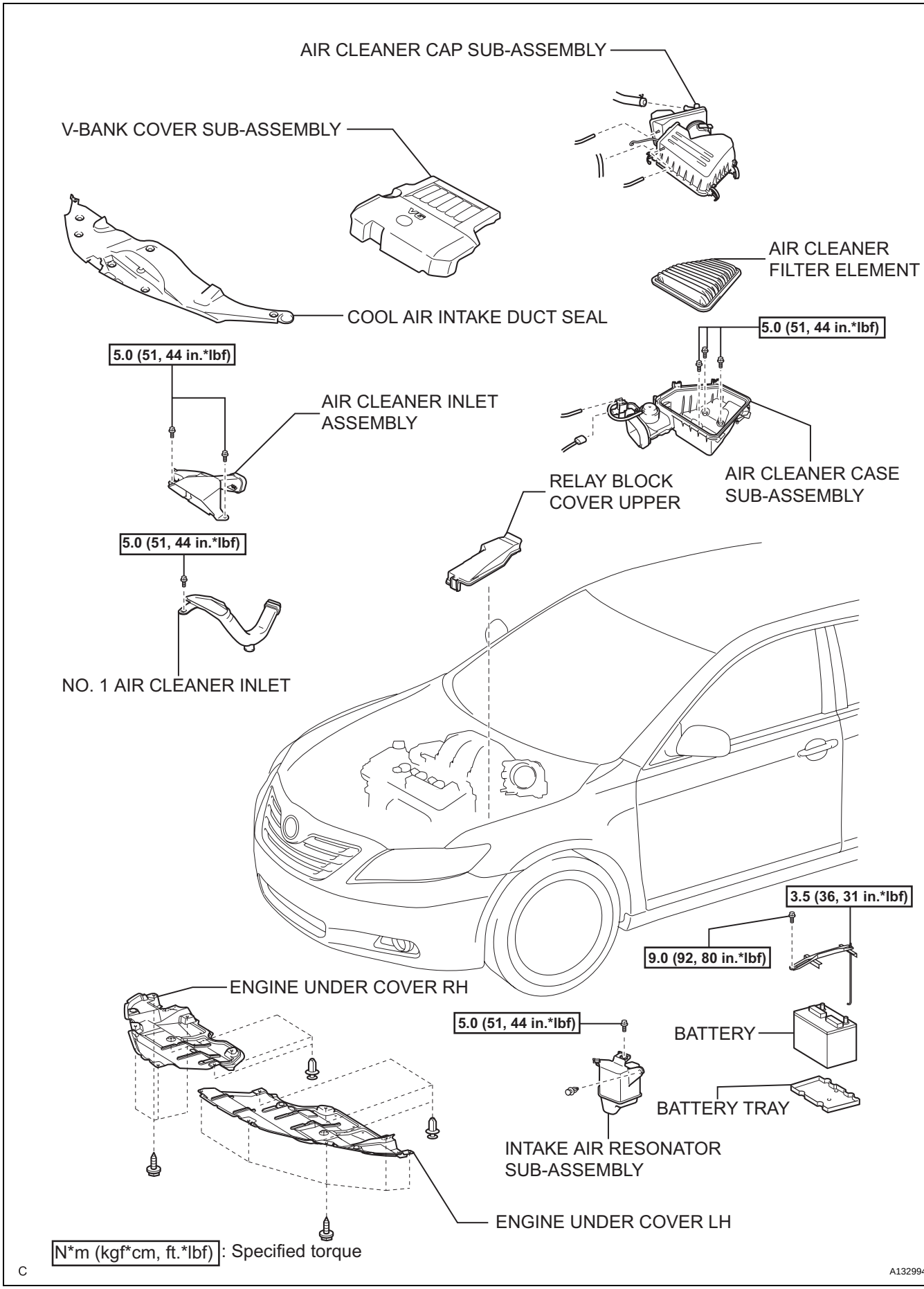
12. **INSTALL FRONT SPEED SENSOR RH (See page EM-45)**
13. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**
14. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH (See page EM-45)**
15. **INSTALL FRONT AXLE HUB NUT LH (See page DS-22)**
16. **INSTALL FRONT AXLE HUB NUT RH (See page EM-45)**
17. **INSTALL FRONT WHEELS (See page EM-51)**
18. **ADD AUTOMATIC TRANSAXLE FLUID**
    HINT:
    (See page AX-164)
19. **ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    (See page SP-4)
20. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) ABS: BC-11
    (b) VSC (for BOSCH): BC-290
    (c) VSC (for ADVICS): BC-123

AUTOMATIC TRANSAXLE ASSEMBLY

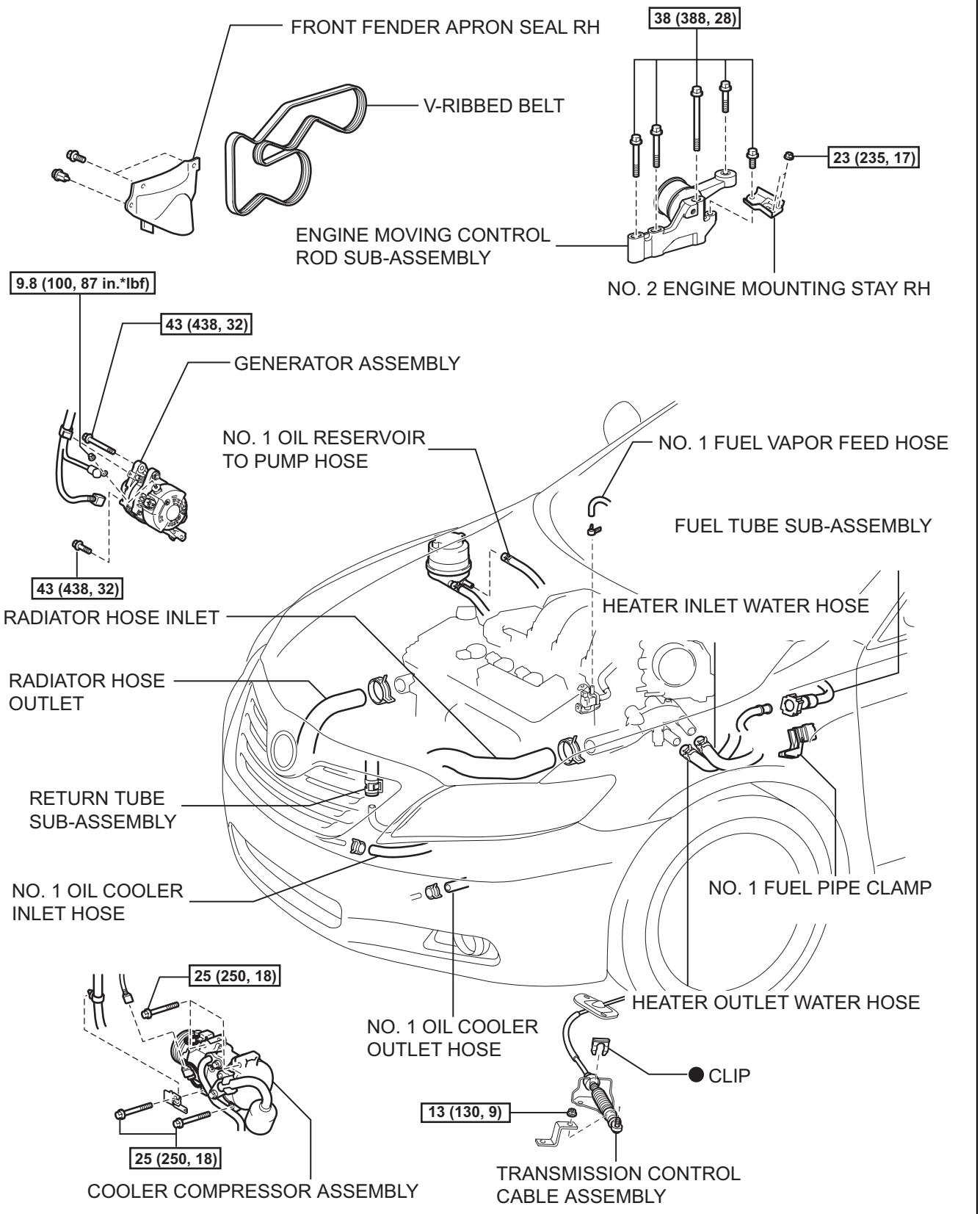
COMPONENTS

AX




AIR CLEANER CAP SUB-ASSEMBLY
V-BANK COVER SUB-ASSEMBLY
AIR CLEANER FILTER ELEMENT
COOL AIR INTAKE DUCT SEAL
5.0 (51, 44 in.*lbf)
5.0 (51, 44 in.*lbf)
AIR CLEANER INLET ASSEMBLY
AIR CLEANER CASE SUB-ASSEMBLY
RELAY BLOCK COVER UPPER
5.0 (51, 44 in.*lbf)
NO. 1 AIR CLEANER INLET
3.5 (36, 31 in.*lbf)
9.0 (92, 80 in.*lbf)
ENGINE UNDER COVER RH
5.0 (51, 44 in.*lbf)
BATTERY
BATTERY TRAY
INTAKE AIR RESONATOR SUB-ASSEMBLY
ENGINE UNDER COVER LH
N*m (kgf*cm, ft.*lbf): Specified torque
C
A132994E01

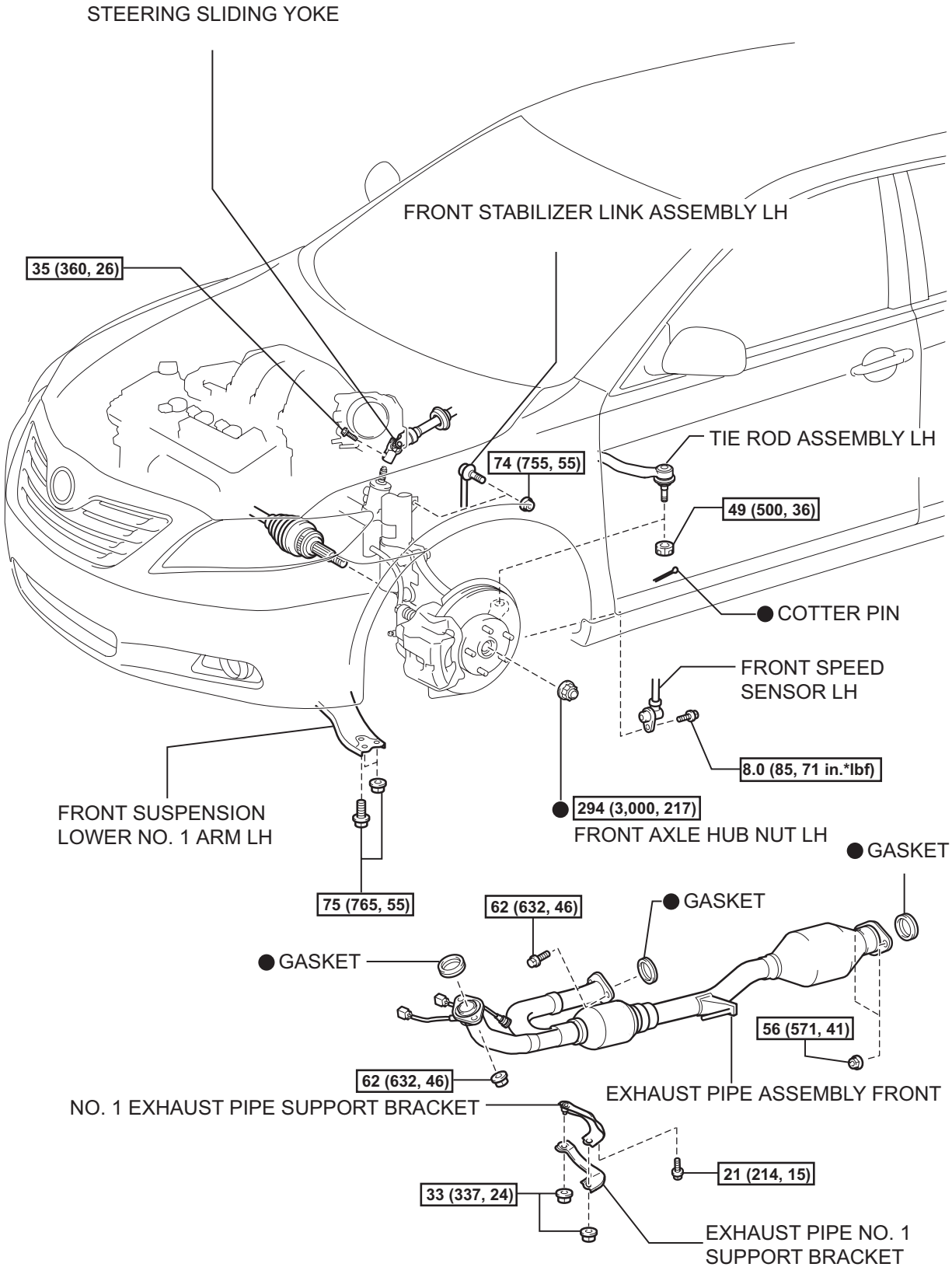
AX



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

C142576E01

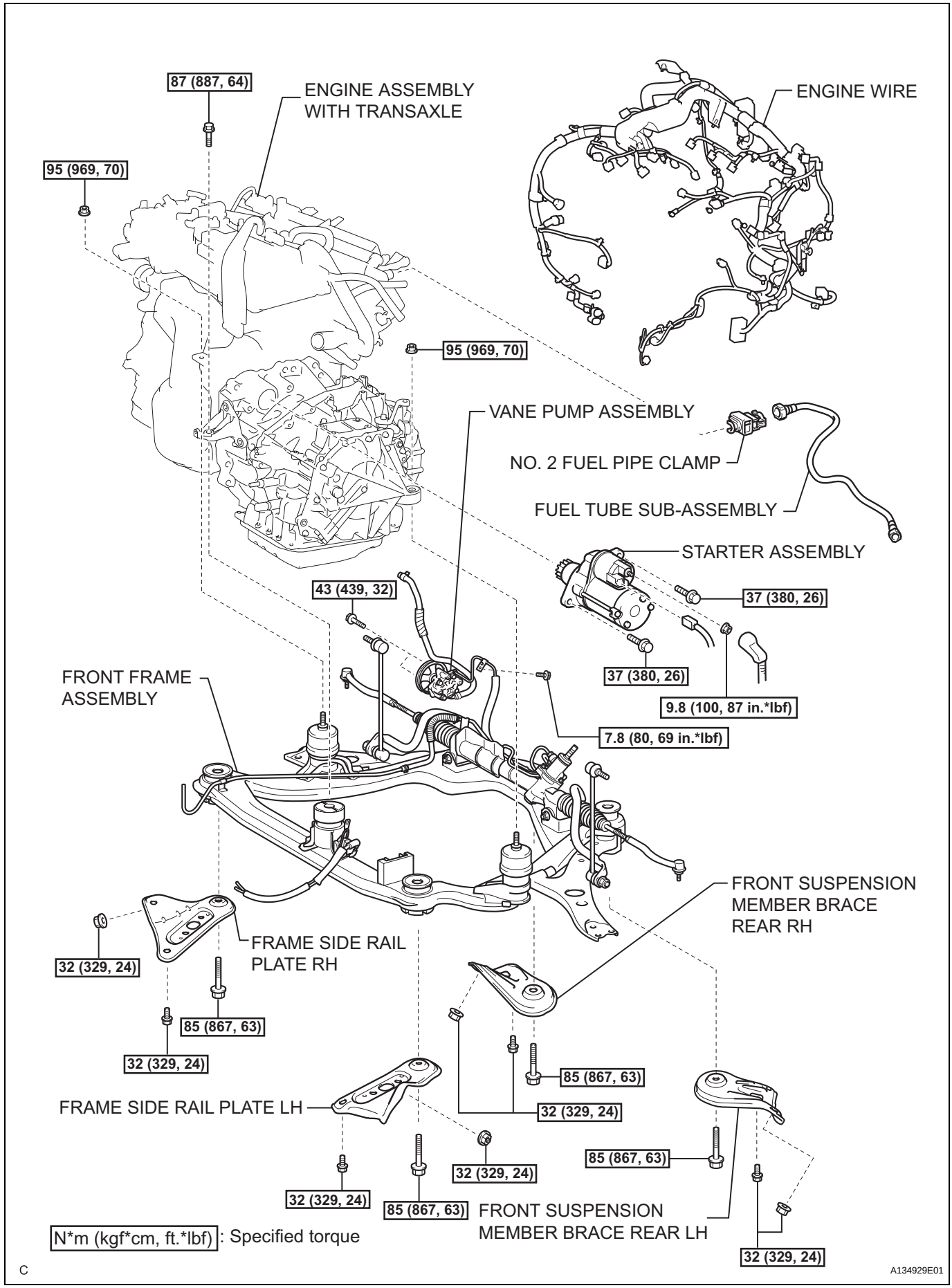


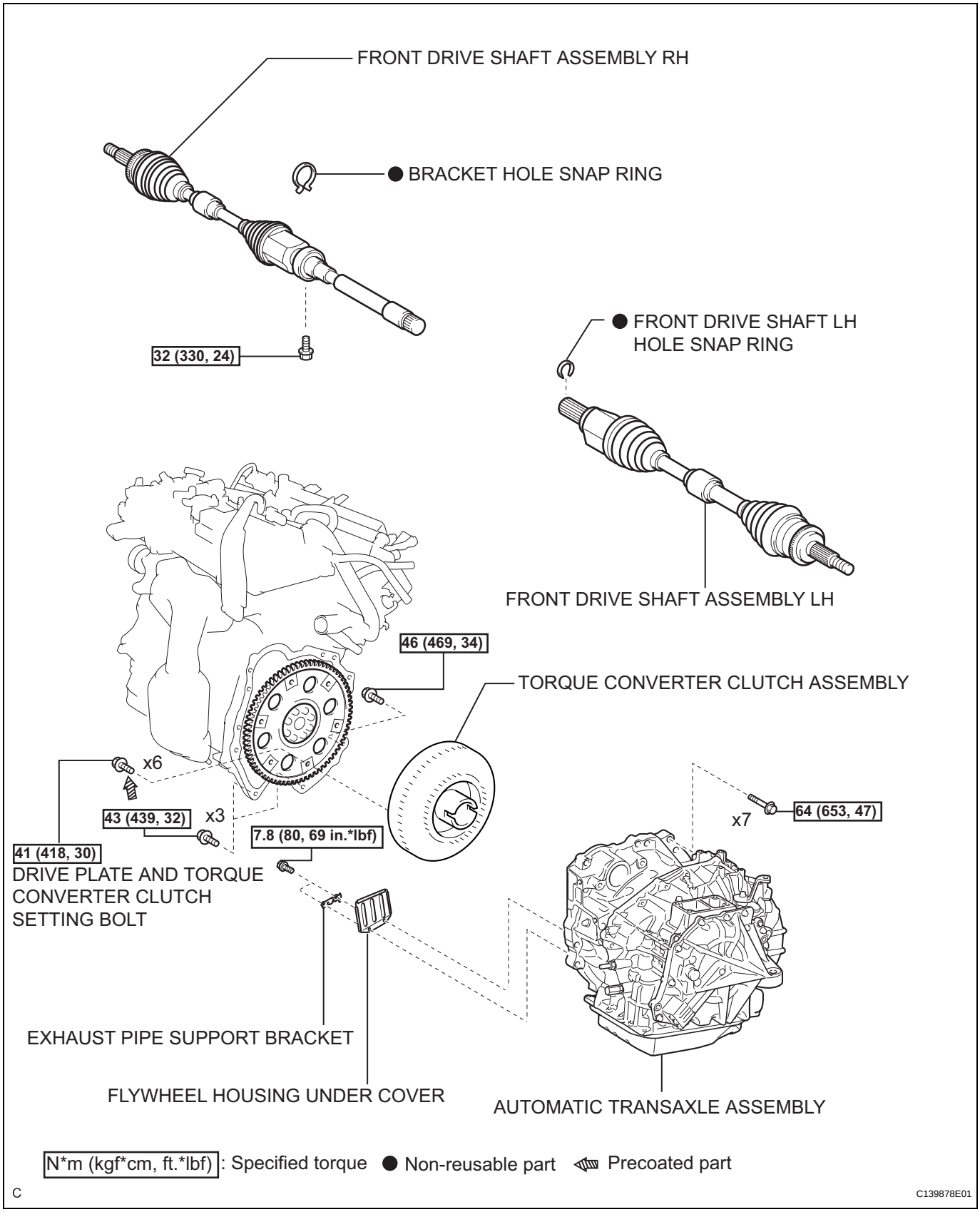
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

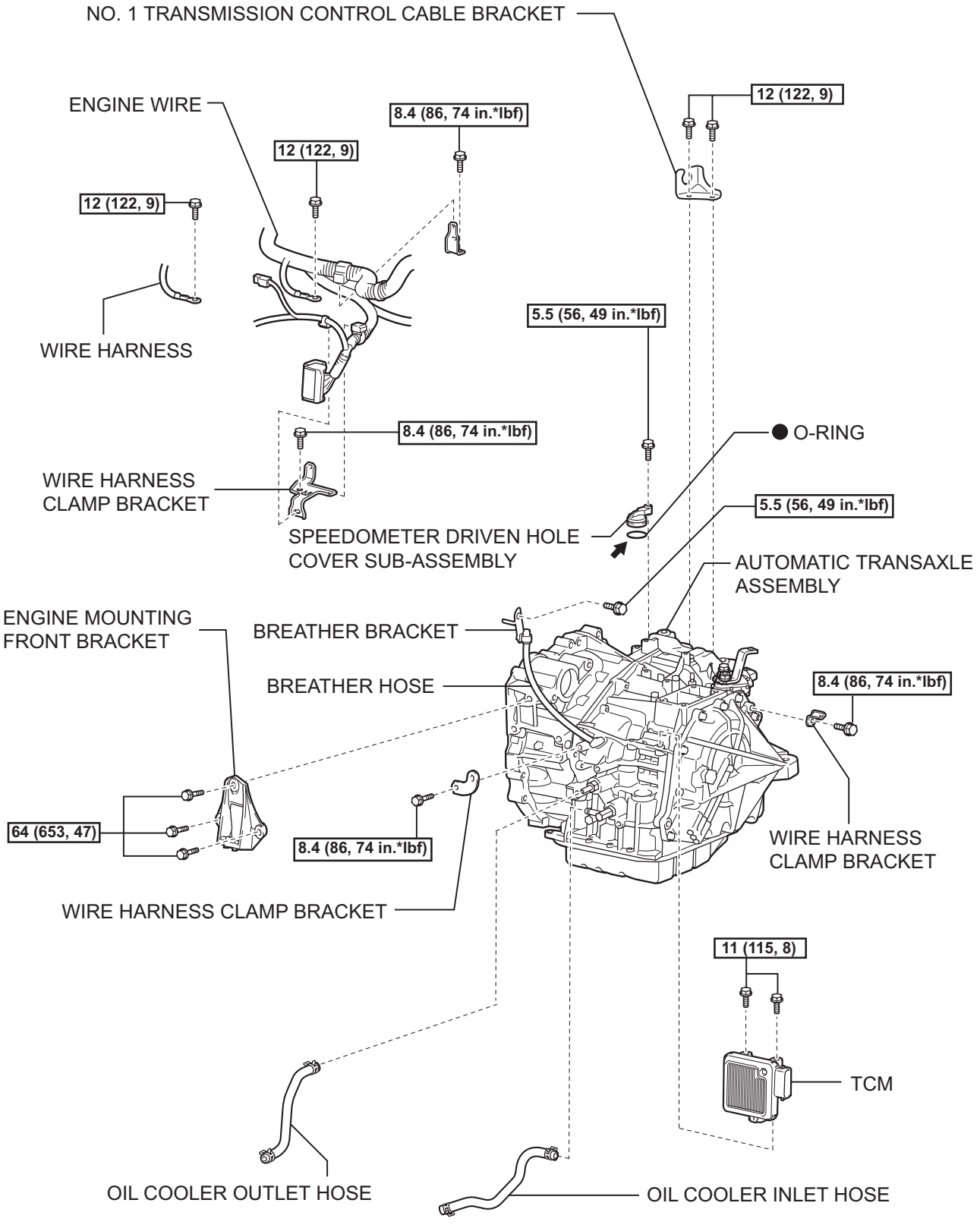
A132996E01

AX


87 (887, 64)
ENGINE ASSEMBLY WITH TRANSAXLE
ENGINE WIRE
95 (969, 70)
95 (969, 70)
VANE PUMP ASSEMBLY
NO. 2 FUEL PIPE CLAMP
FUEL TUBE SUB-ASSEMBLY
STARTER ASSEMBLY
37 (380, 26)
43 (439, 32)
37 (380, 26)
9.8 (100, 87 in.*lbf)
FRONT FRAME ASSEMBLY
7.8 (80, 69 in.*lbf)
FRONT SUSPENSION MEMBER BRACE REAR RH
32 (329, 24)
FRAME SIDE RAIL PLATE RH
85 (867, 63)
32 (329, 24)
85 (867, 63)
FRAME SIDE RAIL PLATE LH
32 (329, 24)
32 (329, 24)
85 (867, 63)
85 (867, 63)
32 (329, 24)
FRONT SUSPENSION MEMBER BRACE REAR LH
32 (329, 24)
N*m (kgf*cm, ft.*lbf): Specified torque
C
A134929E01


FRONT DRIVE SHAFT ASSEMBLY RH
● BRACKET HOLE SNAP RING
32 (330, 24)
● FRONT DRIVE SHAFT LH HOLE SNAP RING
FRONT DRIVE SHAFT ASSEMBLY LH
46 (469, 34)
TORQUE CONVERTER CLUTCH ASSEMBLY
x6
43 (439, 32)
x3
7.8 (80, 69 in.*lbf)
41 (418, 30)
DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT
x7
64 (653, 47)
EXHAUST PIPE SUPPORT BRACKET
FLYWHEEL HOUSING UNDER COVER
AUTOMATIC TRANSAXLE ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
C
C139878E01

AX



N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part ⬅ Apply ATF WS

C

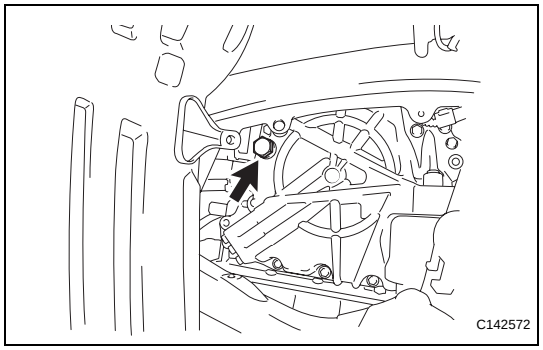
C133599E01

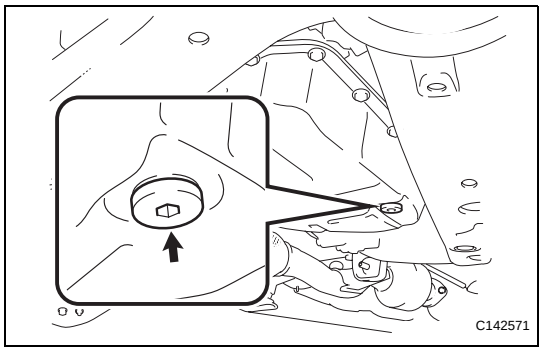
REMOVAL

NOTICE:

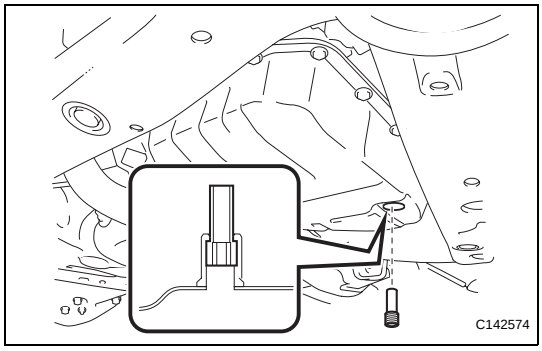
- **When the automatic transaxle is replaced, the transaxle's compensation code must be input into the TCM (See page AX-19).**
- **When the TCM is replaced, the existing transaxle compensation codes must be input into the new TCM (See page AX-22).**
- **If the following parts have been replaced, initialize the TCM and perform a road test to allow the TCM to learn (See page AX-25).**
  - **Valve body assembly**
  - **Shift solenoid SL3**
  - **Shift solenoid SL4**
- **If the following parts have been replaced, perform a road test to allow the TCM to learn (See page AX-25).**
  - **Shift solenoid SL1**
  - **Shift solenoid SL2**
- **If the TCM or transaxle has been replaced, register the transmission compensation code in the TCM (See page AX-19).**
- **Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assembly, engine assembly or ECM (See page AX-25).**

1. **DISCHARGE FUEL SYSTEM PRESSURE**
   HINT:
   (See page FU-1)
2. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
3. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
4. **REMOVE FRONT WHEELS**
5. **REMOVE ENGINE UNDER COVER LH**
6. **REMOVE ENGINE UNDER COVER RH**
7. **REMOVE FRONT FENDER APRON SEAL RH**
8. **DRAIN ENGINE OIL**
9. **DRAIN ENGINE COOLANT (See page CO-5)**
10. **DRAIN AUTOMATIC TRANSAXLE FLUID**
    (a) Remove the refill plug and gasket.



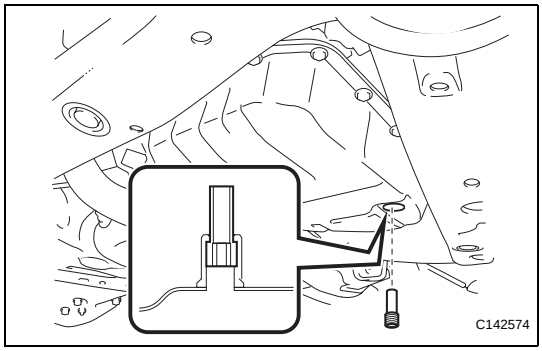


(b) Using a 6 mm socket hexagon wrench, remove the overflow plug and gasket.

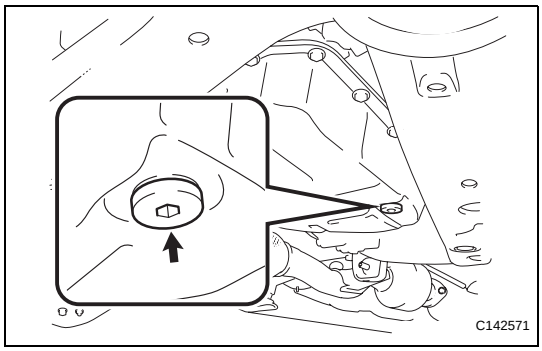


(c) Using a 6 mm socket hexagon wrench, remove the No. 1 transmission oil filler tube.

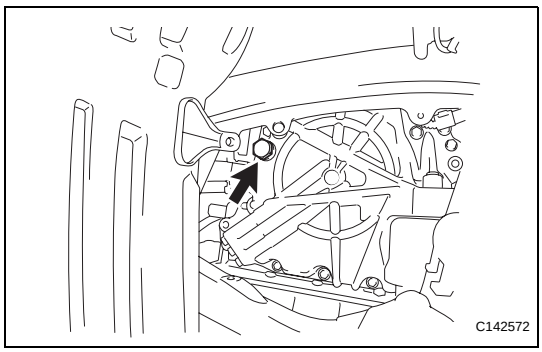
(d) Drain the automatic transaxle fluid.



(e) Using a 6 mm socket hexagon wrench, install the No. 1 transmission oil filler tube.
Torque: 1.7 N*m (17 kgf*cm, 15 in.*lbf)



(f) Using a 6 mm socket hexagon wrench, install the overflow plug with a new gasket.
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)



(g) Install the refill plug with a new gasket.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

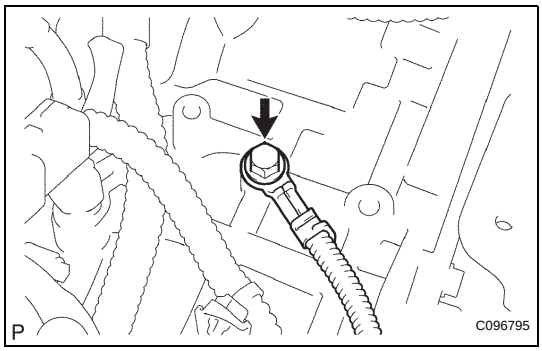
11. REMOVE WINDSHIELD WIPER LINK ASSEMBLY
HINT:
(See page WW-9)

12. REMOVE COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-481)

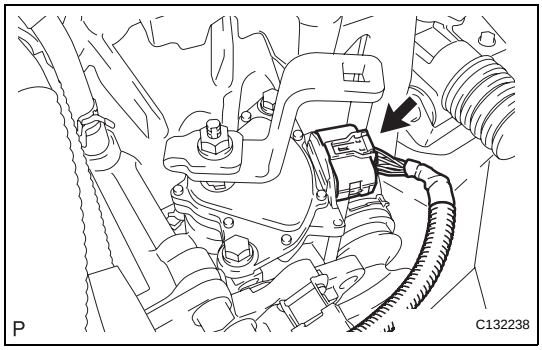
13. REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)

14. REMOVE V-BANK COVER SUB-ASSEMBLY (See page EM-23)
15. REMOVE V-RIBBED BELT (See page EM-6)
16. REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)
17. REMOVE AIR CLEANER CAP SUB-ASSEMBLY (See page ES-503)
18. REMOVE AIR CLEANER CASE SUB-ASSEMBLY (See page EM-24)
19. REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)
20. REMOVE BATTERY (See page EM-24)
21. REMOVE INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-25)
22. REMOVE NO. 2 ENGINE MOUNTING STAY RH (See page EM-25)
23. REMOVE ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-25)
24. DISCONNECT NO. 1 FUEL VAPOR FEED HOSE (See page EM-25)
25. DISCONNECT CHECK VALVE TO BRAKE BOOSTER HOSE (See page EM-25)
26. REMOVE RADIATOR HOSE INLET (See page EM-26)
27. REMOVE RADIATOR HOSE OUTLET (See page EM-26)
28. DISCONNECT NO. 1 OIL COOLER INLET HOSE (See page EM-26)
29. DISCONNECT NO. 1 OIL COOLER OUTLET HOSE (See page EM-26)
30. DISCONNECT HEATER INLET WATER HOSE (See page EM-26)
31. DISCONNECT HEATER OUTLET WATER HOSE (See page EM-26)
32. REMOVE ECM (See page ES-518)
33. REMOVE RELAY BLOCK COVER UPPER
34. DISCONNECT ENGINE WIRE (See page EM-27)

AX



35. **SEPARATE WIRE HARNESS**
    (a) Remove the bolt and disconnect the wire harness.

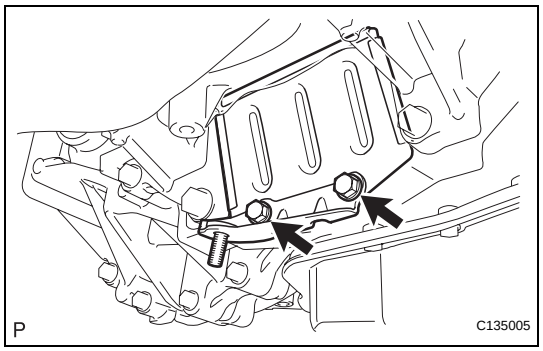


36. **DISCONNECT CONNECTOR**
    (a) Disconnect the park/neutral position switch connector.
37. **DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page EM-27)**
38. **SEPARATE FUEL TUBE SUB-ASSEMBLY (See page EM-28)**
39. **DISCONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-28)**
40. **DISCONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-28)**
41. **REMOVE EXHAUST PIPE NO. 1 SUPPORT BRACKET (See page EX-3)**
42. **REMOVE EXHAUST PIPE ASSEMBLY FRONT (See page EX-3)**
43. **REMOVE FRONT AXLE HUB NUT LH (See page DS-7)**
44. **REMOVE FRONT AXLE HUB NUT RH (See page EM-28)**
45. **DISCONNECT FRONT STABILIZER LINK ASSEMBLY LH (See page DS-7)**
46. **DISCONNECT FRONT STABILIZER LINK ASSEMBLY RH (See page EM-29)**
47. **DISCONNECT FRONT SPEED SENSOR LH (See page DS-7)**
48. **DISCONNECT FRONT SPEED SENSOR RH (See page EM-29)**
49. **DISCONNECT TIE ROD ASSEMBLY LH (See page DS-8)**
50. **DISCONNECT TIE ROD ASSEMBLY RH (See page EM-29)**
51. **DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-8)**
52. **DISCONNECT FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-29)**

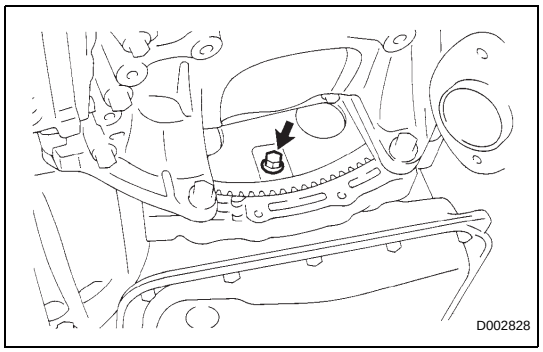
53. **SEPARATE FRONT AXLE ASSEMBLY LH (See page DS-8)**

54. **SEPARATE FRONT AXLE ASSEMBLY RH (See page EM-29)**

55. **REMOVE NO. 1 EXHAUST PIPE SUPPORT BRACKET (See page EM-29)**



56. **REMOVE FLYWHEEL HOUSING UNDER COVER**
    (a) Remove the 2 bolts, exhaust pipe support bracket and flywheel housing under cover.



57. **REMOVE DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT**
    (a) Turn the crankshaft to gain access and remove the 6 bolts while holding the crankshaft pulley bolt with a wrench.

58. **DISCONNECT STEERING SLIDING YOKE (See page PS-40)**

59. **REMOVE GENERATOR ASSEMBLY (See page CH-14)**

60. **SEPARATE COOLER COMPRESSOR ASSEMBLY (See page EM-29)**

61. **REMOVE ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-29)**

62. **REMOVE VANE PUMP ASSEMBLY (See page EM-30)**

63. **INSTALL ENGINE HANGERS (See page EM-30)**

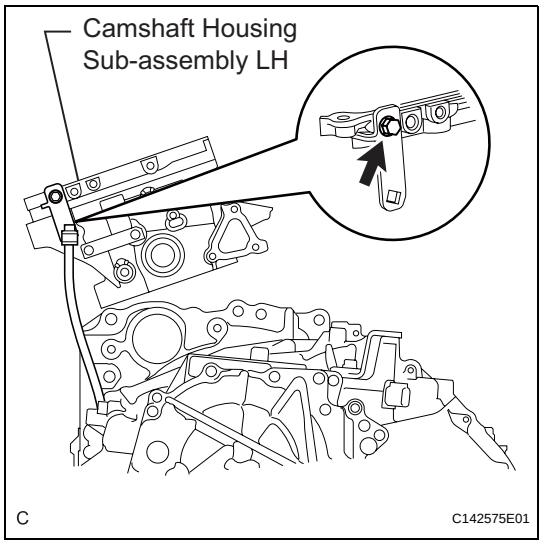
64. **REMOVE FRONT FRAME ASSEMBLY (See page EM-30)**

65. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-9)**

66. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-9)**

67. **REMOVE ENGINE WIRE**

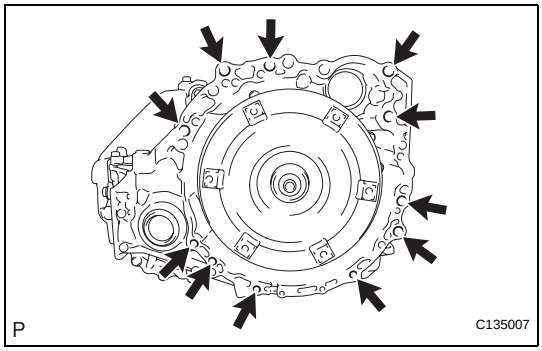
68. **REMOVE STARTER ASSEMBLY (See page ST-141)**



69. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY

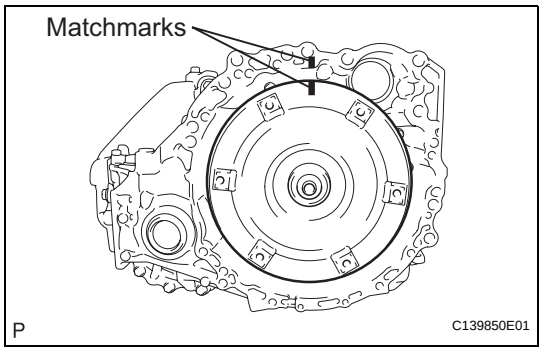
(a) Remove the bolt and breather bracket from the camshaft housing sub-assembly LH.

(b) Remove the breather hose from the breather bracket.



(c) Remove the 11 bolts.

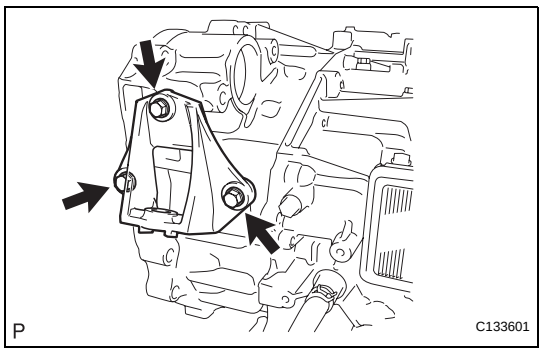
(d) Separate and remove the automatic transaxle.



70. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

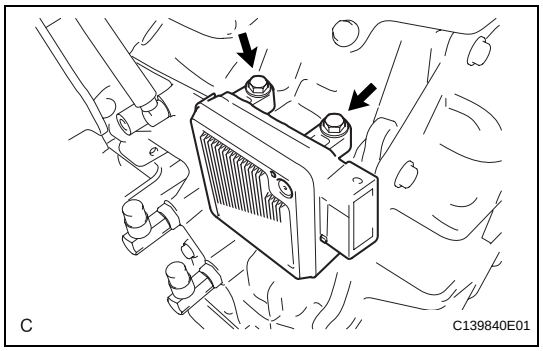
(a) Put matchmarks on the transaxle housing and torque converter clutch assembly.

(b) Remove the torque converter clutch assembly from the automatic transaxle assembly.



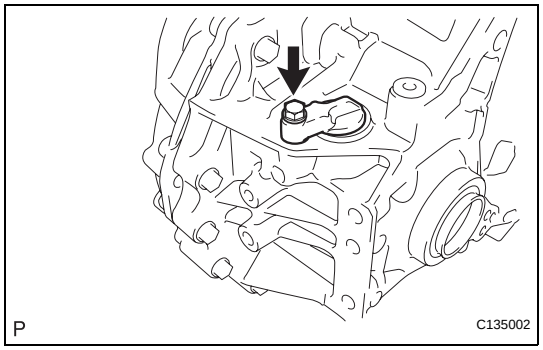
71. REMOVE ENGINE MOUNTING FRONT BRACKET

(a) Remove the 3 bolts and engine mounting front bracket.



72. REMOVE TCM

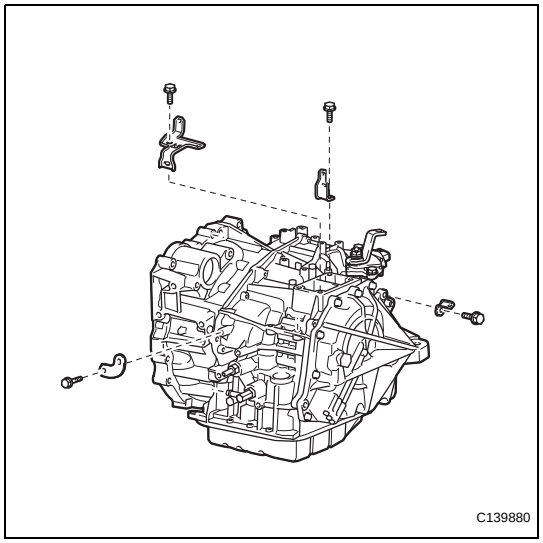
(a) Remove the 2 bolts and TCM from the transaxle.



73. REMOVE SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

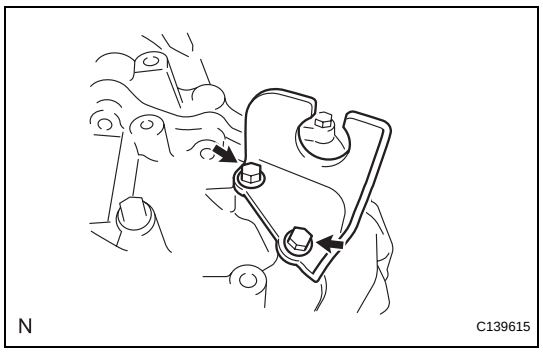
(a) Remove the bolt and hole cover from the transaxle case.

(b) Remove the O-ring from the hole cover.



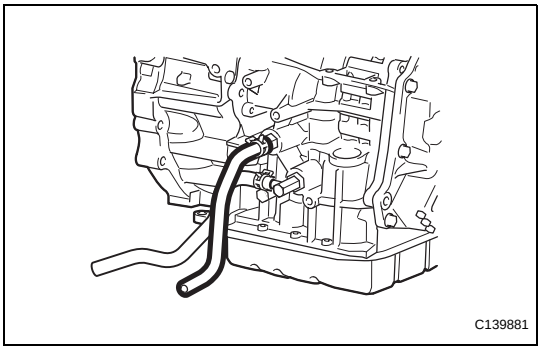
74. REMOVE WIRE HARNESS CLAMP BRACKET

(a) Remove the 4 bolts and 4 clamp brackets.



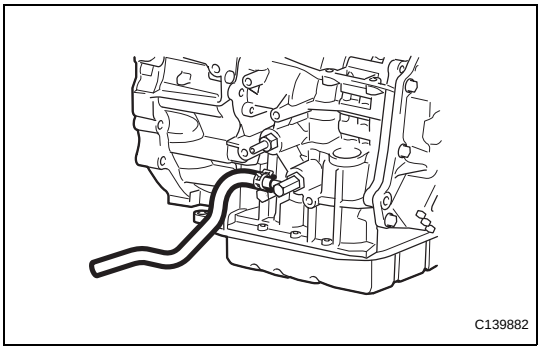
75. REMOVE NO. 1 TRANSMISSION CONTROL CABLE BRACKET

(a) Remove the 2 bolts and No.1 transmission control cable bracket.



76. SEPARATE OIL COOLER OUTLET HOSE

(a) Separate the oil cooler outlet hose.



77. SEPARATE OIL COOLER INLET HOSE

(a) Separate the oil cooler inlet hose.

INSTALLATION

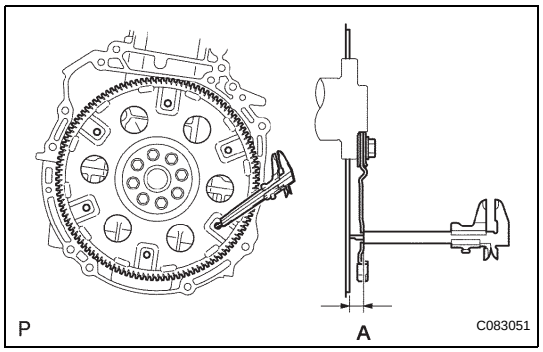
1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

HINT:

(See page AX-239)

2. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

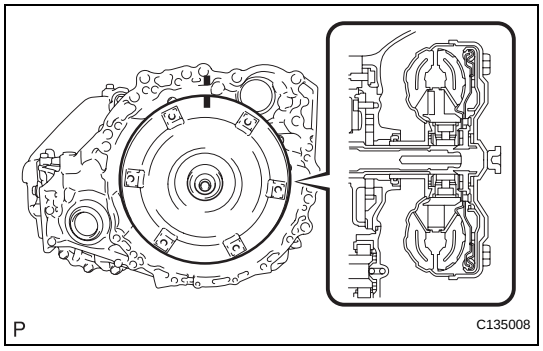
(a) Using vernier calipers and a straightedge, measure dimension "A" between the transaxle fitting part of the engine and the converter fitting part of the drive plate (#).



(b) Aligning the matchmarks on the transaxle case and torque converter clutch assembly, engage the splines of the input shaft and turbine runner.

NOTICE:

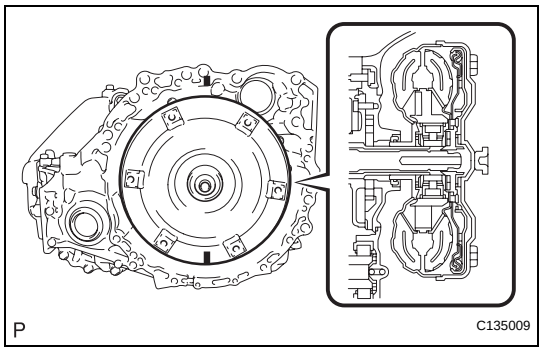
Do not push on the torque converter when aligning the matchmarks.



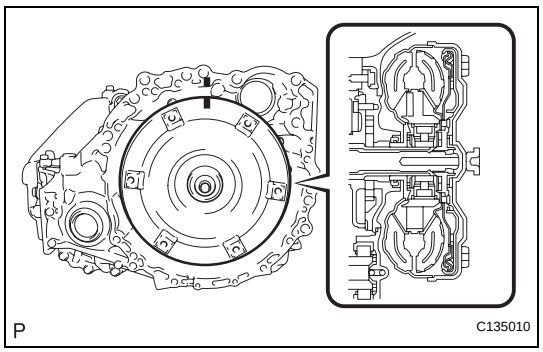
(c) Engage the splines of the stator shaft and the stator while turning the torque converter clutch assembly.

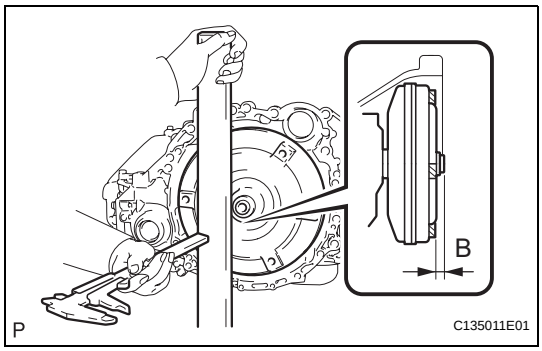
HINT:

Turn the torque converter clutch assembly approximately 180°.

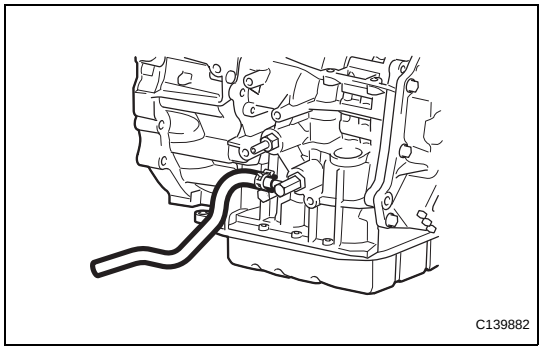


(d) Turn the torque converter clutch assembly and align the matchmarks on the torque converter clutch assembly and transaxle case to engage the key of the oil pump drive gear into the slot on the torque converter clutch assembly.



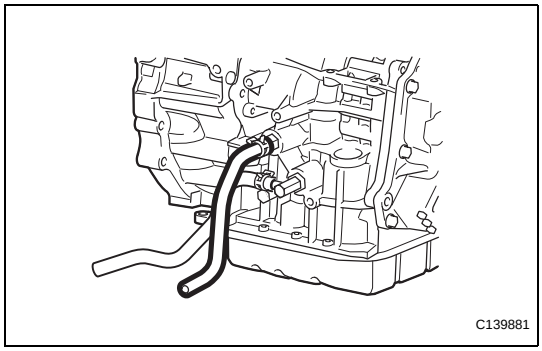


(e) Using vernier calipers and a straightedge, measure dimension "B" shown in the illustration and check that "B" is greater than "A" (measured in step (#)).
Standard:
A + 1 mm (0.04 in.) or more
NOTICE:
Make sure to deduct the thickness of the straightedge.



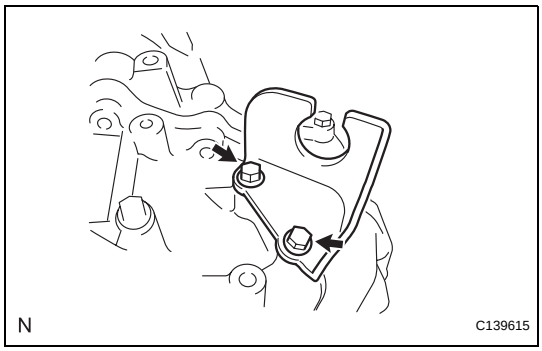
3. INSTALL OIL COOLER INLET HOSE

(a) Install the oil cooler inlet hose.



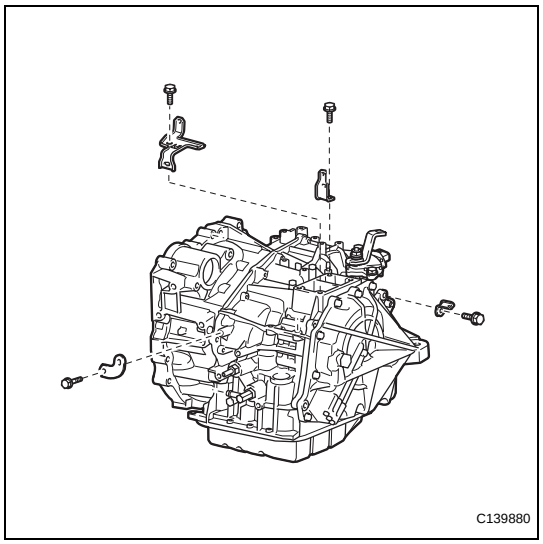
4. INSTALL OIL COOLER OUTLET HOSE

(a) Install the oil cooler outlet hose.



5. INSTALL NO. 1 TRANSMISSION CONTROL CABLE BRACKET

(a) Install the No. 1 transmission control cable bracket with the 2 bolts.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

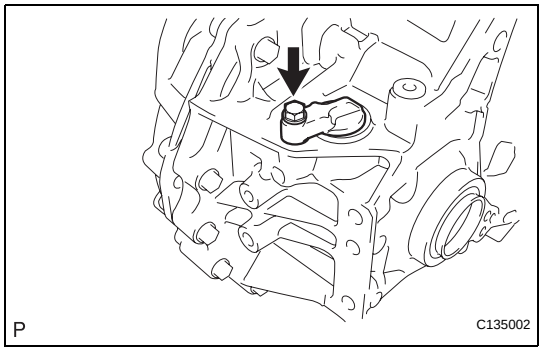


6. INSTALL WIRE HARNESS CLAMP BRACKET

(a) Install the 4 clamp brackets and 4 bolts.
Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

7. INSTALL SPEEDOMETER DRIVEN HOLE COVER SUB-ASSEMBLY

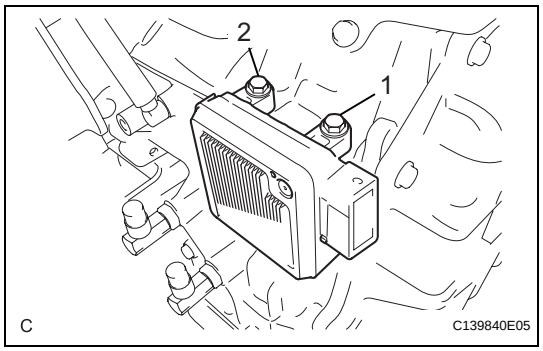
(a) Coat a new O-ring with ATF, and install it to the hole cover.



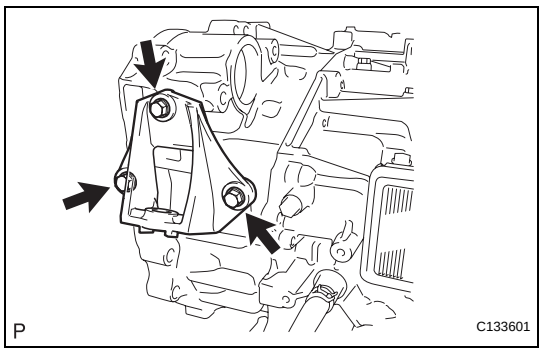
(b) Install the hole cover to the transaxle case with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

8. INSTALL TCM

(a) Install the TCM to the transaxle.

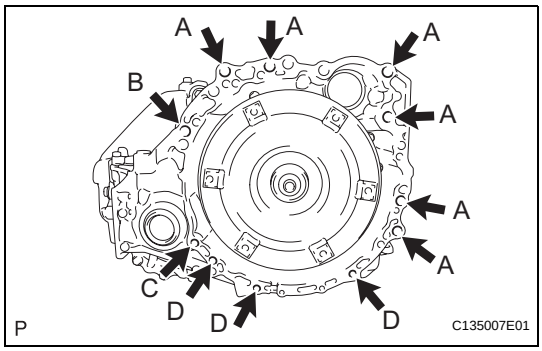


(b) Install and tighten the 2 bolts in the order shown in the illustration.
Torque: 11 N*m (112 kgf*cm, 9 ft.*lbf)



9. INSTALL ENGINE MOUNTING FRONT BRACKET

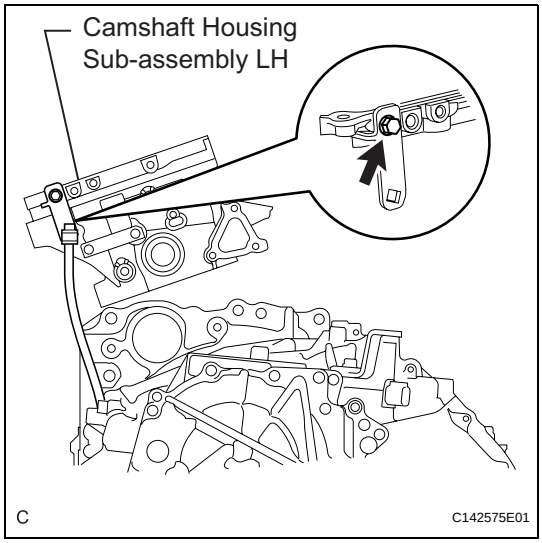
(a) Install the engine mounting front bracket to the automatic transaxle with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



10. INSTALL AUTOMATIC TRANSAXLE ASSEMBLY

(a) Install the automatic transaxle to the engine with the 11 bolts.

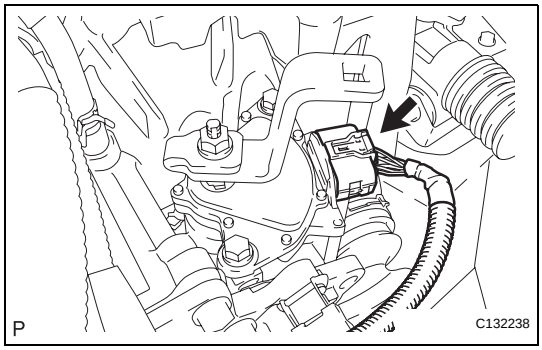
Torque: Bolt A
64 N*m (653 kgf*cm, 47 ft.*lbf)
Bolt B
64 N*m (653 kgf*cm, 47 ft.*lbf)
Bolt C
46 N*m (469 kgf*cm, 34 ft.*lbf)
Bolt D
43 N*m (439 kgf*cm, 32 ft.*lbf)



(b) Install the breather bracket to the camshaft housing sub-assembly LH with the bolt.
Torque: 5.5 N*m (56 kgf*cm, 49 in.*lbf)

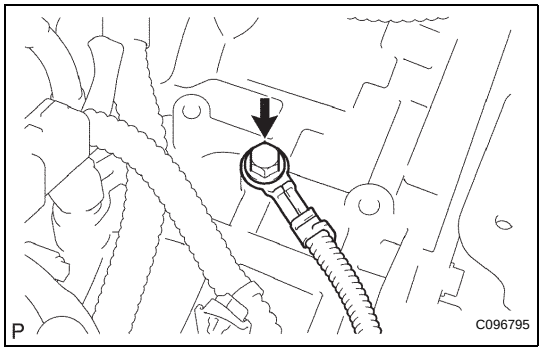
(c) Install the breather hose to the breather bracket.

11. INSTALL STARTER ASSEMBLY (See page ST-148)



12. CONNECT CONNECTOR

(a) Connect the park/neutral position switch connector.



13. INSTALL WIRE HARNESS

(a) Connect the wire harness with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

14. INSTALL ENGINE WIRE

15. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-20)

16. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-21)

17. INSTALL FRONT FRAME ASSEMBLY (See page EM-43)

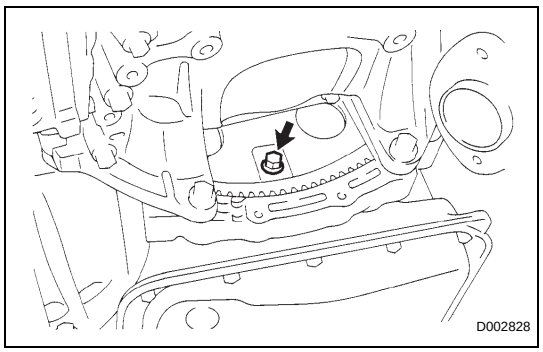
18. INSTALL VANE PUMP ASSEMBLY (See page EM-44)

19. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-44)

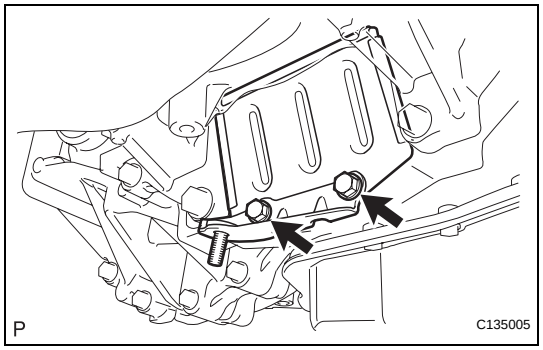
20. **INSTALL COOLER COMPRESSOR ASSEMBLY (See page EM-45)**

21. **INSTALL GENERATOR ASSEMBLY (See page CH-22)**

22. **INSTALL STEERING SLIDING YOKE (See page PS-65)**



23. **INSTALL DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT**
    (a) Apply a few drops of adhesive to 2 threads on the tip of the 6 torque converter clutch mounting bolts.
    Sealant:
    Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent
    (b) Install the 6 torque converter clutch mounting bolts.
    Torque: 41 N*m (418 kgf*cm, 30 ft.*lbf)
    NOTICE:
    First install the black colored bolt, and then the remaining 5 bolts.



24. **INSTALL FLYWHEEL HOUSING UNDER COVER**
    (a) Install the flywheel housing under cover and exhaust pipe support bracket to the automatic transaxle with the 2 bolts.
    Torque: 7.8 N*m (80 kgf*cm, 69 in.*lbf)

25. **INSTALL NO. 1 EXHAUST PIPE SUPPORT BRACKET (See page EM-45)**

26. **INSTALL FRONT AXLE ASSEMBLY LH (See page DS-21)**

27. **INSTALL FRONT AXLE ASSEMBLY RH (See page EM-45)**

28. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM LH (See page DS-21)**

29. **INSTALL FRONT SUSPENSION LOWER NO. 1 ARM RH (See page EM-45)**

30. **INSTALL TIE ROD ASSEMBLY LH (See page DS-21)**

31. **INSTALL TIE ROD ASSEMBLY RH (See page EM-45)**

32. **INSTALL FRONT SPEED SENSOR LH (See page DS-21)**

33. **INSTALL FRONT SPEED SENSOR RH (See page EM-45)**

34. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See page DS-22)**

35. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH (See page EM-45)**

36. **INSTALL FRONT AXLE HUB NUT LH (See page DS-22)**

37. **INSTALL FRONT AXLE HUB NUT RH (See page EM-45)**

38. INSTALL EXHAUST PIPE ASSEMBLY FRONT (See page EX-4)
39. INSTALL EXHAUST PIPE NO. 1 SUPPORT BRACKET (See page EM-45)
40. CONNECT NO. 1 OIL RESERVOIR TO PUMP HOSE (See page EM-46)
41. CONNECT RETURN TUBE SUB-ASSEMBLY (See page EM-46)
42. CONNECT FUEL TUBE SUB-ASSEMBLY (See page EM-46)
43. CONNECT TRANSMISSION CONTROL CABLE ASSEMBLY (See page EM-46)
44. CONNECT ENGINE WIRE (See page EM-47)
45. INSTALL RELAY BLOCK COVER UPPER
46. INSTALL ECM (See page ES-519)
47. CONNECT HEATER INLET WATER HOSE (See page EM-47)
48. CONNECT HEATER OUTLET WATER HOSE (See page EM-47)
49. CONNECT NO. 1 OIL COOLER INLET HOSE (See page EM-48)
50. CONNECT NO. 1 OIL COOLER OUTLET HOSE (See page EM-48)
51. INSTALL RADIATOR HOSE INLET (See page EM-48)
52. INSTALL RADIATOR HOSE OUTLET (See page EM-48)
53. CONNECT CHECK VALVE TO BRAKE BOOSTER HOSE (See page EM-48)
54. CONNECT NO. 1 FUEL VAPOR FEED HOSE (See page EM-48)
55. INSTALL ENGINE MOVING CONTROL ROD SUB-ASSEMBLY (See page EM-49)
56. INSTALL NO. 2 ENGINE MOUNTING STAY RH (See page EM-49)
57. INSTALL INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-49)
58. INSTALL BATTERY (See page EM-49)
59. INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)
60. INSTALL AIR CLEANER CASE SUB-ASSEMBLY (See page EM-50)
61. INSTALL AIR CLEANER CAP SUB-ASSEMBLY (See page ES-506)

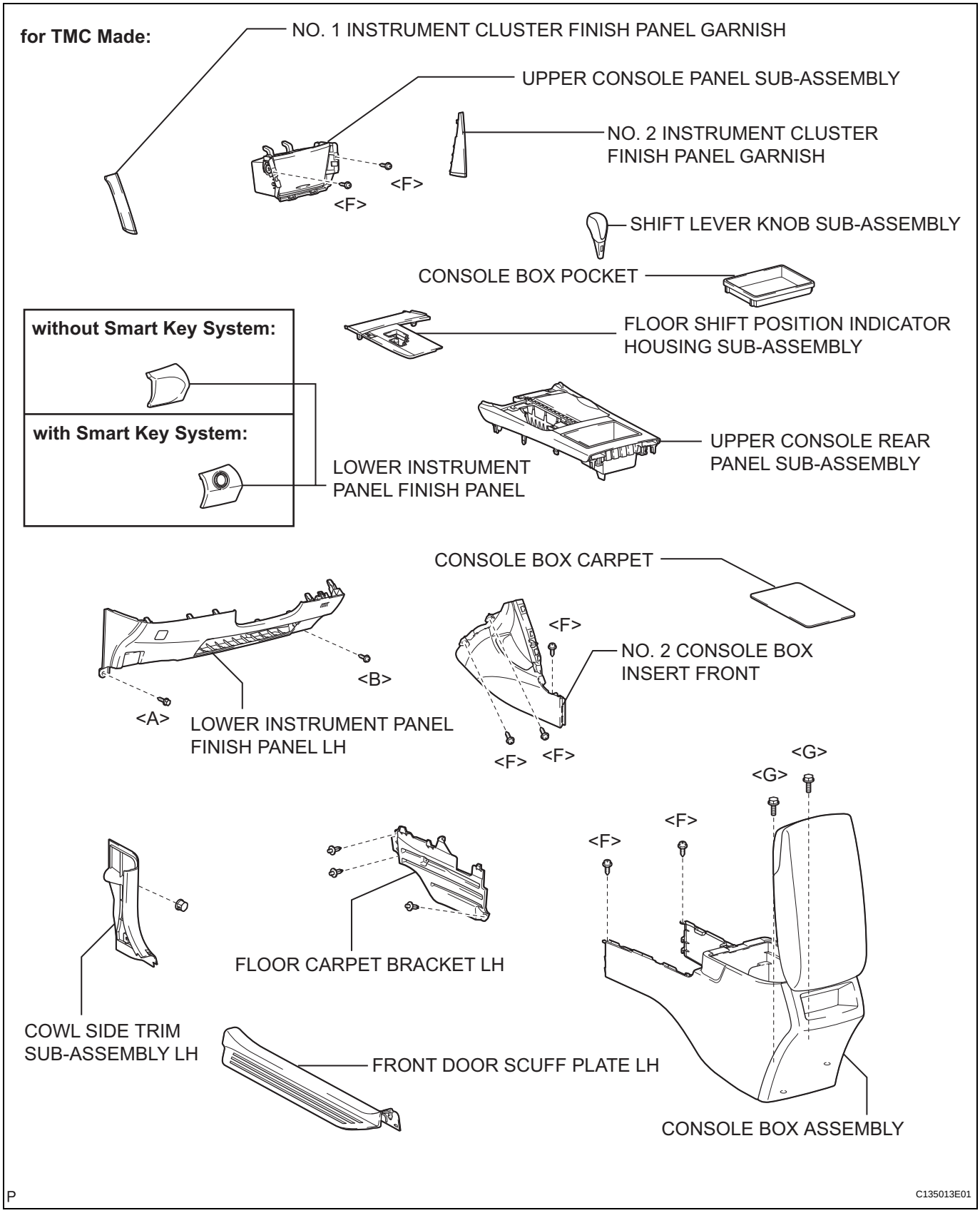
62. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
63. **CONNECT VACUUM HOSES (See page EM-51)**
64. **INSTALL V-RIBBED BELT (See page EM-7)**
65. **INSTALL COWL TOP PANEL OUTER SUB-ASSEMBLY (See page ES-485)**
66. **INSTALL WINDSHIELD WIPER LINK ASSEMBLY**
    HINT:
    (See page WW-13)
67. **INSTALL FRONT WHEELS (See page EM-51)**
68. **ADD ENGINE OIL**
69. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)**
70. **ADD ENGINE COOLANT (See page CO-6)**
71. **ADD AUTOMATIC TRANSAXLE FLUID**
    HINT:
    (See page AX-164)
72. **ADD POWER STEERING FLUID**
73. **BLEED POWER STEERING FLUID (See page PS-7)**
74. **CHECK FOR FUEL LEAKS (See page FU-8)**
75. **CHECK FOR ENGINE OIL LEAKS**
76. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-1)**
77. **CHECK FOR EXHAUST GAS LEAKS**
78. **CHECK SHIFT LEVER POSITION (See page AX-224)**
79. **CHECK AND ADJUST FRONT WHEEL ALIGNMENT**
    HINT:
    (See page SP-4)
80. **CHECK IGNITION TIMING (See page EM-1)**
81. **CHECK ENGINE IDLE SPEED (See page EM-2)**
82. **CHECK CO/HC (See page EM-4)**
83. **CHECK FUNCTION OF THROTTLE BODY (See page ES-503)**
84. **INSTALL FRONT FENDER APRON SEAL RH**
85. **INSTALL ENGINE UNDER COVER LH**
86. **INSTALL ENGINE UNDER COVER RH**
87. **INSTALL V-BANK COVER SUB-ASSEMBLY (See page EM-52)**
88. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
89. **CHECK ABS SPEED SENSOR SIGNAL**
    (a) ABS: BC-11

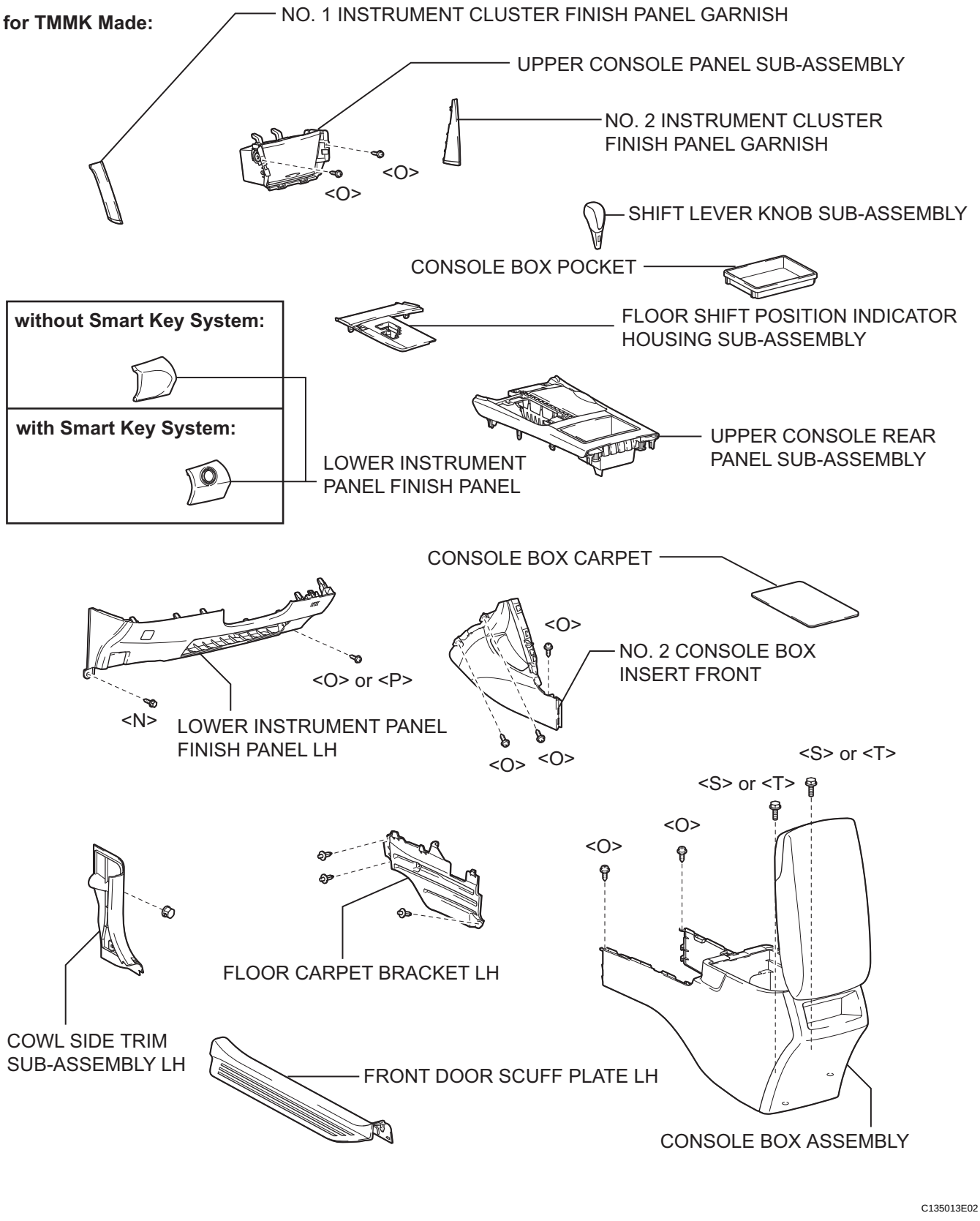
AX

(b) VSC (for BOSCH): BC-290
(c) VSC (for ADVICS): BC-123

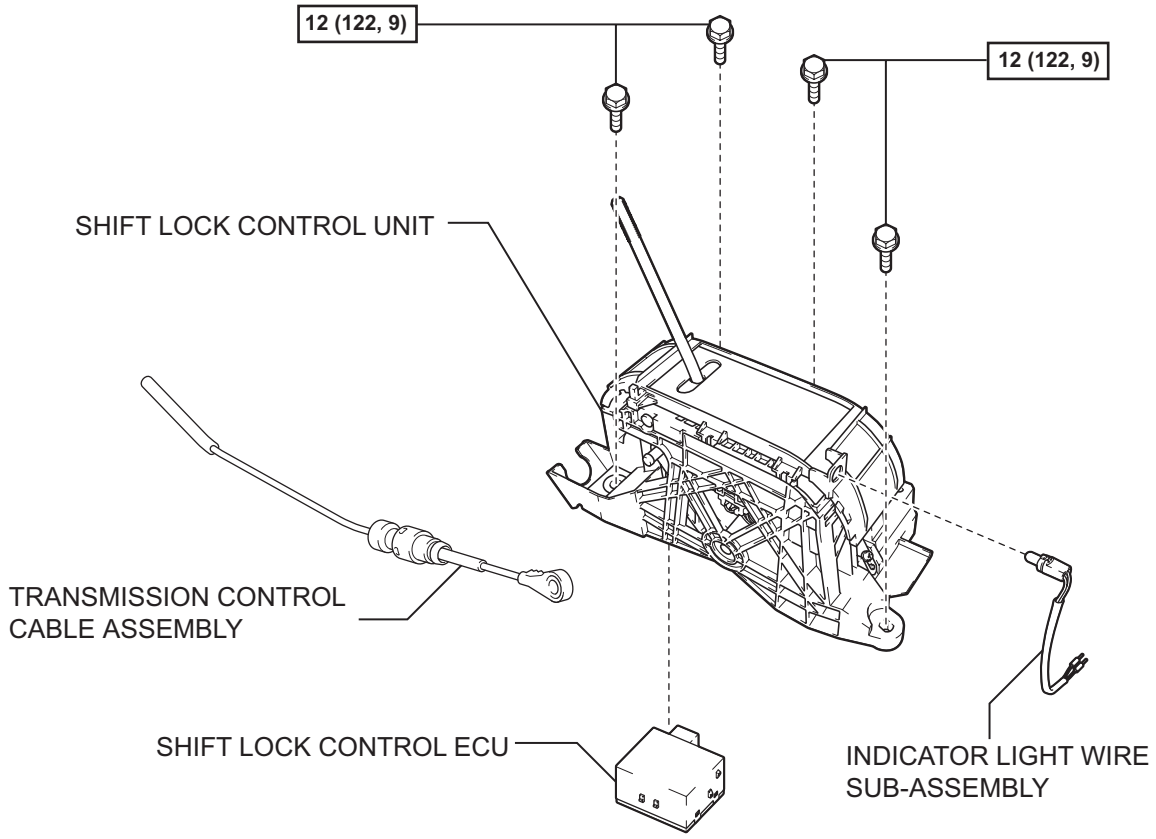
SHIFT LEVER

COMPONENTS




for TMMK Made:
NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH
UPPER CONSOLE PANEL SUB-ASSEMBLY
NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH
<O>
<O>
SHIFT LEVER KNOB SUB-ASSEMBLY
CONSOLE BOX POCKET
without Smart Key System:
with Smart Key System:
FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY
UPPER CONSOLE REAR PANEL SUB-ASSEMBLY
LOWER INSTRUMENT PANEL FINISH PANEL
CONSOLE BOX CARPET
<O> or <P>
<N>
LOWER INSTRUMENT PANEL FINISH PANEL LH
<O>
NO. 2 CONSOLE BOX INSERT FRONT
<O>
<O>
<S> or <T>
<S> or <T>
<O>
<O>
FLOOR CARPET BRACKET LH
COWL SIDE TRIM SUB-ASSEMBLY LH
FRONT DOOR SCUFF PLATE LH
CONSOLE BOX ASSEMBLY
P
C135013E02

AX



N*m (kgf*cm, ft.*lbf): Specified torque

C135729E03

ON-VEHICLE INSPECTION

1. INSPECT SHIFT LEVER POSITION

(a) When shifting from the P to the R position with the ignition switch on (IG) and the brake pedal depressed, make sure that the shift lever moves smoothly and moves correctly into the position.

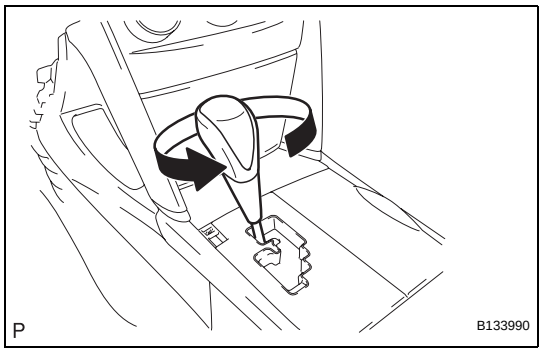
(b) Start the engine and make sure that the vehicle moves forward when shifting from the N to the D position and moves rearward when shifting to the R position. If operation cannot be done as specified, inspect the park/neutral position switch assembly and check the shift lever assembly installation condition.

AX

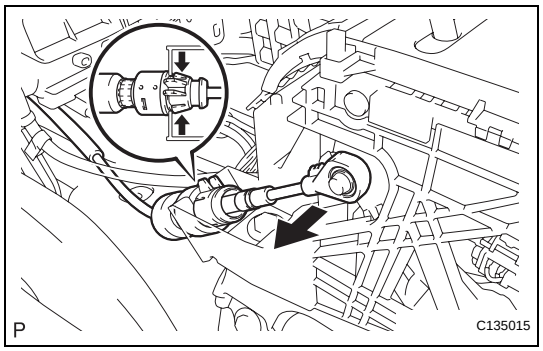
REMOVAL

HINT:
(See page IP-1)

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT DOOR SCUFF PLATE LH (See page IR-24)**
3. **REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-25)**
4. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-20)**
5. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-21)**
6. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (without Smart Key System) (See page IP-22)**
7. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL (with Smart Key System) (See page IP-22)**
8. **REMOVE SHIFT LEVER KNOB SUB-ASSEMBLY**
   (a) Turn the shift lever knob counterclockwise and remove the shift lever knob sub-assembly.



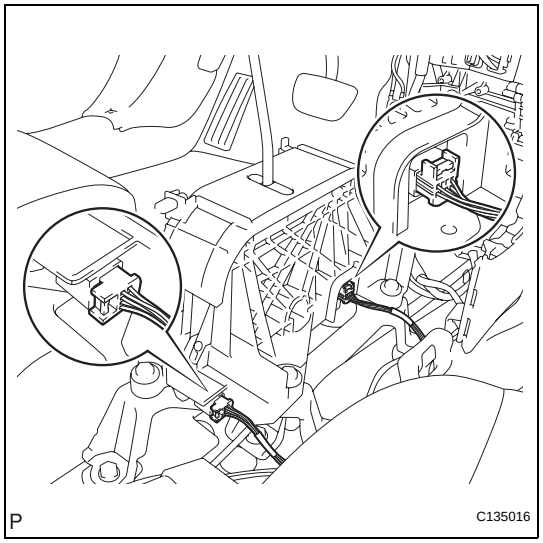
9. **REMOVE NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-24)**
10. **REMOVE NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-25)**
11. **REMOVE FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-25)**
12. **REMOVE UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-26)**
13. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-27)**
14. **REMOVE UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-27)**
15. **REMOVE CONSOLE BOX POCKET (See page IP-28)**
16. **REMOVE CONSOLE BOX CARPET (See page IP-28)**
17. **REMOVE CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-28)**
18. **REMOVE CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-29)**
19. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-29)**
20. **REMOVE NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-30)**
21. **REMOVE FLOOR CARPET BRACKET LH (See page AC-155)**



22. DISCONNECT TRANSMISSION CONTROL CABLE ASSEMBLY

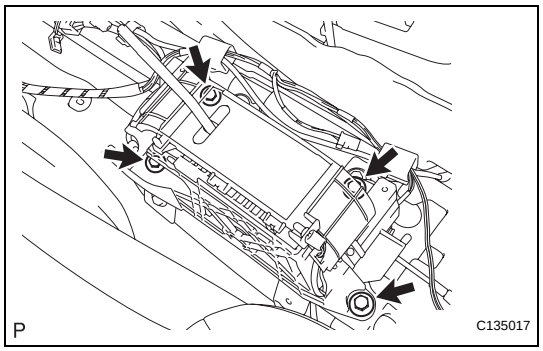
(a) Disconnect the end of the transmission control cable from the shift lock control unit.

(b) Disconnect the transmission control cable assembly from the transmission floor shift assembly while pushing the 2 claws of the floor shift cable.



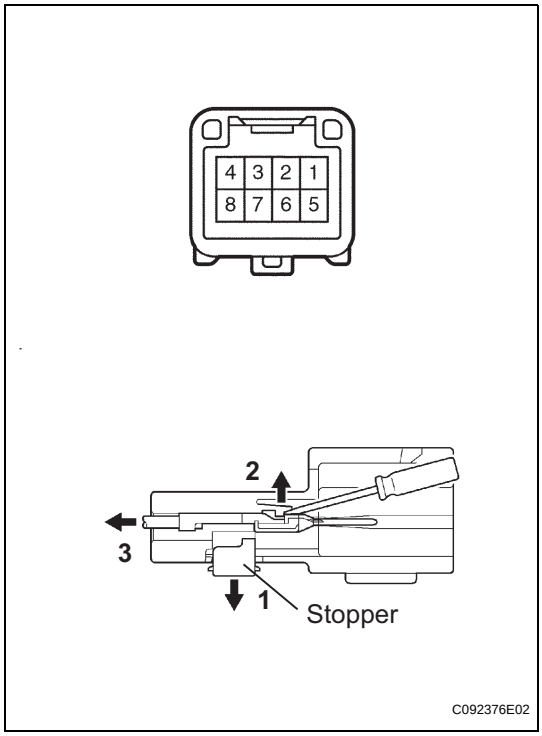
23. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY

(a) Disconnect the shift lock control ECU connector and indicator light wire connector.



(b) Remove the 4 bolts and shift control unit assembly.

AX

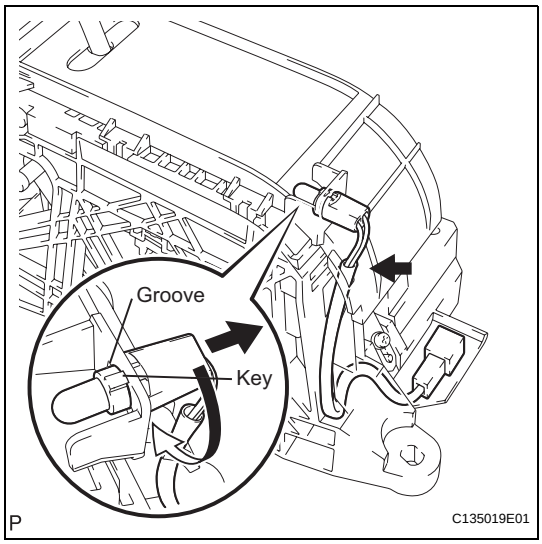


DISASSEMBLY

1. REMOVE INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Using a screwdriver, release the stopper.

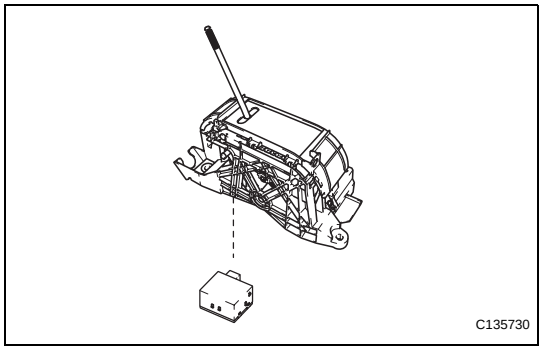
(b) Using a screwdriver, disengage the locking lug of terminals (4) and (8), and pull the terminals out from the rear of the connector.



(c) Release the indicator light wire from the clamp on the shift lock control unit assembly.

(d) Turn the indicator light guide counterclockwise.

(e) Align the indicator light guide key with the groove on the shift lock control unit to remove the indicator light wire.

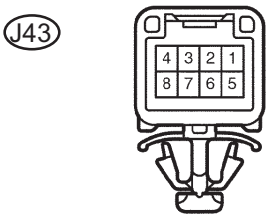


2. REMOVE SHIFT LOCK CONTROL ECU

(a) Remove the shift lock control ECU from the shift lock control unit assembly.

Switch Side:

(Connector Front View):



C110341E15

INSPECTION

1. INSPECT TRANSMISSION CONTROL SWITCH

(a) Measure resistance between each terminal of the shift lock control unit assembly when the shift lever is moved to each position.

Standard resistance

Shift Position	Tester Connection	Specified Condition
S, "+" and "-"	3 - 7	Below 1 Ω
Except S, "+" and "-"	3 - 7	10 kΩ or higher
Press continuously "+" (Up shift)	2 - 5	Below 1 Ω
S	2 - 5	10 kΩ or higher
Press continuously "-" (Down shift)	1 - 5	Below 1 Ω
S	1 - 5	10 kΩ or higher

If the resistance value is not as specified, replace the shift lock control ECU.

AX

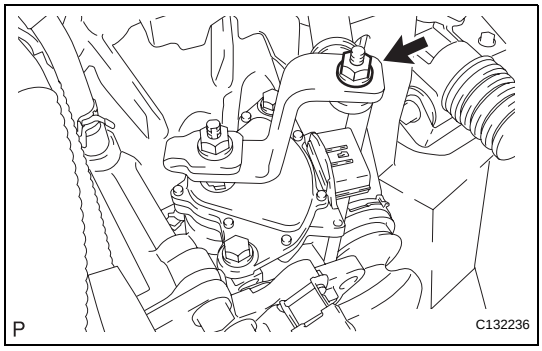
AX

ADJUSTMENT

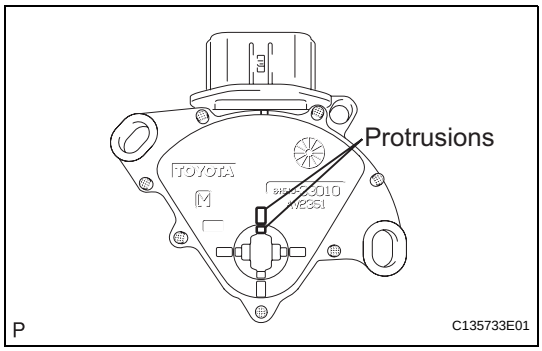
1. ADJUST SHIFT LEVER POSITION

(a) Move the shift lever to the N position.

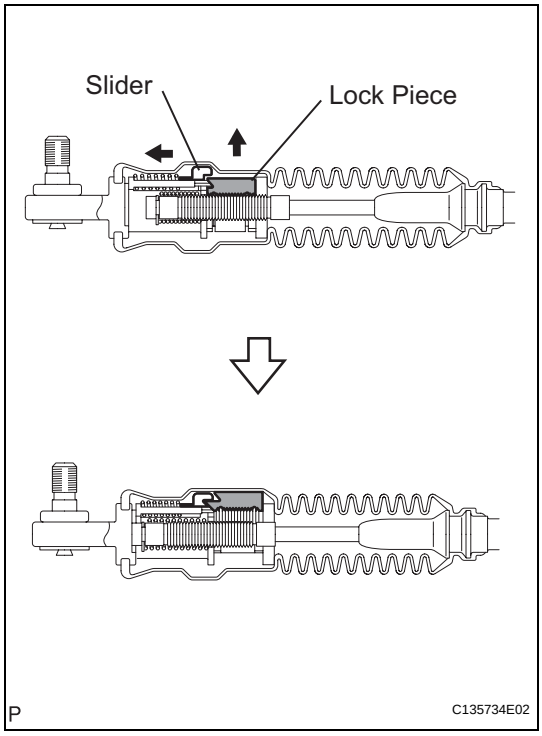
(b) Remove the nut and transmission control cable from the control shaft lever.

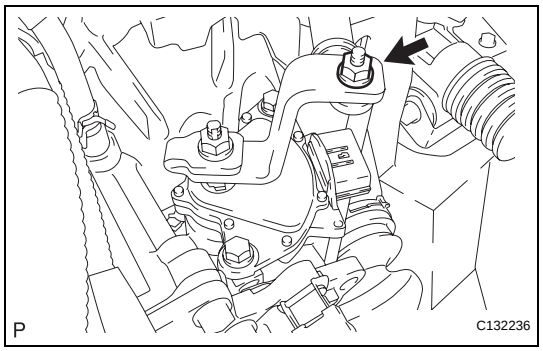


(c) Align the protrusions of the park/neutral position switch.

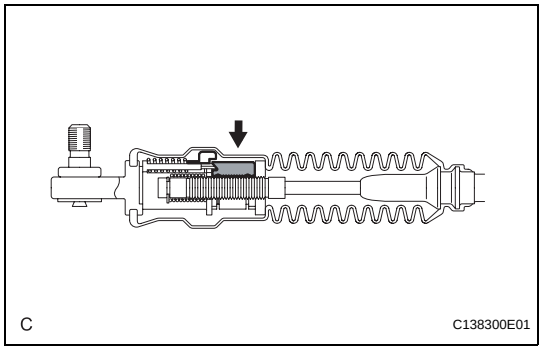


(d) Move the slider in the directions indicated by the arrows and pull up the lock piece.
NOTICE:
Do not damage the boot.





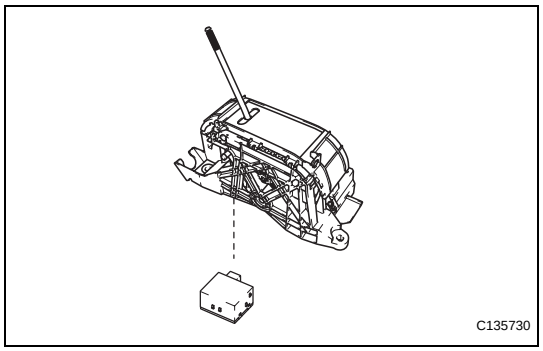
(e) Connect the transmission control cable assembly to the control shaft lever with the nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



(f) Push in the lock piece.
NOTICE:
Firmly push in the lock piece until the slider lock is engaged.

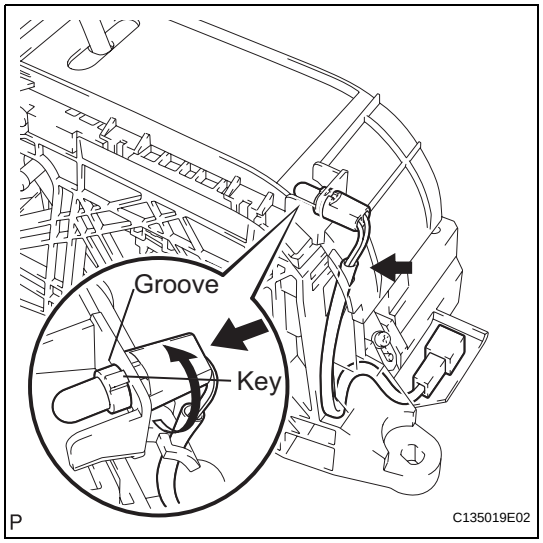
(g) Start the engine and make sure that the vehicle moves forward when moving the lever from the N to the D position and moves rearward when moving it to the R position.
If it becomes hard to move the shift lever, readjust the shift lever position.

REASSEMBLY



1. INSTALL SHIFT LOCK CONTROL ECU

(a) Install the shift lock control ECU to the shift lever.

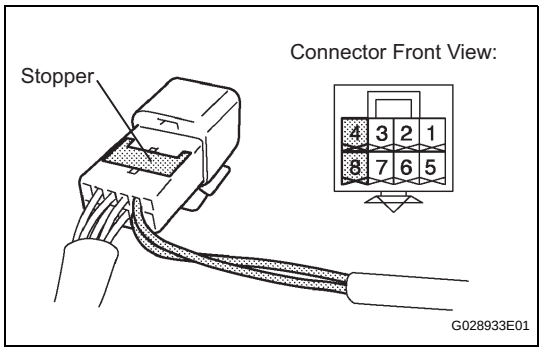


2. INSTALL INDICATOR LIGHT WIRE SUB-ASSEMBLY

(a) Insert the indicator light wire into the shift lock control unit while aligning the groove on the unit with the indicator light guide key.

(b) Install the indicator light guide by turning it clockwise until it securely locks.

(c) Install the indicator light wire to the clamp on the shift lock control unit.

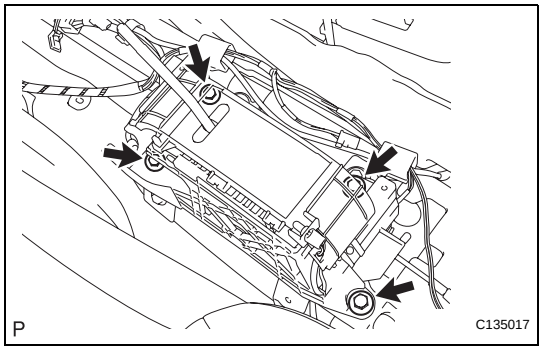


(d) Connect terminals (4) and (8) of the indicator light wire.
(e) Push the stopper.

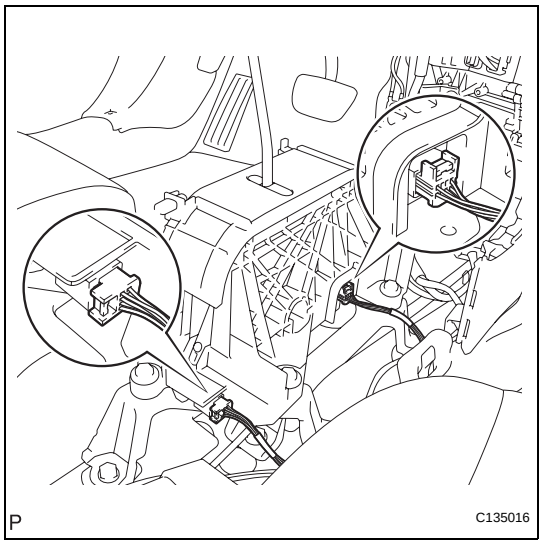
INSTALLATION

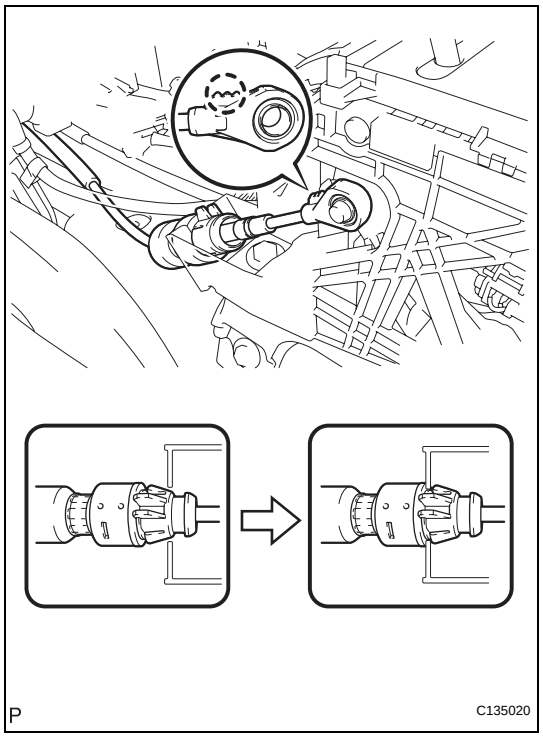
1. INSTALL SHIFT LOCK CONTROL UNIT

(a) Install the 4 bolts and shift lock control unit.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

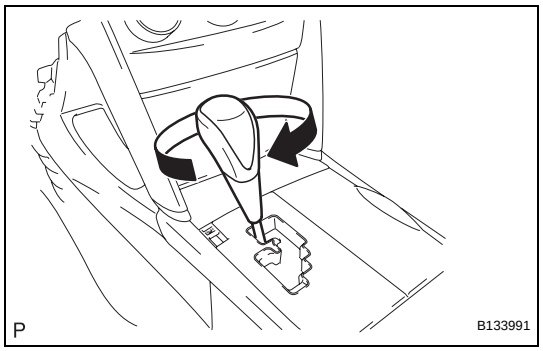


(b) Connect the shift lock ECU connector and transmission control switch wire connector.





2. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY**
   (a) Install the transmission control cable assembly as shown in the illustration.
   HINT:
   - Install the floor shift cable with the uneven surface facing up.
   - Securely engage the claws of the floor shift cable.
3. **INSTALL FLOOR CARPET BRACKET LH**
4. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMC Made) (See page IP-50)**
5. **INSTALL NO. 2 CONSOLE BOX INSERT FRONT (for TMMK Made) (See page IP-50)**
6. **INSTALL CONSOLE BOX ASSEMBLY (for TMC Made) (See page IP-51)**
7. **INSTALL CONSOLE BOX ASSEMBLY (for TMMK Made) (See page IP-51)**
8. **INSTALL CONSOLE BOX CARPET (See page IP-51)**
9. **INSTALL CONSOLE BOX POCKET (See page IP-51)**
10. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMC Made) (See page IP-52)**
11. **INSTALL UPPER CONSOLE PANEL SUB-ASSEMBLY (for TMMK Made) (See page IP-52)**
12. **INSTALL UPPER CONSOLE REAR PANEL SUB-ASSEMBLY (See page IP-53)**
13. **INSTALL FLOOR SHIFT POSITION INDICATOR HOUSING SUB-ASSEMBLY (See page IP-53)**
14. **INSTALL NO. 2 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-54)**
15. **INSTALL NO. 1 INSTRUMENT CLUSTER FINISH PANEL GARNISH (See page IP-55)**



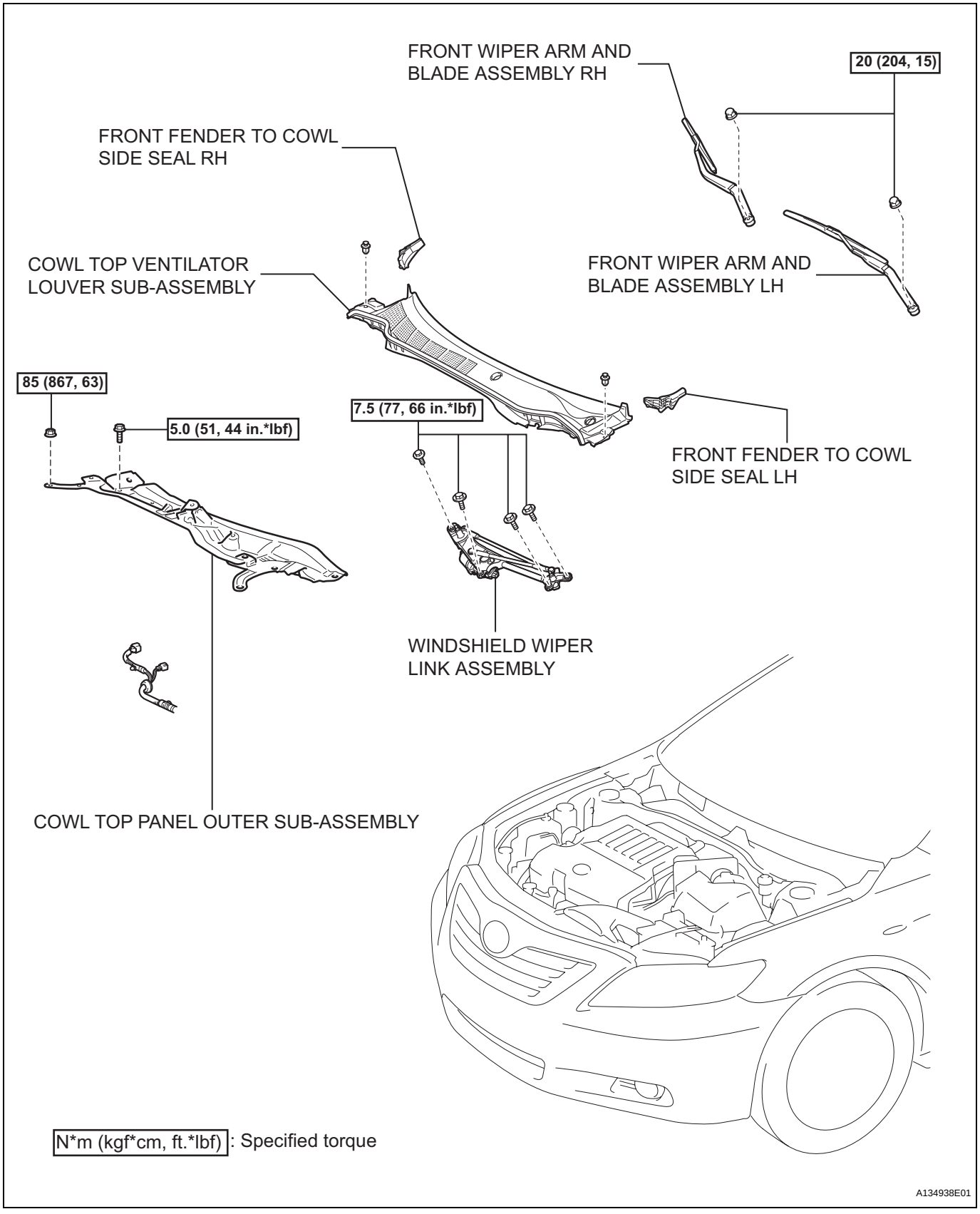
16. **INSTALL SHIFT LEVER KNOB SUB-ASSEMBLY**
    (a) Install the shift lever knob sub-assembly.
17. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (without Smart Key System) (See page IP-57)**
18. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL (with Smart Key System) (See page IP-57)**
19. **INSTALL LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMC Made) (See page IP-58)**
20. **REMOVE LOWER INSTRUMENT PANEL FINISH PANEL LH (for TMMK Made) (See page IP-59)**
21. **INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH (See page IR-54)**

AX

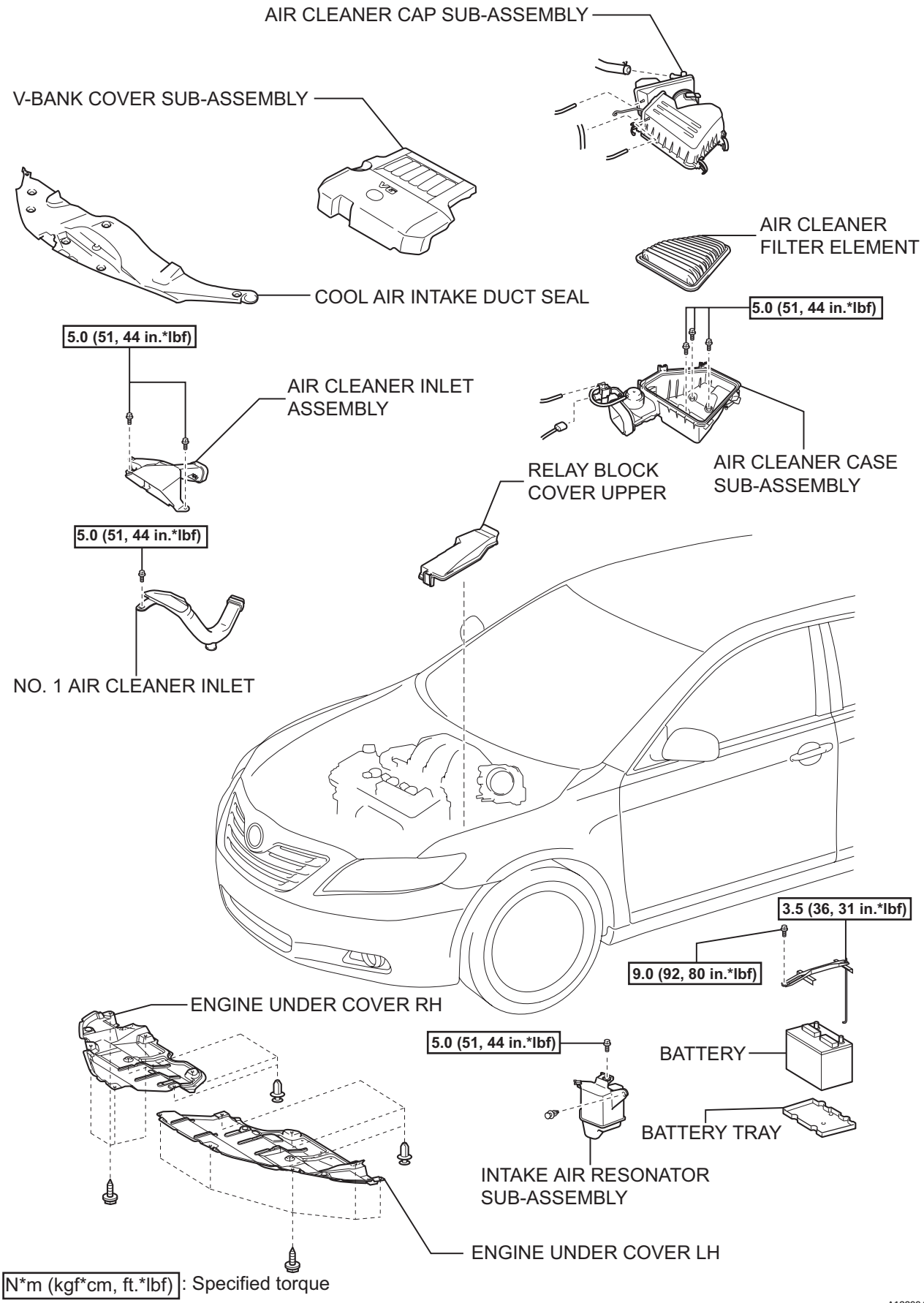
22. **INSTALL FRONT DOOR SCUFF PLATE LH (See page IR-54)**
23. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page EM-51)**
24. **INSPECT SHIFT LEVER POSITION (See page AX-191)**
25. **ADJUST SHIFT LEVER POSITION (See page AX-191)**

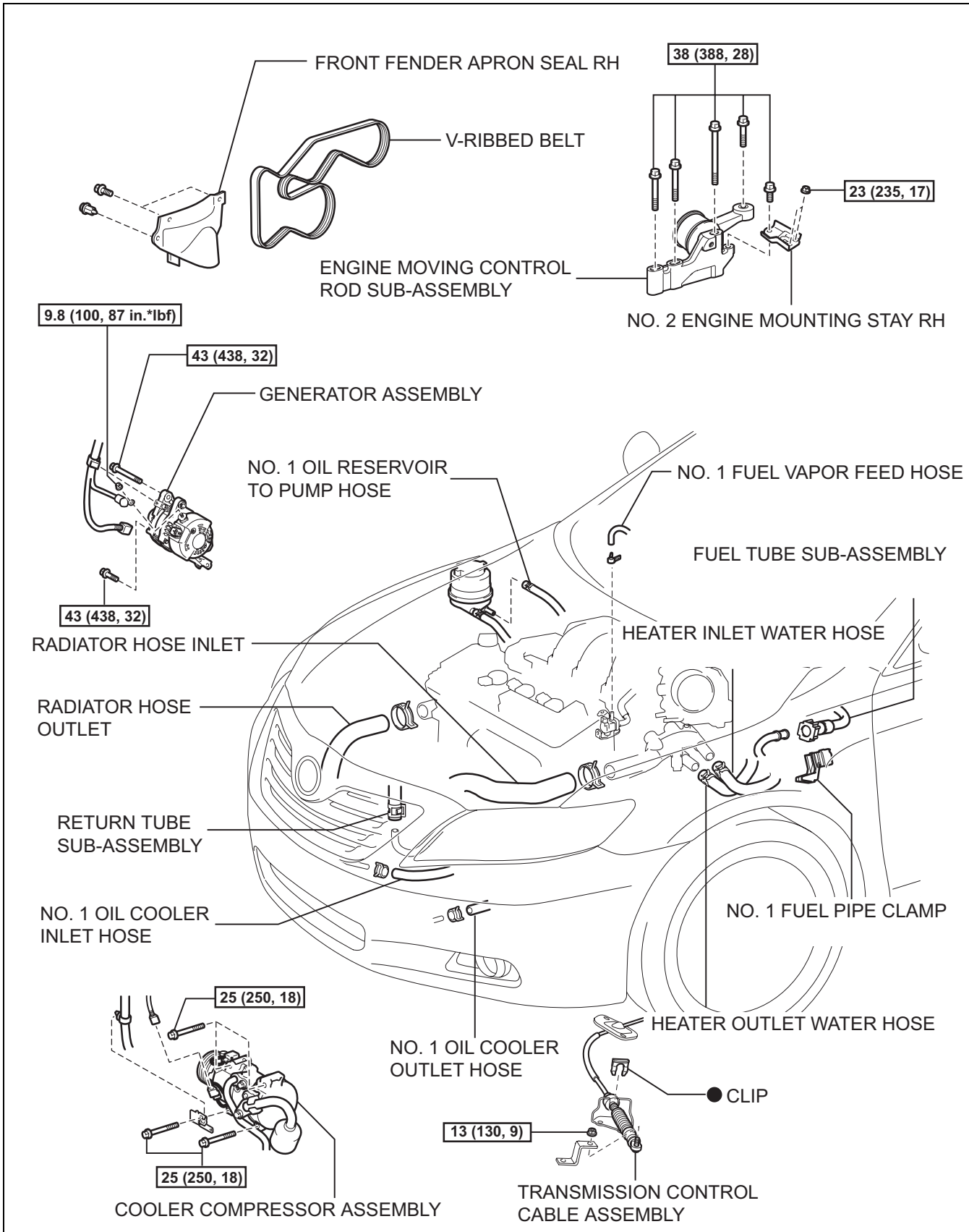
TORQUE CONVERTER CLUTCH AND DRIVE PLATE

COMPONENTS



AX


AIR CLEANER CAP SUB-ASSEMBLY
V-BANK COVER SUB-ASSEMBLY
AIR CLEANER FILTER ELEMENT
COOL AIR INTAKE DUCT SEAL
5.0 (51, 44 in.*lbf)
5.0 (51, 44 in.*lbf)
AIR CLEANER INLET ASSEMBLY
AIR CLEANER CASE SUB-ASSEMBLY
RELAY BLOCK COVER UPPER
5.0 (51, 44 in.*lbf)
NO. 1 AIR CLEANER INLET
3.5 (36, 31 in.*lbf)
9.0 (92, 80 in.*lbf)
ENGINE UNDER COVER RH
5.0 (51, 44 in.*lbf)
BATTERY
BATTERY TRAY
INTAKE AIR RESONATOR SUB-ASSEMBLY
ENGINE UNDER COVER LH
N*m (kgf*cm, ft.*lbf): Specified torque
C
A132994E01

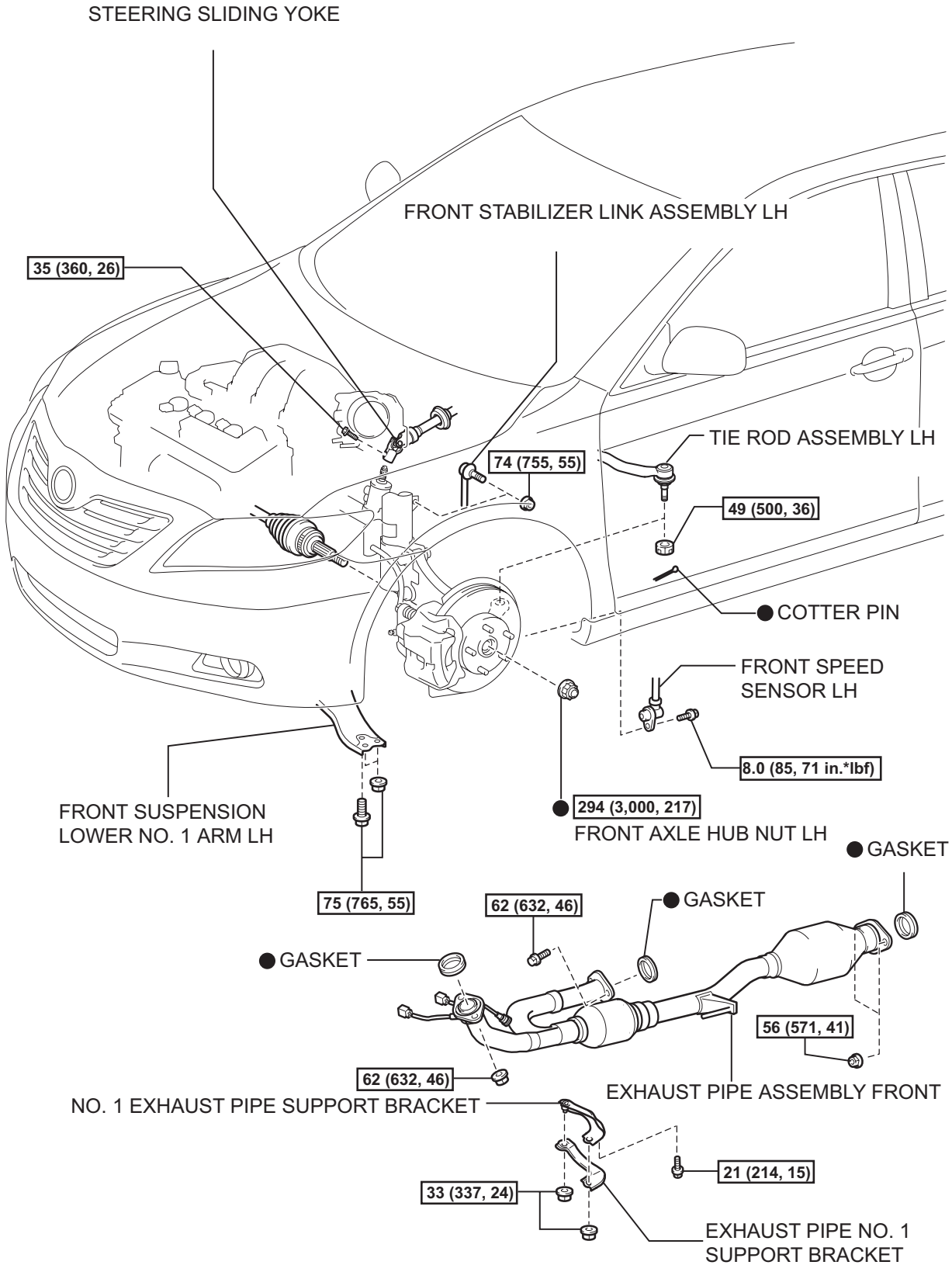


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

C142576E01

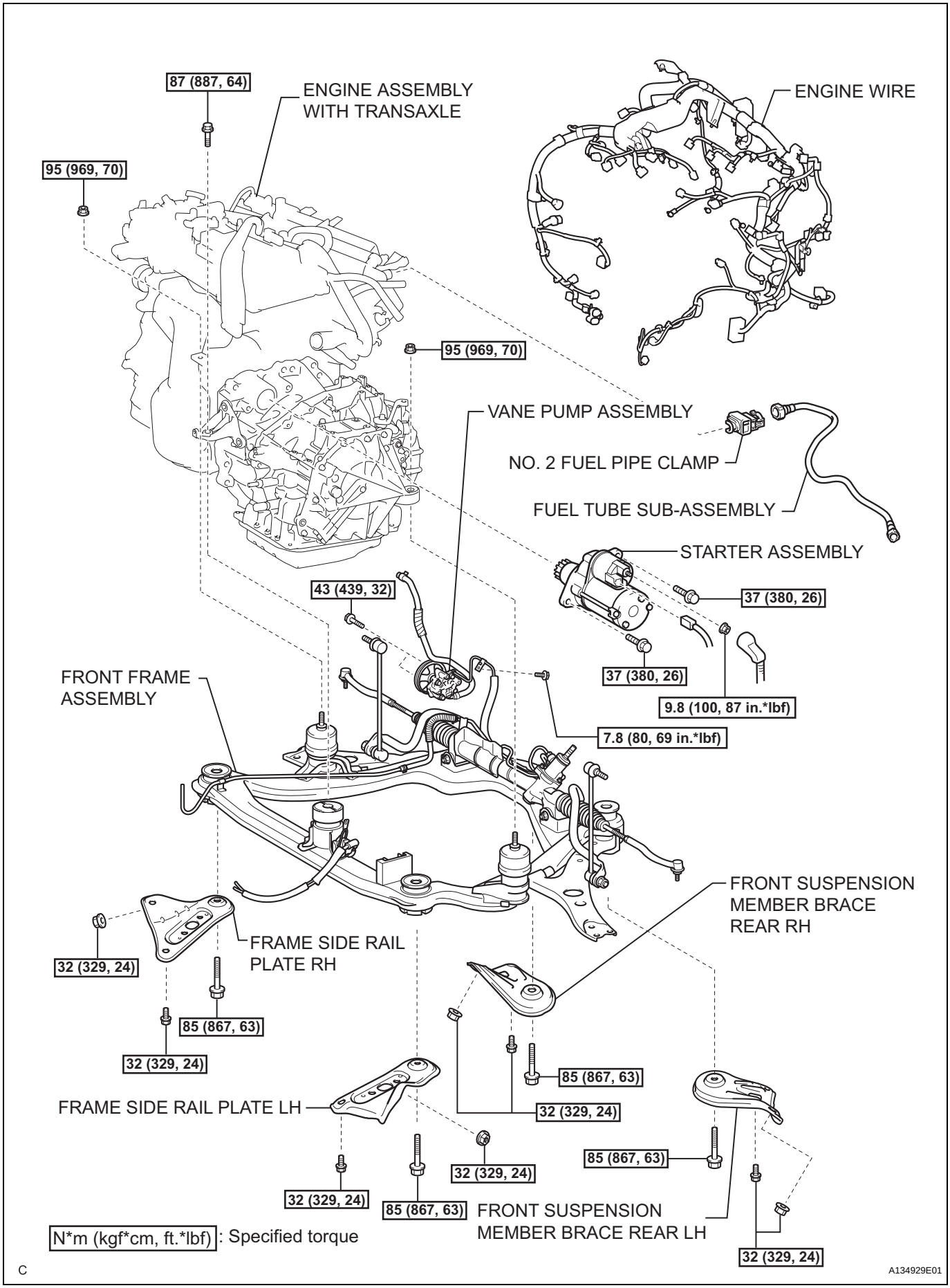
AX



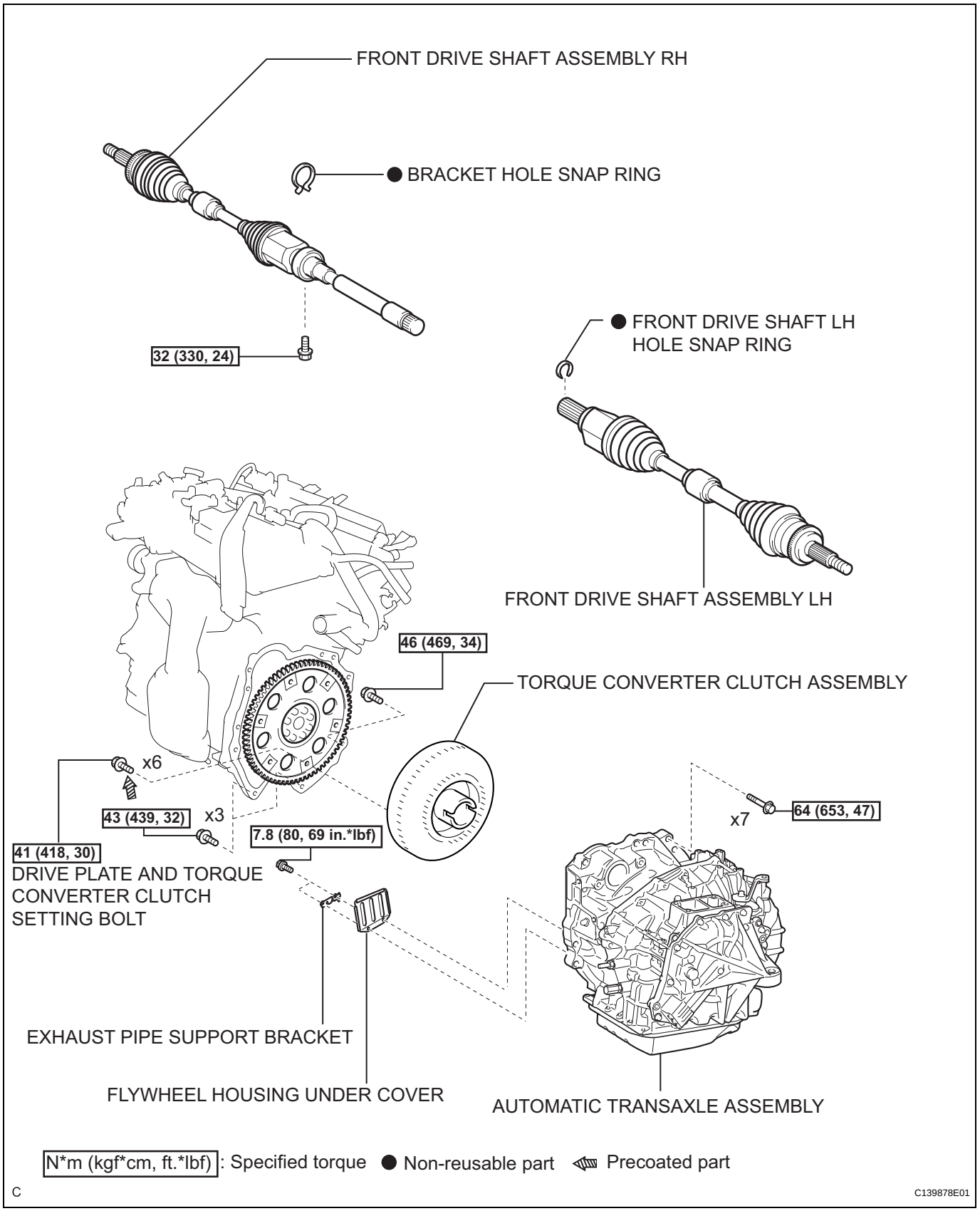
N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

C

A132996E01


87 (887, 64)
ENGINE ASSEMBLY WITH TRANSAXLE
ENGINE WIRE
95 (969, 70)
95 (969, 70)
VANE PUMP ASSEMBLY
NO. 2 FUEL PIPE CLAMP
FUEL TUBE SUB-ASSEMBLY
STARTER ASSEMBLY
43 (439, 32)
37 (380, 26)
37 (380, 26)
9.8 (100, 87 in.*lbf)
FRONT FRAME ASSEMBLY
7.8 (80, 69 in.*lbf)
FRONT SUSPENSION MEMBER BRACE REAR RH
32 (329, 24)
FRAME SIDE RAIL PLATE RH
85 (867, 63)
32 (329, 24)
85 (867, 63)
FRAME SIDE RAIL PLATE LH
32 (329, 24)
32 (329, 24)
85 (867, 63)
85 (867, 63)
32 (329, 24)
FRONT SUSPENSION MEMBER BRACE REAR LH
32 (329, 24)
N*m (kgf*cm, ft.*lbf): Specified torque
C
A134929E01

AX


FRONT DRIVE SHAFT ASSEMBLY RH
● BRACKET HOLE SNAP RING
32 (330, 24)
● FRONT DRIVE SHAFT LH HOLE SNAP RING
FRONT DRIVE SHAFT ASSEMBLY LH
46 (469, 34)
TORQUE CONVERTER CLUTCH ASSEMBLY
x6
43 (439, 32)
x3
7.8 (80, 69 in.*lbf)
41 (418, 30)
DRIVE PLATE AND TORQUE CONVERTER CLUTCH SETTING BOLT
x7
64 (653, 47)
EXHAUST PIPE SUPPORT BRACKET
FLYWHEEL HOUSING UNDER COVER
AUTOMATIC TRANSAXLE ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
C
C139878E01

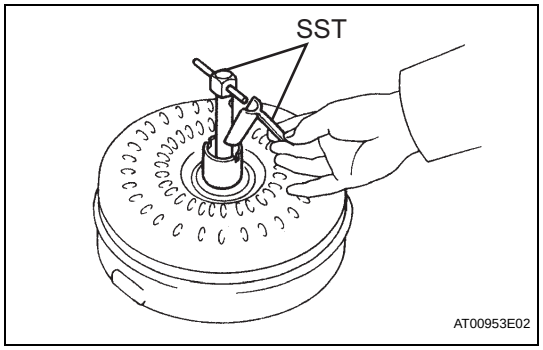
REMOVAL

1. REMOVE TORQUE CONVERTER CLUTCH ASSEMBLY

HINT:

(See page AX-207)

INSPECTION



1. INSPECT TORQUE CONVERTER CLUTCH ASSEMBLY

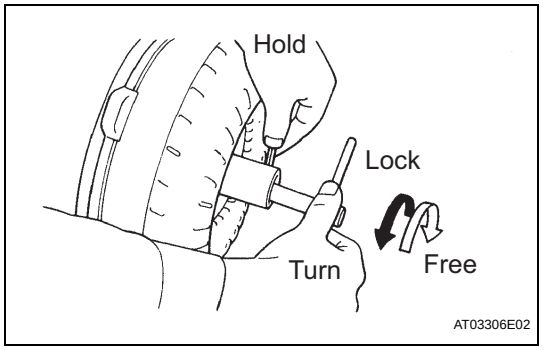
(a) Inspect the one-way clutch.

(1) Set SST into the inner race of the one-way clutch.

SST 09350-32014 (09351-32010)

(2) Install SST so that it fits in the notch of the converter hub and outer race of the one-way clutch.

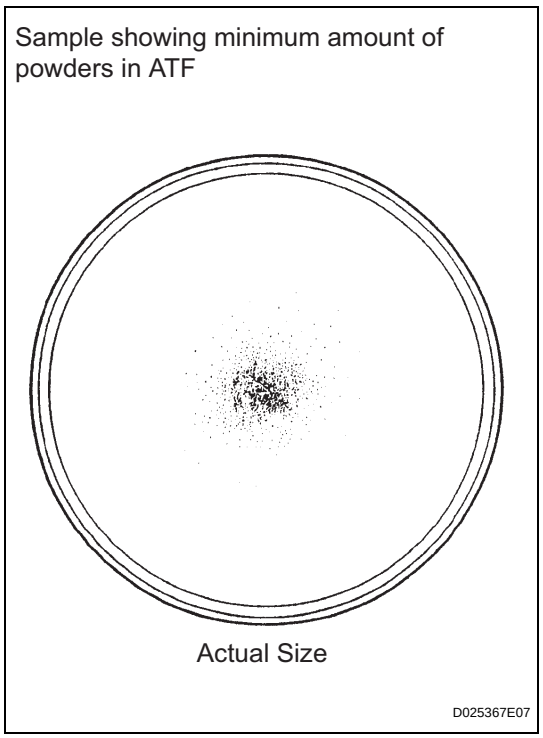
SST 09350-32014 (09351-32010, 09351-32020)



(3) Stand the torque converter up and turn the SST.

Standard:

If the one-way clutch is turned clockwise, it rotates freely and if turned counterclockwise, it locks.



(b) Determine the condition of the torque converter clutch assembly.

(1) If the inspection result of the torque converter clutch assembly satisfies the following conditions, replace the torque converter clutch assembly.

Malfunction item:

A metallic sound is emitted from the torque converter clutch assembly during the stall test or when the shift lever is moved to the N position.

The one-way clutch is free or locked in both directions.

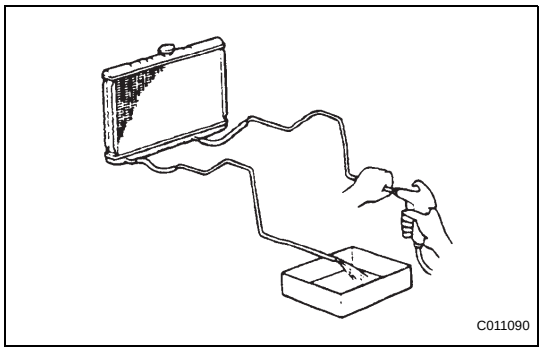
The amount of powder in the ATF is greater than the sample shown in the illustration (see the sample).

HINT:

The sample shows the auto fluid of approximately 0.25 liters (0.26 US qts, 0.22 Imp. qts) that is taken out from the removed torque converter clutch.

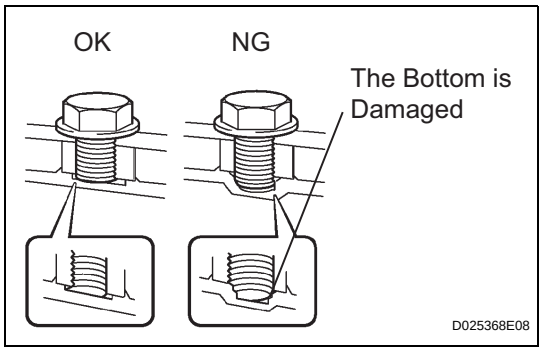
(c) Exchange the ATF in the torque converter clutch.

(1) If the ATF is discolored and/or has a foul odor, completely stir the ATF in the torque converter clutch and drain it.

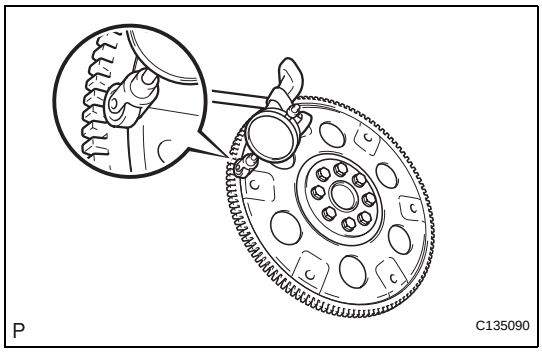


(d) Clean and check the oil cooler and oil pipe line.
(1) If the torque converter clutch is inspected or the ATF is exchanged, clean the oil cooler and oil pipe line.
HINT:
- Spray compressed air of 196 kPa (2 kgf/cm, 28 psi) from the inlet hose.
- If plenty of fine powders are identified in the ATF, add new ATF using a bucket pump and clean it again.

(2) If the ATF is cloudy, inspect the oil cooler (radiator).



(e) Prevent deformation of the torque converter clutch and damage to the oil pump gear.
(1) When there is any damage to the end of the bolt for the torque converter clutch and to the bottom of the bolt hole, replace the bolt and the torque converter clutch.
(2) All of the bolts must be the same length.
(3) Bolts with washers must be used.



2. INSPECT DRIVE PLATE & RING GEAR SUB-ASSEMBLY

(a) Set up a dial indicator with a roller instrument and measure the drive plate runout.
Maximum runout:
0.20 mm (0.0079 in.)

(b) Check for damage of the ring gear.
If runout is not within specification or the ring gear is damaged, replace the drive plate.

INSTALLATION

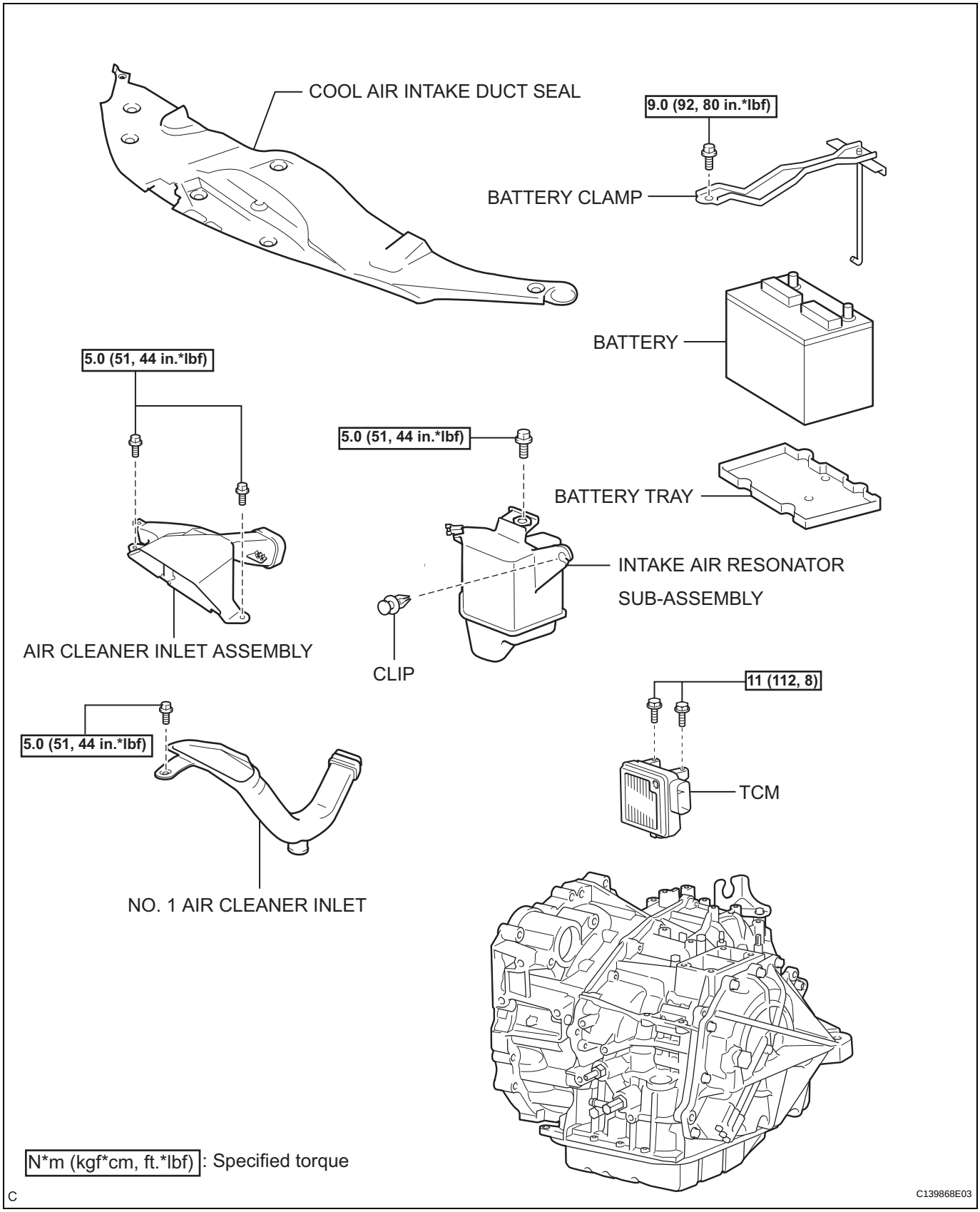
1. INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY

HINT:

(See page AX-214)

TCM

COMPONENTS

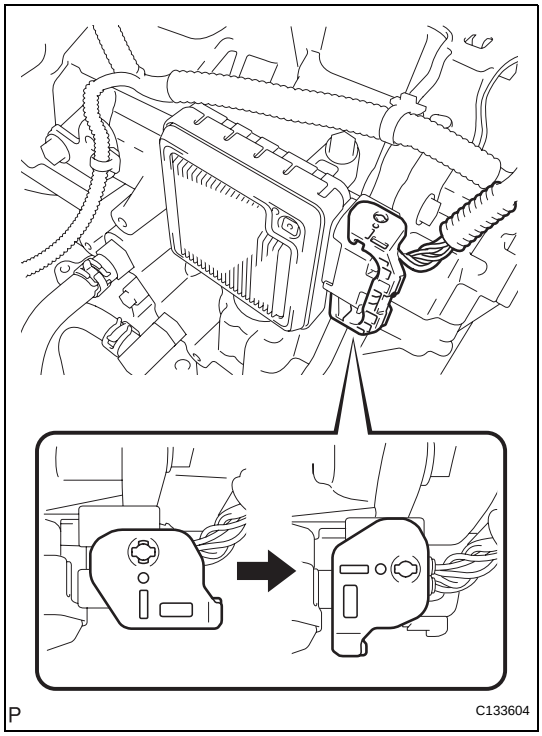


AX

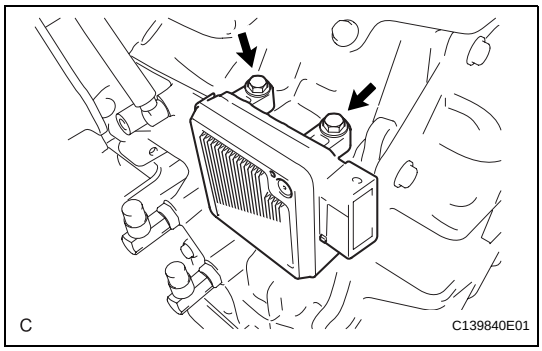
REMOVAL

NOTICE:
When the TCM is replaced, the existing transaxle compensation codes must be input into the new TCM (See page AX-22).

1. **REMOVE COOL AIR INTAKE DUCT SEAL (See page EM-23)**
2. **REMOVE BATTERY (See page EM-24)**
3. **REMOVE AIR CLEANER INLET ASSEMBLY (See page EM-24)**
4. **REMOVE NO. 1 AIR CLEANER INLET (See page EM-24)**
5. **REMOVE INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-25)**
6. **REMOVE TCM**
   (a) Turn the lock lever and disconnect the connector from the TCM.

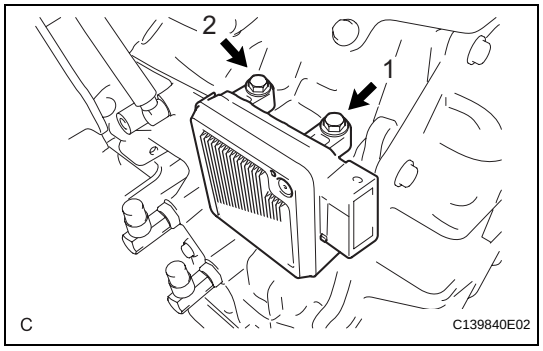


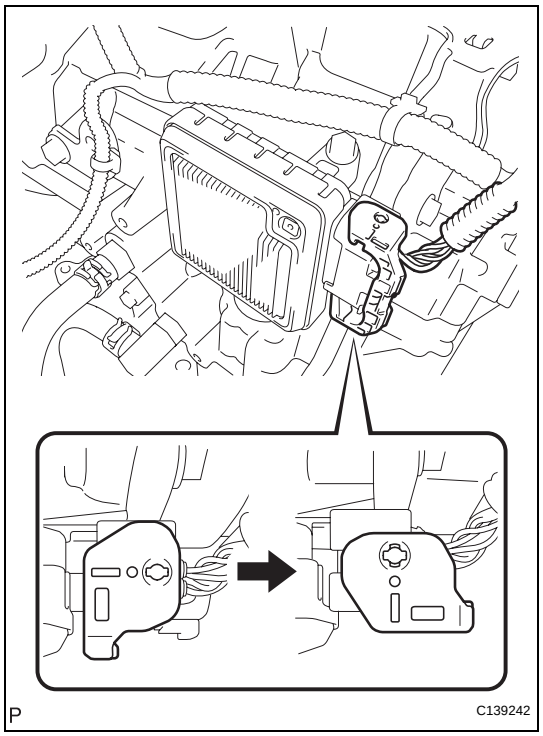
   (b) Remove the 2 bolts and TCM from the transaxle.



INSTALLATION

1. **INSTALL TCM**
   (a) Install the TCM to the transaxle.
   (b) Install and tighten the 2 bolts in the order shown in the illustration.
   Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)





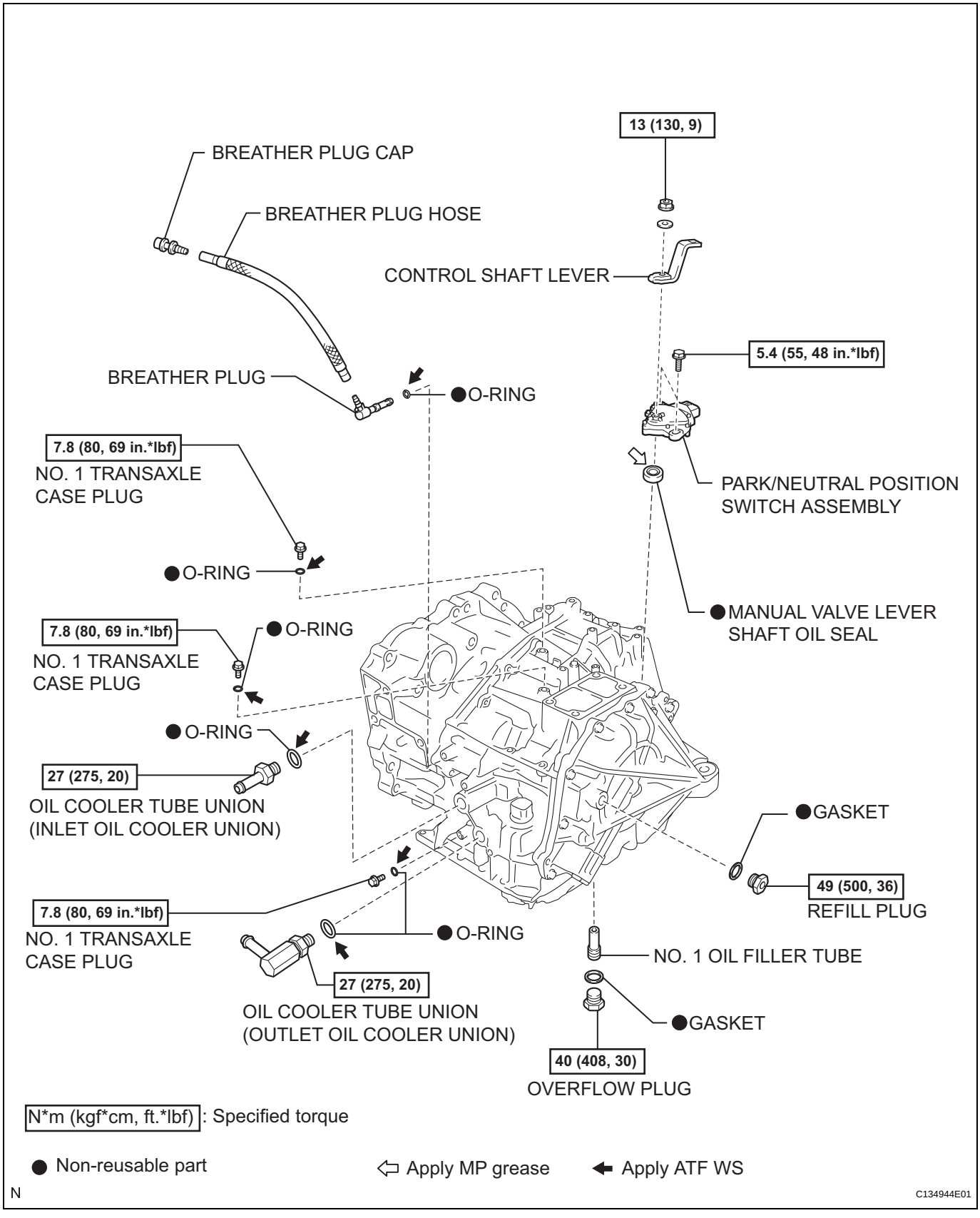
   (c) Connect the connector to the TCM.
   (d) Turn the lock lever and secure the connector with the lock lever.

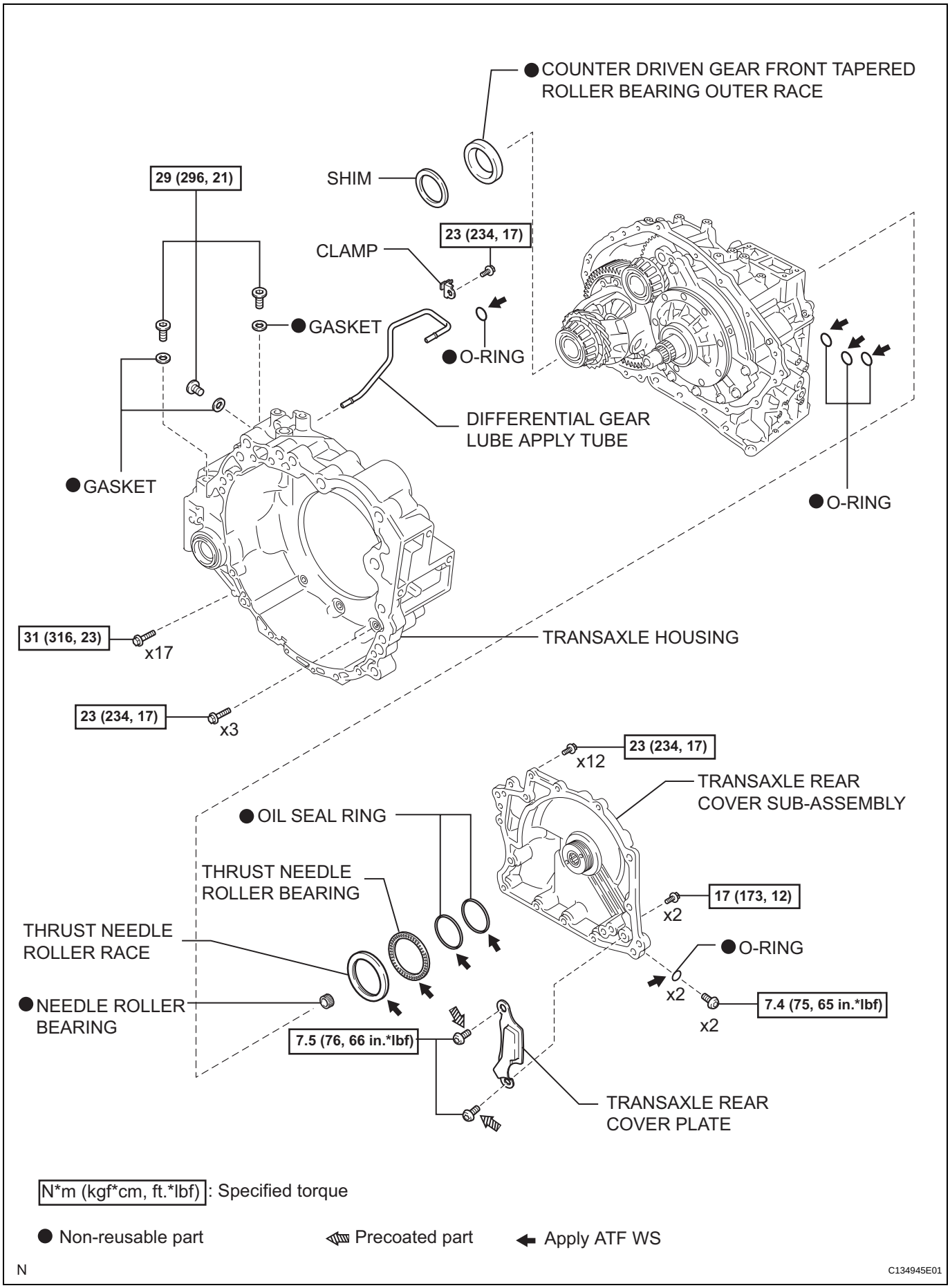
2. **INSTALL INTAKE AIR RESONATOR SUB-ASSEMBLY (See page EM-49)**
3. **INSTALL NO. 1 AIR CLEANER INLET (See page EM-49)**
4. **INSTALL AIR CLEANER INLET ASSEMBLY (See page EM-50)**
5. **INSTALL BATTERY (See page EM-49)**
6. **INSTALL COOL AIR INTAKE DUCT SEAL (See page EM-52)**
7. **PERFORM TCM REGISTRATION**
   HINT:
   (See page AX-19)

AUTOMATIC TRANSAXLE UNIT

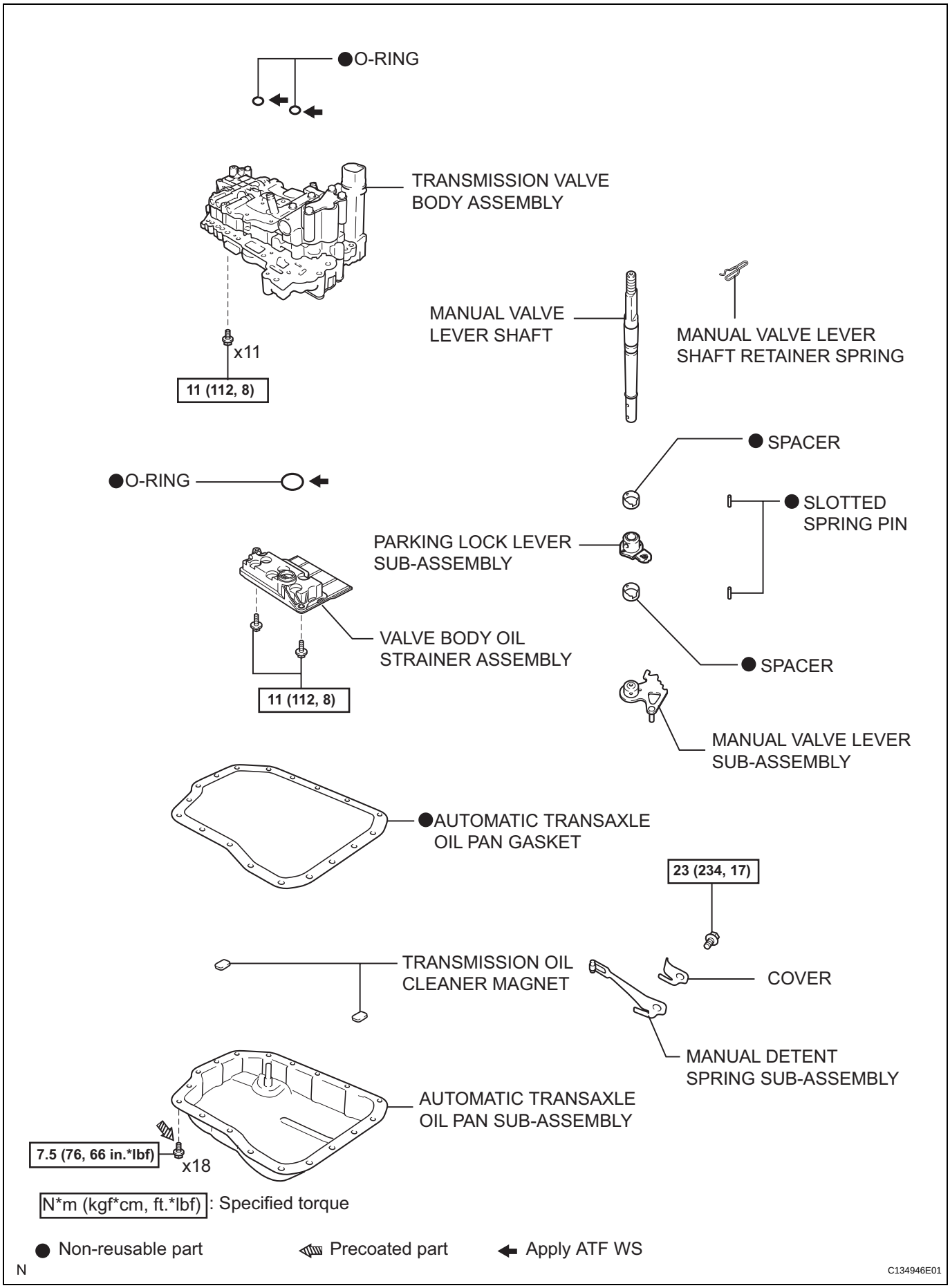
COMPONENTS

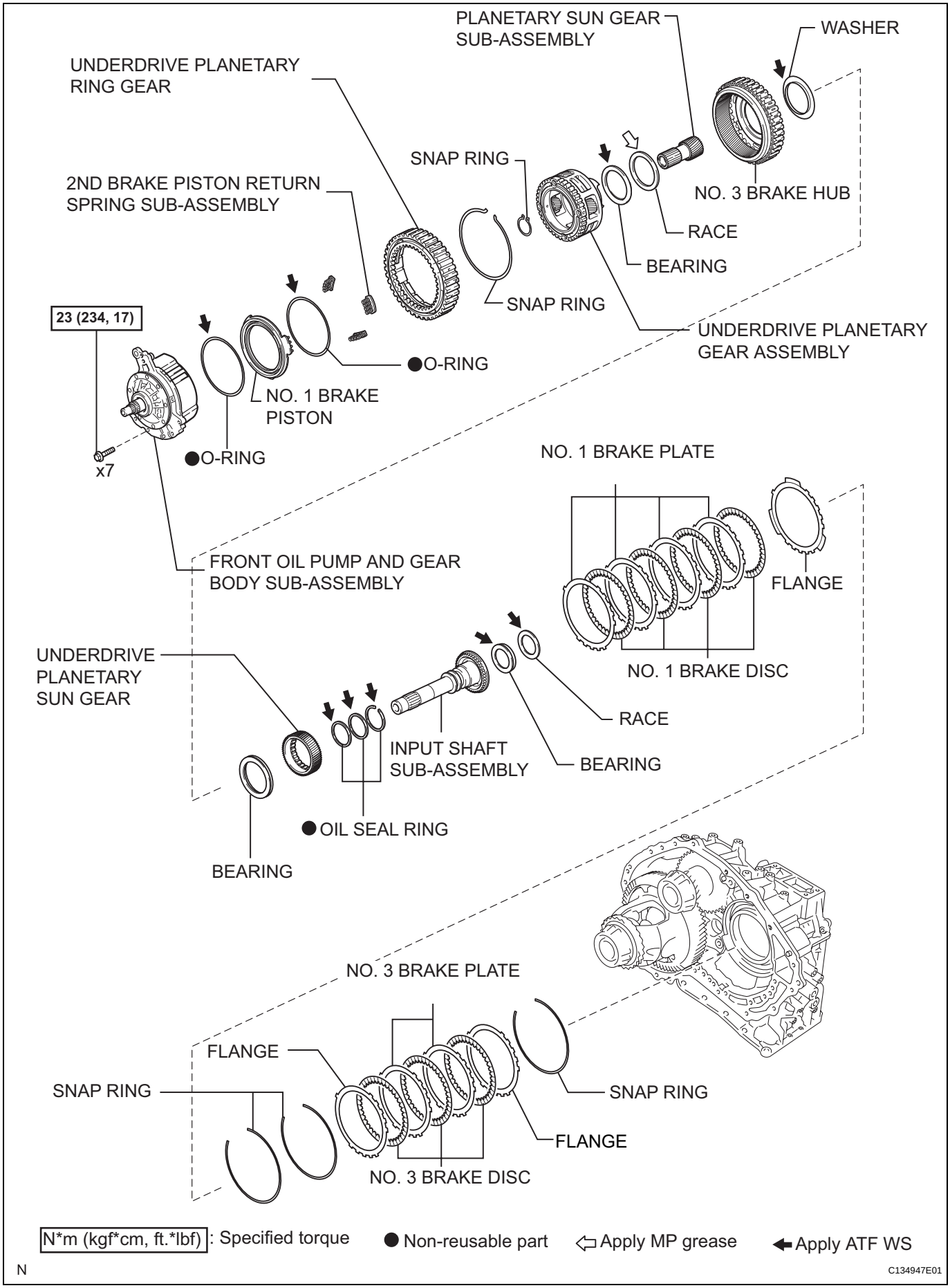
AX




●COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING OUTER RACE
SHIM
29 (296, 21)
23 (234, 17)
CLAMP
●GASKET
●O-RING
DIFFERENTIAL GEAR LUBE APPLY TUBE
●GASKET
●O-RING
31 (316, 23)
x17
TRANSAXLE HOUSING
23 (234, 17)
x3
23 (234, 17)
x12
TRANSAXLE REAR COVER SUB-ASSEMBLY
●OIL SEAL RING
THRUST NEEDLE ROLLER BEARING
17 (173, 12)
x2
THRUST NEEDLE ROLLER RACE
●O-RING
x2
●NEEDLE ROLLER BEARING
7.4 (75, 65 in.*lbf)
x2
7.5 (76, 66 in.*lbf)
TRANSAXLE REAR COVER PLATE
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
Apply ATF WS
N
C134945E01

AX

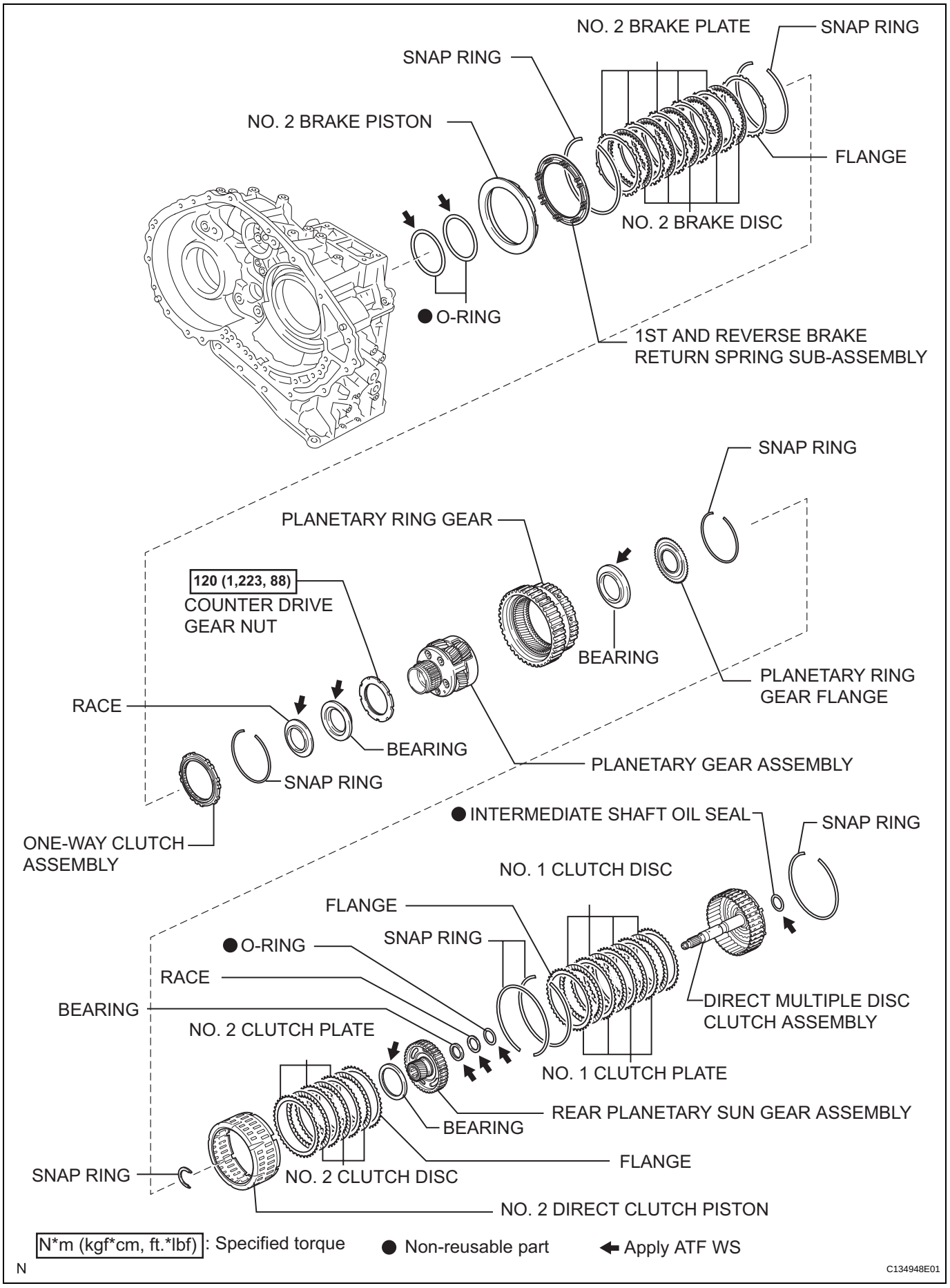

●O-RING
TRANSMISSION VALVE BODY ASSEMBLY
x11
11 (112, 8)
MANUAL VALVE LEVER SHAFT
MANUAL VALVE LEVER SHAFT RETAINER SPRING
●SPACER
●O-RING
●SLOTTED SPRING PIN
PARKING LOCK LEVER SUB-ASSEMBLY
VALVE BODY OIL STRAINER ASSEMBLY
●SPACER
11 (112, 8)
MANUAL VALVE LEVER SUB-ASSEMBLY
●AUTOMATIC TRANSAXLE OIL PAN GASKET
23 (234, 17)
TRANSMISSION OIL CLEANER MAGNET
COVER
MANUAL DETENT SPRING SUB-ASSEMBLY
AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY
7.5 (76, 66 in.*lbf)
x18
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Precoated part
Apply ATF WS
N
C134946E01

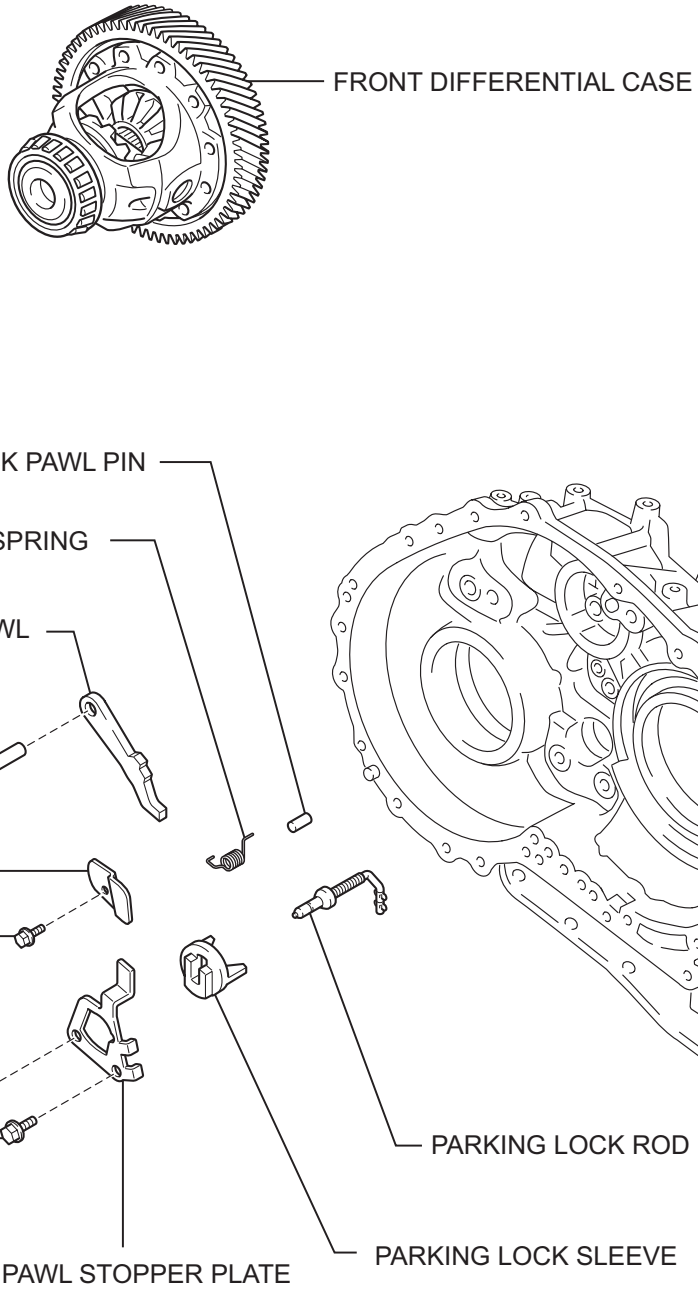


N

C134947E01

AX


NO. 2 BRAKE PLATE
SNAP RING
SNAP RING
NO. 2 BRAKE PISTON
FLANGE
NO. 2 BRAKE DISC
● O-RING
1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY
SNAP RING
PLANETARY RING GEAR
120 (1,223, 88)
COUNTER DRIVE GEAR NUT
BEARING
PLANETARY RING GEAR FLANGE
RACE
BEARING
PLANETARY GEAR ASSEMBLY
SNAP RING
● INTERMEDIATE SHAFT OIL SEAL
SNAP RING
ONE-WAY CLUTCH ASSEMBLY
NO. 1 CLUTCH DISC
FLANGE
SNAP RING
● O-RING
RACE
BEARING
DIRECT MULTIPLE DISC CLUTCH ASSEMBLY
NO. 2 CLUTCH PLATE
NO. 1 CLUTCH PLATE
REAR PLANETARY SUN GEAR ASSEMBLY
BEARING
FLANGE
SNAP RING
NO. 2 CLUTCH DISC
NO. 2 DIRECT CLUTCH PISTON
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Apply ATF WS
N
C134948E01

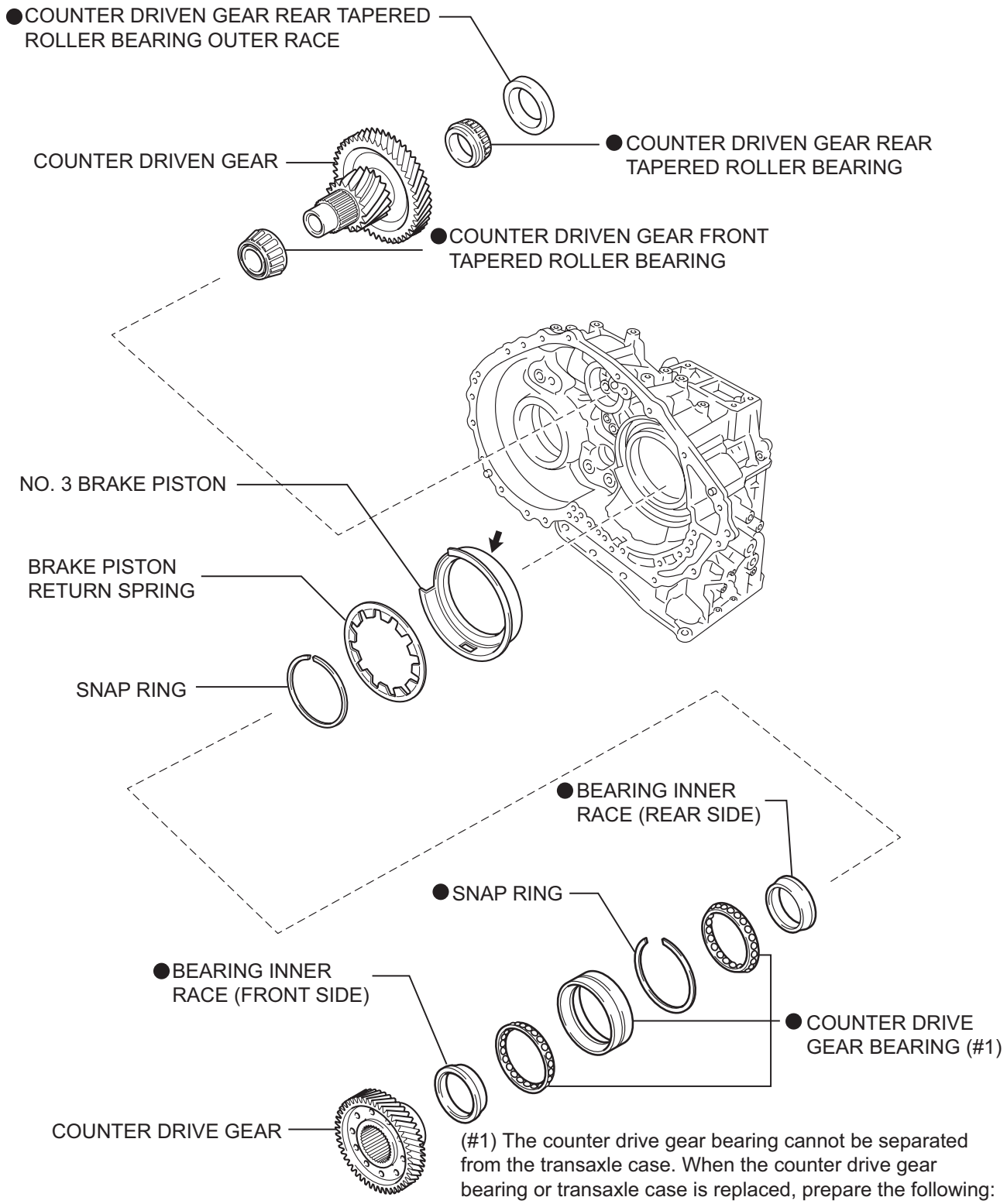


N*m (kgf*cm, ft.*lbf): Specified torque

N

C134949E01

AX



(#1) The counter drive gear bearing cannot be separated from the transaxle case. When the counter drive gear bearing or transaxle case is replaced, prepare the following:

- COUNTER DRIVE GEAR BEARING
- SNAP
- TRANSAXLE CASE

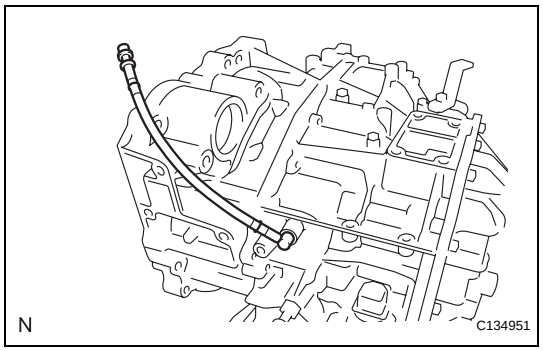
● Non-reusable part

◄ Apply ATF WS

N

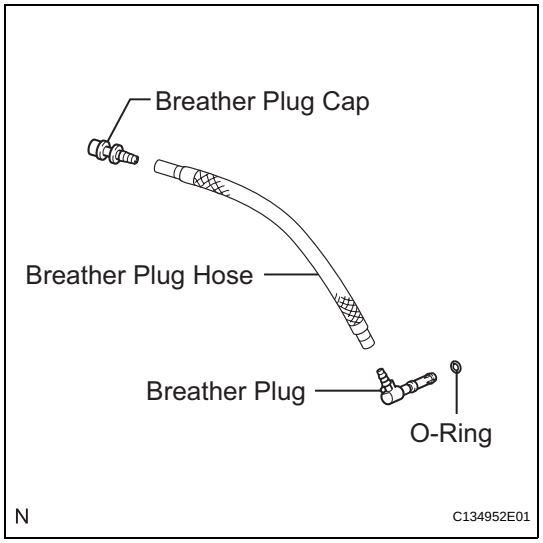
C134950E01

DISASSEMBLY



1. REMOVE NO. 2 BREATHER PLUG

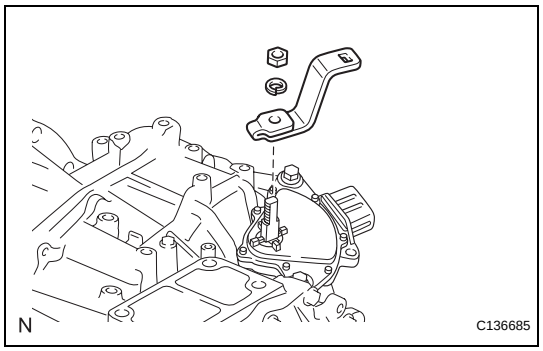
(a) Using a screwdriver, remove the breather plug hose from the transaxle case.



(b) Using a screwdriver, remove the breather plug from the breather plug hose.

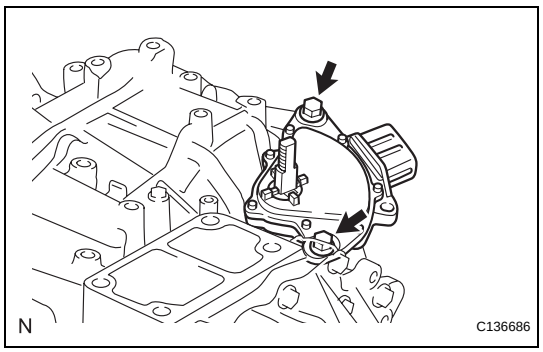
(c) Using a screwdriver, remove the O-ring from the breather plug.

(d) Using a screwdriver, remove the breather plug cap from the breather breather plug hose.



2. REMOVE PARK/NEUTRAL POSITION SWITCH ASSEMBLY

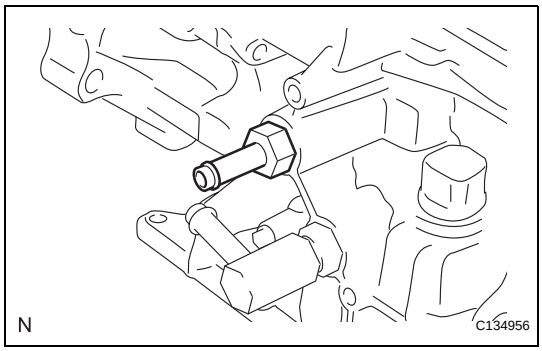
(a) Remove the nut, washer, and control shaft lever from the control shaft.



(b) Remove the 2 bolts and the park/neutral position switch assembly from the transaxle case.

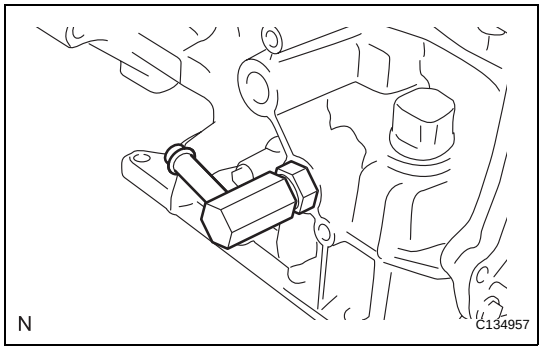
NOTICE:

Before removing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to remove the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.



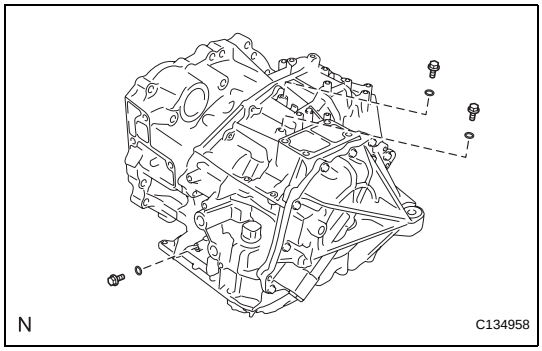
3. REMOVE OIL COOLER TUBE UNION (INLET OIL COOLER UNION)

(a) Loosen the nut while holding the oil cooler tube union (inlet oil cooler union).
(b) Remove the oil cooler tube union (inlet oil cooler union) from the transaxle case.
(c) Remove the O-ring from the oil cooler tube union (inlet oil cooler union).



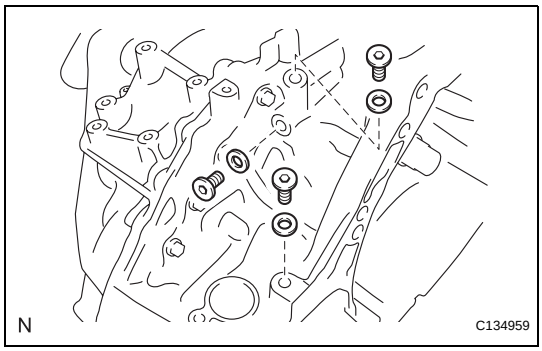
4. REMOVE OIL COOLER TUBE UNION (OUTLET OIL COOLER UNION)

(a) Loosen the nut while holding the oil cooler tube union (outlet oil cooler union).
(b) Remove the oil cooler tube union (outlet oil cooler union) from the transaxle case.
(c) Remove the O-ring from the oil cooler tube union (outlet oil cooler union).

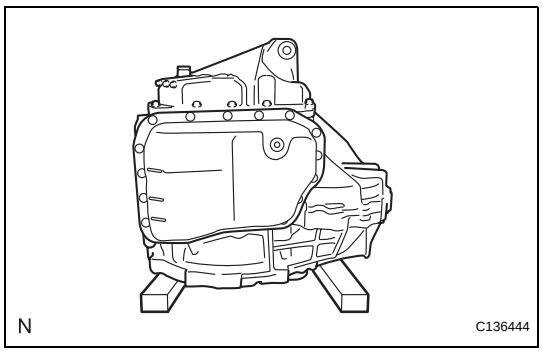


5. REMOVE NO. 1 TRANSAXLE CASE PLUG

(a) Remove the 3 No. 1 transaxle case plugs from the transaxle case.
(b) Using a screwdriver, remove the 3 O-rings from the 3 No. 1 transaxle case plugs.

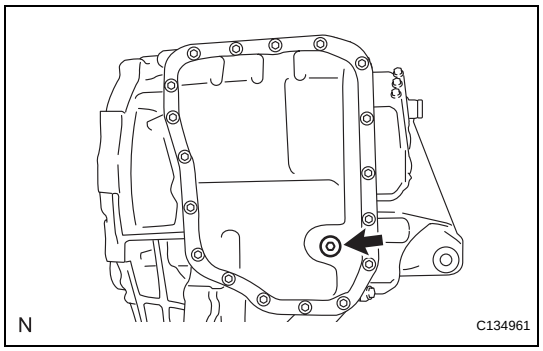


(c) Using a hexagon wrench (6 mm), remove the 3 hexagon bolts from the transaxle housing.
(d) Remove the 3 gaskets from the 3 hexagon bolts.



6. FIX AUTOMATIC TRANSAXLE ASSEMBLY

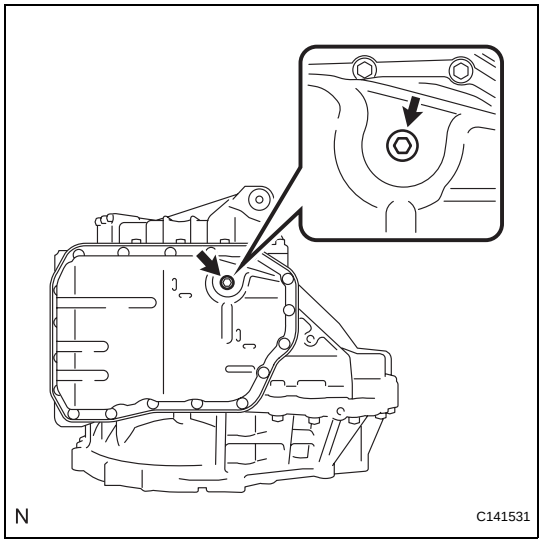
(a) Secure the transaxle assembly on wooden blocks.



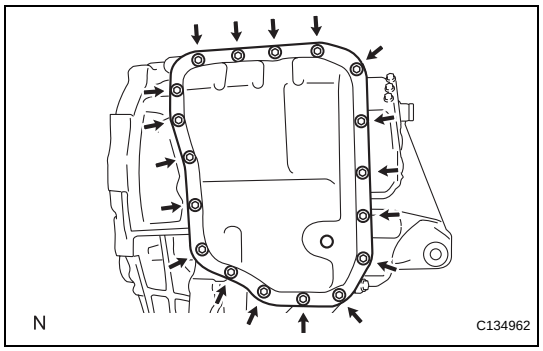
7. REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Using a hexagon wrench (6 mm), remove the overflow plug from the automatic transaxle oil pan sub-assembly.

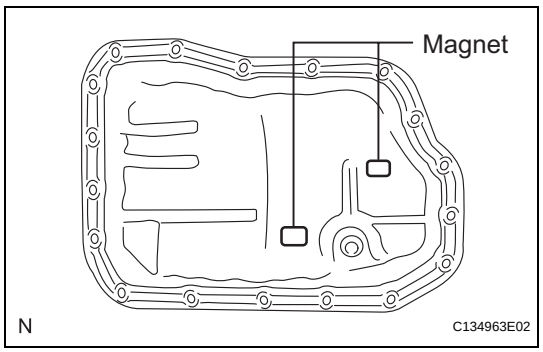
(b) Remove the gasket from the overflow plug.



(c) Using a hexagon wrench (6 mm), remove the No. 1 oil filler tube from the automatic transaxle assembly.

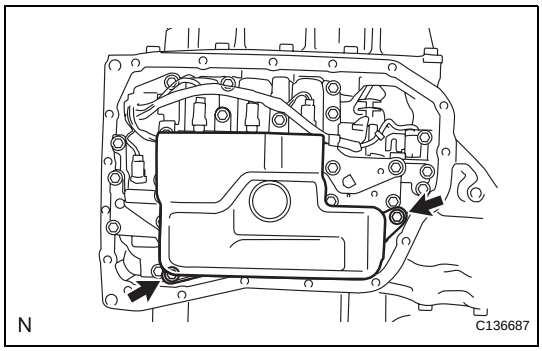


(d) Remove the 18 bolts, automatic transaxle oil pan sub-assembly, and gasket from the automatic transaxle assembly.



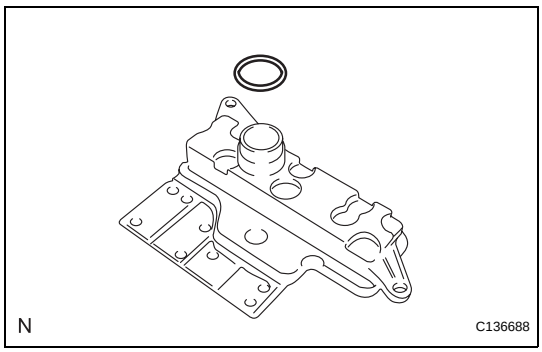
(e) Remove the 2 magnets from the automatic transaxle oil pan sub-assembly.

8. INSPECT TRANSMISSION OIL CLEANER MAGNET (See page AX-274)

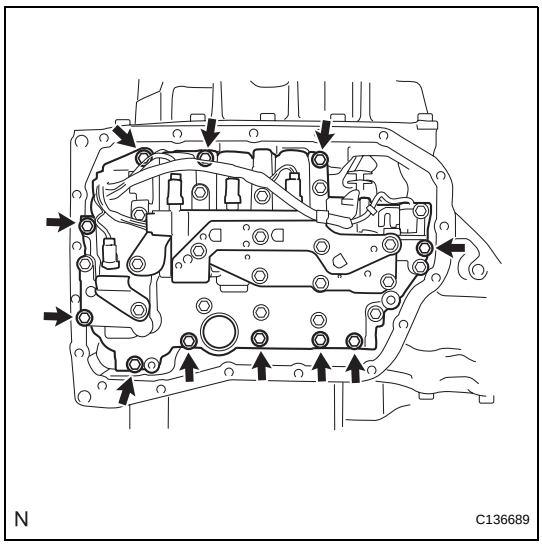


9. REMOVE VALVE BODY OIL STRAINER ASSEMBLY

(a) Remove the 2 bolts and oil strainer assembly from the valve body assembly.



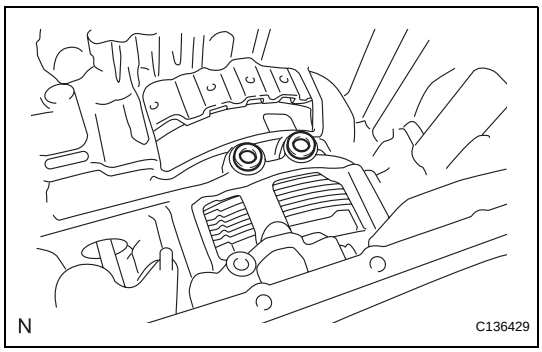
(b) Remove the O-ring from the oil strainer assembly.



10. REMOVE TRANSMISSION VALVE BODY ASSEMBLY

(a) Remove the 11 bolts and valve body assembly from the transaxle case.

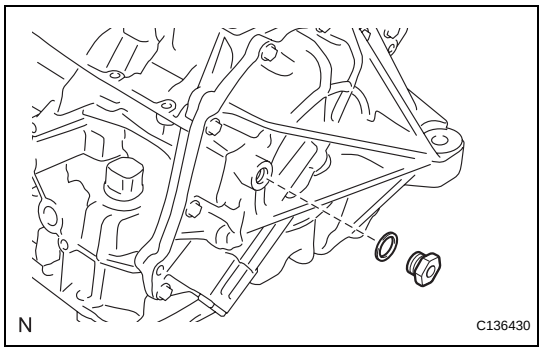
NOTICE:
When removing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and the transaxle case to interfere each other.



11. REMOVE TRANSAXLE CASE GASKET

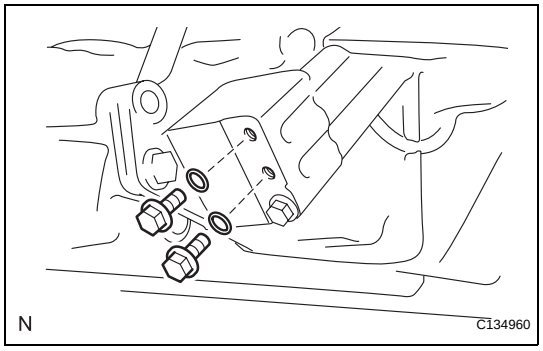
(a) Remove the 2 gaskets from the transaxle case.

12. INSPECT INPUT SHAFT SUB-ASSEMBLY (See page AX-274)

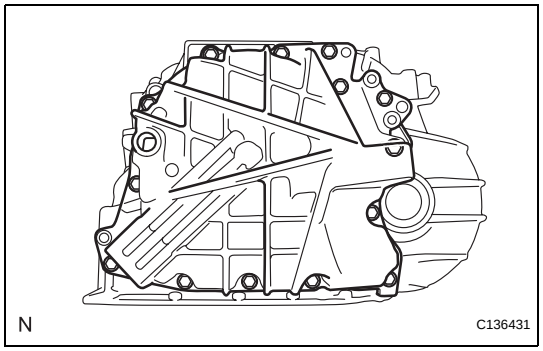


13. REMOVE TRANSAXLE REAR COVER SUB-ASSEMBLY

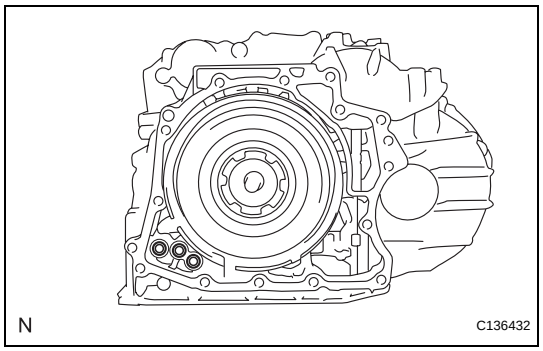
(a) Remove the refill plug from the transaxle rear cover.
(b) Remove the gasket from the refill plug.



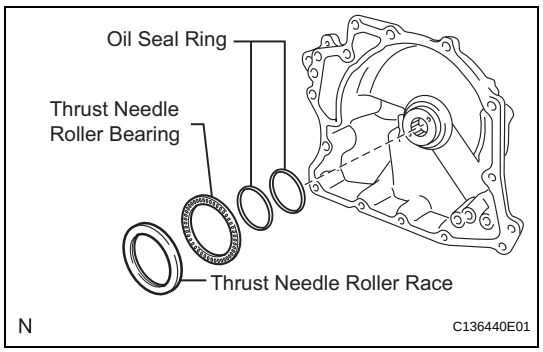
(c) Remove the 2 No. 1 automatic transaxle case plugs from the transaxle rear cover.
(d) Using a screwdriver, remove the 2 O-rings from the 2 No. 1 automatic transaxle case plugs.



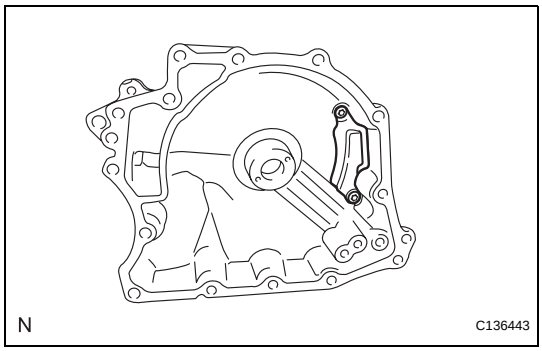
(e) Remove the 14 bolts from the transaxle rear cover.
(f) Using a brass bar and hammer, tap on the circumference of the rear transaxle cover, to remove the transaxle rear cover from the transaxle case.



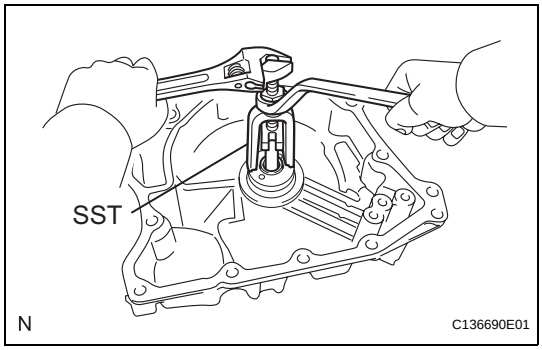
(g) Using a screwdriver, remove the 3 O-rings from the transaxle case.



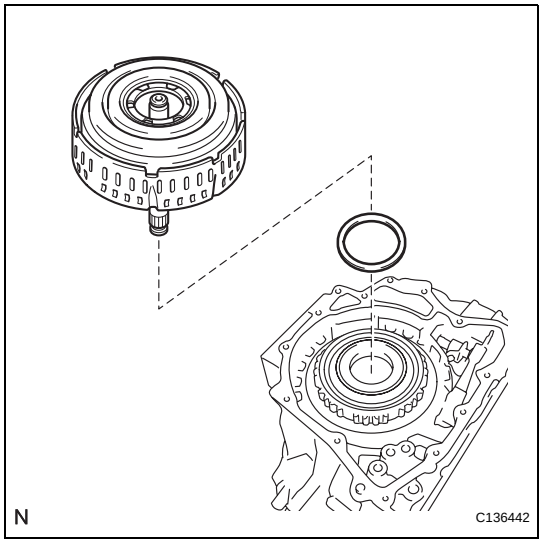
(h) Using a screwdriver, remove the 2 oil seal rings from the transaxle rear cover.
(i) Remove the thrust needle roller bearing and thrust needle roller race from the transaxle rear cover.



(j) Using a "TORX" wrench (T30), remove the 2 "TORX" screws and transaxle rear cover plate from the transaxle rear cover.



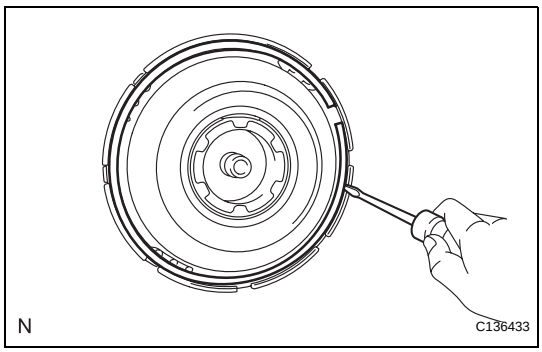
(k) Using SST, remove the needle roller bearing from the transaxle rear cover.
SST 09319-60020



14. REMOVE DIRECT MULTIPLE DISC CLUTCH ASSEMBLY

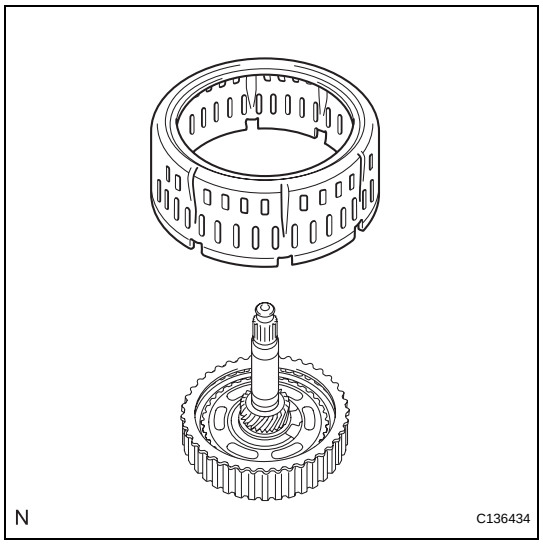
(a) Remove the direct multiple disc clutch assembly from the transaxle case.

(b) Remove the thrust needle roller bearing from the direct multiple disc clutch assembly.

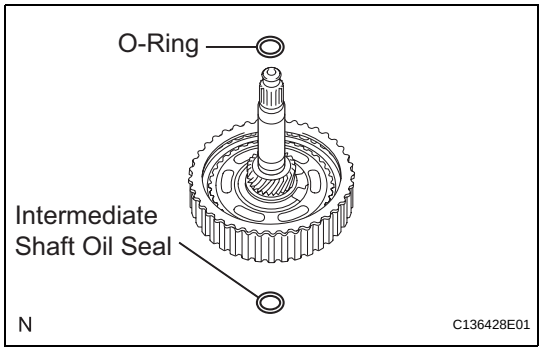


15. REMOVE DIRECT MULTIPLE DISC CLUTCH SNAP RING

(a) Using 2 screwdrivers, remove the snap ring from the direct multiple disc clutch assembly.

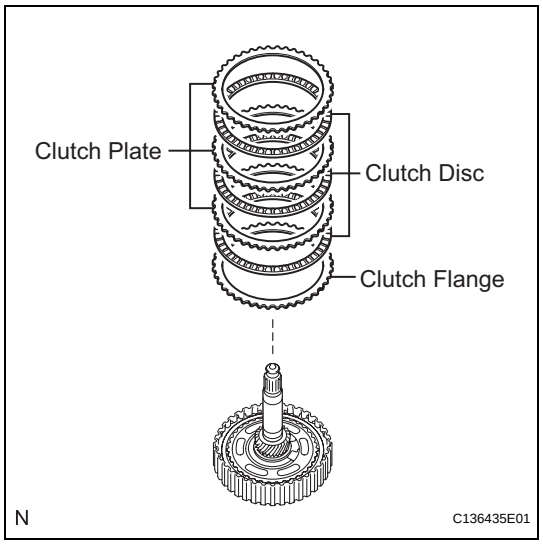


(b) Remove the No. 2 direct clutch piston from the direct multiple disc clutch assembly.



(c) Using a screwdriver, remove the intermediate shaft oil seal ring from the direct No. 2 direct clutch piston.

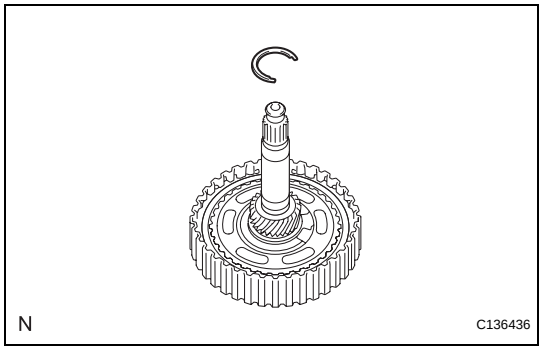
(d) Using a screwdriver, remove the O-ring from the direct multiple disc clutch assembly.



16. REMOVE NO. 2 DIRECT MULTIPLE DISC CLUTCH FLANGE

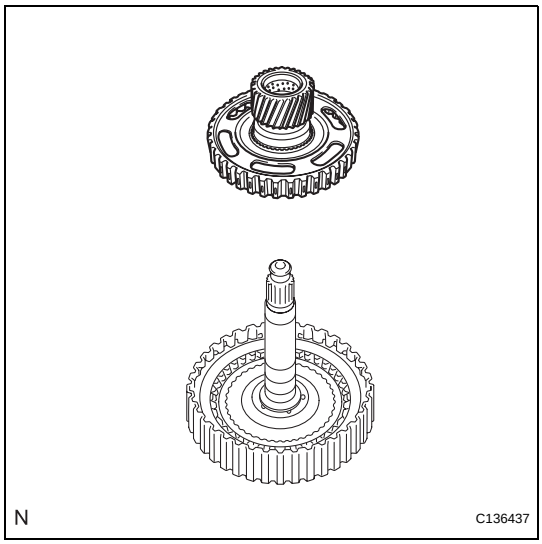
(a) Remove the flange, 3 clutch discs and 3 clutch plates from the direct multiple disc clutch assembly.

17. INSPECT NO. 2 CLUTCH DISC (See page AX-274)

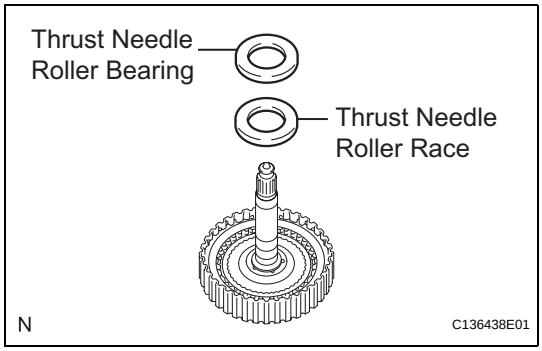


18. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

(a) Using a snap ring expander, remove the snap ring from the direct multiple disc clutch assembly.

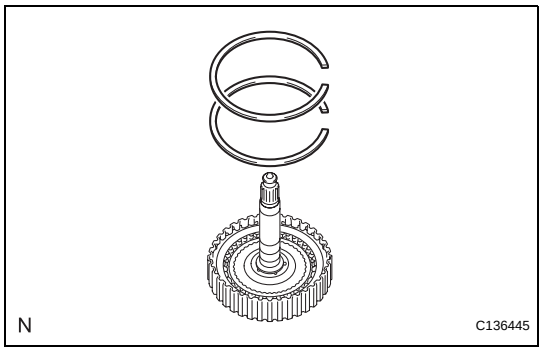


(b) Remove the rear planetary sun gear from the direct multiple disc clutch assembly.



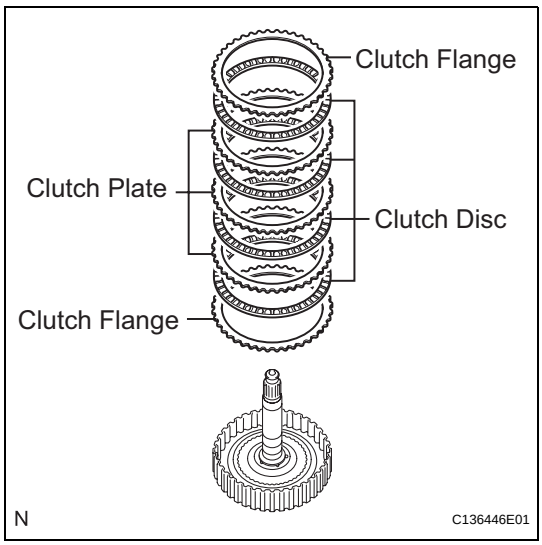
(c) Remove the thrust needle roller bearing and thrust needle roller race from the direct multiple disc clutch assembly.

19. INSPECT REAR PLANETARY SUN GEAR ASSEMBLY (See page AX-276)



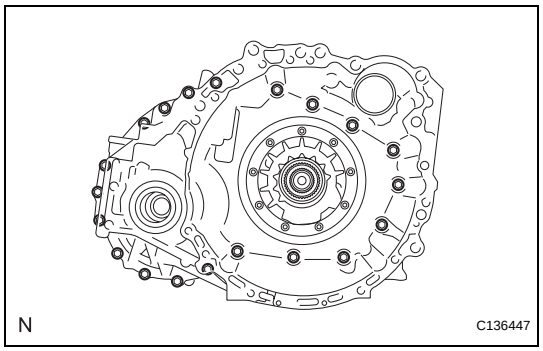
20. REMOVE NO. 1 DIRECT MULTIPLE DISC CLUTCH FLANGE

(a) Using 2 screwdrivers, remove the 2 snap rings from the direct multiple disc clutch assembly.



(b) Remove the flange, 4 clutch discs, and 4 clutch plates from the direct multiple disc clutch assembly.

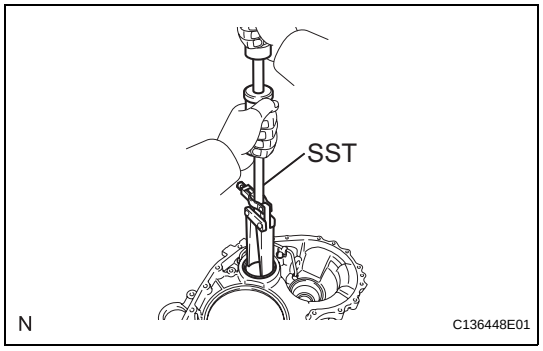
21. INSPECT NO. 1 CLUTCH DISC (See page AX-275)



22. REMOVE TRANSAXLE HOUSING

(a) Remove the 20 bolts from the transaxle housing.

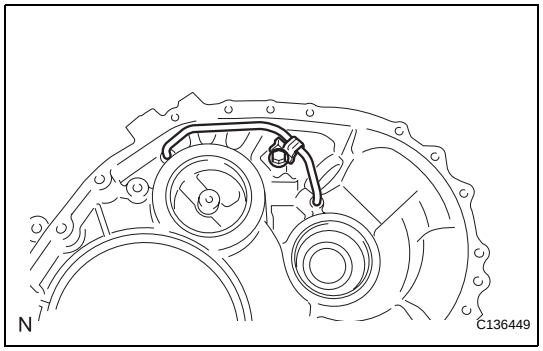
(b) Using a brass bar and hammer, tap on the circumference of the transaxle housing to remove the transaxle housing from the transaxle case.



23. REMOVE COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING OUTER RACE

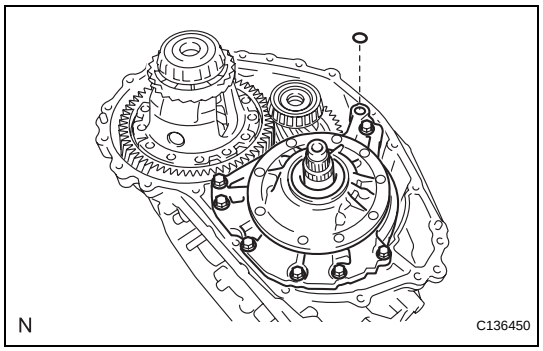
(a) Using SST, remove the counter driven gear front tapered roller bearing outer race and shim from the transaxle housing.

SST 09308-00010



24. REMOVE DIFFERENTIAL GEAR LUBE APPLY TUBE

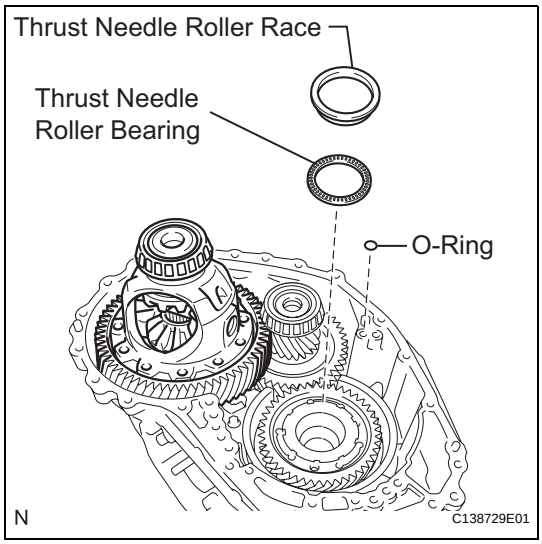
(a) Remove the bolt, clamp, and differential gear lube apply tube from the transaxle housing.



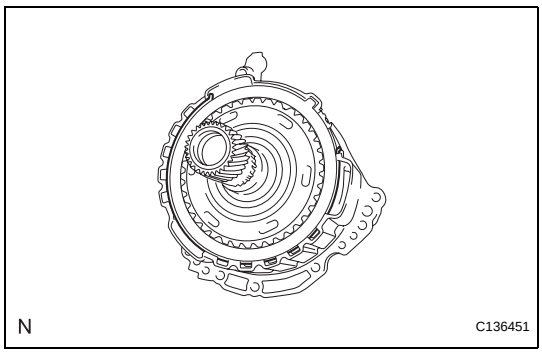
25. REMOVE FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Remove the 7 bolts and oil pump from the transaxle case.

(b) Remove the O-ring from the oil pump assembly.

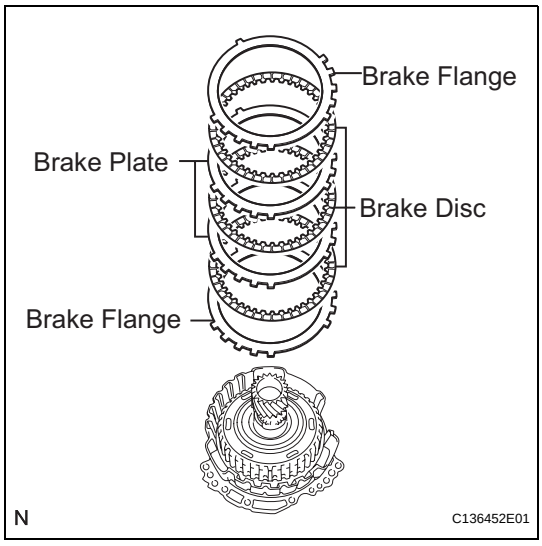


(c) Remove the thrust needle roller bearing and thrust needle roller race from the carrier lock nut.
(d) Remove the O-ring from the transaxle case.



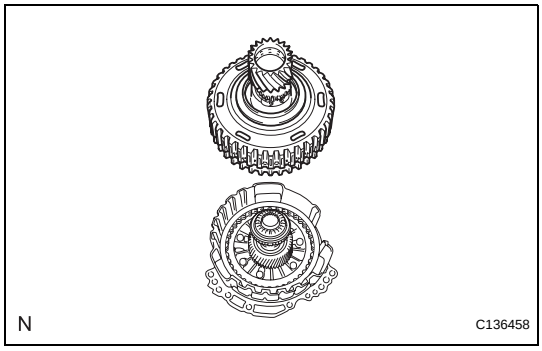
26. REMOVE NO. 3 BRAKE DISC

(a) Using a screwdriver, remove the snap ring from the oil pump assembly.



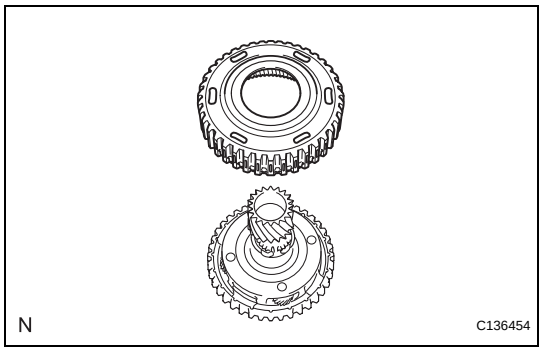
(b) Remove the 2 brake flanges, 3 brake discs, and 2 brake plates from the oil pump assembly.

27. INSPECT NO. 3 BRAKE DISC (See page AX-275)



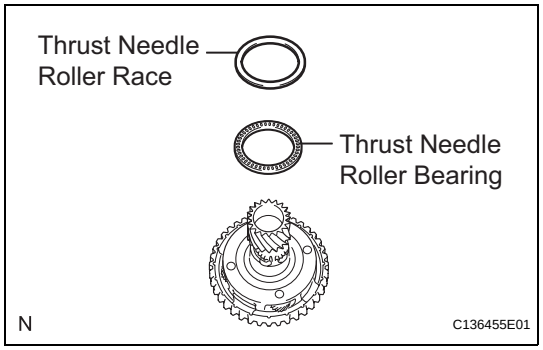
28. REMOVE UNDERDRIVE PLANETARY GEAR ASSEMBLY

(a) Remove the underdrive planetary gear assembly from the oil pump assembly.

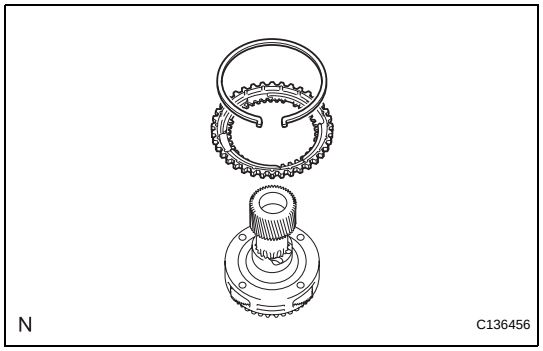


29. REMOVE NO. 3 BRAKE HUB

(a) Remove the No. 3 brake hub from the underdrive planetary gear assembly.



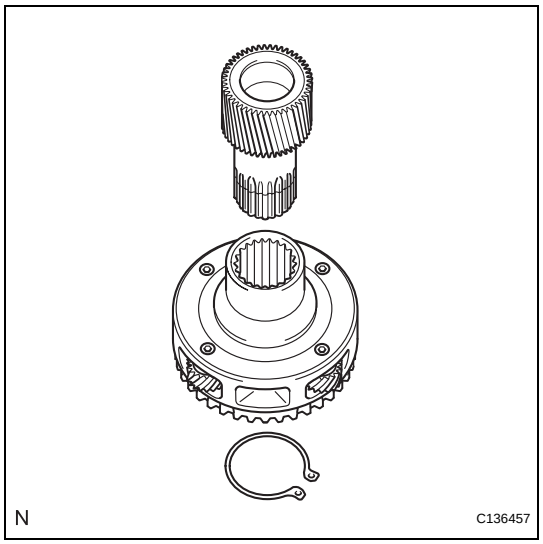
(b) Remove the thrust needle roller bearing and thrust needle roller race from the underdrive planetary gear assembly.



30. REMOVE UNDERDRIVE PLANETARY RING GEAR

(a) Using needle-nose pliers, remove the snap ring from the underdrive planetary ring gear.

(b) Remove the underdrive planetary ring gear from the underdrive planetary gear assembly.



31. REMOVE PLANETARY SUN GEAR SUB-ASSEMBLY

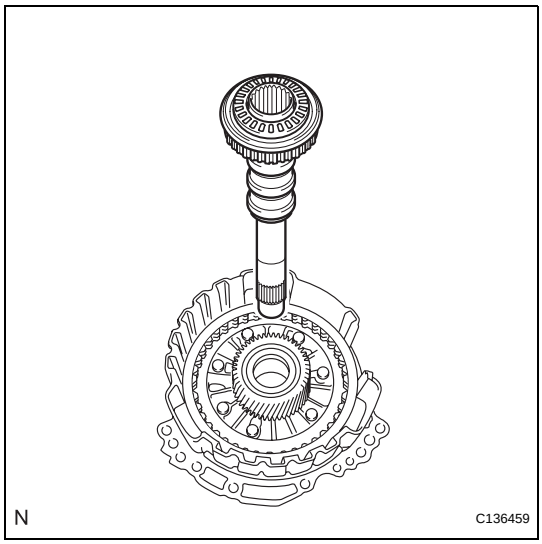
(a) While expanding the snap ring with snap ring pliers, remove the front planetary sun gear from the underdrive planetary gear assembly.

(b) Remove the snap ring from the underdrive planetary gear assembly.

32. INSPECT UNDERDRIVE PLANETARY GEAR ASSEMBLY (See page AX-276)

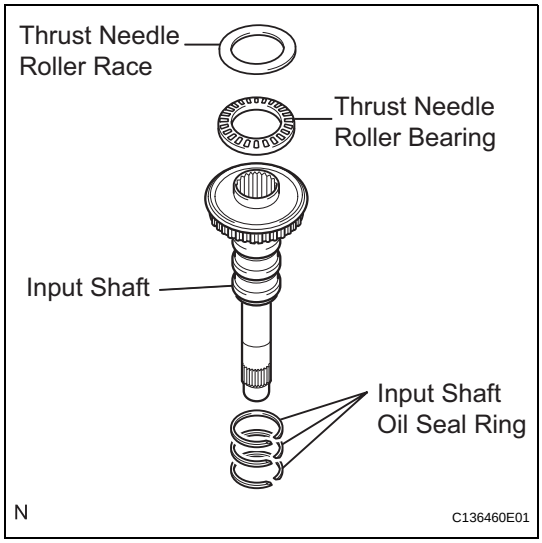
33. INSPECT PLANETARY SUN GEAR SUB-ASSEMBLY (See page AX-275)

AX



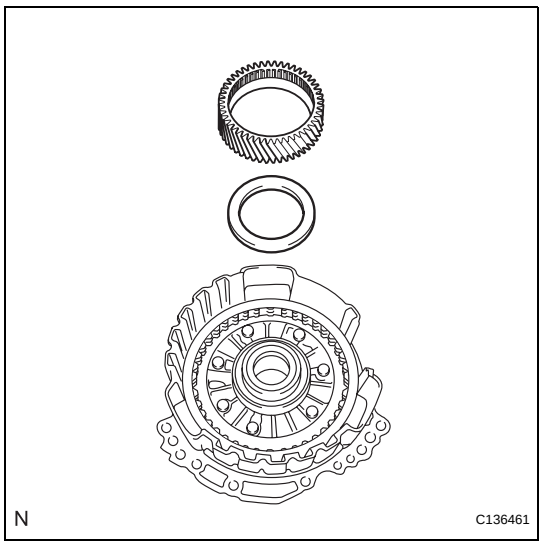
34. REMOVE INPUT SHAFT SUB-ASSEMBLY

(a) Remove the input shaft from the oil pump assembly.



(b) Remove the thrust needle roller bearing and thrust needle roller race from the input shaft.

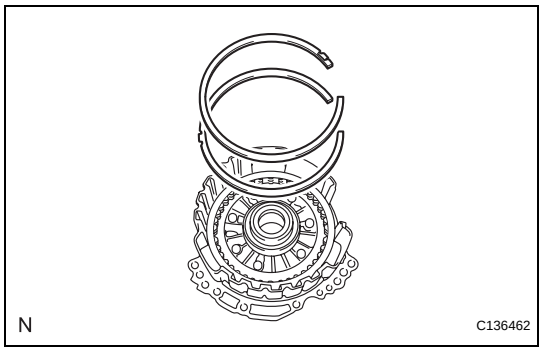
(c) Using a screwdriver, remove the 3 input shaft oil seal rings from the input shaft.



35. REMOVE UNDERDRIVE PLANETARY SUN GEAR

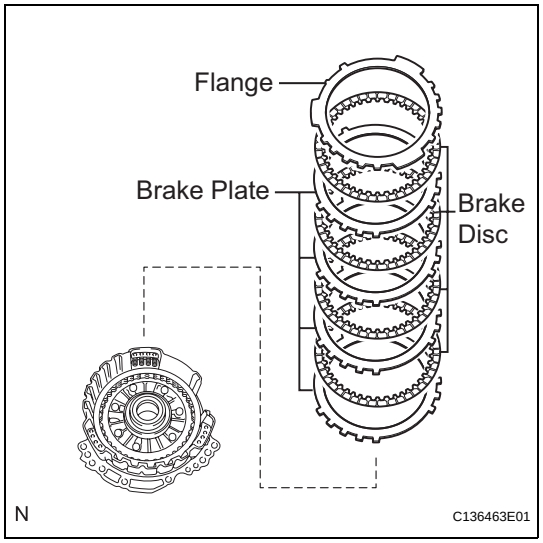
(a) Remove the underdrive planetary sun gear from the oil pump assembly.

(b) Remove the thrust needle roller bearing from the oil pump assembly.



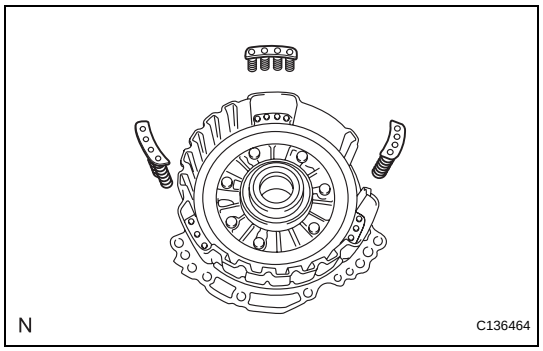
36. REMOVE NO. 1 BRAKE DISC

(a) Using a screwdriver, remove the 2 snap rings from the oil pump assembly.



(b) Remove the flange, 4 brake discs, and 4 brake plates from the oil pump assembly.

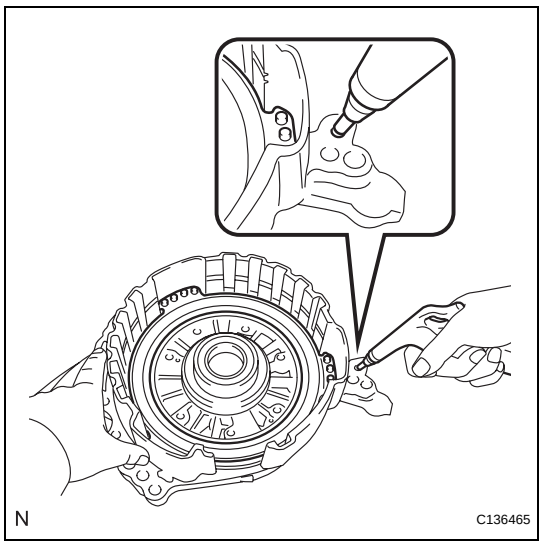
37. INSPECT NO. 1 BRAKE DISC (See page AX-276)



38. REMOVE 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

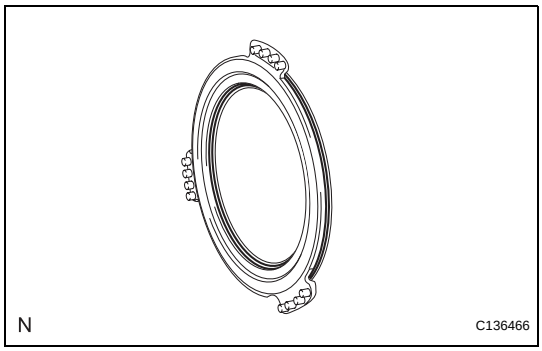
(a) Remove the 3 2nd brake piston return springs from the oil pump assembly.

39. INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY (See page AX-277)

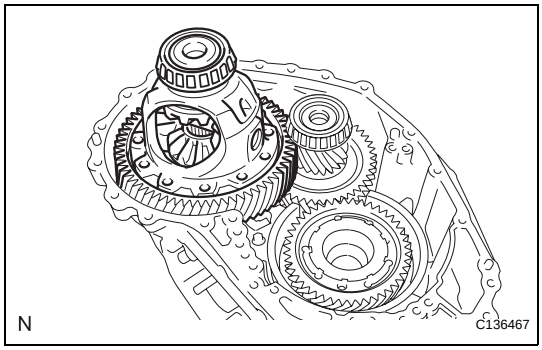


40. REMOVE NO. 1 BRAKE PISTON

(a) Holding the oil pump assembly by hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil pump assembly to remove the No. 1 brake piston.

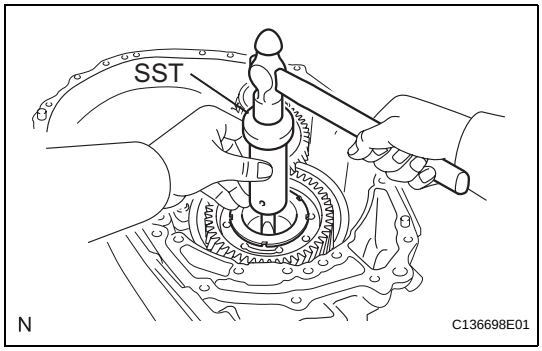


(b) Using a screwdriver, remove the 2 O-rings from the No. 1 brake piston.



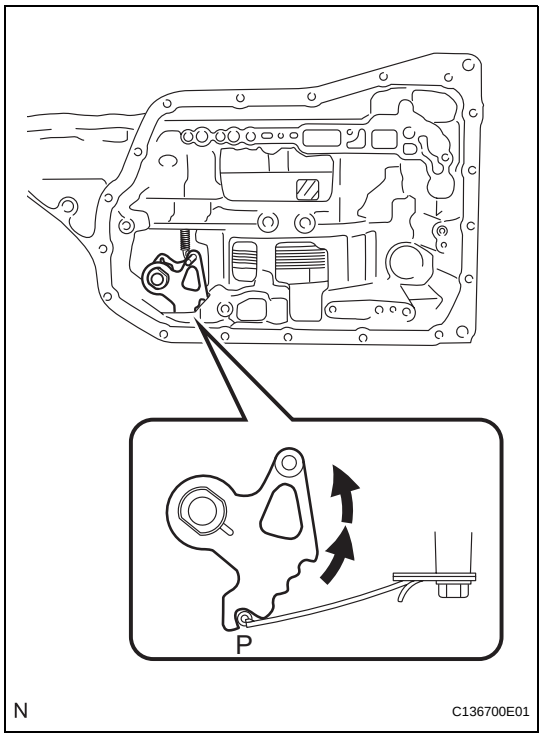
41. REMOVE FRONT DIFFERENTIAL CASE

(a) Remove the differential case sub-assembly from the transaxle case.

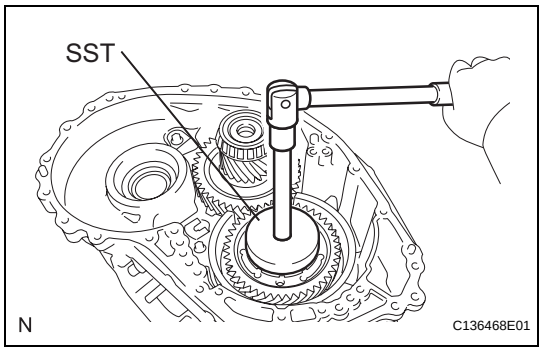


42. REMOVE COUNTER DRIVE GEAR NUT

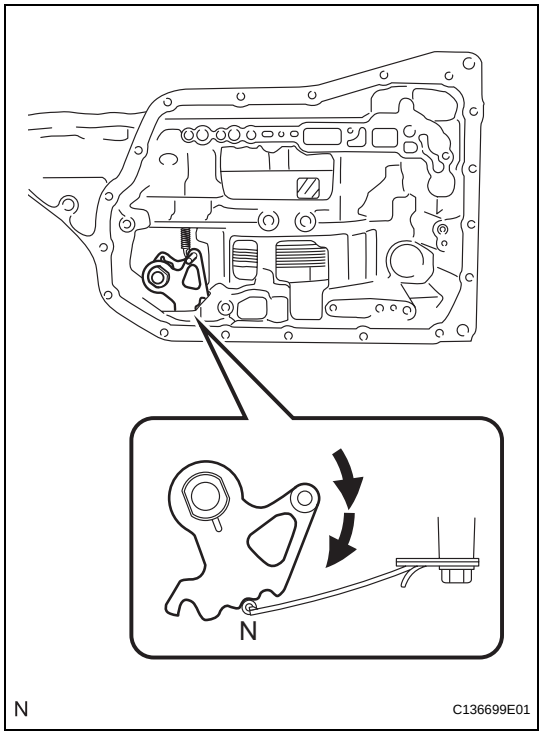
(a) Using a SST and hammer, unstake the nut.
SST 09930-00010



(b) Turn the manual valve lever 2 notches counterclockwise to set it in the P position as shown in the illustration.

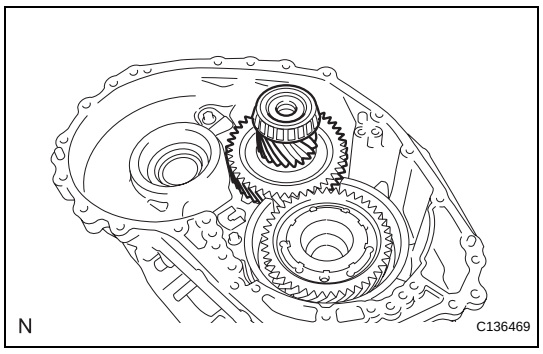


(c) Using SST, remove the nut from the planetary gear assembly.
SST 09387-00130

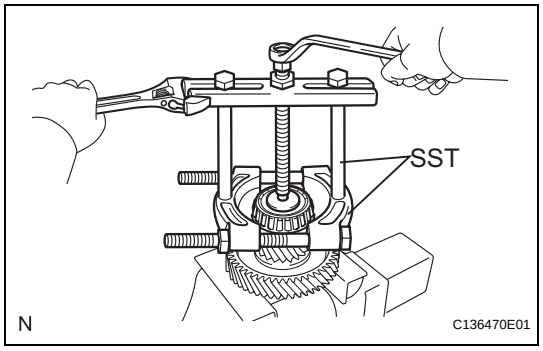


43. REMOVE COUNTER DRIVEN GEAR

(a) Turn the manual valve lever 2 notches clockwise to set it in the N position as shown in the illustration.

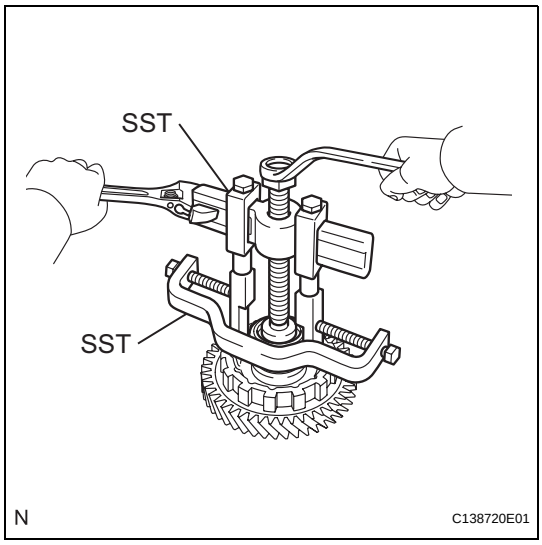


(b) Remove the counter driven gear sub-assembly from the transaxle case.



44. REMOVE COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING

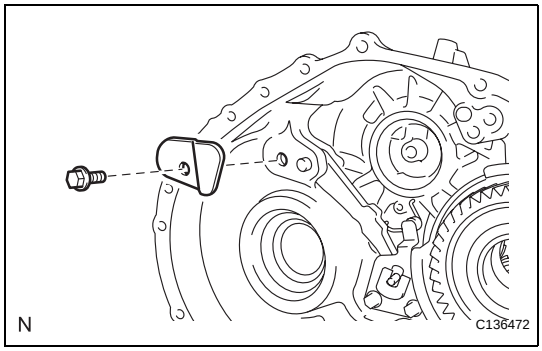
(a) Using SST, remove the counter driven gear front tapered roller bearing from the counter driven gear sub-assembly.
SST 09950-00020, 09950-00030, 09950-60010 (09951-00400)



45. REMOVE COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING

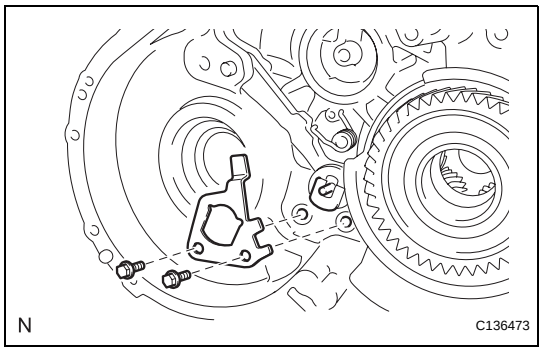
(a) Using SST, remove the counter driven gear rear tapered roller bearing and differential drive pinion from the counter driven gear.

SST 09950-40011 (09951-04010, 09952-04010, 09954-04010, 09953-04020, 09955-04071, 09957-04010, 09958-04011), 09950-60010 (09951-00320)



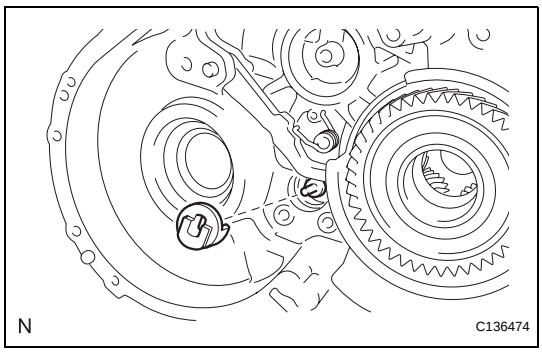
46. REMOVE PAWL SHAFT CLAMP

(a) Remove the bolt and pawl shaft clamp from the transaxle case.



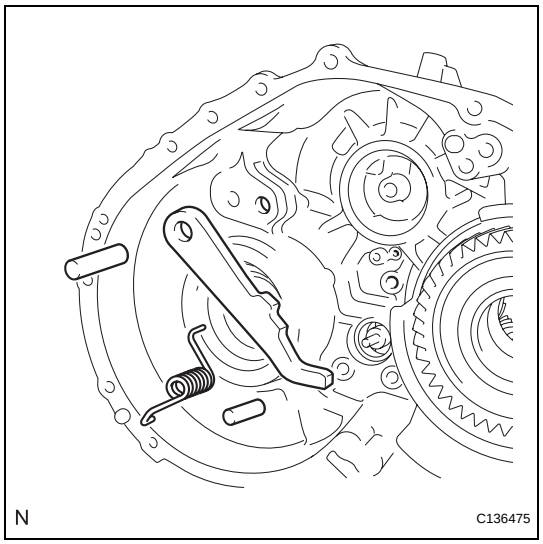
47. REMOVE PAWL STOPPER PLATE

(a) Remove the 2 bolts and pawl stopper plate from the transaxle case.



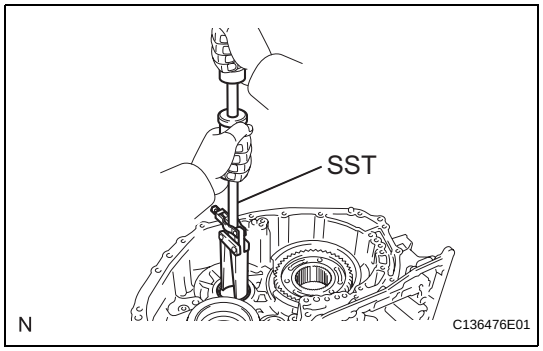
48. REMOVE PARKING LOCK SLEEVE

(a) Remove the parking lock sleeve from the transaxle case.



49. REMOVE PARKING LOCK PAWL

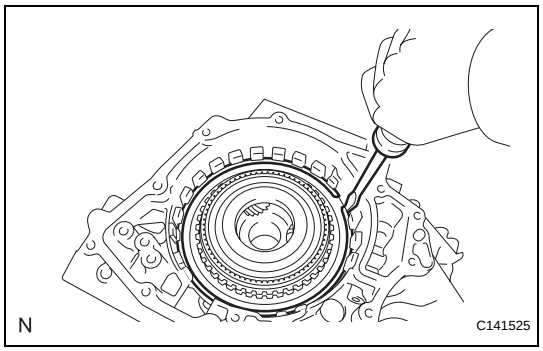
(a) Remove the spring, parking lock pawl pin, parking lock pawl shaft, and parking lock pawl from the transaxle case.



50. REMOVE COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING OUTER RACE

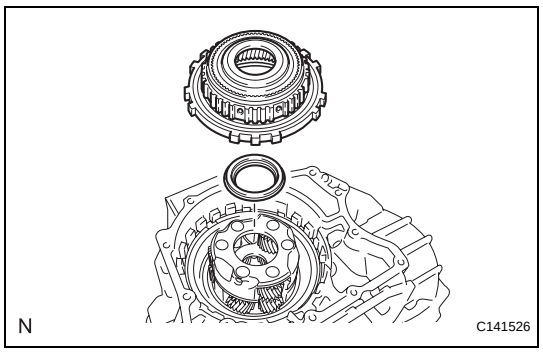
(a) Using SST, remove the counter driven gear rear tapered roller bearing outer race from the transaxle case.

SST 09308-00010



51. REMOVE ONE-WAY CLUTCH ASSEMBLY

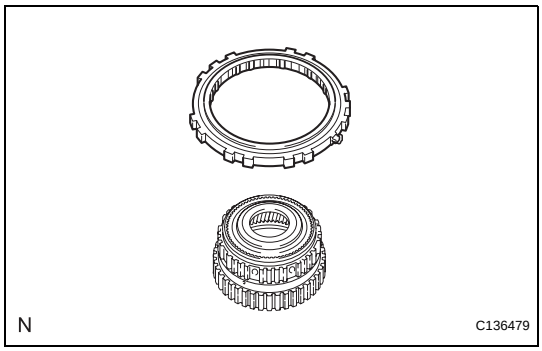
(a) Using a screwdriver, remove the snap ring from the transaxle case.



(b) Remove the one-way clutch assembly with planetary ring gear from the transaxle case.

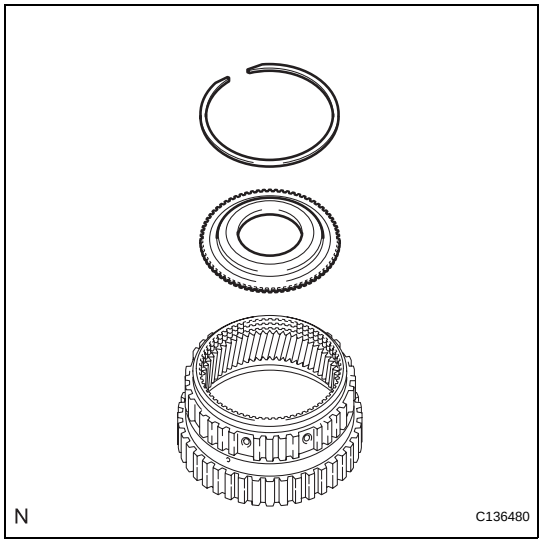
(c) Remove the thrust needle roller bearing from the transaxle case.

52. INSPECT ONE-WAY CLUTCH ASSEMBLY (See page AX-277)



53. REMOVE PLANETARY RING GEAR

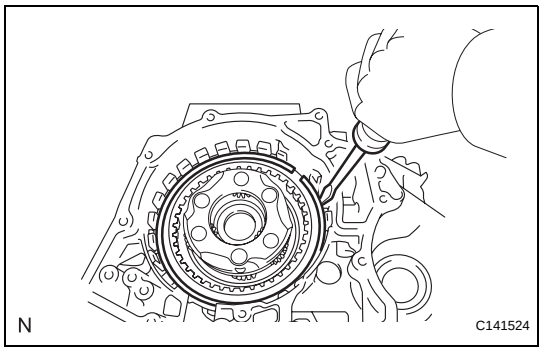
(a) Remove the planetary ring gear from the one-way clutch assembly.



54. REMOVE PLANETARY RING GEAR FLANGE

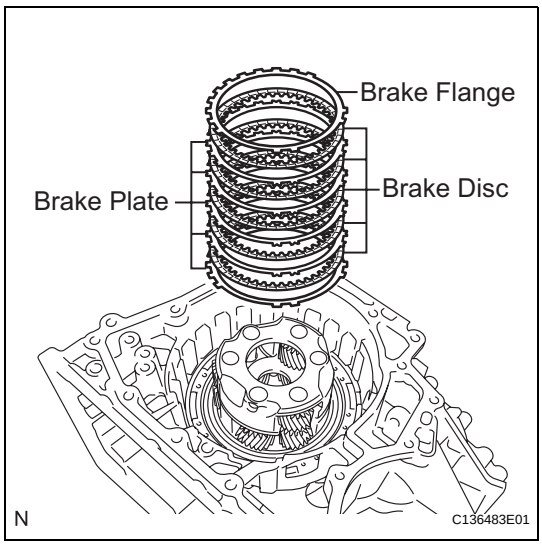
(a) Using a screwdriver, remove the snap ring from the planetary ring gear.

(b) Remove the planetary ring gear flange from the planetary ring gear.



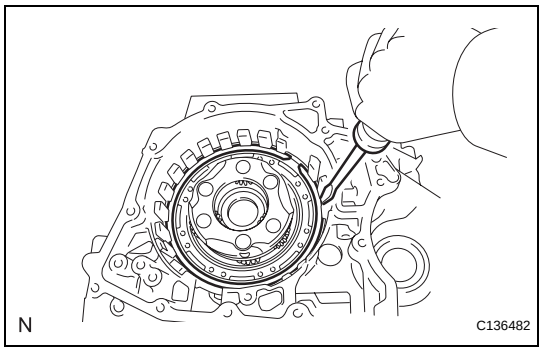
55. REMOVE NO. 2 BRAKE DISC

(a) Using a screwdriver, remove the snap ring from the transaxle case.



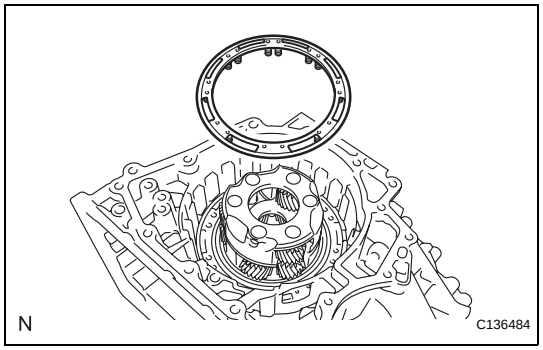
(b) Remove the brake flange, 5 brake discs, and 5 brake plates from the transaxle case.

56. INSPECT NO. 2 BRAKE DISC (See page AX-277)



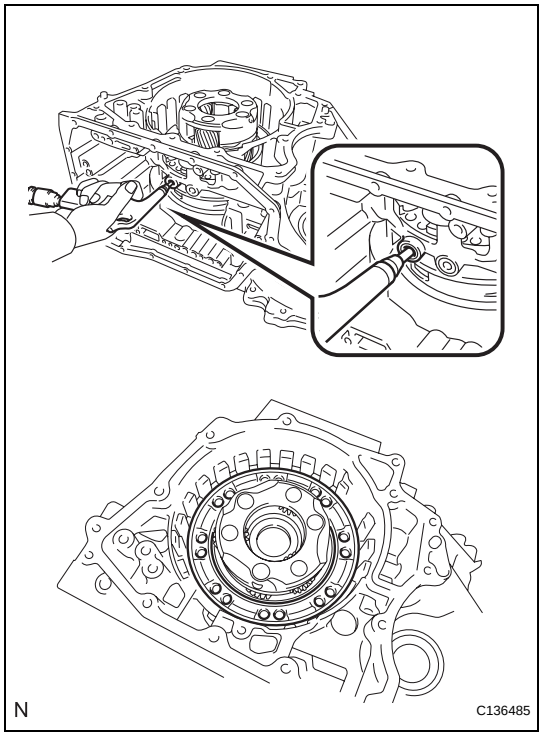
57. REMOVE 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using a screwdriver, remove the snap ring from the transaxle case.



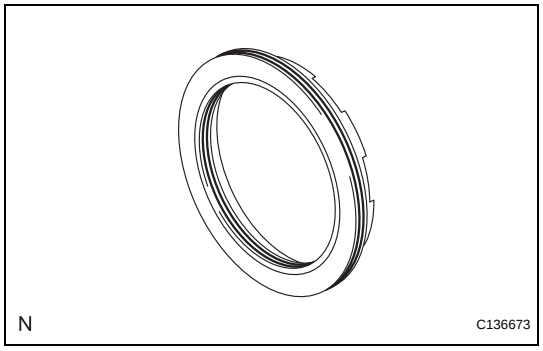
(b) Remove the 1st and reverse brake return spring from the transaxle case.

58. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY (See page AX-278)



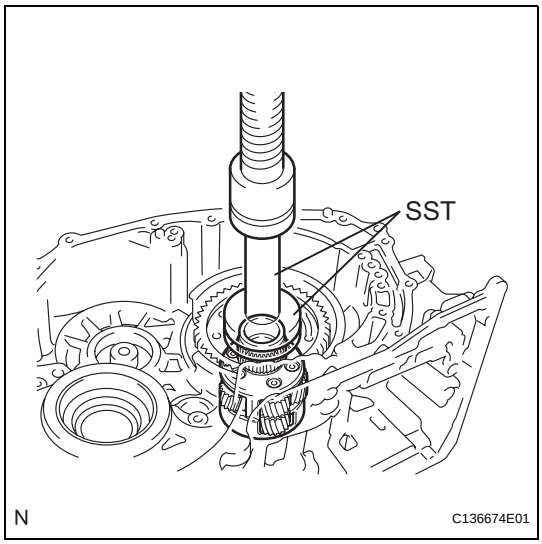
59. REMOVE NO. 2 BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the ATF hole indicated by the arrow to remove the No. 2 brake piston assembly from the transaxle case.



(b) Using a screwdriver, remove the 2 O-rings from the No. 2 brake piston.

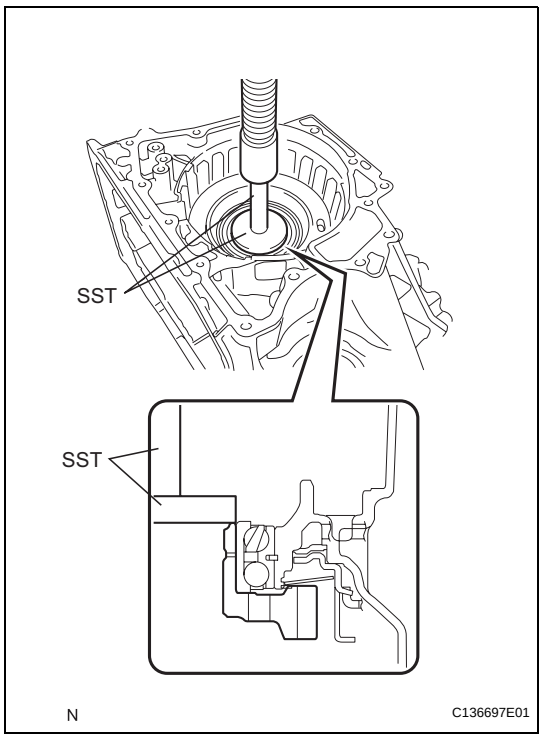
AX



60. REMOVE PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, remove the planetary gear assembly from the transaxle case.

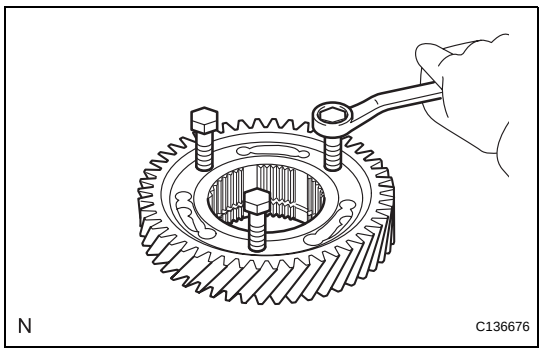
SST 09950-60010 (09951-00580), 09950-70010 (09951-07100)



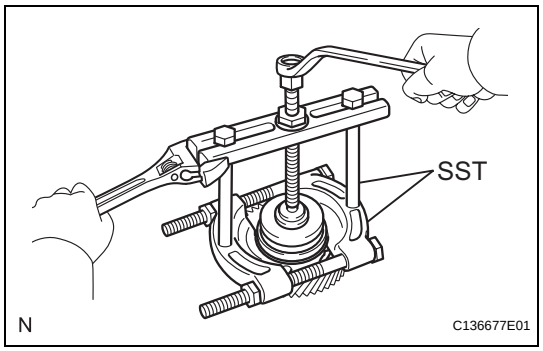
61. REMOVE COUNTER DRIVE GEAR

(a) Using SST and a press, remove the counter drive gear and bearing inner race (rear side) from the transaxle case.

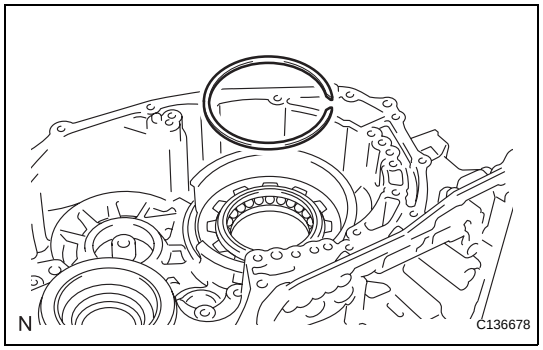
SST 09950-60020 (09951-00710), 09950-70010 (09951-07100)



(b) As shown in the illustration, tighten the 3 bolts evenly and leave a clearance of approximately 20.0 mm (0.797 in.) between the counter drive gear and inner race.

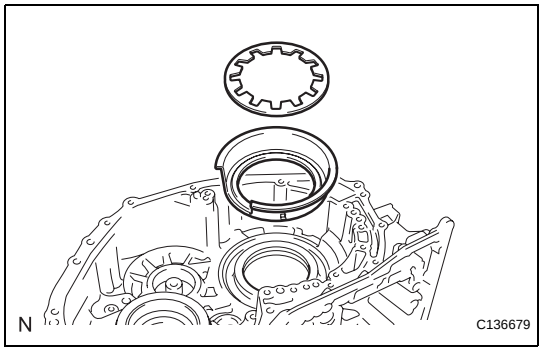


(c) Using SST, remove the bearing inner race (front side) from the counter drive gear.
SST 09950-00020, 09950-00030, 09950-60020 (09951-00710)

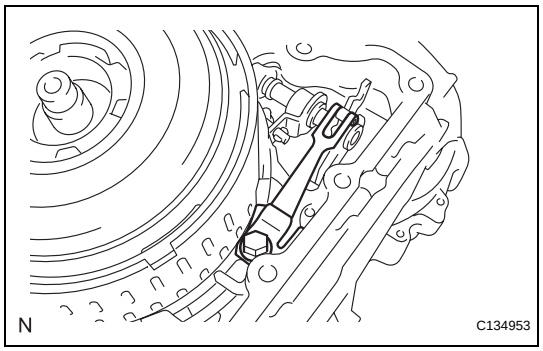


62. REMOVE NO. 3 BRAKE PISTON

(a) Using a screwdriver, remove the snap ring from the transaxle case.

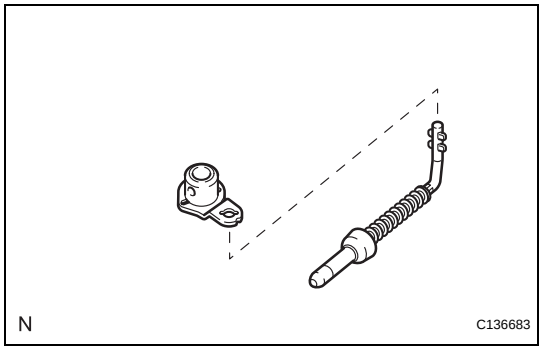


(b) Remove the brake piston return spring from the transaxle case.
(c) Remove the No. 3 brake piston from the transaxle case.



63. REMOVE MANUAL DETENT SPRING SUB-ASSEMBLY

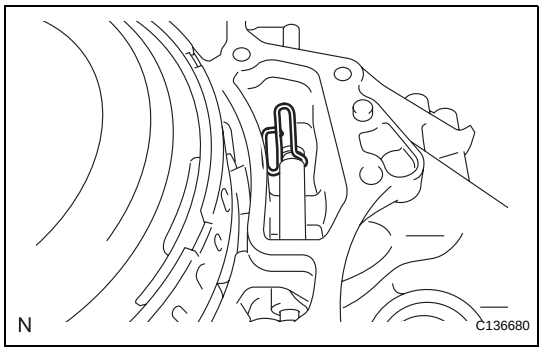
(a) Remove the bolt, cover, and manual detent spring sub-assembly from the transaxle case.



64. REMOVE PARKING LOCK ROD SUB-ASSEMBLY

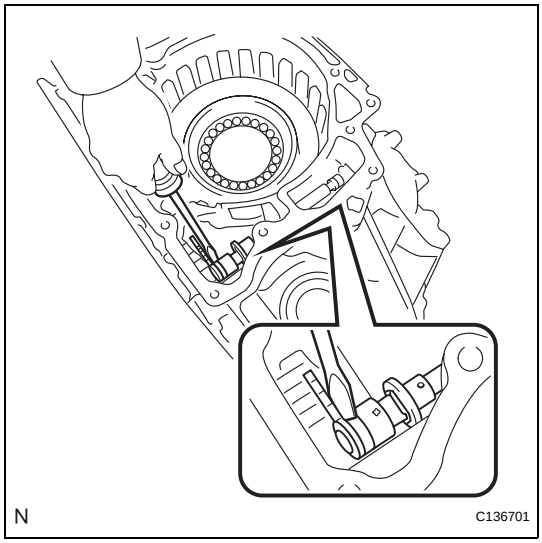
(a) Remove the parking lock rod sub-assembly from the parking lock lever sub-assembly.
HINT:
Align the dial with the notches on the parking lock lever sub-assembly to remove the parking lock rod sub-assembly.

AX

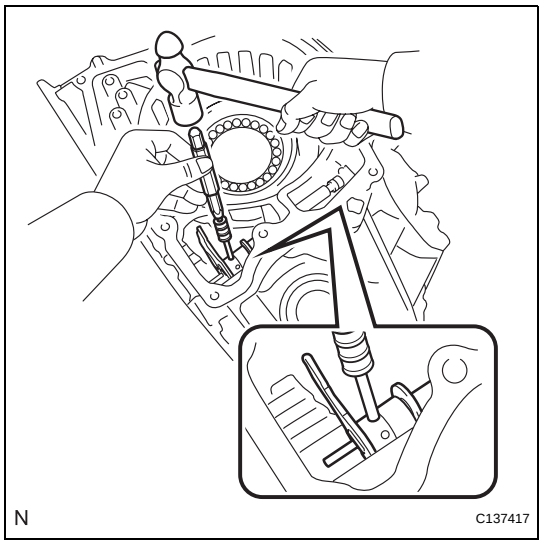


65. REMOVE MANUAL VALVE LEVER SHAFT

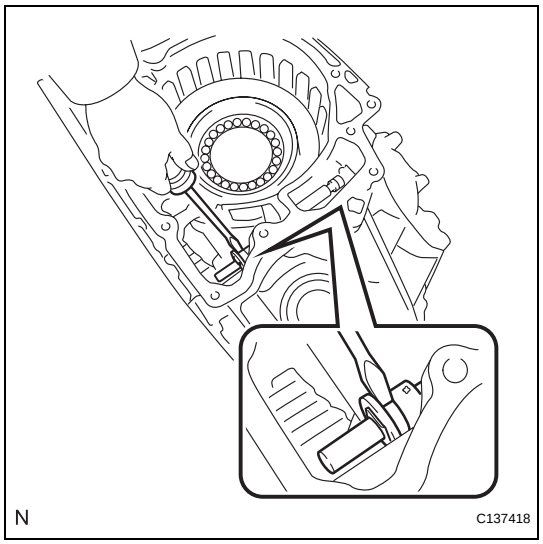
(a) Using needle-nose pliers, remove the manual valve lever shaft retainer spring from the transaxle case.



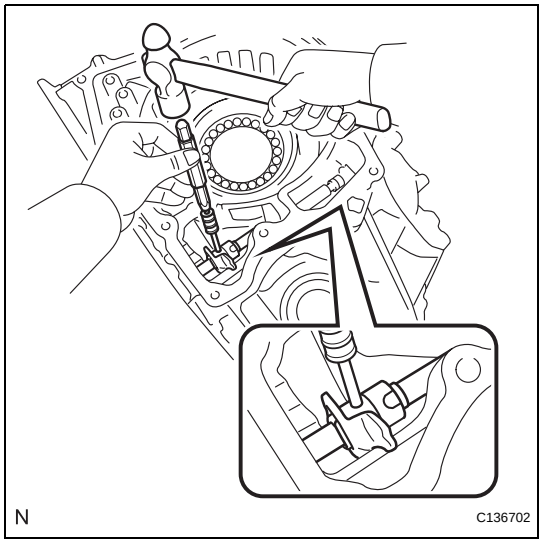
(b) Using a screwdriver, slide the spacer of the manual valve lever sub-assembly.



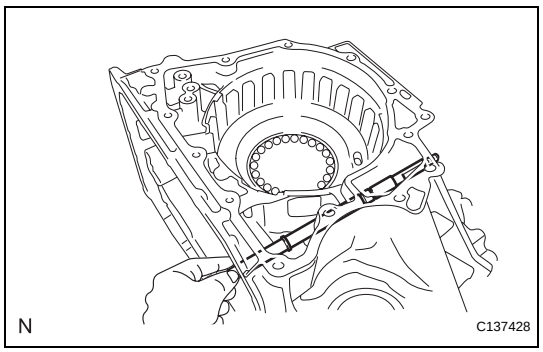
(c) Using a pin punch (3 mm) and hammer, drive out the slotted spring pin from the manual valve lever sub-assembly.
HINT:
Slowly drive out the pin so that it will not fall into the transaxle case.



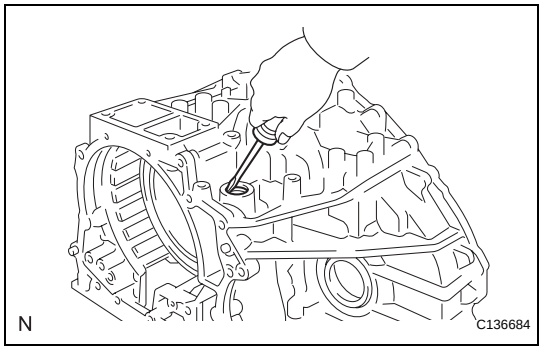
(d) Using a screwdriver, slide the spacer of the parking lock lever sub-assembly.



(e) Using a pin punch (3 mm) and hammer, drive out the slotted spring pin from the parking lock lever sub-assembly.
HINT:
Slowly drive out the pin so that it will not fall into the transaxle case.



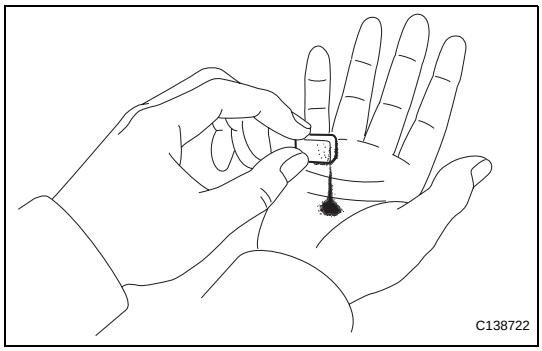
(f) Remove the manual valve lever shaft, manual valve lever sub-assembly, parking lock lever sub-assembly and 2 spacers from the transaxle case.



66. REMOVE MANUAL VALVE LEVER SHAFT OIL SEAL

(a) Using a screwdriver, remove the manual valve lever shaft oil seal from the transaxle case.

AX



INSPECTION

1. INSPECT TRANSMISSION OIL CLEANER MAGNET

(a) Use the removed magnets to collect any steel chips. Examine the chips and particles in the pan and on the magnets to determine what type of wear has occurred in the transaxle:

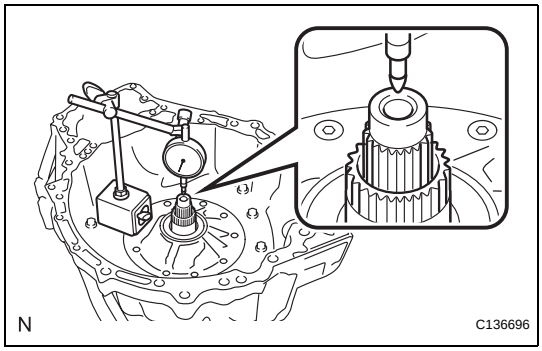
Result:

Steel (magnetic):

Bearing, gear and plate wear

Brass (non-magnetic):

Bearing wear

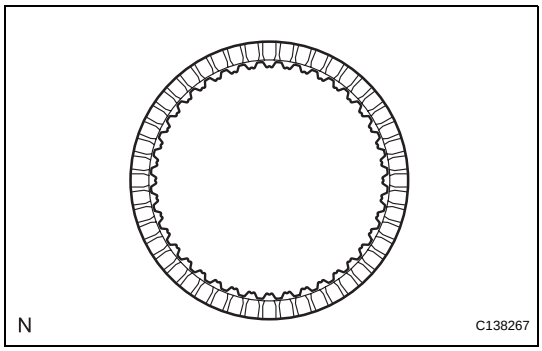


2. INSPECT INPUT SHAFT SUB-ASSEMBLY

(a) Using a dial indicator, measure the input shaft end play.

End play:

0.012 to 1.250 mm (0.0005 to 0.0492 in.)

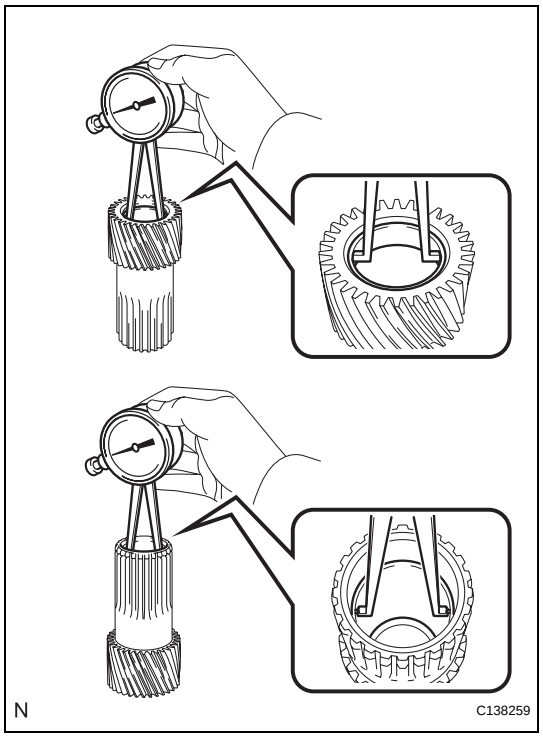


3. INSPECT NO. 2 CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:

If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.



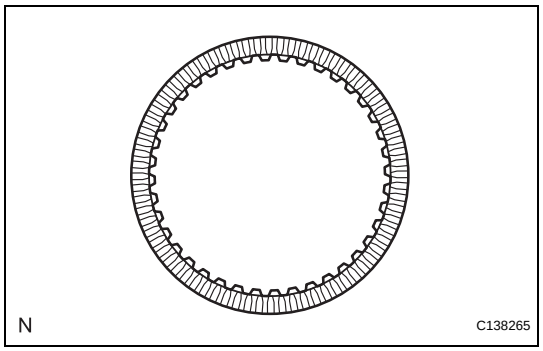
4. INSPECT PLANETARY SUN GEAR SUB-ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the bushings of the planetary sun gear.

Standard inside diameter:
25.525 to 25.546 mm (1.0049 to 1.0057 in.)

Maximum inside diameter:
25.546 mm (1.0057 in.)

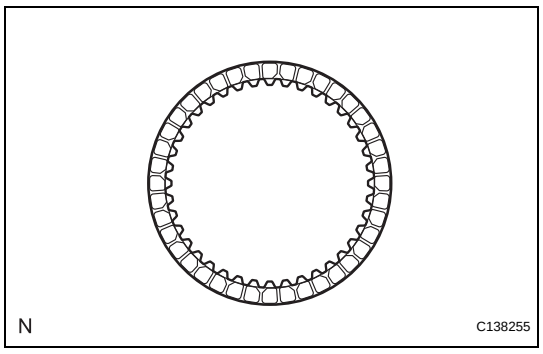
If the inside diameter is greater than the maximum, replace the planetary gear sun gear.



5. INSPECT NO. 1 CLUTCH DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:
If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.

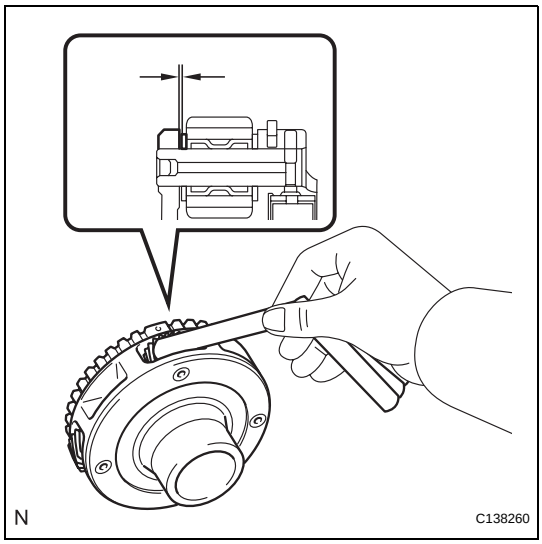


6. INSPECT NO. 3 BRAKE DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:
If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.

AX



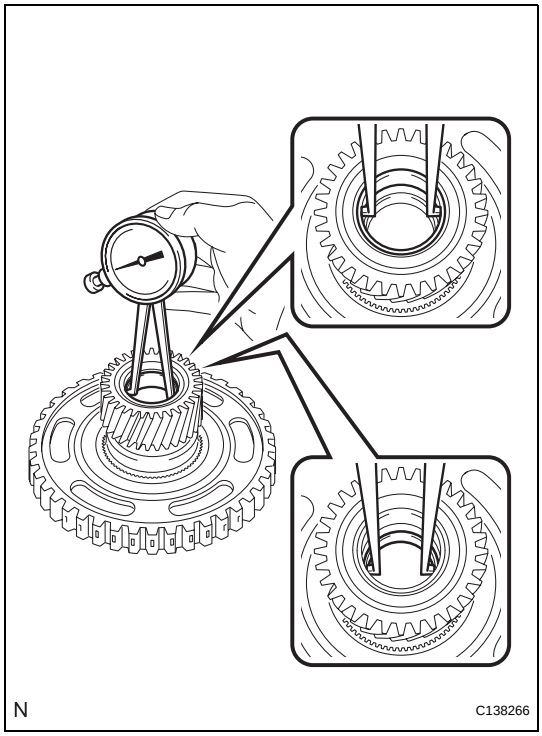
7. INSPECT UNDERDRIVE PLANETARY GEAR ASSEMBLY

(a) Using a feeler gauge, measure the clearance between the underdrive planetary gear and the pinion gear at 4 points.

Standard clearance:

0.18 to 0.54 mm (0.0071 to 0.0213 in.)

If the clearance is greater than the standard clearance, replace the underdrive planetary gear sun gear.



8. INSPECT REAR PLANETARY SUN GEAR ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the bushing of the rear planetary sun gear sub-assembly.

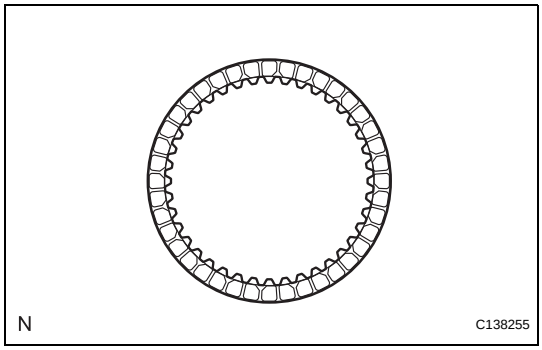
Standard inside diameter:

25.580 to 25.601 mm (1.0071 to 1.0079 in.)

Maximum inside diameter:

25.601 mm (1.0079 in.)

If the inside diameter is greater than the maximum, replace the rear planetary sun gear sub-assembly.

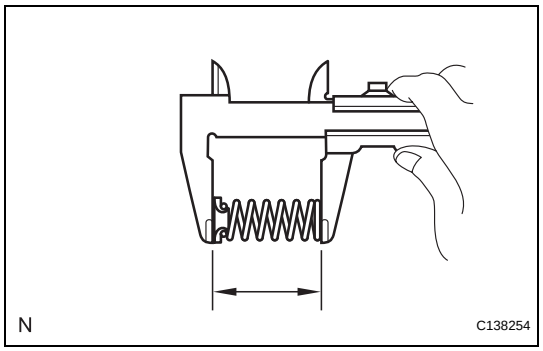


9. INSPECT NO. 1 BRAKE DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:

If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.



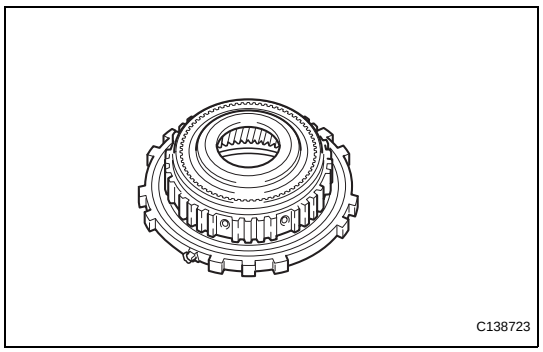
10. INSPECT 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the 3 2nd brake piston return springs including the spring seats.

Standard free length:

23.85 mm (0.9390 in.)

If the free length is shorter than the standard free length, replace the 2nd brake piston return spring.

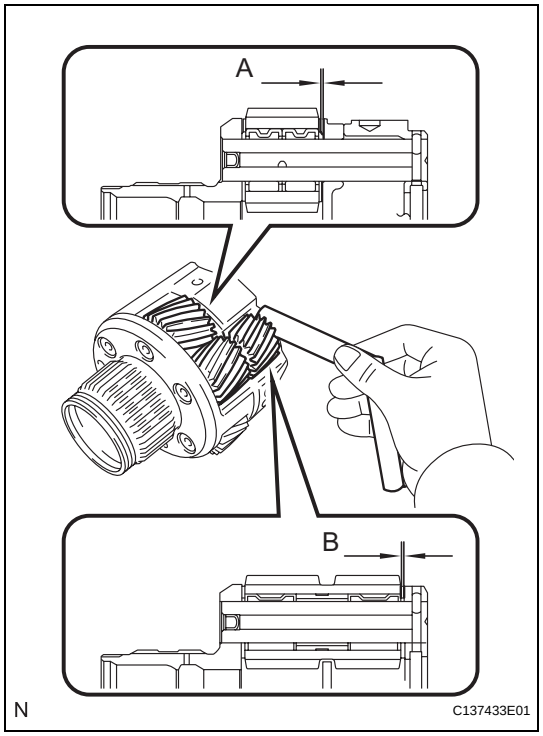


11. INSPECT ONE-WAY CLUTCH ASSEMBLY

(a) Temporarily install the one-way clutch assembly to the planetary ring gear.

(b) Rotate the one-way clutch assembly to check the rotating direction for lock or free operation.

If the one-way clutch assembly does not operate normally, replace it.

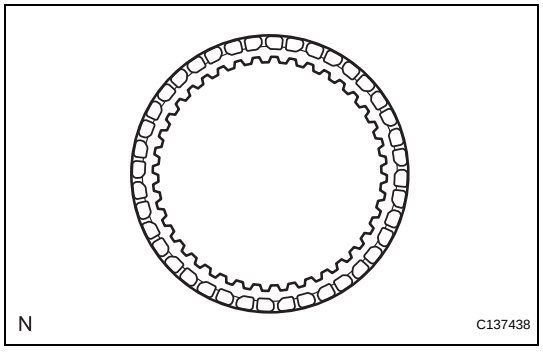


12. INSPECT PLANETARY GEAR ASSEMBLY

(a) Using a feeler gauge, measure the clearance between the planetary gear case and each pinion gear at points A and B.

-	Standard Clearance
A point	0.23 to 0.59 mm (0.0091 to 0.0232 in.)
B point	0.16 to 0.66 mm (0.0063 to 0.02598 in.)

If the clearance is greater than the standard clearance, replace the planetary gear assembly.

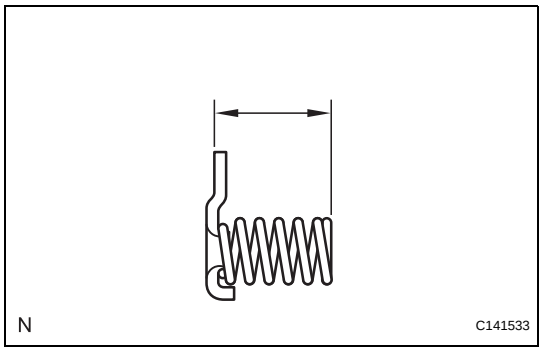


13. INSPECT NO. 2 BRAKE DISC

(a) Check if the sliding surfaces of the discs, plates, and flange are worn or burnt. If necessary, replace them.

NOTICE:

If the linings of the discs are peeled off or discolored, or even if a part of the groove is damaged, replace all discs.



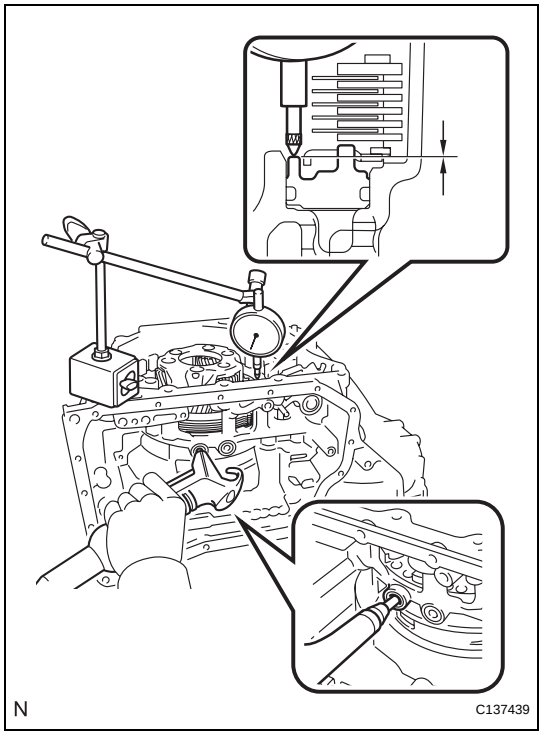
14. INSPECT 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Using vernier calipers, measure the free length of the 1st and reverse brake return spring together with the spring seat.

Standard free length:

15.79 mm (0.6217 in.)

If the free length is shorter than the standard free length, replace the 1st and reverse brake return spring.



15. INSPECT CLEARANCE OF NO. 2 BRAKE

(a) Using a dial indicator, measure the clearance of the No. 2 brake while applying compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).

Standard clearance:

0.884 to 1.196 mm (0.0348 to 0.0471 in.)

HINT:

Measure the clearance at 3 points where the brake piston diameter is approximately 140 mm (5.51 in.) and calculate the average.

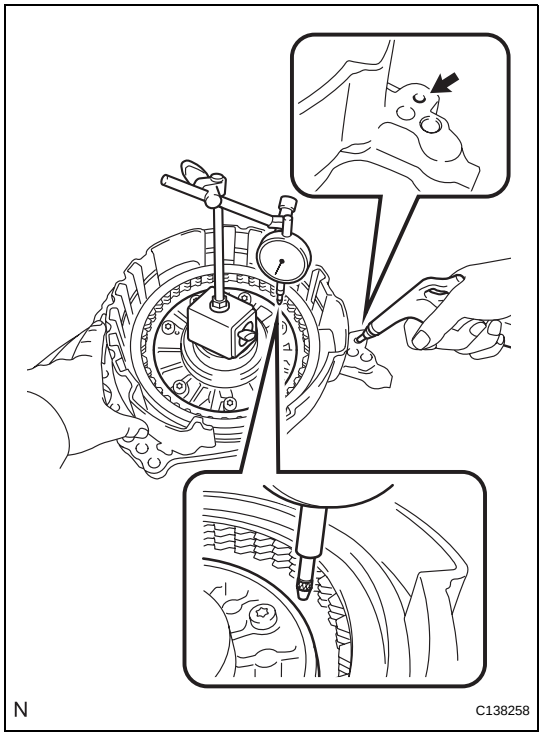
If the clearance is not as specified, select an appropriate No. 2 brake flange so that the clearance will be within the specified range.

HINT:

There are 5 different thicknesses of flanges available.

No. 2 brake flange thickness: mm (in.)

Thickness	Thickness
4.0 (0.157)	4.3 (0.169)
4.1 (0.161)	4.4 (0.173)
4.2 (0.165)	-



16. INSPECT CLEARANCE OF NO. 1 BRAKE

(a) Using a dial indicator, measure the clearance of the No. 1 brake while applying compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).

Standard clearance:

0.807 to 0.974 mm (0.0318 to 0.0383 in.)

HINT:

Measure the clearance at 3 points where the brake piston diameter is approximately 140 mm (5.51 in.) and calculate the average.

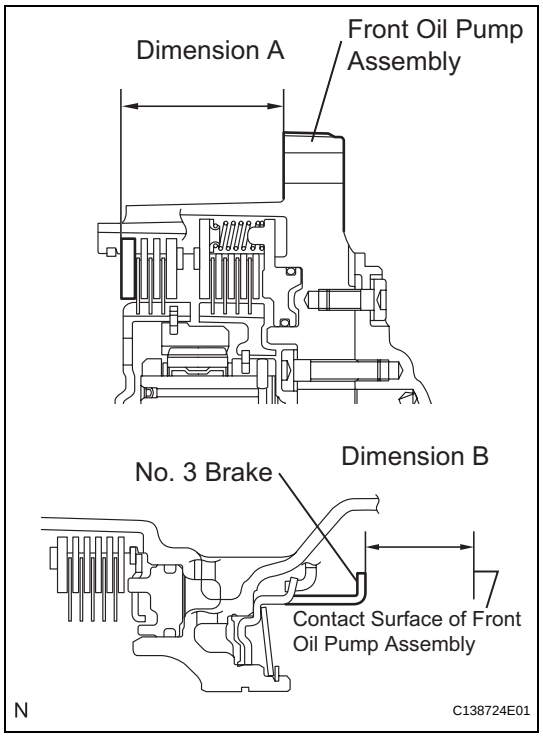
If the clearance is not as specified, select an appropriate No. 1 brake flange so that the clearance will be within the specified range.

HINT:

There are 6 different thicknesses of flanges available.

No. 1 brake flange thickness: mm (in.)

Thickness	Thickness
3.0 (0.118)	3.3 (0.130)
3.1 (0.122)	3.4 (0.134)
3.2 (0.126)	3.5 (0.138)



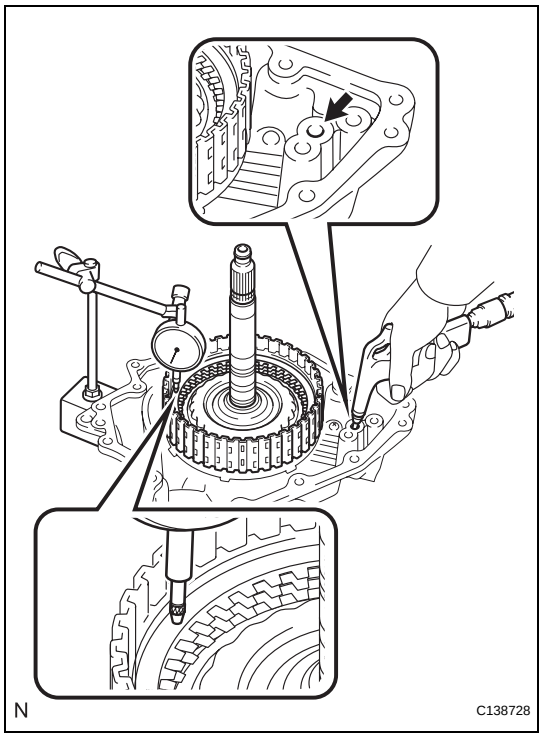
17. INSPECT CLEARANCE OF NO. 3 BRAKE

(a) Using vernier calipers and a straight edge, measure the distance shown in the illustration (Dimension A) while a load of 500 N (51 kgf, 112 lbf) is being applied to the flange.
HINT:
Measure dimension A at 3 points where the flange diameter is approximately 166 mm (6.54 in.) and calculate the average.

(b) Using vernier calipers and a straight edge, measure the distance shown in the illustration. (Dimension B).
HINT:
Measure dimension B at 3 points where the No. 3 brake diameter is approximately 166 mm (6.54 in.) and calculate the average.

(c) Calculate the clearance value using the following formula:
clearance = Dimension B - Dimension A
Standard clearance:
0.599 to 0.761 mm (0.0236 to 0.0300 in.)
If the clearance is not as specified, select an appropriate brake flange so that the clearance will be within the specified range.
HINT:
There are 6 different thicknesses of flanges available.
No. 3 brake flange thickness: mm (in.)

Thickness	Thickness
3.80 (0.150)	4.10 (0.161)
3.90 (0.154)	4.20 (0.165)
4.00 (0.157)	4.30 (0.169)



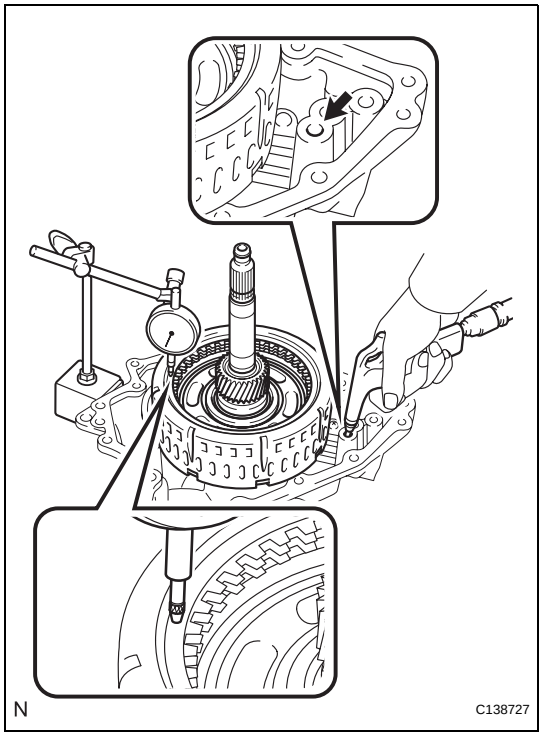
18. INSPECT CLEARANCE OF NO. 1 CLUTCH DISC

(a) Install the direct multiple disc clutch assembly onto the transaxle rear cover.

(b) Using a dial indicator, measure the No. 1 clutch pack clearance while applying and releasing compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).
HINT:
Measure the clearance at 3 points where the flange diameter is approximately 152 mm (5.98 in.) and calculate the average.
Pack clearance:
0.806 to 0.974 mm (0.0317 to 0.0383 in.)
If the pack clearance is not as specified, inspect the discs, plates and flange.
HINT:
There are 6 different thicknesses of flanges available.
No. 1 clutch flange thickness: mm (in.)

Thickness	Thickness
3.0 (0.118)	3.3 (0.130)
3.1 (0.122)	3.4 (0.134)

Thickness	Thickness
3.2 (0.126)	3.5 (0.138)



19. INSPECT CLEARANCE OF NO. 2 CLUTCH DISC

(a) Install the direct multiple disc clutch assembly onto the transaxle rear cover.

(b) Using a dial indicator, measure the No. 2 clutch pack clearance while applying and releasing compressed air (200 kPa, 2.0 kgf/cm^2, 29 psi).

HINT:

Measure the clearance at 3 points where the diameter of the No. 2 direct multiple clutch piston is approximately 152 mm (5.98 in.) and calculate the average.

Pack clearance:

0.544 to 0.744 mm (0.0214 to 0.0293 in.)

If the pack clearance is not as specified, inspect the discs, plates and flange.

HINT:

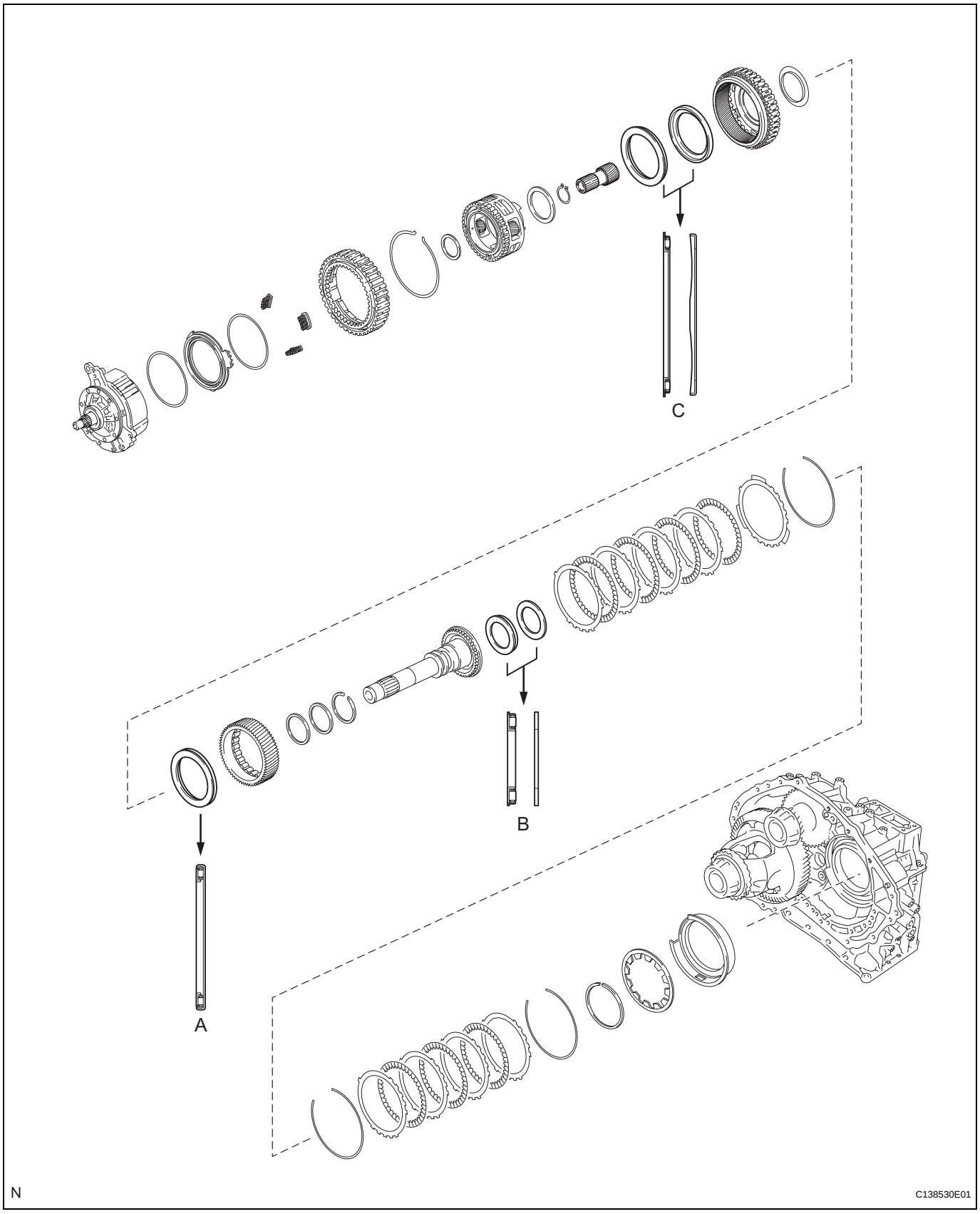
There are 6 different thicknesses of flanges available.

No. 2 clutch flange thickness: mm (in.)

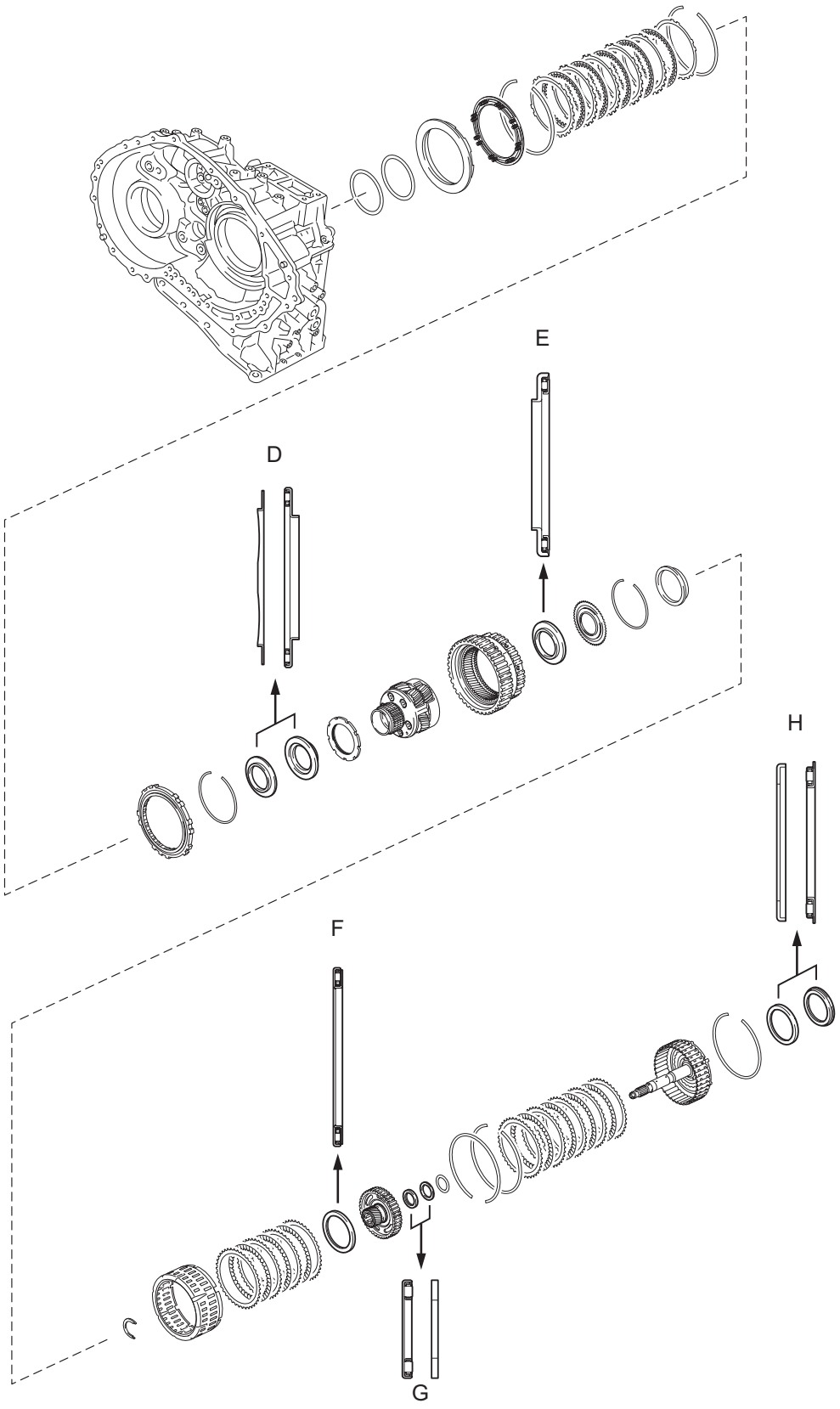
Thickness	Thickness
3.0 (0.118)	3.3 (0.130)
3.1 (0.122)	3.4 (0.134)
3.2 (0.126)	3.5 (0.138)

REASSEMBLY

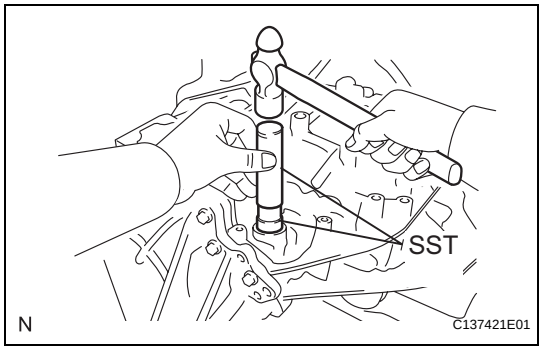
1. BEARING POSITION



AX



Mark	Front Race Diameter Inside / Outside mm (in.)	Thrust Bearing Diameter Inside / Outside mm (in.)	Rear Race Diameter Inside / Outside mm (in.)
A	-	57.7 (2.271) / 75.2 (2.961)	-
B	-	29.1 (1.146) / 48.6 (1.913)	30.7 (1.209) / 48.3 (1.902)
C	65.9 (2.594) / 80.3 (3.161)	62.6 (2.465) / 82.4 (3.244)	-
D	59.4 (2.339) / 77 (3.032)	53.1 (2.091) / 79 (3.110)	-
E	-	56.1 (2.209) / 80.9 (3.185)	-
F	-	61.2 (2.409) / 79 (3.110)	-
G	-	28 (1.102) / 47.1 (1.854)	26.1 (1.028) / 44 (1.732)
H	52.2 (2.055) / 70.4 (2.772)	48.9 (1.925) / 72.0 (2.835)	-



2. INSTALL MANUAL VALVE LEVER SHAFT OIL SEAL

(a) Coat the lip of a new manual valve lever shaft oil seal with MP grease.

(b) Using SST and a hammer, install the manual valve lever shaft oil seal to the transaxle case.

SST 09950-60010 (09951-00230), 09950-70010 (09951-07100)

Oil seal installation depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

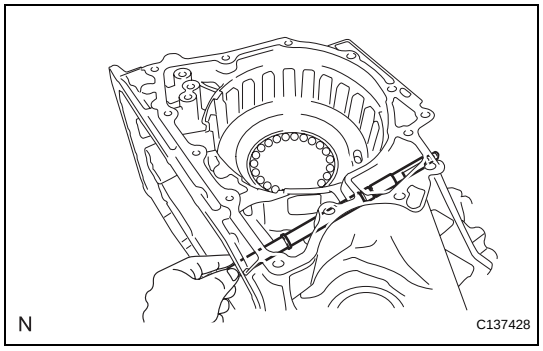
3. INSTALL MANUAL VALVE LEVER SHAFT

(a) Install a new spacer to the parking lock lever sub-assembly.

(b) Install the parking lock lever sub-assembly to the manual valve lever shaft.

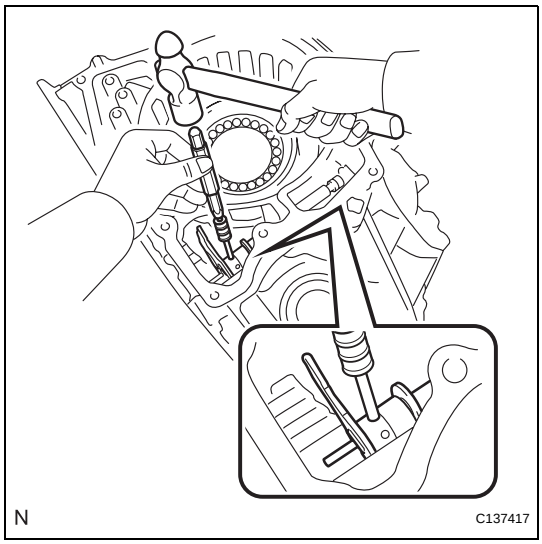
(c) Install a new spacer to the manual valve lever sub-assembly.

(d) Install the manual valve lever sub-assembly to the manual valve lever shaft.

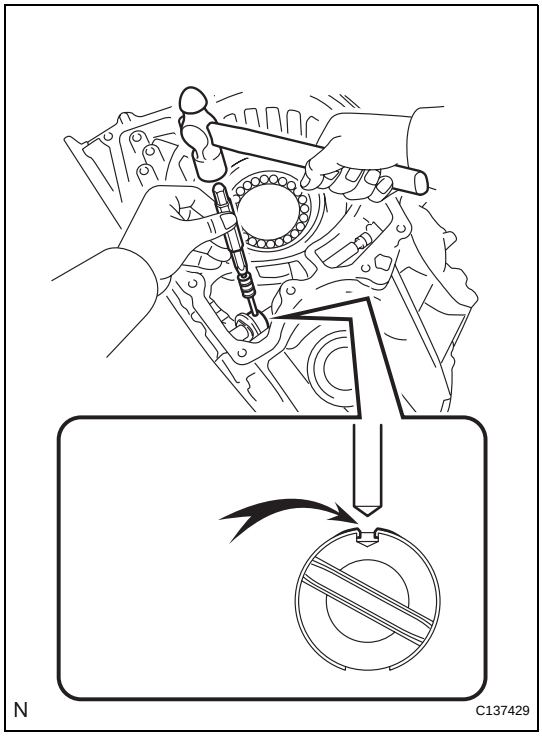


(e) Install the manual valve lever shaft to the transaxle case.

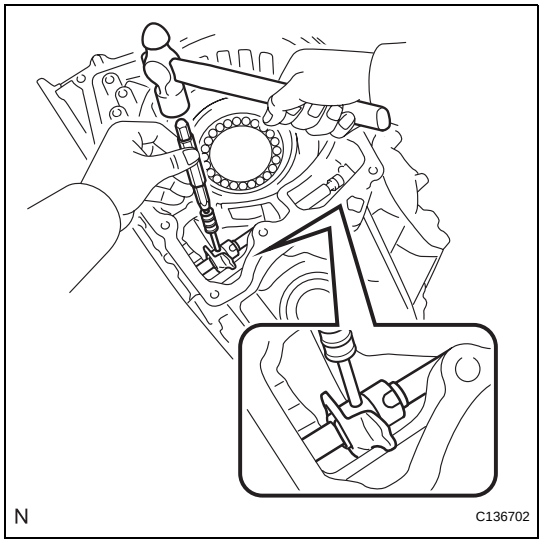
NOTICE:
Do not damage the manual valve lever shaft oil seal while installing the manual valve lever shaft to the transaxle case.



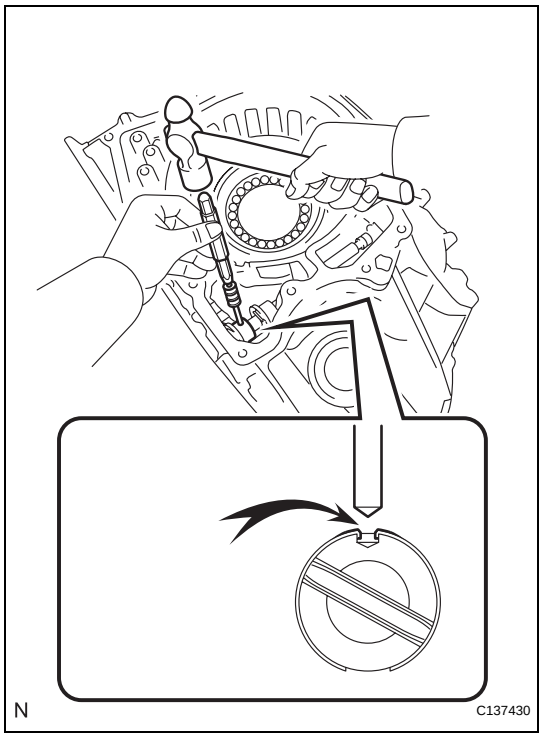
(f) Using a pin punch (3 mm) and hammer, install a new slotted spring pin to the parking lock lever sub-assembly.



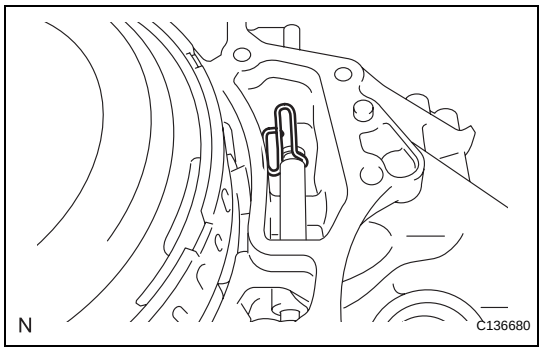
(g) Turn the spacer and the lever shaft to align the smaller hole of the spacer with the staking position mark on the lever shaft.
(h) Using a pin punch, stake the spacer through the small hole.
(i) Check that the spacer does not turn.



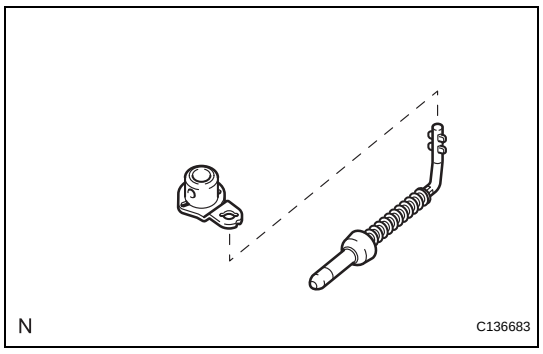
(j) Using a pin punch (3 mm) and hammer, install a new slotted spring pin to the manual valve lever sub-assembly.



(k) Turn the spacer and the lever shaft to align the smaller hole of the spacer with the staking position mark on the lever shaft.
(l) Using a pin punch, stake the spacer through the small hole.
(m) Check that the spacer does not turn.

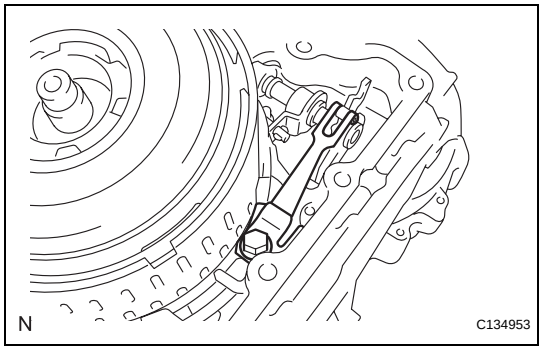


(n) Using needle-nose pliers, install the manual valve shaft retainer spring to the transaxle case.



4. INSTALL PARKING LOCK ROD SUB-ASSEMBLY

(a) Align the dial with the notches on the parking lock lever sub-assembly and install the parking lock rod sub-assembly.



5. INSTALL MANUAL DETENT SPRING SUB-ASSEMBLY

(a) Install the manual detent spring sub-assembly and cover to the transaxle case with the bolt.
Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)
NOTICE:
Make sure to install the manual detent spring first and then the cover.

AX

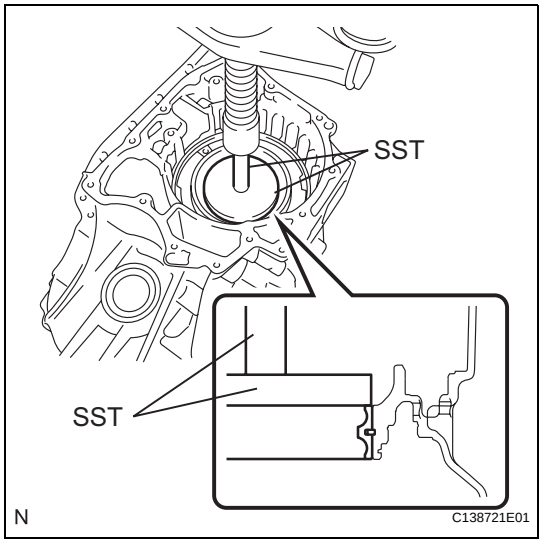
6. INSTALL COUNTER DRIVE GEAR BEARING

NOTICE:

Perform this procedure only when the counter drive gear bearing or transaxle case is replaced.

(a) Using SST and a press, install a new counter drive gear bearing and snap ring to the transaxle case.

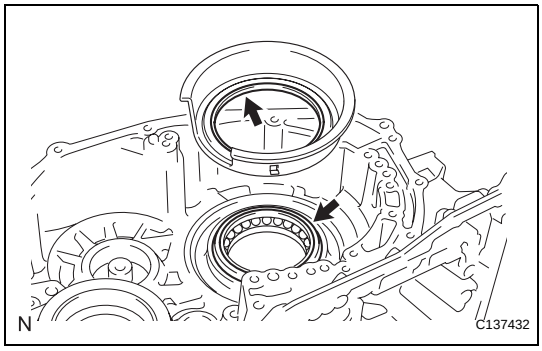
SST 09950-60020 (09951-01030), 09950-70010 (09951-07100)



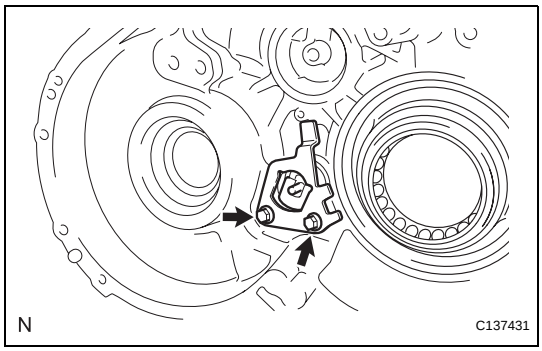
7. INSTALL NO. 3 BRAKE PISTON

(a) Coat the contact surface of the transaxle case with ATF.

(b) Coat the lip seal of the No. 3 brake piston with ATF.



(c) Temporarily install the pawl stopper plate to the transaxle case with the 2 bolts.

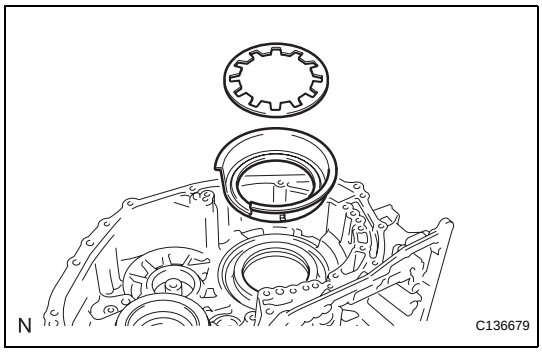


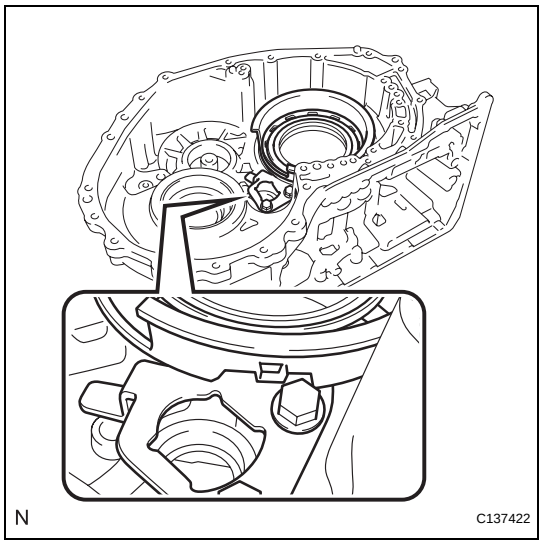
(d) Press the return spring installation surface to install the No. 3 brake piston to the transaxle case.

NOTICE:

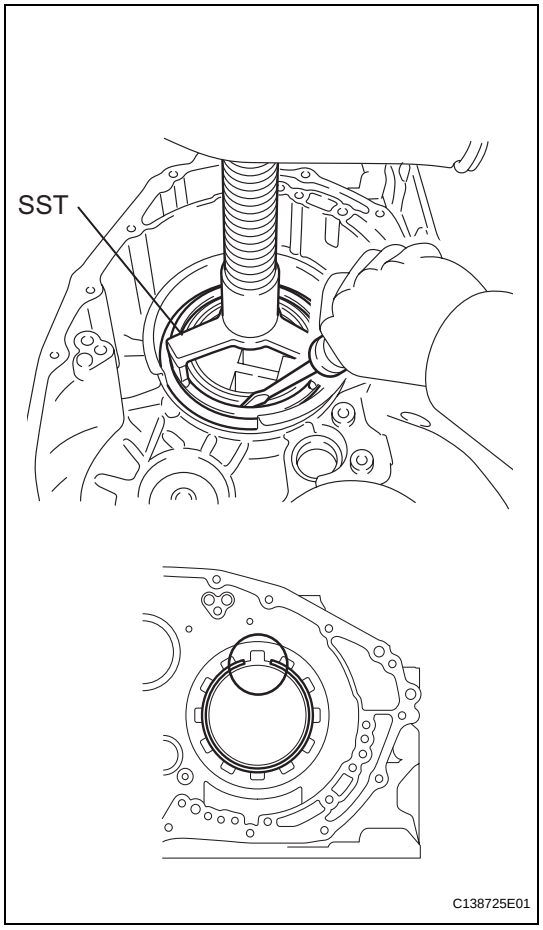
- **Make sure that the lip of the No. 3 brake piston is not twisted and does not get caught in the transaxle case.**
- **After installing, make sure that the protrusions on the No. 3 brake piston and the grooves on the pawl stopper plate are aligned.**

(e) Install the return spring to the transaxle case.



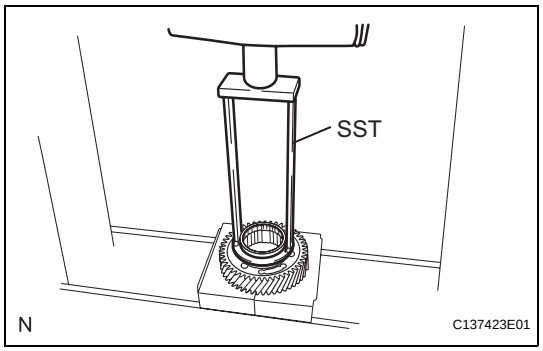


(f) Remove the 2 bolts and pawl stopper plate from the transaxle case.



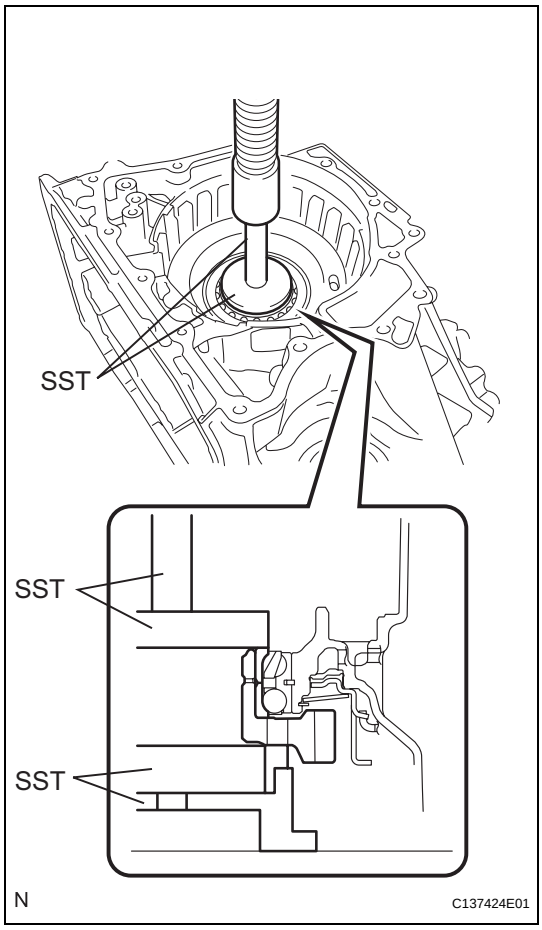
(g) Place SST on the brake piston return spring and compress the brake piston return spring with a press.
SST 09387-00070
NOTICE:
Stop the press when the brake piston return spring is flush with the snap ring groove. This prevents the brake piston return spring from being deformed.

(h) Using a screwdriver, install the snap ring to the transaxle case as shown in the illustration.
NOTICE:
- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**

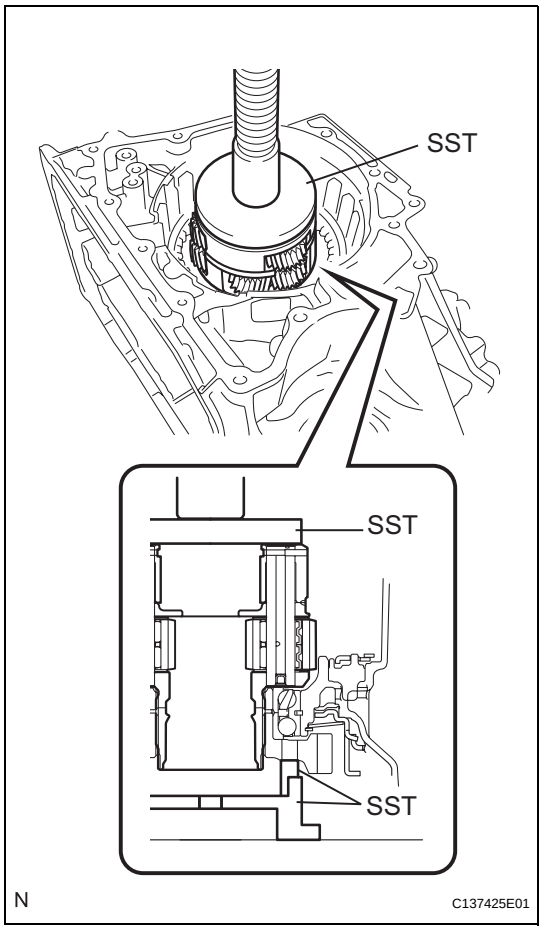


8. INSTALL COUNTER DRIVE GEAR

(a) Using SST and a press, install the bearing inner race (front side) to the counter drive gear.
SST 09387-00020

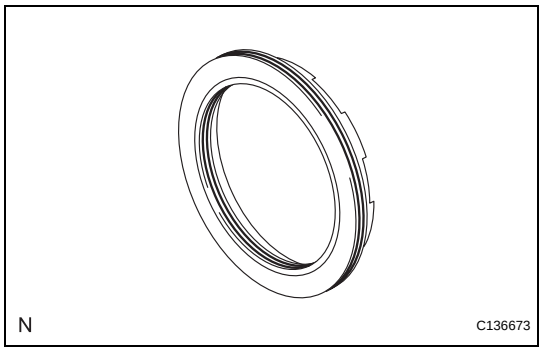


(b) Install the bearing inner race (rear side) and counter drive gear to the transaxle case.
SST 09223-15030, 09527-17011, 09950-60020 (09951-00810), 09950-70010 (09951-07100)
NOTICE:
There should not be any clearance between the bearing inner race (front side) and counter drive gear.



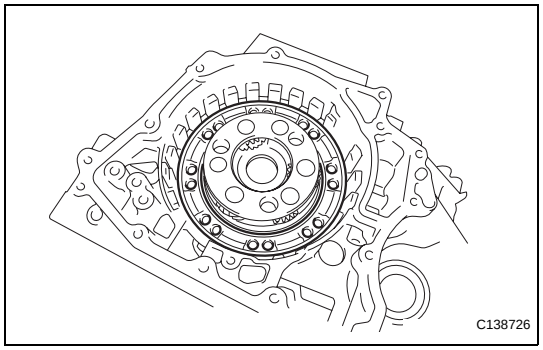
9. INSTALL FRONT PLANETARY GEAR ASSEMBLY

(a) Using SST and a press, press in the planetary gear assembly to the transaxle case.
SST 09223-15030, 09527-17011, 09951-01100



10. INSTALL NO. 2 BRAKE PISTON

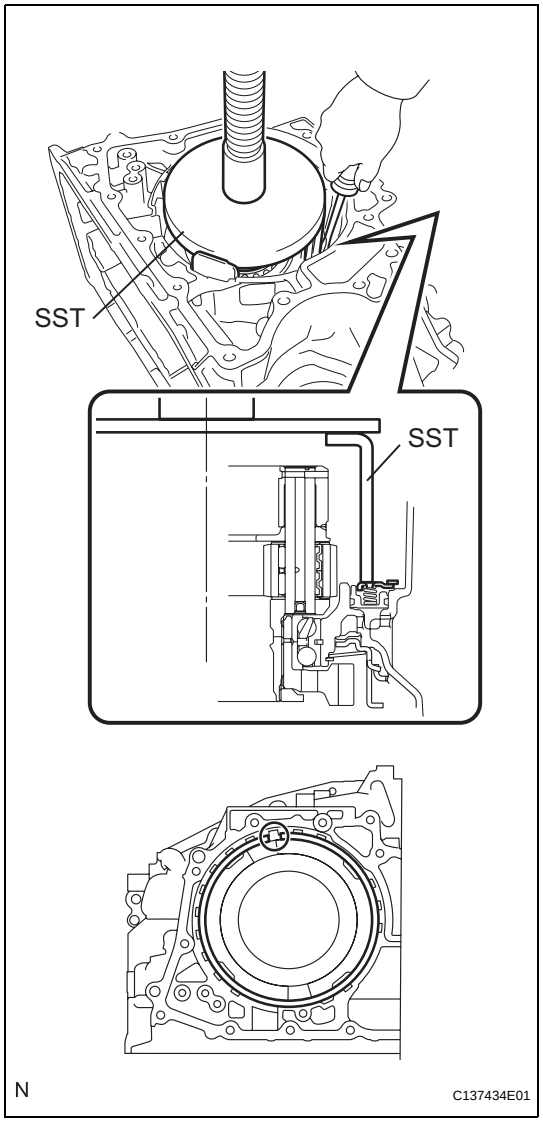
(a) Coat 2 new O-rings with ATF and install them to the No. 2 brake piston.
NOTICE:
Ensure that the 2 O-rings are not twisted.



(b) Install the No. 2 brake piston to the transaxle case.
NOTICE:
Be careful not to damage the O-rings.

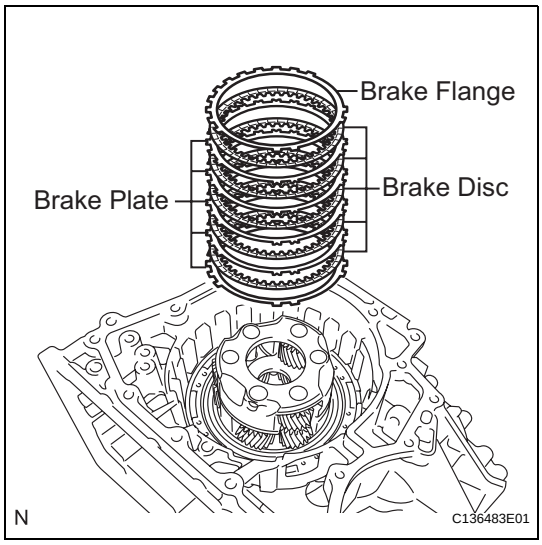
11. INSTALL 1ST AND REVERSE BRAKE RETURN SPRING SUB-ASSEMBLY

(a) Install the 1st and reverse brake return spring to the transaxle case.



(b) Place SST on the 1st and reverse brake return spring and compress the 1st and reverse brake return spring with a press.
SST 09387-00060
NOTICE:
Stop the press when the 1st and reverse brake return spring is flush with the snap ring groove. This prevents the 1st and reverse brake return spring from being deformed.

(c) Using a screwdriver, install the snap ring to the transaxle case as shown in the illustration.
NOTICE:
- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the transaxle case as shown in the illustration.**

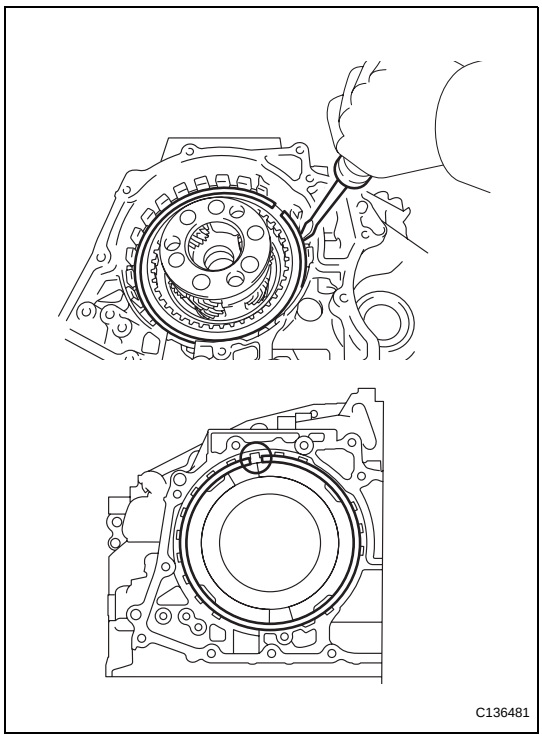


12. INSTALL NO. 2 BRAKE DISC

(a) Install the 5 brake discs, 5 brake plates, and brake flange to the transaxle case.

NOTICE:

Make sure that the discs, plates, and flange are installed in the correct order.

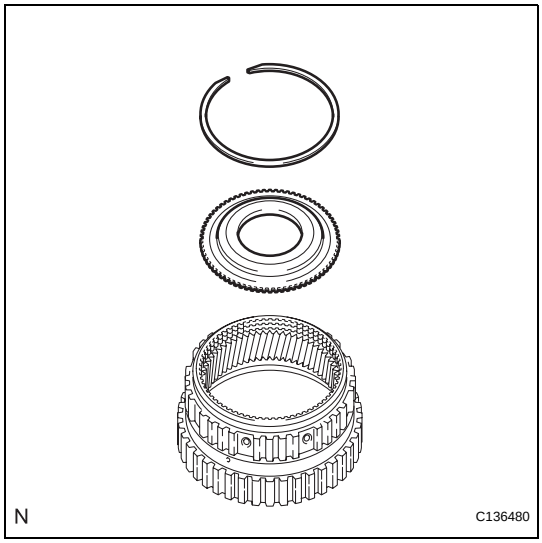


(b) Using a screwdriver, install the snap ring to the transaxle case.

NOTICE:

- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the transaxle case as shown in the illustration.**

13. INSPECT CLEARANCE OF NO. 2 BRAKE (See page AX-278)



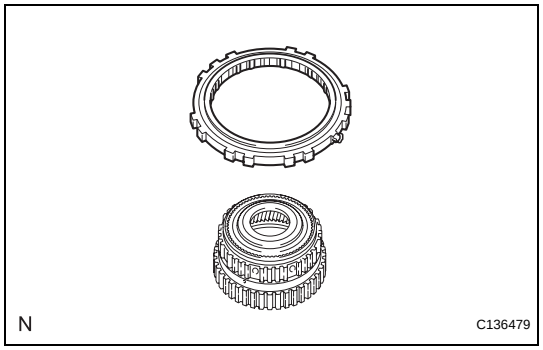
14. INSTALL PLANETARY RING GEAR FLANGE

(a) Install the planetary ring gear flange to the planetary ring gear.

(b) Using a screwdriver, install the snap ring to the planetary ring gear.

NOTICE:

Confirm that the snap ring is secured in the groove of the planetary ring gear.

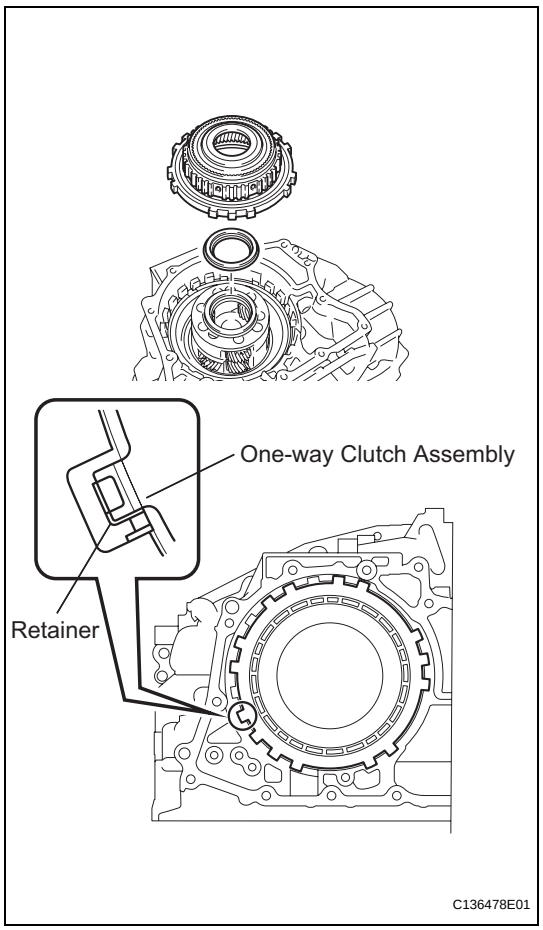


15. INSTALL PLANETARY RING GEAR

(a) Install the planetary ring gear to the one-way clutch assembly.

NOTICE:

Make sure that the one-way clutch assembly is positioned in the correct direction as shown in the illustration.



16. INSTALL ONE-WAY CLUTCH ASSEMBLY

(a) Coat the thrust needle roller bearing with ATF, and install it onto the planetary gear assembly.

Bearing diameter: mm (in.)

-	Inside	Outside
Bearing	56.1 (2.209)	80.9 (3.185)

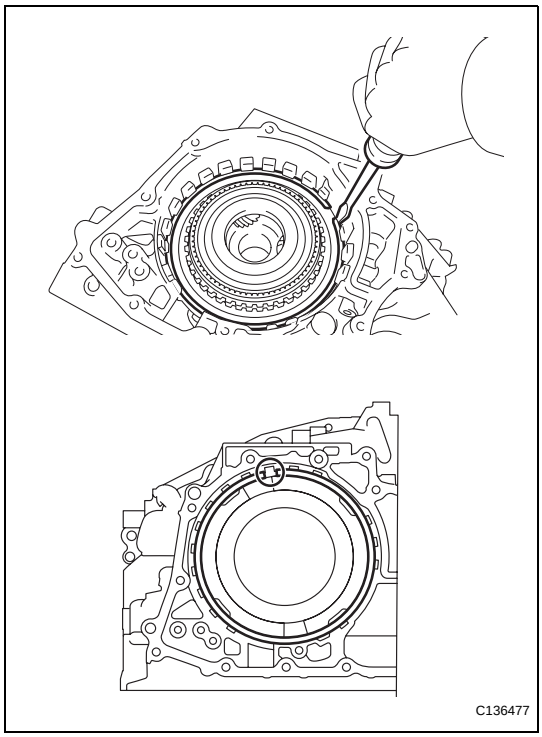
NOTICE:

Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

(b) Install the one-way clutch assembly to the transaxle case.

NOTICE:

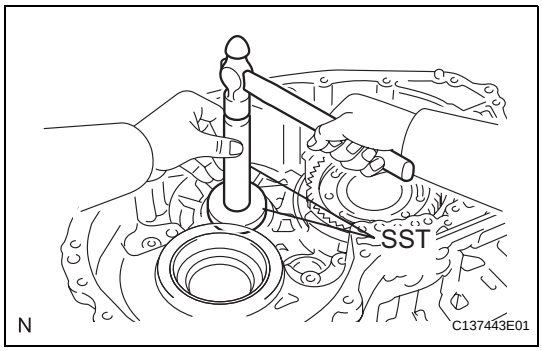
Make sure that there is no clearance between the retainer and the claw on the one-way clutch assembly. If there is any clearance, the spring of the retainer will be deformed.



(c) Using a screwdriver, install the snap ring to the transaxle case.

NOTICE:

- **Confirm that the snap ring is secured in the groove of the transaxle case.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the transaxle case.**



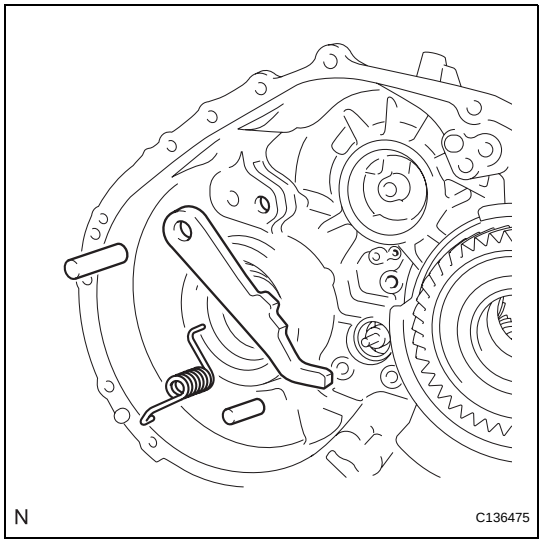
17. INSTALL COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING OUTER RACE

(a) Using SST and a hammer, install the counter driven gear rear tapered roller bearing outer race to the transaxle case.

SST 09950-60010 (09951-00650), 09950-70010 (09951-07100)

NOTICE:

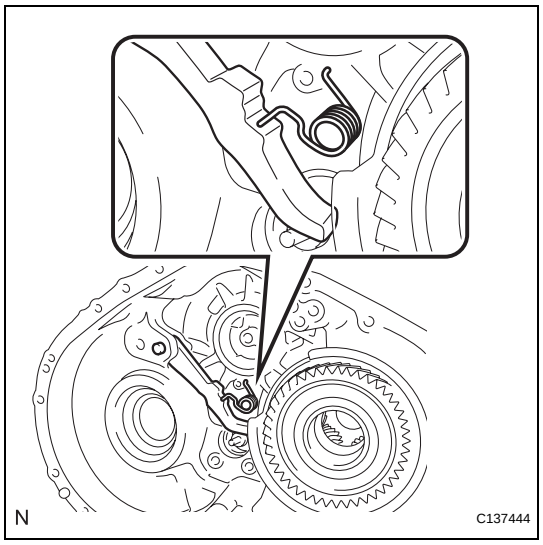
Be sure to install the counter driven gear rear tapered roller bearing outer race so that there is no clearance between the bearing outer race and the transaxle case. If there is any clearance, the turning torque of the counter drive gear cannot be measured correctly.



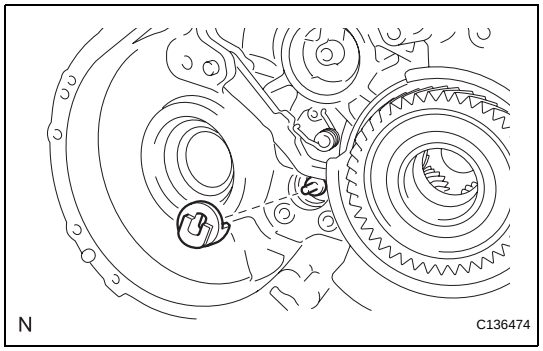
18. INSTALL PARKING LOCK PAWL

(a) Install the parking lock pawl to the transaxle case with the parking lock pawl shaft.

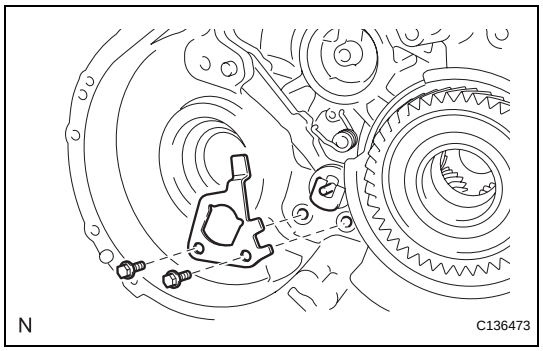
(b) Install the parking lock pawl pin to the transaxle case.



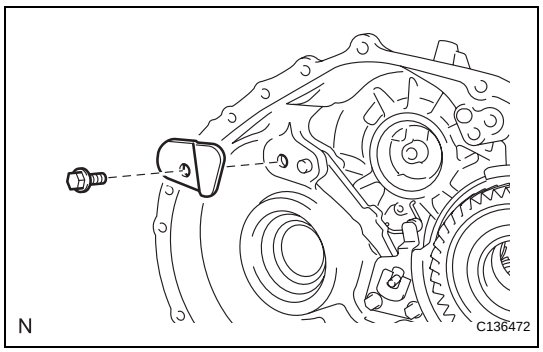
(c) Install the torsion spring to the parking lock pawl.
NOTICE:
Make sure that one end of the spring is fixed in the hole of the transaxle case and the other end is positioned on the parking lock pawl as shown in the illustration.



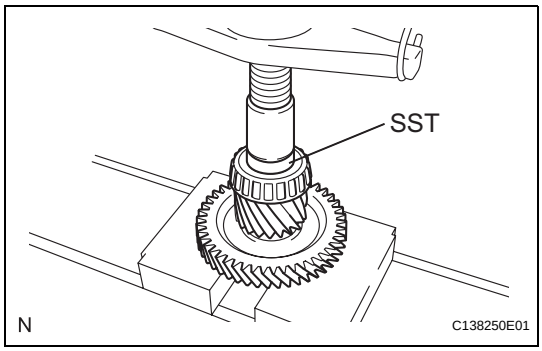
19. INSTALL PARKING LOCK SLEEVE
(a) Install the parking lock sleeve to the transaxle case.



20. INSTALL PAWL STOPPER PLATE
(a) Install the pawl stopper plate to the transaxle case with the 2 bolts.
Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)



21. INSTALL PAWL SHAFT CLAMP
(a) Install the pawl shaft clamp to the transaxle case with the bolt.
Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)



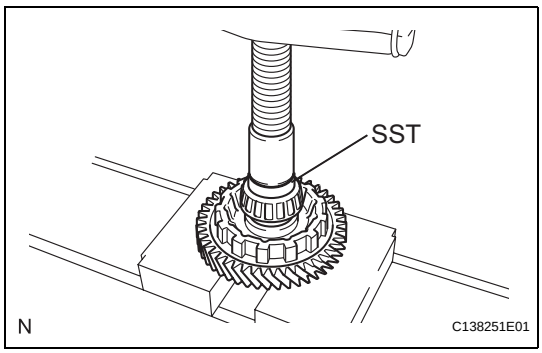
22. INSTALL COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING

(a) Using SST and a press, install a new the counter driven gear front tapered roller bearing to the counter driven gear sub-assembly.

SST 09950-60010 (09951-00530)

NOTICE:

Be sure to install the counter driven gear front tapered roller bearing so that there is no clearance between the bearing and the counter driven gear. If there is any clearance, the turning torque of the counter drive gear cannot be measured correctly.



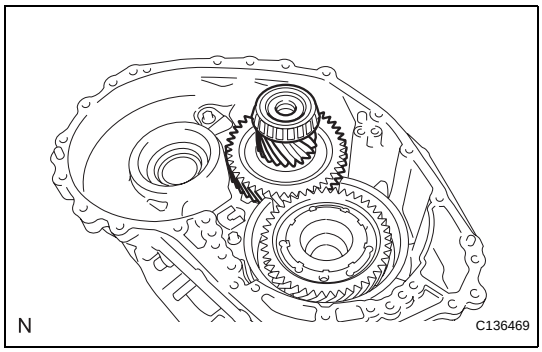
23. INSTALL COUNTER DRIVEN GEAR REAR TAPERED ROLLER BEARING

(a) Using SST and a press, install a new the counter driven gear rear tapered roller bearing to the counter driven gear sub-assembly.

SST 09950-60010 (09951-00420)

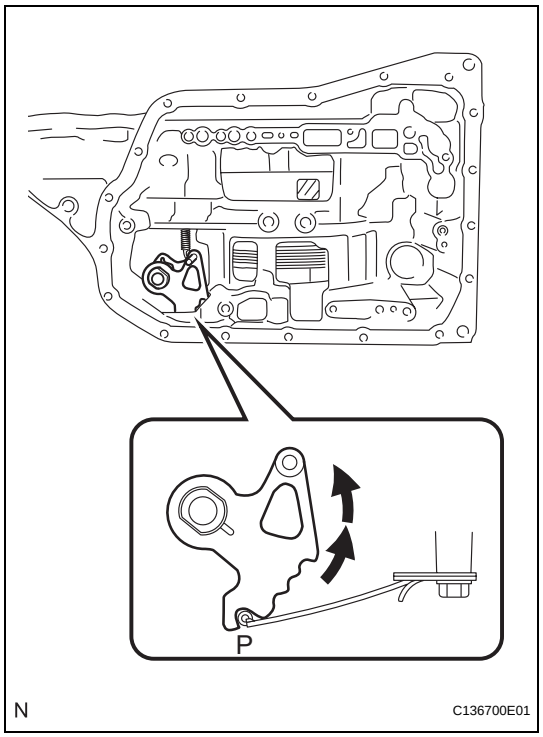
NOTICE:

Be sure to install the counter driven gear rear tapered roller bearing and the differential drive pinion so that there is no clearance between each of them and the counter driven gear.



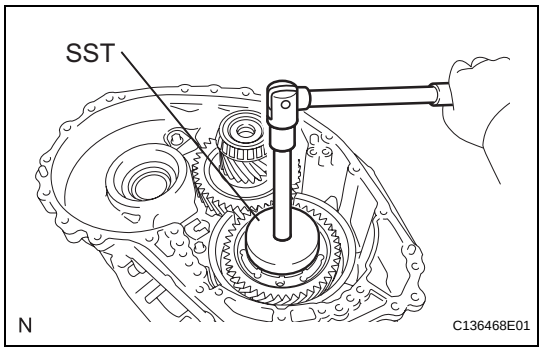
24. INSTALL COUNTER DRIVEN GEAR

(a) Install the counter driven gear sub-assembly to the transaxle case.

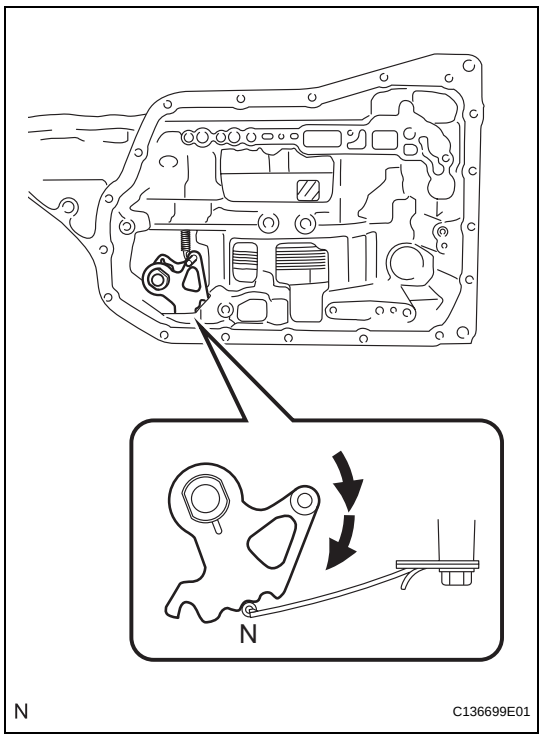


25. INSTALL COUNTER DRIVE GEAR NUT

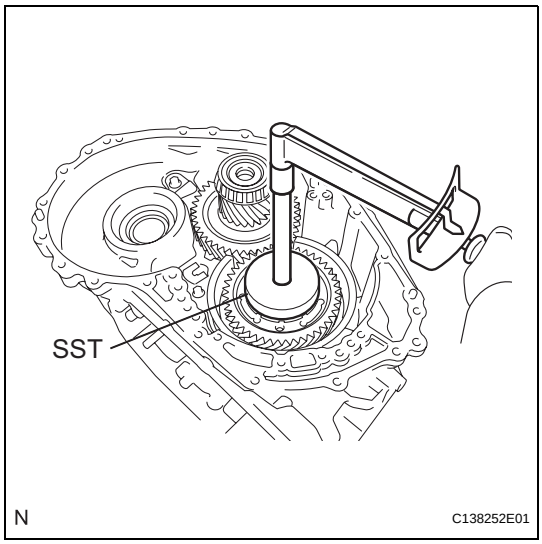
(a) Turn the manual shaft lever 2 notches counterclockwise to set it in the P position as shown in the illustration.



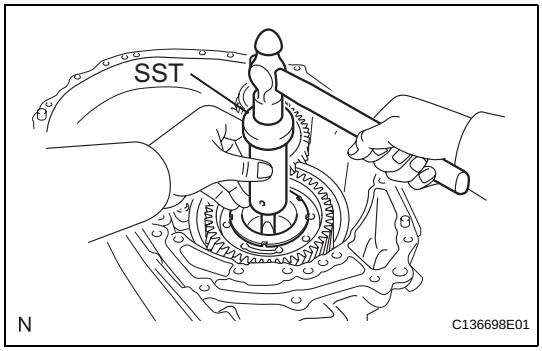
(b) Using SST, install a new nut.
SST 09387-00130
Torque: 120 N*m (1,223 kgf*cm, 88 ft.*lbf)



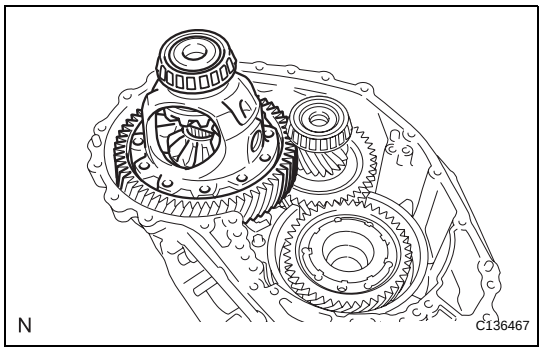
(c) Turn the manual shaft lever 2 notches clockwise to set it in the N position as shown in the illustration.



(d) Using SST and a torque wrench, measure the turning torque of the bearing while rotating SST at 60 rpm.
SST 09387-00130
Turning torque:
0.10 to 0.22 N*m (1.02 to 2.24 kgf*cm, 0.89 to 1.94 in.*lbf)
When the measured value is not within the specified range, gradually tighten the nut until the turning toque falls within the specified range.
Maximum torque:
180 N*m (1,835 kgf*cm, 132 ft.*lbf)

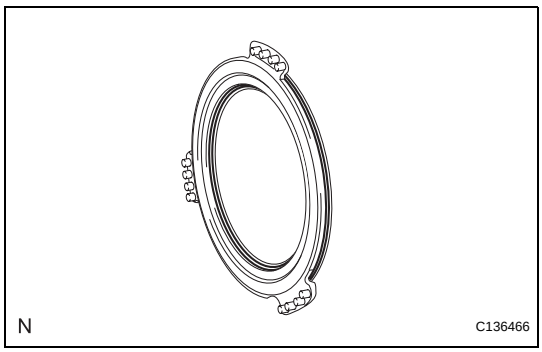


(e) Using SST and a hammer, stake the planetary gear assembly.
SST 09930-00010

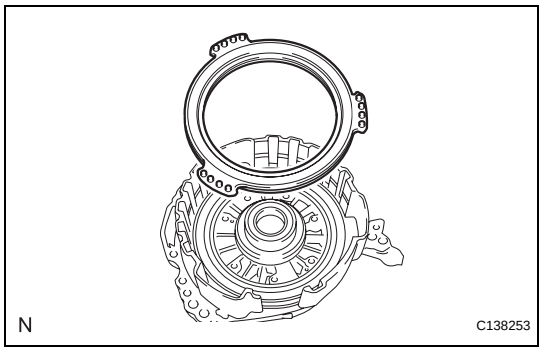


26. INSTALL FRONT DIFFERENTIAL CASE
(a) Install the differential case sub-assembly to the transaxle case.

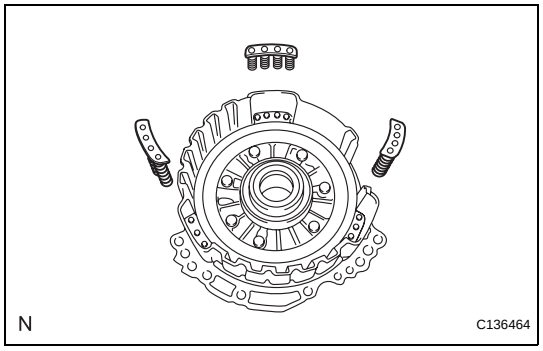
27. INSPECT DIFFERENTIAL SIDE GEAR (See page AX-332)



28. INSTALL NO. 1 BRAKE PISTON
(a) Coat 2 new O-rings with ATF and install them to the No. 1 brake piston.
NOTICE:
Ensure that the 2 O-rings are not twisted.

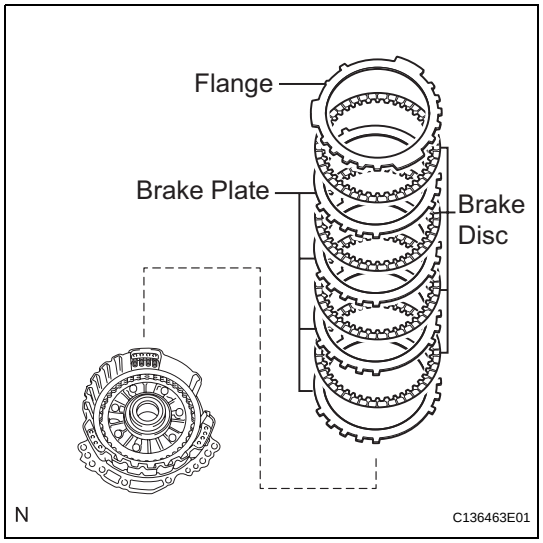


(b) Install the No. 1 brake piston to the oil pump assembly.
NOTICE:
Be careful not to damage the O-rings.



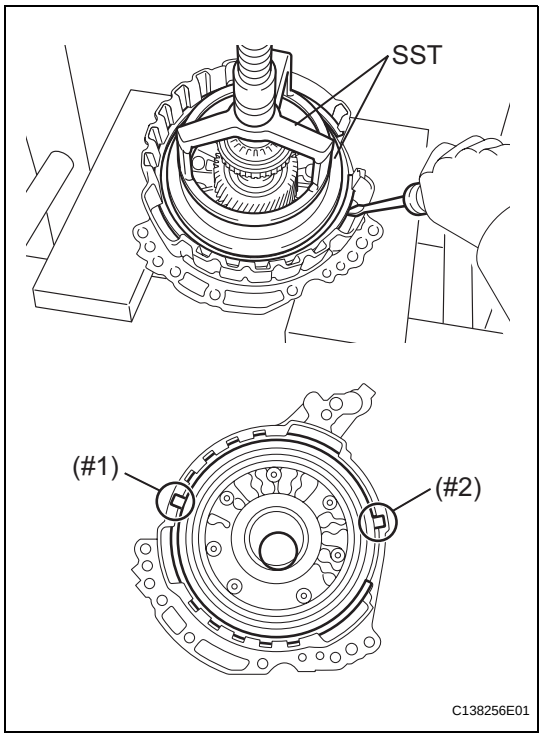
29. INSTALL 2ND BRAKE PISTON RETURN SPRING SUB-ASSEMBLY

(a) Install the 3 2nd brake piston return springs to the oil pump assembly.
NOTICE:
Make sure that the 3 2nd brake piston return springs are installed straight through the protrusions on the oil pump assembly.



30. INSTALL NO. 1 BRAKE DISC

(a) Install the 4 brake discs, 4 brake plates, and brake flange to the oil pump assembly.
NOTICE:
- **Make sure that the discs, plates, and flange are installed in the correct order.**
- **Be sure to install the flange in the correct direction.**

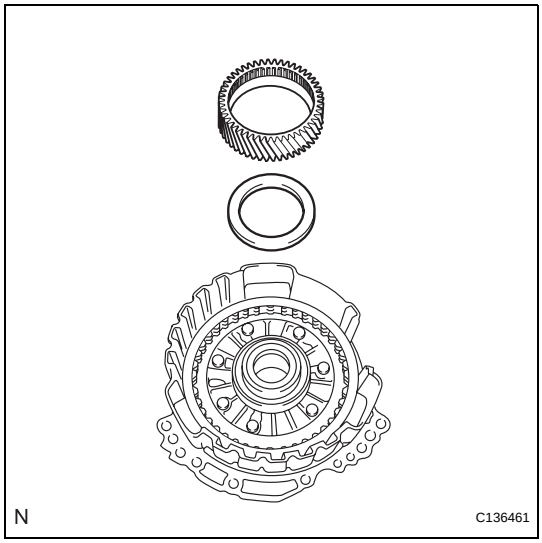


(b) Place SST on the flange and compress the flange with a press.
SST 09387-00070, 09495-65040
NOTICE:
Stop the press when the brake piston return spring is flush with the snap ring groove. This prevents the brake piston return spring from being deformed.

(c) Using a screwdriver, install the snap ring to the transaxle case as shown in the illustration (#1).
NOTICE:
- **Confirm the snap ring is fixed in the groove of the oil pump.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**

(d) Using a screwdriver, install the snap ring to the oil pump assembly as shown in the illustration (#2).
NOTICE:
- **Confirm that the snap ring is secured in the groove of the oil pump.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**

31. INSPECT CLEARANCE OF NO. 1 BRAKE (See page AX-278)



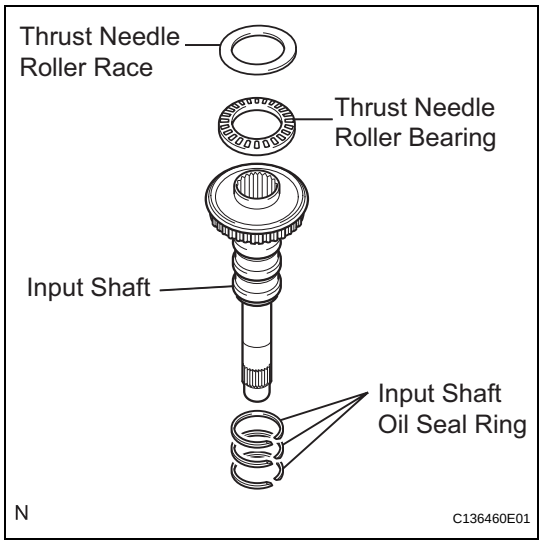
32. INSTALL UNDERDRIVE PLANETARY SUN GEAR

(a) Coat the thrust needle roller bearing with ATF, and install it to the oil pump assembly.
Bearing diameter: mm (in.)

-	Inside	Outside
Bearing	57.7 (2.272)	75.2 (2.961)

NOTICE:
Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

(b) Install the underdrive planetary sun gear to the oil pump assembly.



33. INSTALL INPUT SHAFT SUB-ASSEMBLY

(a) Coat the 3 input shaft oil seal rings with ATF and install them to the input shaft.

NOTICE:
Do not expand the gap of the oil seal ring too much.

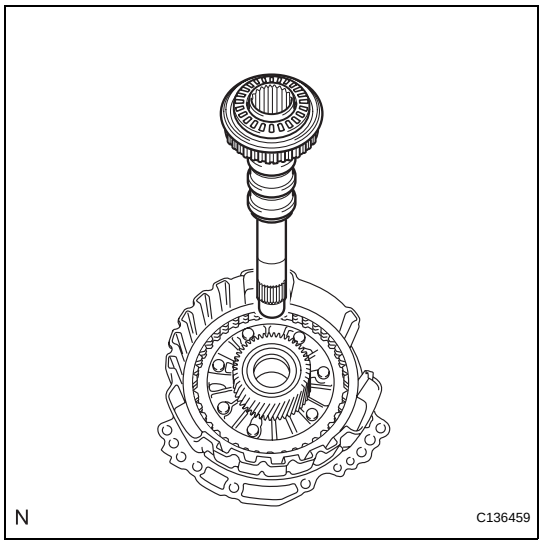
(b) Coat the thrust needle roller bearing and thrust needle roller race with ATF, and install them on the oil pump assembly.

Bearing diameter: mm (in.)

-	Inside	Outside
Bearing	29.1 (1.146)	48.6 (1.913)
Race	30.7 (1.209)	48.3 (1.902)

NOTICE:
Be sure to install the thrust needle roller bearing in the correct direction.

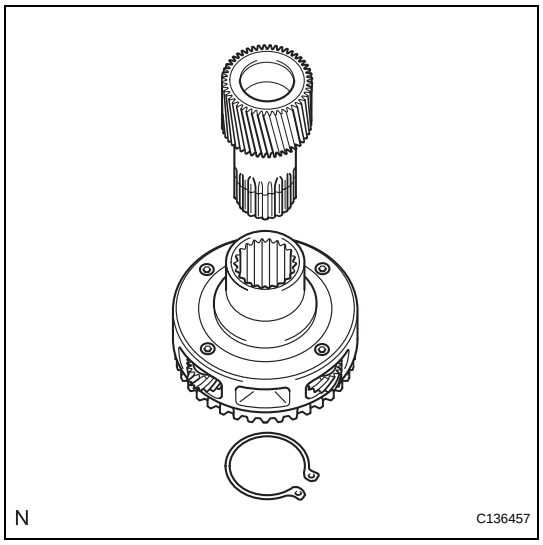
(c) Install the input shaft to the oil pump assembly.



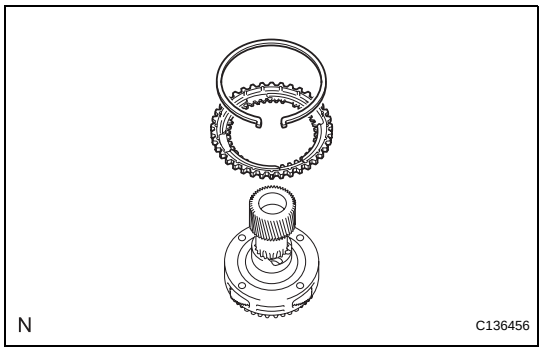
34. INSTALL PLANETARY SUN GEAR SUB-ASSEMBLY

(a) Using a snap ring expander, install the snap ring to the underdrive planetary gear assembly.

(b) Using a snap ring expander, install the front planetary sun gear sub-assembly to the underdrive planetary gear assembly with the snap ring expanded.



AX



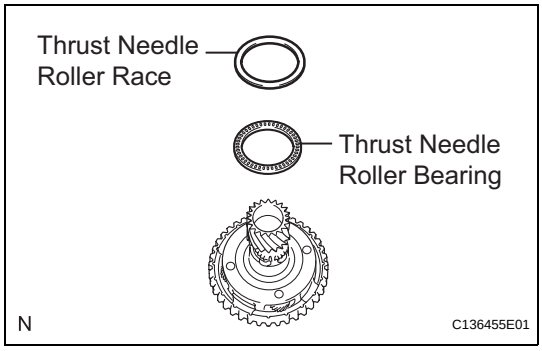
35. INSTALL UNDERDRIVE PLANETARY RING GEAR

(a) Install the underdrive planetary ring gear to the underdrive planetary gear assembly.

(b) Using needle-nose pliers, install the snap ring to the underdrive planetary ring gear.

NOTICE:

Confirm that the snap ring is secured in the groove of the underdrive planetary ring gear.



36. INSTALL NO. 3 BRAKE HUB

(a) Coat the thrust needle roller bearing with ATF and install it on the underdrive planetary gear assembly.

Bearing diameter: mm (in.)

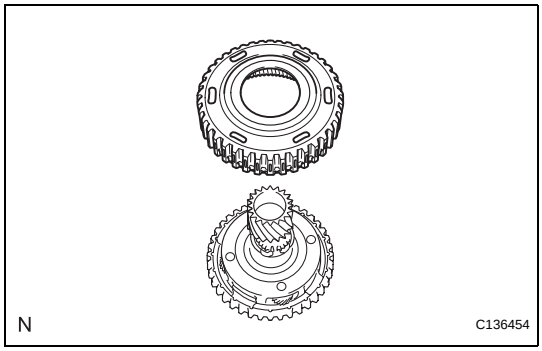
-	Inside	Outside
Bearing	62.6 (2.464)	82.9 (3.263)
Race	65.9 (2.594)	80.3 (3.161)

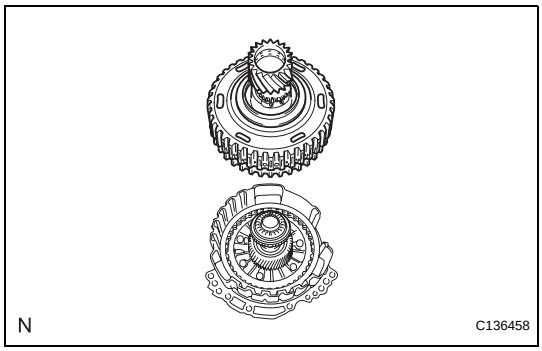
NOTICE:

Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

(b) Coat the race with MP grease and install it to the No. 3 brake hub.

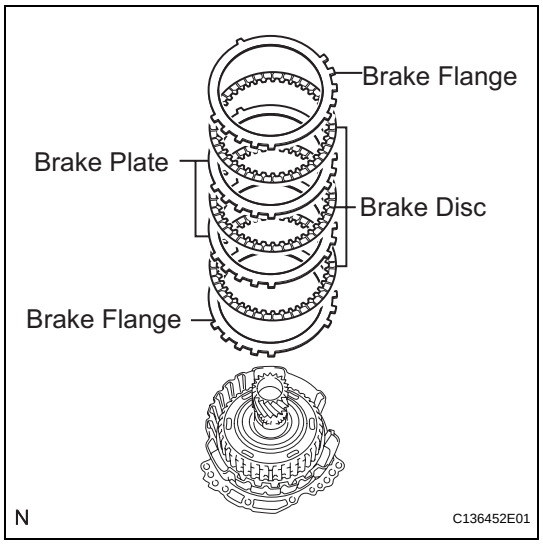
(c) Install the No. 3 brake hub to the underdrive planetary gear assembly.





37. INSTALL UNDERDRIVE PLANETARY GEAR ASSEMBLY

(a) Install the underdrive planetary gear assembly to the oil pump assembly.

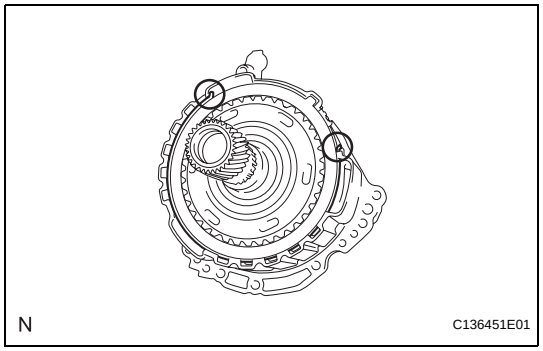


38. INSTALL NO. 3 BRAKE DISC

(a) Install the 2 brake flanges, 3 brake discs, and 2 brake plates to the oil pump assembly.

NOTICE:

Make sure that the discs, plates, and flange are installed in the correct order.

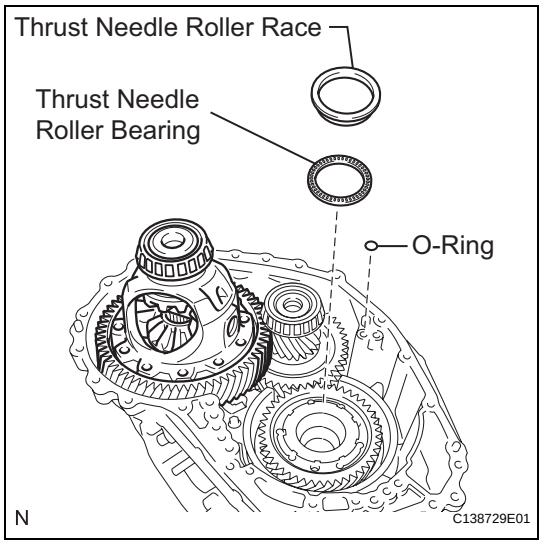


(b) Using a screwdriver, install the snap ring to the oil pump assembly.

NOTICE:

- **Confirm the snap ring is fixed in the groove of the oil pump.**
- **Be sure to align the opening ends of the snap ring with the protrusions on the brake piston return spring as shown in the illustration.**

39. INSPECT CLEARANCE OF NO. 3 BRAKE



40. INSTALL FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Coat the O-ring with ATF and install it to the transaxle case.

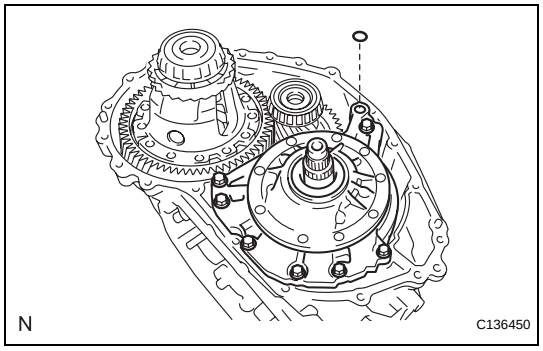
(b) Coat the thrust needle roller bearing and thrust needle roller race with ATF and install them on the underdrive planetary gear assembly.

Bearing and race diameter: mm (in.)

-	Inside	Outside
Bearing	53.1 (2.091)	79 (3.11)
Race	59.4 (2.339)	77 (3.03)

NOTICE:

Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

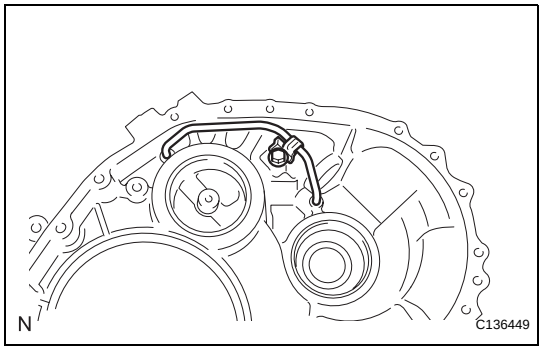


(c) Coat the O-ring with ATF and install it to the oil pump.

(d) Install the oil pump assembly to the transaxle case with the 7 bolts.

Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)

AX



41. INSTALL DIFFERENTIAL GEAR LUBE APPLY TUBE

(a) Install the differential gear lube apply tube to the transaxle housing.

NOTICE:

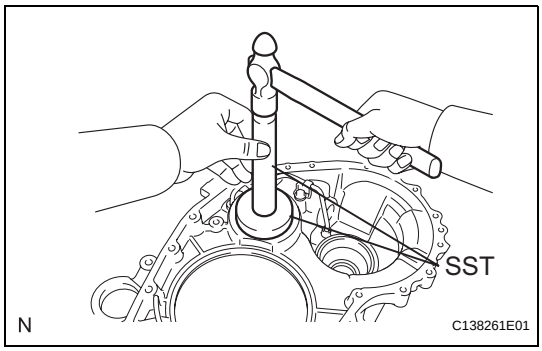
Insert the differential lube apply tube into the transaxle case until it makes contact with the stopper.

(b) Install the apply tube clamp to the differential gear lube apply tube with the bolt.

Torque: 23 N*m (234 kgf*cm, 17 ft.*lbf)

NOTICE:

There should be clearance between the differential lube apply tube and apply tube clamp.



42. INSTALL COUNTER DRIVEN GEAR FRONT TAPERED ROLLER BEARING OUTER RACE

(a) Install the shim to the transaxle housing.

(b) Using SST, install a new counter driven gear front tapered roller bearing outer race to the transaxle housing.

SST 09950-60020 (09951-00810), 09950-70010 (09951-07100)

NOTICE:

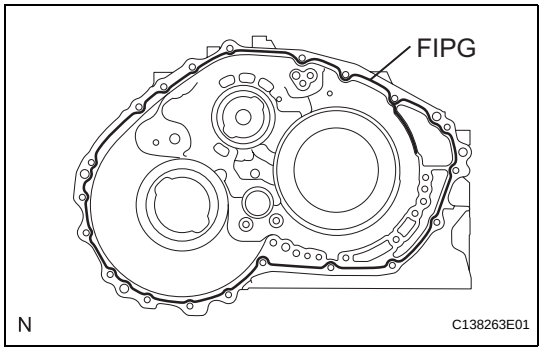
Be sure to install the counter driven gear front tapered roller bearing outer race so that there is no clearance between the shim and the transaxle housing.

43. INSTALL TRANSAXLE HOUSING

(a) Remove packing material from the contact surface between the transaxle housing and case.

NOTICE:

Make sure that there is no ATF on the contact surface.



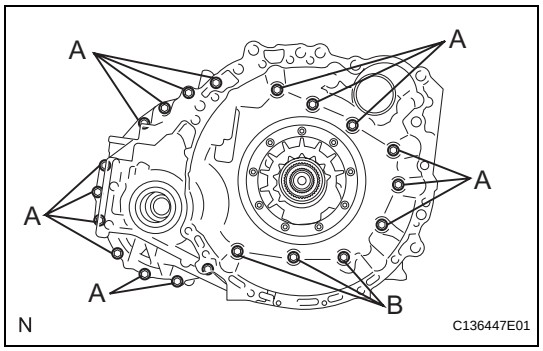
(b) Apply FIPG to the transaxle case.

FIPG:

Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent.

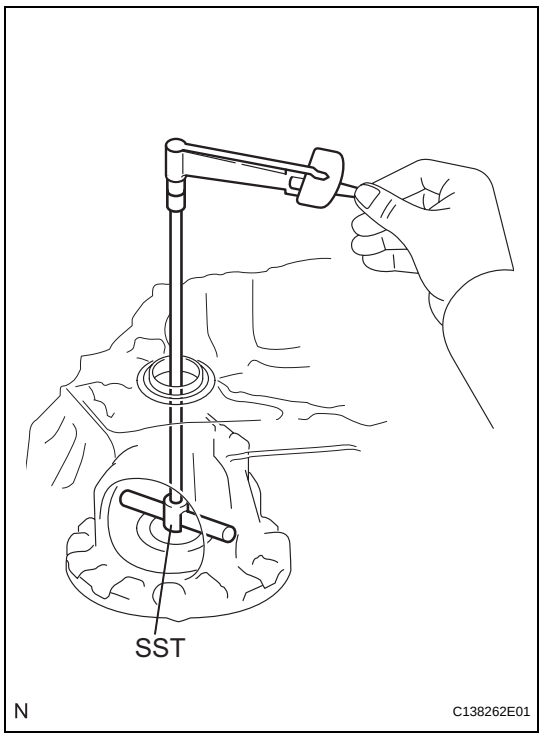
NOTICE:

Apply a bead of FIPG (width 1.2 mm (0.047 in.)) along the sealing surface.



(c) Install the transaxle housing to the transaxle case with the 20 bolts.

Torque: Bolt A
31 N*m (316 kgf*cm, 23 ft.*lbf)
Bolt B
23 N*m (234 kgf*cm, 17 ft.*lbf)



44. ADJUST COUNTER DRIVEN GEAR PRELOAD

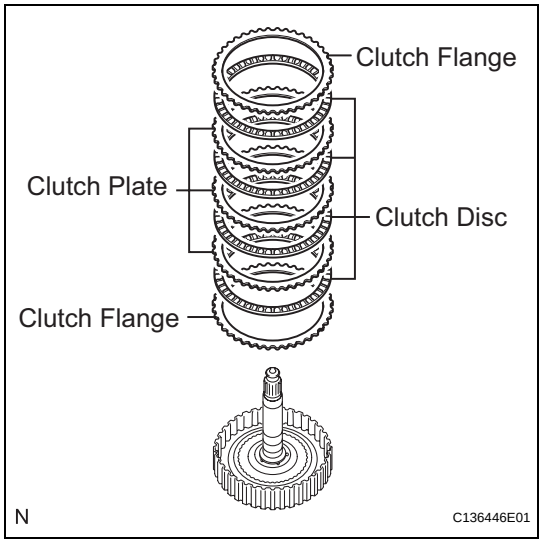
(a) Using SST and a torque wrench, measure the turning torque of the counter driven gear while rotating SST at 10 rpm.

SST 09564-33010

Turning torque:
Differential side bearing preload 3.29 to 6.07 N*m (33.53 to 61.86 kgf*cm, 2.42 to 4.46 ft.*lbf)

If the turning torque is not within the specified range, refer to the table below to select a shim of the counter driven gear front tapered roller bearing outer race so that the turning torque is within the specified range.

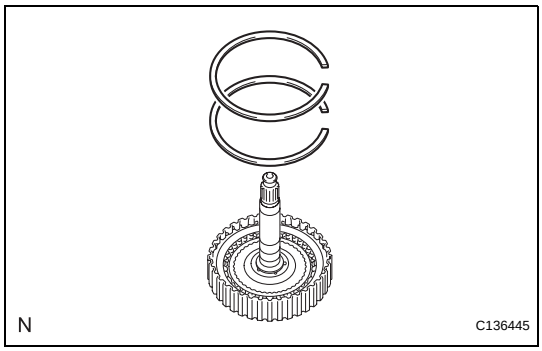
Thickness	Thickness	Thickness	Thickness
2.000 (0.0787)	2.275 (0.0896)	2.525 (0.0994)	2.775 (0.1093)
2.025 (0.0797)	2.300 (0.0906)	2.550 (0.1004)	2.800 (0.1102)
2.050 (0.0807)	2.325 (0.0915)	2.575 (0.1014)	2.825 (0.1112)
2.075 (0.0817)	2.350 (0.0925)	2.600 (0.1024)	2.850 (0.1122)
2.100 (0.0827)	2.375 (0.0935)	2.625 (0.1034)	2.875 (0.1132)
2.125 (0.0837)	2.400 (0.0945)	2.650 (0.1043)	2.900 (0.1142)
2.150 (0.0847)	2.425 (0.0955)	2.675 (0.1053)	2.925 (0.1152)
2.175 (0.0856)	2.450 (0.0965)	2.700 (0.1063)	2.950 (0.1161)
2.200 (0.0866)	2.475 (0.0974)	2.725 (0.1073)	2.975 (0.1171)
2.225 (0.0876)	2.500 (0.0984)	2.750 (0.1083)	3.000 (0.1181)
2.250 (0.0886)	-	-	-



45. INSTALL NO. 1 CLUTCH DISC

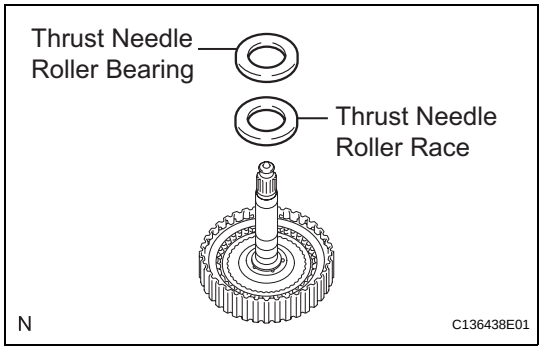
(a) Install the clutch flange, 4 clutch discs, and 4 clutch plates to the direct multiple disc clutch assembly.

NOTICE:
Make sure that the flange, discs, and plates are installed in the correct order.



(b) Using a screwdriver, install the 2 snap rings to the direct multiple disc clutch assembly.
NOTICE:
Confirm that the snap ring is secured in the groove of the direct multiple disc clutch assembly.

46. INSPECT CLEARANCE OF NO. 1 CLUTCH DISC (See page AX-279)



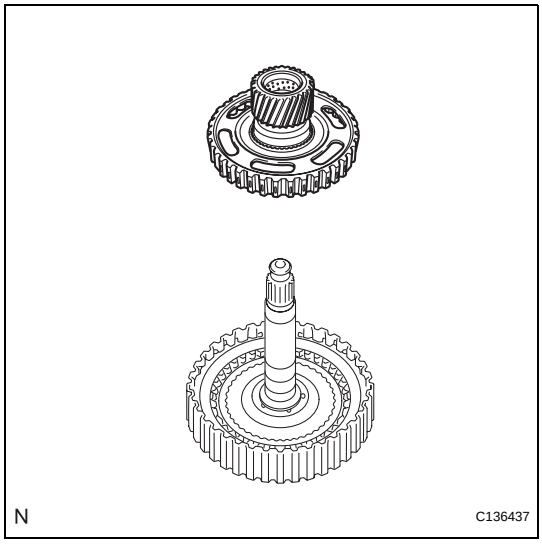
47. INSTALL REAR PLANETARY SUN GEAR ASSEMBLY

(a) Coat the thrust needle roller bearing and thrust needle roller race with ATF, and install them to the direct multiple disc clutch assembly.
Bearing and race diameter: mm (in.)

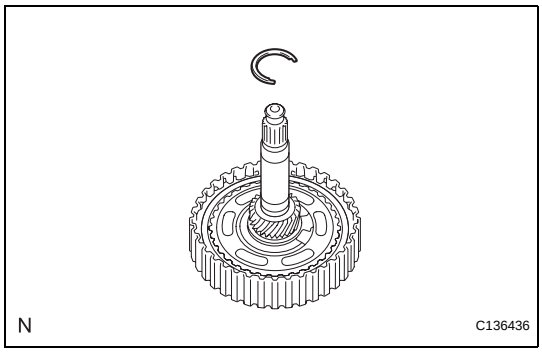
-	Inside	Outside
Bearing	28 (1.10)	47.1 (1.854)
Race	26.1 (1.028)	44 (1.73)

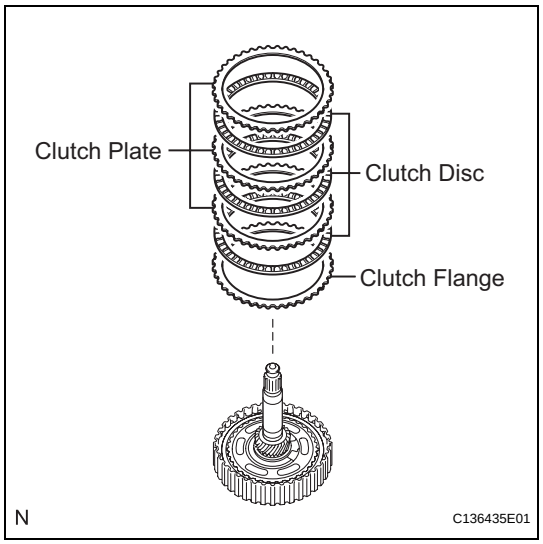
NOTICE:
Install the thrust needle roller bearing properly so that the temper colored side of the race will be visible.

(b) Install the rear planetary sun gear to the direct multiple disc clutch assembly.



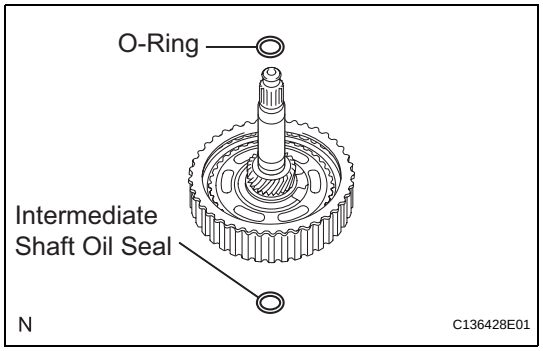
(c) Using a snap ring expander, install the snap ring to the direct multiple disc clutch assembly.





48. INSTALL NO. 2 CLUTCH DISC

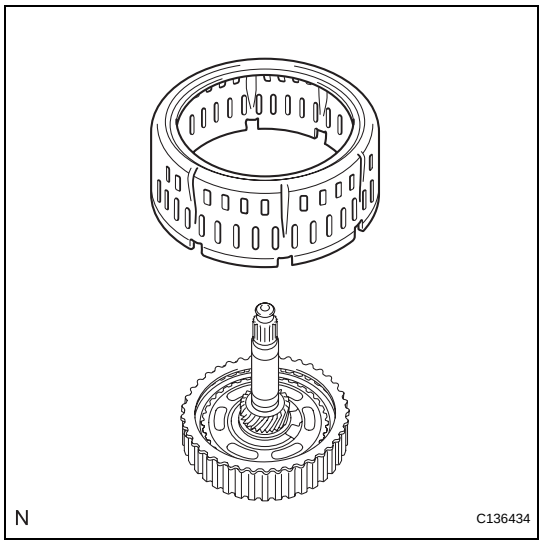
(a) Install the clutch flange, 3 clutch discs, and 3 clutch plates to the direct multiple disc clutch assembly.
NOTICE:
Make sure that the flange, discs, and plates are installed in the correct order.



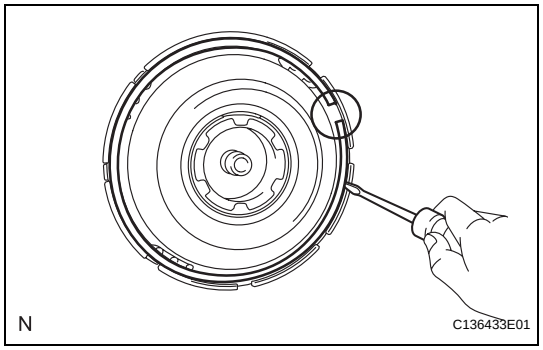
49. INSTALL DIRECT MULTIPLE DISC CLUTCH SNAP RING

(a) Coat a new O-ring with ATF and install it to the direct multiple disc clutch assembly.

(b) Coat a new intermediate shaft oil seal ring with ATF and install it to the intermediate shaft.



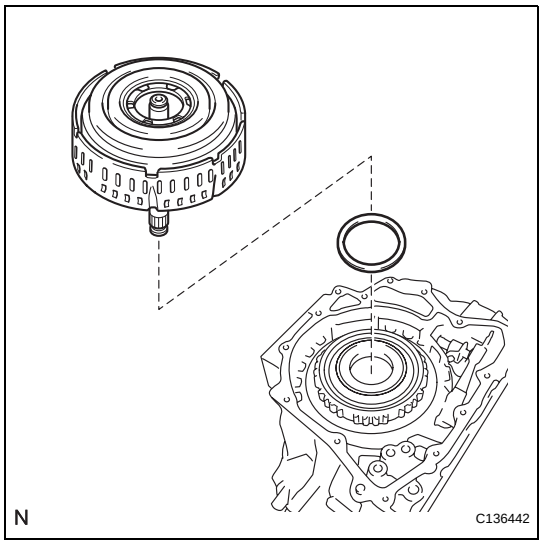
(c) Install the No. 2 direct clutch piston to the direct multiple disc clutch assembly.
NOTICE:
Be sure to engage the claws on the direct multiple disc clutch assembly to the grooves on the No. 2 direct clutch piston.



(d) Using a screwdriver, install the snap ring to the direct multiple disc clutch assembly.
NOTICE:
Position the opening of the snap ring as shown in the illustration.

50. INSPECT CLEARANCE OF NO. 2 CLUTCH DISC (See page AX-280)

AX



51. INSTALL REAR MULTIPLE DISC CLUTCH ASSEMBLY

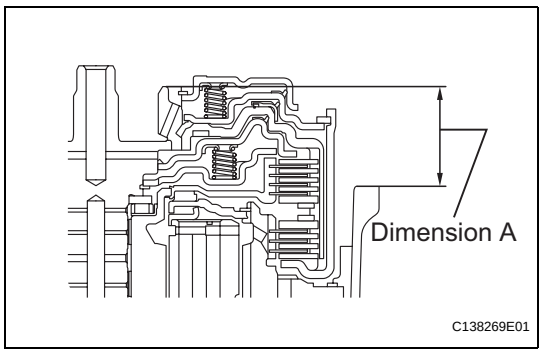
(a) Coat the thrust needle roller bearing with ATF and install it on the transaxle case.

Bearing diameter: mm (in.)

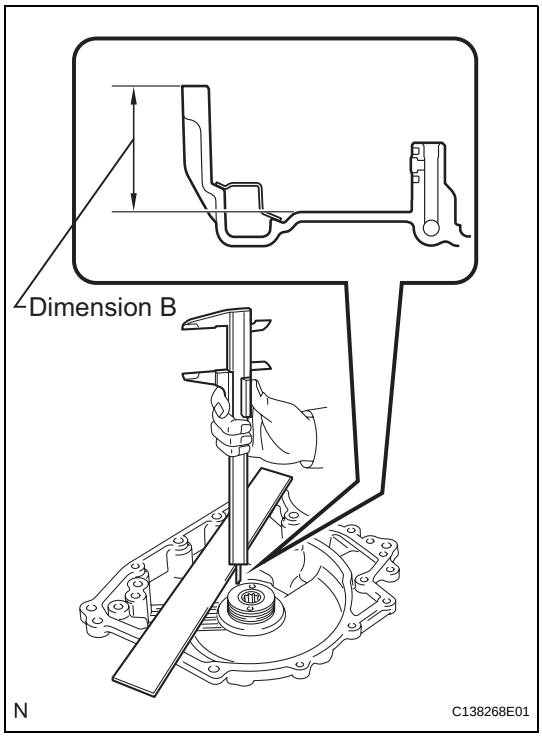
-	Inside	Outside
Bearing	61.2 (2.409)	79 (3.11)

(b) Install the direct multiple disc clutch assembly to the transaxle case.

(c) Clean the contact surface of the transaxle case and transaxle rear cover.



(d) As shown in the illustration, place a straight edge on the multiple direct clutch drum and measure the distance between the transaxle case and the straight edge using vernier calipers (Dimension A).



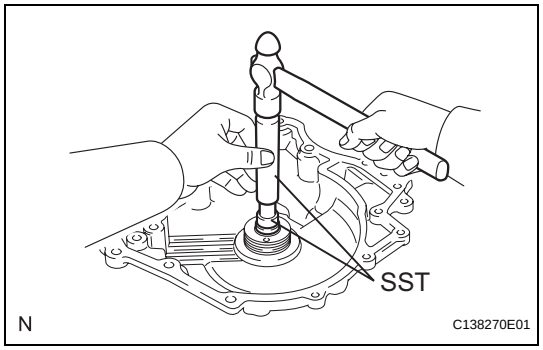
(e) Using vernier calipers and a straight edge, measure the distance shown in the illustration. (Dimension B)

(f) Calculate the end play value using the following formula:

End play = Dimension B - Dimension A

End play:

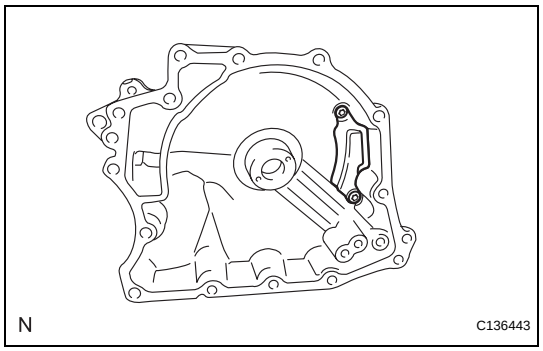
0.007 to 1.113 mm (0.0003 to 0.0438 in.)



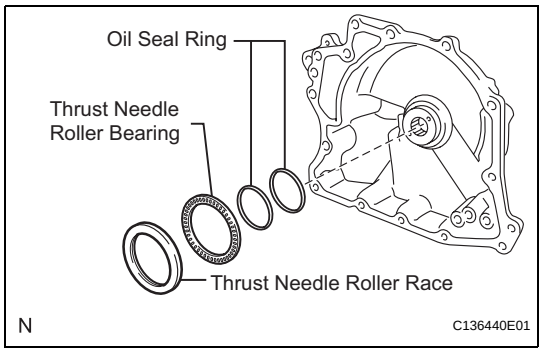
52. INSTALL TRANSAXLE REAR COVER SUB-ASSEMBLY

(a) Using SST and a hammer, install the needle roller bearing into the transaxle rear cover.
SST 09950-60010 (09951-00220), 09950-70010 (09951-07100)
Press installation depth:
21.5 to 21.9 mm (0.8464 to 08622 in.)

(b) Apply sealant to the 2 "TORX" screws.
Adhesive:
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



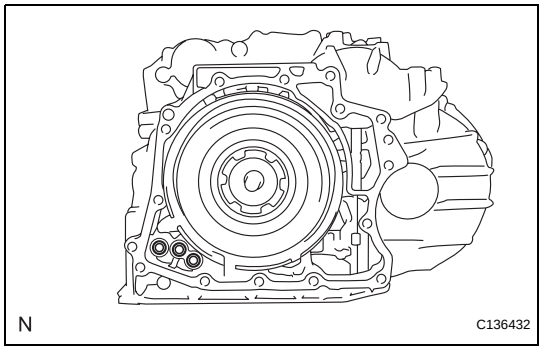
(c) Using a "TORX" wrench (T30), install the transaxle rear cover plate to the transaxle rear cover with the 2 "TORX" screws.
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)



(d) Coat the thrust needle roller bearing and thrust needle roller race with ATF and install it on the transaxle case.
Bearing diameter: mm (in.)

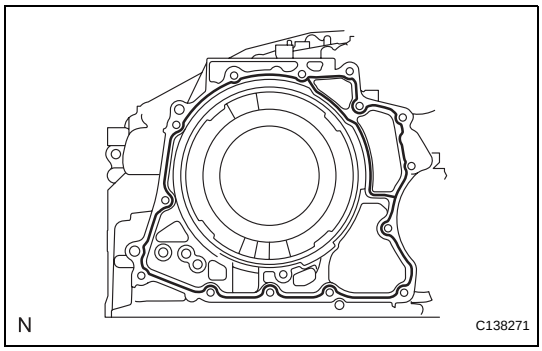
-	Inside	Outside
Bearing	48.9 (1.925)	72.0 (2.835)
Race	52.2 (2.055)	70.4 (2.772)

(e) Coat the 2 new oil seals with ATF and install them to the transaxle rear cover.

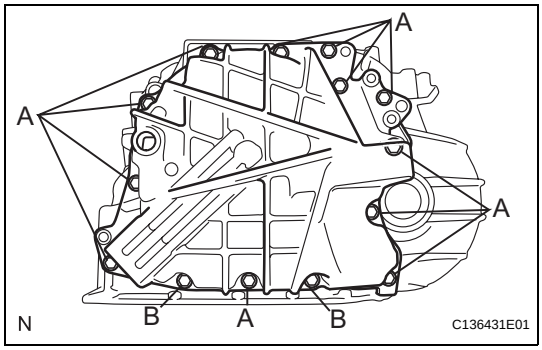


(f) Coat the 3 O-rings with ATF and install them to the transaxle case.
NOTICE:
Ensure that the 3 O-rings are not twisted.

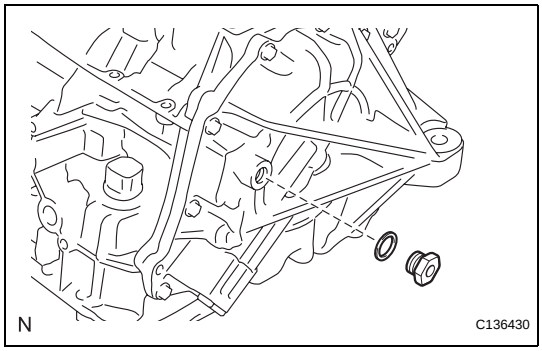
AX



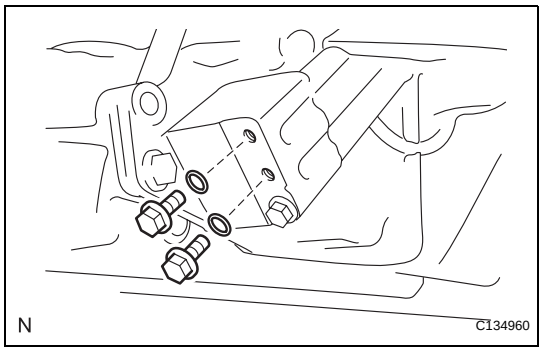
(g) Remove packing material from the contact surfaces between the transaxle rear cover and transaxle case.
NOTICE:
Make sure that there is no ATF on the contact surface.
FIPG:
Toyota Genuine Seal Packing 1281, Three Bond 1281 or equivalent.



(h) Install the transaxle rear cover to the transaxle case with the 14 bolts.
Torque: Bolt A
23 N*m (234 kgf*cm, 17 ft.*lbf)
Bolt B
17 N*m (173 kgf*cm, 12 ft.*lbf)

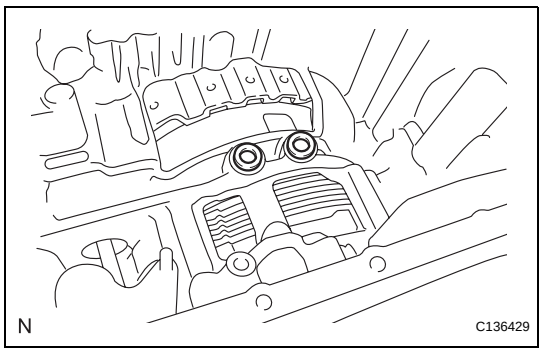


(i) Install a new gasket to the refill plug.
(j) Install the refill plug to the transaxle rear cover.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

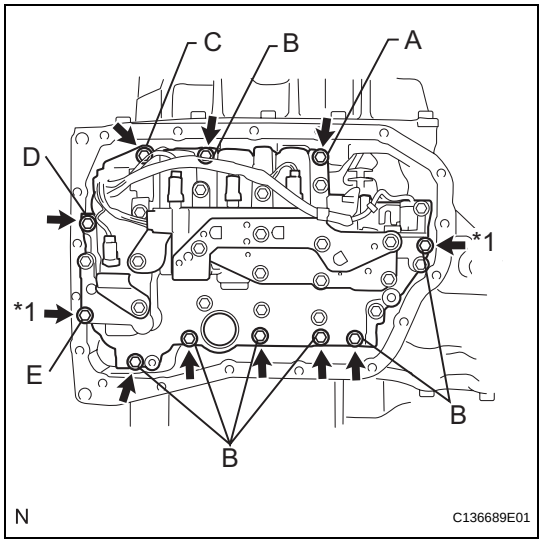


(k) Coat 2 new O-rings with ATF and install them to the 2 No. 1 automatic transaxle case plugs.
(l) Install the 2 No. 1 automatic transaxle case plugs to the transaxle rear cover.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)

53. INSPECT INPUT SHAFT END PLAY (See page AX-274)



54. INSTALL TRANSAXLE CASE GASKET
(a) Coat the 2 gaskets with ATF and install them to the transaxle case.

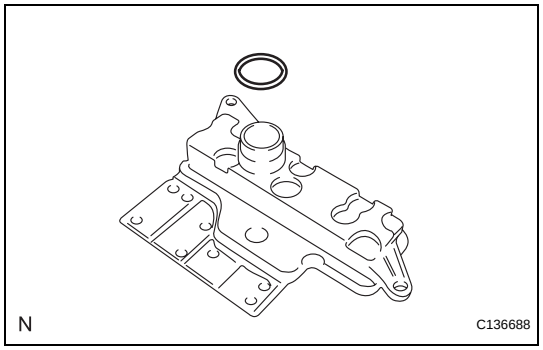


55. INSTALL TRANSMISSION VALVE BODY ASSEMBLY

(a) Install the valve body assembly to the transaxle case with the 11 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

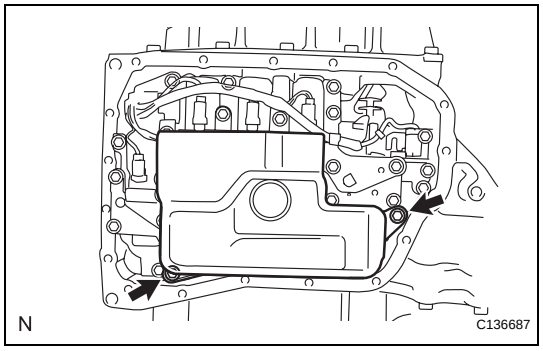
-	Bolt length
Bolt A	25 mm (0.98 in.)
Bolt B	30 mm (1.18 in.)
Bolt C	35 mm (1.38 in.)
Bolt D	45 mm (1.77 in.)
Bolt E	55 mm (2.17 in.)

NOTICE:
- **When installing the transmission valve body assembly, be careful not to allow the transmission revolution sensor and transaxle case to interfere each other.**
- **Be sure to insert the pin of the manual valve lever into the groove on the end of the manual valve.**
- **First, temporarily tighten the bolts marked by (*1) in the illustration because they are positioning bolts.**

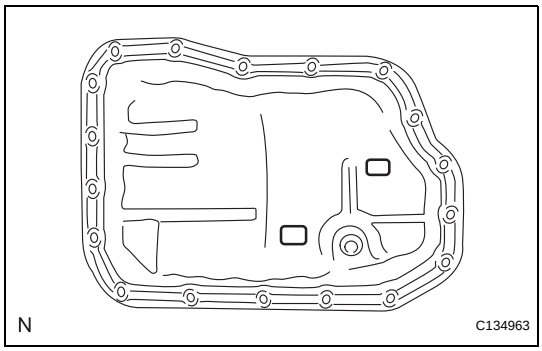


56. INSTALL VALVE BODY OIL STRAINER ASSEMBLY

(a) Coat a new O-ring with ATF and install it to the oil strainer assembly.
NOTICE:
Ensure that the O-ring is not twisted or pinched.



(b) Install the oil strainer assembly to the valve body assembly with the 2 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



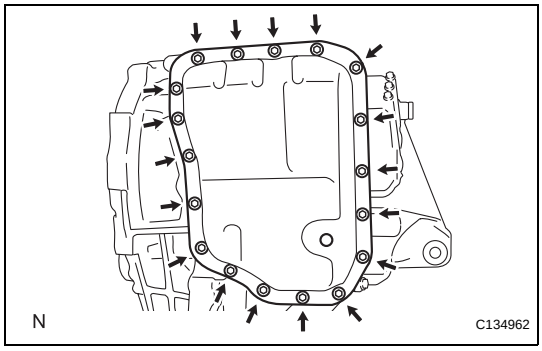
57. INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY

(a) Install the 2 magnets in the automatic transaxle oil pan sub-assembly.

(b) Apply sealant to the 18 bolts.

Sealant:

Toyota Genuine Seal Packing 1344, Three Bond 1344 or equivalent.

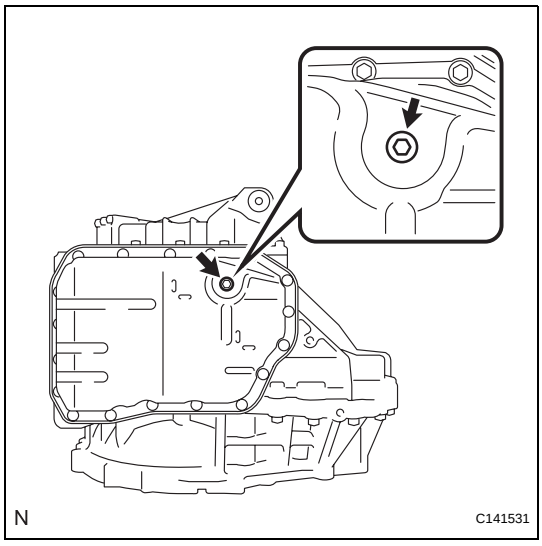


(c) Install the automatic transaxle oil pan sub-assembly and a new gasket to the transaxle case with the 18 bolts.

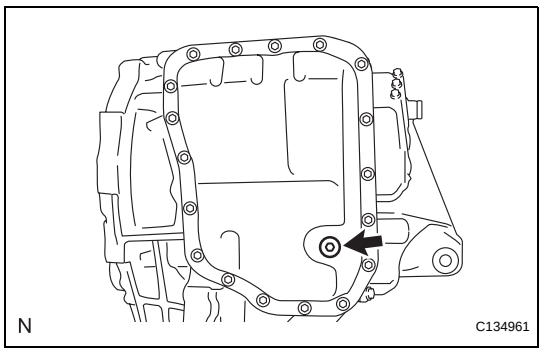
Torque: 7.5 N*m (76 kgf*cm, 66 in.*lbf)

NOTICE:

- **In order to ensure proper sealing of the transmission pan bolts, apply sealant to the bolts and install them within 10 minutes of sealant application.**
- **Completely remove any oil or grease from the contact surface of the transaxle case and oil pan sub-assembly with the gasket before installation.**



(d) Install the No. 1 oil filler tube from the automatic transaxle assembly.



(e) Install the overflow plug and a new gasket to the oil pun sub-assembly.

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

58. INSTALL NO. 1 TRANSAXLE CASE PLUG

(a) Install the 3 gaskets to the 3 hexagon bolts.

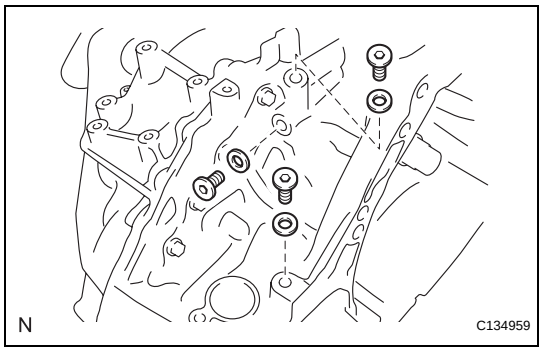
(b) Apply sealant to the 3 hexagon bolts.

Sealant:

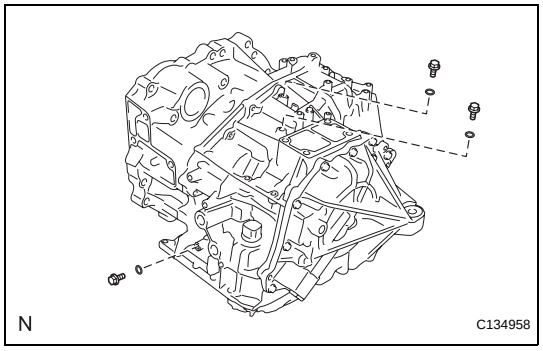
Toyota Genuine Seal Packing 1344, Three Bond 1344 or equivalent.

NOTICE:

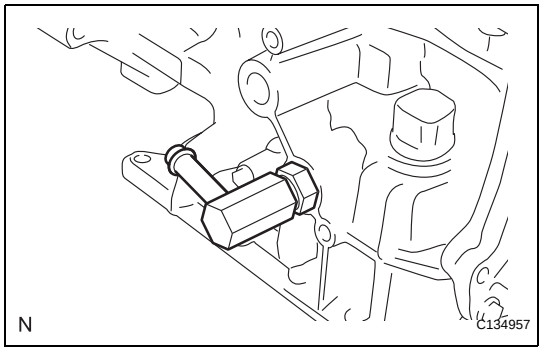
In order to ensure proper sealing of the hexagon bolts, apply sealant to the bolts and install them within 10 minutes of sealant application.



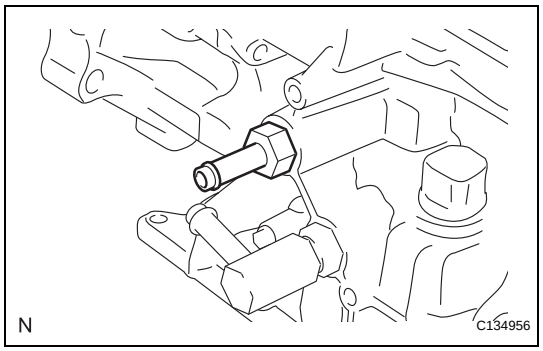
(c) Install the 3 hexagon bolts to the transaxle housing with the gaskets.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



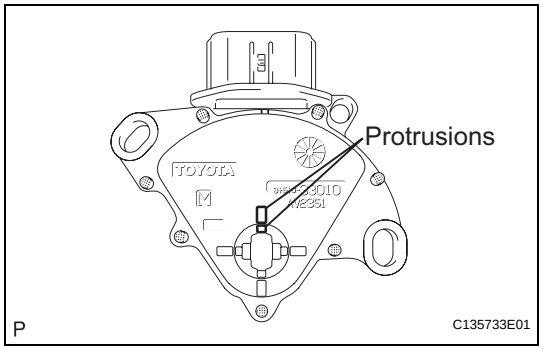
(d) Coat 3 new O-rings with the ATF and install them to the 3 No. 1 transaxle case plugs.
(e) Install the 3 No. 1 transaxle case plugs to the transaxle case.
Torque: 7.4 N*m (75 kgf*cm, 65 in.*lbf)



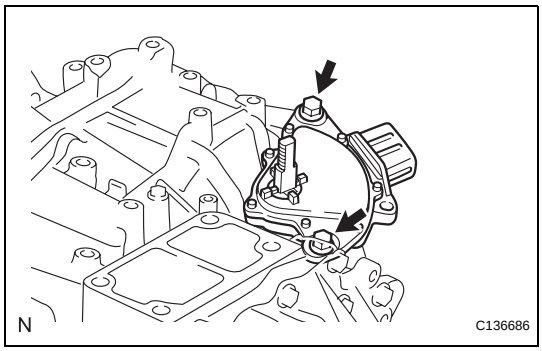
59. INSTALL OIL COOLER TUBE UNION (OUTLET OIL COOLER UNION)
(a) Coat a new O-ring with ATF and install it to the oil cooler tube union (outlet oil cooler union).
(b) Install the oil cooler tube union (outlet oil cooler union) to the transaxle case as shown in the illustration.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



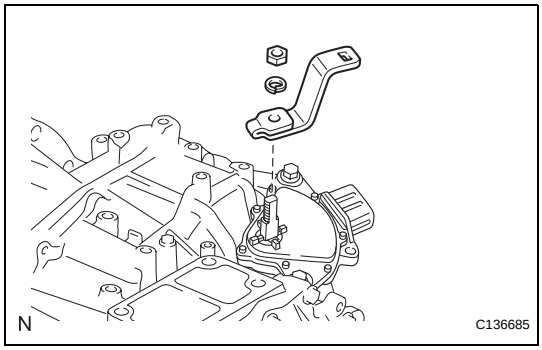
60. INSTALL OIL COOLER TUBE UNION (INLET OIL COOLER UNION)
(a) Coat a new O-ring with ATF and install it to the oil cooler tube union (inlet oil cooler union).
(b) Install the oil cooler tube union (inlet oil cooler union) to the transaxle case.
Torque: 27 N*m (275 kgf*cm, 20 ft.*lbf)



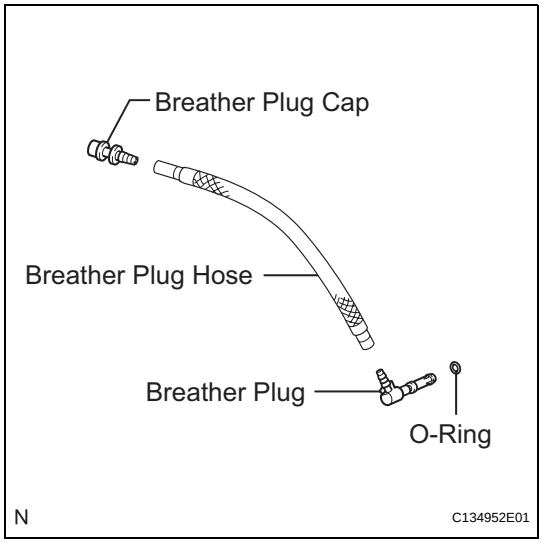
61. INSTALL PARK/NEUTRAL POSITION SWITCH ASSEMBLY
(a) Align the protrusions of the park/neutral position switch.



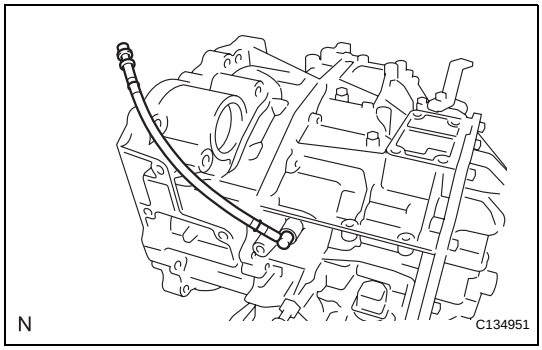
(b) Install the park/neutral position switch to the control shaft with the 2 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)
NOTICE:
- **Before installing the park/neutral position switch, remove any dirt or rust on the installation portion of the control shaft. Be sure to install the switch straight along the shaft while being careful not to deform the plate spring that supports the shaft. If the plate spring is deformed, the park/neutral switch cannot be reinstalled correctly.**
- **After installing the park/neutral position switch, confirm that the 2 protrusions on the switch are aligned.**



(c) Install the control shaft lever to the control shaft with the washer and nut.
Torque: 13 N*m (130 kgf*cm, 9 ft.*lbf)



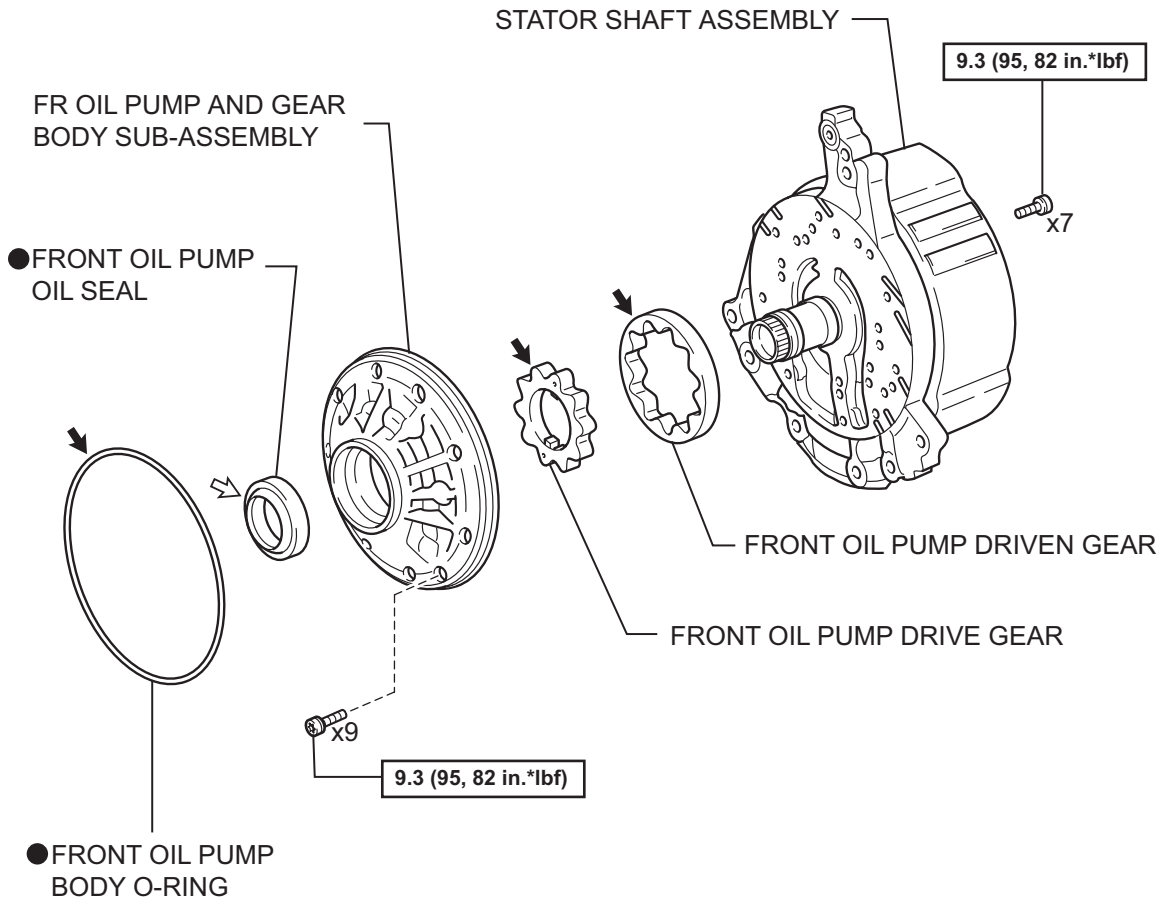
62. INSTALL BREATHER PLUG HOSE
(a) Install a new O-ring to the breather plug.
(b) Install the breather plug to the breather plug hose.
(c) Install the breather plug cap to the breather plug hose.



(d) Install the breather plug hose to the transaxle case.

OIL PUMP

COMPONENTS



N*m (kgf*cm, ft.*lbf): Specified torque

●Non-reusable part ⇦ Apply MP grease ⬅ Apply ATF WS

N

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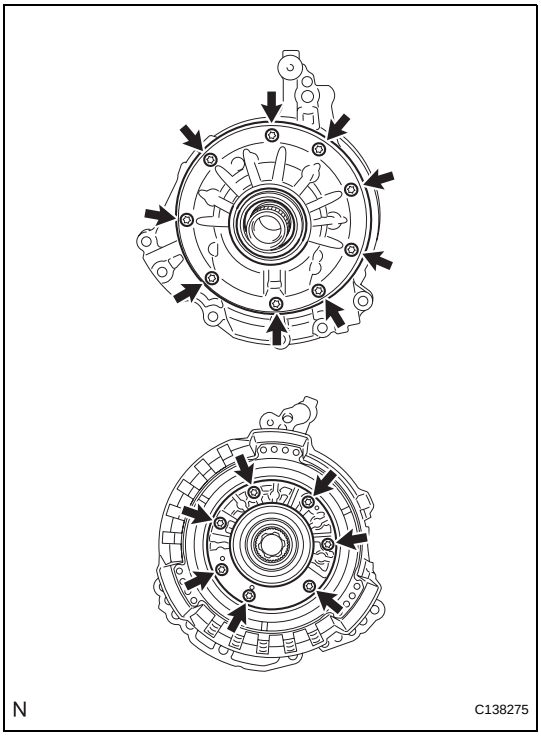
AX

DISASSEMBLY

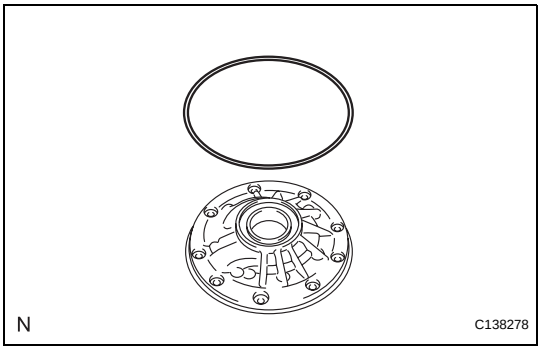
1. **INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY (See page AX-315)**

2. **REMOVE STATOR SHAFT ASSEMBLY**
   (a) Using a "TORX" wrench (T30), remove the 16 bolts and stator shaft assembly from the oil pump body.
   NOTICE:
   Keep the gears in the order of installation.

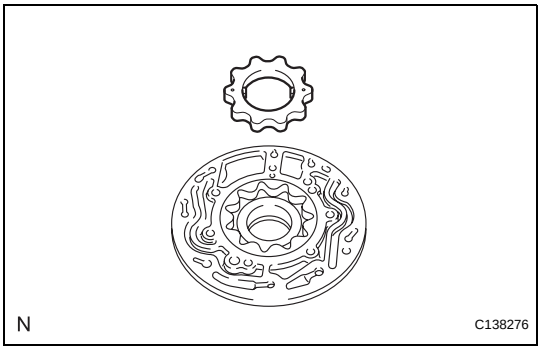
3. **INSPECT CLEARANCE OF FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY (See page AX-315)**

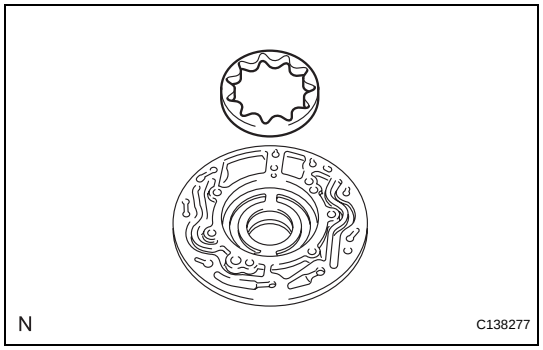


4. **REMOVE FRONT OIL PUMP BODY O-RING**
   (a) Remove the O-ring from the oil pump body.



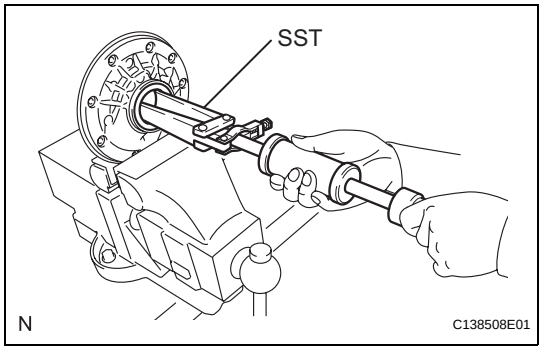
5. **REMOVE FRONT OIL PUMP DRIVE GEAR**
   (a) Remove the front oil pump drive gear from the oil pump body.





6. REMOVE FRONT OIL PUMP DRIVEN GEAR

(a) Remove the front oil pump driven gear from the oil pump body.



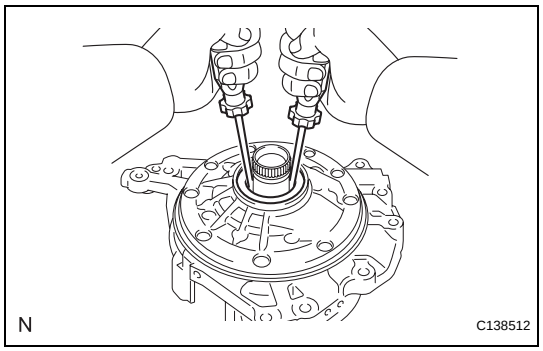
7. REMOVE FRONT OIL PUMP OIL SEAL

(a) Mount the oil pump in a soft jaw vise.

(b) Using SST, remove the oil seal from the oil pump body.

SST 09308-00010

INSPECTION

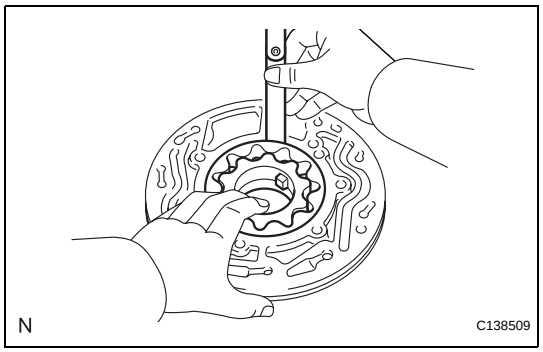


1. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Turn the drive gear with 2 screwdrivers and make sure that it rotates smoothly.

NOTICE:

Be careful not to damage the oil seal lip.



2. INSPECT CLEARANCE OF FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

(a) Push the driven gear to one side of the body.

(b) Using a feeler gauge, measure the clearance.

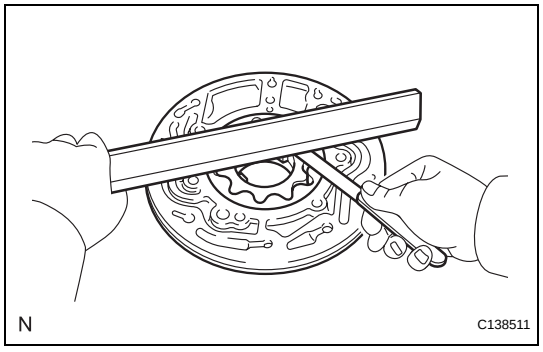
Standard clearance:

0.08 to 0.15 mm (0.0031 to 0.0059 in.)

Maximum clearance:

0.15 mm (0.0059 in.)

If the clearance is greater than the maximum, replace the oil pump body sub-assembly.



(c) Using a straight edge and feeler gauge, measure the side clearance of both gears.

Standard side clearance:

0.025 to 0.04 mm (0.0010 to 0.0016 in.)

Maximum side clearance:

0.04 mm (0.0016 in.)

Drive gear thickness:

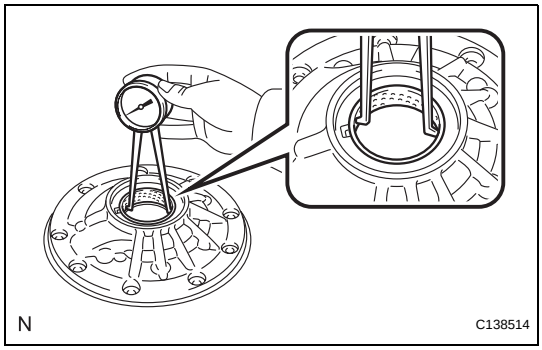
Mark	Thickness
-	11.547 to 11.555 mm (0.4546 to 0.4549 in.)
-	11.555 to 11.563 mm (0.4549 to 0.4552 in.)
-	11.564 to 11.571 mm (0.4553 to 0.4556 in.)

AX

Mark	Thickness
-	11.572 to 11.579 mm (0.4556 to 0.4559 in.)
-	11.580 to 11.587 mm (0.4559 to 0.4562 in.)

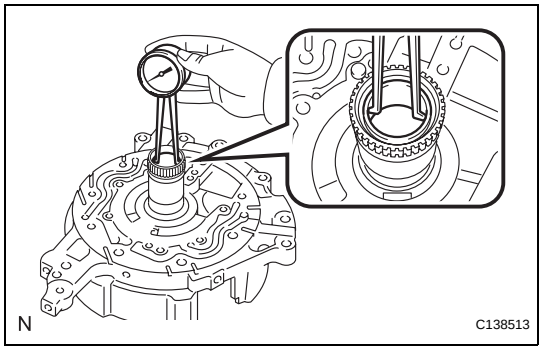
Driven gear thickness:

Mark	Thickness
-	11.547 to 11.555 mm (0.4546 to 0.4549 in.)
-	11.555 to 11.563 mm (0.4549 to 0.4552 in.)
-	11.564 to 11.571 mm (0.4553 to 0.4556 in.)
-	11.572 to 11.579 mm (0.4556 to 0.4559 in.)
-	11.580 to 11.587 mm (0.4559 to 0.4562 in.)



3. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY

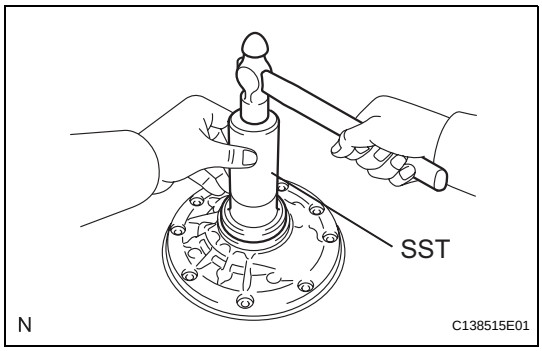
(a) Using a dial indicator, measure the inside diameter of the oil pump body bushing.
Standard inside diameter:
43.113 to 43.138 mm (1.6974 to 1.6983 in.)
Maximum inside diameter:
43.188 mm (1.7003 in.)
If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.



4. INSPECT STATOR SHAFT ASSEMBLY

(a) Using a dial indicator, measure the inside diameter of the oil pump body bushing.
Standard inside diameter:
22.500 to 22.526 mm (0.8858 to 0.8868 in.)
Maximum inside diameter:
22.570 mm (0.8886 in.)
If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.

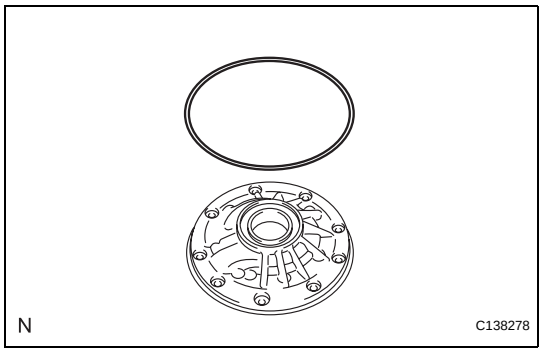
REASSEMBLY



1. INSTALL FRONT OIL PUMP OIL SEAL

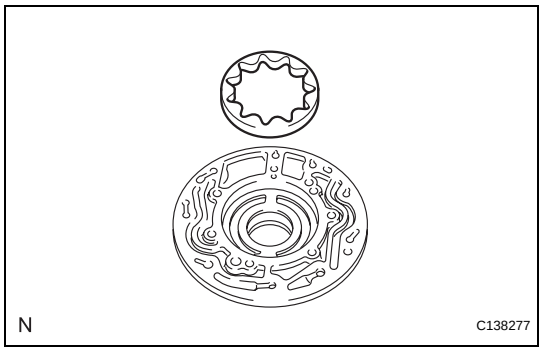
(a) Using SST and a hammer, install a new oil seal to the oil pump body.
SST 09350-32014 (09351-32140)
NOTICE:
The seal end should be level with the outer edge of the oil pump.

(b) Coat the lip of the oil seal with MP grease.



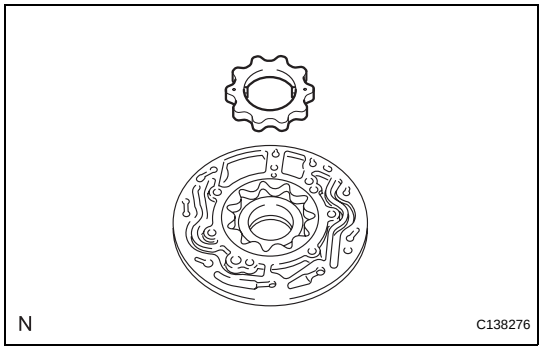
2. INSTALL FRONT OIL PUMP BODY O-RING

(a) Coat a new O-ring with ATF and install it to the oil pump body.
NOTICE:
Ensure that the O-ring is not twisted.



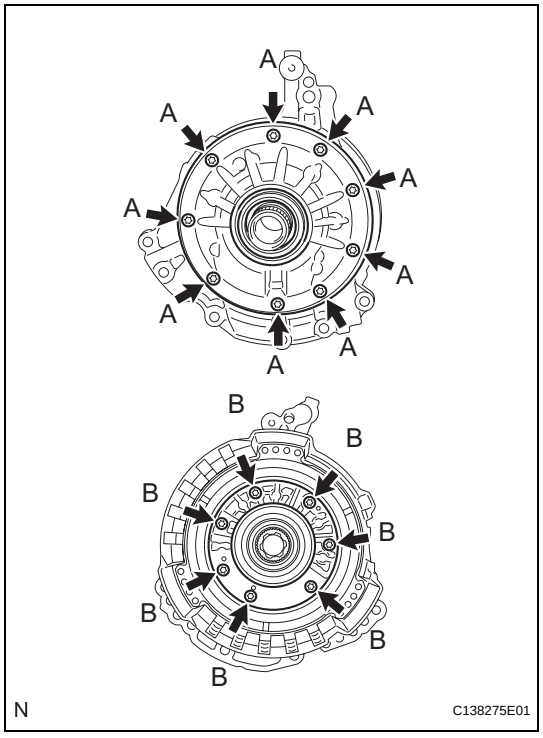
3. INSTALL FRONT OIL PUMP DRIVEN GEAR

(a) Coat the front oil pump driven gear with ATF and install it to the oil pump body with the marked side up.



4. INSTALL FRONT OIL PUMP DRIVE GEAR

(a) Coat the front oil pump drive gear with ATF, and install it to the oil pump body with the marked side up.



5. INSTALL STATOR SHAFT ASSEMBLY

(a) Align each knock pin of the stator shaft with the holes in the oil pump body and install the stator shaft to the oil pump body with the 16 bolts.

(b) Using a "TORX" socket (T30), install the 11 bolts.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)

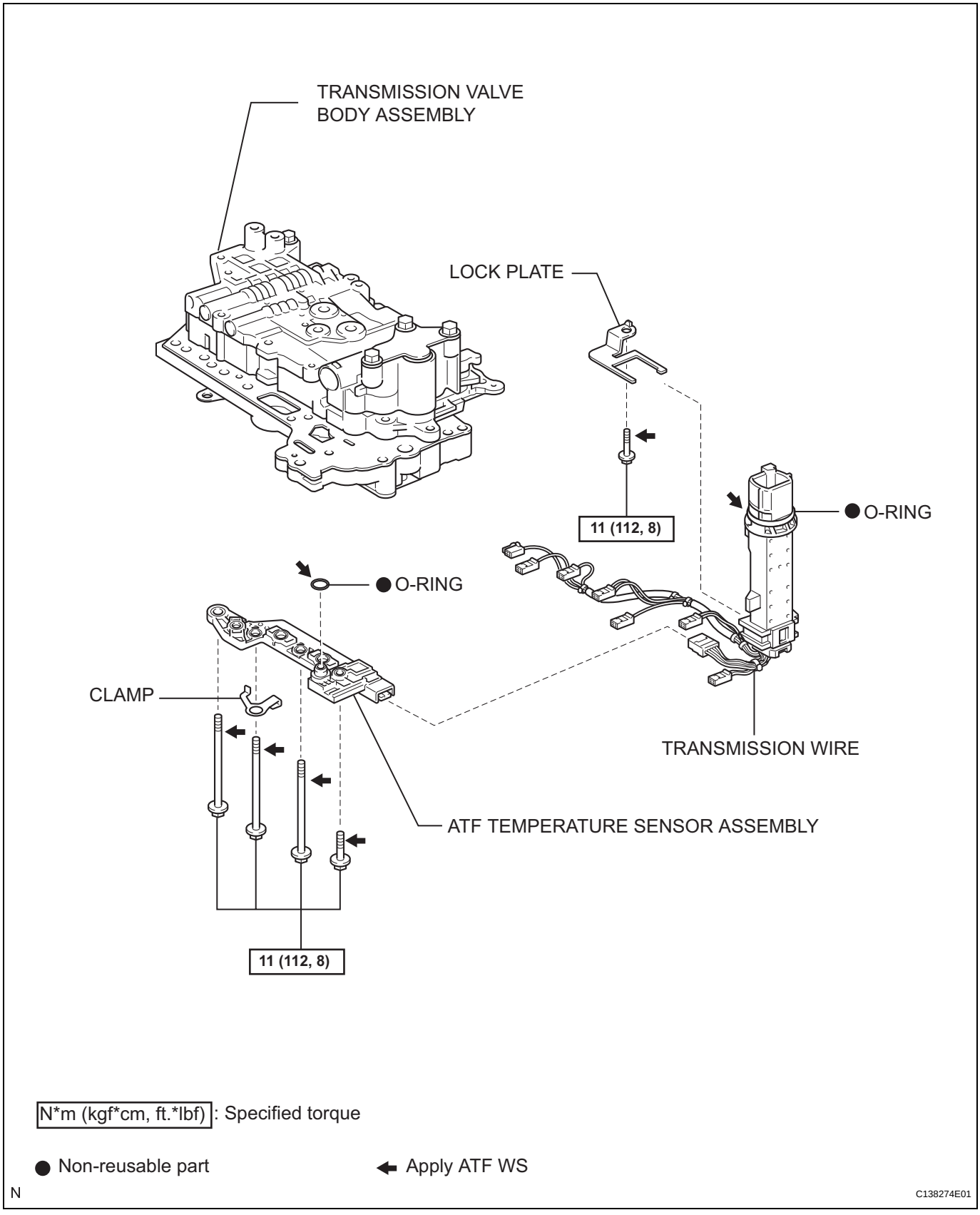
-	Bolt length:
Bolt A	14 mm (0.55 in)
Bolt B	26 mm (1.02 in)

6. INSPECT FRONT OIL PUMP AND GEAR BODY SUB-ASSEMBLY (See page AX-315)

SHIFT SOLENOID VALVE

COMPONENTS

AX



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ Apply ATF WS

N

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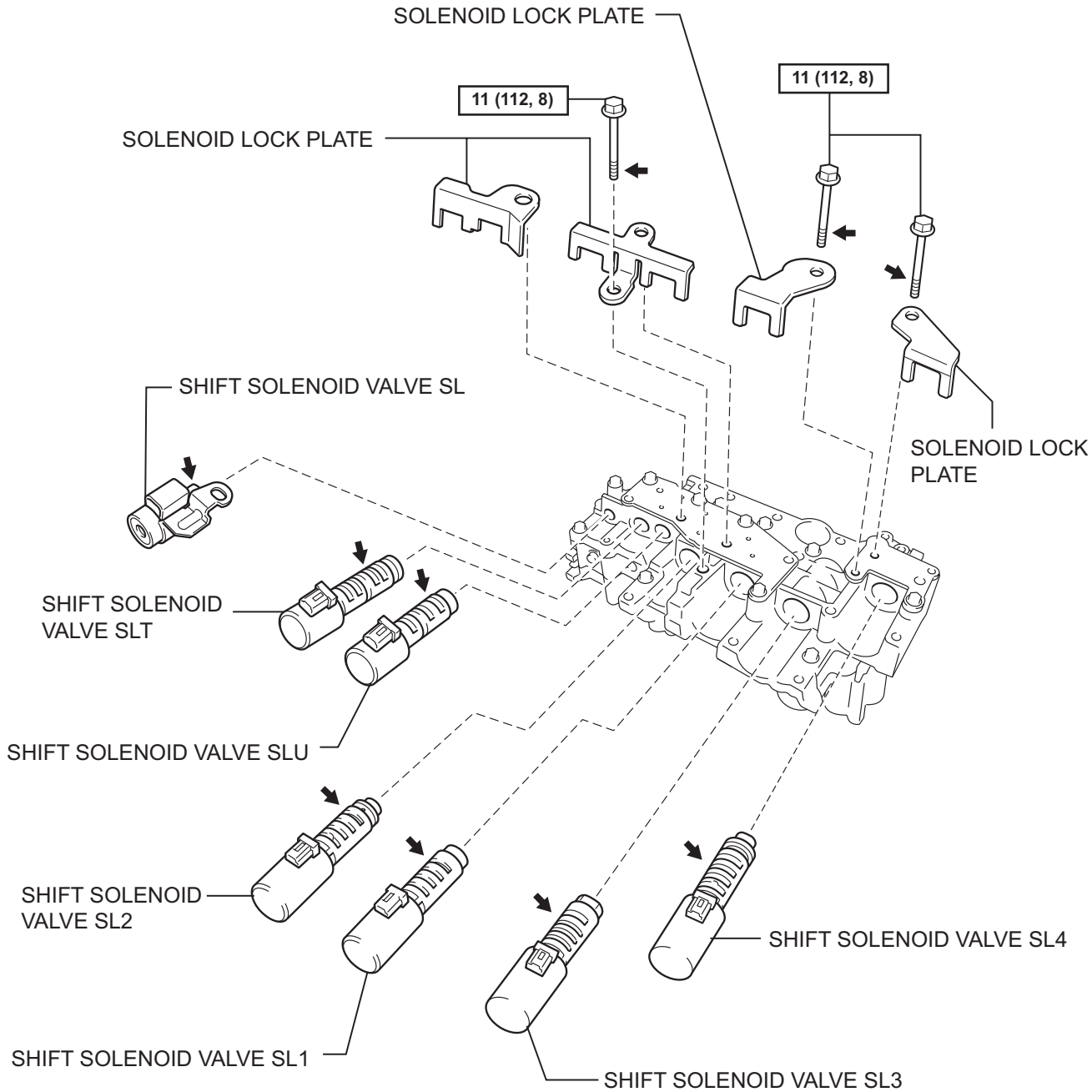

N*m (kgf*cm, ft.*lbf): Specified torque

Apply ATF WS

N

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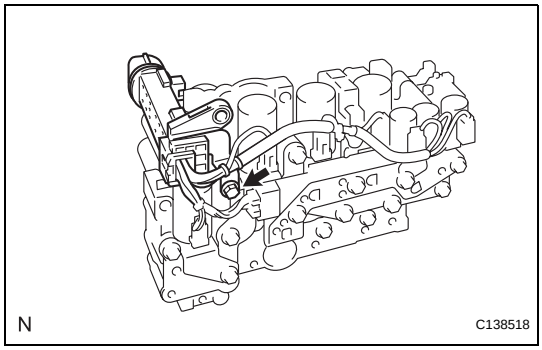
AX

REMOVAL

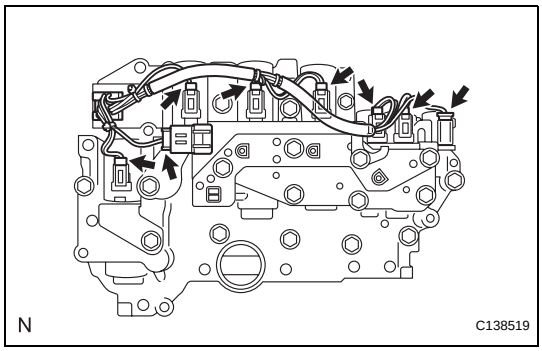
1. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY** (See page AX-207)
2. **REMOVE AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-182)**
3. **REMOVE VALVE BODY OIL STRAINER ASSEMBLY (See page AX-182)**
4. **REMOVE TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**

DISASSEMBLY

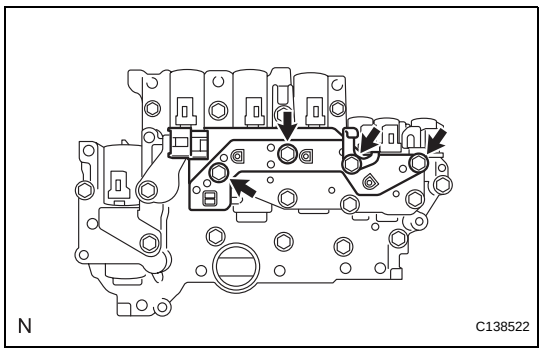
1. **REMOVE TRANSMISSION WIRE**
   (a) Disconnect the connector from the transmission wire.
   (b) Remove the bolt and lock plate from the valve body assembly.



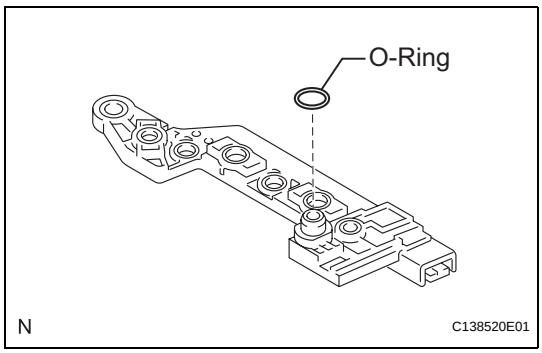
   (c) Disconnect the 8 connectors and remove the transmission wire from the valve body assembly.

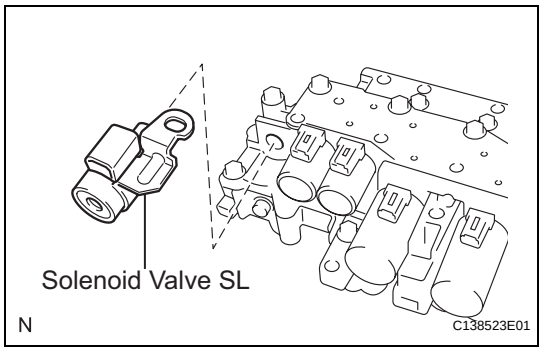


2. **REMOVE ATF TEMPERATURE SENSOR ASSEMBLY**
   (a) Remove the 4 bolts, ATF temperature sensor assembly and clamp from the valve body assembly.



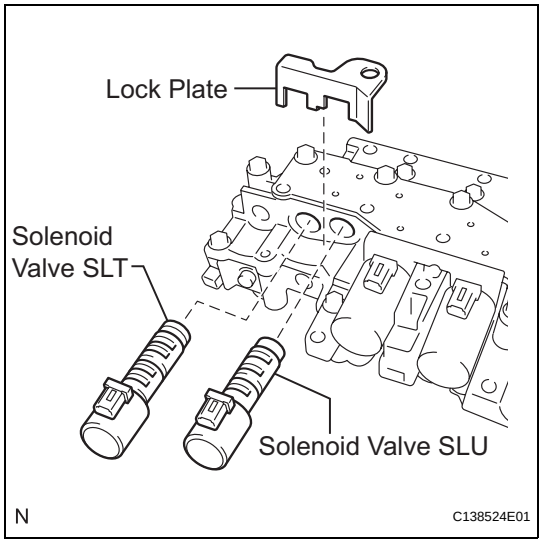
   (b) Remove the O-ring from the ATF temperature sensor assembly. O-ring





3. REMOVE SHIFT SOLENOID VALVE SL

(a) Remove the shift solenoid valve SL from the valve body assembly.

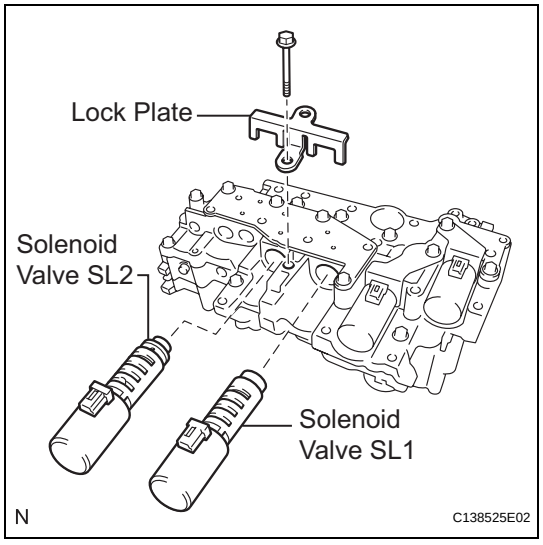


4. REMOVE SHIFT SOLENOID VALVE SLT

(a) Remove the lock plate and shift solenoid valve SLT from the valve body assembly

5. REMOVE SHIFT SOLENOID VALVE SLU

(a) Remove the shift solenoid valve SLU from the valve body assembly.



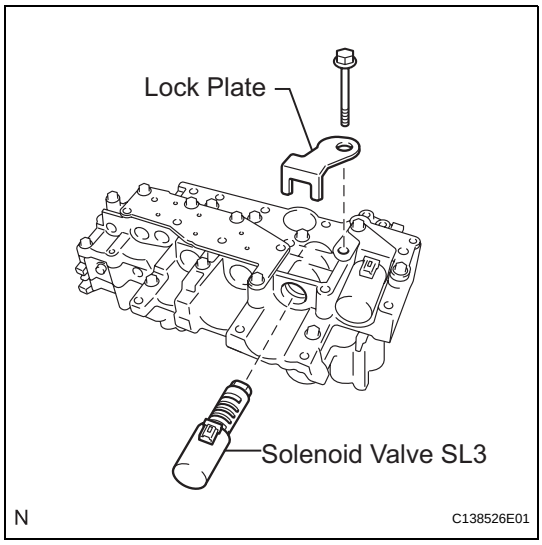
6. REMOVE SHIFT SOLENOID VALVE SL2

(a) Remove the bolt, lock plate and shift solenoid valve SL2 from the valve body assembly.

7. REMOVE SHIFT SOLENOID VALVE SL1

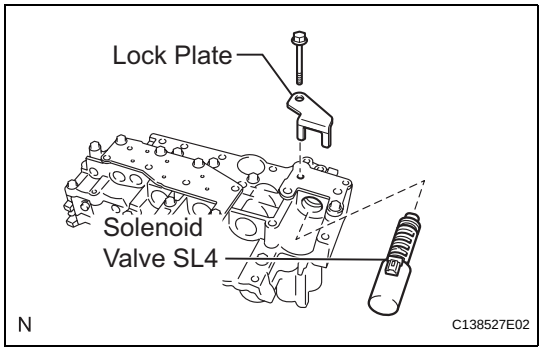
(a) Remove the shift solenoid valve SL1 from the valve body assembly.

AX



8. REMOVE SHIFT SOLENOID VALVE SL3

(a) Remove the bolt, lock plate and shift solenoid valve SL3 from the valve body assembly.



9. REMOVE SHIFT SOLENOID VALVE SL4

(a) Remove the bolt, lock plate and shift solenoid valve SL4 from the valve body assembly.

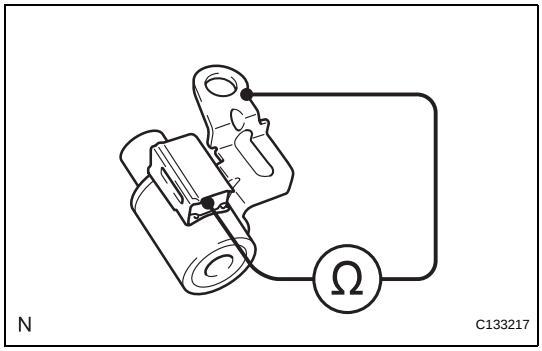
INSPECTION

1. INSPECT SHIFT SOLENOID VALVE SL

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
Solenoid Connector (SL) - Solenoid Body (SL)	11 to 15 Ω



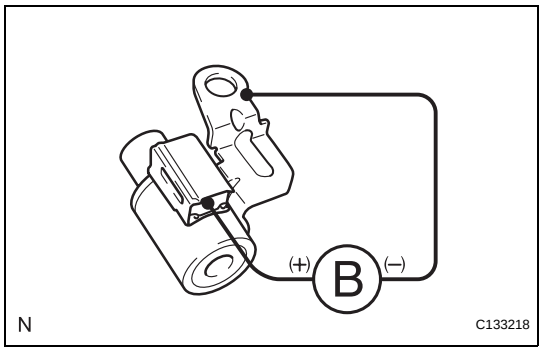
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

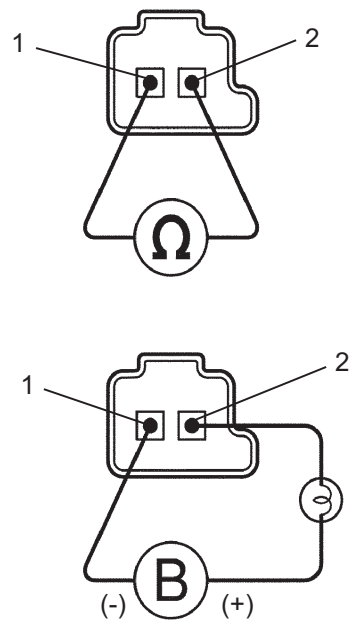
OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



Shift Solenoid Valve SLT:



2. INSPECT SHIFT SOLENOID VALVE SLT

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

If the value is not as specified, replace the shift solenoid valve.

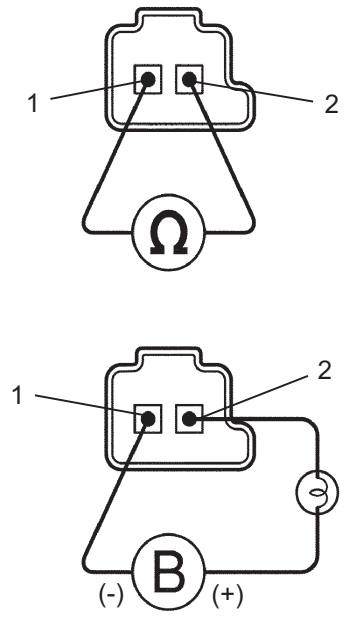
(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.

Shift Solenoid Valve SLU:



3. INSPECT SHIFT SOLENOID VALVE SLU

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

If the value is not as specified, replace the shift solenoid valve.

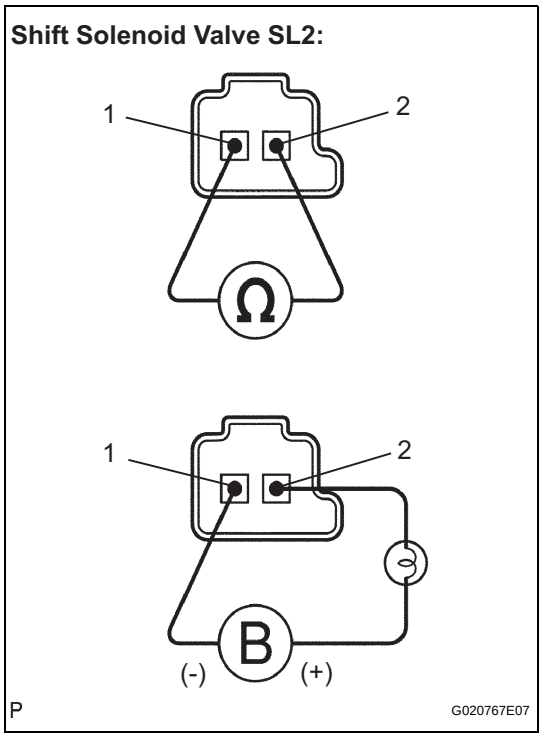
(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.

AX



4. INSPECT SHIFT SOLENOID VALVE SL2

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

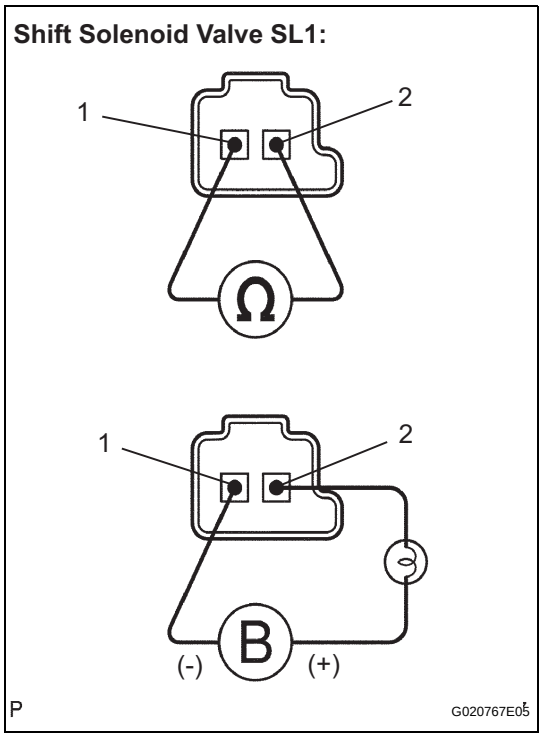
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



5. INSPECT SHIFT SOLENOID VALVE SL1

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

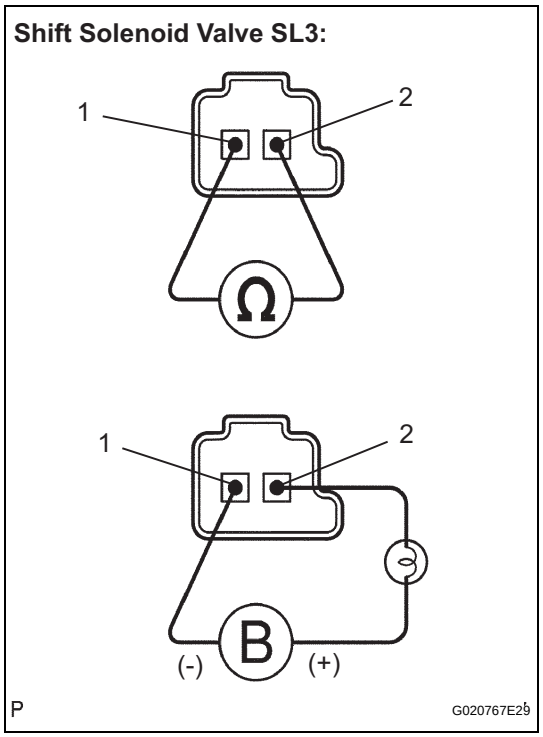
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



6. INSPECT SHIFT SOLENOID VALVE SL3

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

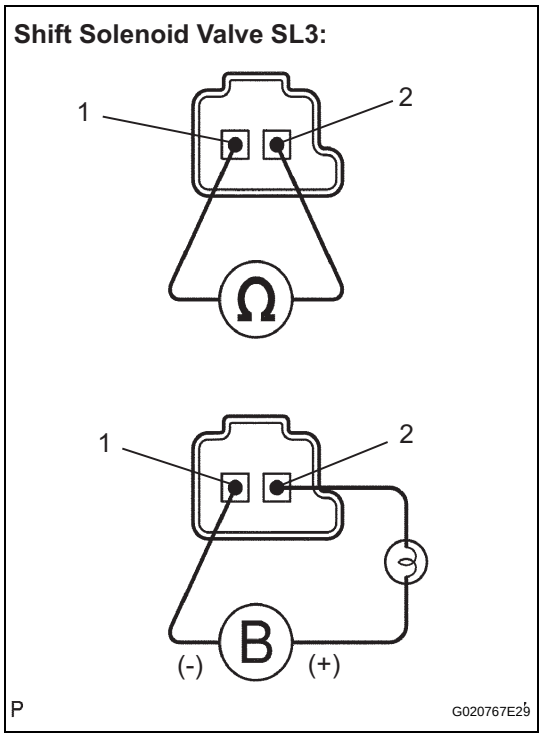
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



7. INSPECT SHIFT SOLENOID VALVE SL4

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Specified Condition 20°C (68°F)
1 - 2	5.0 to 5.6 Ω

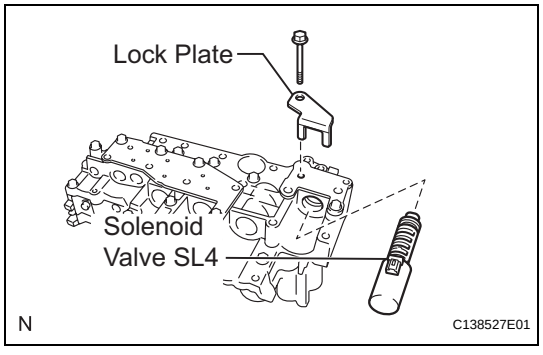
If the value is not as specified, replace the shift solenoid valve.

(b) Connect the positive (+) lead with a 21 W bulb to terminal 2 and the negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the shift solenoid valve.

OK:

The solenoid makes an operating noise.

If the operation is not as specified, replace the shift solenoid valve.



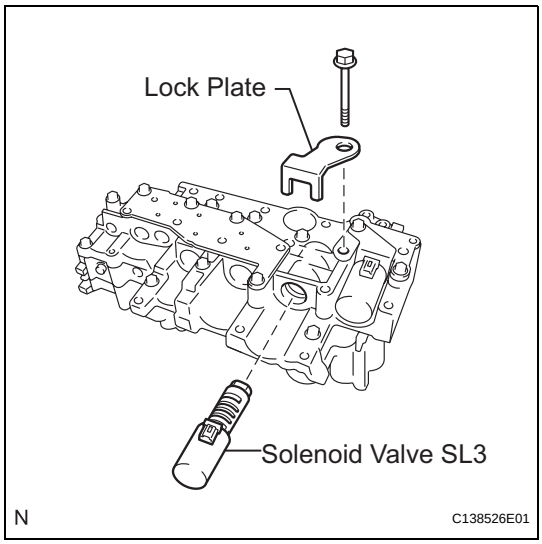
REASSEMBLY

1. INSTALL SHIFT SOLENOID VALVE SL4

(a) Coat the shift solenoid valve SL4 and bolt with ATF.

(b) Install the shift solenoid valve SL4 and lock plate to the valve body assembly with the bolt.

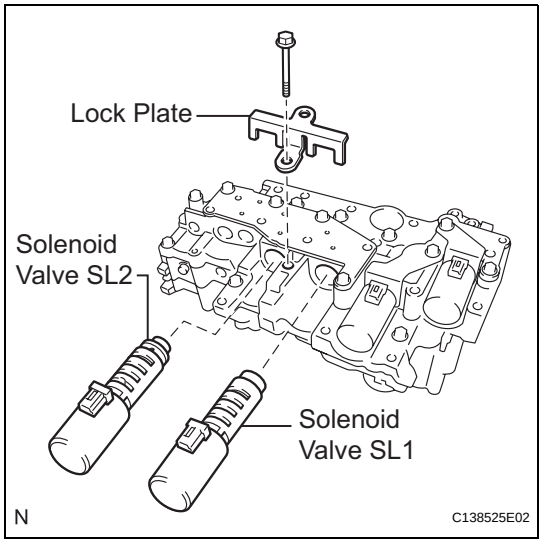
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



2. INSTALL SHIFT SOLENOID VALVE SL3

(a) Coat the shift solenoid valve SL3 and bolt with ATF.

(b) Install the shift solenoid valve SL3 and lock plate to the valve body assembly with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



3. INSTALL SHIFT SOLENOID VALVE SL1

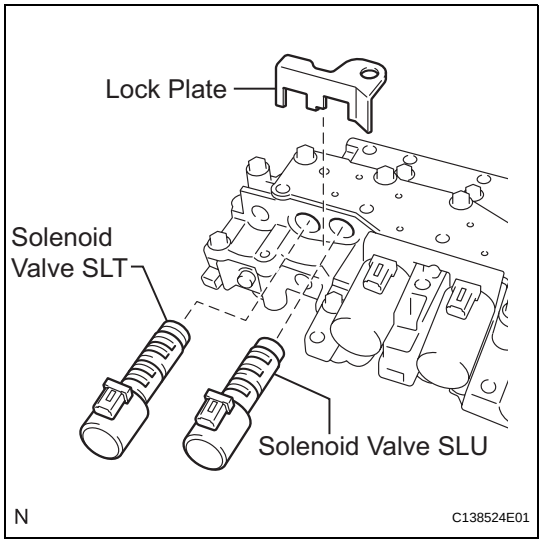
(a) Coat the shift solenoid valve SL1 with ATF.

(b) Install the shift solenoid valve SL1 to the valve body assembly.

4. INSTALL SHIFT SOLENOID VALVE SL2

(a) Coat the shift solenoid valve SL2 and bolt with ATF.

(b) Install the shift solenoid valve SL2 and lock plate to the valve body assembly with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)



5. INSTALL SHIFT SOLENOID VALVE SLU

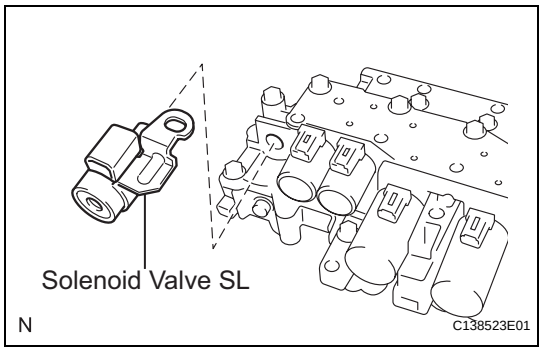
(a) Coat the shift solenoid valve SLU with ATF.

(b) Install the shift solenoid valve SLU to the valve body assembly.

6. INSTALL SHIFT SOLENOID VALVE SLT

(a) Coat the shift solenoid valve SLT with ATF.

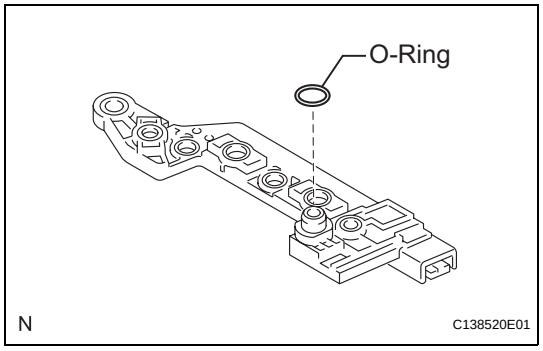
(b) Install the shift solenoid valve SLT and lock plate to the valve body assembly.



7. INSTALL SHIFT SOLENOID VALVE SL

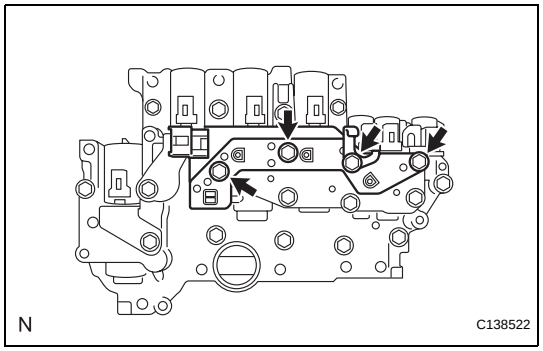
(a) Coat the shift solenoid valve SL with ATF.

(b) Install the shift solenoid valve SL to the valve body assembly.



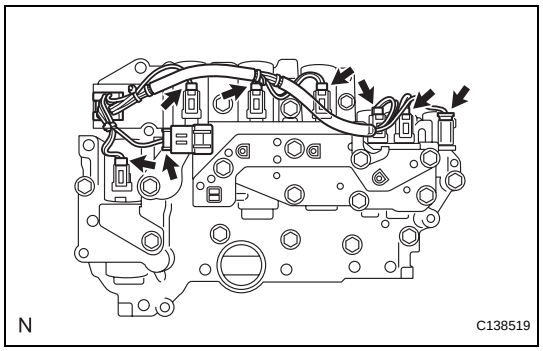
8. INSTALL ATF TEMPERATURE SENSOR ASSEMBLY

(a) Coat a new O-ring with ATF and install it to the ATF temperature sensor assembly.



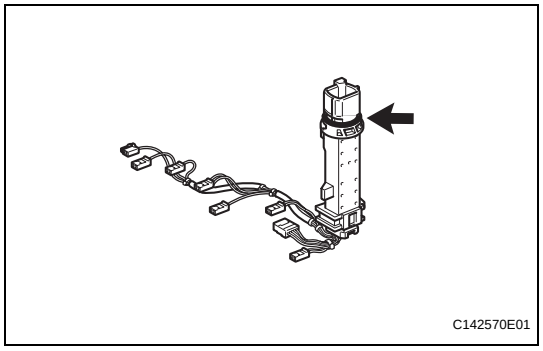
(b) Coat the 4 bolts with ATF.

(c) Install the ATF temperature sensor assembly and clamp to the valve body assembly with the 4 bolts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

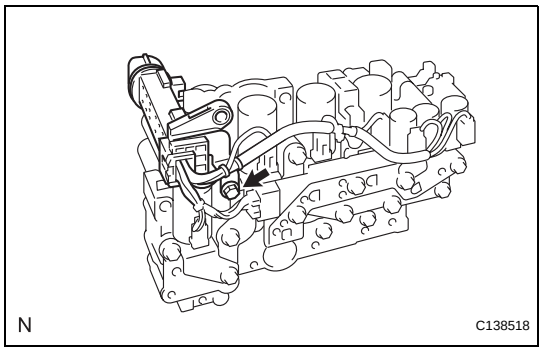


9. INSTALL TRANSMISSION WIRE

(a) Connect the 8 connectors to the valve body assembly.



(b) Coat the O-ring with ATF.



(c) Coat the bolt with ATF.
(d) Install the transmission wire and lock plate to the valve body assembly with the bolt.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

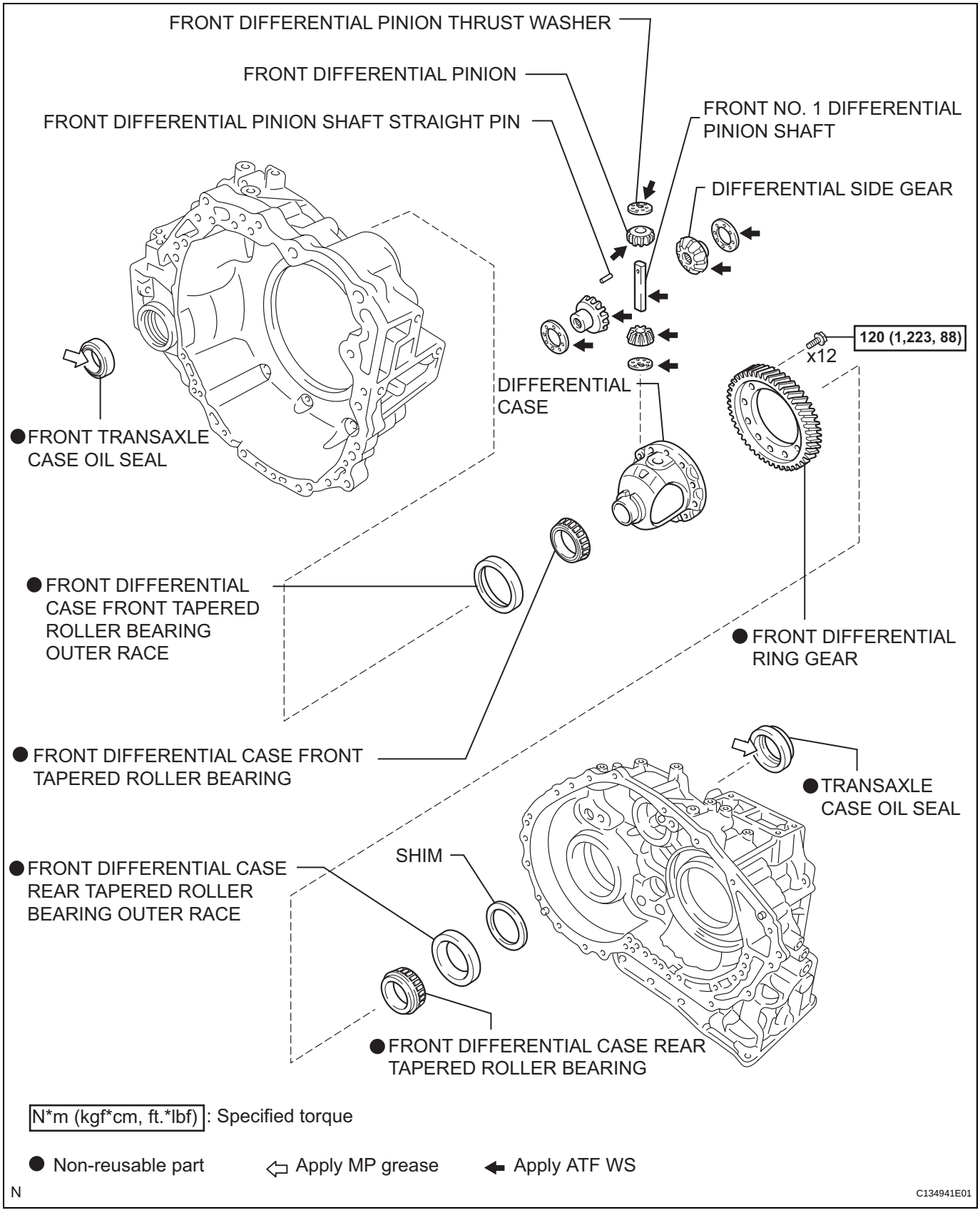
AX

INSTALLATION

1. **INSTALL TRANSMISSION VALVE BODY ASSEMBLY (See page AX-183)**
2. **INSTALL VALVE BODY OIL STRAINER ASSEMBLY (See page AX-184)**
3. **INSTALL AUTOMATIC TRANSAXLE OIL PAN SUB-ASSEMBLY (See page AX-185)**
4. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY** (See page AX-214)

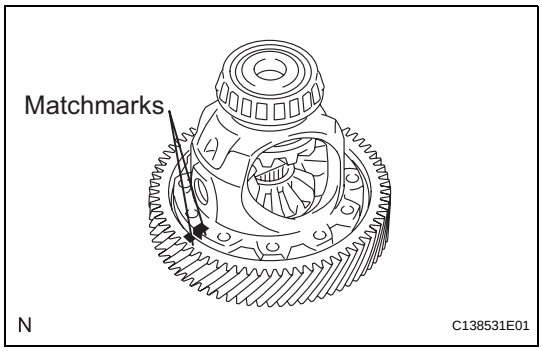
DIFFERENTIAL CASE

COMPONENTS



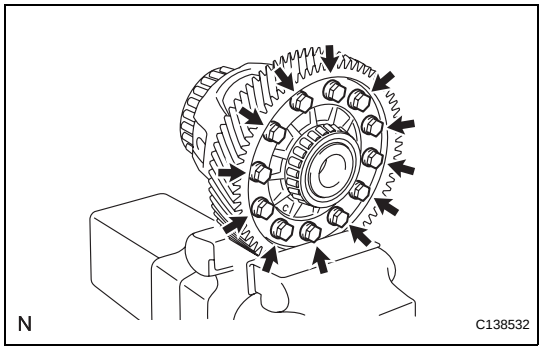
AX

DISASSEMBLY

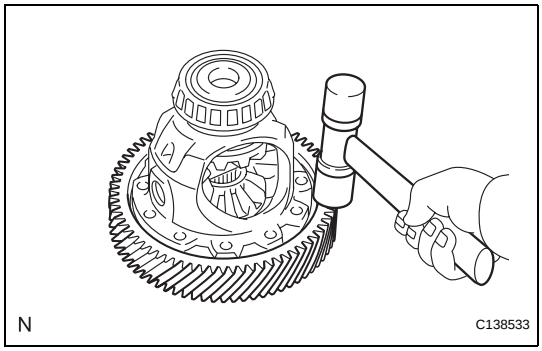


1. REMOVE FRONT DIFFERENTIAL RING GEAR

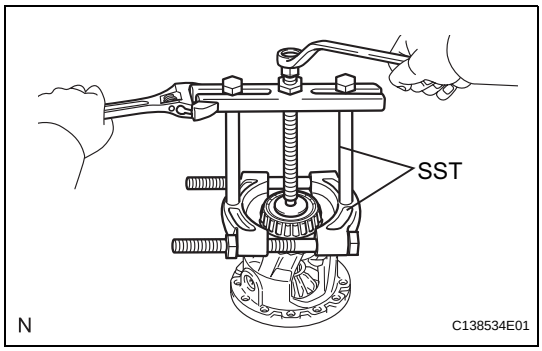
(a) Put matchmarks on the front differential ring gear and differential case.



(b) Remove the 12 bolts.



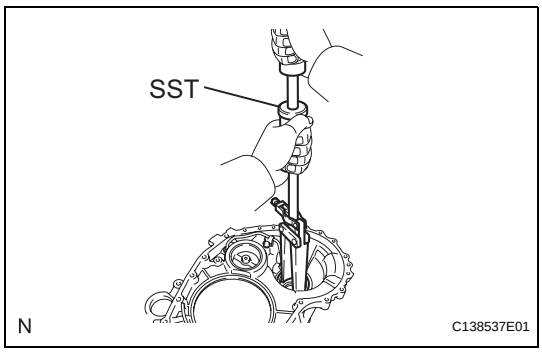
(c) Using a plastic hammer, tap on the front differential ring gear to remove it from the case.



2. REMOVE FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

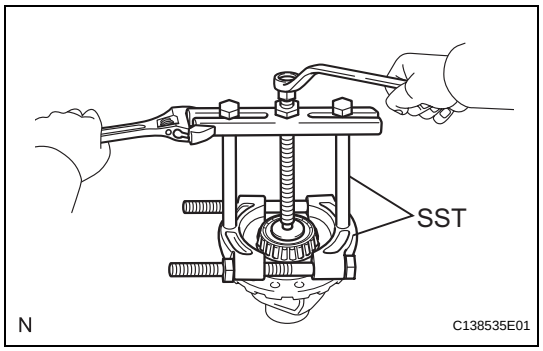
(a) Using SST, remove the front differential case front tapered roller bearing from the differential case.

SST 09950-00020, 09950-00030, 09950-60010 (09951-00480)



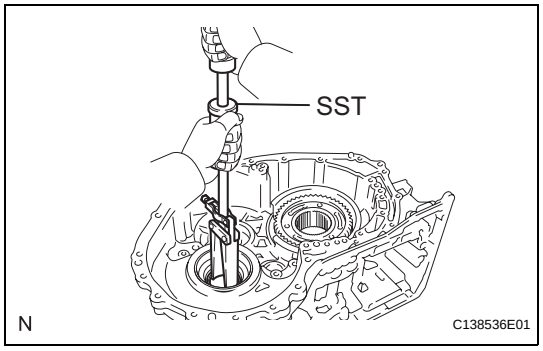
(b) Using SST, remove the front differential case front tapered roller bearing outer race and shim from the transaxle housing.

SST 09308-00010

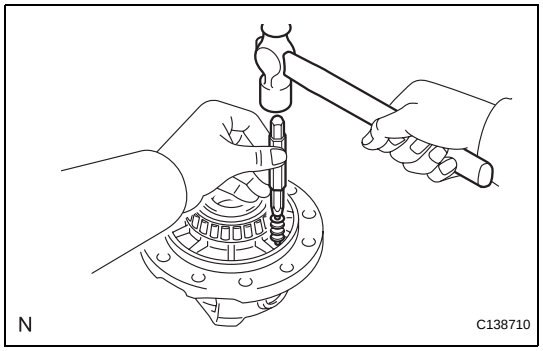


3. REMOVE FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST, remove the front differential case rear tapered roller bearing from the differential case.
SST 09950-00020, 09950-00030, 09950-60010 (09951-00480)

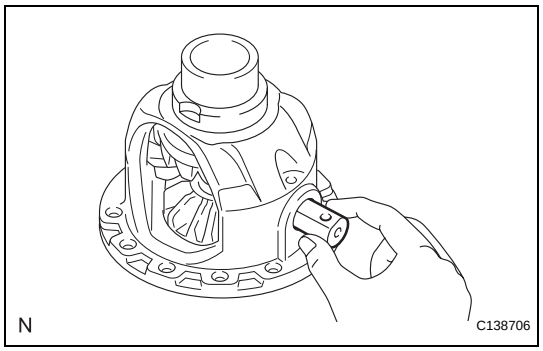


(b) Using SST, remove the front differential case rear tapered roller bearing outer race from the transaxle case.
SST 09308-00010



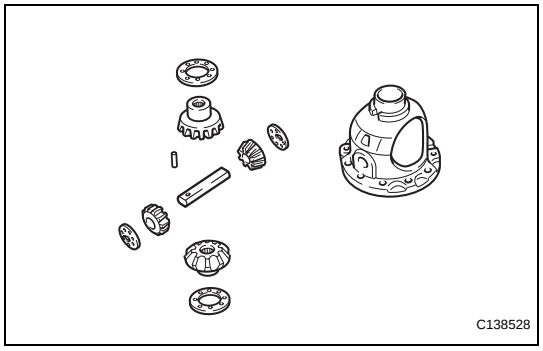
4. REMOVE FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

(a) Using a pin punch (3 mm) and hammer, remove the straight pin.
NOTICE:
Before removing the straight pin, unstake it with a pin punch.



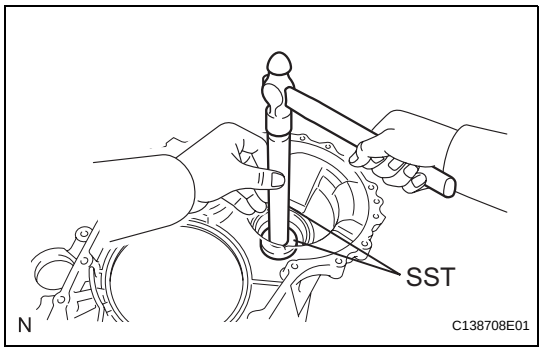
5. REMOVE FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Remove the front No. 1 differential pinion shaft from the differential case.



6. REMOVE DIFFERENTIAL SIDE GEAR

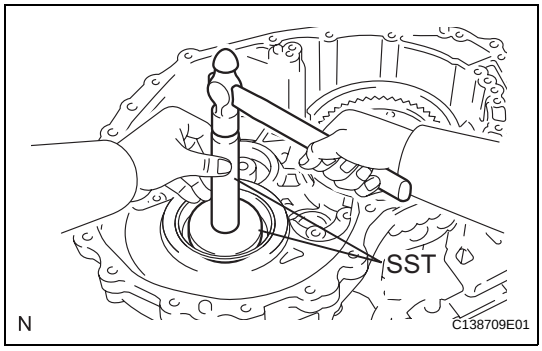
(a) Remove the 2 front differential pinions, 2 pinion thrust washers, 2 front differential side gears, and 2 side gear thrust washers from the differential case.



7. REMOVE FRONT TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, remove the front transaxle case oil seal from the transaxle housing.

SST 09950-60010 (09951-00540), 09950-70010 (09951-07200)

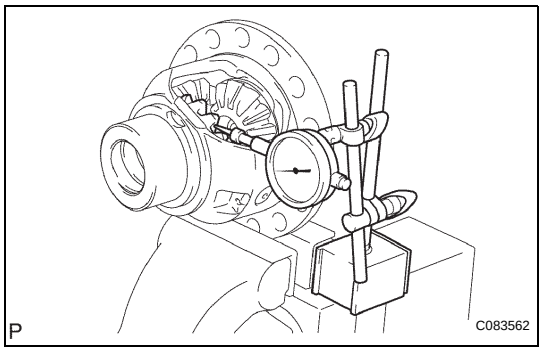


8. REMOVE TRANSAXLE CASE OIL SEAL

(a) Using SST and a hammer, remove the transaxle case oil seal from transaxle case.

SST 09950-60010 (09951-00650), 09950-70010 (09951-07100)

INSPECTION



1. INSPECT DIFFERENTIAL SIDE GEAR BACKLASH

(a) Hold the differential case in a vise between aluminum plates.

NOTICE:

Do not overtighten the vise.

(b) Place a dial indicator on the tip of the side gear tooth at a right angle.

(c) Hold the pinion gear in the differential case and measure the backlash of the side gear.

Standard backlash:

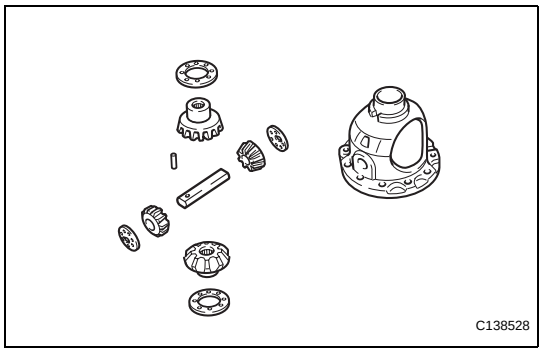
0 to 0.15 mm (0 to 0.0059 in.)

Thrust washer thickness

Thickness	Thickness
1.50 mm (0.0591 in.)	1.75 mm (0.0689 in.)
1.55 mm (0.0610 in.)	1.80 mm (0.0709 in.)
1.60 mm (0.0630 in.)	1.85 mm (0.07283 in.)
1.65 mm (0.0650 in.)	1.90 mm (0.07480 in.)
1.70 mm (0.0669 in.)	-

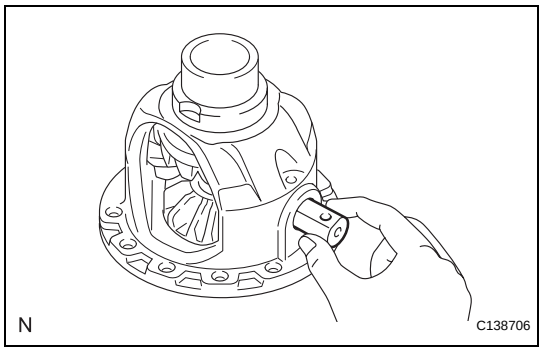
If the backlash is greater than the standard range, select another side gear thrust washer.

REASSEMBLY



1. INSTALL DIFFERENTIAL SIDE GEAR

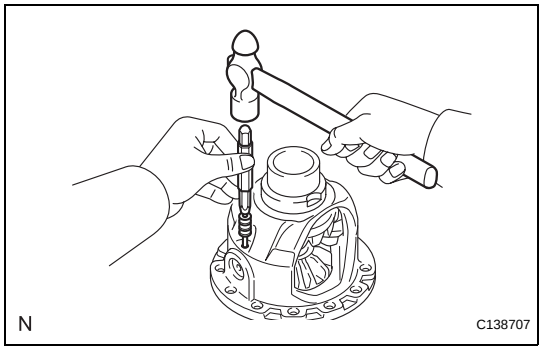
(a) Coat the 2 front differential side gears, 2 side gear thrust washers, 2 front differential pinions and 2 pinion thrust washers with ATF and install them to the differential case.



2. INSTALL FRONT NO. 1 DIFFERENTIAL PINION SHAFT

(a) Coat the front No. 1 differential pinion shaft with ATF, and install it to the differential case.

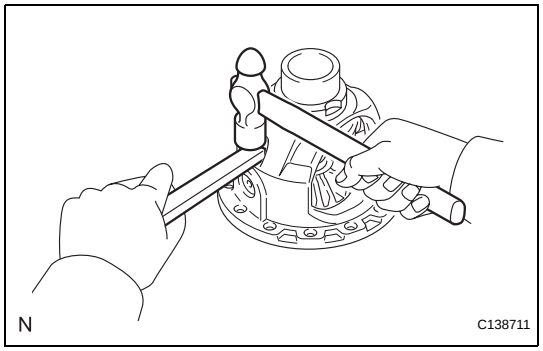
3. INSPECT DIFFERENTIAL SIDE GEAR BACKLASH (See page AX-332)



4. INSTALL FRONT DIFFERENTIAL PINION SHAFT STRAIGHT PIN

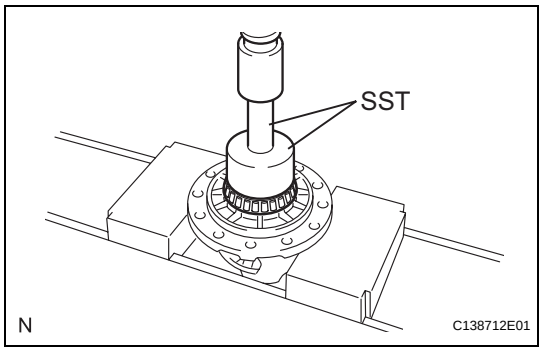
(a) Using a pin punch (3 mm) and hammer, install the pinion shaft straight pin.

NOTICE:
Align the holes, and install the pinion shaft straight pin.



(b) Using a chisel and hammer, stake the differential case.

NOTICE:
Stake the differential case after adjusting the backlash.

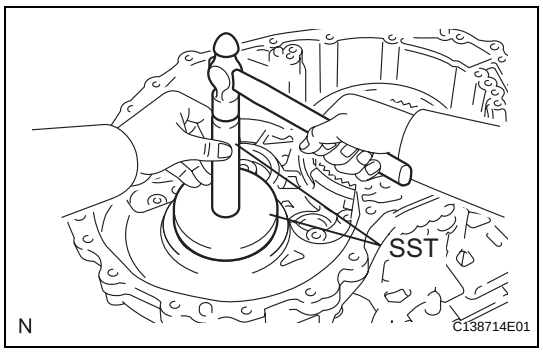


5. INSTALL FRONT DIFFERENTIAL CASE REAR TAPERED ROLLER BEARING

(a) Using SST and a press, install the front differential case rear tapered roller bearing to the differential case.

SST 09710-04081, 09950-60010 (09951-00480), 09950-70010 (09951-07100)

NOTICE:
Do not damage the bearing cage during bearing inner race installation.

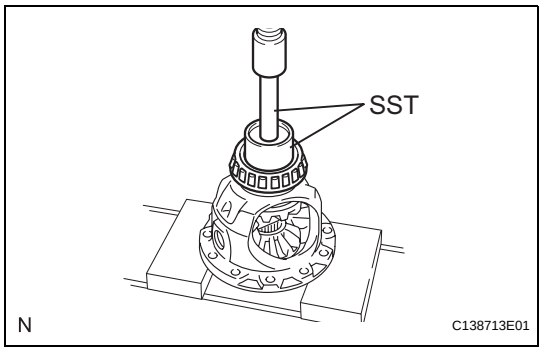


(b) Using SST and a hammer, install the front differential case rear tapered roller bearing outer race to the transaxle case.

SST 09950-70010 (09951-07150), 09950-60020 (09951-00790)

NOTICE:
Ensure that there is no clearance between the bearing and transaxle case.

AX



6. INSTALL FRONT DIFFERENTIAL CASE FRONT TAPERED ROLLER BEARING

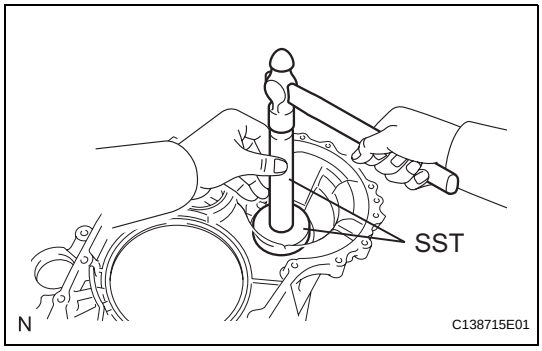
(a) Using SST and a press, install the front differential case front tapered roller bearing to the differential case.

SST 09710-04081, 09950-60010 (09951-00480), 09950-70010 (09951-07100)

NOTICE:

Do not damage the bearing cage during bearing inner race installation.

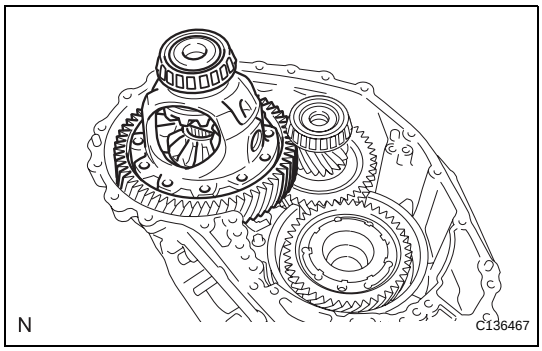
(b) Install the shim to the transaxle housing.



(c) Using SST and a hammer, install the front differential case front tapered roller bearing outer race to the transaxle housing.

NOTICE:

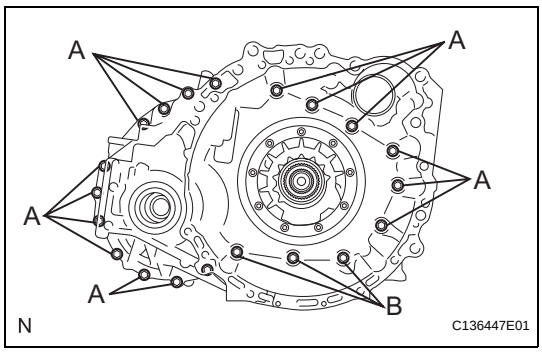
Ensure that there is no clearance between the bearing and transaxle housing.



7. ADJUST DIFFERENTIAL SIDE BEARING PRELOAD

(a) Install the differential assembly to the transaxle case.

(b) Clean the contact surfaces of the transaxle case and transaxle housing.



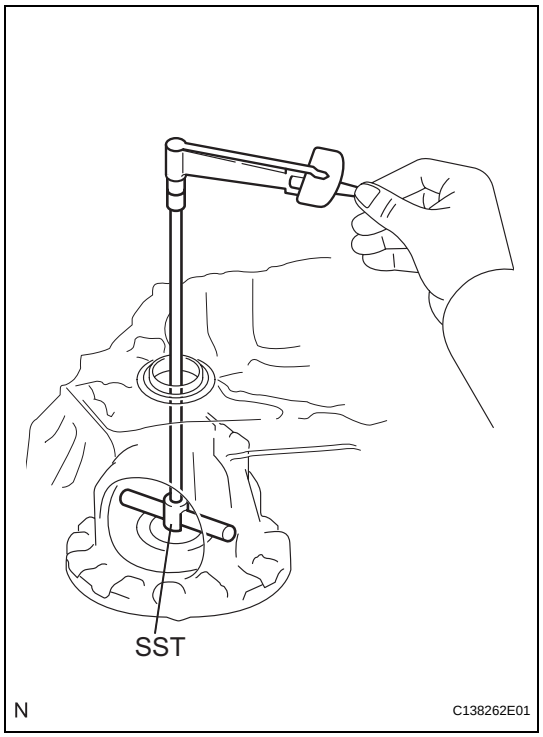
(c) Install the transaxle housing to the transaxle case with the 20 bolts.

Torque: Bolt A

31 N*m (316 kgf*cm, 23 ft.*lbf)

Bolt B

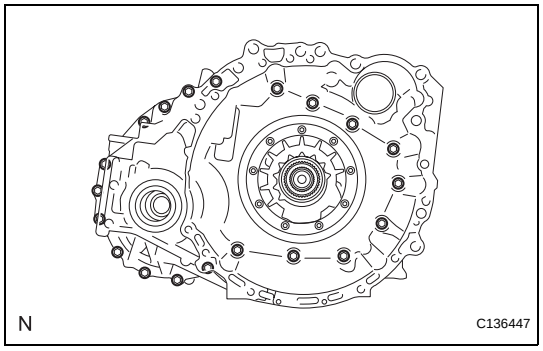
23 N*m (234 kgf*cm, 17 ft.*lbf)



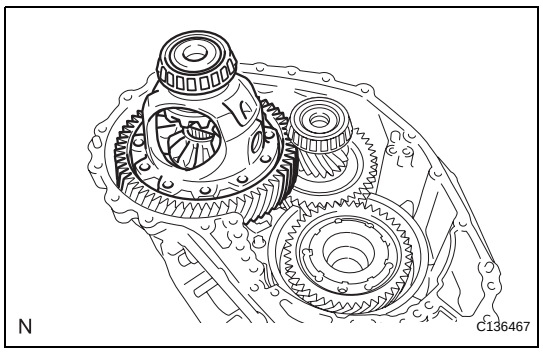
(d) Using SST, turn the differential assembly right and left 2 or 3 times to settle the bearing.
SST 09564-33010

(e) Using SST and a torque wrench, measure the turning torque of the differential side bearing while rotating SST at 10 rpm.
SST 09564-33010
Turning torque:
1.05 to 1.93 N*m (10.70 to 19.67 kgf*cm, 9.29 to 17.08 in.*lbf)
If the turning torque is not within the specified range, refer to the table below to select a shim so that the turning torque is within the specified range.
Shim thickness: mm (in.)

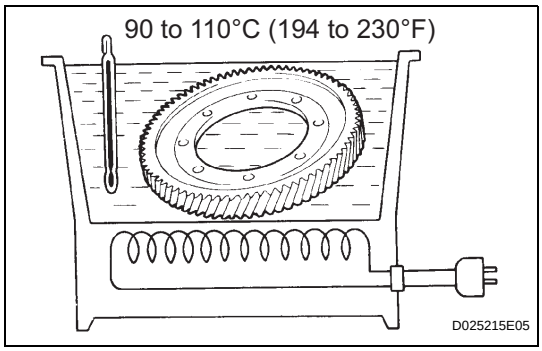
Thickness	Thickness	Thickness	Thickness
2.000 (0.0787)	2.225 (0.0876)	2.450 (0.0965)	2.675 (0.1054)
2.025 (0.0797)	2.250 (0.0886)	2.475 (0.0974)	2.700 (0.1063)
2.050 (0.0807)	2.275 (0.0896)	2.500 (0.0984)	2.725 (0.1073)
2.075 (0.0817)	2.300 (0.0906)	2.525 (0.0994)	2.750 (0.1083)
2.100 (0.0827)	2.325 (0.0915)	2.550 (0.1004)	2.775 (0.1093)
2.125 (0.0837)	2.350 (0.0925)	2.575 (0.1014)	2.800 (0.1102)
2.150 (0.0847)	2.375 (0.0935)	2.600 (0.1024)	2.825 (0.1112)
2.175 (0.0856)	2.400 (0.0945)	2.625 (0.1034)	2.850 (0.1122)
2.200 (0.0866)	2.425 (0.0955)	2.650 (0.1043)	2.875 (0.1132)



(f) Remove the 20 bolts and the transaxle housing from the transaxle case.



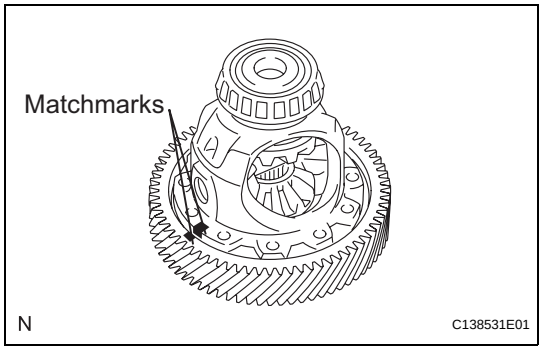
(g) Remove the differential assembly from the transaxle case.



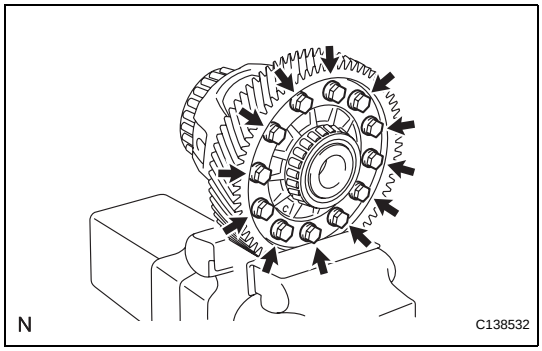
8. INSTALL FRONT DIFFERENTIAL RING GEAR

(a) Using ATF and a heater, heat the front differential ring gear to 90 to 110°C (194.0 to 230.0°F).
NOTICE:
Do not heat the ring gear to more than 110°C (230.0°F).

(b) Clean the contact surface of the front differential case.



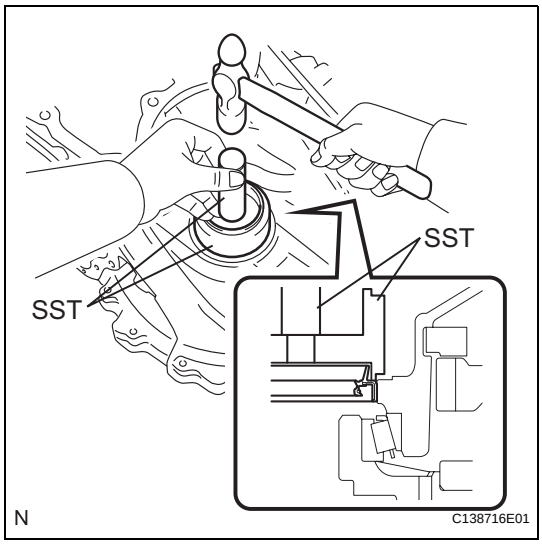
(c) Align the matchmarks, and install the front differential ring gear case quickly.
NOTICE:
Do not install the bolts while the ring gear is hot.



(d) Tighten the 12 bolts.
Torque: 120 N*m (1,223 kgf*cm, 88 ft.*lbf)
NOTICE:
Tighten the bolts a little at a time in diagonal order.

9. INSTALL TRANSAXLE CASE OIL SEAL

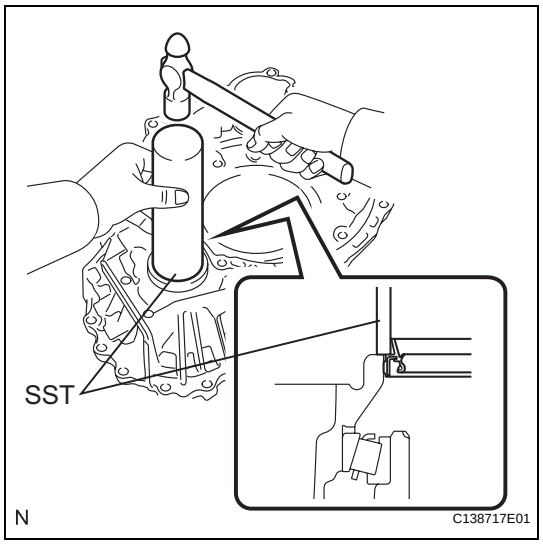
(a) Coat the lip of a new oil seal with MP grease.



(b) Using SST and a hammer, install the oil seal.
SST 09316-10010, 09950-70010 (09951-07100)
Oil seal drive in depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

10. INSTALL FRONT TRANSAXLE CASE OIL SEAL

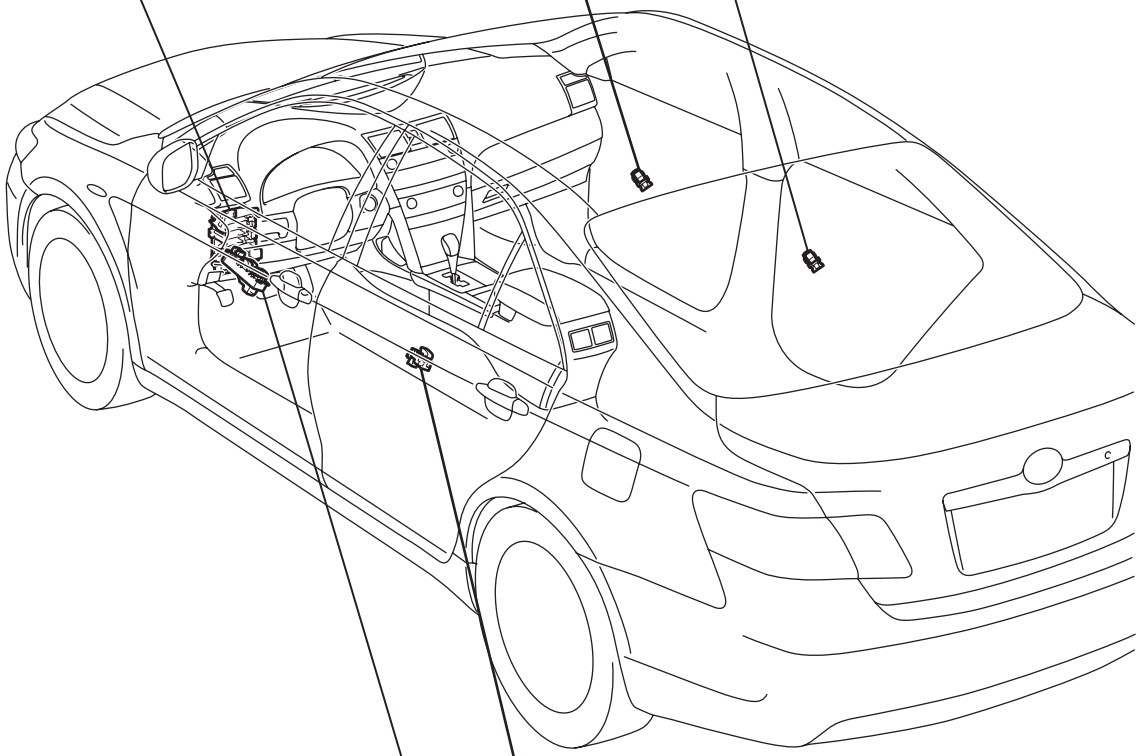
(a) Coat the lip of a new oil seal with MP grease.



(b) Using SST and a hammer, install the oil seal.
SST 09308-14010
Oil seal drive in depth:
-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

POWER WINDOW CONTROL SYSTEM

PARTS LOCATION



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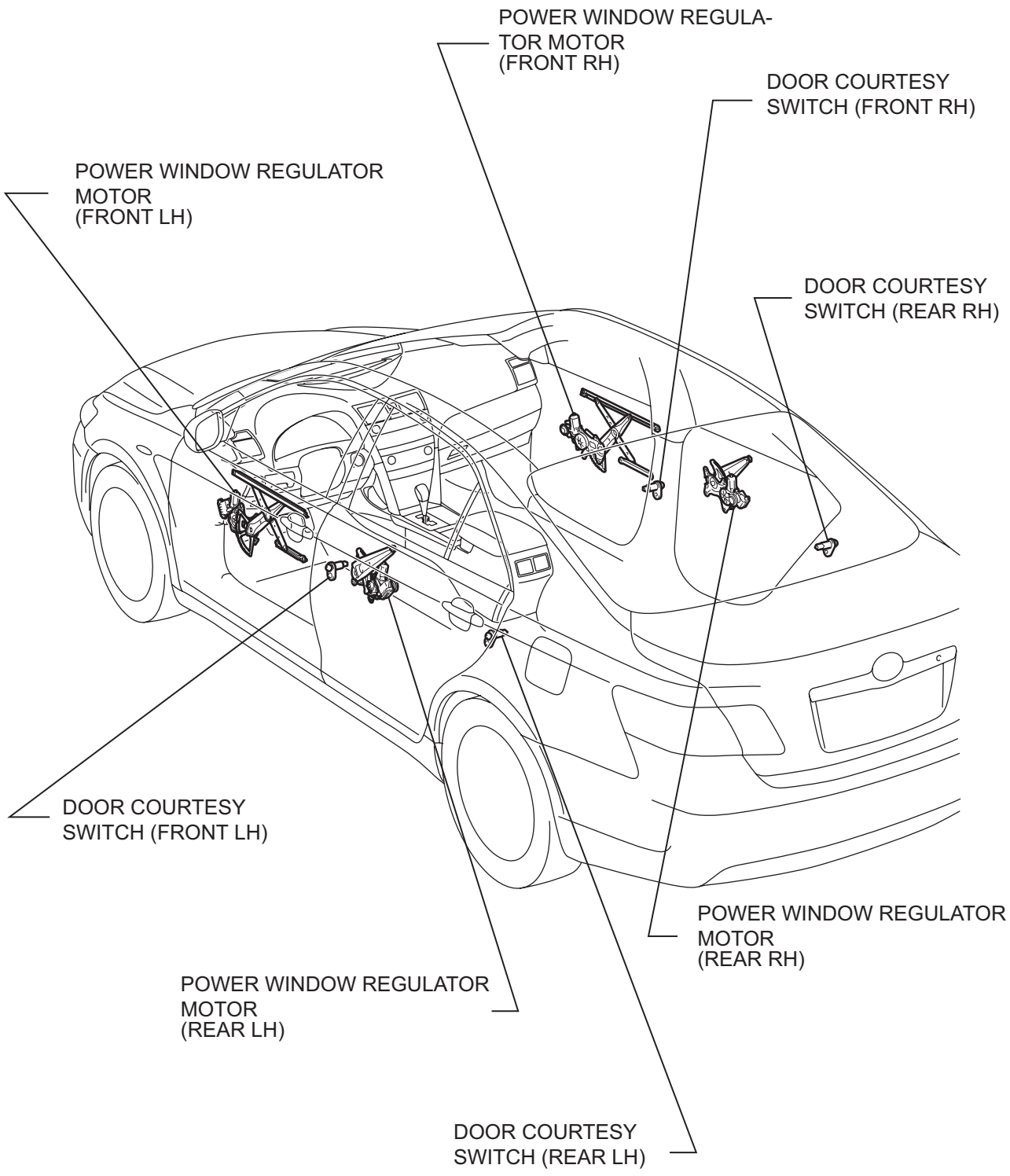
POWER WINDOW REGULA-
TOR MOTOR
(FRONT RH)
DOOR COURTESY
SWITCH (FRONT RH)
POWER WINDOW REGULATOR
MOTOR
(FRONT LH)
DOOR COURTESY
SWITCH (REAR RH)
DOOR COURTESY
SWITCH (FRONT LH)
POWER WINDOW REGULATOR
MOTOR
(REAR RH)
POWER WINDOW REGULATOR
MOTOR
(REAR LH)
DOOR COURTESY
SWITCH (REAR LH)
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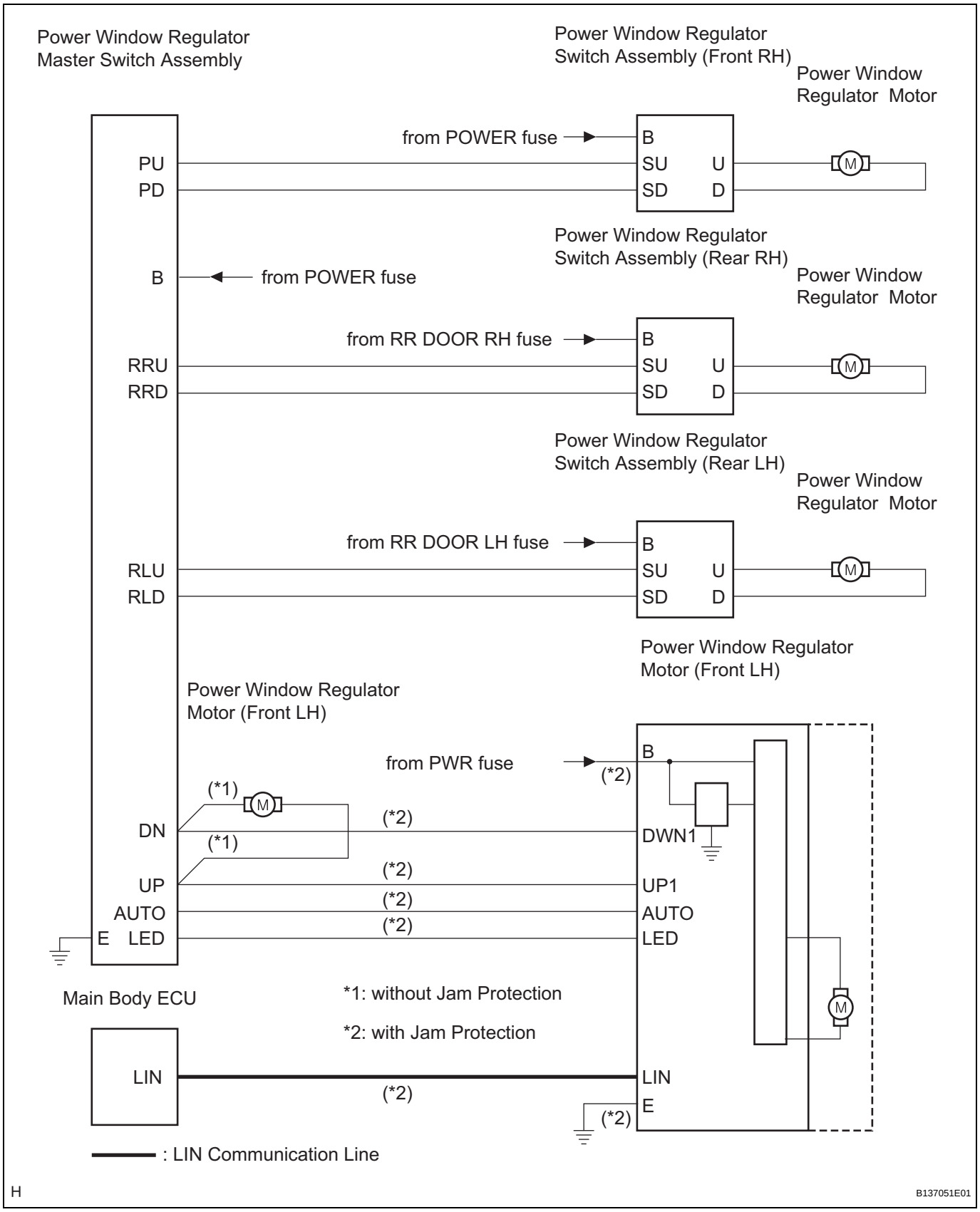
SYSTEM DIAGRAM



WS

SYSTEM DESCRIPTION

1. POWER WINDOW CONTROL SYSTEM DESCRIPTION

(a) The power window control system controls the power window operation using the power window regulator motors. The main controls of this system are the power window regulator master switch, which is mounted on the driver side door, and the power window regulator switches, which are mounted on the passenger side door and rear doors. Operating a window switch results in electrical power being transmitted to the corresponding power window regulator motor.

(b) The power window control system has the following functions:

Function	Outline
Manual up-and-down function	Function that causes window to go up while power window switch is being pulled halfway up and to go down while pushed halfway down. Window stops as soon as the switch is released.
Driver's door auto up-and-down function *	Function that enables windows of driver's doors to be fully opened or closed by one press of power window switch.
Jam protection function	Function that automatically stops power window and moves it downward if a foreign object gets jammed in door window during auto-up operation.
Remote control function	Function that allows power window master switch to control MANUAL up-and-down operations of front passenger door window and rear door windows.
Key-off operation function	Function that makes it possible to operate power window for approx. 45 seconds after ignition switch is turned on (ACC) or off, if either front door is not opened.
Key-linked up-and-down function	Function that causes window to go up while driver's door key is turned to lock side for more than 1.5 seconds and to go down while turned to unlock side for more than 1.5 seconds. Window stops as soon as the key is returned to original position.
Diagnosis	Function that allows the power window switch to make a diagnosis for failed section when power window switch detects a malfunction in power window system. Power window switch light comes on or blinks to inform driver.
Fail-safe	A fail-safe function to disable a part of power window functions if pulse sensor in power window motor has a malfunction: Driver's door auto up-and-down function and remote control function are disabled.

*: with Jam Protection

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the power window control system.
- The intelligent tester should be used in steps 3 and 5.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK

NEXT

3 CHECK COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM

(a) Use the intelligent tester, inspect the LIN communication function to ensure there are no malfunctions in the communication system.

Result

Result	Proceed to
No DTCs output	A
DTCs output	B

B → GO TO DIAGNOSIS TROUBLE CODE CHART

A

4 PROBLEM SYMPTOMS TABLE

HINT:

See page WS-9.

NEXT

5 OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Data list/Active test

HINT:

See page WS-17.

(b) Circuit inspection

(c) Terminal of ECU

HINT:

See page WS-9.

NEXT

6	ADJUST, REPAIR OR REPLACE

NEXT

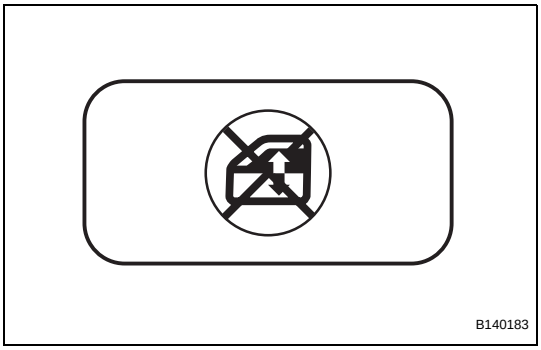
WS

7	RESET POWER WINDOW MOTOR

HINT:
See page WS-8.

NEXT

END



OPERATION CHECK

1. CHECK WINDOW LOCK SWITCH

(a) Check that the front passenger side power window and rear power windows operation are disabled when the window lock switch of the power window master switch is pressed.

Standard:

Front passenger side power window and rear power windows operation are disabled.

(b) Check that the front passenger side power window and rear power windows can be operated when the window lock switch is pressed again.

Standard:

Front passenger side power window and rear power windows can be operated.

2. CHECK MANUAL UP/DOWN FUNCTION

(a) Check that the driver side power window operates as follows:

Standard

Condition	Master Switch	Switch Operation	Power Window
Ignition switch on (IG)	Driver side	Pulled halfway up	UP (Closed)
		Pushed halfway down	DOWN (Open)

(b) Check that the power windows except the driver side power window operate as follows:

Standard

Condition	Switch	Switch Operation	Power Window
• Ignition switch on (IG) • Window lock switch OFF	Passenger side	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear LH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear RH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)

3. CHECK AUTO UP/DOWN FUNCTION

(a) Check that the driver side power window operates as follows:

Standard

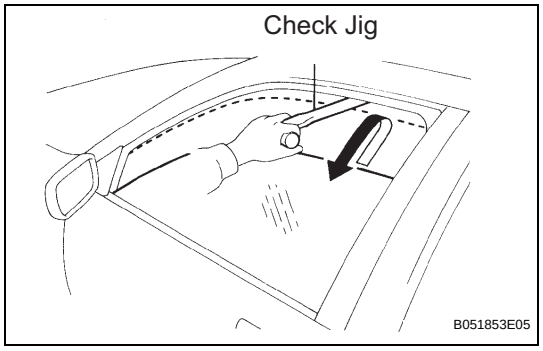
Condition	Master Switch	Switch Operation	Power Window
Ignition switch on (IG)	Driver side	Pulled up fully	UP (Closed)
		Pushed down fully	DOWN (Open)

4. CHECK REMOTE MANUAL UP/DOWN FUNCTION

(a) Check that the power windows except the driver side power window operate as follows:

Standard

Condition	Master Switch	Switch Operation	Power Window
• Ignition switch on (IG) • Window lock switch OFF	Passenger side	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear LH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)
	Rear RH	Pulled up	UP (Closed)
		Pushed down	DOWN (Open)



5. CHECK JAM PROTECTION FUNCTION

NOTICE:

- **The jam protection function can activate when either the AUTO UP function or MANUAL UP function is used.**
- **Limbs, fingers or other body parts should not be used to test the jam protection function. Do not allow any body parts to get caught by the moving window or regulator.**

HINT:

The jam protection function can activate when either the AUTO UP function or MANUAL UP function are used with the ignition switch ON. The jam protection function can also activate as long as the driver's door remains closed, within 45 seconds after the ignition switch is turned off.

(a) Check the reversing distance.
  (1) Fully open the door glass.
  (2) Place a check jig measuring 4 to 10 mm (0.16 to 0.40 in.) thick near the window fully closed position.
  (3) When the door glass is closed using AUTO or MANUAL operation, check that the door glass goes down after contacting the check jig. The glass should go 200 to 240 mm (7.90 to 9.44 in.) away from the position where it contacted the check jig.
  (4) While the door glass is going down, verify that the window switch can not be used to make the glass go up.

(b) Check the reversing distance.
  (1) Fully open the door glass.

(2) Place a check jig measuring 200 to 250 mm (7.90 to 9.84 in.) thick near the window fully closed position.
(3) When the door glass is closed using AUTO or MANUAL operation, check that the door glass goes down after contacting the check jig. The door glass should go 80 to 100 mm away from the position where it contacted the check jig.
(4) While the door glass is going down, verify that the window switch can not be used to make the glass go up.

INITIALIZATION

1. INITIALIZE POWER WINDOW REGULATOR MOTOR FRONT LH (WITH JAM PROTECTION)

NOTICE:

- **If the power window motor or power window regulator assembly is replaced, initialization is required (initialization is not necessary when the negative battery terminal is disconnected and reconnected).**
- **No other electrical systems should be operated during initialization. Initialization will be interrupted if a voltage drop occurs in the power being supplied to the power window motor.**
- **Replacing the door glass or door glass run may cause a difference to exist between the current door glass position and the position memorized in the ECU. In this case, the jam protection function may work improperly. Return the system to the pre-initialized condition and reinitialize the system.**

HINT:

- The AUTO UP function will not work unless initialization is completed.
- The indicator on the power window master switch will blink when the ignition switch is ON, until initialization has been completed. The indicator will remain on after initialization is successfully completed.

(a) Connect the negative battery terminal.

(b) Turn the ignition switch on (IG). The indicator on the power window master switch will blink.

(c) Fully close the door glass by operating the power window master switch. After the door glass stops, hold the power window master switch in the AUTO UP position for 1 second or more.

(d) Check that the indicator on the power window master switch remains on.

HINT:

If the indicator does not remain on, this means that initialization has not been completed successfully. In this case, lower the door glass at least 50 mm (1.96 in.) and hold the power window master switch in the AUTO UP position for 1 second after the window closes fully.

2. TO RETURN THE SYSTEM TO THE PRE-INITIALIZES CONDITION

Disconnect the power window regulator motor connector during power window operation. This will return the motor to the pre-initialized condition.

WS

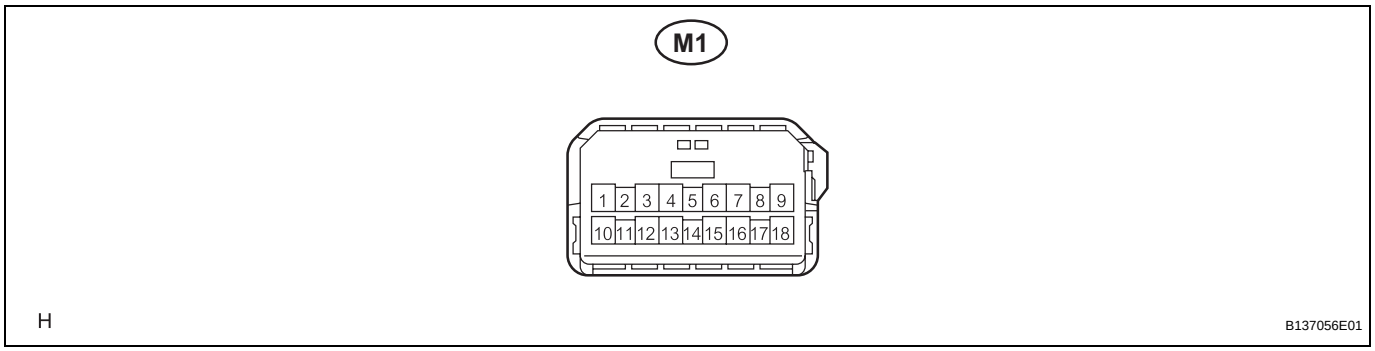
PROBLEM SYMPTOMS TABLE

POWER WINDOW CONTROL SYSTEM

Symptom	Suspected area	See page
Power window does not operate with power window regulator master switch	1. PWR, POWER, RR DOOR LH/RH fuses	-
	2. Power window master switch circuit (power source)	WS-26
	3. Power window regulator motor circuit	WS-33
	4. Power window regulator master switch	-
Front passenger side power window does not operate with power window regulator switch	1. Power window master switch circuit (power source)	-
	2. Power window regulator motor circuit (front passenger side)	WS-36
	3. Power window regulator switch (front LH side)	WS-30
Rear LH side power window does not operate with power window regulator switch	1. Power window regulator switch circuit (power source)	-
	2. Power window regulator motor circuit (rear LH side)	WS-38
	3. Power window regulator switch (rear LH side)	WS-31
Rear RH side power window does not operate with power window regulator switch	1. Power window regulator switch circuit (power source)	-
	2. Power window regulator motor circuit (rear RH side)	WS-40
	3. Power window regulator switch (rear RH side)	WS-32
AUTO UP/DOWN function does not operate on driver side (Only jam protection assistant)	1. Diagnosis check	WS-14
	2. Power window regulator motor reset	WS-8
	3. Power window regulator master switch	-
	4. Wire harness	-
Remote UP/DOWN function does not operate	1. DATA LIST/ACTIVE TEST	WS-17
	2. Power window regulator master switch	-
	3. Wire harness	-
Power window can be operated after ignition switch is turned off even if operated conditions are not met	1. Front door courtesy switch	LI-109
	2. Wire harness (LIN communication line)	-
AUTO UP operation does not fully close power window (Jam protection function is activated)	1. Power window regulator motor reset	WS-8
	2. Check & clean glass run	-
	3. Power window regulator master switch	-
AUTO DOWN function does not operate on driver side (only DOWN AUTO)	1. Power window regulator master switch	-
	2. Power window regulator motor circuit (driver side)	WS-33
	3. Wire harness	-

TERMINALS OF ECU

1. POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY



(a) Disconnect the M1 switch connector.
(b) Measure the voltage and resistance of each terminal according to the value(s) in the table below.

Standard resistance

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
E (M1-1) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (M1-6) - E (M1-1)	GR - W-B	Power supply	Ignition switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.
(c) Reconnect the M1 switch connector and reset the power window motor.
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage:
with Jam protection

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
UP (M1-8) - E (M1-1)	G - W-B	Power window motor UP output	Ignition switch on (IG), driver side power window switch OFF → UP (Manual operation)	10 to 14 V → 0 V
AUTO (M1-4) - E (M1-1)	B - W-B	Power window motor AUTO UP output	Ignition switch on (IG), driver side power window fully open → driver side power window switch UP (AUTO UP position) → driver side power window fully closed	10 to 14 V → 0 V → 10 to 14 V
		Power window motor AUTO DOWN output	Ignition switch on (IG), driver side power window fully closed → driver side power window switch DOWN (AUTO UP position) → driver side power window fully open	10 to 14 V → 0 V → 10 to 14 V

WS

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
DN (M1-5) - E (M1-1)	R - W-B	Power window motor DOWN output	Ignition switch on (IG), driver side power window switch OFF → DOWN (Manual operation)	10 to 14 V → 0 V
PU (M1-16) - E (M1-1)	W - W-B	Power window motor UP output	Ignition switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
PD (M1-15) - E (M1-1)	R - W-B	Power window motor DOWN output	Ignition switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V
RLU (M1-12) - E (M1-1)	L - W-B	Power window motor UP output	Ignition switch on (IG), rear LH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
RLD (M1-13) - E (M1-1)	B - W-B	Power window motor DOWN output	Ignition switch on (IG), rear LH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
RRU (M1-10) - E (M1-1)	Y - W-B	Power window motor UP output	Ignition switch on (IG), rear RH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
RRD (M1-18) - E (M1-1)	LG - W-B	Power window motor DOWN output	Ignition switch on (IG), rear RH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V

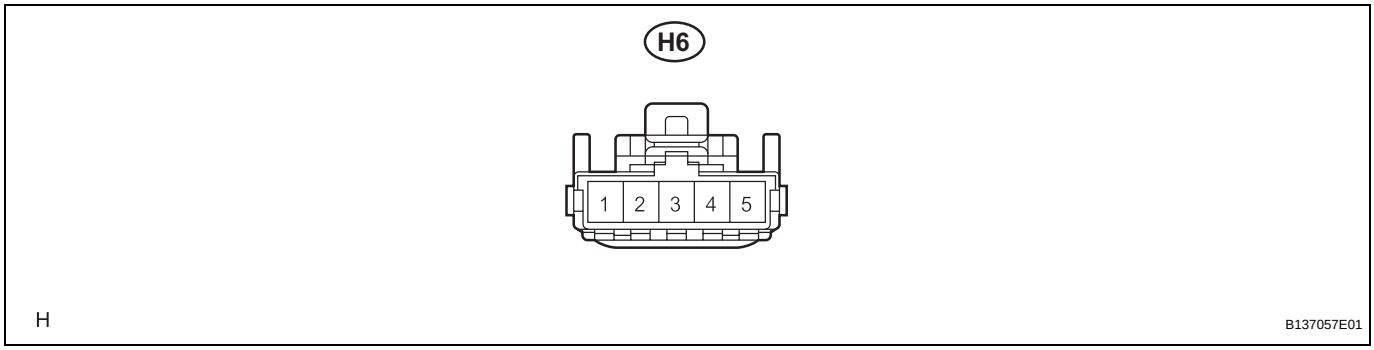
without Jam protection

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
UP (M1-3) - E (M1-1)	G - W-B	Power window motor UP output	Ignition switch on (IG), driver side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
DN (M1-4) - E (M1-1)	G - W-B	Power window motor DOWN output	Ignition switch on (IG), driver side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V
		Power window motor AUTO DOWN output	Ignition switch on (IG), driver side power window fully closed → driver side power window switch DOWN (AUTO operation) → driver side power window fully open	10 to 14 V → 0 V → 10 to 14 V
PU (M1-16) - E (M1-1)	W - W-B	Power window motor UP output	Ignition switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
PD (M1-15) - E (M1-1)	R - W-B	Power window motor DOWN output	Ignition switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V
RLU (M1-12) - E (M1-1)	L - W-B	Power window motor UP output	Ignition switch on (IG), rear LH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RLD (M1-13) - E (M1-1)	B - W-B	Power window motor DOWN output	Ignition switch on (IG), rear LH side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V
RRU (M1-10) - E (M1-1)	Y - W-B	Power window motor UP output	Ignition switch on (IG), rear RH side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
RRD (M1-18) - E (M1-1)	LG - W-B	Power window motor DOWN output	Ignition switch on (IG), rear RH side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.

2. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (FRONT RH)



(a) Disconnect the H6 switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (H6-3) - Body ground	GR - Body ground	Power supply	Ignition switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.

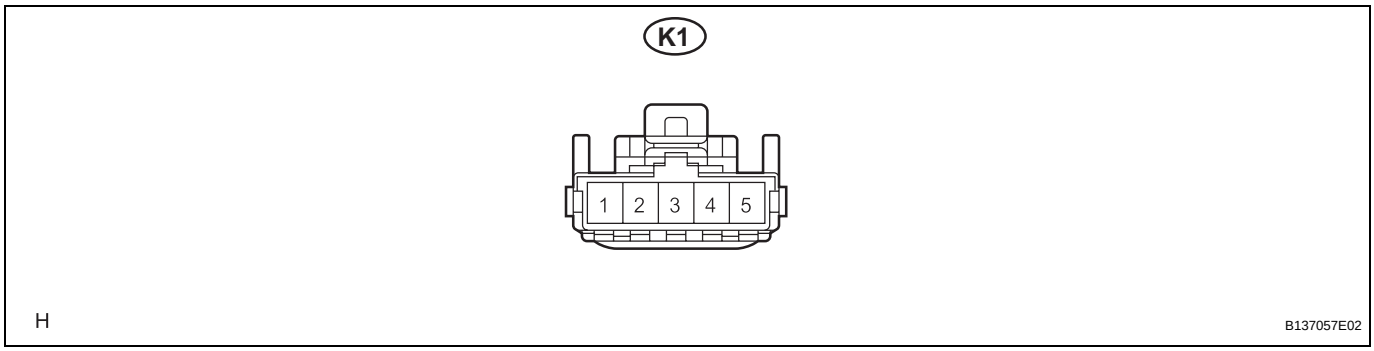
(c) Reconnect the H6 switch connector and reset the power window motor.
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
U (H6-4) - Body ground	G - Body ground	Power window motor UP output	Ignition switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
D (H6-1) - Body ground	Y - Body ground	Power window motor DOWN output	Ignition switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

If the result is not as specified, the power window regulator switch assembly may have a malfunction.

3. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (REAR LH)



(a) Disconnect the K1 switch connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (K1-3) - Body ground	V - Body ground	Power supply	Ignition switch on (IG)	10 to 14 V

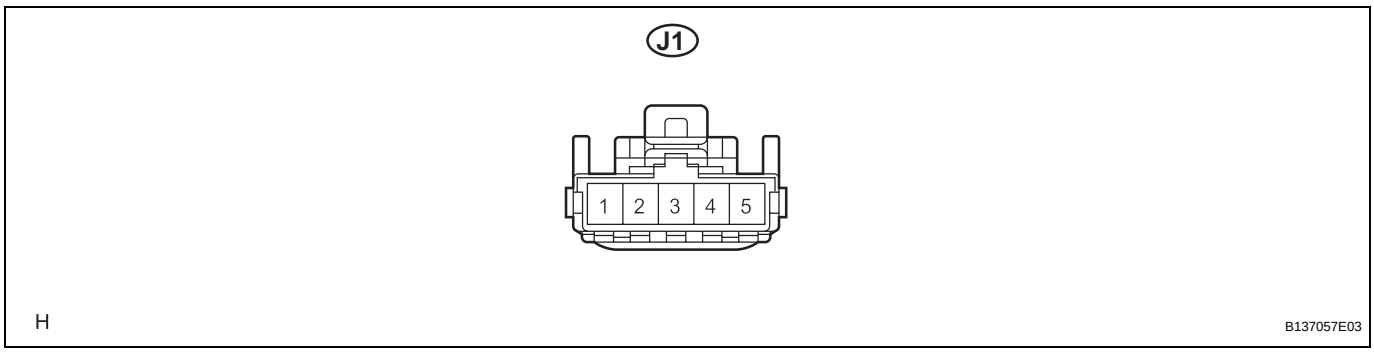
If the result is not as specified, there may be a malfunction in the wire harness.
(c) Reconnect the K1 switch connector and reset the power window motor.
(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
U (K1-4) - Body ground	G - Body ground	Power window motor UP output	Ignition switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
D (K1-1) - Body ground	R - Body ground	Power window motor DOWN output	Ignition switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

If the result is not as specified, the power window regulator switch assembly may have a malfunction.

4. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (REAR RH)



(a) Disconnect the J1 switch connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
B (J1-3) - Body ground	G - Body ground	Power supply	Ignition switch on (IG)	10 to 14 V

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the J1 switch connector and reset the power window motor.

(d) Measure the voltage according to the value(s) in the table below.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
U (J1-4) - Body ground	V - Body ground	Power window motor UP output	Ignition switch on (IG), front passenger side power window switch OFF → UP (Manual operation)	0 V → 10 to 14 V
D (J1-1) - Body ground	R - Body ground	Power window motor DOWN output	Ignition switch on (IG), front passenger side power window switch OFF → DOWN (Manual operation)	0 V → 10 to 14 V

If the result is not as specified, the power window regulator switch assembly may have a malfunction.

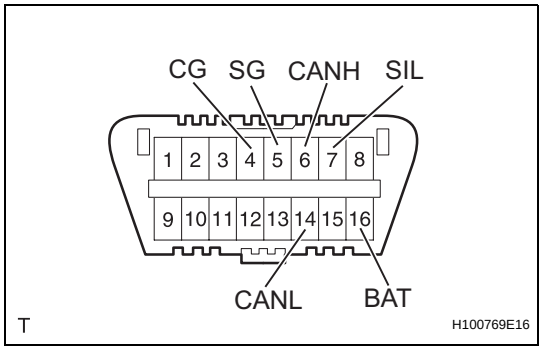
WS

DIAGNOSIS SYSTEM

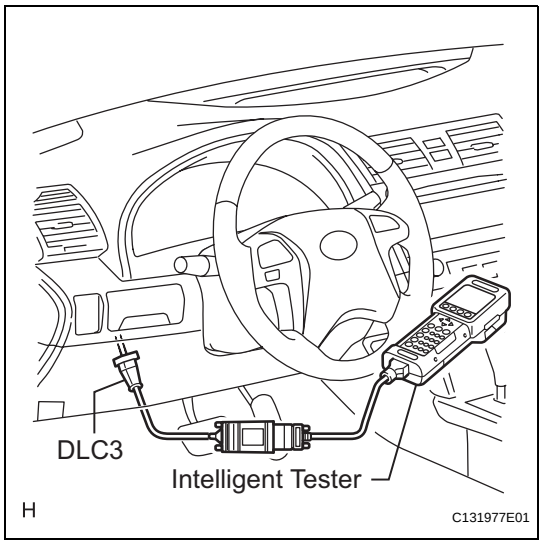
1. DESCRIPTION

(a) The power window control system data can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



(a) The ECU uses ISO 15765-4 communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or more

NOTICE:

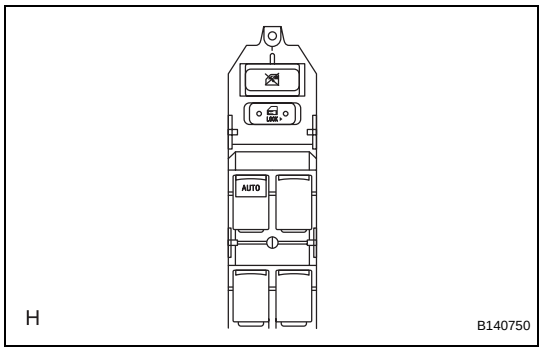
***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the door.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.



3. CHECK DIAGNOSIS (WITH JAM PROTECTION)

HINT:

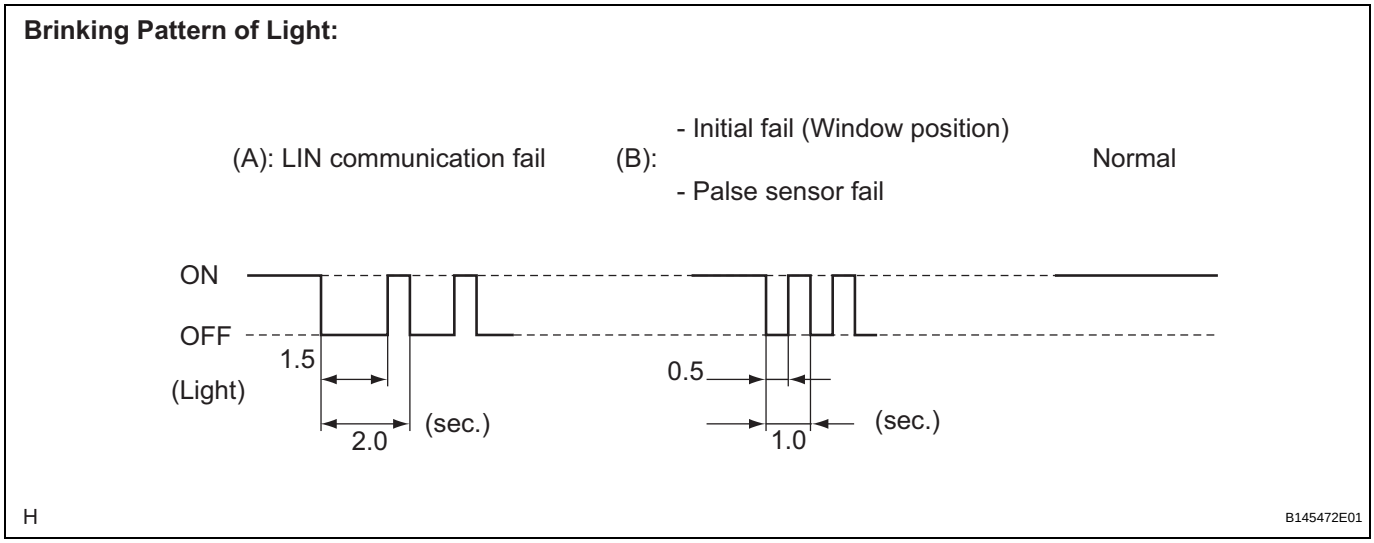
If there is a malfunction in the pulse sensor, manually operating the power window switch will cause the power window switch light to blink.

(a) Turn the ignition switch on (IG).

(b) Manually operate the power window master switch or power window switch on each door.

(c) Check the blinking pattern of the AUTO light as shown in the illustration.

Brinking Pattern of Light:



(1) If pattern (A) is displayed, check the wire harness or power window ECU.

(2) If pattern (B) is displayed, check the power window regulator motor or power window ECU.

(3) If the normal pattern is displayed, replace the power window regulator master switch.

WS

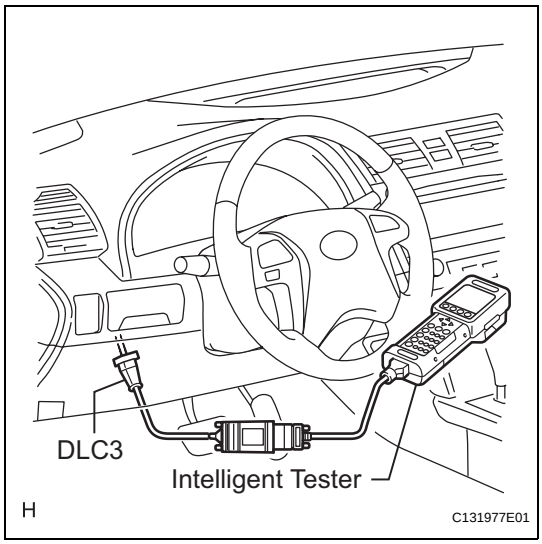
DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG).
(c) Check the DTC(s).

2. CLEAR DTC

(a) Connect the intelligent tester to the DLC3.
(b) Turn the ignition switch on (IG) .
(c) Clear the DTCs.
(d) Check that "DTCs are cleared" is displayed.
NOTICE:
If any DTCs are output, troubleshoot those DTCs again.



FAIL-SAFE CHART

1. POWER WINDOW OPERATION IN FAIL-SAFE MODE

HINT:

If the pulse sensor built into the power window regulator motor (on the driver side) malfunctions, the power window control system enters fail-safe mode.

Fail mode	Fail Detection Condition
Pulse direction error	With the door glass going up or down, the pulse that indicates door glass operation in the opposite direction is detected for 400 msec.
Pulse stop error	With the door glass going up or down, no pulse is detected for 350 to 450 msec.

(a) The power window control system prohibits the following power window operation when the pulse sensor for the jam protection function has problems and the window position or the learned value is abnormal.

Power window control system

Power window operation	Ignition switch on (IG)	Key-off (Within approx. 45 seconds after ignition switch turned off)	Key-off (After approx. 45 seconds elapsed after ignition switch turned off)
Manual UP	Operation prohibited	Operation prohibited	Operation prohibited
Manual DOWN	Operative (Jam protection not operative)	Operation prohibited	Operation prohibited
AUTO UP (hold switch at AUTO UP position)	Operative (in MANUAL mode) (Jam protection not operative)	Operation prohibited	Operation prohibited
AUTO UP	Operation prohibited	Operation prohibited	Operation prohibited
AUTO DOWN	Operation prohibited	Operation prohibited	Operation prohibited

HINT:

When the pulse sensor is normal, the AUTO UP / DOWN function can be resumed by deactivating fail-safe mode. To deactivate fail-safe mode, pull up the driver door power window switch to the AUTO UP position and hold it for at least 1 second to fully close the window from the fully open position.

(b) If the LIN communication system malfunctions (communication blackout), the power window control system prohibits the following operations.

LIN communication system

Power window operation	Ignition switch on (IG)
MANUAL UP	Operative (Jam protection operative)
MANUAL DOWN	Operative (Jam protection not operative)
AUTO UP (hold switch at AUTO UP position)	Operative (Jam protection operative)
AUTO UP	Operative (Jam protection operative)
AUTO DOWN	Operative (Jam protection not operative)

WS

DATA LIST / ACTIVE TEST

1. USING INTELLIGENT TESTER

(a) Connect the intelligent tester to the DLC3.

(b) Monitor the ECU data by following the prompts on the tester screen.

HINT:

The intelligent tester has a "Snapshot" function which records the monitored data. Refer to the intelligent tester operator's manual for further details.

2. DATA LIST

HINT:

Using the DATA LIST displayed on the intelligent tester, the value of the switches, sensors, actuators, etc. can be read without part removal. Reading the DATA LIST as the first step in troubleshooting is one way to shorten the labor time.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Read the DATA LIST according to the display on the tester.

Body:

Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
Communication Master SW	Master switch communication signal OK/STOP	OK: Communication is normal STOP: Communication is stop	-
Ignition Switch	Ignition switch signal/ON or OFF	ON: Power source mode is (IG) OFF: Power source mode is off or on (ACC)	-
D Door Courtesy SW	Driver side door courtesy switch signal/ON or OFF	ON: Driver side door is open OFF: Driver side door is closed	-
P Door Courtesy SW	Front passenger side door courtesy switch signal/ON or OFF	ON: Front passenger side door is open OFF: Front passenger side door is closed	-

3. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows you to operate the relay, VSV, actuator, etc. without parts removal. Performing the ACTIVE TEST as the first step in troubleshooting is one way to shorten the labor time. It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the intelligent tester to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Perform the ACTIVE TEST according to the display on the tester.

Body:

Item	Test Detail	Diagnostic Note
IG OFF P/W Control Permission Output	Operates power window ON/OFF (After ignition OFF)	-

DIAGNOSTIC TROUBLE CODE CHART

POWER WINDOW CONTROL SYSTEM

DTC No.	Detection Item	Trouble Area	See page
B2311	Driver Door Motor Malfunction	1. Battery disconnection when the ignition switch is on (IG) 2. Power window regulator motor (on driver side) 3. Incorrect installation of power window components 4. Overheated power window regulator motor (on driver side)	WS-19
B2312	Driver Side Door Master Switch Malfunction	1. Power window regulator motor (on driver side) 2. Power window regulator master switch 3. Wire harness 4. Power window regulator master switch is held same position for more than 20 seconds	WS-21
B2313	Glass Position Initialization Incomplete	1. Power window regulator motor (on driver side) 2. Power window regulator motor (on driver side) not initialized	WS-24

DTC	B2311	Driver Door Motor Malfunction

DESCRIPTION

The portion of the power window control system that is located in the driver door consists of a power window master switch, regulator, and a motor with an integrated ECU. The driver door power window regulator motor is controlled by the ECU when the power window master switch is operated (models with jam protection).

DTC B2311 is set when the ECU for the driver door power window regulator motor assembly malfunctions.

NOTICE:

The power window control system uses a serial communication protocol (LIN) to communicate with the main body ECU. Inspect the communication function by following HOW TO PROCEED WITH TROUBLESHOOTING. Troubleshoot the power window control system after confirming that the communication system is functioning properly.

HINT:

- Initialization is required only when the power window regulator motor is replaced. However, replacing the motor may cause the motor gear to be engaged in a different position. This can cause a difference to exist between the current door glass position and the position memorized in the ECU. In this case, the jam protection function may work improperly. Return the system to the pre-initialized condition and reinitialize the system.
- To return the system to the pre-initialized condition:
  Disconnect the power window regulator motor connector during power window operation. This will return the motor to the pre-initialized condition.

DTC No.	DTC Detection Condition	Trouble Area
B2311	When either condition below is met: • The power window regulator motor (on driver side) malfunctions • When the ECU in the power widow regulator motor (on driver side) determines that the fully closed window position has deviated approximately 20 mm (0.79 in.) or more from the normal position	• Battery disconnection when the ignition switch is on (IG) • Power window regulator motor (on driver side) • Incorrect installation of power window components • Overheated power window regulator motor (on driver side)

INSPECTION PROCEDURE

1	INITIALIZE POWER WINDOW CONTROL SYSTEM

(a) Initialize the power window regulator motor assembly (on the driver side) (see page WS-8).

(b) Check that the power window operates normally by opening and closing the window.

OK:

Driver side power window operates normally.

NG → **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)**

OK

2	**CHECK WHETHER PARTS HAVE BEEN INSTALLED CORRECTLY**

(a) Check that the power window components (on the driver side) are installed correctly.

OK:

Power window components (on driver side) are installed correctly.

HINT:

When the power window components are installed correctly, the problem has been caused by battery disconnection while the ignition switch is on (IG), improper installation of the power window components or the motor being overheated.

NG → **INSTALL PARTS CORRECTLY**

OK

END

DTC	B2312	Driver Side Door Master Switch Malfunction

DESCRIPTION

The portion of the power window control system that is located in the driver door consists of a power window master switch, regulator, and a motor with an integrated ECU. The driver door power window regulator motor is controlled by the ECU when the power window master switch is operated (models with jam protection).

When the ECU determines that the power window master switch is stuck, DTC B2312 is set.

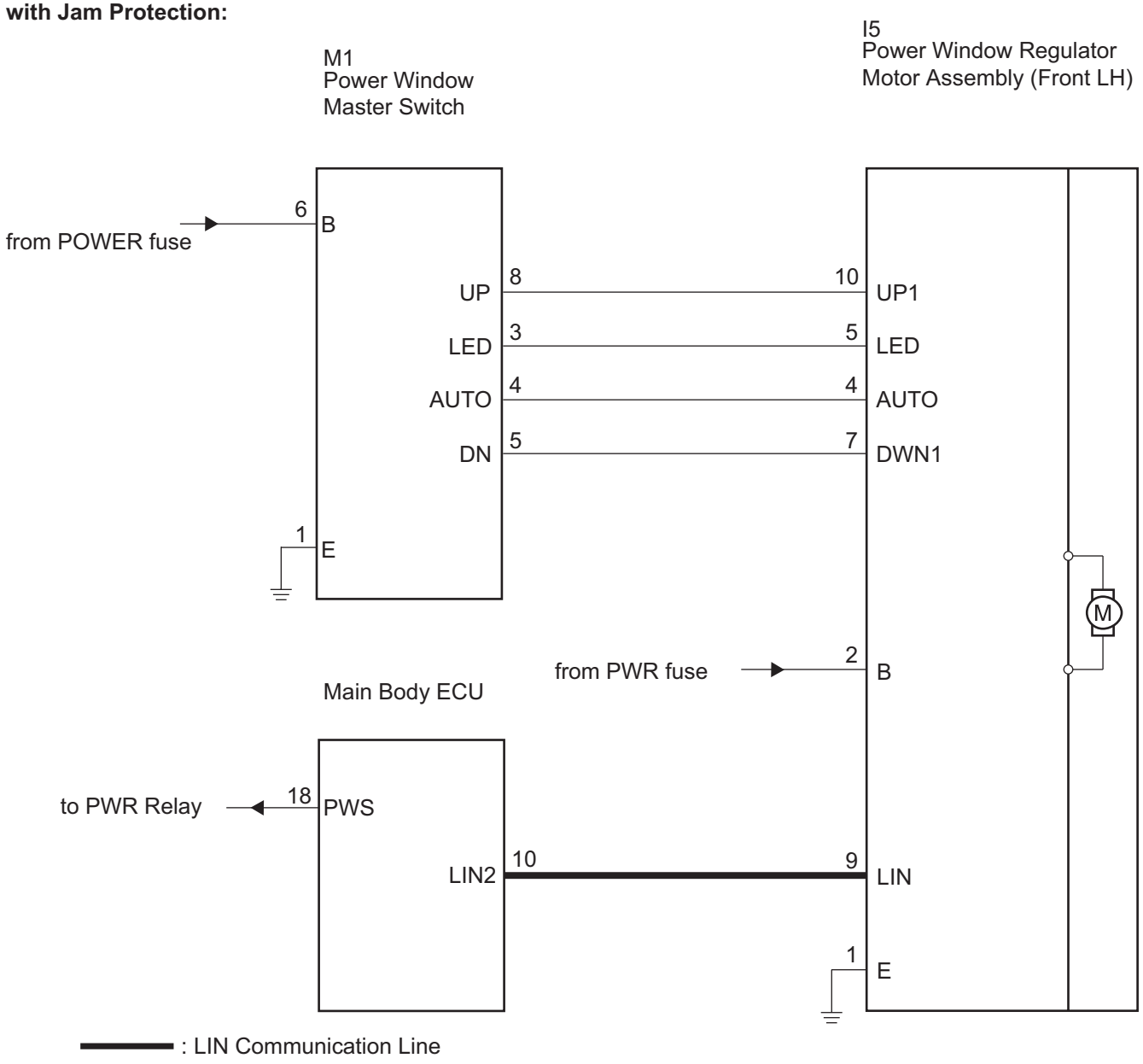
NOTICE:

The power window control system uses a serial communication protocol (LIN) to communicate with the main body ECU. Inspect the communication function by following HOW TO PROCEED WITH TROUBLESHOOTING. Troubleshoot the power window control system after confirming that the communication system is functioning properly.

DTC No.	DTC Detection Condition	Trouble Area
B2312	The power window regulator master switch is stuck	• Power window regulator motor (on driver side) • Power window regulator master switch • Wire harness • Power window regulator master switch is held in same position for more than 20 seconds

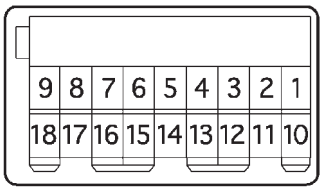
WIRING DIAGRAM

with Jam Protection:



INSPECTION PROCEDURE

1 **INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**



B108710

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

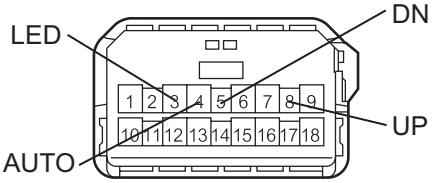
Tester Connection	Condition	Specified Condition
8 (UP) - 1 (E) - 4 (AUTO)	Auto UP	Below 1 Ω
5 (DN) - 6 (B)	Auto UP	Below 1 Ω
8 (UP) - 1 (E)	Manual UP	Below 1 Ω
5 (DN) - 6 (B)	Manual UP	Below 1 Ω
8 (UP) - 5 (DN) - 6 (B)	OFF	Below 1 Ω
5 (DN) - 1 (E)	Manual DOWN	Below 1 Ω
8 (UP) - 6 (B)	Manual DOWN	Below 1 Ω
4 (AUTO) - 5 (DN) - 1 (E)	Auto DOWN	Below 1 Ω
8 (UP) - 6 (B)	Auto DOWN	Below 1 Ω

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH**

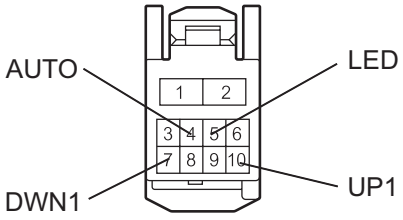
OK

2 **CHECK WIRE HARNESS (WINDOW REGULATOR MASTER SWITCH - WINDOW REGULATOR MOTOR)**

M1
Power Window Regulator Master Switch Assembly:



I5
Power Window Regulator Motor (Front LH):



B137046E02

(a) Disconnect the M1 and I5 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
M1-8 (UP) - I5-10 (UP1)	Always	Below 1 Ω
M1-3 (LED) - I5-5 (LED)	Always	Below 1 Ω
M1-4 (AUTO) - I5-4 (AUTO)	Always	Below 1 Ω
M1-5 (DN) - I5-7 (DWN1)	Always	Below 1 Ω
M1-8 (UP) - Body ground	Always	10 kΩ or higher
M1-3 (LED) - Body ground	Always	10 kΩ or higher
M1-4 (AUTO) - Body ground	Always	10 kΩ or higher
M1-5 (DN) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE DRIVER SIDE POWER WINDOW REGULATOR MOTOR ASSEMBLY

DTC	B2313	Glass Position Initialization Incomplete

DESCRIPTION

The portion of the power window control system that is located in the driver door consists of a power window master switch, regulator, and a motor with an integrated ECU. The driver door power window regulator motor is controlled by the ECU when the power window master switch is operated (models with jam protection).

When the ECU determines that the driver's door power window regulator motor assembly has not been initialized, DTC B2313 is set.

NOTICE:

The power window control system uses a serial communication protocol (LIN) to communicate with the main body ECU. Inspect the communication function by following HOW TO PROCEED WITH TROUBLESHOOTING. Troubleshoot the power window control system after confirming that the communication system is functioning properly.

HINT:

- Replacing the door glass or door glass run may cause a difference to exist between the current door glass position and the position memorized in the ECU. In this case, the jam protection function may work improperly. Return the system to the pre-initialized condition and reinitialize the system.
- To return the system to the pre-initialized condition:
  Disconnect the power window regulator motor connector during power window operation. This will return the motor to the pre-initialized condition.

DTC No.	DTC Detection Condition	Trouble Area
B2313	• The power window regulator motor (on driver side) is not initialized • The power window regulator motor (on driver side) malfunctions	• Power window regulator motor (on driver side) • Power window regulator motor (on driver side) not initialized

INSPECTION PROCEDURE

NOTICE:

When using the intelligent tester to troubleshoot the LIN communication line: Connect the intelligent tester to the vehicle, and turn the courtesy light switch on and off at 1.5 second intervals until communication between the tester and vehicle begins.

1	CHECK DTC OUTPUT

(a) Turn the ignition switch off.
(b) Wait for at least 10 seconds, and then turn the ignition switch on (IG).
(c) Check whether the DTC output recurs.
Result

Display (DTC Output)	Proceed to
B2313	A
No output	B

B → END

A

2	SYSTEM INITIALIZE (POWER WINDOW CONTROL SYSTEM)

(a) Turn the ignition switch on (IG) and initialize the power window regulator motor (on the driver side) (see page WS-8).
(b) Turn the ignition switch off.
(c) Wait for at least 10 seconds, and then turn the ignition switch on (IG).
(d) Check whether the DTC output recurs.

Display (DTC Output)	Proceed to
No output	A
B2313	B

B → **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY FRONT LH**

A

END

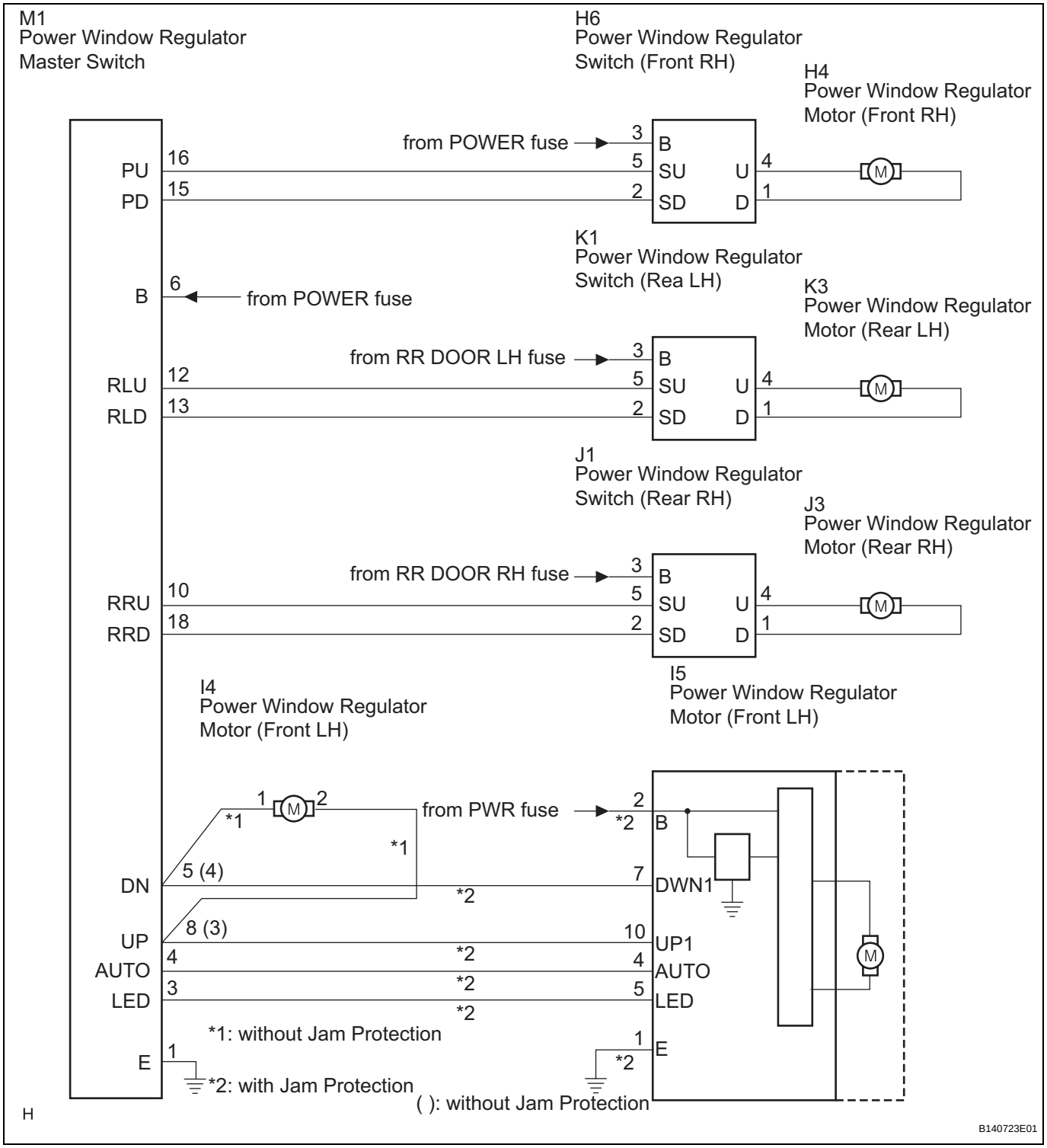
Power Window Master Switch Circuit

DESCRIPTION

This circuit transmits signal from the power window regulator master switch assembly to the power window regulator switch.

WS

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK DTC OUTPUT

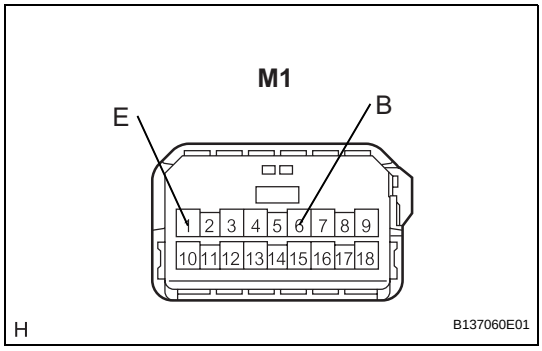
(a) Turn the ignition switch off.
(b) Wait for at least 10 seconds, and then turn the ignition switch on (IG).
(c) Check whether the DTC output recurs.
Result

Display (DTC output)	Proceed to
No output	A
Output DTCs	B

B → **GO TO DTC CHART**

A

2 INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY



(a) Disconnect the M1 connector.
(b) Measure the voltage and resistance according to the value(s) in the table below.
Standard voltage

Tester Connection	Condition	Specified Condition
6 (B) - Body ground	Ignition switch on (IG)	10 to 14 V

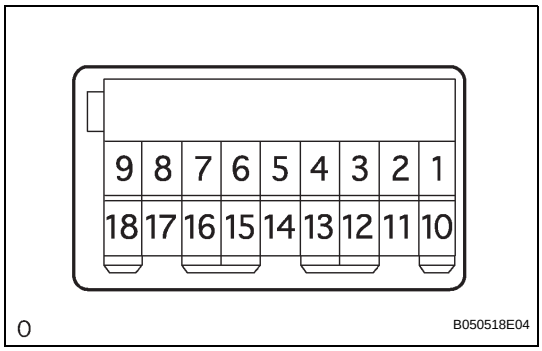
Standard resistance

Tester Connection	Condition	Specified Condition
1 (E) - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

3 INSPECT POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY



(a) Measure the resistance according to the value(s) in the table below.
Standard resistance:
(with Jam Protection)

Tester Connection	Condition	Specified Condition
8 (UP) - 1 (E) - 4 (AUTO)	Auto UP	Below 1 Ω
5 (DN) - 6 (B)		Below 1 Ω
8 (UP) - 1 (E)	Manual UP	Below 1 Ω
5 (DN) - 6 (B)		Below 1 Ω
8 (UP) - 5 (DN) - 6 (B)	OFF	Below 1 Ω
5 (DN) - 1 (E)	Manual DOWN	Below 1 Ω
8 (UP) - 6 (B)		Below 1 Ω

Tester Connection	Condition	Specified Condition
4 (AUTO) - 5 (DN) - 1 (E)	Auto DOWN	Below 1 Ω
8 (UP) - 6 (B)		Below 1 Ω
1 (E) - 10 (RRU)	Lock/Unlock switch	UNLOCK (Below 1 Ω) →LOCK (10 kΩ or higher)
1 (E) - 12 (RLU)		
1 (E) - 13 (RLD)		
1 (E) - 15 (PD)		
1 (E) - 16 (PU)		
1 (E) - 18 (RRD)		

(without Jam Protection)

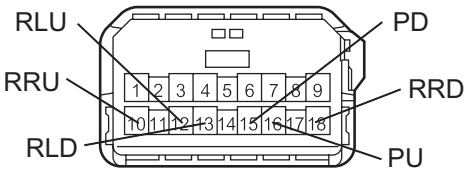
Tester Connection	Condition	Specified Condition
1 (E) - 3 (UP)	OFF	Below 1 Ω
1 (E) - 4 (DN)		Below 1 Ω
1 (E) - 10 (RRU)	Lock/Unlock switch	UNLOCK (Below 1 Ω) →LOCK (10 kΩ or higher)
1 (E) - 12 (RLU)		
1 (E) - 13 (RLD)		
1 (E) - 15 (PD)		
1 (E) - 16 (PU)		
1 (E) - 18 (RRD)		

NG → **REPLACE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY**

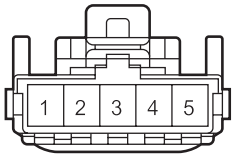
OK

4 CHECK WIRE HARNESS (POWER WINDOW MASTER SWITCH - FRONT LH, REAR LH/RH SWITCH)

M1
Power Window Regulator Master Switch Assembly:



H6 (K1, J1)
Power Window Switch (Front RH, Rear LH/RH):



H B137067E01

(a) Disconnect the M1 and H6 (K1, J1) connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:
Front RH side

Tester Connection	Condition	Specified Condition
M1-16 (PU) - H6-5 (SU)	Always	Below 1 Ω
M1-15 (PD) - H6-2 (SD)	Always	Below 1 Ω
M1-16 (PU) - Body ground	Always	10 kΩ or higher
M1-15 (PD) - Body ground	Always	10 kΩ or higher

Rear LH side

Tester Connection	Condition	Specified Condition
M1-12 (RLU) - K1-5 (SU)	Always	Below 1 Ω
M1-13 (RLD) - K1-2 (SD)	Always	Below 1 Ω
M1-12 (RLU) - Body ground	Always	10 kΩ or higher
M1-13 (RLD) - Body ground	Always	10 kΩ or higher

Rear RH side

Tester Connection	Condition	Specified Condition
M1-10 (RRU) - J1-5 (SU)	Always	Below 1 Ω
M1-18 (RRD) - J1-2 (SD)	Always	Below 1 Ω
M1-10 (RRU) - Body ground	Always	10 kΩ or higher
M1-18 (RRD) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

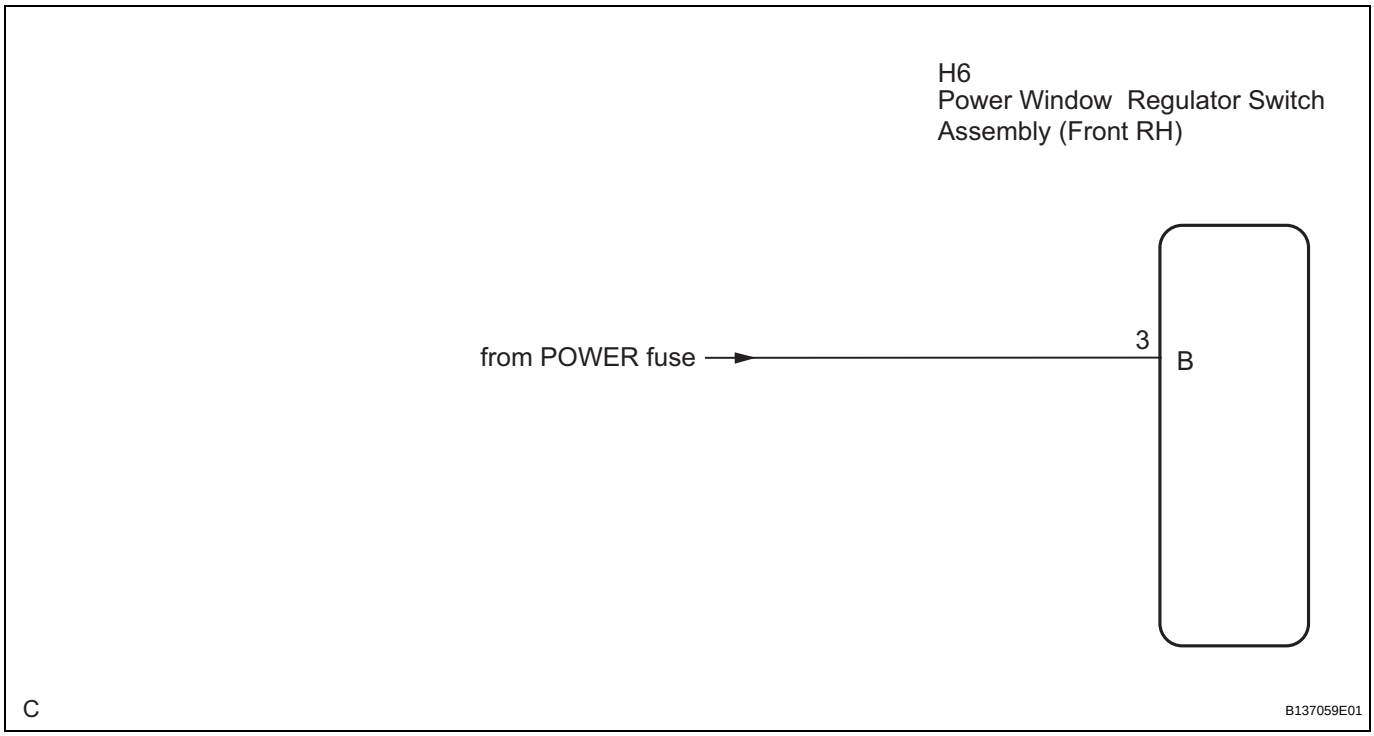
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Front Passenger Side Power Window Switch Power Source Circuit

DESCRIPTION

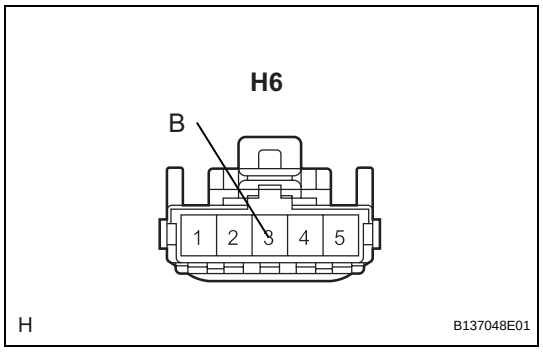
This circuit supplies power to operate the power window regulator switch assembly (Front RH).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER WINDOW REGULATOR SWITCH - BATTERY AND BODY GROUND)



(a) Disconnect the H6 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
3 (B) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

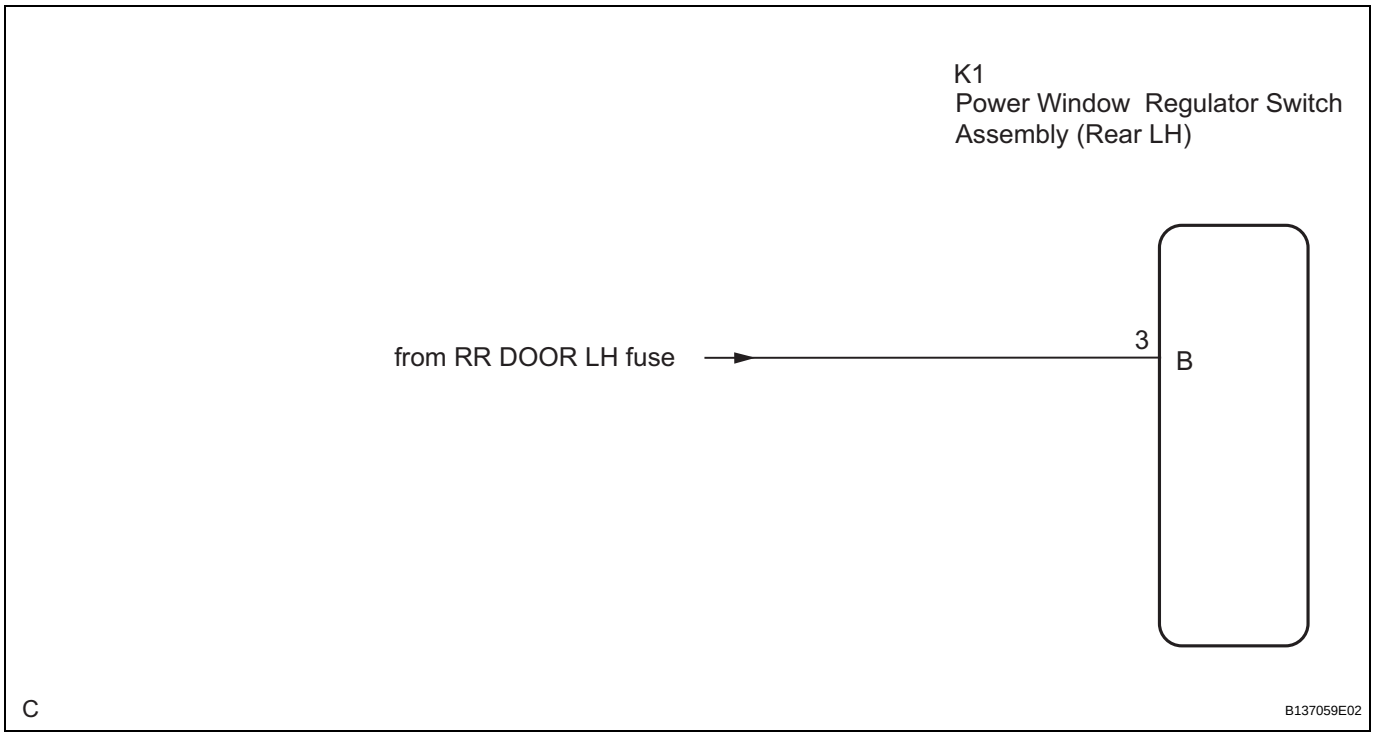
Rear Power Window Switch LH Circuit

DESCRIPTION

This circuit supplies power to operate the power window regulator switch assembly (Rear LH).

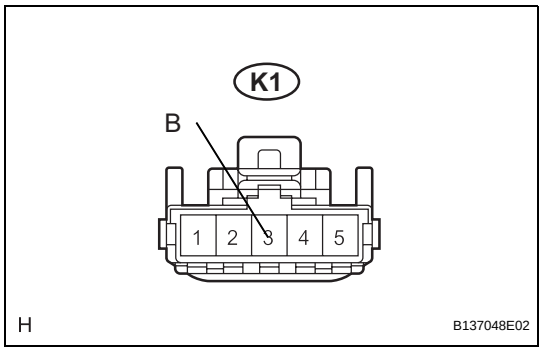
WS

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER WINDOW REGULATOR SWITCH - BATTERY AND BODY GROUND)



(a) Disconnect the K1 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
3 (B) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

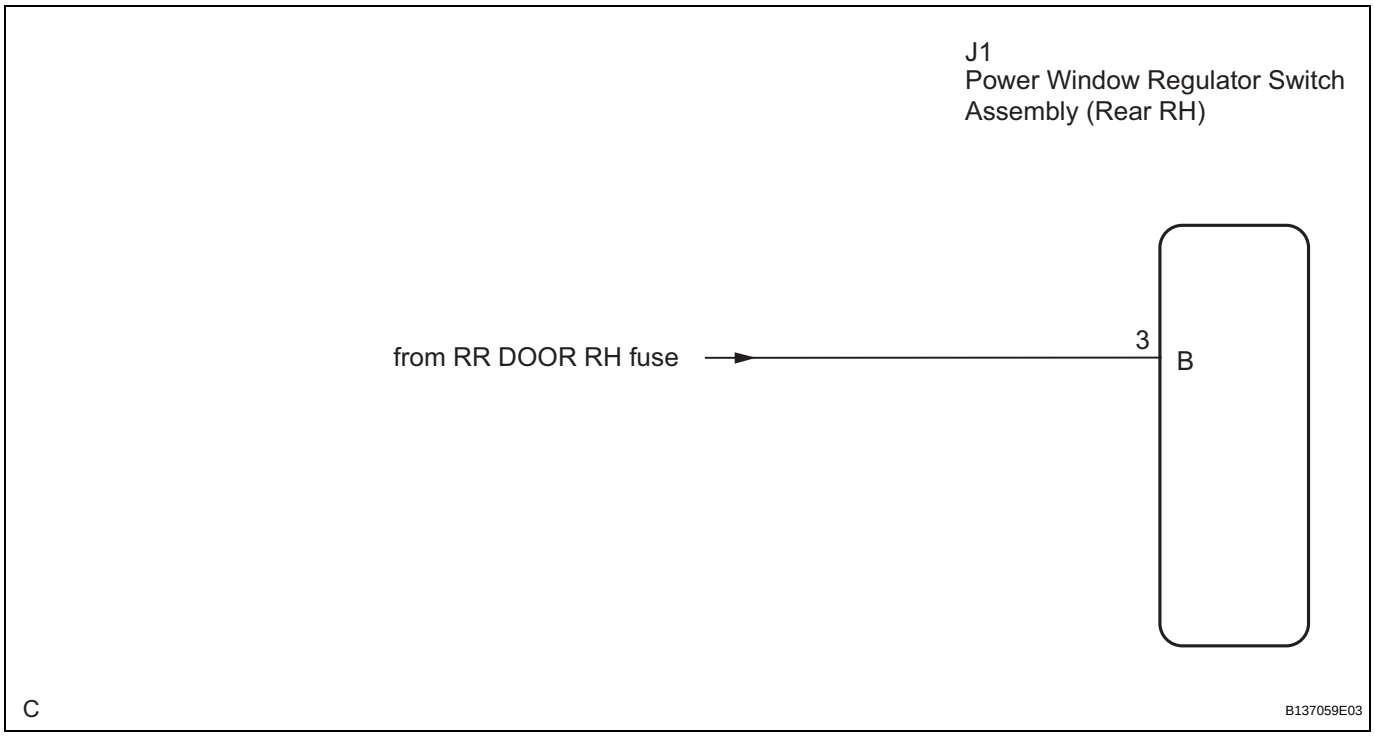
PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Rear Power Window Switch RH Circuit

DESCRIPTION

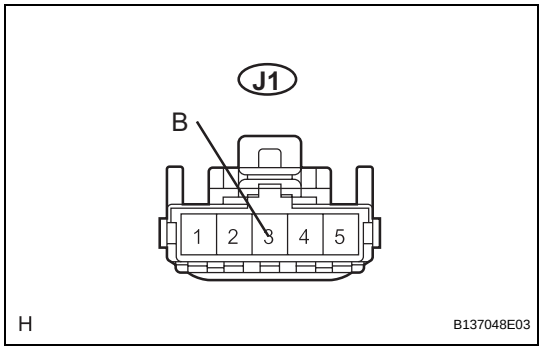
This circuit supplies power to operate the power window regulator switch (Rear RH).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK WIRE HARNESS (POWER WINDOW REGULATOR SWITCH - BATTERY AND BODY GROUND)



(a) Disconnect the J1 connector.
(b) Measure the voltage according to the value(s) in the table below.

Standard voltage

Tester Connection	Condition	Specified Condition
3 (B) - Body ground	Ignition switch on (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

Driver Side Power Window Motor Circuit

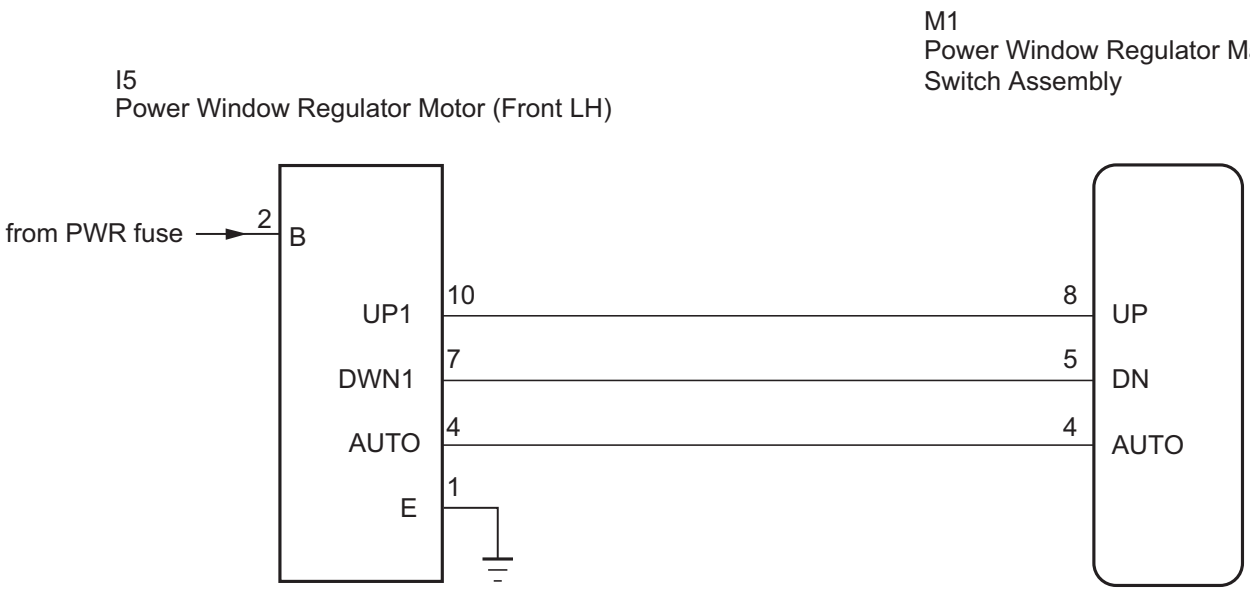
DESCRIPTION

This circuit transmits signals from the power window regulator master switch assembly to the power window regulator motor (Front LH).

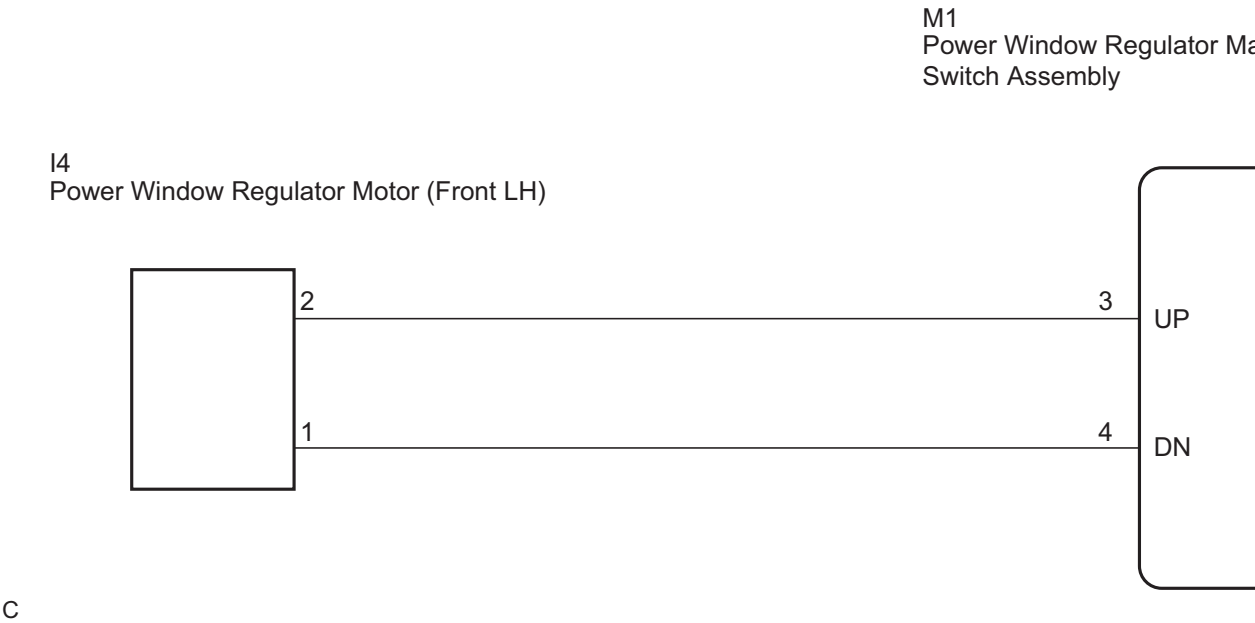
WS

WIRING DIAGRAM

with Jam Protection:

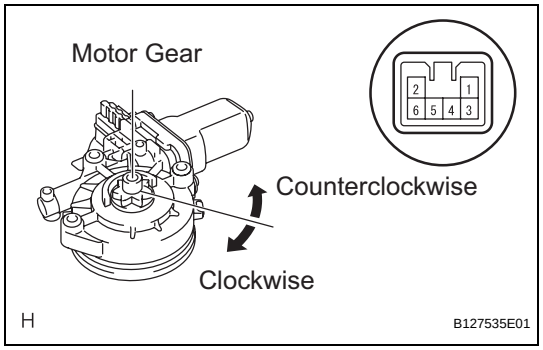


without Jam Protection:



INSPECTION PROCEDURE

1	**INSPECT POWER WINDOW REGULATOR MOTOR**



without Jam protection:

(a) Remove the power window motor.

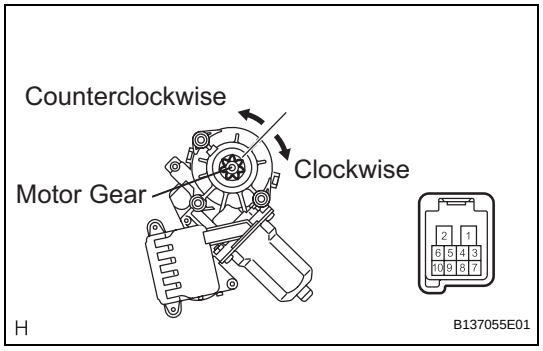
(1) Apply battery voltage to the motor connector according to the table below.

NOTICE:

Do not apply battery voltage to any terminals except terminals 1 and 2.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates clockwise
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates counterclockwise



(b) with Jam protection:

Remove the power window motor.

(1) Apply battery voltage to the motor connector according to the table below.

NOTICE:

Do not apply battery voltage to any terminals except terminals 1, 2, 4, 7 and 10.

Standard

Switch Condition	Measurement Condition	Specified Condition
Manual Operation	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 7 (DN)	Motor gear rotates clockwise
	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 10 (UP)	Motor gear rotates counterclockwise
Auto Operation	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 4 (AUTO), 7 (DN)	Motor gear rotates clockwise
	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 4 (AUTO), 10 (UP)	Motor gear rotates counterclockwise

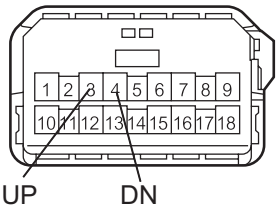
NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

OK

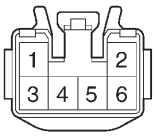
2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - WINDOW REGULATOR MASTER SWITCH)

WS

M1
Power Window Regulator Master Switch Assembly:



I4
Power Window Regulator Motor (Front LH):

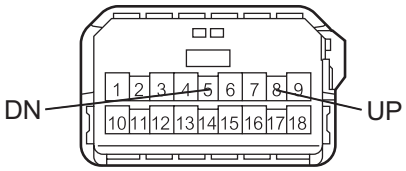


B137061E01

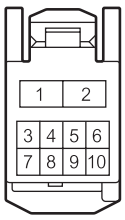
(a) without Jam protection:
Disconnect the M1 and I4 connectors.
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
M1-3 (UP) - I4-2	Always	Below 1 Ω
M1-4 (DN) - I4-1	Always	Below 1 Ω
M1-3 (UP) - Body ground	Always	10 kΩ or higher
M1-4 (DN) - Body ground	Always	10 kΩ or higher

M1
Power Window Regulator Master Switch Assembly:



I5
Power Window Regulator Motor (Front LH):



B137046E01

(b) with Jam protection:
Disconnect the M1 and I5 connectors.
(1) Measure the resistance according to the value(s) in the table below.
Standard resistance

Tester Connection	Condition	Specified Condition
M1-8 (UP) - I5-10	Always	Below 1 Ω
M1-5 (DN) - I5-7	Always	Below 1 Ω
M1-8 (UP) - Body ground	Always	10 kΩ or higher
M1-5 (DN) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

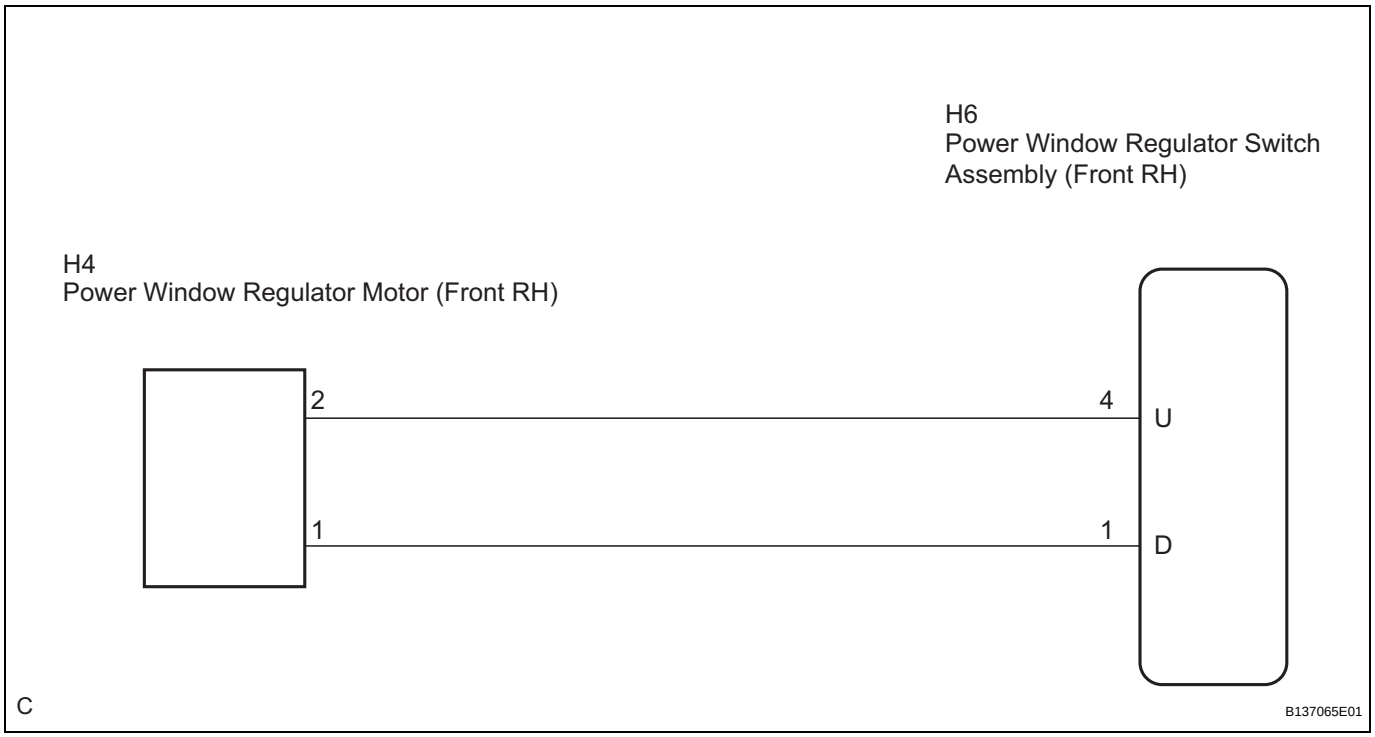
Front Passenger Side Power Window Motor Circuit

DESCRIPTION

This circuit transmits signals from the power window regulator switch assembly (Front RH) to the power window regulator motor (Front RH).

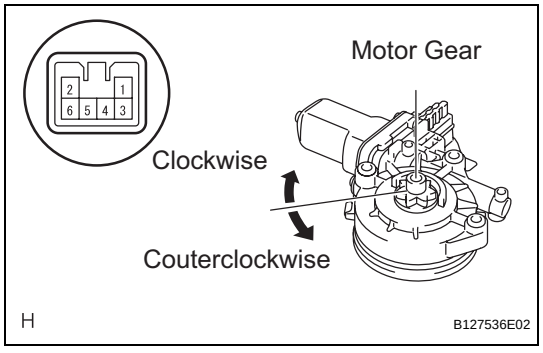
WS

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT POWER WINDOW REGULATOR MOTOR



(a) Remove the power window motor.
(b) Apply battery voltage to the motor connector according to the table below.

NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates clockwise
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates counterclockwise

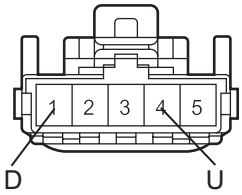
NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

OK

2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - POWER WINDOW REGULATOR SWITCH)

WS

H6
Power Window Regulator Switch Assembly (Front RH):



H4
Power Window Regulator Motor (Front RH):

B137066E01

(a) Disconnect the H6 and H4 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
H6-4 (U) - H4-2	Always	Below 1 Ω
H6-1 (D) - H4-1	Always	Below 1 Ω
H6-4 (U) - Body ground	Always	10 kΩ or higher
H6-1 (D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

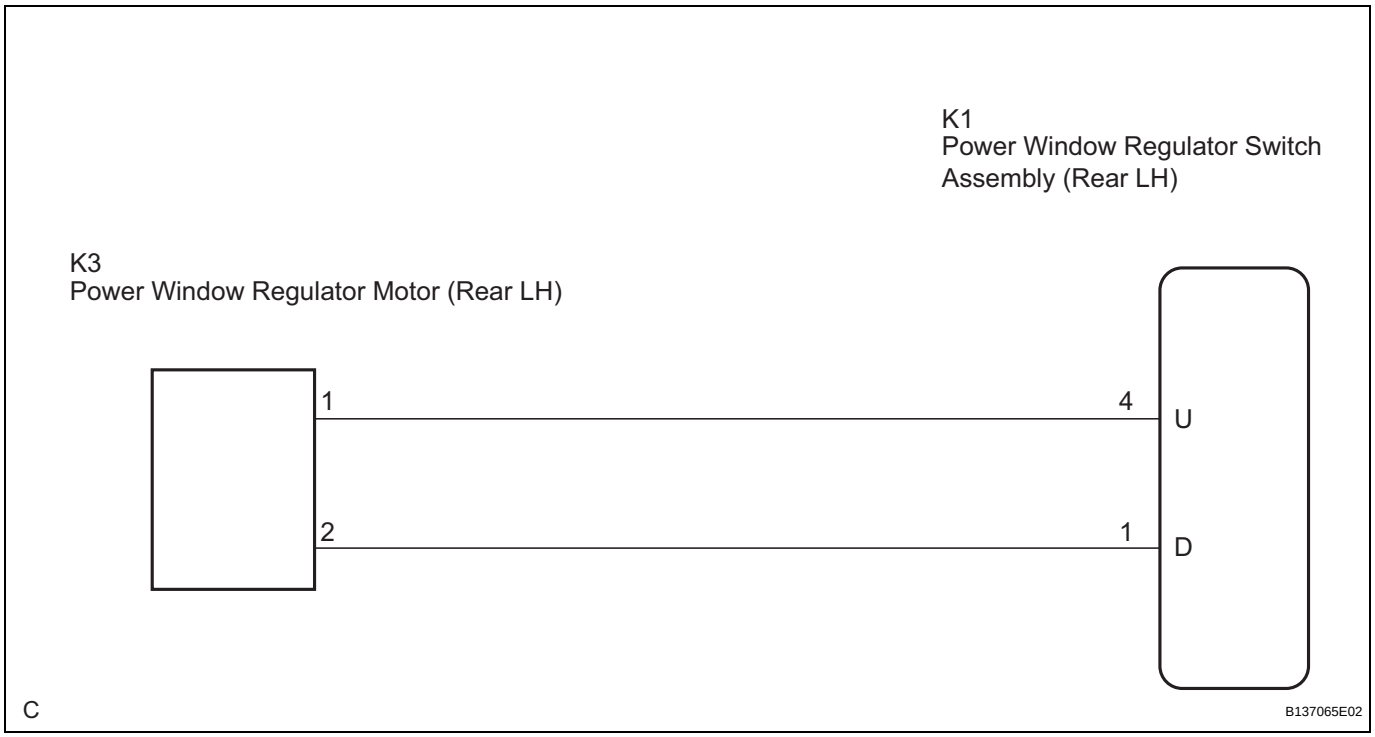
Rear Power Window Motor LH Circuit

DESCRIPTION

This circuit transmits signals from the power window regulator switch assembly (Rear LH) to the power window regulator motor (Rear LH).

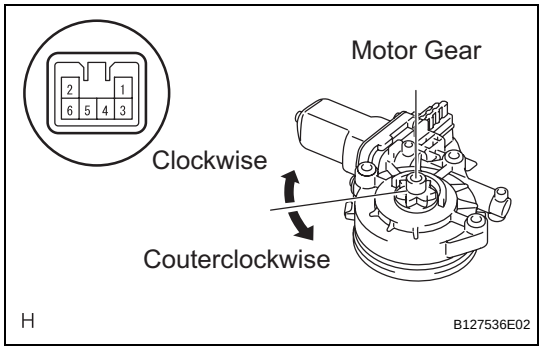
WS

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT POWER WINDOW REGULATOR MOTOR



(a) Remove the power window motor.
(b) Apply battery voltage to the motor connector according to the table below.
NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.
Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates clockwise
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates counterclockwise

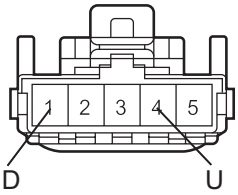
NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

OK

2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - WINDOW REGULATOR SWITCH)

WS

K1
Power Window Regulator Switch Assembly (Rear LH):



K3
Power Window Regulator Motor (Rear LH):

B137066E02

(a) Disconnect the K1 and K3 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
K1-4 (U) - K3-1	Always	Below 1 Ω
K1-1 (D) - K3-2	Always	Below 1 Ω
K1-4 (U) - Body ground	Always	10 kΩ or higher
K1-1 (D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

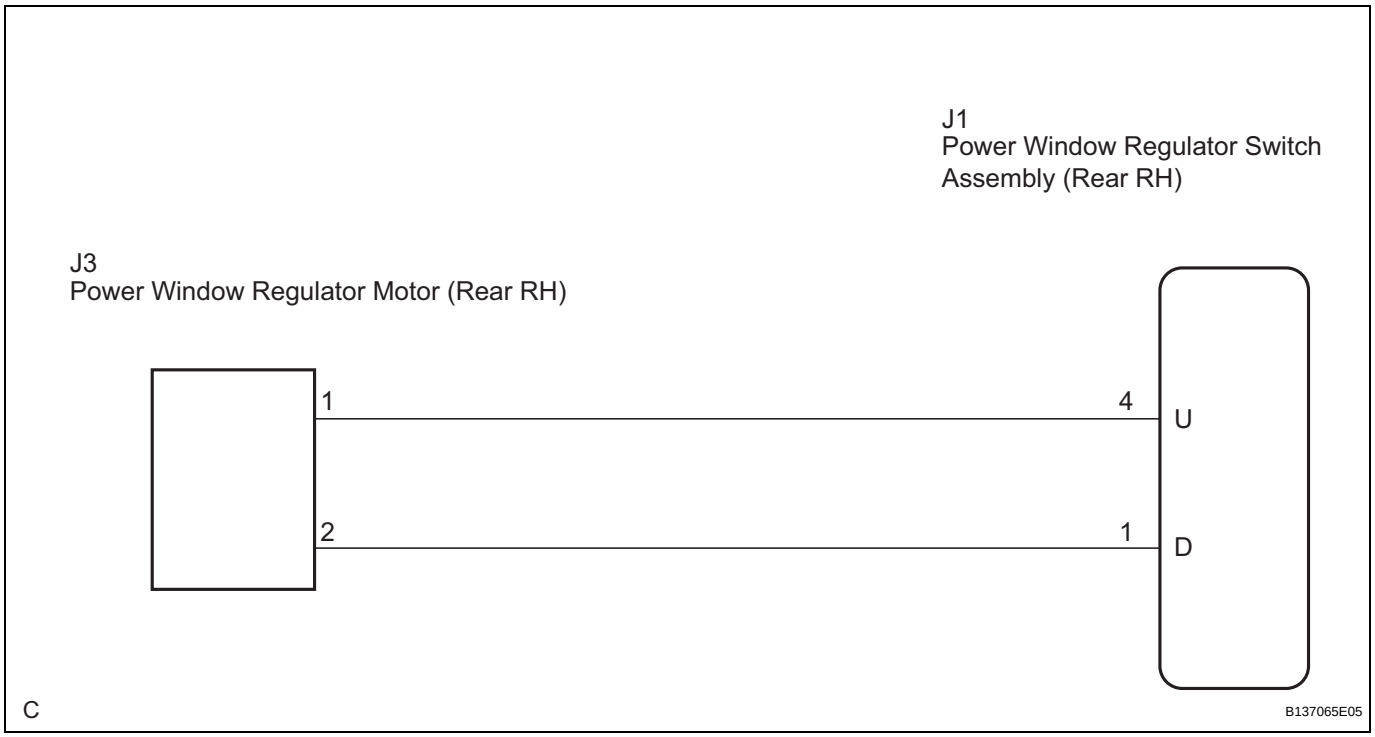
Rear Power Window Motor RH Circuit

DESCRIPTION

This circuit transmits signals from the power window regulator switch assembly (Rear RH) to the power window regulator motor (Rear RH).

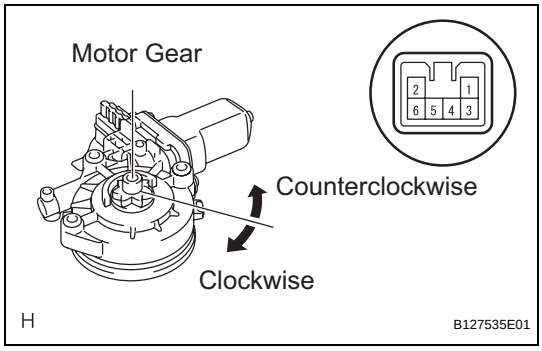
WS

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT POWER WINDOW REGULATOR MOTOR



(a) Remove the power window motor.
(b) Apply battery voltage to the motor connector according to the table below.
NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.
Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates clockwise
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates counterclockwise

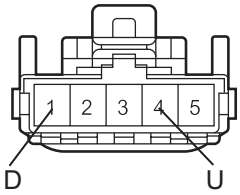
NG → **REPLACE POWER WINDOW REGULATOR MOTOR**

OK

2	CHECK WIRE HARNESS (WINDOW REGULATOR MOTOR - WINDOW REGULATOR SWITCH)

WS

J1
Power Window Regulator Switch Assembly (Rear RH):



J3
Power Window Regulator Motor (Rear RH):

B137066E03

(a) Disconnect the J1 and J3 connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

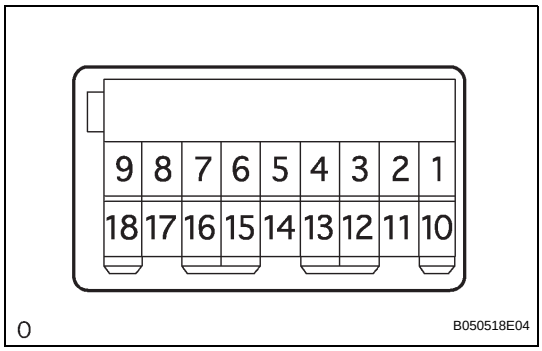
Tester Connection	Condition	Specified Condition
J1-4 (U) - J3-1	Always	Below 1 Ω
J1-1 (D) - J3-2	Always	Below 1 Ω
J1-4 (U) - Body ground	Always	10 kΩ or higher
J1-1 (D) - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

WS



POWER WINDOW MASTER SWITCH

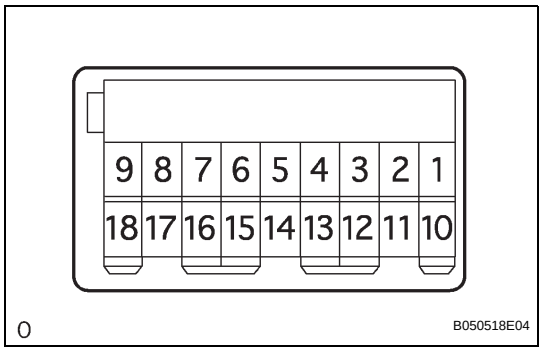
INSPECTION

1. INSPECT POWER WINDOW MASTER SWITCH (w/ Jam Protection Function)

(a) Measure the resistance when the switch is operated according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
8 (UP) - 1 (E) - 4 (AUTO)	Auto UP	Below 1 Ω
5 (DN) - 6 (B)		Below 1 Ω
8 (UP) - 1 (E)	Manual UP	Below 1 Ω
5 (DN) - 6 (B)		Below 1 Ω
8 (UP) - 5 (DN) - 6 (B)	OFF	Below 1 Ω
5 (DN) - 1 (E)	Manual DOWN	Below 1 Ω
8 (UP) - 6 (B)		Below 1 Ω
4 (AUTO) - 5 (DN) - 1 (E)	Auto DOWN	Below 1 Ω
8 (UP) - 6 (B)		Below 1 Ω
1 (E) - 10 (RRU)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)
1 (E) - 12 (RLU)		
1 (E) - 13 (RLD)		
1 (E) - 15 (PD)		
1 (E) - 16 (PU)		
1 (E) - 18 (RRD)		

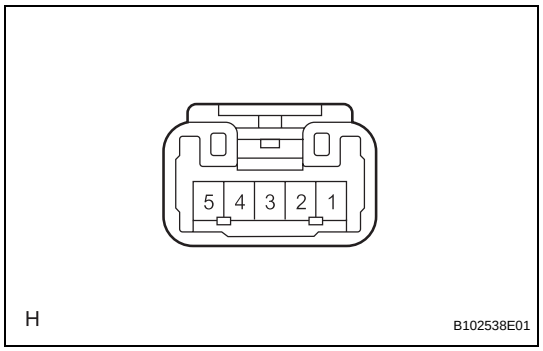


2. INSPECT POWER WINDOW MASTER SWITCH (w/o Jam Protection Function)

(a) Measure the resistance when the switch is operated according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 (E) - 3 (DU)	OFF	Below 1 Ω
1 (E) - 4 (DD)		Below 1 Ω
1 (E) - 10 (RRU)	Lock/Unlock switch	UNLOCK (Below 1 Ω) → LOCK (10 kΩ or higher)
1 (E) - 12 (RLU)		
1 (E) - 13 (RLD)		
1 (E) - 15 (PD)		
1 (E) - 16 (PU)		
1 (E) - 18 (RRD)		



FRONT PASSENGER SIDE POWER WINDOW SWITCH

INSPECTION

1. INSPECT POWER WINDOW SWITCH

(a) Remove the power window switch.

(b) Measure the resistance when the switch is operated according to the value(s) in the table below.

Standard resistance

Tester Connection	Switch Condition	Specified Condition
1 (D) - 2 (SD)	UP	Below 1 Ω
3 (B) - 4 (U)		Below 1 Ω
1 (D) - 2 (SD)	OFF	Below 1 Ω
4 (U) - 5 (SU)		Below 1 Ω
4 (U) - 5 (SU)	DOWN	Below 1 Ω
1 (D) - 3 (B)		Below 1 Ω

WS

REAR POWER WINDOW SWITCH

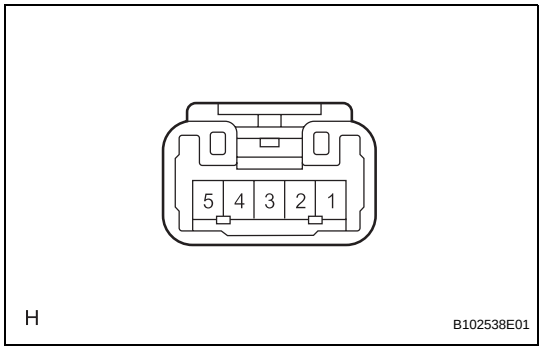
INSPECTION

1. INSPECT POWER WINDOW SWITCH (for Rear RH)

(a) Remove the power window switch.

(b) Measure the resistance when the switch is operated according to the value(s) in the table below.

Standard resistance



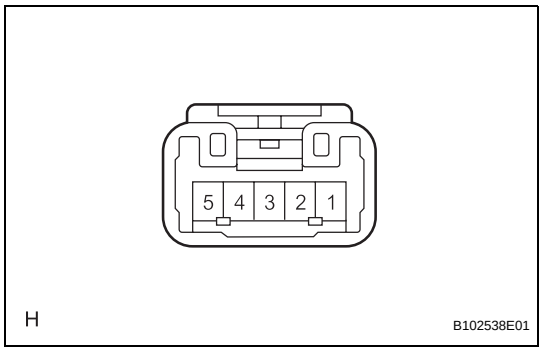
Tester Connection	Switch Condition	Specified Condition
1 (D) - 2 (SD)	UP	Below 1 Ω
3 (B) - 4 (U)		Below 1 Ω
1 (D) - 2 (SD)	OFF	Below 1 Ω
4 (U) - 5 (SU)		Below 1 Ω
4 (U) - 5 (SU)	DOWN	Below 1 Ω
1 (D) - 3 (B)		Below 1 Ω

2. REMOVE POWER WINDOW SWITCH (for Rear LH)

(a) Remove the power window switch.

(b) Measure the resistance when the switch is operated according to the value(s) in the table below.

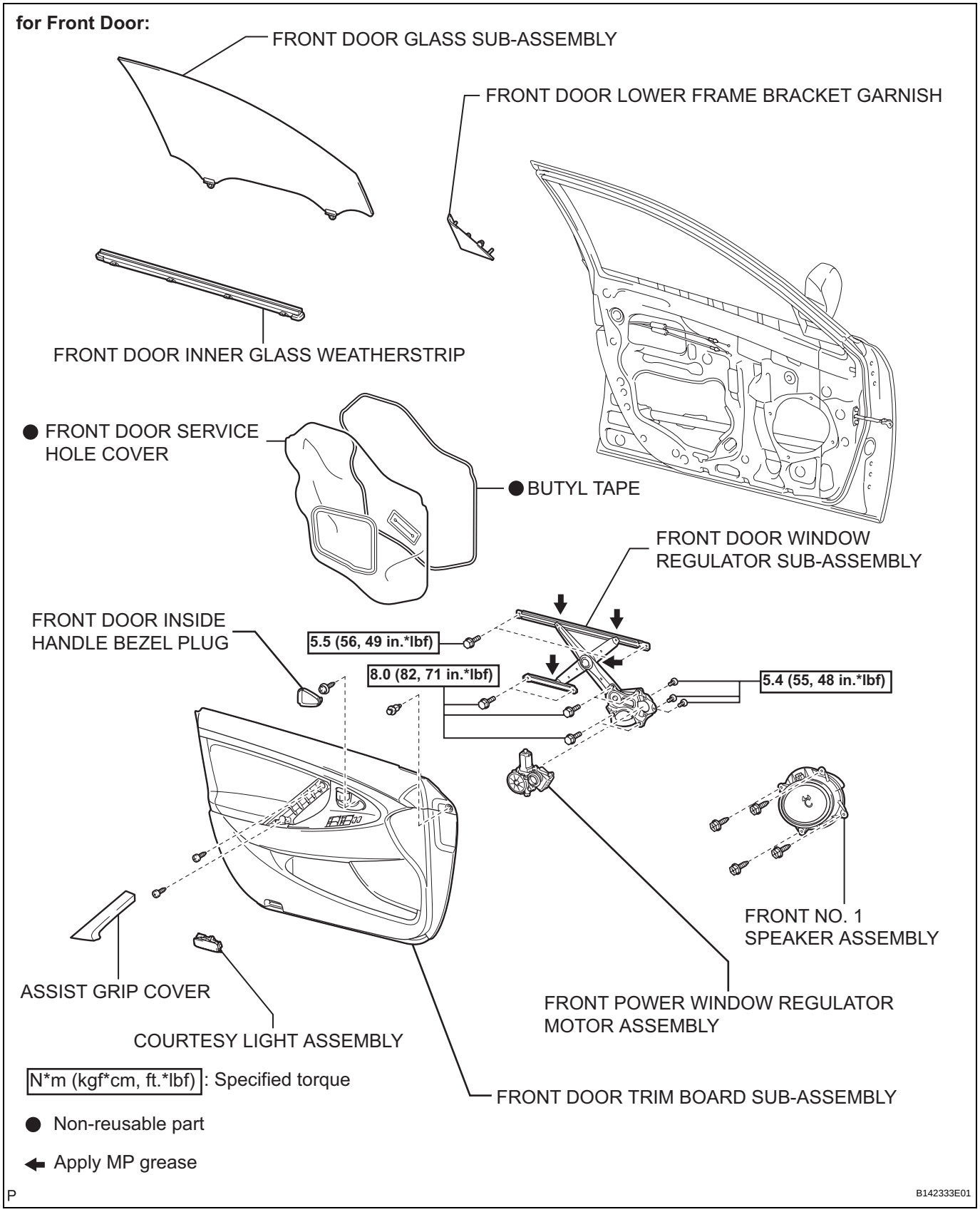
Standard resistance



Tester Connection	Switch Condition	Specified Condition
1 (D) - 2 (SD)	UP	Below 1 Ω
3 (B) - 4 (U)		Below 1 Ω
1 (D) - 2 (SD)	OFF	Below 1 Ω
4 (U) - 5 (SU)		Below 1 Ω
4 (U) - 5 (SU)	DOWN	Below 1 Ω
1 (D) - 3 (B)		Below 1 Ω

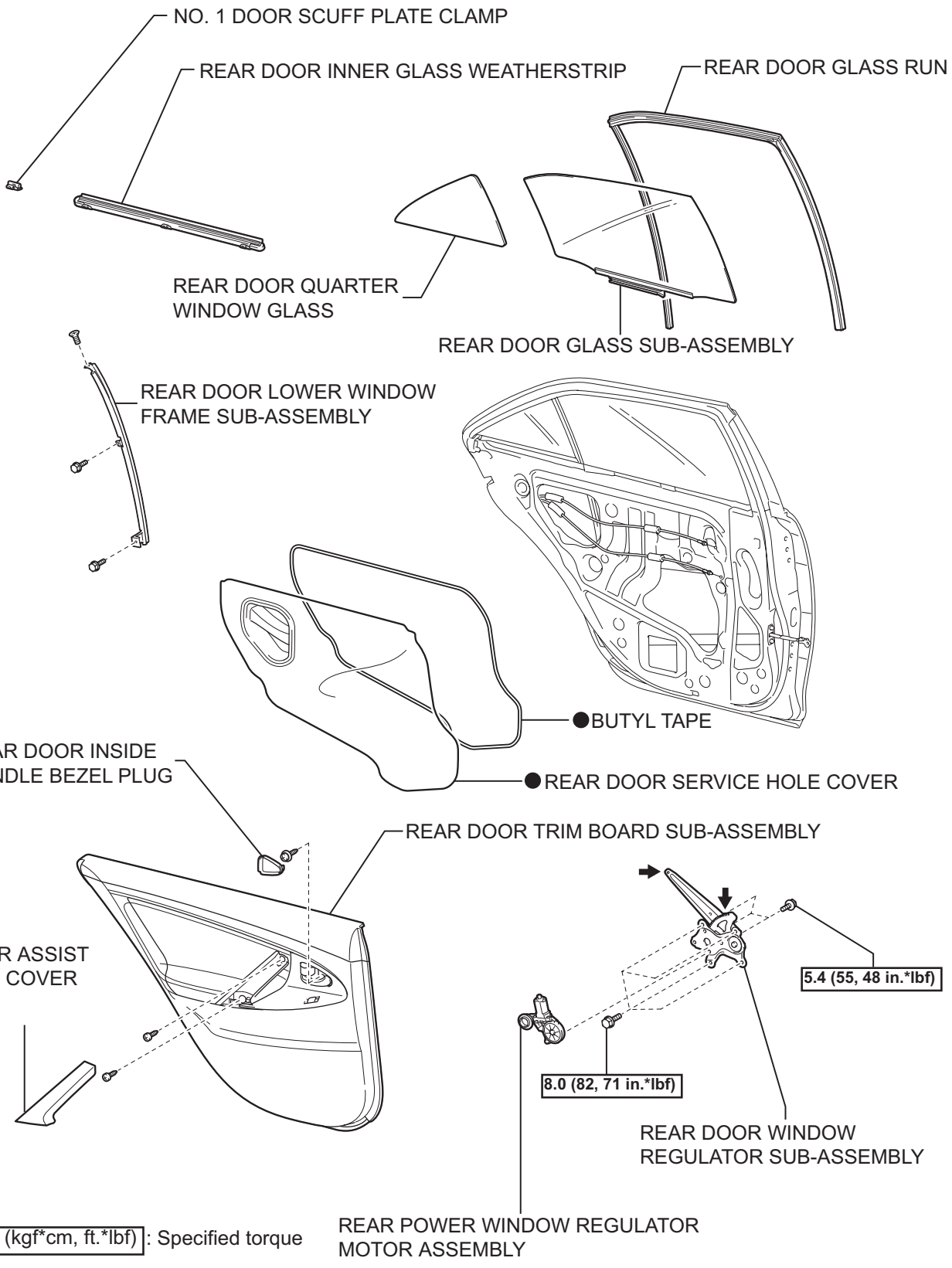
POWER WINDOW REGULATOR MOTOR

COMPONENTS



WS

for Rear Door:



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

◀ Apply MP grease

P

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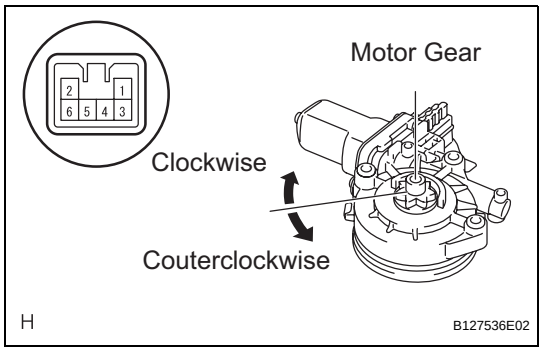
REMOVAL

1. REMOVE FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-14)
2. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-14)
3. REMOVE ASSIST GRIP COVER (See page ED-15)
4. REMOVE COURTESY LIGHT ASSEMBLY (See page ED-15)
5. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-15)
6. REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-16)
7. REMOVE FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-155)
8. REMOVE FRONT DOOR SERVICE HOLE COVER (See page ED-17)
9. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-17)
10. REMOVE FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY (See page ED-18)
11. REMOVE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY (See page ED-18)
12. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-38)
13. REMOVE DOOR ASSIST GRIP COVER (See page ED-38)
14. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-39)
15. REMOVE REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-40)
16. REMOVE REAR DOOR SERVICE HOLE COVER (See page ED-41)
17. REMOVE REAR DOOR GLASS RUN (See page ED-42)
18. REMOVE REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-42)
19. REMOVE REAR DOOR QUARTER WINDOW GLASS (See page ED-43)
20. REMOVE REAR DOOR GLASS SUB-ASSEMBLY (See page ED-43)
21. REMOVE REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY (See page ED-43)
22. REMOVE REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY (See page ED-43)

WS



INSPECTION

1. INSPECT POWER WINDOW REGULATOR MOTOR (FRONT RH)

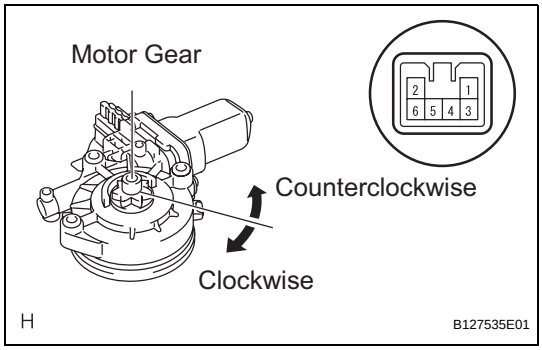
(a) Apply battery voltage to the motor connector according to the table below.

NOTICE:

Do not apply battery voltage to any terminals except terminals 1 and 2.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates clockwise
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates counterclockwise



2. INSPECT POWER WINDOW REGULATOR MOTOR (FRONT LH)

(a) without Jam protection:

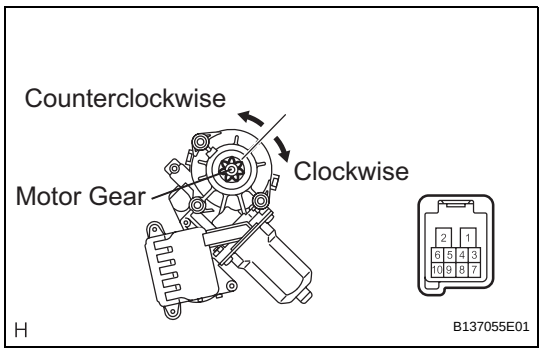
Apply battery voltage to the motor connector according to the table below.

NOTICE:

Do not apply battery voltage to any terminals except terminals 1 and 2.

Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates clockwise
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates counterclockwise



(b) with Jam protection:

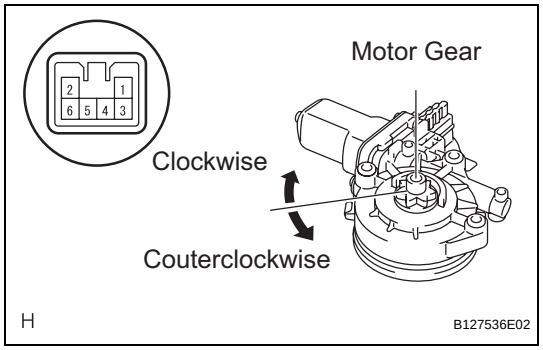
Apply battery voltage to the motor connector according to the table below.

NOTICE:

Do not apply battery voltage to any terminals except terminals 1, 2, 4, 7 and 10.

Standard

Switch Condition	Measurement Condition	Specified Condition
Manual Operation	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 7 (DN)	Motor gear rotates clockwise
	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 10 (UP)	Motor gear rotates counterclockwise
Auto Operation	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 4 (AUTO), 7 (DN)	Motor gear rotates clockwise
	Battery positive (+) → Terminal 2 (PWR) Battery negative (-) → Terminal 1 (E), 4 (AUTO) 10 (UP)	Motor gear rotates counterclockwise

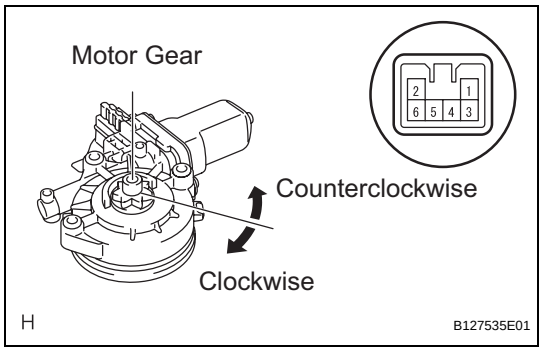


3. INSPECT POWER WINDOW REGULATOR MOTOR (REAR RH)

(a) Apply battery voltage to the motor connector according to the table below.

NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.
Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal 1	Motor gear rotates clockwise
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates counterclockwise



4. INSPECT POWER WINDOW REGULATOR MOTOR (REAR LH)

(a) Apply battery voltage to the motor connector according to the table below.

NOTICE:
Do not apply battery voltage to any terminals except terminals 1 and 2.
Standard

Measurement Condition	Specified Condition
Battery positive (+) → Terminal 1 Battery negative (-) → Terminal 2	Motor gear rotates clockwise
Battery positive (+) → Terminal 2 Battery negative (-) → Terminal	Motor gear rotates counterclockwise

WS

INSTALLATION

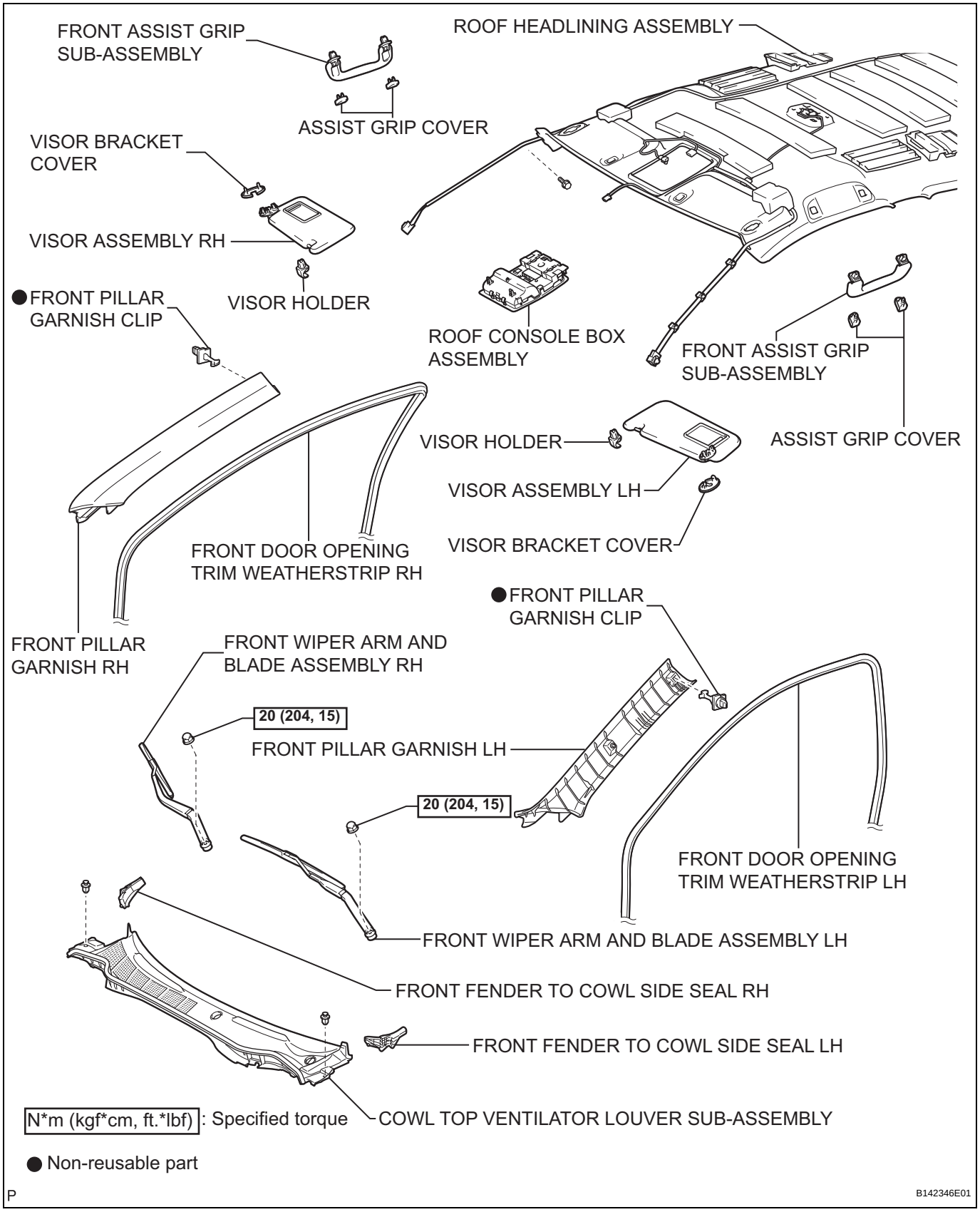
1. **INSTALL REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY (See page ED-51)**
2. **INSTALL REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY (See page ED-51)**
3. **INSTALL REAR DOOR GLASS RUN (See page ED-52)**
4. **INSTALL REAR DOOR GLASS SUB-ASSEMBLY (See page ED-52)**
5. **INSTALL REAR DOOR QUARTER WINDOW GLASS (See page ED-52)**
6. **INSTALL REAR DOOR LOWER WINDOW FRAME SUB-ASSEMBLY (See page ED-52)**
7. **INSTALL REAR DOOR SERVICE HOLE COVER (See page ED-53)**
8. **INSTALL REAR DOOR INNER GLASS WEATHERSTRIP (See page ED-54)**
9. **INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-55)**
10. **INSTALL DOOR ASSIST GRIP COVER (See page ED-56)**
11. **INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG (See page ED-56)**
12. **INITIALIZATION POWER WINDOW CONTROL SYSTEM**
    (See page WS-8)
13. **INSTALL FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY (See page ED-31)**
14. **INSTALL FRONT DOOR WINDOW REGULATOR SUB-ASSEMBLY (See page ED-31)**
15. **INSTALL FRONT DOOR GLASS SUB-ASSEMBLY (See page ED-31)**
16. **INSTALL FRONT DOOR SERVICE HOLE COVER (See page ED-32)**
17. **INSTALL FRONT NO. 1 SPEAKER ASSEMBLY (See page AV-157)**
18. **INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP (See page ED-32)**
19. **INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY (See page ED-33)**
20. **INSTALL COURTESY LIGHT ASSEMBLY (See page ED-34)**
21. **INSTALL ASSIST GRIP COVER (See page ED-34)**
22. **INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG (See page ED-34)**

23. **INSTALL FRONT DOOR LOWER FRAME BRACKET GARNISH (See page ED-34)**

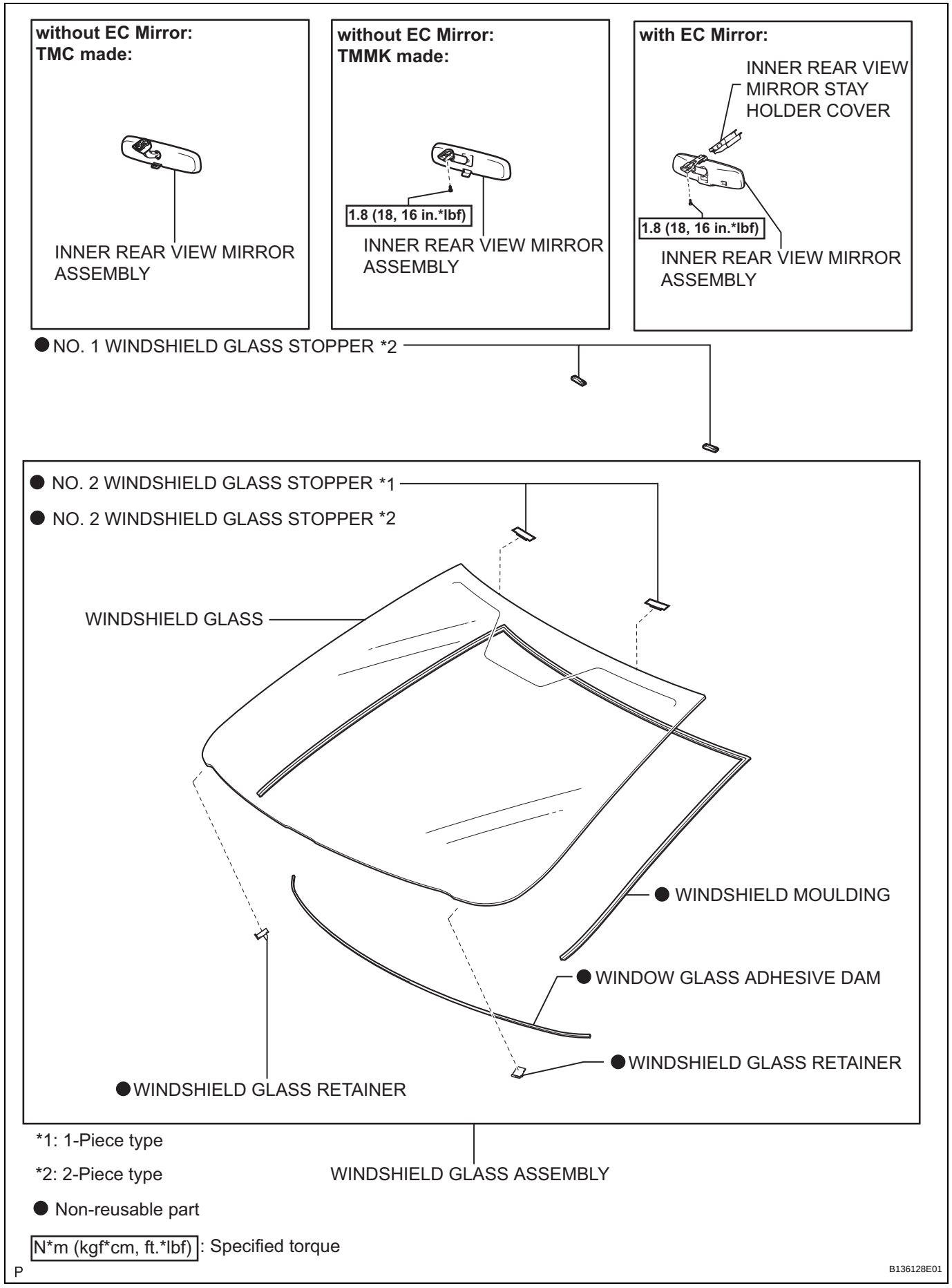
24. **INITIALIZE POWER WINDOW CONTROL SYSTEM** (See page WS-8)

WINDSHIELD GLASS

COMPONENTS



WS



*1: 1-Piece type

*2: 2-Piece type

● Non-reusable part

N*m (kgf*cm, ft.*lbf) : Specified torque

P

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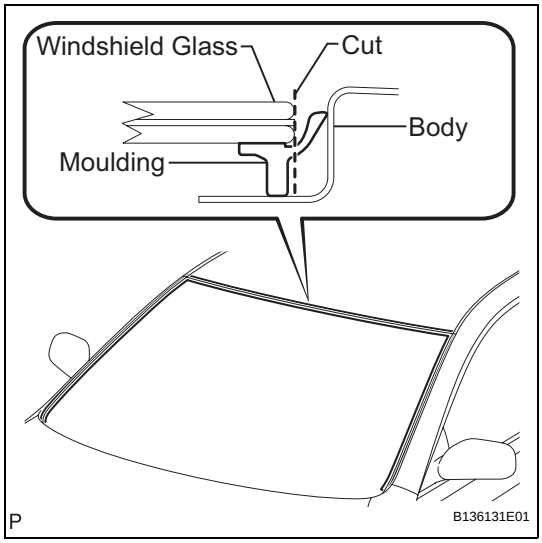
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-9)**
3. **REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-9)**
4. **REMOVE FRONT FENDER TO COWL SIDE SEAL LH (See page WW-9)**
5. **REMOVE FRONT FENDER TO COWL SIDE SEAL RH (See page WW-9)**
6. **REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-10)**
7. **REMOVE INNER REAR VIEW MIRROR ASSEMBLY (for TMC Made without EC Mirror) (See page MI-11)**
8. **REMOVE INNER REAR VIEW MIRROR ASSEMBLY (for TMMK Made without EC Mirror) (See page MI-11)**
9. **REMOVE INNER REAR VIEW MIRROR STAY HOLDER COVER (w/ EC Mirror) (See page MI-11)**
10. **REMOVE INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror) (See page MI-12)**
11. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
12. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
13. **REMOVE FRONT PILLAR GARNISH LH (See page IR-27)**
14. **REMOVE FRONT PILLAR GARNISH RH (See page IR-27)**
15. **REMOVE ROOF CONSOLE BOX ASSEMBLY (See page IR-28)**
16. **REMOVE VISOR ASSEMBLY LH (See page IR-28)**
17. **REMOVE VISOR ASSEMBLY RH (See page IR-29)**
18. **REMOVE VISOR HOLDER (See page IR-29)**
19. **REMOVE FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**
20. **REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)**
    It is not necessary to completely remove the roof headlining assembly. Slightly lower the front section of the roof headlining assembly so that the windshield glass can be removed (See page IR-31).

WS

21. REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)

It is not necessary to completely remove the roof headlining assembly. Slightly lower the front section of the roof headlining assembly so that the windshield glass can be removed (See page IR-32).



22. REMOVE WINDSHIELD MOULDING

(a) Using a knife, cut off the moulding, as shown in the illustration.

NOTICE:

- **Do not damage the vehicle body with the knife.**
- **If the vehicle body is damaged, repair the damaged portion by applying an anti-rust coating after removing the windshield glass.**

(b) Remove the remaining moulding from the windshield glass.

HINT:

When removing the moulding, make a partial cut, then pull and remove it by hand.

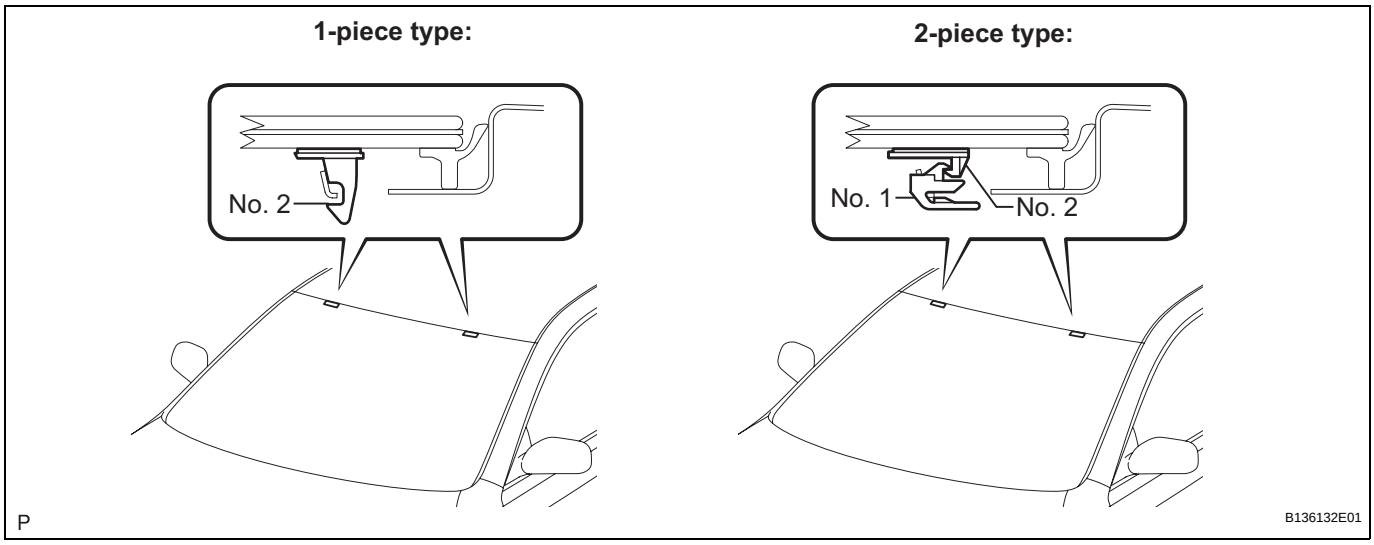
23. REMOVE WINDSHIELD GLASS ASSEMBLY

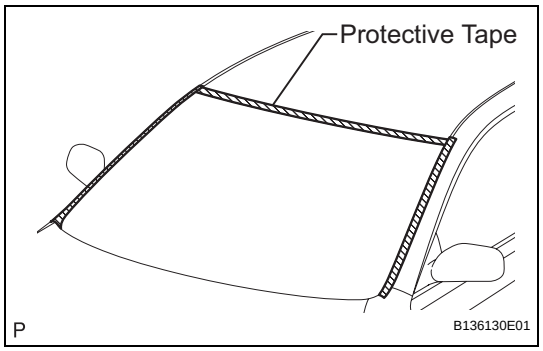
NOTICE:

- **There are No. 1 and No. 2 stoppers on the windshield glass as shown in the illustration. Be careful not to damage the windshield glass when cutting off the adhesive.**
- **To prevent the windshield glass from dropping when performing this operation, be sure to hold the windshield glass using suction cups.**

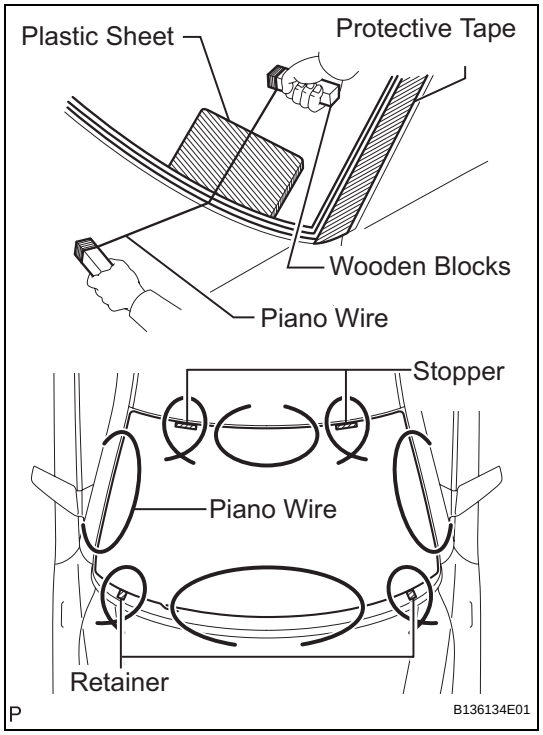
HINT:

Depending on vehicles, a 1-piece or 2-piece type stopper is used.

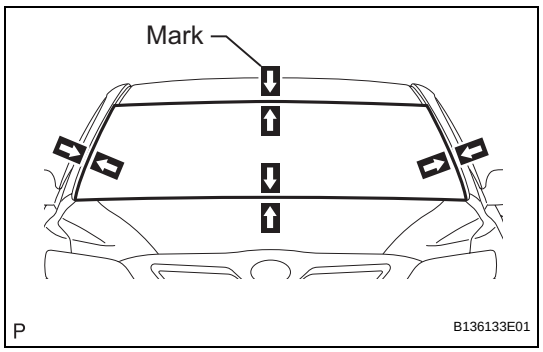




(a) Apply protective tape to the installation position of the windshield glass assembly on the vehicle body.
HINT:
Apply protective tape to the installation surface to prevent it from being scratched.



(b) Pass a piano wire between the vehicle body and glass from the interior.
(c) Tie both wire ends to wooden blocks or similar objects.
(d) Cut off the adhesive by pulling the piano wire around the windshield glass.
NOTICE:
- **When separating the windshield glass, take care not to damage the paint or the interior and exterior ornaments.**
- **To prevent the safety pad from being scratched when removing the windshield glass, place a plastic sheet between the piano wire and safety pad.**



(e) Place matchmarks on the windshield glass and vehicle body on the locations indicated in the illustration.
HINT:
Matchmarks do not need to be placed if the windshield glass is not going to be reused.
(f) Using a suction cup, remove the windshield glass assembly.
NOTICE:
- **Be careful not to drop the windshield glass.**
- **Leave as much adhesive on the vehicle body as possible when removing the windshield glass.**

24. REMOVE WINDOW GLASS ADHESIVE DAM

(a) Using a scraper, remove the adhesive dam.
NOTICE:
- **Be careful not to damage the windshield glass.**
- **Be sure to replace the adhesive dam with a new one.**

25. REMOVE NO. 2 WINDSHIELD GLASS STOPPER

(a) Using a scraper, remove the 2 No. 2 stoppers.

NOTICE:

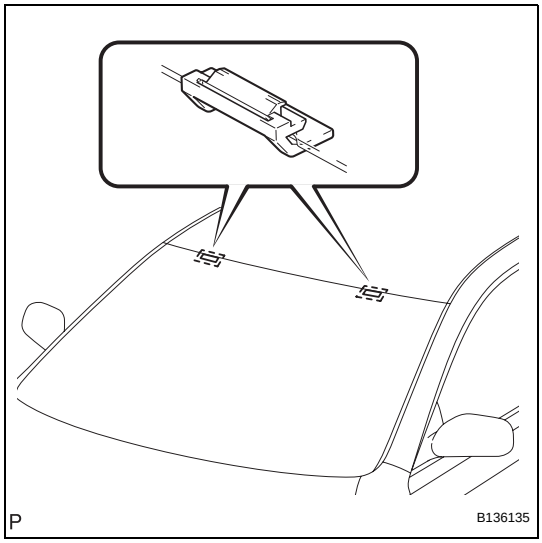
- **Be careful not to damage the windshield glass.**
- **Be sure to replace the No. 2 stoppers with new ones.**

26. REMOVE WINDSHIELD GLASS RETAINER

(a) Using a scraper, remove the 2 retainers.

NOTICE:

- **Be careful not to damage the windshield glass.**
- **Be sure to replace the retainer with a new one.**

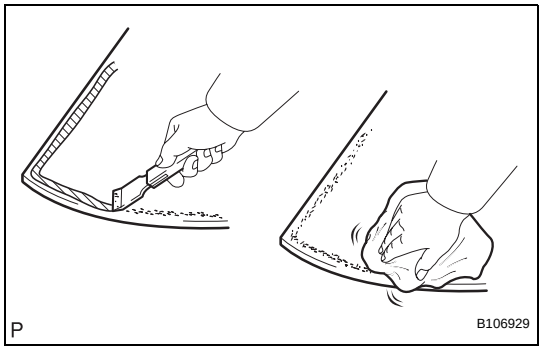


27. REMOVE NO. 1 WINDSHIELD GLASS STOPPER (for 2 Piece Type)

(a) Remove the 2 No. 1 stoppers.

NOTICE:

Be sure to replace the No. 1 stoppers with new ones.



28. CLEAN WINDSHIELD GLASS

(a) Using a scraper, remove the adhesive tape and adhesive sticking to the windshield glass.

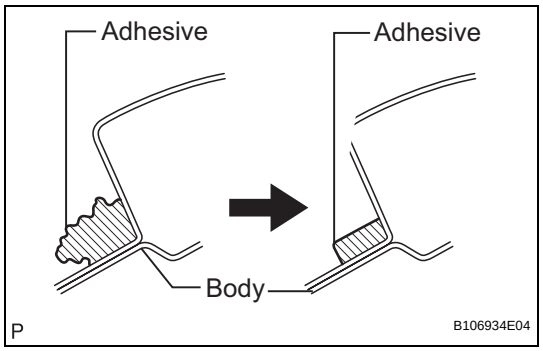
NOTICE:

Be careful not to damage the windshield glass.

(b) Clean the outer circumference of the windshield glass with a non-residue solvent.

NOTICE:

- **Do not touch the windshield glass surface after cleaning it.**
- **Even if using a new windshield glass, clean the windshield glass with a non-residue solvent.**



29. CLEAN VEHICLE BODY

(a) Clean and shape the contact surface of the vehicle body.

(1) Using a knife, cut away any rough adhesive on the contact surface of the vehicle body to ensure the appropriate surface shape.

NOTICE:

Be careful not to damage the vehicle body.

HINT:

Leave as much adhesive on the vehicle body as possible.

(2) Clean the contact surface of the vehicle body with a piece of cloth saturated with cleaner.

HINT:

Even if all the adhesive has been removed, clean the vehicle body.

WS

INSTALLATION

1. INSTALL NO. 2 WINDSHIELD GLASS STOPPER

(a) Using a brush or sponge, coat the application area of the No. 2 stoppers with Primer G.

NOTICE:

- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

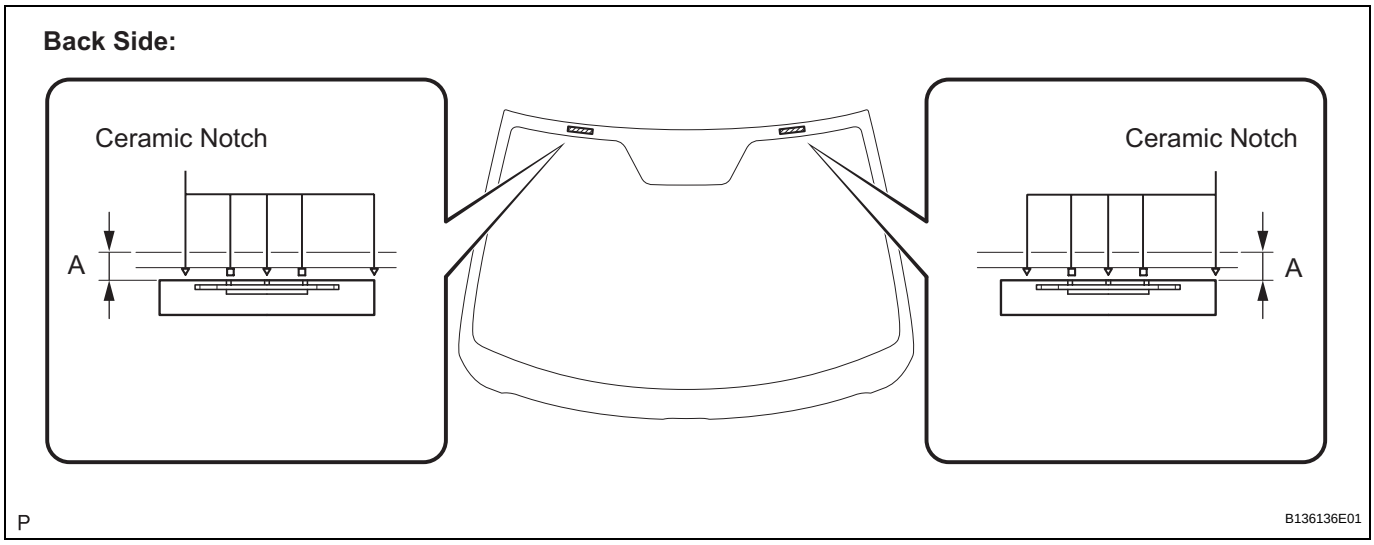
(b) Install 2 new No. 2 stoppers onto the windshield glass, as shown in the illustration.

HINT:

Only 2-piece type No. 1 stoppers are supplied. Use the 2-piece type stoppers even if a 1-piece type was used.

Standard dimension

Area	Dimension
A	13.2 mm (0.519 in.)



2. INSTALL WINDSHIELD GLASS RETAINER

(a) Using a brush or sponge, coat the application area of the retainers with Primer G.

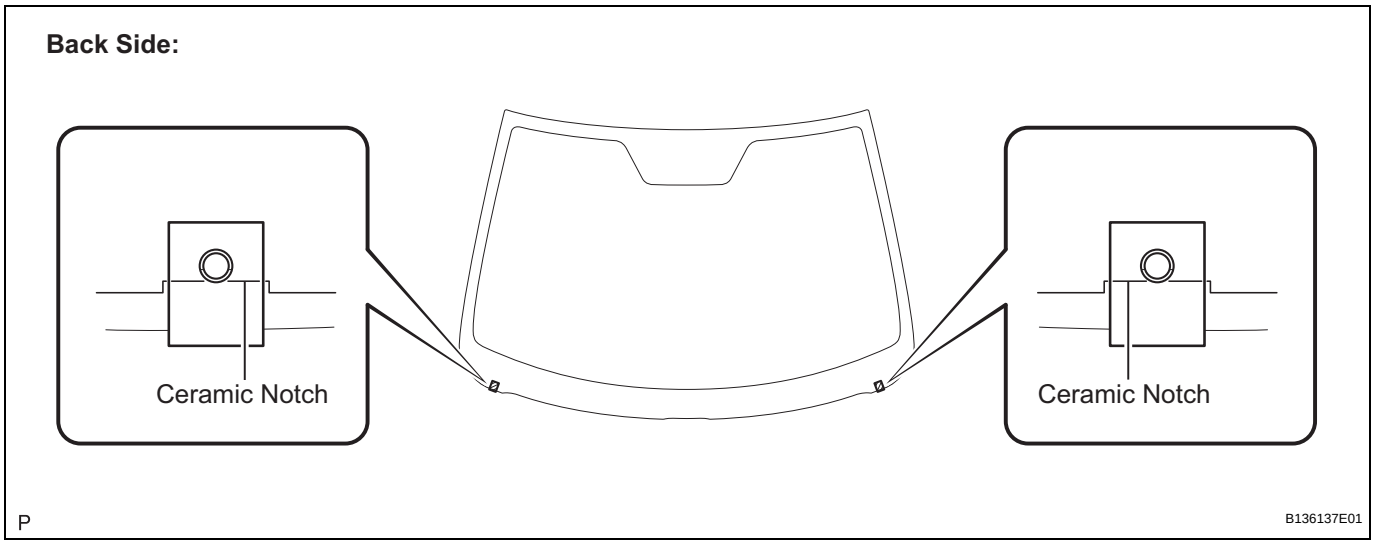
NOTICE:

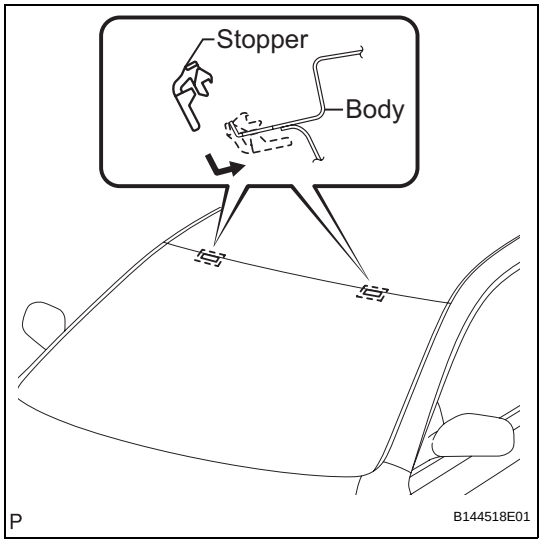
- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Install 2 new retainers onto the windshield glass, as shown in the illustration.





3. INSTALL NO. 1 WINDSHIELD GLASS STOPPER

(a) Install 2 new No. 1 stoppers to the vehicle body, as shown in the illustration.

HINT:

Only 2-piece type No. 1 stoppers are supplied. Use the 2-piece type stoppers even if a 1-piece type was used.

4. INSTALL WINDSHIELD MOULDING

(a) Using a brush or sponge, coat the application area of moulding with Primer G.

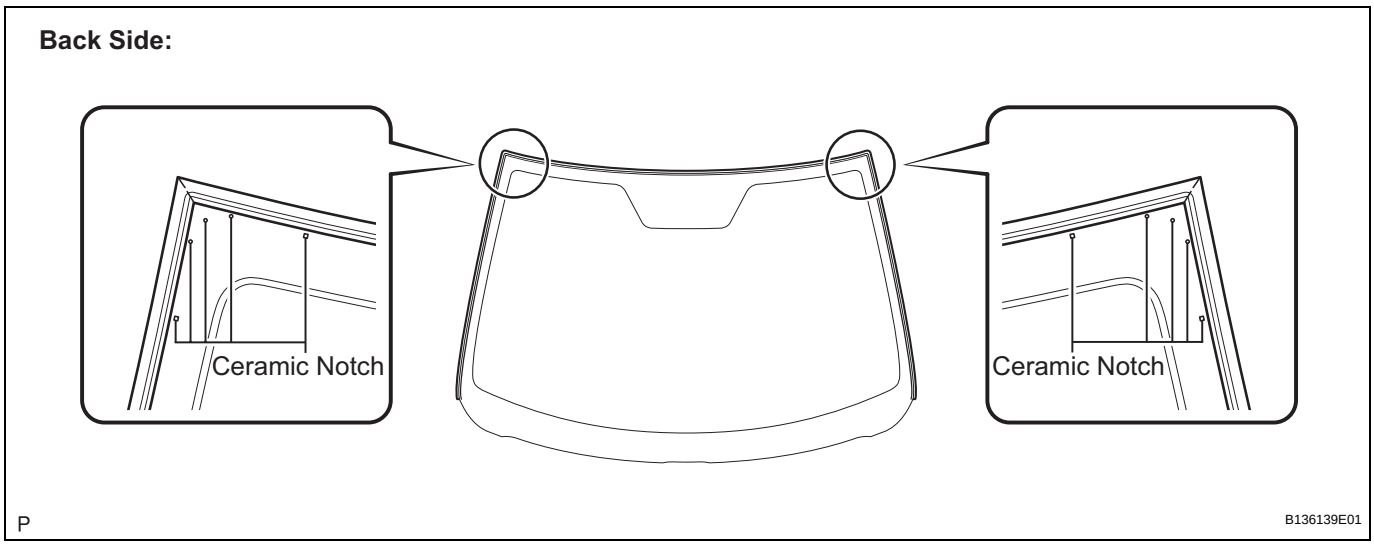
NOTICE:

- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Install a new moulding, as shown in the illustration.



5. INSTALL WINDOW GLASS ADHESIVE DAM

(a) Using a brush or sponge, coat the application area of adhesive dam with Primer G.

NOTICE:

- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Install a new adhesive dam onto the windshield glass, as shown in the illustration.

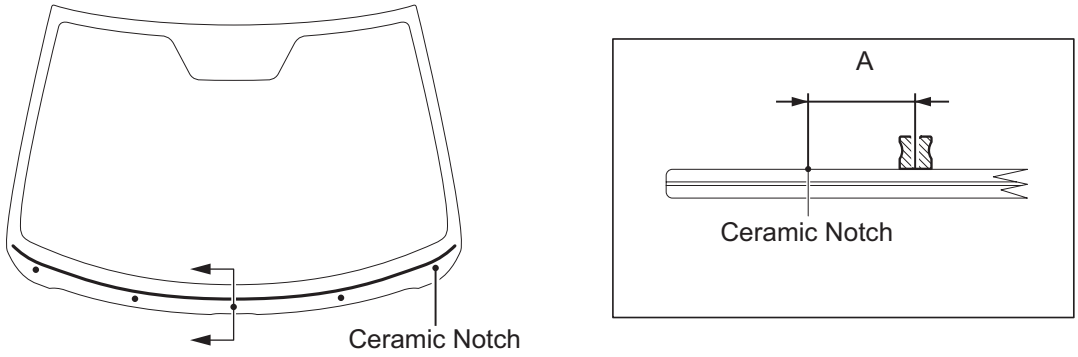
NOTICE:

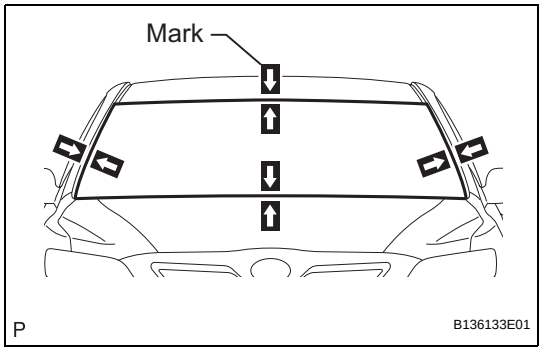
Install the new adhesive dam along the ceramic notches.

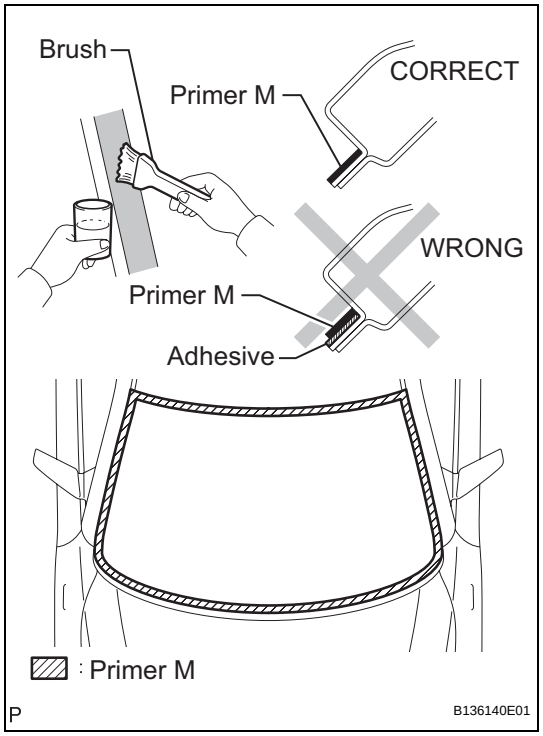
Standard dimension

Area	Dimension
A	6.5 mm (0.255 in.)

Back Side:







6. INSTALL WINDSHIELD GLASS ASSEMBLY

(a) Position the windshield glass assembly.
  (1) Using a suction cup, place the windshield glass assembly in the correct position.
  (2) Check that the whole contact surface of the windshield glass rim is perfectly even.
  (3) Align the matchmarks on the windshield glass and vehicle body.
  NOTICE:
  Check that the windshield glass stoppers are attached to the vehicle body correctly.
  (4) Remove the windshield glass assembly.

(b) Using a brush, coat the installation surface on the vehicle body with Primer M.
NOTICE:
- **Do not coat the adhesive with Primer M.**
- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer M for later use.**

HINT:
If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(c) Using a brush or sponge, coat the application area of adhesive with Primer G.
NOTICE:
- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

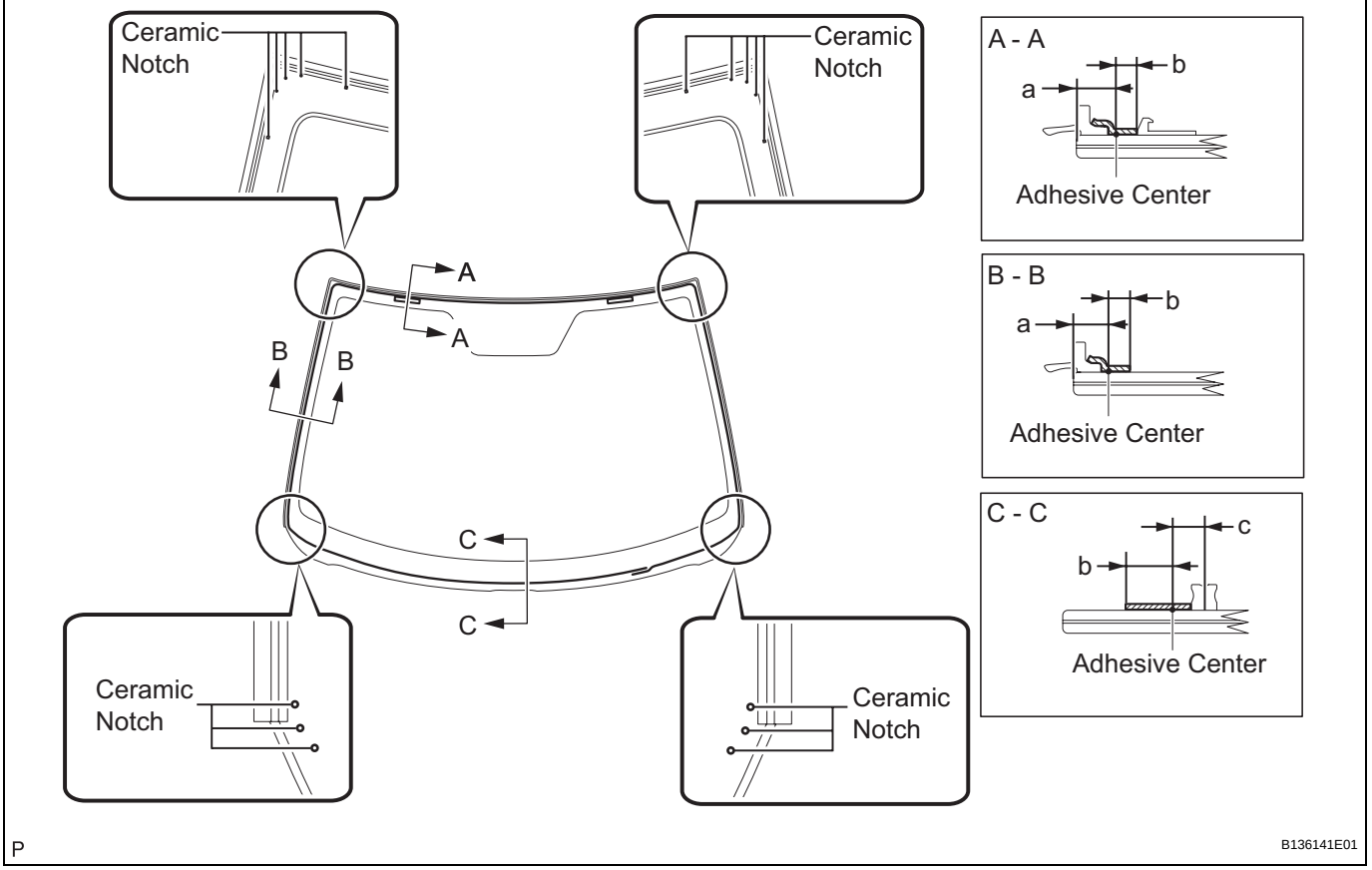
HINT:
- Apply Primer G onto the ceramic notches.
- If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

Standard dimension

Area	Dimension
a	8.7 mm (0.342 in.)
b	7.0 mm (0.275 in.)
c	6.5 mm (0.255 in.)

WS

Back Side:



(d) Apply adhesive (Adhesive: TOYOTA genuine windshield glass adhesive or equivalent).

(1) Cut off the tip of the cartridge nozzle, as shown in the illustration.

HINT:

After cutting off the tip, use all adhesive within the time described in the table below.

Usage time frame

Temperature	Tack-free Time
35°C (95°F)	15 minutes
20°C (68°F)	1 hour and 40 minutes
5°C (41°F)	8 hours

(2) Load the sealer gun with cartridge.

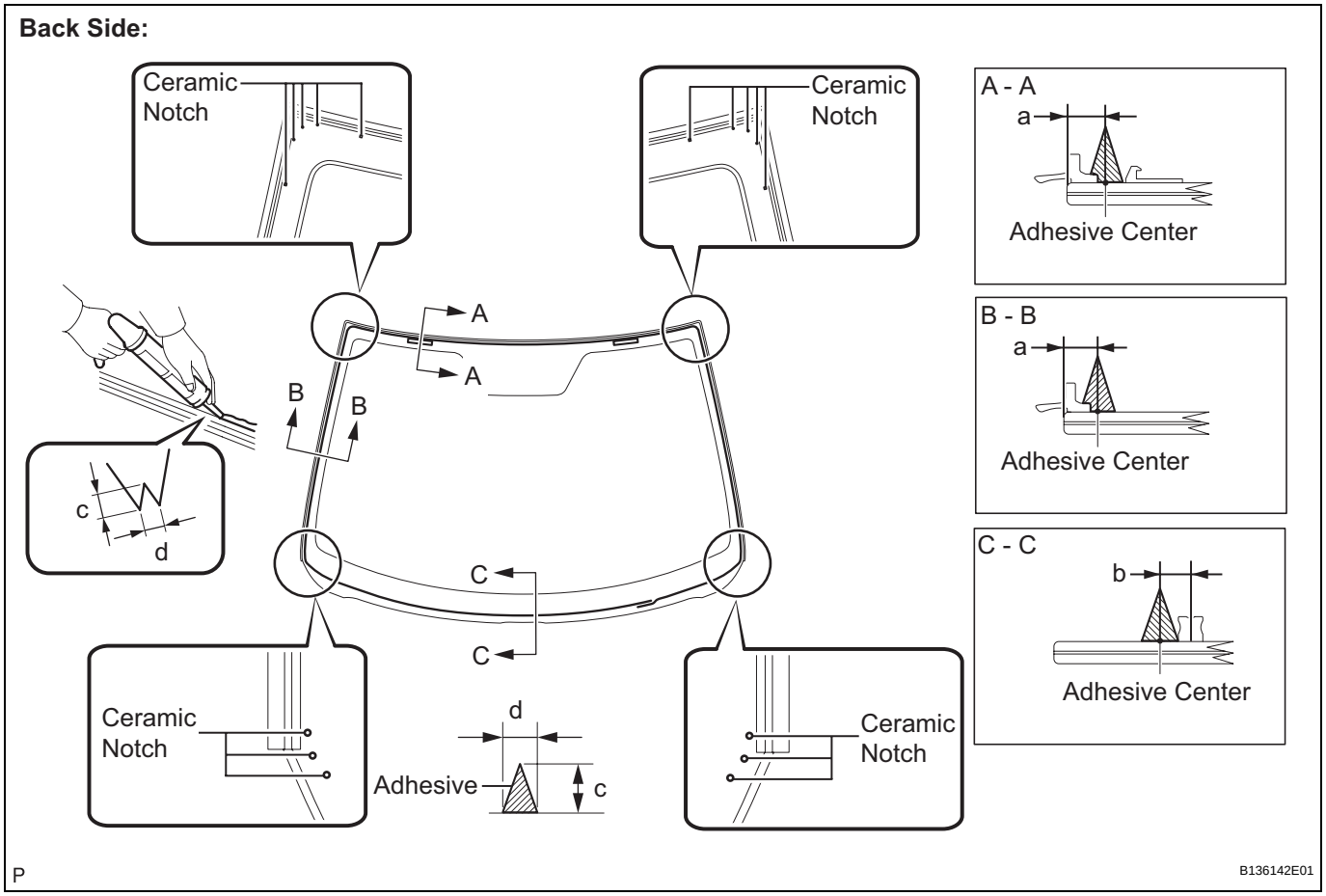
(3) Apply adhesive to the windshield glass, as shown in the illustration.

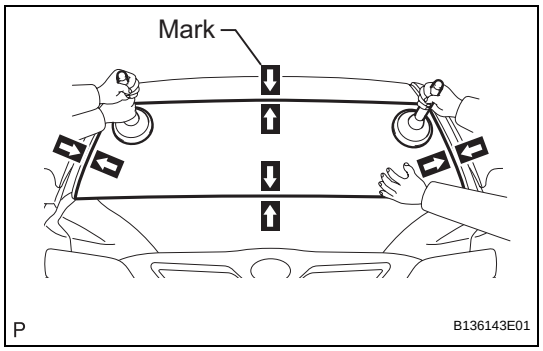
HINT:

Apply adhesive onto the ceramic notches.

Standard dimension

Area	Dimension
a	8.7 mm (0.342 in.)
b	6.5 mm (0.255 in.)
c	12.0 mm (0.472 in.)
d	8.0 mm (0.315 in.)





(e) Install the windshield glass assembly.

(1) Using a suction cup, position the windshield glass so that the matchmarks are aligned, and press it in gently along the rim.

NOTICE:

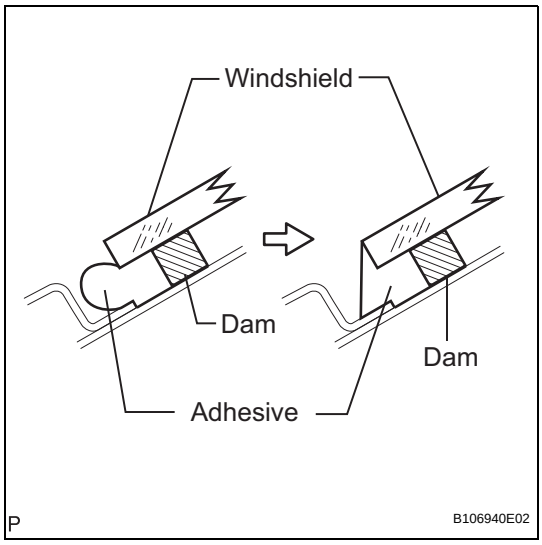
- **Check that the windshield glass stoppers are attached to the vehicle body correctly.**
- **Check the clearance between the vehicle body and windshield glass.**

(2) Lightly press the front surface of the windshield glass to ensure a close fit.

HINT:

Press the glass with force of 98 N (10 kgf, 22 lb) or more.

WS



(3) If necessary, use a scraper to correct the level or position of adhesive that has been applied.
HINT:
Apply adhesive onto the windshield glass rim.

(4) Hold the windshield glass using protective tape until the applied adhesive becomes hard.
NOTICE:
Do not drive the vehicle for the time described in the table below.
Minimum time

Temperature	Minimum time prior to driving vehicle
35°C (95°F)	1 hour and 30 minutes
20°C (68°F)	5 hours
5°C (41°F)	24 hours

7. CHECK FOR LEAKS AND REPAIR

(a) After the adhesive has hardened, apply water from the outside of the vehicle. Check that no water leaks into the cabin.

(b) If water leaks into the cabin, allow the water to dry and add adhesive.

(c) Remove the protective tape.

8. INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-45)

9. INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-46)

10. INSTALL FRONT ASSIST GRIP SUB-ASSEMBLY (See page IR-49)

11. INSTALL VISOR HOLDER (See page IR-49)

12. INSTALL VISOR ASSEMBLY LH (See page IR-50)

13. INSTALL VISOR ASSEMBLY RH (See page IR-50)

14. INSTALL ROOF CONSOLE BOX ASSEMBLY (See page IR-50)

15. INSTALL FRONT PILLAR GARNISH LH (See page IR-51)

16. INSTALL FRONT PILLAR GARNISH RH (See page IR-52)

17. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-54)

18. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-55)

19. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (for TMC Made without EC Mirror) (See page MI-13)

20. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (for TMMK Made without EC Mirror) (See page MI-13)

21. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror) (See page MI-13)

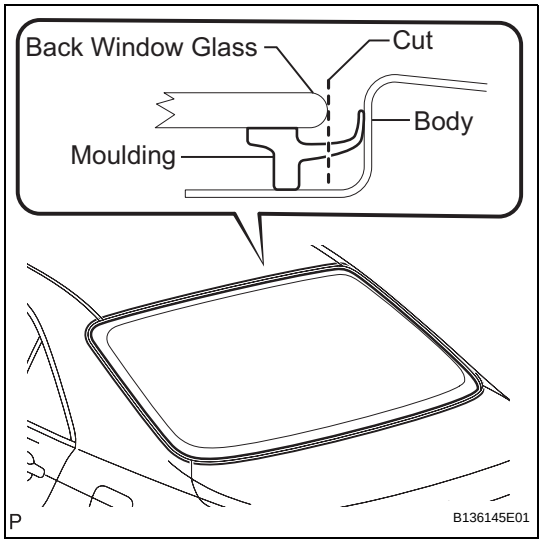
22. **INSTALL INNER REAR VIEW MIRROR STAY HOLDER COVER (w/ EC Mirror) (See page MI-14)**
23. **INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (See page WW-15)**
24. **INSTALL FRONT FENDER TO COWL SIDE SEAL RH (See page WW-15)**
25. **INSTALL FRONT FENDER TO COWL SIDE SEAL LH (See page WW-15)**
26. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
27. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See page WW-15)**
28. **INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See page WW-16)**
29. **INSPECT SRS WARNING LIGHT**
    (See page RS-32)

WS

REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
2. REMOVE REAR SEAT CUSHION ASSEMBLY
3. REMOVE REAR SEAT HEADREST ASSEMBLY
4. REMOVE REAR CENTER SEAT HEADREST ASSEMBLY
5. REMOVE REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-77)
6. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-47)
7. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-47)
8. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-48)
9. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-48)
10. REMOVE REAR SEAT BACK COVER (for Reclining Seat Type) (See page SE-63)
11. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-63)
12. REMOVE SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-64)
13. REMOVE CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-64)
14. REMOVE REAR DOOR SCUFF PLATE LH (See page IR-24)
15. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH
16. REMOVE REAR DOOR SCUFF PLATE RH (See page IR-24)
17. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH
18. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-68)
19. REMOVE RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
20. REMOVE ROOF SIDE INNER GARNISH LH (See page IR-26)

21. **REMOVE ROOF SIDE INNER GARNISH RH (See page IR-26)**
22. **REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)**
23. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-35)**
24. **DISCONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-35)**
25. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-50)**
26. **DISCONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-50)**
27. **REMOVE REAR SEAT SHOULDER BELT COVER (See page SB-36)**
28. **REMOVE REAR SEAT SHOULDER BELT HOLE COVER (See page SB-36)**
29. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-37)**
30. **REMOVE PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-37)**
31. **REMOVE REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-29)**
32. **REMOVE SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-30)**
33. **REMOVE SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-31)**
34. **REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)**
    It is not necessary to completely remove the roof headlining. Slightly lower the rear section of the roof headlining so that the back window glass can be removed (See page IR-31).
35. **REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)**
    It is not necessary to completely remove the roof headlining. Slightly lower the rear section of the roof headlining so that the back window glass can be removed (See page IR-32).



36. REMOVE BACK WINDOW MOULDING

(a) Using a knife, cut off the moulding, as shown in the illustration.

NOTICE:

- **Do not damage the vehicle body with the knife.**
- **If the vehicle body is damaged, repair the damaged portion by applying an anti-rust coating after removing the back window glass assembly.**

(b) Remove the remaining moulding from the back window glass.

HINT:

When removing the moulding, make a partial cut, then pull and remove it by hand.

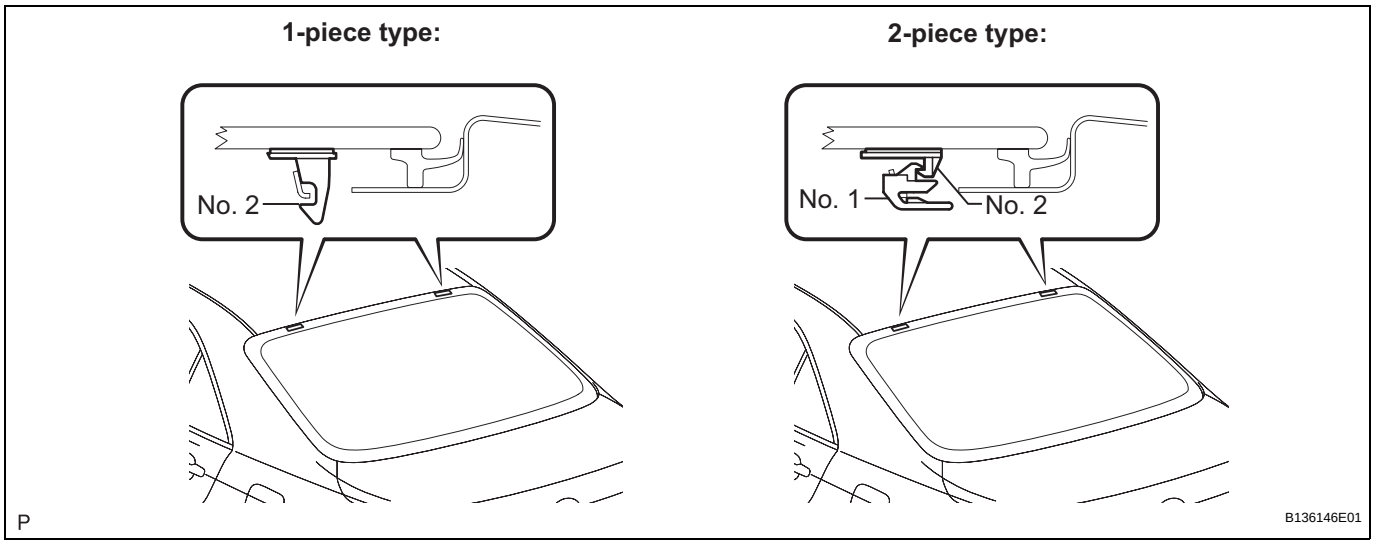
37. REMOVE BACK WINDOW GLASS ASSEMBLY

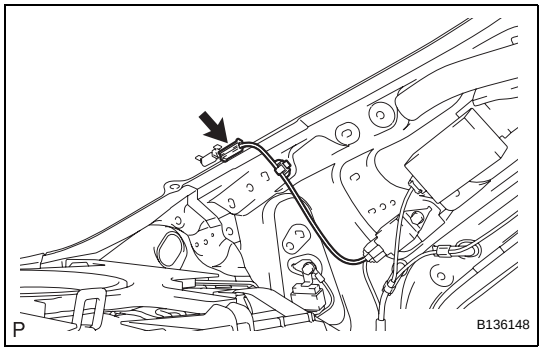
NOTICE:

- **There are No. 1 and No. 2 stoppers on the back window glass as shown in the illustration. Be careful not to damage the back window glass when cutting off the adhesive.**
- **To prevent the back window glass from dropping when performing this operation, be sure to hold the back window glass using suction cups.**

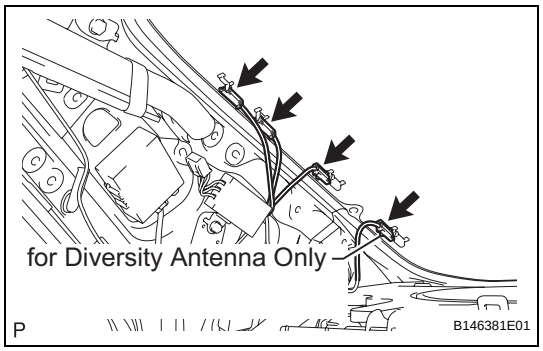
HINT:

Depending on vehicles, a 1-piece or 2-piece type stopper is used.

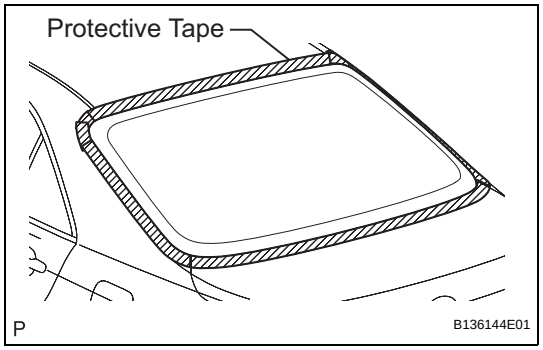




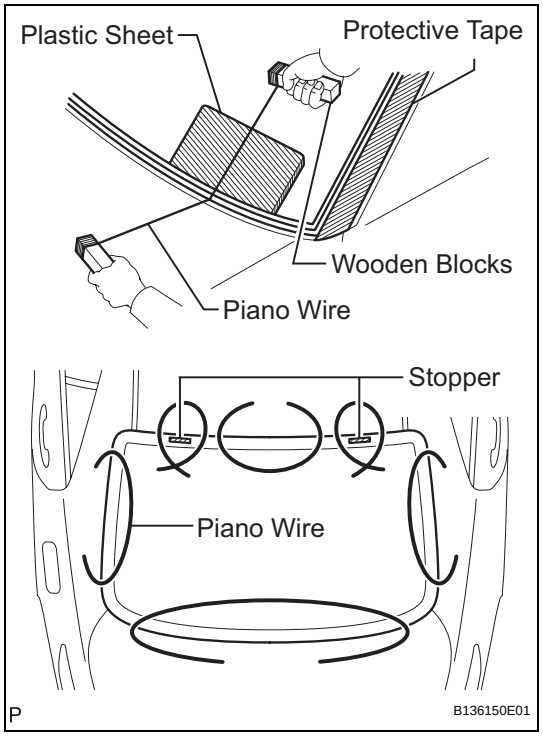
(a) Disconnect the connector.



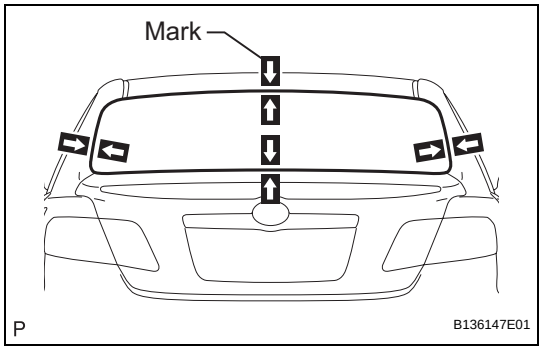
(b) Disconnect the connectors.



(c) Apply protective tape to the installation position of the back window glass assembly on the vehicle body.
HINT:
Apply protective tape to the installation surface to prevent it from being scratched.



(d) Pass a piano wire between the vehicle body and glass from the interior.
(e) Tie both wire ends to wooden blocks or similar objects.
(f) Cut off the adhesive by pulling the piano wire around the back window glass.
NOTICE:
- **When separating the back window glass, take care not to damage the paint or the interior and exterior ornaments.**
- **To prevent the package tray trim panel from being scratched when removing the back window glass, place a plastic sheet between the piano wire and package tray trim panel.**



(g) Place matchmarks on the back window glass and vehicle body on the locations indicated in the illustration.
HINT:
Matchmarks do not need to be placed if the back window glass is not going to be reused.
(h) Using a suction cup, remove the back window glass assembly.
NOTICE:
- **Be careful not to drop the back window glass.**

WS

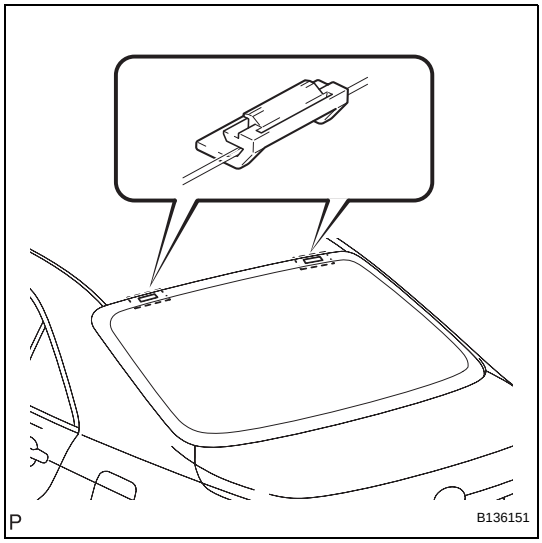
- **Leave as much adhesive on the vehicle body as possible when removing the back window glass.**

38. REMOVE NO. 2 BACK WINDOW GLASS STOPPER

(a) Using a scraper, remove the 2 No. 2 stoppers.

NOTICE:

- **Be careful not to damage the back window glass.**
- **Be sure to replace the No. 2 stoppers with new ones.**

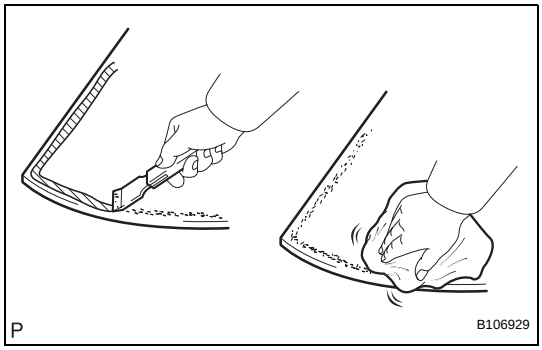


39. REMOVE NO. 1 BACK WINDOW GLASS STOPPER (for 2 Piece Type)

(a) Using a scraper, remove the 2 No. 1 stoppers.

NOTICE:

Be sure to replace the No. 1 stoppers with new ones.



40. CLEAN BACK WINDOW GLASS

(a) Using a scraper, remove the adhesive tape and adhesive sticking to the back window glass.

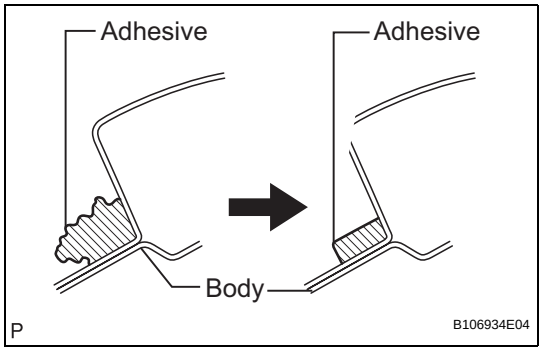
NOTICE:

Be careful not to damage the windshield glass.

(b) Clean the outer circumference of the back window glass with a non-residue solvent.

NOTICE:

- **Do not touch the back window glass surface after cleaning it.**
- **Even if using a new back window glass, clean the back window glass with a non-residue solvent.**



41. CLEAN VEHICLE BODY

(a) Clean and shape the contact surface of the vehicle body.

(1) Using a knife, cut away any rough adhesive on the contact surface of the vehicle body to ensure the appropriate surface shape.

NOTICE:

Be careful not to damage the vehicle body.

HINT:

Leave as much adhesive on the vehicle body as possible.

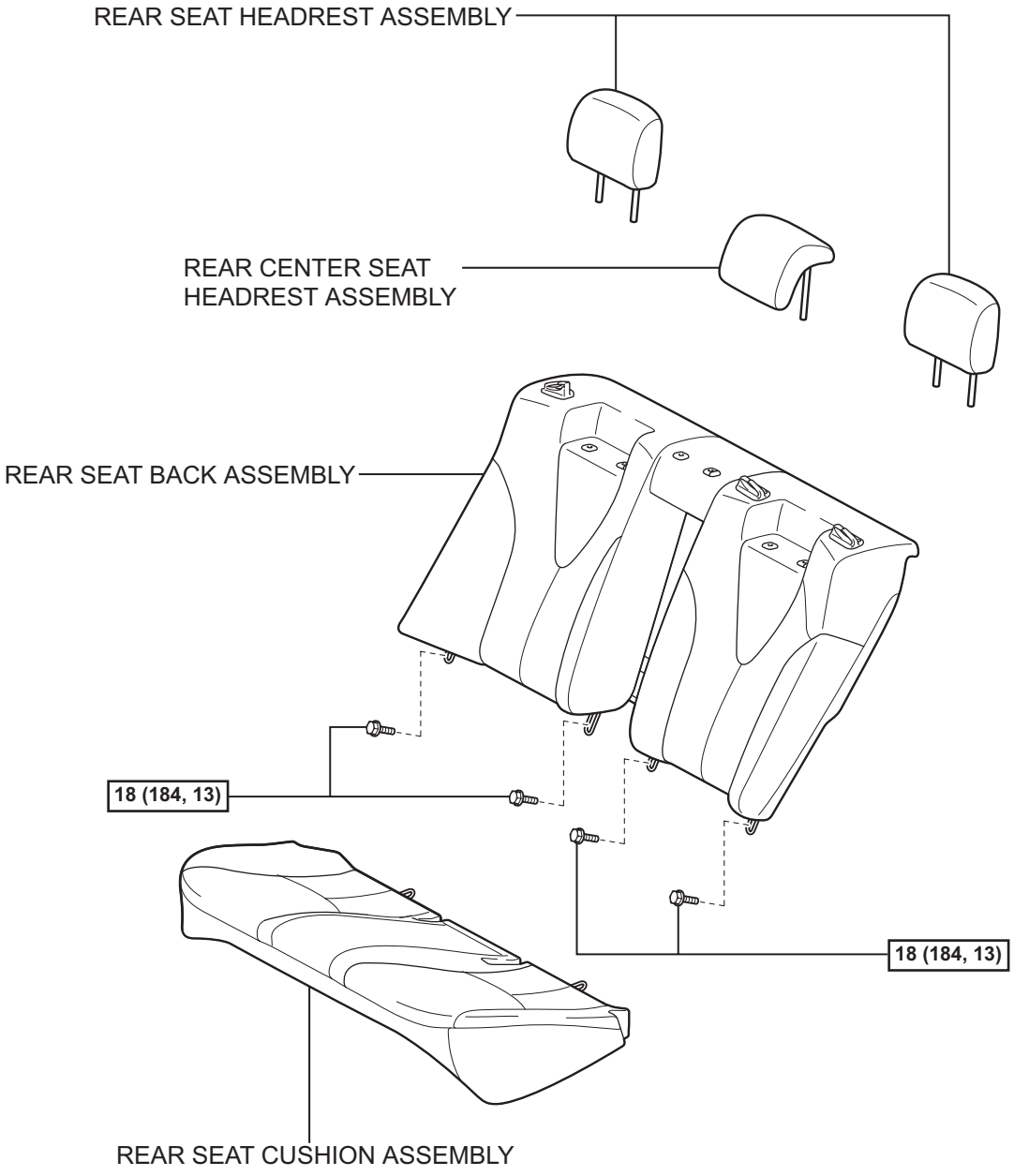
(2) Clean the contact surface of the vehicle body with a piece of cloth saturated with cleaner.
HINT:
Even if all the adhesive has been removed, clean the vehicle body.

BACK WINDOW GLASS

COMPONENTS

WS

for Fixed Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

P

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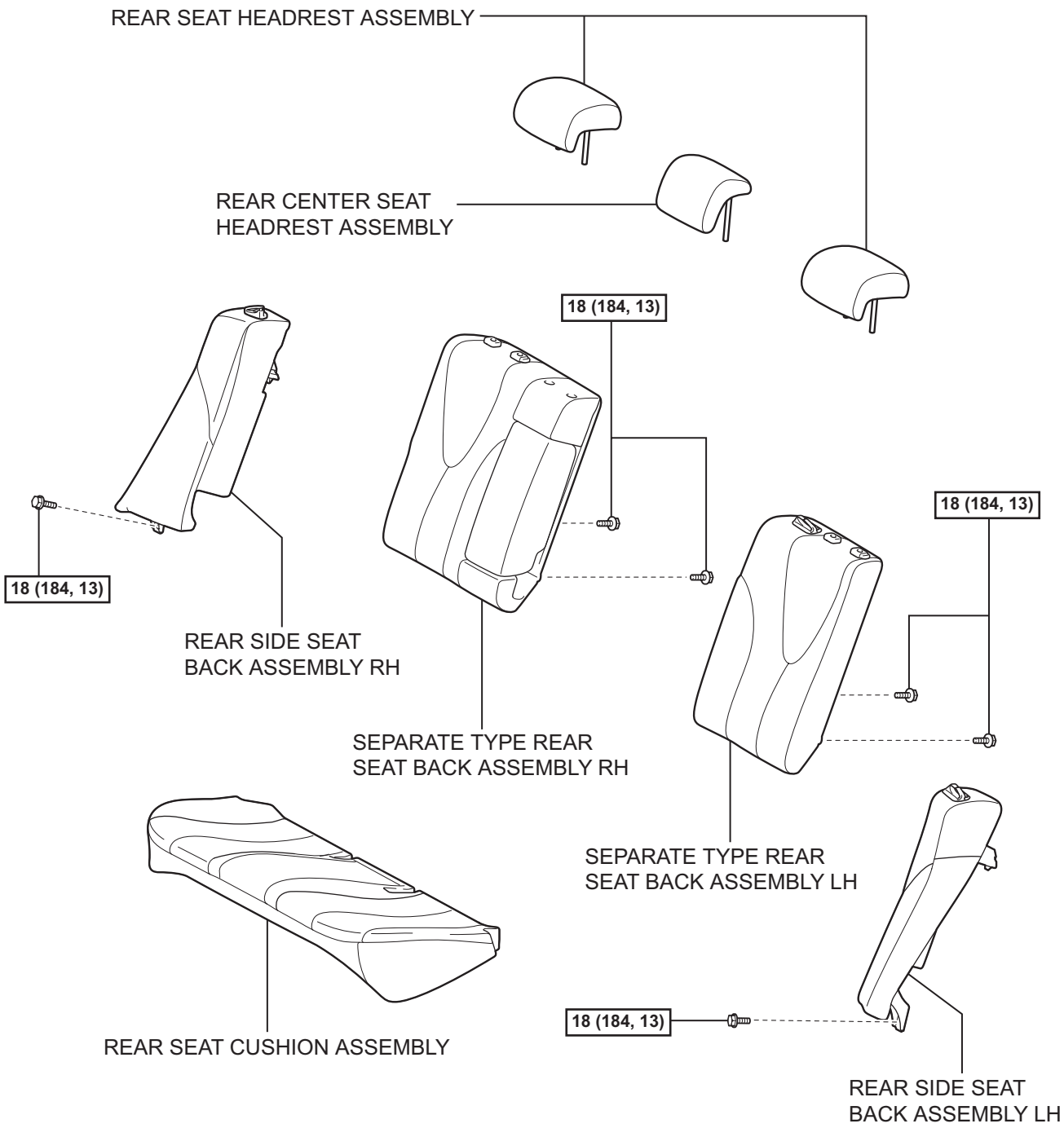
for Fold Down Seat Type:



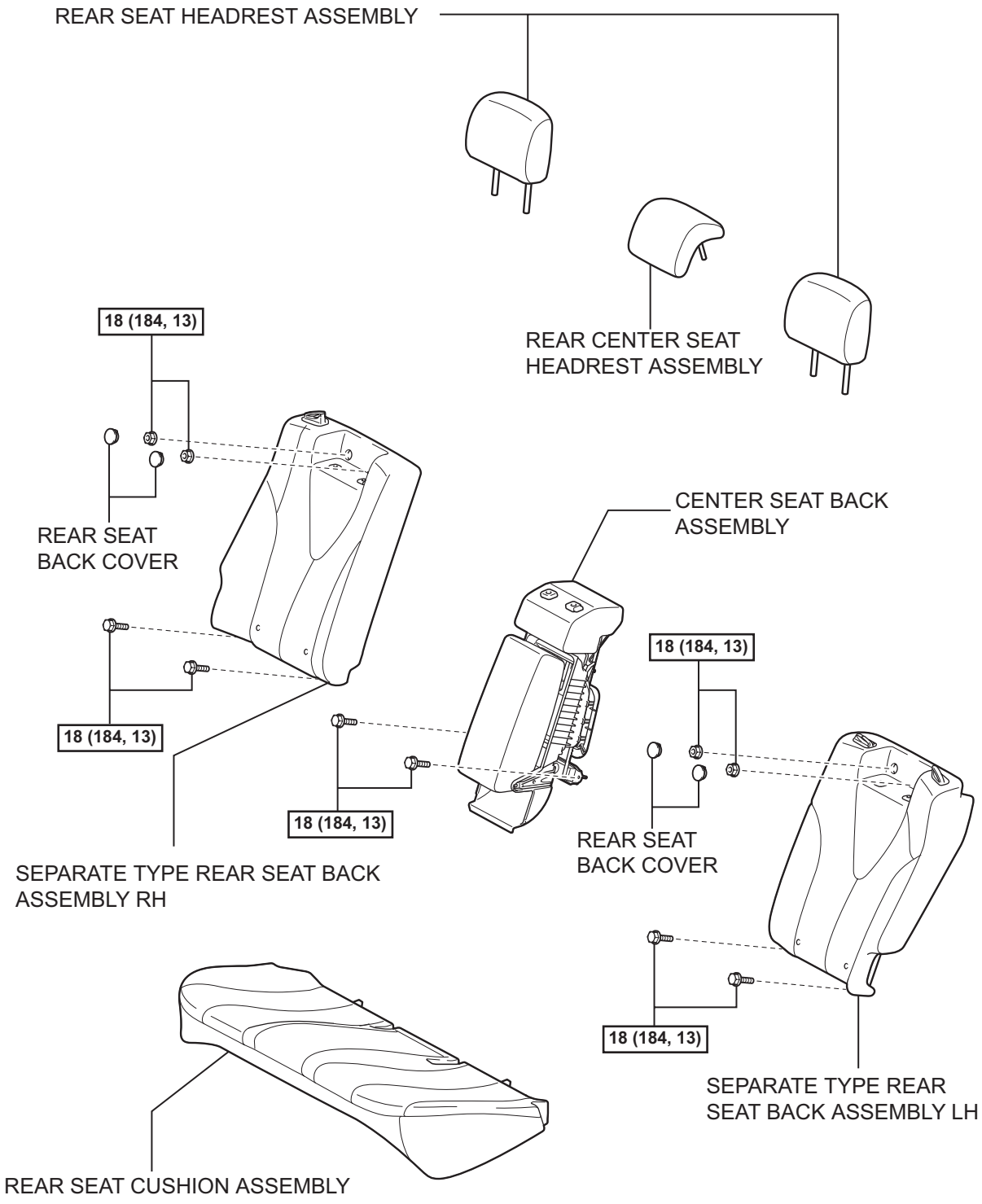
N*m (kgf*cm, ft.*lbf): Specified torque

P

B136564E02

WS

for Reclining Seat Type:



N*m (kgf*cm, ft.*lbf): Specified torque

P

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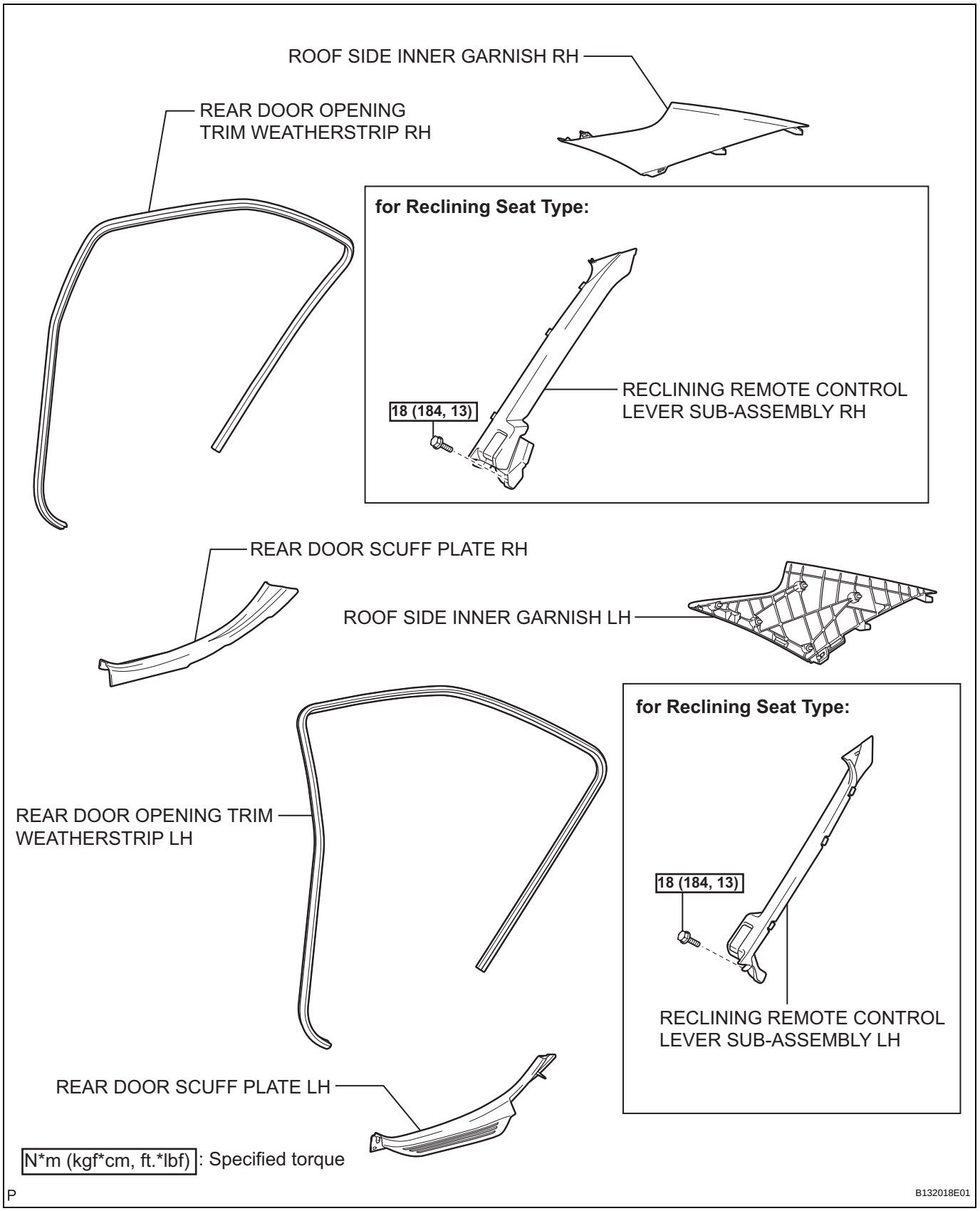
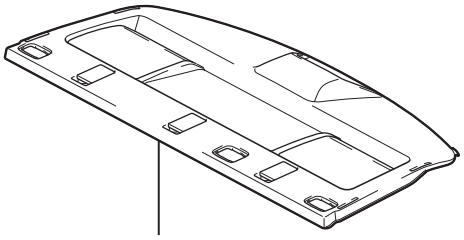

ROOF SIDE INNER GARNISH RH
REAR DOOR OPENING TRIM WEATHERSTRIP RH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH
REAR DOOR SCUFF PLATE RH
ROOF SIDE INNER GARNISH LH
REAR DOOR OPENING TRIM WEATHERSTRIP LH
for Reclining Seat Type:
18 (184, 13)
RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH
REAR DOOR SCUFF PLATE LH
N*m (kgf*cm, ft.*lbf): Specified torque
P
B132018E01

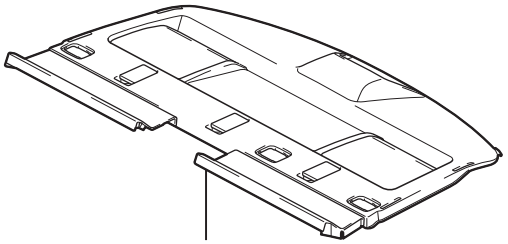
WS

for TMC made:

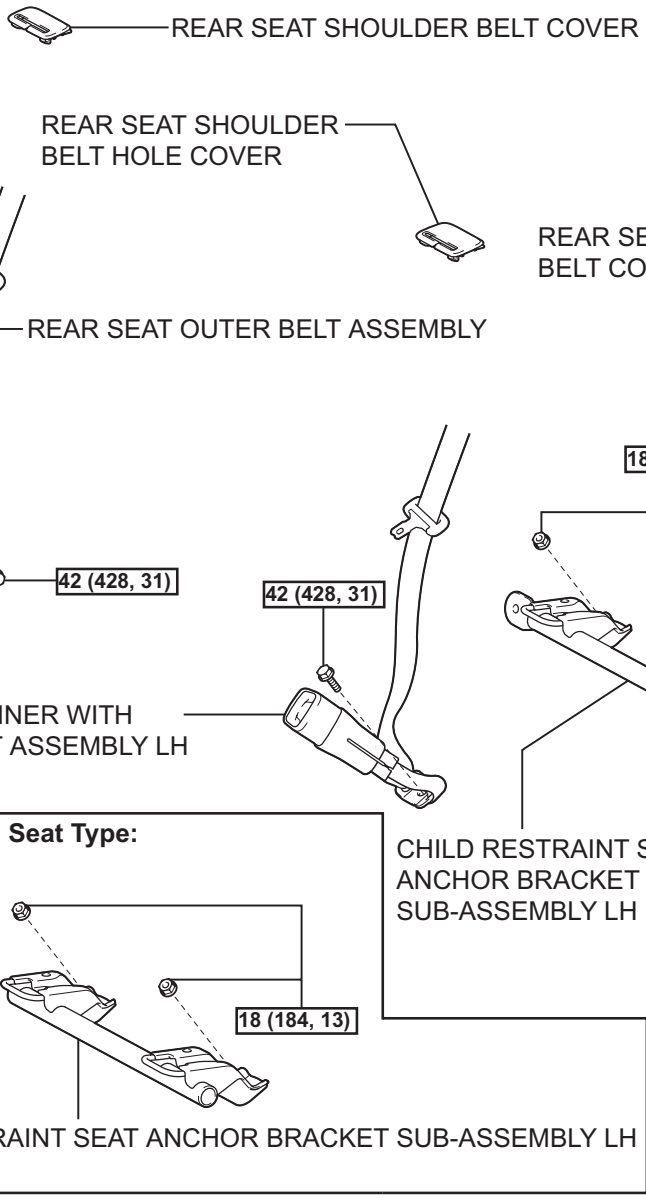


PACKAGE TRAY TRIM PANEL ASSEMBLY

for Reclining Seat Type:



PACKAGE TRAY TRIM PANEL ASSEMBLY

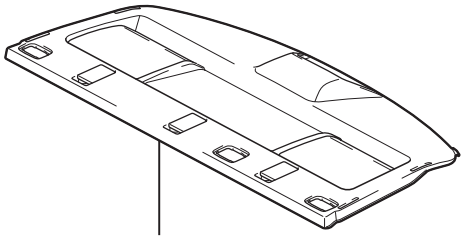


N*m (kgf*cm, ft.*lbf) : Specified torque

P

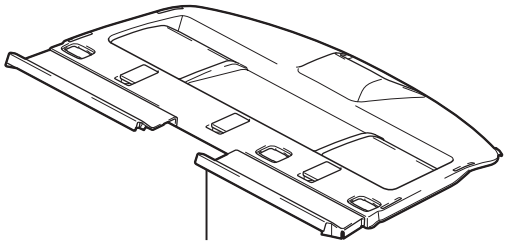
B132113E03

for TMMK made:



PACKAGE TRAY TRIM PANEL ASSEMBLY

for Reclining Seat Type:

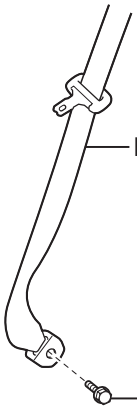


PACKAGE TRAY TRIM PANEL ASSEMBLY

REAR SEAT SHOULDER BELT COVER

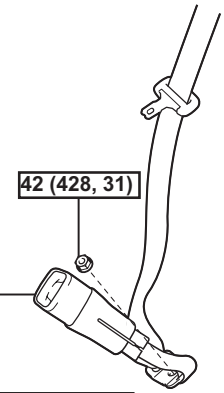
REAR SEAT SHOULDER BELT HOLE COVER

REAR SEAT SHOULDER BELT COVER



REAR SEAT OUTER BELT ASSEMBLY

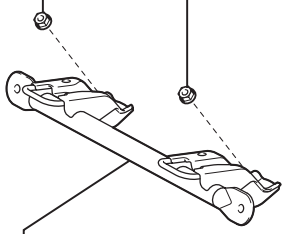
42 (428, 31)



42 (428, 31)

REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH

18 (184, 13)

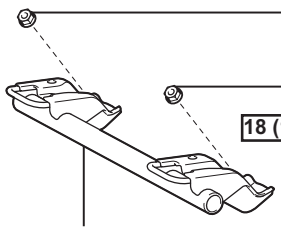


CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH

42 (428, 31)

REAR SEAT OUTER BELT ASSEMBLY

for Fold Down Seat Type:



18 (184, 13)

CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH

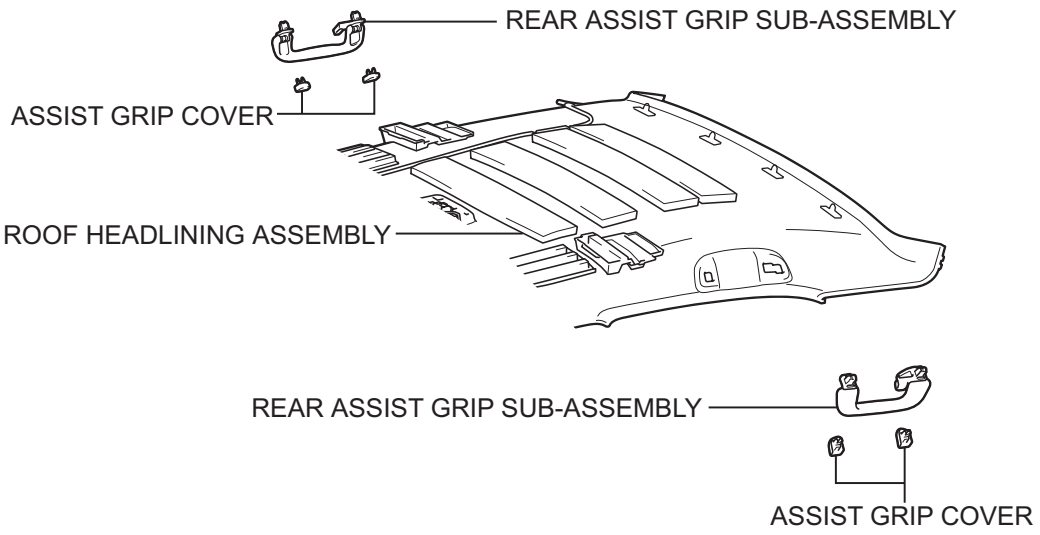
N*m (kgf*cm, ft.*lbf): Specified torque

P

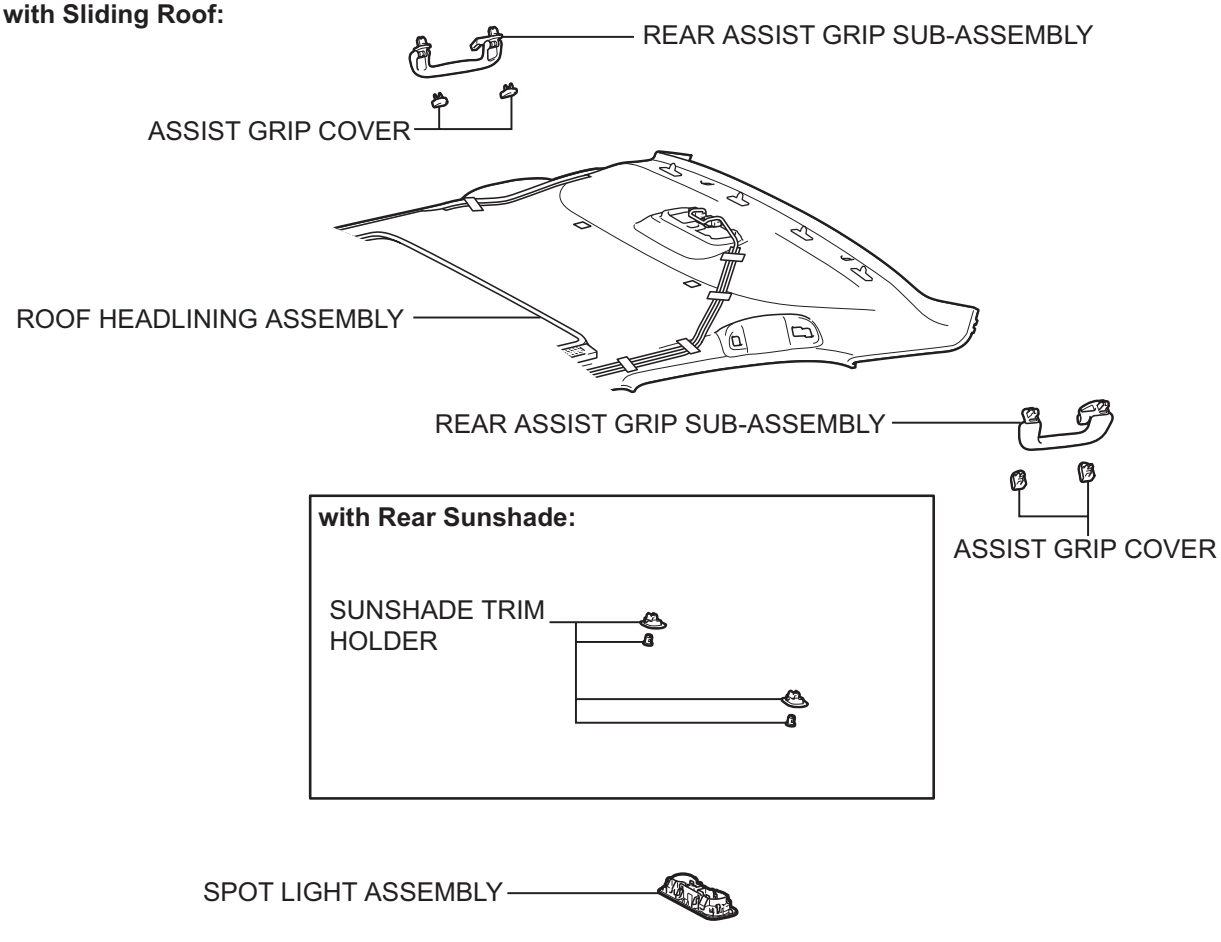
B142742E02

WS

without Sliding Roof:

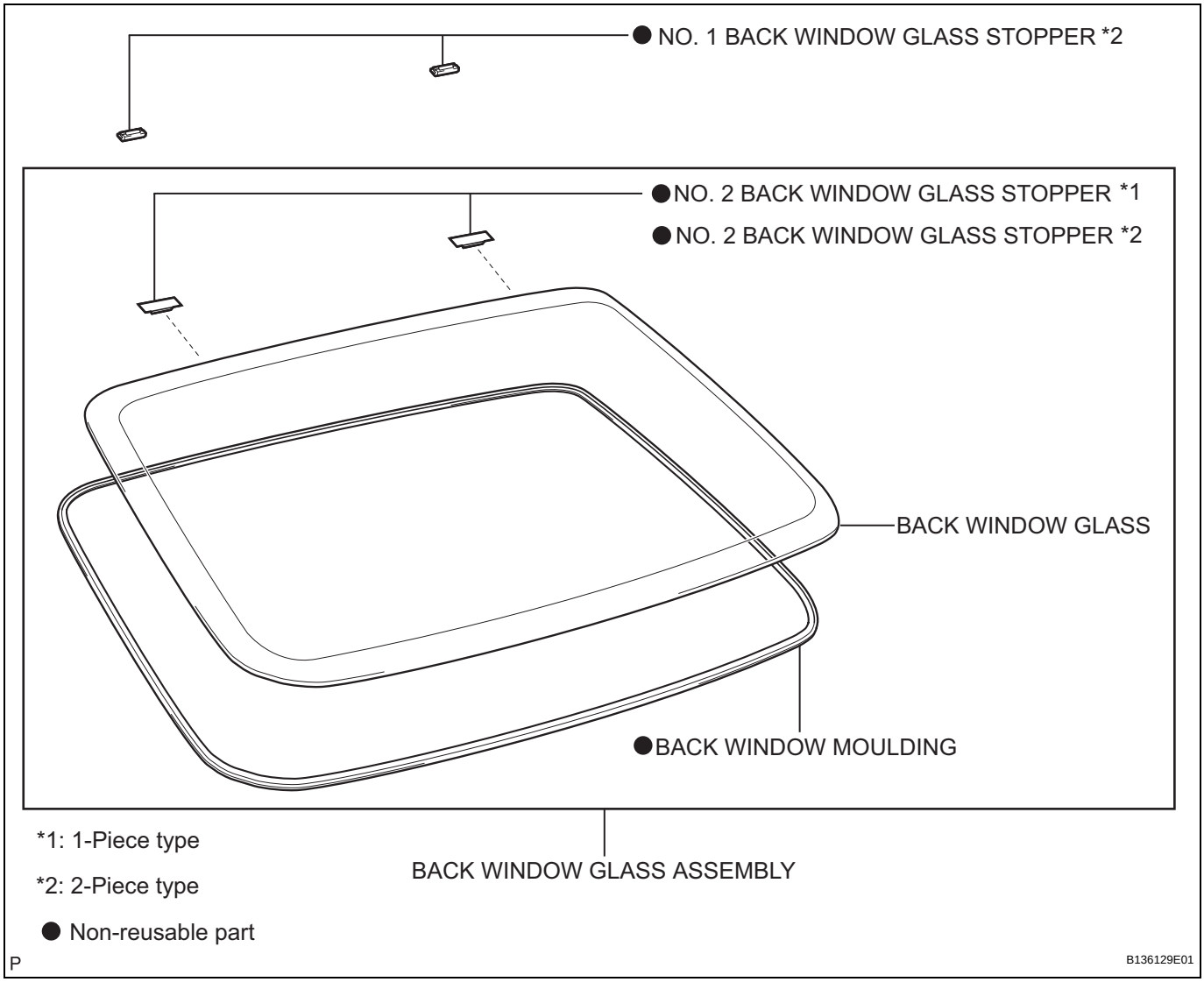


with Sliding Roof:



P

B142347E01


● NO. 1 BACK WINDOW GLASS STOPPER *2
●NO. 2 BACK WINDOW GLASS STOPPER *1
●NO. 2 BACK WINDOW GLASS STOPPER *2
BACK WINDOW GLASS
●BACK WINDOW MOULDING
BACK WINDOW GLASS ASSEMBLY
*1: 1-Piece type
*2: 2-Piece type
● Non-reusable part
P
B136129E01

WS

INSTALLATION

1. INSTALL NO. 2 BACK WINDOW GLASS STOPPER

(a) Using a brush or sponge, coat the application area of the No. 2 stoppers with Primer G.

NOTICE:

- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

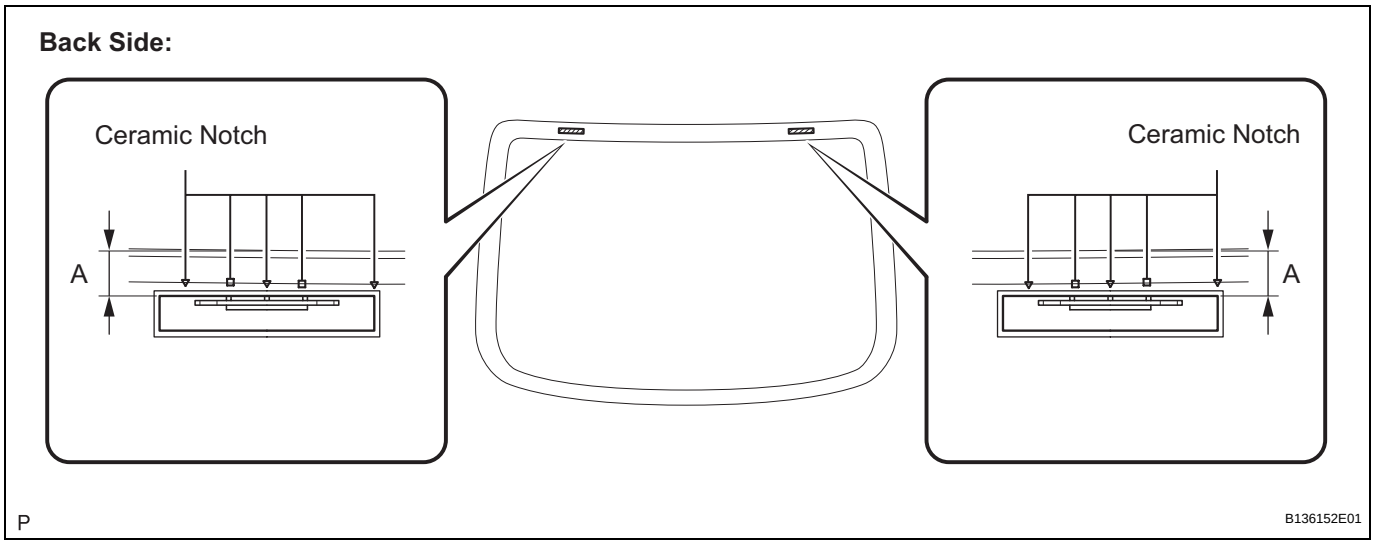
(b) Install 2 new No. 2 stoppers onto the windshield glass, as shown in the illustration.

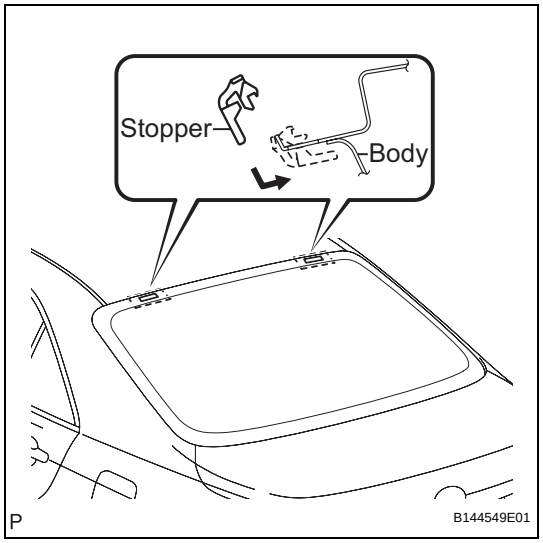
HINT:

Only 2-piece type No. 2 stoppers are supplied. Use the 2-piece type stoppers even if a 1-piece type was used.

Standard dimension

Area	Dimension
A	16.4 mm (0.645 in.)



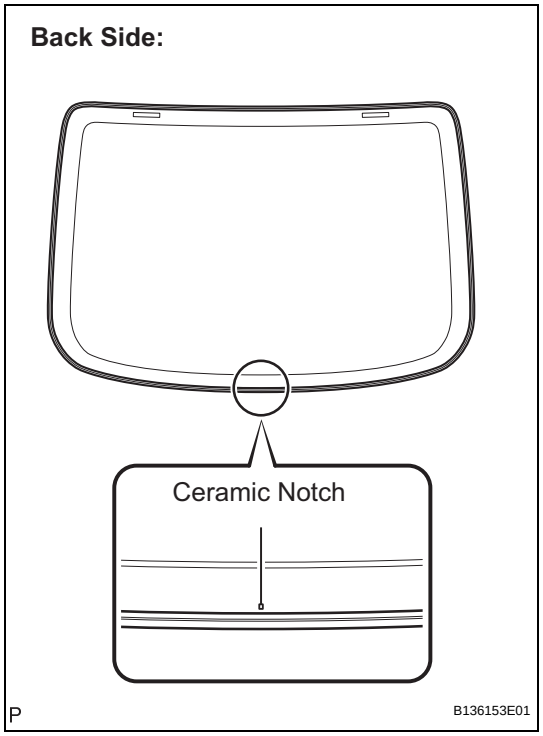


2. INSTALL NO. 1 BACK WINDOW GLASS STOPPER

(a) Install 2 new No. 1 stoppers to the vehicle body, as shown in the illustration.

HINT:

Only 2-piece type No. 1 stoppers are supplied. Use the 2-piece type stoppers even if a 1-piece type was used.



3. INSTALL BACK WINDOW MOULDING

(a) Using a brush or sponge, coat the application area of moulding with Primer G.

NOTICE:

- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

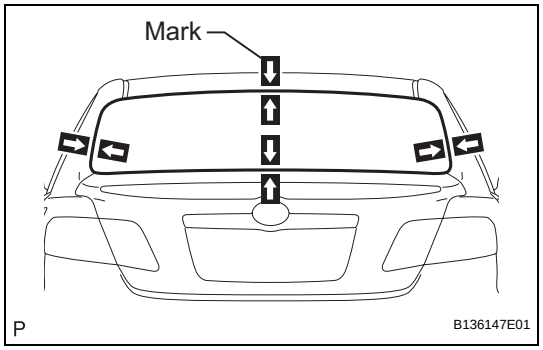
HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Install a new moulding, as shown in the illustration.

NOTICE:

Align the joint of the new moulding with the ceramic notch.



4. INSTALL BACK WINDOW GLASS ASSEMBLY

(a) Position the back window glass assembly.

(1) Using a suction cup, place the back window glass in the correct position.

(2) Check that the whole contact surface of the back window glass rim is perfectly even.

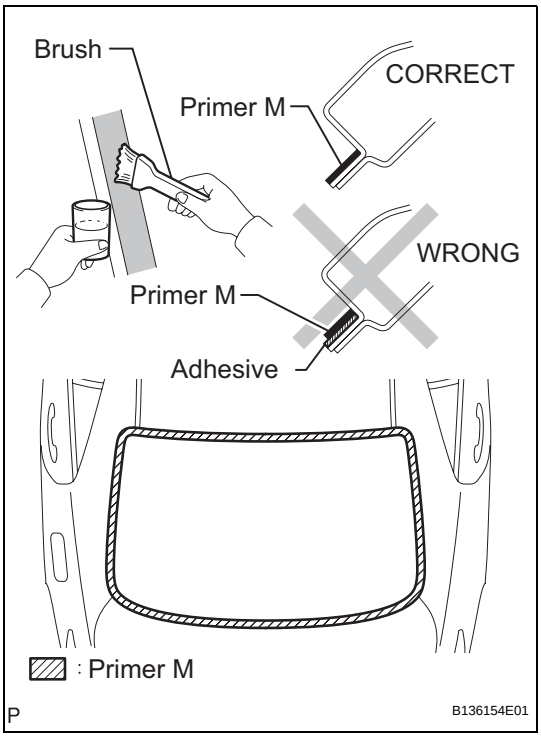
(3) Align the matchmarks on the back window glass and vehicle body.

NOTICE:

Check that the back window glass stoppers are attached to the vehicle body correctly.

(4) Remove the back window glass assembly.

WS



(b) Using a brush, coat the installation surface on the vehicle body with Primer M.

NOTICE:

- **Do not coat the adhesive with Primer M.**
- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer M for later use.**

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(c) Using a brush or sponge, coat the application area of adhesive with Primer G.

NOTICE:

- **Do not apply too much primer.**
- **Allow the primer coating to dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**

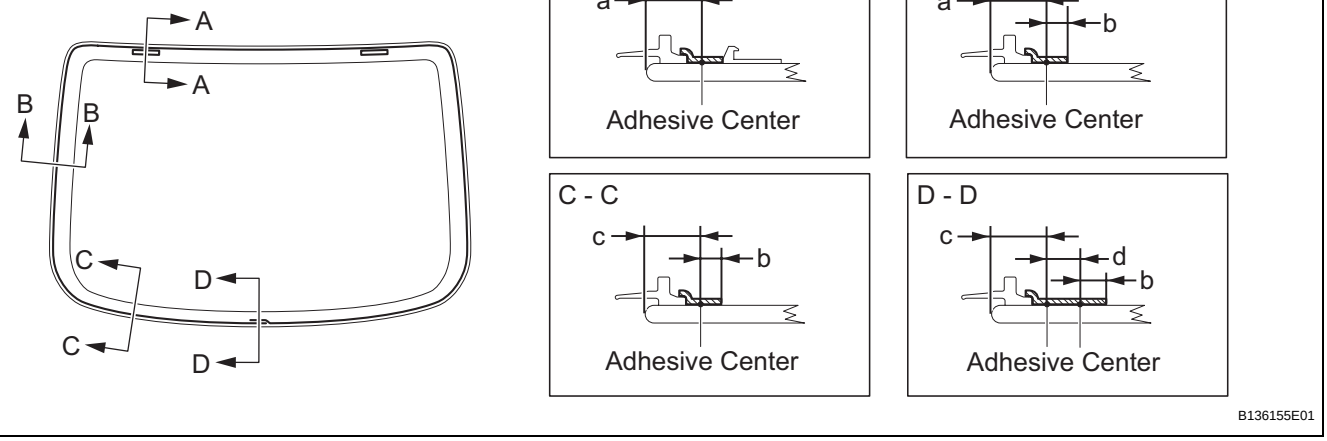
HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

Standard dimension

Area	Dimension
a	10.75 mm (0.423 in.)
b	7.0 mm (0.275 in.)
c	10.25 mm (0.403 in.)
d	8.0 mm (0.315 in.)

Back Side:



(d) Apply adhesive (Adhesive: TOYOTA genuine windshield glass adhesive or equivalent).

(1) Cut off the tip of the cartridge nozzle, as shown in the illustration.

HINT:

After cutting off the tip, use all adhesive within the time described in the table below.

Usage time frame

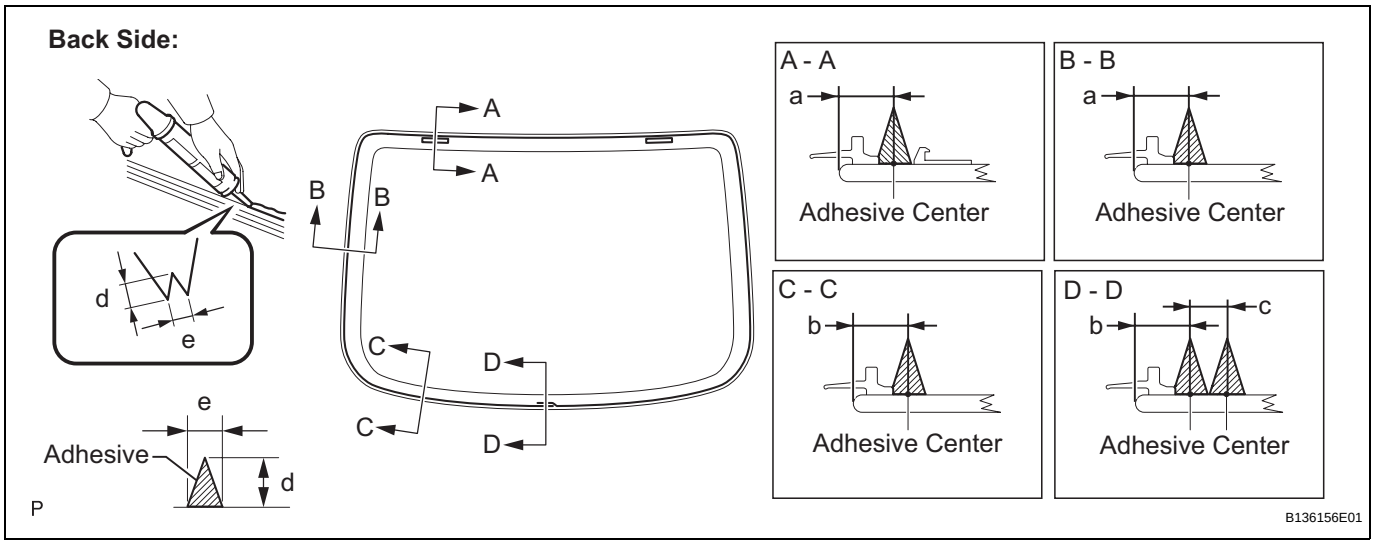
Temperature	Tack-free Time
35°C (95°F)	15 minutes
20°C (68°F)	1 hour and 40 minutes
5°C (41°F)	8 hours

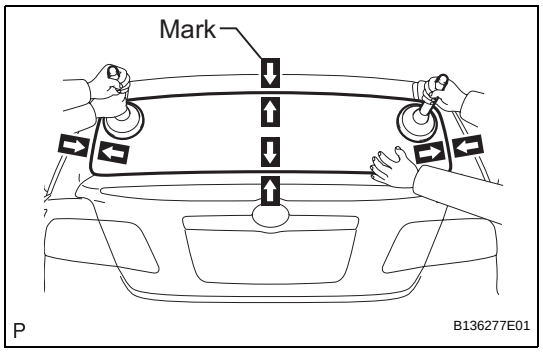
(2) Load the sealer gun with cartridge.

(3) Apply adhesive to the back window glass, as shown in the illustration.

Standard dimension

Area	Dimension
a	10.75 mm (0.423 in.)
b	10.25 mm (0.403 in.)
c	8.0 mm (0.315 in.)
d	12.0 mm (0.472 in.)
e	8.0 mm (0.315 in.)





(e) Install the back window glass assembly.

(1) Using a suction cup, position the back window glass so that the matchmarks are aligned, and press it in gently along the rim.

NOTICE:

- **Check that the back window glass stoppers are attached to the vehicle body correctly.**
- **Check the clearance between the vehicle body and back window glass.**

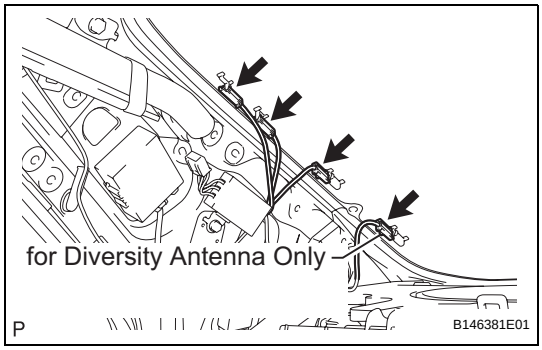
WS

(2) Lightly press the front surface of the back window glass to ensure a close fit.
HINT:
Press the glass with force of 98 N (10 kgf, 22 lb) or more.

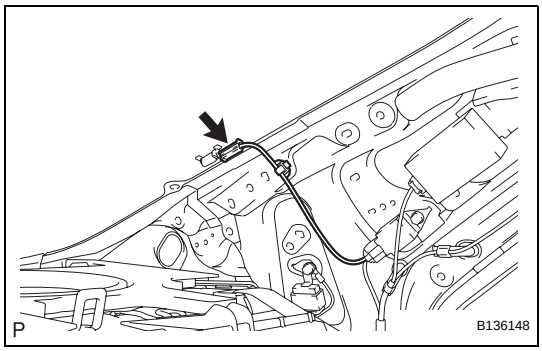
(3) Hold the back window glass using protective tape until applied adhesive becomes hard.
NOTICE:
Do not drive the vehicle for the time described in the table below.
Minimum time

Temperature	Minimum time prior to driving vehicle
35°C (95°F)	1 hour and 30 minutes
20°C (68°F)	5 hours
5°C (41°F)	24 hours

(f) Connect the connectors.



(g) Connect the connector.



5. CHECK FOR LEAKS AND REPAIR

(a) After the adhesive has hardened, apply water from the outside of the vehicle. Check that no water leaks into the cabin.

(b) If water leaks into the cabin, allow the water to dry and add adhesive.

(c) Remove the protective tape.

6. INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof) (See page IR-45)

7. INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof) (See page IR-46)

8. INSTALL SUNSHADE TRIM HOLDER (w/ Rear Sunshade) (See page IR-47)

9. INSTALL SPOT LIGHT ASSEMBLY (w/ Sliding Roof) (See page IR-48)

10. INSTALL REAR ASSIST GRIP SUB-ASSEMBLY (See page IR-49)

11. INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (See page SB-38)

12. INSTALL PACKAGE TRAY TRIM PANEL ASSEMBLY (for Reclining Seat Type) (See page SB-39)

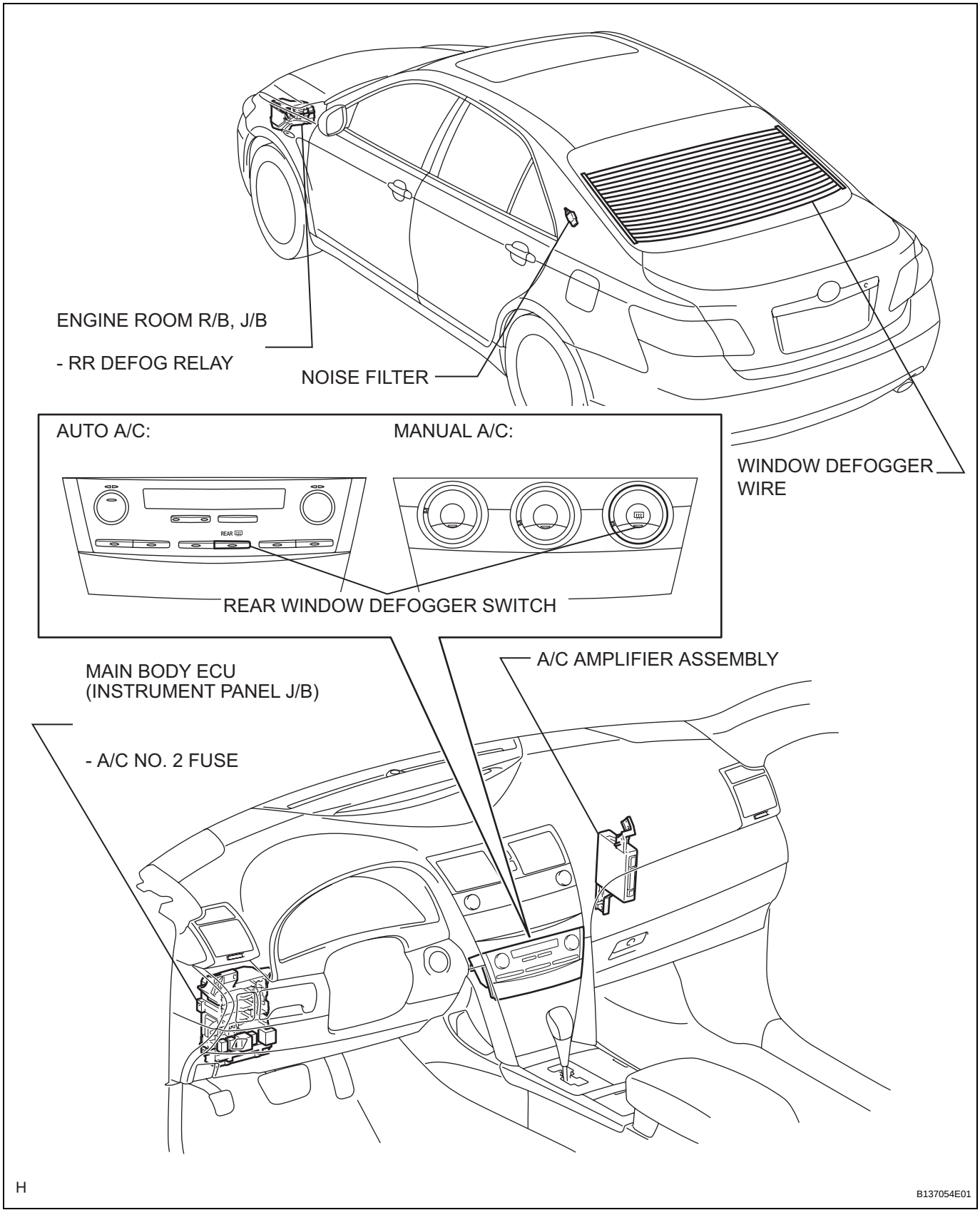
13. INSTALL REAR SEAT SHOULDER BELT HOLE COVER (See page SB-39)
14. INSTALL REAR SEAT SHOULDER BELT COVER (See page SB-39)
15. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for LH Side) (See page SB-52)
16. CONNECT REAR SEAT OUTER BELT ASSEMBLY (for RH Side) (See page SB-52)
17. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMC Made) (See page SB-40)
18. CONNECT REAR SEAT INNER WITH CENTER BELT ASSEMBLY LH (for TMMK Made) (See page SB-40)
19. INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH (See page SB-66)
20. INSTALL ROOF SIDE INNER GARNISH LH (See page IR-52)
21. INSTALL ROOF SIDE INNER GARNISH RH (See page IR-52)
22. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY LH (for Reclining Seat Type) (See page SE-69)
23. INSTALL RECLINING REMOTE CONTROL LEVER SUB-ASSEMBLY RH (for Reclining Seat Type)
24. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH (See page IR-55)
25. INSTALL REAR DOOR SCUFF PLATE LH (See page IR-56)
26. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH (See page IR-56)
27. INSTALL REAR DOOR SCUFF PLATE RH (See page IR-56)
28. INSTALL CENTER SEAT BACK ASSEMBLY (for Reclining Seat Type) (See page SE-71)
29. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Reclining Seat Type) (See page SE-72)
30. INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Reclining Seat Type) (See page SE-71)
31. INSTALL REAR SEAT BACK COVER (for Reclining Seat Type)
32. INSTALL REAR SIDE SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)
33. INSTALL REAR SIDE SEAT BACK ASSEMBLY RH (for Fold Down Seat Type)

34. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY LH (for Fold Down Seat Type) (See page SE-57)**
35. **INSTALL SEPARATE TYPE REAR SEAT BACK ASSEMBLY RH (for Fold Down Seat Type) (See page SE-57)**
36. **INSTALL REAR SEAT BACK ASSEMBLY (for Fixed Seat Type) (See page SE-84)**
37. **INSTALL REAR CENTER SEAT HEADREST ASSEMBLY**
38. **INSTALL REAR SEAT HEADREST ASSEMBLY**
39. **INSTALL REAR SEAT CUSHION ASSEMBLY**
40. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
41. **INSPECT SRS WARNING LIGHT**
(See page RS-32)

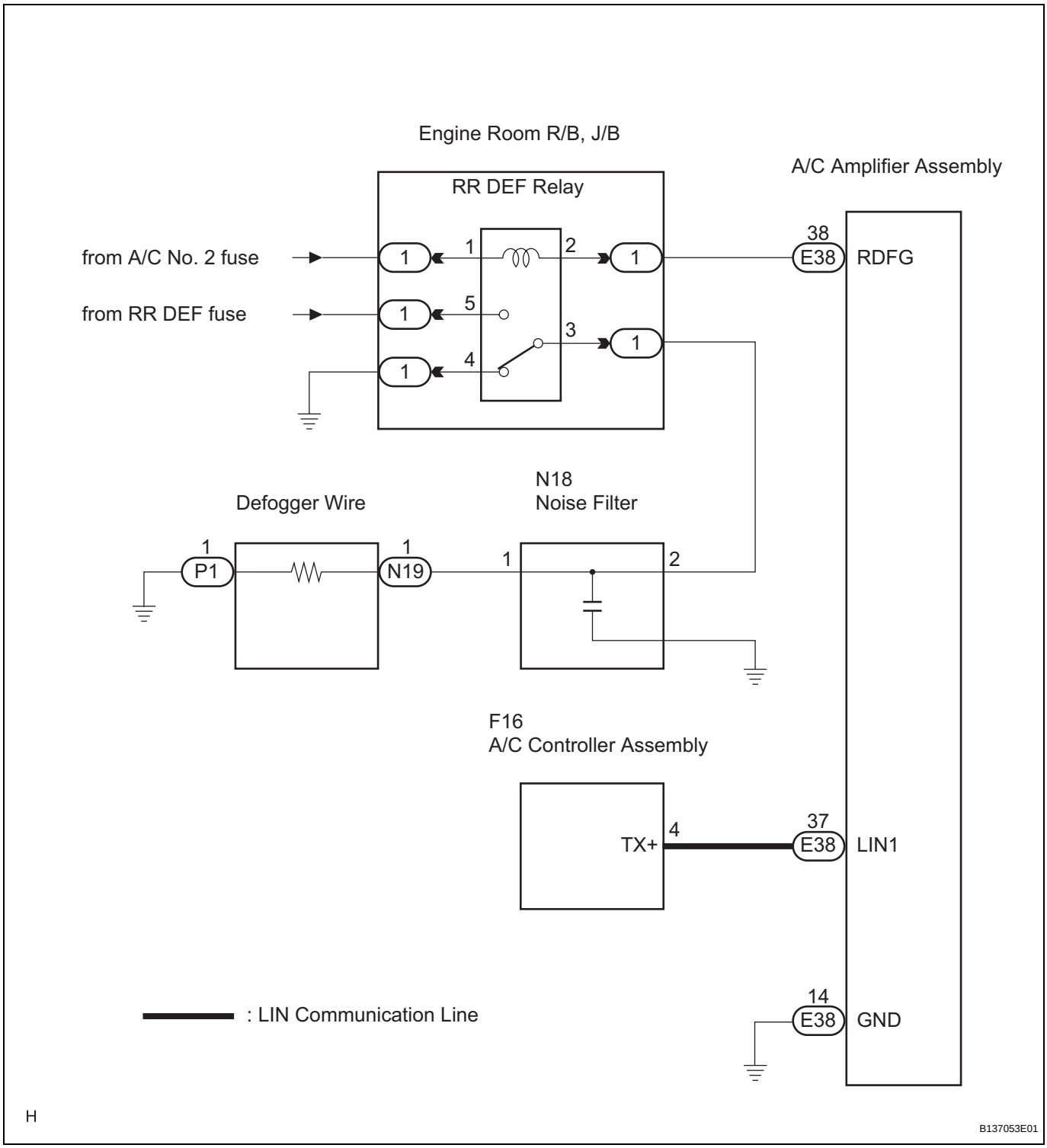
WINDOW DEFOGGER SYSTEM

PARTS LOCATION

WS



SYSTEM DIAGRAM



WS

SYSTEM DESCRIPTION

1. GENERAL

The defogger system's thin heater wires are attached to the inside of the rear window and defog the window surface quickly. The indicator light illuminates while the system is operating. The system automatically turns off after approximately 15 minutes.

HINT:

The rear window defogger is linked with the mirror defogger.

2. FUNCTION OF MAIN COMPONENT

Component	Outline
RR DEF Relay	Receives rear defogger activation request signals from A/C amplifier assembly (A/C ECU) and supplies power to rear window defogger.
Rear Window Defogger	Receives power from RR DEF relay and heats defogger wire.

3. DESCRIPTION

Function	Outline
Defogs the rear window surface	• Receives rear defogger activation request signals from A/C amplifier assembly (A/C ECU) and supplies power to rear window defogger. • Receives power from DEFOG relay and heats defogger wire.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the defogger system.
- The intelligent tester should be used in step 4.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	INSPECT BATTERY VOLTAGE

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

3	PROBLEM SYMPTOMS TABLE

HINT:

(See page WS-89)

NEXT

4	OVERALL ANALYSIS AND TROUBLESHOOTING

(a) Terminals of ECU (See page WS-89)
(b) Data List/Active Test (See page WS-91)
(c) On-vehicle inspection (See page WS-92)

NEXT

5	REPAIR OR REPLACE

NEXT

6	CONFIRMATION TEST

NEXT

END

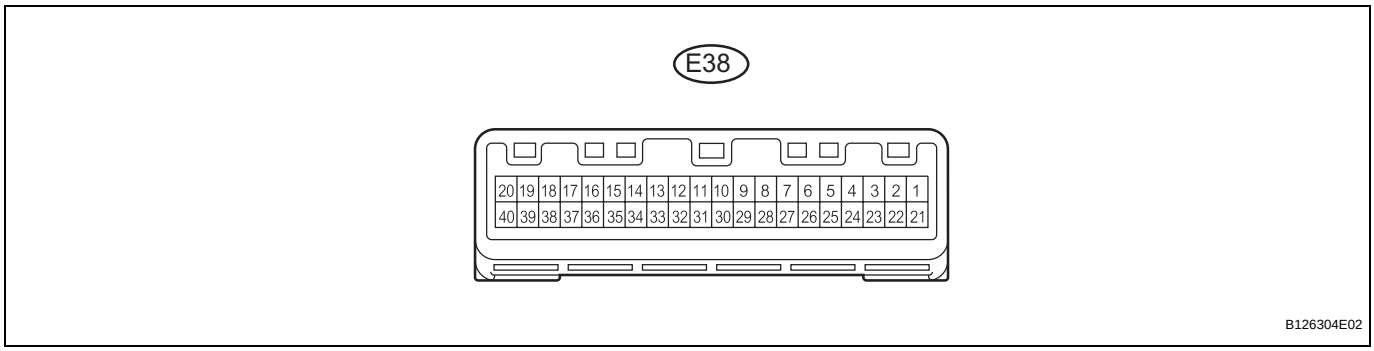
PROBLEM SYMPTOMS TABLE

WINDOW DEFOGGER SYSTEM:

Symptom	Suspected area	See page
Rear window defogger does not operate	1. A/C No. 2, RR DEF fuses	-
	2. RR DEF relay	WS-94
	3. A/C controller assembly	WS-94
	4. A/C amplifier assembly	WS-94
	5. Rear window defogger wire	WS-92
	6. Wire harness	-

TERMINALS OF ECU

1. CHECK A/C AMPLIFIER ASSEMBLY



(a) Measure the voltage and resistance of each terminal of the connectors.

Standard voltage

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
RDFG (E38-38) - GND (E38-14)	G - W-B	Rear Defogger Signal	Ignition switch on (IG), Rear defogger switch OFF	10 to 14 V

Standard resistance

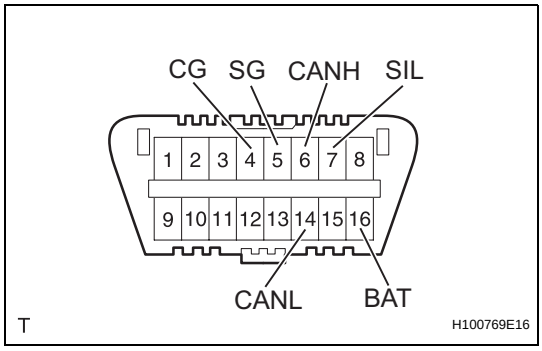
Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
GND (E38-14) - Body ground	W-B - Body ground	Ground	Always	Below 1 Ω

DIAGNOSIS SYSTEM

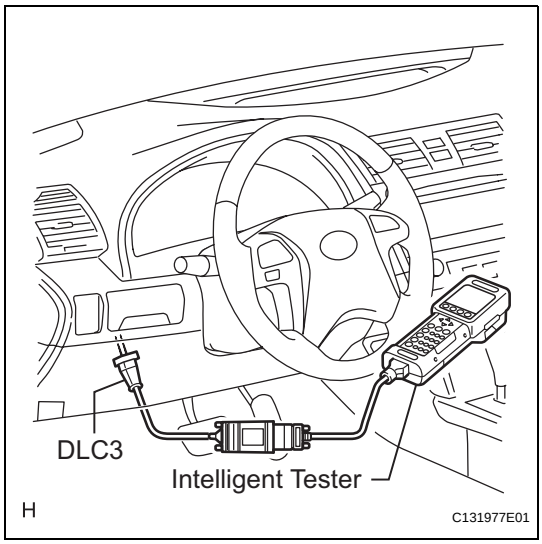
1. DESCRIPTION

(a) The defogger system data can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform repairs.

2. CHECK DLC3



(a) The ECU uses ISO 15765-4 communication. The terminal arrangement of the DLC3 complies with SAE J 1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	10 to 14 V
CANH (6) - CANL (14)	CAN bus line	Ignition switch OFF*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Ignition switch OFF*	200 Ω or more
CANL (14) - CG (4)	LOW-level CAN bus line	Ignition switch OFF*	200 Ω or more
CANH (6) - BAT (16)	HIGH-level CAN bus line	Ignition switch OFF*	6 kΩ or more
CANL (14) - BAT (16)	LOW-level CAN bus line	Ignition switch OFF*	6 kΩ or more

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the ignition switch, any other switches or the door.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the ignition switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

WS

DATA LIST / ACTIVE TEST

1. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows a relay, VSV, actuator and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the ignition switch on (IG).

(c) Perform the ACTIVE TEST according to the display on the tester.

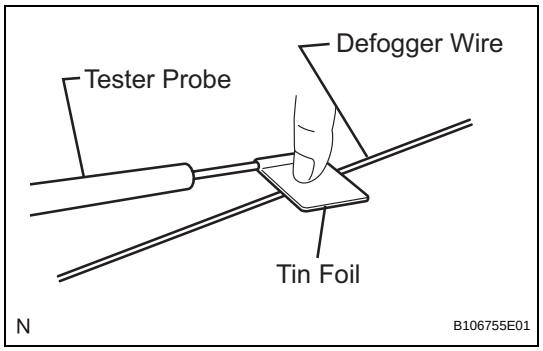
Air Conditioner:

Item	Test Details	Diagnostic Note
Defogger Relay (Rear)	Turns rear window defogger OFF/ON	-

ON-VEHICLE INSPECTION

1. CHECK REAR WINDOW DEFOGGER SYSTEM OPERATION

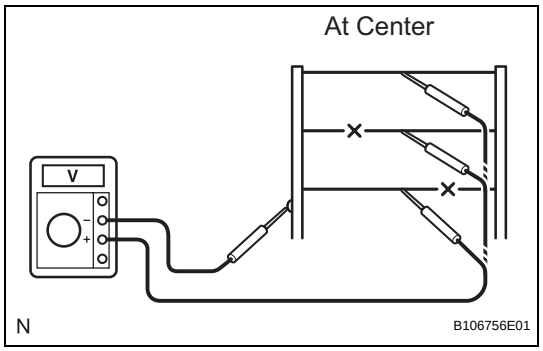
(a) When the ignition switch is turned on (IG) and the defogger switch is pressed, check that the rear window defogger operates.
HINT:
After 15 minutes, check that the defogger automatically turns off.



2. INSPECT BACK WINDOW (DEFOGGER WIRE)

NOTICE:

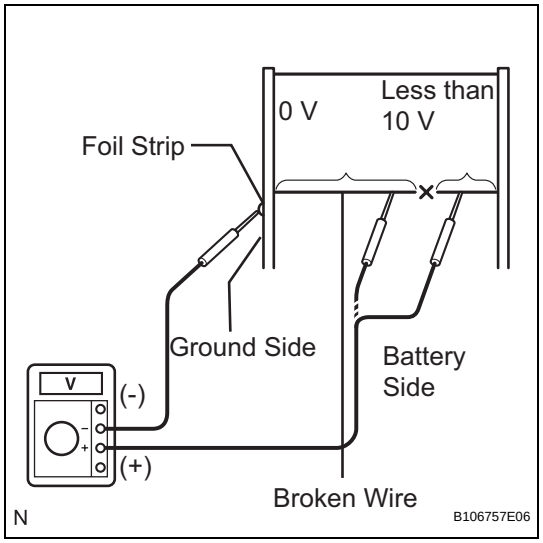
- **When cleaning the glass, wipe the glass along the wire using a soft and dry cloth. Take care not to damage the wires.**
- **Do not use detergents or glass cleaners that have abrasive ingredients.**



- **When measuring voltage, wrap a piece of tin foil around the tip of the negative tester probe and press the foil against the wire with your finger, as shown in the illustration.**

(a) Turn the ignition switch on (IG).

(b) Turn the defogger switch on.



(c) Check the voltage at the center of each defogger wire, as shown in the illustration.
Standard voltage

Voltage	Criteria
Approx. 5 V	Wire is not broken
Approx. 10 or 0 V	Wire is broken

HINT:
If there is approximately 10 V, the wire may be faulty between the center of the wire and the wire end on the battery side. If there is no voltage, the wire may be faulty between the center of the wire and the wire end on the ground side.

(d) Place the voltmeter's positive (+) lead against the defogger wire on the battery side.

(e) Place the voltmeter's negative (-) lead with the foil strip against the wire on the ground side.

(f) Slide the positive (+) lead from the battery side to the ground side.

WS

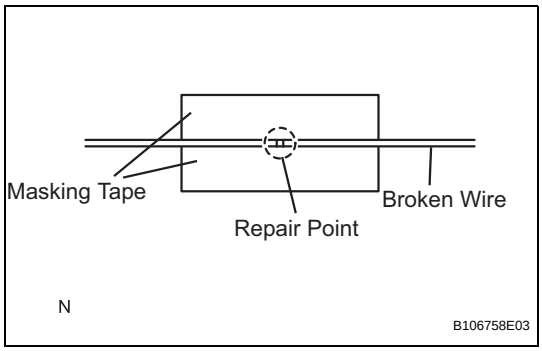
(g) The point where the voltage drops from approximately 10 V to 0 V is the place where the defogger wire is broken.
HINT:
If the defogger wire is not broken, the voltmeter should indicate 0 V at the positive (+) end of the defogger wire but gradually increase to approximately 12 V as the meter probe moves to the other end.

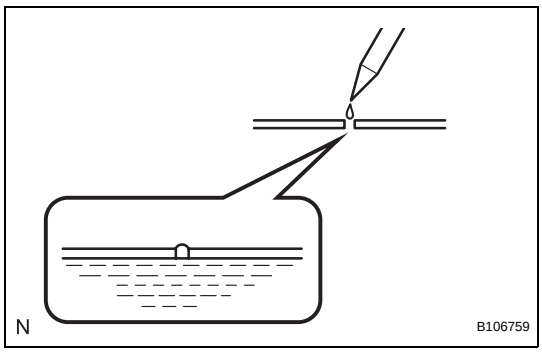
REPAIR

1. REPAIR WINDOW DEFOGGER WIRE

(a) Clean the broken wire tips with a grease, wax and silicone remover.

(b) Place the masking tape along both sides of the wire.





(c) Thoroughly mix the repair agent (Dupont paste No. 4817 or equivalent).

(d) Using a fine tip brush, apply a small amount of the agent to the wire.

(e) After a few minutes, remove the masking tape.
NOTICE:
Do not repair the defogger wire again for at least 24 hours.

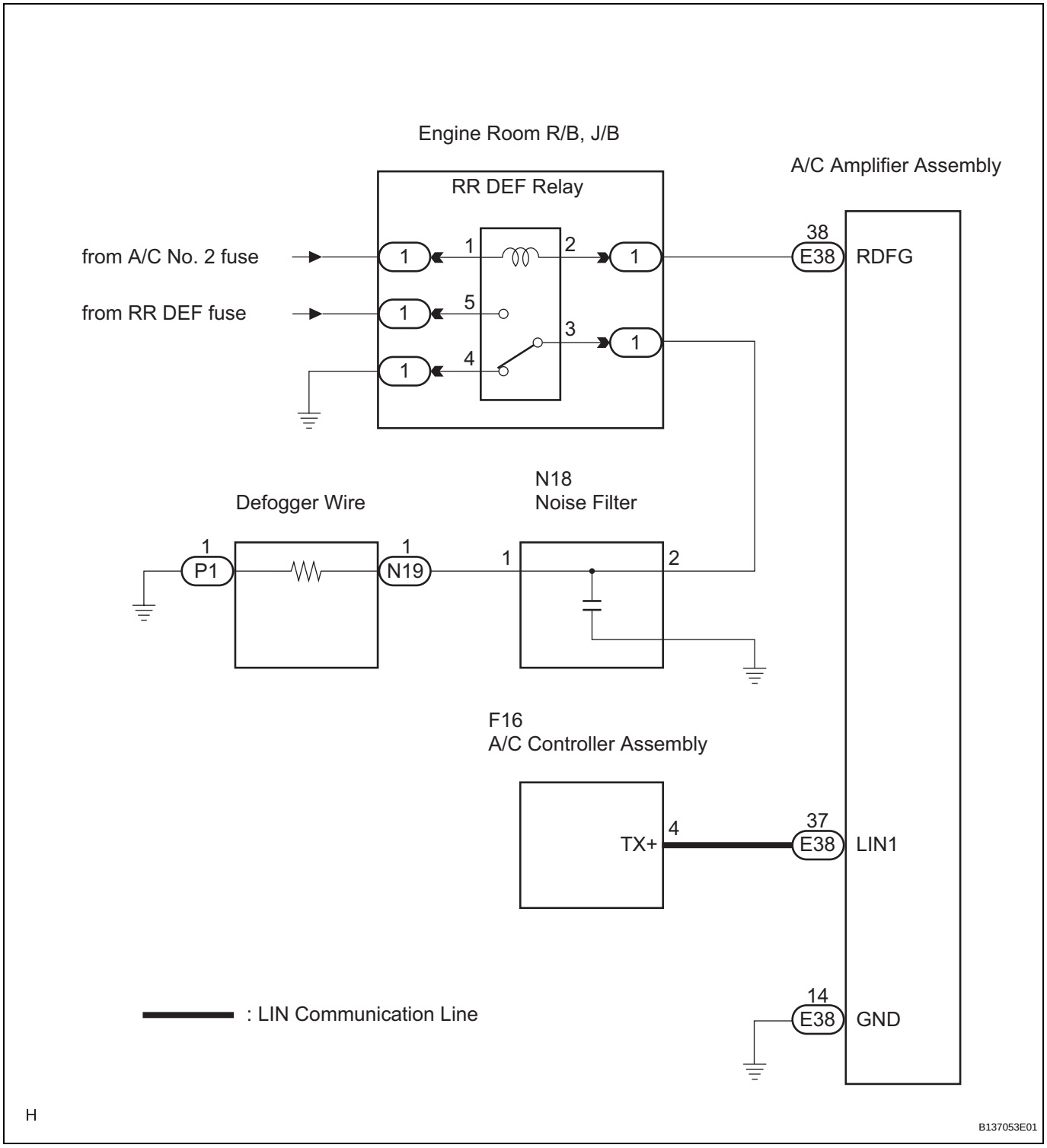
Rear Window Defogger System does not Operate

DESCRIPTION

When the rear window defogger switch, which is built into the heater control assembly, is operated, the operation signals are transmitted to the A/C amplifier assembly through LIN. When the A/C amplifier assembly receives the signals, it turns on the DEFOG relay to operate the rear window defogger.

WS

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK FOR DTCs

(a) Select the DTC check on the intelligent tester to check for communication errors.

Result

Result	Proceed to
Not output DTC codes	A
Output DTC codes (LIN communication)	B

B → GO TO MULTIPLEX COMMUNICATION SYSTEM

A

2	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Select the ACTIVE TEST, use the intelligent tester to issue a control command, and then check the window defogger operation.

Air Conditioner

Item	Test Details
Defogger Relay (Rear)	Turns rear window defogger OFF/ON

OK → Go to step 5

NG

3	REPLACE AIR CONDITIONER CONTROL ASSEMBLY

(a) Replace the air conditioner control assembly.

NEXT

4	CONFIRM REAR WINDOW DEFOGGER OPERATION

(a) Turn the ignition switch on (IG), press the defogger switch, and check that the window defogger operates.

OK:

System operates normally

NG → REPLACE A/C AMPLIFIER ASSEMBLY

OK

END

5	PERFORM ACTIVE TEST BY INTELLIGENT TESTER

(a) Select the ACTIVE TEST, use the intelligent tester to issue a control command, and then check the DEFOG relay operation.
(b) Check that operation sound of the RR DEF relay is heard.

Result	Proceed to
Relay operating sound is heard	OK
Relay operating sound is not heard	NG

OK → Go to step 9

NG

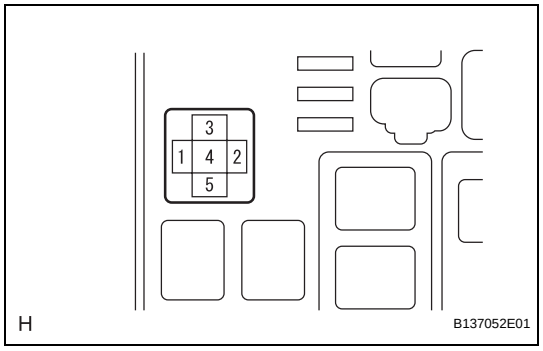
6	INSPECT RR DEF RELAY

See page WS-100.

NG → REPLACE RR DEF RELAY

OK

7	CHECK WIRE HARNESS (RR DEF RELAY - BATTERY POSITIVE)



(a) Disconnect the RR DEF relay.
(b) Measure the voltage according to the value(s) in the table below.
Standard voltage:
Engine room R/B, J/B

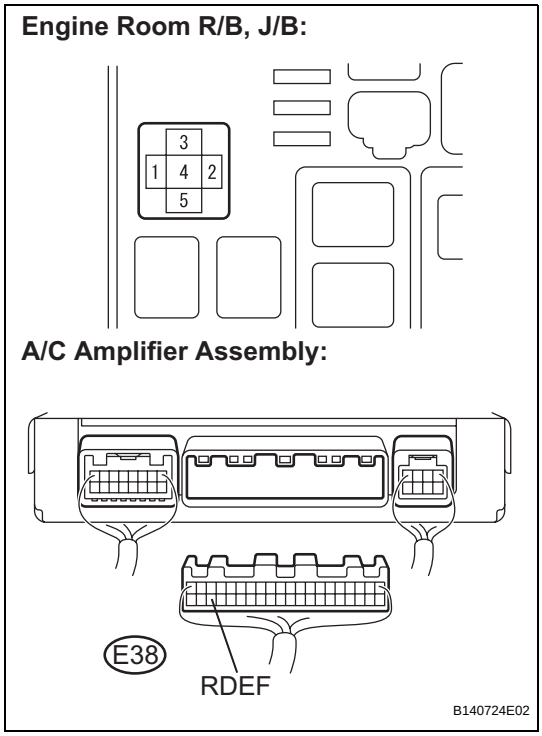
Tester Connection	Condition	Specified Condition
1 - Body ground	Ignition switch on (IG)	10 to 14 V

NG → REPAIR OR REPLACE A/C NO. 2 FUSE, HARNESS OR CONNECTOR

OK

WS

8	CHECK WIRE HARNESS (RR DEF RELAY - A/C AMPLIFIER ASSEMBLY)



(a) Disconnect the RR DEF relay and A/C amplifier assembly connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Connection	Condition	Specified Condition
2 - E38-38	Always	Below 1 Ω
2 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPLACE A/C AMPLIFIER ASSEMBLY

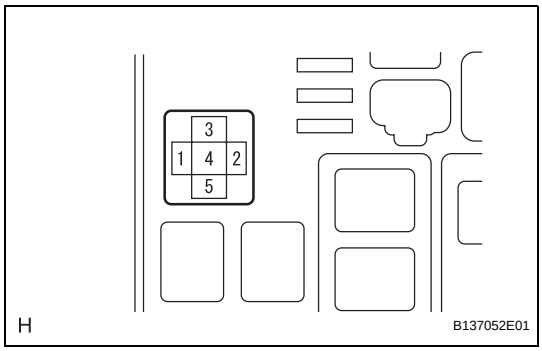
9	INSPECT RR DEF RELAY

See page WS-100.

NG → **REPLACE RR DEF RELAY**

OK

10	CHECK WIRE HARNESS (RR DEF RELAY - BATTERY POSITIVE AND BODY GROUND)



(a) Disconnect the RR DEF relay.
(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard resistance:
Engine room R/B, J/B

Tester Connection	Condition	Specified Condition
4 - Body ground	Always	Below 1 Ω

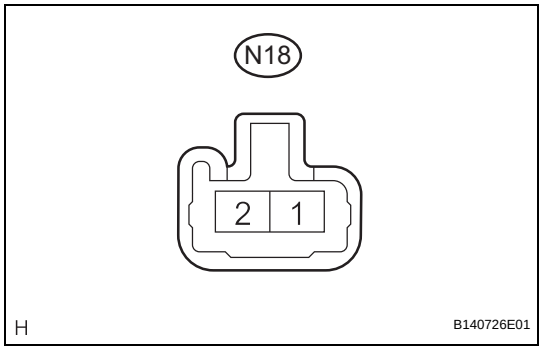
Standard voltage:
Engine room R/B, J/B

Tester Connection	Condition	Specified Condition
5 - Body ground	Always	10 to 14 V

NG → REPAIR OR REPLACE RR DEF FUSE, HARNESS OR CONNECTOR

OK

11 INSPECT NOISE FILTER



(a) Disconnect the noise filter connector.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

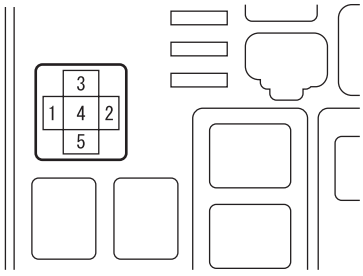
Tester Connection	Condition	Specified Condition
N18-1 - N18-2	Always	Below 1 Ω
N18-1 - Body ground	Always	10 kΩ or higher

NG → REPLACE NOISE FILTER

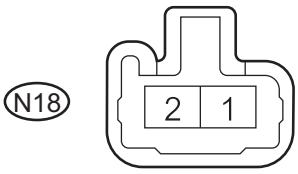
OK

12 CHECK WIRE HARNESS (RR DEF RELAY - NOISE FILTER)

Engine Room R/B, J/B:



Noise Filter:



B140738E01

(a) Disconnect the RR DEF relay and defogger wire connectors.
(b) Measure the resistance according to the value(s) in the table below.

Standard resistance

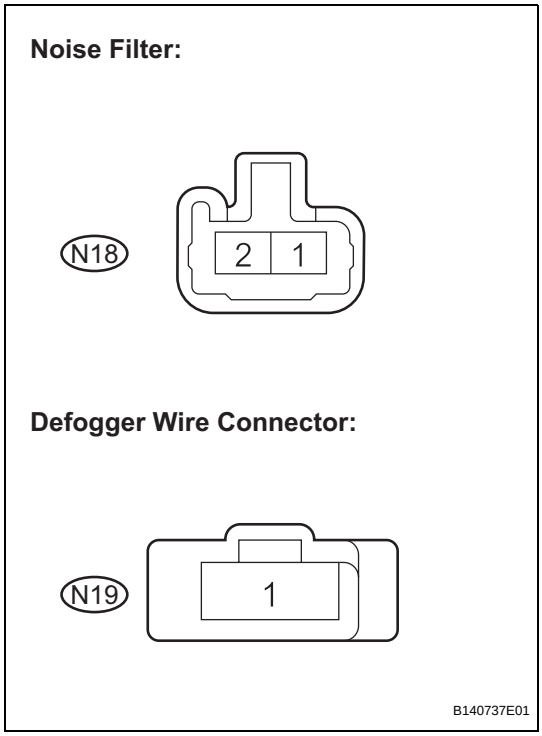
Tester Connection	Condition	Specified Condition
3 - N18-2	Always	Below 1 Ω
3 - Body ground	Always	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

WS

13 CHECK WIRE HARNESS (NOISE FILTER - DEFOGGER WIRE CONNECTOR)



(a) Measure the resistance according to the value(s) in the table below.

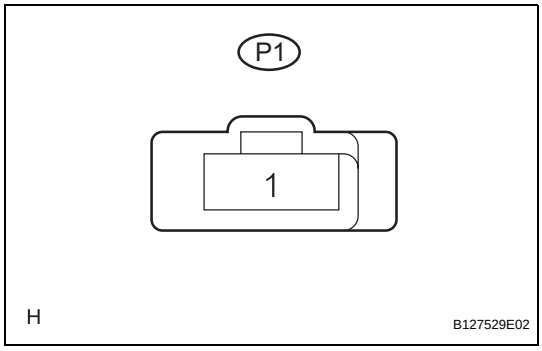
Standard resistance

Tester Connection	Condition	Specified Condition
N18-1 - N19-1	Always	Below 1 Ω
N18-1 - Body ground	Always	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

14 CHECK WIRE HARNESS (DEFOGGER WIRE CONNECTOR - BODY GROUND)



(a) Measure the resistance according to the value(s) in the table below.

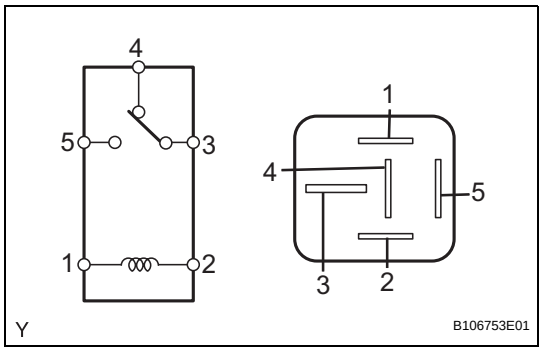
Standard resistance

Tester Connection	Condition	Specified Condition
P1-1 - Body ground	Always	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

REPAIR OR REPLACE REAR WINDOW DEFOGGER WIRE



DEFOGGER RELAY

ON-VEHICLE INSPECTION

1. INSPECT DEFOGGER RELAY (Marking: DEFOG)

(a) Measure the resistance according to the value(s) in the table below.

Standard resistance

Tester Condition	Specified Condition
3 - 4	Below 1 Ω (when battery voltage is not applied between terminals)
3 - 5	10 kΩ or higher (when battery voltage is not applied between terminals)
3 - 5	Below 1 Ω (when battery voltage is applied to terminals 1 and 2)

If the result is not as specified, replace the relay.

WIPER AND WASHER SYSTEM

PRECAUTION

1. EXPRESSIONS OF IGNITION SWITCH

(a) The type of ignition switch used on this model differs according to the specifications of the vehicle.
The expressions listed in the table below are used in this section.

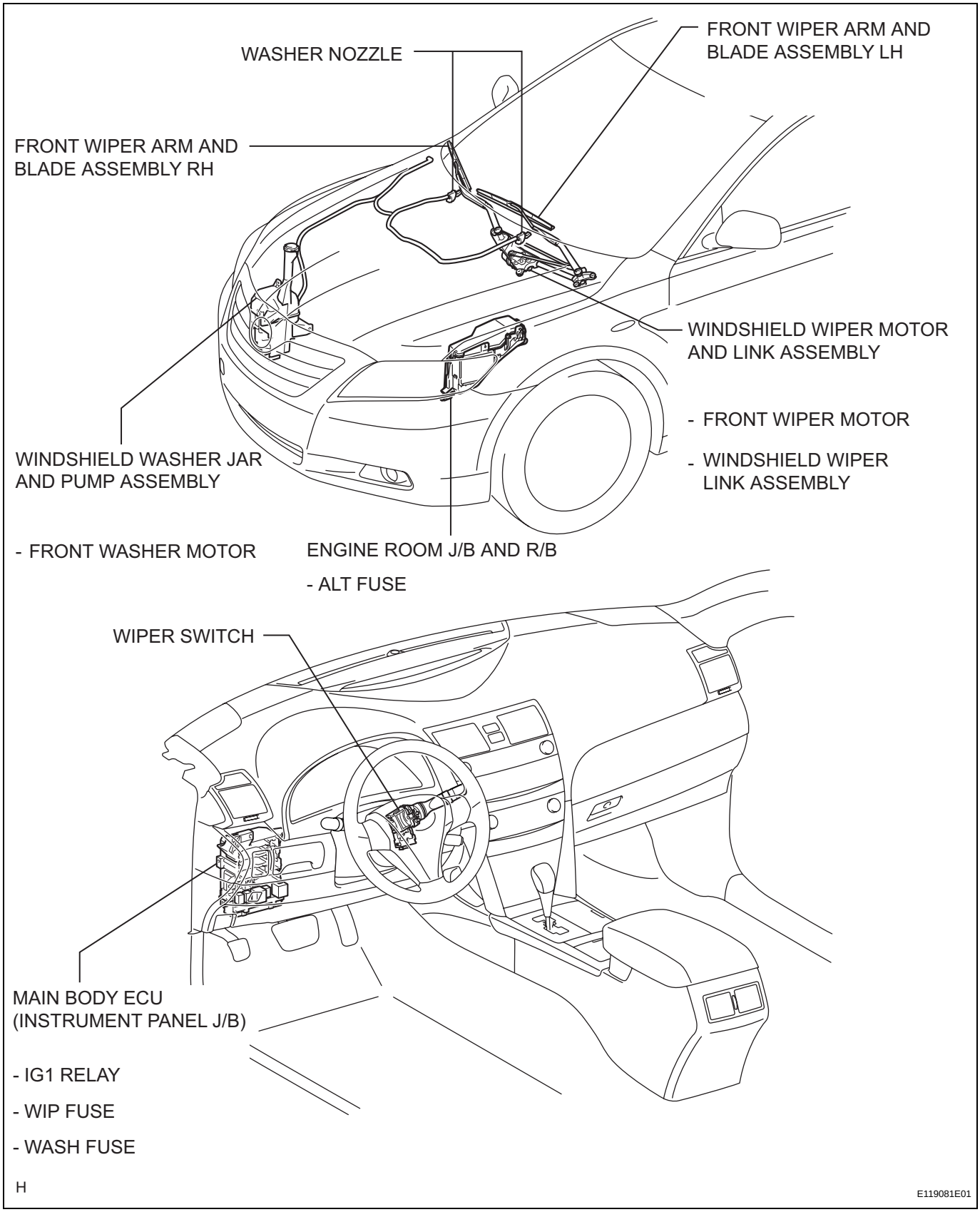
Switch Type		Ignition Switch (position)	Engine Switch (condition)
Expression	Ignition switch off	LOCK	Off
	Ignition switch on (IG)	ON	On (IG)
	Ignition switch on (ACC)	ACC	On (ACC)
	Engine start	START	Start

2. PRECAUTION OF WASHER NOZZLE ADJUSTMENT

(a) Do not clean or adjust the washer nozzle with a safety pin, etc. because;
(1) the washer nozzle tip is made of resin and could be damaged.
(2) adjustment is not necessary because the washer nozzle is a spray type. If it is necessary to change the nozzle angle, replace the washer nozzle with one that has a different nozzle angle. (See page WW-28)

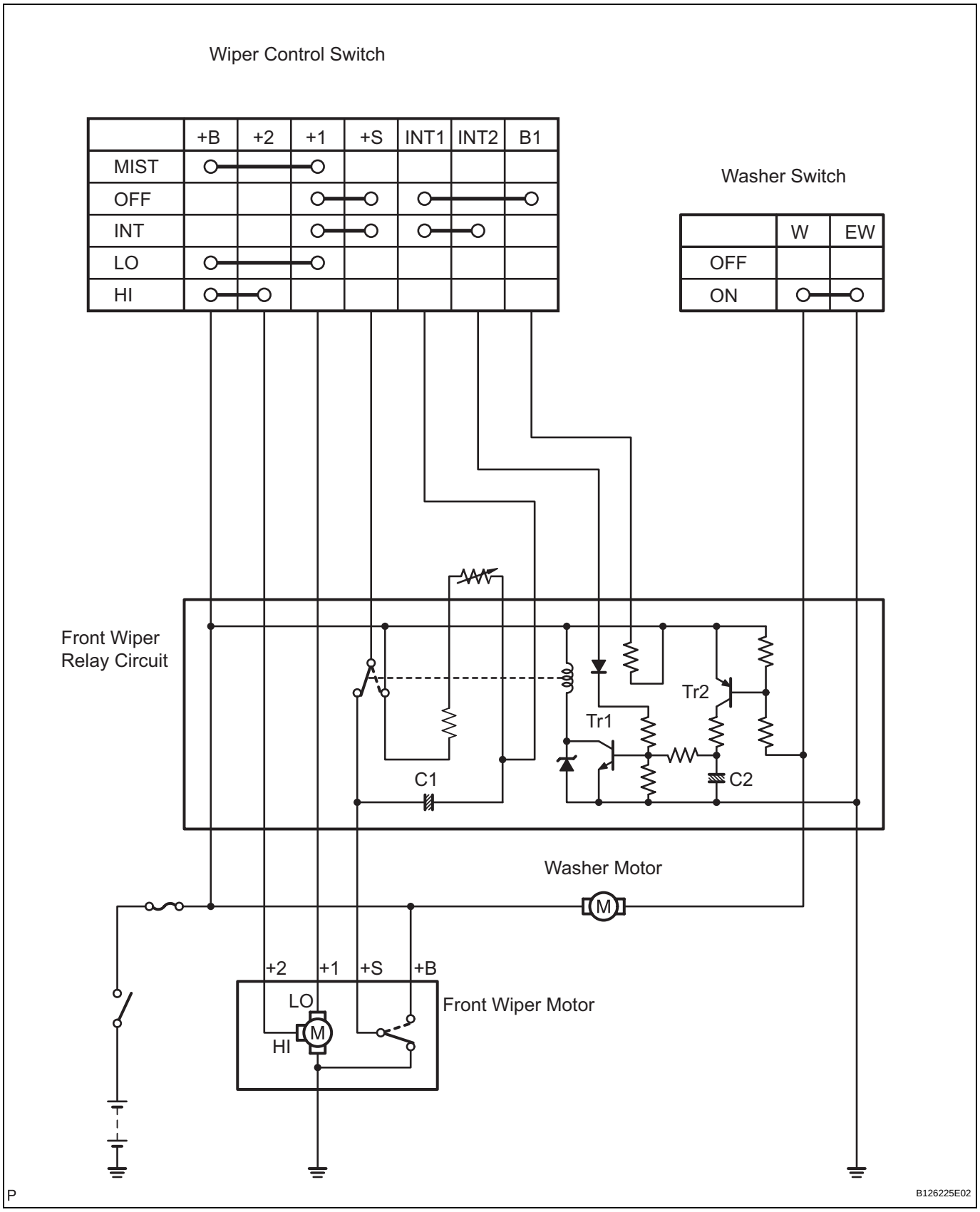
(b) In case the washer nozzle is clogged with wax, etc., remove it and clean the nozzle hole with a soft resin brush, etc.

PARTS LOCATION



WW

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

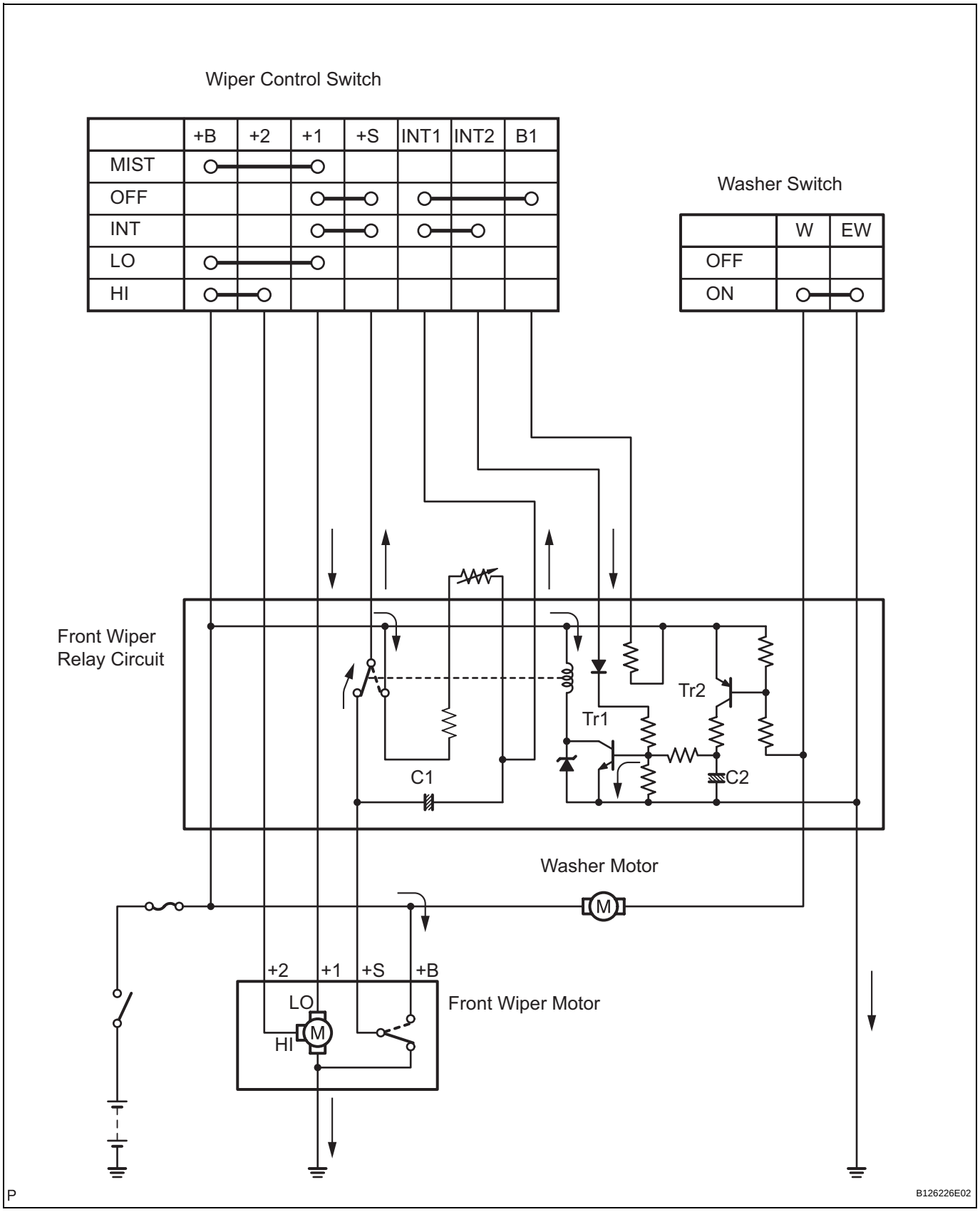
1. WASHER LINKED OPERATION

(a) This system operates the front wipers at a low speed immediately after a jet of washer fluid when the front washer switch is turned on for approximately 0.3 seconds or more. If the switch is turned off within approximately 1.5 seconds, the system stops the wipers when the switch is turned off. If the switch is turned on for approximately 1.5 seconds or more, the system stops the wipers approximately 2.2 seconds after the switch is turned off.

2. INTERMITTENT OPERATION

(a) The system operates the front wipers once in approximately 1.6 to 10.7 seconds when the front wiper switch is turned to the INT position. The intermittent time can be adjusted between 1.6 and 10.7 seconds.

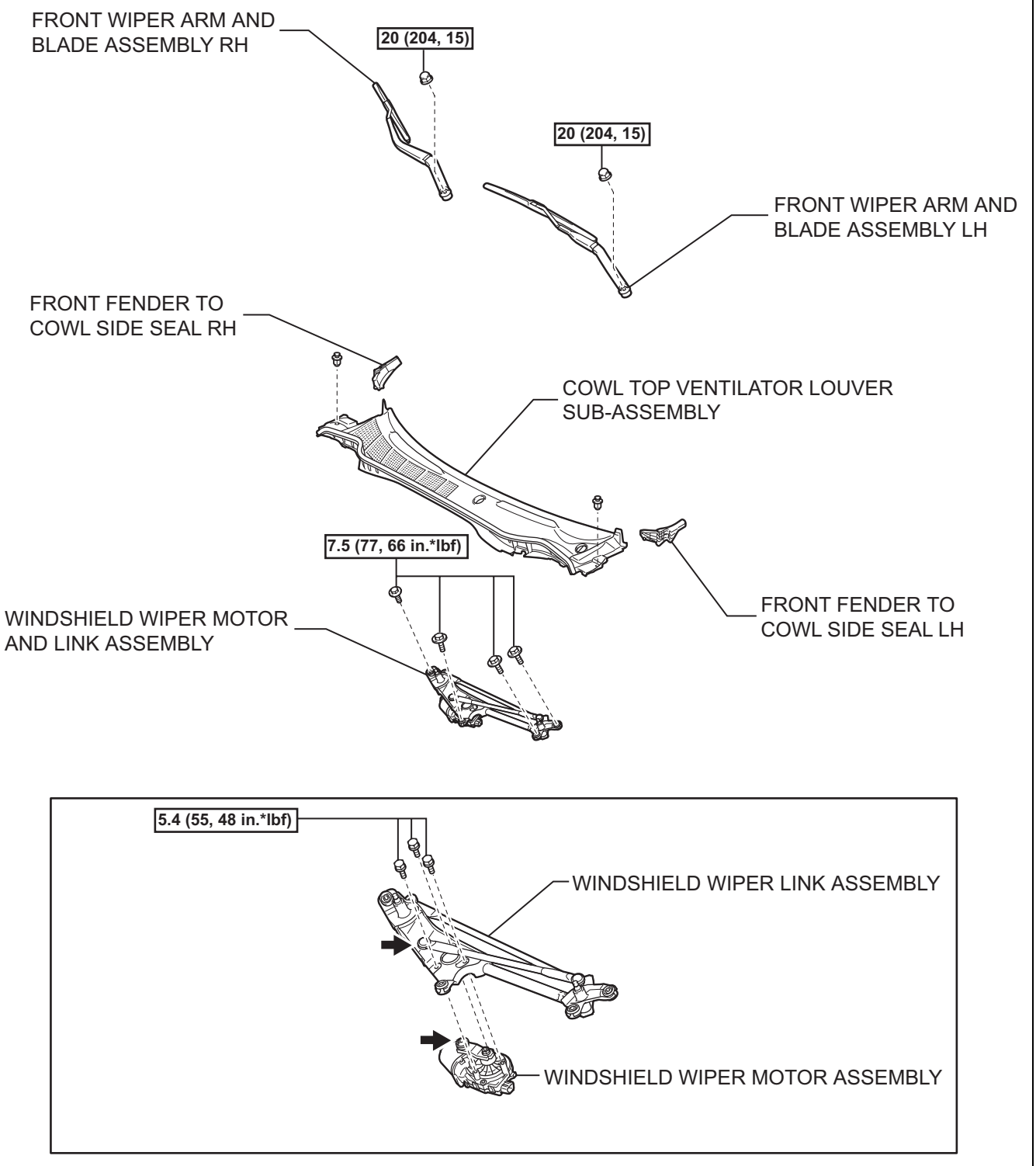
(b) If the wiper control switch is turned to the INT position, current flows from the already charged capacitor C1 to Tr1 (transistor) through terminals INT1 and INT2 of the wiper control switch. When Tr1 turns on, current flows from terminal +S of the wiper control switch to terminal +1 of the wiper control switch, to terminal +1 of the wiper motor, to the wiper motor and finally to the ground, causing the wiper motor to operate. At the same time, current flows from capacitor C1 to terminal INT1 of the wiper control switch and then INT2. When the current flow from capacitor C1 ends, Tr1 turns off to stop the relay contact point and halt the wiper motor. When the relay contact point turns off, capacitor C1 begins to charge again and Tr1 remains off until charging has been completed. This period corresponds to the intermittent time. When capacitor C1 is fully charged, Tr1 turns on and then the relay contact point activates, causing the motor to operate. This cycle is the intermittent operation. The intermittent time can be adjusted by using the intermittent time adjust dial (variable resistor) to change the charge time of capacitor C1.


Wiper Control Switch
+B
+2
+1
+S
INT1
INT2
B1
MIST
OFF
INT
LO
HI
Washer Switch
W
EW
OFF
ON
Front Wiper
Relay Circuit
Tr1
Tr2
C1
C2
Washer Motor
M
+2
+1
+S
+B
LO
M
HI
Front Wiper Motor
P
B126226E02

WW

FRONT WIPER MOTOR

COMPONENTS



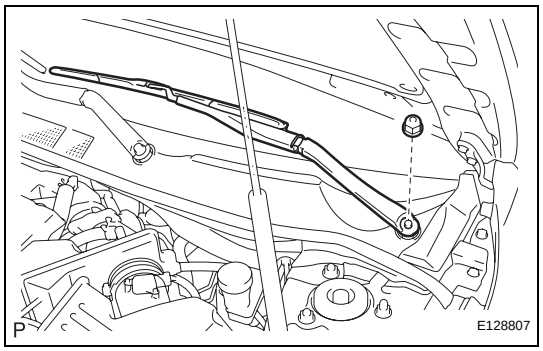
N*m (kgf*cm, ft.*lbf): Specified torque

◀ Apply MP grease

P

E128804E01

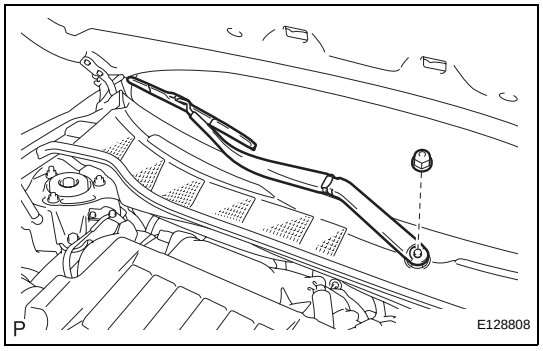
WW



REMOVAL

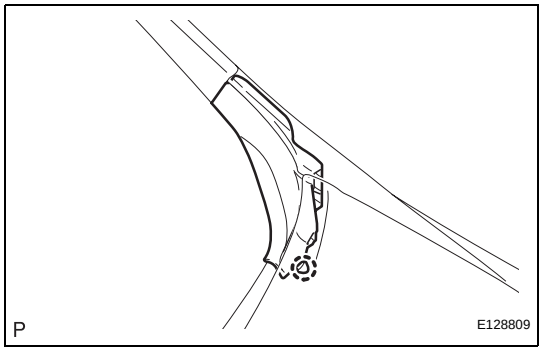
1. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH

(a) Remove the nut and the front wiper arm and blade assembly LH.



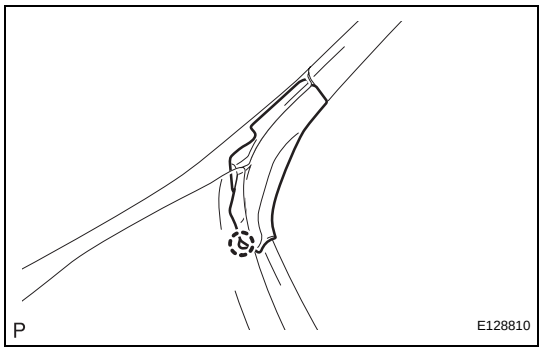
2. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH

(a) Remove the nut and the front wiper arm and blade assembly RH.



3. REMOVE FRONT FENDER TO COWL SIDE SEAL LH

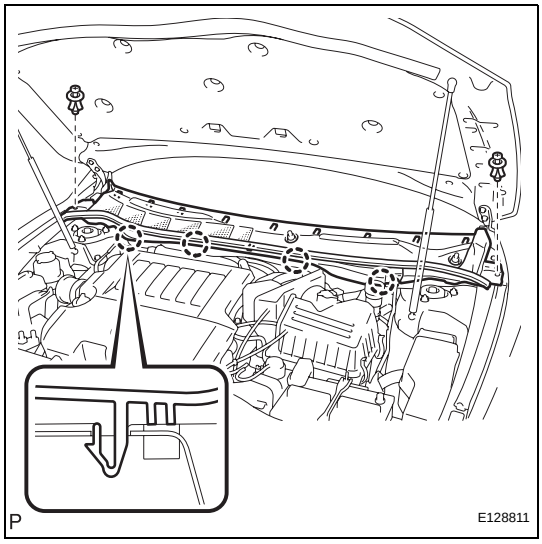
(a) Disengage the claw and remove the front fender to cowl side seal LH.



4. REMOVE FRONT FENDER TO COWL SIDE SEAL RH

(a) Disengage the claw and remove the front fender to cowl side seal RH.

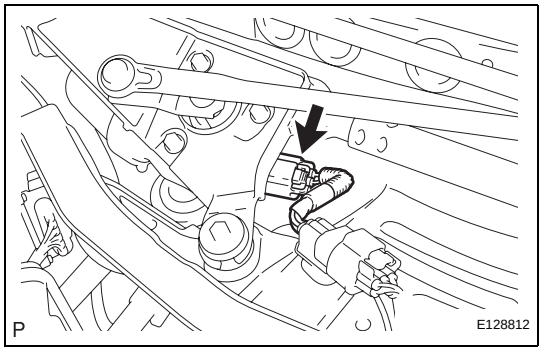
WW



5. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY

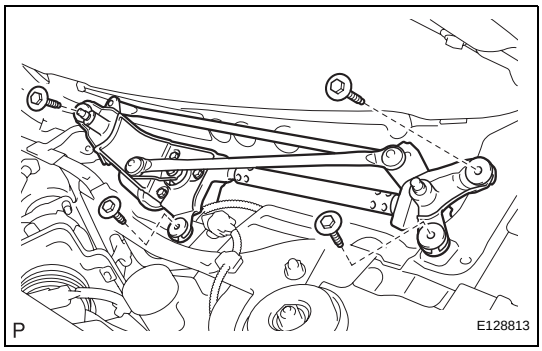
(a) Remove the 2 clips.

(b) Disengage the 4 claws and remove the cowl top ventilator louver sub-assembly.

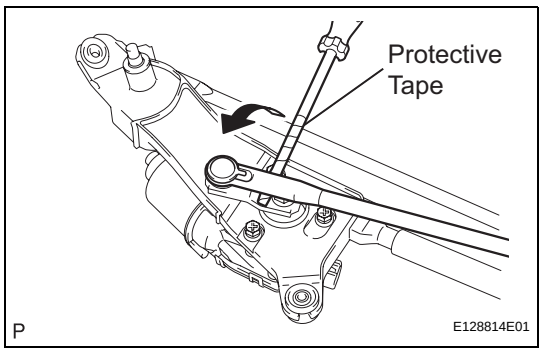


6. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

(a) Disconnect the connector.



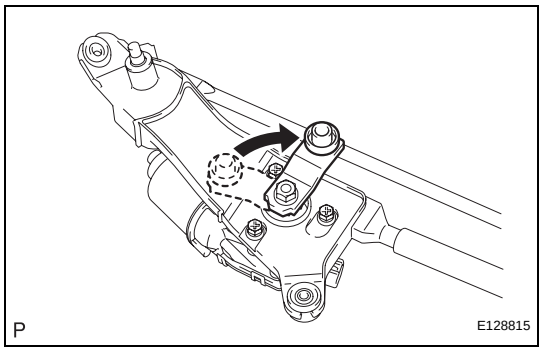
(b) Remove the 4 bolts and the windshield wiper motor and link assembly.



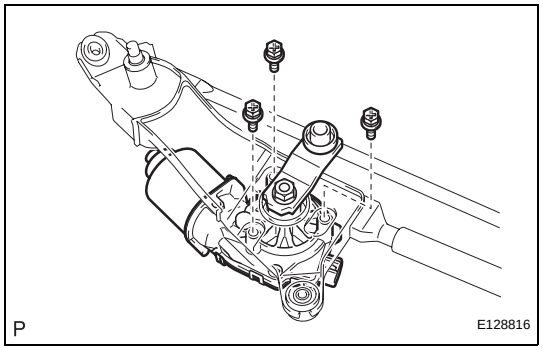
7. REMOVE WINDSHIELD WIPER MOTOR ASSEMBLY

(a) Using a screwdriver, separate the No. 2 windshield wiper link rod from the crank arm pivot of the front wiper motor assembly as shown in the illustration.
HINT:
Tape the screwdriver tip before use.

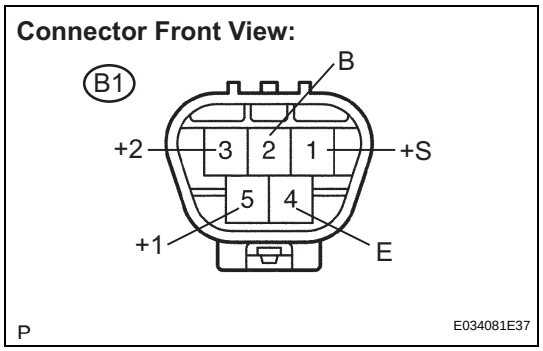
WW



(b) Move the crank arm in the direction indicated by the arrow.



(c) Remove the 3 bolts and the windshield wiper motor assembly from the windshield wiper link assembly.



INSPECTION

1. INSPECT WINDSHIELD WIPER MOTOR ASSEMBLY (for TMC Made)

(a) LO Operation Check

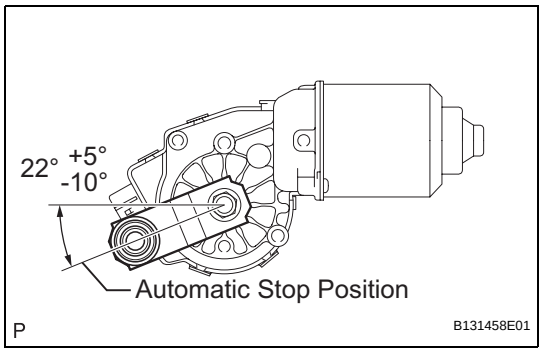
(1) Connect a positive (+) battery lead to terminal B1-5 (+1) of the connector, and a negative (-) battery lead to terminal B1-4 (E), and check that the motor operates at low speed (LO).

(b) HI Operation Check

(1) Connect a positive (+) lead to terminal B1-3 (+2) of the connector, and a negative (-) battery lead to terminal B1-4 (E), and check that the motor operates at high speed (HI).

(c) Automatic Stop Operation Check

(1) Put matchmarks on the windshield wiper motor assembly. The matchmarks will be used to confirm the return of the motor shaft to the park position.

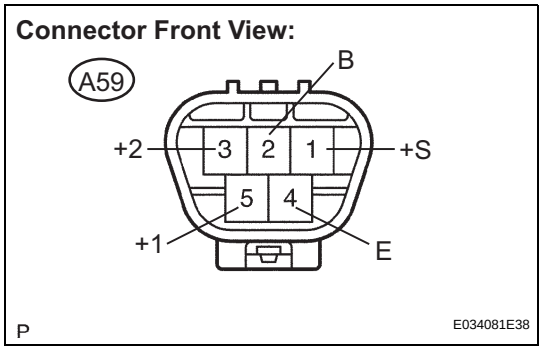


(2) Connect a positive (+) battery lead to terminal B1-5 (+1) of the connector on the wiper motor and connect a negative battery lead to terminal B1-4 (E) of the wiper motor. With the motor operating at low speed (LO), disconnect terminal B1-5 (+1) to stop the wiper motor at a position where the matchmarks do not line up.
HINT:
In the following step, connections will be made at the wiper motor to allow verification of the operation of the park contacts that are operated by the cam in the wiper motor. After the connections have been made, when the motor is not in the park position, current will flow from terminal B1-2 (B) through the park contacts in the wiper motor, to terminal B1-1 (+S). The current will then flow through the jumper wire to terminal B1-5 (+1) through the motor to ground (causing it to operate). When the motor reaches the park position, the park contacts should open, stopping the operation of the wiper motor in the correct location. Terminals B1-2 (B) and B1-1 (+S) are connected by the internal cam in the wiper motor when the wiper motor is not in the park position. Terminals B1-1 (+S) and B1-4 (E) are connected by the internal cam in the wiper motor when the wiper motor is in the park position.

(3) With the ground wire still attached from the previous step, connect a jumper lead between terminal B1-1 (+S) and terminal B1-5 (+1). Next, connect a positive (+) battery lead to terminal B1-2 (B) to cause the wiper motor to operate at low speed. If the wiper motor is operating correctly, the wiper will operate until it reaches the park position. When it reaches the park position, it will automatically stop.

(4) Verify that the matchmarks on the windshield wiper motor assembly are lined up.

WW



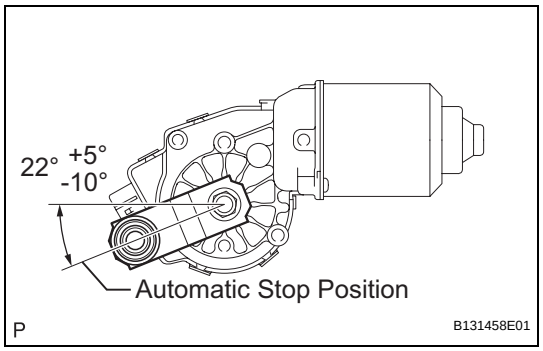
2. INSPECT WINDSHIELD WIPER MOTOR ASSEMBLY (for TMMK Made)

(a) LO Operation Check

(1) Connect a positive (+) battery lead to terminal A59-5 (+1) of the connector, and a negative (-) battery lead to terminal A59-4 (E), and check that the motor operates at low speed (LO).

(b) HI Operation Check

(1) Connect a positive (+) lead to terminal A59-3 (+2) of the connector, and a negative (-) battery lead to terminal A59-4 (E), and check that the motor operates at high speed (HI).



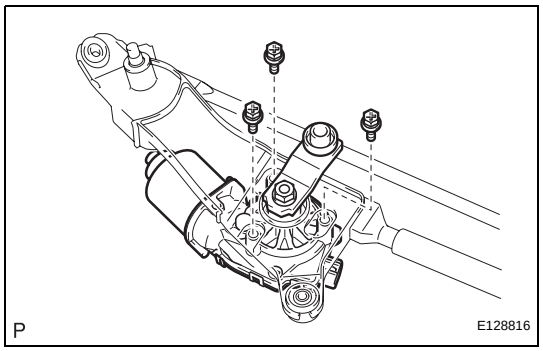
(c) Automatic Stop Operation Check

(1) Put matchmarks on the windshield wiper motor assembly. The matchmarks will be used to confirm the return of the motor shaft to the park position.

(2) Connect a positive (+) battery lead to terminal A59-5 (+1) of the connector on the wiper motor and connect a negative battery lead to terminal A59-4 (E) of the wiper motor. With the motor operating at low speed (LO), disconnect terminal A59-5 (+1) to stop the wiper motor at a position where the matchmarks do not line up.
HINT:
In the following step, connections will be made at the wiper motor to allow verification of the operation of the park contacts that are operated by the cam in the wiper motor. After the connections have been made, when the motor is not in the park position, current will flow from terminal A59-2 (B) through the park contacts in the wiper motor, to terminal A59-1 (+S). The current will then flow through the jumper wire to terminal A59-5 (+1) through the motor to ground (causing it to operate). When the motor reaches the park position, the park contacts should open, stopping the operation of the wiper motor in the correct location. Terminals A59-2 (B) and A59-1 (+S) are connected by the internal cam in the wiper motor when the wiper motor is not in the park position. Terminals A59-1 (+S) and A59-4 (E) are connected by the internal cam in the wiper motor when the wiper motor is in the park position.

(3) With the ground wire still attached from the previous step, connect a jumper lead between terminal A59-1 (+S) and terminal A59-5 (+1). Next, connect a positive (+) battery lead to terminal A59-2 (B) to cause the wiper motor to operate at low speed. If the wiper motor is operating correctly, the wiper will operate until it reaches the park position. When it reaches the park position, it will automatically stop.

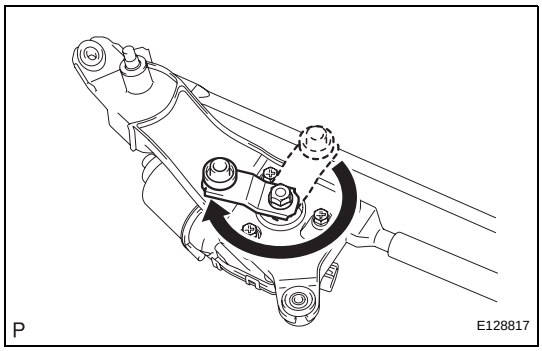
(4) Verify that the matchmarks on the windshield wiper motor assembly are lined up.



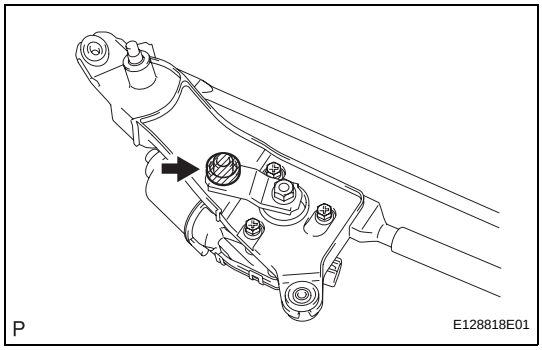
INSTALLATION

1. INSTALL WINDSHIELD WIPER MOTOR ASSEMBLY

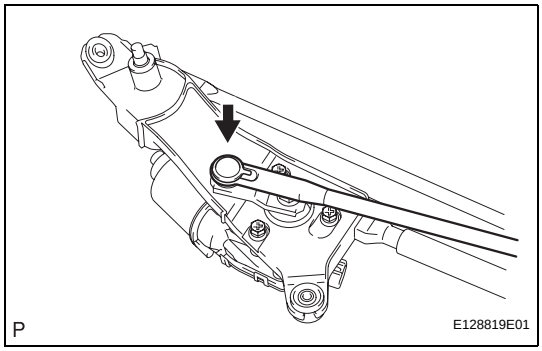
(a) Install the windshield wiper motor assembly with the 3 bolts.
Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)



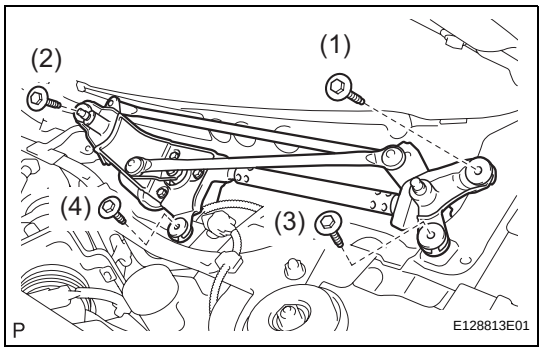
(b) Move the crank arm in the direction indicated by the arrow.



(c) Apply MP grease to the crank arm pivot of the windshield wiper motor assembly.

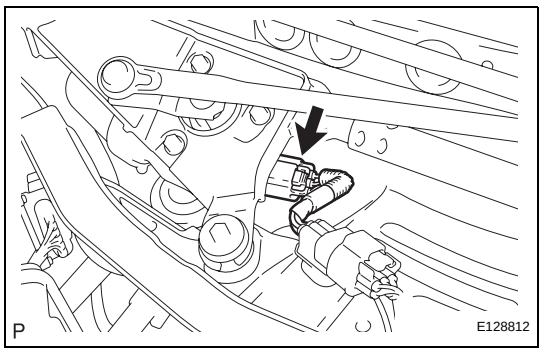


(d) Install the No. 2 windshield wiper link rod to the pivot of the windshield wiper motor assembly.



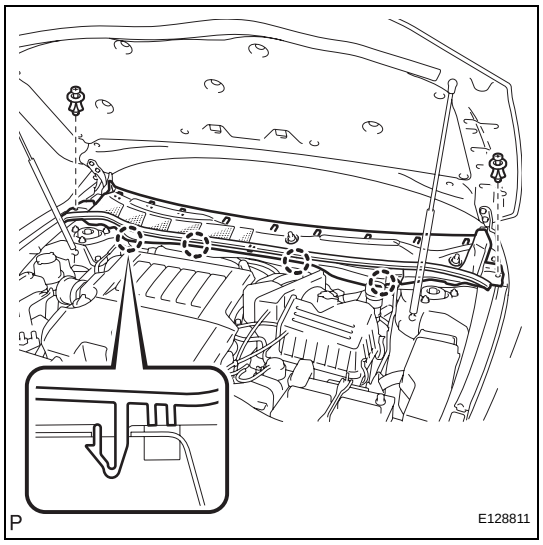
2. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

(a) Install the windshield wiper motor and link assembly with the 4 bolts.
Torque: 7.5 N*m (77 kgf*cm, 66 in.*lbf)
NOTICE:
Tighten the bolts in the order shown in the illustration.



(b) Connect the connector.

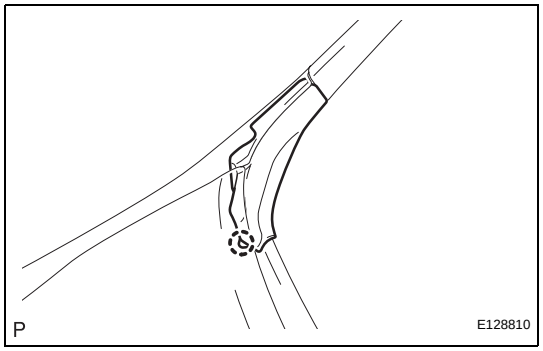
WW



3. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY

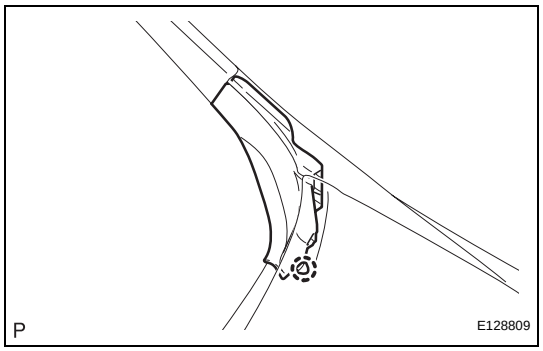
(a) Engage the 4 claws and install the cowl top ventilator louver sub-assembly.

(b) Install the 2 clips.



4. INSTALL FRONT FENDER TO COWL SIDE SEAL RH

(a) Engage the claw and install the front fender to cowl side seal RH.

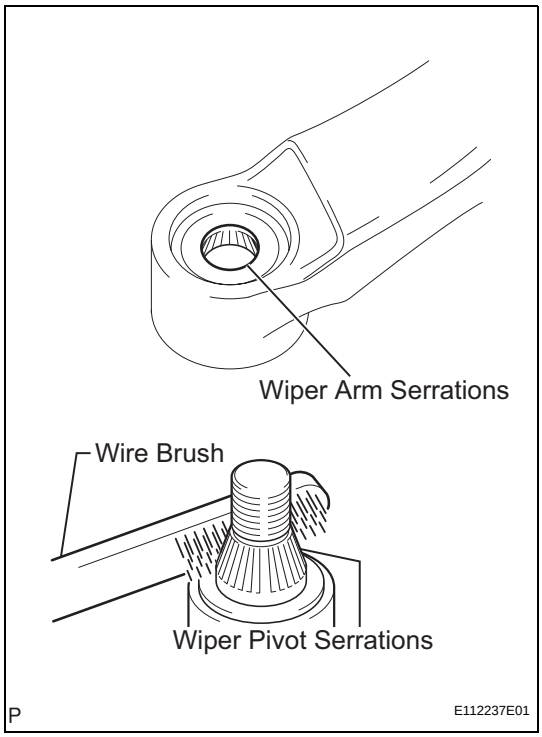


5. INSTALL FRONT FENDER TO COWL SIDE SEAL LH

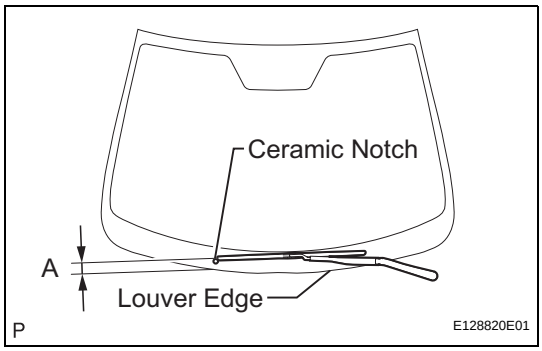
(a) Engage the claw and install the front fender to cowl side seal LH.

6. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH

(a) Operate the wiper and stop the windshield wiper motor at the automatic stop position.



(b) Clean the wiper arm serrations.
(c) When reinstalling:
(1) Clean the wiper pivot serrations with a wire brush.

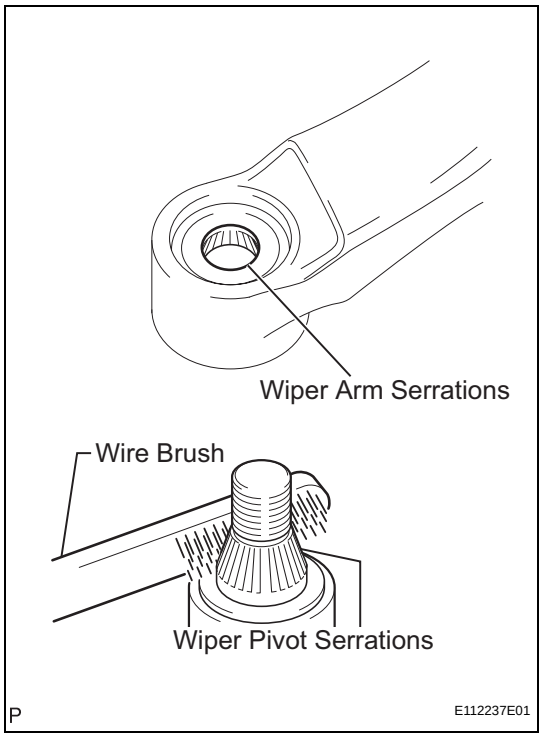


(d) Install the front wiper arm and blade assembly LH with the nut to the position shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
HINT:
Hold the arm hinge by hand to fasten the nut.

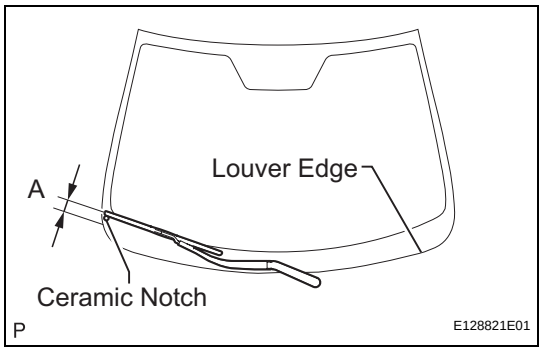
Area	Measurement
A	37 to 52 mm (1.46 to 2.05 in.)

7. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH

(a) Operate the wiper and stop the windshield wiper motor at the automatic stop position.



(b) Clean the wiper arm serrations.
(c) When reinstalling:
  (1) Clean the wiper pivot serrations with a wire brush.



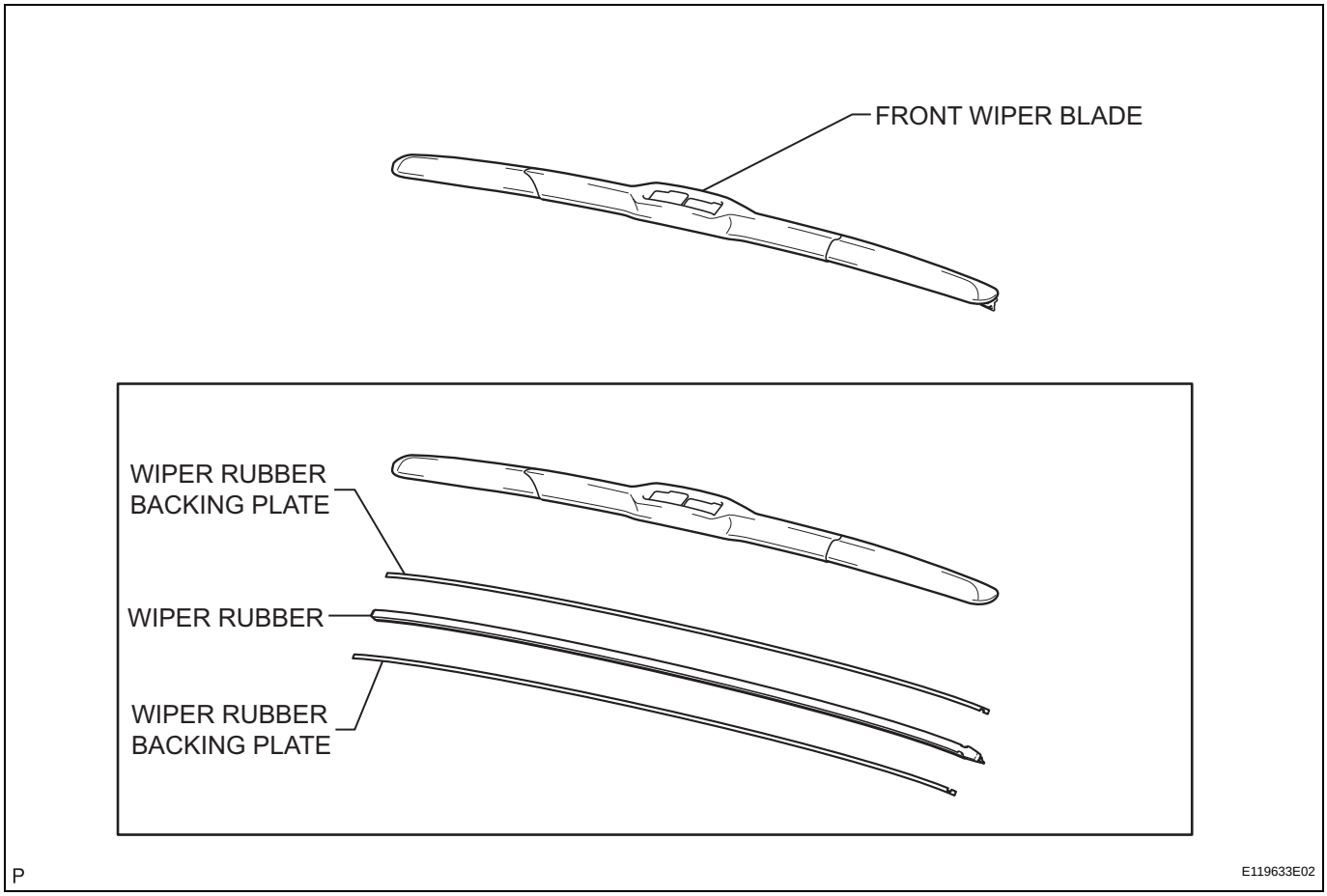
(d) Install the front wiper arm and blade assembly RH with the nut to the position shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)
HINT:
Hold the arm hinge by hand to fasten the nut.

Area	Measurement
A	23 to 38 mm (0.90 to 1.49 in.)

(e) Operate the front wipers while spraying washer fluid on the windshield glass. Make sure that the front wipers function properly and the wipers do not come into contact with the vehicle body.

FRONT WIPER RUBBER

COMPONENTS



REMOVAL

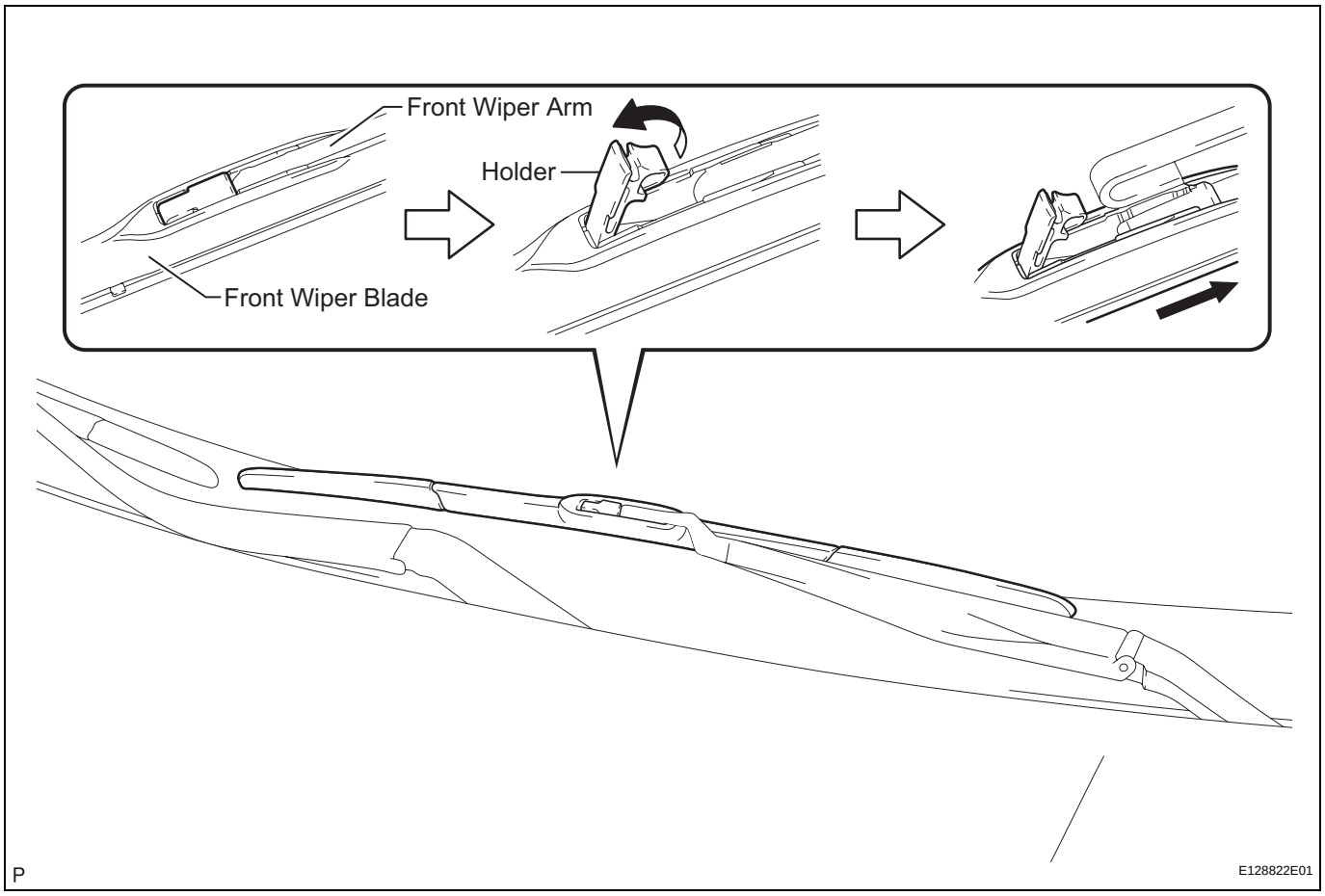
1. REMOVE FRONT WIPER BLADE

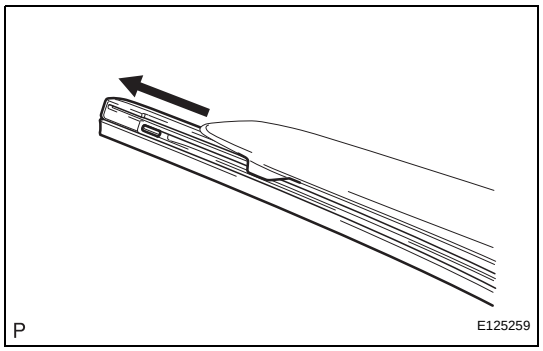
(a) Disengage the holder of the front wiper blade.

(b) Remove the front wiper blade from the front wiper arm as shown in the illustration.

NOTICE:

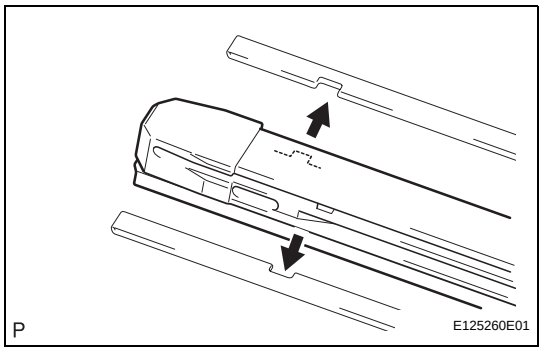
Do not bend the front wiper arm with the front wiper blade removed because the arm tip could damage the windshield surface.



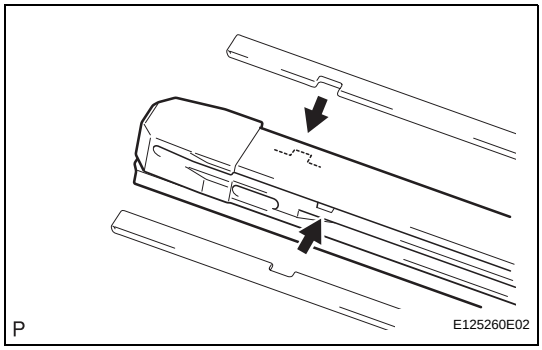


2. REMOVE WIPER RUBBER

(a) Remove the wiper rubber and the wiper rubber backing plates from the front wiper blade.



(b) Remove the 2 wiper rubber backing plates from the wiper rubber.



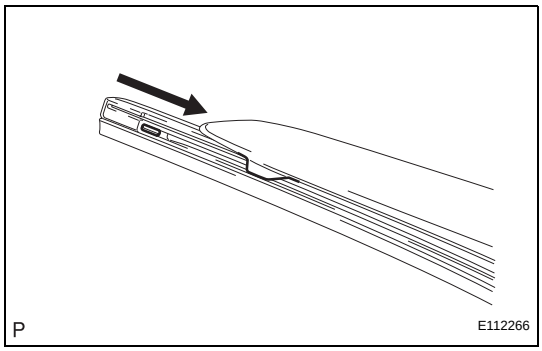
INSTALLATION

1. INSTALL WIPER RUBBER

(a) Install the 2 wiper rubber backing plates to the wiper rubber.

NOTICE:

- **Align the protrusions on the wiper rubber with the notches in the backing plates.**
- **Align the curves of the backing plates with the curve of the glass.**



(b) Install the wiper rubber to the front wiper blade with the tip of the rubber (curved end) facing the axis of the wiper arm.

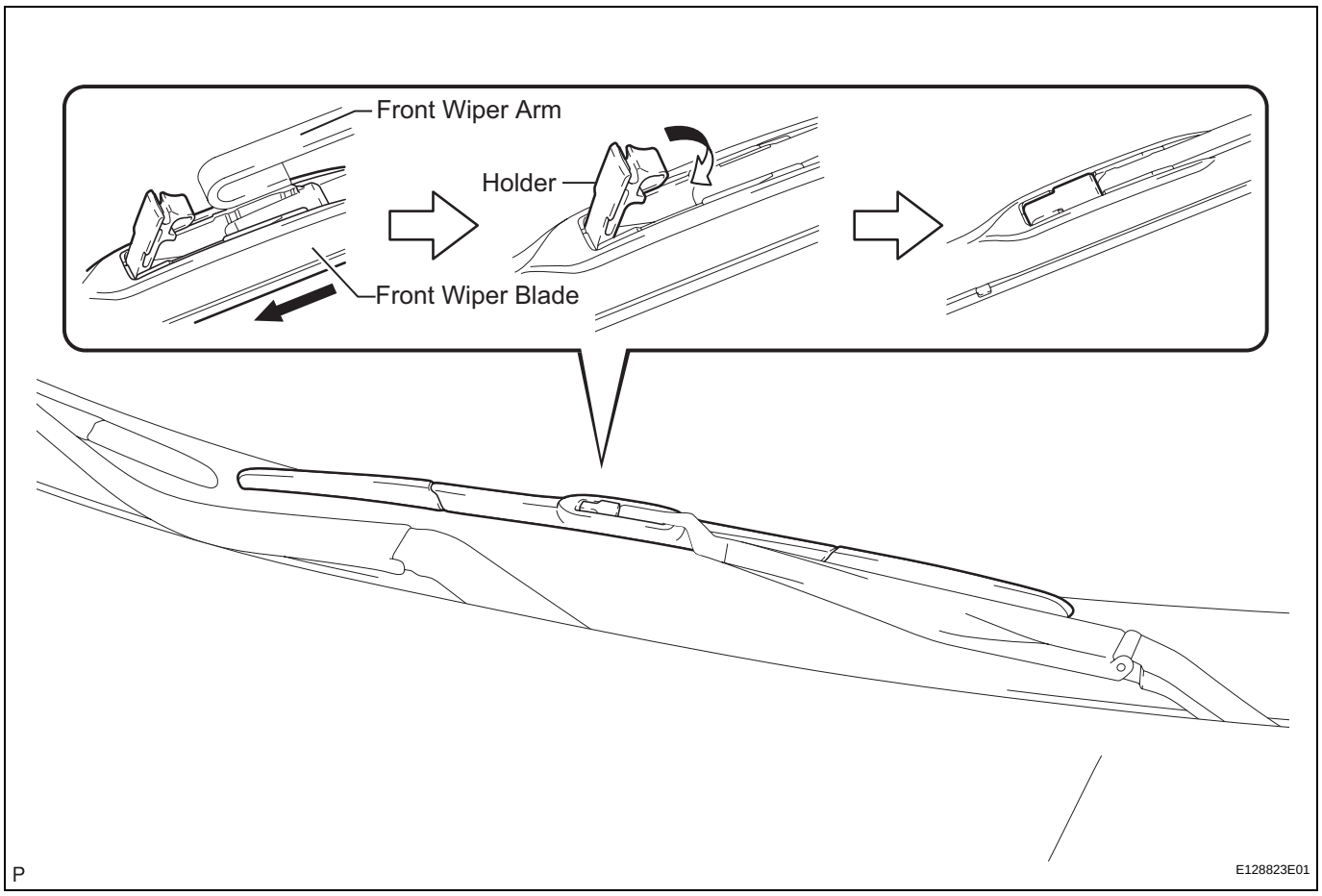
NOTICE:

Firmly push the wiper rubber into the wiper blade to securely engage them.

2. INSTALL FRONT WIPER BLADE

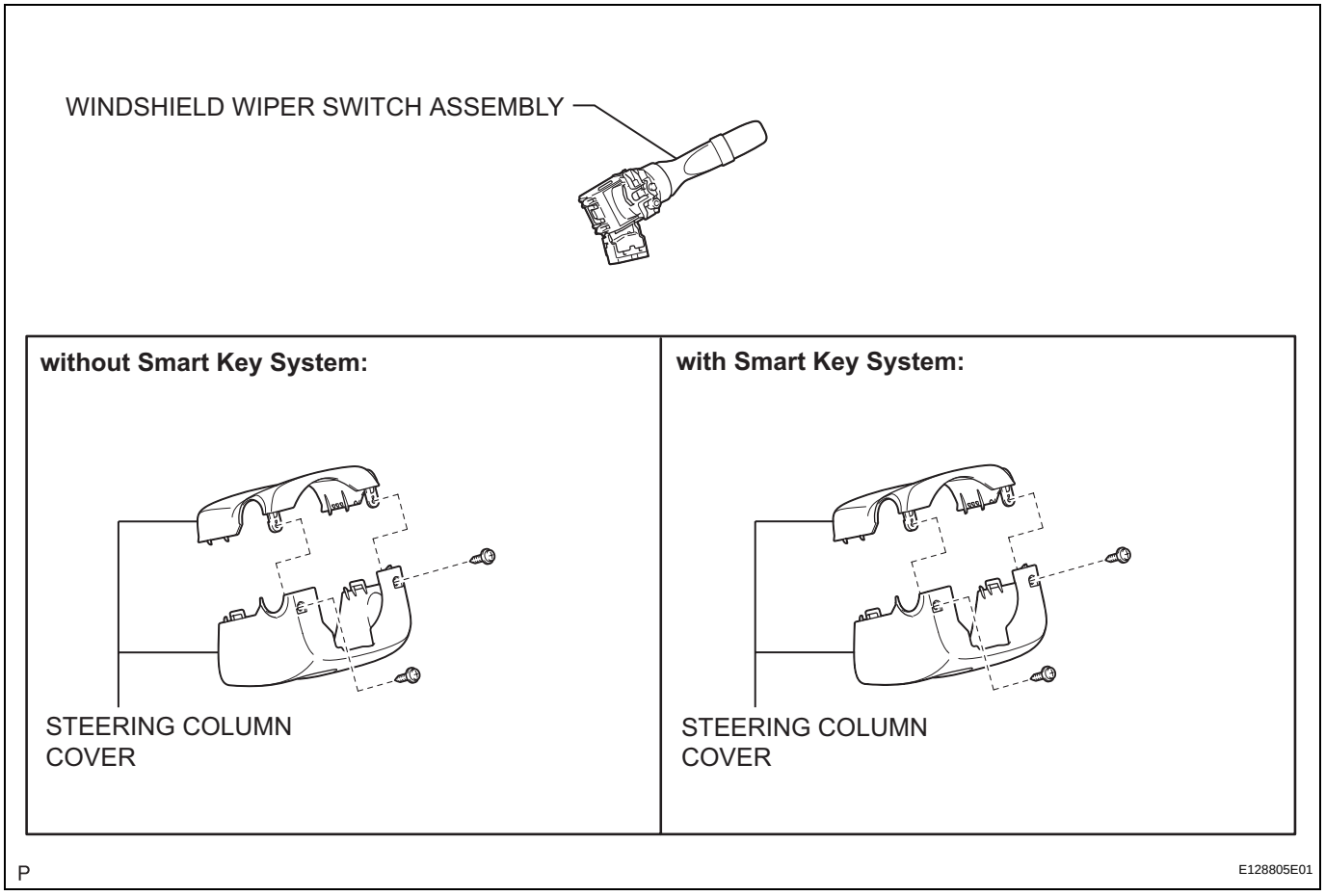
(a) Install the front wiper blade as shown in the illustration.

(b) Install the holder of the front wiper blade.



WIPER SWITCH

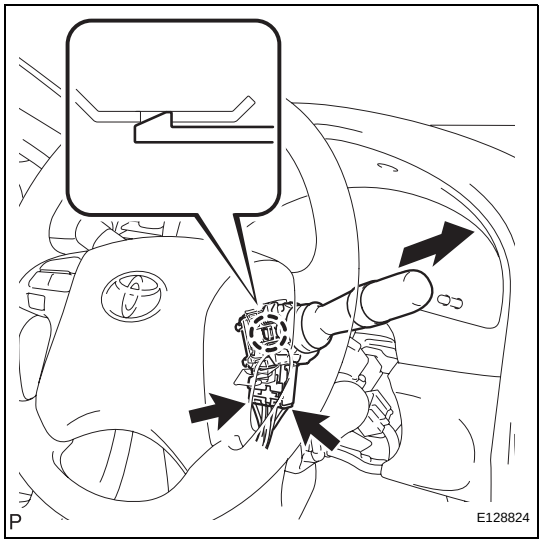
COMPONENTS

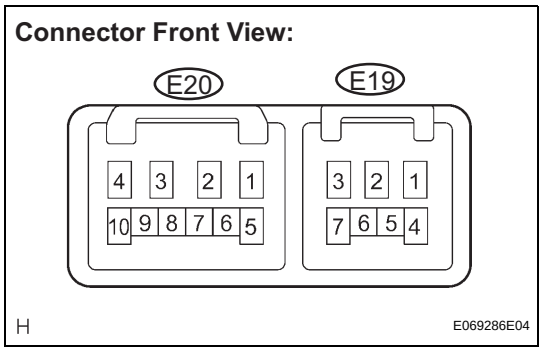


REMOVAL

1. **REMOVE STEERING COLUMN COVER (See page SR-39)**

2. **REMOVE WINDSHIELD WIPER SWITCH ASSEMBLY**
   (a) Disconnect the 2 connectors.
   (b) Disengage the claw and remove the windshield wiper switch assembly as shown in the illustration.
   NOTICE:
   If the claw is pushed with excessive force, it may break.





INSPECTION

1. **INSPECT WINDSHIELD WIPER SWITCH ASSEMBLY**
   (a) Check the continuity of the windshield wiper switch assembly.
      (1) Measure the resistance according to the value(s) in the table below.
      Standard resistance:
      Front Wiper Switch

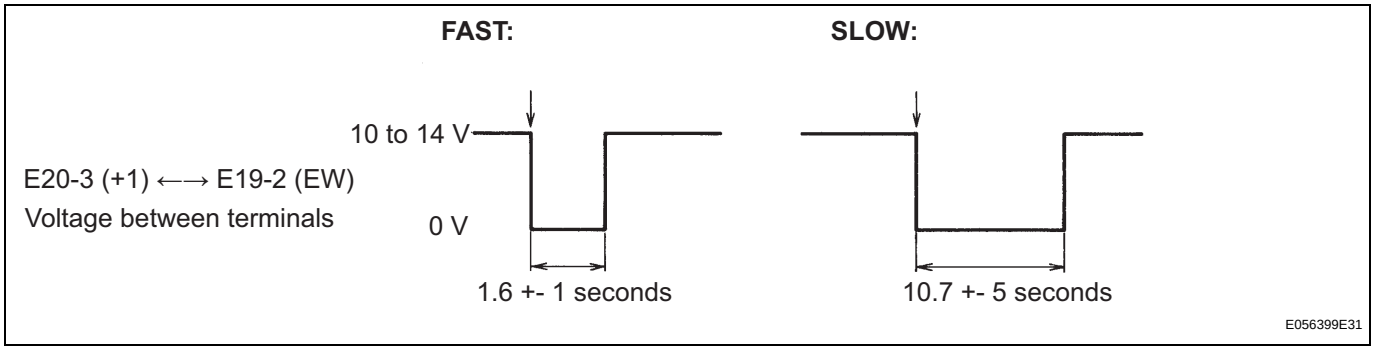
Switch Position	Tester Connection	Specified Resistance
MIST	E20-2 (+B) - E20-3 (+1)	Below 1 Ω
OFF	E20-1 (+S) - E20-3 (+1)	Below 1 Ω
INT	E20-1 (+S) - E20-3 (+1)	Below 1 Ω
LO	E20-2 (+B) - E20-3 (+1)	Below 1 Ω
HI	E20-2 (+B) - E20-4 (+2)	Below 1 Ω

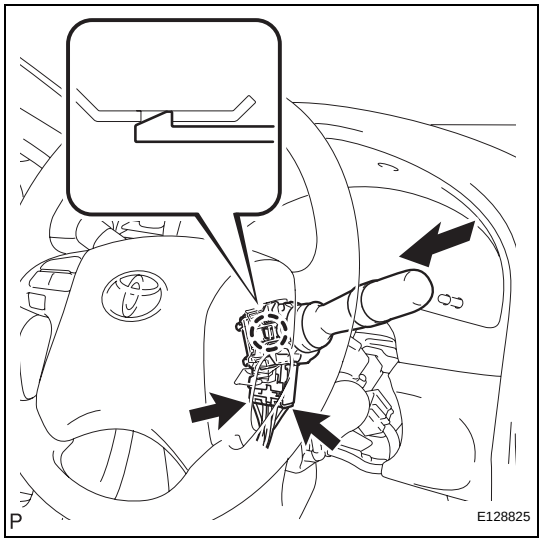
Front Washer Switch

Switch Position	Tester Connection	Specified Resistance
OFF	E19-3 (WF) - E19-2 (EW)	10 kΩ or higher
ON	E19-3 (WF) - E19-2 (EW)	Below 1 Ω

   (b) Intermittent Operation Check
      (1) Connect the voltmeter (+) terminal to terminal E20-3 (+1) of the connector and the voltmeter (-) terminal to terminal E19-2 (EW).
      (2) Connect a positive (+) battery lead to terminal E20-2 (+B) of the connector and a negative (-) battery lead to terminals E19-2 (EW) and E20-1 (+S).
      (3) Turn the wiper switch to the INT position.
      (4) Connect a positive (+) battery lead to terminal E20-1 (+S) of the connector for 5 seconds.

(5) Connect a negative (-) battery lead to terminal E20-4 (+2) of the connector. Operate the intermittent wiper adjustment ring and measure the voltage between terminals E20-3 (+1) and E19-2 (EW).





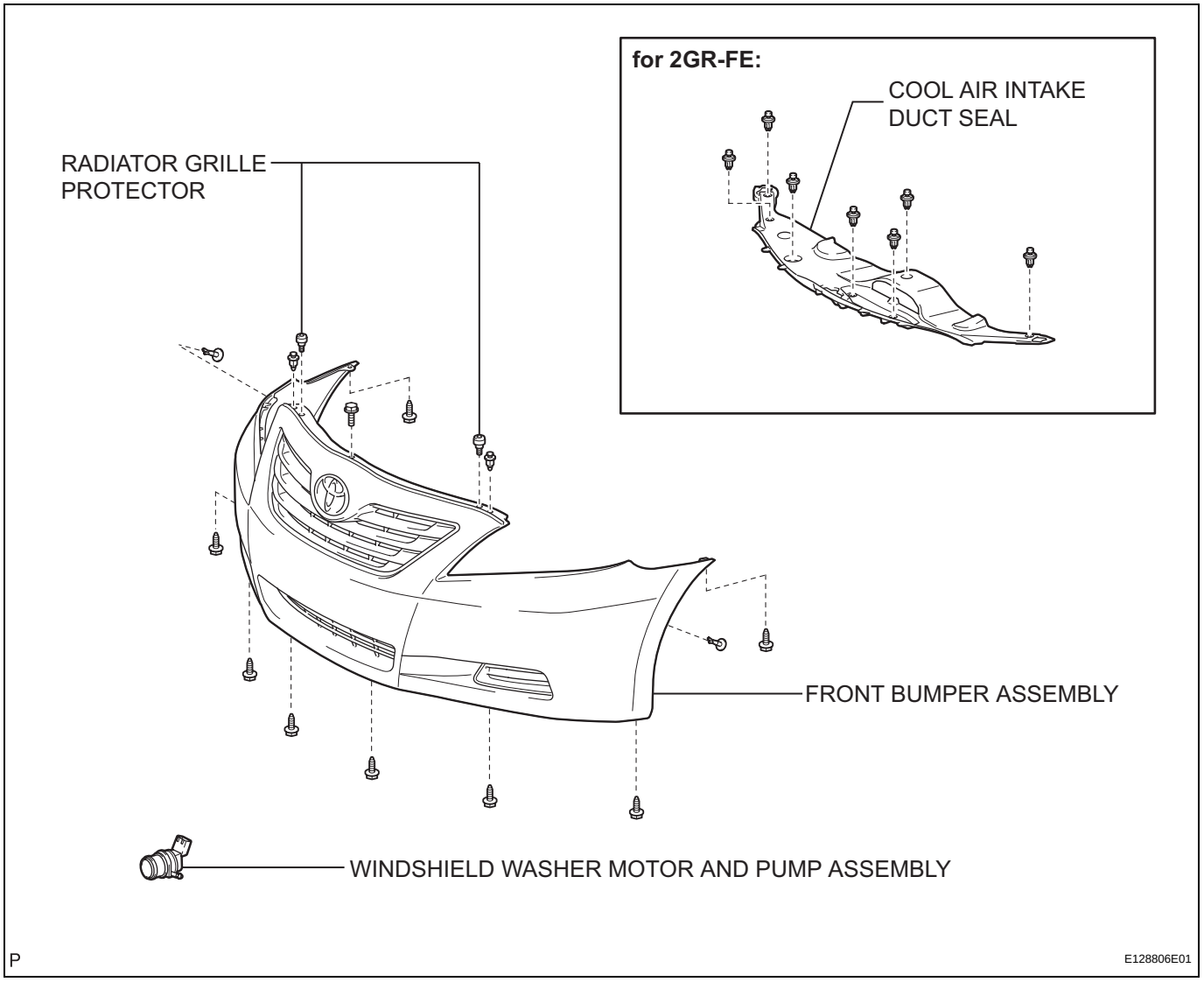
INSTALLATION

1. **INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY**
   (a) Engage the claw and install the windshield wiper switch assembly as shown in the illustration.
   (b) Connect the 2 connectors.
2. **INSTALL STEERING COLUMN COVER (See page SR-50)**

WW

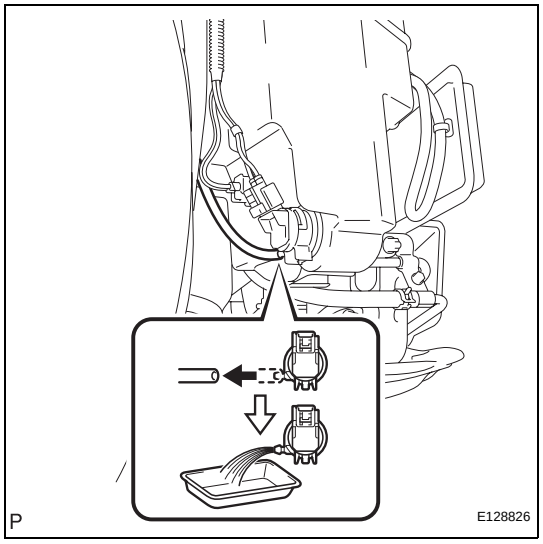
FRONT WASHER MOTOR

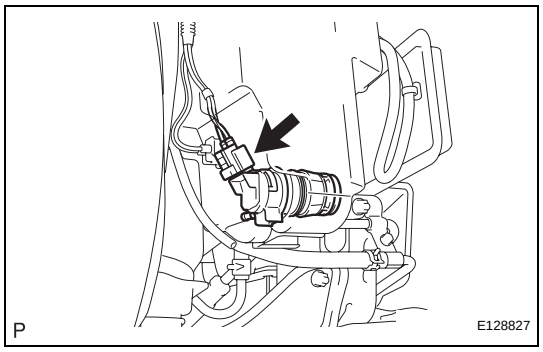
COMPONENTS



REMOVAL

1. **REMOVE COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-4)**
2. **REMOVE FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-5)**
3. **REMOVE FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-6)**
4. **DRAIN WASHER FLUID**
   (a) Disconnect the washer hose from the windshield washer motor and pump assembly, and drain the washer fluid.



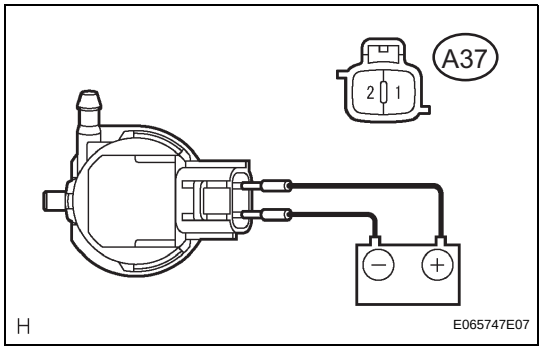


5. **REMOVE WINDSHIELD WASHER MOTOR AND PUMP ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the windshield washer motor and pump assembly.

INSPECTION

1. INSPECT WINDSHIELD WASHER MOTOR AND PUMP ASSEMBLY

HINT:
This check should be performed with the front washer motor and pump installed to the washer jar.



(a) Fill the washer jar with washer fluid.
(b) Connect the positive (+) battery lead to terminal A37-1 of the washer motor and pump, and the negative (-) lead to terminal A37-2.
(c) Check if washer fluid is pumped from the washer jar.
OK:
Washer fluid is pumped from the washer jar.

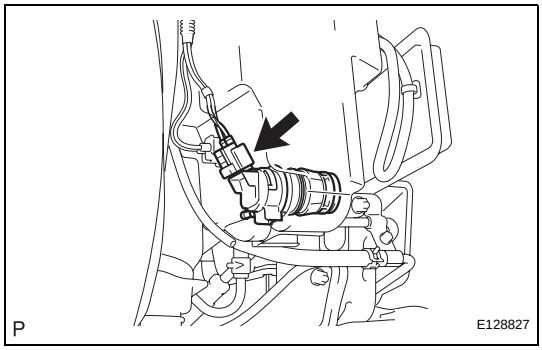
2. INSPECT WASHER FLUID LEVEL SENSOR

HINT:
The following check should be performed with the windshield washer motor and pump installed to the washer jar.

(a) Fill the washer jar with washer fluid.
(b) Disconnect the connector from the washer fluid level sensor.
(c) Measure the resistance according to the value(s) in the table below.
Standard resistance

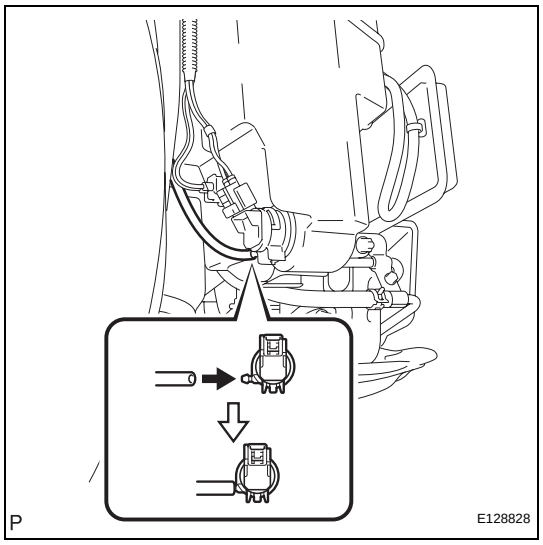
Fluid Volume	Specified Condition
More than 700 to 900 ml	10 kΩ or higher
Less than 700 to 900 ml	Below 1 Ω

INSTALLATION



1. INSTALL WINDSHIELD WASHER MOTOR AND PUMP ASSEMBLY

(a) Install the windshield washer motor and pump assembly.
(b) Connect the connector.



2. **FILL UP WASHER JAR WITH WASHER FLUID**
   (a) Connect the washer hose to the windshield washer motor and pump assembly and fill the washer jar with washer fluid.

3. **INSTALL FRONT BUMPER ASSEMBLY (w/ Fog Light) (See page ET-14)**

4. **INSTALL FRONT BUMPER ASSEMBLY (w/o Fog Light) (See page ET-13)**

5. **INSTALL COOL AIR INTAKE DUCT SEAL (for 2GR-FE) (See page ET-14)**

WASHER NOZZLE

ON-VEHICLE INSPECTION

1. INSPECT WASHER NOZZLE SUB-ASSEMBLY

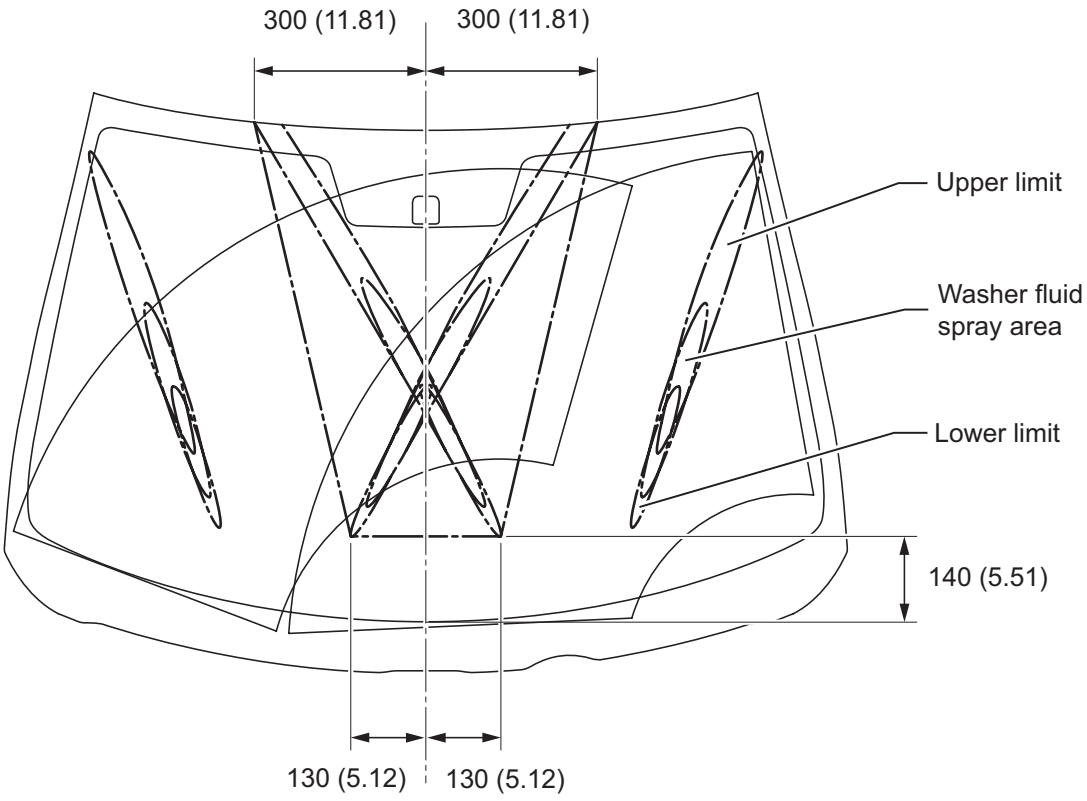
(a) With the engine running, check the position that the washer fluid hits the windshield.

Standard:

Washer fluid hits the windshield in the areas shown in the illustration.

HINT:

If the result is not as specified, replace the washer nozzle.



mm (in.)

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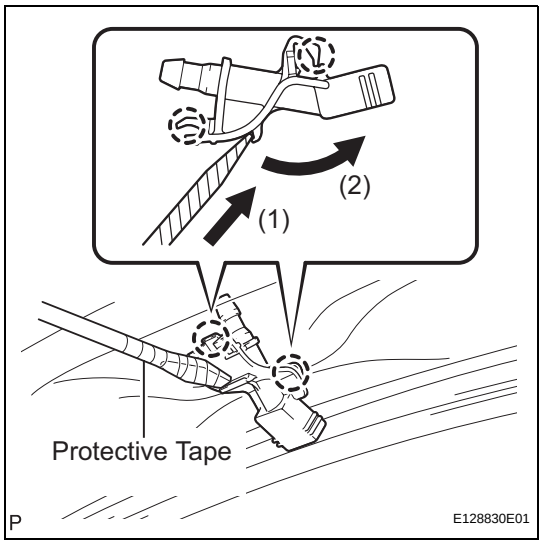
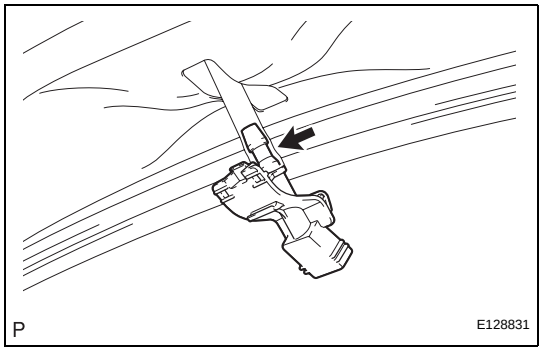


ADJUSTMENT

1. ADJUST WASHER NOZZLE SUB-ASSEMBLY

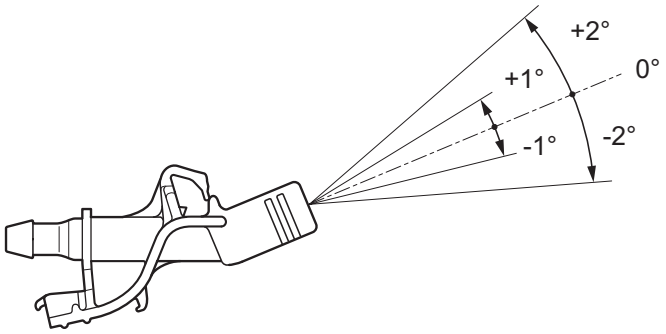
(a) Using a screwdriver, disengage the 2 claws and separate the washer nozzle sub-assembly as shown in the illustration.
NOTICE:
Be careful not to damage the windshield.
HINT:
Tape the screwdriver tip before use.

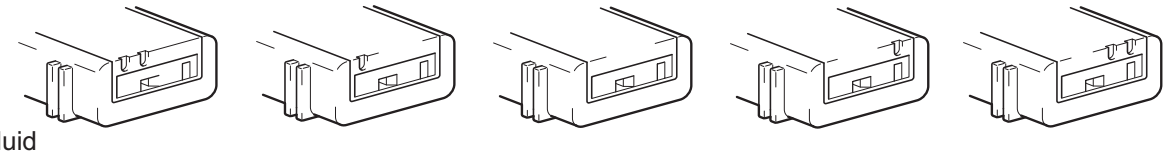


(b) Disconnect the washer nozzle sub-assembly from the washer hose.
NOTICE:
Washer nozzles cannot be reused.

(c) Select a washer nozzle sub-assembly so that the washer fluid spray area is within the standard.

Available Washer Nozzles:





Washer Fluid Spray Angle	-2°	-1°	0°	+1°	+2°
Part Number	85381-30210	85381-30190	85381-30170	85381-30180	85381-30200

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(d) Connect the selected washer nozzle sub-assembly to the washer hose.
(e) Engage the 2 claws and install the washer nozzle sub-assembly.